GULF STATES MARINE FISHERIES COMMISSION

Tenth Annual Meeting
Corpus Christi, Texas
Robert Driscoll Hotel
October 15 (Thursday) and October 16 (Friday), 1959

P R O G R A M

(Commission Chairman Howard D. Dodgen, Presiding)

General Session, October 15, Plaza Deck, Plaza Hotel

9:00 AM REGISTRATION

9:30 AM CALL TO ORDER

INVOCATION — Dr. C. E. Hereford, Pastor, First Baptist Church, Corpus Christi, Texas

WELCOME ADDRESS — Senator Bruce Reagan, State of Texas, Corpus Christi, Texas

ADDRESS: OUR JOB BEGINS AT THE SHORE LINE

Ross L. Leffler
Assistant Secretary of the Interior
Washington, D. C.

ADDRESS: PLANS AND PURPOSES OF THE U. S. STUDY COMMISSION

Harry P. Burleigh, Commissioner
U. S. Study Commission
Austin, Texas

11:00 AM RECESS — Fifteen Minutes

ADDRESS: SHELLFISH AND RADIOACTIVITY

James B. Lackey
Professor of Sanitary Science
University of Florida
Gainesville, Florida

ADDRESS: POSSIBLE ACCOMPLISHMENTS DURING A SECOND DECADE OF COMMISSION WORK

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

12 Noon RECESS FOR LUNCHEON (No formal luncheon)

AFTERNOON SESSION

1:30 PM SUMMARIES BY MEMBERS OF THE ESTUARINE TECHNICAL COORDINATING COMMITTEE ON ADDITIONAL INFORMATION NEEDED

	Estuarine Areas	Contributing Watersheds
Alabama	I. B. Byrd	W. L. Holland, Jr.
Florida	Robert M. Ingle	Harold E. Wallace
Louisiana	Lyle S. St. Amant	Theodore Ford
Mississippi	Gordon Gunter	Cleburne Schultz
Texas	Howard T. Lee	H. T. Odum

3:15 PM RECESS Fifteen Minutes

3:30 PM RESULTS OF THE OCTOBER 14, 1959 SPECIAL COMMITTEE MEETING TO PREPARE A SHRIMP MARKING PROGRAM FOR THE GULF STATES (FOLLOWED BY 15 MINUTE DISCUSSION PERIOD)

George A. Rounsefell
Bureau of Commercial Fisheries
Galveston, Texas

4:00 PM MOTION PICTURE: PROGRESS REPORT OF THE UNDERWATER STUDY OF SHRIMP TRAWLS IN ACTION - (FOLLOWED BY 15 MINUTE DISCUSSION PERIOD)

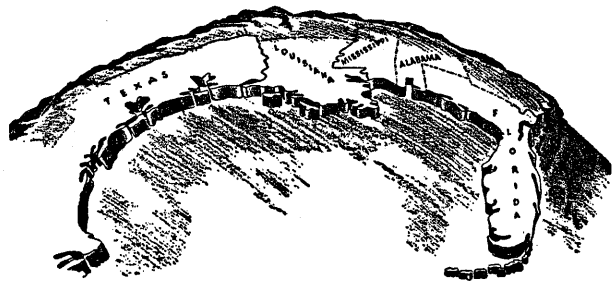
Harvey R. Bullis, Jr.
Bureau of Commercial Fisheries
Pascagoula, Mississippi

ADJOURNMENT

FRIDAY (OCTOBER 16)

ALL SESSIONS AT THE ROBERT DRISCOLL HOTEL

8:30 AM	COMMISSION EXECUTIVE SESSION BREAKFAST	SUITE 301
9:30 AM	ESTUARINE TECHNICAL COORDINATING COMMITTEE SESSION	TERRACE ROOM
11:30 AM	FINAL GENERAL SESSION	TERRACE ROOM
12 Noon	ADJOURNMENT	



Gulf States Marine Fisheries Commission

312 AUDUBON BLDG., NEW ORLEANS 16, LA.

M I N U T E S

REGULAR MEETING

ROBERT DRISCOLL HOTEL

CORPUS CHRISTI, TEXAS

OCTOBER 15-16, 1959

GULF STATES MARINE FISHERIES COMMISSION
312 Audubon Building
New Orleans 16, Louisiana

M I N U T E S

REGULAR MEETING, OCTOBER 15-16, 1959
Robert Driscoll Hotel
Corpus Christi, Texas

office

OFFICIAL ATTENDANCE OF COMMISSIONERS

	PRESENT	ABSENT
ALABAMA:	W. C. Holmes	William C. Younger Will G. Caffey, Jr.
FLORIDA:	Ernest C. Mitts Walter O. Sheppard Vern Merritt	
LOUISIANA:		Rudolph P. Easterly E. J. Grizzaffi A. O. Rappelet
MISSISSIPPI:	Hermes Gautier	Chester Delacruz Stanford E. Morse
TEXAS:		Howard D. Dodgen Jimmy Phillips Wilson Southwell
PROXIES:	George W. Allen Richard K. Yancey James N. McConnell Hermes Gautier Hermes Gautier Howard T. Lee Terence R. Leary	(For William C. Younger) (For Rudolph P. Easterly) (For E. J. Grizzaffi) (For Chester Delacruz) (For Stanford E. Morse) (For Howard D. Dodgen) (For Jimmy Phillips)
STAFF:	W. Dudley Gunn Secretary-Treasurer	

FORMER COMMISSIONERS PRESENT

Charles W. Bevis

OTHER STATE FISHERIES REPRESENTATIVES PRESENT (Commission Committee Members Underscored)

Ray Childress, Don Day, Wm. J. Demoran, Frank Etheredge, Ted Ford, Chas. Hawkshead, Tom Hefferman, W. L. Holland, J. M. Lyon, Robt. M. Ingle, Jos. C. Jacobs, Ed. J. Pullen, Lyle St. Amant, C. A. Schultz, R. L. Schultz, Jon Shidler, James Stevens, Ben F. Vaughan, Jr., Percy Viosca, Jr. L. A. Wilke, H. E. Wallace

OTHER REPRESENTATIVE OF STATE GOVERNMENT PRESENT

M. W. Finuf, Jr., Bruce C. Reagan.

FEDERAL GOVERNMENT REPRESENTATIVES PRESENT (Commission Committee Member Underscored)

DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE: Harvey Bullis, Jr. John Butler, Philip Butler, John G. Degoni, Geo. B. Gross, J. E. King, C. F. Nickenson, Joseph Pileggi, Geo. A. Rounsefell, Spenser H. Smith, Geo. W. Snow, John L. Sypulski, Paul E. Thompson, W. L. Towns, R. T. Whiteleather

DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION: Harry P. Burleigh

REPRESENTATIVES OF FIRMS CONNECTED WITH THE FISHING INDUSTRY PRESENT

James E. Barr, Oliver Clark, Carlton Crawford, Fred. G. Deiler, Paul Kalman, Clois W. Keys, Harry I. McGinnis, Wm. R. Neblett, L. C. Ringhaver, H. W. Smith, Sam Snodgrass, James Summersgill, Virgil Versaggi, Morris Vultaggio

UNIVERSITY REPRESENTATIVES PRESENT (Commission Committee Member Underscored)

C. E. Dawson, W. C. Glazener, Albert C. Jones, J. B. Lackey, R. W. Lamplugh, Jr. Harold Loesch, Howard T. Odum, K. M. Rae, S. M. Ray

CLERGY AND TRADE JOURNAL REPRESENTATIVES PRESENT

Rev. C. E. Hereford; S. W. Corbino

GENERAL SESSION, OCTOBER 15, 1959

In the absence of the Commission Chairman Howard D. Dodgen, due to illness, Commission Vice-Chairman Hermes Gautier called the meeting to order at 9:30 AM and introduced Dr. C. E. Hereford, Pastor, First Baptist Church, Corpus Christi, Texas, who rendered the invocation.

State Senator Bruce Reagan welcomed the group most cordially. Copy of the Senator's address is herewith first attached.

In the absence of Assistant Secretary of the Interior, Ross L. Leffler, Richard T. Whiteleather, Bureau of Commercial Fisheries, St. Petersburg Beach, Florida, read the address the former had prepared for the meeting. Copy of the address, entitled Conservation Begins At The Shoreline, is herewith second attached.

Harry P. Burleigh, Commissioner, United States Study Commission - Texas addressed the session on the plans and purposes of that commission. Copy of the address is herewith third attached.

Following a morning recess a paper on shellfish and radioactivity was presented by James B. Lackey, Professor of Sanitary Science, University of Florida. Copy of the paper is herewith fourth attached.

Commission Chairman Dodgen's report to the Commission was read by Howard T. Lee, Texas Game and Fish Commission, Rockport, Texas. Copy of the report is herewith fifth attached.

Starting the afternoon session, Commissioner Gautier called upon Commission Secretary Gunn to briefly review the major accomplishments of the Estuarine Technical Coordinating Committee during the past year. Copies of the Estuarine Atlas and copies of the Annotated Bibliography of Unpublished Estuarine Research In The Gulf of Mexico, all completed during the year, were made available for inspection by the conferees.

In turn, the Chairman introduced W. L. Holland of Alabama, Robert M. Ingle and H. E. Wallace of Florida, Lyle S. St.Amant and Theodore Ford of Louisiana, William Demoran and C. A. Schultz of Mississippi and H. T. Lee and H. T. Odum of Texas. These members of the Estuarine Technical Coordinating Committee presented summaries which are intended to point up the additional information that is needed on the Estuarine Areas and the Contributing Watersheds. Copies of the above papers are herewith sixth through twelfth attached.

Following an afternoon recess, George A. Rounsefell, Bureau of Commercial Fisheries, Galveston, Texas, was asked to apprise the group of the accomplishments of the October 14 meeting at Rockport of the Shrimp Marking Committee. Prior to presenting the report, Dr. Rounsefell showed a series of colored slides to inform the group as to the techniques of staining shrimp. Following is copy of the report:

"The Committee met at 10 a. m. in the Rockport Laboratory of the Texas Game and Fish Commission.

"The discussion brought out the fact that because of the limitations in colors and the impossibility of telling individual shrimp apart, a degree of centralization and control of staining experiments is absolutely essential in order to reap the benefits of the staining technique.

"The staining technique was developed by Charles Dawson under a Saltonstall-Kennedy grant. It has since been successfully field-tested by the Bureau of Commercial Fisheries in Florida and Texas and the Texas Game and Fish Commission has lately run an experiment in Copano Bay. The Bureau of Commercial Fisheries will be happy to aid anyone commencing staining experiments by showing them in detail the steps found by experience to yield the best results.

"After discussion the following recommendations were drawn up for presentation to the Commission:

* 1. In order to obtain consistent returns of recaptured shrimp a uniform reward of one dollar ($1.00) should be paid for all stained shrimp returned. To simplify this procedure and avoid difficulties which may arise from shrimp released in one state being returned in another, a central fund should be established from which all payments can be made.

2. Since there are strict limitations on the number of experiments that can be performed at the same time without confusion of results it is recommended that the Director of the Galveston Biological Laboratory assign colors of dyes as needed by species of shrimp, size of shrimp, and month of staining. No releases of stained shrimp should be made without prior reference to him.

3. Because of the limitation on the number of simultaneous experiments, no experiment should be planned for a release of less that 10,000 shrimp.

4. The Commission should examine available data and define sizes of shrimp for separating broods in order to permit simultaneous use of the same color on both small and large shrimp of the same species in different localities."

Serving on the Committee are:

William Demoran	-	Alabama
Robert Ingle	-	Florida
Charles Dawson	-	Mississippi
Percy Viosca, Jr.	-	Louisiana
Howard Lee	-	Texas
George Rounsefell	-	Bureau of Commercial Fisheries

* Secretary's Note: In Executive Session, October 16, 1959, the Gulf States Marine Fisheries Commission approved the report of the Shrimp Marking Committee with the exception of Item 1 of the fourth paragraph. This paragraph was changed to read:

1. All States wishing to participate in the shrimp staining program are requested to provide funds to properly insure best results on the return of stained shrimp.

Harvey R. Bullis, Jr., Bureau of Commercial Fisheries, Pascagoula, Mississippi, reported on the progress that has been made on cruises of the George M. Bowers since the initiation of a program in early June to obtain photographic record of the performance of the various designs of trawling gear used in the Gulf shrimp fishery. The report accompanied the showing of a motion picture in color which was made by Bureau SCUBA divers from a diving sled towed by the Bowers. This work, which has been carried on in the vicinity of Panama City, Florida, proved of such interest to the conferees that Mr. Bullis ran the picture twice following the showing at the close of the afternoon.

The Chairman received no response on call for other matters to be presented and the session adjourned at 5:15 PM

Friday, (October 16)

The Commission Executive Session began at 8:30 AM with the serving of breakfast in the Terrace Annex of the Robert Driscoll Hotel.

The Estuarine Technical Coordinating Committee met at 9:30 AM in the Terrace Room of the Robert Driscoll Hotel.

The above sessions terminated at 11:40 AM and a brief final General Session was held in the Terrace Room.

Following is a resume of the Estuarine Technical Coordinating Committee Session:

1. The Atlas was discussed. Drs. Odum and Rae agreed to individually look into the cost for reproducing the estuarine maps and compiling them into a single Atlas which would facilitate handling in both the laboratory and the field. When so compiled the maps could be made available to interested individual workers and groups.

2. The development of a standard project form was discussed and Ted Ford agreed to draft such a form and distribute it to each Estuarine Technical Coordinating Committee member for comment.

3. Mr. Ford was elected Committee chairman, succeeding H. T. Lee.

Below is a resume of considerations at the Executive Session.

The following were called upon to answer questions the Commissioners might have regarding pre-meeting distributed literature:

1. Fisheries Vocational Training Program - Louisiana - Mr. Finuf
   Survey of the U. S. Shrimp Industry - Mr. Whiteleather
   International Oceanographic Congress - Dr. Rae
   Radioactive Waste Disposal at Sea - Mr. King
   The Industry Shrimp Bill - Mr. Neblett

2. The Commission complimented Dr. Butler for his fine work in preparing the bibliography of unpublished estuarine research in the Gulf of Mexico. A status summary of legislation introduced at the last session of Congress was distributed and explained by Mr. Pileggi. Mr. Gross spoke briefly on the effort being made to promote the sale of seafoods during Seafood Week, October 19-25. Dr. Rounsefell provided some additional information on the marking of shrimp.

3. A resolution was adopted which concerns the application of quotas on shrimp imports from all foreign countries.

4. It was voted to ask the Estuarine Technical Coordinating Committee to consider having a programming meeting in January and reporting on its accomplishments at the March 16-17, 1960 Commission meeting, Admiral Semmes Hotel, Mobile, Alabama.

5. St. Petersburg Beach, Florida, was selected for the October 20-21, 1960 Commission meeting.

6. Officers elected for the year 1959-60:

Hermes Gautier Pascagoula, Mississippi	(Chairman)
Walter O. Sheppard Fort Myers, Florida	(Vice-Chairman)

Chairman Gautier received no response on a call for other business, and after thanking the conferees for their attendance, and issuing a cordial invitation to the spring meeting, adjourned the meeting at 12:15 PM.

Prepared by: W. Dudley Gunn
Secretary-Treasurer

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
Corpus Christi, Texas
Robert Driscoll Hotel
October 15-16, 1959

"ADDRESS OF WELCOME"

Senator Bruce Reagan
State of Texas
Corpus Christi, Texas

It is a pleasure to join my colleague in the Texas Senate, Commissioner Jimmy Phillips; your Chairman, Howard Dodgen; Commissioner Wilson Southwell of San Antonio, my fellow-townsman, Ben Vaughan, member of the Texas Game and Fish Commission, and others you have met, in extending a cordial welcome to our State and the City of Corpus Christi.

We have been eagerly awaiting your first meeting here in the top vacation spot of the fabulous coastal bend, and hope you will have time to see this beautiful city, its Shore Line Drive, and the entire bay area, including Padre and Mustang Islands.

Here in Texas and Corpus Christi you are among friends who appreciate your good work. As you know, our Legislature acted promptly in 1949 to bring Texas into this new interstate effort. I am sure you were as pleased as I was when our 56th Legislature found it possible two months ago -- despite crucial revenue problems -- to increase Texas' annual appropriation to the Commission.

The Lone Star State, contrary to legend, does not always operate alone. Texas has had long and fruitful experience with such cooperative enterprises as the Interstate Oil Compact Commission, established in 1935 to conserve oil and gas resources.

I believe you have found during the past decade -- and will continue to find -- that our legislators really welcome the fine service you have been rendering. We have come to look more and more to you for impartial recommendations based upon scientific facts. You have demonstrated over and over that your interest is in fair, sensible conservation measures for the ultimate good of both commercial and recreational interests. The type of confidence we have in you does not come automatically from the fact that the compact declares that you will "draft and recommend to the Governors and Legislatures of the various signatory states legislation dealing with the conservation of the marine, shell and anadromous fisheries of the Gulf seaboard." As you well know, the language of the law books does not get the job done by itself. A lot of fact-finding and common-sense evaluation and give-and-take discussion -- all based on constructive attitudes rather than on legal phases -- underlie your successful record.

This kind of approach can be illustrated by the passage of the highly significant "Texas Shrimp Conservation Act" last spring by the 56th Legislature. Many of the provisions of this law are based upon facts gathered by cooperative efforts among the representatives of the Gulf States Marine Fisheries Commission,

with research assistance from the Fish and Wildlife Service, United States Department of the Interior, and from advisory committees composed of informed, public-spirited citizens.

The very first section of Texas' new shrimp law voices the basic philosophy not only of this State but of this Commission: "It is hereby declared . . . to be the public policy of this State that the shrimp resources of the State of Texas be conserved and protected from depletion and waste in order that the people of Texas and their posterity may enjoy the most reasonable and equitable privileges in the ownership and taking of such shrimp resources, and that the shrimp industry of Texas be protected from unlawful encroachment and be promoted and fostered consistent with the general good of the people of this State and to these ends, and in the interest of achieving fair, impartial, and uniform law enforcement." Those words must be music to your ears, as they are to mine. I might add that this important legislation was ably sponsored in the Texas Senate by one of your own Commissioners, Senator Phillips.

I also am glad to report that the Texas Legislature has been making progress on another front that is of interest to this group. In July, during the second of three called sessions, Senate Bill No. 9 -- again under sponsorship of the Senator from Brazoria County -- was passed, affirming and protecting the right of the public to use State-owned beaches. This legislation was, to some extent an outgrowth of a study undertaken by a Legislative Council committee which I has the honor of heading. In our study we found that the complex legal problems of public and private ownership, boundaries, and commercial and recreational facilities could not be separated entirely from the natural sciences of oceanography, geology, and biology. Incidently, the Legislative Council will be continuing this study and will submit a further report to the next Legislature when it convenes in regular session in January, 1961.

One of our main goals in Texas is to encourage and stimulate industry and recreation -- which is itself an industry -- without unduly harming either by ill-advised or narrowly-conceived legislation. You Commissioners are playing a big part in helping us to achieve this goal.

The work of the specialists in the five Gulf states represented here is especially heartening in this respect -- that the findings of each are available to all. For example, information obtained in the recent Alabama project concerning snapper banks, the Florida studies of spotted shrimp, the Louisiana investigation of oyster growth, the Mississippi research on catfish, and Texas' work regarding striped mullet -- all of this is our common property. It is not just filed away in one State but is made available for cooperative use.

When those of us in legislative positions think of problems of the vast fishery resources of the Gulf of Mexico, we are not forced to listen exclusively to any single vested interest. We need expert help in identifying and solving fishery problems -- and we get it from you. We are finding, through experience, that we can obtain straightforward, reliable information and advice, based on facts rather than on prejudice, from the Gulf States Marine Fisheries Commission.

As one legislator who resides on this wonderful Gulf Coast, I salute you and charge you to continue and intensify your valuable public service.

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
Corpus Christi, Texas
Robert Driscoll Hotel
October 15-16, 1959

"CONSERVATION BEGINS AT THE SHORELINE"

Ross Leffler
Assistant Secretary of the Interior
Washington, D. C.

Read by:
Richard T. Whiteleather
Bureau of Commercial Fisheries
St. Petersburg Beach, Florida

The shores of our country generally are dissected by innumerable estuaries and fringed by extensive marshlands. But nowhere in this type of shoreline more extensive than around the coast of the Gulf of Mexico. Because the marshes are not suitable directly for human habitation or industrial development, and because they prevent access by water or land from the Gulf to centers of population and industry further inland, there is constant pressure to drain and fill the wetlands, deepen channels, and add pollution to the estuaries. These pressures are becoming constantly more acute as our population increases, and they are increasing faster now than ever before.

To the uninitiated, marshlands appear to be of little value to man, and their "reclamation" seems to be in the public interest. Hpwever, to those who hunt, and to those who fish - - both for fun and for profit - - these marshes are the very fountainhead of valuable marine fish and wildlife resources that afford income and recreation to many of our people. The commercially important fish and shellfish that depend upon the estuaries and marshlands for spawning, nursery, or feeding grounds make vital contributions to our economy. To mention only a few of the more important American fisheries, there are shrimp worth 73 million dollars, clams and oysters worth 41 million, and menhaden worth 25 million each year. The total landed value of our estuarine commercial fishery resources may be conservatively estimated at 150 million dollars, and their retail value is probably two or three times this amount. By any standards, this is an important industry.

But this is by no means the whole story. Every year the recreational importance of these waters and their resources grows. More people are finding pleasure in sportfishing; and on the Gulf coast alone, it is conservatively estimated that 100 million pounds of edible fishes are caught by sportsmen each year. It is well known that sportsmen as a group spend considerable sums in following their hobby, and these expenditures support many kinds of business enterprise, including dealers in bait and tackle, boat liveries, marinas, fishing piers, and the like. On the basis of the 1955 Survey of Fishing and Hunting, it is estimated that salt-water fishermen spent a total of $311,862,000 during that year in connection with their support along the Atlantic and Gulf coasts.

Coastal lands and waters also have great significance for wildlife resources. Since time immemorial, coastal marshes and associated estuarine waters along the

Gulf have furnished preferred wintering habitat for wild ducks, wild geese, and other migratory birds. In sustaining continental waterfowl populations, and at the same time providing areas wherein these birds may be hunted under appropriate regulations, these wetlands play a duel role for which by nature they are peculiarly well fitted. In this respect, they are truly irreplaceable.

Gulf coast marshes are also our most productive habitat for muskrats and other semi-aquatic fur animals. Because they are particularly well adapted to wildlife management, coastal marshes have been the mainstay of the fur trade in States like Louisiana.

The coastal areas are probably the only part of the sea that can be cultivated like farm land. We believe that, with the application of modern fish cultural and agricultural practices, the harvest from these areas may be greatly increased. In fact, it is our opinion that they have a much higher potential for human food production than open ocean areas where the fisheries are still dependent on very primitive hunting methods for harvesting the crop.

If our marshes and estuaries were destroyed or polluted, shrimp, menhaden, and many other migratory marine animals that spend their early life in these areas would virtually disappear. Oysters and clams, unable to move away from unfavorable conditions, would be even more vulnerable. The annual value of the harvest from these waters is not the best criterion of their importance, for if properly managed, these resources can yield annual crops much larger than at present. This annual yield can be considered as dividends from a capital investment many times as large. If, by thoughtless action, we make irreversible changes that destroy the principal, the profits will disappear, too. This is something no good businessman would condone. Truly, it can be said that conservation of our marine resources begins at the shoreline.

Our attitude in this respect is by no means negative. We recognize that for selfish reasons we cannot halt the development of new industries, or block the spread of residential and urban areas that must be built to accommodate the needs of a growing population. We must recognize that there are circumstances under which industrial development and marine resources can exist side by side without significant effects, one upon the other, provided that proper precautions are taken. We must expand and intensify our studies of the lives and habits of the marine organisms that inhabit our marshlands and estuaries in order to understand the effects of human activities upon them.

It is essential that we have the necessary knowledge before we take positions for or against engineering developments in these areas. Unreasonable caution in dealing with such matters, however, may do more harn than good since the schedules and programs of the engineering agencies cannot await an extensive research program. We must do everything we can, even with limited facilities, to increase our knowledge so that we can back our policies with facts. But we must not hesitate to take a position with respect to these developments based on informed judgement, even when all the facts we would like to have are not available. We must not let ourselves be in a position of the man who lets his house burn down while his research department is carefully working on a better fire extinguisher.

Now, we all know that conservation of marsh and shoreline is of vital concern to the Gulf States Marine Fisheries Commission and that you have been studying the matter carefully for sometime. The cooperative actions which your technical estuarine committee have taken are commendable. The attack of this problem starts with assembly and good use of present knowledge. I am pleased to learn from my staff that this task is well underway.

But, what about the future? I regret that I cannot report to you now that the Service will finance expanded estuarine research in the near future. Although we have given it high priority, increasing costs and extremely acute budget situations have prevented the actions we have all been seeking. We are fully aware, however, that estuarine and shoreline resources are in jeopardy, and will do all we can with existing programs to help produce the knowledge needed to conserve them. Expanded research will receive our continued attention and a high priority among new projects to be started.

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
Corpus Christi, Texas
Robert Driscoll Hotel
October 15-16, 1959

"PLANS AND PURPOSES OF THE UNITED STATES STUDY COMMISSION"

Harry P. Burleigh
U. S. Study Commission
Austin, Texas

Introduction

Let me thank you here at the start for the opportunity to discuss the United States Study Commission for Texas with you.

As a member of the Commission from the Department of the Interior, it will be my task, with others, to help establish an enduring water supply and control program for the State of Texas.

Implementation of such a program will undoubtedly have an impact of some nature on the estuarine areas along the Texas Gulf Coast. It is proper, then, that we discuss this matter. This will enable those qualified to evaluate such impact to integrate their knowledge into Commission plans at an early stage of the game.

Formulation of a State water plan is one more inevitable encroachment of civilization upon marine life. But it need not be heedless. In view of the magnitude of the industry dependent upon estuarine life, it is unthinkable that Commission plans - which will undeniably affect rate of fresh water inflow to the Gulf - involve without an awareness of all factors involved.

Background

Your Secretary has asked that I discuss with you the plans and purposes of the United States Study Commission.

In order to understand aspirations of this newly created body, it would perhaps be advantageous if we reviewed the background leading to its creation.

We all recognize that, in recent years, there has been growing apprehension over the relationship between our Nation's water supplies and its water needs.

Our southwest and far west have lived with this problem for decades. Concern over it, however, now spreads to the more humid sections of our country; it is a reasonable conclusion these days that the problem of water supply will become a controlling item in the economy of all of the Nation in a short time.

In reviewing objectives and aims of the Study Commission it will also perhaps be well to note here at the outset that the subject of water supply is one that for too long a time has been so loaded with emotional content that calm objectivity has been difficult if not impossible to realize. We must remember that consideration of Texas water problems occurs with an awareness that in the southwest water

resources have emerged as a limiting factor to economic expansion with a swiftness that is disheartening.

It is mandatory therefore, that as new programs, new policies and principals, evolve that emotion be discarded in favor of logic.

Water policies and water programs are no longer matters that can be resolved with a few pleasing platitudes or broad generalities. Our water of Texas, in common with that of the rest of the west, daily assumes new and higher values. Policies and programs therefore dedicating it to use must be conceived with an awareness of this circumstance.

The relationship of cur water resources to the economy of an area, a State, or the Nation as a whole, has manifested itself by a number of actions. Over the past 80 years approximately 19 or 20 Boards, Committees, or Commissions have been created at the National level, with varying degrees of authority, to evolve National water policies and programs in the interest of the Nation as a whole.

The sheer variety of our physiography is perhaps one reason for the failure to evolve satisfactory water policies and programs on a National basis.

The result has been a variety of agencies that concern themselves with water supply programs, flood control programs, hydroelectric programs, wildlife programs, reclamation programs, water pollution programs - the list is endless.

Failure to create unified programs from a National level eventually led to consideration of water programs on a Regional basis. For example, the Reclamation program is restricted to the Western 17 States, the Tenneesee Valley Authority was restricted to a specific watershed.

In time, reliance upon our water resource has become more complicated in order to meet needs of a more complex economy. Hence, appraisal of water projects has been forced to evolve from the single purpose concept to the now generally used multi-purpose approach.

Because the multi-purpose approach involves a number of responsibilities, its full exercise has led to need for integration of effort among a multitude of agencies with Congressionally assigned responsibilities. In the late 40's and early 50's the Congress recognized this circumstance and established the Arkansas-White-Red Basin Inter-Agency Committee and gave it a broad directive: produce a multiple purpose water plan. Elsewhere, in recent years, other inter-agency groups have been established to review the potential of other basins to be controlled by a water program.

Other ramifications of National concern over the relationship of water supply to the changing National economy are reflected in such actions as Senate Resolution No. 48, 86th Congress. After adoption of this resolution, the Senate organized a staff whose function will be to appraise water supply and water control programs on a National basis. The Committee will study the extent to which water resources are related to the National interest; the extent and character of water resource activities at all levels of Government.

The overall result of past effort is that the multiple purpose approach is here to stay and therefore a multiplicity of agencies will always be involved as water programs are perfected.

The question then arises: how good is the inter-agency coordinations?

The initial answer was supplied with some bluntness in January 1956 by the Presidential Advisory Committee on Water Resources Policy which stated:

> "The greatest single weakness in the Federal Government's activities in the field of water resources development is the lack of cooperation and coordination of the Federal Agencies with each other and with the States and local interests."

Here in Texas circumstances leading to the Study Commission reflects all of the preceeding with, however, some local color. In the early 50's Senator Johnson, acting for the Texas Delegation, asked the Department of Interior to examine the Texas water problem and report back upon more effective avenues for investment of the Federal water dollar in Texas water programs.

After some study the Department recognized, and stated, that the scope of Texas water problems was indeed beyond the capability of any single agency or any single level of Government. The Department noted that the full ramifications of the Senator's inquiry involved practically everyone; that everybody had an interest and that if solutions ultimately provided were successful, everybody would benefit.

Recognition of this central fact led, first to preparation of Senate Document III, 86th Congress and immediately thereafter creation of the United States Study Commission for Texas.

Senate Document III, "Water Developments and Potentialities of the State of Texas" was a joint report of the Texas Board of Water Engineers, the Corps of Engineers, Soil Conservation Service, and the Bureau of Reclamation. It was an exploratory attempt to integrate capabilities of these agencies into a unified approach to the Texas water problem. The Document was published in July 1958 and in August of that year by Public Law 85-624, the legislation creating the U. S. Study Commission was passed.

The U. S. Study Commission for Texas, then, is broad scale recognition of the circumstance that water problems are no longer simple; that their solution involves everybody and every facet of our economy; that the talents of many will be required from every level of Government to evolve acceptable solutions. In short, in these complex times, water must serve many masters and a bewildering variety of benefits can be extracted from its control and use. Briefly, the Commission is an outgrowth of past experience.

As we review, now, the Commission, please recognize that my statements and thoughts are those of an individual; I do not speak formerly for the agency.

(Burleigh, #4)

The U. S. S. C. for Texas

The legislation creating the U. S. Study Commission for Texas is broad in scope. It is broad enough to permit the Commission to establish its own policies, its own objectives and modus operandi.

The Commission, in short, is an independent agency and accountable directly to the President.

The legislation seeks formulation of a basic, comprehensive and integrated plan of development of the land and water resources within the area of its responsibility.

The Commission has restricted its intent to the preparation of a water use and control plan for the 8 basins with which it is concerned.

The Commission consists of 6 members, representing Federal agencies, 8 members representing river basins in Texas, and a chairman. Amendatory legislation provides for a representative of the Governor. The Commission, therefore has 16 members, 10 of whom must be from the State of Texas and 9 of whom are nominated by the Governor.

It is thus apparent that control of the Study Commission rests with the State; that the requirements of gubernatorial appointment of many members will lead to close liaison between State administration and the Study Commission.

The Commission is chairmaned by Mr. George R. Brown of Houston who has no agency connection. Mr. Brown is an engineer by training and an outstanding businessman whose construction activities are world-wide in scope.

It is worthy of note that the Federal Commissioners appointed from Interior, Commerce, Agriculture, Health, Education and Welfare, the Corps of Engineers, and the Federal Power Commission are not appointed as representative of those departments but are selected from them. The Federal Commissioners are responsible directly to the President, they retain their responsibilities to their respective agencies, however.

The preceeding, while somewhat unique, carries the advantage of providing the Commission informed personnel from within the Executive Branch of government.

Representatives from the separate river basins are considered informed sources regarding affairs of the respective basins, and as channels to the grass roots therein.

The area of responsibility for the Commission includes the 8 Texas basins, and intervening areas, not subject to interstate or international compact. Excluded therefore, are the Rio Grande, the Red and Sabine basins.

The Commission is not established as a permanent body; it proposes to discharge its one single mission - the preparation of a water use and control plan - and when this is done it proposes to get out of the picture as quickly as possible.

(Burleigh, #5)

The Commission has established a deadline for completion of its proposed report by July 1, 1961. Thereafter, the report will follow standard procedures and be subjected to comment by state-level interests, the various concerned Federal agencies, and others. Ultimately the report is submitted to the President with the written views of the Governor of Texas and the various federal agencies. The President will submit the final report to the Congress ninety days after receipt and the report will be printed as a Senate Document.

Several items are important. Among them:

a. The Commission will conduct its affairs within the framework of Texas' sovereighty over its own water resources,

b. The Commission is to protect existing and authorized projects,

c. The Commission is to utilize programs of the Departments of the United States,

d. The Commission is to recognize existing Federal law affecting public lands, reclamation, irrigation and flood control, and

e. The Commission is to recognize the primary responsibility of Texas in developing water supplies for all purposes.

Headquarters of the Study Commission are established in Houston, Texas; a small, skilled staff has been assembled.

The Commission will rely upon its component agencies, the River Authorities, the Federal and State groups as sources of data. A Planning and Coordinating Committee consisting of appropriate representation from component agencies has been established to assemble data and channel it into preparation of a water use and control plan.

Operating below the level of the Planning Coordinating Committee a series of 14 Collaboration Groups have been established to evaluate subject matter such as hydrology, flood control requirements, water supply requirements, etc.

As examples of this operational procedure, the Soil Conservation Service will provide data on drainage; the Bureau of Reclamation, data on water supply, the Corps of Engineers data of flood control and the Department of Agriculture data on upstream flood damage.

The Commission will ultimately seek the views of various sections of the State and various basins by public hearing. Such will probably begin in 1960.

The preceeding has briefly outlined the plans and purposes of the U. S. Study Commission. Two additional items with respect to this body can well be noted. First, the basic strength of this Commission probably lies in its grass roots nature. The Commission is dominated by state-level interests who come from the River Authorities, or lower legels, that have a deep familiarity with the water problems of their respective basins.

Secondly, it is important to recognize that the Commission is composed almost entirely of men whose professional lives have been dedicated to water problems and programs. Much of the membership of the Commission comes from River Authorities and from field-level heads of state and federal agencies whose day to day tasks are the consideration and solution of a multiplicity of water problems of a widely varying nature.

The Commission, in short, is composed of practical men who have spent their careers on water problems. As such it will probably conduct its affairs in a practical manner its opinions will be the opinions of the people and will reflect their needs. In this framework it is reasonable to assume that the Commission will discharge its mission on schedule.

In summary, and reduced to simplicity, the Commission purpose is to provide a water use and control plan for the State of Texas. It is reasonable to note that the Commission may well represent the most sophisticated attempt yet evolved to prepare such a plan by integration of various levels and agencies of Government.

The Commission is already an operating entity of government, there is considerable evidence that it will accomplish its mission, and thus serve a useful purpose for Texas and the Nation. If successful it may well establish a new modus operandi for approach to the equally complicated water problems of other areas. I know you share with me the hope that this occurs.

I thank you for your hospitality.

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
Corpus Christi, Texas
Robert Driscoll Hotel
October 15-16, 1959

"SHELLFISH AND RADIOACTIVITY" *

James B. Lackey
University of Florida
Gainesville, Florida

Introductory

Life, it seems, used to be relatively simple. Time was, when oysters were harvested, washed, shucked and sold. Periodic coliform checks were made, and if they showed a low count, the sellers' license was good. Today we worry about a poor set of spat, about parasites, about failure to fatten, about bacteria other than coliforms. And next month there is to be a conference at the Florida State Board of Health in Jacksonville which intends, among other things, to determine the maximum permissable radioactivity of oysters sold in the open market. If the oysterman who has watched his crop decline, and has worried about the various items above except the last one, has escaped ulcers so far, he might well get ready now for a diet and treatment.

About 18 months ago, a discussion was held with some U. S. Public Health officials relative to the wastes from nuclear powered submarines and ships. As a result, we now have a four year grant-in-aid, to study the normal radioactivity, uptake, retention and effects of radioisotopes on shellfish, crabs and shrimp. The program has been under way only nine months, but the literature survey and the initial work has already indicated a whole complex of problems to be solved.

Natural Radioactivity.

It must be remembered that naturally occurring radioactive substances are known that emit alpha and beta particles which are high energy electrons and gamma rays. The principal sources are uranium 238 and thorium 232 or their decay products. These are rarely found in high concentration. Potassium 40 on the other hand is found practically everywhere - soil, rocks, water and living things (1). Also, potassium 40 weathered from the rocks will remain in solution (except that part transformed to argon which diffuses into the atmosphere); however some K 40 ions may be absorbed onto clay and settle to the bottom. In either case it becomes available to shellfish directly or indirectly. The first assessment

---

* This work is reported from a contract with the Atomic Energy Commission and a research grant from the National Institutes of Health, U. S. Public Health Service.

GSMFC NOTE: Uranium^{238} etcetera herein written Uranium 238 to facilitate copy work.

of shellfish radioactivity must be that due to natural causes. For purposes of this paper carbon 14 is not considered. Table I shows the natural radioactivity of oysters from Cedar Keys and Tampa, Florida. It may seem high, but certain areas of Florida contain monazite sand, ilmenite and other radioactive deposits, so that a reasonable explanation of this activity is at hand. The table illustrates that any determination of radioactivity should take into consideration the background or natural radioactivity of shellfish.

SHELLFISH

Source of Added Radioactivity

In addition to the normal or natural radioactivity of the ocean, we are now faced with the possible additions to this from: (a) fallout, including weapons and other testing procedures; (b) reactors located near the ocean; (c) nuclear powered ships. The first of these produces effects over a wide area, but is very small in amount, altho there has been a steady increase in nuclear explosions since 1945. In the six years 1945-51 the U. S. set off .7 of a megaton, about 70 pounds of fission products. In 1957-58 the U. S. and Great Britain set off about 43 megatons, of which about 19 produced fallout; Russia in the same time set off about 42 megatons, about 21 producing fallout. If nuclear explosions continue to increase, they will radically change some aspects of nuclear chemistry. For example,the entire amount of "natural" tritium in the seas has been estimated at about 15 pounds, whereas explosions have produced about 100 pounds. Russian explosions have been bad because most of their fallout has been concentrated in the North Temperate Zone. Nevertheless, fallout, at present has contributed a very minor part of our ionizing radiation.

It is inevitable that more and more reactors will be built, especially as coal and oil become more expensive and less available. Many of these will be built near the ocean, and their wastes will enter alongshore waters. Any reactor built in south Florida for example, would certainly contribute to the Gulf or Atlantic.

Nuclear powered vessels are also a coming event. Already the wastes from the submarines Nautilus and Skate are under close study, and one locality where the wastes of nuclear powered ships is under study is the Gulf at Pascagoula, Mississippi. Reports (2) by Iltis and Miles show the elaborate monitoring of the nuclear powered ships program, and the care taken to dispose of their wastes so that the dilution factor renders such wastes harmless. The same precautions are likewise taken against reactor coolants but nuclear weapons are another matter. What must be the present source of caution is accidents. These have been rare, but they do happen.

We already know the composition of the principal wastes from all three sources, and techniques for determining which radionuclides are present in sea water are available. A recent progress report by Straub et al (3) from the Taft Engineering Center, U.S.P.H.S. summarizes much of such work. Table II lists the 32 radioisotopes commonly produced by the above sources. This list is a long one, and very probably will be added to in the future. Some of these are dangerous isotopes - strontium 89 and cobalt 60 for example. Any marked concentration of these in oysters or clams could render the shellfish meats dangerous.

(Lackey)

TABLE I

Natural Radioactivity of some Oysters
in
Micro-microcuries per Gram

Cedar Keys, Florida. March 7, 1958.

Oyster No.	Mantle	Gills	Foot	Gonads	Muscle	Shell	Whole Oyster
1	121.6	185.7	86.7	28.7	86.6		
2	73.0	112.8	64.2	160.2	108.9		
3	20.8	31.6	44.3	85.0	69.0		
4	66.1	88.2	92.6	85.0	64.0		
5	37.3	12.3	128.3	76.8	66.4		
6	133.6	128.2	112.2	157.4	85.5		
			Tampa Bay, Florida. March 15, 1958.				
7	90.1	196.2	122.5	137.9	236.4	37.6	
8	136.8	362.5	88.6	155.2	110.5	7.5	
9	25.5	50.6	55.2	95.6	69.4	17.8	
10						11.6	35.8
11	The water had a radioactivity of 0.728 uuc/ml.					65.3	257.1
12						56.2	181.7
13						55.1	185.5
14						13.5	62.8

(Lackey)

TABLE II

Radioisotopes Produced by Nuclear Explosions

And Nuclear Powered Ships

Fluorine 18
Sodium 24
Chromium 51
Iron 55
Iron 59
Manganese 56
Cobalt 60
Copper 64
Zinc 65
Nickel 65
Strontium 89
Yttrium 91
Zirconium 95
Niobium 95
Molybdenum 99
Ruthenium 103
Ruthenium 106
Rhodium 106
Iodine 131
Barium 133
Barium 140
Cesium 137
Cesium 144
Cerium 141
Cerium 144
Radium 137
Lanthanum 140
Neodymium 147
Promethium 147
Tantalum 182
Tungsten 185
Titanium 187

Others like sodium 24 would seem of little importance. It has such a short half life of about 15 hours that in the 24-72 hours between the oyster bed and the table, decay would have done away with the sodium 24. The same is true for iron 55.

However, the list in Table II is impressive and indicates that the addition of such radioactive isotopes to water in which shellfish are growing should be critically examined.

One reason is that the effects of an accident resulting in a heavy loss to surrounding water should be capable of quick evaluation. We should know what organisms take up the various nuclides and to what extent they are concentrated.

Facilities for Investigating Shellfish Radioactivity

The Sanitary Engineering Laboratory at the University of Florida has been awarded two grants-in-aid by the Atomic Energy Commission and the National Institutes of Health, both of which have a bearing on radioactive wastes relative to shellfish. One of these aims at studying the mechanism of uptake and the amounts of uptake of such wastes by microorganisms. The other specifies mechanisms, amounts and effects of uptake by shellfish.

It has proved an easy matter to grow various marine organisms in mass culture and use them as food. Such organisms are grown in many laboratories, the principal ones in this country being the U. S. Fish and Wildlife Service Laboratory at Beaufort, N. C., where Chipman and Rice have perhaps 10-15 unialgal cultures; the Woods Hole Oceanographic Institution, where Guillard has even a greater collection; the Scripps Institution of Oceanography where Arm Dodson has 10-15 unialgal cultures; and our own Phelps Laboratory at the University of Florida where we maintain some 15 cultures. Our salt water is transported in a stainless steel tank truck, and stored in one half a concrete tank 18 x 7 x 5. The other half is used to store the shellfish which are brought in as needed. The tank was "cured" for a long time before being used, and seems to work very well.

Our laboratory is equipped with excellent radiochemical facilities and counting apparatus.

Fate of Radioisotopes in the Sea

Radioisotopes released to the sea can follow a path of suspension and transport in the sea until they are present in such small quantities (dilution) they can no longer be detected. In this event they will ultimately decay, although those with very long half lives may settle out before this occurs. A second course is that of settling out, in which decay occurs in situ.

The third possibility is that of being incorporated into an animal or plant. This may occur by absorption or ingestion. Adsorption may be important at times. We are accustomed to think that bacteria and algae absorb chemical entities at the lowest level. These are then synthesized into such materials as cellulose (carbohydrate) fat (lipids) and muscle (protein). As such they are in demand by higher animals, on up to man. This accumulation may be many times that of the surrounding water. Black and Dewar (4) have shown the concentration factors (Table III) for seven elements by six brown algae. When Fucus spiralis can

TABLE III

Concentration Factors for Seven Elements by Six Species of Brown Algae

Species	Nickel	Molybdenum	Zinc	Vanadium	Titanium	Chromium	Strontium
Pelvetia canliculat	700	8	1000	100	2000	300	20
Fucus spiralis	1000	15	----	300	10,000	300	8
Ascophyllum nodosum	600	14	1400	100	1000	500	16
F. vesiculosus	900	4	1100	60	2000	400	18
F. serratus	600	3	600	20	200	100	11
Laminaria digitata							
fronds	200	2	400	10	90	200	90
	200	2	1000	20	100	200	18
stipes	300	3	600	10	200	230	16
	400	2	900	30	90	200	14

concentrate Titanium 10,000 times over the amount present in sea water while F. serratus concentrates it only 200 times there is evidently considerable variation with regard to this process even among closely related species. The concentration of Strontium by these brown algae is also interesting, since strontium and titanium are each present as trace elements in the sea.

Organisms apparently do not discriminate between stable and radioactive isotopes. This is not universally true; Weinberger (5) found that algae incorporated deuterium and tritrium at one half the rate for protium. But it is generally true. This affords us an easy(?) way of determining how some organisms acquire some of their radioactivity. We simply measure the radioactivity of a culture of organisms dosed with a particular radioisotope, then feed it to a different organism, and measure the uptake by the feeder. Even this is an oversimplified statement however. We can add Platymonas dosed with Co 60 to an aquarium containing oysters and after a suitable time, determine how much Co 60 has been taken up. This enables us to tell how much Co 60 we eat, provided we except the amount in the shell of the oyster. But it does not tell us whether the Co 60 was in Platymonas eaten by the oyster, or whether the Co 60 had been released by the Platymonas and absorbed by the oyster from the water.

One of our graduate students, J. K. Channel (6) investigated certain phases of this problem. He found that zinc 65 is rapidly removed by oysters from solution of food (Platymonas), reaching equilibrium with the sea water in about four days. Most of the Zinc, up to 1400 times that in sea water, was in the tissues; the shell concentrated it by a factor of 12. Cesium was not taken up by the shell but oyster tissues concentrated it by a factor of 80 either from food or solution.

The uptake of radioisotopes by presumed food organisms for man is of prime interest. There may be several steps from the radioisotope via the oyster to man. The starting point would seem to be marine bacteria and algae. Little work seems to have been done on marine bacteria. Taga (7) briefly examined the scavenging action of certain bacteria, but his paper is inconclusive for salt water bacteria, and his references are to work with fresh water organisms. We are working with bacteria isolated from the mud-water interface in oyster beds, and will distinguish between absorption and adsorption if possible. If these bacteria are ingested by predators (ciliates, for example) the distinction is not of major importance. A point that is important is the extent of recycling caused by the bacteria, of radioactive materials otherwise sedimented in the mud to decay.

As regards algae, considerable work has been done on both fresh water and marine algae. These take materials from solution; therefore such materials as niobium 95 and cerium 144 would not be taken up by them unless adsorbed. Chipman (8) in a paper presented before this Institute in 1958 showed concentration factors of 314 to 4498 for cerium 144 by six species of marine algae. The organisms varied widely both at the end of a half hour and 24 hours. Chipman et al (9) also formed a high uptake of zinc 65 by Nitzschia closterium. Burroughs, Chipman and Rice (10) have reported on 12 species of algae for uptake of strontium, 89 and 90 and yttrium 90; and on the uptake of cesium 137 by nine. Other work, other workers could be cited, but the essential fact is that uptake varies from zero to many thousandfold, and that each species differ from every other -- as far as we have gone. In our own laboratory we have worked with Platymonas largely, using several isotopes. We are just starting on the marine forms.

There is an enormous amount of work to be done then, starting with the bacteria and algae. The amounts which can be taken up, of each nuclide in Table II by each species which might serve as food for an edible shellfish needs to be determined, as well as the factors influencing that take-up. This brings up the old question "What do shellfish eat?"

This, surprisingly, was a widely discussed topeo in the Pacific northwest this summer. One can go back to the many reports (not cited here) of Thurlow Nelson, and many discussions with him, on thru the papers of Cole (11), Coe (12, 13), Loosanoff (14), Imai (15) and Collier et al (16) without getting a definite answer. Many other papers could be cited, but the only recent one with which we are familiar and that might indicate a definite reference is one by Davis and Guillard (17). They secured positive results for two of 12 different species of microorganisms, as food for larvae of oysters and clams. It seems probably that shellfish eat a variety of organisms, and can absorb at least some dissolved organic substances. This is the simplest condition and means that shellfish accumulate radioactivity from any radioactive microorganism - bacteria, alga, ciliate or colorless flagellate - ingested, as well as by absorption from the water.

Under laboratory conditions, we have only to develop a dense culture of a particular organism, dose it with a radioisotope, add it to the water containing the oyster, and measure the uptake of the same radioisotope by the oyster. Under field conditions, the question is much more complicated - a choice of food (if the oyster is a selective feeder), probably several isotopes, and a variety of environmental factors influencing uptake. At least the laboratory studies give us information on what to look for in field studies.

Are There Effects on Food, Reproduction or Larvae?

There are other pertinent questions which come to mind. It is often difficult to get a good set of oysters. The scallop crop may be short because of a poor production of young one year. Are there effects on the gonads of shellfish, or the food of the larvae, from these new substances which are now to be added to the water?

So far our experimental work has shown no effects of added radioisotopes on organisms. These were usually added in amounts less than those present in the surrounding water. Chipman et al (9) have shown that adding zinc in quantities of 250 micrograms or more per liter, reduced the division rate of Nitzschia closterium. But it is inconceivable that such amounts would be added to a water from a reactor or nuclear powered vessel except by accident. Explosion of a nuclear weapon is another matter.

Some radioisotopes produce ionizing radiation within the body of the organism which ingests them. A property of ironizing radiations to the gonads is the possibility of producing mutations (most mutations are harmful or undesirable) and perhaps is some cases, sterilization. However the levels at which we have exposed organisms to gamma radiation have been far in excess of what might be expected in shellfish from ingesting radioactive food. Entosiphon sulcatum is a corlorless flagellate, common in fresh and salt water. Clones of it were exposed to gamma radiation from Co 60 at rates of less than 500,000 roentgens (the killing does is about 500,000 roentgens) In 72 lines with insolations every second day, each line carried for 50 generations, we could find no effects on morphological

and genetic composition and ability to reproduce. Aeolosoma hemprichi, a sewage worm which reproduces by binary fission, showed effects on its reproductive rate at 20,000 roentgens and an occasional worm with a forked tail was found, evidently a mutation. Oyster larvae are quite small, until they reach the attaching stage. It would seem almost impossible for such a larva to accumulate a mass of radioactive matter of sufficient size to kill the larva from internal ironization. For Co 60 one microgram produces 0.198 roentgen. It would take several larvae to weigh 1 gram. By the same token there seems little chance of using radioactivity to kill shellfish enemies such as oyster drills. Hargis, et al (18) reported on the possibility of sterilizing Urosalpinx by x rays. His results were inconclusive, and Co 60 as a source was not used, altho it appeared that approximately 27000 r was a lethal dosage. In animals which have separate sexes, there may be possibilities in this method.

Dangerous Levels in Shellfish

for Human Consumption

Generally, the dangerous isotopes in fishes are not found in the muscle. But we eat whole clams and oysters; sometimes the muscle of clams and generally the muscle of scallops. For oysters the whole body radiation is important. Saddington and Temple (19) point out that if one half pound of fish is eaten per day, the maximum permissable level should be ten times the maximum permissable level recommended for water. This same level might well apply to oysters although few people consume one half pound at a meal and then not every day. The figure actually amounts to $\frac{2500}{500} \times 1 \times 10^{-3} \times 10$ and is .05 uc/ml for Co 60. This is far from a dangerous level. However let us suppose that a person consumed 12 oysters the meat of each weighing 20 gms and having a whole oyster natural radioactivity as in Table I, Tampa oyster no. 7, 185.5 uuc/gm. Since shell has a radioactivity of 55.1 uuc/gm., the meat has 130.4 uuc/gm and for 240 gms this figure would be 31,296 uuc or .031,296 uuc. The maximum permissable level for Co 60 would then be, for this meal, $\frac{2500}{240} \times 1 \times 10^{-3} \times 10$ or .104160 uc plus .031296 uc = .135450 uc/240 gms.

We cannot assume that a single isotope such as Co 60 will be present in an estuary receiving reactor wastes or those from nuclear powered vessels. Rather there will be a mixture of several as shown by Table II. In this case the maximum permissable level will rise perhaps a thousand folds. The level in the shellfish must be considered, and not the level in the water, because of the ability of living organisms to concentrate substances.

It has been shown in our laboratory that oysters accumulate radioactivity both from water, and from algae. Boroughs, Chipman and Rice (9) have proved the same thing for oysters, clams and scallops. Gong, Shipman and Cohn (20) have shown a metabolic incorporation of several fission products at a rapid rate in the soft tissues of the clam. Bonham (21) has reported it for clams and oysters from the Pacific bomb test atolls. He listed oysters as the third hottest group of the several groups of organisms he surveyed. Weiss and Shipman (22) found "an enormous concentrating capacity" of Tridacna gigas collected from Rongelap Island two years after a nuclear detonation in the Marshall Islands. This was from an infinitely dilute environment. Lowman, Palumbo and South (23) found high concentrations of nine radioisotopes in clam kidney from Belle Island

(Pacific Proving Ground) in 1956. In short a great deal of evidence indicates that shellfish readily become radioactive. It would appear therefore, that some idea of average natural radioactivity be obtained in production areas, and that monitoring for accumulated radioactivity be undertaken in such areas as may receive the waste products of reactors and nuclear powered vessels.

Resume

There is always a natural radioactivity in shellfish due at least in part to pottassium 40. Shellfish are filter feeders and therefore will ingest radioactive microorganisms from bacteria to much larger organisms. They then acquire radioactivity, at varying rates and amounts, depending on amounts available and other environmental factors which affect uptake. Manifestly we need to know a great deal more than is currently on record about how nearly shellfish approach maximum permissable levels, and such investigations are under way.

SHELLFISH REFERENCES

1. Platzman, Robert L. What is Ionizing Radiation. Sci. American, 201 (3) Sept. 1959. 74 - 83

2. Iltis, T. J. and M. E. Miles. Radioactive Waste Disposal from U. S. Naval Nuclear Powered Ships. Report. 1959.

3. Straub, Conrad and Abraham S. Goldin. Fate of Radioactive Contaminants in Water. Progress Report No. 1 U. S. Public Health Service, Taft Engineering Center. 1959.

4. Black, W. A. P., and E. T. Dewar. Correlation of Some of the Physical and Chemical Properties of the Sea with the Chemical Constitution of the Algae. Jour. Mar. Biol. Assoc. United Kingdom 28 (3) 673-699. 1949.

5. Weinberger, D. Metabolism of H Isotopes by Algae AEC. HW-28636. 1954.

6. Channell, James K. Uptake, Concentration and Cycle of Certain Radioisotopes in the Oyster. Unpub. Masters' Thesis. Univ. of Fla. 1960.

7. Taga, Nobuo. On the Capacity of Water Bacteria for Adsorption of Fission Products. From "Research in the Effects and Influences of the Nuclear Bomb Test Explosions." (Reprint gives no date)

8. Chipman, Walter A. Accumulation of Radioactive Materials by Fishery Organisms. Eleventh Annual Meeting Gulf and Caribbean Fisheries Institute. 1958.

9. Chipman, Walter A., Theodore R. Rice and Thomas J. Price. Uptake and Accumulation of Radioactive Zinc by Marine Plankton, Fish and Shellfish. Fishery Bulletin 135, Vol 58. 1958.

(Lackey, #8)

10. Boroughs, Howard, Walter A. Chipman and Theodore R. Rice. Laboratory Experiments on the Uptake, Accumulation and Loss of Radionuclides by Marine Organisms. From "The Effects of Atomic Radiation on Oceanography and Fisheries". Pub No. 551. National Academy of Sciences - National Research Council 1957.

11. Cole, H. A. Fisheries Investigations, Series II. 15, No. 4, 1936.

12. Coe, Wesley R. Nutrition, Growth and Sexuality of the Pismo Clam (Tivela stultorum). Jour. Exp. Zool. 104. 1947.

13. Nutrition and Growth of the California Bay Mussel (Mytilus edulis diegenesis). Jour. Exp. Zool. 99. 1945.

14. Loosanoff, Victor L. and Charles A. Nomejko. Growth of Oysters, O. Uirginica, During Different Months. Biol. Bull., 97, 1. 1949.

15. Imai, Takeo, Masayosi Hatanaka, Ryuhei Sato, Seiichi Sakai and Ryogo Yuki. Artificial Breeding of Oysters in Tanks. Tohoku Jour. Agri. Res. 1, 1, 1950.

16. Collier, Albert, S. M. Ray, A. W. Magnitsky and Joe O. Bell. Effect of Dissolved Organic Substances on Oysters. Fishery Bulletin 84. U. S. Fish and Wildlife Service, Fishery Bulletin 54, 1953.

17. Davis, Harry C. and Robert R. Guillard, Relative Value of Ten Genera of Microorganisms as Foods for Oyster and Clam Larvae. Fishery Bulletin 136, Volume. 58. Fishery Bull. U. S. Fish and Wildlife Service.

18. Hargis, William J., Jr., Mary F. Arrighi, Robert W. Ramsey and R. Williams. Some Effects of High Frequency X-Rays on the Oyster Drill, urosalpinx cinerea. Proc. Nat. Shellfisheries Assn. 57. 1957.

19. Saddington, K. and W. L. Templeton. Disposal of Radioactive Waste Geo.Newnes. Ltd. London. 1958.

20. Gong, J. K., W. H. Shipman and S. H. Cohn. Uptake of Fission Products and Neutron-Induced Radionuclides by the Clam. Proc. Soc. Exptl. Biol. and Med. 95. 1957.

21. Bonham, Kilshaw. "Invertebrates". In: Radiobiological Survey of Bikini, Eniwetok and Likiep Atolls -- July-August, 1949. AECD - 3446. 1950.

22. Weiss, Herbert V., and William H. Shipman. Biological Concentration by Keller Clams of Cobalt - 60 from Radioactive Fallout. Science, 125. 3250. 1957.

23. Lowman, Frank G. Ralph F. Palumbo and Dorothy J. South. The Occurence and Distribution of Radioactive Non-Fission Products in Plants and Animals of the Pacific Proving Ground. Univ. Wash. Fish. Labs 51, 1957.

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
Corpus Christi, Texas
Robert Driscoll Hotel
October 15-16, 1959

"TO THE SEMI-ANNUAL MEETING OF THE GULF STATES MARINE FISHERIES COMMISSION AT CORPUS CHRISTI, TEXAS"

Howard D. Dodgen, Chairman
Gulf States Marine Fisheries Commission

I wish to thank this Commission for the honor you gave me when choosing me, for the second time, to serve as your Chairman. The pleasure of your association and your friendship is always gratifying to me personally, as well as beneficial to me professionally.

It has now been twelve years since a small number of dedicated people from each of the five Gulf Coast states, aided by the Council of State Governments, gave their time and talents to the formation of the first draft of the articles of a proposed compact of their states that would bind them to cooperate in managing their marine resources. This proposal was completed on April 11, 1947. It was subsequently approved by the several state legislatures, then ratified by the 81st Congress on May 19, 1949.

This meeting marks the end of the first decade of that important occasion. Therefore, it seems appropriate that we briefly review our accomplishments, take notice of work in progress, and anticipate the future with emphasis on the value of the resource we are entrusted to help manage.

In entering into this compacf, the member states relinquished none of their rights or their responsibilities to regulate or otherwise manage their own fisheries. The commission is given the responsibility to recommend to the governors and legislatures of the member states, action programs and improved laws that would be helpful to obtain maximum yields and the best utilization of our marine and anadromous fishes. The basis for such recommendations comes largely from studies made by trained career people employed by the states and by the United States Department of the Interior. It would not be amiss to quote a part of Article IV of the Compact Law which clearly defines the commission's duties and authority:

"The duty of the said commission shall be to make inquiry and ascertain from time to time such methods, practices, circumstances and conditions as may be disclosed for bringing about the conservation and the prevention of the depletion and physical waste of the fisheries, marine, shell and anadromous, of the Gulf Coast. The commission shall have power to recommend the coordination of the exercise of the police powers of the several states within their respective jurisdictions to promote the preservation of these fisheries and their protection against over-fishing, waste, depletion or any abuse whatsoever and to assure a continuing yield from the fishery resources of the aforementioned states. To that end the commission shall draft and recommend to the governors

and legislatures of the various signatory states, legislation dealing with the conservation of the marine, shell and anadromous fisheries of the Gulf seaboard. The commission shall from time to time present to the governor of each compacting state its recommendations relating to enactments to be presented to the legislature of that state in furthering the interest and purposes of this compact. The commission shall consult with and advise the pertinent administrative agencies in the states party hereto with regard to problems connected with the fisheries and recommend the adoption of such regulations as it deems advisable".

It is as important that we not exceed the authority extended under this Article as it is that we fully carry out its directions.

The United States Fish and Wildlife Service, named in the compact as the primary research agency of this commission, commenced a Gulf research program in 1951. The objectives of the program were: to establish through oceanographic techniques the flow patterns of the major drifts of the Gulf of Mexico; to provide information leading to an understanding of the origin and movements of the young and eggs of various fishes to furnish information on the fertility by areas. and the movement of eggs and larvae into or away from these areas; and the collection of organisms, other than fish, for taxonomic and distributional studies with whatever ecological interpretations were possible

In the spring of 1950, the Fish and Wildlife Service began a Gulf exploratory commercial fishing program. The program has resulted in expanding the offshore shrimp fishery through the discovery of wider limits of some known beds and the discovery of red shrimp in the 200-250 fathom range. Tuna explorations have proven highly successful. It is now known that the Gulf of Mexico supports populations of several commercially important species of tuna. The yellowfin is currently the predominant species appearing in the catches. Commercial canning of tuna on the Gulf began several years ago. The program has been responsible in more recent months for locating large concentrations of anchovies and sardine-like fishes. Resulting catches of these fishes have been processed for industrial use, but at least one species has been found suitable for canning for human consumption. Exploration by the unit into the supplies and location of small croakers and other bottom species, classified as industrial fish, has been of considerable value to the pet food industry which was founded some five years ago. The development of a trawl suitable for taking of snappers and groupers from around rock formations is another of many achievements of the exploratory unit.

Exploration and research work, carried out by the Fish and Wildlife Service, was made possible pricipally through the use of two, 100-foot deisel-powered vessels used in the Gulf. This work was commenced as a direct result of the Fish and Wildlife Service's acceptance of its responsibility in spearheading the fact-finding work to be carried out under the purposes of this compact.

In sound management of any renewable natural resource, it is necessary to know as much as possible about stocks on hand, annual production or severance, and something of the re-occuring annual production possibilities. To help fulfill this need a statistical program for fishery catches has been accomplished by the Gulf States Marine Fisheries Commission. It cannot be said that this statistical program has yet reached satisfactory proportions, but improvements

are constantly being made, and it is felt that soon knowledge of the total poundage taken will be accompanied by details showing the units of effort necessary to harvest this annual crop. Thus far it is disappointing to note that while considerable progress was being made in getting accurate measurement of the amount of commercial and industrial fishes taken, little or no attention has been paid to the pounds taken by recreational fishermen; spot checks indicate this to be a surprising figure.

There has been a continued effort expended in improving statistical reporting. Recently, Texas had a survey conducted to ascertain, among other things, the annual harvest by resident sportsmen of redfish, speckled trout, flounder and drum. The total in pounds caught ran to approximately 37 million, which is about 34 million pounds more than the reported commercial catch. Because of the importance to management of total fishing effort information, it is hoped that within a few years the landing records for the Gulf states will contain both the commercial and sports catches.

One of the most important functions of the commission is to serve as a clearing house for legal, statistical and biological information coming to light in the separate states, and heretofore not readily available for use by others because of a lack of a vehicle to transmit such information. This same principle prevents the unnecessary duplication of work effort in many biological research programs. It gives a basis for a uniform collection of comparable statistics and is most enlightening as regards failures and successes on administrative experiences, particularly as regards the effect of restrictive laws.

Regular meetings of this commission, together with concurrent meetings of our technical and legal staffs, have been of immeasurable benefit in bringing us closer together so that our work-a-day problems are much nearer solution when they make their first appearance.

The publication of a shrimp bulletin, laying out facts about the habits, growth rates, and yields of shrimp, formed a basis for some rather revolutionary recommendations made to the legislatures of some of the states. For example, in Texas, this year we recommended to our legislature some drastic changes in our shrimp laws -- let me quote them to you.

"It is believed to be to the advantage of the shrimp industry, to the recreational fishermen, and to the public, to close all shrimping within the inland bays during all periods of the year except the three fall months, and except to allow such shrimp as necessary to be taken and used only as fish bait. Likewise, authority should be given to close outside waters at any time of the year when the abundance of small shrimp is predominant, or exist in such size and quantity that it would be wasteful to catch them. The present statute banning fishing at night should be repealed, and likewise the law that prohibits heading shrimp at sea should be repealed, neither serve any conservation purpose. The size limit of shrimp presently existing should be repealed, and shrimp of any size, capable of being taken in a net with limited mesh size, should be retained and utilized."

These proposals were by no means wholly accepted by our legislature, but a bill was passed that gives a good start toward accomplishing a sounder shrimp management program. I have not changed my mind about any of the shrimp conservation recommendations just related. Furthermore, these proposals seem equally applicable to all other states touching the Gulf Coast.

(Dodgen, #4)

Since about the time of the creation of the Gulf States Marine Fisheries Commission, the member states have been experiencing the greatest economic growth in all their history. This eruption of social and commercial status has no end in sight, and no doubt will continue until full saturation of the use of our natural resources has been reached. Some of these changes have a direct or indirect adverse effect upon our marine resources. Our task will be to do all possible to see that the improvements in commerce and industry are carried out so as to do minimum harm, or no harm, to the valuable marine resources of the Gulf.

There exists within the commission's work plans an Estuarine Technical Coordinating Committee, formed in April 1958, that is directed to make thorough studies of the effects of these man-made changes, with recommendations as what can and should be planned to permit harmless industrial and commercial progress.

The Texas Game and Fish Commission has in the recent past, employed independent experts to find out some facts about the economic value of our salt water sport fishing and some limited information about the number of pounds of fish taken by sport fishermen. Let's look at a summary of what we found: There are six hundred twenty-four miles of coastline in Texas as measured by its meanders(1). In 1955 there were four hundred forty-seven thousand (447,000) persons who fished in salt water in Texas(2). This represents seven hundred and sixteen (716) fishermen per mile of shoreline. These same resident Texans spent a total of forty-one million two hundred forty-one thousand dollars ($41,241,000) pursuing the sport of fishing in salt water. This is eight dollars and sixteen cents ($8.16) per acre for all salt water in Texas. Beyond this lies the greatest value, the immeasurable good that comes from the recreational benefits. Without this, or some other form of wholesome outlet for the recreational energies of all, there will surely be improverishment of the health, spirit, and mentality of each of us.

In addition to the recreational values, the commercial fishermen of Texas, during the year ended September 1, 1957, produced and landed in Texas ports one hundred thirty-four million one hundred fifty-nine thousand one hundred and thirty (134,159,130) pounds of fish having a market value of thirty-four million four hundred thousand dollars ($34,400,000). This alone amounts to $6.80 per acre of water in Texas, including 10 miles out, and brings the total per acre production to fourteen dollars and ninety-six cents ($14.96). This is in addition to the unmeasured numbers of pounds of marine products caught for other than market purposes. This commercial catch is an important item in our State's economy, and especially to more than ten thousand (10,000) commercial fishermen who depend upon the products of our submerged lands for their livelihood. In addition, there are other thousands who furnish bait, boats and other services as a full time business.

In measuring the sportsmen's catch, we included only four (4) species: trout, redfish, drum, and flounder. We learned that our sportsmen took a little more than 37,000,000 pounds of these fish alone. We believe that if all species were included that the total would be not less than sixty-five million pounds (65,000,000)

(1) Texas Almanac 1958-59
(2) Crossley Survey 1956

There is no reason to believe that the other Gulf Coast states produce any less fish per mile of shoreline than does Texas. There are one thousand six hundred and fifty-nine (1,659) miles of shoreline along the entire Gulf Coast(3). Assuming that the other states have as many fishermen per mile as we do in Texas, and that your fishing is equally as good, we then have this to consider; there are one million one hundred eighty-seven thousand eight hundred (1,187,800) sport fishermen who will spend one hundred nine million five hundred twenty thousand dollars ($109,520,000) to catch ninety-seven million (97,000,000) pounds of fish. Add this to the six hundred ninety-two million (692,000,000) pounds of commercial and industrial fish, having a market value of eighty-four million dollars ($84,000,000), as given by the 1957 Fish and Wildlife Service tabulation, and you have something of the value and importance of this resource.

All of our problems in the management of the marine resources of the Gulf of Mexico can be solved only by a clear understanding and by a favorable attitude on the part of those of us affected in regard to the importance economically and socially of the values of the resource. Once we have the sincere desire to protect these values, and to perpetuate and improve them, only then will we apply the knowledge already gained regarding their best management. Much of the know-how is already on hand; much is yet to be gained, but all knowledge in the world regarding the values of our marine resources and how to manage them will not help unless they are understood and unselfishly accepted.

(3) Development of the South
Walter Prescott Webb

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
Corpus Christi, Texas
Robert Driscoll Hotel
October 15-16, 1959

"SUMMARY OF ADDITIONAL INFORMATION NEEDED FOR THE ALABAMA ESTUARIES"

I. B. Byrd and W. L. Holland
Alabama Department of Conservation
Montgomery, Alabama

Even though Alabama has the smallest coastal area of the Gulf States, it does not mean that problems concerning our estuaries are in direct proportion. Alabama's estuaries are merely concentrated. In many other states a new highway, industry, dredging operation or other sign of progress on or through an estuary may mean only that one insignigicant area is being molested. In Alabama one operation of this type could change our entire estuarine picture. The people must be aroused to the tremendous value of our estuaries. Therefore, we must complete our inventory as soon as possible.

At our last meeting we presented to you a short discussion of our estuarine areas in Alabama. We would like to present a short summary of the report.

Alabama has estuaries totaling approximately 500,000 acres. At a conservative annual value of $150.00 per acre, the total value would be $75,000,000 per year.

The residential and industrial growth of the coastal area is expanding rapidly. Housing projects, large shipping docks, and industries of all types are continually destroying the shore area.

The hydrographic features are listed in the report and considered complete.

The important fish and wildlife species are listed and a temporary value has been placed upon them.

Other uses such as navigation, mudshell and minerals, waste disposal, industrial uses and recreation are discussed.

Developmental projects are listed as to projects completed, under construction, authorized and proposed.

The Alabama Estuarine Atlas, therefore, is near completion. It is opening our eyes to the vast amount of estuary research needed. It is of utmost importance that a detailed economic survey be made of our seafood industry. Little is known of our crabs even though they are an important resource. We need to know the consequences of the new interstate highways if they are built across our estuaries.

These are but a few of the problems that need answering concerning Alabama

estuaries. The Alabama Department of Conservation has started some investigations through a contractual arrangement with consulting marine biologists. The Department of Conservation has also negotiated with the University of Alabama to establish a marine laboratory near Mobile which will be operated jointly by the Department of Conservation and the University of Alabama. A staff of marine biologists will be on full-time duty at the laboratory. Therefore, Alabama desires time to familiarize the marine biologists with our estuarine problems before any additional recommendations for research are made.

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
Corpus Christi, Texas
Robert Driscoll Hotel
October 15-16, 1959

"TODAY'S NEEDS IN ESTUARINE RESEARCH"

Robert M. Ingle
Florida State Board of Conservation
Tallahassee, Florida

During the war we heard a great deal about "Too little, too late." At that time, the remark referred to too little armaments -- too late to be effective against the enemy.

This same expression can today be applied to our understanding of our estuarine resources. Signs have already appeared in various segments of our great fishing industry to indicate that detailed knowledge of our resources will be too little and too late to save us.

Perhaps we can still learn enough in time to be effective but, if we hope to do so, we must certainly address ourselves to the tasks at hand. The near collapse presently of several salt water fisheries pressages dire days to come if we dally.

While money is an integral part of our requirements to accomplish this needed understanding, I do not presume that it alone will save us. We will need trained people, dedicated to estuarine research. In addition, we must have a citizenry alert to our problems and receptive to our suggestions. This can only be achieved through the concerted efforts of all of us -- biologists, administrators and our specialists in public education and information.

But probably the most important factor in our endeavors is positive, sympathetic and resolute leadership in government. Without this, the other ingredients for understanding of estuaries are ineffective.

I do not intend this to be a political talk and I will keep specific examples at a minimum. But the recent history in Florida offers examples of the needs I describe. Our present governor is a fisherman and a hunter. As a result of his interest he brought people into conservation affairs who were equally interested as he in protection and proper exploitation of our estuarine resources. I hope you will be tolerant of our personal pride in the Florida record in recent years. Our achievements, such as they have been, have in turn engendered a confidence and enthusiasm in the fishing fraternity thus creating the enlightened citizenry mentioned above as one of the essentials of progress.

My remarks have been of a general nature. Perhaps now, we should leave this area, hoping that we will be able to bring about a benign climate for our work, and proceed to more specific needs.

Our science can be expected to traverse the same stages through which other sciences have passed. The first stage is usually descriptive. In biology this has ordinarily been called the descriptive or morpbological level. At this grade parts of animals are identified, named, and classified. Animals themselves are divided into species which are combined into catagories of higher rank.

A little later interest develops into the function of the parts of animals (and plants). Purpose and use become important topics for consideration. A later phase attempts to study groups in their relationship to each other and to their environment. Single individuals or species become less important as the entire picture is developed. This echelon might be termed ecological. The scope is further magnified in the next series when all of the scientific disciplines, chemistry, physics, botany, zoology, ecology, and, in the case of aquatic studies, hydrographic, are all brought to bear in studies that attempt to develop knowledge of productivity.

Probably, the last phase of understanding comes when we attempt, by human intervention to manage and direct productivity so that organic material of value to humans is produced in the greatest amount possible. This conceivably could even include the interference in normal ecological relationships so that some animals, or plants, might be favored over others.

The steps described above occur in approximately predicable sequence for logical reasons, the principal one being that each succeeding step rests upon knowledged gained in previous stages. Examples may serve to illustrate. In Florida, we have deliberately not embarked upon chemical work, because we first need to know what organisms are present and some of their ininate features. In our study of plants it would be potently impractical to begin delicate tests on the effects of mud contained vitamins until we discover the principal gross ecological features, prevalence of natural deciduousness, growth rate and temperature requirements.

If we agreed that the stages enumerated above are representative of the normal succession of topics in scientific pursuits perhaps it would be of value to assess our present position in estuarine understanding.

As might be expected, our progress has not been uniform in all departments of investigation and variations exist geographically. Species wise, we are probably farthest advanced with shrimp.

Descriptive work has been done, species locations, migrations, growth, spawning and other vital processes have been treated albeit incompletely. In my opinion it is time now for us to complete certain ecological studies which, in Florida at least, have already been undertaken. And I do definitely feel that it is time to give serious study to the problem of shrimp productivity.

The latter subject has been feebly, but bravely, approached by Milton Lindner (1), Gordon Gunter (2), and Martin Burkenroad (3). These first primitive attempts have indicated that protection of young shows promise of providing greater pounds of production. It appears to me that we have now reached the place where a substantial amount of money, energy and time will be needed to advance our knowledge in this domain. Extensive field work, carefully planned, will be a prerequisite.

Burkenroad has suggested proving the efficacy of small shrimp protection by opening and closing inshore waters in alternate years for several years and then comparing the results. This rather heroic effort will no doubt never be undertaken because of the vast dislocations it would cause the commercial producers.

Furthermore, this method fails to take any account of natural fluctuations in abundance which are independent of man's activities.

The method we would propose would involve a substantial amount of financial support, the use of numerous boats, the coordinated efforts of many people, and the subjection of data obtained to rigorous statistical analysis, probably by electronic computers due to the intricate formulae required.

Simultaneous sampling in several spots of a given shrimp production area weekly by numerous vessels would give instantaneous information on the characteristics of the standing populations. These readings, taken over an entire season would tell us much about migration, growth on the grounds and that present enigma -- natural mortality. There can be no weak or mitigated effort on this study. It will cost -- in time, money and effort. Let us say that in round numbers such a study would cost $133,000.00 in any particular place that it was conducted.

I should mention that this amount is approximately what Florida is now spending on all of the shrimp projects in that state. So, even under the present standards, the figure is not unreasonable.

This seems like a lot of money. But let us look at the record. In 1957 shrimp production of the South Atlantic and Gulf was $72,438,000.00. If we assume $50,000,000.00 a year in the previous 12 years, we have a total shrimp value since the second World War of about $672,000,000.00. If you know of any industry or activity in the U. S. of a similar magnitude that would be spending less than $5,000,000.00 per year on research, I would like to know which one it is. In my opinion the lack of information provided by the paltry money made available for study of our country's most valuable resource is partly responsible for the present condition of the shrimp industry.

In this connection, I invite you to check the amount of money presently being spent in one way or another on tuna, salmon, or even oysters. I think the results will surprise you.

Mathmaticians have helped to prepare the way for us. Techniques have been developed by DeLury (4), (5), (6), Schaeffer (7), Baranov (8), Taylor (9) and many others. We, in Florida, will shortly bring out two publications on shrimp which, we feel, will provide grist for mathmatical mills. In the future, we feel that mathmaticians should sit in with us in the planning stages of our field work to insure that our results will yield themselves to the greatest possible detail in interpretation.

In general, work in most of our other fisheries must begin further down the ladder of the steps outlined earlier. I suggest that we establish and recognize a new and useful scientific discipline which for want of a better name we might call microfauna. The adherents to this new field would of necessity be obliged to commit most or all of their working life to a subject long neglected. It is true that paleontologists with specialties on recent forms have attached such small groups as foraminifera, ostrococls and the like. And it is also true that other specialists have become proficient in the taxonomy of worms. A few have dealt with small mollusks. But the new field I envisage would embrace all of these pursuits and would attempt by stages I described earlier to bring this vast assemblage of extremely important groups into our ken. A recent example

of the type of study I am recommending is provided by Barnard and Hartman (10). Not until we understand more fully these minute creatures can we ever hope to really understand and manage our estuarine fisheries.

In general, I would suggest that we take up any particular item concerning our river mouths at the present state of our developed knowledge and carry on through the stages described above and in line with the two specific examples I have put forward.

There may be a few exceptions -- instances where studies further up the ladder show promise of enlarging our scope and authority over production even though preceeding steps have not been passed.

An example of this rather empirical sort of study is suggested by some relatively recent work of Collier. He found in the course of his oyster studies that certain organic constituents of estuarine waters were able to stimulate or depress pumping of his subject animal. I have always likened his reports to a certain being only slightly drawn aside for a moment for a brief glimpse of something on the other side. Even though a complete understanding of the phenomenon might be lacking, I have always been intrigued with the immediate practical implications of this line of investigation.

SHRIMP

BUDGET (ESTIMATED)
(Continuous standing crop studies - 1 year)

Salaries,	Technical		
	Biologists (2)	$ 12,300	
	Statistician (1)	6,500	
	Technicians (6)	20,000	$ 38,800
Expenses			
	Rent, utilities and communications	$ 10,000	
	Boat Rental - 20 boats @ $50 per boat per day or $1,000 per week for 52 weeks	52,000	
	Consultant Services	3,000	
	Travel	5,000	
	Miscellaneous (Including IBM Services)	15,000	$ 85,000
Capital Equipment			
	Microscopes (6) @ $700	$ 4,200	
	Miscellaneous	5,000	$ 9,200
			$133,000

REFERENCES

(1) Lindner, Milton
1959 Address to Shrimp Assoc. of Americas. June 1959. Mimeo.

(2) Gunter, Gordon
1956 Principles of shrimp fishery management. Proc. Gulf & Caribbean Fish. Inst. 8:99-106.

(3) Burkenroad, Martin, J. L. Obarrio and C. A. Mendoza
1955 The shrimp fishery in Panama. I Evaluation of our wealth in shrimp. Revista de Agricultura, Comercio e Industria. 13(21).

(4) DeLury, D. B.
1947 On the estimation of biological populations. Biometrics 3(4): 145-167.

(5) DeLury, D. B.
1951 On the planning of experiments for the estimation of fish populations. Journ. Res. Brd. Canada 8(4): 281-307.

(6) DeBury, D. B.
1958 The estimation of population size by a marking and recapture procedure. Journ. Fish. Research Brd. Canada 15(1): 19-25.

(7) Schaeffer, Milner B.
1951 Estimation of size of animal populations by marking experiments. Fishery Bulletin 69, Vol. 52, U. S. Fish and Wildlife Service, Washington D. C. pps. 161.

(8) Baranov, F. I.
1918 On the question of the biological foundations of fisheries. U.S.S.R. Bull. Fisheries 1(1): 81-128. Petrograd.

(9) Taylor, Clyde C.
1951 A method of inferring the annual growth increment of lobsters from length-frequency measurements. Fish.Cir. No.3, Fisheries Laboratory, Dept. Sea & Shore Fisheries, Boothbay Harbor, Maine.

(10) Barnard, J. Laurens and Olga Hartman
1959 The sea bottom off Santa Barbara, California: biomass and community structure.

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
Corpus Christi, Texas
Robert Driscoll Hotel
October 15-16, 1959

"A SUGGESTED ESTUARINE RESEARCH APPROACH"

Harold E. Wallace
Florida Game and Fresh Water Fish Commission
Vero Beach, Florida

At this meeting you will probably get your ears filled with theories, expoundings and approaches suggested by deep, dark, "long-haired" research. These procedures are not to be deplored as they are essential in our stacking up of vital and useful knowledge. On the other hand, there would appear to be a rather obvious procedure which could be immediately applied to good advantage and with worthwhile results, and such is herein presented.

The suggested approach is best documented by reference to an actual example and the Caloosahatchee River estuary is thus used for illustrative purposes. This river, emptying into the Gulf of Mexico near Ft. Myers, Florida, was selected because: (1) it comprises a complex estuary and (2) a considerable amount of data is already available for reference. We all realize that the definition of an estuary is nebulous and delineation of its boundaries arbitrary. However, for the purpose of this presentation the Caloosahatchee estuary is considered to be comprised of three parts: (1) Lake Okeechobee, (2) the Caloosahatchee River, and (3) San Carlos Bay.

Lake Okeechobee lies 63 miles from the Gulf of Mexico. It is the second largest fresh water lake lying entirely within the boundaries of the United States and encompasses 730 square miles of surface water area. The lake is partially encircled by levees which were constructed during the early thirties. The Corps of Engineers now attempt to regulate the lake between 12.5 and 15.5 feet m.s.l. though historically lake levels were somewhat higher. Lake regulation is accomplished by discharge eastward thru the St. Lucie Canal and westward thru the Calcoosahatchee River.

The Caloosahatchee River was originally a natural watercourse extending from a point near La Belle, southwest of Lake Okeechobee, to San Carlos Bay, a distance of about 49 miles. In 1884 a canal was constructed to connect Lake Okeechobee with the Caloosahatchee River. Subsequently the river has been improved to provide a navigation channel 8 feet deep and 90 feet wide with stream regulation being accomplished with two locks and water control structures. An additional enlargement is now planned.

San Carlos Bay lies at the mouth of the Caloosahatchee River and is generally confined by Sanibel Island on the west and Pine Island on the north. There has been little improvement of the bay but plans have recently been adopted by the Corps of Engineers for a channel 12 feet deep and 150 feet wide, thence 11 feet deep and 125 feet wide thru Matanzas Pass. An intracoastal waterway is also proposed to extend from Caloosahatchee River thru San Carlos Bay northward.

(Wallace, #2)

A number of biological studies have been made by several agencies in the three components of this estuary. The Florida Game and Fresh Water Fish Commission and the U. S. Fish and Wildlife Service during the past three years have conducted extensive studies in Lake Okeechobee. These same two agencies have also done similar work recently in the Caloosahatchee River. The Fish and Wildlife Service and the Florida Department of Conservation have also recently investigated biological problems in San Carlos Bay primarily as associated with fresh water discharge from the Caloosahatchee River.

A review of some of the problems associated with each of the three estuary components seems appropriate at this time.

Present plans of the Corps of Engineers call for the complete encirclement of Lake Okeechobee with levees and the raising of water levels another foot or so. Biological work in this lake during the past three years was conducted primarily for the purpose of predicting the effects of such higher lake regulation on the biological productivity of the lake. Of primary concern was the effect of such higher stages which would inundate the vast and valuable northwest shore marshes. Studies were pursued in order to determine the type of vegetation which would exist under post project conditions. Findings are documented in a detailed 237 page report entitled "Recommended Program for Northwest Shore of Lake Okeechobee" (1). Essentially it was found that the higher proposed stages would not be detrimental provided the proposed associated levee construction was placed sufficiently shoreward to allow marsh relocation thru ecisis. The investigation also confirmed the much higher fish productivity of the shallow water marshes as compared with the deeper water shorelines created by existing levee encroachment. Because of such documented evidence the Corps of Engineers selected levee alignments which would provide additional acreage for marsh ecisis.

The importance of Lake Okeechobee to salt water fishes is not clearly established. It is known that mullet, snook and tarpon occur in the lake but the reason for their presence is not clearly indicated, nor is the extent of their numbers known. During the extremely cold weather of several winters ago numbers of dead snook were found around the edges of the lake. The reason for their presence is not known. Mr. Art Marshall in his thesis on snook (2) established that extremely young snook were often found in small fresh water ditches far removed from the ocean.

Black mullet have been generally considered to occur in Lake Okeechobee in considerable numbers but there is only vague information regarding their population. One indication of the extent of their presence in the lake is indicated by a mullet kill which took place in December, 1955 when their annual spawning run from the lake thru the St. Lucie Canal to the ocean was blocked by the closed St. Lucie locks. During one 24 hour period an estimated 100,000 mullet died. Their weights ranged up to six pounds with the average being about three pounds. At an average price of ten cents a pound it is estimated that at least ten thousand dollars worth of mullet were directly destroyed by the kill whereas the value of the mullet spawn that was indirectly eliminated cannot be estimated. The size of the mullet run down the Caloosahatchee River is not known but is thought to be considerably less than that which occurs thru the St. Lucie Canal. The value of Lake Okeechobee to the mullet industry, however, is clearly indicated and should be further explored. It might be mentioned that as an aftermath to this

catastrophe the Corps of Engineers now has an operational plan in effect which provides for fish lockage during spawning runs.

The value of the Caloosahatchee River to salt water fishes for spawning areas or feeding grounds is not definitely known. It is known, however, that this river harbors a signigicant salt water fish population. Recent work by the Florida Game and Fresh Water Fish Commission (3) bears this out. At the present time many oxbows exist which may be cut off, obliterated or otherwise eliminated by the proposed channel enlargement. The contribution that these oxbows make has not been completely ascertained as yet. Recent investigative work (4) indicates, however, that oxbows are highly productive and should be preserved to the greatest extent consistent with engineering feasibility for channel enlargement. In fact as a result of similar studies in another watershed the Corps of Engineers drastically revised its proposed channel alignment to bypass major oxbow areas and furthermore changed their plans of blocking off oxbows in favor of preserving open existing channels. Such is proposed for the Caloosahatchee River. Actually much more work is needed to determine the value of these oxbows for spawning and feeding grounds for salt water fishes.

Likewise, there is need for continued study of the effects of stream flow velocities as indicated by recent findings (4). In this particular study it was found that in channels having sheer banks and no available rest areas velocities exceeding 1.0-1.5 second feet were deleterious to the fish population. Another construction item that needs evaluation is the side slope characteristics of proposed channel enlargements. Recent studies (3 & 4) indicate that concentrations of fish are to be found along shallow underwater plateaus resulting from the sloughing off of steep canal banks. Only last year the Florida Game and Fresh Water Fish Commission recommended the inclusion of so-called underwater berms along the Kissimee River (4) and the Corps of Engineers agreed to incorporate this feature in their plans at an additional expense of one-half million dollars. A similar recommendation will be included in the forthcoming report by the Florida Game and Fresh Water Fish Commission for the Caloosahatchee River. Continued study of this facet should be planned to evaluate its merit in order to properly and conclusively recommend it for application to other waterways.

It is obvious that the deposit of sediment on productive bay and other water bottoms is undesirable. Often, however, this problem can be alleviated by careful review of proposed engineering plans followed by recommendations to the construction agency which would deposit silt loads on alternate and less valuable areas. Also a choice can often be made between dragline and dredging operations when costs are comparable or when substantial resource values are involved. Likewise the placement of spoil or the provision of spoil retention dikes are features worthy of study and negotiation with the construction agencies. Whether to have continuous or intermittent spoil alignment is another question answered only thru study and promoted only thru liaison with the involved parties.

Based on the preceeding discussion it is apparent that certain species of salt water fish would benefit appreciably by the provision of various construction and operational features, many of which would be located in fresh water areas and a considerable distance from the coast. These include: (1) a limitation on maximum discharges, (2) the construction of underwater berms, (3) the preservation

of oxbows, (4) the judicious placement of spoil, (5) the proper location of levees, (6) carefully planned deposition of silt loads and (7) appropriately designed and operated water control structures. These are only a few of the many physical phases which have a direct bearing on the welfare of certain commercial marine species of fish. These and other items in the same category should not be overlooked.

The question arises now as to how these features can be properly ascertained and presented. Thus, in essence, we are faced with a research need. Fortunately the answer to this research need is relatively simple. It involves the creation and operation of efficient and live wire survey and investigation programs by the various state conservation agencies, be they fresh or salt or both. For lack of a better name, they can be called State River Basin Programs since several such programs covering this sphere of activity and using this title are already in operation in a number of states. If this particular nomenclature is distasteful to the Commission the program could be called an Estuarine Study though, as is apparent from this discussion, much of the work is necessarily performed inland and in fresh water.

As we all know, the Fish and Wildlife Service already has a river basin program which has similar objectives. In theory it would appear that the Service could perform these activities without help from the states but such is not always the case because of shortage of federal funds, limited time and man power, and special state and local interests. Actually both are needed. In summary, therefore, it seems that the Gulf States Marine Fisheries Commission would be taking a stride in the right direction by working with the various state conservation departments in promoting this type of program. Funds obtained thru the activities of the Commission could be dispensed to the various states based on state proposals which had been reviewed and endorsed by the Commission.

Actually the value received would be more than those amounts of money obtained thru Commission activity and channeled into state river basin programs. For example, findings made as a result of such studies would often result in recommendations to the Corps of Engineers which when accepted would result in the spending of additional sums by that agency for preservation or mitigation of certain salt water fishery values. Thus in the end analysis the Corps of Engineers would be contributing directly to certain features favoring the salt water fishery resource. It is suggested that this approach be carefully examined.

Another program which bears investigation relates to the recent creation of U. S. Study Commissions concerned with the conservation, utilization, and development of the land and water resources of various watersheds. One such commission was recently established in Georgia and the adjacent state watershed areas and another has been proposed for Texas. The same methods as mentioned previously should be pursued and injected into the planning of these Study Commissions.

Programs other than that of the Corps of Engineers can likewise be investigated under the proposed river basin study plan. These include selected small watershed projects provided for the Public Law 566 program which affects upstream estuarine areas, local mosquito control impoundment programs which are being

developed in various brackish water marshes, and bulkhead and bay fill programs which are generally locally proposed and state reviewed. The list is long and the time is short which precludes a lengthy discussion of the involved programs. But perhaps enough has already been said to convey the general thought. It is so hoped.

List of References

1. Anonymous. 1956. Recommended Program for Northwest Shore of Lake Okeechobee. Florida Game and Fresh Water Fish Commission.

2. Marshall, A. R. 1958. A survey of the Snook Fishery of Florida with Studies of the Biology of the Principal Species Centropomis undecimalis. Technical Series #2, Florida State Board of Conservation.

3. Anonymous. 1959. Recommended Program for Caloosahatchee River. Florida Game and Fresh Water Fish Commission (in preparation).

4. Anonymous. 1957. Recommended Program for Kissimmee River Basin. Florida Game and Fresh Water Fish Commission.

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
Corpus Christi, Texas
Robert Driscoll Hotel
October 15-16, 1959

"SUMMARY OF INFORMATION NEEDED BY THE ESTUARINE TECHNICAL COORDINATING COMMITTEE FOR LOUISIANA"

Lyle S. St. Amand and T. B. Ford
Louisiana Wild Life and Fisheries Commission
New Orleans, Louisiana

1. Estuarine Areas

The original concept which gave rise to and fostered the establishment of the estuarine committee was predicated on the fact that there existed a number of problems in coastal areas around the Gulf which could not be studied adquately by any one State because of insufficient funds or technical personnel. Furthermore, it is the general concensus that intensive studies must be conducted in the immediate future if we are to preserve estuarine areas for important fisheries and wildlife values in the face of ever-increasing industrial and other developmental encroachments. To meet these needs, it will be necessary to establish a program over and above the existing state programs or that of the Fish and Wildlife Service in the Gulf. In view of the above facts, it was our understanding that this committee would describe and outline a program to meet these needs on a priority basis including the extent of technical personnel and funds needed over and above existing state and federal facilities. The report would then be submitted to the Gulf States Marine Fisheries Commission for its action.

Reference is made to the letter from Mr. Gunn dated July 28, 1959 and to the attached summary of the types of data that should be obtained in order to develop an adequate estuarine study. We concur in this and think that this list adequately covers any type of problem that may be undertaken. However, we believe that the next step to be taken in organizing needed studies is the designation of (1) specific projects by name, (2) aims and objectives of each project, (3) area in which each particular project can be best conducted, (4) priorities for each project, and (5) fix responsibilities for gathering the information. After priorities are assigned, more detailed examinations of the projects should indicate the estimated number of personnel, amount of money, and time required to accomplish the objectives.

Louisiana is confronted with many estuarine problems which we would like to submit to the committee for assignment of priority and inclusion in the overall study when funds become available. Obviously, the detailed consideration of the many projects in Louisiana cannot be undertaken here, but is a job to be submitted for concert committee action when the overall plan is being prepared. However, we would like to list, as this time, certain type projects which, in our opinion, will have an extreme effect on estuarine ecology:

1. Closure of Vermilion Bay

2. Barataria Bay Waterway

(St. Amant and Ford, #2)

3. Hurricane Protection of Lake Pontchartrain Area by Gated Structures

4. Relocation, Deepening and Widening of Intra-coastal Waterway

5. Accumulative Effects of Extensive Localized Dredging and Silting Attendant to Oil, Gas, and Pipeline Operations

6. Large-range Cumulative Effects of Low-level Oil Pollution on Ecological Structure of a Given Area

7. The Influence of the Low-level Wier Form of Marsh Developments on Fish and Wildlife Production

8. Initiate monitoring of radioactive materials in estuarine areas and studies of Gulf currents which may bring these materials into Louisiana waters from proposed dumping grounds.

11. Contributing Watersheds

There are hundreds of water control projects on the Mississippi and Red Rivers and their tributaries which can conceivably influence the estuarine areas of Louisiana and adjacent areas. Additional projects are proposed which will provide greater control over the water discharge cycles. Accordingly, it is of interest to those in the coastal area to consider potential ecological changes in estuarine areas as a result of these projects.

Some projects may lend themselves to water management in estuarine areas. For example, the Old River Control Structure in Louisiana may provide an opportunity for limited water control of the Atchafalaya River and its estuarine areas. Another proposed project is the controlled introduction of freshwater into the marshes below New Orleans on both sides of the Mississippi River which should provide some control over these estuarine areas.

The influence of industrial effluents and municipal wastes from these river and tributary systems may affect estuarine areas. Perhaps the effect of the effluent from any one industry may be negligible. However, the cumulative effect of the over-increasing number of industries could affect the ecology of estuarine areas on a long-range basis.

Thus, it is suggested that consideration be given to watershed problems such as discharge cycles and long-range pollutional effects. Water chemistries can be included with these studies. These are examples of areas or fields of work which merit consideration by this committee, and, in our opinion, should be included in the suggested program which will be presented to the Commission for its action.

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
Corpus Christi, Texas
Robert Driscoll Hotel
October 15-16, 1959

"ESTUARINE SUMMARY FOR THE STATE OF MISSISSIPPI"

William J. Demoran
Gulf Coast Research Laboratory
Ocean Springs, Mississippi

No all out program has been instituted in Mississippi in the past for compiling chemical and hydrographical data; however, the information contained in the Atlas is taken from data that have been collected during various studies conducted in the estuarine areas in Mississippi.

The estuarine areas in Mississippi are very important to the economy of the state and to the neighboring states because of the extensive marsh lands located within the state's boundaries. These areas provide important nursery grounds for crabs, shrimp and fish.

There are three rivers that flow into Mississippi Sound; the Pearl which flows into the extreme western end of the Sound; the Biloxi River which empties into the central portion; and the Pascagoula River which flows directly into the east end of the Sound.

The fact that these three rivers flow into the Sound at these points helps account for the large estuarine area which borders our state.

Surveys made in our state years ago have proven worthwhile and are still of great value in making comparisons with future studies.

We realize the need for chemical and general hydrographical information, and are planning a program which will enable us to acquire such needed information. Our research and management programs have grown to such a magnitude that we now deem such information necessary.

Oceanographic information of our waters is badly lacking, however, as of July of this year we were fortunate to add an oceanographer to our state marine laboratory and we feel that the information - that will be obtained from his studies will greatly increase our knowledge of the waters in our state and surrounding areas.

Because of encroaching industry here on the coast and the possibility of pollution and damage to our estuarine areas from such sources one of our greatest needs at this time is a study of the chemical and hydrographical features of the rivers and streams that empty into our coastal waters.

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
Corpus Christi, Texas
Robert Driscoll Hotel
October 15-16, 1959

"SUMMARY OF ADDITIONAL INFORMATION NEEDED ON WATERSHEDS CONTRIBUTING TO MISSISSIPPI ESTUARINE AREAS"

Cleburne Schultz
Mississippi Game and Fish Commission
Jackson, Mississippi

Watersheds contributing directly to Mississippi estuarine areas consist primarily of the Pascagoula River System, the Biloxi and Tchouticabouffa River Systems* and a portion of the Pearl River System. A number of bayous constitute small separate drainage systems.

Systematic investigations regarding these watersheds have thus far been limited both in number and in scope, and available information is therefore lacking in completeness and is confined to only a few areas. In view of this, needed research is not restricted to only a few phases, but many of these phases would not pertain significantly to the purposes of this committee. However, the effects of domestic and industrial sewage wastes and the effects of variations in stream flow are problems which pertain to both freshwater and estuarine management.

In portions of all these watersheds critical pollution potentials exist, especially during periods of low flow. With constantly increasing populations and industrial development, this problem will naturally become greater and may produce undesirable conditions in the estuarine areas as well as in the streams themselves. Some attempts at corrective measures are forthcoming, but more information will be needed to help determine proper corrective procedures and to evaluate the affectiveness of these procedures. Further research is needed on the effects of various types of toxic wastes, the effects of nutrients derived from some of these wastes, and the effects of these wastes on water quality in general as related to aquatic life. Investigations of this type have recently been initiated on the Pearl River System; however, it is not known at the present time whether funds will be available to permit these investigations to be expanded to include other river systems in thefuture. Other systems contributing to this estuarine area, especially the Pascagoula, receive wastes of a nature not common to the Pearl River, and there exists a definite need for information of this type from those areas.

We know that variations in stream flow effect the characteristics of both freshwater and estuarine areas. From the fisheries standpoint, additional research on the extent and significance of these effects is of greater importance economically as related to marine species. However, some aspects of this research would also be of interest to freshwater workers. One of these aspects involves salt water intrusions in streams. Usually during periods of low flow these intrusions appear to reach their peaks, and according to available information from the Biloxi and Pascagoula Rivers brackish conditions sometime extend

* , the Wolf and Jordon River Systems

twenty miles or more inland from the mouths of these rivers. Within these limits salinities vary greatly. When river stages and salinities are compared, it is found that usually the salinities drop as the river stage increases; however, occasionally tidal effect appears to exert a greater influence than river stage, and salinities increase even though the river stage is high. Near the mouth of these streams surface salinities were found to range from practically fresh water up to about 14.0 ppt, and the bottom salinities ranged from less that 1.0 ppt to 21.0 ppt. At points approximately 14 miles upstream surface salinities range from fresh water to 8.0 ppt, while bottom salinities range from fresh water up to around 15.0 ppt. It was noted that fresh water fish populations are very low in these areas and that marine species become very abundant in certain seasons. Salinities probably have a great deal of effect upon the freshwater fish populations even though they can tolerate wide ranges of salinities as evidenced by having been found when salinities reach high levels. Also, very little movement of tagged fish was noted even though salinities changed. Information on the effects of these salinity variations on spawning of freshwater fish would be of considerable importance in determining whether or not these areas could be managed for these species.

In connection with problems concerning stream flow, it might be mentioned that there have been large gaps in the network of streamflow stations, particularly in south Mississippi. Additional stations are now being added by the Geological Survey, and more needed data will be available.

The ever-increasing demand for fresh water by municipalities, industry and agriculture is rapidly outgrowing the subsurface supply in many areas, and this water must come from surface sources. Large-scale diversions of water from the streams and increasing numbers of reservoirs may eventually affect the total amount of fresh water discharge to a significant extent. Also, these practices will tend to stabilize stream discharge. Both of these factors may reach a point where estuarine areas are appreciably affected, and it may be advisable to give some thought to this situation before these conditions evolve.

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
Corpus Christi, Texas
Robert Driscoll Hotel
October 15-16, 1959

"ADDITIONAL INFORMATION NEEDED IN TEXAS ESTUARINE AREAS"

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

Since our legal jurisdiction extends only three marine leagues into the Gulf of Mexico, our management problems are similarly limited. With only three and one quarter million (3,250,000) surface areas of salt water ranging in depth from zero to thirteen fathoms, our diversity of habitat types is relatively unlimited. When we consider the multiplicity of uses to which each and every one of these areas is subjected, our need for additional information can never be entirely satisfied. We can, however, reduce this factor by thorough study of existing (and past) conditions and then simply - "keeping up with the changes".

With our somewhat different approach to marine fisheries management studies, we find seasonal abundance data to be most important. This is a blanket sort of term which can be deceptively simplified by saying that it's an effort to learn "what's where when"?. This sort of inventory data then is made much more valuable by the addition of the fourth interrogative - why?

"Whats" in a specific locality then is our first consideration. This study must be begun first in order that the things we're working with can be identified in the various stages of their life cycle.

"Where", of course, is not simply a pin pointing of geographic location as so many degrees of latitude or longtitude but is rather a detailed description of the habitat in which "what" has been found to exist. This would properly include data on bottom types and chemical and physical properties of water and etc.

"When" is also a bit more complex than a simple date. Here it should relate to climatic conditions existing on that date which might affect "whats" being "where".

Now - having carried out continuing studies on the changing "what" in the same (but changing) "where" on a large number of succeeding "whens" our problem is considerably reduced. We can form a committee to study these things and possibly determine some "whys".

At the present time we have a program underway which is providing much of the "what" and "where" information. As this program continues, the "when" answers continue to roll in. In a few portions of our coastal area and with particular reference to certain "forms" we have given considerable attention to the "whys" and made some management suggestions. It now seems that our primary need is just a little bit more time to devote to field studies and we

shall be ready to form a committee. Working groups cannot cease to function when the committee is formed for as the "when" progresses in a recurring pathway the "where" or habitat continues to change. This should, of course, delight the work groups who will forever be employed and it also causes the committee to remain in continuous session.

As for stating flatly what additional information is needed in Texas' estuaring areas, I hope that I've made my point. Perhaps the answer can best be taken from an incident in the life of John D. Rockefeller. When asked: "how much money does it take to satisfy a man" - the old gentleman replied, "just a little bit more".

GULF STATES MARINE FISHERIES COMMISSION

New Orleans, Louisiana
Monteleone Hotel
Queen Anne Room
March 19 (Thursday) and March 20 (Friday), 1959

PROGRAM

(Commission Chairman, Howard D. Dodgen, Presiding)

9:00 AM REGISTRATION

9:30 AM CALL TO ORDER

INVOCATION — Reverend Edward P. Drake
Gentilly Methodist Church
New Orleans, Louisiana

ROLL CALL

WELCOME ADDRESS — Senator R. C. Gaspard
State of Louisiana
Abbeville, Louisiana

Introduced by:
Commissioner F. Lamar Clement
State of Louisiana

ADDRESS: THE VITAL IMPORTANCE OF BETTER RELATIONS BETWEEN THE COMMERCIAL FISHERMAN AND THE ANGLER

Charles E. Jackson
National Fisheries Institute
Washington, D. C.

ADDRESS: THE COMPLEXITY OF INTERRELATIONSHIPS OF MARINE ANIMALS

J. Lawrence McHugh
Bureau of Commercial Fisheries
Washington, D. C.

11:00 AM RECESS — Fifteen Minutes

11:15 AM EXPLORATION AND PRODUCTION OF OYSTER AND CLAM SHELLS ON THE GULF - GENERAL REMARKS AND MOTION PICTURE

James L. McConnell
Bay Towing and Dredging Company, Inc.
Mobile, Alabama

11:35 AM HOW THE TEXAS SALT WATER FISH HARVEST BY SPORTSMEN WAS MEASURED

Joe Belden and John Hall
Belden Associates - Marketing Research
Dallas, Texas

RECESS FOR LUNCHEON (No formal luncheon)

AFTERNOON SESSION

1:45 PM REPORT: RESULTS OF JANUARY 23, 1959 MEETING OF COMMITTEE TO CORRELATE RESEARCH AND EXPLORATION DATA ON FISHERY STATISTICAL REPORTING

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

2:00 PM REPORT: ACTIVITIES OF THE ESTUARINE TECHNICAL COORDINATING COMMITTEE

Results of January 21, 1959 Sub-Committee Meeting on Unpublished Data

Philip A. Butler
Bureau of Commercial Fisheries
Gulf Breeze, Florida

The Estuarine Atlas

I. R. Byrd
Ala. Department of Conservation
Montgomery, Alabama

2:30 PM REPORT: RESULTS OF JANUARY 22, 1959 SPECIAL TECHNICAL COMMITTEE MEETING TO REVIEW PRESENT STATE OF BIOLOGICAL INFORMATION ON THE GULF SHRIMP FISHERY AND MAKE RECOMMENDATIONS ON ITS MANAGEMENT

James N. McConnell, (Discussion Leader)
La. Wild Life and Fisheries Commission
New Orleans, Louisiana

Panel

Albert Collier
Texas A&M College Laboratory
Galveston, Texas

Gordon Gunter
Gulf Coast Research Laboratory
Ocean Springs, Mississippi

Robert Ingle
Fla. State Board of Conservation
Tallahassee, Florida

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

(Following a review of Informational Series No. 2 by Dr. Gunter, the above authors of the publication will remain on panel for a discussion period)

THE THREAD HERRING OF THE GULF OF MEXICO

Fishing for Thread Herring - Motion Picture and Comments

Harvey Bullis, Jr.
Bureau of Commercial Fisheries
Pascagoula, Mississippi

Canning of the Thread Herring

Travis Love
Bureau of Commercial Fisheries
Pascagoula, Mississippi

ADJOURNMENT

Friday (March 20)

8:30 AM	COMMISSION EXECUTIVE SESSION BREAKFAST	ROBERT E. LEE ROOM
9:30 AM	ESTUARINE TECHNICAL COORDINATING COMMITTEE SESSION	QUEEN ANNE ROOM
11:30 AM	FINAL GENERAL SESSION	QUEEN ANNE ROOM
12 Noon	ADJOURNMENT	

GULF STATES MARINE FISHERIES COMMISSION

REGULAR SPRING MEETING

NEW ORLEANS, LOUISIANA

MONTELEONE HOTEL

MARCH 19-20, 1959

MEETING MINUTES

GULF STATES MARINE FISHERIES COMMISSION
312 Audubon Building
New Orleans 16, Louisiana

M I N U T E S

REGULAR MEETING, MARCH 19-20, 1959
Monteleone Hotel
New Orleans, Louisiana

OFFICIAL ATTENDANCE OF COMMISSIONERS

	PRESENT	ABSENT
ALABAMA:	Will G. Caffey, Jr.	Claude D. Kelley W. C. Holmes
FLORIDA:	Ernest C. Mitts Walter O. Sheppard	Vern Merritt
LOUISIANA:	F. Lamar Clement E. J. Grizzaffi A. O. Rappelet	
MISSISSIPPI:	Hermes Gautier	Chester Delacruz Stanford E. Morse, Jr.
TEXAS:	Howard D. Dodgen	Jimmy Phillips Wilson Southwell
PROXIES:	Will G. Caffey, Jr. James A. Allen Ernest C. Mitts Hermes Gautier Howard T. Lee Howard D. Dodgen	(For Claude D. Kelley) (For W. C. Holmes) (For Vern Merritt) (For Stanford E. Morse, Jr.) (For Howard D. Dodgen, 3/19/5 (For Jimmy Phillips)
STAFF:	W. Dudley Gunn (Mrs.) Emily C. Carr	

FORMER COMMISSIONERS PRESENT

Charles W. Bevis, Wilfred A. Duet

STATE FISHERIES REPRESENTATIVES PRESENT (Commission Committee Members Underscore

James A. Allen, I. B. Byrd, Ted Ford, A. V. Friedrichs, Jr., Bess Gollmer, Gordon Gunter, Steve Harman, W. L. Holland, Jr., Robert M. Ingle, Howard T. Lee, Donald Leary, James N. McConnell, Myles A. Patureau, Lyle S. St. Amant, Herbert G. Russe Percy Viosca, Jr., Robert P. Waldron, Harold E. Wallace.

OTHER REPRESENTATIVES OF STATE GOVERNMENT PRESENT

Alvin Dyson, M. W. Finuf, Jr., R. C. Gaspard, Joseph C. Jacobs.

FEDERAL GOVERNMENT REPRESENTATIVES PRESENT (Commission Committee Members Underscored)

DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE: Harvey R. Bullis, Jr., Philip A. Butler, Charles R. Chapman, Edward Chin, Howard H. Eckles, Billy F. Greer, Walter A. Gresh, Don Hoogland, Daniel L. Leedy, Travis Love, Charles H. Lyles, J. L. McHugh, Jim Nipper, Ovide A. Plaisance, George A. Rounsefell, B. E. Skudd, Bobby J. Strength, Seton H. Thompson, R. T. Whiteleather, Roy Wood.

U. S. CORPS OF ENGINEERS: W. E. Shell, Jr.

AMERICAN FISHERIES ADVISORY COMMITTEE PRESENT

John Lewis, James McPhillips.

FISHING INDUSTRY REPRESENTATIVES PRESENT

Alton Alario, Houston Authement, B. W. Bailey, Louis Battistello, Philip Blanchard, Louis Blum, Abbie Boudreaux, Lynn Boudreaux, Paul Bourgeous, A. J. Buquet, Harris Callais, Weber Callais, A. B. Chauvin, Wilbert J. Chauvin, Robert M. Champagne, Louis Chermie, Jr., Tilton Cheramie, Sylvest Cheramie, Alvin Charpentier, Edison Chouest, T. J. Collins, Carlton Crawford, Elmore J. Crochet, Jr., Feltus A. Daigle, Adrian Danos, Roy Danos, H. Morgan Daniel, Clyde Davidson, Alfred Davies, Linton A. Duet, Paul Defrene, Willie E. Dupre, Robert Lee Eddy, Jr., Linwood Esponge, Edward J. Esposito, Adam Gisclair, Freddie Gisclair, Jimmie Gisclair, Layman Gisclair, L. V. Gisclair, David B. Graf, Elmore E. Guidry, T. B. Holcombe, Charles E. Jackson, Clerville Kief, Sr., Steven Kiffe, Edward Lafont, Emile Lapeyre, Jean H. Lapeyre, Camille W. Lapeyrouse, Wiltsie Lapeyrouse, Albert Leftwich, Edw. M. Lombard, B. J. Martin, Harry I. McGinnis, John Mehos, Gordon M. Millet, W. R. Neblett, Clinton Picou, Eusebe Pitre, Jefferson Pitre, Leedwood J. Pitre, Paul V. Pitre, Herbert Plaisance, Maurice A. Porter, C. Pousson, Antoine S. Punch, E. M. Rome, Jos. Ramos, C. G. Reuther, Sr., W. C. Richard, A. J. Robinson, H. R. Robinson, Jessie Savoie, R. Y. Savoie, Ted Shepard, Harry Simoneaux, Tom Steed, Jack T. Styron, J. H. Summersgill, David Toups, Ed. Trahan, Eunice Vinet, Herman A. Wiggins.

REPRESENTATIVES OF FIRMS ASSOCIATED WITH THE FISHERIES INDUSTRY PRESENT

Daniel Behre, J. F. Beu, Joe Belden, John H. Erwin, D. L. Fender, John Hall, Paul Kalman, James L. McConnell, Frank A. Miller, W. M. Miller, C. Vander Molen, Donald R. Moore, Lucien A. Robert, Christopher P. Scully, George Weeks, D. K. Young.

UNIVERSITY REPRESENTATIVES PRESENT (Commission Committee Member Underscored

Albert Collier, E. A. Fieger, J. B. Higman, Clarence P. Idyll, Harold Loesch, J. G. Mackin, A. V. Novak, H. T. Odum, Kenneth M. Rae, S. M. Ray, Royal D. Suttkus.

CLERGY, PRESS AND OTHERS PRESENT

Rev. Edward P. Drake; Bob Friedly, Bill Sarratt; A. S. Cain, A. J. Harris, Alfred Foret, Sidney Landry, Charles A. Murphy, Thaddeus Pelligrin, Bruce Strawbridge, W. S. Werlla.

GENERAL SESSION, MARCH 19, 1959

Commission Chairman Howard D. Dodgen called the meeting to order at 9:30 AM and introduced Reverend Edward P. Drake, Pastor, Gentilly Methodist Church, New Orleans, Louisiana, who rendered the invocation.

The Secretary called the roll of Commissioners after the Chairman welcomed two members who had been appointed to the Commission since the last meeting- - - Alabama Commissioners Claude D. Kelley and Will G. Caffey, Jr., the latter being present.

Louisiana Commissioner F. Lamar Clement was called upon to introduce State Senator R. C. Gaspard, Abbeville, Louisiana. The Senator, representing Lieutenant Governor Frazar, welcomed the group most cordially and delivered the following address:

"The promotion of better methods of utilizing and protecting from undue and unneccessary depletion the salt water fishery resources of this state and those of each of the Gulf States represented here today, is of vital interest to the people of Louisiana and, I know, to the people of Alabama, Florida, Mississippi and Texas, as well. It was because of this vital interest that each of our states entered into the Gulf States Marine Fisheries Compact. Fisheries constitute an important part of the economy of our states and contribute in large measure to the economic well-being and happiness of our people, and the preservation and advancement of our fisheries are major concerns of all of us.

"The interstate compact between and among the states is becoming an effective weapon in the hands of the states for the solving of mutual problems and in strengthening them as they attempt to handle the complex problems of today. The effectiveness of this device is well demonstrated by the accomplishments of the Gulf States Marine Fisheries Commission. Through it we pool our information and discuss our problems and seek solutions to promote an industry which is vital to the economic well being and happiness of all of our citizens. Instead of groping in the dark, with each state seeking to solve its own individual problems without regard to the methods found effective in other states and, indeed, sometimes without regard to or knowledge of the effect of measures taken by one state on its neighbors, we have joined together to find solutions to mutual problems, with each thereby profiting by the experience of the others.

"With the improvements and expansion in communication and transportation facilities and the increased industrialization of the states which have been brought about in recent decades, the citizens of the individual states no longer are forced by circumstances of distance and the difficulties of communication to face and attempt to find solutions to their problems without the valuable asset to be found in the free and easy interchange of ideas, methods and even the facilities and personnel of their neighbors in surrounding states which have the same or similar problems. Also, these very improvements in our way of life have lead to or have been causative factors in the development of new problems and have caused existing ones to assume larger proportions. And so it happens that more and more problems affecting individual states are becoming of

interstate interest, and workable solutions may be found in many, many cases only by cooperation between and among the states, either by means of compacts similar to that under which the Gulf States Marine Fisheries Commission operates, or through voluntary cooperation without formal action represented by the entering into of compacts. It is my firm belief that, if the states are to survive and are to retain their identities as governmental units representative of the people living within their boundaries, if they are effectively to determine and solve their problems, thus serving as at least a curb on the ever-increasing concentration of powers in Washington, we must continue to work jointly and amicably to pool our information, to discuss our problems and to seek joint solutions beneficial to us all."

Prior to a mid-morning recess, Charles E. Jackson, General Manager, National Fisheries Institute, Washington, and J. Laurence McHugh, Chief, Division of Biological Research, Bureau of Commercial Fisheries, Washington, addressed the session. Copies of the papers are first and second attached to these Minutes. Dr. McHugh asked Howard Eckles to summarize work of the National Academy of Science Committee on Oceanography. His remarks are incorporated in the McHugh paper.

The Chairman called upon James L. McConnell, Bay Towing and Dredging Company, Inc., Mobile, Alabama, who spoke briefly on the subject of exploration and production of oyster and clam shells on the Gulf, before having a motion picture shown to illustrate his remarks. The complete operation of the important dredge shell industry was most interestingly covered. In discussion, it was pointed out that the sale of oyster and clam shells by the Gulf States provides a large percentage of the funds made available for development of the oyster fishery and for fishery biological research.

Joe Belden and John Hall, Belden Associates - Marketing Research, Dallas, Texas, were introduced by Chairman Dodgen and presented; How The Texas Salt Water Fish Harvest By Sportsmen Was Measured. An opaque projector was employed to graphically present parts of the subject. The Belden-Hall paper is third attached to these Minutes.

Starting the afternoon session, Howard T. Lee, Texas Game and Fish Commission, presented results of the January 23, 1959, New Orleans meeting of the Committee To Correlate Research and Exploratory Data, regarding improved fishery statistical reporting. Copy of the report is fourth attached to these Minutes.

Considering activities of the Estuarine Technical Coordinating Committee, the Chairman called upon Philip A. Butler, Bureau of Commercial Fisheries, Gulf Breeze, Florida, for a sub-committee report of a January 21, 1959 meeting in Ocean Springs, Mississippi, at which session plans were made for the preparation of an annotated bibliography of unpublished Gulf fishery research data. Copy of Dr. Butler's report is fifth attached to these Minutes.

Further work of the estuarine committee was covered by I. B. Byrd, Alabama Department of Conservation, Montgomery, Alabama, who told of the preparation of an atlas of estuarine areas by each of the member states, using the atlas prepared by Alabama to illustrate. Copy of the report is sixth attached to these Minutes.

Chairman Dodgen informed the conferees that at the October 1958 Commission meeting, it was requested that the State Conservation Directors on the Commission appoint a special Technical Committee to review the present state of knowledge of the Gulf shrimp fish-ry from the Rio Grande River to St. Marks, Florida, and make recommendations on its management. It was stated the committee met in New Orleans, January 22, 1959 and as a result of the conference, Informational Series No. 2 had been published. (The publication was distributed along with the programs at the registration desk). Authors of the publication, Albert Collier, A&M College of Texas Laboratory, Galveston, Texas; Gordon Gunter, Gulf Coast Research Laboratory, Ocean Springs, Mississippi; Robert M. Ingle, Florida State Board of Conservation, Tallahassee, Florida; and Percy Viosca, Jr., Louisiana Wild Life and Fisheries Commission, New Orleans, Louisiana, were complimented by the Chairman for their joint effort and were asked to participate in a panel discussion of their work. To lead the discussion, James N. McConnell, Louisiana Wild Life and Fisheries Commission, was introduced. An extract of the discussion is seventh attached to these Minutes.

Harvey R. Bullis, Jr., Bureau of Commercial Fisheries, Pascagoula, Mississippi, next introduced, supplied comment at the showing of a non-sound but colored film on thread herring fishing with the lampara seine in the Gulf. The setting was offshore from St. Petersburg Beach, Florida, in which area it was explained herring had been caught by Pascagoula fishermen and returned to that port for industrial processing.

Travis Love, Bureau of Commercial Fisheries, Pascagoula, Mississippi, stated that the thread herring of the Gulf had been successfully canned at the Pascagoula fisheries laboratory and invited the delegates to sample the product at the conclusion of the meeting. He said only a small capital outlay would be necessary for any cannery to add canned thread herring to its line of products. *

The Chairman received no response on call for other matters to be presented and the session was adjourned at 5:15 PM.

Friday (March 20)

The Commission Executive Session began at 8:30 AM with the serving of breakfast in the Robert E. Lee Room. This session was adjourned at 11:30 AM and the Commissioners joined the scientists and others who had attended the Estuarine Technical Coordinating Committee session in the Queen Anne Room since 9:30 AM.

Commission Chairman Dodgen introduced James Summersgill, President, Louisiana Shrimp Association, who briefly told of the purposes of the recently formed association, numbering over 600 members, and extended an invitation to the group to attend a meeting of the association in the Queen Anne Room at 2:00 PM that day.

Howard T. Lee, Chairman, Estuarine Technical Coordinating Committee, was called upon for a report of the committee meeting. A summary was given. A more detailed report of the session may be found ninth attached to these Minutes.

* Full report is eighth attached to these Minutes

The Secretary, at the request of the Chairman, announced that the next meeting of the Commission, its 10th annual session, would be held at the Robert Driscoll Hotel in Corpus Christi, Texas, October 15-16, 1959 and that the March 17-18, 1960 meeting would be held at or near Mobile, Alabama.

Chairman Dodgen issued a cordial invitation to the announced meetings and thanked the delegates, numbering about 175, for their attendance and participation at the meeting.

The final general session was adjourned at 12:15 PM.

Prepared by: W. Dudley Gunn
Secretary-Treasurer

M I N U T E S

Executive Session, New Orleans, Louisiana, March 20, 1959

The Commissioners and James Allen, proxy for Commissioner Holmes, met for breakfast in the Queen Anne Room of the Monteleone Hotel at 8:30 AM.

Guests for breakfast included; Charles Bevis, Walter Gresh, Charles Jackson, Howard Lee, James L. McConnell, James N.McConnell and Seton Thompson. Guests, except James N.McConnell, joined the Estuarine Technical Coordinating Committee session at 9:30 AM.

Mr. Jackson told the Commissioners that the Department of Labor had replaced an original interpretation of some years standing with a new one with reference to the Congressional Act relating to seafood exemption. He said, if the more recent interpretation were to be enforced, considerable hardship by virtue of increased operating cost would devolve upon the industry, particularly to the breaders. Mr. Jackson said he wished the Commission could assist industry in this matter but did not know if the Commission directives would permit. Following a discussion, it was the consensus of Commissioners that the matter could not be handled by the body.

It was reported that approximately $100 was needed by the estuarine subcommittee to complete its work on unpublished research data. Mr. Thompson said he would speak with Dr. Philip Butler regarding the matter and see that a required amount was made available. Mr. Thompson said the revised Service shrimp program would be available soon and that copies would be sent to the Secretary for distribution to the Commissioners for their comment.

The Secretary was called upon for a report of his early February trip to Washington. Mr. Gunn reported that he attended a meeting of the Atlantic, Pacific, and Gulf Fisheries Commission executive officers and legal advisers, February 2; that, on February 3, he visited various officials of the Fish and Wildlife Service; and the following day attended a meeting of industry and state advisers on the fisheries to the Department of State.

Copies of the minutes of the Commission secretaries' meeting were distributed. The Commissioners were informed of a bill which was enacted by the 1958 New York Legislature and incorporated, with some changes, in the Council of State Governments Program of Suggested State Legislation For 1959. The model bill, concerning jurisdiction over offshore waters and submerged lands was discussed. Commissioner Grizzaffi moved that the Commission delay the taking of any action on the suggested legislation. Commissioner Mitts seconded. On vote the motion unanimously passed.

Regarding resolutions adopted at the October 16-17, 1958 meeting at Biloxi, Mississippi: The Secretary read letters from Governors Folsom of Alabama; Price Daniel of Texas and Speaker of the Mississippi House of Representatives, Walter Sillers, in which each acknowledged receipt of the Commission resolution requesting an increase in the membership dues of each of those states. Commissioners Caffey, Gautier and Dodgen indicated they would follow up the matter in their respective states.

Next, a letter of acknowledgement by Ross Leffler, Assistant Secretary of the Department of Interior was read. The resolution to which the letter referred concerns the Fish and Wildlife Service proceeding with the Shrimp Program (Resolution of 1954) as outlined and expediting the publishing of data on the shrimp fishery. Mr. Leffler stated his feeling that the shrimp program eventually could be brought to an optimum level and also, that publications would be hurried.

Concerning the resolution on fishery statistics, the committee met and report was rendered March 19 as requested.

Relative to the revision of Informational Series No. 2, the committee met, publication was distributed and report rendered March 19.

The Secretary reported a net cash balance, as of February 28, 1959, of $5,987.97 for the remaining four months operation in the current fiscal year. The Secretary requested that dues payable July 1 be sent in as early as possible in the next fiscal year.

Mr. Gunn reported Mr. Colmer of Mississippi had introduced H. R. 1244, a bill concerning shellfish sanitation, with particular reference to imported products. As previously instructed, he said proper authorities in Congress had been advised that the Commission had passed a resolution concerning its approval of a similar bill in October 1954; such letter having been sent to Mr. Boykin of the House Committee on Merchant Marine and Fisheries.

Commissioner Gautier moved that the Minutes of the last meeting, Biloxi, Mississippi, October 16-17, 1958, be approved as mailed to the Commissioners November 11, 1958. Commissioner Sheppard seconded. On vote the motion unanimously passed.

Commissioner Mitts moved that the Special Technical Committee be thanked by letter for the preparation of Informational Series No. 2. Commissioner Clement seconded. On vote the motion unanimously passed.

A round table discussion of shrimp fishery laws followed. Commissioner Clement presented the following resolution: "Be It Resolved, that the Gulf States Marine Fisheries Commission recommend to the legislatures of the separate member states that authority be given the marine fisheries conservation agencies to prohibit the landing of shrimp during certain seasons of each year, not to exceed 45 days, for the protection of shrimp stocks." Commissioner Grizzaffi seconded.

Following discussion, Commissioner Sheppard offered a substitute motion as follows: "That the Clement resolution be placed in a committee appointed by the Chairman for study and that report be made back to the full Commission at the Executive Session on October 16, 1959 at Corpus Christi." Commissioner Mitts seconded.

The vote by states on the Sheppard substitute motion was as follows: Alabama, yes; Florida, yes; Louisiana, No; Mississippi, yes; Texas, yes.

The Chairman declared the motion passed and appointed the following Commissioners to serve on the committee: Caffey for Alabama, Mitts for Florida, Clement for Louisiana, Gautier for Mississippi and Southwell for Texas.

It being Alabama's turn for the March 17-18, 1960 meeting, Commissioner Caffey suggested that the meeting be held either at Dauphin Island or at Mobile. It was agreed that either of the locations would be satisfactory with the Commission. Commissioner Caffey said he would check at Dauphine Island for accommodations. The Secretary was requested to meet with Commissioner Caffey a little later to make final arrangements for the meeting.

With no further business to be presented, Chairman Dodgen adjourned the session at 11:30 AM and requested the Commissioners to assemble in the Queen Anne Room for the final General Session.

Prepared by: W. Dudley Gunn
Secretary-Treasurer

GULF STATES MARINE FISHERIES COMMISSION (COPY)
New Orleans, Louisiana
Monteleone Hotel
March 19-20, 1959

"LEGISLATION THREATENS THE FISHING INDUSTRY"

Charles E. Jackson
National Fisheries Institute
Washington, D. C.

If the fishing industry of America is to continue to carry out its responsibility to supply essential protein food for the human and animal life of the nation, we must unite to support good legislation and vigorously oppose bad legislation at both the Federal and State levels. Indeed, we must avoid the introduction of hammful legislation whenever possible. At the moment, the greatest threat stems from unwise State legislation - legislation suggested by those who are prejudiced or ignorant of the facts - legislation that is frequently inimical to the sponsors themselves.

Along the Atlantic Coast today are a number of States where fishery bills are pending and which, if enacted, would close down important segments of our industry.

In Massachusetts, House bill no. 1000 sponsored by three representatives, would prohibit seining within 3 miles of the coastline. It would kill the whiting and menhaden industries in Massachusetts. It came about because party boats and yachtsmen complained about the seine fishermen's activities and attitudes in the Plum Island area. Even the authors have termed it a bad bill and have offered to withdraw it upon certain assurances from the whiting and "pogie" fleets. I understand these assurances have now been provided.

This is probably another instance of conflict between fishermen and anglers - a lack of understanding - perhaps unwise actions and hot words on the part of both. The result: anglers complain and legislators propose radical legislation. Hot-heads can endanger an important industry. We have hot-heads and the anglers have hot-heads. Introduction of House bill 1000 in Massachusetts has sobered both sides. We expect the bill to die. It is most unfortunate that a few hot-heads on both sides can endanger the livelihood of more than 1000 men, the employment of many vessels and a substantial reduction in the supply of vital food needed for Americans.

In Maryland a bill is pending which, if enacted, would prohibit the commercial fishing for striped bass during the winter months. It was sponsored by anglers who claim that the fish seek deep holes in winter and are scooped out by commercial fishermen. There is no biological evidence to support the anglers' contention. If they were serious about conservation they would propose legislation prohibiting fishing by both anglers and commercial fishermen for striped bass in the Spring months during the spawning season.

It appears now that because of the scientific facts submitted by State biologists that the bill will not be enacted this year. It has been introduced in the last three sessions of the Maryland Assembly. Each year the anglers gain strength, even though this bill has repeatedly been proven not a conservation measure.

In South Carolina there is a bill, pending which, if enacted, would prohibit the catching or releasing of non-food fish within 1½ miles of the coastline of Horry County of that State. The measure would kill menhaden fishing in South Carolina. What is behind this proposal? The angler is only partly involved in this case. A menhaden net broke just before July 4th last year. Dead fish were strewn about 5 miles along the beach during the height of the season. A 40-mile stretch of beach, including Myrtle Beach, is a popular vacation spot and consequently a big industry in South Carolina. Only 2 operators were involved. They could not help the net breaking. They notified the city authorities. They paid $2000 out of their own pockets to clean up the beach. But indignation swept the area. The city authorities had to take the brunt of the criticism. Also, menhaden boats operated too near the fishing piers. Anglers added their complaints. The Myrtle Beach Chamber of Commerce adopted a resolution. The Horry County Senator introduced a bill.

N.F.I. appealed to the Chamber of Commerce in Myrtle Beach and asked for a conference. All 3 menhaden operators in South Carolina attended the meeting with me. We found out first-hand about the complaints. We offered to try to prevent future occurrences. The operators agreed to keep their boats a reasonable distance away from the fishing piers. We asked for the appointment of a joint industry-Chamber of Commerce committee to consist of 3 operators and 3 Myrtle Beach officials to work out the problem in the future, and the 3 operators agreed to send one of their number to the scene if menhaden unavoidably washed ashore and to cooperate with the local authorities to remove the fish and to bear the expense, provided the legislation is not enacted. It now appears that the agreement will avoid legislation. All parties agreed that it is vital to maintain the beach recreational industry, the menhaden industry and the poultry industry of the Southeastern States which are dependent upon fish products in mixed feeds.

I hope and am sure that the menhaden operators will exercise good faith in this agreement. We must avoid conflicts in the future by this type of live and let live agreement among American business industries, including recreational and commercial fishing industries.

Other legislation is pending in other States. Most restrictive legislation is the result of conflict between sport and commercial fishermen. Some of this conflict is wholly unneccessary. Much of it is engendered by some of our own hot-headed commercial fishermen who think they have a God-given right to operate without consideration for the angler. Just as much conflict, perhaps more, is engendered by hot-headed, selfish anglers who have come to believe they are entitled to exclusive fishing privileges, and because they are conscious of their every-growing strength and their tremendous voting power, they sponsor legislation providing themselves exclusive fishing rights.

This conflict of interest between two groups of citizens poses a serious problem to the future maintenance of one of the nation's most valuable resources.

The commercial fishing industry must take the lead to resolve this conflict. Our first duty is to educate our own fishermen, but we must also hasten to educate the angler. We must begin on the simple premise that the fishery resources belong to all the people of the United States. Certainly neither the commercial fishermen nor the anglers are entitled to any exclusive fishery rights. Every citizen is entitled to his fair share of the resource. If he chooses to personally pursue and

catch his share, that is his right. But he must not deny a fair share to other citizens who may be unable for physical or financial or other reasons to produce their own fish. The angler must remember that the commercial fisherman is the agent of the ill, the elderly, the underage, and other millions of citizens, some of whose physical welfare may be dependent upon protein food from the waters of America.

The fishing industry has a tremendous public relations job to do. We must face up to the fact that one-sixth of the total population goes fishing for recreation today, and that with more leisure, more per capita income, more automobiles and boats and airplanes, more artificial reservoirs, more deep freeze cabinets to hold the anglers' catch, and a rapidly increasing population, the total fishing effort will greatly increase from year to year. With proper management, there are now and there will continue to be sufficient fishery resources to maintain our industry and to meet the reasonable needs of recreation. But it cannot be done on any hit or miss basis The fishing industry and the angler must lay aside their differences and join forces if the fishery resources of America are to be maintained for their mutual benefit.

Legislation precipitated by conflicts of interest serves only to intensify further conflicts. If we can build better relations with the angler, if he can get a clearer concept of what the industry is trying to do, if he understands that we neither claim nor recognize exclusive fishery rights for anyone, and that we are willing to join hands in working out problems that will inure to the benefit of both groups, then we may avoid at least some of the radical legislation we are coping with this year.

We must begin with better relations between anglers and commercial fishermen on the fishing grounds. This is a job which must be undertaken by the firms employing the fishermen and by fishermen's organizations and unions. A briefing session in advance of the opening of the commercial fishing seasons between fishermen and the firms employing or purchasing their catch would do much to prevent misunderstandings between fishermen and anglers on the fishing grounds.

Organizations like this Commission, the N.F.I., the State and Federal agencies, and similar groups must find means to educate the angler by frequent publication of news releases and articles designed to educate the angler and the general public. Some of us belong to the Outdoor Writers Association. I have found most of these writers not only fair on angler-commercial fishermen relations, but anxious to obtain news on our side of the issue.

The Outdoor Writers supply news articles or tips to the membership every month. They will circulate news stories or brief articles for all members. Last year I submitted an articles on a controversial subject which the Outdoor Writer circulated. It did much to build a better understanding, but we need many such articles, at least one a month, and we need more commercial fish people to belong to the Outdoor Writers and to actively participate and attend their local national meetings. Every man engaged in the commercial fishing industry should become personally acquainted with the Outdoor Writers in his community and spend some time discussing mutual fishing problems with them.

The answere are not simple, but we must find them or be continually plagued with legislative proposals like House bill no. 1000 in Massachusetts, the striped bass bill in Maryland, and the South Carolina bill to prohibit commercial fishing within 1½ miles of the coastline.

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
New Orleans, Louisiana
Monteleone Hotel
March 19-20, 1959

"SOME COMPLEXITIES OF FISHERY PROBLEMS"

J. L. McHugh
Bureau of Commercial Fisheries
Washington, D. C.

Introduction

I have spent the past eight years in the service of the Commonwealth of Virginia where I dealt with many problems similar to yours. Virginia has no stocks of shrimp of commercial importance, but she does have valuable oyster and menhaden fisheries, and these species and many others spend important part of the lives close to shore in the estuaries.

Many of these animals have habits that are remarkably similar. They spawn offshore, but soon after hatching, the tiny young somehow find their way into the bays, lagoons, and estuaries, where they spend a good part of their first year of life. We suspect that conditions in their environment during this early part of their lives exert a very strong influence upon survival of young shrimp, blue crabs, menhaden, and other migratory fishes, and thus determine the size of the fishermens' harvest at some future date. But, as yet, we know very little about these things. Two of the questions that must be answered before we can recommend measures for scientific management of these fisheries are: (1) how do the tiny larvae find their way from the ocean to their nursery grounds in estuaries and marshes?; and (2) what governs their survival and growth in the inshore environment?

Movements of Larvae

Young shrimp, menhaden, croakers, and other marine animals, shortly after hatching, move from oceanic spawning areas to estuarine nursery grounds. It is difficult to conceive that this movement is entirely voluntary, for with few exceptions these larval forms are delicate and apparently have little capacity to swim in a definite direction. On the other hand, they could be carried to the nursery areas in a relatively short time by favorable currents, even though these currents were relatively slow. A mean transport of one-half knot would carry larvae 100 miles in less than ten days.

If winds and currents are such that larvae drift away from shore after hatching, or if for some reason they do not survive to reach the estuaries, the commercial supply will be reduced accordingly. We know nothing about the conditions, favorable or adverse, that influence survival in the ocean during early life, and this is one of the most serious gaps in our knowledge of most coastal fishery resources.

Survival and Growth in Estuaries

For reasons as yet unknown, estuaries and marsh areas are particularly favorable for survival and growth of young shrimp, menhaden, croakers, crabs, and many other important marine animals. An abundant supply of nutrients, assuring an adequate food supply, protection from enemies, competitors, diseases, and other hazards; must be important features of the environment, and these favorable characteristics apparently are sufficient to outbalance the unfavorable effects of large salinity changes, sudden temperature variations, siltation, and the like.

Complexity of the Environment

It is quite unrealistic to consider a fishery resource apart from its environment. The abundance of a species is determined by a great variety of forces acting upon it, some physical, some chemical, some biological. These forces do not act independently, but work together in most complex fashion, so that the net result is impossible to predict at present levels of knowledge.

The obvious physical factors are winds, currents, freshets, siltation, temperature, and light. Chemical factors include variations in salinity, dissolved oxygen and nutrients. Biological effects are produced by predators, competitors, parasites, and diseases. Man, of course, also is a predator, and sometimes we tend to overemphasize the magnitude of our influence upon fishery resources. Nevertheless, it is possible for us to catch too many fish, thus disturbing the delicate balance that nature has achieved. One of the principal purposes of scientific fishery research is to discover the largest harvest that can be taken each year, yet not disturb the capacity of the resource to reproduce. But in addition to the biological effects that he produces, man causes alarming physical and chemical effects, by building dams, dredging channels, changing runoff characteristics of watersheds, adding organic and chemical wastes to the water, all of which can be unimportant if properly controlled, but can cause permanent and serious damage if permitted to go on unchecked.

Interrelationships between Marine Animals

One could cite many examples of complexity in relationships between marine animals. A good example is the recent catastrophe that has hit the oyster industry of Long Island Sound. Planters there have always had to contend with starfish, which destroy many oysters if left unchecked. Methods of control have been developed, which have been satisfactory under normal conditions, but in 1957 an unusually large brood of starfish was produced, so abundant that the oyster industry was completely overwhelmed. It is significant that this great abundance of starfish was produced by relatively small numbers of parents, but survival of the young was increased tenfold because a small clam on which young starfish feed was unusually abundant in 1957. The plague of starfish made disastrous inroads on oyster resources that were already depleted on account of poor sets in recent years, but in 1958 this sparse population of spawners produced an unusually good oyster set. However, the abundance of starfish very effectively destroyed this set which, under normal circumstances, would have put the industry back on its feet. This chain of unusual events has put several old-established firms out of business, and others are spending money at a prodigious rate to battle the invaders.

Animals May Change Their Own Environment

Another important effect, seldom considered in marine fishery management, is the influence that the resource may exert upon its own environment. We know, for example, that when a species is more abundant than usual, individuals may grow more slowly as if they were competing with each other for food. A simple example will illustrate how significant such effects may be:

Menhaden are filter-feeders, capable of straining very small organisms from the water that passes over their gills. We know nothing about the amount of water that a single menhaden may filter, but it is not unreasonable to assume that each adult fish may strain a column of water one inch in diameter at a rate of one knot. At this rate, each menhaden would remove living organisms from 800 cubic feet of water in 24 hours.

The tidal waters in the Virginia portion of Chesapeake Bay and its estuaries contain approximately 800 billion cubic feet of water. One billion menhaden, if they did not filter the same water particle more than once, would turn over all the tidal water in Virginia in 24 hours. The 1955 menhaden catch in Virginia was about a billion fish and probably another billion escaped the nets, not to mention the large numbers of young that inhabited estuarine nursery grounds. Therefore, there probably were enough fish in Virginia waters in 1955 to turn over the water of the Bay at least twice each day, and these fish were competing with many other filter feeders for food. No wonder menhaden find it necessary to move about considerably. A large school would soon deplete its food supply if it remained in one place.

Obtaining the Necessary Information

Never have fishery research agencies had sufficient personnel or resources to investigate such problems in all their phases simultaneously. Consequently, scientific fishery research has used a piecemeal approach, often interrupted or terminated by demands to solve problems of immediate concern. The most efficient approach to scientific fishery management is to accumulate a solid foundation of basic knowledge, on which to draw when crises arise, rather than to make frantic efforts to do something after the damage has been done. The National Academy of Sciences recently established a Committee on Oceanography to review the status of American oceanography and to recommend a program for the future. This Committee found that the United States is lagging far behind other countries and recommended a ten-year program to investigate the ocean and their resources. With your chairman's permission, I have asked Mr. Eckles, Chief of our Branch of Marine Fisheries, to review these recommendations briefly.

"OCEANOGRAPHY 1960 TO 1970"

Howard H. Eckles
Bureau of Commercial Fisheries
Washington, D. C.

The National Academy of Science has recently released a report entitled "Oceanography 1960 to 1970". This summarizes the work of a special committee established in 1957. The committee has held many meetings at oceanographic

institutions in the United States, has consulted with specialists in all fields of marine science, and has estimated the national effort required to obtain fullest development of ocean resources and to produce information necessary for military programs.

The committee organized a number of panels on special subjects, such as:

1. Needs for education and manpower to attract more scientists to the field of marine science.

2. The existing U. S. research fleet and requirements in numbers and types of new vessels required to carry out future programs.

3. Needs for shore facilities and laboratories.

4. New devices for exploring the oceans and specification of engineering needs. Recommendations were made to establish floating platforms over the deep ocean for continuous observation over long periods of time. Direct methods to observe the ocean and its contents were considered, for example, the use of submarines for underwater observation and collection of information.

5. Of greatest interest to this Commission will be the panel on ocean resources, which concerns production of fish, shellfish and other living products, and exploration for mineral deposits on the floor of the sea.

Studies were made on population fluctuations, fish behavior, genetics of marine organisms, artificial enrichment of the seas, transplantation of useful organisms from one region to another, recording and handling of all types of data for more rapid analysis, economic and social problems relating to fishery production throughout the world, precise definition of species, and other important topics.

The estuarine environment was given particular attention. The dangers of industrial encroachment to inshore waters and marshland nursery areas thus has been recognized on a national scale. This question has been of vital interest to the Commission in recent years.

If the report of the National Academy of Sciences were implemented, research in marine sciences would proceed at about double the present rate. The required budget for the recommended programs totals about $650,000,000 over a 10-year period, of which $123,000,000 would be the responsibility of the Bureau of Commercial Fisheries. While these amounts appear large, the Committee believed that they are the minimum necessary for programs of utmost importance when considered in relation to the potential for future development of resources and to the urgent need for knowledge about the oceans for defense purposes.

The report of the National Academy of Sciences is being considered very seriously within Government and has received attention by various committees of Congress. As a consequence, a Subcommittee on Oceanography has been established within the Committee on Merchant Marine and Fisheries of the House of Representatives. A new Federal Council on Science and Technology, recently established by recommendation of the Killian Committee, also has the report under its cognizance.

(Eckles, #5)

Of particular interest to this Commission are basic studies on shrimp, menhaden, shellfish and ecology of estuaries, which will be enhanced considerably if the Government acts favorable on the report of the National Academy. While its adoption is not certain, this special study will result in substantial improvement to ocean resources programs which can be carried out by all institutions interested in the field of fisheries and oceanography.

BELDEN ASSOCIATES · MARKETING RESEARCH

JOE BELDEN ALEX LOUIS WALTER BOWLES RALPH BUBIS

HOW THE TEXAS SALT WATER FISH HARVEST BY SPORTSMEN WAS MEASURED

Delivered Before the Gulf States Marine Fisheries Commission
March 19, 1959, New Orleans, Louisiana

By Joe Belden, President, and John R. Hall, Research Associate
Belden Associates - Marketing Research

Introduction

Early in 1958 the Texas Game and Fish Commission asked us if we would tackle the problem of developing a measurement of the salt water fish harvest by Texas sportsmen. The need was for reasonably accurate estimates of five major species to help in the Commission's management and conservation policies.

Howard Dodgen, Executive Secretary of the Texas Commission, had become convinced that something could be done to measure the annual take through the application of population sampling. The study we have recently completed we believe has proved him right. The collection of data from masses of people, systematically, by means of interviews with a sample of the population -- this is the field in which our firm specializes. The adaptation of these marketing research techniques to the measurement of the fishing harvest -- this has been about the most challenging assignment we have ever handled in the nineteen years we have been in business.

The Problem

The problem before us was this, as worded in our report to the Commission:

1. To provide estimates of the harvest of redfish, speckled trout, flounder, drum, and shrimp . . .
2. To measure the distribution of the harvest by areas of the coast and months of the year . . .
3. To study fishing habits: time devoted to salt water fishing and methods and equipment used . . .
4. To determine who fishes: the size and characteristics of the fishing public . . .

Various approaches to the problem were considered. We settled for the most obvious and direct: ask the sports fishermen themselves. The research tools we finally ended up with were considerably more complex than that might imply. But essentially the study is simply a systematic method, logically applied, to gather the information from the original source -- the man who pulled the fish out of the water.

Background

There are, as all of you know, various avenues for attempting a measurement of the harvest. For example:

1. On-the-spot creel censuses. The primary advantage is the accuracy inherent in empirical measurements of the catch by a trained observer. However, every fishing event occurring along the 1,400 miles of Texas coast during a given year cannot be checked. The Commission has figured that a controlled sampling plan for on-the-spot measurements would be prohibitive in cost.

2. The enlistment of cooperation of charter boat operators, boat captains, and dockmasters, providing them with a procedure for recording and reporting catches. States that have used this method report that even if they pay the would-be informants, reporting is irregular. And it misses the fellow who drives up to the beach, hauls in his catch, and drives away.

3. Post card or other mail surveys of fishing license holders. This is getting close to population surveying. But not everyone who fishes in the Gulf is licensed, and unless the filling out of the questionnaire is mandatory, returns are incomplete. A self-administered questionnaire has to be short, and there is no control over the replies being provided. As you will see when we describe the personal interview questionnaire we used, you will realize what a wealth of data you miss when you depend on a self-administered form.

After studying the alternatives, we were more convinced than ever that someone ought to try the personal interview approach to measure total catch. Over the past thirty years we have witnessed the growth of population sampling through the interview technique for an ever-widening range of problems, both for business and government. The fishing problem seemed like a natural one for the application of this efficient and relatively economical approach.

Only limited application of the method seems to have been made before. In 1949 the California Department of Fish and Game had a limited personal interview survey made

to evaluate the information received from its annual post card survey of fishing license holders. In 1955, as most of you are aware, the U. S. Department of the Interior sponsored an extensive personal interview survey to study the economics of hunting and fishing in the nation. This Crossley study provided invaluable background for us. But little else seems to have been done in this field. If any of you know of other examples of this type of survey, we hope you will tell us.

Thus the Texas survey just completed appears to be a pioneering effort. As such it is experimental. It is experimental only in its application of the method to the problem, for basically every phase of the study employed well established techniques.

The Research Problems

As we got into the study, we soon isolated three major research problems:

1. Sampling -- could we find enough salt water fishermen in the population to make the survey economically feasible?

2. Recall -- could the fishermen remember when, where, and what they caught, and for how long?

3. Veracity -- would fishermen give truthful answers on their catches?

Since it did not seem possible to design a sample to contact fishermen in the act, at the right places, and the right times, to interview them on the spot on what they had caught, it was obvious we would have to interview them after the act. That meant at home. So we had to design a household sample of the population, state-wide. Both the Crossley survey and a pilot study we will describe later indicated that only seven or eight out of every hundred persons we would talk to were salt water fishermen. This posed a serious problem of sampling, cost-wise. We had to find ways to increase the yield of fishermen as we called house to house.

The sampling problem was reduced by what the researchers call over-sampling. We were sure that people living close to the water fish more; so we decided to over-sample near the coast. That is, we made an over-proportion of the interviews where the incidence of fishermen is greater, where the interviewers were bound to find more fishermen. Of course, in computing our estimates of total catch we allowed for this over-proportion of interviews in certain areas. The important thing is this: here we are beginning to control the problem, through sampling devices, rather than allow the problem to wag the dog, so to speak. We will tell you more about this later.

We had also considered what we might call over-sampling time. Again we realized that people tend to concentrate their fishing not only by geographical sectors, but by time segments. They fish more during certain months of the year.

Which brings us to the solution of the second problem: recall. How to get people to remember accurately. It appeared to us that the most recent recall would be best; so we decided to concentrate interviewing right after they had done the fishing.

We had had considerable experience getting people to recall actions by asking them to report actual behavior, rather than what they "usually" do or do "most." The technique guides the respondent through a step-by-step reconstruction of past events, with a logical development in his mind of times, places, and other surrounding circumstances. This is psychologically sound; we tested it on fishing habits, and we found what we should have known about these fishermen: they can recount even small details about their experiences for months back. We have no proof to show when recall becomes inaccurate, but we became convinced that what we were getting was good

enough for us to abandon the idea of spreading the interviews out over the entire year and asking only for very recent recall.

Actually, by concentrating all the interviews right after the big fishing season -- which we did -- the bulk of the fishing reported was very recent experience. Not having to interview people the year round was another factor that saved considerable cost. Cost aside, it would probably be better to interview a sample each month and ask for a report of the catch only thirty days back. But you can't usually shove cost aside.

So, we had designed a method for measuring the salt water fish harvest by Texas sportsmen by taking a questionnaire directly to a sampling of fishermen and asking them questions at such places, times, and in such a manner that we could get maximum results for the budget available. Only one problem remained: would they tell the truth -- and this is aside from ability to recall.

We had no idea how much exaggeration might be involved. But we felt we would encounter some, and decided to be prepared for it. The problem was solved, not by trying to force the fisherman to keep his imagination within bounds; it was attacked statistically.

Very simply: we asked the fisherman to tell us both length and weight of the specimens he caught; we decided that length was easier to estimate and recall accurately and took his word for it; but we checked up on his weight reports. That is, after all the returns were in we looked at them and compared weight estimates with known weights of fishes of given lengths; when the fisherman was out of bounds on his weight, we adjusted him down. Again, we are applying statistical devices to control the survey. Of course, we also had to take the fisherman's word for number caught -- but this, like length, is a physical characteristic that can be visually observed. Weight is not.

Method

Because the methodology is so important to the success of a study such as this, let us tell you a few of the more important details. Then we will tell you what the fishermen reported catching.

Our first job was to design an efficient sample of the population. The results, the Commission had stipulated, should be based on a sample large enough to produce estimates within 10 per cent. This means that the sample of fishermen we were to find within the total population sample had to be large enough to come within 10 per cent plus or minus.

Sampling

The only way to produce estimates from a sample within a known margin of error is to use what is called a "probability" sample. Such a sample removes the judgment of respondent selection from the designers or the interviewers; it depends on statistical theory.

For those technically inclined, we used a probability sample stratified geographically and by size of place, with three stages of selection. In plain English this means that the design was one wherein we could draw accurate conclusions about the big world of Texas salt water sports fishermen by looking at the small world of the fishermen in the sample. The key idea is to draw the sample in such a way that the little world of the sample reflects the elements and characteristics of the big world you wish to study. This is achieved through the mathematical principle of randomness or probability so that each member of the bigger world under study has a measurable chance of being selected.

We could spend all day talking about sampling alone. Our biggest task for the Texas study was determining the appropriate size of the sample -- the number of interviews, to stay within the desired accuracy and available budget.

The problem is compounded by the fact that in order to reduce the sampling error -- like the 10 per cent plus or minus here -- in half, we don't just double the sample; we have to square it. So you can see that it is easy to arrive at a point where added accuracy can only be obtained through a prohibitive increase in sample size and cost.

And here we were faced with the fact that only a relatively small proportion of the population does all the salt water fishing -- about seven or eight per cent in Texas.

To be efficient, we knew we had to over-sample near the coast, as previously mentioned. But how near the coast? Where was the line of diminishing efficiency as we went inland? In May 1959, we conducted a pilot study, a state wide survey of 1,000 interviews that not only established the applicability of the interview approach but gave us these statistics:

Distance of Residence From Texas Coastline	Households with Salt Water Fishermen
0 to 99 miles	22%
100 to 199 miles	6
200 to 299 miles	4
300 miles and over	3

Obviously our most productive area would be within 100 miles of the coast; beyond that the incidence of fishermen was too light for any concentration of interviews.

With this information on hand, we were able to apportion our distribution of interviews in the most productive manner, while making sure that all sections of the state were represented.

We concluded from the pilot study that a sample of 2,000 households, if properly distributed, would yield sufficient fishermen for the desired accuracy. We split the sample into two, making 1,000 interviews in the area within 100 miles of the coast, and the other 1,000 in the rest of the state. Only about 31 per cent of the population resides within the 100 mile limit; but as you see we over-sampled it by allocating 50 per cent of the interviews to it. Of course, when we combined the results from all over the state, we weighted the coastal sample and the inland sample into their proper population proportions. Within each section, counties and cities were scientifically selected as interviewing localities, then blocks and households were selected. There are many other sampling details we cannot cover here.

Interviewing

The design of the interviewing process for the survey was controlled by this situation: first we had to locate the households drawn into the sample; then within those households we had to find the salt water fishermen. So we designed two questionnaires:

1. The first was designed for an interview with a responsible adult in the household who could tell the interviewer who lived there, and of those, who fished in salt water.
2. The second questionnaire was designed to interview the individual fishermen found, to elicit their fishing experiences.

In many households we made no fishermen interviews. In some salt water fishing households we interviewed five or six fishermen.

First of all, to gain full cooperation, the interviewer -- who incidentally had gone through intensive training -- displayed a letter from Mr. Dodgen which explained the survey. We got nearly a hundred per cent cooperation. No trouble at all -- in fact, the biggest trouble was getting fishermen to stop talking.

The household questionnaire provided for a complete listing of the residents, their classification by sex, age, and whether they do any fishing or hunting. Another portion of the questionnaire recorded whether anyone had killed deer, turkey or quail -- we are experimenting to see whether any adult in the household can tell us about the hunting done by other members of the family. And a place to record when salt water fishermen in the household could be interviewed individually.

The individual fisherman questionnaire started with questions about the fisherman's general experience which he could answer easily. He was asked whether he had ever caught any redfish, speckled trout, flounder, drum, or shrimp listed on a card. And he was asked by what method as he was shown another card listing the various methods. He was allowed to expand on his fishing success by mentioning other species of salt water fish he might have caught.

While not all of these questions were relevant to the specific objectives of the survey, together in sequence they served to put the respondent in the proper frame of mind to answer the more pertinent questions on actual catch that followed.

The interview continued with a battery of questions that carefully orientated the fisherman as to the areas where he fished, with the aid of a map of the coast marked into the segments significant to the Commission; the months when he fished, with the aid of a calendar clearly indicating the twelve months of 1957 and 1958 we wanted to measure; and the species involved in the study.

The entire procedure emphasized the reconstruction of actual events and behavior connected with the events. It limited the questioning to one thing at a time: where, when, and details of the particular catch.

This basic psychological approach to drawing out the fisherman's testimony we regard as one of the most important contributions to the validity of the data.

One more important measure was incorporated into the questionnaire design: the fisherman was required to estimate both the total weight and the average length of the species he caught in a given month and in a given area. Later we used this information, as we have mentioned, to deflate exaggerations.

This we did by adjusting some of the reports of fishermen to limits of weight and length relationships based on a study by John C. Pearson in which he has reported statistically actual measurements of various species. The process is rather involved and is reported fully in our report to the Commission. Should we do another similar study, we can apply much of what we have now learned to make many of these adjustments automatically while getting the data from the fisherman -- that is, we have learned how to improve the questionnaire to keep him within bounds.

Most importantly, from a technique point of view, we believe it has now been demonstrated that the personal interview approach is certainly adaptable to the problem.

The Results

Nearly three-quarters of a million Texans -- 748,000 -- went salt water fishing somewhere along the Texas coast during the twelve months from September 1957 through August 1958.

Slightly more than half a million -- 539,000 -- of these non-commercial fishermen accounted for the twelve-month harvest of speckled trout, redfish, drum, flounder and shrimp.

Estimates of the total harvest of speckled trout, redfish, drum and flounder taken by Texas sports fishermen are these:

Species:	Number Caught	Pounds Caught
Speckled Trout	17,135,000	20,905,000
Redfish	6,916,000	9,199,000
Drum	2,250,000	4,343,000
Flounder	1,621,000	2,577,000

It is essential for you to bear in mind that these estimates are not exact; since they are based on a sampling of the population they should be interpreted within the tolerance range allowed. Because of the small number of persons reporting shrimping, only a rough estimate of about three million pounds was possible.

We understand that these estimates confirm something long suspected by marine biologists and other conservation authorities: that the sportsman's harvest of these fishes is considerably in excess of the commercial catches.

To pinpoint areas where fishing pressure is heaviest and where on the coast the catch of each species is greatest, we have summarized the harvest findings in the table that follows.

The share of the total catch of each species that was taken from each area is shown.

Area of the coast:	Per Cent of Total Fish Caught				Pressure: Per Cent of total fishing days
	Speckled Trout	Redfish	Drum	Flounder	
Galveston-Freeport ..	31%	40%	30%	51%	36%
Corpus Christi-Aransas .	30	25	34	18	31
Laguna Madre	18	12	19	7	14
Matagorda.....	18	19	10	16	13
Sabine	3	4	7	8	6
	100%	100%	100%	100%	100%

The Galveston-Freeport area produced more redfish and flounder than any other region of the coast. Both the Galveston-Freeport and the Corpus Christi-Aransas areas lead in the speckled trout and drum harvests, each section accounting for nearly equal amounts. The Sabine, Matagorda, and Laguna Madre areas all yielded relatively smaller portions of the total catch.

A good measure of the pressure being placed by sportsmen on various areas is the percentage of total fishing days spent in each area.

To summarize the pressure that fishermen are placing on the various coastal areas: two-thirds of all salt water fishing is done in two areas; Galveston-Freeport and Corpus Christi-Aransas. These two areas also account for roughly two-thirds of the catch of the four species.

Obviously, people do most of their salt water fishing in the area of the coast that is closest to where they live. As a general rule, this was true particularly for people who live within 100 miles of the coastline. However, those who live further inland showed a definite preference for the Corpus Christi-Aransas area, regardless of where they live.

When is the best time for each species? There are two ways of looking at this question:

1. The months when the total catch of each species was the largest, and
2. The months when fishing was relatively most productive, that is, when more fish were caught per total days of fishing activity.

These months stood out, from both standpoints:

Species:	Heaviest Catch Months	Relatively Most Productive Months
Speckled trout	June July August	February
Redfish	September	September
Drum	August September October	October November

June, July and August yielded the biggest catches of specked trout, but the February catch was the best when it is related to the number of fishing days Texas sportsmen spent wetting their hooks that month. September was the best month for redfish from both the standpoint of volume caught and days fished.

August and fall were all good for drum, best months being October and November. The pattern for flounder was much the same as for drum, the biggest volume being taken in August, September, and October, the last month being the best.

The average salt water fisherman in Texas went fishing in the bays and Gulf along the State's coast nine times during the twelve month period. This average is heavily weighted by those living within 100 miles of the Coast; they fished about twelve days a year, compared to an average of five for all the fishermen living farther away.

These are but the main findings from the great wealth of detail that the study produced. The complete results are available to you in the full report submitted to the Game and Fish Commission of Texas.

####

GULF STATES MARINE FISHERIES COMMISSION
New Orleans, Louisiana
Monteleone Hotel
March 19-20, 1959

(COPY)

"RESULTS OF JANUARY 23, 1959 MEETING OF COMMITTEE TO CORRELATE RESEARCH AND EXPLORATORY DATA, ON FISHERY STATISTICAL PROGRAM"

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

Last October at the Biloxi meeting of this Commission Dr. Clare Idyll presented a topic entitled "A Biological Appraisal of Gulf Fishery Statistics." In order to refresh our memories a bit, I would like to repeat two of the introductory paragraphs from his talk.

> "A few simple souls ... find statistics not dull, but alive and full of meaning. Even people in the fishing industry suddenly see something different about landing figures and other fishery statistics when their livelihood is involved. This is because statistics can play a large part in decisions concerning the need for and the kind of regulations applied to commercial fisheries; concerning disputes between commercial and sport fisheries; justification for channel building or deepening; the value of a marine resource whose existence is threatened by dredging and other onslaughts of population growth.
>
> "Even more dependent on statistics is the fishery scientist. If you limit the scientists task to the working out of the life histories and the ecological relationships of the animals in the fishery, then he can do a fine job of pure biology without looking at a table of landings. But this is much too narrow a concept of his responsibility, which is to provide information which permits administrators to manage the resource effectively. In such circumstances the fishery scientist cannot operate without statistics, and these have to be the very best that the money and available manpower will provide." (Emphasis added.)

In compliance with a resolution adopted at the Commission Executive Session at the same meeting the Committee to Correlate Research and Exploratory Data met in New Orleans in January. Those present were Messrs. Dudley Gunn, Ed Iversen for Florida, Percy Viosca for Louisiana, Charles Lyles and George Snow for the Federal Government, Albert Collier of Texas A & M, and myself. The States of Alabama and Mississippi were not represented.

There was general agreement on the type of information needed. There was the same agreement that the information needed is not being obtained. Florida, at the present time, is the only Gulf State endeavoring to measure the catch per unit of effort which is the most desirable system, at least for our present needs.

In addition to the type of information needed, there was agreement on the most practicable method of getting it. Here again Texas and Louisiana were embarrassed to have to follow the example of Florida. The "fish ticket" which Dr. Idyll described last October is designed to provide the basic necessary information in a form that will be the least trouble for the person reporting. This is an example of such a ticket:

SOGGY SEAFOODS CO., INC.
SAND DUNES, TEXAS No. 1234

(Space for I B M coding of information.)

County in which fished _____ Date _____

Area fished _____ Fishermen purchased from _____

No. of days in trip _____ Boat name _____

No. of fishermen _____ Gear type & Quantity _____

	Kind	Qty.	Unit Price		Kind	Qty.	Unit Price
1.	Redfish			19.			
2.	Trout			20.			
3.	Flounder			21.			
4.	Drum			22.			
5.	Mullet			23.			
6.	Redsnapper			24.			
7.	Grouper			25.			
8.	Whiting			26.			
9.	etc.			27.			
10.				28.			
11.				29.			
12.				30.			
13.				31.			
14.				32.			
15.				33.			
16.				34.			
17.				35.			
18.				36.			

As you can see only basic data is requested. More detail such as size range of the fish, actual time devoted to fishing, mesh size of the net and etc. might be desirable but for the present it is felt that this information would suffice.

Already some of you may be saying that the reports would not come in any more regularly or with anymore accuracy than at present. This is where the

stinger lies. Personal contact by an individual to urge complete voluntary cooperation is essential to the successful working of this or any other program.

Following the requests of this Commission, the U. S. Fish and Wildlife Service instituted a program of shrimp research some years ago. Included in that program is a more intensive statistical gathering plan. It is indeed fortunate for us and the shrimp industry that this part of the program is continuing and is being well handled. However, there are other fisheries which are equally important to the several Gulf States and which are being grossly neglected. It is in the interest of proper management of these resources that the committee is seeking your help. As an example of the neglect referred to let me cite our own efforts in Texas.

At the present time Texas reports some 3,000,000 pounds of food fish, 59 million pounds of menhaden, and 65 million pounds of shellfish. In gathering, compiling and publishing the information we spend about $1,000 per year. In other words for every 127,000 pounds of fishery products reported to us we spend only one dollar for "book-keeping". The Federal government is expending many times that amount just to get adequate reports on 64 million pounds of our shellfish or shrimp.

The committee suspects that in some other States the condition is not now much better.

In addition to our own meager efforts, the Corps of Engineers and the Bureau of Sport Fisheries and Wildlife come into our States and make surveys prior to undertaking a project. The very nature of the survey leads to inaccuracies, yet the survey is necessary because detailed and accurate reporting does not now exist. Fishery statistics should be collected by the States since primary responsibility for management is vested in the States. We cannot afford to wait three years for statistics to come out of Washington and we should not wait for the Federal government to do this work that is our responsibility.

Without boring you further by going into the detailed mechanics of the program I should like to pass these recommendations on for the Committee. We would like for you as a group and as representatives of the individual States to give very serious consideration to their adoption and not to consider them as just "passed on".

First: We recommend for each State the establishment of a statistical section to be housed or closely associated with the research division. This will call for at least one full time employee and in some cases more.

Second: Establish a uniform coding system in order that results may be utilized to the best advantage by all States and Federal agencies.

Third: Allow voluntary co-operation and avoid compulsory reporting.

Fourth: In some way measure the non-commercial yield of the resources. This should include not only the harvest by the sportsman but also the bait industry.

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
New Orleans, Louisiana
Monteleone Hotel
March 19-20, 1959

"ESTUARINE TECHNICAL COORDINATING SUB-COMMITTEE REPORT, GULF COAST RESEARCH LABORATORY, OCEAN SPRINGS, MISSISSIPPI: JANUARY 21, 1959"

Dr. Philip A. Butler
Bureau of Commercial Fisheries
Gulf Breeze, Florida

Committee members: Philip A. Butler, Bureau of Commercial Fisheries; Theodore Ford, Louisiana Wild Life and Fisheries Commission; Robert Ingle, Florida State Board of Conservation.

Guests: Albert Collier, Texas Game and Fish Commission; Dudley Gunn, Gulf States Marine Fisheries Commission; Gordon Gunter, Gulf Coast Research Laboratory.

The purpose of this meeting was "to evaluate and organize" listings of unpublished research dealing with estuarine problems in the Gulf of Mexico area. Various private, federal, and state agencies had cooperated fully in searching for and submitting lists of their reports to the Commission. More than 40 single spaced typewritten pages of titles were submitted, most of them annotated. It was obvious from the variety of titles received, that to be most useful, the listings in the proposed bibliography would have to be both simple and at the same time comprehensive.

The committee realized that in view of the large number of papers submitted and in the absence of a special editorial staff, the project would have to be so organized that its publication would impose no undue burden on any one agency. At the same time, it should have wide enough distribution so as to be readily available to workers in these fields. The committee has also taken into consideration the important fact that with any bibliography, as soon as it is published it is on the path to being obsolete. With this in mind, we have selected an open filing system to which new titles can be readily added as they appear without disturbing the basic organization.

Some of us felt that the inclusion of already published titles even though not included in other bibliographies, would slow up the accomplishment of our primary aim. Therefore, we are suggesting that entries in this first edition, at least, include only the following:

1. Reports that have not been circulated outside of the originating agency, or have had only a limited circulation,

2. Collections of organized data that have not been analyzed, and

3. Current, clearly defined research projects both public and private with estimated completion dates.

The system which we propose for your consideration is illustrated on the

concluding pages of this report.

For example, a report of research findings in Alabama would be grouped with others from that area and numbered chronologically in the 1000- series. Similarly, a report covering Gulf-wide research would be placed in the general category in the 7000- series, and so on.

Each entry will be classified as to subject matter and listed in the index in as many places as seems necessary. A report on an oyster reef survey might be indexed also under geographical location, under oyster drills, perhaps under blue crabs, etc. The usefulness of this bibliography will increase in proportion to the care with which the papers are indexed.

In order to increase the accuracy and uniformity of the listings, we suggest that each agency submits its titles on 3 x 5 cards similar to the one shown below. In the future, such cards would be mailed to the Commission's secretary. When enough were on hand, it would be a relatively simple matter for a clerk to group them by areas, number them and make the necessary additions for the subject index. This material would then be mimeographed and distributed for insertion in the original publication.

In this way, the bibliography could be kept current with a moderate expenditure of time and money. As to actual costs, we can't estimate labor in advance, but it will be possible to mimeograph one hundred copies of a one hundred page bibliography at a material cost of less than 35¢ per copy.

If a publication following these suggestions is adopted, it would be possible to have the entire project completed in about a month. However, examination of lists already submitted shows some glaring omissions. We feel that the bibliography will be far more worth while if we can collect entries of the following types.

1. Reports from state university laboratories which are lacking in many instances.

2. Descriptions of collections of data such as continuous hydrographic records made at many laboratories, and also, cruise data from oceanographic and exploratory vessels operating in the Gulf.

3. Titles of research projects which private industries have underwritten in various sections of the Gulf,

4 And finally, titles of major research projects, currently underway, but which have not yet been reported.

To obtain a reasonably complete coverage in all of these fields, the publication committee will probably require an additional two months to get the bibliography into your hands.

(Butler, #3)

SAMPLE

It is contemplated that material will be mimeographed and distributed to interested agencies for filing in looseleaf notebooks. Entries will be grouped by geographical areas and numbered chronologically. A subject index will be prepared initially and reissued as the number of new entries warrants it. Accession numbers will be assigned by areas so that additions can be made from year to year without disturbing the organization of the volume.

Suggested accession numbers:

Alabama	1000-	Mississippi	4000-
Florida	2000-	Texas	5000-
Louisiana	3000-	Mexico	6000-
		General	7000-

Suggested format of subject index:

Bacteria
  sulfate reducing, 5027

Barataria Bay
  drill survey, 3072
  hydrography, 3041

Birds
  waterfowl
    breeding, 3041
    mortality, 3008

Fish
  bibliography, 5030
  economic surveys, 2004, 6197, 7114

etc.

Suggested format of accessions:

Texas (cont.)

5024 Baker, B. B., 1950. Oyster Investigations. Ann.Rept.Mar. Lab., 1949-50., mimeo, 22pp. Environmental study of reefs in Rockport area; reproductive activity, growth and hydrographic data. Texas Marine Lab., Rockport, Texas.*

5025 Bates, Charles . C, 1953. Physical and geological processes of delta formation. Ph.D Dissertation. Texas A & M College

*Agency or person having manuscript available is underscored.

(Butler, #4)

Suggested format for submitting future entries:

Author	-	Person or agency.
Date	-	When work was done.
Title	-	Include number of pages, charts and figures; processing.
Annotation	-	Not necessarily an abstract but enough to show scope of work to person not familiar with it.
Subject	-	One or more key words for indexing purpose.
Location	-	Where manuscript may be obtained.

GULF STATES MARINE FISHERIES COMMISSION (COPY)
New Orleans, Louisiana
Monteleone Hotel
March 19-20, 1959

"THE ESTUARINE ATLAS (SUMMARY)"

I. B. Byrd
Alabama Department of Conservation
Montgomery, Alabama

A considerable amount of work has already been done in the Estuarine Areas along the coastal areas of the Gulf States. However, much more study is needed in these areas to determine their value to fish and wildlife. Also, a considerable amount of work is needed to determine the effect of man-made projects on the fish and wildlife species in these areas.

Because of the over-all value of the Estuarine Areas including their use for spawning grounds, recreational and industrial purposes, the waters of our Estuarine Areas are probably more valuable than any other waters, whether they be fresh or salt, in our coastal states. The actual value of these areas is probably beyond the imagination of all of us here today.

As of this date, the work of the Gulf States Estuarine Technical Coordinating Committee has been confined primarily to the following projects:

1. The listing of all published work that has been done in the Estuarine Areas of the Gulf States.

2. Preparation of annotated bibliography of all unpublished work that has been done in the Gulf States Estuarine Areas.

3. The preparation of an Atlas of all of the Estuarine Areas of the Gulf States.

For the most part, Project 1 and 2 have been completed. However, because of the vast amount of information needed for the Atlas, particularly in some of the larger states, this Project is still in progress. However, most of the states have their Atlas nearly completed.

The purpose of the Atlas is to list basic information needed prior to the establishing of a priority on the Estuarine studies that are most needed in the Gulf States. When the Atlas is completed, it will contain the following information on all the Estuarine Areas in all of the Gulf States:

1. List of Major Estuarine Areas:
   a. Location
   b. Surface acreage

2. Maps:
   a. Provide base maps (U.S.C. & G.S. series at scale of 1:80,000)
   b. Availability of aerial photos
   c. Type maps (vegetative)

3. Broad average hydrographic features:
   a. Salinity range
   b. Temperature range
   c. Depth range
   d. Bottom type
   e. River flow
   f. pH

4. Important fish and wildlife species and their value:
   a. Commercial fishery
   b. Sport fishery
   c. Wildlife

5. Other uses:
   a. Navigation
   b. Mudshell and minerals
   c. Waste disposal
   d. Use as industrial cooling water
   e. Industrial use in extraction processes
   f. Recreational (other than fish and wildlife)

6. Developmental status:
   a. Projects completed
   b. Projects under construction
   c. Projects authorized
   d. Projects proposed

Although Alabama has the shortest coastline of the Gulf States, the annual value of the fish and wildlife species of the Estuarine Areas of Alabama has been estimated at $10,000,000. The annual value of its commercial fisheries is about $4,000,000 and the annual value of oyster shell dredging is about $2,500,000. These are only a few of the many values obtained from the Estuarine Areas.

In Texas the annual value of the Estuarine waters has been estimated to be about $150 per acre and this is no doubt a very conservative estimate.

Several months may pass before the Atlases of all the Gulf States are completed. However, it must be understood that the personnel who are compiling the data for these atlases already have a full work load of other active projects. At the same time, the Estuarine Committee is fully aware of its responsibility and its members realize that the preparation of the Atlas will be a valuable contribution. Once the Atlas is completed for all States, everyone should be in a better position to "pinpoint" needed research work.

GULF STATES MARINE FISHERIES COMMISSION
New Orleans, Louisiana
Monteleone Hotel
March 19-20, 1959

Panel Discussion: GSMFC Informational Series No. 2
The Shrimp Fishery Of The Gulf of Mexico
(Rio Grande River to St. Marks, Florida)

Discussion Leader: James N. McConnell
La. Wild Life and Fisheries Commission
New Orleans, Louisiana

Panel: Albert Collier
Texas A&M College Laboratory
Galveston, Texas

Gordon Gunter
Gulf Coast Research Laboratory
Ocean Springs, Mississippi

Robert Ingle
Fla. State Board of Conservation
Tallahassee, Florida

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

SUMMARY OF TRANSCRIPT

Secretary's Note

For comment, a preliminary draft summarizing the discussion has been sent to those who participated.

Upon receipt of all comments, a final copy of the summary will be prepared and mailed for attachment to these minutes.

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
New Orleans, Louisiana
Monteleone Hotel
March 19-20, 1959

"TECHNOLOGY OF THREAD HERRING, OPISTHONEMA OGLINUM, AND GIZZARD SHAD, DOROSOMA CEPEDIANUM"

Travis D. Love and Mary H. Thompson (the former making presentation)
Bureau of Commercial Fisheries
Pascagoula, Mississippi

The Gulf States Marine Fisheries Commission, as early as 1955, signified interest in measuring the potential of the sardine-like fishes and anchovies in the offshore waters of the Gulf and the utilization of such species. In fact, the commission adopted a resolution to this effect at its meeting in Clearwater, Florida, October 1955. It was not until late in 1957, when technological laboratory facilities were established, that studies on these species could be locally undertaken. Almost at the outset of our technological program, thread herring, one of the species, was the subject of technological studies at the new laboratory. At that time, in January 1958, no attempt was made to can the fish in a sardine-like pack. Proximate composition analyses were made by the chemist to secure data for the industrial fish industry which, even then, had all the earmarks of the rapid expansion which we have recently seen take place on the Gulf.

The species was again sampled in January, 1959, by the Gulf Exploratory Unit and chemical analyses were again made. All chemical data on the two fish will be presented in table form at the end of this discussion. At this latter time we were processing sardines from other species and a few cans of thread herring were included. These few cans were judged by a taste panel as satisfactory. Later two larger packs of about thirty cans each were produced and distributed to members of the industry and other interested parties. We have here at the meeting for your examination and taste testing an additional thirty cans of these sardines.

The simple method of which these sardines are canned is as follows:

1. With scissors the fish are deheaded, the sharp razor belly portion and tail clipped off.

2. A small amount of washing and hand cleaning in warm salt water removes the scales and viscera.

3. Brining in 10% salt water at room temperature for 30-40 minutes toughens the flesh.

4. The drained fish are hand packed 5 to 5½ ounces into ordinary sardine cans and steamed for ten minutes at five pounds of steam pressure

5. The cans are drained of excess liquid and machine closed at 130° F.

(Love and Thompson, #2)

6. In order to soften the bones a process time of 50 minutes at 12 pounds of steam and 238° F. is recommended. Commercially the pressure cooling in water method is necessary in lowering the temperature in order not to damage the cans. We do not have the equipment for this method but instead carefully control the temperature reduction in a bacteriological autoclave without too much damage to the cans.

(I will note here that the thirty cans presented for your taste panel have been varied by having 10 produced as described above, 10 without draining plus ½ ounce peanut oil, and ten cans drained well plus ½ ounce peanut oil.)

In January, 1959, we also received samples of a so-called thread herring, Dorosoma cepedianum, better described as Gizzard Shad. These samples were presented by the two members of the Gulf Fisheries Investigation now attached to the Gulf Exploratory Unit for collaborative work. The Gizzard Shad were taken from a pet food sorting belt after being unloaded for a local trawler.

Chemical analyses were made on these fish, but no attempt has been made as yet to can them. This proximate analysis data has previously been presented in Commercial Fisheries Review, Technological Supplement Vol. 21 No. 2a or is now is press. Therefore, no attempt will be made to discuss this data at the present time. All chemical data on the two fish are shown as follows:

Species	Date	Oil	Protein	Moisture	Ash
		Percent	Percent	Percent	Percent
Thread Herring Opisthonema oglinum	Feb. 1958	8.1	18.9	69.3	3.24
	March 1958	5.0	19.4	70.4	4.59
	Aug. 1958	3.5	18.6	74.4	3.27
	Jan. 1959	3.2	16.0	77	2.9
Gizzard Shad Dorosoma cepedianum	Jan 1959	20.7	14.6	62.2	2.59

(COPY)

GULF STATES MARINE FISHERIES COMMISSION
New Orleans, Louisiana
Monteleone Hotel
March 20, 1959

"MEETING OF ESTUARINE TECHNICAL COORDINATING COMMITTEE"

Howard T. Lee, (Chairman)
Texas Game and Fish Commission
Rockport, Texas

Present Alabama: I. B. Byrd, W. L. Holland

Florida: R. M. Ingle, H. E. Wallace

Louisiana: None

Mississippi: G. Gunter

Texas: H. T. Odum, H. T. Lee

Bureau of Commercial Fisheries: S. H. Thompson, H. H. Eckles

Bureau of Sport Fisheries and Wildlife: W. A. Gresh

Numerous visitors

The sub-committee report on preparation of the bibliography was discussed and adopted. S. H. Thompson offered to have final copies reproduced for limited distribution. The "binding" is to be loose-leaf so that additions and deletions may be made from time to time. Each state or agency will furnish the binders for the total number of bibliographies to be distributed within that state.

Discussion of the form and stage of preparation of the atlas was then discussed. I. B. Byrd's presentation to the commission on the previous day elicited much favorable comment and several points which he had brought out were discussed briefly. Texas presented copies of the charts prepared for their coastline to those members present. After an explanation of symbols and methods used, it was decided that the same general methods should be used by the other states.

The Chairman made an effort to resign and did in fact do so. This abortive attempt was foiled by renomination and a motion that nominations cease.

A proposal that copies of an outline for needed research be submitted to the commission was discussed. It was decided that the Chairman should draw up a recommendation to the Commission which that body might adopt as a resolution. Time did not allow completion of that recommendation.

The meeting adjourned to attend the final general session and set the next meeting date as October 15-16, 1959 in Corpus Christi, Texas.