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THE EDUCATIONAL VIEW

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TEXAS MARINE RESOURCES

THE EDUCATIONAL VIEW

A Consensus Report of
"EDUCATIONAL PROGRAMS IN MARINE AFFAIRS: THE UNIVERSITY VIEW"
A Workshop for Texas Colleges and Universities
Held at Texas A&I University
Kingsville, Texas

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FOREWORD

This report represents a summary statement of the second Texas A&M Sea Grant Workshop, "Educational Programs in Marine Affairs: The University View". The meeting was a continuation of a series of working sessions designed to learn the views of various groups concerned with the development of marine resources in Texas. Similar workshops have been held with industrial users of marine resources, recreation and tourism development, Texas port development, and law and administration of the coastal zone. Others are planned for banking, finance, and land use.

We acknowledge the assistance of Texas A&I University, Kingsville, which generously provided meeting rooms and other facilities for the workshop.

The statement issued here is one of consensus. It should not be assumed that all the ideas were unanimously voiced by all participants or that each individual subscribes to every detail.

It is the intention of the Texas A&M University Sea Grant Program that this statement may stimulate the growth of marine resources and related educational programs in the state. Comments and discussion on the material presented here are welcome.

JOHN C. CALHOUN, JR.
Director, Sea Grant Program
Texas A&M University

May, 1970

INTRODUCTION

Forty three representatives from Texas junior colleges, four-year institutions and governmental agencies met on the campus of Texas A&I University, Kingsville, Texas, December 11-12 to discuss and identify the needs of the Texas Gulf coast region for educational programs related to marine resource development. The workshop, entitled "Educational Programs for Marine Affairs: The University View," was the second in a series of Texas A&M University Sea Grant Program sponsored meetings designed to explore the needs and programs of the state in marine affairs.

The attendees to the meeting were chosen by the president of each college and university who had received an invitation letter from the Sea Grant Office. The purpose of the workshop was to discuss the problems of marine resource education, exchange views, present analyses, and arrive at recommendations which might be of interest to the Texas Coordinating Board, other state agencies, or to the National Science Foundation relative to the needs for marine resources education. It was also hoped that attendance at the workshop would enhance the role of each institution represented.

Opening remarks by Dr. John C. Calhoun, Jr., Vice President for Programs, Texas A&M University, and director of the Sea Grant Program; Mr. Terrance Leary, Parks and Wildlife Department, State of Texas; Miss Floy Johnson, Director of Educational Research, Senior College Division, Coordinating Board, Texas College and University System; and Mr. Robert B. Abel, Director, National

Science Foundation Sea Grant Program, provided background information on state marine activities.

A nine-man panel presented informal remarks giving personal observations and opinions concerning the needs and levels of marine educational programs. Following the panel discussions, representatives from various Texas schools briefly described their existing programs in marine affairs. Coupled with the opening sessions, these presentations provided background information for the workshop discussion groups which were to follow. In addition, attendees had received a booklet of material containing questions to be considered in the discussion sessions, general information on the National Science Foundation Sea Grant Program, information relating to the Texas Interagency Natural Resources Council, and the recommendations pertaining to the role of educational institutions in marine resource development as presented by the President's Commission on Marine Science, Engineering and Resources. Selected readings in marine resource development were also part of the information booklet.

During the second day of the workshop the group was divided into three small groups to discuss the questions presented in the background information booklet and other questions generated during the presentations of the preceding day. It was within the small groups that consensus statements and specific recommendations for the state's educational program in marine resource development were formulated.

Summary statements from each discussion group culminated the workshop activities.

Panel participants included (l. to r.) Prof. Joseph C. Crump, University of Houston, Dr. John C. Calhoun, Jr., Texas A&M University, Mr. Robert B. Abel, National Science Foundation, and Dr. R. J. Williams, Del Mar College.



OCEAN PROGRAMS

Selected speakers, representing the Sea Grant Program, the State Interagency Natural Resources Council, and the Texas College and University Coordinating Board, provided insight into the existing programs in marine resource development in Texas.

Mr. Leary, Texas Parks and Wildlife Department, explained the wide spectrum of interest by state agencies with respect to the coastal zone. He pointed out that until recent years there was little state coordination; each agency acted on its own. With the creation of the Interagency Natural Resources Committee, an attempt for coordination has been made. Specifically, he mentioned the Water Oriented Data Committee as a subcommittee of the Council, and he described its effort to catalog water resources data for all Texas counties, beginning with Brazoria county.

He also spoke of the Coastal Study Committee and the *Annotated Bibliography of Resource Use—Texas Gulf Coast* which has been prepared by the Texas A&M University Sea Grant Program for the Committee. Other activities of the Committee include a review of coastal zone legislation which is being done by the Attorney General's Office, and an estimate of planning costs for the total study which is being used as a basis for moving ahead. An appropriation of \$200,000 has been made for the study and matching funds are being sought. He indicated that a staff was being recruited to manage the Coastal Study Program. Universities and agencies will probably be asked to submit their goals for coastal zone development soon.

He pointed out that there exists a great need within state agencies for technically trained people. These people should be from within the state rather than from outside areas since they will already be familiar with many of the problems to be solved. He also indicated need for a comprehensive study of the Gulf-bay circulation systems and for greater outdoor recreation facilities. Mr. Leary also described a few programs of his agency available to students for summer employment.

Mr. Abel described the present funding problems for national ocean programs but pointed out that the Sea Grant program is not limited drastically from lack of funds.

Specifically, within the national Sea Grant program, he seeks more support from industry, state governments, and private foundations. He expressed sympathy for university research administrators who are facing increasing demands by government agencies for interdisciplinary activities.

The supply-demand situation in ocean manpower is rapidly reaching a saturation level, he remarked. Twelve to fourteen persons are currently enrolled in oceanographic and related curricula for every one thus enrolled in 1960. This is complicated by the fact that employment is being restricted due to limited government funds. Nevertheless, he sees continuing demand for chemical oceanographers, ocean engineers, oceanographic technicians, and skilled administrators.

Through the National Science Foundation's Sea Grant Program, 30 projects are directed toward the training of engineers and technicians. Feedback is needed to determine if these programs are producing useful employees, and if, in fact, the demand for their services is sufficient to justify continuation of these programs.

For the future, Mr. Abel sees the National Science Foundation playing a stronger role in funding applied sciences.

Speaking for the Coordinating Board staff, Miss Johnson pointed out that there are gaps in the state's marine education programs. Established in 1965, the Coordinating Board has the responsibility for planning and providing leadership and coordination among the state's senior college educational programs. She indicated that Texas A&M University has pioneered in marine related educational programs for the state through its graduate degree program in oceanography. Other kinds of manpower are also needed, however. The recently approved Lamar State College of Technology degree program in oceanographic technology was cited. Graduates of this program which begins in the Spring Semester 1970 will qualify for placement in grades 5-7 in the Civil Service classification.

Miss Johnson expressed the view that Texas A&M is to be complimented for its inter-institutional cooperation and its cooperation with other schools such as Del Mar College, Galveston College, and the Marine Biomedical Institute. She also pointed out that industry has generously supported the University's marine programs.

Up until now, the Board has been in a position of reacting to initiatives of universities in the area of marine resources. The Board Staff, however, is now preparing a policy statement on the State's geosciences education program and may take active participation in the development of educational programs in the future.

The Panel Discussion. Participants in the panel discussion held following the keynote presentations were selected because of their expertise and knowledge of marine affairs and because their institutions provide programs in marine resource education. Participants included:

Dr. R. J. Williams, Del Mar College
Dr. Donald E. Wohlschlag, Marine Science Institute, University of Texas
Dr. Robert Lankford, Rice University
Dr. Thomas W. Lins, Lamar State College of Technology
Dr. Alan Lohse, University of Houston, Gulf Universities Research Corporation
Mr. James Frazier, Galveston College
Mr. Robert Abel, National Science Foundation
Mr. Joseph R. Grump, University of Houston
Mr. Donald Walsh, Texas A&M University

Panel members spoke of the educational content of high school oceanography courses and raised the question of teaching methods and curricula. A need for the education of parents and counselors to avoid discouraging students from science fields exists. A strong undergraduate science program at the B.S. level, with degrees in oceanography at the graduate level were felt by most of the panelists to be the best approach at the college level. A need for well trained technicians and for more graduates in marine sciences was expressed. The possibility of split major fields at the B.S. level for marine sciences—such as engineering and geology—was discussed.

The scope and content of the marine sciences needs to be defined and clarified for the educational community, one panelist remarked. Geosciences as a specialization area for teaching certification would be a strong move to strengthen high school science. Facilities to put high school students and teachers into the marine environment would be desirable.

Panelists felt that the State's ocean programs should be built on existing programs rather than by creating separate new programs. The need for many different professions studying the seas was recognized. A Marine Law Center and a "Man in the Sea" program which would serve a broader audience was suggested. Long range plans for coastal use need to be based on scientific knowledge. Lack of facilities for greater ocean work were recognized as a major drawback in the State's ocean program. A study of jobs and opportunities in marine resource development is an essential element in planning for educational programs.

Technician programs slanted toward electronic engineering form the basis for technician program at Del Mar College. This approach attempts to place academic courses in a more favorable position for transferring credits to other institutions. At Lamar State College of Technology a four-year B.S. program in Oceanographic technology has been designed to fill the growing need for an undergraduate ocean engineering course of study.

Frequent references to the Sea Grant Program at Texas A&M University prompted questions as to the role and scope of that program and the relationship between a broad based institutional award and other forms of Sea Grant awards. The NSF policy for initiation of institutional awards was not fully understood by everyone present. Clearly, however, neither project awards nor institutional awards can be fully responsible to all oceanographic and marine needs of the state. But, in accepting a Sea Grant Institutional award, Texas A&M University has accepted the responsibility to develop useful marine programs for the state and to obtain the cooperation of other institutions and agencies of the state in executing these programs.

Existing Ocean Education Programs. In order to inform workshop participants of educational programs already underway representatives from Texas colleges gave brief overviews of ocean-oriented curricula. These presentations were not meant to be a complete inventory of Texas educational programs but rather a sample based on the experience of the attendees.

Texas Maritime Academy's two courses of study—Marine Engineering and Marine Transportation—were described by Rear Admiral J. D. Craik, Superintendent of the Academy. With an enrollment of 133 students, the Academy is a part of Texas A&M University and has already begun plans for classroom and dock space at the Moody Marine Institute on the University's Mitchell Campus. One summer cruise aboard the 15,000 ton *Texas Clipper* gives junior and senior students actual sea-going experience.

The Marine Biomedical Institute was explained by Dr. Stewart Wolf. Jointly sponsored by the University of Texas Medical Branch at Galveston and Texas A&M University, the Institute's initial program is geared toward research, exchange, and graduate education related to comparative neuroscience, physiology and the ocean environment. One of the Institute's current projects concerns work with Tektite II, an underwater habitat study to be

conducted in 100-foot water depth off the Virgin Islands.

Galveston College is involved in the training of technicians for ocean work through the Sea Grant Program of Texas A&M University. Two programs are offered: a two-year oceanographic instrument curriculum and a one-year deck and fisheries training curriculum which provides instruction to marine oriented mechanics, welders, and riggers. Technicians are trained in actual ship-board operations aboard the school's 50-foot *Mariner*. Students learn to make emergency repairs and to assist scientists and engineers in operating instruments and in recording data. Capt. Hank Rowe is in charge of the program.

The University of Texas Marine Science Institute at Port Aransas is concerned with graduate education and marine research. Dr. Donald E. Wohlschlag, director of the Institute, described the objectives of the program and pointed out that limitations in space and facilities were a major problem with the program. A recently announced expansion plan will help alleviate this problem. At the present time formal courses are offered in the summer at Port Aransas and in the winter and spring at the Austin campus.

University of Houston's marine-related work in geology and engineering was explained by Pro-

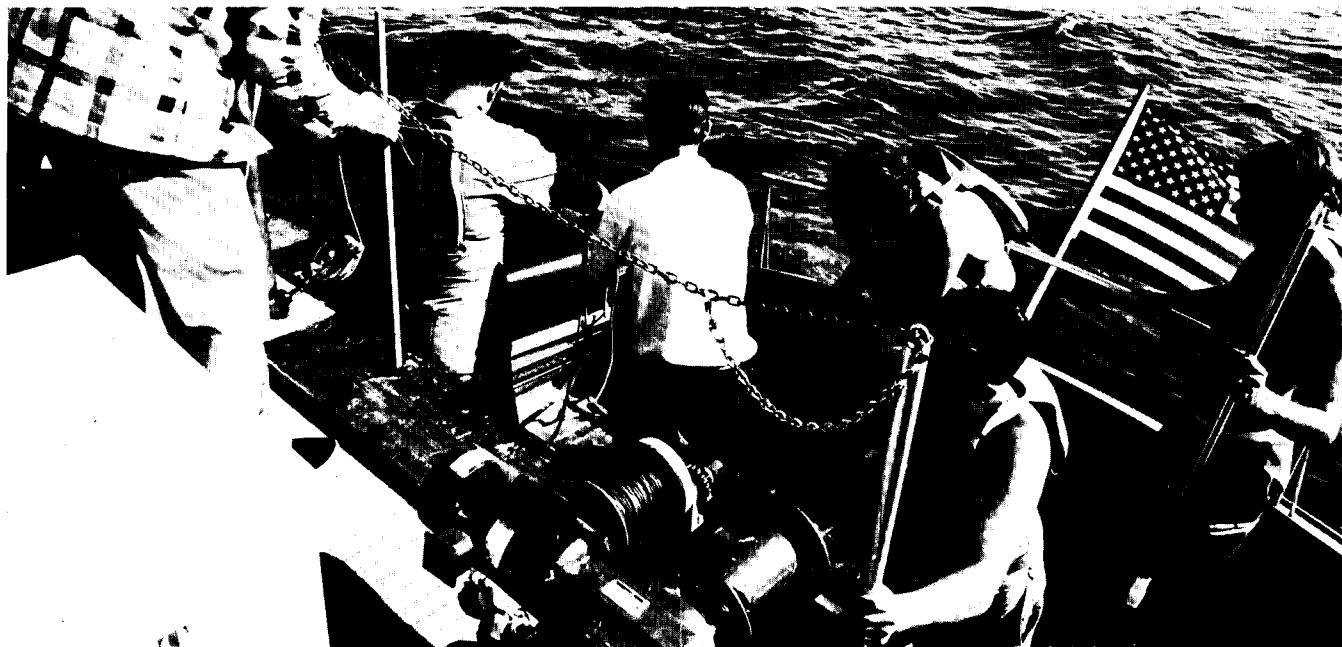
fessor Joseph R. Crump. The recently acquired Camp Wallace property near Hitchcock contains 1600 acres which the University plans to develop for marine activities. A channel which will connect the property with Galveston Bay is already being dredged.

Texas A&I University has 140 acres on Baffin Bay and plans are being considered for the development of this land, according to Dr. Carl Wood who reported on the University's interest in marine affairs. Some instructional work is being offered in oceanography.

The University of Corpus Christi, located on Corpus Christi Bay, is actively involved with marine resource development. As reported by Dr. Carl Wrotenberg, the University has provided offices for the U. S. Geological Survey's Gulf and Caribbean Office.

Texas State Technical Institute at Waco has developed an underwater welding course through the Texas A&M Sea Grant Program. According to Dr. Jack Tompkins, ten students will complete the program within a few days. The first 13 weeks of study are conducted at the Waco campus and the final two weeks at the Harlingen TSTI campus will provide actual ocean experience.

Aboard a 50 foot vessel, students enrolled in the Galveston College-Sea Grant technician training course learn to measure ocean parameters.



The Harlingen Campus of Texas State Technical Institute is also accommodating an adult education program in cooperation with the Texas Shrimping Association. The program is directed toward bilingual immigrants (from Mexico) and currently has 15 students enrolled. Purpose of the program is to provide competent fishery technicians for the Harlingen-Brownsville area shrimping industry. The program is designed to train 20 students every 12 weeks.

Texas Christian University has had courses in geology and biology related to the marine sciences for half a century, according to Dr. Willis Hewatt. There is no degree program specifically labelled as oceanography.

Rice University's ocean related programs are carried on by a small group of interested faculty and staff members. Dr. Robert Lankford told workshop participants of work being conducted in geology, geophysics, biology and engineering.

Lamar State College of Technology's B.S. in Oceanography Technology was described by Dr. Thomas W. Lins. The newly approved program is conducted by the Science and Engineering Departments with participation by the Texas A&M

Department of Oceanography. The purposes of the new program are to produce graduates with a working knowledge of the broad field of oceanography, to train students in gathering and analyzing ocean data, to prepare them for careers in ocean industries, and for graduate study in the marine sciences.

Del Mar College is a two-year school which is embarking on a technician training program which is partially supported by the NSF Sea Grant Program. A two-year grant amounting to \$110,000 is being used to develop a program to accommodate 20 students. The course of study is electronics oriented and students will receive training aboard Southwest Research Institute's vessel, *The Wrangler*.

Texas A&M University's Environmental Engineering Division has docking facilities at Morgan's Point. The Division is carrying out pollution studies in the Houston Ship Channel.

Texas A&M University's Coastal and Ocean Engineering degree program and curriculum was explained by Dr. Robert E. Schiller. Approximately 23 graduate students are currently enrolled in the program. No undergraduate degree is offered in ocean engineering at this time.

INSTITUTIONAL NEEDS

An expanded state program in marine resource development will require properly trained personnel, adequate financial support, and well-equipped institutional facilities. In the small group working sessions, the participants made strong recommendations for coordination and cooperation among the state's colleges and universities in marine resource development areas. The programs which will produce the manpower required for marine resource development must be broad based; their institutional arrangements must be extremely diverse. The existing programs represent a sound base on which arrangements for the growing needs of the state can be built. A number of persons questioned the availability of Sea Grant funds to Texas universities other than Texas A&M.

The recommendations of the group can be classified under five major categories: Public School Instruction; Technician Training; The College and University Level; The Public Interest in Marine Resources; and Governmental Action.

Public School Instruction. The distinction between oceanography education and "educating the public" to the oceans was pointed out. It was felt that awareness and appreciation of the total environment could most effectively be created through public schools, beginning at the elementary level and expanding into a well-developed curriculum in the high school. Some specific recommendations were directed toward public school instruction:

▶Traveling instructors who are professional scientists to deliver concentrated instruction for brief periods (one or two weeks) at state high schools

▶Development of an earth science curriculum for the high school level acceptable to the Texas Education Agency for high school science credit

▶Improved vocational guidance related to marine resource opportunities

▶Summer programs and field trips in marine science

▶Development of a comprehensive basic theorem for treating the natural sciences as an entity

▶Creation of a high school course in marine sciences which might be used as a vehicle for making students aware of their environment.

Technician Training. Twelve representatives from colleges interested in vocational training recommended three areas of action in ocean technician training programs:

▶Junior college curricula in technician training, individualized by the institution, to serve the needs of the local communities.

▶A meeting of representatives from all Texas colleges and institutions interested in technician training to discuss mutual problems and goals.

▶Texas A&M University and the National Science Foundation Sea Grant Program Office should provide information about technician training programs throughout the country.

The College and University Level. Two panel groups totaling 31 representatives for four-year and graduate level institutions addressed themselves to the programs of colleges and universities in marine resource education. The groups recognized that no single program of oceanographic instruction is adequate. Oceanographic horizons are expanding rapidly and encompass such diverse disciplines as economics, sociology, engineering, and education, as well as the traditional geosciences and biological sciences. There is a need for various kinds of training which can be pursued both at the undergraduate level and the graduate level of achievement. To tackle the urgent problems of the coastal zone which are localized and highly specialized, greater facility support and sharing of existing facilities are needed.

Specifically, the panels recommended:

▶A review of each institution's activities in marine resource

▶Easier exchange of credits and students among institutions in marine science programs

▶Development of a Marine Law Center

▶Development of better facility support

▶Greater sharing of facilities among institutions

▶Self-studies on the part of each institution to determine its own interest in marine resource development to assure good internal planning

▶Development of undergraduate courses in ocean science which would provide a continuing interest for students

▶Continuing communication among the universities as a direct outgrowth of this meeting

▶A study of the job opportunities in Texas in marine resource fields

▶Creation of new programs in marine related areas, such as Coastal Zone Management and seafood processing.

The Public Interest in Marine Resources. The institutions of higher education in the state were seen to have an inherent responsibility to inform the public about the importance of marine resources and to actively participate in local, state, and community affairs in this area. The educational institution also is obligated to provide leadership to the community. Specific recommendations were concerned with the methods by which this responsibility might be more effectively carried on:

▶More information on marine resource development to be brought to the attention of the public

▶Expansion of extension services to include the areas of marine resources

▶Greater use of communication devices such as newspaper columns to stimulate public interest

Governmental Action. Participants noted that interest by state government units in marine resources was increasing but fell short of the importance of the problem. Increased governmental ac-

tivity toward the solution of coastal zone problems was urged. Specifically, the group recommended:

▶A State Commission for Marine Resources, parallel to the Interagency Natural Resources Council, as a vital coordinating and planning arm for the state.

▶A build up of existing marine programs rather than the creation of new programs based on self-interest groups.

▶Long range planning for marine resources use and development based on scientific knowledge

▶Creation of a subcommittee on education under the Interagency Natural Resources Council

▶Feedback to educational institutions of findings of the House Interim Study Committee on Oceanography.

IMPLICATIONS FOR ACTION

The Conference indicated that there is a large gap in understanding among the universities and colleges of the State as to what is going on in marine sciences, or what is needed. This Conference was obviously very informative for many attendees and could be the beginning for a continuing dialogue among the universities which have marine resources interests. The need for future conferences and for exchange of information is definitely indicated. The future conferences should probably be narrowed to specific subjects such as technician training, graduate work in oceanography, public information in extension or other separate topics. This is not meant to lose track of the overall point-of-view, but to give selected groups of people an opportunity for an in-depth examination of the needs of various aspects of educational work. It is obvious, also, that the Sea Grant Program has a clear leadership role to play to see that this dialogue occurs and that information is widely disseminated.

The issues of concern to the State in the area of marine resources seem to lie more in the area of need for public information, attention at the high school level and information at the general undergraduate level, rather than for new specialties or graduate level work. This may be, however, simply a reflection of the popular state of discussion on the subject.

In any event, there appears to be a need for a closer examination of the entire subject matter area

of marine resources with an attempt to identify the many kinds of programs that may be available, the opportunities for transference of credit, the appropriate level of training needed for specific career jobs and other things. In particular, it might be a good idea to establish a Marine Resources Education Clearing House. There is very definite need for individual projects dealing with high school counselors and high school science teachers.

The trans-structure of academic specialties is apparently not sufficient to meet the issues of the day on the time scale in which we are operating. Therefore, the need for new program oriented curricula should be examined all the way from the technician level to the graduate level. In particular, we need a new approach to educating planners for marine resources decision-making.

There also seems to be a need for undergraduate bachelor's degree programs which allow the student to identify with marine resources, ocean science, or ocean engineering. Some expressed a need for a B.S. in physical oceanography. Others favored a program which is just a few general oceanography courses tacked onto another curriculum.

Cooperative programs for summer experience or student cooperative programs, whereby students in teams work with State agencies, and other joint studies should be examined with all of the State agencies. A subcommittee for education in the

Interagency Natural Resources Council could be a focus for these activities. There is also a possibility that such relationships would assist in upgrading the manpower of various state agencies.

There is a concern for the subject of marine resources as a part of the entire natural science spectrum. The hope is expressed that this broader issue might be tackled in such a way that it could be the springboard for public information activities and for working with the high schools. This broader issue should probably be examined by the Coordinating Board and its staff.

The consensus appears to be that State resources for marine resources have been lacking. This is extended to a concern for the deliberations of an Institute for Oceanography by the House Interim Study Committee on Oceanography. It is expressed as a feeling that an Institute of Oceanography should be built upon existing programs and that no new programs should absorb funds that should go to building existing programs. Furthermore, there is an expressed hope that the deliberations of the Committee will include procedures for gaining input from all of the universities of the State on this important subject.

PARTICIPANTS

Mr. Robert B. Abel
National Science Foundation

Dr. W. A. Bass
Brazosport Junior College

Dr. Charles C. Bajza
Texas A&I University

Mr. George R. Blicht
University of Texas

Dr. Ronald Bunn
University of Houston

Dr. John C. Calhoun, Jr.
Texas A&M University

Mr. Willis H. Clark
Texas A&M University

Dr. L. C. Collins
Prairie View A&M College

Mr. J. D. Craik
Texas Maritime Academy

Mr. Joseph R. Crump
University of Houston

Dr. Troy Daniel
Texas A&M University

Dr. Andre DelFlache
Lamar State College of Technology

Dr. W. L. Fisher
Texas A&I University

Mr. James Frazier
Galveston College

Dr. John Haynes
University of Texas at Arlington

Dr. Willis Hewatt
Texas Christian University

Mr. Truman T. Isbell
Brazosport Junior College

Miss Floy Johnson
Texas College and University System

Mr. Jack Jones
Texas A&M University

Mr. Wallace G. Klussmann
Texas A&M University

Dr. Robert Lankford
Rice University

Mr. Terrance Leary
Texas Game & Fish Commission

Dr. Thomas W. Lins
Lamar State College of Technology

Dr. Alan Lohse
University of Houston

Col. Robert W. Martindale
The Marine Biomedical Institute

Dr. Wayne McAlister
The Victoria College

Mrs. Leatha F. Miloy
Texas A&M University

Dr. David Neher
Texas A&I University

Dr. Ivory Nelson
Prairie View A&M College

Dr. E. E. O'Banion
Prairie View A&M College

Dr. Jerry O'Donnell
Del Mar College

Dr. Ken Oosterhout
Texas A&I University

Dr. D. F. Rios
Texas Southmost College

Mr. Henry A. Rowe
Galveston College

Dr. William Sackett
Texas A&M University

Dr. Robert Schiller
Texas A&M University

Dr. Lazern Sorensen
Pan American College

Dr. Jack E. Tompkins
Texas State Technical Institute

Mr. Donald E. Walsh
Texas A&M University

Dr. R. J. Williams
Del Mar College

Dr. Donald E. Wohlschlag
Marine Science Institute

Dr. Steward G. Wolf
The Marine Biomedical Institute

Dr. Carl E. Wood
Texas A&I University

Mr. Robert Wright
Lee College

Dr. Carl Wrotenbery
University of Corpus Christi

