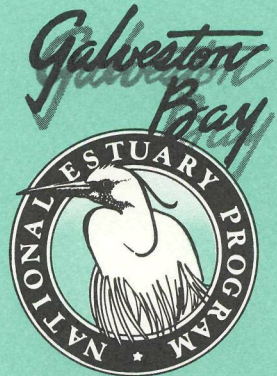


# Fiscal Year 1991 Workplan



Galveston Bay  
National Estuary Program

GBNEP-5

August 1990

---

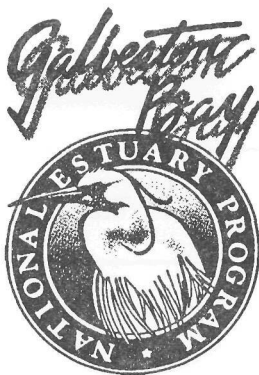
**GALVESTON BAY NATIONAL ESTUARY PROGRAM**

**FY 1991 ANNUAL WORKPLAN**

---

**Publication GBNEP - 5**

**August 1990**



Mr. B. J. Wynne, III, Chair  
Chairman, Texas Water Commission

Robert Layton, Vice-chair  
Administrator, US EPA, Region 6

### **Policy Committee**

Mr. Walter Cardwell  
Chairman,  
Texas Water Development Board

The Honorable Jon Lindsay  
County Judge, Harris County

Ms. Carol Dinkins  
Vinson & Elkins

Mr. Frank Smith, Jr.  
Galveston Bay Foundation

Mr. John Wilson Kelsey  
Commissioner,  
Texas Parks and Wildlife Department

The Honorable Terral Smith  
Texas House of Representatives

### **Local Governments Advisory Committee**

The Honorable Ray Holbrook, Chair

### **Management Committee**

Mr. Myron Knudson, Chair

Dr. Clyde Bohmfalk, Vice-chair

### **Scientific/Technical Advisory Committee**

Dr. Sammy Ray, Chair

Dr. Frank M. Fisher, Vice-chair

### **Citizens Advisory Steering Committee**

Ms. Sharron Stewart, Chair

Ms. Glenda Callaway, Vice-chair

### **Galveston Bay Public Forum**

Dr. Martin Arisco, Chair

Dr. Don Bass, Vice-chair

Dr. Frank Shipley, Program Director

---

## TABLE OF CONTENTS

---

PREFACE .....	ii
LIST OF TABLES AND FIGURES .....	iii
I. INTRODUCTION .....	1
Review of Fiscal Year 1990 .....	1
Identification and Ranking of Priority Problems .....	2
Program Inventory .....	2
Base Programs and "Action Now" Implementation .....	3
Data and Information Management System .....	4
Characterization of Historical Trends, Current Status, and Human Impacts on Galveston Bay .....	6
Public Participation .....	7
Administration .....	12
Some Lessons Learned .....	14
Challenges/Problems .....	14
Program Strengths .....	15
Program Activities for Fiscal Year 1991 .....	19
Key Concepts .....	19
Key Program Areas .....	20
II. FUND SOURCES .....	22
III. FISCAL YEAR 1991 PROJECTS .....	25
Coastal Preserves .....	25
Management Assessments .....	26
Scientific/Technical Projects .....	26
Coordination with Outside Projects .....	29
Public Participation .....	30
Administration .....	31
APPENDIX A. PRIORITY PROBLEMS LIST .....	34
APPENDIX B. DATA AND INFORMATION MANAGEMENT STRATEGY .....	37



## **PREFACE**

This Annual Work Plan sets forth elements of work to be carried out in state fiscal year 1991 (September 1, 1990 through August 31, 1991) by the Galveston Bay National Estuary Program (GBNEP). Work described in this Annual Plan is for year two of a five-year effort to create and implement a Comprehensive Conservation and Management Plan (CCMP) for Galveston Bay.

The Work Plan is written for members of the Management Conference, as well as for the wider Galveston Bay Community with an interest in the Program and the estuary. The information presented here also serves as an agreement between the State of Texas and the U.S. EPA Office of Marine and Estuarine Protection for continued funding of the GBNEP. A more specific Cooperative Agreement with EPA Region 6 will be the instrument for identifying and funding specific activities.

This document contains three sections. First, in the Introduction, is a discussion of the activities for the first year of the Program, Fiscal Year 1990, and a setting forth of activities for Fiscal Year 1991. Second is a discussion of program funding for FY 1991. including a summary table detailing funding sources, and a projected annual budget. Third, projects proposed for FY 1991 are summarized, including current status and previous and projected funding levels.

-Frank S. Shipley  
Program Director

---

## I. INTRODUCTION

---

September, 1990 marks the beginning of the second year of work by the Galveston Bay National Estuary Program toward creation of a Comprehensive Conservation and Management Plan for the estuary. Planning and program establishment activities are now complete, and work efforts are now directed toward creating a factual foundation for future Bay management.

The factual foundation for management, or "Characterization," involves research and data analyses directed at the Bay's recognized problems. Efforts in the coming two years will be directed at determining the status, and trends over time, for critical aspects of Galveston Bay. These aspects include water quality, living resources, habitat, and physical conditions. The work will determine probable causes for the Bay's problems, from an ecosystem perspective. Parallel efforts will be directed at assessment of existing management activities. Finally, under the CCMP in year five, enhanced management efforts will be directed at well-defined environmental problems.

Throughout Characterization, work is guided not only by scientists and environmental managers; anyone with an interest in Galveston Bay can be part of the program. Industry, shipping, business, development, fishing, environmental, and community interests are already participating, and greater involvement is sought in the coming year. This involvement in large part determines what the program does. Comments, questions and suggestions about this work are welcomed at the Program Office at any time.

### **Review of Fiscal Year 1990**

The EPA/State Management Conference Agreement (Publication GBNEP-1, available from the Program Office) outlines the five years of work leading to creation of a CCMP in 1994. The commitments made in that agreement prior to the first year of the program were structured to provide a long-term flexible planning framework for individual annual work plans like this one. This Annual Work Plan therefore strives to be consistent with the Management Conference Agreement, while at the same recognizing new and better approaches.

Where proposed work deviates from the Management Conference Agreement, reasons for the changes are discussed.

## **Identification and Ranking of Priority Problems**

The Management Conference Agreement called for creation of a Priority Problems List by April, 1990. The List was to be based on consensus concerning the identity and relative importance of problems effecting the estuary, and was to become a guide for expenditure of time, effort, and money throughout the program. The components of this effort were to include: drafting of the List with GBNEP committee review; revisions based on public comments and ranking based on an explicit set of listed criteria; final approval and distribution of the List; and periodic re-evaluation of the List as better information becomes available.

Creation of the Priority Problems List was accomplished ahead of schedule and in accordance with the Management Conference Agreement. The final List was approved November, 1989, by the Policy Committee, with provision for annual review. The Priority Problems List and documentation of the steps leading to its creation are given in Appendix A.

The Priority Problems List has been extremely useful to the GBNEP. Drafting the list was the first exercise in consensus-building within the Management Conference. In substance, the list has fulfilled its intended purpose of guiding program efforts, particularly in creating and contracting projects. Although numerous diverse projects have been proposed, some could not be justified in light of the Priority Problems. Agreement on and ranking of Galveston Bay's problems has helped program actions to be focused rather than diffuse.

## **Program Inventory**

In the Management Conference Agreement, the Program Inventory had a two-fold purpose. First, the Inventory was to include descriptions of existing agency data sets related to Galveston Bay. This would determine the potential usefulness of existing information for a Data and Information Management System (DIMS). The data would have central importance in characterizing estuarine Priority Problems, in effect determining "what" should be managed.

Second, the Inventory was to include a compilation of existing management jurisdictions and activities by governmental agencies. This would be the first step in integrating--under the CCMP--the currently diverse components of environmental management. That is, the regulatory information would be the first step in determining "how" management would proceed under the CCMP.

In addressing this program element, the GBNEP determined that the work could not be accomplished by any single project. Therefore several projects were designed to address different aspects of the problem.

For data-- "what" will be managed--the **Data Base Inventory** will compile complete descriptions and specifications for existing bay-related data sets. The result will be an electronic-searchable data base of data set descriptions, including access information. The data set descriptions will then be available for contractors to acquire data for individual characterization studies. The Data Base Inventory will also become a valuable tool for resource agencies in early management implementation.

For Management-- "how" the work will be accomplished--two projects have been designed, both on a pilot scale associated with creation of Christmas Bay and Armand Bayou Coastal Preserves. The **Coastal Preserves Regulatory Survey** and the **Coastal Preserves Regulatory Evaluation** will identify, describe, and evaluate all management jurisdictions and activities within the Christmas Bay and Armand Bayou Coastal Preserves. This will help define work on an expanded scale encompassing the entire estuary.

In Texas, changing the existing mosaic of management authority is seen as a highly sensitive and critical part of drafting the CCMP. Management Assessments have therefore been structured to increase the likelihood for ultimate success. Management Assessments are to be conducted on a pilot scale prior to the entire estuary, in order to determine the most effective approach. Evaluations of agency management are to be linked to the simple base program descriptions specified by the Management Conference Agreement for this element, and state and local entities are to be included in addition to the federal programs required by EPA guidance. Whereas the Management Conference Agreement called for a Program Inventory Report by June, 1990, the projects undertaken under this element will produce several reports, none of which will be available this early. The Data Base Inventory and Coastal Preserves Regulatory Survey will produce results by Fall, 1990, while the Coastal Preserves Regulatory Evaluation will report by December, 1990.

## **Base Programs and "Action Now" Implementation**

The Management Conference Agreement specifies an evaluation of existing agency management activities. This evaluation was then to be the basis for improvements recommended in a "Base Programs Action Plan" in July of 1991 prior to the CCMP. The current approach accomplishes these objectives within the framework of the approach summarized above.

The **Coastal Preserve Regulatory Evaluations** lead to **Coastal Preserves Management Plans** by Fall, 1991, that specify changes in regulatory activities to better protect and enhance these two subsystems of Galveston Bay. The Management Plans will be approved prior to a CCMP as an early model to be used in similar efforts for the entire estuary under the **Galveston Bay Regulatory Survey and Evaluation**. The two-stage approach to the problem of regulatory change has been adopted to realistically address the problem of fragmented jurisdictions in Texas.



The act of designating the two Coastal Preserves is already generating regulatory changes in several agencies. For the first time in Texas, the Texas Parks and Wildlife Department has set a minimum stream flow requirement for an entire body of water, based on need to maintain living resources. This occurred for Armand Bayou as a result of Coastal Preserve designation, with similar requirements being imposed for at least one other area outside the Preserve. The Texas Water Commission has confirmed this flow requirement in a decision limiting water rights withdrawals from Armand Bayou for irrigation of a golf course that lies within the watershed but outside the Armand Bayou Coastal Preserve.

Meanwhile, the GBNEP is implementing other "Action Now" efforts prior to completion of regulatory evaluations. The **Shoreline Survey for Point Sources** involves identification of currently unregulated or illegal influences on the Bay. Illegal point sources of wastewater will be brought under enforcement by appropriate agencies and any unregulated influences on the Bay will be evaluated for necessary regulatory changes.

### **Data and Information Management System (DIMS)**

Although a DIMS was not specifically required by OMEP guidance, such a system was deemed necessary by the Management Conference and was therefore included in the Management Conference Agreement. Commitments were made for identification of DIMS requirements, a feasibility study and report, and choice and implementation of the best DIMS alternative.

DIMS requirements were determined by a user poll. This poll and the DIMS feasibility study were accomplished by a subcommittee of the Scientific/Technical Advisory Committee. Rather than a feasibility report, a full conference DIMS workshop was held to review findings and consider alternatives. At this stage, valuable lessons were learned from other estuary programs. Subsequently the Data and Information Management Strategy (Appendix B) was adopted by consensus in January, 1990. The Strategy will be fully tested as results from characterization studies accumulate. The Strategy is flexible, with an annual review and changes as necessary.

The DIMS strategy emphasizes information as much as data, and deliberately avoids creation of a centralized computer/data processing capability and hardware system. Historical and new data sets will be compiled and analyzed by outside contractors, with data being stored in a common format and accessible storage location. Components of the Strategy begun in FY 1990 are summarized below.

Creation of a **Galveston Bay Information Center** establishes a permanent facility at Jack K. Williams Library on the Galveston Texas A&M Campus. In FY 1990, the project involves compilation of a Galveston Bay Bibliography based on the Literature Survey (below), and

initial planning for a special resource collection. The collection is to include published and unpublished agency reports, journal articles, maps, films, videos, slide programs, and aerial photos.

The Center will also house COMPAS (Coastal Ocean Management, Planning, and Assessment system), a user-friendly microcomputer-based information system currently under development by the National Oceanic and Atmospheric Administration (NOAA) and the State of Texas. Public comments indicate the Galveston Bay Information Center is highly valued by the Galveston Bay community. **CURRENT STATUS:** work plan was approved; creation of the Bibliography is well underway with entry of 2500 Galveston Bay citations completed so far; acquisitions and electronic retrieval system planning has begun; major donations of documents not available in any agency have been received; COMPAS development is proceeding outside this project via an interagency task force coordinated by the Texas Water Commission, and additional COMPAS development will proceed as part of this project as the Information Center develops. **SPECIFICS:** 135K FY 1990 contract to Texas A&M University at Galveston; 111.3K additional cost share; effective date 12/1/89; expected future funding through 1994.

**A Galveston Bay Literature Survey** was undertaken because the literature concerning Galveston Bay is scattered and not indexed, and because the "grey literature" consisting of unpublished agency reports is not likely to be utilized unless special efforts are made to index and acquire copies. This effort is currently being completed as part of the Information Center summarized above, and will result in both a written bibliography and an electronic searchable computer file by Fall, 1990.

Completion of a **Galveston Bay Data Base Inventory** will identify and comprehensively described currently existing Galveston Bay data. The final result will be an electronic searchable data base of data set descriptions, with sufficient information for program participants and project contractors to acquire relevant data from appropriate agencies. This result will be available by Fall, 1990. **CURRENT STATUS:** work plan was approved, including software for electronic retrieval; data sets currently being indexed. **SPECIFICS:** 57.5K FY 1990 contract to University of Texas at Austin; effective 12/1/89; no expected future funding.

Other components of the DIMS Strategy not yet initiated include use of EPA's Ocean Data Evaluation System (ODES) for data formatting and archiving, possible use of the Texas Natural Resource Information Center as a data storage and distribution facility, and an Inventory of and/or Purchase of remote imagery of Galveston Bay. The GBNEP has committed to an annual review of the DIMS Strategy to assure changing data and information needs are addressed by the Program. The Galveston Bay Data and Information Management Strategy is included as Appendix B of this Document.

## **Characterization of Historical Trends, Current Status, and Human Impacts on Galveston Bay**

The Management Conference Agreement specifies that characterization projects be tied to Priority Problems, that they address management needs, that they utilize existing data, and where gaps exist, that new data be gathered for specific purposes. These criteria were explicitly used for selection of the characterization studies summarized in this Annual Plan, and language in each project contract further emphasizes these requirements.

A further commitment was to publish issue papers and an annual "State of the Bay" report concerning study findings and critical problems and management questions. These were to be distributed to participants and the public to augment any technical publications. The GBNEP approach to this commitment is publication of a quarterly newsletter, "Bayline," in which these issues are given a wide audience. Increasingly, Bayline will include summaries of research findings and management issues as characterization proceeds. The annual "State of the Bay" report has not been utilized since full review of each report would take 8-10 months.

Finally, a "Characterization Report" was to summarize and synthesize project findings as a basis for the CCMP. The approach of the GBNEP to this effort is detailed in Figure 2, listing both a characterization report with extensive review, and a prior major symposium contributing findings to the report. Individual scientific/technical projects contributing to this effort are summarized below.

**A Shoreline Survey for Point Source Discharges** was initiated on selected, representative portions of the Galveston Bay shoreline (159 miles), to identify and document point source influences on water quality. The survey focuses on illegal discharges, with referral to appropriate regulatory agencies, and determines feasibility and need for extending the survey to some or all of the entire bay/tributary shoreline (2,491 miles). This project is an early "Action Now" effort designed to address specific problems prior to a CCMP. A shoreline survey report with recommendations will be produced by fall, 1990. This report will help determine need for the CCMP to address undocumented shoreline impacts in the estuary. **CURRENT STATUS:** work plan was approved and field work will be conducted summer, 1990. **SPECIFICS:** 30K FY 1990 contract to Texas A&M University Geochemical and Environmental Research Group; 12.3K additional cost sharing; effective 4/2/90; additional funding not currently planned.

A study entitled **Status and Trends for Wetland and Aquatic Habitats** was initiated to map shoreline and submerged aquatic vegetation habitats based on aerial photo interpretation and field verification. The work includes digitizing of maps for a computer geographic information system. Comparisons are made with previous maps from 1956 and 1979 to determine trends; further investigations determine causes for major trends/losses of critical habitat types. Results of this work include digital geographical habitat data set overlays compatible with state resource agency geographic information systems, maps, and a report

summarizing findings, causes for noted habitat trends, and recommendations. **CURRENT STATUS:** project is just beginning; work in FY 1990 will yield historical habitat data in digital geographic form; work in FY 1991 will yield digitized, field-verified data sets for recent photos; work in FY 1992 will identify habitat losses and probable causes, and final report and maps will be produced. **SPECIFICS:** 40K FY 1990 contract to Bureau of Economic Geology in cooperation with the U.S. Fish and Wildlife Service; effective 5/1/90; expected future funding through FY 1992.

Work was initiated to assess **Toxic Contamination in Aquatic Organisms**. This project involves collection of five commercial fish and shellfish species from each of four locations in Galveston Bay, for analyses for 126 specific contaminants in edible tissue. State-of-the-art analytical procedures are utilized to determine contaminant concentrations, for use in subsequent risk analysis. Tissue concentrations and risk assessments are summarized in a report to be produced by Fall, 1990. **CURRENT STATUS:** field sampling work plan was approved and sampling has begun; laboratory work plan is under review for analyses to be conducted summer, 1990. **SPECIFICS:** 140K FY 1990 contract to Texas A&M University Geochemical and Environmental Research Group; effective 4/13/1990; additional funding not currently planned.

A project was begun to determine **Status and Trends for Oysters**. Oysters are at the heart of estuarine management issues. Oysters are a commercial species, are sensitive to salinity and bacterial contamination, and create shell reef habitat, the only significant hard substrate habitat in the estuary. The project surveys and maps oyster reefs, concentrating on previously unsurveyed portions of the estuary. Other sources of data (for example commercial fisherman, catch statistics, and use of certain sites for population indices) can help determine status and trends, with emphasis on possible causes of identified trends. Findings will be summarized in a report produced in FY 1991. **CURRENT STATUS:** work scope in final review; contract award expected May, 1990. **SPECIFICS:** 80K FY 1990 funds to be awarded for work to begin summer, 1990; no additional funding expected.

## **Public Participation**

In FY 1990, Public Participation activities were undertaken through Program Office projects and outside contracts. Projects described below were conceived to meet three overall objectives: determination of citizen concerns and perceptions related to Galveston Bay; public education and awareness concerning the function and importance of the estuary; and direct involvement of citizens in determining estuarine management. In addition to the projects summarized, the Galveston Bay Information Center (above) is seen as a benefit.

A **Public Perception Survey** of bay area citizens is planned to assess attitudes concerning the Bay and associated environmental issues. Results are to be used both to better target and more effectively design all other public participation activities leading to drafting of the CCMP. In addition the results will provide the Management Conference with a baseline



description of public attitudes and concerns. A report will be produced by Fall, 1990, summarizing survey findings. **CURRENT STATUS:** survey questions being reviewed for survey to be conducted Summer, 1990. **SPECIFICS:** 18K FY 1989 contract to University of Houston-Clear Lake; 4K additional cost sharing; effective 3/15/90; no additional funding expected.

**A Texas Coastal Preserves Video Production** was initiated, targeting Christmas Bay and Armand Bayou as two critical and environmentally significant portions of the estuary. The video will be produced by Fall, 1990 for use as a school and general public educational resource, and to increase public involvement. **CURRENT STATUS:** script outline being drafted for approval for work to be conducted Summer, 1990. **SPECIFICS:** 10K FY 1989 contract to Texas A&M Seagrass Program; effective 2/6/90; no additional funding expected.

A video public service announcement (PSA) series was initiated for **Citizen Prevention of Non-point Source Pollution**. This series will be distributed to local media representatives for airing in the greater Houston area. The objective is to target homeowner and small business activities that have a negative influence on the Bay via urban runoff. **CURRENT STATUS:** project was awarded March, 1990 for work to be conducted Summer, 1990. **SPECIFICS:** 7.5K FY 1990 expenditures approved for Texas Water Commission in-house production; effective March, 1990; no additional funding expected.

**A Galveston Bay User Conflict Video Production** was initiated to document functional conflicts among the various segments of the Galveston Bay community. Competing uses of the estuary will be highlighted, emphasizing the environmental and economic significance of the Bay, and the critical need for wise management. The production will be complete by August, 1990. **CURRENT STATUS:** project was awarded February, 1990; script to be reviewed and production to take place Summer, 1990. **SPECIFICS:** 12.7K FY1990 contract to University of Houston; effective 4/23/90; 7.4K additional cost sharing; no additional funding expected.

**An Oyster Resource Video Production** was initiated concerning oyster use and conservation. Oysters are highlighted as an example of a species at the heart of estuarine management controversies. Topics include economics, biological requirements of oysters, and sensitivity of oysters to effects from human activities. The production will be complete by August, 1990. **CURRENT STATUS:** script under review for shooting to begin June, 1990. **SPECIFICS:** 13K FY 1990 contract to University of Houston; effective 2/8/90; no additional funding expected.

**A Poster Contest** was held for third grade students. School District Superintendents were encouraged to allow their students to participate. Winning entries will be published in a calendar to be distributed in Fall, 1990. **CURRENT STATUS:** seven school districts have participating students; artwork being received for judging to take place May, 1990; calendar to be printed Summer, 1990. **SPECIFICS:** 3K FY 1990 expenditure approved for Program Office in-house project; no additional funding expected.

**Student Book Covers** were developed to promote GBNEP name identification and educational involvement with Galveston Bay Issues. **CURRENT STATUS:** eight participating school districts; cover being designed for distribution of 87,000 Fall, 1990. **SPECIFICS:** 7K FY 1990 expenditure approved for Program Office; no additional funding expected.

The Program initiated a **Publication Series**. The concept was to make all Program documents available to participants and the public in a standard readable style and pleasing format. Topics for FY 1990 included the EPA/State Management Conference Agreement (GBNEP-1), the Fiscal Year 1990 Work Plan (GBNEP-2), and the Member Directory (GBNEP-3). **CURRENT STATUS:** publications will be produced for project final reports in Fall, 1990 and planning documents including a revised Member Directory and this document to be printed late Summer, 1990. **SPECIFICS:** expenditures by Program Office as necessary from publication series budget; project to be funded throughout FY 1994.

The **Bayline Newsletter** is a quarterly publication that addresses conference actions and key issues relevant to the Galveston Bay System. These are distributed free of charge to those requesting to be placed on the program mail list. In addition, copies are distributed at public meetings and other functions. **CURRENT STATUS:** ongoing quarterly publication with distribution of 5,000. **SPECIFICS:** 9K expenditure from publication series budget by Program Office; project to be fully funded through FY 1994.

The Program developed two **Brochures**. The first emphasized historic estuary values, current conflicting uses, and the need for wise management, inviting readers to join the Galveston Bay Public Forum. The second highlighted the theme of Galveston Bay as a home, containing basic information about the bay from an economic, environmental, and recreational view. **CURRENT STATUS:** brochures being distributed from inventory at Program Office. **SPECIFICS:** 8.5K FY 1990 expenditure by Program Office from publication series budget; future expenditures as necessary to revise brochures.

A **Bay Handbook** project was initiated to highlight varied bay uses and actions that local citizens can take to protect the Bay. Issues included proper use of fertilizer and proper disposal of household wastes. Other information in the Handbook gives it a "Bay Almanac" flavor-locations of boat ramps; fishing information for popular species, etc. The book is for distribution at a variety of GBNEP events, including public meetings and through mailings. **CURRENT STATUS:** first draft is under revision for printing Summer, 1990. **SPECIFICS:** approximately 14K expenditures by Program Office as necessary from publication series budget; response to Handbook may lead to additional future expenditures and possible outside sponsorship.

Several **Special Events** were held. A Program Signing Ceremony officially kicked off the GBNEP, and a Coastal Preserve Designation Ceremony officially established two new critical estuarine preserves. Senator Phil Gramm and Senator Lloyd Bentsen were the keynote speakers at the events, respectively. The GBNEP also attended various expositions, including

eight locations for Earth Day. **CURRENT STATUS:** events completed; other events will be planned as opportunities arise. **SPECIFICS:** 5K expenditure by Program Office; future expenditures as opportunities arise.

**A Speaker's Bureau** was organized to coordinate speaking presentations to interested groups. Conference members and staff act as speakers. A slide presentation and standardized script were created. Over 400 announcements were sent to registered groups in five counties. **CURRENT STATUS:** about one program per week is being presented; the slide presentation and script are being revised and personal contacts are being made to increase the number of presentations. **SPECIFICS:** approximately 2K FY 1990 expenditure by Program Office as necessary with presentations by staff and GBNEP committee members; program maintenance funding anticipated through FY 1994.

**A Galveston Bay Media Tour** was arranged for members of the media. This tour highlighted important aspects of the bay to raise media awareness of Program activities. **CURRENT STATUS:** tour scheduled for June, 1990; press to be escorted throughout Bay in boats provided by Texas Water Commission, Texas Parks and Wildlife Department, and Texas Department of Health. **SPECIFICS:** up to 3K expenditures as necessary by Program Office.

**A Portable Informational Display** was created for trade and special interest shows. This display highlights Galveston Bay and provides a back-drop for distributing literature at shows. **CURRENT STATUS:** display has been received from vendor; final photographic elements are being created; plans are underway for circulating display in libraries and other prominent locations. **SPECIFICS:** 1.7K FY 1990 capital expenditure; 1.4K FY 1990 expenditures for display elements; display created and managed by Program Office.

**A Consensus-building survey and training** of committee members represented in the GBNEP was initiated to relate current progress to stated goals of the program. The project was designed to help establish effective working relationships among individuals and among committees in the Conference. **CURRENT STATUS:** in-depth personal interviews were held by contractor with 18 management conference members and staff; survey results were presented at a Management Conference Workshop held April, 1990; survey identified a strong sense of commitment to managing Galveston Bay Well, and highlighted cross-committee communications as a concern; contractor made recommendations now under review by Conference to increase effectiveness of program efforts. **SPECIFICS:** 5.4K FY 1990 contract to University of Houston-Clear Lake Center for Conflict Analysis and Management; effective 2/6/90; no future expenditures anticipated.

During 1990, the GBNEP, in conjunction with the Galveston Bay Foundation, started organizing a **Bay Day** to bring people to the bay for activities which increase the awareness of the bay and increase the involvement of citizens in determining the future role of management in guiding multiple uses. This event is seen as an annual activity to progressively increase in importance, and to outlive the five years now designated for this

program. **CURRENT STATUS:** a special independent committee for Bay Day is to be funded through a special account in the Galveston Bay Foundation; work scope was approved for "seed money" efforts this year; tentative time and location for the first annual event has been set as Memorial Day, 1991, at Sylvan Beach, LaPorte, Texas. **SPECIFICS:** 4.5K FY 1990 contract to Bay Day organization anticipated summer, 1990; additional increased funding anticipated in FY 1991.

The Galveston Bay Public Forum is organizing a series of **Public Meetings** during FY 1990. A series was held in September to seek citizen involvement in recognizing and ranking Priority Problems. A series was held in May concerning this work plan and seeking involvement in the Coastal Preserves management effort planned for FY 1991. A series is planned for August to begin Management Plans for the Coastal Preserves. Each of the meeting series consisted of at least evening meetings in each of three counties. Publicity for meetings is placed in both print and broadcast media, as well as through environmental and civic organization "networking." **CURRENT STATUS:** meetings have been very successful in gathering citizen comments, even though audience size is usually less than 30 per location. **SPECIFICS:** 8.5K FY 1990 expenditure by Program Office.

The GBNEP has undertaken work toward a **Citizen's Monitoring Plan** for Galveston Bay. Under this Plan, a Citizen Monitoring volunteer organization will work in coordination with the Texas Water Commission to design and undertake estuary monitoring activities. The Plan will outline parameters, develop training materials, provide a quality assurance/quality control plan, and coordinate with the GBNEP. This effort will both significantly improve the extent of the monitoring data available per dollar spent, and will involve citizens directly in the welfare of the Bay. **CURRENT STATUS:** work scope was approved and a coordinator designated; pilot scale monitoring to begin on Armand Bayou Summer, 1990. **SPECIFICS:** 25K FY 1990 expenditure approved 3/21/90 for Texas Water Commission to coordinate project; expanded efforts for entire estuary expected next year at a similar funding level.

As part of Program efforts to build consensus and encourage teamwork for the management of the Bay, the CASC recommended and convened a **GBNEP Conference Workshop**. This working conference featured Charles (Bud) Ehler, Director of Oceanography and Marine Assessments, National Oceanic and Atmospheric Administration, and Robert H. Wayland III, Deputy Assistant Administrator, Office of Water, U.S. EPA. In addition to creating a national perspective for Galveston Bay work, the Workshop provided an opportunity for all committee members to interact on a personal basis. **CURRENT STATUS:** workshop was held April 27-28, 1990 with good attendance by all committees including Policy Committee members; verbal comments indicate workshop was extremely successful; Policy Committee unanimously approved letter of commendation to staff and key volunteers. **SPECIFICS:** 3.8K FY 1989 expenditure by Program Office; private sector contributions: 2K Exxon; 2K Mayfield, Inc. .5K Mitchell Energy; .5K Turner, Collie, Braden.



## Administration

Following the establishment of the Program Office in the Bay Area in June, 1989, and hiring of personnel during the summer, FY 1990 began with nearly a complete complement of personnel and program resources. In FY 1990, Hiring of a Research Administrator brought the Program Office to full staffing. Program Office procedures were established for: project contracting via interagency/interlocal agreements between the TWC and project contractors; automation of a mailing list; establishment of program element staff responsibilities and administrative support; and coordination and scheduling of committee meetings and activities. All activities are both coordinated with and reported to EPA Region 6 under the terms of annual cooperative agreements. Overall, the GBNEP is on schedule and making substantial progress toward the overriding goal of creation of an estuary-wide management plan, the CCMP. Below are summaries of planning activities undertaken.

**Identifying Critical Program Areas.** Work in FY 1990 was originally planned utilizing six broad work elements, listed in the FY 1990 Work Plan. These directly corresponded to EPA guidance as reflected in the five-year EPA/State Management Conference Agreement. These six elements were: 1. Program and Literature Inventory; 2. Base Programs Action Plan; 3. Data and Information Management System (DIMS); 4. Characterization Studies; 5. Public Participation; and 6. Administration.

Utilizing these elements was found to be cumbersome due to the difficulty of relating them to committee roles and to specific projects initiated subsequent to planning. For example, the "Base Program/Action Now Agenda" was difficult to translate into tangible project goals so early in the program, before problems were clearly defined. Similarly the GBNEP approach to a Data and Information Management System (DIMS) could not be laid out until the DIMS Strategy was drafted.

As a result of GBNEP actions subsequent to the original FY 1990 Work Plan, a revised Plan was drafted in March, 1990. The revised plan incorporated just four broad elements which directly corresponded to committee roles. These were: 1. Management Assessments (Management Committee); 2. Scientific/Technical Assessments (Scientific/Technical Advisory Committee); 3. Public Participation (Citizen's Advisory Steering Committee); and 4. Administration (Program Office). Work of the Policy Committee, Local Governments Advisory Committee, and Management Committee is seen as encompassing all of these elements. These work elements were found to be an efficient planning framework for budgeting and for defining the specific work to be undertaken, summarized beginning with section II in this Plan.

**Scheduling.** Initial schedule planning for the EPA/State Management Conference Agreement was also carried out before the Management Conference was fully established. Scheduling was expected to change as issues were resolved by consensus. Schedule changes are accomplished by receiving Management Conference approval followed by a request to EPA Region 6.

Estuary Characterization is one program area which may require additional work beyond the currently scheduled December, 1992, completion date. This is evident in reviewing the short period available for the actual data acquisition and analyses (Figure 2). Since Characterization results serve the critical function of factual foundation for the CCMP, scheduling will be reviewed for possible extension through Fiscal Year 1993. This extension of Characterization would agree with projected five-year funding levels supplied by OMEP.

## Some Lessons Learned

Establishing the program on a basis of consensus-building opens the door to a world of new tactical problems for environmental management. These problems can be solved or endured, however, since consensus-building seems the best hope for meaningful positive results. This requires a level of effort not historically present in coastal management. Whether the results are worth the effort can only be determined later, but the potential for good appears higher now than ever before. Below are discussed some of the challenges and victories inherent in the Program, considered from a "lessons learned" perspective.

### Challenges/Problems

**Action by Consensus.** At the heart of the National Estuary Program approach to estuary management is a built-in emphasis on building agreement among diverse participants. A complex committee infrastructure is required for this approach. Committee members represent organizations with a long history of divergent stances on critical issues, and the GBNEP is in the difficult position of changing the course of this history. Yet committees are composed of individuals who are, in many respects, like-minded (e.g. managers on the Management Committee, scientists on the Scientific/Technical Advisory Committee). So, both within-committee and between-committee disagreements can be intense. The dynamic tension among individuals and among committees is vital to guide the program. In practice this approach results in the inefficiency of any democracy in action, along with the burdens of barely manageable logistics, scheduling, and information management.

**Skepticism.** Skepticism comes from several sources. Scientists sometimes believe the program is moving too fast, ahead of a sound knowledge base. Managers sometimes overlook fundamental technical problems that would bias findings. Citizens and environmental groups are sometimes jaded by ineffective problem-solving in the past. In the final analysis, scientists must be willing to take the risk of linking their efforts to management before knowledge is conclusive. Managers must yield to scientists on technical issues. Citizens must be won over by being included in the problem-solving process from the beginning.

**Turf.** Galveston Bay enhancement and protection are the bases for the Program, but participants are sometimes motivated by defence of personal or organizational positions. Motives are political, economic, bureaucratic, or personal, with examples throughout the Program. Distinguishing between legitimate and necessary divergent opinion and defense of turf is not always possible, since the question is one of motive.

**Procurement.** Initiating contracts for projects conceived by the management conference has been fraught with problems. Texas procurement laws offer four kinds of contracting procedures, but extensive legal review eliminated two of these for use by the Program.

Remaining choices involved accomplishing all work by governmental agencies (including state universities), or utilizing a low-bid procedure that could not accommodate scientific peer review nor awards based on scientific merit of proposals. Work is currently being accomplished by agencies and universities, but the process has resulted in significant delays.

## **Program Strengths**

**Action by Consensus.** The greatest challenge to the program is perhaps also its greatest strength. The bottom-up philosophy of the Program hinges upon active participation by citizens, industry, sportsmen, commercial fishermen, elected officials, and other bay users. This philosophy creates advantages over programs imposed by government. These advantages include: building a necessary common vision for success; incorporating a high level of expertise into the plan; increasing the chances for the plan to ultimately survive Texas politics, increasing the likelihood of adequate implementation funding; and creating a higher standard of "practical realism" based on involvement by those to be affected by the plan. The consensus-building approach recognizes that estuary issues will always involve clashing viewpoints, and provides a context for resolution of these conflicts. Ideally this resolution happens before management implementation, and involves a raising of everyone's expectations so that management reflects more than just a compromise.

**Texas Coastal Preserves: Christmas Bay and Armand Bayou.** As a direct result of consensus-building, and due to an innovative newly-created Texas program, two significant portions of Galveston Bay were designated as Texas Coastal Preserves. These designations, in addition to preserving irreplaceable coastal resources, will serve as a microcosm of the entire estuary for program actions. On a pilot scale, the management conference will identify problems, draft management plans, and build management cooperation that cuts across traditional jurisdictional boundaries. This cannot help but to improve efforts in the larger system.

**Data and Information Management Strategy.** Numerous pitfalls exist in the information management arena. The GBNEP carefully examined other programs, and drafted a strategy that decentralizes data processing and centralizes useful information. The temptation was strong to expend program funds on a centralized computer system and dedicated staff, and to acquire "all the data on Galveston Bay" for studies. It is now clear that this would have been a mistake. The adopted strategy makes use of only the data sets that can meaningfully address priority problems, provides for a common format and for universal data availability, and leaves resource agency data sets where they will always be maintained anyway--with the agencies. The Galveston Bay Information Center, COMPAS, and individual studies will put the useful findings in the hands of managers and the public.



**Attracting Local Supplemental Funding.** The Program has sought to supplement federal and state match funding from its inception. This began with coordination with the Texas Legislature during appropriations to highlight the importance of the Program, and continued with assuring competitive distribution of project monies to attract cost-sharing by contractors. To date the GBNEP has attracted funding of more than \$ 435,000 beyond core federal and state monies. The estimated total of state contributions combined with cost-sharing was \$ 668,826 for FY 1990, or nearly as large as the federal share of \$ 700,000.

**Program Publications.** Beginning with Bayline and program brochures, and continuing with the GBNEP publication series, the program has committed to high standards for written communications. This philosophy corresponds to the "open architecture" of the program and high profile of coastal management.

**Attracting Local Supplemental Funding.** The Program has sought to supplement federal and state match funding from its inception. This began with coordination with the Texas Legislature during appropriations to highlight the importance of the Program, and continued with assuring competitive distribution of project monies to attract cost-sharing by contractors. To date the GBNEP has attracted funding of more than \$ 435,000 beyond core federal and state monies. The estimated total of state contributions combined with cost-sharing was \$ 668,826 for FY 1990, or nearly as large as the federal share of \$ 700,000.

**Program Publications.** Beginning with Bayline and program brochures, and continuing with the GBNEP publication series, the program has committed to high standards for written communications. This philosophy corresponds to the "open architecture" of the program and high profile of coastal management.

TABLE 1

# Galveston Bay National Estuary Program

Fiscal Year 1990 Budget

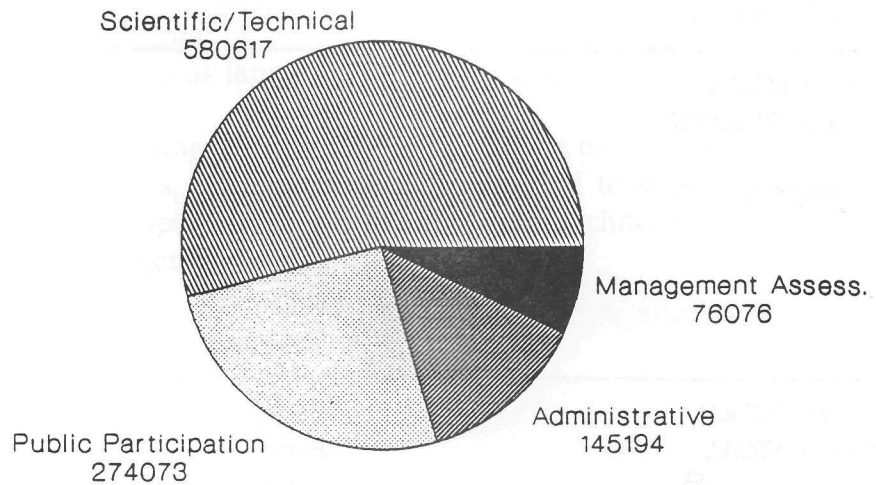
Revised March 15, 1990

Work Element	Category	Budget
<i>MANAGEMENT</i>	Salary	28,736
<i>ASSESSMENTS</i>	Fringe	15,624
	Indirect	6,770
\$76,076	Travel	2,148
	Capital	1,020
	Supplies	172
	Other	2,356
	Contracts	19,250
<i>SCIENTIFIC/</i>	Salary	34,020
<i>TECHNICAL</i>	Fringe	18,497
	Indirect	8,015
\$580,617	Travel	2,354
	Capital	3,801
	Supplies	919
	Other	510
	Contracts	512,500
<i>PUBLIC</i>	Salary	55,273
<i>PARTICIPATION</i>	Fringe	30,052
	Indirect	13,022
\$274,073	Travel	6,260
	Capital	7,282
	Supplies	2,907
	Other	90,920
	Contracts	68,357
<i>ADMINISTRATIVE</i>	Salary	54,616
	Fringe	29,695
\$145,194	Indirect	12,868
	Travel	5,205
	Capital	7,223
	Supplies	1,422
	Other	10,166
	Contracts	24,000
<b>Program Total</b>		<b>1,075,959</b>

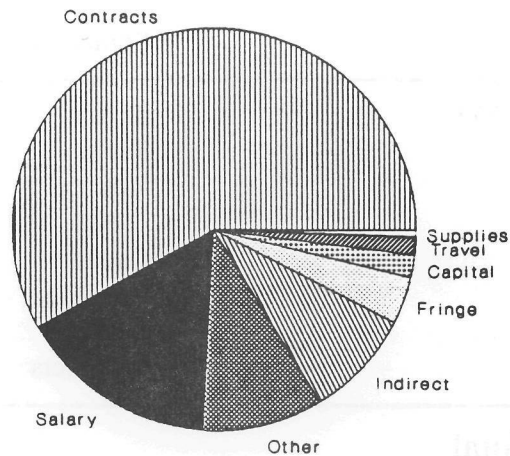
\* Other includes meeting expenses, publications and non-contract public particip

FIGURE 1

**GBNEP FY 1990 BUDGET BY WORK ELEMENT**  
Revised March 15, 1990



**GBNEP FY 1990 BUDGET BY BUDGET CATEGORY**  
Revised March 15, 1990





## Program Activities for Fiscal Year 1991

The following brief descriptions concern actions to be undertaken or considered by the program in FY 1991. Approaches to future work may be discussed at two levels. Key Concepts provide the overall ideological framework for tackling the problem of managing an estuary by consensus; Key Program Areas help determine the content of work that merits the attention of the GBNEP. The Key Program Areas are similar to those determined in the last-revised version of the FY 1990 Work Plan, and are composed of specific individual projects described in section III of this work plan.

### Key Concepts:

Actions to increase public awareness of estuarine problems; active seeking of public participation in consensus-building.

Management based on the estuary as a holistic ecological unit; promotion of basin-wide planning to control pollution and manage living resources.

Establishment of working partnerships among federal, state, and local governments to cut across traditional jurisdictions.

Projects to transfer scientific and management information, experience, and expertise to program participants.

Utilization of a phased approach: first, identify and define priority problems; second, establish probable causes of the problems; third, devise alternative strategies to solve the problems; forth, choose and implement the most effective of these.

Identification of approaches that balance conflicting human uses of the estuary, but seek to restore or maintain its natural character.

Utilization of collaborative problem-solving, to assemble maximum expertise, to broaden the management perspective, and to secure a wide commitment.

Reliance on existing, previously under-utilized data and information, combined with critical applied research to fill in the knowledge gaps.

## Key Program Areas

Two broad activities are recognized for FY 1991. These are management activities corresponding to the EPA "Base Programs/Action Now Agenda" element; and scientific work aimed at "Characterization" of the estuary in the context of recognized problems. Both of the elements were initiated in FY 1990. In addition, commitment is present for the ongoing Public Participation and Administrative activities needed to carry the GBNEP forward. The approach for FY 1991 will therefore encompass four Key Program Areas.

**1. Management Assessments.** This element reflects primarily "Program Inventory" and "Base Programs Action Plan" items in guidance provided by the EPA Office of Marine and Estuarine Protection. The approach to this element in FY 1990 will involve continuation of a pilot regulatory evaluation project concerning the two designated State Coastal Preserves, Christmas Bay and Armand Bayou. This work will lead to initiation of a larger project beginning in the second half of FY 1991 to evaluate jurisdictions and management activities in the entire estuary. Management Assessments will ultimately determine "how" we manage the estuary; whereas the Scientific/Technical Assessments, below, will determine "what" we need to manage.

**2. Scientific/Technical Assessments.** This element reflects primarily the "Characterization" guidance item in the Management Conference Agreement. Critical existing historical data will be evaluated for environmental trends and to determine causes of Priority Problems, and new studies will be initiated where gaps exist in historical data. Study goals will target four broad categories corresponding to Priority Problems: Reduction/Alteration of Living Resources; Public Health Issues; Resource Management Issues; and Shoreline Erosion. Effective characterization of the estuary, more than any other activity, will determine the success of the GBNEP in FY 1991. In FY 1992, the results of this work describing the "State of the Bay" will be published to serve as the factual bench mark for drafting of the CCMP. A time line for these significant activities is shown in Figure 2.

**3. Public Participation.** Public participation is a key element in consensus-building. Citizen educational and involvement activities will maintain continuity with programs begun in FY 1990, listed above. Components include publication of the newsletter, convening of public meetings, slide and video presentations, and special events. A Five-year Public Participation Plan drafted in FY 1990, as well as the specific activities listed in section III of this document provide a detailed planning perspective for this program area.

**4. Program Administration.** A Program Director and support staff will continue to guide the GBNEP toward the goals of the Management Conference. Roles of the Program Office include staff support of committees, program planning, project contract procurement and coordination, interagency coordination and communication, and administrative coordination with EPA. These activities were greatly refined during initial program work in FY 1990, and will undergo continued refinement throughout FY 1991. The projected budget details an administrative component for each of the three other key program areas, above, as well as for this program-wide component.

FIGURE 2

## GALVESTON BAY CHARACTERIZATION TIMELINE

ELEMENT	1990												1991												1992														
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	
STUDIES																																							
Literature Survey																																							
Data Base Inventory																																							
Shoreline Survey																																							
Toxics/Aquatic Organisms																																							
Oyster Trends/Status																																							
Ecosystem Scheme																																							
Habitat Trends/Status																																							
Segmentation																																							
Point Source Loading																																							
Non-Point Source/Land Use																																							
Ambient Water/Sediment																																							
Living Resources																																							
Physical Features																																							
SYNTHESIS																																							
Outline Report																																							
Draft Known Portions																																							
Artwork/Photos																																							
State of Bay Symposium																																							
Complete Report Draft																																							
Peer Review (MC; STAC)																																							
Redraft Report																																							
Public Meetings																																							
Review; GBNEP + Public																																							
Redraft Report																																							
Report Design																																							
Report Sent to Printer																																							

---

## II. FUND SOURCES

---

Funding for the GBNEP is based on a single annual cooperative agreement between the State of Texas (represented by the Texas Water Commission) and the EPA (represented by Region 6). More than one cooperative agreement may be in effect at any one time, since agreements may be extended without loss of federal funds.

Since the TWC is the recipient of all federal monies for the GBNEP, funding is simplified in comparison to many other estuary programs. The TWC has procured for FY 1990 and FY 1991 a single Texas legislative appropriation of general revenue sufficient to meet EPA state matching requirements. Additional funding for the GBNEP also exists due to the Program being considered critical by the Texas Legislature, resulting in appropriations being granted beyond state match levels. Also, active financial support is sought by the Program Office from contractors, via cost sharing. Cost sharing will continue to expand program capability in FY 1991. Table 2 and Figure 3 detail funding sources (excepting cost sharing); Table 3 and Figure 4 present the projected FY 1991 annual budget.

**Table 2. Source of Funds for Fiscal Year 1991**

Source of Funds	Amount	Type of Award
U.S. EPA	1,000,000	Clean Water Act Section 320 (Estuary Prog.)
Texas Legislature	463,209	General State Revenue

EPA share =  $1,000,000/1,463,209 = 68\%$

Rec. share =  $463,209/1,463,209 = 32\%$



TABLE 3

# Galveston Bay National Estuary Program

Fiscal Year 1991 Projected Budget

Revised 5/7/90

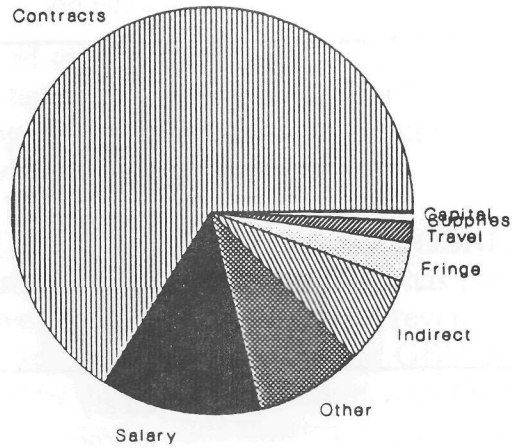
Work Element	Category	Budget
<b>MANAGEMENT</b>	Salary	34,170
<b>ASSESSMENTS</b>	Indirect	18,578
	Fringe	8,050
<b>\$145,549</b>	Travel	4,250
	Capital	0
	Supplies	1,250
	Other*	1,500
	Contracts	77,750
<b>SCIENTIFIC/</b>	Salary	47,472
<b>TECHNICAL</b>	Indirect	25,811
	Fringe	11,184
<b>\$864,047</b>	Travel	6,750
	Capital	300
	Supplies	4,250
	Other*	1,000
	Contracts	767,280
<b>PUBLIC</b>	Salary	60,024
<b>PARTICIPATION</b>	Indirect	32,635
	Fringe	14,142
<b>\$333,801</b>	Travel	9,000
	Capital	0
	Supplies	2,750
	Other*	120,750
	Contracts	94,500
<b>ADMINISTRATIVE</b>	Salary	47,610
	Indirect	25,886
<b>\$119,812</b>	Fringe	11,217
	Travel	5,000
	Capital	2,250
	Supplies	1,250
	Other*	2,600
	Contracts	24,000
<b>Program Total</b>		<b>1,463,209</b>

\*Other includes meeting expenses, publications and non-contract public participation

FIGURE 3

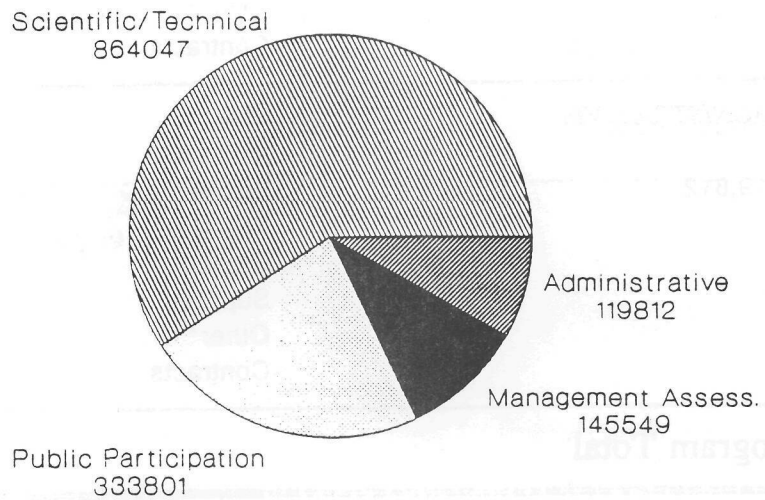
# GBNEP FY 1991 BUDGET BY BUDGET CATEGORY

Revised April 26, 1990



# GBNEP FY 1991 BUDGET BY WORK ELEMENT

Revised April 26, 1990



---

### III. FISCAL YEAR 1991 PROJECTS

---

Projects planned for FY 1991 consist of both continuance of work begun earlier, and conception of new projects. These projects are briefly described below, with detailed technical descriptions available from the Program Office in the form of work scopes and work plans for each project.

#### Coastal Preserves

**Coastal Preserves Establishment.** Christmas Bay and Armand Bayou were designated as Texas Coastal Preserves in February, 1990. The Coastal Preserves effort was undertaken as a two-year Action Plan Demonstration Project under separate funding from the EPA Office of Marine and Estuarine Protection. All Coastal Preserves projects are funded under demonstration funds, except the Regulatory Evaluations. This project involves purchase and installation of monitoring instruments (tide gauges), surveys of boundaries, and placement of signs. Work is to be accomplished prior to September, 1990.

**Coastal Preserve Regulatory Evaluations.** A comprehensive summary of agency regulatory and other activities results from the Regulatory Surveys of Christmas Bay and Armand Bayou, an FY 1990 project. This next step evaluates current regulatory and management effectiveness with respect to strengths and weaknesses, gaps and overlaps in jurisdictions, degree of cooperation, and degree of resource protection. The work will result in changes to improve protection and enhancement of each environment, via the management plan for each area. This project is funded from the base funding grant, rather than demonstration project funds.

**Coastal Preserve Management Plans.** Efforts to draft management plans for Christmas Bay and Armand Bayou will be directed toward preservation and enhancement of water quality, habitat, and living resources. The Plans will be based on the Regulatory Survey and Environmental Inventory projects completed in FY 1990, and will be coordinated with the Regulatory Evaluation project, ongoing. This effort is seen as a pilot-scale opportunity to develop cooperation and consensus among the diverse environmental jurisdictions ultimately involved in implementing the plan, as a prelude to CCMP efforts in the entire estuary.

**Coastal Preserves Management Plan Implementation.** Implementation will address site-specific needs and problems related to water quality, habitat, and living resources. The approach will focus on resource use, including point and non-point wastewater discharges, fisheries, petroleum, and recreation.

**Coastal Preserves Public Participation.** The high degree of public interest in these two areas has already been encouraged by public meetings concurrent with designation of the Preserves. This effort will be continued in FY 1991 with public meetings planned early in the year when results of the Regulatory Survey and Environmental Inventory projects are available, and later to receive comments on the draft Management Plans.

## **Management Assessments**

**History of Galveston Bay Utilization.** The history of the estuary will be researched, focusing on human development of the bay, conservation and management history and resource utilization activities. The purpose of this project is to document the historical context of the Bay prior to recent decades emphasized in all other projects. Old fisheries data, photographs, and anecdotal evidence can reveal much about former estuary conditions; for example the presence of nineteenth century active bay fisheries for sea turtles, tarpon, snook, and hogfish now absent.

**Galveston Bay Regulatory Survey and Evaluation.** Following the Regulatory Survey and Regulatory Evaluation projects for Christmas Bay and Armand Bayou, this project will expand efforts to the entire estuary. Objectives are similar to these pilot studies, but the approach will account for problems identified. Existing regulatory and management activities will be identified and described, followed by a careful evaluation of the effectiveness of these current agency activities. This project will set the stage for identifying management alternatives for the CCMP in FY 1992 and FY 1993.

## **Scientific/Technical Projects**

**Galveston Bay Information Center.** The Information Center was initiated in FY 1990 at Jack K. Williams Library on the Galveston Texas A&M Campus. Work in FY 1990 has been primarily to compile a Galveston Bay Bibliography; work in FY 1991 will emphasize acquisition of a special collection of published and unpublished agency reports, journal articles, maps, films, videos, slide programs, and aerial photos. Establishment of the Information center, and opening the doors to the Galveston Bay user community, will occur in the coming year. Although the Center is funded as a Scientific/Technical Project, and will be an on-line source of information for resource managers in Austin, it is created for the entire Galveston Bay community, and is perceived by the public as the single most beneficial GBNEP project.



**Galveston Bay Ecosystem Conceptual Model.** This project will result in a diagrammatic representation of components of the Galveston Bay Ecosystem and the relationships among these components, as well as simple narrative descriptions of ecosystem structure and function. The Conceptual Model is a qualitative tool to help committee members and the public better evaluate the role and effectiveness of individual projects in contributing to the solution of Priority Problems at the ecosystem level. The Model is expected to help contribute to an integrated approach to characterization studies, but is not intended to be a quantified as a simulation model. This project will be undertaken by a GBNEP task force with no expenditure of project monies.

**Trends and Status for Wetlands and Aquatic Habitats.** This study, begun in FY 1990, involves mapping of shoreline and submerged aquatic vegetation (seagrass) habitats based on aerial photo interpretation and field verification. The work includes digitizing of maps for a computer geographic information system. Comparisons are made with previous maps from 1956 and 1979 to determine trends; further investigations determine causes for major trends/losses of critical habitat types. FY 1991 work under this project will focus on digitizing the newest photos, combined with field investigations to characterize habitat to a level of detail corresponding to plant species associations. The project will require additional work in fiscal year 1992.

**Segmentation of Galveston Bay.** Characterization studies, eventual management activities under the CCMP, and design of an effective monitoring program all are served by segmentation (subdivision) of the estuary into smaller units. This project will determine a rationale for segmentation based on physico-chemical, hydrologic, biological, and geopolitical considerations in relation to estuarine management. Consideration will be given to cell geometry in current modelling efforts by the Texas Water Development Board, U.S. Army Corps of Engineers, and Texas A&M University. The project will determine an appropriate scale (segment size) to enable increased resolution compared current segmenting schemes. A primary benefit of segmentation will be for future monitoring of the Bay.

**Point Source Loading Characterization.** Estimates will be made for pollutant loadings to the estuary from major tributaries and permitted point source wastewater discharges. Parameters to be included are selected nutrients and toxic elements and compounds. The primary sources of information will be: 1. Texas Water Commission permit criteria, compliance monitoring data, permittee self-reporting data, and waste-load evaluation studies; 2. Texas Railroad Commission permit criteria and permittee self-reported data (for oilfield produced water discharges), along with existing data from special studies concerning average produced water constituent concentrations; and 3. Texas Water Commission and other available ambient monitoring data (for tributaries). Results of the study will constitute a cumulative loading study of permitted pollutant loading for the bay system.

**Non-Point Source Characterization.** The objective is to determine non-point source pollutant loadings to Galveston Bay from stormwater runoff, emphasizing urban runoff. The problem of non-point runoff is one of the greatest future challenges to effective management of Galveston Bay. Chesapeake Bay studies indicate Washington D.C. runoff alone contributes conservatively up to 5 million gallons of oil and grease per year to the Chesapeake, or, on the order of half the volume of the Exxon Valdez spill each year. The Houston urban area, being larger and more industrialized, may have a greater impact on its smaller estuary. Because the problem is massive and diffuse, simple solutions do not exist. The GBNEP will convene a Galveston Bay Non-Point Source Management Task Force under the oversight of the Management Committee to coordinate with state and federal non-point efforts. This Task Force will spearhead an effort to better define the problem and carry out actions as determined by findings.

**Ambient Water/Sediment Quality Characterization.** Objectives are to characterize the existing water and sediment quality in the Galveston Bay complex, and to identify trends based on a graphical and statistical time series treatment of existing data. Work will screen existing data sets and reports for applicability and reliability prior to analyses. Results will be compared to existing criteria, standards, and designated uses. Problem areas will be identified, and information gaps preventing effective appraisal of ambient water and sediment quality will be identified. Work will be coordinated with the point and non-point source loading investigations (above) to yield recommendations for future management under the CCMP, and future monitoring approaches that can measure water and sediment improvements.

**Living Resource Characterization.** The objective is to determine status and trends in populations of ecologically or economically significant organisms in Galveston Bay. Species will be chosen for which historical (i.e. fishery) data sets exist, or which are critical in the food web. Primary consideration is given to such species as penaeid shrimp, speckled trout, red drum, flounder, and blue crab. Secondary consideration is given to forage fish species, phytoplankton, birds, and benthic organisms. (Seagrasses, salt marsh species, and oysters are considered in other projects). Multivariate and time series analyses will be applied to data sets, with correlations sought between identified trends and possible controlling variables. Critical missing information will be identified for future work.

**Socioeconomics of Galveston Bay Utilization.** The socioeconomics of Galveston Bay utilization will be characterized, including recreational fishing, boating, shipping, wastewater receiving, commercial fishing, land values, oil and gas production, and others. Direct and indirect dollar estimates will be determined for activities based upon best available existing data. Resource values will be estimated for some specific uses, for example value of salt marsh productivity; value of trawl by-catch mortality; value of shellfish lost to harvest due to closures. A written summary will be produced.

## Coordination With Outside Projects

Several key concerns related to the Priority Problems List are not being initiated as separate projects for Fiscal Year 1991. These include freshwater inflow, estuary circulation/hydrodynamics, cumulative impacts from public development projects, dredge material/channalization impacts, and others.

Freshwater inflow and hydrodynamic circulation in Galveston Bay affect salinity dynamics, point and non-point source wastewater impacts, living resources and habitats, and shoreline erosion. Bay circulation and the mixing of fresh and salt water is the dynamic context for most processes and human influences of concern in Galveston Bay.

Freshwater inflow studies are not being initiated now due to an existing cooperative study by the Texas Water Development Board, Texas Water Commission, and Texas Parks and Wildlife Department. Mandated by the Texas Legislature, this study will produce a report within GBNEP time constraints that addresses the freshwater requirements of Galveston Bay and other Texas estuaries. The results of this study will directly apply to management concerns of the Management Conference related to inflow.

Circulation/hydrodynamic studies are not being specifically initiated now due to three circulation/hydrodynamic modelling efforts already well underway by the Texas Water Development Board, the U.S. Army Corps of Engineers, and Texas A&M University. Program coordination with these efforts is being sought. The Texas Water Development Board is closely involved with the GBNEP through membership on the STAC. The GBNEP is coordinating with the U.S. Army Corps through representation by both the Management Committee and STAC on the Interagency Coordination Team for Houston/Galveston Navigation Channels (ICT).

Cumulative impact and dredge material disposal investigations are also being addressed by state and federal agencies involved with design of impact studies for the proposed Houston/Galveston Ship Channel Project, through membership in the Corps Interagency Coordination Team.

Other project coordination is being undertaken to assure GBNEP characterization results reflect all outside studies with management implications. Specific studies on non-point source pollution will be coordinated with the Texas Water Commission and EPA; specific studies on the impact of oilfield produced water in the estuary will be coordinated with the Texas Water Commission and U.S. Fish and Wildlife Service. This coordination is designed to prevent duplication of efforts by the GBNEP. However, each of these concerns could result in specific work funded by GBNEP as information gaps are recognized which are not being addressed by outside projects.

## Public Participation

**Bayline Newsletter.** The GBNEP newsletter will continue to be produced on a quarterly basis. Bayline is produced by the staff, with articles contributed by a variety of organizations and individuals in the bay area. Bayline includes: Management Conference updates, NEP news, requests for public involvement, and information on specific issues that affect the estuary. Bayline will continue to utilize the "theme" approach of highlighting a relevant Bay topic in each issue.

**Publication Series.** The results of most GBNEP projects will be published in a special series and will be made available to conference members and the public. Publications will include technical and scientific reports, planning documents, membership directories, and results of GBNEP work.

**Youth Outreach.** The Education Subcommittee of the CASC will plan educational projects for students. These may include: 1. Water Education Teams (WETs) - GBNEP will sponsor groups of students as they complete a series of water quality tests in the Bay Area, and as they learn about man's activities and impact on the local environment from a problem-solving perspective; 2. Calendar Contests - students will submit bay-related art work for selection for publications like calendars, posters, and coloring books; 3. Science Fairs - the GBNEP will sponsor special environmental categories and awards for bay-related projects.

**Video Presentations.** A ten to twelve minute video presentation will inform the public concerning the uniqueness of the Bay system; the importance of conserving the Bay; the need to become involved in the Bay's future; and the purpose of the GBNEP. Serving an educational purpose, the video will be used in classrooms to supplement the Speaker's Bureau program, as a resource for persons requesting information about the Bay and the Program. The video is also designed to be viewed with the Educational Display (below) at meetings and expositions.

**Video Public Service Announcement.** PSAs produced in FY 1990 will be followed up with one more in FY 1991. The aim is to reach the general public at its most general, least informed level. The specific topic for this PSA will be determined just prior to production to make use of Public Perception Survey results and needs recognized by the GBNEP.

**Portable Educational Display.** A display backboard and supplementary materials were acquired in FY 1990 for large audience education at various trade shows, festivals, and other exhibits. This project provides for display maintenance (to keep display information current), transportation, and exhibit fees.

**Speaker's Bureau.** Management Conference volunteers and program staff will continue to provide programs for interested organizations in the Houston/Galveston area using the Speaker's Bureau to fill requests for presentations. The Bureau will be coordinated from



the Program Office, with slide presentations, video materials, publications, and equipment made available to the volunteer speakers.

**Citizen's Monitoring Plan.** Citizens from the Bay area will have the opportunity to directly support Galveston Bay management through this plan. A Citizen's Monitoring Committee will be appointed to coordinate with the Texas Water Commission to begin volunteer citizen field monitoring of water quality and other estuary conditions. The data gathered will supplement the existing monitoring data collected by agencies, expanding the amount of information available to managers. Armand Bayou was selected as a pilot project for this effort. Citizen monitoring is seen as a significant component of community involvement in the welfare of the estuary, and this project will expand in future years.

**Public Meetings.** Galveston Bay Public Forum meetings will continue to support interaction between Program participants and the public. Comments received at these meetings will help direct all aspects of the Program.

**Bay Day.** This springtime event is the first of what is hoped to become an annual event for citizens in the Houston-Galveston area. Bay Day is seen a festival in celebration of the bay, as well as a means for highlighting the significance of the estuary and need for wise use. Plans call for a consultant at 50 percent time for twelve months, and will be supported by a Steering Committee, Social Committee, Finance Committee, and Volunteer Committee. A GBNEP staff member will commit 10 percent time to the event in the first year; ultimately the goal is for a growing, self-sufficient event management group.

**Public Information and Education (PIE) Fund.** Monies are to be set aside for innovative Bay-related projects proposed by individuals or groups outside the Management Conference. This project is similar to one successfully undertaken for Puget Sound. Goals are to draw on the creativity of the public, to heighten awareness of the estuary, and to translate public concerns into meaningful actions.

## **Administration**

Administrative activities carried out by the Program staff will continue as described for FY 1990.

Table 4.  
Project Status Table, Fiscal Year 1991

Project	Management Conference Purposes	Products	Date
Coastal Preserves:			
Nomination Packages	1-6	Slides, Maps	2/90
Establishment	1-6	Tide Gauges	8/90
Environmental Inventories	1-2	Reports	8/90
Regulatory Surveys	4-5	Reports	8/90
Regulatory Evaluations	4-5	Reports	12/90
Management Plans	4	Plans	8/91
Management Implementation	5		
Informational Video	4	Video	8/90
Public Participation	4		
Management Assessments			
History of Utilization	4	Report	8/91
Regulatory Survey/Eval.	4-5	Report	8/91
Scientific/Technical			
Data Base Inventory	2,4	Report, Database	8/90
Shoreline Survey	3	Report	8/90
Toxics/Aquatic Organisms	1-3	Report	8/90
Oyster Survey	1-3	Report, GIS	8/90
Information Center	4	Bibliog., Database	8/90
Wetland/Aquatic Habitat	1-2	Report, GIS	8/92
Segmentation	4-5	Report, Map	8/91
Point Source Loading	1-3	Report	8/91
Non-Point/Land Use	1-3	Report	8/91
Ambient Water/Sediment	1-3	Report	8/91
Living Resources	1-2	Report	8/91
Socioeconomics	1,4	Report	8/91
Public Participation *			
Public Perception Survey	4	Survey	8/90
Consensus Building	4	Report	8/90
Bayline Newsletter	4		
Publication Series	4		
Youth Outreach	4	Calendar	8/90
Video Presentations	4	Videos	8/90
Video PSA	4	Videos	8/90
Portable Display	4	Display	6/90
Speaker's Bureau	4		
Citizen Monitoring	4	Plan	7/90
Public Meetings	4		
Bay Day	4		
PIE Fund	4		

\* OMEP Guidance Item 4 also provides for Public Participation

Table 4 (Cont.).  
Project Status Table, Fiscal Year 1991

Project	Cost (K)*		Responsible Organization
	1990	1991	
Coastal Preserves:			
Nomination Packages	15		Bureau of Econ. Geology
Establishment	23.7	27.5	General Land Office
Environmental Inventories	28		Galveston Bay Foundation
Regulatory Surveys	22		Houston-GalvestonCouncil
Regulatory Evaluations	22		Houston-GalvestonCouncil
Management Plans	5	30	Texas Parks and Wildlife
Management Implementation		35.7	Texas Parks and Wildlife
Informational Video	10		Seagrant
Public Participation	1	1.4	Program Office
Management Assessments			
History of Utilization		15	Not Awarded
Regulatory Survey/Evaluation		60	Not Awarded
Scientific/Technical			
Data Base Inventory	57.5		University of Texas-Austin
Shoreline Survey	30		Texas A & M, GERG
Toxics/Aquatic Organisms	140		Texas A & M, GERG
Oyster Survey	80		Not Awarded
Information Center	135	100	Texas A & M at Galveston
Wetland/Aquatic Habitat	40	151	Bureau of Econ. Geology
Segmentation		25	Not Awarded
Point Source Loading		60	Not Awarded
Non-Point/Land Use		125	Not Awarded
Ambient Water/Sediment		100	Not Awarded
Living Resources		125	Not Awarded
Socioeconomics		50	Not Awarded
Public Participation			
Public Perception Survey	15		U. of Houston-Clear Lake
Consensus Building	5.4		U. of Houston-Clear Lake
Bayline Newsletter	8	10	Program Office
Publication Series		54.8	Program Office
Youth Outreach	3	25	Not Awarded (91)
Video Presentations	25.7	12	U. of Hou; 91 Not Awarded
Video PSA	7.5	7.5	Texas Water Commission
Portable Display	1.5	2	Texas Water Commission
Speaker's Bureau	3	2	Program Office
Citizen Monitoring	25	25	Texas Water Commission
Public Meetings	8.5	15	Program Office
Bay Day	4.5	25	Galveston Bay Foundation
PIE Fund	37		Not Awarded

\* All project funds derive from EPA monies matched by Texas general revenue.

---

## APPENDIX A. PRIORITY PROBLEMS LIST

---

### Origin of the Priority Problems List

The Galveston Bay National Estuary Program is charged with developing a Comprehensive Conservation and Management Plan to recommend priority corrective actions to address the problems in Galveston Bay. The first step to accomplish this task has been to develop a consensus within the Management Conference concerning what these problems are, and how they rank in importance. This list has resulted from a ten month process that contained the following elements:

- \* February, 1989- Approval by the Policy Committee of a Draft Priority Problems List based on the Governor's Supplemental Nomination of Galveston Bay as an Estuary of National Significance.
- \* April, 1989- Two public meetings held to receive public input. Numerous comments received and incorporated.
- \* July-October, 1989- Scientific/Technical Advisory Committee appoints Priority Problems subcommittee. Extensive deliberations concerning identity and rankings of problems result in modified Draft Priority Problems List.
- \* September, 1989- Eight Galveston Bay Public Forum meetings held to receive public comment. Comments compiled by the Citizen's Advisory Steering Committee for recommendation to the Management Committee.
- \* October, 1989- Management Committee reviews recommendations from Scientific/Technical Advisory Committee and Citizen's Advisory Steering Committee. Final integrated list is agreed upon for recommendation to the Policy Committee.
- \* November, 1989- Policy Committee approves final Priority Problems List as guidance for projects leading to a CCMP. The List is to be reviewed annually to reflect our current knowledge of the estuary.

## **Purpose of the Priority Problems List**

The problems identified are, by consensus, the most significant challenges facing the Galveston Bay National Estuary Program in accomplishing its goals of protecting and enhancing Galveston Bay.

This list is therefore intended to serve as a guide to target expenditure of program resources during conception and implementation of projects leading to a Comprehensive Conservation and Management Plan.

Within the List, the four major problems (identified by letters A -D) are ranked in order of importance and are considered to be clearly independent. The second order problems within each major problem (identified by number) area are interdependent and may contribute or interact with problems of equal or higher category.

### **A. REDUCTION/ALTERATION OF LIVING RESOURCES**

#### **1. Loss of Physical Habitat**

- \* wetlands and sea grasses
- \* oyster reefs
- \* shallow bay bottom (unvegetated)

#### **2. Alteration of Salinity Gradients**

- \* impoundment, diversion, and interbasin transfer of fresh water inflow
- \* bathymetric and circulatory changes (salinity intrusion)
- \* ungaged inflows from rainfall in coastal watersheds

#### **3. Alteration of Nutrient and Organic Loading**

- \* eutrophication and hypoxia
- \* point and nonpoint sources

#### **4. Bathymetric and Circulatory Changes**



5. Land Subsidence and Sea Level Rise
6. Chemical and Pathogenic Contamination (biotic imparement)
  - \* point and nonpoint sources
7. Increased Turbidity and Sedimentation

## **B. PUBLIC HEALTH ISSUES**

1. Discharge of Pathogens to Bay Waters
  - \* point and nonpoint sources
2. Chemical Contamination of Water, Sediments, and Living Organisms
  - \* point and nonpoint sources
3. Restriction of Contact Recreation
  - \* chemical and pathogenic contamination

## **C. RESOURCE MANAGEMENT ISSUES**

1. Regulatory Problems
2. Fisheries Resource Depletion
3. Marine Debris

## **D. SHORELINE EROSION**

1. Land Subsidence and Sea Level Rise
2. Bathymetric and Circulatory Changes
3. Loss of Buffer Vegetation (wetlands)
4. Use of Littoral Property

---

## APPENDIX B. DATA AND INFORMATION MANAGEMENT STRATEGY

---

The objectives of the Data Management Strategy Subcommittee were to:

1. Identify the necessary requirements for a Data & Information Management System (DIMS) based upon a Program Inventory.
2. Compile a draft Feasibility Report for DIMS alternatives, evaluating currently existing systems as they relate to DIMS requirements and constraints imposed by historical data.
3. Choose and specify a DIMS for recommendation by the Management Committee and approval by the Policy Committee.
4. Screen data identified in the Program Inventory for relevance and quality assurance, and incorporate acceptable data and information into the DIMS.

To achieve these objectives the Subcommittee, with the cooperation of the Program Inventory Subcommittee, has:

1. Evaluated the ability of the existing Texas Natural Resources Information System (TNRIS) to function as the DIMS for GBNEP.
2. Compiled a list of potential users of the DIMS.
3. Distributed a questionnaire to identify sources of potentially useful data and determine the information needs of potential users of the DIMS.
4. Investigated the experience of other national estuary programs in developing a DIMS.

The Texas Natural Resources Information System has extensive experience serving as an interface for public access to agency numerical data and remote images and agency access to U.S. Geological Service maps. Not all data gathered by state agencies has been submitted to TNRIS. Expansion of the TNRIS system to serve as the GBNEP DIMS would require acquisition of a minicomputer and a contemporary database management system.

A preliminary list of approximately 100 users of the DIMS was circulated to all participants in the GBNEP to identify other potential users. An insignificant number of additional users resulted. Circulation of the user needs survey resulted in an approximately 40 percent return which indicated that nearly all users were interested in nearly all types of available information.

Each estuary program appears to have chosen a unique route to development of a DIMS. Several of the approaches have proven to be very expensive and none appear to be fully functional to date. The existing EPA Ocean Data Evaluation System (ODES) could serve as a DIMS but it appears to have a complex user interface and outmoded statistical analysis package.

Two central questions quickly developed:

1. Who would be the primary user of the DIMS?
2. How much existing historical data would be incorporated into the DIMS?

It was clear that the public demanded equal access to the DIMS along with anticipated users among agencies and the scientific community. The Citizens Advisory Steering Committee appointed a DIMS subcommittee to ensure that their perceived needs were accommodated. This dual-role presents conflicting needs because public access, although well justified, requires a user-friendly interface to the system. Sophisticated analytical tools, such as statistical packages and geographic information systems, are seldom user-friendly. To facilitate public access, a skilled database manager and analyst would have to be provided, but the Management Committee, the Policy Committee, and EPA were reluctant to fund a GBNEP staff position for a database manager/analyst. It would be possible to establish a contract position for this task but TNRIS, the logical contractor, is unaccustomed to providing service of this nature.

It is clear that a large quantity of historical data is available. How much of this information can be, and will be, utilized in the characterization of Galveston Bay is unknown. Data to be used will have to undergo a rigorous quality assurance and quality control procedure. It seems uneconomical, in terms of both time and money, to acquire and store all of the existing information in a centralized database system. It appears logical that only data which can be evaluated by a rigorous QA/QC procedure, be it historical or newly acquired data, should be incorporated into the DIMS.

The GBNEP staff will not conduct data analyses; no position of this nature has been created. The Scientific/Technical Advisory Committee is unlikely to conduct direct analyses; specific investigations that address priority problems will be contracted to highly qualified specialists. Contractors of this nature will have access to the necessary computer facilities and analytical

tools in order to qualify for the contract. It would be inappropriate to require these contractors to use computer and database management systems provided by the GBNEP. It will be highly appropriate that all contractors be required to provide all data files and analytical output in ODES format for retention by EPA and TNRIS archives.

Since neither GBNEP staff nor S/TAC members will be conducting analyses, and contractors should not be forced to use an unfamiliar computer and database management system, one question remains - who will use a DIMS? An adequate DIMS, comprising a mainframe or minicomputer with substantial magnetic tape or hard disk storage capacity, statistical analysis package, graphics software, and geographic information system (GIS), would cost hundreds of thousands of dollars and not be user-friendly. Therefore, it would not truly be accessible to members of the public. Highly skilled members of the public would likely have access to a microcomputer system and merely require access to data provided on a floppy or micro-floppy disk.

The Data Management Strategy and Program Inventory Subcommittees have concluded that a data management system comprised of the following components will serve the needs of the GBNEP and the public satisfactorily at this time:

1. **GALVESTON BAY INFORMATION CENTER** - A specific center, physically located at the Texas A&M University-Galveston library, will house a collection of published and unpublished reports and papers, maps, remotely-sensed images, and films/videos concerning Galveston Bay. Members of the public, government agencies, and the scientific community will be served as walk-in, inter-library loan, and telephone-link consumers.
2. **GALVESTON BAY LITERATURE SURVEY** - An electronic index of published and unpublished reports and papers will be assembled and maintained by the Texas A&M University-Galveston library. It will be accessible to walk-in consumers directly and to remote consumers by telephone linkage. Once assembled, the package will be exportable to other university, community college, and public libraries, thereby broadening accessibility to the user community.
3. **GALVESTON BAY DATA INVENTORY** - Existing data and information on Galveston Bay will be identified and described by the University of Texas Center for Water Research. The inventory will provide information on how a potential user can access the data but the data will not necessarily be gathered and provided to TNRIS for archive purposes. Data in danger of being lost, and discrete data sets no longer active, would be identified as needing to be added to a central archive. The inventory will be microcomputer searchable and be provided to the Information Center and other localities as needed.

4. COASTAL OCEAN MANAGEMENT, PLANNING, AND ASSESSMENT SYSTEM - NOAA's COMPAS microcomputer-based information system provides easy access to a wide range of coastal resource data and information. The information is provided in many different forms including data, maps, graphs, and hydrologic models. Installed on MacIntosh microcomputers with Hypercard software, the system is user-friendly and will provide the easiest access to Galveston Bay information available to the public. As a stand-alone system, COMPAS will be available at the Information Center, the GBNEP offices, and other locations depending on agency and library interest.
5. TEXAS NATURAL RESOURCE INFORMATION CENTER - Historical data assembled and subjected to QA/QC evaluation, and new data specifically collected, to address priority problems and bay characterization will be ODES-formatted by the contractors and provided to TNRIS for archival purposes. Transformation of data sets to a standard ODES format will facilitate future correlation analysis of independently gathered data.
6. OCEAN DATA EVALUATION SYSTEM - Incorporation of the data into the EPA ODES database will foster regional comparisons of estuarine condition and behavior. It will also permit GBNEP users access to the analytical tools unique to ODES. Submission of all new data or quality-evaluated data to ODES will permit easy telephone access to the data by users. By using ODES, the GBNEP will not have to create elaborate data standardization, error-trapping, and "scrubbing" procedures which already exist in the ODES protocol.
7. MAP, AERIAL PHOTOGRAPH AND SATELLITE IMAGE INVENTORY - A microcomputer-searchable electronic geographic inventory of all maps, photos, and images of Galveston Bay in the TNRIS collection or elsewhere will facilitate the identification of existing images that document historical trends and characterize macrophenomena observable from various elevations above the earth. [proposed]



---

## LIST OF TABLES AND FIGURES

---

### Tables

Table 1. Fiscal Year 1990 Expenditures .....	17
Table 2. Source of Funds for Fiscal Year 1991 .....	22
Table 3. Fiscal Year 1991 Projected Budget .....	23
Table 4. Project Status Table, Fiscal Year 1991 .....	32

### Figures

Figure 1. Fiscal Year 1990 Expenditures .....	18
Figure 2. Characterization Time Line .....	21
Figure 3. Fiscal Year 1991 Projected Budget .....	24