SECTION 1: INTRODUCTION AND BACKGROUND

Many anthropogenic factors are putting stress on Texas coastal zone resources, in particular seagrass areas.

- Coastal Texas population is growing by 2-3% per year. Affluent commuters prefer to live outside cities near the water or bay front, increasing the amount of shoreline development. Many urban Texas residents also own second homes on the coast.
- Impacts from popular water-oriented recreation activities (e.g. boating and fishing) are rapidly increasing.
- Maintenance dredging of the Gulf Intracoastal Waterway (GIWW), and other ship channels along the Texas coast that are essential to water-borne transportation and the business economy, has major impacts on water quality of seagrass areas.
- Unincorporated areas have less stringent water quality protective regulations e.g. use of septic systems for wastewater treatment can lead to nutrients leaching into surrounding bay water. Nonpoint source (NPS) runoff from agricultural lands or city storm drains may be significant [see Coastal Bend Bays and Estuary Program plan (CBBEP 1998) and Galveston Bay Estuary Program plan (GBEP 1995)].

The magnitude of seagrass changes reflects moderate seagrass degradation in Texas waters.

- Seagrass loss and habitat changes have been well documented in Texas estuaries. "Hot spots" exist, mostly near major urban centers (Galveston and Corpus Christi) or ship channels (Lower Laguna Madre).
- All seagrass beds in West Galveston Bay disappeared by 1982. Only 437 acres remained in the Christmas Bay system (Pulich 2000, personal observation), although recovery has started in a protected part of mid-West Galveston Bay (Ikenson 2002).

- Between the mid 1970's and 1988, approximately 35,000 acres of shoalgrass (*Halodule*) were lost in the lower Laguna Madre due to GIWW dredging. Over that same time, *Syringodium filiforme* and *Thalassia testudinum* increased also by 15,000 and 10,000 acres, respectively, displacing *Halodule* to some extent (Quammen and Onuf 1993, Onuf 1994).

- About 3.8% of seagrass in upper Laguna Madre (about 2300 acres) were lost between 1990 and 1996 due to the brown tide algal bloom (Onuf 2000).

- While about 2100 acres of shoalgrass have been gained overall in the Corpus Christi Bay area since 1975, there has been a concomitant, localized decrease

of 815 acres of mostly turtlegrass in the Redfish Bay system (Pulich et al. 1997).

- Propeller scarring has affected from 33% to 98% of the seagrass beds in the Corpus Christi and Redfish Bays area according to a 1998 study (Dunton and Schoenberg 2002).

Seagrass monitoring has been recommended to assess and provide a basis to manage these problems. "Monitoring," as defined for this planning document, refers to assessing the environmental conditions and ecological health of seagrass beds. It is not simply seagrass mapping to determine the presence or absence of seagrass. Physical, hydrographic, and other ecological data are required to fully describe the health and productivity potential of Texas seagrass beds.

- The goal of developing a Seagrass Monitoring Program was a major recommendation of the Seagrass Conservation Plan for Texas, adopted in 1998 by Texas Parks and Wildlife Department (TPWD), Texas Commission on Environmental Quality (TCEQ) (formerly Texas Natural Resource Conservation Commission), and, and the Texas General Land Office (TGLO).

- The Texas Surface Water Quality Standards (TSWQS) were revised by TCEQ in July 2000 to include "Seagrass propagation" as a new aquatic life use. This designation requires that saltwater with significant stands of submerged seagrass be protected. It is necessary as a long-term goal to define quantitative water quality and related seagrass habitat criteria in order to apply the new standards to environmental assessment and protection activities in seagrass areas. TCEQ, TGLO and TPWD recognized that a formal seagrass monitoring program is necessary in order to obtain the quantitative data to establish numeric criteria for seagrass protection.

- Monitoring data are also routinely needed to assess impacts to seagrass in other coastal regulatory or management actions involving:
  - Nutrient enrichment from nonpoint source pollution and watershed loadings (e.g. agriculture, mariculture, septic tanks or storm drains)
  - Dredging (especially the GIWW channel) that produces high levels of suspended solids and turbidity
  - Shallow-draft boating activities that cause propeller scarring
  - Shoreline and marina developments, especially near seagrasses
  - National Estuary Program projects
  - Restoration and mitigation projects
  - State Scientific Areas and Estuarine Reserves, such as Redfish Bay.

Process for Developing the Texas Seagrass Monitoring Program

- At an August 2000 workshop in Corpus Christi, a Monitoring Planning Workgroup was assembled consisting of TPWD, TCEQ (TNRCC), TGLO, Texas Estuary Programs, USGS, USFWS, EPA, NMFS, university researchers and non-governmental groups interested in conserving seagrasses.

- Goals, objectives and strategies for a Texas seagrass monitoring program were identified. Technical issues associated with a coastwide sampling design and selection of accurate seagrass health indicators were discussed. The necessary organizational framework was created to guide the subsequent program development process.

- Under direction of a Steering Committee (i.e. Workgroup), and with funding from the EPA Gulf of Mexico Program and TPWD, a strategic planning document was envisioned. This plan would contain the conceptual design details and recommendations for the statewide seagrass monitoring program. The focus of the plan would be to identify conceptual ecosystem models, to propose potential indicators, and to evaluate monitoring protocols for key field and landscape parameters reflecting seagrass bed health and quality.

- The need for a data management system and organized network of data custodians was recognized in order to maintain the monitoring data and provide for its access and distribution to resource agency managers, research scientists and concerned non-governmental organizations.

- Research projects would be undertaken to test sampling scheme(s) designs and potential indicators, and to evaluate field and landscape monitoring protocols applicable on a coastwide scale.

- After final acceptance of the strategic plan by the appropriate state agencies and other partnering entities, program implementation would begin by seeking funding for coordinated monitoring projects in specific target areas.

Planning Objectives

This strategic planning document lays out the strategies and conceptual design of the **Texas Seagrass Monitoring Program.** The major sections will address:

1. Major Goals, Objectives, and Strategies of seagrass monitoring, which addresses the question: Why is it important to monitor seagrasses?
2. Field Monitoring Sampling Design, which addresses the questions: How will seagrass health be monitored? What field parameters will be measured and what field survey protocols will be followed?
3. Landscape Monitoring Sampling Design, which addresses the questions: What landscape parameters will be measured and what mapping protocols will be used?

4. Monitoring Data Management System, which addresses the questions: How will monitoring data be compiled, maintained, quality-controlled and distributed for review and analysis?
5. Implementation of Monitoring Program, which addresses the practical questions: Who will coordinate and fund the seagrass monitoring program? Who would participate in monitoring? Who will use monitoring data to set standards?