

# **CITY OF CORPUS CHRISTI BEACH MAINTENANCE PLAN**



*Est. 2/6/10  
Updated 9/24/10  
Updated 2/15/11  
Updated 9/22/11*

## **EXECUTIVE SUMMARY**

The Corpus Christi Gulf Beach Adaptive Management Plan (AMP) was designed to assist in achieving the Project Objectives set forth by the project team, consisting of The City of Corpus Christi and the Watershore Beach Advisory Committee. This AMP is a tool for learning-by-doing and provides a scientific framework for prioritizing restoration actions, project implementation, monitoring, data synthesis, and applied studies to expand our understanding of the ongoing physical and ecological processes onsite. Improved understanding of the complex project site will ultimately reduce uncertainty and support more informed decision making in the long term.

The project site is composed the area between the for-dunes and the Gulf of Mexico. To address these issues, The City of Corpus Christi will develop plans in accordance with the US Army Corps of Engineers (USACE) Beach Maintenance Permit. Development of this AMP was motivated by the desire of the project team to further restore the project site and maximize productivity by improving the Gulf Beach by working to restore the beach to its natural state while keeping it clean and drivable for beach goers.

The AMP and all objectives listed in the AMP should align with all approved UCACE permits that have been issued to the City o Corpus Christi concerning these issues.

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## 1.0 INTRODUCTION

### 1.1 Purpose and Use

The Corpus Christi Beach Maintenance Plan, hereafter referred to as the Plan, is designed to be adaptive and to assist in achieving the Objectives described in Section 1.5. This Plan is a tool for learning-by-doing and provides a scientific framework within which to maintain Corpus Christi Gulf beaches. The Plan is intended to enable necessary beach maintenance while continually improving policies and procedures to minimize environmental impact. Improved understanding of the complex relationship between beach maintenance, coastal processes and stakeholder needs will ultimately support more informed maintenance practices in the long term.

### 1.2 Abbreviated Site History

- In the past the Gulf Beach has been maintained by using heavy equipment. Wheeled loaders were used to remove sargassum at the mean high tide line whenever sargassum arrived on the beach. Motor graders were used to scrape the sand for trench and cover of sargassum as well as maintaining the driving lanes.

### 1.3 General Site Description

- City of Corpus Christi Beach areas
  - Beach Mile Marker (MM) 62 to MM 103
  - MM 203 to North Packery Channel
  - South Packery Channel to MM 223
  - MM 237 to MM 252
- Adjacent Beach areas are maintained by Nueces County, Mustang Island State Park, and Padre Island National Seashore.

### 1.4 Plan Motivation

Tourism related to the Gulf of Mexico beaches within the City of Corpus Christi is a substantial contributor to the economy. Competing interests have all expressed seemingly exclusive desires for beach maintenance related to trash/debris cleanup, sargassum removal and maintenance of beach drivability.

### 1.5 Plan Objectives

The overall goal of this Plan is to accommodate all beach users while preserving the pristine nature of Corpus Christi Gulf beaches. Our barrier island beaches and dunes play a critical role in protecting the City of Corpus Christi from tropical storms and compose an invaluable natural habitat. The following objectives are intended to accomplish this goal:

1. Protect the pristine nature of City of Corpus Christi Gulf beaches.

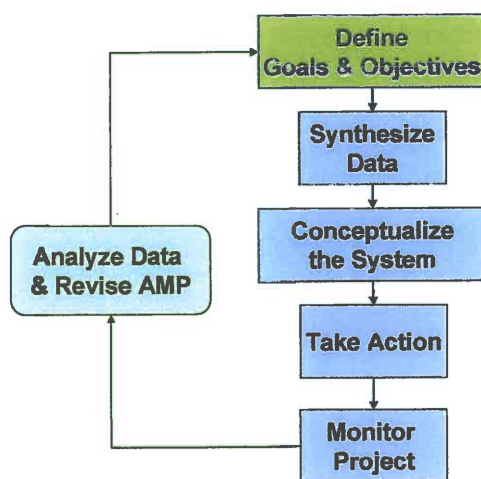
2. Limit sargassum buildup on key beaches during peak periods of use.
3. Maintain two wheel drive access to key beaches during peak periods of use.
4. Keep City of Corpus Christi Gulf beaches free of litter.

The objectives of this Plan rely heavily on the definition of key beaches and peak periods of use. An essential part of the ongoing management plan will be identifying those.

## 1.6 Role of Adaptive Management

A central concept of adaptive management is the recognition that scientific uncertainties exist for complex projects. Informed by existing knowledge and initial conceptualization of the system functions, adaptive management views restoration actions as field experiments, with monitoring and subsequent applied studies designed to refine the understanding of the key processes and reduce uncertainties.

Therefore, an important part of adaptive management is data synthesis and the avoidance of inconclusive results. This adaptive management plan (AMP) formalizes the process for improving our understanding of the system to more effectively achieve the Project Objectives stated above. Figure 1.1 describes the general adaptive management process. Note the critical feedback loop that follows project monitoring.



The basic elements for an effective AMP include:

- Clear goals and targets
- Sound conceptualization of the system
- An effective process for learning from restoration and management actions
- Explicit process for refining and improving current and future management decisions.

Figure 1.1 – Adaptive Management process schematic

## 1.7 Basis for Plan Objectives

The Project Objectives were developed in support of the overall goal of accommodating beach users while maintaining the pristine nature of the beach. The bases for these objectives were derived from a review of published literature, study of past beach maintenance practices, field observations, discussion with stakeholders, and familiarity with current beach operations. The primary basis for developing objectives was the need to balance natural preservation with the needs of beach users.

**Objective 1.** Protect the pristine nature of City of Corpus Christi Gulf beaches.

The gulf beach is the biggest tourism attraction for the City. People prefer to visit a healthy beach. Storm damage is inversely related to the health of the beach and dunes. A healthy beach and dune system will protect coastal property more than a degraded system.

**Objective 2.** Limit sargassum buildup on key beaches during peak periods of use.

Out of town visitors, as well as many locals, prefer to visit a beach without heavy sargassum deposits.

**Objective 3.** Maintain two wheel drive access to key beaches during peak periods of use.

People get stuck in the sand. This leads to a bad experience. It also creates a safety risk. Many people have been maimed and even killed acting as tow truck drivers without experience.

**Objective 4.** Keep City of Corpus Christi Gulf beaches free of litter.

We have to pick up the trash.

## 2.0 CURRENT BEACH MANAGEMENT PLAN

### 2.1 Review of Historic Conditions

The point of describing historic conditions is to clearly lay out why maintenance was conducted in a certain manner and to make the implications of maintenance more apparent.

- Environmental data
  - List the important historic changes. (See Attachment A)
  - Show the historic shoreline retreat rates. (See Attachment A)
  - Show the change since Packery Channel has been constructed. (See Attachment A)
  - List historic sargassum rates. (See Attachment A)
  - Describe important flora and fauna and changes that have led to the current condition. (See attachment A)
  - Leads to the current natural conditions. (See Attachment A)
- Needs of beach users as we understand them today
  - Removal of Sargassum from March thru September in high usage areas. These areas include mm 62 to mm 103, mm 203 to North Packery Channel, South Packery Channel to mm 223.
  - Maintaining driving lanes from March thru September in high usage areas. These areas include mm 62 to mm 103, mm 203 to North Packery Channel, South Packery Channel to the north corner of the seawall, and mm 221 to mm 223.
  - Trash and litter will be picked up year round on all portions of beach.
  - In preparations for Spring Break, driving lane maintenance will begin in February if required do to beach conditions.
- Maintenance practices
  - In the past the Gulf Beach has been maintained by using heavy equipment. Wheeled loaders were used to remove sargassum at the mean high tide line whenever sargassum arrived on the beach.
  - Beach users were generally happy with the beach cleanliness, but had issues with the methods used.
  - There were no wildlife impacts, but the removal of sand was an issue during sargassum removal

### 2.2 Current Maintenance Operations

- Definitions of Sargassum amounts (Amounts based on a 20ft by 20ft area between the water and the mean high water line)
  - Absent – No Sargassum is present
  - Minimal – Less than 30% of sand is covered by Sargassum.
  - Moderate – At least 50% of the sand is covered by Sargassum.
  - Excessive – More than 90% of the sand is covered by Sargassum.
- Maintenance procedures
  - MM 62 to 103 – Priority 3 Area
    - Maintain Sargassum by use of Sargassum Machine during moderate sargassum events.

- Use articulated front-end loader during excessive Sargassum events only.
- Use motor grader to maintain driving lanes between the months of March and September
- MM 203 to North Packery Channel Jetty – Priority 2 Area
  - Maintain Sargassum by use of Sargassum Machine during moderate sargassum events.
  - Use articulated front-end loader during excessive Sargassum events only.
  - Use motor grader to maintain driving lanes between the months of March and September
- South Packery Channel Jetty to north corner of the seawall– Priority 1 Area
  - Maintain Sargassum by use of Sargassum Machine during moderate sargassum events.
  - Use articulated front-end loader during excessive Sargassum events only.
  - Use motor grader to maintain driving lanes between the months of March and September
- Seawall area – Priority 1 Area
  - Maintain Sargassum by use of Sargassum Machine (Beach Tech 2800 or equivalent) during moderate Sargassum events.
  - Use articulated front-end loader during excessive Sargassum events only.
- MM 221 to MM 223 – Priority 3 Area
  - Use articulated front-end loader during excessive Sargassum events only.
  - Use motor grader to maintain driving lanes between the months of March and September.
- MM 237 to MM 252– Priority 3 Area
  - Use motor grader to maintain driving lanes during special events only.

### **2.2.1 Sargassum Removal**

- Procedures
  - Normal
    - Sargassum will be removed with the Sargassum machine (Beach Tech 2800 or equivalent) only or left on the beach in a shallow trench above the mean high tide line or in temporary storage areas in the fore dune area.
  - Special Events
    - Articulated front-end loader and motor grader will be used for sargassum removal during excessive Sargassum events.
    - Articulated front-end loaders and motor grader may be used to clean the beach before special events (Spring Break, Memorial Day, 4<sup>th</sup> of July, Labor Day)
  - Emergency
    - Articulated front-end loaders and motor grader will be used to remove Sargassum if Sargassum interferes with emergency response vehicles on the beach.
  - The use of heavy equipment to remove sargassum from City beaches should be avoided as much as possible
- Table with locations and Sargassum Removal Methods



Location	Minimal Sargassum	Moderate Sargassum	Excessive Sargassum
MM 62 to MM 103	None	Sargassum Machine	Wheeled Loader and Motor Grader
MM 203 to North Packery Channel	None	Sargassum Machine	Wheeled Loader and Motor Grader
South Packery Channel to Seawall	None	Sargassum Machine	Wheeled Loader and Motor Grader
Seawall Area	Sargassum Machine	Sargassum Machine	Wheeled Loader and Motor Grader
MM 221 to MM 223	None	None	Wheeled Loader and Motor Grader
MM 237 to MM 252	None	None	None

### 2.2.2 Vehicular Access Maintenance

- Procedures
  - Normal
    - Driving lanes will be maintained using motor grader and wheeled loaders.
  - Special Events
    - Driving lanes will be maintained using motor grader and wheeled loaders.
  - Emergency
    - Driving lanes will be maintained using motor graders and wheeled loaders.
  - Beach sand that has been stacked near & deposited upon the primary sand dunes by past maintenance methods be redistributed back on to the beach where it originally came from. This should be done immediately and it should be done in a way that will restore the natural beach slope.
  - Every attempt should be made to fill the driving lane with sand to attain the same elevation & slope as the rest of the beach, eliminating the trench that has been created by the constant use of graders & loaders
  - The use of heavy equipment to maintain driving lanes should only be used when absolutely necessary.
- Include a table with key dates and locations

Location	Normal	Special Events	Emergency
MM 62 to MM 103	March to September	None	As Required
MM 203 to North Packery Channel **	March to September	February (Spring Break)	As Required
South Packery Channel to Seawall	March to September	February (Spring Break)	As Required
Seawall Area*	None	None	As Required
MM 221 to MM 223	March to September	None	As Required
MM 237 to MM 252	None	None	As Required

\* This area of the beach is currently too narrow to maintain the driving lanes. Driving lane maintenance will resume as soon as the beach is wide enough to support vehicle traffic.

**\*\*Sand removed from Zahn Rd. entrance to the beach will temporarily be stored on the north side of the beach road. Doing this will help keep the road clear of blow sand during the summer months.**

### 2.3.3 Litter/Debris Removal

- Procedures
  - Normal
    - Trash cans will be emptied two to five times per week depending on the season
    - Litter pickup will be done three to seven days a week depending on the season
  - Special Events / Holidays
    - Trash cans will be emptied daily
    - Litter pickup will be done daily
  - Emergency
    - Trash cans will be emptied daily during emergency operations
    - Litter and debris pickup will be daily during emergency operations
- Include a table with key dates and locations
  - Trash Pickup

Location	March thru October	November thru February	Special Events
MM 62 to MM 103	Five times per week	Three times per week	Every day throughout the event
MM 203 to North Packery Channel	Daily	Three times per week	Every day throughout the event
Packery Channel Boat Ramp	Three times per week	Twice a week	Every day throughout the event
South Packery Channel to Seawall	Daily	Three times per week	Every day throughout the event
Seawall Area	Daily	Three times per week	Every day throughout the event
MM 221 to MM 223	Five times per week	Three times per week	Every day throughout the event
MM 237 to MM 252	Three times per week	Twice a week	Every day throughout the event

- Litter and Debris Removal

Location	March thru October	November thru February	Special Events
MM 62 to MM 103	Daily	Four times per week	Every day throughout the event
MM 203 to North Packery Channel	Daily	Four times per week	Every day throughout the event

Packery Channel Boat Ramp	Four times per week	Twice a week	Every day throughout the event
South Packery Channel to Seawall	Daily	Four times per week	Every day throughout the event
Seawall Area	Daily	Four times per week	Every day throughout the event
MM 221 to MM 223	Daily	Four times per week	Every day throughout the event
MM 237 to MM 252	Three times per Week	Twice a week	Every day throughout the event

### 3.0 MONITORING PROCEDURES

Successful adaptive management relies on an effective process for learning from maintenance and management actions. Targets will help measure progress towards Project Objectives. Monitoring procedures described below are necessary for generating data needed to evaluate targets and for applied studies.

#### 3.1 Initial Maintenance Targets and Monitoring Methods

Table 3.1 presents initial maintenance targets associated with Project Objectives. Monitoring parameters needed to assess progress towards targets and related methods to generate parameter data are also provided. These should be reviewed yearly after monitoring data are available.

<b>Objective</b>	<b>Target</b>	<b>Parameters</b>
1. Preserve the beach	<ul style="list-style-type: none"> <li>✓ No Deviation from natural slope</li> <li>✓ Vegetation line collocated with un-maintained beaches</li> <li>✓ Maintain the natural habitat and safety of the Sea Turtles and Piping Plovers</li> </ul>	Beach surveys Turtle Patrol Reports Others
2. Remove Sargassum	<ul style="list-style-type: none"> <li>✓ Limit sargassum removal to moderate and excessive sargassum events</li> <li>✓ Use sargassum machine as primary removal method</li> <li>✓ Pickup less than 5% of sand during sargassum removal</li> <li>✓ Reduce the use of heavy equipment (Graders &amp; Loaders)</li> </ul>	Staff reports Visitor Complaints
3. Maintain Vehicle Access	<ul style="list-style-type: none"> <li>✓ Ensure driving conditions during the season</li> <li>✓ Preserve the natural slope of the beach</li> <li>✓ Coordinate with tidal events</li> <li>✓ Utilize temporary sand storage areas</li> <li>✓ Reduce the use of heavy equipment (Graders &amp; Loaders)</li> </ul>	Staff reports Visitor Complaints
4. Control Litter	<ul style="list-style-type: none"> <li>✓ Maintain clean beaches 12 months out of the year</li> <li>✓ Provide extra staff for holiday weekends</li> </ul>	Staff reports Visitor Complaints

#### 3.2 Monitoring Plan

- Need to establish a plan to provide the data needed to evaluate the success of maintenance
- Beach Surveys - See USACE Permit No. SWG-2006-00647 for Beach Maintenance, Attachment B, Habitat Monitoring Effort
- Opinion Surveys
- Staff reports
- List the applied studies that we may think are required

- City look into the use of a Water Truck for vehicle lane maintenance.
- Others

### **3.3 Documentation and Reporting**

- Periodic (weekly) reports documenting operations
- Technical reports
- Annual report Due to UCACE on February 1<sup>st</sup> every year

#### **4.0 PUBLIC OUTREACH AND EDUCATION**

The City will look into providing a way to educate the public about the importance of the beach and it's maintenance practices. Public service announcement and literature are important tools that should be used to reach out and educate the public about the Gulf Beach.

9/23/10 – Look into the possibility of a Public Safety Announcement (PSA) to educate beach goers about the amount of trash that comes in from the Gulf and what we as citizens and beach goers can do to help.

2/15/11 – Published informational pamphlets called “Have You Seen Our Sargassum” to help educate the public about our seaweed on the beach.

## 5.0 AMP IMPLEMENTATION

To implement this AMP, an annual maintenance plan is implemented along with a rigorous monitoring plan. Without the ability to review and quantify the impact of maintenance, this AMP cannot be properly implemented. Therefore, maintaining commitment to monitoring, conducting applied studies, and continuing the adaptive management process is critical to long-term success. The following section describes additional considerations for implementing this AMP.

### 5.1 Roles & Responsibilities

The following key roles & responsibilities need to be assigned for adequate AMP implementation. Typically, responsible persons are drawn from funding entities, resource agencies, regulatory bodies, stakeholder groups, local governments, and consultants. It is also recommended that an Adaptive Management Team (AMT) of 6 to 10 persons be formed from these entities to provide scientific review, public outreach, and direction on a regular, but not full time basis. Upon establishment of the AMT, protocols, organization, and procedures can be modified as needed. It may be possible to combine responsibility for the key roles described below, as many of them are related.

***Derek Herzog - Adaptive Management Director (AMD)***

Decision-maker responsible for coordinating of all aspects of funding, maintenance actions, monitoring, data management, science, public outreach, and AMP implementation. Responsible for directing the project, improving process, and facilitating among the AMT and Leaders.

***Derek Herzog - Monitoring Program Leader (MPL)***

Responsible for oversight of system-wide monitoring. Expected to coordinate all field crews and participate as needed in field work and data collection. Reports progress towards targets and objectives and provides recommendations on improvement of data collection and monitoring protocols to Adaptive Management Director and other Leaders.

***Sargassum Sub-committee - Applied Studies Leader (ASL)***

Scientist or local expert responsible for annually determining scientific research priorities and coordinating with other Leaders to implement studies and reduce uncertainties. Reports findings of applied studies to AMT and implements the peer review process for research findings and applied study design.

***Derek Herzog - Data Manager (DM)***

Responsible for storing and managing all project data and information. Initiates data management protocols, actively maintains GIS database of all data, and disseminates processed or raw data as needed. Works closely with MPL and ASL to incorporate and format data generated through monitoring and applied studies.

## **5.2 Data Management**

Data generated by staff reports, monitoring, or applied studies must be incorporated, comprehensively, into the project database.

## **5.3 AMP Process**

At a minimum the AMT should hold meetings twice a year to review actions and monitoring results. The AMP formal re-evaluation process should be carried out on a yearly cycle by the AMT and leadership. The following list describes, in general, the steps needed to support this and (key personnel) responsible.

- Gather monitoring data and results of applied studies (DM & MPL).
- Conduct Stakeholder meetings to reevaluate needs (AMD)
- Evaluate progress towards targets and Objectives (MPL to AMT).
- Evaluate how well the targets indicate progress towards Objectives (AMT).
- Evaluate the Project Objectives (AMT).
- Determine changes to the Plan (AMT).
- Determine monitoring and applied studies that should be implemented to support the Plan (MPL & ASL to AMT).



