Christmas Bay North Shore Wetland and Water Quality Protection Project Christmas Bay, Brazoria County, Texas

TCEQ # 582-4-65091

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Executive Summary

Christmas Bay, a State Coastal Preserve, State Scientific Area, and Gulf Estuarine Marine Site is a joint conservation effort between the Texas General Land Office and Texas Parks and Wildlife Department (TPWD). Christmas Bay, a shallow 4,173-acre embayment in the southwestern portion of the Galveston Bay system, is a unique high-quality subsystem of the estuary.

One of the most productive and least disturbed bays within the Galveston Bay complex, Christmas Bay is suffering from severe erosion. While the southern shoreline of the preserve is vegetated with *Spartina alterniflora*, much of the northern shoreline is void of emergent vegetation within the inter-tidal zone. The areas that lack vegetation either have a small erosional bluff, 4-10 inches, or a large erosional bluff, sometimes measuring 4 feet and greater. Approximately 2.65 miles of Christmas Bay's northern shoreline is exposed to the areas predominant southeast winds which results in enough energy to cause significant erosion along this shoreline.

Also vegetated with *Halodule wrightii, Halophila engelmanni* and *Thalassia testudinum*, until recently Christmas Bay was the only minor bay in the Galveston Bay system to still have seagrass beds. Seagrass in the Galveston Bay system had almost entirely disappeared by the late 1970's.

This project involved planting 18,900 linear feet of Christmas Bay's north shoreline with *Spartina alterniflora* on one-foot centers. Completed in November of 2005, this project, once established, will improve the quality of habitat in Christmas Bay in three ways; 1) create 14,000 linear feet of intertidal shoreline habitat, 2) reduce erosion of upland habitat, and 3) improve water quality and clarity thus improving conditions required by seagrass (clear, shallow-saline water).

Introduction

Christmas Bay Coastal Preserve, a Gulf Estuarine Marine Site (GEM site), is a joint conservation effort between the Texas General Land Office and Texas Parks and Wildlife Department (TPWD). Christmas Bay, also known as Oyster Bay, is a shallow 4,173-acre embayment in the southwestern portion of the Galveston Bay system and is a unique high quality subsystem of estuary that has not yet been greatly altered by human activity. The water of Christmas Bay to the mean high tide line constitutes the preserve, approximately 5,700 acres. The preserve, situated within the Gulf Prairies and Marshes ecological region, is bordered by Brazoria National Wildlife Refuge and Follet's Island.

There are two sizable oyster reefs within the preserve, Arcadia Reef (completely in the preserve) and Christmas Point Reef (partially in the preserve). But the bay's most prominent characteristic is its 250 acres of seagrass beds, dominated by shoalgrass (*Haldule wrightii*) and widgeon grass (*Ruppia maritima*) interspersed with star grass (*Halophila engelmanni*) and turtle grass (*Thalassia testudinum*).

While the southern shoreline of the preserve is vegetated with *Spartina alterniflora*, much of the northern shoreline is void of emergent vegetation within the inter-tidal zone.

The areas that lack vegetation either have a small erosional bluff, 4-10 inches, or a large erosional bluff sometimes measuring 4 feet and greater. Approximately 2.65 miles of Christmas Bay's northern shoreline is exposed to the areas predominant southeast winds. The fetch across Christmas Bay ranges from 9,000-11,500 feet resulting in enough energy to cause significant erosion along this shoreline.

In May of 2004, TPWD received a finalized contract from the U.S. Fish and Wildlife Service Coastal Program providing $15,000 in funding and in December 2004, $20,000 in funding from the Galveston Bay Estuary Program was received. Texas Genco also provided an in-kind contribution of 18,900 *Spartina alterniflora* plugs, valued at $23,625. Total project funding was $58,625.

Project Methodology

Objectives: Plant 14,000 linear feet of erosive shoreline on the north shore of Christmas Bay with *Spartina alterniflora* in order to create 14,000 linear feet of intertidal shoreline habitat, reduce erosion of upland habitat, and improve water quality and clarity thus improving conditions required by seagrass (clear, shallow-saline water).

Bid Process: In May of 2005 the Invitation For Bid (IFB) was advertised on the Texas Market Place for 14 days and was set to close on June 9, 2005. An addendum correcting contact information and adding an aerial photograph extended the closing date to June 16th.

The company selected for the project was to: 1) harvest and transport to the project site a minimum of 14,000 planting units of native smooth cordgrass (*Spartina alterniflora*), 2) each unit of smooth cordgrass would be planted on a minimum of one (1) foot centers along 14,000 linear feet (2.65 miles) of the north shoreline of Christmas Bay, and 3) provide documentation recording the number of plants planted and percentage of survival 60 days after being planted and prior to 90 days.

Two bids where received, Belaire Environmental, Inc. ($47,888) and Benchmark Ecological Services, Inc., ($26,180). The qualified low bidder was Benchmark Ecological Services, Inc., (Benchmark) coming in well below the project's budgetary control dollar amount of $35,000. Awarded to Benchmark, the planting began in July 2005.

Because the first awarded contract was below the project's budgetary control dollar amount, in late June, a second IFB was sent to three companies requesting bids to plant 4,700 planting units, closing on July 6th. Benchmark and Apahe was again the low bidder and awarded the second planting contract to plant the additional 4,700 units in selected areas, also began planting in July.

Planting Techniques: Planting techniques were traditional, collecting *Spartina alterniflora* clumps (3-5 live stems per clump) from Texas Genco's nursery in Baytown, transporting them to the project site keeping them moist, transporting them to the planting area, and planting them using dibbles and sharp shooters. Benchmark and their subcontractor, Apache Ecological Services, Inc., (Apache) began harvesting plants and

completed the planting in July, planting 14,000 units along 14,000 linear feet of shoreline. The additional 4,700 clumps were planted in selected areas, also completed in July.

Reporting Requirements: As required by the contract between TPWD and Benchmark, the contactor provided documentation recording the number of plants planted and the percentage of survival within 90 days of being planted. (please see attached report) (Attachment 1).

Project Results

A total of 18,900 *Spartina alterniflora* plugs were planted on one-foot centers along 14,000 linear feet of shoreline. The majority of the shoreline was planted with a single row, and six areas where planted with multiple rows. Please see the attached maps provided by the contractor depicting the areas planted and the number of plants planted in each (Attachment 1). Received in October 2005, the monitoring report (Attachment 1) reported each segment had less than the required 90% survival and required some spot planting. A total of 5,595 plugs were replaced, 1,900 plugs in segment A, 1,560 plugs in segment B, 1,235 plugs in segment C, and 900 plugs in segment D. Replanting was completed on Tuesday November 15th. The final monitoring report received April 24, 2006 (Attachment 2) estimated an overall survival rate of 91.52%

Project Conclusions and Lessons Learned

Some likely reasons for the poor survival in the primary planting efforts could be attributed to long periods of extreme high tides associated with Hurricanes Katrina and Rita in the Christmas Bay area and high salinities due to the lack of rain. In addition, all portions of unvegetated shoreline were planted regardless of bay bottom type, planting platform, or depth. Some of the areas planted may have not been suitable areas to support the growth and survival of the planted *Spartina alterniflora*. All of these circumstances compounding the stress of the harvest, transport, and transplant activities most likely affected the survival of the transplanted plants.

Due to some of the obstacles mentioned above (bay bottom with a high content of oyster shell, narrow planting platform, or depth) it is likely that not all of the planted areas will flourish into wide bands of marsh. But, it is likely that the areas that are conducive to supporting *Spartina alterniflora* (approximately 2/3 of the planted length) will flourish and establish bands of marsh creating intertidal habitat, reducing erosion, and improving water quality.

Planting and establishing vegetation along the north shoreline will also address and assist with some of the concerns and management goals in the Christmas Bay Coastal Preserve Management Plan, such as reducing erosion and redistribution of sediments along the Preserve's north margin, sediment potentially affecting existing cordgrass stands, water quality, and the seagrass. The creation of shoreline intertidal habitat will also assist with the fishery management aspect of the plan; optimize the diversity, quality, and abundance of priority species in Christmas Bay while also providing feeding habitat for avian species and small mammals.

Attachment 1

Attachment 2