Texas Wetland News

and WETLAND CONSERVATION PLAN UPDATE

4200 Smith School Road • Austin, TX 78744
www.tpwd.state.tx.us/wetlands/publications

TEXAS PARKS & WILDLIFE

JANUARY 2006

MASTER NATURALIST PROGRAM SEEKS APPLICANTS

Twenty chapters of the Texas Master Naturalist program are conducting spring training classes for volunteers wanting to learn about natural resource and conservation management.

The Texas Master Naturalist program, with 33 chapters located across the state, aims to develop a corps of well-informed citizen volunteers who educate their communities about the wise management of natural resources. The main qualification needed to become a Certified Texas Master Naturalist is an interest in learning and playing an active part in conservation. Volunteers will receive a minimum of 40 hours training from educators and specialists from places such as universities, natural resource agencies, nature centers and museums. Training topics include interpretation and management of natural resources, ecological concepts, eco-regions in Texas and natural systems management. Volunteers are expected to give 40 hours of service a year in community education, demonstration and habitat enhancement projects. They are also expected to pursue a minimum of eight hours of advance training in areas of personal interest.

Texas Master Naturalist Chapters offering volunteer training this spring are listed with contact information. Enrollment is limited in most chapters. Some registration deadlines are fast approaching, so contact a chapter near you to see if seating is still available.

Classes listed on page 5

Saltmarsh and Seagrass Restoration and Protection at Delehide Cove

Saltmarshes and seagrass meadows are critical components of estuarine ecosystems. In addition to providing many services to society including water quality maintenance, storm surge abatement and primary production, saltmarshes and seagrass meadows are also critical to the life cycles of numerous animal species such as egrets, herons, clapper rails, diamond back terrapins and river otters.

Numerous recreationally and commercially important fishery species such as red drum, brown shrimp and blue crab use saltmarshes and seagrass meadows as “nursery” habitats, as the young of these species utilize these areas for food, shelter from water currents and protection from predators. These species utilize saltmarsh until they are motile and can feed and avoid predators in the open water environment. Due to their essential role in estuarine fishery species life histories, saltmarshes and seagrass meadows are the engines that sustain the recreational and commercial fisheries.

West Bay, a sub-bay of the Galveston Bay system, has suffered extensive loss of saltmarsh and seagrass meadows over the last 50 years. For example, between the

continued on the next page

Marsh mound one and a half years post construction.

Delehide Cove, continued

1950s and 1990s, over 5,200 acres of saltmarsh were lost in West Bay, in addition to all the previously-existing 2,000 acres of seagrass meadow. The primary culprit for this loss is land surface subsidence resulting from groundwater withdrawal by the City of Houston and local industries, which pumped groundwater to meet water demands.

As water was withdrawn from underground, the ground compressed and sank, lowering the elevation of West Bay marshes as much as one foot. Because saltmarshes grow in a narrow elevation range, this subsidence resulted in the loss of marshes in lower elevations as they drowned in a (relative) higher water level. The subsidence also submerged spits and reefs that had offered the marshes protection from erosion, and this loss of protection left the remaining marsh vulnerable to loss due to chronic erosion. Other reasons attributed to marsh and seagrass loss in West Bay include conversion of habitat to housing developments and canal dredging.

In response to this habitat loss, Texas Parks and Wildlife Department (TPWD) has worked within diverse partnerships to protect some of the remaining habitat and restore some of what has been lost. One recently completed restoration project is Delehide Cove Marsh Restoration and Protection Project, which was awarded one of two National Wetland Conservation Awards from the United States Fish and Wildlife Service in June 2005. Bestowed to the entire project team, this recognition emphasized the partnerships that are essential to the completion of habitat restoration projects on the Texas Coast. Along with TPWD, contributors to the project included the United States Fish and Wildlife Service, Texas General Land Office, Galveston Bay Estuary Program, Galveston Bay Foundation, National Marine Fisheries Service, Pirate's Beach Property Owner's Association, Reliant Energy, Texas GenCo, Blackard Industries, West Galveston Island Properties Association and the Fish America Foundation.

Aerial photograph of Delehide Cove in 1930. Note extensive marshes in the cove.

Top: Delehide Cove prior to restoration Bottom: Delehide Cove in 2005, less than one year after completion.

Delehide Cove, continued

Geo-textile tube being filled by hydraulic dredge.

An essential part of this project was protecting the remaining saltmarsh from erosion. Over 8,000 feet of breakwaters have been constructed to simulate the functions of the spits and reefs as they existed prior to subsidence, and over 200 acres of saltmarsh and other estuarine habitats are now protected from erosion by these breakwaters. Constructed from sand-filled geo-textile tubes, this breakwater material was chosen because it is more cost effective when compared to rock breakwaters; however, a drawback to this choice of materials is their limited lifespan.

Although made to last up to 25 years, the industrial fabric that comprise the geo-textile tubes can have their lifespan shortened by external factors such as boat strikes and vandalism. TPWD has installed numerous markers in an attempt to prevent boat strikes, and ironically enough, the vandalism has been conducted largely by recreational fishermen, one of the user groups that stands to benefit the most from these marsh restoration projects. TPWD staff has found intentional cuts in the geo-textile tube fabric that are used for mooring by fishermen on the leeward side of the breakwaters and for use as rod holders. These cuts allow sand to escape from the breakwater structure and can significantly shorten their lifespan. If you see fellow fishermen or other individuals vandalizing these breakwaters, please inform them of the purpose of these breakwaters as important elements in marsh restoration projects or contact TPWD personnel to report the incident.

The marsh restoration at Delehide Cove utilized a hydraulic dredge to pump sand into marsh mounds, which is a technique was pioneered by TPWD at the nearby Jumbile Cove project. This technique results in gentle slopes that approximate a natural marsh and result in wide "edge" that is subject to tidal inundation and provides habitat that has the highest use by the young of fishery species.

The constructed breakwaters have led to increases in water clarity, which has fostered seagrass growth at several of these projects, including the regrowth of seagrass meadows in West Bay. Currently, approximately five acres of seagrass meadow has grown behind the breakwater and these meadows are expected to expand throughout the project area.

TPWD and project partners are committed to restoring the marshes of Texas to maintain the recreational and commercial fisheries of this state. As these projects are expensive, TPWD needs the support of its various usergroups, especially fishermen, to continue these projects and to prevent vandalism from inhibiting the progress of this restoration program.

Intentional cut in the geo-textile breakwater.

WANT TO GET ON THE MAILING LIST?

If you would like to be added to the mailing list or would like to submit an article for the next issue of the Texas Wetlands News, contact:

Jennifer Key
Inland Fisheries Division
4200 Smith School Road
Austin, Texas 78744
or E-mail – jennifer.key@tpwd.state.tx.us

Historic Wetlands of Houston

How many of you have marveled at the cartographic beauty and wealth of historic information that can be found on an old map? Once confined to rare and fading paper maps, mapping efforts from the early 1900s is now in the process of becoming available in digital formats, with the result of enhanced accessibility and usability. In 1915, the U.S. Geological Survey (USGS), in conjunction with Harris County, began extensive ground surveys to produce a series of 1-foot elevation contour maps for Harris County at a 1:31,680 scale. However, it's important to note that where these contour lines fall within the boundary of Houston, they change to 5-foot intervals.

A valuable feature of these maps is that they denote depressions in the area, which can include a range of conditions from significant water features to seasonal wetlands. The maps have symbols for marshes and swamps, submerged marshes and swamps, and other natural features such as bayous, rivers, gullies, gulches, sloughs, hollows, ponds, lakes, ridges, mounds, hills, flats, beaches, bays and islands. The maps also include symbols for cultural features such as USGS elevation benchmarks, dams, roads, railroads, schools, cemeteries, warehouses, oil pumping facilities, oil wells, sawmills and buildings, and delineate some selected ranches and parks. Most of these old maps have limited annotation.

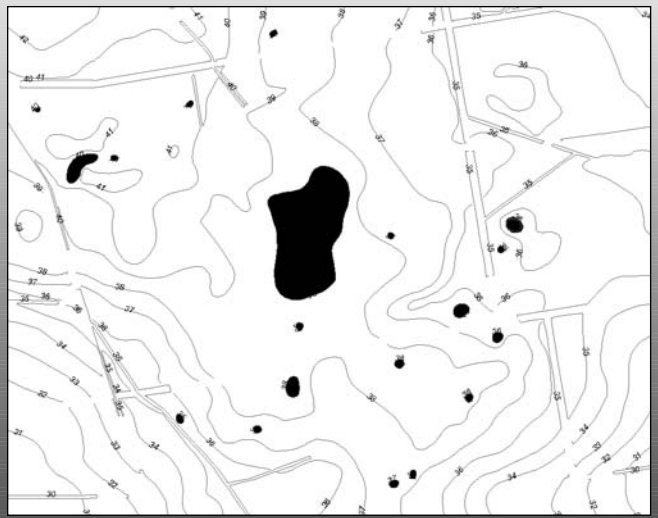
More recent maps in the 1-foot contour series were surveyed in 1929, with the completed maps published in 1932. Among these were Algoa and Dickinson in northeastern Galveston County, which were maps developed as a joint effort of the USGS, U.S. Coast and Geodetic Survey, and the Texas Reclamation Department. The cultural and drainage features of the Dickinson quadrangle map were in part compiled from aerial photographs taken by U.S. Army Air Corps.

The Texas Parks and Wildlife Department (TPWD), with the aid of the Environmental Protection Agency's Region 6 State Wetlands Grant money, contracted with Digital Data Services, Inc. (DDS) of Denver for digital georeferenced versions of these historic paper maps. As these maps are out of print, DDS borrowed the originals from the USGS historic archive in Denver and scanned them at 400 dots per inch to insure digitizing accuracy. They were then georeferenced using ESRI ARCVIEW 9 to rubber-sheet the scanned images to a custom ESRI shapefile template, and the topographic contour lines were then digitzed by hand from the georeferenced raster images in AutoCad. The resulting AutoCad DWG was converted into an ESRI shapefile for final quality control and editing of the database and an effort was made to edge-match the vector contour lines. As a final step, metadata was included with the digital files to document the source of the data and the process used to produce these digital maps.

From this process, TPWD received two products: 1) the scanned georeferenced raster images of each quad sheet (Figure 1), and 2) the digital vector contour lines (Figure 2). The digital vector data includes a database which denotes whether a topographic contour line elevation was determined directly from annotation on the map, whether it was interpolated from nearby annotated contours, and if the contour line was originally symbolized as a depression. For

Figure 1: A subsection of the 1919 Cedar Bayou raster image of the USGS map showing 1-foot contours and depressions.

Figure 2: A subsection of the 1919 Cedar Bayou vector data with the contours annotated and the depressions selected and highlighted in black.



the trained GIS-user familiar with database queries, it's a simple matter to quickly select contour lines at, above or below a given elevation and also to see where depressions existed in the southeastern Gulf Coast landscape some 70 to 90 years ago.

To better understand subsidence in this region, the Houston Subdistrict Office of the USGS Water Resources Division, working with the Houston-Galveston Subsidence District, is using the historic data as a baseline to compare to Light Detection and Ranging (LIDAR) data of Harris County that was collected in 2000.

The historic maps are providing valuable data on the location of former marsh locations, and this data can be very helpful in achieving success in wetland restoration projects. As many of Texas' prairie wetlands were leveled and converted for use in rice production, the native topsoil was buried. Now with the knowledge of former marsh locations, the non-native topsoil can be removed and the restored wetland can benefit from proper pH, rich organic matter, and even some still-viable seeds of native wetland plants inherent to the formerly buried native topsoil. In addition, use of the historic data can help ensure that a restored wetland will "fit," i.e., be of the proper size for the surrounding watershed, and even help form a more natural shoreline. Wetland restoration projects created with the historic conditions taken into account can be more hydrologically successful overall and may even have fewer problems with invasive, weedy plant species.

Contact Kim Ludeke at (512) 389-8071 for more information.

Master Naturalist Training Classes

ABILENE–Big Country Chapter. Registration deadline is Mar. 17 for classes beginning Apr. 3. (325) 672-6048 or g-bomar@tamu.edu

AMARILLO–Panhandle Chapter. Registration deadline is Mar. 27 for classes beginning Apr. 3. (806) 355-0724 or chassell@arn.net

AUSTIN–Capital Area Chapter. The spring class is full, but the chapter maintains a waiting list of prospective members. To be added to the list go to: www.camn.org

BASTROP–Lost Pines Chapter. Registration deadline is Feb. 13 for classes beginning Feb. 27. Information and application at: www.lostpinesmasternaturalist.org

BAY CITY–Mid-Coast Chapter. Registration deadline is Jan. 15 for classes beginning in February. kirkwood@cableone.net

BRENHAM–Gideon Lincecum Chapter (Austin, Colorado, Fayette and Washington counties). Registration deadline is Jan. 15 for classes beginning Feb. 11. dredden@tconline.net

CLEBURNE–Rio Brazos Chapter. Plans for a class to begin in April or May are in progress. Cebellsdell@aol.com

CONROE/HUNTSVILLE–Heartwood Chapter. Registration deadline is Mar. 1 for classes beginning Mar. 11. texasnaturelover@earthlink.net

DALLAS–North Texas Chapter. Registration deadline is Jan. 11 for classes beginning Feb. 15. (214) 904-3050 or www.ntmn.org

EL PASO–Trans-Pecos Chapter. Spring dates pending. (915) 859-7725 or r-bader@tamu.edu

GALVESTON–Galveston Bay Area Chapter. Registration deadline is Feb. 10 for classes beginning Feb. 23. (281) 534-3413, ext.3 or jk-massey@tamu.edu

HARLINGEN–Rio Grande Valley Chapter. Registration deadline is Jan. 25 for classes beginning Feb. 1. (956) 364-1410 or rgvctmn@rgv.rr.com

HOUSTON–Gulf Coast Chapter. Registration deadline is Feb. 13 for classes beginning Feb. 27. (281) 855-5600 or gcmn@tamu.edu

NEW BRAUNFELS–Lindheimer Chapter. Registration deadline is Mar. 14 for classes beginning Apr. 4. (830) 620-3440 or elee@nbutexas.com

PLANO–Blackland Prairie Chapter. Registration deadline is Jan. 15 for classes beginning Feb. 9. (214) 538-4444 or txmasternaturalist@comcast.net

SAN ANTONIO–Alamo Area Chapter. Registration deadline is Feb. 9 for classes beginning Mar. 9. (210) 698-2397 or aamn@texas.net

SAN MARCOS–Hays County Chapter. Registration deadline is Jan. 17 for classes beginning Feb. 7. (512) 393-2120 or jp10@txstate.edu

TYLER–East Texas Chapter. Registration deadline is Jan. 9 for classes beginning Jan. 21. (903) 871-2648 or johnnie1541@yahoo.com

WACO–Heart of Texas Chapter. For information: karen.watson@tpwd.state.tx.us

WICHITA FALLS–Rolling Plains Chapter. Registration deadline is Mar. 17 for classes beginning Mar. 21. Mark Howell: (940) 766-2383 or mark.howell@tpwd.state.tx.us

Texas Parks and Wildlife Department and Texas Cooperative Extension co-sponsor the Texas Master Naturalist Program statewide. For more information about existing chapters or forming a new chapter contact Sonny Arnold, Assistant Program Coordinator, 111 Nagle Hall, 2258, TAMU, College Station, TX 77843-2258. Phone (979) 458-1099 or e-mail: sarnold@ag.tamu.edu.

Goose Island Shoreline Stabilization and Marsh Restoration Project – Phase One

The Goose Island Shoreline Stabilization and Marsh Restoration Project was implemented by Texas Parks and Wildlife Department (TPWD) and its federal, state and local partners to protect, enhance and restore wetland habitats that are integral parts of the Texas Gulf Coast and the Aransas Bay estuarine ecosystems. The completion of Phase One of the project provides immediate and long-term protection and enhancement of valuable seagrass, intertidal marsh, high marsh, and oyster reef habitats in Aransas Bay through the construction of an offshore breakwater to protect the eroding shoreline of Goose Island and the construction of two containment levees for the creation of intertidal marsh habitat in a future phase.

Goose Island is an integral part of the Goose Island State Park located in the northern end of Aransas Bay on the southern tip of Lamar Peninsula, 12 miles northeast of Rockport in Aransas County, Texas. It is a popular vacation destination because of the recreational fishing and wildlife viewing opportunities available to visitors. Goose Island's southern shoreline along Aransas Bay is protected by a bulkhead along the developed portion of the island. The undeveloped and unprotected portion of the shoreline consists of a shell ridge with smooth cordgrass (*Spartina alterniflora*) marsh occurring in front of portions of it. Behind the shell ridge, high marsh grades into intertidal smooth cordgrass marsh. Tidal channels occur within the high marsh and intertidal marsh habitats. The approximately 100 acres of Aransas Bay north of Goose Island supports scattered living oysters, active oyster reefs and smooth cordgrass marsh. The shallow bay water on the southern side of the island supports expansive beds of shoal grass (*Halodule wrightii*) as well as scattered eastern oysters. The seagrasses, salt marshes and oyster reefs associated with Goose Island provide important feeding habitat for waterfowl, shorebirds and wading birds, and provide important nursery areas for commercially and recreationally important finfish and shellfish.

Coastal wetland loss in Texas is significant and is a continuing concern because of the essential roles that wetlands perform in providing fish and wildlife habitat, stabilizing shorelines and sediments, and improving water quality. Most of the 25 acres of Goose Island that has become submerged since 1969 was originally high marsh and intertidal emergent marsh habitats. Continued erosion and submergence of Goose Island threatened the remaining seven acres of smooth cordgrass marsh and ten acres of associated high marsh on the island and degradation of valuable oyster reef habitat and marsh habitats along the mainland shoreline.

Based on the results of a feasibility study and analysis of potential shoreline protection and marsh restoration alternatives for Goose Island, funded in part by the Texas General Land Office and the Coastal Bend Bays and Estuaries Program and completed in June 2003 by PBS&J, the following restoration objectives were established for the project.

Objective 1: Stabilize the approximately one-mile-long southern shoreline of Goose Island and its adjacent habitats in Aransas Bay with the construction of an offshore rock breakwater up to 4,400 feet in length.

Objective 2: Preserve and increase the quantity, quality and diversity of habitats and living resources in Aransas Bay through the creation of a lagoon effect in the approximately 40 acres of shallow bay located between the proposed breakwater and existing shoreline to enhance seagrass, oyster and intertidal marsh habitats located there.

Objective 3: Restore intertidal marsh habitat on the north side of Goose Island through the creation of a 24-acre marsh site through beneficial use of dredge material from two nearby boat channels and planting it with smooth cordgrass as a community-based effort.

TPWD Resource Protection Division (now the Coastal Fisheries Division), State Parks Division and Infrastructure Division teamed up with federal, state and local partners to implement the Goose Island Shoreline Stabilization and Marsh Restoration Project. Federal project partners providing funds for the project include the National Oceanic and Atmospheric Administration (NOAA), U.S. Fish and Wildlife Service (USFWS), and Environmental Protection Agency (EPA) Gulf of Mexico Program. The Texas General Land Office (GLO) supported the project with Coastal Impact Assistance Program funds and Coastal Erosion Program funds. Local project funding partners include the Coastal Bend Bays & Estuaries Program, the Aransas County Commissioners Court and the Gulf of Mexico Foundation. Staff from federal and state resource agencies participated as members of the project advisory team to guide the planning and implementation of the project.

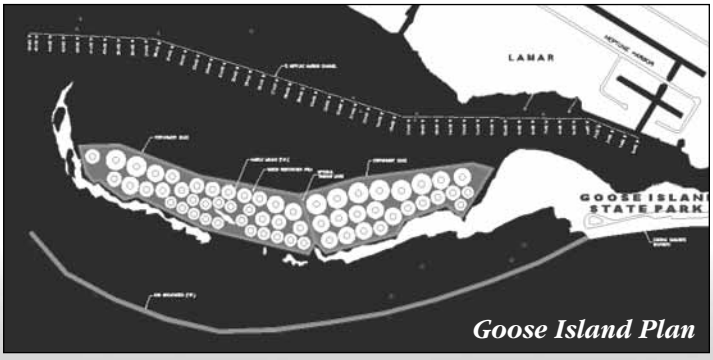
Phase One of the project consisted of the construction of an offshore rock breakwater to reduce erosion of the southern shoreline from daily wind and wave energy and the construction of two containment levees north of Goose Island for future development into a created estuarine

marsh site. A Corps of Engineers Section 10/404 permit and a Section 401 water quality certification from the Texas Commission on Environmental Quality were required for the project. In addition, consultation with the USFWS for potential impacts to federal listed threatened and endangered species and the Texas Historical Commission for potential impacts to cultural resources were required. Finally, an amendment to TPWD's coastal lease with the GLO was necessary to add the shoreline stabilization and marsh restoration project. All of the permits, certifications and consultations were acquired by August 2004 and the coastal lease was amended effective Feb. 1, 2005.

Lester Contracting Inc. of Port Lavaca, Texas, was contracted to construct the offshore breakwater and the marsh containment levees. Construction began on June 20, 2005, as the contractor's crew installed geo-textile filter fabric breakwater work corridor on the bay bottom that had been raked smooth. The breakwater was constructed of graded riprap material that met specific gradation criteria. The riprap consisted of durable natural stone having a minimum unit weight of 155 pounds per cubic foot. The contractor selected to construct the breakwater from the existing bulkhead rather than to construct it from a work barge. The contractor built a temporary "road" that would become the base of the breakwater and drove dump trucks on the road to deliver the rock to the contractor's project manager who placed the rock using an excavator. The breakwater was constructed with a crest elevation of +2.2 feet NAVD '88, a minimum crest width of 5 feet and 2:1 side slopes. After reaching the end of the 4,400-foot-long breakwater alignment, the contractor backed the excavator along the temporary road towards the starting point, shaping the breakwater on the way back and creating seven gaps for water exchange and animal ingress and egress. The end of the breakwater is located approximately 500 feet offshore so that the protected "lagoon" inside the breakwater is open on its west end. The breakwater was completed in October 2005.

Wilco Marsh Buggies and Draglines, Inc., the subcontractor hired to construct the marsh containment levees, also began work in June 2005. The eastern marsh containment levee is 3,400 feet long and the western containment levee is 3,860 feet long. They were constructed with a crest elevation of +3.0 feet NAVD '88 and 4:1 side slopes from in-situ material located inside the marsh containment cells using a marsh excavator. Water control structures were installed in both levees and will be used for dewatering dredge material placed into the cells in a future phase.

After the levee material settled, Belaire Environmental, Inc. was contracted to plant the marsh containment levees in the fall and winter of 2005 using plants from nearby existing marshes. Over 23,000 high marsh plant species including *Spartina patens, Sporobolus virginicus, Borrichia frutescens, Fimbristylis castanea, Batis maritima, Salicornia virginica* and associated species were planted on the tops and sides of the levees at or above +1.5 feet NAVD '88.



Goose Island Plan

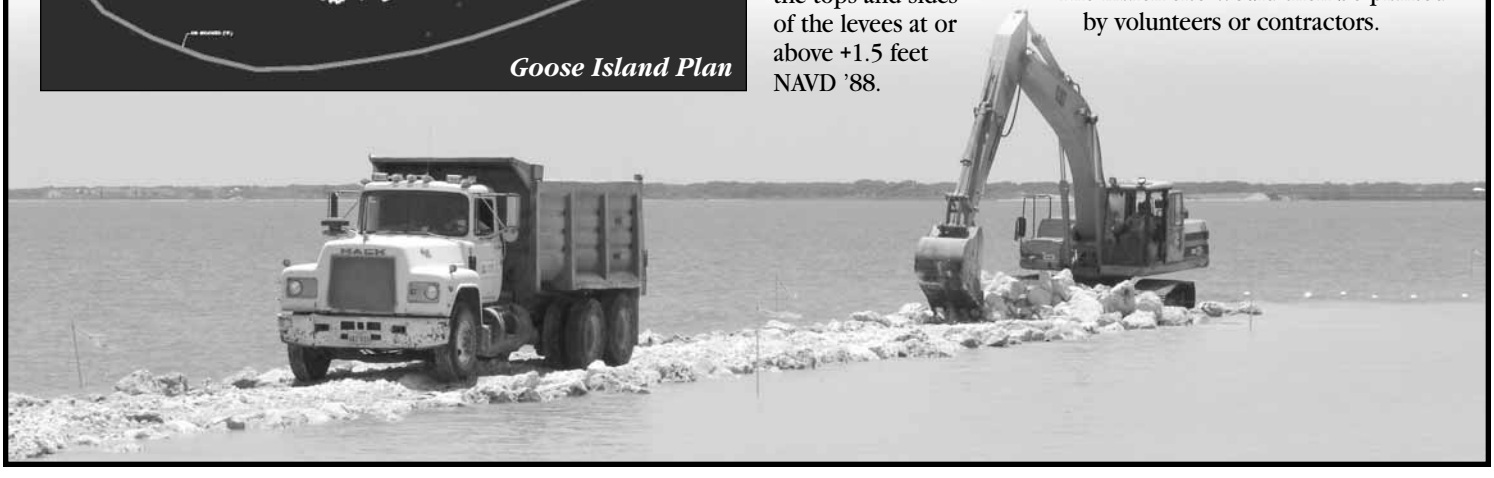
Approximately 9,500 low marsh plants, *Spartina alterniflora* (smooth cordgrass), were planted in the intertidal zone on the levee sides from +0.5 feet to +1.5 feet NAVD'88 during fall and winter 2005. The project costs associated with the project are provided below.

Final engineering and construction oversight:	$175,000
Breakwater construction (4,400 linear feet offshore rock breakwater)	$1,215,700
Marsh containment levees (7,260 linear feet earthen levee)	$178,705
Planting marsh containment levees (~32,500 plants)	$68,365
Total	**$1,637,770**

All of the Phase One project components were completed within the allocated construction timelines.

Future Construction Phase Two

To complete the Goose Island Shoreline Stabilization and Marsh Restoration Project, two nearby boat channels would be dredged and the material placed into the marsh containment levees to raise the elevation of the bay bottom to that which supports intertidal emergent marsh. The boat channel between the western half of Goose Island and the mainland, known as Neptune Harbor Channel, would provide approximately 31,000 cubic yards of material that would be used to create mounds within the 24-acre marsh site. Then the Goose Island State Park boat channel would be dredged to provide 24,000 cubic yards of material that would be pumped around the mounds creating undulating topography in the marsh creation site. The estimated cost for constructing the marsh site is $500,000. The marsh site would then be planted by volunteers or contractors.



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