COTE BLANCHE HYDROLOGIC RESTORATION PROJECT (TV-04)
Shoreline Component

I. INTRODUCTION

I.1. Project Description

The project is located in St. Mary Parish, Louisiana, at approximately Lat 29° 40' 45" Long 91° 33' 40". Within the landscape, the 30,000-acre (12,140.8-hectare) project area is located on the eastern side of the Vermilion-Cote Blanche Bays system and is west of the Wax Lake Outlet (figure 1). The project's eastern boundary is the flood protection levee west of Bayou Sale. East Cote Blanche Bay is the southern boundary along with an indefinite east-west line from East Cote Blanche Bay to the levee just south of South Bend, LA. West Cote Blanche Bay is the western boundary and the Gulf Intracoastal Waterway (GIWW) is the northern boundary.

The originally proposed project feature consisted of 10,000 linear feet (3,048 linear meters) of low-level rock shoreline protection along the southern boundary (USDA SCS and State of Louisiana 1993). The constructed shoreline protection is a vinyl sheet piling wall that was built in two main sections. One project wall section extends 1,640 feet (499.9 meters) west from the British-American Canal to the east end of an existing wooden sheet piling wall (approximately 40-50 years old) which is approximately 1,200 feet (365.8 meters) in length. The other wall section extends west approximately 2,310 linear feet (704.1 linear meters) from the west end of the existing wooden wall (figure 1). The vinyl material was chosen to construct the wall when the geotechnical investigation revealed that the soils were unsuitable for supporting even a low elevation rock dike. The final length and footprint of the wall was the result of budget and design limitations.

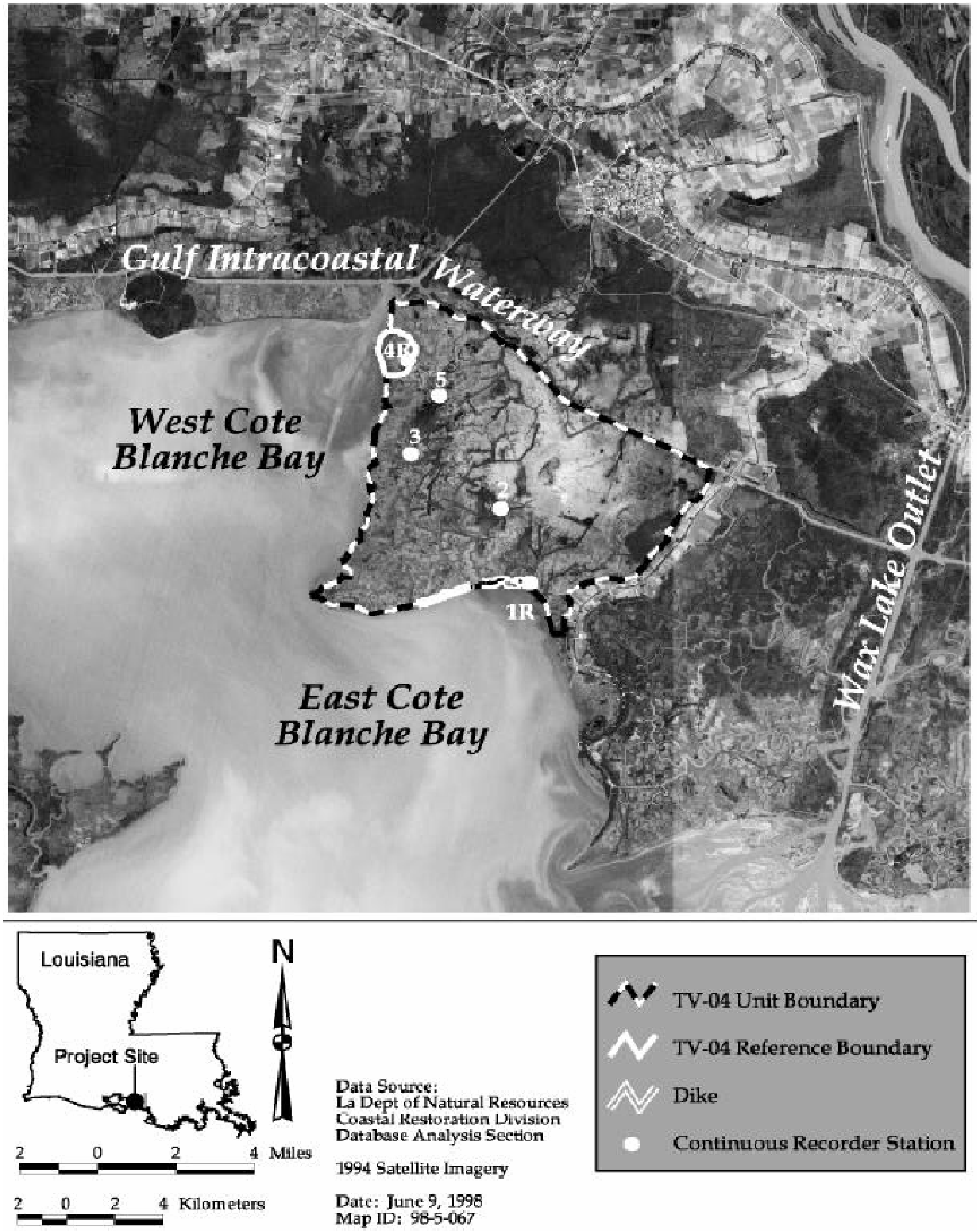

Figure 1. Location and project features.

I.2. Project Personnel

Project Phase	Name	Position	Agency
1. Planning	Kevin Roy	Project Manager (formerly NRCS)	USFWS
2. Planning & Implementation	Cindy Steyer	Project Manager	NRCS
3. Planning & Implementation	Jerry Hall	District Conservationist	NRCS
4. Planning & Implementation	Terrell Rabalais	District Conservationist	NRCS
5. Planning & Implementation	Loland Broussard	Planning Engineer	NRCS
6. Planning	Garrett Broussard	Planning Engineer	LDNR
7. Planning & Implementation	Herb Juneau	Engineer	LDNR
8. Design	Steve Garner	Engineer	NRCS
9. Construction	Wayne Melancon	Engineer	NRCS
10. Monitoring	Shannon Holbrook	Monitoring Mgr.	LDNR
11. Monitoring	Christine Thibodaux	Monitoring Mgr.	LDNR
12. O&M	Herb Juneau	Engineer	LDNR
13. O&M	Brad Sticker	Engineer	NRCS

II. PLANNING

II.1. Causes of Loss

What was assumed to be the major cause of land loss at the time of planning in the projected area?
Shoreline erosion was occurring at the rate of 10 to 15 feet (3.1 to 4.6 meters) per year. Shoreline surveys by Miller and Associates conducted between 1958 and 1975, and measurements from aerial photography showed increasing erosion rates from 1950's to 1990. Local citizens reported observing an increase in wave and tidal amplitude following the removal of shell reefs southwest of Point Chevreuil in the 1970's. Some shoreline areas were identified as critical where further breaching and loss would result in large interior open water areas being captured by East Cote Blanche Bay (USDA SCS 1993).

What were assumed to be the additional causes of land loss at the time of planning in the projected area?
Subsidence and sea level rise. Subsidence estimated for the area is 0.07 in/year (0.18 cm/year) and sea level rise is approximately 0.09 in/year (0.23 cm/year) (USDA SCS 1992). (See discussion on discrepancy with other data in the Physical Response section discussion on elevation.)

II.2. Background

The project was proposed as a candidate for the Second and Third Priority Project Lists, and was selected for the third list. A wetland value assessment (WVA) was completed for the project for each year's list. The project was originally proposed to be approximately 32,400 acres (13,112.3 hectares) with the eastern boundary continuing south past the terminus of the levee, along Highway 317 and the western bank of Bayou Sale to its mouth at East Cote Blanche Bay (USDS SCS and State of Louisiana 1992). During the third year WVA process, the project boundary was adjusted to eliminate the southern area between South Bend and the Burns Point area (USDA SCS and State of Louisiana 1993).

Shoreline erosion on the southern project boundary resulting from wave energy and breaches in adjacent canals was evident from aerial photography as early as 1952. Shoreline erosion rates averaged 10 - 15 ft/yr (3.04 – 4.6 m/yr) according to 1952, 1957, 1971, 1979, 1983, and 1990 aerial photography and surveys completed in 1975 by Miller Engineers and Associates. The measurements show an increase in shoreline erosion after 1978 for the Teche/Vermilon basin. Erosion rates averaged 10 - 12ft/yr (3.0-3.7 m/yr) from 1941 to 1978 and increase to an average of 20 - 25 ft/yr (6.1 - 7.6 m/yr) from 1978 to 1983.

The Cote Blanche Hydrologic Restoration Project contains measures to improve hydrologic conditions in 31,637 ac (12,803 ha) of fresh marsh through low-level weirs placed at major water exchange avenues and through shoreline protection on the southern boundary of the project area (LDNR 1998 TV-04 Monitoring Plan).

II.3. Project Goals and Objectives

How were the goals and objectives for the project determined?
See background.

Are the goals and objectives clearly stated and unambiguous?
WVA:
1) Reduce further shoreline loss from wave erosion, and
2) Prevent hydrologic connection or coalescence of East Cote Blanche Bay and open water areas forming in interior fragile marshes.

EA: Objective is to reduce the rate of wetland loss and subsequently improve habitat conditions for fish and wildlife. Goals:
1) Reduce shoreline erosion from wave energy in critical areas

The goals presented here are specific to the shoreline protection aspect of this project whereas a full list of the goals can be found in the hydrologic restoration review for TV-04.

Are the goals and objectives attainable?
The group interpreted this question to mean either 1) that the stated goals and objectives as stated are attainable under any possible circumstances, rather than for this particular project, or 2) whether or not data collected is sufficient to determine if goals and objectives have been obtained by this project.

The answer to the first interpretation is yes, the goals as stated are attainable. The answer to the second interpretation is that it is too early to determine because additional data collection and analysis is needed.

Do the goals and objectives reflect the causes of land loss in the project area?
Yes. The problem of direct loss of wetlands due to shoreline erosion is addressed, as well as the threat of loss of interior wetlands that would occur with loss of narrow shoreline currently protecting interior fragmenting marsh and open water areas from coalescence with East Cote Blanche Bay.

III. ENGINEERING

III.1. Design Feature(s)

What construction features were used to address the major cause of land loss in the project area?
The purpose of the PVC wall was to reduce the rate of the shoreline recession and protect critically vulnerable shoreline from breaching and allowing coalescence of interior open water areas with East Cote Blanche Bay (USDS NRCS 1995 and USDA SCS 1993). PVC wall was used in lieu of rock riprap because of foundation concerns. The wall was designed to be at an elevation sufficient to dissipate most of the energy from wind-generated waves during mean high tides.

The results from the geotechnical investigation by Eustis Engineering indicated poor foundation conditions in the project area with approximately forty feet of Holocene deltaic deposits overlaying a Pleistocene Prairie complex surface. The large anticipated settlements of the structures precluded use of a rock structure. The estimated settlement for the foreshore structure was particularly unsuitable. An ultimate settlement of seven to eight feet was anticipated in order to maintain the design crest elevation with six to one side slopes leaving sheet piling as the primary choice for the foreshore structure.

Because the anticipated settlement of the proposed rock structure was significantly larger than the original estimate, the rock feature was changed to a sheet pile structure. The cost per linear foot of the sheet pile was $385 as opposed to the original estimate of $130 per linear foot. This resulted in a change in the alignment of the shoreline protection feature to offset the cost. The path of the shoreline protection was angled shoreward to a selected point to reduce the total linear footage. The original contracted wall specifications were to construct it as 6,470 linear feet (1972.6 linear meters) of continuous shoreline protection with a top elevation of +3 NAVD between the British-American Canal and Jackson Bayou (USDA NRCS 1998a).

What construction features were used to address the additional causes of land loss in the project area?
Passive water control structures at key exchange points to restore lower energy, hydrologic regime. See Review for TV-4 Cote Blanche Hydrologic Restoration.

What kind of data was gathered to engineer the features?
Aerial photography, geotechnical borings and evaluations, and preliminary field engineering surveys of the various openings to and from the project area, local reports of wave and tidal amplitude provided data to engineer the features. As all weir structures were provided with a boat or barge bay to allow prevailing navigation the continued use of the bayous/canals, the depths and widths of the notch of the respective weir structures were ultimately dictated by draft demand of the navigation users.

An anchored sheet pile design was considered with batter piling, but due to concerns about dewatering and the minimum three foot centers to center recommendation, along with the allowable pile load capacity chart presented in Eustis' report, a cantilever sheet pile section was chosen for all but the foreshore structure.

What engineering targets were the features trying to achieve?
The purpose of the structure is to buffer against wave energy in order to provide shoreline protection. The PVC was designed to carry the anticipated load from wave energy, and to be of sufficient height to serve as a wave break to minimize wave impact at the shoreline.

III.2. Implementation of Design Feature(s)

Were construction features built as designed? If not, which features were altered and why?
The PVC shoreline protection component was not constructed as originally designed. During construction, at the beginning of July 1998, it became apparent that the portion of PVC Shoreline Protection wall that was constructed up to this point was weak in structural integrity. This portion was located between the British-American Canal and the east end of an old existing wooden sheet wall. Waves were causing the PVC wall to sway and some of the structural components began to fail. The Engineering Element of the project co-sponsors, NRCS and LDNR, reviewed the design of the supporting framework, discussed potential action alternatives and agreed to revise the design of the supporting framework of the wall essentially by "doubling" the structural support by addition of timber piling and using larger wales. It was recognized that this would increase the cost

of the structure and therefore reduce the linear footage of the structure that could be built within the available construction budget.

Because the number of acres benefited would be reduced with a decrease in the length of the shoreline protection provided, the estimate of benefits/AAHU was recalculated to determine if another WVA analysis would be required. It was determined that the amount of change in the estimate of emergent marsh at the shoreline in the Future with Project (FWP) was minimal: it was less than 1%. No loss of interior marsh was anticipated above that projected by the original WVA as long as the wall protected those stretches of shoreline vulnerable to breaching which would allow hydrologic connection of the Bay with deteriorating adjacent interior marsh and open water areas, as determined by the WVA.

It was decided that the configuration of the shoreline protection would be in two segments: the 1,650 foot (503 meter) segment that was already constructed from the British-American Canal to the east end of an existing wooden wall, and a segment extending west approximately 2,350 feet (716.5 meters) from the west end of the existing wooden wall toward Jackson Bayou. The final top elevation of the structure segments was +3 NAVD, as originally planned. This configuration provided the necessary protection to the most vulnerable stretches of shoreline (USDA NRCS 1998b, USDA NRCS 1999).

III.3. Operation and Maintenance

Were structures operated as planned? If not, why not?
Structures are operating as planned.

Are the structures still functioning as designed? If not, why not? Was maintenance performed?
The design and contract were modified, and the first segment already constructed was modified per the design revisions and then the second segment was built also using the revised design (USDA NRCS 1999). This fixed the instability problem as described above. Since construction completion, the PVC shoreline protection wall is still sound. The only current problem that is apparent, though this is minor, is that some of the metal caps on the timber pilings are experiencing severe corrosion.

There have been field observations that sediment is accreting at the points where the PVC wall segments overlap the ends of the existing wooden wall, and also in other areas between the PVC wall and the shoreline (LDNR 2002, Miami Corp 2002). We recommend extension of the wall and additional sections of shoreline protection.

IV. PHYSICAL RESPONSE

IV.1. Project Goals

Do monitoring goals and objectives match the project goals and objectives?
The objectives stated in the monitoring plan dated July 17, 1995 (revised July 23, 1998) as related to shoreline protection are: (1) Reduce water exchange between marshes of Cote Blanche and East Cote Blanche Bays to prevent scouring of approximately 31,637 ac (12,803 ha) of fresh marsh and (2) Protect shoreline on southern boundary between Humble and British-American canals from wave erosion and (3) Decrease rate of marsh loss. The goals and objectives in the monitoring plan were clear, non-conflicting and consistent with the project features. They are realistic and attainable.

IV.2. Comparison to adjacent and/or healthy marshes

IV.2.1. Elevation

Does the project elevation fall within the range for its marsh type?
The project area is comprised of fresh and intermediate marsh types. Marsh elevation averaged 1.33 ft (.41 m) NAVD 88 at station 2, 1.29 ft (.39 m) at station 3 and 1.55 ft (.47 m) at reference station 4. There is insufficient information to suggest if these elevations support healthy marsh. An elevation survey is scheduled for April-May 2002 to re-establish elevations for all of the structures and water level recorders. Healthy marsh in the project area within both the fresh marsh and intermediate marsh class will be identified and surveyed for marsh elevation provided funds are available.

Did the project meet its target elevation?
There was no target marsh elevation identified for this project. Structure elevation targets were established to reduce water exchange and protect against wave erosion.

What is the subsidence rate and how long will the project remain in the correct elevation range?
The Marsh Plan and the WVA stated that subsidence estimated for the area is 0.07 in/year (0.18 cm/yr) and sea level rise is approximately 0.09 in/year (0.23 cm/yr). According to the EA (Penland, et al. 1989), subsidence rates ranged from 0.437 in/yr (1.11 cm/yr) at Morgan City to 0.606 in/yr (1.54 cm/yr) at Calumet. It was noted in the EA that this could be a high number because this data was collected during a flood period.

Erick Swenson of LSU recently analyzed long-term water level records and came up with the following relative sea level rise estimates:

Station	Period of Record	ft per year	cm per year
Grand Isle	1955-2000	0.035	1.06
Leeville	1956-1995	0.025	0.77
Catfish Lake	1976-1993	0.037	1.28
Houma	1959-1995	0.049	1.49
Morgan City	1935-2000	0.042	1.28

The Coast 2050 Report, which looked at a larger regional area, showed this area to have an intermediate subsidence rate of 0.335 cm/yr to 0.61cm/yr (1.1 to 2 feet per century). Also, interestingly, the report shows that there are two branches of a major fault trend running east-west through the project area.

Discrepancies in subsidence estimates are a common problem. The new coastwide benchmark system should help refine subsidence estimates. The differences in the subsidence data that was used for this project may be reconciled somewhat with additional surveying. The USGS (Jeff Williams) and UNO (Shea Penland) have been funded to refine subsidence estimates for Louisiana. Details on their activities need to be explored. Improvements on this project can be made if Sediment Erosion Table (SET) measurements were conducted. If the Coastwide Reference Monitoring System (CRMS) is approved by CWPPRA for implementation, 8 CRMS stations (which include SET measurements) will be employed in the project area (Steyer et al. 2002).

IV.2.2. Hydrology

See the TV-04 Cote Blanche Hydrologic Restoration Review.

IV.2.3. Salinity

What is the salinity regime that supports healthy marshes in the different marsh types?
Chabreck (1972) documented a salinity range of 0.2 – 5.99 ppt for fresh and intermediate vegetation types in the hydrologic unit encompassing Cote Blanche. Dominant species in the project area such as *Sagittaria lancifolia*, *Typha* spp., and *Alternanthera philoxeroides* have optimal biomass at salinities between 1.0 – 2.0 ppt (Southwest Texas RC&D 1992, La Peyre 2001). Stress and recovery experiments on *Sagittaria lancifolia* by McKee and Mendelssohn (1989) and Webb and Mendelssohn (1996) found tolerances up to 4.6 ppt but tissue damage after 35 days at 4.8 ppt. Grace and Ford (1996) found that *Sagittaria lancifolia* had substantial capacity for recovery to a 1-week exposure to 15 ppt salinity during a flooding event.

Does the project have the correct salinity for its marsh type?
Although salinity was not a required monitoring element on this project, salinities were measured with water levels as part of the equipment deployment. Average annual salinities in the project area fall within the lower range identified by

Chabreck (1972), and are assumed to be correct for the marsh types. Salinities in 1999 and 2000 were higher on average than previous years. Station 2 in the south-central project area had an approximate average annual salinity of 2.4 ppt in 2000 with salinities exceeding 4 ppt from July through October with a peak of 9.7 ppt (Note: this was during the second of two consecutive drought years). The salinity literature associated with extended exposures and tolerances is incomplete, thus unable to verify if the extended exposures in 2000 were significant.

What were the salinity targets for the project and were they met?
Since salinity was not a concern, no salinity targets were established for the project. One could perhaps assume that a goal of the project was to maintain the project area as a fresh/intermediate marsh. Assuming the appropriate salinity range for fresh/intermediate marsh is 0 - 5 ppt, may represent a reasonable salinity target for this project, though it is not stated in any of the project documents.

IV.2.4. Soils

What is the soil type that supports healthy marshes in the different marsh types?
According to Hatton (1981), fresh marshes in the Mississippi River Deltaic Plain are characterized by:

	Streamside	Inland
Bulk Density:	0.11 ± 0.03 g/cm^3	0.09 ± 0.01 g/cm^3
Organic Carbon:	23.1 ± 4.2 %	29.6 ± 3.1 %
Nitrogen:	1.5 ± 0.3 %	1.8 ± 0.2 %
Phosphorus:	927 ± 171 ug/g	944 ± 82 ug/g

Does the project have the correct soil for its marsh type?
According to the EA, project area soils are highly organic mixed with very fluid clay. The predominant soil series found throughout the project area is Kenner, with limited occurrences of Allemands and Larose soils toward the southern part of the project area. The typical moist bulk density of Kenner soil series is .05 to .25 g/ cm^3 in the top horizon (0 to 65 in, or 165.1 cm), and the typical organic carbon content is 17.4 to 34.9%. The typical moist bulk density of the Allemands and Larose series is .05 to .25 g/ cm^3, and the typical organic carbon is 17.4 to 49.4% (USDA SCS 1984, USDA NRCS 2000a, and USDA NRCS 2000b). Note that this is much more general information than that from Hatton (1981; from Gosselink 1984) above, though we did not find any reference to grain size there. Because of this, we are not in a position to compare data on the same parameters from the project area, to those determined by Hatton (1981).

In addition, there are no soil parameters being monitored in the project monitoring plan, so there is no way to determine if soil parameters are changing over time. However, it may be worth noting that the highly organic soils at the site as discussed in the EA, are consistent with the low bulk density and high organic matter content found by Hatton (1981).

A geotechnical investigation of the project area by Eustis Engineering was used as a reference for this project. Their report indicates a stratigraphy of Holocene deltaic deposits overlaying a buried Pleistocene prairie complex surface. The Holocene deltaic deposits include interdistributary marsh and inland swamp deposits composed primarily of loose black humus, extremely soft to very soft gray and dark gray organic clays and inland swamp deposits, are abundant throughout these soils. In the lower portion of the Holocene deposits, very soft gray silty clays, loose gray clayey silts and loose gray silty sands are present.

The surface of the Prairie Complex was approximately forty feet below the water surface. The Prairie Complex is composed of stiff to very stiff clays and silty clays. However, in some areas, soft to medium stiff clays and silty clays are present immediately below the Prairie Complex surface.

What were the soil targets for the project and were they met? If not, why?
No soil targets were established. See above discussion.

IV.2.5. Shoreline Erosion

How have shoreline erosion rates changed in the project area compared to nearby reference areas?
Not known. Surveys and data analysis have not been conducted as of yet. See above anecdotal info in III.3. Operation and Maintenance, paragraph under "Other". To document shoreline movement, continuous differential GPS data will be established at the vegetated marsh edge along the original shoreline behind the proposed breakwater. Using GPS, shoreline position will be documented as-built in 1998, and in 2001, 2004, 2007, 2010, 2013 and 2016 post-construction to provide a template for mapping shoreline changes and movement over time. Shoreline measurements will be taken at the same time of the year. Shoreline positions will be compared to historical data sets available in digitized format for years 1952, 1957, 1971, 1979, 1983, and 1990, and shoreline survey information that is available from Miller Engineers and Associates from 1958–1975. Shoreline erosion rate for the project area will also be compared to the shoreline erosion rate of a reference area located west of the foreshore dike (LDNR 1998 TV-04 Monitoring Plan).

IV.2.6. Other

None.

IV.3. Suggestions for physical response monitoring

Are there other variables that could be monitored to substantially increase the ability to understand the results of the project?
Other variables that could be monitored here include SET measurements, which would give insight into sedimentation and subsidence.

V. BIOLOGICAL RESPONSE

V.1. Project Goals

See IV.1

V.2. Comparison to adjacent and/or healthy marshes

V.2.1. Vegetation

What is the range in species composition and cover for healthy marshes in each type?
There were no vegetation goals and objectives on this project and therefore no vegetation data collection. The entire project area has been classified as fresh marsh based on Chabreck and Linscombe 1988 and 1997, and predominately intermediate marsh in 2001. USDA SCS (1993) and USDA NRCS (1995) identified the following most common plant species in the project area pre-construction: *Sagittaria lancifolia* (bulltongue), *Colocasia antiquorum* (elephantsear), *Typha* sp. (cattail), *Alternanthera philoxeroides* (alligatorweed), *Vigna luteola* (deerpea), *Polygonum* sp. (smartweed)., *Eichhornia crassipes* (water hyacinth), *Myriophyllum spicatum* (Eurasian watermilfoil), *Ceratophyllum demersum* (coontail), *Najas guadalupensis* (southern naiad), *Cabomba caroliniana* (fanwort), and *Heteranthera dubia* (waterstargrass).

Does the project have the correct species composition and cover for its type?
DNR monitoring personnel observed emergent and submergent vegetation species during post-construction hydrologic field monitoring. The emergent species are *Paspalum repens*, *Iris virginica*, *Hymenocallis occidentalis*, *Sagittaria lancifolia*, *Phragmites australis*, *Cicuta mexicana*, *Sesbania drummondii*, *Colocasia esculenta*, *Spartina patens*, *Physostegia intermedia*, *Schoenoplectus americanus*, *Alternanthera philoxeroides* and *Hydrocotyle* sp. and the submergent and floating species are *Echhornia crassipes*, *Zannichellia palustris*, *Myriophyllum spicatum*, *Ceratophyllum*, *Valisineria americana* and *Cabomba caroliniana*. *Morella cerifera*, *Salix nigra, Persea palustris*, and *Quercus virginiana* are some of the woody vegetation seen on higher points of elevation in the project area.

All vegetation in this area appears to be healthy and is indicative of a fresh to intermediate marsh environment. The community composition for fresh and intermediate marsh is consistent with O'Neil (1949) and Chabreck (1972). The weirs that were constructed in this area may be holding water on the marsh for longer periods of time than before construction (see physical response). However, the vegetation listed is well adapted to increased water levels, except for *Spartina patens*, which is a remnant dominant from before the 1970's when the marsh was predominately brackish.

What were the vegetation targets for this project and were they met? If not, what is the most likely reason?
The vegetation targets for the project were to maintain the project area as fresh/intermediate marsh. So far, that has been accomplished.

V.2.2. Landscape

What is the range in landscapes that supports healthy marshes in different marsh types? Is the project changing in the direction of the optimal landscape? If not, what is the most likely reason?
The land:water ratio for the project area was monitored in 1996 pre-construction and will be obtained in 2002, 2009, and 2015 post-construction. The land:water ratio was 83.4% land and 16.6% water in 1996. This compares with 1984 and 1990 land:water estimates of 93:7% and 87:13%, respectively, obtained from the WVA. It should be noted that the project boundary acreage in the 1995 WVA was 31,638 acres (12,803.7 ha) and in the 1996 analysis it was 30,898.8 acres 12,383.2 ha). As previously mentioned, the boundary did not change. This difference was generated from going from lower resolution quad sheets and maps in the planning stage to higher resolution spot imagery in the monitoring plan development stage. As part of the "brown marsh" investigations, photography was flown in September of 2000. Visual observations of the unrectified 2000 photography with the 1996 photography suggest little change has occurred in the project area.

Habitat classification of the project area in 1996 pre-construction identified 22,633 acres (9,159.4 ha) of fresh marsh, 880 acres (356.1 ha) of floating aquatics, 111 acres (44.9 ha) of submerged aquatics, 1,861 acres (753.1 ha) of wetland forested and 1,359 acres (550 ha) of wetland scrub-shrub as the predominant classes. Habitat classification post-construction will be completed after the fall 2002 flight. Chabreck-Linscombe habitat classifications conducted in 1997 and 2001 covered the project area. The 1997 classification was almost identical to the 1988 classification that identified the project area as primarily fresh marsh (~96%). Visser and Sasser (1998) further classified the 1997 Chabreck-Linscombe data into the following subclasses within the project area (fresh bulltongue, fresh spikerush, fresh maidencane, oligohaline wiregrass, oligohaline spikerush, oligohaline bulltongue and mesohaline wiregrass). The 2001 classification showed that 61% of the project area was intermediate marsh, with the northwest, northeast and southeast remaining fresh (~35%). Salinity data collected in the project area do not confirm nor refute the change in classification;

however, salinities in 1999 and 2000 were higher on average than previous years. Station 2 in the south-central project area had an approximate average annual salinity of 2.4 ppt in 2000 with salinities exceeding 4 ppt from July through October with a peak of 9.7 ppt.

The project appears to be maintaining the optimal landscape of fresh to intermediate marsh since construction. The unrectified 2000 color-infrared photography suggests the landscape is maintaining its integrity and that submerged aquatic vegetation is extremely abundant in all water bodies. The fall 2002 data is needed before further interpretation can be completed.

V.2.3. Other

None.

V.3. Suggestions for biological response monitoring

Are there other variables that could be monitored to substantially increase the ability to understand the results of the project?
Monitoring the species composition and cover of emergent vegetation in the project area, especially in the vicinity of the structures, could help determine if new growth is being encouraged per the original project goal. This can be accomplished adjacent to the structures using the Braun-Blanquet protocols described in Steyer et al. (1995) or throughout the entire project area using Visser and Sasser (1998) subclasses when Chabreck-Linscombe surveys are conducted. The vegetation surveys can indirectly help determine at a finer scale whether water flow in the area has been reduced sufficiently to eliminate erosive scouring.

Spot imagery at 10m (32.8 ft) resolution could also provide a quick evaluation of landscape integrity. One pre-construction and 3 post-construction analyzes of habitat changes are temporally insufficient to adaptively evaluate landscape changes over time.

VI. ADAPTIVE MANAGEMENT

VI.1. Existing improvements

What has already been done to improve the project?
No additional modification has been done to the structure since construction completion in January 1999. If funds are available, elevation transects will be conducted for comparison to baseline transects to determine if sediment accretion is occurring in the vicinity of the structure.

VI.2. Project effectiveness

Are we able to determine if the project has performed as planned? If not, why?
Project construction has only been completed since January 1999. This was followed by two years of historic drought conditions so significant biological response to the structures has likely not occurred. Analysis of water level data beyond 1999 is currently being conducted. This data, along with aerial photography that will be conducted in fall 2002, will improve evaluations of the project.

What should be the success criteria for this project?
The project may have performed in decreasing the rate of marsh loss; however, we will not know for certain until after the fall 2002 flight and analysis is conducted. The success criteria for this project should be maintaining an average annual percent land loss less than 0.084%, which is the short-term loss from 1983-1990. The scientific literature is insufficient to set targets for water level depth, duration, and frequency of flooding. Analysis of water level data to date should help establish targets for the future.

VI.3. Recommended improvements

What can be done to improve the project?
Some additional monitoring elements that should be considered are water velocity, vegetation, and sediment accretion.

The shoreline protection should be extended further west. If a different material can be used that is more feasible from an engineering standpoint and more economical, then that should be used. Shoreline protection should be added to prevent erosion from circumventing the structures in Mud and Jackson Bayous (and Humble-F Canal?). The addition of shoreline protection should also be investigated where East Cote Blanche Bay is encroaching on School Bus Bayou, west of Humble Canal.

VI.4. Lessons learned

1. The monitoring needs addressed in this document support a good argument for the Coastwide Reference Monitoring System (CRMS). There is constantly a lack of water level, elevation, salinity and other data in many coastal areas that are needed to better understand project area systems and develop appropriate project plans and features.
2. Sufficient geotechnical investigations (this was done for this project).
3. Environmental Assessment, Wetland Value Assessment, Ecological Review and Monitoring Plan Goals and Objectives should have been more consistent. Agencies are attempting to do this with more recent projects.
4. Annual post-construction inspections of the structures are necessary to monitor structure integrity.

VII. SUPPORTING DOCUMENTATION

VII.1. Published References

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VII.2. Unpublished Sources

Agency	Year	Agency Contact	Document Type	ShortDescription	Pages
American Forest & Paper Associates	1991		Article	National Design Specifications for Wood Construction. National Design Specification.	
USDA NRCS	2002	Loland Broussard	Interview	Communication with Cindy Steyer	
Eustis Engineering Company Inc.	1997		Report	Geotechnical Investigation for TV-04 Cote Blanche Hydrologic Restoration Project for USDA NRCS	
	1994	K. Roy	Interview	Project Manager Briefing with C. Schexnayder	
USDA NRCS	1998a		Repot	Awarded Contract and Drawings for Cote Blanche Hydrologic Restoration Project TV-04, Construction Unit 1	
USDA NRCS	1998b		Report	Notes from July 10, 1998 LDNR/NRCS Project Meeting. Subject: Construction Contract Modification of Site 8, TV-04 Construction Unit 1	
USDA NRCS	1999		Report	As-Built Plans for Cote Blanche Hydrologic Restoration Project TV-04, Construction Unit 1. Approved April 1, 1999.	
USDA NRCS	2000b		Report	St. Mary Parish Physical Properties of Soils Table J1.	
USDA NRCS	1992		Report	GIWW to Salt Point Wetlands, St. Mary Parish, Louisiana, Marsh Conservation Plan. Alexandria, LA: Water Resources Office.	10
USDA SCS	1192		Report	Candidate Project Fact Sheet	6
USDA SCS	1993		Report	Project Information Sheet for WVA	8
University of Texas		Stephen G. Wright	Computer Program	UTEXAS 3, Slope-Stability Package	
RISA Technologies			Computer Program	RISA2D, Rapid Structural Analysis 2	
RISA Technologies			Computer Program	RISA3D, Structural Design Program	
HEC-20	1991		Computer Program	Stream Stability at Highway Structures. FWP-IP-90-014	
HEC-18	1991		Computer Program	Evaluating Scour at Bridges FHWA-IP-90-017	
LDNR	2002	Herb Juneau		TV-04 Cote Blanche Shoreline Proctection: O&M Inspection Reports	
USDA NRCS	2002	Cindy Steyer	Interview	Miami Corportation: Landowner Rep. and Land Manager Conversation	

VIII. PROJECT REVIEW TEAM

Cindy Steyer	NRCS
Loland Broussard	USDA
Ralph Libersat	LDNR
Joy Merino	NOAA
Larry Rouse	LSU
Wes McQuiddy	EPA
Herb Juneau	LDNR
Agaha Brass	LDNR
Deetra Washington	LDNR

APPENDIX A. PROJECT INFORMATION CHECK SHEET

Project Name and Number: TV-04 Cote Blanche- Shoreline
Date: March 11, 2002

INFORMATION TYPE	YES	NO	N/A	SOURCE
Fact Sheet	X			Cindy Steyer (NRCS), PPL 3 RTC cindy.steyer@la.usda.gov
Project Description	X			Cindy Steyer (NRCS), Pre-selection plan
Project Information Sheet	X			Cindy Steyer (NRCS)
Wetland Value Assessment	X			Cindy Steyer (NRCS)
Environmental Assessment	X			Cindy Steyer (NRCS)
Project Boundary	X			Cindy Steyer (NRCS), Candidate List, WVA, PPL report, Eng. Design
Planning Data	X			Cindy Steyer (NRCS), Marsh Mgmt Plan
Permits	X			Cindy Steyer (NRCS)
Landrights	X			Cindy Steyer (NRCS)
Cultural Resources	X			Cindy Steyer (NRCS)
Preliminary Engineering Design	X			Cindy Steyer (NRCS)
Geotechnical	X			Cindy Steyer (NRCS)
Engineering Design	X			Cindy Steyer (NRCS), Contract package
As-built Drawings	X			Cindy Steyer (NRCS)
Modeling Output		X	X	
Construction Completion Report		X		
Engineering Data	X			John Jurgensen, (NRCS)
Monitoring Plan	X			Christine Thibodeaux (DNR), www.saveLAwetlands.org
Monitoring Reports	X			Christine Thibodeaux (DNR), www.saveLAwetlands.org
Supporting Literature	?			West Bay Modeling (USACE)
Monitoring Data	X			Christine Thibodeaux (DNR)
Operations Plan			X	
Operations Data			X	
Maintenance Plan	X			
Maintenance Data	X			DNR
O&M Reports: Annual inspection rpts	X			DNR
Other: Maintenance contract	X			DNR
Cost Share Agreement	X			Cindy Steyer (NRCS), DNR
Data Needs:				
Tie in elevations to network				
Atchafalaya River discharge				
Accretion behind PVC structure				

Possible sources of additional information: WES Model (Larry Rouse), WL and Circulation, Nan Walker (LSU), Lower Atchafalaya Bay Study (USACE, WES), Coastal Environments Report, Shell Removal EIS (USACE, Richard Boe).

Design changed from rock shoreline to PVC structure