CLEAR MARAIS SHORELINE PROTECTION (CS-22)

I. INTRODUCTION

I.1. Project Description

This project was authorized for construction by the 2nd Priority Project List. The project is located in Calcasieu Parish along the north bank of the Gulf Intracoastal Waterway (GIWW), about 5 miles to the west of Highway 27 (figure 1). The project area consists of 4,637 acres (1,877 hectares) according to the Wetland Value Assessment (WVA). The comprehensive monitoring report shows 4,311 acres (1,745 hectares) of impounded freshwater marsh and open water with submerged aquatic vegetation. The project boundaries are the GIWW on the south, agricultural lands on the north, the Alkali Ditch on the east, and the Department of Energy Pipeline on the west (U.S. Army Corps of Engineers (USACE) Fact Sheet, 1993). The name "Clear Marais" appears to be attributed to both a lake within the project area and a specific area of managed units since it is referred to in many places as a distinct area.

The project features consist of a rock dike along 6.6 miles (10.6 kilometers) or approximately 35,000 feet (10,668 meters) of the north bank of the GIWW. Construction of the project began on 12/13/96 and was completed on 3/4/97. According to the Secondary Criteria for Prioritizing Candidate and Listed Projects sheet dated 9/16/92 and the Environmental Assessment (EA) prepared in 11/94, material excavated from the flotation channel necessary for accessing the site would be used to create 46 acres (18.6 hectares) of marsh inside of the rock dike. However, according to the Wetland Value Assessment (WVA), no marsh creation from dredged material placement would occur, but 38 acres (15.4 hectares) of marsh would develop between the dike and the original shoreline within the 10 years following project construction. This is a discrepancy found in the project files. The goals and objectives developed for the project do not address marsh creation or accretion.

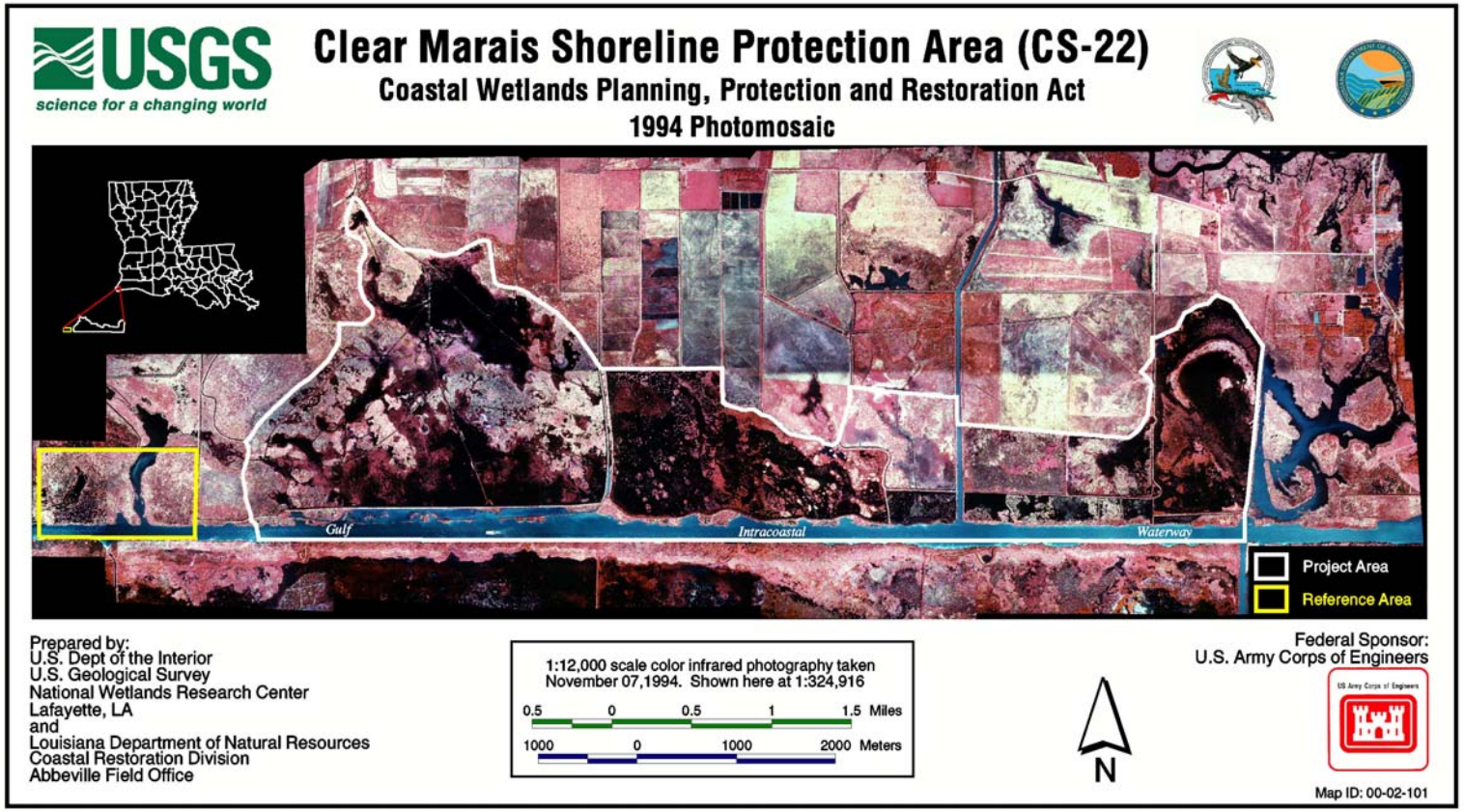

Figure 1. Location of Clear Marais Shoreline Protection project (CS-22).

I.2. Project Personnel

Project Phase	Name	Position	Agency
Implementation	Garrett Broussard	Project Engineer	LDNR
Planning and Implementation	Beth Cottone	Project Manager (early)	USACE
Planning and Implementation	Dom Elguezabal	Senior Project Manager	USACE
Implementation	Melvin Guidry	Project Manager	LDNR
Implementation	Bill Hicks	Project Manager (late)	USACE
Monitoring	Mike Miller	Monitoring Manager	LDNR
Planning	Michael Saucier	Prepared EA	USACE

II. PLANNING

II.1. Causes of Loss

What was assumed to be the major cause of land loss in the projected area?
The major cause of land loss was assumed to be the erosion of the GIWW bank. It was assumed that the bank would continue to erode and breach into the project area if nothing was done.

This project is more than just a shoreline erosion project. It is designed to protect an area much larger than the area that would erode over the project life if nothing were done to protect the shoreline. The spoil bank of the GIWW separates the brackish to saline water in the GIWW from the freshwater wetlands that occur just to the north of the spoil bank. If the bank of the GIWW were to be breached, the freshwater wetlands of the project area would be subjected to brackish and salt water and tidal fluctuation, causing rapid loss of the vegetated wetlands. It was assumed by the Environmental Work Group for the WVA, that the freshwater wetlands in the project area were stable and that no loss would occur if the north bank of the GIWW is kept intact. The rock dike along the GIWW was assumed to keep the shoreline intact throughout the project life.

What were assumed to be the additional causes of land loss in the projected area?
No additional causes of land loss were assumed. The project area interior marshes were assumed to be stable.

II.2. Background

The project is actually a “protection” project rather than a “restoration” project. Landowner representatives and the Natural Resources Conservation Service (NRCS) identified the potential for the freshwater wetlands of the project area to

be adversely impacted in the event of a shoreline breach. The potential for rapid loss of these vegetated wetlands was the rationale for selecting the bank protection.

A big problem that developed after project authorization was a significant increase in the project cost estimate. The original project cost, prepared by the NRCS, had estimated only about one-half of the rock needed to construct the original project design and did not include a cost for a flotation channel (U.S. Army Corps of Engineers (USACE) Fact Sheet, 1994). The proposed features were changed from the NRCS design to the USACE design. The original estimate was for a 4-foot (1.2-meter) high dike with 1 vertical on 2 horizontal side-slopes, with no top width, and rock estimated at $16/ton. No flotation was said to be necessary since field investigation noted adequate depth for draft. Things often change between the years of initial evaluation and the time a project is constructed.

Team members report that the original cost estimate had been prepared for protection of the property owned by Walker Properties. Before the project was submitted for Priority Project List funding, the project was modified to include protection of property belonging to the Gray Estate, but the cost estimate was not revised. This would explain the significant increase in cost.

A Value Engineering Study was conducted by the USACE, but the study did not produce any acceptable alternatives that had a significant cost savings. Extended negotiations between the USACE and the LDNR concerning costs and alternatives are documented in the files. There were discussions about reducing the length of shoreline protection and ways to secure additional state funding. In the end, the project was built essentially the same as planned by the NRCS, except for minor modifications in the design of the dike. The Clear Marais project is the first rock dike project built by the USACE, New Orleans District that has neither a specified berm width nor a crown width. District engineers refer to the design as a “pointy” dike.

It cannot be determined from the Narrative Completion Report how much flotation channel was excavated. The report refers only to 300 feet (91 meters) of excavation that was necessary at the far eastern end of the project. Team members verified that was the only location that flotation channel dredging was necessary.

II.3. Project Goals and Objectives

There is no specific mention of goals and objectives in the project files prior to development of the project monitoring plan. The EA discusses needs but not goals or objectives.

The project objectives, as stated in the monitoring plan are: Maintain and protect approximately 35,000 linear feet (10,668 meters) of a management levee along the north bank of the GIWW that will contribute to protecting the integrity of the freshwater marshes of Clear Marais adjacent to the GIWW.

The project goal, according to the monitoring plan, is: Decrease the rate of shoreline erosion along the north bank of the GIWW south of the Clear Marais marshes through the use of a rock breakwater.

How were the goals and objectives for the project determined?
The goals stated in the monitoring plan were likely developed by the monitoring work group and technical advisory group (TAG), based on anticipated effects documented in the WVA and EA.

Are the goals and objectives clearly stated and unambiguous?
The first part of the project objective about maintaining and protecting approximately 35,000 linear feet (10,668 meters) of management levee along the north bank of the GIWW is clear and unambiguous. The second part about how the project will contribute to protecting the integrity of freshwater marshes of Clear Marais adjacent to the GIWW is ambiguous. It adds subjectivity into the analysis.

Are the goals and objectives attainable?
The project goal is attainable. However, as it is written, the project could meet the goal, but not achieve the objective. According to the WVA and the project objective, the project was expected to completely stop shoreline erosion, not decrease the rate.

Do the goals and objectives reflect the causes of land loss in the project area?
The goals and objectives reflect the causes of land loss in the project area as determined by the Environmental Work Group when the project was first evaluated. It was assumed that no land loss was occurring within the project area and the only loss was the shoreline erosion, which would ultimately cause significant loss of the interior wetlands once the GIWW bank was breached.

III. ENGINEERING

III.1. Design Feature(s)

What construction features were used to address the major cause of land loss in the project area?
A rock dike was constructed along 6.6 miles or approximately 35,000 feet (10.6 kilometers or approximately 10,668 meters) of bank line to prevent further erosion of the north bank of the GIWW. The rock dike was constructed on top of geotextile fabric. Most of the dike was a foreshore type, but it touched the shoreline in places. Possibly as much as on third of the dike actually touched the

shoreline when built. The westernmost 2,000 feet (610 meters) of dike was supposed to be constructed against the bankline according to the P&S drawings dated 6/4/1996. However, even that portion of the dike was constructed mainly a short distance from the shoreline. The dike was built with a top elevation of +3 feet (+0.9 meters) NGVD83, and 1 vertical on 2.5 horizontal side slopes. The dike was tied into the bankline at both ends of the project and at the Brannon Canal, which was left open. According to the Narrative Completion Report, there was only one change made during project construction. An access gap, lined with rock, was left in the rock dike at one location for the landowner's access. The landowner agreed to place a gate across the opening.

The construction cost was significantly lower than the government estimate. It was partly due to the rock bid price coming in cheaper than estimated. A small break in price on such a big amount of rock can low the cost significantly. Another reason is the lower quantity of rock used. There was a discrepancy between the surveys performed by the USACE and the contractor, throwing off the baseline. The problem had something to do with using GPS for the first time and the contractor using DGPS. A decision was made to just go by the contractor's equipment, which apparently put the dike a little closer to shore, lessening the amount of rock used.

The contractor apparently believed that there would be less rock necessary to complete the job than estimated. The contractor included a very high cost per settlement plate in the bid price. In that way, the contractor was able to assure a profit, even if there was an under-run of rock.

What construction features were used to address the additional causes of land loss in the project area?
There were no construction features used to address the additional causes of land loss in the project area, because there were no other cases of loss identified.

What kind of data was gathered to engineer the features?
Soil borings and surveys were gathered to engineer the features.

What engineering targets were the features trying to achieve?
The target the features achieved was a continuous rock dike with a top elevation of +3.0 feet (+0.9 meters) NGVD83, with no specified crown width and 1 on 2.5 side slopes.

III.2. Implementation of Design Feature(s)

Were construction features built as designed? If not, which features were altered and why?
The dike was built very close to the original design of the NRCS, but not without much discussion within the USACE. The USACE hydraulic design engineers said that a pointy dike as the NRCS had proposed would not work. The belief

was that since there was no crown, the rock on top would just roll off, lowering the top of the dike. After much discussion, the District's Engineering Division bought-off on the pointy dike design based on the position that since this was a project in P&S stage that had already been justified, they would just design it, but not stand behind the design. An assumption was also made that whatever benefits had been assigned to the project were based on a pointy rock design. Engineering Division essentially washed their hands of the matter saying it could be built, but probably wouldn't last. One design criteria that couldn't be agreed upon was the side slopes. The original NRCS design had a 1 on 2 side slope. The District's Geotechnical Branch said that it couldn't be constructed that way and insisted on a 1 on 2.5 slopes (Interview dated 3/29/02). NRCS personnel have also stated recently that some NRCS personnel had objected to 1 on 2 side slope design when the project was being designed by the NRCS.

The project was built as designed by the USACE with minor "field fitting".

III.3. Operation and Maintenance

Were structures operated as planned? If not, why not?
No operation of structures is required. The dike is a passive structure with no operation and maintenance plan.

Are the structures still functioning as designed? If not, why not?
Team members report the dike is functioning well, although there may be some subsidence of the dike in places.

Was maintenance performed?
There has been no maintenance performed and none is planned. The project Cost Sharing Agreement specified refers to a Project Operations and Schedule Manual, but an O&M plan has not been formally agreed to by the USACE and LDNR. The details of the O&M plan are being negotiated between the two agencies. The amount estimated for project O&M according to the Cost Sharing Agreement is $400,000.

IV. PHYSICAL RESPONSE

IV.1. Project Goals

Do monitoring goals and objectives match the project goals and objectives?
There were no project goals and objectives stated before development of the monitoring plan. The monitoring plan goals and objectives were likely based on what the project was designed to accomplish. The goals and objectives were developed during a time when it was thought that project goals should not be stated too rigidly. That is why the goal is to decrease shoreline erosion, not stop shoreline erosion. It was believed that if the goal was to stop erosion, any small erosion that may occur could cause the project to appear as a failure.

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

IV.2.1. Elevation

What is the range of elevations that support healthy marshes in the different marsh types?
Unknown.

Does the project elevation fall within the range for its marsh type?
Unknown.

Did the project meet its target elevation?
Unknown.

What is the subsidence rate and how long will the project remain in the correct elevation range?
Unknown.

IV.2.2. Hydrology

What is the hydrology that supports healthy marshes in the different marsh types?
The marsh in the project area is hydrologically isolated form the tidal system. That is the preferred hydrology for this freshwater marsh since connection to the brackish and saline conditions of the tidal waters nearby would likely cause rapid loss.

Does the project have the correct hydrology for its marsh type?
Yes, and that is isolation from brackish and saline tidal waters.

What were the hydrology targets for the project and were they met?
The target was to continue the isolation of the project area marsh from the GIWW. It was assumed that the existing hydrology within the interior of the project area, based on management levees, was suited to this area since the marsh appeared stable.

IV.2.3. Salinity

What is the salinity regime that supports healthy marshes in the different marsh types?
The salinity that supports healthy marsh in the project area is as close to zero as possible.

Does the project have the correct salinity for its marsh type?
There is no way of knowing from the monitoring data, but it is assumed that the salinity is suitable since the marsh is stable and is remaining as a freshwater marsh.

What were the salinity targets for the project and were they met?
The project was designed to prevent salinity encroachment into the project area by maintaining an existing levee. Maintenance of the existing, impounded freshwater system was part of the project objective. The monitoring program does not include salinity measurements. Chabreck and Linscombe habitat data from 1988, 1997, and 2001 indicates the freshwater marsh in the project area is stable, as it was assumed for the WVA.

IV.2.4. Soils

What is the soil type that supports healthy marshes in the different marsh types? Does the project have the correct soil for its marsh type?
Soil type is not a factor used for analysis of this project.

IV.2.5. Shoreline Erosion

How have shoreline erosion rates changed in the project area compared to nearby reference areas?
The project area shoreline contains three different land types, based on soils and the rate of erosion prior to project construction. Land type 1 is located along the western part of the protected shoreline; land type 2 is in the middle section; and land type 3 is on the eastern end. According to the draft Three-Year Comprehensive Monitoring Report dated June 2001, land types 1 and 2,which were experiencing severe and moderate erosion, respectively, before project construction, pro-graded 15.96 ft/yr (4.80 m/yr) and 1.62 ft/yr (0.49 m/yr) respectively, between 1997 and 2000. The rock breakwater is approximately 100 ft (30 m) from the shoreline in front of these land types.

Land type 3, which was experiencing mild erosion prior to project construction, has showed a loss of 4.59 ft/yr (1.40 m/yr) since the project was constructed. This loss is most likely associated with the close proximity of the rock breakwater to the shoreline in this area. At some of the survey stations, vegetation was bordering the rock breakwater immediately after project construction. Overtopping of the dike by vessel wakes appears to be having a direct, adverse effect on the shoreline within this area, causing some erosion to occur. Due to land loss occurring within only land type 3, future shoreline surveys in this area will be monitored closely to determine the exact cause or causes of the land loss.

The overall shoreline change along the protected shoreline between 1997 and 2000 was a gain of 13 ft/yr. During the same period, the shoreline change along the reference shoreline, located to the west of the protected shoreline, was a loss of 20.5 ft/yr. Additional shoreline surveys to document shoreline position are scheduled in years 2003, 2006, 2010, and 2015.

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?
There are no other variables necessary that could be monitored to substantially increase the ability to understand the results of the project.

V. BIOLOGICAL RESPONSE

V.1. Project Goals

The project has no documented biological response goals.

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 and is being maintained as fresh marsh based on Chabreck and Linscombe 1988, 1997, and 2001.

Does the project have the correct species composition and cover for its type?
Unknown.

What were the vegetation targets for this project and were they met? If not, What is the most likely reason?
Post–construction photo acquisition is scheduled for 2006, so no information will be available to document changes in land-water ratio at least until then.

V.2.2. Landscape

What is the range in landscapes that supports healthy marshes in different marsh types?
Pre-construction photography was collected in 1994 in both the project area and a reference area, and classified into land and water. The 4,337-acre (1,755-hectare) project area contains 1,456 acres (589 hectares) of land (33.6%) and 2,881 acres (1,166 hectares) of water (66.4%) and the 328-acre (133-hectare) reference area contains 257 acres (104 hectares) of land (78%) and 71 acres (29 hectares) of water (22%). Change analysis will be conducted once the first post-construction flight is conducted in 2006. The percentage of marsh is a bit lower than the 44% identified in the WVA in 1992.

Is the project changing in the direction of the optimal landscape? If not, what is the most likely reason?
The project area is being maintained as it is, which is the purpose of the project.

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?
There are no other variables that could be monitored to substantially increase the ability to understand the results of the project.

VI. ADAPTIVE MANAGEMENT

VI.1. Existing improvements

What has already been done to improve the project?
Nothing has been done and nothing is necessary to improve the project.

VI.2. Project effectiveness

Are we able to determine if the project has performed as planned? If not, why?
The monitoring program is documenting the erosion protection provided by the project. The following is repeated from the draft Three-Year Comprehensive Monitoring Report: "The project has shown that, not only protecting the shoreline, but also increasing land to water ratios behind the rock breakwater can be obtained in a few years. Shoreline gains have occurred at 24 of the 34 sampling sites behind the rock breakwater. Shoreline losses have occurred at all of the reference sites. Overall, the project has shown a positive response of gaining 12.99 ft/yr (5.26 meters/yr) of land behind the breakwater."

What should be the success criteria for this project?
Stabilization of the shoreline should be the success criteria. If the interior wetlands deteriorate for other reasons, it is not due to the failure of the projects.

VI.3. Recommended improvements

What can be done to improve the project?
The first recommended improvement is to install secondary monuments on the east and west ends of the project in order to improve future elevation maintenance surveys. It is also suggested that on all shoreline protection projects, maintenance surveys should be used to monitor and evaluate shoreline protection features,

including accretion and toe scour. The maintenance survey would need to include a DGPS shoreline survey of the vegetated marsh edge in both the project and a reference area.

VI.4. Lessons learned

- Due to the minimal settlement occurring at this project, the use of geotextile fabric may not be necessary in areas with similar soil types. Other project s in similar soils should be investigated to determine if geotextile is necessary.
- There may not be a necessity to monitor land/water ratios if maintaining a certain ratio is not a project goal or objective.
- Information is being collected through a cooperative effort between the monitoring program and the maintenance program to document accretion behind the dike. This project benefit is not captured in the project goals or objectives, but is believed to be worthy of documentation. Both the monitoring and maintenance programs are contributing to surveys so that efforts are not duplicated.

VII. SUPPORTING DOCUMENTATION

VII.1. Published References

Louisiana Coastal Wetlands Conservation and Restoration Task Force. 1992 Candidate Project Fact Sheet in 2nd Priority List Report. Pages 167-171.

Louisiana Department of Natural Resources. 1995. Final Revised Monitoring Plan for Clear Marais (CS-22). 7 pp.

Louisiana Department of Natural Resources. 2001. Clear Marais Shoreline protection (C/S-22), Three Year Comprehensive Monitoring Report. C/S-22-MSTY-0301-1. 15pp + app.

U.S. Army Corps of Engineers, New Orleans District. 1994. Environmental Assessment for the Clear Marais Shoreline Protection Project. EA#219. 15 pp.

VII.2. Unpublished Sources

Agency	Date	Agency Contact	Document Type	Short Description	Pages
USACE	1992 (AUG)	Unknown	Project Information Sheet	Detailed listing of project information	3
USACE	1992 (AUG)	Richard Boe	Wetland Value Assessment Worksheet	Handwritten worksheet	1
USFWS	1992 (AUG)	Loyd Mitchell	WVA Meeting Notes	Handwritten notes from WVA meeting	5
USACE	1992 (SEP)	Unknown	Secondary Criteria	Letters of interest, average annual acres, rates of land loss, level of public support, etc.	1
USACE	1992 (NOV)	Unknown	2nd Priority List Pages	Copies of project pages from 2nd PPL	6
LDNR	1993 (FEB)	Unknown	Project Scope Fact Sheet	General project information	4
USACE	1993 (JUN) to 1996 (SEP)	Dom Elguezabal	Project Fact Sheets	Seven fact sheets prepared by the USACE over a 3-year period	12

Agency	Date	Agency Contact	Document Type	Short Description	Pages
USACE	1993 (AUG)	Gerry Giroir	Memo	Memo from the USACE Engineering Div. about preliminary project design.	1
USACE	No date	Unknown	WVA Narrative Explanation	A very detailed, typed explanation of assumptions used for the WVA	6
USACE	1994 (DEC)	Lynn Broussard	Memo	Memo from USACE Engineering Div. about project design	1
LDNR	1995 (JUN)	Greg Steyer	Monitoring Plan	Final monitoring plan for the project	11
USACE	1995 (JUL)	Dom Elguezabal	Letter	Letter from the USACE to Senator Breaux explaining cost overruns	2
USACE	1995 (SEP)	Unknown	Project History/Status Sheet	History/status sheet prepared for briefing the USACE District Engineer	1
N/A	1995 (NOV)	Harold Aymond	Letter	Letter from Gulf Coast Soil and Water Cons. Dist. about the need to include the Walker property in the project	2
USACE	1996 (APR)	Beth Cottone	E-mail	E-mail discussing real estate acquisition	1
USACE	1996 (APR)	Dom Elguezabal	Letter	Letter from USACE to Senator Breaux explaining project cost increase	2
USACE	1996 (MAY)	Dom Elguezabal	Memo	Memo from project manager to P&E subcommittee advising the project is ready to be constructed	2
USACE	1997 (MAR)	Joe Cormier	Narrative Completion Report	Detailed report of completed project	4
LDNR	1997 (DEC)	Unknown	Map	Project boundary map	1
LDNR	1998 (AUG)	Norman Davidson	Project Boundary Memo and Map	Memo from LDNR with map showing project boundary	2
USACE	2002 (MAR)	Richard Boe	Interview w/Jason Binet, Gerry Giroir, and Chris Alfonso	Interview report	1

VIII. PROJECT REVIEW TEAM

Jason Binet	USACE
Richard Boe (team leader)	USACE
Marty Floyd	NRCS
Mel Guidry	LDNR
John Jurgensen	NRCS
Ralph Libersat	LDNR
Wes McQuiddy	EPA
Joy Merino	NMFS
Mike Miller	LDNR
Andy Nyman	LSU
Deetra Washington	LDNR

APPENDIX A: INFORMATION CHECK SHEET

Project Name and Number: CS-22 Clear Marais- Shoreline
Date: July 2, 2002

INFORMATION TYPE	YES	NO	N/A	SOURCE
Fact Sheet – *Included in package*	X			Richard Boe (USACE), PPL 1 RTC
Project Description – *Included on fact sheet*	X			Richard Boe (USACE), Pre-selection plan
Project Information Sheet – *Included in package*	X			Richard Boe (USACE)
Wetland Value Assessment – *Included in package, with notes and narrative discussion*	X			Richard Boe (USACE), (DNR)
Environmental Assessment – *Included in package*	X			Richard Boe (USACE)
Project Boundary – *Two maps included in package*	X			Richard Boe (USACE)
Planning Data – *Numerous memos, letters, and USACE Fact Sheets included in package*	X			Richard Boe (USACE)
Permits – *WQC, 404*	X			Richard Boe (USACE)
Landrights - *No issues*	X			Richard Boe (USACE)
Cultural Resources – *No issues*	X			Richard Boe (USACE)
Preliminary Engineering Design – *A USACE memo is included*	X			Richard Boe (USACE)
Geotechnical – *USACE Engineering*	X			Richard Boe (USACE)
Engineering Design - *USACE Engineering*	X			Richard Boe (USACE)
As-built Drawings – *Unavailable, P&S drawings included*	X			Richard Boe (USACE)
Modeling Output – *N/A*			X	
Construction Completion Report – *Included in package*	X			Richard Boe (USACE)
Engineering Data – *USACE Engineering*	X			Richard Boe (USACE), Value Engineer Report
Monitoring Plan – *Included in package*	X			(DNR), www.saveLAwetlands.org
Monitoring Reports	X			(DNR), www.saveLAwetlands.org
Supporting Literature	X			Richard Boe (USACE)
Monitoring Data	X			Shoreline X-sect 1998 (DNR)
Operations Plan			X	None
Operations Data			X	None
Maintenance Plan: O&M Plan			X	Not yet executed
Maintenance Data		X	X	No maintenance done
O&M Reports: Annual inspection reports	X			DNR
Other:				
Cost Share Agreement	X			USACE or LDNR
Data Needs:				
Re-survey elevation of sediment/accretion behind breakwater				
Survey marsh (habitat) behind shoreline: what is being protected (descriptive 1998 – 2000 change)				

Modifications to project design were done as the project planning progressed.
USACE went to Task Force to receive additional funds for construction.