



State of Louisiana

**Coastal Protection and Restoration
Authority of Louisiana (CPRA)**

**2022 Operations, Maintenance,
and Monitoring Closeout Report.**

for

**SWEET LAKE/WILLOW LAKE
HYDROLOGIC RESTORATION**

State Project Number CS-11B
Priority Project List 5

March 2022
Cameron Parish

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2022 Operations, Maintenance, and Monitoring Closeout Report
For
Sweet Lake/Willow Lake Hydrologic Restoration (CS-11b)

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I. Introduction

The Sweet Lake/Willow Lake shoreline protection project is composed of approximately 6,000 ac (2,428 ha) of open water and freshwater wetlands surrounding Sweet Lake and Willow Lake in northeastern Cameron Parish (Figure 1). The project area is bounded on the south and west by the Gulf Intracoastal Waterway (GIWW), and on the north and east by Pleistocene prairie formations along La. Hwy. 384 and La. Hwy. 27.

The three soil types occurring in the project area are Allemands muck, Aquents, and Udifluvents (U.S. Department of Agriculture, Soil Conservation Service [USDA/SCS] 1995; USDA/Natural Resources Conservation Service [USDA/NRCS] 1997). Allemands muck is a very poorly drained organic soil found in freshwater marshes, making up 90% of the project area. The remaining 10% consists of frequently flooded Aquents Series and Udifluvents Series soils that comprise the dredged spoil along GIWW.

The plant community in the project area is fresh marsh dominated by *Sagittaria lancifolia* (bulltongue), with lesser amounts of *Panicum hemitomon* (maiden cane), *Schoenoplectus californicus* (California bullwhip), *Spartina patens* (marshay cordgrass), *Typha* sp. (cattail), *Phragmites australis* (common reed), *Colocasia esculenta* (elephant ear), and *Alternanthera philoxeroides* (alligator weed). A canopy layer of *Sesbania drummondii* (rattlebox), *Salix nigra* (black willow), *Sapium sebiferum* (Chinese tallow tree), and *Cephalanthus occidentalis* (buttonbush) is present on higher ground and on the remains of ridges formed by old levees and spoil banks in the area. Shallow open water areas support a number of aquatic plants, with stands of *Nelumbo lutea* (American lotus) and *Potamogeton diversifolius* (common pondweed) dominant. *Eichhornia crassipes* (water hyacinth) is also prevalent, with large floating mats often developing in open water areas by the summer.

When the GIWW was constructed in the early 1900's, its route lay just south of the southern shorelines of both lakes, but the high energy associated with the navigation channel has and continues to impact the lakes and surrounding marshes. Erosion of the banks of the GIWW has occurred, caused by the water level drawdown effect and wave wash from the wakes created by passing boats and barges (Good et al. 1995), along with the widening and deepening of the channel from its original dimensions of 40 ft (12.2 m) wide x 5 ft (1.5 m) deep to 125 ft (38 m) wide x 12 ft (3.7 m) deep in the 1940's (United States Army Corps of Engineers [USACE] 1978). This erosion has resulted in the breaching of the narrow strip of marsh and spoil bank between the canal and the southern shoreline of both lakes.

These hydrologic connections have led to increased mechanical erosion of the lake shorelines and the surrounding organic marsh soils, followed by the suspension and transport of organic and mineral sediments from the lakes and surrounding marshes into the deeper water of the GIWW channel, resulting in a significant loss of fresh marsh in the project area. Such "blowouts," where direct connections between a channel and inland water body form, expose

fragile organic marsh soils to high energy and increased erosion, are a common problem along navigation channels in coastal Louisiana (Good et al. 1995).

Land loss studies by Britsch (1994) indicate that in 1956, approximately 19 percent of the project area was classified as open water, and 61 percent was classified as fresh emergent marsh. By 1993, approximately 74 percent of the project area was classified as open water, and only 26 percent as fresh emergent marsh, most of which was deteriorated and converting to open water (Britsch 1994).

Between 1952 and 1975, the average shoreline erosion rate was 3.8ft/yr (1.2 m/yr) at Willow Lake and 2.6 ft/yr (0.8 m/yr) at Sweet Lake (Adams et al. 1978). Between 1978 and 1990, this rate increased to 11ft/yr (3.4 m/yr) along the northern and eastern shorelines of Willow Lake, and averaged 22 ft/yr (6.7 m/yr) along the Sweet Lake shoreline (Brown & Root 1992).

In May 2001, the placement of 17,460 linear feet (5,322 m) of foreshore rock dike was completed along the GIWW. In August 2001, construction of 25,931 linear feet (7,904 m) of open water terraces north of Sweet Lake was initiated; however due to complications with the contractor, timing of the installation of plants and inclement weather, the contract was terminated in October 2001 after only partial completion of the terraces (Figure 1). In June 2002, the construction of 20,650 linear feet (6,924 m) of shoreline terraces along the Willow Lake shoreline (Figure 1 and 2) was initiated. After completion of the Willow Lake terraces, construction began on the terraces in Sweet Lake. In October 2002, construction of 29,897 linear feet (9,113 m) of shoreline terraces in Sweet Lake (Figure 1 and 3), was completed.

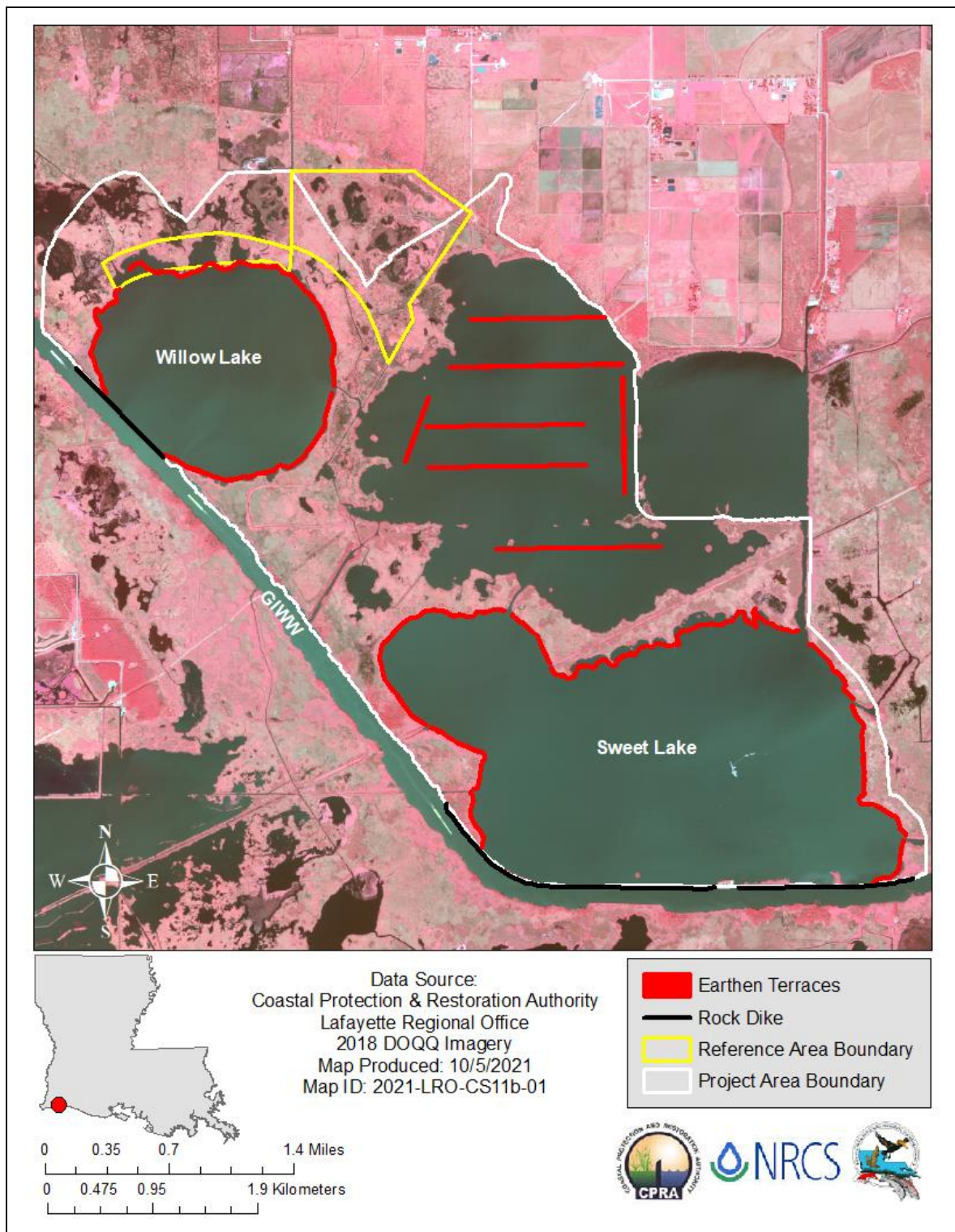


Figure 1. Sweet Lake/Willow Lake (CS-11b) project features, project area boundaries and reference area boundaries. (Refer to as-built diagrams (Figures 2 and 3) for exact dimensions and features.)

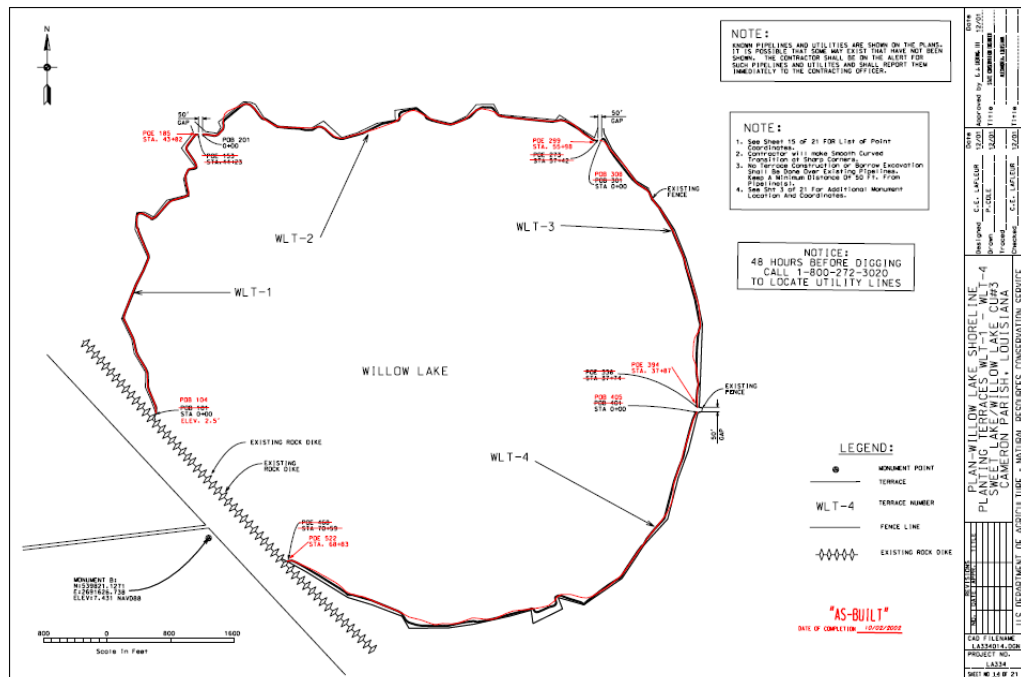


Figure 2. As-built location of shoreline terraces within the Willow Lake area of the Sweet Lake/Willow Lake Hydrologic Restoration (CS-11b) project area.

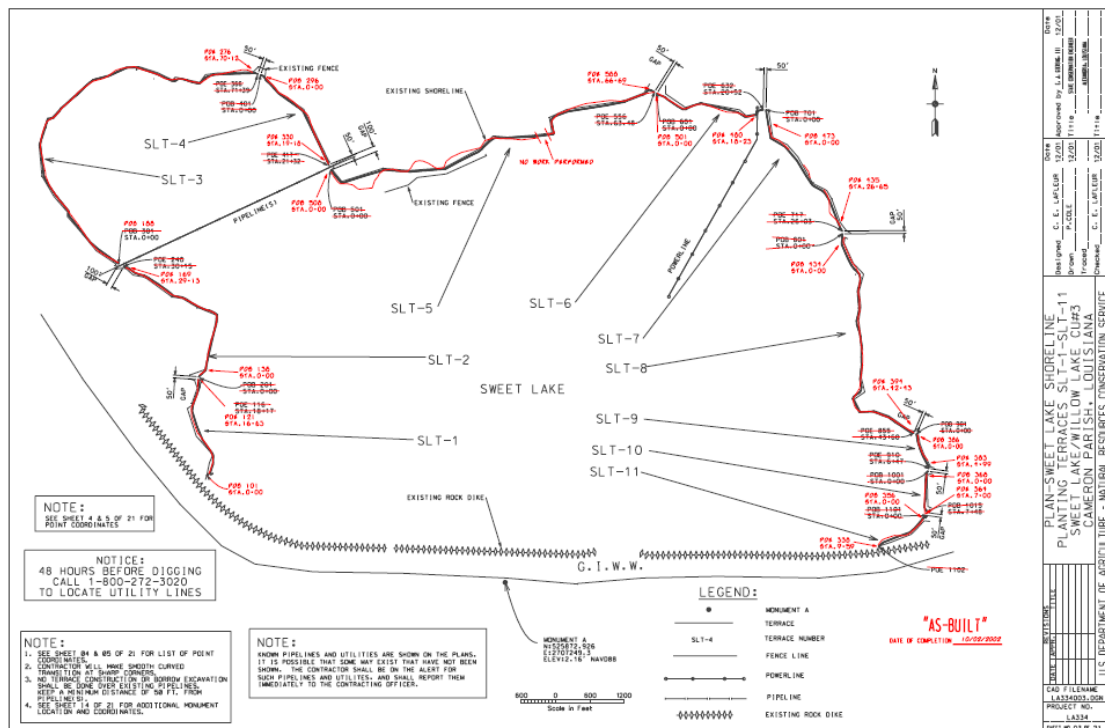


Figure 3. As-built location of shoreline terraces within the Sweet Lake area of the Sweet Lake/Willow Lake Hydrologic Restoration (CS-11b) project area.

II. Maintenance Activity

a. Project Feature Inspection Procedures

The purpose of the annual inspection of the Sweet Lake/Willow Lake Hydrologic Restoration Project (CS-11b) is to evaluate the constructed project features to identify any deficiencies and prepare a report detailing the condition of project features and recommended corrective actions needed. Should it be determined that corrective actions are needed, CPRA shall provide, in the report, a detailed cost estimate for engineering, design, supervision, inspection, and construction contingencies, and an assessment of the urgency of such repairs. The annual inspection report also contains a summary of maintenance projects, if any, which were completed since completion of the constructed project features and an estimated projected budget for the upcoming three (3) years for operation, maintenance and rehabilitation. The three (3) year projected operation and maintenance budget is shown in appendix B.

An inspection of the Sweet Lake/Willow Lake Hydrologic Restoration Project (CS-11b) was held on June 12, 2013. In attendance were Mel Guidry and Dion Broussard from CPRA, Frank Chapman and Brandon Samson from NRCS. The annual inspection began at approximately 10:00 a.m. on the eastern boundary of the project area.

The field inspection included a complete visual inspection of the entire rock dikes from the GIWW. Staff gauge readings were not available to be used to determine approximate elevations of water and rock dikes. Photographs were taken (see Appendix A) and a Field Inspection form was completed in the field to record measurements and deficiencies (see Appendix C).

b. Inspection Results

The dikes were in reasonably good condition. There were a few low places along the length of the rock dike. The most significant low stretches were along the open water areas adjacent to Sweet Lake. There was an additional low area approximately 50 feet length along the very eastern end of the project area where the dike appears to have been “pushed back” 10-12 feet apparently by a barge. There is another area approximately 4 feet long in which the dike appears to have been removed by hunters or fishermen. Several settlement plates are either broken or leaning and are of no use. No gauges were available in the vicinity to determine water levels. The shallow water terraces of the project were not visible because their condition had deteriorated earlier in the project and due to high water conditions in Sweet Lake and Willow Lake. (Photos: Appendix A, Photos).

II. Maintenance Activity (continued)

c. Maintenance Recommendations

i. Immediate/ Emergency Repairs

None

ii. Programmatic/ Routine Repairs

None

d. Maintenance History

There has been no maintenance performed on this project.

III. Operation Activity

a. Operation Plan

There is no water control structures associated with this project; therefore no structural operation plan is required.

b. Actual Operations

There are no water control structures associated with this project; therefore no structural operations are required.

IV. Monitoring Activity

Pursuant to a CWPPRA Task Force decision on August 14, 2003, to adopt the Coastwide Reference Monitoring System-*Wetlands* (CRMS-*Wetlands*) for CWPPRA, updates were made to the CS-11b Monitoring Plan to merge it with CRMS-*Wetlands*. The intended purpose of this was to provide more useful information for modeling efforts and future project planning while maintaining the monitoring mandates of the CWPPRA Program. This report is a closeout report for monitoring, operations and maintenance activity associated with the CS-11b project and includes the summaries of all data collected.

a. Monitoring Goals

The objectives of the Sweet Lake/Willow Lake Hydrologic Restoration Project are to protect the emergent marsh by reducing shoreline erosion and to increase the acreage of emergent and submerged aquatic vegetation (SAV) within the project area.

The following specific goals will contribute to the evaluation of the above objectives:

1. Reduce the erosion rate along the lake shorelines adjacent to the terraces with vegetative plantings of *Zizaniopsis miliacea*.
2. Decrease the rate of marsh loss in the project area.
3. Increase the coverage of emergent wetland vegetation and submerged aquatic vegetation (SAV) in the shallow open water areas in the terracing/vegetative planting section of the project.

b. Monitoring Elements

Aerial Photography:

In order to evaluate shoreline movement and the extent of interior emergent marsh creation (direct and indirect) in the project area, near-vertical, color-infrared aerial photography (1:12,000 scale) was obtained once prior to construction in 1998. The original photography was checked for flight accuracy, color correctness, and clarity and was subsequently archived. Aerial photography was scanned, mosaicked, and georectified by USGS/NWRC personnel according to standard operating procedures (Steyer et al. (1995, revised 2000). Photography originally scheduled for 2009 and 2016 was eliminated due to project ineffectiveness and budgetary constraints.

Shoreline Change:

To document movement of the Sweet Lake and Willow Lake shorelines, GPS surveys of a sample of each lake's shoreline adjacent to the planted terraces was conducted in August 2001. A survey monument established in the vicinity of the rock dike was used to establish a GPS control point at the beginning and end of each day of surveying. GPS readings taken at this control point were used as an accuracy check and for determining error associated with each

GPS shoreline survey. Post-construction shoreline surveys scheduled for 2005, 2009, and 2016 were eliminated due to project ineffectiveness and budgetary constraints.

Vegetative Plantings

In order to determine planting success, and to estimate the amount (acreage) of emergent vegetation that becomes established on the terraces, random sampling plots of 16 plants were established to include a 3% sub-sample of the *Z. miliacea* plantings on the open water terraces and a 5% sub-sample on the Sweet Lake and Willow Lake terraces. The open water terraces were monitored in years 2001, 2002 and 2005 while the Sweet Lake/Willow lake terraces were monitored in years 2002 and 2005. Each plot included 16 plants, and the area of each plot was determined by measuring the length and width of the terrace at each plot. Ocular estimates of percent canopy cover were recorded for each plot. The percent cover for each plot was broken down into the percent cover provided by the *Z. miliacea* plantings and percent cover by other wetland and upland species in each plot. The percent survival was determined as a percentage of the number of live *Z. miliacea* plants to the number planted (percent survival = no. plants/no. planted x 100), after Mendelssohn and Hester (1988) and Mendelssohn et al. (1991). Species Richness was calculated from the total species occurring within each sampling plot during each sampling period.

Submerged Aquatic Vegetation (SAV)

The rake method (Nyman and Chabreck 1996) was used to document changes in the relative frequency of SAV in the project and reference areas. Transects were established in the shallow open water area north of Sweet Lake where the terraces and plantings were installed. For comparison and use as a reference, transects were similarly established in an open water area in the marsh northeast of Willow Lake. Open water areas were sampled for presence or absence of SAV at 25 to 100 random points along each transect line, depending on the size of the water body. Species composition and relative frequency of occurrence (frequency = number of occurrences/number of samples taken x 100) were determined. Because extensive colonies of *Eichhornia crassipes* are likely to be present in the open water areas during the fall season, SAV was monitored pre-construction in May 2000. Based on recommendations from the CRMS review, SAV sampling originally scheduled for 2004, 2009, and 2016 was canceled.

c. Preliminary Monitoring Results and Discussion

Aerial Photography:

Land to water analysis for pre-construction photography collected on December 17, 1998, indicated 23.0% land and 77.0% water within the project area versus 44.0% land and 56.0% water within reference area (Figure 4). Due to project ineffectiveness and budgetary constraints post construction land to water analysis was eliminated.

Shoreline Change:

DGPS readings to document shoreline position were collected in August 2001 (pre-construction) as baseline data (Figure 5). Due to elevated water levels and constant wave poundings, a rapid deterioration of the terraces occurred within the first year. The shoreline terraces were deemed ineffective and the 2004, 2009 & 2016 post construction shoreline

measurements were eliminated. Thus, the project goal of increasing coverage of emergent marsh vegetation was not successful.

Vegetative Plantings:

Zizaniopsis miliacea (giant cutgrass) plantings installed in 2001 and 2002 did not survive beyond the first few years. Generally, % survival of plantings on the terraces in all three areas planted reduced from about 80% to about 30% between 2001/2002 and 2005 (Figure 6).

The failure of the *Z. miliacea* was due to elevated water levels, wind driven fetch, and resulting erosion of the terraces. Most of the plantings washed away within the first year. The goal of reducing shoreline erosion with terraces was not achieved.

A monitoring field trip was conducted on September 2, 2021, in order to inspect the project area for this final assessment. No new monitoring data was collected though a qualitative assessment was performed. Vegetation continues to be mostly composed of freshwater species such as *Schoenoplectus californicus* (California bullwhip) and *Typha* sp. (cattail). A good amount of *Phragmites australis* has taken over the landscape. Vegetation along the shoreline in both Willow and Sweet Lakes appeared stressed. There were many dead stems of *Phragmites australis* along the shoreline, some with barnacle growth on them. These dead stems were easily pulled up from the water bottom. Also noted were patches of *Cyperus* species, which can be indicative of a disturbed landscape. Causation is mostly likely attributed to sustained elevated water levels. These high water conditions in addition to wave action seem to have adversely affected the shorelines and vegetation in the project area. In addition to stressed vegetation, Willow Lake also had large rafts of *Eichhornia crassipes* along the shoreline. These could potentially smother out the existing shoreline vegetation.

Submerged Aquatic Vegetation:

SAV data collected pre-construction in May 2000 indicated there was a limited amount of SAV in the project and reference area with most of it being located in the reference area. (Figure 7). Based on recommendations from the CRMS review, SAV sampling originally scheduled for 2004, 2009, and 2016 was canceled. Due to the limited data set and rapid deterioration of the terraces within the first year, it is assumed that the project did not meet its goal of increasing SAV. This was confirmed on a recent site visit conducted on September 2, 2021, when no submerged aquatic vegetation was noted in the project and reference areas.

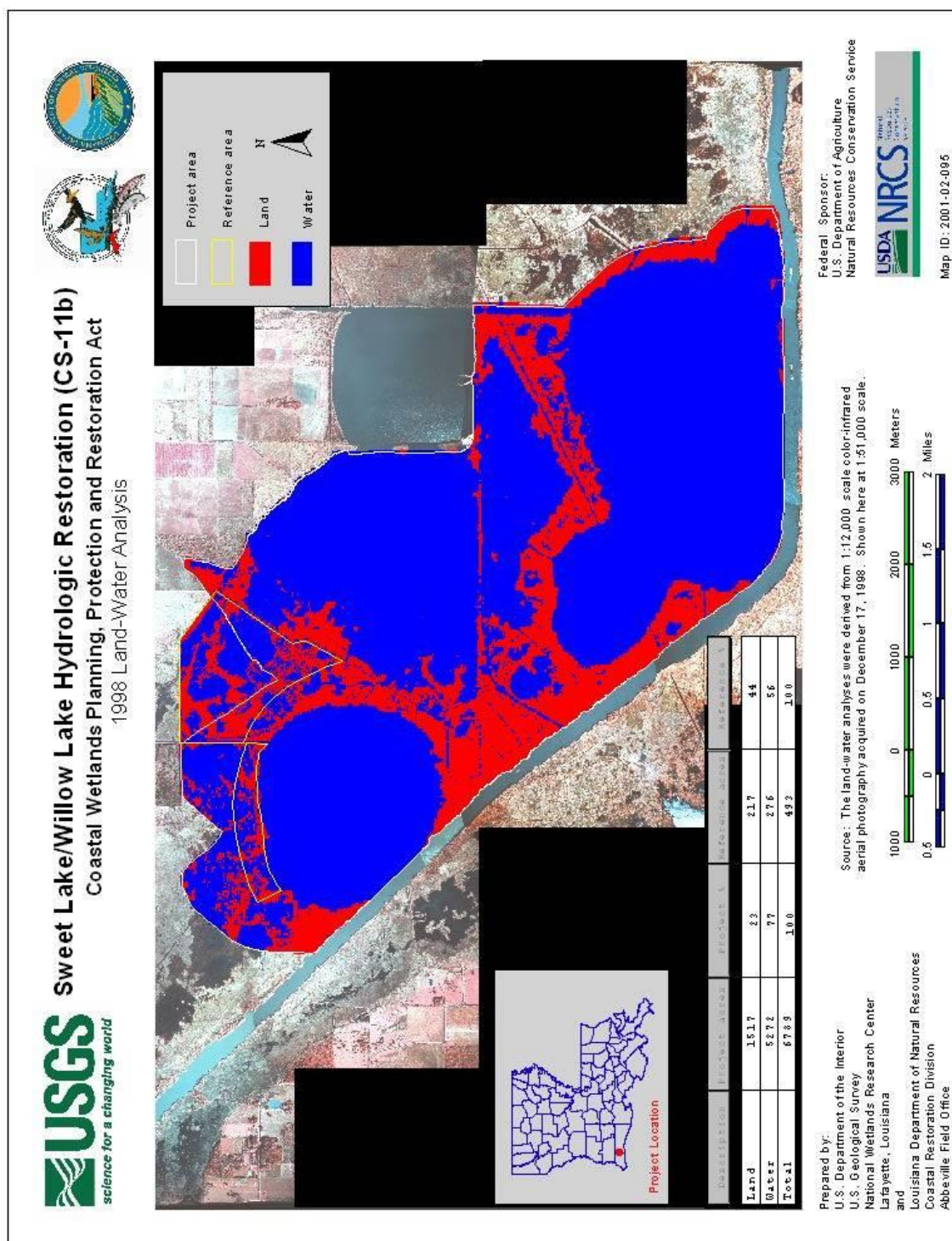


Figure 4. Land to Water analysis of the Sweet Lake/Willow Lake Hydrologic Restoration (CS-11b) project area from photography obtained December 17, 1998.

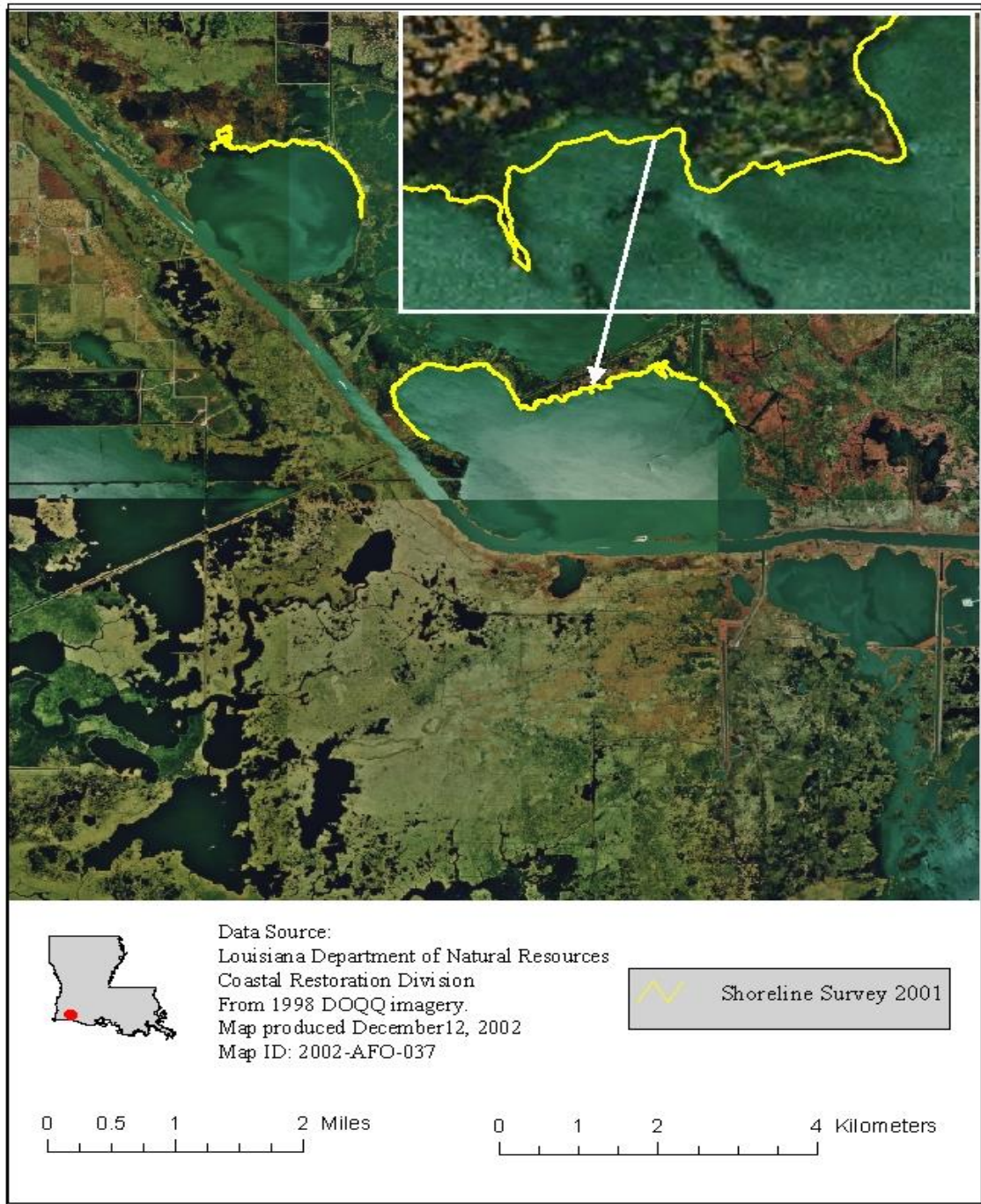


Figure 5. Baseline shoreline position survey of the Sweet Lake/Willow Lake Hydrologic Restoration (CS-11b) project area from data obtained August 2001.

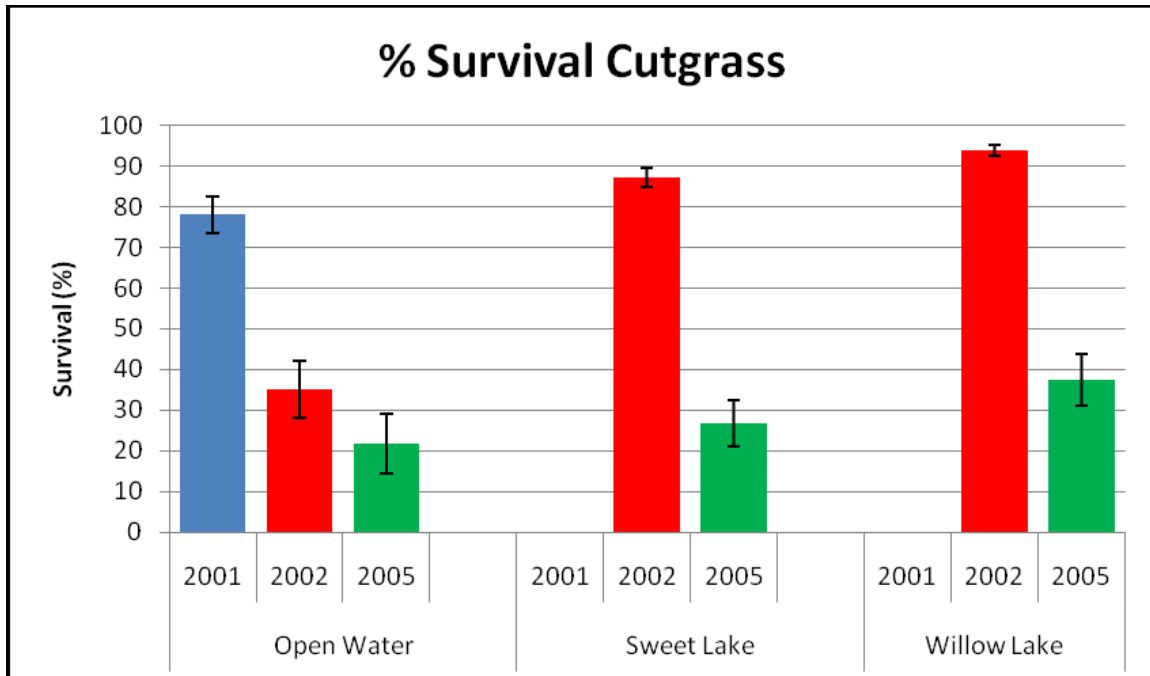


Figure 6. Mean percent survival of cutgrass (*Zizaniopsis miliacea*) plantings on the Open Water, Sweet Lake and Willow Lake terraces for 2001, 2002 and 2005 sampling periods.

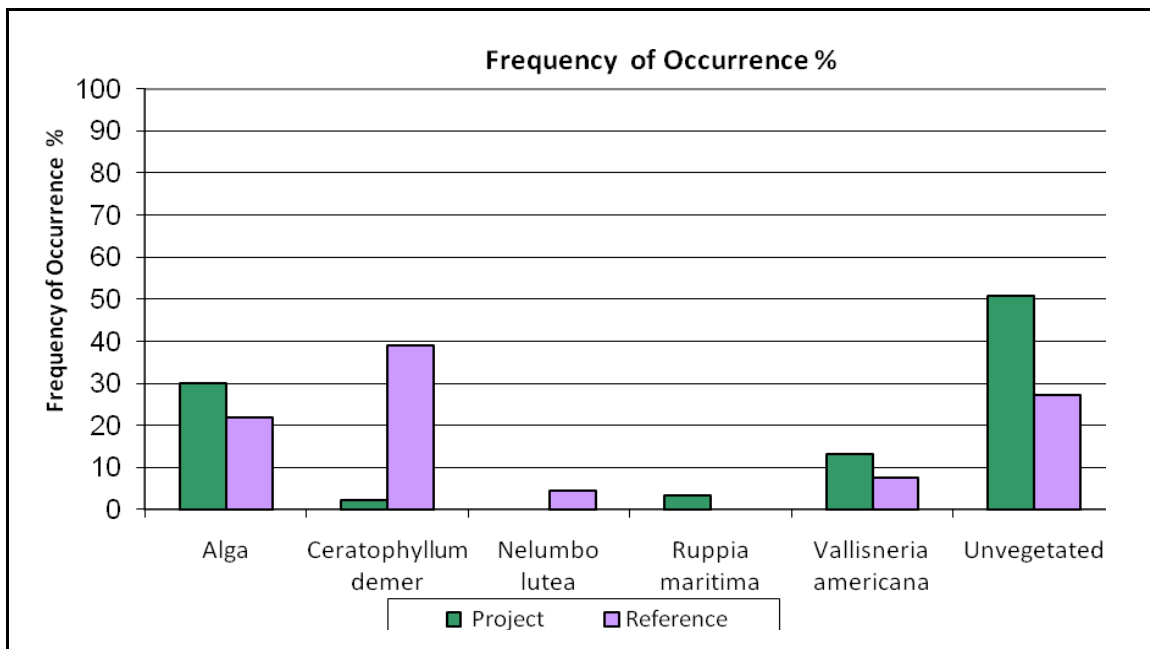


Figure 7. 2000 pre-construction data for frequency of occurrence (%) of submerged aquatic vegetation within the Sweet Lake/Willow Lakes Hydrologic Restoration (CS-11b) project and reference areas.

V. Discussion

The CS-11b project, unfortunately, was unsuccessful in meeting the project goals over its 20-year life span. Terraces and vegetative plantings that were installed in order to reduce shoreline erosion and reduce the rate of marsh loss were destroyed by high water levels and wave fetch shortly after they were constructed.

VI. Conclusions

a. Project Effectiveness

A monitoring field trip was conducted on September 2, 2021. The rock dike along Willow Lake looked to be in reasonably good condition. The rock dike along Sweet Lake looked to be in reasonably good condition as well. Low areas of the Sweet Lake rock dike previously noted in O&M inspections were observed but the project team determined that maintenance is not warranted.

The open water terraces north of Sweet Lake and along the shoreline of Sweet Lake and Willow Lake deteriorated early in the project life due to wind-induced fetch. With the degradation of the earthen terraces, the vegetative plantings were unsuccessful in establishing. Overall, the terraces were ineffective at combating shoreline erosion within the Sweet Lake/Willow Lake project area.

b. Recommended Improvements

Overall, the rock dikes functioned as designed. However, due to wind-induced fetch, the earthen terraces deteriorated early in the project life. It would not be feasible or practical to maintain the earthen terraces as originally designed and constructed. NRCS and CPRA do not intend to pursue re-construction of the earthen terraces.

c. Lessons Learned

Earthen terraces constructed along lake shorelines that are subject to wind-induced fetch should not be considered as a project feature. Rock along the Sweet Lake and Willow Lake shorelines would have been more effective at reducing shoreline loss along the GIWW.

d. End of Project Life

The CS-11b project area will likely continue to experience loss of shoreline vegetation due to the consistent high water levels and large open water fetch across Willow and Sweet Lakes. No maintenance is expected to be performed thus the remaining project features will be left to naturally degrade over time. The CWPPRA Task Force approved an early project closeout in May 2019.

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APPENDIX A

(Inspection Photographs)



Photo No. 1, (Sweet Lake) Typical rock dike



Photo No. 2, Western End of Sweet Lake Rock Dike



Photo No. 3, Willow Lake Rock Dike (Southeastern End)

APPENDIX B
(Three Year Budget Projection)

SWEET LAKE/WILLOW LAKE SP/ CS-11B / PPL 5
Three-Year Operations & Maintenance Budgets 07/01/2022 - 06/30/2023

| | | | |
|------------------------|--------------------------|------------------------|--------------------|
| <u>Project Manager</u> | <u>O & M Manager</u> | <u>Federal Sponsor</u> | <u>Prepared By</u> |
| Mel Guidry | Mel Guidry | NRCS | Mel Guidry |

2022/2023

| | | | |
|-----------------------------------|-------------|------|------|
| Maintenance Inspection | | | |
| Structure Operation | | | |
| State Administration | \$14,500.00 | \$ - | \$ - |
| Federal Administration | | | |
| Maintenance/Rehabilitation | | | |

22/23 Description: project closeout

| | |
|-------------------------------|------|
| E&D | |
| Construction | |
| Construction Oversight | |
| Sub Total - Maint. And Rehab. | \$ - |

Description:

| | |
|-------------------------------|------|
| E&D | \$ - |
| Construction | \$ - |
| Construction Oversight | \$ - |
| Sub Total - Maint. And Rehab. | \$ - |

Description:

| | |
|-------------------------------|------|
| E&D | \$ - |
| Construction | \$ - |
| Construction Oversight | \$ - |
| Sub Total - Maint. And Rehab. | \$ - |

| | | | |
|------------------------------|---------------------|-------------|-------------|
| | 2022/2023 | 0 | 0 |
| Total O&M Budgets | \$ 14,500.00 | \$ - | \$ - |

| | |
|---|----------------------|
| O & M Budget (3 yr Total) | \$ 14,500.00 |
| Unexpended O & M Budget | \$ 396,944.62 |
| Remaining O & M Budget (Projected) | \$ 382,444.62 |

OPERATION AND MAINTENANCE BUDGET WORKSHEET
 SWEET LAKE/WILLOW LAKE HR PROJECT / PROJECT NO. CS-11b / PPL NO. 5 / 2022/2023

| DESCRIPTION | UNIT | EST. QTY. | UNIT PRICE | ESTIMATED TOTAL |
|-------------------------------|------|-----------|------------|-----------------|
| O&M Inspection and Report | EACH | 0 | \$0.00 | \$0.00 |
| General Structure Maintenance | LUMP | 0 | \$0.00 | \$0.00 |
| Engineering and Design | LUMP | 0 | \$0.00 | \$0.00 |
| Operations Contract | LUMP | 0 | \$0.00 | \$0.00 |
| Construction Oversight | LUMP | 0 | \$0.00 | \$0.00 |

ADMINISTRATION

| | | | | |
|------------------------------------|------|---|-------------|--------------------|
| CPRA Admin. | LUMP | 1 | \$14,500.00 | \$14,500.00 |
| FEDERAL SPONSOR Admin. | LUMP | 0 | \$0.00 | \$0.00 |
| SURVEY Admin. | LUMP | 0 | \$0.00 | \$0.00 |
| OTHER | | | | \$0.00 |
| TOTAL ADMINISTRATION COSTS: | | | | \$14,500.00 |

MAINTENANCE / CONSTRUCTION

SURVEY

| | | | | | |
|------------------------|------------------------------|------|---|--------|--------|
| SURVEY DESCRIPTION: | | | | | |
| | Secondary Monument | EACH | 0 | \$0.00 | \$0.00 |
| | Staff Gauge / Recorders | EACH | 0 | \$0.00 | \$0.00 |
| | Marsh Elevation / Topography | LUMP | 0 | \$0.00 | \$0.00 |
| | TBM Installation | EACH | 0 | \$0.00 | \$0.00 |
| | OTHER | | | | \$0.00 |
| | TOTAL SURVEY COSTS: | | | | \$0.00 |

GEOTECHNICAL

| | | | | | |
|----------------------|---------------------------|------|---|--------|--------|
| GEOTECH DESCRIPTION: | | | | | |
| | Borings | EACH | 0 | \$0.00 | \$0.00 |
| | OTHER | | | | \$0.00 |
| | TOTAL GEOTECHNICAL COSTS: | | | | \$0.00 |

CONSTRUCTION

| CONSTRUCTION DESCRIPTION: | | | | | |
|------------------------------|-----------------------------------|--------|----------|------|------------|
| | Rip Rap | LIN FT | TON / FT | TONS | UNIT PRICE |
| | Rock Rip rap | 0 | 0.0 | 0 | \$0.00 |
| | Aggregate Surface Course | 0 | 0.0 | 0 | \$0.00 |
| | | 0 | 0.0 | 0 | \$0.00 |
| | Filter Cloth / Geogrid Fabric | | SQ YD | 0 | \$0.00 |
| | Navigation Aid | | EACH | 0 | \$0.00 |
| | Signage | | EACH | 0 | \$0.00 |
| | General Excavation / Fill | | CU YD | 0 | \$0.00 |
| | Dredging | | CU YD | 0 | \$0.00 |
| | Sheet Piles (Lin Ft or Sq Yds) | | | 0 | \$0.00 |
| | Timber Piles (each or lump sum) | | | 0 | \$0.00 |
| | Timber Members (each or lump sum) | | | 0 | \$0.00 |
| | Hardware | | LUMP | 0 | \$0.00 |
| | Materials | | LUMP | 0 | \$0.00 |
| | Mob / Demob | | LUMP | 0 | \$0.00 |
| | Contingency | | LUMP | 0 | \$0.00 |
| | General Structure Maintenance | | LUMP | 0 | \$0.00 |
| | OTHER | | | | \$0.00 |
| | OTHER | | | | \$0.00 |
| | OTHER | | | | \$0.00 |
| TOTAL CONSTRUCTION COSTS: | | | | | \$0.00 |

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **\$14,500.00**

APPENDIX C

(Field Inspection Notes)

FIELD INSPECTION CHECK SHEET

Project No. / Name: Sweet Lake/Willow Lake Hydrologic Restoration CS-11B Date of Inspection: 6/12/2013 Time: 11:00 AM

Structure No. _____ Inspector(s): Mel Guidry, Stan Aucoin, & Dion Broussard (CPRA)
Frank Chapman, Brandon Samson (NRCS)

Structure Description: Rock Dike Water Level: Inside: N/A Outside: N/A

Type of Inspection: Annual Weather Conditions: Sunny and warm

| Item | Condition | Physical Damage | Corrosion | Photo # | Observations and Remarks |
|--------------------|-----------|-----------------|-----------|---------|---|
| Earthen Terraces | N/A | | | | Terraces were not included in the inspection. |
| Steel Grating | N/A | | | | |
| Stop Logs | N/A | | | | |
| Hardware | N/A | | | | |
| Timber Piles | N/A | | | | |
| Timber Wales | N/A | | | | |
| Galv. Pile Caps | N/A | | | | |
| Cables | N/A | | | | |
| Signage/Support | N/A | | | | |
| Rip Rap(fill) | N/A | | | | |
| Earthen Embankment | N/A | | | | |
| Foreshore Dike | Good | | | 1 | 300 Linear feet of dike on eastern edge of Willow is low,. Also, there is a 50 foot section of rock dike that has apparently been pushed back. Another 4 foot section is missing in another area. |

What are the conditions of the existing levees?
 Are there any noticeable breaches?
 Settlement of rock plugs and rock weirs?
 Position of stoplogs at the time of the inspection?
 Are there any signs of vandalism?