Long Point Bayou Marsh Creation

Candidate Project

Twenty-Eighth Priority
Project List
of the
Coastal Wetlands Planning, Protection and Restoration Act

Draft Revised Project Information Sheet for Wetland Value Assessment

Prepared by

U. S. Environmental Protection Agency

September 14, 2021

Project Name: Long Point Bayou Marsh Creation

Project Type: Marsh Creation

Sponsoring Agency
U.S. Environmental Protection Agency
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Project Location
The project is located approximately 4 miles south of Hackberry between LA Highway 27 and Calcasieu Ship Channel. The project is located in the Calcasieu/Sabine Basin, Cameron Parish, in Region 4 (Figure 1).

Figure 1. Project Location.

Problem

The project area is in an area that has been influenced by saltwater intrusion, increased water fluctuations and erosion. Human alterations have disrupted the hydrologic processes which contributed to wetland building and maintenance, while subsidence and sea level rise continues. Almost all fresh marsh was converted to intermediate and brackish by the late 1970s as a result of saltwater intrusion and increased tidal influence. Land loss rates within the project area now show a positive trend; the experimental land change analysis conducted by USGS for the extended project boundary shows a land gain of +0.46% per year (1985 to 2020) in the project area. Historical topographic maps show that the area was nearly all land in 1955 (Figure 2).

Goals

The project goal is to create and/or nourish approximately 395 acres (create 318 acres and nourish 77 acres) of emergent marsh through beneficial use dredged material from the Calcasieu Ship Channel. Eight acres of tidal creeks and 196 acres of vegetative plantings will also be included. The Environmental Protection Agency's strategic plan goals include "Work with partners to protect and restore wetlands and coastal and ocean water resources." In addition, this project would restore habitat potentially used by the saltmarsh topminnow and black rail, which are petitioned/proposed for Federal listing as threatened/endangered species. The project may also benefit neotropical migratory birds.

Proposed Project Features

This project will create/nourish 395 acres of marsh near Long Point Bayou and just north of the Sabine National Wildlife Refuge (Figure 2). This project will beneficially use dredged material from the Calcasieu Ship Channel or other locations and placed into shallow open water sites within the project area. Constructed containment dikes would be breached/gapped as needed to provide tidal exchange after fill materials settle and consolidate. The project would create 318 acres of marsh and nourish at least 77 acres of existing fragmented marsh. A target fill elevation of +1.14 feet (NAVD88) is envisioned to enhance longevity of this land form. Additionally, 196 acres of vegetative plantings and 8 acres of tidal creeks will be included.

Monitoring Information

Successful CWPPRA beneficial use and dedicated dredging marsh creation projects show that placement of dredged material in shallow open water areas can restore vegetated marsh within a few years post construction (Table 1). Natural revegetation and revegetation due to vegetative plantings may range from 0% to 40% cover after one growing season (Bayou Grand Liard WVA 2006). The information on Sabine Refuge Marsh Creation Cycles is most relevant, as that project is similar in location and type to the project being evaluated here.

Table 1. CWPPRA Marsh Creation Project Monitoring Results.

Project	Vegetation Results	Comments
Sabine Refuge Marsh Creation Cycle 1	52% vegetated 2 years post construction (compared to reference area which was 78% covered)	125 acres/800,000 yd3; 6,400 yd3/acre Slurry 5.0 ft high; 3.7 NAVD 88
Sabine Refuge Marsh Creation Cycle 3		230 acres/ 800,000 yd3; 4,950 yd3/acre

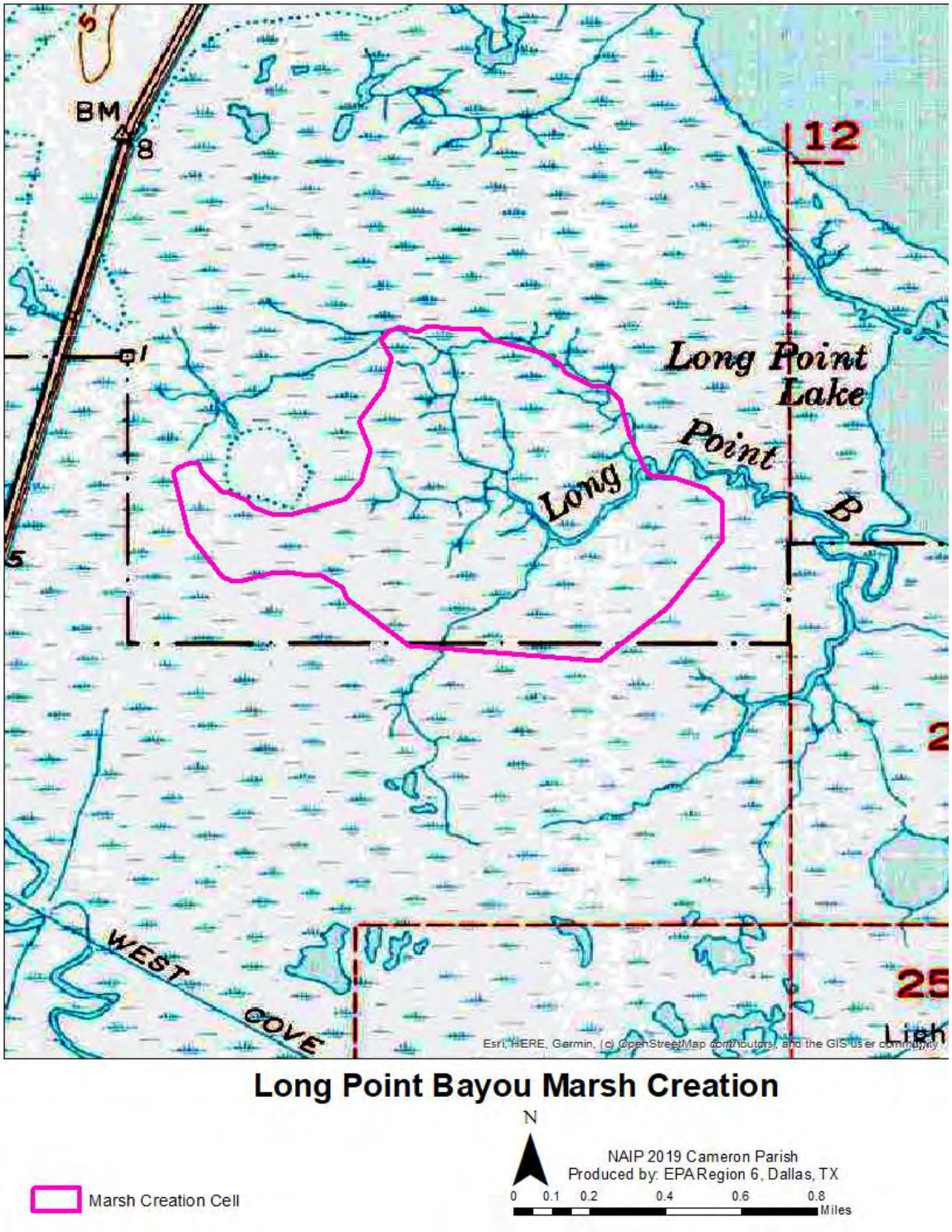

Figure 2. Historical topographic map from 1955 showing the Long Point Bayou Marsh Creation project.

Figure 3. Project Map.

CRMS Station 0687 (Figure 4) is closest to the project boundary and used for salinity and vegetation comparisons.

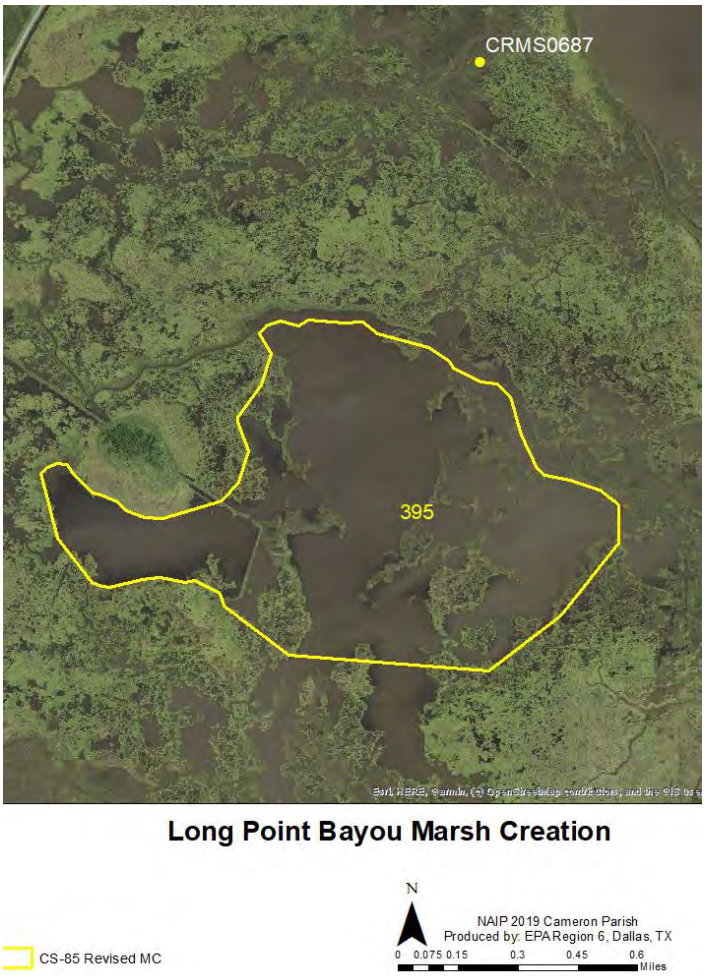

Figure 4. Location of CRMS 0687.

Vegetative Survey

CRMS vegetative survey data from CRMS 0687 indicates that these sites are dominated by black rush (*Juncus roemerianus*) and smooth cordgrass (*Spartina alterniflora*) (Figure 5).

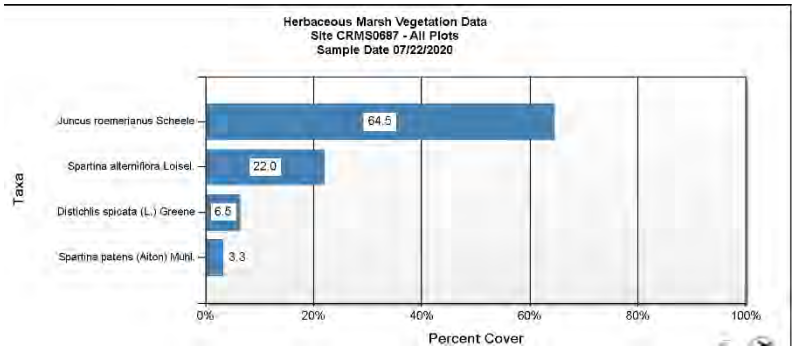

Figure 5. Vegetative Community, September 2020

Salinity

Salinity data from CRMS 0687 ranged between approximately 0.18-33.87 parts per thousand (ppt), with a mean annual salinity of 13.76 ppt (Figure 6). Salinity measurements taken on May 8, 2018 averaged 10.79 ppt from the CRMS station and 12.70 ppt at the project location. Salinity measurements taken on June 21, 2018 averaged 14.78 ppt from the CRMS station and 12.28 ppt at the project location.

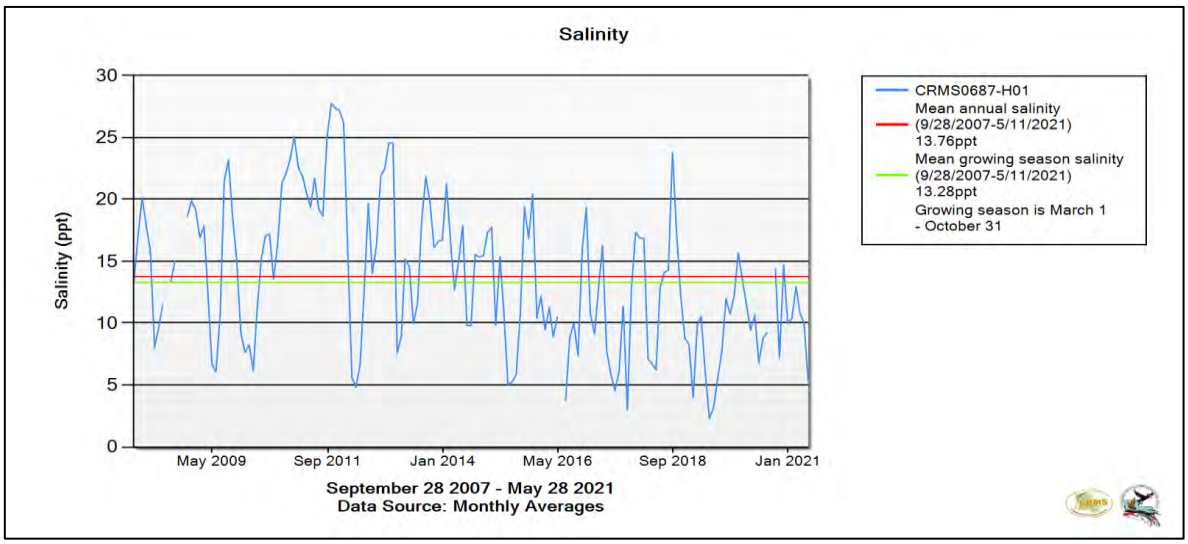

Figure 6. Salinity at CRMS 0687, May 2013 -May 2021.

Based on the latest salinity (Figure 6), marsh type classification (Figure 7), and vegetative community data for CRMS 0687 (Figures 5 and 8) as well as data taken on the field trip, we propose that the project be evaluated under the saline marsh model to accommodate for the latest conditions indicated by the data.

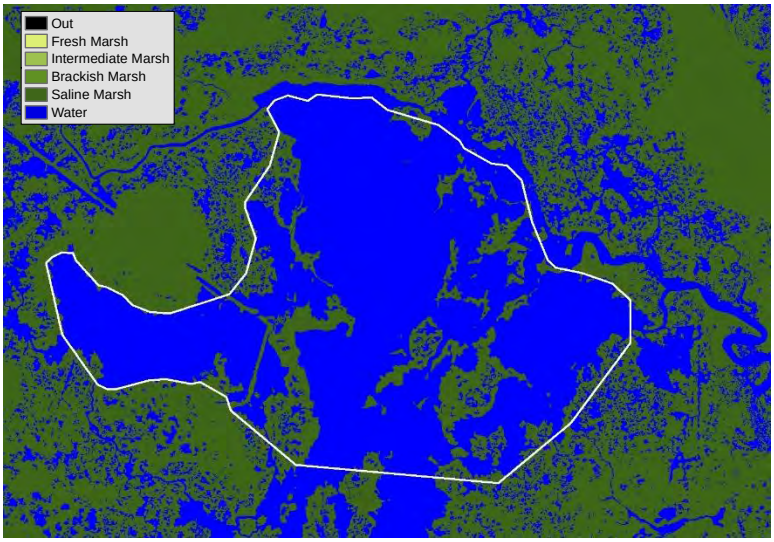

Figure 7. 2013 Marsh Type Survey (from Sasser et. al. 2014). The project is 19% saline marsh and 81% water.

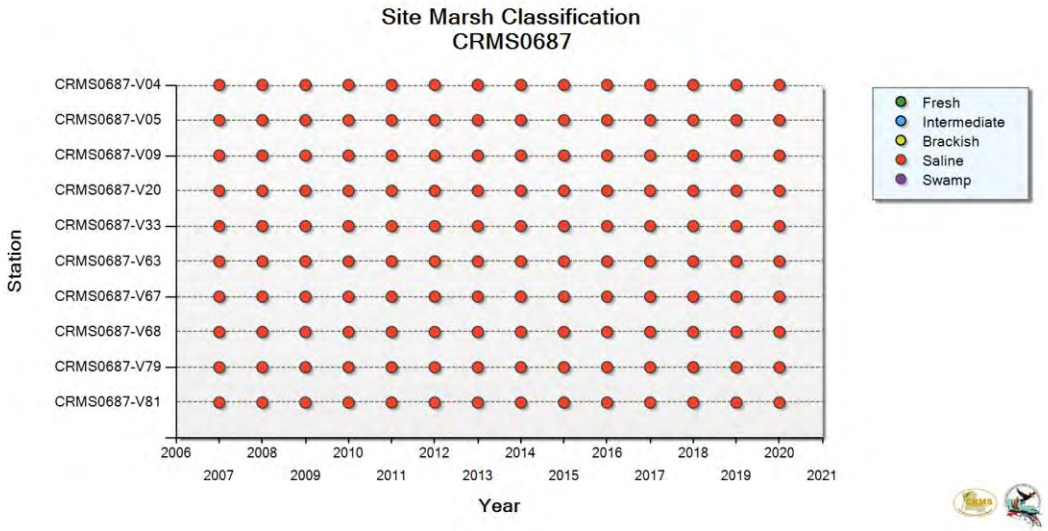

Figure 8. CRMS 0687 Marsh Classification, 2007-2020.

Interior Land Loss Data

For interior marsh loss, USGS evaluated land/water data within an extended boundary (Figure 9) surrounding the project area. Using a hyper-temporal analysis (1985-2020) for the extended boundary, USGS calculated historical rates of land change (Figure 10). Figure 10 shows the experimental land loss analysis using the project boundary to query cloud-free data for the project polygon only. See the Section on V1 for more information on land change calculations.

Figure 9. Extended boundary used for land loss calculation.

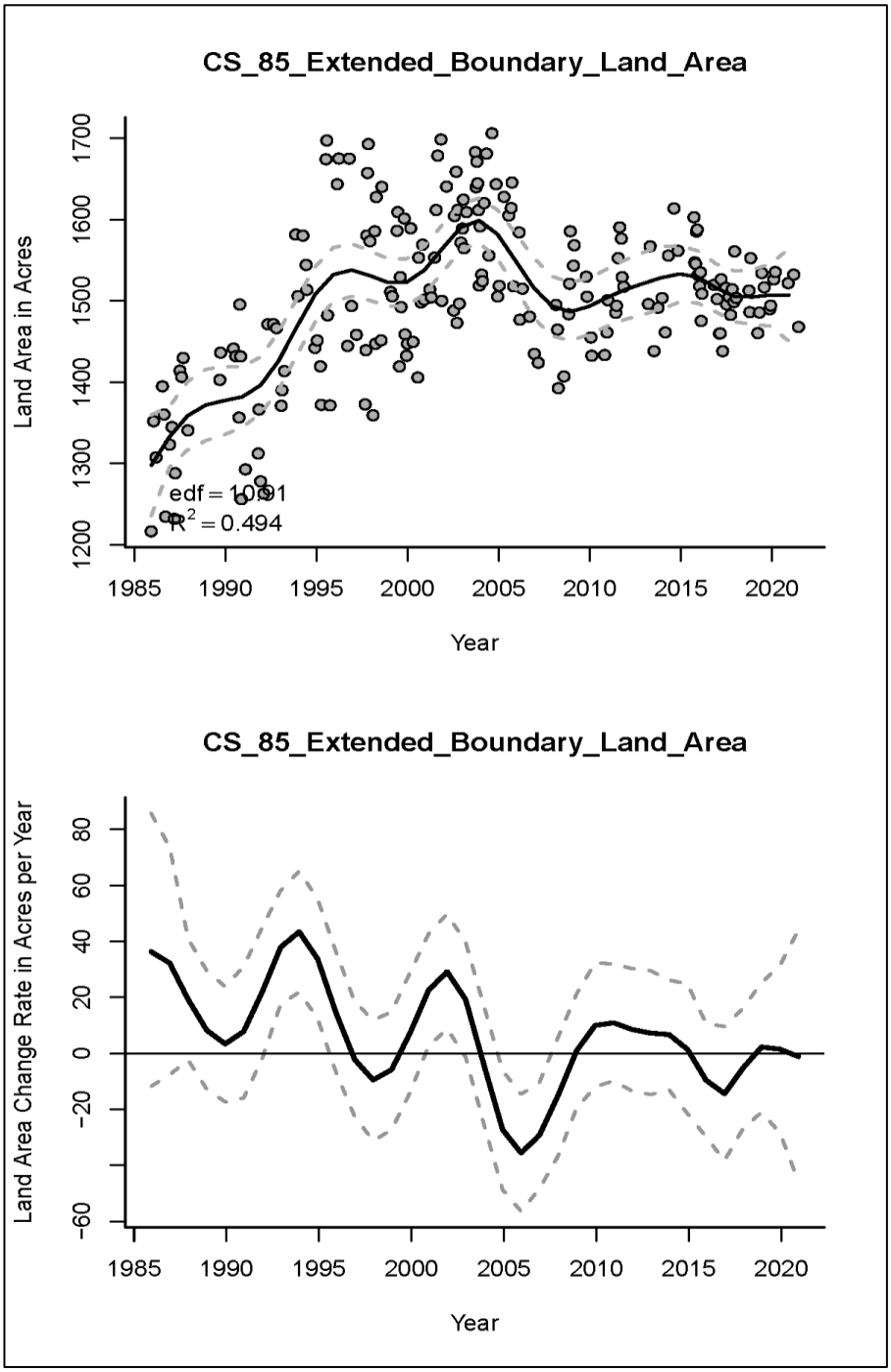

Figure 10. Land Loss Trends, 1985-2020.

V1: % of Wetland Area Covered by Emergent Vegetation

FWOP

Two years of loss was applied to the land acreage from the 2019 NAIP photoimagery data land/water analysis to calculate the TY0 project acreage for 2021 (See land loss spreadsheet in Appendix A).

Land loss rates within the project area have slowed and now show a positive trend; the hyper-temporal analysis conducted by USGS for the extended project boundary shows a land gain of +0.46% (Figure 10) per year (1985 to 2020) in the project area according to the experimental land loss analysis.

FWOP	Marsh Acres	Water Acres	V1
TY0	77	318	19%
TY1	77	318	20%
TY20	84	311	21%

FWP

We are proposing 50% plantings, which equals 196 acres. Under the standard workgroup conventions, created marsh receives 17.5% credit at TY1, 50% credit at TY3, and 100% credit at TY5-TY20.

In addition, we are proposing to include 8 acres of tidal creeks which is 2.02% of the total acreage of the project. The inclusion of tidal creeks increases the functional marsh credit by 5% at TY03. In this project, the inclusion of tidal creeks also assists the saltmarsh topminnow and black rail, species petitioned or proposed for listing on the Federal Endangered Species List. Therefore, 17.5% at TY01 and 55% at TY03. Nourished marsh receives 50% credit at TY1 and 100% at TY3-TY20.

Settlement curves (Figure 12) show the changes in elevation over the 20-year design life of the project and were used to compare different construction marsh fill elevations. The target constructed marsh fill elevation is +2.75 ft NAVD88. Over the 20-year project life, including eustatic sea level rise (ESLR), the preferred inundation range is expected to rise from 0.202 ft NAVD88 and 1.172 ft NAVD88 (80%-20% inundated) to 0.706 ft NAVD88 and 1.676 ft (NAVD88). Based on water level for the full period of record (9/28/2007 – 5/11/2021) from CRMS 0687, the 1% inundation level is 1.86 ft NAVD88. Based on water level for the last 5 years (5/11/16-5/11/21) from CRMS 0687, the 1% inundation level is 2.02 ft NAVD88.

FWP	Marsh Acres	Water Acres	V1
TY1	93	7	24%
TY3	249	5	63%
TY5	391	4	99%
TY20	405	-10	103%

Net acres at TY20 = 321 acres.

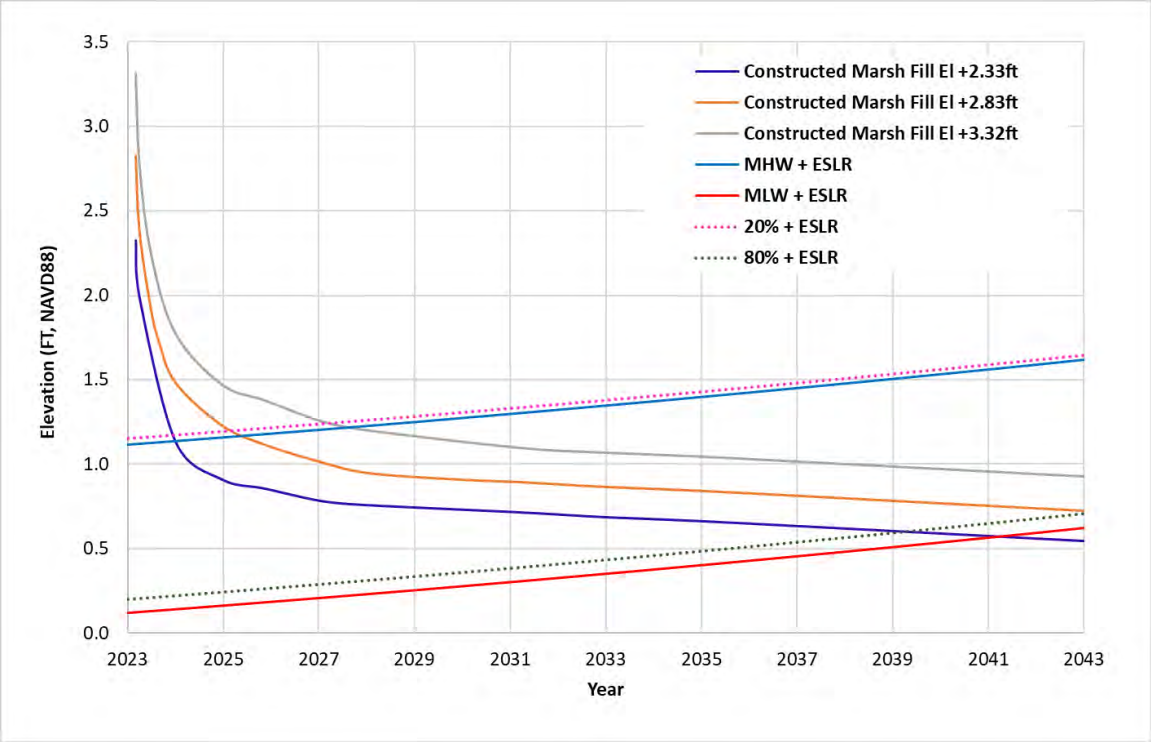

Figure 12. Estimated Total Settlement Curve.

V2: % Open Water Covered by Submerged Aquatic Vegetation (SAV)

Very little SAV were present in the open water areas of the site. We propose 10% based on observations from the 2018 site visits for all target years FWOP.

FWOP	
TY0-TY20	10%

For FWP, after construction activities are complete, we expect that no SAVs would be present in the area. At TY3, we would assume that SAVs would have recovered to roughly half of FWOP conditions (5%), with full recovery projected by TY5 in any developing open water ponds within the project area (10%).

FWP	
TY1	0%
TY3	5%
TY5	10%
TY20	10%

V3: Marsh Edge and Interspersion

For FWOP, we propose that the project cell be considered Class 4.

FWOP	
TY0-TY20	100% Class 4

Standard Workgroup convention for the marsh creation was used at FWP TY01, TY03, and TY05. We assume that the marsh will be classified as Class 1 for the remainder of the project life (TY05 – TY 20).

FWP	
TY1	100% Class 5
TY3	100% Class 3
TY5	100% Class 1
TY20	100% Class 1

V4: % of the Open Water Area <= 1.5 ft Deep

Survey data, collected from April – June 2020, was used to calculate V4 (Appendix B). For TY0, 1,366 of the 2,676 (51%) survey measurements can be considered as shallow open water. Therefore, a value of 51% is proposed.

- MHW = +1.05 ft NAVD88 (GEOID18)
- MLW = +0.06 ft NAVD88 (GEOID18)
- MTL = +0.56 ft NAVD88 (GEOID18)

Local subsidence rates in this region are approximately 4.3mm per year (0.17 in/yr) (Reed and Yuill 2016). This equates to a decrease in the project area mudline elevation of 3.4 in. (0.28 ft) over the 20-year project design life. To calculate V4 estimates for TY20, 0.28 ft of subsidence was assumed and added to the adjusted TY0 observed depths, with results showing 1,195 of 2,880 (41%) survey measurements being shallow open water. See supporting documents in Appendix B for data collected and calculations related to V4.

FWOP	
TY0	51%
TY1	51%
TY20	41%

Similar to PPL28 Sabine Cycles 6 & 7 and because the USGS experimental land loss analysis showed a land gain, we are projecting that there would be no open water within the marsh creation cell. Tidal creeks are proposed and represent 2.02% of the FWP condition.

FWP	
TY1	2%
TY3	2%
TY5	2%
TY20	2%

V5: Salinity

Salinity data from CRMS 0687 ranged between approximately 0.18-33.87 parts per thousand (ppt), with a mean salinity of 13.76 ppt (Figure 6). Salinity measurements taken on May 8, 2018 averaged 10.79 ppt from the CRMS station and 12.70 ppt at the project location. Salinity measurements taken on June 21, 2018 averaged 14.78 ppt from the CRMS station and 12.28 ppt at the project location.

FWOP and FWP	
TY0-TY20	13.76 ppt

V6: Aquatic Organism Access

We assume that estuarine fisheries access would not change under the FWOP over the 20-year life of the project. The area currently has unrestricted access and the project polygon is slightly inset in order to maintain Long Point Bayou as an open waterway for aquatic organism access (Figure 13).

FWOP	
TY1-TY20	1.0

For FWP, an access value of 0.0001 will be assumed since the marsh platform will be impounded by retention dikes at TY1. These will be degraded in TY3, at which point an access value of 1 will be assumed.

FWP	
TY0	1.0
TY1	0.0001
TY3-20	1.0

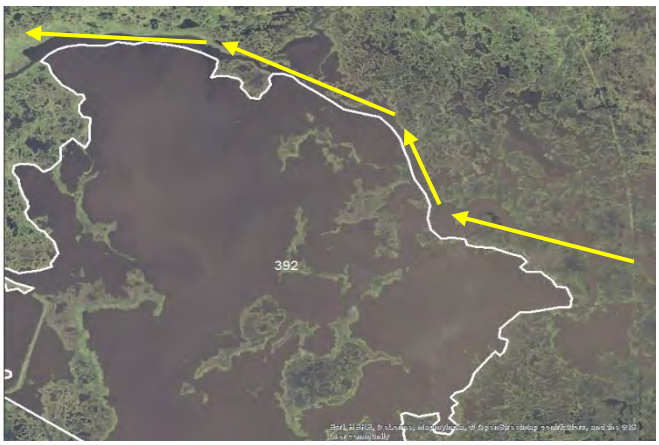

Figure 13. Aquatic organism access, North and South.

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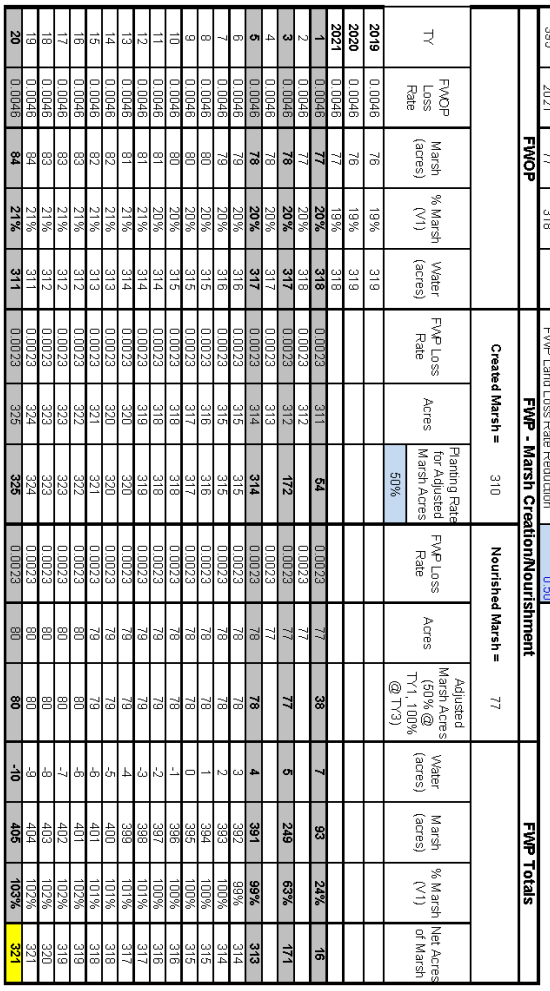
Coastal Protection and Restoration Authority of Louisiana. 2017. Louisiana's Comprehensive Master Plan for a Sustainable Coast. Coastal Protection and Restoration Authority of Louisiana. Baton Rouge, LA.

Reed, D. and Yuill, B. 2016. 2017 Coastal Master Plan: Attachment C2-2: Subsidence. Version I. (p. 15). Baton Rouge, Louisiana: Coastal Protection and Restoration Authority.

Sasser, C.E., Visser, J.M., Mouton, Edmond, Linscombe, Jeb, and Hartley, S.B., 2014, Vegetation types in coastal Louisiana in 2013: U.S. Geological Survey Scientific Investigations Map 3290, 1 sheet, scale 1:550,000, <http://dx.doi.org/10.3133/sim3290>.

Appendix A: Long Point Bayou Marsh Land Loss Spreadsheet



Project:	Long Point Bayou Marsh Creation			Loss Rate (%/yr)		Total MC & MN (acres)
Total Acres	Year	Marsh Acres	Water Acres			
395	2019	76	319	0.46		395
395	2021	77	318	FWP Land Loss Rate Reduction		0.50

		FWOP				FWP - Marsh Creation/Nourishment								FWP Totals			
						Created Marsh = 310			Nourished Marsh = 77								
	TY	FWOP Loss Rate	Marsh (acres)	% Marsh (Y1)	Water (acres)	FWP Loss Rate	Acres	Planting Rate for Adjusted Marsh Acres 50%	FWP Loss Rate	Acres	Adjusted Marsh Acres (50% @ TY1, 100% @ TY3)	Water (acres)	Marsh (acres)	% Marsh (Y1)	Net Acres of Marsh	Total Acres Check
2019		0.0046	76	19%	319												
2020		0.0046	76	19%	319												
2021		0.0046	77	19%	318												
1		0.0046	**77**	**20%**	**318**	0.0023	311	**54**	0.0023	77	**38**	**7**	**93**	**24%**	**16**		395
2		0.0046	77	20%	318	0.0023	312		0.0023	77							
3		0.0046	**78**	**20%**	**317**	0.0023	312	**172**	0.0023	77	**77**	**5**	**249**	**63%**	**171**		395
4		0.0046	78	20%	317	0.0023	313		0.0023	77							
5		0.0046	**78**	**20%**	**317**	0.0023	314	**314**	0.0023	78	**78**	**4**	**391**	**99%**	**313**		395
6		0.0046	79	20%	316	0.0023	315	315	0.0023	78	78	3	392	99%	314		395
7		0.0046	79	20%	316	0.0023	315		0.0023	78	78	2	393	100%	315		395
8		0.0046	80	20%	315	0.0023	316	316	0.0023	78	78	1	394	100%	315		395
9		0.0046	80	20%	315	0.0023	317	317	0.0023	78	78	0	395	100%	315		395
10		0.0046	80	20%	315	0.0023	318	318	0.0023	78	78	-1	396	100%	316		395
11		0.0046	81	20%	314	0.0023	318	318	0.0023	79	79	-2	397	100%	316		395
12		0.0046	81	21%	314	0.0023	319	319	0.0023	79	79	-3	398	101%	317		395
13		0.0046	81	21%	314	0.0023	320	320	0.0023	79	79	-4	399	101%	317		395
14		0.0046	82	21%	313	0.0023	320		0.0023	79	79	-5	400	101%	318		395
15		0.0046	82	21%	313	0.0023	321	321	0.0023	79	79	-6	401	101%	318		395
16		0.0046	83	21%	312	0.0023	322	322	0.0023	80	80	-6	401	102%	319		395
17		0.0046	83	21%	312	0.0023	323	323	0.0023	80	80	-7	402	102%	319		395
18		0.0046	83	21%	312	0.0023	323	323	0.0023	80	80	-8	403	102%	320		395
19		0.0046	84	21%	311	0.0023	324	324	0.0023	80	80	-9	404	102%	321		395
20		0.0046	**84**	**21%**	**311**	0.0023	325	**325**	0.0023	80	**80**	**-10**	**405**	**103%**	**321**		395

TY	100% planting rate (credit)	50% planting rate (credit)	25% planting rate (credit)	0% planting rate (credit)
1	25.0%	17.5%	13.7%	10.0%
3	100.0%	55.0%	40.0%	30.0%
5	100.0%	100.0%	100.0%	100.0%

FWP % Marsh: Red values indicate minimum 3% open water for Interspersion Class 1 designation

Appendix B: V4 Spreadsheet

Assumptions and methods are as follows:

1. Elevations are from 2020 design survey data, NAVD88, GEOID18.
2. Calculated tidal datums (NAVD88) (GEOID18) for project area: MHW = +1.05 ft; MTL = +0.56 ft; and MLW = +0.06 ft
3. The average of all land survey points that are considered healthy marsh =0.71 ft. This is higher than MTL (0.56 ft) and probably unlikely that the lower limit of the marsh would be higher than this level. Therefore, survey points greater than +0.71 ft (NAVD88) (GEOID18) are considered to be emergent marsh. Elevations greater than +0.71 ft are not likely to be open water.
4. The lower limit of shallow open water is calculated as +0.56 ft (NAVD88) (GEOID18) (MTL) - 1.5 ft depth = -0.94 ft NAVD88 Therefore, all points less than +0.56 ft (lower limit of marsh) and greater than or equal to -0.94 ft are identified as SOW (shallow open water). All points lower than -0.94 ft are classified as deep open water (DOW).
5. Depths at TY20 include an adjustment for subsidence Local subsidence rates in this region are approximately 4.3mm per year (0.17 in/yr) (Reed and Yuill 2016). This equates to a decrease in the project area mudline elevation of 3.4 in. (0.28 ft) over the 20-year project design life.

Project:	Long Point Bayou Marsh Creation
Assumptions and methodology are provided in the numbered items below.	
1. Elevations are from 2020 design survey data.NAVD88, GEOID18	
2. Calculated tidal datums (NAVD88) (GEOID18) for project area: MHW = +1.05 ft; MTL = +0.56 ft; and MLW = 0.06 ft	
3. The average of all land survey points that are considered healthy marsh =0.71 ft. This is higher than MTL (0.56ft) and probably unlikely that the lower limit of the marsh would be higher than this level. Therefore, survey points greater than +0.71 ft (NAVD88) (GEOID18) are considered to be emergent marsh. Elevations greater than +0.71 ft are not likely to be open water.	
4. The lower limit of shallow open water is calculated as +0.56 ft (NAVD88) (GEOID18) (MTL) - 1.5 ft depth = -0.94 ft NAVD88 Therefore, all points with an elevation less than +0.56 ft (lower limit of marsh) and greater than or equal to -0.94 ft are identified below as SOW (shallow open water). All points with an elevation lower than -0.94 ft are classified as deep open water (DOW).	
5. TY20 bottom elevations estimated by applying 20 years of subsidence (-0.28 ft) to all TY0 elevations.	

TARGET YEAR 0	
MTL	0.56 ft NAVD88
V4 lower limit	-0.94 ft NAVD88
Marsh lower limit	0.71 ft NAVD88
Total Pts	2676
Deep Open Water	1310
Shallow Open Water	1366
% OW ≤ 1.5' deep	51%

TARGET YEAR 20	
MTL	0.56 ft NAVD88
V4 lower limit	-0.94 ft NAVD88
Marsh lower limit	0.71 ft NAVD88
Subsidence rate (20 yrs)	0.28 ft
Total Pts	2880
Deep Open Water	1685
Shallow Open Water	1195
% OW ≤ 1.5' deep	41%