Appendix H:
Wetlands Value Assessment (WVA)

Port Fourchon Marsh Creation

Thirty-first Priority
Project List
of the
Coastal Wetlands Planning, Protection and Restoration Act

Phase 2 Project Information Sheet for Wetland Value Assessment

Prepared by

U. S. Environmental Protection Agency

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Project Name: Port Fourchon Marsh Creation

Sponsoring Agency: U.S. Environmental Protection Agency
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Project Location:
Region 3, Terrebonne Basin, Lafourche Parish

Problem:
Historic wetland loss in the project area stems from subsidence, sediment deprivation, and construction of pipeline canals. According to USGS data, nearly 324,000 ac of land were lost between 1932 and 2010 within the basin, which had the highest land loss rate in the state from 1984 to 2024. Wetlands have been replaced by open water where canals are dug, while spoil banks convert them to upland habitat. Bounded by Bayou Lafourche to the east and Timbalier Bay to the west (Figure 1) the project area is also subject to shoreline erosion. From January 1984 to July 2024, the extended project boundary experienced a land change rate of -0.97% per year. based on a USGS hyper-temporal analysis of satellite imagery.

Goals:
The primary goals of this project are to restore degraded wetland habitat and provide increased protection from storm surge and flooding. Specific goals of the project are to create approximately 445 acres and nourish approximately 98 acres of marsh with dredged material from Belle Pass. This project helps to further EPA CWPPRA Team goals by improving local community resilience, restoring wetland habitats and protecting critical infrastructure, and supporting stakeholder priorities in synergy with EPA's mission. The project demonstrated cost-sharing opportunities with local stakeholders and supporting stakeholder priorities.

Proposed Project Features:
Create/nourish 543 acres of wetlands by converting open water into marsh and nourishing existing marsh remnants with sediment hydraulically dredged from a borrow source in Belle Pass. Temporary containment dikes will be constructed and gapped to allow greater tidal exchange and estuarine organism access. A target initial fill elevation of +1.60 ft (NAVD88) based on existing bottom and target marsh elevation is envisioned to enhance longevity of this land form. There will be an enhanced berm as a bank stabilization feature (Figure 1). This feature will not have any hard structures and is not a shoreline protection feature.

Figure 1. Project location.

The proposed project features will help maintain the marshes near Port Fourchon and will provide support for local infrastructure and communities, such as Port Fourchon, highways, etc. The project would provide a synergistic effect with the West Belle Pass Headland Restoration (TE-23), West Belle Pass Barrier Headland Restoration (TE-52), Terrebonne Basin Barrier Island and Beach Nourishment/West Belle Pass Headland Restoration (TE-143/TE118), West Fourchon Marsh Creation (TE-134), West Belle Pass Headland Repair (TE-176) as well as nearby Caminada projects (BA-171, BA-45, BA-143).

Historical and Present Vegetation Community and Hydrology:
CRMS Station 0292 (Figure 2) is approximately 2.55 miles northeast of the marsh creation polygon and is referred to here for hydrology, salinity, and vegetation comparisons. According to the CRMS 0292 marsh classification, the area has been consistently classified as saline marsh (Figure 3).

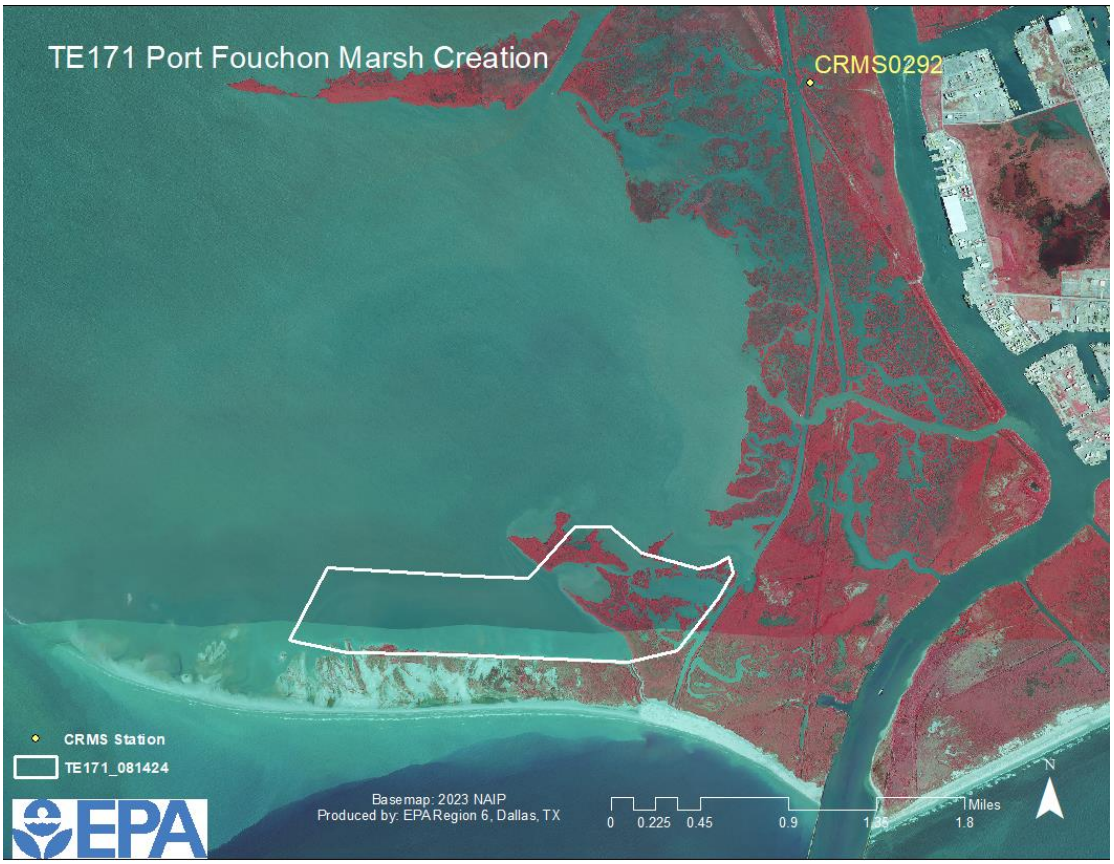

Figure 2. Project features with nearest CRMS station.

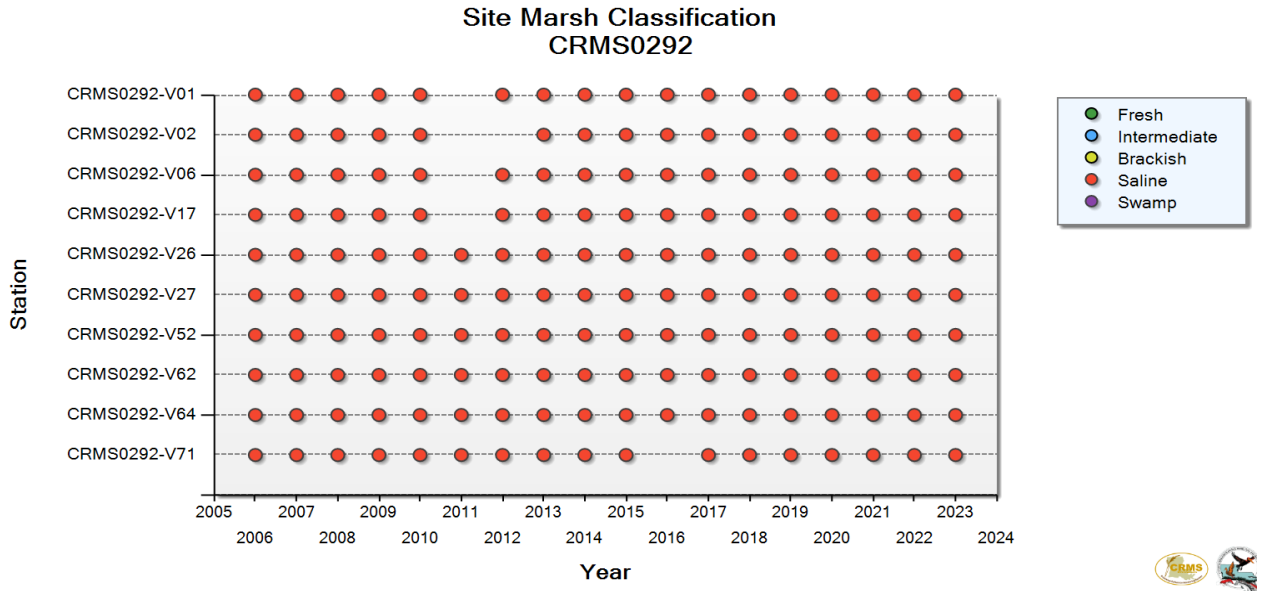

Figure 3. CRMS 0292 site marsh classification, 2006-2023.

Mean annual salinity for the full period of record (12 May 2006 – 10 May 2024) at CRMS 0292 measured from monthly averages was 24.34 parts per thousand (ppt) and mean annual growing season (1 March – 31 October) salinity was 23.24 ppt (Figure 4). Salinity measurements taken at the project site during agency field trip on 24 May 2021 averaged 18.9 ppt and 18.2 ppt on 24 June 2021. Salinity averaged 19.7 ppt on 24 June 2021 from CRMS Station 0292.

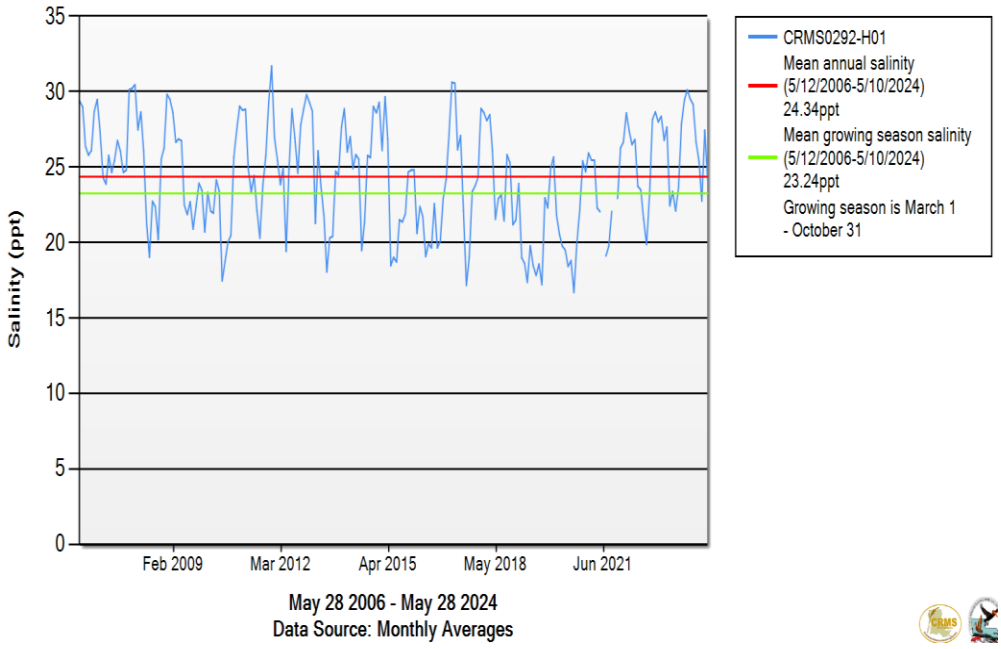

Figure 4. Salinity levels at CRMS 0292 for May 2006 through May 2024.

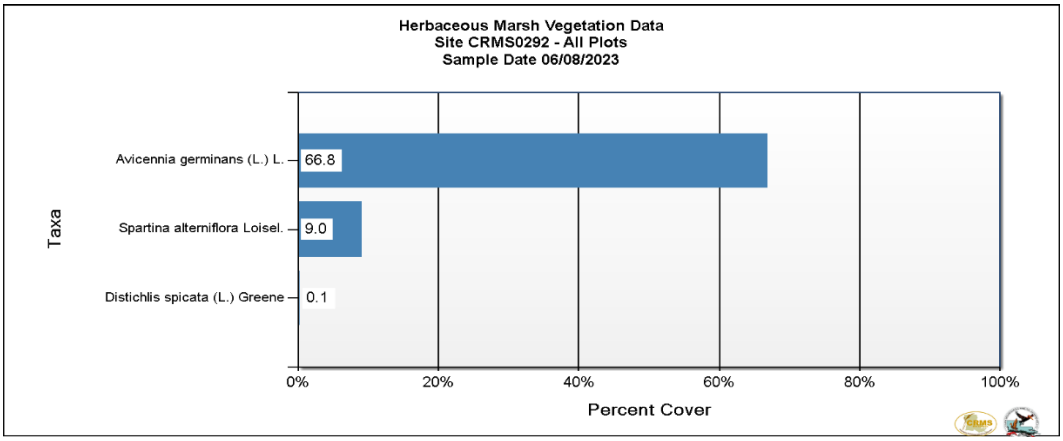

Figure 5. Herbaceous marsh vegetation cover for CRMS 0292, 8 June 2023.

Figure 6. 2021 marsh type survey (Nyman et al. 2022). The project is 18% saline marsh and 82% water.

Herbaceous vegetation survey data from 8 June 2023 at CRMS 0292 (Figure 5) indicates mostly black mangrove (*Avicennia germinans,* 67% cover) dominates the project area. Field observations during the data collection trips (24 May 2021 and 24 June 2021) showed no SAVs. Based on the salinity, vegetation, Nyman marsh type survey (Nyman et al.2022) (Figure 6), the saline marsh WVA model is proposed for project evaluation.

Interior Land Loss Data:
For interior marsh loss, USGS evaluated land/water data within an extended boundary (Figure 7) surrounding the project area. Using a hyper-temporal analysis (1984-2024) for the extended

boundary, USGS calculated historical rates of land change and a land loss rate of -0.97% per year (Figure 8).

Figure 7. Extended boundary used for USGS land loss calculation.

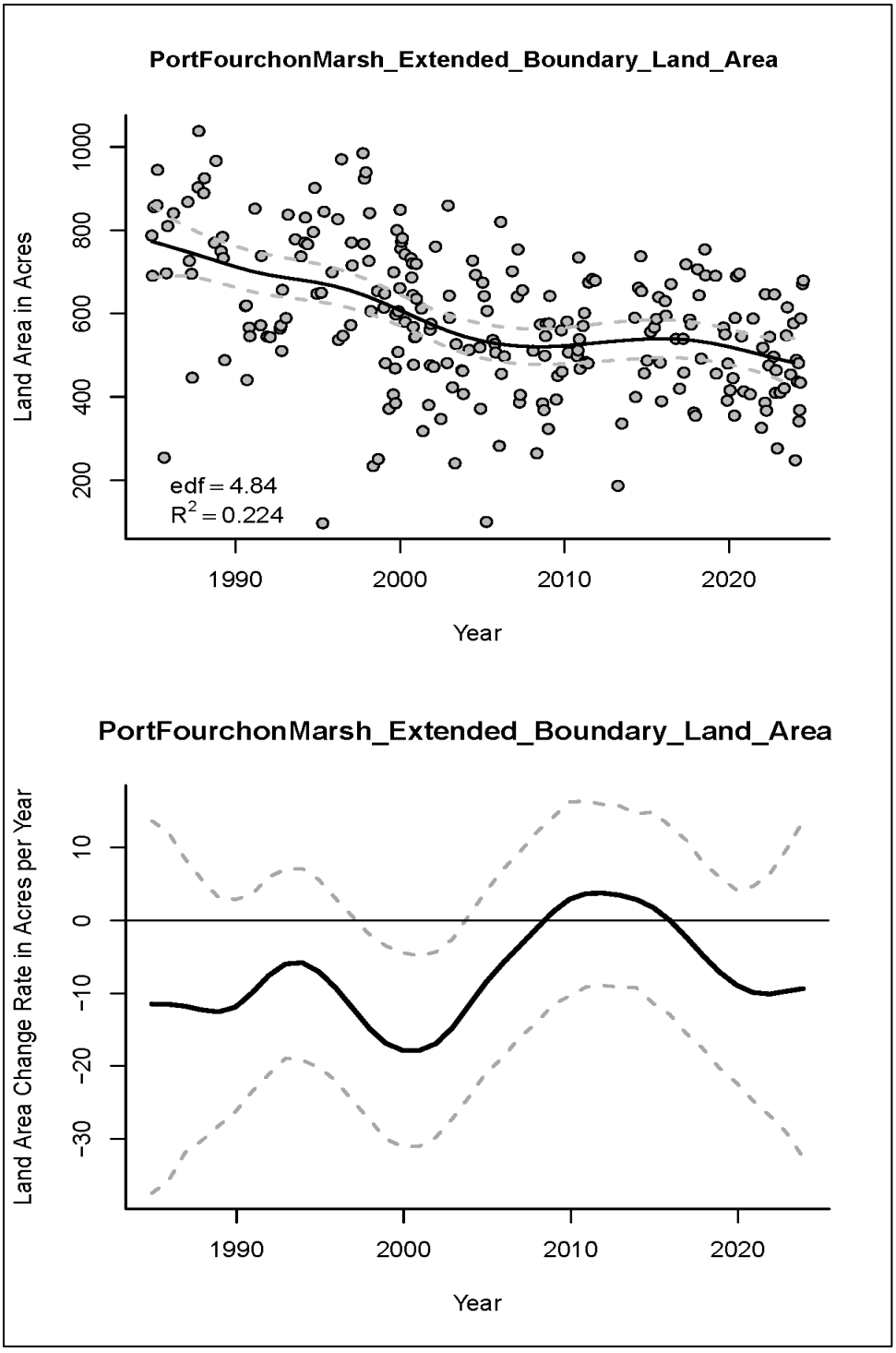

Figure 8. Change in project extended boundary area by acres and acres per year.

V1: % of Wetland Area Covered by Emergent Vegetation

FWOP

One year of loss was applied to the land acreage from the USGS analysis of 2023 NAIP DOQQ photo-imagery data to calculate the TY0 project acreage for 2024. Land loss rates within the project area show a negative trend; hyper-temporal analysis for the extended project boundary shows a land loss rate of -0.97% per year (1984 to 2024) (Figure 8).

FWOP	Marsh Acres	Water Acres	V1
TY0	98	445	18%
TY1	97	446	18%
TY20	81	462	15%

FWP

No plantings are proposed therefore, marsh credit for no plantings is TY1 = 10%, TY3 = 30%, and TY5 = 100%. Environmental Workgroup standard assumptions are applied: 50% marsh credit at TY01 and 100% marsh credit at TY03.

Settlement curves (Figure 9) 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 +1.60 ft. NAVD88. Based on water level for the last 5 years (10 May 2019 to 10 May 2024) from CRMS 0292, the 1% inundation water level is +2.07 ft NAVD88. The target constructed marsh fill elevation is +1.60 ft. (NAVD88) is below the 1% inundation elevation (ENV WG standard for saline marsh). Over the 20-year project life, the preferred inundation range is expected to rise from 0.073 ft (TY0 80% inundated) to 0.605 ft (TY20 80% inundated) and 1.173 ft (TY0 20% inundated) to 1.705 ft (TY20 20% inundated) (All NAVD88 12B). Percent inundation elevations for TY20 were calculated using a 20-year eustatic sea level rise rate (ESLR) of 0.532 ft/year (GIS Engineering 2024). Survey results for average marsh elevation are shown in Table 1.

FWP	Marsh Acres	Water Acres	V1
TY1	93	3	17%
TY3	228	8	42%
TY5	530	13	98%
TY6	527	16	97%
TY20	493	50	91%

Net acres at TY20 = 412 acres

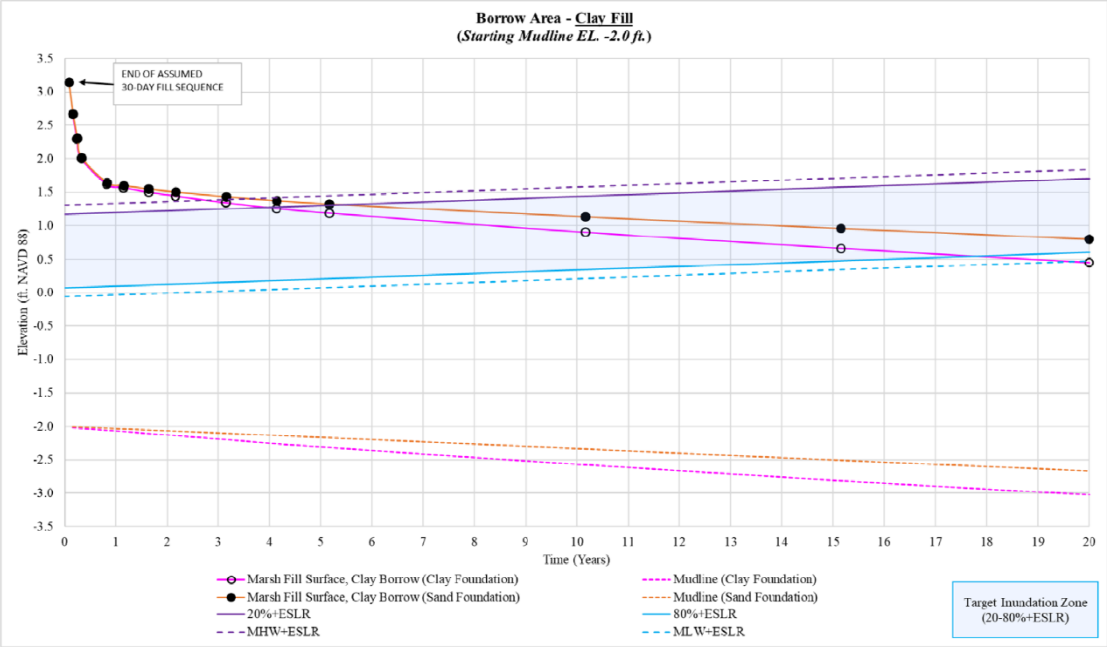

Figure 9. MCA Settlement Curves

Table 1. Average Marsh Elevation Results

Project ID	Minimum Elevation	Average Elevation	Maximum Elevation
TE171	-6.044	-4.618	-3.192
TE171	-3.192	-2.841	-2.490
TE171	-2.490	-2.267	-2.043
TE171	-2.043	-1.864	-1.684
TE171	-1.684	-1.422	-1.159
TE171	-1.159	-0.735	-0.311
TE171	-0.311	0.081	0.472
TE171	0.472	3.538	6.604
Total Avg	-2.786	-0.540	1.706

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

Data were collected on a field trip on 24 May 2021 and 24 June 2021. No SAV were present in the open water areas of the site. We propose an overall SAV coverage of 0% for the entire project area for all target years in FWOP, based on observations from the 2021 data collection field trip. This value represents the average of all SAV cover observations.

FWOP	V2
TY0-TY20	0%

For FWP, we expect that no SAVs would be present in the area post-construction at TY01. Due to the saline and wave conditions, SAV communities are predicted to remain at 0% for TY20.

FWP	V2
TY1-20	0%

V3: Marsh Edge and Interspersion

For FWOP, USGS land/water analysis indicates the project area is an Interspersion Class 4.

FWOP	Class	V3
TY0-TY20	4	100%

Standard workgroup convention for marsh creation was used at FWP target years. We assume that the marsh will be classified as Class 3 in TY3 and TY5 and Class 1 for TY6-20. Class 1, which is 3% water and 97% land is achieved in TY06.

FWP	Class	V3
TY1	5	100%
TY3	3	100%
TY5	3	100%
TY6	1	100%
TY20	1	100%

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

Survey data collected from December 6, 2023 – January 11, 2024, was used to calculate V4. Topographic and bathymetric surveys were collected in a 500 ft by 500 ft grid in the MCA area. Transects extended approximately 500 ft past the originally proposed ECD locations in the south and east sides of the MCA. Transects extended 1,500 ft past the originally proposed ECD on the north and west sides of the MCA. Additional topographic survey data were collected every 25 ft when the change in elevation was greater than 0.5 ft as well as at locations where obvious features were observed.

Topographic data were taken with a Real-time Kinematic (RTK) Global Positioning System (GPS) with a 2 m rover pole with a 6 in attached flatfoot. Bathymetric surveys used a single beam dual frequency echo sounder in correlation with Hypack 2021 survey data collection software. Vessel positioning was recorded with RTK GPS.

For TY0, 523 of the 2107 (25%) survey measurements can be considered as shallow open water (SOW) and 381 measurements (18%) can be considered marsh. Therefore, a value of 25% is proposed. MHW, MLW, and MTL information below is from CRMS 0292. V4 calculation is located in the TE171_WVA_supporting information XL file.

MHW = +1.309 ft., NAVD88 (GEOID12B)
MLW = -0.061 ft., NAVD88 (GEOID12B)
MTL = +0.624 ft., NAVD88 (GEOID12B)

For TY0, the lower limit of shallow open water is calculated as +0.624 ft - 1.5 ft. depth = -0.876 ft. All points with an elevation lower than -0.876 ft are classified as deep open water (DOW). Survey points greater than +0.073 ft NAVD88 are considered to be emergent marsh. This is the 80% inundation elevation and is assumed here to be the lower limit of marsh elevation in the project area for saline marsh. These survey points have been removed from consideration in order to calculate the percent of deep and shallow open water. Therefore, all points between +0.073 ft and -0.876 ft are identified as SOW. TY20 bottom elevations are estimated by applying 20 years of subsidence (0.664 ft) to all TY0 elevations. Local subsidence rates in this region are approximately 10.21 mm per year (0.398 in/yr) (Fitzpatrick et al. 2021; GIS Engineering 2024).. This equates to a decrease in the project area elevation of 7.964 in. (0.664 ft.) over the 20-year project design life. The ecoregion Eastern Terrebonne Basin has a 20th percentile of 10.21 mm/yr subsidence rate which is equivalent to 0.664 ft over the project's 20-year life (Pahl et al. 2023). To calculate V4 estimates for TY20, 0.664 ft of subsidence was added to the surveyed elevations, with results showing 374 of 2392 (16%) survey measurements being shallow open water (see associated TE171_WVA_supportinginfo.xlsx for assumptions). The 20-year eustatic sea level rise rate (ESLR) is 0.532 ft/year (Fitzpatrick et al. 2021; GIS Engineering 2024).

For future projections of shallow open water within the project area, the formation of open water habitat $\leq$ 1.5ft was considered. Subsidence was applied to the open water areas to estimate the change in shallow open water over the project life.

FWOP	V4
TY0	25%
TY1	25%
TY20	16%

For FWP, convention is that all open water is assumed to be less than 1.5 ft deep at TY1 through TY6. For TY20, it is estimated that 90% of the open water would remain shallow due to the formation of some open water areas greater than 1.5 feet deep.

FWP	V4
TY1	100%
TY3	100%
TY5	100%
TY6	100%
TY20	90%

V5: Salinity

Mean annual salinity for the full period of record (12 May 2006 – 10 May 2024) at CRMS 0292 measured from monthly averages was 24.34 parts per thousand (ppt) (Figure 4). Salinity measurements taken at the project site during field trips on 24 May 2021 averaged 18.9 ppt and averaged 18.2 ppt on 24 June 2021. Salinity averaged 19.7 ppt on 24 June 2021 from CRMS Station 0292. Salinity is not predicted to change throughout the project life in FWOP or FWP scenarios.

FWOP and FWP	V5
TY0-TY20	24.34

V6: Aquatic Organism Access

We assume that aquatic organism access would not change under FWOP over the 20-year life. The project area and surrounding area is open with many avenues for aquatic organism access.

FWOP	V6
TY0-TY20	1

For FWP, an access value of 0.0001 will be assumed at TY1 since the marsh platform will be impounded by containment dikes. These will be gapped and degraded by TY3, up to 20%, and an access value of 1.0 will be assumed at this target year and all subsequent target years. Tidal creeks acreage will be determined during the construction phase and subject to adaptive management.

FWP	V6
TY1	0.0001
TY3-TY20	1.0

LITERATURE CITED

Fitzpatrick, C., Jankowski, K. L., & Reed, D. 2021. 2023 Coastal Master Plan: Attachment B3: Determining Subsidence Rates for Use in Predictive Modeling. Version 3. (p. 71). Baton Rouge, Louisiana: Coastal Protection and Restoration Authority.

GIS Engineering. 2024. Port Fourchon Marsh Creation (TE0171): Draft 95% Design Report. New Orleans, LA.

Nyman, J.A., Reid, C.S., Sasser, C.E., Linscombe, J., Hartley, S.B., Couvillion, B.R., and Villani, R.K., 2022, Vegetation Types in Coastal Louisiana in 2021: US Geological Survey data release, https://doi.org/10.5066/P9URYLMS.)

Pahl, J. W., Freeman, A. M, Fitzpatrick, C., Jankowski, K. L., & White, E. D. (2023). 2023 Coastal Master Plan: Attachment B2: Scenario Development: Sea Level Rise and Additional Climate-Driven Variables. Version 2. (p. 43). Baton Rouge, Louisiana: Coastal Protection and Restoration Authority.

Appendix A: Land Loss Spreadsheet

Project:	Port Fourchon MC			Loss Rate (%/yr)	Total MC & MN (acres)
Total Acres	Year	Marsh Acres	Water Acres	-0.97	543
543	2023	99	444		
543	2024	98	445	FWP Land Loss Rate Reduction	0.50

FWOP					FWP - Marsh Creation/Nourishment						FWP Totals				
					Created Marsh =	445		Nourished Marsh =	98						Total Acres Check
TY	FWOP Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	FWP Loss Rate	Acres	Planting Rate for Adjusted Marsh Acres 0%	FWP Loss Rate	Acres	Adjusted Marsh Acres (50% @ TY1, 100% @ TY3)	Water (acres)	Marsh (acres)	% Marsh (V1)	Net Acres of Marsh	
2023	-0.0097	99	18%	444											
2024	-0.0097	98	18%	445											
1	-0.0097	**97**	**18%**	**446**	-0.00485	443	**44**	-0.00485	98	**49**	**3**	**93**	**17%**	**-4**	
2	-0.0097	96	18%	447	-0.00485	441		-0.00485	97						543
3	-0.0097	**95**	**18%**	**448**	-0.00485	439	**132**	-0.00485	97	**97**	**8**	**228**	**42%**	**133**	
4	-0.0097	94	17%	449	-0.00485	436		-0.00485	96						543
5	-0.0097	**93**	**17%**	**450**	-0.00485	434	**434**	-0.00485	96	**96**	**13**	**530**	**98%**	**437**	
6	-0.0097	92	17%	451	-0.00485	432	432	-0.00485	95	95	16	527	97%	435	543
7	-0.0097	92	17%	451	-0.00485	430	430	-0.00485	95	95	18	525	97%	433	543
8	-0.0097	91	17%	452	-0.00485	428	428	-0.00485	94	94	21	522	96%	432	543
9	-0.0097	90	17%	453	-0.00485	426	426	-0.00485	94	94	23	520	96%	430	543
10	-0.0097	89	16%	454	-0.00485	424	424	-0.00485	93	93	26	517	95%	428	543
11	-0.0097	88	16%	455	-0.00485	422	422	-0.00485	93	93	28	515	95%	427	543
12	-0.0097	87	16%	456	-0.00485	420	420	-0.00485	92	92	31	512	94%	425	543
13	-0.0097	86	16%	457	-0.00485	418	418	-0.00485	92	92	33	510	94%	423	543
14	-0.0097	86	16%	457	-0.00485	416	416	-0.00485	92	92	36	507	93%	422	543
15	-0.0097	85	16%	458	-0.00485	414	414	-0.00485	91	91	38	505	93%	420	543
16	-0.0097	84	15%	459	-0.00485	412	412	-0.00485	91	91	41	502	93%	418	543
17	-0.0097	83	15%	460	-0.00485	410	410	-0.00485	90	90	43	500	92%	417	543
18	-0.0097	82	15%	461	-0.00485	408	408	-0.00485	90	90	45	498	92%	415	543
19	-0.0097	81	15%	462	-0.00485	406	406	-0.00485	89	89	48	495	91%	414	543
20	-0.0097	**81**	**15%**	**462**	-0.00485	404	**404**	-0.00485	89	**89**	**50**	**493**	**91%**	**412**	543

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%	50.0%	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