

# A Case Study of Thin Cover Placement Pilot Application in Brunswick Estuary Wetlands, Georgia, USA

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**Honeywell**





Pilot thin layer cover (TLC) placement within coastal Georgia marsh to evaluate as a remedy component for full-scale design

How can we demonstrate  
thin layer cover effectiveness  
in remedy and marsh  
recovery?

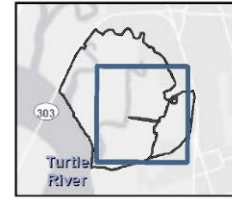
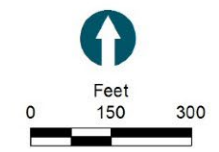
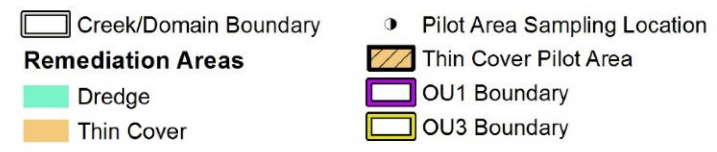
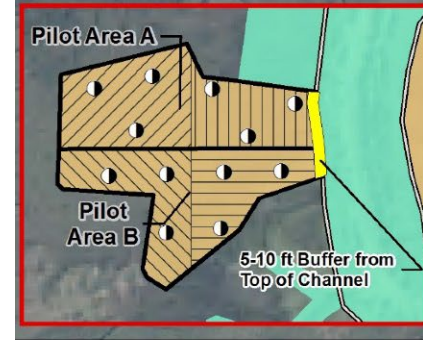
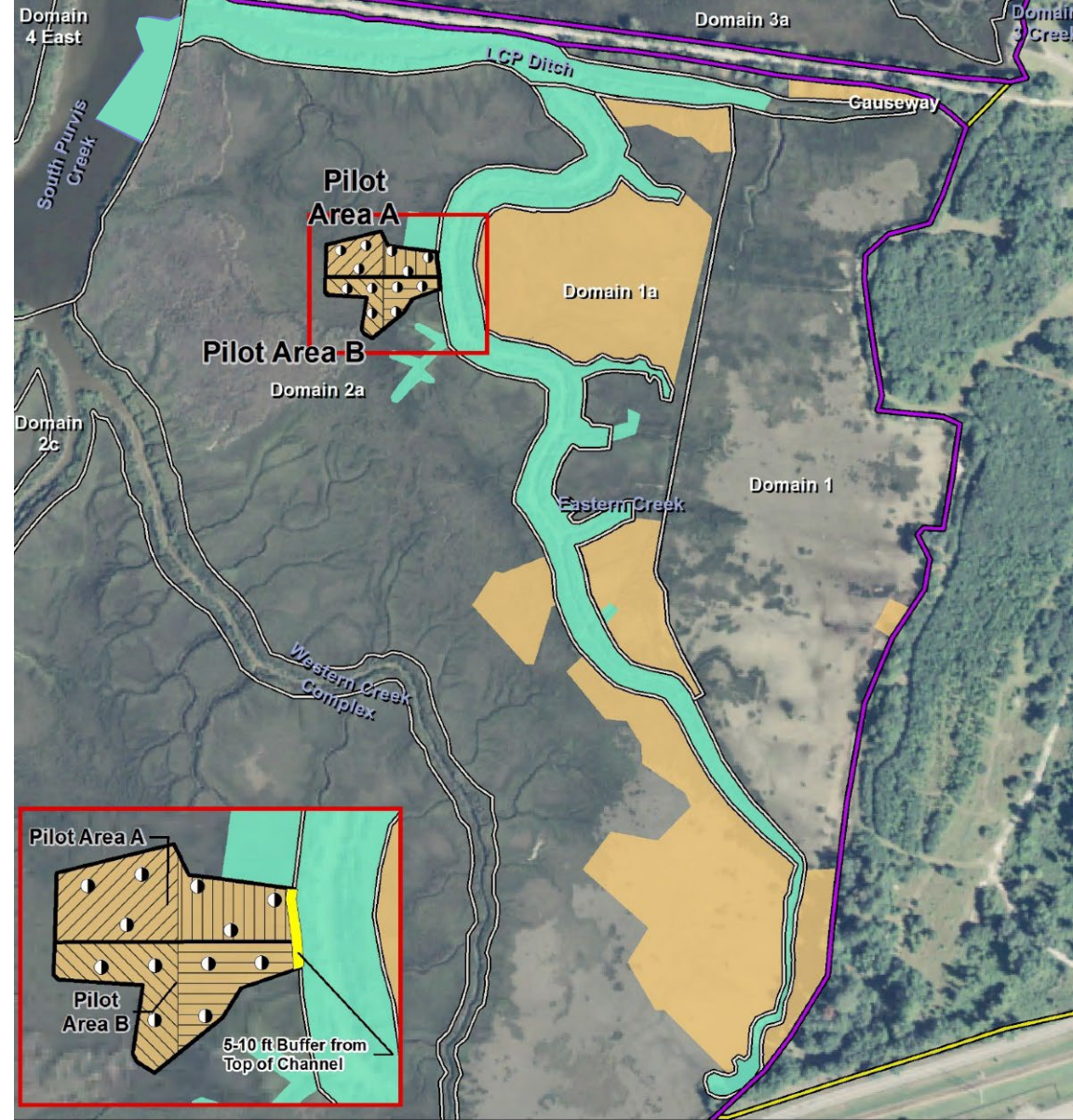
# Pilot Study Goals

- Evaluate application techniques and marsh recovery
- Document reduction of contaminant exposure
- Develop specifications and construction approach
- Collect analytical and marsh recovery monitoring data



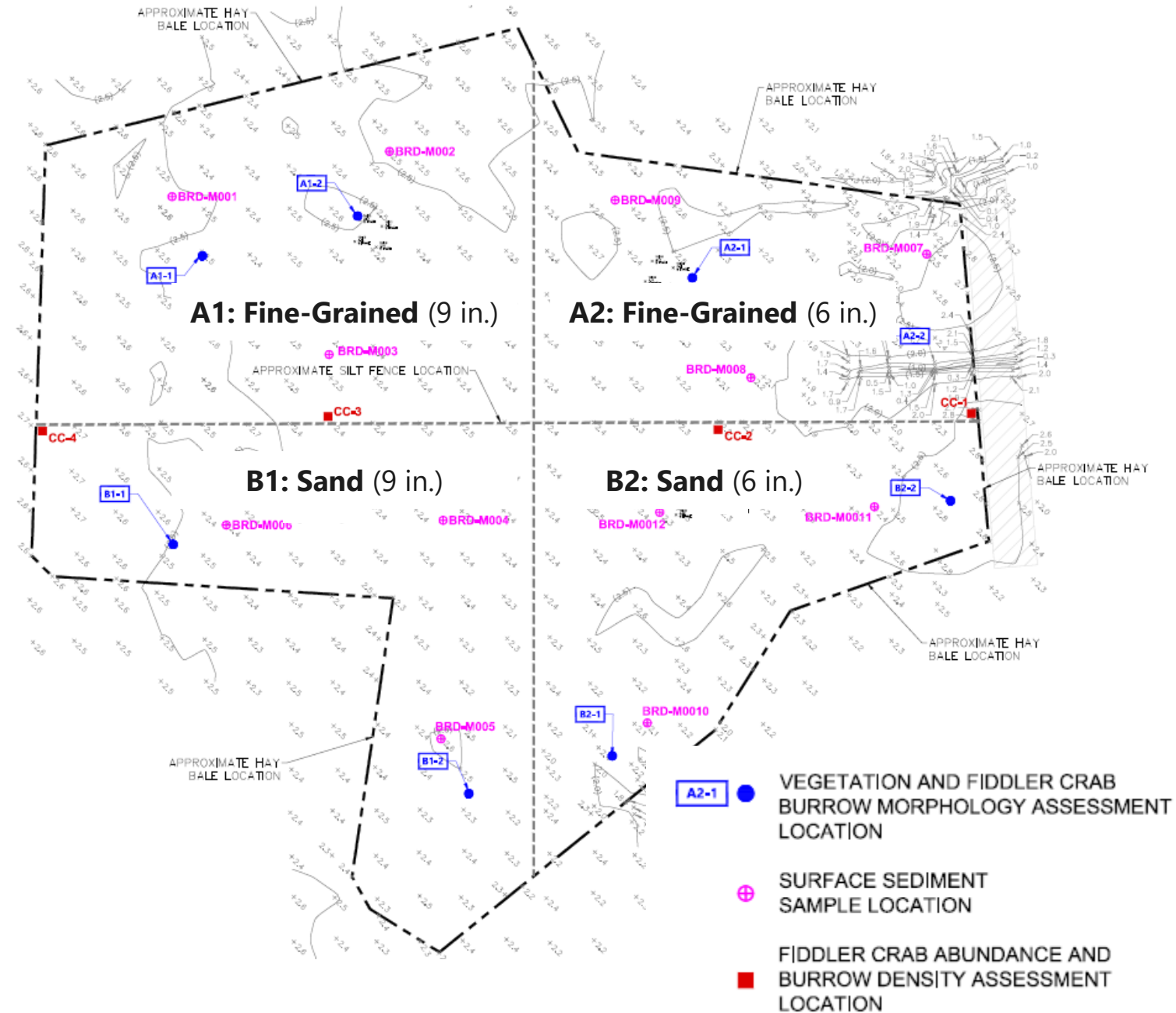
# Project Area

- Representative location within project area, sized at 2/3 acre
- Range of COC concentrations (Hg, PCBs, Pb, and tPAHs)
- Centrally located near land access
- Addresses separate remedial area west of Eastern Creek
- Balance of design and construction aspects prior to full remedy start



# Pilot Approach

- Pilot area split into four regions based on material type and placement thickness
  - Sand (6- and 9-inch minimum)
  - Fine-grained material (6- and 9-inch minimum)



# Construction

- Hydraulic slurry placement
  - Two methods: rainbowing and dispersed energy “mushroom”
  - Landside slurry plant and pump system
- Marsh access by composite mat roadway
- Measurement by grade stake and topographic survey
- Verification by core measurements



Overview of construction setup





# Monitoring Approach

- Monitoring plan developed for 2 years postconstruction
  - 6-month and 1-year intervals
- Combination of analytical and habitat evaluations
- Implementation timing established to coincide with remedial design timeline

Task	October 2018	April 2019	October 2019	April 2020
Aerial photography	✓	✓	✓	✓
Marsh vegetation assessment		✓	✓	✓
Fiddler crab assessment		✓	✓	✓
Sediment chemistry		✓		✓
TLC thickness		✓		✓
Tracer material inspection		✓		✓

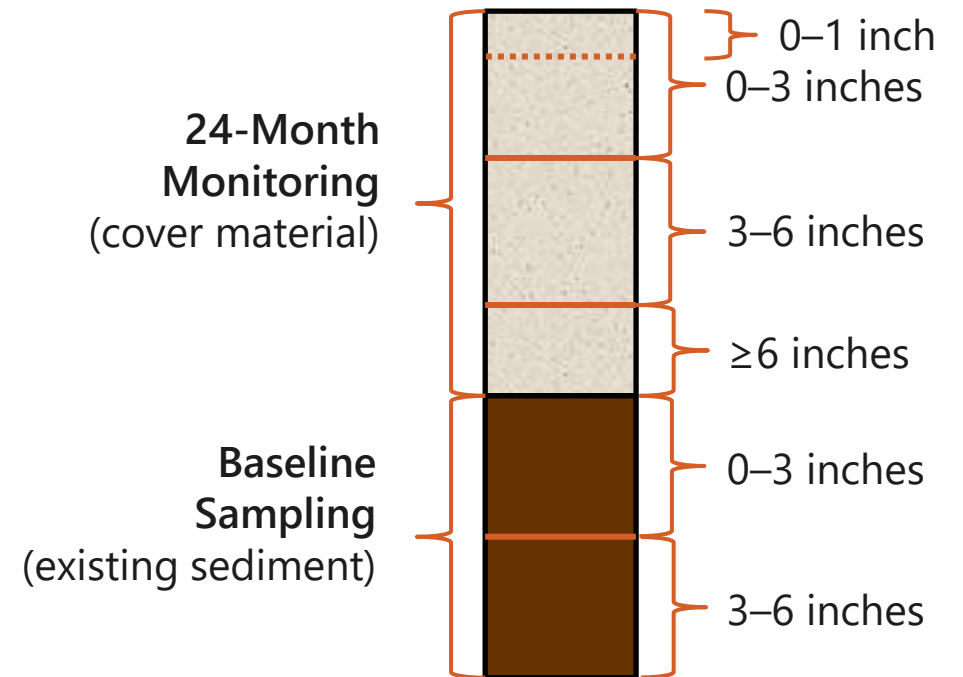
# Tracer Material

- Evaluated ways to demonstrate no significant loss of material prior to root mat establishment
- Surveyed test plots installed in each region prior to TLC placement
  - Geotextile and surround boards used to prevent washout and removed after TLC placement
- Colored sand layer utilized to document lack of material loss and show potential mixing from burrows



# Analytical Sampling

- Site goals are surface-weighted average concentration (SWAC) and discrete cleanup level, depending on COC
- Baseline
  - Surface conditions in existing sediment
  - Two intervals: 0 to 3 and 3 to 6 inches
- 24-month monitoring
  - Surface conditions in cover material
  - Four intervals: 0 to 1, 0 to 3, 3 to 6, and >6 inches



# Results: Mercury

Depth Interval (inches)	Average Concentration (mg/kg)			Maximum Concentration (mg/kg)			Sample Count/ Non-Detect Count		
	Pre-Cover	12-Month March 2019	24-Month June 2020	Pre-Cover	12-Month March 2019	24-Month June 2020	Pre-Cover	12-Month March 2019	24-Month June 2020
0–1	--	0.09	0.06	--	0.35	0.16	--	12/0	12/0
0–3	1.21	0.03	0.04	4.22	0.06	0.11	12/0	12/0	12/1
3–6	3.79	0.01	0.02	7.56	0.04	0.04	12/0	12/0	12/8
6–12*	--	0.01	0.01	--	0.02	0.03	--	10/0	10/7

Notes:

Duplicates are not included.

\* End of sample interval (location-specific)

-- : not available

ROD Clean Up Level (CUL): 11 ppm

ROD SWAC: 2 ppm

# Results: PCBs

Depth Interval (inches)	Average Concentration (mg/kg)			Maximum Concentration (mg/kg)			Sample Count/ Non-Detect Count		
	Pre-Cover	12-Month March 2019	24-Month June 2020	Pre-Cover	12-Month March 2019	24-Month June 2020	Pre-Cover	12-Month March 2019	24-Month June 2020
0–1	--	0.12	0.10	--	0.47	0.28	--	12/0	12/0
0–3	0.46	0.04	0.06	1.47	0.17	0.21	12/0	12/0	12/0
3–6	1.28	0.02	0.02	2.32	0.12	0.05	12/0	12/4	12/0
6–12*	--	0.01	0.01	--	0.02	0.01	--	10/3	10/5

Notes:

Duplicates are not included.

\* End of sample interval (location-specific)

-- : not available

ROD CUL: 16 ppm

ROD SWAC: 3 ppm

# Results: Lead

Depth Interval (inches)	Average Concentration (mg/kg)			Maximum Concentration (mg/kg)			Sample Count/ Non-Detect Count		
	Pre-Cover	12-Month March 2019	24-Month June 2020	Pre-Cover	12-Month March 2019	24-Month June 2020	Pre-Cover	12-Month March 2019	24-Month June 2020
0–1	--	5.58	3.82	--	13.90	9.24	--	12/0	12/0
0–3	20.78	2.88	3.01	24.10	6.48	6.28	12/0	12/0	12/0
3–6	23.13	1.88	2.19	27.00	4.83	5.56	12/0	12/0	12/0
6–12*	--	1.63	2.13	--	3.56	6.23	--	10/0	10/0

Notes:

Duplicates are not included.

\* End of sample interval (location-specific)

-- : not available

ROD CUL: 117 ppm

ROD SWAC: not applicable

# Results: TPAH

Depth Interval (inches)	Average Concentration (mg/kg)			Maximum Concentration (mg/kg)			Sample Count/ Non-Detect Count		
	Pre-Cover	12-Month March 2019	24-Month June 2020	Pre-Cover	12-Month March 2019	24-Month June 2020	Pre-Cover	12-Month March 2019	24-Month June 2020
0–1	--	0.08	0.08	--	0.20	0.20	--	12/0	12/0
0–3	0.36	0.04	0.07	1.10	0.10	0.19	12/0	12/1	12/0
3–6	0.30	0.02	0.10	0.44	0.06	0.60	12/0	12/6	12/3
6–12*	--	0.04	0.07	--	0.16	0.28	--	10/4	10/5

Notes:

Duplicates are not included.

\* End of sample interval (location specific)

-- : not available

ROD CUL: 4 ppm

ROD SWAC: not applicable

# Habitat Evaluations

- Quadrat evaluations performed in 6-month intervals
- Strong recovery 2+ years post-remedy

Vegetative Cover (%)				
Location	Baseline Feb. 2018	12-Month March 2019	18-Month Nov. 2019	24-Month June 2020
A1-1	40	--	--	< 5
A1-2	35	--	--	15
A2-1	65	< 5	30	50
A2-2	75	50	75	75
B1-1	50	< 5	15	30
B1-2	50	--	< 5	15
B2-1	40	30	60	50
B2-2	80	20	70	70



12-month, March 28, 2019

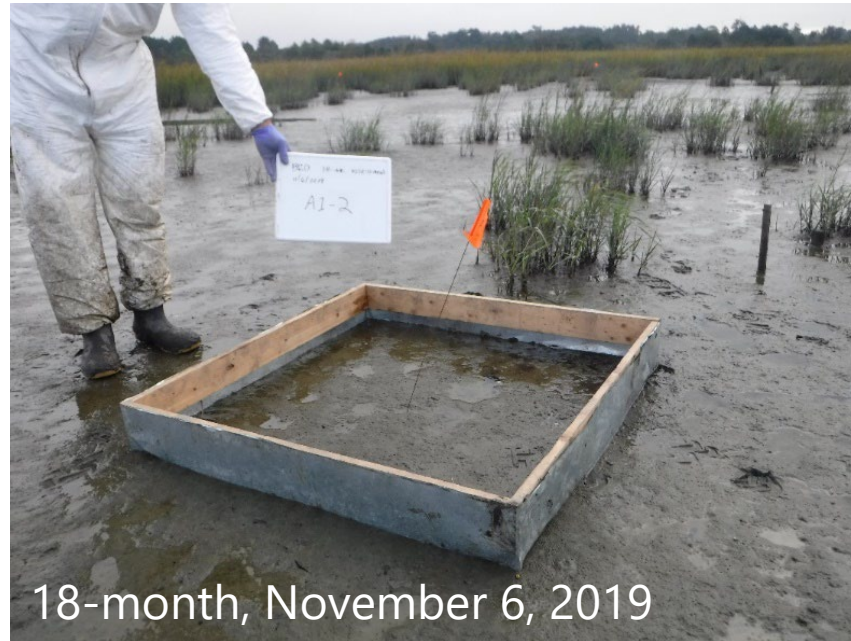
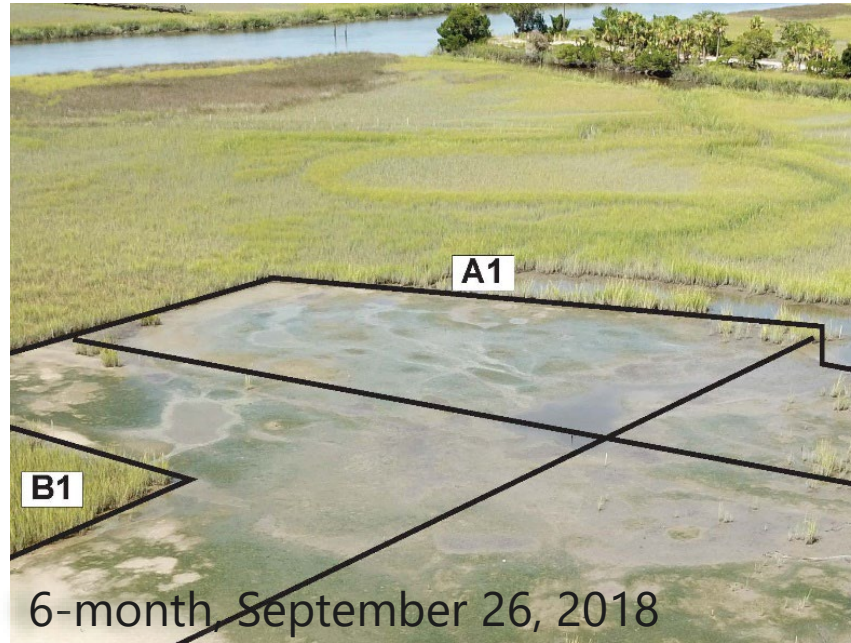


24-month, June 16, 2020



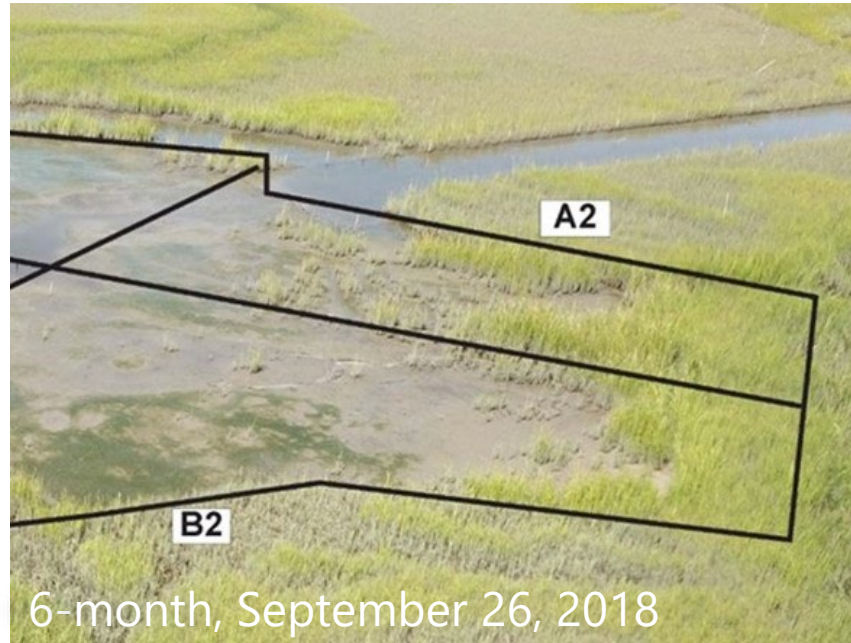
# Habitat Evaluations

Grid A1 – 9 inches of sand/topsoil



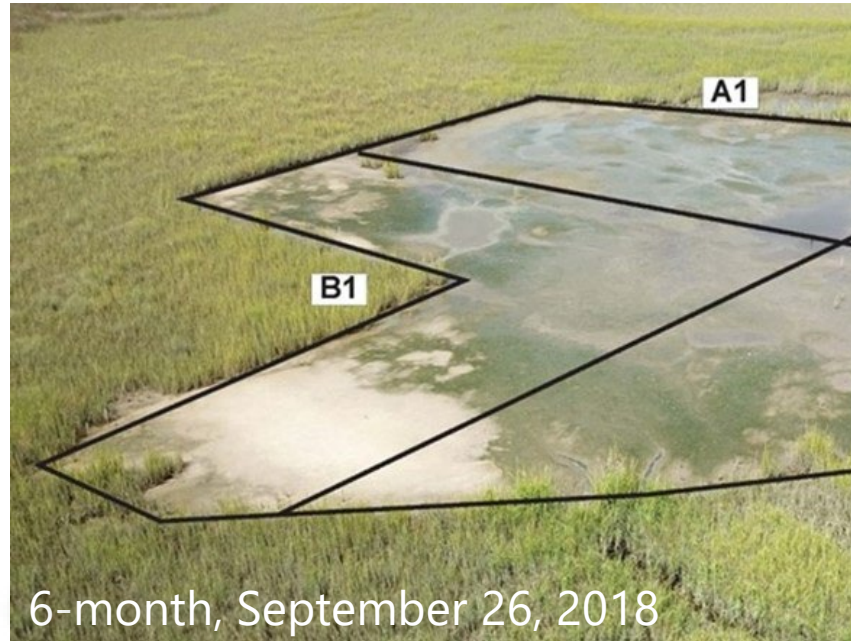
# Habitat Evaluations

Grid A2 – 6 inches of sand/topsoil



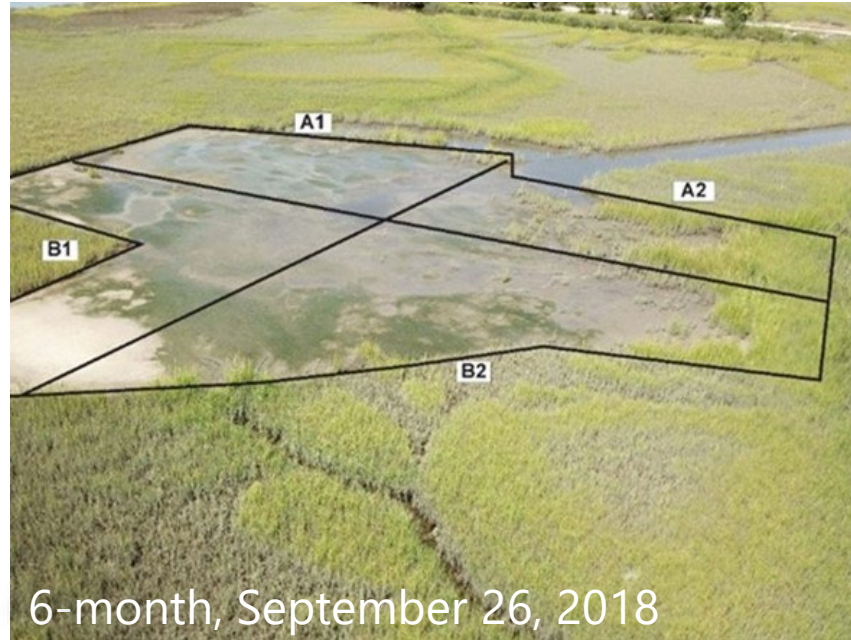
# Habitat Evaluations

Grid B1 – 9 inches of fine sand



# Habitat Evaluations

Grid B2 – 6 inches of fine sand



# Fiddler Crab Assessment

## Average Burrow Sizing Over Pilot Area

Event	Depth (inches)	Width (inches)	Average Diameter (inches)
Baseline	2.4	2.2	0.5
12-Month	1.4	1.2	0.4
18-Month	1.9	1.5	0.4
24-Month	2.4	1.9	0.6

## Fiddler Crab Counts in Pilot Area

Site	Baseline			24-Month		
	Burrows	Crabs	Burrows per Crab	Burrows	Crabs	Burrows per Crab
CC-1	55	11	5	160	13	12.3
CC-2	268	47	5.7	72	33	2.2
CC-3	178	29	6.1	93	48	1.9
CC-4	193	26	7.4	37	10	3.7
<b>Total</b>	<b>694</b>	<b>113</b>	<b>6.1</b>	<b>362</b>	<b>104</b>	<b>3.5</b>



Baseline example



24-month example



# Pilot Cover Facing North



24-month assessment, June 15, 2020



Post installation



12-month assessment



18-month assessment

# November 2022 Condition

An aerial photograph of a wetland area. The landscape is dominated by dense, green and greyish-brown vegetation, likely marsh grasses. A network of small, winding water channels or ditches is visible, particularly on the right side of the image. In the background, there is a line of trees and a small body of water. The overall scene depicts a natural, undisturbed wetland environment.

Remedy preconstruction, November 2, 2022

# Pilot Cover Facing West



24-month assessment, June 15, 2020



Post-installation



12-month assessment



18-month assessment



# November 2022 Condition

An aerial photograph of a wetland area. The foreground and middle ground are dominated by dense, green and brownish vegetation, likely marsh grasses. A winding waterway or canal cuts through the vegetation, starting from the right side and curving towards the top right. In the background, a large body of water is visible, with a long bridge spanning across it. The sky is clear and blue.

Remedy preconstruction, November 2, 2022

# Summary

- Accurate, controlled placement of TLC was achieved during construction
- Initial vegetation recovery was achieved within 2 years and full cover at 3+ years
- Reduction in surface concentrations reduced exposure and met site goals
- TLC can be effectively utilized as a major remedy component for enhanced natural recovery in marsh systems



THANK YOU

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