

**Summary of Laboratory Test Results of Soils Analysis  
Sea Grass Survey - Galveston Bay  
PSI Project No: 325-344**

Belaire Environmental, Inc.  
1802 Baywood  
Rockport, TX 78382

Sample No.	Boring No.	Depth, ft.	Moisture % ASTM D2216	Liquid Limit ASTM D4318	Plastic Limit ASTM D4318	Plasticity Index ASTM D4318	Specific Gravity ASTM D854	Void Ratio *Assumes 100% saturation	Classification ASTM D2487
S-1	T-1	0-2	31	31	12	19	Pending	Pending	Gray Lean Clay with Sand (CL)
S-2	T-1	0-2	29	33	11	22	Pending	Pending	Gray Lean Clay with Sand (CL)
S-3	T-1	0-2	31	31	14	17	Pending	Pending	Gray Lean Clay with Sand (CL)
S-4	T-1	0-2	46	39	12	27	Pending	Pending	Gray Lean Clay with Sand (CL)
S-1	T-2	0-2	33	32	17	15	Pending	Pending	Gray Lean Clay with Sand (CL)
S-2	T-2	0-2	45	45	15	30	Pending	Pending	Gray Lean Clay with Sand (CL)
S-3	T-2	0-2	23	NP	NP	NP	Pending	Pending	Gray Sand with Shell Fragments
S-4	T-2	0-2	40	40	14	26	Pending	Pending	Gray Lean Clay with Sand (CL)
S-1	T-3	0-2	28	34	13	21	Pending	Pending	Gray Lean Clay with Sand (CL)
S-2	T-3	0-2	37	39	15	24	Pending	Pending	Gray Lean Clay with Sand (CL)
S-3	T-3	0-2	21	NP	NP	NP	Pending	Pending	Gray Sand with Shell Fragments
S-4	T-3	0-2	48	51	16	35	Pending	Pending	Gray Fat Clay with Sand (CH)
S-1	T-4	0-2	38	44	18	26	Pending	Pending	Gray Lean Clay with Sand (CL)
S-2	T-4	0-2	25	35	13	22	Pending	Pending	Gray Lean Clay with Sand (CL)
S-3	T-4	0-2	29	25	20	5	Pending	Pending	Gray Clayey Sand (SC)
S-4	T-4	0-2	44	45	17	31	Pending	Pending	Gray Lean Clay with Sand (CL)
S-1	T-5	0-2	35	46	17	29	Pending	Pending	Gray Lean Clay with Sand (CL)
S-2	T-5	0-2	33	25	17	8	Pending	Pending	Gray Clayey Sand (SC)
S-3	T-5	0-2	23	NP	NP	NP	Pending	Pending	Gray Sand with Shell Fragments (SP)
S-4	T-5	0-2	49	46	15	31	Pending	Pending	Gray Lean Clay with Sand (CL)
S-1	T-6	0-2	31	39	16	23	Pending	Pending	Gray Lean Clay with Sand (CL)
S-2	T-6	0-2	31	28	18	10	Pending	Pending	Gray Clayey Sand (SC)
S-3	T-6	0-2	23	NP	NP	NP	Pending	Pending	Gray Sand (SP)
S-4	T-6	0-2	36	33	17	16	Pending	Pending	Gray Lean Clay with Sand (CL)
S-1	T-7	0-2	27	NP	NP	NP	Pending	Pending	Gray Sand (SP)
S-2	T-7	0-2	23	NP	NP	NP	Pending	Pending	Gray Sand (SP)
S-3	T-7	0-2	23	NP	NP	NP	Pending	Pending	Gray Sand with Shell Fragments (SP)
S-4	T-7	0-2	27	NP	NP	NP	Pending	Pending	Gray Sand with Shell Fragments (SP)
S-1	T-8	0-2	26	NP	NP	NP	Pending	Pending	Gray Sand (SP)
S-2	T-8	0-2	28	NP	NP	NP	Pending	Pending	Gray Sand (SP)
S-3	T-8	0-2	23	NP	NP	NP	Pending	Pending	Gray Sand (SP)
S-4	T-8	0-2	28	NP	NP	NP	Pending	Pending	Gray Sand (SP)

Note: NP = Non Plastic



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The samples provided by Belaire Environmental, Inc. were received in sealed and labeled containers and transported to our Houston laboratory. A representative portion of each sample was tested. The laboratory-testing program included: natural moisture content determination tests (ASTM D2216), Atterberg Limits tests (ASTM D4318), and Specific Gravity (ASTM D854). Classification of each sample as determined using the results from the laboratory-testing program and ASTM D 2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).

Samples testing can were classified as Lean Clay (CL) with Sand, Fat Clay (CH) with Sand, Clayey Sand (SC) and Poorly Graded Sand (SP). Shell fragments were present in some of the Poorly Graded Sand (SP) samples.

The void ratio for each sample was calculated assuming the samples were 100 percent saturated. Void ratios ranged from 0.554 to 0.741 for the Poorly Graded Sand (SP) samples, 0.665 to 1.280 for the Lean Clay (CL) with Sand samples, 0.771 to 0.898 for the Clayey Sand (SC) samples. The one Fat Clay (CH) with Sand sample had a Void ratio of 1.271.

Void ratio is defined as the ratio of the volume of voids in the soils to the volume of solid particles in the soil. Void ratios greater than one (1) indicated that the soils are relatively less dense than soils with a void ratio less than one (1).

## **Appendix E**

Aerial Image Analysis, Seagrass Distribution from 2005 to Present

August 6, 2005 Aerial Image

Greens Lake

GIWW

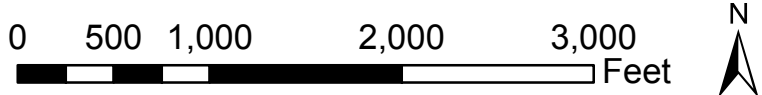
2005 Seagrass Distribution Range  
Approx. 68.2 Ac - 71.6 Ac

CE PA 62 Boundary




West Bay

**Appendix E: Figure 1  
Historical Evaluation of Seagrass Beds  
Corps of Engineers GIWW PA 62,  
Galveston County, Texas**

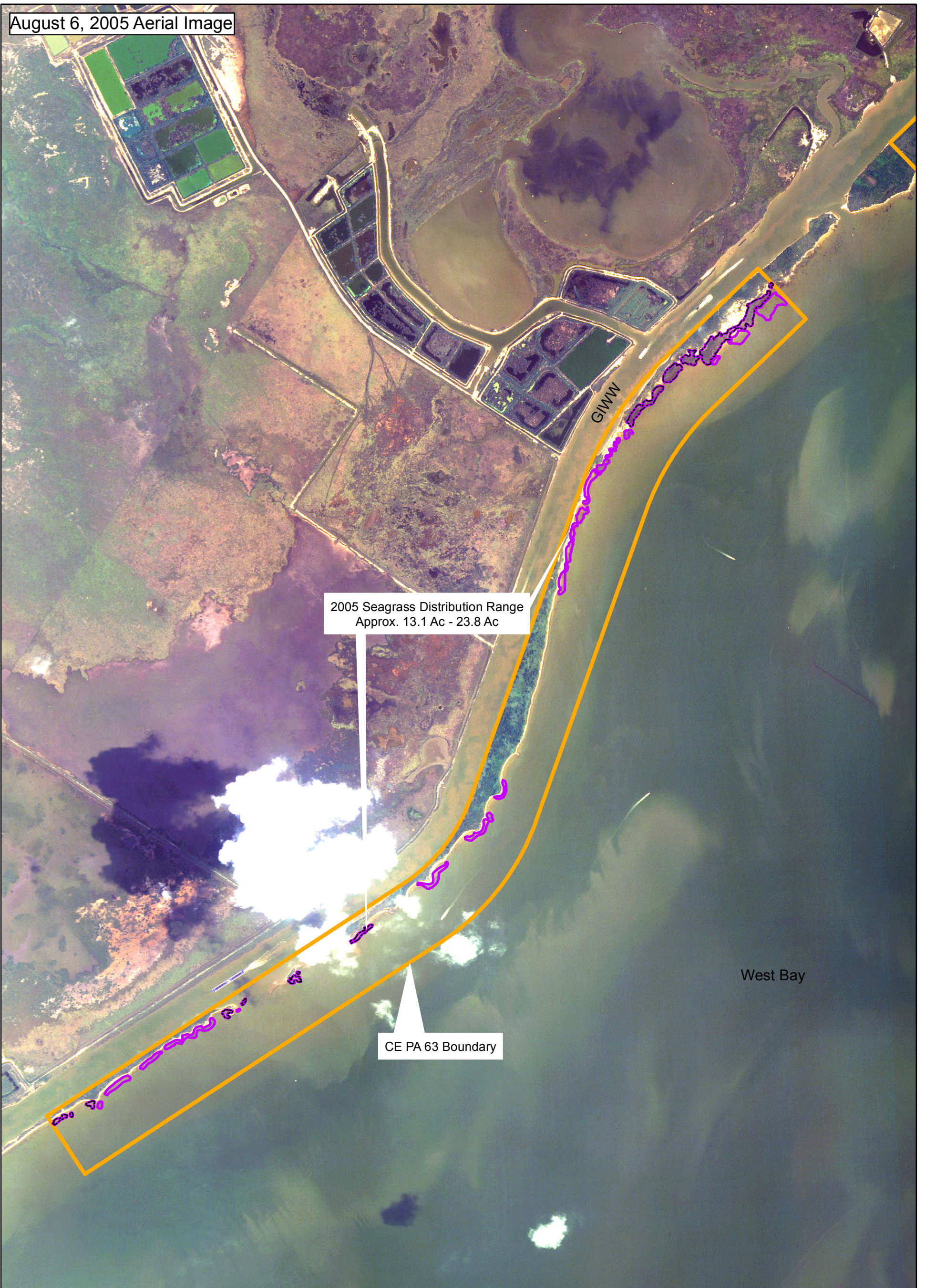
Notes:  
- Imagery obtained from TNRIS, Galveston, County. Image date August 6, 2005.  
- Prepared by Belaire Environmental, Inc. January 24, 2012 (KNT), Revised February 3, 2012 (KNT), Revised August 31, 2012 (KNT).



**Legend**

-  2005 Seagrass Boundary (Approx. 68.2 Ac)
-  Extended 2005 Seagrass Boundary (Approx. 71.6 Ac)
-  CE PA 62 Boundary

August 6, 2005 Aerial Image



2005 Seagrass Distribution Range  
Approx. 13.1 Ac - 23.8 Ac

CE PA 63 Boundary

West Bay




**Appendix E: Figure 2**  
**Historical Evaluation of Seagrass Beds**  
**Corps of Engineers GIWW PA 63,**  
**Galveston County, Texas**

Notes:  
- Imagery obtained from TNRIS, Galveston, County. Image date August 6, 2005  
- Prepared by Belaire Environmental, Inc. January 24, 2012 (KNT), Revised February 3, 2012 (KNT), Revised August 31, 2012 (KNT).

0 750 1,500 3,000 4,500 Feet



**Legend**

-  2005 Seagrass Boundary (Approx. 13.1 Ac)
-  Extended 2005 Seagrass Boundary (Approx. 23.8 Ac)
-  CE PA 63 Boundary

January 2006 Aerial Image



2006 Seagrass Distribution Range  
Approx. 30.0 Ac - 100.7 Ac

CE PA 62 Boundary

GIWW

West Bay




**Appendix E: Figure 3**  
**Historical Evaluation of Seagrass Beds**  
**Corps of Engineers GIWW PA 62,**  
**Galveston County, Texas**

Notes:  
- Imagery obtained from TNRIS, Galveston, County. Image date January 2006.  
- Prepared by Belaire Environmental, Inc. January 24, 2012 (KNT), Revised February 3, 2012 (KNT), Revised August 31, 2012 (KNT).

0 500 1,000 2,000 3,000 Feet



**Legend**

-  2006 Seagrass Boundary (Approx. 30.0 Ac)
-  Extended 2006 Seagrass Boundary (Approx. 100.7 Ac)
-  CE PA 62 Boundary