

**BENTHIC ASSESSMENT OF CANALS 2S, 3, and 6
PHASE 1 B/C IN KING'S BAY
PROGRESS REPORT**

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prepared for:

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SCOPE OF WORK:

The purpose of this study is to document the conditions of the benthos prior to the habitat restoration in Canals 3 and 6 and after the de-mucking and restoration of Canal 2 South. This is a progress report based on the results of the first round of core samples from all three canals covered by this contract. The post restoration core sampling of canals is currently underway and the results will be presented in a separate final report.

METHODS:

On August 13, 2018 Johnson Engineering's senior aquatic ecologist and an environmental specialist collected core samples from Canals 3 and 6 in the King's Bay Restoration area prior to de-mucking (flocculent and *Lyngbya* removal) operations by Gator Dredging to obtain a baseline of five benthic samples from each canal from the terminus on the South to the confluence with Canal 7 on the North. Recognizing the time constraints for obtaining this data, Johnson Engineering proceeded to collect core samples from Canals in August 2018, prior to final approval of the pending agreement(s) with Save Crystal River. Canal 2 was also to be sampled but de-mucking activities had already commenced and post-restoration core samples would be collected at the appropriate time at a later date. On October 16, 2018, restoration activities were completed on Canal 2 South and post-restoration core samples were collected and analyzed at that time. Water depth and GPS location was recorded at each sampling site. Core samples from the benthos were collected using a customized vacuum core sampler developed by Florida Gulf Coast University for limnological studies and characterizing sediment types. The core sampler consists of a 3.1 meter-long section of 3.8 cm diameter schedule 40 PVC pipe, with a one-way ball valve, rubber coupler, and 7.6 diameter x 0.75 meter clear Plexiglas™ cylinder at the base for collecting and viewing benthic samples (Figure 1).



Figure 1. Core sampling device ready to be deployed in Canal 3, August 13, 2018.

RESULTS:

For purposes of this study we define “Floc” is as the unconsolidated organic material floating above the surface of the benthos that is unsuitable substrate for *Vallisneria* growth and root establishment. This layer of floc was first identified inside the clear plastic cylinder by gently agitating the cylinder back and forth to see what organic material is loosely aggregated and mostly liquid. To measure the depth of the floc layer and lower layers of sediment, a plunger was used to slowly extract the floc and sediment and each layer was measured with a meter stick. Preliminary The floc layer often contained live and dead *Lyngbya* which was to be removed by the contractor, Gator Dredging prior to planting and enclosure cage installation by Sea and Shoreline LLC. Results from core samples from Canal 2 South (post-restoration) are presented in Table 1.

The post-restoration core samples were collected from water depths of 1.8 to 4.9 meters (average depth of 3.4 meters). Floc layers ranged from <0.01 to 0.8 cm with an average of 0.6 cm. Lower

sediment layers consisted mostly of mixed mud, sand and shell with occasional gravel and limestone deposits. Sediment quality overall appeared to be well suited for establishment of *Vallisneria americana* but water depths and light attenuation may become a limiting factor for growth in some deeper pockets of Canal 2. Photographs of the core samples collected from Canal 2 South are included in the Appendix.

King's Bay Core Sample Locations			Core Sample Constituents in cm (top to bottom).			
Site	Latitude	Longitude	Water Depth (m)	Floc (cm)	Mud/Sand/Shell	Overall (cm)
C2S-1	28.884504	-82.585862	4.9	< 0.01	19.0	19.0
C2S-2	28.884772	-82.585887	3.7	0.8	9.7	10.5
C2S-3	28.885261	-82.585913	4.1	<0.01	18.0	18.0
C2S-4	28.885717	-82.585976	2.4	0.3	18.7	19.0
C2S-5	28.886195	-82.585970	1.8	0.8	11.7	12.5
		Mean Value =	3.4	0.6	15.4	15.8

Core samples from Canal 3 were collected prior to Floc/*Lyngbya* removal and planting of *Vallisneria americana*. Water depths ranged from 1.6 to 3.1 meters with an average depth of 2.5 meters (Table 2). The floc (and *Lyngbya*) layer in Canal 3 ranged from 1.0 cm to 11.5 cm in depth with the largest deposits toward the southern dead end at site C3-1. Average floc depth was 5.2 cm with deep deposits of mud/sand, shell layers and deposits of clay in some locations. It will be imperative to remove the deep floc deposits from Canal 3 to reach suitable sediments for *Vallisneria* growth and establishment. Photographs of the baseline core samples collected from Canal 3 are included in the Appendix.

King's Bay Core Sample (Approximate) Locations			Core Sample Constituents in cm (top to bottom)						
Site	Latitude	Longitude	Water Depth (m)	Floc (cm)	Shell	Mud/Sand	Clay	Overall (cm)	
C3-1	28.5305	-82.3522	2.5	11.5		10.5	10.0	32.0	
C3-2	28.5307	-82.3523	2.5	7.0		21.0		28.0	
C3-3	28.5309	-82.3523	3.0	1.0	7.5	24.0	14.5	47.0	
C3-4	28.5315	-82.3523	3.1	3.0		19.0		22.0	
C3-5	28.5325	-82.3523	1.6	3.5		28.5		33.0	
		Mean Value =	2.5	5.2		20.6		32.4	

Note: GPS unit was having difficulty locating satellites on Canal 3. Samples collected from center of canal at equal distances from terminus to mouth.

The results of baseline core samples collected from Canal 6 are summarized in Table 3. Water depths ranged from 1.1 to 2.7 meters with an average depth of just 1.96 meters. Floc layers ranged from 0.5 cm to 6.0 cm with an average of 2.3 cm. The underlying sediments consisted mostly of muddy sand with shell fragments from snails. The sediments appeared to be suitable for the establishment of *Vallisneria* and with relatively shallow water depths, there should be plenty of photosynthetically active radiation for growth and spread once the floc and *Lynbya* layer is removed.

King's Bay Core Sample Locations			Core Sample Composition in cm (top to bottom)			
Site	Latitude	Longitude	Water Depth (m)	Floc (cm)	Mud/Sand/Shell	Overall (cm)
C6-1	28.883928	-82.590384	2.1	0.8	26.2	27.0
C6-2	28.885563	-82.589967	1.1	0.5	25.0	25.5
C6-3	28.886058	-82.590520	1.5	1.0	27.0	28.0
C6-4	28.886517	-82.590425	2.4	3.0	39.0	42.0
C6-5	28.887494	-82.590424	2.7	6.0	20.0	26.0
		Mean Value =	1.96	2.3	27.4	29.7

DISCUSSION:

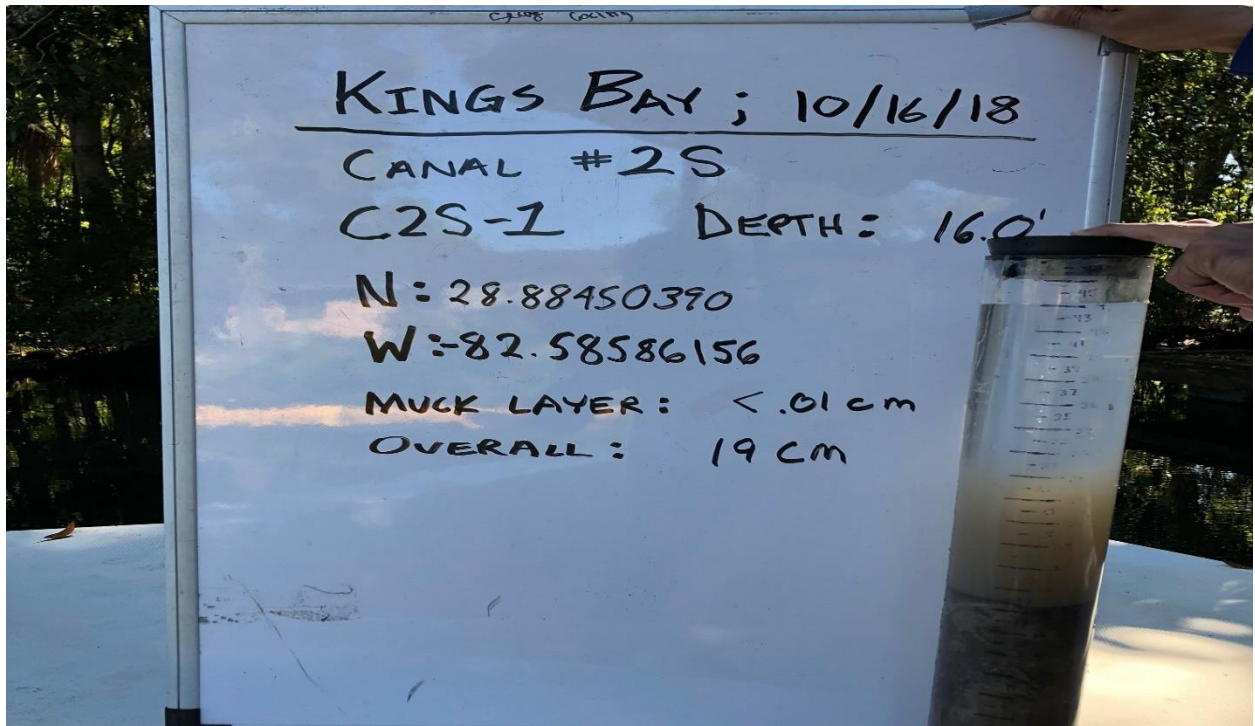
Post-restoration core samples are in the process of being collected and will be compared with pre-restoration samples to assess % Floc and *Lynbya* removal. Percent removal efficiency rates will be calculated for Canals 3 and 6 once these data are collected and analyzed. Canal 2 South

has very little floc remaining post restoration but water depths, light attenuation, and sedimentation rates may become limiting factors in deeper holes in the Canal.

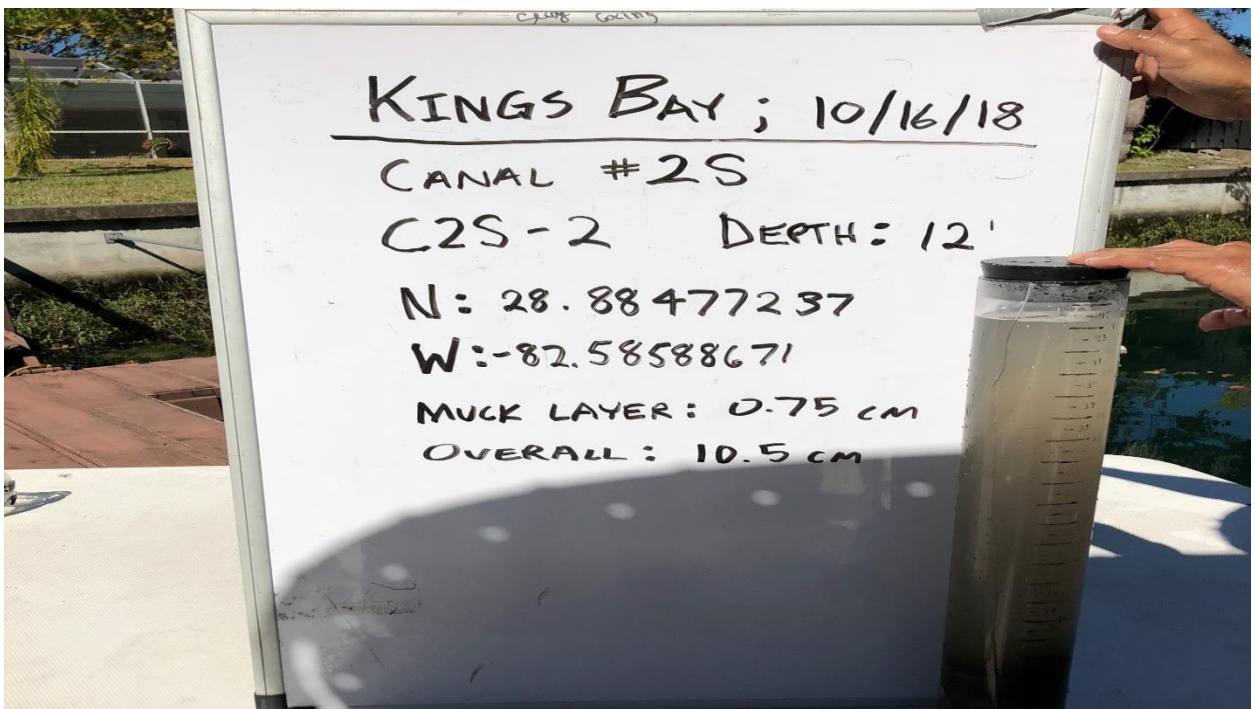
APPENDIX A

Core Sample Photographs





Canal 2, S-1



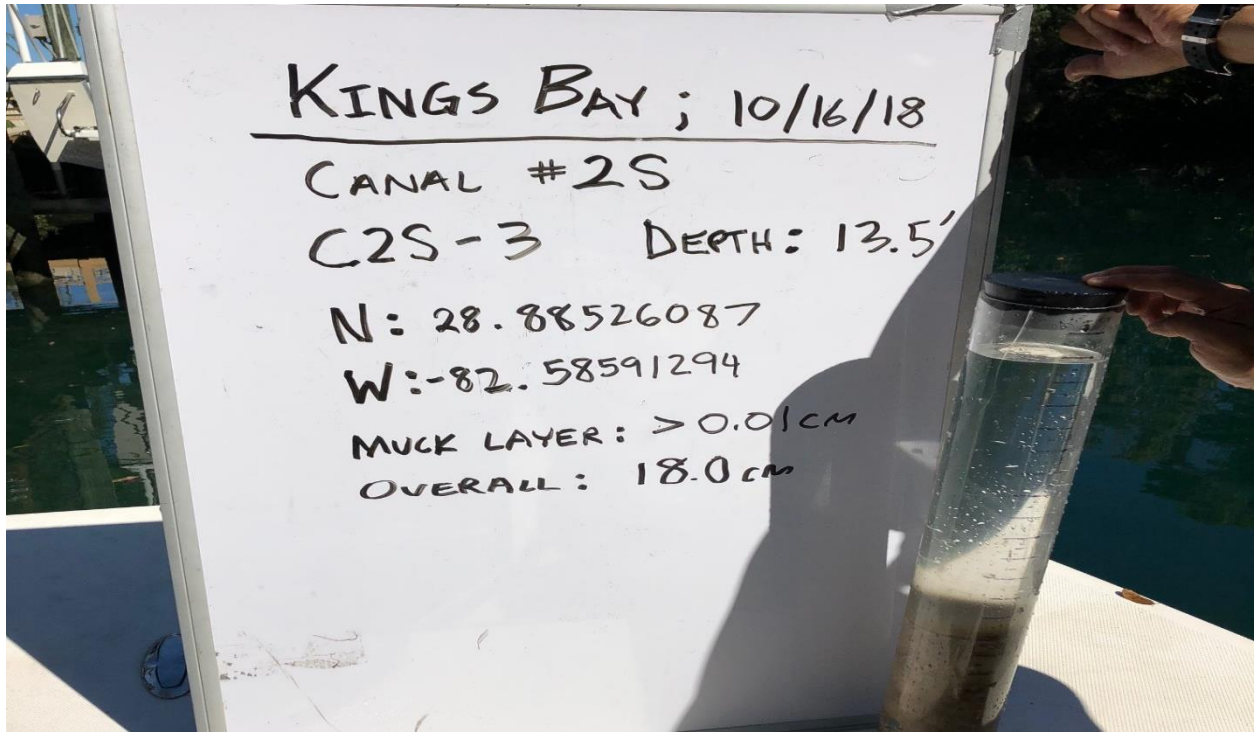
Canal 2, S-2



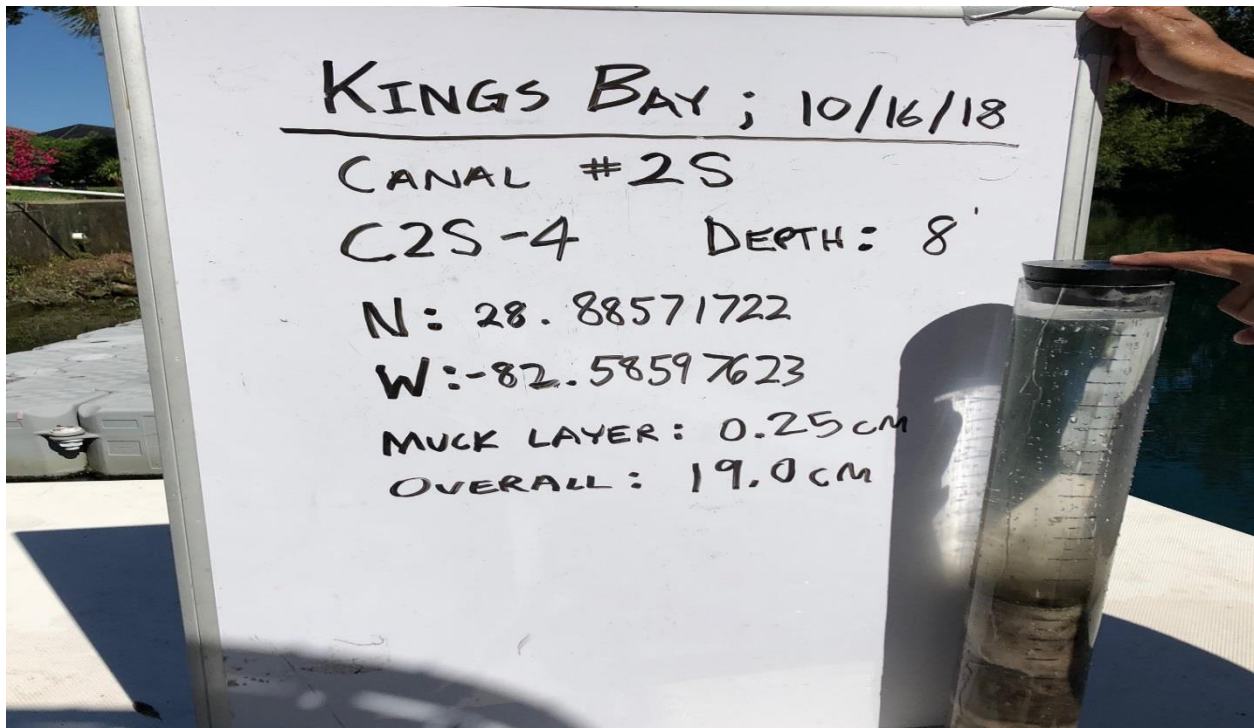
Canal 2, S-1. Close-up of sample



Canal 2, S-2. Close-up of sample



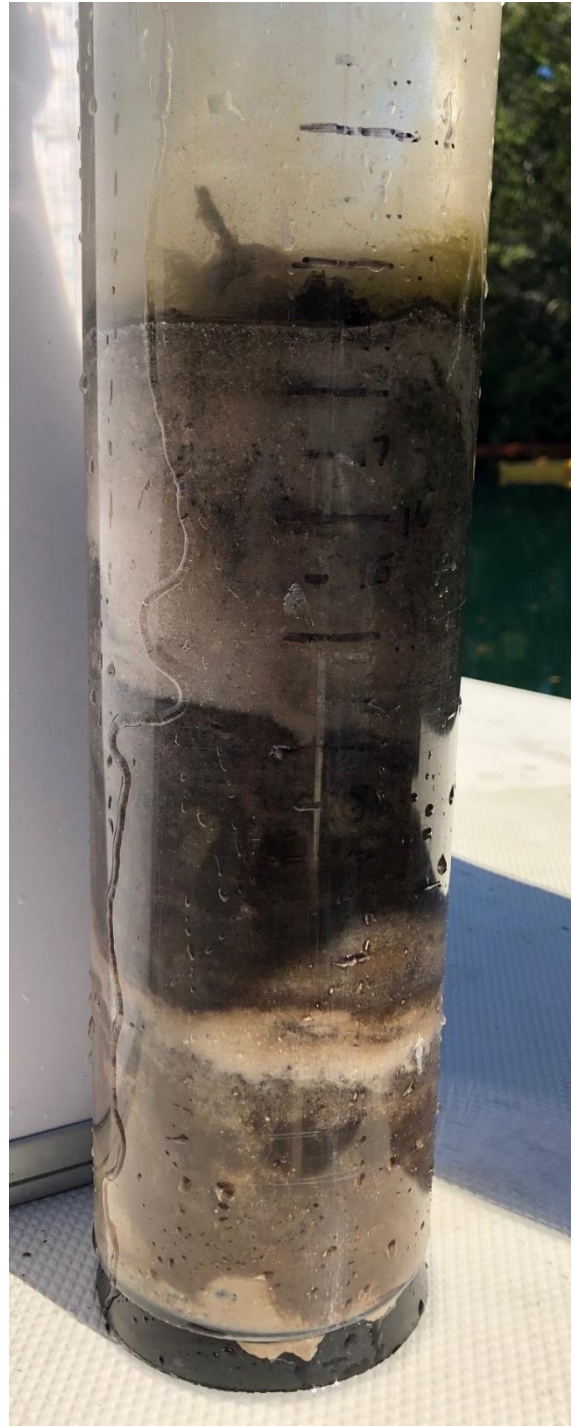
Canal 2, S-3



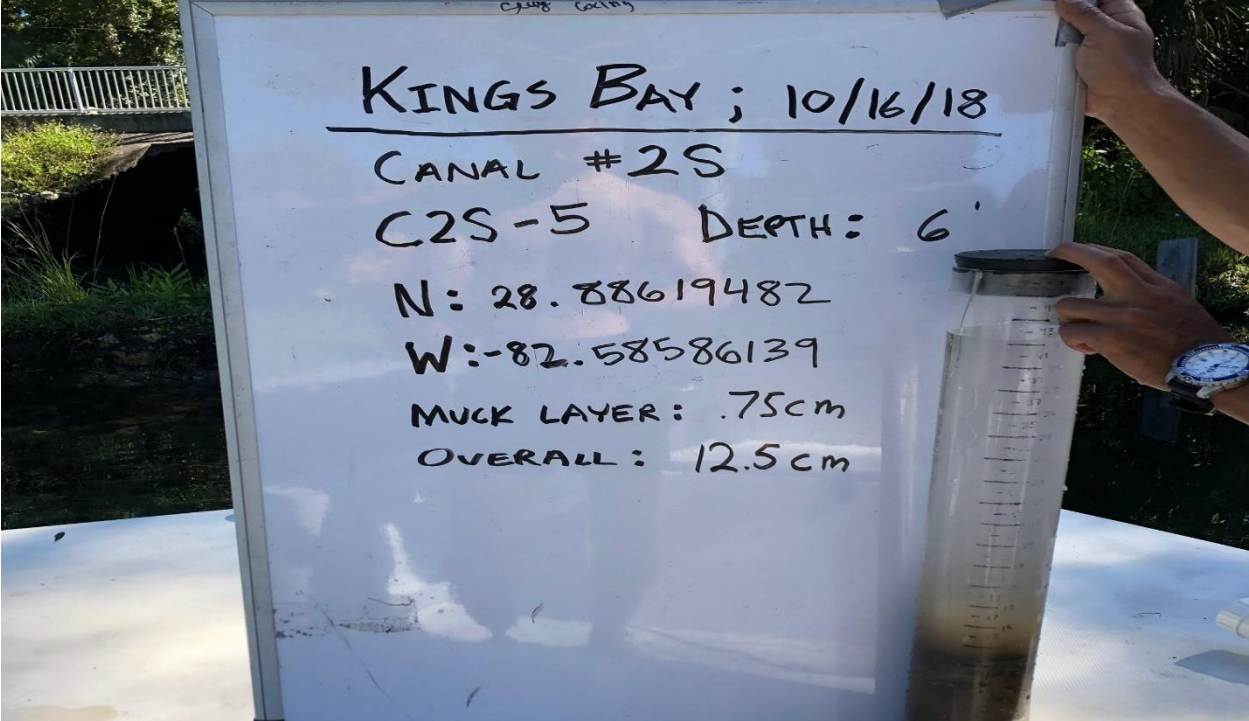
Canal 2, S-4



Canal 2, S-3. Close-up of sample



Canal 2, S-4. Close-up of sample



Canal 2, S-5

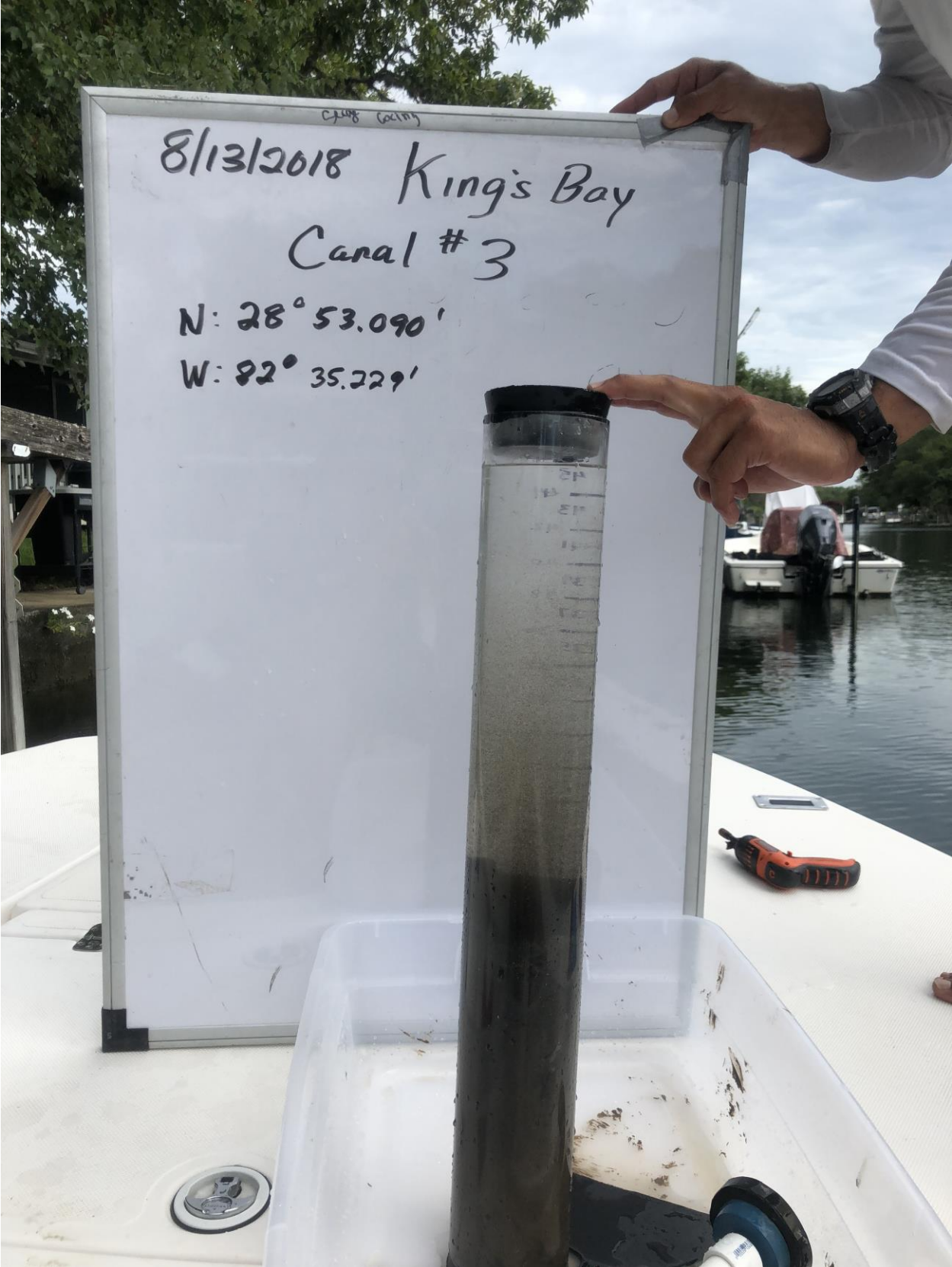


Canal 2, S-5. Close-up of sample



8/13/2018 King's Bay
Cand 3
N 28° 53.045'
W 082° 35.221'





8/13/2018 King's Bay
Canal #3

N: 28° 53.090'

W: 92° 35.229'

8/13/2018 King's Bay

Canal # 3

C3-3

N 28° 53.091'

W 82° 35.228'



8/13/2018 Kings Bay

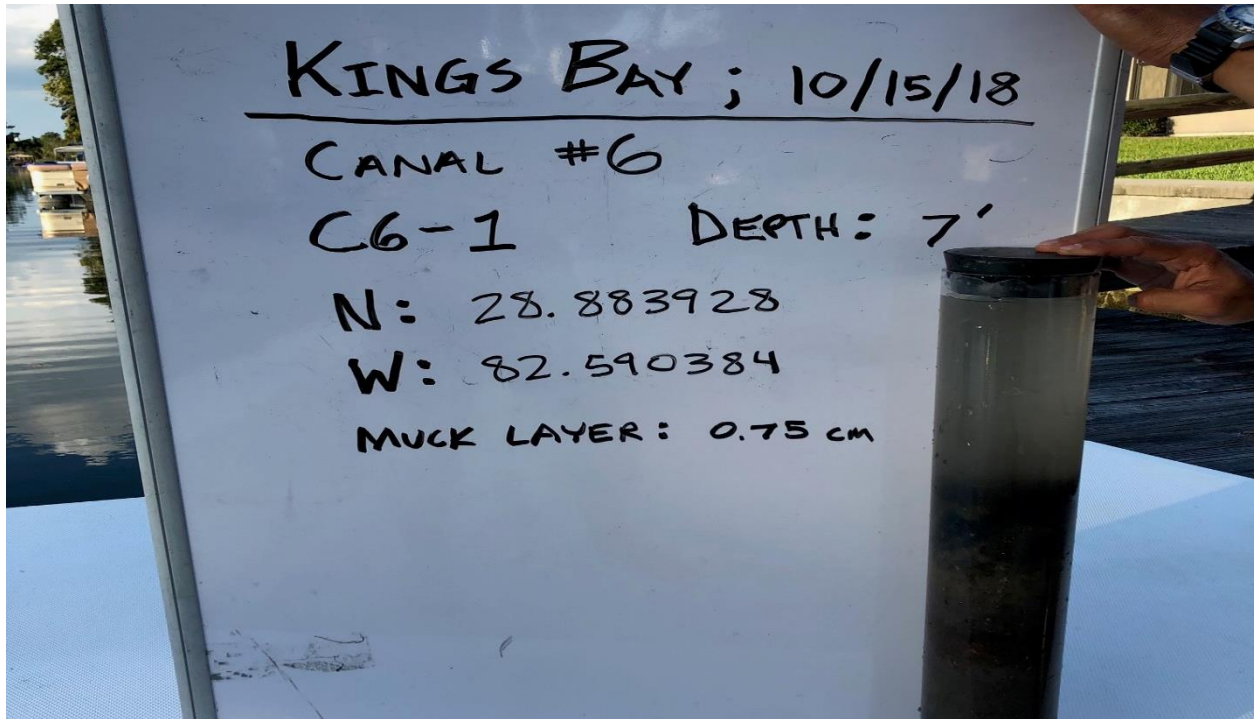
Canal # 3 - 4

N 28° 53.091'

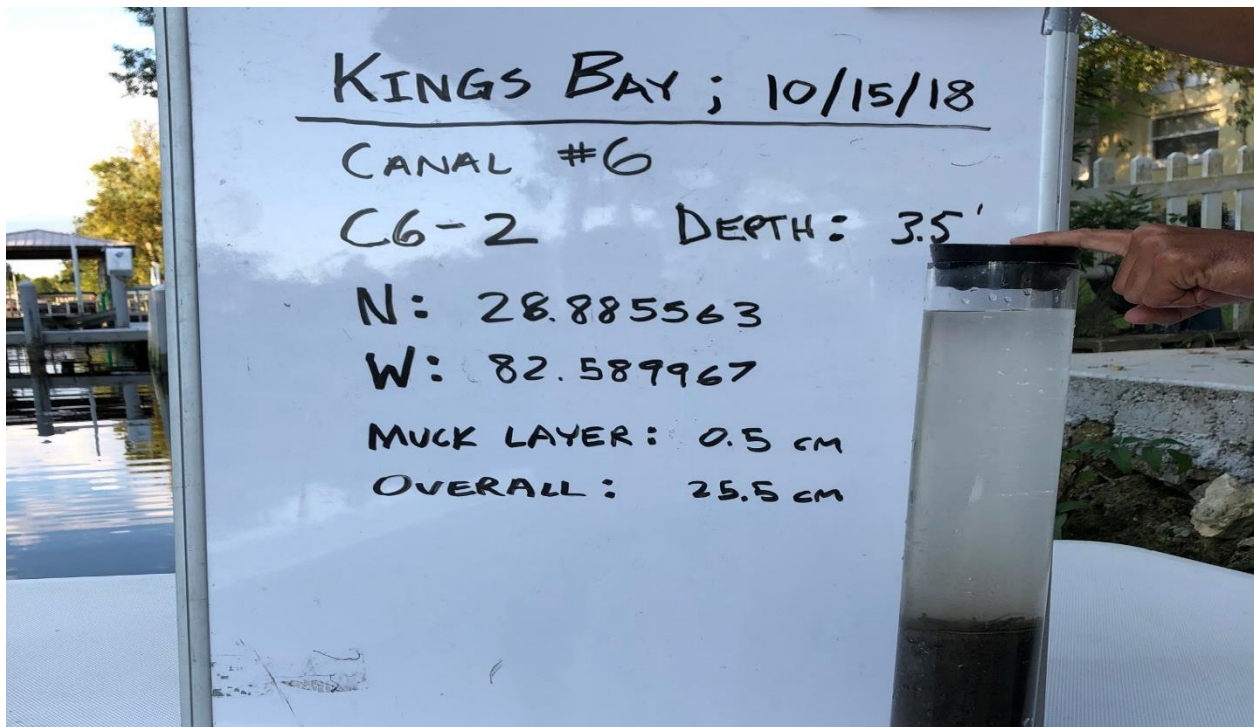
W 82° 35.228'

Depth 10.2'





Canal 6, 1



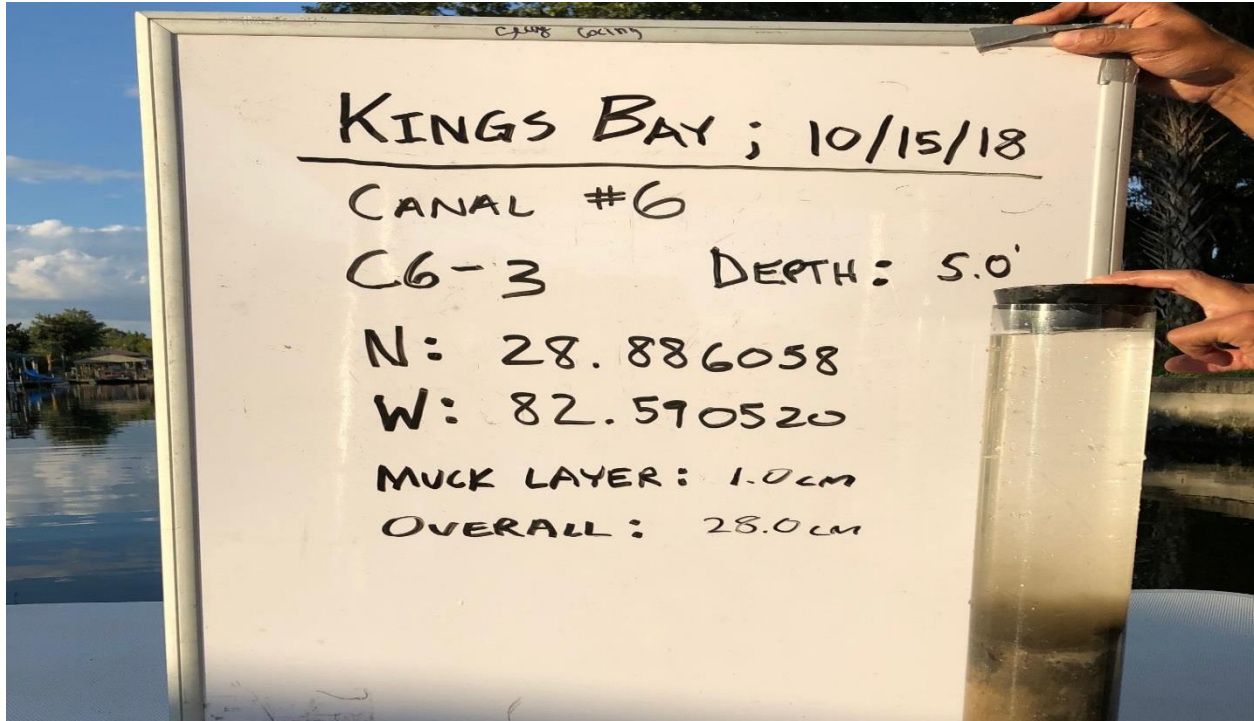
Canal 6, 2



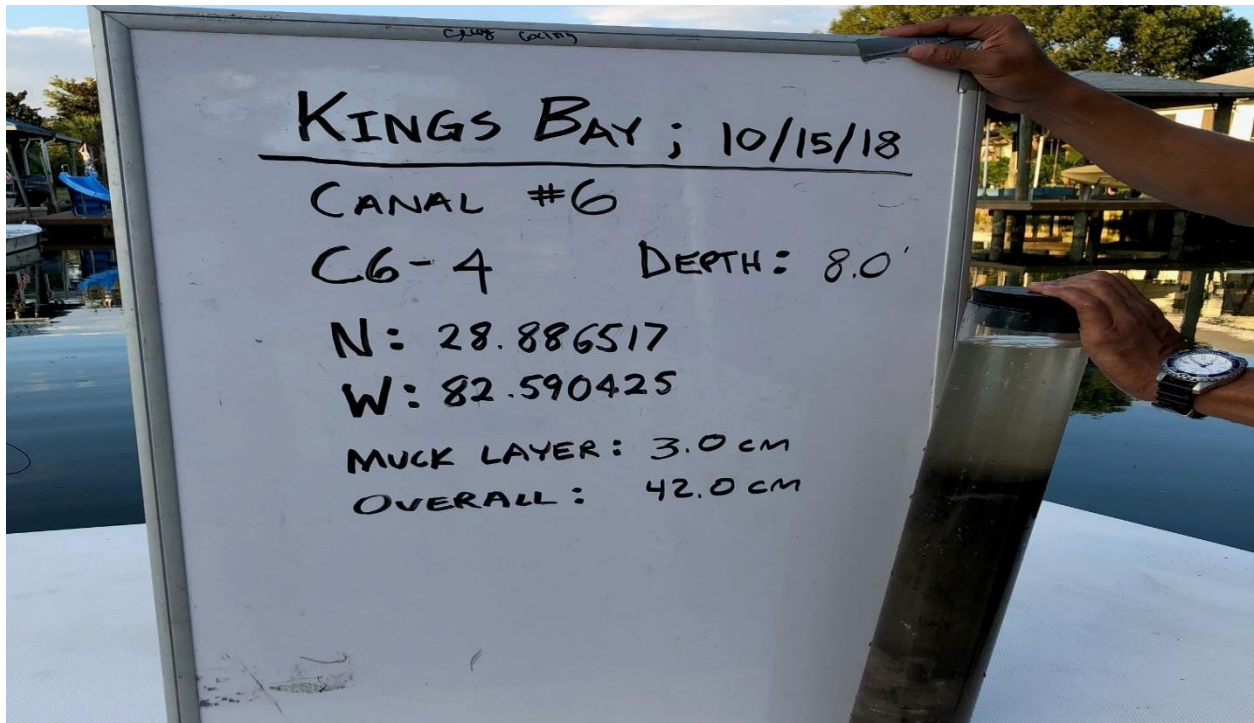
Canal 6, 1. Close-up of sample



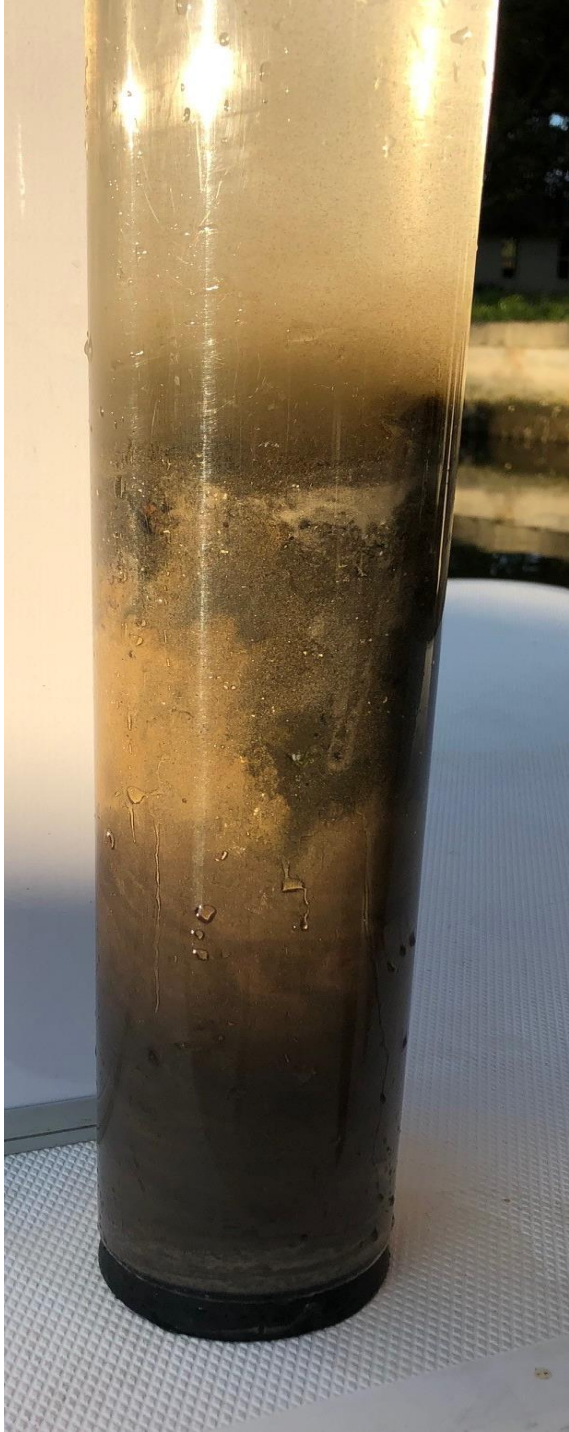
Canal 6, 2. Close-up of sample



Canal 6, 3



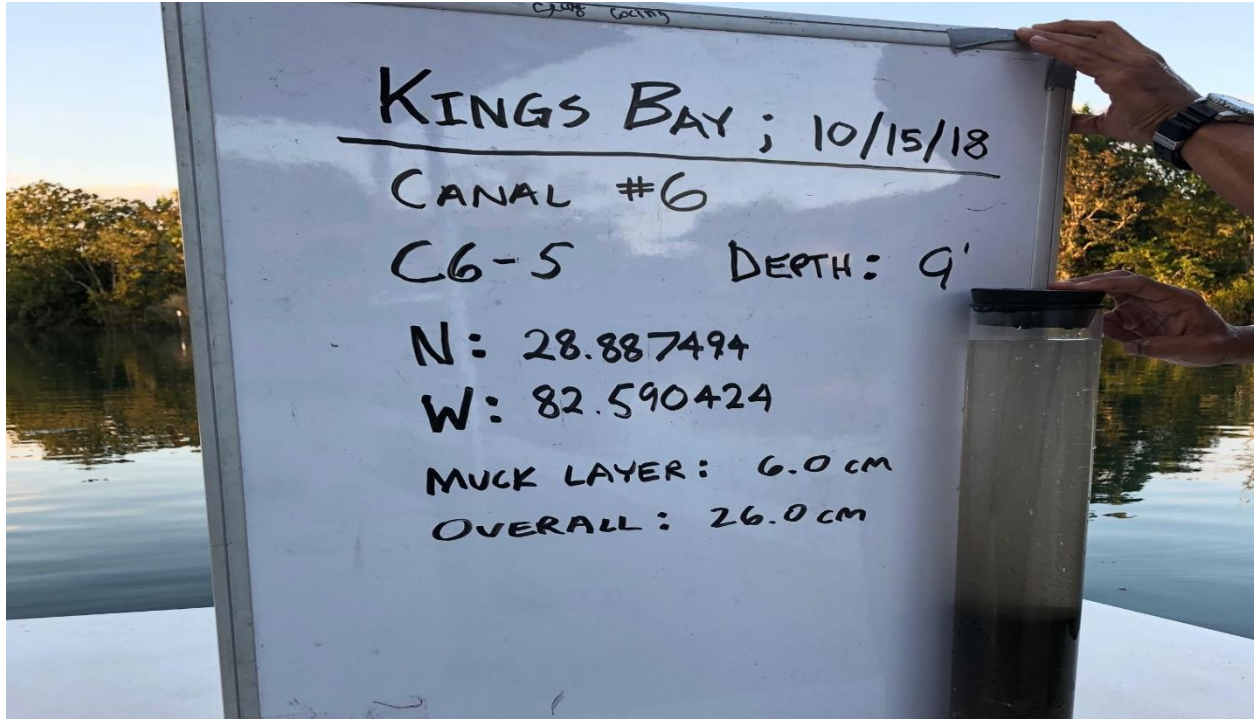
Canal 6, 4



Canal 6, 3. Close-up of sample



Canal 6, 4. Close-up of sample



Canal 6, 5



Canal 6, 5. Close-up of sample