

BASELINE BENTHIC SAMPLING & REPORT KING'S BAY RESTORATION AREA: PHASE 3B-3

April 26, 2022

Prepared for:

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INTRODUCTION

This report summarizes the results of **Task 2a. Core Samples and Report**: The contractor will collect ten (10) core samples at stratified random locations to represent baseline sediment profiles in Phase 3B3 of The Kings Bay Restoration Project (Figure 1). Sediment profiles will be photographed, analyzed, and recorded for future comparison with post-restoration core samples. This report includes the results of pre-restoration (baseline) to document conditions before de-mucking of Phase 3B3.

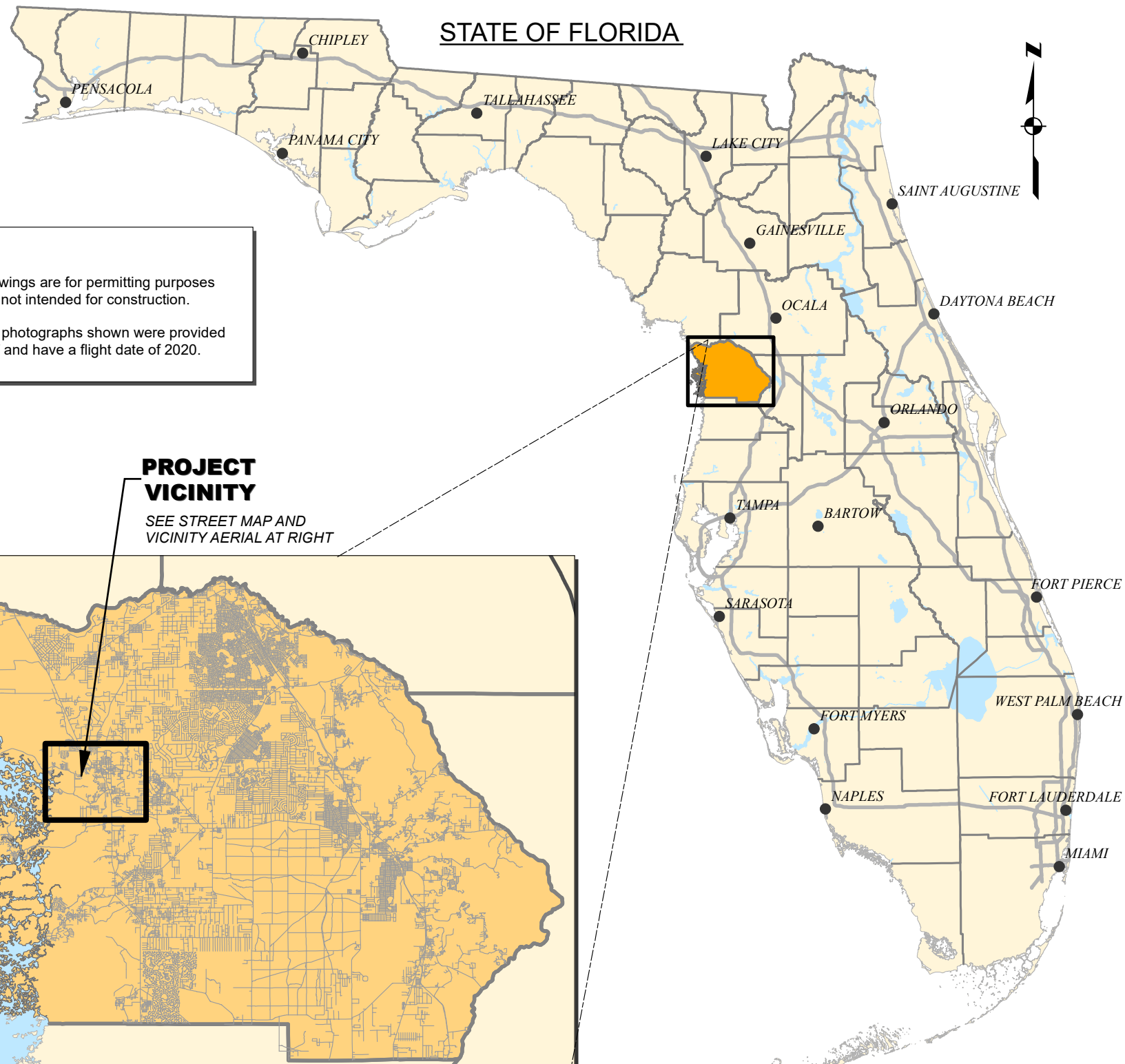
METHODS

To determine that *Lyngbya (Microseira wollei)* and flocculent organic substrate has been sufficiently removed to sustain *Vallisneria americana* restoration, colonization, and survival; a total of 10 benthic core samples were collected on October 12, 2021. Based on the highly variable results obtained from the initial ten (10) core samples, an additional ten (10) benthic core samples (total of 20 cores) were collected on November 2, 2021, to obtain a more complete representation of the baseline sediment conditions. Figure 2 shows the location of all 20 core samples collected during the baseline sampling event.

The core sampler consists of a 3.8 cm diameter x 3.1-meter-long section of schedule 40 PVC, with a one-way ball valve, rubber coupler, and 7.6 cm diameter x 0.75-meter-long clear Plexiglas™ cylinder at the base for collecting and viewing samples (Figure 4, Attachment A). Upon collection cores were removed from the PVC extension and photographed against a white board with location and date for archival and later comparison with post-restoration sediment profiles.

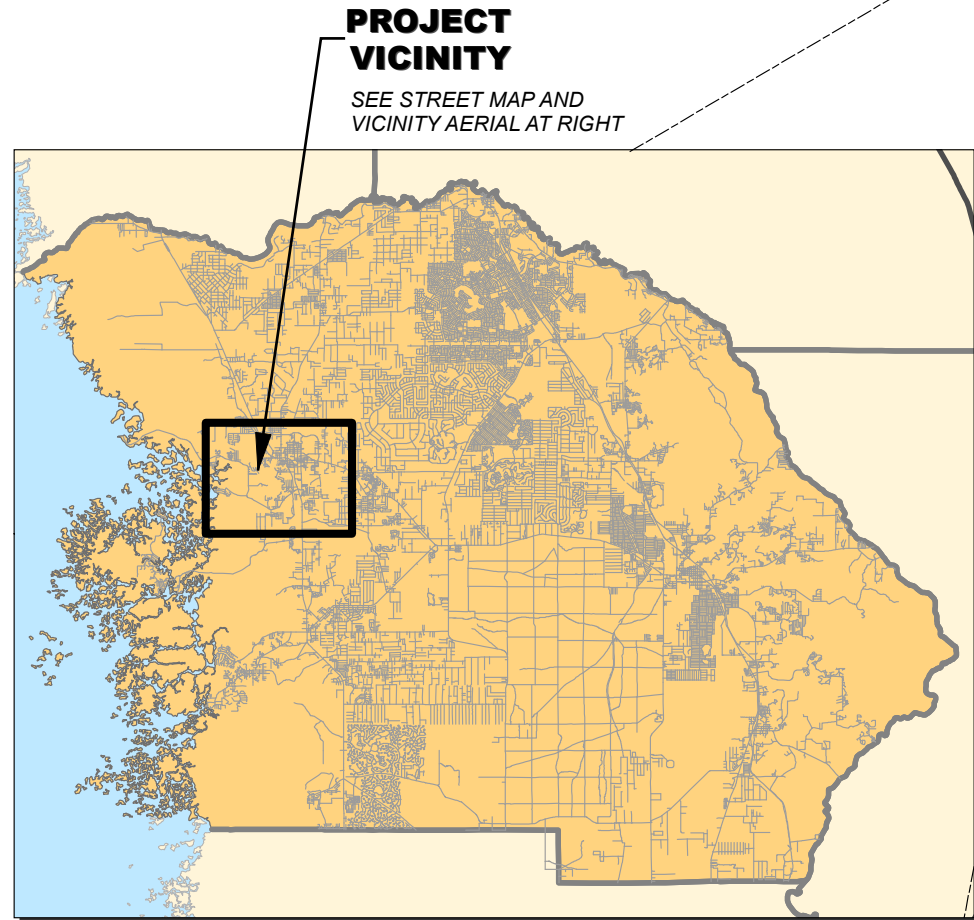
Flocculent (floc) unconsolidated organic materials were measured on the surface of sediments. Consolidated sediments were also measured in depth and characterized as either flocculent organic (floc), muck/mud, mud/sand, sand, sand/clay, and peat. The upper layer of flocculent unconsolidated organics and muck/mud, which are unsuitable habitat for the long-term survival and growth of *Vallisneria americana*, were the focus of the baseline analysis. Core sample sites were GPS located during baseline sampling so that these sites could be resampled post-restoration to determine efficiency and effectiveness of the de-mucking operation.

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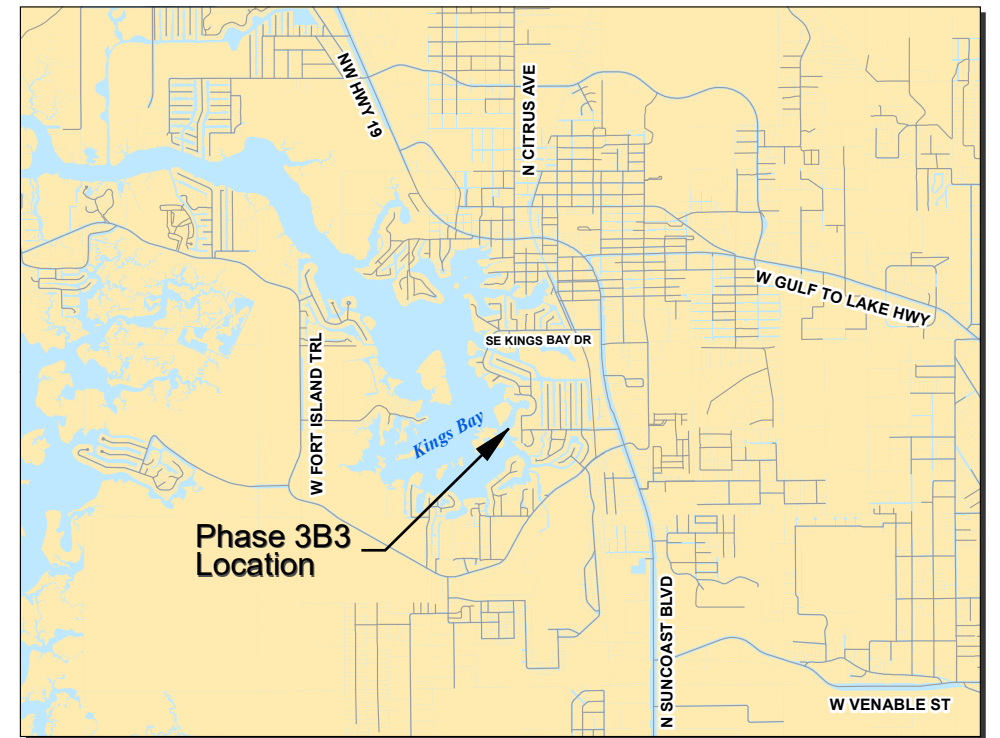
NOTES

1. These drawings are for permitting purposes only and are not intended for construction.
2. The aerial photographs shown were provided by the FDOT and have a flight date of 2020.



CITRUS COUNTY
N.T.S

Sections 28 Township 18 S, Range 17 E
Latitude: 28° 53' 07" N; Longitude: 82° 35' 34" W



STREET MAP
N.T.S



VICINITY AERIAL
N.T.S

Homosassa River Restoration
Project, Inc.

Homosassa River Restoration
Phase 3B3
Citrus County, Florida

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Project Location Map

DATE	PROJECT NO.	FILE NO.	SCALE	SHEET
Oct 2021	20203063-001	28-19-17	NTS	1

NO.	DESCRIPTION	DATE

DATE: November 2021
 PROJECT NO. 20203063-001
 FILE NO. 28-19-17
 SCALE: As Shown

Core Sampling
 Locations

SHEET NUMBER

Fig. 2



Core Sample Locations		
Core	Latitude	Longitude
C-1	28.88550	-82.59183
C-2	28.88606	-82.59228
C-3	28.88561	-82.59238
C-4	28.88576	-82.59275
C-5	28.88496	-82.59305
C-6	28.88513	-82.59321
C-7	28.88405	-82.59331
C-8	28.88433	-82.59378
C-9	28.88587	-82.59308
C-10	28.88566	-82.59314
C-11	28.88584	-82.59159
C-12	28.88590	-82.59195
C-13	28.88544	-82.59181
C-14	28.88525	-82.59276
C-15	28.88628	-82.59356
C-16	28.88609	-82.59365
C-17	28.88507	-82.59280
C-18	28.88415	-82.59306
C-19	28.88445	-82.59379
C-20	28.88488	-82.59343

Legend
 Core Sample Locations (20)

NOTES:
 The aerial photograph shown was acquired from the FDOT and has a flight date of 2020.

RESULTS

The initial ten (10) core samples collected from Phase 3B3 showed highly variable sediment profiles with flocculent organic layers ranging from 0.0 cm up to 5.0 cm with underlying mud/muck layers from 0.0 up to 12.0 cm deep (Table 1, Figure 3). Total core depths were dependent on softness of the sediments and ability to penetrate with the PVC core device. Total core depths for the first ten samples ranged from 12.0 to 41.0 cm, with the deepest cores collected from areas with deep mud/muck layers. To obtain better spatial resolution, an additional ten (10) core samples were collected and analyzed from stratified locations to fill in gaps. Generally, areas with higher current velocities and regular tidal flushing contained little if any floc, and less mud/muck (C-4 through C-10) while areas with less tidal flushing contained deep layers of floc and mud/muck (Figure 2 and Table 1). A total of six (6) of the 20 core samples were collected from areas that contained some *Vallisneria americana* growing on top of the sediment (Table 1). Drone photos were collected during the second core sampling event on November 2, 2021, to estimate baseline SAV cover. Of the total area of 7.67-acres in Phase 3B3, approximately 30% (2.3-acres) was mapped as SAV cover. Deep peat deposits were identified at four locations, C-11, C-12, C-15 (Figure 4), and C-18, while deep clay layers were found at C-13 and C-19 (Table 1, Figure 3). These highly variable sediment profiles indicate dynamic flow conditions and erosional forces exist that appear to redistribute fine organics to areas of low velocity along the east side of the island, some shallow flats, and the northeastern terminus of Phase 3B3.

In summary, Phase 3B3 is mostly a natural aquatic habitat, except for seawalls, docks and residential development along the shoreline. Phase 3B3 contained variable sediment conditions that were about 70% unsuitable for establishment of SAV (i.e. *Vallisneria americana*). Removal of flocculent organics and mud/muck layers would improve habitat suitability for establishment of additional SAV cover while improving fisheries habitat for demersal spawners such as largemouth bass (*Micropterus salmoides*) and species of sunfish in the genus *Lepomis*. Post-restoration core samples will be needed to identify the overall effectiveness of the de-mucking operation.

Table 1. Kings Bay Phase 3B3: Baseline Sediment Core Sample Locations and Profile (top to bottom in cm).

Core	Latitude	Longitude	Vallisneria	Floc	Mud/Muck	Mud/Sand	Sand	Sand/Clay	Peat	Total cm
C-1	28.8854967	-82.591830	No	5.0	10.5	25.5	0.0	0.0	0.0	41.0
C-2	28.8860630	-82.592277	No	5.0	10.0	10.0	0.0	0.0	0.0	25.0
C-3	28.8856130	-82.592378	No	5.0	12.0	5.0	0.0	0.0	0.0	22.0
C-4	28.8857647	-82.592754	Yes	0	0	12	4	0	0	16.0
C-5	28.8849589	-82.593051	Yes	0	0	5	11	0	0	16.0
C-6	28.8851268	-82.593208	No	2	0	5	10	0	0	17.0
C-7	28.8840451	-82.593314	No	2.5	0	3	8	0	0	13.5
C-8	28.8843334	-82.593775	No	1.5	0	3.5	11	0	0	16.0
C-9	28.8858670	-82.593081	Yes	2	0	8	2	0	0	12.0
C-10	28.8856590	-82.593144	Yes	2	0	8	14	0	0	24.0
C-11	28.8858400	-82.591589	No	1	20	0	0	0	15	36.0
C-12	28.8859000	-82.591952	No	1	3	0	8	0	18	30.0
C-13	28.8854410	-82.591810	No	4	15	0	0	14.5	0	33.5
C-14	28.8852470	-82.592759	No	1	8	5.5	0	0	0	14.5
C-15	28.8862800	-82.593556	Yes	2	0	0	0	0	20	22.0
C-16	28.8860940	-82.593654	Yes	0	1.5	11.5	0	0	0	13.0
C-17	28.8850650	-82.592802	No	4	15	9	0	0	0	28.0
C-18	28.8841530	-82.593059	No	1.5	8.5	0	0	0	17.5	27.5
C-19	28.8844450	-82.593790	No	4	7	0	0	11	6	28.0
C-20	28.8848830	-82.593430	No	7	9.5	0	0	0	2	18.5

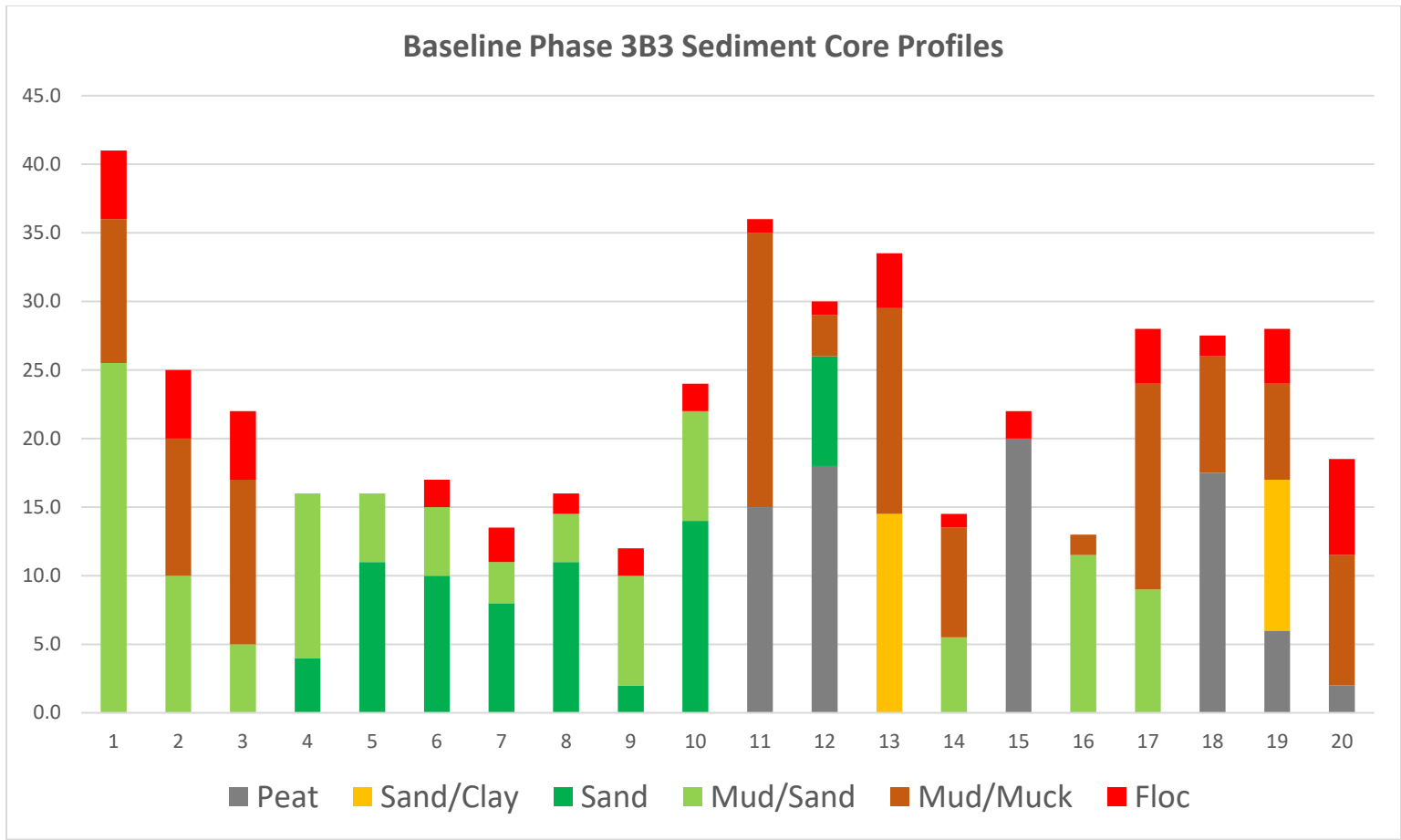


Figure 3. Kings Bay Restoration Phase 3B3: Baseline sediment core profiles collected October 12 (Core 1-10) and November 2 (Cores 11-20), 2021 by Johnson Engineering, Inc. Depth in centimeters (cm) of each constituent on the Y axis and core sample number (1-20) on the X axis.



Figure 4. Senior ecologist and project manager (D.W. Ceilley) using core sampling device in shallow waters at Phase 3B3 to collect Core #15 on November 2, 2021.