CORE SAMPLING
BENTHIC ASSESSMENT OF CANALS 5 and 7
IN KING'S BAY

December 5, 2018

Interim Report Prepared for:

Save Crystal River, Inc.
Post Office Box 2020
Crystal River, Florida 34423
&
DEP Agreement LP09112

Prepared by:

JOHNSON ENGINEERING

2122 Johnson Street

Fort Myers, Florida 33901
(239) 334-0046

www.johnsonengineering.com

SCOPE OF WORK:

This Interim Report includes the results of pre-restoration (or baseline) benthic core sampling from five locations in Canal 5 and Canal 7 to document conditions prior to the de-mucking and the planting *Vallisneria americana* planting. The study also includes a post-restoration core sampling and visual assessment of the canal bottom to compare with pre-restoration conditions within 15-30 days of restoration to allow conditions to stabilize. The methodology is detailed in the following section

METHODS:

The purpose of the monitoring is to verify that the *Lyngbya* sp. and flocculent organic substrate has been sufficiently removed to support *Vallisneria americana* restoration, colonization and survival. Johnson Engineering Senior Aquatic Ecologist, assisted by an Environmental Specialist collected baseline core samples from both of the unrestored canals in a stratified pattern throughout the canals with five (5) samples for each canal (Figure 1).

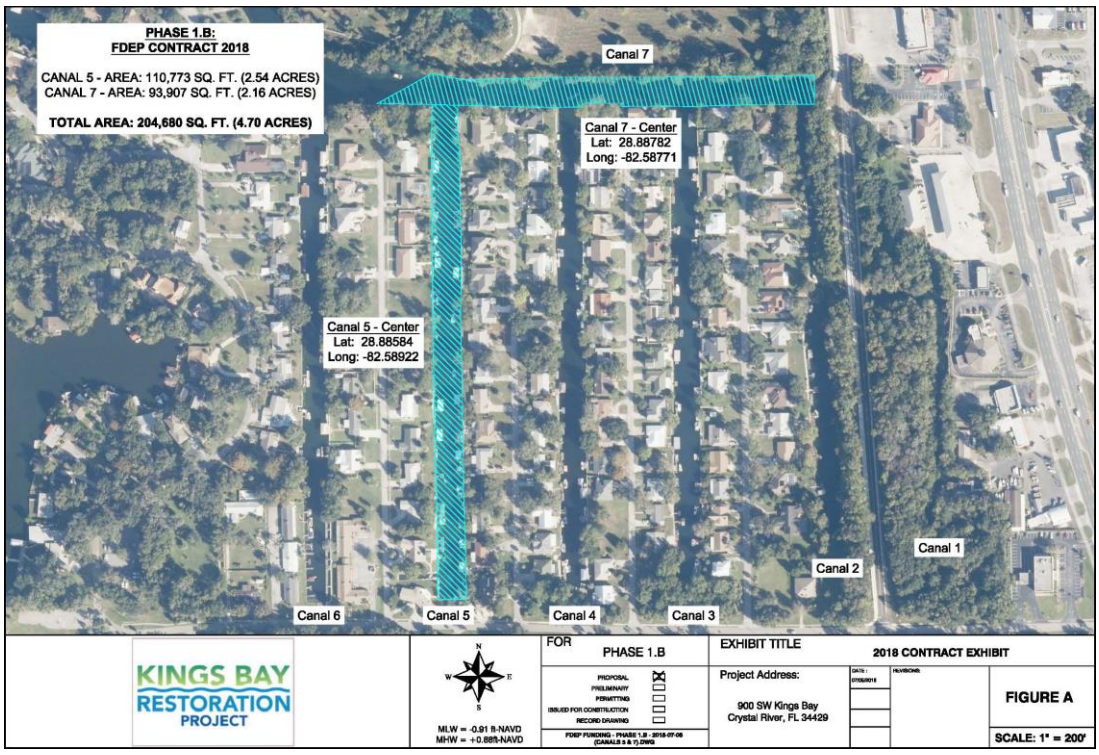

Figure 1. Canals of Phase 1B where core sampling will be conducted (Canals 5 and 7).

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 2).

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

Sediment 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 categorized as floc (including live and dead *Lyngbya*) mud/muck, sand, shell, clay, and peat. The focus is on the upper layer of flocculent material along with *Lyngbya* and unconsolidated organics which is unsuitable habitat for survival and growth of *Vallisneria americana*. Substrate samples will be GPS located and

are presented on aerial map in the final report.

RESULTS:

The following are the results of the pre-restoration (baseline) core samples collected in August 2018. Canal 5 sampling was initiated at the southern end and continued north to the confluence with Canal 7 (Figure 1). Water depths were relatively consistent, ranging from 1.6 to 1.9 meters with an average of 1.7 meters (Table 1). Floc depths ranged from 2.0 to 10.0 cm deep with an average of 4.9 cm. At all the sampling sites in Canal 5, there were deep deposits of soft muck/mud ranging from approximately 10 to 21.5 cm in depth over another layer of sand/clay. Core sample depths ranged from 32.0 to 38.0 cm. At three locations (C5-3, C5-4 and C5-5), the lower sections of the core samples contained pockets of peat. Peat forms when plant material does not fully decay because of acidic or anaerobic conditions like in a bog or swamp. These peat deposits may be remnants of historic habitat conditions prior to human development and excavation of canals. Photographs of core samples from Canal 5 are included in the Appendix.

Table 1. Canal 5: Baseline Results of Core Samples collected on August 13, 2018

King's Bay Core Sample Locations			Core Sample Composition in cm (top to bottom)					
Site	**Latitude**	**Longitude**	**Water Depth (m)**	**Floc (cm)**	**Muck/Mud**	**Sand/Clay**	**Peat**	**Overall (cm)**
C5-1	28.53043	-82.35352	1.6	2.0	21.5	12.5	0.0	34.0
C5-2	28.53103	-82.35350	1.7	10.0	12.0	10.0	0.0	32.0
C5-3	28.53156	-82.35358	1.7	5.0	10.0	10.0	13.0	38.0
C5-4	28.53209	-82.35351	1.7	5.0	20.0	5.0	6.0	36.0
C5-5	28.53251	-82.35353	1.9	2.5	20.0	8.0	3.5	34.0
		Mean =	1.7	4.9				

Core sampling at Canal 7 was hindered by the dredging operation which was underway in Canal 4 and turbidity barriers that were in place on Canal 7 at the time of sampling. Canal 7 had water depths ranging from 1.2 to 2.0 meters with an average depth of 1.5 meters. Flocculent material ranged in depth from a low of 0.5 cm near Three Sisters Spring up to 6.5 cm in the middle and 6.0 along the eastern half of Canal 7. Average floc depths were 4.0 cm but it was unevenly distributed due to the influence of the springs, adjacent canals, boat traffic and uneven water depths.

Table 2. Canal 7: Baseline Results of Core Samples collected on August 13, 2018								
King's Bay Core Sample Locations			Core Sample Composition in cm (top to bottom)					
Site	Latitude	Longitude	Water Depth (m)	Floc (cm)	Muck/Mud	Sand/Shell	Overall (cm)	
C7-1	28.53266	-82.35240	1.5	6.0	5.0	14.0	25.0	
C7-2	28.53269	-82.35269	2.0	6.0	5.0	21.0	32.0	
C7-3	28.53091	-82.35228	1.3	6.5	2.0	16.5	25.0	
C7-4	28.53273	-82.3535	1.3	1.0	3.0	15.5	19.5	
C7-5	28.53266	-82.35374	1.2	0.5	4.0	12.0	16.5	
		Mean =	1.5	4.0				

DISCUSSION:

Canal 5 was relatively consistent in water depths and sediment composition with deeper deposits of flocculent material and deep mud, sand/clay, and peat in some areas. The suitability of Canal 5 for *Vallisneria americana* establishment will depend on restoring suitable sediment conditions. Canal 7 was much more variable in sediment conditions with the influence of Three Sisters Spring on water clarity and substrate conditions. Post-restoration core samples are in the process of being collected and will be compared with pre-restoration samples to assess % Floc and *Lyngbya* removal. Percent removal efficiency rates will be calculated for Canals 5 and 7 when samples have been collected, analyzed and compared with baseline conditions presented here.

APPENDIX A

Photographs of Core Samples

Collected August 13, 2018