Cockroach Bay
Status of Seagrasses for 1997
HCC Results

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In 1996 the Environmental Protection Commission of Hillsborough County along with the Florida Department of Environmental Protection, extended the contract for Hillsborough Community College (HCC) and the University of South Florida (USF) to continue studies of seagrasses in Cockroach Bay, Little Cockroach Bay, and the surrounding waters of Tampa Bay. The project was funded by pollution recovery funds and extends the coverage of research until 1999. This report summarizes the data collected from January of 1997 to October of 1997.

The work contracted to Hillsborough Community College for this project involves two distinct tasks:

1. Conduct aerial photographic monitoring of Cockroach Bay, Little Cockroach Bay, and the surrounding waters of Tampa Bay. The monitoring will include aerial photographs of the site, computer analysis of the images, computation of seagrass prop scarring, and ground truthing to establish and verify the accuracy of the images.

2. Conduct research on seagrass recovery and re-growth techniques in an effort to reestablish seagrasses in damaged seagrass beds.

Aerial photography:

Procedure:

In order to record images of seagrass beds for measurement and analysis, an improved imaging system has been employed by HCC investigators. This system utilizes a vertically mounted Sony digital video camcorder (mini D.V. format) to record a continuous record of the study area(s) from

an altitude of 800 feet. A video monitor in the cockpit allows the pilot to align the flight track for optimum coverage. An audio patch cable connects the pilot's intercom to the camcorder, allowing in-flight commentary to be recorded. All of Cockroach Bay, Little Cockroach Bay, and the surrounding waters of Tampa Bay are filmed on digital video tape. Following the flight, the tape is reviewed and digital still frame images are produced using Computer Eyes hardware/software. These images are imported into the program (Sigma Scan) for detailed analysis. The images may also be printed out, or archived in a presentation program. Resolution and color fidelity offered by this system is very comparable to the 35 mm film-based system used previously. Advantages realized by using the digital video method rather than the film-based system include lower cost per image, shorter post flight turn around time, greater flexibility in image processing/enhancement, and improved accuracy. An additional benefit obtained is the greater safety this system affords the flight crew, since it is "heads-up" and less difficult to manage in-flight.

Results:

The results of the aerial photography and computer analysis are listed below relative to each location:

1. Recovery Area #1: this site had very little seagrass in it five years ago. In our report last year we noted that new seagrasses had grown back into the area, completely covering the entire site. The site has remained the same during the period of record. In March of this year we noted a new prop scar through the area that measured about 100 feet in length. In May and June we injected the first 75 feet of the scar with nutrients and plant growth regulators. This was completely re-vegetated by August. The remaining 25 feet that was not injected is still visible.

2. Recovery Area #2: no changes are apparent except at the entrances. Of particular interest is entrance "E" and inside pathway leading to entrance "D" , the southernmost entrance from Tampa Bay into Cockroach Bay. Three years ago we reported that all of the seagrasses were destroyed in the northern fork of the entrance. This year all of the seagrasses have regrown into the site. There are now 145,488 square feet (3.33 acres) of new seagrasses in this area, with most of the new growth consisting of *Halodule wrightii* (Shoal grass).

3. Recovery Area #3: this site is unchanged except for the shifting of sand attributed to currents in "Hole-in-the-Wall" pass. The shifting sands have covered about 25 square feet of seagrasses. This site will be monitored in order to follow the changes in the currents and subsequent changes in seagrass coverage.

4. Recovery Area #4: there are no new scars in this area. All of the previous identified scars have achieved 75% to 100% vegetative recovery.

5. In the inner waters of Little Cockroach Bay no changes were noted.

6. In Tampa Bay in front of Cockroach Bay and Little Cockroach Bay, 11,386.62 linear feet of new prop scars have been measured. The line of markers warning boaters of the shallow waters in this area had not been posted during our study period, therefore, more scarring is expected until the signs are in place.

Seagrass growth research:

A number of experiments have been conducted by the HCC and USF teams over the past five years to determine preferred methodology for restoration of damaged seagrass beds. The primary impetus for the research has centered around nutrient enrichment and the use of plant growth regulators. Both treatments showed promising results in experiments conducted in 1995 and 1996. Nutrients and plant growth regulators were used in 1997 to stimulate seagrass re-growth.

Procedure:

A special boat and injection system, designed to inject a nutrient formula into the seagrass sediments, was built in the winter of 1997 by Mr. Jim Anderson of Ruskin, Florida. The system has a series of small injectors that push about 10 ml. of formula into the sediment. The injectors are set in a circular pattern around a wheel. As the wheel rolls along the bottom, the nutrients are injected into the sediment with a force of about 20 pounds per square inch. There are two wheels that roll along the sediment parallel to each other injecting at the same time. There are two other wheels that roll behind the injector wheels that push sediment over the injector holes to seal the nutrient formula into the sediment. The boat contains a 100 gallon tank for mixing the formula, which is pumped from the tank through a series of tubes to the injectors.

A mixture of 100 pounds of prilled nitrogen 44% plus 2 ounces of synthetic cytokinin and 2 ounces of synthetic gibberellin dissolved in 100 gallons of seawater is used for injections. The seawater was pulled from the bay at the site of the injections. Injections were made into the sediment about every 20 centimeters along designated prop scars. Injections were made in Little Cockroach Bay prop scars beginning on May 3, 1997 and continuing every 7 to 10 days for 6 inoculation periods.

A counting method was established to determine the number of new shoots that grow into the prop scars after the injections. A one meter square PVC frame was made to place over PVC stakes placed in a square pattern over select prop scars. The center portion of the meter square frame had a one meter by 22 centimeter frame inside the larger frame that fit over the prop scar lengthwise. The entire frame structure was set over the stakes during each counting period so that the seagrass shoots could be counted each time in the same manner. Six sites were established for counting injected prop scars. Two sites were established as controls. All of the sites were located in Little Cockroach Bay.

Counting was conducted approximately every 10 days, yielding five sampling periods. Two sites each were located in prop scars through *Thalassia testudinum* and in *Halodule wrightii*.

Results:

The results of the meter square seagrass sampling in Little Cockroach Bay were:

Prop scars through *Halodule wrightii* (summary of data from 4 sites):

Sample Count #	Average # of shoots ($1\ m^2$)	Average in Control ($1\ m^2$)
1	21.5	3
2	23.5	4
3	37.5	4
4	43	6
5	45.5	6
6	148	18

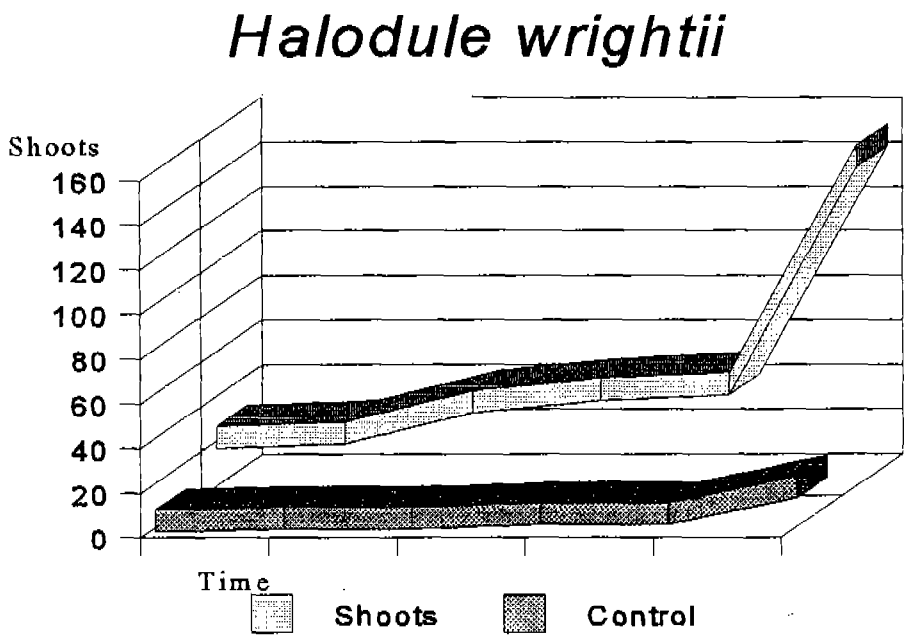

Figure 1

The results indicate that *Halodule wrightii* responds very favorably to the addition of nutrients and plant growth regulators. The number of new shoots growing into the injected sites corresponds to 74% recovery. A complete recovery would show 200 shoots per unit area..

Prop scars through *Thalassia testudinum* (summary of data from 6 sites):

Sample Count #	Average # of shoots ($1\ m^2$)	Average in Control ($1\ m^2$)
1	6.75	4
2	15.25	4
3	15.25	4
4	17	5
5	17.75	8
6	23	9

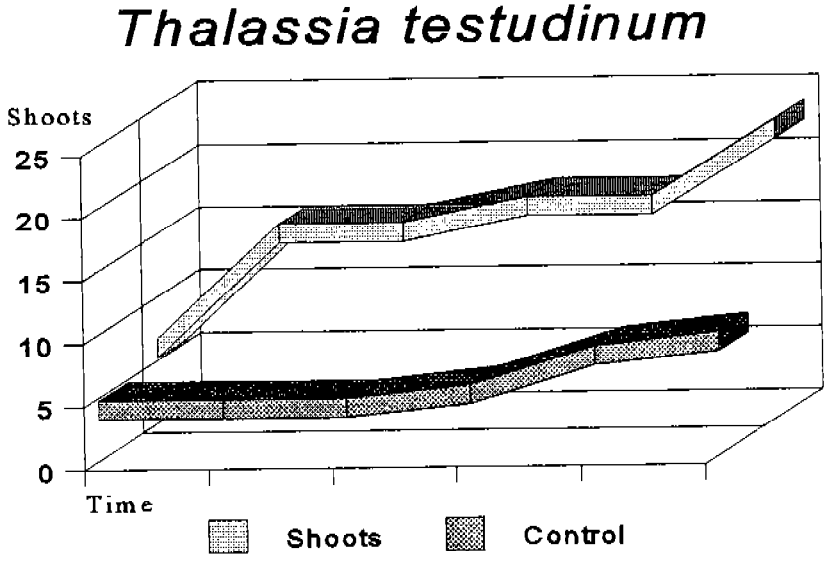

Figure 2

The data from figure 2 show a rapid increase in new shoots within the first 20 days of sediment injections. Following the initial growth new shoots did grow into the prop scars but at a much slower

rate. Later another spurt in growth occurred. This later growth could be attributed to the plant growth regulators which take time to become effective. A complete recovery would have 75 shoots of Turtle grass into the unit area. Results of this study indicate a 31% recovery of *Thalassia testudinum*.

Conclusions:

The following conclusions can be made from this 1997 study of seagrasses at Cockroach Bay:

- Seagrasses are continuing to grow into sites that were previously damaged. An additional 3.33 acres of new seagrasses have grown into Recovery Area #2 at entrance E.

- New prop scars continue to occur in Tampa Bay. There are 11,386.62 linear feet of new prop scars. The most likely reason for the scarring is a lack of signs to mark the seagrasses.

- Seagrass re-growth experiments show that prop scars can be healed. Injections on a large scale show that *Halodule wrightii* responds well to the injections, while *Thalassia testudinum* does respond, but at a lesser rate.