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Cockroach Bay
Status of Seagrasses for 1998
HCC Results

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In 1996 the Environmental Protection Commission of Hillsborough County 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 1998 through July of 1998.

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 includes aerial photographs of the site, computer analysis of the images, measurements 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 beginning in 1997. 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 a computer 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 includes 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:

Three flights were flown over the site in May and June of 1998. 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 1996 we noted that new seagrasses had grown back into the area, completely covering the site. The site has remained the same during the period of record. No new prop scars were noted.

2. Recovery Area #2: no changes were noted in this area. There were no new scars.

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 was also noted in the report from 1997.

4. Recovery Area #4: No new scars in this area.

5. In the inner waters of Little Cockroach Bay and in Big Pass 11,575 linear feet of prop scars were noted. Most of the scars were very long, moving from Tampa Bay, through Big Pass and into Little Cockroach Bay. One concentric scar was noted in Little Cockroach Bay.

6. In Tampa Bay in front of Little Cockroach Bay, 6,257 linear feet of new prop scars have been measured.

Seagrass growth research:

A number of experiments have been conducted by the HCC and USF teams over the past six 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 from 1995 to the present. 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. 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. In 1998, poly-phosphate was added to the formula. 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 and in Big Pass beginning on May of 1998 for three total injections.

A counting method was established in 1997 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 injections are as follows:

1. All of the prop scars injected in 1997 have grown to complete recovery.

2. The prop scars injected in 1998 are at the beginning stages of recovery. Preliminary counts show that new shoots are growing into the prop scars. A complete accounting of the growth will be given in September of 1998 and again in the spring of 1999.

Discussion:

In 1992 discussions were held concerning the health of the Cockroach Bay ecosystem, especially the status of prop scarring in the bay. In 1993 monitoring of the seagrasses was initiated and signs were placed in critical sites within the bay. Areas 1, 2, 3, and 4 were marked as zones where motorized boats were not allowed. In the first three years of the restrictions, prop scarring continued to take away more seagrasses than were recovering. Complete closure of Cockroach Bay was considered.

Four events occurred that resulted in improvements in seagrass recovery in Cockroach Bay. The first event was the formation of CBUG (Cockroach Bay Users Group). This organization set out to educate boaters on the importance of seagrasses and on the means to avoid damaging them. Their education program has made boaters aware of their actions in shallow marine systems and their actions have seen a reduction in prop scarring.

The second event that has helped the recovery of seagrasses is the hiring of an ecosystem manager for the bay. Having a resource manager in the field is a continual reminder to the boaters of the need to remain cautious in the shallow water. The manager is an in-field educator reminding the boaters of their responsibilities in a protected ecosystem.

The third event that aided the seagrasses was the passage of the "net ban" rule for shallow waters in the state of Florida. Prior to the ban, concentric scarring of the seagrasses was a yearly event. Following the ban, only one such pattern has been seen in the bay.

The fourth event that has aided seagrasses in the bay has been our ability to recover prop scars. We now have an injection system and a seagrass formula that completely recovers damaged seagrasses in 12 to 15 months. Normal recovery of seagrasses could take from 3 to 7 years. This recovery technique grew out of research at Cockroach Bay. An injection boat was built by Jim Anderson that has the ability of injecting 17,000 linear feet of prop scars in one day. The result is, we now have a system of recovery when boaters accidently damage seagrasses. We no longer have to wait for the long natural recovery of seagrasses. We can repair them.

In Cockroach Bay and surrounding waters, seagrass damage has gradually declined. The only site

where damage is occurring is in Little Cockroach Bay and in some sites in Tampa Bay. A lack of signs alerting boaters of the shallow conditions could be the reason for this. In Cockroach Bay proper, especially the restricted areas, no new damage has occurred in over two years. The seagrasses have recovered as much as they can. They can only recover more as water quality in the bay improves. Boaters are now more educated on the importance of seagrasses and a recovery system for damaged seagrasses is now in place. Six years of education, monitoring and of research have resulted in significant recovery of seagrasses in Cockroach Bay.

Recommendations:

As a result of recovery of seagrasses in Cockroach Bay, the following recommendations are presented:

- In Area 2 of Cockroach Bay, remove the restrictions on motorized boats. Change the signs to read "Seagrass Caution."
- Areas 1, 3 and 4 are small sites that have recovered. However, they are in locations that could become severely damaged if restrictions are removed. Keep the restrictions in place for these locations.
- Place "Seagrass Caution" signs at the entrances to Little Cockroach Bay, especially along Big Pass.
- Continue the monitoring of seagrasses. Our present monitoring contract continues through 1999.
- Establish a program of "Seagrass Recovery". Use Jim Anderson's injection boat every spring to inject all of the prop scars in and around Cockroach Bay. A recovery program can make up for boater error.
- Encourage CBUG to continue their boater education program. This has been very successful and should be a model for other damaged sites in the state of Florida.