Comparative Study Of Seagrass Bed Habitat Along The Skyway Bridge

SCUBAnauts International

Masternaut Project

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Abstract-

Seine nets, core samples, and roaming mollusk surveys were conducted in seagrass beds at three locations. Two sites were located at the Bob Graham Sunshine Skyway Bridge South Rest Stop and the third was at the Bob Graham Sunshine Skyway Bridge North Rest Stop. The surveys were used to assess if the habitat in the mitigated seagrass bed was restored to the level of the habitat in the surrounding natural seagrass beds. The data set determined that the difference in richness and abundance of species found between the natural and mitigated sites was insignificant. Therefore, the habitat in the mitigated seagrass bed was successfully restored to the level of the surrounding natural seagrass beds. However, there were no living mollusks found in the roaming mollusk surveys, suggesting there could be a problem with the health of the habitat in all sites along the skyway bridge. Another concerning finding was that several mollusk species recorded at the site 10 years ago were not found, meaning the richness of mollusk species in the area has been decreasing since mitigation occurred.

Introduction-

Seagrass is a flowering aquatic plant found in estuaries, such as Tampa Bay. It serves many important roles in the ecosystem. Seagrass prevents coastal erosion, catches suspended sediment, reduces wave height, sequesters carbon, protects coastal communities, and takes up nutrients. Seagrasses promote healthy reef ecosystems by providing food for many fishes that live on Florida's coral reefs (Robblee and Zieman, 1984). The presence of seagrasses enables some fish stocks on coral reefs to rebound following disturbances. Seagrass also acts as a nursery, protecting

juvenile fish from predators. Ninety percent of commercial fish and shellfish live in a seagrass bed at some point in their life cycle (Parsons, 2009).

Multiple sewage overflows and nutrients originating from stormwater and freshwater inputs, as well as construction projects, are killing seagrass in Tampa Bay. Tampa Bay has about 10% of the total global seagrass population (Parsons, 2019, 2009). In 2019, 446.8 hectares of seagrass were lost in Tampa Bay, reducing the global seagrass population by 4% (Parsons, 2019). The indisputable importance of the species grants it protections as part of an estuary. To combat seagrass die off, the Tampa Bay Estuary Program has been outplanting to maintain seagrass population. Bureaucracies like the Florida Department of Environmental Regulation, can also require that construction projects, or other environmentally disruptive activities engage in seagrass mitigation. Mitigation helps increase seagrass populations in the short term, but there has been very little research investigating the effect of mitigation in the long term. The purpose of this project is to compare the habitat of one mitigated site compared to two surrounding natural sites 10 years after mitigation occurred to determine if the habitat has been restored to the level of the surrounding areas.

Background information-

The study was conducted off the Bob Graham Sunshine Skyway Bridge South Rest Stop and the Bob Graham Sunshine Skyway Bridge North Rest Stop located in St. Petersburg, Florida, United States.

The Florida Department of Transportation conducted construction on the I-275 Sunshine Skyway Bridge and South Rest Area. The permit from the Florida Department of Environmental Regulation required seven acres of seagrass mitigation along the South Skyway Rest Area. After

the site was mitigated, it was studied for three years to ensure the mitigation was successful and the seagrass survived.

It had been ten years since anyone had studied the site, so it was selected after Zack Morris and SCUBAnauts International received a grant from the Tampa Bay Estuary Program to lead several shore cleanups and to investigate growth over time of a released mitigation site and compare its most current coverage to a natural seagrass bed. The funding enabled this project, and provided an opportunity to build on the research Zack Morris and Florida Department of Transportation have done in the area. This project is also meant to be built on by future SCUBAnauts seeking the MasterNaut Rank.

Hypothesis-

If the mitigated and natural seagrass beds have similar species abundance and richness of mollusks and fish, then the mitigated site was restored to a similar level of the natural surrounding areas.

Methodology-

Figure 1 South mitigated site

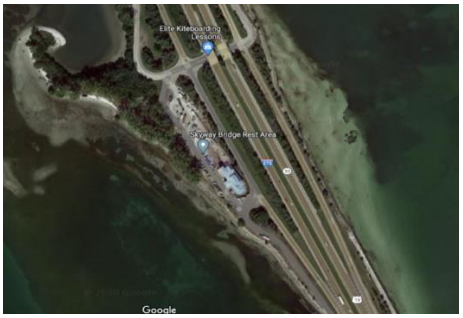

Figure 2 North natural site

The study was conducted off the Bob Graham Sunshine Skyway Bridge South Rest Stop (Figure 1) and the Bob Graham Sunshine Skyway Bridge North Rest Stop (Figure 2) located in St.Petersburg, Florida, United States. Three sites were surveyed; two sites were located on the South Skyway Rest Stop, and one site on the North Skyway Rest Stop. The southern natural site was located at 27°35'1.62"N and 82°36'59.08"W. The southern mitigated site was located at 27°34'58.37 N and 82°36'51.04"W. The two southern seagrass beds were located within one quarter kilometer of one another, separated only by a man-made breakwater wall and sandbar. The northern natural site was located at 26°38’11.2” N and 82°40’ 4.9” W

At each site, three survey methods were used: seine nets to measure fish abundance and species richness, coring to measure living and dead mollusk abundance, and roaming mollusk surveys to measure living and dead mollusk abundance. The seine net was dragged twice at each site. Two cores were taken at each site. There were two roaming mollusk surveys at each site.

Seine net

Materials: a 1 m tall x 5.5 m wide seine net, 3 buckets, a clipboard, a data sheet, a waterproof watch, and a writing utensil

On shore, the team practiced the methodology and reviewed fish identification. Practice was conducted away from actual data collection sites to reduce disruption to fish and seagrass. A site was chosen in a location shallower than 1.5 meters. The net was pulled in a semicircle, swinging the net until it was parallel to shore, then they began walking for 30 seconds (measured with a watch). At the end of the pull, the net was turned horizontal and all fish were placed into buckets. Then, their lengths were determined within predetermined size brackets. The brackets were less than 0.5 inch, between 0.5 and 1, between 1 and 2, between 2 and 3, between 3 and 4, and greater than 4 inches. The recorder would tally the fish according to the size and species.

Coring

Materials: A 1 m. tall 6.4 cm diameter Polyvinyl chloride (PVC) pipe with a mark 0 .5 m from the bottom end, a clip board, a data sheet, a rubber mallet, an 8x9x1 inch wooden board, a writing utensil, and a sifter.

A location about 1m deep with a relatively high density of seagrass was chosen to set up the core. The core was hammered 0.5 m into the ground. The core was then put into a sifter. (Note: If the rapidly gushing water threw the sample into the ocean, the data was not recorded and a new core was taken.) All remaining shells were identified and determined to be alive or dead. (Note: shells had to be mostly whole and identifiable to count as a dead organism.) The recorder tallied the organisms according to species, and determined whether living, or dead.

Roaming mollusk survey

Materials: mask, snorkel, fins, data sheet, slate, underwater watch, and writing utensil

A team used an underwater watch to record a minute and thirty seconds as they swam in a straight line away from shore. When they found a mollusk, they stopped their timer, recorded the species of the organism or took a picture if they weren't sure, and recorded if the mollusk was dead or alive. Then, they continued the timer and swam pausing each time they saw a mollusk.

Results-

To determine if the data was statistically significant that data from the natural and mitigated site was compared with a T-test. A T-test was done on both the abundance and richness data from the seine nets, coring sampels, and roaming mollusk surveys.

Seine net- Species richness

Site	Avg	Max	Min
Mitigated South	4.4	9	1
Natural – ALL	4.9	9	1

T-test- 0.47

Seine net- Species abundance

Site	Avg	Max	Min
Mitigated South	78.1	394	2
Natural - ALL	41.9	107	7

T-test- 0.7

Roaming mollusk survey- Species abundance

Site	Avg	Max	Min

Mitigated South	1.3	4	0
Natural – ALL	1.3	5	0

T-test- 0.93

Roaming mollusk survey- Species richness

Site	Avg	Max	Min
Mitigated South	1	3	0
Natural – ALL	0.6	1	0

T-test- 0.46

Coring- Species abundance

Site	Avg	Max	Min
Mitigated South	9.5	17	6
Natural - ALL	6.6	15	3

T-test- 0.15

Coring- Species Richness

Site	Avg	Max	Min
Mitigated South	4.3	6	2
Natural - ALL	3.4	5	2

T-test- 0.21

After conducting a T-test between the natural and mitigated sites, for the abundance and richness of seine net, coring samples, and roaming mollusk survey data, the findings concluded that the differences between the mitigated site and the natural sites were not statistically significant, because it does not reach .05.

Data from the roaming mollusk survey suggests that there were no living mollusks in any of the seagrass beds. Also, there were no Southern Quahog clams, or Abalone found at the site, two species which the Florida Department of Transportation reported present in 2010.

Roaming mollusk survey- Number of mollusks found

	Dead	living
Natural	10	0
Mitigated	8	0
Total	18	0

Discussion-

Based on the findings from the seine net, core samples, and roaming mollusk surveys there is no statistical difference between the natural and mitigated sites. This suggests that the habitat of the mitigated site was successfully restored to the level of habitat of the surrounding natural sites. This is in concordance with a previous Masternaut project conducted by Zack Morris, where it was found that there was no statistically significant difference in seagrass coverage between the natural and mitigated sites. However, there is reason to believe that all the habitat, natural and mitigated, surrounding the Skyway Bridge is distressed.

The Florida Department of Transportation reported organisms such as Southern Quahog clams and Abalone present at the mitigated site in 2010. However, there were none found in either the southern location or the northern location. Beyond this, there were other organisms which should have been found alive in seagrass beads and were also not present. Meaning the richness of mollusk species along the skyway has been decreasing since mitigation occurred. During a previous outing with Tampa Bay Watch, campers swam in seagrass beds collecting and

releasing organisms, after recording what they found. The Seagrass beds within Shell Key preserve contained large numbers of living scallops, clams, and lightning whelk, which could be viewed by snorkeling.

The lack of living mollusks along the Skyway is worrisome because they depend on seagrass beds for habitat. In a study done on clams, it was found that clams in unvegetated sand flats failed to grow. Those found in denser seagrass beds were more than twice as likely to survive as those in low density areas and unvegetated areas. (Irlandi, and Peterson, 1991) If living mollusks such as clams aren't found in seagrass beds, it is unlikely they are surviving in surrounding areas. The Tampa Bay Watch tracks the health of the bay by counting the number of scallops. They use the abundance of scallops as a marker for improving water quality and habitat. (Parsons, 2009) The absence of both living clams and scallops could point to water quality problems along the skyway bridge.

There were a couple of limitations to this project. The first was using a seine net determined fish species richness and abundance. The seine net had setbacks because it was slow and only caught smaller fish. Larger fish which can swim faster and avoid being caught in the net were never found. Ultimately, using this method gives us an idea of the richness and abundance, however it is not indicative of all of the species or population densities present in the area. Another limitation was, the height of the core. The length of the PBC tube was short enough all the samples had to be taken in shallow areas about 1 meter deep leaving no data gathered in deeper areas. Another limitation could be a lack of data points from the northern site. There was only one day of data collection, verses four at the southern natural and mitigated sites.

A future project could investigate a comparative study between the seagrass beds around the skyway bridge and seagrass beds in protective preserves such as Shell Key preserve, to determine if protected seagrass beds provide more habitat. The project could also investigate differences between the seagrass beds around the skyway bridge and areas with known poor water quality and struggling seagrass beds, such as Feather Sound.

Citations-

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