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OFFICE OF
RESEARCH AND DEVELOPMENT

TECHNICAL MEMORANDUM

SUBJECT: 2009 Tampa Berm ODMDS Habitat Assessment

TO: Gary Collins
ODMDS Site Manager

FROM: Jed G. Campbell
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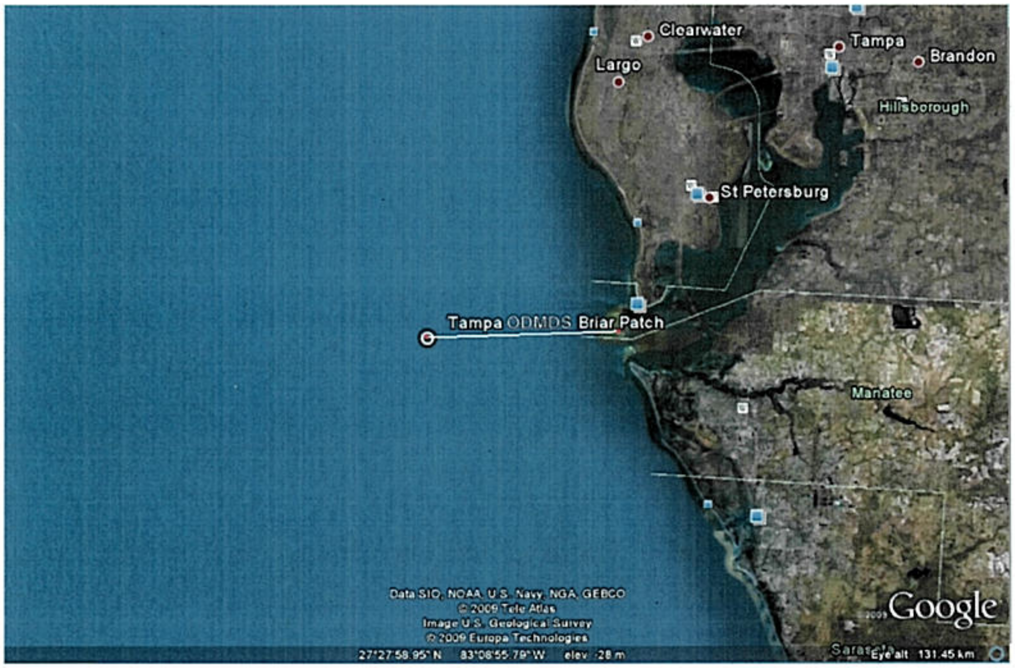
History

The U.S. Environmental Protection Agency (EPA) has the responsibility under Section 103 of the Marine Protection Research and Sanctuaries Act (MPRSA), for the review of dredged material ocean disposal permits and under Section 102 for the management and monitoring of Ocean Dredged Material Disposal Sites (ODMDS) and the development of ocean dumping criteria.

During the deepening of Tampa Harbor from May 1984 through November 1985, the dredge Chicago, which boasted a 50-cubic-yard bucket, was utilized to complete the work from the sea buoy to the end of Cut B. Approximately 3.4 million cubic yards of new work material was carefully placed along well-defined dump lanes located in a temporary ODMDS. The site, then known as Tampa 4, eventually received final designation as the permanent ODMDS for Tampa (June 1995) and is located 18 nautical miles west of Egmont Key with depths averaging about 66 feet. The subsequent mound created by this operation lies in approximately 70 feet of water and rises to about 52 feet of water at its shallowest point (see Figure 1). After completion of the deepening project, no additional dumping into the ODMDS was necessary until 1996. The 1996 dump site was more than a mile away from the Berm site which to date has not been dumped on since 1985.. The distance of the Berm from landfall, the depth of water that it lies in, and the relative proximity of the site to the Loop Current has probably been factors that have resulted in what the disposal berm has now become. The crest of this feature has become covered by a myriad of sessile invertebrates and appears to serve as habitat for a variety of finfish species. This berm is now referred to as "The Briar Patch".

Figure 1. Ocean Dredge Material Disposal Site (ODMDS) in relation to Tampa Bay.



Rationale

Viability of Tampa Bay as a commercial marine transportation hub depends upon routine maintenance dredging of all ship channels from the sea buoy to the most inland berth. The only three realistic disposal options that are available are upland disposal, beneficial uses, or ocean dumping. Beneficial use is not always a viable option due to time of year or physical characteristics of the dredged material. Upland disposal is currently limited to use of the two diked disposal islands that are not only nearing their capacity but also are not capable of being modified for extended use. Nearly all major port facilities are facing the reality that ocean dumping, despite the long haul distances, is fast becoming the only option that may still be left. All of this translates into more material being placed into the Tampa ODMDS and at an increased frequency. Even though the site is large and has an average depth of 66 feet, capacity will inevitability become a crucial management concern for EPA and USACE.

As more of the ODMDS is needed to meet the disposal needs of Tampa Bay, the possible impacts to any habitat associated with the "The Briar Patch" become more and more a reality. The issue of what value does the "The Briar Patch" provide as habitat as a possible trade-off for impacts to other types of naturally-occurring habitat will be paramount. Another issue may be whether the time and expense of designating a new site is warranted; is expansion to the north into known low-level relief habitat the better option, or just dump directly onto the "The Briar Patch".

The only way to make an informed decision when that time comes is to have some measure of "value" for the "The Briar Patch" and nearby habitats. This current survey effort is our attempt to obtain preliminary data related to the specific species of epifauna inhabiting the top surface of "The Briar Patch", as well as the species of finfish which may be utilizing it for cover and/or forage.

Methods

An underwater Rapid Bioassessment Protocol (RBP) and visual census methods was used for assessing reef fishes, macro biota, corals, and associated substrate in Tampa to utilize prevailing good visibility, rugose habitats, and our desire to use non-destructive assessment methods. The belt transect method was employed to quantify fish species size and abundance (Menza et al. 2006). The stations along the "Briar Patch" (BP01-BP05) were initially spacially selected along the length of the berm then ground truthed and confirmed using high resolution underwater video. The Natural Bottom sites were chosen using side scan sonar in an attempt to pick up bottom features then high resolution video was used to select sites that proved to have biota associated with them and also looked to be similar in makeup. (Figure 2) Large areas of sand encompass the sites selected and they were ruled out as sites for this study. The Station locations were determined and Global Positioning System (GPS) coordinates were used to guide the dive survey teams to the exact locations. (Table 1) A weight with buoy attached was dropped at the GPS coordinates. The divers descended and secured the measuring tape to the weight. The fish census consist of a 25 meter transect (25 m long and 4 m wide = 100 m^2) that was to be completed in a 15 min time period. Then the divers slowly progressed out across the best available habitat in a North or South orientation. The one diver gathered data for all fishes within two meters of either side of transect and vertically as far as possible. The other diver served as tender and photographer of species needing further identification on the return swim. The tender ensured the habitat was not disturbed in any manner by either diver by lifting or moving bottom structure. The observer recorded fish swimming through the transect, seen in holes, under ledges and in the water column. To identify, enumerate, or locate new individuals, the diver moved off the centerline of transect and stayed within the 4m transect width. The diver did not look back along the area already covered. The transect was completed in approximately 15 minutes regardless of substrate type or complexity. Fishes were identified to lowest identifiable taxonomic level and placed into 5cm size class increments up to 35cm estimating fork length. For fish over 35cm the actual size will be estimated and recorded. Fishes were identified with a four letter code using the first two letters of the genus name then the first two letters of the species. If the fish could only be identified to the family or genus level then that is all that was recorded. If the fish was not identifiable to the family level then no entry is necessary. Area and time was held constant to reduce biases associated with species detectability among habitat types and ensure the sample unit selection is known. These data provided quantitative estimates of species composition, abundance (density per plot), frequency of occurrence, individual size composition for the reef fish community, and biomass associated with the transect area surveyed.

On the return swim the fish/coral surveyor would identify all coral colonies located in a 1 m area on the right side of the transect. As per the EPA Stony Coral RBP, each colony over 10cm in the survey transect was identified by genus/species, size measurements, and estimated percent live tissue. The corals were identified to species with a four letter code using the first letter of the genus and first three letters of the species. In this survey, coral height, maximum diameter, and orthogonal width were measured, percent live tissue will be estimated in 10% increments. Colonies completely denuded of tissue (standing dead, 0%LT) will be counted and measured whether or not they are identifiable to genus. Coral origin will be defined as presence of calyx. Those denuded colonies that are not identifiable will be reported as unknown (UNK). Also, disease, bleaching, and presence of Cliona (boring sponge) was documented for all corals within the transect. This was performed at every transect if physically and physiologically possible.

Figure 2. Station Locations

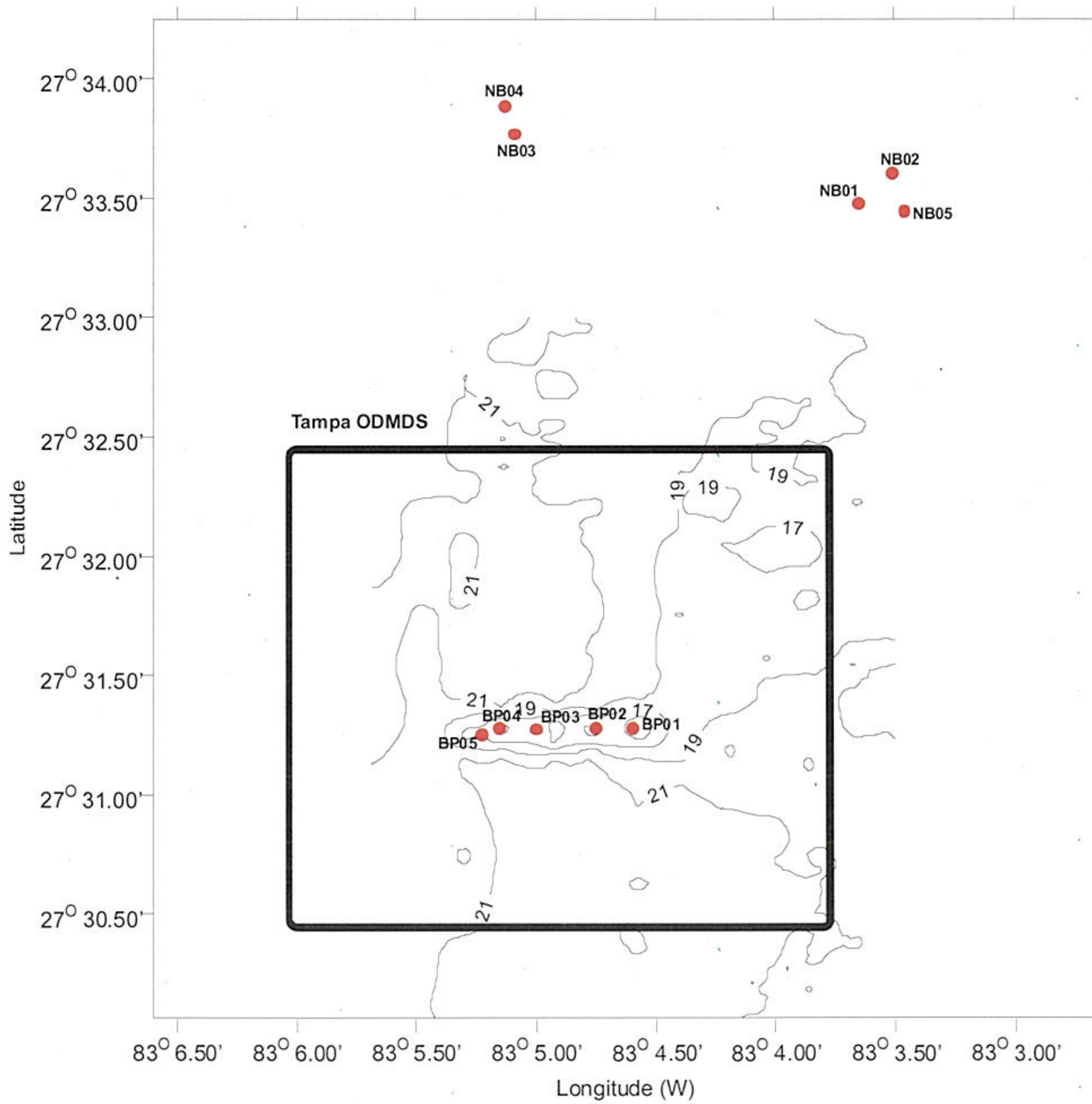


Table 1. Latitude and Longitude for all stations.

Station	Lat(deg)	Lat(min)	Long(deg)	Long(min)
BP01	N 27	31.280	W 83	4.600
BP02	N 27	31.280	W 83	4.750
BP03	N 27	31.280	W 83	5.000
BP04	N 27	31.280	W 83	5.150
BP05	N 27	31.255	W 83	5.224
NB01	N 27	33.478	W 83	3.645
NB02	N 27	33.604	W 83	3.506
NB03	N 27	33.768	W 83	5.082
NB04	N 27	33.887	W 83	5.129
NB05	N 27	33.450	W 83	3.455

The second survey team members delayed entry into the water to enable the fish/coral surveyor to finish the transect. This team enumerated macroinvertebrates, performed rugosity measurements, performed a linear point intercept protocol to estimate relative cover of algae, coral, sand and other substrate, and employed underwater video to document the transect.

1. *Macroinverebrates*. Divers enumerated the number of crabs, lobsters, sea urchins and conch found 2m to each side of the tape measure (total macroinvertebrate survey area 4m x 25m =100 m^2).

2. *Rugosity*, f_r, is a measure of small-scale variations or amplitude in the height of a surface, $f_r = A_r / A_g$ where A_r is the <u>real (true, actual) surface area</u> and A_g is the <u>geometric surface area</u>. *Rugosity is a measure of complexity, rugosity is presumed to be an indicator of the amount of available habitat available for colonization by benthic organisms (those attached to the seafloor), and shelter and foraging area for mobile organisms.* Divers performed 5 rugosity measurements at the 0, 5, 10, 15 and 20 m marks along the transect tape. They employ a light chain which will follow the contour on the bottom. Divers then recorded the linear distance traveled by a 6-m chain draped across the substrate in the transect thus yielding rugosity.

3. *Linear point intercept (LPI) protocol.* At each 0.5 m along the transect tape, one diver identified whether the substrate was coral (species), macro-algae, turf algae, soft coral, sponge, sand, hard bottom, rubble, fine sediment or other. These data were used to estimate the percent cover of the various substrata as a characterization of each transect. The utility and comparability of LPI was recently examined by Nadon and Stirling (2006).

Results

Survey results of the Berm sites Briar Patch 01 – Briar Patch 05 (BP01-BP05) proved to be quite interesting. The Rugosity ranged from 1.30 – 1.46 the lowest at BP01 and highest at BP05. (Table 2) Via Line point intercept (LPI) the dominant substrata were turf algae, rock, live coral, macro algae, rubble, coralline algae, sponge, sand, and octocorals (Figure 3). A separate survey of scelacterian corals found an assemblage a mono specific species *Cladocora arbuscula*. Small colonies to numerous to count due to depth time limitations were noted. A qualitative estimate of live corals indicated continuous sporadic coverage in all transects. Macroinvertebrates were enumerated and found to be dominated by gastropods, sea urchins, crabs, and bivalves. (Table 3) The fish survey results demonstrated diverse populations 32 different fish species associated with BP01-BP05 (Table 2). There were 727 total fish counted at the BP sites. The largest numbers of individuals encountered were the juvenile tomtate <5cm which were too prolific to count and not used in the calculations to avoid introducing artifacts due to the inability to accurately enumerate. Followed by the scamp, gray snapper, white grunt, red grouper and numerous other species as shown in (Table 4). Fish biomass calculations were performed on all sites and found the biomass of the area dominated by several commercially important species scamp, gray snapper, white grunt, and red grouper, followed by twenty eight other biologically important species listed. (Figure 4) The fish biomass at these sites ranged from 7224 to 26,266 g/100m^2 with a mean of 15248g/100m^2 across stations. (Table 2)

Table 2. Includes rugosity measurement, species richness/100m^2, fish abundance/100m^2, and total Biomass g/100m^2. Rugosity, fr, is a measure of small-scale variations or amplitude in the height of a surface, fr = Ar / Ag where Ar is the real (true, actual) surface area and Ag is the geometric surface area.

Site	End dpth	Rugosity	Species Richness	Fish Abundance	Total Biomass per site
BP01	57	1.30	18	138	9737.92
BP02	53	1.32	19	147	13614.17
BP03	53	1.35	22	106	7224.36
BP04	57	1.45	18	155	19400.22
BP05	54	1.46	25	181	26265.69
				Total	**Average Biomass**
				727	15248.47
NB01	69	1.14	8	102	388.50
NB02	67	1.15	8	64	429.61
NB03	76	1.15	7	55	624.70
NB04	69	1.13	6	52	320.73
NB05	69	1.12	10	71	379.77
				Total Abundance	**Average**
				344	428.66

Figure 3. Dominant substrate observed along 25 meter transect at Briar Patch Sites BP01-BP05.

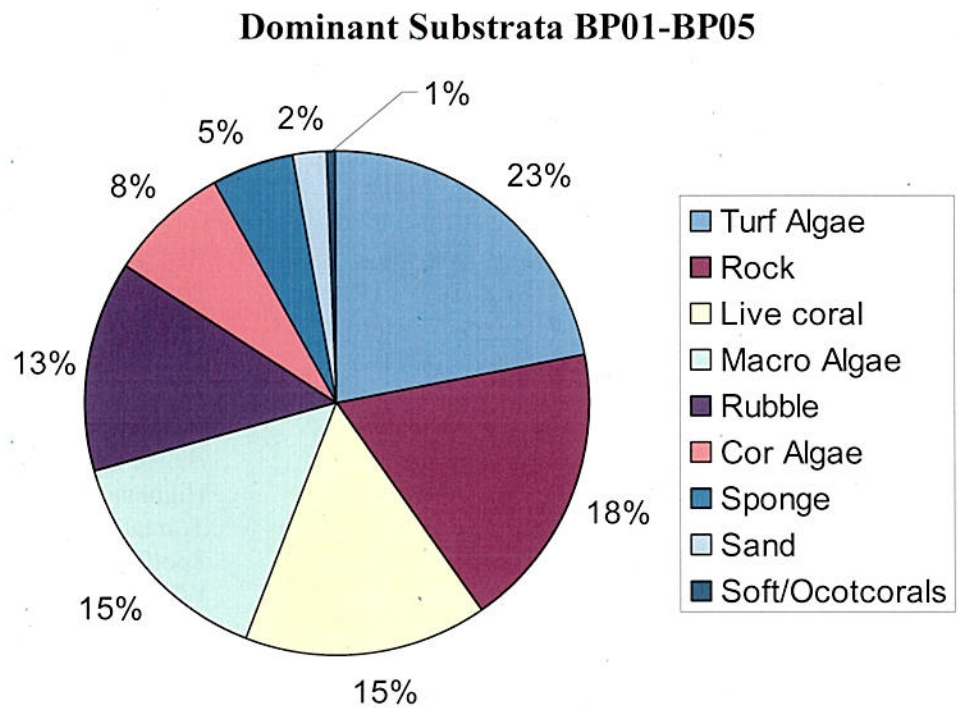


Table 3. Divers enumerated the number of crabs, lobsters, sea urchins and conch found 2m to each side of the 25 meter tape (total macroinvertebrate survey area 4m x 25m =100 m2).

Date	Site	Conch Other	Spiny Lobster	Slipper Lobster	Arrow Crabs	Other Crabs	Black Sea Urchins	Purple Sea Urchins	Bivalve	Gastropods
5/30/2009	BP01	0	0	0	0	0	>130	4	0	0
5/31/2009	BP02	1	0	0	3	0	101	18	4	>318
5/31/2009	BP03	0	0	0	7	3	101	15	6	>448
6/1/2009	BP04	1	0	0	12	1	40	18	11	>135
6/1/2009	BP05	0	0	0	9	0	9	21	4	>135
6/2/2009	NB01	0	0	0	6	1	13	1		4
6/2/2009	NB02	1	0	0	4	5	7	0	2	25
6/3/2009	NB03	0	0	0	11	1	3	2	1	7
6/3/2009	NB04	0	0	0	16	5	0	2	12	6
6/4/2009	NB05	0	0	0	3	4	0	0	4	32

*Gastroposds were not counted at first site.

Table 4. Species encountered at BP01-BP05 and NB01-NB05 stations.

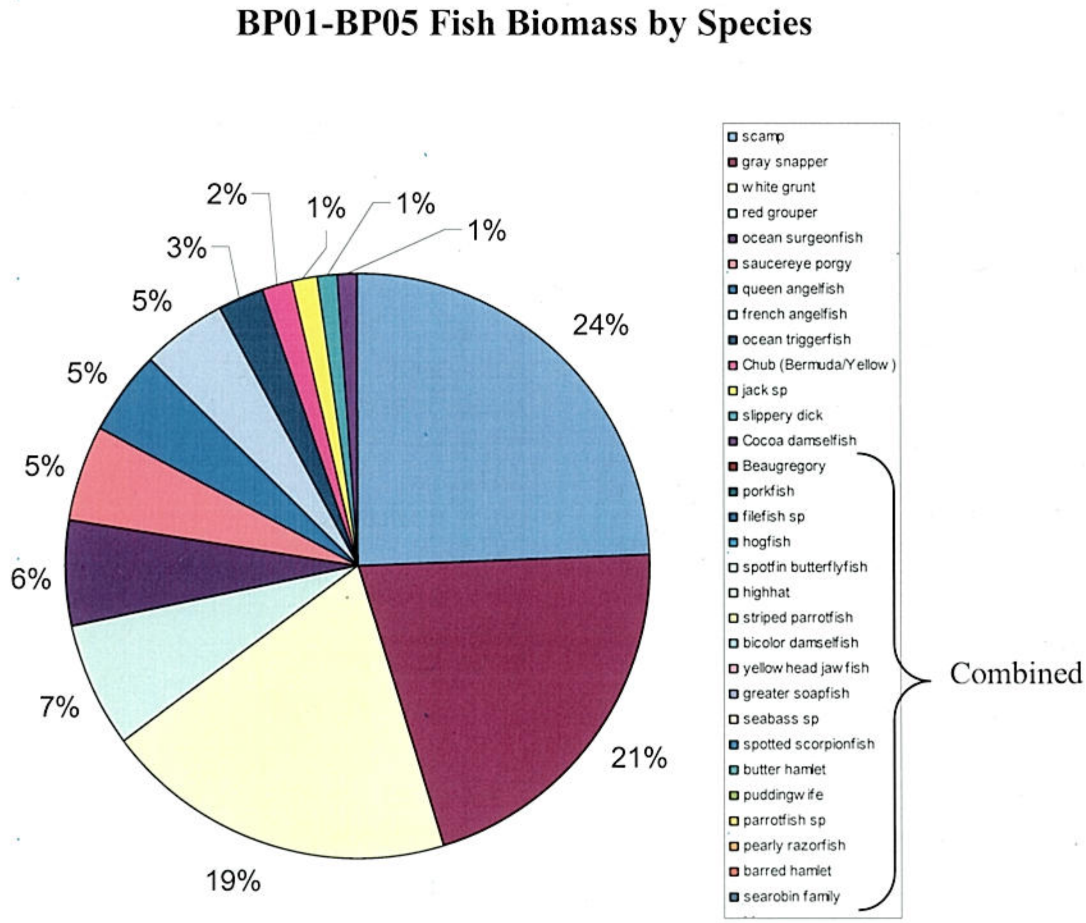
BP01-BP05

Scientific name	**Common names**
Mycteroperca phenax	Scamp
Lutjanus griseus	Gray snapper
Haemulon plumierii	White grunt
Epinephelus morio	Red grouper
Balistes capriscus	Gray triggerfish
Seriola rivoliana	Almaco jack
Calamus calamus	Saucereye porgy
Holacanthus ciliaris	Queen angelfish
Pomacanthus paru	French angelfish
Kyphosus sectatrix	Chub (Bermuda/Yellow)
Seriola spp	Jack spp
Halichoeres bivittatus	Slippery dick
Stegastes variabilis	Cocoa damselfish
Stegastes leucostictus	Beaugregory
Anisotremus virginicus	Porkfish
Cantherhines macrocerus	White spotted filefish
Stephanolepis hispidus	Planehead filefish
Lachnolaimus maximus	Hogfish
Chaetodon ocellatus	Spotfin butterflyfish
Pareques acuminatus	Highhat
Scarus iseri	Striped parrotfish
Stegastes partitus	Bicolor damselfish
Ptereleotris calliurus	Blue dartfish
Rypticus maculatus	Whitespotted soapfish
Serranus subligarius	Belted sandfish
Scorpaena plumieri	Spotted scorpionfish
Hypoplectrus unicolor	Butter hamlet
Halichoeres radiatus	Puddingwife
Scarus spp	Parrotfish sp
Xyrichtys novacula	Pearly razorfish
Hypoplectrus puella	Barred hamlet
Prionotus spp	Searobin family
Blenny spp	Blenny spp
Haemulon aurolineatum	Tomtate

NB01-NB05

Scientific name	**Common names**
Epinephelus morio	Red grouper
Halichoeres bivittatus	Slippery dick
Ptereleotris calliurus	Blue dartfish
Calamus calamus	Saucereye porgy
Epinephelus striatus	Nassau grouper
Stegastes leucostictus	Beaugregory
Serranus subligarius	Belted sandfish
Pareques acuminatus	Highhat
Haemulon aurolineatum	Tomtate
Chaetodon ocellatus	Spotfin butterflyfish
Rypticus maculatus	Whitespotted soapfish
Blenny spp	Blenny spp

Figure 4. Total Fish biomass makeup of Briar patch stations combined species indicated the biomass of these individuals were combined to make up < 1%.



Survey of the Natural Bottom sites 1-5 (NB01-NB05) showed he rugosity ranging from 1.12 – 1.15 across the five stations. (Table 2) The dominant substrata consisted of sand, live coral, coralline algae, sponge, hydroid, octocorals, rubble, macro algae rock, and turf algae. (Figure 5) Macroinvertebrate counts were dominated by gastropods, crabs, sea urchins, and bivalves. (Table 3) The scelacterian corals were sparce at all sites and dominated by *Stephanocoena intersepta*. Also, found were *Cladocora arbuscula, Solenastrea bournoni, Porites divaricata,* solitary disc *Scolymias,* and *Isiophyllia sinuosa*. (Table 5)

The fish survey of the NB sites found 12 different species. There was a total of 344 fish counted at the five stations(Table 2). Fish biomass calculations were performed on all sites and found the biomass of the area dominated by red grouper, followed by by slippery dick, yellowhead jawfish, and saucereye porgy. (Figure 6) The fish biomass at these sites ranged from 320 g/100m^2 to 624 g/100m^2 with a mean of 429g/100m^2 across stations. (Table 2)

Figure 5. Dominant substrata observed along 25 meter transect at Natural Bottom sites (NB01-NB05).

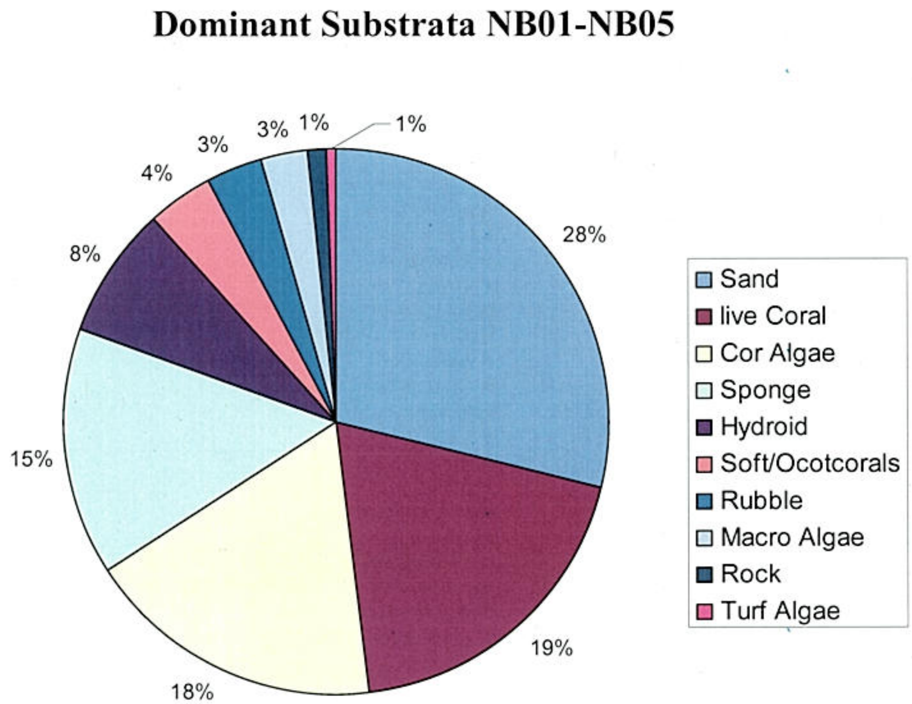


Table 5. Coral counts for Natural Bottom Stations. No quantitative data was collected for Briar Patch stations.

Species	NB01	NB02	NB03	NB04	NB05
Stephanocoena intersepta	11	7	25	7	20
Scolymia sp	1	1	1		
Cladocora arbuscula	1	1	1	1	>50
Porites divarcata	1				
Isophillia sinousa		1			
Solenastrea bournoni		1		4	1

Figure 6. Fish biomass makeup of NB01-NB05 stations.

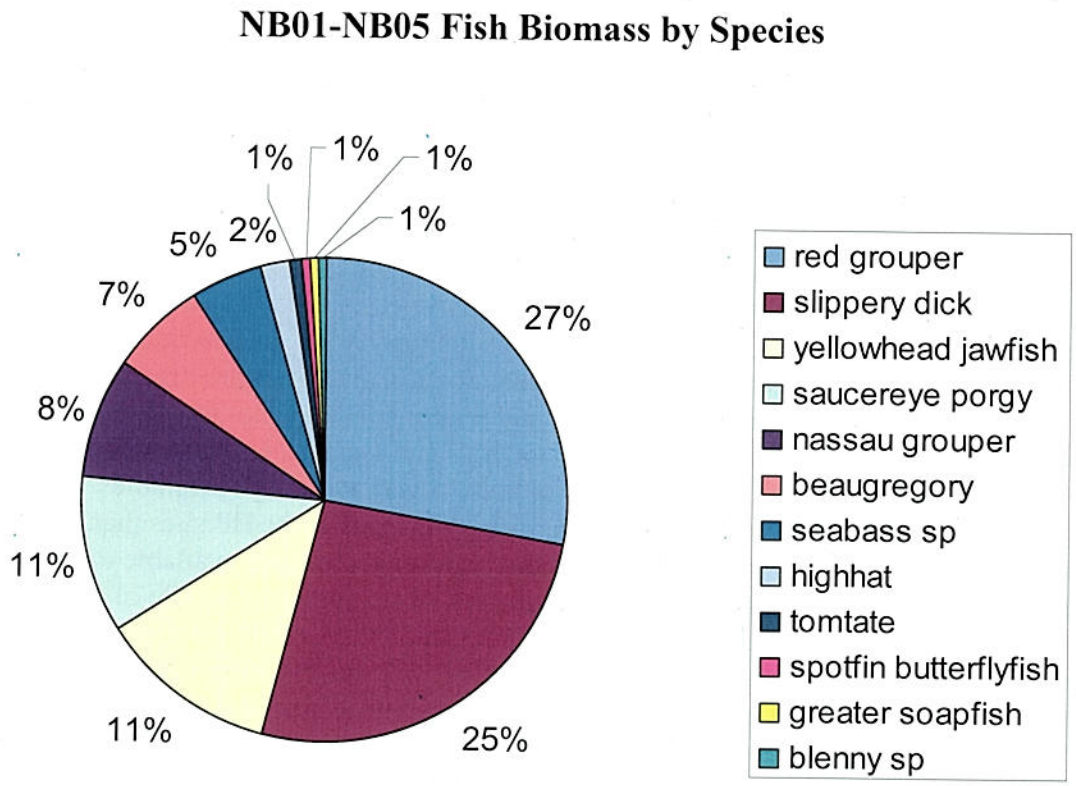
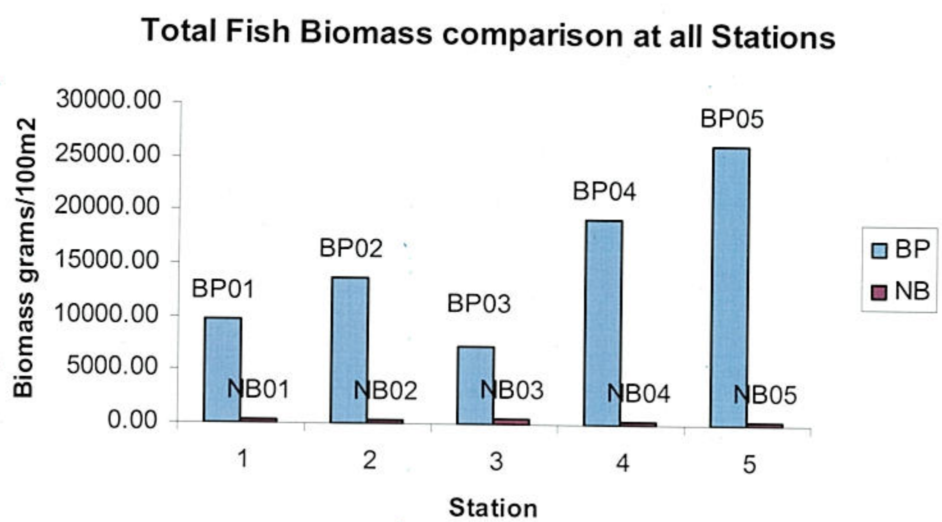


Figure 7. Fish biomass comparison of BP01-BP05 to NB01-NB05 stations.



Discussion

The surveys of the Briar Patch 01-05 and Natural Bottom 01-05 proved to be distinctly different in structural and biological makeup. The Briar Patch substate consisted of the dredge spoil from the Tampa dredging project and produced a significant amount of relief. Where as the Natural bottom site was based on sand and old submerged natural bottom with very little relief. BP sites were covered in the coral species *Cladocora arbuscula* however, due to depth and time limitations there were too many to count. A qualitative measurement noted that this species was abundant at all of the BP stations. It also should be noted that Cladocora arbuscula was the only species encountered and lead one to consider BP sites as monospecies specific. There were far fewer coral colonies encountered at the NB sites than the BP sites yet the scelacterian colonies encountered were significantly larger. The NB sites also proved to have a more diverse group of coral species than the BP sites. Sponges, octocorals, and gorgonians were not found on the BP sites. In contrast the NP sites did have a variety of octocorals and sponges in the survey areas which would lead one to relate the presence absence of these organisms to the available substrate. We observed larger numbers of sea urchins and gastropods at the BP sites than at the NB site. This could be attributed to larger mats of macro algae observed and available for these animals as forage. The sea urchins and gastropods which are larger and more motile of many of the benthic organisms are not as motile as the finsfish. They and others could be covered and destroyed by further dumping, this viable system would effectively have to begin again. During the 1980's there was a die off of sea urchins the reefs suffered significantly due to their loss. This area could serve as a nursery ground for sea urchin populations across the Gulf and into the Caribbean. The number of species, numbers of fish, and the biomass available at the BP sites was dramatically greater than what was found at the NB sites. (Figure 7) There were 34 different species at the BP site compared to only 12 encountered at the NB sites and one could associate this with the rugose habitat which allows for shelter and forage. The BP sites also, held more commercially important fish than the NB for example scamp and snapper were prolific at the Briar Patch sites. Although the BP sites held many more fish species and a significantly higher amount of fish biomass, the NB sites were too biologically diverse in having larger coral colonies, octocorals were also present and more diverse than observed at the BP sites and an important feature in the Gulf of Mexico.

Tampa ODMDS