

Mitigation Reef C	Nearshore Artificial Reef Site	Deployed July-Aug 2000
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Project Dates: *May 26 & 30, 2004*

Subject: Annual monitoring report for the Nearshore Mitigation Reef C

Location: Nearshore permitted reefsite C, approximately 1000-ft. offshore of the north end of the Stuart Public Beach, Martin County, Florida

GPS Coordinates: **N27 13.335 / W80 10.513** (center of the reefsite)

Crewmembers: *5/26/30 – Dr. Lee Harris, Kerry Dillon, Mark Perry, Tony Cimagglio, Joe Morrow 5/30/04 – Capt. Leon Morrison, Scott Glover, Laura Herron*

The following field report documents the conditions on the artificial reef site known as nearshore mitigation reef “C” the southernmost of three such reefs in Martin County, Florida. The report addresses three types of data collected: Fish species identification, benthic species identification, and reef component stability.

HISTORY OF NEARSHORE REEF “C”

To offset predicted impacts from beach renourishment projects, Martin County has created three nearshore mitigation artificial reefsites. These reefs were constructed during the summer of 2000. Materials utilized were from dismantled concrete and steel components from the old Evans Crary Bridge. Larger sections were placed in the Ernst permitted offshore reefsite in 60 –70 ft. of water while smaller sections were utilized for the shallower nearshore mitigation reefsites.

Nearshore reef C was constructed on 7/19, 22, 25, 28 & 8/16 2000 with five total bargeloads of the following materials:

- 120 concrete piles from 20 – 40 ft. long each
- 24 concrete pilecaps approx. 30 ft. x 4 ft. x 5 ft. each
- 19 steel/concrete roadway sections approx. 40 ft. x 5 ft. x 4 ft. each

These materials were deployed from an unanchored barge using several temporary surface buoys to mark the areas for material deployment. Nearshore reefsite C is approximately 1000 feet offshore of the beach, with water depths to natural bottom 15 – 24 ft. deep. The shallowest spot to the top of the reef components was measured as 7 feet, with the average water depth above reef components being 12 – 15 feet.

REEF COMPONENTS STABILITY:

It was observed that most all components are still close to the same position as when first deployed in the summer of 2000 and monitored in 2001, 2002, **2003 & 2004**. This area is subject to seasonal and storm induced beach profile changes, with covering and uncovering of the nearshore natural and artificial reefs. There has been some settlement (and/or burial) and scour around the bridge pieces. The scour provides habitat similar to that provided by similar scour around nearshore natural reefs in the area.

The individual pilings that were placed horizontally on the flat sandy bottom have been partially buried into the sand, due to either sinking of the unit in the sand or sand accretion (or a combination of both). Many of the components that stacked on top of each other appear to be stable, and are providing many overhangs and crevices which provide excellent habitat for a variety of marine organisms.

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FISH SPECIES & ABUNDANCE FINDINGS:

Fish identification and abundance were determined utilizing the guidelines setup by the Reef Environmental Education Foundation, known as *REEF*. The roving diver method was used for a set time period of 30 minutes. The divers would roam around the reef structure and identify species and abundance and record data on underwater slates. Data would be double-checked once topside using field texts with color photographs and then transferred to the *REEF* data sheets to be added to their worldwide database. Underwater video and digital still photodocumentation were also utilized to accurately document fish species and abundance. Below are the results of those findings:

<u>Marine species identified</u>	<u>Quantity observed</u>	<u>Juvenile or Adult</u>
Porkfish	100's	<i>J & A</i>
<i>Reef Croaker</i>	<i>10's</i>	<i>A</i>
Grey snapper	10's	<i>J & A</i>
Sheepshead	<i>7</i>	<i>A</i>
Beaugregory	<i>2</i>	<i>J 1/2" & 1" long</i>
Spottail pinfish	<i>1</i>	<i>A</i>
Common Snook	<i>2</i>	<i>J & A</i>
Atlantic Spadefish	<i>2</i>	<i>A</i>
Highhat	<i>1</i>	<i>J</i>
Blue Runners	<i>10's</i>	<i>A</i>
Gray Triggerfish	<i>1</i>	<i>A</i>
Barracuda	<i>1</i>	<i>A</i>
Lane Snapper	<i>1</i>	<i>A</i>
Red Porgy	<i>4</i>	<i>A</i>
<i>Fry (unidentified species)</i>	<i>100's</i>	<i>J – 3/8" long</i>
<i>Nurse shark</i>	<i>2</i>	<i>2.5 ' & 6' long</i>

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<u>Marine species identified (cont.)</u>	<u>Quantity observed</u>	<u>Juvenile or Adult</u>
Gag Grouper	1	<i>J/A 7 lbs.</i>
Black Margate	<i>10's</i>	<i>A & J</i>
<i>Porcupinefish</i>	<i>1</i>	<i>A</i>
<i>Scamp</i>	<i>1</i>	<i>J</i>
<i>Atlantic Bumper</i>	<i>10's</i>	<i>A</i>

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Benthic species identification:

Survey Date: 30 May 2004

Benthic species listed below were identified using the roving diver technique.

Professionally trained divers spent 60 minutes hovering over Mitigation Reef C looking specifically for benthic invertebrates and macroalgae. All species were documented (to lowest recognizable taxon) on an underwater slate and verified at the surface using reference guides. Some of the most relevant guides for the Martin County area include: 1) Littler and Littler's Caribbean Reef Plants: An Identification Guide to the Reef Plants of the Caribbean, Bahamas, Florida and Gulf of Mexico, 2) Hendler, Miller, Pawson and Kier's Echinoderms of Florida and the Caribbean: Sea Stars, Sea Urchins, and Allies, and 3) Paul Humann's Reef Creature Identification: Florida Caribbean and Bahamas. For further analysis, underwater video and digital still photo documentation were also performed onsite. Individuals observed were also placed in one of the following abundance classifications for long-term analysis: 1, 2-10, 11-100 or >100.

<u>Benthic Species Identified</u>	<u>Abundance</u>	<u>Comments</u>
<u>Green Algae</u>		
<i>Codium</i> spp.	11-100	
<i>Caulerpa brachypus</i> (attached & drift*)	Abundant	Low relative density all over reef.
<i>Caulerpa racemosa</i>	11-100	
<i>Halimeda tuna</i>	11-100	
<u>Brown Algae</u>		
<i>Sargassum hystrix</i> var. <i>buxifolium</i>	2-10	
Unidentified <i>Dictyota</i> spp.	2-10	
<i>Spatoglossum</i> spp.	2-10	
<i>Padina</i> spp.	11-100	
<u>Red Algae</u>		
<i>Botryocladia</i> spp.	11-100	
<i>Rhodomenia</i> spp.	11-100	
<i>Gracilaria</i> spp.	2-10	
<i>Acanthophora</i> spp.	2-10	
<i>Liagora</i> spp.	11-100	
Red turf algae	>100	
<u>Cyanobacteria (Blue-green algae)</u>		
Unidentified black cyanobacteria	uncommon	One small patch approx. 10 cm ² .
<u>Sponges</u>		
Orange encrusting sponge	2-10	
Unidentified encrusting sponges	11-100	
<u>Worms</u>		
Feather dusters	11-100	
<u>Gastropods</u>		
Eastern augers (<i>Terebra salleana</i>)	>100	Several shells were occupied by hermit crabs.
<u>Cnidarians</u>		
Unidentified hydroids	>100	

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Feather hydroids	>100	
Regal sea fan (<i>Leptogorgia hebes</i>)	11-100	
Yellow sea whip	11-100	
White telesto (<i>Carijoa riisei</i>)	2-10	
Star coral	2-10	

Tunicates

<i>Clavelina</i> spp.	11-100	
<i>Polyandrocarpa</i> spp.	11-100	
Black solitary tunicate	11-100	
Unidentified tunicate # 1	2-10	Looks similar to <i>Styela</i> spp.

Urchins

Unidentified juveniles (black)	11-100	Diameter: ~ 3 cm (with spines).
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Sea cucumbers

Unidentified spp. # 1	1	Captured on digital video.
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* Large amounts of drift algae were observed to collect between the pilings. In some locations, drift balls of *Caulerpa brachypus* were approximately 0.5 m deep.

Additional Benthic organisms identified:

Octocorals
 Mat coral
 Branching coral (orange & yellow)
 Soft coral (yellow & green)
 Barnacles
 Hermit crabs
 Fern Hydroid
 Snail

CONCLUSIONS:

Of the three Martin County mitigation reefsites, Site C has the largest quantity of concrete and steel materials. It was built with 5 total bargeloads using fully loaded barges.

Lee – The following paragraph seems to directly contradict what is written in the historical section of this report and included in the final 2003 report that was submitted. From history we know that site C was built with 5 bargeloads, site B with 5 bargeloads, & site A with only 3 bargeloads. Obviously we have to fix the statements for the 2004 report.

Site A had the fewest number of bargeloads (three) & Site B had the same number of bargeloads, but slightly less total material than Site A. Site C appears to have a greater number of fish species and larger total numbers than Sites A and B.

Although site C has the most total amount of material in place, it is more spread out so the footprint area is larger. In the 2004 monitoring the total identified fish species declined from 22 in 2003 monitoring to 20 in 2004 monitoring. It has also been observed that

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because of the larger footprint of materials more have settled into the bottom sand/shell substrate. At sites A & B it is relatively easy for a diver to find and swim from one grouping of materials to the others. At site C larger gaps exist for the divers to traverse from one section to another. Many of the original pilings in these areas between stacked pilings are now mostly and/or completely covered with the seafloor substrate. In 2005 these areas again will be checked for any reemerging concrete materials.