

on most of the tetrahedrons with long strands extending upward. Alga, sponges, tunicates and other attaching benthic organisms have flourished on the concrete surfaces as was noted in the previous monitoring reports.

Total fish species identified decreased slightly during the 2006 monitoring down to 18 from the 2005 total of 20. There were 5 species identified in 2006 that were not seen in 2005. The most significant of these being a species of snapper that could not positively be identified. After not being seen in 2005, red grouper was once again seen here in 2006. Another significant species seen in 2006 is Striped Croaker, a species that is currently on the Federal list of species of special concern. This species natural range is limited to the central East Coast of Florida waters and has previously been identified on the nearshore mitigation artificial reefs of Martin County and other artificial reefs of St. Lucie County. There were 7 species not seen in 2006 that were previously documented at this site, the most notable were gag grouper, and rock hind, both of which are migratory species that probably roam from site to site over time.

## 7 Railroad Tie Stack Reef

Construction date: March 13, May 9, June 23, 2003

Monitoring Date: May 23, 2006

Location: Approximately 7 miles offshore St. Lucie Inlet - Martin County, Florida

GPS coordinates: N27° 12.201 / W80° 02.310 at the summit of the reef site

Crewmembers: Kerry Dillon, Jack Glanville, and Mark Cloer

### 7.1 History of the Railroad Tie Stack Artificial Reef:

This is the first artificial reef site to be built in Martin County from donated concrete railroad ties. As part of a grant from the Florida Fish and Wildlife Commission (FWC Grant #02108 for \$25,000) and with additional funding from Martin County, the Railroad Tie Stack Reef was constructed in March, May and June 2003. This reef was built utilizing discarded concrete railroad ties donated by the Florida East Coast Railroad Company. Each railroad tie is approximately 11' x 14" x 10" and weighs 600 to 700 lbs. each. Approximately 1500 tons of concrete railroad ties were placed in three deployments from an anchored barge in 93 feet of ocean water. Deployment dates were March 13, May 9, and June 23, 2003.

### 7.2 Dive Data

Max. Depth at bottom = 91 feet

Min. depth at top center of summit = 72 feet

Size of structure = 120 feet long by 50 feet wide by 18 feet high

Underwater visibility this day = 50 feet

Bottom water temperature = 71° F

Surface water temperature = 76° F

Current direction and speed < ½ knot to the north

Divers breathing mode and gases = SCUBA with NITROX 38 and 32%

### 7.3 Representative Photographs

Underwater photographs taken on April 26, 2006 are shown in Figure 13. The upper right photograph shows one of the subsurface underwater buoys. Sheepshead, angelfish, and divers are shown in the photographs.



**Figure 13. RRtie Stack Reef Photographs**

#### **7.4 Reef Components Stability**

The railroad ties that comprise this reef are interlocked with each other at numerous contact points. The reef structure is quite complex with many interstitial voids in which marine life can hide from predators. Even on bright sunny days with good visibility, many dark recesses were observed which required use of a light just to peer into the areas.

Martin County was the recipient of two hurricanes in September 2004, and another one in October 2005. These storms had little effect on the two concrete railroad tie reefs in Martin County. When viewed in 2005 and 2006 the overall shape of the pile seemed exactly as it was each year since construction, a cone shaped mountain of concrete railroad ties. The local nickname of this site is "The Matterhorn". The only measurable change was that the depth of the uppermost summit is now 72 feet (in 2004 it was measured as 69 feet).

### 7.5 Fish Species and Abundance Findings:

Fish identification and abundance were determined utilizing the guidelines setup by The Reef Environmental Education, as described previously. The fish species census is shown in Table 9.

**Table 9. Railroad Tie Stack Reef Fish Census**

<i>Marine Species Identified</i>	<i>2006 Quantity Observed</i>	<i>2005 Quantity Observed</i>	<i>Juvenile or Adult (2006)</i>
Atlantic Spadefish	2	10's	A
Batfish	1	Not seen	A
Beau Gregory	2	4	A
Belted Sandfish	4	Not seen	A
Black Seabass	6	3	A
Burrfish	1	Not seen	A
Gag Grouper	2	Not seen	A
Gray Snapper	3	10's	A
Gray Triggerfish	1	2	A
Greater Amberjack	10's	10s in feeding school	A
Highhat	Not seen	3	--
Lane Snapper	Not seen	10's	--
Porcupinefish	Not seen	1	--
Porkfish	Not seen	5	--
Red Snapper	3	Not seen	A
Reef Butterflyfish	2	Not seen	A
Scorpionfish	1	Not seen	A
Scrawled Cowfish	Not seen	1	--
Sheepshead	5	10's	A
Sheepshead Porgy	3	7	A
Snook	2	Not seen	A
Southern Stingray	2	Not seen	A
Spiny Lobster	1	Not seen	A
Spotfin Butterflyfish	Not seen	2	--
Tomtate	10's	100's	A
Vermilion Snapper	Not seen	5	--

### 7.6 Benthic Species Identification

Benthic species listed in Table 10 were identified using the roving diver technique. Species and abundance were similar to that observed in 2005, except for the lack of the green algae *Caulerpa brachypus* in 2006. In 2006 a small colony of hard stony white coral, *Oculina diffusa*, was observed, which had not been recorded at this site in previous years.

**Table 10. Railroad Stack Reef Benthic Species Census**

<i>Benthic Species Identified</i>	<i>2006 Abundance</i>	<i>2005 Abundance</i>	<i>Comments</i>
<b>Green Algae</b>			
<i>Codium spp.</i>	>100 Small individuals	>100 Small individuals	(thallus < 6 cm high)
<i>Caulerpa brachypus</i>	none	1 rhizome with 4 blades	attached
<b>Brown Algae</b>			
<i>Spatoglossum spp.</i>	11-100	11-100	Thalli up to 0.33 m long
<b>Red Algae</b>			
<i>Rhodymenia spp.</i>	11-100	11-100	
<b>Sponges</b>			
White encrusting sponge			
Orange encrusting sponge			
<b>Cnidarians</b>			
Unidentified anemone	11-100	11-100	
<b>Crustaceans</b>			
Spiny Lobster ( <i>Panulirus argus</i> )	2	0	
Deep-water limpets	>100	>100	Extremely abundant
Arrow crab ( <i>Stenorhynchus seticornis</i> )	2-10	1	
<b>Gastropods</b>			
Unidentified spp. # 1	2-10	2-10	
Unidentified spp. # 2	2-10	2-10	
<b>Bryozoans</b>			
Yellow bryozoan	2-10	2-10	
<b>Urchins</b>			
<i>Arbacia punctulata</i>	11-100	11-100	
<b>Coral</b>			
<i>Oculina diffusa</i>	1	0	

The benthic growth rate on the concrete surfaces of each railroad tie has been quite rapid since immersion in 2003. Compared to steel surfaces on the nearby FPL reef in the same depth of water, the growth rate is quicker on the concrete materials. Also the upper portions of the pile exhibits much more benthic growth compared to the lower areas. This is probably due to more sunlight and warmer surface waters flowing through the shallower depths.

### 7.7 Railroad Tie Stack Reef Summary

The overall size, density, complexity, and profile of this site are providing an excellent artificial reef habitat to enhance the offshore marine environment and benefit marine resource users. The stability of the structure appears to be excellent, especially in surviving relatively intact after three direct passes of major hurricanes in a timeframe of 13 months. In the 2006 fish census, the total species identified is up slightly to 18 from 16 identified at this site in 2005 and down from the 2004 count of 20. The most significant sport/food fish seen in 2006 were Gag Grouper, Common Snook, Red Snapper, and Gray Snapper. Four important food/sport species not seen in 2006 from previous years are Vermillion and Lane Snapper (2005) and Yellowtail Snapper and Snowy Grouper (2004).