

## 8 Railroad Tie Patches (Five Peaks) Reef

Construction date: June 22, 28, 29, 2004

Monitoring date: May 27, 2006

Location: Sirotkin permitted artificial reef site

GPS coordinates: 27° 11.701 North / 80° 02.140 West (summit of yellow patch).

Crew members: Lee Harris, Kerry Dillon, Mark Cloer

### 8.1 History of the Railroad Tie Patches Artificial Reef:

As part of a Florida Fish and Wildlife Conservation Commission construction grant, (FWC Grant #03048 for \$52,500) and with additional funding from Martin County, a 5 component patch reef utilizing donated concrete railroad ties was constructed in June of 2004. The materials deployed were donated by the Florida East Coast Railroad Company. Each railroad tie is approximately 11' x 14" x 10" and weighs approximately 600 – 700 lbs. each. On the East Coast of Florida similar successful artificial reefs have been built in St. Lucie and Indian River Counties.

In Martin County this reef is the fourth in a series of four that were built in 90 to 100-foot water depths for the purpose of comparing different materials and arrangements on the seafloor. The five peaks reef was built in 2004 approximately 3/4 mile south of an existing concrete railroad tie stack reef constructed in 2003. One half mile north of the RR tie stack reef is a patch reef built of concrete tetrahedrons built in 2002, and 1/2 mile north of that is a tetrahedron stack reef constructed in 2001. Each of these 4 reefs consists of a similar total tonnage of concrete (1500 tons) and is located in similar water depth and distance offshore of the Martin County shoreline (6.5 miles).

The 5 peaks railroad tie patch reef was built on June 2, 28, and 29, 2004 utilizing a full barge load of concrete railroad ties for each deployment. Approximately 1500 railroad ties (500 tons) were placed from an anchored barge for each of the three deployments. There are five patches or "peaks" on the reef; each separated by a natural sand/shell seafloor. Distances vary between the peaks and are an average of 120 feet from centers of each cluster. Color-coded tie wraps have been added to each of the patch areas to aid future monitoring efforts.

### 8.2 Dive Data

Max. depth at bottom = 96 feet

Underwater visibility this day = 50 feet

Bottom water temperature = 68°F

Surface water temperature = 78°F

Current speed and direction = 1/2 knot to the north

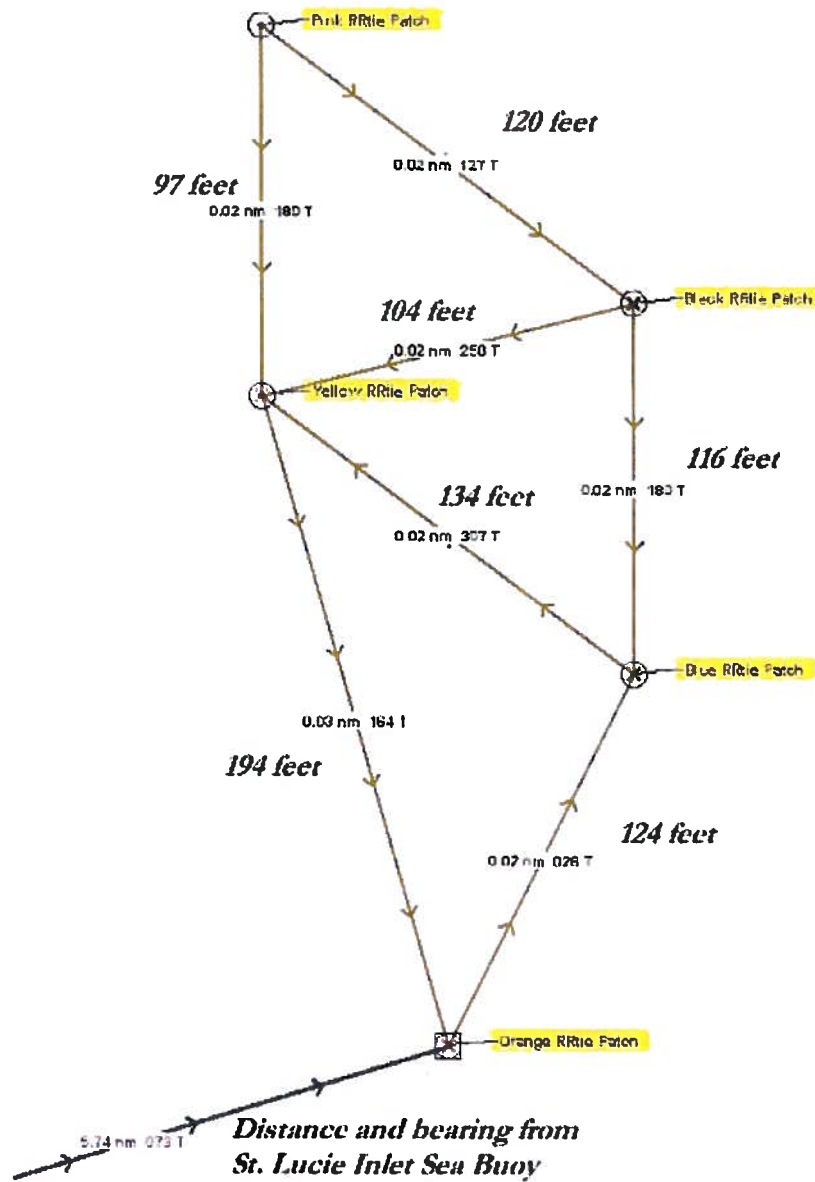
Divers breathing mode and gases = SCUBA with NITROX 36 and 38%

GPS positioning of vessel determined by a Standard Horizon model CP150C

Shipboard fathometer used was a Furuno model LCD LS-6000 (200kHz)

### 8.3 Railroad Tie Patches Orientation:

Figure 14 shows the detailed chart of the concrete railroad tie five-patch reefs (Five Peaks Reef). The distances and bearings between the five peaks are shown, based on the GPS coordinates and diver observations.



**Figure 14. Chart of the Five Concrete Railroad Tie Patch Reefs**

Also known as Five Peaks Reef, with the locations, distances and bearings between the five summits of this reef shown in the above diagram.

#### 8.4 Representative Photographs

Underwater photographs taken on May 27, 2006 are shown in Figure 15. Triggerfish, benthic growth, and divers are shown in the photographs.

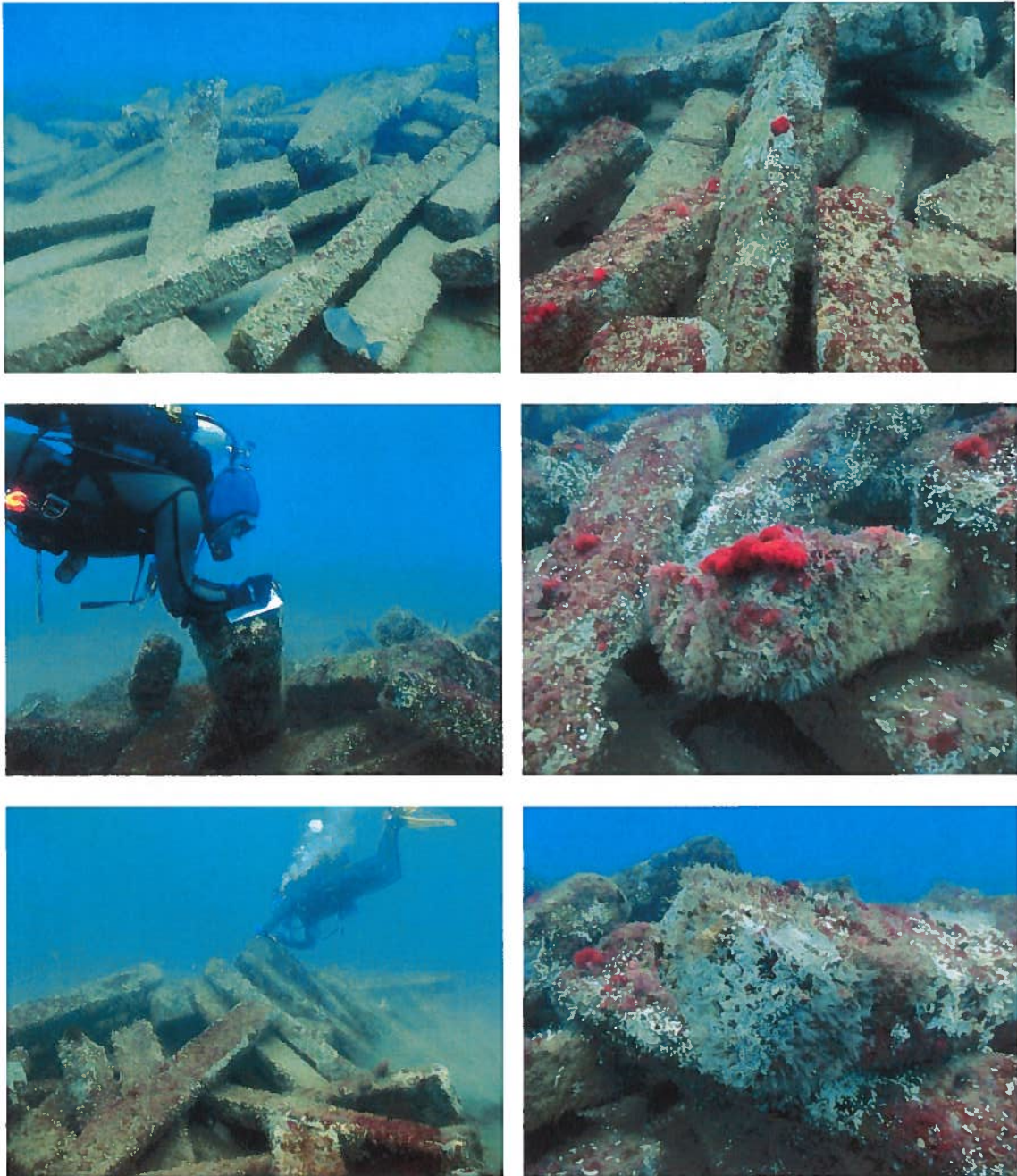


Figure 15. RRtie Patch Reef Photographs

### 8.5 Reef Components Stability

The concrete railroad ties weigh in air between 600 – 700 lbs. each. They are approximately 11' x 14" x 10" and as they are deployed they wedge into spaces between adjacent ties. There were about 920 ties for each peak, forming an interlocking matrix of 300 tons of concrete in a cone-shaped pile. The average profile for each of the 5 peaks is 7.5 feet; with a roughly circular shape with approximately 50-foot diameter.

Table 11 illustrates the profiles and bottom depths in the year of construction (2004) and next two years (2005 and 2006). In between these years Martin County sustained direct hits by two hurricanes within three weeks of each other. In September 2004 Hurricanes Frances and Jeanne paths each crossed over the 5 peaks reef with little damage to the reef. Another hurricane passed over the reef in October 2005, Hurricane Wilma, again with no damage noted. The natural bottom has been scoured and the overall profiles of the peaks above the seafloor have shown only minor changes, as shown in the table below.

**Table 11. Comparison of Railroad Tie Patch Reefs in 2004 - 2006**

| <i>Peak ID color</i> | <i>2006 bottom depth</i> | <i>2005 bottom depth</i> | <i>2004 bottom depth</i> | <i>2006 profile height</i> | <i>2005 profile height</i> | <i>2004 profile height</i> |
|----------------------|--------------------------|--------------------------|--------------------------|----------------------------|----------------------------|----------------------------|
| Yellow               | 96.5 feet                | 96.5 feet                | 93 feet                  | 5.5 feet                   | 5.5 feet                   | 10 feet                    |
| Black                | 97.5 feet                | 97.5 feet                | 93 feet                  | 5.5 feet                   | 5.5 feet                   | 10 feet                    |
| Blue                 | 99 feet                  | 99 feet                  | 93 feet                  | 9 feet                     | 9 feet                     | 15 feet                    |
| Orange               | 97 feet                  | 97 feet                  | 93 feet                  | 9 feet                     | 9 feet                     | 14 feet                    |
| Pink                 | 94.5 feet                | 94.5 feet                | 93 feet                  | 8.5 feet                   | 8.5 feet                   | 16 feet                    |

### 8.6 Fish Species and Abundance Findings:

Fish identification and abundance was determined utilizing the roving diver method, as previously described. Fish census is shown in Table 12.

**Table 12. Railroad Tie Patches Reef Fish Census**

| <i>Marine Species Identified</i> | <i>2006 Quantity Observed</i> | <i>2005 Quantity Observed</i> | <i>Juvenile or Adult (2006)</i> |
|----------------------------------|-------------------------------|-------------------------------|---------------------------------|
| Amberjack                        | 1                             | Not seen                      | A                               |
| Atlantic Spadefish               | Not seen                      | 10's                          | --                              |
| Bandtailed Puffer                | 3                             | Not seen                      | A                               |
| Belted Sandfish                  | 4                             | 2                             | J and A                         |
| Black Seabass                    | 5                             | 10's                          | J and A                         |
| Cuburru                          | 2                             | Not seen                      | J                               |
| Gag Grouper                      | 4                             | 2                             | A                               |
| Gray Angelfish                   | Not seen                      | 1                             | --                              |
| Gray Snapper                     | 5                             | 10                            | A                               |
| Gray Triggerfish                 | 8                             | 10's                          | A                               |
| Lane Snapper                     | Not seen                      | 6                             | --                              |
| Porkfish                         | Not seen                      | 5                             | --                              |
| Puddingwife                      | 2                             | 1                             | A                               |
| Red Snapper                      | 7                             | 10's                          | J and A                         |
| Sergeant Major                   | 1                             | Not seen                      | A                               |
| Reef Butterfly                   | 4                             | 4                             | A                               |
| Sailors Choice                   | Not seen                      | 10's                          | --                              |
| Scamp                            | Not seen                      | 4                             | --                              |
| Scrawled Cowfish                 | Not seen                      | 2                             | --                              |
| Sheepshead                       | 5                             | 3                             | A                               |
| Sheepshead Porgy                 | Not seen                      | 3                             | --                              |
| Southern Flounder                | Not seen                      | 1                             | --                              |

| <i>Marine Species Identified</i>                 | <i>2006 Quantity Observed</i> | <i>2005 Quantity Observed</i> | <i>Juvenile or Adult (2006)</i> |
|--|-------------------------------|-------------------------------|---------------------------------|
| Spotfin Butterflyfish                            | 2                             | 2                             | A                               |
| Spotfin Hogfish                                  | 1                             | 1                             | J                               |
| Spottail Pinfish                                 | 5                             | Not seen                      | A                               |
| Spotted Scorpionfish                             | 1                             | 1                             | A                               |
| Tomtate  | 10's                          | 100's/10's                    | A                               |
| Unidentified baitfish                            | Not seen                      | 100's                         | --                              |
| Vermilion Snapper                                | Not seen                      | 3                             | --                              |
| Whitespotted Soapfish                            | Not seen                      | 1                             | --                              |
| Unidentified Snapper w/black spot near gill slit | 1                             | Not seen                      | A                               |
| Bo Gregory                                       | 1                             | Not seen                      | A                               |

### **8.7 Railroad Tie Patches Reef Summary**

This reef site survived the 2004 and 2005 hurricanes, with some loss of profile height as well as some scouring of the bottom sediments. Each of the 5 peaks is still at the same location as before the storms. Twenty fish species were identified at this site, which is down from 28 in 2005. The most significant sport and food fish species observed on this reef are Red Snapper, Gag Grouper, and Gray Snapper, Black Seabass, and Greater Amberjack. This is the first year spiny lobster has been seen. Lane snapper and Southern Flounder was the most significant food/sport species not observed which was previously reported at this site.

Overall this site is performing very well, benthic growth is becoming more pronounced and is now found on each of the railroad ties, especially the ones in the uppermost locations. The RRties at the base of each of the 5 mounds have slightly less attached benthic growth, most likely because of bottom sediments that tend to scrub the surfaces and at times may partially cover over the concrete surfaces.

## **9 Tree Barge**

Construction date: April 19, 2002

Monitoring date: June 3, 2006

Location: Sirotkin permitted artificial reef site

GPS coordinates: 27° 13.419 North / 80° 00.270 West

Crew members: Lee Harris, Kerry Dillon, Wayne Turner, Doug Rainer

### **9.1 History of the Tree Barge**

The Tree Barge was nicknamed such because a young Australian pine tree had grown on top of the deck while the barge lay idle for approximately four years in the Okeechobee waterway several miles west of the St. Lucie Locks. Martin County acquired this barge when the owner abandoned it where it was grounded on the north embankment of the waterway. The County