

8 Railroad Tie Patches (Five Peaks) Reef

Monitoring Date: June 8, 2005

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, Randal Bazemore, Grayson Kyte

This is the first annual monitoring effort at this site. This report addresses three types of collected data: dive data, reef component stability, and fish species & abundance.

8.1 History of the Railroad Tie Patches Artificial Reef:

As part of a Florida Fish & 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 built in 90 to 100-foot water depths for the purpose of comparing different materials and arrangements on the seafloor (see Figure 6). The five peaks reef was built 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). It is planned to monitor the stack and patch reefs (2 concrete tetrahedron reefs and two concrete railroad tie reefs) to compare their performance over time. This will assist in determining which module shape is better, and if it is better to build concrete module reefs in a tightly concentrated high profile design or in smaller patches.

The 5 peaks railroad tie patch reef was built on June 2, 28, & 29, 2004 utilizing a full barge load of concrete railroad ties for each deployment. Approximately 1540 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 116 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 = 99 ft.

Underwater visibility this day = 40 ft.

Bottom water temperature = 68°F

Surface water temperature = 78°F

Current speed & direction < 1/2 knot to the north

Divers breathing mode & gases = open circuit scuba with nitrox 34 & 31%

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 8 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.

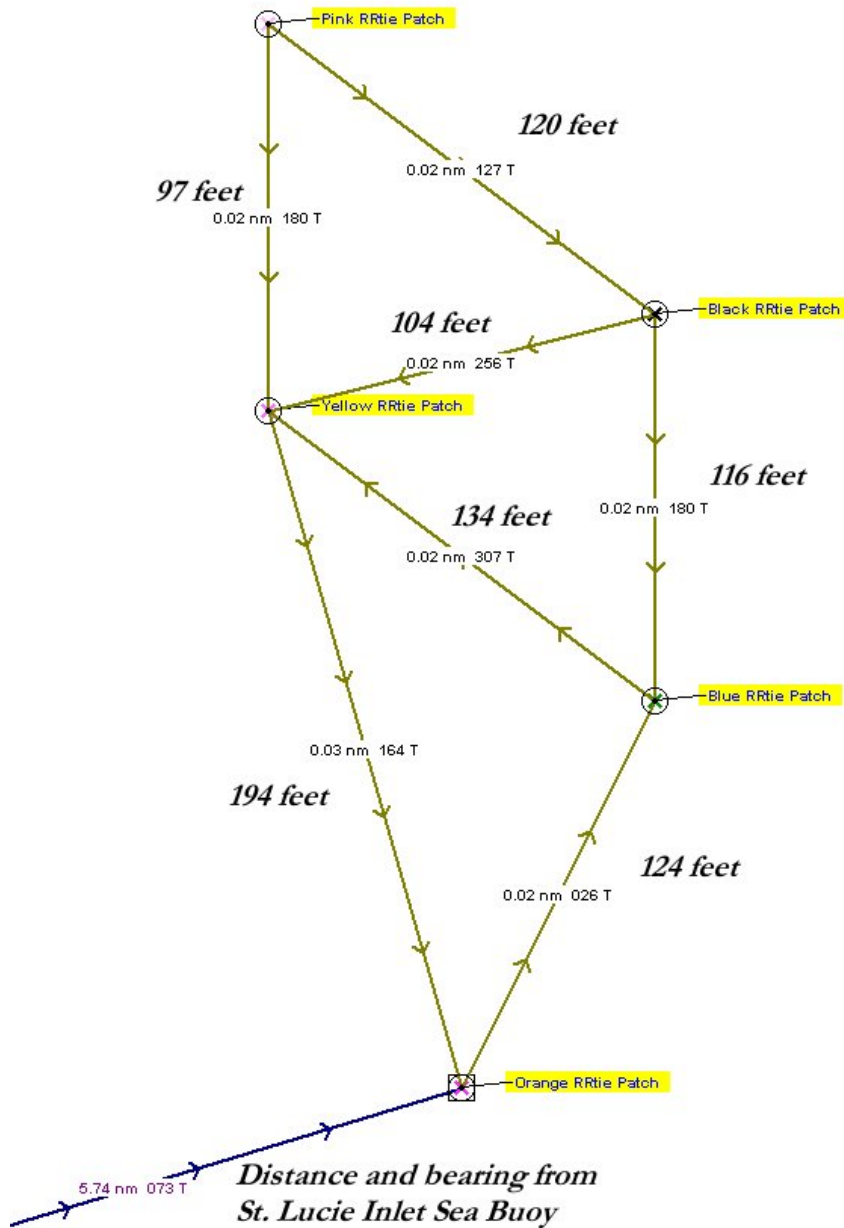


Figure 8. Chart of the Five Concrete Railroad Tie Patch Reefs

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 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 924 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-ft. diameter.

Table 14 illustrates the profiles and bottom depths in the year of construction (2004) and this first monitoring year (2005). In between these years Martin County sustained direct hits by two hurricanes within three weeks of each other. In Sept. 2004 Hurricanes Frances cat 2 and Jeannie cat 3 paths crossed over the 5 peaks reef with little major damage to the reef. The natural bottom was scoured and the overall profiles of the peaks above the seafloor have changed. The table below presents these changes.

Table 14. Comparison of Railroad Tie Patch Reefs in 2004 and 2005

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

8.5 Fish Species & Abundance Findings:

Fish identification and abundance was determined utilizing the roving diver method, as previously described. Fish census is shown in Table 15.

Table 15. Railroad Tie Patches Reef Fish Census

<i>Marine Species Identified</i>	<i>Quantity observed</i>	<i>Juvenile or Adult</i>
Red Snapper	10's	A
Red Snapper	10's	J
Gag Grouper	2	A
Southern Flounder	1	A
Reef Butterfly	4	A
Gray Triggerfish	10's	A
Gray Triggerfish	10's	J
Vermilion Snapper	3	A
Black Seabass	10's	A
Black Seabass	10's	J
Sheepshead Porgy	3	A
Spotted Scorpionfish	1	A
Greater Amberjack	5	A
Sheepshead	3	A
Gray Angelfish	1	A
Blue Angelfish	1	A
Belted Sandfish	2	A
Spotfin Hogfish	1	A
Tomtate	100's/10's	A/J

Table 16 (continued). Railroad Tie Patches Reef Fish Census

Lane Snapper	6	A
Gray Snapper	10	A
Scrawled Cowfish	2	A
Smooth Trunkfish	2	A
Sailors Choice	10's	A
Puddingwife	1	A
Whitespotted Soapfish	1	A
Spotfin Butterflyfish	2	A
Porkfish	5	A
Scamp	4	A
Atlantic Spadefish	10's	A
Unidentified baitfish	100's	

8.6 Railroad Tie Patches Reef Summary

This reef site survived the 2004 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-eight fish species were identified at this site. This is the highest number ever recorded on a first year monitoring effort in Martin County. The most significant sport & food fish species observed on this reef are Red Snapper, Gag Grouper, Gray & Lane Snapper, Black Seabass, and Greater Amberjack.