

3.7 Railroad Tie Patches (Five Peaks) Artificial Reef

- Location: Sirotkin Reef
- Materials: Concrete
- Maximum Depth: 93 feet
- Reef High Point: 72 feet
- Year Created: 2004
- Monitoring Date: 6/25/2008, 10/2/2009

3.7.1 History of the Railroad Tie Patches Artificial Reef

As part of a FWC construction grant and with additional funding from Martin County, a 5-unit patch reef composed of donated concrete railroad ties was constructed in late June of 2004. There are five patches or “peaks” on the reef, each composed of 300 tons of railroad ties, lying on a flat sand/shell hash seafloor. Distances vary between the peaks, but average 120 feet on center between clusters. Colored nylon tie wraps have been added to the top of each pile to help identify each and to aid future monitoring efforts. Figure 5 shows the Railroad Tie Patches Reef in the southwest portion of the Sirotkin Artificial Reef area.

This reef is the fourth in a series of four that were built in 90 to 100-foot water depths intended to evaluate how material shape and configuration affect a reef’s biomass and diversity characteristics. This reef was built in 2004 approximately 0.75 mile south of the Railroad Tie Stack Reef that was constructed in 2003. One half mile north of the Railroad Tie Stack Reef is the Tetrahedron Patch Reef, a 5-unit patch reef built in 2002 using pyramid-shaped concrete tetrahedrons. And one half mile north of that is the Tetrahedron Stack Reef, constructed using the same concrete shapes, but deployed in 2001 as a single large pile. Each of these 4 reefs consists of 1500 tons of concrete, sits on a sandy seafloor and is located in a similar depth of water about 6.5 miles off the Martin County shoreline.

3.7.2 Structural Summary

Each of the five reef patches is made up of about 900 concrete railroad ties. Due to the elongated shape and high relative mass of the railroad ties, the reef piles formed as jumbled but fairly stable cone-shaped heaps of concrete. Each reef pile forms a circle about 50 feet in diameter with a vertical profile of about 7.5 feet. Figure 20 shows the configuration of the five reef piles that make up this artificial reef. Distances and bearings between the five peaks are shown, based on GPS coordinates and diver observations.

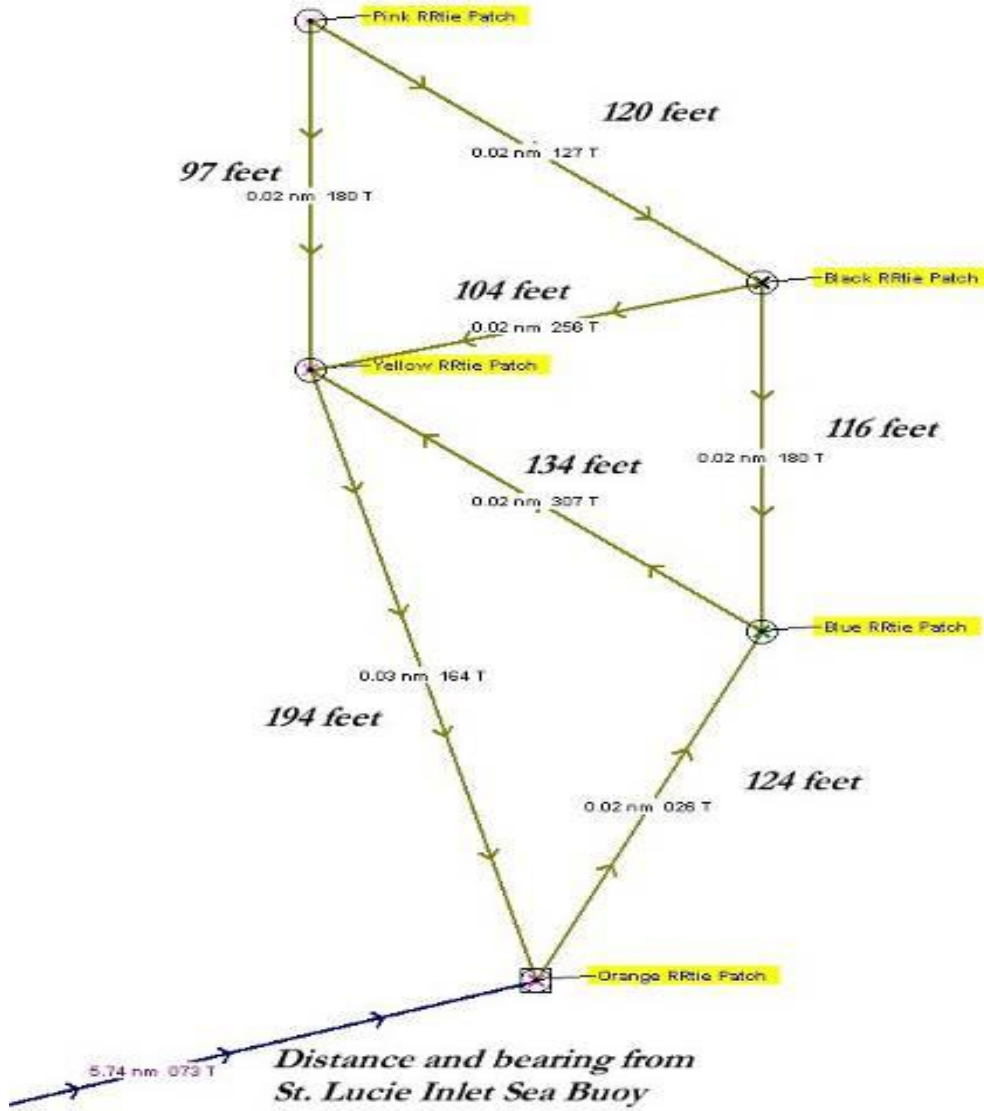


Figure 20. Configuration of the Railroad Tie Patches (5 Peaks) Reef



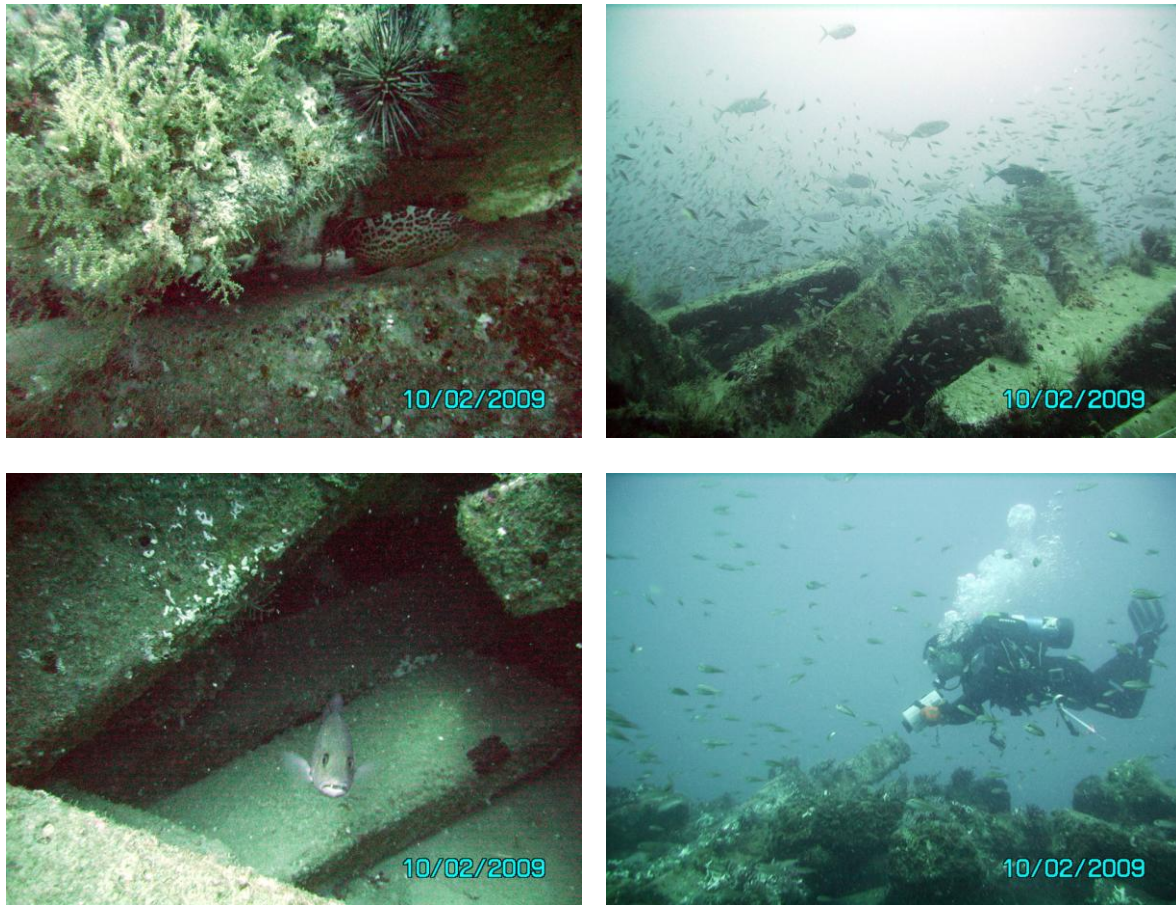


Figure 21. Railroad Tie Patches Artificial Reef 2009 photographs.

3.7.3 Biological Survey Results

Fish surveys indicate a generally increasing trend in fish species diversity since 2004. Wrasses, jacks and seabasses are the best represented families. Vast schools of round scad and blue runner were observed around and above the reef crest. Most other fish species were more closely associated with the reef structure, seeking shelter within cavities when approached by the divers. Other species were observed swimming between the individual reef piles over the flat, sandy seafloor. The compact arrangement of these five reef units may function as a single reef to many of the fish species observed. Invertebrate biomass on the artificial reef had visibly increased in both 2008 and 2009 when compared to the previous monitoring efforts. Most common species included sea urchins, hydroids, tube worms, encrusting sponges, tunicates and sea cucumbers. The numerous interstitial spaces within the reef provide refugia for large numbers of fish and invertebrates, however, it appears that a relative lack of sunlight reaching the deeper recesses may limit the growth of encrusting flora and fauna. Table 12 presents the fish species observed from 2007 through 2009.

Family/ Common Name	Species	2009		2008		2007	
		Abundance	Size	Abundance	Size	Abundance	Size
Elasmobranchs							
Southern stingray	<i>Dasyatis americana</i>			S	A	S	A
Muraenidae							
Spotted moray	<i>Gymnothorax moringa</i>					S	A
Serranidae							
Bank seabass	<i>Centropristis ocyurus</i>			M	A		
Belted sandfish	<i>Serranus subligarius</i>	M	A,J	A	A		
Black grouper	<i>Mycteroperca bonaci</i>			S	J		
Black seabass	<i>Centropristis striata</i>	F	A	F	A	M	A,J
Gag grouper	<i>Mycteroperca microlepis</i>			F	A	S	A
Scamp	<i>Mycteroperca phenax</i>	F	A/J			F	A
Grammistidae							
Whitespotted soapfish	<i>Rypticus maculatus</i>			F	A	F	A
Apogonidae							
Twospot cardinalfish	<i>Apogon pseudomaculatus</i>			F	A		
Rachycentridae							
Cobia	<i>Rachycentron canadum</i>					S	A
Carangidae							
Almaco jack	<i>Seriola rivoliana</i>	F	A/J				
Amberjack	<i>Seriola dumerili</i>	M	A			F	A
Bar jack	<i>Caranx ruber</i>	M	J				
Blue runner	<i>Caranx chrysos</i>	A	A	M	A	M	A
Round scad	<i>Decapterus punctatus</i>	A	A,J	A	A	A	A
Yellow jack	<i>Caranx bartholomaei</i>	S	J				
Lutjanidae							
Gray snapper	<i>Lutjanus griseus</i>	M	A	F	A	F	A
Lane snapper	<i>Lutjanus synagris</i>			M	A,J	F	A
Red snapper	<i>Lutjanus campechanus</i>			F	A	M	A,J
Yellowtail snapper	<i>Ocyurus chrysurus</i>	F	A				
Haemulidae							
Black margate	<i>Anisotremus surinamensis</i>	F	A,J				
Pigfish	<i>Orthopristis chrysoptera</i>	M	A	M	A		
Porkfish	<i>Anisotremus virginicus</i>			F	A	M	A,J
Tomtate	<i>Haemulon aurolineatum</i>	A	A,J	A	A	M	A,J
Sparidae							
Pinfish	<i>Lagodon rhomboides</i>	F	A				
Sheepshead	<i>Archosargus probatocephalus</i>	M	A	M	A	M	A
Sheepshead pogy	<i>Calamus penna</i>	A	A	M	A	F	A
Spottail pinfish	<i>Diplodus holbrooki</i>					F	A
Sciaenidae							
Cubbyu	<i>Equetus umbrosus</i>	M	A	M	A,J	M	A,J
Ephippidae							
Atlantic spadefish	<i>Chaetodipterus faber</i>			F	A		
Chaetodontidae							
Reef butterflyfish	<i>Chaetodon sedentarius</i>			F	A		
Spotfin butterflyfish	<i>Chaetodon ocellatus</i>					F	A
Pomacanthidae							
Blue angelfish	<i>Holocanthus bermudensis</i>	F	A,J			F	A
Pomacentridae							
Beaugregory	<i>Pomacentrus leucostictus</i>	M	A,J	M	A,J		
Sergeant major	<i>Abudefduf saxatilis</i>					F	A
Yellowtail reeffish	<i>Chromis enchrysurus</i>	M	A	F	A		

Family/ Common Name	Species	2009		2008		2007	
		Abundance	Size	Abundance	Size	Abundance	Size
Labridae							
Bluehead wrasse	<i>Thalassoma bifasciatum</i>			F	A		
Hogfish	<i>Lachnolaimus maximus</i>			F	A		
Painted wrasse	<i>Halichoeres caudalis</i>	S	A				
Slippery dick	<i>Halichoeres bivittatus</i>	M	A,J				
Spanish hogfish	<i>Bodianus rufus</i>	M	A,J				
Spotfin hogfish	<i>Bodianus pulchellus</i>	F	A,J	F	A,J	M	A,J
Clinidae							
Hairy blenny	<i>Labrisomus nuchipinnus</i>			F	A		
Acanthuridae							
Doctorfish	<i>Acanthurus chirurgus</i>	F	A				
Scaridae							
Stoplight parrotfish	<i>Sparisoma viride</i>	S	J				
Scombridae							
Little tunny	<i>Euthynnus alletteratus</i>					F	J
Scorpaenidae							
Spotted scorpionfish	<i>Scorpaena plumeiri</i>	M	A	F	A		
Balistidae							
Gray triggerfish	<i>Balistes capriscus</i>	F	A			F	A,J
Tetraodontidae							
Bandtail puffer	<i>Sphoeroides spengleri</i>			M	A	F	A,J
Diodontidae							
Porcupine fish	<i>Diodon hystrix</i>	S	A				
	Total	30		28		24	

Abundance Key: S=single, F=few (2-10), M=many (11-100), A=abundant (>100)

Size Key: A=adult, J=juvenile, A/J=intermediate

Table 12. Railroad Tie Patches Artificial Reef fish census.

3.8 KD Select Artificial Reef

- Location: Sirotkin Reef
- Materials: Concrete, steel
- Maximum Depth: 129 feet
- Reef High Point: 117 feet
- Year Created: 2007
- Monitoring Date: 12/20/2008, 10/10/2009

3.8.1 History of the KD Select Artificial Reef

This artificial reef was deployed in 120 feet of water in July 2007 along the southern boundary of the Sirotkin Artificial Reef area. The reef was created using approximately 537 tons of waste concrete recovered from the Martin County landfill and stockpiled until enough material was available to create several artificial reefs at once. This reef was named by a local diver and marine services specialist who has worked on Martin County's artificial reef program for three decades.