

Family/Common Name	Species	2013	
		Abundance	Size
Beaugregory	<i>Stegastes leucostictus</i>	M	A
Yellowtail reeffish	<i>Chromis enchrysurus</i>	M	A
<b>Labridae</b>			
Slippery dick	<i>Halichoeres bivittatus</i>	A	A
Spanish hogfish	<i>Bodianus rufus</i>	F	A
<b>Clinidae</b>			
Hairy blenny	<i>Labrisomus nuchipinnus</i>	M	A
<b>Tetraodontidae</b>			
Bandtail puffer	<i>Sphoeroides spengleri</i>	F	A
Sharpnose puffer	<i>Canthigaster rostrata</i>	F	A
<b>TOTAL</b>		<b>31</b>	

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 20. Kyle’s Crossbar Reef Benthic Species Census**

	Common Name	Scientific Name
<b>Cnidarians</b>	Sea Anemones	<i>Aptasia sp.</i>
<b>Crustaceans</b>	Caribbean Spiny Lobster	<i>Panulirus argus</i>
<b>Mollusca</b>	Rock snails	<i>Muricidae (Unidentified species)</i>
	Octopus - Caribbean Reef	<i>Octopus briareus</i>
<b>Porifera</b>	Encrusting Sponge	<i>Halisarca sp.</i>
<b>Polychaeta</b>	N/A	<i>Spirorbidae</i>

## 5.5 FIVE PEAKS PATCH – BLUE SITE

- Location: Sirotkin Reef
- Materials: Concrete Railroad Ties
- Maximum Depth: 98 feet
- Blue Reef High Point: 92 feet
- Year Created: 2004
- 2009 Monitoring Date: 10/2/2009
- 2013 Monitoring Date: 09/05/2013
- Total Cost: \$10,500 (75% FWC grant (03048) & 25% Martin County)

### 5.5.1 History of the Five Peaks Patch - Blue

As part of a FWC construction grant and with additional funding from Martin County, this 5-unit, color coded patch reef is comprised of donated concrete railroad ties (from the Florida East Coast Railroad Company), and was constructed in late June 2004. Each of the five sites or “peaks” (Pink, Black, Black, Orange and Yellow) are composed of roughly +300 tons of railroad ties (11ft X 14ft X 10”), 924 ties, with each tie weighting approximately 600 to 700 pounds. Distances vary between the peaks, but average 120 feet on center between clusters. Colored nylon tie wraps were added to the top of each pile to help identify each site, and aid in future monitoring efforts. Refer to Figure 20 for all five-peak locations. The “Blue” site was selected for 2013 monitoring.

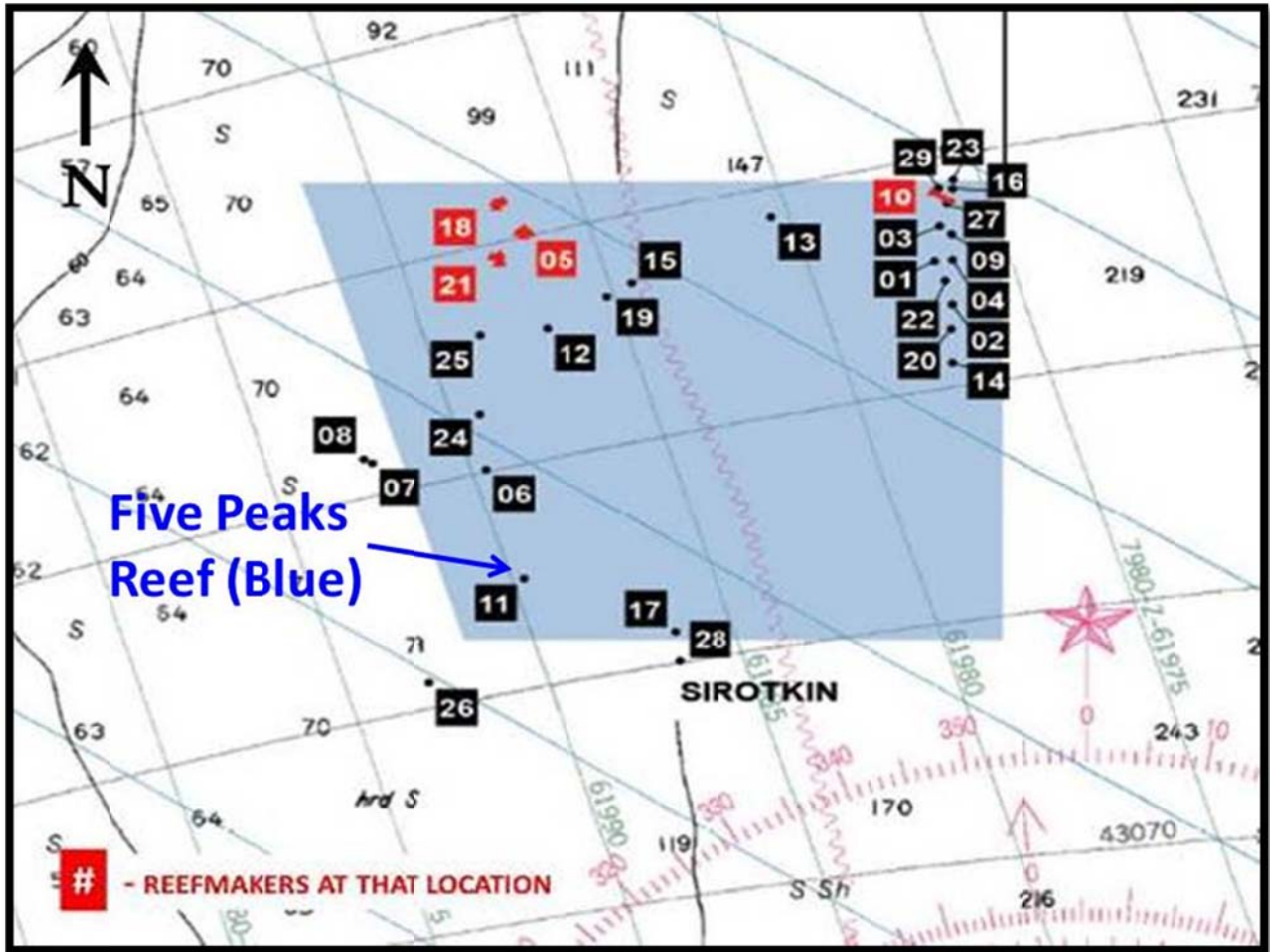


Figure 20. Chart of the Sirotkin Reef site showing the Five Peaks Patch - Blue location.

### 5.5.2 Structural Summary

According to Martin County's records, each of the five reef patches is comprised of approximately 924 railroad ties per peak. Due to the elongated shape and high relative mass of the railroad ties, each peak forms an interlocking and stable cone-shaped heap of concrete railroad ties. Each reef pile forms a circle about 50 feet in diameter with an average vertical profile of 6 feet.

The placement pattern for the Five Peaks' sites is shown in Figure 21. The entire site is roughly diamond-shaped, with one central unit surrounded by the remaining four, spaced approximately 100 feet apart. Color coded zip ties were attached to the top of each unit during deployment to simplify identification of individual units during monitoring.

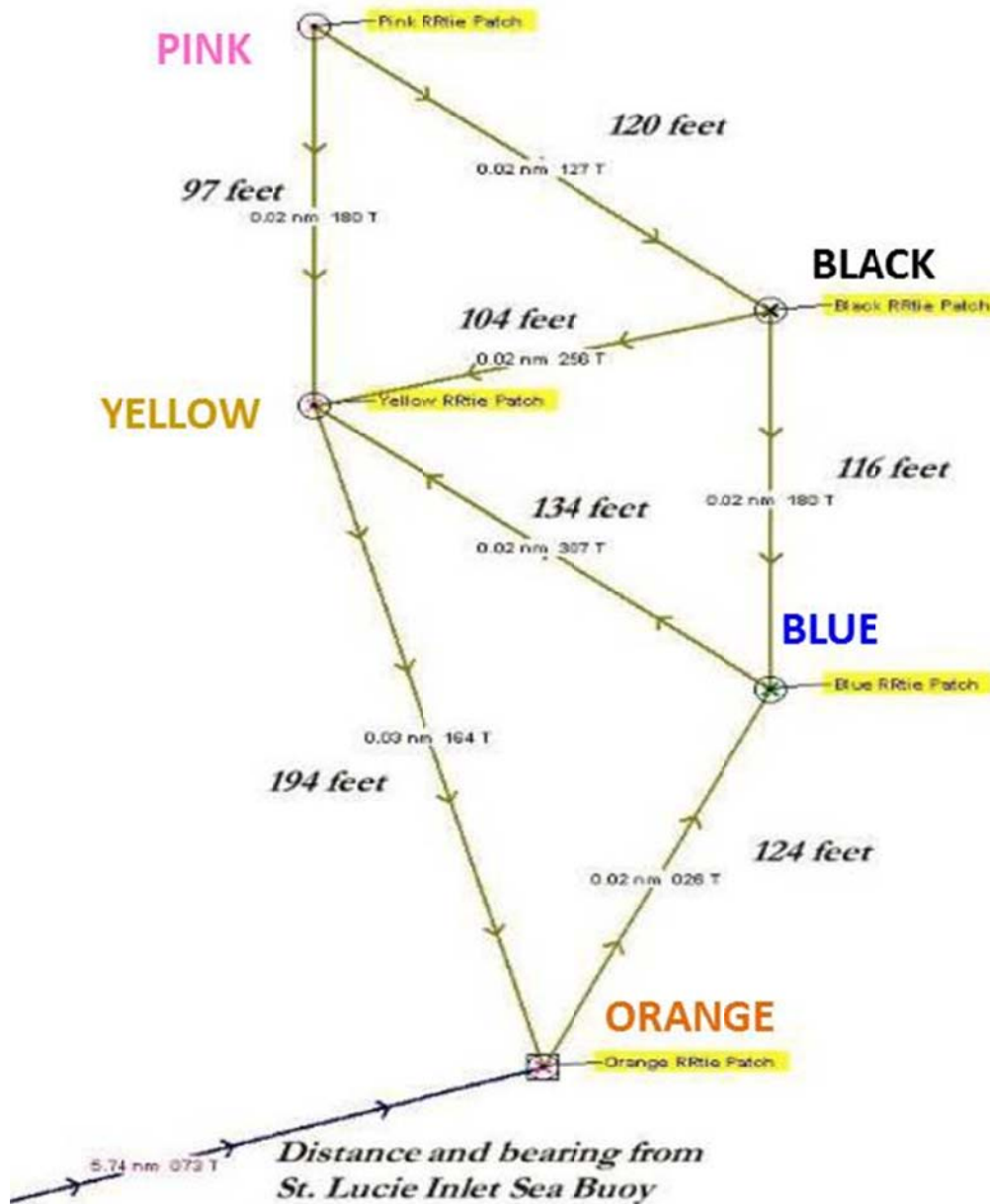


Figure 21. Chart Configuration of the Five Peaks Patch. The “Blue Patch” (one of the Five Peaks) was monitored in 2013.

Refer to Table 21 for the recorded depths from 2013, as well as recorded depths from 2004-2006 (by others).

Table 21. Comparison of Five Peak Patch – Blue, Recorded Depths, 2004 (by others) to 2013.

Location	2013 (ft)	2006 (ft) By others	2005 (ft) By others	2004 (ft) By others
Seafloor Depth	98	99	99	93
Profile Height	6	9	9	15

According to County records, the original deployment depth for the Blue site was recorded at 99ft with a reef crest of 90ft. In comparing our 2013 structural data with past monitoring efforts (by others) and the County’s records, the site has experienced some minor shifting of sands, as well as change in the crest height. Tide could be a minor factor for this discrepancy; however, it is likely that some settlement has occurred, coupled with shifting sands. Regardless, the site appeared stable; no loose or isolated pieces were encountered or observed.

### **5.3 Biological Survey Results**

Fish surveys indicate a generally increasing trend in fish species diversity since monitoring began in 2004. Wrasses, jacks, snapper and seabass are the best represented families, but bull and reef sharks were also present. Sharks are considered “indicator species” for healthy and diverse reefs. Vast schools of round scad and blue runner were observed around and above the reef crest, typical of previous monitoring efforts. 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. Invertebrate biomass on the artificial reef has increased 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 refuge 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. Refer to Table 22, which presents the fish species observed.



**Figure 22. Five Peaks Patch Reef – Blue Site, Schools of Blue Runners, 2013**

**Table 22. Five Peaks Patch Reef – Blue Fish Species Census, 2013**

Family/Common Name	Species	2013	
		Abundance	Size
<b>Elasmobranchs</b>			
Bull shark	<i>Carcharhinus leucas</i>	F	A
Reef shark	<i>Carcharhinus perezi</i>	F	A
<b>Serranidae</b>			
Belted sandfish	<i>Serranus subligarius</i>	M	A
Black seabass	<i>Centropristis striata</i>	F	A,J
<b>Grammistidae</b>			
Whitespotted soapfish	<i>Rypticus maculatus</i>	F	A
<b>Carangidae</b>			
Blue runner	<i>Caranx chrysos</i>	A	A
Round scad	<i>Decapterus punctatus</i>	A	A
<b>Lutjanidae</b>			
Gray snapper	<i>Lutjanus griseus</i>	M	A
<b>Haemulidae</b>			
Tomtate	<i>Haemulon aurolineatum</i>	A	A,J
<b>Sparidae</b>			
Sheepshead	<i>Archosargus probatocephalus</i>	F	A
Sheepshead porgy	<i>Calamus penna</i>	F	A
<b>Sciaenidae</b>			
Highhat	<i>Equetus acuminatus</i>	S	J
Cubby	<i>Equetus umbrosus</i>	M	A,J
<b>Labridae</b>			
Slippery dick	<i>Halichoeres bivittatus</i>	M	A
<b>Scombridae</b>			
Little tunny	<i>Euthynnus alletteratus</i>	M	A
King mackerel	<i>Scomberomorus cavalla</i>	F	A
<b>Scorpaenidae</b>			
Spotted scorpionfish	<i>Scorpaena plumieri</i>	F	A,J
<b>Bothidae</b>			
Gulf flounder	<i>Paralichthys albigutta</i>	S	A
<b>Tetraodontidae</b>			
Bandtail puffer	<i>Sphoeroides spengleri</i>	F	A
Sharpnose puffer	<i>Canthigaster rostrata</i>	F	A,J
<b>TOTAL</b>		<b>20</b>	

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

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