

	<b>Common Name</b>	<b>Scientific Name</b>
<b>Mollusca</b>	Rock snails	<i>Muricidae</i> (Unidentified species)
	Wing Oyster	<i>Pteria colymbus</i>
	Black Sea Hare	<i>Aplysia morio</i>
<b>Ectoprocta</b>	Encrusting Bryozoans	Unidentified Species
<b>Ascidians</b>	Geometric Encrusting Tunicates	<i>Botryllus sp.</i>
	Bulb Tunicates	<i>Clavelina sp.</i>
	Giant Tunicates	<i>Polycarpa spongiabilis</i>
	Black Tunicates	<i>Phylusia nigra</i>
<b>Porifera</b>	White Lumpy Encrusting Sponge	<i>Ptilocaulus sp.</i>
	N/A	<i>Scopalina ruetzleri</i>
	Star Encrusting Sponge	<i>Halisarca sp.</i>

## 5.2 RALPH EVINRUDE REEF

- Location: Donaldson Reef
- Materials: Concrete (chunks, roof trusses, roadway slabs, box culverts)
- Maximum Depth: 62 feet
- Minimum Depth: 61 feet
- Reef top Depth: 50 feet
- Year Created: 2011
- 2012 Monitoring Date: 09/09/2012
- 2013 Monitoring Date: 10/10/2013
- Total Cost: \$18,000 (FWC grant 10160 33% & Martin County 67%)

### 5.2.1 History of the Ralph Evinrude Reef

The materials utilized to build the Ralph Evinrude Reef were comprised of reinforced concrete debris primarily from the Ralph Evinrude Science Building on the former site of the Jensen Beach campus of the Florida Institute of Technology. Refer to Figure 9 for a chart showing the location of the Ralph Evinrude Reef within the Donaldson site.

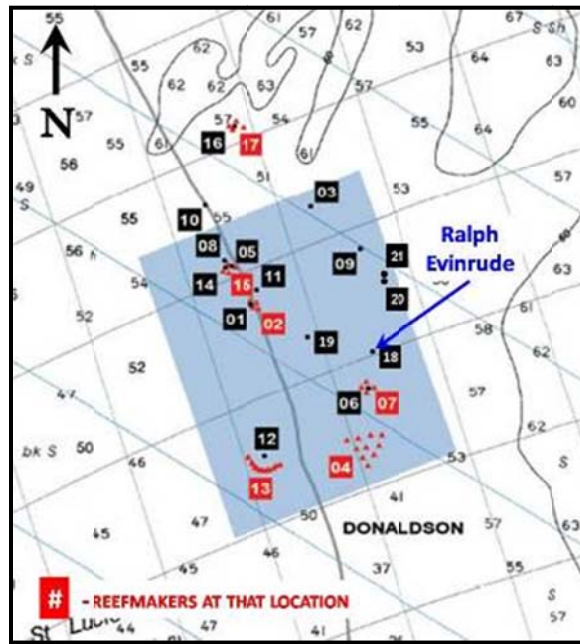


Figure 9. Chart of the Donaldson Reef site showing the Ralph Evinrude Reef location.

### 5.2.2 Structural Summary

This reef is comprised of approximately 154 pieces of varying sizes and shapes of concrete, the equivalent of 507 tons. When the contractor dismantled the Ralph Evinrude Science building, he demonstrated caution while removing the large roof concrete trusses without breaking them. These trusses are still mostly intact; with one end in particular covered in benthic growth.

Similar to the Lee Harris reef configuration, the Evinrude reef has remained stable, likely due to the interlocking and complex arrangement of mixed shapes and sizes of the materials used to create this reef. It is anticipated that the components will continue to perform well resisting wave forces from significant storm events. On other artificial reefs at this depth range and with similar level of complexity, very little movement has occurred as documented from past monitoring efforts, even during the Category 2 and 3 hurricanes that passed through the Martin County waters in 2004 and 2005. Refer to Table 12 for the depth measurements.

Table 12. Summary of Depth measurements at the Ralph Evinrude Reef.

Direction	Distance from reef high point to the perimeter (ft)	Perimeter Depth (ft)	Depth at 25 ft from perimeter (ft)
North	31	62	62
East	30	61	62
South	22	61	63
West	49	62	63

Note – Reef top depth was recorded via dive computer to be 50ft.

According to County's MPR, the original deployment depth for the Ralph Evinrude was recorded at 56ft with a maximum material height of 14ft. In comparing our 2013 structural data with the County's deployment data, the site has experienced scouring, as well as a 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.

### **5.2.3 Biological Survey Results**

Similar to the Lee Harris reef (complexity, depth and age) the Ralph Evinrude Reef had many finfish species identified during this first annual monitoring effort. We observed forty nine (49) fish species, and visibility was excellent (+50ft). The following photographs show the general condition of the Ralph Evinrude Reef observed during the monitoring dive.



**Figure 10. Ralph Evinrude Reef, Porkfish and Tomtates (2013).**



**Figure 11. Ralph Evinrude Reef, Sheephead, Porkfish, Black Seabass & Tomtates (2013).**



**Figure 12. Ralph Evinrude Reef, Speared Lionfish, 2013 .**

The benthic diversity for this newly deployed artificial reef was extremely impressive, with forty nine (49) different species observed attached to the concrete substrate, as well as inhabiting the many voids and crevices. Numerous sea cucumbers, urchins, spiny lobsters, bristleworms and arrow crabs were seen foraging about the structure where tunicates, encrusting sponges, and anemones covered a majority of the exposed substrate. Table 13 lists fish and species/taxa, their relative abundance and size class (adult, intermediate, and juvenile) while Table 14 lists the benthic species observed during the monitoring dive. Unfortunately, we also noted the presence of several lionfish, which is consistent with nearly all of the other 2013 monitoring sites. As shown in Figure 12, we were successful in removing lionfish with a spear.

**Table 13. Ralph Evinrude Reef Fish 2013 Species Census**

Family/Common Name	Species	2013	
		Abundance	Size
<b>Muraenidae</b>			
Purplemouth moray	<i>Gymnothorax vicinus</i>	S	A
Spotted moray	<i>Gymnothorax moringa</i>	S	A
<b>Clupeidae</b>			
Spanish sardine	<i>Sardinella aurita</i>	A	A
<b>Centropomidae</b>			
Snook	<i>Centropomus undecimalis</i>	M	A
<b>Serranidae</b>			
Belted sandfish	<i>Serranus subligarius</i>	M	A
Black seabass	<i>Centropristis striata</i>	F	A,J
Gag grouper	<i>Mycteroperca microlepis</i>	S	J
Goliath grouper	<i>Epinephelus itajara</i>	S	A
Sand perch	<i>Diplectrum formosum</i>	F	A,J
Scamp	<i>Mycteroperca phenax</i>	F	J
<b>Apogonidae</b>			
Twospot cardinalfish	<i>Apogon pseudomaculatus</i>	F	A
<b>Grammistidae</b>			
Whitespotted soapfish	<i>Rypticus maculatus</i>	F	A
<b>Carangidae</b>			
Amberjack	<i>Seriola dumerili</i>	F	A
Atlantic bumper	<i>Chloroscombus chrysurus</i>	A	A
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
Lane snapper	<i>Lutjanus synagris</i>	F	A,J
Yellowtail snapper	<i>Ocyurus chrysurus</i>	F	A
<b>Haemulidae</b>			
Black margate	<i>Anisotremus surinamensis</i>	F	A
Cottonwick	<i>Haemulon melanurum</i>	F	A
Pigfish	<i>Orthopristis chrysoptera</i>	A	A
Porkfish	<i>Anisotremus virginicus</i>	F	A,J
Tomtate	<i>Haemulon aurolineatum</i>	A	A,J
White margate	<i>Haemulon album</i>	F	A
<b>Sparidae</b>			
Jolthead porgy	<i>Calamus bajonado</i>	S	A
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
Cubbyu	<i>Equetus umbrosus</i>	M	A,J
<b>Chaetodontidae</b>			

Family/Common Name	Species	2013	
		Abundance	Size
Reef butterflyfish	<i>Chaetodon sedentarius</i>	F	A
<b>Pomacanthidae</b>			
Blue angelfish	<i>Holocanthus bermudensis</i>	S	A
French angelfish	<i>Pomacanthus paru</i>	S	J
<b>Pomacentridae</b>			
Beaugregory	<i>Stegastes leucostictus</i>	F	A,J
Bicolor damselfish	<i>Stegastes partitus</i>	S	A
Blue chromis	<i>Chromis cyaneus</i>	F	A
Cocoa damselfish	<i>Stegastes variabilis</i>	M	A
Yellowtail reeffish	<i>Chromis enchrysurus</i>	A	A,J
<b>Labridae</b>			
Slippery dick	<i>Halichoeres bivittatus</i>	M	A
Spanish hogfish	<i>Bodianus rufus</i>	F	A
<b>Sphyraenidae</b>			
Guaguanche	<i>Sphyraena guachancho</i>	A	A
<b>Clinidae</b>			
Hairy blenny	<i>Labrisomus nuchipinnus</i>	F	A
<b>Acanthuridae</b>			
Blue tang	<i>Acanthurus coeruleus</i>	S	J
Doctorfish	<i>Acanthurus chirurgus</i>	F	A
<b>Scorpaenidae</b>			
Lionfish	<i>Pterois sp.</i>	M	A, J
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>49</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 14. Ralph Evinrude Reef Benthic Species Census.**

	<b>Common Name</b>	<b>Scientific Name</b>
<b>Echinoderms</b>	Rock Boring Urchin	<i>Echinometra lucunter</i>
	3 Rowed Sea Cucumber	<i>Isostichopus badionotus</i>
<b>Cnidarians</b>	Sea Anemones	<i>Aptasia sp.</i>
	Hydroids	Unidentified species
	Algae Hydroids	<i>Thyroscyphus ramosus</i>
<b>Ascidians</b>	Overgrowing Mat Tunicates	<i>Trididemum solidum</i>
	Giant Tunicates	<i>Polycarpa spongiabilis</i>
	White Speck Tunicates	<i>Didemnum conchyliatum</i>
<b>Crustaceans</b>	Yellowline Arrow Crab	<i>Stenorhynchus seticornis</i>
	Giant Hermit Crab	<i>Petrochirus diogenes</i>
	Spiny lobster	<i>Panulirus argus</i>
<b>Mollusca</b>	Rock Snails	<i>Muricidae</i> (Unidentified Species)
<b>Ectoprocta</b>	Encrusting Bryozoans	Unidentified Species
<b>Polychaeta</b>	N/A	<i>Spiroridae</i>
<b>Porifera</b>	Star Encrusting Sponge	<i>Halisarca sp.</i>
	N/A	<i>Clathria sp.</i>