

## 5.0 MONITORING RESULTS

The following sections summarize the monitoring results for the 2012 selected reefs. A brief history and description of each reef is followed by structural details and biological survey results, along with photographs.

### 5.1 CEMENT BARGE - 4 REEFMAKERS

- Location: Donaldson Reef
- Materials: Barge (Steel) & 4 concrete and steel Reefmaker units
- Maximum Depth: 62 feet
- Reef High Point: 52 feet
- Year Created: 1984, Reefmakers deployed in 2005
- Monitoring Date: 09/18/2012
- Total Cost: \$3,180 (FWC 89% & Martin County 11%)

#### 5.1.1 History of the Cement Barge - 4 Reefmakers

The Cement Barge was deployed in January 1984 in the Donaldson Permitted Area, approximately 3.5 nm East Northeast of the St. Lucie Inlet, and sits upright in 60 feet of water. It is called the “Cement Barge” because it was deployed with several Rinker/Cement Mixer barrels on top of it that, during deployment, rolled off and settled on the Northeast side of the barge. Most of them remain in that same area to this day. In 2005, as part of an FWC grant, Martin County deployed four Reefmaker “Florida Special” artificial reef units around the Cement Barge site to enhance and diversify the existing reef site.

The Cement Barge site is one of four barge sites within Donaldson where four Reefmaker units were placed approximately 100 feet to the north, south, east and west of each barge. One colored zip tie was attached to each reef unit to mark the Reefmaker units deployed around the barges to assist divers with identifying and photo documenting the individual units during monitoring efforts. The following color code was used: blue - reef unit to north, red - reef unit to west, green - reef unit to east, yellow - reef unit to south.

Figure 5 shows a chart with the location of the Cement Barge and the Reefmaker units surrounding the barge. A chart showing the placement of the units around the Cement Barge location is shown in Figure 6.

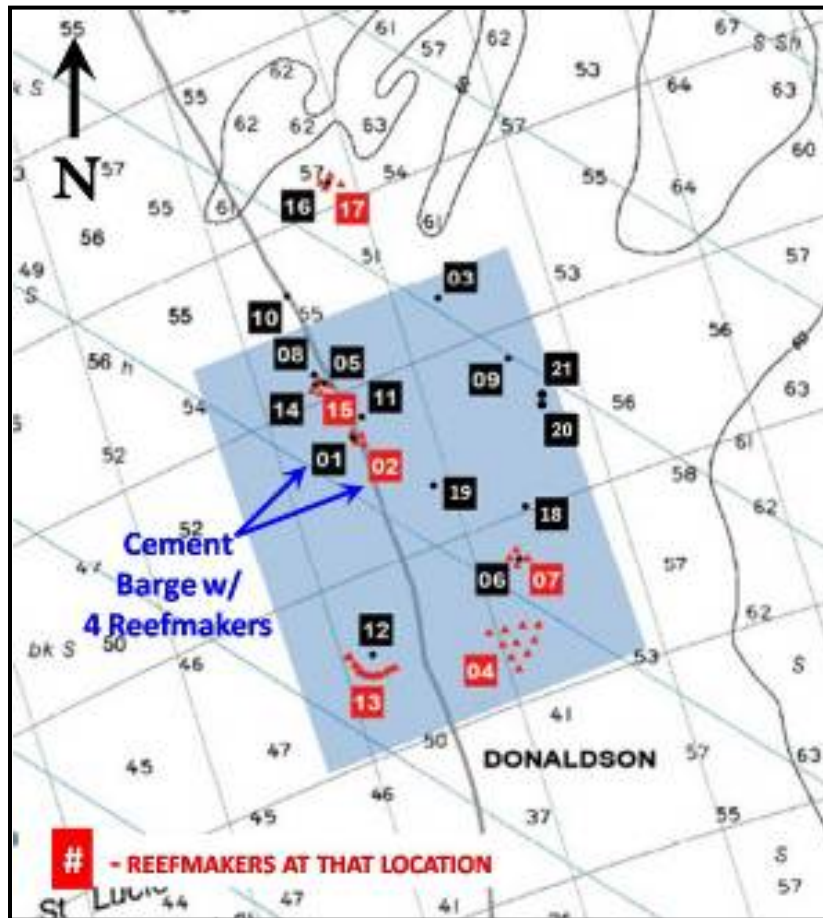


Figure 5. Chart of the Donaldson Reef site showing the Cement Barge and Reefmakers location.

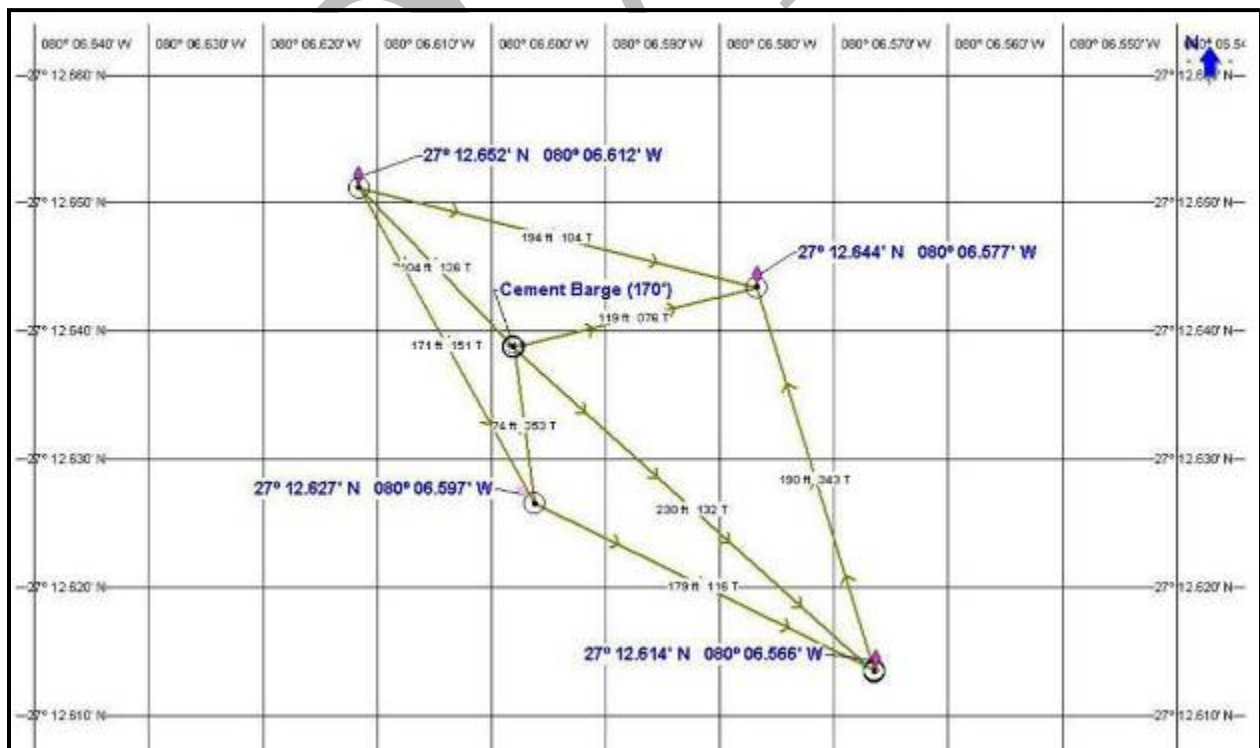


Figure 6. Chart view of the Cement Barge and 4 Reefmaker units.

### 5.1.2 Structural Summary

During the 2012 monitoring effort, divers checked for evidence of stability and settlement of the Reefmaker units surrounding the Cement Barge site. This was done by visually inspecting the steel and concrete, and by physically grasping the steel bars and tugging on them. In addition, measurements of seafloor depths were recorded immediately adjacent to the bases and offset 25 feet from the units. All of the exposed steel bars were assessed in overall good condition, except those portions closest to the seafloor (approximately within 18 inches). At those areas, corrosion and erosion damage is likely due to wave surge and shifting sands, which occurs almost continuously at shallow depths. In contrast, the Reefmaker units located in deeper sites (+100 ft) do not experience this level of erosive forces.

Because of shifting sediments in this area, some sides of the concrete bases were almost buried. In our opinion, this is a seasonal occurrence, and is not cause for concern when evaluating the overall effectiveness of the Reefmaker units. The photographs in Figure 7 show the general condition of the Reefmaker units surrounding the Cement Barge site.



Figure 7. Cement Barge – 4 Reefmakers 2012 photographs.

### 5.1.3 Biological Survey Results

Although the Cement Barge has been underwater since 1984 and is abundant with many fish species, at this time, monitoring was limited to the 4 Reefmaker sites, and 23 species were observed, identified and photographed. Of the 23 fish species, 5 are considered important recreational and food value species, as well as baitfish species. Unfortunately, a few Lionfish were observed on the Martin County Artificial Reefs. Table 8 lists the fish species census, including relative abundance and size class (adult, intermediate, and juvenile). Table 9 lists the benthic species that were present. Species identified in Figure 7, clockwise from the top left are (1) none, (2) atlantic spadefish, (3) none, and (4) atlantic spadefish.

Table 8. Cement Barge - 4 Reefmakers Fish Species Census.

Family/Common Name	Species	2012
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		Abundance	Size
<b>Carangidae</b>			
Blue runner	<i>Caranx crysos</i>	A	A
Permit	<i>Trachinotus falcatus</i>	S	A
<b>Chaetodontidae</b>			
Spotfin Butterflyfish	<i>Chaetodon ocellatus</i>	F	A
<b>Clupeidae</b>			
Fry	<i>Unidentified species</i>	A	J
<b>Ephippidae</b>			
Atlantic spadefish	<i>Chaetodipterus faber</i>	F	J
<b>Haemulidae</b>			
Tomtate	<i>Haemulon aurolineatum</i>	M	J & A
Porkfish	<i>Anisotremus virginicus</i>	M	J & A
<b>Labridae</b>			
Spanish hogfish	<i>Bodianus rufus</i>	S	A
Slippery dick	<i>Halichoeres bivittatus</i>	F	J & A
<b>Labrisomidae</b>			
Hairy blenny	<i>Labrisomus nuchipinnis</i>	F	J & A
<b>Lutjanidae</b>			
Gray snapper	<i>Lutjanus griseus</i>	F	A
<b>Pomacanthidae</b>			
Blue angelfish	<i>Holacanthus bermudensis</i>	S	A
<b>Pomacentridae</b>			
Beaugregory	<i>Pomacentrus leucostictus</i>	F	J
<b>Sciaenidae</b>			
High hat	<i>Equetus acuminatus</i>	F	J
<b>Scorpaenidae</b>			
Red Lionfish	<i>Pterois volitans</i>	F	J
<b>Serranidae</b>			
Belted sandfish	<i>Serranus subligarius</i>	F	J & A
Gag grouper	<i>Mycteroperca microlepis</i>	F	J
Goliath grouper	<i>Epinephelus itajara</i>	F(2)	A
Whitespotted soapfish	<i>Rypticus maculatus</i>	F	A
<b>Sparidae</b>			
Sheepshead	<i>Archosargus probatocephalus</i>	F	A
Sheepshead porgy	<i>Calamus penna</i>	F	A
<b>Tetraodontidae</b>			
Bandtail puffer	<i>Sphoeroides spengleri</i>	F	A
Sharpnose puffer	<i>Canthigaster rostrata</i>	F	J
	<b>Total</b>	<b>23</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 9. Cement Barge - 4 Reefmakers Benthic Species Census.**

	Common Name	Scientific Name
<b>Echinoderms</b>	Rock Boring Urchin	<i>Echinometra lucunter</i>
<b>Cnidarians</b>	Algae Hydroids	<i>Thyroscyphus ramosus</i>
<b>Crustaceans</b>	Volcano Barnacle	<i>Tetraclita stalactifera</i>
<b>Porifera</b>	N/A	<i>Batzella spp.</i>