

2008 First Annual Monitoring
Civic Center Reef Deployed in Jan-Feb 2007
Offshore St. Lucie County, FL



Photo of Goliath Grouper, baitfish, and structure of the Civic Center Reef

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2008 First Annual Monitoring of the Civic Center Reef Deployed in Jan-Feb 2007 Offshore St. Lucie County, FL

1 Introduction

This report presents the first annual monitoring surveys of the Civic Center Reef deployed during January and February 2007 offshore St. Lucie County in Reef Site #2. This work was performed for St. Lucie County (SLC), with funding support from the Florida Fish and Wildlife Conservation Commission (FWC), the St. Lucie County Board of County Commissioners (SLCBOCC), and the Boating Improvement Program Grant. The primary objectives of this project were to:

- verify and document reef locations,
- document biological activity (benthic and pelagic communities,) and
- evaluate engineering performance (stability and condition of the reef materials, scour and settlement, etc.).

Figure 1 shows the locations of the three artificial reef sites offshore of St. Lucie County. The Civic Center Reef was placed in Site #2, which is also known as the “Nearshore Site” and as the “Fishing Club” Site. This artificial reef area is a 1-mile square area located 6.3 miles SE of Ft. Pierce Inlet, with water depths ranging from 50 feet of water depth on the western boundary to 62 feet deep on the eastern boundary. The bottom is a mix of soft fine sand and coarse sand with shell fragments, and no natural reefs or hardbottom areas have been located in this area. Over the years the Fort Pierce Sportfishing Club, St. Lucie County, Florida FWC & DOT, and others have utilized this site to deploy artificial reef materials.

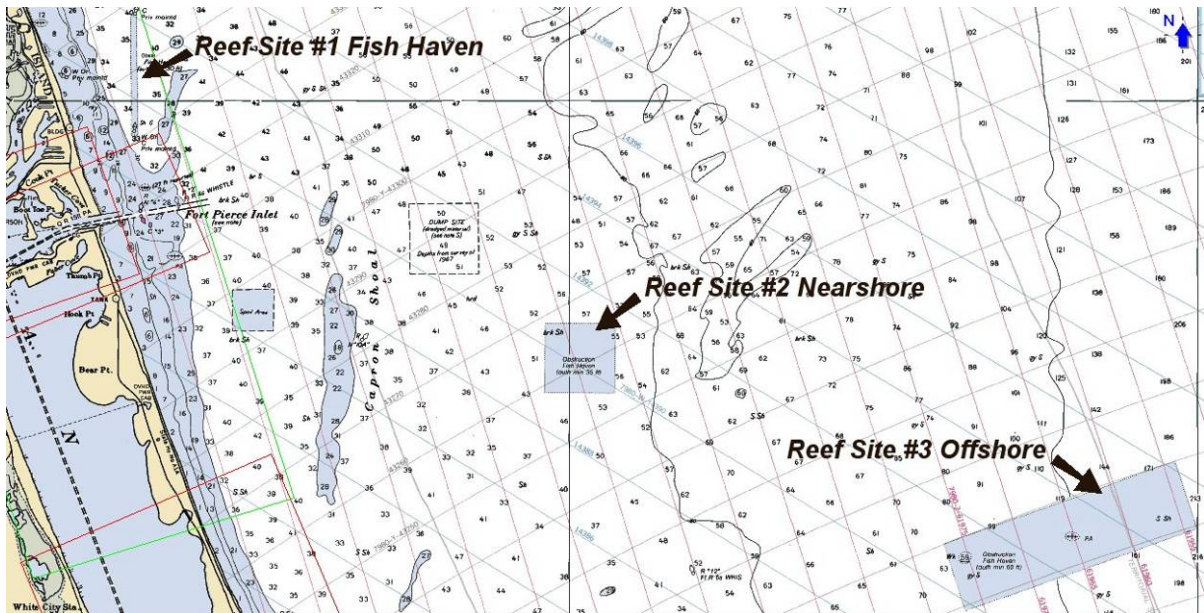


Figure 1. St. Lucie County Offshore Artificial Reef Sites

2 Methodology

The field work was performed by divers using visual techniques plus still and video underwater photography of the reef areas. Dr. Lee Harris and Kerry Dillon performed the field work and report writing for this report, with additional divers employed to assist with the field work. The field work is described as follows:

Physical reef structure – diver inspections and measurements were made to determine changes in the reef structure, including scour, settlement, horizontal extent, and movement of reef components. This was accomplished by repeating survey measurements taken on past monitoring surveys. Reef structure depths were measured using dive computers for measurements of the bottom and both the highest and average depths of the reef materials. The natural bottom depths away from the reefs were compared to the maximum depths adjacent to the reefs to assess scour, and changes in the reef heights were used to assess settlement of the materials. Distance measurements of the horizontal extent of the reefs were made using a tape measure. Divers also released buoys on tight lines to the surface at key locations in order to get GPS coordinates with the boat.

Biological surveys – data collection methods included roaming diver fish counts to assess the relative fish species diversity and quantities. Fish census surveys were conducted using the Roving Diver underwater visual assessment method (Schmitt and Sullivan 1996). Data were recorded on waterproof slates during the reef assessments. Dive data such as date and time, bottom time, depth, and water temperature were recorded. The relative abundance for each species was recorded based on the numbers observed, which can be described by the following categories:

- ‘A’ for abundant, (over 100 individuals);
- ‘M’ for many (from 11 to 100) individuals;
- ‘F’ for few, (from 2 to 10 individuals); and
- ‘S’ for a single individual of that species.

Photo-documentation – underwater digital still and video cameras were used to document the reefs’ condition and observations made during the dives. These were used to compare with still and video photographs taken in prior reef surveys. Representative photographs are included in this report, with a copy of all photographs and video submitted on CD.

Backup photographic equipment was available during each diving day, so that additional equipment was available in the event of equipment failure. Post-deployment reports from prior years were reviewed prior to performing the field work, and slates were prepared in advance with sketches of the dive sites and tables for recording measurements and observations. All data taken during each dive was thoroughly reviewed on the boat following each dive, and data was transferred into field books to assure that correct and complete data were recorded and saved. Data collected from the dive was compared to previous years’ data to ensure reasonableness of the data.

3 Reef Locations

The location of the Civic Center Reef is shown on the chart in Figure 2. The Sterling Barge was deployed in May 2006, and subsequently two barge loads of 500-tons each of materials were deployed on top of the barge in January and February 2007. These consist of (in chronological order of the deployments):

- 5/15/06 – Sterling Barge, one steel barge 140'x40' deployed upside down
- 1/13/07 –555 tons of concrete materials (pilings and light poles)
- 2/7/07 –539 tons of concrete materials (largely culverts)

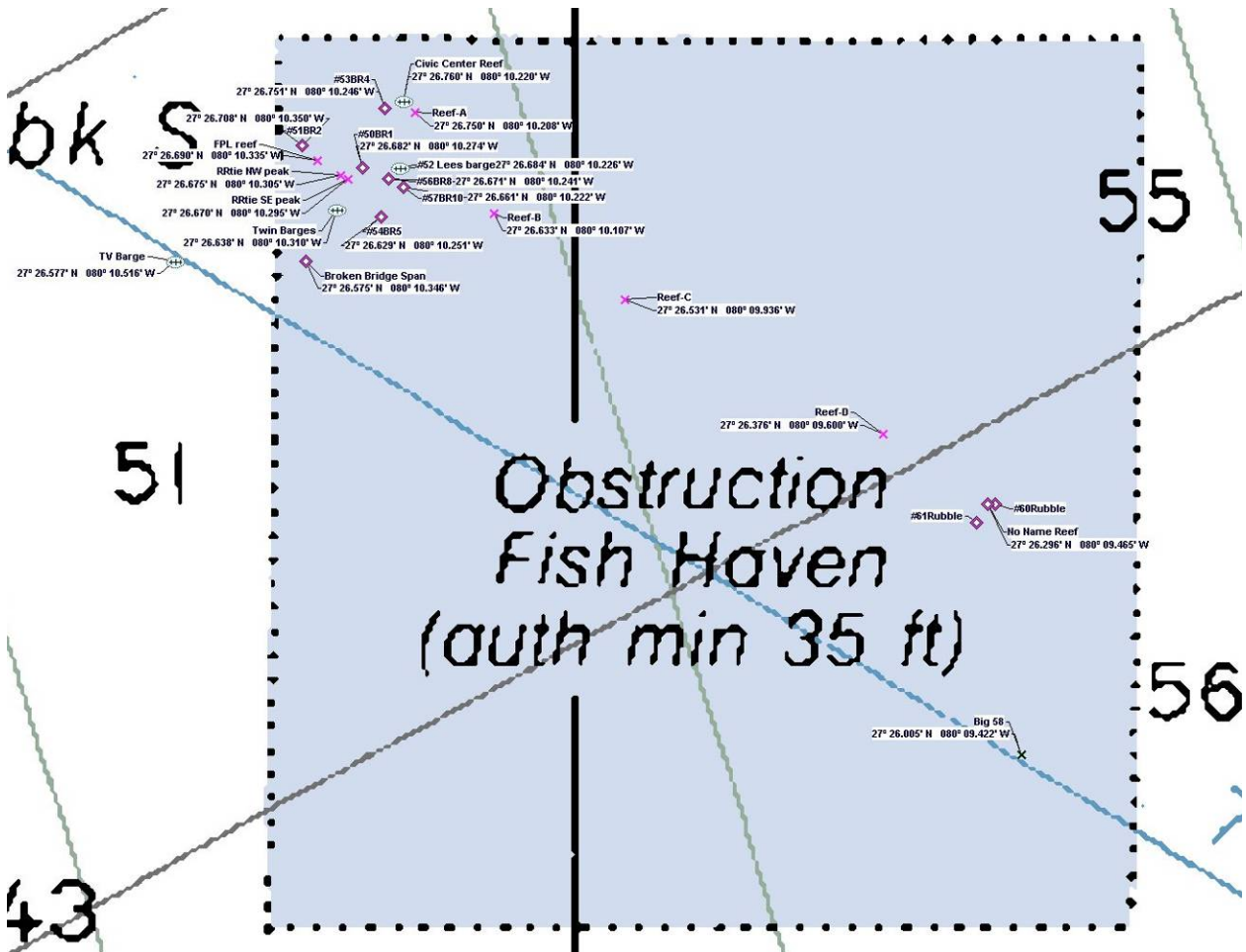


Figure 2. Chart of St. Lucie County Artificial Reef Site #2

Table 1 summarizes all of the known artificial reef sites in the St. Lucie County Nearshore Reef Site #2. Figure 3 shows an enlarged chart of the NW corner of Site #2.

Table 1. Materials in St. Lucie County Artificial Reef Site #2

<i>Name</i>	<i>Latitude(N)</i>	<i>Longitude(W)</i>	<i>Water Depth</i>	<i>Top Depth</i>	<i>Deploy Date</i>	<i>Materials and Orientation</i>
Twin Barges – larger barge,	27° 26.651'	080° 10.312'	55'	49'	June 1995	steel barge, 100x40x8, lies E-W 100°
Twin Barges – smaller barge,	27° 26.638'	080° 10.310'	56'	49'	Jan. 1995	steel barge, 61x31x12, lies NW-SE 150°
#50BR1 - lies E-W	27° 26.682'	080° 10.274'	54'	50'	March 2001	concrete bridge span, lies E-W
#51BR2 -, top slopes down to W	27° 26.708'	080° 10.350'	54'	48'E, 50'W	March 2001	concrete bridge span, lies N-S
#52Lees barge – 90x34x8 lies N-S	27° 26.684'	080° 10.226'	56'	48'	unknown	steel barge lies N-S
#53BR4 northernmost span	27° 26.751'	080° 10.246'	53'	49'	Marc, 2001	concrete bridge span, lies SE-NW
#54BR5 - lies E-W	27° 26.629'	080° 10.251'	54'	50'	March 2001	concrete bridge span, lies E-W
#55BR7 - 2 PVC pipes inside	27° 26.672'	080° 10.235'	55'	50'	March 2001	concrete bridge span, lies E-W
#56BR8 - concrete slab inside	27° 26.671'	080° 10.241'	53'	47'	March 2001	concrete bridge span, lies N-S 190o
#57BR10, lies E-W (same as #55BR7)	27° 26.661'	080° 10.222'	55'	50'	March 2001	concrete bridge span, lies E-W
Broken Bridge Span, E end broken	27° 26.575'	080° 10.346'	54'	48'	March 2001	broken bridge span, lies E-W 80°
TV barge - steel barge remains	27° 26.577'	080° 10.512'	53'	46'	unknown	68'x44', lies N-S, tilted down to W
Sterling barge bow	27° 26.743'	080° 10.214'	56'	46'	May 2006	140' steel barge
Sterling barge stern	27° 26.777'	080° 10.229'	56'	46'	May 2006	140' steel barge
No Name Reef	27° 26.311'	080° 09.470'	58'	47'	mid 1990's	FPL mixed concrete and steel materials
RRtie NW peak	27° 26.675'	080° 10.305'	50	37	Aug-05	RRties
RRtie SE peak	27° 26.670'	080° 10.295'	50	39	Aug-05	RRties
FPL reef materials	27° 26.689'	080° 10.339'	55	35	Sep-05	480 tons concrete
Reef - A	27° 26.750'	080° 10.208'	52	46	May-06	523 tons concrete culverts & mixed materials
Reef - B	27° 26.633'	080° 10.107'	55	44	May-06	572 tons concrete dock piles
Reef - C	27° 26.531'	080° 09.936'	57	50	May-06	515 tons concrete culverts & mixed materials
Reef - D	27° 26.402'	080° 09.601'	54	46	May-06	490 tons concrete dock piles
Civic Center Reef	27° 26.743'	080° 10.214'	56'	35'	Jan 2007	555 tons concrete Civic Center materials
Civic Center Reef	27° 26.777'	080° 10.229'	56'	31'	Feb 2007	539 tons concrete culverts and mixed materials

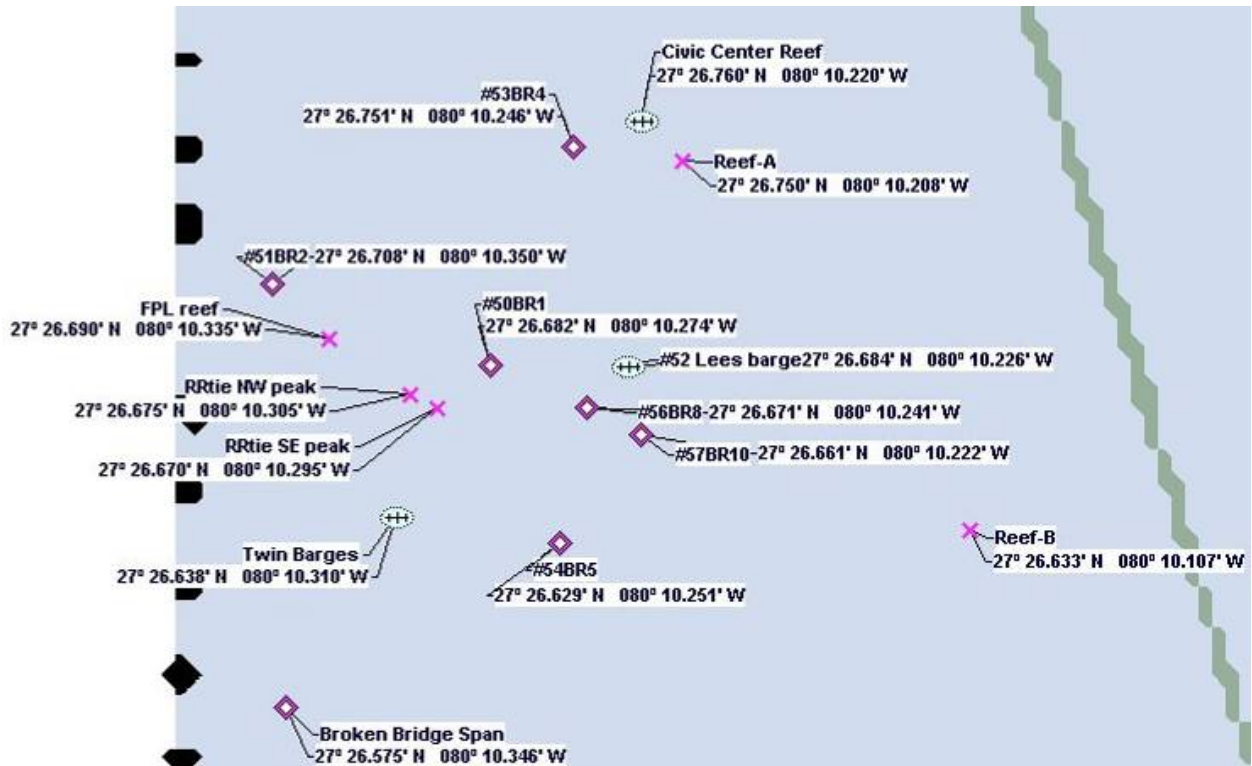


Figure 3. Chart of NW Portion of St. Lucie County Nearshore Artificial Reef Site #2

4 History of the Civic Center Deployment

The Sterling Barge was deployed beginning on May 10, 2006 (Figure 4) but ended up resting on her side. On May 15, 2006 she was righted, but ended up resting upside down on the bottom.



Figure 4. Sterling Barge Deployment

On January 31, 2007 555 tons of concrete materials, including the demolition of the Fort Pierce Civic Center, were deployed on top of the barge. On February 7, 2007 another 539 tons of mixed concrete materials, including a large number of concrete culverts, were added to the reef.

5 2008 First Annual Monitoring

Post-deployment monitoring of the Civic Center Reef was performed during March 2007 with additional dives on the site during the summer of 2007. The first annual monitoring of the Civic Center Reef was performed on May 23, 2008, 15 months following the last deployment, with the conditions summarized below:

- Maximum water depth = 56 feet
- Reef crest depth = 37 feet
- Maximum reef relief = 19 feet
- Surface water temperature = 75F
- Bottom water temperature = 72F
- Thermocline depth = 22 feet
- Current = less than 0.25 knots from South
- Visibility = 30 feet

A detailed underwater survey of the Civic Center Reef was performed by divers, and the survey is shown in Figure 5. The barge lies in a NW-SE orientation, with the stern to the NW and bow to the SE. Both the barge bow and stern ends are raked, so that the reef surface slopes down to the bottom at each end of the barge. Concrete light poles are found predominantly at the NW area of the reef, with concrete culverts found at the SE end. Several of the culverts are standing upright, with the majority lying on their sides or at angles resting on other reef materials. A large field of material is located NE of the SE end of the reef. Reef-A is nearby, located 140 feet to the SE (140 degrees) of the Civic Center Reef, and a concrete bridge span is located SW of the Civic Center Reef.

**St. Lucie County Artificial Reef Program
Civic Center Reef Survey May 23, 2008**

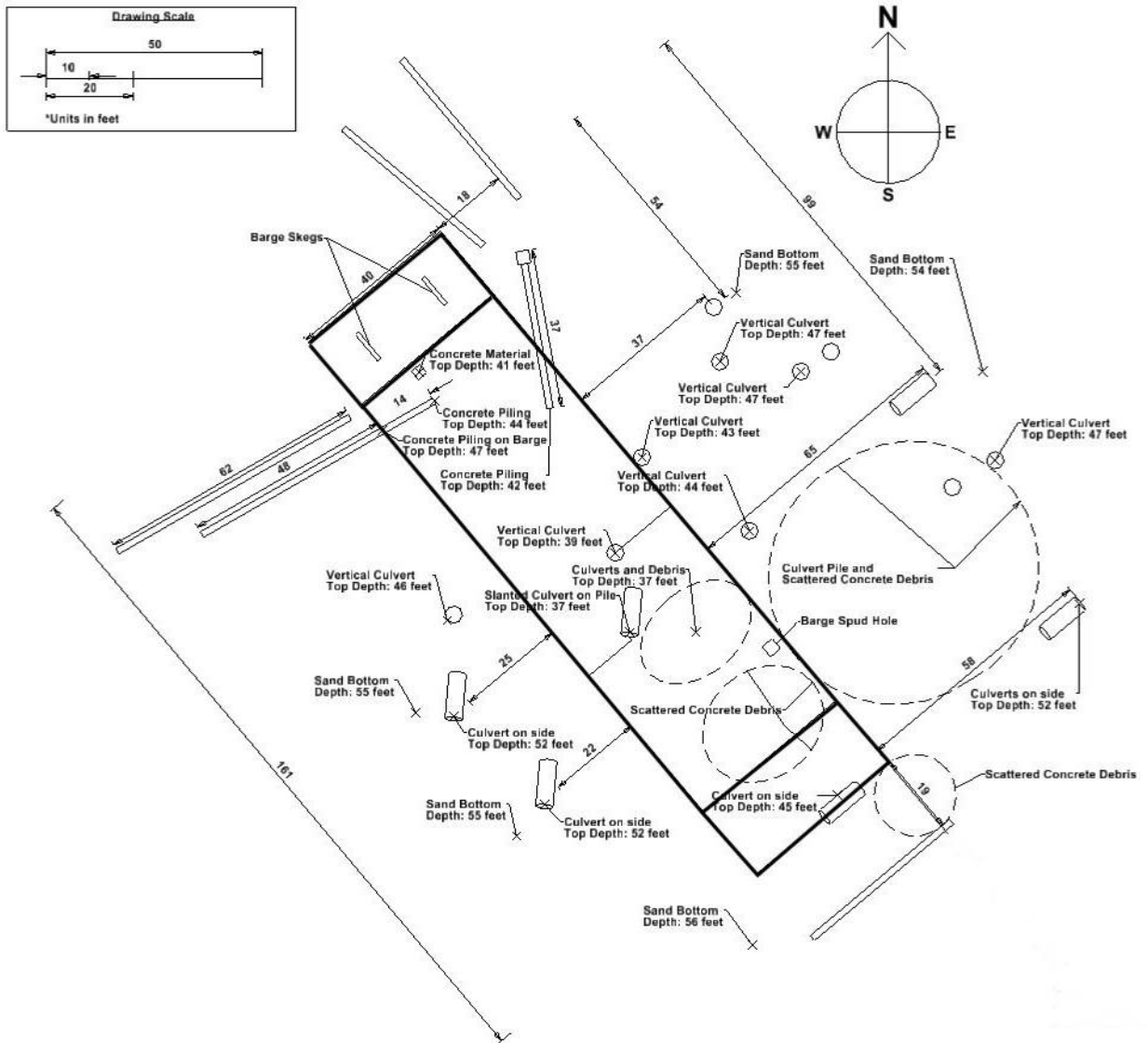


Figure 5. Layout of the Civic Center Reef

Fish census data for the first annual monitoring are presented in Table 2. The Roving Diver method was used, with numbers of species positively identified recorded. 32 species of fish were identified during the 30-minute fish count.

Table 2. Fish Census for Civic Center Reef on May 23, 2008

Common Name	Scientific Name	Number	Adult or Juvenile
1. Atlantic Spadefish	<i>Chaetodipterus faber</i>	A	A
2. Bandtail puffer	<i>Sphoeroides spengleri</i>	M	J&A
3. Baracuda	<i>Sphyraena barracuda</i>	A	A
4. Beaugregory	<i>Stegastes leucostictus</i>	M	J&A
5. Belted Sandfish	<i>Serranus subligarius</i>	M	A
6. Black Margate	<i>Anisotremus surinamensis</i>	M	A
7. Black Seabass	<i>Centropristis striata</i>	M	A
8. Blue Runners	<i>Caranx crysos</i>	M	A
9. Common Snook	<i>Centropomus undecimalis</i>	M	A
10. Cubbyu	<i>Pareques umbrosus</i>	M	A
11. Doctorfish	<i>Acanthurus chirurgus</i>	M	A
12. Fry	2 species observed	A (1,000's)	J 2 species: 1" & 3/8" long
13. Goliath Grouper	<i>Epinephelus itajara</i>	F (2)	A
14. Gray Angelfish	<i>Pomacanthus arcuatus</i>	S	A
15. Gray Snapper	<i>Lutjanus griseus</i>	M	A
16. Greater amberjack	<i>Seriola dumerili</i>	M	A
17. Hairy Blenny	<i>Labrisomus nuchipinnis</i>	M	A
18. Lane Snapper	<i>Lutjanus synagris</i>	F	A
19. Parrotfish	Species not confirmed	S	A
20. Pigfish	<i>Orthopristis chrysoptera</i>	M	A
21. Porkfish	<i>Anisotremus virginicus</i>	M	J&A
22. Sergeant Major	<i>Abudefduf saxatilis</i>	F	A
23. Sheepshead	<i>Archosargus probatocephalus</i>	F	A
24. Sheepshead porgy	<i>Calamus penna</i>	M	A
25. Slippery Dick	<i>Halichoeres bivittatus</i>	F	A
26. Southern Flounder	<i>Paralichthys lethostigma</i>	S	A
27. Southern Stingray	<i>Dasyatis americana</i>	S	A
28. Spottail Pinfish	<i>Diplodus holbrookii</i>	F	2" long
29. Spotted soapfish	<i>Rypticus subbifrenatus</i>	F	A
30. Tomtate	<i>Haemulon aurolineatum</i>	A	A
31. Two spot cardinalfish	<i>Apogon binotatus</i>	F	A
32. Yellowmouth Grouper	<i>Mycteroperca interstitialis</i>	F (2)	J 10" long, yellow edge mouth

Representative underwater photographs of the civic Center Reef taken on May 23, 2008 are shown in Figures 6 and 7. The visibility was fair (30 feet) and the abundance of baitfish often limited visibility. Additional photographs of the reef taken during the summer of 2007 are also available to provide other views of the reef during unusually good visibility (60 feet), so that the summer 2007 photographs clearly show the reef structure with benthic and pelagic marine life.



Figure 6. May 2008 Underwater Photographs of Civic Center Reef

The last two photographs in Figure 7 show the tears in the steel hull, that provide access for water flow and transit of marine life. These tears were probably initiated by the impact of the concrete materials deployed on top of the barge, and have increased slowly in their numbers and sizes since the summer 2007 inspections.



Figure 7. May 2008 Underwater Photographs of Civic Center Reef

Figure 8 shows underwater photographs taken in June 2007, with better visibility than during the 2008 monitoring. Larger portions of the reef can be seen, with abundant snook, and large Goliath Groupers with baitfish. The subsurface buoy at the east end of the reef often attracts fish, as shown in Figure 8.

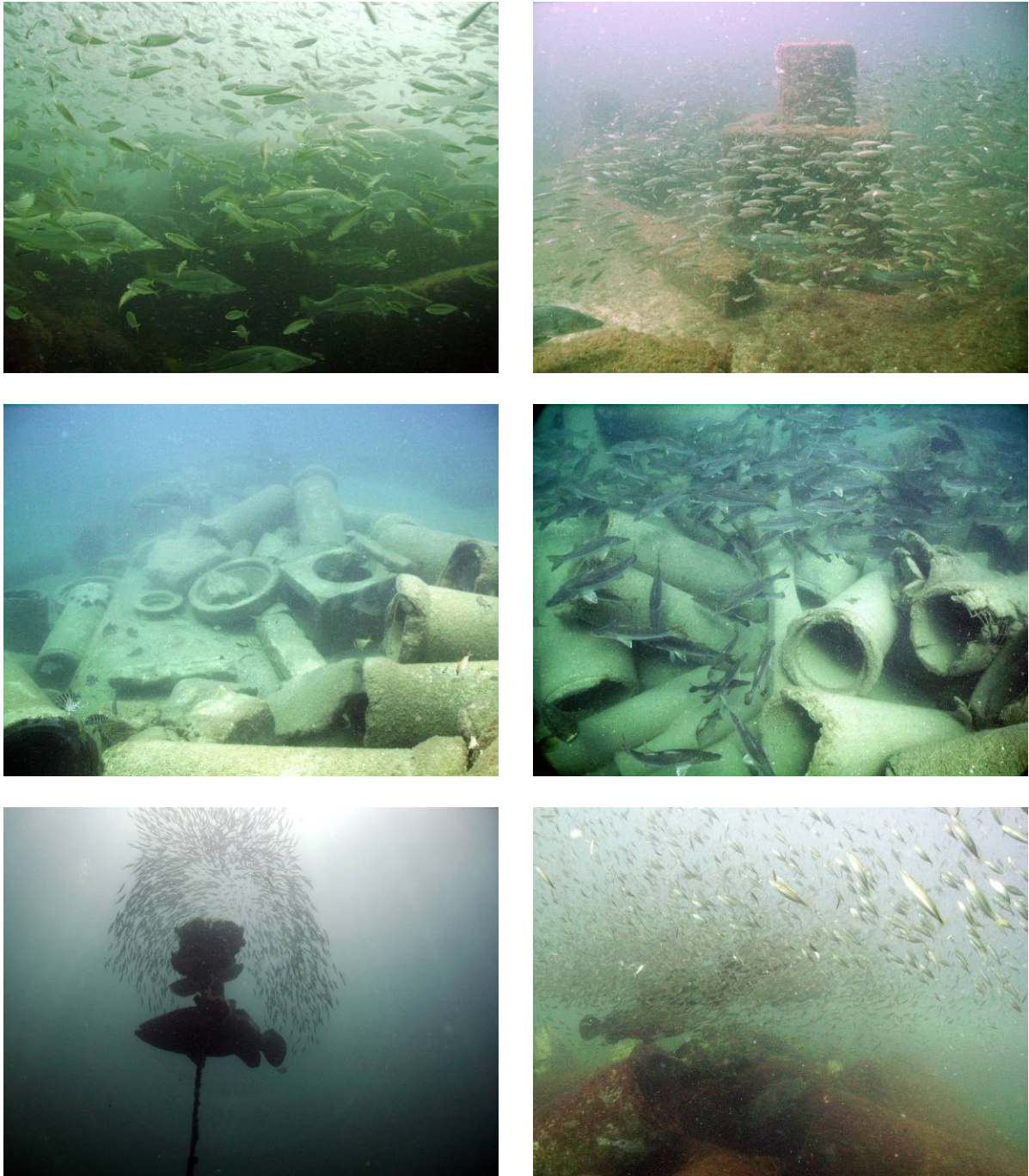


Figure 8. June 2007 Underwater Photographs of Civic Center Reef

6 Summary

The Civic Center Reef is one of the best shallow artificial reefs in St. Lucie County for numbers and diversity of marine life. The large footprint (almost 200'x200') and large vertical relief (almost 20 feet total relief) make this reef an attraction for marine life, divers and salt water anglers.

The Sterling Barge assisted in creating the high vertical relief of this reef, and the barge's rectangular shape and raked ends provide good navigation references for divers and underwater surveys. The concrete materials placed on top of and alongside of the barge provide an abundance of habitat both within and between the materials. The long-term corrosion of the barge will eventually result in some loss of the vertical relief, but that is not expected for several years due to the thickness of the steel.

In addition to the 32 fish species identified during this monitoring study, other species have been observed by divers and caught by anglers on this reef. These include gag groupers and other important sport fishes. Seasonal and other changes in the water temperature and other parameters cause variations in the fish populations at this and other reefs in St. Lucie County. During the summer and fall of 2007, over one hundred snook and more than 20 Goliath Grouper were seen in one dive on the Civic Center Reef. Many of these fish have been observed swimming to and from the Civic Center Reef from other reefs in this area