

3.10.3 Biological Survey Results

Because this tower was deployed in 2008, this report contains data from the first annual monitoring event for this reef. Fish species consisted mainly of seabasses and jacks. Black and bank seabasses were common around the tower feet and greater amberjacks patrolled the tower legs and mast. A single snowy grouper juvenile was photographed at the base of the tower (Figure 26). Vast schools of unicorn filefish were observed around the rope and barrels above the tower. Because of the strong Gulf Stream current, these filefish were all facing into the current. Invertebrate biomass on the artificial reef was already well established with barnacles, hydroids, tunicates, tube worms and numerous small colonies of *Oculina* coral. Table 14 presents the fish species observed during 2009.

Family/ Common Name	Species	2009	
		Abundance	Size
Serranidae			
Bank seabass	<i>Centropristis ocyurus</i>	M	A
Black seabass	<i>Centropristis striata</i>	M	A
Snowy grouper	<i>Epinephelus niveatus</i>	S	J
Carangidae			
Almaco jack	<i>Seriola rivoliana</i>	M	A
Amberjack	<i>Seriola dumerili</i>	M	A
Chaetodontidae			
Bank butterflyfish	<i>Chaetodon aya</i>	F	A
Balistidae			
Unicorn filefish	<i>Aluterus monoceros</i>	M	A
	Total	7	

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 15. American Custom Yachts Tower Artificial Reef fish species census.

3.11 Mango Artificial Reef

- Location: Ernst Reef
- Materials: Concrete
- Maximum Depth: 61 feet
- Reef High Point: 48 feet
- Year Created: 2007
- Monitoring Date: 6/27/2008, 10/8/2009

3.11.1 History of the Mango Artificial Reef

Staff from Martin County Engineering sought to simplify the collection and transport of materials of opportunity to aid artificial reef construction. Arrangements were made to allow local contractors to drop acceptable reef materials at the Martin County Landfill with no tipping fees. These materials were taken to Harbor Pointe Park in Ft. Pierce, loaded on barges, and brought to the north end of the Ernst Artificial Reef area. On June 15 and 26, 2007, 440 tons of concrete culverts, bridge components, and other large forms were unloaded from an anchored barge to form the Mango Artificial Reef.

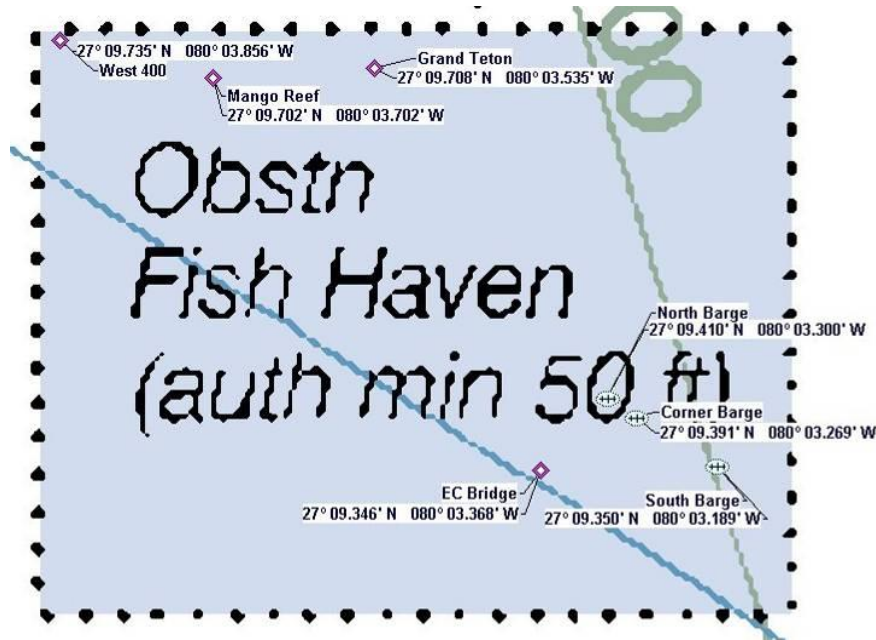
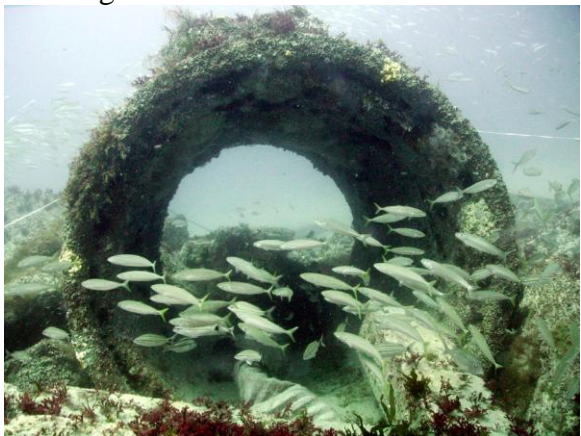


Figure 27. Chart view of the Donaldson Reef with West 400, Grand Teton and Mango Artificial Reefs.

3.11.2 Structural Summary

The maximum depth at this artificial reef site is about 61 feet with a maximum relief of about 13 feet. The footprint of the site is generally round and occupies about 2.0 acres of seafloor. The deployment barge was securely moored at two points when the reef materials were dropped and the large concrete components settled in a single pile, although a few pieces settled to the bottom a short distance from the reef pile. Several large culvert sections provide cavernous recesses that are used extensively by large and small fish alike. The seafloor at this site is comprised of fine sand and appears to have sunken or subsided in the years since deployment, so that it now sits within a bowl-like depression. Scouring does not appear to be a significant factor at this reef site. Figure 27 shows a chart with the location of the Mango Reef.



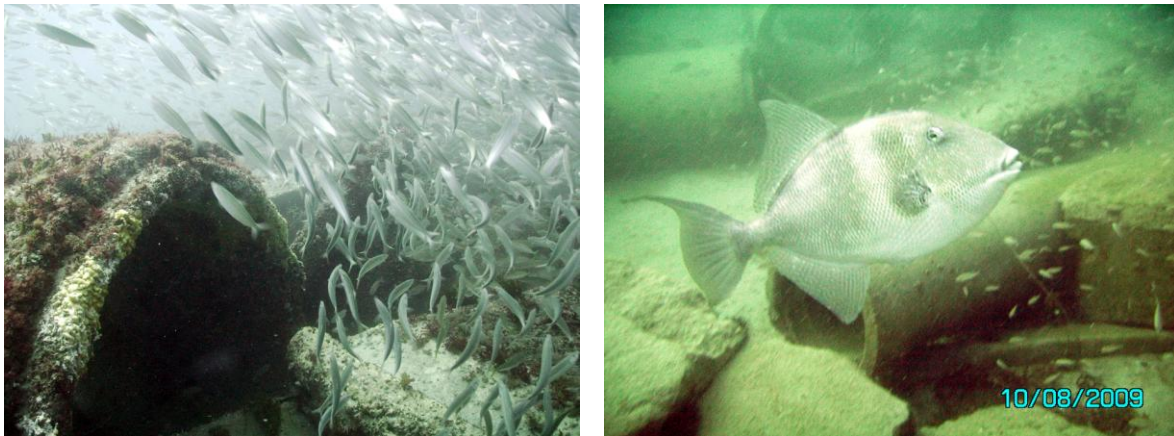


Figure 28. Mango Artificial Reef photographs from 2008 and 2009.

3.11.3 Biological Survey Results

Fish surveys indicate an increasing trend in species diversity since 2008, although 2009 was only the second year of monitoring since deployment. Seabasses and jacks represented the most numerous species in both 2008 and 2009, although grunts and snappers were also common. Vast schools of adult and juvenile round scad were observed around and above the reef crest. Like most of the artificial reef locations offshore of Martin County, several adult and sub-adult goliath grouper were observed on the Mango Reef. Invertebrate biomass on the artificial reef also appeared to have increased since deployment. The most common species included sea urchins, hydroids, sea anemones, tube worms, fire worms and encrusting sponges. Sea cucumbers, tunicates and various crabs were also observed. Table 16 presents the fish species observed during 2008 and 2009.

Family/ Common Name	Species	2009		2008	
		Abundance	Size	Abundance	Size
Muraenidae					
Purplemouth moray	<i>Gymnothorax moringa</i>	S	A		
Spotted moray	<i>Gymnothorax vicinus</i>	S	A		
Serranidae					
Bank seabass	<i>Centropristis ocyurus</i>			M	A
Belted sandfish	<i>Serranus subligarius</i>	M	A,J	M	A
Black grouper	<i>Mycteroperca bonaci</i>	S	J		
Black seabass	<i>Centropristis striata</i>	M	A,J	M	A,J
Goliath grouper	<i>Epinephelus itajara</i>	F	A,J	S	A
Harlequin bass	<i>Serranus tigrinus</i>	S	A		
Scamp	<i>Mycteroperca phenax</i>	M	J		
Grammistidae					
Whitespotted soapfish	<i>Rypticus maculatus</i>	F	A		
Apogonidae					
Twospot cardinalfish	<i>Apogon pseudomaculatus</i>	M	A		
Echeneididae					
Sharksucker	<i>Echeneis naucrates</i>	S	J		
Carangidae					
Almaco jack	<i>Seriola rivoliana</i>	F	A/J		
Bar jack	<i>Caranx ruber</i>	S	J		

Family/ Common Name	Species	2009		2008	
		Abundance	Size	Abundance	Size
Blue runner	<i>Caranx chrysos</i>	M	A	M	A
Rainbow runner	<i>Elegatis bipinnulata</i>	F	A		
Round scad	<i>Decapterus punctatus</i>	A	A,J		
Yellow jack	<i>Caranx bartholomaei</i>				
Lutjanidae					
Gray snapper	<i>Lutjanus griseus</i>	M	A	F	A
Lane snapper	<i>Lutjanus synagris</i>	M	A,J	M	A
Red Snapper	<i>Lutjanus campechanus</i>			F	J
Vermillion snapper	<i>Rhomboplites aurorubens</i>			M	A
Yellowtail snapper	<i>Ocyurus chrysurus</i>	F	A,J		
Haemulidae					
Pigfish	<i>Orthopristis chrysoptera</i>	F	A		
Porkfish	<i>Anisotremus virginicus</i>	F	A		
Tomtate	<i>Haemulon aurolineatum</i>	A	A,J	M	A
White grunt	<i>Haemulon plumieri</i>	F	A		
Sparidae					
Sheepshead	<i>Archosargus probatocephalus</i>	M	A	F	A
Sheepshead pogy	<i>Calamus penna</i>	M	A	F	A
Sciaenidae					
Cubbyu	<i>Equetus umbrosus</i>	M	A	M	A,J
Pomacanthidae					
Blue angelfish	<i>Holocanthus bermudensis</i>	F	A		
Pomacentridae					
Beaugregory	<i>Pomacentrus leucostictus</i>	M	A,J	M	A,J
Yellowtail reeffish	<i>Chromis enchrysurus</i>	M	A		
Labridae					
Slippery dick	<i>Halichoeres bivittatus</i>	M	A,J	F	A
Spanish hogfish	<i>Bodianus rufus</i>	F	A,J		
Sphyraenidae					
Sennet	<i>Sphyraena guachancho</i>			M	A
Acanthuridae					
Doctorfish	<i>Acanthurus chirurgus</i>	F	J		
Scombridae					
Little tunny	<i>Euthynnus alletteratus</i>			M	A
Tetraodontidae					
Bandtail puffer	<i>Sphoeroides spengleri</i>			M	A
Balistidae					
Gray triggerfish	<i>Balistes capriscus</i>	S	A		
	Total	33		18	

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 16. Mango Artificial Reef fish species census.

3.12 Grand Teton Artificial Reef

- Location: Ernst Reef
- Materials: Concrete, steel
- Maximum Depth: 62 feet
- Reef High Point: 34 feet
- Year Created: 2007
- Monitoring Date: 6/19/2008, 9/26/2009