5.6 Evans Crary Bridge Artificial Reef

- Location: Ernst Reef
- Materials: Concrete, steel, cast iron, PVC
- Maximum Depth: 75 feet
- Reef High Point: 49 feet
- Year Created: 2000
- Monitoring Date: 9/11/2010
- Total Cost: There was no cost to Martin County

5.6.1 History of the Evans Crary Bridge Artificial Reef

As part of the contract with the Florida Department of Transportation to construct the new Evans Crary Bridge (completed in 2000) in Stuart, Florida, the contractor was required to dismantle and dispose of the old bridge components. The contractor was required to transport the steel and concrete bridge components offshore to construct an artificial reef. Some of the smaller bridge components were used to create three nearshore shallow water mitigation reefs close to the Stuart and Jensen Beach shorelines in water depths of 10-20 feet, while the larger bridge sections and the majority of the materials were deployed in the Ernst permitted reef site in water depths of 60-70 feet.

In the summer of 2000 approximately 24 barge loads of old bridge components were deployed at the Ernst offshore site, these deployments consisted of the following:

- concrete piles from 20 – 40 ft. long each
- concrete pile caps approx. 30 ft. x 4 ft. x 5 ft. each
- steel/concrete roadway sections approx. 40 ft. x 5 ft. x 4 ft. each
- pieces of the bascule piers various sizes up to 10 ft. x 8 ft. x 4 ft.
- sections of the steel drawbridge leafs up to 30 ft. x 12 ft. x 10 ft.
- large steel gears from the drawbridge lifting mechanisms
- cast iron & PVC water main piping
- steel & aluminum electrical conduit
- concrete handrail & sidewalk sections

Each barge load of these materials was deployed from one of two temporary mooring buoys placed approximately 100 to 200 yards west of three sunken barges previously sunk for artificial reef development in 1972. Because the contractor moored the barge each time to the same buoys, the materials settled on the bottom in a tightly grouped pile. This pile is roughly elliptical and measures approximately 280 feet long x 80 feet wide x 26 feet high, with the major axis in an east/west orientation.

The Evans Crary Bridge pile has become a thriving reef community with substantial populations of pelagic and benthic species. At the surface above the reef, baitfish by the 1000's are often seen at this site. This artificial reef site has become one of, if not the most visited artificial reef sites in Martin County for saltwater anglers, charter sport fishing boats, and recreational divers. Figure 17 shows the location of the Evans Crary Bridge Artificial Reef.

Figure 17. Chart view of the Evans Crary Bridge Reef within the Ernst Artificial Reef site.

5.6.2 Structural Summary

The Evans Crary Bridge Reef site was monitored with much frequency during construction in 2000, and then annually between 2001 and 2006. This site is likely the most popular fishing and dive sites of all the 60+ Martin County reef sites. This is due to its relatively shallow depth 65 to 75 feet and relative closeness to Martin County's sole ocean access inlet. It has the most total tonnage of any artificial reefs to date, over 20 barge loads of steel & concrete materials were placed here in the spring/summer of 2000.

Between 2004 & 2005 this large reef was hit by three hurricanes - Frances, Jeanne, & Wilma. Although these hurricanes rearranged the materials and took approx. 10 ft off the total profile, the reef site still has an impressive 26 foot profile with max depth of 75 ft and a reef crest depth of 49 ft. The overall footprint on the seafloor is approximately the size of a football field measuring 280 ft x 80 ft.

Although the footprint has increased slightly in the past 10 years it is still a very stable reef site with 100s of components interlocked with one another. Some scouring (3-4 feet) has occurred around the base of the reef. As a result of the scouring 100s of automobile, truck and airplane tires have emerged from the substrate (as was previously reported). In 2000, when the reef was

built it was not known a tire reef had been placed nearby in the 1970s. Over time the "tire reef" settled into the sands and began reappearing in 2001 after the placement of the material at the Evans Crary reef site. These tires, although not an ideal reef material, have become a part of the Evans Crary Bridge reef site and do provide habitat for mostly crustaceans and other demersal species.

The overall structural stability of this site appears very good and should continue to be an excellent artificial reef site for many decades to come. The photographs in Figure 18 are from the monitoring dive and show general conditions of the reef and some of the species observed during the dive.

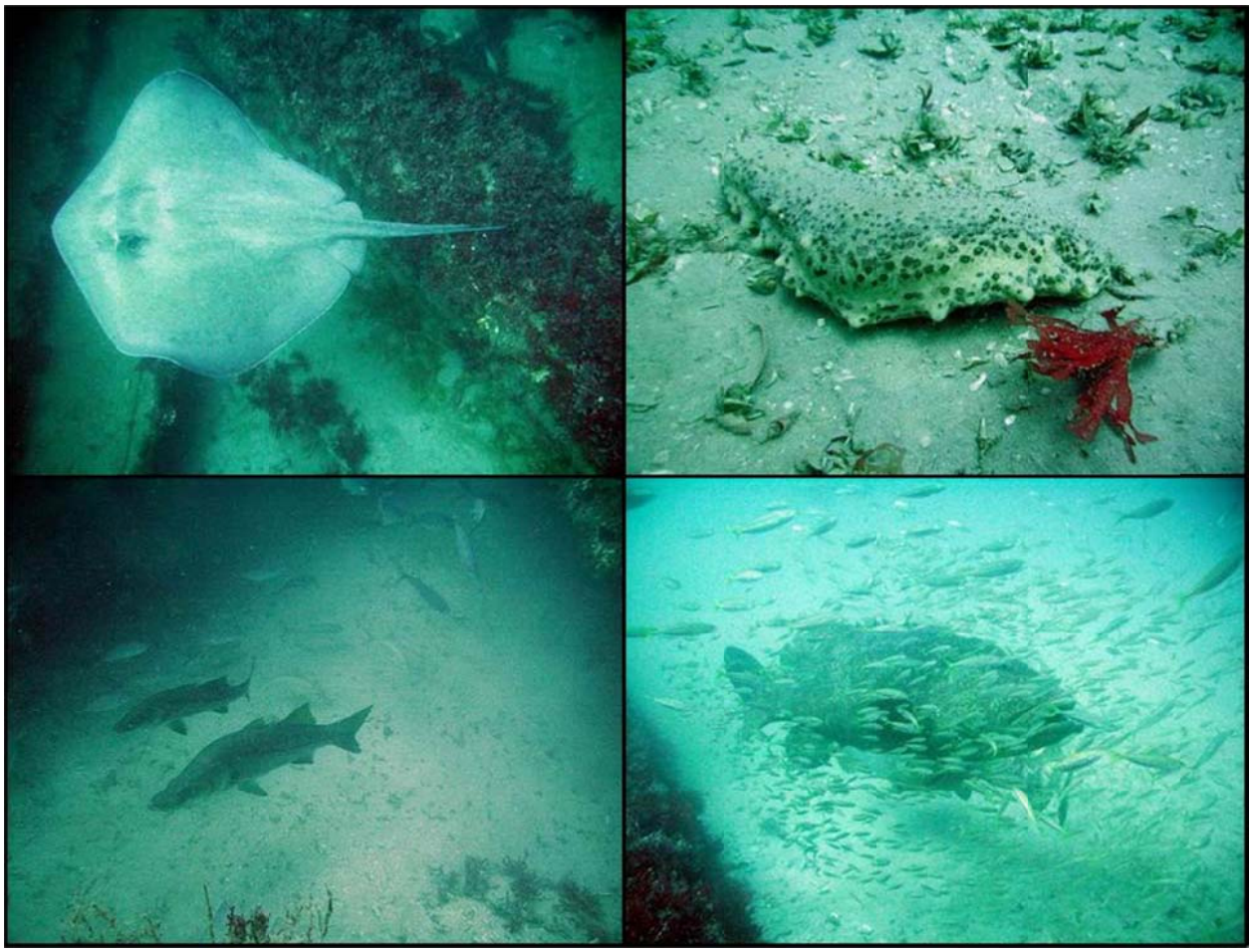

Figure 18. Evans Crary Bridge Reef 2010 photographs.

Identification of species in the photographs shown above in clockwise order from the upper-left photograph are (1) southern stingray, (2) variegated sea cucumber, (3) goliath grouper and round scad, and (4) common snook and tomtates.

5.6.3 Biological Survey Results

Total invertebrate biomass on the artificial reef has observably increased since deployment of the Evan Crary Bridge Reef in 2000 with 34 fish species present. Most common species included spiny lobsters, hermit crabs, sea urchins, encrusting sponges, tunicates and sea cucumbers. Due

to the high profile of the site increasing the amount of sunlight reaching parts of the structure corals, tunicates, gorgonians, alga and other marine plants thrive at this site.

The Evans Crary Bridge Reef also had the highest fish species diversity of all the sites monitored during 2010 with a total of 34 for fish species observed and two non-fish species, bottlenose dolphin and a loggerhead turtle. Over the years of monitoring the Martin County artificial reefs it has been observed that the reefs typically reach a threshold of 40 fish species on the shallow artificial reef sites and around 20 fish species on the artificial reef sites deeper than 130 ft.

During the 10 years of monitoring and diving the artificial reef sites off of Martin County the Evans Crary Bridge Reef site is often the most biologically complete artificial reef site in Martin County's inventory of over 60 artificial reef sites. All of the major fish types are seen at this site on almost every dive. Typical species include reef grazers such as butterflyfish, damsels, angelfishes, and sheepshead to predator species such as snappers, groupers, rays, barracudas, and snook. As well, there are usually pelagic species observed at this site such as sharks, kingfish, eagle & manta rays, little tunny, and dolphin. Marine mammal species such as bottlenose dolphin (seen during the 2010 monitoring dive) and spotted dolphin have also been observed at this artificial reef site. Two species of marine reptiles, loggerhead and leatherback sea turtles, are often seen in the spring as they ready to lay their eggs on the beaches 4 miles to the west on Jupiter and Hutchinson Islands.

Because of its overall size, high profile, complex array of steel & concrete materials and ideal location the Evans Crary Bridge Artificial Reef has been the benchmark for what a successful shallow water artificial reef should look like. Table 16 presents the fish species observed and Table 17 presents the invertebrate data collected from 2010.

Table 16. Evans Crary Bridge Artificial Reef fish species census.

Family/Common Name	Species	2010		
		Abundance	Size	Comments
Apogonidae				
Twospot cardinalfish	*Apogon pseudomaculatus*	F	A	
Carangidae				
Blue runner	*Caranx chrysos*	A	A	
Rainbow runner	*Elafatis bipinnulata*	M	A	
Round scad	*Decapterus punctatus*	M	J & A	
Centropomidae				
Common snook	*Centropomus undecimalis*	F	A	
Chaetodontidae				
Reef butterflyfish	*Chaetodon sedentarius*	M	A	
Spotfin butterflyfish	*Chaetodon ocellatus*	S	A	
Delphinidae				
Bottlenose dolphin	*Tursiops truncates*	M (13)	J & A	
Elasmobranchs				
Southern stingray	*Dasyatis Americana*	F (2)	A	(1) = 5' Dia
Ephippidae				
Atlantic spadefish	*Chaetodipterus faber*	A	A	

Family/Common Name	Species	2010		
		Abundance	Size	Comments
Grammistidae				
Whitespottedsoapfish	*Rypticus maculates*	F	A	
Haemulidae				
Black margate	*Anisotremus surinamensis*	M	A	
Cottonwick	*Haemulon melanurum*	F	J & A	
Pigfish	*Orthopristis chrysoptera*	M	J & A	
Porkfish	*Anisotremus virginicus*	F	J & A	
Tomtate	*Haemulon aurolineatum*	A	J & A	
Labridae				
Spanish hogfish	*Bodianus rufus*	M	J & A	
Lutjanidae				
Gray snapper	*Lutjanus griseus*	M	J & A	
Yellowtail snapper	*Ocyurus chrysurus*	F	J & A	
Pomacanthidae				
Blue angelfish	*Holocanthus bermudensis*	F	A	
Pomacentridae				
Beaugregory	*Pomacentrus leucostictus*	F	A	
Blue chromis	*Chromis cyanea*	M	A	
Cocoa damselfish	*Stegastes variabilis*	S	A	
Sergeant major	*Abudefduf saxatilis*	M	J & A	
Yellowtail reeffish	*Chromis enchrysurus*	M	J & A	
Priacanthidae				
Bigeye	*Priacanthus arenatus*	S	A	
Sciaenidae				
Cubbyu	*Equetus umbrosus*	F	A	
Scorpaenidae				
Spotted scorpionfish	*Scorpaena plumeiri*	F	A	
Serranidae				
Belted sandfish	*Serranus subligarius*	M	J & A	
Gag grouper	*Mycteroperca microlepis*	S	A	
Goliath grouper	*Epinephelus itajara*	M (18)	A	200-400 lbs
Scamp	*Mycteroperca phenax*	M	J	
Sparidae				
Sheepshead	*Archosargus probatocephalus*	M	J & A	
Sheepshead porgy	*Calamus penna*	F	A	
Tetraodontidae				
Bandtail puffer	*Sphoeroides spengleri*	F	J & A	
	Total	**35**		

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 17. Evans Crary Bridge Artificial Reef benthic species census.

	Common Name	Scientific Name
Echinoderms	Common arbacia sea urchin	*Arbacia punctulata*
	Variegated Sea Cucumber	Unidentified species
Cnidarians	Algae Hydroid	*Thyroscyphus ramosus*
	Hydroids	Unidentified species
Ascidians	Overgrowing Tunicates	*Didemnidae*
	Mottled Encrusting Tunicate	*Distaplia bermudensis*
Poriferans	Encrusting Sponge	Unidentified species
Crustaceans	Spiny Lobster	*Panulirus argus*
	Hermit Crabs	Unidentified species
Anthozoa	Gorgonians – several species	*Holaxonia*
Other	Red, Brown & Green Algae	Unidentified species