

Tetrahedron Stack Reef	Sirotkin Artificial Reef Site	Deployed April 2001
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Project Date: April 28, 2003

Subject: Monitoring Report for Tetrahedron “Stack” Artificial Reef

Location: Sirotkin permitted reefsite

GPS coordinates: N27 12.814 / W80 02.329

Crewmembers: Lee Harris, Kerry Dillon, Marc Damon

The following field report documents conditions on the “Stack” tetrahedron artificial reef. The report addresses three types of data collected: .

HISTORY OF THE STACK TETRAHEDRON ARTIFICIAL REEF:

As part of a Florida Fish & Wildlife Conservation Commission construction grant, Martin County constructed a single stacked concrete tetrahedron reef in April of 2001. It is believed this is the deepest (statewide) that such a reef has been built made of concrete tetrahedrons. The materials utilized were 5 ft. and 6 ft. solid concrete tetrahedrons with a cast in place lifting eye of steel.

The reef was built on April 4 & April 25, 2001 utilizing two bargeloads of concrete modules. A total of 430 units were placed from an anchored barge, with approximately 215 units deployed on each date. The deployment resulted in a single reef with an elliptical shape oriented in a general northeast/southwest direction. When diving this site one cannot determine any separation of the first deployment's modules from the second.

Many of the modules settled on their bases without stacking on top of other modules, but approximately 40% landed on top of others. These units are designed to interlock together and “stack” on top of each other to form many crevices, voids, and hiding places for fish, crustaceans, and other marine life. The large surface area of each module also provides habitat for benthic organisms to attach themselves.

REEF COMPONENTS STABILITY:

The individual tetrahedron concrete modules are solid units which weigh up to 3600 lbs. each in air. At this depth of 100 feet they are designed to be stable against wave forces accompanying a 50-year storm event. Compared with the previous monitoring performed in 2002, no noticeable movement or shifting of units was observed, nor was any notable scouring or sinking into the bottom.

The tetrahedron modules are either near, leaning on, or on top of adjacent modules. The highest profile achieved was the stacking of three modules for a total profile height of 14 feet above the bottom. It appears the units are performing as designed and have become a very stable base for marine life development.

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FISH SPECIES & ABUNDANCE FINDINGS:

Fish identification and abundance was determined utilizing the guidelines setup by the Reef Environmental Education Foundation, known as *REEF*. The roving diver method was used for a set time period of 30 minutes. The divers would roam around the reef structure and identify species and abundance and record data on underwater slates. Data would be double-checked once topside using field texts with color photographs and then transferred to the *REEF* data sheets to be added to their worldwide database. Underwater digital video photodocumentation also was utilized to accurately document fish species and abundance. Below are the results of those findings:

<u>Marine species identified</u>	<u>Quantity observed</u>	<u>Juvenile or Adult</u>
Striped Grunt	schools of 10's	A
Gray triggerfish	> 10	A
Grey snapper	> 10	A & J
Toro	1	A
Southern Stingray	3	A
Greater Amberjack	school of 10's	A
Loggerhead Turtle	1	A
Sheepshead	> 10	A
Tomtate	100's	A
Gag grouper	5	2- J 3-A
Sheepshead porgy	3	A
Bo-Gregory	2	A
Common Snook	3	A
Atlantic Spadefish	5	A
Spanish hogfish	1	A
Harlequin Bass	5	J & A
Reef Butterflyfish	1	A

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BENTHIC SPECIES IDENTIFICATION:

The roving diver method was also used for benthic species identification. The divers would roam around the reef structure and identify benthic species and record data on underwater slates. Data would also be double-checked once topside using field texts with color photographs. Underwater digital video photodocumentation was also utilized to accurately document benthic species.

As noticed in the 2002 monitoring and again this year, some modules have more benthic growth than others do, even though they are adjacent. In addition to normal biodiversity, another possible explanation for this would be differences in the pH of the concrete during the original fabrication of the modules, that could have an effect on the growth rates and patterns.

The most notable benthic species observed are pinshell oysters. They are found everywhere at this site, lying on the bottom within and surrounding the tetrahedrons.

Below are the results of the benthic survey:

Marine benthic species identified:

Black tunicates

Several species of sponges

Hydroids

Green marine algae

Several species of red marine algae

Pinshell Oysters

Barnacles (Red & White)

Although no additional benthic species were identified in 2003, the quantity of the coverage has definitely increased since 2002, as can be seen when comparing the videos from the two monitoring years.