



SCUBAnauts International: A decade of youth education and research in the Florida Keys National Marine Sanctuary

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Abstract

Engaging youth in coral reef research plays a significant role in increasing awareness and appreciation of these important ecosystems, while providing youth with the opportunity, knowledge and tools to become the next generation of ocean explorers and ocean stewards. SCUBAnauts International (SNI) is a non-profit 501(c)3 informal education program that consists of a diverse group of young men and women (ages 12-18) mentored by professional reef scientists. The mission of SNI is to expand and promote opportunities for emerging explorers by involving them in the marine sciences through underwater exploration and research activities, such as environmental and undersea conservation projects that educate, promote active citizenship, and develop effective leadership skills. *Dr. Brian Keller, in particular, was always very supportive of SNI youth's research within the sanctuary.*

SNI Chapters



SNI currently has four chapters (locations shown in map below left), all of which have conducted research in the Florida Keys National Marine Sanctuary (FKNMS) including the **Key West Chapter** (pictured left following their first Chapter meeting in 2008).



Since 2001, SCUBAnauts have embarked on 12 major summer research expeditions to study and research coral reef ecosystems in Florida, Hawaii, Bahamas, Jamaica, and Belize. These research expeditions were led by marine science experts from numerous national and state agencies and universities.



Original SNI group, including founder Captain Dave Olson, preparing for Annual REEF fish count in FL Keys (above left). SCUBAnauts at Dr. Nancy Foster Florida Keys Environmental Center (above right)

Experiential Learning Opportunities

Coral Reef Assessments

Since 2001, SCUBAnauts have been learning about the complexity of reef ecosystems and actively participating in reef research in FKNMS including benthic habitat monitoring and marine archeology. Through active participation in research the SCUBAnauts have shown a significant improvement in environmental literacy and understanding of the oceanic realm. SCUBAnauts have been trained in a variety of well-established, standardized research methods including the Atlantic and Gulf Rapid Reef Assessment (AGRRA) benthic and coral protocols, the REEF Roving Diver fish and sea turtle diversity protocols and Global Learning and Observations to Benefit the Environment (GLOBE) atmospheric and hydrologic protocols. The SNI youth collect research quality data that provides useful information to the NOAA/NMS resource managers, who designate boundaries for protecting ecologically important areas. For example, in July 2009, the youth of SNI surveyed the benthic cover and fish populations on an inshore patch reef, "Nauty Reef" (24°33.579' N, 81°39.780' W), off the coast of Key West, Florida, USA.



Example SCUBAnaut Project:

Nauty Reef had relatively high coral cover (52±9%; Below middle) compared to typical Florida Keys reefs (mean of 6% coral cover). SNI youth recorded the presence of the rare coral species, *Acropora prolifera* (Below far right) on Nauty Reef. They counted a total of 639 fish, with the highest percentage (84%) in the family Haemulidae. "Ground-truthing" satellite images, such as the IKONOS image (below far left), provides a synoptic view of the reef. Using GIS software, SNI youth determined that Nauty Reef had an area of 5,809 m² running 115 m east to west and 76 m north to south.

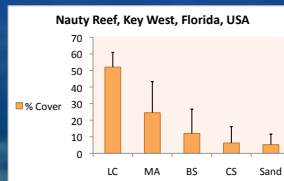
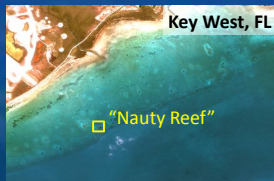


Figure Legend: LC = Live Coral; MA = Macroalgae; BS = Bare Substrate (Turf); CS = Covered Substrate – not coral

"Once in a Lifetime" Opportunities

On several occasions, SCUBAnauts have had the rare privilege to tour the world's only underwater laboratory, **Aquarius**, which is deployed 5.6 km offshore of Key Largo, FL, at a depth of 18 m. While each SCUBAnaut only had a brief visit of 40 minutes in



Aquarius, this allowed them to explore the facilities where scientists work, sleep and eat underwater and learn about the reef studies that this unique laboratory has made possible.



SNI has partnered with NOAA and GLOBE on the **Ocean for Life Program**, which fosters cultural understanding through study of the ocean ecosystem. In the 2009 pilot year, a group of 15 Western students and 15 Greater

Middle Eastern students met in the FKNMS to learn about the ocean and each other.

Environmental Stewardship



SCUBAnauts have participated in **coral restoration** projects by helping maintain coral nurseries in collaboration with NOAA in Key West and the Coral Restoration Foundation, a non-profit conservation organization in Key Largo.

The picture above is a SCUBAnaut preparing a transplant coral for its new location by scrubbing the bottom of the colony. In addition to coral restoration projects, SCUBAnauts have participated in reef and beach cleanups in the Keys.

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