Study on shallow artificial reefs offers clues to improving marine life habitat along Florida's east coast

July 29 2014

A newly completed seven-year collaborative research project by Jacksonville University, the Florida Institute of Technology and other research groups has the potential to have a large impact on marine life by improving artificial and natural reef management along Florida's east coast.

Beach renourishment projects help widen beaches by replacing sand lost through erosion with fill from offshore dredges, but their sand often covers neighboring shallow reefs. Because of that, when coastal cities and counties along the coast request permits to restore a beach, the government requires they restore reefs to make up for the ones that may be lost.

Over the years, a variety of materials have been used to do this. It has long been suspected that the timing of deployment, type of material and shape or depth of the deployed artificial reef are inconsistent and probably not properly compensating for reef loss.

What does that mean? Potentially serious long-term consequences for turtles, fish and other marine animals.

Probably the most alarming result in the study is that young green turtles don't appear to be using the artificial reefs. They have almost entirely been observed at the shallowest depths of natural nearshore reefs. In the

study, for example, researchers counted only four green turtles on artificial nearshore reefs off the Southeast Florida coast during one period in 2012-13, compared to 93 on natural reefs. Some reasons may be that the shape of the reef does not allow them to hide as well from predators such as sharks, as well as that their main food source, algae, varies from that found on the natural reefs, researchers say. Further, natural reef edges have spaces underneath that may be good for hiding. This particular feature doesn't occur on most artificial reefs.

Jacksonville University Marine Science Prof. Daniel A. McCarthy and students from the JU Marine Science Research Institute, along with colleagues including David Snyder from CSA Ocean Sciences Inc., Karen Halloway-Adkins from East Coast Biologists Inc. and Dr. Ken Lindeman from the Florida Institute of Technology, recently wrapped up a seven-year comprehensive study of how effective nearshore artificial reefs can be in replacing natural reefs lost to beach restoration.

"The issue is that we are seeing different types and amounts of algae on these reefs that are not optimal as a food source for marine life such as green turtles," McCarthy said. "Having a different community of algae may not bode well for turtle numbers over time, because they may not use these reefs. We've long suspected that artificial reefs don't exactly mimic what happens on a natural reef, and for the first time we've proven that on the Southeast Florida coast."

The project, which began in 2008, was funded with more than $450,000 from the Florida Department of Environmental Protection, with final results delivered in July 2014 to the FDEP, National Oceanic and Atmospheric Administration and U.S. Army Corps of Engineers.

It is clear these nearshore reefs can house many more species than previously thought, and that currently used artificial reefs aren't completely restoring the function provided by the lost natural

counterparts, as suspected.

In order to help these coastal communities, the research team believes future reefs should be deployed to the shallowest depths possible, and that they be deployed earlier than anticipated impacts to allow the algae community to develop more to the turtles' liking.

"What we don't want is an adverse impact on marine life in these shallow waters," McCarthy said. "We run the risk of degrading our marine resources if the mitigation isn't done properly. More research needs to be done on the placement, timing and shape of these reefs."

Provided by Jacksonville University