



An underwater photograph showing a large school of small, silvery fish swimming in the upper half of the frame. In the lower-left corner, there is a close-up of a coral reef with vibrant red and orange corals. The background is a deep blue water.

ARTIFICIAL REEF

AN UNEXPECTED EXPERT

Lessons from an Artificial Reef Guru

BY DANNY THORNTON

Scott and Martha Harris started the Andrew “Red” Harris Foundation to honor their son, who died in a tragic boating accident. The couple are the driving force behind the foundation, which has a mission to build reefs that will ensure the long-term health of the oceans that Andrew loved. The Jupiter Lighthouse, of which they made a replica for their artificial reef system, is in the background.

Back in 2017, *Guy Harvey Magazine* published an article (see sidebar excerpt on page 68) about Andrew “Red” Harris, an inspirational 26-year-old from Jupiter, Florida, who was killed after he was hit by a boat as he tried to save his girlfriend from drifting away in a rip current.

The heroic tragedy inspired his parents to start a foundation to build artificial reefs in their son’s name. Enhancing the marine environment made sense because he loved fishing, diving and being on the water. Doing something good for the ocean would create a legacy in his name and maybe even help to soften their grief. Over the past seven years, the Andrew “Red” Harris Foundation has raised and spent more than \$2.5 million to build more than 2 miles of offshore reefs. That includes 36 deployments comprised of 6,250 tons of limestone boulders, 300 4-ton “coral head” modules, 280 3-ton “hollow boulders,” 4,000 8-foot-long concrete culverts that weighed between 1 and 3 tons, and a 17-foot-tall replica of the Jupiter Lighthouse.

This is not your casual weekend project.

The Foundation has created this immense amount of habitat, and it has enhanced the marine environment in ways no one anticipated. Also, something unexpected emerged. Scott Harris, Red’s father, has become somewhat of an artificial reef guru.

“I asked a lot of marine scientists about the best materials and locations and so forth, and I got a lot of different and mostly general answers that seemed to have the common thread of ‘it depends.’ I was hoping to get specific information like what shape of boulder or what kind of module design worked best, but I found out on my own that it depends on the application and the site,” said Harris.

“Fortunately, we have really good experts and partners here in the Palm Beach County government, and they have supported us every step of the way. Jena McNeal, an environmental supervisor with Palm Beach County Environmental Resource Management, and her predecessor, Carman Vare, are two of the best reef builders around, so we just forged ahead with their guidance.”

McCulley Marine Services and their barge captain, Scott Bachman, have completed all 35 of the offshore deployments. Capt. Scott knows all too well how the Gulfstream-driven current is constantly changing speed, intensity and even direction. Plus, the wind tends to blow the barge and tug around.

“We have to hit a pinpoint spot on our thin sand ridge sites,” Harris said, “and it’s not easy to keep the barge on target. Mix in vicious, South Florida afternoon thunderstorms and equipment that’s pushed hard in a harsh environment, and you have very challenging situations. Working inshore would obviously be tremendously easier, but we’re committed to building world-class habitat to capitalize on northern Palm Beach County’s unique Gulfstream-fueled marine life growth.”

The original reef building expedition in 2015 was supposed to be in 95 feet of water, but on the day of the deployment, the current was too strong. Their second choice was closer to shore — in just 35 feet of water with less current — near a 10-year-old reef the Florida Department of Transportation had built using a local bridge that had been dismantled.

“We went just north of the FDOT reef,” Harris said. “That was the first time I learned about scouring. I saw that, after a few months, the sand underneath some of our reef structures had been swept away by the current, and some of our modules looked like Noah’s Ark on top of a mountain. Our modules interacted with the current and scoured away sand, exposing buried parts of the FDOT reef that had





Alongside wife Martha, daughter Christina and son Ryan (left), Scott Harris has become a newly minted expert on artificial reefs thanks to the projects completed by the foundation. The Harris family is standing on reef materials made by the Artistic Stone Company.



been put down 10 years before. Over the years, a lot of the FDOT reef had been swallowed up by the ocean floor.”

Over the past few years, Harris and his team have gotten a good handle on building reefs in areas that will stand up to the test of time and enhance the marine ecosystem for decades to come.

“I’ve learned that where an artificial reef is located is more important than what it is made of,” Harris says. “In our area of southeast Florida, there is ancient bedrock beneath the sand floor of the ocean. The bedrock is exposed in some areas on the present day shoreline, like at the Blowing Rocks preserve in Hobe Sound and other rocky areas in northern Palm Beach County. This bedrock floor extends for miles offshore, rising and falling from as much as 10 feet below the sand floor of the ocean to areas where the bedrock rises above the ocean floor and we have live reefs.”

“If our materials are placed in areas where the bedrock is 10 feet below the ocean’s sand floor, everything will sink out of sight in a year or two and be lost. But artificial reefs are not allowed to be built where live rock is exposed. So, the ideal site is an area where a thin layer of sand covers the bedrock.”

After the first year deployment at the FDOT Reef site, Harris spent days surveying the ocean floor while scuba diving with a sledge hammer and spear inside the boundaries of the local



A 17-foot-tall replica of the Jupiter Lighthouse has blossomed with marine life growth.

Army Corp of Engineers-permitted artificial reef sites. All the while, he was looking for areas where there was a thin layer of sand over the underlying bedrock.

"It was nothing but sand as far as I could see, so I would pound the spear down three feet or so again and again in search of bedrock," Harris said. "Finally, I had a eureka moment. I hit the spear and it went 'boing!' I had discovered a sub-sand ridge where, decades or centuries ago, a reef had once existed before it was smothered by sand, most likely due to a hurricane. I could brush the sand away with my hand, and it looked like a travertine floor underneath."

Morgan and Eklund Surveyors, now part of Continental Shelf Associates, donated a sub-bottom survey that took six employees a full day to complete. They learned that this ridge is between 50 and 150 feet wide and a mile long. Everything the Foundation has built in Jupiter after the first year is on top of this ridge to make sure that the reefs will never sink under the sand.

One of the most important morsels of knowledge Harris gleaned from putting manufactured concrete modules, giant boulders and culverts on the ocean floor is what he calls the "scouring effect."

"The current interacts with boulders and other structures and moves the sand one grain at a time, 24/7, until the underlying bedrock gets exposed," Harris said. "It creates something like a comet trail — some as much as 50 feet long. The bottom is transformed from a lifeless smothered sand floor to a vibrant rocky cragginess that creates a habitat for crabs, shrimp and all kinds of sea life. Plus, it's excellent for coral recruitment. We have seen huge growth of gorgonians and other corals in areas that were just fields of sand before."

Not a fan of using old ships for artificial reefs because they rust, collapse and can become dangerous to divers, Harris believes that rocks and concrete work best in the long term.

"Ships are great for eco-tourism, and a lot of divers love them because they're exciting to dive on, but saltwater deteriorates metal fairly quickly," Harris said. "I want something that's going to be there generating new life for 50 or 100 years or more."



In 2016, the foundation placed 15 coral head modules at the Blue Heron Bridge Snorkel Trail in Palm Beach County.

IN THE BEGINNING

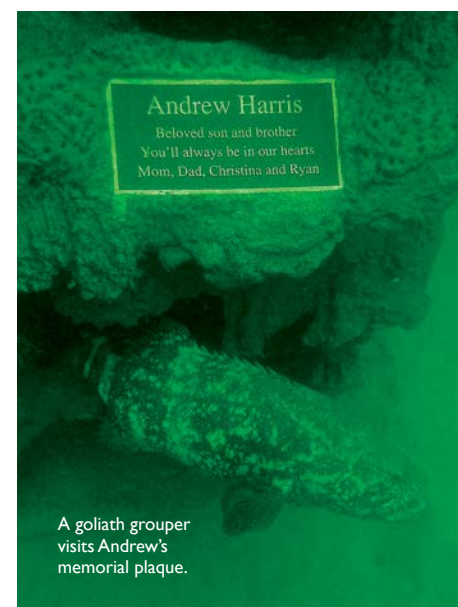
The Harris family began their organization in July 2014, just a month after the accident, and by November, they had formed a viable plan to build and deploy concrete modules. A year later, they deployed 40 artificial reef modules; the next summer, they deployed 100 more — 50 pyramids and 50 custom-designed coral heads. They also put down 15 prototype concrete block reefs and a 17-foot-tall replica of the Jupiter lighthouse that the Town of Jupiter funded. A few months later, in November 2016, they placed 15 coral head modules at the Blue Heron Bridge Snorkel Trail in Phil Foster Park in Palm Beach County.

In 2017, the Foundation reached the north end of the Jupiter ridge site with 132 more coral heads and another 1,000 tons of boulders deployed in four reef piles. In 2018, they began building the huge Juno thin-

sand site with 32 coral heads and 500 tons of boulders. In 2019, the Juno site received 280 of the Foundation's 3-ton hollow boulder designs that connected three new 250-ton boulder reefs.

The south extension of the Jupiter Reef ridge is in 58 feet of water and was completed in 2020 with 4,500 tons of boulders deployed as six massive 20-to-25-foot-tall reefs. Each are 300 feet apart, and they are so large they create current swirls on the ocean surface. In 2021, the foundation filled in the gaps between the 2020 Jupiter boulder reefs with 2,500 8-foot-long concrete culverts, creating trails between the boulder reefs and five new culvert reef piles.

"A couple of months ago, a local family contacted me," said Harris. "Their parents, Nanie and Curtis Weaver, both passed away last year, and they left a charitable remainder



A goliath grouper visits Andrew's memorial plaque.

Andrew "Red" Harris



REEFS WITH A CAUSE

The Harris family honors Andrew's memory by building reefs for snorkeling, diving and fishing. The Andrew "Red" Harris Foundation has made it their mission to build reefs in the waters he loved to ensure the long-term health of the oceans and to assure that he will not be forgotten. They've held tennis tournaments, golf tournaments and other events to raise money to build reefs.

Understandably, Andrew's mom and dad, Scott and Martha Harris, are the driving force behind the foundation. They were determined to do something in Andrew's memory, but they weren't sure where to begin.

"We started out with college scholarships," Scott said, "but didn't get much interest from local schools. It's a very crowded space. Then we started to think about Andrew's hobbies like golf, fishing and snorkeling and decided that artificial reefs would be perfect!"

"Andrew loved fishing and diving and we thought, 'how hard could it be?'" Scott says with a laugh.

It's no surprise that 100 percent of the money raised for the foundation goes to reef building. Of course, the Harris family itself has also been a major donor.

"We are not just asking others to contribute, we are putting our own money and time in," Harris said. "It's important to us, and our community increasingly sees the benefits as our dreams become real and our projects move from theoretical to actual, even though the new reefs won't reach full maturity for a couple years."

"Our long-term goal is to honor Andrew's memory by seeing the Foundation become a self-sustaining organization for building and advancing the science of artificial reefs," Harris said.

— Excerpt from 2017 article in
Guy Harvey Magazine



trust. The whole family loves boating on the ocean, and the children think contributing the trust funds to build a reef in their parents' honor would be perfect. We are also scheduled to receive a large grant soon, and these funds will allow us to go ahead and expand the Juno site with three barge loads of culverts later this summer instead of waiting until next year."

THE FUTURE

The next expansion focus is the Juno Reef, a mile and a half square grid in 80 feet of water that is the closest place on the coast where the Gulfstream approaches the continental U.S.

"Our Jupiter site is largely built out," Harris says, "and we have always been laser-focused on Jupiter, but we have been successful in reaching our goal of creating a sustainable engine to build new offshore reefs off Palm Beach County. So instead of saying we are



done and calling it a day, we are going to let the Foundation keep building new habitats as long as we have great sites. And our Juno site actually has many advantages. Its proximity to the Gulfstream means the visibility is better for divers, there are more large fish there and it is more centrally located for fishermen and divers to access.

“We’ve got many years of deployment on the Juno site, it’s so much bigger than our Jupiter site,” Harris said. “Eighty feet deep off Juno is an iconic local fishing and diving destination. The Gulfstream brings in a hugely vibrant nutrient stream, and our reefs will provide the structural habitat that marine life needs to thrive there.”

At this point, the Foundation is only limited by the funds they can raise. Two key supporters that have contributed to the overall

success are the Al Packer Ford Dealership in West Palm Beach as well as Marc Collette with the Artistic Stone Company, which provides the coral heads and hollow boulders for the projects. It has a great new partner in Forterra Pipe and Precast as they have donated more than \$450,000 of culverts this year as part of their Reef of Opportunity. The Foundation’s funding comes from a wide variety of sources. Local government entities like Palm Beach County, the Town of Jupiter and the Jupiter Inlet District are big supporters. Business organizations like the Marine Industries Association of Palm Beach County and businesses such as Engel Coolers have been huge supporters since the beginning. Two local businesses, Treasure Coast Carpets and Interiors and Pinder’s Seafood, support the Foundation every year

and are key to spreading the word, and that’s alongside a large group of local residents who love what the Foundation is doing.

The Florida Blue Foundation funded the entire cost of their 2018 donation of a five-book set of the Professor Clark The Science Shark book series to every third grade classroom in Florida — 11,000 sets in all. Written and beautifully illustrated by family friends of the Harris family, Scott and Karen Lamberson, the books tell the story of Andrew meeting an orphaned tiger shark pup who grows up to become Professor Clark.

Sponsorships range from \$200 to sponsor a hole in their golf tournament to \$600 for a truckload of culverts, to \$12,000 for trucking a barge load of culverts to \$20,000 for the barge operation itself. 🐟

For more info or to donate, visit the Andrew “Red” Harris Foundation at AndrewRedHarrisFoundation.org.