

Nemesis, the photogenic great hammerhead shark of Bimini, becomes a breakthrough 3D animation

By CHRIS PERKINS

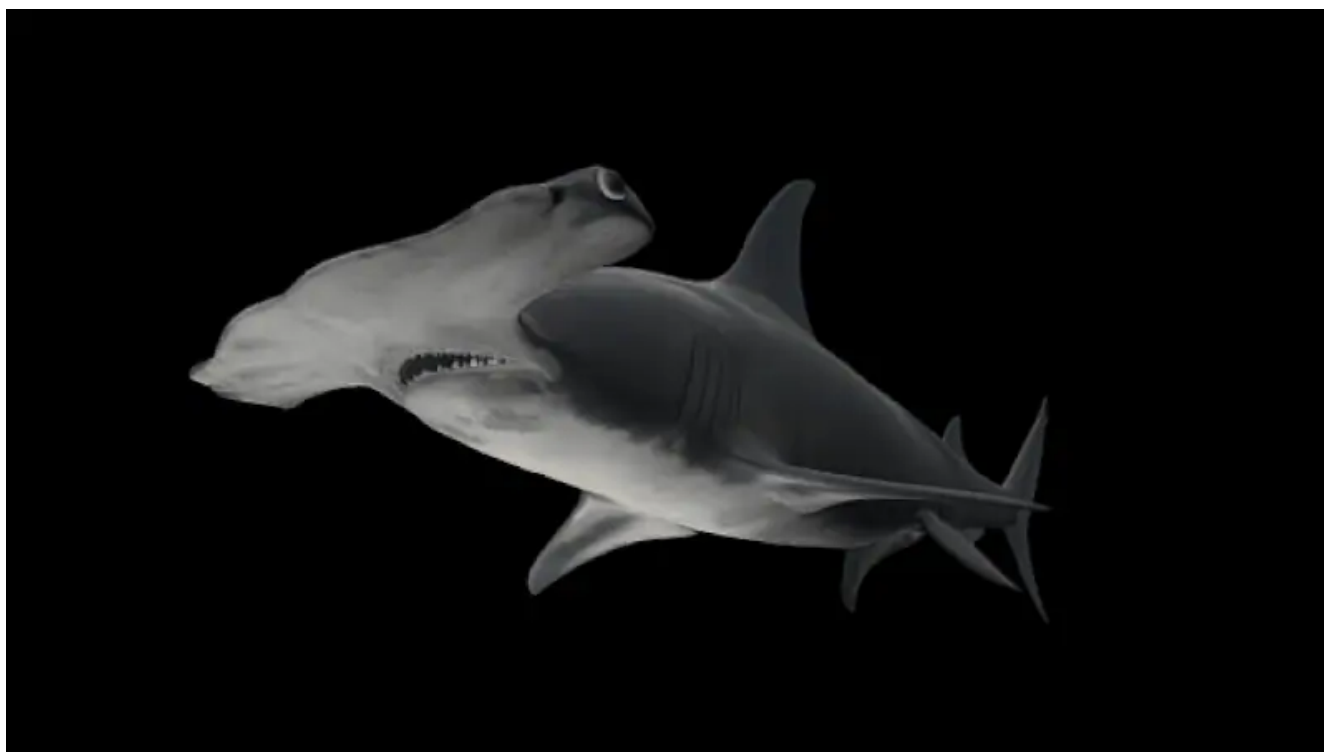
SOUTH FLORIDA SUN SENTINEL | SEP 28, 2020

Nemesis, the great hammerhead shark known to divers and scientists for her annual winter visits to Bimini, has always been a model shark.

Now she's a supermodel.

Earlier this year, multiple cameras spent days recording her every movement around the tiny island 50 miles east of South Florida — every flip of her tail, every turn of her fin, every twist of her 10.8-foot body.

The result: An animated, [3D model of Nemesis](#), the first of its kind that shows with scientific accuracy the movements of a large, underwater species in its native environment.



Scientists created an accurate 3D model of a great hammerhead shark, named Nemesis, swimming in its natural environment off the coast of Bimini in the Bahamas. The interactive model can be accessed by clicking [here](#). (ANGARI Foundation, courtesy)

The 3D Nemesis will serve as a resource for scientists who want to study sharks to research behavior such as locomotion or hydrodynamics, as well as educators and conservationists.

But shark enthusiasts anywhere can also spend time spinning Nemesis backward or sideways, making her swim faster and enjoying her natural movements.

The project was headed by the West Palm Beach-based ANGARI Foundation and the Digital Life Project, a non-profit initiative led by Dr. Duncan Irschick at the University of Massachusetts at Amherst.

ANGARI (pronounced An-jarry) and Digital Life, along with videographer Casey Sapp and digital artist Jeremy Bot, produced the breakthrough model, which was made available to the public last week.

“This is the first initiative to do what would be considered videogrammetry or what would be considered volumetric capture,” Sapp said. “And capturing digitally the entire animal and its movement underwater, its natural movement, it’s never been done. No precedent, no history. This is the first of its kind.”

The great hammerhead is the largest of the nine hammerhead shark species. Its fins are valued as an ingredient in shark fin soup and, as a result, the hammerhead is classified as endangered in many locations around the world.

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The Nemesis video session off Bimini wasn’t easy. Similar recording sessions have been tried in the past on sharks in captivity, but never before with great hammerhead sharks in the wild.

Maybe Nemesis wasn’t camera shy — she was relatively cooperative during the sessions, Irschick said. “When we were filming she just was the best shark. Kind of the most regular shark, the most, I don’t know, well-behaved. She does the things we wanted her to do.”

But other factors complicated things.

It took several cameras and lots of careful coordination to capture Nemesis and her friends doing their thing. The crew and researchers had to set up the cameras in circular configurations, synchronize them and get the sharks to swim through while other fish weren't in the frames.

The team also had to make sure the water had good visibility for 15 minutes at a time while battling currents. Cameras had to be sufficiently weighted so they didn't shift during tide changes.

"I think we did have one day where we sat at the dock because it was just too rough out there," said Angela Rosenberg, captain of the 65-foot research vessel ANGARI, and co-founder of ANGARI Foundation. "And you're only diving in 20 feet so if it's surgy, you feel it."

The resulting model was made for free to researchers in the public in the hopes it will become a blueprint for recreating more species in their native waters.

"I think the main point is these models are provided free to the public for nonprofit use and anyone can download and use them –teachers, kids, artists, scientists," Irschick said. "It's not just creating technology, it's creating technology we give back and that's a big distinction because I think you'll find the basic rule of high-quality digital content is it's never given away free, or extremely rarely."

The project has the potential to change the future of aquariums, which could use 3D models instead of holding living sea creatures in captivity, the researchers say.

In that way, the camera work by Nemesis will have a lasting effects.

"Anything that moves, this is our foray into being able to recreate that digitally," Sapp said. "There's very, very little precedent to doing this in the wild."

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Chris Perkins is the Sun Sentinel's weather and wild Florida reporter. Previously, he covered the Miami Dolphins for the Sun Sentinel and was a sports writer for The Athletic. He was born in Chicago and reared in Texas, and has covered the Miami Heat, University of Miami, University of Texas, TCU, MMA, boxing, and a host of other sports.