Impacts of sharks on coral reef ecosystems

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Do healthy reefs need sharks? This is one of the most misunderstood questions in coral reef ecology. Shark populations are declining due to habitat loss, overfishing, and other stressors. It is important to understand how these losses could affect the rest of the ecosystem.

Understanding the predator-prey interactions between herbivores and sharks is crucial for coral reef conservation. As top predators, sharks not only eat other fish, but they can also affect their behavior. In the presence of sharks, herbivorous fish may be concentrating their grazing to small, sheltered areas. Because these fish have to eat where they are safe from predators, there is more space to allow young coral to settle, grow, and thrive. In the absence of sharks, herbivorous fish may spread out their grazing randomly across large patches of algae, leaving few well-defined or cleared areas for corals to settle.

Fortunately, Florida International University has just the place to explore these dynamic questions, a lab under the sea – Aquarius Reef Base. From September 7th to 14th, a mission at Aquarius Reef Base will combine sonar with baited remote underwater video surveys (BRUVs), an experiment the first of its kind to bring these technologies together. Researchers on this mission strive to understand the direct impact of shark presence on herbivorous fish behavior as well as the indirect impact of sharks on algae communities. Combining these technologies:

• Provides a new way to study reef fish behavior • Carves the path forward for future ecological research • Offers insights that may lead to critical marine conservation outcomes

Mission Overview:

Dr. Kevin Boswell, an assistant professor of biology, is leading this mission. His lab will use low frequency sound to attract sharks around Aquarius. HD remote video combined with multi-beam imaging sonar will be used to quantify how fish behavior changes in the presence and absence of sharks. At the same time, grazing intensity by herbivores will be measured in order to understand the impacts of shark presence on the benthic community.

Take a look at Kevin's sonar data & videos.

Dr. Michael Heithaus, Dean of the College of Arts, Sciences & Education as well as Global FinPrint's co-lead principal investigator, is co-leading this mission. His lab will be setting BRUVs to provide quantifiable data on reef fish behavior in the presence and absence of sharks. Setting these BRUVs is also part of Global FinPrint, a larger project attempting to assess the presence of sharks and rays on coral reefs all over the world, understand the factors affecting shark and ray distribution, and inform conservation actions for threatened species.

In an effort to inspire the next generation of ocean enthusiasts and engage the public using innovative research technologies, a FIU student teacher, Carlos Calle, will take part of this mission via the Teacher Under the Sea program.

You can join the adventure online: https:/*aquarius.fiu.edu*media/watch-live/

Aquarius Reef Base Twitter #Angellsharks

SEAS Twitter #sharksFIU

Global FinPrint Twitter #count2save

Meet the Aquanaut Team:

Alain Duran – Science Team Lead

- Ph.D. candidate at FIU
- Studies the effect of biotic and abiotic drivers of herbivorous fish-algae interactions and their impacts on coral reef dynamics and conservation.
- Works on the dynamics of coral reef fish, particularly herbivores.

Benjamin Binder - Scientist

- Graduate student at FIU
- Focuses on the community wide effect of fish spawning aggregations (FSA) in the South Florida region and the spatiotemporal patterns of FSA formation.

- Tools of his trade include various fisheries sonars, which will be used extensively during the mission.

Frances Farabaugh - Scientist

- Ph.D. student in the Heithaus Lab at FIU and is involved with the Global FinPrint project.
- Focuses on behavioral ecology of marine predators.
- Hopes to elucidate the role sharks play in structuring reef communities by investigating predation risk effects and the functional redundancy of top predators.

Roy Bartnick - Science Translation Specialist, Teacher-Under-the-Sea Program

- Currently working on his Ph.D. dissertation in Educational Leadership at Capella University, Minneapolis, MN.
- Goal is to seamlessly blend STEM across the curriculum at the elementary school levels in hopes of fostering a love of learning while providing students the ability and opportunity to apply their knowledge to real world applications on a global community level.

- Will mentor the FIU student teacher, Carlos Calle, and lead many of the educational programs conducted aboard Aquarius through collaboration with Skype in the Classroom.

Check out Roy's blogs from the bottom of the ocean!

Check out his class's webpage and another mission blog

Meet the topside support team:

Carlos Calle – Science Translation Specialist, Teacher-Under-the-Sea Program

- Studies Elementary Education at FIU and is completing his internship at Norman S. Edelcup K-8 Center in Sunny Isles, Florida.
- Has a special interest in conducting experimental research in natural sciences and will work hand-in-hand with the science team.
- Will lead many of the educational programs conducted aboard Aquarius through collaboration with Skype in the Classroom.

Check out Carlos's blog!

Cathy Guinovart – Aquarius Reef Base Education and Outreach Coordinator

- Senior pursuing a Bachelor’s degree in Sustainability and the Environment.
- Started a student-run organization at FIU called "Age of Aquarius", which is dedicated to teaching the community about the value of Aquarius and the oceans as a whole.
- Schedules all virtual field trips for this mission and facilitates shore base live links with Carlos Calle.

This work would not be possible without the help of our amazing Aquarius Reef Base staff and the support of the Paul M. Angell Family Foundation.