Conducting Field Research to Study Population Dynamics of Clearwater's Sharks and Rays

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Abstract

This summer, I worked with a program called CMERA, also known as the Coastal Marine Research and Education Academy. This is a program that allows undergraduate and postgraduate students from all across the country to assist them in their process of researching population dynamics of the sharks and rays in Clearwater, Florida.
Sharks and rays are part of a subclass called elasmobranchs. Elasmobranchs play a critical role throughout the world's oceans, however, their slow life histories and negative interactions with fisheries makes them particularly susceptible to exploitation (Kacev et al., 2017). Many of these elasmobranch species are now classified as endangered. In order to reach sustainable levels, these populations must be consistently monitored and assessed so they may be managed. The specific research conducted by CMERA in Florida's waters involves:

- **documenting observed shark and ray species;**
- **determining the geographic distribution of sharks & rays by tagging the animals with identification and acoustic tags;**
- **determining population sizes and observing any changes over time;**
- **determining age structure within populations;**
- **determining sex ratio within populations; and**
- **observing site fidelity of individuals.**

These population dynamics are used to make inferences regarding population trends, size, and risk of extinction. CMERA works with the Florida Fish and Wildlife Conservation Commission, and also shares collected data with the Florida Fish and Wildlife Conservation Commission (FWC), National Oceanic and Atmospheric Administration (NOAA), as well as the Florida Division of Parks and Recreation.

Purpose

CMERA's research goals are primarily focused on conservation. Their commitment sets a strong precedent in safeguarding the delicate ecosystems of Clearwater's marine life, particularly through emphasizing the protection and preservation of its diverse sharks and rays, examples shown below in Figures 1 and 2. This is vitally important, as the collapse or imbalance of a species could destroy the whole ecosystem, which could lead to much more drastic effects when it comes to maintaining biodiversity. Through their research, dedicated advocacy, and inclusive community engagement, CMERA works towards nurturing a harmonious coexistence between humanity and the ocean.

Figure 1. Spotted Eagle Ray (*Aetobatus narinari*)

Figure 2. Great Hammerhead Shark (*Sphyrna mokarran*)

Data Collection

During my two weeks at CMERA, work consisted of being out on a research vessel for around six hours each day, conducting field research by capturing and releasing sharks and stingrays. We would capture the animals by either using a tangle net (Figure 3) or longlines (Figure 4). The tangle nets were used in shallow waters, anywhere from 3 to 5 feet deep, where the longlines were used in deeper waters and were also baited. Only sharks were caught on the longlines, but the tangle nets were able to catch sharks and rays alike. Other animals were also occasionally brought on board as bycatch and used for observation, identification, and documentation, before being released. These animals included sea turtles, sea urchins, sand dollars, starfish, a variety of fish species, crabs, and octopi. All animals were safely released, and none were harmed in this process.

Figure 3. Tangle Nets

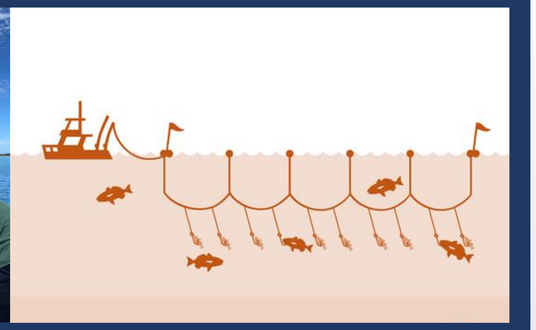

Figure 4. Diagram of longlines

When a shark or a ray, was successfully captured, it would first be **sexed and measured**, shown on a Bonnethead shark (*Sphyrna tiburo*) in Figure 5. Next, **each had a genetic sample taken**, as shown in Figure 6, where a student is cutting a piece of the fin of a Southern stingray (*Hypanus americanus*). This sample was then placed into test tubes and later sent to a lab for DNA analyzation of the individual animal. Finally, the animal would **be tagged with an acoustic identification tag**. This can be seen in Figure 7 on an Atlantic sharpnose shark (*Rhizoprionodon terraenovae)*, where an identification tag is being inserted under the dorsal fin.
Other pertinent data. was also recorded, including date, time, GPS coordinates, air and water temperature, water depth, tide, and even moon phase.

Figure 5. Measuring a Bonnethead hammerhead shark (*Sphyrna tiburo)*

Figure 6. Taking a genetic sample from a Southern stingray (*Hypanus americanus)*

Figure 7. Tagging an Atlantic sharpnose shark (*Rhizoprionodon terraenovae*)

Conclusion

It was inspiring for me to obtain hands-on experience conducting field research with sharks and rays this summer, along with all other marine-biology aspiring students in the program. CMERA provided all students with not only an amazing learning opportunity, but also an experience filled with long-lasting memories.
CMERA's research has been used in various ways. One study analyzed spatial distributions of certain elasmobranch species (Johnson & Miller, 2021), while others have created life history charts based on sex, maturity, and age structures of species in the area. As time goes on, more data will be available on changes in population dynamics in the area, and it will be of interest to see how climate change is affecting these elasmobranch species.
Overall, CMERA works diligently towards embracing responsibility and taking decisive action in preserving these invaluable species and the precious habitats they call home. I was honored to be a part of their research this past summer, it truly was an experience I will never forget.

References

Johnson, R. P., & Miller, M. (2021). Spatial Distribution of Cownose Rays (Rhinoptera bonasus) Within St. Joseph Sound, Florida. https://doi.org/10.48497/snn7-1647

Kacev, D., Sippel, T. J., Kinney, M. J., Pardo, S. A., & Mull, C. G. (2017). Chapter Three—An Introduction to Modelling Abundance and Life History Parameters in Shark Populations. In S. E. Larson & D. Lowry (Eds.), Advances in Marine Biology (Vol. 78, pp. 45–87). Academic Press. https://doi.org/10.1016/bs.amb.2017.08.001

Figure 8. Me (Kilia Brawand) holding an Atlantic sharpnose shark (*Rhizoprionodon terraenovae*)

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