Enclosure No. 2

Bimini Shark Lab

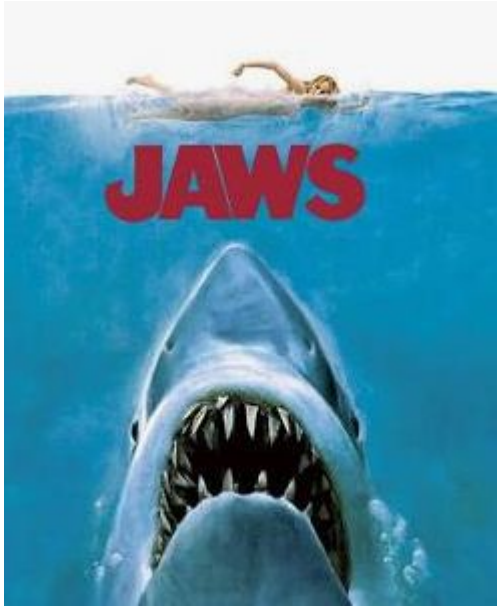
Teacher Internship Summer 2024

Jaws movie

Jaws was released in the summer of 1975 - it was based on a book written by Peter Benchley (sold 10 million copies).

Benchley would later express regret for writing a novel about “a rogue shark” who carried grudges.

He would spend the rest of his life spending his summers in Nantucket, advocating for oceanic conservation.



Background (Shark Lab)

The Bimini Biological Field Station (or Shark Lab) was established in 1990 by Dr. Samuel Gruber, who was a shark biologist and founder of the American Elasmobranch Society. He was a professor at the University of Miami's Rosenstiel School for Marine and Atmospheric Science. The lab is now run by Dr Matthew Smukall.

The mission of the BBFS is:

- To advance knowledge of the biology of marine animals with special emphasis on elasmobranch fish (sharks and rays)
- To educate future scientists at undergraduate and graduate levels
- To disseminate research results to advance the field of marine science and conservation
- To raise awareness of sharks and other marine life

OUR MISSION

RESEARCH

Understanding the biology of sharks and rays and the role that they play in the marine ecosystem through cutting edge field and laboratory research, spanning multiple disciplines such as molecular and behavioural ecology, physiology, conservation and sensory biology.

EDUCATION

Educating future scientists through providing opportunities for students, to design and conduct research projects at the undergraduate and graduate level, to complete advanced university degrees in the marine sciences; and through voluntary training as interns, thus advancing their field experience and skills.

https://www.natgeotv.com/za/shows/nationalgeographicwild/tiger-shark-terror
https://www.nationalgeographic.com/animals/article/sharks-form-years-long-friendships-dispelling-myths

CONSERVATION

Enhancing conservation and awareness through disseminating our results to both the public (tours of our facility, talks, tv documentaries, social media, posters and blogs) and scientists (peer-reviewed journals, conference presentations and posters, fishery reports and books).

In 2011 the Bahamas Government declared well over 600,000 Km2 of their waters as a shark sanctuary, prohibiting any commercial fishing of the animals as well as banning the possession, sale and trade of shark products.

Data collected by BBFSF researchers was a key factor in determining the importance and value of sharks to the Bahamian economy, and our studies continue to advance our understanding of these apical predators now fully protected. This was an astounding turn of events and will assure the long-term survival of elasmobranch fishes in the wider Atlantic in perpetuity. We are truly gratified to be a part of this historic event.

20 AUGUST 2024

Share on Twitter Share on Facebook

A Hammerhead sharks swims next to diver Matt Smukall. This is from OceanXplorers.

National Geographic/James Loudon

Teacher/Educator Internship

Summer 2024 Teacher and Educator Course

- **Funded by the Save our Seas Foundation and the Ocean Mokum Foundation**
- ALL expenses covered by the donors (flight to/from Bimini to Fort Lauderdale; accommodations; meals; excursions)
- 14 teachers are selected for both the July and August sessions for a 6 night/7 day field course at the Bimini Biological Field Station (28 out of more than 200 applicants)

The course included:

- Daily lectures by Dr Dean Grubbs (associate director of research at Florida State University Coastal and Marine Laboratory)
- Daily field trips to various areas around South Bimini to study directly, lemon sharks, nurse sharks, blacktip sharks and Caribbean reef sharks in their natural habitat, as well as with southern stingrays and sea turtles

Eligibility

Our goal for this scholarship is to provide an opportunity specifically to teachers and educators who can take their experience back into the classroom and reach students who may otherwise have no connection to the ocean. We believe that by providing educators with real life encounters and learning experiences in the field, we can help inspire the next generation of marine scientists/educators/conservationists, etc. **We hope that by expanding our educational reach to under-resourced and under-represented communities, we can help aid in the diversity and inclusion in the field of marine biology for ALL who are interested.**

To help us fulfill this mission we are looking for candidates who are:

- Actively working in the field of education
- Teaching middle & high school age groups
- **Able to educate in under-resourced and underrepresented communities or areas without access to ocean environments**

Stingray

Wyatt Albert | Bimini Biological Field Station

Juvenile lemon shark

Wyatt Albert | Bimini Biological Field Station

Juvenile/adult lemon shark

Blacktip shark

Wyatt Albert | Bimini Biological Field Station


Caribbean reef shark
Wyatt Albert | Bimini Biological Field Station

Sharks role in the ecosystem

Did you know that: for every one lb of shrimp caught in trawling nets, 4.5 lb of bycatch is caught/killed?

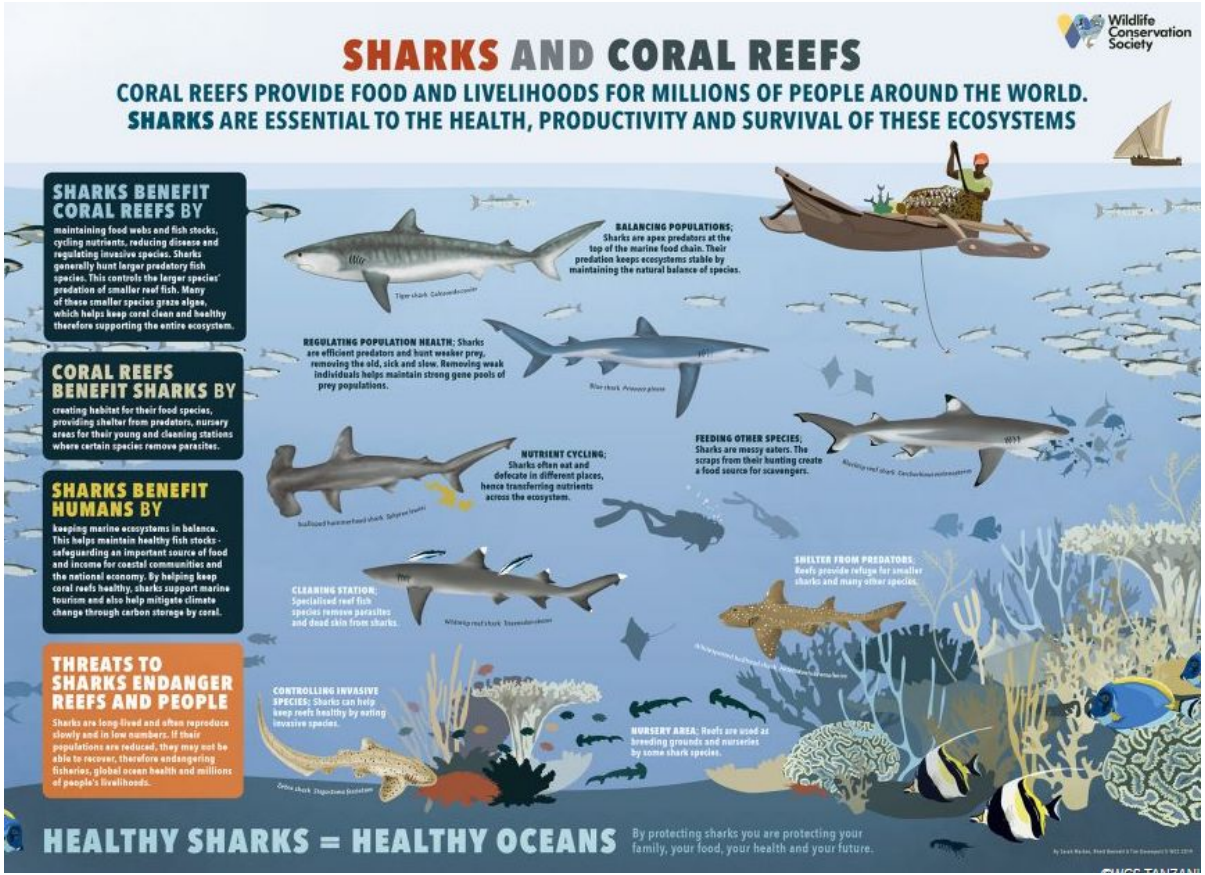
As most of us all know, large sharks like great white and tiger sharks are at the top of ocean food chains. They are what we call “apex” predators, and being the ones at the top means they keep all of the other levels below them in balance.

Smaller sharks predominantly fulfill roles in the food chain that makes biologists call them “meso-predators.” They occupy lower rungs of the food chain, but nevertheless exert important pressure on populations of fish, squid, crabs and other marine invertebrates, not allowing any one group to grow too abundant and thus upsetting the delicate balance.

Their ability as predators to maintain this balance amongst the animal members of marine communities means that sharks are absolutely essential for the health and balance of marine ecosystems, and also biodiversity.

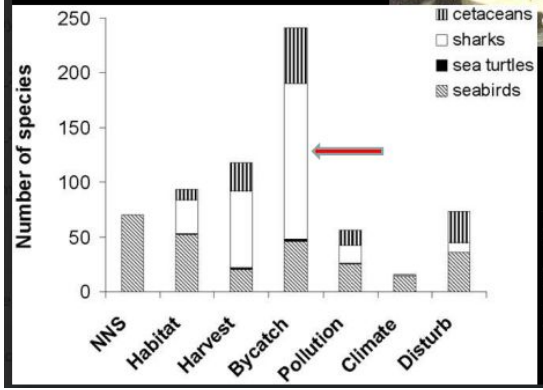
Shark and ray populations are estimated to have declined by an astonishing 71% since 1970[1]. Additionally, fisheries scientists have suggested that only 1 in every 10 large fish remain in the ocean[2]. This decline in shark populations is the result of half a century of industrial and commercial fishing. This decline means 167 species of shark are endangered[3].

The largest threat to species of sharks, and the biggest reason why sharks are endangered, is **commercial fishing**. Fishing fleets around the world catch an absolutely astounding 60-200 million sharks each year[4]. While most of these are caught for use in the shark-fin trade, there is also an increasing demand for their flesh as well as their oil-rich livers. Often, sharks are caught by fishing vessels attempting to catch other fish, such as tuna. In these instances, sharks are what we call “bycatch”.



https://sharkchampions.org.au/why-are-sharks-important-to-the-ecosystem/#:~:text=Sharks%20keep%20food%20webs%20in,important%20element%20of%20healthy%20biodiversity.

BYCATCH ISSUES



Finkelstein et al. 2008
Total number of species of cetaceans, sharks, sea turtles, and seabirds in the IUCN red list database affected by various threat categories

- Disparate life histories

TARGET Species	BYCATCH Species
2-3 years to mature	20 years to mature
Produce millions of eggs annually	Produce 12 pups every 3 years
2 years for population to double	30 years for population to double

Pristidae (Sawfishes)
5 species
All species listed as Endangered or Critically Endangered on IUCN Redlist!

Anoxypristis cuspidata (Narrow Sawfish)
Status: Endangered A2cd ver 3.1
Pop. trend: decreasing

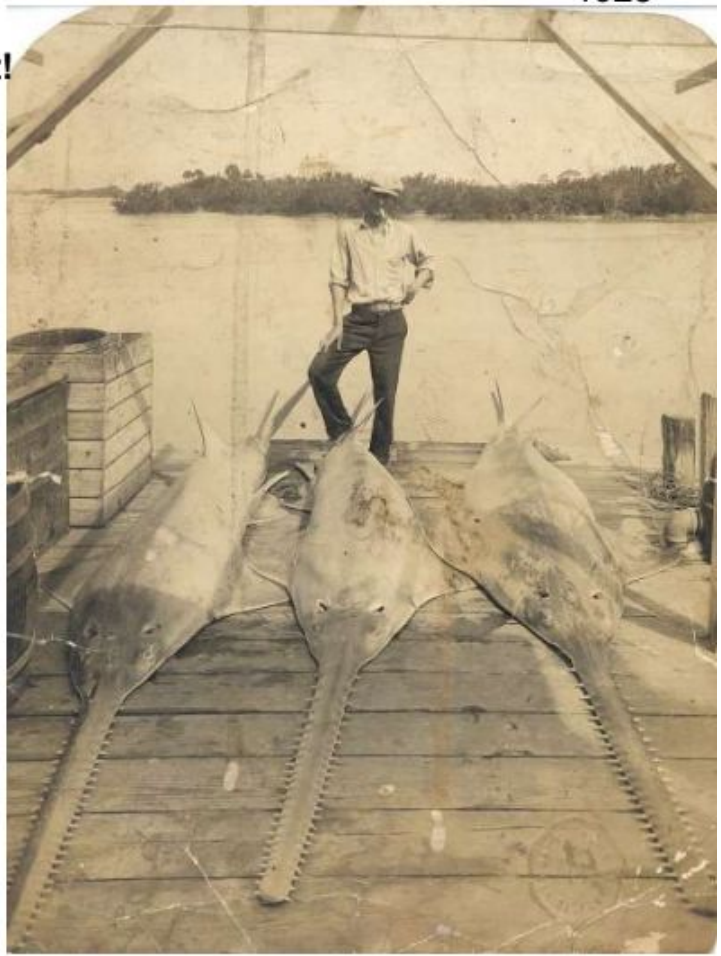
Pristis clavata (Dwarf Sawfish)
Status: Endangered A2cd ver 3.1
Pop. trend: decreasing

Pristis pectinata (Smalltooth Sawfish)
Status: Critically Endangered A2cd ver 3.1
Pop. trend: decreasing

Pristis pristis (Largetooth Sawfish)
Status: Critically Endangered A2cd ver 3.1
Pop. trend: decreasing

Pristis zijsron (Green Sawfish)
Status: Critically Endangered A2cd ver 3.1
Pop. trend: decreasing

1928



IUCN 2013. IUCN Red List of Threatened Species. <www.iucnredlist.org>. Downloaded on **08 April 2014**.

Bimini Golf Course

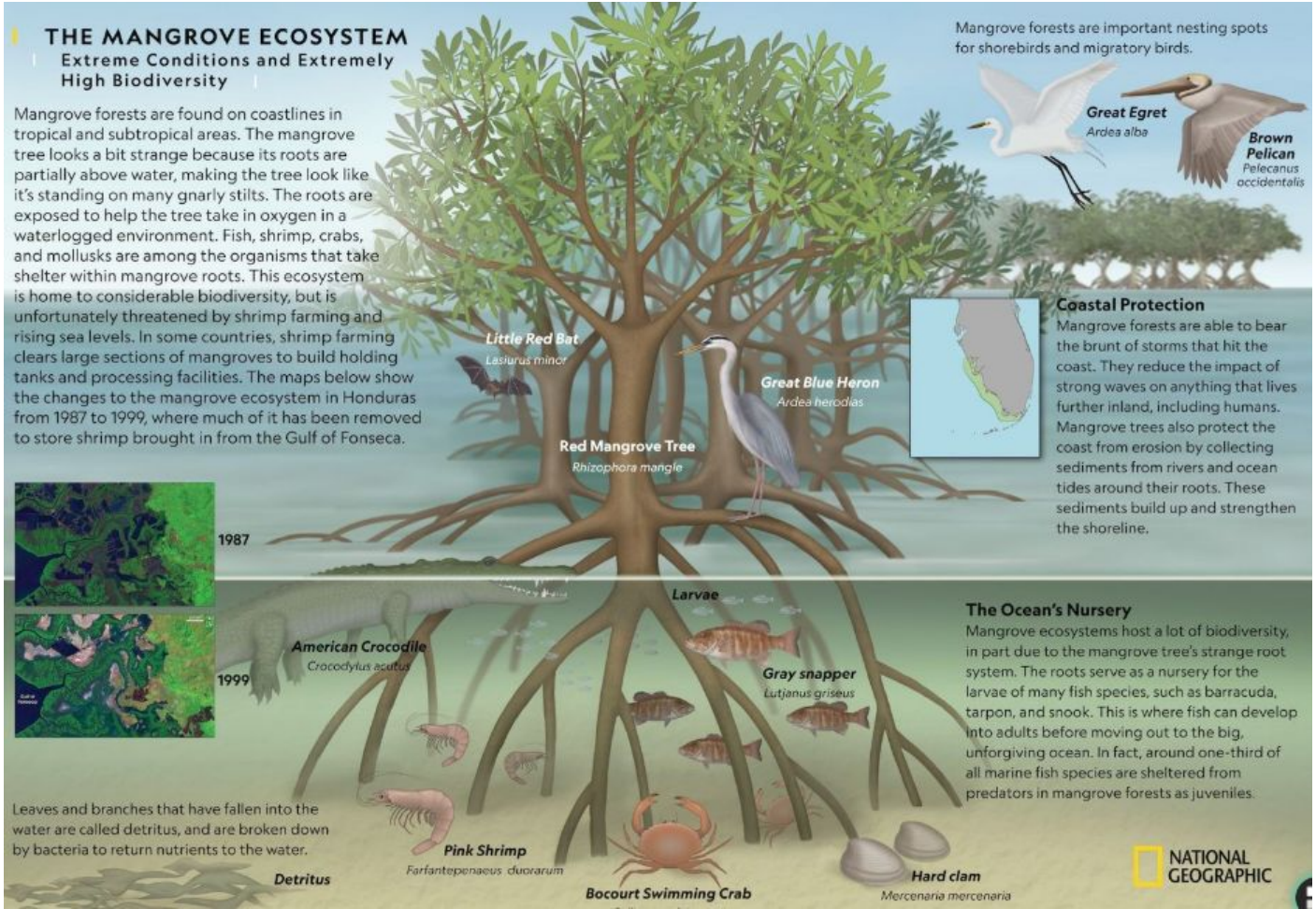
Despite efforts to protect North Bimini, a golf course will be built over the mangroves there. This involves DREDGING - the removal of sediments from underwater environments

Lemon sharks can spend up to 7 years living in the mangroves as it provides natural protection from larger predators. Females mature at about 14 years of age - they remember where they were born and return to the mangrove nursery area every 2 years to birth their pups.

Mangrove conservation

Mangrove ***forests give sturdy support to the coastline by minimizing erosion from storm surges, currents, waves, and tides.*** The intricate root system of mangroves is unique as they allow them to shelter fish and other organisms in an ecologically benign environment. For example, the area of Sunderbans is the world's largest mangrove forest and they have wider species diversity. This **biodiversity** hotspot is home to 180 species of trees and plants growing within its marshy boundaries, the Gangetic dolphin, estuarine crocodiles, river terrapins, hawksbill turtles, horseshoe crabs and the famous Bengal tiger. They are a World Heritage site and the biggest **carbon-sink** in South Asia. They have an important role in carbon sequestration and hence climate management.

Mangroves are the ***first line of defence against cyclones and rising seas***.



How am I going to use this for students?

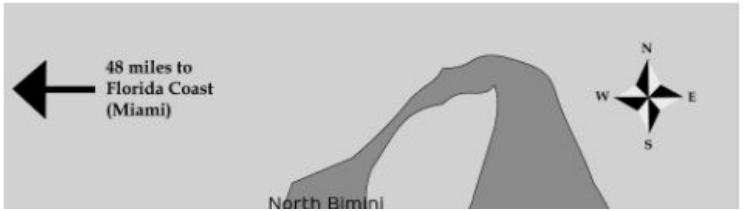
1. General presentation to students
    a. Lunch hour presentation to students
        i. Targeted at any student who has an interest in marine biology, conservation efforts or just in sharks
2. Targeted presentations to Biology 20 students and Science 14/24/20/30 students
    a. Importance of sharks/rays in the global ecosystem
    b. Human impact on shark/ray populations
    c. What conservation efforts are being made to protect sharks/rays globally?
    d. What can each of us do to protect our marine ecosystems?
    e. Volunteer/internship opportunities to work at the Bimini Shark Lab or the like
3. Embedded information into Biology and Physics 30 courses
    a. Comparative anatomy and physiology (sensory systems; reproductive systems)
    b. Use of electric and magnetic fields in sharks

Epigenetics

Bimini Dredge Leaves its Mark on Sharks' DNA

May 27, 2021

Scientists have discovered changes in DNA patterns for juvenile lemon sharks that lived through a dredging event to construct a commercial marina in Bimini, Bahamas.



Internship Opportunities

March 1 - June 1, 2025 (about same time each year)