Sharks!

Biology, Behavior & Importance

Mariah Meyer & One Ocean Diving
Photo by Paul phin Photography

One Ocean Diving

Here at One Ocean, we educate people about shark biology, behavior and conservation efforts, while showing them how beautiful these misunderstood apex predators really are

Photo by Blake Thompson

Photo by Paul Phin photography

Founders of One Ocean

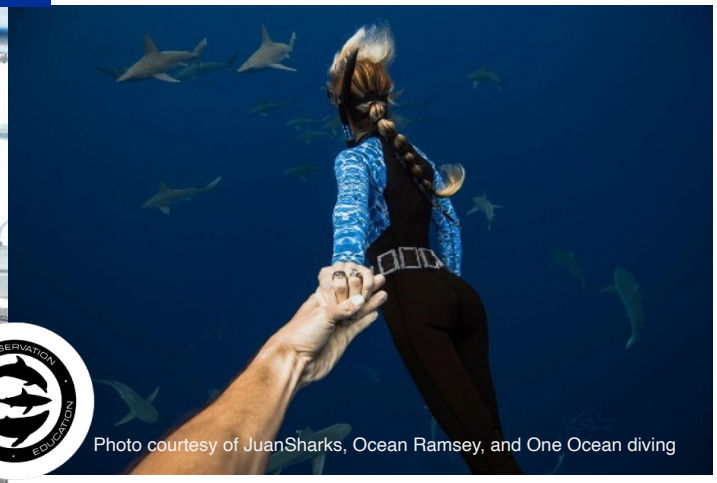


Photo courtesy of JuanSharks, Ocean Ramsey, and One Ocean diving

Ocean & Juan created One Ocean to :

help teach the world about sharks,

reverse the stigma around them,

promote ocean conservation

collect data about shark abundance and behavior

support the field of shark science

offer safe interactions with sharks

monitor local populations-saving them from entanglement and fishing line

Photo by PaulPhin

Learning about sharks

- Biology of sharks
- Shark behaviors
- The importance of sharks
  - Culturally
  - Ecosystem
- Shark Conservation

So many different sharks!


Photo courtesy of Dr Csotonyi


Photo courtesy of Rick Miskiv


Photo by Juan Sharks


Photo courtesy of NOAA

Shark sight


Photo by Mariah Meyer

Sharks see in monochromatic vision (contrast), they are only able to see a little color

- Some “colors” are attractive to them, yum yum yellow and white

Nictitating Membrane helps protect their eyes when they eat

Tapetum Lucidum helps them see in low light conditions

Shark smell

Photo by Juan Sharks

- Smells travel easier in water than in air
- Some sharks can smell better than others
- Some sharks have better smell than others
    - Low light conditions, deep sea, open ocean
- Sharks can smell us! (but they don’t care)

Shark Hearing

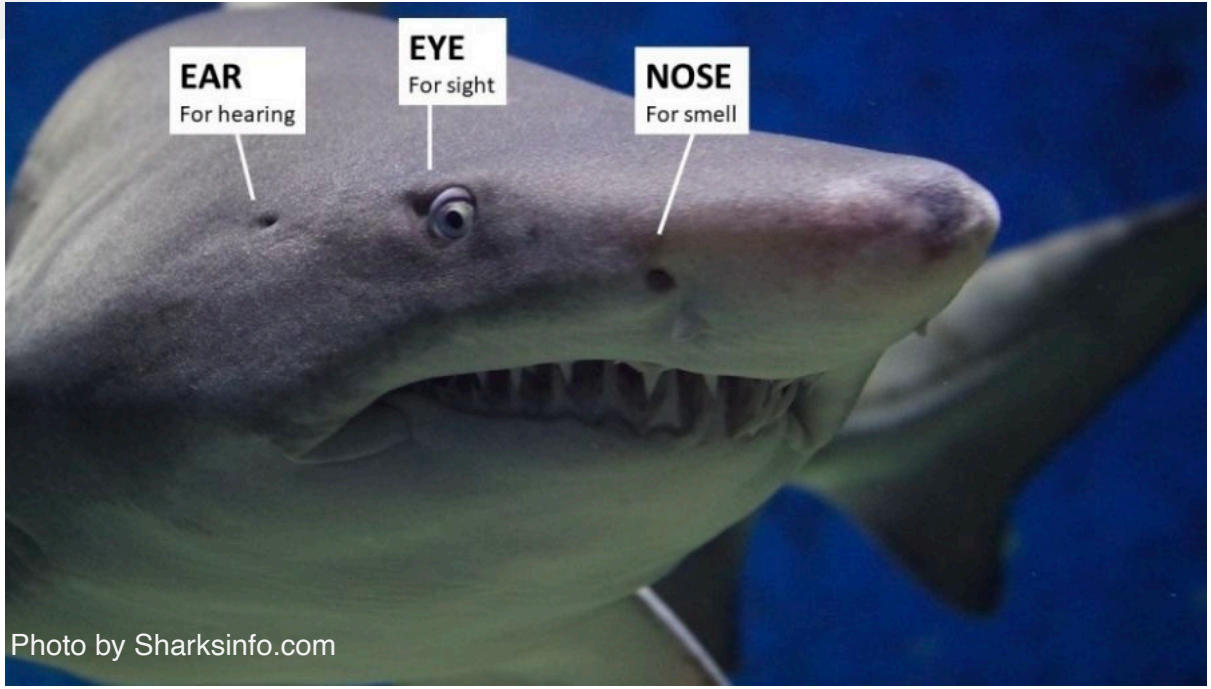


Photo by Sharksinfo.com

- Sharks can hear louder noises from around a mile away (boat, helicopter)
- Sharks can hear splashing noises from around 300 feet away
- Sharks are more attracted to prey noises
    - Loud splashing noises, whimpering/whining

Ampullae of Lorenzini

- Sharks have a special 6th sense called Ampullae of Lorenzini
- Detects electrical impulses from:
  - Cameras
  - Boat motors
  - heartbeats/movement
  - Fish
  - Injured animals

What type of movement would a healthy animal make?

What about an injured one?

Photo by JuanSharks & Ocean Ramsey

Lateral Line

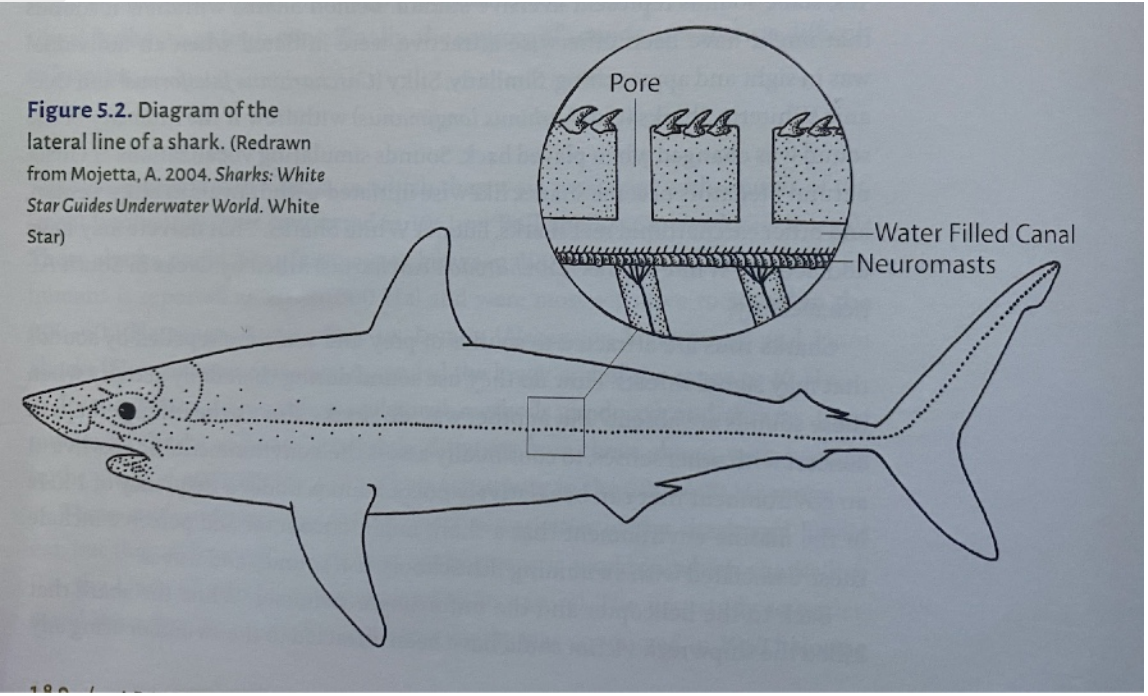
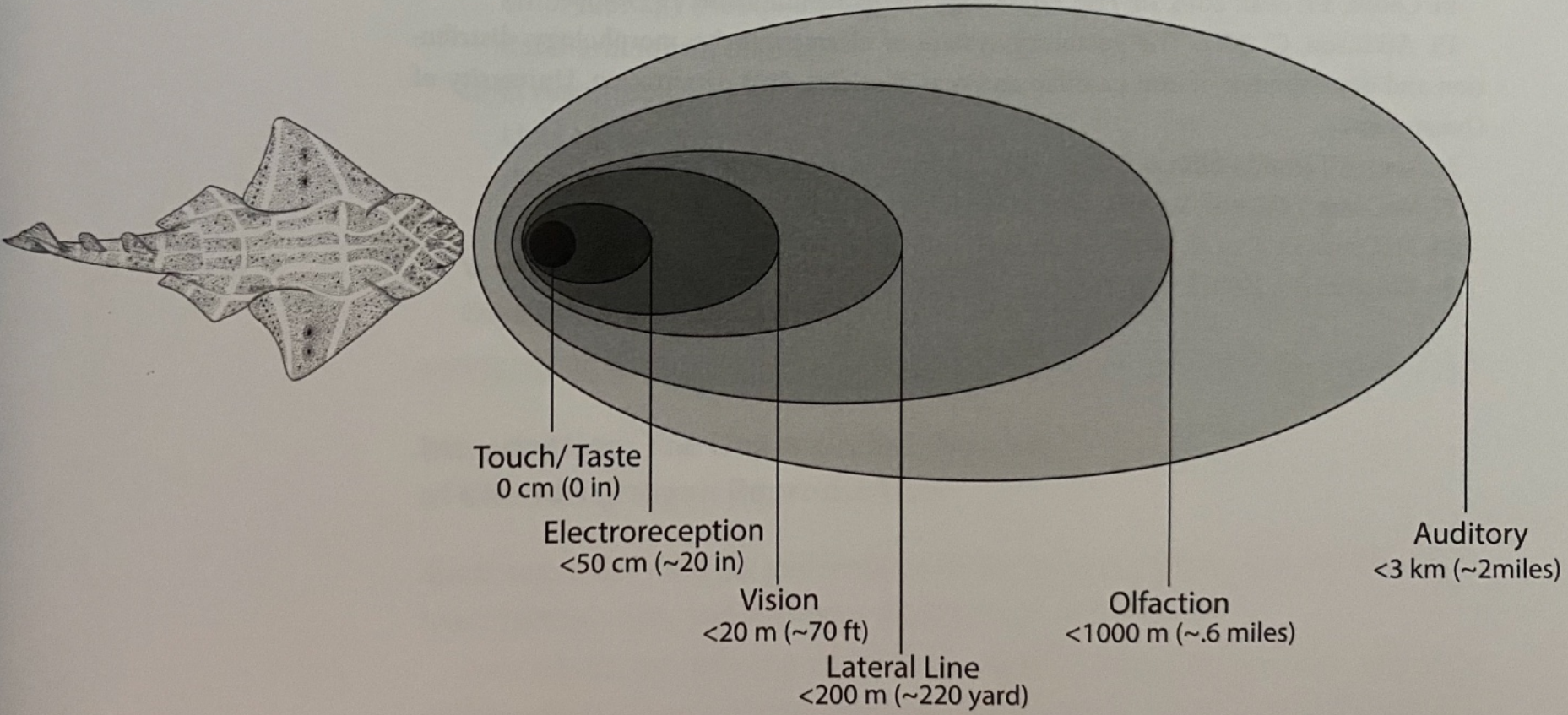


Figure 5.2. Diagram of the lateral line of a shark. (Redrawn from Mojetta, A. 2004. *Sharks: White Star Guides Underwater World*. White Star)

- Porous canals running along side of the sharks body
- Canals have hair cells, which move and bend in response to environmental stimuli
  - Kind of like cat whiskers- but no actual “whisker”. Water moves, which moves the hair inside of the cell
  - Ex: Marco polo
- Detects multiple stimuli- water movement, low frequency sounds, and vibrations

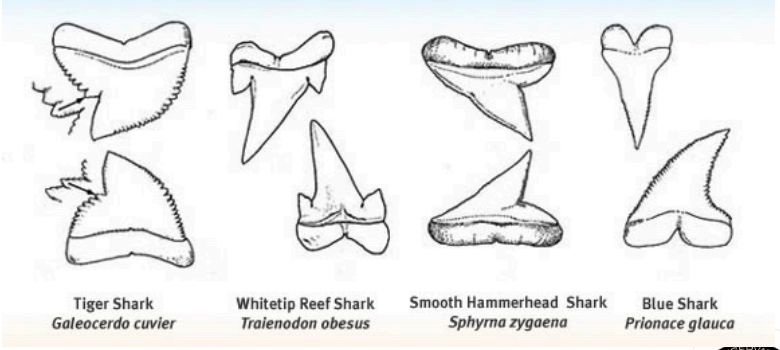
Recap of senses



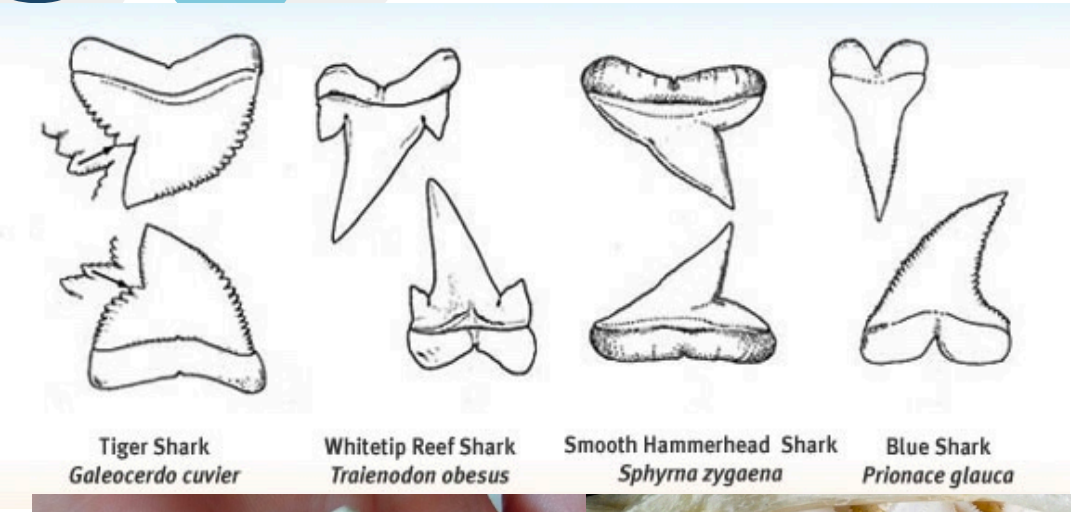
Shark teeth


Photo by Juan Sharks

- Sharks have rows of teeth that are constantly being replaced
- How many teeth do you think a shark can lose in his lifetime?
- Many different types of teeth for different types of prey
    - Like we have different utensils

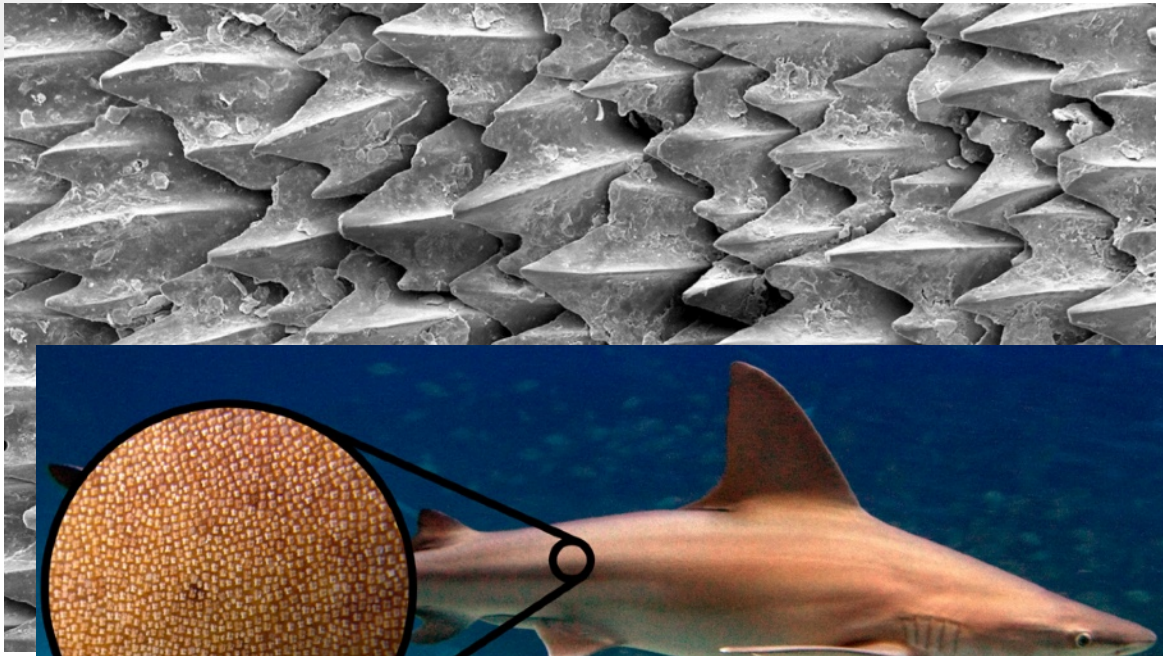


Shark Teeth and prey



- Many different types of teeth for different types of prey
- What do think each teeth is good for?
- Tiger shark
  - Prey: Scavengers, turtles
  - Teeth like a saw
- Reef shark/Blue shark
  - Prey: fish and squid
  - Teeth long and thin to catch fish easier
- White shark
  - Prey: Rays -> Seals
  - Teeth to catch fish to Teeth like steak knives

Shark Skin



- Shark skin is called “dermal denticles”
  - Dermal- skin, denticle- teeth
  - “Skin teeth”
- Instead of scales like fish, sharks have dermal denticles to help them swim really fast

Photos courtesy of Getty Images & Uwm.com

Shark Respiration

Photo by PaulPhin

- Sharks breathe through their gills
- All sharks have from 5-7 gills
  - Six gill shark, Seven gill shark
- Most sharks are ram ventilators: meaning they need to keep swimming to breathe
- Some sharks have spiracles where they can pull water over their gills- so they don't have to swim

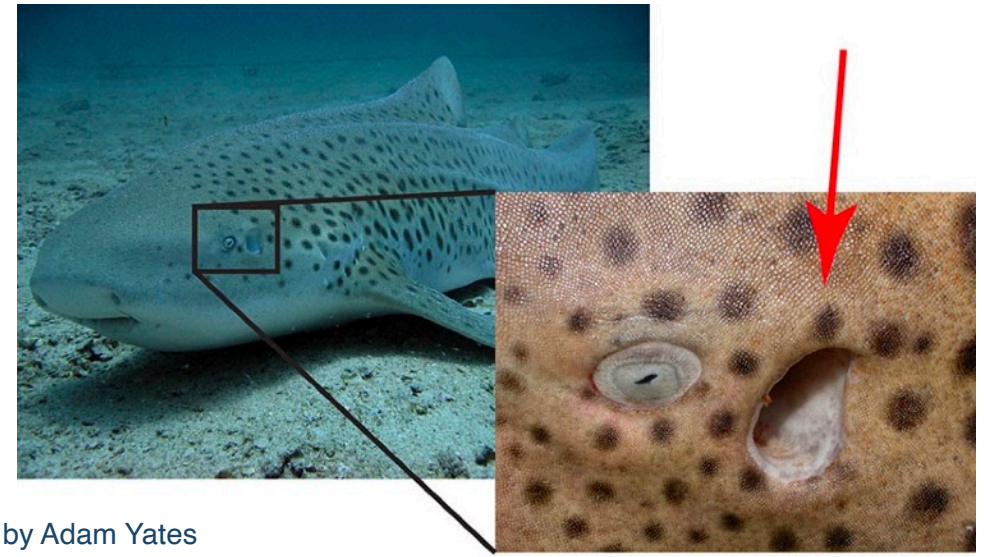
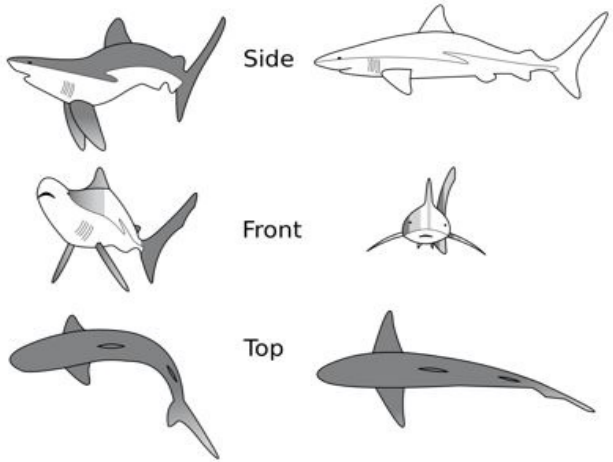


Photo by Adam Yates

Shark behaviors

Photos by Mariah Meyer

More shark behaviors

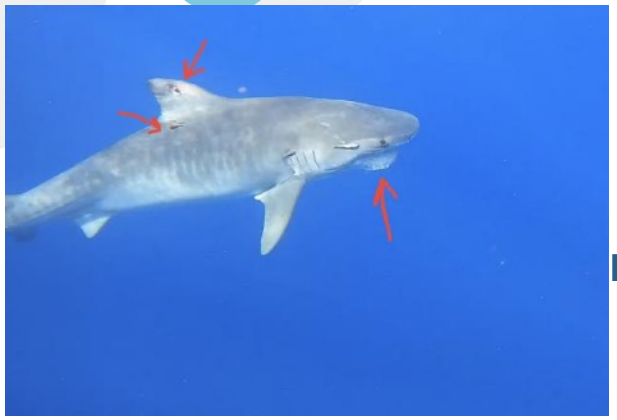


pectoral fin dropping and back arching

Gill fluffing

Photos courtesy of JuanSharks, World of sharks.com, Paulphin, TaylorKSeadiving.com

How we ID a shark!



We can use:

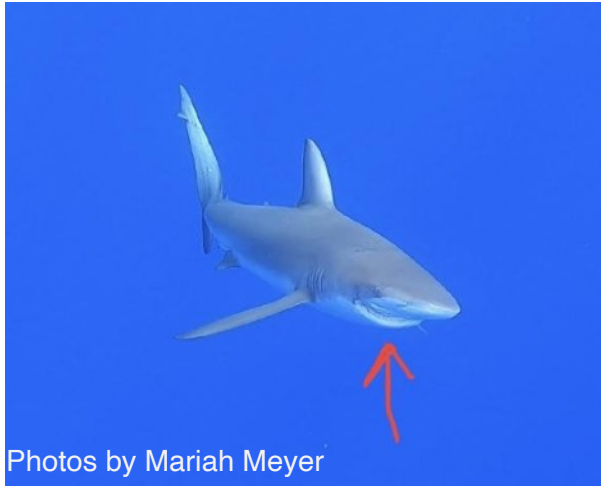
- Tags
- Scars
- Notches out of fins

Roxy:

- Old tags
- Jaw deformity

Mr. Itchy:

- Orange tag



Smiley:

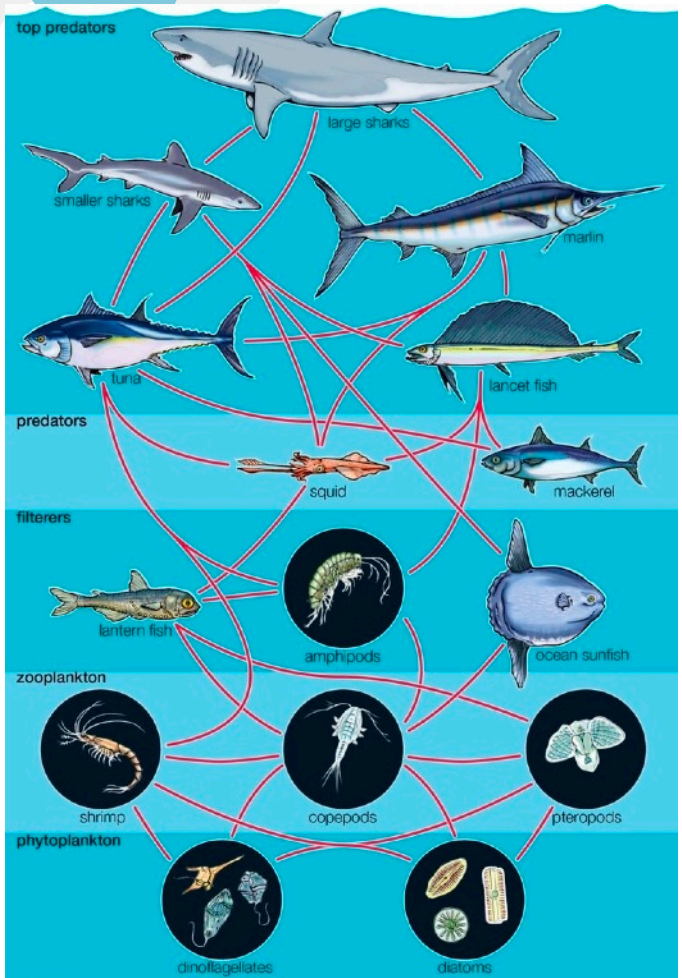
- Jaw deformity
- 2 white scars on back

Photos by Mariah Meyer

Nosey:

- Notch out of nose area

Sharks in the ecosystem



- What is an Apex predator?
  - At the top of the food chain with no other predators.
  - Sharks keep the populations of prey species in check
  - Sharks are like the doctors of the ocean keeping it healthy, they feed on the weak and sick making sure that diseases don't spread

Photos courtesy of Encyclopedia Britannica

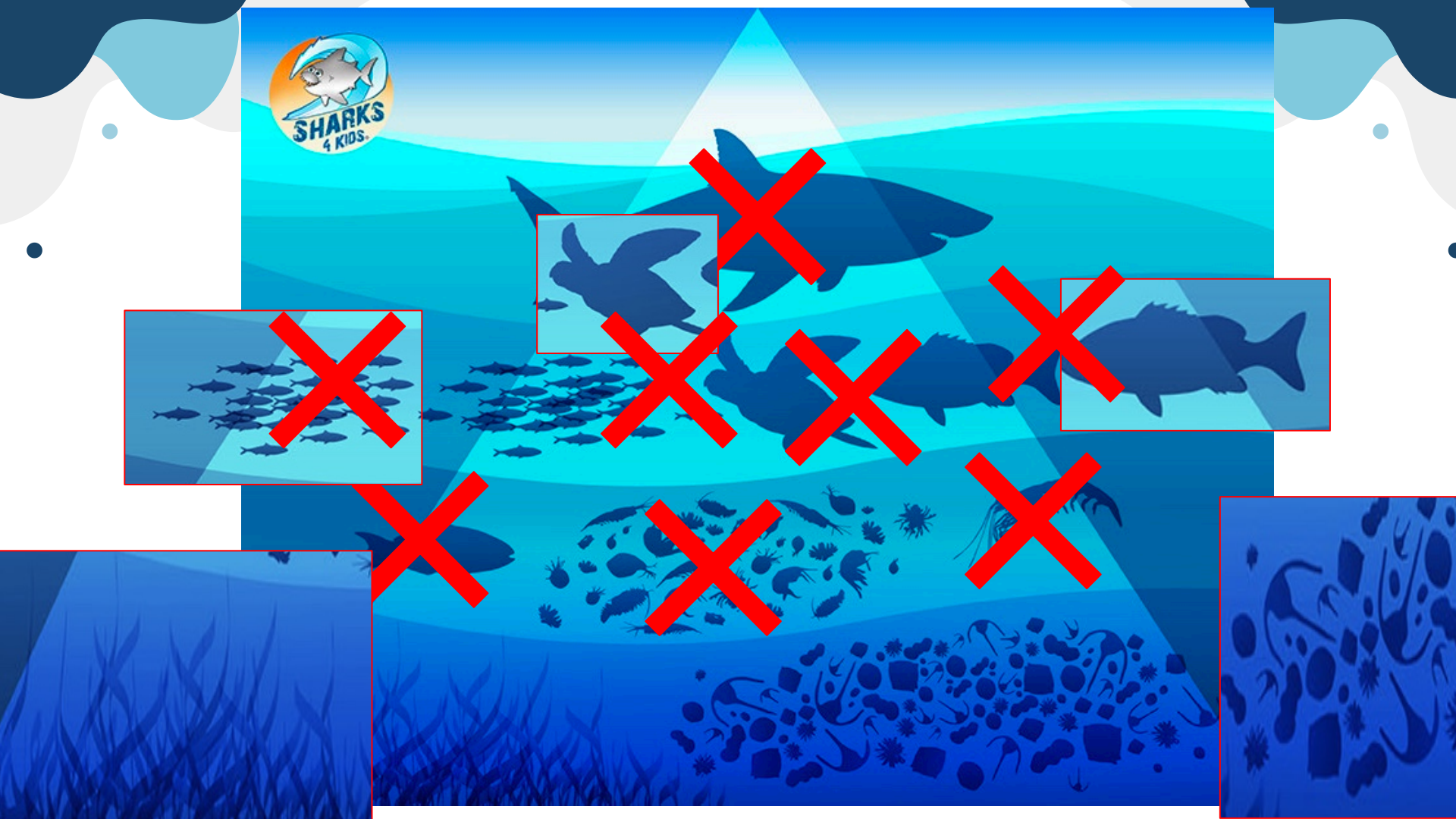
Why sharks are important: ecosystem

Without sharks, the Ocean could experience a trophic cascade

A trophic cascade is an event where one action affects the entire ecosystem.

If we removed sharks, there would be many “level 2” omnivores which would soon overpopulate and use all the resources below them (level 3)

After all the “level 3” herbivores have been consumed, the “level 2” omnivores will starve and all the plant life (4) and zooplankton/ phytoplankton would overpopulate


SHARKS
4 KIDS

Why sharks are important: Aumakua

Sharks- Manō

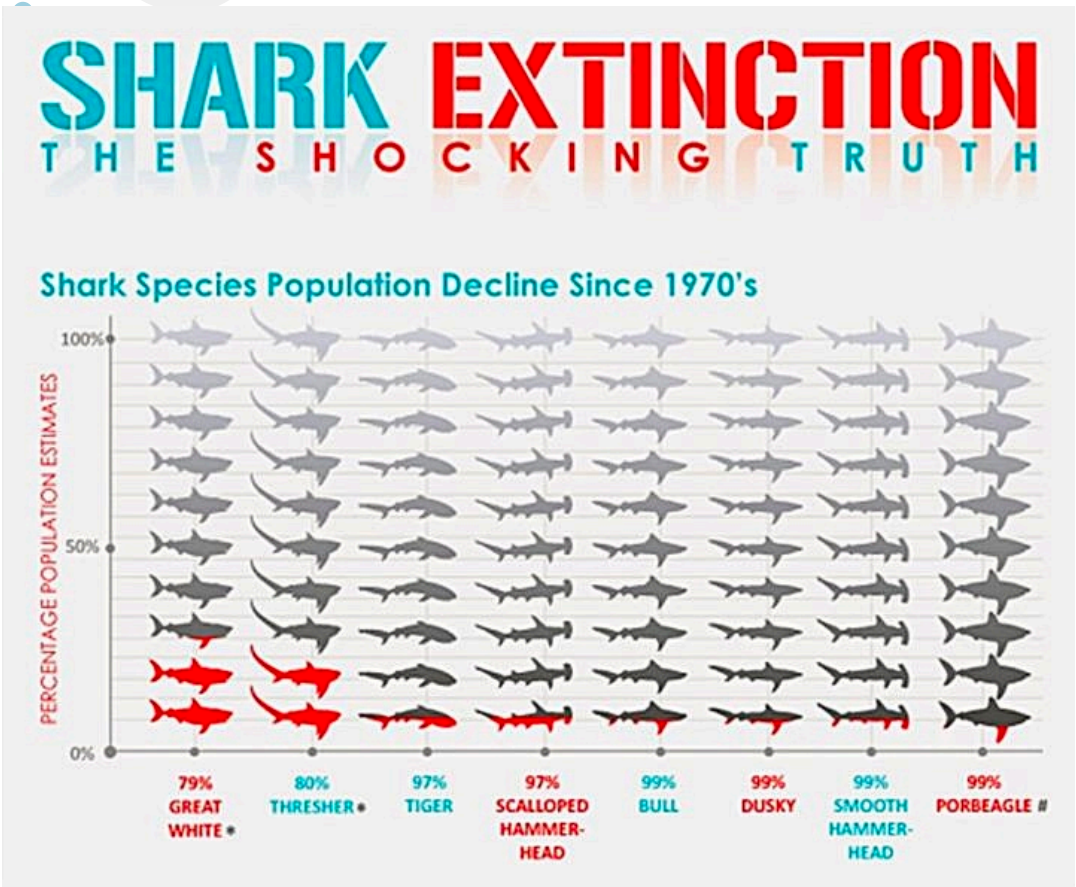
‘Aumākua- a dead ancestors spirit reincarnated into a living entity.

An ‘Aumākua could be a shark, dolphin, whale, turtle, owl, the list goes on.

Sharks that are ‘Aumākua will protect and give wisdom as long as they are respected

Photos courtesy of Herb Kawainui Kane

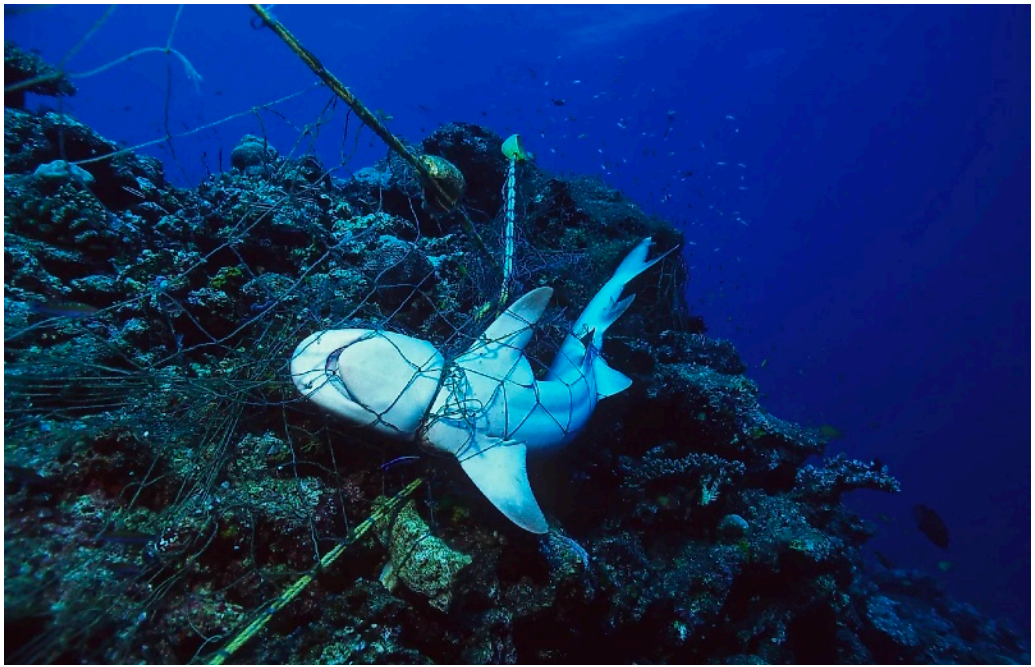
Shark conservation



In recent years over 90% of Shark species populations have declined.

How many sharks do you think are killed each year?

So what kills all these sharks?



What kills sharks?

Finning

Bycatch

Marine debris

Shark culling

Shark fishing

Photos courtesy of Jason Isley, Shark Stewards, flyfisherman.com, reefCI.com

Shark finning

Photos courtesy of Jason Isley, Shark Steward, flyfisherman.com, reefCI.com

Shark finning is when fishermen land a shark and cut their fins off.

They do this to the shark live and throw the body back overboard to drown.

This way the boat can carry more fins without the excess weight of the shark body.

Extremely wasteful, only 2% of the sharks body weight is used

Shark fin soup

Photos courtesy of Wikipedia and wild aid

Shark fins are used to shark fin soup.

Shark fin soup has been a status symbol food and cultural food in many parts of Asia. Often served as a “luxury” item. It is also believed that shark fins can help fertility and other ailments when consumed.

Shark is high in **Mercury**, from bioaccumulation due to eating large fish.

Mercury is a known neurotoxin, and is extremely detrimental to our nervous system.

Shark Products

Squalene/Squalane: Shark liver oil, sharks are harvested and killed for this

UNLESS your product says 100% plant derived it is not cruelty free :(

Sharks jaws and teeth: Sharks are killed for their jaws and teeth as well.

***If you do want to buy shark tooth jewelry, opt for the fossilized kind, no sharks were harmed!

Photos courtesy of Google shopping

Shark meat in pet food :(

Shark meat is a common additive in pet food.

Check you labels before buying for any of these names.

*****Ocean Fish or "Fish" on you pets food is also shark meat. Unless the species/type of fish is specified it is shark meat.**

Shark meat is extremely common in canned cat and canned dog food

Pet foods that tested positive for shark meat:

FANCY FEAST, WHISKAS, FRISKIES

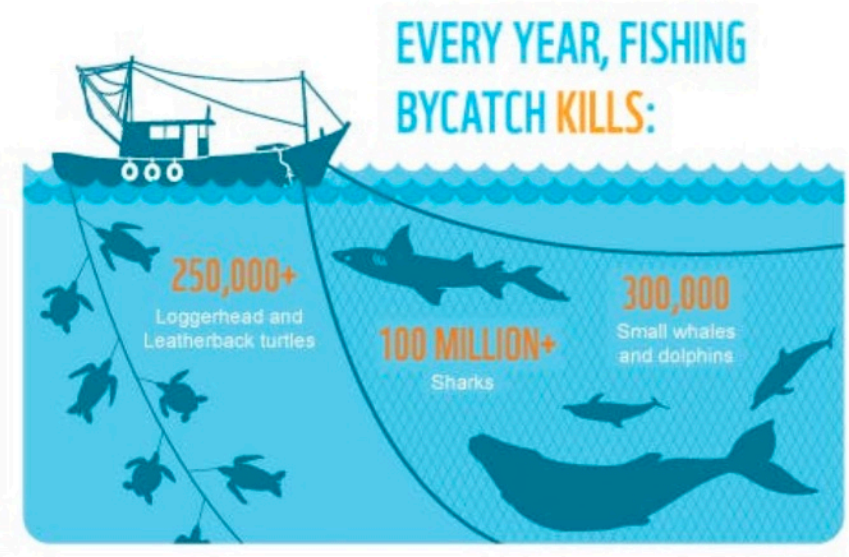
Bycatch

Photos courtesy of BBC and World Atlas

Bycatch is the catch of anything that isn't the target species.

In the Tuna longline fishing industry, for every 1 tuna 9-12 other marine species are caught

Bottom trawlers, Gill nets and Long lines produce tons of bycatch



Marine debris/waste

Ghost nets: abandoned fishing nets

Ghost nets, ghost lines, and dumped fishing gear is the biggest plastic polluter in the ocean.

Over 640,000 TONS are discarded every year.

Thats 1,280,000,000 lbs.

Photos courtesy of WWF and instagram

Photos courtesy of Jason Isley, Shark Stewards, flyfisherman.com, reefCI.com

Shark culling/ Shark Fishing

Shark culling: the killing of sharks out of fear. This is still very prevalent in Australia

Shark fishing: Fishing exclusively for sharks to kill as many as possible

Some fishermen even believe that there are “too many” sharks in the ocean and that the sharks are competing with them for the fish…

Photos courtesy of Jason Isley, Shark Stewards, flyfisherman.com, reefCI.com

Changing perspectives

One of the easiest things we can do is change peoples views on sharks, and make them love sharks!

Did you ever think sharks were scary?

What made you change your mind?

How could you spread the word and help tell people sharks aren't the mindless killers the media portrays them as?

How can you help?

- Shark meat/shark fins
  - Don’t consume shark meat or fins, refuse to eat at places that sell shark
- Squalene/Squalane
  - Check you beauty products and make sure any Squalane/ Squalene is 100% cruelty free
- Shark meat in pet food
  - Check your pet food, boycott brands that do sell shark meat to your pets (it's not good for the sharks or your pets!)
- Bycatch/Marine waste
  - Reduce your fish intake, have a fishless friday, eat sustainable seafood, buy from local fishermen with ethical fishing practices
- Shark Culling/ Shark fishing
  - Protest shark culling and fishing in your hometown/ get educated and learn more about what is happening worldwide and how to help!

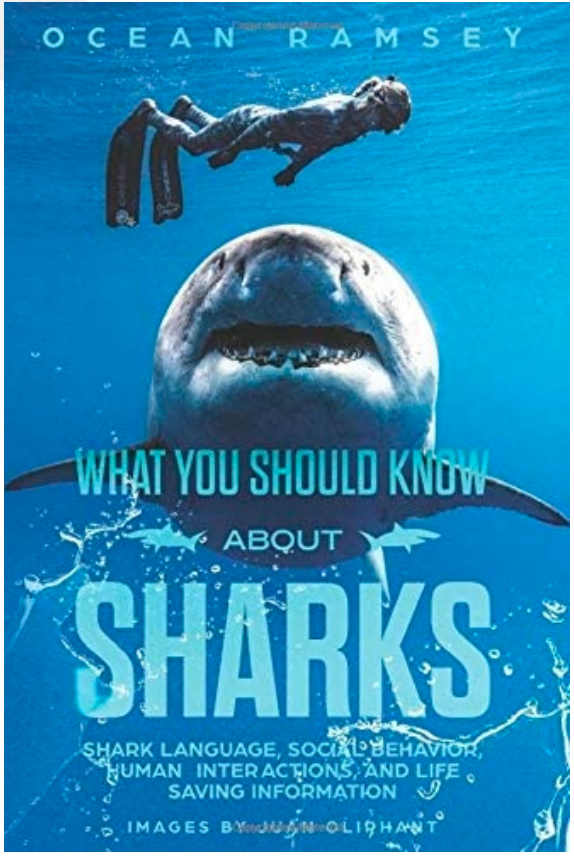
Photo by PaulPhin

The best thing we can do is to be a voice for the sharks, on social media, to our families, friends and in our community

The sharks cannot speak up for themselves, so we have to be their voice.

Photo by PaulPhin

Want to Learn More?



Visit **OneOceandiving.com** and **OceanRamsey.org** to learn more

Take Oceans' Course online or read her book!

questions?

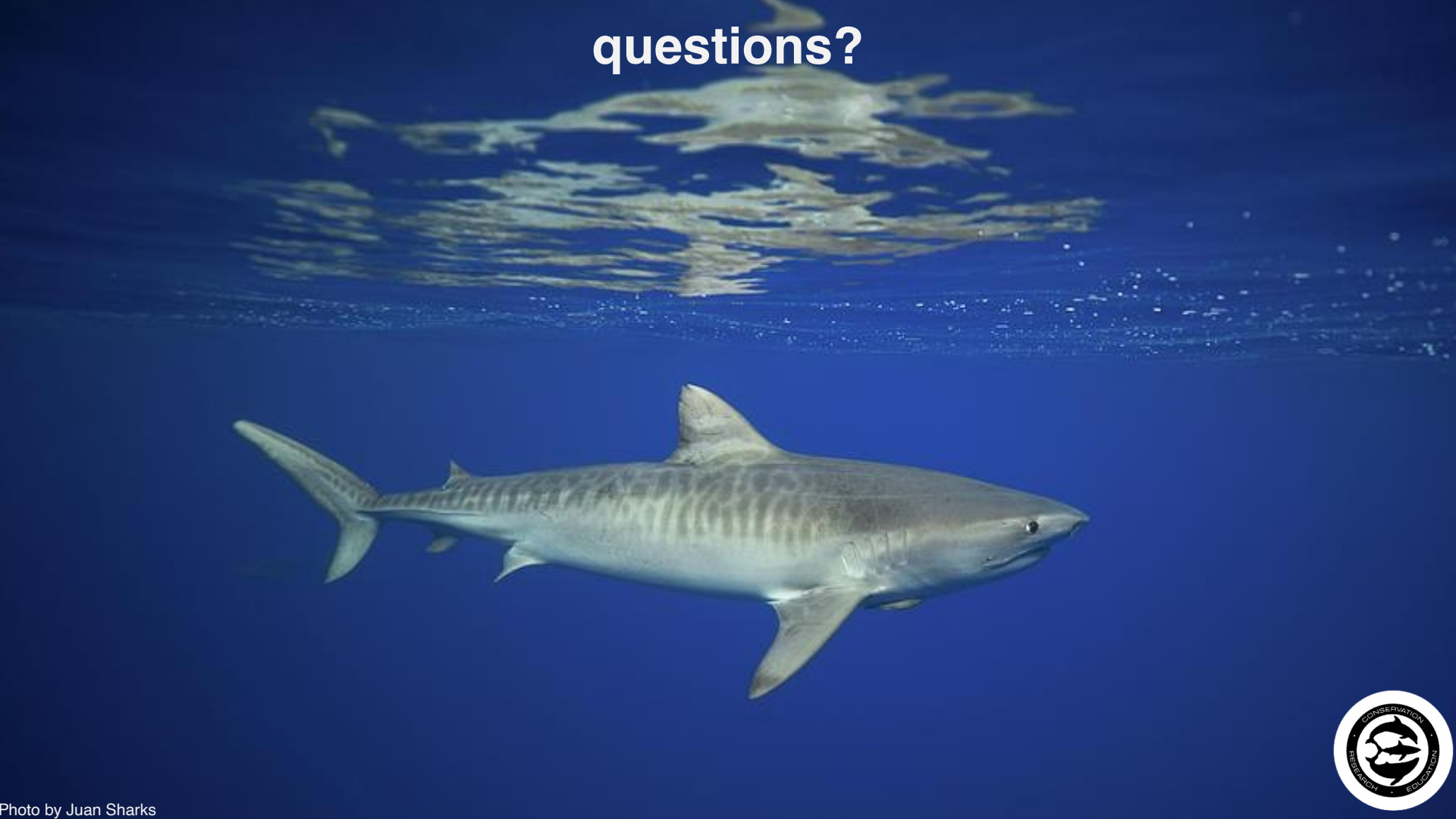


Photo by Juan Sharks

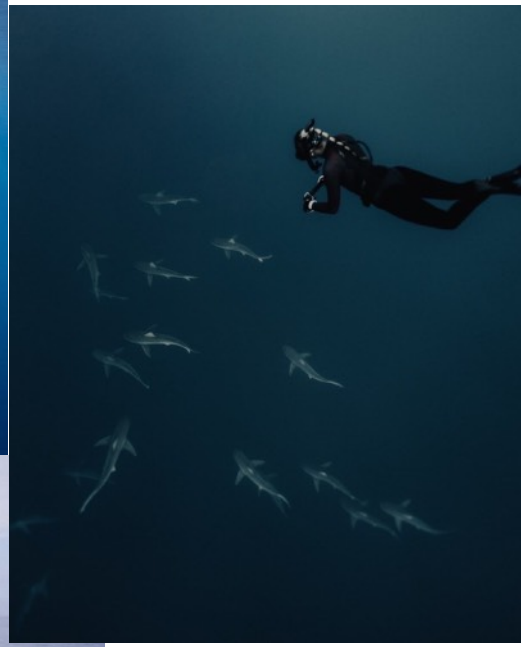
Other Resources:

Abel, D. C., Grubbs, R. D., Guttridge, T. L., Pullen, E., & Dando, M. (2020). *Shark biology and conservation: Essentials for educators, students, and enthusiasts*. Johns Hopkins University Press.

Hastings, P. A., Walker, H. J., & Galland, G. R. (2015). *Fishes: A guide to their diversity*. University of California Press.

Hawaiian storyteller Kahu Charles Kauluwehi Maxwell Sr. : https://www.moolelo.com/sharks.html

Safety Diver Mariah Meyer



College & Degree: California State University Long Beach, Marine Biology

Favorite shark: Tiger Shark or Horn Shark

Why I love the Ocean: I love that even though not everything in life is constant and stable, the ocean will always be there and i can always find my happy place diving and being underwater.

Something the Ocean has taught me: The ocean has taught me to be thankful for all I have. There are times where I wake up and wish I looked different or didn't have health issues. But the ocean reminds me that i have a strong healthy body- a body that lets me surf, swim and freedive. We can all learn to count our blessings

Fun fact: I'm a cat mom and i'm allergic to bread!