Shark Reading Assignment

1. Students read **Sharks: Not Scary…Necessary**. The reading is available online at oceanconnectors.org/resources.

2. Students provide written responses to 10 questions then complete a discussion-based critical thinking extension.

3. Please review the answers together in class.

4. This lesson covers 7th grade Common Core State Standards in ELA/Literacy, and Next Generation Science Standard MS-LS2.

5. **Critical Thinking Extension: Have students form small groups and discuss the following questions together.**

    - Explain the flow of matter among the living and nonliving parts of an ocean ecosystem, including sharks.
    - Every two years, the National Oceanic and Atmospheric Administration (NOAA) issues a report to Congress to improve international fisheries management. Review the most recent report at: fisheries.noaa.gov/international/report-iuu-fishing-bycatch-and-shark-catch and respond to the following questions.
        - What is IUU fishing?
        - What is fisheries management?
        - What types of regulatory measures can be used to protect sharks and other species?
        - In the most recent report, how many nations were identified with vessels engaged in IUU fishing?
        - As a consumer, how can we use this information to make responsible seafood choices?

Shark Reading Assignment

Answer the questions below with complete sentences.

1. How do sharks differ from other fish? Give 3 examples.

2. Sharks have an unlimited number of teeth. Why is this important?

3. About how many different species of sharks are there?

4. What is the pelagic environment?

5. Which species of shark is the largest, and how big can they get?

6. How many sharks are killed by humans each year?

7. Describe overfishing and how it affects shark populations.

8. What is bycatch?

9. What parts of a shark are typically consumed by humans?

10. List 2 ways we can help sharks.

Shark Reading Assignment

Answer Key

1. How do sharks differ from other fish? Give 3 examples.
Regular fish have bones, whereas a shark's skeleton is made almost entirely of cartilage. Sharks also tend to grow much more slowly than other fish and, unlike bony fish, they have eyelids.

2. Sharks have an unlimited number of teeth. Why is this important?
Sharks often lose teeth while hunting, so having the ability to replace those teeth can mean the difference between catching a meal and going hungry.

3. About how many different species of sharks are there?
There are over 500 different species of sharks.

4. What is the pelagic environment?
The pelagic environment is the open ocean.

5. Which species of shark is the largest, and how big can they get?
The whale shark is the largest species of shark. They can reach up to 12 meters in length (about 40 feet).

6. How many sharks are killed by humans each year?
Humans kill an estimated 100 million sharks every year (the actual number could be much higher).

7. Describe overfishing and how it affects shark populations.
Overfishing is the removal of a species at a rate that cannot be replenished. When people remove too many sharks, it disrupts the food web, which throws the entire ocean ecosystem out of balance.

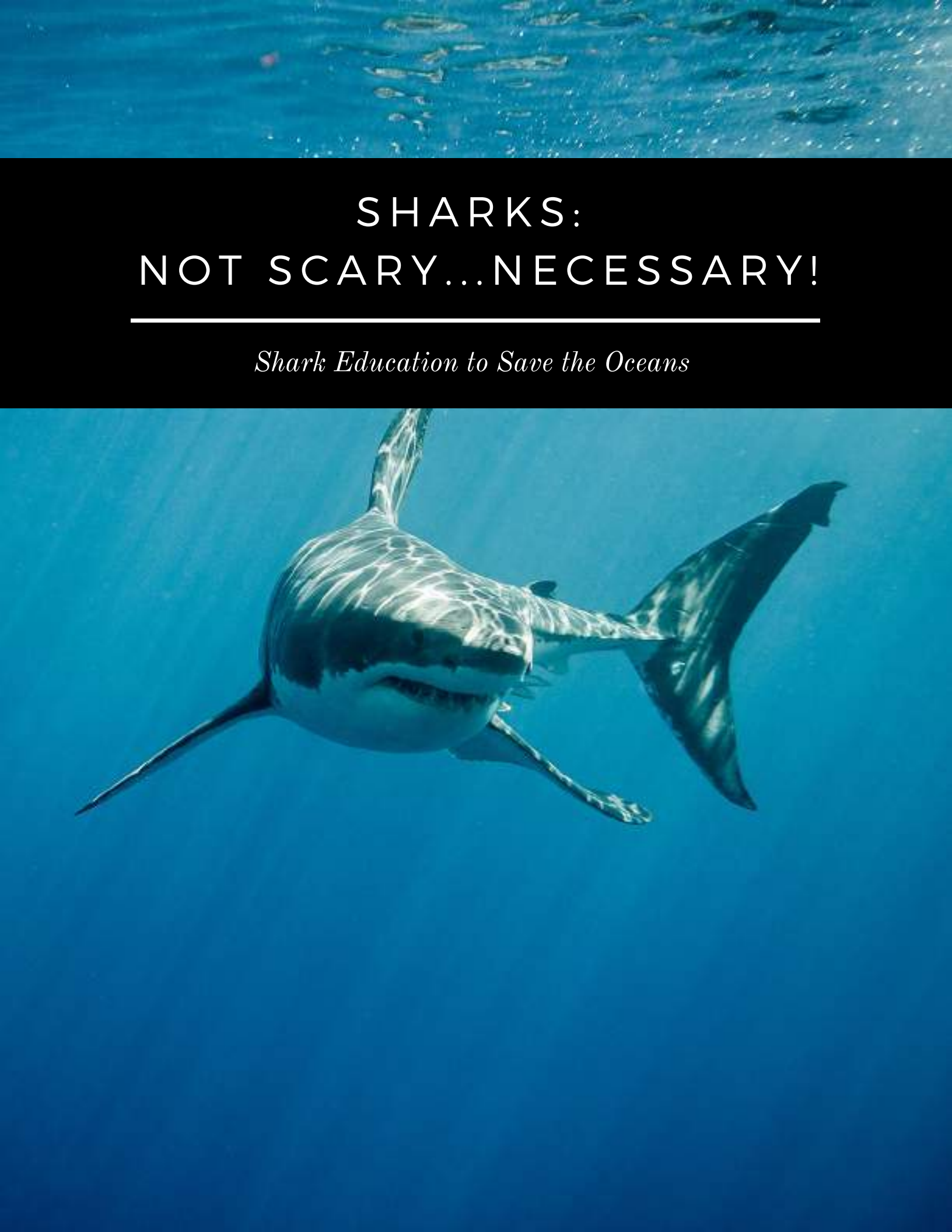
8. What is bycatch?
Bycatch is when fish and other marine creatures are caught while fishing for a different species.

9. What parts of a shark are typically consumed by humans?
Humans consume shark fins and meat.

10. List 2 ways we can help sharks.
To help sharks, we can inform others so they won't be fearful of sharks, don't eat shark fin soup, speak up about fisheries management to elected leaders, and go see sharks up-close!

SHARKS:
NOT SCARY...NECESSARY!

Shark Education to Save the Oceans



SHARK BIOLOGY

WHAT ARE THEY MADE OF?

Of all the creatures in the world's oceans, none are more fascinating than sharks. Sharks have been on the planet for 450 million years and incredibly, their physical structure has hardly changed in all that time. In comparison, dinosaurs lived on earth for 165 million years and went extinct about 65 million years ago. Scientists have uncovered many amazing things about sharks, and there is still much more to learn about these truly unique animals.

Sharks are **elasmobranchs** (ee-laz-mo-branks). They differ from other fish in a number of ways. Regular fish have bones, whereas a shark's skeleton is made almost entirely of **cartilage**, the same tissue we have in our nose and ears. Feel how much more flexible your ears are then your forearm, for example.

Having cartilage instead of bone makes even the largest sharks lightweight and maneuverable. When your prey can move fast, being able to turn swiftly is the difference between catching a meal and going hungry.

Sharks also tend to grow much more slowly than other fish and, unlike bony fish, they have eyelids!

Oceanic Whitetip Shark (up to 13 feet)
photo taken in Cat Island, Bahamas by Jonathan Lavan

SHARK BIOLOGY

WHAT ARE THEY MADE OF?

You probably remember losing some of your baby teeth. All humans and many other mammals have only two sets of teeth throughout their lifetime. Sharks, on the other hand, have an unlimited number of teeth. Whenever they lose teeth, which happens often during hunting, more teeth just roll forward to fill in the gaps.

Sharks also have a complex sensory system that enables them to detect electrical fields as well as movement in the water. They can sense other animals even if they are hiding under the sand. Amazing!

WHAT DO SHARKS EAT?

BASICALLY THE SAME FOOD AS ALL OTHER FISH

There are over 500 different species of sharks, with more being discovered each year. While many large sharks that swim in the open ocean (known as the **pelagic** environment) prey on large animals like seals and sea lions, most sharks are nothing like the way they are portrayed in movies and on television. In fact, many sharks are quite small and have molar-like teeth for grinding up crabs, clams, and other **invertebrates**.

Horn Shark (up to 4 feet)
photo taken in Catalina Island, California by Jonathan Lavan

Interestingly, some sharks are VERY big but feed only on tiny **planktonic** animals called **krill**, through filter feeding. A whale shark for example, which is not only the largest shark in the world but also the largest fish, can reach up to 12 meters in length (about 40 feet). They don't even have teeth – they have gill rakers for filtering out their food like cooked pasta poured into a strainer.

Whale Shark (up to 40 feet)
photo taken in Bahía de los Ángeles, Mexico by Jonathan Lavan

WHY ARE SO MANY PEOPLE AFRAID OF SHARKS?

BECAUSE THEY DON'T HAVE ENOUGH INFORMATION

There is no such thing as a man-eating shark! Even large sharks rarely attack humans and even then, it is accidental. Sharks may occasionally “test bite” a human, mistaking it for a sea turtle or seal when seeing the human’s profile from below. Of course, even if the shark quickly realizes its mistake, a test bite can cause serious injury, which has led to the **misconception** that all sharks are dangerous. Each year, there are only around a dozen fatalities from sharks worldwide. In contrast, humans kill an estimated 100 million sharks every year (the actual number could be much higher).

> **“SHARKS ARE BEAUTIFUL ANIMALS, AND IF YOU'RE LUCKY ENOUGH TO SEE LOTS OF THEM, THAT MEANS THAT YOU'RE IN A HEALTHY OCEAN. YOU SHOULD BE AFRAID IF YOU ARE IN THE OCEAN AND DON'T SEE SHARKS.”**

SYLVIA EARLE

OVERFISHING AND BYCATCH

THE TRUE THREATS OF THE OCEAN

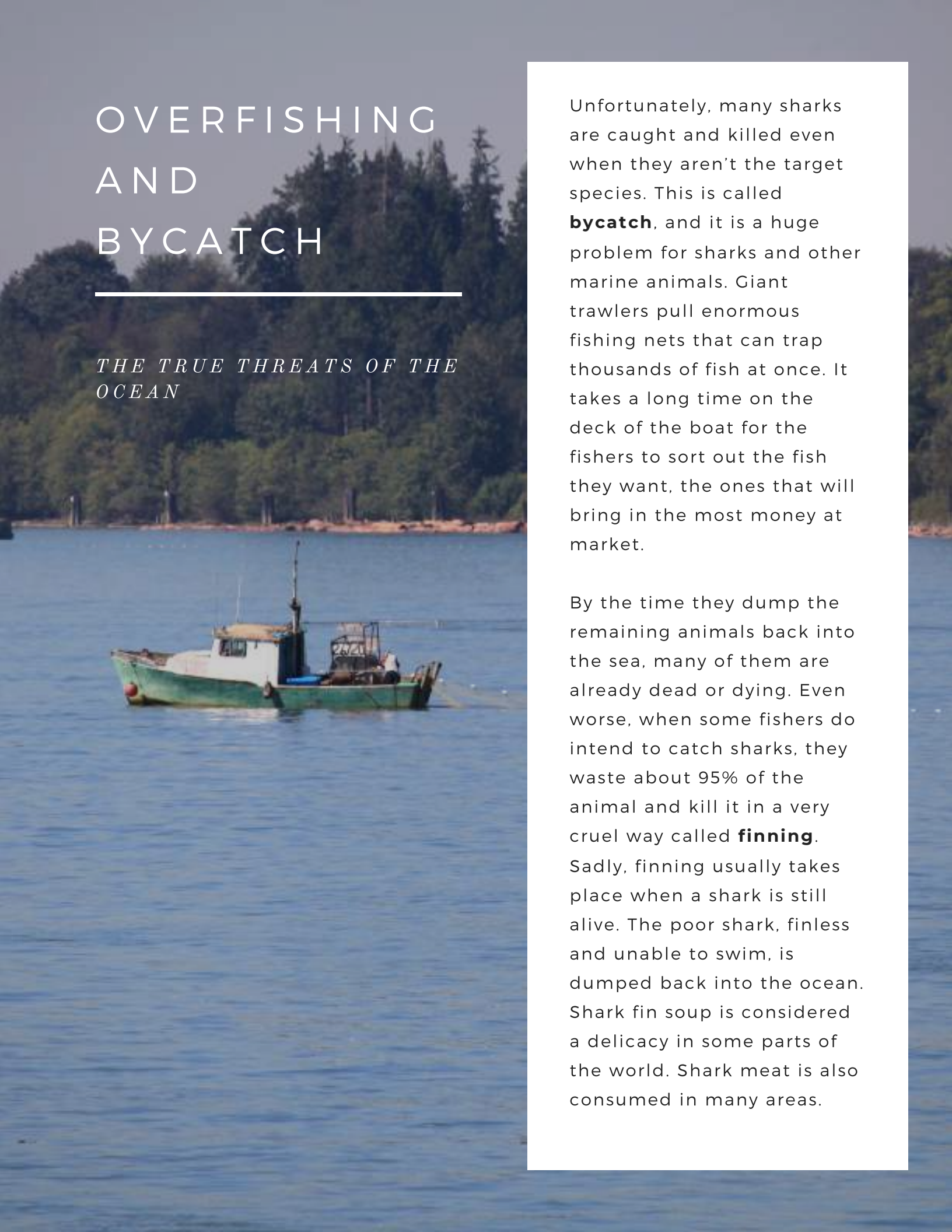
Fish are an inexpensive and major source of protein for many people. About 70% of the world's population lives within five kilometers of a water source. There are almost eight billion people on the planet today, all competing for limited resources, including seafood.

Many countries, including the U.S., are unable to adequately monitor how many fish are being removed and how often, leading to a serious issue called **overfishing**.

This is especially problematic for shark populations, as they are one of the top predators that help to keep the oceans healthy. Sharks prey on animals that are weak, sick or injured, leaving the strong and healthy ones behind. When people remove too many sharks, it disrupts the **food web**, which throws the entire ocean ecosystem out of balance.

OVERFISHING AND BYCATCH

THE TRUE THREATS OF THE OCEAN



Unfortunately, many sharks are caught and killed even when they aren't the target species. This is called **bycatch**, and it is a huge problem for sharks and other marine animals. Giant trawlers pull enormous fishing nets that can trap thousands of fish at once. It takes a long time on the deck of the boat for the fishers to sort out the fish they want, the ones that will bring in the most money at market.

By the time they dump the remaining animals back into the sea, many of them are already dead or dying. Even worse, when some fishers do intend to catch sharks, they waste about 95% of the animal and kill it in a very cruel way called **finning**. Sadly, finning usually takes place when a shark is still alive. The poor shark, finless and unable to swim, is dumped back into the ocean. Shark fin soup is considered a delicacy in some parts of the world. Shark meat is also consumed in many areas.

HOW CAN WE HELP SHARKS?

HERE ARE A FEW TIPS TO CONSIDER

Inform others.
Tell other people some of the facts you've learned so they won't be fearful of sharks. When you see sharks being portrayed inaccurately in movies, let people know that this is not how sharks really behave and that most sharks are small and harmless.

Don't eat shark fin soup.
Don't let your friends and family eat it either. Explain to them that many species of sharks are endangered and that they play an important role in keeping the oceans healthy.

Speak up about fisheries management.
Our elected leaders have a responsibility to protect our oceans by reducing bycatch and supporting well-managed seafood certification and labeling programs.

Dive in!
One of the best ways to learn about sharks is to see them for yourself. Visit a local aquarium to see sharks up-close, or try snorkeling if you want to take a closer look.

Whitetip Reef Sharks (up to 5.3 feet)
photo taken in Koror, Palau by Jonathan Lavan

Oceanic Whitetip Shark (up to 13 feet)
photo taken in Cat Island, Bahamas by Jonathan Lavan

Together, let's remember and teach others just how fascinating and **essential** these incredible creatures truly are. Every animal deserves respect and the opportunity to live in a clean and safe environment, including those animals that, sometimes, we are afraid of.

GLOSSARY

BYCATCH

Unwanted fish and other marine creatures caught while fishing for a different species

CARTILAGE

Firm, whitish, flexible connective tissue

ELASMOBRANCH

A cartilaginous fish of a group that comprises the sharks, rays, and skates

ESSENTIAL

Absolutely necessary; extremely important

FINNING

The practice of catching sharks and removing their fins; usually involves discarding the rest of the shark into the ocean

FOOD WEB

The natural interconnection of food chains; shows the overall relationships between organisms in a particular environment

INVERTEBRATE

An animal with no internal skeleton, such as a crab, clam, lobster, squid, or coral

KRILL

Tiny crustaceans that resemble shrimp

MISCONCEPTION

A view or opinion that is incorrect

PELAGIC

Relating to the open ocean, neither close to the bottom or near the shore

PLANKTONIC

Floating microscopic organisms that drift through the water

OVERFISHING

Removal of a species of fish at a rate that cannot be replenished; unsustainable fishing

OCEAN CONNECTORS