Grade Level: 6-8
Time Estimate: 3-5 days

ENDANGERED SPECIES / INSTRUCTOR INFO

Summary

This lesson includes vocabulary, content, and problem solving activities to help students learn about the Endangered Species Act and the Endangered Species List. Students will learn which species of shark are vulnerable, threatened, or endangered, and the reasons why.

Part 1. Sharks are Disappearing Faster than Ever
Part 2. Why You Should Care
Part 3. Protection for Endangered Species: CITES
Part 4. Protection for Endangered Species: IUCN
Part 5. Protection for Endangered Species: Endangered Species Act
Part 6. Protection for Endangered Species: State Protection
Part 7. How OCEARCH is Helping Wild Sharks
Part 8. How YOU Can Help Endangered Species
Activity 1. Sign a Petition
Activity 2. Be Heard

Goals & Objectives

The students will:

- Learn how and why sharks become threatened;
- Learn how the Endangered Species Act started and what it does;
- Learn how the Endangered Species List started and what categories are listed;
- Learn about state, federal, and international protection;
- Learn what shark species are listed under each category;
- Learn what they can do to help endangered or threatened shark species.

// STANDARDS

This lesson aligns with the following TEKS:
Grade 6 Science: 1A, 1B, 2A, 2E, 3A, 3D
Grade 7 Science: 1A, 1B, 2A, 2E, 3A, 3D
Grade 8 Science: 1A, 1B, 2A, 2E, 3A, 3D

This lesson aligns with the following Next Generation Science Standards:

Framework

1. Asking questions and defining problems.
2. Planning and carrying out investigations.
3. Analyzing and interpreting data.
4. Constructing explanations.
5. Engaging in argument from evidence.
6. Obtaining, evaluating, and communicating information.

MS. Matter and Energy in Organisms and Ecosystems – MS-LS2-4

Science and Engineering Practice
Engaging in Argument from Evidence

• Engaging in argument from evidence in 6-8 builds on K-5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s). Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute and explanation or a model for a phenomenon or solution to a problem. (MLS-LS2-4).

Connections to Nature of Science
• Science disciplines shark common rules of obtaining and evaluating empirical evidence. (MS-LS1-4)

Disciplinary Core Ideas
MS-LS2-4: Ecosystem Dynamics, Functioning, and Resilience

• Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.

Crosscutting Concepts
Stability and Change

• Small changes in one part of a system might cause large changes in another part. (MS-LS2-4)

Grade Level: 6-8
Time Estimate: 5-15 mins

ENDANGERED SPECIES / PRE-LESSON ASSESSMENT

Use the following true/false and multiple-choice questions as an introduction/warm-up to the lesson topics. You can do this in a verbal or written format, as a game, individually, or as a whole class! A handout is provided if you wish to hand the questions out in a quiz format.

The questions do not need to be graded. They are intended to give the students an idea of what they will be learning and to see what they already know.

1. True or False
Sharks are not becoming endangered due to human activity and interactions.
Answer: False

2. True or False
The Convention on the Conservation of Migratory Species (CMS) is involved with the conservation of migratory species, their habitat, and their migratory routes.
Answer: True

3. A species listed as Vulnerable on the International Union for Conservation of Nature (IUCN) is
- **a.** At very high risk of extinction in the wild
- **b.** Likely to become extinct in the wild
- **c.** Likely to become endangered in the wild

Answer: c

4. Sharks can be protected by
- **a.** State law
- **b.** Federal law
- **c.** International law
- **d.** All of the above

Answer: d

5. Why does OCEARCH tag sharks?
- ***a.*** To gain an understanding of the range and migratory movements of sharks
- **b.** To find hot spots for breeding, birthing sites, and feeding locations
- **c.** To determine conservation methods to protect threatened and endangered species
- **d.** All of the above

Answer: d

Grade Level: 6-8

OCEARCH
EDUCATE INSPIRE ENABLE

ENDANGERED SPECIES / LESSON PLAN

INTRODUCTION **3-5 mins**

An endangered species is an animal or plant that is in danger of disappearing completely from the planet. Most scientists believe a species is endangered when its population is so small that it will become extinct in fifteen years. Many species are threatened, which means that unless conservation measures are taken, they are likely to become endangered.

Sharks have roamed the oceans for millions of years. Out of the nearly 400 species of sharks, close to one third are threatened with extinction. Sharks mature late, produce few offspring, and can live a long time. This makes them extremely vulnerable to exploitation by humans and makes it more difficult for their populations to recover. This is a problem because sharks are apex predators and are crucial to the health of the ocean.

PART 1. SHARKS ARE DISAPPEARING FASTER THAN EVER **5-10 mins**

Extinction has always been a part of nature. As climate and food supplies change, animal and plant species that cannot adapt to the altered environment do not survive. However, not all extinctions are from natural causes.

Many shark species are becoming threatened and endangered due to human activity and human interactions. Humans kill approximately 100 million sharks a year! Major threats to sharks include, but are not limited to, commercial fishing, bycatch, and habitat degradation. And the negative public image of sharks is a challenge for conservation efforts.

Commercial Fishing
The United States and many other countries are world consumers and traders of shark meat and shark fins. Approximately 70 million sharks are killed each year due to commercial fishing. Most often, the called shark fin soup. The fishermen are only after the shark's fins, which are sold at a high cost due to high demand for the soup. Shark finning is a very wasteful practice and is extremely destructive to wild shark populations.

Bycatch

With commercial fishing, sharks are also threatened by bycatch. Bycatch is the unintentional capture of non-targeted species. Each year, thousands of sharks are caught accidently in fishing nets and on long-lines. Irresponsible fishing practices are the cause of bycatch. Safer fishing methods have been developed to reduce the amount of sharks caught as bycatch, but it is difficult to enforce these methods.

Habitat Degradation

Pollution is also a threat to wild shark populations. Tons of sewage, chemicals, and trash litter the world's oceans. Many sharks die after accidentally mistaking trash for food and consuming it. Toxins from chemical waste become concentrated as they are carried through the food chain. This not only makes some fish dangerous for humans to eat, but it also ends up killing many predators such as sharks.

Part 2. Why You Should Care (10 – 15 minutes)

Sharks play a crucial role in keeping the oceans and its inhabitants healthy. As apex predators, they keep our oceans healthy by keeping everything in balance. If sharks were completely removed from the oceans, we would see devastating effects. Shark prey populations would increase and consume their food source(s) until there is nothing left.
Since sharks typically feed on sick animals, disease would also spread out of control. Eventually, there would be no life left in the oceans.

You don't have to live near the ocean to be connected to it. The oceans affect all of our lives every day, from the air we breathe, to the weather we experience, and to the food we eat.

The world's oceans:

- hold 97% of the planet's water.
- absorb nearly 1/3 of human-caused carbon dioxide emissions.
- are home to plants that produce half of the planet's oxygen.
- provides jobs, goods, and service. One in six jobs in the United States is marine-related.
- provide the primary source of protein for nearly one billion people.
- regulate the weather, keep global temperatures stable, and form clouds that bring rain.
- provide natural resources such as minerals, oil, and natural gas.
- offer an array of potential medicines.
- are home to a large amount of fascinating and diverse plants and animals.
- provide limitless inspiration.

Part 3. Protection for Endangered Species: CITES (15 – 20 minutes)

The Convention on the Trade in Endangered Species (CITES) is an international treaty signed by over 150 countries. The purpose of CITES is to manage the movement of wild plants and animals across international borders in such a way to assure that international trade does not result in the endangerment of a particular species. For example, elephant tusks, tiger teeth, and sea turtle shells are

all illegal to move from one country to another. This is to discourage the illegal trade of protected species.

CITES has the power to ban the commercial trade or international movement of a species if the species is considered endangered. These species are listed in the Appendix I of the treaty (Table 1). If the population of a species is at a level where we would be concerned about the survival of the species, then they would be listed under Appendix II and the commercial trade would be allowed, but monitored. Appendix III lists species that are already protected by one government but needs assistance from another government to prevent illegal trade and unsustainable exploitation (Table 1).

Table 1. CITES Appendix Definitions

Appendix I	Lists species that are the most endangered among CITES-listed species. CITES prohibits international trade of these species except when the import is not commercial (e.g., scientific research).
Appendix II	Lists species that are not currently threatened or endangered but are at risk of becoming so in near future. International trade may be possible by possessing a permit.
Appendix III	Lists species at the request of a government that already regulates trade but needs the support of other countries to prevent unsustainable and illegal exploitation of the listed species. International trade is allowed but only with certain permits.

Great white sharks are the most widely protected shark species in the world and are listed in CITES under Appendix II. The CITES listing means that great whites are not currently threatened or endangered, but could become so if not properly managed. The capture and trade of great whites (e.g., fins, jaws, and flesh) is prohibited within and across borders of the Atlantic states of the United States, Australia, South Africa, Namibia, Malta, and California.

In 2013, five species of sharks were listed on Appendix II of CITES, providing international protection. These sharks include the oceanic whitetip, porbeagle, scalloped hammerhead, great hammerhead, and smooth hammerhead sharks.

In 2000, the United States proposed that the whale shark be added to Appendix II of CITES, but was rejected. However in 2002, India and the Philippines turned in a revised proposal to list the whale shark in Appendix II. In 2003, the proposal was accepted and put into effect. This listing means that fishing states have to demonstrate that all exports were taken from a sustainable and managed population. Also, all exports and imports must be monitored. This is great news for whale sharks!

Part 4. Protection for Endangered Species: IUCN (10 – 15 minutes)

Founded in 1948, the International Union for Conservation of Nature (IUCN) is the oldest and largest global environmental organization in the world. There are more than 1,200 member organizations,

including over 200 government organizations. The purpose of the IUCN is to preserve biodiversity. Thirty percent of sharks and rays assessed for IUCN are threatened or near-threatened with extinction. There are 9 categories within the IUCN in which a species can be placed (Table 2). These include the following:

Table 2. IUCN Category Definitions

Not Evaluated	Not yet been evaluated against Red List Criteria
Data Deficient	Sufficient data are lacking to make a decision on status
Least Concern	Do not qualify as threatened or near threatened
Near Threatened	Currently do not qualify as threatened; may be close to qualifying.
Vulnerable	Likely to become endangered
Endangered	Likely to become extinct
Critically Endangered	Very high risk of extinction in the wild
Extinct in the Wild	Extinct in natural habitat
Extinct	No surviving individuals

Great white sharks are listed as vulnerable under the IUCN Red List, meaning that this species is likely to become endangered (Table 2). Possible reasons for population decline include overfishing, drowning in nets, and finning. Great white sharks are regionally protected in many areas such as South Africa, Namibia, Australia, Florida, and California. This means the sharks are protected from illegal chase, capture, or possession. However, great white sharks are not internationally protected.

Whale sharks are also listed as vulnerable on the IUCN Red List and are legally protected in Australia, Maldives, Philippines, India, Malaysia, Thailand, Honduras, Mexico, and in the Atlantic waters of the United States. They are also protected in a small area off the coast of Belize. Whale sharks are hunted for their meat, liver, and fins. Whale sharks recover slowly from population decreases because they have long lifespans and slow reproductive rates.

Great hammerhead sharks are listed as endangered under the IUCN Red List due to an 80% population decline in the past 25 years. This is likely due to overfishing of this species for their large fins.

The pondicherry shark (Figure 2), found in the Indian Ocean and in the Pacific northwest and Pacific western-central, is listed as critically endangered under the IUCN Red List. This species may already be extinct in China, India, Indonesia, Malaysia, Oman, and Pakistan. Pondicherry sharks are so rare it is likely already on the verge of extinction, if not already extinct. The last recorded observation was in 1979!

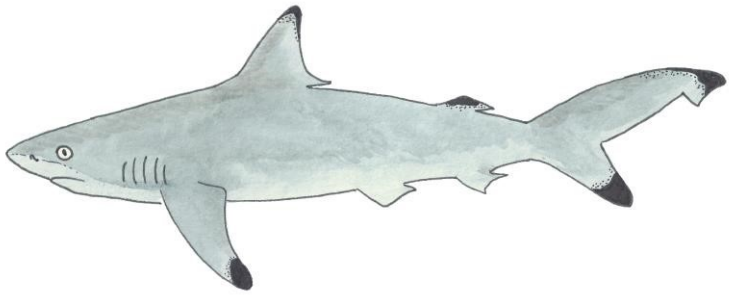

Figure 2. Pondicherry shark.
Illustration Credit: Sarah Rich – Landry's Downtown Aquarium

Part 5. Protection for Endangered Species: The Endangered Species Act

The United States Congress passed the Endangered Species Act (ESA) in 1973. The purpose of the ESA is to protect and recover species that are at risk, being harmed, injured, or destroyed.

Species listed under the ESA are listed as either "endangered" or "threatened." Endangered means that a species is at risk of becoming extinct throughout some or all of its natural range. Whereas, threatened means a species is likely to become endangered in the near future.

The scalloped hammerhead shark is the first and only shark species to be protected by the Endangered Species Act. On July 3, 2014, the National Marine Fisheries Service stated that four of the six distinct populations of scalloped hammerhead species were listed as threatened or endangered. The decision was based on a 2011 petition from Wild Earth Guardians and Friends of Animals.

Part 6. Protection for Endangered Species: State Protection

State governments in the United States also have control and responsibilities in maintaining their own state's endangered species. State laws range from prohibiting taking and trafficking of endangered species to management and protection of species and the habitat in which it lives.

In the United States, great white sharks are protected by California state laws. As of January 1, 1994, it is illegal to take (e.g., chase, capture, possess, or kill) great white sharks in Californian waters according to the California Code of Regulations for Fish and Game.
This means that great white sharks cannot be killed in California, even with a permit.
However, conservation activists have sought further protection for white sharks in California due to possible population decline. In 2012, California Department of Fish and Game Commission received a petition to list the northeast Pacific population of great white sharks as threatened or endangered under the California Endangered Species Act (CESA). In 2013, great news came to those who petitioned for this listing! The Commission designated this white shark population as a candidate species for CESA. A candidate species is a species undergoing status review, which takes one year. This took effect March 1, 2013.

In California, candidate species in review get the same protection as those already on the protected list. In other words, if a fisherman caught a white shark while the listing was in review, the fisherman would still be fined for taking great white sharks. In March 2014, the northeast Pacific great white shark population was denied further protection as an endangered species on the CESA. However, they are still protected from being caught without a permit by the California Code of Regulations for Fish and Game.

Currently there are eight states and three U.S. territories that have banned the possession or sale of shark fins – Hawaii, California, Oregon, Washington, Illinois, Maryland, Delaware, New York, Massachusetts, Northern Mariana Islands, Guam, and American Samoa. Other states are currently preparing to join this shark fin ban – Florida, Nebraska, New Jersey, Pennsylvania, and Texas.

Part 7. How OCEARCH is Helping Wild Sharks

OCEARCH researchers have tagged approximately 200 individual sharks all around the world. It is important to tag and track sharks in order to understand their range, migration patterns, and life history.

It is very difficult to obtain accurate estimates of great white shark population size due to their highly migratory behaviors. In March 2014, Lydia, a 14 foot female great white shark, travelled over 20,000 miles from Florida across the mid-Atlantic ridge in the span of just a few weeks! By tracking her movements, researchers are hoping to find hot spots for breeding grounds, pupping sites, and feeding locations. If researchers learn where these hot spots are, governments can establish proper regulations to protect great white sharks.

Part 8. How YOU Can Help Endangered Species

Everyone is able to help protect endangered species! Every day, you can do small, simple things to help the health of our planet and save endangered species.

1. Start a recycling club at your school, day care, or church. Recycle paper, glass, plastic, and aluminum cans.
2. Conserve paper by using both sides of a piece of paper.
3. Visit zoos, aquariums, national parks, and nature centers to learn about wild animals and their habitats.
4. Read about endangered species in books, magazines, and newspapers.
5. Share what you learn with others!
6. Dispose of pesticides, motor oil, paint, household cleaners, and other toxic wastes properly (not down a drain!).
7. Turn off the lights when you leave a room. And turn off the television when no one is watching it.
8. Plant native plants in your garden and observe wildlife in your own backyard!
9. Reduce the amount of trash you create – use reusable bottles, bags, napkins, and containers.
10. Don't purchase animal or plant products if you don't know where it comes from.

Teacher Demonstration (optional)

A great way to keep the students attention is to prepare a bulletin board with conservation facts. Teachers could create "Fintastic Fridays or "Shark-tastic Wednesdays" to focus on the importance of shark conservation. Students can hang up their own shark conservation messages, fun facts about sharks, or ways to protect sharks. This is a fun way to get the students involved and let them share their ideas!

Endangered Species Activity 1. Sign a Petition

Introduction

This lesson introduces students to the power of voice! In 2012, the California Department of Fish and Game Commission received a petition to list the northeast Pacific population of great white sharks as

threatened or endangered under the California Endangered Species Act (CESA). In 2013, the Commission received enough petitions to designate this white shark population as a candidate species under CESA.

Another example of how petitions can make a difference is the banning of the sale of shark fins in California. Recently, Governor Jerry Brown signed the California shark fin ban due to the pressures he received from petitions by the citizens. Signing a petition really does make a difference!

Instructions

1. Have students openly discuss what shark conservation issues they are interested in. This could be shark culling, shark finning, or overfishing.
2. Students can do their own research into conservation organizations that address the issues they are most interested in. Or, you can use the conservation organizations listed below for currently open petitions.
3. Have the students select and sign petition. The students may also want a handout or print out of the petition they signed. If teachers do not wish to print a copy for each student, teachers can post a copy of the petition on a bulletin board. This helps to remind students of the pledge they made, or the cause they are supporting.
4. **If parent permission is necessary for the signing of a petition, make sure to obtain the permission prior to the signing.**

Open petitions to conserve shark species:

A. **Australian Marine Conservation Society** (http://www.marineconservation.org.au/)

B. **Save our Sharks: Shark Conservation Petitions** (http://www.supportoursharks.com/en/conservation/Petitions.htm)

Endangered Species Activity 2. Be Heard

Introduction

Personal letters to Congress have made huge impacts on laws that are passed. For example, shark finning is still on ongoing practice in many parts of the world. However, many states and United States territories have listened to their citizens and banned shark fin products in local waters. These state

laws would have never passed without the voice of the people. Hawaii, California, Oregon, Washington, Illinois, Maryland, Delaware,
Massachusetts, and New York have officially banned the sale of shark fin products. Florida, Nebraska, New Jersey, Pennsylvania, and Texas are preparing to join this shark fin ban. How can you influence your state to join this shark fin ban? Write to your own state or federal government representative to enforce protection or to support the passing of antishark finning laws!

Instructions

The class should select a single cause to support. Then each student should write his or her own persuasive letter to their representative asking them to support the cause. State and federal governments get a lot of letters every day, so make sure yours stand out! Below are helpful tips for writing to your government.

1. Say who you are. What is your name and what school are you associated with?
2. Personalize your letter. Direct your letters to the representative from your local district or your state senators. Your vote, or the vote of your parents, helps to elect them. Your voice matters to them!
3. Keep your letters short and simple. You can easily get your point across in one page. Your first paragraph should be an introduction to why you are writing them. Follow up with actual facts about your topic, rather than just general information. Close your letter by requesting the action you want them to take (e.g., ban shark fins).
4. Use facts and examples rather than general information. Facts get points across and general information gets glanced over.
5. Be courteous. Your representatives will most likely listen to you if you are respectful.

You can find your state senator at the link below.
http://www.senate.gov/general/contact_information/senators_cfm.cfm

You can find your state representative at the link below.
http://www.house.gov/representatives/find/