



## Sharks at Risk Viewer Guide

“ Now more than ever, two myths must be laid to rest. One, sharks are not mindless predators nor sinister man-eaters, and two, the oceans are not full of sharks.” —Jean-Michel Cousteau

### THEME

Protection and maintenance of diverse shark populations by understanding the effect that overfishing has on ocean ecosystem food webs

### VIEWING TIME

1 hour total; viewing in shorter segments is recommended

### OBJECTIVES

Students will be able to

- understand the impact of overfishing on the ocean's web of life.
- identify predator-prey relationships that affect ecosystem balance.
- learn about techniques that humans have developed to interact safely with sharks.

### MATERIALS

- Ocean Vocabulary Sheet (student handout #1)
- Sharks at Risk Viewing Questions (student handout #2)
- Sharks at Risk Viewing Questions With Answers (teacher sheet)
- Copy of the Sharks at Risk episode of the **Jean-Michel Cousteau: Ocean Adventures** series

In *Sharks at Risk*, Jean-Michel Cousteau and his team meet sharks face-to-face in two intense expeditions. The first takes place in French Polynesia in the Tuamotu Archipelago at Rigatooa, the second-largest coral atoll in the world and an underwater paradise that is famous for its large concentration of sharks. The second takes place off the coast of South Africa, at the Cape of Good Hope, where Jean-Michel Cousteau and others swim with the most feared of all sharks -- the great white. These powerful creatures play a vital role in the intricate balance that makes up the ocean ecosystem. Today, a new predator, the human, puts these amazing creatures at risk, giving sharks far more reason to fear us than we have to fear them.

### PRE-VIEWING ACTIVITIES

- Brainstorm all the ways that human activities affect the ocean ecosystem, both positively -- including benefits to humans from ocean resources -- and negatively, as well as things that humans can do differently to lessen negative effects and increase positive effects.
- Use the Shark Encounter lesson to introduce students to sharks.
- Utilize the shark interactive to investigate the effects declining shark populations have had on ecosystems over the last decade.
- Read the detailed episode description on the Web site; pay particular attention to the vocabulary words and record them on the Ocean Vocabulary Sheet.

### FOCUS FOR VIEWING

- Use the *Sharks at Risk* Viewing Questions that go with the segments you watch.

#### WEB LINKS

##### **Sharks at Risk**

##### **episode description**

[pbs.org/oceanadventures/  
episodes/sharks](https://pbs.org/oceanadventures/episodes/sharks)

##### **Shark Decline Interactive**

[pbs.org/oceanadventures/  
episodes/sharks](https://pbs.org/oceanadventures/episodes/sharks)

##### **Predator Protector Game**

[pbs.org/oceanadventures/  
episodes/sharks](https://pbs.org/oceanadventures/episodes/sharks)

##### **Predator Protector lesson plan**

[pbs.org/oceanadventures/  
educators/sharks](https://pbs.org/oceanadventures/educators/sharks)

##### **Shark Encounter**

[pbs.org/oceanadventures/  
educators/sharks](https://pbs.org/oceanadventures/educators/sharks)

##### **Fish Are Animals Too**

[pbs.org/oceanadventures/  
educators/sharks](https://pbs.org/oceanadventures/educators/sharks)

##### **How to Catch a Fish**

[pbs.org/oceanadventures/  
educators/sharks](https://pbs.org/oceanadventures/educators/sharks)

#### STANDARDS

##### **National Science Education Standards Grades 5-8**

[http://www.nap.edu/catalog/  
4962.html](http://www.nap.edu/catalog/4962.html)

##### **Life Science -**

##### **Content Standard C:**

Populations and ecosystems  
Interdependence of organisms  
Behavior of organisms

##### **Science and Technology -**

##### **Content Standard E:**

Understanding about science  
and technology

#### FOLLOW-UP ACTIVITIES

- Use the images in the download library to make a collage showing either (1) the diverse food web found in our oceans or (2) how human activities interfere with the balance of the ocean ecosystem.
- Research what it takes to become a diver. What kind of training and experience is essential?
- Play the Predator Protector Game; use the Predator Protector lesson plan to enhance the learning of your students as they play.

#### SEGMENT SUGGESTIONS

NOTE: The indicated timings are approximate and are based on the PBS broadcast; home video versions may differ slightly.

#### Theme: **Ocean biodiversity**

##### **Location in *Sharks at Risk*:**

Rangiroa (5:20-10:40); mating behaviors (23:25-27:32); dolphin encounters (29:57-36:21); the great white dive (36:21-45:20); African penguins (46:37-48:06); Cousteau's dive and the concluding monologue (48:06-end)

##### **Pre-Viewing Questions:**

- What is biodiversity and why do you think it is important in the ocean?
- List the different species that you know live in the ocean.
- Describe any relationships that you think exist between different species in the ocean.

##### **Focus for Viewing:**

- For Rangiroa, use questions 5 through 7 from the *Sharks at Risk* Viewing Questions.
- For mating behaviors, use questions 3 through 5 from the *Sharks at Risk* Viewing Questions.
- For dolphin encounters, use questions 1 through 5 from the *Sharks at Risk* Viewing Questions.
- For the great white dive, use questions 1 and 13 from the *Sharks at Risk* Viewing Questions.
- For African penguins, use questions 1 through 3 from the *Sharks at Risk* Viewing Questions.
- For Cousteau's dive and the concluding monologue, use questions 3 through 5 from the *Sharks at Risk* Viewing Questions.

**Science in Personal and Social Perspectives -**

**Content Standard F:**

Natural resources  
Environmental quality  
Populations, resources and environments  
Natural and human-induced hazards

**Science As Inquiry –**

**Content Standard A:**

Abilities necessary to do scientific inquiry  
Understanding about scientific inquiry

**Ocean Literacy:**

**Essential Principles and Fundamental Concepts**

<http://coexploration.org/oceanliteracy/>

**Essential Principle #1:**

**Earth has one big ocean with many features.**

- a. The ocean is the dominant physical feature on our planet Earth, covering approximately 70 percent of the planet's surface. There is one ocean with many ocean basins, such as the North Pacific, South Pacific, North Atlantic, South Atlantic, Indian and Arctic.
- h. Although the ocean is large, it is finite and its resources are limited.

**Essential Principle #5:**

**The ocean supports a great diversity of life and ecosystems.**

- a. Ocean life ranges in size from the smallest virus to the largest animal that has lived on Earth, the blue whale.
- d. Ocean biology provides many unique examples of life cycles, adaptations and important relationships among organisms (symbiosis, predator-prey dynamics and energy transfer) that do not occur on land.

**Post-Viewing Discussion Questions:**

- What are some challenges that the sharks face today and in the near future?
- How do you think humans can help protect the ocean's biodiversity?
- What do you think will happen if humans continue to disregard the importance of ocean biodiversity?

**Follow-up Activity:**

- Use the Shark Encounter lesson plan to help your students explore what they think and feel about sharks.
- Use the Fish Are Animals Too lesson plan to deepen your students' knowledge of the important role that biodiversity plays in the health of our ocean ecosystems.
- Conduct library or Internet research and write a report on a famous diver. Look at the kind of science background a diver must have to do their job.

**Theme: Ecosystem balance, food web**

**Location in *Sharks at Risk*:**

Introduction (2:15-5:27); Rangiroa (5:20-10:40); night dive (14:00-16:52); dolphin encounters (29:57-36:21); the great white dive (36:21-45:20); African penguins (46:37-48:06); Cousteau's dive and the concluding monologue (48:06-end)

**Pre-Viewing Questions:**

- Describe some specific predator-prey relationships that you have observed.
- Describe what a predator-prey relationship can offer an ecosystem.
- Describe how you think an ocean ecosystem could become unbalanced.

**Focus for Viewing:**

- For the introduction, use questions 1 through 4 from the *Sharks at Risk* Viewing Questions.
- For Rangiroa, use questions 5 through 11 from the *Sharks at Risk* Viewing Questions.
- For night fishing, use questions 1 through 5 from the *Sharks at Risk* Viewing Questions.

**Essential Principle #6:**

**The ocean and humans are inextricably interconnected.**

- b. From the ocean we get foods, medicines, and mineral and energy resources. In addition, it provides jobs, supports our nation's economy, serves as a highway for transportation of goods and people, and plays a role in national security.
- c. The ocean is a source of inspiration, recreation, rejuvenation and discovery. It is also an important element in the heritage of many cultures.
- e. Humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean. Human development and activity leads to pollution (point source, nonpoint source and noise pollution) and physical modifications (changes to beaches, shores and rivers). In addition, humans have removed most of the large vertebrates from the ocean.
- g. Everyone is responsible for caring for the ocean. The ocean sustains life on Earth and humans must live in ways that sustain the ocean. Individual and collective actions are needed in order to effectively manage ocean resources for all.

- For dolphin encounters, use questions 3 through 7 from the *Sharks at Risk* Viewing Questions.
- For the great white dive, use questions 1 through 5 and 13 from the *Sharks at Risk* Viewing Questions.
- For African penguins, use questions 1 through 3 from the *Sharks at Risk* Viewing Questions.
- For Cousteau's dive and the concluding monologue, use questions 1 through 5 from the *Sharks at Risk* Viewing Questions.

**Post-Viewing Discussion Questions:**

- Describe the shark's role as predator in the ocean ecosystem.
- List specific examples of at least five predator-prey relationships that you observed.
- Who is most affected by the decrease in shark populations?

**Follow-up Activity:**

- Use the Fish Are Animals Too lesson plan to deepen your students' knowledge and understanding of sharks as an integral part of their natural communities. Introduce the topic of or expand on your student's knowledge of food webs and predator-prey relationships.

**Theme: Longline fishing, other human factors**

**Location in *Sharks at Risk*:**

Longline fishing (10:33-14:00); fishing and finning (27:32-29:57); fisheries (16:52-20:11); Cousteau's dive and the concluding monologue (48:06-end)

**Pre-viewing Questions:**

- Describe all the different jobs a fisherman must do while catching fish.
- List all of the human activities that you can think of that pollute the ocean or decrease its biodiversity.
- Describe what you think longline fishing and shark finning are.

**Focus for Viewing:**

- For longline fishing, use questions 1 through 10 from the *Sharks at Risk* Viewing Questions.
- For finning, use questions 1 through 3 from the *Sharks at Risk* Viewing Questions.
- For fisheries, use questions 1 through 7 from the *Sharks at Risk* Viewing Questions.
- For Cousteau's dive and the concluding monologue, use questions 1 through 5 from the *Sharks at Risk* Viewing Questions.

**Essential Principle #7:**

**The ocean is largely unexplored.**

- a. The ocean is the last and largest unexplored place on Earth—less than 5 percent of it has been explored. This is the great frontier for the next generation's explorers and researchers, where they will find great opportunities for inquiry and investigation.
- c. Over the last 40 years, use of ocean resources has increased significantly; therefore the future of sustainability of ocean resources depends on our understanding of those resources and their potential and limitations.

**Post-Viewing Discussion Questions:**

- Describe what you think the role of government could be in placing strict regulations on longline fishing, the use of fisheries and the practice of finning.
- How do you think the economy would be affected if sharks were driven to extinction?

**Follow-up Activity:**

- Learn about the complexities of fishing; use the How to Catch a Fish lesson plan to enhance the knowledge of your students.
- List different ways in which you could educate your community about what is going on in the oceans today. For use in a presentation, have your students create a collage poster board that shows images and data on ocean health and/or on human activities that affect the ocean. They can get images for the collage from the Internet and the Ocean Adventures download library. Involve your school by turning your presentations into a schoolwide ocean conference.

Additional educator resources for **Jean-Michel Cousteau Ocean Adventures** can be found at [pbs.org/oceanadventures](http://pbs.org/oceanadventures).

**AUTHOR**

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**CREDITS**

**Jean-Michel Cousteau Ocean Adventures** is produced by KQED Public Broadcasting and Ocean Futures Society.

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## Sharks at Risk Viewing Questions With Answers

**Note:**

The indicated timings are approximate and are based on the PBS broadcast; home video versions may differ slightly.

**Introduction (2:15-5:27)**

1. Who is the king of predators? *the shark*
2. What is the name of the region that Jean Michel Cousteau's team travels to that is south of the Hawaiian Islands?  
*French Polynesia*
3. What is the name of the famous sunken volcano known for being a place where the greatest number of sharks can be found?  
*Rangiroa*
4. What do the powerful currents provide the area in the lagoon with?  
*nutrient-rich waters, perfect hunting ground, perfect place for Cousteau to study sharks*
5. Where does the Ocean Adventures team make its base camp?  
*one of the two small villages on the atoll*
6. Who is Yves Lefevre? *expedition guide*
7. What are the names of the two main passes at Rangiroa?  
*Tiputa and Avatoru*
8. Where in Rangiroa is the largest concentration of gray reef sharks found? *entrance of Tiputa Pass*
9. How many sharks does the guide think the team will see on this dive? *hundreds*

**Rangiroa (5:20-10:40)**

1. How many feet down will the divers go to see the sharks?  
*200 feet*
2. Why is it important for the divers to stay together as a group during the dive? *because the current will make them disperse, and for security—divers always need to be near one another in the event that their equipment malfunctions*
3. How much time will the divers spend at the bottom? *five minutes*
4. What vital roles do the members of this team play?  
*in front of and behind the camera and keeping watch*
5. What is the name of the first shark that approaches the team?  
*the silvertip*
6. What do sharks do to ensure balance between shark and prey?  
*catch the weak and sick, increasing the genetic diversity of fish population; sharks have constant food in return*
7. Who are the primary enforcers of the balance of a species becoming too depleted or overpopulated? *sharks*
8. What species do the divers encounter midway to the bottom?  
*spotted eagle rays*
9. What do the team members find when they finally reach the bottom? *many sharks*
10. How long does it take for some female sharks to mature?  
*up to 25 years*
11. How long is the gestation period (the length of a pregnancy) of some sharks? *24 months*

## Sharks at Risk Viewing Questions With Answers

### Longline fishing (10:33-14:00)

1. The impact of longline fishing has been \_\_\_\_\_ both on the ocean and on the land. *severe*
2. How many residents live on the atoll on Rangiroa? *3000*
3. Why is Rangiroa's future dependent on fishing? *Rangiroa and the Tuamotu Islands supply over half the fish marketed in all of French Polynesia*
4. What does the president of the local fishermen's association think the key is to saving the future of Rangiroa? *conservation and protecting fish balance*
5. How many fish did the fisherman used to catch every day just a few years ago? *20-30*
6. How many fish does the fisherman catch every day now? *10*
7. Why does the fisherman not see tuna anymore? *longliners have overfished the population*
8. What does the fisherman think the government should do? *regulate the catch and limit boat size*
9. According to the fisherman, why are there so many squid present in the waters at Rangiroa? *not enough fish to eat the squid, so they multiply*
10. How has the absence of large fish due to overfishing affected the local people's economic future? *forced to turn to squid, maybe sharks next*

### Night dive (14:00-16:52)

1. What type of fish gathers and releases its sperm and eggs during the full moon? *surgeon fish*
2. What do the stripes on a fish do to a predator? *confuse the predator*
3. How do sharks breathe? *water must continually flow over their gills*
4. Why does the nurse shark not have to be moving around to breathe? *is able to pump water across its own gills*
5. What plays an important part in the coral reef's food chain? *plankton*

### Fisheries (16:52-20:11)

1. Describe the system set up at the fishery to catch fish. *fish enter in one direction with the tidal flow and cannot escape the same way*
2. What does Jean-Michel Cousteau find inside one of the traps? *representation of the abundant fish species found in Rangiroa*
3. What happens after the fish are trapped? *kept fresh until fisherman herds them into a basket*
4. What kind of material were the fisheries built with traditionally? *coral and straw*

## Sharks at Risk Viewing Questions With Answers

5. Small-scale fishing like this makes up \_\_\_\_\_ percent of the total commercial catch. *80 percent*
6. What are all the small-scale family fisheries called?  
*South Pacific coastal fishery*
7. What do the fishermen do when they accidentally catch sharks?  
*throw them back*

### Mating behaviors (23:25-27:32)

1. What is the name of the shark that the divers find? *grey reef*
2. How do the males find females during their mating season?  
*identify and follow females by odor; this puts males on edge*
3. Describe the mating ritual of this shark. *males bite female; females have evolved thicker skin to endure this*
4. What has Cousteau spotted that has gone wrong? *an aggressive male has crossed the line from mating to full-on attack*
5. Which species of shark will benefit from the female's death?  
*hammerhead*
6. Why is the fate of the sharks at Rangiroa in danger? *because if fishing practices change, people may start hunting sharks*

### Fishing and finning (27:32-29:57)

1. How many sharks are caught each year? *more than 100 million*
2. What are a growing number of Asian fishermen doing to sharks when they catch them? *cutting off their fins to use in shark fin soup; is a sign of prosperity for the middle class*
3. What are marine biologists concerned about all over the world?  
*removal of predators at top of food chain will affect all life in the ocean*

### Dolphin encounters (29:57-36:21)

1. Which animals are the first to approach the divers? *dolphins*
2. What traits do humans share with dolphins? *intelligence, living in a tight society, using language, taking care of each other and having fun*
3. How do sharks play a role with dolphins? *sharks are dolphins' natural predators; dolphins band together and outnumber sharks*
4. Which is another of the ocean's key predators? *barracuda*
5. What are the world's underwater rain forests known as?  
*coral reefs*
6. "In the end nature will survive, but perhaps \_\_\_\_\_ won't." *we*

### Great white dive (36:21-45:20)

1. List some of the places where large numbers of great whites are found. *near coastlines all over the world; but many are found in northeastern United States, Northern California, Australian coast, South Africa*

## Sharks at Risk Viewing Questions With Answers

2. What is the name of the area that the team travels to in South Africa? *Cape of Good Hope*
3. What species of seal draws the great white to the Cape of Good Hope? *Cape fur seal*
4. What does Jean Michel Cousteau's guide tell us about how they started opening the shark's mouth? *lured shark with bait and touched the tip of the shark's nose*
5. How do sharks catch a seal? *they recognize it as prey and hit it at high speed from below*
6. What are the divers' real protections from the shark underwater? *each other and tapping the shark with the stick*
7. What does the great white do when it spots the divers? *swims down to investigate*
8. What is the key to not being attacked? *never to lose shark's position and confront it head-on with the stick*
9. How many people do great whites attack every year? *seven or eight*
10. Why do the great white attacks occur? *sharks mistake a human for its preferred prey*
11. What surprised the divers about the sharks? *how gentle and timid they are*
12. How fast can a shark go? *25 miles per hour*
13. How does the shark play a role in the Cape fur seal population? *catches the weak and the sick*

### **African penguins** (46:37-48:06)

1. What percentage has the penguin population decreased by in the last century? *90 percent*
2. What are the greatest threats to the African penguin? *human activities like guano mining, oil pollution from tankers and commercial fishing*
3. What trick does the penguin use to get the shark to go away? *tap them from above*

### **Cousteau's dive and the concluding monologue** (48:06-end)

1. How does Cousteau approach the sharks? *from the surface*
2. What is found in shark fins that is a greater risk to humans than shark attacks? *fins have 42 times more mercury than is safe for human consumption*
3. What are the two myths that Cousteau and his team have dispelled for us? *sharks are not man-eaters; the oceans are not filled with sharks*
4. By what percentage may the population of the hammerhead and the great white have fearfully declined by? *75%—that is three out of four!*
5. What does our future depend on? *ocean, balance between predator and prey, the shark*

# Ocean Vocabulary Sheet

WORD	PICTURE
DEFINITION	

WORD	PICTURE
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## Viewing Questions

### Introduction

1. Who is the king of predators?
2. What is the name of the region that Cousteau's team travels to that is south of the Hawaiian Islands?
3. What is the name of the famous sunken volcano known for being a place where the greatest number of sharks can be found?
4. What do the powerful currents provide the area in the lagoon with?
5. Where does the Ocean Adventures team make its base camp?
6. Who is Yves Lefevre?
7. What are the names of the two main passes at Rangiroa?
8. Where in Rangiroa is the largest concentration of gray reef sharks found?
9. How many sharks does the guide think the team will see on this dive?

### Rangiroa

1. How many feet down will the divers go to see the sharks?
2. Why is it important for the divers to stay together as a group during the dive?
3. How much time will the divers spend at the bottom?
4. What vital roles will the members of this team play?
5. What is the name of the first shark that approaches the team?
6. What does the shark do to ensure balance between shark and prey?
7. Who are the primary enforcers of the balance of a species becoming too depleted or overpopulated?
8. What species do the divers encounter midway to the bottom?
9. What do the team members find when they finally reach the bottom?
10. How long does it take for some female sharks to mature?
11. How long is the gestation period (the length of a pregnancy) of some sharks?

### Longline fishing

1. The impact of longline fishing has been \_\_\_\_\_ both on the ocean and on the land.
2. How many residents live on the atoll on Rangiroa?
3. Why is Rangiroa's future dependent on fishing?
4. What does the president of the local fishermen's association think is the key to saving the future of Rangiroa?
5. How many fish did the fisherman used to catch every day just a few years ago?
6. How many fish does the fisherman catch every day now?
7. Why does the fisherman not see tuna anymore?
8. What does the fisherman think the government should do?
9. According to the fisherman, why are there so many squid present in the waters at Rangiroa?
10. How has the absence of large fish due to overfishing affected the local people's economic future?

## Viewing Questions

### Night dive

1. What type of fish gathers and releases its sperm and eggs during the full moon?
2. What do the stripes on a fish do to a predator?
3. How do sharks breathe?
4. Why does the nurse shark not have to be moving around to breathe?
5. What plays an important part in the coral reef's food chain?

### Fisheries

1. Describe the system set up at the fishery to catch fish.
2. What does Cousteau find inside one of the traps?
3. What happens after the fish are trapped?
4. What kind of material were the fisheries built with traditionally?
5. Small-scale fishing like this makes up \_\_\_\_\_ percent of the total commercial catch.
6. What are all the small-scale family fisheries called?
7. What do the fishermen do when they accidentally catch sharks?

### Mating behaviors

1. What is the name of the shark that the divers find?
2. How do the males find females during their mating season?
3. Describe the mating ritual of this shark.
4. What has Cousteau spotted that has gone wrong?
5. Which species of shark will benefit from the female's death?
6. Why is the fate of the sharks at Rangiroa in danger?

### Dolphin encounters

1. Which animals are the first to approach the divers?
2. What traits do humans share with dolphins?
3. How do sharks play a role with dolphins?
4. Which is another of the ocean's key predators?
5. What are the world's underwater rain forests known as?
6. "In the end nature will survive, but perhaps \_\_\_\_\_ won't."

## Viewing Questions

### Great white dive

1. List some of the places where large numbers of great white sharks are found.
2. What is the name of the area that the team travels to in South Africa?
3. What species of seal draws the great white to the Cape of Good Hope?
4. What does Cousteau's guide tell us about how they started opening the shark's mouth?
5. How do sharks catch a seal?
6. What are the divers' real protections from the shark underwater?
7. What does the great white do when it spots the divers?
8. What is the key to not being attacked?
9. How many people do great whites attack every year?
10. Why do the great white attacks occur?
11. What surprised the divers about the shark?
12. How fast can a shark go?
13. How does the shark play a role in the Cape fur seal population?

### African penguins

1. What percentage has the penguin population decreased by in the last century?
2. What are the greatest threats to the African penguin?
3. What trick does the penguin use to get the shark to go away?

### Cousteau's dive and the concluding monologue

1. How does Cousteau approach the sharks?
2. What is found in shark fins that is a greater risk to humans than shark attacks?
3. What are the two myths that Cousteau and his team have dispelled for us?
4. By what percentage may the population of the hammerhead and the great white have fearfully declined by?
5. What does our future depend on?