The Great Barrier Reef

Where are the most biologically diverse places on the planet? If I asked you this question, you might guess the Amazon rainforest in Brazil or the jungles of India. But, in fact, one of the richest sources of biodiversity is actually underwater. Off the northeastern coast of Australia live thousands of species of fish, birds and reptiles. Their home is the Great Barrier Reef, the world's largest coral reef. Stretching over 1,600 miles, the Great Barrier Reef is as long as the distance from Boston to Miami in the United States. The Great Barrier Reef is home to over 1,500 species of fish. But it's not just fish that live in the reef. The reef also provides food and shelter to sponges, whales, dolphins, marine turtles and mollusks.

The reef may look like a rock but it's actually alive. Coral reefs are underwater structures that are made by corals—tiny animals that are related to jellyfish. The coral have tender bodies that are vulnerable to attack, so they secrete a hard substance called calcium carbonate to protect their exteriors. The calcium carbonate builds up until it makes formations that look like rocks to the human eye. Coral reefs grow best in warm, shallow, clear water that receives a lot of sunshine. Around a quarter of all marine species live in coral reefs, and they play an important role in supporting diversity in the ocean. Charles Darwin, the famous biologist who first proposed the scientific theory of evolution, described the coral reef as an oasis in the desert of the ocean. Though tropical waters typically provide very little nutrients, the coral reefs that exist in tropical waters are among the richest and most diverse ecosystems on earth.

The Great Barrier Reef is the largest coral reef on the planet. Covering more than 133,000 square miles, it is even visible from outer space. Scientists believe that the Reef is around 500,000 years old, but has shifted forms several times during its existence. The Reef has most likely had its present topology for 6,000-8,000 years. Hundreds of different species of coral make up the various structures composing the Great Barrier Reef. Within these structures, several ecosystems flourish. Ecosystems are complex systems that contain several species that interact with one another.

Symbiotic Relationships on the Reef: Clownfish and Sea Anemone

The Great Barrier Reef is home to a number of species that have special, interdependent relationships. One such example is the unique, mutually beneficial partnership that exists between the clownfish and the sea anemone. Clownfish are small fish, typically about three to seven inches long. The name comes from their bright coloring, which can be orange, red or yellow, interspersed with stripes of black and white. The sea anemone is a polyp, a cousin to the jellyfish. The clownfish and sea anemone each benefit the other. In science, this type of relationship is called symbiotic and mutualistic.

Sea anemone have long tentacles and look like exotic underwater flowers. But the sea anemone has a hidden power—its tentacles have venom that paralyzes fish and crabs. Once the fish are paralyzed, the sea anemone eats them. How does the clownfish survive living inside such a dangerous home? The body of the clownfish is covered in a particular type of mucus. This mucus protects the clownfish from the anemone, making it immune to the poison. Because clownfish live inside anemone, the poison tentacles protect them from other predators. The clownfish is also able to eat some of the food the anemone can't digest. The sea anemone benefits from having clownfish live inside it, as well. The clownfish plays a crucial role defending the sea anemone from fish and parasites that might otherwise harm it.

Visitors to the Reef: Humpback whales

While the Great Barrier Reef is the permanent home for many animals and plants, other species only visit the area seasonally. The humpback whale comes to the Great Barrier Reef every winter to breed and give birth to its young. Though humpback whales look similar to fish and share many characteristics, they are, in fact, mammals. Instead of scales they are covered in skin. The markings on a humpback whale's skin are unique to each whale, similar to how every human being has a fingerprint unlike any other. Humpback whales are one of the largest animals on the Great Barrier Reef, about as long as a medium school bus. On average, the humpback whale comes to the ocean's surface to breathe every seven to 15 minutes, but they can remain underwater for as long as 45 minutes.

Humpback whales are famous for their singing. Male humpback whales vocalize, making noises that last up to 20 minutes and sound eerily similar to songs. Even though humpbacks are enormous, they only eat the tiniest of fish. Favorite foods of the humpback whale include plankton, shrimp-like creatures called krill, and other small fish such as herring and mackerel. Humpback whales don't have sharp teeth like sharks. Instead, their mouths are filled with large plates of baleen. Baleen is made out of keratin, the same material that our fingernails are made from, and enables the whales to strain the small fish from the seawater. To feed, the humpback whale will gulp a mouthful of plankton or krill and then let the water flood out.

Humpback whales use a hunting strategy called bubblenet feeding. A group of whales work together to capture large schools of herring, krill or other small fish. One whale will blow a wall of bubbles around the herring school, while other whales will make noises. These stimuli confuse the fish so that the rest of the whales can herd them together and upwards. Then the whales can easily lunge up with their mouths open, and consume large quantities of the fish. The average humpback whale eats 4,500 to 5,500 pounds of plankton, krill and fish each day during their feeding season. The Great Barrier Reef is crucial for the humpback whales' survival. Humpback whales come from Antarctic waters to the Great Barrier Reef from May to September to calve and to build up strength over the winter before they return to the Antarctic in the summer, according to the Great Barrier Reef Marine Park Authority.

The Future of the Great Barrier Reef

The Great Barrier Reef, home to so many diverse species, is now in danger due to several threats. These threats include pollution, human interference and changing ocean temperatures. Pollution and declining water quality endanger both the coral reef and the species that live within it. Rivers coming from northern Australia can bring pollution from farm run-off when there are floods. Farm run-off pollution includes animal waste, fertilizer and pesticides. In recent years, pollution from these rivers has become worse because there are fewer coastal wetlands. In the past, coastal wetlands between the rivers and the Great Barrier

Reef would serve as a filter, keeping the worst of the pollution from reaching the ocean.

Human interference that harms the Great Barrier Reef includes shipping accidents and overfishing. Many ships pass through the Great Barrier Reef when they are bringing cargo to and from Australia. It can be tricky for captains to navigate through these waters, and, as of 2013, there were over 1,600 known shipwrecks in the Great Barrier Reef. Shipwrecks not only damage the physical structure of the reef; they can also spill oil into the water, killing local species.

Though pollution and human interference are both problems, many scientists consider climate change the greatest threat to the Great Barrier Reef. Ocean temperatures are rising, making coral reefs weaker and more susceptible to disease. Rising ocean temperatures also affect the ecosystems in the coral reef, throwing off the delicate balance that allows so many species to coexist. The Great Barrier Reef is one of the planet's treasure troves of biodiversity—but it may disappear within our lifetimes.

Name: _____ Date: _____

1. What is the Great Barrier Reef?

A a mammal that comes to the ocean's surface to breathe every seven to 15 minutes
B something that is made out of the same material as human fingernails and enables whales to strain small fish from seawater
C the world's largest coral reef, located off the northeastern coast of Australia
D a large part of the Amazon rainforest located in the country of Brazil

2. The danger that the Great Barrier Reef now faces is an effect. What is one cause of the danger it faces?

A the humpback whale
B a symbiotic relationship
C pollution
D clownfish

3. Many animals live in and around the Great Barrier Reef.

What evidence from the passage supports this statement?

A "Rivers coming from northern Australia can bring pollution from farm run-off when there are floods. Farm run-off pollution includes animal waste, fertilizer and pesticides. In recent years, pollution from these rivers has become worse because there are fewer coastal wetlands."
B "The Great Barrier Reef is home to over 1,500 species of fish. But it's not just fish that live in the reef. The reef also provides food and shelter to sponges, whales, dolphins, marine turtles and mollusks."
C "Many ships pass through the Great Barrier Reef when they are bringing cargo to and from Australia. It can be tricky for captains to navigate through these waters, and, as of 2013, there were over 1,600 known shipwrecks in the Great Barrier Reef."
D "Where are the most biologically diverse places on the planet? If I asked you this question, you might guess the Amazon rainforest in Brazil or the jungles of India."

4. Based on information in the passage, what is a symbiotic relationship?

A a biologically diverse place, such as a jungle in India
B an underwater structure that secretes a hard substance called calcium carbonate
C an animal that visits an area seasonally to breed and give birth
D a relationship between two animals in which each animal helps the other

5. What is this passage mainly about?

A sea anemones and clownfish
B humpback whales and their young
C the Great Barrier Reef
D rising ocean temperatures

6. Read the following sentence: "Around a quarter of all marine species live in coral reefs, and they play an important role in supporting **diversity** in the ocean."

What does the word **diversity** mean?

A many different kinds of things
B a serious threat to ocean life
C a hard outer layer than protects coral
D something that can be seen from outer space

7. Choose the answer that best completes the sentence below.

The Great Barrier Reef is the largest coral reef on Earth; _____, it may disappear within your lifetime.

A consequently
B before
C as an illustration
D however

8. What is an ecosystem?

_____

_____

_____

_____

9. What are some of the animals that live in the ecosystems of the Great Barrier Reef?

_____

_____

_____

_____

10. The passage states that "rising ocean temperatures also affect the ecosystems in the coral reef, throwing off the delicate balance that allows so many species to coexist." Explain how rising ocean temperatures, pollution, or human interference could throw the ecosystems of the Great Barrier Reef off balance. Support your answer with evidence from the passage.

_____

_____

_____

_____

Teacher Guide & Answers

Passage Reading Level: Lexile 1090

1. What is the Great Barrier Reef?

- **A** a mammal that comes to the ocean's surface to breathe every seven to 15 minutes
- **B** something that is made out of the same material as human fingernails and enables whales to strain small fish from seawater
- **C** **the world's largest coral reef, located off the northeastern coast of Australia**
- **D** a large part of the Amazon rainforest located in the country of Brazil

2. The danger that the Great Barrier Reef now faces is an effect. What is one cause of the danger it faces?

- **A** the humpback whale
- **B** a symbiotic relationship
- **C** **pollution**
- **D** clownfish

3. Many animals live in and around the Great Barrier Reef.

What evidence from the passage supports this statement?

- **A** "Rivers coming from northern Australia can bring pollution from farm run-off when there are floods. Farm run-off pollution includes animal waste, fertilizer and pesticides. In recent years, pollution from these rivers has become worse because there are fewer coastal wetlands."
- **B** **"The Great Barrier Reef is home to over 1,500 species of fish. But it's not just fish that live in the reef. The reef also provides food and shelter to sponges, whales, dolphins, marine turtles and mollusks."**
- **C** "Many ships pass through the Great Barrier Reef when they are bringing cargo to and from Australia. It can be tricky for captains to navigate through these waters, and, as of 2013, there were over 1,600 known shipwrecks in the Great Barrier Reef."
- **D** "Where are the most biologically diverse places on the planet? If I asked you this question, you might guess the Amazon rainforest in Brazil or the jungles of India."

4. Based on information in the passage, what is a symbiotic relationship?

- **A** a biologically diverse place, such as a jungle in India
- **B** an underwater structure that secretes a hard substance called calcium carbonate
- **C** an animal that visits an area seasonally to breed and give birth
- **D** **a relationship between two animals in which each animal helps the other**

5. What is this passage mainly about?

- **A** sea anemones and clownfish
- **B** humpback whales and their young
- **C** **the Great Barrier Reef**
- **D** rising ocean temperatures

6. Read the following sentence: "Around a quarter of all marine species live in coral reefs, and they play an important role in supporting **diversity** in the ocean."

What does the word **diversity** mean?

A **many different kinds of things**
B a serious threat to ocean life
C a hard outer layer than protects coral
D something that can be seen from outer space

7. Choose the answer that best completes the sentence below.

The Great Barrier Reef is the largest coral reef on Earth; _____, it may disappear within your lifetime.

A consequently
B before
C as an illustration
D **however**

8. What is an ecosystem?

Suggested answer: An ecosystem is a complex system containing several species that interact with one another.

9. What are some of the animals that live in the ecosystems of the Great Barrier Reef?

Suggested answer: Students should name at least two animal species mentioned in the passage. These include coral, clownfish, sea anemones, dolphins, mollusks, and more.

10. The passage states that "rising ocean temperatures also affect the ecosystems in the coral reef, throwing off the delicate balance that allows so many species to coexist." Explain how rising ocean temperatures, pollution, or human interference could throw the ecosystems of the Great Barrier Reef off balance. Support your answer with evidence from the passage.

Suggested answer: Answers may vary. As an example, students may argue that oil spills near the reef can cause the ecosystems there to be thrown off balance. If the oil kills one species of fish, that may in turn harm another species dependent on it for food or protection. For instance, if clownfish were killed, then sea anemones, which rely on clownfish for defense against other fish and parasites, might die off as well.