

CORAL REEFS

Objective:

1. Students will demonstrate an understanding of varied characteristics in a coral reef.
2. Students will explain the growth and development of organisms living in coral reefs.
3. Students will hypothesize ways in which humans can protect the coral reefs.
4. Students will gain an understanding of coral reef ecosystems.

Performance Objectives:

Grade 1: Strand 4: Concept 1 PO 1-3; Concept 3 PO 2-3

NGSS: 1-LS-2

Grade 2: Strand 4: Concept 1 PO 1-2; Concept 2 PO 2-3; Concept 4

NGSS: 2-LS2-1A

Grades 1 – 2

Key Vocabulary

- Reef
- Polyp
- Organism
- Diversity

Related Literature:

Coral Reef
Steve Parker

Secret Seahorse
Stella Blackstone

Ocean Life from A to Z
Cynthia Stierle

Background Information:

The ocean floor is filled with living organisms. Many parts of the ocean remain a mystery, and new discoveries are being made every day. It is difficult to know the number of living species in the ocean and how each is a part of the cycle of life on Earth. Oceanographers know that the ocean ecosystem is home for over 100 million species including all varieties of sharks, rays, sea snakes, jellyfish, and coral. All of these species and countless others live in their own unique habitats, balancing predator and prey instincts, and surviving in the ocean community.

One of the most unique, living ecosystems in the ocean is coral reefs. Coral reefs are animals, not plants, and are very important to other creatures that live among

them. One of the most famous coral reefs is the Great Barrier Reef. Filled with life, the Great Barrier Reef is the world's largest reef community. With over 2,900 separate reefs, they can be seen from space as the reef stretches 1,400 miles along the coast of Queensland, Australia. The reef is located offshore approximately 10 to 100 miles depending on the shape of the ocean floor. The reef was formed over millions of years from tiny creatures known as coral **polyps**. The surface water temperature is between 70 to 100 degrees and allows the coral to continue to grow, supporting all of the living organisms that are dependant on the reef for food and protection. Each section of reef consists of numerous living organisms and can be described as having many, many habitats. In some locations of the reef species such as anemones, sponges, worms, gastropods, lobsters, sea stars, and crayfish can be observed living in groups with the coral.



The Great Barrier Reef is an extraordinary system of living creatures. Containing on of the largest **diversities** (different types of animals) of **Organisms**. Every individual species plays a part in the reef and they all depend on each other. Six species of sea turtles, seventeen species of sea snakes, over 1,500 fish species, 215 species of birds, and over 400 species of hard coral co-exist and support life on the reef.



This photo of the Great Barrier Reef was taken from space. It is clear to see how the reef begins offshore and follows the shape of the land. Changes in color denote the area of the reef and

the small ‘islands’ that connect the great expanse known as the Great Barrier Reef. The world’s largest coral ecosystem includes over 2900 separate coral reefs which make up the rich and diverse Great Barrier Reef, an ocean community of living organisms.

(NOAA Photo)

Different types of reefs are located in various waters of the world. The three main types of reefs are **fringing**, **atolls**, and **barrier** reefs. The Great Barrier Reef is the largest of all and is a barrier type. The term ‘barrier’ is used due to the extended distance of the reef offshore, which allows lagoons to form between the shoreline and the reef. Often the water between shore and reef is very deep. Marine animals living in the coral are closer to the surface and many divers love to take a look at the beautiful colors, shapes, and sizes of life among the reef. In addition, the lagoon areas can house larger species of marine life who live and hunt in the

deeper water. The crystal clear water is a paradise for the sea turtle that swims along the coral reef.



Fringing reefs are those that extend toward the ocean directly from the shore. Fringing reefs are the most common form of reef. For example, the Red Sea Reef in the Indian Ocean is considered a fringing reef which extends along 1240 miles of shoreline. This hardy reef has unique types of coral that appear more tolerant to climate and temperature changes. Scientists have determined that approximately 10% of the coral fish found in the Red Sea area are not found anywhere else.





Notice how the fringing reef begins at the shoreline in this picture of a reef in the Red Sea. The Red Sea Reef is home to a variety of species that prefer the coastal waters and plentiful food.



Reefs formed as a result of a volcanic island sinking back into the sea are called atolls. Atolls generally appear oblong or round with a lagoon in the center. While they may appear mysterious, atolls are coral formations that house various habitats for marine life, much the same as other coral reefs. Atolls like the one at Lighthouse Reef in Belize are also popular scuba diving spots and welcome visitors with their colorful ocean species.





Lighthouse Reef, Belize (NOAA Photo)



Rays are among the marine species that swim around the atoll reefs. Along with a variety of colorful large and small fish species, sea turtles, sharks, and dolphins visit the reef feeding grounds on a regular basis. Coral and sea sponges are among the inhabitants that form this unique ecosystem.

Each type of reef is made of a collective system of living organisms that includes various species of coral. Coral, closely related to jellyfish and anemones, flourish by creating colonies consisting



of coral polyps. Each polyp houses algae that uses photosynthesis to maintain health and continual growth. The collective colony of polyps creates what is called a coral head. The coral head is home for thousands of individual polyps, which extend their tentacles to attract food.

The star coral shows each individual tentacle extending out into the water. As the tentacles wave about, fish are likely to swim close; then they are stung and drawn in for eating.

(NOAA Photo)

Coral can be divided into two groups, hard coral and soft coral. Hard coral is the building foundation of the reef. Over time, colonies of coral polyps produce limestone skeletons that extend outward and upward into various shapes and sizes. Healthy coral is generally colorful and teeming with polyps waving their tentacles in the water.

Soft coral does not have a solid skeleton and is flexible in the water. Sometimes mistaken as plants, soft coral is supported by spicules, which look like spikes. Soft coral has tentacles with a feather-like appearance. Soft coral makes a comfortable home for many marine species that live among the branches often camouflaging themselves by taking on the color of the coral. Tiny shrimp, snails, and fish are among the species living in soft coral.

Hard Coral



Soft Coral



Protecting the world's coral reefs is an ongoing challenge. Coral reefs are often in danger from predators of the deep. For example, the crown of thorns starfish has been found to be a ravenous eater of coral. Oceanographers have detected a large

increase in the population of crown of thorn starfish since 1970 and significant damage done to certain coral reef areas since that time. These rapidly moving starfish make their way over the coral smothering it and injecting venom through their stomach. Soon after, the starfish eat the polyps leaving only the vacant skeleton behind. Since the crown of thorns can produce hundreds of thousands of offspring at one time, ‘outbreaks’ of these starfish can consume large colonies of coral in as little as a week. Controlling the crown of thorn population takes place as healthy reefs attract marine animals that feed on the starfish.

Clean ocean water is one key to maintaining a healthy coral reef and marine life ecosystem. Damaging oil spills, pollutants, chemicals, and litter in the water continues to be part of the concern over protecting the oceans. Over fishing and destructive fishing are concerns when the natural balance of ocean regions is disrupted. Coral diseases have risen in the past ten years and spread around the world damaging areas of reefs. An abundance of harmful fungi, bacteria, and viruses are to blame for the loss of numerous reef corals. Climate changes may be contributing to the spread of diseases as temperature changes have enormous impacts on coral reefs. Temperature changes have influenced the changes in tides along the reefs. Coral reefs thrive in water held at constant temperatures. The slightest changes that allow more exposure to ultraviolet rays from the sun can cause great damage to coral reefs. Coral bleaching takes place when the coral is exposed to higher than normal water temperatures and ultraviolet rays, for extended periods of time. The two most significant coral bleaching events in the Great Barrier Reef took place in 1998 and 2002. Currently, a third coral bleaching event is feared by scientists observing climate changes around the world.



The devastating impact of coral bleaching in one area of Hawaii’s reef is recognized by the whitened coral. The once healthy coral is reduced to skeletal remains following a time of coral bleaching. (NOAA Photo)

Life on Earth is constantly changing, but what remains the same is that world-wide attention must be given to protecting natural resources, supporting ecosystems on

land and in the sea, keeping the water clean and safe, and understanding that community relationships are key to a healthy planet.



Additional Resources:

Coral Bleaching: <https://www.youtube.com/watch?v=fA6mpexcyN4>

Coral Time-lapse: <https://www.youtube.com/watch?v=fbYA6uZFJ-w>

Coral Eating: <https://www.youtube.com/watch?v=tZuxZdG6TfM>

Coral Bleaching Great Barrier Reef: https://www.youtube.com/watch?v=I_dC2swK9AY

Sources: Great Barrier Reef Marine Park Authority; World Wildlife Federation; Britannica; National Oceanic and Atmospheric Administration.



Indicates ‘take along’ activity.

Procedures and Activities:

1. State the learning objectives. Review previous instruction as it relates to the topic and objectives.
2. Review vocabulary.
3. Read related literature. Engage students in open-ended questioning and discussion of the topic. Evaluate the level of prior knowledge and experience students may have regarding the topic. Ask students if they have been to an aquarium. Let students talk about their experiences.
4. Discuss coral reefs around the world and refer students to the use of technology to investigate areas of oceans and seas where coral reefs are located. Demonstrate how to relate distances from one location to another. Use wall maps if available to show students where they live and where reefs are located. Ask students to point out the nearest reef and how long it takes to get to that location.
5. Discuss the concept of global communities, ecosystems, and habitats. Ask students to give examples of each in the human, animal, and marine worlds.

6. In the marine environment, discuss the predator and prey cycle of life. Relate this to both large and small creatures including coral. Clarify that coral is an animal and discuss how coral is formed and multiplies.

7. Use technology to project colorful reef pictures so students become familiar with reefs and have a visual impression of the environment.

Snack: Stick pretzels and goldfish crackers are an easy snack. Pretzels represent coral and goldfish crackers are the fish that live in the coral. Large marshmallows can be used as the base of the sea urchin. Poke 4-6 stick pretzels into the marshmallow and you have a sea urchin that lives in the coral reef.

Coral Crafts: Make your own (paper) coral. Follow directions on craft sheet.



Activity: The Great Barrier Reef Fish activity can be taken to the aquarium to complete when students look at the reef exhibit. Students draw a picture of the creature they selected and complete the information on the sheet. As a follow-up to the field trip, students use recall to select a creature. The use of technology will assist them in completing the questions related to the chosen creature.

Activity: Coral Reef Habitat is an activity that students can use their visual impression of a reef and create their own. They color the coral and add a few ocean species that live in the coral. This may be a pre-field trip activity.

Activity: To enhance the understanding of a coral reef habitat, Home for a Clown Fish allows students to draw the habitat for a clown fish. To practice writing and spelling, students complete the description of the habitat.

Activity: Sea Turtle Diversity gives students an opportunity to use technology to investigate the 6 sea turtle species that live around coral reefs. Students select their favorite type of turtle, draw the turtle, complete the scientific data questions and share their turtle selection with the class.

Activity: Students label the parts of the Coral Polyp.

Activity: Coral Reef Quiz is a post fieldtrip activity to check for understanding. For younger students, the quiz can be done with partners or groups.

Reflections and Assessments: Students are assessed on varied levels.

Participation and grade standards may be applied to each activity. Activities are designed for flexibility and use pre or post fieldtrips. Some activities meet the STEM guidelines.





Great Barrier Reef Fish

Choose a fish from the Great Barrier Reef exhibit and create a profile for that coral reef animal.

Species: _____

Habitat: _____

Location: _____

Diet: _____

Predators: _____

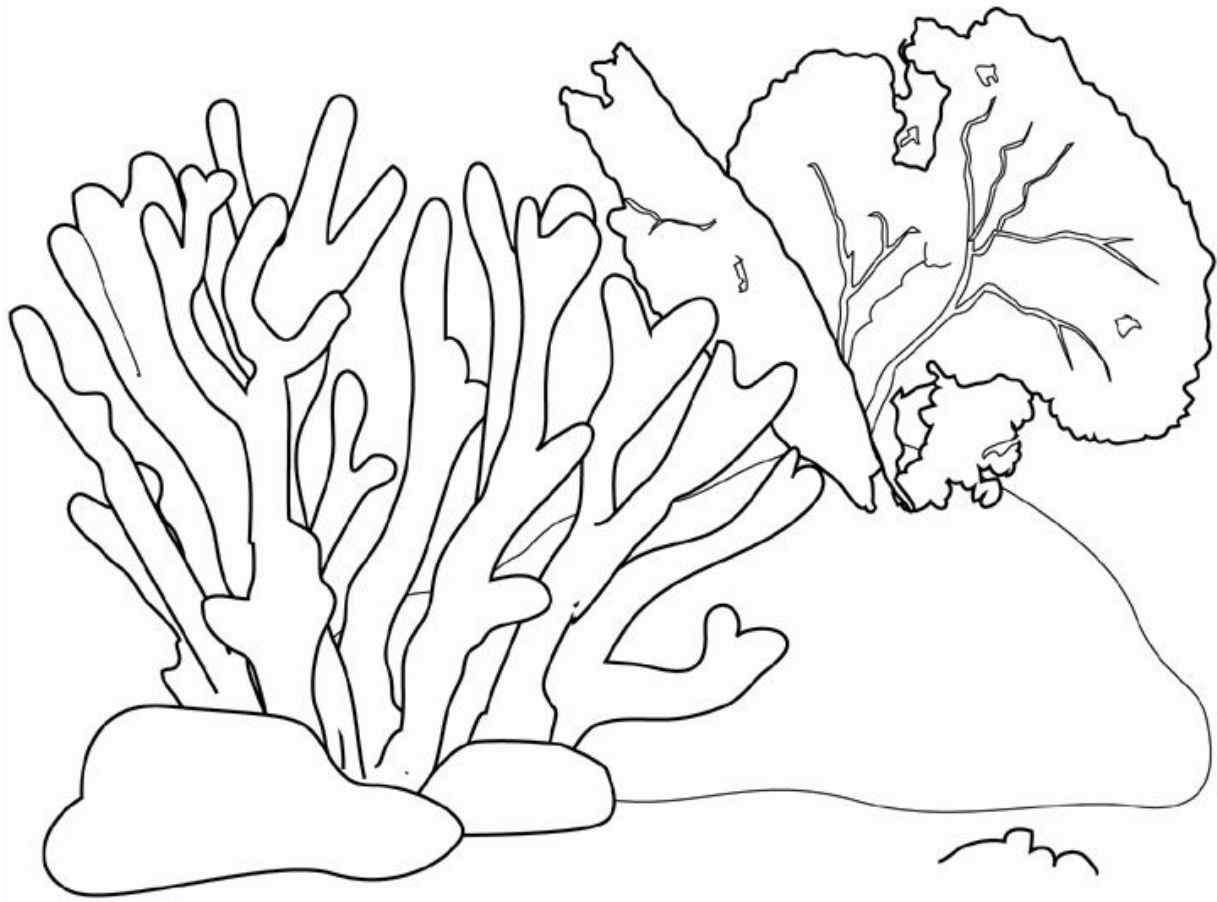
Special Adaptations: _____

Fun Facts: _____



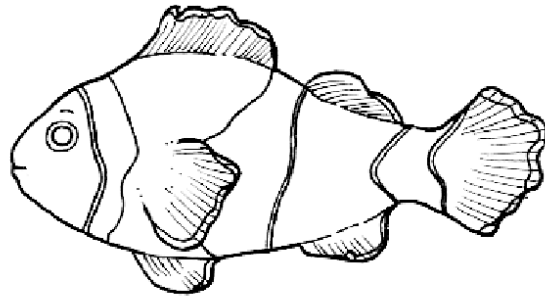
Coral Reef Habitat

Draw animals to live in this coral reef habitat.



Home for a Clown Fish

Draw a habitat for this clown fish.



Explain why you chose this habitat for your clown fish.



Sea Turtle Diversity

There are 7 different species of sea turtles in the world:

1. Green Sea Turtle
2. Hawksbill Sea Turtle
3. Loggerhead Sea Turtle
4. Leatherback Sea Turtle
5. Kemp's Ridley
6. Olive's Ridley
7. Flatback Sea Turtle

Chose one species of sea turtle to investigate and report your findings.

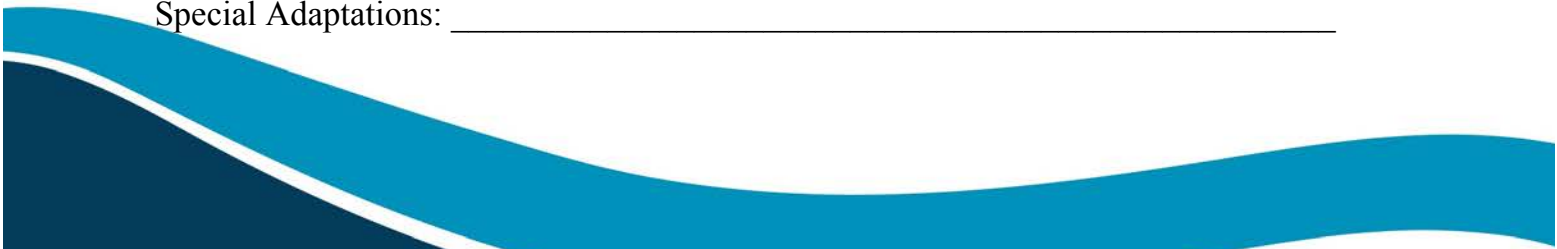
Species: _____

Habitat: _____

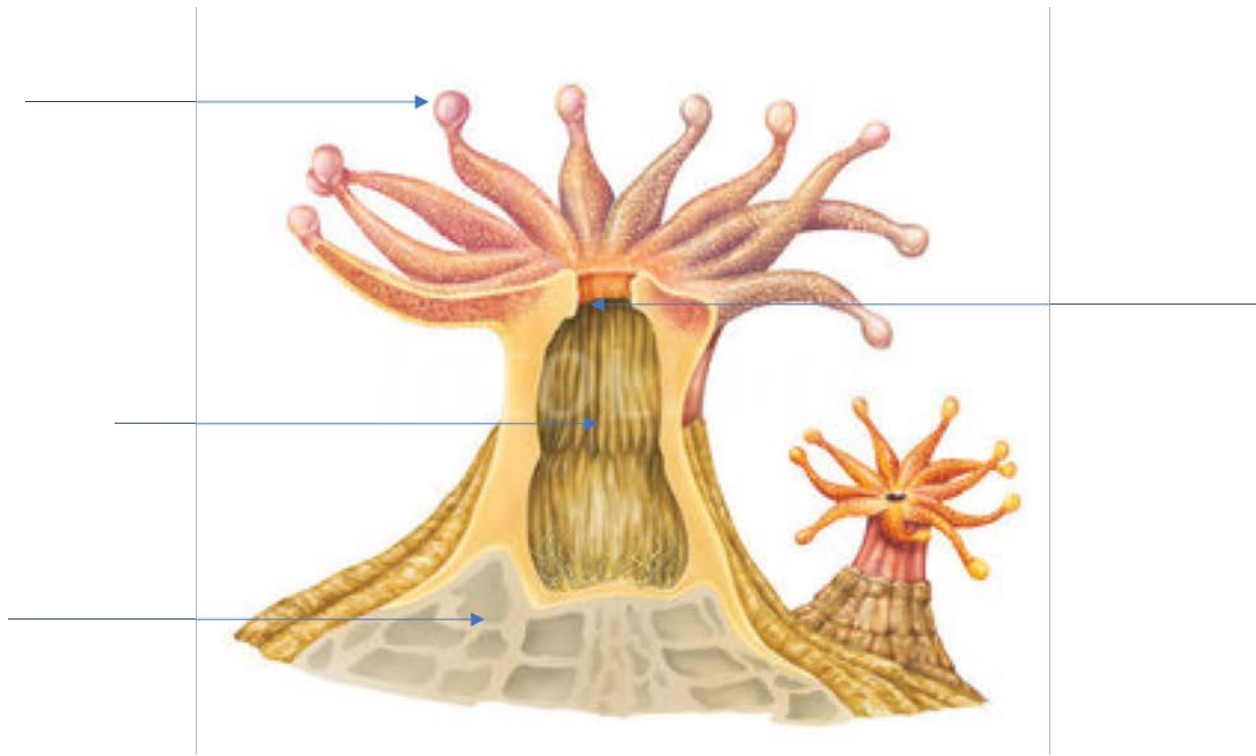
Diet: _____

Predators: _____

Special Adaptations: _____



Label the Coral Polyp



Word Bank:

Skeleton

Mouth

Tentacles

Stomach

Coral Reef Quiz

Circle the best answer to each question.

1. Where are coral reefs located?
a. deserts b. oceans c. forest d. lakes
2. One type of coral reef is called?
a. Hole b. Barrier c. Rock d. Boat
3. What kind of animal lives in a coral reef?
a. horse b. penguin c. fish d. duck
4. What is coral?
a. animal b. plant c. tree d. weeds
5. The largest coral reef in the world is?
a. Great Barrier Reef b. Clown Reef
c. Shrimp Reef d. Sunny Reef
6. Large groups of coral polyps are called?
a. friends b. colonies c. fingers d. skeletons
7. What kind of water do coral reefs like?
a. warm b. hot c. cold d. ice
8. A coral reef that starts at the shore is called?
a. fish reef b. fringing reef c. stone reef d. seaweed reef
9. What can cause a coral reef to die?
a. water pollution b. calm water c. sharks d. snow
10. Name an ocean creature that lives in a coral reef? _____



Coral Reef Quiz Key

Circle the best answer to each question.

1. Where are coral reefs located?
a. deserts **b. oceans** c. forest d. lakes
2. One type of coral reef is called?
a. Hole **b. Barrier** c. Rock d. Boat
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a. fish reef **b. fringing reef** c. stone reef d. seaweed reef
9. What can cause a coral reef to die?
a. water pollution b. calm water c. sharks d. snow
10. Name an ocean creature that lives in a coral reef? **Fish, sea turtles, sharks, etc.**



Making Coral Craft

Coral with Polyps

Materials: Toilet paper rolls, colored tissue paper cut into strips that are approximately 8-10 inches long; stapler, and glue sticks. Optional – small cut out fish.

Fold one piece of colored tissue paper around the toilet paper roll to cover it and staple or glue edges. Using approximately 4 pieces of tissue paper placed in a stack, fold the stack so that it fills the paper roll and sticks out about 4 inches. Fasten the tissue in the paper roll by stapling the bottom on two sides of the roll. Cut the tissue that sticks over the top of the paper roll into $\frac{1}{4}$ inch sections from top down to paper roll edge. Lightly shake the tissue and place the paper roll on a flat surface – a coral with extended polyps has been created. This craft also resembles a sea anemone. Place a cut out fish in it and you have a new specimen.

Brain Coral

Materials: Styrofoam balls cut in half, twisted macaroni, white glue, and paint. Optional – tooth picks or pipe cleaners, small cut out fish.

For each half of the ball, glue the twisted macaroni pieces all over the rounded surface and let it dry over night. When dry, paint the entire surface of the macaroni ball to give the effect of a solid color resembling brain coral. Your coral is complete!

The foam ball halves can also be used to create a sea urchin by poking either tooth picks or pipe cleaners into the rounded part of the ball. Place a cut out fish in the middle of the pipe cleaners.

