

EDUCATOR'S
GUIDE

MACGILLIVRAY FREEMAN'S

CORAL REEF
ADVENTURE

Reef Partners Wanted



ACTIVITY 1

Objective: Students will identify several reef partnerships and describe how the organisms help each other.

In The Film: The coral reef is a delicately balanced and linked habitat in which creatures large and small cooperate to build a community—neighbor helping neighbor. As the Crosby, Stills, and Nash song

KEY WORDS

Symbiosis—an association between two or more organisms. Examples—**mutualism**: both organisms benefit, **commensalism**: symbiont benefits, host does not benefit nor is it harmed, **parasitism**: symbiont benefits, host is harmed.

Zooxanthellae—One celled algae that live inside the soft body parts of coral polyps.

Photosynthesis—The process by which plant-like organisms with chlorophyll use sunlight, water, nutrients, and carbon dioxide to produce organic energy or carbohydrates.

“Our House” plays in the background, the Goby and the shrimp benefit from sharing a home in the reef. The goby gets to live in a great burrow, while the near-sighted shrimp gets a live-in body-guard. Later in the film, a 300-pound potato cod visits a “cleaning station” at

which it allows the tiny wrasse to swim right into its mouth to clean its mouth and gills. The relationship the wrasse has with the potato cod requires mutual trust.

Materials: per group

- Copies of *The Coral Gazette* Want Ads Copy Page
- Players and Partnerships Cards set

Teacher Prep Notes: Copy *The Coral Gazette* Want Ads for each group of students. Copy **Players and Partnerships Copy Page** in advance and cut them into cards. Each group of students should have a complete set of Players and Partnerships cards. All symbiotic relationships identified in this activity are examples of mutualism. This activity is adapted from *Naturescope*, “Diving into Oceans.”

Note: Answer key on the inside back cover.

Background: Survival strategies on coral reefs extend beyond the usual adaptations of camouflage, spines, stingers and other physical features. Relationships between animals as well as between animals and plants have evolved on the reef to include a variety of social and biological interactions in which one or all of the organisms involved receive some benefit from the relationship. The amount of benefit (and cost) may change over time as the relationships change in response to environmental changes or other inputs. Scientists call these interactions “symbiotic” relationships.

The numbers of symbiotic relationships on a coral reef are extensive—“perhaps the greatest concentration of symbioses within one single habitat on the planet,” according to the film. The corals themselves act as hosts to a variety of symbionts, including the zooxanthellae. These “helper algae” live in the tissues of the coral polyp and use the sun’s energy to produce sugars that are necessary for the survival of the coral. When water temperatures rise, occasionally the zooxanthellae will abandon the coral tissues, leaving the coral colorless. This phenomenon is called “bleaching” and could result in death to the coral by starvation due to the loss of the sugars contributed by the zooxanthellae. The relationship between the coral and the zooxanthellae is an example of mutualism.

A mutualistic relationship involves the sea anemone and the clownfish (also called the anemonefish). The anemone’s tentacles contain cells with small stinging structures (organelles) that harm most small creatures, including fish. However, the clownfish builds a defense by acquiring a mucus coat that protects against the stinging structures (nematocysts) and makes a home within the anemone’s tentacles providing a safe place for it and its companion. In turn, the clownfish brings its meals back to the anemone where, while it eats, bits of the prey may fall into the anemone’s tentacles, providing an easy snack for the anemone. The anemone plays a part in another mutualistic relationship—this one with a specific type of hermit crab. The hermit crab first finds a snail shell to use as a mobile shelter, then adds the anemone to the shell. The anemone serves two purposes—camouflage and stinging protection. In turn, the anemone has found a place to live and gather scraps of food (space can be limited on the reef).

To Do: Discuss with students the partnerships found living in, on and around a coral reef. Ask them to explain the different types of living relationships the inhabitants of the coral have. Ask students to explain symbiosis, mutualism, commensalism, and parasitism. Ask students to think about how humans might disrupt these relationships. Write their descriptions on the board.

1 Divide class into groups and give each group one copy of *The Coral Reef Gazette* Want Ads Copy Page. Give each group a set of the Players and Partnership cards, one set per group. While working in groups ask students to take turns reading a want ad and discussing which Player could have placed the ad and which Players might answer the want ad. Students should try to match up as many partners and players as possible, based on the advertisements in *The Coral Reef Gazette*.

2 After students find matching pairs of Players and Partnerships cards, students should discuss whether each relationship is an example of mutualism, commensalism, or parasitism.

Want Ads

Will Work for Food

Diverse group of maids available to clean. If interested, stop by Wrasse Alley during daylight hours. Only trustworthy fish allowed.

Grocery Delivery Offered

Attractive fish couple looking for nice, safe home with security. Willing to do grocery shopping in exchange for rent.

House for Rent

Spacious and clean 100-tentacle home available. Built-in security system. Rent charges may be waived in exchange for other services.

Fiji or Bust

Daily transportation around reef needed. I am deceptively beautiful and can offer bodyguard services in exchange for transportation.

Rental Property Available

Mobile Home on 1/1000th of an acre. Subject to high turnover in ownership. Future relocation assistance available through original owner.

The End is Near!

Photosynthetic partners needed immediately! Global warming threatens health of reef. Volunteers needed to aid in fight for survival. If available, report to any reef-building coral immediately.

Got Algae?

Have you recently lost your "helper" algae? Free-floating algae available and interested in "settling down" in the tropics. If you or a loved one are in need of assistance, call toll free 1-800-HELP.

Dental Hygienist Needed

Desperate for a good teeth and gill cleaning. I may look tough, but you can trust me not to eat you!

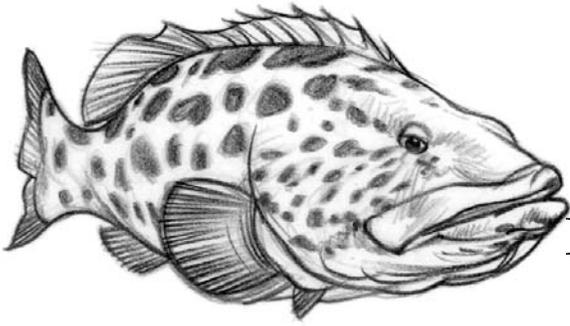
Bodyguard Available

Off-duty security officer seeks room for rent. Willing to offer security services in exchange for rent. Would prefer a bottom dwelling.

Roommate Wanted

Visually impaired reef resident, looking for roommate to share luxury apartment on Benthic Avenue. Room and board FREE in exchange for security services.

PLAYERS AND PARTNERSHIPS CARD SET COPY PAGE



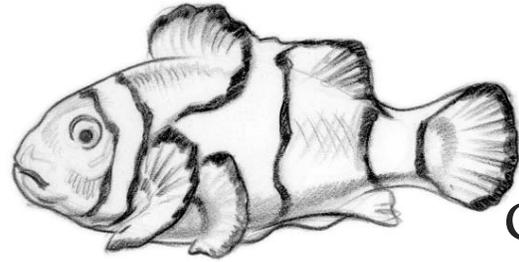
Potato
Cod



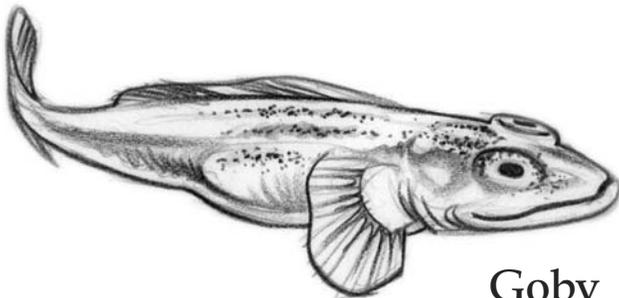
Sea
Anemone



Zooxanthellae



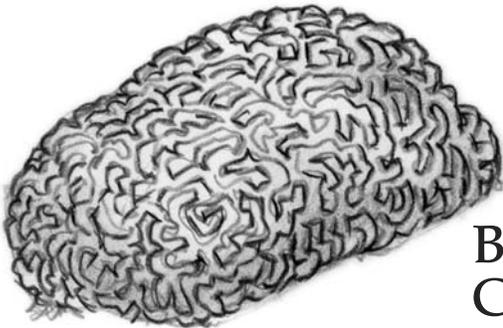
Clown
Fish



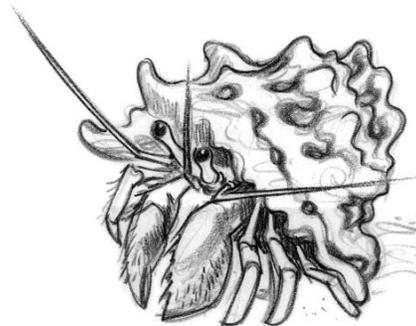
Goby



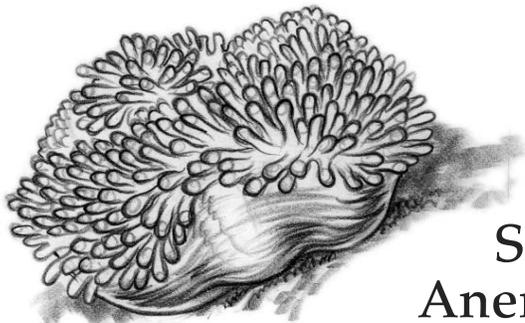
Wrasse



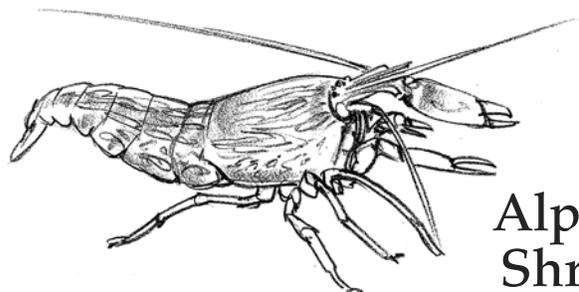
Brain
Coral



Hermit
Crab



Sea
Anemone



Alpheid
Shrimp

Resources

Living Mirrors: A Coral Reef Adventure,
Jack Stephens, Umbrage Editions, 2002

Animals and Their Environments: Coral Reefs,
Wendy Weir, Wendy's Bookworks, 1998.

Coastal Ecology Bodeaga Head,
Michael Barcour, Robert Craig, Frank Drysdale, Michael Ghislin,
University of California Press, Berkely, 1973.

Hawaiian Coral Reef Ecology,
David Gulko, Mutual Publishing Company, 1998.

Introductory Oceanography, 5th edition,
Harold Thurman V, Merrill Publishing Company,
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Invertebrate Zoology, 5th Edition,
Saunders College Publishing, 1987.

Marine Biology,
John Reseck, Reston Publishing Company, Reston, 1980.

Ranger Rick's NatureScope: Diving Into Oceans,
National Wildlife Federation, McGraw- Hill, 1997.

Sea Searcher's Handbook,
Monterey Bay Aquarium, Monterey Bay Aquarium
Foundation, 1996.

Web Sites

- www.coralfilm.com
- www.reefbase.org
- www.reef.edu.au/
- www.coralreef.org/
- www.coralreef.noaa.gov
- www.coralreefalliance.org/
- www.coris.noaa.gov
- www.gcrmn.org
- www.reefcheck.org/
- www.ourworld.compuserve.com/homepages/mccarty_and_peters/coral/c-intro.htm

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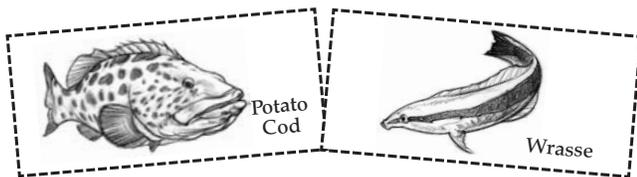
Illustration

Phil Roberts

Activity 1 Answer Key



Fiji or Bust + Rental Property Available



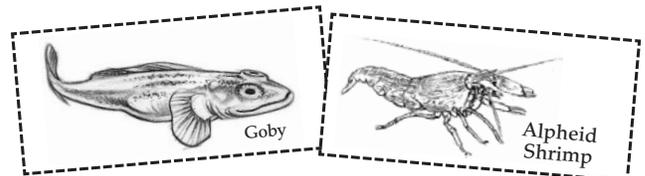
Will Work For Food + Dental Hygienist Needed



The End is Near! + Got Algae?



Grocery Delivery Offered + House for Rent



Bodyguard Available + Roommate Wanted