

THE CORAL REEF TEACHER'S GUIDE

LESSON PLANS FOR 6-8:

- **What and Where are the Coral Reefs?**
- **Life on the Coral Reef**
- **Benefits, Threats, and Solutions**



Gray angelfish. (Photo: Larry Benvenuti)

Introductory Lesson

Objective: Students read about and review some basic background information about **What and Where are the Coral Reefs?**

Interdisciplinary Index: Science, Language Arts

Vocabulary: coral reefs, Great Barrier Reef, polyp, nematocysts, herbivore, carnivore, spawning, planula, budding, octocorals, soft coral, hard coral, external skeleton, symbiotic relationship, zooxanthellae, fringing reef, barrier reef, atoll, coral reef regions

Materials:

- pencils/pens
- copies of **What and Where Are The Coral Reefs** section in the **Background Information** (the number depends upon how you want to present this information)
- copies of the **Review Worksheet** for each student

PRESENTATION:

1. Read the background material. Select a method that is best for your class, having the students read individually, in small groups, or as a whole class.
2. Have students complete the **Review Worksheet**. This can be done while you read the information or as a review after the reading.

REVIEW WORKSHEET

1. How do polyps eat?
2. Explain the two ways polyps reproduce.
3. What is the difference between soft and hard corals?
4. Describe the symbiotic relationship between the zooxanthellae and the polyps.
5. What is the difference between a fringing reef, a barrier reef, and an atoll?

Mapping the Reefs

Objective: Students locate coral reefs on a world map.

Interdisciplinary Index: Geography, Science

Vocabulary: longitude, latitude, equator, tropic of Cancer, tropic of Capricorn

Materials:

- a map of the world
- a copy of the coral reef map, Figure 1-6, on page 1-6 of the **Background Information**, per group of two students
- copies of the **Coral Reef Map** and the **Geography Map Key** (one for every two students)
- two copies of the list of **Geography Clues**
- thin color markers (ink pens may be substituted)

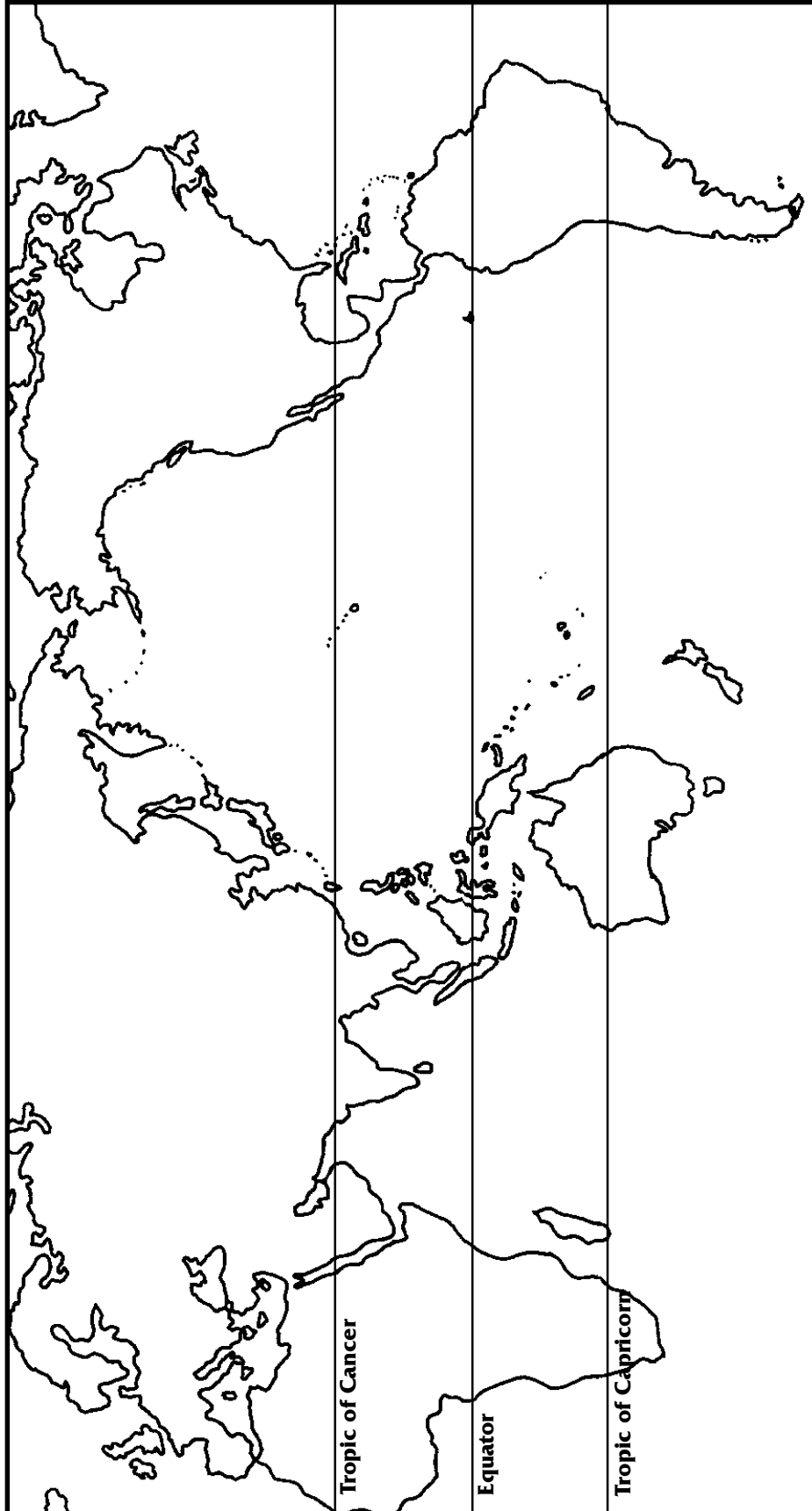
PRESENTATION:

1. Before class, cut the two copies of the **Geography Clues** sheet into strips with one clue per strip.
2. Divide the class into groups of two.
3. Hand out a copy of Figure 1-6, a **Coral Reef Map**, and a **Geography Map Key**, one for every two students. Hand out one clue strip per group.
4. Referring to the coral reef map, Figure 1-6, students should mark the location of coral reefs around the world using a colored marker. Referring to the world map, students then need to answer the geography clues and mark their location on the **Coral Reef Map** with the clue number.
5. Then they should record the name of the location on the **Geography Map Key**. The number of letters in the location will also serve as a clue.
6. After completing both of these steps for a clue, one member of the team should exchange the original clue for another clue. This process should be repeated until all thirteen clues have been used.
7. As each group completes the locating and recording section, have them work together (or separately) to complete the follow-up question.

ANSWERS TO GEOGRAPHY CLUES:

1. Bahama Islands
2. Belize
3. Caribbean
4. Madagascar
5. Pacific
6. Great Barrier Reef
7. Jamaica
8. Panama
9. Florida
10. Hawaii
11. Philippines
12. Red Sea
13. Marshall Islands

CORAL REEF MAP



GEOGRAPHY MAP KEY

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____

Follow-up: Describe in general terms where these coral reefs are located.

GEOGRAPHY CLUES

Each of these locations has coral reefs.

1. Group of islands northeast of Cuba
2. Central American country bordering the Caribbean and Guatemala
3. Fifteen percent of the world's coral reefs are located in this sea
4. Large island off the eastern coast of Africa
5. Largest ocean in the world
6. Largest barrier reef in the world, located off the eastern coast of Australia

7. Island country south of Cuba

8. Central American country adjacent to South America

9. United States peninsula state

10. United States island state

11. Collection of many islands located in the South China Sea

12. Body of water between Africa and Asia

13. A group of islands in the Pacific where Kwajalein, the world's largest atoll, is located

Coral Reef Two-Syllable Poetry

Objective: Students express an understanding and appreciation of the coral reefs through poetry. Students write about each of the three topics to be covered during this unit. This lesson is designed to be completed in three stages. The first stanza of the poem will address the topic **What and Where are the Coral Reefs?** Have the students complete the second and third stanza of the poem after each group of corresponding lessons is completed (**Life on the Coral Reef** and **Benefits, Threats, and Solutions**). The final draft should be written leaving space for illustrations.

Interdisciplinary Index: Science, Language Arts

Vocabulary: stanza

Materials:

- paper
- pencil
- dictionary/thesaurus (optional)

PRESENTATION:

1. Share an example of two-syllable poetry with the class such as the sample following. Mention that the sample contains only one stanza, whereas the final poem will contain three stanzas. Each stanza will address a different topic about the coral reefs.
2. The primary rule for this form of poetry is that each line is limited to two syllables (either one two-syllable word or two one-syllable words). This will require some creativity since a first-choice word may violate this rule and others will have to be used (ie. creature instead of animal).
3. Today's goal is to create a first draft for the first stanza of a poem that will be completed, in stages, during this unit.
4. The first stanza of the poem will address the topic **What and Where are the Coral Reefs?** It should include information gained during the first set of lessons.

5. Each stanza should be about twenty to thirty lines in length.

SAMPLE TWO-SYLLABLE POETRY

Coral Reefs

by Mary Meyer

Between
the poles
of our
planet
is a
life belt.
Beneath
the waves.
Life teems
in the
salty,
warm, clear,
shallow,
sunlit
waters.
Here the
polyps
build a
stony
coral
city.
They need
algae.
Algae
needs them.
We see
beauty
in their
colors.
Orange,
yellow,
purple,
blue, white,
red, green,
browns and
olives
brighten
the calm
waters.

Diving Expedition

Objective: Students learn to construct bar graphs from compiled data and interpret these graphs.

Interdisciplinary Index: Math, Science

Vocabulary: expedition, population, data

Materials:

- **Coral Reef Life Cards** (make 2 or 3 copies of each card and use only reef life that one can see with the human eye)
- graph paper
- colored pencils, crayons or markers.

PRESENTATION:

1. Cut up **Coral Reef Life Cards** and, on each one, write a number from one to twenty. Discuss facts about each **Life Card** with the students. You can use the following **Fact Sheet** as a reference.
2. Arrange desks in a circle and place life cards randomly on the floor, face down, in the middle of the circle.
3. Tell students they will be going on a diving expedition to gather data on the population of coral reef life. Explain to students that the “reef” they will be diving is in the middle of the circle (a patch reef).
4. Have students one at a time “dive into the water” and take a card. They will then report to the class what they observed. For example, if they drew a parrotfish card with the number 12 on it, they would say to the class, “I observed 12 parrotfish.” Repeat this process several times.
5. Each student, as well as the teacher, should be keeping a tally of how many of each animal is observed.
6. When sufficient data has been collected, have students construct a bar graph depicting the number of each animal that was observed. Represent each animal with a different color on the graph.

7. Once the graphs are done, the teacher can ask comparative and quantitative questions about the graph.

FOLLOW UP/EXTENSION:

Have students calculate what percentage of the total population was comprised by parrotfish, sharks, sea stars, etc. Once these figures are calculated, have students construct a pie chart showing this data.

See the following pages for **Coral Reef Life Cards**.

CORAL REEF LIFE CARDS FACT SHEET

FOR USE BY THE TEACHER.

Blue Dash Butterflyfish - The butterflyfish is shaped like a thin pancake so that it can hide easily among the coral and be safe from predators. The blue dash butterflyfish is bright yellow with a blue streak on its body and a “fake eye” on its tail to confuse any predators that try to attack. The predator thinks that it is aiming for the head when in reality it is aiming for the tail, enabling the butterflyfish to swim forward quickly and escape.

Clown Triggerfish - The clown triggerfish is marked with large white polka dots which help to break up its outline and camouflage it against the reef. It is also very poisonous so predators do not try to eat it. The clown triggerfish attacks small reef animals, such as fish that hide in the sand and sea urchins, by blowing streams of water out of its mouth to uncover or overturn its prey.

Clownfish and Sea Anemone - The clownfish, a small orange damselfish often marked with one or two white stripes, has a symbiotic relationship with its partner, the sea anemone. The clownfish lives among the stinging tentacles of the anemone. The fish protects the anemone from being eaten by predators and drops bits of food into its mouth, and the anemone protects the clownfish with its poisonous tentacles.

Damselfish - Damselfish come in many colors, from dull brown and gray to brilliant yellow and blue. They are found abundantly on the reef and are very territorial. Some species are “farmers”, actively guarding and growing small patches of algae on an area of coral to serve as a food source.

Giant Clam - The giant clam has a symbiotic relationship with its zooxanthellae, enabling it to grow its own food in the tissue of its mantle. It can

reach more than 40 inches (1m) in length and weigh more than 1,000 pounds (453kg). Humans have destroyed populations of these clams in the Pacific, harvesting them for their meat and shells. Projects are now underway to farm giant clams and return them to the reefs.

Gray Reef Shark - The gray reef shark hunts for food along the coral reef during the night and rests in caves during the day. Sharks are powerful carnivores, hunting large and small marine animals including fish, crustaceans, and mollusks. Some of the larger species even hunt marine mammals, sea birds, sea turtles, and other sharks. Sharks have very sharp teeth, keen vision, and a highly-developed sense of smell. Although they are at the top of the food chain, most sharks are not dangerous to humans unless provoked.

Hard Coral - Hard coral builds reefs by secreting a hard external limestone skeleton. There are three types of hard (stony) corals: branching, massive and plate. Most hard coral polyps have tentacles in multiples of six and can be found individually or in colonies. During the daytime, the hard coral polyp retracts into its limestone base for protection but at night it comes out to feed on floating plankton.

Hawksbill Turtle - The hawksbill turtle is a species of sea turtle with its nose shaped like the sharp beak of a hawk. Most sea turtles are herbivores (vegetarians) feeding on seagrass. Many lay their eggs in nests on the beach. Sea turtles are endangered because many of them are caught and drowned in fishing nets each year, their eggs and flesh hunted for food, and their shells and skin used for ornament.

Lionfish - The lionfish has spectacular orange and white markings which help to camouflage it from predators, however the spines on its fins are highly poisonous. Lionfish are mostly stationary during the daytime but active at night, feeding primarily on crustaceans and small fish. Because of its beauty and uniqueness, it is often photographed by divers.

Mollusk - The mollusk is an animal with an unsegmented muscular “foot” that is protected by a

shell. This is a giant triton, the natural predator of the crown-of-thorns sea star which eats coral polyps. The triton has been overharvested for its meat and beautiful shell. Scientists believe that this might be one reason for the explosion in the crown-of-thorns population which has caused extensive damage to reefs in parts of Australia and the Philippines.

Moray Eel - The moray eel has a long muscular body that propels it through the water like a snake, and a large mouth with sharply pointed teeth. It hides in coral holes along the reef face where it waits for unsuspecting fish to come close enough to attack. It also eats mollusks and an occasional octopus. The moray eel is not dangerous to humans unless provoked.

Parrotfish - The parrotfish is often brightly colored with a hard beak that resembles a parrot's. It is an herbivore and uses its beak to attack the coral for food, scraping the limestone base to extract nutrition from the algae (zooxanthellae) in the coral polyps. The limestone base is digested along with the polyp, broken down in the stomach, then excreted as sand. The parrotfish is an important source of sand for tropical beaches.

Plankton: Zooplankton and Phytoplankton - Plankton consists of microscopic drifting animals (zooplankton) and microscopic drifting plants (phytoplankton) which are swept onto the reef face by upwelling currents from deeper parts of the ocean, supplying the reef life with easy access to food.

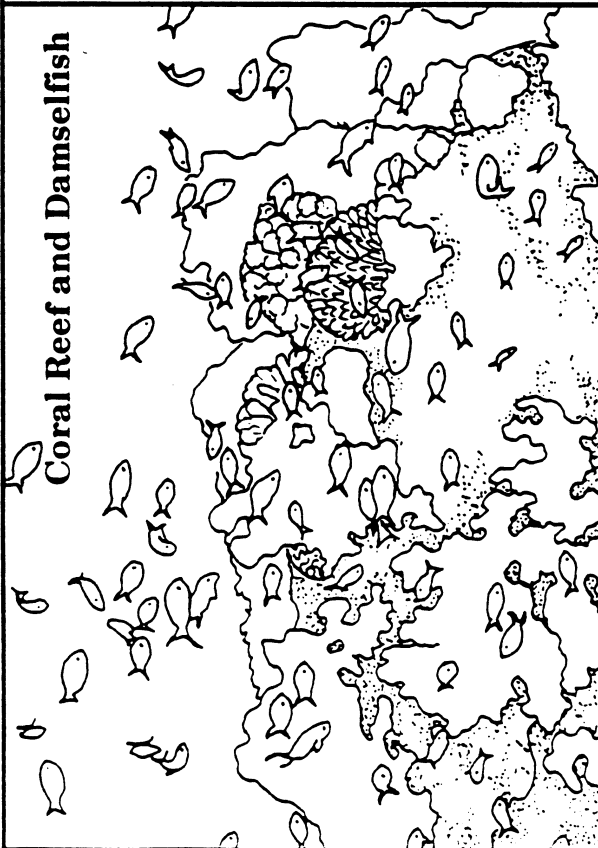
Sea Stars - Sea stars are characterized by radial symmetry wherein the body parts are repeated around a center, like the spokes of a wheel. They eat coral polyps and mollusks by wrapping their stomach and arms around the food. The crown-of-thorns sea star can be a threat to coral reefs because it eats the coral polyps, thereby killing the coral. If a sea star loses part of its body, it can grow the missing part back quickly.

Soft Coral - Soft corals do not build reefs. They secrete a flexible or soft skeleton which enables

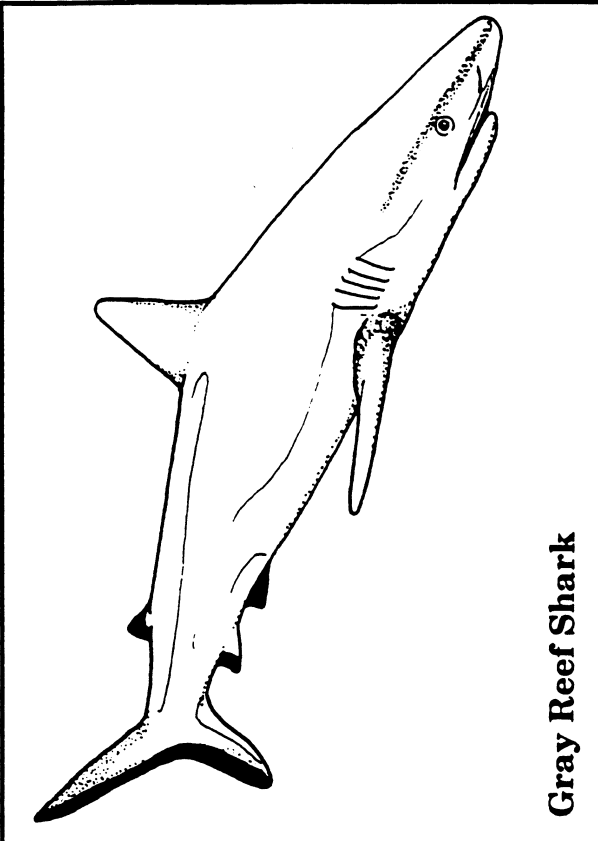
them to bend and sway in the water. They are also known as octocorals because each polyp has eight tentacles. Soft corals thrive in strong currents where they have access to lots of plankton. They also grow in dark caves and overhangs where hard coral cannot grow.

Spotted Eagle Ray - The eagle ray is often found swimming gracefully along the perimeter of the reef face, either alone or in small groups. It has two wings or flaps and a long, hard tail with poisonous spines near the base. Its powerful jaws enable it to feed on mollusks, especially clams, mussels, and oysters. It is also hunted for food by native coastal people.

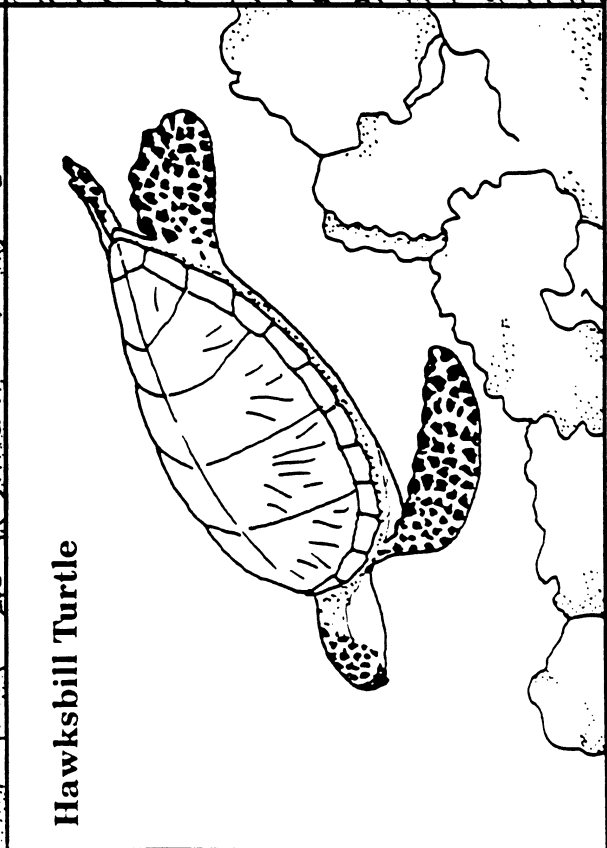
CORAL REEF LIFE CARDS



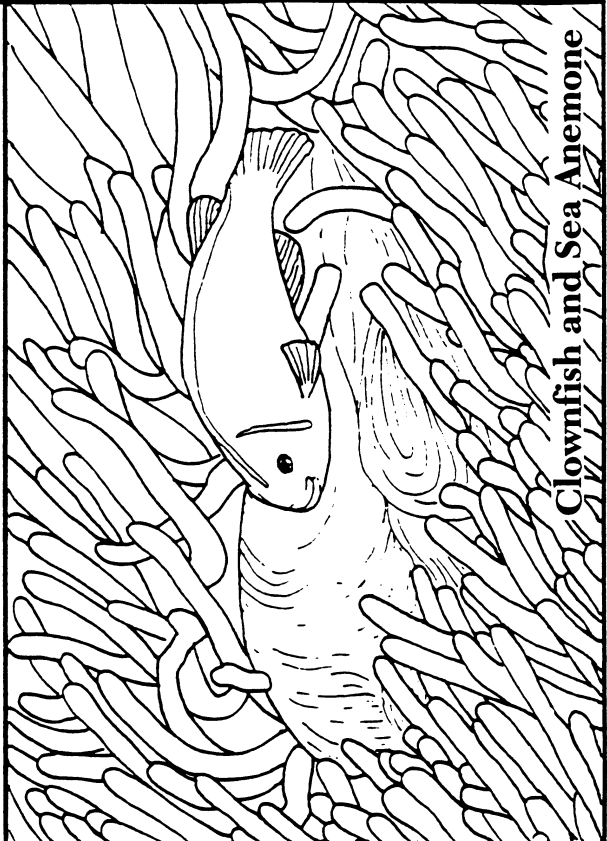
Coral Reef and Damselfish



Gray Reef Shark

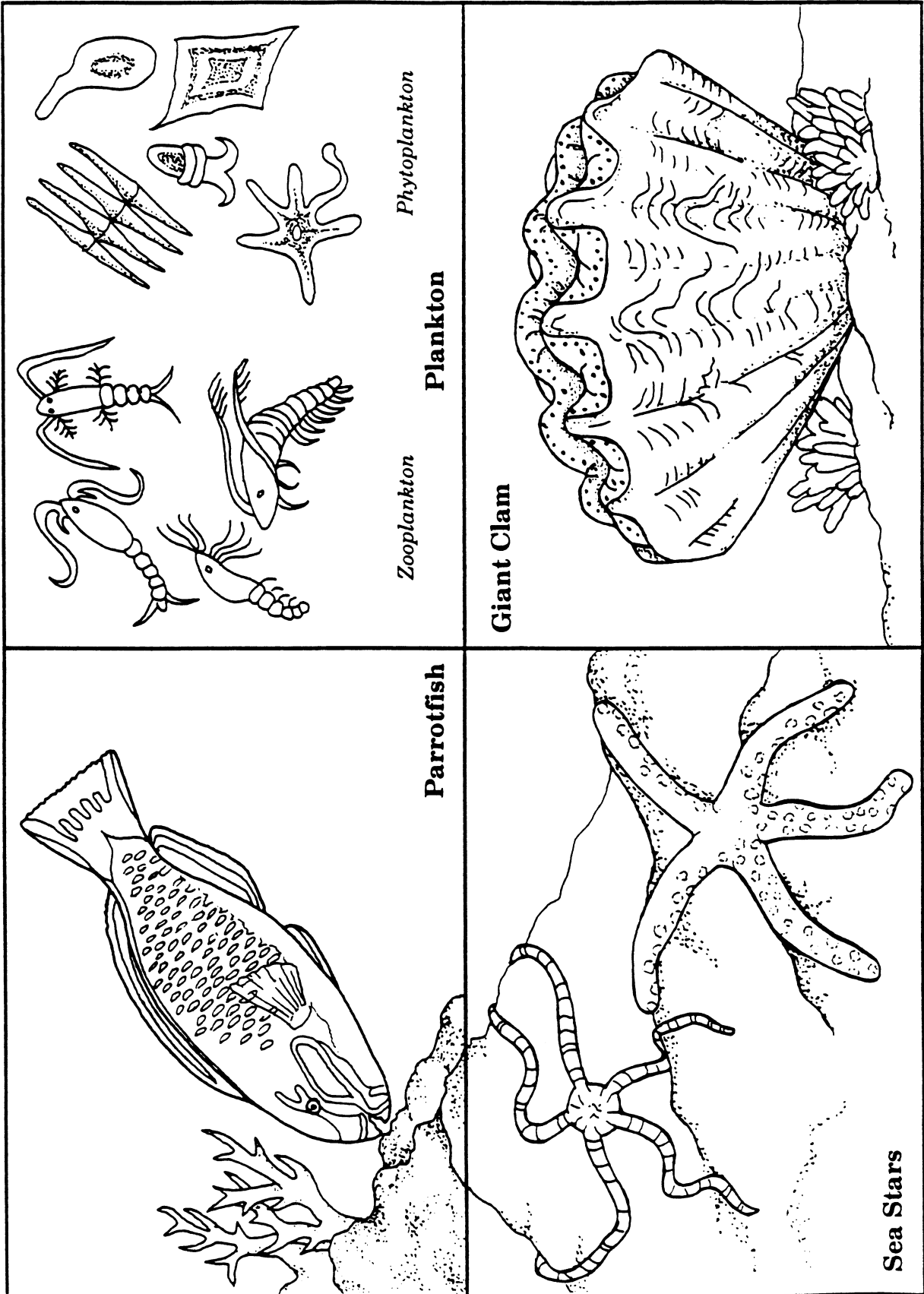


Hawksbill Turtle



Clownfish and Sea Anemone

CORAL REEF LIFE CARDS

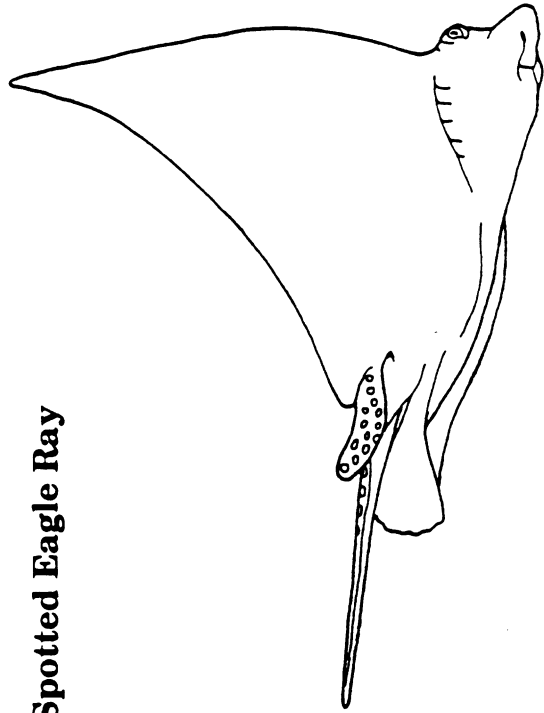


CORAL REEF LIFE CARDS

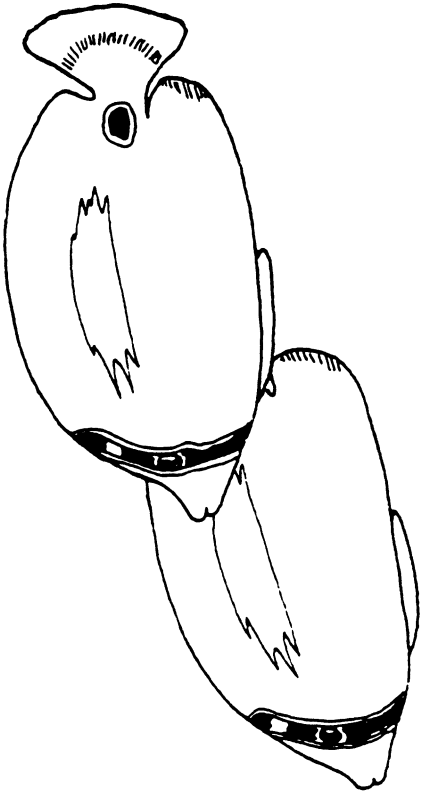
Mollusk



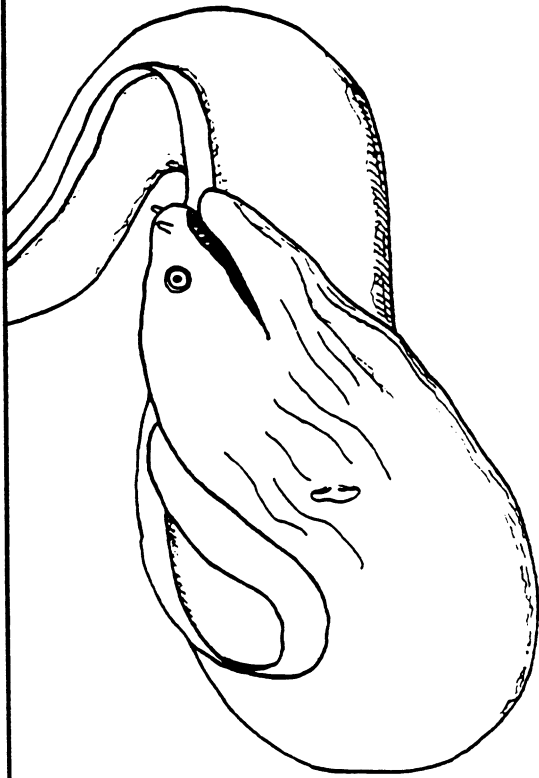
Spotted Eagle Ray



Blue Dash Butterflyfish

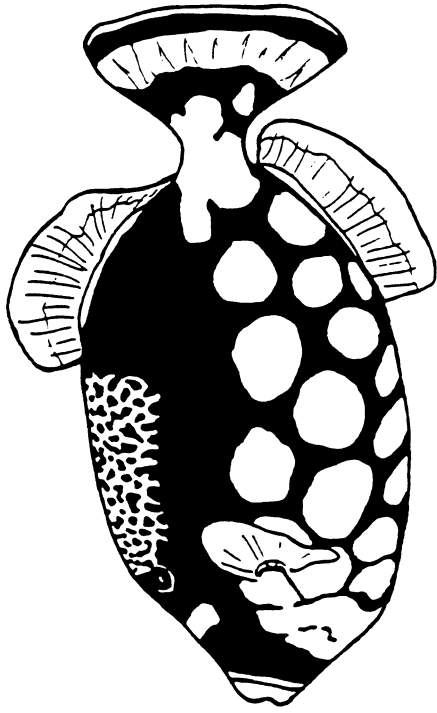


Moray Eel

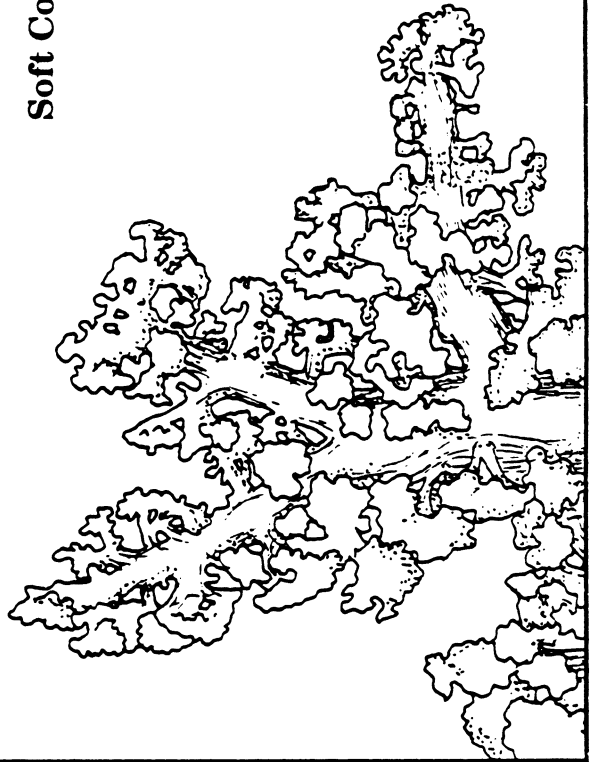


CORAL REEF LIFE CARDS

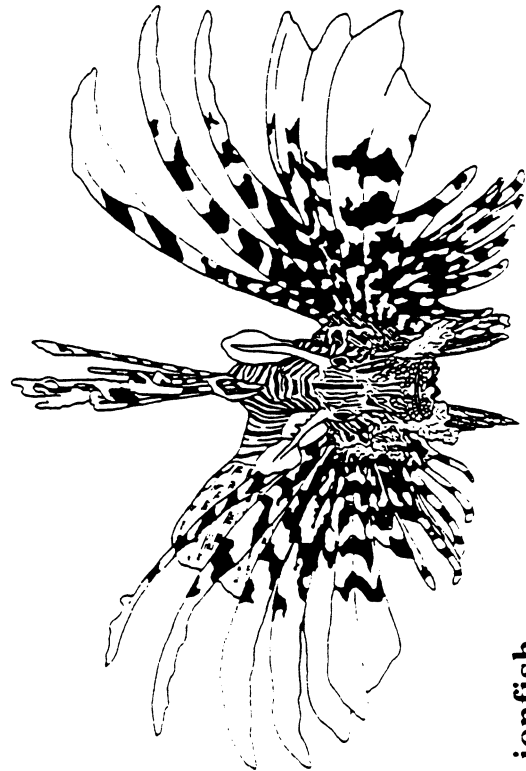
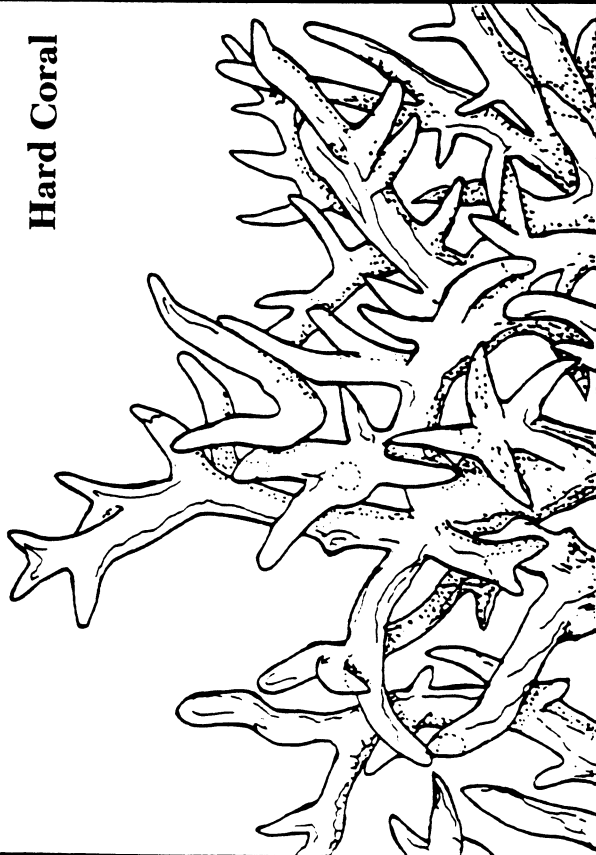
Clown Triggerfish



Soft Coral



Hard Coral



Lionfish

Create a Creature

Objective: Students use what they have learned about coral reef animals and their own imagination to create a fictitious creature designed to live on a coral reef.

Interdisciplinary Index: Science, Art, Language Arts

Materials:

- pencils/pens
- drawing paper
- crayons/markers/colored pencils
- writing paper

PRESENTATION:

1. Discuss how different types of animals obtain food and defend themselves from becoming someone else's lunch. There are several examples in the section **Life on the Coral Reef** in the **Background Information**. Other resources will add to the lesson.
2. Have the students brainstorm a variety of methods creatures could use to obtain food. You may want to break this down into ideas for herbivores, omnivores and carnivores. Consider the obstacles and ways to overcome them.
3. Have the students brainstorm methods of defense. Include passive and aggressive methods such as camouflage, poisons, teeth, "smoke screens," etc.
4. Have the students use their imagination to create their own coral reef creatures, incorporating characteristics that have been discussed. Then have them write a brief description by selecting several characteristics to describe their own invented creature. Size, coloring, methods for obtaining food, methods for defense, and a description of the specific habitat should be included. Don't forget to name the newly created creature.

5. Each student should then draw a picture of the invented creature based upon the written description. The picture can also include a scene showing the creature in its habitat, defending itself, or obtaining food. You can use the **Sample Coral Reef Creature** as an example.
6. Now that the drawing is complete, have the student review the written description. A final draft should include all of the previously mentioned information and should refer to the drawing as an illustration for the written section.
7. Have the students share the creature they have "discovered" by giving an oral presentation or displaying the work on a wall.

SAMPLE CORAL REEF CREATURE



Windows to the Sea

Objective: Students create a three dimensional, water based representation of underwater life.

Interdisciplinary Index: Science, Art

Materials:

- blue construction paper
- markers, crayons, colored pencils
- permanent markers
- blue food coloring
- sand (optional)
- water
- laminating material
- heavy duty freezer self sealing baggie (one per student)
- thin cardboard (two pieces) or two paper plates per student

PRESENTATION:

1. Student should begin with the frame for the underwater scene. For this, each student will need two pieces of thin cardboard (local warehouse stores frequently have this for the asking). One piece of cardboard will serve as the backing, while the second piece will need to have the center cut out so that it can serve as the front of the frame. Allow the students to be creative. Some may want to use a traditional oval or rectangle opening, but others may choose to cut the opening into some other design.
2. Have the students decorate the blue construction paper using sand, crayons, markers, and/or colored pencils to serve as the background for the underwater scene. Glue this to the backing.
3. Have the students draw their own coral reef creatures to fit in the baggie. Laminate the artwork and cut out each creature.

4. Pour some water that has been mixed with blue food coloring into the baggie. (The amount of water will depend on the size of the baggie and the frame.)
5. Place the cut out creatures in the baggie. Seal the baggie taking care to remove all of the air.
6. Place the baggie between the two cardboard pieces and tape the edges to complete the frame.

Coral Reef Mural

Objective: Students work together to complete a colorful, inspirational coral reef mural. A video on the coral reefs or numerous photos/color drawings of coral reefs would be an excellent introduction to this project as it would help the students to visualize the final product. (This is a difficult project to complete as a whole class and may be more easily completed by assigning small groups to specific tasks.)

Interdisciplinary Index: Science, Art

Materials:

- overhead projector
- overhead projector pens
- transparency of **Coral Reef Color Page** or transparency paper
- butcher paper – approximately 3 feet by 6 feet
- optional media: crayons, markers, colored pencils, watercolors, tempera paints, food coloring, tissue paper, scissors, glue, construction paper, etc.
- **The Coral Forest: Diversity of Life on the Coral Reef** poster as a reference and color guide.*

PRESENTATION:

1. Before class make a transparency copy of the **Coral Reef Color Page** or trace the artwork by placing transparency paper over the design.
2. Prepare the area where the mural will be completed by covering it with butcher paper. (You may wish to use a light blue paper to act as a watery background.)
3. Use the butcher paper as the screen for the overhead projector transparency that you created.
4. Have students use a pencil to draw the image on the butcher paper. (Depending on your class you may want them to copy all of the details, only the background, or only the major features.)

5. Decorate the mural. Use the **The Coral Forest: Diversity of Life on the Coral Reefs** poster as well as videos or other artwork as a color guide. Combine your skills and talents with those of your students to create a unique class mural.

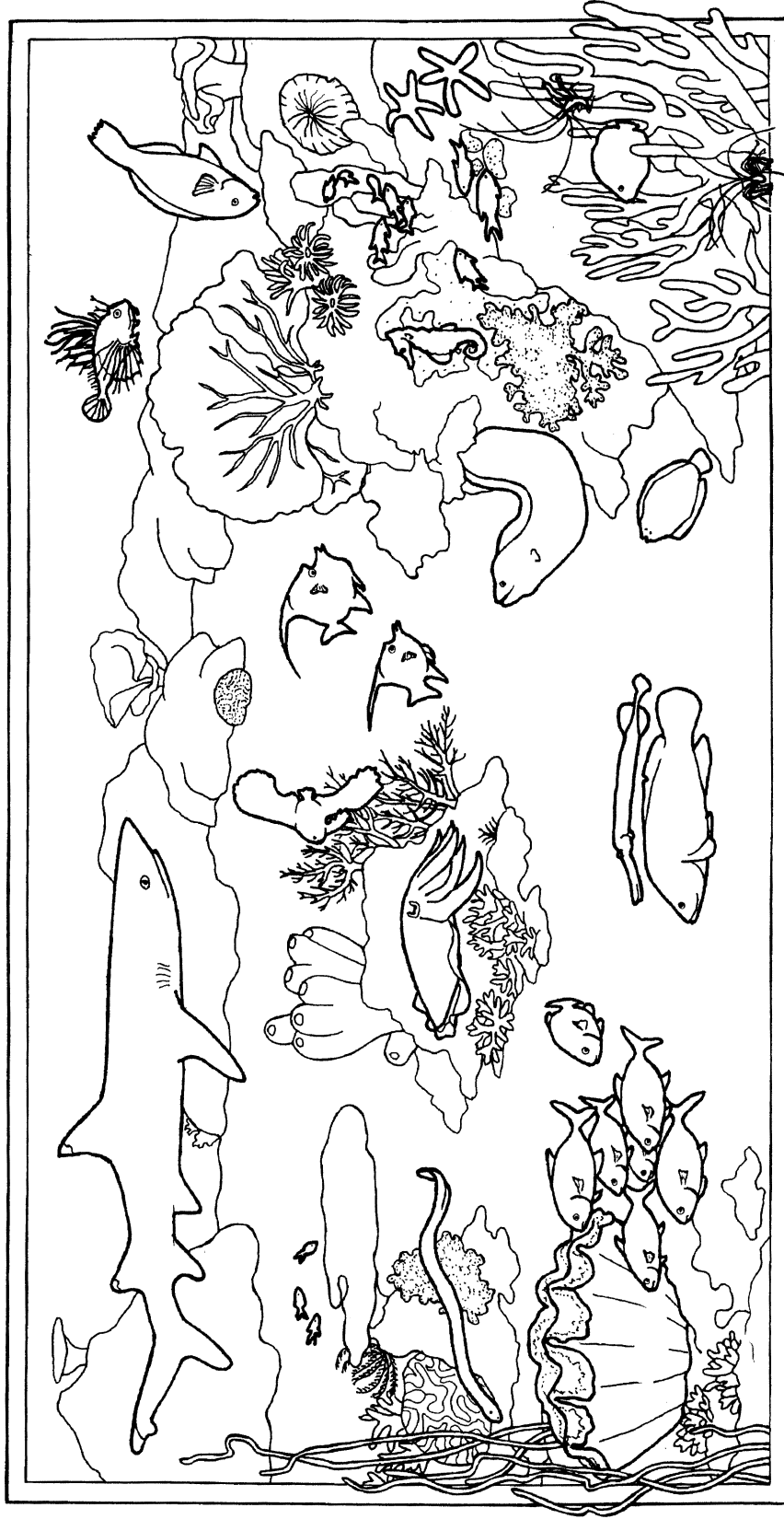
SUGGESTIONS:

1. Use a variety of materials to create a two or three dimensional mural.
2. Create a soft-colored background by using colored pencils, light colored tissue paper, water colors, light colored construction paper, or food coloring on dampened paper towels/coffee filters.
3. Create a vivid foreground by using temperas, markers, bold colored tissue paper, crayons, or bold colored construction paper.
4. Optional: Add student invented creatures to the mural. (See **Create a Creature.**)

* To order, refer to **Merchandise** information in back.

CORAL REEF COLOR PAGE

THE CORAL FOREST: Diversity of Life on the Coral Reef



© 1993 Wendy Weir. Donated by Wendy Weir. Illustration from *Banu Bay: Australia*, Bob Weir and Wendy Weir, Hyperion Books for Children, NY, 1995. All rights reserved.

NOTE: See next page for information and Key to the Illustration.

CORAL REEF COLOR PAGE

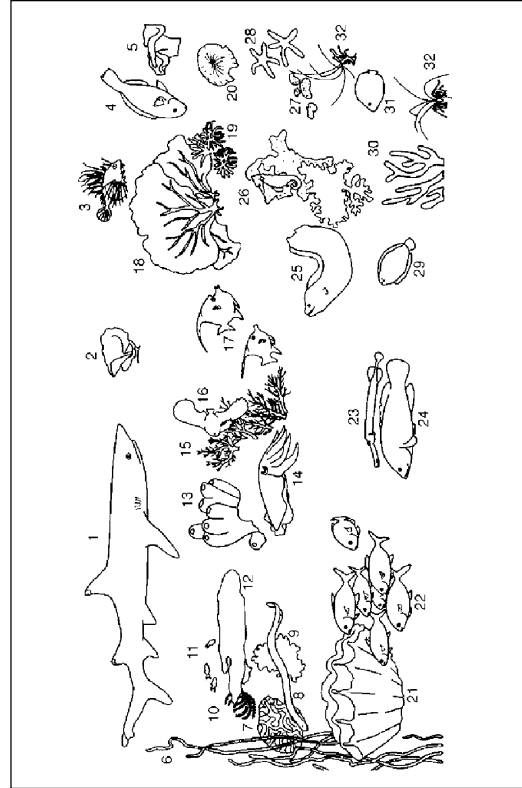
THE CORAL FOREST: Diversity of Life on the Coral Reef

Coral reefs were first formed more than 500 million years ago, and since that time they have successfully developed and supported a tremendous array of plant and animal life, earning them the name "rainforests of the sea." Today, reefs are found in 109 countries around the world; however, it is estimated that they are either destroyed or damaged by human activity in 93 of them. Like the rainforests, their survival is threatened. With the rainforests, they form an interrelated ecosystem whose health and balance is critical to ensure the biodiversity of species, protection of the coastlines, and an on-going supply of food and medicinal resources. Enjoy the beauty of the coral reef, learn about its vast diversity of life, and help to preserve it for generations to come.

KEY TO THE ILLUSTRATION

Location: The Great Barrier Reef, Australia

Key Fact: The Great Barrier Reef is the largest structure built by living organisms on Earth, and it is the only living structure visible from outer space. Located along the northeast coast of Queensland, it is 1,240 miles (2,000 km) long and consists of over 2,500 major reefs.



- | | |
|-----------------------------|----------------------------------|
| 1. White tip reef shark | 17. Moorish idol |
| 2. Lettuce coral | 18. Gorgonian fan coral |
| 3. Butterfly cod (lionfish) | 19. Sea anemone |
| 4. Parrotfish | 20. Mushroom coral |
| 5. Soft coral | 21. Giant clam |
| 6. Sea whips | 22. Six-banded trevally |
| 7. Brain coral | 23. Trumpetfish |
| 8. Olive sea snake | 24. Coral cod |
| 9. Soft coral | 25. Yellowmargin moray eel |
| 10. Feather star | 26. Spotted seahorse |
| 11. Damselfish | 27. Sponge |
| 12. Plate coral | 28. Blue sea star |
| 13. Vaseform sponge | 29. Flowery flounder |
| 14. Cuttlefish | 30. Branching coral |
| 15. Needle coral | 31. Emperor angelfish (juvenile) |
| 16. Batfish (juvenile) | 32. Banded coral shrimp |

Student-Generated Research Fold-Out Book

Objective: Students create a booklet of information about life forms in and related to the coral reefs.

Interdisciplinary Index: Science, Art, Language Arts

Vocabulary: plagiarism

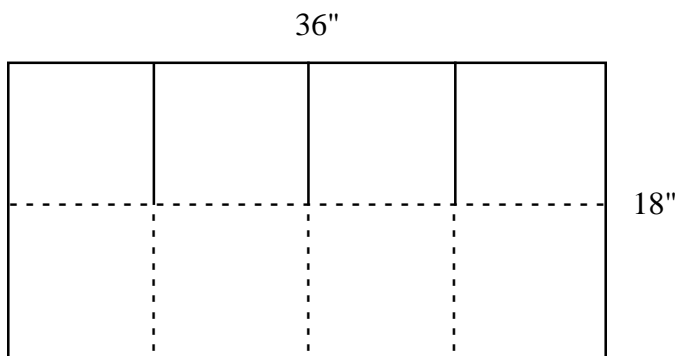
Materials:

- copies of **Life on the Coral Reef** (second section in **Background Information**)
- butcher paper
- plain paper/construction paper
- writing paper
- pencils/pens
- markers, crayons, colored pencils

PRESENTATION:

Before class, construct a sample fold-out book so that students have a model to follow. Also cut out the butcher paper into strips which the students will fold and cut into books.

Here is the basic pattern:

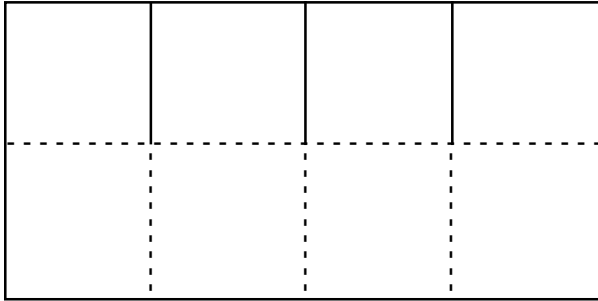


- A. Fold on the dotted line.
- B. Cut on the solid line.
- C. Each section should be a 9" by 9" square.

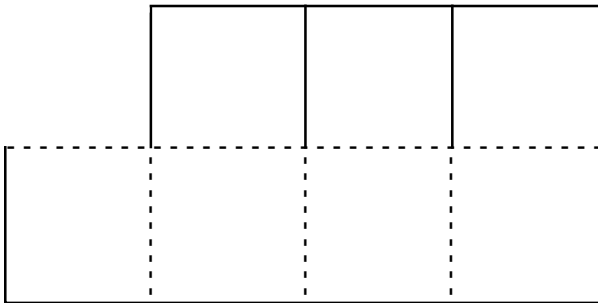
1. Demonstrate the folding and cutting pattern for the fold-out book.
2. Have students prepare the book. Set aside.
3. Read the **Life on the Coral Reef** section. This can be done as a whole class, or in small groups.
4. Students will need to take notes on the four topics to be covered in the book.
 - a. lagoon, reef crest, and reef face
 - b. food chains, herbivores, omnivores, and carnivores
 - c. methods of predation and protection
 - d. creatures of the coral reef (corals, anemones, clownfish, nudibranchs, sea stars, sharks, angelfish, giant clams, etc.)
5. You may wish to have students complete additional research on any and/or all of the topics in order to complete the book.
6. Using the notes, students should write a summary of the information for each of the sections.
7. Have students create an illustration for each of the four sections and for the cover of the book. (You may choose to use the art from the lesson plan **Window to the Sea** for the cover.)
8. Follow the guide on the following page. Paste the illustrations to the "flap" and the summary information to the section under the "flap."
9. After the glue has dried, fold the book.

Follow these illustrations:

1. Glue the information onto the lower sections and dry.



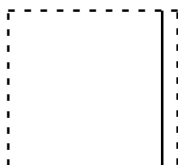
2. Fold down each of the flaps. (This shows only one flap down.)



3. Glue the illustration onto the flap and let it dry.
4. Fold in half lengthwise, bringing the right edge over to the left edge.



5. Fold in half lengthwise, bringing the left edges over to the right edge.



Reef Links Crossword Puzzle

Objective: Students will learn about life on the coral reef by finding words to complete the crossword puzzle.

Interdisciplinary Index: Language Arts, Science

Materials:

- a copy of the **Reef Links Crossword Puzzle**, one per student
- pencils

PRESENTATION:

1. Hand out one copy of the **Reef Links Crossword Puzzle** to each student.
2. Ask them to read the description and find the word that both answers the description and fits into the boxes.
3. When everyone is finished, discuss the answers with the students.

FOLLOW-UP/EXTENSION:

Have students create their own crossword puzzles for the class to answer.

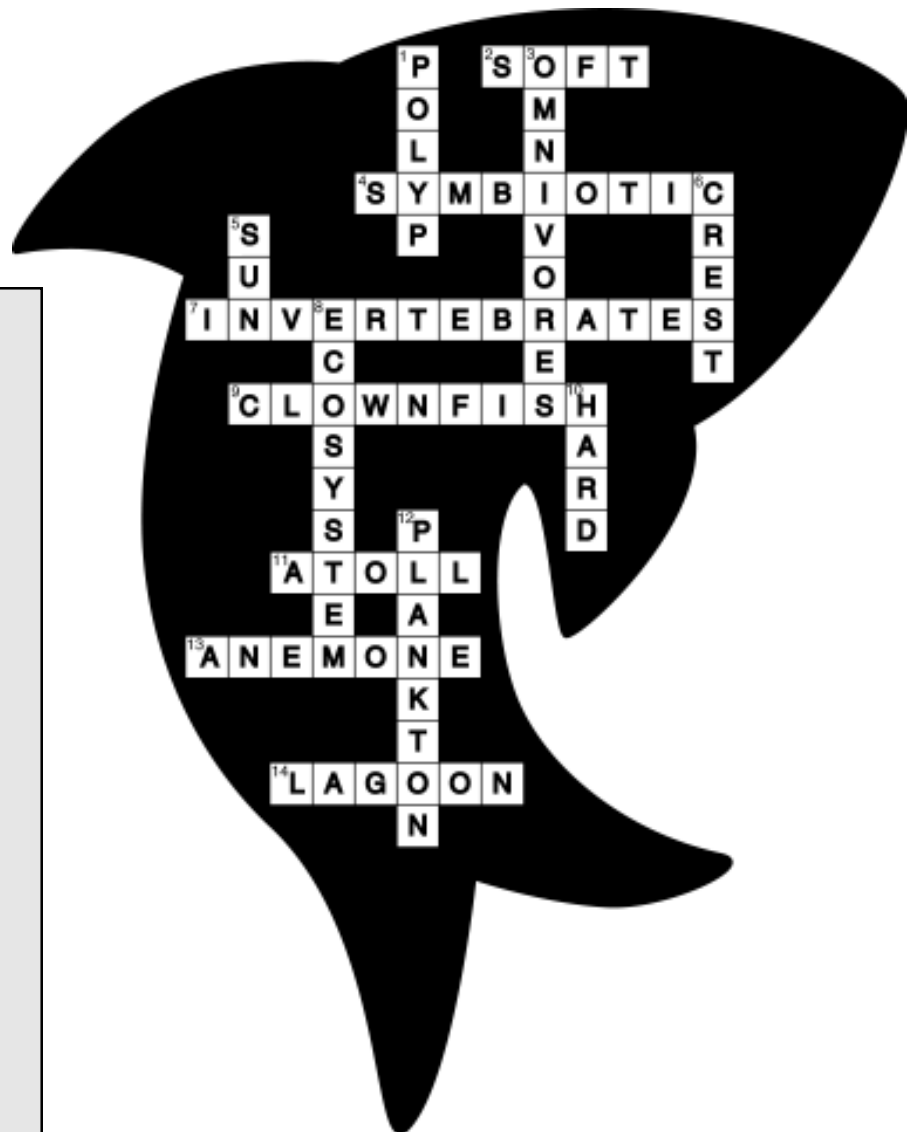
ANSWER KEY:

ACROSS

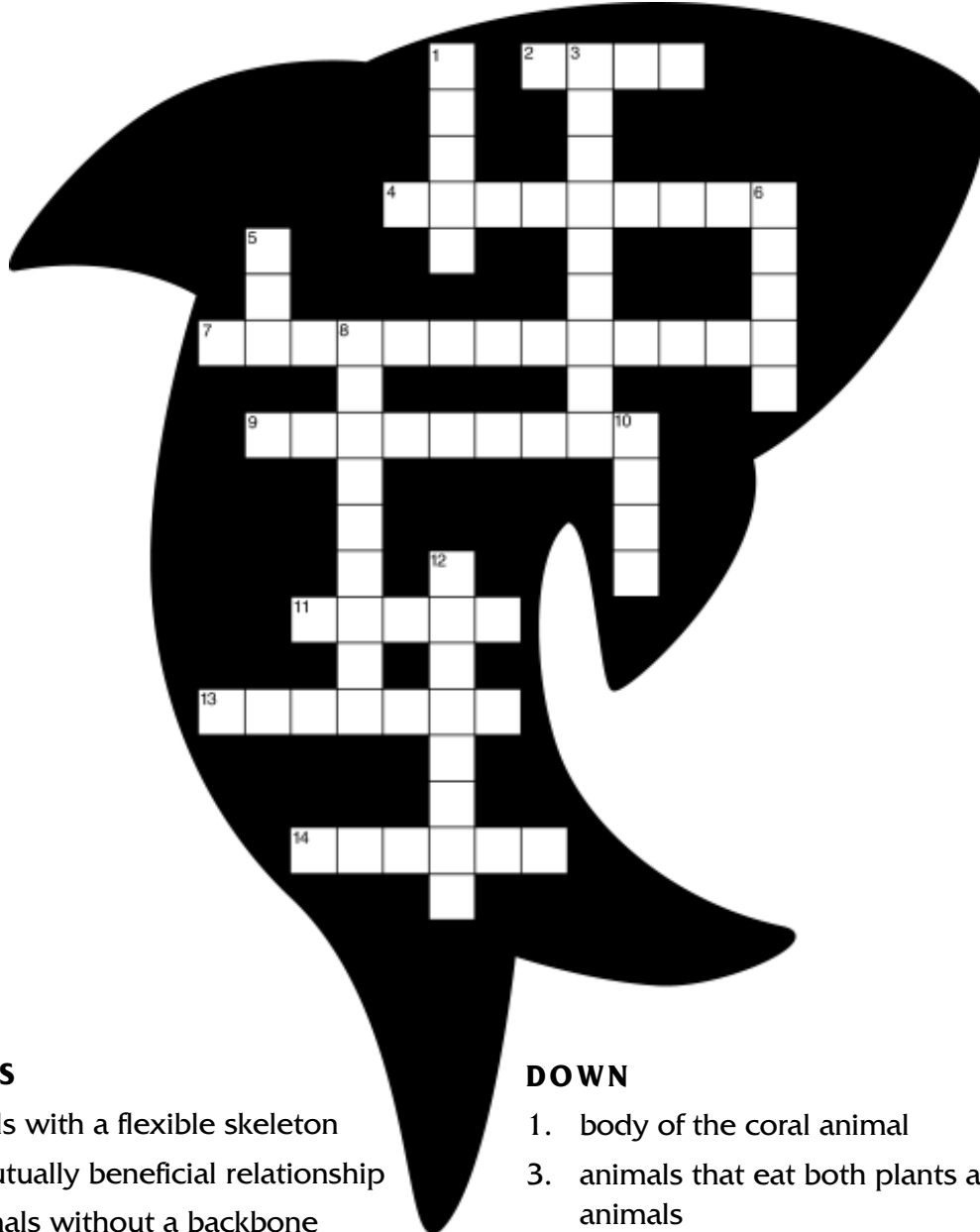
2. soft
4. symbiotic
7. invertebrates
9. clownfish
11. atoll
13. anemone
14. lagoon

DOWN

1. polyp
3. omnivores
5. sun
6. crest
8. ecosystem
10. hard
12. plankton



REEF LINKS CROSSWORD PUZZLE



ACROSS

2. corals with a flexible skeleton
4. a mutually beneficial relationship
7. animals without a backbone
9. a damselfish that has a symbiotic relationship with #13
11. ring-like coral formations surrounding a central lagoon
13. an invertebrate that has a symbiotic relationship with #9
14. the area between the beach and the reef crest

DOWN

1. body of the coral animal
3. animals that eat both plants and animals
5. without it's light, coral reefs could not exist
6. highest and shallowest part of the reef
8. a group of living things and their non-living environment
10. a type of coral that builds reef
12. creatures that move passively through the water

Positive Posters

Objective: Students create posters addressing a major coral reef threat and solution.

Interdisciplinary Index: Science, Art, Language Arts

Vocabulary: anthropogenic

Materials:

- copies of the human threats described in **Benefits, Threats, and Solutions**
- drawing paper
- pens/pencils
- crayons, markers, colored pencils, or paints

PRESENTATION:

1. Explain that coral reefs are damaged by natural as well as anthropogenic (human-made) events. We will concentrate on the anthropogenic threats, since these are the ones that we can prevent.
2. Assign each student one of the human threats described in **Benefits, Threats, and Solutions**. You may wish to read and discuss each of these threats before assigning them.
3. Have the students that were assigned to the same topic work together to brainstorm several solutions to the problem.
4. Individually, students should use crayons, markers, colored pencils, or paints to design a colorful, educational poster that briefly explains the problem and solution.
5. Have the students share the posters with the class by giving a brief oral presentation or displaying the posters in the classroom.

Advice Column

Objective: Students express an understanding of an anthropogenic (human-made) activity which threatens the coral reef by writing a letter to an imaginary advice columnist. This activity should be completed after the "Positive Posters" lesson.

Interdisciplinary Index: Science, Language Arts

Vocabulary: advice columnist

PRESENTATION:

1. Discuss the role of advice columnists and the types of letters they receive.
2. Have each student select a threat to the coral reefs that is of particular interest to him or her (other than the one he/she used for the **Positive Posters**).
3. Have the students write a letter to a fictitious advice columnist from the viewpoint of a coral reef creature. Express the specific concerns of that animal.
4. Students should exchange papers and answer each other's letters.

How You Can Help Reef Relief!

Objective: Students use their knowledge of anthropogenic threats to coral reefs to write effective direct action letters to elected officials.

Interdisciplinary Index: Science, Language Arts

Materials:

- a copy of **Effective Letter - Writing Guidelines**, one per student
- paper
- pens/pencils

PRESENTATION:

1. Choose one or more of the current threats to coral reefs and discuss with the students. Also, discuss the value of taking direct action as a way to protect the reefs. Review the **Effective Letter - Writing Guidelines**.
2. Based upon this information, ask the students to write a direct action letter about one of these threats. You can either assign a threat to each student or they can choose one of their own.
3. Have each student read his/her letter to the class and discuss its effectiveness. Were the guidelines followed? Is the letter persuasive? Did the student understand the issue?
4. Mail the finished letters to the elected officials, then wait and see if the elected official replies to them.

Here are some addresses to get you started:

Name
President of the United States
The White House
1600 Pennsylvania Ave. NW
Washington, DC 20500

Name
Vice-President of the United States
United States Senate
Washington, DC 20510

Your Senator _____
United States Senate
Washington, DC 20510

Your Representative _____
U.S. House of Representatives
Washington, DC 20515

Name
Administrator
Environmental Protection Agency
401 M Street, SW
Washington, DC 30460

For specific information about current coral reef threats and whom to write, contact REEF RELIEF at tel: (305) 294-3100, fax: (305) 293-9515, e-mail: reef@bellsouth.net, or go to our web site:

<http://www.reefrelief.org>

FOLLOW - UP/EXTENSION:

Ask students to research the countries worldwide that have coral reefs. Then, have them choose a country and ask that country's leader(s) to help preserve the coral reefs by creating marine parks and passing laws to protect coral reef ecosystems.

EFFECTIVE LETTER-WRITING GUIDELINES

Date

Legislator or other's name and address

Dear _____:

First Paragraph: Describe your request with a few adjectives to help them visualize. If possible, tell them what you would like them to protect and how. If there is a bill being considered, provide the name and/or number of the bill and if you want them to vote for or against it. (You can write to REEF RELIEF or look at the Action Alerts section of the REEF RELIEF Web Site to get current information on legislation and other actions to protect coral reefs. The URL is www.reefrelief.org.)

Second Paragraph: Explain what's important about what you want protected. What's special or unique about it? What is its function to humans and/or other species? Tell why it's important to you.

Third Paragraph: Describe what is threatening it. Provide suggestions about how to protect it. If there is a bill, explain how that bill will work for or against protection.

Summarize your ideas and add your personal feelings. Ask again for their support and action.

Sincerely,

Student's Name

Grade

Name of School

Address

City, State

Student Assessment

Tell and Show What You Know

Objective: Students will review what they have learned about the coral reef by illustrating their knowledge and sharing it with others.

Interdisciplinary Index: Science, Language Arts, Art

Materials:

- writing paper or butcher paper for each student
- colored pencils, pens, crayons, and felt pens

PRESENTATION:

1. Have students fold paper into 4, 8, or 16 equal parts.
2. Tell students that they are to think of the 4, 8, or 16 most interesting things that they have learned about the coral reefs.
3. Have students draw or write down their thoughts in the 4, 8, or 16 parts of the paper.
4. Have students share their thoughts/pictures in small groups or with the class.
5. The finished product can be used as a mural.

FOLLOW-UP/EXTENSION:

Ask students to repeat the activity based on one of the following formats:

What would happen if...

What would you do if...

How I can help...

The 4, 8, 16 most interesting coral reef creatures are...