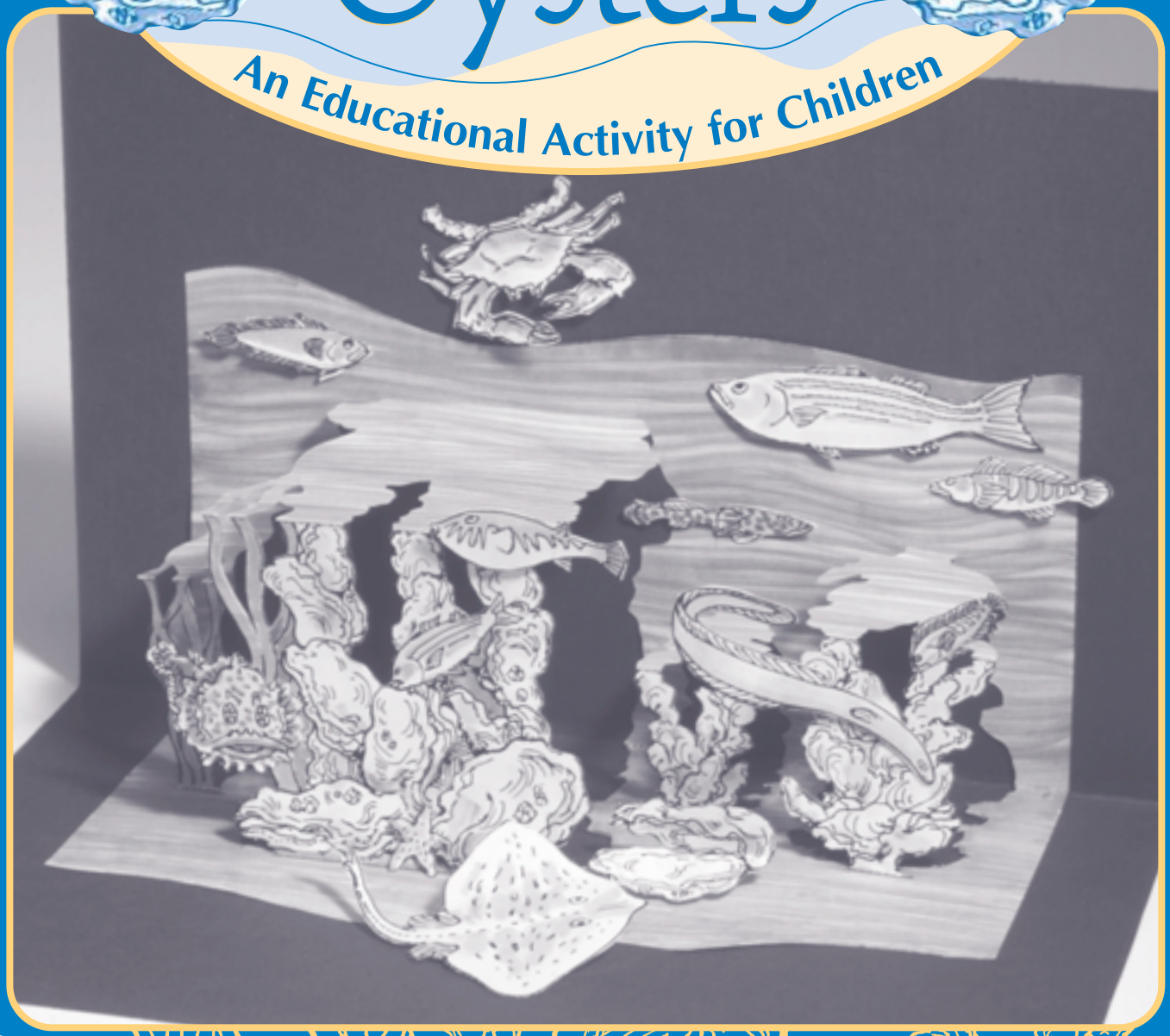
Amazing Oysters

An Educational Activity for Children



Amazing Oysters – The Bay's most valuable animal

LESSON PLAN

Background

You might be surprised to learn that the most important animal in the Chesapeake Bay is the oyster. In addition to being a tasty dish on the menu at many seafood restaurants, and an important part of the economy of the Bay area, oysters play a critical role in maintaining the health of the Bay for a variety of reasons.

First, oysters are natural water purifiers. Because they are filter feeders, oysters help keep the water in the Bay clear by eating (or filtering) algae and sediments from the water. Oysters are such efficient cleaning machines that a single adult oyster can filter up to 60 gallons of water a day. Before the Chesapeake Bay's decline, it took only three to six days for the oysters to clean the amount of water in the bay. Today, because there are so few oysters left, it takes a year or more to do the same job.

Clean, clear water is crucial to the health of the Bay. And without it, plants that live underwater, called submerged aquatic vegetation (SAV), cannot survive. Just as the plants in your backyard cannot survive without sunlight, these submerged plants rely on light to live and grow. SAV is very important because it provides shelter and rich feeding grounds for a variety of species of fish and birds in the Bay.

Another reason that oysters are so important is that their homes, or oyster reefs, are ideal living and feeding grounds for a wide variety of animals up and down the food chain. Plants attach to the reef and attract grazers, such as silversides, juvenile black sea bass and silver perch. Grazers attract predators and perpetuate the food chain.

In addition, the nooks and crannies of the reef provide ideal hiding spots for a variety of species. Thin flat fish like skillet fish and blennies can slip in and hide in the small spaces within the reef.

These small fish live, feed and breed in the reef. Their larval forms eat oyster larvae and the mature fish are eaten by other reef residents such as mud crabs and striped bass. Reefs are shelter and feeding grounds for a variety of animals throughout the food chain including striped bass, oyster toad fish, puffer fish, skates, blue crabs, grass shrimp, mussels, sponges and barnacles. The diversity and abundance of species living in the reef area depends on the health of the reef. Not only do healthier reefs contain more oysters, but they also contain more fish and crabs.

Young oysters, called spat, need to attach to the older oysters shells in order to develop. The layering of oysters is how reefs are formed and grow as older oysters at the bottom die, and new oysters settle on the top. The reef grows both vertically and horizontally over time and the older a reef is, the more surface area it contains where other plants and animals can grow, hide, feed and breed.

Why oyster populations are at risk

Unfortunately, disease, harvesting, habitat loss and sediment build up, have led to a significant decline in the oyster population over the past century.

Two diseases, prevalent since the 1960's have contributed to oyster decline. *Haplosporidium nelsoni* or MSX and *Perkinsus marinus*, or Dermo, infect and kill oysters living in areas of the Bay with high salinity.

Oysters were harvested from the Bay before the first European colonists entered the tidewaters of what would become Virginia. Native Americans had named the Bay "Tschiswapeki" or "Great Shellfish Bay." By the 19th Century, oysters were such a valuable fishery that waterman dubbed them "Chesapeake Gold." Over the years this harvesting and the reduction of oyster habitat, due to removal of oyster shells, have taken a toll on a species in decline.

Oysters thrive when they grow on tall reefs. When oysters were plentiful, the reefs were so high that boats had trouble navigating around them, but now reefs are fewer and rarely seen above the surface. Tons of oyster shells have been taken from the water and used for road building and other purposes. This has left the oysters with less habitat.

Pollution from agriculture, homeowner fertilizers, sewage treatment plants, septic systems and car exhaust all contribute to poor water quality which can kill oysters. Sediment, a byproduct of land-moving activities such as construction, runs off the land and into the water. Sediments in the water cover and suffocate oyster beds, preventing spat from attaching to their hard substrate and maturing.

What is being done

The Virginia Coastal Program at the Virginia Department of Environmental Quality and the Virginia Marine Resources Commission (VMRC) have teamed up with other state and federal agencies, nonprofit organizations, such as the Chesapeake Bay Foundation (CBF) and universities and marine research organizations to build, enhance, and monitor reefs. Transplanting healthy, disease-tolerant oysters into the rivers that flow into the bay increases the odds of the oysters survival and reproduction. Amazingly, each healthy oyster can produce 5 million offspring each year! These offspring would replenish neighboring reefs with a more vigorous oyster population.

Also, if you live along the water, you can join more than nearly 500 "oyster gardeners" and grow oysters that will be transplanted onto sanctuary reefs. And by simply reducing the amount of chemicals you use in your yard you can help maintain the health of the bay and the oyster population.

ASSESSMENT QUESTIONS

Why are oysters important to the health of the Bay? Oysters filter and clean the water and clean water is essential for SAV growth.

What are spat and where do they live? Spat are immature oysters and they prefer to live on top of mature oysters.

Name three reasons why oysters reefs are important?
- Reefs are home for oysters both young and old.
- Reefs contain nooks and crannies which are homes and hiding places for small fishes and invertebrates to thrive.
- Small animals provide food for larger species - creating the predator-prey relationships and a food chain.

How are oysters uniquely adapted to their environment? Their hard outer shells provide protection from the predators living in the reef.

ACTIVITY

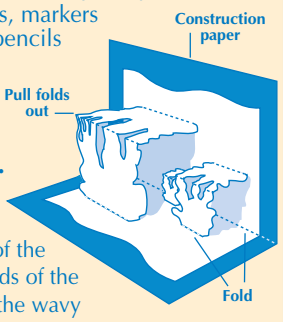
Build a 3-D Oyster Pop-Up Reef

Ages: Elementary

Standards of Learning: 3.4, 4.8, 5.9, 6.11

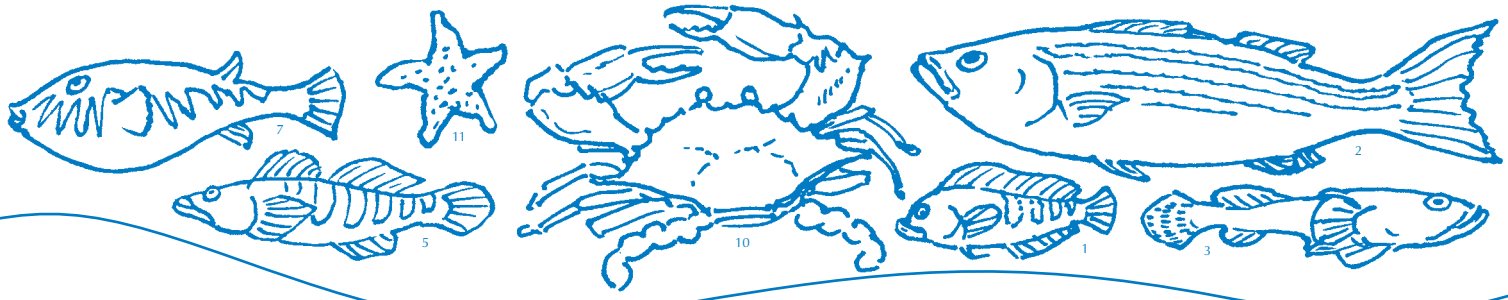
Vocabulary: Adaptation
Tides
Food Chain
Habitat
Predator-prey

Materials: copies of reef diagram
construction paper
scissors
blunt pencils or ballpoint pens
glue crayons, markers or colored pencils
rulers



This pop-up reef is easy and fun to make. Here's how:

1. Remove the drawings of the reef animals at both ends of the sheet by cutting along the wavy lines. Set these drawings aside to use later.
2. Score all the dashed lines with a blunt pencil or ball point pen. Press firmly, but be careful not to tear the paper. (You might want to use a ruler to keep the lines straight.)
3. With the printed side facing out, fold the page in half along the dashed line. Crease well with the edge of a pencil or ruler.
4. Cut through both layers of the paper along all the solid lines. (You will cut some pieces out completely. But be sure that you don't cut along any dashed lines.)
5. Open the page carefully. Gently pull the cut-out features outward, in the opposite direction that they were originally folded in. Crease each construction paper feature along its folded edges and carefully close the pop-up again.
6. Fold a different colored piece of construction paper in half width-wise. Then glue the fold of the cut-out reef into the fold of the construction paper. Don't glue on any of the cut-out parts. Trim excess construction paper from the sides only, leaving extra paper at the top and bottom. Close the pop-up, making sure that the cut-out parts are folded out the right way and put under a heavy book to dry.
7. Color the reef animals you set aside earlier then cut them out. Refer to the descriptions on the back.
8. Glue the animals onto your pop-up reef. You can glue some of them to the pop-up part and some to the flat background. To make sure the animals stand out from the background, make a tab folding a small piece of paper in half. The folded tab should be smaller than the animal you are gluing it to so it won't show. Glue one side to the tab to the animal and the other side to the reef. You can add pop-up rocks, and other features to your reef.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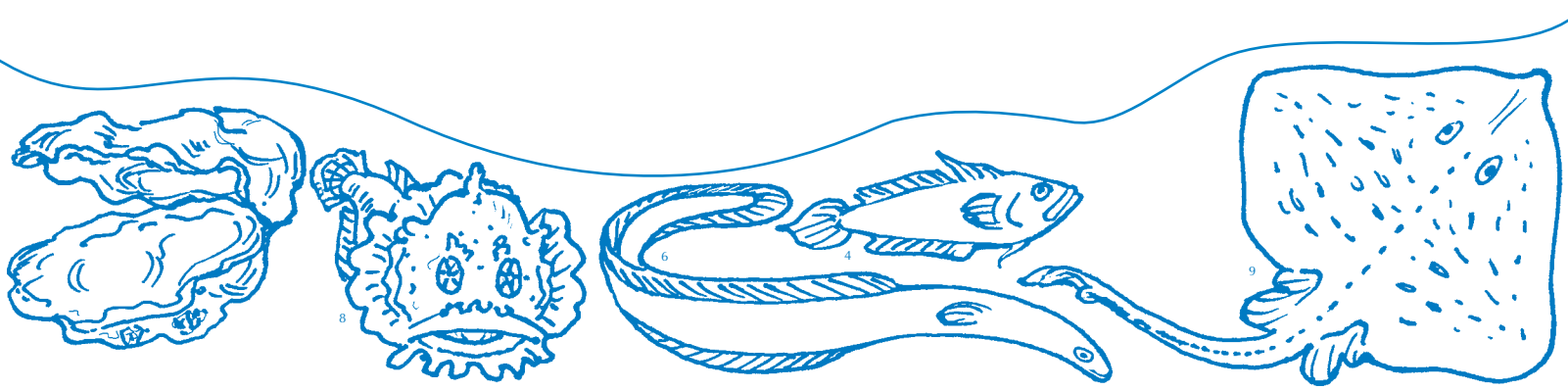
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9

Coloring Descriptions (see the number next to each fish)

1 Striped Blennie

Chasmodes bosquianus

Males have bright blue longitudinal lines that converge near the tail

Head is spotted

Orange stripe runs through the dorsal fin

Dorsal fin has a brilliant blue spot near the front edge

Females are darker olive-green with a network of paler green lines

2 Striped Bass (Rockfish)

Morone saxatilis

Fingerlings (young) have longitudinal stripes overlaying a series of vertical bars along their sides

Silvery with dark stripes

3 Skilletfish

Gobiesox strumosus

Shaped like a skillet with a broad flat head

Eyes are small and widely spaced

Pelvic fins are formed into large suction discs

Evenly speckled with brown

4 Green Gobie

Microgobius thalassinus

Scales on the back part of the body

Head and belly do not have scales

Very colorful! Greenish blue with intense reddish hue on a spotted dorsal fin, vivid orange to yellow pelvic fins and a row of dark spots on the border of the white-edged anal fin

5 Naked Gobie

Gobiosoma bosci

Have no scales

Dark greenish brown on top, pale below

Have eight or nine light, vertical bars along their sides

6 American Eel

Anguilla rostrata

Can grow up to three feet

Have long uninterrupted fins along the back, tail and belly

Pale grayish brown with transparent fins

7 Puffer Fish or Swell Fish

Sphoeroides maculatus

Small, club-shaped covered with prickles

Tiny beaked mouths

Small gill slits

Yellow with deep greenish blue bars on the side

Dark above and pure white on the belly

8 Oyster Toad Fish also called Dowdies

Opsanus tau

Slimy and ragged - the ugliest in the Bay!

Fleshy flaps hang from their lips and over their eyes

Covered with warts, brown and muddy colored

Wide gaping jaws filled with sharp teeth

Sharp spines on its dorsal fin and gills

9 Clearnose Skate

Raja eglanteria

Two transparent patches on each side of a pointed nose

Their back is covered with prickles

Line of sharp short spines extends down the middle of the back and tail

Back is brown to gray with scattered dark spots and bars

10 Blue Crab

Callinectes sapidus

Bright blue claws - female's are tipped in red

Olive to bluish green shell covering its back

Transparent backfin

Educational Resources About Oysters

Virginia Oyster Heritage Program: state-wide public-private oyster restoration partnership. Visit www.deq.state.va.us/oysters for more information.

Chesapeake Bay Program: multistate program producing information on water quality and living resources in the Bay. Set a commitment to restore the Bay's oyster population. Visit www.chesapeakebay.net/c2k.htm.

Chesapeake Bay Foundation: middle school curriculum (WAVE), field trips and student oyster restoration projects. Call CBF at (804) 780-1392 or visit www.savethebay.cbf.org.

Virginia Institute of Marine Science: curriculum supplement and teacher training program called VORTEX, Virginia's Oyster Reef Teaching Experience. For more information, including current oyster research and a VIMS aquarium visit, call (804) 684-7000 or visit www.vims.edu.

Related Lesson Plans

Project Aquatic WILD: *Designing a Habitat*, *Something's Fishy Here*, and *Fashion a Fish*. For information call the Department of Game and Inland Fisheries, (804) 367-1000 or visit www.projectwild.org.

Additional Resources

Environmental Educator's Resource Directory: www.deq.state.va.us/education/eed.html

CHeSSIE: Chesapeake Science on the Internet for Educators - www.bayeducation.net/

Virginia Naturally: Commonwealth's environmental education initiative - www.vanaturally.com

Virginia Project WET and Healthy Water, Healthy People: www.deq.state.va.us/education/wetinfo.html

Alliance for the Chesapeake Bay: www.acb-online.org; ACB's Bay Journal - www.bayjournal.com.

DEQ Virginia Department of Environmental Quality Virginia Coastal Program

NOAA

Virginia Environmental Endowment

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For additional copies of Amazing Oysters, *please call the Virginia Department of Environmental Quality at 1-800-592-5482*

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