

## Reading Selection

### The Chesapeake Bay: An Ecosystem in Danger

*Exploring the Bay in 1608, Captain John Smith found a bounteous bay full of fish such as “brettes, mullets, white Salmonds, Trowts, Soles, Plaice, Herrings, Rockfish, Eeles, Shades, Crabs, Shrimps, Oysters, Cocles and Muscles.... In somer,” he wrote, “no place affordeth more plentie of Sturgeon, nor in winter more abundance of fowle.... In the small rivers all the years there is good plentie of small fish, so that with hookes those that would take paines had sufficient.”\**

#### The Chesapeake Bay Is an Ecosystem

The Chesapeake Bay area is a vast and complicated ecosystem. It covers a surface area of over 2,200 square miles (approximately 3,500 square kilometers). That’s almost as large as the entire state of Delaware! Its waters are a mixture of fresh water from about 150 rivers and streams and salt water from the Atlantic Ocean. The bay holds 18 trillion gallons of water!

The bay bursts with all kinds of life. Its producers include water grasses anchored to the bottom and algae so tiny you need a microscope to see one. And its animals range from crabs, fish, muskrats, and seahorses to swans, diamondback terrapins, and billions of baby eels.



*Over 13 million people live, work, and play in the Chesapeake Bay watershed.*

The land around the Chesapeake is a jumble of different environments: swamps, wetlands, meadows, forests, mountains, and beaches. Each environment is home to many different kinds of plants and animals. In fact, over 2,500 different kinds of plants and animals live in the bay area.

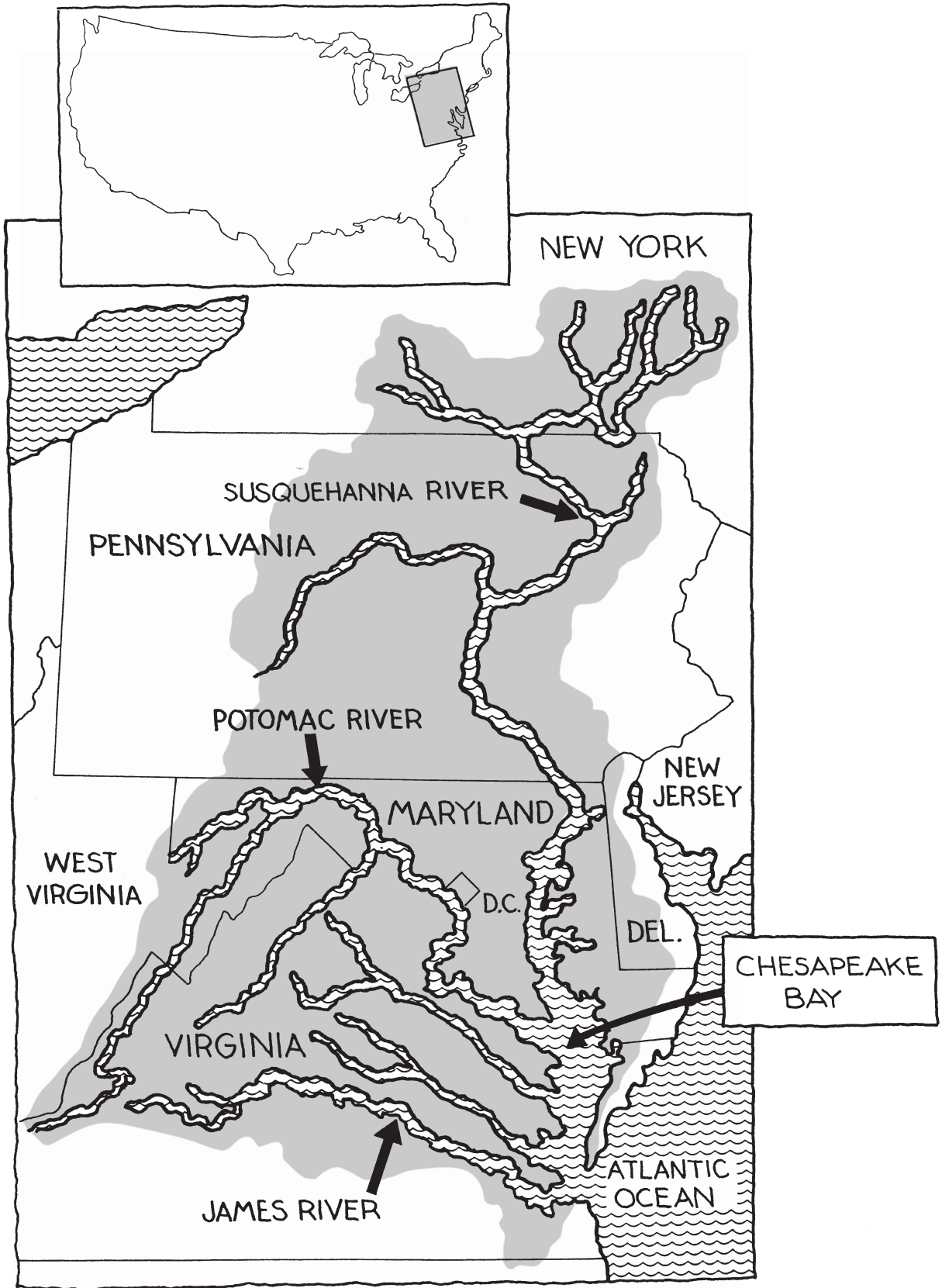
In the bay’s ecosystem (as in all ecosystems) every single element—water, land, air, light, and living things—is connected in a complex web of relationships. For the bay area, the web is very complex indeed.

But remember: through your work on the ecocolumns, you have already learned a lot about ecosystems. This will help you understand the complicated ecosystem of the Chesapeake Bay.

#### How Is the Bay Like Your Ecosystem?

You have seen that what happens on land (as in your terrarium) can greatly affect what happens in water (as in your aquarium). Now apply this idea to the land bordering the Chesapeake. It’s covered with farms and factories, cities and highways, schools and apartment buildings, landfills and campgrounds, restaurants and marinas.

\* Eugene L. Meyer, *Maryland Lost and Found: Peoples and Places from Chesapeake to Appalachia* (Baltimore: The Johns Hopkins University Press, 1986).



Chesapeake Bay watershed area

Over 13 million people live, work, and play there. One way or another, pollutants from all of these people wind up in the bay's waters.

So, what if a homeowner in the Chesapeake area overfertilizes his or her lawn? That extra fertilizer eventually washes into the Chesapeake Bay. The same goes for the road salt used after a snow storm. And what about the acid rain caused by industry, homes, and cars? Where do you think it goes?

### **What Is a Watershed?**

An area of land whose waters all drain into the same place is a **watershed**. You could think of your terrarium as the watershed for your aquarium. The Chesapeake Bay's watershed is huge. As you can see from the map, it drains water from six states (Maryland, Delaware, Pennsylvania, Virginia, West Virginia, and New York) and the District of Columbia. It covers 64,000 square miles between Vermont and North Carolina.

### **It's All Downhill**

Think about this. The land in this watershed slopes toward the bay the way the inside of a bathtub slopes toward its drain. So, much of the water that runs off this land flows down the slope, toward the bay. Just imagine industrial waste pouring out of Baltimore's factories, puddles of motor oil on the highway, extra fertilizer and pesticides from lawns in Virginia and Delaware, muddy runoff from construction sites in Maryland, acid runoff from mines in West Virginia, cow manure from Pennsylvania dairy farms, and sewage from 13 million people's toilets. Sooner or later, it all flows toward the bay.

With all this human-made pollution, no wonder the bay is in trouble.

### ***A Problem: Too Much Goes into the Bay, Too Much Comes Out***

The ecological problem in the Chesapeake Bay has two main causes: people are putting too many pollutants into the bay; and people

are "overharvesting," or taking too much seafood out of the bay.

Let's take a closer look at each cause. How does each affect the bay and all the living things in it?

### ***Too Many Pollutants***

From your team's ecocolumns, you know that pollutants in an ecosystem can set off a chain of events. For example, what happens when pollution kills plants? You may also have predicted that if there were animals in your team's ecocolumns, the animals—who depended on those plants—would have starved. This has happened in the Chesapeake.

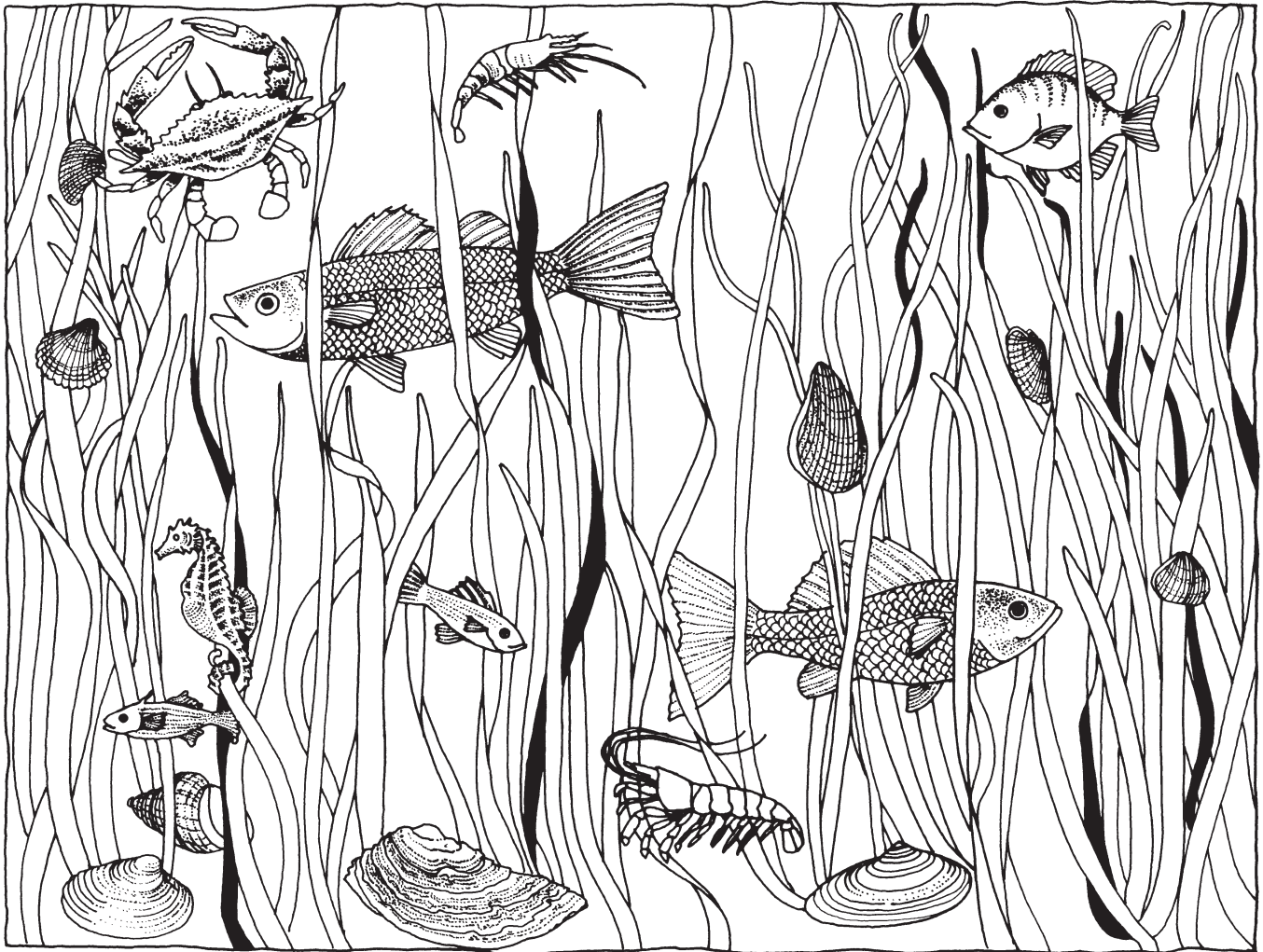
Too many nutrients from human sewage, cow manure, and fertilizer are overloading the bay. This causes **algae blooms**. Too many algae cloud the water and keep light from reaching the grass below. What's the result? Underwater grass beds are dying fast.

### **The Importance of Grass**

The grass beds are essential to the bay's health. When nutrients wash in, the grasses take them in and use them to grow. Also, the roots of the grasses help hold down the bay's muddy bottom. That way, mud doesn't get stirred up, cloud the water, and block the sunlight.

Grass beds near the shoreline help absorb the pounding of the waves. This helps keep the soil there from washing away. When the grass beds do their job, the water stays clearer, sunlight pours in, and other aquatic plants thrive.

Animals need underwater grasses, too. Ducks, geese, swans, snails, isopods, worms, muskrats, beavers, sea slugs, and other animals of the bay depend on the grasses for food. In the bay's grass beds, baby fish, shrimp, crabs, seahorses, and even turtles stay safe. What will happen to these animals if the grass beds disappear?



*Underwater grass beds are home to many living things.*

### **Sediment Kills**

Did you notice that when you watered your terrarium enough to cause a runoff, the runoff was cloudy? That's because it contained not only water but also tiny bits of soil, called **sediment**. Some sedimentation occurs naturally. But humans cause most of it, especially when we cut down trees and other vegetation.

Forests help keep sediment out of the Chesapeake. Tree roots help hold the soil in place. Their leaves and branches cushion rainfall so it hits the ground more gently. (Then the soil and roots have time to absorb the water.) Leaf matter on the forest floor acts like a sponge. Leaves soak up the water and slow its flow.

But we've cut down about 40 percent of the forests in the Chesapeake watershed to build highways, houses, shopping centers, and offices. Unlike forests, these hard surfaces (such as pavements and rooftops) prevent water from seeping slowly into the soil. When it rains, water races off these surfaces, picks up more sediment (and whatever it holds, such as pesticides or chemicals from asphalt roof tiles), and gushes toward the bay.

Like algae, sediment clouds the water and keeps light from reaching the underwater plants. It also can clog fish gills and smother fish eggs. Bottom dwellers such as clams, oysters, worms, sponges, and coral can smother under a layer of sediment.

## What Happens to the Animals?

### Oysters: Nature's Filters

Oysters serve as natural filters, helping keep the water clear. To trap its food, microscopic algae, an oyster pumps in water—up to two gallons per hour! Along with the algae, oysters suck in sediment that would otherwise cloud the water. Oysters pump the clear water back out. Then they digest the algae and drop harmless pellets of waste (which include sediment) to the bottom of the bay.

In Colonial times, the floor of the Chesapeake Bay was piled high with oyster beds. In fact, ships had to be careful to steer around them. But today, only 1 percent of the oysters are left. And they can no longer play a big part in keeping the water clear.



*Oysters: nature's filters*

This is also bad news for the snails, crabs, and small fish that live in the millions of nooks and crannies in a healthy oyster bed. Many of these creatures lost their homes.

What happened to all the Chesapeake's oysters? A virus infected some of them. Pollution killed others. And oyster drill snails ate still more. But the main reason so few oysters are left is that people have eaten most of them.

Lots of people find oysters so tasty that they will pay a high price for them. So it is no surprise that watermen are taking so many out of the bay. As a result, not enough oysters are left to replenish the population.

### Go Fish

Many different kinds of fish live in or visit the Chesapeake Bay for part of the year. Some have unusual names, like cownose ray or hogchoker. But you may have heard of others, such as shad, rockfish (striped bass), herring, perch, eel, and bluefish. Some eat plants and algae. Some are bottom feeders and hunt in oyster or grass beds for snails, small crabs, and worms. Some eat smaller fish.

Fish that visit the bay for only part of the year seem to be doing fine. But fish that live there year-round may be in trouble. In fact, the rockfish population has been so low that some states, such as Maryland, have laws to control fishing for rockfish.

Why are fishermen catching fewer fish? There are many reasons. People built dams across the rivers in the bay's watershed area. And these stop fish from swimming upstream to lay eggs. Cars and power plants that use fossil fuels have caused acid rain. It has damaged both eggs and young fish. Harmful chemicals from factories and mines can give fish cancer or even kill them. Plus, there is the sediment that can kill fish eggs and clog fish gills.

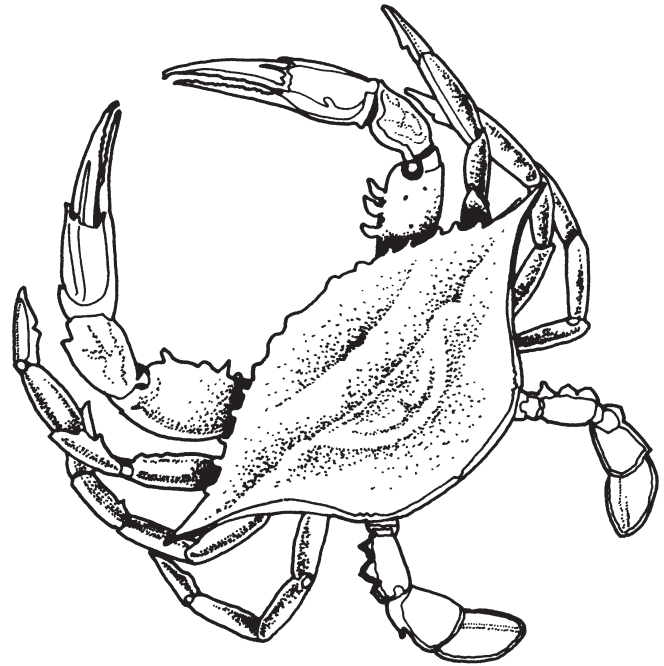
And remember, one of the bay's biggest problems is that we take too much out of it. For most kinds of fish, there are no limits on how many can be caught. So commercial fishermen (who catch fish for a living) and sports fishermen continue to overfish the bay.

### Blue Crabs: The Last Great Catch

The Chesapeake Bay still produces about half of the nation's blue crab harvest. They are the last great catch in the bay. As fish and oysters become scarcer, the demand for crabs grows. Watermen can sell just about as many as they can pull out of the water.

Blue crabs are real survivors. They are scavengers who eat almost anything they can find. In spite of pollution, changes in temperature, and more salt in the water, the blue crabs live on.

But even the blue crab is showing signs of trouble. As the grass beds disappear, crabs are losing their safest hiding place. (To avoid being eaten during molting, for example, crabs need to hide in the grass while their shells harden.) And as the oyster beds disappear, young crabs are losing their winter homes.



*Blue crabs are the last great catch in the bay.*

### Searching for Solutions

If the animals in your ecocolumns had been threatened by pollution, the solution would have been simple: move them to a safe place. In the real world of the Chesapeake Bay, the problems are much more complex. And the solutions are, too.

Everyone agrees that the Chesapeake Bay has many problems, most of them human-made. But depending on where they live and what they do, people who live, work, and play in the Chesapeake Bay watershed area see these problems from very different points of view. And what seems like a solution to one group may seem like a problem to another group.

Let's look at the bay's problems from several different points of view. Then let's see if we can come up with some solutions. We all know that solving problems requires making compromises. That means we often need to give up one thing to receive another. This is called a **trade-off**. Both groups work together to do what is best. Depending on your point of view, you will find some solutions and trade-offs more difficult to live with than others. Each group will need to decide how it can best help the bay without giving up too much.