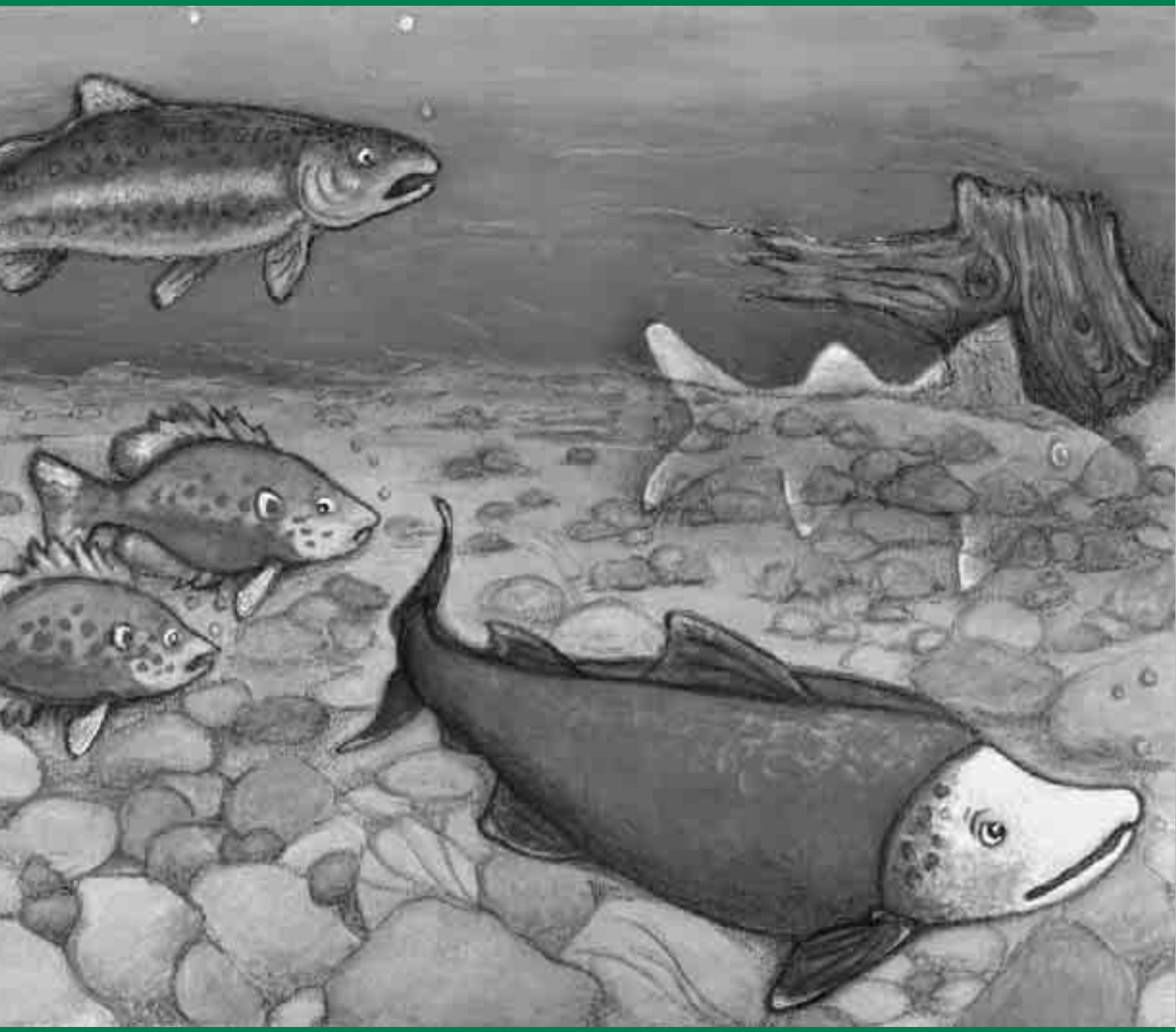
One Fish, Two Fish, Red Fish—No Fish?

The Current Situation and Possible Future of Aquatic Animals in the United States



Meet Mr. Loftus:

I like being a scientist because it gives me a chance to explore new things and use what I discover to change the way we *manage* the environment.

Mr. Loftus

Meet Dr. Flather:

I like being a scientist because it is essentially problem solving—and in my case, the problems deal with the *conservation* of *wildlife*. Working on wildlife conservation problems can be very satisfying when their solution leads to better management of the *habitats* where wildlife live.

Dr. Flather

Thinking About Science

Scientists try to solve problems or answer questions by collecting information and doing an *analysis* of the information they have collected. If they have enough time and money, scientists usually collect their own *data*. If they do not have enough time or money, or if the kind of data they need are already available, they will analyze (**an** uh liz) data already collected by other scientists.

In this study, the scientists did not have enough time or money to collect their own data. Instead, they used data already collected by other scientists to help them answer their questions. You do the same thing when you write a school paper on a topic not familiar to you. You collect information from other sources, such as the Internet, the library, or encyclopedias. When you collect information to write a paper, you are like the scientists in this study!

Thinking About the Environment

Since the pilgrims landed in Massachusetts in 1620, more

Glossary

manage (**man** ij): To have charge of or direct the work of.

conservation (kän sür **va** shun): The care and protection of natural resources such as forests and water.

wildlife (**wild** lif): Animals that live in the wild.

habitats (**hab** uh tats): Environments where a plant or animal naturally grows and lives.

analysis (uh **nowl** uh sis): Separating something into its parts to examine it.

data (**dat** uh): Facts or figures studied in order to make a conclusion.

species (**spe** sez): Groups of organisms that resemble one another in appearance, behavior, chemical processes, and genetic structure.

extinct (ek **stinkt**): No longer living.

populations (päp yoo **la** shunz): The total number of individuals of separate types of plants or animals occupying an area.

classify (**klas** uh fi): To arrange by putting into groups according to some system.

status (**staht** us): The state or condition of something.

trends (trendz): The directions or courses that some things take.

aquatic (uh **kwat** ik): Growing or living in or upon water.

freshwater (fresh **wat** ür): Having to do with or living in water that is not salty.

assumption (uh **sump** shun): Anything taken for granted.

native (**nat** iv): Naturally occurring in an area.

eroding (e **rod** *ing*): Wearing away.

emissions (e **mish** ens): Something discharged or sent out.

Pronunciation Guide

a	as in ape	ô	as in for
ä	as in car	u	as in use
e	as in me	ü	as in fur
i	as in ice	oo	as in tool
o	as in go	*ng*	as in sing

Accented syllables are in **bold**.

than 500 plant and animal *species* have become *extinct* in the United States. The U.S. Fish and Wildlife Service is charged with protecting species from extinction (eks **tink** shun). To do this, the U.S. Fish and Wildlife Service studies the *populations* of animals and plants. When they find a plant or animal species that is in immediate danger of becoming extinct, they *classify* it as endangered (en **danj** ürd).

When the U.S. Fish and Wildlife Service finds a plant or animal species that is likely to become endangered, it is classified as threatened. Being classified as threatened or endangered provides the plant or animal species with special consideration that protects it from human activities that would further threaten or endanger it.

Introduction

The scientists in this study were asked to develop information about the *status* of and *trends* in *aquatic* animal species populations across the United States. They already knew that there are about 800 *freshwater* fish species in the United States (figure 1).

However, the scientists found that there were few measurements already available that would help them to determine the status of and trends in the populations of these 800 freshwater fish and other freshwater aquatic species. The only data they could find were collected in a few separate areas of the country.

In addition, the information was not the same from location to location. Still, the scientists collected information that might show general trends. From these separate pieces of information, the scientists made an informed guess about the status of and potential trends in populations of freshwater aquatic species.

Reflection Section

- One of the purposes of science is to use current data or information to predict what might happen in the future. Scientists predict what might happen in the future by studying trends from the past and into the present. Why it is important to be able to make scientific predictions about what might happen in the future? (Hint: Think about the future path of a hurricane or about global

Figure 1. Trout are a freshwater aquatic species.

climate change. Is it important to be able to predict these events? Why or why not?)

Methods

The scientists used two types of information. To determine the status of aquatic species populations, they gathered data that had been collected by other scientists. Even though they did not have all of the data that they needed, they made an educated guess about the current status of aquatic animal species populations.

To determine the trends in populations, the scientists studied examples of things that people have done that affected the trends in species. If the things people do increase the populations of aquatic species in a particular stream, river, or lake, this is an example of conservation (**kän** sür **va** shun). Conservation means taking care of the natural environment so that it will be both useful and protected now and in the future.

Reflection Section

- To guess what might happen in the future to some populations of aquatic species, the scientists made an *assumption* that more and more people will practice conservation. What does conservation mean? Think of an example of a conservation activity.

Remember that conservation activities can benefit land, water, air, plants, animals, or any part of the natural environment. How many conservation activities can you and your class think of?

Results

The scientists found that there are more threatened and endangered aquatic species than any other type of animal species, including those that live on land. Of the 297 freshwater mussel species naturally living in North America, 213 are considered threatened, endangered, or of special concern (figure 2). (What percentage is that? Divide 213 by 297 to find out!)

Other species are declining but are not yet considered threatened or endangered. In the Chesapeake Bay, for example, there are 99 percent fewer oysters living there than were living there over 100 years ago (figure 3).

In the Pacific Northwest, some types of salmon (**sam** un) are threatened or endangered, but the population of salmon as a whole is not considered threatened. In the Northeast, the number of Atlantic salmon is declining. In the Southern Appalachian mountains of Tennessee, the number of miles of streams and rivers where *native* trout can be found is only about 30 percent of what it used to be.

These are just a few of the examples that the scientists discovered. There are many reasons for the decline in the numbers of fish and other

Figure 2. Freshwater mussel.

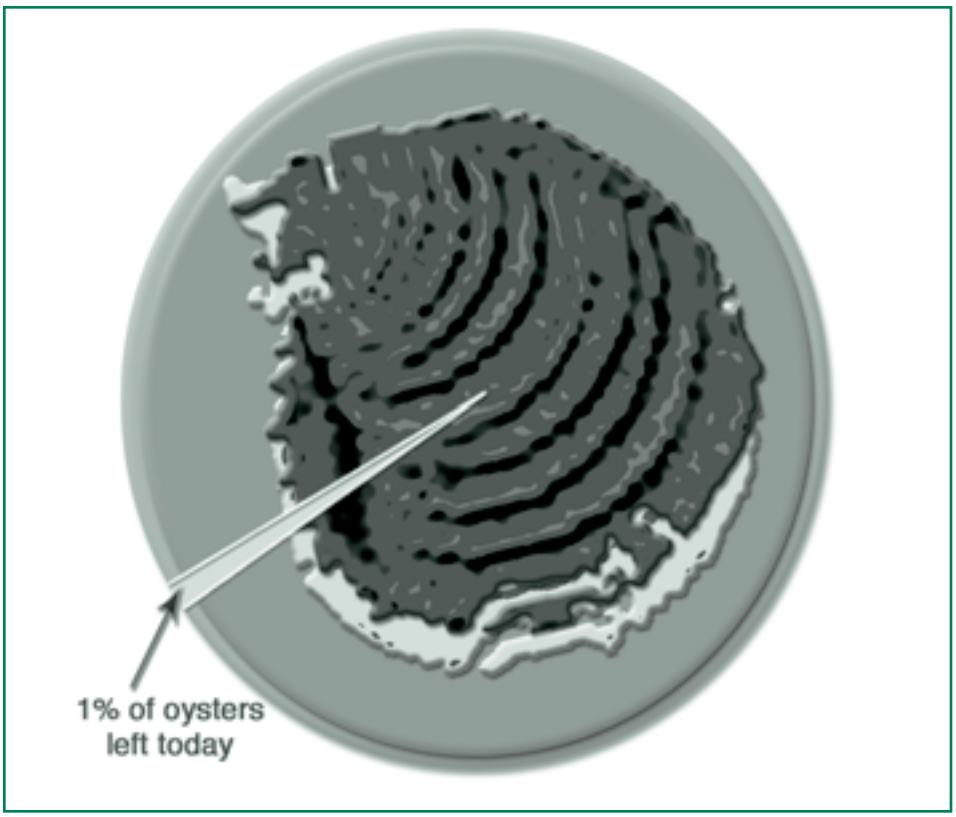


Figure 3. There are 99 percent fewer oysters living in the Chesapeake Bay now compared to 100 years ago.

aquatic animals (figure 4). Most of the decline is caused by human activities.

The scientists found that people living in different areas of the country have been doing things to reduce the decline in the populations of aquatic animal species. In some cases, people have been able to improve the quality of streams, rivers, and lakes so that the populations of aquatic animals are actually increasing. For example, a group of people living in the States surrounding the Chesapeake Bay (figure 5) have agreed to work together

Agriculture—*Eroding* soil and washing fertilizers into waterways. This is called siltation. Silt is the number one pollutant threatening our Nation's waters.

Dams—Stopping the free flow of water in a stream or river.

Over-fishing—Taking more fish out of the water than the species can handle to keep their numbers at a healthy level.

Buildings and other human development—Causing erosion and pollution.

Gravel mining—Taking gravel from stream beds for human use.

Water supply—Taking water out of streams and rivers for irrigation of agricultural land and water supply.

Nonnative fish species—Competing with native fish species for food and habitat.

Pollution—Coming from a range of human actions, such as industrial waste products, poor farming practices, runoff from city streets, *emissions* from cars, etc.

Cattle grazing near streams and lakes—Eroding soil into waterways.

Poor forestry practices—Washing soil from unpaved forest roads into waterways.

Mining—Washing heavy metals into waterways.

Figure 4. Some causes of the decline in the number of fish and other aquatic species.

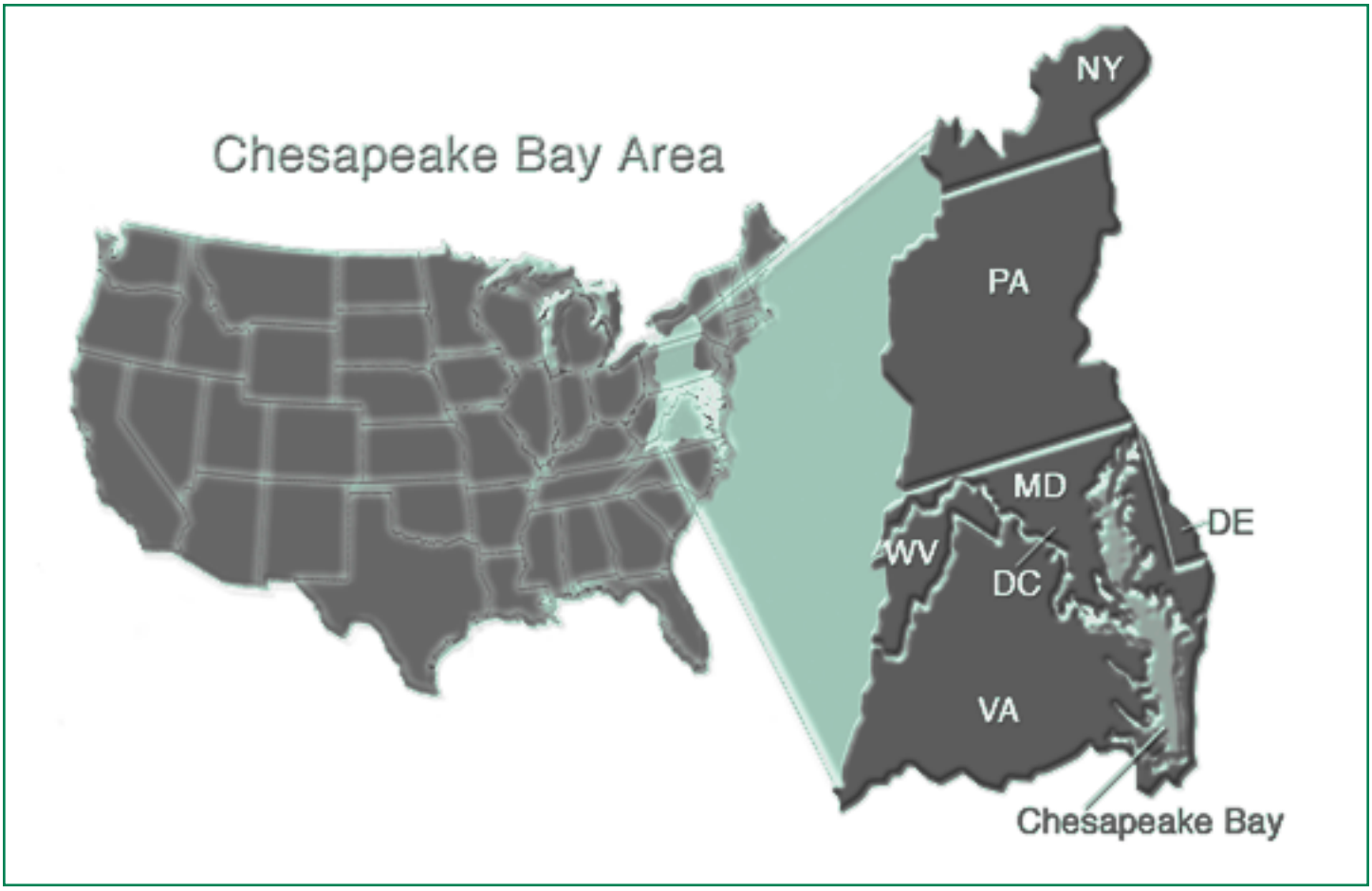


Figure 5. The States surrounding the Chesapeake Bay.

to clean up the bay. Some of the things they are doing are:

1. Cleaning up the water and the land surrounding the bay.
2. Reducing the amount of pollution entering the bay.
3. Educating citizens about what they can do to protect the bay.
4. Encouraging citizens to help make decisions about the bay.
5. Agreeing to continue to work together on solving the problems of the bay.

In another example, a group of people from Arizona wanted to improve Canyon Creek for trout. One of the problems was the rising water temperature, caused by the loss of green plants along the stream's edge. The plants had provided shade for the stream, keeping it cooler. The plants had been killed by cattle that were allowed to graze by the streambank. The people moved the cattle away from the stream and planted native plants along the stream's edge. Within 8 years, the water temperature dropped from an average of 21.7 °Celsius to 12.3 °Celsius (figure 6). (To determine the temperatures in Fahrenheit, multiply the temperature in Celsius by 9/5 and then add 32.) Because of the cooler water, native trout are once again living and reproducing in Canyon Creek.

Reflection Section

- Do you think that the water in creeks or rivers near your home or

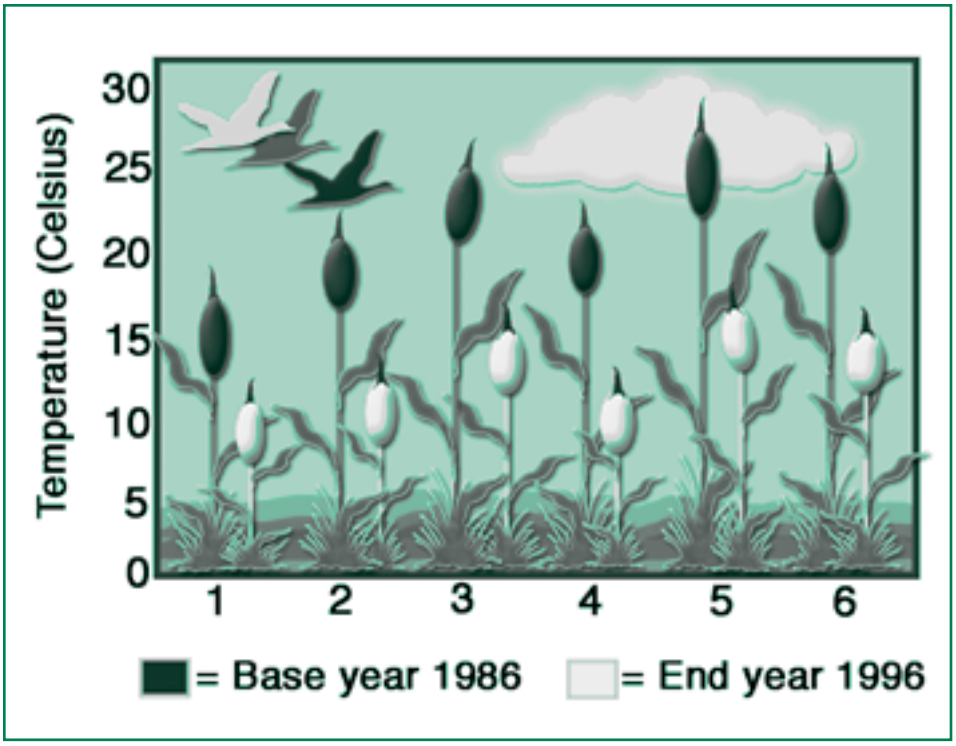


Figure 6. Water temperature changes in six areas of Canyon Creek.

school is clean and healthy? Why or why not?

- What do you think will happen to the populations of aquatic animals if conservation is not practiced? Why? What do you think will happen to the populations of aquatic animals if conservation is practiced? Why?

Implications

Although the scientists were able to determine that the populations of fish and other aquatic animals have been declining across the United States, they do not know exactly what the status of these animals is nationwide.

So that better information is available in the future, the scientists are trying something new. They are working with people from six States to develop a way to share information about fish and other aquatic animals. They have agreed to share the same information, such as water temperature; the number of aquatic species and animals found in streams, rivers, and lakes; and the chemical content of the water. They are using the Internet to share the information.

Using this system, the scientists will know whether populations of aquatic species are continuing to decline, or whether conservation activities are helping aquatic animals to survive and reproduce. The scientists will be able to compare the status of one river with another river. They hope that more States will join the effort. Using this system, one day scientists will know a lot more about the status of and trends in the Nation's aquatic species.

Reflection Section

- Why do you think that it is important to determine the status and possible future of the Nation's fish and other aquatic species?

For water-related activities, visit:

www.epa.gov/ow/citizen/thingstodo.html

www.epa.gov/ow/kids.html

www.projectwet.org

From: Loftus, Andrew J. and Flather, Curtis H. 2000. *Fish and other aquatic resource trends in the United States: A technical document supporting the 2000 USDA Forest Service RPA Assessment.* Gen. Tech. Rep. RMRS-GTR-53. Ft. Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 50 p.

FACTivity

The question you will answer by doing this FACTivity is: What is the status and probable future of a current environmental condition or event? The method you will use to answer the question will be to analyze news articles describing the environmental condition or event. This is similar to how the scientists in this study determined the status and probable future of aquatic animal species.

As a class, decide on a current environmental condition or issue that will likely be reported in the newspaper, TV, and in magazines for at least a few days. You may select any environmental condition or event, such as a recent hurricane, flood, wildland fire, or chemical spill. You may select stories about whether, as a society, we should drill for oil in a national wildlife area, for example. You may select a local, national, or international condition or event.

Once you have selected your topic, each student should search for current printed news on the topic. The stories can come from a newspaper, magazine, the internet, or other printed source. If the issue is national or international, be sure to check news magazines. Each student should bring his or her printed news article to class.

You will need to have at least five different stories on the same topic. They may be stories about similar conditions or events happening in different places, such as wildland fires occurring in different States or countries. Eliminate any duplicate articles.

Divide the class into groups of five students each. Each group should get one copy of each of the articles. Assign one news story to each student in the group. Each student should study his or her article and answer the four questions below. Then, the entire group of five students should discuss the issue and develop a group answer to the following questions.

1. What caused the condition or event? For example, if you studied a wildland fire, did dry weather and lightening likely cause the fire? If you studied a debate over drilling for oil, what are the conditions that caused the debate?
2. What is the current environmental status of the condition or event?
3. Based on the evidence that you have, what do you think will happen to the environment within the next 3 days? Within the next week? Can you guess what might happen in a month, based on the information that you currently have? What might happen within the year?
4. What are the possible implications of the condition or event? The implications may be environmental, personal, social, or economic.

Each group should present its analysis of the news articles to the class. As a class, identify which groups reported similar answers, and which groups reported different answers. What do you think caused the analyses to be the same? Why do you think some of the analyses are different?

By analyzing different news stories, you are using a similar method as the scientists in this study. What are the advantages of using this method? What are the disadvantages?

Alternative: Your teacher may identify an event or condition or even supply the articles. Also, each group can address a different current environmental condition or event.