SECTION 3

# Making Informed Decisions

Scientific research is an essential first step in solving environmental problems. However, many other factors must also be considered. How will the proposed solution affect people's lives? How much will it cost? Is the solution ethical? Questions like these require an examination of **values,** which are principles or standards we consider important. What values should be considered when making decisions that affect the environment? **Table 3** lists some values that often affect environmental decisions. You might think of others as well.

## Objectives

- Describe three values that people consider when making decisions about the environment.
- Describe the four steps in a simple environmental decision-making model.
- Compare the short-term and long-term consequences of two decisions regarding a hypothetical environmental issue.

## Key Terms

**value**
**decision-making model**

## An Environmental Decision-Making Model

Forming an opinion about an environmental issue is often difficult and may even seem overwhelming. It helps to have a systematic way of analyzing the issues and deciding what is important. One way to guide yourself through this process is by using a decision-making model. A **decision-making model** is a conceptual model that provides a systematic process for making decisions.

**Figure 16** shows one possible decision-making model. The first step of the model is to gather information. In addition to watching news reports and reading newspapers, magazines, and books about environmental issues, you should listen to well-informed people on all sides of an issue. Then consider which values apply to the issue. Explore the consequences of each option. Finally, evaluate all of the information and make a decision.

**Table 3 ▼**

| Values That Affect Environmental Decision Making | |
|---|---|
| **Value** | **Definition** |
| Aesthetic | what is beautiful or pleasing |
| Economic | the gain or loss of money or jobs |
| Environmental | the protection of natural resources |
| Educational | the accumulation and sharing of knowledge |
| Ethical/moral | what is right or wrong |
| Health | the maintenance of human health |
| Recreational | human leisure activities |
| Scientific | understanding of the natural world |
| Social/cultural | the maintenance of human communities and their values and traditions |

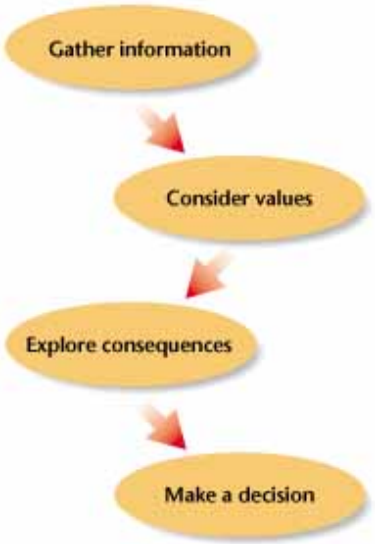


**Figure 16 ▶** The diagram above shows a simple decision-making model.


**Figure 17** ▶ The map (above) shows the proposed nature preserve, which would be home to warblers like the one pictured (right).

## A Hypothetical Situation

Consider the following hypothetical example. In the town of Pleasanton, in Valley County, biologists from the local college have been studying the golden-cheeked warbler, shown in **Figure 17.** The warblers have already disappeared from most areas around the state, and the warbler population is declining in Valley County. The biologists warn county officials that if the officials do not take action, the state fish and wildlife service may list the bird as an endangered species.

Pleasanton is growing rapidly, and much of the new development is occurring outside the city limits. This development is destroying warbler habitat. Valley County already has strict environmental controls on building, but these controls do not prevent the clearing of land.

Several groups join together to propose that the county buy several hundred acres of land where the birds are known to

CASE STUDY

## Saving the Everglades: Making Informed Decisions

The Florida Everglades is an enormous, shallow freshwater marsh. The water in the Everglades slowly flows from Lake Okeechobee to Florida Bay. Much of the marsh is filled with sawgrass, mangroves, and other water-loving plants. It is also home to wildlife, from 40 species of fish to panthers, alligators, and wading birds such as herons and roseate spoonbills.

In the 1880s, marshlands were considered wastelands. Developers began to drain the Everglades. They replaced marsh with houses and sugarcane fields. Between 1940 and 1971, the Army Corps of Engineers built dikes, canals, and pumping stations that drained even more water. The Corps also straightened the Kissimmee River, which runs into Lake Okeechobee.

Scientists have shown that what remains of the Everglades is dying. Its islands and mangrove swamps are vanishing, its water is polluted with fertilizer from farms, and its wading-bird colonies are much smaller than before. These effects have economic consequences. Because much of the Everglades' water has been diverted from Florida Bay into the Atlantic Ocean, the towns of southeast Florida are running out of fresh water and much of the marine life in Florida Bay has died.

In the 1990s, a commission reported that the destruction of the Everglades had jeopardized the state's tourism industry, farming, and the economic future of south Florida. The solution was obvious—undo the water diversion dikes and dams and restore water to the Everglades.

▶ **The roseate spoonbill** is a colorful resident of the Everglades.

breed and save that land as a nature preserve. The groups also propose limiting development on land surrounding the preserve. The group obtains enough signatures on a petition to put the issue to a vote, and the public begins to discuss the proposal.

Some people who own property within the proposed preserve oppose the plan. These property owners have an economic interest in this discussion. They believe that they will lose money if they are forced to sell their land to the county instead of developing it.

Other landowners support the plan. They fear that without the preserve the warbler may be placed on the state's endangered species list. If the bird is listed as endangered, the state will impose a plan to protect the bird that will require even stricter limits on land development. People who have land near the proposed preserve think their land will become more valuable. Many residents of Pleasanton look forward to hiking and camping in the proposed preserve. Other residents do not like the idea of more government regulations on how private property can be used.

**Ecofact**

**The Everglades** Scientists have identified more than 400 endangered species of plants and animals that live in the Florida Everglades.

**internet connect**

**www.scilinks.org**
**Topic: Environmental Decision Making**
**SciLinks code: HE4035**

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▶ **The Everglades** can be thought of as a shallow, slow-moving river that empties into Florida Bay.

In 2000, the $7.8 billion Everglades Restoration Plan was signed into law. The plan was put together by groups that had been fighting over the Everglades for decades: environmentalists, politicians, farmers, tourism advocates, and developers. Over the course of 5 years, members from the groups met and crafted a plan. At first people were afraid to break up into committees for fear that other people would make deals behind their backs. The director instituted social gatherings, and the members got to know and trust each other.

In the end, no one was completely satisfied, but all agreed that they would be better off with the plan than without it. Already Florida has restored 7 mi of the Kissimmee River to its original path. Native plants are absorbing some of the pollution that has killed an estimated $200 million worth of fish and wildfowl. The Everglades Restoration Plan is not perfect, but the process of creating and approving it shows how science and thoughtful negotiation can help solve complex environmental problems.

## CRITICAL THINKING

**1. Analyzing Processes** Explain why it was so difficult for people to agree on how to restore the Everglades.

**2. Analyzing Relationships** If your county decided to build a landfill, do you think the decision-making process would resemble the Everglades example?

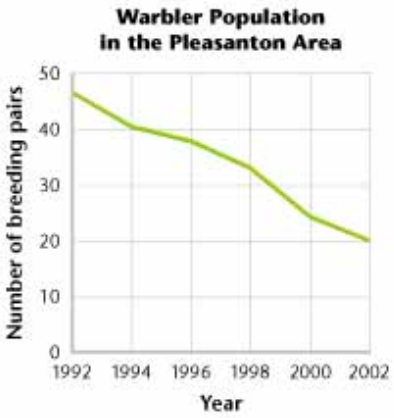



**Figure 18** ▶ The population of golden-cheeked warblers in the Pleasanton area has declined in recent years.

## How to Use the Decision-Making Model

The hypothetical situation in Pleasanton can be used to illustrate how to use the decision-making model. Michael Price is a voter in Valley County who will vote on whether the county should create a nature preserve to protect the golden-cheeked warbler. The steps Michael took to make his decision about the proposal are outlined below.

**Gather Information** Michael studied the warbler issue thoroughly by watching local news reports, reading the newspaper, learning more about golden-cheeked warblers from various Web sites, and attending forums where the issues were discussed. An example of scientific information that Michael considered includes the graph of warbler population decline in **Figure 18.** Several of the arguments on both sides made sense to him.

**Consider Values** Michael made a table similar to **Table 4** to clarify his thoughts. The values listed are environmental, economic, and recreational. Someone else might have thought other values were more important to consider.

**Table 4** ▼

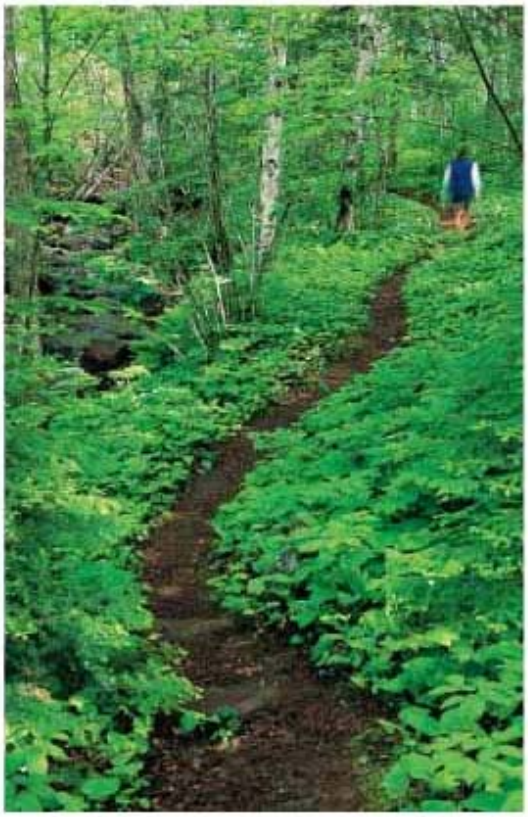
| Should Valley County Set Aside a Nature Preserve? | | | |
|---|---|---|---|
| | **Environmental** | **Economic** | **Recreational** |
| **Positive short-term consequences** | Habitat destruction in the nature preserve area is slowed or stopped. | Landowners whose property was bought by the county receive a payment for their land.<br><br>Property outside the preserve area can be developed with fewer restrictions. | Parts of the preserve are made available immediately for hiking and picnicking. |
| **Negative short-term consequences** | Environmental controls are made less strict in parts of the county outside the preserve area. | Property owners inside the preserve area do not make as much money as if they had developed their land.<br><br>Taxpayers must pay higher taxes to buy preserve land. | Michael could not think of any negative short-term consequences. |
| **Positive long-term consequences** | The population of warblers increases, and the bird does not become endangered.<br><br>Other species of organisms are also protected.<br><br>An entire habitat is preserved. | Property near the preserve increases in value because it is near a natural area.<br><br>Businesses move to Valley County because of its beauty and recreational opportunities, which results in job growth.<br><br>The warbler is not listed as endangered, which avoids stricter controls on land use. | Large areas of the preserve are available for hiking and picnicking.<br><br>Landowners near the preserve may develop campgrounds with bike trails, swimming, and fishing available on land adjacent to the preserve. |
| **Negative long-term consequences** | Other habitat outside the preserve may be damaged by overdevelopment. | Taxpayers must continue to pay for maintaining the preserve.<br><br>Taxpayers lose the tax revenue that this land would have provided if it was developed. | State officials might restrict some recreational activities on private land within the preserve. |

**Explore Consequences** Michael decided that in the short term the positive and negative consequences listed in his table were almost equally balanced. He saw that some people would suffer financially from the plan, but others would benefit. Taxpayers would have to pay for the preserve, but all the residents would have access to land that was previously off-limits because it was privately owned. Some parts of the county would have more protection from development, and some would have less.

It was the long-term consequences of the plan that allowed Michael to make his decision. Michael realized that environmental values were an important factor in his decision. The idea of a bird becoming extinct distressed him. Also, protecting warbler habitat now would be less costly than protecting it later under a state-imposed plan.

Michael considered that there were long-term benefits to add to the analysis as well. He had read that property values were rising more rapidly in counties where land was preserved for recreation. He found that people would pay more to live in counties that have open spaces. Michael had found that Valley County contained very little preserved land. He thought that creating the preserve would bring the county long-term economic benefits. He also highly valued the aesthetic and recreational benefits a preserve would offer, such as the walking trail in **Figure 19.**

**Figure 19** ▶ Land set aside for a nature preserve can benefit people as well as wildlife.



**Make A Decision** Michael chose to vote in favor of the nature preserve. Other people who looked at the same table of pros and cons might have voted differently. If you were a voter in Valley County, how would you have voted?

As you learn about issues affecting the environment, both in this course and in the future, use this decision-making model as a starting point to making your decisions. Make sure to consider your values, weigh pros and cons, and keep in mind both the short-term and long-term consequences of your decision.

## SECTION 3 Review

1. **Explain** the importance of each of the four steps in a simple decision-making model.
2. **List** and define three possible values to consider when making environmental decisions.
3. **Describe** in a short paragraph examples of two situations in which environmental values come into conflict with other values. WRITING SKILLS

### CRITICAL THINKING

4. **Making Decisions** Pick one of the situations you described in question 3. Make a decision-making table that shows the positive and negative consequences of either of two possible decisions.
5. **Analyzing Ideas** Suggest how to make the decision-making model presented here more powerful.

# CHAPTER 2 Highlights

## 1 Scientific Methods

### Key Terms

observation, 31
hypothesis, 32
prediction, 32
experiment, 33
variable, 33
experimental group, 33
control group, 33
data, 34
correlation, 35

### Main Ideas

- Science is a process by which we learn about the world around us. Science progresses mainly by the experimental method.
- The experimental method involves making observations, forming a hypothesis, performing an experiment, interpreting data, and communicating results.
- In cases in which experiments are impossible, scientists look for correlations between different phenomena.
- Good scientists are curious, creative, honest, skeptical, and open to new ideas.

## 2 Statistics and Models

statistics, 38
mean, 39
distribution, 39
probability, 40
sample, 40
risk, 41
model, 42
conceptual model, 43
mathematical model, 44

- Scientists use statistics to classify, organize, and interpret data.
- Measures such as means and probabilities are different ways of describing populations and events.
- Statistics provides a powerful tool for evaluating information about the environment.
- Scientists use models, including conceptual and mathematical models, to understand the systems they study.

## 3 Making Informed Decisions

value, 45
decision-making model, 45

- Making environmental decisions involves gathering information, considering values, and exploring consequences.
- Decisions about the environment should be made thoughtfully. Using a decision-making model will provide you with a systematic process for making knowledgeable decisions.
- Making a table that lists positive and negative short- and long-term consequences will help you recognize and weigh your values about an environmental decision.

# CHAPTER 2 Review

## Using Key Terms

Use each of the following terms in a separate sentence.

1. *experiment*
2. *correlation*
3. *model*
4. *distribution*
5. *values*

For each pair of terms, explain how the meanings of the terms differ.

6. *hypothesis* and *prediction*
7. *risk* and *probability*
8. *distribution* and *population*
9. *sample* and *population*

### STUDY TIP

**Imagining Examples** To understand how key terms apply to actual examples, work with a partner and take turns describing an environmental problem and explaining how the key terms relate to the problem.

## Understanding Key Ideas

10. Scientists form _____ hypotheses to answer questions.
    **a.** accurate
    **b.** short
    **c.** mathematical
    **d.** testable
11. Risk is the _____ of a negative outcome.
    **a.** sample
    **b.** statistic
    **c.** probability
    **d.** event
12. If the results of your experiment do not support your hypothesis, you should
    **a.** publish your results anyway.
    **b.** consider the results abnormal and continue working.
    **c.** find a way to rationalize your results.
    **d.** try another method.
13. In a population, characteristics such as size will often be clustered around the
    **a.** sample.
    **b.** mean.
    **c.** distribution.
    **d.** collection.
14. Models used by scientists include
    **a.** conceptual models.
    **b.** variable models.
    **c.** physical models.
    **d.** Both (a) and (c)
15. Reading scientific reports is an example of
    **a.** assessing risk.
    **b.** considering values.
    **c.** gathering information.
    **d.** exploring consequences.
16. A conceptual model represents a way of thinking about
    **a.** relationships.
    **b.** variables.
    **c.** data.
    **d.** positions.
17. In an experiment, the experimental treatment differs from the control treatment only in the _____ being studied.
    **a.** experiment
    **b.** variable
    **c.** hypothesis
    **d.** data
18. To fully understand a complex environmental issue, you may need to consider
    **a.** economics.
    **b.** values.
    **c.** scientific information.
    **d.** All of the above
19. Scientists _____ experiments to make sure the results are meaningful.
    **a.** perform
    **b.** repeat
    **c.** conclude
    **d.** communicate

# CHAPTER 2 Review

## Short Answer

**20.** Explain the statement, "A good scientist is one who asks the right questions."

**21.** Explain the role of a control group in a scientific experiment.

**22.** How are statistics helpful for evaluating information about the environment?

**23.** Explain why environmental scientists use mathematical models.

**24.** How does making a table help you evaluate the values and concerns you have when making a decision?

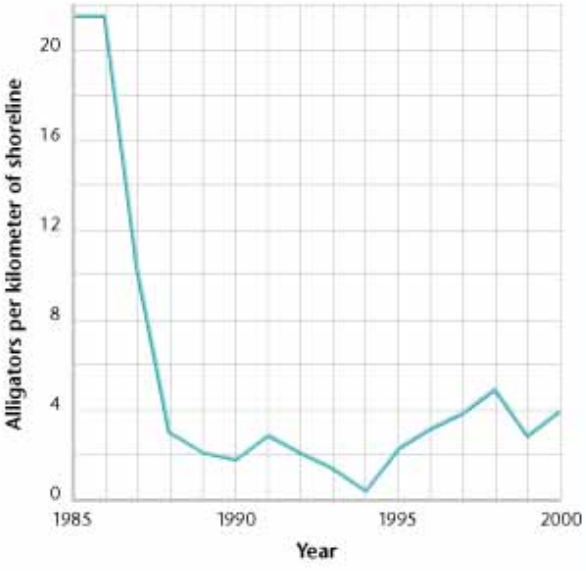
## Interpreting Graphics

The graph below shows the change in size of a shoreline alligator population over time. Use the graph to answer questions 25–27.

**25.** What happened to the density of alligators between 1986 and 1988?

**26.** What happened to the trend in the alligator concentration between 1994 and 1998?

**27.** How many times greater was the alligator population in 1986 than it was in 2000?




## Concept Mapping

**28.** Use the following terms to create a concept map: *control group*, *experiment*, *experimental group*, *prediction*, *data*, *observations*, *conclusions*, and *hypothesis*.

## Critical Thinking

**29. Drawing Conclusions** What does a scientist mean by the statement, "There is an 80 percent probability that a tornado will hit this area within the next 10 years"?

**30. Making Inferences** How does a map of Denver allow you to navigate around the city?

**31. Evaluating Assumptions** Are complicated models always more accurate? Write a paragraph that uses examples to explain your answer. WRITING SKILLS

**32. Interpreting Statistics** Explain what the following statement proves: "We sampled pet owners and found that three out of five surveyed own dogs and two out of five surveyed own cats."

## Cross-Disciplinary Connection

**33. Language Arts** The word *serendipity*, which means "luck in finding something accidentally," came from a Persian fairy tale called *The Three Princes of Serendip*. In the story, each of the princes discovers something by accident. Research and write a short report on a serendipitous discovery about the environment. WRITING SKILLS

## Portfolio Project

**34. Make a Poster** Choose an environmental issue in your area. You can choose a real-life problem that you have heard about on the news, such as improving the sewage system or building a new landfill, or you can choose a project that you think should be considered. Research the issue at your school or local library. Prepare a poster listing the groups of people likely to be involved in the decision and the factors that may be taken into consideration, including economic, social, and environmental factors.

## MATH SKILLS

This table shows the results of an experiment that tested the hypothesis that butterflies are attracted to some substances but not to others. Twenty-four trays containing four substances were placed in random order on a sandbank to see if butterflies landed on the trays. The number of butterflies that landed on each type of tray and stayed for more than 5 min during a 2 h period was recorded in the table. Use the data in the table below to answer questions 35–36.

**Butterfly Feeding Preferences**

| | Sugar solution | Nitrogen solution | Water | Salt solution |
|---|---|---|---|---|
| Number of butterflies attracted | 5 | 87 | 7 | 403 |

35. **Evaluating Data** Do the results in the table show that butterflies are attracted to salt solution but not any other substance? Why or why not? What other data would you like to see to help you evaluate the results of this experiment?

36. **Analyzing Data** Are there any controls shown in this table?

## WRITING SKILLS

37. **Communicating Main Ideas** How is the experimental method an important scientific tool?

38. **Writing Persuasively** Write a letter to the editor of your local paper outlining your opinion on a local environmental issue.

## STANDARDIZED TEST PREP

For extra practice with questions formatted to represent the standardized test you may be asked to take at the end of your school year, turn to the sample test for this chapter in the Appendix.

## READING SKILLS

**Read the passage below, and then answer the questions that follow.**

Jane and Jim observed a group of male butterflies by the roadside. Jane said that this behavior was called puddling and that the butterflies were counting each other to see if there was room to set up a territory in the area. Jim said he did not think butterflies could count each other and suggested the butterflies were feeding on nitrogen in the sand. Jane agreed that the butterflies appeared to be feeding, but she said that they may not be feeding on nitrogen, because female butterflies need more nitrogen than males.

Jim and Jane decided to perform some experiments on the butterflies. They put out trays full of sand in an area where butterflies had been seen. Two trays contained only sand. Two contained sand and water, two contained sand and a salt solution, and two contained sand and a solution containing nitrogen. Butterflies came to all the trays, but they stayed for more than 1 min only at the trays that contained the salt solution.

1. Which of the following statements is a useful hypothesis that can be tested?
   - **a.** Male butterflies mate with female butterflies.
   - **b.** Salt is a compound and nitrogen is an element.
   - **c.** Butterflies are never seen in groups except on sandy surfaces.
   - **d.** Butterflies are attracted to salt.

2. Which of the following conclusions is supported by the observations Jane and Jim made?
   - **a.** Male butterflies can count each other.
   - **b.** The butterflies were probably feeding on nitrogen in the sand.
   - **c.** The butterflies were probably feeding on salts in the sand.
   - **d.** Female butterflies need less nitrogen than male butterflies.

CHAPTER 2

# Skills Practice Lab: OBSERVATION

## Objectives

- **USING SCIENTIFIC METHODS** **Formulate** a hypothesis about the relationship between temperature and fermentation by yeast.
- **USING SCIENTIFIC METHODS** **Test** your hypothesis.
- **Analyze** your data.
- **Explain** whether your data support or refute your hypothesis.

## Materials

beakers, 100 mL (3)
beakers, 400 mL (3)
clock
delivery tubes, rubber or plastic (3)
graph paper
ice cubes
solution of yeast, corn syrup, and water
stoppers, no. 2, one-hole (3)
test tubes, 20 mm × 200 mm (3)
thermometer

▶ **Step 3** Carbon dioxide bubbles will be released from the delivery tube.

## Scientific Investigations

A scientist considers all the factors that might be responsible for what he or she observes. Factors that can vary and that can be measured are called *variables*. The variable that you experimentally manipulate is the *independent variable*. The variable that you think will respond to this manipulation is the *dependent variable*.

You can practice the scientific method as it relates to everyday observations, such as the observation that bread dough rises when it is baked. According to a bread recipe, you dissolve a package of yeast in warm water and add flour, corn syrup, salt, and oil. Yeast is a microorganism that plays an important role in making bread. Yeast obtains energy by converting sugar to alcohol and carbon dioxide gas in a process called *fermentation*. The carbon dioxide forms bubbles, which make the bread dough rise. But what role, if any, does temperature play in this process? In this investigation, you will work as part of a team to try to answer these questions. Together, you will form a hypothesis and conduct an experiment that tests your hypothesis.

## Procedure

1. Restate the question relating temperature to fermentation in yeast as a hypothesis.
2. Set up three test tubes containing yeast, water, and corn syrup stoppered with a gas-delivery tube. Label the test tubes "A", "B", and "C". Place each test tube in a water bath of different temperature. Place tube A in a water bath cooled by a few ice cubes, place tube B in room-temperature water, and place tube C in a warm water bath.
3. Allow the apparatus to sit for 5 min. Then place the open end of the delivery tube under water and begin to collect data on gas production. For the next 10 min, count the number of gas bubbles released from each tube, and record your data in the table on the next page.
4. Prepare a graph of data by placing time on the *x*-axis and the total number of gas bubbles released on the *y*-axis. Plot three curves on the same graph, and label each with the temperature you recorded for each test tube. Compare your graph with that of three other teams before handing in your report.

| Carbon Dioxide Bubbles Released by Yeast | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Time (min)** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| Tube A:____ | | | | | | | | | | |
| Tube B:____ | | | | | | | | | | |
| Tube C:____ | | | | | | | | | | |



## Analysis

1. **Classifying Data** Which set of conditions is most similar to the conditions for the bread dough in the recipe? Why were two other conditions used in this experiment?
2. **Classifying Data** What was the independent variable in this experiment? Explain your answer.
3. **Classifying Data** What was the dependent variable in this experiment? Explain your answer.

## Conclusions

4. **Drawing Conclusions** Write a conclusion for this experiment. Describe how the independent and dependent variables are related. Tell how the data supports your conclusion.
5. **Evaluating Results** What does temperature have to do with making bread dough rise?
6. **Evaluating Methods** Why did you compare your results with those of other teams before writing your conclusions?
7. **Applying Conclusions** Science is not just something you know but also something you do. Explain this statement in light of what you have learned in this investigation.

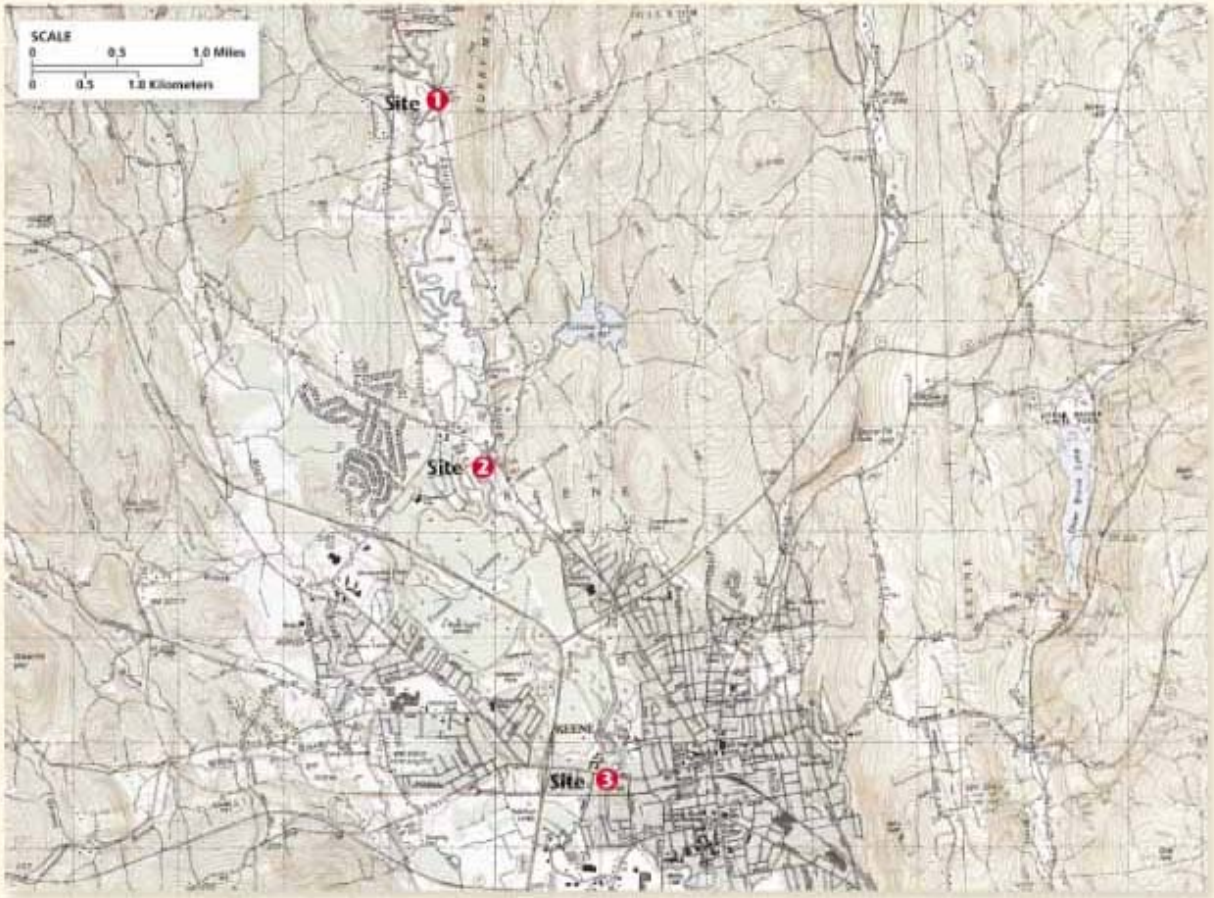
## Extension

1. **Designing Experiments** Formulate a new hypothesis about the effect of different types of sugar on carbon dioxide production by yeast. Test your new hypothesis under controlled conditions. Did your results support your hypothesis? Research the types of sugar you used, and write a short explanation for your findings.

▶ **Recording Data** Count the number of bubbles produced under each experimental condition and record the data in a table.

# MAPS in action

## A TOPOGRAPHIC MAP OF KEENE, NEW HAMPSHIRE




## MAP SKILLS

Topographic maps use contour lines to indicate areas that share a common elevation. Where the lines are close together, the terrain is steep. Where the lines are far apart, the landscape is flat. In this map, the Ashuelot River flows downhill from Site 1 to Site 3. Use the map to answer the questions below.

1. **Using a Key** Use the scale at the top of the map to calculate the distance between Sites 1 and 2 and between Sites 2 and 3.
2. **Understanding Topography** Are the hills to the east and west of the town of Keene more likely to drain into the river around Site 3 or Site 2? Explain your answer.
3. **Identifying Trends** Which site is more likely to be polluted? Explain your answer.
4. **Analyzing Data** Trace the sections of the Ashuelot River between each site to determine the length of stream between each site.
5. **Interpreting Landforms** A flood plain is an area that is periodically flooded when a river overflows its banks. Interpret the contour lines to locate the flood plain of the Ashuelot River.

# SOCIETY & the Environment

## BATS AND BRIDGES

A large colony of Mexican free-tailed bats lives under the Congress Avenue Bridge in Austin, Texas. These bats eat millions of insects a night, so they are welcome neighbors. Communities around the country and around the world have learned of the bats and have asked Austin for help in building bat-friendly bridges. But all that the people of Austin knew was that the bats appeared after the Congress Avenue Bridge was rebuilt in the 1980s. What attracted the bats? The people of Austin had to do a little research.

### A Crevice Will Do

In the wild, bats spend the day sleeping in groups in caves or in crevices under the flaking bark of old trees. They come back to the same place every day to roost. Deep crevices in tree bark are rare now that many of our old forests have been cut down, and many bats are in danger of extinction.

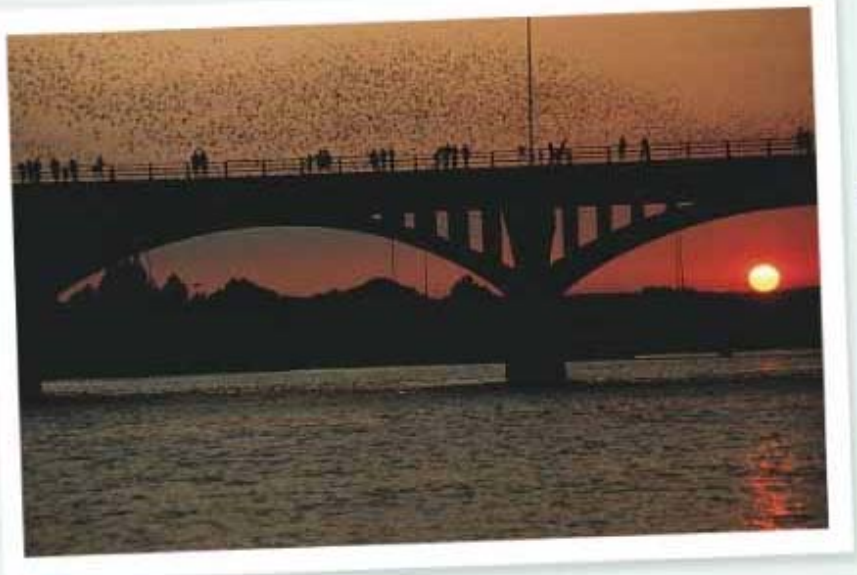
In the 1990s, the Texas Department of Transportation and Bat Conservation International, a nonprofit organization located in Austin, set out to discover what made a bridge attractive to bats. They collected data on 600 bridges, including some that had bat colonies and some that did not. They answered the following questions: Where was the bridge located? What was it made of? How was it constructed? Was it over water or land? What was the temperature under the bridge? How was the land around the bridge used?

### Some Bridges are Better

Statistical analysis of the data revealed a number of differences between bridges occupied by bats and bridges unoccupied by bats. Which differences were important to the bats and which were not? The researchers returned to the Congress Avenue Bridge in Austin to find out. Crevices under the bridge appeared to be crucial, and the crevices had to be the right size. Free-tailed bats appeared to prefer crevices 1 to 3 cm wide and about 30 cm deep in hidden corners of the bridge, and they prefer bridges made of concrete, not steel.

The scientists looked again at their data on bridges. They discovered that 62 percent of bridges in central and southern Texas that had appropriate crevices were occupied by bats. Now, the Texas Department of Transportation is adding bat houses to existing bridges that do not have crevices. These houses are known as Texas Bat-Abodes, and they can make any bridge bat friendly.

Bat Conservation International is collecting data on bats and bridges everywhere. Different bat species may have different preferences. A Texas Bat-Abode might not attract bats to a bridge in Minnesota or Maine. If we can figure out what features attract bats to bridges, we can incorporate these features into new bridges and make more bridges into bat-friendly abodes.



▶ **Mexican free-tailed bats** leave their roost under the Congress Avenue Bridge in Austin, Texas, to hunt for insects.

### What Do You Think?

Many bridges in the United States could provide roosting places for bats. Do you think communities should try to establish colonies of bats under local bridges? How should communities make this decision, and what information would they need to make it wisely?