

Reflection Section Answer Guide

It's Elemental, My Dear!

the area in the past. Social scientists often use questionnaires to collect information from people.

Introduction:

- **Think about what it would be like to be in an area as remote as Gates of the Arctic National Park and Preserve. Think of three things that you would expect to see, do, or feel if you were in an area that far away from cars, phones, buildings, or other people. Remember that in a wilderness, you cannot use any motorized vehicles or equipment. Share your ideas with your class. Discuss the benefits and disadvantages of visiting such a remote place.** *These are personal questions. Examples of responses to what I might expect to see include: I would expect to see bears and wolves. I would expect to see mountains and clean rivers. I would not expect to see airplanes. Examples of what I might do include: I might hike up a mountain trail, pitch a tent, drink hot chocolate, canoe in a cold river. Examples of what I might feel include: I might feel cold, or inspired by the beauty. I might feel challenged, or afraid, or lonely. I might feel awed by how large and beautiful the area is. Some benefits the class may mention are: Having some time either alone or with just a few people; seeing bears, caribou, and other wildlife; not hearing any machines; challenging myself to do something new or difficult. Some disadvantages the class may mention are: Having to walk everywhere, not having a phone or computer, not having TV, or not having a shower.*
- **If you were the scientist, how would you find out what some of the elements of experience are for people visiting Gates of the Arctic National Park and Preserve?** *Some ideas include: Ask people who are visiting the area what stands out in their experience. Send out a questionnaire to people who have visited*

Method:

- **Why do you think that the scientists audio-recorded the conversations?** *Because they could never keep track of 94 conversations. To have accurate information, scientists must record everything, whether it is by writing, using computers, audio-recording, photography, or sketching.*
- **Do you think that the scientists received responses from all 242 people who were sent the questionnaire? Why or why not?** *Probably not. This is because not everyone who received a questionnaire either had time to or cared about filling it out and sending it back in. Some of the people might have moved and would have never received the questionnaire.*

Findings:

- **Look at figure 7 and table 1. Each of the comments in figure 7 should fit somewhere in table 1. See if you can place each item from figure 7 under one of the five elements in table 1.** *This can be done individually or as a group. The important thing is for students to be able to give a logical reason for placing each item in figure 7 under an element in table 1. This will be difficult to do for a few of the comments. Allow your students to debate and finally decide where to place each of the comments.*
- **Which of the elements in table 1 do you think that wilderness managers can change? Discuss why or how managers might or might not be able to change each of these elements with your classmates.** *This will help you to introduce the concept of management. For*

example, while managers cannot change the wildlife, they can manage the land so that wildlife populations are protected and sustained. They can manage so that visitors do not feel overburdened by rules and regulations, even if those rules and regulations exist. They could improve the way visitors get information about wilderness. An example of something they cannot change is uncertainty regarding the weather.

Discussion:

- **Look at table 1, element 2 (Free-Roaming Wildlife). Name one way that managers might measure this element.** Managers could keep an inventory of different kinds of wildlife seen in wilderness. They could then identify whether visitors are seeing more, less, or the same amount of animals over the years.
- **Why do you think that managers will have to measure any of the elements that they decide to use?** Because if you do not keep track of something by measuring it, it is hard to judge whether you are making any difference in the future.

Wilderness Makes Cents!

Introduction:

- **Reread the first paragraph under “Introduction,” above. What are some of the benefits you might receive from buying one shirt instead of another?** The benefits might be fashion-related, such that one shirt is more in style and will bring more admiration from peers. The benefits might be comfort-related, in that one shirt will be more comfortable to wear. Another benefit might be that one shirt will be more versatile, and will “go with” more of the person’s clothes. Your students may come up with a

variety of other benefits. You may want to discuss the idea of benefit in relation to price; for example, the number or type of benefits may increase as the price increases.

- **Restate what the scientists wanted to discover by doing this research.**

The scientists wanted to discover how much the recreation use benefits and passive use benefits of wilderness are worth to the entire American public.

Method:

- **Look at figure 3. Explain in your own words what each of the dollar values represents.** On the average, an individual is willing to pay \$68 more than they have to pay to go on a wilderness recreation trip. On the average, an individual is willing to pay \$67 more every year to protect wilderness because they want the option of visiting them in the future, they want their children to be able to enjoy wilderness, or they just want to know that wilderness exists.
- **Reread the last sentence in the “Methods” section. What might be one advantage of knowing the dollar amount of benefit per acre for each of the two types of benefits?** By placing both of the benefits on a per-acre basis, it is easier to compare them. Whenever you can compare two numbers using the same unit of measurement, it is a better and easier way to understand their relationship.

Findings:

- **Look at figures 4 and 5. Compare the amounts in each column. Would you say that recreation use benefits or passive use benefits have greater value to the American public? Why?** Passive use benefits have greater value because the number representing those benefits in column 2 is much higher than the number representing recreation use benefits in column 1.

- **Think about what the numbers in figures 4 and 5 represent. If you need to refresh your memory, reread “Thinking About the Environment” at the beginning of this article. What would you conclude about the benefits people receive from wilderness?** *This is an individual question, but some answers might be: 1. Wilderness is important to Americans. 2. Non-use benefits of wilderness are much more important than recreation use benefits to Americans. 3. People think that wilderness is important, even if they never plan to visit wilderness. 4. People want wilderness to be there in the future, either for themselves or for their children. 5. Passive use benefits are over eight times greater than recreation use benefits. Your students may come up with other conclusions as well.*
- **The last paragraph in the “Introduction” describes three things that the scientists wanted to discover. Restate these three things as questions.** *1. What types of habitats are needed by Columbia spotted frogs at different times of the year? 2. How far will Columbia spotted frogs migrate to reach these different habitats? 3. What routes do Columbia spotted frogs take when they migrate from habitat to habitat?*

Method:

- **The scientists marked the toes of each frog that was found. Can you think of one reason why the scientists would want to identify the frogs that had been caught?** *The scientists needed to have a way to identify which frogs had been measured, weighed, and identified as to which sex they were. Otherwise, the scientists might catch the same frog more than once. If they did this, they would not have an accurate count of the frogs.*
- **The scientists were careful not to harm the frogs during their research. Do you think that scientists should take care not to harm the animals that they study? Why or why not?** *This question must be answered individually by each student, however, the student should be able to give a reason for his or her answer. This question provides an opportunity to discuss ethics in animal-based science. Scientists are bound by ethics (and law) to protect animals from pain and suffering when they conduct their studies.*

Discussion:

- **Recreation use benefits and passive use benefits are not the only benefits of having wilderness. Name at least one other benefit of having wilderness.** *Wilderness provides clean water and places for wildlife to live, it helps to slow soil erosion, it helps to clean the air, it protects plant and animal species, and it provides a place for scientists to do research. Your students may come up with many other benefits to having wilderness.*

As the Frog Hops:

Introduction:

- **Do you think that a nonnative species of animal should be allowed to harm the population of a native species? Why or why not?** *This question must be answered personally. Each student should be able to back up his or her answer with logically constructed reasons.*

Findings:

- **The scientists found that the female frogs migrated farther than males. They also found that larger frogs migrated farther than smaller frogs. What does this tell you about the size**

of male and female frogs? *Female frogs must be generally larger than male frogs.*

- **If you were a natural resource manager and you wanted to protect the Columbia spotted frog, would you only focus your attention on the lakes, ponds, and streams where frogs breed, forage, and spend the winter? Why or why not?** *No, because this study has shown that the dry areas between lakes, ponds, and streams are used by female frogs for migration. Although frogs need watery habitat to breed, forage, and hibernate, they also need the spaces in between these water bodies.*

Discussion:

- **What new thing did the scientists learn about the migration of Columbia spotted frogs?** *That the frogs sometimes migrate from water body to water body by generally traveling in a straight line, even if that means traveling across dry areas that have no water.*
- **Why do you think the scientists suggest protecting dry land areas within one kilometer of a water body?** *Because the female frogs migrated up to 1,033 meters from a water body, which is just over one kilometer. Most of the female frogs did not migrate that far. So by protecting the land up to one kilometer, most of the land being used by frogs for migration will be protected.*
- **Do you think that the scientists could have done this study in an area that was not a wilderness? You might want to reread “Thinking About Science” before you answer this question.** *The scientists could have done this study in an area that is not wilderness. However, it would be harder to find a nonwilderness area that would not be disturbed by humans or development over the time span of a year.*

Wild and Free!

Introduction:

- **Restate, in your own words, what the scientists in this study wanted to learn about wilderness as compared with other land in the United States.** *They wanted to know whether wilderness has a greater quality of wildness than other lands. This means they wanted to know if wilderness is more natural and freer from human control than other lands.*
- **If you have not done so yet, read “Thinking About Science” and “Thinking About the Environment.”** **In those sections, you learned that the scientists used a GIS to collect their information. You also learned that in a GIS, information is connected to a specific place. For the land and water in each of the 16 million squares, what did the scientists want to know?** *They wanted to know how natural the land was and how free it was from human control. In other words, they wanted to know how “wild” it was.*

Method:

- **For each square kilometer, the five values were summed. What was the range of values possible for each of the square kilometers? How many colors were possible across the entire map?** *The lowest value is 1, so the lowest value for the six qualities together is 6 (6 qualities times a value of 1). The highest value is 5, so the highest value for the six qualities is 30 (6 qualities times a value of 5). Therefore, the range in value for each square kilometer is 6-30. The possible number of colors is 30-6 (+1), or 25. The lower the score, the less wild the square kilometer is thought to be. The higher the score, the wilder the square kilometer is thought to be.*

- **What are some of the advantages of using a map to display scientific findings?** *This should be answered individually, and the class should be encouraged to identify at least three advantages. Examples include being able to easily see relationships between different areas of land and water; being able to present a combination of land- or water-based qualities as one quality; showing the information as a picture rather than as numbers, which is easier for some people to understand; being able to see patterns across an area of land and water; and being able to look at different size areas of land and water. Your students may come up with different advantages.*

Findings:

- **Look at figure 6. Identify four of the wildest States, and four of the least wild States. Look at your own State and compare it with these other States. What can you say about the wildness of your State?** *Most wild: Nevada, Montana, Wyoming, Utah, New Mexico. Least wild: Illinois, Indiana, Ohio, Michigan, New Jersey. The students should develop their own observations regarding their own State in comparison with these other eight States.*
- **In figure 7, compare the wildness values of Federal nonwilderness and Federal wilderness. Are the values close together or far apart? Why do you think Federal nonwilderness might have the value that it does?** *Students will have to have some experience with or knowledge of national parks, national forests, national wildlife refuges, or other Federal land to answer this question. Federal nonwilderness lands are typically large tracts of undeveloped or minimally developed land and water. They have a*

lower value than Federal wilderness because they have some roads, buildings, and other development. Compared with non-Federal land, they can be considered to have a high quality of wildness.

Discussion:

- **Look again at figures 3 and 4. You know that Federal lands have a high wildness value. Pretend that you have been asked to describe Federal wilderness and Federal nonwilderness to a foreign visitor. How would you describe these lands?** *The student should mention the qualities given in these two figures. He or she should point out that wilderness lands have a higher wildness rating than nonwilderness lands, but that all Federal lands have these qualities. The student should point out some of the characteristics mentioned in these two figures.*
- **Why are Federal lands freer from human control than non-Federal lands, and why is Federal wilderness freer from human control than Federal nonwilderness? (Hint: This has something to do with being protected.)** *You may need to help your students figure this out. Federal lands are freer from human control because as a society we have enacted laws to protect them from certain kinds of development. Wilderness is the freest of Federal lands because it is protected under a stricter law (The Wilderness Act of 1964).*

Can You Hear Me Now?

Introduction:

- **What questions did the scientists want to answer in this study?** *They wanted to know if people know that wilderness*

exists, how people feel about wilderness, and whether people's attitudes about wilderness have changed in recent years.

- **Why would this information be of interest to Congress?** *As the body of people who make decisions about lands like wilderness, Congress wants to know how the majority of American citizens feel about wilderness. Congress makes decisions on behalf of the people they represent. Information about how people value wilderness will help them to make decisions in the best interests of the majority of American citizens.*

Method:

- **The scientists did this study in 2000. Since the year 2000, many more people have cell phones. Do you think that scientists could do this study again in 2008 and contact people with cell phones? Why or why not?** *Because the 4-digit phone numbers are randomly generated, the scientists could add the cell phone exchanges and contact people on cell phones as well.*
- **Look at the list of benefits in figure 2. Which three benefits do you think are the most important? Why?** *This is a personal question. Each student should, however, be able to state the reasons he or she selected his or her top three benefits.*

Findings:

- **Overall, would you say that the benefits of wilderness are important to the American public? Explain your answer using the information in table 2.** *Yes, because a majority of American citizens said that 12 of the 13 values were either very important or extremely important.*
- **Reread “Thinking About the Environment.” Looking at the information in table 2, would you say**

that more Americans place a high value on the “use benefits” or “non-use benefits” that they receive from wilderness? Explain your answer.

People place a higher value on non-use benefits because a higher percentage of them rated non-use benefits as very important or extremely important.

Discussion:

- **In what ways can wilderness help protect human health?** *By protecting air quality and water quality, wilderness can help protect people from diseases caused by dirty air and polluted water. Wilderness also protects the overall environment and protects plant species that might be useful as medicines in the future. Wilderness may help to slow flooding. Students may come up with other ways that wilderness works to protect human health.*

Speak-o-logical

Introduction:

- **What do you think is meant by the term “ecological value”?** **A value is the quality of a thing that makes people want to have it. Think about the values, or desirable qualities, that you might find in a natural area. You may also want to reread “Thinking About the Environment.”** *This is an individual question and could be answered in many different ways. Students should be able to provide a rationale for their answer. An area's ecology is its diversity of natural processes, including the relationship of organisms to each other and to the whole area. Qualities might include providing habitat for animals, providing clean water, providing a quiet place to camp or hike, protecting the area for the future, etc.*

- **To compare the ecological value of wilderness and nonwilderness lands, the scientists had to be able to measure the different areas' ecological value. They needed to use numbers to make their comparison. Think about your answer to the first reflection question. Can you think of a way to measure ecological value, or desirable qualities, using your definition? How would you do that?** *This question must be answered individually. The student should be able to provide a rationale for his or her answer. This could include counting the number of plant and animal species in wilderness and nonwilderness, testing the water quality and comparing it with nonwilderness lands, identifying how many opportunities exist for quiet types of recreation, or identifying how likely it will be that the wilderness and nonwilderness will be undisturbed in the future.*

Method:

- **Do you think that the naturalness of an area is a good measure of its ecological value? Why or why not? Remember that naturalness was defined by the two concepts in figure 3.** *This is an individual question and must be answered individually. However, students should be able to provide a rationale for their answer.*
- **Have you ever done any research in which you used some of the same methods as these scientists? If so, describe what you did.** *Students should have done previous research projects where they used the library and the Internet to collect information on a topic. They should have also had to define the topic that they were studying. Hold a class discussion on how their research was similar to and different from this study.*

Findings:

- **Now that you have read the "Findings," would you say that**

wilderness is more natural than land that is not wilderness? Why or why not? *Students should conclude that wilderness is more natural than nonwilderness. The reasons they should give are that a greater percentage of wilderness than nonwilderness is in natural cover and a greater percentage of wilderness is farther from roads than nonwilderness.*

- **The scientists assumed that the more natural an area is, the greater its ecological value. This is because the more natural an area is, the greater is its ability to support human and nonhuman life. Would you agree that taken together, wilderness has greater ecological value than land that is not wilderness? Why or why not?** *If the scientists' assumption is accepted, then wilderness has greater ecological value. This is because wilderness has more areas covered by forests, water, wetlands, prairies, etc., which support more life than do areas covered by pavement, roads, buildings, etc. Students can reason through the "Findings" to determine whether wilderness is better able to support human and nonhuman life.*

Discussion:

- **Re-read the last sentence in "Discussion." Do you agree that wilderness has a greater ability than nonwilderness to support both human and nonhuman life? Why or why not?** *This question could be used for a class discussion. Students should think about how agricultural lands support human life, and how roads and buildings also support human life. Then, students should compare this with the types of support offered by wilderness, including the qualities identified in the first reflection question under "Introduction."*