

Natural Inquirer

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Number 9

The Natural Inquirer Monograph Series

Investigating

Backpacking

Pack to Back:
and Other Backcountry

and Wilderness Activities





The *Natural Inquirer*

Monograph Series

Pack to Back: Investigating Backpacking and Other Backcountry and Wilderness Activities

Produced by

Forest Service, an agency of the U.S. Department of
Agriculture (USDA)

Cradle of Forestry in America Interpretive Association

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Photo courtesy of Discover Outdoors.



Join us in being green!

The following Educator Resources are now available exclusively on the *Natural Inquirer* Web site, <http://www.naturalinquirer.org>. Click on the “Pack to Back” cover or go to “Educator Resources” to access these resources:

- Note to Educators
- Lesson Plan for Pack to Back
- Wilderness 50 Lesson Plan
- Pack to Back Reflection Section Answer Guide

WHO ARE SCIENTISTS?

Scientists are people who collect and evaluate information about a wide range of topics. Some scientists study the natural environment.

To be a successful scientist, you must:

Be curious:

Are you interested in learning?

Question everything:

Do you think about what you read and observe?

Be enthusiastic:

Are you excited about a particular topic?

Be open-minded:

Are you willing to listen to new ideas?

Be careful:

Are you accurate in everything that you do?



Welcome to the *Natural Inquirer* Monographs!

Scientists report their research in a variety of special books. These books enable scientists to share information with one another. A monograph is a book about research that focuses on a single science project. This monograph of a *Natural Inquirer* article was created to give scientists the opportunity to share their research with you and other middle school students. The monograph presents scientific research conducted by scientists in the Forest Service, an agency of the U.S. Department of Agriculture (USDA). If you want to learn more about the Forest Service, you can read about it on the inside back cover of this monograph, or you can visit the *Natural Inquirer* Web site at <http://www.naturalinquirer.org>.

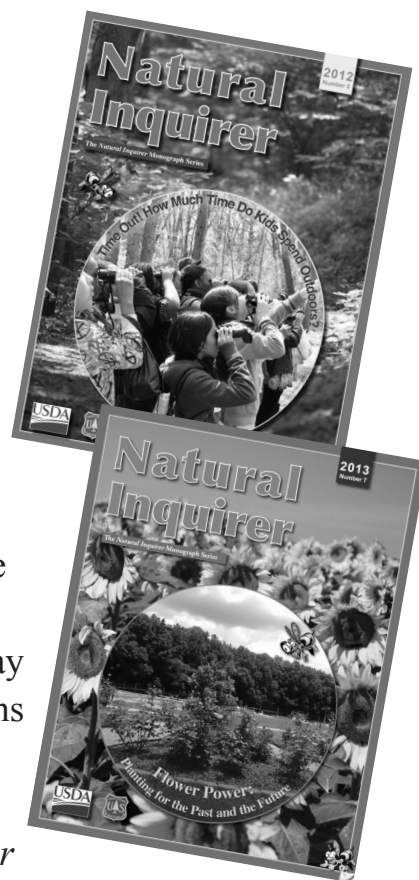
All of the research in this *Natural Inquirer* monograph is concerned with the natural environment, such as trees, forests, animals, insects, outdoor activities, and water. To introduce you to this monograph, you will first “meet the scientists” who conducted the research. Then you will read about one of the many interesting aspects of science and about the natural environment. You will also read about a specific research project. (The research article in this monograph is written in the format that scientists use when they publish research in scientific journals.) Then YOU become the scientist as you go through the FACTivity **associated** with the article. The

glossary and the special sections highlighted in the article give you extra information that is educational and interesting.

At the end of each section of the article, you will find a few questions to help you think about what you have read. These questions will help you think like a scientist. They will help you think about how research is conducted. Your teacher may use these questions in a class discussion, or you may discuss these questions in a small group.

Each *Natural Inquirer* monograph will help you explore the exciting world of science and prepare you to become a young scientist. You will learn about the scientific process, how to conduct scientific research, and how to share your own research with others.

Visit <http://www.naturalinquirer.org> for more information, articles, and resources.



Editorial Review Board At Work

Brethren Middle School, Brethren, Michigan

Teachers:

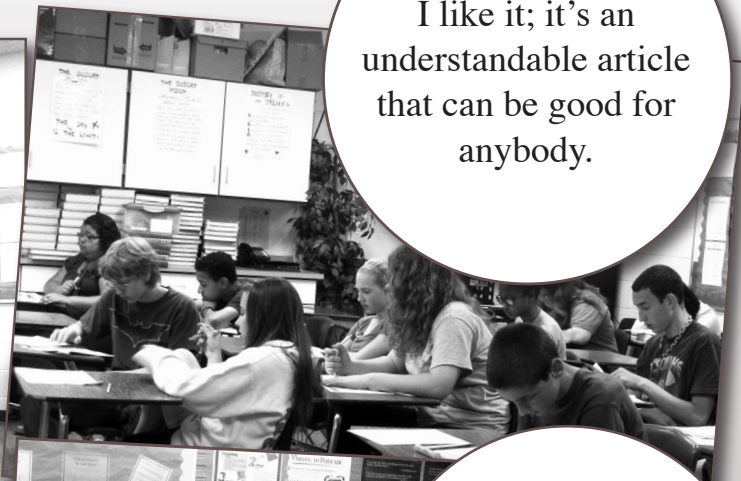
Ms. Gail Bennett

Ms. Rachel Edmondson

I learned that
State parks are
smaller than
national parks.



I like it; it's an
understandable article
that can be good for
anybody.



I would suggest
you show images of
plants and animals in
these places.



Have more color
and more facts on
why some things
happen.



I learned that
there are many
backcountry
activities.



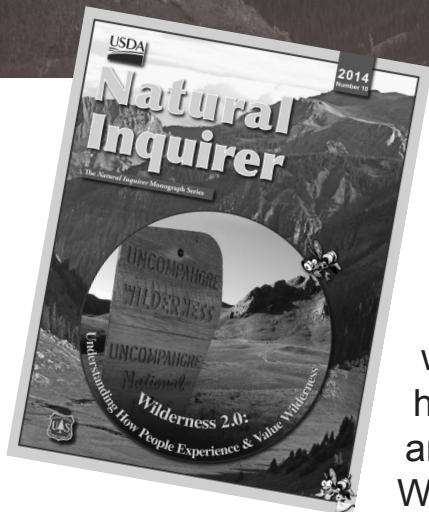
This wasn't
a really big
important thing, but
I learned that men
are more likely to do
outside fun than
women.



WELCOME TO THE WILDERNESS 50 MONOGRAPHS!

Photo by Andrew Maher.

Glossary words are in **bold** and are defined on page 32.



This monograph is one of two Wilderness 50 monographs. These two monographs were created to honor the 50th anniversary of the Wilderness Act of 1964. You can read

the other Wilderness monograph, “Wilderness 2.0,” by visiting <http://www.naturalinquirer.org>. At this Web site, you can download the monograph or order a hardcopy of the monograph for free. “Wilderness 2.0” explores the experiences of a 16-year-old boy in a Colorado wilderness and tells how he used technology to blog about his wilderness experiences.

Wilderness Timeline:

The idea of protecting lands as wilderness did not happen overnight. Before the National Wilderness Preservation System was established in 1964, many people took actions that helped Americans understand the value of protecting wild lands. Since 1964, other people have continued to ensure the protection of more wilderness areas.

1822: Pawnee Chief Petalesharo (**pə tə lə shə rō**) spoke to President James Monroe. He described the way of Indian life and noted that numbers of game animals such as buffalo were decreasing because of human settlement and exploration.

1827: Thomas Cole, a leader in the romantic landscape painting movement known as the Hudson River School, produced “St. John Preaching in the Wilderness.” Cole believed that wilderness was passing away and that there was a “necessity of saving and perpetuating its features.”

1836: Ralph Waldo Emerson published “Nature.” His essay helped Americans develop positive attitudes toward nature.

When Congress passed the Wilderness Act of 1964, nearly every Member of Congress voted in favor of the act. The law, created by the passage of the act, permanently protects some of the most natural and undisturbed places

in America (figure 1). The act is one of the most successful U.S. environmental laws. It continues to be the guiding piece of legislation for all wilderness areas.



Figure 1. The Bisti/De-Na-Zin (**Bis-tī** Dā na zin) Wilderness is a rolling landscape of badlands in the Four Corners region of New Mexico. Badlands are sedimentary rocks that have been eroded over time by wind and water. These rock formations are made of sandstone, shale, mudstone, coal, and silt. The weathering of the sandstone forms hoodoos. Hoodoos are weathered rock in the form of pinnacles, spires, and other unusual shapes. Da-Na-Zin is Navajo for “standing crane.”

Photo courtesy of the Bureau of Land Management.

Wilderness Timeline *continued*

1837: George Catlin called for “a nation’s park” to protect the American Indian way of life.

1854: Henry David Thoreau, author of *Walden*, wrote that wilderness sanctuaries are the “need of civilized man.”

1864: George Perkins Marsh published *Man and Nature*, warning citizens to stop the devastation of forests and other natural resources.

1864: President Abraham Lincoln signed the Yosemite Bill, “to protect an area and conserve it for recreational enjoyment.” This bill marked the first time a national government set aside land for the purpose of conservation.

President Lyndon Johnson signed the Wilderness Act into law on September 3, 1964. Following the passage of the Wilderness Act of 1964, other countries around the world have also protected

natural areas. Few of these other areas worldwide, however, have the same level of protection from human activities as American wilderness areas.

Section 2(c) of the Wilderness Act of 1964 describes wilderness as follows:

A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are **untrammelled** by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its **primeval** character and influence, without permanent improvements or human **habitation**, which is protected and managed so as to preserve its natural conditions; and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for **solitude** or a **primitive** and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

Be sure to read the *Natural Inquirer* Wilderness Benefits edition. You can find it at <http://www.naturalinquirer.org/Wilderness-Benefits-Edition-i-11.html>.

1865: Frederick Law Olmstead pushed for protection of Yosemite Valley (California) and was first to advance the idea of placing certain areas under government protection.

1885: The New York State Legislature created the Adirondack Forest Preserve "to be kept forever as wild forest lands," along with similar lands in the Catskill Mountains.

1892: John Muir organized the Sierra Club in California to enlist public and governmental support for preservation of wilderness. The Sierra Club remained a State group until the 1950s, when David Brower convinced the group to think nationally.

Howard Zahniser (**zah**(n) ī zər), author of the Wilderness Act of 1964, selected the word “untrammeled” to define wilderness. Many people read the word “untrammeled” as “untrampled,” as in not stepped on. Yet the word “untrammeled” means something much different. A “trammel” is a net used for catching fish, or a device used to keep horses from walking. To trammel

something is to catch or restrain it. Untrammeled means something is free or unrestrained. Wilderness areas, therefore, are not to be controlled by humans. Zahniser defined “untrammeled” in the Wilderness Act as “not being subject to human controls and **manipulations** that hamper the free play of natural forces.”

WILDERNESS FUN FACTS

- 🌿 When the Wilderness Act of 1964 was passed, it protected 9.1 million acres of wilderness in 13 States.
- 🌿 On the 50th anniversary of the Wilderness Act, the act now protects 109,511,966 acres of wilderness in 44 States and Puerto Rico.
- 🌿 The smallest wilderness is Pelican Island Wilderness in northern Florida. This wilderness contains 5.5 acres of land and water.
- 🌿 The largest wilderness is Wrangell-Saint Elias Wilderness in Alaska. This wilderness contains 9,078,675 acres.
- 🌿 Only Connecticut, Delaware, Iowa, Kansas, Maryland, and Rhode Island have no **designated** wilderness areas.
- 🌿 The newest wilderness area is Sleeping Bear Dunes Wilderness in Michigan. It became an official wilderness area on March 13, 2014.

For more information about wilderness areas, visit <http://www.wilderness.net>.

Wilderness Timeline *continued*

1898: Gifford Pinchot took office as Chief of the Division of Forestry, later organized into the national Forest Service in 1905. Today, this agency is known as the Forest Service, an agency of the U.S. Department of Agriculture.

1903: President Theodore Roosevelt protected vast acres of Federal land for public use and conservation.

1906: President Roosevelt signed the Antiquities Act into law. This law gives the President the authority to protect public land by Executive order. In 1906, President Roosevelt used the law to create the Grand Canyon National Monument, which later became Grand Canyon National Park.

This monograph presents research about the recreational use and value of wilderness. Wilderness areas provide important settings for outdoor recreation. When in wilderness, people must meet nature on its terms without



Aldo Leopold is considered by many to be the father of the U.S. wilderness system.

Photo courtesy of <http://www.outdoorhub.com>.

the benefit of human-built machines. This meeting with nature on its terms is what the Wilderness Act calls a “primitive and unconfined type of recreation.”

Information adapted from <http://www.wilderness.net/>.



President Johnson signed the Wilderness Act of 1964 into law with overwhelming support from Congress. Photo courtesy of <http://www.wildernessstewardship.org>.

Gifford Pinchot (pin **chō**) promoted the conservation of the United States’ forests by planned use and renewal. He was the first leader of what is now the Forest Service.

Photo courtesy of

<http://www.seekinggreatestgood.org>.



Rachel Carson is recognized as one of the founders of the modern environmental movement.

Photo courtesy of U.S. Fish and Wildlife Service.

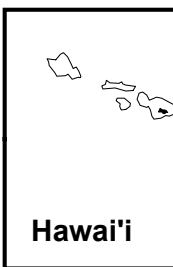
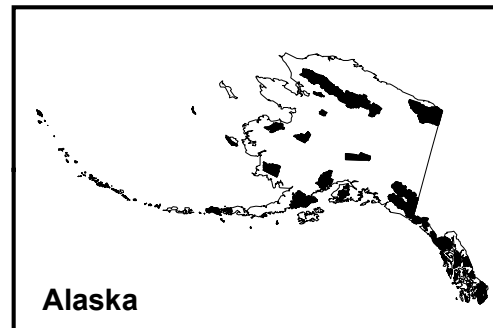
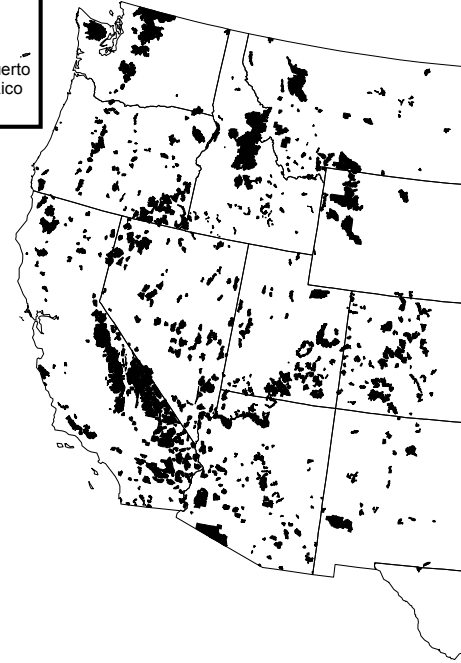
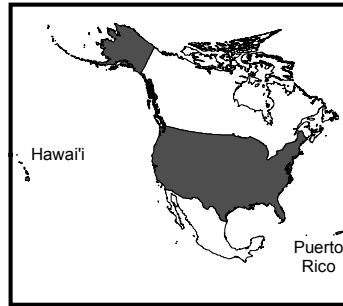


1919: Arthur Carhart recommended that the Trappers Lake area in Colorado not be developed for summer homes and that it be allowed to remain wild. His plan was approved.

1924: Aldo Leopold’s work resulted in the **designation** of the first official wilderness area. This area is the Gila (**hē la**) Wilderness in New Mexico.

1935: Bob Marshall, Aldo Leopold, Benton MacKaye (**Mə kī**), and others founded The Wilderness Society as a national organization based in Washington, DC, to specialize in advocating wilderness protection.

1962: Scientist Rachel Carson published *Silent Spring*, stirring public awareness of pesticides and the environment.



Alaska, Hawai'i, and Puerto Rico are not drawn to scale.

Wilderness Timeline *continued*

1964: President Lyndon Johnson signed the Wilderness Act into law, creating the National Wilderness Preservation System, which protected 9 million acres of wilderness. (figure 2, pages 12-13).

1970: Senator Gaylord Nelson founded Earth Day, focusing national attention on the environment.

1972: President Richard Nixon signed legislation designating the Scapegoat Wilderness in Montana. This was the first wilderness area to be designated by Congress because of a grass-roots citizens' effort.

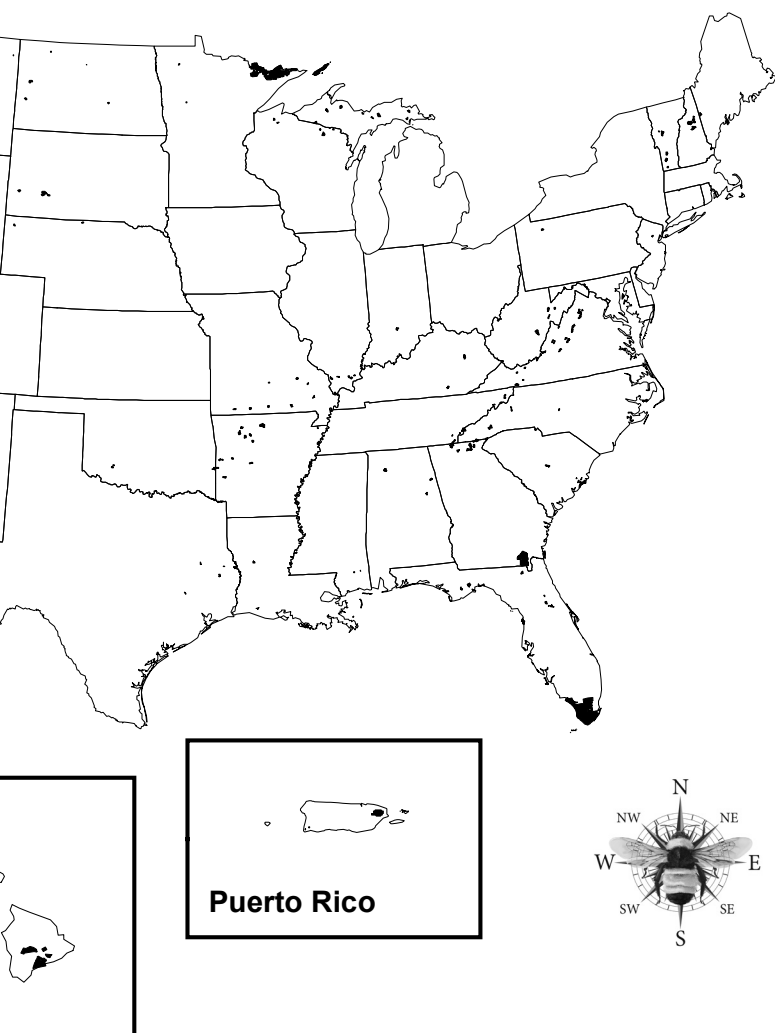


Figure 2. The National Wilderness Preservation System. Find the wilderness area nearest to you. For more wilderness maps and to identify the name of the wilderness closest to you, visit <http://www.wilderness.net/NWPS/maps>.

1975: President Gerald Ford signed the Eastern Wilderness Areas Act, protecting 207,000 acres of wilderness on national forests in the East, South, and Midwest. With this act, Congress rejected the view that once-logged or once-inhabited lands can never qualify for Wilderness Act protection.

1978: President Jimmy Carter signed the Endangered American Wilderness Act. With this act, 1.3 million acres of national forest lands across the West were designated as wilderness, all on the basis of proposals initiated by local citizens groups.

1984: President Ronald Reagan (who signed more individual wilderness protection laws than any other President) signed wilderness laws for 22 States in a single year, protecting some 8 million acres.

What Benefits Do Wilderness Areas Provide?

Backcountry areas and wilderness areas provide many benefits to the American people. Wilderness, however, is a special type of backcountry area. No human developments are allowed in wilderness, and wilderness is a place where people can visit but not live. Wilderness areas, therefore, provide benefits beyond those provided by backcountry areas. Some wilderness benefits include the following.



Clean water and air—People drink water that flows from wilderness and breathe air that is replenished by the filtering action of plants and forests found in wilderness.

Photo by Babs McDonald.



Legacy—The wilderness idea is a part of U.S. history and is passed as a **legacy** to our children. For many Americans, just knowing wilderness exists inspires pride and a sense of responsibility.

Photo courtesy of Forest Service,
Pacific Southwest Region.



The economy—Wilderness areas have a positive impact on local and regional **economies**. Counties with wilderness areas usually have higher income and employment growth rates than the national average.

Photo by Babs McDonald.

Wilderness Timeline *continued*

2001: President William Clinton's Roadless Area Conservation Rule was adopted. This rule protected some 60 million acres of "roadless areas" on national forests, much of which local citizen groups had hoped to see Congress preserve as wilderness.

2005: President George W. Bush signed into law wilderness protection for 11,000 acres of desert canyon lands in northwestern New Mexico and 10,000 acres of tropical rain forest in Puerto Rico—the only tropical rainforest in America's National Forest System.



Recreation—Every year, more than 12 million people visit wilderness areas to hike, watch birds, ride horses, hunt, fish, go canoeing, take pictures, and stargaze. Many visitors value wilderness for the challenging recreation experiences it provides. Other visitors value wilderness as a **refuge** from our fast-paced, developed society. Wilderness provides a place to reconnect with oneself and with the land. Wilderness provides solitude. Photo by Babs McDonald.



Wild animals and plants—Wildlife is protected in wilderness, from grizzly bears to wildflowers. Wilderness protects natural processes, including natural disturbances like fire. Natural processes support **biodiversity**. A diversity of life forms is critical to global environmental health.

Photo courtesy of Forest Service, Northern Region.



Science—Wilderness areas provide a special place for scientists to study the natural world.

Photo courtesy of Forest Service, Northern Region.

From <http://www.fs.fed.us/r2/recreation/wilderness/faq/#6>.

2009: President Barack Obama signed the Omnibus Public Land Management Act of 2009. This bill protected 2.1 million acres of new wilderness areas in California, Colorado, Idaho, Michigan, New Mexico, Oregon, Utah, Virginia, and West Virginia.

2014:
50th Anniversary
of the Wilderness
Act of 1964.

Time Line information is from http://www.nature.nps.gov/views/KCs/Wilderness/HTML/ET_04_Why.htm and <http://www.scotchmanpeaks.org/history-of-wilderness-progress/>.

PACK TO BACK:

INVESTIGATING BACKPACKING AND OTHER BACKCOUNTRY
AND WILDERNESS ACTIVITIES

MEET THE SCIENTISTS!

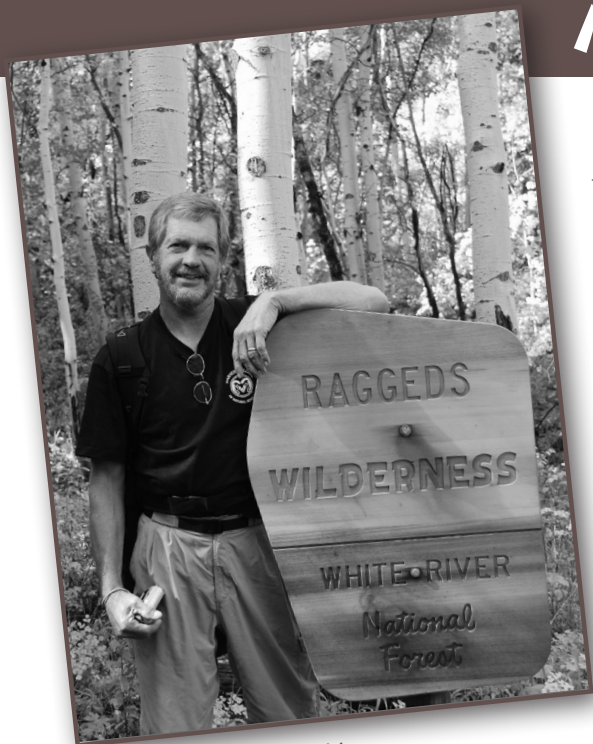


Photo by Babs McDonald.

◀ Dr. Ken Cordell, Social Scientist

My favorite research experience was conducting a national survey of recreationists from all across the United States. I learned much from this survey about the diversity of activities people enjoy outdoors. This photo was taken while I was hiking in Colorado (figure 1).

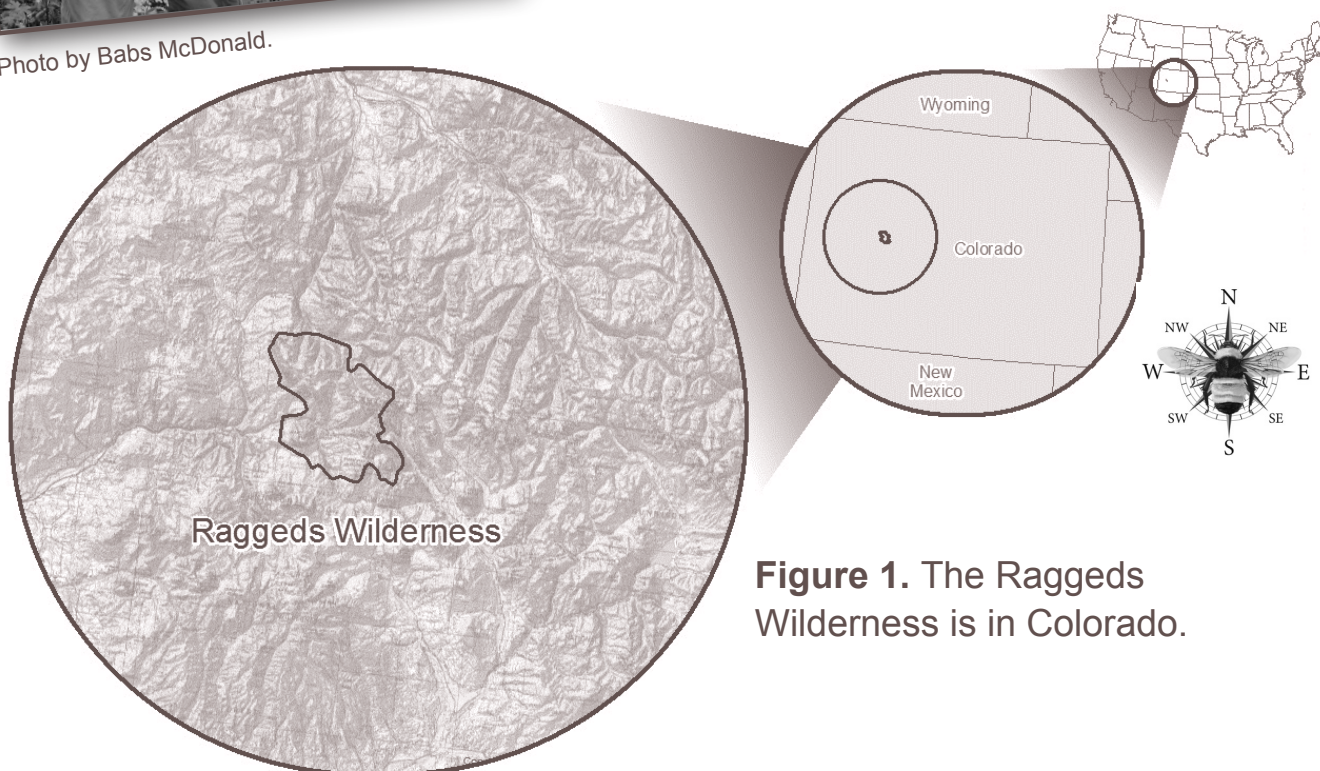


Figure 1. The Raggeds Wilderness is in Colorado.

► **Dr. Michael Bowker,
Social Scientist**

My favorite science experience was working on understanding the users of Georgia's State parks. State parks are similar to national parks but are smaller and are operated by each State on behalf of the State's citizens and visitors. This photo was taken while I was hiking in New Zealand. New Zealand is in the Southern Hemisphere (figure 2).



Photo by Colin Bowker.

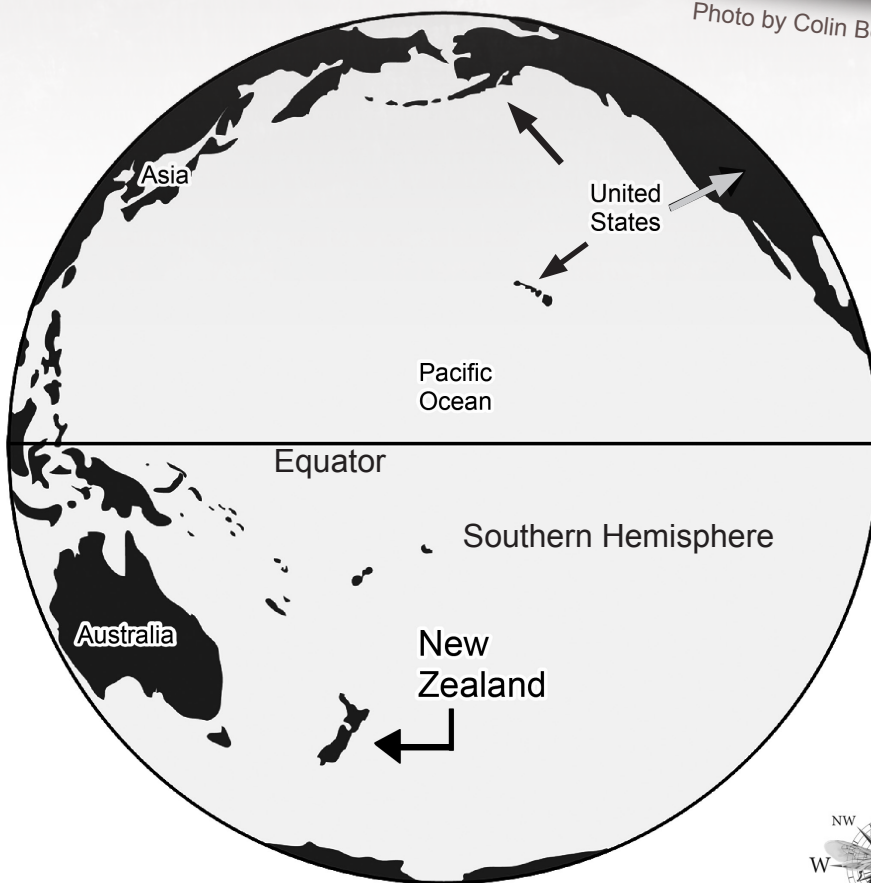
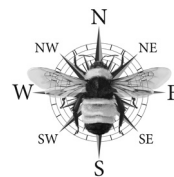


Figure 2. The Southern Hemisphere is the area of Earth south of the Equator. New Zealand is in Earth's Southern Hemisphere in the western Pacific Ocean.



What Kind of Scientist Did This Research?

social scientist:

This scientist studies human societies and human behaviors.



Thinking About Science

Science is important to human society. Because humans are curious, they have always tried to explain things that are not easy to understand. Scientists explore mysteries from the depths of the ocean to outer space. Sometimes scientists work to describe, understand, or explain what they have observed. Sometimes scientists unexpectedly discover new information, facts, or events.

One goal of science is to discover new relationships or things. Another goal is to explore what happened in the past. Still another science goal is to **project** what might happen in the future. In this research, the scientists were interested in how humans might behave differently in the future. When science helps us to understand what might happen in the future, we can plan for a better future.

Thinking About the Environment

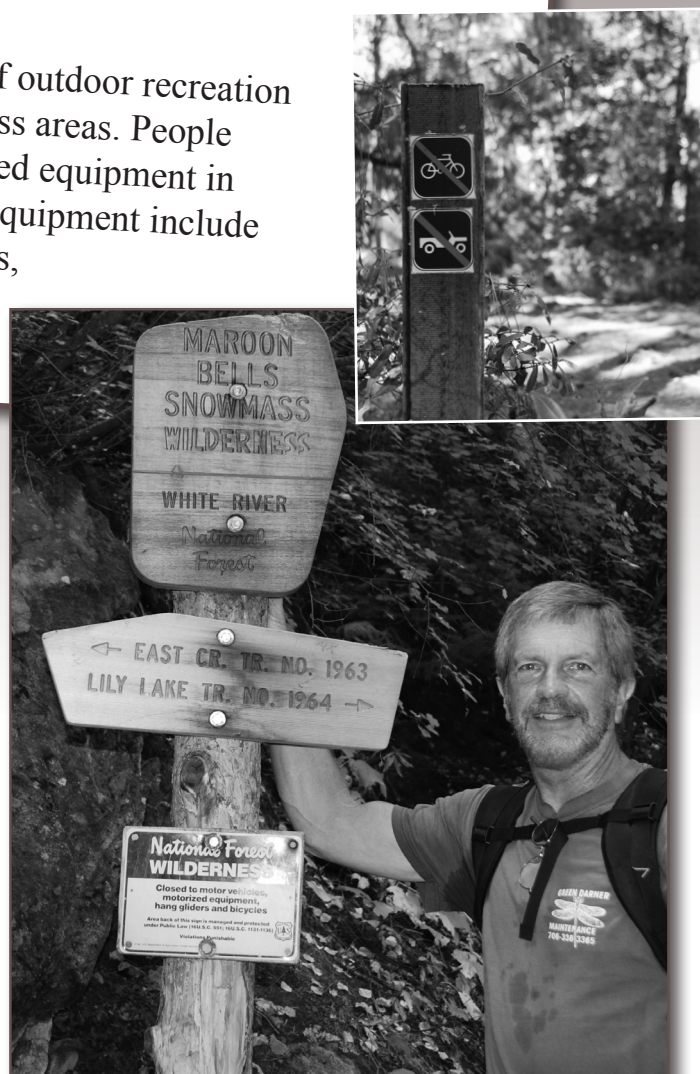
Do you know the difference between a backcountry area and a wilderness area? These two areas are similar in many ways. One of the main differences between them has to do with a legal designation (figure 3).



Backcountry areas are natural primitive areas, with little more than trails and unpaved roads among their natural wild features. Backcountry areas may sometimes include human developments (figure 4). Wilderness areas are special backcountry areas. Wilderness areas designated under the Wilderness Act of 1964 are Federal lands. The Federal Government manages these lands on behalf of every American. These Federal lands are a part of the U.S. National Wilderness Preservation System (NWPS). When an area becomes a part of the NWPS, certain activities are prohibited. Most notably, no motorized or mechanized equipment or human developments are allowed in designated wilderness areas.

People often participate in the same kinds of outdoor recreation activities in backcountry areas and wilderness areas. People may, however, use motorized and mechanized equipment in backcountry areas. Examples of motorized equipment include all-terrain vehicles (ATVs), off-road vehicles, bicycles, airplanes, snowmobiles, and motorboats.

Figure 3. Dr. Cordell had already hiked a few miles in the White River National Forest before reaching the boundary between national forest backcountry and Maroon Bells Snowmass Wilderness in Colorado. Notice the small sign at the bottom of the post. This sign tells visitors that motorized equipment, including bicycles, are prohibited in wilderness areas. If you were riding on an ATV and came to the wilderness boundary, what would you need to do? In some wilderness areas, you might see a sign like the one in the smaller photograph.



Photos by Babs McDonald.



Figure 4. Backcountry areas, unlike wilderness areas, may have human developments, and people may use motorized and mechanized equipment within backcountry areas. Photo courtesy of Forest Service, Northern Region.

When doing research to understand the future of certain types of outdoor recreation activities, the scientists in this study identified activities that could be done in both backcountry and in wilderness areas. Look closely at figures 3 and 4. Based on

what you now know about backcountry and wilderness areas, name two outdoor recreation activities that can be done in both areas. Name two activities that can be done in backcountry areas but not in wilderness areas.

Introduction

Backcountry managers and wilderness managers want to do the best they can to protect the environments they manage. These managers also want people to enjoy the time they spend visiting backcountry and wilderness areas.

To do the best job, managers consider the number of people who are likely to participate in different backcountry and wilderness activities. Managers also want to have some idea of how many people will participate in these activities in the future. Managers want to know this number because too many people visiting backcountry and wilderness areas can reduce visitor enjoyment. Too many people might also reduce environmental quality by damaging animal and plant habitats.

The scientists in this study wanted to help backcountry and wilderness managers by projecting participation rates for different backcountry and wilderness activities. The scientists wanted to project the numbers of participants in backcountry and wilderness activities by the year 2060. The scientists identified four activities that occur in wilderness or other backcountry areas. These activities were challenge activities, horseback riding on trails, hiking, and visiting primitive areas (figures 5–8c).

The scientists in this study wanted to answer two questions: (1) How many people in the United States are projected to participate in four backcountry and wilderness activities in 2060 compared with participation in 2008? (2) On average, how many days per year is each person projected to participate in 2060 compared with the number of days per year in 2008?

Figure 5. Challenge activities include rock climbing, mountain climbing, mountain biking, and cave exploring. Look closely to find the rock climbers in this photo. They are climbing a mountain in Scotland called Buachaille Etive Mòr (**boo ka la ə tiv mòr**).

Photo by Babs McDonald.





Figure 6. Many people enjoy riding horses in backcountry and wilderness areas. Photo courtesy of Discover Outdoors, <http://www.discoveroutdoors.com>.



Figure 7. Hiking is one of the most popular backcountry activities. These kids are hiking in Scapegoat Wilderness in Montana. Photo courtesy of Forest Service, Northern Region.

Figure 8a. Visiting primitive areas includes activities like backpacking and primitive camping. Here, David Baldwin (on the right) and his father Dave are backpacking in Cumberland Island Wilderness.

Photo by Babs McDonald.



Figure 8b. Cumberland Island Wilderness and Okefenokee Wilderness are in southern Georgia.

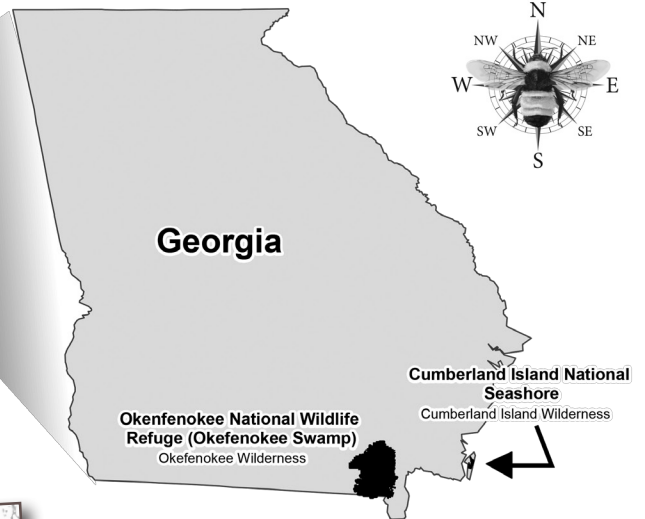
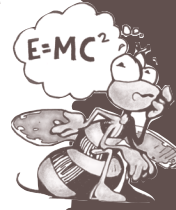


Figure 8c. Many people camp in the Okefenokee Wilderness. The Okefenokee Wilderness is a large swamp. The only way to travel in the Okefenokee Wilderness is by canoe or kayak. Because the Okefenokee Wilderness is a swamp, campers must set up camp on wooden platforms. Photo

by Babs McDonald.

Number Crunch

Over how many years did the scientists compare backcountry and wilderness recreation participation?



Reflection Section



Reread the first two sentences in the introduction. How would having an idea of how many people are likely to participate in backcountry and wilderness activities in the future help managers do their job better today?

Look at figures 5–8a and 8c. What makes these activities appropriate for wilderness areas? If you need a hint, reread “Thinking About the Environment.”

Look at figure 8c. How do you think managers preserve the value of solitude in the Okefenokee Wilderness?

Methods

The scientists used existing information to make their projections. First, they looked at data collected as part of a national survey of outdoor recreation. This survey included questions about participation in a number of outdoor recreation activities, including the four backcountry and wilderness activities shown in figures 5–8a and 8c.

This national survey asked questions of a **random** sample of American adults (see page 26). The number of people reporting participation in 2008 in each activity was recorded. Then, the scientists identified the **demographic** characteristics **associated** with people participating. For example, the scientists identified the percentage of women and the percentage of men who said they participated in mountain climbing in 2008.

This survey helped the scientists determine whether people with different demographic characteristics would be more or less likely to participate in backcountry and wilderness activities (figure 9).

The scientists then estimated the total number of people in the United States who might have participated in these activities in 2008. The scientists based their estimates on the demographic information they collected and compared it with U.S. demographics in the entire U.S. population. For example, assume that 25 percent of the people over age 60 answering the survey reported they had gone hiking in 2008. The scientists would have calculated a number representing 25 percent of the entire U.S. population over age 60 in 2008.

To learn how kids spend their time outdoors, read “Time Out!” by visiting

<http://www.naturalinquirer.org/Time-i-34.html>

Demographic and Other Characteristics	Probable Effect on Backcountry and Wilderness Participation
African American	Less likely to participate
Native American/American Indian	More likely to participate
Asian American	Less likely to participate
Hispanic	Less likely to participate, except for day hiking
More education	More likely to participate
Higher income	More likely to participate
Gender	Males more likely to participate
Living in a city	Less likely to participate
Living close to backcountry areas	More likely to participate
Continuing climate change	Somewhat less likely to participate

Figure 9. The scientists determined the relationship between participation and demographic characteristics.



Photo by Babs McDonald.

Why Are Random Samples Powerful?

When a random sample is taken, every member of the population has an equal chance of being selected for the sample. A population is the total number of individuals in an area. A sample contains only a percentage of the population from which the sample is taken. Because every member of the population has an equal chance of being selected in a

random sample, scientists assume that their random sample accurately represents the population.

For example, think about having a large bag (about 1 pound) of M&Ms®. You might want to know how many blue M&Ms® are in the bag. Instead of counting the entire bag, you decide to take a sample. You shake up the bag and pour out 50 M&Ms®. You then count the number of blue M&Ms®. You know that an average pound bag of M&Ms® contains about 660 M&Ms®. Out of the 50 M&Ms®, 10 M&Ms®, or 20 percent of your random sample, are blue. You calculate 20 percent of 660. You estimate that 132 M&Ms® in the bag are blue. You feel confident that your estimate is close to the actual number of blue M&Ms® because your sample was taken randomly. You can do this experiment yourself at home or in your classroom.

Scientists would report this number for the total number of people over age 60 hiking in 2008 (table 1). Remember, the estimates shown in table 1 were calculated from a random sample of Americans who answered the survey questions.

The scientists then looked at population projections for the year 2060. Population projections told the scientists how many women and how many men, for example, are likely to be living in the United States in 2060. The scientists identified population projections for a number of demographic characteristics (see figure 9). The scientists created a mathematical equation, or

model. They entered this model into a computer. In the model, the scientists included the likelihood that individuals with certain demographic characteristics would participate in an activity. The scientists included information from 2008, the population projections to 2060, and demographic information. The scientists used the mathematical model to project likely participation in each of the four backcountry and wilderness activities in 2060. Then, the scientists compared the projections for 2060 with the information they had for 2008.

Table 1. U.S. participation in 2008 for the four backcountry and wilderness activities.

Source: The National Survey on Recreation and the Environment.

Backcountry and Wilderness Activities	Number of Participants (in millions)	Percentage of the Population Participating	Average Number of Days Per Participant	Total Days in 2008 (in millions)
Challenge activities: mountain climbing, rock climbing, mountain biking, caving	25	11	4.8	120
Horseback riding on trails	17	7	16.3	262
Hiking	79	33	22.9	1,826
Visiting primitive areas: backpacking, primitive camping	91	38	13.2	1,233

Reflection Section



How Do You Read Tables With Large Numbers?

Scientific tables with large numbers usually present the large numbers in shorthand, which makes the table easier to read. In the first column in table 1, for example, the words, “in millions” is in parentheses. This header label means that, for the number of people participating in challenge activities, you should add 6 zeroes to 25, making it 25,000,000. Likewise, you should add 6 zeroes to the other numbers in the first and last columns to understand the true value.

What do you do when the shorthand number includes a decimal point? Insert a comma in the place of the decimal point, and substitute the number behind the decimal point for the first zero. For example, 25.3 would be written as 25,300,000 in table 1.



The scientists built a mathematical model to describe things associated with backcountry and wilderness activity participation in the United States. In addition to the effects of population change, what other changes might affect backcountry and wilderness activity participation by the year 2060?

Do you think more or fewer people are projected to participate in backcountry and wilderness activities in 2060 compared with 2008? (Hint: Think about whether the population is expected to grow or shrink over the next 50 years.)

Findings

The scientists projected an increase in participation in the four backcountry and wilderness activities (table 2).

The scientists projected that the percentage of people age 16 or older participating in backcountry and wilderness activities will increase between 2008 and 2060 (figure 10).

Table 2. More people overall may be participating in each of the four backcountry and wilderness activities in 2060 compared with the number in 2008.

Backcountry and Wilderness Activities	Projected Number of Participants in 2060 (in millions)	Projected Average Number of Days Per Participant in 2060	Total Days in 2060 (in millions)
Challenge activities: mountain climbing, rock climbing, mountain biking, caving	46.4	4.71	219
Horseback riding on trails	30.6	16.8	503
Hiking	134.4	24.2	3,330
Visiting primitive areas: backpacking, primitive camping	141	13.1	1,909

Compare table 2 with table 1 (below and on page 27).

Table 1. U.S. participation in 2008 for the four backcountry and wilderness activities.

Backcountry and Wilderness Activities	Number of Participants (in millions)	Percentage of the Population Participating	Average Number of Days Per Participant	Total Days in 2008 (in millions)
Challenge activities: mountain climbing, rock climbing, mountain biking, caving	25	11	4.8	120
Horseback riding on trails	17	7	16.3	262
Hiking	79	33	22.9	1,826
Visiting primitive areas: backpacking, primitive camping	91	38	13.2	1,233

Source: The National Survey on Recreation and the Environment.

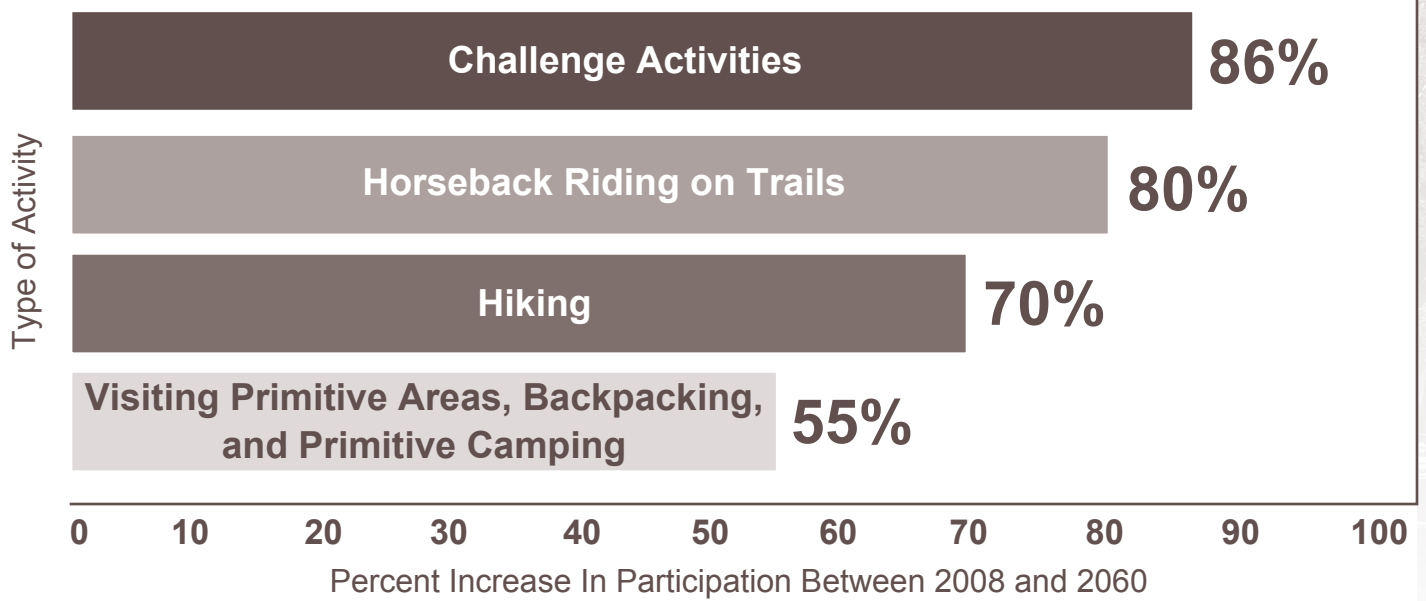


Figure 10. The projected percentage increase in the number of people age 16 or older who will participate in backcountry and wilderness activities between 2008 and 2060.

Reflection Section

How might the experience of backcountry and wilderness participants be different in 2060 compared with 2008? Think about what may not increase for these activities.

Carefully observe figure 10. How would you explain these findings? For example, what is likely to cause a large increase in challenge activity participation in the future?

Discussion

The scientists said that if their projections are correct, more people will want to use backcountry and wilderness areas in the future. If the number of people hiking increases, for example, then more people will be hiking on the same trails. This increased participation will change the experience of hiking on backcountry and wilderness trails in the future. The scientists found that when climate change is included in their models, the number of people participating in backcountry and wilderness activities in the future may still increase, but the rate of growth will likely be lower.



If the scientists' projections are correct, what wilderness benefits are likely to be affected in the future?

How old will you be in 2060?
Do you think you will be likely to participate in backcountry or wilderness activities in 2060?
Why or why not?

If you were a scientist offering information to a backcountry or wilderness manager about the number of participants in his or her area 10 years from now, what would you tell him or her?

Glossary

associated (ə sō shē āt ed): Closely related or connected.

authorize (ō thə rīz): To empower, approve, or support.

biodiversity (bī ō dī vər sə tē): A measure of the differences between the types and numbers of living things in a natural area.

compromise (kām prə mīz): (1) A way of reaching agreement in which each side gives up something to end an argument or dispute. (2) A change that makes something worse and that is done for a bad reason.

demographic (de mə gra fik): Physical characteristics of people, such as their age, sex, or race.

designate (de zig nāt): To choose or appoint; to give a name to.

designation (de zig nā shən): The act of choosing or appointing; A given name.

deviation (dē vē ā shən): An action, behavior, or condition that is different from what is usual or expected.

economy (e kə nə mē): The process or system by which goods and services are produced, sold, and bought in a country or region.

habitation (ha bə tā shən): The act of living in a place.

increment (īj crə mənt): One of a series of regular additions in value or quantity.

insight (īn sīt): The ability to understand people or situations in a very clear way.

legacy (le gə sē): Something (such as property, money, or the results of an action) that is received from someone who has died.

manipulation (mə ni pyə lā shən): An action that moves or controls something by hand or by using a machine.

primeval (prī mē vəl): Very old or ancient.

primitive (pri mə tiv): Original. Natural areas with no development.

project (prə jekt): To calculate or estimate something for a time in the future.

random (ran dəm): Selection purely by chance, with every element having an equal chance of being selected.

refuge (re fyüj): A place that provides shelter or protection.

remote (ri mōt): Far away from other people, houses, cities, etc.

solitude (sā lə tüd): The quality or state of being alone or remote from society.

untrammeled (un tra məl[d]): Unrestrained; free.

Accented syllables are in **bold**.
Marks and definitions are from
<http://www.merriam-webster.com>.



If you are a Project Learning Tree-trained educator, you may also use the following activity as an added resource: "School Yard Safari."



FACTivity

In this FACTivity, you will answer the question: “How might a changing climate affect the projection of backcountry and wilderness participation by the year 2060?”

Methods

In the Discussion section of the article, you read that when climate change was included in the mathematical models, the scientists’ projections were different. The projected rate of increase in activity participation was lower than was projected without climate change. The next section includes two tables. These tables come directly from the scientists’ mathematical models. Table 3 shows the projected percentage increase or decrease in backcountry and wilderness activities when climate change was not included in the models. Table 4 shows the projected percentage increase or decrease in backcountry and wilderness activities when climate change was included in the models.

In groups of three to four students, examine the tables. First, examine table 3. What do the numbers in parentheses indicate? Now examine both tables, comparing the data in each table for each activity.

- What pattern do you notice overall?
- Why do you think you see this pattern?
- Where do you see a **deviation** from this pattern?

Discuss your observations and thoughts in your small group. Your teacher may also lead a class discussion about the tables’ data. In your discussion, think carefully about how a changing climate might affect outdoor recreation participation in the future. What do you know about climate change that might affect participation?

Using the data in the first and third columns of tables 3 and 4, construct two bar graphs with the following x and y axes. You will construct one bar graph for the first column of tables 3 and 4, and one bar graph for the third column of tables 3 and 4.

- Y axis: Percentage from -10 to 100 in **increments** of 5.
- X axis: For each of the four activities, two bars will be created. One bar will represent 2060 with no climate change, and a second bar will represent 2060 with climate change included. Give each bar graph a title and label both axes.

Table 3

No Climate Change By the Year 2060	Percent Increase (Decrease) in Adult Participants (in millions)	Percent Increase (Decrease) in Days Per Participants	Percent Increase (Decrease) in Total Days (in millions)
Challenge activities	85	(1)	82
Horseback riding on trails	87	3	92
Hiking	72	6	82
Visiting primitive areas	56	(1)	55

Table 4

Climate Change Occurring to the Year 2060	Percent Increase (Decrease) in Adult Participants (in millions)	Percent Increase (Decrease) in Days Per Participants	Percent Increase (Decrease) in Total Days (in millions)
Challenge activities	81	0	81
Horseback riding on trails	92	(4)	83
Hiking	69	7	81
Visiting primitive areas	54	(3)	50

After you create the bar graphs, carefully observe the graphs.

- Consider what you have learned from examining the tables. Do you have any additional **insight** into how climate change might affect these four activities in the future?
- Is it easier for you to understand the data when they are in tables or in bar graphs?
- Name one advantage of examining the data in tables.
- Name one advantage of examining the data in bar graphs.

Now answer the question posed at the beginning of this FACTivity.

FACTivity



The question you will answer in this FACTivity is, "Should forest managers allow mountain biking in potential wilderness areas?"

Methods

First, read the introductory material that follows. You may want to search the Internet for more information about the wilderness mountain biking debate. (See "Web Resources" following this FACTivity.) After you have read the introduction and done additional research, your teacher will form small groups with four to six students.

Based on your reading and research, discuss the question given above. Use the graphic organizer that follows the introductory material to organize your thoughts. Your group will decide if they would allow mountain biking in potential wilderness areas. Your group can also come up with a **compromise** position. For example, you might recommend that limited mountain biking could be allowed in some potential wilderness areas if certain conditions were met.



Photo courtesy of Forest Service, Northern Region.

Using the second graphic organizer, write your group's decision and justification about allowing mountain biking in potential wilderness areas. After all groups have made a decision, your teacher will hold a class discussion about mountain biking in potential wilderness areas. After hearing all of the arguments, hold a class vote about whether to allow mountain biking in potential wilderness areas.

Section 4(c) of the Wilderness Act of 1964 states that:

Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and, except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, *no other form of mechanical transport*, and no structure or installation within any such area.

(Emphasis added)

The statement that prohibits “...no other form of mechanical transport...” is the statement that prohibits mountain biking in wilderness. When the Wilderness Act of 1964 became law, few mountain bikes were found in the backcountry.

Introduction

In 2009, some Forest Service managers decided that mountain biking should be prohibited in areas that have been identified as potential future wilderness areas. These areas were not wilderness areas at the time, but they had the qualities necessary for wilderness designation. The managers felt that mountain biking in these areas might destroy some of the qualities that made the areas eligible for wilderness designation. National Park Service managers agreed with them.

Garry Oye (ō ē) was chief of the National Park Service’s wilderness and recreation section. He said, “Existing lands that have been determined to be eligible for wilderness, they should not be considered for potential mountain bike trails at this point. We wouldn’t want to **authorize** a use if we’ve already determined that the lands should be considered for wilderness. We wouldn’t want to allow a use that would **compromise** that future designation. That’s consistent with our policies.”

The International Mountain Biking Association felt differently about the decision to prohibit mountain biking in these potential wilderness areas. This association had been working with the National Park Service to study mountain biking in certain national parks. Although mountain biking was already allowed in some national parks, the association was interested in opening more national parks to mountain biking. Areas in some of those national parks and

national forests had been identified for possible designation as wilderness areas.

“There is a wilderness experience, a truly backcountry experience, that is part of the idea and the concept behind wilderness,” said Michael Carroll, associate director of The Wilderness Society’s Wilderness Support Center. “Wilderness preserves a landscape that is similar to the landscape that our fathers and their fathers before them were able to experience. It’s hard to argue that that experience has been preserved when you have heavy traffic zipping by on mountain bikes after you’ve spent two days hiking in.”

The International Mountain Biking Association had worked to build partnerships with the National Park Service. They had met with officials and sent trail crews out to both repair trails and demonstrate how to build trails that will stand up to mountain bike use. The association had not suggested that trails be built in wilderness. The association had focused on creating more riding opportunities elsewhere in national parks. When new mountain biking trails were built in national parks, the association hoped to show that trails can be well designed and used cooperatively by hikers and bikers.

Mountain bikers also argued that they take good care of the trails that they use. They



Photo courtesy of Forest Service, Northern Region.

argued that they support wilderness areas and want to enjoy the same backcountry experience as hikers, backpackers, and horseback riders. They just want to enjoy the experience on a mountain bike.

Additional Resources

Wilderness Mountain Biking Forum

http://www.warriorsociety.org/News/mtn_bike.pdf



Graphic Organizer 1

for the Mountain Biking Question

Use complete sentences, proper grammar, and correct punctuation.

Benefit of Wilderness (see sidebar on pages 14–15)	How Mountain Biking Might Affect Wilderness Benefits in the Area
Clean water and air	
Wild animals and plants	
Recreation	
The economy	
Legacy	
Science	



Graphic Organizer 2 for the Mountain Biking Question

Use complete sentences, proper grammar, and correct punctuation.

Group Members: State the group's decision about allowing mountain biking in potential wilderness areas and provide justification for this decision.	

Introductory information adapted from <http://www.nationalparkstraveler.com/2009/10/forest-service-drawing-line-mountain-bikers-potential-wilderness-national-park-service-agrees4742>.

Web Resources

Wilderness

<http://wilderness.net>

Wilderness Investigations

<http://www.wilderness.net/NWPS/k12>

Discover the Forest

<http://www.discovertheforest.org/where-to-go>

Tips for Taking Kids to the Backcountry

http://www.trails.com/list_1145_tips-taking-kids-backcountry.html

The Wild Foundation

<http://www.wild.org/>

International Union for the Conservation of Nature (IUCN) Protected Lands Categories

http://www.iucn.org/about/work/programmes/gpap_home/gpap_quality/gpap_pacategories/

Locate Protected Areas Worldwide

<http://www.protectedplanet.net>

Natural Inquirer Wilderness Benefits Edition

<http://www.naturalinquirer.org/Wilderness-Benefits-Edition-i-11.html>

Using *Natural Inquirer* to Interpret Real-World Data

<http://www.naturalinquirer.org/>



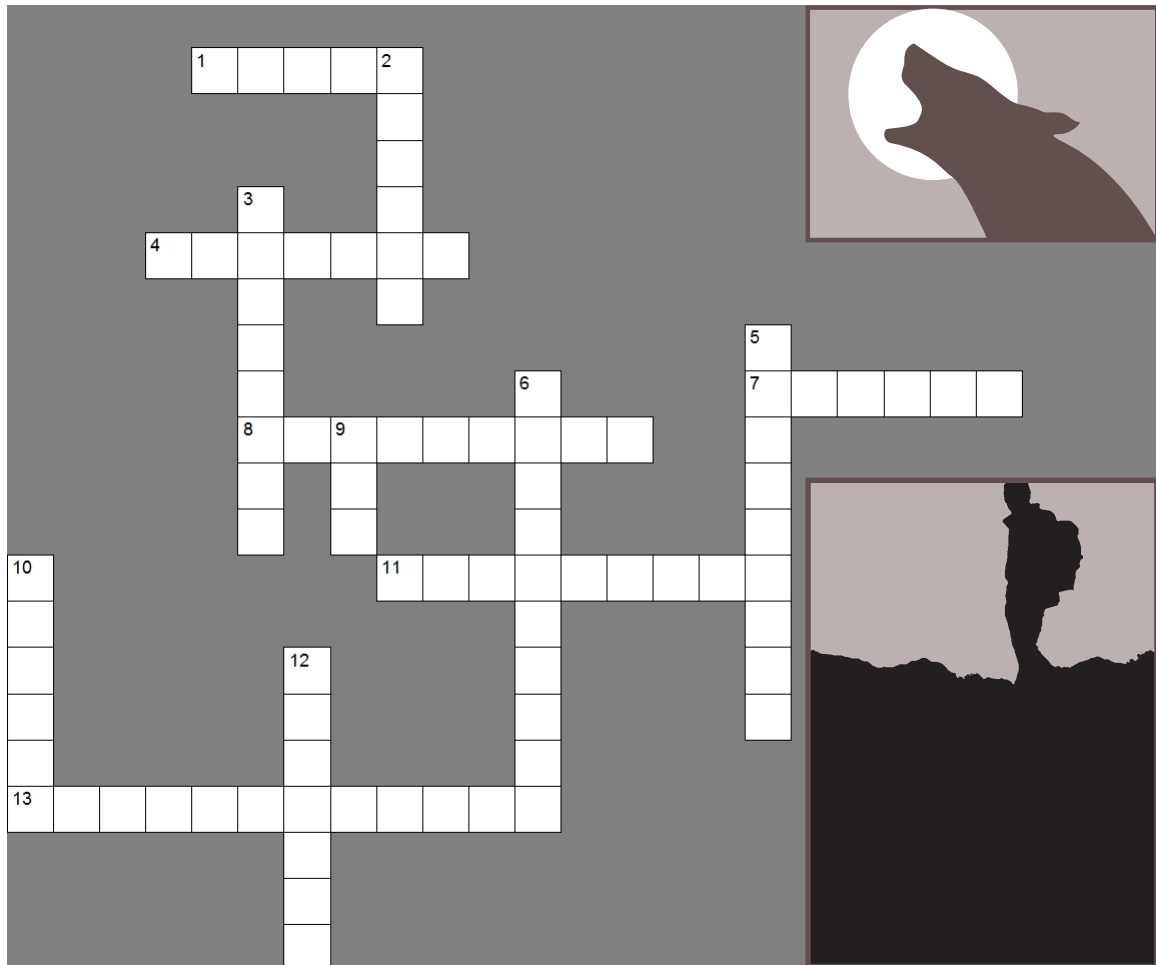
Pack to Back Photo Challenge

Explain what each of these photos means in relation to the Pack to Back monograph. You may write your explanation or hold a class discussion. If you write your explanation, use complete sentences with proper grammar, spelling, and punctuation.



Pack to Back

Crossword Puzzle



Across

1. Something that represents a system.
4. To calculate or estimate something for a time in the future.
7. A place that provides shelter or protection.
8. Agreed to by everyone.
11. The action or process of increasing, especially in quantity or value.
13. A bicycle made especially for off-road use.

Down

2. Something (such as property or money) that is received from someone who has died.
3. The quality or state of being alone or remote from society.
5. Natural areas with no development.
6. A way of reaching agreement in which each side gives up something to end an argument or dispute.
9. Initials for All-Terrain Vehicle.
10. Selection purely by chance, with every element having an equal chance of being selected.
12. The ability to understand people or situations in a very clear way.

Which National Education Standards Can Be Addressed Using This Monograph?

National Science Education Standards Addressed in This Article

National Science Education Standard	Where the Standard Is Addressed
Abilities Necessary To Do Scientific Inquiry	Who Are Scientists? Characteristics of scientists; Methods and Why Are Random Samples Powerful? Pulling a random sample; Tables 1 and 2: Reading tables; How Do You Read Tables With Large Numbers? Reading tables; Figure 12: Reading bar graphs; Findings Reflection Section: Reading tables; FACTivity Methods: Reading tables and constructing bar graphs.
Understandings About Scientific Inquiry	Thinking About Science: Goals of science; Methods and Why Are Random Samples Powerful? Understanding random samples; How Do You Read Tables With Large Numbers? Understanding how to read tables; What Is a Scientific Model? Introduction to the use of scientific models; Second FACTivity Methods: Constructing an argument from evidence and reason.
Regulation and Behavior	Figure 3 and Introduction Reflection Section: The Wilderness Act of 1964 regulates behavior by prohibiting certain activities in wilderness areas.
Populations and Ecosystems	What Benefits Does Wilderness Provide? Wilderness provides ecosystem benefits and benefits to animal and plant populations.
Diversity and Adaptations of Organisms	What Benefits Does Wilderness Provide? Wilderness supports biodiversity.
Populations, Resources, and Environments	Welcome to the Wilderness 50 Monographs and Thinking About the Environment: The wilderness concept.
Risks and Benefits	What Benefits Do Wilderness Areas Provide? Provides a list of wilderness benefits.
Science As a Human Endeavor	Who Are Scientists? Describes characteristics of scientists; Meet the Scientists: Puts a human face on science; What Kind of Scientist Did This Research: Defines social scientist; Thinking About Science: Describes some of the goals of science.
Nature of Science	Thinking About Science: Describes some of the goals of science; Introduction: How science helps managers plan for the future.

Social Studies Education Standards Addressed in This Article

National Curriculum Standards for Social Studies	Location in Article
Culture	Second FACTivity Introduction: Describes the mountain biking culture as revealed through the International Mountain Biking Association.
Time, Continuity, and Change	Welcome to the Wilderness 50 Monographs! Time Line shows the progression of wilderness thought over time; Introduction: The scientists were projecting how recreation participation might change in the future. Introduction Reflection Section: Students are asked to explain how projections into the future might help backcountry and wilderness managers; Findings Reflection Section: Students are asked to imagine how backcountry and wilderness experience may be different in the future; Discussion and Discussion Reflection Section: Information and reflection about how the wilderness participation situation and benefits may change in the future, and how individuals may change as they get older; First FACTivity: Consideration of how climate change might affect future wilderness participation.
People, Places, and Environments	The entire monograph addresses the relationship of people, places, and environment.
Individuals, Groups, and Institutions	Welcome to the Wilderness 50 Monographs! Congress passed the Wilderness Act, Time Line introduces the actions of individuals, Congress, and groups. Second FACTivity: How the International Mountain Biking Association has worked to increase backcountry biking opportunities.
Power, Authority, and Governance	Welcome to the Wilderness 50 Monographs and Thinking About the Environment: The Wilderness Act of 1964 and what it prohibits in wilderness areas; Time Line describes Congressional and Presidential action.
Production, Distribution, and Consumption	What Benefits Do Wilderness Areas Provide? Recreation and economic benefits are provided by wilderness areas.
Global Connections	Welcome to the Wilderness 50 Monographs! The Wilderness Act of 1964 provided a model for the protection of wild areas around the world.
Civic Ideals and Practices	Welcome to the Wilderness 50 Monographs! Time Line describes the development of public support for wilderness; What Benefits Do Wilderness Areas Provide? The legacy value of wilderness represents a civic ideal; Second FACTivity: The International Mountain Biking Association has worked with the National Park Service to increase mountain biking opportunities.

Common Core Standards for Science Addressed in This Article

Common Core Standard	Where the Standard Is Addressed
Scientific and Engineering Practices	
Asking Questions (for science) and Defining Problems (for engineering)	Who Are Scientists? Asking questions is a characteristic of scientists; Thinking About Science: Goal of science is to discover new information. Introduction: The research questions in this study.
Developing and Using Models	Methods: The scientists used mathematical models; What Is a Scientific Model: Introduction to the scientific use of models; Methods Reflection Section: Consider what other changes might be reflected in the scientists' model.
Planning and Carrying Out Investigations	The entire monograph focuses on planning and carrying out an investigation.
Analyzing and Interpreting Data	Methods and Findings: Describe what the scientists did; Methods Reflection Section: Project what the scientists found based on inference; Findings Reflection Section: Observing and interpreting tables; First FACTivity: Interpret two tables.
Using Mathematics and Computational Thinking	Why Are Random Samples Powerful? Taking a random sample. Methods: How the scientists used mathematics to project future participation.
Constructing Explanations (for science) and Designing Solutions (for engineering)	Findings Reflection Section: Explaining the findings; Discussion Reflection Section: Explaining findings to a backcountry or wilderness manager and explaining how wilderness benefits may change in the future; First FACTivity: Explain how climate change may impact future participation patterns; Second FACTivity: Explain a decision based on available evidence and reason.
Engaging in Argument From Evidence	First and Second FACTivities: Using evidence, interpret and justify a position.
Obtaining, Evaluating, and Communicating Information	Methods: Obtaining and analyzing information; First and second FACTivities: Evaluating and communicating information.
Crosscutting Concepts	
Patterns	Findings and First FACTivity Methods: Examine the pattern evident in the tables.
Scale, Proportion, and Quantity	Methods and Why Are Random Samples Powerful? How samples are used to estimate population characteristics; Findings and first FACTivity: Reading tables; How Do you Read Tables with Large Numbers? How to read large numbers using shorthand.
Stability and Change	Welcome to the Wilderness 50 Monographs and Thinking About the Environment: The character of wilderness and the prohibition of human modification.
Core Idea LS2: Ecosystems: Interactions, Energy, and Dynamics	
LS2.C: Ecosystem Dynamics, Functioning, and Resilience	Welcome to the Wilderness 50 Monographs and Thinking About the Environment: The character of wilderness and the prohibition of human modification; What Benefits Do Wilderness Areas Provide? Ecosystem benefits provided by wilderness.
Core Idea ESS3: Earth and Human Activity	
ESS3.A: Natural Resources	The entire monograph is concerned with natural resources.
ESS3.C: Human Impacts on Earth Systems	Welcome to the Wilderness 50 Monographs and Thinking About the Environment: The character of wilderness and the prohibition of human modification; What Benefits Do Wilderness Areas Provide? Ecosystem benefits provided by wilderness.
ESS3.D: Global Climate Change	First FACTivity: Students are asked to evaluate data and consider the impact of climate change on the projection of backcountry and wilderness recreation.



SUMMER 2014

NATURE-ORIENTED PARENTING®



A guide for caregivers to teach children about the natural world

A companion to the *Natural Inquirer*

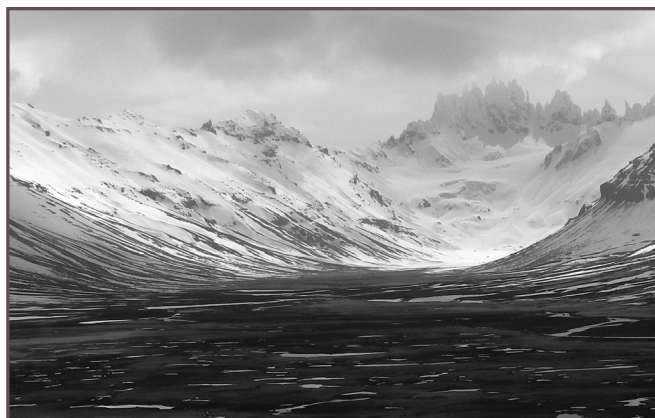
...Be natural



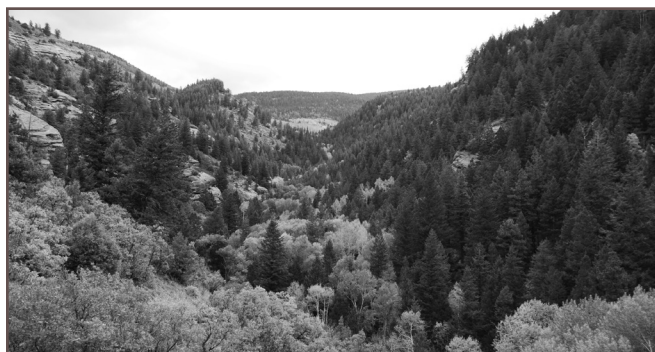
Celebrate the Wild!

Before European colonization and westward expansion, the lands and waters of what is now the United States were mostly wild. Wild areas are lands and waters in their natural condition with little to no influence from humans. Nature is the dominant influence in wild areas. In 1964, with an almost unanimous vote, Congress passed a law that established a system of wild areas referred to as the National Wilderness Preservation System (NWPS). From just 9.2 million acres established as wilderness by Congress in 1964, the amount of area in the NWPS has grown to nearly 110 million acres today.

Areas within the NWPS are the most protected of any land and water areas in the United States. They are referred to as wilderness areas. Motorized vehicles, mechanical transportation, mining, timber harvesting, farming, and other such uses are not permitted in NWPS areas. Some people question whether U.S. citizens are in support of having highly protected wilderness areas. This question has actually been studied. One study shows that citizens support the idea of having highly protected wilderness lands, and more than one-half of them think even more areas should be added for permanent protection. The U.S. public especially values wilderness areas, because they help provide clean water, good wildlife habitat, clean air, and protection for endangered plant or animal species. The sample of the public in this study also placed value on protecting wilderness so that their children and future generations will have wild, natural areas to visit and appreciate. Overall, the U.S. public places a higher value on preservation of the natural condition of wilderness than on using these natural areas as sources of minerals, timber, growing crops, or land development.



Izembek Wilderness. Photo courtesy of the U.S. Fish and Wildlife Service.



Maroon Bells Snowmass Wilderness. Photo by Babs McDonald.

The year 2014 marks the 50th anniversary of passage of the law that established the NWPS. A national conference celebrates this 50th landmark in 2014 in Albuquerque, NM. For more information about this celebration, visit <http://www.wilderness50th.org>.

Ken Cordell, Scientist Emeritus, USDA Forest Service

The 10 Hiking Essentials

Map • Knife • Compass (optionally supplemented with a GPS receiver) • Extra food
Sunglasses and sunscreen • Extra water • Extra clothes • Headlamp/flashlight
First aid kit • Fire starter (matches, chemical heat tabs, canned heat, or a magnesium stick)

The *Nature-Oriented Parenting* newsletter is designed for you to cut it out of the journal and take it home to share with your parents or other caregivers.



Family Hiking Activity

Hiking with kids is a great way to connect them with the outdoors at a young age, but it can also be intimidating for the parent planner. We challenge you to get the kids in your life out on the trail this year, because part of preserving wilderness for future generations is teaching youth to appreciate and enjoy nature. Here are 10 tips to help get the kids outdoors:

Keep it easy and feature friendly. For at least the first few times, select a hike that isn't too long or too strenuous—remember that for kids, the hike is about the experience. Picking a trail that has some features—a lake, stream, waterfall, or something else—will keep kids occupied and give them a goal to reach. And remember, it's about the journey, not the destination. If your child is more interested in getting down on his or her hands and knees to explore the undergrowth, then that is the experience for the day—there will always be a next time.

Time is your friend—so plan for lots of it. Kids are natural explorers and want to pick up and touch everything. This is one of the greatest things about hiking—there's so much of the natural world for kids to discover and examine—make sure they have time to get their wilderness fill.

Prepare for anything. This pretty much goes for any hike, regardless of whether or not a child is involved. Always make sure you pack the 10 Essentials (see the sidebar). Additional kid-friendly supplies are wet wipes or tissues, lip balm, binoculars, a magnifying glass, field guides (to point things out to kids), a camera, and a safety whistle for each child. Teach children why, how, and when to use the 10 Essentials.

Dress for success. Layers, layers, layers. Make sure to take ample amounts of clothing in case your child gets chilled while out on the trail. Always bring rain clothes—aside from the wet weather, they can also be great windbreaking clothing. Don't forget hats and gloves for everyone—even in the summer, mornings can be chilly. Make sure your kids have adequate hiking shoes, depending on terrain, this could range from sandals to tot-sized hiking boots. Finally, always pack a change of clothes for each child and leave them in the car for your return from the trail—chances are your children will be wet or muddy!

Plan frequent energy stops. Hiking requires a lot of energy. Energy-sapped kids often equate to cranky kids. Keep your child happy and motivated by taking numerous small breaks for fluid and food. You can also use energy breaks as a way to keep your child moving by saying, "at that footbridge, we'll take a break and have a snack." Chances are, by the time they have had that snack, they will be eager to continue. Also take a medley of snacks in case your child becomes a picky eater out on the trail.

Pick a leader and be sure to rotate. Kids love feeling like they are in charge. Having the children take turns leading the hiking group can help the kids feel empowered—just make sure that the leadership rotates or this could lead to arguments farther down the trail. By allowing the kids to lead, you can also make sure that the pace is slow enough so they can keep up.

Make it fun! The key to a successful hike is to keep the kids motivated and having fun—so why not combine the two? Create games that you and your children can play out on the trail. Have them look for signs of wildlife (scat, bird holes in trees, fur) or count wildflower species. Organize a scavenger hunt and have them find things that are bumpy, smelly, small, big, living, wet...the list goes on!

Believe in the power of positive reinforcement. When hiking, go overboard in telling your child how well they are hiking, how strong they look and how fast they are—even if they aren't. Kids need to hear that they are doing an awesome job, especially if it's their first time out on the trail (I'd say adults need this just as much, really!).

Leave no trace. When out on a hike, make sure that all of your trash is collected—taking a gallon-size, zip-top plastic bag always works well for this—the "pack it in, pack it out" concept is fully embraced on our trails. To further reinforce this idea, you could also take a small garbage bag and have the kids pick up any litter they see on the way back to the car. While taking a break, be sure to examine the area and see that everything is in its place. If your child dug a hole with a stick, cover it up again before you leave. For more information on Leave No Trace, visit <http://www.lnt.org>.

Hike often! Start a family tradition of going hiking one or more times a month. Kids love the sense of adventure and doing something new. There's a wide range of trails, terrain and sights for children to behold. With some kids spending a good chunk of their time indoors during the week, hiking on the weekend is a perfect way to get them outside—be it an urban park or wilderness area trail.

From <http://wilderness.org/blog/take-your-kids-hiking-10-tips-make-adventure-fun-whole-family>

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What Is the Forest Service?

The Forest Service is part of the United States Department of Agriculture (USDA). It is made up of thousands of people who care for the Nation's forest land. The USDA Forest Service manages more than 150 national forests and nearly 20 national grasslands. These lands are large areas of trees, streams, and grasslands. National forests are similar in some ways to national parks. Both are public lands, meaning that they are owned by the public and managed for public use and benefit. Both national forests and national parks provide clean water, homes for the animals that live in the wild, and places for people to do fun things in the outdoors. National forests also provide resources for people to use, such as trees for lumber, minerals, and plants used for medicines. Some people in the Forest Service are scientists whose work is presented in this monograph. Forest Service scientists work to solve problems and provide new information about natural resources so that the Forest Service can make sure our natural environment is healthy, now and into the future.

For more information, visit <http://www.fs.fed.us>.

What Is the Southern Research Station?

The Southern Research Station's mission is to create the science and technology needed to sustain and enhance southern forest ecosystems and the benefits they provide. The station is part of USDA Forest Service Research and Development. Headquartered in Asheville, NC, the station serves 13 Southern States and beyond. Since the beginning of the 20th century, the Southern Research Station's 130 researchers have excelled in studies on temperate and tropical forests, forest resources, and forest products. These studies provide a wealth of long-term information on the dynamics of tree plantations and natural stands, watersheds, and wildlife habitats.

For more information, visit <http://www.srs.fs.usda.gov>.

What Is the Cradle of Forestry in America Interpretive Association?

The Cradle of Forestry Interpretive Association is a 501(c)3 nonprofit organization based in Pisgah Forest, NC. The Cradle of Forestry Interpretive Association strives to help people better understand ecology through recreation and education opportunities. Their projects include:



- Campground and recreation area management.
- Educational programs and services, including *Natural Inquirer*, *Investi-gator*, *Natural IQ*, *Natural Inquirer* Reader Series, *Nature-Oriented Parenting*, and scientist cards (<http://www.naturalinquirer.org>).
- Sales of forest-related gifts and educational materials.
- Workshops, newsletters, and publications.
- Partnership with the USDA Forest Service to provide programming at the Cradle of Forestry Historic Site.

For more information, visit <http://www.cfaia.org>

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