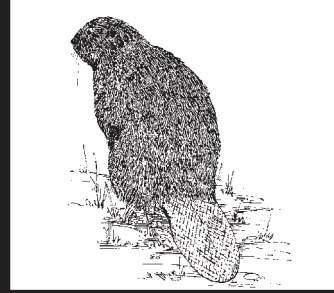
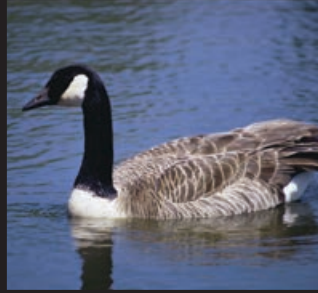
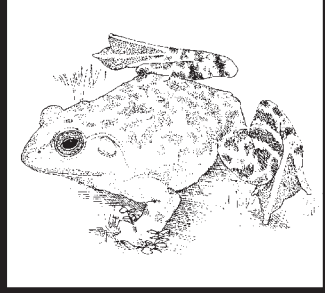


WILDLIFE SCIENCE 2





NOTE TO 4-H MEMBER

The 4-H Wildlife Science curriculum is for youth who enjoy studying wildlife. Level 2 activities help you use your basic knowledge of wildlife from Level 1 to explore more complex wildlife topics. Activities are presented by wildlife groups, as in the Level 1 manual. Level 3 delves deeper into the study of wildlife and can prepare you to be well informed and to study these topics at a college or university.

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Words defined in the glossary are in **bold** the first time they appear in the text.

Keep a journal.

Keep track of all your wildlife observations. You can organize your journal in different ways:

- A section for each month and year of study
- A section for each vertebrate class: mammals, birds, fish, reptiles, and amphibians
- Another method of your choosing

Discuss the Let’s Chat questions with your parent, 4-H leader, or other facilitator after you have completed the activity.

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Additional Contributors: The Wildlife Science curriculum (2017) builds upon previous works (Indiana 4-H Wildlife, 1995, revised 2001). The contributions of wildlife biologists, Extension specialists, Extension educators, 4-H members, 4-H parents, FFA coaches, fair judges, teachers, graduate students, and undergraduate students were critical in its development. Topic focus was determined by wildlife biologists. Activities were developed, used, and revised in 4-H clubs, after school programs, and the wildlife habitat evaluation program. Major input to previous works was provided by wildlife biologists Brian Miller, Brian MacGowan, and Rod Williams.



PIONEERS IN WILDLIFE CONSERVATION

Do you know any wildlife conservation pioneers?

INTRODUCTION

Many animals' natural **habitat** is lost when we cut forests, drain wetlands, and remove other natural resources from the landscape. Natural resources serve many purposes and are important for economic stability. But we must use them in a sustainable way so they are not depleted.

Using our natural resources wisely also ensures that wildlife have a place to live. Many people over time have recognized the importance of conserving natural environments and protecting wildlife. They have worked to ensure a sustainable natural environment for wildlife. In this activity you will learn more about these wildlife pioneers.

GEAR

- Pioneers of Wildlife Conservation worksheet
- Pen or computer



LET'S DO IT

1. Read about the contributions made by the wildlife pioneers listed in the box on this page.



Wildlife Pioneers

Theodore Roosevelt (1858-1919). The 26th U.S. president and an avid naturalist. His efforts have had far-reaching impact on wildlife protection.

John Muir (1838-1914). Naturalist and author. His efforts helped promote the protection of forest and wildlife areas. He wrote many books, including *My First Summer in the Sierra*.

Ansel Adams (1902-1984). American photographer and environmentalist. He used photography to promote protection of natural areas.

Rachel Carson (1907-1964). Marine biologist and environmentalist who wrote about the potential harm to wildlife from chemicals. She is best known as the author of *Silent Spring*.

Gene Stratton-Porter (1863-1927). Indiana naturalist and photographer who wrote novels about young people who appreciated nature. Among her books are *Freckles* and *Girl of the Limberlost*.

Aldo Leopold (1887-1948). Conservationist whose work greatly impacted forestry and wildlife ecology. His book, *A Sand County Almanac*, is a lesson in ecology.

2. Study one wildlife pioneer. Use information from a library or online.
 - Online resources ending in .edu (education) or .gov (government) are preferred.
 - Use .org (organization) websites only if reputable organizations like museums, zoos, or wildlife or science societies sponsor them.
 - Do not use question-and-answer blogs.
3. Complete the Pioneers of Wildlife Conservation worksheet for the wildlife pioneer you choose.



LET'S CHAT

Share What Happened: Why did you choose the person you did?

Apply: What have you learned that will make you a better advocate for wildlife?

Generalize to Your Life: What individual you know has made a positive impact on wildlife?



LET'S FLY HIGHER

- Read a book by one of the pioneers of wildlife.
- Search for other pioneers of wildlife.

PIONEERS OF WILDLIFE CONSERVATION WORKSHEET

Name of person _____

Born: _____ Died: _____

Early life or background:

Summary of career:

Important contributions:

Impact on wildlife:

Other interesting information:

Why do you admire this person?

Reference(s):

SIGNS OF WILDLIFE

What evidence of wildlife can you find without actually seeing an animal?

INTRODUCTION

You can make observations of wildlife without actually seeing live animals. Many wildlife animals in nearby habitats avoid humans, and some are **nocturnal**. But you can often find evidence of them if you look carefully. You may find tracks, **scat, pellets, rubs, skeletons, feathers, snakeskins, eggshells, browse lines, nests, or dens**. In this activity you will search for signs of wildlife in places you would expect to find it or create an area that encourages wildlife to visit.



GEAR 1

- Animal field guide or internet
- Camera (optional)
- Binoculars (optional)



LET'S DO IT 1 WILDLIFE OBSERVATION HIKE

1. Take a one-hour hike looking for signs of wildlife. Possible places include home, a park, nature preserve, woods, or other location where you would expect wildlife to live.



2. Walk quietly. Try to observe all signs of wildlife.
Wildlife: Birds are most commonly seen but if you watch carefully, you might also see squirrels, chipmunks, rabbits, or deer.
Signs of wildlife: animal tracks, scat, pellets, rubs, skeletons, feathers, snakeskins, eggshells, browse lines, nests, or holes for underground tunnels.
 - Pay particular attention in mud near a stream or pond where you might see footprints.
 - Watch for nests in trees or on the ground.
 - Look for animal damage on trees and vegetation:
 - Deer rubs – from antlers scrapping trees
 - Trees that beavers have cut
 - Plants that deer or rabbits have eaten
 - Watch for snakeskins, broken eggs, feathers, and skeletons.



3. Listen for wildlife sounds—noises or calls that wildlife might make.
4. Record what you see and hear in your journal. Include the date, time, and weather conditions. Sketch or take pictures of what you observe.
5. Use identification guides as needed. You can carry small printed guides in a backpack, or use apps on a mobile device during your hike. When you get home or to a library, you can use the internet to learn more about your sketches or pictures.

GEAR 2

- Play sand, 50 pounds
- Rake
- **Lures** to attract wildlife
Scent attractants: oil of anise or vanilla
Food attractants: corn, sunflower seeds, peanut butter, table scraps
- Plaster of Paris
- Gallon of water
- Spray bottle
- Milk jug or plastic cup
- Plastic mixing cup and mixing stick or spoon
- Animal field guide or internet for identification
- Camera (optional)



LET'S DO IT 2 CAST A TRACK

1. Choose a location for your track trap where you expect animals to walk. You should have permission to use it and be able to check it daily.
2. Make your track trap by removing the turf and vegetation from an area about 4 feet by 4 feet. Rake the ground, and empty a 50-pound bag of sand on the area. Rake the sand smooth, and spray it with water.
3. Check the trap every morning for footprints.
4. Add a lure, if you don't see footprints after a day or two.
Food lures: Place food on a piece of wood, brick, or other flat surface in the center of the track trap.
Scent attractant: Use a rubber band or string to attach a cotton ball to a 12- to 18-inch stick. Push the stick into the ground in the center of the track trap. The cotton ball should be about a foot above the sand. Drip or spray several drops of a lure on the cotton.
5. Record your findings in your journal. Include the date, time, and weather conditions. Sketch or take a picture of what you see.
6. Make a plaster cast of a footprint in the sand.
 - Cut the bottom of the plastic cup or, if the print is too large for a cup, cut a strip of plastic from a milk jug to circle the print and hold the plaster.
 - Gently push the form into the ground around a footprint.

- Mix enough Plaster of Paris and water to fill the print and form.
- Pour the plaster into the form to a depth of about 1 inch.
- Allow the plaster to set (become dry and hard).
- After the plaster is hard, remove the cast and brush off any excess dirt.



LET'S CHAT

Share What Happened: What signs of wildlife did you find?

Apply: Why is it useful to be able to find evidence of wildlife without seeing wildlife?

Generalize to Your Life: How might you tell that people have been on a hiking trail without actually seeing them?



FLY HIGHER

- Take the same hike at different times of day, and compare your observations.
- Take a hike in different seasons, and compare your observations.
- Make multiple track traps, and compare lures and locations.
- Visit the Purdue Soundscape webpage, <http://ltm.agriculture.purdue.edu/soundscapes.htm>.



IMPACT OF CLIMATE CHANGE

What impact does climate change have on wildlife?

INTRODUCTION

The burning of fossil fuels—coal, oil, gasoline, and natural gas—powered the **Industrial Revolution** and has significantly increased the amount of carbon dioxide in the air.

Carbon dioxide is a gas that increases the atmosphere's retention of heat. Carbon dioxide is often called a greenhouse gas because it traps heat like glass in a greenhouse traps the sun's heat. More than 30 billion tons of carbon dioxide is added to the atmosphere every year from burning fossil fuels. Consequently, the earth's atmosphere has been warming much faster than it would have naturally.

The National Oceanic and Atmospheric Administration (NOAA) and National Aeronautics and Space Administration (NASA) have been tracking carbon dioxide levels and global temperatures for many years. Both have been increasing over time (see figures 1 and 2).

Many people use the phrase **global warming** when talking about **climate change**, because the average global temperature has been rising for so long. This can be confusing, however; although the average global temperature has been rising, some areas have recorded lower average temperatures in recent years. Climate change refers to more than just temperature. It includes changes in weather patterns and, many scientists believe, more storms and more severe storms.



FIGURE 1.
NOAA CARBON DIOXIDE DATA, 1958-2015

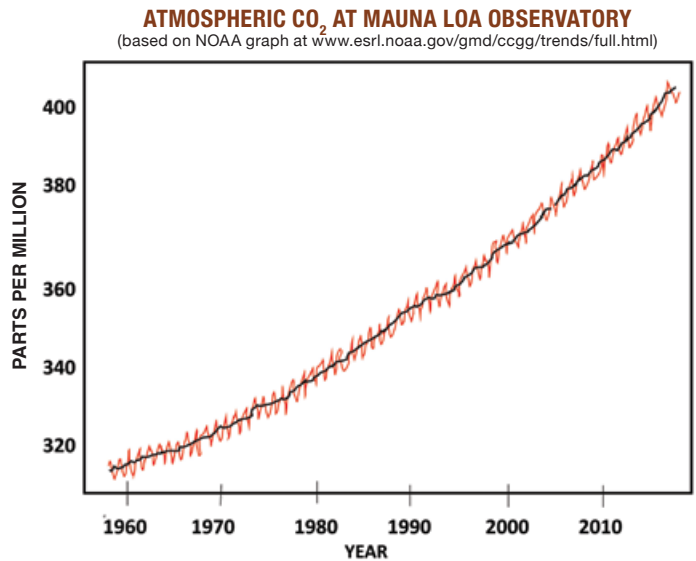
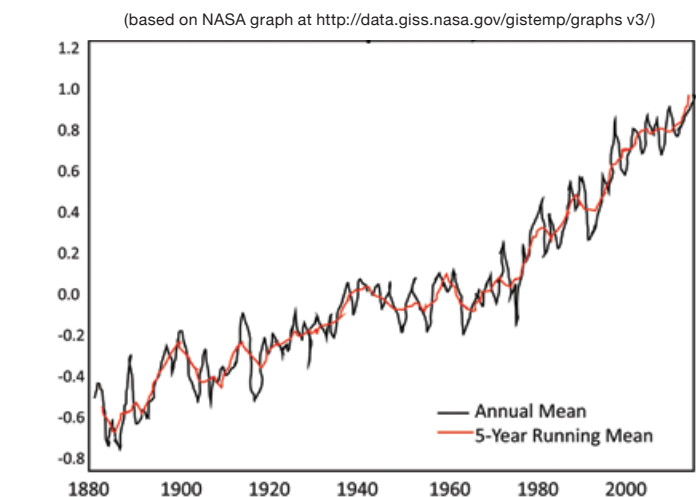


FIGURE 2.
MEAN GLOBAL TEMPERATURE, 1880-2010



Earth's overall warming is changing habitat around the globe. These changes affect wildlife. Wildlife biologists are concerned these changes might decrease or even eliminate wildlife populations. In this activity you will study the possible effects of climate change on one wildlife animal.

Earth is a biological system, just like your body. Both systems can be harmed by seemingly small changes in temperature.

GEAR

- Internet access. Record your source of information with your findings. Internet references must be *.edu or *.gov websites. If you find information at other websites, you must confirm it is research-based. Do not use question-and-answer blogs.
- Materials to present results (poster presentation or an electronic presentation)



LET'S DO IT

1. Choose a wildlife species from this list.

Blue crab	Marsupial frog
Brown pelican	Moose
Burrowing owl	North Atlantic right whale
Common loon	Penguins
Common side-blotched lizard	Pika
Giant panda	Polar bears
Goebel's false brook salamander	Ringed seals
Greater short-horned lizard	Salmon
Harlequin frog	Sea turtles
Lake sturgeon	Timber rattlesnake
	Walleye

2. Take notes while you learn all you can about your subject. You can keep your notes on index cards. Put different topics on each card for easy sorting later; for example, *food and shelter needs, survival temperature range, special reproduction requirements, and range*.
3. Prepare a report of 3-5 pages on the expected environmental impact of climate change on your species.
 - Create an outline before you begin.
 - Arrange the information you found during your research, following your outline.
 - Write your report.
 - Include possible solutions and/or programs to address any problems you learn about.
 - Include pictures, graphs, and/or tables, if you can, to help your reader understand the impact of climate change on the species you researched.
 - List the references you used. *Book references* must include the title, authors, publisher, and date of publication. *Internet references* must include the page title, professional affiliation



(university, government agency, or professional society), web address, and date of access.

Articles in professional papers, magazines, or newspapers must include the title, author, source, and date of publication.

4. Prepare a poster exhibit to convey the plight of your subject to the public. A good poster attracts attention. It is simple and clear, interests people in your subject, and does not contain too much information for a casual reader.



LET'S CHAT

Share What Happened: Why did you choose to research this animal?

Apply: Are there things you can do to reduce the effects of climate change on wildlife?

Generalize to your life: What effect might climate change have on your life?



LET'S FLY HIGHER

- Study the impact of climate change on another species of wildlife.
- Investigate other issues related to environmental impacts of climate change. You might start by studying the Indiana 4-H Weather and Climate project manual.
- Visit the Purdue Climate Change Research Center, www.purdue.edu/discoverypark/climate, to learn about the research it's doing.
- Visit the United Nations Climate Change webpage, www.un.org/climatechange, to find what world leaders are thinking and doing.

WILDLIFE CAREERS

Is there a wildlife career for you?

INTRODUCTION

Your interest in wildlife could lead to a career. Middle school (grades 6-8) is the perfect time to think about a possible career. No matter what field you wish to pursue, it's important to know what high school courses will help you prepare for college, technical school, or a job.

Youth who plan to get a degree toward a wildlife profession need a good math and science background to prepare for college-level work. If you want a wildlife career, now is a good time to start exploring the possibilities. This activity will help you explore different wildlife careers. Even if you plan on a different career, your interest in wildlife can become an **avocation**.



GEAR

- Internet access
- Computer or pencil and paper



LET'S DO IT

1. Visit Purdue University's Department of Forestry and Natural Resources website, www.ag.purdue.edu/fnr. Click on the Current Students arrow and Career Resources. Read the information and explore the links to possible jobs (FNR Job Board, Career Search Sites, State and Federal Employment).
2. Find three jobs you might be interested in.
3. Create a document (on a computer or by hand) with the following information:
 - Job title/description
 - Pay, benefits (if listed)
 - Employer
 - Job location
 - Education and experience requirements
 - Job duties
 - Required skills
 - Recommended skills



LET'S CHAT

Share What Happened: What type of jobs were you interested in?

Apply: What do you need to do during high school to get one of these jobs?

Generalize to Your Life: Why do employers require specific skills for a job?



LET'S FLY HIGHER

- Explore degrees that are available at your favorite universities.
- Talk to a wildlife biologist and find out about his or her career path.