



Winter Explorations

Summary: Admire the rare and special beauty of the winter woods. Search for signs of winter, and seek for the food and shelter of animals. Activities will help students understand how plants and animals adapt to survive the winter. An indoor discussion and slide show will precede either hiking or snowshoeing through the woods.

Objectives: Students will be able to:

1. Compare human adaptations to animal adaptations for winter.
2. State the benefits to nature of national parks.
3. List four ways animals or plants adapt to survive the winter.
4. Identify at least three signs of animal life.
5. State the beneficial and detrimental effects snow has on nature and animals.



What to expect during your field trip: Students arrive and participate in a 20-30 minute interactive slide presentation in the Douglas Center auditorium on animal and plant adaptations for survival in winter.

If enough snow is on the ground, students are introduced to snowshoes, how to put them on and how to walk in them.

If there is not enough snow, students will walk in the woods for about 45 minutes to 1 hour to investigate signs of animal and plant life; looking for tracks; discussing winter adaptations of plants and animals, camouflage and insulating properties of snow.

A brief conclusion will take place in the Douglas Center to return snowshoes and review the concepts covered during the program.

Setting: Douglas Center and along a half-mile trail through the woods outside the center.

Age/grade: 3rd-6th grade

Ratio of students to ranger: 18 per ranger unless staffing is limited; then the groups will be larger with the teachers having to help lead.

Safety issues: falling while using snowshoes or hiking.

Background Information:

Winter is a harsh time for plants and animals. Through specialized adaptations and features nature survives the bitter cold, lack of available water and food, and diminished light supply during this trying time. The presence or lack of snow has profound affects on specific species of plants and animals as well.

Since the beginning of time, the human species has had to deal with the weather and adapt to the conditions of the seasons. Perhaps winter has necessitated the need for the most creative functions. Examples of this can be seen by the use of snowshoes and skis.

Prerequisite Classroom Activities:

Prior to your visit to Indiana Dunes National Lakeshore, please take a moment to read through the information in this activity packet. We suggest that you do one or more of the described activities with your class in order to prepare them for the lessons and experiences they will have during their field trip.

SCIENCE ACTIVITIES:

1. Have the students pick one wild animal that lives in the area. Research as much as possible about the animal especially what this animal does during the winter to survive. Some suggestions include: - pileated woodpecker, groundhog, chipmunk, white-tailed deer, fox squirrel, tufted titmouse, hog-nosed snake, painted turtle, monarch butterfly, coho salmon, coyote, deer mouse

2. Take an observation hike around the schoolyard or neighborhood to look for signs of any animal's tracks or preparations for winter.

3. Capturing Snowflakes: Activity adapted from:

<http://web.archive.org/web/20031203051537/http://www.monroe2boces.org/shared/esp/snwflake.htm>

Get a cardboard box to store your equipment in and place everything in a sheltered spot at outdoor temperatures. An unheated garden shed or garage works well. Having all your equipment cold will keep the snowflakes from melting too fast while you look at them. In the box, put some black construction paper, a soft paintbrush, some toothpicks, and a magnifying glass. If you would like to try to preserve snowflakes, add a can of hair spray or artist's fixative and some glass microscope slides. If you want to try to preserve snowflakes, you will want to get an adult to help.

When it starts to snow, take your box outside and catch snowflakes on the black paper. If you need to, you can move them around to look at them with the paintbrush or toothpicks. Look at them with the magnifying glass. A magnifying glass works best if you hold it close to your eye and move the paper with the snowflake up close to get it in focus. Try not to breath on the snowflake or it might melt.

How many sides does a snowflake have? Do all snowflakes seem to have this same number of sides? Does the size and beauty of snowflakes change with the weather? How can you find out?

To preserve a snowflake, spray a microscope slide with hairspray or artist's fixative. Catch a falling snowflake on the sticky surface of the slide. Set the slide somewhere where it will stay cold but where no more snowflakes will fall on it, maybe in your supply box with the lid closed. Leave the slide for a few hours so the hairspray or fixative dries and the water in the snowflake disappears.

If you can, look at the finished slide under a microscope.

To view stunning photographs of snowflakes under a microscope, check out this website: <http://snowflakebentley.com/snowflakes.htm> which showcases the work of scientist and photographer Wilson Bentley.

4. You're One of A Kind: (sets the tone for exploration)

Form a circle and hand out pinecones to each person. Tell them to examine it so carefully that they would be able to pick it out of a whole pile of pinecones. During the next minute or two they look at it, feel it, smell it, then put all the cones in a bag. Teacher dumps them out on the ground. Each person must find his or her pinecones. Afterwards ask them to explain what made their cone unique. Sum up by mentioning that even though all cones seem alike they are "one of a kind: just like all other things in nature.

5. Winter Weather Lesson Plan: Adapted from

www.weather.com

Lead your students in an in-depth discussion about regional weather and the change of the seasons to help them prepare their outdoor field trip.



for

Question: What kind of weather do you expect in your community in the winter? Explain.

Answers will vary according to region. Possible answers include:

Mid-Atlantic to New England States: Nor'easters are the dramatic, classic storm for this area. Low pressure areas, south and off the Carolina coast, drive winds north, tapping the Atlantic's moisture and bringing heavy snow to the region. Ice storms also occur. Mountains trap cold air in the valleys. Then, warm moist air moves over the cold trapped air, causing rain that freezes on the surface below, creating treacherous driving surfaces and breaking tree limbs and power lines.

Gulf and Southeast States: Normally, the area is not characterized by cold, snowy winters. Sometimes, cold air from the North can make its way south, bringing falling temperatures and harming crops. Accumulated snow or ice can snap branches and power lines and render roads hazardous. Most cities in the area are not prepared for these conditions (no snow removal equipment, etc.) so the populace is often trapped. Schools and many businesses close until the thaw.

Midwest and Plains States: Warm moist air flows northward from the Gulf of Mexico; cold air travels on the jet stream south from Canada. Heavy snows and often blizzard conditions occur. Wind and cold moving across the Plains and the Great Lakes can drop temperatures below -60 degrees F. The "lake effect" can bring even greater amounts of snow to areas around the Great Lakes.

Rockies to the West Coast States: Storms come across the northern Pacific and hit the coast. There is so much moisture that, if it's cold enough, heavy snows can even fall in Northern California. This moisture can also rise into the higher elevations, meeting cold air, the more snow falls at lower elevations. Winds and snow can cause blizzard conditions.

Alaska: Across the Arctic coast, high winds and loose snow produce blizzards.

Temperatures can drop to below -60 degrees F. Accumulations of snow help build the glaciers in the mountains and can cause ice jams and flooding on rivers. Flooding can occur in the coastal area due to intense storms.

Hawaii: Hawaiian weather is consistent across the islands, with only slight changes in temperature due to seasonal change. Winter daytime temperatures average 78 degrees F; nighttime temperatures average 68 degrees F. November through March are the wettest months.

*Question: What is the difference between snow, sleet and freezing rain?
Describe how each forms.*

Answer:

Freezing rain: rain droplets fall into a shallow layer of cold air near the surface and freeze upon contact with the ground.

Snow: frozen precipitation in the form of six-sided ice crystals form within the cloud. Snow requires below freezing temperatures in all or most of the atmosphere, from the surface to cloud level.

Sleet: frozen precipitation falls as ice pellets. Snowflakes melt into raindrops as they pass through a thin layer of warmer air. Raindrops then refreeze into ice before hitting the ground. Freezing rain occurs when raindrops do not refreeze until they hit the ground.

Question: How does the vertical temperature profile influence the type of winter precipitation? How do meteorologists determine this profile?

Answer: A vertical temperature profile is a series of temperature measurements at various levels of the troposphere. Precipitation - rain, freezing rain, snow or sleet - depends on whether temperatures along this vertical profile are sub-freezing. Meteorologists use weather balloons to determine the thermal structure of the atmosphere over a specific location.

Question: Which type of precipitation is your region most likely to experience during the winter? Why?

Answers will vary. See above regional explanations.

*Question: Describe the weather conditions of the worst winter storm you can remember. When did it occur?
What damage occurred in and around your community?
How did the storm affect your activities?*

Answers will vary.

Going Further: Check Historical Winter Storms online at The Weather Channel www.weather.com/encyclopedia/winter/history.html to see if your community was affected by some of the worst storms across the U.S. If so, have students select an appropriate storm and perform first person interviews with people who "weathered" that storm. Challenge: For storms in the 1800's have students search newspaper archives to determine how the storm affected the community. Then, have them work together to role-play interviews with fictitious people who lived throughout the storm.

Question: Why do we have lower temperatures during winter months?

Answer: Earth's tilted axis (23.5 degrees) causes some parts of Earth to receive direct sunlight and other parts to receive indirect sunlight as Earth orbits the Sun.

Indirect sunlight does not warm the Earth as much as direct sunlight.

During the orbit, the tilt stays the same, but during the Northern Hemisphere's summer, the Sun is most directly overhead and the sunlight is more direct and focused. During the winter, in the Northern Hemisphere, the angle of the tilt causes the rays of the Sun to be less concentrated, more diffused. During the same months, the opposite is true in the Southern Hemisphere.

Note: The distance between Earth and the Sun changes slightly during Earth's elliptical orbit, but that does not produce the change in temperature that causes the change in seasons.

Going Further: Have the class hypothesize whether the majority of people in their school community or at home know that seasons occur because of the tilt of the Earth. What answer do they think will be given more often? Why? Create a class survey to test your hypothesis. (Note: Many polls reveal that people believe winter occurs when the Earth is farthest away from the Sun.)

Question: What is the main course of winter storms? Explain.

Answer: When cold air from the North comes down with the Jet Stream and warm moist air moves up from the tropics, they meet and form a storm. The north and west parts of the storm get the most frozen precipitation because that's where the coldest air is. The southern and eastern parts of the storm get more rain. Winter storms can also come in from the northern Pacific in the Northwest and across the Bering Sea in Alaska.

Question: Why does Earth have seasons?

Answer: Because of the tilt of the Earth and its rotation around the Sun, the Sun may be more or less directly overhead. The more direct the sunlight, the warmer the temperature; the less direct the sunlight, the colder the temperature.

Provide teams with flashlights, globes, or balls. Have them experiment to develop demonstrations to explain seasons using, illustrating and/or defining the following terms:

-axis, direct, concentrated, angle, indirect, orbit, warmer, cooler

Divide the class into groups to diagram the following:

-Differences in seasons in the Northern and Southern hemispheres

-Latitudes closer to the equator are not affected by seasonal change

-The poles are perpetually cold

-Areas nearer the poles have very short summers.

Vocabulary:

Adaptation	-	Adjustment or change to fit the situation
Drift	-	A mass or bank made up of drifting matter such as snow
Flake	-	Any small or light piece, especially snow
Flurry	-	Of snow, to fall lightly for a short time
Freeze	-	To become hardened into ice or a solid form through loss of heat
Frost	-	A light, white covering of dew or water vapor frozen into ice crystals
Ice	-	Water in a frozen, solid state
Icicle	-	A tapered spike of ice formed by the freezing of dripping water
Arctic	-	Of or pertaining to the geographic region encompassing the North Pole
Avalanche	-	The sudden rush of snow, ice or rocks down a mountain
Precipitation	-	Snow, rain, or the like, to fall on a given area in a given time
Slush	-	Snow that is partly melted
Thaw	-	To become unfrozen or melt
Squall	-	To storm suddenly and for a brief time

Illinois Content Standards: The Winter Exploration program can assist teachers in meeting the following Science Proficiencies.

Early Elementary:

- 12. A.1a Identify and describe the component parts of living things (e.g., birds have feathers; people have bones, blood, hair, skin) and their major functions.
- 12. A.1b Categorize living organisms using a variety of observable features (e.g., size, color, shape, backbone).
- 12. B.1a Describe and compare characteristics of living things in relationship to their environments.
- 12. B.1b Describe how living things depend on one another for survival.
- 12. E.1b Identify and describe patterns of weather and seasonal change.
- 12. F.1b Identify daily, seasonal and annual patterns related to the Earth's rotation and revolution.
- 13. A.1c Explain how knowledge can be gained by careful observation.

Late Elementary:

- 12. A.2a Describe simple life cycles of plants and animals and the similarities and differences in their offspring.
- 12. B.2a Describe relationships among various organisms in their environments (e.g., predator/prey, parasite/host, food chains and food webs).
- 12. B.2b Identify physical features of plants and animals that help them live in different environments (e.g., specialized teeth for eating certain foods, thorns for protection, insulation for cold temperature).

Extension or Follow-up Activities:

Class reflection paper or writing sample:

Ask each student to write a short essay, letter or story about what they learned on their field trip to Indiana Dunes National Lakeshore. Rangers love receiving mail from their students. Send the ranger the packet of essays from your class (or a copy of them), and your ranger will send your class a certificate from the dunes. Send your essays to:

Indiana Dunes National Lakeshore
1100 N. Mineral Springs Road
Porter, IN 46304

Attn: Your ranger's name or just Education Department

If you are using this essay as a class assignment for a grade, we would like to suggest that each essay contain the following elements. Use the rubric below to score them.

- * The name of the park and the location of their field trip—for example: Douglas Center, Indiana Dunes National Lakeshore
- * Three facts they learned on the field trip about adaptations of animals in winter.
- * A brief explanation of why Indiana Dunes is unique and therefore a national park.
- * At least two things the student can do to help take care of his or her national park.
- * Fill in the blank of this statement and provide an explanation: I would like to learn more about _____ at Indiana Dunes.

***For advanced groups, add the following element:

Tell the park rangers if you would like to bring your families and friends to the dunes and if so what would you do here and where would you go.

Assessment:

Rubric for Class reflection writing assignment:

Elements	4 points	3 points	2 points	1 point
Writing and organization	The writing sample is very well written and organized by the elements provided. It has a strong introduction, middle and conclusion.	The writing sample is well written and organized by the elements provided. It includes an introduction, middle and conclusion.	The writing sample is choppy and is not well organized. It lacks an introduction or conclusion.	The writing sample is very short and unorganized.
Grammar & Spelling	Mistakes in spelling and grammar are minor or non-existent.	Mistakes in spelling and grammar are minimal—about 4-5.	Mistakes in spelling and grammar are numerous—5-10.	Mistakes in spelling and grammar are more than 10.

Facts and content	The writing sample demonstrates the student's learning on the dunes program and includes three or more facts provided by the park staff.	The writing sample demonstrates the student's learning and includes only two facts provided by the park staff.	The writing sample does not demonstrate much learning and only includes one fact provided by the park staff.	The writing sample does not demonstrate any learning and does not include any facts provided by the park staff.
National Park Service theme	The writing sample clearly demonstrates the student's understanding of the role of the NPS in preserving the dunes by explaining why Indiana Dunes is such a unique treasure.	The writing sample mentions the NPS and its role in preserving the Indiana Dunes.	The writing sample mentions the NPS and Indiana Dunes.	The writing sample does not mention anything about the NPS or its role at Indiana Dunes.
Stewardship	The writing sample lists three things the student can do to assist in taking care of the Indiana Dunes.	The writing sample lists two things the student can do to assist in taking care of the Indiana Dunes.	The writing sample lists one thing the student can do to assist in taking care of the Indiana Dunes.	The writing sample does not list anything about what the student can do to take care of the Indiana Dunes.