

WINTER INVESTIGATION

Grade: Fourth Grade

Number of Kids: Up to 27 students/class, 54 students/visit

Number of Groups: 7 adult leaders with approximately 6-7 students each

9:00 a.m. – 9:15 a.m.	Getting in the Moment
9:15 a.m. – 9:45 a.m.	Introduction to Winter (Indoors)
9:45 a.m. -11:00 a.m.	Winter Investigation (Outdoors)
11:10 a.m. – 11:45 a.m.	Wrap-Up (Indoors)

*Sample schedule; plan for about an hour outside, weather and school schedule permitting.

Winter Investigation

Grade: Fourth Grade

Group Size: One Class

Time: 1.5 -2 hours

Season: Winter

Summary:

Students make predictions about what they may find in winter habitats at Sherburne NWR. They work in small groups to make observations and use their nature journals to record living and non-living items. After the outside investigation, students return inside to share their findings and compare them to their predictions.

Performance Objectives:

After completing this activity, students will be able to...

- Collect data about living and nonliving things in winter.
- Write a conclusion sentence summarizing their findings about winter ecology.
- Explain in their own words how and why non-living factors influence living things and their habitats.

Materials Needed:

- White board and dry erase marker
- Rulers, wind meter, thermometer
- Pencils and clip boards
- Attached Facilitator's Guide
- Attached Nature Journal Sheet for students

Background Information (Adapted from Prairie Wetlands Learning Center):

According to the National Weather Service, Sherburne NWR's region experiences the following ranges of normal conditions in winter: high temperatures of 15-25 degrees Fahrenheit; low temperatures of minus five to five degrees Fahrenheit; less than one-half to one inch of rainfall per month; and five to 15 inches of snowfall per month. Recent phenology records indicate that Sherburne NWR wetlands freeze over mid to late November and thaw completely by the last week of March or the first week of April. The first measurable snow falls in the last two weeks of November.

In winter, life slows down considerably. Reproduction and growth are temporarily suspended, food becomes scarcer, and survival becomes the first order of business.

Plants respond to winter in mainly two ways:

1. **Perennials and Biennials:** Die back to ground level, produce seed, and go dormant. Most prairie plants are herbaceous perennials, which means they are soft-stemmed grasses and flowering plants that reproduce by seed and re-grow from dormant roots. Examples include blazing star, cattail, lead plant, New England aster.
2. **Annuals-** Die completely, produce seed, and do not regrow. Examples include brown-eyed Susan, slender false foxglove.

Animals adapt to winter in three ways:

1. **Migrate:** Animals leave for warmer habitats. (e.g., many birds, monarch butterflies, bats, green darner dragonflies).
2. **Hibernate:** Animals stay and sleep or become inactive. (e.g., most insects, reptiles, amphibians).
3. **Resist:** They can stay and continue to be active. (e.g., some birds, deer, muskrat, mink, weasels, mice, gophers, squirrels, rabbits, fox, coyotes).

Evidence of active winter animals may include tracks, browse, hair, and scat. Finding evidence of an animal during winter usually implies that the animal is active. **Active animals are adapted to survive in different layers of snow. The layers of snow include:**

1. **Supranivean region (above the snow):** Animals living above the snow pack live in the supranivean region; these include deer, foxes, coyotes, and weasels.
2. **Intranivean layer (within the snow pack):** Like a huge, thick blanket, a dry snow pack of at least six to 10 inches deep insulates the ground beneath it. Dry, fluffy snow provides the best insulation because it has more air spaces between flakes compared to wet, dense snow. Rabbits submerge themselves into the powder of the intranivean layer for protection from predators, shelter, and warmth.
3. **Subnivean layer (between the ground and snow pack):** In the small, narrow space between the ground and the snow pack, air temperatures stabilize at around 32 degrees Fahrenheit causing gaps to open and allowing radiant heat from the earth to thaw soil and provide abundant moisture. This layer is inhabited by rodents like mice, shrews, and voles who graze on grass or insect eggs.
4. **Ground layer:** On the surface of the ground are huge colonies of bacteria and fungi. They eat, breathe, and grow on decaying plants and nitrogen from the soil and snow pack. They produce vast amounts of carbon dioxide.

Most Commonly Observed (by evidence) Winter Animals

Animal	Evidence	Likely Habitat
Black-capped Chickadee	Calls “fee-fee” or “chicka-deedee dee”	Oak Savanna
Coyote	Tracks, trails, scat, kill-site	Prairie
Deer Mouse	Tracks with tail drag, scat, urine, vents, trails	Prairie and Wetlands
Muskrat	Huts	Wetland
Weasel	Tracks, snow tunnels	Wetland, prairie
Red Fox	Tracks, trails, scat	Prairie

Although students could read about these discoveries in a textbook or observe them in a movie, there simply is no comparable substitute for experiencing them outdoors for themselves. Exploring winter ecology gives students an important opportunity to become better acquainted with our home biome in every season and connects them with nature at a time of year when it's easier to stay indoors.

Procedure:

1. **Lead Refuge Volunteer:** In the classroom, welcome students, teachers, and chaperones to Sherburne National Wildlife Refuge. Remind them of your name. Explain traits of a naturalist and expectations for behavior: calm and quiet, inquisitive, respectful, prepared, use all of their senses.
2. **Teacher:** Explain to students that today they are going to investigate winter habitats. Last time they explored fall habitats. Write the word *habitat* on the board. Ask a student to remind the class what the word *habitat* means and its components (food, shelter, space, light, water, air). What will they be studying today? *Winter ecology*. Write it on the board. Its definition is similar to the word *habitat*, but its meaning is broader; ecology can include many habitats. Winter ecology translates to "the study of our home in winter."
3. **Teacher, with assistance from volunteer:** On the board, draw a T-Chart. Label one side "Fall" and the other side "Winter." Ask students to make a T-chart in their journal. Based on their fall experience, ask students to list what they already know about Sherburne NWR's habitats. What plants and animals do they know? What do they know about non-living factors like weather, moisture, rocks? Record their answers under "Fall." Then ask students to predict what they might find outside today in winter. What do they think might be different now? What questions do they have about what they may find in winter? Allow students the time to journal answers quietly before asking for them aloud.
4. **Volunteer, with assistance from teacher:** Explain that soon the class will be splitting into groups and heading outside to explore and find answers to their questions. Help students prepare their journal entries by modeling on the board. Ask students what they think will be the most important observations to record while outside. Have students split a page of their nature journals into four boxes and label each box with one important thing to observe outside. Examples might include: plant life, animal life, water, soil observations, and weather. (*Journal pages can be done with the classroom teacher prior to the field trip to allow for more time spent outdoors).
5. **Volunteer, with assistance from teacher:** Tell students that they are ready to go outside to explore. Put students into small groups, and put an adult volunteer with each group, if possible. Adult volunteers make sure students have all of their materials. Remind students that naturalists are happy outside, explorers, adventurers, respectful, prepared, responsible, and quiet. They ask questions, use words, numbers, and pictures, and share their discoveries. Review the journal sheet with them one more time.
6. **Volunteer:** Once outside, adult leaders will guide students in exploring winter ecology, which will include visiting wetland, prairie, and/or oak savanna habitats.
7. **Volunteer and Teacher:** After returning inside, have students sit down. Adult volunteers review the journal sheets in small groups with their students. Based on their data, what conclusions can students draw about winter ecology? Give them a few minutes to write down at least one conclusion in a complete sentence, and then time to share aloud in small groups.
8. **Teacher:** To wrap up as a whole class, review the data – which animals and plants were found outside today? What signs of animals were found? What conclusions can they now draw about winter ecology? What differences and similarities did they derive between fall and winter at Sherburne NWR?

9. **Volunteer:** At the end of the lesson, explain to students that today they discovered how magical the oak savanna, prairie, and wetlands can truly be if they just look closely. They are so much more than trees, grass, and cattails. And the same habitat can even be very different depending on the time of year! There are endless discoveries to be made about different habitats. Students don't even have to come to Sherburne NWR to track these changes; they can do it in their very own yard, at a park, at school, or anywhere outside. Explain that the world needs more naturalists who will stop to examine the beauty of different habitats and that, because they did such a good job today, they seem like perfect candidates.

Core Standards:

Science: Physical Science

- Objects have observable properties that can be measured.
 - ✓ Measure temperature, volume, weight and length using appropriate tools and units.
- Energy can be transformed within a system or transferred to other systems or the environment.

Science: Earth Science

- Rocks are an Earth material that may vary in composition.
 - ✓ Recognize that rocks may be uniform or made of mixtures of different minerals.
- Rocks are an Earth material that may vary in composition.
 - ✓ Describe and classify minerals based on their physical properties. *For example:* Streak, luster, hardness, reaction to vinegar.
- Water circulates through the Earth's crust, oceans and atmosphere in what is known as the water cycle.
 - ✓ Identify where water collects on Earth, including atmosphere, ground, and surface water, and describe how water moves through the Earth system using the processes of evaporation, condensation and precipitation.
- In order to maintain and improve their existence, humans interact with and influence Earth systems.
 - ✓ Describe how the methods people utilize to obtain and use water in their homes and communities can affect water supply and quality.

Reading: Standards for Informational Text

- Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
 - ✓ Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
- Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
- Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

Writing: Research to Build and Present Knowledge

- Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation

Speaking, Viewing, Listening and Media Literacy

- Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
 - ✓ Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. Follow agreed-upon rules for discussions and carry out assigned roles. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion. Cooperate and problem solve as appropriate for productive group discussion.