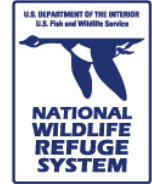


Wildlife Mysteries



Grade: 2nd **Season:** Winter **Time:** 1½ hours
Group Size: 1 class **Ratio:** 1:5; adults: students

For the Teacher:

Overview	Using the KWHL approach, students design and conduct a field investigation about active winter animals and the clues they leave behind. They practice “reading the land.” They use those clues to try and solve animal mysteries (or answer their investigation questions).
Subjects Covered	Science, Math, Reading
MN Science Standards Supported	Helps support 12 standards. See sections “Minnesota Academic Standards in Science” and “Minnesota Academic Standards in Language Arts.”
Skills Used	Investigating, following directions, listening, cooperating, asking and answering questions, exploring, observing, describing, measuring, inferring, identifying, concluding, respectful treatment of animal homes, and comparing and contrasting
Performance Objectives	After completing this activity, students will be better able to... <ul style="list-style-type: none"> • Observe animal sign without destroying it • Name two animals which are active in winter • Use the synonyms <i>sign</i> and <i>evidence</i> for <i>clue</i> • Describe an animal clue using two different characteristics (size, shape, distance, pattern, habitat, etc.) • Use evidence of a winter animal to infer about the animal (direction of travel, pace, gait, etc.) • Enjoy exploring outside in winter
Vocabulary	Track, scat, shelter, clue, evidence, detective, mystery, sign, investigation

For the PWLC Instructor:

PWLC Theme	The Prairie Pothole Region
Primary EE Message	The prairie pothole region is valuable and in need of restoration and protection.
Sub-message	Wildlife: <i>The prairie pothole region is home to a variety of resident and migratory wildlife.</i>
PWLC EE Objectives	3. Use scientific methodology to explore the environment (ask questions, hypothesize, collect data, analyze data, form conclusions, make recommendations). (Wildlife and Habitat) 5. Identify the components and functions of a given ecosystem by observing, counting, and describing the animals and plants in that ecosystem. (Wildlife and Habitat)
Materials	Rulers, flagging sticks, chaperone set of Peterson Flash Guides – Animal Tracks
Location	Mallard Marsh

Background Information

The purpose of this field investigation is to introduce 2nd graders to animals that are active in winter and the signs they leave behind, such as tracks, tunnels, and scat. This field investigation would also make a suitable review of a unit on seasons, winter, animals, or adaptations.

According to the position of the sun, the first day of winter is December 21, and last day of winter falls on March 19th. During this timeframe, the sun's position is the farthest

possible south of the equator due to the earth's tilted axis and annual path around the sun. At the PWLC, we experience colder air temperatures, wind chill, frozen ponds and prairies, snowfall, and the shortest day-length (photoperiod) of the year. According to the National Weather Service, we experience 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 PWLC 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 on the prairie slows down considerably. Reproduction and growth are temporarily suspended, food becomes scarcer, and survival becomes the first order of business.

Colder temperatures, snow, and ice force animals and plants to adapt to this dramatically different season. Animals respond in mainly three ways: by leaving the area in fall (migration), hibernating, or by staying active (resisting). The lists below provide examples of resistors found at the PWLC. We search for these active animals that remain here and most often actually find the signs they leave behind.

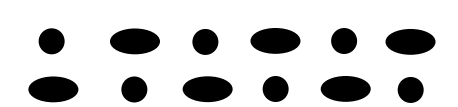





Resistors	Most Common Evidence at PWLC
chickadees, crows	calls
great horned owls	pellets, kill sites
deer	tracks, buck rubs, browse
muskrats	huts
mink	tracks, snow tunnels, snow slides
weasels	tracks, snow tunnels
mice	tracks, snow tunnels, scat, urine
grey squirrels	nests
rabbits	tracks, trails, browse, scat, urine
fox, coyotes	tracks, trails, scat

We can infer many things about nature by studying animal signs. For example:

Winter Animal Sign	Inference
chickadee calls	an individual is separated from the flock and the flock breaks up in late winter to form breeding pairs (depending upon the call)
owl pellet	diet and food chain
size, shape, and gait of tracks, and the distance between sets of tracks	the type of animal present and its pace
Hoar frost (ice crystals) around the entrance to a mouse burrow	an active burrow
Blue urine	rabbits have switched to browsing on buckthorn

Tracking animals involves its own set of terminology which is helpful when making

observations with students at the PWLC. For example, the following normal pace gaits may be discernable. Gait means how an animal moves (walking, trotting, hopping, etc.). Long ovals indicate back feet; small ovals indicate front feet.

Gait	Speed/Pattern	Animal	Illustration
Waddling	Slowest, shuffle	Raccoon, skunk, opossum	
Walking (2 legs)	Slow, alternating	Goose, person	
Walking (4 legs)	Slow, alternating and diagonal	Cat, coyote, fox, deer	
Galloping (4 legs)	Faster, hind feet land in front of front feet	Dog, coyote	
Hopping	Hind feet land in front of front feet	Rodent, rabbit, bird, squirrel	
Bounding	Tight clusters of prints, front prints directly behind back	Weasel, mink	

Some other helpful track terms and observations include:

- Trail: a path or the series of track patterns
- Straddle: the total width of the trail, all tracks included
- Register: when a back foot lands in the print of a front foot
- Dragline: a print left by a foot or tail dragging over the surface

From the evidence, we can also discern the types of adaptations these animals have for surviving winter, such as larger/fur-covered feet that spread out their weight over a greater surface area, allowing easier navigation through snow (snowshoe hare, some rodents), feather-covered feet (some birds), changing diet as food becomes scarce (rabbits), and worn paths for easier travel in deep snow (rabbits). Nature has much to teach us about wildlife and winter when we slow down, observe carefully, and try to interpret the mysteries laid out before us.

Humans must also respond to the change of seasons. Like foxes and rabbits, most of us remain here all winter and are actively resisting winter stressors. At the PWLC, teachers and students alike adapt to the weather and safely explore and enjoy the often overlooked world of winter ecology. Dress in layers and wear insulated boots, winter mittens, scarves, and hats. When needed, to stay warm in the field, we keep moving, sit out of the wind, turn our backs to the wind, make snow angels, walk briskly, do jumping jacks, wiggle our fingers and toes, and/or check each other's cheeks for any early signs of cold exposure (frostnip: pale spots on cheeks, nose, earlobes, fingertips). We shorten our time outside if necessary, and stay inside entirely if the temperature exceeds -15 degrees Fahrenheit. We see winter as an opportunity instead of a barrier; a challenge – to be met.

During this winter visit, students have the chance to become nature detectives and search for clues left behind by active winter animals. Each track, trail, feather, or call provides a new mystery to marvel at and solve as they explore and become completely immersed in the relatively undisturbed wintry setting of the prairie wetlands. Naturalist Aldo Leopold called this skill *reading the land*. In his book *A Sand County Almanac*, he wrote,

January observation can be almost as simple and peaceful as snow, and almost as continuous as cold. There is time not only to see who has done what, but to speculate why.

The prairie wetlands is like an open book, each track or clue a word in the story we read as we follow the trail. Who are the main characters? What is the setting? Will there be a conflict? How will it be resolved? What genre is this story? A drama, romance, mystery, comedy? The same powers of observation and inference used in reading the land are also used in reading other stories and books. When visiting the PWLC for this field investigation, though, you can leave your library card at home, but be sure still to bring your critical thinking and sleuthing ability. In the words of expert tracker Tom Brown, "I learned to track not animals but disturbances, things knocked out of place, minute and indistinct traces, the ghost of a print, a stone turned wrong-side up, a fragment of hair on a branch."

Teacher Preparation

- To maximize outdoor classroom time at the PWLC, teachers may
 - Conduct steps 2 through 5 in the section "Field Investigation Procedure" at school. Upon arrival at the PWLC, teachers may provide PWLC staff with a written list of what students know and wonder for quick review before heading out into the prairie.
 - Organize students into small groups at school, each led by one chaperone and everyone wearing nametags.
- We highly recommend conducting one or more of the suggested extensions before your visit in order to integrate this field investigation into the classroom study of animal life, seasons, survival, life cycles, adaptations, or other topics. It would make a great pairing with reading, too! (See section, "Teacher-Led Extensions/Adaptations/Assessment Ideas.")
- Please help save paper. Bring your students' science notebooks or journals to record their field data and discoveries in. You may wish to print, photocopy, and tape the last page of this lesson to the cover of the notebook, and attach a pencil to each notebook with string or yarn. If science notebooks are not available, please inform the PWLC staff that you will need paper and clipboards when booking your date.

PWLC Staff Preparation

Check for ice safety according to the PWLC Ice Safety Plan. Review winter animal signs and preview the Mallard Marsh site. Prepare materials.

Field Investigation Procedure

1. In the classroom, welcome students, teachers, and chaperones to the Prairie Wetlands Learning Center.
2. Organize students into small groups, each led by a chaperone.
3. Explain to students that they will have the opportunity to become nature detectives and search for clues left behind by animals outside. What are some examples of clues they might find? Record their answers on the white board (the K or know part of KWHL). Ask them other questions to find out what they already know, such as, what kinds of animals might be active in the winter here? What can animal signs tell you about the animal?
4. Ask the students what they wonder about these animals and their signs? Record their responses on the white board (the W or wonder part of KWHL).
5. Encourage them to make predictions. What do they think they would find out today about animal signs when we search for them outside? Record their answers on the white board.
6. How do they think we should search for animal signs? Where do they think we should go? What should we do if we find some? If we find tracks, should we walk on them? Record their responses on the white board (the H or how part of KWHL).
7. Set up field journals accordingly. Possible quadrants might include tracks, scat, burrows, homes, etc. You might also add a wonder word quadrant titled mystery or drama. Be sure to save space for recording weather data: air temperature, snow temperature, wind speed, and sky.
8. Show students any equipment that will be taken outside and how to use it properly. Possible materials include animal tracks cards, rulers, and weather instruments. Keep the materials simple though, only taking what is necessary to complete the investigation, and asking adults to carry and distribute to students when appropriate. Provide equipment to chaperones before heading out.
9. Review rules for the trail. Explain that each time a new clue is found, you will mark it with a flag. As each group encounters a pink flag, they should observe, sketch, measure, and wonder about the track. Who made it? Which way was the animal traveling? Did it keep the same pace and gait the whole time? What was it doing? Does it travel in a straight line? They should record their observations and thoughts in their journals. The last adult in line should remove each flag after the last small group has passed by.
10. Outside, search for clues of animal signs, and proceed as described in step 8 above. The most typically observed animal signs include mouse tracks and vents, mink, rabbit, squirrel, and weasel tracks, squirrel nests, muskrat huts, chickadee calls, owl prints, and coyote or fox tracks.
11. Record observations as words, sketches, and measurements in field journals (depending upon the questions and journal set-up). Before coming back indoors, allow students to observe and record weather data in their journals.
12. Return to the classroom and use data recorded in their field journals to answer the questions they first suggested when designing the investigation. Suggest that students write down a complete sentence to describe their biggest discovery.

Offer a sentence starter, such as, “Today I discovered” Or “Today I was really surprised by” Or “The mystery I solved today was” Ask them to write down a new question they now have about animal signs. If they could be any winter animal at the PWLC, which one would they chose? Why?

Weather Alternatives

Field investigations take place rain or shine. Everyone should dress appropriately for the weather. In the event of unsafe weather (extreme cold) or pouring rain, everyone must come indoors. PWLC staff makes every effort to make your travel worthwhile despite the weather and prepare indoor, age-appropriate plans. PWLC staff welcomes teacher input into these plans. Some possible alternatives might include:

- Go outside for a very short amount of time, even if only under the deck or at Center Pond, to search for, observe, and record animal signs.
- Walk like the animals do! Practice walking on all fours on the floor in the different gait patterns by walking on laminated paper tracks taped to the floor. Make a station for each kind of gait and complete journal sketches of each gait using simple black dots. (See section, “Background.”)
- Sometimes animal signs include bones and hair. Conduct a blindfold activity where students use their sense of touch to become familiar with an animal fur or skull and then (sighted) guess which one was theirs. They can further examine and sketch their skulls/furs using hand lenses, rulers, colored pencils, etc.
- Read *In the Snow: Who’s Been Here?* by Lindsay Barrett George, or other appropriate titles. Provide furs and feathers of the animals depicted for students to examine.
- Provide students with latex tracks and ink pads to make and label track prints in their journals. Use large sheets of paper for the class or small groups to create a prairie wetlands scene complete with printed tracks telling the story of active winter wildlife.
- Examine and sketch latex and preserved animal scats. Draw conclusions about the different sizes and shapes of scat.
- Students may dissect owl pellets, sort the bones by shape, identify the prey consumed by the owl, and reconstruct the skeletal remains on dark construction paper with glue. There is a \$2.00 charge per pellet, and this activity is dependent upon their immediate availability.

Teacher-Led Extensions/Adaptations/Assessment Ideas

- Write a story based upon the animal tracks and other signs discovered at the PWLC. Determine what genre to use, the setting, characters, conflict or problem, and solution. Illustrate the story to show what happened.
- Go outside at school or a nearby park and search for signs of active winter animals. Which kinds are present? Compare and contrast these discoveries to the ones found at the PWLC. Why might they be the same or different?
- Give a homework assignment to sketch what students see outside of their own homes such as tracks, nests, scat, chews, etc. Compare and contrast these discoveries to the ones found at the PWLC and/or your local park or school yard.

Why might they be the same or different?

- Use “Tricky Tracks” from [NatureScope - Amazing Animals](#) by National Wildlife Federation. There are three pages, one with animal track identification cards; the other with a track scene to decipher (answers on the third page).
- Lead students through the “Guess Who?” interactive power point presentation located on the PWLC web site.
- This one is completely scatological. Brainstorm a list of synonyms for scat (poop, feces, excrement, guano, dung, frass, doo-doo, poo-poo, ca-ca, splay, manure, fertilizer, derrière dirt, sloppy slim sludge, stinky butt mud, etc.). Create a “Poo Poo Platter” with your students. Provide Play Doh and allow students to create models of various animal scats they observe outside or in field guides. Or, with different kinds of seeds, allow students to make a scat chart by gluing them onto it (thistle for mouse, etc.)
- On news print paper, have half of the class draw a wildlife scene with signs. Once completed, the other half of the class tries to guess who left the signs behind. Then switch groups and do it again.

2010 Minnesota Academic Standards in Science

This lesson helps support the following state standards.

Strand 1. THE NATURE OF SCIENCE AND ENGINEERING

Substrand 1. The Practice of Science

Standard 2. Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.

Benchmark 2.1.1.2.1 Raise questions about the natural world and seek answers by making careful observations, noting what happens when you interact with an object, and sharing the answers with others.

Strand 1. THE NATURE OF SCIENCE AND ENGINEERING

Substrand 2. The Practice of Engineering

Standard 2. Engineering design is the process of identifying a problem and devising a product or process to solve the problem.

Benchmark 2.1.2.2.3 Explain how engineered or designed items from everyday life benefit people.

Strand 2. PHYSICAL SCIENCE

Substrand 1. Matter

Standard 1. Objects can be described in terms of the materials they are made of and their physical properties.

Benchmark 2.2.1.1.1 Describe objects in terms of color, size, shape, weight, texture, flexibility, strength and the types of materials in the object.

Standard 2. The physical properties of materials can be changed, but not all materials respond the same way to what is done to them.

Benchmark 2.2.1.2.1 Observe, record and recognize that water can be a solid or a liquid and can change from one state to another.

Substrand 2. Motion

Standard 1. The motion of an object can be described by a change in its position over time.

Benchmark 2.2.2.1.1 Describe an object's change in position relative to other objects or a background. *For example:* Forward, backward, going up, going down.

Benchmark 2.2.2.1.2 Demonstrate that objects move in a variety of ways, including a straight line, a curve, a circle, back and forth, and at different speeds. *For example:* Spinning toy and rocking toy. *Another example:* Construct objects that will move in a straight line or a curve such as a marble or toy car on a track.

Strand 3. EARTH AND SPACE SCIENCE

Substrand 2. Interdependence Within the Earth System

Standard 2. Weather can be described in measurable quantities and changes from day to day and with the seasons.

Benchmark 2.3.2.2.1 Measure, record and describe weather conditions using common tools. *For example:* Temperature, precipitation, sunrise/sunset, and wind speed/direction.

Strand 4. LIFE SCIENCE

Substrand 1. Structure and Function in Living Systems

Standard 1. Living things are diverse with many different observable characteristics.

Benchmark 2.4.1.1.1 Describe and sort plants into groups in many ways, according to their physical characteristics and behaviors.

2010 Minnesota Academic Standards in Language Arts

This lesson helps support the following state standards.

Strand READING

Substrand Reading Informational Text K–5

Standard Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

Benchmark 2.2.3.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.

Benchmark 2.2.6.6 Identify the main purpose of a text, including what the author wants to answer, explain, or describe.

Benchmark 2.2.10.10 By the end of year, select, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 2–3 text complexity band proficiently, with scaffolding as needed at the high end of the range for personal interest, enjoyment, and academic tasks.

Substrand Foundational Skills K-5

Standard None

Benchmark 2.3.0.4 Read with sufficient accuracy and fluency to

support comprehension.

Strand WRITING

Substrand Writing K-5

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

Benchmark 2.6.7.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).

Benchmark 2.6.8.8 Recall information from experiences or gather information from provided sources to answer a question.

Strand SPEAKING, VIEWING, LISTENING, AND MEDIA LITERACY

Substrand Speaking, Viewing, Listening and Media Literacy K-5

Standard Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on each other's ideas and expressing their own clearly and persuasively.

Benchmark 2.8.1.1 Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.

a. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).

b. Build on others' talk in conversations by linking their comments to the remarks of others.

c. Ask for clarification and further explanation as needed about the topics and texts under discussion.

d. Cooperate for productive group discussion.

e. Follow two- and three-step oral directions.

Benchmark 2.8.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.

Benchmark 2.8.3.3 Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issues.

Benchmark 2.8.6.6 Produce complete sentences when appropriate to task and situation in order to provide requested detail or clarification.

Strand LANGUAGE

Substrand Language K-5

Standard Demonstrate command of the conventions of English capitalization, punctuation, and spelling when writing.

Benchmark 2.10.2.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. a. Capitalize holidays, product names, and geographic names.

References and Resources

For Children

- Animals in Winter by Henrietta Bancroft
- Big Tracks, Little Tracks by Millicent E. Selsam
- Everyone Poops by Taro Gomi
- In the Snow: Who's Been Here? By Lindsay Barrett George
- Little Lost Fox Cub, on the Trail of Little Fox by Louis Espinassous
- Reading the Wild by Bev Dolittle
- Secrets of a Wildlife Watcher, by Jim Arnosky
- Someone Walks By, the Wonders of Winter Wildlife by Polly Carlson-Voiles
- Stranger in the Woods by Carl R. Sams II and Jean Stoick
- Summer Coat, Winter Coat, the Story of a Snowshoe Hare by Doe Boyle
- Taking a Winter Nature Walk by Jane Kirkland
- The Scoop on Poop by Wayne Lynch
- Track Pack: Animal Tracks in Full Life Size by Ed Gray
- Tracks, Scats, and Signs by Leslie Dendy
- Whose Footprints? by Masayuki Yabuuchi
- Wintersigns in the Snow by Gerald Cox
- EEK! Follow that Footprint, Paw Print, Hoof Print
<http://www.dnr.state.wi.us/org/caer/ce/EEK/nature/track.htm>
- EEK! Track Quiz for Beginners
<http://www.dnr.state.wi.us/EEK/cool/trackQuizLVLone.htm>
- Identify Mammal Tracks, Western Minnesota
http://www.enature.com/mammal_tracks/tracks_wizard01.asp?rgn=&allSpecies=y&source=zipGuides&fromWhere=zipGuides&email=molly_stoddard@fws.gov&wantNews=y&zipGuide=tracks®ionZip=56537&btnSubmit.x=10&btnSubmit.y=8

For Adults

- A Guide to Nature in Winter by Donald Stokes
- A Sand County Almanac by Aldo Leopold
- Animal Tracks by Olaus Murie
- Animal Tracks of Wisconsin and Minnesota by Ian Sheldon and Tamara Eder
- Life in the Cold, an Introduction to Winter Ecology by Peter J. Marchand
- NatureScope Amazing Animals by National Wildlife Federation.
- Peterson Flash Guides: Animal Tracks by Olaus Murie and Richard P. Grossenheider
- Tom Brown's Field Guide to Nature Observation and Tracking by Tom Brown
- Winter, An Ecological Handbook by James C. Halfpenny and Roy Douglas Ozanne
- "Packed to the Hilt" by Jeff Hull. Audubon November-December 2010
- Animal Detective Teachers Guide by the University of Nebraska State Museum,
<http://www.unl.edu/museum/education/pdf/UNSMAnimalDetGuide.pdf>
- British Columbia Outdoor Wilderness Guide,

<http://bcadventure.com/adventure/wilderness/animals/coyote.htm>

- Merck Manual On-Line Medical Library, Frostnip,
<http://www.merck.com/mmpe/sec21/ch319/ch319b.html>

Credits

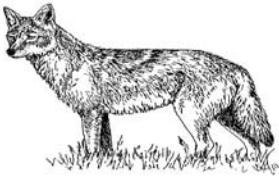

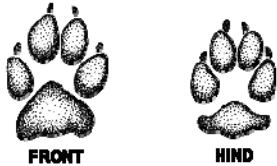




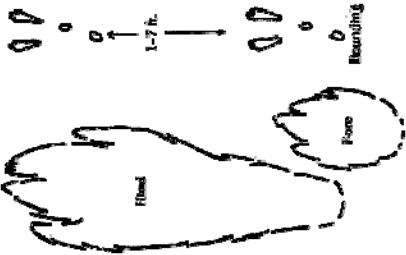








This field investigation was developed and written by Prairie Wetlands Learning Center Staff, U.S. Fish and Wildlife Service. Thanks to the following teachers for reviewing this lesson plan: Renee Larsen, Adams School, Fergus Falls; Vanessa Jacobsen, licensed teacher and home school educator, Fergus Falls; and Barb Case, Our Lady of Victory School, Fergus Falls.

Student material follows.



Prairie Wetlands Learning Center

Wildlife Mysteries - Solved!

Coyote			 <p>FRONT HIND</p>
Deer mouse			 <p>1 inch</p>
Eastern cottontail rabbit		 <p>1-7 ft. Front Hind</p>	
Muskrat			
Weasel			
Red fox		 <p>Toeing 8-15 inches (203-381 mm)</p>	 <p>Front foot Hind foot 2 inches (50 mm)</p>