



Prairie Wetlands Learning Center

Wildlife Mysteries

2nd Grade Animal Life Series

Summary

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).

Background

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 Prairie Wetlands Learning Center, we experience colder air temperatures, wind chill, frozen ponds and prairies, snowfall, and the shortest day-length (photoperiod) of the year. The National Weather Service indicates 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 Prairie Wetlands Learning Center 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

Minnesota Academic Standards

Subjects Covered:
Science, Math
and Language
Arts

This lesson helps support 7 standards and 13 benchmarks. See sections “Minnesota Academic Standards in Science” and “Minnesota Academic Standards in Language Arts.”

Grade Level:
2nd Grade

Time:
90 Minutes

Season:
Winter

Objectives:
Students will be better able to...

- Observe animal sign without walking on it
- Name two animals which are active in winter
- Use the synonyms sign and evidence for clue
- 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

Materials:

- Rulers
- flagging sticks
- chaperon set of Peterson Flash Guides (Animal Tracks)



Background, *continued*

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 (migrating), hibernating, or by staying active (resisting). The lists below provide examples of resistors found at the Prairie Wetlands Learning Center. We search for active animals that remain here, and most often actually find the signs they leave behind.

Resistors	Evidence Found
Chickadees, Crows	Calls
Great Horned Owls	Pellets, kills sights
Deer	Tracks, buck rubs, browse, scat
Muskrats	Huts, push-ups
Mink	Tracks, snow tunnels
Weasels	Tracks, snow tunnels
Mice	Tracks, snow tunnels, scat, urine
Grey squirrels	Nests (dreys)
Eastern cottontails	Tracks, trails, browse, scat, urine
Fox, coyotes	Tracks, trails, scat

Studying animal signs allows us to infer many things about nature, for example:

Winter Animal Sign	Inference
Chickadee contact calls	One bird is separated from the flock
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 ice burrow
Blue urine	Rabbits have switched to browsing on buckthorn

Skills Used:
 investigating,
 following directions,
 listening,
 cooperating, asking
 and answering
 questions, exploring,
 observing,
 describing,
 measuring,
 inferring, identifying,
 concluding,
 respecting animal
 homes, comparing
 and contrasting





Background, *continued*

Tracking animals involves its own set of terminology which is helpful when making observations with students. For example, the following normal pace gaits may be discernable. Gait means how an animal moves.

Walkers leave a nearly straight line of single, same-size prints, walking on their toes or toenails. The back foot lands in the print left behind by the front foot. The sequence would be front left foot moves forward, followed by back right, then front right followed by back left. Felines, canines, fox, and hooved animals typically travel in a walking gait.

Waddlers have longer back legs than front legs and shift their weight from side to side as they move forward, indicating a wider straddle. The larger back foot lands in front of the footprint left behind by the smaller front paw. They often walk with the entire bottom surface of their paw landing on the ground and move the front and back leg on the same side of the body at the same time. Waddlers include raccoons, skunks, muskrats, and bears.

Hoppers also have smaller front feet and larger back feet. Their hind feet straddle and land in front of the front footprints. Large back legs power their jumps when they are entirely airborne, sometimes creating long distances between sets of prints. Rodents, rabbits, and squirrels are hoppers.

Bounders have long, tubular bodies and short legs. Their back feet land in the footprints left behind by the front feet, and they are briefly airborne. Bounders include most members of the weasel family such as mink, otter, and long-tailed weasels.

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 Prairie Wetlands Learning Center, 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



Background, *continued*

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 Prairie Wetlands Learning Center 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

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.")

- Conduct steps 2 through 5 in the section "Field Investigation Procedure" at school. Upon arrival at the Prairie Wetlands Learning Center, teachers may provide Prairie Wetlands Learning Center 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.



Prairie Wetlands Learning Center Staff Prep

- 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 Prairie Wetlands Learning Center staff that you will need paper and clipboards when booking your date.
- Check for ice safety according to the Prairie Wetlands Learning Center Ice Safety Plan. Review winter animal signs and preview the Mallard Marsh site. Prepare materials.

Field Investigation Procedure

Introduce the Topic

1. In the classroom, welcome students, teachers, and chaperones to the Prairie Wetlands Learning Center. Organize students into small groups, each led by a chaperone.
2. 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?
3. 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).
4. Encourage them to make predictions. What do think they would find out today about animal signs when we search for them outside? Record their answers on the white board.
5. 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).
6. Distribute the data sheet we will use with clipboards and pencils, one per chaperon or small group.
7. Review rules for the trail. It will be important for everyone to walk in a single file line to avoid stepping on tracks and other animal signs. 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 on their data sheet. The last adult in line should remove each flag after the last small group has passed by.



Field Investigation Procedure, *continued*

Explore Outside

8. Outside, search for clues of animal signs, and proceed as described in step 7 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.

9. Before coming back indoors, allow students to observe and record weather data on their group's data sheet.

Reflect Together

10. Return to the classroom and use data

recorded on their data sheets 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 Prairie Wetlands Learning Center, which one would they chose? Why?

Vocabulary

scat, track, shelter, clue, evidence, mystery, sign

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. Prairie Wetlands Learning Center staff makes every effort to make your travel worthwhile despite the weather and prepare indoor, age-appropriate plans and welcomes your 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.



Weather Alternatives, *continued*

- 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 and Assessments

Try these activities at school to extend your visit!

Prairie Wetlands Learning Center Connection

- Write a story based upon the animal tracks and other signs discovered at the Prairie Wetlands Learning Center. 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 Prairie Wetlands Learning Center. Why might they be the same or different?

Home Connection

- 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 Prairie Wetlands Learning Center and/or your local park or school yard. Why might they be the same or different?

School Connections

- 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).
- 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.). 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 newsprint 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.



For the Prairie Wetlands Learning Center Educator

Prairie Wetlands Learning Center Theme – the Prairie Pothole Region

Primary Environmental Education Message – The prairie pothole region is valuable and in need of restoration and protection.

Sub-message – Wildlife: The prairie pothole region is home to a variety of resident and migratory wildlife.

Prairie Wetlands Learning Center Environmental Education Objectives –

3. Use scientific knowledge to explore the environment (ask questions, hypothesize, collect data, analyze data, form conclusions, make recommendations) (Habitat and Wildlife).

5. Identify components of and functions of a given ecosystem by observing, counting, and describing the animals and plants in that ecosystem. (Wildlife and Habitat)

2019 Minnesota Academic Standards in Science

This lesson helps support the following state standards

Strand 2 Looking at data and empirical evidence to understand phenomena or solve problems

Substrand 2.1 Analyzing and interpreting data

Standard 2.1.1 Students will be able to represent observations and data in order to recognize patterns in the data, the meaning of those patterns, and possible relationships between variables.

Content Area Earth and Space Science

Benchmark 2E.2.1.1.1 Represent data to describe typical weather conditions expected during a particular season. (P: 4, CC: 1, CI: ESS2) *Examples of data may include temperature, precipitation, and wind direction. Data displays can include pictographs and bar graphs.*

Strand 4 Communicating reasons, arguments and ideas to others

Substrand 4.1 Engaging in Arguing from evidence

Standard 4.1.1 Students will be able to engage in argument from evidence for the explanations the students construct, defend and revise their interpretations when presented with new evidence, critically evaluate the scientific arguments of others, and present counter arguments.

Content Area: Life Science

Benchmark 2L.4.1.1.1 Construct an argument with evidence that evaluates how in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all (P: 7, CC: 2, CI: LS4, ETS2) *Emphasis is on the interdependence of parts of a system (organisms and their habitat). Examples of habitats should include those found in Minnesota, such as a wetland, prairie, or garden. Examples of evidence may include needs and characteristics of the organisms and habitats involved.*



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, scientific ideas or concepts, or steps in technical procedures in a text. Events

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.



Language Arts Academic Standards, *continued*

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.

Reference and Resources

Books and Web Sites 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
- *Follow that Footprint, Paw Print, Hoof Print* on Minnesota Department of Natural Resources EEK! web site
- *Track Quiz for Beginners* on Minnesota Department of Natural Resources web site
- *Identify Mammal Tracks, Western Minnesota* on enature web site



References and Resources, *continued*

Books, Articles and Web Sites 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
- *Audubon* November–December 2010. "Packed to the Hilt" by Jeff Hull.
- *Animal Detective Teachers Guide* on the University of Nebraska–Lincoln State Museum web site
- *British Columbia Outdoor Wilderness Guide* on the British Columbia's Travel Guide web site
- *Merck Manual On-Line Medical Library*, Frostnip on the Merck Manual Professional Version web site

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. Photos provided by Molly Stoddard/USFWS.

