Animal Signs

Program Purpose:
Through hands-on exploration, participants will discover different types of animal signs that are used to learn about and track animals big and small.

Length of Program:
2 hours

Age:
Grades 1st-9th

Maximum Number of Participants:
20

Objectives:
After completion of all activities, students will be able to:
• Name three to five different categories of animal signs.
• Examine animal signs and infer the animal’s behavior.
• List several different animals living in the Upham Woods area.
• Define humans as animals and list several human signs in our world.

Preparation:
Before the class arrives:
• Locate and inventory the animal signs material box.
• Set-up the classroom by arranging all of the example animal signs in an appealing and logical arrangement.
• Check that there are enough half sheets of paper on each clipboard.
• For iPad lesson: gather six iPads (five for the student groups and one for you to demonstrate with) and make sure they are fully charged and connected to Wi-Fi. Set up the Apple TV.

Basic Outline:
I. Introduction (5 minutes)
II. Categories of signs (45-50 minutes)
III. Animal signs hike (60 minutes)
IV. Conclusion (10-15 minutes)

Materials:
5 labeled clipboards
Scrap paper
Pencils and/or pens (at least five)
5 Animal tracking books
Beaver taxidermy (in program room)
Animal track poster
Plaster and rubber track examples & track bandana

Variety of rubber imitation scat & scat bandana
Owl pellet
Paper wasp nest
Galls
Beaver chews
Call whistles
Animal photos
Assorted bones and badger feet
Turtle shells
Owl wing
Deer skulls
Deer legs
Assorted feathers
Red fox pelt and tail
Beaver pelt
Badger pelt
Squirrel pelt
Snake sheds
Large rattlesnake skin (on board in treehouse room)

Introduction:
Introduce yourself and the title of the class. Explain to the class that today they will be learning about the signs animals leave behind. Then they will be going outside and becoming animal sign detectives. If it is a younger group, ask the participants what a detective is. Like Sherlock Holmes or Harriet the Spy, the students will look for clues. As detectives, they will find clues or signs that will help them discover what animals live in this area and what they do. Different animals leave different signs, and these signs serve as clues to the internal and external structures and behaviors (a.k.a. “adaptations”) that allow each animal to survive, grow, and reproduce (4-LS1-1). At the end of the class everyone will share what kinds of animal signs they found and what they learned from each sign.

Categories of Signs:
Ask the participants to list what kinds of signs, or evidence, of animals they may find outside, and what those signs tell them. As they name each type of sign, write it on the white-board. Give the students examples if they have trouble coming up with ideas. Once you have a list on the board, take several minutes to describe the kinds of signs in each category. Show examples of each kind of sign, and ask the students what each kind of sign tells us about the animal that left it behind.

Types of Signs:
• Tracks and Trails
• Scat and Urine
• Eat/Cheat marks
Track and Trails:
- A “track” is a single print made by an animal, and a set of tracks is a “trail.”
- Different animals have differently shaped feet, and tracks provide a record of these different shapes. For example, ungulates (including deer, moose, cattle, horses, and giraffes) have one or two large toes on their feet; their tracks are easily distinguished from canine (dog) or feline (cat) tracks which have more toes that are smaller and rounded.
- What does the shape of an animal’s feet (as reflected in their tracks) tell us about how the animal lives? How does it help the animal survive, grow, behave, and reproduce? (4-LS1-1) (A duck’s webbed feet indicate it spends time in the water, the claws of a badger’s print tell us it digs a lot, etc.)
- The program box contains several plaster tracks and track books, a track poster, and a track bandana. Describe how plaster tracks are made (by pouring wet plaster on a good track, waiting for it to dry, and then peeling it up). Hold up the plaster tracks and have the students guess what animals made each track and where the track was found. Ask the students where the best places to find tracks are (sand, mud, river banks, snow, puddles) and why.
- Tracks can tell you how fast and at what gait (walking, running, etc.) an animal was moving (based on the depth and spacing of the tracks). A series of tracks and trails can show an encounter between different animals or different animals visiting the same place.

Eat/Chew Marks:
- Show the beaver chewed sticks and log with woodpecker holes in it during this segment.
- Ask the students what other eat marks they can list. Some may include deer eat marks on twigs, bark beetles, several different types of woodpeckers, and insect eat marks on wood and plants.
- Although it is difficult to determine how old an eat mark is, a fresh eat mark (moist, green, distinct, no weathering or debris, etc.) indicates the animal was in the area recently.

Homes:
- There are several different types of animal homes the students may find. These include holes in trees; holes in the ground; holes in snow; and nests, cocoons, galls, wasps’ nests, bark, and beds.
- Explain to the students what a gall is. A plant usually produces a gall when an insect lays eggs on or in it, although bacteria, viruses, and fungi can also produce galls. The plant produces the mass to protect itself from the insect, but this mass helps the eggs form into larvae and the larvae form into adult insects by providing shelter and food. By stimulating growth around the site of the infection, the insect effectively hijacks the plant’s own system for the production of new cells. Galls typically do not injure the plant, but for smaller plants the rapid growth of new cells can hinder the plant’s water and nutrient circulation systems, stunting its overall growth.
growth (MS-LS1-3). Show the students the gall and the hole where the insects ate their way out.

• Show the students the wasp nest and explain how a wasp makes the paper to form its nest: the wasp chews wood from different trees and other plant material. The woody material mixes with the wasp's saliva and the wasp spits it out into thin layers to form paper. The different colors of the paper wasp nest are evidence of the different plant material the wasp used to make the paper.
• Ask the students why they think animals make homes. How do homes help animals reproduce more successfully? (MS-LS1-4) (Protection, keeps young out of the elements.)

Body Parts:
• This category includes hair or fur rubbed off on sharp twigs as an animal passes by, shed hair, molted feathers, shed antlers, and bones.
• Show the students several bones, feathers, and skulls. Try to have them identify the items.
• Show the students the bone that has been chewed on. The bone is two types of animal signs: a body part and eat marks! What can they conclude about the bone's life story?

Territory Markings:
• Although there are many different ways animals mark their territory, students are most likely to find two specific types of territory markings here at Upham Woods: tree rubbings and beaver mounds.
• Buck deer "rub" on saplings that are 1-2 inches in diameter. Rubbing gets rid of velvet covering on antlers after they have quit growing and the velvet becomes dry. Besides leaving the visual mark as it rubs the tree, the buck deposits a scent from the pre-orbital gland in the front of its eye. This scent acts as a personal claim to a territory.
• Beavers pile up a mound of mud in several places along their pond or stream. Then they deposit castoreum—oil from their castor glands—onto this mud. The smell is somewhat anise-like and remains for weeks.
• Have the students think about why it is important for animals to mark their territory. How might this help them reproduce? (MS-LS1-4) (Can find a mate and scare off rivals, more territory means more resources for the animal and its offspring)
• Territory markings are evidence of what type of relationship with other organisms or individuals in the ecosystem? (Competetive.) (MS-LS2-2)

Sounds and Smells:
• Ask the students how else they can find animal signs without using their eyes.
• Ask the students to name some sounds they may hear outside. (Squirrels chattering, rustling leaves, bird calls/songs, frog and toad calls.) Many birders identify birds solely by their song in dense brush areas where vision is limited. Nighttime is the best for listening to the rustle of feet, and the calls of loons, wolves, and owls.
• Ask the students to name some smells that could be a sign of an animal. (Urine, scat, musk, decomposition of body parts.) Smells from members of the weasel family have a distinctive musk, skunks are obvious, as well as the musk of a short-tailed shrew. If you have shrews in your house rather than mice, you'll know just by the aroma.

Animal Signs Hike:
In the classroom, explain to the students that they are now going to go on a hunt for animal signs. Ask the students to make some predictions. How many different animal signs do they think they will find? Would they find more or less depending on the season? Why? (More or less resources are available, migration, hibernation, seasonal behavior like mating, tracks may be easier or more difficult to see depending on snow/mud conditions). (MS-LS2-1).

If the class is using clipboards: Break the students into five groups (try to get one adult in each group). Each group receives a clipboard, and each clipboard has an animal sign category(s) on the back of it. Each group needs to look for animal signs that match their category.

About every ten minutes, explain that you will call out "switch." Every group needs to switch their clipboard with one they have not had. Then they will look for animal signs in their new category until it’s time to switch again. By the end of the hike, every group should have the chance to look for animal signs in each category. When a group finds an animal sign that matches their category, they should write it and draw it on their clipboards. Humans are animals too! Human signs count as well! Remind the students to leave the animal signs in place so others can discover them too.

If this class is using the iPads: Divide the students into five groups and give each an iPad. Hook your iPad to the Apple TV and demonstrate the features of the ScreenChomp and iTrack apps (as outlined in Appendix A), then let the students play with the app to experiment with how to use the tools. After five minutes, instruct students to draw five columns in five different colors on their white screen, each labeled with an animal signs category (Tracks & Trails, Scat & Urine, Chew Marks & Body Parts, Homes & Territory Markings, Sounds & Smells). Tell each group which category they will be searching for first and that we will be walking outside to different habitat areas. In each area, they will have ten minutes to search for signs as a group. Students should be sure to discuss and record the signs they find using ScreenChomp—by writing, taking pictures, video recording, drawing, and/or annotating what they see.
After ten minutes, everyone will gather up, hike to a new habitat area, and begin searching for signs in the next column category. After another ten minutes, the group will gather and hike again, and so forth.

Take the group outside. Instruct them to spread out but stay within sight of you. Inform the students that they will be walking, so they should keep up with the group. Remind them to listen for the switch time. During the hike, walk around and try to help students find signs and also help them identify what animal left the sign (use questions as much as possible). For groups that find animal tracks or trails, have the students compare what they find to pictures in the animal tracking books or on the iTrack app. How do these natural “texts” of the landscape match up to the idealized images found in the books or the app? (RST.6-8.1)

With about twenty minutes left, bring the group back into the classroom for the conclusion.

**Conclusion:**
Ask the students to read out loud and show the animal signs on their clipboard to the rest of the students (they should read the clipboard they currently are holding). Take turns reading all of the clipboards. If the class is using iPads, groups will take turns connecting their iPad to the Apple TV and presenting what they recorded in ScreenChomp. (SL.5.5, SL.8.5) Use this time to explain any signs that the students seem particularly interested in. Have the students draw on multiple resources to answer questions about some signs (RI.5.7):
- Who made the sign? What evidence did you use to form your conclusion?
- What does the sign tell us about the animal who made it?
- What human signs did you find?
- How did some of these human signs affect the environment?

Animal signs can shed light on the functioning of the ecosystem. Help the students construct a food web model that includes all of the animals that they found signs of on the hike. You may need to add animals that they didn’t find signs of in order to complete the food web. Have the students trace the flow of matter and energy between living and non-living parts of the ecosystem. (MS-LS2-3) How would the type and number of animal signs change if the physical or biological components of the ecosystem were different? For example, have the students think of what animal signs they find in their backyard or favorite park. What are the physical and biological differences between that backyard or park and Upham Woods? How are these differences reflected in the animal signs that we might find in each place? (MS-LS2-4).

Ask the students to brainstorm who might have looked for animal signs in the wild throughout history and why these people looked for animal signs. (Hunting or fishing for food, following animals to better grazing lands):
- Prehistoric humans
- Native Americans
- Pioneers
- Voyageurs

People still look for animal signs, both for fun and for work. What careers involve looking for animal signs?
- Wildlife biologists
- Ranchers
- Hunters
- Commercial fishermen and recreational anglers
- Marine biologists

These people not only look for animal signs to learn about animals but also use technology. Can the students think of any technology that can be used to track animals? (GPS, Radio Collars) Take a brief moment to explain GPS. Global Positioning System is a system of satellites and receivers that allow you to pinpoint your exact location anywhere on earth. GPS satellites circle the earth twice a day. Like a television satellite sends a signal to your television, GPS satellites send a signal to a portable GPS receiver. When the receiver gets the signal it “knows” exactly where it is on the planet. Scientists put GPS collars on animals to tell where they migrate, eat, bathe, swim, fly, and reproduce. This technology is used in animal conservation. What are some animals the students think are tracked using GPS? (Dolphins, whales, sea turtles, caribou, elk, elephants, cranes, hawks, eagles, osprey, and many more.) How can information about where an animal lives and migrates be used for conservation? (Helps identify priority feeding, mating, and nesting grounds and migration corridors, etc.)

Collect the clipboards or iPads and thank the students for a great class!

**References:**
Garmin Ltd. [http://www.garmin.com/aboutGPS/](http://www.garmin.com/aboutGPS/)

Missouri Botanical Garden. [Galls on Trees](http://www.missouribotanicalgarden.org).


**APPENDIX A: iPad App Instructions**

**ScreenChomp:**
Each student iPad contains a copy of the ScreenChomp application, which allows students to freely write, draw, record, save and share information. Before passing out the iPads to students, demonstrate the features of ScreenChomp. On the ScreenChomp menu page, students should touch the “Draw and Record” arrow in the top right corner. On the bottom menu bar, students should see 3 markers of varying thickness and an eraser. Touching any of the markers flips the tip up, indicating you’ve selected that drawing tool. Touching a marker with the tip up shows the color and thickness box, where colors and weight (thickness) of the drawing tool can be changed. If students need to erase something they’ve drawn, tapping the black eraser will turn it white, showing that it’s been selected. Dragging over drawn objects will erase them. To clear a whole page, press and hold the picture of the white board in the lower left hand corner. The screen will be erased.

To record what you are drawing, writing or taking a picture of, press the red record button on the lower right hand side of the screen. A “3-2-1” countdown will appear, followed by white pause and stop buttons on the lower right hand side. A timer appears on the top right of the screen, and a microphone (which indicates the level of sound) next to it. When students are finished recording, they can press the stop button. A new window will pop up that begins playing the recorded video. If they need to discard a recording, they should press and hold the trash can in the lower left hand corner. A photo of an animal sign can be added by tapping the multimedia picture to the left of the white rag over the white board icon. A photo can be added from a Library of photos, or students can take a new photo. Once selected, the photo can be resized (by dragging two fingers on the edges of the photo to expand or contract) or repositioned on the white screen (use one finger to drag the photo to the proper place). Students can then draw, list, or highlight areas on the photo with the markers as they record.

Previous recordings or screens (without sound) can be viewed by touching the 3 layered pages picture on the top left corner.

Make sure the ScreenChomp screens are all erased from the iPads when the students are done.

iTrack:

Students looking for animal signs in the Tracks & Trails category can use the added tool of the iTrack app. When opened, the iTrack app will list mammals alphabetically (by Common name or Latin (scientific) name), shown in boxes at the top. Each mammal will have a picture of the front and hind track prints and the average length in inches and centimeters of both tracks.

If students want to skip to a particular animal, they can do it in one of two ways. The letters listed vertically down the right hand side allow you to skip directly to mammals starting with that letter. Or, tap the magnifying glass icon in the top left corner. A search box and keypad will appear and students can type the name of the mammal in the search box. To minimize the keypad, click the keypad icon in the lower left hand corner. To clear the search, click the X button on the right hand side of the search box. To exit searching all together, tap “Show All” in the upper right hand corner of the menu bar.

When students find a track, they can attempt to identify it by tapping the “Search” icon at the bottom of the screen. Starting at the top, this tool is like a key that allows users to input as much information as they can about the observed track to narrow down its identification.

1) If students have a quick guess they want to check, they type the name of the mammal into the search box.
2) If they have no guess, they should measure the length and width of the track and input this information using the slider keys. (The “ruler” can be accessed through the Help section of the bottom menu bar.)
3) Next, count the number of toes and choose the appropriate number.
4) Indicate if toes are rounded or long.
5) Indicate if claws are present and their relative size.
6) Indicate if track is symmetrical (both right and left sides of track are equal).
7) If known, tap the mammal group the track belongs to.
8) Select a state by tapping on the box and using a finger to scroll up or down in the list (the blue horizontal bar should not move; only the list of states underneath it). Click “Done” when finished.
9) Tap “View Results.”
10) To remove a selection, tap it until the checkmark to the right disappears.

It is not necessary to input information in every category. At any time, students can tap “View Results” to see a list of possible identifications for the observed track. Tapping a particular mammal listing will scroll to several photos and descriptions of that mammal’s tracks. Students can compare their observed track with the photos to see if they match.

In the top left corner of the screen is an Options menu, which allows multiple selections to be listed and where the units of measurement can be changed. Students can start a new search by tapping the Reset button in the upper right hand corner.

At the base of the photos is a menu bar listing “Tracks,” “Sign,” “Notes,” “Wiki,” “Similar,” and a star symbol.
Sign – will show photos of the animal, its scat and urine, chew marks, and skull pictures.
Notes – will give written descriptions of the front and hind tracks, the gait, and similar species with which their tracks might be confused.
Wiki – will go to the Wikipedia webpage on the animal.
Similar – shows photos of tracks of similar species listed in “Notes.”
Star symbol – will add this mammal to the Favorites list in the bottom menu bar.

Tracking Info – Tapping this on the bottom menu bar will lead to a page with additional written and photo information, divided into 7 categories: “Learning to Track,” “Identifying Tracks,” “Track Anatomy,” “Measuring Tracks,” “Gait Patterns,” “Tracking Tools,” and “Classes & Certifications.”

Help - Tapping this on the bottom menu bar will lead to a page with additional written and photo information, divided into 9 categories. The most useful to the students will be the “Ruler,” which provides a metric and American unit ruler on opposite sides of the screen with which to measure track lengths and widths.

At any time in a subpage, students can go back to a previous page by clicking the Back button in the upper left hand corner of the page.

APPENDIX B: Standards Alignment

Next Generation Science Standards:
4-LS1-1
5-LS2-1
MS-LS1-3
MS-LS1-4
MS-LS1-7
MS-LS2-1
MS-LS2-2
MS-LS2-3
MS-LS2-4

Common Core State Standards:
RI.5.7
SL.5.5
SL.8.5
RST.6-8.1

Wisconsin’s Model Academic Standards:
Science
C.8.4
C.8.6
F.8.8