

1. CONTRIBUTOR'S NAME: ALLISON GREENE, BROOKE MCBRIDE, MIKE MACHURA

2. NAME OF INQUIRY: TRACK MYSTERIES

3. GOALS AND OBJECTIVES:

a. Inquiry Questions:

1. How do animals make different track patterns?
2. Can you figure out what an animal was doing when it made a track?
3. How did a group of animals interact to create certain track patterns?

b. Ecological Theme(s): Tracking, animal movement, and interactions between animals

c. General Goal: In this inquiry, students will learn about animal movement and make hypotheses about interactions between animals.

d. Specific Objectives: Students will create their own track patterns, make observations and hypotheses about the track patterns of other students, learn local animal tracks, and make hypotheses about interactions between different animal species.

e. Grade Level: Grade 1 - 5

f. Duration/Time Required:

→ Prep time: About 10-15 min; as this exercise requires students to observe tracks in the snow, select an undisturbed area of fresh snow in the schoolyard.

→ Implementing Exercise During Class: 1 ½ to 2 hours

→ Assessment

4. ECOLOGICAL AND SCIENCE CONTEXT:

a. Background (for Teachers and presentation to students):

Begin the inquiry by asking students what they think they can learn by studying animal tracks. Specifically, ask the students to think about how they would determine the way an animal was moving based on its tracks. Next, introduce the basic ways an animal can move; walking, running, jumping, hopping, landing, and crawling (examples of the track patterns created by some of these movement patterns are shown below). Ask students to make hypotheses about how the distance between tracks will change when an animal is walking versus running, and how the depth of tracks will change between each type of movement (the students will get a chance to test their hypotheses later in the inquiry). If you are feeling artistically inclined, you can even draw the track patterns the students hypothesize on the board (again, you can use the track patterns below as a reference). Lastly, ask the students what they could learn if they see the tracks of different individuals of even different species in an area. What are some signs they could observe that would give them clues about how the animals interacted?

The pictures below show the track patterns of some common movements (from *Animal Tracks of the Rockies*, by Ian Sheldon, 1997)

Walking

Tracks are evenly spaced,
may or may not have
dragmarks.





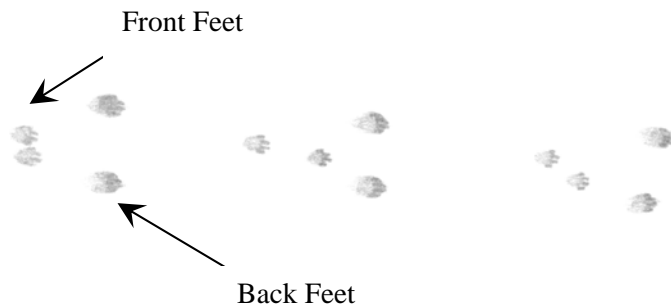
Hopping

Movement used by squirrels, rabbits, and small rodents. Tracks of all feet are tightly clustered, and the tracks of the front feet appear inside those of the back feet.



Running

In tracks of four-legged animals, fore and hind prints are grouped together. In general, running tracks have a greater distance between individual tracks



Landing

These prints can be made by birds, flying squirrels, or even a jumping or landing animal. These are also called sitzmarks.

5. **MOTIVATION AND INCENTIVE FOR LEARNING:** This is a fun, active inquiry. Students go outside and create their own tracks and solve “track mysteries.”

6. **VOCABULARY:**

Draglines: Lines left in the snow behind or between tracks caused by a dragging foot or tail. Draglines left by dragging feet are common in walking tracks of some species, like deer and pronghorn antelope.

Sitzmark: Imprint of an animal, such as a landing bird or flying squirrel. These are also created when an animal pounces, jumps, or falls.

Hopping: Hopping is a common movement of squirrels, rabbits, and rodents. Hopping tracks are tightly clustered groups of all four feet, and the tracks of the front feet can usually be seen between the tracks of the back feet.

7. **SAFETY INFORMATION:** AS THIS INQUIRY IS CONDUCTED OUTSIDE DURING THE WINTER, MAKE SURE STUDENTS DRESS WARMLY. AS WELL, STUDENTS WILL BE MAKING TRACKS WITH THEIR HANDS, FEET, SO MAKE SURE THEY HAVE GLOVES AND EVEN SNOW PANTS.

8. MATERIALS LIST (including any handouts or transparency masters):

For the outdoor portion of the inquiry, colored flags or markers are useful to mark undisturbed areas of snow and keep students from making prints in the area before the inquiry begins. Use the schoolyard tracking guide and the track mysteries worksheets for the indoor portion of the inquiry.

9. METHODS/PROCEDURE FOR STUDENTS:

First, discuss the different ways animals move and ask the students to form hypotheses about the differences in the tracks formed by different motions (see the background and student presentation section above).

Part I. Take students outside to the schoolyard and find an area of undisturbed snow, making sure students do not disturb it until the activity begins. Divide the class into groups, with between four and five students per group. Line each group up facing the area of undisturbed snow, with enough room between groups for several sets of tracks. The first person in each group then walks across the undisturbed area, and then circles around to the back of the line (not walking through the undisturbed area again). Ask everyone in each group to look at their group's set of walking tracks. Do they have dragmarks? How much distance is between each track? Are the tracks deep? Have the second person in the line make a set of running tracks next to the walking tracks. Again examine the tracks, and compare them to the walking tracks. Continue giving each student a new type of movement (ie jumping, hopping, crawling, and landing), and observe and compare the resulting tracks.

Part II. After the students have observed the different track patterns created by different types of movements, have each group find their own area of undisturbed snow. For lower grade levels, have each student in a group come up with their own way of moving and create a set of tracks from one side of their undisturbed area of snow to the other. For higher grade levels, have all group members can work together to create a "mystery story." For example, all students could run to the center of their snow area, and then two students could be carried out of the area by the other two students. After each group has completed their mystery tracks, walk to each area's patch of snow and look at each set of tracks. Ask the student's how they think each track (or group of tracks) could have been made. After students have taken a guess, ask the groups to show how the tracks were actually created.

Part III. This portion of the inquiry can be done as homework or as a follow-up to parts I and II, and is best for third, fourth, and fifth grade levels, but can be simplified for younger ages. Each student is given a "Schoolyard tracking guide" and a "Track Mysteries" worksheet. Tell the students that they have come on a patch of fresh snow, and they see the tracks shown in the "Track Mysteries" sheet. It is their job to identify the animals that made the tracks and make up a story about how the animals interacted to create the tracks on the worksheet. Stress the fact that there is no correct answer, and there are many possible scenarios that may have taken place. Students may talk about their stories or write them in their nature journals.

10. ASSESSMENT:

11. EXTENSION IDEAS:

12. SCALABILITY

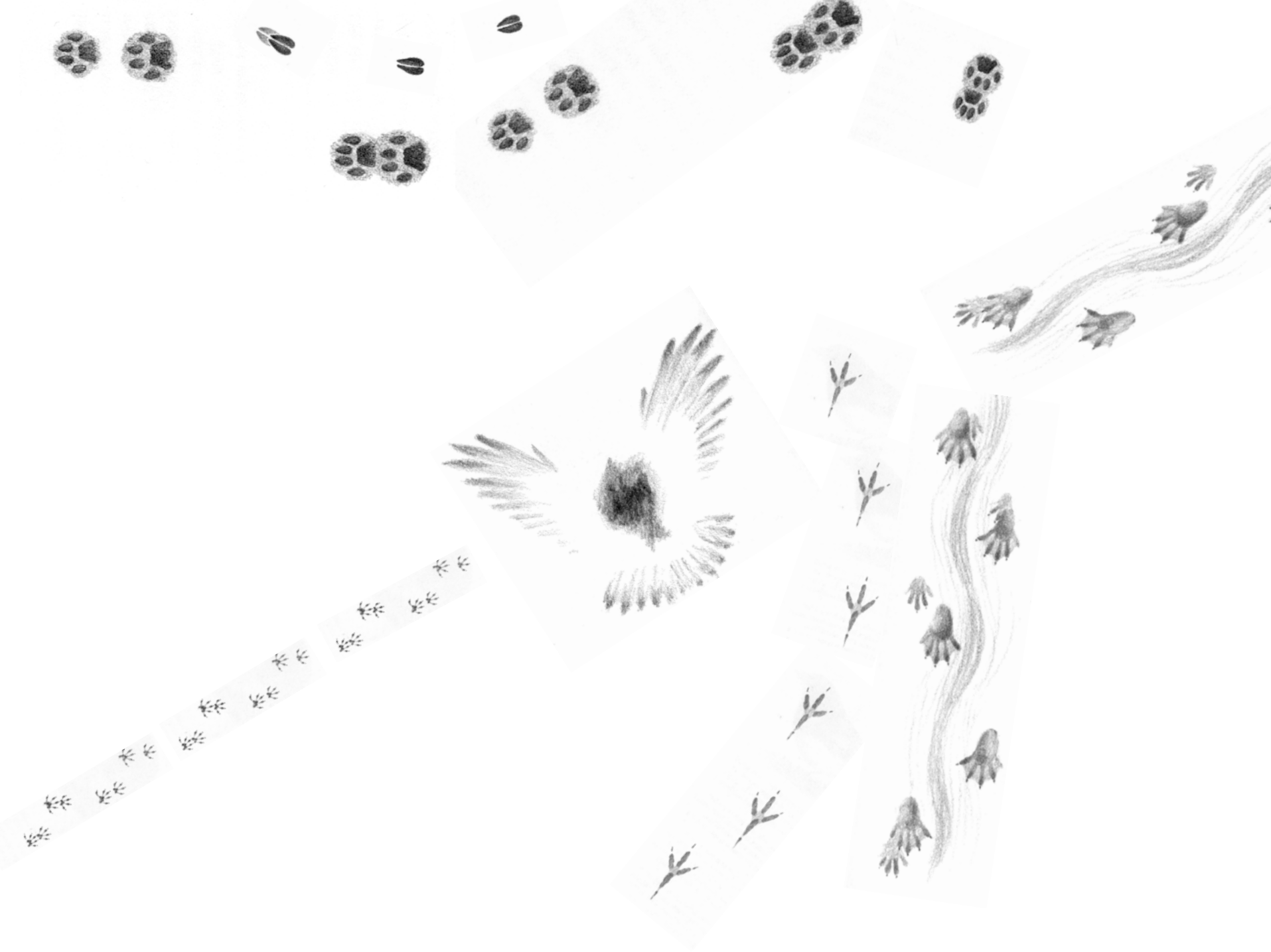
13. REFERENCES:

Sheldon, Ian. Animal Tracks of the Rockies. Copywrite in 1997 by Lone Pine Publishing.

14. LIST OF EXPERTS AND CONSULTANTS

Dr. Kerry Foresman, University of Montana

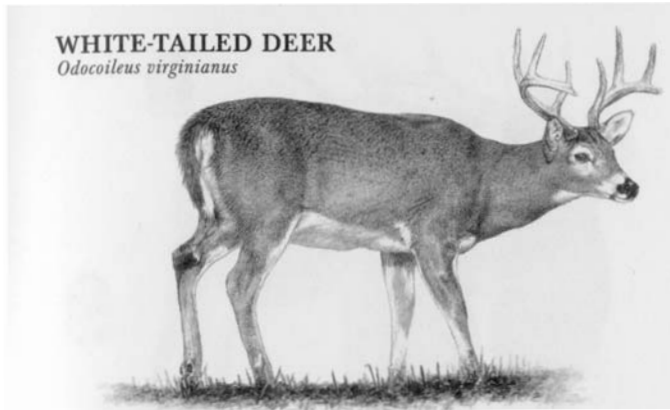
15. EVALUATION/REFLECTION BY FELLOWS AND TEACHERS OF HOW IT WENT:





Schoolyard Tracking Guide

Common Deer Species



White-tailed deer and mule deer tracks can look nearly identical, but white-tailed deer tracks are often found in areas with dense cover, while mule deer tracks are found in open areas.



Mule Deer

Carnivores



Red fox tracks are usually smaller than coyote tracks, although there may be some overlap. As well, the tracks of domestic dogs may look like red fox or coyote tracks.



Coyote

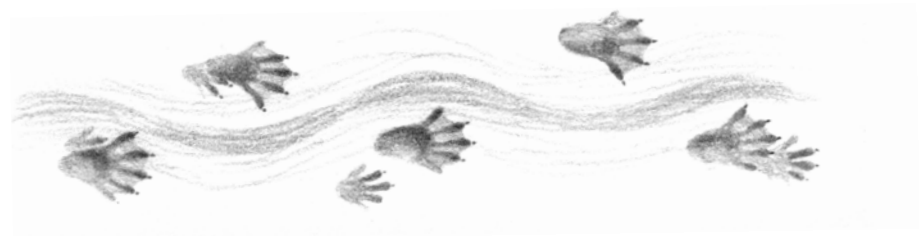
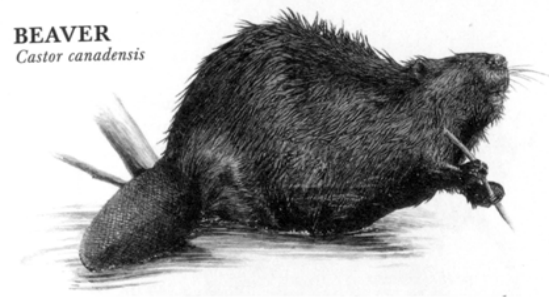
Cats

Unlike dog, fox, and coyote tracks, cat tracks have no claw marks and the main footpad is slightly more square shaped. Domestic cats have quite small tracks, bobcats have slightly larger tracks, and mountain lions have very large tracks.



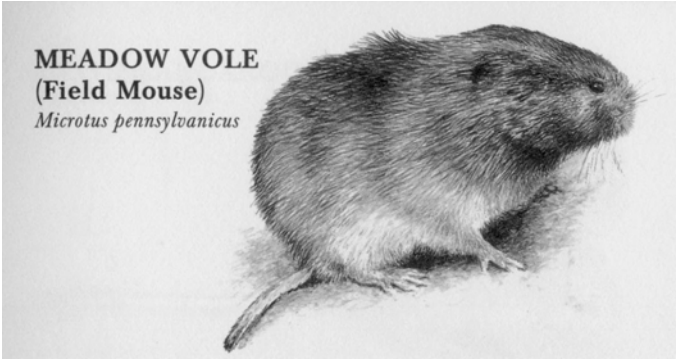


Skunk



Notice the webbed feet and the tail marks in the beaver tracks.

Small Mammals



Deer Mouse

Birds

Great Horned Owl (Sitzmark)

