



**THE RING OF DARHAD**  
MONGOLIA WOLVERINE EXPEDITION

# LESSON 4: BECOME A WILDLIFE ECOLOGIST

**LENGTH: 60 MINUTES**

**GRADES/AGES: GRADES 3-7**

## Lesson Overview:

Explore how scientists gather data on wildlife and the techniques they use in the field. Investigate signs of life and search for evidence of life in your own schoolyard.

## LEARNING OBJECTIVES

Students will be able to:

1. Identify animal signs.
2. Explain the techniques scientists use to gather data about animal populations.
3. Use standard research techniques to collect data.
4. Draw conclusions about schoolyard animal populations by analyzing observations and data collected as a class.

## DIRECTIONS:

### 1. Explore signs of life used by ecologists.

- a. Brainstorm as a class how ecologists know wildlife are present even if they aren't seen live. Record these ideas and share with your students additional signs of life they did not describe. (A list of signs of life can be found in this lesson's Background Information.)
- b. Distribute different signs of life to small groups. (These real examples need to be collected by the teacher prior to the activity. A list of examples can be found in the Background Information.)
- c. Have the students work together to identify what each sign is, what organism it is from and what it can tell ecologists on the **Signs of Life worksheet**.
- d. Have each group share their most interesting sign of life with the whole class.

### 2. Watch a video of ecologists collecting scientific data.

- a. Watch a video from Adventurers and Scientists for Conservation of ecologists in the field who study and collect data on a species. Have students record what techniques scientists use to collect data during the video.
  - ASC 2012 Grizzly Bear Tracking: <http://www.adventureandscience.org/grizzly-2012-movie>
  - ASC 2012 Wolverine Tracking: <http://www.adventureandscience.org/wolverine-movie>
- b. Have students share what techniques they observed. Explain why these techniques are important. Discuss what we can learn about different species through data collected using these techniques and how this data will enhance our understanding of ecosystems and wildlife management. (See the Background Information for more information on these discussions.)

### 3. Students collect scientific data in your schoolyard.

- a. Tell students that they will be visiting their schoolyard and collecting data to understand more about what species live in their schoolyard. They will be using techniques similar to those of the Ring of Darhad Mongolia Wolverine Expedition team.
- b. Before the lesson, use a map of your schoolyard and divide the whole schoolyard into smaller areas – one for each small group. If possible, before the lesson, mark these areas with stakes and flags for students.
- c. If possible, distribute the schoolyard map to your students. Assign each group an area (that you have pre-determined and marked on a map) within the larger study area. Have each group circle their area on their map.
- d. Ask your students what animals (including humans) they expect to find evidence of in their schoolyard. How will they know this animal species is there if they do not see it? Have your students think back to the Signs of Life activity earlier in the lesson.
- e. Tell your students that when they go outside, they will be looking for these signs of life and collecting scientific data to show what evidence of animals they found.

- f. Show your students the **Schoolyard Study worksheet**. Tell your students that to be a good scientist, they will need to walk slowly and listen and look carefully within their area to find signs of life. Using the examples provided on the worksheet, introduce how each group will collect their data. Go over proper collection techniques (listed in the Background Information) and school rules for the schoolyard.
- g. Visit the schoolyard. Have students make observations and complete worksheets in small groups. In addition to making observations, your students may use additional optional techniques similar to the Ring of Darhad Mongolia Wolverine Expedition by:
- Using GPS units to record the locations of the evidence they find
  - Collecting the evidence they find. (Use tweezers to put hair/scat in plastic bags/envelopes. Use plaster to record tracks. Use cameras to document signs you cannot bring back to your classroom.)
  - Discuss with your students where good locations for wildlife cameras would be for their schoolyard. The Ring of Darhad expedition will be scouting areas for motion cameras to catch wolverine activity based on where they find the most evidence of wolverines.
- h. Back in the classroom, have each group share what they found. As a whole class, discuss what species are the most common in your schoolyard and how you know. Discuss which species are rare and how you could protect these species (bird houses, natural areas, etc.)

## Tips and Modifications

To adapt this lesson to a different age group, use the following modifications:

3.b. For older students, have them be a part of the process to divide the schoolyard. Have them think about where they would anticipate finding more signs of life. Have students mark the boundaries with you in the schoolyard.

3.f. Older students may record data in a field journal instead of a worksheet. This will be more similar to how data is collected during an expedition.

## Assessment:

Review students' Signs of Life worksheets for accuracy and completion.

Have students record the techniques they observe in the ASC videos. Review for accuracy.

Review students' Schoolyard Study worksheets for accuracy and completion.

## Extending the Learning:

Complete Activity 4 of Lesson 7 of the unit. This activity has students collect data (similar to Activity 3 in this lesson) in their schoolyard.

Leave the signs of life examples out for further independent exploration by students.

Have a biologist visit your classroom to explain the techniques he or she uses in the field and answer student questions.

Use remote cameras to collect data over a longer period of time. Visit ASC's Website to watch videos of animals recorded by remote cameras.

Discuss how DNA can be gathered from hair and scat samples. Complete an activity on extracting DNA from cheek cells or beans.

## PREPARATION:

### MATERIALS YOU PROVIDE

- Pencils
- Signs of life – Collected, identified, placed into bags/containers, and numbered before the lesson
- Map of your schoolyard – Divided into small areas for data collection
- Clipboards (optional for the schoolyard study)
- Rulers (for schoolyard study)

### RESOURCES PROVIDED

#### Audio and Video

- Adventurers and Scientists for Conservation (ASC) 2012 Grizzly Bear Tracking video at <http://www.adventureandscience.org/grizzly-2012-movie>
- ASC 2012 Wolverine Tracking video at: <http://www.adventureandscience.org/wolverine-movie>

#### Handouts and Worksheets

- Signs of Life Worksheet (one per student)
- Schoolyard Study Worksheet (one per small group)

### REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per classroom
- Projector
- Speakers
- Plug-Ins: Flash

## Other Notes

Lesson 7 of this unit, “Schoolyard Biodiversity Study,” provides an opportunity for students to participate in all the steps of the Ring of Darhad Mongolia Wolverine Expedition. This lesson may be completed in portions at the end of the first six lessons to reinforce each lesson’s major ideas.

- Don’t put anything you find in your mouth including plants, berries, mushrooms, and leaves.
- Don’t reach into places you can’t see.
- Return rocks and logs you move to where you found them.
- Wash your hands as soon as you return do your classroom. Do not touch your face without washing your hands first.

## Background and Vocabulary

### SIGNS OF LIFE EXAMPLES

- Tracks
- Hair/Fur
- Feathers
- Scat
- Nests
- Burrows
- Spider webs
- Bones
- Sounds/calls
- Digging and scratching marks on trees
- Leaves and branches with pieces missing
- Holes in dead trees and logs from insects

### PROPER SIGNS OF LIFE COLLECTION TECHNIQUES

- Be careful while you are collecting, making sure not to damage any trees or plants.
- Don’t touch scat, dead animals, or trash unless you are wearing gloves.

### WILDLIFE ECOLOGY

#### DATA COLLECTION METHODS

Following the scientific standards of occupancy surveys for rare, low-density species like the wolverine, the Ring of Darhad Mongolia Wolverine Expedition will survey large areas with less intensity, rather than smaller areas with more intensive surveys used for sampling common species (Mackenzie et al 2005). Like all wildlife studies, this expedition has modified data collection techniques to fit the unique needs of the location and species. The distance covered by this research expedition corresponds to how wolverine track surveys should be carried out – surveying a very large sampling area with lower search intensity. While this research is a single transect, and not replicated, the expedition is also testing whether this survey technique is effective in documenting wolverine presence in an area of presumed but unconfirmed occupancy.

Occupancy studies attempt to determine the proportion of suitable habitat that is inhabited by a species. With repeated surveys, this approach can help researchers and managers understand changes in population over time, and whether a relationship exists between

## VOCABULARY

Term	Part of Speech	Definition
<b>DNA</b>	Noun	The material in each organism that provides the instructions for what each living thing looks like and how it will survive.
<b>Ecologist</b>	Noun	A person who studies living things and their environments.
<b>Hair snare</b>	Noun	A trap set up for collecting animal hair.
<b>Scat</b>	Noun	Animal droppings.
<b>Track</b>	Noun/verb	A mark or a series of marks left by an animal, usually footprints.
<b>Wildlife ecologist</b>	Noun	A person who studies animal populations and how to help them.

distribution, occupancy, and landscape processes. Many unresolved challenges exist in applying this method to naturally rare, wide-ranging species like wolverines, since researchers have to search for a single animal over a very large area. Since baselines data on wolverines in Mongolia are absent, the Mongolian wolverine expedition in the Darhad will adapt some techniques associated with occupancy studies, and some more basic, naturalist techniques associated with simply determining the presence of the species in a given area. By doing this, we gather information on presence and distribution, and also provide a baseline for future, more statistically intense research and monitoring.

When expedition team members discover a wolverine track, the team will backtrack to seek a DNA sample from fur or scat. "Collecting noninvasive genetic samples from putative wolverine (*Gulo gulo*) snow tracks is an effective method for providing definitive species identification for use in Presence-Absence surveys" (Ulizio, et. al, 2006). DNA will be analyzed to determine species identity, minimum number of wolverines detected, and genetic relationship to other wolverine populations, both in Mongolia's other mountain ranges, and globally.

*Mackenzie, D. and Royle, J. 2005. Designing occupancy studies: general advice and allocating survey effort. Journal of Applied Ecology. 44(2): 1105-1114.*

*Ulizio, T, Squires, J, Pletscher, D., Schwartz, M., Claar, J., and Ruggiero, L.*

*2006. The Efficacy of Obtaining Genetic-Based Identifications from Putative Wolverine Snow Tracks. Wildlife Society Bulletin. 34(5):1326-1332.*

## **BENEFITS OF MONGOLIA WOLVERINE EXPEDITION'S DATA COLLECTION**

This baseline study will enhance our understanding of the Darhad region's ecosystem and contribute to wildlife management for this area by:

- Adding to the knowledge of wolverines in Mongolia and highlighting a species at risk due to climate change.
- Providing naturalists a baseline index of all wildlife species observed. This will be presented as a report from this expedition team to the Mongolian government and Mongolian Academy of Sciences who have previously expressed interest in this information.
- Identifying those areas where more intensive wolverine surveys and monitoring could be done using cameras and DNA collection grids in the future.
- Contributing to a growing global DNA database of this circumboreal species. This may add to much-needed understanding of this species' genetic diversity and possible resilience in the face of climate change.

## **Prior Knowledge**

None

## **Recommended Prior Activities**

Lesson 1 of the Ring of Darhad unit: Meet the Team

Lesson 2 of the Ring of Darhad unit: Discover the Darhad

Lesson 3 of the Ring of Darhad unit: Explore the Ecosystem of Northern Mongolia

# SCHOOLYARD STUDY (EXAMPLE SHEET)

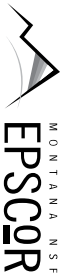
Name: \_\_\_\_\_ Date: \_\_\_\_\_

Name of study area: \_\_\_\_\_

Brief description of study area: \_\_\_\_\_

Record the signs of life you find in your section of your schoolyard using the data table below.

WHAT IS IT?	WHAT IS IT FROM?	SIZE		HABITAT TYPE	LOCATION
		LENGTH	WIDTH		
Animal Track	Dog	2"	1.5"	Open playground	By swingset in mud
Big dark feather	Bird (magpie?)	8"	1"	Under trees in grassy area	By fence under trees at the far end of the playground
Pink mitten	Child (maybe a girl?)	5"	3"	Open playground area	On the pavement by where we line up
Boot track	An adult	13"	4"	Open playground area	On the pavement by where we line up



# SCHOOLYARD STUDY

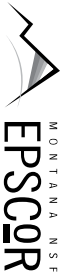
Name: \_\_\_\_\_ Date: \_\_\_\_\_

Name of study area: \_\_\_\_\_

Brief description of study area: \_\_\_\_\_

Record the signs of life you find in your section of your schoolyard using the data table below.

WHAT IS IT?	WHAT IS IT FROM?	SIZE		HABITAT TYPE	LOCATION
		LENGTH	WIDTH		



# SIGNS OF LIFE

Name: \_\_\_\_\_

For each sign of life, write down what you think it is, what animal it is from and what scientists can learn from this specimen.

SPECIMEN #	WHAT IS IT?	WHAT ANIMAL IS IT FROM?	WHAT CAN IT TELL US?
EXAMPLE	A track	Deer	How fast the deer was walking/running, where it was going, how big it is

