



# Lesson 1: Winter is Coming

## Key Concepts:

- Animals contend with adverse weather conditions in a variety of ways.
- Strategies for surviving extremely cold temperatures include becoming dormant, hibernating, remaining active and migrating.

## Skills:

- Brainstorming
- Understanding physiological and behavioral responses to cold conditions

## Materials:

- *How Do Animals Survive During the Winter?* (student handout page)

## Objective

Students will brainstorm ways in which animals survive winter's cold temperatures. They will create a class list that illustrates the variety of ways in which animals deal with cold temperatures, and compare these to ways in which humans prepare for and survive winter.

## Background

In temperate regions, animals must contend with surviving the adverse environmental conditions of winter, when temperatures are cold and food is scarce. Animals have developed several strategies for winter survival. Some animals **become dormant**, either hibernating as the ground squirrel does or overwintering as a dormant egg or pupa (as many insects do). **Hibernation** is defined as a state in which an animal's metabolic rate is reduced to a minimum and the animal enters a deep sleep, surviving on food reserves (fats) stored in the body. Hibernation occurs along a continuum, from deep hibernation where metabolic rates are greatly reduced to a partial hibernation (or **torpor**) where rates drop but not as far as in deep hibernation. Ground squirrels, for example, enter a deep hibernation, with heartbeats dropping from 300 beats/minute down to 7 to 10 beats/minute. Their respiration and body temperature are reduced as well. Black bears, on the other hand, enter a torpor. Although their respiration rate drops to 2 or 3 times/minute, their body temperature only drops to around 95° F. Other animals **remain active**, often developing thicker coats (e.g.: deer and rabbits) or huddling together to keep each other warm (e.g.: honey bees clustering in the winter hive). Still others **migrate**, leaving the adverse conditions behind and moving to other regions where the conditions are more suitable. Migration is defined as the regular movement of animals over relatively long distances. Many animals migrate great distances to escape harsh winter conditions.

Monarch butterfly combine two of these strategies. They migrate from their temperate breeding grounds to warmer locations in central Mexico or California. They then enter a torpor once they reach the overwintering colonies in November, remaining mostly inactive until January or February.

This lesson is divided into two portions, a group activity in which students imagine that they are animals getting ready for winter and a small group and class discussion in which students assess what they know about overwintering strategies of animals.

## Procedure

1. Have each student first imagine that he or she is a butterfly, mammal, bird, insect, or other animal. Then tell students to close their eyes,

relax, and listen carefully to this brief fantasy from *Keepers of the Earth*, by M. J. Caduto and J. Bruchae (1988).

### ***Winter is Coming***

*It is fall. The sun is rising later and setting earlier every day. The days are cooler, and the morning air is cold. All around you leaves are changing color. Fog forms over the ponds, lakes and rivers as the sun rises. The mist disappears when the sun climbs high in the sky. You have a great need to eat as much as you can find, and you are storing fat as you eat. Can you feel your body growing larger?*

*As each day goes by, the nights grow longer and colder. White frost crystals cover the plants, turning many of them brown and lifeless. Food is running low, yet you are using more food to keep warm. Ponds and lakes are freezing over and you have to travel farther each day to get water. Winter is coming fast! Soon the snow will blow, food will be hard to find and much of the water around you will become ice. You are a wild creature and winter is coming. What are you going to do to survive?*



2. Discuss animal responses to winter with your students, using the background information provided above. You can decide how much to tell students before they begin the lesson, possibly telling them very little to determine how much they already know about overwintering strategies. Or you may give them examples, such as remaining active, entering a period of deep hibernation or torpor, living as a resting stage like an egg, migrating, or finding a sheltered area.
3. As a class, brainstorm a list of animals, then discuss how each these animals survive the winter in a cold climate. Challenge students to list many different survival strategies (not just many different animals). Examples include: bear, sleep or hibernation; chickadee, stay active; robin, migrate. If students are having difficulty, prompt them by suggesting certain animals (e.g., how does a frog survive?). If they don't know how some animals survive, put question marks on the list after those animals, and see if students can find the answer in the library.
4. Depending on the reading and writing abilities of your students, you may wish to have each student make a list using the student handout.
5. Ask students to think of all the ways humans prepare for and survive the winter.
6. After this discussion, introduce the phenomenon of monarch migration as this insect's response to winter. You may wish to use the *Reading Rainbow* "Bugs" video clip on monarch migration, or read about monarch migration to your students from one of the many sources listed in the bibliography. Discuss monarch migration with your students, using the following questions as a guideline.
  - *How have people studied monarch migration?*
  - *Why do monarchs migrate?*
  - *Why do they go to Mexico?*
  - *Why do they cluster together?*

# How do Animals Survive During the Winter?

Name \_\_\_\_\_

Name of Animal	Winter Survival Strategy
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	