**Thick Coats and Sleeping Bears: How Alaskan Animals Stay Warm During the Winter**

**Target grades:**
K-2

**AK GLEs:**

*Reading*
- [K] 1.2.1
- [1/2] 1.2.3
- [1] 1.2.4
- [K/1] 1.4.2
- [K/1/2] 1.10.1

*Cultural*
- E2

**Set up time:**
15 minutes

**Class time:**
One class period

**Overview:**
This lesson explores how Alaskan animal cope with winter weather. Students will compare animals’ strategies to their own ways of keeping warm in the winter.

**Objectives:**
Students will explore energy conservation by examining how animals and people stay warm during long, cold Alaska winters.

**Materials:**
*How_Animals_Stay_Warm.ppt* Powerpoint presentation
Projector or Smartboard (or have the slides printed out)

**Background:**
As winter arrives in Alaska, the weather gets colder and the days become shorter and darker. Snow covers the ground. People begin to heat their houses and wear heavy coats outside to stay warm. But what happens to the animals? Virtually every Alaskan animal uses some type of coping strategy to conserve energy and stay warm to survive the long, cold, Alaskan winter.

**Migration:** Migration is an amazing tool that animals use to stay warm and conserve energy during the winter. Migratory animals move between habitats during the seasons to take advantage of shelter, food, water, and climates. In Alaska, animals travel to warmer places and places where they can find more food before winter arrives.

For example, caribou migrate between habitats during summer and winter months. During the summer, they migrate to environments that provide lots of food for themselves and their calves so they can store energy and fat before winter. For many caribou herds, the summer grounds are inhospitable during the winter, so the caribou move to a winter habitat that is more agreeable (i.e. less snow cover, warmer temperatures, more available food).

Another example is bird migration. Many birds such as the American golden plover and the arctic tern spend the summer in Alaska eating and raising their young. However, when the weather cools during the fall, they migrate south where the weather is warmer, there is little to no snow cover, and food is available throughout the winter.
**Adaptation:** Some animals remain in Alaska and stay active during the winter months. However, to do this, they must adapt to the colder weather by making changes in their behavior and/or bodies.

Some animals grow thicker fur in the fall to stay warm during the winter. Animals such as arctic hares and arctic foxes put on winter coats. Dogs also grow an undercoat for winter. Caribou and polar bears develop hollow hairs for extra insulation. Birds such as the snowy owl grow downy feathers. Through the addition of thicker fur or feathers, all of these animals are able to overwinter in Alaska’s cold and harsh environment.

Since all of these animals have adapted to overwinter, they are able to forage for food throughout the winter months, using food calories as another means to stay warm. Some animals such as the raven and certain squirrels will cache food during the summer months so they have it during the winter when food is scarce.

Another behavioral adaptation for certain birds is the act of gathering together in large flocks at night to share body heat. This is called roosting. Birds will roost in shrubbery or trees (including nesting cavities and other hollowed-out spots in trees) and empty birdhouses to retain heat and conserve energy.

**Hibernation:** Another strategy that Alaskan animals use to stay warm and conserve energy during the winter is hibernation, either for all or part of the winter. Hibernation is a state of inactivity; a period of very deep sleep. During hibernation, an animal’s body temperature lowers and its breathing and heart rate slows allowing it to use very little energy. Animals are able to survive periods of hibernation by eating extra food and storing body fat during the summer and fall months. They then use this stored fat to provide energy while hibernating. Bears and arctic ground squirrels are examples of animals that hibernate during the Alaskan winters. Wood frogs produce antifreeze that allows them to spend the winter with body temperatures below freezing.

Insects also look for winter shelter to stay warm. Many burrow into holes in the ground, under the bark of trees, or deep inside rotting logs to stay warm.

Aquatic animals use water as a means to stay warm during the winter. When the weather gets colder, many fish will move to the bottom of lakes and ponds and may even bury themselves in the sand and mud for extra insulation. Although not technically considered hibernation, fish become dormant and are able to survive the winter without migrating to warmer waters.

**Energy Conservation:** Energy conservation relates to our efforts to reduce the amount of energy we consume or use. For Alaskan animals, it involves minimizing the amount of energy they use to stay warm and to survive the winter months. Some animals conserve energy by storing food and fat during the fall months, while others conserve energy by lowering their heart rate and body temperature during hibernation.
**Vocabulary List:**

**adaptation** - adjusting to environmental conditions to improve fitness and survival. These adjustments can be physiological or behavioral.

**cache** - to secure and store food for future use.

**energy conservation** - reducing energy use through a behavior change that results in not using energy at a time when one might normally. For example, riding a bike instead of driving a car, unplugging computers and other electronics at night or when not in use, or turning off the lights when you leave a room.

**habitat** - the environment where a plant or animal naturally or normally lives or grows. This includes the physical environment (substrate, temperature, moisture, and light availability) and the other biotic factors present (food availability and other living things also in the environment).

**hibernation** - a method used by some animals to reduce their energy use during the winter when food is scarce by slowing down their metabolisms and entering into a sleeping or resting state. While in hibernation, the body temperature is lowered, and breathing and heart rate slows down.

**migration** - movement from one region or climate to another more suitable region or climate. Migration can occur as part of an annual cycle for feeding or breeding.

**Gear Up:**

Begin the lesson by discussing how animals’ needs change depending on the season. Ask them what animals do during the summertime, and encourage a discussion about being active and foraging for food. Ask them what happens to their dog’s hair during the summer and encourage a discussion about how some animals shed hair and grow different coats to stay cool during the summer.

Transition into a discussion about what happens during the wintertime in Alaska when the weather gets colder and days are shorter. Introduce the idea that animals use techniques to stay warm during the winter, including migration, hibernation, and adaptation. Review the material and examples covered in the “Background” section.

Next, ask the students how their behavior changes depending on the season. Talk about how in the summertime, when it is hotter, they do not need to wear layers of clothes to stay warm. However, they may need to wear hats and sunscreen to protect their skin from the sun. Ask the students what they do to stay warm during the winter. Encourage a discussion of how we wear more clothing layers, heat our houses, and stay inside to stay warm.

**Activity:**

Show the students the Powerpoint (or pictures) of different animals. Ask them to name the animal; if possible, have the class name the animals using the local heritage language. Discuss the methods that each animal uses (i.e. migration, hibernation, adaptation) to stay warm during the winter. Many of these ani-
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Animals use multiple methods to stay warm, such as caribou migrating and growing another layer of hair. Encourage them to think of all of the different ways that each animal stays warm. Next, show the students the Powerpoint (or pictures) of people during the winter and ask them what the people are doing to stay warm.

Extension:

1. Discuss how animals have strategies to stay warm during the winter and how many of them involve conserving energy. Examples include hibernation (lowering their body temperature and heart rate), growing thicker coats or feathers, and storing fat. Then discuss how humans have ways to stay warm during the winter, many of which involve using energy. Examples include burning wood, oil, gasoline, and diesel to keep their houses and cars warm. Ask them if they can think of ways to conserve energy. Examples include turning off lights, using compact florescent lights, bicycling or walking instead of driving, putting on a sweater instead of turning up the heat, etc.

2. Grouping Game: Write “Migration”, “Adaptation”, and “Hibernation” on three different pieces of paper. You may either print several copies of the animals from the Powerpoint presentation or have the students draw them. Go through each animal and have students put them on top of the category (migration, adaptation, and hibernation) that the animal uses to stay warm. Remind the students that many animals use more than one method of staying warm, so an animal might be in more than one category (i.e. the brown bear will be in adaptation and hibernation).

3. Have students tell a story about a family of birds who migrate south for winter and describe their destination.

4. Have students explore Native Alaskan stories related to migration/hibernation/adaptation, for both animals and humans.

Additional Resources:

Alaska Department of Fish and Game Animal Profiles
This online resource has information about Alaska’s mammals, birds, fish and reptiles.
http://www.adfg.alaska.gov/index.cfm?adfg=animals.main

Arctic Animals of Alaska
A lesson plan to explore some of Alaska’s charismatic animals
http://score.rims.k12.ca.us/activity/alaska/
Animal adaptations to winter in Alaska Lesson 4: Can we make animals that will survive an Alaskan winter?

A lesson plan where students design their own animals to survive the Alaskan winter.

http://www.task.uaf.edu/docs/AlaskaDiscoveryLessons/AnimalAdaptationsInWinter-Lesson4_BuildYourOwnAlaskanMammal.pdf

The Arctic and Its Animals

A website about different arctic animals that was created by students.

http://library.thinkquest.org/3500/animals.htm

Alaska Grade Level Expectations addressed:

Reading Performance Standards

R1.2 The student comprehends literal or inferred meaning from text by:
   [K] 1.2.1 Answering who, where, and what questions after listening to a sentence, paragraph, or story based on information from the story.
   [1] 1.2.3 Making and verifying predictions based on information from the story.
   [1] 1.2.4 Drawing conclusions about stories or information while listening or reading (e.g., comparing and contrasting).

R1.4 The student restates/summarizes information by:
   [K] 1.4.2 Restating information after listening to text.
   [1] 1.4.2 Restating information after listening to text.

R1.10 The student connects themes by:
   [K] 1.10.1 Making relevant connections between text and personal experiences.
   [1] 1.10.1 Making relevant connections between text and personal experiences and other texts.
   [2] 1.10.1 Making relevant connections between text and personal experiences, experiences of others, and other texts.

Alaska Cultural Standards

E2 Understand the ecology and geography of the bio-region they inhabit
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