Winter Adaptations

Overview
Students will understand how species have evolved adaptations to survive winter in Crater Lake National Park.

California Science Standards
Grade 1: 2a.b.c. L.S.
Grade 3: 3a.b. L.S.
Grade 4: 3B. L.S.

Oregon Science Standards
Grades 1-5: 2L.1

National Standards
Content Standard A: Science as Inquiry
Content Standard C: Life Sciences

Materials Included
- Student Journal

Materials Needed
- Colored pencils

Activity Time
Preparation: 10 min.
Activity Time: 40 min.

Best Season
Fall and Winter

Vocabulary
- Adaptation
- Hibernation
- Migration

Grade Level: 1st-5th (O.S.S 1st-5th) (C.S.S: 3rd-6th)

Learner Objectives

Student will:

- Define *adaptation* in a biological context
- Identify adaptations of high elevation winter species
- Define hibernation

Background Information

Winter weather characterizes Crater Lake National Park for many months each year. With snow on the ground from October to June and over 500 inches annually the resident animals at Crater Lake National Park must be adapted to survive these conditions. An adaptation can be defined as modifications, or changes, by which a species improves its condition in relationship to its environment over generations. Several different species of birds and mammals remain active during the coldest of winter months.

During the summer and early fall months, Crater Lake National Park sees the largest diversity of bird life. There are insects, berries, aquatic plants, conifer seeds as well as small vertebrates to support a large number of different species. As this food becomes scarce, warblers, flycatchers and raptors migrate to their wintering grounds, while others stay. Birds that are seen year round at Crater Lake National Park include: Clark's Nutcracker, Gray Jay, Common Raven, Hairy Woodpecker, Brown Creeper, Red-breasted Nuthatch, Winter Wren, Dusky Grouse and Great Horned Owl.

The winter residents at Crater Lake National Park have adaptations that allow them to stay the winter. The Brown Creeper, Red-breasted Nuthatch and Mountain Chickadee eat arthropods during warm months but switch to seeds during the winter. Red-breasted Nuthatch, Mountain Chickadee, Clark's Nutcracker and the Gray Jay all cache, or store, food. These birds also defend territories where they have cached food. The Dusky Grouse moves up to high elevations for the winter. Feeding on conifer needles, it has ample food supply to last the winter months. Red Crossbills have adapted to have nomadic movements where flocks will move to and between subalpine and alpine areas that have produced large cone crops from season to season. A highly specialized beak shape where the lower and upper mandible cross each other allows Crossbills to pry open closed

Lesson Plan

conifer cones creating an ample food source in the middle of winter when other species are relying on cached seeds.

Birds are not the only animals to spend the winter at Crater Lake National Park. Of the small mammals that live year round at the rim of the caldera, only a few hibernate. Hibernation comes from the Latin word *hiber* which means "winter," and refers to the metabolic depression, that lowers body temperature, slows breathing and conserves energy. True hibernators do not readily "wake up" from this state, unlike bears that "den" for the winter. Hibernators at Crater Lake National Park include the Yellow-bellied Marmot, Golden-mantled Ground Squirrel and Townsend's Chipmunk. The Douglas Squirrel and Pika are just two examples of the many non-hibernators. Like the Clark's Nutcracker, Townsend's Chipmunk caches and hoards seeds and piles of cones in its den to last the winter. Pikas will spend summer months making haystacks - piles of dried plant material that it will store in its den. If a Pika's food supply runs out during the winter, this animal will readily forage on lichen and cushion plants that are now within reach due to the large amounts of snow.

Large Mammals like elk and mountain lion will migrate with in the region to follow their food sources. Many songbirds seen at Crater Lake National Park will migrate for the winter as well. Some migrate to lower elevations, like the Dark-eyed Junco, others like the Rufous Hummingbird migrate a much farther distance to Central America. Migration refers to an organism's regular seasonal movement in response to food, breeding conditions, or habitat availability.

Getting Ready!

1. Read background information.
2. Plan snow shoe visit to Crater Lake National Park
3. Make copies of *Student Journal: Winter Adaptations.*

Discuss!

1. Let students know that in this investigation, they will go on a field trip to Crater Lake National Park. First students must understand how animals survive the winter months.
2. Hypothesize with students as to what animals (or evidence of animals) they will see the most of during their winter visit. Example: I think we will see the most small mammals and tracks in the snow.
3. Discuss with students what winter is like at Crater Lake National

Photo by Tom Grey

Habitat Components

- **Food: to obtain energy**
- **Water: to stay healthy and hydrated**
- **Shelter: to protect from weather or predators**
- **Space: to gather the other three resources, reproduce, raise their young, and defend their territory**

Animals that live year round at the caldera are adapted to find all of these habitat components while others are not.

Birds' Remarkable Adaptations!

Birds are found inhabiting every continent facing a wide range in environmental conditions from extreme heat to extreme cold. Their adaptations make this possible! Down feathers help to insulate birds and keep them warm even at the coldest temperatures. Even the way a bird folds its wings against its body helps to keep in heat. High metabolism and internal body temperatures also help to fight against the cold. Air sacs, acting as a second pair of lungs to aid in flight, allow for efficient breathing at high elevations.

Lesson Plan

Park.

4. Discuss adaptations animals have evolved for winter, including hibernation and migration as well as strategies to continue living at Crater Lake National Park during the winter months.
5. Ask Suggested Questions (see side panel).
6. Pass out Student Journal Handout matching adaptations to animals.
7. Once the class has a clear understanding of winter at Crater Lake National Park and the adaptations animals have to survive the winters have students create their own *Winter Wonder Adaptation Creation* to share with the class.
8. Students will work individually to create an organism that is adapted to the high elevation winters at Crater Lake National Park.
9. Students will illustrate the winter adaptations of their organism and write a brief story about how their *Adaptation Creation* finds food, water and shelter in the winter environment.

Investigate!

1. When attending the field trip to Crater Lake National Park, students should be looking out for signs of life and recording sighting in the Student Journal.

Suggested Questions

What is an adaptation? Provide an example an adaptation that is suited for winter life in the high montane environment.

How is hibernation different from migration? Give examples of animals that hibernate and migrate?

Why have Red Crossbills adapted a nomadic behavior?

Photo by Jim Livaudais

What wildlife can we see in winter at Crater Lake National Park?

Pine Martins are especially active during the winter months. Their small bodies and large feet are well adapted for bounding over snow to catch deer mice or other small rodents. Be on the look out for snow shoe hare tracks as well. Birds are easy to spot year round. In the winter be on the look out for Clark's Nutcracker, Gray Jay, Steller's Jay, Mountain Chickadee and the *Yank-Yank* call of the Red-breasted Nuthatch.