

CRAZY ANIMAL ADAPTATIONS



CLASS



1 HOUR

KEY CONCEPTS:

Habitat, community, comparing and contrasting, survival, creative thinking

COLORADO ACADEMIC STANDARDS:

- *Science 2.1:* Organisms depend on their habitat's nonliving parts to satisfy their needs.
- *Science 2.2:* Each plant or animal has different structures or behaviors that serve different functions.
- *Reading, Writing and Communicating 1.2:* New information can be learned and better dialogue created by listening actively.
- *Reading, Writing and Communicating 4.2:* Questions are essential to analyze and evaluate the quality of thinking.

LOCATION:

Indoors

SUGGESTED TIME OF YEAR:

Mid to Late Winter

GOAL:

Students explore how animals that live in Northwest Colorado survive the winter season.

LEARNING OBJECTIVES:

- Students will define habitat.
- Students will create unique animals living in specific habitats.
- Students will present their animals to the class.

COMMON CORE:

- *Writing Standards #8:* Recall information from experiences or gather information from provided sources to answer a question.
- *Speaking and Listening Standards #1:* Participate in collaborate conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.
- *Speaking and Listening Standards #2:* Recount or describe key ideas or details from text read aloud or information presented orally through other media.
- *Speaking and Listening Standards #3:* Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.
- *Speaking and Listening Standards #4:* Tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking audibly in coherent sentences.
- *Speaking and Listening Standards #5:* Produce complete sentences when appropriate to task and situation in order to provide requested detail or clarification.
- *Language Standards #1:* Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- *Language Standards #3:* Use knowledge of language and its conventions when writing, speaking, reading, or listening.
- *Language Standards #6:* Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using adjectives and adverbs to describe

MATERIALS NEEDED:

- Paper, 1 piece per student
- Markers, crayons
- White board and marker
- Photos of a variety of habitats throughout the world; list of habitat characteristics written on back of photo (habitat characteristics attached)
- Glossary, attached

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Indoors

SUGGESTED TIME OF YEAR:

Mid to Late Winter

BACKGROUND INFORMATION:

All life forms have evolved over time, adapting to their changing environment. Those that can not adapt will die. And all life forms need food, shelter, water and space. If they have all of these and produce young, they are living in a good habitat. Habitats are based on the dominant vegetation found (or not found) there: aspen groves, rainforest, desert, arctic, etc. Habitats can be big (a large desert) or small (your back yard full of food, shelter, and water for animals). Animals have adapted some very unique things over time to survive in their very unique habitat.

A unique habitat that we have in abundance in our valley is the area under the snowpack all winter. Scientists have considered this is a true habitat because it offers the organisms living there food, shelter, water and space, and many will produce young throughout the winter. This habitat is called the subnivean zone; "sub" meaning under and "niveus" meaning white, snowy. So the subnivean zone is the area of snowpack on top of the ground and 3-24 inches above the ground where the "living zone" of most animals is. This area is beneficial to many small mammals. The dynamics of the subnivean zone can be complicated, but we will try to simplify here.

Snow can be a good insulator, especially our fluffy, dry snow we tend to get in Northwest Colorado. As snowpack deepens, the subnivean zone will reach a fairly stable temperature of around 35-40F. The warm ground is constantly changing the snowpack directly above it. Snow sublimates (goes from a solid into a vapor) and moves up through the snowpack as a vapor. 3-24 inches away from the ground the colder temperatures refreeze the molecule onto another ice crystal, forming beautiful pyramid shaped ice grains called depth hoar. Depth hoar feels like crystallized sugar, and is very easy for small mammals to move through. There is some light that can penetrate most snowpack, especially in the spring, and enable some plants to be moderately active. This is important food for small mammals. Being under a thick snowpack provides extra protection from predators, although weasels, foxes, and coyotes are still quite adept at finding prey under deep snow.

So how do animals cope with winter? HAM. They hibernate, adapt, or migrate. Since we do not see any of the migrators in the winter, this session focuses on hibernators and adaptors. Some winter adaptations include thicker coats and extra feathers, fur in between toes and over foot pads, change in coat color, changes in food sources and lowered metabolism to name a few. Most scientists use the term dormancy rather than the very confusing hibernation for winter down time. Hibernation is a typically winter-long dormancy, and short-term dormancy with periods of wakefulness is called torpor. Hibernation involves lowering of the heart rate and breathing, as well as the body temperature, and animals in hibernation require 30 minutes to an hour to rouse from their dormant state. Animals in torpor will enter a hibernation-like state for shorter periods, waking to eat and eliminate wastes. Hibernation is basically an extended form of torpor, but torpor alone does not qualify as hibernation. Regardless of what it is called, in our area bats, marmots, ground squirrels and black bears are all animals that go through winter in a dormant state without ingesting anything, and skunks, chipmunks and raccoons have short periods of dormancy followed by feeding.

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LOCATION:

Indoors

SUGGESTED TIME OF YEAR:

Mid to Late Winter

ACTIVITY:

1. Introduce the topic of a community. Begin by asking students about their own local community and then writing their answers on the board. For example, ask if they know how many people live here. Ask if there more older people than younger people. Ask if everyone likes to eat pizza. Ask how many schools are in the community. Discuss what the weather is like. Discuss what the landscape is like. Discuss if there are seasons here. Think of any other questions.
2. Ask the students who likes to live in urban environments or in rural environments. Separate out the students into two groups.
3. Then ask the students who likes to live in hot climates or in cold climates. You should now have four smaller groups.
4. If you still have large groups, ask who loves pizza and who loves salads. Separate them one more time. Hopefully by now there should be small groups, each with specific interests: cold-loving, urbanites who love pizza, etc. They have basically formed very simplified communities.
5. Discuss the differences they would find in their communities, and if they would feel comfortable in another person's community.
6. Wild animals find similar things as our human communities. They will find food, shelter, water and space. We call these places where animals find everything they need to survive their habitat.
7. Habitats are based on the dominant vegetation found (or not found) there: aspen groves, rainforest, desert, arctic, etc. Just like communities, habitats can be big (a large desert) or small (a back yard full of food, shelter, and water for animals).
8. The animals that live in these different habitats have adapted (it is best to define adapt and adaptations to the students, writing them on the board), to live there. Discuss that if you were living in your communities for several years, you might change somehow to adapt to that community. Ex: the warm-loving urbanites who love salad, might begin to wear shorts and sandals and ride their bikes all the time because they live where they can easily bike everywhere. Animals adapt to their habitats. Give a few examples of these adaptations.
9. Separate the class into 4 or 5 groups. Hand each group a habitat photo and large piece of newsprint with markers. Explain that in each habitat lives an animal that was discovered by the teams' scientific research team while on a trip there. It is very unique and different in the ways it has adapted to its habitat. Explain that the teams are going to create that animal on paper.
10. On the habitat picture they have received is a short list of habitat characteristics. Explain that the characteristics are going to help them design their animal. Example; if the card says "almost no water found here", their animal might develop a storage sack somewhere so it doesn't have to drink as often. Tell them to be creative with their animals and adaptations. You might need to give them very specific ideas to get their creative juices going.
11. Give them a few minutes to create their animal. Gather the students together and have each group come up to present their new animal after you have shown

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LOCATION:

Indoors

SUGGESTED TIME OF YEAR:

Mid to Late Winter

ACTIVITY: (CONT.)

the rest of the class the habitat photo and read the traits of the habitat. After each group has presented their new animal, have the class decide if, and why, they think the animal could survive in the habitat.

12. Bring the students back into the real world, saying we are now going to talk about animals found where they live. Ask the students how animals might adapt to our long winters of cold, short days with very little free water. Write down the responses they provide for use during the field site session. Explain they will be visiting the field site to learn more about winter and how animals have adapted to our winter season.



THE WHITE WORLD



FIELD



1 1/2 HOUR

KEY CONCEPTS:

Observation, survival, adaptations, creative thinking

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- *Science 2.2:* Each plant or animal has different structures or behaviors that serve different functions.
- *Science 3.1:* Weather and changing seasons impact the environment and organisms such as humans, plants and other animals.
- *Reading, Writing and Communicating 1.1:* Discussions contribute and expand on the ideas of self and others.
- *Reading, Writing and Communicating 1.2:* New information can be learned and better dialogue created by listening actively.
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LOCATION:

Field site

SUGGESTED TIME OF YEAR:

Mid to Late Winter

GOAL:

During this session, students experience the snowpack layers and discover how animals adapt to live in a subnivean environment.

LEARNING OBJECTIVES:

- Students will discuss animal adaptations to winter.
- Students will investigate the subnivean zone.
- Students will describe the subnivean zone as a habitat.
- Students will develop an ability to snowshoe.

COMMON CORE:

- *Writing Standards #8:* Recall information from experiences or gather information from provided sources to answer a question.
- *Speaking and Listening Standards #4:* Tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking audibly in coherent sentences.
- *Speaking and Listening Standards #5:* Produce complete sentences when appropriate to task and situation in order to provide requested detail or clarification.
- *Language Standards #1:* Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- *Language Standards #3:* Use knowledge of language and its conventions when writing, speaking, reading, or listening.

MATERIALS NEEDED:

- Notes from the classroom lesson on adaptations
- White board
- Beaver pelt
- Snowshoe hare picture
- Weasel pelts (summer, winter)
- Snowshoes
- Thermometers (2)
- "Who Lives in the Snow?" by Jennifer Berry Jones and Consie Powell

Parent volunteers are recommended for the field session.

PRE-WORK:

To save time, the naturalist needs to have 2 small snow pits ready for the students. The pits are best in a full sun area to get the maximum temperature difference. They should be wide enough for a couple of students to get down into, and go all the way to the ground.

ACTIVITY:

1. Welcome to the field site! Orientation to the site for the students, then right into the activity.
2. Review with the students the classroom lesson on habitat and animal adaptations. Bring out the notes taken in the classroom on the adaptations they

THE WHITE WORLD



FIELD



1 1/2 HOUR

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- *Reading, Writing and Communicating 1.1:* Discussions contribute and expand on the ideas of self and others.
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LOCATION:

Field site

SUGGESTED TIME OF YEAR:

Mid to Late Winter

ACTIVITY: (CONT.)

- came up with for winter survival. Ask if they can add any more. Discuss if these are good winter survival adaptations.
3. On a white board write HAM and introduce the HAM concept: Hibernate, Adapt, or Migrate. These are all winter survival methods for animals. This session will focus on adaptations.
 4. Ask the students how they adapt to winter. Warm boots, puffy coats, mittens and hats are all part of winter. Discuss if it is the coat that keeps people warm or the air. Puffer coats are warmer. Animals active in the winter also have puffy coats in a way. Use a beaver pelt to discuss the guard hairs and underfur. Birds have twice as much underdown and also puff up when they are cold. Use a bird mount to show regular feathers and how they would change for winter.
 5. Ask them what it is like to walk through the snow in winter, especially fresh snow. It's difficult. Discuss what animal has a really good advantage in this way in the winter. The snowshoe hare has huge feet for its size (show a picture). If humans had the same size foot relative to the snowshoe hare, our feet would be 2 feet long (for a 5 foot 8 person; basically a third of the height of the person). Ask if humans can make big feet in the winter. Other animals grow fur between their toes.
 6. All the animals so far are larger animals that we see often. Ask what about small animals that feed on or under the ground. Discuss where they might go in the winter. Ask the students what they would do if they are cold in their bed. Get more blankets would be one option. These small animals use something similar; snow! Explain the air in the snow acts as an insulator, just like their puffy coat.
 7. Explain that they will be going outside and looking at the temperature of the snow down at the very bottom by the ground, and on the top layer. Have them take a guess at the temperatures in both places and write them down to compare.
 8. Get on snowshoes, bring the thermometers, and head out to the 2 snow pits already dug.
 9. Make sure the students stand far enough away from the pit edge so they don't break the edge. Ask the students where the oldest snow is found. Get into the pit and place a thermometer at the ground level in the snow, and in the very top layer of snow. Then point out to the students the various layers and have them guess what month the layers might have formed. Down on the ground, dig up some depth hoar and describe how the depth hoar is formed and the importance to the small animals. Show them how it is just like marbles running through your fingers. Have students get into both pits and, using their hands, feel the different layers. Make sure they feel the depth hoar layer.
 10. As soon as everyone has a chance to feel the layers, pull out the thermometers and read the temperatures. Ask the students if they are surprised about the



THE WHITE WORLD



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LOCATION:

Field site

SUGGESTED TIME OF YEAR:

Mid to Late Winter

ACTIVITY: (CONT.)

temperatures. If they were a little critter where would they like to spend the winter?

11. Head back inside. Using the book "Who Lives in the Snow?" briefly go through the most pertinent pictures regarding the subnivean zone. Describe the complete subnivean zone: consistent temperature, high humidity, active insects, plant life, and depth hoar. Discuss if the subnivean zone provides all the things animals need in a habitat; food, water, shelter and space.



SUBNIVEAN ON A WALL



SERVICE-LEARNING 1 HOUR

KEY CONCEPTS:

Creativity, drawing conclusions, using new vocabulary

COLORADO ACADEMIC STANDARDS:

- *Science 2.1:* Organisms depend on their habitat's nonliving parts to satisfy their needs.
- *Science 2.2:* Each plant or animal has different structures or behaviors that serve different functions.
- *Visual Arts 4.1:* Visual arts respond to human experience by relating art to the community.

LOCATION:

Indoors

SUGGESTED TIME OF YEAR:

Mid to Late Winter

GOAL:

Modeling a snow ecology book, students design a poster to teach others about the subnivean environment.

LEARNING OBJECTIVES:

- Students will create a glossary of subnivean terms.
- Students will recreate the subnivean zone on a mural.
- Students will present their mural to the class and hang the mural in the school or community.

COMMON CORE:

- *Reading Standards for Literature #7:* Use information gained from the illustrations and words in a print or digital text to demonstrate understanding of its characters, setting, or plot.
- *Writing Standards #8:* Recall information from experiences or gather information from provided sources to answer a question.
- *Speaking and Listening Standards #1:* Participate in collaborate conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.
- *Speaking and Listening Standards #2:* Recount or describe key ideas or details from text read aloud or information presented orally or through other media.
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- *Language Standards #6:* Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using adjectives and adverbs to describe.

MATERIALS NEEDED:

- Roll of butcher paper
- Markers, paints, scissors, construction paper
- "Who Lives in the Snow?" by Jennifer Berry Jones and Consie Powell

ACTIVITY:

1. Start with a review of the two previous lessons by creating a glossary of the new terms. Ask the students to name new words they learned. Write each one on the board and

SUBNIVEAN ON A WALL



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LOCATION:

Indoors

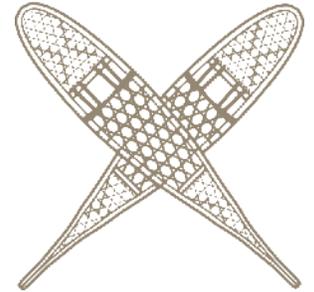
SUGGESTED TIME OF YEAR:

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ACTIVITY: (CONT.)

have the students define each one as they are added. Terms to include: habitat, adaptations, hibernation, migration, depth hoar, subnivean. See the glossary from the first lesson for complete definitions.

2. Explain that the students will be using at least one word from the glossary and drawing it, or representing it, on paper. Give an example such as "adaptation" being a snowshoe hare with big feet to stay on top of the snow. Draw this on the board making sure to label the picture "adaptation of big feet in snow" or something to describe the picture. They can draw more than one word as long as it is labeled.
3. To begin the art activity, roll the butcher paper out on the floor or tables placed together in a long roll. Each student will get a 2 foot section of the newsprint, so take that into consideration when measuring how long to make it. To create the layers of snow, take a marker or paint and draw lines all the way across the newsprint so each student will start out with the basic snow layers.
4. Explain to the students that they are to recreate the snowpack they saw on their field day and also add any of the other animals they learned about in the winter. Show them the snow line and have them tell you which area is under the snowpack and which area is sky.
5. Place the book "Who Lives in the Snow" on the table/floor and remind the students there are great pictures in there to help them draw theirs.
6. Suggest cutting out construction paper for animals, adding all the animals we talked about at the field site (snowshoe hare, beaver, birds, etc.).
7. If there is time, go around the mural and have the students describe their drawings along the mural.
8. Encourage the teacher to hang the completed poster in a highly visible place for all to learn about snow ecology.
9. Gather all the students together in a sharing circle. Ask them if they could be one animal in the winter which animal would it be and WHY (be specific, give a detailed example). Go around the circle.



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