# Utah Explorer Mountain Naturalist



NATURAL HISTORY MUSEUM OF UTAH Rio Tinto Center | University of Utah

# Introduction



## **Become a Utah Explorer Mountain Naturalist**

### Welcome to the Utah Explorer Naturalist Program!

You can work on this program anywhere in Utah. Many of the activities also can be used if you live outside of Utah. Although it is encouraged that you visit some of the areas we refer to in this booklet, we know this is not always possible. Therefore, we have included plenty of multimedia resources and hands-on activities to help enhance your understanding of Utah Deserts. All activities can be done at your pace. There is no deadline for completing the program. This program is designed for the approximate ages 8–11. This program may also be used by younger or older students as is appropriate.

When you have completed all the requirements to become a Utah Mountain Explorer Naturalist, email a photograph of your completed scorecard to vallyse@nhmu.utah.edu. Make sure you include a mailing address. You will receive your patch and certificate in the mail.\*

\*An electronic version of the certificate is available now, but there may be a delay of a few months before the physical certificates and patches are available.

## **Role of Adults**

- Supervise student activities and ensure safety at all times.
- Help students read and understand Explorer Naturalist Activities, and if necessary, help them complete activities.
- Review completed activities and initial scorecard.
- Help students explore Utah mountains through field trips or further use of other media sources.

Utah Explorer Mountain N	latura	list
Name:		
Email:		
Address (does not have to be a home address):		
Activity	Student Initials	Adult Initials
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<b>Discover Mountains</b> Page 7		
<b>Understand Climate</b> Page 9		
Explore Communities Page 11		
<b>Examine Ecology</b> Page 13		
Plant Adaptations Page 15		
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Be sure to include your name and an address where we can send the certificate and patch. You must have an adult's permission to send us your real name and address. Including your last name is optional. You may use the address of a school or another place that is not your home. If you do, include the name of a teacher or adult who can get the certificate to you. Questions? Please contact us by Email: vallyse@nhmu.utah.edu or Phone: 801-581-6418



To earn your patch and certificate, complete and initial all activities on scorecard, photograph the completed scorecard, and email it to NHMU.

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# Mountain Naturalist Pledge

Our Utah mountains are an important **ecosystem** for the plants and animals that inhabit them. They are also a vital resource for humans. It's important to learn as much about Utah mountains as we can so that we can help them remain healthy, restore them to better health, and use them wisely.

### As a Mountain Naturalist I pledge that ...

- ▶ I will care for the mountains by remaining on established trails and paths.
- ▶ I will clean up after myself, and practice "Leave No Trace" principles. If I decide to pick up trash left by others, I will ask an adult first if it is safe for me to do so.
- ▶ I will care for and respect animals in the mountains. I will keep my distance from them, and not feed them.
- ▶ I will care for mountain plants. I will take pictures instead of pulling off flowers, branches, or leaves.
- ▶ I will talk to my friends and family about the importance and beauty of the Utah mountains, and encourage them to become mountain protectors also.

Signature of the Utah Explorer Mountain Naturalist





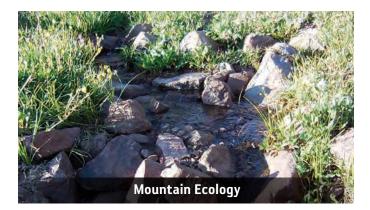




Human Impact on Utah Mountains



As a Utah Explorer Mountain Naturalist, you will be observing and learning about:







How You Can Become a Mountain Naturalist

# **Discover Utah Mountains**



In 2002, the Winter Olympics were held in Utah, with most of the skiing and sledding events being held in the Wasatch Mountain Range west and north of Salt Lake City.

This may have been the first time much of the world thought of Utah as a mountainous state, although Utah is the third highest elevation state in the United States, and has many mountain ranges.

### There are several ways Utah mountains are created.

You may already know about some of them. **Volcanoes** can build mountains. So can **magma** that pushes up under the earth's surface but never breaks through. It makes a dome under the surface that cools and hardens, and eventually can be exposed as top rock erodes away. *Navajo Mountain*, a culturally significant peak in Southern Utah, was formed in this way.

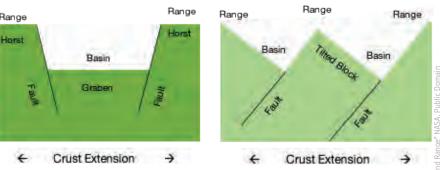
In Utah, the **Basin and Range Province** in the western part of the state was formed by the earth's crust being pulled apart, with pieces dropping in the middle, and thick blocks of rocks slowly lifting or rotating upwards.

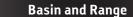
The **Wasatch Range** in the northern part of central Utah was mostly created by compression causing the crust to buckle,

crack, and shift. Place a piece of paper crosswise on a slippery surface, like a table top. Press your hands down on both sides of the paper, and slide your hands together. Did the paper buckle in the middle?

Finally, the **Colorado Plateau** is a large uplift of land in the Four Corners area where Utah, New Mexico, Colorado, and Arizona meet. As this plateau has eroded away, the higher areas have become mountains such as *Boulder Mountain* and *Thousand Lake Mountain*. The tops of these mountains tend to be flatter than other Utah mountains.









### Wherever You Are

This is a photograph from NASA of the Utah and Nevada Basin and Range area.

Remember, the **topography** (physical features) of this area are caused when the earth's crust is being pulled apart.

The **green** color outlines the narrow mountain ranges that run in a north/south direction.

The **brown** areas are lower areas between the mountains. The **lightest** areas are areas of salt build-up in the soil.



What are some things that you notice in this photograph that might help you recognize a basin and range type topography?



### Outside

# You will create a model that shows how Navajo Mountain was formed.

- 1. Find a rock that is small enough you can lift it up with one hand. The rock represents the dome of magma that formed under the Earth's surface.
- 2. Cover the rock completely in dirt so no part of it is visible. The dirt represents the Earth's surface over the magma dome (rock).



3. Create weathering and erosion by pouring water or blowing wind (using a fan or waving a sturdy piece of paper). Stop as soon as ANY part of your original rock is showing. Take a photo or draw a picture of your model.



### Online

Raft River Mountains wildaboututah.org/the-raft-river-mountains/

Life Cycle Mountains nationalgeographic.com/video/ shorts/367324227714/

# **Understanding Mountain Climate**

### Have you ever taken a trip up into the mountains? You may have noticed that as you climbed higher, the temperature tends to get cooler. Why does this happen?

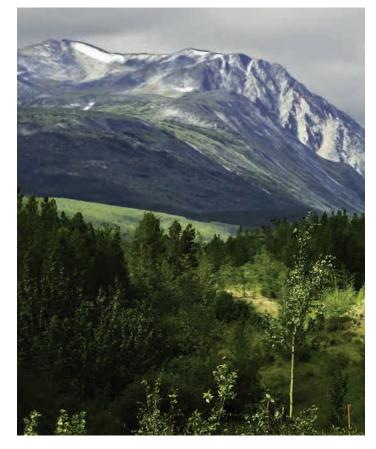
The atmosphere is a blanket of gases that surrounds the earth. It protects us from solar radiation, and holds in heat from the sun. The atmosphere also has weight and density. At sea level, the blanket of gases over the earth is heavier and denser, and it holds in more heat. As we climb up a mountain, the blanket of gases becomes lighter and less dense, and holds in less heat. For every one thousand feet you climb upward, the blanket gets thinner, and the temperature gets cooler by 2 to 3 degrees Celsius (3.6 to 5.4 degrees Fahrenheit).

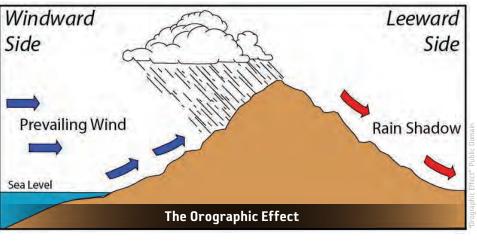
The mountains of Utah are taller than the valleys around them. That also means that they are cooler than the valleys. This lower temperature causes some parts of the mountains to receive much more snow and rain than the valleys. To understand why, first you need to know that warm air holds more moisture than cool air. If warm air

has a lot of moisture in it, when the air cools, the moisture will fall out of it. It will start raining or snowing.

When warm, moist air hits the mountains, it is forced to flow up the side. As the air climbs up the mountains, it cools to the point where the water precipitates out of it. This is called the **orographic effect**. Most of the rain will fall on one side of the mountain, and the other side will have less rain because the air now has less moisture in it. This is the rain shadow side of the mountain.

The orographic effect means that some Utah mountains have great snow for skiing. When warm air passes over the Great Salt Lake, it picks up moisture that then falls over the Wasatch Range as snow. This is called **Lake Effect Snow**. It is a big reason Utah was able to host the Winter Olympics and why Utah is a place where winter sport athletes train.







### Wherever You Are



Pretend you are planning a trip up into the mountains, and you are taking friends who have never been in the mountains.

It is 82° Fahrenheit (about 30° Celsius) where you are, and you and your friends are wearing short-sleeved t-shirts, thin pants, and running shoes. There are clouds in the sky, and you will be going to the rainy side of the mountain.

If your final destination will be at an altitude of 3,000 feet higher up than where you are starting, and if the temperature gets cooler by 5° F for each 1,000 feet you go up the mountain, **what temperature will it be where you are going?** 

\_\_\_\_ degrees Fahrenheit

What are you going to suggest you and your friends take with you on your mountain trip and why?



### Outside

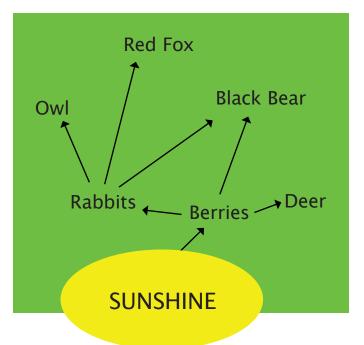
Climate is different from weather; If it is raining one day, it does not mean that the climate is rainy. **Climate** is what the weather is like over a long period of time. Go outside and look at the weather. Describe it. The weather today is:

Does the weather today describe what the climate is like where you are? For example, if it is raining, is the climate normally a rainy climate, or is the rain just an occasional occurrence? If you are not sure, you can go online and research the climate in your area.

### Online

Mountain Biome (This is a long video but worth watching) youtube.com/watch?v=yLMdjRaLIYs

# Examine Mountain Ecology





### **Continually-Changing Utah Forests**

Just because one type of tree or animal exists in a forest now, does not mean it was the same in the past, or that it will stay the same in the future.

Here is a **food web** that might illustrate how energy flows in a Utah mountain community. All food webs begin with energy from the sun. **What do you think would happen if one of these animals or plants were to disappear?** Perhaps something else would easily move into its place, taking up the same role. Sometimes, however, removing one plant or one animal can change the whole way an ecosystem works, and other animals or plants may have to change (adapt) in order to survive.

### What about other changes? What happens when the climate changes? What about fires? How do they change the way the forest works?

After a fire, different kinds of plants and trees get a chance to grow. First, grasses and quick growing forbs (wildflowers) will start growing from seeds blown in from nearby areas. Then shrubs and quick growing trees like aspens will come in. Aspens grow fast and recolonize areas that have been disturbed. Wildlife will move back into a burnt area as soon as there is enough food for them. Aspens don't grow well in the shade, so as more shade-tolerant trees like spruces and fir trees start to grow, the aspen is outcompeted and disappears. This is called **forest succession**.

Changes to the forest can be quick, like a fast-moving wildfire, or slower, like aspen groves being followed by spruce trees. Humans can play a role in the changes by building roads or cutting down trees. When one part of a forest is disturbed or changed, when animals or plants are affected, it changes the systems that exist in the mountains. Some changes may be barely noticeable, but others can have widespread consequences.

### Wherever You Are



Changes are always occurring in our environment. Sometimes the changes don't cause you to change your behavior in any way. Maybe a building near where you live was painted. You might like the color, but that doesn't mean your behavior changed. Sometimes the changes do cause you to change your behavior. An example might be something like a new store in your neighborhood that you start going to instead of an old one you used to go to.

Think about a change that has happened in your environment that caused you to change your behavior. What was the environmental change, and how did your behavior change?





### Outside

Go outside and look around. **Find five things in your environment.** They can be natural things like plants or trees, or human-made, like a car or a building. Write down those five things.

1.		
2.		
3.		
4.		
5.		

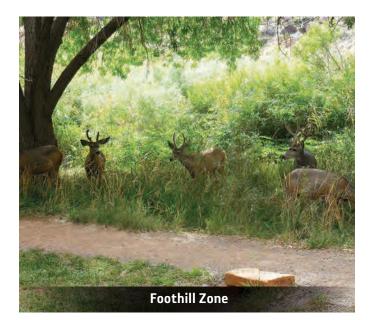
Now, put a line through one of those things, and pretend that it just went away. **Does making that one item go away change behavior or life for you or for other animals or plants in the area? Explain why you said yes or no.** 

### Online

How Wolves Change Rivers filmsforaction.org/watch/how-wolves-change-rivers/

Food Web studyjams.scholastic.com/studyjams/jams/science/ ecosystems/food-webs.htm

## **Explore Mountain Communities**







Just like the temperature changes as we climb up a mountain, communities of plants and animals that live on the mountain will differ depending on where they are on the mountain, the soil types, and the amount of water available.

### In Utah, there are some plant and animal communities that tend to live at certain elevations above sea level.

Foothill Zone: On the lower slopes of the Utah mountains, the foothill zone, you can find **pinyon-juniper** forests. This type of forest grows well in the transition between mountain and desert areas. At this altitude you can find animals like squirrels, chipmunks, pack rats, bighorn sheep, black bears, deer, and elk. On slopes that get more rain or snow, Oak-Maple type forests are found.

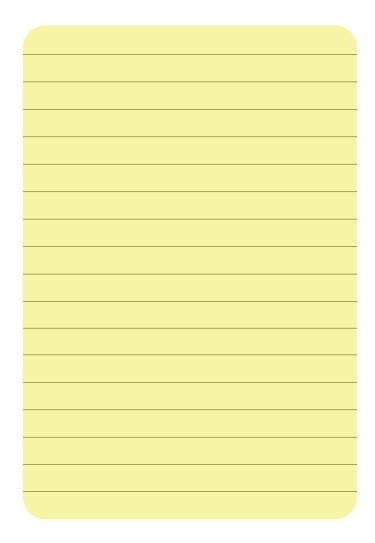
Montane Zone: Higher up in the mountains, in the montane zone, you can find quaking aspen trees, Douglas-fir, spruce trees, and various types of pine trees (ponderosa, lodgepole, limber, and bristlecone). You will find a lot of the same animals in these forests as you will find lower down. Many animals move lower or higher on the mountain as the temperature and food availability change with the seasons.

Alpine Zone: High on the mountain, 10,000 feet and more above sea level, are the subalpine and alpine zones. These areas experience long and very cold winters, and plants and animals need special adaptations to survive. Many plants become dwarfed, growing shorter and smaller than they would further down the mountain. Trees won't grow at all on top of the tallest mountains. Pikas and marmots can often be seen high up in the mountains, watching you and scurrying around to find food during the short growing season.

### Wherever You Are

Picture that for three years in a row it is unusually snowy and cold in the mountains of Utah.

Think about the animals and plants that normally live halfway up the mountain. What changes do you think that they will have to make if they want to continue to survive?



### Online

Conifers in Utah wildaboututah.org/utahs-conifer-trees/ Activities

### Outside

An **evergreen** is a plant that doesn't lose its leaves during the fall. Many mountain trees are evergreens. Here is a quide to some evergreens that live in Utah. Go outside and see if you can find any of these trees.

### Spruce

Short, stiff needles that grow alone from a small woody peg-like stalk. Needles are sharp and square, not flat.



### Pine

Needles grow in **clusters** (more than one needle) from the same point, and are usually long and soft.

### Fir

Needles are flat and soft, and grow from a single point. They are attached to the branch with something resembling a suction cup.



### Juniper

Needles are scalelike and branch out from other needles.





# **Utah Mountain Plant Adaptations**

Each plant has a place where it grows best, and has adaptations that help it survive in specific environments. Think about what structures/parts or behaviors a plant would need in order to grow well in the mountains of Utah. Many plants, especially those up higher on the mountains, would have to be able to survive cold winters. What about deep snow? Plants growing at a high elevation may have to deal with this. What about wind, rain, times when there are floods or droughts, animals, and fire?



This tree is a **bristlecone pine**. It looks dead, or mostly dead, but the truth is that not only is the tree alive, it may have been alive for more than 5,000 years! It is hard to imagine anything surviving that long in the harsh, mountainous conditions where it grows. This tree has some important traits that help its survival.

First, bristlecones and other plants have to survive in places of high winds and cold temperatures. Although bristlecones can reach 40-60 feet high, those trees growing on the higher slopes of a mountain grow short, twisted trunks. Growing lower to the ground keeps them more protected from the cold and from blowing over. They also have to be able to survive short growing seasons. They do this by growing very slowly and keeping their needle-shaped leaves for many years so they don't have to use up energy producing new needles. The bristlecone needles are narrow and waxy and allow snow and ice to easily slide off them, and help the tree retain moisture. Other plants that manage to grow well at high, cold altitudes are shrubs, wildflowers and grasses.



Rhizome Aspen Forest

Mountain plants tend to have multiple ways to reproduce. This means that although they may make seeds, many don't rely on seeds to make new plants. Some trees start new plants growing when their branches touch the soil and develop roots.

### Some have **rhizomes**

(underground stems) that spread out from the original tree and then grow upward to form trees. This is what aspens do, and it is the reason that a large grove of aspens can often be all a part of the same tree.

### Wherever You Are



Alpine plants have two ways that they survive high up in the mountains. They work to absorb the most heat that they can from the sun while at the same time protecting themselves from extreme cold. Which one of these adaptations do you think would help a plant survive high up in cold places? Put a check mark in the box.

- □ Plant grows low to the ground
- Plant grows where the wind blows on it
- Plant is in sheltered area next to rocks
- Plant faces away from the sun
- □ Plant grows facing the sun as much as possible

### Online

Bristlecone Pines nps.gov/media/video/view.htm?id=005A7C7B-9197-FF49-339CA96C4E5D7522

### Alpine Biome

untamedscience.com/biology/biomes/alpine-tundrabiome/



### Outside

**Go outside and find a plant** (if it is cold, you are welcome to describe an indoor plant). **Draw your plant below**.

Describe the plant. How tall is it?

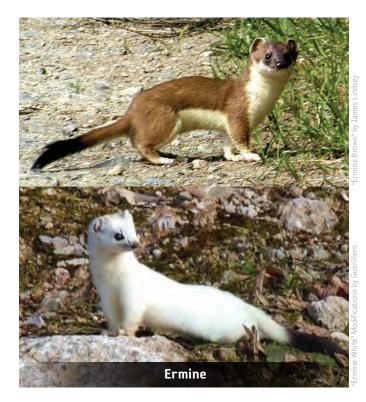
Are the leaves flat or needles?

Are the leaves shiny or dull?

Do you think this plant would or would not do well high up in the mountains? Why or why not?

## **Utah Mountain Animal Adaptations**

Have you ever thought how you would survive on the top of a mountain? Maybe in the summer it wouldn't be hard if you knew where to find food and how to shelter yourself from summer rains and winds. What would you choose to do if it became too cold, or the snow too deep, for you to survive?



Look at these two animals. What do you notice about them? Do you think that they look very much alike, except for the coloring? Notice the tail tips for both these animals are black and about half the size of their bodies.

These are actually the same animal (!), known as the short-tailed weasel or **ermine**. In the summer they are brown and in the winter they are white. Although the color change helps with winter camouflage, there are other advantages for the weasel when they change color. The longer white fur helps with insulation.

The **snowshoe hare** has large feet with fur on the soles to protect from the cold and to prevent sinking into the mountain snow. Long-legged animals like moose can walk through the deep snow, and sure-footed animals like mountain goats and bighorn sheep will travel on the rock walls away from the deep snow. They also grow a thicker coat to help deal with the cold. Many animals avoid the deep snows by moving lower down the mountains during the winters. This is also a good strategy because finding food in the higher mountain areas is difficult.



Finally, some animals will sleep during cold months using adaptations called **hibernation** and **torpo**r. During hibernation, marmots enter a state of truly deep sleep that allows them to use less energy and generally survive on the stored fat in their bodies until food becomes available. Torpor is very much like hibernation, except that it is much easier for an animal, like a mountain chickadee, to wake, even during the winter.

### Wherever You Are

### Imagine that you are a mountain goat.

You have to survive in the mountains, usually up high at the area where trees are small and twisted (subalpine) and above the tree line (alpine). You live up on the steepest, rocky areas. Which of the following adaptations do you want to have? Place a check mark in front of as many as you wish.

- A protective mother who keeps you safe from falls and predators until you are a confident rock climber.
- \_\_\_\_Ability to eat a variety of plants, lichens, and moss depending on what is available each season.
- \_\_\_\_Large ears that help to disperse body heat.
- \_\_\_ Claws to help to take down prey.
- \_\_\_\_ Hooves with hard outer shells and rubbery pads that help to create grip on rocks.
- \_\_\_\_ Thick layers of wool coats that grow heavier in the winter and shed in warmer weather.

### Online

Short-Tailed Weasels wildaboututah.org/tag/short-tailed-weasels/

Snowshoe Hare wildaboututah.org/snowshoe-hare/

Wildlife in Winter wildaboututah.org/wildlife-winter-climate-change/



### Outside

**Go outside.** Like the creatures of the mountains, you are prepared to survive in your environment.

What season is it?

What are you doing to shelter yourself (what kind of clothing, hats, shoes, glasses, etc. are you wearing for the weather)?

Is it better to be in the sun or the shade today?

What is your plan for food if you get hungry?

What is your plan for a drink if you get thirsty?

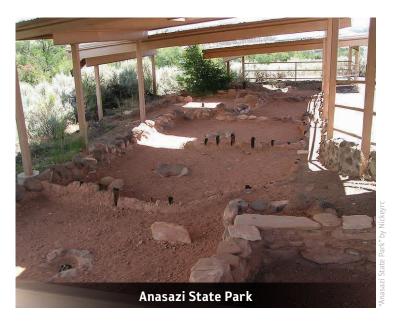
# **Early Human Inhabitants in Utah Mountains**

We know that there have been people in the area that is now Utah for at least 12,000 years. These people most likely spent time in the Utah mountains, gathering food and hunting animals that were abundant there during the warmer parts of the year.

In the small mountain town of Boulder, Utah you can visit Anasazi State Park. This is a village that was occupied by Ancestral Puebloan people for about 200 years (from the year 1050) and is one of the largest Ancestral Puebloan communities discovered west of the Colorado river.

Hovenweep National Monument is near the southern border of Utah and Colorado and sits on the Colorado Plateau. Some places on the plateau are nearly 2,100 meters above sea level (almost 7,000 feet). It is likely that hunting-gathering people were in the area as far back as 8,000 BC. Evidence left behind by Hovenweep's original inhabitants and the Ancestral Puebloans that followed suggests they used local materials (such as juniper and pinyon trees, quartz, and sandstone) to build shelters, tools, weapons, and storage areas.

Along the western Wasatch Mountain Range and in the Great Salt Lake area, there is a lot of evidence of people living, farming, hunting, and traveling through. People mostly lived in the lower altitudes while venturing into the



surrounding mountains for supplies. In the mountains above Ogden, for example, is one site called **Fallen Rocks Shelter**. The Fremont people once used it as a place of refuge. The Fremont people lived in Utah at the same time as the Ancestral Puebloans.

The largest known Fremont village was discovered during road construction and is now preserved at Fremont Indian State Park in the Pahvant Range that runs down the center of Southern Utah. There is evidence that other native people traveled through this region regularly, and left their own drawings on the rocks in the area.



### Wherever You Are

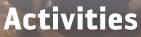
Pretend you are an early Utah inhabitant, and you lived near the mountains. Tell about a day of your life in the middle of summer. What resources would you gather in the mountains?



### Online

Picking Piñon youtube.com/watch?time\_continue=81&v=iQu68JiDhCk

Ancient Native Plant Relationships (This program covers plants used not only from the mountains, but other places in Utah) wildaboututah.org/ancient-native-plant-relationships-18-apr-2016/



### Outside

Wherever you are, are you able to see mountains? If you can see mountains, do you know what they are called? (If you can't see mountains, do you remember a time when you could see mountains, or do you know about nearby mountains that you are unable to see from where you are?)

Thinking about mountains that you can see or that you have seen in the past, what do you think would be an advantage to living in or close to the mountains a long time ago? What do you think would have been hard about living in the mountains a long time ago?

# How Humans Impact the Mountains

Utah mountains are beloved by many people, and they are also a vital resource. Sometimes we wonder how much impact humans have on the mountains, and whether or not we need to change the way we are doing things.

Utah mountains are a place with some of the best outdoor recreation in the United States. In the Utah mountains you can hike, ski, mountain bike, climb, four-wheel, raft, camp, boat, snowshoe, and backpack. You can also dinosaur hunt, learn about ancient cultures, and collect rocks if you are careful to follow the laws about gathering things and leaving things where they belong.

Have you ever wondered how so many people playing in the mountains affect them? What do you think? What if people take good care of the mountains, making sure to keep the streams clean and not leave trash or fires behind? Should we make new rules for mountain use, or spend more money to enforce rules that are already there? The answers to these questions will definitely take a lot of careful research.

Humans impact the mountains by things that we change. Sometimes we change the way that the mountain rivers and streams run, and build dams to hold and control water flow. We mine mountain minerals and rocks, cut trees for lumber, often changing the shape of the mountain and what grows on it. We build roads through mountains, blocking or altering the way that animals have to move through the mountains. Also, we can change the mountains by things that we bring in. Plants and animals that are not native to mountains are purposely or accidentally introduced. If those plants or animals cause problems, they are usually known as invasive species.

Finally, we change mountains by interrupting natural processes. Forest fires have occurred since the beginning of time, but humans will often fight naturally caused fires (usually started by lightning) in order to reduce destruction. Should we do this? What about if the fire is started by a human? How do we decide?





### Wherever You Are

Choose one of the following scenarios. Write about how you imagine it might impact the mountains.

- 1) A human has left a campfire burning in the forest during a very hot, dry time of the year.
- 2) The seed of a new species of plant has accidentally been brought to the mountains on the muddy tires of a truck, and it grows very well; so well, in fact, that it is crowding out native plants on the hillside where it started growing.
- A larger highway is being built through the mountains in order to shorten travel times between cities on either side of the mountains.
- 4) There is a very beautiful hiking trail that very few people knew about. People started posting pictures of the trail online, and telling others about how amazing it is.

Which scenario did you choose?\_\_\_\_\_ What do you imagine the impact would be?



### Outside

**Go outside and look around you**. Even if you can't see the mountains, you can see human impact in the area you are. **Name two or three things you see in the natural world that humans have impacted.** Maybe it is the plants that are growing, or how the ground beneath our feet is shaped.

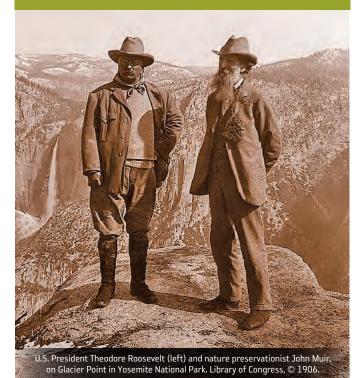


### Online

Importance of Fire wildaboututah.org/fire/

# A Historical Mountain Naturalist

### President Roosevelt & John Muir



It was mid-May in the year 1903, and 65-year-old John Muir was going camping. He had received a letter in March, three sentences long, asking that he alone serve as a guide through Yosemite National Park. It was signed by the President of the United States, Teddy Roosevelt.

"You will need a new suit," his wife Louie said, and he knew she was right. It was going to be one of the most important meetings of his life, and perhaps his best chance to make sure that his beloved California mountains were protected and preserved forever. He had to make a good impression. He was, however, greatly disappointed when he met the president at Mariposa Grove. Instead of being just the two of them, they were accompanied by more than forty people. Still, he showed them the giant sequoia trees and photographs were taken. When the day was nearly over, and the group turned back, heading for a hotel, the president paused.

"John, here, walk with me," he said, and they moved to the back of the group. Soon, all the others had moved ahead, and they were left behind with just two park rangers and an army packer. The President had no intention of catching up. He wanted time alone with John, and he wanted to go camping.

As night approached, a fire was built at the base of a tree named Grizzly Giant, and John and the president talked. "We need to take care of the trees," John told the President. He told him all about his concerns. It was a stunningly beautiful evening, and, after talking late, the President and John wrapped up in blankets and slept out under the stars.

The next two days in Yosemite, John taught the president about the valley, told him stories about his time there, and the president, in turn, told John all his ideas to take care of the beautiful places in America. They camped in Yosemite at night, once in a snowstorm, and another night at the edge of Bridalveil Meadow in the bottom of the valley. John said that during this trip he learned to love this president.

Because of the camping trip, President Roosevelt made Mariposa Grove a part of Yosemite National Park, protecting it for the future. Later in his presidency, he signed into existence **five national parks, 18 national monuments, 55 national bird and wildlife refuges, and 150 national forests**.

### Wherever You Are

In 1877 John Muir spent time in the Salt Lake area of Utah, and even hiked the mountains. Here is what he wrote about the Oquirrh Mountains:

" I found many delightful seclusions—moist nooks at the foot of cliffs, and lilies in every one of them, not growing close together like daisies, but well apart, with plenty of room for their bells to swing free and ring ... Descending the mountain, I followed the windings of the main central glen on the north, gathering specimens of the cones and sprays of the evergreens, and most of the other new plants I had met; but the lilies formed the crowning glory of my bouquet—the grandest I had carried in many a day. I reached the hotel on the lake about dusk with all my fresh riches, and my first mountain ramble in Utah was accomplished." — John Muir, 1919

What is your favorite part of the quote? Underline or highlight it.

What does the quote say to you about the Oquirrh Mountains and/or John Muir?





### Outside

Go outside. If you can, you can do this on a trip to the mountains, but any place you are will work well. Look around you and find something in nature that is beautiful to you. Write about it.

### Online

John Muir youtube.com/watch?v=-CDzhIvugw8

John Muir and Roosevelt

utah.pbslearningmedia.org/resource/john-muir-teddyroosevelt-video-9072/john-muir-and-teddy-rooseveltken-burns-the-national-parks/#.Xpm4NFNKiRs

# **Becoming a Mountain Naturalist Today**

### What does it mean to become a Utah explorer mountain naturalist?

## What else can you do?

- **Study.** Read and watch everything you can about the Utah mountain, and the people who live in it and have lived there in the past.
- **Visit.** Any chance you get, go to the mountain, even if it is not very far from your home. When you visit, spend a lot of time just observing. Write about what you observe, what do you see, what do you smell, what colors do you see, watch the weather, look closely at plants and soils. If you can't visit, watch videos about the places you can't travel to.
- > Talk to people. Find experts who know about the Utah mountains, the animals, the plants, the soils, and if you can, talk to them about what they know.
- Learn to identify mountain plants and animals.
- Learn about tracking mountain animals, about their footprints and other signs that they leave. Again, you can find books and information online to learn this.

A naturalist is someone who works to understand not only the animals and plants in an environment, but also how each one relies on the other. A naturalist works to understand as much as possible about the area.

You can go to school to become a naturalist, but you can also become an amateur naturalist in your everyday life. Alice Eastwood never managed to attend college, but she let her love of plants and nature guide her learning, and she became an expert in her field and a fierce protector of the natural world.

Another part of becoming a naturalist is helping others understand things that you have learned about the natural world. It is important to do this in a way that doesn't scare or make people feel bad. It is better to love the mountain and help others learn to love it and to know vhow important it is.

By completing this booklet, you are on your way to becoming a mountain naturalist.

### Wherever You Are

A naturalist is someone who observes and studies plants, animals, insects, rocks, and fossils. Curiosity is a vital trait in becoming a naturalist. **Can you remember a time** you were curious about the mountains, or that you discovered something exciting or interesting in the mountains?

### Online

Wasatch Mountains youtube.com/watch?v=95S0zJ0wryc



### Outside

### Go outside and stand where you can see mountains.

You may need to wait until you can have an adult drive you somewhere you can find mountains, or you may have to go online and find a video of mountains. Looking at the mountains, answer the following questions:

### What do you know about these mountains?

What would you like to know about these mountains?

Who can you teach about these mountains?

# **Visit Utah Mountains**





**Uinta Mountains** 



An extremely rare, red-colored form of mineral called red beryl, found only in Utah's Wah Wah Mountains. The best way to learn about Utah mountains is to spend time in the mountains. If you live, vacation, or travel through the mountains, see if you can take the time to get outside and just be in the mountains. Find a "sit spot", and listen, look, and smell.

### Wasatch Range

The Wasatch Range is the longest mountain range in Utah, although it doesn't have the highest peaks. Most of Utah's population lives along the Wasatch Range. There are 13 ski resorts, along with hundreds of miles of hiking trails, rivers, lakes, and towns. Have you been in the Wasatch Range?

### **Uinta Range**

The Uinta range, in northeast Utah, is unique in that it runs from east to west. Most mountain ranges in the United States run from north to south. Perhaps someday you would like to climb Kings Peak, the highest mountain in Utah, which is in the High Uintas. It is 4,123 meters tall (13,528 feet), and it is at almost 24 kilometers (15 miles) from the closest parking lot if you want to hike in. Most people do it as a backpack trip.

### La Sal and Abajo Mountains

These mountains in Southern Utah stand out for several reasons. They were created by magma under the crust pushing up the earth's surface without ever coming out on the exterior. They also often remain snow-capped when winter has long left the surrounding land.

### Wah Wah Mountains

Located in the central and western part of the state, in Beaver and Willard counties, the Wah Wah Mountains are where **red beryl** is found. This is an extremely rare red-colored form of the mineral beryl. Utah is the only place where gemstonequality red beryl has been found, and it is possibly the rarest gemstone in the world! These mountains are remote, with no hiking trails. It is NOT a place to explore unless you are with someone who understands safe travel in remote areas.

### **Northwest Utah Mountains**

Unless we live in the area, we often don't think about the mountains north of the Great Salt Lake. There are a few, however, and they are places where people hike, hunt, and there is one place to camp. Some of the mountains in this area are the Dove Creek Mountains, the Bally Mountains, the Raft River Mountains, and the Grouse Creek Mountains.

### Wherever You Are

A bucket list is a list of experiences or achievements that a person hopes to accomplish in their lifetime. **Write a bucket list of at least three places in the Utah mountains you want to visit or revisit.** Maybe you won't be able to go for years, but keep this list for the future. Search online if you want more ideas.

My Utah Mountain Bucket List:

1.		
2.		
3.		
4. 5.		
5.		
6.		

### Online

Sacred Mountains wildaboututah.org/sacred-mountains/



### Outside



The word **sacred** means that a place or an object is treated with great respect or reverence by a group or a person. The native people of Utah have many mountain places that they consider sacred. John Muir also found that the mountains were sacred to him. One of his famous quotes is, "Going to the mountains is going home."

Go outside. Is anything here sacred to you, or if not sacred, it is something that you just like very much? Describe the place or item that that you are thinking about. Take a photograph or sketch it. Why do you find it important?

# **Mountain Naturalist Vocabulary**

## **Become Familiar with these Words**

**Ecosystem:** An interconnected community of organisms (plants, animals, bacteria, fungi, etc.) and their environment.

Naturalist: A person who studies or is an expert in nature and natural history.

**Topography:** The physical features of an area.

Solar Radiation: Energy that radiates from the sun.

**Density:** How much matter (stuff) there is compared to the size. If two objects are the exact same size, but one is heavier, it has more density.

Precipitates: Changes from water vapor in clouds into rain, snow, hail, etc.

Orographic Effect: As air rises over a mountain, the change in temperature and air density causes rain or snow to fall.

Foothill Zone: Lowest area on a mountain. transition area between the mountain and valley.

**Montane Zone:** The area on a mountain above the foothills. This zone usually has a wide variety of trees and animals.

Subalpine Zone: The higher slopes of a mountain, to just below were trees stop growing.

Alpine Zone: Very high on a mountain, above the level where trees grow.

Forb: A flowering plant that is not a grass, shrub, or tree.

**Trait:** A feature or characteristic you get from your parents.

Hibernation: A deep sleep state an animal enters in to allow survival through winter. Their heart rate, body temperature, breathing rate and metabolic rate drop, and this can last for weeks or months.

**Torpor:** Much like hibernation, this is a survival mechanism that slows down an animal's metabolism, except that during torpor an animal can wake up and have active periods between times of deeper sleep.

Ancestral Puebloan: A Native American culture that lived in the area that is now the Four Corners region of Utah, Arizona, New Mexico, and Colorado. The people of this culture were once called the Anasazi, a term that is still occasionally seen, but is now known to be incorrect.

**Freemont People:** A Native American culture that lived in the Utah area 2,000 to 700 years ago. Although they lived in the area at the same time as the Ancestral Puebloan people, their cultures are distinctly different.

### Wherever You Are

This activity should be able to be completed wherever the person is. What would you like them to do?

### Online

Find one or two online resources for information about Utah mountains. Make sure that they are interesting and appropriate for students who are in 3rd–6th grade.



This is your chance to come up with an activity for someone to learn more about the deserts of Utah.

## Outside

Come up with an activity for someone to do outside that will help them become an observer of the natural world, preferably something that has a mountain focus. Remember, however, that not everyone will be able to visit the mountains. (Hint: Ask your learners to find patterns, discuss how things change or stay the same, how things work together, what causes things to happen and what the effect is.)

# Sources and Additional Resources

### Books

Steep Trails by John Muir (adult book)

High in Utah by Michael R. Weibel and Dan Miller (adult book)

The Camping Trip That Changed America by Barb Rosenstock (children's book)

A Walk with John Muir by Carl W. Grody (children's book)

### Online

What is a desert biome conserve-energy-future.com/desert-biomes.php

Basin & Range: Structural Evolution iris.edu/hq/inclass/animation/basin\_range\_ structural\_evolution

John Muir "Storm in Utah" vault.sierraclub.org/john\_muir\_exhibit/writings/ steep\_trails/chapter\_7.aspx

Mountain Habitats kids.nationalgeographic.com/explore/nature/ habitats/mountain/

Mountains Plants Field Book extension.usu.edu/utahmasternaturalist/files/ UMNP\_Mountains\_Plants\_Book\_pages.pdf

Mountain Wildlife Field Book extension.usu.edu/utahmasternaturalist/files/ UMNP\_Mountains\_Wildlife\_Book\_booklet.pdf

As our Junior Naturalist series is developed, it will be designed to be used by students of all ages, with each level being geared towards a specific age group or learning need.

### **Explorer Naturalist Series**

These books are designed to be used by all ages, but are specifically geared towards students ages 8-11.

Explorer Naturalist: Utah Deserts Explorer Naturalist: Utah Mountains Explorer Naturalist: Utah Water\*

\*under development

Future series planned:

### **Junior Naturalist Series**

(In development)

This second level will be able to be used as a continuation of the Explorer Naturalist Series, or on its own. It will be geared to ages 11–14, and will consist of three booklets.

### **Junior Master Naturalist Series**

(In development) This series will be recommended for students ages 14–18.



### Acknowledgements

Developed by Val Allyse, with use of resources from the Utah Master Naturalist program by Mark Larese-Casanova. I would also like to thank and acknowledge the intellectual contributions of the following educators:

J. Boling, T. Collins, D. Joy, B.Knighton, L. Matheson,

J. McLean, J. Nielson, K. Oliver, and K. Worthen.

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