

# Knowing the Wyoming Evergreens

Adapted from *Expedition Yellowstone*



## Overview

Because of our modern life style, most people today are removed from nature. This tree identification activity lets students become acquainted with the evergreen trees that are part of their environment in Wyoming. They gain an appreciation for the evolution of many adaptations by native tree species that allow them to survive the climate of the Northern Rocky Mountains.

## Objectives

Students will:

- be able to identify the species of evergreen (conifer) trees that are native to Wyoming.
- develop an awareness of the evolutionary modifications that allow native trees to be successful in the Wyoming climate and geophysical conditions.

## Grade Levels

4 - 6

## Time Needed

60 minutes

## Subjects to Integrate

Science, Social Studies

## Topics

tree identification, economics of trees, appreciation for ecological adaptations of trees

## Skills

classification, observation, analysis, problem solving

## Goals and Concepts

A 8, 13; B 1, 3, 6; C 21, 25

## Materials

Samplings of as many of the following evergreens as can be obtained. Collect small pieces of branches (4 to 6 inch tip ends) and cones (four from each species) from the following Wyoming conifers.

Rocky Mountain Juniper  
Utah Juniper  
Douglas Fir  
Subalpine Fir  
Pinyon Pine

*Juniperus scopulorum*  
*Juniperus osteosperma*  
*Pseudotsuga menziesii*  
*Abies lasiocarpa*  
*Pinus edulis*

Ponderosa Pine	<i>Pinus ponderosa</i>
Lodgepole Pine	<i>Pinus contorta</i>
Limber Pine	<i>Pinus flexilis</i>
White-Bark Pine	<i>Pinus albicaulis</i>
Engelmann Spruce	<i>Picea engelmannii</i>
Blue Spruce	<i>Picea pungens</i>
White Spruce	<i>Picea glauca</i>

One ruler for each group of five  
 "Wyoming Evergreen Tree Key" (Student Activity Sheet—included)

Note: If some of the above evergreens can not be obtained, tell the students to cross them from the listing in the key. Most of the above are obtainable on the slopes of Wyoming mountains.

## Background

As people drive across America, they see a change in the tree and plant species. In the eastern states there are many species of oak, maple, and beech. Wyoming has only two oak species that are native. In fact, there are only 27 species of native trees in Wyoming. The harsh climatic conditions of the state have prevented the entry of many tree species that thrive well in warmer and wetter areas. Some species have a very limited distribution in the state. The Bur Oak grows only in the Black Hills Forest in the northeastern corner of Wyoming. The range of the Gambel Oak (Oak Brush) barely dips into Wyoming in the southern edge of the Sierra Madre Mountain Range. Some species, such as Engelmann Spruce, are found throughout Wyoming, but only at higher elevations where they obtain adequate moisture. They are, also, able to endure very cold temperatures.

The dominant trees in Wyoming are conifers (evergreens), which means "cone bearing". All conifers in Wyoming keep their needles throughout the year. Although the junipers are grouped with the conifers, the reproductive structure of junipers is not very cone-like. It is small and berry-like. The leaves of junipers are not needle-like either. They look more like tightly-scaled, small branches.

The conifer trees have historically been important to the people of Wyoming and they continue to be. They were important to Native Americans for lodges. The evergreen forests, especially the Lodgepole forests, provided ties as the early railroads reached across the continent. Englemann Spruce and Alpine Fir are important timber trees for the needs of people. In the Black Hills Forest, the Ponderosa Pine is the primary lumber tree.

The conifer forests have other important uses for both humans and other species. They provide habitat for hundreds of wildlife species. They hold the winter's snow

pack that melts in the spring to fill reservoirs and lakes. Much of the coniferous forests of Wyoming have been set aside as Wilderness Areas. The state includes some of the nation's largest Wilderness Areas, such as Bridger-Teton Wilderness Area. In these areas the land is left in as pristine condition as possible, with much of it as it was before modern human influence. Wilderness provides a special kind of recreation for humans. It also provides habitat for wilderness species: grizzly bears, wolves, mountain lions, mountain sheep, and other species that can not or do not mix well with human settlements. This activity helps students to identify most conifers of Wyoming and the forests where they grow as they learn to use a dichotomous (twice branching) classification key.

## Procedure

1. The activity may be used as part of a field trip where students visit the tree in its habitat or parts of the trees may be brought to the classroom. If the teacher is unable to visit the forest with the students, he or she should collect cones and small pieces of branches from as many Wyoming native evergreens as possible. The preferred procedure is to identify the tree in the classroom and then with a field trip visit the trees in a natural undisturbed setting. If the teacher does not know their identity, an excellent and inexpensive booklet, *Wyoming Trees*, is available from the University of Wyoming. Each member of the class may obtain a copy for use. Order from: Science and Math Teaching Center, University of Wyoming, Laramie, WY 82071, or call (307) 766- 63811, (put e-mail address here). Using this book, on most mountains in the State, at least six species of evergreens may be identified. If the teacher is very unsure of the identity of Wyoming trees, he or she may call a forester to assist with the activity. (Refer to the Resource Agency Appendix for the agency nearest you.)
2. Lay branches with their associated cones, separated by species, on a large table where students have easy access to them. Students can work independently or in cooperative groups. One at a time, at their tables, they take each tree through the activity pages "Key to Wyoming Conifers" included with this activity.

## Extending the Activity

1. Use the *Wyoming Trees* booklet and give students additional information about the trees they have classified. The book *Trees of North America* (Additional Resources Section) is excellent to share with your students. It gives a map of the growth area of each species. Another excellent inexpensive booklet to go with this activity is *The Rocky Mountain Tree Finder*. It is referenced in Additional Resources at the end of this activity. It is 59 pages and only \$.92.

2. Call a representative of a timber company in your area and ask the representative to visit your class. (Refer to Wyoming Forestry Resources at the end of this section.) Ask him or her about the species of trees that are used by the mills in your area. What are the uses for the trees milled? How is the volume of trees harvested measured and what are the shapes and sizes of the boards marketed? How much timber is harvested from the local forest by the mills? What reforestation programs are carried out?

3. Plan a field trip to a mill where students may see the operation. Of course, do all of the preparations. Follow all school district guidelines to ensure the safety of the students.

4. A discussion of the reasons for scientific naming of organisms is usually new information for elementary students. Each kind (species) of animal or plant has only one scientific name. The name has two parts: its genus name and its species name. Latin is used because it is no longer spoken by any nation. It is a “dead” language and is no longer changing, like spoken languages do. When we see a scientific name it is always underlined or in italics. The first letter of its first name (genus name) is upper case (a capital), and the second name (species) name is in lower case (small letter).

A plant or animal may have several common names, which are names people in a particular region commonly use. For example, the aspen tree is also called a quaky, quaker, quaking aspen, and sometimes even a birch (an aspen is not a birch, though it looks like one). It is a member of the poplar genus, which includes trees such as lombardy poplars, balsam poplars, and white poplars. The genus also includes the cottonwood trees.

The scientific name often resembles one or more of the common names, and it often describes a characteristic of the plant or animal. The branches of the Limber Pine are very flexible and strong winds do not break them. Its

scientific name is *Pinus flexilis*. That is its only scientific name in Wyoming, New Mexico, Canada, or anywhere else.

## Suggested Assessment

Give students a practical quiz on the collected trees. The specimens may be arranged at stations where questions are positioned by the specimen. Try to avoid questions that ask only the name of the tree. The name in itself is nice to know, but knowing information about species adds meaning and importance to recognizing the tree.

Example: Where in Wyoming is this tree harvested as an important lumber tree? (The Black Hills) What is its common name? (Ponderosa Pine)

## Additional Resources

*A Guide to Field Identification: Trees of North America.* 1986 Brockman, C. Frank, Golden Press, New York

*Rocky Mountain Tree Guide.* 1972 Watts, Tom, Nature Study Guild, Berkley, CA

# Key to Wyoming Conifers

Student Activity Pages

Answer the following questions (yes or no) about each tree and you will be led to the name of the tree.

1. Does the tree have needles that look like scales?  
NO - go to #3.  
YES - go to #2.
2. Does the bark peel off in plates?  
★NO -(in shaggy strips) it's a..... **Utah Juniper.**  
★YES - it's a.....**Rocky Mountain Juniper.**
3. Does the tree have needles?  
NO - you're barking up the wrong tree!  
YES - go on to #4.
4. Are the needles attached to the twig in bundles?  
NO - go to #13.  
YES - it's a pine. Go on to #5.
5. Are the needles 4 to 6 inches long?  
NO - go to #6 question.  
★YES - it's a.....**Ponderosa Pine.**
6. Are there 5 needles in a bundle?  
NO - go to #11.  
YES - go to #7.
7. Are the outer twigs thicker than your pencil?  
NO - go to #9.  
YES - go on to #8.
8. Are the cones round and short (about 2 1/2 inches long) with scales that have pointed ends?  
NO - go to #9.  
★YES - it's probably a .....**White-bark Pine.**
9. Are the outer twigs thinner than a pencil?  
NO - go back to #7.  
YES - go on to #10.
10. Are the cones long (3-8 inches) like a column with scales that thicken but aren't pointed at the ends?  
NO - go back to #7  
★YES - it's probably a.....**Limber Pine.**  
(Bend the outer twigs. They should be limber!)

11. Are there two needles in each bundle?  
 NO - go to #13.  
 YES - go to #12.
12. Do the cones have a sharp spike on each scale?  
 NO - (cones less than 2 1/2 in., and only a few blunt scales; Pinyon Nuts are delicious) it's ★a..... **Pinyon Pine**.  
 ★YES - it's a.....**Lodgepole Pine**.  
 (Look at its cones. They may be sealed with a resin that only a fire can melt.)
13. Are the needles individually attached to the branch?  
 NO - go to #4.  
 YES - it's either a spruce, a fir, or a Douglas Fir Go to #14.
14. Can you roll the needles between your thumb & index finger?  
 NO - go to #18.  
 YES - go to #15.
15. Are the needles stiff with a sharp, pointed tip?  
 NO - go back to #13.  
 YES - go to #16.
16. Are the needles sharp pointed and short (1/3 - 3/4 inch) and the cones 2 1/2 inches long or less?  
 NO - go to #17  
 YES - look below  
 ★If the scales on the cones are pointed and somewhat toothed at the tips, it's an.....**Engelmann Spruce**.  
 ★If the scales on the cones are smooth and rounded at the edges, it's a..... **White Spruce**.
17. Are the cones longer than 2 1/2 inches to 3 1/2 in?  
 ★Yes - it's a.....**Blue Spruce**.
18. Pull a needle from the branch. Did the pulled-off needle leave a large, round, depressed scar?  
 NO - go to #19.  
 ★YES - it's a.....**Subalpine Fir**. (You may not find a cone of a Subalpine Fir. They stay on the tree. The scales fall off, leaving stalks sticking straight up.)
19. Does the pulled-off needle have a piece of bark with it? Does the cone have three-pronged, tongue-like pieces (called **bracts**) hanging out of it?  
 ★YES - it's a.....**Douglas Fir**.

# Interesting Facts About the Evergreens

Student Activity Pages

## **Rocky Mountain Juniper** *Juniperus scopulorum*

One of two juniper species in Wyoming, it is found in most parts of the state. Rocky Mountain Juniper is well adapted to growing in dry areas and is characterized by its scale-like leaves. It produces a small blue berry that was used by the Native Americans in pemmican. It has a beautiful pink to maroon core.

## **Utah Juniper** *Juniperus osteosperma*

This is the other species of juniper found in Wyoming. It is found only in the southwestern corner of the state. It, too, is well adapted to growing in dry areas. Utah Juniper looks very much like Rocky Mountain Juniper, except the Utah Juniper has gray, shaggy bark which peels off in long strips.

## **Douglas Fir** *Pseudotsuga menziesii*

The Douglas Fir is a very important lumber tree throughout the west. It has flat, single needles that feel rather soft when a branch is grabbed or brushed against. These are characteristics of a fir tree. However, the Douglas Fir is not a “true” fir tree. One clue is the distinctive cones which hang like pendants from the bottom of the branches. True fir trees have cones that point upward from the top side of the branch.

## **Subalpine Fir** *Abies lasiocarpa*

This is a “true” fir tree. The cones grow upward from the branch rather than hanging downward like pendants. In addition to having flat, single needles, the subalpine fir grows in a very pointed “Christmas Tree” shape and has beautiful smooth, ash-gray bark. It is also very “pitchy”. You probably won’t find the cone of this tree because the scales fall off of a spike that remains attached to the tree, rather than the entire cone falling off.

## **Pinyon Pine** *Pinus edulis*

Found in southwestern Wyoming, the Pinyon Pine produces large, tasty seeds often called “pinyon nuts.” The Pinyon Pine has a very strong pine aroma and it is very difficult to handle a branch without getting pitch on your fingers! Pinyons are common in the four corners area of Colorado, New Mexico, Utah, Arizona.

## **Ponderosa Pine** *Pinus ponderosa*

This is a very important lumber tree in the west. The Ponderosa Pine is distinguishable from other common pines in Wyoming by its long needles that occur mostly in clusters of 3.

## **Lodgepole Pine** *Pinus contorta*

The Lodgepole Pine grows straight and tall, making good “lodge poles”. Red squirrels live in Lodgepole forests, collecting the cones and storing them in caches for winter food. Lodgepoles produce two types of cones: a cone that opens when it is mature, discharging seeds, and a cone that remains closed. The heat of forest fires opens these closed cones, re-seeding the forest. Lodgepole pines were

used to make railroad ties for the transcontinental railroad. The forests of the Snowy Range Mountains in southeastern Wyoming produced millions of ties for the railroads of the West.

**Limber Pine** *Pinus flexilis*

As the name implies, branches of this tree are very limber. It is adapted to grow well in very windy regions. The twigs at the ends of the branches can easily be tied in to a knot! It is also distinguished by its thick, woody cone, and needles that occur in bunches of 5.

**White Bark Pine** *Pinus albicaulus*

The White Bark Pine looks similar to the Limber Pine, but it has a smaller cone. Grizzly bears often feed on the seeds of the White Bark Pine.

**Englemann Spruce** *Picea engelmannii*

Another important lumber tree in the west. Englemann Spruce grow 60-90 feet tall in a pyramidal or cone shape that reminds many people of a Christmas tree.

**Blue Spruce** *Picea pungens*

This looks very similar to the Englemann Spruce, but it has larger cones and often, but not always, has a bluish color. The Blue Spruce is very thirsty and is usually found near streams. If you brush against the stiff, pointed needles of this or of the other spruces, you will quickly distinguish it from the soft needles of a fir.

**White Spruce** *Picea glauca*

The White Spruce is found naturally in Wyoming only in the Black Hills. If you call it a White Spruce in the Black Hills, residents will be quick to correct you for not calling it a "Black Hills Spruce."

## Wyoming Standards

## **Science**

### **BENCHMARK GRADE 8**

#### **UNIFYING CONCEPTS AND PROCESSES**

Concepts in LIFE SYSTEMS are taught within the context of the following Unifying Concepts and Processes of Science:

Systems, classification, order and organization  
Evolution and equilibrium  
Form and function

- 2. Reproduction and Heredity:** Students describe reproduction as a characteristic of all living systems, which is essential to the continuation of species, and identify and interpret traits, patterns of inheritance, and the interaction between genetics and environment.
- 3. Evolution as a Theory:** Students explain evolution as a theory and apply the theory to the diversity of species, which results from natural selection and the acquisition of unique characteristics through biological adaptation.
- 4. Diversity of Organisms:** Students investigate the interconnectedness of organisms, identifying similarity and diversity of organisms through a classification system of hierarchical relationships and structural homologies.
- 5. Behavior and Adaptation:** Students recognize behavior as a response of an organism to an internal or environmental stimulus and connect the characteristics and behaviors of an organism to biological adaptation.
- 6. Interrelationships of Populations and Ecosystems:** Students illustrate populations of organisms and their interconnection within an ecosystem, identifying relationships among producers, consumers, and decomposers.

### **BENCHMARK GRADE 4**

#### **UNIFYING CONCEPTS AND PROCESSES**

Concepts in LIFE SYSTEMS are taught within the context of the following Unifying Concepts and Processes of Science:

Systems, classification, order, and organization  
Form and function

#### **LIFE SYSTEMS**

- 1. Characteristics of Organisms:** Students describe observable characteristics of living things, including structures that serve specific functions and everyday behaviors.
- 2. Life Cycles of Organisms:** Students sequence life cycles of living things, and recognize that plants and animals resemble their parents.
- 3. Organisms and Their Environments:** Students show connections between living things, their basic needs, and the environments.

## **Social Studies**

### **3. PRODUCTION, DISTRIBUTION, AND CONSUMPTION**

**Students demonstrate an understanding of economic principles and concepts and describe the influence of economic factors on societies.**

**BENCHMARK GRADE 4**

- 1. Students describe the importance of major resources, industries, and economic development of the local community and Wyoming.**
- 2. Students describe different ways that people earn a living in the local community and in Wyoming.**