



Unit 4: Native Plants

Our Medicine... Our Food



Glacier Lily Student
Artwork by Kevin
Racine

Native Plants Teacher Background Information

This unit focuses on the importance of native plants to the economy and culture of American Indian peoples, as well their ecological importance in general. Discussing native plant significance and use requires that students are familiar with what native plants are, their life cycles, their inter-relationships with insects/wildlife, how they colonized the glacially carved slopes of this area, and how they are adapted to different habitats. Knowing this will help students understand why a plant's (or group of plants') growing location was such an influence on the movements of the tribes. In this day and age when for most of us, our food gets delivered to us (via grocery stores or local markets, and even our houses) it may be very hard for students to relate to a lifestyle of moving to where the plants (and/or animals) were.

While the early Blackfeet, Salish, Pend d'Oreille, and Kootenai were all plant-dependent, the degree of dependence varied between cultures and locations. There was also variation in the extent to which bands and tribes gathered plants and traveled for trade within the area that is now Glacier National Park. The area that is Glacier National Park today, is just a small portion of the much larger homelands that each tribe lived in and used in their yearly movement patterns (see the introduction and text from each of the tribes about their relationship with Glacier). It is also worth re-iterating that many traditional plant collecting areas of North America have been changed and no longer support native plant communities- further adding to the importance of protecting the native plant communities in Glacier. *People Before the Park: The Kootenai and Blackfeet Before Glacier National Park* is recommended for more specific information on plant use than can be related here (Thompson, 2015).

The Student Reading for Unit 4 contains the important Salish story about the bitterroot. Today, there additional resources available to use with this story. There is a YouTube video, "[Story of the Bitterroot](#)" directed by [Steve Slocumb](#) that is 64 minutes and divided into eight sections. The video focuses primarily on Montana Salish Indian culture with tribal elders being the predominant source of information. Sections directly related to this unit include: "Botany" (6 minutes); "When We Were Children" (11 minutes); and "The Future" (6 minutes-examines the issues of the plant's continued existence and ethics of propagation- a similar situation for many of Montana's Native Plants). There is also an [OPI Social Studies lesson for the movie \(8th grade\)](#). An education trunk is available for teachers in the Flathead Valley. Flathead Audubon, Flathead National Forest and the Northwest Montana Educational Cooperative teamed up to develop an education trunk with this story. It is "The Indian Education for All, Youth Book Club Trunk, Gift of the Bitterroot and Crown of the Continent Ecosystem." It is free to borrow from Flathead Audubon Chapter (Contact the NW MT Educational Coop Office at 406/752- 3302 or auduboneducator@gmail.com). The trunk includes a class set of the book *Gift of the Bitterroot*, and additional materials. Finally, a quick on-line search found another lesson using the story with a downloadable copy of the book. [The Gift of the Bitterroot - K-2 Lesson plan](#) uses the book Illustrated by Antoine Sandoval with story as told by Johnny Arlee.

Also included in the Student Reading for Unit 4 is a Blackfeet story about tobacco. Teachers reviewing the lessons have pointed out the importance of

making sure students understand the difference between traditional tobacco use versus smoking cigarettes. The National Native Network’s, keepitsacred.org has additional information.

The Student Reading for Unit 3 includes a botanical account for Glacier National Park. This can be supplemented with information from the park’s website about [plants](#) and [forests](#) and [fire](#). The Crown of the Continent Research Learning Center has a number of 2-page, [resource briefs pertaining to fire](#). The park’s [student guide](#) has a number of 2-page fact sheets, including one on plant and animal diversity.

When doing plant studies in Glacier National Park, or in any other environment, it is important to emphasize minimum impact activity. When visiting Glacier National Park, remember that plants may not be collected. Perhaps of more concern is the impact that plant gathering might have on American Indian values and resources. These concerns have been raised by tribal advisors. Many people simply have no concept of how important these plants are. As one tribal advisor pointed out, “They are our medicine.... our food!”

In “Gathering Moss,” Robin Wall Kimmerer describes her struggle with her experiences with cultural differences in regards to plants,

In college, the two perspectives on the life of plants, subject and object, spirit and matter, tangled like the two cores around my neck. The way I was taught plant science pushed my traditional knowledge of plants to the margins. Writing this book has been a process of reclaiming that understanding, of giving it its rightful place...

In indigenous ways of knowing, we say that a thing cannot be understood until it is known by all four aspects of our being: mind, body, emotion, and spirit. The scientific way of knowing relies only on empirical information from the world, gathered by body and interpreted by mind. In order to tell the mosses’ story I need both approaches, objective and subjective. These essays intentionally give voice to both ways of knowing, letting matter and spirit walk companionably side by side. And sometimes even dance. (vii)

Finally, in the National Park Service Report, “Our Mountains Are Our Pillows: an Ethnographic Overview of Glacier National Park,” Dr. Brian Reeves and Dr. Sandra Peacock recognize that Indian peoples throughout North America actively managed critical plant resources. They point out the importance of oral histories to plants,

Our study also highlights the value of traditional ecological knowledge... [Oral traditions] represent an intimate and sophisticated understanding of the natural world. Oral traditions indicate which plants were utilized, the specific harvesting times, preparation techniques, resource management strategies, and the benefits accruing from the proper use of each plant” (254).



At Home In This Place
DVD Content

Play Video:
[Kootenai - We Ask That
You Walk Lightly](#)

The book “People Before the Park” includes a detailed account from the Blackfeet of their seasonal rounds in connection with Glacier National Park (Thompson, 2015).

The Early Blackfeet

University of Arizona and Blackfeet Community College (BCC) students researched the nutritional value of native plant foods in 2005-2006 and described the importance of recognizing the connection between a nomadic lifestyle and a diet relying on many native plants. They begin with information about the difference between the names Blackfoot and Blackfeet,

The Blackfeet are comprised of four bands: Southern Peigan (Blackfeet), North Peigan, Siksika, and the Kainah (Bloods). Today some regard the “Blackfoot” to be the nations to the north in Canada while the term “Blackfeet” is applied to the natives south of the border in the United States, although, this term is controversial as to how it is applied amongst tribesmen. The term Blackfoot at one time, and still does, represent all four bands regardless of geographic location. For the purposes of this paper the tribe is referred to Blackfeet and inclusive of all four tribal bands. In the past, before the 49th parallel or the Canadian/United States border, there were considered 3 branches: the Pikunni or Peigan, Siksika, and Kainah (Blood). Pikunni is the original name that the Blackfeet called themselves before Peigan was given to them by the European people. This is also true of the words Blackfeet and Blackfoot.

Before treaty negotiations, mid 1800’s, the Blackfeet Nation inhabited a large land base from the North Saskatchewan River, Alberta Canada; south to Yellowstone, Montana, and into northern parts of Wyoming; east to the Dakotas and; west to the Montana Rocky Mountains, Bitterroot Valley and beyond. Some say as far west as the Bigfork in western Montana (Senior Blackfeet Honorary Advisory Council Minutes 11/29-2005). This is a very large land mass of the Blackfeet tribes. The health and survival of the Blackfeet demanded a large land base for their subsistence on big game, bison, and foraging for important plant foods from roots, leafy greens and stems, berries, and the like. The hunting of wild game and gathering of wild plant foods determined their nomadic way of life...

It is important to recognize the seasonal movements of a nomadic hunter-gatherer tribe because it strengthens the identification of food resources, when planted, harvested, and how it may be stored” (8-9)

The students found references to Blackfeet use of 100-185 plant species (for numerous uses) and over 50 species used specifically for food (Univ. Az & BCC, 2006). Similarly, Information from the [Blackfeet Section of Trailtribes.org](http://BlackfeetSectionofTrailtribes.org) shows how the yearly cycle and patterns of movement reflected the location of important foods.

The buffalo was most important, but particular camp locations were selected with other resources in mind as well. Each location was known for the resources it held, whether they were plant, animal, or mineral, and year after year, the people returned to these locations....Before they left winter camp, just after the snow disappeared, the ground of the tobacco garden was prepared for planting. The seeds would grow while they were off hunting the buffalo. Some of the important men who were responsible for the well-being of the tobacco, would return to the garden to tend the plants



Culturally scarred tree, NPS photo.

several times during the growing season. At the right time, everyone would gather near the garden for harvesting the tobacco in a ceremonial manner.

Reeves research also revealed over 80 plants traditionally utilized by the Blackfeet occur within the current park boundaries. Of these, 41 were used for food, 66 prepared as medicine, 25 used for spiritual reasons, and 48 used for a variety of purposes (212). It goes on to say that settlement on the reservation curtailed many of the traditional activities of the Blackfeet. Loss of access to the resources of Glacier NP aided in this decline. Evidence from interviews with elders points to the importance of major river valleys as access corridors to the resources of GNP. These areas have high cultural significance for these three main reasons: 1) the purity and power of the plants found in the mountains of the park; 2) many important plant resources do not occur elsewhere; 3) the mountains are the last remnant of traditional Blackfeet territory not disturbed by modern economic activities. (245)

The Early Kootenai

We traditionally followed a yearly cycle of movement, a way of life directed by the seasons. In the summers we fished by canoe on rivers and lakes, from near Lake Windermere in British Columbia, Canada to Edmonton, Alberta, Canada. In the cold winter months we moved south to the Sweetgrass Hills and Yellowstone, hunting bison on snowshoes. As the snows melted we moved west to Lake Pend Oreille, and then back to the north” (St. Mary VC Exhibits, 2010).

Listening to the Kootenai video clip, “The Place Where They Danced” is a clear reminder of the significance of the Lake McDonald area too the Kootenai. Oral tradition and contemporary accounts of the traditional and ceremonial importance of the Glacier National Park area are numerous (Thompson, 2015).

A [survey of culturally scarred trees](#) in Glacier National Park - on which the bark has been peeled to remove the cambium layer- identified approximately 70 scarred trees. Culturally scarred trees are indicators of prehistoric and historic travel corridors and campsites. The inner cambium layer of Ponderosa Pine is edible and extremely rich in nutrients. In the vicinity of Glacier National Park, this has been an important food source for Kootenai, Salish and Pend d’Oreille people for thousands of years.

Reeves recorded an ethnobotanical study that revealed more than 90 plant species utilized by the Kootenai people in their traditional range are the same species that occur within the boundaries of Glacier National Park. Of these, 48 species were used for food, 43 as medicines, 16 for spiritual purposes and 45 as materials for various purposes (64). A lack of ethnobotanical detail is recognized because of the inability of the researchers to interview elders directly. Also, that the Kootenai and other Tribes “essentially lost access to the resources of this portion of their traditional territory about 100 years ago when the park was established; thus, much of the ethnographic information pertains to the former use of the region by the ancestors of today’s elders” (Reeves, 65).

As hunter-gatherers, the Kootenai relied extensively on plant foods to



At Home In This Place
DVD Content

Play Video:
[Kootenai- The Place
Where They Danced](#)

supplement wild game in their diets. They collected and consumed at least 50 plant species, including fruits and berries, edible roots, greens, pine seeds, tree cambium, and tree lichen. Black tree lichen (*Bryoria fremontii*) available year round, is described as a valuable food source in times of scarcity. The collection of plant foods was seasonally patterned. They used the leaves, bark, roots, and pitch of a wide variety of plants for medicines. They also mixed a variety of other plants with tobacco for smoking, including kinnikinnick, pipsissewa, and the bark of red osier dogwood. Plants were used in all aspects of technology- for containers, canoes, houses, sources of fibers and dyes, and for fuel and cooking (Reeves, 65).

People Before the Park includes a information from the Kootenai of their seasonal rounds in connection with Glacier National Park (Thompson, 2015). Below is information from the MT Office of Public Instruction of Kootenai history and location in general,

Ktunaxa subsistence was based on seasonal migrations that followed plant and animal production cycles, and coincidentally served to prevent an environmental degradation of aboriginal lands. Food preservation was an integral part of the Ktunaxa life cycle.

Seasonal migrations for hunting and harvesting began in the early spring when bitterroots ripened and fisheries were bountiful. In early summer, they traveled east of the Rockies to hunt buffalo, returning in mid-summer to process and store the meat. In summer, camas, huckleberries, serviceberries, chokecherries, and other plants were harvested. By fall, big game expeditions were organized and some of the hunters returned to the plains for more buffalo. The people preserved and processed food for the winter cache.

The Ktunaxa life cycle also depended on a commerce sector, which involved agriculture and aquaculture. The Ktunaxa cultivated a unique species of tobacco for personal use and trade with other tribes. They specialized in water, fisheries, bird hunting, trapping, and other aquacultural activities that were ongoing in Kootenai society.

The most prominent distinction of the Ktunaxa is the isolated language they speak. While scientists classify most indigenous languages into family groups to determine origin and migratory patterns, the Kootenai language has never been likened to any other language in the world. It is an anomaly that effectively contradicts any migration theory for Ktunaxa. Other distinctions of the Ktunaxa include their portable tulle-styled summer lodges called Tanat. They also held the distinction of being avid canoeists, trappers, and anglers. They excelled in engineering light craft to expedite navigation on some of the most treacherous waterways in the Northwest. Their hunting and fishing techniques were superior even by modern standards. They developed and utilized devices to augment their technique. Traditional Kootenai fish weirs and bird traps were widely sought after for their utility.(25)

The Early Salish and Pend d'Oreille

We are the Séliš (Salish or “Flathead”) and Qlispé (Pend d’Oreille), the easternmost tribes of the Salish language family.

Originally, we were one nation. Many thousands of years ago, as the population grew, we dispersed from here to the west, eventually forming many tribes and dialects reaching from Montana to the Pacific Coast.

We lived as hunters, fishers, and gatherers, with vast territories on both sides of the Continental Divide. The Flathead drainage system and the west side of Glacier National Park was part of the territory of the Qlispé band known as the Słqetk^wmsčiñt, meaning People of the Broad Water. This was the ancient name for Flathead Lake. A related tribe, the Tuñáxn, lived along the Rocky Mountain Front. (St. Mary VC Project, 2010)



At Home In This Place
DVD Content

Play Videos:
[Salish & Pend d'Oreille-](#)
[I can Almost Hear our](#)
[Ancestors](#)

The Salish made regular use of the Glacier National Park area for passage to the plains for hunting, gathering, and for ceremonial and social purposes. The Nyack Valley, for instance, was so important to the Salish that it is specifically mentioned in traditional stories (*Work House*, 1992).

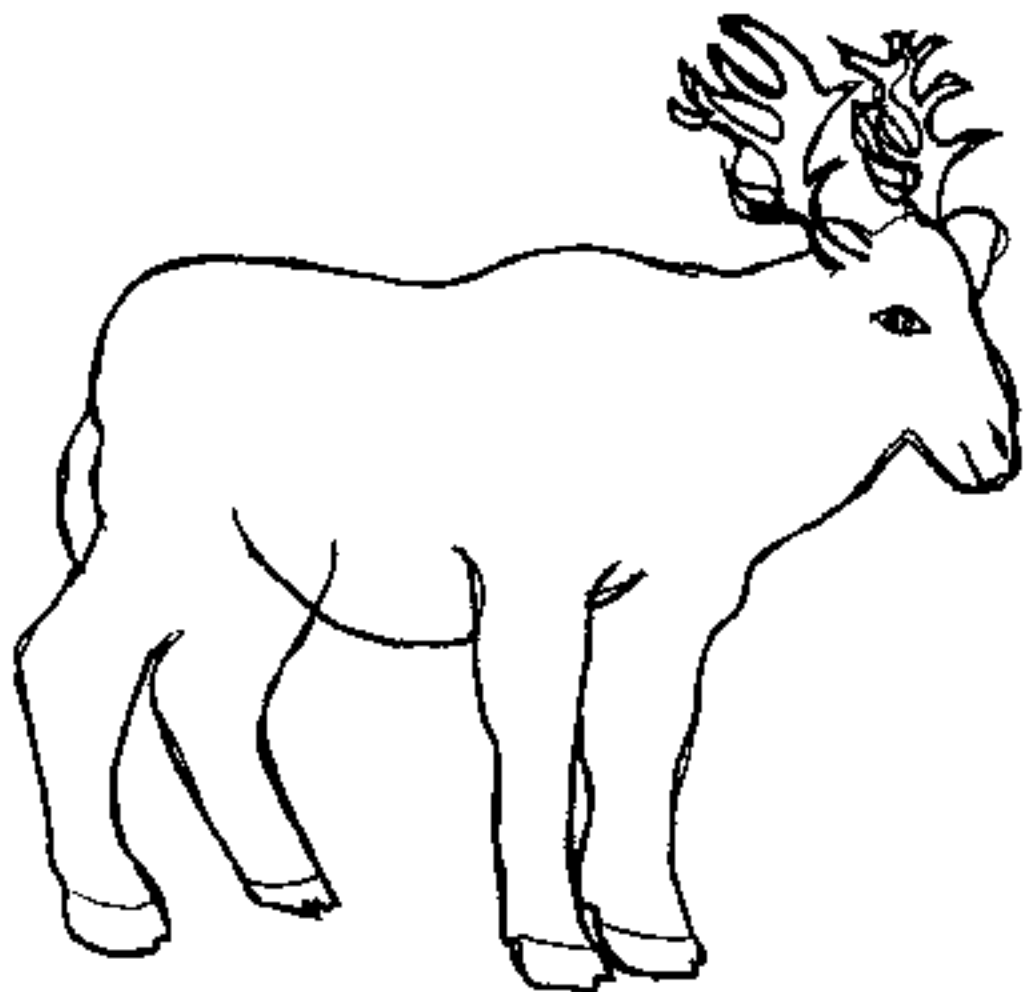
Information from the MT Office of Public Instruction provides a short overview of Salish and Pend d’Oreille history and location in general,

From the beginning of time, the Salish and Pend d’Oreille people made their living off the land through a complex pattern of seasonal hunting and gathering activities. The land provided all that the people needed. Elders say that life was hard, but good. Spring would yield a plentiful bitterroot harvest, followed by sweet camas bulbs in June.

The bloom of the wild rose signaled the people that the buffalo calves had been born and that it was time for the summer buffalo hunt. Throughout the rest of the summer, berries and fruits, including serviceberries, huckleberries, and chokecherries would be gathered, dried and stored. The Salish and Pend d’Oreille regularly gathered hundreds of different plants for food and medicinal uses.

In the fall, hunting began in earnest. Men hunted for large game, which the women butchered, dried and stored for winter. As the hunters brought home elk, deer, and moose, the women tanned hides for clothes, moccasins and other items such as a parfleche. A parfleche is a rawhide container used for storing a variety of things like dried foods and clothing. Fishing was also important throughout the year. Both fishhooks and fish weirs were used to catch fish. Elders tell of days when the fish were so plentiful that you could almost cross the creeks walking on their backs.

The winter season involved trapping, ice fishing, and some hunting. Cold weather brought families inside and women made and repaired clothing while the men made and repaired tools and weapons. Coyote stories were brought out with the first snow. This was a sacred and happy time when ceremonial dances would be held” (24-25).



Elk Student Artwork by
Rachel Marie Deming



Unit 4 -Native Plants

Lesson 1

Who Says Plants Can't Move?

Materials:

- Balloons (green, brown, purple and red are preferable)
- Frozen or fresh berries (huckleberries, blueberries or raspberries are most appropriate)
- Grocery bags (preferably painted bright red, pink or white)
- A yellow or black stocking cap
- Powdered sugar
- Marshmallows
- Velcro strips
- A collection of locally gathered seeds such as dandelion, maple, poppy, cockle burrs, pine cones, and mushroom spores
- Optional: magnifying glasses to look at seeds



Douglas fir cone, NPS photo
(Glacier Student Guide CD).

Lesson At A Glance

Student volunteers move around the classroom and role play different techniques to model the various ways plants can distribute their seeds. They observe a variety of seeds/berries from their neighborhood.

Objectives

Students will be able to:

- Role play how plants spread their seeds and populate new areas.
- Think about plants as organisms that are adapted to their environment and contribute to the well being of other plant, animals, and people.

Time Required

50 minutes

Vocabulary

Fungi, mushroom, nectar, pollen, pollination, pollinator, proboscis, seed, seed dispersal, spore.

Teacher Preparation/ Background

If doing the review on pollination, prepare powdered sugar and marshmallows in a paper bag ahead of time. Review [pollination](#) and how flowering plants produce seeds in order to reproduce. Gather seed examples for the different [types of dispersal mechanisms](#) and photos of plants that you can show as students do the role plays for seed dispersal.

Photos and information can be found on-line at [Montana Plant Life](#). If students are able to use Apps, there is a Glacier Wildflower App available

Teacher Preparation/ Background Continued

for download. The two plant books that were included in the original *Work House* kit are available from most school and public libraries: 1) *Montana Native Plants and Early Peoples*, by Jeff Hart, Montana Historical Society Press; and 2) *Plants of Waterton-Glacier National Parks and the Northern Rockies*, by Richard J. Shaw and Danny On, Missoula: Mountain Press, 1979, which describes and illustrates with colored photographs over 200 species of trees, shrubs, flower and plants.

Consider borrowing [Glacier's Plant Invaders education trunk](#) as it has laminated, printed photos of native plants. The "Great Race for Survival" activity about plant competition includes how some non-native, invasive plants can out compete native species by having higher seed creation and dispersal techniques.

Procedures

1. You may want to start out by doing the following role play to review pollination (needed for plants to produce seeds). Before the presentation begins, sprinkle powdered sugar in the bottom of a colored grocery bag so that it sticks to the sides after shaking. Place a marshmallow in the bag with the sugar. Place another marshmallow in a second colored grocery bag (no sugar).
2. Discuss the relationships that flowering plants have with pollinating insects. Explain that this is one of the most sophisticated arrangements for pollination of flowers. Choose a student to represent a honey bee. Put the black or yellow stocking cap on the student's head and say there is a treat in the first bag. Explain that bees use their proboscis to obtain nectar from flowers. Hold the bag (blossom) and have the bee get its treat. The bee must stick its head in the bag. In the process of gathering nectar (marshmallow) the bee will pick up a coating of pollen (powdered sugar) on its head (cap). Ask the group what the bee has on its head. Tell the bee that you have another treat in the other blossom. In the process of bobbing for more nectar (marshmallow) pollen (powered sugar) will be deposited in the other bag. Show the small amount of pollen at the bottom of the second blossom to the group. Discuss the importance of bees and other insects to the process of pollination and seed production.
3. Discuss the concept that plants are rooted in the ground and spend their entire lives in one spot, but have active mechanisms with which to spread their seeds into new territory. It is through these mechanisms that plants were able to invade the barren areas of Glacier National Park as the Ice Age glaciers receded. That process is still happening today. There is footage of Bitterroot's ability to spread its seeds in the ["Botany" section of the online video](#) (7 minutes).
4. Choose a student to be a burr bearing plant. Examples include [large leaved avens](#), ([Geum macrophyllum](#)), stickseed (*Hackelia micrantha*), mountain sweet cicely (*Osmorhiza chilensis*) or the notorious non-native invasive plant with burrs- [houndstongue](#) ([Cynoglossum officinale L.](#)) . Explain that a burr is a seed designed to stick to animals that pass by. Mention that burrs were an inspiration for the invention of Velcro. Show the students the Velcro and burrs you've brought to class. Choose another student to be a large mammal that lives in Glacier National Park. Give the plant an inflated balloon. Ask the student to rub the balloon against clothing to generate static electricity. The mammal comes walking down the trail, stops to scratch, and the plant

Procedures Continued

places the balloon on the mammal's back. The balloon stays "attached" until the mammal has traveled some distance. Eventually the seed drops by the wayside.

5. Choose another student to be a huckleberry plant. Have the student hold some berries while standing by the trail. Another volunteer becomes a grizzly bear and eats the berries. The grizzly continues on down the trail and deposits seeds complete with fertilizer. A purple balloon is not as much fun as berries, but is more graphic in the deposit demonstration. Did you ever wonder why huckleberries seem to line so many of the trails in the park?

6. Have another student be a [mountain maple](#) tree. Have the student inflate a green balloon, tie it, and use the wind to transport it as far away from its parent as possible. Can they think of other seeds they've seen that float on the wind?

7. Have another student be an [early blue violet](#) (*Viola adunca*). Have the student inflate a dark balloon and hold it, waiting patiently until another student touches the balloon-and then let it go! The balloon will rocket out into the room and settle on the floor some distance away. Some plants (and fungi/mushrooms) [use pressure from inside or outside forces](#) to propel their seeds or spores out away from the parent plant. [Richardson's geranium](#) is noted to send its seeds 3 feet away. On a related note, spores from mushrooms also are forcibly ejected and because of their ability to be carried by wind have [travelled from Northern Mexico to Canada](#). They have also been found thousands of feet up in the air! Students may be familiar with [puffball mushrooms](#).

8. Select students to be a pine tree and a stream. Explain that conifers (trees with cones) use several mechanisms for seed and pollen dispersal. Give the tree student a green balloon and have the stream student meander by. As the stream passes by the tree, the tree drops a cone into the open arms of the stream. The stream continues down its course and deposits the cone ashore some distance below. It is important that students understand that this is only one of several ways that conifers spread their seeds.

Reflection and Assessment

Ask the students to explore their neighborhoods in search of various seeds and have them demonstrate and explain the mechanism for dispersal. Interesting seed variations are available during all seasons of the year.

Writing Extension

Have students choose a seed dispersal mechanism and report on plants using that method. Put the reports together in a class book on propagation (natural dispersal) methods in plants. Donate the book to the school library.

Action Project/ Field Trip Extension

- Invite an herbalist from the Blackfeet, Salish, Pend d'Oreille, or Kootenai to visit your class and talk about plant uses.
- Plant a native garden at your school - the [Montana Native Plant Society Flathead Chapter](#) has native plant lists, nursery locations and much more.
- [Flathead Audubon](#), [Flathead National Forest](#), and [Flathead Conservation District](#) - offer native plant gardening and restoration projects.
- Partner to do a [Master Gardner](#) project with Montana State University Extension.
- Visit a native plant nursery or have a speaker from one visit your class.
- [Ranger-Led Field Trips and Service Learning Projects](#) in Glacier National Park. The park's native plant restoration program has service learning

**Action Project/
Field Trip Extension
Continued**

- field trips for middle and high school students; the [Forest Processes](#) and [Fire Ecology](#) field trips can be modified for 3rd - 8th grade.
- [Self-Guided Field Trips](#) in Glacier National Park.
 - [Glacier Institute](#) - fire ecology and other education programs for students and adults.
 - [Guided Tours in Glacier National Park](#)- various concession operated.
 - Flathead Community of Resource Educators (CORE) - [outdoor education guide for field trips in the Flathead Region](#).

Additional Resources

- [Salish -Pend d'Oreille Culture Committee](#)- 81 Blind Barnaby Street, P.O. Box 550, St. Ignatius, Montana 59865, Phone: (406) 745-4572.
- [Kootenai Culture Committee](#) - Kootenai Culture Committee, PO Box 278, Pablo, Montana 59855, Phone: (406) 849-5541.
- [Blackfeet Community College Cultural and Language Division](#) -Browning, MT 59417-0819, Phone (406) 338-5441.
- "Seasons of the Salish" DVD. Produced by Confederated Salish and Kootenai Tribes' Tribal Preservation Office and distributed by OPI to every elementary school library. It is also included in the [PlaceNames: Building Worldviews Using Traditional Cultures and Google Earth](#), distributed by OPI to every middle and high school library.
- Glacier's [Plant Invaders Traveling Trunk](#) -contains hands-on materials and lessons to learn about non-native, invasive plants.
- Glacier National Park Fact Sheet, "[Culturally Scarred Trees](#)".
- [Bitterroot Adaptations and Salish Traditions](#), MT OPI-IEFA Science, gr. 4.
- [There is a Season](#)- Salish Seasonal Rounds, MT OPI- IEFA, grade 2.
- [Flathead CORE Education Traveling Trunk List and Field Trip Sites](#).
- [Explore the River Curriculum CD](#)- CSKT Tribal Fish & Game; the Habitats Native section has information about traditional uses of native riparian plants and their Salish -Pend d'Oreille names.
- [Niitsitapiisini Our Way of Life; The Story of the Blackfoot People](#) - Blackfoot First Nations and Glenbow Museum of Calgary, teacher toolkit.
- [Flathead Watershed Sourcebook](#); A Guide to an Extraordinary Place.
- "[Avalanche Basin Audio Tour](#)" created by students from the Univ. of MT.
- [Pollinators Curriculum](#) -United States Forest Service.
- National Park Service, [Biodiversity Bee Week](#), Middle School Lessons.
- Project Learning Tree - [Have Seeds, Will Travel](#) Lesson.

MT Content Standards

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Montana Standards for Science

Science 3.3.1 Identify that plants and animals have structures and systems that serve different functions for growth, survival, and reproduction.

Science 3.3.3 Describe and use models that trace the life cycles of different plants and animals and discuss how they differ from species to species.

Science 3.3.4 Explain cause and effect relationships between nonliving and living components within ecosystems.

Indian Education for All Seven Essential Understandings Regarding Montana Indians

Essential Understanding 1 —tribal diversity



Unit 4 -Native Plants Lesson 2

Native Harvest

Materials:

- [Student Reading, Unit 4](#)
- Art paper
- Theme paper
- Colored pencils
- *Native Plants and Early Peoples*, Jeff Hart and Jacqueline Moore



Field of blue camas, NPS photo.

Lesson At A Glance

Discussion of the value of native plants and plants as cultural resources. Students have access to materials, library, internet to do plant research. Best if can also do field trip to park or other wild area to see native plants in their natural setting.

Objectives

Students will be able to:

- Research uses and characteristics of a plant native to the Glacier NP area.
- Define what it means to be a native plant.
- List two reasons why native plants are important to the Blackfeet, Salish, Kootenai, and Pend d'Oreille as well as other people in Montana.

Time Required

50 minutes. Some students may need additional time for plant research.

Vocabulary

Ceremony, native plant, protocol, scientific name.

Teacher Preparation/ Background

Preview the [student reading for unit 4](#) and assign as homework or incorporate into class time. (See the unit introduction for resources to discuss traditional tobacco use versus smoking cigarettes). Jeff Hart's, *Native Plants and Early Peoples*, written from his interviews with elders from different tribes around the state, contains histories and stories about major plants used in this area. Pages 82-85 describe the use of kinnikinnick's leaves as a smoking mixture.

Teacher Preparation/ Background Continued

Photos and information about plants can also be found on-line at [Montana Plant Life](#). If students are able to use Apps, there is a Glacier Wildflower App available for download. The *Plants of Waterton-Glacier National Parks and the Northern Rockies*, by Richard J. Shaw and Danny On, Missoula: Mountain Press, 1979, describes and illustrates with colored photographs over 200 species of trees, shrubs, flower and plants found in the park.

Procedures



At Home In This Place
DVD Content

Play Videos:
[Salish & Pend d'Oreille-
I can Almost Hear our
Ancestors](#)

1. Discuss the [student reading for unit 4](#) from the homework assignment. Share answers (as a class, in pairs, or small groups) for the “checking understanding questions). Why are native plants important? What is a native plant? Both teacher and students supply as much personal information about plant uses as possible. This is a good place to re-listen to the Salish and Pend d’Oreille video clip, “I Can Almost Hear Our Ancestors” from the *At Home in This Place* DVD as it mentions getting plant medicines and how the park is a reminder of what things were like years ago and the lifestyle of that time.
2. Emphasize the importance of respecting and preserving native plants in our environment and the respect we need to show for local tribes. It is not legal to pick plants in Glacier National Park. We are not encouraging people to gather these plants, but rather to learn about them so that we might understand more about our environment and the importance of these plants to the Blackfeet, Salish, Pend d’Oreille, Kootenai (and other American Indian) cultures.
3. Explain that the class is going to do some individual research and put together another book. This time it will be about native plants.
4. Read and discuss the background information provided by Jeff Hart for one or two interesting plants. Ask the students to each select a plant from *Native Plants and Early Peoples* book, or from their own experience that they would like to research. Explain that they will have to use at least two sources- oral or written- to make this research their own. (They could also select a plant from the [Glacier NP Coloring book](#). Then they could print and color in the drawing of their plant).
5. Supply the students with the following “Questions for Plant Research”. Add additional questions that might be appropriate. There are similar online [lesson examples from Missouri Headwaters State Park](#) and [Cut Bank Public School on-line lesson](#) (grade 7) for identifying native plants and their use by local tribes.

Field Trip Option: tell students to keep in mind that they will be trying to locate and photograph as many of the plants as they can on their field trip and that it may be hard to identify plants depending on the season, as they may not all have flowers. They should think about this during their research.

Student Page

Questions for Plant Research

Name:

1. List the common and scientific names and your local tribe's name (if available) for the plant you have chosen to research. Give a physical description of the plant.

Date:

2. How is this plant used by native peoples? What parts are used and how are they prepared for use?

3. Are there any special ceremonies or protocols observed when gathering, preparing and using this plant?

4. Are there any traditional stories involved with the use of this plant?

5. How does the plant reproduce? How does it spread into new territory?

6. In what sort of environment would you look for this plant? Does it have special requirements for soil, moisture, elevation, shelter, etc.?

7. Is this plant usually found in association with other plants?

8. Does your plant have any special relationships with other plants or animals?

9. What special contributions does your plant make to its habitat?

10. Are there any plants or animals that make life difficult for your plant? Is it a rare or threatened species?

11. What other interesting information can you supply about your plant?



Common Harebell
Student Artwork by
Aaron Connelly

Writing Extension	When the students have finished writing, editing, and rewriting; ask them to do illustrations of their chosen plants.
Reflection and Assessment	Have the students present their research to the class and then bind the papers and illustrations into a class book. Take the book on your field trip and use it as a reference during your visit. Present the book to the school library when completed.
Action Project/ Field Trip Extension	<ul style="list-style-type: none"> • Invite an herbalist from the Blackfeet, Salish, Pend d'Oreille, or Kootenai to visit your class and talk about plant uses. • Plant a native garden at your school - the Montana Native Plant Society Flathead Chapter has native plant lists, nursery locations and much more. • Flathead Audubon, Flathead National Forest, and Flathead Conservation District - offer native plant gardening and restoration projects. • Partner to do a Master Gardner project with Montana State University Extension. • Visit a native plant nursery or have a speaker from one visit your class. • Ranger-Led Field Trips and Service Learning Projects in Glacier National Park. The park's native plant restoration program has service learning field trips for middle and high school students; the Forest Processes and Fire Ecology field trips can be modified for 3rd - 8th grade. • Self-Guided Field Trips in Glacier National Park. • Glacier Institute - fire ecology and other education programs for students and adults. • Guided Tours in Glacier National Park- various concession operated. • Flathead Community of Resource Educators (CORE) - outdoor education guide for field trips in the Flathead Region. • Family Forestry Expo and River Honoring - organized annually, target specific grades and include information about native plants.
Additional Resources	<ul style="list-style-type: none"> • Aboriginal Tobacco Program - Cancer Care Ontario, Canada. • Salish -Pend d'Oreille Culture Committee- 81 Blind Barnaby Street, P.O. Box 550, St. Ignatius, Montana 59865, Phone: (406) 745-4572. • Kootenai Culture Committee - Kootenai Culture Committee, PO Box 278, Pablo, Montana 59855, Phone: (406) 849-5541. • Blackfeet Community College Cultural and Language Division -Browning, MT 59417-0819, Phone (406) 338-5441. • Glacier National Park Fact Sheet, "Culturally Scarred Trees". • Explore the River Curriculum CD- CSKT Tribal Fish & Game; the Habitats Native section has information about traditional uses of native riparian plants and their Salish -Pend d'Oreille names. It also has an interactive section to make tools like a fish spear. • Niitsitapiisini Our Way of Life; The Story of the Blackfoot People - Blackfoot First Nations and Glenbow Museum of Calgary, teacher toolkit. • Flathead Watershed Sourcebook; A Guide to an Extraordinary Place. • "Avalanche Basin Audio Tour" created by students from the Univ. of MT. • "Seasons of the Salish" DVD. Produced by Confederated Salish and Kootenai Tribes' Tribal Preservation Office and distributed by OPI to every elementary school library. It is also included in the PlaceNames: Building Worldviews Using Traditional Cultures and Google Earth, distributed by OPI to every middle and high school library.

MT Content Standards Unit 4: Lesson 2, page 63

Montana Common Core Standards—English Language Arts

CCRA.SL.1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

CCRA.SL.4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

CCRA.SL.6. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

Standards for Literacy in History/Social Studies, Science, and Technical Subjects

CCRA.RH/ST.1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

CCRA.RH/ST.4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

CCRA.RH/ST.6. Assess how point of view or purpose shapes the content and style of a text. (Identify aspects of a text, including those by and about American Indians, that reveal an author's point of view or purpose (e.g., loaded language, inclusion or avoidance of particular facts).)

CCRA.RH/ST.7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.

CCRA.RH/ST.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

CCRA.RH/ST.10. Read and comprehend complex literary and informational texts independently and proficiently.

CCRA.WHST.2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

CCRA.WHST.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCRA.WHST.7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

Montana Standards for Science

Science 1.1.6. Identify, compare, explain... how observations of nature form an essential base of knowledge among the Montana American Indians.

Montana Standards for Social Studies

Social Studies Standard 1. Students access, synthesize, and evaluate information to communicate and apply social studies knowledge to real world situations.

Social Studies Standard 3. Students apply geographic knowledge and skills (e.g., location, place, human/environment interactions, movement, and regions).

Social Studies Standard 4. Students demonstrate an understanding of the

MT Content Standards effects of time, continuity, and change on historical and future perspectives
Continued and relationships.
Social Studies Standard 6. Students demonstrate an understanding of the impact of human interaction and cultural diversity on societies.
Indian Education for All Seven Essential Understandings Regarding Montana Indians
Essential Understanding 1 —tribal diversity
Essential Understanding 3 —importance of oral traditions
Essential Understanding 6 —history is subjective



Unit 4 -Native Plants Lesson 3

What's In A Name?

Materials:

- *At Home In This Place* DVD
- Marking pens
- Note cards
- [Dictionary Of Word Roots And Combining Forms](#) by Donald J. Borror



Girls looking up plant name (“Parks in Focus” photo, Glacier trip 2013).

Lesson At A Glance

Students decipher scientific name meanings and use native plant field guides, information from the tribes, or links to online resources provided to create a chart of the different names for the same native plant.

Objectives

Students will be able to:

- Use prefix, suffix and word root definitions to decipher the meaning of the scientific name.
- Use a field guide (or wildflower App.) to discover plant family characteristics.
- Research common, scientific (genus and species), Blackfoot, Kootenai, Salish-Pend d’Oreille names for a few plants occurring in Glacier NP.

Time Required

50 minutes. Some students may need additional time for plant research.

Vocabulary

Genus, prefix, pronunciations, species, suffix.

Teacher Preparation/ Background

Practice using the [Dictionary of Word Roots and Combining Forms](#) to show students how to decipher scientific name meanings. Contact the local Tribal Cultural Committees for suggestions for speakers and see the list of additional resources for on-line websites that provide language connections. Each Tribe may have several words that indicate the same plant at different times of the year or when used for different purposes. Ideally, local dialect

**Teacher Preparation/
Background
Continued**



Wild Rose Student
Artwork by K.A.B.

and proper pronunciations should be provided by elders and language enthusiasts in your area.

Be prepared to discuss the importance of language and of knowing native plant names and place names, to understanding culture and for nurturing sense of place. Robin Wall Kimmerer, writes in *Gathering Moss; A Natural and Cultural History of Mosses*,

The sanitized suburban life has succeeded in separating us from the plants that sustain us. Their roles are camouflaged under layers of marketing and technology. You can't hear the rustle of corn leaves in a box of Froot Loops. Most people have lost the ability to read the role of a medicine plant from the landscape and read instead the "directions for use" on a tamper-proof bottle of Echinacea. Who would recognize those purple blossoms in this disguise? We don't even know their names anymore. The average person knows the name of less than a dozen plants and this includes such categories as "Christmas Tree." Losing their names is a step in losing respect. Knowing their names is the first step in regaining our connection" (101-102).

Below is the information in the St. Mary Visitor Center Exhibits from the Tribes about place names in Glacier National Park.

Most of our place names have been used by our people from time immemorial - for many thousands of years, before there ever was a Glacier National Park.
-Tony Incashola, Pend d'Oreille

Salish and Pend d'Oreille

The ancient spiritual and material importance of the area to the tribes is reflected in its many Salish-language place names, a number of which are still known. The Flathead River, including its various forks and branches, is of such seminal importance that it is known simply as *Nt̓x̓'ət̓k̓* - The River.

- The Belly River is *Olín Sew̓łk̓*'s in Salish - literally, "Waters of the Digestive Tract," referring to bison.
- Chief Mountain. The mountain has always been known as *S̓'ilm̓x̓'w̓s̓c̓ut* in Salish - Chief of the Sharp-edged Mountains.

Kootenai

A place is usually named for a significant event that happened there or for a person or family that lived in the area. This means that a river or stream may not have the same name its whole length from glacier to ocean.

- *Ya·kił̓ Haqwił̓namki* means the place where they dance in Kootenai and is the site of important winter dances. It is also the site for Apgar Campground.
- *Sina ʔA·k̓łam̓ ʔA·kuq̓nuk* (Avalanche Lake) is named after a Kootenai family who traditionally camped in the area.

Blackfeet

Ninastako (Chief Mountain) in Blackfeet, means "the mountain that stands apart."

Procedures



At Home In This Place

DVD Content

Play Audio:

Blackfeet, Salish, Pend
d'Oreille, Kootenai

- Greetings

1. Discuss with students how language is an important part of cultural identity. Have them listen to the different greetings from the Blackfeet, Salish, Kootenai, and Pend d'Oreille so they can hear the differences in the language sounds. Do any of them speak another language?
2. Today, there is one common naming language for plants that is used by the entire world. Why would it be helpful for everyone to be using this same language instead of their own for plant names? Why would you want to preserve the name in your own language as well?
3. Start a class chart of "plant names and meanings" from the list provided. Include columns for: common name, scientific name, Blackfeet, Salish/Pend d'Oreille, and Kootenai name with space to write the meaning or translation of that name. Using one of the scientific plant names from the list provided, demonstrate how to use the [Dictionary of Word Roots and Combining Forms](#) to find the meaning of the scientific name. Can the students do the same and fill in the meanings of the scientific names for the rest of the plants? What other plants in the field guide are in the same family (related) to their plant? What similarities are there for the plants grouped together with that same family name?
4. Have them continue to work individually or in small groups and research the Blackfeet, Kootenai, Salish-Pend d'Oreille names and meanings. Ideally, have a native language speaker come to your classroom. How do names compare? Did they notice that Salish-Pend d'Oreille and Kootenai Languages have different letters in their alphabets?

Salish language resources:

www.cskt.org/hc/salish.htm ; www.salishaudio.org; www.salishworld.com
www.thesalishinstitute.org; www.kalispeltribe.com; www.interiorsalish.com
www.sk.edu

Kootenai language resource:

[Plant names](http://www.firstvoices.com/) - <http://www.firstvoices.com/>

Blackfeet language resources:

[Piegan Institute-Language](#)

Blackfeet words from the [Native Languages of the Americas](#).

Reflection and Assessment

Knowing plant names and being able to recognize/identify plants in the past was a common skill and necessary for everyday survival. Today, for most of us, it is not necessarily a survival need but it is a great way to reconnect with the place where we live. See if students can add some of these plants names (or better yet, ones from their neighborhood) to their vocabulary. Hand out markers and note cards, pick study pairs or teams, and have the students make their own flash cards to study as they would any other language.

Writing Extension

Provide a forum to demonstrate or apply their vocabulary. For instance; labeled drawings could be displayed as part of an open house. One school made a field guide for their own school native plant garden!

A List of a Few Native Plants of Glacier National Park

Common Name	Scientific Name	Blackfeet Name (names can vary by region)	Kootenai Name	Salish-Pend d'Oreille Name
Biscuit-root coos-root	Lomatium cous	koos	ʔakuʔaʔak	pč̣lu
Bitterroot	Lewisia rediviva	eks-ix-ix	naqamçu	ṣp̣éłm
Blue Camas	Camassia quamash	miss-issia	xapi	ṣx̣ẉéʔli (uncooked raw)
Chokecherry	Prunus virginiana	pukkeep	ʔa-kiʔmaḳ	tx̣ẉto
Huckleberry	Vaccinium globulare	apa-oapspi	nupxamuʔ	sṭśá
Lodgepole pine	Pinus contorta	manistami	ʔiʔti-t'	q̣ẉq̣ẉliʔt
Serviceberry Sarvisberry Saskatoonberry	Amelanchier alnifolia	ok-kun-okin	ṣq̣umu	ṣtaq
Western red cedar:	Thuja plicata	sixinikok	ʔiç̣nat'	astq̣ẉ
Yampa wild carrot	Perideridia gairdneri	nitzi-katasi	niʔç̣na	ṣłúkẉm



Pink Fairies, Student Artwork by Sam

Action Project/ Field Trip Extension

- Invite an herbalist from the Blackfeet, Salish, Pend d'Oreille, or Kootenai to visit your class and talk about plant uses.
- Plant a native garden at your school - the [Montana Native Plant Society Flathead Chapter](#) has native plant lists, nursery locations and much more.
- [Flathead Audubon](#), [Flathead National Forest](#), and [Flathead Conservation District](#) - offer native plant gardening and restoration projects.
- Partner to do a [Master Gardner](#) project with Montana State University Extension.
- Visit a native plant nursery or have a speaker from one visit your class.
- [Ranger-Led Field Trips and Service Learning Projects](#) in Glacier National Park. The park's native plant restoration program has service learning field trips for middle and high school students; the [Forest Processes](#) and [Fire Ecology](#) field trips can be modified for 3rd - 8th grade.
- [Self-Guided Field Trips](#) in Glacier National Park.
- [Glacier Institute](#) - fire ecology and other education programs for students and adults.
- [Guided Tours in Glacier National Park](#)- various concession operated.
- Flathead Community of Resource Educators (CORE) - [outdoor education guide for field trips in the Flathead Region](#).

Additional Resources

- [Salish -Pend d'Oreille Culture Committee](#)- 81 Blind Barnaby Street, P.O. Box 550, St. Ignatius, Montana 59865, Phone: (406) 745-4572.
- [Kootenai Culture Committee](#) - Kootenai Culture Committee, PO Box 278, Pablo, Montana 59855, Phone: (406) 849-5541.
- [Blackfeet Community College Cultural and Language Division](#) - 504 SE Boundary St., Browning, MT 59417-0819, Phone (406) 338-5441.
- "Seasons of the Salish" DVD. Produced by Confederated Salish and Kootenai Tribes' Tribal Preservation Office and distributed by OPI to every elementary school libraries. It is also included in the [PlaceNames: Building Worldviews Using Traditional Cultures and Google Earth](#), distributed by OPI to every middle and high school library.
- Glacier National Park Fact Sheet, "[Culturally Scarred Trees](#)".
- [Montana Project Learning Tree](#), Montana State University Extension Forestry.
- [Niitsitapiisini Our Way of Life; The Story of the Blackfoot People](#) - Blackfoot First Nations and Glenbow Museum of Calgary. A virtual tour with teacher toolkit.
- [The Gift of the Bitterroot](#) - K-2 Lesson plan using the illustrated children's book Illustrated by Antoine Sandoval with story as told by Johnny Arlee.
- Indian Education for All, Youth Book Club Trunk, Gift of the Bitterroot and Crown of the Continent Ecosystem. - free from Flathead Audubon Chapter (Contact the NW MT Educational Coop Office at 406/752- 3302 or auduboneducator@gmail.com).
- [Flathead Watershed Sourcebook](#); A Guide to an Extraordinary Place.
- Place Names In Glacier NP, lesson 2, p. 45 in "[The Land of Many Stories: The People & Histories of Glacier National Park](#)" MT Historical Society Footlocker.
- Jesse Nenemey, Nkwusom instructor wrote a tree and plant book with many photos, Salish and Latin names, and traditional preparations and uses. It is teacher and student friendly.

MT Content Standards Unit 4: Lesson 3, page 67

Montana Common Core Standards—English Language Arts

CCRA.SL.1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

CCRA.SL.4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

Standards for Literacy in History/Social Studies, Science, and Technical Subjects

CCRA.RH/ST.4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

CCRA.RH/ST.5. Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.

Montana Standards for Science

Science 1.1.6. Identify, compare, explain... how observations of nature form an essential base of knowledge among the Montana American Indians.

Science 3.3.1 Identify that plants and animals have structures and systems that serve different functions for growth, survival, and reproduction.

Science 3.3.5 create and use a classification system to group a variety of plants and animals according to their similarities and differences.

Montana Standards for Social Studies

Social Studies Standard 3. Students apply geographic knowledge and skills (e.g., location, place, human/environment interactions, movement, and regions).

Social Studies Standard 6. Students demonstrate an understanding of the impact of human interaction and cultural diversity on societies.

Indian Education for All Seven Essential Understandings Regarding Montana Indians

Essential Understanding 1 —tribal diversity

Essential Understanding 3 —importance of oral traditions

Essential Understanding 6 —history is subjective



Unit 4 -Native Plants Lesson 4

Forest Communities

Materials:

- *Easy Field Guide To Trees Of Glacier National Park* by Dick and Carol Nelson
- *Plants Of Waterton-Glacier National Parks And The Northern Rockies* by Richard J. Shaw and Danny On
- Magnifying glasses
- Poster board
- Marking pens
- Scissors
- Glue
- Optional: [Dichotomous tree key](#) for Glacier NP
- Optional: [Glacier NP coloring book of trees and plants](#)



Students hike the Huckleberry Nature Trail, NPS photo.

Lesson At A Glance

Students collect conifer tree needles and cones (not in the national park but from locations where it is permissible) and make displays from them. They identify trees and take note of where their samples were collected.

Objectives

Students will be able to:

- Ethically collect tree needles, cones and leaves.
- Identify local native trees from their needles and cones.
- Be able to associate tree species with climate, terrain, elevation, and successional state.

Time Required

50 minutes with two to three additional class periods if adding the “Mystery Trees” lessons from FireWorks or time to use the “Fire on the Land” DVD information.

Vocabulary

Botanists, conifers, deciduous, disturbance, naturalist, specimens, understory.

Teacher Preparation/ Background

Since this *Work House* lesson was created, two amazing resources have been developed that bring the concepts from this lesson to life.

- 1) the [FireWorks Education Trunk](#) (Missoula Fire Sciences Lab) -available to borrow for free from numerous locations in Montana, Idaho, and Colorado.
- 2) the Fire on the Land DVD (Confederated Salish & Kootenai Tribes Fire History Project). This should be in all school libraries.

Teachers may want to gather example needles, cones, leaves and seeds to show students what you want them to collect. The FireWorks trunk has pressed specimens of native: black cottonwood; Douglas-fir; Engelmann spruce; lodgepole pine; ponderosa pine; quaking aspen; subalpine fir; western larch; and whitebark pine. They are used with the “Mystery Trees” Activities 4-3, p. 79-81 (elementary grades) and 4-4, p. 82-89 (middle school grades), of the [FireWorks Curriculum](#) along with worksheets and felt boards (also supplied in the trunk) to help students to identify trees. These would be perfect “warm-up” activities before students went out to collect their own specimens.

The pertinent sections of the “Fire on the Land” DVD for students to look at (homework, group work, or individual work when finished with other assignments) are under the heading “[Fire Ecology](#)” and then “[Fire Concepts](#).” The interactive “[Forest Succession](#)” (especially the “burn the forest link) and “Disturbance” sections will provide background information for students about how forests change over time and with natural disturbance. As the DVD indicates, “for thousands of years the Salish, Pend d’Oreille, and other tribes of the Northern Rockies periodically set fire to the land, profoundly shaping plant and animal communities.” All four tribes associated with Glacier National Park, the Blackfeet, Salish, Pend d’Oreille and Kootenai were intimately familiar with the plant communities. Then and today, being able to recognize and identify the successional stages of native plant communities provides a great deal of information about the soil conditions, moisture availability, and history of natural disturbances. A field trip to either the St. Mary or Lake McDonald Valleys will allow students to see first hand these native plant communities.

Plant Communities in the St. Mary Valley



St. Mary Lake, NPS photo (Glacier NP Digital Image Library).

St. Mary Lake is situated at the terminal point of a vast prairie that continues onto the open grasslands of Alberta. Rough fescue (*Festuca scabrella*) is the dominant native grass in the St. Mary Valley. Though the valley has been invaded by some exotics like spotted knapweed (*Centaurea maculosa*), it remains one of a few refuges for native grassland communities.

The small lateral moraines on both sides of the valley display a gradual progression of plant communities as elevation increases. Moving up the St. Mary Valley, the grasslands quickly narrow to borders of shrub communities. As the valley edges climb, there is a gradual transition from grassland-shrub communities to aspen groves with understories composed of grasses and shrubs.

Near the valley floor, intermittent groves of conifers occur on stream banks. For the most part, however, individual conifers are interspersed within aspen groves. The quaking aspen (*Populus tremuloides*) and black cottonwood (*Populus trichocarpa*) that make up the groves are an extension of the southwestern Alberta aspen grove communities. Isolated conifers along the St. Mary Valley floor tend to be predominantly Douglas fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), Engelmann spruce (*Picea engelmannii*), and limber pine (*Pinus flexilis*).

Further up the moraines and on the mountain slopes, aspen groves gradually give way to stands of fire-influenced lodgepole pine. Further into the St. Mary Valley where fire has not been severe, seral communities of Douglas fir and Engelmann spruce are more common. Throughout the continuum of plant communities, moisture and elevation are the most important determinants of species composition; however, other minor climatic and terrain variables can be responsible for unexpected plant communities.

Higher up the mountain slopes (between 4-6000 ft.), lodgepole and Douglas fir gradually make a transition into stands of Engelmann spruce and subalpine fir (*Abies lasiocarpa*). The higher the elevation, the more dominant the subalpine fir becomes. Above 6000 feet, especially at the head of the valley near Logan Pass, Engelmann spruce becomes less common, subalpine fir becomes more common, and white bark pine (*Pinus albicaulis*) makes a strong showing. At these elevations most species begin to take on krummholz or dwarfed characteristics because of the severity of the climate and the extremely short growing season. Above the alpine meadows, isolated flowers and grasses appear on moist barren ledges. Lichens (not in the Plant Kingdom, but a combination of two organisms—a fungus and an alga—living together) can be found in various growth forms throughout the park, including crustose forms growing tight against the substrate on the highest peaks. Algae occur on the surface of glaciers and snowfields.

Plant succession is influenced by natural disturbances such as flood, snowslides, drought, fire, insects, plant disease, and erosion. Fire is the greatest influence upon plant succession and accounts for the predominance of lodgepole pine at the lower elevations where it occurs most often.

Fire control during much of Glacier's history has altered the patterns of plant succession; however, it is difficult to assess the impact of park fire control policies on plant communities. A major fire swept through the west side of the St. Mary Valley from Rising Sun to Babb in 1885. Before the 1885 fire, a more mature forest existed. Pioneer communities of lodgepole and aspen have dominated the valley since and have been aided in their dominance as late as the mid-1980's by the Napi Point fire and the more recent, Red Eagle (2006) and Reynolds Fires (2015).

Lodgepole are adapted to a natural fire regimen and produce two kinds of cones. One kind opens to spread seeds on a regular basis, while serotinous cones can lie dormant for 15 years and only open in extreme heat. Thousands of lodgepole seeds released after a fire thrive in burned over-soil. Aspen have a similar pioneering advantage. They can reproduce by vegetative means spreading suckers in an ever-increasing island. While established aspen groves normally spread slowly through both vegetative and sexual means of reproduction, explosive vegetative sprouting occurs following fires severe enough to destroy the parent plants.

Elk, moose, deer, beavers, rabbits, ground squirrels, and mice feed on young pioneer saplings along the edges of groves during the coldest part of winter. In earlier times, large populations of buffalo provided a natural pruning service in the mountain valleys, resulting in more and larger open grassy areas than we see today. The spread of lodgepole and aspen communities into surrounding meadows is slowed by the feeding activity. Plants and animals, along with the occasional intercession of fire, have created a healthy mosaic of plant communities over time.

Plant Communities in the Lake McDonald Valley

The Lake McDonald Valley is a unique place in terms of its plant communities. The largest number of plant species in Glacier National Park occurs in the Lake McDonald Valley. The western red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*) forest is the eastern most extension of the Pacific Coast floristic peninsula. This forest is similar to the Pacific Coast temperate rain forest community.

As a result of fire and early settlement in the Lake McDonald area, the forest reveals a complex mosaic of plant communities. Today, cedar and hemlock are not abundant in the West Glacier and Apgar areas. However, historical records and existing isolated pockets of trees indicate that the cedar-hemlock dominance evident in the Avalanche Campground area extended to West Glacier near the beginning of this century. A hike along the Rocky Point Trail from the Fish Creek Campground starts out in cedar-hemlock forest, but then enters into the area burned in the 2003 Robert Fire, a lodgepole pine forest. Due to fire and other disturbances, lodgepole pine (*Pinus contorta*) and western larch (*Larix occidentalis*) are currently more prevalent along the lower reaches of the lake.

While lodgepole pine is generally the most common pioneer species after fire, western larch is also a very successful invader of newly burned areas. Lodgepole have amazing adaptive mechanisms that favor their propagation in newly burned territory. While they have some cones that release seeds on a continuous seasonal basis, they also have serotinous cones that remain closed and dormant until exposed to temperature extremes produced by fire.

Lodgepole and their accompanying understory plants do not thrive once a significant forest canopy has evolved. In fact, barring a second fire, the very success of lodgepole inhibits the success of their offspring, allowing opportunities for shade tolerant species to thrive. Lodgepole pine have a maximum life expectancy of about 150 years, while western larch, because of thick fire resistant bark, can often survive relatively cool fires and live as long as 800 years. As a result of this resilience, larch are often significant components of pioneer, seral, and climax forests.



Avalanche Lake, NPS photo (Glacier Student Guide CD).



Western Red Cedar,
Thuja plicata, NPS
photo.

In the absence of natural and human-caused disturbances, the Lake McDonald area would likely support a climax cedar-hemlock forest today. In fact, the Trail of The Cedars, near Avalanche Campground, approximates an ideal climax forest and all of its dynamics. The forest exists at an ideal elevation between 3200 and 3500 feet and many of its trees have survived for over 400 years. A short distance up the trail to Avalanche Lake, (elevation 3500 to 4000 feet), cedar and hemlock share dominance with subalpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmanni*). As the elevation increases and average temperature decreases above 4000 feet, the spruce-fir community becomes more dominant and the cedar-hemlock community all but disappears.

Above the 4000 foot level along the Going-to-the-Sun Road north of upper McDonald Creek, the fire of 1967 has created a pioneer community dominated by mixed larch and lodgepole. Between the Loop and the alpine meadows of Granite Park, the terrain is populated by alternating stretches of subalpine fir, dense stands of alder (*Alnus* sp.), and open meadows dominated by herbaceous plants ideal for grazing animals. Below the highway and near the head of Logan Creek, there are patchy stands of subalpine fir and various shrubs in subalpine meadows.

Western red cedar is a seral dominant within fire established lodgepole-larch communities along the lakeshore between Avalanche Campground and Apgar. While ample light is available in a newly established lodgepole canopy, cedar will readily spread seedlings. Cedars once established also utilize asexual or vegetative reproduction. Low hanging branches make contact with soil and establish adventitious roots to produce new trees. Broken branches can fall to the ground and establish roots. It is not at all uncommon to see young trees maintaining their original connection with the parent tree.

While cedars are in the process of replacing lodgepole and larch, the environment becomes more receptive to their successional partner, western hemlock. Hemlock seedlings thrive in the moist organic debris of dying pioneer species. These seedlings can remain in a slow growth pattern for many years until an opening appears in the canopy. Hemlock go into a surge of growth to fill the space in the canopy. Eventually hemlock and cedar are able to assert dominance with only a smattering of other tree species interspersed among them.

Once a cedar-hemlock canopy is established, the understory tends to remain organically rich and moist, but too dark for the establishment of other tree species. Cedar saplings and shade tolerant hemlock seedlings can thrive in the environment prepared by parent plants. The moist understory provides some protection against fire. Theoretically, this climax community can maintain stability for hundreds of years if there is no disturbance. (*Work House*, 1992, 1998)

Procedures

1. Review the information on Glacier's plants from the student reading. Incorporate the FireWorks /and or Fire on the Land lessons.
2. Ask the students to gather samples of conifer branches and cones, and leaves and seeds of common deciduous trees from the areas around their homes. Discuss ways to minimize damage to trees while making collections and to only collect in areas where they have permission. Emphasize that they should be looking for trees that they believe to be native to the area.
3. Have the students write descriptive notes of the physical environment from which each specimen was gathered (soils, sun/shade, wet/dry, etc.).
4. Students should use the tree guide to identify their specimens and to research its characteristics and habitat.
5. Then students can make leaf, cone, and needle displays.

Reflection and Assessment

Discuss where the trees they identified might occur in Glacier National Park.

Writing Extension

Have students display their tree guides and consider making a neighborhood field guide to trees.

Action Project/ Field Trip Extension

- Complete more activities in the "FireWorks" education trunk.
- Invite someone who had extensive experience with a wildfire in your area. Have them come into your classroom and discuss conditions before the fire, management of the fire, and conditions in the area after the fire. For the Blackfeet and Flathead Reservations, contact the Divisions of Fire Management.
- [Ranger-Led Field Trips and Service Learning Projects](#) in Glacier National Park. The park's native plant restoration program has service learning field trips for middle and high school students; the [Forest Processes](#) and [Fire Ecology](#) field trips can be modified for 3rd - 8th grade.
- [Self-Guided Field Trips](#) in Glacier National Park.
- [Glacier Institute](#) - fire ecology and other education programs for students and adults.
- [Guided Tours in Glacier National Park](#)- various concession operated.
- Flathead Community of Resource Educators (CORE) - [outdoor education guide for field trips in the Flathead Region](#).

Additional Resources

- [Salish -Pend d'Oreille Culture Committee](#)- Phone: (406) 745-4572
- [Kootenai Culture Committee](#) - Phone: (406) 849-5541 .
- [Blackfeet Community College Cultural and Language Division](#) - Phone (406) 338-5441.
- Explore more of the "Fire on the Land: Native Peoples and Fire in the Northern Rockies" DVD. Confederated Salish and Kootenai Tribes, Fire History Project- the traditional and contemporary use of fire by the Salish and Pend d'Oreille Tribes of the Flathead Indian Reservation.
- Play more video clips from the "At Home in This Place" DVD to tell students about traditional tribal use of the Glacier National Park area and encourage a sense of pride in the historical associations and wise stewardship by tribal ancestors.
- Use the [Kid's Discover Montana's Ecosystem](#) to learn more about the plant community types across the state.
- Take an [e-hike on Glacier's Avalanche](#)



At Home In This Place
DVD Content

Play Videos:
[At Home in This Place](#)

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Montana Common Core Standards—English Language Arts

CCRA.SL.1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

CCRA.SL.2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

CCRA.SL.4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

Standards for Literacy in History/Social Studies, Science, and Technical Subjects

CCRA.WHST.2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

CCRA.WHST.7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

Montana Standards for Science

Science 1.1.6. Identify, compare, explain ... how observations of nature form an essential base of knowledge among the Montana American Indians.

Science 3.3.1 Identify that plants and animals have structures and systems that serve different functions for growth, survival, and reproduction.

Science 3.3.5 create and use a classification system to group a variety of plants and animals according to their similarities and differences.

Montana Standards for Social Studies

Social Studies Standard 3. Students apply geographic knowledge and skills (e.g., location, place, human/environment interactions, movement, and regions).

Social Studies Standard 4. Students demonstrate an understanding of the effects of time, continuity, and change on historical and future perspectives and relationships.

Social Studies Standard 6. Students demonstrate an understanding of the impact of human interaction and cultural diversity on societies.

Indian Education for All Seven Essential Understandings Regarding Montana Indians

Essential Understanding 1 —tribal diversity

Essential Understanding 3 —importance of oral traditions

Essential Understanding 6 —history is subjective