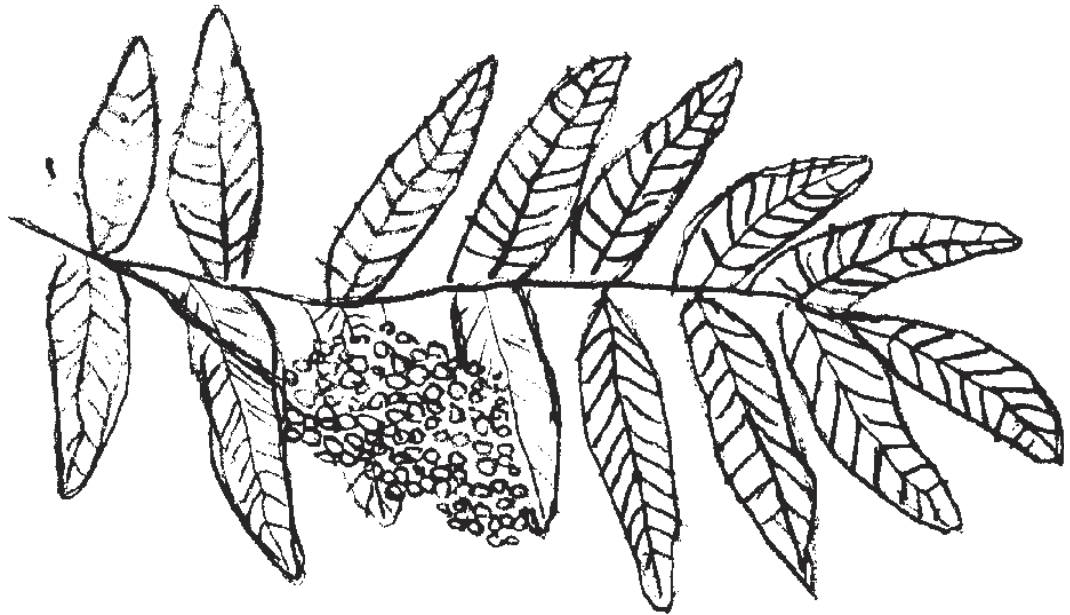


Track 3
“Our Medicine... Our Food”
Native Plant Use



Kenneth Stevens

Directions and Background

This Track focuses on the importance of plants to the economy and culture of Native peoples. If you choose to follow this Track, review the background stories and activities included. There are useful books and supplementary materials included in the *Work House Activity Kit*; however, most Track 5 activities can be implemented without it. We recommend that teachers review the general introductory information for *Work House* and integrate activities with other tracks studied.

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 Native American values and resources. These concerns have been raised by tribal advisers. As one tribal adviser passionately pointed out, “Non-Indians simply have no concept of how important these plants are to native peoples. They are “Our Medicine.... Our Food!”

Native Americans going into the forests for traditional gathering expeditions have found trees, that their people have respectfully and carefully harvested bark and sap from for generations, girdled and killed. Pop culturists, knowing that natives ate cambium or constructed containers from bark, but unaware of proper harvesting techniques have often been responsible. Other native groups have gone to their traditional bitterroot or camas gathering sites to find that bulbs have been harvested out of season. These activities are insensitive to Native American culture. As a result, the trust and willingness of native peoples to share their knowledge with educational and scientific communities has suffered. Our actions must not contribute to this problem.

Native Americans and Plant Use

Traditional Native Americans have always been in touch with the Earth and its dynamics. Hunting and gathering are not simply activities done in order to make a living, they are a religion and a way of life. It is important to respect Native American beliefs within their cultural context.

In the old days, the tribes and bands of the Blackfeet, Ktunaxa (Kootenai), and Salish were dependent upon plants and animals for their livelihood. They knew the habitat and uses of most plants in their territory. If they came upon an unfamiliar plant in their travels, it was subjected to scrutiny and experimentation. It was, after all, a new gift from the Creator.



Knowledge of traditional plant use has been passed from generation to generation. That knowledge base continues to grow today. If a skilled native botanist is not able to find a use for a plant in a relatively short time, it is assumed that a use will eventually be discovered. Plant uses are sometimes revealed to worthy individuals through visions, dreams or as a gift from a spirit guardian; but most uses are determined through observation and testing. Typically, a person known for powers as a medicine woman or medicine man will carefully test the properties of a plant. A new species of mint reveals a use to the sense of smell and taste. While nettles and thistles might have seemed a simple nuisance to the uninformed, upon observation of animals eating them and after testing, native botanists found uses for them as medicines, food, dyes and even material for fabric.

Sometimes Native Americans resort to an observational technique called the “doctrine of signatures” by early Europeans. This method of experimentation assumes that a plant resembling an ailing body part will be useful in healing its ailments. An eye wash prepared from a brown eyed Susan might be useful in treating sore eyes, or a tea made from the secretions of milk weed might induce the flow of milk for a new mother. While this method was suspect to many early peoples, coincidental or placebo cures sometimes led to the continued use of specific plants for specific remedies.

Plants used as medicines are most often used individually. However, several plants with related curative properties are sometimes used in combination. Indian tobacco, for instance, while a specific species of plant, *Eriogonum heracleoides*, is more commonly a combination of as many as 20 plants mixed to the taste of individual users. Many medicinal plants are burned and inhaled, cooked and used in the form of a poultice, or simply rubbed on the ailing portion of the body, but the great majority of medicines are boiled and consumed as a tea.

Many medicines are also food. Native Americans always believed that one must eat right to stay fit. Unbalanced or unhealthy diets were most often due to a scarcity of food rather than poor eating habits. Given the opportunity to gather in peace in a bountiful environment, the people enjoyed a rich and balanced diet.

Whether used for construction, medicine, food, or for all three (as the lodgepole pine was), living close to the Earth necessitated intimate involvement and understanding of plants. It is from such a point of view that we can attempt to appreciate Native American plant use. There is little doubt that Native people regard plants as having spirits; that they gather plants with social and religious ceremony; that they consume plants in a preservationist and prayerful manner; and that they thank the spirits for everything they are given.



While the early Blackfeet, the Ktunaxa, and the Salish peoples 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 Early Blackfeet

The Blackfeet prided themselves on being hunters living primarily off the large herds of buffalo roaming the plains, but they were as familiar with the plants in their environment as any other Native American tribe. The Blackfeet referred to meat as “natapi waksin” or “real food” and to anything else edible as “kistapi waksin” or “nothing foods”. Nonetheless, they made use of at least 185 species of plants for food, medicine, ceremonial, and construction purposes.

The Blackfeet tribes made extensive use of lodgepole pine, camas, bitterroot, serviceberries, chokecherries, sages, and many other plants. Some of the most desirable plants brought the Blackfeet into present-day Glacier National Park for gathering or trading.

Lodgepoles for tipis had to be replaced yearly. Lodgepole pine is thin, strong, straight and lightweight. The cambium can be eaten and the sap used medicinally. The Cut Bank Creek area was a favorite collection site for lodgepoles. Because the area also provided access to a major pass over the mountains into the Flathead Valley, the Blackfeet would come to replenish lodgepoles in late June and July when camas was also ready for harvesting. The mountains provided a respite from the summer heat on the prairie. The people would stay to gather huckleberries, hunt elk and mountain sheep, and attend social and ceremonial gatherings.

Because bitterroot was relatively rare east of the mountains, the Blackfeet often traveled across the passes to gather, trade, or raid for the precious plant. The Salish and Ktunaxa people were especially wary of attack during the seasons for gathering bitterroot and camas in the western valleys. Several of their traditional stories give accounts of Blackfeet raids during the harvest.

Before the coming of Europeans, agriculture was little known to the Plains and Plateau cultures. However, the cultivation of various smoking materials was so important to the tribes in the area that they ceremonially planted gardens to insure supplies of the sacred substances. Because the mountains were sacred to the spirits to whom the tobacco was offered, cool moist areas in the foothills were favorite spots to cultivate tobacco gardens. Important tobacco gardens reportedly existed near the foot of Lower St. Mary Lake, near present day East Glacier, in the Spotted Bear area, and along the North Fork of the Flathead River.



Although the Blackfeet tribes were not exclusively dependent upon the area that is now Glacier National Park, it was a favorite forage area for plants.

The Early Ktunaxa (Kootenai)

More at home in the foothills and mountains than either the Blackfeet or Salish tribes, the Ktunaxa continued to make buffalo hunting excursions onto the plains even after the Blackfeet had asserted dominance there. However, buffalo were never the chosen game animal of the Ktunaxa. They preferred the hides and meat of mountain animals like big horn sheep, elk, moose, and woodland caribou. Known as the “fish trap people” or “the fish eaters” by neighboring tribes, the Ktunaxa balanced their diet of fish with red meat and vegetation. Their cultural stories abound with tribute to the Grizzly Bear, protector of berries and roots. One of their most important cultural heroes, Chief Yankekam, was responsible for bringing the gift of the all important serviceberry to the people.

From the serviceberry, the Ktunaxa obtained a reliable and basic food and also the raw materials for arrows. From the western red cedar tree, they obtained material for bows, canoes, lodges, baskets, and containers. There were staple plants that the Ktunaxa used extensively and many others that played a lesser role in their culture. In addition to serviceberries, they were heavily dependent upon chokecherries, and huckleberries. Roots such as kouse or biscuit-root, blue camas, bitterroot, wild carrots or yampa, and an assortment of wild onions. The Ktunaxa considered black tree lichen to be a staple food and ate as much as 25 pounds per person per year in various mixtures.

The Ktunaxa also used lodgepole pine extensively for construction, food, and medicine. In the days before skin tipis, lodges were constructed from lodgepole, western red cedar, willow, birch, and tule or rushes. Ktunaxa canoes were made from cedar and birch. Various containers were woven and built from cedar roots and bark, birch bark, tules, and hemp. Many dyes were also prepared from plants.

The Ktunaxa planted tobacco gardens in the foothills. Proximity to the sacred mountains was an important part of the religious ceremonialism connected with sacred pipes and daily smoking rituals that assured constant connection with the Creator.

Early non-Indian visitors to the area that was to become Glacier National Park frequently encountered the Ktunaxa in and around the mountains. Oral tradition and contemporary accounts of the traditional and ceremonial importance of the Glacier National Park area are numerous. Archaeological evidence of the regular presence of Native peoples for hunting, gathering, and ceremonial purposes is well-established.



The Early Salish

The Salish were most at home in the intermountain valleys. Often allied with the Ktunaxa for mutual protection from the Blackfeet, the Salish and Ktunaxa shared hunting grounds. The allies also exchanged plant use knowledge and traded plant commodities. Before the horse made skin tipis portable, the Salish peoples used similar building materials and constructed lodges similar to those of the Ktunaxa. The Flathead Salish were not dependent upon fishing and built fewer canoes than their neighbors to the north. The Salish did build fish weirs and traps and did some cooperative fishing with the Ktunaxa.

The Salish had a well-balanced diet of plant foods and meat. They occasionally hunted in the mountains and spent time hunting buffalo on the plains. With slightly different emphasis in quantities, the Salish used the same plants as the Ktunaxa. The Salish resided mainly in the valleys and had access to such root crops as bitterroot, camas, biscuit root, wild carrots, and onions.

Good sources of smoking materials were universally important to people of Plains and Plateau cultures. Tobacco was given to the Salish by Amotkin, the creator, along with instructions for cultivation and ceremonial smoking. The Salish made a daily practice of offering prayer and tobacco to the great spirits.

Ceremonialism surrounding plant use was important to both Salish and Ktunaxa peoples. They practiced many of the same rituals at virtually the same time of the year. There were ceremonies to pray for a good harvest, a ritual before gathering the first bitterroot, and another before consuming the first bitterroot of the year. Similar elaborate ceremonies surrounded the use of camas, berries, and tobacco. In addition to a general giving of thanks ceremony at the end of the gathering season, important rituals were held in thanksgiving for "first fruits". While both tribes were serious and devout in their ceremonials, Salish ceremonials were generally a bit more solemn and lasted longer than those of the Ktunaxa.

Salish oral tradition contains many stories of medicine trees with spirits that grant gifts, protection, and visions. These trees serve as shrines where offerings were left and spiritual guidance sought. There are also stories of tree people able to transform themselves as need dictated. There is clearly a strong awareness of the spirits associated with trees in Salish culture.

The early Salish people were able to integrate Christian religious practice with their own traditional beliefs. They were less opposed to cultivating the soil than other native peoples. Some even saw the plow as a more efficient way to gather roots until it became evident how quickly it depleted their traditional gathering places for the coming years. Symbolic of the Salish ability to assimilate elements of European culture, agriculture, and



religion into their own culture is the practice of combining palms with cedar and sweet-grass to hang by the door on Palm Sunday.

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.



Common Harebell
Aaron Connelly



Among the important Salish stories is *The Origin Of Bitterroot*. Tobacco was important to all of the tribes and bands on both sides of the mountains. The Blackfeet have many tobacco stories. *Nawak'osis: The Sacred Herb* is included because it contains so many of the cultural values implicit in tobacco ceremonials. The west and east side stories are followed by a botanical account of Glacier National Park.

The Origin of Bitterroot (A west side plant story)

Long ago, when the Salish people still lived to the south in the area that is now called the Bitterroot Valley, there was a time of severe famine. In those sad days there lived a righteous old woman, the wife of a medicine man. The old woman grieved for her children who were slowly starving. With no meat and no fish to eat, her sons were doing their best to get by on some old dried up shoots of balsamroot. Even those were nearly gone.

"My sons have nothing to eat and will soon be dead", she sobbed. So she took herself down to the banks of the creek we call Little Bitterroot and laid herself down to mourn for her children. With her face to the ground and her old gray hair spread about her head she wept bitter tears as she wailed a song of death.

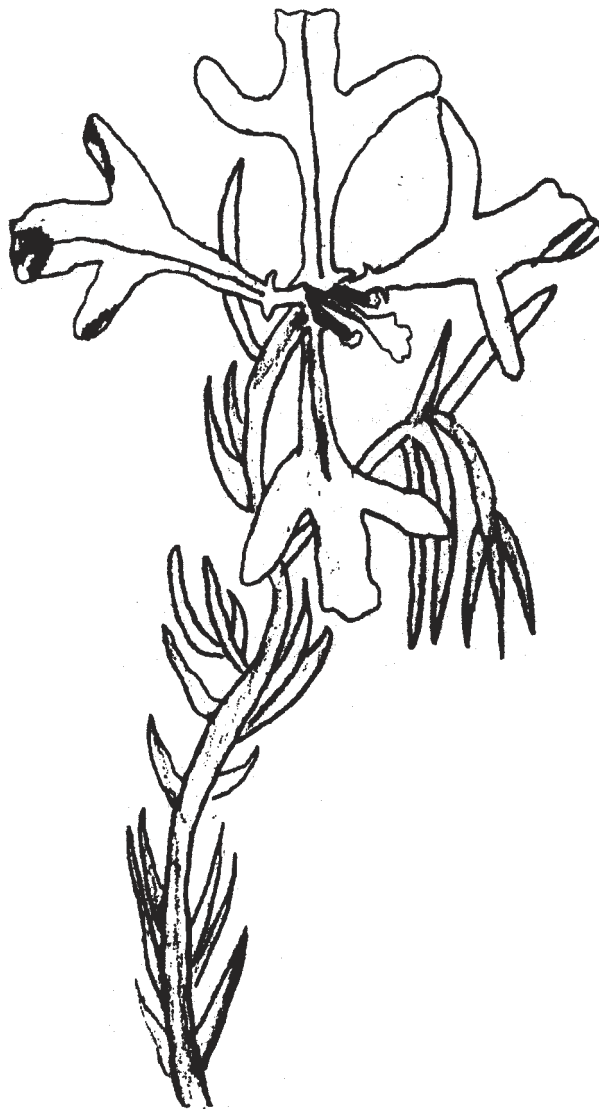
As The Sun rose up over the mountains and peered down into the valley, he was greatly sorrowed to hear the old woman's death chant. The Sun called forth the guardian spirit of the woman and said, "Your daughter is in need. Go to her; give her comfort and bring forth food and beauty from that which is dead."

Assuming the form of a beautiful red bird, the guardian spirit flew down to the old woman and gently spoke to her. "Your bitter tears have soaked the earth beneath you. Even now they are mingling with the dead vegetation below to form the roots of a new plant. Its fleshy leaves will lay upon the ground and a beautiful flower will rise up to the Sun. Its blossom will share the silver-white color of your hair and the rosy hue of my wings. Your children will dig the roots of our gift plant.



Though they will find its taste as bitter as your tears have been, they will know that it is good food and they will grow to love it.

Each year, in the moon of deep water, they will see the return of the blossoms and say, "See, there is the silver hair of our mother upon the ground and there are the rosy wings of the spirit bird. The love and bitter tears of our mother have provided us with food for all generations."



Nawak'osis, the Sacred Herb

(An east side plant story)

In the long ago there were four brothers with great spiritual power. They were chosen by the High Ones to bring tobacco, its pipes, prayers, songs, dances, and ceremonials to the people. When these things had been revealed to them by the spirits and after the brothers had found the sacred herb, made their pipes of bone, learned the proper songs, prayers, and dances; they sat down to smoke. The four medicine men prayed together, inhaled, exhaled, and watched the smoke rise up to the sky. The fragrant smell filled the lodge and surrounded them with calm and peace.

The oldest brother, feeling powerful, wise and clear-headed, said to his brothers: "This thing we will call nawak'osis. It is good. It is strong medicine. We will keep it to ourselves and we will have even greater power". So the four of them formed a Tobacco Society. They crept off into the foothills to plant the sacred plant in a secret garden and they kept the sacred prayers, songs, and rituals to themselves.

The spirits had meant for the gift of tobacco to be shared with the people. Tobacco would encourage peace, calmness, control, unity, and prayerful life. Without it there was anger, war, discord, and impiety among the people.

In the same village there lived a just man named Bull by-Himself. He saw that the four medicine men had received a gift from the spirits and that they had refused to share. To his wife, Bull-by-Himself said, "This discord is a result of selfishness on the part of these men. We must find this plant called nawak'osis and we must learn the sacred ways so that we can share them with the people."

The man and his wife took themselves to a sacred lake where they put up their lodge and began the search for the sacred herb. Everyday Bull-by-Himself went in search of nawak'osis and everyday he returned with plenty of game but no sacred herb.



One day, as his wife knelt by the tipi door scraping a hide, she heard beautiful music coming from the shore of the lake. She looked high and low for the source of the beautiful voices, but could find nothing until she came to the site of a beaver lodge. When her husband returned she took him to the lodge to hear the music but he could hear nothing.

In her frustration, the woman took her knife and cut into the side of the lodge. The couple peered in to see a family of beavers singing and performing a graceful dance.

“My brothers”, she called, do not keep this wonderful medicine to yourselves. Teach us to sing and to dance.”

“Close the hole. You are letting the cold in.” they replied. “We will come to visit you in your lodge.”

That very evening four beavers came to visit the worthy couple. Immediately upon entering the lodge they transformed themselves into four handsome young men. The oldest turned to Bull-by-Himself and asked, “Why have you come to this place?”

“I have come in search of the sacred herb nawak’osis and its ceremonies.”

“You have come to the right place worthy brother. Nawak’osis is water medicine and we are water people. We will give you the sacred herb and instruct you in the ways of its use.”

For many days the beaver people instructed the young couple in the rituals that surrounded tobacco. The husband hunted and his wife prepared the skins of all the water animals. “You must do this”, said the head beaver, “because these animals represent the life force of water. The Sun begets life, and water is the source of its growth.”



Every evening Bull-by-Himself and his wife practiced the ritual songs, prayers, and dances with the beavers. Together they prepared the Beaver Medicine bundle. On the final night of their instruction the beavers presented them with a plant that looked like a common weed. The stalk was topped with a bundle of tiny round seeds. The beavers placed the seeds into the medicine bundle that the woman had prepared.

“Now it is time to plant the seed”, said the beavers. “Do not touch these seeds until you are ready to place them in the ground. Locate your garden in a balance of shade and sun. Mix the soil in equal portions of brown and black and till it often. Then say the prayers that we have taught you.”

“When all this is in readiness, Bull-by-Himself, take the antler of a deer and make holes in the earth. You, woman, must use a buffalo-horn spoon to drop a single seed in each hole. As you plant, sing the songs we have taught you; dance the dance you have learned as you tamp the soil over the seeds. Then watch patiently and nawak’osis will come. Now you know all and it is time for us to go.” With that the four young men turned and as they trailed through the door of the lodge they resumed their beaver shapes.

Bull-by-Himself and his worthy wife cultivated their garden in a prayerful manner as they had been instructed. The four selfish medicine-men saw them at their work and wondered what they were doing. They listened to their songs and found them familiar. But they laughed to themselves, secure in the knowledge that only they possessed the sacred plant, knew the appropriate rituals and had the power that came from the spirits.

Just before the time arrived to harvest the sacred herb a terrible storm came in the night. Early the following morning the four brothers slipped away to their secret garden only to find that their crop had been devastated by hail. Not so much as a seed could be salvaged from the washed out remnants of their garden.



Dejected, the four selfish men returned to the village in time to see Bull-by-Himself and his wife presenting their gift to the village people. In disbelief they looked at the plants and were forced to acknowledge that this was indeed the sacred herb they had tried to keep to themselves.

This is the way in which Bull-by-Himself and his wife brought the gift of the beaver people to the tribes. Their ancestors have always shared the gift of nawak'osis and followed its rituals in a sacred manner.



Glacier Lily
Kevin Racine



The Plants of Glacier National Park

There may have been human eyes watching the gradual unveiling of the land as valley glaciers receded at the end of the last ice age. Archaeological evidence indicates that early people had migrated into North America in pursuit of animal herds as long as 40,000 years ago. An ancient site on Black Tail Ranch close to Wolf Creek, Montana, near the Old North Trail, makes unofficial claims to 32,000 year-old cultural artifacts.

Archaeologists from The Museum of the Rockies are currently excavating an extensive complex of early hearth sites along the Ruby River in southern Montana that have been confirmed to be 9,400 years old. Pollen and food remnants indicate that the plant resources used then are virtually identical to plants available in the area today. An archaeological survey of the immediate environs of Waterton Lakes and Glacier National Parks have confirmed a long and significant history of presence and use by the tribes that reside in the neighboring area today and by many other Native groups. The oldest positively dated artifacts in the area are 10,500 years old and a great deal of evidence indicates high country usage by Native People as early as 8,500 years ago.

Glacier National Park's unique location, climate, and terrain provide an unmatched laboratory and gathering point for plant species and communities. Over 1400 plant species occur in the Park. Of those, forty-one species are rare in Montana and twenty-eight species are not found anywhere else in the state. Glacier's native flora are one measure of the high level of biodiversity present in this protected area. Due to unique interactions of elevation, moisture and prevailing temperatures, Glacier National Park contains the eastern most extension of a Pacific Coast forest community characterized by western red cedar and western hemlock. The North Fork prairies harbor an island of vegetation including Palouse grasses characteristic of grasslands to the south and west in Idaho, Oregon and Washington. Plant communities characterized by aspen groves and Canadian and Great Plains prairie grasses reach no further west than the northeastern margins of Waterton Lakes and Glacier National Parks. Some of Glacier's alpine plant species occur in the central Rockies and range little further north than here, while some boreal tundra species reach their southern limits in the alpine environment.

A drive across the Going-to-the-Sun Road passes through life zones that can only be duplicated by travelling 1800 miles north at a constant elevation. Naturally within this huge continuum of habitat there is also a great diversification of life forms. Although there are no two places in the Park which provide precisely the same habitat and resultant biotic communities, there are some general community types that can be examined at various elevations and locations throughout the Park.



Vegetation Zones & Common Trees Along the Going-to-the-Sun Road



Alpine Zone (above 6600')

Vegetation similar to treeless Arctic Tundra



Sub-Alpine Zone (between 6600' and 5900')

Stunted subalpine fir; limber pine; whitebark pine



Montane Zone (below 5900')

Douglas fir; lodgepole pine; Engleman spruce; western larch; and, in the lower, wetter Lake McDonald Valley, western red-cedar and western hemlock



Prairie (below 3900')

Fescue grasslands

West

East

graphic is missing



Forests Born of Fire

An important agent in forest succession is fire. The mosaic pattern of plant communities characteristic of Glacier National Park and the surrounding ecosystem results from a succession of fire-related events that impact most northern Rocky Mountain forests over a cycle of 100-300 years. Some fires have less impact on a plant community than others, and the natural fire cycles have been altered and interrupted by human intervention.

Until recently, all fire was viewed as having predominantly negative effects upon the environment, but plant ecologists now realize that fire is an essential agent to healthy diversified plant communities. Park and forest managers are now studying and implementing prescribed burn and controlled burn policies in order to promote more natural patterns of plant succession and diversification.

Seeds of some plants survive in the soil for many years but germinate and bloom only after a major fire prepares the environment. Some species spread seed into an area year after year without successful germination. A fire clears away the forest canopy or the carpet of leaves and needles on the forest floor, allowing plants to grow where they could not previously survive. In fact, were it not for fire, certain seral species (plants which have an intermediate role in forest community succession) might completely disappear from an area. Species such as wild geranium, wild hollyhock, dragonhead, and snowbrush appear in a given area for a short period every 100-300 years if the fire cycle follows a natural course. One of the most ubiquitous and persistent colonizers in Glacier National Park is the lodgepole pine. Lake bottom core samples indicate that lodgepole pine proliferated in the wake of receding Ice Age glaciers.

Plants on the Move

While we are aware of the ability of animals to move and adapt to changes in their environment, there is a tendency to think of plants as stationary organisms with little ability to adapt or move. In fact plants have evolved many devices and techniques for protection, proliferation, and transportation.

While trees do not get up and walk to a more hospitable location, looking at a record of botanical succession over time would make it clear that plants change locations based on climatic factors. A time lapse film set for a period of 2,000 years might show forests moving up and down the slopes of Logan Pass several times as climactic changes occurred. In fact evidence indicates that the dwarfed groves of trees at Logan Pass did extend higher up the mountains in the recent past. Currently they may be in the process of moving up the mountain side again.

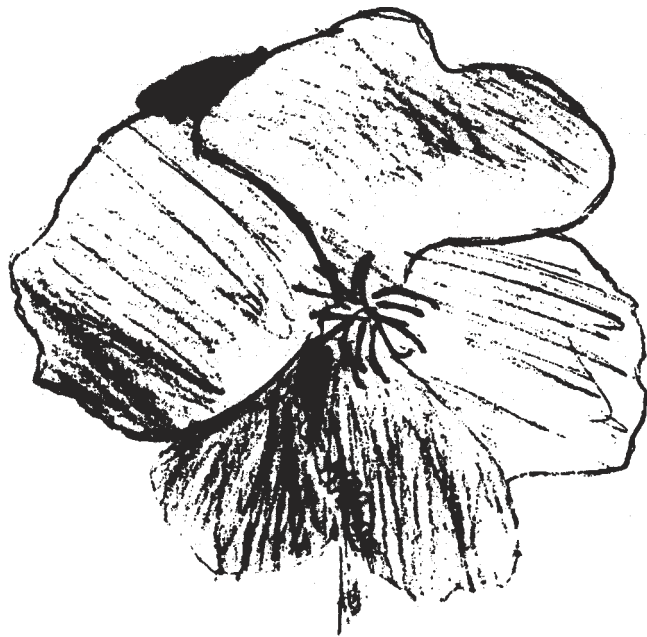


Native American Influence

Before the European emigration to North America, Native Americans had relatively little long-lasting impact on the land. Generally migratory in their life style, they lived within the natural limits of their environment rather than altering it to suit their needs. Though they often set prairie and forest fires to clear pathways, herd game, and stimulate new growth, the impact was short-lived and of less significance than changes stimulated by today's technological society.

The Future

The ecological importance of the Glacier National Park area for the future cannot be overemphasized. The surrounding areas and most of the country in general are under intensive management for the production of food, lumber, and mineral resources. Protected areas like national parks must continue to provide a refuge for plant and animal species and communities that can no longer flourish outside the area. In a time when the last remnants of native wilderness are quickly being absorbed by civilization, it is extremely important to preserve, protect, and restore Glacier National Park and as much of the surrounding area as possible. The biological diversity of the Glacier ecosystem must be maintained for future generations.



Wild Rose
K.A.B.



Classroom Activities

Classroom Activity 1

Who Says Plants Can't Move ?

Objective:

Students will learn how plants spread their seeds and populate new areas. Students will be encouraged to think about plants as organisms that are adapted to their environment and contribute to the well being of other plant and animal species.

Background:

Modern cultures tend to think about plants as organisms that are subject to the whims and uses of humans and other animals. Traditional Native American cultures have seen plants in a very different light. According to their perception, plants have spirits and are able to communicate among themselves and occasionally with other beings. Such a view of nature may be viewed as primitive by scientists and other "modern" people. Native Americans, however, are relating very personally with their environment. The intimacy of that relationship seldom, if ever, distorts the basic soundness of their understanding of plants. Their perspective certainly adds a more personal dimension to the study of plants. In fact, plants do have a number of defense mechanisms and many techniques for pioneering new living space.

Materials:

Balloons (Green, brown, and red are preferable)

Frozen or fresh berries (huckleberries, blueberries or raspberries are most appropriate, purple or red balloons will suffice)

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.

Procedure:

1. 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.
2. Choose a student to be a burr bearing plant. 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 (Natures 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 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.
3. 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?
 4. 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.
 5. Have another student be a puffball. Have the student inflate a dark balloon and release it. The balloon will rocket out into the room and settle on the floor some distance away. Some plants and mushrooms use gases to propel their seeds or spores out away from the parent plant.
 6. Select students to be a pine tree and a stream. Explain that conifers use several mechanisms for seed and pollen dispersal. Give the tree a green balloon and have the stream 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.
 7. Discuss the relationships that flowering plants have with pollinating insects. Explain that this is the most sophisticated arrangement for pollination of flowers.

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). 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 (powdered 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 to the process of pollination.



Follow Up:

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



Classroom Activity 2

Native Harvest

Objective:

Students will become familiar with some of the Glacier National Park plants used by Native Americans for food, medicine, and construction.

Background:

After introducing the general background, supply as much personal information about plant uses as possible. Jeff Hart's *Native Plants and Early Peoples* is an excellent source of information, history, and stories about major plants used in this area. This book is included in the Activity Kit.

Materials:

Art Paper

Theme Paper

Colored Pencils

Native Plants and Early Peoples: Jeff Hart and Jacqueline Moore

Procedure:

1. After providing introductory information on Native American plant use, explain that the class is going to do some individual research and put together a book.
2. Emphasize the importance of respecting and preserving native plants in our environment and the respect we need to show for local tribes. 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 Native American cultures.
3. 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* 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.
4. Ask students to keep in mind that they will be trying to locate specimens of as many of the plants as they can when they visit the Park.
5. Supply the students with the "Questions for Plant Research" listed below. Add additional questions that might be appropriate. The questions will provide students with some direction for their research.
6. When the students have finished writing, editing, and rewriting; ask them to do illustrations of their chosen plants.
7. Have the students present their research to the class and then bind the papers and illustrations into a class book. Take the book to Glacier and use it as a reference during your visit.
8. Present the book to the school library when completed.



Questions for Plant Research

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.
2. How is this plant used by native peoples? What parts were used and how were they prepared for use?
3. Were there any special ceremonies or rituals observed when gathering, preparing and using this plant?
4. Are there any special legends or 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?



Classroom Activity 3

What's in a Name ?

Objective:

Students will learn tribal names, as well as the scientific names (genus and species) for plants occurring in and near Glacier National Park.

Background:

Tribal members that have participated in the development of this program have expressed a strong desire to use bilingual teaching. Culture is difficult to understand, share, disseminate, and preserve without knowledge of native languages. Each tribe may have several words that indicate the same plant at different times of the year or when used for different purposes. There are dialect differences in pronunciations even within the same bands of each tribe. To make matters even more difficult, some sounds in native languages are not readily reproducible with phonetic symbols.

Local dialect and proper pronunciations can only be provided by elders and language enthusiasts in your area. This activity is designed to bring tribal elders into the classroom for language appreciation and study. Pronunciation and accompanying hand signs can only be communicated orally and visually. The presence of elders in a capacity to teach specific terms will stimulate language side trips and other enrichment.

Materials:

Marking pens

Note cards

Dictionary Of Word Roots And Combining Forms by Donald J. Borror

Procedure:

1. Ask a Native language speaking elder or tribal member to come to the classroom and work with the students on pronunciation and meaning of native terms for commonly used plants. A partial list is provided (contact the local tribal cultural committee for suggestions for speakers).
2. Concentrate on the common name, genus, and species and native term for your tribal area; but encourage the students to become familiar with other tribal languages as well as their own.
3. Demonstrate the use of the Greek and Latin root and suffix guide: *Dictionary Of Word Roots And Combining Forms*. Have students look up meanings of the scientific names for each plant.
4. 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 flash cards.
5. Provide a forum to demonstrate or apply their vocabulary. For instance; labeled drawings could be displayed as part of an open house.



A List of Names for a Few Familiar Plants (add your own)

Serviceberry (sarvisberry, Saskatoonberry): *Amelanchier alnifolia*

Blackfeet: ok-kun-okin Kootenai: squmu Salish: s saq

Black tree lichen: *Alectoria fremontii*

Blackfeet: e-simatch-sis Kootenai: a a Salish: sawtamqan

Blue Camas: *Camassia quamash*

Blackfeet: miss-issia Kootenai: xapi Salish: ltx^we?

Biscuit-root (coos-root): *Lomatium cous*

Blackfeet: koos Kootenai: Naptnuquku Salish: pcLu

Chokecherry: *Prunus virginiana*

Blackfeet: pukkeep Kootenai: A ki'lماك Salish: tx^wLo

Bitterroot: *Lewisia rediviva*

Blackfeet: eks-ix-ix Kootenai: Naqamçu Salish: spe> am

Lodgepole pine: *Pinus contorta*

Blackfeet: manistami Kootenai: l ti t' Salish: q^wq^wLi?t

Western red cedar: *Thuja plicata*

Blackfeet: sixinikok Kootenai: lç'nat' Salish: astq^w

Huckleberry: *Vaccinium globulare*

Blackfeet: apa-oapspi Kootenai: awiya Salish: stsa

Yampa (wild carrot): *Perideridia gairdneri*

Blackfeet: nitzi-katasi Kootenai: Ni'çna Salish: s>uk^wam



Classroom Activity 4

Forest Communities

Objective:

Students will gain familiarity with local trees and learn to see them as indicators of prevailing climate, terrain, elevation, and stage of succession.

Background:

In the old days it was important for native peoples to be able to identify plant communities from a distance. Recognition of trees was a quick and usually accurate indication of the kinds of understory herbs, berries, and roots to be found in a given area. Skilled native botanists used these observations to lead their people to food sources. Today naturalists and botanists are able to tell a great deal about land, soil conditions, moisture availability, and history of natural disturbances in an area by identifying the dominant and incidental tree species.

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
(books are in Activity Kit)
Magnifying glasses
Poster board
Marking pens
Scissors
Glue

Procedure:

1. Review the background information in this track with the students. The background information for Park Visits is particularly relevant to this exercise.
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. 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.
4. Have the students use the tree guides to identify their specimens and to research their characteristics and habitat.
5. Have the students make leaf, cone, and needle displays.
6. Discuss where the trees they identified might occur in Glacier National Park.



Park Visit Activities

Visits to St. Mary and Apgar will involve naturalist guided investigations of plant communities studied during classroom activities. The St. Mary Valley and the Lake McDonald Valley offer fantastic visual laboratories for a wide range of activities. Visits to both sides of the park provide dramatic contrast in climate and representative plant communities.



Park Visit Activity 1

Plant Communities in the St. Mary Valley

Objective:

Students will examine plant succession stimulated by natural disturbances and examine transitional communities influenced by local climate and elevation. They will have an opportunity to locate some individual plants that they have researched, observe ways in which plants left in a natural setting interact with their environment, and see how plants pioneer and propagate in new areas. Finally, classes will be able to investigate efforts made by Park Service personnel to preserve native plant communities, restore areas impacted by human activity, and eradicate exotic plants that have been inadvertently introduced by human activity.

Background:

We know that Native Americans came to the St. Mary area for gatherings and ceremonies, to visit neighbors, to hunt, and to gather lodge poles and seasonal roots and berries. The people also tended secret tobacco gardens in cool moist areas near the mountains where the Great Spirits made their home. Many came to the mountains to make contact with the Spirits in vision quests.

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 engelmanni*), 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 can be found on the highest peaks in the park and algae occur on the surface of glaciers and snowfields.

Plant succession is influenced by natural disturbances such as flood, snowslides, drought, fire, 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.

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 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.



Park Visit Activity 2

Plant Communities in The Lake McDonald Valley

Objective:

Students will examine an area where prevailing climatic conditions support very localized and distinctive plant communities. Students will have an opportunity to locate some of the plants they have researched, observe ways in which plants left in a natural setting interact with their environment, and see how plants pioneer and propagate in new areas. Finally, classes will be able to observe efforts made by Park Service personnel to preserve native plant communities, restore areas impacted by human activity and eradicate exotic plants that have been introduced by human activity.

Background:

Lake McDonald was an important gathering place for the Kootenai and Salish. In spite of the impact of modern civilization, archaeologists have found evidence of seasonal paleo-Indian occupation near many streams and lakes on the west side of Glacier National Park.

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. 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.

In the absence of natural and human-caused disturbances, the McDonald Lake 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. This climax community can maintain stability for hundreds of years under ideal conditions.



Back In The Classroom

Take the time to reinforce the Park Visit experience. Discuss the field trip with your students and decide what worked and what didn't. Be sure to fill out the trip evaluation form and return it to the park.

Some follow up activities for this Track include:

1. Have students write a letter to the naturalist who conducted your visit. Ask the students to tell the naturalist what they learned and what they enjoyed.
2. Invite someone who had extensive experience with the great westside fire of 1967, the Napi Point Fire, or the Red Bench Fire to come into your classroom and discuss conditions before the fire, management of the fire, and conditions in the area after the fire.
3. Invite elders into the classroom to tell students about traditional tribal use of the Glacier National Park area. Encourage a sense of pride in the historical associations and wise stewardship of the area by tribal ancestors.
4. Invite tribal elders to speak to the students about tobacco use and abuse. In the process of researching this track, many of the advisers expressed concern about difficulties involved in communicating the differences between traditional ceremonial use of tobacco and habitual tobacco abuse.



