National Park Service
U.S. Department of the Interior

Glacier National Park

Fire Ecology

4th-5th Grade Field Trip

Preparing For Your Trip

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Fire Ecology 4th-5th Grade Field Trip

Welcome and Need to Know Information

Dear Teacher,

This packet contains all the information you will need to prepare your students for a "Fire Ecology" field trip to Glacier National Park.

- The field trip lesson plan on pages 14-20 should answer most questions about field trip logistics, objectives, and schedules.
- The rest of the lessons are meant to prepare students for the concepts and vocabulary highlighted on the field trip. Each activity can serve as a pre-visit introduction or a post-visit assessment/extension. A suggested unit plan organization is located on the following page.
- Glacier's SmartBoard lessons are a great way to supplement this unit.
- Visit our website for more lesson plan ideas and background information for any field trip. This guide contains only a sample of what is available.

Be sure to confirm the date(s) and meeting place for your field trip (received via email are correct). There is no cost for this field trip. A waiver for the park entrance fee has been processed for your class(es). Travel grants from the Glacier National Park Conservancy may be available to schools with restricted travel budgets.

The education ranger assigned to your group will call you before your field trip date to discuss the schedule and answer any questions. You can also reach them at 406-888-7899.

Our education programs are made possible by the support of the Glacier National Park Conservancy. Thank you for introducing your students to the National Park Service mission and the wonders of Glacier!

Glacier National Park
Education Staff

Glacier National Park
CONSERVANCY

Glacier's Education Goals

- Provide opportunities for the students to form emotional and intellectual connections with park resources and values.
- Introduce students to the National Park Service mission and significances of Glacier.
- Provide curriculum-based, outdoor education experiences that are age appropriate and supplement classroom learning objectives.
- Introduce students to the value of protecting natural and cultural resources for current and future generations and to encourage actions we can all take to be good stewards of this special place.

Suggested 5-Day Lesson Sequence with Field Trip

	Summary	Objectives *Students will know:*	MT and Next Generation Science Standards	Materials
Pre-Field Trip *Lesson 1* *Meeting The Fire Triangle*	Students make a physical model of the Fire Triangle. They manipulate the model and discuss the components of the Fire Triangle in the context of things they are familiar with.	• How to construct a geometric triangle • The components of the Fire Triangle • How the removal of one piece of the Fire Triangle extinguishes the fire.	MT.SCI.K-12.1.4 Demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations. 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.	• Gumdrops (12+ per student team) • Toothpicks (12 per student team)
Pre-Field Trip *Lesson 2* *Meeting The Fire Triangle 2*	This activity is a brief guided discussion that describes combustion and wildland fire.	• How extinguishing a fire is analogous to removing one leg of a triangle.	MT.SCI.K-12.1.4 Demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations. 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.	• Tree poster/ picture • Transparency of Fire Triangle • Discussion questions
Pre-Field Trip *Lesson 3* *Tree Parts*	Class discussion of tree parts and their functions, then students construct small trees incorporating all the parts it will need to live.	• How to identify the basic parts of trees and understand how they help the tree to live and grow.	MT.SCI.K-12.1.4 Demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations. 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	• Cross sections of tree trunks (photos work) • Cardboard tubes • Tacks, tape, paper, glue, scissors, crayons, paints, pipe cleaners, string, plant parts
Field Trip Day *Fire Ecology*	Students participate in an introduction at Apgar, then travel to the Rocky Point Trail for a 2-mile long hike. There will be stops at various points along the trail to do activities related to fire.	Vary depending on field trip. Talk to the ranger before your visit for more information.	Vary depending on field trip. Talk to the ranger before your visit for more information.	• Layers of clothing • Name tags • Lunch • Adult Helpers
Post-Field Trip *Lesson 4* *Forest Communities*	Students will gain familiarity with local trees and learn to see them as indicators of prevailing climate, terrain, elevation, and stage of succession.	• A number of native trees. • How to use a key to identify a tree.	MT.SCI.K-12.1.4 Demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations. MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.	• Tree Guides • Magnifying glasses • Poster board • Marking pens • Scissors, Glue

Lesson 1: Pre-Visit

Meeting The Fire Triangle

Materials:

* *Gumdrops (12+ per student team)*
* *Toothpicks (12 per student team)*

Vocabulary

Fire triangle, fuel, heat, oxygen, triangle.

Method

In this activity, students make a physical model of the Fire Triangle as a geometric shape. They manipulate the model and discuss the components of the Fire Triangle in the context of things they are already familiar with - candle flames, campfires, and engines.

Objectives

Students will be able to:

- Construct a geometric triangle
- Name the components of the Fire Triangle
- Explain that removal of one component of the Fire Triangle extinguishes the fire.

MT State Science Standard

MT.SCI.K-12.1.4 Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations.

- A proficient student will be able to use models that illustrate simple concepts and compare those models to the actual phenomenon

Next Generation Science Standard

4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

Background

Fire can occur only if oxygen, fuel, and heat are available. These three components are called the "fire triangle." The complete curriculum this activity is from is online at http://www.firelab.org/project/fireworks-educational-program . The educational FireWorks trunk and materials that go with this curriculum are available from the Glacier Education Specialist.

Procedure

1. Explain that fire has occurred in forest communities for hundreds of years. To understand more about fire in nature, they will first learn more about fire itself.
2. Ask students to work in groups of three or four.
3. Explain: Each student team should build three or four shapes out of gumdrops and toothpicks. Write them on the board: 3-sided (triangle), 4-sided (in this case, a square), 5- sided (pentagon), and 6-sided (hexagon). Use the toothpicks for the sides and gumdrops for the corners.
4. Ask students to find out which shape is the most "stable" one, that is, it keeps its shape even when you push on a side or a corner. Unless they eat all the gumdrops, it won't take long for them to decide that the triangle is the most stable.
5. All students can convert their shapes to triangles. Ask students what happens when one leg of a triangle is removed. It collapses into a single line.
6. Explain: Scientists use the idea of a "triangle" to describe fires because a fire needs three things to be stable, that is, to keep burning. Can they think of what is needed? List their thoughts on the board. Look for items relating to ignition sources, fuel, and oxygen.
7. Display the Fire Triangle image. Explain that these are the three things needed to start a fire and keep it going, and relate the components on the triangle to students' ideas on the board.
8. Ask what happens when one of these components is removed from a fire. (It stops burning.) Ask: Burnable things surround us every day. Why aren't they on fire? (An external source of heat is usually needed to start a fire. Once a fire has started, it produces the heat needed to continue burning. A fire can be put out if fuel, oxygen, or heat is removed.)
9. Ask how people can use this knowledge to stop a fire that occurs in their homes and in wildlands. (When you throw water on a fire, you cut off oxygen and remove heat. You can also cut off oxygen by throwing dirt on a fire. "Stop, drop, and roll" reduces the supply of oxygen to a fire. Running away would do the opposite—add more oxygen—so it is a bad idea. Fire extinguishers remove heat and deprive a fire of oxygen. Fire retardant dropped from airplanes removes heat and cuts off oxygen from wildland fires. When all the wax is gone from a candle or all the fuel is burned in a campfire, it goes out.)

Evaluation

1. Name the three things needed for a fire to occur.
2. Explain to a partner and demonstrate how "stop, drop, and roll" removes something from the Fire Triangle and puts a fire out.
3. Closure: Collapse the triangles completely by eating the gumdrops and throwing the toothpicks away.

Extension

1. Make and decorate your own paper fire triangles.
2. Read about people's feelings about fire in Legends of Earth, Air, Fire and Water. These stories would be fun to read to the whole class.

Lesson 2: Pre-Visit

Meeting The Fire Triangle 2

**From the USFS FireWorks Curriculum.*

Materials:

- *Tree poster/picture*
- *Transparency of Fire Triangle*
- *Discussion questions*

Vocabulary

Fire Triangle, fuel, heat, hypothesis, model, oxygen, prescribed fire, tree crown.

Method

This activity is a brief guided discussion that describes combustion and wildland fire.

Objective

Students will be able to:

- Given materials for a paper model, students can construct a model of the Fire Triangle and explain how extinguishing a fire is analogous to removing one leg of a triangle.

MT State Science Standard

MT.SCI.K-12.1.4 Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations.

- A proficient student will be able to use models that illustrate simple concepts and compare those models to the actual phenomenon

Next Generation Science Standard

4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

Background

Fire can occur only if oxygen, fuel, and heat are available. These three components are called the "fire triangle." The complete Fireworks Educational Program curriculum this activity is from can be found online. The traveling trunk that goes with this curriculum can be obtained from the Flathead National Forest Office in Kalispell or from the park in West Glacier.

Procedure

1. Post or draw the Fire Triangle picture in the classroom. Ask students what is needed for a fire. Write answers on the board. Then use the answers to discuss the three parts of the Fire Triangle: heat, fuel, and oxygen. The Fire Triangle transparency can be used as a transparency to guide discussion, but may not be necessary.
2. At the end of the discussion, ask students to construct a paper model of the Fire Triangle Kit (student page 2); use this as an evaluative tool

Discussion Points

1. What is fire? Fire is a rapid chemical reaction that combines fuel and

Procedure Continued

oxygen to produce heat and light.

Carbohydrate + oxygen + heat → carbon dioxide + water vapor + heat + light

$C_6H_{12}O_6 + 6\ O_2 + \text{heat} \rightarrow 6\ CO_2 + 6\ H_2O + \text{heat} + \text{light}$

2. Burnable things surround us every day. Why aren't they on fire? An external source of heat is usually needed to start combustion. Once a fire has started, it produces the heat needed to continue burning. A fire can be put out if fuel, oxygen, or heat is removed. This idea is often depicted using a triangle (refer to the Fire Triangle poster). Remove any one of the three legs of a triangle, and it will collapse; remove any one of the required components of fire, and it will go out.

3. What is the fuel in fires we are familiar with? Most cars are fueled by gasoline, candles are fueled by melted wax, furnaces by natural gas or fuel oil, and campfires by wood.

4. What fuels a wildland fire? In nature, fire's fuel is plant material. Use a tree picture to discuss nature's fuels and illustrate these points:

- Tree crowns, high above the ground , provide some fuel; these include tree branches, leaves (needles are a kind of leaf), and trunks.
- Fuels that lie on or right above the surface of the ground include dead and fallen needles, eaves, grass, dead wood, stumps, and low shrubs.
- The main ground fuel is duff, the layer of dead, decaying plant material that makes up the top layer of soil. It contains decaying leaves, decaying wood, and roots. Sometimes it is mixed with mineral soil (very fine rock particles), which won't burn.

5. Where does the oxygen for fire come from? Oxygen is plentiful in air. Students may be able to relate the "oxygen" part of the fire triangle to their fire-safety education: "Stop, drop, and roll" is one way to reduce the oxygen available to burning clothing. If a person runs with clothing on fire, the oxygen supply increases and the fire burns more intensely.

6. What heat sources do we use to start fires? Spark plugs in cars, pilot lights in appliances, and matches are some examples.

7. What provides heat for forest fires? In wildlands, nature provides heat in lightning and volcanoes. Matches, untended campfires, and cigarettes are the sources of heat for many human-caused wildland fires. During the thousands of years when Native Americans were the only people living in North America, they often started fires to change the plant communities that provided their food and shelter. They used fire to make their campgrounds safe from fire and enemies, to improve grazing and berry supplies, and for many other reasons. After they obtained horses, Native Americans used fire to improve forage for their herds. Today, we would call these prescribed fires.

8. How does wind influence fire? Wind influences fire in many ways. Think about starting a campfire. If you blow on it, you provide extra oxygen and blow the heat toward the fuels, getting the fire to burn more intensely. If you blow too hard, especially across a small flame like a candle, you scatter the heat so much that the fire goes out. Wind helps forest fires spread by drying out fuels and carrying burning embers ahead of the fire.

9. Use the fire triangle to describe some ways to put out a fire. To slow down a fire or put it out, at least one of the three components of the fire triangle must be changed. Think about ways that both large and small fires are controlled.

Procedure Continued

When all the wax is gone from a candle or all the fuel is burned in a campfire, it goes out. A fire line, used to control forest fires, is simply a path cut through all of a forest's fuels—down to mineral soil. When the fire gets to the fire line, it runs out of fuel. When you throw water on a fire, you cut off oxygen and remove heat. You can also cut off oxygen by throwing dirt on a fire. Fire extinguishers and fire retardant dropped from airplanes remove heat and cut off oxygen from wildland fires.

Evaluation

Provide each student with a Fire Triangle Kit. Ask students to construct a Fire Triangle and label the parts correctly. Ask them to write a paragraph in which they do the following:

1. Describe a fire (candle, engine, campfire, and forest fire are all possibilities)
2. Tell one way to put it out
3. Explain what part of the Fire Triangle is removed when that method is used to put it out
4. Explain to students that this discussion has provided a model for how fires work. A model is like an hypothesis because it is an explanation for something observable, and it can be tested.

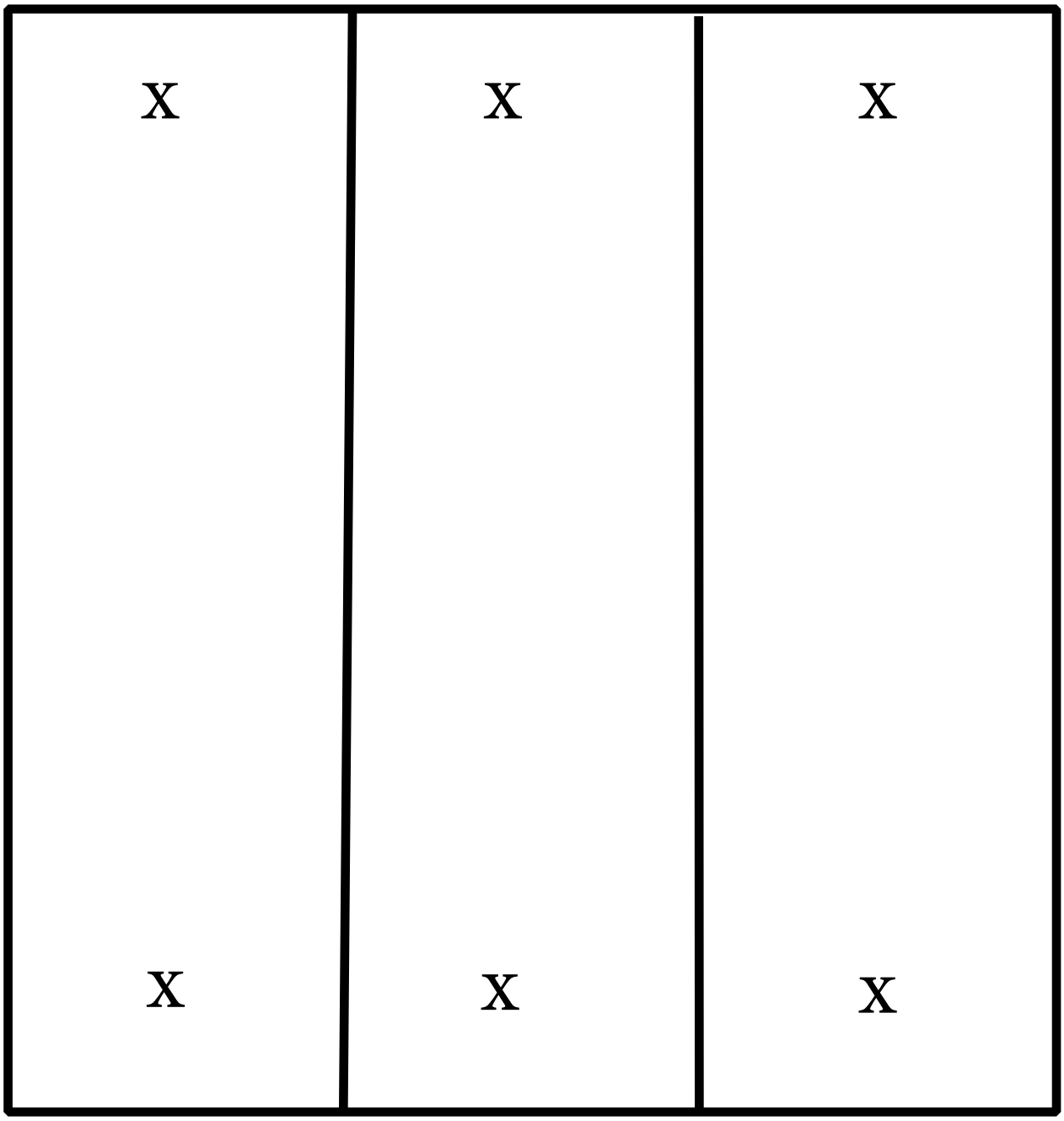
Extension

Make a collage of familiar things that use combustion. Examples: Cars and gas appliances contain "burning chambers." Electrical appliances may rely on combustion of coal to produce power. Barbecues, lanterns, and candles use fire. So do "real" fireworks displays. Use the components of the Fire Triangle to describe how combustion is controlled in these items.

The Fire Triangle

Fire Triangle Kit

1. Cut along the lines to make the three “legs” of your Fire triangle.
2. Mark one leg “Fuel.” Mark another “Oxygen.” Mark another “Heat.” Decorate the pieces.
3. Punch holes on the X marks at the ends of each leg.
4. Put brads or other connectors through the holes and connect the legs of the triangle. Write your name on the back.
5. If you remove one leg of a paper triangle, what happens to it?
6. If you remove one leg of the Fire Triangle, what happens to the fire?



Lesson 3: Pre-Visit

Tree Parts

Materials:

* *Cross sections of tree trunks (photos work)*
* *Cardboard tubes*
* *Tacks, tape, construction paper, glue, scissors, crayons, paints, pipe cleaners, string, plant parts*

Vocabulary

Bark, cambium, deciduous, heartwood, leaves, phloem, roots, sap, sapwood, stems, trunk, xylem.

Method

Class discussion of tree parts and their functions, then students construct small trees incorporating all the parts it will need to live.

Objective

Students will be able to identify the basic parts of trees and understand how they help the tree to live and grow.

MT State Science Standard

MT.SCI.K-12.3.1 Students, through the inquiry process, demonstrate knowledge of characteristics, structures and function of living things, the process and diversity of life, and how living organisms interact with each other and their environment.

- A proficient student will be able to identify that plants and animals have structures and systems that serve different functions for growth, survival, and reproduction.

Next Generation Science Standard

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Background

The purpose of this activity is to familiarize students with the basic workings of a tree.

Tree Parts Natural History
Roots hold the tree in the ground. They branch underground and eventually form into small rootlets with miles of fine root hairs that take up water and minerals from the soil and bring it up to the tree for use. A fully grown deciduous tree can pull one ton of water from the soil each day, about the amount of water it would take to fill the bed of a standard size pickup truck. There is also great power in a growing root. A root four inches around and three feet long can lift the equivalent of 7 elephants stacked on top of each other!

- Leaves (broad leaves and needles) use sunlight to begin the process of photosynthesis, a reaction which takes place in the green chlorophyll of the leaf: water and carbon dioxide, a poisonous gas for humans, are changed into food for the tree (sugar, protein and starch), and oxygen is

Background, Continued

released for us to breathe. In one year an average tree inhales 26 pounds of carbon dioxide - the amount emitted by an automobile during an 11,300 mile trip (or almost two trips from San Francisco to New York and back again), and exhales enough oxygen to keep a family of four breathing for a year.

- Trunks provide support and act as pipelines to carry water and minerals up to the leaves and branches, and sugar, protein and starch down from the leaves to branches and roots. The following are all trunk parts, moving from the outside to the inside. Bark covers the trunk and branches and protects the tree from disease, fire, and injury. Inner bark or phloem carries sap down from the leaves to the branches, trunk and roots.
- Cambium is a layer that is about two cells thick. Each year it grows new phloem to the outside and sapwood (xylem) to the inside. Branches, trunks and roots grow in thickness as a result of cambium growth. Sapwood and heartwood make up the bulk of the tree trunk. Just inside the cambium is the sapwood, which carries minerals and water up from the roots to the rest of the tree. Some vessels in the sapwood can move stored water and nutrients horizontally to other parts of the tree. Beyond the sapwood is the heartwood, the older, dead sapwood that is usually darker and can no longer carry minerals and water up from the roots. It now provides support for the tree. Being dead, heartwood can rot away to leave a hollow tree with a covering of living wood on the outside.

Procedure

1. Discuss tree parts with students, drawing a tree and a cross section of a tree trunk on the board, labeling the parts and discussing their function (see "Tree Parts Natural History").
2. Erase the cross section drawing leaving a list of the cross section parts on the board. Divide students into groups according to the number of trunk cross sections you have. Give each group a trunk cross section and small strips of paper and tacks with which to label the parts on their trunk. Direct the groups to discuss the function of each part they label.
3. Call on each group to show a tree part on their trunk and explain its function.
4. Distribute tree making materials and instruct students to construct their own small tree, including all of the parts it will need to live.

Evaluation

1. When the projects are done, have the students share their trees and describe them to the class.
2. Ask them to point out how the sap flows from the leaves and roots to the rest of the tree, and where the tree's food is made from sunlight. Which parts of the tree are alive? Where is the dead heartwood found? How is their homemade tree different from a living tree?

Extension

Use the FireWorks Curriculum from the Rocky Mountain Research Station's Fire, Fuel, and Smoke Science Program to learn more about forest communities. All of the Chapter 4 lessons are about biological communities. Here are suggestions from that curriculum: have students write and illustrate a booklet about the life of a tree for first grade students. Use a book in your classroom or the school library to find a poem or a song about trees; create a dance or drawing to illustrate it.

Project Learning Tree has curriculum with numerous lessons related to trees and forest communities that they share at teacher workshops, www.plt.org .

Field Trip Day!

Fire Ecology

Vocabulary

Adaptation, coniferous, dichotomous, disturbance, fire scars, fire triangle (fuel, oxygen, heat), interrelationships, tree cookies.

Method

Students participate in an introduction to Glacier National Park and fire ecology at Apgar, then travel to Rocky Point Trail or West shore Trail for a 2-mile long (round-trip) hike with a ranger. There will be stops at various points along the trail to do activities related to fire and to discuss what's happened in the forest since the Robert Fire of 2003.

Objectives

These are typical of the objectives that can be achieved, depending on the teacher's pre- and post- visit focus and the ranger.
Students will be able to:

- Tell what national parks protect and one reason Glacier National Park was established.
- Identify coniferous trees with a dichotomous key.
- Give 3 examples of interrelationships in the forest.
- Give an example of an effect the forest fire has had on plants and on wildlife.
- Point to an area that has had a disturbance other than fire.
- Model how trees transfer food and water throughout their structures, and how they are adapted for protection from fire.
- Tell how a fire might increase plant reproduction.
- List the three parts of the fire triangle (fuel, oxygen, heat) and how each contribute to a fire.
- Give examples of adaptations that plants and animals have to survive fires.
- Explain how we can understand past fires by examining tree cookies and fire scars.
- Discuss how fires are different and act in varying ways depending on environmental factors like wind, fuel, terrain, and make predictions about how a fire with certain conditions might burn.
- Discuss two organisms who not only can survive fire, but who actually thrive after a fire.
- Explain how American Indians used fire and name one important role of fire in a natural system.

MT State Science Standards

MT.SCI.K-12.1.1 Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations.

- A proficient student will be able to identify a question, determine relevant variables and a control, formulate a testable hypothesis, plan and predict the outcome of an investigation, safely conduct scientific investigation, and compare and analyze data

MT.SCI.K-12.3.2 Students, through the inquiry process, demonstrate knowledge of characteristics, structures and function of living things, the process and diversity of life, and how living organisms interact with each other and their environment.

- A proficient student will be able to explain how organisms and systems of organisms obtain and use energy resources to maintain stable conditions (e.g., food webs, photosynthesis, respiration)

Next Generation Science Standards

MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

Background

Glacier National Park was established to protect habitat for plants and animals and preserve biodiversity and natural processes such as fire. Fire is a natural disturbance that plays an important role in natural communities.

Sample Field Trip Schedule

Flexibility for weather conditions, bus problems, etc. is essential to having an enjoyable visit. No two school programs are exactly alike, but the following schedule represents a typical trip. If two classes visit at the same time we may modify the schedule.

8:30 a.m. – 9:30 a.m. Travel to the Park

Simple assignments can be completed by seat mates or individuals during this time. Point out sights along the way that relate to the park story such as mountain uplifting, plant communities, river crossings, signs of past forest fires. You may also want to review vocabulary words or ecological concepts.

9:30 a.m. – 10:00 a.m. Meet at the Apgar area

Rangers will meet the bus and talk with teachers and chaperones about the schedule for the day. There will be an introduction to the national park service and to Glacier National Park along the shores of Lake McDonald. Students will have time for a bathroom break.

10:00 a.m. – 10:15 a.m. Bus travels to Fish Creek Picnic Area

10:15 a.m. – 10:30 a.m. Introduction to Fire and the Fire Triangle

10:30 a.m. – 12:30 p.m. Hike the "Rocky Point Trail"

Classes will be split into two groups and one ranger will go with each group. Rangers will stop along the trail to involve the students in short activities to learn about the fire triangle, forest succession, adaptations of plants and animals to fire, and fire's important role in nature.

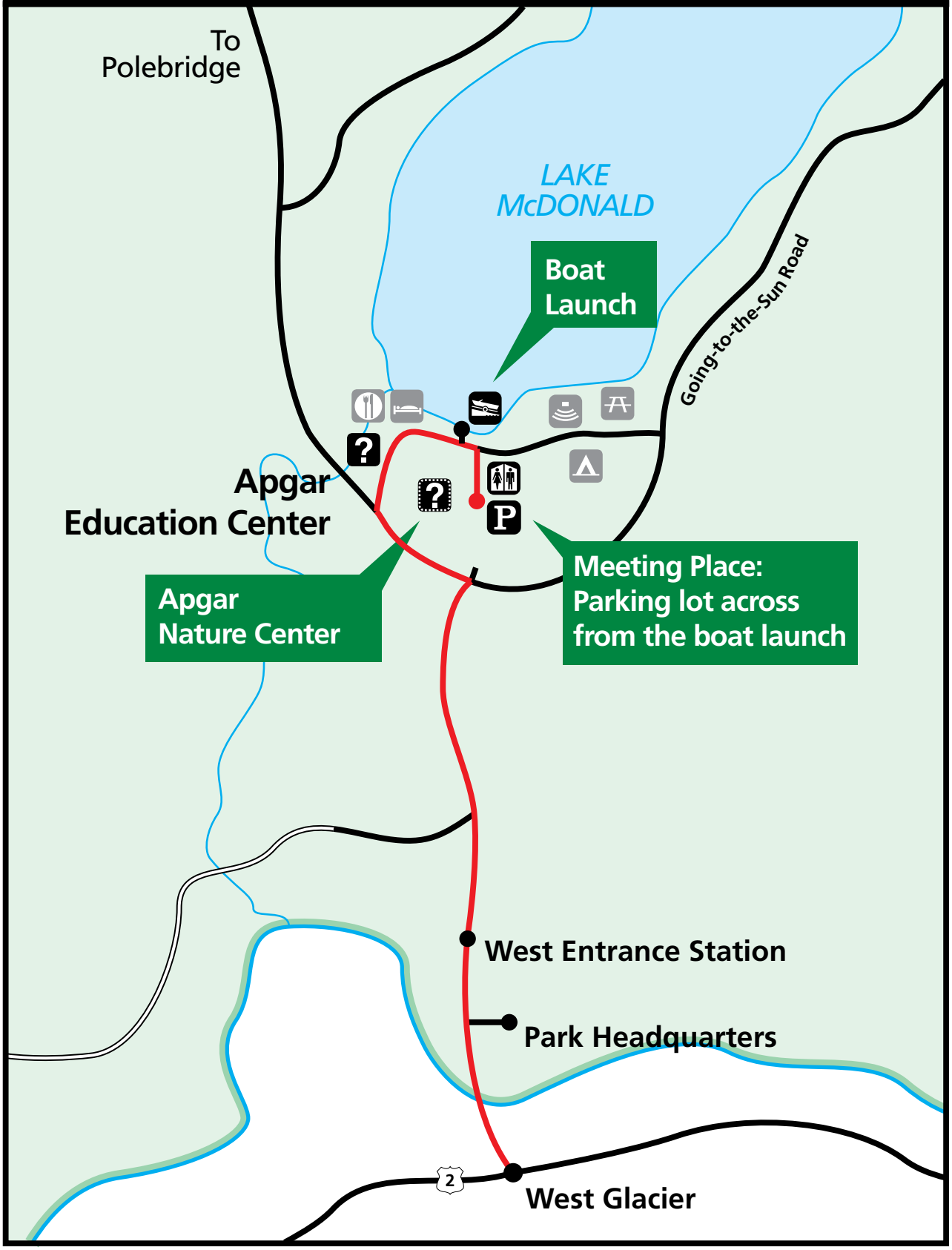
12:30 p.m. – 1:00 p.m. Lunch, bathrooms, and Clean-Up

1:00 - 1:30 p.m. Wrap-Up

Ranger(s) review the educational objectives for the day and engage all of the students in activities to assess their learning.

1:30 - 1:45 p.m. – Bus Leaves the Park (with possible stop in Apgar for bathrooms)

Education Programs



Protecting the National Park

In order to have a fun and exciting experience, a firm framework of rules should be discussed in advance. The discussion should include the following points:

- Respect both plants and animals in Glacier National Park.
- Harassing animals and picking flowers, pine cones, feathers, and other natural objects in the park are illegal.
- Respecting rights of others in Glacier by refraining from disruptive behavior.
- Respecting each other, the ranger, chaperones, and teachers (walk on trails, keep hands to yourself, wait to talk until the instructor is finished, etc...)

School Regulations and Safety

Teachers are responsible for following school regulations regarding parental permission slips, travel authorization/insurance, etc. An accident can ruin a field trip and jeopardize future ones. Safety is of utmost importance. Students must be with adults at all times.

Clothing

Remind students to check the weather and bring appropriate, comfortable clothing, including a hat, rain pants, warm coat, gloves/mittens, and hiking shoes. Encourage students to bring extra layers.

Name Tags

For safety and courtesy, rangers prefer to call students by name. Masking tape with names written in big letters, works well. If you make name tags as a pre-visit activity, be sure they are easy to read and stay on when the students are active.

Food and Lunches

Everyone needs a lunch and drink. Re-sealable drinks work best as they can be refilled and saved. No food or drink is available at the park. Students are expected to clean up the lunch area. Food/gum are prohibited except at designated times.

Groups

See the chaperone guidelines on the next page. Typically it works best to assign adults to groups of students before arriving at the park. (A typical bus of 45-5th gradestudents would be divided into nine groups of five students each.)

Items to Leave Behind

Students should not bring iPods, CD players, radios, cell phones, or money. These items can be lost and may be a distraction. Adults should also leave cell phones at home (or turned off) during the field trip. Cameras and binoculars will not be needed and may only be brought if they will be used at ranger approved times. Designating one adult as the class photographer and asking them to take pictures throughout the day to share with everyone is a great alternative.

Safety

An accident can ruin a field trip and jeopardize future ones. Safety is of the utmost importance. Students should stay with adults at all times.

Chaperone Guidelines and Responsibilities

The chaperone requirements for ranger-led educational field trips to Glacier are (these numbers include the teacher):

- 3rd - 5th grade = 1 adult for every 5 students (example: 22 students, 5 adults required/allowed)).
- 6th grade and higher = 1 adult for every 10 students (example: 22 students, 3 adults required/allowed).

Please assist your child's teacher by volunteering to help with a field trip to Glacier, or **by respecting when your help is not needed because it exceeds the park's guidelines listed above.** Our facilities, staffing, and resource protection mandate that we limit not only the number of students we can handle per trip, but also the number of adults with each group.

If you are selected to help with a field trip, realize that you are an important partner in our program. We need your participation and cooperation to make the trip a success and will be asking this of you:

- **Do not bring siblings who are not part of the class.** Your full attention is needed to help monitor the students assigned to you that day.
- **Please ride on the school bus.** It makes getting everyone through the entrance station much easier and avoids parking problems.
- **Assist with safety.** It will be one of your primary duties as a chaperone.
- **Be an active participant.** Students will want to participate if you do.
- Provide guidance to students for lunch and clean-up.
- Help set boundaries and provide leadership.
- Guide the learning process and help focus students on the activity or speaker.
- **Please consult with your school administrators about the policy regarding firearms on school sponsored events.** We have never had an injury from a wildlife encounter in over 20 years of conducting school field trips in Glacier. Rangers carry bear spray, first aid kits, and radios and will show the group how to hike and recreate safely while in the park.
- Most importantly go with the flow, adapt, and have fun in Glacier! The students pick up on how you react if you are having fun, they will too!

Sample Teacher Evaluation of Ranger and How Day Went

United States Department of the Interior

NATIONAL PARK SERVICE
Glacier National Park
West Glacier, Montana 59936

IN REPLY REFER TO:

Thank you for bringing your students to Glacier National Park. Your candid and thoughtful responses to the questions below will be used to help us further improve our programs.

1. Please rate how enthusiastically the ranger engaged your students
   - Exceeded my expectations
   - Met my expectations
   - Did not meet my expectations

2. Please rate how respectfully the ranger engaged with you and your chaperones
   - Exceeded my expectations
   - Met my expectations
   - Did not meet my expectations

3. Please rate how appropriate the ranger's teaching techniques were for your students' grade level
   - Exceeded my expectations
   - Met my expectations
   - Did not meet my expectations

4. Please rate how well prepared the ranger was to teach and lead your class
   - Exceeded my expectations
   - Met my expectations
   - Did not meet my expectations

5. How well did the ranger attend to the safety of all participants?
   - Very well
   - Somewhat well
   - Not at all well

6. Please let us know what the ranger did well and what he/she can improve upon

7. Please rate how well the program activities met the curriculum learning objectives
   - Very well
   - Somewhat well
   - Not at all well

8. Please rate how appropriate the vocabulary and concepts were for your students' age level.
   - Very appropriate
   - Somewhat appropriate
   - Not appropriate

9. Please rate how much your students' understanding of concepts you are teaching in the classroom increased.
   - Exceeded my expectations
   - Met my expectations
   - Did not meet my expectations

10. Please let us know what content and activities worked well and what we can improve upo

11. How would you rate the ease of registering for the GNP program?
   - Very easy
   - Somewhat easy
   - Not easy

12. Please rate the usefulness of the pre-arrival resources you used by placing an "x" in the appropriate box.

	Essential	Useful, not essential	Not useful	Don't know/Didn't use
Pre-visit lessons				
Tips for a successful field trip				
Chaperone guidelines and responsibilities				
Meeting map				
Field trip logistics and timeline				
Learning objectives and alignment with state standards				
Pre-trip phone call with GNP ranger				
Post-visit lessons				

13. If you used pre- and/or post-visit lessons, please describe the ones which you found most useful.

Sample Ranger Evaluation of Class and How Day Went

United States Department of the Interior

NATIONAL PARK SERVICE
Glacier National Park
West Glacier, Montana 59936

IN REPLY REFER TO:

Dear_____:

Thank you for participating in the education program at Glacier National Park on _____.

We hope that the field trip provided your class with an opportunity to better understand the significance of their national park. As a follow-up we are sending all participating teachers this evaluation to help you better prepare for your next trip. This evaluation is intended to point out strengths as well as areas that need additional attention.

Students wore name tags and were properly dressed for the day.	
Snacks/lunches were organized for easy distribution and everyone assisted with lunch clean-up.	
There were an appropriate number of chaperones present.	
Chaperone(s) actively participated in supervising students.	
Pre-site class preparation was evident.	
Class behavior facilitated a positive learning environment.	

Additional comments:

Sincerely,

Park Ranger(s)

Lesson 4: Post-Visit

Forest Communities

Materials:

* *Tree Guides (listed under Procedure) Magnifying glasses*
* *Poster board*
* *Marking pens*
* *Scissors, Glue*

Vocabulary

Cone, conifer, key, leaf, needle.

Method

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

Objectives

Students will be able to
- Identify a number of native trees
- Understand how to use a key to identify a tree

MT State Science Standard

MT.SCI.K-12.3.5 Students, through the inquiry process, demonstrate knowledge of characteristics, structures and function of living things, the process and diversity of life, and how living organisms interact with each other and their environment.
- A proficient student will be able to create and use a basic classification scheme to identify plants and animals

Next Generation Science Standard

MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

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.

Procedure

1. Review the background information and stories in the introduction to this unit with the students.
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 ("Easy Field Guide To Trees Of Glacier National Park" by Dick and Carol Nelson and "Plants Of Waterton-Glacier National Parks And The Northern Rockies" by Richard J. Shaw and Danny On) to identify their specimens and to research their characteristics and habitat.
5. Have the students make leaf, cone, and needle displays. Discuss where the trees they identified might occur in Waterton-Glacier International Peace Park.

Evaluation

Quiz students with unlabeled plant specimens.

Extension

Have students, as a group project, make a field guide to tree shapes at a distance, using silhouettes.

Borrow the Fireworks Education Program Traveling Trunk for additional activities to learn about fire.

The Fire on the Land DVD from the Salish and Kootenai Tribes Fire History Project has wonderful resources about Native Peoples and Fire in the Northern Rockies.

Appendix

Additional Teacher Background Information

Fire

Fire is a powerful force of nature. Ignited by lightning or by humans, fires fascinate and frighten us. When conditions are dry and windy a wildland fire can race through a forest, cross meadows and jump rivers. Or it can simply creep along in the undergrowth. Humans have used fire and tried to control it from the earliest times. While burned trees may look stark and dead, they are evidence of a natural process that helps maintain a healthy forest. In many ecosystems fire is essential for the continued survival of both the plants and animals that live there. While loss of homes, property or human life is a tragedy to be avoided, fire is a beneficial force necessary to ensure forest succession.

The summer of 2003 was one of the most significant fire season in the history of Glacier National Park. After a normal winter snowpack, precipitation was below average from April through June (66% of normal), but more importantly, July, August, and early September brought almost no precipitation. This came on the heels of the 5th year of drought in northwest Montana. Approximately 136,000 acres burned within the park boundary, which was more than during the previous benchmark fire-year of 1910.

Seldom does everything burn within a fire perimeter. Some areas may be untouched by flames, while adjacent sections burn at a low to moderate severity. These areas will rejuvenate quickly. Other areas are fully engulfed, but will in time provide a vibrant habitat. The result is a dynamic blend of mixed severity burned and unburned forest called the forest mosaic.

Most animals, plants and trees in the Park have evolved with fire. Fire causes rapid change in a forest, creating openings that allow light to reach the forest floor where sun-dependent plants grow. Downed logs and duff on the forest floor are burned to ash, releasing nutrients back into the soil. Many flowering plants such as fireweed and lupine flourish after a fire. Older Ponderosa pine, western larch, and Douglas fir trees have thick bark that insulates the inner living tissue from the heat of a fire. Larch trees have additional fire adaptations. In an intense fire they can lose all their needles to the heat, and then can grow new ones and even replace burned branches along the bole of the tree. These survivors provide seed for reforestation. Other species depend on fire for reproduction. Lodgepole pines drop millions of seeds after a fire and produce vast stands of even aged trees, which can perpetuate a fire cycle on an 80-120 year rotation called a fire regime. Ponderosa pine germinates best on a mineral seedbed, which is provided by fire on a landscape scale.

It is rare for mammals to get caught in a fire. Larger animals are able to move out of the way and most small animals, amphibians and reptiles avoid fire by seeking refuge; i.e., in tunnels in the ground, under large downed logs, or in damp areas. Grazers (such as elk, rodents and ground squirrels) and browsers (such as deer and moose) find new habitat and succulent vegetation where only unpalatable plants grew previously. As these populations flourish, so do predators and scavengers. Birds that nest in cavities take advantage of dead snags and other birds thrive on the increase in insects found in decaying trees. Fire is a major ingredient in the ecology of the Northern Rockies just like the snow, the wind,

the rain, and other natural forces. Wildland fire is an essential component of this ecosystem and native plants and animals are well adapted to it.

Where dense tree canopies previously shaded the ground, fireweed, lupine, pinegrass, spirea and willows will thrive in the newly nutrient-rich soil, creating a high-contrast landscape of blackened bark, bright flowers, and green plants. Some plants will re-grow vegetatively from corms, stolons, root crowns, rhizomes, or bulbs that survived in the soil. Shrubs such as serviceberry and huckleberry re-sprout after a fire producing a more vigorous plant, which increases fruit production. Lodgepole pine, Douglas fir and spruce may produce huge quantities of seedlings during the first few years after a fire.

The diverse stands of forest seen throughout the park are in different stages of regeneration and every-day move one step closer to a time when they will once again be blackened. Glacier National Park has been described as one of the most intact natural ecosystems in the lower 48 states. Fire has played a dominant role in creating the rich biological diversity. Without fire, Glacier Park's character would be forever altered.

The following information is courtesy of the Crown of the Continent Research Learning Center

Wildlife Fire

A Heated History

Wildland fire has been an integral part of the western landscape for millennia. In Glacier National Park, as well as the rest of the West, fires are naturally ignited by lightening with a cyclic occurrence, and forest and grassland ecosystems are adapted to this periodic disturbance. Therefore, nearly every existing forest in Glacier has had fire course through once or multiple times, or, has replaced a previously burned forest, or has invaded open areas that fire may eventually reopen. Fire on the landscape creates a diverse mosaic of vegetation and associated wildlife. Glacier has fires every year which burn anywhere from less than an acre up to the 146,000 acres burned in 2003. Man's relationship with fire on the land has had a very heated history. Before European settlement of the West, Native Americans used fire in the region for a variety of purposes. And, even today, a large percentage of fires are also started by people, both intentionally and unintentionally. For more information about fire, visit the Crown of the Continent Research Learning Center's website.