



Unit III

Fire Management



National Wildlife Refuge System

1011 E. Tudor Road

Anchorage, Alaska 99503

<http://alaska.fws.gov/fire/role/>



Unit III: Fire Management Overview

Background

Important information for teachers

Ecosystem Model (2-6)

Students construct a mural to show the effects of different human activities on the environment

Why We Manage Wildland Fires (8-12)

Students research why wildland fires are managed in Alaska

How We Manage Wildland Fires (5-12)

Students will choose appropriate priorities for management under given fire scenarios

Material Handouts

*Scenario Cards

Mapping a Fire Plan (6-12)

Students develop their own fire management plan

Material Handouts

*Fire Protection Map

Defensible Space (4-12)

Students design a plan to provide a defensible space around their home

Material Handouts

*Defensible Space Checklist

Community Views on Fire (6-12)

Students will research local community view points regarding fire management

A Little Piece of Forest or Tundra (6-12)

Students describe the different opinions usually associated with forest management

Material Handouts

*Fire Policy Cards - Boreal Forest

*Fire Policy Cards - Tundra

*Fire Role Cards

Dilemmas in Fire Management (6-12)

Students discuss current fire management issues and the importance of making informed management decisions

Material Handouts

*Forest and Tundra Dilemma Background Information Sheet #1

*Forest and Tundra Dilemma Background Information Sheet #2

*Forest and Tundra Dilemma Background Information Sheet #3



FIRE MANAGEMENT

Background

WHAT IS NATURAL RESOURCES MANAGEMENT?

Natural resources management is the art and science of maintaining the benefits and values of forest, tundra, and other environments for present and future generations of people. The concept of management originated when people realized that uncontrolled human activities often led to undesirable consequences, such as shortages of wood, disappearance of fish and wildlife, alterations of local climates and water tables, disappearance of clear-flowing streams, flooding, and loss of soil through erosion. People slowly recognized that these consequences could be avoided if use of natural resources such as wildlife, timber, soil, and water was limited and managed.

Initially, management of natural resources focused on using trees and game animals as renewable resources. Trees and wildlife can be harvested then re-grown unlike non-renewable resources such as coal, oil, and gas. Regulations on wood cutting, logging, hunting, and trapping were the first tools of natural resource managers. Forest managers developed different methods for harvesting trees. They determined how to

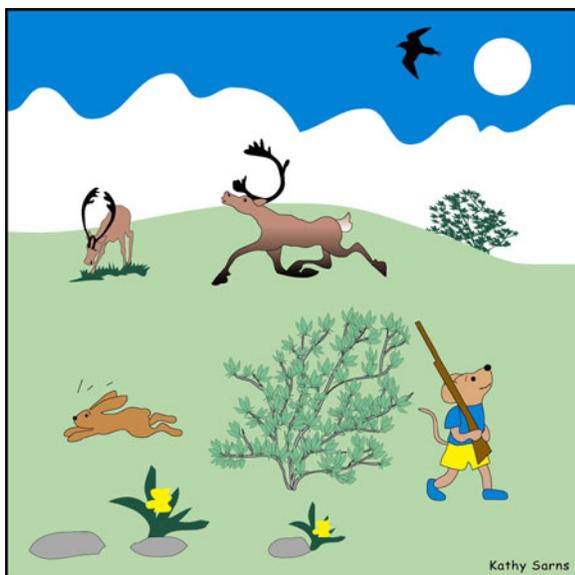
build logging roads to prevent erosion. They established guidelines and methods for the replanting of trees after logging (**reforestation**). Wildlife managers set up hunting and trapping seasons and established bag limits to ensure that enough animals survived to reproduce. To encourage people to follow forest and wildlife management regulations, public information campaigns were undertaken to make people more aware of the value of natural resources.

Over time, natural resource managers experimented with changing natural conditions to produce more of a given benefit from natural environments. The techniques used by managers to alter forest ecosystems included various harvesting techniques, the planting of certain species of trees, the application of insecticides and herbicides to reduce insect or selected plant populations, and fertilization of soils with synthetic nutrients. Wildlife managers have used similar techniques to increase wildlife populations.

More recently, natural resource managers have recognized fire as a valuable management tool. In the boreal forest and tundra ecosystems, fire is one of the few tools that managers believe can provide significant benefits.

WHY DO FIRES HAVE A "BAD" REPUTATION?

The use of fire for management is limited because few people recognize the beneficial effects of fire. Historically, both Native American people and European settlers used fires for cooking, heating, signaling, hunting, and combating insect pests. These fires sometimes escaped and burned surrounding forests and tundra. In addition, some people purposefully set fires to clear vegetation, drive game animals, or



provide a supply of dry wood. Little or no effort was made to prevent or control fires in North America until the early 1900s.

The growth of the logging industry and the beginnings of forest management led to recognition of the commercial value of trees. Fires were seen to destroy wood that might have been cut and sold. Fires caused losses of valuable natural resources, and because they often occurred near human habitation, they often destroyed homes and property. As lands were settled, fires threatened more homes and businesses. Soon, natural resource managers, loggers, and others began to pressure governments to suppress fires to prevent loss of human-made and natural resources.



Smoky Bear and his message "Help Prevent Forest Fires" are known across the nation. His message is directed at human-caused fires. Fire management policy, until recently, has encouraged suppression of all fires.

This policy extended to the boreal forest and tundra of Alaska. Less than one-fifth of the boreal forest contains commercial quantities of wood. Much of this is in remote areas where harvest and transport of the wood to markets is not feasible. Complete fire suppression has never been justified in Alaska either for human safety or

protection of valuable resources, but the public and governments nevertheless have adopted a policy of putting out all fires.

WHY NOT PUT ALL FIRES OUT?

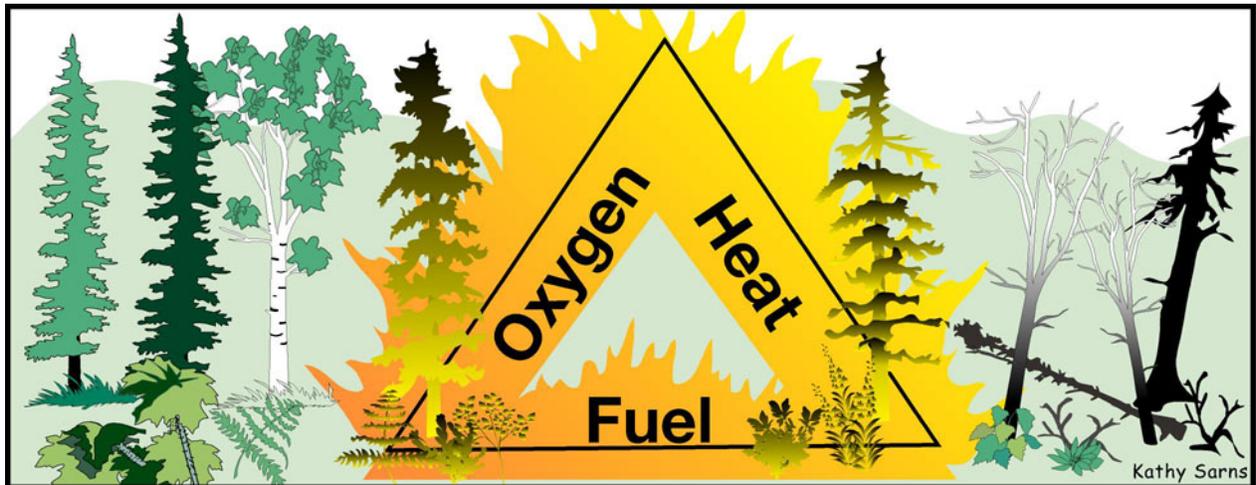
Ironically, as manpower, dollars, and the technology to fight fires increased, the science of ecology began to reveal the natural role of fire in some ecosystems, such as the boreal forest and tundra. Left undisturbed by fire, natural succession in the boreal forest leads to an old growth forest. Some research suggests that black spruce/feather moss stands are the final stage of succession in the boreal forest (see page 13 on Succession), even on well drained soils. This forest type is the least productive of all boreal forest types. Tree growth is minimal, and this forest type supports relatively few kinds of wildlife. Extensive stands of black spruce/feather moss provide little variety in wildlife habitat, little wood, and few berries, mushrooms, or other forest products. (See page 86 "How do fires in the boreal forest affect wildlife populations?")

Understanding the role of fire in the boreal forest ecosystem led to recognition that fire was needed to maintain the vegetative mosaic providing habitat for wildlife and benefits for people. This led to the realization that suppression of all fires was not always necessary and could be harmful in the long term.

Scientists and natural resource managers began to press for changes in public fire policies as they recognized these problems. Today, public views about fires are in transition. It is difficult for many people to understand that some fires are necessary and beneficial after years of hearing that fires are harmful. In addition, established fire fighting programs are slow to change.



WHAT UNEXPECTED EFFECTS HAVE RESULTED FROM FIRE SUPPRESSION?



A fire must have three things in order to burn: oxygen, heat, and fuel. Oxygen is not limited in most cases, and lightning is a common heat source. Thus, the amount and condition of available fuel is the most important variable in determining whether or not a fire will burn and how far and fast it will spread. Fuel that feeds a fire includes live and dead trees, shrubs, and the organic mat on the soil surface. In tundra, trees are generally absent, so fire is fueled by grasses, sedges, shrubs, and the organic mat.

Natural resource managers are still trying to gain a better understanding of the complex relationships between fuel accumulation, forest succession, and fire. Some scientists and managers think that fire suppression in the boreal forest may inadvertently increase fire danger. Fires burn in a patchy pattern. They burn intensely in sites with high fuel build-up, but only lightly in places where little fuel has accumulated. Repeated light fires can prevent accumulations of fuel. As a result, the fires that occur have less fuel to feed them and tend to burn smaller areas more lightly.

Unfortunately, fire suppression allows high accumulation of fuels and can sometimes lead to explosive, fast-moving, high intensity fires that consume large areas of forest.

Recovery of vegetation and wildlife following a high intensity fire is less predictable and requires more time than following a light fire. Soils are damaged in heavily burned sites, which further slows revegetation.

Scientists have found that some sites supply more fuel for fires than others. For example, mature spruce forest stands, particularly black spruce stands, are more likely to catch fire and tend to burn faster and hotter than young forests dominated by aspen and birch. Similarly, fires are more likely to ignite and burn hotter and faster in forest sites where insect outbreaks or other events have killed trees and created a supply of dry fuel. However, in some instances a young spruce forest with dense stands of trees may burn faster and hotter than an old forest with widely spaced trees. Resource managers need more information on the complex relationships between fire behavior and forest age.

Recognition that fires, fuel build-up, and plant and wildlife succession are interrelated has led resource managers to realize that fire is not only natural, but also a necessary part of the boreal forest ecosystem. Its role in the tundra is less understood, but it is apparent that fires are also a natural part of some tundra environments.



WHAT ARE THE OTHER COSTS OF FIRE SUPPRESSION?

In the boreal forest, absence of repeated fires may lead to gradual, but steady, declines in the abundance of some kinds of wildlife, forest wood production, and the scenic beauty of the forest mosaic. The effects of complete fire suppression on tundra productivity are less clear.

In boreal forest areas, complete fire suppression has other potential long-term costs. In the absence of repeated fires, dead trees, branches, and other organic matter can accumulate. This sometimes creates conditions for the kind of explosively hot, fast moving fire that fire fighters cannot stop or control. This type of fire is the most expensive to fight, burns the greatest acreage, and is most likely to cause losses of property and human life. Heavily burned sites also take longer to recover. Thus, complete fire suppression may lead to greater and longer-term economic hardships than a management policy that recognizes the natural role of fire.

Fire suppression has other negative consequences in both the boreal forest and tundra. Fire suppression techniques include the cutting of fire lines and spraying of fire retardants. In some cases, these suppression activities have caused more severe damage than the fire being fought. Construction of a fire line involves removing the vegetation and scraping the soil surface down to the mineral layer. This line helps stop fire from spreading by depriving the advancing fire of fuel. However, on permafrost soils, fire lines reduce the insulation of the soil. This can lead to melting of the permafrost and severe erosion problems. Erosion ditches 16 to 33 feet (5 to 10 m) deep have resulted from fire lines even on relatively gentle permafrost terrain, and in some cases erosion has continued for 10 years or more after the fire. Fire lines constructed using bulldozers, other heavy equipment, and fire line explosives are the most damaging. In tundra areas, the effects of a fire may only

be visible for 6 to 8 years, but the effects of fire suppression may be visible for decades or even centuries.

Fire retardants can also damage boreal forest and tundra ecosystems. When these are dumped in or near water, they can kill fish and other aquatic organisms. In places where people rely on fish resources, the damage to fish habitat may be more serious than fire damage. Fire suppression crews can also cause damage. They may be pushed for time and working under less than optimum conditions and sometimes leave behind litter and camps, which reduce the quality of the lands where they worked.

In any case, complete fire suppression is really not possible. Despite a policy of complete fire suppression between 1940 and 1980, over 4000 lightning-caused fires occurred and burned over 18 million acres of Alaska forest and tundra. Fire management is the only rational and feasible course of action.

HOW CAN FIRE BE USED AS A MANAGEMENT TOOL?

Rather than viewing fire as the enemy, land and resource managers today see fire as a useful and effective tool for habitat enhancement and increasing the yield of valuable forest and tundra products (such



as wood, berries, mushrooms, wildlife, furs, and meat) and benefits.

Using fire to increase the yield of wood from the boreal forest may seem illogical, but fire can do this in some places by enriching the soil with nutrients, raising soil temperatures, and by clearing out dense stands of old, slow growing trees. By managing the timing of fires, forest managers may be able to affect the kinds of trees growing on a given site and increase their rate of growth. Fires also dry out standing wood and can create a temporary, valuable source of dry firewood in accessible areas.

Fires can be used to increase yields of blueberries, raspberries, and other species. These berry plants often flourish in burned areas due to increased nutrients, reduced competition, and shading by other plants. Increased berry production has been observed following fire in both forest and tundra areas. In the lower 48 states, fire is a common management tool used to increase blueberry production.

Fire can also be used to manage wildlife populations, particularly in the boreal forest. The abundance of wildlife in an area will likely drop immediately following fire. However, the numbers of some species generally recover in a few years. Many species return in greater numbers than existed before the fire. Yields of furs and meat can be increased by fire, since a variety of furbearers and game animals, such as marten, foxes, and moose, find ideal feeding habitat in the early stages of forest succession. Waterfowl and aquatic furbearer populations can also benefit from fire because fires increase nutrients and can help form wetlands and ponds in both forest and tundra areas (see Table 2).

Fire can also be used in some circumstances to reduce insect damage to trees. By burning dead and down trees in regions where bark beetle outbreaks are occurring, fires can help reduce insect habitat. This could potentially reduce insect

attacks on otherwise healthy trees. This insect control method has been suggested as an alternative to the use of pesticides.

When natural fires are considered to be beneficial to resources, fire managers may designate the fire(s) for management as **Wildland Fire Use**. Management on these fires is focused on public safety by directing fire away from homes and communities. These fires burn under natural conditions producing benefits for many wildlife and plant species. Remember that fire is a natural ecological process of change in Alaska. See Units I and II for information on how fire affects different wildlife and plant species.

WHO IS IN CHARGE OF MANAGING FIRES?

Recognition of fire as a management tool in Alaska has grown over the past 20-35 years. Meetings between agencies, natural resource managers, scientists, and the public gradually led to the adoption of an updated fire management policy and plans.

The Alaska Wildland Fire Coordinating Group (AWFCG) oversees the coordination and direction of the interagency wildland fire management efforts in Alaska. The AWFCG has completed the long-term project to amend the 13 Area Specific Alaska Interagency Wildfire Management Plans into one plan. This effort was undertaken to eliminate the need to refer to three documents to fully understand wildland fire operations in Alaska, to incorporate operational changes, to clarify the language of the plan and to update terminology. The organization of the original area-specific plans required most local land managers/owners to use their local interagency fire management plan and refer to the **Alaska Interagency Fire Management Plan**, Tanana/Minchumina Plan and the 1984 amendment to the interagency plans. The 1998 amendment entitled, "Alaska Interagency Wildland Fire Management Plan" provides the land owners/managers one document to guide



their management options, responsibilities, and operation of wildland fire management in Alaska. This makes it much easier for Alaska fire suppression organizations to deploy their limited resources in the heat of battling wildfires.

The 1998 amendment contains the common elements of the area-specific plans. It does not change the intent of the area-specific plan nor does it change any landowners'/managers' fire management option selections or any fire protection option boundaries. The landowners'/managers' responsibilities and ability to determine how fire will be managed on their lands has not changed.



Other than having one document to use, there should be no noticeable change to the land owners/managers. The Coordinating Group is made up of representatives from federal agencies, the State of Alaska, Alaska Native organizations, and local governments. The Alaska State agencies involved include the Department of Fish and Game (ADFG), the Department of Natural Resources (ADNR), and the Department of Environmental Conservation (ADEC). The federal agencies involved include the US Fish and Wildlife Service (USFWS), Bureau of Land Management (USBLM), the National Park Service (USNPS), and the Forest Service (USFS), the Bureau of Indian

Affairs (USBIA). Specific native organizations as of 1999 are Chitin Village Traditional Council, Chugachmiut Inc., and the Tanana Chiefs Conference.

WILDLAND FIRE MANAGEMENT OPTIONS

Lands are divided into four fire protection categories called Management Options based on the resource values to be protected, as determined by the respective landowners and managers. When fires do occur, the Alaska Fire Service (sponsored by USBLM), ADNR Division of Forestry, and USFS are jointly responsible for providing suppression services.

1. Critical Management Option - This category is assigned to lands where human lives and property require that immediate, top priority fire protection be provided. Fires on these lands will be given unquestioned priority in the allocation of fire fighting funds, manpower, and equipment. Fires will be immediately and aggressively suppressed.

2. Full Management Option - Areas in this category include lands with high cultural or historical values or other resource values that landowners or managers determine to need fire protection. These lands are generally uninhabited. On lands classified for full protection, all fires will be aggressively fought throughout the fire season.

3. Modified Management Option - This category can serve as a buffer area between Full Protection and Limited Action areas. It includes lands where fire protection is needed during critical burning periods (unusually dry months), but where fires are otherwise desirable. On these sites, immediate fire fighting action is taken if conditions indicate that a large fire could occur (generally during the first and drier part of each fire season). If the fire cannot be contained the first day, an escaped fire situation analysis (EFSA) will be made to determine levels of continued action. When the danger is deemed low due to wetter



conditions, no initial attack is made on new fire starts, and these lands are treated much like those in Limited Action areas. This generally occurs later in the fire season, historically after July.

4. Limited Management Option -This category recognizes those areas where a near natural fire regime is desirable, or where the resource values at risk are worth less than it would cost to launch a fire fighting effort. On these lands, fires are only monitored unless they threaten lands in other higher-valued categories or critical sites within the area. Suppression action then will be taken if the responsible land management agency deems it necessary.

WHO USES THESE MANAGEMENT OPTIONS?

The Alaska Fire Service, the US Forest Service, and the State of Alaska use these land categories as fire suppression guidelines. These agencies use the land categories to determine the appropriate kind of suppression response required when a fire is detected. Because land-ownership, settlement, and resource values may change, the fire protection categories contained in the plan are reviewed on an annual basis.

WHY IS THE ALASKA INTERAGENCY WILDLAND FIRE MANAGEMENT PLAN IMPORTANT?

The plan provides a method for fire-fighting agencies to allocate limited manpower and money. This allows them to place the manpower and money where it is needed most to fight fires that threaten human life and property and, secondarily, cultural, historical, and other valuable resources. The ability to wisely allocate fire-fighting efforts is likely to become more important in the future since both federal and state moneys to fight fires are likely to decline. Federal revenues may decline due to the national deficit and competition with other federal programs for scarce funds. State revenues are expected to decline along with

oil revenues. Thus, Alaskans must have a



means of wisely allocating funds to ensure adequate fire protection where it is most needed.

The fire management plans also allow the possibility of returning fire to its near natural and valuable role in parts of the boreal forest and tundra. All federal agencies will identify important resources that must be protected, and fight fire in those areas. The fires on lands with no identified important resources will normally not have natural fires suppressed. This is necessary to ensure that these ecosystems continue to provide the many products and benefits that they provide today. Along with the desire to reduce fire suppression costs, this may be a primary goal of land and resource managers.

FIRE MANAGEMENT AND PEOPLE

Recognition of the important natural role of fire and its potential as a management tool has led to changes in fire management policies. But fire management remains a complicated issue. In the absence of people, naturally occurring fires would maintain the boreal forest and tundra mosaics without need for management. But people live, work, and recreate in these environments. Fire management policies must take into account not only the



ecological effects of fire, but also the effects on the people who use these environments.

For people who learned that all fires are harmful and have become accustomed to a policy of putting out all fires, the new fire management policy may seem confusing. And, despite the great change in public policy toward fires, the media continues to report both the number of acres "lost to" or "destroyed by" fire each year and the millions of dollars spent to "fight" fires. These reports help maintain a public misconception that fires are destructive, harmful, and costly--in other words, bad. This simplistic view of fire and its effects must be replaced by a fair assessment of the costs and benefits of both the natural role of fire and fire suppression over the short and long term.

WON'T LIVES AND PROPERTY BE THREATENED IF FIRES ARE NOT SUPPRESSED?



The most important potential cost of fire is the threat posed to human lives and property. As illustrated by the Alaska Interagency Fire Management Plans, everyone agrees that all fires in areas where human lives and property are threatened must be given immediate priority and full attention when allocating fire-fighting resources. The Alaska Interagency

Fire Management Plans actually increase the amount of protection and fire suppression in populated areas because human and equipment resources that might once have been used in remote Limited Management Options now can be dedicated to Critical and Full Management Options.

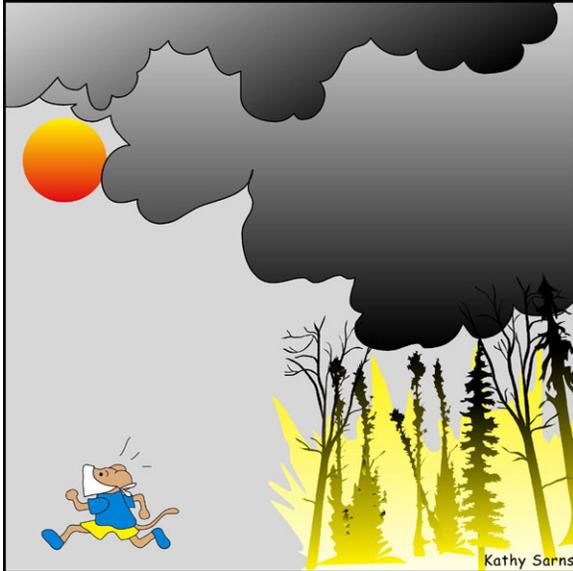
The Alaska Interagency Fire Management Plan ensures that Critical Management Options, where human lives and property are threatened, receive complete, top priority attention in the allocation of fire-fighting funds and manpower.

WON'T ALLOWING SOME FIRES TO BURN CREATE MORE SMOKE?

The tremendous amount of smoke generated by wildland fires is undesirable, but unavoidable. Often clouds of smoke, even from distant fires, drift or are blown into towns and villages. This smoke can greatly reduce visibility, which detracts from the scenic qualities of Alaska. Occasionally, thick smoke can interrupt small plane service to remote villages and towns. Thick smoke can also interfere with fire detection and suppression activities. Residents and visitors dislike breathing smoke and the eye irritation smoke sometimes causes. Thick smoke can cause temporary breathing problems for the very young and old. This occasionally requires that these people be evacuated from the area. For all these reasons, people often express concern about the smoke generated by fires.

Concerns regarding fire smoke are valid, but the problem is more of a temporary irritation to people than a threat. Wildland fire smoke consists mainly of carbon dioxide and water vapor. These are not considered pollutants since both are natural components of the air. The ash in smoke causes the most serious problems. Ash laden smoke irritates eyes, causes breathing difficulties for some people with existing health problems, and reduces visibility. In general, however, smoke does not pose a serious danger to health.





Other chemicals in smoke include carbon monoxide, nitrous oxide, a variety of hydrocarbons, and ash (or particulates). High concentrations of carbon monoxide, a dangerous and potentially lethal gas, have been found in the active part of some fires. Concentrations of this gas decrease rapidly in all directions from the fire, however, so it only threatens people and wildlife in the immediate area of the fire. Nitrous oxide, a component of photochemical smog which results in damaging compounds such as ozone, can be caused by fire as it is formed when air temperatures exceed 2800 r (1538oc). The amount of nitrous oxide formed by wildland fire does not appear significant.

Hydrocarbons result from the burning of the volatile oils, waxes, and resins in forest and tundra plants. The amount of hydrocarbons released by fires does not appear to be an important factor affecting air quality.

Smoke reduction cannot necessarily be achieved by attempting to put all fires out. In some cases, attempts at fire suppression may change a hotly burning fire that produces little smoke into a cool smoldering fire that produces great clouds of thick smoke. Suppression of small fires during low fire years may inadvertently create

conditions for a disaster fire that produces more severe smoke problems another year. Fires in Alaska's boreal forest can only be postponed; they can never be entirely prevented or suppressed.

HOW DO FIRE MANAGEMENT PLANS AFFECT FIRE FIGHTING COSTS?

Fire suppression costs Alaska and the federal government millions of dollars each year; fire suppression is an expense to everyone. In 1988, which was a particularly heavy fire year, the cost of fighting fires in Alaska was over \$29 million dollars. When many fires are burning, not enough manpower, equipment, or money exists to fight all fires. The Alaska Interagency Fire Management Plan addresses this problem by providing a reasonable method for allocating limited suppression funds and manpower. Clearly, when money and manpower are in short supply, control efforts should focus on fires that threaten lives, homes, or valuable resources rather than on fires burning in wild areas where no people live and where existing forest resources cannot be harvested or are rarely used.

In the long term, the Alaska Interagency Fire Management Plan should reduce fire-fighting costs. By allowing wildland fires to burn in Limited Management Options and reduce fuel loads in those areas, it also reduces the danger of large fires in the future. Unfortunately, since fire suppression has been practiced in the past 40 years, high fuel loads currently exist in some areas. Fires in Limited Management Options can, and have sometimes, moved into areas where fire suppression is required. Since it is less expensive to attempt suppression or control of a small fire, the limited action response can, in some circumstances, lead to higher fire fighting costs in the short term.



WHAT ABOUT FIREFIGHTER JOBS?

The money expended by governments to fight fires is paid to individual firefighters and to support services providing aircraft, equipment, housing, and food to firefighters. In heavy fire years, many fire fighting crews are employed. This brings a substantial cash flow into some communities. It is particularly important in some remote towns. Under the Alaska Interagency Fire Management Plan, fire fighting jobs and income will continue to flow into Alaska's towns and villages because many fires will still need to be fought. The Alaska Interagency Fire Management Plan has been in place since 1984, yet millions of dollars are still spent every year for fire suppression.



In addition, the Alaska Interagency Fire Management Plan calls for increased use of pre-fire suppression which provides work for firefighters, even in low fire years. Pre-fire suppression techniques include the construction of fire breaks around critical zones or the use of prescribed fires (fires planned, ignited, and controlled by land managers) to reduce heavy fuel loads in selected areas. Construction and maintenance of fuel breaks and prescribed fires will be conducted in years when fire danger is low. Typically, fire fighting income is highly variable and unpredictable

because the number and size of fires varies widely from year to year.

Fire fighting jobs are not threatened by the Alaska Interagency Fire Management Plan. In contrast, pre-fire suppression activities, which are necessary for effective fire management, will need to be conducted regularly. In the long run, the Alaska interagency Fire Management Plans should help provide firefighters a more reliable source of revenue.

WHAT ABOUT THE RESOURCES IMPACTED BY FIRES?

Fires do not destroy the boreal forest or tundra ecosystems, they only change the successional pattern. Some of the changes are negative, but many are beneficial to wildlife and people. Immediately after a fire, the blackened land provides little in the way of berries, game animals, or furbearers. It also offers few scenic values or recreational opportunities. These changes can cause severe, though temporary, hardships to the people who depend on the natural resources for their livelihoods. Hunters, trappers, and tourist guides may be affected.

But the negative economic effects of fire are counter-balanced by many beneficial effects. Even in the short-term, forest fires can benefit communities by leaving scorched trees. These provide needed dry fuel, seasoned logs for building, and jobs for woodcutters. Recovery of vegetation in a burn site may take 1 to 10 years depending on the impact and location of the fire. Once a site recovers through natural plant succession, berry-producing plants and populations of moose, hares, and furbearers are likely to be far greater than before the burn; fires often create better berry-picking, hunting, and trapping opportunities for residents and tourists. Fires are necessary to ensure the continued productivity of the boreal forest and some tundra areas. Even though fires may cause temporary economic hardship for some people and

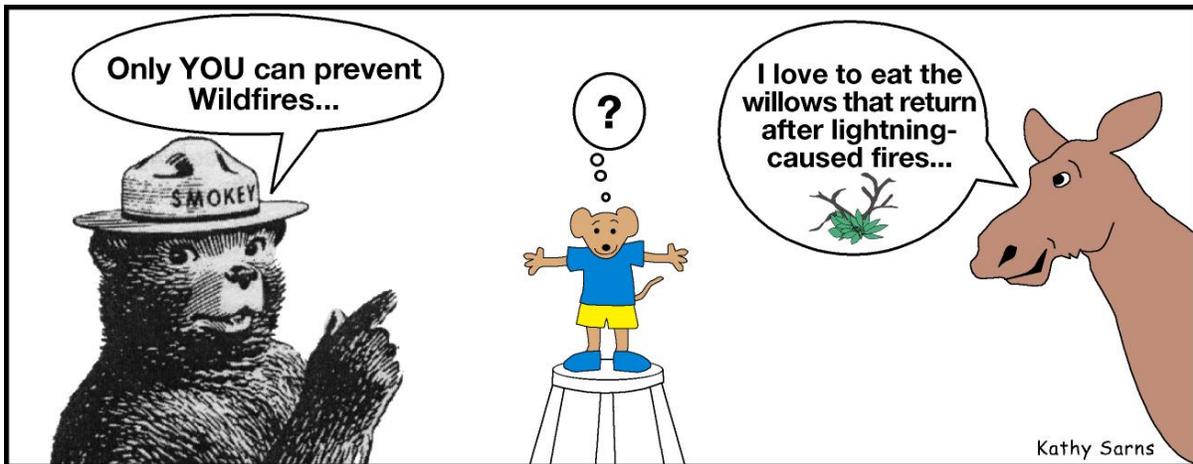




communities, the long-term effects of fire must be considered beneficial.

WHAT SHOULD WE DO?

If we wish to maintain the benefits and products of the boreal forest and tundra, we must recognize that fire is a natural and necessary part of these ecosystems. To fairly evaluate the costs and benefits of fire, we must take into account both the short-term and long-term effects of fire and fire suppression. We must be sensitive to the needs of individuals and communities, now and in the future. The Alaska Interagency Fire Management Plan is a tool that helps land and resource managers make the difficult, but necessary decisions about when and where to allow or suppress fires. Public understanding and support of fire management are needed if fire is to be restored to its natural role in Alaska's boreal forest and tundra ecosystems.



ECOSYSTEM MODEL



Grade Level: 2-6

Alaska State Content Standards: Art A-5; Language Arts A-1; D-1a; Geography C-1, E-3, E-4, E-5, Government G-3

Subject: Science, Geography, Government

Skills: Analysis, Comparison, Description, Generalization, Problem-Solving

Duration: 2 class periods

Group Size: 2

Setting: indoors

Objective

Students describe different uses and their effects on the ecosystem.

Teaching Strategy

Students construct a mural to show the effects of different human activities on the environment.

Materials

- Paper and pencil
- Large white butcher paper
- Construction paper

Teacher Background

The different ecosystems of Alaska are important to people economically and aesthetically. Although people use wood to heat and build homes, only 1/5 of the interior boreal forest has commercial value. Some of this wood may be gathered from the streams or the ocean. Plants are gathered for food and animals are harvested for fur. Recreationists enjoy the

aesthetically pleasing settings that a variety of ecosystems provide. Sometimes human activities can be detrimental if the resources and activities are mismanaged.

Each ecosystem provides important habitat for wildlife of many kinds. From small invertebrates to large mammals and birds, these areas provide the food, water, shelter, and space wildlife needs to thrive.

In Alaska one of the most common natural forces that changes natural systems is lightning caused fire. Scientists now understand the beneficial effect fires have on habitat and wildlife. Fire removes dead brush and trees, creates new browse for animals, and diversifies habitat, in turn, attracting a greater diversity of animals.

All ecosystems have renewable resources that are affected by natural and human forces. Resource management acknowledges these forces and strives to



maintain healthy and productive ecosystems.

Procedure

1. Students will construct a large mural on a bulletin board or wall. Younger students may want to use a felt board. Make a list of tasks that must be accomplished to complete the mural and assign these tasks to student groups. Using construction paper, have some students cut out trees, streams, other plants, and wildlife (these can be taped to the mural). Other students can draw and color features like the sun, sky, and water directly onto the mural.
2. Brainstorm with students the activities of different resource users (loggers, miners, homesteaders, land developers, hunters, trappers, berry pickers, photographers, etc.). Try to think of one for each two students in the class. Write each on a piece of paper, fold it up, and place them all in a box or bag.
3. Divide the class into pairs and have each pair draw a paper from the box. Allow the students time to discuss how their resource user would affect the forest. Although students may stereotype users, it is important to point out that people are individuals and that not all users of one type will act in the same manner.
4. Each pair presents to the class how the actions of their resource user would affect the ecosystem. Students use the mural to illustrate their presentation and may remove ecosystem components (trees, wildlife, etc.) from the mural. If the ecosystem becomes depleted of resources after several presentations, have the class discuss why this happened. You may need to reassemble the mural to complete the presentations. After all the presentations have been made, ask the students if there are unlimited resources for us to use.

5. The teacher selects 3 users and asks the class to discuss how these three might work together to use the same ecosystem without destroying it. Conclude the activity by discussing the fact that the public owns most of Alaska's lands.

Evaluation

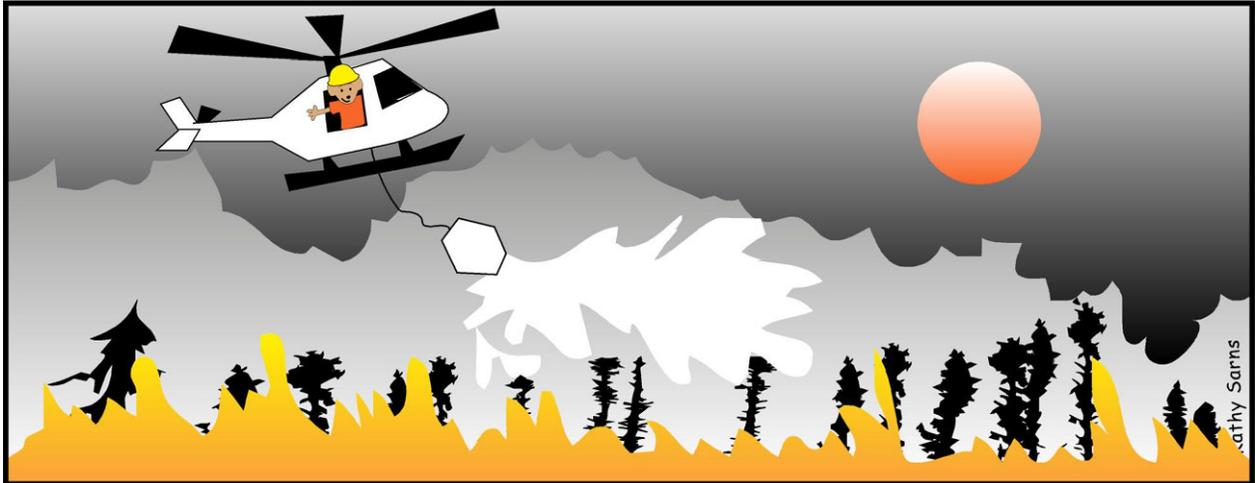
Have students pretend that he/she is a land manager. Have them write about how they would manage the land that has all the users brainstormed in the activity.

Extensions

Invite a local land manager to the class to talk about fire management.



WHY WE MANAGE WILDLAND FIRES



Grade Level: 8-12

Alaska State Content Standards: Geography E-5; E-6; F-3; Government G-2, G-3; Language Arts A-1; Science G-1

Subject: Geography, Government

Skills: Research

Duration: 2 class periods

Group Size: 1-2

Setting: indoors

Vocabulary: Interagency Fire Management Plan, Alaska Wildland Fire Coordinating Group

Objective

Students list the reasons why wildland fires are managed in Alaska.

Teaching Strategy

Students research why wildland fires are managed in Alaska.

Materials

- Internet and/or library access

Teacher Background

Refer to the background material at the beginning of Unit III.

Procedure

1. Ask the students what would happen in Alaska if the wildland fires were not managed? Brainstorm and list their ideas.
2. Either individually or in pairs, have students research the history of wildfires

in Alaska and why the state now manages these fires. Also have them research why the state organized the Alaska Wildland Fire Coordinating Group and the Alaska Interagency Wildland Fire Management Plan.

3. Students complete their assignment with a written report.
4. Share reports and discuss.

Evaluation

Use step #3 in the Procedure section as an assessment.



HOW WE MANAGE WILDLAND FIRES



Grade Level: 5-12

Alaska State Content Standards: Geography E-5, F-3; Government G-3

Subject: Geography, Government

Skills: Application, Comparison, Description

Duration: 1 class period

Group Size: 4

Setting: indoors

Vocabulary: Alaska Interagency Wildland Fire Management Plan, critical management option, full management option, modified management option, limited management option.

Objective

Students will be able to explain how Wildland fires are managed in Alaska based on the Alaska Interagency Fire Management Plan

Teaching Strategy

Students will choose appropriate priorities for management under given fire scenarios.

Materials

- How We Manage Fires scenario cards

Teacher Background

Managers have to make difficult decisions when fire suppression resources are in short supply. They must prioritize fires and

associated costs even if a fire is in a management option dictating immediate suppression.

Fire Management Options

Lands are divided into four fire protection categories or Management Options based on the resource values to be protected, as determined by the respective landowners and managers. When fires do occur, the Alaska Fire Service (sponsored by USBLM), ADNR Division of Forestry, and USFS are jointly responsible for providing suppression services. The four categories include:

1. **Critical Management Option** - This category is assigned to lands where human lives and property require that immediate, top priority fire protection be provided. Fires on these lands will be given unquestioned priority in the allocation of fire fighting funds, manpower, and equipment. Fires will be



immediately and aggressively suppressed.

- 2. Full Management Option** - Areas in this category include lands with high cultural or historical values or other resource values that landowners or managers determine to need fire protection. These lands are generally uninhabited. On lands classified for full protection, all fires will be aggressively fought throughout the fire season.



- 3. Modified Management Option** - This category can serve as a buffer area between Full Protection and Limited Action areas. It includes lands where fire protection is needed during critical burning periods (unusually dry months), but where fires are otherwise desirable. On these sites, immediate fire-fighting action is taken if conditions indicate that a large fire could occur (generally during the first and drier part of each fire season). If the fire cannot be contained the first day, an escaped fire situation analysis (EFSA) will be made to determine levels of continued action. When the danger is deemed low due to wetter conditions, no initial attack is made on new fire starts, and these lands are treated much like those in Limited Action areas. This generally

occurs later in the fire season, historically after July.

- 4. Limited Management Option** - This category recognizes those areas where a near natural fire regime is desirable, or where the resource values at risk are worth less than it would cost to launch a fire fighting effort. On these lands, fires are only monitored unless they threaten lands in other higher valued categories or critical sites within the area. Suppression action then will be taken if the responsible land management agency deems it necessary. Limited Action areas are usually found in the remote parts of the state, far removed from any human development.

These fire plans are followed whenever possible. During severely dry years there may be so many fires that not all can be fought at their designated level due to lack of manpower or funding.

Procedure

- Review that areas of the state are managed for wildfires differently. Discuss why. See the Teacher Background section for more information.
- Explain to the students that they will be working in teams of 4 to prioritize wildfire scenario cards. The team must decide which wildfire scenarios should receive the highest priority – where should those limited suppression resources be sent? Refer to the Teacher Background section for more information.
- Divide the class into teams of 4. Give each team a set of scenario cards and have them prioritize the cards from highest to lowest suppression priority.
- Have groups compare their answers and discuss.

Evaluation

Use steps 3 and 4 in the procedure section as the evaluation.



How We Manage Wildland Fires

Scenario Cards

Scenario 1

A wildfire has begun 50 miles northwest of Fairbanks. The area burned in 10 years. The last month has been very wet with frequent thunderstorms. There are no villages or historic sites within a 30 mile radius.

Scenario 2

A low intensity surface fire is burning in a remote area. The only property at risk is a single cabin about 5 miles from the fire. It is not inhabited and hasn't been for years, although it is privately owned.

Scenario 3

A high intensity wildfire is burning in the tundra. There are no cabins, historic sites, forests, or villages within a hundred mile radius. The weather has been warm and dry, but rains are predicted within the week.

Scenario 4

A wildfire is burning 5 miles west of a heavily forested area considered to be commercially valuable, but which is not slated for harvest any time soon.

Scenario 5

A wildfire has begun 3 miles east of Ninilchik in bug-killed spruce. The last 2 months have been extremely hot and dry. Erratic thunderstorm winds are predicted.

Scenario 6

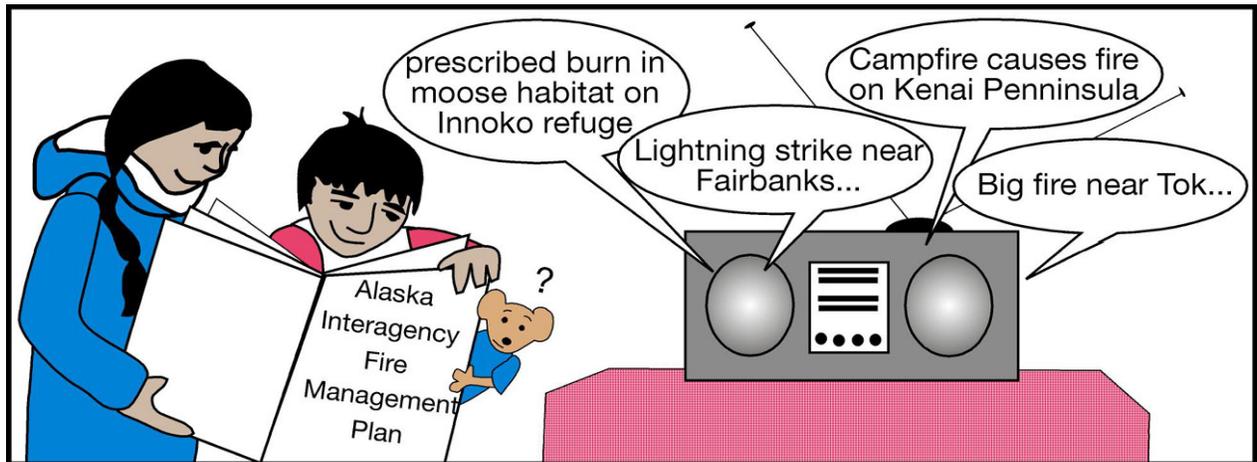
A high intensity tundra fire is burning 20 miles east of Nome.

Scenario 7

A wildfire of extreme intensity is burning 30 miles south of Kiatuk. The fire is very close to an area that is presently uninhabited, but contains fish site cabins used every July by those living in Kiatuk.



MAPPING A FIRE PLAN



Grade Level: 6-12

Alaska State Content Standards: Geography A-1, E-4, E-5, E-6, F-3; Government G-3; Language Arts C-1, C-5, D-1 (a-d); Science E-1.

Subject: Geography, Government

Skills: Description, Evaluation, Generalization, Problem-Solving

Duration: 1 class period

Group Size: individual

Setting: indoors

Vocabulary: The Alaska Wildland Fire Coordinating Group (AWFCG), critical management option, full management option, modified management option, limited management option

Objective

Students describe fire management plans and the criteria used to develop them.

Teaching Strategy

Students develop their own fire management plan.

Materials

- Fire Protection Map included in this activity, or a USGS topography map of your area
- Markers

Complementary Activities:

You Decide! (page 231)

Advanced Preparation

To obtain a USGS topography map of your area, call 1-888-ASK-USGS.

Teacher Background

Refer to background material at beginning of Unit III.

Wildfire Management Options

Lands are divided into four fire protection categories or Management Options based on the resource values to be protected, as determined by the respective landowners and managers. When fires do occur, the Alaska Fire Service (sponsored by USBLM), ADNR Division of Forestry, and USFS are jointly responsible for providing suppression services. The 4 categories include:

1. Critical Management Option -This category is assigned to lands where human lives and property require that immediate, top priority fire protection be provided. Fires on these lands will be given unquestioned priority in the allocation of fire-fighting funds, manpower, and equipment. Fires will be immediately and aggressively suppressed.



2. Full Management Option - Areas in this category include lands with high cultural or historical values or other resource values that landowners or managers determine to need fire protection. These lands are generally uninhabited. On lands classified for full protection, all fires will be aggressively fought throughout the fire season.

3. Modified Management Option - This category can serve as a buffer area between Full Protection and Limited Action areas. It includes lands where fire protection is needed during critical burning periods (unusually dry months), but where fires are otherwise desirable. On these sites, immediate fire fighting action is taken if conditions indicate that a large fire could occur (generally during the first and drier part of each fire season). If the fire cannot be contained the first day, an escaped fire situation analysis (EFSA) will be made to determine levels of continued action. When the danger is deemed low due to wetter conditions, no initial attack is made on new fire starts, and these lands are treated much like those in Limited Action areas. This generally occurs later in the fire season, historically after July.

4. Limited Management Option - This category recognizes those areas where a near-natural fire regime is desirable, or where the resource values at risk are worth less than it would cost to launch a fire fighting effort. On these lands, fires are only monitored unless they threaten lands in other higher valued categories or critical sites within the area. Suppression action then will be taken if the responsible land management agency deems it necessary. Limited Action areas are usually found in the remote parts of the state, far removed from any human development.

These fire plans are followed whenever possible. During severely dry years there may be so many fires that not all can be fought at their designated level due to lack of manpower or funding.

Procedure

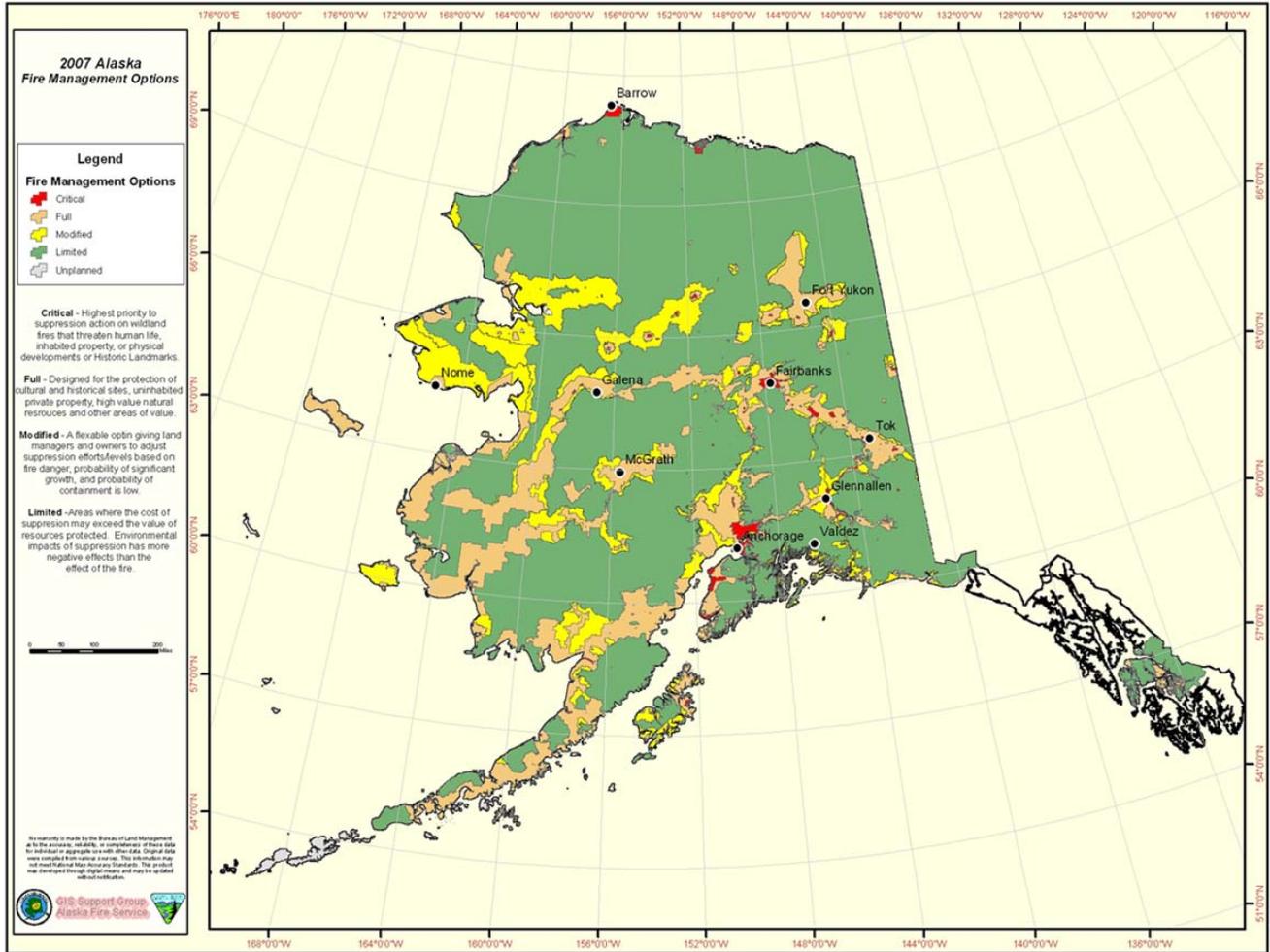
1. Write brief summaries of each fire management category on the board, or make an overhead, for the students to use for reference. For each category assign a color code for groups to use to mark their maps.
2. Divide the class into groups of 4-5 students and give each group a copy of the Fire Protection Map, or a USGS topography map (1: 63,360) of your area. Each group should assign its members responsibilities (one student records, one student leads the discussion, all participate using quiet voices).
3. Students will first mark those areas that are important to humans on the map. These may be villages, cabins, or private land.
4. Using the four fire management options, each group will take 10-15 minutes to develop a fire plan they feel would best manage the land and its resources. The description of each category written on the board will help them decide which areas on their map should be assigned to that category. Color each area according to the fire protection category assigned by the fire plan.
5. Ask each group to present and explain their plan to the class. Encourage the class to ask each group questions about their plan.

Evaluation

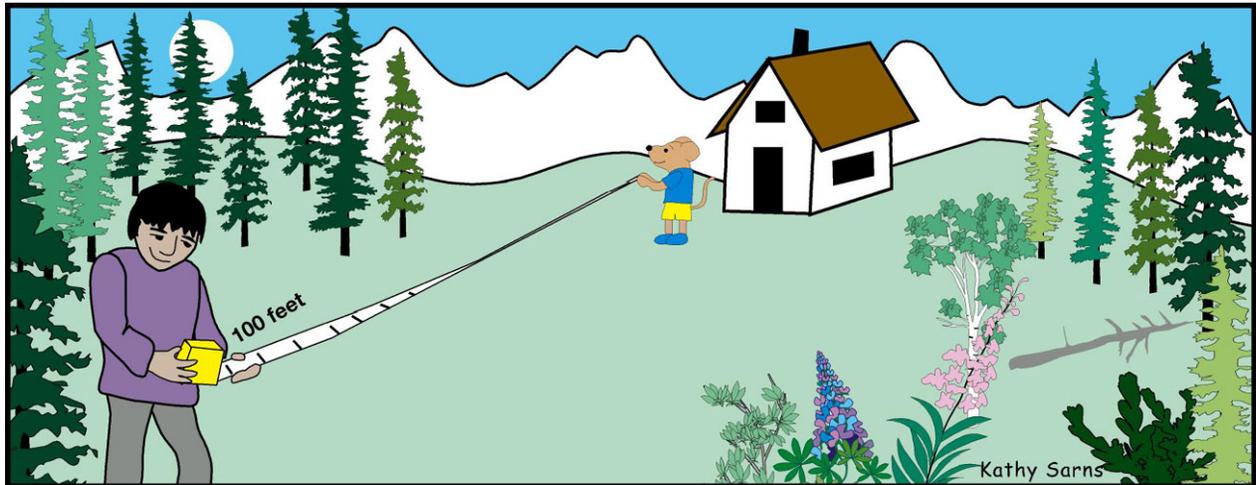
Obtain a copy of the real fire management plan for your area and discuss it with the class. This plan can be obtained from the State of Alaska Division of Forestry Fire Management's great web site (<http://www.dnr.state.ak.us/forestry>). The fire management plan should be available from the agency or organization that manages the lands in your area. They may also be willing to come to your class and explain the plan.



FIRE PROTECTION MAP



DEFENSIBLE SPACE



Grade Level: 4-12

Alaska State Content Standards: Geography E-4, Skills D-2; Science E-1.

Subject: Science, Geography

Skills: Application, Construction

Duration: 1 class period

Group Size: individual

Setting: indoors

Vocabulary: defensible space, fuel

Objective

Students describe a defensible space and its importance.

Teaching Strategy

Students design a plan to provide a defensible space around their home.

Materials

- Paper and pencil
- Defensible Space Checklist
- Magazine pictures of homes or cabins in a forested area
- Permanent markers

Complementary Activities:

Houses in the Woods, (page 217).

Teacher Background

In Alaska, thousands of acres burn in wildland fires every year. Some of these fires also endanger or destroy remote homes and cabins. Over the past several years, hundreds of homes and cabins have

been destroyed by wildland fires. If these homes and cabins had a **defensible space** established around them, the chances of the fire reaching the structure could have been reduced and fire protection could have been improved.

A **defensible space** is an area you create around your home or cabin that is free from burnable materials. Sometimes a defensible space is the only protection you and your remote site may have against a wildfire. A well-established and maintained defensible space may mean the difference between a loss of life and property, or survival and property protection if a wildfire does occur.

To create a defensible space around your home or cabin, you should clear a circle of roughly 30 feet around the surrounding area of trees, shrubs, and tall grasses that could carry a fire to your building. Fire can easily travel up trees, out overhanging branches, and reach rooftops, or it can move quickly



through dry shrubs and grass and reach firewood or machinery stored against the structure. Thinning trees 30 – 100 feet from your home or cabin and removing the lower branches on the remaining trees can help reduce the chance of fire reaching your roof. Removing shrubs and cutting back tall grass can reduce the ways a fire can reach your structure. Move things that can catch fire at least 30 feet away from the house such as firewood, gas or diesel fuel cans, propane tanks, cars, trucks, four-wheelers and snow machines are all things that can catch fire and spread to your home. Propane bottles should be marked with a warning sign for fire fighters to see. If you have a water source on site, identify it with a sign so that it can be used in case of a fire.

Your defensible space includes your building's roof. Some types of roofing material burn easily and flying sparks from a fire as far away as a mile can ignite the roof. Choosing metal roofing, asphalt shingles, or non-burnable material can help reduce the chances of your home or cabin's roof catching fire from drifting sparks. If you can, wet down the roof during dry times to reduce the risk of fire.

If there is a wildfire in the area around your home or cabin, tell your local fire fighting agency where your building is located and if it is occupied. Be sure to alert them to any specific fire hazards such as fuel tanks or access problems.

From "Protecting Your Home or Cabin From Wildland Fires", Alaska Wildland Fire Coordinating Group, US Government Printing Office: 2000 – 573-278/21013 Region No. 8.

Procedure

1. Ask students why they think some homes or cabins can burn during a wild fire and others do not. Brainstorm ideas.
2. Explain that sometimes a cabin or home is saved from wildfire because those owning the property have taken special precautions to remove as much **fuel** from around the house as possible creating what is called a **defensible space**. Discuss defensible space using the information provided in the Teacher Background and the Fire Safety Checklist attached.
3. Pass magazine pictures of homes or cabins located in forested areas. Using markers, have students mark a defensible space. On it they should determine what should be altered, what should be marked, and what should be removed all together.
4. Compare and discuss his/her ideas determining whether or not each student did create a defensible space.

Evaluation

Have students draw a picture and a description of their own home. Have each student then draw and write how he/she would build a defensible space around his/her home.



FIRE SAFETY CHECKLIST

- 1) Clear trees, brush and other flammable items at least 30 feet away from your home or cabin, and be sure no branches are left hanging over the roof.
- 2) Within 100 feet of the structure, thin brush and shrubs, remove tall grass, and spruce tree branches up at least six feet. Stack firewood at least 30 feet away.
- 3) Make sure your building's roof is made of non-burnable materials and kept clear.
- 4) Be sure to clear the ground to bare soil for at least 5 feet around approved burn barrels and open fires.
- 5) If you have a water source, make sure you can reach all around the building with a hose or other method.
- 6) Put spark arresters on chimneys and chainsaws.
- 7) Know your home or cabin's legal description or latitude and longitude location.
- 8) Make sure your home or cabin is accessible to fire fighters.
- 9) Have the correct tools to fight a fire located in a place you can quickly get to; an ax, shovel, and pump for your water source.
- 10) Know your local burning laws, and obtain a permit to burn out-of-doors between May 1 and September 30 where required.
- 11) Don't burn on windy or dry days.
- 12) Don't dump hot ashes or burning cigarette butts on the ground, and remember that hot mufflers on off-road vehicles can catch dry moss, grass, and leaves on fire.
- 13) Know your local fire protection and prevention authorities and how to contact them.

From "Protecting Your Home or Cabin From Wildland Fires", Alaska Wildland Fire Coordinating Group, US Government Printing Office: 2000 – 573-278/21013 Region No.



COMMUNITY VIEWS ON FIRE



Grade Level: 6-12

Alaska State Content Standards: Geography E-4, E-5; Language Arts B-3, E-1, E-2.

Subject: Language Arts, Science, Geography

Skills: Analysis, Evaluation, Generalization, Research

Duration: 1 class period

Group Size: individual

Setting: indoors

Vocabulary: fire season

Objective

Students will research local community viewpoints regarding fire management.

Teaching Strategy

Students interview people in their community about how fire management issues affect them.

Materials

- Paper and pencil

Teacher Background

The occurrence of fires in Alaska affects residents' lifestyles and livelihoods in many different ways.

For people hunting or trapping for commercial or subsistence purposes, fire has both short-term and long-term effects on wildlife habitat, wildlife populations, and personal property. Furbearers that initially flee a burned area return when their prey--voles, hares, and small birds--move in to take advantage of the food and cover that

new plants provide. Moose will often come back to a recently burned area to feed on the new growth or to find an easy travel route. Bears soon discover that burned areas produce abundant berry crops. As the forest progresses from early to later successional stages, wildlife diversity declines.

During the **fire season**, people from villages are employed to fight fires and provide goods and services to firefighters. Local grocers, hardware stores, pilots, restaurants, and hotels welcome the business. This revenue fluctuates greatly depending on the severity of the fire season. Sometimes pre-suppression activities such as the construction of fire lines provide work and income during periods of low fire occurrence. Prescribed burning activities might generate income for firefighters and businesses, although the income might be less than that generated by actual fire suppression.



The occurrence and suppression of fires may affect tourism. Visitors may feel that scenic values are compromised by fire and that goods and services are more difficult to obtain due to increased demand in areas where fires are being fought.

It is important for people to understand how fire activity and management decisions affect their local community. Governmental agencies meet with local people whenever changes to fire management plans are being discussed.

Procedure

1. Brainstorm with the class the many ways fire affects the lifestyles and livelihoods of people in their community. On the board make a list of local people whose livelihoods might be affected by fire. This list might include firefighters, subsistence or sport hunters, and fishermen, trappers, village elders, pilots, guides, lodge owners, store owners, photographers, firewood cutters, commercial loggers, landowners, and others.
2. Divide the class into interview teams of two or three students and assign one livelihood to each team.

3. Each team is to choose one (two if possible) local individuals with that livelihood in their community. Teams will ask the individuals these questions:

- Have you ever benefited from a wildland fire?
- Have you ever done any work associated with wildland fire?
- Has wildland fire ever had a negative impact on your life? In what way?

(Safety Note: Students should only interview friends or family members, not strangers.)

4. After the teams have completed their interviews, have each team share with the class what was said at their interview. Make a list of the different comments on the board. Point out to the class the great variety of comments made and the complexity of fire management issues.

Evaluation

Have students write several paragraphs about what was said during an interview given and reported by another student group.



A LITTLE PIECE OF FOREST OR TUNDRA



Grade Level: 6-12

Alaska State Content Standards: Art A-1; Geography E-4, E-5, E-6, F-3; Government G-3; Language Arts D-1a, D-2, D-4, E-2.

Subject: Language Arts, Geography, Government

Skills: Analysis, Comparison, Generalization, Problem-Solving

Duration: 2-3 class periods

Group Size: individual

Setting: indoors

Vocabulary: management policy, interest groups

Objective

Students describe the different opinions usually associated with forest management.

Teaching Strategy

Students role play different interest groups associated with forest management decisions.

Materials

- Writing materials
- "Fire Role Cards"
- "Fire Policy Cards"
- 3 blank sheets of paper for each student
- Markers

Complementary Activities:

You Decide! (page 231).

Teacher Background

Local **interest groups**, industry, and government agencies have concerns about

how forest resources are managed.

Hunters, fishermen, bird watchers, firewood cutters, gold miners, trappers, and others are sensitive to any changes in forest **management policies** that may affect the future of their activities.

Different public agencies manage lands according to their federal or state guidelines. Their challenge is to manage their land according to their guidelines, with consideration given to all the interest groups involved. It is important to learn how to negotiate and compromise in a group situation.

Advanced Preparation

1. Copy, laminate, and cut out "Role of Fire Cards" so that every student has a card. You may need to make more than one copy of some of the cards to have enough.



2. Copy, laminate, and cut out one set of "Fire Policy Cards".

Procedure

1. Distribute one "Fire Role Card" to each student. The students receiving the "Expert" cards will be required to answer questions as that expert.
2. Ask each student to read his/her card carefully and to imagine that they are the person described in the card. They are to forget their own opinions and think only like the person they are portraying. Make sure that the students understand that they are only portraying one person's opinion in that role and that other people in that role may have different opinions.
3. Each student should have a marker and three pieces of paper. On each paper students should write (in large letters) one of the following response phrases:
 - Agree
 - Disagree
 - Need more information
4. Explain that students are attending a public meeting at which they will be invited to give input on the development of policies and regulations for use of a public forest. You will represent a land manager conducting the meeting and students will represent people who are experts or are interested in forest management for business or personal reasons.

5. Explain the procedure to students. You will read a "Fire Policy Card," give the students a minute to think about it, and then ask them to hold up the response card that represents their reaction to the policy read. Ask those who agree with the policy who they represent and why they agreed. Repeat this format with those that disagreed. Students that need more information may ask questions of the "experts." If the "experts" do not know the answer, discuss where a person might be able to get more information.
6. Finally, after hearing all the input, read the policy again. Then ask students whether any would like to change their opinions. What caused them to change? Repeat the above steps for each Fire Policy Card.

Evaluation

1. Discuss with the students how they felt about the revised policy. Were they frustrated with the procedure? How does this game resemble real life? How does it differ?
2. Pick a policy where groups of students both agreed and disagreed. Make two groups, one of students that agreed and one of students who disagreed with the policy. Give each group 5-10 minutes to write a new revised policy that represents their viewpoint. Ask the groups to read their policy to the entire class. Once each group's policy is heard, the entire class will negotiate a final policy that is in the best interest of the resource and that the majority of the class can agree on. You, as the land manager, monitor the negotiations, suggesting compromises.



FIRE POLICY CARDS

Boreal Forest

<p>Prescribed burning should be done to increase browse for moose where the moose population is declining.</p>	<p>All Forest fires should be put out.</p>
<p>Loggers and firewood cutters should be allowed to cut dead trees out of a burned area.</p>	<p>Trees that have been killed by spruce bark beetles should be removed from the forest.</p>
<p>We should let all forest fires burn.</p>	<p>Prescribed burning should be done to remove the trees that have been killed by spruce bark beetles.</p>



FIRE POLICY CARDS

Tundra

Grass fires should continue to be set as they have been in the past.	All wildland fires should be put out.
Fires in peat bogs should be put out even though they may have smoldered for over a year.	Large areas that have lichen growth that may take 50 years or more to regrow should have fires fought.
We should let all fires burn.	



FIRE ROLE CARDS #1

<p>Hunter: You harvest animals such as moose to feed yourself, your family and some older people who can no longer hunt. The removal of trees from the forest encourages brushy vegetation to grow, making more food for moose. The fires that burn through tundra may encourage additional plant growth but may damage some slow growing lichens.</p>	<p>Trapper: You harvest fox and marten to sell and make clothing for your family. The higher the animal population, the more you can harvest. Fires eventually improve habitat for these animals because their prey, small birds, rodents, and hares find abundant food in recently burned areas.</p>
<p>Private Firewood Cutter: You heat your home entirely with wood. Every summer you collect enough wood to provide you with sufficient firewood for the next winter.</p>	<p>Bird Watcher: You enjoy hiking and looking for different kinds of birds. You know that different kinds of birds live in different habitats; in order to see a greater variety of birds, you want to protect all kinds of habitats.</p>



FIRE ROLE CARDS #2

<p>(Forest) Commercial Logger: You earn a living by cutting firewood and selling it to other people. The more firewood people need and the more you can cut, the more money you make.</p>	<p>Fire fighter: You earn your living by putting out fires. When there are few fires or fires are allowed to burn, there is little work for you.</p>
<p>Store Owner: You sell hardware, groceries, and have an ice cream truck in the summer for tourists. Your business depends on the population growth in the area..</p>	<p>Photographer: You make your living selling scenic and wildlife photographs to publishers and other businesses. Fires make the area "uglier"; however, there seems to be a market for forest fire documentation.</p>



FIRE ROLE CARDS #3

<p>Mother: You have 3 children, a husband, and grandparents for whom you gather many of the traditional plants. You find that the area that was burned 8 years ago has an abundance of the food you like to gather.</p>	<p>Commercial Pilot: You own a small commercial airline that transports people and supplies into and out of the area. Fires produce a large amount of smoke, sometimes making it unsafe to fly. Fires also bring you business if people and supplies need to be transported.</p>
<p>Fire Expert: You are concerned about protecting people and property from wildland fires. You know that fires in areas near towns or small villages present a more serious threat to people than do wildland fires in areas distant from inhabited areas. You know that if forest fires are put out there will be a build-up of fuels, which often leads to a more severe fire in the future. You feel it important to monitor all wildland fires and put out those that threaten people. Because it is very expensive to put out fires, you think those that do not pose a threat should be watched carefully, but allowed to burn. You realize that if more people are allowed to build homes in remote areas, it will become more important to put out fires in those areas. This will make it more difficult to allow fires to perform their natural role, and it will cost the public much more money.</p>	<p>Landowner: You own land adjacent to the forest and plan to cut logs to build a home there in the future. You like to hunt, but also enjoy seeing animals wander through your property. You hope the firebreak along the forest boundary might provide access to the property..</p>



FIRE ROLE CARDS #4

<p>Moose Expert: You are concerned about protecting habitat for moose so that they will remain abundant. You know that moose feed on shrubs and saplings that are most numerous in areas in forests during the early stages of succession. These shrubs may be more abundant in mature tundra. Suppression of fires may reduce the amount of tall shrub areas by allowing these forest areas to mature, thus reducing the amount of feeding habitat for moose.</p>	<p>Atmosphere Expert: You are concerned about the atmosphere and the air we breathe. You know that healthy vegetation is important in keeping the air clean and in removing dust, carbon dioxide, and pollutants. They also return oxygen to the air. Fires release smoke and ash into the air, sometimes causing short term breathing difficulties for people..</p>
<p>(Forest) Tree-growing Expert: You know that spruce bark beetles live and breed in dead and dying trees. Certain conditions promote spruce bark beetle outbreaks that kill live, healthy trees. You want to stop the loss of trees to the spruce bark beetle. You believe that trees infested by spruce bark beetles should be removed from the forest.to allow fires to perform their natural role, and it will cost the public much more money.</p>	<p>Bird Expert: You are concerned about protecting habitat for birds. You know that a fire sometimes improves habitat for some kinds of birds, while it destroys habitats for other kinds. To provide habitat for the greatest variety of birds it is important to have aging forests, young forests, cleared areas, and the areas where these habitats meet (edges). Dead and dying trees provide important feeding and nesting sites for some kinds of birds. Some birds eat insects like the spruce bark beetle and help reduce disease that may kill trees.</p>



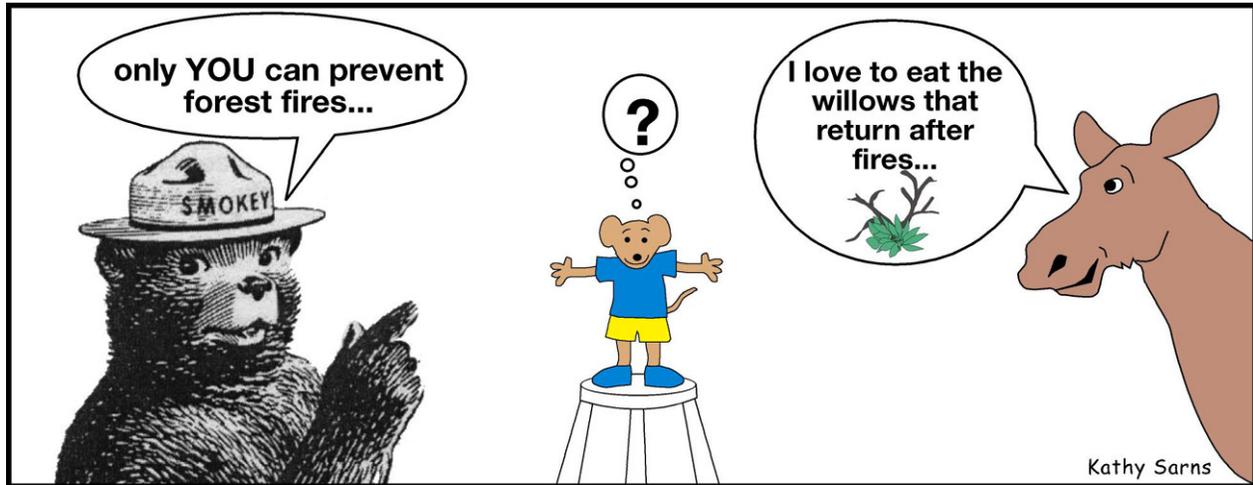
FIRE ROLE CARDS #5

<p>Watershed Expert: You are concerned about protecting the water supplies for towns and villages and about preventing floods and droughts. You know that vegetation is very important in the water cycle, returning moisture to the air and storing and purify water. You know that burning of large areas can cause more frequent and severe flooding and can result in less water in streams during dry periods.</p>	<p>Waterfowl Expert: You are interested in preserving breeding habitat for waterfowl. Good breeding habitat includes the availability of wetlands with high quality water to support substantial invertebrate populations and aquatic plants for waterfowl food. In addition, nearby nesting cover must be available. The waterfowl nesting season is May-July. The removal of nesting cover, decline in food resources, or other disturbances could have an adverse impact on nesting success. Many North American waterfowl populations are declining due to loss of breeding habitat. Alaska has many areas that are critical nesting habitat.</p>
<p>Furbearer Expert: You are concerned about protecting habitat for furbearers such as marten and foxes. You know that openings in boreal forests created by fires and other disturbances can improve habitat for mice, voles, birds, and hares, the main prey of furbearers. These prey animals require adequate ground cover and shrubby plants that provide food. Some furbearers require patches of old forest for cover and denning. Fire may encourage new growth in tundra as well.</p>	<p>Village Elder: You are a member of the Village Council that works hard to help the younger generation learn to understand and appreciate the traditional values your father and grandfather taught you. You feel that in the past the small natural fires around your village have provided a variety of habitat that allows the traditional ways to flourish.</p>

** The commercial logger and tree growing expert roles will not be assigned in a tundra ecosystem.



DILEMMAS IN FIRE MANAGEMENT



Grade Level: 6-12

Alaska State Content Standards: Geography C-1, E-4, E-5, E-6, F-3; Gov G-3; Language Arts A-4, B-1, D-1a, D-2, D-4, E-2; Science E-1, E-2, E-3.

Subject: Language Arts, Geography, Government

Skills: Comparison, Description, Evaluation, Generalization, Problem-Solving, Research

Duration: 2-3 class periods

Group Size: 4-6

Setting: indoors

Objective

Students discuss current fire management issues and the importance of making informed management decisions.

Teaching Strategy

Students express original opinions on fire management issues and then make informed decisions.

Materials

- Paper and markers
- Index cards – 4 per student
- [Forest and Tundra Dilemma Background Information Sheets #1, #2, #3, and #4](#)
- Reference materials including newspaper and magazine articles

Complementary Activities:

You Decide! (page 231).

Teacher Background:

The following dilemmas are designed to help students identify different types of human perspectives related to fire management issues. They will then formulate opinions about what they think would be the most responsible and appropriate actions to take. There are no "right" or "wrong" answers. Teachers are encouraged to have students do additional research so that decisions are based on the best factual information available.

Procedure

Part A. The Original Options

1. Give each student a magic marker and four index cards. Write a number on each card (1-4) corresponding to the opinions listed below. On the board write the following information:



Opinions:

1. definite NO
2. uncertain NO
3. uncertain YES
4. definite YES

2. Divide the class into groups of 4-6 students. Explain to students that one member of each group will be reading aloud the 3 resource management dilemmas.
3. Each group reader will read aloud each dilemma to the group. Instruct students to think about the dilemma and choose an "opinion number" corresponding to their original opinion. When the group is ready, have students hold up their index cards with the number facing the reader. The group reader asks each student why they chose the opinion they did. For each dilemma, tally the results on paper making bar graphs representing the group's original opinion for each dilemma.

The Three Dilemmas to Read:

- 1) The intentional, planned use of fire to alter habitat is known as prescribed burning. Resource managers will prescribe burn an area to reduce a build-up of fire fuels or to maintain vegetation to benefit wildlife. Should prescribed fires be started or should nature be allowed to take its course?
- 2) Spruce bark beetles kill thousands of trees on public forest land. The intentional, planned use of fire to alter habitat is known as prescribed burning. Should the government do prescribed burning in an attempt to stop the spread of the beetles?
- 3) Some areas in SW Alaska should be categorized as limited action areas where fires are mainly monitored but not fought. The people who live a subsistence lifestyle in this area are very dependent on caribou herds that prefer the lichens that are destroyed by hot fires. Should

another level of protection be given those areas to help maintain the reindeer herds that these people are so dependent upon?

Part B. The Informed Decisions

1. Give each group member a copy of the Dilemma Background Information Sheets and reference materials for the dilemmas. You may want to give each group only one dilemma to work on.
2. Groups are to read their Dilemma Background Information Sheets. Students may further research newspaper and magazine articles or talk to local experts and agency people. After considering all the information and sides of the issue, the group will then formulate an informed group decision.
3. Each group presents their findings and their informed decision to the class. The class is encouraged to ask questions. After each group's presentation, each student in the class makes their own informed decision about the dilemma. Students hold up an index card containing the number corresponding to their decision. The class informed decision is tallied and a new bar graph may be drawn.

Part C: Discussion

Compare the original opinions and informed decisions. Discuss the importance of learning about all sides of an issue before making a decision or forming an opinion. Opinions and decisions are based on available information, which may or may not be complete or accurate. In addition, the media's presentation of an issue may or may not be biased. How can the public get the information they need to make researched decisions?

Evaluation

Have students write a dilemma of their own, research it, and make an informed decision.



Extensions

Rather than researching each dilemma, informed decisions may be formulated after the class has completed some of the other activities in this curriculum, including "Tundra or Boreal Forest Fire Hunt," or "Good or Bad Effects of Fire in the Tundra

or Forest -- Who's To Say". Before each of these activities, read the dilemma and take an original opinion vote. Teachers may wish to substitute other dilemmas for those described here.



FOREST DILEMMA BACKGROUND INFORMATION SHEET #1

The intentional, planned use of fire is known as prescribed burning. Forest managers will prescribe burn an area to reduce a build-up of fire fuels or to maintain vegetation to benefit wildlife. Should prescribed fires be started or should nature be allowed to take its course?

FIRE AS A NATURAL FORCE

Fires burn in a patchwork pattern called a mosaic. This vegetation mosaic results in diverse habitat for wildlife. People benefit from the availability of wildlife whether they hunt, fish, photograph, or simply observe them. When fire is excluded from fire-dependent ecosystems, the ecosystem's diversity, productivity, and stability are reduced.

PRESCRIBED BURING AS A MANAGEMENT TOOL

Research has taught us much about the behavior of fire. By analyzing weather conditions, fuel types, and the topography of an area, a professional fire manager can begin to predict how fast a fire will spread, how high the flames will go, and how intensely the fire will burn the area.

Prescribed burning is the intentional, planned use of fire. It can be used to duplicate the historic cycle of natural fire. The **fire interval** is the length of time that passes between natural fires in a given area. The fire interval for Interior Alaska is as often as every 50-100 years.

Prior to setting a prescribed burn, managers complete a burn plan. These plans consider such things as the purpose of the burn, fuel load of the area, public notification plans, ignition source and patterns, pre-fire surveys, and manpower and equipment needed. Sometimes prescribed burns "escape" and cause damage. This is usually due to an unexpected change in the weather.

Prescribed burning can benefit wildlife. The mosaic patchwork pattern of a fire creates many **edges** between vegetation. These **edges** are often preferred by wildlife for feeding areas and travel corridors. Prescribed burning on lake margins in the fall removes dead vegetation and promotes regrowth of grass and sedge shoots desired by waterfowl for food and nesting materials.

Prescribed burns can be used to create fire breaks. **Fire breaks** are areas where fuels have been removed to stop a fire from spreading. Fire breaks are often used to protect privately owned lands and developed areas from fire.

EFFECTS OF SMOKE

Smoke produced by fires can have a variety of effects on residents and visitors. Long lasting fires can lead to disruption of air service due to smoke density problems and can pose serious aviation safety problems for aircraft. Smoke can interfere with the tourism industry. It can also cause health problems for elderly residents and those with respiratory ailments. For most people, however, smoke is an irritation rather than a health hazard.

FOREST DILEMMA BACKGROUND INFORMATION SHEET #2

Spruce bark beetles kill thousands of trees on public forest land. The intentional, planned use of fire is known as prescribed burning. Should the government do prescribed burning in an attempt to stop the spread of the beetles?

THE EFFECTS OF THE SPRUCE BARK BEETLE

The spruce bark beetle attacks white spruce trees by boring through the bark to feed and breed in the phloem. The phloem is the layer of tissue that transports food manufactured in the tree's leaves to the rest of the tree. If this layer is totally destroyed, the tree dies.

The beetle has infected trees on the Kenai Peninsula and in the Yukon and Kuskokwim Valleys. The beetles are spreading north and are a serious threat to Alaska's forests.

WHAT HAS LED TO THE SPRUCE BARK BEETLE EPIDEMIC?

Small populations of the beetle are always present in white spruce forests, feeding and breeding in dead and dying trees. Under normal conditions, beetle populations are controlled by parasites (such as ichneumon wasps) and predators (such as woodpeckers). However, when conditions are favorable, spruce beetle populations may suddenly increase to epidemic proportions. Conditions that favor beetle reproduction include very dry summers and the presence of many dead or dying trees. When populations reach epidemic size, the beetles begin moving from dead and dying trees into healthy, living trees nearby.

Beetles that attack healthy trees are usually trapped by pitch the tree produces. Patches of resin may be produced on the infected tree's trunk and the needles may turn a yellowish-green, then a reddish-brown color, before falling off.

Many human activities disturb the growing conditions of white spruce, contributing to spruce beetle attacks and epidemics. Timber harvest, land clearings (roads, seismic lines, pipelines, powerlines, or building construction), and fire can injure healthy trees or leave dead wood where beetles can reproduce.

THE SPRUCE BARK BEETLE AND THE BOREAL FOREST ECOSYSTEM

Epidemics of the spruce bark beetle and other insects are a natural phenomenon in the boreal forest. Even in severely affected forest stands, some white spruce are able to survive beetle attacks. The survivors are more vigorous, less attractive to beetles, or are perhaps better able to trap the beetles with their pitch.

Dead and insect-infested spruce trees provide important habitat for certain wildlife species. Woodpeckers feed primarily on bark beetles and other wood-boring insects.

They excavate nesting and roosting cavities in diseased trees with rotten interiors. Flying squirrels, boreal and black-capped chickadees, tree and violet-green swallows, and boreal owls require nesting and roosting holes (usually old woodpecker holes) in dead and dying trees in order to raise their young and to survive the winter. Juncos, sparrows, and several thrush species use fallen trees for nesting cover. Small mammals such as voles, squirrels, and hares use fallen trees for important cover from predators. The decomposition of dead trees returns minerals to the soil where they can be used again by growing plants. Burning dead trees returns minerals to the soil more quickly than does decomposition. When dead trees are removed from the site, so are the minerals.

PREVENTATIVE MEASURES AGAINST THE BARK BEETLE

Some people believe that pesticides should be used to stop the spread of the spruce bark beetle. Others feel that use of chemicals should be avoided since they may adversely affect the entire food chain.

Some forest entomologists (people who study insects and insect-caused diseases) suggest removing old, diseased, and dead trees and harvesting white spruce trees when they reach 150 years of age to reduce or prevent spruce bark beetle epidemics. They also recommend removing slash from logging, wind-damaged trees, and trees killed or injured by fire.

Forest ecologists recognize that healthy forests consist of a variety of tree species and ages. These kinds of forests provide habitat for a variety of bark beetle predators, such as birds, wasps, ants, and spiders. A greater variety of predators may decrease the probability of beetle epidemics.

VARIOUS POLICIES CONCERNING TREE REMOVAL

The Alaska Division of Forestry removes dead, diseased, and dying trees in accessible areas of the Tanana Valley State Forest; the U.S. Forest Service does this in accessible parts of the Chugach National Forest. On lands managed by the U.S. Fish and Wildlife Service, dead, dying, and diseased trees, including those killed by beetles, are left in place to serve as nesting habitat and cover for wildlife. The U.S. Bureau of Land Management encourages harvest of dead, dying, and diseased trees on most accessible forested lands under their jurisdiction.

TUNDRA DILEMMA BACKGROUND INFORMATION SHEET # 3

Some areas in SW Alaska should be categorized as limited action areas where fires are mainly monitored but not fought. The people who live a subsistence lifestyle in this area are very dependent on reindeer herds that prefer the lichens that are destroyed by hot fires. Should another level of protection be given those areas to help maintain the reindeer herds that these people are so dependent upon?

PROBLEMS FROM FIRE

There is a problem with establishing some areas of SW Alaska as limited action areas where fires are only monitored unless they threaten lands in other higher valued categories or critical sites within the area. The value of the resources lost during a fire in these areas would be much less than the cost of fighting those fires.

Reindeer herds are kept in this area and support much of the local subsistence economy. Most people agree that the lichens that are burned in very hot fires are a preferred food for caribou and reindeer. These lichens may not revegetate these areas for 15-100 years, depending upon the severity of the burn and the environmental conditions of the area. This does not present a serious problem for caribou that can move to other areas for winter food. The reindeer cannot be moved to a new area so these fires may have a devastating effect on these herds and the people who depend upon them.

ADVANTAGES OF FIRE

Fast shallow burns may increase the lichen cover, especially where thick carpets of mosses have developed. These burns may favor the growth of some lichen species preferred by caribou and reindeer.

Some burns may also increase the early spring plant growth for reindeer and waterfowl. A fire in the Selawick area caused an increase from 21.0 ducks per square mile to 33.3 ducks per square mile the next year.