

# MONTANA'S NATURAL RESOURCES

Montana Department of Commerce

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# FORESTS

"Sit down in climbing, and hear the pines sing."  
- John Muir

The evergreen forests of Montana are far different from the hardwood forests in other parts of the United States. In Montana, the trees are mostly conifers with their roots in the rocky, acid soils of the western mountains or the benches and uplands of the eastern two-thirds of the state. Ground cover is sparse in many places, partly because soils are thin and moisture is low. These forests provide a variety of valuable things—water, timber, livestock grazing, recreation, and wildlife habitat.

The Montana Department of Natural Resources and Conservation thanks the Iowa State University Press for permission to use illustrations from its publication, *Rocky Mountain Trees*, by Richard J. Preston.

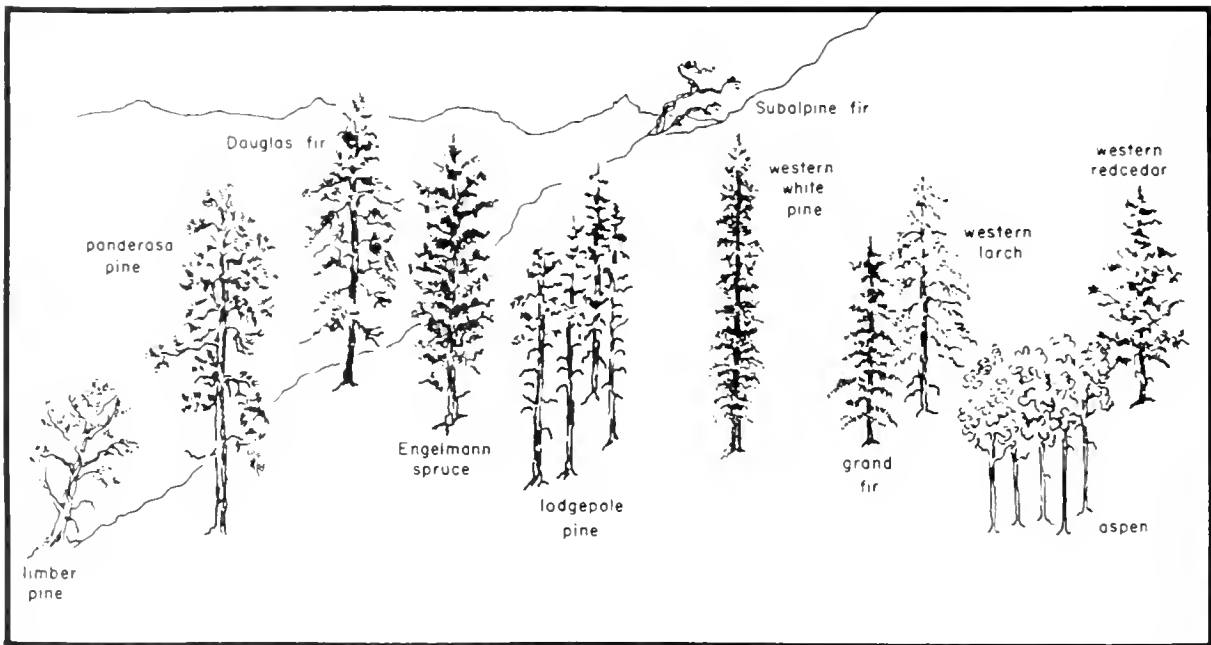


Figure 1. Some of the Principal Trees in Montana

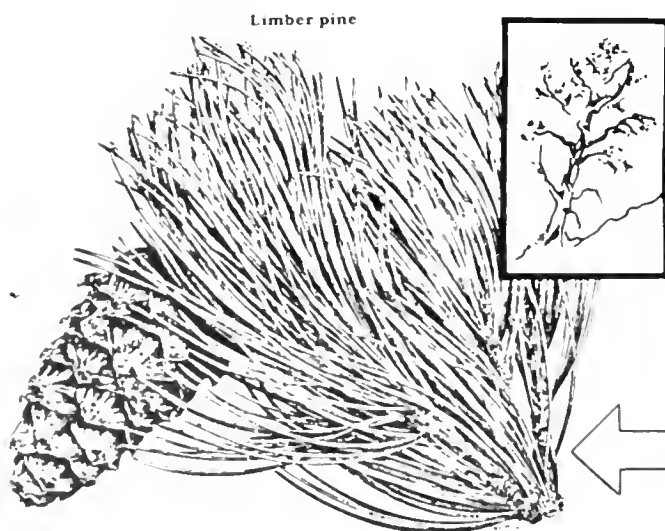
Peggy Todd

### What Grows Where?

Many factors influence the kinds of trees that grow in certain locations. Moisture, soil, and elevation are three of these factors. Equally important is aspect or exposure—which direction a mountain slope or a foothill faces. Slopes that face south or west are ordinarily dryer and warmer than those that face north or east. A north-facing area usually holds snow or other moisture longer. These are some of the conditions that help determine the kinds of trees that will grow in certain areas, their size, and how dense a stand of timber may be.

Most of Montana's forests (80 percent) lie in the western third of the state. But wherever they grow, the first trees above the grasslands are usually ponderosa pine. Douglas fir grows well in moist areas, and in those places that receive even more moisture, grand fir, redcedar, western hemlock, and spruce grow. Below timberline, dryer slopes have subalpine fir, mountain hemlock, whitebark pine, and alpine larch; along the rivers cottonwoods grow in groves.

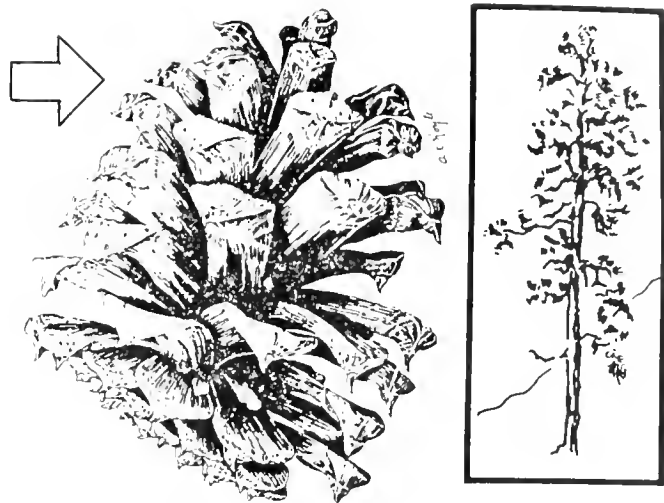
The following section includes the locations where the trees in figure 1 are most likely to grow.



Limber pine is adapted to a dry climate, so you wouldn't expect to see large numbers of these trees on moist locations. A small, slow-growing tree, it grows in the shallow, rocky soils common in the foothills at 4,000 feet, and to the highest elevations where trees can grow. The growth of limber pine may be stunted in very cold areas, but these trees often live to be 400 to 500 years old. Rocky Mountain juniper is also found in these forests, which provide range for the deer and elk that feed on the bluebunch wheatgrass and fescues there.

Montana's state tree, ponderosa pine, is usually found in a belt that separates grassland from Douglas fir forests, although Douglas fir are often mixed with juniper in these stands. The dry uplands and high benches of eastern and southeastern Montana have open stands of this pine. Shrubs that grow with ponderosa are snowberry, bitterbrush, Oregon grape, and chokecherry. Soils may vary from rocky to deeper soils with a top layer of duff composed of fallen needles and leaves.

Ponderosa pine



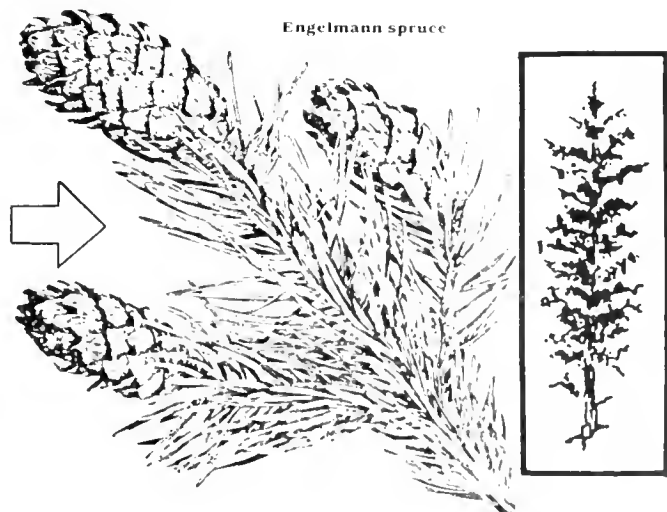
Douglas fir



Moisture and moderate elevations are the principal requirements of Douglas fir, which, with subalpine fir, larch, and lodgepole pine, predominates in many of the coniferous forests in Montana's Rockies. Douglas fir grows in northwestern Montana at elevations of up to 5,500 feet, and in southern Montana at elevations of up to 7,500 feet. (At higher elevations, the average temperature is lower, which limits the growth of Douglas fir.) Douglas fir grows best on deep, moist soils on north exposures. Shrubs usually growing among these trees are ninebark, snowberry, and kinnikinnick. Soils are mostly gravelly, sandy loams.

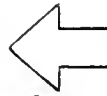
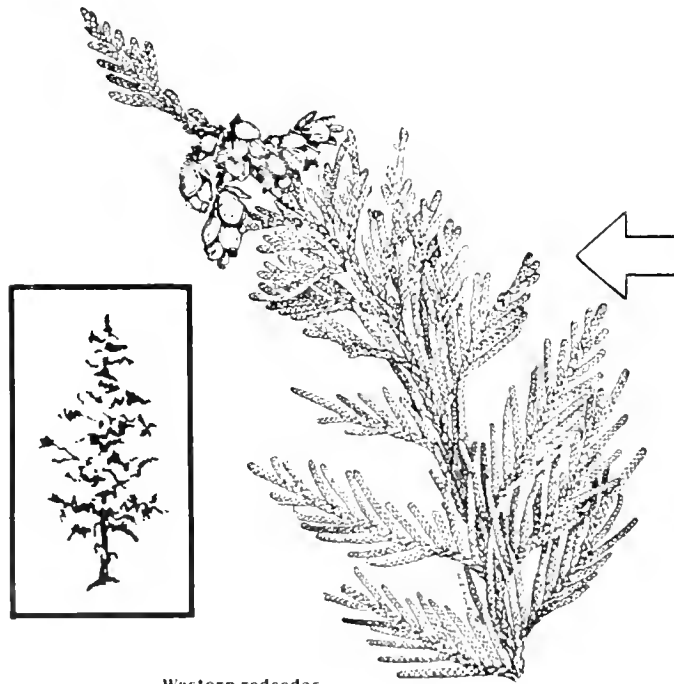
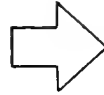
Engelmann spruce grows in cool ravines, at higher elevations of western Montana, and at the lower elevations of central Montana. These forests have a mix of Douglas fir, western larch, and lodgepole in northwestern Montana. East of the Continental Divide larch disappears from forests there. Deer, elk, and moose live in these mixed forests, where undergrowth is varied, with huckleberry, Solomon's seal, geranium, pinegrass, and twinflower.

Engelmann spruce



Western white pine is found mostly in the far northwestern corner of Montana, sharing with western larch the distinction of being the tallest tree in our forests—from 90 to 180 feet tall. It grows very straight, with wood that is soft, light, and easily worked, so white pine is valuable as timber.

Western white pine



Redcedar and western hemlock forests occur in moist areas in the mountainous northwest corner of Montana, and extend along the river valleys at lower altitudes. Larch, lodgepole pine, and Douglas fir, as well as spruce, are often part of the mixed forests in these places. Redcedar and hemlock can grow in dense shade, and often outlive other trees; redcedar may reach an age of 600 to 1,000 years. Hemlock rarely lives to be over 500 years old.

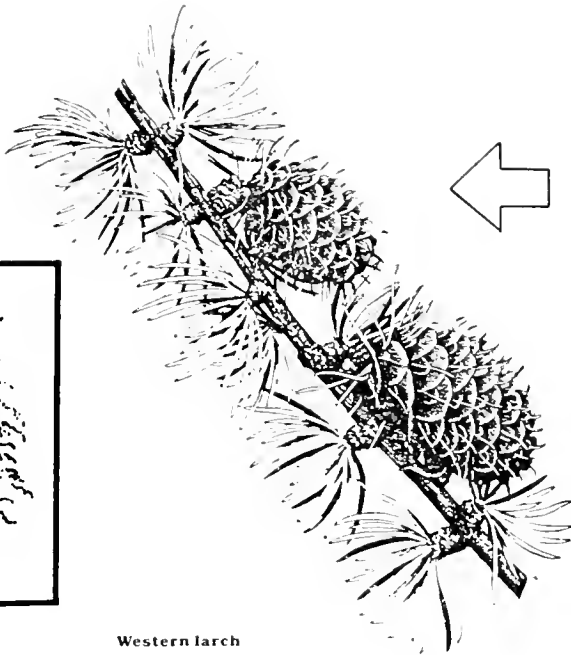
Western redcedar



Grand fir grows in northwest Montana at lower and middle elevations (2,400 to 5,000 feet), where the climate is like that of the cool, moist Pacific Northwest, and in the river valleys of west central Montana. Undergrowth is usually beargrass, twin-flower, and wild sarsaparilla.

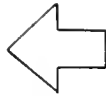
Grand fir





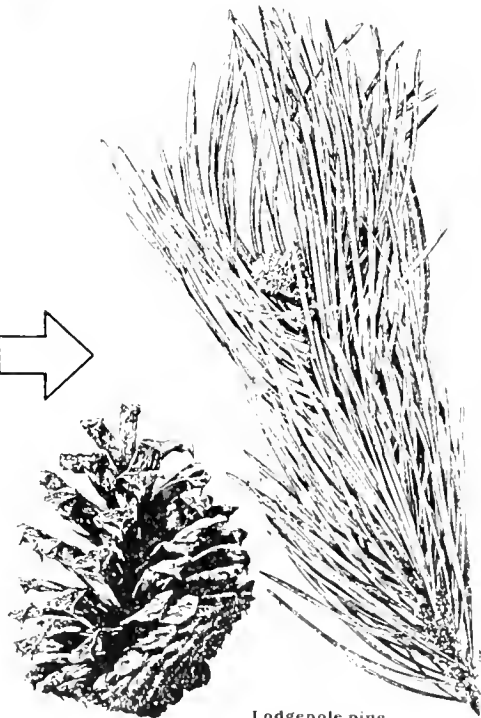
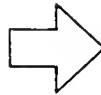
Western larch

Western larch may grow in nearly pure stands or in mixed forests of Douglas fir, ponderosa and lodgepole pine, Engelmann spruce, and alpine and grand fir. It ranges from 2,000 to 7,000 feet, growing best on moist locations. These conifers are easily recognized because their foliage is a light green, turning to yellow and dropping in the early fall. Larch is a large, slow-growing tree that can live over 500 years.

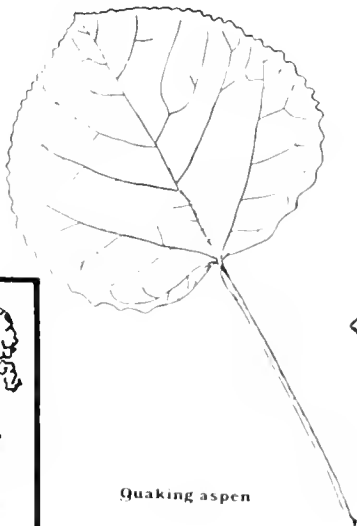


Lodgepole pine often grows in dense stands, where it usually has followed forest fires. The cones may stay unopened on the tree for years, but will burst in intense heat and take root in the mineral soil exposed by fire. This slow-growing conifer reaches maturity at about 200 years. Because of its shallow root system, it is prone to windfall. The wood is fine-textured and strong, and is used for lumber, mine timbers, and railroad ties.

Lodgepole is found in many forest types, and has an elevation range of 3,000 to 8,500 feet. Deer, moose, and elk live in these forests.

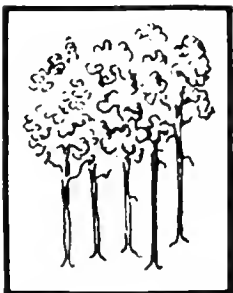
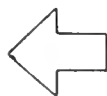


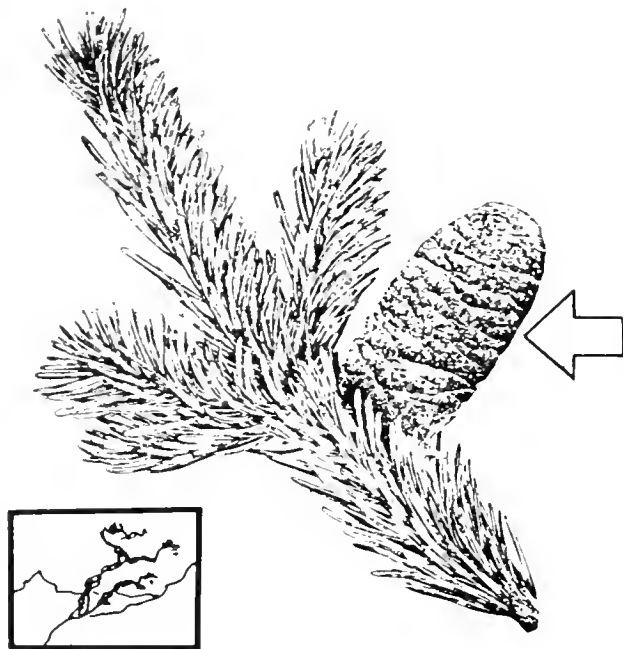
Lodgepole pine



Quaking aspen

Aspen and cottonwood, because they need lots of moisture, are usually found along waterways and in damp locations. Aspen grow in spring-fed groves near conifers, where their golden fall foliage splashes color against the dark evergreens. Along streams beaver often cut aspen for winter food, and they use the trunks of cottonwoods to build their dams across creeks and ditches.





Subalpine fir

Subalpine fir ranges from 3,500 feet to timberline; it grows best with large amounts of moisture, but has a wide range and can stand extremely cold temperatures. It is found in mixed forests with lodgepole and white pine, spruce, and alpine larch. Subalpine fir grows very slowly at high elevations, reaching a height of only 60 to 70 feet at the age of 200 years, and may look more like a shrub at timberline.

Other trees in this band of severe climatic conditions are whitebark pine, Engelmann spruce, and, on lower levels, lodgepole pine. Most trees become dwarfed at the highest elevations, where July mean temperatures are not more than 50°F. These trees also have to contend with blizzards, deeply frozen soil, high winds, and wide fluctuations in temperatures. At higher elevations the principal ground cover is timberline bluegrass, mosses, and forbs. The subalpine areas provide summer range for many species of wildlife—mountain goats, bighorn sheep, elk, deer, bear, and mountain lion are among the larger ones.

### Forests as Watersheds

Montana is a headwaters state; three major rivers have their beginnings here. About 65 percent of the water that flows out of state comes from rivers and streams that start inside Montana's borders. Water is one of the most valuable resources that comes from our forests. People who will never see our wooded mountains will use water that once fell as snow or rain in Montana's Rockies. For instance, an area that has only 15 percent of the state's land surface contributes a large amount of water to the Columbia River Basin—58 percent of the total amount of water in the Clark Fork drainage. Only about 10 per-

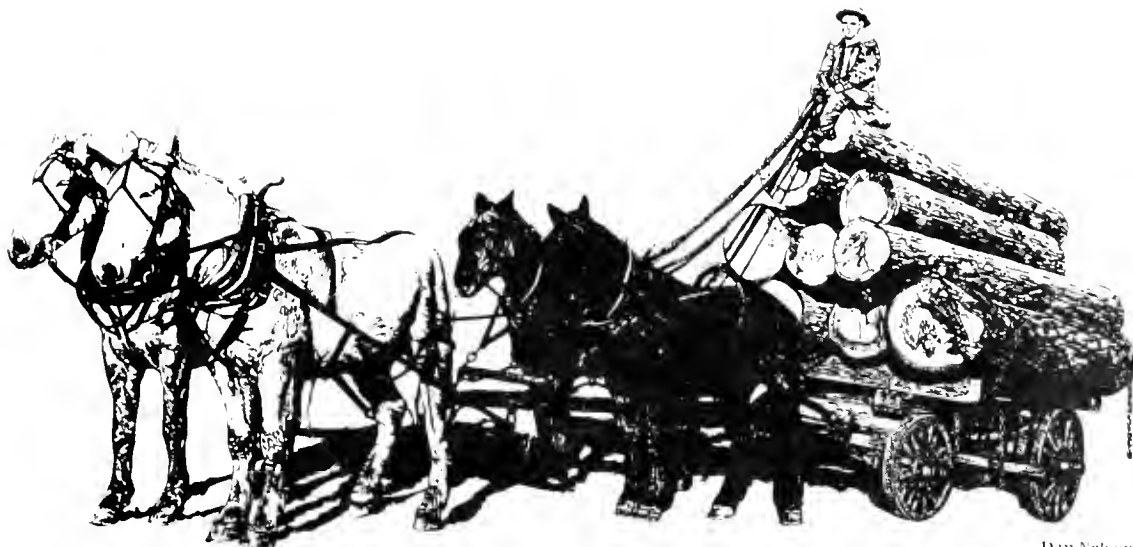
cent of Montana's water is used in the state; most of that goes to irrigate crops and pasturelands.

It would be hard to overestimate the importance of forests to our watersheds. (A watershed is a region or area that supplies water to a lake or river.) Trees and shrubs in the forests help to hold the snowpack that builds up during our long cold winters; the shade and undergrowth help to keep it frozen. In some years, brief warming periods in January and February may melt some of this snowpack. Often, though, below-freezing temperatures keep it trapped in the higher elevations. In May and June, the snow melts and runs into streams and rivers, providing more water for agriculture, industry, home use, recreation, and power generation. Some of this water is stored in about 61,000 farm ponds and 67 reservoirs; there are also 1,500 natural lakes in the state.

(For more information on Montana's water resources, see the Water chapter of this series.)

### Forest Products

Montana's lumber industry began as an offshoot of her first industry, mining. The first commercial lumber mill was set up in Virginia City in 1863 to supply mine timbers and building materials. The railroads that advanced into Montana needed lum-



Early Day Logging

Dan Nelson

ber for their ties, and for the towns that sprang up along the way. With the advent of copper mining, sawmills supplied millions of dollars worth of fuel for the smelters and timbers for the tunnels.

Montana's logging industry is centered on the west side of the Continental Divide, where 58 percent of the state's timber grows. Montana's portion of the nation's commercial forests is not large—3 1/2 percent, but lumbering is an important part of the state's commerce. Lumber mills and other industries that use timber and wood products ordinarily employ about 40 percent of the manufacturing workers in the state. In 1981, 9,100 people worked in these industries. Montana's forests contain 23,200,000 acres of forested land, of

which 14,400,000 acres are commercial timberland.

Douglas fir and larch provide over half of Montana's lumber production: the most valuable woods for lumber are white pine, Douglas fir, larch, and ponderosa pine. The long, straight trunks of the lodgepole pine are used for utility poles, posts, and house logs. Their use depends on their size and the quality of the wood. Veneers, plywood, pulp, and paper are processed in the state. There is also a thriving business in Christmas trees in western Montana.

Four principal types of logging are used: clearcut, shelterwood, selective, and shelterwood (figure 2). In the clearcut method, all trees are taken from an area, allowing uniform regrowth and opening the forests to

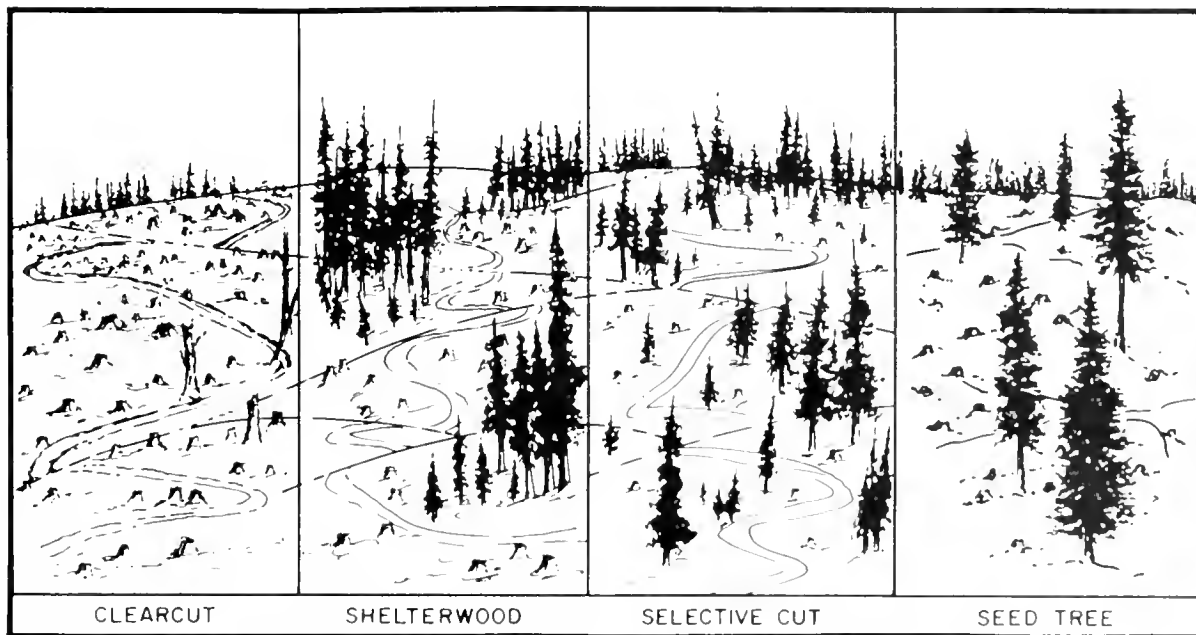


Figure 2. Four Methods of Cutting

Peggy Todd

grazing by livestock and big game animals.

The second method, shelterwood cutting, leaves some larger trees to provide shade for young trees. Selective cutting, the third method, is done by removing the oldest and largest trees in a stand of timber. This may be done over a period of several years. The fourth method is the seed-tree method which leaves scattered, mature trees to seed a logged-over area.

### **Fire—Tool or Disaster?**

Primitive people often used fire to drive game out of shelter. They also set fires to clear land for crops, as some tribes do in Africa. Early settlers in this country did the same thing. But usually fire has been considered a disaster by modern people, and for good reasons (figure 3).

lost. For years after, the rivers ran thick with silt washed from the bare earth.

Fire control in the northwest had begun before 1910, but the fires of that year gave terrible evidence of what uncontrolled fire could do. By the next year, the lumber companies had joined with foresters to prevent fire in the woods and to get fire fighters as fast as possible to those fires that did start. The University of Montana at Missoula established a smoke jumpers school, and a laboratory for the design of fire fighting equipment was set up. Both are at the Missoula airport; visitors may tour this center. And to help restore the forests that had been burned, millions of new trees were planted.

A fire may occur in a location where it doesn't threaten human life or property.



Figure 3. Forest Fire!

Montana Department of Fish, Wildlife, and Parks

The worst fire in Montana's history, which began on August 20, 1910, was part of a flaming band of forest fires that swept across Idaho and Washington that summer. It burned 3 million acres of timberland in the three states, and killed 85 people. An untold number of wildlife was

Such a fire is now sometimes allowed to burn itself out. Fire is a natural occurrence. All-out prevention can upset the balance of nature and other problems can result.

Some species of trees, such as ponderosa pine, Douglas fir, lodgepole pine, and west-



ern larch are adapted for regrowth by the conditions that follow a fire. Mature trees with thick bark are protected against the fire's heat, and seed cones that were on the ground at the time of the fire break open. Unless fire burns into the ground, sterilizing it, enough seeds are left for regrowth. In the mineral soil exposed by the fire, the seeds germinate, and start to form new trees.

### **Insects and Disease**

Just as deadly to trees as fire, insects like the mountain pine beetle can kill whole stands of trees. The pine beetle attacks mature trees; another pest, the spruce budworm, attacks trees of all ages. The resulting dead trees are a fire hazard, as well as a loss of valuable forestland. Great damage can also be caused by the pine and fir engraver beetles, the Douglas fir tussock moth, and the larch casebearer.

Trees sometimes get diseases such as rust and fungus. Trees attacked by the parasite, dwarf mistletoe, develop growths in their branches, called witches' brooms.

### **Grazing**

Grazing for livestock is another important forest use in Montana, both on public and private land (figure 4). About 3.7 million acres of public lands on our ten na-

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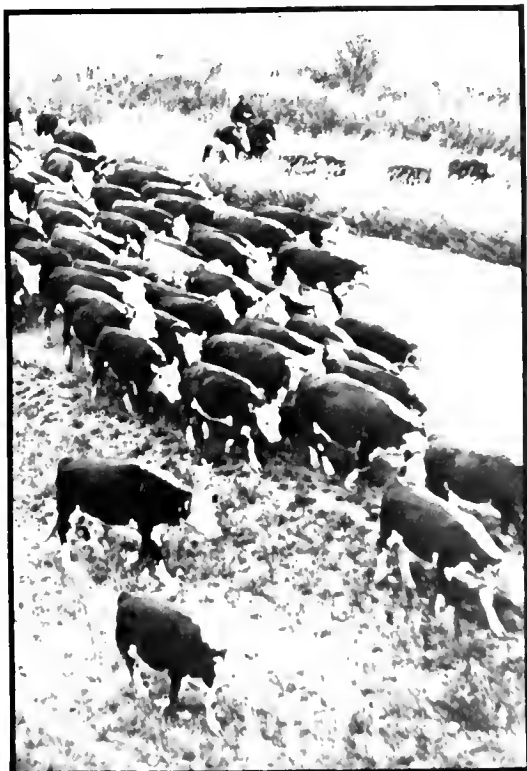


Figure 4. Cattle on the Range

### **\* NATIONAL FORESTS**

When did the idea of national forests get started? Montana's Lewis and Clark National Forest, one of the early "forest reserves," was set aside in 1877. Others were established in 1891, but it wasn't until 1907 that these reserves became known as national forests.

Before that time, many of the hardwood forests in the eastern United States had already been cut down for lumber, firewood, and charcoal. In the Pacific northwest, the "timber barons" were logging huge tracts of unclaimed forest, leaving the land stripped. The first forest reserves were set aside to preserve and manage other woodlands that were being threatened by destruction. So today's national parks and grasslands, wildlife and bird refuges, wilderness areas, and many other preserves became a part of our national inheritance.

tional forests\* can be used by ranchers who have grazing permits or leases. It was once a common sight to see cattle and sheep being driven along some of our highways to summer pasture in June and back to the ranches again in September.

Cattle and other livestock can share the summer range with deer and elk with few problems. Livestock aren't moved to the ranges until the grass has grown high enough for grazing. If spring "green-up" comes late, the permitted grazing season is shorter.

### **Recreation**

Montana has over sixteen million acres in her ten national forests, with many campgrounds, hiking and riding trails, and scenic highways. Two national parks also attract visitors. Glacier Park is in the high peaks of the northwest corner of the state, and part of Yellowstone Park lies in the lodgepole pine forests along Montana's southwest border (figure 5).

The forested western mountains offer both anglers and hunters many hours of pleasure. Most of Montana's blue ribbon trout streams rise in these mountains, and some of the finest big game hunting can be found here, also.



Figure 5. Recreation in Our Forests

Montana Department of Commerce

Skiers have a choice of a number of ski areas, from Big Mountain north of Whitefish to Showdown near Neihart, and Bridger Bowl near Bozeman. Cross-country skiing is popular in many forests, and there are specially marked trails for snowmobiling, too.

Water sports are popular in many places in Montana's forests. Swimmers can enjoy hot springs like those located at Chico, near Pray on the edge of Yellowstone Park, and Lolo, southwest of Missoula. Flathead Lake, surrounded by wooded hills, is a favorite spot not only for swimming, but for sailing as well.

Hikers, backpackers, and photographers might prefer to head for one of Montana's eleven wilderness areas; all are in national forests. Remarkable for their rugged beauty, their remoteness, and the variety of wildlife they hold, they appeal to people who want challenge, solitude, and inspiration.

### **Wildlife Habitat**

Montana has almost nine million acres of publicly-owned wildland, and most of it is

forested. The terrain is often extremely rugged, with steep slopes and rocky outcrops. Numerous high mountain lakes are scattered in the hollows between the peaks; lively small torrents rush along the drainages, and meandering, willow-fringed creeks run through the mountain meadows.

Bighorn sheep and Rocky Mountain goats range from 5,000 feet to above timberline, where the wind keeps the alpine grasses clear of snow. Elk, deer, and the larger carnivores, grizzly bear, black bear, and mountain lion live in the forests and forest edges, moving into the upland parks after food, and retreating into the woods for shelter. Falcon, eagle, and owl live and hunt on the forest edges (figure 6), and moose browse on willows in the marshlands and along the creeks.

Game fish such as brown trout and Dolly Varden inhabit the cold, fast-moving waters. And in the alder, cottonwood, and quaking aspen groves, the beaver builds dams and stores food for the time when ice covers its ponds.



Figure 6. Eagles Gather in Glacier Park

Montana Department of Commerce

The importance of forests as habitat has increased as more land is occupied by agricultural, urban, and industrial uses. Some wildlife species, like the grizzly (figure 7), were once also found on eastern Montana's plains, but are now limited to the high mountains and meadows of the Rockies.

All wildlife needs a place to live where it can get the food it needs, where it can avoid its enemies, and where there is enough room for it to move freely. In Montana, the forests make all these things possible for many species of wildlife.



Figure 7. Grizzlies

Montana Department of Livestock & Wildlife

## Issues

1. An area valued by recreationists may also have timber wanted by logging companies. Is the value of the timber to private industry greater? Or is the land and its trees more important to the public? Other questions may be: Are roads acceptable in a roadless area? What is the age and condition of the timber? How will logging affect the watershed?
2. There may be a market for the minerals in national forests. Recent discoveries of natural gas and oil along the Overthrust Belt (see the Minerals section of this series) may mean that development will take place in these forests. How do we decide how much?
3. As forest land increases in value for resorts, skiing areas, second homes, and camping, how is a fair decision made? Who gets what?

## Further Reading

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- \*Student reading.

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The Montana Department of Natural Resources and Conservation has had many requests for information about the minerals, water, forests, and other resources in Montana. This booklet is one of a series presented to answer some of those questions and to stimulate an interest in the natural resources of Montana. The University of Montana cooperated with DNRC in preparing the series which was financed in part by a federal grant made under Title I of the Higher Education Act of 1965.

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