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# MONTANA'S NATURAL RESOURCES

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# GRASSLANDS

"Of all the things that live and grow upon this earth, grass is the most important. Should its harvest fail for a single year, famine would depopulate the earth."

—John James Ingalls

From the high plateaus of the Absaroka Range and the windswept Bighorn Mountains, to the sandy prairies of eastern Montana, grasses grow that are well adapted to their environments. Montana has 60 million acres of the remaining 700 million acres of grasslands in the nation. Of this acreage, 58 percent of the land area is rangeland, and 12 percent is woodland that can be grazed. The grazing lands provide forage for tens of thousands of beef cattle, thousands of sheep and horses, and many wild grazing animals; the other 30 percent of grassland provides timber, recreation, and watersheds.

The Montana Department of Natural Resources and Conservation thanks the University of Washington Press for the use of drawings by Hitchcock from its publication, "Grasses of the Pacific Northwest."

### What is a Grass?

A grass can be any one of a family of plants with long, narrow leaves, jointed stems, flowers that grow in spikelets, and seedlike fruit. Grass may spread from seed, runners on top of the ground, or stems (rhizomes) underground. A grass may be anything from the tiniest alpine plant that grows no more than an inch tall, to the bamboo that looks like a tree and may grow to 120 feet.

### Grass in the Plant Community

Grasses are only one part of a natural plant community—Montana's grasslands also contain *forbs*, *sedges*, and *shrubs*. *Forbs* are broad-leaved plants like sunflowers, wild geraniums, asters, and lupine that bloom early when soil moisture is high. *Sedges*, such as the Rocky Mountain fringed gentian, usually grow in moist areas. Generally their stems are triangular and solid; they have three rows of narrow, pointed leaves, and flowers that may be

very tiny. These plants belong to the same large family as the Egyptian papyrus used to make paper in ancient times. Montana's native *shrubs* include the wild rose, willow, chokecherry, buffaloberry, and Oregon grape. The fruits from some of these shrubs gave both Indians and settlers a delicious food that was high in vitamin C.

### What Grows Where?

Altitude, climate, land forms (or topography), and soils determine what grasses grow in certain places. Montana is a big state, with a climate that ranges from North Pacific to desert-like, with soils of many kinds, and altitudes from 1,800 feet to over 12,000 feet. You might expect, then, that a wide variety of native grasses grow here.

In the following section the state's grasslands are divided into ten general areas, by geographical location, elevation, and by the soil type most prevalent. There are many variations within these areas, but these are some of the principal grasslands.

Beginning in the mountains of northwest Montana, a few high altitude grasses, such as elk sedge, grow along the steep western slopes in forests of Douglas fir and western larch. Montana's state grass, bluebunch wheatgrass\*, grows in ponderosa forests here and throughout the state. Shrubs and broadleaved forbs survive best in the sandy loam of these high areas, which are good summer range for deer and elk. Bears are fond of the huckleberries that grow here.



Pacific Bluegrass



In the mountain valleys the soil is deeper and more fertile than that on the surrounding hillsides. The grasses most common there are needlegrass, meadow grasses, Canada and Sandberg and Pacific bluegrasses\*, prairie Junegrass, and rough fescue.



Bluebunch Wheatgrass



Growing on the foothills throughout the western part of the state, Idaho fescue, bluebunch wheatgrass, Junegrass, and Indian ricegrass\*, are mixed with several species of sagebrush. The soils in these places are mostly sandy; along the streams they are mixed with dark, rich soils deposited by water.

Indian Ricegrass



Timberline Bluegrass



On the towering Beartooth-Absaroka plateau north of Yellowstone Park, alpine grasses are the chief vegetation on the shallow, rocky soils. Alpine timothy and timberline bluegrass\*, and Ross bent grass, together with forbs such as lupine and paintbrush, are able to thrive in spite of the short growing season at these high altitudes.

The rolling landscape of Montana's central plains is interrupted by several widely separated small mountain ranges where lodgepole pine, Engelmann spruce, and Douglas fir predominate. In these forests, at altitudes of from 5,000 to 8,000 feet, elk sedge, pine reedgrass, and Idaho fescue\* grow in the soils that range from sandy loams to heavy clays.



Idaho Fescue



Sweetgrass



The western glaciated plains (that is, those once covered by glaciers), have richer soils than those farther south. Most of the land is planted to wheat, so there are few native grasses in these north central areas. Among them are blue grama, western wheatgrass, and threadleaf and needleleaf sedges. The sweetgrass\* that grows on Montana's central plains was used by Indians as a ceremonial incense.

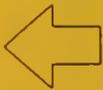
The eastern glaciated plains extend from near Havre to the Montana-North Dakota border, with a southern boundary that roughly follows the Missouri River. The dark grayish brown soils of these wide valleys, foothills, and benchlands have fescues, wheatgrasses, needle-and-thread, and bromes\*. Shrubs growing here are serviceberry, western chokecherry, buffaloberry, and rose.



Smooth Brome



Sandberg Bluegrass



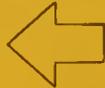
In a wide area extending on either side of the Missouri River, known as the Missouri Breaks, the vegetation suits the rugged terrain. Scrub pine, juniper, and some Ponderosa pine cling to the heavy clay soils of the steep, dry cliffs and gorges. Bluebunch wheatgrass, blue grama, Sandberg bluegrass\*, and plains muhly grow here, along with rabbitbrush, sagebrush, yucca, and pricklypear.

Plains Muhly



The western sedimentary plains curve in a wide reverse "S" from the Missouri River to Montana's southern border. Vegetation in these benchlands and wide valleys is composed of fescues, bluebunch and western wheatgrasses, blue grama, plains muhly\*, and shrubs of the foothills type. Sagebrush dominates in some parts of this region. Saltbush, pricklypear, phlox, and wildbuckwheat occur in smaller amounts.

Buffalograss



Montana's eastern sedimentary plains are marked by scattered stands of Ponderosa pine on the dry upper elevations. Grasses here are the wheatgrasses, fescues, sideoats grama, Indian ricegrass, and Sandberg bluegrass. In sandy places, big and little bluestem are the principal grasses. Forbs are plantain, wild onion, and biscuitroot; shrubs are snowberry, pricklypear, and skunkbush sumac. The only remaining pure stand of buffalograss\* grows in the southeastern corner of the state. It was once one of the most abundant grasses on the western plains.

## The Climax Community

Plants that have adapted themselves to their environment and formed a stable community, one that remains about the same, year after year, belong to a climax community. Unless something happens to change it, it continues to maintain the same kinds of plants and make the best use of the prevailing climate and soil conditions. The more varied a plant community is, the more protection it has against extreme heat, drought, or overuse.

## Decreasers, Increases, and Invaders

In any plant community there will be plants of three classifications—decreasers, increasers, and invaders. Decreasers are most abundant in a climax community. They are the ones that grazing animals prefer, and they also have more of the food elements that these animals need. They do, however, decrease in number with heavy grazing—that's why they are called decreasers (figure 1).

### 1. Decreasers

Canada Wild Rye



Green Needlegrass



Sideoats Grama

Empty space is rare in nature, so when more useful plants (the decreaseers) are removed from the plant community, others come in that are better adapted to constant grazing and trampling. These are called increasers (figure 2)—they increase to fill the spaces left when the decreaseers are forced out.

Increasers are a natural part of the climax vegetation, and may grow in about equal numbers with the decreaseers. However, they are usually less appetizing to grazing animals. This gives them added protection against heavy use. But like most plants, increasers can be weakened by continued close grazing.

## 2. Increasers



Blue Grama



Nebraska Sedge

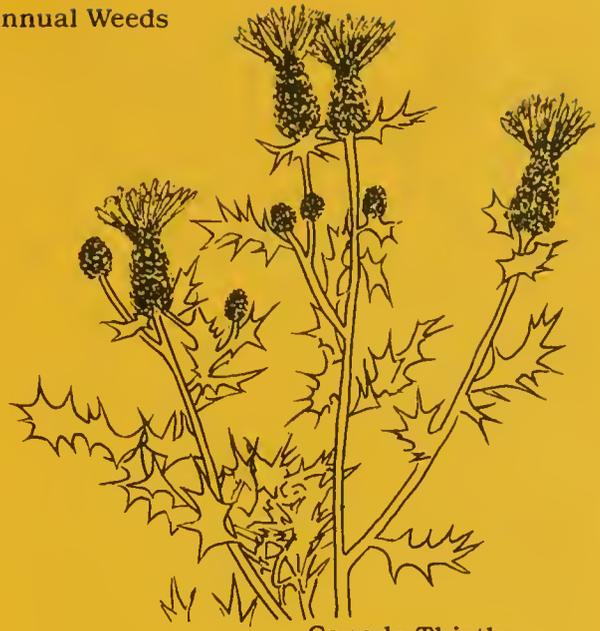


Needle-and-Thread

### 3. Invaders—Annual Weeds



Chess



Canada Thistle



Curly Cup Gumweed



Salsify

If continued heavy use also forces the increasers out of a plant community, invader plants will come in to fill their place. Invaders may not be present at all in the climax community, or if present they make up less than 2 1/2 percent of the total community. Invaders are usually not palatable to animals and some in fact may be poison-

ous, or have thorns or stickers. In Montana some of these low quality grasses are saltgrass, little bluestem, and wild rye. Annual weeds, such as spotted knapweed, baby's breath, salsify, bindweed, curly cup gumweed, lambsquarter, and Canada thistle often invade grasslands that have been overgrazed or disturbed (figure 3).

## More About Grasses

Native grasses, unique in their adaptability to Montana growing conditions, have developed traits to ensure their survival. Their roots, many reaching depths of six feet or more, are capable of drawing moisture from any level. Many of these grasses complete their growing cycle in early summer when temperatures are cool and moisture is plentiful. They may become dormant during the dry months; some resume growth in the fall. Large amounts of nutrients are stored in the root system to be used in times of stress to rebuild the plant. These stored nutrients may help a plant to survive short periods of overgrazing or drought.

Range plants and grasses give back to the soil as much as two-thirds of their growth. Dead stems and leaves form a layer of litter that gradually breaks down into humus, a dark material made of decaying plants and animals. The minerals and other nutrients in this humus return to the soil. Humus also protects the ground surface from extreme heat, breaks the force of wind or falling rain, and helps the earth retain moisture.

Other plants that are a part of the Montana grassland provide food and habitat for wildlife; however, domestic stock usually avoid them unless nothing else is available.

None of these weeds and annual grasses is very nutritious for livestock, and some, like downy chess (military grass), can harm animals if the sharp seeds lodge in their throats or under their skins. All are "indicators" of an overused or poorly managed range. When ranchers or range specialists notice that these plants are on the increase in rangeland or pastures, they know they must act not only to curb their spread, but also to provide better conditions for the productive range grasses.

Woody shrubs such as sagebrush, rabbit brush, big sage, greasewood, saltbush, snowberry, willows, and wild rose provide forage and shelter for wild browsing animals and other wildlife (figure 4). Many of these shrubs do, however, invade grasslands that have been overgrazed, and, like annual weeds, are "indicators" of poor range condition.



4. Moose Browsing

Montana Department of Fish, Wildlife, and Parks

## Grasslands as Grazing Land

Most grasslands in Montana are used for grazing domestic animals, either on privately owned lands, or on land that is leased from the federal government. About 7 million acres of the state's grassland is woodland that can be grazed.

Cattle, like the bison before them, prefer the high-protein native grasses. In order to conserve these plants, ranchers have learned to "take half, leave half." Most use a system of rest-rotation—that is, they move their stock from one part of the range to another to avoid overgrazing. If salt and water are provided, cattle or sheep can be kept in a desired area. Sheep may be tended by a herder, who moves them to different grazing areas. Such rotation of pasture imitates the natural migration patterns of the wild grazing animals that used to move across the prairie. Other methods of keeping range healthy or restoring it to its original vigor include reseeding to native grasses and weed spraying.

## Forested Grassland

Roughly 7 million acres of Montana's grassland is woodland that can be grazed. Another 18 million acres provides timber, watersheds, and places for recreation. The trees in Montana's forested grasslands range in variety from western ponderosa, Douglas fir, and redcedar on the Pacific slope of the Rockies to scattered dryland stands of ponderosa pine on the high plains. These forests serve as wildlife habitat, as sources of timber, and, in the western part of the state, as important watersheds\* that hold and conserve the snowpack of the cold months.

## Grasslands as Watersheds

In Montana the most important contribution that grasslands make besides grazing is that they store moisture. You might not think of abundant water when you look at a dry, brown stretch of prairie in midsummer. But grassland plays a vital part in holding water in the soil. This is because soil with a thick matt of grass and roots absorbs as much as 8 or 9 times more water than ground without such protection.

Grasslands are like shields that protect the earth. They keep heavy rainshowers from washing away topsoil, and wind from blowing it away; grass cools the earth, and breaks down into the humus that nourishes its own growth. In the grassy foothills and mountains of Montana, this ground cover helps to hold the snowpack that builds up during the cold months. In the spring, when the snow starts to melt, the root systems of many different kinds of grass help to control runoff.

## Recreation

Recreation on grasslands may include fishing, hunting, photography, riding, hiking, or camping. Many access areas provide places for people to enjoy these outdoor activities. Among the grassland areas, the National Bison Range near Moiese in western Montana attracts many visitors (figure 5). One of the largest wildlife refuges in the world, the Charles M. Russell National Wildlife Refuge, along the Missouri River in north-central Montana, includes almost undisturbed grasslands. These are two of six publicly owned game preserves in the state that include more than 120,000 acres of grassland.

\*A watershed is a whole region or area of land that supplies water to a lake or river. This water enters the ground from rain or snow and returns to the surface in springs, marshy places, or in streamflow.



5. Bison on National Bison Range

Montana Department of Commerce

## History of Montana's Grasslands —What Happened to the Prairie?

Most of the scars are covered now by stands of wheat or grasses that were planted by farmers and ranchers, but in the drought years from 1933 to 1940, great stretches of Montana prairie resembled a desert. Fences were almost drifted under with light sandy soil. Abandoned houses and barns slumped into the endless wind. What had been advertised as the last frontier now had little grass, no cattle, and few people left.

How could the rich, thick, prairie grassland have disappeared so quickly? Early day cattlemen and farmers evidently gave little thought to the results when they put thousands of animals on what seemed like limitless prairie. They had a few hard lessons to learn before they began to manage the land properly. One such lesson came in the winter of 1886-87. During that winter Montana artist Charlie Russell sent a postcard to some eastern cattle investors with a sketch of a starving steer. He wrote on the card, "The Last of Ten Thousand, or Waiting for a Chinook."

After buffalo hunters had cleared the prairies in the years from 1872-74, investments in cattle were popular among eastern businessmen. English, Scotch, and

European noblemen who had hunted on the western plains joined in the cattle rush. The prairies were soon crowded with lean Texas longhorns that had never seen snow.

That winter of 1886-87 turned out to be the worst that anyone could remember. Blizzard followed blizzard; ice coated the drifts and the cattle couldn't dig through to grass. Hundreds of thousands of cattle, in poor condition after long trail drives, died. Fortunes were lost, and men began to realize that cattle couldn't survive on the open range without winter feed. For the first time, western stockmen fenced pastures and fed their animals; the rancher became a farmer, too. He put some of his land into hay production and kept his animals close to the home ranch so they could be fed during the cold months. That was the beginning of the stock-raising business as we know it now in Montana.

Although one lesson had been learned, more followed. Sheep had been in Montana since 1857, but their numbers reached 100,000 by 1880. They survived the "Hard Winter" far better than cattle did. By 1890, 1 1/2 million sheep grazed the high plains and mountain valleys of Montana (figure 6). Before the national forests were established, overgrazing damaged many of those areas that couldn't withstand heavy use.



6. Shepherd with Flock

Montana Historical Society

Then came the homesteaders with moldboard plows that could turn the deep prairie sod. There were a few good years when enough rain fell to produce adequate crops. But then drought, a natural recurrence in the prairie climate, came—and stayed. Without the deep-rooted grasses to hold it, the soil dried and blew in dust storms that covered the plains. Crops failed, and most of the homesteaders, broke and disillusioned, moved on. The land they left behind was severely damaged.

## Repairing the Damage

In the years that followed, national concern focused on rebuilding the soils of the Great Plains, where most of the country's grain had been grown. In 1930 the U.S. Congress passed the Buchanan Amendment to the Agriculture Appropriation Bill. This amendment provided funds to create the Soil Erosion Service, which in 1935 became known as the Soil Conservation Service. Its duty was twofold: (1) to find ways of improving and conserving our soil, water, and other natural resources, and (2) to demonstrate and teach conservation practices.

In 1937 President Franklin D. Roosevelt asked the nation's governors to support laws permitting landowners to form conservation districts. Their purpose was to work through local people to conserve and improve our natural resources. In 1939

Montana passed a law to form conservation districts that would be a part of state government.

Meanwhile, rangeland and grass specialists were searching for grasses and other plants that could take root in the desert-like conditions left by the great dust storms that had stripped the land of precious topsoil. From Russia they brought the seeds of crested wheatgrass, a native of the cold, windswept steppes near the arctic circle. Brome grass, an import from Hungary, did well on the high dry plains of this country. From the wheatlands of central Canada came ideas for new ways of planting grain and the use of shelterbelts and strip farming to fight the wind.

Because damage to rangelands has long been a problem in Montana, the state legislature has passed several laws to improve our grasslands. Among these laws are the Montana Grazing District Law of 1933, and the only rangeland management law in the United States, the Coordinated Management Act. The Rangeland Resource Program established in 1970 works to improve Montana's rangelands through county range leaders who are local ranchers.

Erosion from wind will always be a problem in Montana; in 1980 and 1981, drought and high winds gave us the second highest erosion rate in the United States (figure 7).



7. Wind Erosion in Eastern Montana, 1981

U.S. Soil Conservation Service

## Relict Areas

Throughout Montana there are many areas where the grasses grow just as they did before domestic grazing began. These relict areas, identified and maintained through the Soil Conservation Service, are located on ranches, in pioneer cemeteries, (figure 8), and in isolated areas. On all of these sites more tall grasses grow, with smaller numbers of short grasses, broad-leaved forbs, and woody shrubs.

One of these relict areas, near Ekalaka, contains about 400 acres and is on top of a butte that large grazing animals can't reach. Others are on the old Custer and Reno-Benteen battlefields southeast of Hardin. Another is a railroad right-of-way near Whitehall that has not been grazed since 1912. These plots provide ranchers with comparisons for grazing lands in their areas, so they can maintain similar mixes of native grasses.



U.S. Soil Conservation Service

8. Relict Area—Helmville Cemetary

## Grassland Inhabitants

Montana's grasslands are home to many wild things. The most commonly seen big game are mule deer and pronghorn antelope (figure 9), but hundreds of other creatures burrow beneath the grass or nest in it, or fly above it looking for food. Among the burrowing animals, the largest is the badger. Smaller animals like ground squirrels, moles, voles, and prairie dogs also burrow under the thick mat of roots and grasses. Snakes often share quarters with the larger underground inhabitants. Overhead drift the hawks and buzzards, and on the forest edges, eagles hunt from their nests on cliffs and dead trees.



Montana Department of Commerce

9. Antelope

Sparrows, quail, grouse, bluebirds, and thrushes keep to the sagebrush and grass that join the arid fringes of ponderosa pine and Douglas fir. In the mountain valleys, where wild marsh grasses (or sedges) line many of the waterways, muskrats, skunks, and raccoons make their homes. They pad their burrows with grass, and prey on the crayfish, frogs, and water insects that live in these grassy streams. High on the talus slopes, the little gray pica, or coney, the haymaker of the wild, clips grass and spreads it on the rocks to cure for his winter meals.

## Suggested Class Projects

1. Ask area representatives of Bureau of Land Management; Department of Fish, Wildlife, and Parks; Soil Conservation Service; and other government agencies responsible for grassland management to speak to the class.



2. Ask area ranchers to speak to the class on their range management techniques.



3. Collect area grasses, identify, and label them. Discuss what they indicate about the soil in which they were found.



4. Arrange for a group hike through an area grassland or outdoor classroom. Keep a list of plants and signs of animals seen during the hike.



5. Visit any of the 100 "relict" sites located around the state where grasslands are kept in the same condition they were before domestic livestock began grazing in the area. (Your local soil conservation office can tell you where one is located in your area.)

## Further Reading

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\*Student Reading.



Alpine Bluegrass



Junegrass

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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