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Alberta's Prairie Vegetation: Past and Present Use

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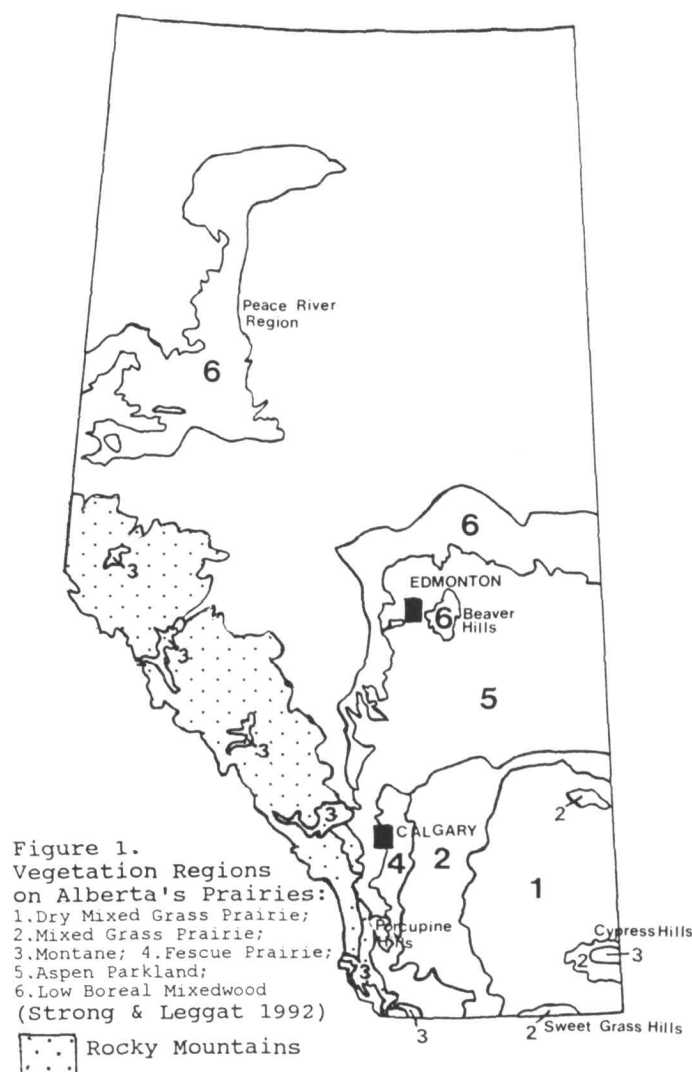
Alberta's prairie vegetation has gone through many changes. Glaciation, fire, climate, and bison grazing played important roles in its development before European settlement. Since European settlement, fire suppression, domestic crop production, and the elimination of migratory bison herds have altered Alberta's prairie ecology and changed much of the vegetation.

Vegetational Changes since Glaciation

During Alberta's early history after the last glaciation, coniferous forests dominated the landscape. Even the semiarid grasslands present in southern Alberta today were dominated by coniferous forest. After the glaciers fully retreated, dry weather along with natural wildfire created grasslands and expanded them northward. The amount of grassland expansion that occurred is uncertain. Some postulate that the grasslands of the Peace River region in northwestern Alberta joined up with those in central Alberta. These grasslands are currently separated by nearly 100 miles of boreal forest. As the dry period became less harsh, forests began invading back into the grasslands until the present equilibrium was reached.

Present Vegetation

With the present equilibrium, six vegetation regions occur on Alberta's prairies (Figures 1 to 6). They are the Dry Mixed Grass Prairie, the Mixed Grass Prairie, the Fescue Prairie, the Aspen Parkland, the Montane, and the Low Boreal Mixedwood. The Dry Mixed Grass Prairie is a Needle-Grama Grass complex of *Stipa comata*, *S. spartea*, and *Bouteloua gracilis*. The Mixed Grass Prairie is a Needle-Wheat Grass complex of *Stipa viridula*, *S. spartea*, *S. comata*, *Agropyron dasystachyum*, and *A. smithii*. Rough Fescue (*Festuca scabrella*)-Parry Oat Grass (*Danthonia parryi*) grasslands dominate the Fescue Prairie. The Aspen Parkland is a combination of Rough Fescue grasslands on upland sites and Trembling Aspen (*Populus tremuloides*) clones on moist sites. The dominant vegetation in the Montane is a combination of Lodgepole pine (*Pinus contorta*) and Douglas-fir (*Pseudotsuga men-*



ziesii) forests. Dry sites in the Montane are occupied by Rough Fescue or June grass (*Koeleria macrantha*) grasslands, while moist sites are occupied by Balsam poplar (*Populus balsamifera*) or Willow (*Salix* spp.). Trembling



Fig. 2. *Mixed Grass Prairie.*

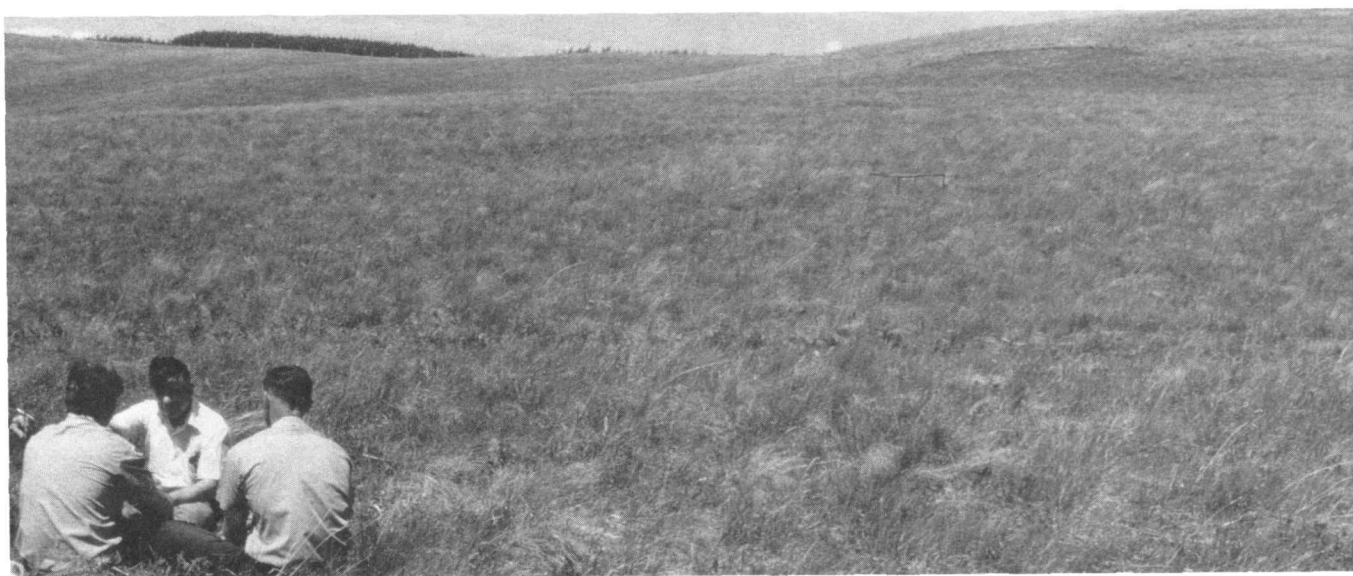


Fig. 3. *Fescue Prairie*



Fig. 4. *Aspen Parkland*



Fig. 5. *Montane*



Fig. 6. *Low Boreal Mixedwood.*

Table 1. Precipitation and temperature Alberta's prairies (Strong and Leggat 1992).

	Annual precip.	May–Aug. precip.	Ave. May–Aug. max. temp's	Extreme summer max. temp's
Dried mixed grass	272mm 10.7"	156mm 6.1"	23°–28°C 73°–82°F	35°C 95°F
Mixed gras	326mm 12.8"	176mm 6.8"	21°–24°C 70°–75°F	33°C 91°F
Fescue	445mm 17.5"	214mm 8.4"	19°–23°C 66°–73°F	31°C 88°F
Aspen Parkland	412mm 16.2"	259mm 10.2"	19°–22°C 64°–72°F	31°C 88°F
Montane	515mm 20.3"	210mm 8.3"	17°–20°C 62°–68°F	30°C 86°F
Low Boreal Mixedwood	380mm 15.0"	235mm 9.3"	19°–21°C 64°–70°F	30°C 86°F

Aspen stands dominate the Low Boreal Mixedwood with White Spruce (*Picea glauca*) occurring as a subdominant on some sites.

Influences of the Present Vegetation

Climate

There are three significant climatic influences on Alberta's prairies. They are Pacific moisture systems, thunderstorms, and chinooks.

Pacific moisture systems are low pressure weather systems that bring moisture inland from the Pacific Ocean. These systems supply most of the moisture received by Alberta's Prairies. Generally, most of the moisture in these systems is lost crossing the Rocky Mountains. Any remaining moisture is usually dropped shortly after they enter the prairies. The rainfall pattern exhibited by these moisture systems forms a moisture gradient of moist to dry from the Rocky Mountains eastward to the Dry Mixed Grass Prairie region (Table 1). The Aspen Parkland and the Low Boreal Mixedwood are exceptions to this moisture gradient because they receive moisture from other moisture systems known as thunderstorms.

Thunderstorms are rain showers that form when the air at ground level, that is warmed by daytime heating, rises and condenses by colliding with cooler air above it. This form of rain is most frequent in the Aspen Parkland and Low Boreal Mixedwood during July and August when daytime heating is at a maximum. Thunderstorms are important to the Aspen Parkland and Low Boreal Mixedwood because they supply the Trembling Aspen stands with needed moisture during the hottest summer months. The Aspen Parkland and Low Boreal Mixedwood have the highest amount of May–August precipitation on Alberta's prairies (Table 1). The Fescue Prairie also receives high amounts of May–August precipitation, but cannot sustain Trembling Aspen stands because thunderstorms are not frequent enough and because chinooks desiccate the Trembling Aspen stands.

Chinooks are hot, dry winter winds that come over the Rocky Mountains from the southwest. They are important because they warm the area and melt off the snow cover. Early ranching in Alberta was feasible because chinooks cleared the grasslands of snow so that they could be grazed year-round. Chinooks have most of their influence closer to the mountains in the Rough Fescue Prairie and Montane regions. As they move further out into the prairies they lose their warmth and often become bitter winds.

Fire

Before European settlement, wildfires controlled brush and forest expansion throughout Alberta's prairies. The importance of fire was especially significant in the Aspen Parkland and Low Boreal Mixedwood where it controlled the spread of Trembling Aspen. With fire, most of the Aspen Parkland was maintained as Rough Fescue grasslands. Palliser (1863) described the fire maintained Aspen Parkland as an area where, "the woods are very scanty and consist almost exclusively of aspen poplar, which

form small groves and artificial-looking clumps that dot the rich pasture lands." Frequent fires were also important in maintaining a false parkland state of Trembling Aspen stands and Rough Fescue grasslands throughout the Low Boreal Mixedwood region. Proof of fire's role in this region is substantiated by early settlers who found burnt conifer trees in the soil while breaking treeless land (Dewar 1992).

After Alberta was settled, fires were suppressed and removed from the Aspen Parkland and Low Boreal Mixedwood regions. With fire suppression, Trembling Aspen stands have expanded, unchecked, into the fire maintained grasslands at a rate of 1% of the area per year. This has decreased the amount of forage produced in the Aspen Parkland and Low Boreal Mixedwood regions and has created many management problems.

Pre-Settlement Use

Before European settlement the main use of Alberta's central and southern prairie vegetation was year-round bison grazing. Large herds of bison utilized these prairies in a migratory pattern. During spring and early summer, bison moved throughout the Dry Mixed Grass and Mixed Grass regions. They chose to graze these areas at this time because the snow cover disappears earlier than in the other regions, which allowed succulent spring growth to occur earlier. Then, after the vegetation in the Dry Mixed Grass and Mixed Grass regions ripened and became unpalatable, the bison would move into the Fescue Prairie and Aspen Parkland regions. The grasslands in these two regions, which are mainly Rough Fescue grasslands, have the highest nutritional value after curing of any grassland region in Alberta. The Fescue Prairie and Aspen Parkland regions also tend to have more available water in the late summer and fall than the Mixed Grass regions do. During winter the bison also tended to stay in the Fescue Prairie and Aspen Parkland regions. They chose these regions because of the nutritious Rough Fescue forage and because frequent chinooks left the hills in the Fescue Prairie bare of snow. The bison also used the Montane and Low Boreal Mixedwood regions to some extent during the winter. Even after the snow cover was established, bison would stay in these regions because the tall, dense growth form of Rough Fescue was easy to reach by cratering through the snow.

Use After European Settlement

After European settlement, domestic crop production and livestock grazing became the main activities on Alberta's prairies. Through these activities Alberta's prairies have been significantly altered.

The most distinguishable changes have been caused by annual crop production. Most of the Aspen Parkland, Fescue Prairie, and Mixed Grass Prairie regions have been put into annual crop production in order to take advantage of their rich soils. Large areas of the Low Boreal Mixedwood and Dry Mixed Grass Prairie regions have also been put into annual crop production, despite

their poorer soils. More native vegetation might have remained in the Dry Mixed Grass Prairie if it had not been for the Homesteader Act which required settlers to cultivate half (80 acres) of their quarter section homesteads. Because of this Act, many areas that were not suitable for annual crop production were cultivated. Most of these areas have since been seeded back to the perennial forages.

Annual cropping is not the only reason why native grasslands have been plowed under. Domestic forage production for range rejuvenation, creating complementary grazing systems, and producing winter feed has caused many native grasslands to be cultivated. Range rejuvenation has been used to increase the production on rangelands choked by Trembling Aspen encroachment and on overgrazed rangelands. Seeding domestic forage has also been used when implementing grazing systems that mimic bison grazing patterns. Because of the past bison grazing patterns, each vegetation region is best suited to grazing at certain times during the grazing season. Therefore, domestic forages have been used to create spring, fall, or summer pastures that complement the proper use of the available native range. Producing

winter feed is essential for livestock production in Alberta. With the frequent heavy snow falls that occur during the winter, grazing is impossible and providing stored forage for the livestock is essential.

Even though agricultural activity has significantly altered Alberta's prairies, many sites with native vegetation still exist. From these sites, and even from the sites that have intensive agricultural activity occurring on them, you can appreciate the beauty and productivity of Alberta's prairies. John Macoun (1882), an early prairie botanist, may have captured the splendour of Alberta best when he stated, "In all my wanderings, I never saw any spot equal in beauty...."

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