Great Plains Mixedgrass Grassland

General Description

The *Great Plains Mixedgrass Grassland* zone covers an area of approximately 193,000 km² in southeastern Alberta and southern Saskatchewan. This zone represents the northern portion of North American mixedgrass prairie that extends south to Texas. The climate is one of the driest in Canada. The majority of the contemporary landscape supports crop cultivation and livestock grazing.

Vegetation

Mixedgrass prairie is characterized by a mixture of mid-height grasses (mid-grasses) and short grasses. In the *Great Plains Mixedgrass Grassland*, the mid-grass component generally dominates but in climatically drier portions of the zone, the short grass component becomes more prominent. Forbs and dwarf shrubs are scattered throughout the grassland. Shrub and tree-dominated communities only occur on moist sites. Shrubs and trees are primarily cold-deciduous, broad-leaved species. Species composition and abundance in native grasslands can shift dramatically with grazing impacts, changes in fire regime or invasion by non-native species.

The dominant mid-grasses include needle-and-thread grass (*Hesperostipa comata*), northern porcupine grass (*H. curtiseta*), thick-spike wildrye (*Elymus lanceolatus*) and western wheatgrass (*Pascopyrum smithii*). Stands at the eastern end of the range may be dominated by plains porcupine grass (*H. spartea*). Other mid-grasses that can be important on some sites are green needlegrass (*Nassella viridula*), plains reedgrass (*Calamagrostis montanensis*), little bluestem (*Schizachyrium scoparium*) and, on sandy sites, prairie sandreed (*Sporobolus rigidus* var. *rigidus*) and sand dropseed (*Sporobolus cryptandrus*).

The most important short graminoids are prairie junegrass (*Koeleria macrantha*), blue grama (*Bouteloua gracilis*) and several upland sedges (e.g., blunt sedge [*Carex obtusata*], needle-leaved sedge [*C. duriuscula*], long-stolon sedge [*C. inops* ssp. *heliophila*], thread-leaved sedge [*C. filifolia*]). Other short grasses that can be abundant on some sites include Sandberg's bluegrass (*Poa secunda*), plains muhly (*Muhlenbergia cuspidata*) and saltgrass (*Distichlis spicata*).

Forb/dwarf shrub species include prairie pasqueflower (*Pulsatilla nuttalliana*), prairie sagebrush (*Artemisia frigida*), prairie sage (*A. ludoviciana*), common yarrow (*Achillea millefolium*), scarlet globe-mallow (*Sphaeralcea coccinea*), prairie golden bean (*Thermopsis rhombifolia*), milk-vetches (*Astragalus* spp.), locoweeds (*Oxytropis* spp.), Indian breadroots (*Pediomelum* spp.), American vetch (*Vicia americana*), hairy goldenaster (*Heterotheca villosa*), Missouri goldenrod (*Solidago missouriensis*), winterfat (*Krascheninnikovia lanata*), Hood's phlox (*Phlox hoodii*) and pussytoes (*Antennaria* spp.). Many stands have a ground layer of prairie spikemoss (*Selaginella densa*).

With the exception of prairie rose (*Rosa arkansana*), shrubs are generally infrequent. Western snowberry (*Symphoricarpos occidentalis*) and Woods' rose (*R.*

woodsii) can be abundant on moist sites. On alluvial sites in the climatically drier part of the zone, shrub-grassland with silver wormwood (*Artemisia cana*) develops. Creeping juniper (*Juniperus horizontalis*) occurs with silver wormwood on steep valley slopes, as well as on sandy soils and dunes.

Alluvial forests dominated by plains cottonwood (*Populus deltoides* ssp. *monilifera*), narrow-leaved cottonwood (*P. angustifolia*), balsam poplar (*P. balsamifera*) and Manitoba maple *Acer negundo*) occur on stable floodplain terraces. These stands often have shrub-rich understories.

Wetlands and small water bodies are fairly common on the landscape. They are mainly confined to poorly drained topographic depressions and often dry up during the summer; small alkali wetlands are common occurrences.

Deeper marshes dominated by broad-leaved cattail (*Typha latifolia*), hard-stemmed bulrush (*Schoenoplectus acutus*) and common reed (*Phragmites australis*) occur on the margins of water bodies. Non-saline shallow marshes are dominated by a variety of graminoids, including sedges (e.g., water sedge [*Carex aquatilis*], wheat sedge [*Carex atherodes*], northern beaked sedge [*Carex utriculata*]), grasses (e.g., tall mannagrass [*Glyceria grandis*], common rivergrass [*Scolochloa festucacea*]) and common spikerush (*Eleocharis palustris*). Non-saline wet meadows are dominated by woolly sedge (*Carex pellita*), tufted hairgrass (*Deschampsia cespitosa*), fowl bluegrass (*Poa palustris*) or a wide variety of forbs. Saline wet meadows and shallow marshes dominated by alkali saltgrass (*Distichlis stricta* var. *stricta*), alkali cordgrass (*Spartina gracilis*), Nuttall's alkaligrass (*Puccinellia nutalliana*) or northern reedgrass (*Calamagrostic stricta* ssp. *inexpansa*) occur on seasonally flooded sites where evaporation concentrates salts.

Shrub communities dominated by willows (e.g., Bebb's willow [*Salix bebbiana*], starved willow [*Salix famelica*], meadow willow [*Salix petiolaris*]) often line small watercourses and margins of waterbodies where water tables remain near the surface throughout the year.

Climate

The *Great Plains Mixedgrass Grassland* zone occurs within the dry continental temperate macroclimate of southeastern Alberta and southern Saskatchewan. Winters are cold and summers are warm; mean annual temperatures average approximately 3.6˚C. Growing degree days above 5˚C vary between about 1550 and 1860. This is the driest climatic area in the Canadian prairies, with annual precipitation of approximately 300 – 430 mm; winter snowfall is low.

There is pronounced precipitation variation within the zone, with the driest conditions occurring at low elevations in southeastern Alberta and southwestern Saskatchewan. The climate is somewhat moister in the Cypress Hills and to the west, north and east of this core area. Both structure and species composition of mixedgrass prairie communities change in response to this climatic variation. Drought years with extremely low precipitation occur more frequently in the *Great Plains Mixedgrass Grassland* zone than in surrounding vegetation zones with more humid climates, and adaptation to drought is an important feature of the natural vegetation.

Physiography, Geology, Topography and Soils

This zone occupies portions of the Alberta and Saskatchewan Plains, subdivisions of the Interior Plains physiographic region. Elevations are generally <1000 mASL, although some mixedgrass prairie occurs above this elevation in western Alberta and in the Cypress Hills.

The zone is underlain by level Mesozoic and Tertiary sedimentary rocks. The terrain is mostly an undulating plain, but local relief is provided by low bedrock hills and the lower slopes of the Cypress Hills, as well as by postglacial valley complexes, hummocky moraines and sand dunes.

The entire zone was affected by late Pleistocene glaciation. The predominant surficial material is moderately calcareous glacial till. Fine-textured glaciolacustrine and sandy glaciofluvial sediments also cover large areas. Dune complexes are significant in some locations. Soils are primarily deep Chernozems with loamy to clayey textures, but Solonetzic soils with an impervious hardpan layer

caused by excess sodium (Na+) are common in climatically drier areas.

Notes

In most of Saskatchewan, the *Great Plains Mixedgrass Grassland* zone borders the *Great Plains Parkland* to the north and east. In Alberta, and a small part of western Saskatchewan, its northern boundary is the *Great Plains Fescue Grassland*. On its western edge, it adjoins the *Rocky Mountain Foothills Fescue Grassland*. To the south, it continues into the United States. The *Cypress Hills* is an elevational feature that is surrounded by this zone; mixedgrass occurs at the lower elevations of the Cypress Hills.