Canadian National Vegetation Classification (CNVC)
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Great Plains Forest & Woodland

Macrogroup M151

Forêts & terres boisées des Grandes Plaines

Cool Temperate Forest & Woodland

D326 North American Great Plains Forest & Woodland

M151 Great Plains Forest & Woodland

Concept

This factsheet describes the Canadian expression of Great Plains treed vegetation, including broad-leaved cold-deciduous woodlands and forest patches of the Parkland and Great Plains Grassland CNVC vegetation zones in Alberta, Saskatchewan and Manitoba. M151 does not include floodplain forests, which are described by M028 [Great Plains Floodplain Forest]. Most Canadian occurrences of M151 are in the Parkland vegetation zone, which occupies the northern edge of the dry North American Great Plains grassland region where it is transitional to boreal forest. Here, the climate is moist enough to support tree growth under certain conditions, and the natural vegetation is a landscape mosaic comprising patches of grassland and groves of forest and woodland. In the Parkland vegetation zone, M151 describes only the treed portion of the vegetation mosaic. M151 also describes copses of forest and woodland that are found in the prairie grasslands, south of the parkland, on specific sites, including steep north-facing valley slopes, moist depressions and flats within sand dune complexes.

In Canada, the largest proportion of M151 occurrences exist as pure stands of trembling aspen (*Populus tremuloides*), sometimes accompanied by balsam poplar (*Populus balsamifera*), Manitoba maple (*Acer negundo*) or red ash (*Fraxinus pennsylvanica*) on moist lower slopes. At the eastern end of the range, bur oak (*Quercus macrocarpa*) also becomes important, especially on drier sites. Red ash may also occur as an understory associate in upland aspen stands at the eastern end of the range. Understory vegetation in these stands includes a diverse suite of shrubs and herbs adapted to partial shade. Common species include saskatoon (*Amelanchier alnifolia*), chokecherry (*Prunus virginiana*), pin cherry (*Prunus pensylvanica*), hazelnut (*Corylus* spp.), western snowberry (*Symphoricarpos occidentalis*), thin-leaved snowberry (*S. albus*), Canada gooseberry (*Ribes oxyacanthoides*), Woods' rose (*Rosa woodsii*), vetchling (*Lathyrus* spp.), American vetch (*Vicia americana*), star-flowered false Solomon's seal (*Maianthemum stellatum*), wild lily-of-the-valley (*M. canadense*), meadow-rue (*Thalictrum* spp.), rough-fruited fairy bells (*Prosartes trachycarpa*), spreading dogbane (*Apocynum androsaemifolium*), Maryland sanicle (*Sanicula marilandica*), wild sarsaparilla (*Aralia nudicaulis*), slender wildrye (*Elymus trachycaulus*), purple false melic (*Schizachne purpurascens*), rough-leaved mountain rice (*Oryzopsis asperifolia*), dry-spike sedge (*Carex siccata*) and Sprengel's sedge (*C. sprengelii*). Stands of M151 occur on a variety of well-drained, mostly Chernozemic soils. Forest and woodland conditions described here for Canada also occur in North Dakota and Minnesota.

Trembling aspen (*Populus tremuloides*) stand in a small parkland valley near Saskatoon, Saskatchewan. Grassland vegetation occupies the south-facing valley slopes.
Source: J. Thorpe

Trembling aspen (*Populus tremuloides*) stand with an open canopy and dense broad-leaved shrub layer dominated by chokecherry (*Prunus virginiana*).
Source: J. Thorpe

Great Plains Forest & Woodland

Macrogroup M151

Forêts & terres boisées des Grandes Plaines

Vegetation

Physiognomy and Structure

In Canada, M151 includes open woodlands and small dense forest patches (canopy closure between 15% and 90%) comprising broad-leaved, cold-deciduous tree species. Floodplain forests and woodlands are not included in M151; these are described by M028 [Great Plains Floodplain Forest]. Trees are generally short in stature, reaching mature heights of 15–20 m at the northern edge of the range but averaging 5–10 m on well-drained sites at the southern limit of tree growth in the prairie grasslands. Most stands are dominated by *Populus tremuloides*, which forms discrete groves, the smallest of which consist of a single clone of genetically identical trees. *P. tremuloides* canopies are relatively diffuse, transmitting ample light for development of dense understory vegetation, including both shrub and herb layers. Herb layers are dominated by forbs but also include a variety of shade tolerant grasses and sedges. Canopies of *Quercus macrocarpa* and *Fraxinus pennsylvanica* cast more shade than *P. tremuloides* canopies and the understory vegetation is correspondingly less dense. Stand structure also varies with site conditions; stands on sandy soils tend to be shorter and more open than those on fine-textured soils.

Floristics

Populus tremuloides is the overwhelmingly dominant tree species throughout the Canadian range of M151. At the eastern end of this range, *Quercus macrocarpa* becomes important, especially on drier sites. *P. balsamifera* and, occasionally, *Acer negundo* and *Fraxinus pennsylvanica* occur on moist lower slopes in some *P. tremuloides* stands. Also on moist slopes are naturally occurring hybrids of *P. deltoides* and *P. balsamifera* (*Populus x jackii*). *F. pennsylvanica* appears in upland *P. tremuloides* stands at the eastern edge of the range and forms either pure or mixed stands (with *P. tremuloides*) on north-facing valley slopes far out into the mixedgrass prairie. Along the northern edge of the range, *Picea glauca*, *Pinus banksiana* and *Betula papyrifera* occur occasionally. In the western part of the range, *P. glauca* also forms dense stands on steep north-facing walls of “coulees” (i.e narrow ravines).

Important tall shrub species include *Amelanchier alnifolia*, *Prunus virginiana*, *P. pensylvanica*, *Corylus* spp. and on moist sites, *Cornus stolonifera*, *Salix* spp., *Viburnum opulus* and *Betula occidentalis*. Low shrub species include *Symphoricarpos occidentalis*, *S. albus*, *Rosa woodsii*, *R. acicularis*, *Rubus idaeus* and *Ribes* spp. The dwarf shrubs *Arctostaphylos uva-ursi* and *Juniperus horizontalis* are abundant in *P. tremuloides* stands on sandy sites.

The herb layer of these forest and woodland patches is almost completely different in species composition from the herbaceous communities of the adjacent prairie grasslands, which contain species that require full sunlight. Common forb species include *Lathyrus* spp., *Vicia americana*, *Maianthemum stellatum*, *M. canadense*, *Thalictrum* spp., *Prosartes trachycarpa*, *Apocynum androsaemifolium*, *Sanicula marilandica*, *Aralia nudicaulis*, *Galium boreale*, *Symphyotrichum ciliolatum*, *Fragaria virginiana*, *Cornus canadensis*, *Actaea rubra* and *Viola* spp. Important graminoids include *Elymus trachycaulus*, *Schizachne purpurascens*, *Oryzopsis asperifolia*, *Carex siccata*, *C. xerantica* and *C. sprengelii*. Additional species on moist sites include *Calamagrostis canadensis, Poa palustris, Glycyrrhiza lepidota, Toxicodendron radicans, Urtica dioica, Equisetum* spp*., Anemone* spp*.* and *Heracleum maximum*.

Dynamics

Historically, landscape proportions of forest/woodland and grassland in the Parkland CNVC vegetation zone have fluctuated over the years in a dynamic balance. Prior to agricultural settlement, frequent fires kept *Populus tremuloides* groves small. With fire suppression, these groves have expanded significantly by encroaching into grasslands. Periods of drought reduced the forest/woodland component on the landscape, both by inhibiting tree regeneration and by favouring increased fire frequency.

Currently, forest/woodland groves are often subject to livestock grazing, to which they are less resilient than grasslands. Heavy grazing eliminates the taller shrubs and herbs and removes the most palatable species. Grazing also causes soil disturbance that fosters invasion by exotic plant species. Heavily grazed *P. tremuloides* stands are often reduced to a layer of unpalatable low shrubs, such as *Symphoricarpos occidentalis*, and a layer of exotic grass species, such as *Bromus inermis* or *Poa pratensis*. Along with over-grazing, conversion to agriculture has significantly decreased the extent and range of natural stands of Great Plains forests and woodlands in Canada.

Great Plains Forest & Woodland

Macrogroup M151

Forêts & terres boisées des Grandes Plaines

Environment

Climate

In Canada, M151 occurs in a subhumid continental temperate climate. The Parkland CNVC vegetation zone occupies the northernmost edge of the North American Great Plains grasslands, where it reflects an ecoclimatic transition from grassland to boreal forest vegetation. Here, the climate is moist enough to support tree growth on certain sites. Winters are cold and summers are warm; mean annual temperatures average approximately 2˚C, with extreme minimum temperatures below -40˚C. In Alberta and western Saskatchewan, growing degree days above 5˚C (GDD) vary between about 1300 and 1600, with annual precipitation between approximately 350 and 500 mm. In eastern Saskatchewan and Manitoba, the Parkland zone is generally warmer and wetter (GDD approximately 1550 to 1840; annual precipitation between 400 and 540 mm). Forests and woodlands described in M151 may also occur on locally moist sites in the drier climate of the Great Plains Grassland CNVC vegetation zone (CM051 [Great Plains Mixedgrass Prairie]; CM332 [Great Plains Rough Fescue Prairie]; M054 [Central Lowlands Tallgrass Prairie]).

Physiography, Geology, Topography and Soils

The Parkland CNVC vegetation zone primarily occupies portions of the Alberta and Saskatchewan Plains, subdivisions of the Interior Plains physiographic region. This area is underlain by level Mesozoic and Tertiary sedimentary rocks. Elevations are <1000 mASL. The entire Parkland zone was affected by Pleistocene glaciation and although topography is mostly an undulating plain, local relief is provided by postglacial valley complexes, hummocky moraines and sand dunes.

The Parkland vegetation zone is a landscape mosaic of grassland patches and groves of forest and woodland. *Populus tremuloides* groves in the Parkland zone occur on a wide variety of well-drained to moderately well-drained sites. Soils are mainly Black and Dark Grey Chernozems, with Gleysols in poorly drained locations. On rolling terrain (e.g. hummocky moraines), forests and woodlands tend to occur on north-facing aspects and in depressions, while grasslands occur on south-facing aspects and ridges. However, at the southern edge of the Parkland zone, forest and woodland stands are more restricted to depressions, often forming a ring around a wetland. The treed component of land cover gradually expands northward, until at the northern edge of the Parkland zone it occupies most topographic positions while grasslands are restricted to steep south-facing aspects. On level terrain, grassland and forest/woodland patches may be interspersed with no obvious site differences. In sand dune complexes, *P. tremuloides* groves occur on inter-dune flats, both in parkland and mixedgrass prairie landscapes. Stands of *P. tremuloides* or, in the eastern part of the range, *Fraxinus pennsylvanica* may also occur on steep north-facing valley slopes in the mixedgrass prairie.

Great Plains Forest & Woodland

Macrogroup M151

Forêts & terres boisées des Grandes Plaines

Distribution and Geographic Range

Most Canadian occurrences of the forests and woodlands described by M151 are in the Parkland CNVC vegetation zone, which extends from central Alberta, across central and southeastern Saskatchewan, to southern Manitoba. However, some stands on locally moist sites occur in the Great Plains Grassland CNVC vegetation zone in southern Alberta and Saskatchewan, and southward to North Dakota and northwestern Minnesota.

Related Concepts

The Canadian expression of M151 includes forest and woodland communities that have been described in provincial publications for the Central Parkland natural subregion in Alberta and the Aspen Parkland ecoregion in Saskatchewan and Manitoba.

Prairie floodplain forests are described by M028 [Great Plains Floodplain Forest].

USNVC M151 [Great Plains Forest & Woodland] describes all forest and woodland vegetation across the full range of the North American Great Plains. This factsheet describes the Canadian expression of this vegetation, which includes conditions treated (at least partially) in USNVC Groups G328 [Northwestern Great Plains Aspen Woodland] and G146 [Northeastern Great Plains Aspen Woodland].

Comments

The Parkland CNVC vegetation zone is a geographic area comprising a landscape mosaic of grassland patches and groves of forest and woodland. It occupies the northernmost edge of the North American Great Plains grassland region and reflects an ecoclimatic transition from temperate grassland to boreal forest vegetation. The treed component of the natural parkland vegetation complex is represented by a portion of M151 and is described in this factsheet. Grassland components of the parkland mosaic are described in factsheets for CM332 [Great Plains Rough Fescue Prairie], CM051 [Great Plains Mixedgrass Prairie] and M054 [Central Lowlands Tallgrass Prairie], representing non-treed plant communities that occur in spatial relationship with treed communities across the east to west range of the Parkland zone. The geographic extent of the Parkland CNVC vegetation zone (as a map unit) approximates that of the Aspen Parkland ecoregion of the Terrestrial Ecozones and Ecoregions of Canada.

The majority of the range of northern Great Plains forests and woodlands (described here) lies in Canada, although this vegetation does occur in parts of North Dakota and northwestern Minnesota. In the Canadian portion of its range, M151 vegetation occurs more extensively on upland sites and is more highly dominated by *Populus tremuloides*.

CNVC may recognize subtypes of M151 in the future (e.g., the eastern Aspen – Oak condition), but this is pending development of Associations from ground plot data.

Populus deltoides here refers to subspecies *monilifera* (plains cottonwood, peuplier deltoïde de l'Ouest).

Great Plains Forest & Woodland

Macrogroup M151

Forêts & terres boisées des Grandes Plaines

Source Information

Number of Source Plots for M151:
Information Sources (data):
Concept Authors: Ken Baldwin, Lorna Allen, USNVC
Description Authors: Jeff Thorpe, Ken Baldwin, Lorna Allen
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Great Plains Forest & Woodland

Macrogroup M151

Forêts & terres boisées des Grandes Plaines

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