Cordilleran Dry Forest

General Description

The *Cordilleran Dry Forest* zone covers an area of approximately 48,000 km² in south-central British Columbia (BC), including valley, lower montane and plateau terrain. This zone represents the northern extent of dry temperate conifer forest and parkland that is widespread at low to mid-elevations in the northwestern United States. Rain shadow effects of the Coast Mountains create a dry climate. Landcover is dominated by evergreen coniferous forests and woodlands, sometimes in a parkland landscape.

Vegetation

Upland vegetation is dominated by structurally diverse forests and woodlands, typically comprising evergreen coniferous tree species. Cold-deciduous broad-leaved species are occasionally intermixed with the conifers on mesic or moist sites, or in seral communities. In the warmest and driest areas, the climate is moist enough to support tree growth only under certain conditions and the natural vegetation is often a parkland mosaic comprising patches of grassland or shrub-steppe and groves of forest and woodland. In cooler and moister areas, forest cover can be continuous. Open woodland stands are most common at the lowest elevations in the driest climates, as well as on edaphically dry sites in moister climates. Stand structure can be both simple and multi-storied. Understory structure varies from dense to sparse, and is typically dominated by shrubs and/or graminoids. Shrubs can be cold-deciduous broad-leaved, evergreen needle-leaved or evergreen microphyllous species; graminoids are primarily bunchgrasses and rhizomatous grasses.

These ecosystems are adapted to frequent low- to moderate-intensity surface fires that maintain relatively open stands of fire-resistant plant species and restrict the size of forest patches in parkland landscapes. With fire suppression, treed stands become denser, forest groves encroach into grasslands and shrub-steppe, and high intensity stand-replacing fires are more prevalent. Many of these stands are used for livestock grazing, which often alters the understory structure and species composition. Forest harvesting is a significant disturbance factor in many areas. Crop cultivation and other human modification of the landscape is relatively minor overall, and mostly confined to a few river valleys in the southern part of the zone.

Rocky Mountain Douglas-fir (*Pseudotsuga menziesii* var. *glauca*) is the characteristic tree species. In the warmest areas, ponderosa pine (*Pinus ponderosa*) occupies the driest locations that support tree growth, often forming open woodland stands, and Douglas-fir is found on slightly moister and cooler sites. At low to mid-elevations in southern parts of the zone, these two species often form mixed stands. At higher elevations and in northern parts of the zone, lodgepole pine (*Pinus contorta* var. *latifolia*) often occurs with Douglas-fir. Trembling aspen (*Populus tremuloides*) and paper birch (*Betula papyrifera*) are commonly found following disturbance, especially on moist sites. Alluvial forests dominated by black cottonwood (*Populus*

trichocarpa) occur on some stable floodplain terraces.

Understory species composition is variable, depending on site conditions and degree of canopy closure. Typical shrubs include saskatoon (*Amelanchier alnifolia*), snowberries (*Symphoricarpos albus; S. occidentalis*), holly-leaved barberry (*Berberis aquifolium*), shiny-leaved meadowsweet (*Spiraea lucida*), wild roses (*Rosa* spp.), soapberry (*Shepherdia canadensis*) and common juniper (*Juniperus communis*). Grasses are often important in the understory, including pine reedgrass (*Calamagrostis rubescens*), bluebunch wheatgrass (*Pseudoroegneria spicata*), mountain rough fescue (*Festuca campestris*), Idaho fescue (*F. idahoensis*) and prairie junegrass (*Koeleria macrantha*). Other common understory species include common yarrow (*Achillea millefolium*), wild strawberry (*Fragaria virginiana*), common bearberry (*Arctostaphylos uva-ursi*), arrow-leaved balsamroot (*Balsamorhiza sagittata*), heart-leaved arnica (*Arnica cordifolia*) and northern bedstraw (*Galium boreale*). Red-stemmed feathermoss (*Pleurozium schreberi*) is the most commonly occurring moss. Stands with a history of heavy grazing have reduced cover of native bunchgrasses; grazing often promotes the introduction of non-native species such as Kentucky bluegrass (*Poa pratensis*), common timothy (*Phleum pratense*), downy brome (*Bromus tectorum)* and knapweeds (*Centaurea* spp.).

In the drier parts of the zone, grassland and shrub-steppe communities are often extensive within the parkland mosaic. They are characterized by bluebunch wheatgrass, mountain rough fescue, Idaho fescue and big sagebrush (*Artemisia tridentata* var. *tridentata*).

Wetlands occur in poorly drained locations, mostly along watercourses. Swamps, marshes and fens are the predominant wetland classes. Treed wetlands are uncommon.

Shrub swamps dominated by tall willows (especially Bebb's willow [*Salix bebbiana*], Drummond's willow [*S. drummondiana*] and MacCalla's willow [*S. maccalliana*]) or water birch (*Betula occidentalis*) often line small watercourses and margins of waterbodies where water tables remain near the surface throughout the year. Marshes occur on the margins of shallow water bodies and typically are dominated by sedges (especially water sedge [*Carex aquatilis*] or northern beaked sedge [*C. utriculata*]), hard-stemmed bulrush (*Schoenoplectus acutus*) or broad-leaved cattail (*Typha latifolia*). Sedge-dominated fens often include a shrub component of arctic dwarf birch (*Betula nana*) or willows. Saline wet meadows dominated by alkali saltgrass (*Distichlis stricta* var. *stricta*), alkali cordgrass (*Spartina gracilis*), Nuttall's alkaligrass (*Puccinellia nutalliana*) or clustered field sedge (*Carex praegracilis*) occur on seasonally flooded sites where evaporation concentrates salts.

Climate

The *Cordilleran Dry Forest* zone occurs at low to mid-elevations in southern BC in the lee of the Coast, Cascade and Columbia Mountains, where rain shadow effects on Pacific air masses create relatively dry conditions within the continental temperate macroclimate of interior BC. In general, summers are warm and winters are cool; annual precipitation is typically low.

The primary climatic driver of vegetation patterns is moisture. Mean annual precipitation varies between approximately 400 and 800 mm, with higher amounts (>1000 mm) near the Coast Mountains. Summer precipitation varies from 200 to 300 mm throughout the zone. In some locations, up to half of the precipitation falls as snow. Winter snowpacks typically melt in early spring, especially at lower elevations, leaving sites prone to summer drought and subject to growing season moisture deficits. Mean annual temperatures vary from approximately 3.5°C to 9°C, the warmest being in low elevation areas where forests/woodlands are dominated by ponderosa pine. The growing season averages between approximately 1100 and 2200 growing degree days above 5°C.

Physiography, Geology, Topography and Soils

This zone occurs within the southern Interior System of the Cordilleran physiographic region in BC. It dominates the southern portion of the Interior Plateau and fingers into lower elevations of valleys in the Columbia Highlands, Columbia Mountains, and the eastern Cascade and Coast Mountains. This zone

also occurs in the southern Rocky Mountain Trench and adjacent valleys. Depending on the location, elevations range from valley bottoms (as low as 150 mASL) to mid-elevations (about 1400 mASL) in mountainous terrain.

The Coast Mountains consist predominantly of crystalline igneous and metamorphic rocks, while the Interior Plateau is mostly underlain by geologically recent lava deposits. The Cascade, Columbia and Rocky Mountains comprise mostly faulted and folded Paleozoic, Mesozoic or Tertiary sedimentary, and often carbonate-rich, rocks. The terrain is a complex mixture of high mountains (up to 3900 mASL) with intervening plateaux, hill systems, valleys, trenches and basins.

The entire zone was affected by late Pleistocene glaciation. The predominant surficial material is glacial till derived from basaltic bedrock, thus reasonably rich in basic cations. In the valleys, fluvial and glaciofluvial materials occur, along with thin till and colluvial materials on steeper slopes. Volcanic ash often forms a thin upper soil layer. Mineral soils are commonly Luvisols and Brunisols, with Chernozems in the warmest driest areas.

Notes

The *Cordilleran Dry Forest* zone is mostly bounded by the *Cordilleran Subboreal Forest*, although in some locations of southern BC it adjoins the *Cordilleran Rainforest*. At higher elevations, with the exception of a few occurrences in the Coast Mountains, it is bounded by the *Cordilleran Montane Forest*. To the south, it continues into the United States. At the lowest elevations of the deeper river valleys in south-central BC, the *Intermontane Shrub-Steppe* zone occurs, surrounded by this zone.