



Blue Mounds State Park, Rock County, MN

General Description

Communities in the Cliff/Talus (CT) System are present on steep-sided bluffs, along streams, on margins of bedrock ridges, and in other settings with sheer bedrock exposures. The vegetation of CT communities is generally open. Lichens and mosses are often the dominant life-forms, with vascular plants sparse or patchy largely because of scarcity of soil. In this classification, cliff communities are grouped by moisture and light regimes and by bedrock type, which are major determinants of species composition. Cliff habitats range from warm and dry to cool and wet depending on cliff aspect, surrounding vegetation, proximity to streams or lakeshores, and presence of groundwater seepage on the cliff face.

In the Prairie Parkland (PPA) Province, CT communities are very rare. Throughout most of the province, bedrock is buried deep below glacial drift. Cliff communities have been documented on Sioux quartzite, a metamorphic sandstone of Early Proterozoic origin, at several locations in the Inner Coteau and Minnesota River Prairie subsections of the CGP, and on the Paleozoic sandstone along ravines of the Minnesota River valley in the Minnesota River Prairie Subsection. Small cliffs may also be present as part of igneous and metamorphic outcrop complexes that occur sporadically along the Minnesota River. There are no documented talus slopes in the PPA Province but small examples may be present in association with cliffs in the areas mentioned above. CT communities do not occur in the Tallgrass Aspen Parklands Province.

Vegetation Structure and Composition

Lichens, mosses, and liverworts cover rock surfaces in CT communities and colonize areas exposed by erosion. Lichens are especially diverse in CT communities. Many of these species also occur in Rock Outcrop (RO) communities, but some species, such as *Xanthoria soreliata* and *Peltula euploca*, appear to be limited to vertical bedrock exposures (i.e., cliffs). Vascular plant cover is strongly correlated with the amount of fracturing of bedrock, with plants generally limited to crevices and ledges where soil has accumulated and roots can take hold. As a result, cliffs composed of highly fractured bedrock tend to have higher plant cover than those with few fractures. On wetter cliffs, vascular plants may also root in thick mats of mosses and liverworts that cover the bedrock. Most cliffs have less than 25% cover of trees or shrubs, although woody plant cover is variable.



Plant Adaptations

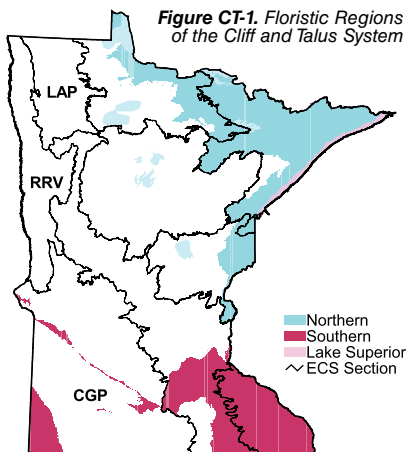
Plants in CT communities are generally tolerant of greater environmental extremes than species in surrounding terrestrial communities. Many plants on cliffs are well adapted to desiccation because of low moisture-holding capacities of substrates and exposure to direct sunlight and strong winds. They must also withstand rapid fluctuations in substrate temperatures, which are colder at night than in surrounding communities and often much warmer during midafternoon on sunny days. Limited availability of nutrients on many cliffs strongly influences community composition and growth rates of plants. Wind and gravitational stresses have a visible impact on the growth forms of trees and shrubs, causing stunting, stem dieback, and misshapen trunks. Vascular plant species in CT communities commonly reproduce by vegetative structures such as rhizomes or runners and tend to persist from year to year once established at a site; species that disperse and propagate primarily by seed are less common. Ferns, which reproduce by spores, are fairly common on most cliffs. Dry cliff communities share a number of vascular plant and lichen species with RO and Upland Prairie (UP) communities. Many of the lichen species present in cliff communities are also often present on large boulders or glacial erratics in prairies, forests, and other habitats. Moister cliffs often have vascular plants that are common in Mesic Hardwood Forest (MH) communities.

Landscape Setting and Disturbance Regime

In the broader landscape, CT communities are small features, rarely covering more than 5 acres (2ha). In the PPA Province, they generally occur in landscapes dominated by UP communities. CT communities may also occur in association with small patches of woodlands or forests of the Fire-Dependent Forest/Woodland and MH systems, especially along the Minnesota River valley. The disturbance regimes that shape these prairies, woodlands, and forests often affect CT communities. Fires that originate in prairies, woodlands, or forests may scorch cliff vegetation. Removal of forest canopies by fire often leaves cliffs or talus slopes more exposed to sunlight, causing warmer and drier conditions. Major windstorms or logging in forests adjacent to CT communities causes similar warming and drying effects. Fracturing of large pieces of rock from cliff faces are major, although rare, events that disrupt community equilibrium. In general, cliff communities are fairly stable over time as a result of low rates of natural disturbances, combined with limited habitat for plant establishment and growth and with prevalence of species that persist once established. Cliff and talus communities are some of the least human-disturbed habitats in Minnesota. Since the late 1800s, some cliff and talus communities have been destroyed or altered by quarrying. In recent years, increased human foot traffic along trails and near scenic vistas and campsites, especially in popular areas such as state parks, has become a threat to some cliff communities. Other threats include rock climbing and erosion and sedimentation from upslope areas that have been developed or otherwise cleared.

Floristic Regions and Plant Community Classes in the PPA Province

Communities in the CT System are divided into three floristic regions based on geographic variation in climate, bedrock type, and composition of vascular plant, bryophyte, and lichen species (Fig. CT-1). The Southern Floristic (CTs) Region occurs in the PPA and Eastern Broadleaf





Forest (EBF) provinces. The other two floristic regions, the Northern Floristic (CTn) Region and the Lake Superior Floristic (CTu) Region, occur within the Laurentian Mixed Forest Province.

Cliffs in the PPA Province have not been systematically surveyed. Despite limited data, there appear to be marked differences between CTs communities in the PPA Province and CTs communities in the EBF Province. Further sampling and analysis of CTs communities in the two provinces may warrant division of the CTs Region. Two CT plant community classes have been documented in the PPA Province, Southern Dry Cliff (CTs12) and Southern Mesic Cliff (CTs33).