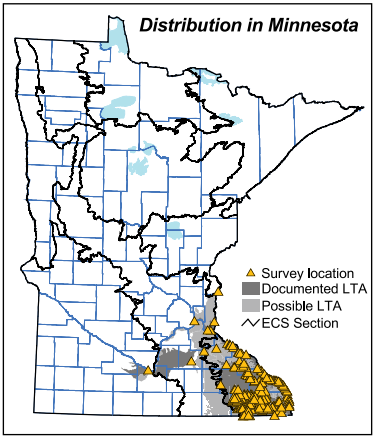
Southern Mesic Cliff

Open lichen- and moss-dominated plant communities on dry-mesic to mesic, shaded, northwest- to east-facing cliffs in rugged terrain in southeastern Minnesota. Vascular plants are largely restricted to crevices and ledges.

Vegetation Structure & Composition

Description is based on summary of plant species lists and field notes from approximately 400 cliffs (almost entirely in PPL).



- **Lichen** and **bryophyte** cover is high. Exposed bedrock is dominated by lichens. Mosses, liverworts, and algae are common but usually less abundant than lichens. Large populations of the mosses *Anomodon attenuatus*, *A. minor*, *A. rostratus*, and *Gymnostomum aeruginosum* cover vertical rock faces. Characteristic thalloid liverworts are the mesic species *Preissia quadrata* and the xeric *Reboulia hemisphaerica*. Small clones of the mosses *Bryoerythrophyllum recurvirostre*, *Desmatodon obtusifolius*, *Didymodon fallax*, *D. rigidulus*, and *Mnium thomsonii*, and the liverwort *Porella pinnata* are present in crevices and on narrow ledges.
- **Herbaceous plant** cover is sparse to patchy. Typical species include fragile fern *(Cystopteris fragilis)*, bulblet fern *(C. bulbifera),* smooth cliff brake *(Pellaea glabella),* hairy rock cress *(Arabis hirsuta)*, walking fern *(Asplenium rhizophyllum),* columbine *(Aquilegia canadensis),* black-fruited sedge *(Carex eburnea),* jeweled shooting star *(Dodecatheon radicatum),* harebell *(Campanula rotundifolia),* northern bedstraw *(Galium boreale),* winter bentgrass *(Agrostis scabra),* and occasionally blunt-lobed woodsia *(Woodsia obtusa),* common polypody *(Polypodium virginianum),* reniform Sullivantia *(Sullivantia renifolia),* and Wolf's bluegrass *(Poa wolfii)*. Plants common in Mesic Hardwood Forest (MH) communities, such as miterwort *(Mitella diphylla),* sharp-lobed hepatica *(Hepatica acutiloba),* zigzag goldenrod *(Solidago flexicaulis),* and wild ginger *(Asarum canadense)*, also often occur on mesic cliffs.
- **Climbing plants** and **vines** including Virginia creeper *(Parthenocissus* spp.) and virgin's bower *(Clematis virginiana)* are often present.
- **Tree** and **shrub** cover on cliff faces ranges from absent to fairly dense but most often is sparse to patchy (5–50%), with canopy, subcanopy, and shrub layer poorly differentiated when present. Species common in MH communities, such as basswood, are frequent. White pine, Canada yew *(Taxus canadensis),* red-berried elder *(Sambucus racemosa),* and highbush cranberry *(Viburnum trilobum)* are important on some mesic cliffs. Trees at top and base of cliff often shade large parts of cliff face.

Landscape Setting & Soils

- **Steep stream-dissected bedrock bluffs**—Common. Present in dissected bedrock terrain where little of the original plateau remains as interfluves between stream valleys. Most common on steep slopes with north to east aspects. Common rock types include limestone and dolomite; sandstone is occasional. Cliff faces are sometimes composed of multiple rock layers. True soil development is limited, with soil mostly confined to ledges and crevices and consisting of thin organic deposits from decomposing plant and animal remains. Local areas such as slides and chutes generally have somewhat greater soil accumulation. (PPL; very local in St. Paul–Baldwin Plains & Moraines and Oak Savanna in MIM)

Natural History

Species of cliff communities are subjected to greater environmental extremes than species in surrounding terrestrial communities, including rapid fluctuations in substrate temperature, limited nutrient availability, and gravitational stresses on plants growing outward from steep vertical surfaces. Growth forms of woody species are commonly affected by wind, with stunting, stem dieback, and misshapen trunks prevalent on cliffs. The absence of soil on much of the cliff limits opportunities for colonization by vascular plants, which are generally restricted to crevices or small patches of soil that have accumulated on ledges. The amount of vascular plant cover is strongly related to the amount of fracturing of the bedrock; bedrock exposures with few fractures (especially sandstone cliffs) are often largely devoid of vascular plants. Fracture of large pieces of rock from the cliff face is a major, although rare, event that can disrupt cliff communities and set back succession. In general, erosion rates are higher on cliffs composed of sandstone and highly fractured limestone than on cliffs composed of slightly fractured limestone or dolomite.

Similar Native Plant Community Classes

- **CTs53 Southern Wet Cliff**

CTs53 often grades into CTs33. Distinguishing between the two is most difficult on large, predominantly mesic cliffs that have small, wet areas of groundwater seepage. In these settings, a rough guideline for differentiating the two is based on amount of the cliff that is continuously wet from seepage: if > 30% of the cliff is wet, it is classified as CTs53; if < 30% of the cliff is wet, it is classified as CTs33. In general, in CTs53 mosses and algae are dominant on rock surfaces, often forming thick mats, and vascular plants root on moss mats in addition to crevices and ledges. CTs53 is also more likely to have slender cliff brake *(Cryptogramma stelleri)*. In CTs33, lichens are either dominant or codominant with mosses, and vascular plants are restricted mostly to crevices and ledges. CTs33 is more likely to have smooth cliff brake, jeweled shooting star, black-fruited sedge *(Carex eburnea)*, and northern bedstraw.

- **CTs12 Southern Dry Cliff**

CTs12 often grades into CTs33, and distinguishing the two can be difficult, especially on partially shaded west- or east-facing cliffs, where sunlight exposure and moisture levels are often intermediate between those that characterize dry versus mesic cliffs. CTs12 generally is present on south to west aspects, with less than 50% of the cliff face shaded. Lichens dominate areas of exposed rock, mosses are uncommon, and algae are absent or rare. CTs12 is also more likely to have slender lip fern *(Cheilanthes feei)*, cliff goldenrod *(Solidago sciaphila)*, nodding wild rye *(Elymus canadensis)*, bush juniper *(Juniperus communis)*, and species common in dry prairies, such as plains muhly *(Muhlenbergia cuspidata)* and alumroot *(Heuchera richardsonii)*. CTs33 generally is present on north to east aspects with 75% or greater of the cliff face shaded by trees or because of aspect. Mosses and algae are common on exposed rock and are widely distributed across cliff faces. CTs33 is more likely to have fragile fern, bulblet fern, walking fern, hairy rock cress, common poison ivy *(Toxicodendron rydbergii),* and species common in Mesic Hardwood Forest communities, such as miterwort, sharp-lobed hepatica, and wild ginger.

- **CTs43 Southern Maderate Cliff**

CTs43 is rare and characterized by northern species supported by cold air and moisture drainage through crevices on the cliff face; CTs43 can grade into CTs33 away from areas affected by cold air. Northern species that help to distinguish CTs43 include the rare plants Leedy's roseroot *(Sedum rosea* var. *integrifolium)* and Arabian whitlow grass *(Draba arabisans)*, which are present in southeastern Minnesota only on maderate cliffs. Populations of rare Pleistocene land snails are also diagnostic for CTs43.

- **CTn32 Northern Mesic Cliff**

CTn32 typically occurs on rocks of the Canadian Shield in northeastern Minnesota, well outside the range of CTs33. There is, however, a southern outlier of Northern Dry Cliff (CTn12) on Precambrian basalt along the St. Croix River at Taylors Falls in Chisago County, and CTn32 may be present there as well. If so, the ranges of CTn32 and CTs33

may merge in this area; CTs33 has been recorded on Paleozoic sandstone less than 10 miles downstream in southern Chisago County, and little data exist on the flora of cliffs along this part of the St. Croix River.

- **Southern Mesic Hardwood Forests**

Southern Mesic Hardwood Forest (MHs) communities share a number of species with CTs33. MHs communities and CTs33 are distinguished by obvious differences in substrate as well as by the presence of typical cliff plants in CTs33, including smooth cliff brake, fragile fern, and walking fern; the larger the cliff, the more likely it is to have these specialized cliff species. In southeastern Minnesota, mesic sandstone and limestone-dolomite cliffs (CTs33a and CTs33b) are frequently surrounded by mesic hardwood forests, and many areas mapped as MHs communities contain inclusions of mesic cliffs.

Native Plant Community Types in Class

Plant species composition has not been systematically sampled across the range of CTs33, but composition appears to vary with pH and nutrient availability. The community types recognized in CTs33 at present are based on broad bedrock categories reflecting pH and nutrient properties.

- **CTs33a Mesic Sandstone Cliff (Southern)**

CTs33a is occasional, with most occurrences in the Blufflands Subsection in the PPL. There are also scattered occurrences in the Rochester Plateau Subsection and locally in the lower St. Croix River valley and along the Mississippi River valley in the Twin Cities metropolitan area. The most common bedrock layers include the St. Peter, Jordan, Franconia, Ironton, and Galesville formations. Cliff faces are often mostly devoid of crevices, and vascular plants are often sparse. Lichens and mosses predominate on more stable areas of rock.

- **CTs33b Mesic Limestone-Dolomite Cliff (Southern)**

CTs33b is common, with most occurrences in the Blufflands Subsection in the PPL. There are also scattered occurrences in the Rochester Plateau Subsection and locally in the lower St. Croix River valley and along the Mississippi River valley in the Twin Cities metropolitan area. The most common bedrock layers include the Galena Group (Stewartville, Prosser, and Cummingsville Formations), Prairie du Chien Group (Oneota and Shakopee formations), and St. Lawrence, Maquoketa, Dubuque, and Platteville formations. Shales of the Decorah and Glenwood formations are also included. Cliff faces vary from highly fractured with abundant rooting places for vascular plants in some of the limestone formations to moderately fractured in some of the dolomite formations.

photo by M.D. Lee MN DNR

Winona County, MN