



Southern Wet Cliff

Open moss-dominated plant communities on shaded northwest- to east-facing cliffs kept wet by seeping groundwater. Present in rugged terrain in southeastern Minnesota. Vascular plants are sparse, present mainly in crevices, on ledges, and on thick bryophyte mats.

Vegetation Structure & Composition

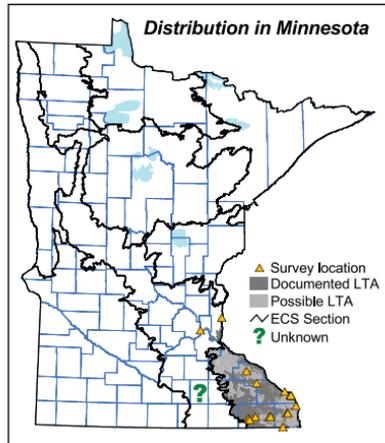
Description is based on summary of plant species lists and field notes from 25 cliffs, all from PPL.

- **Lichen and bryophyte** cover is high. Exposed bedrock on cliff face is dominated by mosses, liverworts, and algae, which form thick mats. Lichens are common on exposed bedrock but are usually less abundant than mosses and liverworts. Characteristic bryophytes are species common in communities characterized by flowing water or groundwater seepage and include the mosses *Brachythecium rivulare*, *Cratoneuron filicinum*, *Lepidictyum riparium*, *Philonotis* spp., and all species of the genus *Hygroamblystegium*. These mosses often form large clones in CTs53. The thalloid liverworts *Conocephalum conicum*, *Mannia triandra*, and *Marchantia polymorpha* are also very common on seeping rock faces.

Sphagnum species, such as *S. capillifolium* and *S. centrale* may be present on ledges, and small clones of true wetland mosses are commonly present among larger moss populations, including *Bryum muehlenbeckii*, *B. pseudotriquetrum*, *Campylium radiale*, *Hypnum lindbergii*, and *Rhizomnium punctatum*.

- **Herbaceous plant** cover is sparse to patchy (5–50%). Typical species include slender cliff brake (*Cryptogramma stelleri*), reniform Sullivantia (*Sullivantia renifolia*), fragile fern, (*Cystopteris fragilis*), bulblet fern (*C. bulbifera*), and touch-me-nots (*Impatiens capensis* and *I. pallida*). Herbaceous plants characteristic of Southern Mesic Hardwood Forest (MHs) communities are also frequent on cliff faces.

- **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 characteristic of MHs communities, such as basswood, are frequent. White pine, red-berried elder (*Sambucus racemosa*), highbush cranberry (*Viburnum trilobum*), and Canada yew (*Taxus canadensis*) are important on some wet cliffs. Trees at top and base of cliff often shade large parts of cliff face.



Landscape Setting & Soils

- **Steep stream-dissected bedrock bluffs**—Uncommon. Present in dissected bedrock terrain where little of the original plateau remains as interfluvies between stream valleys. Most common on steep slopes with north to east aspects, often near streams. Rock types include limestone, dolomite, and sandstone. Cliff faces are often composed of multiple rock layers, with groundwater seepage typically emerging at contact between different 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

Southern wet cliffs tend to occur on lower slopes in deep, narrow forested valleys. These deep valleys are generally cooler and moister than the surrounding landscape, especially in areas with intact forest canopies, and wet cliffs are rarely affected by direct sunlight. Cool air settles into the valleys in the evening, further enhancing their microclimate

and minimizing desiccation. Groundwater seepage commonly supplies moisture to parts of wet cliffs, with seepage ranging from barely detectable flows emanating from crevices to water visibly dripping or cascading over rock faces. Rates of seepage flow can vary depending on annual precipitation levels and groundwater recharge rates. Dense, thick mats of mosses and liverworts are typical around seepage areas. Wet cliffs are somewhat more buffered from the extremes of temperature, moisture, and wind prevalent on mesic and dry cliffs. Limited nutrient availability, however, and stresses on plants growing outward from vertical surfaces are still important influences on the composition and structure of vegetation. 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

● CTs33 Southern Mesic Cliff

CTs33 often grades into CTs53. 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 the 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 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 (*Pellaea glabella*), jeweled shooting star (*Dodecatheon radicum*), black-fruited sedge (*Carex eburnea*), and northern bedstraw (*Galium boreale*). 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.

● CTs43 Southern Maderate Cliff

CTs43 occurs in settings similar to CTs53 but is rare and characterized by a cold microclimate created by cold air and moisture draining from crevices on the cliff face. This cold microclimate supports populations of rare plant species more typical of northern climates, including Leedy's roseroot (*Sedum rosea* var. *integrifolium*) and Arabian whitlow grass (*Draba arabisans*), and also supports remnant populations of rare Pleistocene land snails. These populations of rare plants and snails are absent from CTs53.

● Southern Mesic Hardwood Forests

Southern Mesic Hardwood Forest (MHs) communities share a number of species with CTs53. MHs communities and CTs53 are distinguished by obvious differences in substrate as well as by the presence of typical cliff plants in CTs53, including fragile fern and slender cliff brake.

Native Plant Community Types in Class

Plant species composition has not been systematically sampled across the range of CTs53, but composition appears to vary with pH and nutrient availability. The community types in CTs53 at present are based on broad bedrock categories reflecting pH and nutrient properties

● CTs53a Wet Sandstone Cliff (Southern)

CTs53a is rare, with most examples recorded in the Blufflands Subsection of the PPL. There are also scattered occurrences recorded in the Rochester Plateau Subsection and very locally along the Mississippi and lower St. Croix rivers in the Twin Cities metropolitan area. The most common bedrock layers include the St. Peter, Jordan, Franconia, Ironton, and Galesville formations. Although cliff faces are often mostly devoid of crevices, lush carpets of bryophytes are present on wetter portions, providing alternative rooting areas for vascular plants. Vascular plants can be quite abundant on bryophyte mats, as is often the case for rare species such as montia (*Montia chamissoi*).



- **CTs53b Wet Limestone - Dolomite Cliff (Southern)**

CTs33b is rare, with nearly all examples present in the PPL. 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. Bedrock layers may also include shales of the Decorah and Glenwood formations. 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. Much of the fracture patterning, however, is hidden by lush carpets of bryophytes.



photo by S. C. Zager MN DNR

Beaver Creek Valley State Park, Houston County, MN