



Northern Dry Cliff

Open plant communities on dry south- to west-facing, sunny cliffs in rugged terrain in northeastern and, rarely, eastcentral Minnesota. Vascular plants are largely restricted to crevices and ledges.

Vegetation Structure & Composition

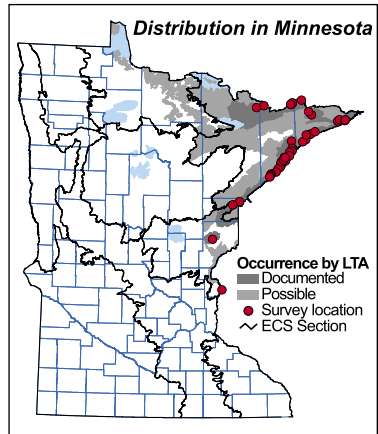
(Description is based on summary of plant species lists and field notes from 58 cliffs.)

- **Lichen** cover is high, with exposed bedrock on cliff face dominated by lichens. Mosses and liverworts are occasional, and algae are absent to rare.

- **Herbaceous plant** cover is sparse (5-25%). Characteristic species include early goldenrod (*Solidago juncea*), rusty woodsia (*Woodsia ilvensis*), Oregon woodsia (*W. oregana*), rock cress (*Arabis* spp.), and pussytoes (*Antennaria* spp.).

- **Tree and shrub** cover on cliff face ranges from absent to sparse (0-25%), with tree canopy, subcanopy, and shrub layer poorly differentiated when present. Red pine trees are characteristic, especially at tops of cliffs. Trees are often short and deformed, and may be very old. Trees at tops and bases of cliffs

occasionally shade portions of the cliff. Understory species common in adjacent forests, such as bush honeysuckle (*Diervilla lonicera*), are often present on the cliff face.



Landscape Setting & Soils

CTn11 is most common on the upper portions of steep slopes in rugged, bedrock-controlled terrain in landscapes dominated by Superior and Rainy lobe till. CTn11 is also present occasionally in river gorges. Common rock types include diabase, basalt, gabbro, diorite, granite, and graywacke. Cliff face sometimes is composed of multiple rock layers, and veins of nutrient-rich calcite or other intrusive rocks are often present. True soil development is minimal, with soil mostly confined to narrow ledges and crevices and consisting of thin organic deposits from decomposing plant and animal remains. Areas such as slides and chutes may have somewhat greater soil accumulation.

Natural History

Dry cliff plants must withstand high rates of desiccation because of low substrate moisture-holding capacity and exposure to direct sunlight and strong winds. Dry cliff species are also subjected to large daily fluctuations in substrate temperature. Low nutrient availability on dry cliffs influences both plant community composition and plant growth rates. The absence of soil on much of the cliff also limits opportunities for colonization by vascular plants, which are generally restricted to crevices or small patches of soil that accumulate on ledges. The overall amount of vascular plant cover is strongly related to the amount of fracturing of the bedrock; bedrock exposures with few fractures (such as anorthosite cliffs) are often nearly devoid of vascular plants.

Similar Native Plant Community Classes

The upper parts of cliffs are generally dry, regardless of aspect; the classification of any cliff should be based more on conditions on the lower two-thirds of the cliff face rather than the upper third.

- **CTu22 Lake Superior Cliff**

CTu22, when present on south- to east-facing cliff faces exposed to scouring from storm waves and ice, can be similar to CTn11 (although by definition all dry cliff communities along the immediate shore of Lake Superior are classified as CTu22).

- ▶ **CTu22**—Characterized by species rarely present away from the immediate shore of Lake Superior, including Hudson Bay eyebricht (*Euphrasia hudsoniana*), spike trise-



tum (*Trisetum spicatum*), ninebark (*Physocarpus opulifolius*), and shrubby cinquefoil (*Potentilla fruticosa*). More likely to have orange lichens (*Xanthoria* spp.). Talus slope is rarely present below cliff because of removal of talus by wave action.

► **CTn11**—More likely to have red pine, especially at top of cliff. Talus slope is almost always present below cliff.

● **CTn32 Northern Mesic Cliff**

CTn32 often grades into CTn11 and distinguishing the two can be difficult, especially on partially shaded west- or east-facing cliffs, or on the upper parts of south- or west-facing river gorge walls.

► **CTn32**—75% or greater of cliff face is shaded by trees or because of aspect. Mosses and algae are common on exposed rock and are widely distributed across cliff face. More likely to have harebell (*Campanula rotundifolia*), fragile fern (*Cystopteris fragilis*), and firmosses (*Huperzia* spp.).

► **CTn11**—Less than 75% of cliff face is shaded. Lichens dominate areas of exposed rock; mosses are uncommon, and algae are absent or rare.

Native Plant Community Types in Class

Plant species composition has not been systematically sampled across the range of CTn11, but composition likely varies with pH and nutrient availability. Therefore, the community types in CTn11 at present are based on broad bedrock categories reflecting bedrock pH and nutrient properties.

● **CTn11a Dry Mafic Cliff (Northern)**

Open communities on dry, circumneutral to moderately alkaline cliffs composed of diabase, basalt, gabbro, diorite, andesite, anorthosite, or greenstone. CTn11a is the most common dry cliff type in the North Shore Highlands and much of the Border Lakes subsections in NSU. Early goldenrod is present on most occurrences and red pines are often present on cliff tops. On cliffs in the Rove Landtype Association in the eastern Border Lakes Subsection, CTn11a often occurs as cap of erosion-resistant diabase above a more erodible layer of shale, argillite, or graywacke (see CTn11b below). A southern outlier of CTn11a is present along the St. Croix River at Taylors Falls in WSU.

● **CTn11b Dry Rove Cliff (Northern)**

Open communities on dry, circumneutral to slightly alkaline cliffs composed of shale, argillite, and graywacke bedrock of the Rove Formation, which are slightly metamorphosed sedimentary rocks deposited in thin, highly erodible layers. The lower parts of the Rove Formation and upper parts of the underlying Gunflint Iron Formation tend to be calcareous. Often, Rove Formation rocks are present as an erodible band at the base of a cliff, beneath a much more resistant diabase (mafic) cap, resulting in complexes of CTn11b and CTn11a. CTn11b probably occurs rarely on exposures of the Rove Formation in the eastern part of the Border Lakes Subsection and the northeastern end of the North Shore Highlands Subsection in NSU.

● **CTn11c Dry Thomson Cliff (Northern)**

Open communities on dry, circumneutral (or possibly slightly acidic) cliffs composed of slate and graywacke bedrock of the Thomson Formation. These metamorphosed sedimentary rocks are exposed along the St. Louis River in the northeastern corner of the WSU in the vicinity of Jay Cooke State Park. The two documented occurrences of CTn11c have little vascular plant cover other than rusty woodsia. Both red and white pines are present at the tops of these cliffs.

● **CTn11d Dry Felsic Cliff (Northern)**

Open communities on dry, weakly to moderately acidic cliffs of rhyolite, granite, granodiorite, granophyre, or tonalite bedrock. CTn11d appears to have lower vascular plant species diversity than CTn11a or CTn11b. CTn11d is occasional in the Border Lakes and North Shore Highlands subsections in NSU.

● **CTn11e Dry Sandstone Cliff (Northern)**

Open communities on mesic, moderately acidic cliffs composed of quartz sandstone bedrock. Examples of CTn11e are present along the Kettle River near Banning State Park in WSU, and possibly occur on Fond du Lac Sandstone along the lower St. Louis River in SSU. There are few records available on the flora of CTn11e.