



## Northern Bedrock Shrubland

Dry to dry-mesic, shrub-dominated communities on sites with exposed bedrock and shallow soils in northeastern Minnesota.

### Vegetation Structure & Composition

Description is based on summary of vegetation data from 9 plots (relevés), and species lists and field notes from 72 bedrock shrublands.

- **Bryophyte and lichen** cover is often high. Mosses frequently carpet rainwater-collecting depressions in the bedrock. Crustose and foliose lichens predominate on exposed bedrock, with foliose and fruticose lichens such as reindeer moss (*Cladina* spp.) also important. Species of epiphytic lichens are characteristic on bark and twigs in bedrock shrublands near Lake Superior.

- **Herbaceous plant** cover is sparse to patchy (5-50%), with composition similar to (although more diverse than) that of Northern Bedrock Outcrop (ROn12). Typical herbaceous species include poverty grass (*Danthonia spicata*), pale corydalis (*Corydalis sempervirens*), rock spikemoss (*Selaginella rupestris*), umbel sedge (*Carex umbellata*), Back's sedge (*C. backii*), northern sedge (*C. deflexa*), fringed false buckwheat (*Polygonum cilinode*), Douglas' knotweed (*P. douglasii*), rusty woodsia (*Woodsia ilvensis*), pussy toes (*Antennaria* spp.), and large-leaved aster (*Aster macrophyllus*).

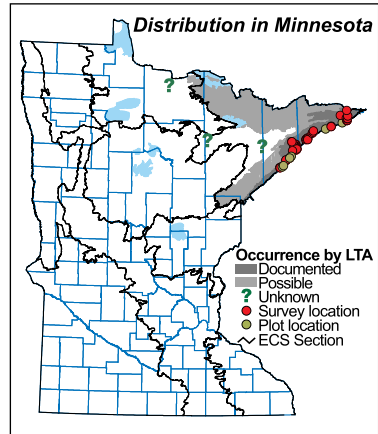
- **Shrub and tree** cover is patchy to interrupted (25-75%). Characteristic shrubs include juneberries (*Amelanchier* spp.), bush honeysuckle (*Diervilla lonicera*), lowbush blueberry (*Vaccinium angustifolium*), hawthorns (*Crataegus* spp.), and prairie willow (*Salix humilis*). Scattered stunted trees are often present and may include mountain ash, quaking aspen, big-toothed aspen, northern red oak, heart-leaved birch, balsam fir, white spruce, white pine, or red pine.

### Landscape Setting & Soils

ROn23 forms small- to medium-sized patches (1-35 acres) on sites with level to sloping exposures of Precambrian bedrock and shallow soils. ROn23 is occasional to common on bedrock exposures on summits and ridgetops in rolling to rugged bedrock-controlled terrain, and on headlands along Lake Superior; the community may also occur on side-slopes in rugged terrain, on headlands along large inland lakes, and on bedrock knolls in more level terrain such as the large peatland landscapes of northern Minnesota. Recorded rock types include diabase, basalt, gabbro, diorite, anorthosite, rhyolite, andesite, granite, ferromonzodiorite, and granophyre. The amount of fracturing in the bedrock is quite varied, depending on the cleavage properties and resistance to weathering of the rock, and influences the amount of vascular plant cover in the community; exposures with more fractures tend to have higher cover of vascular plants. Soil development varies from minimal to moderate, with thin accumulations of decomposing plant and invertebrate remains present in crevices and under moss and lichen mats, and shallow to moderately deep soil present in larger depressions in the bedrock.

### Natural History

Plant species on bedrock exposures generally experience greater environmental extremes than species in surrounding terrestrial communities, including more rapid fluctuations in substrate temperature, higher rates of desiccation, and more limited nutrient availability. Strong winds, often in combination with ice storms, commonly affect the growth of trees and shrubs on summits and along the shores of large lakes, causing stunting and characteristic "krummholz" growth forms. Many of the landscapes where





bedrock shrublands occur are prone to fires, and lightning strikes are relatively frequent on rocky summits. Fire-scarred stumps are present on many sites, indicating that fires play a role in maintaining bedrock shrublands by eliminating trees and consuming organic soil deposits. It is likely that bedrock shrublands are a long-lived successional community following intense fire in woodlands or forests, with successive fires acting to slow the eventual return of the site to woodland. Many typical rock outcrop plants are adapted to drought, and drought, like fire, may slow or prevent succession of open outcrop communities to shrub- or tree-dominated communities by periodically killing desiccation-intolerant trees and shrubs.

## Similar Native Plant Community Classes

### ● ROn12 Northern Bedrock Outcrop

ROn12 shares many species with ROn23 but has lower cover of woody plants. Occurrences of ROn12 are usually smaller and often are present as inclusions within ROn23, which is composed of a mix of large shrub-dominated areas and small, open exposures of bedrock dominated by lichens. Whether a site is classified as ROn12 or ROn23 can be at least in part a question of scale.

► **ROn12**—Tree and shrub cover is <25% and often <10%. Trees and tall shrubs are sparse or absent.

► **ROn23**—Tree and shrub cover is >25%. More likely to have small trees and tall shrubs such as mountain ash, white spruce, big-toothed aspen, northern red oak, northern pin oak, junberries, and hawthorns.

### ● FDn22 Northern Dry-Bedrock Pine (Oak) Woodland

FDn22 often surrounds and grades into occurrences of ROn23.

► **FDn22**—Has patchy to interrupted canopy (25%-75% cover) of taller trees. More likely to have shade-tolerant herbaceous species such as wild sarsaparilla (*Aralia nudicaulis*), large-leaved aster, wintergreen (*Gaultheria procumbens*), and bracken (*Pteridium aquilinum*). Mosses are abundant, especially on areas of exposed bedrock.

► **ROn23**—Areas of exposed bedrock are covered mainly by lichens rather than mosses.

### ● LKu43 Lake Superior Rocky Shore

LKu43 and ROn23 are often adjacent to one another along Lake Superior (see ROn23b below); LKu43, however, occurs at lower elevations in areas more frequently washed by storm waves and usually has fewer (and shorter) trees and lower shrub cover.

► **LKu43**—More likely to have shrubby cinquefoil (*Potentilla fruticosa*), harebell (*Campanula rotundifolia*), tufted hair grass (*Deschampsia cespitosa*), and tufted bulrush (*Scirpus cespitosus*).

► **ROn23**—More likely to have shade-tolerant woodland species such as large-leaved aster and Canada mayflower (*Maianthemum canadense*).

### ● FDn32 Northern Poor Dry-Mesic Mixed Woodland

FDn32 often grades into occurrences of ROn23 along Lake Superior (see ROn23b below).

► **FDn32**—Has patchy to continuous canopy (25-100% cover) of tall trees. More likely to have shade-tolerant herbs such as bunchberry (*Cornus canadensis*), starflower (*Trientalis borealis*), and twinflower (*Linnaea borealis*). Mosses are abundant, especially on areas of exposed bedrock.

► **ROn23**—Areas of exposed bedrock are mainly covered by lichens rather than mosses.

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## Native Plant Community Types in Class

### ● ROn23a Bedrock Shrubland (Inland)

Small- to medium-sized (1 to >25 acres) shrub-dominated communities on sites with exposed bedrock and shallow soils, most often on ridgetops, summits, slopes, and cliff tops. Shrubs are dominant where deeper soil is present and generally have 25-75% overall cover. Scattered small, often open-grown trees are also present. Herbaceous plants are sparse and generally restricted to crevices and areas of shallow soil. Characteristic vascular plant species include big-toothed aspen, northern red oak, northern pin



oak, juneberries, bush honeysuckle, hairy honeysuckle (*Lonicera hirsuta*), blueberries (*Vaccinium angustifolium*, *V. myrtilloides*), three-toothed cinquefoil (*Potentilla tridentata*), bearberry (*Arctostaphylos uva-ursi*), large-leaved aster, poverty grass, and Back's sedge (*Carex backii*). Crustose lichens are dominant on areas of exposed bedrock, with fruticose and foliose lichens also important. Although no quantitative data exist, lichens and mosses generally appear to be less diverse in ROn23a than in ROn23b. Evidence of fire is common. ROn23a is present occasionally throughout the inland portion of the North Shore Highlands Subsection of NSU; ROn23a may also be present in the Laurentian Uplands, Border Lakes, and Toimi Uplands subsections of NSU, and in MOP, SSU, and WSU.

### ● ROn23b Bedrock Shrubland (Lake Superior)

Small (<25 acres), open shrubland communities on bedrock outcrops near Lake Superior, either on rocky knobs or headlands along the shore, or on rocky ledges or slopes inland from wave-washed and ice-scoured zones. Vegetation is patchy (25- 50% cover) and composed of shrubs, herbs, graminoids, lichens, mosses, and sometimes scattered small trees. Characteristic vascular plant species include juneberries, bush honeysuckle, blueberries, three-toothed cinquefoil, bearberry, poverty grass, and large-leaved aster. Characteristic nonvascular plant species include fruticose and foliose lichens such as *Stereocaulon paschale*, *Umbilicaria muehlenbergii*, *Cladonia pyxidata*, *Cladina mitis*, and *Cladina rangiferina*; crustose lichens such as *Rhizocarpon grande* and *Dimelaena oreina*; and haircap moss (*Polytrichum piliferum*). If trees are present, they are usually stunted (6-30ft [2-10m] tall). Tree species include balsam fir, black spruce, white spruce, paper birch, heart-leaved birch, mountain ash, and jack pine. ROn23b is relatively uncommon and restricted to the North Shore Highlands Subsection of NSU.



photo by M.D. Lee MN DNR

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