RO Rock Outcrop System

photo by N.E. Aaseng MN DNR

Voyageurs National Park, St. Louis County, MN

General Description

Rock Outcrop (RO) communities are open or shrub-dominated plant communities on horizontal or sloping bedrock exposures. They are common in landscapes with thin soils over bedrock. Crustose and foliose lichens typically cover exposed rock surfaces, with fruticose lichens also common. Vascular plant cover is sparse to patchy, depending on the amount of fracturing of the bedrock surface and accumulation of soil in cracks, crevices, and shallow depressions. Outcrops with minimal fracturing and little accumulation of soil are dominated by lichens, with scattered shrubs and herbaceous plants. Shrub-dominated communities are typical on bedrock with greater accumulations of soil. In the Laurentian Mixed Forest (LMF) Province, RO communities are most common in the North Shore Highlands and Border Lakes Subsections in NSU where Precambrian bedrock is frequently at or just below the surface. RO communities are somewhat less common in the Laurentian Uplands and Nashwauk Uplands Subsections in NSU and the Littlefork-Vermilion Uplands Subsection in MOP, and are widely scattered, although common locally, in WSU and in the Agassiz Lowlands Subsection in MOP. RO communities are often present as openings within larger areas of woodland or forest vegetation, and whether a site is classified as an RO community rather than a woodland or forest is often a matter of scale.

Plant Adaptations

Species in RO communities are adapted to greater environmental extremes than species in surrounding terrestrial communities. Many plants on bedrock outcrops are adapted to frequent desiccation because of low moisture-holding capacities of substrates and exposure to direct sunlight and strong winds. Plants must also withstand rapid fluctuations in substrate temperatures, which are significantly colder at night than in surrounding forests and much warmer during mid-afternoon on sunny days. Limited availability of nutrients in outcrop habitats strongly influences community composition and diminishes growth rates of plants. Wind can have a visible impact on the growth forms of trees and shrubs, causing stunting, stem die-back, and misshapen trunks. Characteristic wind-sculpted “krummholz” forms are common, especially in exposed settings along lakeshores and on summits and ridge tops, where wind speeds are often high. Species in RO communities commonly reproduce by vegetative structures such as rhizomes, runners, or stolons, and tend to persist from year to year once established at a site; species that disperse and reproduce by seed alone are much less common.

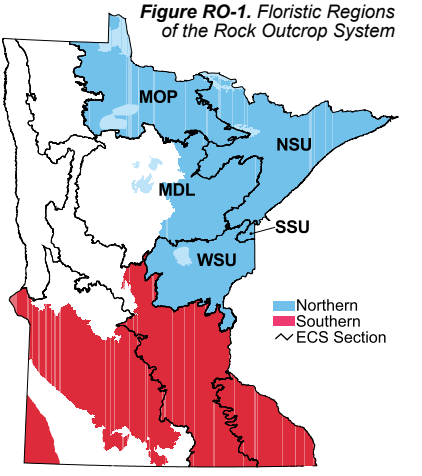

Figure RO-1. *Floristic Regions of the Rock Outcrop System*

Landscape Setting and Disturbance Regime

In the landscape as a whole, RO communities are small features, rarely covering more than 25 acres (10ha) and most often less than 5 acres (2ha). They are commonly surrounded by communities of the Fire-Dependent Forest/Woodland (FD) System and occasionally by Mesic Hardwood Forest (MH) communities. Because of their small size, RO communities are strongly affected by disturbances in adjacent forests or woodlands. Removal of forest canopies by fire or windstorm results in warmer and drier conditions on adjacent bedrock outcrops. Evidence of fire such as charcoal or scarred stumps is present on many rock outcrops. Fire, with frequent drought and scarce soils, plays a role in maintaining the open vegetation characteristic of RO communities. Light or moderate fires reduce woody plant cover and consume litter and humus. Severe fires can remove virtually all vascular plant cover for long periods through incineration of both plants and accumulated soil deposits. Major fires often expand RO communities into adjacent forests and can create new outcrop openings in woodlands with shallow soils over bedrock. RO communities are relatively stable over time because of limited habitat for plant establishment and prevalence of species that persist from year to year once established on a site. In the absence of fire or other major disturbances such as extreme drought, they can eventually succeed to woodland or forest communities.

Floristic Regions

Communities in the RO System are divided into two regions based on geographic variation in climate, bedrock type, and plant species composition (Fig. RO-1). One of these regions, the Northern Floristic (ROn) Region, is entirely within the LMF Province. The other, the Southern Floristic (ROs) Region, is present to the south in the Eastern Broadleaf Forest and Prairie Parkland Provinces. Plants with high fidelity for RO communities in the ROn Region include pale corydalis *(Corydalis sempervirens),* bristly sarsaparilla *(Aralia hispida),* fringed false buckwheat *(Polygonum cilinode),* Douglas' knotweed *(P. douglasii),* umbel sedge *(Carex umbellata),* Back's sedge *(C. backii),* and rock spikemoss *(Selaginella rupestris).* Within the ROn Region, outcrop communities are divided into plant community Classes based on amount of woody plant cover.