



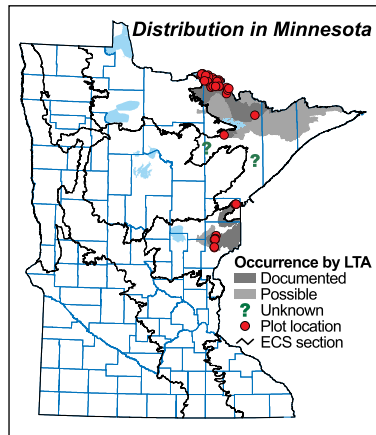
Northern Dry-Bedrock Pine (Oak) Woodland

Dry pine or oak woodlands on shallow, excessively drained, loamy soils on bedrock ridges and hillsides or on rock ledges and terraces adjacent to rivers. Crown and surface fires were common historically.

Vegetation Structure & Composition

Description is based on summary of vegetation data from 47 plots (relevés).

- **Ground-layer** cover of forbs and graminoids typically ranges from 25-75%. The most common vascular plants are Canada mayflower (*Maianthemum canadense*), wild sarsaparilla (*Aralia nudicaulis*), large-leaved aster (*Aster macrophyllus*), poverty grass (*Danthonia spicata*), wintergreen (*Gaultheria procumbens*), and bracken (*Pteridium aquilinum*). Lichen- and moss-covered bedrock and boulders typically make up at least 25% of the ground layer.
- **Shrub layer** is typically dominated by deciduous species, usually with patchy to interrupted cover (25-75%). Lowbush blueberry (*Vaccinium angustifolium*), juneberries (*Amelanchier* spp.), red maple saplings, and bush honeysuckle (*Diervilla lonicera*) are the most common species in the shrub layer.
- **Subcanopy** is usually absent, but when present, red maple and paper birch are frequent components.
- **Canopy** is composed of conifers, hardwoods, or conifers mixed with hardwoods, and is usually patchy (25-50% cover), with openings in areas of exposed bedrock or boulders. Red pine and white pine are dominant on many sites. On other sites, jack pine or northern pin oak are dominant. In mixed forests, conifers often form a supercanopy above hardwood species. Paper birch is often present in the hardwood canopy.



Landscape Setting & Soils

- **Glacially scoured bedrock**—Common. Landscape is hummocky to rugged. Parent material is non-calcareous drift, usually less than 20in (50cm) deep over bedrock. Exposed bedrock and boulder-sized rocks are usually obvious. Soils are variable in texture, ranging from coarse sandy loam to silt loam washed into crevices. Mosses and organic litter are important substrates for ground-layer plants. Soils are excessively drained. Soil-moisture regime is dry to moderately dry, depending on the thickness of parent material over the bedrock. (Border Lakes and Nashwauk Uplands in NSU; WSU).

Natural History

In the past, fires were occasional throughout the range of FDn22. An analysis of Public Land Survey records indicates that the rotation of catastrophic fires was about 195 years, and the rotation of severe surface fires about 255 years. The rotation of all fires combined is estimated to be 107 years. Windthrow was not common, with an estimated rotation exceeding 1,000 years. Based on the historic composition and age structure of these woodlands, FDn22 had three growth stages and one period of transition.

- **0-55 years**—Young woodlands recovering from fire, dominated by jack pine mixed with red pine, quaking aspen, and paper birch.
- **55-75 years**—A transition period marked by a sharp decline in jack pine. Red pine, white spruce, and white pine increase during this period.
- **75-115 years**—Mature woodlands dominated by red pine mixed with old jack pine, white spruce, white pine, and some quaking aspen and paper birch. Northern pin oak, present in modern mature woodlands, was not mentioned in the historic notes.



● **>115 years**—Old forests dominated by a mixture of white spruce, red pine, and very old jack pine. Scattered old white pines are also present, with many white pine seedlings in the understory.

Similar Native Plant Community Classes

● **FDn12 Northern Dry-Sand Pine Woodland**

FDn12 and FDn22 are very similar in overall species composition. They differ mainly in substrate and site characteristics.

▶ **FDn12**—On sand deposits. More likely to have round-leaved pyrola (*Pyrola rotundifolia*), one-sided pyrola (*P. secunda*), smooth blue aster (*Aster laevis*), Lindley's aster (*A. ciliolatus*), wood anemone (*Anemone quinquefolia*), pipsissewa (*Chimaphila umbellata*), and trailing arbutus (*Epigaea repens*) in the ground layer.

▶ **FDn22**—On shallow soils over bedrock. More likely to have northern pin oak in the canopy or understory; bush juniper (*Juniperus communis*), staghorn sumac (*Rhus hirta*), and smooth sumac (*R. glabra*) in the shrub layer; and sweet fern (*Comptonia peregrina*), common polypody (*Polypodium virginianum*), rock spikemoss (*Selaginella rupestris*), poverty grass, twin bentgrass (*Agrostis hyemalis*), and slender wheatgrass (*Elymus trachycaulus*) in the ground layer.

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

FDn32 is most likely to be confused with FDn22 when FDn32 occurs on bedrock and is dominated by red pine or white pine.

▶ **FDn32**—Present on dry-mesic sites with greater soil development. Often has >50% canopy cover. More likely to have black spruce (especially in the canopy) and abundant mesic forest species in the ground layer, including twinflower (*Linnaea borealis*), bunchberry (*Cornus canadensis*), and bluebead lily (*Clintonia borealis*).

▶ **FDn22**—Present on dry sites with thin or patchy soils. Canopy cover typically 25-50%. More likely to have dry woodland species such as poverty grass, pussytoes (*Antennaria* spp.), and bastard toadflax (*Comandra umbellata*).

● **FDn33 Northern Dry-Mesic Mixed Woodland**

▶ **FDn33**—Most common on sandy soils, but on rare occasions may be present on shallow loamy soils over bedrock. Often has >50% canopy cover. Beaked hazelnut (*Corylus cornuta*) is much more likely to be abundant in the shrub layer, and mesic forest species such as wood anemone, dwarf raspberry (*Rubus pubescens*), sweet-scented bedstraw (*Galium triflorum*), and rose twistedstalk (*Streptopus roseus*) are more common in the ground layer.

▶ **FDn22**—Present on dry sites with thin or patchy soils. Canopy cover typically 25-50%. More likely to have dry woodland species such as poverty grass, pussytoes, and bastard toadflax in the ground layer.

Native Plant Community Types in Class

● **FDn22a Jack Pine Woodland (Bedrock)**

Canopy is dominated by jack pine, often mixed with northern pin oak, especially in the understory. Smooth sumac (*Rhus glabra*), gray goldenrod (*Solidago nemoralis*), prairie willow (*Salix humilis*), and bush juniper (*Juniperus communis*), when present, are good indicators of FDn22a relative to other types in the community class. Other diagnostic species include prickly or smooth wild rose (*Rosa acicularis/blanda* group), red raspberry (*Rubus idaeus*), bastard toadflax, American vetch (*Vicia americana*), and harebell (*Campanula rotundifolia*), although these can also be diagnostic for FDn22c (see below), which occurs in the same general habitats as FDn22a. Documented in the Border Lakes and Nashwauk Uplands subsections in NSU; may occur on rocky ridges in other areas in northern Minnesota. Description is based on summary of vegetation data from 18 plots).

● **FDn22b Red Pine - White Pine Woodland (Northeastern Bedrock)**

Canopy is dominated by white pine or red pine, often in mixed stands. Deciduous trees are uncommon in the canopy. Canopy and understory are relatively open, and white pine regeneration is common. Many sites have all age classes of white pine and, to a



lesser extent, red pine. Documented in the Border Lakes Subsection in NSU. Description is based on summary of vegetation data from 5 plots.

● **FDn22c Pin Oak Woodland (Bedrock)**

Canopy is typically dominated by short, scrubby northern pin oak or, less frequently, bur oak. Jack pine, red pine, and paper birch are occasionally present in the canopy. Downy arrowwood (*Viburnum rafinesquianum*) is common and abundant in FDn22c relative to other community types in this class; wild roses, red raspberry, bastard toadflax, American vetch, and harebell are also reasonably good indicators of FDn22c when present, but see also FDn22a above. Documented in the western part of the Border Lakes Subsection in NSU. Description is based on summary of vegetation data from 11 plots.

● **FDn22d Red Pine - White Pine Woodland (Eastcentral Bedrock)**

Canopy is dominated by red pine, white pine, or, rarely, white cedar. Deciduous trees such as big-toothed aspen, quaking aspen, paper birch, northern red oak, and red maple may also be important in the canopy. Documented on outcrops and rocky terraces along the St. Louis River in SSU and on similar sites along the Kettle River in WSU. Description is based on summary of vegetation data from 13 plots.



photo by K. Wendt, MN DNR

Kettle River Scientific and Natural Area, Pine County



FDn22 Northern Dry-Bedrock Pine (Oak) Woodland – Species Frequency & Cover

	freq%	cover		freq%	cover		freq%	cover
Forbs, Ferns & Fern Allies								
Canada mayflower (<i>Maianthemum canadense</i>)	98	••						
Large-leaved aster (<i>Aster macrophyllus</i>)	87	••••						
Wild saussurella (<i>Aralia nudicaulis</i>)	87	••••						
Bracken (<i>Pteridium aquilinum</i>)	74	••••						
Cow wheat (<i>Melampyrum lineare</i>)	57	••						
Spreading dogbane (<i>Apocynum androsaemifolium</i>)	55	••						
Common strawberry (<i>Fragaria virginiana</i>)	47	••						
Field or Variable puspsyes (<i>Antennaria neglecta</i> or <i>A. neglecta</i>)	40	••						
Common polypody (<i>Polypodium virginianum</i>)	40	••						
Bunchberry (<i>Cornus canadensis</i>)	38	••						
Starflower (<i>Trientalis borealis</i>)	32	••						
Bastard toadflax (<i>Comandra umbellata</i>)	30	••						
American vetch (<i>Vicia americana</i>)	28	••						
Veiny pea (<i>Lathyrus venosus</i>)	23	••						
Rough hawkweed (<i>Hieracium umbellatum</i>)	21	••						
Harebell (<i>Campanula rotundifolia</i>)	21	••						
Pale corydalis (<i>Corydalis sempervirens</i>)	21	••						
Pale vetchling (<i>Lathyrus ochroleucus</i>)	21	••						
Kalm's hawkweed (<i>Hieracium kalmii</i>)	19	••						
Spinulose shield fern or Glandular wood fern*	19	••						
Bluehead lily (<i>Clintonia borealis</i>)	17	••						
Columbine (<i>Aquilegia canadensis</i>)	17	••						
Rusty woodsisia (<i>Woodisia ilvensis</i>)	17	••						
Sticky hawkweed (<i>Hieracium scabrum</i>)	17	••						
Groundpine (<i>Lycopodium dendroideum</i> or <i>L. hickeyi</i>)	15	••						
Gray goldenrod (<i>Solidago nemoralis</i>)	15	••						
Twinflower (<i>Linnaea borealis</i>)	13	•••						
Grasses & Sedges								
Poverty grass (<i>Danthonia spicata</i>)	81	•••						
Mountain rice grass (<i>Oryzopsis asperifolia</i>)	53	••						
Sharp-pointed rice grass (<i>Oryzopsis pungens</i>)	36	••						
False melic grass (<i>Schizachne purpurascens</i>)	36	••						
Twin bentgrass (<i>Agrostis hyemalis</i>)	30	••						
Slender wheatgrass (<i>Elymus trachycaulis</i>)	26	••						
Low Shrubs								
Lowbush blueberry (<i>Vaccinium angustifolium</i>)								98
Winegreen (<i>Gaultheria procumbens</i>)								72
Valvet-leaved blueberry (<i>Vaccinium myrtilloides</i>)								66
Red raspberry (<i>Rubus idaeus</i>)								47
Sweet fern (<i>Comptonia peregrina</i>)								32
Beaberry (<i>Arctostaphylos uva-ursi</i>)								28
Shrubs								
Junberries (<i>Amelanchier</i> spp.)								94
Bush honeysuckle (<i>Diervilla lonicera</i>)								81
Baked hazelnut (<i>Corylus cornuta</i>)								51
Prickly or Smooth wild rose (<i>Rosa acicularis</i> or <i>R. blanda</i>)								49
Prairie willow (<i>Salix humilis</i>)								43
Bush Juniper (<i>Juniperus communis</i>)								36
Downy arrowwood (<i>Viburnum rafinesquianum</i>)								30
Fly honeysuckle (<i>Lonicera canadensis</i>)								26
Pin cherry (<i>Prunus pensylvanica</i>)								23
Sand cherry (<i>Prunus pumila</i>)								17
Trees								
Red pine	43	••••	Canopy cover	43	••••	Subcanopy cover	43	••••
Jack pine	30	••••		30	••••		30	••••
White pine	28	••••		28	••••		28	••••
Big-toothed aspen	13	••••		13	••••		13	••••
Paper birch	13	••••		13	••••		13	••••
Northern red oak	9	••••		9	••••		9	••••
Red maple	9	••••		9	••••		9	••••
Quaking aspen	9	••••		9	••••		9	••••
Northern pin oak	4	••••		4	••••		4	••••
Balsam fir	4	••••		4	••••		4	••••
White spruce	2	••••		2	••••		2	••••
Black spruce	2	••••		2	••••		2	••••
Bur oak	-	-		-	-		-	-
Mountain ashes	-	-		-	-		-	-

*Spinulose shield fern or Glandular wood fern (*Dryopteris carthusiana* or *D. Intermedia*)