



Northern Mesic Savanna

Sparsely treed and usually shrubby communities with grass-dominated ground layers on somewhat poorly drained to well-drained loam soils mainly formed in glacial till (sometimes water-reworked) and outwash deposits, and less frequently in lacustrine sediments. Present primarily on level to gently rolling sites. Drought stress is irregular in occurrence and usually not severe. Historically, these communities burned every few years.

Vegetation Structure & Composition

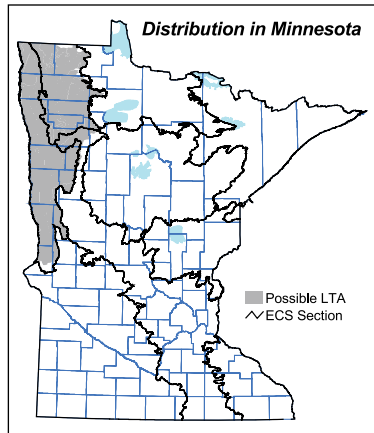
There are no plot data for this class; description is based on field notes and inference from Northern Mesic Prairie (UPn23), Northern Dry Savanna (UPn13), Northwestern Dry-Mesic Oak Woodland (FDw24), Northwestern Mesic Oak-Aspen Woodland (FDw34), and Northwestern Wet-Mesic Aspen Woodland (FDw44).

- Graminoid** cover is interrupted to continuous (50–100%). Species composition is similar to that of Northern Mesic Prairie (UPn23), with big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), and prairie dropseed (*Sporobolus heterolepis*) the most important species. Little bluestem (*Schizachyrium scoparium*) and porcupine grass (*Stipa spartea*) are common associates in the drier end of the moisture gradient, and mat muhly grass (*Muhlenbergia richardsonis*), switchgrass (*Panicum virgatum*), and prairie cordgrass (*Spartina pectinata*) are common in the moister end. Pennsylvania sedge (*Carex pensylvanica* var. *pensylvanica*), a woodland species, is sometimes present. Cool-season (C₃) grasses such as junegrass (*Koeleria pyramidata*) and porcupine grass may be more important than in UPn23 because of partial shading from trees in UPn24 during the summer.

- Forb** cover is sparse to patchy (5–50%). Species composition is similar to that of UPn23. Common species include heath aster (*Aster ericoides*), stiff goldenrod (*Solidago rigida*), wild bergamot (*Monarda fistulosa*), purple prairie clover (*Dalea purpurea*), stiff sunflower (*Helianthus pauciflorus*), white sage (*Artemisia ludoviciana*), hoary puccoon (*Lithospermum canescens*), northern bedstraw (*Galium boreale*), and smooth blue aster (*Aster laevis*). In the wetter end of the moisture gradient, Maximilian's sunflower (*Helianthus maximiliani*), tall meadow-rue (*Thalictrum dasycarpum*), heart-leaved alexanders (*Zizia aptera*), Virginia mountain mint (*Pycnanthemum virginianum*), and white camas (*Zigadenus elegans*) are also common. Rough blazing star (*Liatris aspera*), Missouri and gray goldenrods (*Solidago missouriensis* and *S. nemoralis*), and white prairie clover (*Dalea candida*) are common in the drier end. In addition, woodland species such as wild sarsaparilla (*Aralia nudicaulis*), Maryland black snakeroot (*Sanicula marilandica*), and Lindley's aster (*Aster ciliolatus*) are likely to be present.

- Climbing plants and vines** are a minor component. Virginia creeper (*Parthenocissus* spp.) is frequently present, and wild grape (*Vitis riparia*) is occasionally present.

- Shrub layer** is patchy to interrupted (25–75% cover) and composed of low (< 20 in [50cm]) semi-shrubs, taller (up to 6ft [2m]) shrubs, bur oak grubs (< 6ft), and root suckers of quaking aspen (< 6ft). Species composition is similar to that of UPn23. The low semi-shrub prairie rose (*Rosa arkansana*) is frequently present, and leadplant (*Amorpha canescens*) is usually present in the drier end of the moisture gradient. Common taller shrubs in the drier end of the gradient include wolfberry (*Symphoricarpos occidentalis*), Saskatoon juneberry (*Amelanchier alnifolia*), American hazelnut (*Corylus americana*), sand cherry (*Prunus pumila*), and prairie willow (*Salix humilis*). In the moister end Bebb's willow (*Salix bebbiana*) is frequent. Shrubs that are rare in UPn23 but frequent in UPn24





include gray dogwood (*Cornus racemosa*) and chokecherry (*Prunus virginiana*). Poison ivy (*Toxicodendron rydbergii*) is also much more common in UPn24 than in UPn23.

- **Trees** are scattered or in scattered clumps, with total cover 10%–70% and typically 25–50%. Bur oak is most common in dry-mesic examples; tree-size quaking aspen is sometimes present on dry-mesic sites and is dominant on wet-mesic sites.

- **Notes:** The exotic grasses Kentucky bluegrass (*Poa pratensis*) and smooth brome (*Bromus inermis*) are troublesome invaders in UPn24. Pennsylvania sedge (*Carex pennsylvanica* var. *pennsylvanica*), a native graminoid that is naturally a minor component of UPn24, increases in abundance with prolonged heavy grazing.

Landscape Setting & Soils

Historically, UPn24 occurred in the morainic landscape east of the limit of the Glacial Lake Agassiz plain in the RRV and in the lake-modified ground moraine in the LAP. It may have been occasional in the beach-ridge zone in the RRV. UPn24 typically occurred as an ecotonal formation between prairies and more fire-protected sites occupied by woodland or forest, and along the margins of prairie lakes. Soils are somewhat poorly drained to well drained, mostly moderately permeable to permeable, fine- and medium-textured loams. Without exception these soils are mollisols, characterized by a thick, dark, humus-rich surface horizon with high base saturation and dominantly bivalent cations.

Natural History

Savannas form where fire recurs frequently enough to prevent trees and shrubs from dominating but where frequency and severity are low enough to allow fire-tolerant trees to become established and sometimes reach maturity. Historically, savannas occurred in physical proximity to prairies but where features such as streams, lakes, and steep topography impeded the spread of fires, locally attenuating the prairie fire regime. All savannas are highly sensitive to fire suppression, quickly succeeding to woodland and eventually to forest in the absence of fire; the higher productivity of sites where UPn24 occurs makes it even more susceptible to succession than Northern Dry Savanna (UPn13). UPn24 occupies sites where soil moisture availability remains high on average because of soil texture and composition but where saturation of the rooting zone is limited to brief episodes during snowmelt or heavy rains. Before Euro-American settlement, grazing, browsing, and trampling by large ungulates were probably regular occurrences in UPn24. The contribution of these disturbances to the composition and structure of the vegetation is poorly understood. The fertile soils and gentle relief of UPn24 are ideal for row-crop agriculture, and almost all of the land that supported UPn24 has been converted to cropland; areas not converted have either been so heavily grazed that almost none of the native herbaceous flora survives, or they have become woodland or forest with fire suppression.

Similar Native Plant Community Classes

- **UPs24 Southern Mesic Savanna**

There are no plot data for either UPs24 or UPn24, making comparison of these classes speculative. Differences in the herbaceous flora probably mirror differences between Southern Mesic Prairie (UPs23) and Northern Mesic Prairie (UPn23). UPs24 and UPn24 differ in tree composition, with northern pin oak frequent in UPs24 but rare in UPn24, and white oak occasional in UPs24 but not present in UPn24. Quaking aspen is probably more frequent in UPn24 than in UPs24. The boundary between these two classes, like that between UPs23 and UPn23, is set by convention and could be repositioned or abandoned on further study.

- **UPn23 Northern Mesic Prairie**

The most salient difference between UPn23 and UPn24 is the rarity of trees taller than 2m (6ft) in UPn23, whereas UPn24 has at least sparse (> 10%) tree cover. The shrub layer is typically shorter and sparser in UPn23 than in UPn24, and some species are less common in UPn23 than in UPn24, notably American hazelnut and chokecherry, the



last of which is rare in UPn23. Because of partial shading in UPn24, cool-season (C_3) graminoids are probably more important relative to warm-season (C_4) grasses than in UPn23, and forbs may be more important relative to graminoids.

● UPn13 Northern Dry Savanna

Differences in the herbaceous flora between UPn13 and UPn24 are probably similar to the differences between Northern Dry Prairie (UPn12) and UPn23. Shrub cover is probably less in UPn13 than in UPn24—UPn24 may have more the appearance of a shrub thicket than that of a tree-studded prairie. Differences in substrate characteristics (predominantly sandy or gravelly outwash and beach-ridge deposits or aeolian sands in UPn13 versus predominantly loamy till in UPn24) are sufficient in most cases to distinguish the two classes; classification uncertainty is most likely on loamy slopes, where Dry Hill Oak Savanna (Northern) (UPn13d) is a possibility.

● FDw24 Northwestern Dry-Mesic Oak Woodland

FDw24 is similar to UPn24 when FDw24 has significant presence of prairie species in the understory (FDw24a). This is especially true for examples of UPn24 that are succeeding to woodland in the absence of fire. Downy arrowwood (*Viburnum rafinesquianum*) is typically present in FDw24 but rare in UPn24; other shrubs more common in FDw24 than in UPn24 are chokecherry, gray dogwood, and nannyberry (*Viburnum lentago*). Prairie rose, leadplant, and fragrant false indigo (*Amorpha nana*), characteristic prairie semi-shrubs that are often present in UPn24, do not occur in FDw24. The woodland forbs Canada mayflower (*Maianthemum canadense*) and wild sarsaparilla are typically present in FDw24 but uncommon or rare in UPn24; a similar pattern is exhibited by mountain rice grass (*Oryzopsis asperifolia*) and false melic grass (*Schizachne purpurascens*). A number of characteristic herbaceous prairie species that are frequent in UPn24 are absent from FDw24. Purple prairie clover, heath aster, black-eyed Susan (*Rudbeckia hirta*), rough blazing star, and northern plains blazing star (*Liatris ligulistylis*) are examples of forbs in this category, and prairie dropseed, Indian grass, and little bluestem are examples of grasses.

● FDw34 Northwestern Mesic Aspen-Oak Woodland

FDw34 is similar to UPn24 when FDw34 has significant presence of prairie species in the understory (FDw34a). This is especially true for examples of UPn24 that are succeeding to woodland in the absence of fire. Downy arrowwood is frequent in the shrub layer of FDw34 but rare in UPn24. Gray dogwood is also frequent in FDw34 but only occasional in UPn24. Lowbush blueberry (*Vaccinium angustifolium*) is somewhat frequent in FDw34 but rare in UPn24. Fragrant false indigo and leadplant, often present in UPn24, do not occur in FDw34. Woodland forbs such as Canada mayflower, Lindley's aster, Maryland black snakeroot, wild sarsaparilla, and spreading dogbane (*Apocynum androsaemifolium*) are frequent in FDw34 but only occasionally present in UPn24. The same pattern is true for the graminoids Pennsylvania sedge (*Carex pensylvanica* var. *pensylvanica*), mountain rice grass, and false melic grass. Bluejoint (*Calamagrostis canadensis*), a grass common in wet prairie and wet meadow communities but rare in UPn24, is often present in FDw34. A number of herbaceous species of prairie communities that are frequent in UPn24 are rare or do not occur at all in FDw34, including purple prairie clover, heath aster, heart-leaved alexanders, blazing stars (*Liatris* spp.), prairie dropseed, Indian grass, little bluestem, and prairie cordgrass.

● FDw44 Northwestern Wet-Mesic Aspen Woodland

FDw44 is similar to wet-mesic examples of UPn24 when FDw44 has significant presence of prairie species in the understory (FDw44a). This is especially true for examples of UPn24 that are succeeding to woodland in the absence of fire. Several shrubs that seldom occur in UPn24 are frequent in FDw44, notably dwarf alder (*Rhamnus alnifolia*), swamp gooseberry (*Ribes hirtellum*), and red-osier dogwood (*Cornus stolonifera*). Smooth and prickly wild roses (*Rosa blanda* and *R. acicularis*) are common in FDw44 but are uncommon in UPn24, whereas prairie rose is frequent in UPn24 and absent from FDw44. Fragrant false indigo is somewhat frequent in UPn24 but does not occur in FDw44. Side-flowering aster (*Aster lateriflorus*), Canada mayflower, dwarf raspberry (*Rubus pubescens*), and fringed loosestrife (*Lysimachia ciliata*) are common in FDw44



but rare in UPn24, and a number of prairie species typical of UPn24 do not occur in FDw44, including heath aster, stiff goldenrod, purple prairie clover, heart-leaved alexanders, and northern plains blazing star.

Native Plant Community Types in Class

● **UPn24a Mesic Oak Savanna (Northern)**

Sparsely treed, herb- and shrub-dominated communities on medium to medium-fine textured loamy soils. Soils have well-developed mollic epipedons. UPn24a occurs on nearly level to gently sloping sites, though it may occupy moderate slopes on finer-textured soils. Bur oak is the principal tree, but quaking aspen is frequently present, mostly as shrub- and sapling-size root suckers but sometimes as mature trees. American hazelnut and junberries are more prominent in the shrub layer than in UPn24b, and leadplant is more common. Little bluestem, junegrass, and porcupine grass are more common than in UPn24b. UPn24a tends to occur on better-drained sites than UPn24b. There are no known examples of UPn24a; historically it occurred in the eastern part of the RRV and in the LAP. There are no vegetation plot data available for UPn24a; description is based on inference from UPn23, UPn13, FDw24a, and FDw34a.

● **UPn24b Aspen Openings (Northern)**

Sparsely treed, herb- and shrub-dominated communities on medium-fine to medium textured loamy soils. Soils have well-developed mollic epipedons. UPn24a occurs on nearly level sites. Quaking aspen is the dominant tree, but bur oak is typically present, and balsam poplar may be occasional. Aspens tend to occur in clumps (usually root-connected clones), with some older trees present among the shrub- and sapling-size root suckers. Shrubby cinquefoil (*Potentilla fruticosa*) and bog birch (*Betula pumila*) are more prominent in the shrub layer than in UPn24a. Fragrant false indigo is more common than leadplant. Prairie cordgrass is more common than in UPn24a. UPn24b tends to occur on more poorly drained sites than UPn24a. UPn24b has been documented at a few sites in the LAP. There are no vegetation plot data available for UPn24b; description is based on field notes and inference from UPn23, FDw34a, and FDw44a.



photo by R. P. Dana, MN DNR