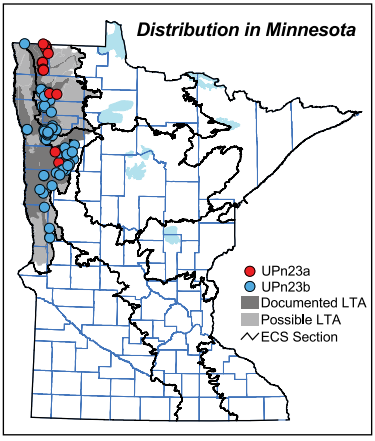
## *Northern Mesic Prairie*

*Grass-dominated but forb-rich herbaceous communities (very shrubby in the Tallgrass Aspen Parklands Province) on somewhat poorly drained to well-drained loam soils formed in lacustrine sediments, in glacial till (sometimes reworked by water), or less frequently in outwash deposits. Present primarily on level to gently rolling sites. Drought stress is irregular in occurrence and usually not severe. Fires were very frequent historically.*

### *Vegetation Structure & Composition*

Description is based on summary of vegetation data from 110 plots (relevés).




- **Graminoid** cover is usually continuous (75–100%). Tall grasses dominate, but several midheight grasses are also important. Species composition is fairly uniform, although relative abundances shift across the moisture gradient within the community. Big bluestem *(Andropogon gerardii)* and Indian grass *(Sorghastrum nutans)* are the dominant grasses, with prairie dropseed *(Sporobolus heterolepis)* either a codominant or subdominant component. On drier sites, little bluestem *(Schizachyrium scoparium)* is important, and porcupine grass *(Stipa spartea)* is frequent. On moister sites, mat muhly grass *(Muhlenbergia richardsonis)* is common, and switchgrass *(Panicum virgatum)* and prairie cordgrass *(Spartina pectinata)* are usually present. Leiberg's panic grass *(Panicum leibergii)* is distinctive, although usually minor in terms of cover.
- **Forb** cover is sparse to patchy (5–50%). Forb species composition also responds to moisture. A number of species are common across the moisture gradient, including 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)*. The most common forbs on moister sites are 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)*. Rough blazing star *(Liatris aspera)*, Missouri and gray goldenrods *(Solidago missouriensis* and *S. nemoralis)*, and white prairie clover *(Dalea candida)* are common on drier sites.
- **Shrub layer** is sparse to interrupted (5–75% cover). The low semi-shrub prairie rose *(Rosa arkansana)* is frequently present, and on drier sites leadplant *(Amorpha canescens)* is also typically present. Sparse patches of wolfberry *(Symphoricarpos occidentalis)* are occasional. In the LAP, taller shrubs are often common; shrubby cinquefoil *(Potentilla fruticosa)*, bog birch *(Betula pumila)*, and Bebb's willow *(Salix bebbiana)* are prominent on moister sites, and American hazelnut *(Corylus americana)*, Saskatoon juneberry *(Amelanchier alnifolia)*, sand cherry *(Prunus pumila)*, and prairie willow *(Salix humilis)* are often important on drier sites.
- **Trees** are typically absent except in the LAP, where suckers of quaking aspen, and shrublike grubs of bur oak are frequently present and sometimes common. Elsewhere, the presence of tree species in UPn23 is usually the result of fire suppression.
- **Notes**: Kentucky bluegrass *(Poa pratensis)*, an introduced species, is invariably present; it increases in abundance in the prolonged absence of fire but becomes dominant only with heavy grazing pressure. Smooth brome *(Bromus inermis)*, another exotic, is a very troublesome invasive species favored by disturbance, including natural disturbance by pocket gophers.

### *Landscape Setting & Soils*

The region of Minnesota in which UPn23 occurs—largely coincident with the RRV and LAP—is a low-relief landscape dominated by the Glacial Lake Agassiz plain. The nearly flat abyssal lake plain occupies most of the RRV, and the entire LAP is ground moraine planed by wave action while it was a shallow-water part of the glacial lake. Low beach ridges and wave-cut scarps along the eastern margin of the RRV and arcing across the LAP provide the only significant relief in this landscape. Poorly drained soils predominate in the abyssal lake plain in the RRV; in this landscape UPn23 occurred historically on local areas of better drained soils—such as natural levees along streams—in a matrix of wetland communities. Some parts of the lake plain exhibit a complex microtopography believed to result from shrink-swell processes in the lacustrine clays; in these areas UPn23 formed intricate mosaics with wetland communities. In the beach ridge zone along the eastern margin of the RRV and in the LAP, UPn23 was interspersed with wetland communities and dry prairie communities (Northern Dry Prairie [UPn12] and Northern Dry Savanna [UPn13]) and probably occupied no more than half the landscape. In the eastern part of the RRV south of the LAP, in a region of undulating to gently rolling ground moraine with greater local relief along stream valleys and glacial drainageways, UPn23 was present on uplands interspersed with poorly drained areas and historically occupied more than half of the landscape. Soils in UPn23 range from somewhat poorly drained to well drained, mostly moderately permeable to permeable, fine and medium-textured loams. Without exception these are mollisols, characterized by a thick, dark, humus-rich surface horizon with high base saturation and dominantly bivalent cations.

### *Natural History*

UPn23 is present on level to gently sloping sites where growing-season 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. Recurrent fire is essential for the existence of UPn23, as environmental conditions are otherwise suitable for the growth of trees. Where propagules are available, succession to forest occurs rapidly in the absence of fire. Fires also recycle nutrients bound up in litter and promote flowering and seed production. Fire temporarily opens up the soil surface and so probably plays an important role in plant regeneration. Before Euro-American settlement, grazing and trampling by large ungulates were regular occurrences in UPn23. Episodic grazing probably enables persistence of some native species that cannot reproduce in the dense canopy of the tall grasses and forbs characteristic of UPn23; these would include short species and especially annual or biennial species. Historically, spatial patchiness in grazing intensity also influenced fire behavior, providing a shifting patchwork of refugia for fire-sensitive animal species. The fertile soils and gentle relief of UPn23 are ideal for row-crop agriculture, and almost all of the land that supported these communities has been converted to cropland. Most of the small amount of land that has not been cultivated has been used for season-long grazing by confined livestock, which has resulted in the replacement of most of the native species by introduced ones.

### *Similar Native Plant Community Classes*

- **UPs23 Southern Mesic Prairie**

Floristic differences between UPs23 and UPn23 are slight. The same species dominate both classes, and almost all of the species common in one are common in the other as well. Of the species common in UPs23 but rare in UPn23, none is present throughout the geographic range of UPs23 or occurs in the entire soil moisture gradient present in the class. For example, skyblue aster (*Aster oolentangiensis)* is restricted to the eastern margin of UPs23, and aromatic aster *(Aster oblongifolius)* occurs predominantly in the dry-mesic end of the moisture gradient. Of the species common in UPn23 but rare in UPs23, only tufted hair grass *(Deschampsia cespitosa)* and shrubby cinquefoil are restricted to the range of UPn23; both of these are limited to wet-mesic examples of UPn23. The others have ranges that extend well into that of UPs23, and their apparent rarity in UPs23 may be an artifact of the greater representation of wet-mesic prairies in

UPn23 and of mesic and dry-mesic prairies in UPs23. The boundary between these two classes is set more or less by convention; further study may determine that it should be repositioned or abandoned.

| ***UPn23 Indicator Species*** | (freq%) ***UPn23*** | UPs23 |
|---|---|---|
| Tufted hair grass *(Deschampsia cespitosa)* | **29** | - |
| Shrubby cinquefoil *(Potentilla fruticosa)* | **22** | - |
| Harebell *(Campanula rotundifolia)* | **48** | 2 |
| Glaucous false dandelion *(Agoseris glauca)* | **32** | 2 |
| Bebb's willow *(Salix bebbiana)* | **26** | 2 |
| Mat muhly grass *(Muhlenbergia richardsonis)* | **52** | 6 |
| - | - | - |
| - | - | - |

| ***UPs23 Indicator Species*** | (freq%) UPn23 | ***UPs23*** |
|---|---|---|
| Gray-headed coneflower *(Ratibida pinnata)* | - | **36** |
| Bird's foot coreopsis *(Coreopsis palmata)* | - | **30** |
| Skyblue aster *(Aster oolentangiensis)* | - | **17** |
| Canada tick trefoil *(Desmodium canadense)* | - | **17** |
| Clammy ground cherry *(Physalis heterophylla)* | - | **14** |
| Bicknell's sedge *(Carex bicknellii)* | - | **11** |
| Round-headed bush clover *(Lespedeza capitata)* | - | **10** |
| Aromatic aster *(Aster oblongifolius)* | 1 | **10** |

- **UPn24 Northern Mesic Savanna**

UPn24 is distinguished from UPn23 by the presence of sparse to patchy (10-50%) tree cover dominated by bur oak or quaking aspen. Lack of data for UPn24 makes further comparison with UPn23 speculative. Shrubs, especially chokecherry *(Prunus virginiana)*, American hazelnut, and Saskatoon juneberry, are probably more common in UPn24. Because of shading by the oaks, more shade-tolerant cool-season ($C_3$) graminoids, such as porcupine grass, slender wheatgrass *(Elymus trachycaulus)*, and sedges *(Carex* spp.), may be more important relative to warm-season ($C_4$) grasses in UPn24, and forbs may be more important relative to graminoids in UPn24 than in UPn23. Otherwise the herbaceous component of the two classes is similar.

- **UPn12 Northern Dry Prairie**

Greater importance of midheight grasses relative to tall grasses in UPn12 results in generally lower vegetation height in UPn12 than in UPn23. UPn12 typically has sparser vegetation cover, with some bare soil exposed, often with terricolous lichens, while the soil surface is completely hidden by vegetation in UPn23. There is little difference in species composition between drier examples of UPn23 and occurrences of UPn12 on loamier soils. Topography, soil characteristics, and relative abundances of species characteristic of dry versus mesic habitats provide the basis for differentiating the two classes.

| ***UPn23 Indicator Species*** | (freq%) ***UPn23*** | UPn12 |
|---|---|---|
| Common strawberry *(Fragaria virginiana)* | **57** | - |
| Virginia mountain mint *(Pycnanthemum virginianum)* | **55** | - |
| Wild licorice *(Glycyrrhiza lepidota)* | **30** | - |
| Smooth rattlesnakeroot *(Prenanthes racemosa)* | **29** | - |
| Maximilian's sunflower *(Helianthus maximiliani)* | **75** | 2 |
| Tall meadow-rue *(Thalictrum dasycarpum)* | **71** | 2 |
| Prairie cordgrass *(Spartina pectinata)* | **54** | 2 |
| Northern plains blazing star *(Liatris ligulistylis)* | **35** | 2 |

| ***UPn12 Indicator Species*** | (freq%) UPn23 | ***UPn12*** |
|---|---|---|
| Dotted blazing star *(Liatris punctata)* | - | **69** |
| Sage wormwood *(Artemisia frigida)* | - | **60** |
| Blue grama *(Bouteloua gracilis)* | - | **59** |
| Hairy golden aster *(Chrysopsis villosa)* | - | **57** |
| Sand reed grass *(Calamovilfa longifolia)* | - | **29** |
| Plains muhly *(Muhlenbergia cuspidata)* | 1 | **50** |
| Wilcox's panic grass *(Panicum wilcoxianum)* | 1 | **36** |
| Pasqueflower *(Anemone patens)* | 3 | **52** |

- **WPn53 Northern Wet Prairie**

WPn53 grades into UPn23 at the moist end of the moisture gradient in UPn23, without a distinct floristic boundary between the two classes. Sites supporting WPn53 are level or slightly concave except in the unusual situation where groundwater seepage creates moist habitats on slopes. Prairie cordgrass is typically much more important in WPn53 than in UPn23, as are sedges *(Carex* spp.). Indian grass is infrequently present in WPn53, and is less abundant when present than in UPn23. Leadplant is typically present in drier instances of UPn23 but very rarely present in WPn53.

| ***UPn23 Indicator Species*** | (freq%) ***UPn23*** | WPn53 |
|---|---|---|
| Porcupine grass *(Stipa spartea)* | **35** | - |
| Silverleaf scurfpea *(Pediomelum argophyllum)* | **29** | - |
| White prairie clover *(Dalea candida)* | **22** | - |
| Wild bergamot *(Monarda fistulosa)* | **44** | 2 |
| Leadplant *(Amorpha canescens)* | **23** | 1 |
| Harebell *(Campanula rotundifolia)* | **48** | 3 |
| Smooth blue aster *(Aster laevis)* | **62** | 5 |
| Rough blazing star *(Liatris aspera)* | **34** | 4 |

| ***WPn53 Indicator Species*** | (freq%) UPn23 | ***WPn53*** |
|---|---|---|
| Cut-leaved bugleweed *(Lycopus americanus)* | 1 | **23** |
| Buxbaum's sedge *(Carex buxbaumii)* | 4 | **46** |
| Sartwell's sedge *(Carex sartwellii)* | 4 | **31** |
| Eastern panicled aster *(Aster lanceolatus)* | 7 | **51** |
| Spotted water hemlock *(Cicuta maculata)* | 7 | **49** |
| Seaside arrowgrass *(Triglochin maritima)* | 4 | **25** |
| Flattened spikerush *(Eleocharis compressa)* | 5 | **32** |
| Swamp lousewort *(Pedicularis lanceolata)* | 8 | **31** |

## Native Plant Community Types in Class

- **UPn23a Mesic Brush-Prairie (Northern)**

Mixed herb-shrub communities on medium-fine to medium-textured loamy soils. Soils have well-developed mollic epipedons. UPn23a occurs on nearly level to gently sloping sites. The herbaceous component is similar to that of UPn23b, but shrub cover is commonly 25-50% and sometimes as great as 75%. Bebb's willow, pussy willow *(Salix discolor)*, bog birch, and shrubby cinquefoil are the principal shrubs in wet-mesic examples, while in drier ones Bebb's willow, prairie willow, Saskatoon juneberry, and American hazelnut may be common, as well as the low shrubs leadplant and prairie rose. Small bur oak grubs or saplings are also frequently present in drier examples, and aspen suckers are frequent in all variants. UPn23a has been documented at many locations in the western part of the LAP and in a few locations in the eastern part of the RRV, just south of the LAP. Description is based on summary of vegetation data from 22 plots.

- **UPn23b Mesic Prairie (Northern)**

Graminoid-dominated herbaceous communities on medium-fine to medium-textured loamy soils. Soils have well-developed mollic epipedons. UPn23b typically occurs on nearly level to gently sloping sites, though it may occupy moderate slopes on finer-textured soils. Tall grasses are dominant, most typically big bluestem, Indian grass, and prairie dropseed. Little bluestem and porcupine grass are common in dry-mesic variants, while prairie cordgrass and mat muhly grass are common in wet-mesic ones. UPn23b is rich in forb species, which collectively may be codominant with grasses. Leadplant and prairie rose are common low shrubs, but taller shrubs are typically sparse or absent (with < 25% cover). UPn23b has been documented at many locations on the eastern side of the RRV south of the LAP, and in the western part of the LAP. There is one occurrence in the northern end of the MIM very close to the RRV. Description is based on summary of vegetation data from 88 plots.

photo by R. P. Dana, MN DNR

Kittson County, MN

## *UPn23 Northern Mesic Prairie* — Species Frequency & Cover

| | freq% | cover |
|---|---|---|
| ***Forbs, Ferns & Fern Allies*** | | |
| Northern bedstraw *(Galium boreale)* | 88 | ●● |
| Purple prairie clover *(Dalea purpurea)* | 88 | ● |
| Canada goldenrod *(Solidago canadensis)* | 85 | ●● |
| Heath aster *(Aster ericoides)* | 84 | ●● |
| Stiff goldenrod *(Solidago rigida)* | 82 | ● |
| Maximilian's sunflower *(Helianthus maximiliani)* | 75 | ● |
| Heart-leaved alexanders *(Zizia aptera)* | 75 | ● |
| Black-eyed Susan *(Rudbeckia hirta)* | 74 | ● |
| Tall meadow-rue *(Thalictrum dasycarpum)* | 71 | ●● |
| Smooth blue aster *(Aster laevis)* | 62 | ● |
| Common strawberry *(Fragaria virginiana)* | 57 | ● |
| White camas *(Zigadenus elegans)* | 56 | ● |
| Virginia mountain mint *(Pycnanthemum virginianum)* | 55 | ● |
| Gray goldenrod *(Solidago nemoralis)* | 51 | ● |
| Golden alexanders *(Zizia aurea)* | 51 | ● |
| Harebell *(Campanula rotundifolia)* | 48 | ● |
| Bastard toadflax *(Comandra umbellata)* | 47 | ● |
| Wild bergamot *(Monarda fistulosa)* | 44 | ● |
| Flodman's thistle *(Cirsium flodmanii)* | 43 | ● |
| Hoary puccoon *(Lithospermum canescens)* | 41 | ● |
| White aster-like goldenrod *(Solidago ptarmicoides)* | 40 | ● |
| Stiff sunflower *(Helianthus pauciflorus)* | 35 | ● |
| Northern plains blazing star *(Liatris ligulistylis)* | 35 | ● |
| Rough blazing star *(Liatris aspera)* | 34 | ● |
| Clasping dogbane *(Apocynum sibiricum)* | 34 | ● |
| Giant or Sawtooth sunflower* | 33 | ●● |
| Pale-spiked lobelia *(Lobelia spicata)* | 32 | ● |
| Glaucous false dandelion *(Agoseris glauca)* | 32 | ● |
| Wood lily *(Lilium philadelphicum)* | 32 | ● |
| Prairie loosestrife *(Lysimachia quadriflora)* | 31 | ● |
| Yarrow *(Achillea millefolium)* | 31 | ● |
| Prairie wild onion *(Allium stellatum)* | 31 | ● |
| Wild licorice *(Glycyrrhiza lepidota)* | 30 | ●● |
| Golden or false golden ragwort *(Senecio aureus* or *S. pseudaureus)* | 29 | ● |
| Silverleaf scurfpea *(Pediomelum argophyllum)* | 29 | ● |
| Smooth rattlesnakeroot *(Prenanthes racemosa)* | 29 | ● |
| Long-headed thimbleweed *(Anemone cylindrica)* | 28 | ● |
| Grass-leaved goldenrod *(Euthamia graminifolia)* | 26 | ● |
| Wood betony *(Pedicularis canadensis)* | 25 | ● |
| Indian paintbrush *(Castilleja coccinea)* | 25 | ● |
| Prairie phlox *(Phlox pilosa)* | 24 | ● |
| White prairie clover *(Dalea candida)* | 22 | ● |
| Marsh vetchling *(Lathyrus palustris)* | 22 | ● |
| White sage *(Artemisia ludoviciana)* | 20 | ● |
| Great blazing star *(Liatris pycnostachya)* | 20 | ●● |
| ***Grasses & Sedges*** | | |
| Big bluestem *(Andropogon gerardii)* | 97 | ●●●● |
| Prairie dropseed *(Sporobolus heterolepis)* | 69 | ●●● |
| Indian grass *(Sorghastrum nutans)* | 64 | ●●● |
| Little bluestem *(Schizachyrium scoparium)* | 62 | ●●● |
| Prairie cordgrass *(Spartina pectinata)* | 54 | ●● |
| Slender wheatgrass *(Elymus trachycaulus)* | 53 | ● |
| Mat muhly grass *(Muhlenbergia richardsonis)* | 52 | ●●● |
| Junegrass *(Koeleria pyramidata)* | 51 | ● |
| Kalm's brome *(Bromus kalmii)* | 41 | ● |
| Switchgrass *(Panicum virgatum)* | 36 | ●● |
| Clustered muhly grass *(Muhlenbergia glomerata)* | 36 | ● |
| Porcupine grass *(Stipa spartea)* | 35 | ●● |
| Rigid sedge *(Carex tetanica)* | 34 | ● |
| Tufted hair grass *(Deschampsia cespitosa)* | 29 | ●● |
| Narrow reed grass *(Calamagrostis stricta)* | 25 | ●● |
| Leiberg's panic grass *(Panicum leibergii)* | 24 | ●● |
| ***Semi-Shrubs*** | | |
| Prairie rose *(Rosa arkansana)* | 48 | ● |
| Fragrant false indigo *(Amorpha nana)* | 26 | ● |
| Leadplant *(Amorpha canescens)* | 23 | ●● |
| ***Shrubs*** | | |
| Bebb's willow *(Salix bebbiana)* | 26 | ●● |
| Shrubby cinquefoil *(Potentilla fruticosa)* | 21 | ●● |
| ***Tree Seedlings or Saplings (<6ft)*** | | |
| Quaking aspen | 17 | ●●● |

*Giant or Sawtooth sunflower *(Helianthus giganteus* or *H. grosseserratus)*