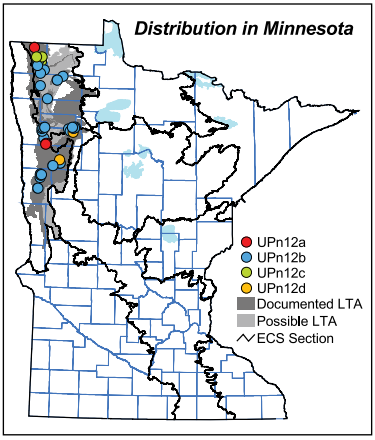
Northern Dry Prairie

Grass-dominated herbaceous communities on nearly level to steeply sloping sites with droughty soils. Moderate growing-season moisture deficits occur during most years, and severe moisture deficits are frequent, especially during periodic regional droughts. Historically, fire probably occurred every few years.

Vegetation Structure & Composition

Description is based on summary of vegetation data from 58 plots (relevés).



- **Graminoid** cover is patchy to continuous (50–100%). Midheight and short grasses are prominent, although tall grasses are typically important as well. Species composition varies considerably, reflecting variation in soils and topography; several species in the community are restricted to sites on deep sands. The midheight grasses little bluestem *(Schizachyrium scoparium)* and porcupine grass *(Stipa spartea)* are generally the most important graminoids, along with the tall grass big bluestem *(Andropogon gerardii)*; other major graminoids are prairie dropseed *(Sporobolus heterolepis)* and plains muhly *(Muhlenbergia cuspidata)*, and the short grass blue grama *(Bouteloua gracilis)*. Junegrass *(Koeleria pyramidata)* is common, although minor in terms of cover. Of the other tall grasses present in the community, Indian grass *(Sorghastrum nutans)* is associated with more mesic sites, and sand reed grass *(Calamovilfa longifolia)* is common only in very sandy soils.
- **Forb** cover is sparse to patchy (5–50%). Species composition is more variable than that of graminoids. Common forb species include purple prairie clover *(Dalea purpurea)*, northern bedstraw *(Galium boreale)*, heath aster *(Aster ericoides)*, silky aster *(Aster sericeus)*, stiff sunflower *(Helianthus pauciflorus)*, dotted blazing star *(Liatris punctata)*, stiff goldenrod *(Solidago rigida)*, gray goldenrod *(S. nemoralis)*, Missouri goldenrod *(S. missouriensis)*, hairy golden aster *(Chrysopsis villosa)*, pasqueflower *(Anemone patens)*, and hoary puccoon *(Lithospermum canescens)*. Distinctive minor species include blanketflower *(Gaillardia aristata)*, narrow-leaved puccoon *(Lithospermum incisum)*, silky prairie clover *(Dalea villosa)*, and plantain-leaved pussytoes *(Antennaria plantaginifolia)*. The low, mat-forming fern ally rock spikemoss *(Selaginella rupestris)* is typically common on sands.
- **Shrub layer** is sparse to patchy (up to 50% cover) and typically composed of low (< 20in [50cm]) semi-shrubs, most commonly leadplant *(Amorpha canescens)*. Sage wormwood *(Artemisia frigida)*, a dry-prairie specialist, is frequently present, and prairie rose *(Rosa arkansana)* is often present. The taller shrub sand cherry *(Prunus pumila)* is also fairly frequent, and prairie willow *(Salix humilis)* is occasionally common on sandy sites.
- **Trees** are absent or consist of occasional small bur oak trees; shrublike grubs of bur oak are often present in shrubby variants of UPn12 in the LAP, along with occasional root suckers of trembling aspen. Other tree species may sometimes be present, having invaded as a result of fire suppression.

Landscape Setting & Soils

UPn12 historically occurred as patches of variable size and shape within larger mesic prairie or parkland landscapes where local topography or substrate favored frequent, often severe growing-season moisture deficits. Typical sites that support UPn12 include

Glacial Lake Agassiz beach ridges and shoreline scarps, ice-contact features (kames, eskers, and collapsed outwash), steep slopes along glacial meltwater drainageways, and windblown sand deposits (dunes). Soils are highly permeable sands or loamy sands, the latter often having a substantial gravel fraction. UPn12 also can occur on loam soils formed in unsorted till on steep slopes. The soil moisture regime is somewhat excessively drained or excessively drained. With the exception of the dune sands, soils are mollisols, with a dark, humus-rich surface horizon, although this is usually thinner and has lower humus content than in soils of mesic prairies. In dune sands there is little or no soil development, but some staining and organic debris usually are present in the upper few inches on sites where the sand surface has been stable for an extended time.

Natural History

The xeric conditions and lower soil fertility of UPn12 strongly favor species having physiological and morphological adaptations to cope with these stresses. Reduced aboveground biomass, narrow, small, or deeply dissected leaves, and dense hairy vestiture are examples of such adaptations. On dune sands, blowout formation and migration produce dramatic local variation in species composition, from sparse stands of pioneer species in bare, sterile sand to relatively dense sods of grasses and forbs on long-stabilized, organically enriched sand. Several rare plant species in Minnesota occur only in these bare-sand habitats. As for all prairie classes in Minnesota, recurrent fire is necessary to prevent succession of UPn12 to woodland or forest, although the fire frequency required to maintain dry prairies is lower than for mesic prairies because the xeric conditions and lower fertility of the sites somewhat inhibit tree and shrub invasion. Before Euro-American settlement, grazing and trampling by large ungulates were regular occurrences in dry prairies. The contribution of these disturbances to the composition and structure of the vegetation is not well understood. It is fairly well documented that mid-height and short graminoid species increase relative to tall species in dry prairies subjected to moderately heavy grazing. Sites that support UPn12 are attractive as sources of sand and gravel, and much of the original area where UPn12 occurred has been destroyed to obtain these aggregate materials. Aggregate mining is a serious threat to unprotected remnants.

Similar Native Plant Community Classes

- **UPs13 Southern Dry Prairie**

UPs13 is very similar in species composition to UPn12. Almost all of the common species of one class are also common in the other. The species that do occur primarily or exclusively in one of the two classes are frequent in only some of the types in that class, or their range limits confine them to only part of the range of the class, or they are simply not very common. The boundary between UPs13 and UPn12 is set more or less by convention; further study may determine that it should be repositioned or abandoned. Because of differences between the glacial landforms in the ranges of the two classes, dry prairies on finer-textured soils are much more common in the range of UPs13 than in that of UPn12. This imbalance appears to account for much of the species frequency differences between the two classes.

UPn12 Indicator Species	(freq%) ***UPn12***	UPs13
Spike oat *(Helictotrichon hookeri)*	**21**	-
Blunt sedge *(Carex obtusata)*	**17**	-
Blanketflower *(Gaillardia aristata)*	**24**	1
Saskatoon juneberry *(Amelanchier alnifolia)*	**16**	1
Field chickweed *(Cerastium arvense)*	**36**	7
Sand cherry *(Prunus pumila)*	**38**	8
Slender beard tongue *(Penstemon gracilis)*	**24**	5
-	**-**	-

UPs13 Indicator Species	(freq%) UPn12	***UPs13***
Aromatic aster *(Aster oblongifolius)*	-	**30**
Bird's foot coreopsis *(Coreopsis palmata)*	-	**28**
Skyblue aster *(Aster oolentangiensis)*	-	**24**
Hoary vervain *(Verbena stricta)*	-	**23**
Flowering spurge *(Euphorbia corollata)*	-	**22**
Gray-headed coneflower *(Ratibida pinnata)*	-	**22**
False boneset *(Kuhnia eupatorioides)*	-	**19**
Scribner's panic grass *(Panicum oligosanthes)*	2	**26**

- **UPn13 Northern Dry Savanna**

UPn13 is quite similar to UPn12 in herbaceous species composition but differs structurally, having scattered, often stunted bur oak trees and a more prominent

shrub layer. By convention, total tree cover must exceed 10% for the community to be classified as UPn13. Several species typically present in woodlands but not prairies occur frequently in UPn13, and several species that are moderately common in UPn12 are absent from UPn13. However, the latter differences may reflect mainly a difference in the soils represented in the vegetation plot samples available for the two classes: most of the samples of UPn13 are on wind-modified sand deposits, and most of the samples of UPn12 are on loamier beach ridges.

UPn12 Indicator Species	(freq%) ***UPn12***	UPn13
Prairie turnip *(Pediomelum esculentum)*	**41**	-
Flodman's thistle *(Cirsium flodmanii)*	**38**	-
Grooved yellow flax *(Linum sulcatum)*	**36**	-
Toothed evening primrose *(Calylophus serrulatus)*	**33**	-
Narrow-leaved purple coneflower*	**24**	-
Blanketflower *(Gaillardia aristata)*	**24**	-
Ground plum *(Astragalus crassicarpus)*	**21**	-
Pasqueflower *(Anemone patens)*	**52**	7

UPn13 Indicator Species	(freq%) UPn12	***UPn13***
Starry false Solomon's seal *(Smilacina stellata)*	-	**64**
Erect or Smooth carrion-flower**	-	**29**
Pennsylvania sedge***	-	**21**
Spreading dogbane****	2	**50**
Pale vetchling *(Lathyrus ochroleucus)*	2	**36**
Bur oak (C)	7	**86**
American hazelnut *(Corylus americana)*	7	**57**
Poison ivy *(Toxicodendron rydbergii)*	9	**64**

*Narrow-leaved purple coneflower *(Echinacea pallida)* **Erect or Smooth carrion-flower *(Smilex ecirrata* or *S. herbacea)*
***Pennsylvania sedge *(Carex pensylvanica* var. *pensylvanica)* ****Spreading dogbane *(Apocynum androsaemifolium)*

- **UPn23 Northern Mesic Prairie**

UPn23 is similar to UPn12 in structure but differs somewhat in herbaceous species composition. Although the two classes are similar in general appearance, tall grass species are dominant in UPn23, whereas midheight grass species are generally dominant in UPn12. The boundary between UPn23 and UPn12 is not distinct, however, and dry-mesic examples of UPn23 are generally similar to UPn12.

UPn12 Indicator Species	(freq%) ***UPn12***	UPn23
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)*	**50**	1
Wilcox's panic grass *(Panicum wilcoxianum)*	**36**	1
Pasqueflower *(Anemone patens)*	**52**	3

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

*Virginia mountain mint *(Pycnanthemum virginianum)*

Native Plant Community Types in Class

- **UPn12a Dry Barrens Prairie (Northern)**

Graminoid-dominated herbaceous communities on wind-reworked, medium sands. Plant cover is usually less than 100%, with bare sand exposed among plants. Dune forms are typically evident, and active blowouts are sometimes present. There is little or no soil profile development. Within UPn12, several species are restricted to UPn12a, for example, sand dropseed *(Sporobolus cryptandrus)*, Schweinitz's nut sedge *(Cyperus schweinitzii)*, western spiderwort *(Tradescantia occidentalis)*, and silky prairie clover. Several species more common in UPn12a than in the other community types in UPn12 are purple lovegrass *(Eragrostis spectabilis)*, nodding wild rye *(Elymus canadensis)*, western ragweed *(Ambrosia psilostachya)*, and rock spikemoss. UPn12a usually occurs in association with sparsely treed areas on dune sands that are classified as Dry Barrens Oak Savanna (Northern) (UPn13b). UPn12a has been documented at two locations: a sizeable area of wind-reworked sand in the interbeach zone in the RRV, and another large area of dune sand in the western part of the LAP. Description is based on summary of vegetation data from 4 plots.

- **UPn12b Dry Sand - Gravel Prairie (Northern)**

Graminoid-dominated, forb-rich herbaceous communities on coarse-textured, usually gravelly soils on gentle slopes on wave-reworked Glacial Lake Agassiz shoreline deposits and rarely on moderate slopes on outwash and ice-contact deposits. Plant cover is often less than 100%, and lichens may encrust the bare areas among the plants. Few species appear to distinguish UPn12b from other types in UPn12, and these, such as blanketflower and Nuttall's groundrose *(Chamaerhodos erecta)*, are uncommon. Many of the common species of UPn12b do not occur in UPn12a but do occur in the

other community types in UPn12. These include plains muhly, prairie dropseed, silky aster, and Flodman's thistle *(Cirsium flodmanii)*. UPn12b lacks significant cover of the taller shrubs important in UPn12c; leadplant and prairie rose, both low semi-shrubs, are the primary woody species in UPn12b. Terricolous lichens are sometimes common and may be distinctive of UPn12b. UPn12b has been documented in the eastern part of the RRV, in the LAP (predominantly the western part), and in the northern tip of the MIM in the Eastern Broadleaf Forest (EBF) Province. Description is based on summary of vegetation data from 48 plots.

- **UPn12c Dry Sand - Gravel Brush-Prairie (Northern)**

Graminoid-dominated, forb-rich, shrubby herbaceous communities on coarse-textured, usually gravelly soils on gentle slopes on wave-reworked Glacial Lake Agassiz shoreline deposits. Soils are characterized by mollic epipedons. Herbaceous species composition is similar to that of UPn12b, but taller shrubs are much more important, forming patchy (25–50%) cover. Prairie willow is common, American hazelnut *(Corylus americana)* is frequent, and shrubby bur oak grubs are typically present. Presumably, occurrences of UPn12c reflect some amelioration of the fire regime relative to that of occurrences of UPn12b. UPn12c has been documented at a few locations in the LAP. Description is based on summary of vegetation data from 4 plots.

- **UPn12d Dry Hill Prairie (Northern)**

Graminoid-dominated, forb-rich herbaceous communities on medium- to fine-textured soils on steep slopes in glacial till. UPn12d occurs on erosion-carved slopes and on steeply rolling ice-disintegration moraines. Soils are characterized by well-developed mollic epipedons. Composition of major graminoids is similar to that of UPn12b, but side-oats grama *(Bouteloua curtipendula)* and Indian grass are usually more important in UPn12d, and needle-and-thread grass *(Stipa comata)* and plains muhly are less important. The loam soils of UPn12d have greater moisture-retaining capacity than soils of other community types in UPn12, and therefore UPn12d has the most overlap in species composition with Northern Mesic Prairie (UPn23). The characteristically mesic species silverleaf scurfpea *(Pediomelum argophyllum)*, wood lily *(Lilium philadelphicum)*, and white aster-like goldenrod *(Solidago ptarmicoides)* are all more common in UPn12d than in the other types in UPn12. The geomorphic settings in which UPn12d occurs are uncommon in the RRV and absent from the LAP. UPn12d has been documented in the eastern side of the RRV and in the northern tip of the MIM in the EBF Province. Description is based on summary of vegetation data from 2 plots, supplemented by inference from differences between UPs13d and UPs13b.

photo by E. R. Rowe, MN DNR

Becker County, MN

UPn12 Northern Dry Prairie — Species Frequency & Cover

	freq%	cover
Forbs, Ferns & Fern Allies		
Purple prairie clover *(Dalea purpurea)*	78	●
Heath aster *(Aster ericoides)*	76	●
Harebell *(Campanula rotundifolia)*	74	●
Stiff sunflower *(Helianthus pauciflorus)*	69	●●
Dotted blazing star *(Liatris punctata)*	69	●
Gray goldenrod *(Solidago nemoralis)*	67	●
Hoary puccoon *(Lithospermum canescens)*	67	●
Prairie wild onion *(Allium stellatum)*	66	●
Northern bedstraw *(Galium boreale)*	59	●●
Hairy golden aster *(Chrysopsis villosa)*	57	●
Stiff goldenrod *(Solidago rigida)*	55	●●
Long-headed thimbleweed *(Anemone cylindrica)*	55	●
Bastard toad-flax *(Comandra umbellata)*	55	●
Missouri goldenrod *(Solidago missouriensis)*	53	●●
Alumroot *(Heuchera richardsonii)*	53	●
Pasque-flower *(Anemone patens)*	52	●
Daisy fleabane *(Erigeron strigosus)*	50	●
Tall cinquefoil *(Potentilla arguta)*	50	●
White sage *(Artemisia ludoviciana)*	50	●
Prairie smoke *(Geum triflorum)*	50	●
Yarrow *(Achillea millefolium)*	48	●
Silky aster *(Aster sericeus)*	47	●●
Rough blazing star *(Liatris aspera)*	43	●
Prairie turnip *(Pediomelum esculentum)*	41	●
White prairie clover *(Dalea candida)*	41	●
Field pussytoes *(Antennaria neglecta* or *A. neodioica)*	41	●
Smooth blue aster *(Aster laevis)*	40	●
Flodman's thistle *(Cirsium flodmanii)*	38	●
Grooved yellow flax *(Linum sulcatum)*	36	●
Tall wormwood or Tarragon *(Artemisia campestris* or *A. dracunculus)*	36	●
Field chickweed *(Cerastium arvense)*	36	●
Bearded birdfoot violet *(Viola pedatifida)*	34	●
Virginia ground cherry *(Physalis virginiana)*	33	●
Toothed evening primrose *(Calylophus serrulatus)*	33	●
Narrow-leaved purple coneflower *(Echinacea pallida)*	24	●
Wild bergamot *(Monarda fistulosa)*	24	●
Blanketflower *(Gaillardia aristata)*	24	●
Slender beard tongue *(Penstemon gracilis)*	24	●
Plantain-leaved pussytoes *(Antennaria plantaginifolia)*	22	●
Whorled milkwort *(Polygala verticillata)*	22	●
Prairie ragwort or Balsam ragwort*	21	●
White aster-like goldenrod *(Solidago ptarmicoides)*	21	●
Ground plum *(Astragalus crassicarpus)*	21	●
Pale-spiked lobelia *(Lobelia spicata)*	21	●
Prairie milk vetch *(Astragalus adsurgens)*	17	●
Downy paintbrush *(Castilleja sessiliflora)*	17	●
Western ragweed *(Ambrosia psilostachya)*	14	●●
Grasses & Sedges		
Little bluestem *(Schizachyrium scoparium)*	84	●●●
Junegrass *(Koeleria pyramidata)*	81	●
Porcupine grass *(Stipa spartea)*	79	●●●
Big bluestem *(Andropogon gerardii)*	76	●●●
Blue grama *(Bouteloua gracilis)*	59	●●●
Prairie dropseed *(Sporobolus heterolepis)*	57	●●●
Plains muhly *(Muhlenbergia cuspidata)*	50	●●
Slender wheatgrass *(Elymus trachycaulus)*	45	●
Wilcox's panic grass *(Panicum wilcoxianum)*	36	●
Sand reed-grass *(Calamovilfa longifolia)*	29	●●
Needle-and-thread grass *(Stipa comata)*	28	●●●
Indian grass *(Sorghastrum nutans)*	26	●●
Side-oats grama *(Bouteloua curtipendula)*	21	●●
Blunt sedge *(Carex obtusata)*	17	●●
Semi-Shrubs		
Leadplant *(Amorpha canescens)*	88	●●
Sage wormwood *(Artemisia frigida)*	60	●●
Prairie rose *(Rosa arkansana)*	40	●●
Shrubs		
Sand cherry *(Prunus pumila)*	38	●
Snowberry or Wolfberry *(Symphoricarpos occidentalis* or *S. albus)*	29	●

*Prairie ragwort or Balsam ragwort *(Senecio plattensis* or *S. pauperculus)*