



Southern Dry Prairie

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

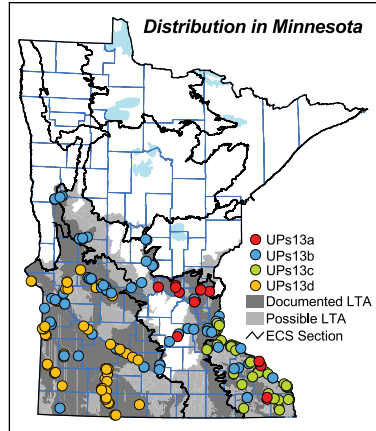
Vegetation Structure & Composition

Description is based on summary of vegetation data from 219 plots (relevés).

- Graminoid** cover is patchy to continuous (50–100%). Midheight and shortgrass species are prominent, although tallgrass species are typically important as well. Overall species composition varies considerably, reflecting variation in soils and topography; several species in the community are restricted to sites on deep sands. Little bluestem (*Schizachyrium scoparium*) is generally the dominant grass; other major midheight grasses are side-oats grama (*Bouteloua curtipendula*), prairie dropseed (*Sporobolus heterolepis*), porcupine grass (*Stipa spartea*), and plains muhly (*Muhlenbergia cuspidata*). Junegrass (*Koeleria pyramidata*) and hairy grama (*Bouteloua hirsuta*) are common minor grasses. Of the tallgrasses, big bluestem (*Andropogon gerardii*) is usually important, while Indian grass (*Sorghastrum nutans*) is less frequent, being more strongly associated with more mesic sites within the community.
- Forb** cover is sparse to patchy (5–50%). Species composition is more variable than that of graminoids. Common species that are more abundant in UPs13 than in other UP classes include gray goldenrod (*Solidago nemoralis*), silky aster (*Aster sericeus*), aromatic aster (*A. oblongifolius*), dotted blazing star (*Liatris punctata*), hairy golden aster (*Chrysopsis villosa*), pasqueflower (*Anemone patens*), harebell (*Campanula rotundifolia*), western ragweed (*Ambrosia psilostachya*), false bonset (*Kuhnia eupatorioides*), and flowering spurge (*Euphorbia corollata*) in the southern part of the EBF Province, and narrow-leaved purple coneflower (*Echinacea angustifolia*) in the CGP. Also common but less distinctive of UPs13 are purple prairie clover (*Dalea purpurea*), heath aster (*Aster ericoides*), stiff goldenrod (*Solidago rigida*), rough blazing star (*Liatris aspera*), stiff sunflower (*Helianthus pauciflorus*), hoary puccoon (*Lithospermum canescens*), bird's foot coreopsis (*Coreopsis palmata*), and bearded birdfoot violet (*Viola palmata* var. *pedatifida*). Distinctive minor species include green milkweed (*Asclepias viridiflora*), narrow-leaved puccoon (*Lithospermum incisum*), silky prairie clover (*Dalea villosa*), and plantain-leaved pussytoes (*Antennaria plantaginifolia*).
- Shrub layer** is sparse (< 5% cover) and composed mostly of low (< 20in [50cm]) semi-shrubs, primarily leadplant (*Amorpha canescens*), with prairie rose (*Rosa arkansana*) and sage wormwood (*Artemisia frigida*) often present. The taller shrub smooth sumac (*Rhus glabra*) is also often present.
- Trees** are absent or consist of occasional bur oak or black oak; other species may sometimes be present, having invaded as a result of fire suppression.

Landscape Setting & Soils

UPs13 historically occurred as patches of variable size and shape within larger mesic prairie or brushland landscapes where local topography or substrate favored frequent, often severe growing-season moisture deficits. Typical sites that supported dry prairie include steep, bedrock-cored bluffs in the PPL and steep erosional slopes on glacial till along larger river valleys and meltwater drains elsewhere. Slopes on ice-contact features (kames, eskers, collapsed outwash) and dunes formed in outwash sands are





also typical sites for UPs13, as are more level terraces in coarse outwash in river valleys. Soils are somewhat excessively to excessively drained, usually highly permeable, coarse-textured sandy loams or loamy sands, often with a substantial gravel fraction, but they may be finer textured on steep slopes, formed in either glacial till or in loess and residuum. Except on dune sands, soils are mollisols, with dark, organic-enriched upper horizons, although these horizons are usually thinner and have lower organic content than soils of mesic prairies. On dune sands, there is little or no soil formation, 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 UPs13 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 produces dramatic local variation in species composition, from sparse stands of pioneer species in bare, sterile sand to a relatively dense sod of grasses and forbs on long-stabilized, organically enriched sand. Several plant species characteristic on bare sands are rare in Minnesota, occurring only in these habitats; a few, such as seaside three-awn (*Aristida tuberculosa*), are midwestern outliers of Atlantic Coastal Plain plants. As for all prairie classes in Minnesota, recurrent fire is necessary to prevent succession of UPs13 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. Smooth sumac and eastern red cedar (*Juniperus virginiana*) are two of the most aggressive prairie invaders in the absence of fire. The first spreads clonally into prairies from woodland edges, while the second invades from seed dropped by birds. Once these woody species establish dense stands, it is difficult for fire to remove them. Other trees present in nearby woods and forests also can become established in dry prairies unless eliminated by fire. Before Euro-American settlement, grazing and trampling by large ungulates were regular occurrences in dry prairies except probably on steep slopes. 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.

Similar Native Plant Community Classes

• UPn12 Northern Dry Prairie

UPn12 differs from UPs13 mainly in the rarity of several species typically present in UPs13, although most of these are not present throughout the range of UPs13. There are a few species restricted to UPn12 relative to UPs13, but none is common. The boundary between UPn12 and UPs13 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 less common in UPn12 than in UPs13. This imbalance may account for most of the differences in species frequency between the two classes.

UPs13 Indicator Species	(freq%)		UPn12 Indicator Species	(freq%)	
	UPs13	UPn12		UPs13	UPn12
Aromatic aster (<i>Aster oblongifolius</i>)	30	-	Nuttall's groundrose (<i>Chamaerhodos erecta</i>)	-	14
Bird's foot coreopsis (<i>Coreopsis palmata</i>)	28	-	Spike oat (<i>Helictotrichon hookeri</i>)	-	14
Skyblue aster (<i>Aster oolentangiensis</i>)	24	-	Nuttall's evening primrose (<i>Oenothera nuttallii</i>)	-	7
Hoary vervain (<i>Verbena stricta</i>)	23	-	Blanketflower (<i>Gaillardia aristata</i>)	1	28
Flowering spurge (<i>Euphorbia corollata</i>)	22	-	Glaucous false dandelion (<i>Agoseris glauca</i>)	1	16
Gray-headed coneflower (<i>Ratibida pinnata</i>)	22	-	Field chickweed (<i>Cerastium arvense</i>)	7	35
False boneset (<i>Kuhnia eupatorioides</i>)	19	-	Slender beard tongue (<i>Penstemon gracilis</i>)	5	21
Scribner's panic grass (<i>Panicum oligosanthes</i>)	26	2	-	-	-

• UPs14 Southern Dry Savanna

UPs14 is quite similar to UPs13 in herbaceous species composition but differs structurally, having scattered, often stunted trees (typically bur, black, and northern pin oaks, with jack pine in a few instances) and a more prominent shrub layer. By convention, total tree cover must exceed 10% for the community to be classified as UPs14.



UPs13 Indicator Species	(freq%)	
	UPs13	UPs14
Prairie turnip (<i>Pediomelum esculentum</i>)	37	-
Aromatic aster (<i>Aster oblongifolius</i>)	30	-
Sage wormwood (<i>Artemisia frigida</i>)	23	1
Flowering spurge (<i>Euphorbia corollata</i>)	22	1
Prairie wild onion (<i>Allium stellatum</i>)	36	3
Heart-leaved alexanders (<i>Zizia aptera</i>)	25	3
Silky aster (<i>Aster sericeus</i>)	61	10
Pasqueflower (<i>Anemone patens</i>)	42	7

UPs14 Indicator Species	(freq%)	
	UPs13	UPs14
Erect, Smooth, or Illinois carrion-flower*	-	23
Black oak (C)	-	23
Virginia creeper (<i>Parthenocissus</i> spp.)	3	47
Bur oak (C)	3	43
American hazelnut (<i>Corylus americana</i>)	3	43
Starry false Solomon's seal (<i>Smilacina stellata</i>)	4	47
Chokecherry (<i>Prunus virginiana</i>)	5	50
Pennsylvania sedge**	4	37

*Erect, Smooth, or Illinois carrion-flower (*Smilax ecirrata*, *S. herbacea*, or *S. illinoensis*) **Pennsylvania sedge (*Carex pennsylvanica* var. *pennsylvanica*)

• UPs23 Southern Mesic Prairie

UPs23 is similar to UPs13 in structure but differs somewhat in herbaceous species composition. Although the two classes are similar in general appearance, tallgrass species are dominant in UPs23 whereas midheight grass species are generally dominant in UPs13.

UPs13 Indicator Species	(freq%)	
	UPs13	UPs23
Hairy grama (<i>Bouteloua hirsuta</i>)	30	-
Dotted blazing star (<i>Liatris punctata</i>)	34	1
Sage wormwood (<i>Artemisia frigida</i>)	23	1
Flowering spurge (<i>Euphorbia corollata</i>)	22	1
Harebell (<i>Campanula rotundifolia</i>)	25	2
Western ragweed (<i>Ambrosia psilostachya</i>)	26	4
Plains muhly (<i>Muhlenbergia cuspidata</i>)	56	11
Hoary vervain (<i>Verbena stricta</i>)	23	5

UPs23 Indicator Species	(freq%)	
	UPs13	UPs23
Prairie cordgrass (<i>Spartina pectinata</i>)	-	30
American vetch (<i>Vicia americana</i>)	1	23
Ox-eye (<i>Helioopsis helianthoides</i>)	2	31
Tall meadow-rue (<i>Thalictrum dasycarpum</i>)	5	44
Maximilian's sunflower (<i>Helianthus maximiliani</i>)	4	31
Switchgrass (<i>Panicum virgatum</i>)	8	44
Silverleaf scurphea (<i>Pediomelum argophyllum</i>)	12	43
Leiberg's panic grass (<i>Panicum leibergii</i>)	16	43

Native Plant Community Types in Class

• UPs13a Dry Barrens Prairie (Southern)

Graminoid-dominated herbaceous communities on wind-reworked sands. Vegetative cover is usually less than 100%, with bare sand exposed among plants. Dune forms are typically evident, with small local blowouts present. There is little or no soil formation. Several species typical in UPs13a and rarely present in the other community types in this class are silky prairie clover (*Dalea villosa*), Muhlenberg's sedge (*Carex muhlenbergii*), white-haired panic grass (*Panicum commonsianum*), long-leaved panic grass (*P. perlongum*), seaside three-awn (*Aristida tuberculosa*), and rock spikemoss (*Selaginella rupestris*). Sand reedgrass (*Calamovilfa longifolia*), sand dropseed (*Sporobolus cryptandrus*), hairy puccoon (*Lithospermum carolinense*), and western spiderwort (*Tradescantia occidentalis*), although present to some extent in UPs13b, are much more common in UPs13a. UPs13a usually occurs in association with sparsely treed areas on aeolian sand deposits, which are classified as Dry Barrens Oak Savanna (Southern) (UPs14a). UPs13a has been documented at scattered locations in river valleys in the PPL, and in the central part of the MIM. Description is based on summary of vegetation data from 19 plots.

• UPs13b Dry Sand - Gravel Prairie (Southern)

Graminoid-dominated, forb-rich herbaceous communities on coarse-textured, usually gravelly soils on gentle or occasionally steep slopes on outwash and ice-contact deposits. Soils are characterized by mollic epipedons. UPs13b shares many species with UPs13c and 13d that are rare in UPs13a; species with this pattern that are most common in UPs13b are side-oats grama, plains muhly, and prairie dropseed. Less common species include needle-and-thread grass (*Stipa comata*), silky aster, bastard toadflax (*Comandra umbellata*), tall cinquefoil (*Potentilla arguta*), stiff goldenrod, and aromatic aster (*Aster oblongifolius*). Species shared with UPs13a but rare in UPs13c and UPs13d are sand reedgrass, sand dropseed, western ragwort, and large-flowered beard tongue (*Penstemon grandiflorus*). Sage wormwood is most common in UPs13b but is sometimes also present in UPs13a. Field chickweed (*Cerastium arvense*) and thread-leaved sedge (*Carex filifolia*) are occasionally present in UPs13b and rare in the other types in this class. Terricolous lichens are sometimes common and are distinctive of UPs13b. UPs13b has been documented at numerous locations in the PPL, MIM, and CGP and at two locations in the southern part of the RRV just outside of the MIM. Description is based on summary of vegetation data from 86 plots.



• **UPs13c Dry Bedrock Bluff Prairie (Southern)**

Graminoid-dominated, forb-rich herbaceous communities on thin soils over dolomite and sandstone bedrock on steep, usually south- or west-facing slopes. Soils are thin, formed in loess and residuum, with abundant rock fragments from the underlying bedrock. Bedrock outcrops are common. Soil texture varies with loess thickness and the nature of the underlying bedrock. Pure sand residuum accumulates below sandstone cliffs and outcrops. Soils are mostly dark but typically too thin for full profile development. The tallgrass species big bluestem and Indian grass are much more important in UPs13c than in UPs13a and 13b, and several midgrasses are also more common, including side-oats grama, plains muhly, and Kalm's brome (*Bromus kalmii*). A number of forbs exhibit this pattern, the most common being flowering spurge (*Euphorbia corollata*), skyblue aster (*Aster oolentangiensis*), bird's foot coreopsis (*Coreopsis palmata*), and bearded birdfoot violet (*Viola palmata* var. *pedatifida*). A few species frequent in UPs13c are uncommon to rare in UPs13a and 13b, including false boneset (*Kuhnia eupatorioides*), beardless birdfoot violet (*Viola pedata*), cylindric blazing star (*Liatris cylindracea*), gray-headed coneflower (*Ratibida pinnata*), and compass plant (*Silphium laciniatum*). The outcrop-associated shrub ninebark (*Physocarpus opulifolius*) is distinctive of UPs13c although uncommon. Local areas of intermittent and barely discernible groundwater seepage create anomalous habitat for wetland species such as edible valerian (*Valeriana edulis*). UPs13c occurs on bluffs along the Mississippi River and its tributaries in the PPL; it has been documented at many locations in the PPL and at a number in the MIM just outside the north end of the PPL. Description is based on summary of vegetation data from 53 plots.

• **UPs13d Dry Hill Prairie (Southern)**

Graminoid-dominated, forb-rich herbaceous communities on medium- to fine-textured soils on moderate to steep slopes in glacial till or loess-mantled till. UPs13d is most common on erosion-carved slopes in morainic deposits but also occurs on hill slopes in recessional moraines. Soils have a well-developed mollic epipedon. A few species more important in UPs13d than in others in this class include heart-leaved alexanders (*Zizia aptera*), alumroot (*Heuchera richardsonii*), northern bedstraw (*Galium boreale*), white aster-like goldenrod (*Solidago ptarmicoides*), prairie phlox (*Phlox pilosa*), and silverleaf scurfs (*Pediomelum argophyllum*). The low shrub wolfberry (*Symphoricarpos occidentalis*) is somewhat frequent in UPs13d and uncommon to rare in the other types. UPs13d has been documented at many locations in the CGP and at one location in the southern part of the RRV just outside the MIM; it has not been documented in the MIM or PPL. Description is based on summary of vegetation data from 61 plots.



photo by Steve Merchant, MN DNR



UPs13 Southern Dry Prairie – Species Frequency & Cover

	freq%	cover		freq%	cover
Forbs, Ferns & Fern Allies					
Purple prairie clover (<i>Dalea purpurea</i>)	72	•	Flowering spurge (<i>Euphorbia corollata</i>)	22	•
Gray goldenrod (<i>Solidago nemoralis</i>)	61	•	White sage (<i>Artemisia ludoviciana</i>)	22	•
Silky aster (<i>Aster sericeus</i>)	61	•	Whorled milkweed (<i>Asclepias verticillata</i>)	21	•
Heath aster (<i>Aster ericoides</i>)	60	••	Field blue-eyed grass (<i>Sisyrinchium campestre</i>)	21	•
Stiff goldenrod (<i>Solidago rigida</i>)	53	•	Tall wormwood or Tarragon*	20	•
Long-headed thimbleweed (<i>Anemone cylindrica</i>)	53	•	Hairy golden aster (<i>Chrysopsis villosa</i>)	20	•
Bearded birdfoot violet (<i>Viola pedatifida</i>)	47	•	Prairie or Balsam ragwort (<i>Senecio platensis</i> or <i>S. pauperculus</i>)	20	•
Rough blazing star (<i>Liatris aspera</i>)	45	•	False bonaset (<i>Kuhnia eupatorioides</i>)	19	•
Daisy fleabane (<i>Erigeron strigosus</i>)	43	•	False groomwell (<i>Oenothera mollis</i>)	19	•
Pasque-flower (<i>Anemone patens</i>)	42	•	Green milkweed (<i>Asclepias viridiflora</i>)	19	•
Stiff sunflower (<i>Helianthus pauciflorus</i>)	41	••	Narrow-leaved puccoon (<i>Lithospermum incisum</i>)	17	•
Narrow-leaved purple coneflower (<i>Echinacea angustifolia</i>)	40	•	Plantain-leaved pussytoes (<i>Antennaria plantaginifolia</i>)	16	•
Tall cinquefoil (<i>Potentilla arguta</i>)	40	•	Hairy puccoon (<i>Lithospermum carolinense</i>)	13	•
Bastard road-flax (<i>Conandra umbellata</i>)	37	•	Silky prairie clover (<i>Dalea villosa</i>)	6	••
Prairie turnip (<i>Pediemelum esculentum</i>)	37	•	Grasses & Sedges		
Dotted blazing star (<i>Liatris punctata</i>)	34	•	Little bluestem (<i>Schizachyrium scoparium</i>)	88	•••
Hoary puccoon (<i>Lithospermum canescens</i>)	32	•	Side-oats grama (<i>Bouteloua curtipendula</i>)	79	•••
Aromatic aster (<i>Aster oblongifolius</i>)	30	•	Big bluestem (<i>Andropogon gerardii</i>)	73	•••
Virginia ground cherry (<i>Physalis virginiana</i>)	30	•	Prairie dropseed (<i>Sporobolus heterolepis</i>)	58	•••
Flodman's thistle (<i>Cirsium flodmanii</i>)	29	•	Porcupine grass (<i>Stipa spartea</i>)	57	•••
Bird's foot coreopsis (<i>Coreopsis palmata</i>)	28	•	Plains mulhy (<i>Muhlenbergia cuspidata</i>)	56	•••
Grooved yellow flax (<i>Linum sulcatum</i>)	28	••	Indian grass (<i>Sorghastrum nutans</i>)	45	•••
Western ragweed (<i>Ambrosia psilostachya</i>)	26	••	Junegrass (<i>Koeleria pyramidata</i>)	43	•••
Canada goldenrod (<i>Solidago canadensis</i>)	25	•	Hairy grama (<i>Bouteloua hirsuta</i>)	30	••
Hearth-leaved alexanders (<i>Zizia aurea</i>)	25	•	Scribner's panic grass (<i>Panicum oligosanthos</i>)	26	•
Wild bergamot (<i>Monarda fistulosa</i>)	25	••	Wilcox's panic grass (<i>Panicum wilcoxianum</i>)	22	•
Harebell (<i>Campanula rotundifolia</i>)	25	••	Blue grama (<i>Bouteloua gracilis</i>)	16	•••
Toothed evening primrose (<i>Calyptophus serrulatus</i>)	25	••	Sand reed-grass (<i>Calamovilla longifolia</i>)	16	•••
Missouri goldenrod (<i>Solidago missouriensis</i>)	24	•	Needle-and-thread grass (<i>Stipa comata</i>)	13	•••
Sky-blue aster (<i>Aster coelestangensis</i>)	24	••	Semi-Shrubs		
Mock pennyroyal (<i>Hedeoma hispida</i>)	24	••	Leadplant (<i>Amorpha canescens</i>)	71	••
Prairie sagewort (<i>Artemisia frigida</i>)	23	••	Prairie rose (<i>Rosa arkansana</i>)	40	•
Hoary vervain (<i>Verbena stricta</i>)	23	••	Shrubs		
			Smooth sunac (<i>Rhus glabra</i>)	29	••
			Waltberry (<i>Symphoricarpos occidentalis</i>)	15	••

*Tall wormwood or Tarragon (*Artemisia dracunculoides* or *A. campestris*)