

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD CODE 643

**RESTORATION AND MANAGEMENT OF DECLINING
HABITATS SPECIFICATION**

(Acre)
Code 643

This specification has been developed to accompany the Iowa Restoration and Management of Declining Habitats, Practice Code 643 Standard. Within this document, criteria and considerations specific to habitat class are provided to supplement the general criteria and considerations provided in the 643 Standard. The habitat classifications contained within this specification were derived from a document titled, *Plant Communities of the Midwest*, published by NatureServe. The habitat classification sections may be used to help resource managers identify remnant habitats or to help guide the reconstruction or management of a particular habitat class.

Practice Code 643 applies to sites that previously or currently support a rare or declining habitat targeted for restoration or management. Iowa habitats deemed rare and in decline for the purposes of this practice include,

- Prairie
- Fen
- Forest/woodland
- Savanna
- Sedge and Wet Meadow

Within the 643 Standard and this specification, **reconstruction** refers to the *restoration* of native plant communities where such a community does not currently exist, or within areas that have been seeded to native vegetation, but need to be enhanced to reflect a natural community. A **remnant** is recognized as a *natural* habitat with presettlement components and diversity still intact.

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Prairie Habitat Criteria and Considerations

RECONSTRUCTION CRITERIA

- Applicable on sites where prairies are to be reconstructed.
- A suitable seedbed will be prepared as described in [Conservation Cover, Practice Code 327](#).
- A minimum of 40 seeds/ft² will be planted, with a minimum of 30 seeds/ft² graminoid on highly erosive sites and/or sites with > 5% slope. A minimum of 20 graminoid seeds/ft² may be seeded on sites that are not highly erosive and are <5% in slope.
- Graminoid/herbaceous composition and structure will be based upon habitat classification and floristic assessments of high quality, well protected, like-type reference plant communities found within the same MLRA and on the same or similar soil series.
- A minimum of 30 species are to be planted.
- A minimum of one species from the cool season graminoid, legume, and hemi-parasitic plant functional groups will be included in the seeding plan for reconstructed sites (appendices A, B, and C).
- Impacts of restoration and management should be monitored to ensure that stated ecological objectives are being met.

RECONSTRUCTION CONSIDERATIONS:

For sites that have existing, desirable vegetation, burning and/or mowing the site the year or two prior to interseeding will promote the establishment of newly seeded flora.

Burn, mow, hay, or graze to remove duff prior to no-till interseeding.

RESTORATION CRITERIA FOR REMNANTS:

- Applicable on sites with a currently established *remnant* prairie community.
- Trees, shrubs and other undesirable vegetation will be reduced as deemed necessary based upon habitat classifications. Refer to [Brush Management, Practice Code 314](#), and [Prescribed Burning, Practice Code 338](#).

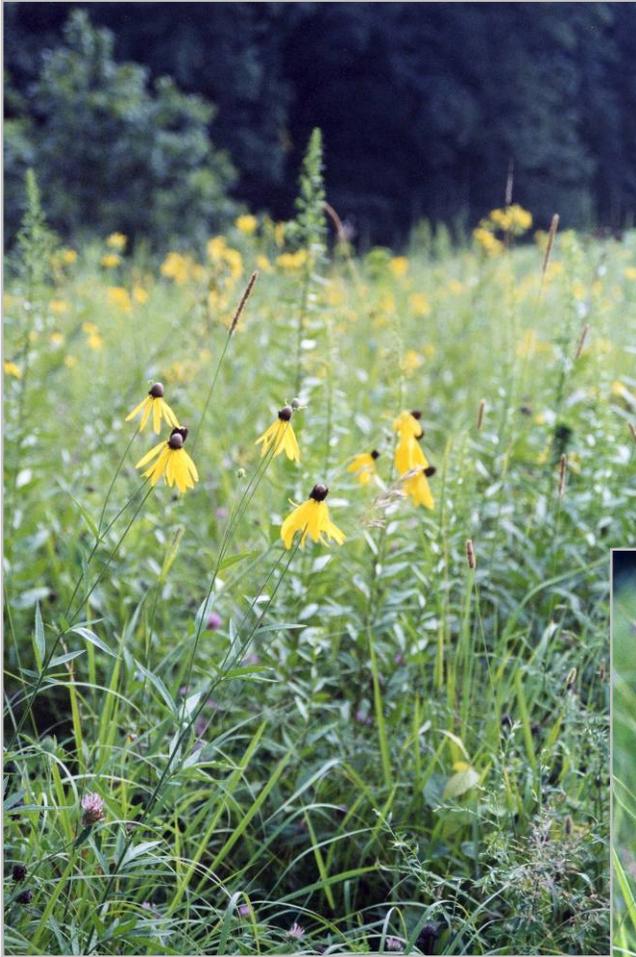
RECONSTRUCTION AND RESTORATION CONSIDERATIONS:

First and foremost, the use of fire should be prescribed to meet set objectives for the site. In some instances, more aggressive use of fire may be warranted to accomplish desired effects, while a break in fire interval may be desired to meet a different objective. Objectives evolve over time; therefore burn prescription should evolve accordingly. Below are considerations to keep in mind when planning to use prescribed fire as a prairie management tool:

- Burning within the same area more often than every four years may impose significant negative impacts on invertebrate populations.
- Allowing prairie fires to periodically burn into adjacent forestland will create a prairie - forest transition zone which can substantially improve wildlife habitat and species richness.

Managing with hemi-parasitic plants (Appendix B) will promote long-term sustainability of forb species within the management area.

Prairie Habitat Classes



Midwest Dry Gravel Prairie

Vegetation Characteristics: This prairie community is dominated by tall grasses with a few interspersed shrub clumps that make up less than 10% of the vegetative coverage. Forb composition within this prairie community is variable between sites.

Site Characteristics: This prairie community prefers gravely, well to excessively well drained and aerated soils on steep south and south west facing slopes of kames, eskers, river terraces or hills.

Range: Throughout Iowa

Known Flora of Midwest Dry Gravel Prairie

Scientific Name	Common Name	Form	Comments
<u><i>Bouteloua curtipendula</i></u>	Sideoats Grama	Graminoid	Dominant
<u><i>Cirsium hillii</i></u>	Hills Thistle	Forb	Indicator spp
<u><i>Hesperostipa spartea</i></u>	Porcupinegrass	Graminoid	Dominant
<u><i>Lithospermum incisum</i></u>	Narrowleaf Puccoon	Forb	
<u><i>Schizachyrium scoparium</i></u>	Little Bluestem	Graminoid	Dominant
<u><i>Sorghastrum nutans</i></u>	Indian Grass	Graminoid	Dominant
<u><i>Sporobolus heterolepis</i></u>	Prairie Dropseed	Graminoid	Dominant

If accessing an electronic version of this specification and there is an internet connection, clicking on the blue underlined text will link to the USDA Plants Database species profile.

Loess Hills Little Bluestem Dry Prairie

Vegetation Characteristics: This prairie community is dominated by short to midsize bunch and sod forming grasses with intermixed forbs and occasional shrubs. The Loess Hills little bluestem dry prairie is maintained by a combination of fire and drought.

Site Characteristics: This prairie community can be found on steep slopes, ridges, and bluffs with a south or west facing position. The soils of this prairie are shallow (0-40 cm), somewhat rapidly drained loess deposits.

Region: Loess Hills along the Missouri River

Known Flora of Loess Hills Little Bluestem Dry Prairie

Scientific Name	Common Name	Form	Comments
<u><i>Andropogon gerardii</i></u>	Big Bluestem	Graminoid	Dominant
<u><i>Astragalus lotiflorus</i></u>	Lotus Milkvetch	Forb/legume	
<u><i>Astragalus missouriensis</i></u>	Missouri Milkvetch	Forb/legume	
<u><i>Bouteloua curtipendula</i></u>	Sideoats Grama	Graminoid	Dominant
<u><i>Bouteloua gracilis</i></u>	Blue Grama	Graminoid	
<u><i>Bouteloua hirsuta</i></u>	Hairy Grama	Graminoid	
<u><i>Buchloe dactyloides</i></u>	Buffalograss	Graminoid	
<u><i>Catapyrenium lachneum</i></u>	Earth lichen	Lichen	
<u><i>Dalea candida</i></u>	White Prairie Clover	Forb/legume	
<u><i>Dalea enneandra</i></u>	Nine Anther Prairie Clover	Forb/legume	
<u><i>Dalea leporina</i></u>	Foxtail Prairie Clover	Forb/legume	
<u><i>Delphinium carolinianum</i></u>	Carolina Larkspur	Forb	
<u><i>Gaura coccinea</i></u>	Scarlet Beeblossom	Forb	
<u><i>Pediomelum argophyllum</i></u>	Silverleaf Indian Breadroot	Forb/legume	
<u><i>Psora decipiens</i></u>	Fishscale Lichen	Lichen	
<u><i>Pulsatilla patens ssp. multifida</i></u>	Cutleaf Anemone	Forb	
<u><i>Schizachyrium scoparium</i></u>	Little Bluestem	Graminoid	Dominant
<u><i>Sporobolus cryptandrus</i></u>	Sand Dropseed	Graminoid	
<u><i>Symphotrichum sericeum</i></u>	Western Silver Aster	Forb	

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Northern Little Bluestem Gravel Prairie

Vegetation Characteristics: This prairie community is dominated by midsize grasses and has a moderate to high forb diversity. Very few shrubs exist within this plant community.

Site Characteristics: Slopes of glacial outwash, glacial beaches, or other glacially derived substrates high in sand and gravel are suitable for the growth of northern little bluestem gravel prairie. The soils are usually shallow mollisols with fine to course gravel, sand and larger rocks. The coarse nature of this soil results in an excessively well drained profile with low soil moisture.

Range: Northwestern Iowa

Known Flora of Northern Little Bluestem Gravel Prairie

Scientific Name	Common Name	Form	Comments
<u><i>Amorpha canescens</i></u>	Leadplant	Sub-shrub/legume	
<u><i>Andropogon gerardii</i></u>	Big Bluestem	Graminoid	
<u><i>Artemisia frigida</i></u>	Prairie Sagewort	Forb	
<u><i>Astragalus lacmannii</i> var. <i>robustior</i></u>	Prairie Milkvetch	Forb/legume	
<u><i>Bouteloua curtipendula</i></u>	Sideoats Grama	Graminoid	Dominant
<u><i>Bouteloua gracilis</i></u>	Blue Grama	Graminoid	Dominant
<u><i>Bouteloua hirsuta</i></u>	Hairy Grama	Graminoid	
<u><i>Calamovilfa longifolia</i></u>	Prairie Sandreed	Graminoid	
<u><i>Carex inops</i> ssp. <i>heliophila</i></u>	Sun Sedge	Graminoid	
<u><i>Echinacea angustifolia</i></u>	Blacksamson Echinacea	Forb	
<u><i>Hesperostipa comata</i></u>	Needle and Thread	Graminoid	
<u><i>Hesperostipa spartea</i></u>	Porcupinegrass	Graminoid	Dominant
<u><i>Lygodesmia juncea</i></u>	Rush Skeletonplant	Forb	
<u><i>Potentilla pensylvanica</i></u>	Pennsylvania cinquefoil	Forb	
<u><i>Rosa arkansana</i></u>	Prairie Rose	Sub-shrub	
<u><i>Schizachyrium scoparium</i></u>	Little Bluestem	Graminoid	Dominant
<u><i>Solidago missouriensis</i></u>	Missouri Goldenrod	Forb	
<u><i>Sporobolus heterolepis</i></u>	Prairie Dropseed	Graminoid	
<u><i>Symphoricarpos occidentalis</i></u>	Western Snowberry	Sub-shrub	

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Midwest Dry Sand Prairie

Vegetation Characteristics: This plant community is dominated by grasses and by a diverse array of forbs. The vegetation may be very dense or sparse dependant on site characteristics.

Site Characteristics: Midwest dry sand prairie can be found on substrates that are well to excessively well drained coarse textured sands, loamy sands, and sand loams with minor inclusions of gravel. Steep slopes, sandy outwash, sandy lake plains, and alluvial deposits are commonly inhabited by this community. The A horizon of this plant community is very light (brownish, yellowish, grayish, or reddish) with a very thin B horizon with no redoximorphic features.

Range: Throughout Iowa

Known Flora of Midwest Dry Sand Prairie

Scientific Name	Common Name	Form	Comments
<i>Ambrosia psilostachya</i>	Cuman Rragweed	Forb	
<i>Artemisia frigida</i>	Prairie Sagewort	Forb	
<i>Asclepias verticillata</i>	Whorled Milkweed	Forb	
<i>Astragalus distortus</i>	Ozark Milkvetch	Forb	
<i>Besseyia bullii</i>	Bull's Coraldrops	Forb	
<i>Bouteloua hirsuta</i>	Hairy Grama	Graminoid	
<i>Carex pensylvanica</i>	Pennsylvania Sedge	Graminoid	Dominant
<i>Danthonia spicata</i>	Poverty Oatgrass	Graminoid	Dominant
<i>Dichanthelium acuminatum var. fasciculatum</i>	Western Panicgrass	Graminoid	
<i>Digitaria cognata</i>	Carolina Crabgrass	Graminoid	
<i>Euphorbia corollata</i>	Flowering Spurge	Forb	
<i>Hesperostipa spartea</i>	Porcupinegrass	Graminoid	Dominant
<i>Hieracium longipilum</i>	Hairy Hawkweed	Forb	
<i>Koeleria macrantha</i>	Prairie Junegrass	Graminoid	Dominant
<i>Lecbea tenuifolia</i>	Narrowleaf Pinweed	Forb	
<i>Liatris aspera</i>	Tall Blazingstar	Forb	
<i>Liatris cylindracea</i>	Ontario Blazingstar	Forb	
<i>Lithospermum canescens</i>	Hoary Puccoon	Forb	
<i>Lupinus perennis</i>	Sundial Lupine	Forb	
<i>Nuttallanthus canadensis</i>	Canada Toadflax	Forb	
<i>Oenothera rhombipetala</i>	Fourpoint Evening Primrose	Forb	
<i>Paspalum setaceum</i>	Thin Paspalum	Graminoid	
<i>Phlox pilosa</i>	Prairie Phlox	Forb	
<i>Polygala polygama</i>	Racemed Milkwort	Forb	
<i>Pseudognaphalium obtusifolium</i>	Rabbit Tobacco	Forb	
<i>Schizachyrium scoparium</i>	Little Bluestem	Graminoid	Dominant
<i>Solidago nemoralis</i>	Gray Goldenrod	Forb	
<i>Tephrosia virginiana</i>	Virginia tephrosia	Forb	
<i>Viola pedata</i>	Birdsfoot Violet	Forb	

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Little Bluestem Bedrock Bluff Prairie

Vegetation Characteristics: The little bluestem bedrock bluff prairie is dominated by short grasses with localized low shrubs and trees making up no more than 10% of the vegetative cover. Due to the geology underlying this prairie, drought and frequent desiccation help to maintain this community along with *infrequent* fire events which curbs the invasion of encroaching woody species.

Site Characteristics: The little bluestem bedrock bluff prairie is found on south, southwest and west facing slopes and hillsides on very thin soils (<10cm) overlaying limestone bedrock. The soils of this prairie have an average pH of 7.8 and usually have a very high water and nutrient holding capacity, but become droughty and prone to erosion due to their shallow to bedrock position. The Brunizem and melanized Rendzina soil groups are good examples of soils commonly inhabited by this prairie community.

Range: Found on the Paleozoic Plateau in Northeastern Iowa.

Known Flora of Little Bluestem Bedrock Bluff Prairie

Scientific Name	Common Name	Form	Comments
<i>Amorpha canescens</i>	Leadplant	Forb/legume	
<i>Andropogon gerardii</i>	Big Bluestem	Graminoid	Dominant
<i>Bouteloua curtipendula</i>	Sideoats Grama	Graminoid	Dominant
<i>Bouteloua hirsuta</i>	Hairy Grama	Graminoid	Dominant
<i>Dalea purpurea</i>	Violet Purple Prairie Clover	Forb/legume	
<i>Dichanthelium linearifolium</i>	Slimleaf Panicgrass	Graminoid	
<i>Euphorbia corollata</i>	Flowering Spurge	Forb	
<i>Muhlenbergia cuspidata</i>	Plains Muhly	Graminoid	Dominant
<i>Pediomelum esculentum</i>	Large Indian Breadroot	Forb	
<i>Schizachyrium scoparium</i>	Little Bluestem	Graminoid	Dominant
<i>Scutellaria parvula var. missouriensis</i>	Leonard's Skullcap	Forb	
<i>Solidago nemoralis</i>	Gray Goldenrod	Forb	
<i>Sporobolus heterolepis</i>	Prairie Dropseed	Graminoid	Dominant
<i>Symphotrichum oblongifolium</i>	Aromatic Aster	Forb	
<i>Symphotrichum sericeum</i>	Western Silver Aster	Forb	

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Central Tallgrass Big Bluestem Loess Prairie

Vegetation Characteristics: The central tallgrass big bluestem loess prairie is dominated by tall grasses with interspersed subshrubs less than half a meter tall. This dry mesic prairie community requires a 3-4 year fire frequency.

Site Characteristics: This prairie is found on hill slopes and ridges with well drained acidic to neutral soils formed from loess, glacial till, or other extensively weathered substrate. The soils are 40-100 cm deep and experience moderate drought stress.

Range: Found in the west central tallgrass prairie region

Known Flora of Central Tallgrass Big Bluestem Loess Prairie

Scientific Name	Common Name	Form	Comments
<u><i>Amorpha canescens</i></u>	Leadplant	Subshrub/legume	
<u><i>Andropogon gerardii</i></u>	Big Bluestem	Graminoid	Dominant
<u><i>Dalea candida</i></u>	White Prairie Clover	Forb/legume	
<u><i>Echinacea pallida</i></u>	Pale Purple Coneflower	Forb	
<u><i>Hesperostipa spartea</i></u>	Porcupinegrass	Graminoid	Dominant
<u><i>Potentilla arguta</i></u>	Tall Cinquefoil	Forb	
<u><i>Psoralidium tenuiflorum</i></u>	Slimflower Scurfpea	Legume	
<u><i>Schizachyrium scoparium</i></u>	Little Bluestem	Graminoid	Dominant
<u><i>Silphium laciniatum</i></u>	Compass Plant	Forb	
<u><i>Sorghastrum nutans</i></u>	Indiangrass	Graminoid	Dominant
<u><i>Sporobolus compositus</i></u>	Composite Dropseed	Graminoid	

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Northern Wet-mesic Tallgrass Prairie

Vegetation Characteristics: The northern wet-mesic tallgrass prairie is dominated by the tall grasses, particularly big bluestem and switch grass, with several graminoid associates. This graminoid dominated vegetation is dense with minimal forb coverage.

Site Characteristics: This prairie is found on moist loams and poorly drained silt loams that developed from glacial drift.

Range: Northwestern Iowa

Known Flora of Northern Wet-mesic Tallgrass Prairie

Scientific Name	Common Name	Form	Comments
<u><i>Andropogon gerardii</i></u>	Big Bluestem	Graminoid	Dominant
<u><i>Calamagrostis canadensis</i></u>	Bluejoint	Graminoid	Associate
<u><i>Calamagrostis stricta</i></u>	Slimstem Reedgrass	Graminoid	Associate
<u><i>Panicum virgatum</i></u>	Switchgrass	Graminoid	Dominant
<u><i>Spartina pectinata</i></u>	Prairie Cordgrass	Graminoid	Associate

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Northern Mesic Tallgrass Prairie

Vegetation Characteristics: This prairie community is dominated by tall grasses and a high diversity of forbs. This community is usually found adjacent to wetlands bordered by clumps of small trees and tall brush. The northern mesic tallgrass prairie is maintained by frequent fire events that deter woody encroachment.

Site Characteristics: This prairie is found on saturated, black, organic-rich soils with accumulations of salts and carbonates in the subsurface horizons due to intermittent dry periods during the warm season. These soils are friable, high in bases, and are typically clay loams.

Range: Northwest Iowa

Known Flora of Northern Mesic Tallgrass Prairie

Scientific Name	Common Name	Form	Comments
<u><i>Amorpha canescens</i></u>	Leadplant	Subshrub/legume	
<u><i>Andropogon gerardii</i></u>	Big Bluestem	Graminoid	Dominant
<u><i>Hesperostipa spartea</i></u>	Porcupinegrass	Graminoid	Indicative
<u><i>Solidago canadensis</i></u>	Canada Goldenrod	Forb	
<u><i>Sorghastrum nutans</i></u>	Indiangrass	Graminoid	Dominant
<u><i>Symphotrichum ericoides</i></u>	White Heath Aster	Forb	

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Central Wet-mesic Tallgrass Prairie

Vegetation Characteristics: This prairie community is dominated by tall grasses and an abundant number of forbs covered large expanses within low-lying areas of the tallgrass prairie region. Tree and shrub coverage of less than 10% is maintained by a minimum 4-5 year fire regime.

Site Characteristics: The central wet-mesic tallgrass prairie is found along the draws of headwater streams and within depressions on large river terraces and floodplains. Along headwater streams soils are generally formed from loess, glacial till, or deeply weathered rock. On terraces and floodplains the soils are typically those of sandy outwash plains, lake plains, and shallow swales. The soils of this prairie are generally very deep (>100cm) alluvial deposits that range from somewhat poorly drained to imperfect or somewhat imperfectly drained sands, loamy sands, sandy loams, and clay loams with a slowly permeable layer. These soils are influenced by a high groundwater table which produces slight gleying of the soil just below the A horizon. This prairie has an acidic, dark, organic rich A horizon that is commonly ponded in the winter, spring, and after heavy rain events.

Range: Throughout Iowa except in the Northwest part of the state.

Known Flora of Central Wet-Mesic Tallgrass Prairie

Scientific Name	Common Name	Form	Comments
<u><i>Andropogon gerardii</i></u>	Big Bluestem	Graminoid	Dominant
<u><i>Calamagrostis canadensis</i></u>	Bluejoint	Graminoid	
<u><i>Carex bicknellii</i></u>	Bicknell's Sedge	Graminoid	
<u><i>Eryngium yuccifolium</i></u>	Rattlesnake Master	Subshrub/forb	
<u><i>Helianthus grosseserratus</i></u>	Sawtooth Sunflower	Forb	
<u><i>Juncus interior</i></u>	Inland Rush	Graminoid	
<u><i>Panicum virgatum</i></u>	Switchgrass	Graminoid	Dominant
<u><i>Potentilla simplex</i></u>	Common Cinquefoil	Forb	
<u><i>Spartina pectinata</i></u>	Prairie Cordgrass	Graminoid	Dominant
<u><i>Tripsacum dactyloides</i></u>	Eastern Gamagrass	Graminoid	

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Central Mesic Tallgrass Prairie

Vegetation Characteristics: The central mesic tallgrass prairie includes a mix of grasses and forbs that provide 85-95% vegetative coverage. Warm season bunch and sod grasses dominate this prairie and may not be as species diverse as the forb community. Over 95% of the species in this prairie community are perennial. Trees are rare in this prairie and their encroachment is managed through fire.

Site Characteristics: This prairie is found on silty clay loams and silt loams formed over glacial till or unaltered loess on level to gently rolling uplands of glacial outwash or on till plains. These soils are deep (>100cm), nutrient rich, have intermediate drainage and a slightly acidic to circumneutral pH.

Region: Throughout Iowa

Known Flora of Central Wet-Mesic Tallgrass Prairie

Scientific Name	Common Name	Form	Comments
<u><i>Andropogon gerardii</i></u>	Big Bluestem	Graminoid	Dominant
<u><i>Calamagrostis canadensis</i></u>	Bluejoint	Graminoid	
<u><i>Carex bicknellii</i></u>	Bicknell's Sedge	Graminoid	
<u><i>Eryngium yuccifolium</i></u>	Rattlesnake Master	Subshrub/forb	
<u><i>Helianthus grosseserratus</i></u>	Sawtooth Sunflower	Forb	
<u><i>Juncus interior</i></u>	Inland Rush	Graminoid	
<u><i>Panicum virgatum</i></u>	Switchgrass	Graminoid	Dominant
<u><i>Potentilla simplex</i></u>	Common Cinquefoil	Forb	
<u><i>Spartina pectinata</i></u>	Prairie Cordgrass	Graminoid	Dominant
<u><i>Tripsacum dactyloides</i></u>	Eastern Gamagrass	Graminoid	

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Savanna Habitat Criteria and Considerations

RECONSTRUCTION CRITERIA:

- Applicable on sites where savanna vegetation is to be reconstructed.
- Floristic assessments, historical accounts, species lists of similar sites and habitat classifications should be used to determine the tree, shrub, and herbaceous species structure and composition to be restored.
- 80% of the tree species planted will be native oaks (*Quercus* spp.) suited to site conditions and location.
- If trees are to be planted, a minimum of 3' tall by 1/2" diameter air pruned stock are to be used and maintained following the methods described in [Tree/Shrub Establishment, Practice Code 612](#).
- Savanna reconstructions with tree plantings should not be burned until the trees have surpassed a minimum of 3-6 inches DBH to ensure fire resistance. If fire is to be used prior to reaching the minimum DBH, trees must be protected by a minimum 4-6 foot firebreak. Refer to [Prescribed Burning, Practice Code 338](#).
- Herbaceous vegetation is to be restored in accordance with the habitat classification and the prairie reconstruction criteria provided within this specification.
- Impacts of restoration and management are to be monitored to ensure that stated ecological objectives are being met.

RECONSTRUCTION CONSIDERATIONS:

Oak savannas are fire dependant habitats resulting from fire disclimax, becoming stable over time given periods of fire.

Include late spring, summer, fall, and dormant season burns in management plans.

Prairie-associated species generally grow in areas of high light while woodland-associated species generally grow in low light, shaded conditions under gallery oaks. Interseed shade adapted plant species when suitable canopy cover has established.

RESTORATION CRITERIA FOR REMNANTS:

- Applicable on sites with existing *remnant* savanna vegetation.
- Undesirable trees, shrubs, and other vegetation will be reduced as deemed necessary based upon habitat classification. Refer to [Brush Management, Practice Code 314](#) and [Prescribed Burning, Practice Code 338](#).
- Tree stock will be planted following the criteria described under Savanna reconstruction criteria and the [Tree/Shrub Establishment, Practice Code 612](#).

RESTORATION CONSIDERATIONS FOR REMNANTS:

Unmanaged oak savannas convert to closed forest in less than 50 years. Indicators of an area where savanna has succeeded to forest include large oaks with spreading crowns, fire scars, and evidence of self-pruning limbs.

Controlling undesirable understory vegetation (multiflora rose, honeysuckle, ironwood, garlic mustard, etc.) is best accomplished under the shaded environment of a dense tree canopy. Once the understory vegetation is under control canopy manipulation can occur.

Rapid reduction in a dense tree canopy may cause undesirable shrubs and trees to sprout aggressively. Gradually reducing tree canopy by girdling, removal, and treating stumps with herbicide along with prescribed burns may

reduce this risk and aid in the establishment of an herbaceous layer.

First and foremost, the use of fire should be prescribed to meet set objectives for the site. Objectives evolve over time; therefore burn prescription should evolve accordingly. In some instances, aggressive use of fire may be warranted to accomplish desired effects; whereas, a break in fire interval may be desired in order to allow for oak seedling recruitment and growth to a fire resistant stage. Below are considerations to keep in mind when planning to use prescribed fire as a savanna management tool:

- It has been estimated that oak savannas *historically* had fire return intervals of 2-14 years.
- Frequent fires can damage young white oaks, and recurrent fires at less than 8-year intervals could eliminate natural white oak recruitment within the area until a break in the fire interval occurs.
- Several fires of moderate severity may be needed to select against fire prone competitors prior to encouraging oak regeneration within a restoration.

Savanna Habitat Classes



Central Bur Oak Opening

Vegetation Characteristics: This savanna community is composed of scattered trees, predominantly bur oak, with 10-60% canopy cover. Research has documented densities of 40-75 stems/ha in this savanna community. The herbaceous layer is continuous, resembling that of mesic prairies, with sparse shrubby areas. This savanna community commonly occurred in areas surrounded by wet conditions (wetlands, lakes, streams, rivers) therefore fires usually occurred during dry years. Fire was uncommon enough to allow oak resistance yet frequent enough to maintain a graminoid dominated herbaceous layer. Grazing has been noted as another important natural process in the maintenance of savanna communities.

Site Characteristics: Central Bur Oak Openings occur on low to moderate slopes, hillsides, and ridges with north and east facing slopes being mesic. These openings have also been found on elevated areas within wetland complexes. The soils of this community were developed from loess, shallow glacial till, or deeply weathered rock with no appreciable rock residuum. Soils are moderately well drained to well drained and are 40-100 cm deep.

Region: Northern and Eastern Iowa

Known Flora of Central Bur Oak Openings

Scientific Name	Common Name	Form	Comments
<u><i>Andropogon gerardii</i></u>	Big Bluestem	Graminoid	Dominant
<u><i>Carya ovata</i></u>	Shagbark Hickory	Tree	Low abundance
<u><i>Corylus americana</i></u>	American Hazelnut	Tree	
<u><i>Prunus serotina</i></u>	Black Cherry	Tree/shrub	
<u><i>Quercus alba</i></u>	White Oak	Tree	Secondary
<u><i>Quercus imbricaria</i></u>	Shingle Oak	Tree	Low abundance
<u><i>Quercus macrocarpa</i></u>	Bur Oak	Tree	Dominant
<u><i>Schizachyrium scoparium</i></u>	Little Bluestem	Graminoid	Dominant
<u><i>Sorghastrum nutans</i></u>	Indiangrass	Graminoid	Dominant

If accessing an electronic version of this specification and there is an internet connection, clicking on the blue underlined text will link to the USDA Plants Database species profile.

North Central Bur Oak Opening

Vegetation Characteristics: These openings occur in a patchwork assembly of intermixing grassland, shrub and forest communities across the landscape. Each vegetative community is locally dominant with less than 30% woody cover. The trees within this community are scattered or clumped into wooded groves having 1-40 stems/ha. Woodland associated shrub layers consist of moderately fire resistant shrubs with 0-100 percent coverage. The herbaceous community is dominated by graminoids and has a high diversity of forbs. Fires are infrequent enough to establish fire resistance of oaks, and grazing by herbivores helps to maintain this savanna community.

Site Characteristics: This community is found on level to rolling topography with excessively to moderately well drained loam to sandy loam soils on well-drained outwash plains or coarse textured end moraines. On steep shallow to bedrock hills in the driftless area, the north central bur oak opening community has been found on silt loams.

Region: Northern and Eastern Iowa

Known Flora of North Central Bur Oak Opening

Scientific Name	Common Name	Form	Comments
<u><i>Amorpha canescens</i></u>	Leadplant	Subshrub	
<u><i>Andropogon gerardii</i></u>	Big Bluestem	Graminoid	
<u><i>Carya ovata</i></u>	Shagbark Hickory	Tree	Infrequent
<u><i>Ceanothus americanus</i></u>	New Jersey Tea	Shrub/subshrub	
<u><i>Quercus alba</i></u>	White Oak	Tree	Dominant. Hilly, dry to dry-mesic areas
<u><i>Quercus macrocarpa</i></u>	Bur Oak	Tree	Dominant
<u><i>Quercus velutina</i></u>	Black Oak	Tree	Dominant. More common on sandy, infertile soils
<u><i>Schizachyrium scoparium</i></u>	Little Bluestem	Graminoid	

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Northern Bur Oak Opening

Vegetation Characteristics: The northern bur oak opening consists of a graminoid dominated herbaceous layer with widely scattered bur oak. Shrub layers in the NBO-opening may be highly variable between sites. Four to ten year fire frequencies maintain this open canopy savanna and it is thought that this community may be the result of high intensity fires in oak forests during drought years.

Site Characteristics: The northern bur oak opening community has been found on clay loam to sandy loam soils on rolling to moderately sloping glacial outwash or till.

Region: Western and possibly Southern Iowa

Known Flora of Northern Bur Oak Openings

Scientific Name	Common Name	Form	Comments
<u><i>Andropogon gerardii</i></u>	Big Bluestem	Graminoid	Dominant
<u><i>Fraxinus pennsylvanica</i></u>	Green Ash	Tree	Invader
<u><i>Hesperostipa spartea</i></u>	Porcupinegrass	Graminoid	Dry areas
<u><i>Panicum virgatum</i></u>	Switchgrass	Graminoid	Wet areas
<u><i>Quercus macrocarpa</i></u>	Bur Oak	Tree	Dominant
<u><i>Schizachyrium scoparium</i></u>	Little Bluestem	Graminoid	Dry areas
<u><i>Sorghastrum nutans</i></u>	Indiangrass	Graminoid	Dominant
<u><i>Sporobolus heterolepis</i></u>	Prairie Dropseed	Graminoid	Dominant

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Black Oak/Lupine Barrens

Vegetation Characteristics: Black oak/lupine barrens can be highly variable ranging from a ground layer dominated by herbaceous vegetation and a sparse tree canopy (5-30%); to an oak dominated shrub land; to an open woodland with 30-80% canopy coverage. The black oak is dominant in these barrens with scattered white and pin oak. The herbaceous layer is dominated by graminoids with the presence of forbs increasing with percent woody cover. Black Oak Barrens with a shrub layer commonly house black cherry, sassafras, and shagbark hickory. The shrub layer also includes numerous (10-60% coverage) small, brushy black oaks that have resprouted after damaging fires.

Site Characteristics: The black oak/lupine Barrens have been documented on glacial outwash, high gravely/sandy moraines, and lake plain dune systems with well drained, coarse textured, sandy, infertile soils. Soils may vary from pure sand to a sandy loam.

Region: One example of this savanna community in Allamakee County

Known Flora of Black Oak/Lupine Barrens

Scientific Name	Common Name	Form	Comments
<i>Antennaria neglecta</i>	Field Pussytoes	Forb	
<i>Antennaria plantaginifolia</i>	Woman's Tobacco	Forb	
<i>Carex pensylvanica</i>	Pennsylvania Sedge	Graminoid	Dominant
<i>Carya ovata</i>	Shagbark Hickory	Tree	Sub-canopy
<i>Ceanothus americanus</i>	New Jersey Tree	Shrub/subshrub	Low shrub/scrub layer
<i>Cornus amomum</i>	Silky Dogwood	Shrub	Tall shrub layer
<i>Corylus americana</i>	American Hazelnut	Shrub	Tall shrub layer
<i>Euphorbia corollata</i>	Flowering Spurge	Forb	
<i>Gaylussacia baccata</i>	Black Huckleberry	Shrub	Low shrub/scrub layer
<i>Helianthemum bicknellii</i>	Hoary Frostweed	Subshrub/forb	
<i>Helianthemum canadense</i>	Longbranch Frostweed	Subshrub/forb	
<i>Lespedeza capitata</i>	Roundhead Bush Clover	Forb	
<i>Lithospermum canescens</i>	Hoary Puccoon	Forb	
<i>Lupinus perennis</i>	Sundial Lupine	Forb	
<i>Prunus serotina</i>	Black Cherry	Tree/Shrub	Sub-canopy
<i>Pteridium aquilinum</i>	Western Bracken Fern	Forb/herb	
<i>Quercus alba</i>	White Oak	Tree	
<i>Quercus ellipsoidalis</i>	Northern Pin Oak	Tree	
<i>Quercus velutina</i>	Black Oak	Tree	Dominant
<i>Rhus glabra</i>	Smooth Sumac	Tree/Shrub	Tall shrub layer
<i>Rosa</i> spp.	Rose species	Subshrub	Low Shrub/scrub layer
<i>Rubus allegheniensis</i>	Allegheny Blackberry	Shrub	Low shrub/scrub layer
<i>Sassafras albidum</i>	Sassafras	Tree/Shrub	Sub-canopy
<i>Schizachyrium scoparium</i>	Little Bluestem	Graminoid	Dominant
<i>Vaccinium angustifolium</i>	Lowbush Blueberry	Shrub/subshrub	Low shrub/scrub layer

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Fen Habitat Criteria and Considerations

REMNANT RESTORATION CRITERIA:

- Map and survey geologic setting to ID source water.
- Restoration of fen hydrology must be accomplished as a first step. Raise the water table to the fens surface by plugging ditches, rerouting or breaking tile, etc. Refer to [Practice Code 657 Wetland Restoration](#), [Practice Code 659 Wetland Enhancement](#), and [Practice Code 658 Wetland Creation](#).
- After hydrologic restoration has been attempted, evaluate the plant community response for 2-3 years to determine whether hydrologic restoration was accomplished.
- Fence and remove cattle from the fen and surrounding area. Refer to [Practice Code 472, Use Exclusion](#).
- Fens adjacent to crop fields commonly suffer from herbicide drift, weed infestation, mineral soil deposition, and nutrient enrichment. To avoid these impacts, create buffers (min of 20ft) around the fen and promote best management practices for the adjacent land.
- Impacts of restoration and management should be monitored to ensure that stated ecological objectives are being met.

REMNANT RESTORATION CONSIDERATIONS:

Artesian fens exhibit continuous groundwater flow and water table levels which deter invasive species to a greater extent than fens fed by fluctuating groundwater sources (common of eastern Iowa fens).

Compaction of peat due to drainage, grazing, or heavy equipment use on fens may irreversibly change the peat's flow patterns.

Undesirable woody species are best removed by hand. Stumps may be treated with a herbicide with low leaching potential.

Mowers or other lightweight equipment used to control undesirable plant species should occur in late summer when the fen is the driest.

First and foremost, the use of fire should be prescribed to meet set objectives for the site. In some instances, aggressive use of fire may be warranted to accomplish desired effects; whereas, a break in fire interval may be desired to meet a different objective. Objectives evolve over time; therefore, burn prescription should evolve accordingly.

Due to their small size and uniqueness, use of fire as a management tool must be used cautiously, with only a portion of the fen burnt in any given year.

Prescribed burns may be planned during the wet or dormant season after the water table has been restored to the soil surface.

Trails will create compaction and erosion of peat.

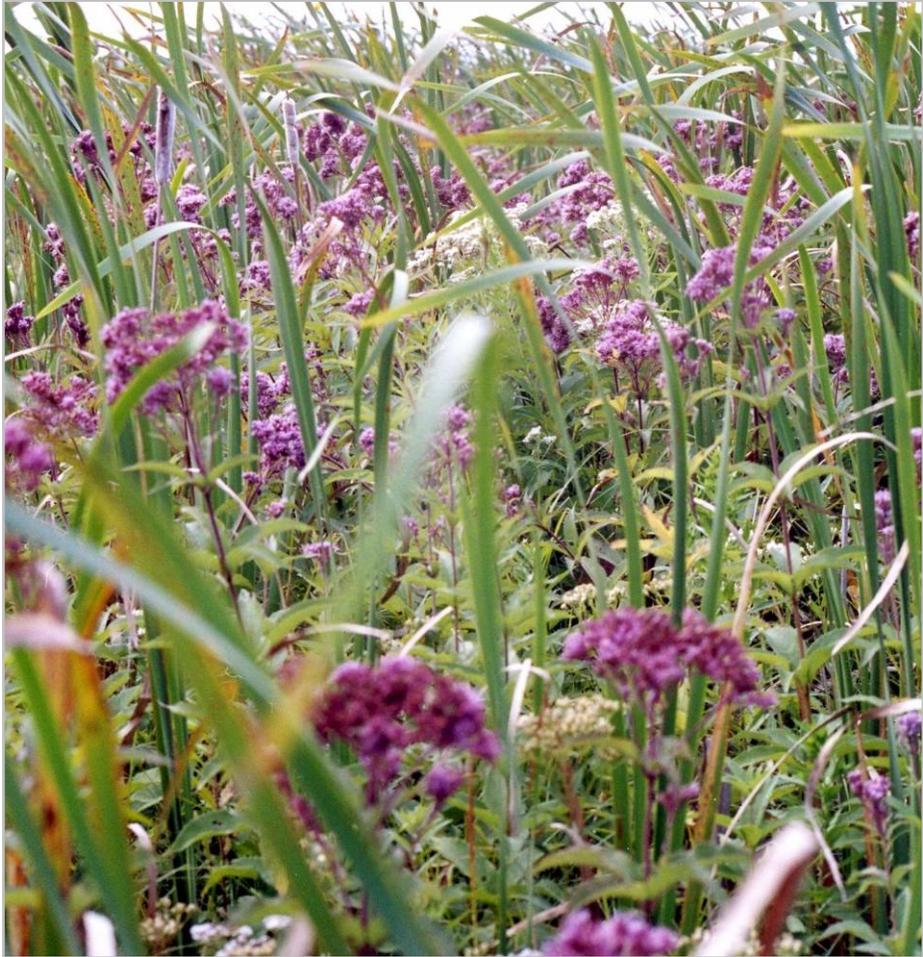
Western Iowa fens generally exhibit distinct, concentric vegetative zones with a sedge matt zone in the center and taller vegetative communities on the fens border. Such zonation may also be found in some eastern Iowa fens, but is not as common.

Bryophytes are sensitive to burning; therefore, their populations should be monitored to track response to management practices.

Monitor source and discharge water for nutrients, herbicides or other contaminants.

Monitor water table levels.

Fen Habitat Classes



Prairie Transition Rich Fen

Vegetation Characteristics: This rich fen is dominated by graminoids in the sedge (*Carex*), Spikerush (*Eleocharis*), and Bulrush (*Schoenoplectus*) genera. Shrub coverage is variable and may exceed 25%. Sparse to abundant occurrence of mosses may also be present within this fen community.

Site Characteristics: Found on calcareous, gravely moraines and on wet, saturated soils with groundwater influence at or near the surface throughout the majority of the growing season. May also be found along the edges of lake margins and on grounded or floating mats. Soils are typically sedge peat that may be up to 0.5 m deep; or, rarely found on highly decomposed peat.

Region: Northern Iowa

Known Flora of Prairie Transition Rich Fen

Scientific Name	Common Name	Form	Comments
<i>Betula pumila</i>	Bog Birch	Shrub	Abundant; fen indicator
<i>Calamagrostis canadensis</i>	Bluejoint	Graminoid	Common
<i>Calamagrostis stricta</i>	Slimstem Reedgrass	Graminoid	Common
<i>Calliergonella cuspidata</i>	Calliergonella Moss	Moss	
<i>Campylium stellatum</i>	Star Campylium Moss	Moss	
<i>Carex aquatilis</i>	Water Sedge	Graminoid	Common, associate
<i>Carex buxbaumii</i>	Buxbaum's Sedge	Graminoid	Associate
<i>Carex interior</i>	Inland Sedge	Graminoid	Associate
<i>Carex lasiocarpa</i>	Woolyfruit Sedge	Graminoid	Common, dominant
<i>Carex pellita</i>	Wooly Sedge	Graminoid	Associate
<i>Carex sartwellii</i>	Sartwell's Sedge	Graminoid	Associate
<i>Carex stricta</i>	Tussock Sedge	Graminoid	Abundant
<i>Comarum palustre</i>	Purple Marshlocks	Forb	
<i>Dasiphora floribunda</i>	Shrubby Cinquefoil	Shrub	Abundant
<i>Eleocharis elliptica</i>	Elliptic Spikerush	Graminoid	Associate
<i>Eriophorum angustifolium</i>	Tall Cottongrass	Graminoid	Common; fen indicator
<i>Euthamia graminifolia</i>	Flat-top Goldentop	Forb	Common
<i>Fissidens adiantoides</i>	Fissidens Moss	Moss	
<i>Galium labradoricum</i>	Northern Bog Bedstraw	Forb	
<i>Glyceria grandis</i>	American Mannagrass	Graminoid	Associate
<i>Impatiens capensis</i>	Jewelweed	Forb	
<i>Leptodictyum riparium</i>	Streamside Leptodictyum Moss	Moss	
<i>Lobelia kalmii</i>	Ontario Lobelia	Forb	Common; fen indicator
<i>Lycopus uniflorus</i>	Northern Bugleweed	Forb	Common
<i>Lysimachia thyrsoiflora</i>	Tufted Loosestrife	Forb	
<i>Menyanthes trifoliata</i>	Buckbean	Forb	Fen indicator
<i>Onoclea sensibilis</i>	Sensitive Fern	Fern	
<i>Pedicularis lanceolata</i>	Swamp Lousewort	Hemi-parasitic forb	
<i>Salix candida</i>	Sageleaf Willow	Shrub	Eastern Iowa fens; Fen indicator
<i>Salix pedicellaris</i>	Bog Willow	Shrub	Eastern Iowa fens; Fen indicator
<i>Salix spp</i>	Willow spp.	Shrub	Abundant
<i>Schoenoplectus acutus</i>	Hardstem Bulrush	Graminoid	Associate
<i>Oligoneuron riddellii</i>	Riddell's Goldenrod	Forb	
<i>Thelypteris palustris</i>	Eastern Marsh Fern	Fern	
<i>Triadenum fraseri</i>	Fraser's Marsh St. Johnswort	Forb	Common; Eastern Iowa fens

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Northern Sedge Poor Fen

Vegetation Characteristics: Fen community dominated by graminoids and a continuous sphagnum moss layer. This community may house shrubs and scattered trees with up to 25% coverage.

Site Characteristics: Found on perched landscapes with low to no exposure to mineral rich flood and/or groundwater. May occur as basin fens, along shorelines, and within larger peat lands. The soils are saturated to the surface with slightly acidic (4.1-5.9) and nutrient poor conditions.

Region: Northern Iowa

Example Sites: Pilot Knob State Preserve

Known Flora of Northern Sedge Poor Fen

Scientific Name	Common Name	Form	Comments
<u>Carex chondrorhiza</u>	Creeping Sedge	Graminoid	Associate
<u>Carex lasiocarpa</u>	Woollyfruit Sedge	Graminoid	Dominant
<u>Carex limosa</u>	Mud Sedge	Graminoid	Associate
<u>Salix discolor</u>	Pussy Willow	Shrub	Shrub-layer
<u>Salix pedicellaris</u>	Bog Willow	Shrub	Shrub-layer: fen indicator
<u>Sphagnum capillifolium</u>	Sphagnum	Moss	Dominant
<u>Sphagnum fuscum</u>	Sphagnum	Moss	Dominant
<u>Sphagnum magellanicum</u>	Sphagnum	Moss	Dominant

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Northern Tallgrass Calcareous Fen

Vegetation Characteristics: Graminoid dominated with some small shrubs and numerous light loving species. Vegetative coverage is moderate due to anoxic, saturated conditions of the soil.

Site Characteristics: Found in seepage areas with calcium and magnesium rich groundwater from porous bedrock or coarse textured deposits such as beach or outwash. Cold, circumneutral spring water slows decomposition promoting the accumulation of shallow to deep peat soils which may house calcium carbonate/magnesium precipitates.

Region: Primarily found in northwestern Iowa

Known Flora of Northern Tallgrass Calcareous Fen

Scientific Name	Common Name	Form	Comments
<u><i>Andropogon gerardii</i></u>	Big Bluestem	Graminoid	Prairie Associate
<u><i>Betula pumila</i></u>	Bog Birch	Shrub	Fen indicator; Eastern Iowa fens
<u><i>Calamagrostis stricta</i></u>	Slimstem Reedgrass	Graminoid	InfrequentAbundant
<u><i>Carex prairea</i></u>	Prairie Sedge	Graminoid	Abundant
<u><i>Carex sterilis</i></u>	Diocious Sedge	Graminoid	Abundant to Infrequent
<u><i>Cirsium muticum</i></u>	Swamp Thistle	Forb	Fen indicator
<u><i>Dasiphora floribunda</i></u>	Shrubby Cinquefoil	Shrub	
<u><i>Doellingeria umbellata</i></u>	Parasol Whitetop	Forb	Prairie Associate
<u><i>Eleocharis spp</i></u>	Spikerush	Graminoid	Abundant
<u><i>Gentianopsis virgata</i></u>	Lesser Fringed Orchid	Forb	Fen indicator; infrequent to common
<u><i>Liatris ligulistylis</i></u>	Rocky Mountain Blazingstar	Forb	Prairie Associate
<u><i>Lilium philadelphicum</i></u>	Wood Lilly	Forb	Prairie Associate
<u><i>Lobelia kalmii</i></u>	Ontario Lobelia	Forb	Abundant, fen indicator
<u><i>Muhlenbergia glomerata</i></u>	Spiked Muhly	Graminoid	Abundant, fen indicator
<u><i>Oligoneuron riddellii</i></u>	Riddell's Goldenrod	Forb	Prairie Associate
<u><i>Parnassia glauca</i></u>	Fen Grass of Parnassus	Forb	Abundant, fen indicator
<u><i>Rhynchospora capillacea</i></u>	Needle Beaksedge	Graminoid	Abundant, fen indicator
<u><i>Salix bebbiana</i></u>	Bebb's Willow	Shrub	
<u><i>Salix candida</i></u>	Sageleaf Willow	Shrub	Eastern Iowa Fens, Fen indicator
<u><i>Salix discolor</i></u>	Pussy Willow	Shrub	
<u><i>Schoenoplectus pungens</i></u>	Common Threesquare	Graminoid	Abundant
<u><i>Solidago nemoralis</i></u>	Gray Goldenrod	Forb	Prairie Associate
<u><i>Spartina pectinata</i></u>	Prairie Cordgrass	Graminoid	Abundant
<u><i>Triglochin maritimum</i></u>	Seaside Arrowgrass	Graminoid	InfrequentAbundant, fen indicator
<u><i>Triglochin palustre</i></u>	Marsh Arrowgrass	Graminoid	Fen indicator; infrequent
<u><i>Zigadenus elegans</i></u>	Mountain Deathcamas	Forb	Prairie Associate
<u><i>Zizia aurea</i></u>	Golden Alexander	Forb	Prairie Associate

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Tussock Sedge Fen

Vegetation Characteristics: Dominated by tussock sedge forming a hummock-hollow microtopography.

Site Characteristics: This community is commonly found where groundwater seeps emerge from a hillside and are usually less than 2 ha in size. These sites usually have a fluctuating water table and slightly acidic to neutral (6.5-7.0), organic peat soils. This community does not exhibit a sedge mat zone.

Region: Central and eastern Iowa

Known Flora of Tussock Sedge Fen

Scientific Name	Common Name	Form	Comments
<i>Asclepias incarnata</i>	Swamp Milkweed	Forb	Associate
<i>Calamagrostis canadensis</i>	Bluejoint	Graminoid	Associate
<i>Carex interior</i>	Inland Rush	Graminoid	Associate
<i>Carex prairea</i>	Prairie Sedge	Graminoid	Associate
<i>Carex</i> spp	Sedges	Graminoid	Associate
<i>Carex stricta</i>	Tussock Sedge	Graminoid	Dominant
<i>Chelone glabra</i>	White Turtlehead	Forb	Eastern Iowa Fens
<i>Cornus amomum</i>	Silky Dogwood	Shrub	
<i>Doellingeria umbellata</i>	Parasol Whitetop	Forb	Associate
<i>Eriophorum angustifolium</i>	Tall Cottongrass	Graminoid	Fen Indicator
<i>Eupatorium maculatum</i>	Spotted Joe-pye Weed	Forb	Dominant
<i>Eupatorium perfoliatum</i>	Boneset	Forb	Associate
<i>Fragaria virginiana</i>	Virginia Strawberry	Forb	More Common in Eastern Iowa Fens
<i>Gentiana andrewsii</i>	Closed Bottle Gentian	Forb	More Common in Eastern Iowa Fens
<i>Geum aleppicum</i>	Yellow Avens	Forb	More Common in Eastern Iowa Fens
<i>Helenium autumnale</i>	Sneezeweed	Forb	Associate
<i>Helianthus grosseserratus</i>	Sawtooth Sunflower	Forb	Associate
<i>Liparis loeselii</i>	Fen Twayblade	Forb	Fen Indicator
<i>Lobelia kalmii</i>	Ontario Lobelia	Forb	Western Iowa Fens, fen indicator
<i>Lobelia siphilitica</i>	Great Blue Lobelia	Forb	Associate
<i>Lythrum alatum</i>	Winged Loosestrife	Forb	More Common in Eastern Iowa Fens
<i>Muhlenbergia glomerata</i>	Spiked Muhly	Graminoid	Fen Indicator
<i>Oligoneuron riddellii</i>	Riddell's Goldenrod	Forb	More Common in Eastern Iowa Fens
<i>Onoclea sensibilis</i>	Sensitive Fern	Fern	Eastern Iowa Fens
<i>Oxypolis rigidior</i>	Stiff Cowbane	Forb	More Common in Eastern Iowa Fens
<i>Parnassia glauca</i>	Fen Grass of Parnassus	Forb	Fen Indicator
<i>Pedicularis lanceolata</i>	Swamp Lousewort	Hemi-parasitic Forb	Associate
<i>Pblox maculata</i>	Wild Sweet William	Forb	More Common in Eastern Iowa Fens
<i>Pycnanthemum virginianum</i>	Virginia Mountain Mint	Forb	Associate
<i>Rhynchospora capillacea</i>	Needle Beaksedge	Graminoid	Fen Indicator
<i>Salix bebbiana</i>	Bebb's Willow	Shrub	
<i>Salix candida</i>	Sageleaf Willow	Shrub	Eastern Iowa Fen; Fen indicator
<i>Salix discolor</i>	Pussy Willow	Shrub	
<i>Saxifraga pensylvanica</i>	Eastern Swamp Saxifrage	Forb	Eastern Iowa Fens
<i>Schoenoplectus acutus</i>	Hardstem Bulrush	Graminoid	Associate
<i>Spiraea alba</i>	White Meadowsweet	Forb	Eastern Iowa Fens
<i>Symphotrichum puniceum</i>	Purplestem Aster	Forb	Associate; common in western Iowa fens

<u>Thelypteris palustris</u>	Eastern Marsh Fern	Fern	Eastern Iowa Fens
<u>Triadenum fraseri</u>	Fraser's Marsh St. Johnswort	Forb	Prairie Associate; Eastern Iowa fens
<u>Triglochin palustre</u>	Marsh Arrowgrass	Graminoid	Fen Indicator
<u>Valeriana edulis</u>	Tobacco Root	Forb	Fen Indicator of Eastern Iowa fens
<u>Veronicastrum virginicum</u>	Culver's Root	Forb	Prairie Associate
<u>Viola nephrophylla</u>	Northern Bog Violet	Forb	Associate

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Central Tallgrass Fen

Vegetation Characteristics: Due to the wet nature of this fen hydrophytic graminoids and forbs dominate with occasional shrubs.

Site Characteristics: This seepage fen may be found near or on the foot slopes of valleys and bluffs and on floodplain terraces. The hydric, sandy, peat or muck soils are continually saturated to the surface with moderate (6.0-6.9) to strong (7.0-8.0) minerotrophic groundwater. Uplifted mounds of peat are common and subsurface recharge of water may occur through localized artesian conditions.

Region: Eastern Iowa

Known Flora of Central Tallgrass Fen

Scientific Name	Common Name	Form	Comments
<u><i>Asclepias incarnata</i></u>	Swamp Milkweed	Forb	
<u><i>Carex emoryi</i></u>	Emory's Sedge	Graminoid	
<u><i>Carex hystericina</i></u>	Bottlebrush Sedge	Graminoid	
<u><i>Carex interior</i></u>	Inland Sedge	Graminoid	
<u><i>Carex pellita</i></u>	Woolly Sedge	Graminoid	Dominant
<u><i>Chelone glabra</i></u>	White Turtlehead	Forb	Eastern Iowa Fens
<u><i>Eupatorium perfoliatum</i></u>	Boneset	Forb	
<u><i>Juncus</i> spp.</u>	Rushes	Graminoid	Dominant
<u><i>Onoclea sensibilis</i></u>	Sensitive Fern	Fern	Eastern Iowa fens
<u><i>Schoenoplectus acutus</i></u>	Hardstem Bulrush	Graminoid	Infrequent
<u><i>Schoenoplectus tabernaemontani</i></u>	Softstem Bulrush	Graminoid	
<u><i>Scirpus atrovirens</i></u>	Green Bulrush	Graminoid	
<u><i>Thelypteris palustris</i></u>	Eastern Marsh Fern	Fern	Eastern Iowa Fens

If accessing an electronic version of this specification and there is an internet connection, clicking on the blue underlined text will link to the USDA Plants Database species profile.

Sedge and Wet Meadow Criteria and Considerations

CRITERIA FOR RECONSTRUCTIONS:

- Historic water table levels, flood frequency and duration should be determined utilizing soils information, NWI maps, and other suitable resource information.
- **Reconstruction** sites should be graded to create areas of varying hydrologic regime, emphasizing areas that will have high water tables (within 12" of the surface) that persist, at a minimum, through mid June.
- Restore water table to the within 12" of the soil surface by plugging ditches, breaking or rerouting tile, creating berms, dikes, or by spring development, etc. Refer to [Practice Code 657 Wetland Restoration](#), [Practice Code 659 Wetland Enhancement](#), [Practice Code 574 Spring Development](#) and [Practice Code 658 Wetland Creation](#).
- Invasive species (purple loosestrife, reed canary grass, giant reed, buckthorn, etc.) must be managed against. Refer to [Practice Code 327, Conservation Cover](#) and [Practice Code 314 Brush Management](#).
- Graminoid/herbaceous composition will be determined by habitat classification and floristic assessments of high quality, well protected, like-type reference plant communities found within the same MLRA and on the same or similar soil series.
- On **reconstruction** sites, vegetative communities are to be planted based upon ecological zones of soil moisture and landscape aspect. Refer to Agronomy Technical Note 27, Guidance on Seeding for Pothole, Floodplain, and Other Wetlands.
- Organic surface horizons should not be disturbed and the deposition of mineral sediments within the meadow community must be prevented.

- Impacts of restoration and management should be monitored to ensure that stated ecological objectives are being met.

CONSIDERATIONS FOR BOTH RECONSTRUCTION AND REMNANT RESTORATIONS

It is very rare for a remnant or reconstruction site to house just one habitat class. Several habitat classes are closely associated with one another, separated only by variations in soils, hydrology, and/or landscape aspect.

First and foremost, the use of fire should be prescribed to meet set objectives for the site. In some instances, aggressive use of fire may be warranted to accomplish desired effects; whereas, a break in fire interval may be desired to meet a different objective. Objectives evolve over time; therefore burn prescription should evolve accordingly.

- Burning of sedge meadows hinders succession to a shrub/scrub wetland. Burning sites at least once in 5 years has been shown to encourage forb seed recruitment to the seed bank and contribute to plant community richness.
- Frequent burning may create greater graminoid dominance and the depletion of forb seed in the seed bank.
- Burning during drought conditions may destroy organic soils.
- Sedge and wet meadow graminoid species predominantly spread vegetatively and are little affected by periodic burning.
- Burning removes dense graminoid litter and allows short-lived forb establishment and reproduction; thus helping to maintain forb species within the seed bank.
- Annual forbs increase in frequency the first growing season after a burn while perennial forb frequency increases for two growing seasons after a burn.

- Significant increases in bird use have been recorded after prescribed burns.

Some sedge species may be difficult to establish by seed. Planting plugs, transplanting, or encouraging vegetative spread of existing plants may be required to establish difficult species on the site.

Hemi-parasitic plant species may be included in the seeding plan for reconstructed sites (appendix B).

Mowing or haying during dry spells may help maintain a diverse sedge meadow community by hindering succession to shrub/scrub wetland and by reducing duff.

Sedge meadows occur in areas with soils high in organic content, with low bulk density, and high oxygen and moisture levels.

If organic soils are present, capillary fringe will naturally maintain a water table within 12 inches of the soil surface upon hydrologic restoration.

Sites with mineral soil accretion will require a more aggressive approach to maintain water table levels within 12 inches of the soil surface.

Sites degraded by sedimentation are susceptible to invasion by unwanted vegetation, particularly reed canarygrass, cattail and phragmites.

Sedimentation is greatest at stormwater outfalls, outlet culverts, etc.; therefore creation or maintenance of sedge meadows should not be within close proximity of such structures.

Beaver may be important in creating and maintaining sedge meadows by raising water tables due to the creation of pools and by harvesting large trees that would otherwise evapotranspire copious amounts of groundwater.

Monitor and protect surface and groundwater quality and quantity.

Sedge and Wet Meadow Habitat Classes



Skunk Cabbage Seepage Meadow

Vegetation Characteristics: The skunk cabbage seepage meadow is dominated by herbaceous plants, particularly forbs, with less than 25% graminoid cover and less than 25% tree and shrub cover. When present, sedges are coarse-leaved rather than fine-leaved species.

Site Characteristics: This seepage community can be found on the foot slopes of glacial moraines; ravines, deep glacial melt water-cut river valleys, and stream terraces. This plant community develops around springheads and in broader areas of groundwater discharge where there is a diffuse water flow to the surface. The peat soils are usually less than 0.4 m deep and are seasonally to permanently saturated.

Known Flora of Skunk Cabbage Seepage Meadow

Scientific Name	Common Name	Form	Comments
<u><i>Angelica atropurpurea</i></u>	Purplestem Angelica	Forb	Dominate, Indicator
<u><i>Caltha palustris</i></u>	Yellow Marsh Marigold	Forb	
<u><i>Carex comosa</i></u>	Longhair Sedge	Graminoid	Low coverage
<u><i>Carex lacustris</i></u>	Hairy Sedge	Graminoid	Low coverage
<u><i>Carex stricta</i></u>	Tussock Sedge	Graminoid	Low coverage
<u><i>Carex trichocarpa</i></u>	Hairyfruit Sedge	Graminoid	Low coverage
<u><i>Chelone glabra</i></u>	White Turtlehead	Forb	Eastern Iowa
<u><i>Epilobium coloratum</i></u>	Purpleleaf Willowherb	Forb	
<u><i>Impatiens capensis</i></u>	Jewelweed	Forb	
<u><i>Pedicularis lanceolata</i></u>	Swamp Lousewort	Hemi-parasitic Forb	
<u><i>Pilea pumila</i></u>	Canadian Clearweed	Forb	
<u><i>Saxifraga pensylvanica</i></u>	Eastern Swamp Saxifrage	Forb	Eastern Iowa
<u><i>Symplocarpus foetidus</i></u>	Skunk Cabbage	Forb	Dominant; indicator
<u><i>Thelypteris palustris</i></u>	Eastern Marsh Fern	Fern	Eastern Iowa Fens

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Great Plains Neutral Seep

Vegetation Characteristics: Dominated by hydrophytic plants with small trees rarely present. Emergent hydrophytic forbs may occur in areas with flowing coldwater springs.

Site Characteristics: Occurs on seeps from loess, sand, glacial till, limestone, or siltstone on hill and valley slopes and at the base of bluffs where there is a confining layer of shale, clay, or siltstone. Soils may be shallow to deep sand, muck, or gravel from parent materials of glacial till, loess, aeolian sand, colluvium, or bedrock. Moderately minerotrophic groundwater (6.0-6.9) continually saturates at least a portion of this community and may develop a shallow sedge peat (<30cm) on some areas.

Region: Western Iowa

Known Flora of Great Plains Neutral Seep

Scientific Name	Common Name	Form	Comments
<i>Berula erecta</i>	Cutleaf Waterparsnip	Forb	Coldwater spring & stream associate; Western Iowa
<i>Carex hystericina</i>	Bottlebrush Sedge	Graminoid	predominant
<i>Carex pellita</i>	Wooly Sedge	Graminoid	predominant
<i>Carex</i> spp	Sedge spp	Graminoid	predominant
<i>Epilobium</i> spp	Willowherb spp	Forb	Frequent
<i>Equisetum hyemale</i>	Scouring Rush	Graminoid	predominant
<i>Eupatorium perfoliatum</i>	Boneset	Forb	Frequent
<i>Glyceria striata</i>	Fowl Managrass	Graminoid	Frequent
<i>Impatiens</i> spp	Jewelweeds	Forb	Frequent
<i>Marchantia polymorpha</i>		Liverwort	Frequent
<i>Mimulus glabratus</i>	Roundleaf Monkeyflower	Forb	Coldwater spring & stream associated
<i>Pilea fontana</i>	Lesser Clearweed	Forb	Frequent
<i>Populus deltoides</i>	Eastern Cottonwood	Tree	Rare; Weak to moderately flood tolerant
<i>Rorippa nasturtium-aquaticum</i>	Watercress	Forb	Coldwater spring and stream associate
<i>Salix</i> spp.	Willow spp.	Shrub	Rare
<i>Schoenoplectus acutus</i>	Hardstem Bulrush	Graminoid	Frequent
<i>Schoenoplectus pungens</i>	Common Threesquare	Graminoid	Frequent
<i>Schoenoplectus tabernaemontani</i>	Softstem Bulrush	Graminoid	Frequent
<i>Sparganium eurycarpum</i>	Broadfruit Bur-reed	Graminoid	Frequent
<i>Typha latifolia</i>	Broadleaf Cattail	Graminoid	Dominant
<i>Veronica americana</i>	American Speedwell	Forb	Coldwater spring and stream associate

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Northern Sedge Wet Meadow

Vegetation Characteristics: This community is dominated by coarse leaved sedges (*Carex*) which create a hummocky topography. Shrub cover may reach 25% and submergent vegetation may occur in areas of pooling water.

Site Characteristics: Occurs on floodplains, bays of lakes and streams, ditches and occasionally in isolated basins. Soils are mineral and are influenced by seasonal to semipermanent hydrology. Flooding is variable with up to a meter of standing water one year and little to no flooding in other years.

Known Flora of Northern Sedge Wet Meadow

Scientific Name	Common Name	Form	Comments
<i>Acorus calamus</i>	Calamus	Forb	
<i>Calamagrostis canadensis</i>	Bluejoint	Graminoid	
<i>Campanula aparinoides</i>	Marsh Bellflower	Forb	
<i>Carex aquatilis</i>	Water Sedge	Graminoid	Dominant
<i>Carex lacustris</i>	Hairy Sedge	Graminoid	Dominant
<i>Carex lasiocarpa</i>	Woollyfruit Sedge	Graminoid	Dominant
<i>Carex stricta</i>	Upright Sedge	Graminoid	Locally Dominant
<i>Carex vesicaria</i>	Blister Sedge	Graminoid	Dominant
<i>Comarum palustre</i>	Purple Marshlocks	Forb	
<i>Eleocharis palustris</i>	Common Spikerush	Graminoid	Wetter areas
<i>Equisetum fluviatile</i>	Water Horsetail	Graminoid	Wetter areas
<i>Eupatorium maculatum</i>	Spotted Joe-pye Weed	Forb	
<i>Iris virginica var. shrevei</i>	Shreve's Iris	Forb	
<i>Lycopus uniflorus</i>	Northern Bugleweed	Forb	
<i>Poa palustris</i>	Fowl Bluegrass	Graminoid	
<i>Polygonum amphibium</i>	Water Knotweed	Forb	
<i>Scirpus atrovirens</i>	Green Bulrush	Graminoid	
<i>Scirpus cyperinus</i>	Woolgrass	Graminoid	
<i>Symphotrichum lanceolatum</i>	White Panicle Aster	Forb	

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Awned Sedge Meadow

Vegetation Characteristics: Vegetation within this community is dominated by herbaceous plants 0.5-1.0 meter in height with moderate to high forb diversity. Vegetation cover is high, but varies with hydrology, becoming less dense in dry years. This community is subject to woody encroachment in the absence of fire.

Site Characteristics: Typically found in depressions, basins, and along streams and rivers where several weeks of flooding or standing water may occur each year. May also occur in a band around prairie pothole wetlands. Soils are mineral with temporary to seasonal hydrology.

Known Flora of Awned Sedge Meadow

Scientific Name	Common Name	Form	Comments
<u><i>Alisma triviale</i></u>	Northern Water Plantain	Forb	Associate
<u><i>Carex atherodes</i></u>	Wheat Sedge	Graminoid	Dominant to monotypic
<u><i>Eleocharis palustris</i></u>	Common Spikerush	Graminoid	Associate
<u><i>Glyceria grandis</i></u>	American Mannagrass	Graminoid	Associate on drier stands
<u><i>Mentha arvensis</i></u>	Wild Mint	Forb	Associate
<u><i>Polygonum amphibium</i></u>	Water Knotweed	Forb	Associate
<u><i>Salix</i> spp</u>	Willow spp	Shrub	
<u><i>Scolochloa festucacea</i></u>	Common Rivergrass	Graminoid	Associate
<u><i>Sium suave</i></u>	Hemlock Waterparsnip	Forb	Associate
<u><i>Sparanium eurycarpum</i></u>	Broadfruit Bur-reed	Forb	Associate
<u><i>Symphotrichum lanceolatum</i></u>	White Panicle Aster	Forb	Associate

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Lake Sedge Wet Meadow

Vegetation Characteristics: the lake sedge meadow is dominated by tall sedges with up to 25% shrub coverage.

Site Characteristics: Commonly found on floodplains, shallow bays of lakes and streams, and on upland depressions. Soils are mineral with a seasonal flooding regime.

Known Flora of Lake Sedge Wet Meadow

Scientific Name	Common Name	Form	Comments
<u><i>Calamagrostis canadensis</i></u>	Bluejoint	Graminoid	Common associate
<u><i>Carex lacustris</i></u>	Hairy Sedge	Graminoid	May be mono-dominant
<u><i>Carex stricta</i></u>	Tussock Sedge	Graminoid	Common associate
<u><i>Doellingeria umbellata</i></u>	Parasol Whitetop	Forb	Common associate
<u><i>Eupatorium maculatum</i></u>	Spotted Joe-pye Weed	Forb	Common associate
<u><i>Muhlenbergia glomerata</i></u>	Spiked Muhly	Graminoid	Common associate
<u><i>Sagittaria</i> spp</u>	Arrowhead spp	Forb	Co-dominant
<u><i>Salix petiolaris</i></u>	Meadow Willow	Shrub	
<u><i>Salix</i> spp</u>	Willows	Shrub	
<u><i>Typha latifolia</i></u>	Broadleaf Cattail	Graminoid	Co-dominant

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Bluejoint – Woolly Sedge Meadow

Vegetation Characteristics: This community provides 100% cover, and is dominated by dense 0.3-1 m tall graminoid vegetation with 25% forb coverage. Shrubs are rare in this community type.

Site Characteristics: Found on shallow, level depressions and lowlands with poorly drained sandy, loamy, or silty clay soils. Soils may have a high organic content and a circumneutral to alkaline pH. Hydrology is temporarily to seasonally flooded with several weeks of standing water during each growing season.

Region: Northern Iowa

Known Flora of Bluejoint - Woolly Sedge Wet Meadow

Scientific Name	Common Name	Form	Comments
<u><i>Anemone canadensis</i></u>	Canada Anemone	Forb	
<u><i>Apocynum cannabinum</i></u>	Indianhemp	Forb	
<u><i>Calamagrostis canadensis</i></u>	Bluejoint	Graminoid	
<u><i>Carex buxbaumii</i></u>	Buxbaum's Sedge	Graminoid	
<u><i>Carex pellita</i></u>	Woolly Sedge	Graminoid	
<u><i>Carex sartwellii</i></u>	Sartwell's Sedge	Graminoid	
<u><i>Eleocharis compressa</i></u>	Flatstem Spikerush	Graminoid	
<u><i>Juncus balticus</i></u>	Baltic Rush	Graminoid	
<u><i>Polygonum amphibium</i></u>	Water Knotweed	Forb	
<u><i>Symphotrichum lanceolatum</i></u>	White Panicle Aster	Forb	

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Central Midwest Sedge Meadow

Vegetation Characteristics: This community type exhibits dense coverage dominated by tall (0.5-1.0 m) graminoids and commonly houses forbs. This plant community may grade into freshwater marsh communities complicating delineation at some sites.

Site Characteristics: Found on level floodplains, in bands bordering channels, basins, or marshes. This community occurs on poorly drained silty loam or clay loam formed in alluvium. Hydrology varies from seasonal to semipermanent with inundation throughout much of the growing season. Sites may dry out in late summer.

Known Flora of Central Midwest Sedge Meadow

Scientific Name	Common Name	Form	Comments
<u><i>Apocynum cannabinum</i></u>	Indianhemp	Forb	
<u><i>Carex cristatella</i></u>	Crested Sedge	Graminoid	
<u><i>Carex molesta</i></u>	Troublesome Sedge	Graminoid	
<u><i>Carex pellita</i></u>	Wolly Sedge	Graminoid	
<u><i>Carex stipata</i></u>	Owlfruit Sedge	Graminoid	
<u><i>Carex tribuloides</i></u>	Blunt Broom Sedge	Graminoid	
<u><i>Carex vulpinoidea</i></u>	Fox Sedge	Graminoid	
<u><i>Eleocharis spp</i></u>	Spikerush	Graminoid	
<u><i>Juncus interior</i></u>	Inland Rush	Graminoid	
<u><i>Juncus torreyi</i></u>	Torry's Rush	Graminoid	
<u><i>Leersia oryzoides</i></u>	Rice Cutgrass	Graminoid	Where community borders marsh
<u><i>Lycopus americanus</i></u>	American Water Horehound	Forb	
<u><i>Lythrum alatum</i></u>	Winged Loosestrife	Forb	
<u><i>Scirpus atrovirens</i></u>	Green Bulrush	Graminoid	
<u><i>Scirpus pallidus</i></u>	Cloaked Bulrush	Graminoid	
<u><i>Symphotrichum lanceolatum</i></u>	White Panicle Aster	Forb	
<u><i>Verbena hastata</i></u>	Blue Vervain	Forb	

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Tussock Sedge Meadow

Vegetation Characteristics: Dominated by sedges and grasses with up to 25% shrub coverage. This community may share some of the vegetation characteristics of fens. The tussock sedge meadow is dependant on fire and a stable water table to suppress woody encroachment and succession to a scrub-shrub community.

Site Characteristics: Found along stream valleys, lake margins, and in depressions and channels of glacial outwash. The soils are mineral with a water table at the surface for most of the growing season.

Known Flora of Tussock Sedge Wet Meadow

Scientific Name	Common Name	Form	Comments
<u><i>Anemone canadensis</i></u>	Canada Anemone	Forb	
<u><i>Asclepias incarnata</i></u>	Swamp Milkweed	Forb	
<u><i>Calamagrostis canadensis</i></u>	Bluejoint	Graminoid	Dominant
<u><i>Carex aquatilis</i></u>	Water Sedge	Graminoid	Associate
<u><i>Carex bebbii</i></u>	Bebb's Sedge	Graminoid	Associate
<u><i>Carex lacustris</i></u>	Hairy Sedge	Graminoid	Associate
<u><i>Carex pellita</i></u>	Wooly Sedge	Graminoid	Associate
<u><i>Carex stricta</i></u>	Tussock Sedge	Graminoid	Dominant
<u><i>Eleocharis</i> spp</u>	Spikerush	Graminoid	Associate
<u><i>Equisetum arvense</i></u>	Field Horsetail	Graminoid	
<u><i>Eupatorium maculatum</i></u>	Spotted Joe-pye Weed	Forb	
<u><i>Eupatorium perfoliatum</i></u>	Boneset	Forb	
<u><i>Iris versicolor</i></u>	Harlequin Blueflag	Forb	
<u><i>Juncus</i> spp</u>	Rush spp	Graminoid	Associate
<u><i>Lycopus americanus</i></u>	American Water Horehound	Forb	
<u><i>Solidago canadensis</i></u>	Canada Goldenrod	Forb	
<u><i>Symphotrichum lanceolatum</i></u>	White Panicle Aster	Forb	
<u><i>Typha latifolia</i></u>	Broadleaf Cattail	Graminoid	Associate

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Central Cordgrass Wet Prairie

Vegetation Characteristics: This wet prairie is dominated by a dense stand of 1-2 meter tall graminoids generally intermixed with forbs, small trees and shrubs. Fire and periodic, prolonged flood events maintain this community by suppressing woody invasion.

Site Characteristics: Found in low lying areas frequently flooded in the spring. The soils are deep, fine textured, poorly drained, high in organic content, and saturated for most of the growing season. A perched water table may be present where an impervious layer is impeding permeability.

Known Flora of Central Cordgrass Wet Prairie

Scientific Name	Common Name	Form	Comments
<u><i>Andropogon gerardii</i></u>	Big Bluestem	Graminoid	
<u><i>Asclepias incarnata</i></u>	Swamp Milkweed	Forb	
<u><i>Calamagrostis canadensis</i></u>	Bluejoint	Graminoid	Dominant
<u><i>Carex aquatilis</i></u>	Water Sedge	Graminoid	Common
<u><i>Carex atherodes</i></u>	Wheat Sedge	Graminoid	Common
<u><i>Carex lacustris</i></u>	Hairy Sedge	Graminoid	Common
<u><i>Carex pellita</i></u>	Wooly Sedge	Graminoid	Common
<u><i>Carex</i> spp</u>	Sedge	Graminoid	Common
<u><i>Fragaria virginiana</i></u>	Virginia Strawberry	Forb	
<u><i>Galium boreale</i></u>	Northern Bedstraw	Forb	
<u><i>Helianthus grosseserratus</i></u>	Sawtooth Sunflower	Forb	
<u><i>Iris versicolor</i></u>	Harlequin Blueflag	Forb	
<u><i>Leersia oryzoides</i></u>	Rice Cutgrass	Graminoid	
<u><i>Liatris pycnostachya</i></u>	Prairie Blazingstar	Forb	
<u><i>Lythrum alatum</i></u>	Winged Loosestrife	Forb	
<u><i>Oxypolis rigidior</i></u>	Stiff Cowbane	Forb	
<u><i>Panicum virgatum</i></u>	Switchgrass	Graminoid	
<u><i>Pycnanthemum virginianum</i></u>	Virginia Mountain Mint	Forb	
<u><i>Sium suave</i></u>	Hemlock Waterparsnip	Forb	
<u><i>Solidago gigantea</i></u>	Tall Goldenrod	Forb	
<u><i>Spartina pectinata</i></u>	Prairie Cordgrass	Graminoid	Dominant
<u><i>Stachys pilosa</i></u>	Hairy Hedgenettle	Forb	
<u><i>Symphotrichum novae-angliae</i></u>	New England Aster	Forb	
<u><i>Thalictrum dasycarpum</i></u>	Purple Meadowrue	Forb	
<u><i>Veronicastrum virginicum</i></u>	Culver's Root	Forb	

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Northern Cordgrass Wet Prairie

Vegetation Characteristics: The plant community of this wet prairie is dominated by graminoids, particularly fine textured grasses, low sedges, and rushes, and includes a high diversity of forbs.

Site Characteristics: Found in bands around seasonal and temporary ponds or along floodplains and terraces of streams and rivers. Soils are deep, poorly drained clay or silty loams with an obvious gleyed horizon. These soils may contain up to 20% clay and have a pH of 5.4-7.7. These meadows are usually found in situations with seasonal inundation and moist soils ponding water for several weeks during wet years.

Known Flora of Northern Cordgrass Wet Prairie

Scientific Name	Common Name	Form	Comments
<u><i>Apocynum cannabinum</i></u>	Indianhemp	Forb	
<u><i>Calamagrostis canadensis</i></u>	Bluejoint	Graminoid	Common
<u><i>Carex pellita</i></u>	Wooly Sedge	Graminoid	Common
<u><i>Carex praegracilis</i></u>	Clustered Field Sedge	Graminoid	Common
<u><i>Carex sartwellii</i></u>	Sartwell's Sedge	Graminoid	Common
<u><i>Carex stricta</i></u>	Tussock Sedge	Graminoid	Common
<u><i>Juncus balticus</i></u>	Baltic Rush	Graminoid	
<u><i>Liatris pycnostachya</i></u>	Prairie Blazingstar	Forb	
<u><i>Poa palustris</i></u>	Fowl Bluegrass	Graminoid	Common
<u><i>Spartina pectinata</i></u>	Prairie Cordgrass	Graminoid	May form monoculture
<u><i>Stachys pilosa</i></u>	Hairy Hedgenettle	Forb	
<u><i>Symphotrichum lanceolatum</i></u>	White Panicle Aster	Forb	Common
<u><i>Teucrium canadense</i></u>	American Germander	Forb	

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Forest and Woodland Habitat Criteria and Considerations

RECONSTRUCTION CRITERIA FOR BOTH UPLAND AND BOTTOMLAND COMMUNITIES:

- Tree establishment may occur by direct seeding, planting of seedlings or cuttings, or by transplanting saplings or larger trees. Refer to [Practice Code 666 Forest Stand Improvement](#) and [Tree/Shrub Establishment, Practice Code 612](#)
- Oak acorns (pin, bur, and swamp white) should be planted 1-2 inches deep at a rate of 2 ½ bu/ac. If planted in rows, row spacing should be 8-12 feet apart. To obtain a more natural appearance, acorns may be scattered either by hand or mechanically.
- Bare root seedlings should be a minimum of 18 inches tall with a root collar of no less than ¼ inch thick.
- If working in an existing stand, use of heavy equipment should be kept to a minimum and only occur during the dry season or while the ground is frozen to minimize soil compaction and erosion.
- Trees should be protected from herbivores such as deer, raccoons, beaver, and small rodents during the establishment period.
- Understory herbaceous strata reconstruction/restoration should be included in the restoration plan. Shade dependant herbaceous communities should not be planted until suitable canopy cover has developed.

Additional criteria for bottomland reconstructions:

- Restore surface contours and ridge swale topography on bottomland sites.
- Bottomland forests house an assortment of hydrologic regimes and soils. Boundaries of these “patches” must be identified to ensure that appropriate vegetation is established within each.

REMNANT RESTORATION CRITERIA:

- Restore site hydrology and vernal pools where appropriate.
- Assess the tree canopy, sub-canopy, shrub, herbaceous and littler strata to determine stand stage and whether management is needed to improve habitat quality of the site or to meet the definition of a desired habitat class.
- Methods of harvest and thinning will be prescribed and applied to meet predetermined ecological objective(s).

RESTORATION CONSIDERATIONS:

Plantings are most susceptible to climatic and environmental extremes (temperature, precipitation, flooding, drought, etc) for the first two years after planting.

Most deciduous forests have well developed vertical strata: the uppermost dense canopy, an open subcanopy of immature trees and mature small trees, a shrub layer, a forest associated herb layer, and a surface/litter layer including mosses, lichens and organic debris. Deciduous woodlands may exhibit all of the aforementioned strata, but the mature canopy is more open, the subcanopy and shrub layers may be lacking, and the herbaceous community consists of both forest and prairie associated species.

Forest stratification is more apparent in mature or moist soil forests than in young, dry, or very wet forests.

Sites with saplings similar to the dominant canopy trees are self reproducing forests with excellent restoration and management potential.

Stand management may include thinning and harvesting for uneven or even-aged stands. Methods of harvesting and thinning vary greatly

in their impacts on floral and faunal communities; therefore, guidance from a forestry resource professional should be sought when developing management plans to ensure desired results will be achieved. If included in a management plan, clear cuts should be kept small (<2 acres).

Gaps in tree canopy support successional, light dependent understory species and the succession of tree species such as oak.

Vegetation may be planted in various patterns; regular, evenly spaced (manmade appearance); clumped (especially rhizomatous species); or random.

Red cedar indicates past habitat disturbance such as pasture use.

Oak-hickory forests give way to maple, ironwood, bitternut hickory, or other shade tolerant species if disturbance (fire, thinning, etc.) is ceased.

Sycamore, maple, elm and ash species commonly colonize reconstruction sites naturally. Heavy seeded species such as oak, walnut and hickory have weak dispersal mechanisms and may require planting.

Where a quick turn-around is desired to provide wildlife habitat, a nursery crop of fast growing trees such as cottonwood or sycamore may be included in seeding plans to rapidly establish vertical structure to the reconstruction site within a few years time. This may be especially important where the objective is to provide habitat for Neotropical migrants. Careful planning and management should occur when using this technique. The slower-growing, more desirable tree species should not be hindered by the nurse crop. Monitor the stand in order to determine when to release the desirable species through thinning or selective removal of the nurse crop.

Forests restored along streams should include stream restoration to ensure hydrologic restoration is met. In addition, leaf litter drives energy transfer and biotic communities within forest streams and pools.

Residue coverage can significantly increase tree survival and growth in reconstructions. Residue must be applied thick enough to prevent accompanying undesirable seed from germinating.

If invasive plant species are present (Reed Canary grass, buckthorn, bush honeysuckle, garlic mustard, etc.) they should be immediately eradicated. Eradication of exotic/invasive plants should occur prior to forest manipulation.

First and foremost, the use of fire should be prescribed to meet set objectives for the site. Objectives evolve over time; therefore burn prescription should evolve accordingly. In some instances, aggressive use of fire may be warranted to accomplish desired effects such as woodland community establishment; whereas, a break in fire interval may be desired in order to allow for oak seedling recruitment and/or forest community establishment. Below are considerations to keep in mind when planning to use prescribed fire as a management tool:

- Frequent fires can damage and kill young white oaks and recurrent fire at less than 8-year intervals could eliminate white oak regeneration within the area until a break in the fire interval occurs.
- A fire of average intensity kills oak acorns due to their high moisture content.
- Soils in annually burned oak-hickory forests were found to have reduced nutrient availability, water infiltration, earthworm and insect activity, and increased compaction.
- Historically, *oak-hickory forest* maintenance fires occurred on an intermediate frequency of 50-100 years which promoted the dominance and stability of oak species. Fire intervals for restoration purposes may be significantly

shorter, and are to be determined by site assessments both pre and post treatment.

- Historic fire intervals for maintaining *gallery woodlands* have been estimated to range between 23-40 years. Fire intervals for restoration purposes may be significantly shorter, and are to be determined by site assessments both pre and post treatment.
- Several fires of moderate to high severity may be required to select against fire prone competitors prior to the encouragement of oak regeneration early in a restoration.

Mature stands provide a great deal of cavity and den habitat for wildlife. Removal of culls and snags or management for even-age stands may have detrimental impacts on cavity nesting species.

The presence of downed woody debris and leaf litter in various stages of decay is an important habitat attribute for many woodland/forest associated wildlife species.

Impacts of restoration and management should be monitored to ensure that stated ecological objectives are being met.

Specific Considerations for Bottomland Restorations:

In general, floodplain forests are mesic communities, becoming hydric late-winter through mid-summer.

Topographic positions within floodplains include sloughs, natural levees, lower floodplain or first bottoms, terraces, and slopes, each hosting unique vegetative communities in a montage of patterns.

Climate, hydrology, and soils are the most important abiotic factors to consider when restoring bottomland forests.

Most bottomland forest trees will not grow in soils with bulk densities exceeding 1.4 g/cm^3

Fire should not be used as a management tool to restore/manage bottomland forest types.

Bottomland Forest Habitat Classes



Pin Oak Mixed Hardwood Forest

Vegetation Characteristics: this community is dominated by oaks which make up to 25% of the forest canopy. The canopy of this forest is open, supporting a variable shrub, vine, and herbaceous ground layer.

Site Characteristics: This forest community is found on unglaciated, flat, poorly drained terraces that experience infrequent flooding or within upland swales. These sites are seasonally flooded and have seasonally saturated soils.

Known Flora of Pin Oak Mixed Hardwood Forest

Scientific Name	Common Name	Form	Comments
<u><i>Acer saccharinum</i></u>	Silver Maple	Tree	Moderately flood tolerant
<u><i>Alisma subcordatum</i></u>	American Water Plantain	Forb	
<u><i>Betula nigra</i></u>	River Birch	Tree	Moderately flood tolerant
<u><i>Carex squarrosa</i></u>	Squarrose Sedge	Graminoid	
<u><i>Cornus</i> spp</u>	Dogwood spp	Shrub	
<u><i>Eleocharis</i> spp</u>	Spikerush spp	Graminoid	
<u><i>Juncus effusus</i></u>	Common Rush	Graminoid	
<u><i>Ludwigia alternifolia</i></u>	Seedbox	Forb	
<u><i>Luzula</i> spp</u>	Woodrush spp	Graminoid	
<u><i>Lycopus virginicus</i></u>	Virginia Water Horehound	Forb	
<u><i>Parthenocissus quinquefolia</i></u>	Virginia Creeper	Vine	
<u><i>Penthorum sedoides</i></u>	Ditch Stonecrop	Forb	
<u><i>Polygonum sagittatum</i></u>	Arrowleaf Tearthumb	Forb	
<u><i>Quercus bicolor</i></u>	Swamp White Oak	Tree	Associate; Moderately flood tolerant
<u><i>Quercus macrocarpa</i></u>	Bur Oak	Tree	Flood intolerant
<u><i>Quercus palustris</i></u>	Pin Oak	Tree	Dominant; Moderately flood tolerant
<u><i>Quercus rubra</i></u>	Northern Red Oak	Tree	Shade intolerant
<u><i>Sambucus nigra ssp. canadensis</i></u>	American Elderberry	Shrub	
<u><i>Scirpus atrovirens</i></u>	Dark Green Bulrush	Graminoid	

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Silver Maple – American Elm – Eastern Cottonwood Forest

Vegetation Characteristics: Community structure and composition of this forest is dependant upon flooding regimes. Generally, these forests have a closed canopy with silver maple representing over 50% of the canopy coverage. The shrub/sapling layer is open with less than 25 % coverage with woody and herbaceous vines prominent. The ground layer is dominated by herbaceous grasses, forbs and ferns, with yellow loosestrifes (*Lysimachia* spp.), reed canarygrass (*Phalaris arundinacea*), Nepalese browntop (*Microstegium vimineum*), and/or Japanese honeysuckle (*Lonicera japonica*) commonly invading degraded sites.

Site Characteristics: This forest community has been found along major rivers and small perennial streams on temporarily flooded, well drained, sandy soils. Loamy soils may be inhabited in bottomland areas and on levees that experience infrequent flooding. This forest community has also been found growing in deep silts on stable sites along rivers. This forest community experiences annual flooding of no more than a few weeks in average years; no flooding in dry years; or extensive flash flooding in wet years. The influence of past flooding is evident via debris on the forest floor and ice scars on tree trunks. Flood events also create abandoned channels and pools that pond water throughout this forest.

Known Flora of Silver Maple - American Elm - Eastern Cottonwood Forest

Scientific Name	Common Name	Form	Comments
<i>Acer negundo</i>	Boxelder	Tree	Co-dominant; Moderately flood tolerant
<i>Acer saccharinum</i>	Silver Maple	Tree	Dominant; Moderately flood tolerant
<i>Amphicarpaea bracteata</i>	American Hogpeanut	Forb/Legume	
<i>Apios americana</i>	Groundnut	Forb/Legume	
<i>Betula nigra</i>	River Birch	Tree	Co-dominant; Moderately flood tolerant
<i>Boehmeria cylindrica</i>	Smallspike False Nettle	Forb	
<i>Celtis occidentalis</i>	Common Hackberry	Tree	Co-dominant; Moderately flood tolerant
<i>Echinocystis lobata</i>	Wild Cucumber	Forb	
<i>Elymus virginicus</i>	Virginia Wild Rye	Graminoid	
<i>Fraxinus pennsylvanica</i>	Green Ash	Tree	Co-dominant; moderate flood tolerance
<i>Impatiens pallida</i>	Pale Touch-me-not	Forb	
<i>Laportea canadensis</i>	Canadian Woodnettle	Forb	
<i>Lindera benzoin</i>	Northern Spicebush	Shrub/tree	
<i>Mattencia struthiopteris</i>	Ostrich Fern	Fern	
<i>Onoclea sensibilis</i>	Sensitive Fern	Fern	
<i>Parthenocissus quinquefolia</i>	Virginia Creeper	Vine	
<i>Pilea pumila</i>	Canadian Clearweed	Forb	
<i>Platanus occidentalis</i>	American Sycamore	Tree	Co-dominant; moderately flood tolerant
<i>Populus deltoides</i>	Eastern Cottonwood	Tree	Co-dominant; weak to moderately flood tolerant
<i>Salix nigra</i>	Black Willow	Shrub/tree	Co-dominant; Flood Tolerant
<i>Sambucus nigra ssp. canadensis</i>	American Elderberry	Shrub/tree	
<i>Symphotrichum lateriflorum</i>	White Panicle Aster	Forb	
<i>Ulmus americana</i>	American Elm	Tree	Co-dominant; moderately flood tolerant
<i>Ulmus rubra</i>	Slippery Elm	Tree	Co-dominant; moderately flood tolerant
<i>Urtica dioica</i>	Stinging Nettle	Forb	
<i>Vitis riparia</i>	Riverbank Grape	Vine	

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Central Green Ash – Elm – Walnut Forest

Vegetation Characteristics: this forest may have an open to closed canopy with both a shrub and herbaceous layer.

Site Characteristics: Found on upper floodplain terraces of streams and rivers and within ravines in the draws of upland habitats. Soils are moderately well drained to poorly drained.

Known Flora of Central Green Ash - Elm - Hackberry Forest

Scientific Name	Common Name	Form	Comments
<u><i>Acer saccharinum</i></u>	Silver Maple	Tree	Moderately flood tolerant
<u><i>Carya laciniosa</i></u>	Shellbark Hickory	Tree	Southern Iowa
<u><i>Celtis occidentalis</i></u>	Common Hackberry	Tree	Dominant; moderately flood tolerant
<u><i>Cornus drummondii</i></u>	Roughleaf Dogwood	Shrub	Flood tolerant
<u><i>Elymus virginicus</i></u>	Virginia Wild Rye	Graminoid	
<u><i>Festuca subverticillata</i></u>	Nodding Fescue	Graminoid	
<u><i>Fraxinus pennsylvanica</i></u>	Green Ash	Tree	Dominant, moderate flood tolerance
<u><i>Galium aparine</i></u>	Stickywilly	Forb	
<u><i>Geum canadense</i></u>	White Avens	Forb	
<u><i>Juglans nigra</i></u>	Black Walnut	Tree	Well drained soils
<u><i>Laportea canadensis</i></u>	Canadian Woodnettle	Forb	
<u><i>Parthenocissus vitacea</i></u>	Woodbine	Vine	
<u><i>Populus deltoides</i></u>	Eastern Cottonwood	Tree	Weak to moderately flood tolerant
<u><i>Ribes missouriense</i></u>	Missouri Gooseberry	Shrub	
<u><i>Smilax tamnoides</i></u>	Bristly Greenbrier	Vine	
<u><i>Symphoricarpos occidentalis</i></u>	Western Snowberry	Shrub	
<u><i>Tilia americana</i></u>	American Basswood	Tree	
<u><i>Toxicodendron radicans</i></u>	Poison Ivy	Vine	
<u><i>Ulmus americana</i></u>	American Elm	Tree	Dominant; Moderately flood tolerant
<u><i>Ulmus rubra</i></u>	Slippery Elm	Tree	Subcanopy; moderately flood tolerant
<u><i>Vitis riparia</i></u>	Riverbank Grape	Vine	
<u><i>Zanthoxylum americanum</i></u>	Common Pricklyash	Tree	

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Cottonwood-Silver Maple-Black Willow Forest

Vegetation Characteristics: Limited tree diversity is found within this forest due to the deposition and scouring of sediments of frequent floods. The canopy cover is closed with a subcanopy dominated by a few shrub species if not completely black willow. The herbaceous layer is commonly sparse and patchy due to frequent inundation, although a lush ground layer may be found on some sites.

Site Characteristics: Found adjacent to rivers, lakes, streams, and frequently flooded, low, wet depressions within floodplains. This is an early successional forest community maintained by frequent flooding which forms newly deposited sandbars, front land ridges and well drained flats along major rivers. Flooding and/or ponding of the soils in late winter and early spring is prolonged.

Known Flora of Cottonwood - Black Willow Forest

Scientific Name	Common Name	Form	Comments
<u><i>Acer negundo</i></u>	Boxelder	Tree	Common; Moderately flood tolerant
<u><i>Acer saccharinum</i></u>	Silver Maple	Tree	Common; Moderately flood tolerant
<u><i>Aster spp</i></u>	Aster spp	Forb	
<u><i>Bidens spp</i></u>	Sticktight spp	Forb	
<u><i>Carex spp</i></u>	Sedge spp	Graminoid	
<u><i>Fraxinus pennsylvanica</i></u>	Green Ash	Tree	Common; Moderate flood tolerance
<u><i>Leersia oryzoides</i></u>	Rice Cutgrass	Graminoid	
<u><i>Platanus occidentalis</i></u>	American Sycamore	Tree	Common; moderately flood tolerant
<u><i>Populus deltoides</i></u>	Eastern Cottonwood	Tree	Dominant; weak to moderately flood tolerant
<u><i>Salix nigra</i></u>	Black Willow	Tree	Dominant; Flood Tolerant
<u><i>Ulmus americana</i></u>	American Elm	Tree	Common; moderately flood tolerant
<u><i>Urtica dioica</i></u>	Stinging Nettle	Forb	

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Bur Oak – Swamp White Oak Mixed Bottomland Forest

Vegetation Characteristics: Were historically maintained with a woodland structure due to fire.

Site Characteristics: This forest community is restricted to river bottoms, low terraces, and low slopes along river floodplains. Stands are found in wet-mesic bottomland habitats.

Known Flora of Bur Oak – Swamp White Oak Mixed Bottomland Forest

Scientific Name	Common Name	Form	Comments
<u>Boehmeria cylindrica</u>	Bog hemp	Forb	Herbaceous Layer
<u>Carex spp.</u>	True Sedges	Graminoid	Herbaceous Layer, Dominant
<u>Carya illinoensis</u>	Pecan	Tree	Canopy, Associate
<u>Carya laciniosa</u>	Shellbark Hickory	Tree	Canopy, Co-dominant, Weakly flood tolerant
<u>Cinna arundinacea</u>	Wood reed	Graminoid	Herbaceous Layer
<u>Fraxinus pennsylvanica</u>	Green Ash	Tree	Canopy, Associate , Moderately flood tolerance
<u>Leersia oryzoides</u>	Rice cut-grass	Graminoid	Herbaceous Layer
<u>Leersia virginica</u>	Whitegrass	Graminoid	Herbaceous Layer
<u>Populus deltoides</u>	Cottonwood	Tree	Canopy, Associate
<u>Quercus bicolor</u>	Swamp White Oak	Tree	Canopy, Dominant , Moderately flood tolerant
<u>Quercus macrocarpa</u>	Bur Oak	Tree	Canopy, Dominant , Flood intolerant
<u>Toxicodendron radicans</u>	Poison ivy	Woody Vine	Vine Component
<u>Ulmus americana</u>	American Elm	Tree	Canopy, Associate , Moderately flood tolerant
<u>Urtica sessilifolia</u>	Sessile-leaved bellwort	Forb	Herbaceous Layer

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River Birch – Sycamore Forest

Vegetation Characteristics: This is a fast-growing, short-lived, shade-tolerant forest community with a wide range of canopy species, including both bottomland and mesophytic species with swamp species inhabiting poorly drained areas. River birch comprises 50% or more of the canopy cover within this community type. Due to the effects of frequent, fast, short duration flooding the understory is open with a high percentage of standing dead trees and snags. This community commonly blends indistinguishably with adjacent forest types. River birch proliferates in areas where the soils are at field capacity throughout the year. Sycamore are found in areas that do not flood for more than two consecutive weeks.

Site Characteristics: Found on levees, along small rivers and streams, and on slightly elevated flats behind terraces with minimal to no history of disturbance. Growing within the alluvial floodplains of small streams and rivers this forest community is subject to seasonal inundation or saturation for no more than 12-25% of the year. Flooding events occur in the spring and early summer with a 51-100% frequency and are of short duration.

Known Flora of River Birch – Sycamore Forest

Scientific Name	Common Name	Form	Comments
<u><i>Acer negundo</i></u>	Boxelder	Tree	Moderately flood tolerant
<u><i>Arisaema dracontium</i></u>	Green Dragon	Forb	
<u><i>Betula nigra</i></u>	River Birch	Tree	Dominant; prefers acidic soils; Moderately flood tolerant
<u><i>Fraxinus pennsylvanica</i></u>	Green Ash	Tree	Moderately flood tolerant
<u><i>Impatiens capensis</i></u>	Jewelweed	Forb	
<u><i>Juglans nigra</i></u>	Black Walnut	Tree	
<u><i>Pilea pumila</i></u>	Canadian Clearweed	Forb	
<u><i>Platanus occidentalis</i></u>	American Sycamore	Tree	Dominant; Moderately flood tolerant
<u><i>Prunus serotina</i></u>	Black Cherry	Tree	Flood intolerant
<u><i>Quercus bicolor</i></u>	Swamp White Oak	Tree	
<u><i>Quercus palustris</i></u>	Pin Oak	Tree	Moderately flood tolerant
<u><i>Symphotrichum ontarione</i></u>	Bottomland Aster	Forb	Moderately flood tolerant
<u><i>Ulmus americana</i></u>	American Elm	Tree	Moderately flood tolerant

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Cottonwood Floodplain Woodland

Vegetation Characteristics: In this woodland community type the overstory of tall to medium trees rises above a ground layer of mid to tall grasses and forbs similar to those found in wet-mesic to wet prairies.

Site Characteristics: This palustrine woodland community type is found within the floodplains of streams and rivers where water tables are near the surface and standing water ponds in depressions in the spring. Soils are deep sandy loams to sandy, somewhat poorly drained soils derived from alluvium.

Region: Lower Missouri River and tributaries

Known Flora of Cottonwood Floodplain Woodland

Scientific Name	Common Name	Form	Comments
<u><i>Acer negundo</i></u>	Boxelder	Tree	Moderately flood tolerant
<u><i>Andropogon gerardii</i></u>	Big Bluestem	Graminoid	
<u><i>Carya illinoensis</i></u>	Pecan	Tree	Weakly flood tolerant
<u><i>Fraxinus pennsylvanica</i></u>	Green Ash	Tree	Moderate flood tolerance
<u><i>Panicum virgatum</i></u>	Switchgrass	Graminoid	
<u><i>Populus deltoides</i></u>	Eastern Cottonwood	Tree	Dominant. Weak to moderately flood tolerant
<u><i>Quercus palustris</i></u>	Pin Oak	Tree	Moderately flood tolerant
<u><i>Salix nigra</i></u>	Black Willow	Tree	Flood Tolerant
<u><i>Spartina pectinata</i></u>	Prairie Cordgrass	Graminoid	
<u><i>Ulmus americana</i></u>	American Elm	Tree	Moderately flood tolerant

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Upland Forest and Woodland Habitat Classes



Northern Bur Oak Forest

Vegetation Characteristics: this is a bur oak dominated forest intermixed with shade tolerant tree species forming a closed canopy. There is a prevalent shrub layer commonly dominated by dogwood (*Cornus spp.*) and a sparse herbaceous layer.

Site Characteristics: this forest community is found along draws and bluffs on gentle to steep slopes where historically maintained firebreaks protected this forest from adjacent tallgrass prairie fires. Typical soils of the northern bur oak forest include silt and sand loams formed in loess and glacial till.

Known Flora of Northern Bur Oak Forest

Scientific Name	Common Name	Form	Comments
<i>Amelanchier alnifolia</i>	Saskatoon Serviceberry	Shrub	
<i>Aralia nudicaulis</i>	Wild Sarsaparilla	Shrub	
<i>Carex blanda</i>	Eastern Woodland Sedge	Graminoid	
<i>Celastrus scandens</i>	American Bittersweet	Vine	
<i>Celtis occidentalis</i>	Common Hackberry	Tree	Moderately shade tolerant
<i>Cornus drummondii</i>	Roughleaf Dogwood	Shrub	Shade tolerant, dominant
<i>Elymus villosus</i>	Hairy Wildrye	Graminoid	
<i>Fraxinus pennsylvanica</i>	Green Ash	Tree	Shade intolerant
<i>Galium boreale</i>	Northern Bedstraw	Forb	
<i>Geum canadense</i>	White Snakeroot	Forb	
<i>Maianthemum stellatum</i>	Starry False Lily of the Valley	Forb	
<i>Osmorhiza longistylis</i>	Longstyle Sweetroot	Forb	
<i>Parthenocissus quinquefolia</i>	Virginia Creeper	Vine	
<i>Polygonatum biflorum</i>	Smooth Solomon's Seal	Forb	
<i>Populus tremuloides</i>	Quaking Aspen	Tree	
<i>Quercus macrocarpa</i>	Bur Oak	Tree	Dominant. Weakly shade tolerant
<i>Quercus rubra</i>	Northern Red Oak	Tree	
<i>Symphoricarpos occidentalis</i>	Western Snowberry	Shrub	
<i>Symphoricarpos orbiculatus</i>	Coralberry	Shrub	
<i>Tilia americana</i>	American Basswood	Tree	
<i>Toxicodendron radicans</i>	Poison Ivy	Vine	
<i>Ulmus americana</i>	American Elm	Tree	Moderately shade tolerant
<i>Ulmus rubra</i>	Slippery Elm	Tree	Shade Tolerant
<i>Viola sororia</i>	Common Blue Violet	Forb	
<i>Zanthoxylum americanum</i>	Common Pricklyash	Shrub	

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Swamp White Oak Woodland

Vegetation Characteristics: the swamp white oak woodland has an open canopy dominated by swamp white oak with codominant bur oak. Where drier soils are present within this community other oak species (*Quercus* spp.) may be present.

Site Characteristics: this is a mesic to wet-mesic woodland community found on silt loams underlined by glacial till or loess.

Known Flora of Swamp White Oak Woodland

Scientific Name	Common Name	Form	Comments
<u><i>Andropogon gerardii</i></u>	Big bluestem	Graminoid	Herbaceous Layer
<u><i>Carex pensylvanica</i></u>	Pennsylvania oak sedge	Graminoid	Herbaceous Layer
<u><i>Ceanothus herbaceus</i></u>	Redroot	Subshrub	Shrub Layer
<u><i>Celtis occidentalis</i></u>	Hackberry	Tree	Canopy, Associate
<u><i>Cornus racemosa</i></u>	Gray dogwood	Shrub	Shrub Layer
<u><i>Corylus americana</i></u>	Hazelnut	Shrub	Shrub Layer
<u><i>Elymus virginicus</i></u>	Virginia Wild Rye	Graminoid	Herbaceous Layer
<u><i>Euonymus atropurpurea</i></u>	Eastern Wahoo	Shrub	Shrub Layer
<u><i>Laportea canadensis</i></u>	Wood nettle	Forb	Herbaceous Layer
<u><i>Platanus occidentalis</i></u>	Sycamore	Tree	Canopy, Associate
<u><i>Prunus</i> spp.</u>		Shrub	Shrub Layer
<u><i>Quercus alba</i></u>	White Oak	Tree	Canopy, Associate
<u><i>Quercus bicolor</i></u>	Swamp White Oak	Tree	Canopy, Dominant
<u><i>Quercus macrocarpa</i></u>	Bur Oak	Tree	Canopy, Co-dominant
<u><i>Quercus rubra</i></u>	Northern Red Oak	Tree	Canopy, Associate
<u><i>Quercus stellata</i></u>	Post Oak	Tree	Canopy, Associate
<u><i>Sorghastrum nutans</i></u>	Indian grass	Graminoid	Herbaceous Layer
<u><i>Ulmus americana</i></u>	American Elm	Tree	Canopy, Associate

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Central Maple Basswood Forest

Vegetation Characteristics: This forest is dominated by shade tolerant trees in areas protected from fire. This forest type has a variable shrub layer and a species rich herbaceous layer.

Site Characteristics: found on valley slopes or in bottoms on north or east facing slopes of moderately to well drained soils. Soils are moderate to deep silt and clay loams which formed from parent materials of glacial till, loess, sandstone, or limestone.

Region: Northeast Iowa

Known Flora of Central Maple – Basswood Forest

Scientific Name	Common Name	Form	Comments
<u><i>Acer nigrum</i></u>	Black Maple	Tree	Dominant
<u><i>Acer saccharum</i></u>	Sugar Maple	Tree	Dominant
<u><i>Adiantum pedatum</i></u>	Northern Maidenhair Fern	Fern	
<u><i>Arisaema triphyllum</i></u>	Jack in the Pulpit	Forb	
<u><i>Carpinus caroliniana</i></u>	American Hornbeam	Tree	
<u><i>Carya cordiformis</i></u>	Bitternut Hickory	Tree	Associate
<u><i>Celtis occidentalis</i></u>	Common Hackberry	Tree	Associate
<u><i>Erythronium albidum</i></u>	White Fawnlily	Forb	
<u><i>Fraxinus pennsylvanica</i></u>	Green Ash	Tree	Associate
<u><i>Geum canadense</i></u>	White Avens	Forb	
<u><i>Impatiens pallida</i></u>	Pale Touch-me-not	Forb	
<u><i>Juglans nigra</i></u>	Black Walnut	Tree	Associate
<u><i>Polygonatum biflorum</i></u>	Smooth Solomon's Seal	Forb	
<u><i>Prunus virginiana</i></u>	Chokecherry	Shrub	
<u><i>Quercus rubra</i></u>	Northern Red Oak	Tree	Dominant
<u><i>Sambucus nigra ssp. canadensis</i></u>	Common Elderberry	Shrub	
<u><i>Sanicula spp.</i></u>	Snakeroot	Forb	
<u><i>Staphylea trifolia</i></u>	American Bladdernut	Tree	
<u><i>Thalictrum dioicum</i></u>	Early Meadow-rue	Forb	
<u><i>Tilia americana</i></u>	American Basswood	Tree	Dominant
<u><i>Viburnum prunifolium</i></u>	Blackhaw	Shrub	

If accessing an electronic version of this specification and there is an internet connection, clicking on the blue underlined text will link to the USDA Plants Database species profile.

Post Oak Woodland

Vegetation Characteristics: this woodland class is dominated by oaks with a diverse mix of prairie and forest flora. Prairie grasses are more prevalent in open stands, especially in woodlands exposed to periodic fire. These woodlands were historically maintained by frequent fire and/or xeric slope conditions.

Site Characteristics: Found on steep slopes and arrow ridges on xeric soils.

Region: Southeast Iowa

Known Flora of Post Oak Woodlands

Scientific Name	Common Name	Form	Comments
<u><i>Carya alba</i></u>	Mockernut Hickory	Tree	Associate
<u><i>Carya ovata</i></u>	Shagbark Hickory	Tree	Associate
<u><i>Prunus serotina</i></u>	Black Cherry	Tree	Sapling layer
<u><i>Quercus stellata</i></u>	Post Oak	Tree	Dominant
<u><i>Quercus velutina</i></u>	Black Oak	Tree	Dominant
<u><i>Sassafras albidum</i></u>	Sassafras	Tree	Sapling layer

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White Oak-Hickory Forest

Vegetation Characteristics: this forest community is dominated by tall oak and hickory species and lacks a subcanopy. The shrub layer is prevalent, rarely exceeding 2 meters in height and the herbaceous layer is well developed consisting of woodland associated flora.

Site Characteristics: typically found of flat uplands or on gently to moderately steep upland and valley slopes. Soils range from poorly drained to well drained silt, clay, or loam originating from loess, glacial till, limestone, shale, or sandstone.

Known Flora of White Oak – Hickory Forest

Scientific Name	Common Name	Form	Comments
<i>Amelanchier alnifolia</i>	Serviceberry	Shrub	
<i>Aquilegia canadensis</i>	Wild Columbine	Forb	
<i>Carya cordiformis</i>	Bitternut Hickory	Tree	Dominant
<i>Carya ovata</i>	Shagbark Hickory	Tree	Dominant
<i>Cercis canadensis</i>	Eastern Redbud	Shrub	
<i>Cornus drummondii</i>	Roughleaf Dogwood	Shrub	
<i>Dicentra cucullaria</i>	Dutchman's Breeches	Forb	
<i>Erythronium albidum</i>	White Fawnlilly	Forb	
<i>Hydrophyllum virginianum</i>	Virginia Waterleaf	Forb	
<i>Laportea canadensis</i>	Canadian Woodnettle	Forb	
<i>Quercus alba</i>	White Oak	Tree	Dominant
<i>Quercus macrocarpa</i>	Bur Oak	Tree	
<i>Quercus rubra</i>	Northern Red Oak	Tree	Dominant
<i>Quercus velutina</i>	Black Oak	Tree	Dominant
<i>Ribes spp</i>	Currant	Shrub	
<i>Smilax tamnoides</i>	Greenbrier	Vine	
<i>Symphoricarpos orbiculatus</i>	Coralberry	Shrub	
<i>Tilia americana</i>	American Basswood	Tree	Dominant
<i>Verbena urticifolia</i>	White Vervain	Forb	

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Midwestern White Oak – Red Oak Forest

Vegetation Characteristics: this oak dominated forest generally has a closed canopy (>80%), but may be variable depending on age and site history. The shrub and herbaceous layers can be variable, with more dense cover in areas receiving sunlight through openings in the tree canopy.

Site Characteristics: found on rolling topography on a wide variety of dry-mesic soils.

Known Flora of Midwestern White Oak – Red Oak Woodlands

Scientific Name	Common Name	Form	Comments
<u><i>Acer saccharum</i></u>	Sugar Maple	Tree	Subcanopy
<u><i>Botrychium virginianum</i></u>	Rattlesnake Fern	Fern	
<u><i>Brachyelytrum erectum</i></u>	Bearded Shorthusk	Graminoid	
<u><i>Carya alba</i></u>	Mockernut Hickory	Tree	Associate
<u><i>Carya ovata</i></u>	Shagbark Hickory	Tree	Codominant
<u><i>Circaea lutetiana ssp. canadensis</i></u>	Broadleaf Enchanter's Nightshade	Forb	
<u><i>Cornus alternifolia</i></u>	Alternateleaf Dogwood	Shrub	
<u><i>Cornus racemosa</i></u>	Gray Dogwood	Shrub	
<u><i>Corylus americana</i></u>	American Hazelnut	Shrub	
<u><i>Desmodium glutinosum</i></u>	Pointedleaf Ticktrefoil	Forb	
<u><i>Galium concinnum</i></u>	Shining Bedstraw	Forb	
<u><i>Geranium maculatum</i></u>	Wild Geranium	Forb	
<u><i>Juglans nigra</i></u>	Black Walnut	Tree	Associate
<u><i>Maianthemum racemosum</i></u>	False Solomon's Seal	Forb	
<u><i>Osmorhiza claytonii</i></u>	Clayton's Sweetroot	Forb	
<u><i>Parthenocissus quinquefolia</i></u>	Virginia Creeper	Vine	
<u><i>Prunus serotina</i></u>	Black Cherry	Tree	Subcanopy
<u><i>Quercus alba</i></u>	White Oak	Tree	Dominant
<u><i>Quercus ellipsoidalis</i></u>	Northern Pin Oak	Tree	Codominant
<u><i>Quercus macrocarpa</i></u>	Bur Oak	Tree	Codominant
<u><i>Quercus rubra</i></u>	Northern Red Oak	Tree	Dominant
<u><i>Quercus velutina</i></u>	Black Oak	Tree	Codominant
<u><i>Ribes cynosbati</i></u>	Eastern Prickly Gooseberry	Shrub	
<u><i>Sanicula odorata</i></u>	Clustered Blacksnakeroot	Forb	
<u><i>Sassafras albidum</i></u>	Sassafras	Tree	Subcanopy
<u><i>Zanthoxylum americanum</i></u>	Common Pricky Ash	Shrub	

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Appendices

Appendix A. Legumes Native to the State of Iowa

Common Name	Latin Name ¹	Form ²	CC ³	Wetland Indicator Status
Lead Plant	<i>Amorpha canescens</i>	Shrub	8	UPL
Indigo Bush	<i>Amorpha fruticosa</i>	Shrub	5	FACW+
Fragrant False Indigo	<i>Amorpha nana</i>	Shrub	8	
American Hogpeanut	<i>Amphicarpaea bracteata</i>	H-Vine	4	FAC
Groundnut	<i>Apios americana</i>	H-Vine	4	FACW
Purple Milkvetch	<i>Astragalus agrestis</i>	P-Forb	8	FACW-
Canadian Milkvetch	<i>Astragalus canadensis</i>	P-Forb	4	FAC+
Ground Plum	<i>Astragalus crassicaarpus</i>	P-Forb	9	
Ozark Milkvetch	<i>Astragalus distortus</i>	P-Forb	5	UPL
Flexile Milkvetch	<i>Astragalus flexuosus</i>	P-Forb	7	
Lotus Milkvetch	<i>Astragalus lotiflorus</i>	P-Forb	10	UPL
Missouri Milkvetch	<i>Astragalus missouriensis</i>	P-Forb	8	
Largeleaf Wild Indigo	<i>Baptisia alba var. macrophylla</i>	P-Forb	6	FACU
Longbract Wild Indigo	<i>Baptisia bracteata</i>	P-Forb	7	
Eastern Redbud	<i>Cercis canadensis</i>	Tree	3	FACU
Partridge Pea	<i>Chamaecrista fasciculata</i>	A-Forb	1	
Rattlebox	<i>Crotalaria sagittalis</i>	A-Forb	6	UPL
White Prairie Clover	<i>Dalea candida</i>	P-Forb	10	UPL
Nine-anther Dalea	<i>Dalea enneandra</i>	P-Forb	10	UPL
Foxtail Prairie Clover	<i>Dalea leporina</i>	A-Forb	6	UPL
Purple Prairie Clover	<i>Dalea purpurea</i>	P-Forb	8	UPL
Silky Prairie Clover	<i>Dalea villosa</i>	P-Forb	8	
Illinois Bundleflower	<i>Desmanthus illinoensis</i>	P-Forb	4	FAC-
Showy Ticktrefoil	<i>Desmodium canadense</i>	P-Forb	6	FAC-
Hoary Ticktrefoil	<i>Desmodium canescens</i>	P-Forb	4	UPL
Large Bract Ticktrefoil	<i>Desmodium cuspidatum</i>	P-Forb	8	UPL
Pointedleaf Ticktrefoil	<i>Desmodium glutinosum</i>	P-Forb	5	UPL
Illinois Ticktrefoil	<i>Desmodium illinoense</i>	P-Forb	5	UPL
Nakedflower Ticktrefoil	<i>Desmodium nudiflorum</i>	P-Forb	8	UPL
Panicledleaf Ticktrefoil	<i>Desmodium paniculatum</i>	P-Forb	8	FACU
Fewflower Ticktrefoil	<i>Desmodium pauciflorum</i>	P-Forb		
Sessileleaf Ticktrefoil	<i>Desmodium sessilifolium</i>	P-Forb	5	UPL
Honey locust	<i>Gleditsia triacanthos</i>	Tree	0	FAC
Wild Licorice	<i>Glycyrrhiza lepidota</i>	P-Forb	4	FACU-
Kentucky Coffeetree	<i>Gymnocladus dioica</i>	Tree	5	UPL
Cream Pea	<i>Lathyrus ochroleucus</i>	P-Forb	7	UPL
Marsh Pea	<i>Lathyrus palustris</i>	P-Forb	7	FACW
Veiny Pea	<i>Lathyrus venosus</i>	P-Forb	7	FAC
Roundhead Lespedeza	<i>Lespedeza capitata</i>	P-Forb	3	FACU
Shrubby Lespedeza	<i>Lespedeza frutescens</i>	P-Forb	6	UPL
Prairie Bushclover	<i>Lespedeza leptostachya</i>	P-Forb	7	UPL
Creeping Lespedeza	<i>Lespedeza repens</i>	P-Forb	5	UPL

Slender Lespedeza	<u>Lespedeza virginica</u>	P-Forb	5	UPL
Sundial Lupine	<u>Lupinus perennis</u>	P-Forb	10	UPL
French-grass	<u>Orbexilum onobrychis</u>	P-Forb		
Locoweed	<u>Oxytropis lambertii</u>	P-Forb	8	FACU-
Silverleaf Scurfpea	<u>Pediomelum argophyllum</u>	P-Forb	5	
Prairie Turnip	<u>Pediomelum esculentum</u>	P-Forb	8	
Thicket Bean	<u>Phaseolus polystachios</u>	H-Vine		
Lemon Scurfpea	<u>Psoraleidum lanceolatum</u>	P-Forb	4	
Slimflower Scurfpea	<u>Psoraleidum tenuiflorum</u>	P-Forb	6	FAC
Maryland Senna	<u>Senna marilandica</u>	P-Forb	5	FACW
Trailing fuzzybean	<u>Strophostyles helvula</u>	A-Forb	5	FAC+
Slickseed Fuzzybean	<u>Strophostyles leiosperma</u>	A-Forb	7	UPL
Goats Rue	<u>Tephrosia virginiana</u>	P-Forb	7	UPL
Buffalo Clover	<u>Trifolium reflexum</u>	A-Forb	8	UPL
American Vetch	<u>Vicia americana</u>	A-Forb	8	UPL

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² Form:

H-Vine Herbaceous vine

P-Forb Perennial Forb

A-Forb Annual Forb

⁴ CC:

Iowa Coefficient of Conservatism

Appendix B. Native Hemi-parasitic Plants Native to Iowa

Scientific Name ¹	Common Name	CC ²	Wetland Indicator Status
<u><i>Agalinis aspera</i></u>	Tall false foxglove	10	Upland
<u><i>Agalinis auriculata</i></u>	Earleaf false foxglove	5	Upland
<u><i>Agalinis gattingeri</i></u>	Roundstem false foxglove	10	Upland
<u><i>Agalinis paupercula</i></u>	Smallflower false foxglove	8	Obligate
<u><i>Agalinis purpurea</i></u>	Purple false foxglove	8	FACW
<u><i>Agalinis skinneriana</i></u>	Skinner's false foxglove	10	Upland
<u><i>Agalinis tenuifolia</i></u>	Slenderleaf false foxglove	4	FACW
<u><i>Aureolaria grandiflora</i></u>	Largeflower yellow false foxglove	9	Upland
<u><i>Aureolaria pedicularia</i></u>	Fernleaf yellow false foxglove	10	
<u><i>Castilleja coccinea</i></u>	Scarlet Indian paintbrush	7	FAC
<u><i>Castilleja sessiliflora</i></u>	Downy paintedcup	10	Upland
<u><i>Comandra umbellata</i></u>	Bastard Toadflax	6	FACU
<u><i>Dasistoma macrophylla</i></u>	Mullein foxglove	6	FACU-
<u><i>Orobancha fasciculata</i></u>	Clustered Broomrape	10	Upland
<u><i>Orobancha ludoviciana</i></u>	Louisiana Broomrape	10	Upland
<u><i>Orobancha uniflora</i></u>	One Flowered Broomrape	9	Upland
<u><i>Pedicularis canadensis</i></u>	Canadian lousewort	7	FACU+
<u><i>Pedicularis lanceolata</i></u>	Swamp lousewort	7	FACW+

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²CC: Iowa Coefficient of Conservatism

Appendix C. Various Native Cool Season Graminoids of Iowa.

Scientific Name ¹	Common Name	Coefficient of Conservatism ²	Wetland Indicator Status
Bromus ciliatus	Canada brome grass	10	OBL
Bromus kalmii	Prairie brome	10	FAC
Bromus pubescens	Canada brome	9	FACU+
Calamagrostis canadensis	Bluejoint	5	OBL
Carex annectens	Large yellow fox sedge	6	FACW
Carex atherodes	Hairy-leaved lake sedge	8	OBL
Carex bebbii	Bebb's oval sedge	8	OBL
Carex bicknellii	Bicknell's sedge	10	FAC-
Carex brevior	Plains oval sedge	4	FAC
Carex cephalophora	Short-headed bracted sedge	5	FACU
Carex comosa	Bristly sedge	6	OBL
Carex crinita	Fringed sedge	10	OBL
Carex crus-corvi	Crowfoot fox sedge	10	OBL
Carex eburnea	Ivory sedge	6	FACU-
Carex frankii	Bristly cattail sedge	8	OBL
Carex gracillima	Purple-sheathed	10	FACU
Carex granularis	Pale sedge	3	FACW+
Carex grayi	Common bur sedge	7	FACW+
Carex hirsutella	Hairy green sedge	4	FACU-
Carex hystericina	Porcupine sedge	5	OBL
Carex laeviconica	Long-toothed lake sedge	6	OBL
Carex lupulina	Common hop sedge	6	OBL
Carex lurida	Bottlebrush sedge	5	OBL
Carex molesta	Field oval sedge	2	FAC
Carex muehlenbergii	Sand bracted sedge	5	UPL
Carex normalis	Spreading oval sedge	5	FACW
Carex prairea	Fen paniced sedge	10	OBL
Carex scoparia	Lance-fruited oval sedge	5	FACW
Carex shortiana	Short's sedge	8	FACW+
Carex sprengeii	Long-beaked sedge	4	FAC
Carex squarrosa	Narrow-leaved cattail sedge	10	OBL
Carex sterilis	Fen star sedge	10	OBL
Carex stipata	Common fox sedge	5	OBL
Carex stricta	Common tussock sedge	6	OBL
Carex tenera	Narrow-leaved oval sedge	8	FAC+
Carex tribuloides	Awl-fruited oval sedge	3	FACW+
Carex utriculata	Northwest Territory Sedge	8	OBL
Carex vesicaria	Tufted lake sedge	7	OBL
Carex vulpinoidea	Brown fox sedge	3	OBL
Cyperus lupulinus	Slender flat sedge	8	FACU-
Danthonia spicata	Poverty oat grass	5	UPL
Dichanthelium oligosanthes var. scribnerianum	Scribner's Panic grass	5	FACU
Eleocharis acicularis	Needle spike rush	3	OBL
Eleocharis obtusa	Blunt spike rush	3	OBL
Eleocharis palustris	Marsh spike rush	6	OBL

Elymus canadensis	Canada wild rye	5	FAC-
Elymus hystrix	Bottlebrush grass	5	UPL
Elymus riparius	Riverbank wild rye	5	FACW
Elymus trachycaulus	Slender wheatgrass	5	FAC
Elymus villosus	Slender wild rye	5	FACU
Elymus virginicus	Virginia wild rye	3	FACW-
Festuca subverticillata	Nodding fescue	7	FACU+
Glyceria grandis	American manna grass	6	OBL
Glyceria striata	Fowl manna grass	5	OBL
Hesperostipa spartea	Porcupine grass	6	UPL
Hierochloa odorata	Holy grass	7	FACW
Hordeum jubatum	Squirrel-tail barley	0	FAC+
Juncus canadensis	Canadian rush	7	OBL
Juncus dudleyi	Dudley's rush	2	FAC
Juncus effusus	Common rush	4	OBL
Juncus interior	Inland rush	2	FAC+
Juncus nodosus	Joint rush	4	OBL
Juncus tenuis	Path rush	0	FAC
Juncus torreyi	Torrey's rush	3	FACW
Koeleria macrantha	June grass	7	UPL
Nassella viridula	Green needlegrass	5	UPL
Paspalum setaceum	Bead grass	4	FAC
Poa palustris	Foul meadow grass	5	FACW+
Schoenoplectus acutus	Hard-stemmed bulrush	4	OBL
Schoenoplectus tabernaemontani	Soft-stemmed bulrush	3	OBL
Scirpus atrovirens	Dark green bulrush	1	OBL
Scirpus cyperinus	Woolly bulrush	4	OBL

¹ If accessing an electronic version of this specification and there is an internet connection, clicking on the blue underlined text will link to the USDA Plants Database species profile.

² CC: Iowa Coefficient of Conservatism

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