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Vascular Flora of Arend's Kettle, Freda Haffner Kettlehole State Preserve, Dickinson County, Iowa

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Arend's Kettle is a 5 ha glacial landform in Dickinson County, Iowa. The flora of this kettle was studied over two years prior to acquisition by the Nature Conservancy in 1973. The known vascular flora of Arend's Kettle as of 1973 consisted of 299 species, representing 177 genera and 59 families. The vegetation ranged from xeric short grass prairie along the rims of the kettle to mesic prairie along the middle and lower slopes. In the bottom of the kettle, there was a marsh/seasonal pond community that varied greatly in the amount of water present, depending on rainfall within the 30 ha drainage into the kettle. At the time of this study, cattle grazing was occurring in the kettle, and there was a prominent ruderal flora associated with trails running along the rims and down to the bottom of the kettle. The shoreline of the marsh also was frequently disturbed by cattle. One federally and state threatened species, *Lespedeza leptostachya*, prairie bush clover, and one state threatened species, *Asclepias lanuginosa*, woolly milkweed, were present on the site. Two species were added to the Dickinson County flora.

INDEX DESCRIPTORS: Arend's Kettle, Freda Haffner Kettlehole State Preserve, Iowa flora, prairie, *Lespedeza leptostachya*, *Asclepias lanuginosa*, Dickinson County.

Arend's Kettle in northwestern Iowa is widely known as an exemplary kettle (Salisbury and Knox 1969). This unique geological feature, about 5 hectares (12.4 acres) in size (Gerhardt 1940; Collins 1968), is located in the Freda Haffner Kettlehole State Preserve, a 44.5 ha preserve managed by the Iowa Chapter of The Nature Conservancy. This preserve is located in Dickinson County, Iowa, about 5 km west of West Lake Okoboji.

In this paper, we present a species list of vascular plants for Arend's Kettle that was compiled over two growing seasons just prior to acquisition by The Nature Conservancy in 1973. The preserve was grazed by cattle during the period of study. The cattle cropped the vegetation where they grazed, and they created trails running from the rims down to the marsh at the bottom of the kettle. The wet prairie and marsh at the bottom of the kettle were frequently disturbed by cattle coming down to drink and graze. Since 1973, grazing has ceased, and prescribed fires have been used for management of the preserve. The species list and general locations of species of plants within the preserve in the early 1970s thus should provide data useful in documenting changes occurring after establishment of this preserve.

STUDY AREA

Arend's Kettle is located in the southeast quarter of the northwest quarter of Section 33, Lakeville Township, Tier 99 North, Range 37 West, Dickinson county, Iowa. It is situated on the east bluff of the Little Sioux River floodplain, which at this location is a broad, U-shaped trough. The kettle watershed is 29.6 hectare (73.1 acres). The highest point on the kettle rim is 447 meters (1465 feet) above sea level (Gerhardt 1940). The surface of the pond is at 427 meters (1400 feet), producing a 20 m difference in elevation from rim to floor of the kettle. Kettle slopes are steep (30-45°). The widest rim to rim distance is 322 meters (1056 feet), and the narrowest is 181 meters (594 feet). The marsh (0.1 hectare, 0.26 acre) in the center of the kettle varies in depth from dry to 2 meters depending on rainfall (Collins 1968). The seasonal pond in the center of the marsh has never been known to overflow the rim of the kettle and has no known springs. Soil types are of the Dickinson, Clarion, and Pierce series (Soil Survey of Iowa 1923). Average yearly precipitation for the county is 686 mm

(Shaw and Waite 1964). Dickinson county weather is coldest in January (-9°C average), warmest in July (23°C average).

Formation of the large kettle occurred during the Wisconsin period of glaciation (Salisbury and Knox 1969). A large block of ice melted, and glacial till was deposited around the edges, forming the rim of the kettle. Arend's kettle is located near the Altamont terminal glacial moraine (about 2 km west). The ridge on which Arend's kettle is located appears to be an esker deposited by the Little Sioux River carrying glacial runoff under the ice sheet. Radiocarbon dating of cores taken by Collins (1968) establish kettle formation at more than 12,400 years before present.

METHODS

Collections were made from the rim and interior of the kettle (a 5 ha area) over two periods: June to September 1972 and March to November 1973. Specimens of vascular plants were located and identified. A majority of these were collected as vouchers, which have been deposited in the herbarium at the University of Northern Iowa.

Nomenclature follows Gleason and Cronquist (1963) and updates on classification and synonymy made by Roosa et al. (1989). Pohl (1966) was used for Poaceae. Exceptions are as follows: (1) Potamogetanaceae and Cannabinaceae are treated as separate families; (2) *Artemisia caudata* is considered a distinct species; (3) *Mirabilis* is considered a distinct genus; (4) *Penthorum* is included in Saxifragaceae; and (5) *Lobelia* is included in Campanulaceae.

RESULTS AND DISCUSSION

An annotated checklist of vascular plants collected from Arend's kettle is presented in Appendix I. Families, genera and species are listed alphabetically. Habitats refer to environmental conditions occurring along the slopes of the kettle. Relative frequency of occurrence was based on personal field observations and collections within each habitat. "Abundant" indicates occurring in large numbers or very evident. "Common" indicates many specimens or locations. "Frequent" indicates 11-20, and "infrequent" denotes 6-10 occurrences. A species was considered "rare" if only 1-5 locations were made. Flowering times were noted for most species and are indicated as that span of time over which flowers were observed in the field.

A total of 276 species and 173 genera, representing 57 families, were identified during our collections made in 1972 and 1973. Only

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one pteridophyte was collected. The monocots consisted of 13 families, 48 genera, and 83 species, while dicots consisted of 43 families, 121 genera, and 192 species. The four largest families are: Asteraceae, 51 species; Poaceae, 46 species; Fabaceae, 22 species; Cyperaceae, 17 species.

Three habitats present in the kettle included dry prairie rim, mesic slopes, and marsh. Typical short-grassland species occupied the kettle rim. The most abundant species included *Bouteloua gracilis*, *Poa pratensis*, *Schizachyrium scoparium*, *Amorpha canescens*, *Ambrosia artemisiifolia*, *Panicum praecocius*, *Achillea millefolium*, *Bouteloua hirsuta*, *Solidago missouriensis*, and *Carex brevior*. Other representative species were *Anemone patens*, *Echinacea pallida*, *Koeleria cristata*, *Psoralea esculenta*, *Aster sericeus*, *Allium stellatum*, and *Astragalus crassicaerpus*. *Oxytropis lambertii* and *Androsace occidentalis* also occupied dry sandy knobs.

Tall grass prairie dominated the mesic slopes. Dominant grasses and composites included *Poa pratensis*, *Ambrosia artemisiifolia*, *Andropogon gerardii*, *Schizachyrium scoparium*, *Bouteloua curtipendula*, *Achillea millefolium*, *Solidago canadensis*, *Panicum praecocius*, *Stipa spartea*, *Panicum oligosanthes*, and *Cirsium undulatum*. Other important species were *Verbena stricta*, *Asclepias verticillata*, *Trifolium procumbens*, *Onosmodium molle*, *Dalea purpureum*, *Heliopsis helianthoides*, *Medicago lupulina*, *Lithospermum incisum*, *Monarda fistulosa*, *Potentilla arguta*, and *Erigeron strigosus*. Many other typical tall grass species, for example, *Asclepias tuberosa*, *Ceanothus americanus*, and *Brickellia eupatorioides*, were present in lesser numbers.

The marsh contained two zones. The outer zone was a wet prairie that ranged from moist soil to standing water. Typical dominant species were *Glyceria grandis*, *Polygonum hydropiper*, *Lysimachia hybrida*, *Leersia oryzoides*, *Iris versicolor*, *Ambrosia artemisiifolia*, *Carex meadii*, *Scutellaria latiflora*, *Menta arvensis*, *Alopecurus aequalis*, *Sium suave*, *Bidens cernua*, *Eleocharis acicularis*, and *Hypericum majus*. In each of the two years studied, plants of the inner marsh zone were in standing water most of the growing season. There were fewer species present as well. Dominant species were *Sagittaria latifolia*, *Scirpus heterochaetus*, and *Sparganium eurycarpum*. Two other abundant species, *Lemna minor* and *Spirodella polyrrhiza*, were species that floated on the pond surface.

The seasonal pond also supported a lush growth of submerged aquatic plants. *Potamogeton foliosus*, *Potamogeton pusillus*, *Ceratophyllum demersum* and *Najas flexilis* were the most abundant species. Yellow flowered bladderwort, *Utricularia vulgaris*, dotted the surface throughout the summer.

Ruderal species were quite evident in the kettle. Cowpaths were most evident along the ridge top, descending the slopes at an angle on the southeastern and western sides, and encircling the marsh. A well-worn path led to a watering strip at the western pond edge. The kettle slopes were grazed, although not heavily. Plants of weedy species were located throughout the kettle, but were especially noticeable along paths of mid to lower slope. Most abundant were ragweed, *Ambrosia artemisiifolia*; yarrow, *Achillea millefolium*; mock pennyroyal, *Hedeoma hispida*; vervain, *Verbena stricta*; spurge, *Euphorbia glyptosperma*; low hop clover, *Trifolium campestre*, black medic, *Medicago lupulina*; yellow foxtail, *Setaria lutescens*; daisy fleabane, *Erigeron strigosus*; yellow wood-sorrel, *Oxalis stricta*. A few scattered clones of Canada thistle, *Cirsium arvense*, were present on the southern slope.

Woody plants were scattered throughout the kettle. *Ulmus pumila*, *Crataegus mollis*, and *Prunus americana* occurred in small numbers. *Populus deltoides* and *Salix amygdaloides* invaded the cattle watering strip on the west side of the marsh during 1973. Several small clumps of *Symphoricarpos occidentalis* were present on the southeast slope.

Gerhardt (1940) sampled the kettle flora. He reported 96 species of vascular plants, 90 from permanent quadrats and discussed 6 more, representing 74 genera and 35 families. Although we searched the entire kettle carefully, we did not locate 19 species, including some prominent prairie and marsh species. A number of these species,

(e.g., *Helianthus grosseserratus*, *Silphium perfoliatum*, *Silphium laciniatum*, *Panicum implicatum*, *Panicum scribnerianum*, *Viola pedata*, *Cuscuta glomerata*, *Fragaria vesca*, *Physalis pruinosa*, *Tragopogon pratensis*, *Apocynum cannabinum*, and *Thalictrum revolutum*) may have been eliminated by grazing, while others may have succumbed to trampling and grazing of the marsh edges (*Typha latifolia*, *Scirpus validus*, *Carex communis*, *Carex vulpinoidea*, and *Polygonum natans*). Some species are possibly misidentified (e.g., *Oxalis dilleni* and *Tradescantia subaspera*).

A search through the Iowa Lakeside Laboratory Herbarium revealed many specimens collected from Arend's kettle. One species, *Panicum philadelphicum* (Grant 8904) is listed as threatened in Iowa, but was not located during the current study. The earliest collected specimen from the kettle was *Agalinis* (*Gerardia*) *aspera* (B. Shimek, 1794, August 24, 1919).

Lespedeza leptostachya, prairie bush clover, is listed as a threatened plant by the U.S. Department of Interior's endangered and threatened species listing (1987). Plants were located on the southeast slope. *Asclepias lanuginosa*, woolly milkweed, is listed as threatened in Iowa. Scattered plants were present near the kettle rim.

Two new species were added to the Dickinson county flora: *Androsace occidentalis* and *Geum triflorum*. The most recent updates of the county flora were those of Martin L. Grant (1951, 1953). *Scirpus heterochaetus* was not reported by Grant, but was included in the Cayler Prairie flora by Aikman & Thorne (1956).

Van Der Valk and Davis (1976) conducted an ecological survey of the kettle marsh vegetation during the 1973 and 1975 growing seasons. Plants were sampled by clipping along two permanent transects located perpendicular to shoreline. They reported 30 species of vascular plants comprising 19 families and 26 genera. Of these 15 were monocots and 15 were dicots. Three species, *Beckmannia syzigachne*, *Carex rostrata*, and *Polygonum coccineum*, were not located during our search. *Eleocharis palustris* also was collected and may be synonymous with *Eleocharis erythropoda* (Gleason & Cronquist 1963) and *Eleocharis macrostachya* of Grant (1951, 1953). Differences in species composition of the flora in the kettle marsh between the 1970-1972 and 1973-1975 seasons may reflect marked year to year changes in water levels, as well as the timing of precipitation during the growing season.

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**Annotated Checklist of Vascular Plants
Arend's Kettle
Freda Haffner Preserve, Dickinson County, Iowa**

Division Pteridophyta

Equisetaceae (Horsetail Family)

Equisetum laevigatum A. Br. Prairie scouring rush. Dry to mesic prairie; common; June.

Division Spermatophyta

Class Angiospermae

Subclass Monocotyledoneae

Alismataceae (Water-plantain Family)

Alisma subcordatum Raf. Water-plantain. Shallow marsh; abundant; July-August.

Sagittaria latifolia Willd. Broad-leaved arrowhead. Shallow marsh; abundant; July-August.

Amaryllidaceae (Amaryllis Family)

Hypoxis hirsuta (L.) Cov. Star grass. Mesic to wet prairie; infrequent; April-July.

Commelinaceae (Spiderwort Family)

Tradescantia bracteata Small. Spiderwort. Mesic prairie; infrequent; June-July.

Tradescantia ohioensis Raf. Spiderwort. Dry prairie; infrequent; June-July.

Tradescantia subaspera Kev. Spiderwort. (Gerhardt 1940).

Cyperaceae (Sedge Family)

Carex atherodes Spreng. Sedge. Shallow marsh; abundant locally; June-July.

Carex bebbii (Bailey) Fern. Sedge. Wet prairie to marsh; infrequent.

Carex bicknellii Britt. Sedge. Dry to wet prairie; common; May-July.

Carex brevior (Dewey) Mackenzie. Sedge. Dry to mesic prairie; abundant; May-July.

Carex communis Bailey. Sedge. (Gerhardt 1940).

Carex eleocharis Bailey. Sedge. Dry prairie; abundant locally; May-June.

Carex gravida Bailey. Sedge. Wet prairie to marsh; common; June-July.

Carex lasiocarpa Ehrh. Sedge. Wet prairie to marsh; common; May-July.

Carex meadii Dewey. Sedge. Mesic prairie to marsh; abundant; May-July.

Carex praegracilis W. Boott. Sedge. Marsh; abundant locally; June-July.

Carex rostrata Stokes. Sedge. Marsh (Van der Valk and Davis 1976).

Carex stricta Lam. Sedge. Wet prairie to marsh; abundant (locally); May.

Carex sycnocephala Carey. Sedge. Wet prairie to marsh; common; June-August.

Carex vulpinoidea Michx. Sedge. (Gerhardt 1940).

Cyperus odoratus L. Moist prairie to marsh; common; July-August.

Eleocharis acicularis (L.) R. & S. Spike-rush. Marsh and shallow water; abundant; May-August.

Eleocharis erythropoda Steud. Spike-rush. Marsh and shallow water; common; May-July.

Scirpus atrovirens Willd. Bulrush. Marsh; frequent; June-July.

Scirpus fluviatilis (Torr.) Gray. River bulrush. Marsh to shallow water; common; June-July.

Scirpus heterochaetus Chase. Great bulrush. Shallow water; abundant locally; June-July.

Scirpus validus Vahl. Great bulrush. (Gerhardt 1940).

Hydrocharitaceae (Frog's-bit Family)

Vallisneria americana Michx. Tape-grass. Open water; rare.

Iridaceae (Iris Family)

Iris versicolor L. Blue flag. Wet prairie and marsh; abundant; May-July.

Sisyrinchium campestre Bickn. Blue eyed grass. Dry to mesic prairie; abundant; April-June.

Juncaceae (Rush Family)

Juncus dudleyi Wieg. Rush. Wet prairie; infrequent; June-August.

Lemnaceae (Duckweed Family)

Lemna minor L. Duckweed. Abundant in shallow pond.

Spirodella polyrhiza (L.) Schleid. Duckweed. Abundant in shallow pond.

Wolffia punctata Griseb. Duckweed. Rare in shallow pond.

Liliaceae (Lily Family)

Allium stellatum Nutt. Prairie onion. Dry to mesic prairie; abundant; July-September.

Smilacina stellata (L.) Desf. False Solomon's seal. Mesic sandy prairie (local); rare; May-June.

Zygadenus elegans Pursh. Death camas. Dry to mesic prairie; infrequent; June-July.

Najadaceae (Naid Family)

Najas flexilis (Willd.) Rostk. & Schmidt. Naiad. Abundant in open water.

Poaceae (Grass Family)

Agropyron repens (L.) Beauv. Quack grass. Disturbed prairie; infrequent; June-July.

Agropyron smithii Rydb. Wheat grass. Dry to mesic prairie; common; June-July.

Agropyron trachycaulum (Link) Malte. Slender wheatgrass. Dry to mesic prairie; common; June-August.

Agrostis alba L. Redtop. Wet prairie; frequent; June-July.

Agrostis scabra Willd. Ticklegrass. Dry to mesic prairie; common; May-August.

Alopecurus aequalis Sobol. Short-awn foxtail. Moist prairie to shallow water; common; June-August.

Andropogon gerardii Vitm. Big blue stem. Dry to mesic prairie; abundant; August-September.

Aristida basiramea Engelm. Three-awn. Dry prairie; frequent; August-October.

Beckmannia syzigachne (Steud.) Fern. Sloughgrass. (Van der Valk and Davis 1976).

Bouteloua curtipendula (Michx.) Torr. Side-oats grama. Dry to mesic prairie; abundant; June-September.

Bouteloua gracilis (HBK) Lag. Blue grama. Dry prairie; common; July-August.

Bouteloua hirsuta Lag. Hairy grama. Dry prairie; common; July-August.

Bromus inermis Leyss. Smooth brome. Mesic prairie; infrequent; weed; June-July.

Bromus japonicus Thunb. Japanese brome. Dry prairie and disturbed areas; infrequent weed; June-July.

Calamagrostis canadensis (Michx.) Beauv. Blue joint. Marsh; infrequent; June-July.

Calamagrostis inexpansa A. Gray. Bluejoint. Marsh; rare; June-July.

Echinochloa crusgalli (L.) Beauv. Barnyard grass. Disturbed areas; frequent; July-September.

Elymus canadensis L. Wild rye. Mesic-wet prairie; frequent; July-August.

Eragrostis cilianensis (All.) E. Masher. Stink grass. Weed along paths; infrequent; June-September.

Glyceria grandis S. Wats. Manna grass. Shallow marsh; abundant; May-June.

Hierochloa odorata (L.) Beauv. Holy grass. Mesic-wet prairie; rare; April-June.

Hordeum jubatum L. Squirrel tail barley. Mesic-wet prairie and marsh; common; May-July.

Koeleria cristata (L.) Pers. June grass. Dry prairie; common; May-July.

Leersia oryzoides (L.) Sw. Rice cut grass. Wet prairie to shallow marsh; common; July-September.

Muhlenbergia cuspidata (Torr.) Rydb. Muhly grass. Dry prairie; frequent; July-September.

Muhlenbergia mexicana (L.) Trin. Muhly grass. Wet prairie and marsh; infrequent; July-October.

Panicum capillare L. Witch grass. Disturbed areas; infrequent; July-September.

Panicum implicatum Scribn. (Gerhardt 1940).

Panicum leibergii (Vasey) Scribn. Dry to mesic prairie; infrequent; May-July.
Panicum oligosanthos Schult. Dry to mesic prairie; abundant; May-August.
Panicum philadelphium Bernh. (Grant 1951).
Panicum praecox Hitchc. & Chase. Dry to mesic prairie; abundant; May-August.
Panicum scribnerianum Nash. (Gerhardt 1940).
Panicum virgatum L. Switch grass. Mesic prairie; frequent; July-September.
Panicum wilcoxianum Vasey. Dry prairie; infrequent; May-July.
Phalaris arundinacea L. Reed canary grass. Wet prairie and marsh; frequent; June-August.
Pbleum pratense L. Timothy. Mesic-wet prairie and cowpaths; common; June-August.
Poa compressa L. Canada blue grass. Dry prairie; common; June-July.
Poa palustris L. Wet prairie and marsh; common; June-August.
Poa pratensis L. Kentucky blue grass. Dry prairie to marsh; abundant; May-July.
Schizachyrium scoparium (Michx.) Nash. Little blue stem. Dry to mesic prairie; abundant; August-September.
Setaria lutescens (Weigel) F.T. Hubb. Yellow foxtail. Dry prairie to marsh; common; June-September.
Setaria viridis (L.) Beauv. Green foxtail. Dry prairie to marsh; frequent; June-September.
Sorghastrum nutans (L.) Nash. Indian grass. Dry to mesic prairie; abundant; August-September.
Spartina pectinata Link. Slough grass. Wet prairie to marsh; common; July-August.
Sporobolus asper (Michx.) Kunth. Dropseed. Dry to mesic prairie; frequent; August-October.
Sporobolus heterolepis A. Gray. Prairie dropseed. Dry prairie; common; July-September.
Sporobolus vaginiflorus (Torr.) Wood. Dropseed. Dry prairie; common; August-September.
Stipa spartea Trin. Porcupine grass. Dry to mesic prairie; common; May-June.
Zea mays L. Corn. Cowpaths; rare.

Potamogetonaceae (Pondweed Family)
Potamogeton foliosus Raf. Pondweed. Abundant in shallow marsh; June.
Potamogeton pusillus L. Pondweed. Abundant in shallow marsh; June.
Potamogeton zosteriformis Fern. Pondweed. Frequent in shallow marsh.

Sparganiaceae (Bur-reed Family)
Sparganium eurycarpum Engelm. Bur-reed. Common in marsh; n marsh; June-July.

Typhaceae (Cat-tail Family)
Typha latifolia L. Cattail. (Gerhardt 1940).

Subclass Dicotyledoneae

Amaranthaceae (Amaranth Family)
Amaranthus graecizans L. Tumbleweed. Disturbed dry prairie; infrequent; June-September.
Amaranthus retroflexus L. Green amaranth. Disturbed prairie; common; August-October.
Amaranthus tamariscinus Nutt. Pigweed. Disturbed prairie; infrequent; July-September.

Apiaceae (Parsley Family)
Cicuta maculata L. Water hemlock. Wet prairie; rare; June-August.
Sium suave Walt. Water parsnip. Marsh; common; July-September.
Zizia aurea (L.) W. Koch. Golden alexander. Mesic to wet prairie; rare; May-June.

Apocynaceae (Dogbane Family)

Apocynum cannabinum L. Indian hemp. (Gerhardt 1940).
Apocynum sibiricum Jacq. Dogbane. Mesic prairie; infrequent; June-July.

Asclepiadaceae (Milkweed Family)
Asclepias birtella (Pennell) Woodson. Tall green milkweed. Dry prairie; frequent; June-August.
Asclepias lanuginosa Nutt. Woolly milkweed. Dry prairie; infrequent; June-August.
Asclepias ovalifolia Dcne. Oval milkweed. Mesic prairie; rare; June-July.
Asclepias syriaca L. Common milkweed. Mesic prairie; infrequent; June-August.
Asclepias tuberosa L. Butterfly weed. Mesic prairie; infrequent; June-August.
Asclepias verticillata L. Whorled milkweed. Dry to mesic prairie; common; June-August.
Asclepias viridiflora Raf. Green milkweed. Dry prairie; infrequent; July-August.

Asteraceae (Composite Family)
Achillea millefolium L. ssp. *lanulosa* (Nutt.) Piper. Yarrow. Dry to mesic prairie; abundant; June-November.
Ambrosia artemisiifolia L. Ragweed. Dry to wet prairie; abundant; August-September.
Ambrosia psilostachya DC. Western ragweed. Dry prairie; infrequent; July-October.
Ambrosia trifida L. Giant ragweed. Disturbed prairie; infrequent; July-October.
Antennaria neglecta Greene. Pussytoes. Dry to mesic prairie; common; April-July.
Arctium minus Bernh. Burdock. Disturbed prairie; rare; July-October.
Artemisia caudata Michx. Wormwood. Dry prairie; infrequent; August-September.
Artemisia dracunculosa L. Linear leaved wormwood. Dry prairie; common; July-September.
Artemisia ludoviciana Nutt. Mugwort, White sage. Mesic prairie; common; July-October.
Aster ericoides L. Heath aster. Dry to mesic prairie; common; August-October.
Aster laevis L. Smooth aster. Dry to mesic prairie; frequent; August-October.
Aster lanceolatus Willd. Panicked aster. Wet prairie; abundant; August-October.
Aster oblongifolius Nutt. Aromatic aster. Dry prairie; common; August-October.
Aster puniceus L. Purple stemmed aster. Wet prairie; rare; August-November.
Aster sericeus Vent. Silky aster. Dry prairie; common; August-September.
Bidens cernua L. Stick-tight. Wet prairie and marsh; common; August-October.
Bidens frondosa L. Beggar-ticks. Wet prairie; infrequent; June-October.
Bidens vulgata Greene. Hairy beggar-ticks. Wet prairie and marsh; common; August-October.
Boltonia asteroides (L.) L'Her. Boltonia. Marsh; common; July-October.
Brickellia eupatorioides (L.) Shinn. False-boneset. Mesic prairie; infrequent; August-October.
Carduus nutans L. Nodding thistle. Mesic prairie; infrequent; June-October.
Cirsium altissimum (L.) Spreng. Tall thistle. Mesic prairie; infrequent; July-October.
Cirsium arvense (L.) Scop. Canada thistle. Mesic prairie; infrequent; July-August.
Cirsium flodmanii (Rydb.) Arthur. Thistle. Mesic prairie; common; June-September.

Cirsium undulatum (Nutt.) Spreng. Thistle. Dry to mesic prairie; common; June-September.
Cirsium vulgare (Savi.) Tenore. Bull thistle. Mesic prairie; frequent; June-October.
Conyza canadensis (L.) Cronq. Horseweed. Dry to mesic prairie; common; July-November.
Coreopsis palmata Nutt. Stiff coreopsis. Dry to mesic prairie; frequent; June-October.
Echinacea pallida Nutt. Pale purple coneflower. Dry prairie; common; May-August.
Erigeron strigosus Muhl. Daisy fleabane. Dry to mesic prairie; abundant; June-September.
Euthamia graminifolia (L.) Nutt. Lance-leaved goldenrod. Mesic to wet prairie; infrequent; July-October.
Helianthus grosseserratus Martens. Saw-toothed sunflower. (Gerhardt 1940).
Helianthus rigidus (Cass.) Desf. Showy sunflower. Dry to mesic prairie; frequent; August-September.
Heliopsis helianthoides (L.) Sweet. Ox-eye. Mesic prairie; infrequent; June-August.
Lactuca ludoviciana (Nutt.) Ridd. Prairie lettuce. Dry to mesic prairie; infrequent; July-September.
Lactuca serriola L. Prickly lettuce. Mesic prairie; infrequent; August-September.
Liatris aspera Michx. Rough blazing-star. Dry prairie; frequent; August-October.
Liatris punctata Hook. Dotted blazing-star. Dry prairie; common; August-October.
Machaeranthera spinulosa Greene. Goldenweed. Dry prairie; rare; July-September.
Prenanthes aspera Michx. Rattlesnake root. Dry prairie; infrequent; August-September.
Ratibida pinnata (Vent.) Barnh. Gray-headed coneflower. Dry to mesic prairie; common; June-August.
Senecio plattensis Nutt. Ragwort. Dry prairie; infrequent; May-July.
Silphium laciniatum L. Compass plant. (Gerhardt 1940).
Silphium perfoliatum L. Cup plant. (Gerhardt 1940).
Solidago canadensis L. var. *silvicanescens* Rydb. Tall goldenrod. Mesic prairie; common; August-September.
Solidago canadensis L. Canada goldenrod. Mesic prairie; infrequent; July-September.
Solidago gigantea Ait. Large goldenrod. Mesic to wet prairie; common; August-September.
Solidago missouriensis Nutt. Missouri goldenrod. Dry to mesic prairie; common; July-September.
Solidago nemoralis Ait. Gray goldenrod. Dry prairie; common; August-September.
Solidago ptarmicoides (Ness.) Boivin. Sneezewort aster. Dry prairie; frequent; July-September.
Solidago rigida L. Hard-leaved goldenrod. Dry to mesic prairie; common; July-October.
Taraxacum officinale Weber. Common dandelion. Dry to wet prairie; common; March-December.

Tragopogon dubius Scop. Goat's beard. Dry to mesic prairie; infrequent; May-July.
Tragopogon pratensis L. Goat's beard. (Gerhardt 1940).
Vernonia fasciculata Michx. Ironweed. Wet prairie; infrequent; July-September.
Xanthium strumarium L. Cocklebur. Disturbed prairie; infrequent; August-September.

Boraginaceae (Borage Family)

- Lappula echinata* Gilib. Stickseed. Dry to mesic prairie; common; May-September.
Lithospermum canescens (Michx.) Lehm. Hoary puccoon. Mesic prairie; common; April-May.
Lithospermum incisum Lehm. Narrow-leaved puccoon. Dry to mesic prairie; common; April-May.
Onosmodium molle Michx. var. *occidentale* (Mack.) I.M. Johnston. False gromwell. Mesic prairie; common; June-July.

Brassicaceae (Mustard Family)

- Arabis hirsuta* (L.) Scop. Rock cress. Dry to mesic prairie; frequent; May-June.
Berteroa incana (L.) DC. Hoary alyssum. Dry to mesic prairie; infrequent; June-September.
Capsella bursa-pastoris (L.) Medic. Shepherds' purse. Dry to mesic prairie; rare; April-September.
Descurainia sophia (L.) Webb. Tansy mustard. Disturbed prairie; infrequent; May-July.
Draba reptans (Lam.) Fern. Carolina whitlow-grass. Dry prairie; common; April-May.
Lepidium densiflorum Schrader. Peppergrass. Dry to mesic prairie; common; May-June.
Rorippa islandica (Oeder) Borbas. Yellow cress. Marsh; common; May-September.
Sisymbrium officinale (L.) Scop. Hedge mustard. Dry to mesic prairie; frequent; May-October.

Campanulaceae (Harebell Family)

- Lobelia spicata* Lam. Pale-spike lobelia. Dry to mesic prairie; common; July-September.

Cannabaceae (Hemp Family)

- Cannabis sativa* L. Hemp. Dry to mesic prairie; infrequent; July-August.

Caprifoliaceae (Honeysuckle Family)

- Symphoricarpos occidentalis* Hook. Wolfberry. Mesic prairie; infrequent; June-August.

Caryophyllaceae (Pink Family)

- Silene antirrhina* L. Sleepy catchfly. Dry to mesic prairie; common; May-July.

Certophyllaceae (Hornwort Family)

- Ceratophyllum demersum* L. Coontail. Abundant in shallow pond.

Chenopodiaceae (Goosefoot Family)

- Chenopodium album* L. Lamb's quarters. Dry to wet prairie; frequent; June-September.
Kochia scoparia (L.) Schrader. Summer cypress. Dry to wet disturbed prairie; infrequent; July-September.
Salsola kali L. Common saltwort. Dry prairie; infrequent.

Convolvulaceae (Morning Glory Family)

- Cuscuta glomerata* Choisy. Dodder. (Gerhardt 1940).

Euphorbiaceae (Spurge Family)

- Euphorbia deniata* Michx. Toothed spurge. Dry to mesic prairie; infrequent; June-September.
Euphorbia glyptosperma Engelm. Spurge. Dry to mesic prairie; abundant; June-September.
Euphorbia maculata L. Milk-purslane. Dry to mesic prairie; infrequent; June-September.

Fabaceae (Bean Family)

- Amorpha canescens* Pursh. Leadplant. Dry to mesic prairie; common; June-August.
Amblicarpa bracteata (L.) Fern. Hog-peanut. Moist prairie; frequent; August-September.
Astragalus canadensis L. Milk-vetch. Dry to mesic prairie; frequent; June-August.

- Astragalus crassicaarpus* Nutt. Ground-plum. Dry prairie; common; April-May.
Dalea candida Willd. White prairie clover. Dry to mesic prairie; frequent; June-July.
Dalea purpurea Vent. Purple prairie clover. Dry to mesic prairie; abundant; June-July.
Desmodium canadense (L.) DC. Showy tick-trefoil. Mesic prairie; frequent; July-August.

- Lathyrus palustris* L. Vetchling. Mesic to wet prairie; frequent; June-September.
Lathyrus venosus Muhl. Vetchling. Mesic prairie; infrequent; June-July.

- Lespedeza capitata* Michx. Round-headed bush clover. Mesic prairie; frequent; July-September.

- Lespedeza leptostachya* Engelm. Prairie bush clover. Dry to mesic prairie; infrequent; July-September.

- Medicago lupulina* L. Black medick. Dry to mesic prairie; common; March-November.

- Medicago sativa* L. Alfalfa. Dry to mesic prairie; infrequent; May-October.

- Melilotus alba* Medic. White sweet clover. Mesic prairie; infrequent; May-October.

- Melilotus officinalis* (L.) Pall. Yellow sweet clover. Mesic prairie; infrequent; June-August.

- Oxytropis lambertii* Pursh. Locoweed. Dry, sandy prairie; common; May-June.

- Psoralea argophylla* Pursh. Silvery scurf pea. Mesic prairie; frequent; June-August.

- Psoralea esculenta* Pursh. Breadroot. Dry prairie; frequent; May-July.

- Trifolium campestre* Schreb. Low hop clover. Dry to wet prairie; common; May-September.

- Trifolium pratense* L. Red clover. Dry to wet prairie; infrequent; May-September.

- Trifolium repens* L. White clover. Dry to wet prairie; common; May-September.

- Vicia americana* Muhl. Vetch. Mesic to wet prairie; frequent; May-July.

Gentianaceae (Gentian Family)

- Gentiana puberulenta* J. Pringle. Prairie gentian. Dry to mesic prairie; frequent; August-October.

Hypericaceae (St. John's-wort Family)

- Hypericum majus* (Gray) Britt. St. John's-wort. Wet prairie and marsh; common; July-September.

Lamiaceae (Mint Family)

- Hedeoma hispdatum* Pursh. Mock pennyroyal. Dry to mesic prairie; common; May-August.
Lycopus americanus Muhl. Cut-leaved water-horehound. Wet prairie and marsh; common; July-September.
Lycopus asper Greene. Bugleweed. Wet prairie and marsh; frequent; July-September.
Mentha arvensis L. Wild mint. Mesic to wet prairie and marsh; common; July-September.
Monarda fistulosa L. Wild bergamot. Mesic prairie; common; June-September.
Nepeta cataria L. Catnip. Mesic prairie; rare; July-October.

- Pycnanthemum virginianum* (L.) Durand & Jackson. Mountain mint. Mesic prairie; infrequent; July-September.

- Scutellaria lateriflora* L. Mad-dog skullcap. Marsh; common; July-September.

- Scutellaria parvula* Michx. Smaller skullcap. Dry prairie; infrequent; May-July.

- Stachys palustris* L. Woundwort. Marsh; frequent; June-August.

- Teucrium canadense* L. Germander. Marsh; frequent; June-August.

Lentibulariaceae (Bladderwort Family)

- Utricularia vulgaris* L. Bladderwort. Abundant in shallow pond; June-August.

Linaceae (Flax Family)

- Linum sulcatum* Riddell. Wild flax. Dry to mesic prairie; common; June-July.

Nyctaginaceae (Four o'clock Family)

- Mirabilis hirsuta* Pursh. MacM. Four-o'clock. Dry prairie; frequent; May-August.

- Mirabilis nyctaginea* (Michx.) MacM. Four-o'clock. Dry prairie; rare; May-August.

Onagraceae (Evening-primrose Family)

- Calylophus serrulatus* (Nutt.) Raven. Toothed-leaved primrose. Dry to mesic prairie; common; June-July.

- Epilobium coloratum* Biehler. Purple-leaved willow-herb. Marsh; infrequent; July-October.

- Oenothera biennis* L. var. *canescens* T & G. Evening primrose. Dry to mesic prairie; common; June-September.

Oxalidaceae (Wood-sorrel Family)

- Oxalis dillenii* Jacq. Wood-sorrel. (Gerhardt 1940).

- Oxalis pilosa* L. Yellow wood-sorrel. Dry to wet prairie; abundant; May-October.

- Oxalis violacea* L. Violet wood-sorrel. Dry to mesic prairie; frequent; April-June.

Plantaginaceae (Plantain Family)

- Plantago major* L. Common plantain. Mesic prairie; common; June-October.

- Plantago rugelii* Dcne. Pale plantain. Mesic prairie; common; June-October.

Polemoniaceae (Phlox Family)

- Phlox pilosa* L. Prairie phlox. Mesic prairie; common; April-June.

Polygalaceae (Milkwort Family)

- Polygala verticillata* L. Whorled milkwort. Dry to mesic prairie; infrequent; July-October.

Polygonaceae (Smartweed Family)

- Polygonum aviculare* L. Prostrate knotweed. Dry prairie to marsh; common; June-September.

- Polygonum coccineum* Muhl. Water smartweed. (Van der Valk and Davis 1976).

- Polygonum convolvulus* L. Black bindweed. Dry to mesic prairie; infrequent; June-September.

- Polygonum erectum* L. Erect knotweed. Dry to mesic prairie; frequent; June-September.

- Polygonum hydropiper* L. Common smartweed. Wet prairie to marsh; abundant; July-August.

- Polygonum lapathifolium* L. Pale smartweed. Wet prairie and marsh; infrequent; July-September.

- Polygonum natans* Eat. Water smartweed. (Gerhardt 1940).

- Polygonum pennsylvanicum* L. Pennsylvania smartweed. Dry to wet prairie and marsh; frequent; July-September.

- Polygonum ramosissimum* Michx. Bushy knotweed. Dry to wet prairie; infrequent; August-September.

- Rumex altissima* Wood. Pale dock. Mesic; infrequent; May-July.

- Rumex crispus* L. Sour dock. Mesic to wet prairie; frequent; June-July.

- Rumex orbiculatus* Gray. Great water dock. Marsh; rare; July-August.

Portulacaceae (Purslane Family)

Portulaca oleracea L. Purslane. Dry disturbed prairie; rare; June-October.

Primulaceae (Primrose Family)

Androsace occidentalis Pursh. Androsace. Dry, sandy prairie; rare (locally abundant); April.

Lysimachia hybrida Michx. Hybrid lysimachia. Marsh; common; June-July.

Lysimachia thyrsoiflora L. Tufted loosestrife. Marsh; frequent; May-June.

Ranunculaceae (Crowfoot Family)

Anemone canadensis L. Canada anemone. Dry to wet prairie; common; May-August.

Anemone cylindrica Gray. Thimbleweed. Dry to mesic prairie; common; June-August.

Anemone patens L. Pasque-flower. Dry to mesic prairie; common; March-April.

Delphinium virescens Nutt. Larkspur. Dry to mesic prairie; frequent; June-July.

Ranunculus pennsylvanicus L. f. Bristly crowfoot. Wet prairie and marsh; common; July-August.

Ranunculus rhomboideus Goldie. Prairie buttercup. Dry to mesic prairie; frequent; April-May.

Thalictrum dasycarpum Fisch. & Ave-Lall. Purple meadow rue. Mesic prairie infrequent; June-July.

Thalictrum revolutum DC. Meadow rue. (Gerhardt 1940).

Rhamnaceae (Buckthorn Family)

Ceanothus americanus L. New Jersey tea. Mesic prairie; infrequent; June-July.

Rosaceae (Rose Family)

Agrimonia striata Michx. Agrimony. Mesic to wet prairie; frequent; June-August.

Crataegus mollis (T. & G.) Scheele. Hawthorn. Mesic prairie; rare.

Fragaria virginiana Duchesne. Strawberry. Mesic prairie; common; April-June.

Fragaria vesca L. Strawberry. (Gerhardt 1940).

Geum aleppicum Jacq. Yellow avens. Mesic to wet prairie; frequent; June-August.

Geum triflorum Pursh. Prairie avens. Dry prairie; rare; May-June.

Potentilla argentea L. Silvery cinquefoil. Dry prairie; frequent; June-September.

Potentilla arguta Pursh. Tall cinquefoil. Dry to mesic prairie; common; June-August.

Potentilla norvegica L. Rough cinquefoil. Dry to wet prairie; frequent; June-October.

Potentilla rivalis Nutt. Cinquefoil. Wet prairie and marsh; frequent; June-August.

Prunus americana Marsh. American plum. Mesic prairie; rare.

Rosa suffulta Greene. Prairie rose. Dry to mesic prairie; frequent; June-July.

Rubiaceae (Madder Family)

Galium boreale L. Northern bedstraw. Dry to mesic prairie; common; June-July.

Galium obtusum Bigel. Bedstraw. Wet prairie and marsh; common; May-July.

Salicaceae (Willow Family)

Populus deltoides Barram. Cottonwood. Common invader of disturbed wet prairie and marsh.

Salix amygdaloides Anders. Peach leaved willow. Common invader of disturbed wet prairie and marsh.

Santalaceae (Sandal-wood Family)

Comandra umbellata (L.) Nutt. Bastard toad-flax. Dry to mesic prairie; common; May-July.

Saxifragaceae (Saxifrage Family)

Heuchera richardsonii Rr. Prairie alumroot. Dry to mesic prairie; common; May-July.

Penthorum sedoides L. Ditch stoncrop. Marsh; common; July-September.

Scrophulariaceae (Figwort Family)

Agalinis aspera (Benth.) Britt. Purple gerardia. Dry to mesic prairie; infrequent; August-September.

Agalinis tenuifolia (Vahl.) Raf. Slender gerardia. Wet prairie and marsh; infrequent; August-October.

Castilleja sessiliflora Pursh. Downy painted cup. Dry prairie; common; May-July.

Mimulus ringens L. Square stemmed monkey flower. Marsh; frequent; June-September.

Scrophularia lanceolata Pursh. Figwort. Mesic prairie; frequent; May-July.

Veronicastrum virginicum (L.) Farw. Culver's root. Mesic prairie; frequent; June-August.

Solanaceae (Nightshade Family)

Physalis heterophylla Nees. Ground cherry. Dry to mesic prairie; common; June-September.

Physalis pruinosa L. Ground cherry. (Gerhardt 1940).

Physalis virginiana P. Mill. Virginia ground cherry. Dry to mesic prairie; common; June-August.

Solanum americanum P. Mill. Common nightshade. Dry to mesic prairie; infrequent; May-September.

Ulmaceae (Elm Family)

Ulmus pumila L. Siberian elm. Dry to mesic prairie; frequent invader.

Urticaceae (Nettle Family)

Parietaria pennsylvanica Muhl. Pellitory. Mesic prairie; infrequent; June-September.

Verbenaceae (Vervain Family)

Verbena hastata L. Blue vervain. Wet prairie and marsh; frequent; June-October.

Verbena stricta Vent. Hoary vervain. Dry to mesic prairie; abundant; June-September.

Violaceae (Violet Family)

Viola nephrophylla Greene. Stemless blue violet. Mesic to wet prairie; common; May-July.

Viola pedata L. Birdfoot violet. (Gerhardt 1940).

Viola pedatifida G. Don. Prairie violet. Dry to mesic prairie; common; April-June.

Vitaceae (Grape Family)

Vitis riparia Michx. Wild grape. Mesic prairie; rare.