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FLORISTIC ANALYSIS OF THE *C. BERTRAND AND MARIAN OTHMER SCHULTZ PRAIRIE*, A MIXED-GRASS PRAIRIE IN SOUTH-CENTRAL NEBRASKA

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ABSTRACT

The C. Bertrand and Marian Othmer Schultz Prairie is a 259 ha/640 ac/1 mi^2 tract of mixed-grass prairie in a region of loess hills in south-central Nebraska. It is on the Kansas border in Webster County, 6.5 km south and 8.1 km east of Red Cloud. A floristic study of the prairie was made during the 1993 and 1994 growing seasons. The 1993 study was accompanied by an ecological survey which determined (1) plant species importance and (2) plant-community relationships using point-step and quadrat methods. Major plant community types are *Andropogon scoparius–A. gerardii–Bouteloua gracilis* on shallow limy range sites, *A. scoparius–Poa pratensis–Bouteloua curtipendula* on silty sites, and *A. gerardii–A. scoparius–Buchloë dactyloides* on lowland overflow sites. The prairie is traversed from south to north by Lost Creek which supports wetland and riparian vegetation. A total of 239 plant species representing 58 families are listed in this report.

† † †

The C. Bertrand and Marian Othmer Schultz Prairie (T1N, R10W, Sec. 35) is located in the loess hills region of extreme south-central Nebraska (Fig. 1). It is bordered on the south by the Kansas state line and is 8.1 km due east of U.S. Highway 81 and the Willa Cather Memorial Prairie, a Nature Conservancy Preserve. A parent material of chalky limestone lies beneath gentle to steep slopes containing deep silty soils. Major soil associations are Kipson, Geary/Hobbs, and Holdrege (Paden and Ragon, 1974) which determine the 3 major range types classified in this region: (1) shallow limy, (2) silty, and (3) lowland silty overflow range sites.

This region was originally classified as Kansas mixed-grass prairie by Kaul (1975) and is more recently included in the original loess hills mixed-grass prairie in Nebraska by Kaul and Rolfsmeier (1993). Küchler (1974) identified this region as bluestem-grama prairie dominated by big bluestem (*Andropogon gerardii*), little bluestem (*Andropogon scoparius*), sideoats grama (*Bouteloua curtipendula*), and blue grama (*Bouteloua gracilis*). Schultz Prairie contains species with affinities to the Nebraska loess hills as described by Weaver and Bruner (1948) and the Kansas mixed-grass prairie which predominates much of north-central Kansas. Also, the transitional ecotone between eastern tallgrass prairie and mixed-grass prairie (Weaver and Bruner, 1954) passes through eastern Webster County. Schultz Prairie is within an area of transitional grasslands on both an east-west and a north-south basis.

Among the earliest known plant collections in Webster County were those made in 1893 and 1894 by Mrs. G. P. Cather and in 1899 by Lawrence L. Pierce; both collections are presently in the Willa Cather Historical Museum in Red Cloud, Nebraska. Vegetation typical of this area was previously described by Hulett et al. (1968), Hulett and Tomanek (1969), and Nicholson and Marcotte (1979). Studies by Nagel (1994) on the Willa Cather Memorial Prairie documented 17 years of successional changes influenced by limited grazing and fire. That research reported significant reductions in blue grama, buffalo grass (*Buchloë dactyloides*), Japanese brome (*Bromus japonicus*), and sideoats grama, while big bluestem, sedges (*Carex* spp.), smooth brome (*Bromus inermis*), and tall dropseed (*Sporobolus asper*) increased dramatically. The dominant grasses present at Schultz Prairie, i.e. little bluestem, side-oats grama, and buffalo grass, are much the same as those that dominated Willa Cather Memorial Prairie in 1976. Differences in grazing intensity and fire frequency might to explain these comparisons, but other edaphic factors (soils, rainfall) are also likely to play a role. These native mixed-grass prairies are possibly much more dynamic than first suspected and undergo changes in species composition even when disturbance is minimal.

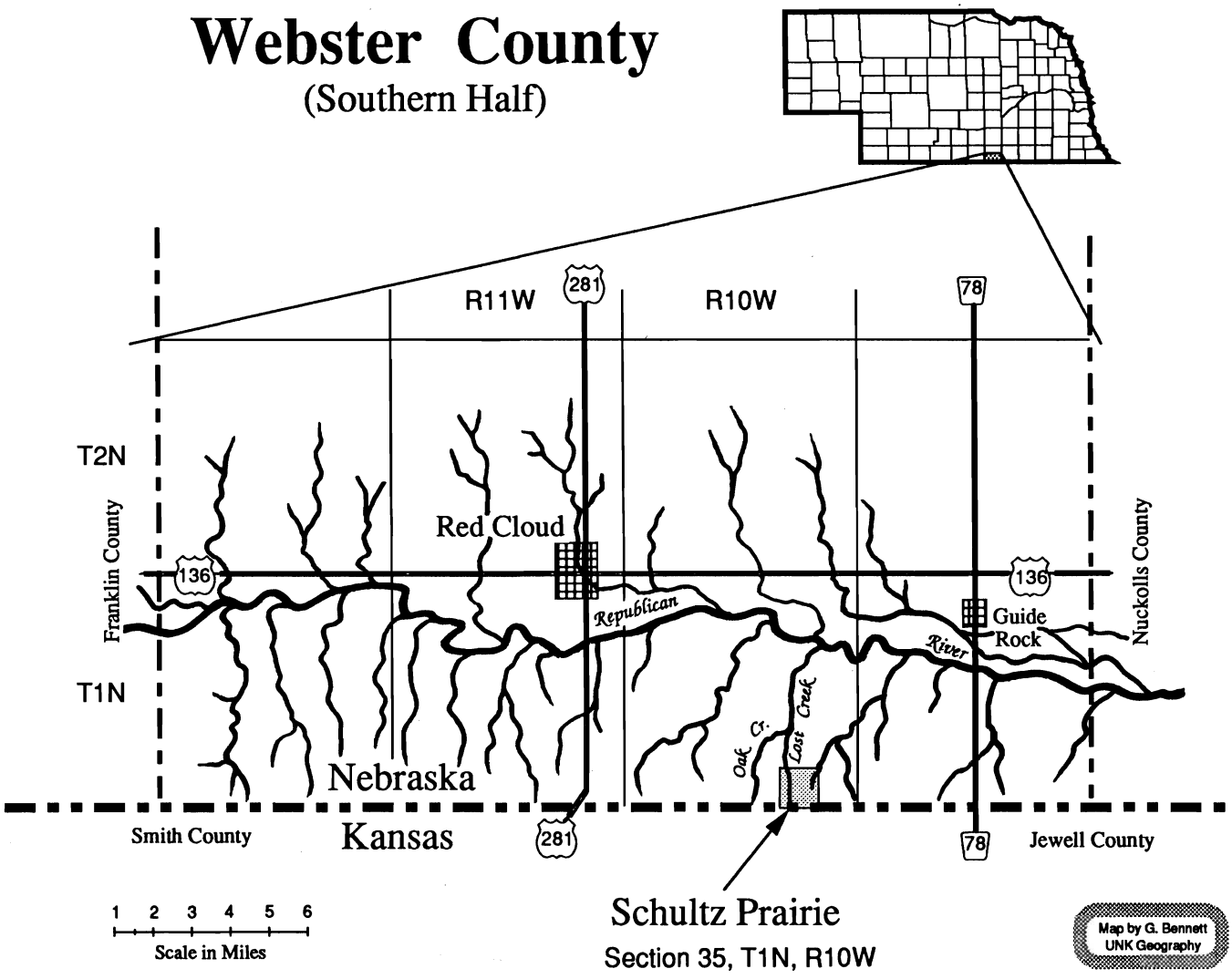

Figure 1. Southern half of Webster County, Nebraska, showing the location of Schultz Prairie.

PHYSICAL DESCRIPTION

The Republican River is a dominant feature of south-central Nebraska, draining nearly 22,000 mi^2 (57,000 km^2) upstream from Red Cloud and all of Webster County. Lost Creek is a permanent stream which traverses Schultz Prairie from south to north and is joined by Oak Creek before entering the Republican River (Fig. 1). The Cretaceous limestone deposits in much of the county are part of the Niobrara Formation originating as calcareous ooze on the floor of Cretaceous seas (Pabian, 1980). This material is referred to as "Niobrara chalk" or chalky limestone. Unconsolidated stream deposits (alluvium) and two distinct layers of aeolian loess overlie these rocky deposits. The wind-deposited loess began to form during the Pleistocene Epoch beginning about 2 million years ago. However, the oldest loess deposit in the Webster County area is less than one million years old (Pabian, 1980). The lower loess deposits here are named Peorian and the upper are named Bignell loess. They are made of silty materials and are capped by modern soil which may be as much as 12 in (30 cm) deep. Steep eroding slopes expose calcareous limestone breaks that provide a uniquely different type of environment for prairie plants. Species composition of these shallow limy range sites is further discussed in the section "Present Vegetation."

METHODS

A floristic study of Schultz Prairie was made during the 1993 and 1994 growing seasons. The 1993 floristic analysis was part of an ecological study of the prairie (Rothenberger, 1994) where 41 field sites were sampled using both the modified step-point method (Owensby, 1973) and 0.1m^2 quadrats. One hundred step points per site were randomly taken within a

400m^2 area to obtain per cent basal cover and per cent species composition. Twenty five 0.1m^2 quadrats (totaling 2.5m^2/site) were randomly placed along lines of uniform topography in order to determine forb density, frequency, and importance. Aerial cover (%) was also recorded for all species present within each 0.1m^2 quadrat. These data contributed to the information on species distribution and abundance included in this paper.

PRESENT VEGETATION

The princiapl plant communities present at Schultz Prairie are mixed-grass prairie, riparian woodland, and wetlands. There are also minor vegetaton types, such as roadside waste areas and disturbed border sites. Portions of the Prairie have been overgrazed for several years, which may account for the fairly large number of ruderal species. Most wetlands in this area are associated with tributaries of the Republican River. A number of hydrophytes and associated species occupy these lowlands which are frequently wet from runoff from the surrounding hills. The ten most common plant families comprise 64% of the total reported flora (Table 1).

Table 1. The ten major plant families at Schultz Prairie.

Families	Genera	Species
Poaceae	28	44
Asteraceae	27	42
Fabaceae	11	18
Cyperaceae	4	12
Polygonaceae	2	8
Lamiaceae	7	7
Euphorbiaceae	3	7
Brassicaceae	5	6
Verbenaceae	1	5
Rosaceae	3	4
		Total Species =153 (64% of total flora)

Mixed-grass prairie

Mixed-grass prairie is the most extensive original vegetation type in south-central Nebraska. Much rangeland remains, but cultivated lands have gradually replaced many of the original prairie tracts. Schultz Prairie has never been placed into cultivation and the earliest known aerial photograph of the site, June 1937 (Conservation and Survey Division, 1937), indicates that topographic changes have been minor. Three range types are included in the community:

(1) Shallow limy range sites. Shallow limy range sites are found on Kipson silt loam soils which are exposed on sloping calcareous uplands. Underlying bedrock limits effective water movement and root penetration. Slopes are steep (7–31%) and dry with rapid runoff. Plants must adapt to rocky or chalky breaks that are periodically dry. The dominant association is little bluestem–big bluestem–blue grama mixed with moderate amounts of hairy grama (*Bouteloua hirsuta*). Major forbs are purple prairie clover (*Dalea purpurea*), field pussytoes (*Antennaria neglecta*), gray green wood sorrel (*Oxalis dillenii*), spotted spurge (*Euphorbia maculata*), and common mullein (*Verbascum thapsis*).

(2) Silty range sites. Silty range sites are located on the uplands where most slopes average only 3–7%. They contain deep silt loam soils of the Geary and Holdrege series and erode more severely where slopes ranges from 7 to 10%. A little bluestem–Kentucky bluegrass (*Poa pratensis*)–sideoats grama association is dominant while buffalo grass, big bluestem, and blue grama are present in lesser amounts. A diverse combination of grasses and forbs is found on silty sites because of their deeper soils and gentle drainage. Introduced perennial and annual brome grasses (*Bromus inermis* and *B. japonicus*) are much more frequent on silty sites. Common forbs are gray-green wood sorrel, field pussy toes, common mullein, and western ragweed (*Ambrosia psilostachya*).

(3) Lowland silty overflow sites. The short sides and narrow bottoms of lowland drainageways are dominated by big bluestem–little bluestem–buffalo grass associations with significant amounts of sideoats grama, Junegrass (*Koeleria pyramidata*), and blue grama. Geary soils are found on the moderately steep canyon sides (up to 31% slopes) with gently sloping to nearly level Hobbs soils on the bottomlands (Paden and Ragon 1974). The slopes are well-drained but are quite permeable with moderate to high available water capacity. Prominent forbs are field pussy toes, spotted spurge, gray-green wood sorrel, and hoary vervain (*Verbena stricta*).

Wetlands

Small areas of wetland vegetation are found along Lost Creek, a permanent stream that flows north across the west side of Schultz Prairie and within temporary drainageways on the north and east sides of the prairie. Lost Creek adds another dimension to the area flora as a number of associated species are not normal components of a mixed-grass prairie (Table 2).

Riparian Forest

Riparian vegetation is associated with Lost Creek and several roadside thickets along the west-central edge of the prairie. Dominants are bur oak (*Quercus macrocarpa*), white mulberry (*Morus alba*), green ash (*Fraxinus pennsylvanica* var. *subintegerrima*), silver maple (*Acer saccharinum*), and red cedar (*Juniperus virginiana*). Understory species are rough-leaved dogwood (*Cornus drummondii*), American bittersweet (*Celastrus scandens*), and Missouri gooseberry (*Ribes*

Table 2. Species associated with Lost Creek and not typical of mixed-grass prairie.

Trees	Stream-bank herbs	Wetland herbs
Acer saccharinum	*Acalypha viginiana*	*Carex emoryi*
Fraxinus pennsylvanica	*Alopecurus carolinianus*	*Eleocharis erythropoda*
Morus alba	*Bidens cernua*	*Juncus dudleyi*
Populus deltoides	*Carex blanda*	*Juncus effusus*
Prunus americana	*Echinocystis lobata*	*Juncus torreyi*
Prunus virginiana	*Geum canadense*	*Lemna minor*
Quercus macrocarpa	*Glycyrrhiza lepidota*	*Lemna perpusilla*
Ulmus americana	*Hackelia virginiana*	*Sagittaria brevirostra*
Shrubs	*Leersia virginica*	*Scirpus pallidus*
Amorpha fruticosa	*Lycopus americanus*	*Scirpus pendulinus*
Celastrus scandens	*Monarda fistulosa*	*Sparganium eurycarpum*
Cornus drummondii	*Plantago rugelii*	*Typha latifolia*
Ribes missouriense	*Rorippa palustris*	*Zannichellia palustris*
Sambucus canadensis	*Sanicula canadensis*	
Toxicodendron radicans	*Smilacina stellata*	
	Solidago gigantea	

missouriense). Several bur oak trees are quite large, with one measuring 1.1 m in diameter. This small riparian community was likely a presettlement savanna with postsettlement fire supression responsible for the proliferation of small trees and shrubs.

ANNOTATED CHECKLIST

The majority of taxa in this list are documented by voucher specimens deposited at the University of Nebraska at Kearney Herbarium (UNK) and/or the University of Nebraska at Omaha Herbarium (*OMA*). Credible sight records exist for several species that are undocumented by voucher specimens. Some were likely recorded by field workers who were concentrating on musk thistle control rather than on a botanical survey. Several common species are noticeably absent from this list, such as *Potentilla* spp. and *Asclepias syriaca,* while others, such as *Asclepias tuberosa* are much less frequent than expected. Grazing and applications of picloram as Tordon® to control musk thistle have had an adverse affect on a number of native forbs.

Those species that were sampled during ecological surveys are labeled, based on site location and estimated cover/ abundance, using the following abbreviations:

L = Limy sites
S = Silty upland sites
O = Lowland silty overflow sites
1 = Rare (single, isolated individuals, cover <1%)
2 = Infrequent (widely scattered; cover 0–5%)
3 = Occasional (small groups/clumps; cover 5–10%)
4 = Common (thick patches; cover 10–15%)
5 = Abundant (cover 15–25%)
6 = Very abundant (cover >25%)

All others are given a subjective estimate of abundance based largely on field observations. Nomenclature follows the Great Plains Flora Association (1991). Species not previously reported for Webster County in the *Atlas of the Flora of the Great Plains* (Great Plains Flora Association, 1977) are designated with an asterisk (*).

Aceraceae

Acer negundo L. (box elder). Along fencelines on the west and northeast sides of the prairie. Uncommon.

Acer saccharinum L. (silver maple). Occasional along Lost Creek, SW ¼, within riparian vegetation.

Alismataceae

Sagittaria brevirostra Mack. & Bush (arrowhead)*. Collected at a lowland overflow site, NW side of prairie, partially submerged.

Amaranthaceae

Amaranthus albus L. (tumbleweed). Occasional on disturbed areas of both silty upland and limy sites.

Amaranthus retroflexus L. (rough pigweed). Along roadsides and dry, disturbed sites at the west edge of prairie.

Anacardiaceae

Toxicodendron radicans (L.) O. Ktze. (poison ivy). Semi-shaded riparian area, SW ¼.

Apiaceae

Conium maculatum L. (poison hemlock). Weed in lowland overflow areas, in partial shade on the south and west sides of the Prairie.

Lomatium orientale Coult. & Rose (wild parsley). Infrequent, scattered on hillsides.

Sanicula canadensis L. (black snakeroot). In partial shade as a constituent of savanna-like oak openings along the spring-fed stream.

Spermolepis inermis (Nutt.) Math. & Const. (scaleseed). Quite scarce on dry, upland sites.

Asclepiadaceae

Asclepias stenophylla A. Gray (narrow-leaved milkweed). Uncommon and scattered widely on upland sites.

Asclepias tuberosa L. (butterfly milkweed). This showy plant grows on calcareous breaks and rocky slopes. Oddly, it is a rare plant on the prairie collected only once on the north side.

Asclepias verticillata L. (whorled milkweed). Collected on the northeast ¼ Sec. of Schultz Prairie. Uncommon.

Asclepias viridiflora Raf. (green milkweed). In mixed-prairie adjacent to oak riparian forest on the west side.

Asteraceae

Achillea millefolium L. (yarrow). Frequently encountered, scattered on upland sites. S-2

Ambrosia psilostachya DC. (western ragweed). Scattered but common on silty upland sites. S-4

Ambrosia trifida L. (giant ragweed). A weedy invader along the roadside, southwest side.

Antennaria neglecta Greene (field pussy-toes). Quite common on both limy and silty lowland overflow range sites. Occasional on upland sites. L-4; S-4; O-3

Artemisia ludoviciana Nutt. var. ***ludoviciana***. (white sage). Collected most often on silty upland sites. S-4

Aster ericoides L. (white aster). Infrequent and scattered on upland sites, NE ¼.

Aster fendleri A. Gray (Fendler's aster). A rare plant on the Schultz Prairie.

Aster oblongifolius Nutt. (aromatic aster). A roadside weed along the fenceline, west side of prairie. S-1

Aster simplex Willd. var. ***ramosissimus*** (T. & G.) Cronq. (panicled aster). Collected only on calcareous breaks on the north side of the prairie.

Bidens cernua L. (nodding beggar-ticks). Collection from the west-central side of the prairie, along Lost Creek. (*OMA*)

Carduus nutans L. (musk thistle). An aggressive invader especially in the northern half of the prairie. S-4

Cirsium altissimum (L.) Spreng. (tall thistle). Tall or roadside thistle is quite common on upland and some lowland overflow sites. L-2; O-2

Cirsium flodmanii (Rydb.) Arthur (Flodman's thistle). Infrequent; scattered on slopes and upland sites.

Cirsium ochrocentrum A. Gray (yellowspine thistle). Occasional; scattered on upland sites. S-2

Cirsium undulatum (Nutt.) Spreng. (wavy-leaved thistle). A common, native thistle throughout the loess hills prairies of Nebraska and Kansas.

Cirsium vulgare (Savi) Ten. (bull thistle). The large size of this plant is often a cause for overestimating its significance. Scattered throughout the south half of this section.

Conyza canadensis (L.) Cronq. (horseweed). A common weedy species with little significance in natural grasslands. S-2

Dyssodia papposa (Vent.) Hitchc. (fetid marigold). A roadside invader that does not easily compete in established prairie sites.

Echinacea angustifolia DC. (purple coneflower). A showy mixed-grass species, remotely scattered along the east edge of Schultz Prairie and infrequent on limy breaks. L-2: S-2

Erigeron strigosus Muhl. ex Willd. (daisy fleabane). This composite is quite frequently encountered in both upland and lowland overflow sites. S-2; W-2

Grindelia squarrosa (Pursh) Dun. (gumweed). A common roadside species which occurs occasionally on both lowland and limy sites. O-2

Haplopappus spinulosus (Pursh) DC. (cutleaf ironplant). Scattered on drier sites, silty upland areas.

Helianthus annuus L. (common sunflower). An large, aggressive annual entering the Schultz Prairie from the roadside on the west side.

Helianthus maximilianii Schrad. (Maximilian's sunflower). A common sunflower in this area, collected in the SW ¼ and along the fence on the west side.

Helianthus petiolaris Nutt. (plains sunflower). Collected on dry, eroded slopes on the north side of the prairie.

Helianthus tuberosus L. (Jerusalem artichoke). Collected in semi-shaded area along the Kansas State line road, southwest edge of the prairie.

Kuhnia eupatorioides L. (false boneset). Infrequently encountered on slopes and calcareous areas on NE side of the prairie.

Lactuca serriola L. (prickly lettuce). Relatively common in southern Nebraska prairies and along roadsides. O-2

Liatris punctata Hook. (gay-feather). Infrequent on slopes and lowland overflow sites. S-3; O-2

Ratibida columnifera (Nutt.) Woot. & Standl. (prairie coneflower). It is most common on silty sites even though it appears elsewhere. S-4

Senecio plattensis Nutt. (prairie ragwort). A common species throughout Schultz Prairie. L-3; S-2

Solidago canadensis L. (Canada goldenrod). Not as common as the other goldenrods. Collected only near the fenceline on the west side of the prairie.

Solidago gigantea Ait. (late goldenrod). Occasional on lower slopes near Lost Creek in the SW ¼.

Solidago missouriensis Nutt. (Missouri goldenrod). Scattered on slopes on the west side of the prairie. Infrequent.

Solidago mollis Bartl. (soft goldenrod). Widely scattered prairie goldenrod. Most common on slopes and silty uplands in the SW ¼.

Solidago rigida L. (rigid goldenrod). A prominent prairie species.

Taraxacum officinale Weber (common dandelion). An occasional inhabitant of Schultz Prairie, becoming better established on heavily grazed sites. L-2; W-1

Thelesperma megapotamicum (Spreng.) O. Ktze. A common species which adapts well to the dry conditions along calcareous breaks. Collected in the NE ¼.

Townsendia exscapa (Richards.) Porter (Easter daisy). An early flowering species sometimes overlooked; on sloping hillsides, upland silty sites, NW ¼.

Tragopogon dubius Scop. (western salsify). A weedy, roadside species. Occasional in the prairie.

Vernonia baldwinii Torr. (western ironweed). More common along roadsides than in the prairie.

Xanthium strumarium L. (cocklebur). A weedy invading species collected in rocky soil along calcareous sites, NE ¼.

Boraginaceae

Hackelia virginiana (L.) I. M. Johnst. (stickseed). Collected in shaded area near Lost Creek, SW ¼; uncommon.

Lithospermum incisum Lehm. (narrow-leaved puccoon). Quite common on slopes and uplands.

Onosmodium molle Michx. var. ***occidentale*** (Mack.) Johnst. (false gromwell). Very common, especially on upland sites. S-3

Brassicaeae

Capsella bursa-pastoris (L.) Medic. (shepherd's purse). In moist soil along fencelines, roadsides, and lowland overflow sites.

Descurainia pinnata (Walt.) Britt. subsp. ***intermedia*** (Rydb.) Detling (tansy mustard). Collected on west side of the prairie along eroded bank of Lost Creek.

Draba reptans (Lam.) Fern. (white whitlowort). In shorter, mixed vegetation on slopes; silty upland sites; common.

Hesperis matronalis L. (dame's rocket). A roadside species that invades the prairie along the southeastern edge.

Rorippa palustris (L.) Bess. subsp. ***glabra*** (Sch.) Stuckey var. ***fernaldiana*** (Butt. & Abbe) Stuckey (bog yellow cress). In shaded area in Lost Creek, west-central side. (*OMA*)

Rorippa palustris (L.) Bess. subsp. ***glabra*** (Sch.) Stuckey var. ***glabrata*** (Lunell) Stuckey (bog yellow cress). Along Lost Creek, west-central side. (*OMA*)

Cactaceae

Opuntia macrorhiza Engelm. (plains prickly pear). On disturbed, grassy slope, NE ¼. Uncommon.

Campanulaceae

Lobelia cardinalis L. (cardinal flower). Rare on the prairie, collected in a lowland grassy area, 13 Sept. 1991 (*OMA*).

Triodanis leptocarpa (Nutt.) Nieuw. (Venus' looking glass). Not rare, but more elusive than *T. perfoliata*. Silty upland sites.

Triodanis perfoliata (L.) Nieuw. (Venus' looking glass). A common mixed-grass prairie forb in this region; collected on silty upland sites, NE ¼.

Cannabaceae

Cannabis sativa L. (hemp). Opportunistic, occasional in open prairie; collected in moist soil near Lost Creek, SW ¼.

Capparaceae

Polanisia dodecandra (L.) DC. subsp. ***trachysperma*** (T. & G.) Iltis (clammy-weed). Not necessarily rare, but only one collection has been made. (*OMA*)

Caprifoliaceae

Sambucus canadensis L. (common elderberry). Occasional in semi-shaded area along Lost Creek, SW ¼.

Symphoricarpos occidentalis Hook. (western snowberry). Common prairie shrub especially on upland sites. S-3

Caryophyllaceae

Arenaria stricta Michx. subsp. ***texana*** (Robins.) Maguire (rock sandwort). Upland slopes, NE ¼.

Saponaria officinalis L. (bouncing bet)*. Enters the prairie on the west side from an abandoned farmstead. Rare in Schultz Prairie, but frequently escapes in central and eastern Nebraska.

Silene antirrhina L. (sleepy catchfly). A single collection from disturbed sites along upland slopes, NE ¼, 4 June 1992. (*OMA*)

Celastraceae

Celastrus scandens L. (American bittersweet). Along Lost Creek in riparian area, SW ¼.

Chenopodiaceae

Chenopodium berlandieri Moq. (pitseed goosefoot)*. Uncommon, but present on dry slopes in the SW ¼.

Kochia scoparia (L.) Schrad. (fireweed). Infrequent in disturbed areas, SW ¼.

Cornaceae

Cornus drummondii C. A. Mey. (rough-leaved dogwood). One of the common shrubs along Lost Creek, SW ¼, and in thickets along the west edge of the prairie.

Cucurbitaceae

Echinocystis lobata (Michx.) T. & G. (wild cucumber). In semi-shaded thickets along the southwestern side of the prairie and along Lost Creek several hundred meters to the north.

Cupressaceae

Juniperus virginiana L. (red cedar)*. Infrequent in the prairie, but more common in riparian area, SW ¼. L-2

Cyperaceae

Carex blanda Dew. (woodland sedge). Infrequent scattered under trees along Lost Creek, SW ¼.

Carex brevior (Dew.) Mack. ex Lunell (fescue sedge). Exceptionally common and widespread. L-4; S-5; O-3

Carex eleocharis Bailey (needleleaf sedge). Another common species which matures very early. L-3; S-3

Carex emoryi Dew. (Emory's sedge). Overall, an uncommon species here. Collected in moist soil in and along Lost Creek, SW ¼.

Carex gravida Bailey var. ***gravida***. (heavy sedge)*. Following *C. brevior,* the second-most common sedge in the prairie. L-4; S-4

Carex heliophila Mack. (sun sedge). Not rare, but its small size and early flowers are often overlooked. Hillsides, SE ¼. S-2

Carex vulpinoidea Michx. (fox sedge). Occasional on lowland sites. W-2

Cyperus lupulinus (Spreng.) Marcks (Houghton flatsedge). Very common and widespread, small size. S-3; W-3

Eleocharis erythropoda Steud. (spike rush). Occurring in thick stands near Lost Creek and in wet soil of lowland overflow sites. NE ¼ and SW ¼.

Scirpus pallidus (Britt.) Fern. (dark green bulrush). Common in wet soil of lowland overflow sites; SW ¼ and NE ¼.

Scirpus pendulinus Muhl. (bulrush). In wet soil where Lost Creek spreads out across lowland overflow area; NW ¼.

Scirpus validus Vahl (soft-stem bulrush). In large colonies where Lost Creek drains to the north. NW ¼.

Equisetaceae

Equisetum laevigatum A. Br. (smooth scouring rush). Common in moist areas and low prairie slopes, NW ¼ and NE ¼

Euphorbiaceae

Acalypha virginica L. (three-seeded mercury). Scattered on lowland overflow area in shade along Lost Creek.

Croton texensis (Kl.) Muell. Arg. (Texas croton). Collected on west edge of the prairie; dry upland slopes.

Euphorbia dentata Michx. (toothed spurge). Occasional in mixed prairie, on upland slopes and moist lowland sites.

Euphorbia glyptosperma Engelm. (ridge-seeded spurge). A weed occasionally found in disturbed areas.

Euphorbia maculata L. (spotted spurge). Very common but inconspicuous due to its small size. L-2; S-2; O-2

Euphorbia marginata Pursh (snow-on-the-mountain). Infrequent in disturbed areas; much more common on heavily grazed Webster County prairies. S-2; O-2

Euphorbia spathulata Lam. Collections from upland prairie on north-central side. (*OMA*)

Fabaceae

Amorpha canescens Pursh (lead plant). Along the fence and into mixed-grassland; SW ¼. Common in this area.

Amorpha fruticosa L. (false indigo). Collected only along Lost Creek on west-central side of prairie. (*OMA*)

Astragalus canadensis L. (Canada milk-vetch). Occasional on hillsides and lowland overflow sites.

Astragalus crassicarpus Nutt. var. ***crassicarpus*** (groundplum). Common prairie legume on upland and lowland sites. L-3; S-4; O-3

Astragalus lotiflorus Hook. (lotus milk-vetch). Scattered on dry sites, but extends into lowland sites. L-2; O-3

Astragalus mollissimus Torr. (woolly locoweed). Another common milk vetch, especially on upland slopes; SE ¼.

Astragalus plattensis Nutt. ex T. & G. (Platte River milk-vetch). Upland slopes, NE ¼. (*OMA*)

Dalea aurea Nutt. ex Pursh (golden prairie-clover). Uncommon on Schultz Prairie. A single collection, 28 July 1992. (*OMA*)

Dalea candida Michx. ex Willd. (white prairie-clover). Quite common throughout, favoring calcareous breaks.

Dalea purpurea Vent. (purple prairie-clover). The most common of the three *Daleas*, collected on a number of sites. L-4; S-2; O-3

Glycyrrhiza lepidota Pursh (wild licorice). Common on lowland overflow area near Lost Creek, SW ¼.

Lotus purshianus Clem. & Clem. (prairie trefoil). Common on hillsides and uplands; collections from the NE ¼.

Medicago lupulina L. (black medick). Scattered and quite common on both upland and lowland sites. L-4; O-3

Melilotus officinalis (L.) Pall. (yellow sweet clover). Infrequent in the prairie, SW ¼.

Oxytropis lambertii Pursh (purple locoweed). Common especially on grazed sites. L-2; O-2

Psoralea tenuiflora Pursh (scurfy pea). Common on Willa Cather Prairie but infrequent on Schultz Prairie, where collected only along the west edge.

Strophostyles leiosperma (T. & G.) Piper (slick-seed bean). Mixed with various graminoids on upland and lowland sites. S-2; O-2

Vicia americana Muhl. ex Willd. var. ***americana*** (American vetch). Widely scattered but not common on silty, upland site, SE ¼.

Fagaceae

Quercus macrocarpa Michx. (bur oak). Numerous along Lost Creek, especially in the SW ¼.

Grossulariaceae

Ribes missouriense Nutt. (Missouri gooseberry). Collected with *Cornus* and *Celastrus* near stream, SW ¼.

Hydrophyllaceae

Ellisia nyctelea L. (waterpod). In understory of bur oaks on the west side and near the road ditch, SW ¼.

Juncaceae

Juncus dudleyi Wieg. (Dudley rush). Likely more common, but collected only once in the Lost Creek area, SW ¼.

Juncus effusus L. (bog rush). Rare in moist soil along and in Lost Creek, SW ¼.

Juncus torreyi Cov. (Torrey's rush). Collections from west central area along stream and in lowland overflow sites, NE ¼.

Lamiaceae

Hedeoma hispidum Pursh (rough false pennyroyal). Upland slopes and grazed sites. L-2

Lycopus americanus Muhl. ex Bart. (American bugleweed). In moist soil along Lost Creek, west side of prairie, SW ¼.

Monarda fistulosa L. var. **fistulosa** (wild bergamot). On semi-shaded stream bank, SW ¼.; also common where Lost Creek flows into Schultz Prairie from Kansas.

Nepeta cataria L. (catnip). Along roadside fence and trees on west-central side of the prairie.

Salvia reflexa Hornem. (lance-leaved sage). Collected on upland valley slopes, SE ¼.

Scutellaria lateriflora L. (blue skullcap). Uncommon, possibly rare; collected near fenceline thicket, west edge of the prairie.

Teucrium canadense L. (American germander). Very common along fenceline, west-central side and in the Lost Creek area, SW ¼.

Lemnaceae

Lemna minor L. (duckweed)* On surface of Lost Creek, SW ¼.

Lemna perpusilla Torr. (duckweed)*. Also on overflow areas, Lost Creek, SW ¼.

Liliaceae

Allium spp. (wild onion). Sight record.

Asparagus officinalis L. (asparagus)*. Collection from fenceline, NE ¼.

Smilacina stellata (L.) Desf. (false Solomon's seal). Semi-shaded areas, Lost Creek riparian area, SW ¼.

Linaceae

Linum rigidum Pursh (stiffstem flax). Common on prairie, adapts well to calcareous sites. L-3; W-2

Loasaceae

Mentzelia decapetala (Pursh) Urban & Gilg (ten-petal mentzelia). On rocky, calcareous exposures, NE ¼.

Malvaceae

Abutilon theophrasti Medic. (velvet-leaf)*. Uncommon, weedy. NE ¼.

Callirhoe involucrata (T. & G.) A. Gray (purple poppy mallow). Quite common throughout the prairie. L-2; S-4; O-2

Mimosaceae

Schrankia nuttallii (DC.) Standl. (sensitive brier). Collections from the NE ¼ and the west side near riparian area. L-2

Moraceae

Morus alba L. (white mulberry). Several trees in riparian area, SW ¼.

Oleaceae

Fraxinus pennsylvanica Marsh. var. ***subintegerrima*** (Vahl) Fern. (green ash). With *Morus* and *Quercus* along Lost Creek, SW ¼.

Onagraceae

Calylophus serrrulatus (Nutt.) Raven (plains yellow primrose). Uncommon but occasional on upland slopes.

Gaura parviflora Dougl. (velvety gaura)*. Scattered in the prairie on the west side of Lost Creek, SW ¼.

Oenothera biennis L. (common evening primrose). A weedy roadside species which enters the prairie on the northwest and west sides; NE ¼.

Stenosiphon linifolius (Nutt.) Heynh. (stenosiphon). Collected on calcareous breaks, NE ¼. Infrequent.

Oxalidaceae

Oxalis dillenii Jacq. (gray-green wood sorrel). Exceptionally abundant; its significance is concealed by its small size. L-4; S-4; O-3

Oxalis violacea L. (violet wood sorrel). Scattered on upland slopes, it prefers north-facing areas. SW ¼.

Pedaliaceae

Proboscidea louisianica (P. Mill.) Thell. (devil's claw). Sight record in low, relatively disturbed ground, SW ¼.

Plantaginaceae

Plantago patagonica Jacq. (Patagonian plantain). On drier sites with short vegetation; uplands.

Plantago rugelii Dcne. (Rugel's plantain)*. In moist soil on slopes, west side of Lost Creek; SW ¼.

Poaceae

Agropyron smithii Rydb. (western wheatgrass). An important mixed-grass species. L-4; S-5; O-4

Agrostis hyemalis (Walt.) Tuckerm. (ticklegrass). Scattered and infrequent on slopes; NE ¼.

Agrostis stolonifera L. (redtop)*. Quite common in moist soil near Lost Creek, SW ¼.

Alopecurus carolinianus Walt. (Carolina foxtail). Collections from lowland overflow areas that run into Lost Creek, SW ¼.

Andropogon gerardii Vitman (big bluestem). A dominant warm-season species essential for best grazing conditions. L-6; S-5; O-6

Andropogon scoparius Michx. (little bluestem). The most common species on the Schultz Prairie. L-6; S-6; W-6

Aristida oligantha Michx. (oldfield three-awn). Collections from upland slopes, west side of prairie.

Aristida purpurea Nutt. var. ***robusta*** (Merrill) A. Holm. & N.Holm. (red three-awn). A bunch grass scattered on hillsides; NE ¼ and SE ¼. S-4

Bouteloua curtipendula (Michx.) Torr. (sideoats grama). Abundant on all three range types. L-5; S-6; O-5

Bouteloua gracilis (H.B.K.) Lag. ex Griffiths (blue grama). An important mixed-prairie component. L-5; S-5; O-5

Bouteloua hirsuta Lag. (hairy grama)*. Not as common as the other *Bouteloua*s but especially adaptable to rocky areas. L-5; S-4; O-4

Bromus inermis Leyss. (smooth brome). One of the introduced brome grasses which invades silty sites on the SW and SE areas of the prairie. It has formed pure, extensive stands on parts of Willa Cather Prairie but is much less common on Schultz Prairie.

Bromus japonicus Thunb. ex Murr. (Japanese brome). Common mainly on gentle-sloping to level upland sites.

Bromus tectorum L. (downy brome). Disturbed areas from the western edge of the prairie. Infrequent.

Buchloë dactyloides (Nutt.) Engelm. (buffalo grass). An important species that can handle variable conditions and sites. L-5; S-5; O-5

Calamovilfa longifolia (Hook.) Scribn. (prairie sandreed)*. Collections from SW side of the prairie, drier upland sites.

Cenchrus longispinus (Hack.) Fern. (sandbur). Infrequent; collections from the NW ¼. L-2; S-2

Chloris verticillata Nutt. (windmill grass). Not rare but widely scattered on hillsides; NW ¼. L-2

Dichanthelium oligosanthes (Shult.) Gould var. ***scribnerianum*** (Nash) Gould (Scribner dichanthelium). Very common throughout the prairie. L-4; S-5; O-4

Echinochloa crusgalli (L.) Beauv. (barnyard grass). Uncommon on disturbed sites, SW ¼. L-2

Eleusine indica (L.) Gaertn. (goosegrass). In gravel at roadside edge and on disturbed site, east edge of prairie.

Elymus canadensis L. (Canada wildrye). Shaded roadside area and along thickets, west edge of the prairie.

Elymus virginicus L. var. ***virginicus*** (Virginia wildrye). Collections from NE ¼. Infrequent.

Eragrostis cilianensis (All.) E. Mosher (stinkgrass). In gravel at roadside edge, east side of the prairie and on hillsides, SW ¼.

Eragrostis pectinacea (Michx.) Nees (Carolina lovegrass). North-central area on hillsides.

Eragrostis spectabilis (Pursh) Steud. (purple lovegrass). Common and scattered on hillsides and lowland sites. L-3; S-4; O-4

Eragrostis trichodes (Nutt.) Wood (sand lovegrass). Uncommon in the NW ¼.

Festuca octoflora Walt. (sixweeks fescue). Somewhat common on hillsides but quite inconspicuous. S-2; W-2

Hordeum jubatum L. (foxtail barley). Common invader on upland sites.

Hordeum pusillum Nutt. (little barley). Collections from the SE ¼ and on disturbed sites NE ¼. S-2; O-2

Koeleria pyramidata (Lam.) Beauv. (Junegrass). Abundant throughout the prairie but contributes less biomass than the *Andropogons* and *Bouteloua*s. L-4; S-4; 0-5

Leersia virginica Willd. (whitegrass)*. Collected in shaded riparian area, under bur oaks near Lost Creek, SW ¼.

Muhlenbergia bushii R. Pohl (muhly)*. Collections only from the west-central part of the prairie along Lost Creek. (*OMA*)

Panicum capillare L. (witchgrass). Scattered on upland, lowland, and hillside areas. L-2; S-3; O-1

Panicum virgatum L. (switchgrass). Infrequent on lower edges of hillsides and forming stands within several lowland overflow areas. L-3

Paspalum setaceum Michx. var. ***stramineum*** (Nash) D. Banks. Scattered on hillsides but infrequent in much of the prairie; collections from the NE ¼ and SW ¼. S-2

Poa pratensis L. (Kentucky bluegrass). Very common throughout especially on silty sites. L-4; S-6; O-4

Setaria faberi Herrm. (Chinese foxtail). Collected on grazed hillside, SW ¼. Perhaps more common than the records indicate.

Setaria glauca (L.) Beauv. (yellow foxtail). Quite common, invades a variety of sites. L-3; S-5; O-3

Setaria viridis (L.) Beauv. (green foxtail). Collection from hillside prairie, SW ¼. Infrequent.

Sorghastrum nutans (L.) Beauv. (Indiangrass). On hillsides and upland prairie, it is most common along the west and southwest edge of the prairie. L-4; S-4; W-2

Sphenopholis obtusata (Michx.) Scribn. var. ***obtusata***. (wedgegrass). Lowland overflow area, where runoff from the prairie drains to the east; NE ¼.

Sporobolus asper (Michx.) Kunth var. ***asper*** (tall dropseed)*. Prominent, occasionally overlooked, is most prevalent in the NW ¼. L-2; S-5; O-4

Sporobolus cryptandrus (Torr.) A. Gray (sand dropseed). Occasional along roadsides and on upland sites on the west side of the prairie.

Polygalaceae

Polygala alba Nutt. (white milkwort). A common mixed-prairie species, SE ¼. S-2; W-2

Polygonaceae

Polygonum bicorne Raf. (pink smartweed). Collections from south central depression (*OMA*) and along Lost Creek near the state line (UNK). Uncommon.

Polygonum lapathifolium L. (pale smartweed). With *P. punctatum* in overflow area near Lost Creek; SW ¼. Locally common, but restricted to moist/wet habitats.

Polygonum pensylvanicum L. (Pennsylvania smartweed). Wooded area along stream, SW ¼ and west central areas.

Polygonum persicaria L. (lady's thumb). Collected in wet areas near Lost Creek and on lowland overflow sites, NE ¼.

Polygonum punctatum Ell. (water smartweed). Collected with *P. pensylvanicum*, SW ¼ (UNK) and west central area (*OMA*).

Polygonum scandens L. var. ***dumetorum*** (L.) Gl. (false buckwheat). On west edge of prairie on shrubs. Uncommon.

Rumex altissimus Wood (pale dock). A roadside species which enters the prairie in low depressions on the south side.

Rumex crispus L. (curly dock). Collected and observed in shaded areas along Lost Creek.

Primulaceae

Androsace occidentalis Pursh (western rock jasmine). Upland areas and well-drained slopes, SE ¼. Infrequent.

Ranunculaceae

Anemone caroliniana Walt. (Carolina anemone). Uncommon to rare at Schultz Prairie. A single collection from an east-facing hillside, SW ¼.

Delphinium virescens Nutt. (prairie larkspur)*. A sight-record exists for this species but no voucher specimen at either *OMA* or UNK.

Ranunculus sceleratus L. (cursed crowfoot). Abundant only in shallow water and wet soil, lowland overflow sites, SW and NE ¼.

Rosaceae

Geum canadense Jacq. (white avens). In semi-shaded understory along Lost Creek, SW ¼.

Prunus americana Marsh. (wild plum). In roadside thicket along the west edge of the prairie.

Prunus virginiana L. (choke cherry). Uncommon, in thicket near Lost Creek along the west-central side of the prairie.

Rosa arkansana Porter (prairie wild rose). Occasional on hillsides and along roadsides, especially along the south side.

Rubiaceae

Galium aparine L. (catchweed bedstraw). Collections from the riparian area on the west-central side of the prairie. (*OMA*)

Hedyotis nigricans (Lam.) Fosb. (narrowleaf bluet). A small, showy plant prevalent on calcareous breaks. L-2

Salicaceae

Populus deltoides Marsh. subsp. ***monilifera*** (Ait.) Eckenw. (cottonwood). Infrequent; seedlings occur in lowlands along the NE edge of the prairie and along Lost Creek.

Salix sp. (willow). Only a sight record exists at this time.

Scrophulariaceae

Agalinis aspera (Dougl. ex Benth.) Britt. (gerardia)*. Collections from west side of the prairie on uplands and hillsides. Occasional. O-2

Verbascum thapsus L. (common mullein). Prevalent throughout the prairie and possibly overrated because of its large size and basal rosette. L-4; S-5; O-2

Veronica peregrina L. (purslane speedwell). Scattered on hillsides with *Androsace occidentalis* and *Festuca octoflora*; SE ¼.

Solanaceae

Physalis heterophylla Nees (clammy groundcherry)*. Scattered on silty sites, collected in moist soil on upland, NW of stock pond.

Physalis longifolia Nutt. (common ground cherry). Not rare, but a seldom-encountered invader on silty and lowland sites. S-2; O-2

Solanum ptycanthum Dun. ex DC. (black nightshade). In disturbed area, lowland overflow site, NE ¼.

Solanum rostratum Dun. (buffalo bur). Along dry hillside, NE ¼, uncommon.

Sparganiaceae

Sparganium eurycarpum Nutt. (bur-reed). In wet soil in Lost Creek, SW ¼, with *Juncus effusus* and *Scirpus validus*.

Typhaceae

Typha latifolia L. (broad-leaved cat-tail)*. It forms a large stand in wet soil where Lost Creek enters Schultz Prairie from Kansas. Absent elsewhere.

Ulmaceae

Ulmus americana L. (American elm). West-central riparian area. Uncommon.

Ulmus pumila L. (Siberian elm). In roadside thicket along the west edge of the prairie.

Verbenaceae

Verbena bipinnatifida Nutt. (Dakota vervain). Very common and scattered on the prairie. L-4; S-3; W-3

Verbena bracteata Lag. & Rodr. (prostrate vervain). In rocky soil, roadside area and near the fenceline along the west side. Uncommon and possibly absent in the prairie.

Verbena hastata L. (blue vervain). On prairie hillsides and in shaded areas, SW ¼.

Verbena stricta Vent. (hoary vervain). Very common throughout the area. Scattered throughout the prairie but not forming large colonies like those of heavily grazed sites. L-4; S-4; O-2

Verbena urticifolia L. (nettle-leaved vervain). A weedy species from a lowland overflow area and in disturbed prairie, SW ¼.

Violaceae

Viola pedatifida G. Don (prairie violet). Sight record.

Viola pratincola Greene (blue prairie violet). A common prairie violet in this area on silty and lowland sites.

Zannichelliaceae

Zannichellia palustris L. (horned pondweed). Submerged in shallow water where Lost Creek spreads out into lowland overflow area.

Zygophyllaceae

Tribulus terrestris L. (puncture vine). Sandy soil along roadside, west edge of Schultz Prairie.

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