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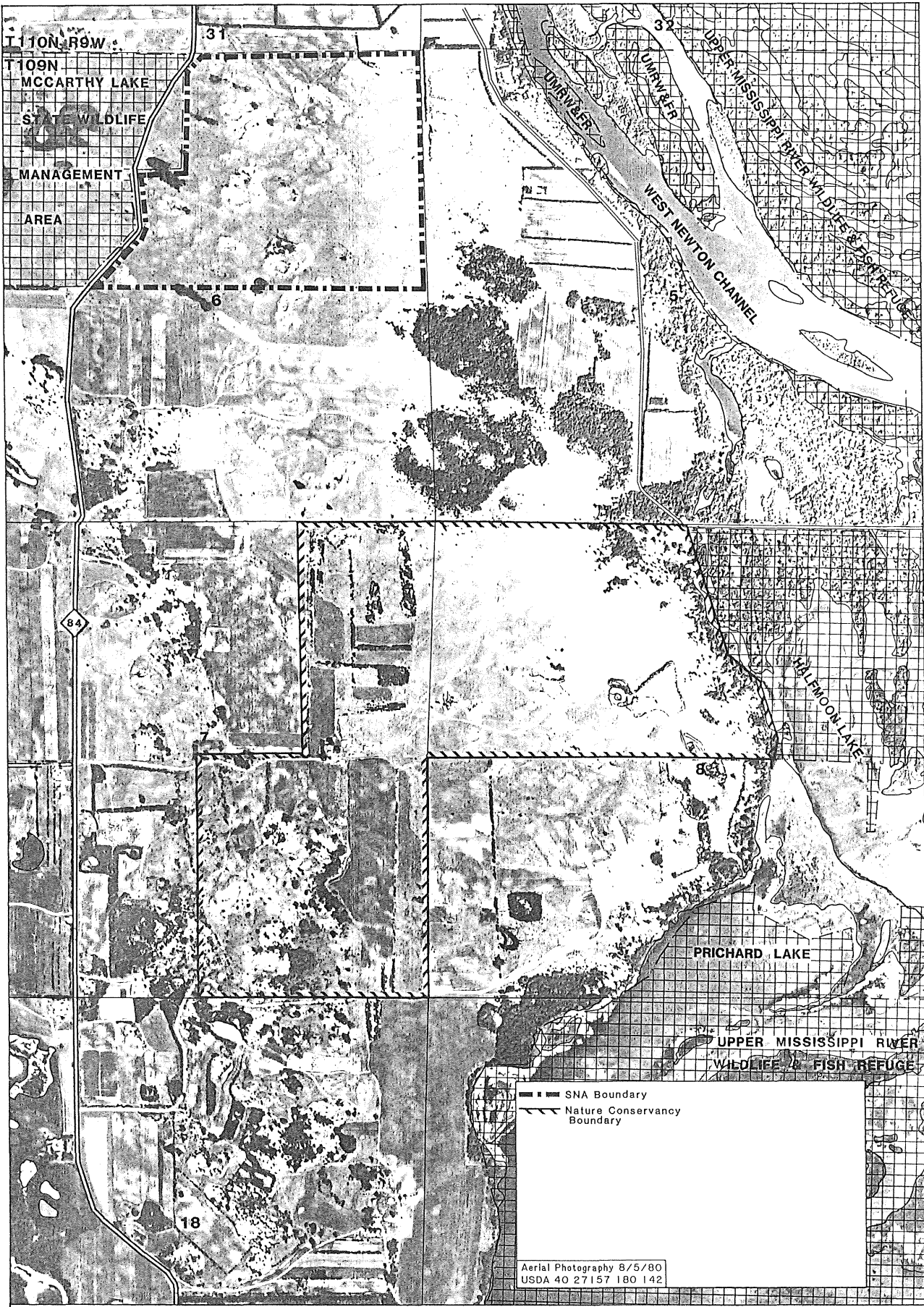
APPENDIX

KELLOG-WEAVER DUNE
SCIENTIFIC AND NATURAL AREA
RESOURCE INVENTORY

JUNE 1985

Present Vegetation
RELVES
DRY SAND PRAIRIE -
Element Abstract
FLORA
Element Status Sheets

F612
.K44
K45
1985



KELLOGG WEAVER SNA

KELLOGG-WEAVER DUNES, SNA

PRESENT VEGETATION

Introduction

Kellogg-Weaver Dunes SNA is a gently rolling tract of sand prairie, interrupted by a scattered band of more steeply sloped stabilized dunes which follow a north-northwest to south-southeast line through the preserve. Associated with some of the dunes are active blowouts, characterized by small areas of unstabilized sand.

Most of the preserve is classed by the soil survey as duneland, with its well-drained sand surface not suited for cultivation. Better soils and a low-lying level topography, primarily in the northeast part of the preserve, did permit cultivation, with the present vegetation there reflecting severe disturbance.

Woody vegetation occurs on hillsides and in association with the dune areas, usually as aggregates of many woody and herbaceous species. Isolated juniper and ash trees and colonies of invasive shrubs and trees also occur on the preserve. Planted windbreaks of pine grow within the preserve in one location, and also outside the preserve along the north and west boundaries.

Methods

The vegetation communities of the Kellogg-Weaver preserve are mapped and described in the following section. Three major categories of cover type, based on vegetation composition, were recognized on the preserve: 1) sand prairie (with dunes and blowouts), 2) old field, and 3) woody vegetation.

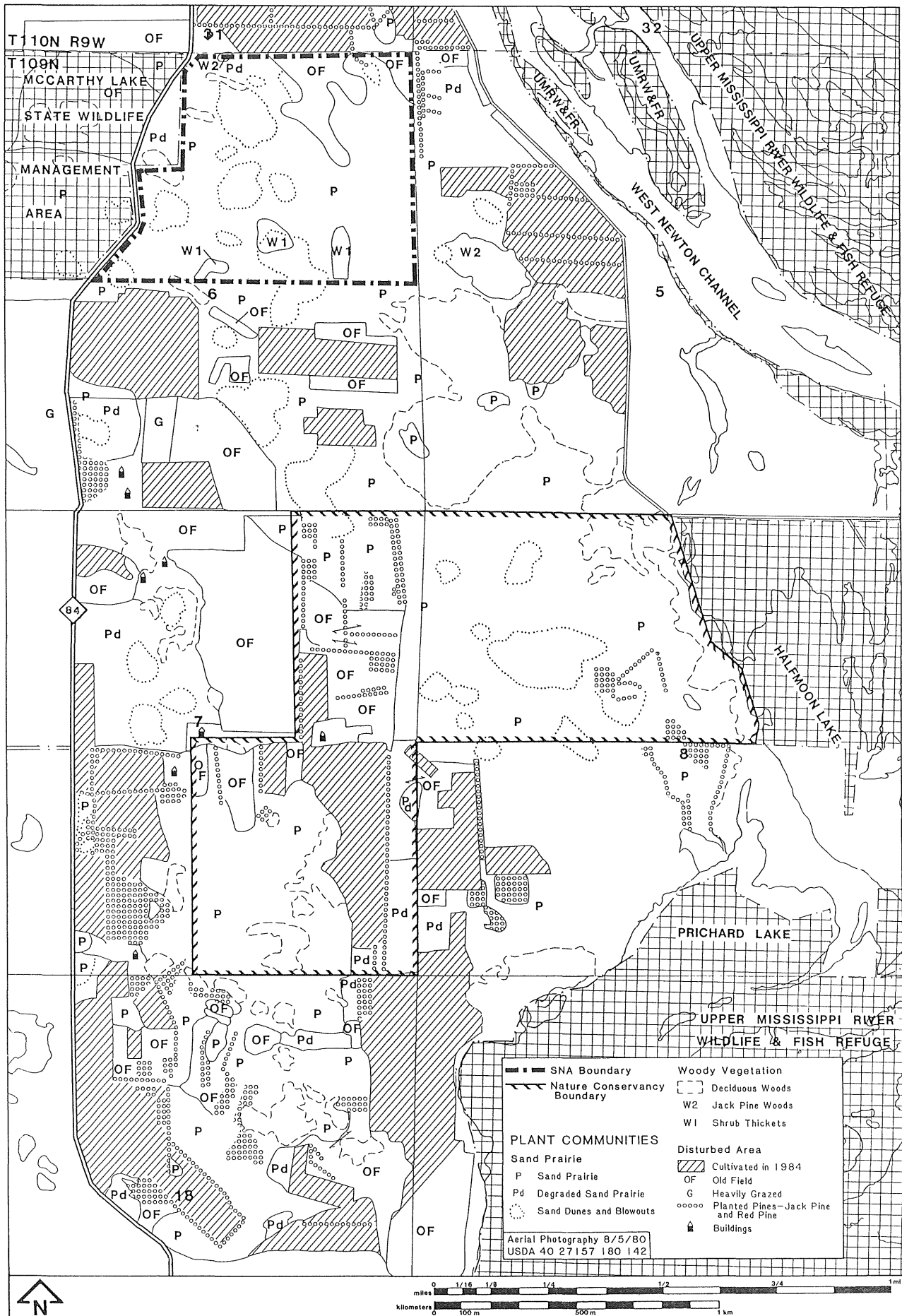
The vegetation community types that are considered elements* by the Minn. Natural Heritage Program were ranked according to their quality (i.e., how closely they resemble presettlement conditions). Four element occurrence ranks are given: Grade A = excellent, Grade B = good, Grade C = marginal, Grade D = poor. Definitions of the above ranks are provided in the element abstract for Sand Prairie. This assessment was done in order to document the significance of these community types. The rankings are also useful for preserve management because they reflect the degree to which the original vegetation has been altered and the likelihood that a return to more natural conditions can be achieved.

Boundaries for the vegetation communities shown on the cover type map were identified using aerial photographs, USGS topographic maps, and on-site field evaluations. The boundaries given are in most cases approximate. Sharp divisions between vegetation types are rare; the species composition in these boundary zones is transitional.

In addition to the cover type categories a letter and number code corresponding to more detailed explanations of certain features is provided in the map explanation.

Releve plots were used to sample vegetation composition in representative locations in the sand prairie, dunes and old fields. Plants found in these 100-square-meter plots are listed in the Releve section. Lists of species were compiled for several types of wooded areas; see next section.

*An Element is a natural feature of particular importance because it is exemplary, unique, threatened or endangered on a national or statewide basis.



VEGETATION

KELLOGG WEAVER SNA

Community Descriptions

SAND PRAIRIE: Element occurrence rank B

This community type covers most of the Kellogg-Weaver SNA. Occurring on the dry to dry-mesic well-drained sandy soils of hilltops, slopes and depressions, the sand prairie is dominated by grasses, notably little bluestem (Andropogon scoparius), porcupine grass (Stipa spartea), Junegrass (Koeleria cristata), sand reed (Calamovilfa longifolia) and big bluestem (Andropogon gerardi). Grama grass (Bouteloua hirsuta) is common on the drier dunes and south-facing slopes.

The most abundant forbs are horsemint (Monarda punctata), prairie ragweed (Ambrosia psilostachya), peppergrass (Lepidium densiflorum), and stiff sunflower (Helianthus rigidus). Other prairie forbs found throughout are spiderwort (Tradescantia occidentalis), leadplant (Amorpha canescens), prairie clover (Petalostemum spp.), blazing-star (Liatris aspera), polygala (Polygala polygama), and hairy hawkweed (Hieraceum longipilum).

There are areas throughout the relatively undisturbed sand prairie that have been degraded by past land use activity. These areas are characterized by a dominance of invasive bluegrass (Poa pratensis). This sod forming grass is usually found in moister low places, forming extensive colonies in some locations. Some of the bluegrass areas correspond with sites of formerly cultivated land, visible in old aerial photos. Galatowitsch (1984) compiled the data from many aeriels, dating back to 1950, into a composite map showing locations of fields and number of years since abandonment.

These Poa areas typically have a much denser vegetation cover than the surrounding native sand prairie, although prairie species are usually well represented. Relve #1 was situated in one of these areas and reflects their species diversity. Certain low areas, however, are more thickly covered with bluegrass, permitting only a few other species to grow in close association-notably common milkweed (Asclepias syriaca), big bluestem (Andropogon gerardi), and smooth sumac (Rhus glabra).

Vegetation cover is not complete in the sand prairie. Bare sand is typically exposed over 10-25% of the surface. British-soldier lichen is common on these dry sandy patches. Relieves #2 and #5 were conducted in the sand prairie, showing the variable diversity and abundance of forb species found at different locations.

Within the sand prairie are found areas of sand dunes and blowouts. These landform types often contain typical sand prairie plants, and stands of woody vegetation. Most of the dune areas are complexes of prominent hills surrounding or adjacent to lower bowl-shaped areas of active and stabilized blowouts. The dunes are characterized by steeper slopes, more open sand in the stabilized parts and by bare, actively wind-blown sand blowouts.

Certain sand prairie species such as sand reed (Calamovilfa longifolia), dropseed (Sporobolus sp.), sandbur (Cenchrus longispinus), and horsemint (Monarda punctata) predominate as colonizers and stabilizers of the open sand of blowouts, but species composition is similar to the surrounding

sand prairie. Releve #3 was located within a dune complex on a gentle east-facing slope, with approximately 35-50% open sand. Grasses, including little bluestem (Andropogon scoparius), porcupine grass (Stipa spartea), Junegrass (Koeleria cristata), sand reed (Calamovilfa longifolia), and some grama grass (Bouteloua hirsuta) are predominant. Most forbs found in dune areas are species that are disturbance-tolerant such as horsemint (Monarda punctata), ragweed (Ambrosia psilostachya), stiff sunflower (Helianthus rigidus), dogbane (Apocynum sp.), carpetweed (Mollugo verticillata), silky prairie clover (Petalostemum villosum), and false heather (Hudsonia tomentosa).

Woody vegetation finds a foothold in the dune complexes, either as isolated trees, mixed height stands, or as low growing colonies of such plants as sumac (Rhus glabra), poison ivy (Toxicodendron radicans), and sand cherry (Prunus pumila).

WOODY VEGETATION

Wooded areas tend to be associated with the steeper slopes found primarily in the dunes and blowouts areas on the western half of the preserve. Four types of woody vegetation are delineated on the map: 1) deciduous woods (oak, juniper, ash, cottonwood, hazelnut, cherry); 2) jack pine woods; 3) shrub thickets (juniper, plum, cherry, aspen); and 4) planted pines - jack pine and red pine.

Three large stands of natural deciduous woods occur along north to northeast facing slopes in the hilly sand prairie community west of the main dunes areas. These are dense (cover 75-100%) canopy communities dominated by black oak (Quercus velutina), hackberry (Celtis occidentalis), green ash (Fraxinus pennsylvanica), and aspen (Populus grandidentata). Understory shrubs are prickly ash (Zanthoxylum americanum), hazelnut (Corylus americana), Virginia creeper (Parthenocissus quinquefolia), and gooseberry (Ribes missouriense). At the edges of these stands are dense populations of chokecherry (Prunus virginiana), wild plum (Prunus americana), sumac (Rhus glabra), poison ivy (Toxicodendron radicans), and dogwood (Cornus sp.). See table for a species list of the large wooded area in the middle of the western SNA boundary.

Associated with the dune areas are small stands of deciduous woods often found on north and east facing slopes. Those consist of one of several large trees surrounded by an open to dense growth of shorter saplings, shrubs and forbs. Characteristic trees are black oak (Quercus velutina), green ash (Fraxinus pennsylvanica), cottonwood (Populus deltoides), and juniper (Juniperus virginiana). Shrubs include chokecherry (Prunus virginiana), wild plum (Prunus americana), hazelnut (Corylus americana), poison ivy (Toxicodendron radicans), sumac (Rhus glabra), grape (Vitis sp.), bittersweet (Celastrus scandens), and prickly ash (Zanthoxylum americanum).

Woody vegetation also occurs as shrub thickets expanding into the surrounding sand prairie. These thickets of chokecherry (Prunus virginiana), wild plum (Prunus americana), juniper (Juniperus virginiana), and aspen (Populus tremuloides) grow in low areas, particularly in the south part of

the preserve. Typically, these are concentric colonies with the younger individuals on the periphery.

Red and jack pines were planted in numerous areas throughout the Kellogg-Weaver area. Within the SNA red pines (Pinus resinosa) were planted as a windbreak along a sand ridge between cultivated fields in the northeast part of the SNA. Their age group is approximately presently about feet in height.

In the northwest corner of the SNA there is a stand of jack pine woods (Pinus banksiana) mixed with oak (Quercus velutina), and green ash (Fraxinus pennsylvanica). Whether or not these pines, aged approximately years, were naturally occurring, has not been determined.

OLD FIELDS

Vegetation indicative of severe disturbance covers a large area in the north and northeast parts of the preserve. This area of recently abandoned agricultural fields is overgrown with weedy plants. Along some hillsides an abrupt line between intact prairie and old field vegetation is visible due, probably, to plowing of the original prairie.

Located in level low areas, on dark sandy soil, this community type is dominated by vetch (Vicia villosa), and bluegrass (Poa pratensis). Many weedy forbs are present: horseweed (Conyza canadensis), giant ragweed (Ambrosia trifida), prairie ragweed (Ambrosia psilostachya), evening primrose (Oenothera biennis), knotweed (Polygonum sp.), peppergrass (Lepidium densiflorum), wild lettuce (Lactuca scariola), and goat's beard (Tragopogon dubius). Releve #4 records the typical vegetation found in these old fields. Bare soil is rare, occurring as low surface mounds of pocket gophers.

REF. NO: 1

DATE: 17 July, 1984

SURVEYOR: D. J. Eagan, M. Leoschke

LOCATION: Kellogg-Weaver Dunes SNA, T109N, R9W, Sec. 6. Wabasha County

Gently rolling tract of sand prairie interrupted by steep sloping, stabilized dunes and occasional blowouts. Within the Mississippi Valley outwash.

RELEVE HABITAT: Bluegrass area, within the sand prairie, dominated by *Poa pratensis*, on sandy dune land soil, gently sloping south, bare soil 5% (due to pocket gopher mounds)

SIZE: 100 sq. m.

SPECIES RICHNESS: 22

(no. of native species per releve plot)

SYMBOLS USED ON RELEVE DESCRIPTIONS

Height Class (Stratification)

8 >35 m
7 20-35 m
6 10-20 m
5 5-10 m
4 2-5 m
Graminoid & Forb layer <2 m

For each species within the height class 2 symbols are used (e.g., *Zizia aptera* + .1):
the first is an estimate of cover-abundance,
the second is an Index of sociability
(dispersion of population)

Cover-abundance

r single occurrence
+ occasional, cover <5%
1 plentiful, cover <5%
2 very numerous, cover 5-25%
3 any number of individuals, cover 25-50%
4 any number of individuals, cover 50-75%
5 any number of individuals, cover 75-100%

Sociability

1 growing singly
2 grouped, few individuals
3 large group, many individuals
4 small colonies, extensive patches,
broken mat
5 extensive mat

Additional symbols

r rare or endangered species
cf precise identification not possible
although close resemblance exists to
indicated taxon
f introduced species

GRAMINOIDS

FORBS

(i) *Poa pratensis* 4.5
Stipa spartea 2.3
Andropogon scoparius 2.3
Koeleria cristata +.1
Panicum sp +.2
Panicum sp. +.1
Grass-narrow lvs. +.2
Carex spp. 2.1
Paspalum ciliatifolium +.2

Ambrosia psilostachya 2.1
Monarda punctata +.2
(i) *Lepidium densiflorum* 1.1
Tradescantia occidentalis +.1
Lithospermum cf. *caroliniense* +.1
Physalis virginiana 1.1
Ranunculus rhomboideus 1.1
Erigeron strigosus r.1
Chenopodium sp. r.1
Aster ericoides +.1
Euphorbia corollata +.1
Polygala polygama +.2
Liatris aspera +.1
Anemone cylindrica +.1
Convolvulus sepium r.1

Other species typical of Poa-dominated areas:

Andropogon gerardi
Rhus glabra
Poa compressa

REF. NO: 2
 DATE: 17 July, 1984
 SURVEYOR: D. J. Eagan, M. Loeschke
 LOCATION: Kellogg-Weaver Dunes SNA, T109N, R9W, Sec. 6. Wabasha County
 Gently rolling tract of sand prairie interrupted by steep sloping,
 stabilized dunes and occasional blowouts. Within the Mississippi Valley
 Outwash.
 RELEVÉ HABITAT: Sand prairie on sandy duneland soil, level to gently
 sloping hill-crest, 25% bare sand

SIZE: 100 sq. m.
 SPECIES RICHNESS: 17
 (no. of native species per relevé plot)

GRAMINOIDS		FORBS
Andropogon scoparius	2.1	Monarda punctata 2.2
Calamovilfa longifolia	1.1	Ambrosia psilostachya 1.2
Koeleria cristata	1.1	Lepidium densiflorum 2.1
Stipa spartea	1.1	Helianthus rigidus 1.1
Paspalum ciliatifolium	+1	Polygala polygama +.2
Bouteloua hirsuta	+2	Tradescantia occidentalis +.1
Panicum sp.	+1	Conyza canadensis 1.1
Panicum sp.	+1	Chenopodium sp. +.1
Carex sp.	1.1	
		LICHENS, MOSSES
		Cladonia cf. cristatella +.2

Other species typical of Sand Prairie:

Erigeron strigosus
 Tragopogon dubius
 Anemone cylindrica
 Toxicodendron sp.
 Rumex acetosella
 Liatris aspera
 Prunus pumila
 Cyperus sp.
 Hieracium longipilum
 Coreopsis palmata

SYMBOLS USED ON RELEVÉ DESCRIPTIONS

Height Class (Stratification)

8 >35 m
 7 20-35 m
 6 10-20 m
 5 5-10 m
 4 2-5 m
 Graminoid & Forb layer <2 m

For each species within the height class 2
 symbols are used (e.g., *Zizia aptera* + .1):
 the first is an estimate of cover-abundance,
 the second is an index of sociability
 (dispersion of population)

Cover-abundance

r single occurrence
 + occasional, cover <5%
 1 plentiful, cover <5%
 2 very numerous, cover 5-25%
 3 any number of individuals, cover 25-50%
 4 any number of individuals, cover 50-75%
 5 any number of individuals, cover 75-100%

Sociability

1 growing singly
 2 grouped, few individuals
 3 large group, many individuals
 4 small colonies, extensive patches,
 broken mat
 5 extensive mat

Additional symbols

r rare or endangered species
 cf precise identification not possible
 although close resemblance exists to
 indicated taxon
 i introduced species

REF. NO: 3

DATE: 18 July, 1984

SURVEYOR: D. J. Eagan, M. Loeschke

LOCATION: Kellogg-Weaver Dunes SNA, T109N, R9W, Sec. 6. Wabasha County
Gently rolling tract of sand prairie interrupted by steep sloping,
stabilized dunes and occasional blowouts. Within the Mississippi
Valley Outwash.

RELEVE HABITAT: Sand prairie nestled among stabilized dunes on
duneland sand soil, gently sloping east, 40-50% bare sand.

SIZE: 100 sq. m.

SPECIES RICHNESS: 22

(no. of native species per releve plot)

GRAMINOIDS

Andropogon scoparius 2.1
Stipa spartea 2.1
Calamovilfa longifolia 1.1
Koeleria cristata 1.1
Paspalum ciliatifolium +.1
Bouteloua hirsuta +.1
Panicum sp. 1.1
Carex sp. 1.1

FORBS

Ambrosia psilostachya 2.1
Monarda punctata 1.1
Lepidium densiflorum 1.1
Conyza canadensis 1.1
Polygala polygama +.1
Helianthus rigidus +.1
Tradescantia occidentalis 1.1
Delphinium virescens r.1
Liatris aspera +.1
Euphorbia corollata +.1
Viola cf. petatifida +.2
Chenopodium sp.
Rhus glabra 1.1

LICHENS, MOSSES

Cladonia cf. cristatella +.2

Other species in areas similar to this and surrounding this releve

Lithospermum caroliniense
Petalostemum villosum
Mollugo verticillata
Prunus pumila
Populus tremuloides (seedlings)
Erigeron strigosus
Apocynum sp.

Apocynum sp.
Toxicodendron sp.
Prunus virginiana
Cyperus sp.

SYMBOLS USED ON RELEVE DESCRIPTIONS

Height Class (Stratification)

8 >35 m
7 20-35 m
6 10-20 m
5 5-10 m
4 2-5 m
Graminoid & Forb layer <2 m

For each species within the height class 2
symbols are used (e.g., *Zizia aptera* + .1):
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4 any number of individuals, cover 50-75%
5 any number of individuals, cover 75-100%

Sociability

1 growing singly
2 grouped, few individuals
3 large group, many individuals
4 small colonies, extensive patches,
broken mat
5 extensive mat

Additional symbols

r rare or endangered species
cf precise identification not possible
although close resemblance exists to
indicated taxon
i introduced species

REF. NO: 4

DATE: 18 July, 1984

SURVEYOR: D. J. Eagan, M. Loeschke

LOCATION: Kellogg-Weaver Dunes SNA, T109N, R9W, Sec. 6. Wabasha County
Gently rolling tract of sand prairie interrupted by steep sloping,
stabilized dunes and occasional blowouts. Within the Mississippi
Valley Outwash.

RELEVE HABITAT: On old field with dark sandy soil-Plainfield fine sand-
level to barely sloping, cover complete except for gopher mounds.

SIZE: 100 sq. m.

SPECIES RICHNESS: 10

(no. of native species per releve plot)

GRAMINOIDS	FORBS
(i) Grass 3.3	(i) <i>Vicia</i> cf. <i>violsa</i> 3.1
(i) <i>Poa pratensis</i> 1.3	<i>Tradescantia occidentalis</i> +.1
<i>Panicum</i> sp. +.1	<i>Ambrosia psilostachya</i> 1.1
	<i>Monarda punctata</i> 1.1
	<i>Conyza canadensis</i> 1.1
	<i>Oenothera biennis</i> +.2
	<i>Asclepias syriaca</i> r.1
	<i>Chenopodium</i> sp. +.1
	(i) <i>Tragopogon dubius</i> +.1
	<i>Lepidium densiflorum</i> 1.1
	(i) <i>Solanum nigrum</i> +.1
	<i>Polygonum</i> cf. <i>scandens</i> 1.1
	(i) <i>Lactuca scariola</i> +.1

Other species typical of this habitat

Ambrosia trifida
Carex spp.
Helianthus rigidus
Silene antirrhina
Chenopodium album

SYMBOLS USED ON RELEVE DESCRIPTIONS

Height Class (Stratification)

8 >35 m
7 20-35 m
6 10-20 m
5 5-10 m
4 2-5 m
Graminoid & Forb layer <2 m

For each species within the height class 2
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Sociability

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Additional symbols

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cf precise identification not possible
although close resemblance exists to
indicated taxon
i introduced species

REF. NO: 5

DATE: 18 July 1984

SURVEYOR: M. Loeschke

LOCATION: Kellogg-Weaver Dunes SNA, T109N, R9W, Sec. 6. Wabasha County
Gently rolling tract of sand prairie interrupted by steep sloping,
stabilized dunes and occasional blowouts. Within the Mississippi Valley
Outwash.

RELEVE HABITAT: Sand prairie on sandy duneland soil, gentle NW facing
slope, just below a hilltop, bare sand 10%.

SIZE: 100 sq. m.

SPECIES RICHNESS: 25

(no. of native species per releve plot)

GRAMINOIDS

Andropogon scoparius 4.1
Stipa spartea 1.1
Sorghastrum nutans +.1
Koeleria cristata +.1
Bouteloua hirsuta +.1
Panicum sp. hairy leaved 1.1
Carex sp. +.1

LICHENS, MOSSES

Cladonia cf. cristatella +.1

FORBS

Monarda punctata 2.1
Ambrosia psilostachya 1.1
Lithospermum carolinense 1.1
Helianthus rigidus 1.1
Liatris aspera +.1
Tradescantia occidentalis 1.1
Anemone cylindrica +.1
Euphorbia corollata +.1
Polygala polygama 1.1
Erigeron sp. +.1
Conyza canadensis +.1
Ranunculus rhomboideus +.1
Lepidium densiflorum +.1
Oenothera biennis r.1
Physalis virginiana r.1
(i) Tragopogon dubius r.1
Lespedeza capitata r.1

WOODY SPECIES

Juniperus virginiana r.1

Species adjacent to plot

Carex sp.
Hieracium longipilum
Smilacina stellata

Toxicodendron radicans
Chenopodium sp.
Petalostemum purpureum
Delphinium virescens

SYMBOLS USED ON RELEVE DESCRIPTIONS

Height Class (Stratification)

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7 20-35 m
6 10-20 m
5 5-10 m
4 2-5 m
Graminoid & Forb layer <2 m

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Additional symbols

r rare or endangered species
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DRY SAND PRAIRIE
ELEMENT ABSTRACT

NATURAL COMMUNITY

ELEMENT NAME: Dry Sand Prairie

ELEMENT RANK: *Threatened in Minnesota

PLANT COMMUNITY

COVER TYPES: Calamovilfa longifolia - Andropogon scoparius - Koeleria cristata

BASIS FOR CONCERN: Habitat conditions necessary for the development of dry sand prairie are relatively uncommon in Minnesota. On the presettlement landscape, dry sand prairie was probably only prevalent in the Anoka Sand Plain. The frequency of this community has been reduced throughout its original range by human activities. Today undisturbed examples of this community are found in widely scattered, isolated areas in sandy river terraces and coarse sandy outwash.

DESCRIPTION: Dry sand prairies are found on coarse textured soils ranging from sands to sandy loams. The soils are characterized by low soil fertility and high permeability; soil pH ranges from acid to neutral. Sand prairies are found on a variety of landforms throughout the northwest, southwest, southeast, and east central sections of the state. They are found in mostly isolated areas under extreme habitat conditions associated with sandy river terraces, inland dunes, glacial lake beach lines, and sand outwash plains.

Dry sand prairies are dominated by Sand reed (Calamovilfa longifolia), Little bluestem (Andropogon scoparius), June grass (Koeleria cristata), and Big bluestem (Andropogon gerardi). Associated species include Cyperus schweinitzii, Sporobolus cryptandrus, Selaginella rupestris, Monarda punctata, Ambrosia psilostachya, Polygala polygama (E 1/2 Minn.), Cyperus filiculmis, Panicum lanuginosum, Aristida spp., Eragrostis spectabilis and Lithospermum carolinense (E 1/2 Minn.). In areas where wind is actively moving the sand and dunes and blowouts are formed, a distinctive vegetation association occurs. These habitats are characterized by plants which are able to colonize xeric, topographically unstable substrates. These include Petalostemum villosum, Hudsonia tomentosa, Calamovilfa longifolia, Aristida tuberculosa, Froelichia floridana (E 1/2 Minn.), and Panicum villosissimum.

Evidence from a number of Midwestern states indicates many of the active dune and blowout areas on the landscape today were formed in response to severe erosion created by intensive grazing and/or cultivation of the original prairie sod. In Minnesota, Galatowitsch (1984) stated no records were made of blowouts or open dunes in the state survey of 1855 in the sand region of Wabasha County. Today, blowouts and dunes are common on the Kellogg-Weaver sand prairie in this county. Similarly, Cooper (1935) suggested that the blowouts on the Anoka Sand Plain in Minnesota were due to grazing and cultivation. In Illinois, the 1800's state survey of the sand

* Element ranks for natural community types are program-defined and do not represent an official federal or state status (e.g., no legal status exists).

region of the state did not note any occurrences of blowouts (Gleason and Hart 1910). In Wisconsin, Curtis (1959) stated much of the original prairie sod in the sand barren regions had been plowed and the resultant wind erosion created dunes and blowouts. Likewise, Chapman and Crispin (1984), in their study of the sands region of Newaygo county, Michigan, stated most of the larger open sand prairies were plowed before 1900 and subsequent wind erosion was so severe that blowouts and dunes were formed. The above evidence indicates active sand blowouts and dunes may have been relatively rare on the presettlement landscape, and areas of active sand today may be largely a result of human disturbance.

Sand prairies are relatively resilient to man induced disturbances such as grazing and, under certain conditions, even limited cultivation. On the sterile, droughty soils, exotic weeds compete poorly with the native prairie species which pioneer quickly after disturbance. Galatowitsch (1984) found that the lighter soils in blowouts and dunes on a Wabasha county sand prairie were occasionally used for small melon fields. After 25 to 32 years of abandonment, the vegetation composition of these fields could not be distinguished from the vegetation composition of uncultivated sites in the study area. This type of cultivation typically involves abandonment after one growing season and fertilizers are not used. On relatively level areas with darker soils, sand prairie can be easily destroyed by grazing and cultivation. These sandy soils with higher values of organic matter, nitrogen and soil moisture are much less resilient to disturbance than the lighter sand soils. Cultivation of such soils usually involves longer rotations and fertilization. The result is the replacement of the native perennial plants with exotic species and large populations of annuals. Natural, unplowed prairie on stabilized sands is easily distinguished by its high frequency and cover of perennial prairie grasses (Andropogon scoparius, A. gerardi, and Koeleria cristata).

In Minnesota, numerous rare plant species are found in sand prairie. Most of these species prefer the open sand habitat of blowouts and dunes. Galatowitsch (1984) found the greatest abundance and diversity of rare plants within the Kellogg-Weaver sand prairie preserve on open sand areas and in the heavily grazed sand prairie areas. Galatowitsch further states the preservation of the dunes and blowouts, which support rare plant species, will depend on grazing or some similar disturbance. Fire is not sufficient enough to maintain large dunes and blowouts.

Dry sand prairies, due to their isolation, often contain disjunct populations of plants and/or plants at the edge of their natural range. In southeast Minnesota, the sand prairies contain a number of species which reach their northern and western geographic limits and occur nowhere else in Minnesota. These include Talinum rugospermum, Asclepias amplexicaulis, and Tephrosia virginiana.

Dry sand prairie in Minnesota is typically associated with dry sand savanna dominated by oaks or jack pine. These communities, which often intergrade with each other on the same site, are related by successional trends. Low fire frequency often results in the replacement of sand prairie by sand savanna or woodland. Since the early 1900's, effective fire suppression has allowed many of the original sand prairie and savanna sites to develop into woodland.

CURRENT STATUS: Intact dry sand prairie remnants, similar to dry sand savanna, remain today in large part because of the droughty, infertile nature of their soils which make them unsuitable for cultivation. Dry sand prairie is currently threatened by agricultural uses such as grazing, tree planting (notably the establishment of red pine plantations) and limited cultivation for crops such as melons. Most of the remaining dry sand prairies are located on or associated with sand dune complexes. These areas afford the fewest opportunities for development. Sand dunes are found in three geographic regions of the state: (1) in southeast Minnesota, within the Mississippi Valley Outwash found below Lake Peppin, (2) in east-central Minnesota, on the Mississippi River Sand Plain from Brainerd to the Twin Cities, (3) in northwest Minnesota, within the Glacial Lake Agassiz, Inter-Beach Area. The extent of these three regions is shown on the map in Figure 1.

NUMBER OF OCCURRENCES: occurrences of A or B quality (as of Jan. 1985).

REPRESENTATIVE SITES: Kellogg-Weaver Scientific and Natural Area, Wabasha County.
Helen Allison Scientific and Natural Area, Anoka County.
Agassiz Dunes, Polk and Norman Counties.

LITERATURE CITED: Chapman, K. A. and S. R. Crispin. 1984. A field search for Newaygo County prairies based on air photos and the soil survey. Mich. Bot. 23:69-75.

Cooper, W. S. 1935. The history of the upper Mississippi River in the late Wisconsin and postglacial time. Minnesota Geological Survey Bulletin No. 26. 116 p.

Curtis, J. T. 1959. The Vegetation of Wisconsin. University of Wisconsin Press, Madison.

Galatowitsch, S. M. 1984. The effects of land use on the vegetation of a sand prairie in southeastern Minnesota. MS Thesis. University of Minnesota, Minneapolis. 177 p.

Gleason, H. A. and Hart J. 1910. The vegetation of the inland sand deposits of Illinois. Bulletin of the Illinois State Laboratory of Natural History Vol. 9:1-173.

PREPARED BY: Keith Wendt, Minn. Natural Heritage Program, 1/85

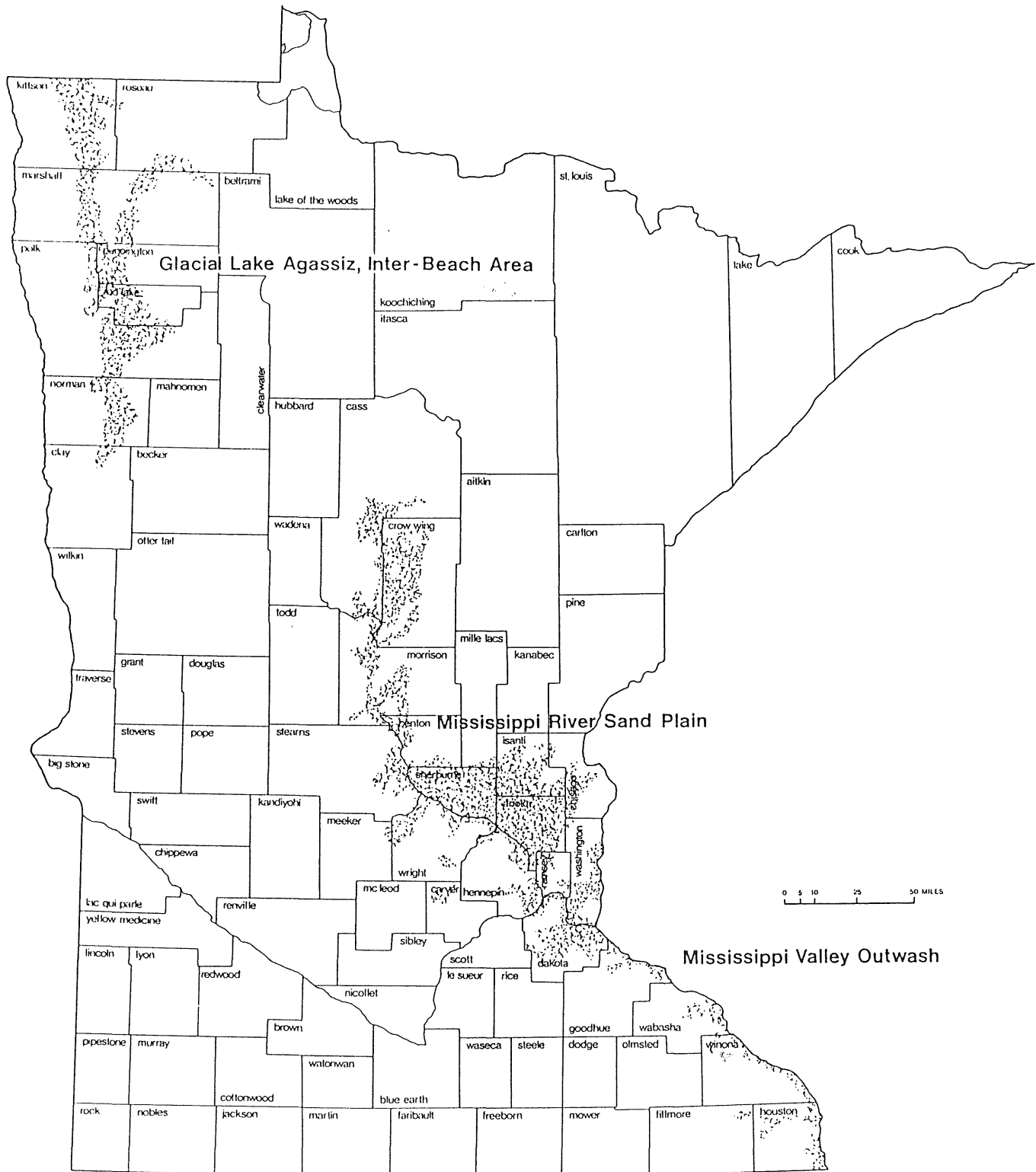


Figure 1. Regions containing sand dunes in Minnesota

Source: Adapted from Minnesota Soil Atlas Project. 1969-1981. Miscellaneous Reports 90, 120, 168, 171, and 173. Agricultural Experiment Station, University of Minnesota, St. Paul, Minn.

DRY SAND PRAIRIE - ELEMENT OCCURRENCE RANKING

Occurrence of dry sand prairie are ranked according to their degree of naturalness (i.e., how close they resemble presettlement conditions). Exemplary occurrences ranked B or higher are considered natural areas of statewide significance.

RANK A -- Prairie occurrences that are virtually undisturbed by man, or recovered to an extent where community structure and composition is intact and reflects presettlement conditions. Rank A sites typically have topographic variety in the form of dunes and flats which allows a high vegetational diversity of adapted climax prairie species as well as sand barren species. Stabilized habitats are distinguished by a high frequency and cover of native perennial grasses - Andropogon scoparius, A. gerardi, Koeleria cristata, and Panicum virgatum. They have an absence of exotic species, and annual plants which indicate past grazing and cultivation. Partially unstabilized habitats, such as dunes and blowouts, show the processes of active wind erosion and deposition. Such areas provide pioneer surfaces for a unique association of native sand binding plants - Calamovilfa longifolia, Hudsonia tomentosa and Petalostemum villosum. This habitat in Rank A sites is distinguished by the absence of introduced or weedy species such as Verbascum thapsus, Erigeron canadensis, and Panicum capillare.

RANK B -- These prairies are similar in species composition and habitat variety to Rank A sites, except some of the conservative species may be absent, or the complement of characteristic species may not be fully represented. These tracts typically have had a history of light-moderate disturbance from grazing, or very limited cultivation such as establishment of small melon fields abandoned after 1 growing season and never fertilized. As a result the original proportions of native prairie species may have shifted, and occasional weedy species may have entered the prairie. Poa spp. typically increase under these conditions, as do the short native prairie grasses which are less frequent on Rank A sites. With removal of disturbance, these sites will in time recover to more natural condition.

RANK C -- These sites are characterized by a species composition and structure that has been substantially altered from their presettlement character. A long history of moderate-heavy grazing activity and cultivation attempts is usually the major disturbance. In general, such areas have a low native species diversity with large populations of forbs and annual grasses replacing the native perennial grasses. On flat or low areas Poa spp may form mono-dominant patches excluding all other species. Exotic species and annual ruderals indicating cultivation attempts are typically present: Lepidium densiflorum, Erigeron canadensis, and Cenchrus longispinus. Although these sites still maintain native sand prairie species, their original character has been substantially altered.

RANK D -- These sites have been heavily disturbed by overgrazing and long term cultivation. The result is a near complete replacement of the original native flora by exotic species and weedy native plants. Dense turfs of Eurasian pasture grasses such as Agropyron repens, Bromus inermis and Poa spp. often dominate the habitat. On the lighter soils annual ruderals indicating past cultivation and fertilization are the most abundant species.

FLORA

Methods

The flora of Kellogg-Weaver Dunes SNA was sampled at three times during the growing season of 1983. During those visits, a set of voucher specimens was collected for a purpose of documenting the flora of the site. A list of the species which were vouchered are presented in Table 1. This represents a preliminary list of the flora, additional field work will likely add additional species to the list.

Rare Species

Of the 126 species of vascular plants vouchered at this site, four have statewide significance because of their rarity.

Asclepias amplexicaulis Sm. (clasping milkweed)

This species is listed as Special Concern in Minnesota. It is restricted in the state to dunes and sand prairies in southeastern Minnesota, although it also occurs in other midwestern states. There are several (5-10) small colonies of this species on the SNA. However, they were severely afflicted by an unknown insect pest and few of them set seed in 1983.

Carex annectens Bickn. (a species of sedge)

This species is listed as special concern in Minnesota and was first discovered in the state in 1978 at the Kellogg-Weaver Dunes SNA. At that time, only one clump was found, but its exact location was not recorded. An intensive effort was made in 1983 to relocate this species on the SNA. The effort was unsuccessful, and the current status of this species at the site is unknown. Efforts should continue to relocate this population.

Baptisia leucophaea Nutt (wild indigo)

This species is listed in Minnesota as Special Concern. It is known to occur at 19 locations in 5 counties in Minnesota. The population at Kellogg-Weaver Dunes is rather small, and is concentrated along the southwestern and southcentral portion of the unit.

Tephrosia virginiana (L.) Pers. (Goat's-rue)

This species is listed as Special Concern in Minnesota. Within the state, it is restricted to sand prairies and dunes in the southeastern corner of the state, where it is peripheral to the main range of the species. It is occasional to frequent on the SNA, with scattered colonies and individual plants well established at several locations on the unit.

Additional rare species that should be looked for during future visits to the SNA include: Talinum rugospermum, Aristida tuberculosa, Desmodium illinoense, and Tradescantia ohioensis.

Table 1 . Plant Species List for Kellogg Weaver Dunes SNA

Aceraceae

Acer negundo L.

Aizoaceae

Mollugo verticillata L.

Amaranthaceae

Froelichia floridana (Nutt.) Mog.

Anacardiaceae

Rhus glabra L.

Asclepiadaceae

SPC **Asclepias amplexicaulis* Sm.

Asclepias syriaca L.

Asclepias verticillata L.

Asclepias viridiflora Rof. Var. *lanceolata* (Ives) Torr.

Asteraceae

Ambrosia psilostachya DC.

Antennaria neodioica Greene

Artemisia ludoviciana Nutt.

Aster sericeus Vent.

Coreopsis palmata Nutt.

Crepis tectorum L.

Erigeron strigosus Muhl.

Gnaphalium obtusifolium L.

Helianthus occidentalis Riddell

Helianthus rigidus (Cass) Desf.

Hieracium longipilum Torr.

Kuhnia eupatorioides L.

Liatris aspera Michx.

Solidago missouriensis Nutt

Solidago nemoralis Ait.

Tragopogon major Jacq.

Boraginaceae

Lithospermum carolinense (Walt.) MacM.

Campanulaceae

Specularia perfoliata (L.) DC.

Capparidaceae

Polanisia graveolens Rof.

Caprifoliaceae

Lonicera tatarica L.

Caryophyllaceae

Lonicera tatarica L.

Caryophyllaceae

Silene anthirrhina L.

Chenopodiaceae

Chenopodium hybridum L. var. *gigantospermum* (Aellen) Roulean
Chenopodium leptophyllum Nutt.
Cycloloma atriplicifolium (Spreng.) Coult.
Salsola kali L. var. *tenuifolia* Tausch

Cistaceae

Hudsonia tomentosa Nutt.

Commelinaceae

Tradescantia occidentalis (Butt.) Smyth

Corylaceae

Corylus americana Watt.

Cyperaceae

SPC**Carex annectens* Bickn.
Carex brevior (Dew.) Mack.
Carex foenea Willd.
Carex heliophila Mack.
Carex muhlenbergia Willd.
Carex sprengelii Spreng.
Cyperus filiculmis Vahl.
Cyperus schweinitzii Torr.

Equisetaceae

Equisetum laevigatum A. Br.

Ericaceae

Arctostaphylos uva-ursi (L.) Spreng.

Euphorbiaceae

Euphorbia corollata L.
Euphorbia geyeri Engelm.

Fabaceae

Amorpha canescens Pursh
SPC**Baptisia leucophaea* Nutt
Cassia fasciculata Michx.
Lespedeza capitata Michx.
Petalostemum candidum (Willch) Michx.
Petalostemum purpureum (Vent.) Rydb.
Staphostyles helvola (L.) Ell.
SPC**Tephrosia virginiana* (L.) Pers.
Vicia villosa Roth.

Fagaceae

Quercus velutina Farm.

Iridaceae

Sisyrinchium campestre Brickn.

Labiaceae

Hedeoma hispida Pursh
Monarda fistulosa L. var. mollis (L.) Benth.
Monarda punctata L.
Nepeta cataria L.
Teucrium canadense L.

Lamaceae

Arabis lyrata L.
Lepidium densiflorum Schrad.

Liliaceae

Polygonatum canaliculatum (Muhl.) Pursh
Smilacina stellata (L.) Desf.

Menispermaceae

Menispermum canadense L.

Nyctaginaceae

Mirabilis hirsuta (Pursh) MacM.

Oleaceae

Fraxinus pennsylvanica Marsh var. subintegerrima (Vahl) Fern.

Pinaceae

Juniperus virginiana L.

Poaceae

Andropogon gerardi Vitman
Andropogon scoparius Michx.
Bouteloua hirsuta Lag.
Calamovilfa longifolia (Hook.) Scribn.
Cenchrus longispinus (Hackel) Fern.
Elymus canadensis L.
Eragrostis spectabilis (Pursh) Stend.
Festuca octoflora Walt.
Kolleria micrantha (L.) Pers.
Leptoloma cognatum (Schultes) Chase
Panicum oligosanthos Schultes var. scribnerianum (Nash) Fern.
Panicum perlongum Nash.
Panicum villosissimum Nash var. pseudopubescens (Nash) Fern.
Panicum virgatum L.
Paspalum ciliatifolium Michx. var. stramineum (Nash) Fern.
Poa pratensis L.
Setaria glauca (L.) Beauv.
Sporobolus cryptandrus (Torr.) Gray
Stipa spartea Trin.

Polygalaceae

Polygala polygama Walt.

Polygonaceae

Polygonella articulata (L.) Meism.
Polygonum aviculare

Polygonum convolvulus
Polygonum tenue
Rumex acetosella

Ranunculaceae

Anemone caroliniana Walt.
Anemone cylindrica Gray
Anemone patens L.
Delphinium virescens Nutt.
Ranunculus rhomboideus Goldie

Rhamnaceae

Ceanothus ovatus Desf.

Rosaceae

Fragaria virginiana Duchesne
Geum triflorum Pursh
Potentilla arguta Pursh
Prunus americana Marsh
Prunus pumila L.
Prunus virginiana L.
Rose arkansana Porter
Rubus occidentalis

Rubiaceae

Galium aparine L.

Rutaceae

Xanthoxylum americanum Mill.

Salicaceae

Populus grandidentata Michx.
Populus tremuloides Michx.

Saxifragaceae

Heuchera richardsonii R. Br.
Ribes missouriense Nutt.

Scrophulariaceae

Linaria canadensis (L.) Dumont.

Solanaceae

Physalis heterophylla Nees.
Physalis virginiana Mill.

Tiliaceae

Tilia americana L.

Ulmaceae

Celtis occidentalis L.

Verbenaceae

Verbena hastata L.

Violaceae

Viola pedatifida L.

Vitaceae

Vitis riparia Michx.

Parthenocissus inserta (Kerner) K. Fritsch

SPECIES STATUS SHEET

SCIENTIFIC NAME: Baptisia leucophaea Nutt.

FAMILY: Fabaceae

COMMON NAME: Cream-colored False Indigo

STATE STATUS: Special Concern

FEDERAL STATUS: None

BASIS FOR MINNESOTA STATUS: This species occurs in Minnesota at the northwestern limit of its range and is more common in the geographic center of its range. Within Minnesota, it has suffered numerous local extirpations as a result of habitat lost to agricultural development.

PREFERRED HABITAT IN MINNESOTA: This is a prairie species with rather broad ecological amplitude. It occurs in mesic prairies as well as sand prairies and bluff prairies.

RECOMMENDATIONS: The population trends of this species should be watched carefully to determine the effect of local extirpations and the extent of overall decline in population numbers.

SELECTED REFERENCES:

Larsey, M.M. 1940. A Monograph of the genus Baptisia. Ann. Mo. Bot. Gard. 27(2):119-224.

STATUS SHEET

ELEMENT NAME: Tephrosia virginiana (L) Pers; (Goats-rue)

FEDERAL STATUS: None

STATE STATUS: None

NATURAL HERITAGE PROGRAM STATUS: Threatened

BASIS FOR STATUS CLASSIFICATION: This species has specific habitat requirements and a very restricted geographic distribution in Minnesota. Furthermore, it is known to be a very poor colonizer and faces a drastic population decline as its habitat is converted to agricultural and commercial uses.

PREFERRED HABITAT: This species is known to occur in sand dunes, sandy goat prairies, Pine barrens, oak savannas and dry prairies. In Minnesota, the largest population is in an oak savanna in sandy soil. Its present occurrences in sand dunes and goat prairies may represent relict populations that have temporarily survived the land conversion that savannas are less susceptible to.

DISTRIBUTION: See map

OCCURRENCES IN MINNESOTA: This species has been documented from two sites in Houston county and one each in Wabasha, Fillmore and Winona Counties. Information on the Fillmore County site dates from 1920 and should be verified before any statement is made about its current status in that county.

OF OCCURENCES IN MANAGED AREAS: This species is not known to occur in any managed area.

POTENTIAL THREATS TO SPECIES: A housing development is known to currently threaten one site, but other specific threats are not known. Certainly any drastic alteration of the habitat on which the plants depend would jeopardize their existence.

REFERENCES: Fox, W. B. 1945. The Leguminosae in Iowa. Am. Midl. Nat. 34(1): 207-230.

Welsh, S. L. 1960. Legumes of the North-Central states: Galegeae. Iowa State Journal of Sci. 35(2): 111-250.

LOCATION IN
STUDY AREA:

This species was first documented to occur in the vicinity of the study area in 1926 (Fassett and Hotchkiss). The only description given was, "sand prairie; Wabasha County." This leaves considerable doubt about the exact location of the site, but it was likely near the study area. The next recorded occurrence in the area was in 1961 (Morley) when the plant was collected in section 18, about 1/2 mile south of the study area. This location was confirmed in 1979 (Smith). Although this species has never been documented to occur within the study area, it is possible that a search might discover it there.

EVALUATION:

Since the plant has not been documented to occur in the study area, little can be said in evaluation. There is, however, a very large and well established population occurring in an oak savanna seven miles southwest of the study area. This site is the best occurrence currently known, and would most likely surpass anything that might be discovered in the study area. However, the oak savanna is not protected and could be threatened by any number of developments. Therefore, if a population could be found in the study area, it would be high priority for preservation.