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Paul B. Kannowski, *Editor*
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THE COVER AND ITS ARTIST

The western meadowlark is a common sight on the Northern Great Plains, often perching on fence- and sign-posts to sing. It is one of our earliest returning migrants, frequently weathering late season snow storms after it arrives.

This pen-and-ink rendering was drawn by D. Randall Crooke of Mandan. Randy is Senior Environmental Specialist at the Falkirk Mine near Underwood, ND, a lignite coal mine which is currently involved in reclaiming prairie pothole wetlands. Randy coordinates the reclamation of these important wildlife habitats.

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Movements and Habitat Use of Male Ruffed Grouse in the Turtle Mountains, North Dakota

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ABSTRACT — Movements and habitat use of 11 male ruffed grouse (*Bonasa umbellus*) were monitored in the Turtle Mountains, North Dakota, during spring and summer of 1978 and 1979 using radio telemetry. Male grouse typically used an area of forest within a 200-m radius of drumming sites. Mean weekly range size increased as drumming activity decreased as the season progressed. Vegetational makeup and other site characteristics of the home ranges were analyzed and grouped into five habitat types. Common to each was a dense shrub layer of beaked hazel (*Cornus cornuta*) that provided vertical cover and quaking aspen (*Populus tremuloides*) which was an important tree component.

Knowledge of the movements and habitats used by male ruffed grouse (*Bonasa umbellus*) is valuable for forest management. Previous studies in the Great Lakes region (Eng 1959, Gullion et al. 1962, Palmer 1963, Berner and Gysel 1969) and in Alberta (Rusch and Keith 1971) described habitats used by ruffed grouse. Movements have been documented in Minnesota (Archibald 1975) and Wisconsin (Hale and Dorney 1963).

An insular population of ruffed grouse occurs in the Turtle Mountains of north-central North Dakota and southwestern Manitoba. Counts of drumming males and wing and harvest surveys have been used in North Dakota to provide population data (Schulz 1984). Our objective was to describe home ranges and habitats used by male ruffed grouse from spring to late summer in this isolated population.

STUDY AREA

The 2711-ha Wakopa Wildlife Management Area in northern Rolette County, North Dakota (Fig. 1), is a glaciated area of rolling uplands interspersed with wetlands. The soils, geology, and topography of this area have been described by Deal (1971) and Potter and Moir (1961).

Vegetation on the study area is a mosaic of deciduous forest, wetland, and grassland communities. The dominant tree species is quaking aspen (*Populus tremuloides*), with paper birch (*Betula paprifera*), bur oak (*Quercus macrocarpa*), green ash (*Fraxinus pennsylvanica*), balsam poplar (*Populus balsamifera*), and box elder (*Acer negundo*) also present. The moderate to dense shrub understory is dominated by beaked hazel (*Corylus cornuta*). Other common shrubs are serviceberry (*Amelanchier alnifolia*), chokecherry (*Prunus virginiana*),

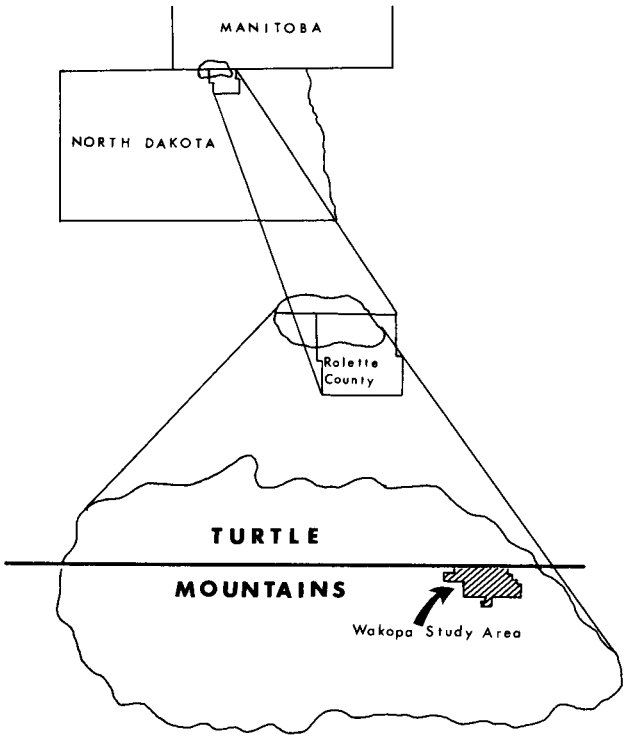

Figure 1. Turtle Mountains study area.

highbush cranberry (*Viburnum trilobum*), and redosier dogwood (*Cornus stolonifera*). Herbaceous undergrowth includes wild sarsaparilla (*Aralia nudicaulis*), black snakeroot (*snaicula marilandica*), sedges (*Carex* spp.), bedstraw (*Galium* sp.), and meadowrue (*Thlaictrum* sp.).

METHODS

Field work was conducted from 22 April to 8 August 1978 and 8 May to 20 July 1979. Ruffed grouse were captured using mirror traps and lily-pad traps (Gullion 1965). Captured birds were classified to age (Hale et al. 1954, Davis 1969) and sex (Dorney and Holzer 1957). Grouse were fitted with radio transmitters weighing 15-18 g using a harness design similar to that described by Brander (1968). Expected transmitter life ranged from 175 to 225 days. All grouse were released at the capture site immediately after being equipped with transmitters.

Radio-marked birds were located by triangulation (Schladweiler 1965) using a portable receiver and a hand-held Yagi antenna. Grouse were located from two to five times each day, generally at sunrise, mid-day, and sunset. Less often, locations were taken at mid-morning, mid-afternoon, and at night. Data for each bird were plotted on base maps by seven-day periods. Home range size was computed by the minimum area method (Mohr 1947), resulting in a representation of the range as a N-sided polygon including all fixes.

Vegetation was sampled within the home range of each marked grouse and separated into tree, shrub, and herbaceous components. Woody plants with a stem diameter at breast height (DBH) greater than 2.5 cm were classified as trees, those less than 2.5 cm as shrubs. Importance values for trees and shrubs were estimated using the point-centered quarter method (Cottam et al. 1953). The herbaceous component was sampled using a 1-m^2 quadrat centered on the sampling point (Oosting 1956). A systematic sample of 10 or more sites was made within each home range.

Habitat types used by marked grouse were categorized by grouping home range plots similar in vegetative and site attributes. Vegetation attributes were importance values of each species of tree, shrub, and herb. Site attributes included elevation and topographic relief. The diverse attribute data were standardized by setting the maximum value for each attribute equal to 100 and scaling all other values accordingly (Thilenius 1972). The standardized attributes were then arranged in a matrix of similarity using Sorenson's coefficient (Sorenson 1948). The matrix of similarity was subjected to cluster analysis by the weighted pair-group method (Sokal and Sneath 1963). The uniform vegetation (primarily aspen-hazel) and topography of the study area necessitated the use of cluster analysis.

RESULTS

Home Range

Eleven radio-marked male ruffed grouse yielded a total of 1039 locations during the two field seasons. Weekly mean home range size increased throughout the spring although home range sizes were quite variable between individuals (Fig. 2). Marked males were generally sedentary. Over 90% of all radio locations were within 200 m of drumming sites for 8 of the 11 males monitored.

Shapes of home range varied between weeks and appeared to reflect the distribution of wooded habitat in the vicinity of home ranges.

Habitats

Cluster analysis was used to separate home ranges into five different habitat types (Fig. 3). The dendogram (Fig. 3) is based on 59 attributes of vegetation and site. The percent similarity level (K-53) was an arbitrary choice based on the assumption that this level delineated a reasonable number of classification groups. A lower level of K would have given fewer groups, but within-group heterogeneity would have been greater. Higher values of K would create more homogeneous groups but would increase the number of groups to make the classification meaningless.

The five habitat types (HT) are described below. Table 1 gives percent constancy (No. of home ranges containing plant species ÷ No. of total home ranges in habitat type x 100) and average importance value for plant species in each habitat type.

HT-1 This type, represented by four home ranges, was characterized by a predominance of large, mature aspen with green ash and bur oak in the tree layer. The shrub component was predominantly hazel, but green ash and aspen saplings were also present. Dominant herbaceous species were wild sarsaparilla

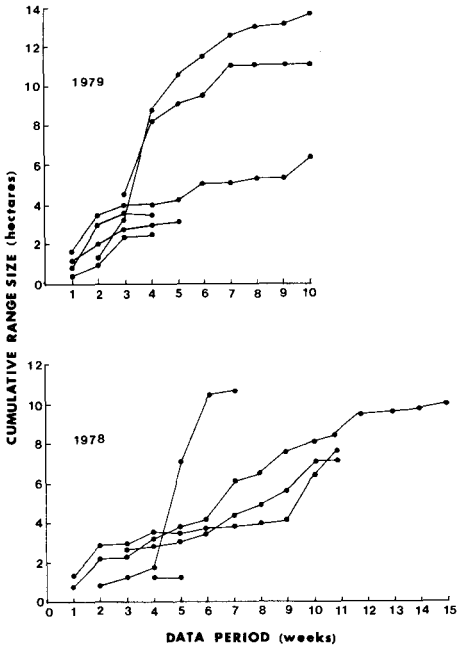

Figure 2. Cumulative home range sizes for male ruffed grouse.

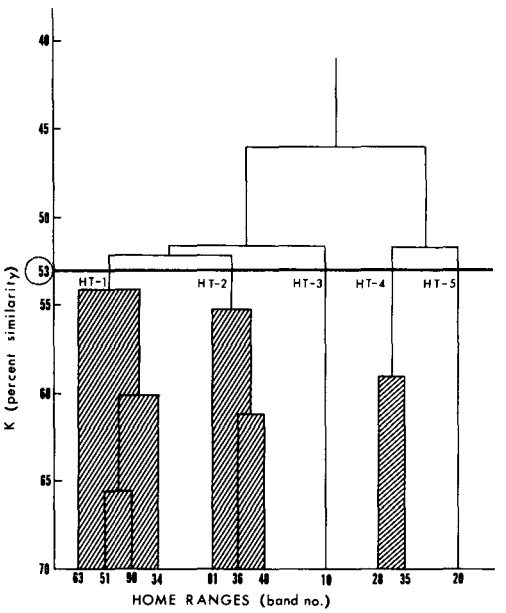

Figure 3. Similarity relationships between home ranges of male ruffed grouse.

Table 1. Average importance value for plants in each habitat type.

Species	HT-1	HT-2	HT-3	HT-4	HT-5
Trees					
Populus tremuloides	196.8	155.3	180.1	67.0	38.7
Populus balsamifera	3.0	25.3	4.1	34.2	
Salix spp.	0.4	19.3	8.0	11.2	8.0
Quercus macrocarpa	27.4	13.0	18.2	87.1	92.5
Amelanchier alnifolia	0.9	16.7	5.1	33.5	18.2
Prunus virginiana	2.0	19.3		28.0	36.3
Acer negundo	6.7	12.4	17.9		8.5
Fraxinus pennsylvanica	56.2	25.2	49.1	33.1	87.9
Other tree species[a]	6.6	13.7	17.4	5.5	9.8
Shrubs					
Populus tremuloides	20.1	31.3	38.2	9.4	
Corylus cornuta	192.5	127.7	191.7	204.5	217.5
Amelanchier alnifolia	14.2	40.0	20.0	12.8	29.2
Prunus virginiana	11.1	24.3	10.2	50.1	44.4
Acer negundo	3.8	11.6	12.7		
Fraxinus pennsylvanica	29.8	19.2	13.6	9.1	
Viburnum trilobum	7.1	15.4	13.6		
Viburnum affine	11.3				
Other shrub species[a]	10.1	30.7		14.1	8.9
Herbs					
Carex spp.	98.1	96.5	101.5	94.9	125.6
Maianthemum canadense	18.4	17.4	20.8	19.5	13.9
Actaea rubra	2.6	3.6	11.3	5.3	
Thalictrum spp.	12.7	13.8	10.1	15.3	16.1
Fragaria virginiana	14.7	12.8	3.9	9.6	4.4
Aralia nudicaulis	71.1	60.3	42.6	59.1	71.1
Sanicula marylandica	28.6	21.6	17.1	23.2	15.4
Heracleum lanatum	9.6	7.0	22.2	10.5	14.6
Pyrola spp.	9.8	14.8	23.2	15.1	6.5
Other herb species[a]	34.4	52.3	47.4	47.6	32.3

[a]Average importance value of less than 10.

and sedge, with the former making a distinct, dense layer near the forest floor in all four home ranges. There were 48 plant species in HT-1. Three of the four stands were clustered within the study area. Topography was generally level. One stand bordered a small permanent wetland. Other stands were not associated with wetlands but contained moist spots that temporarily held water in the spring.

HT-2 — Three home ranges were included in HT-2. Aspen was the dominant tree species with balsam poplar, willow (*Salix* spp.), bur oak, box elder, and green ash also represented. Hazel had the highest importance value in a

shrub layer that contained more species (15) than any of the other habitat types. Sedge, wild sarsaparilla, and black snakeroot dominated the herb category. Fifty plant species were identified in this habitat type. The stands were relatively low in elevation and all were associated with wetlands.

HT-3 — HT-3 was represented by a single home range in an area dominated by large, mature aspen. Green ash, bur oak, and box elder were also present. Hazel was the most important shrub followed by aspen saplings and service berry. Sedge was the most important herb. Thirty plant species were identified in the home range. The stand surrounded a small seasonal wetland and the gradual sloping sides comprised most of the home range.

HT-4 — The two stands of HT-4 were in the same geographic part of the study area on dry, upland sites. Bur oak was the most important tree, with aspen. balsam poplar, and green ash well represented. Hazel and chokecherry formed a distinct shrub layer. Sedge and wild sarsaparilla were the most important herbs. Thirty-eight plant species were identified.

HT-5 — The home range of a single male grouse encompassed HT-5. This site was on a steep, upland hillside dominated by bur oak and green ash. The shrub component was dominated by hazel, chokecherry, and serviceberry. Sedge and wild sarsaparilla were the most common herbs. Plant species numbered 31.

DISCUSSION

Home Range

Movements of male ruffed grouse were similar to that reported by Hale and Dorney (1963), and Gullion and Marshall (1968). Males restricted their movements to the vicinity of the drumming site during spring season. A general increase in the mean weekly range size corresponded with a decrease in drumming activity over time. Archibald (1975) found a similar inverse relationship between range size and drumming activity.

Although movements were extended after the drumming season, all but two of the marked males remained within a 200-m radius of the drumming site. One spent three weeks near his drumming log, then moved 400 m across a small lake and established a new home range. The other made three temporary forays during a three-week period to an area 700 m south of his original drumming log. Gullion (1967) described this behavior as expanded occupancy.

Mean weekly ranges were variable between marked birds in part due to small sample size; however, cumulative ranges for males showed consistent increases over the field season. This increase reflected regular expansion of the home range during spring and summer. Movements outside of an activity center often accounted for cumulative increases. Although movement patterns investigated during this study were restricted to spring and summer, it has been shown that male ruffed grouse use the same general home range year around (Hale and Dorney 1963).

Habitats

The presence of adequate understory cover is one of the major characteristics of the home ranges of male ruffed grouse. One similarity among the five habitat types was the presence of a dense shrub layer dominated by hazel. The shrub

layer often shades out herbaceous plants, creating a sparsely vegetated layer at ground level. The relationship between a dense shrub layer and quality grouse cover has been well documented (Palmer 1963, Rusch and Keith 1971). Gullion (1972) referred to the importance of vertical cover in providing protection from avian predators in spring.

All five habitat types included aspen as an important part of the tree component, although bur oak had the highest average importance value in HT's 4 and 5. Studies in Minnesota have described the relationship between aspen and ruffed grouse (Gullion and Svoboda 1972). The most important food source during the winter and spring is the flower buds of male aspen (Vanderschaegen 1970) and most drumming grouse in Minnesota select sites near clones of male aspen (Gullion and Svoboda 1972). In Wisconsin, 98% of ruffed grouse drumming sites were within 40 m of at least one mature (25 year-old) aspen tree (Kubisiak et al. 1980). Schulz (1984) reported aspen buds as the most common tree species food item occurring in crops from fall-harvested ruffed grouse in the Turtle Mountains. The importance of aspen in the habitat types is probably a reflection of its abundance as well as selection by male grouse for home ranges which include this tree.

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The Birds of Konza Prairie Research Natural Area, Kansas

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ABSTRACT — Since 1972, bird species on the Konza Prairie Research Natural Area, a Nature Conservancy site administered by the Division of Biology at Kansas State University, Manhattan, have been recorded throughout the year on a weekly basis and their relative abundances noted. While virgin tall-grass prairie covers most of the 3486-ha area, some lowlands have been cultivated, and a gallery of forest of oak and hackberry borders the lower reaches of the major stream courses. Through 1984, 199 species have been seen on the site; direct evidence of breeding has been obtained for 59 species.

The Flint Hills form a 70-km-wide band across Kansas north and south astride the 97th meridian. This range of hills is an eastward-facing, dissected escarpment of resistant limestones alternating with more easily weathered shales. These more resistant beds form extensive benches, while the intervening slopes are covered by shallow, rocky soils strewn with chert fragments. This terrain has been a deterrent to cultivation, hence the Flint Hills remain covered by the most extensive remnant of virgin tall-grass prairie in North America.

The Konza Prairie Research Natural Area is a 3486-ha tract in the northern Flint Hills (Geary and Riley Counties, Kansas), purchased by The Nature Conservancy in the period 1971-1977, administered by the Division of Biology at Kansas State University in Manhattan, and set aside in perpetuity for ecological research. The uplands are covered by tall-grass or true prairie dominated by *Andropogon gerardii*, *A. scoparius*, *Sorghastrum nutans*, and, less abundantly, *Panicum virgatum*. Since settlement of this area about 125 years ago and up to the date of purchase by The Nature Conservancy, this tract has been grazed by cattle, usually from May to October, and burned in the spring about three years out of every four (Lloyd Hulbert, personal communication). About 50 ha of lowlands with deep soils have been cultivated or converted into pastures of *Bromus inermis*. A gallery forest occurs in the lowlands along the two major streams and comprises about 6% of the area (Killingbeck 1984). This habitat is dominated by burr oak (*Quercus macrocarpa*) and hackberry (*Celtis occidentalis*) at the lowest and most mesic elevations but becoming largely composed of chinquapin (*Q. muehlenbergii*) upstream. The distribution of underlying rock strata determines the availability of water since the resistant limestone layers impede the downward flow of groundwater, diverting it to numerous springs and seeps along the margins of outcrops. The outflow from these perched water tables permit the development of shrub thickets composed of *Cornus drummondii*, *Zanthoxylum americanum*, *Ulmus americana*, and *Rhus aromatica* above the stream valleys.

Present management plans involve watershed-sized treatment areas subjected to different intervals of spring burning: unburned, annually, every two years, every four years, every ten years, and after especially wet years. Future plans to introduce large native herbivores such as bison, elk, and pronghorn into some of these burning treatments will be implemented within the next few years.

Data collection was begun in 1972 and confined largely to the breeding season for the first eight years. Since 1980, however, surveys of Konza Prairie were made throughout the entire year. In the winter season, visits were made once a week, but during the remainder of the year visits were more frequent, as often as daily during the breeding season in order to document the nesting of as many summer residents as possible. A systematic approach was used in order that all habitats would be covered, and a definite effort was made to search for species to be expected in appropriate habitats at the proper season. Species presence was tabulated by week and is available as LTER data set CBC01, which provides the basis for this paper. These data also indicate whether the species was known to be nesting in a given week, but nest locations, contents, and nest histories comprise data set CBN01. Relative abundance estimates were made on the basis of frequency of occurrence over the span of several weeks as well as the numbers of individuals per species observed on a particular date. Common names used follow the American Ornithologists' Union (1983). The following notations are used to indicate relative abundance:

•	rare	Few records, not to be expected. This species is either erratic or extralimital in its occurrence.
---	occasional	Irregular during the seasons indicated or, if regular, the species is irregular in its annual frequency of occurrence. When present, it only occurs at low densities. Thus records are infrequent.
———	uncommon	Present during the seasons indicated at low densities. Thus the species may be found, but appropriate habitats must be searched.
▬▬	common	Present in moderate densities during the seasons indicated and can be expected to be seen in appropriate habitat.
▬▬	abundant	Occurs at high densities in the most frequently encountered habitats, a very noticeable member of the local avifauna.
*	Direct evidence for breeding, either as an active nest or as recently fledged young attended by adults.	

ACKNOWLEDGMENTS

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cipal Investigator, DEB 80-12166). The cooperation and assistance of Lloyd C. Hulbert, Director, Konza Prairie Research Natural Area, is gratefully acknowledged as well.

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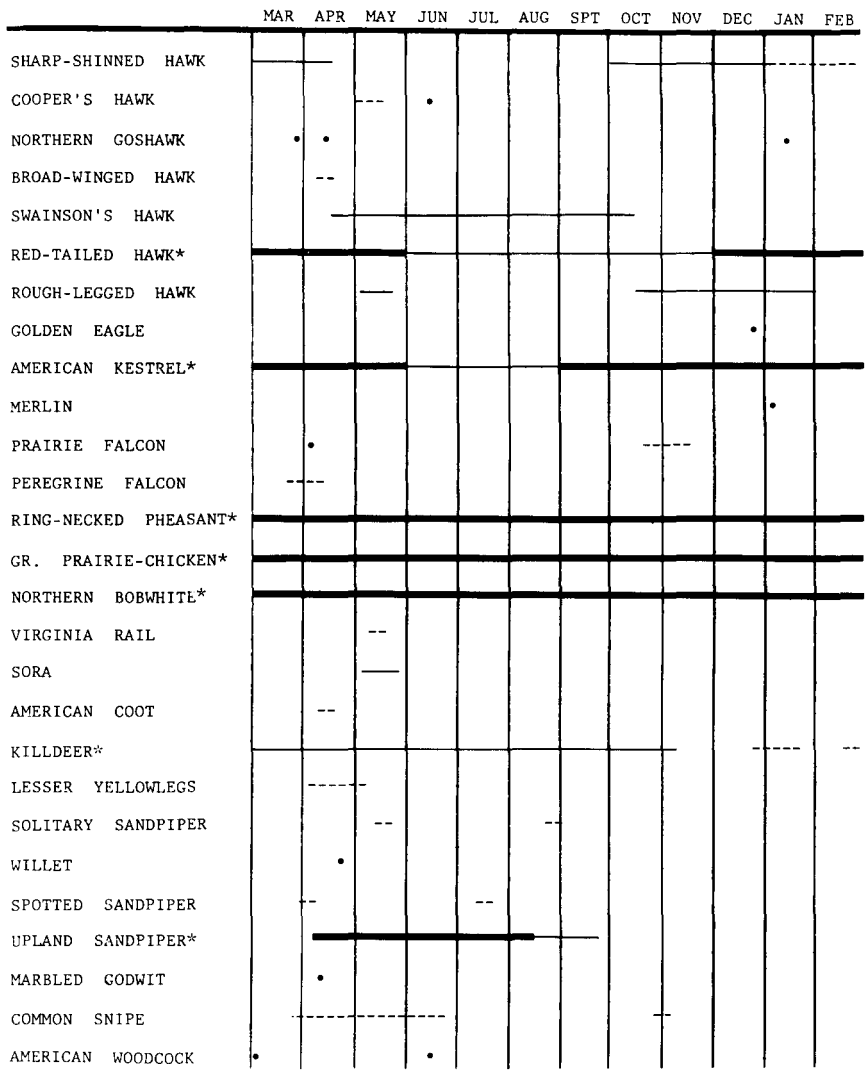

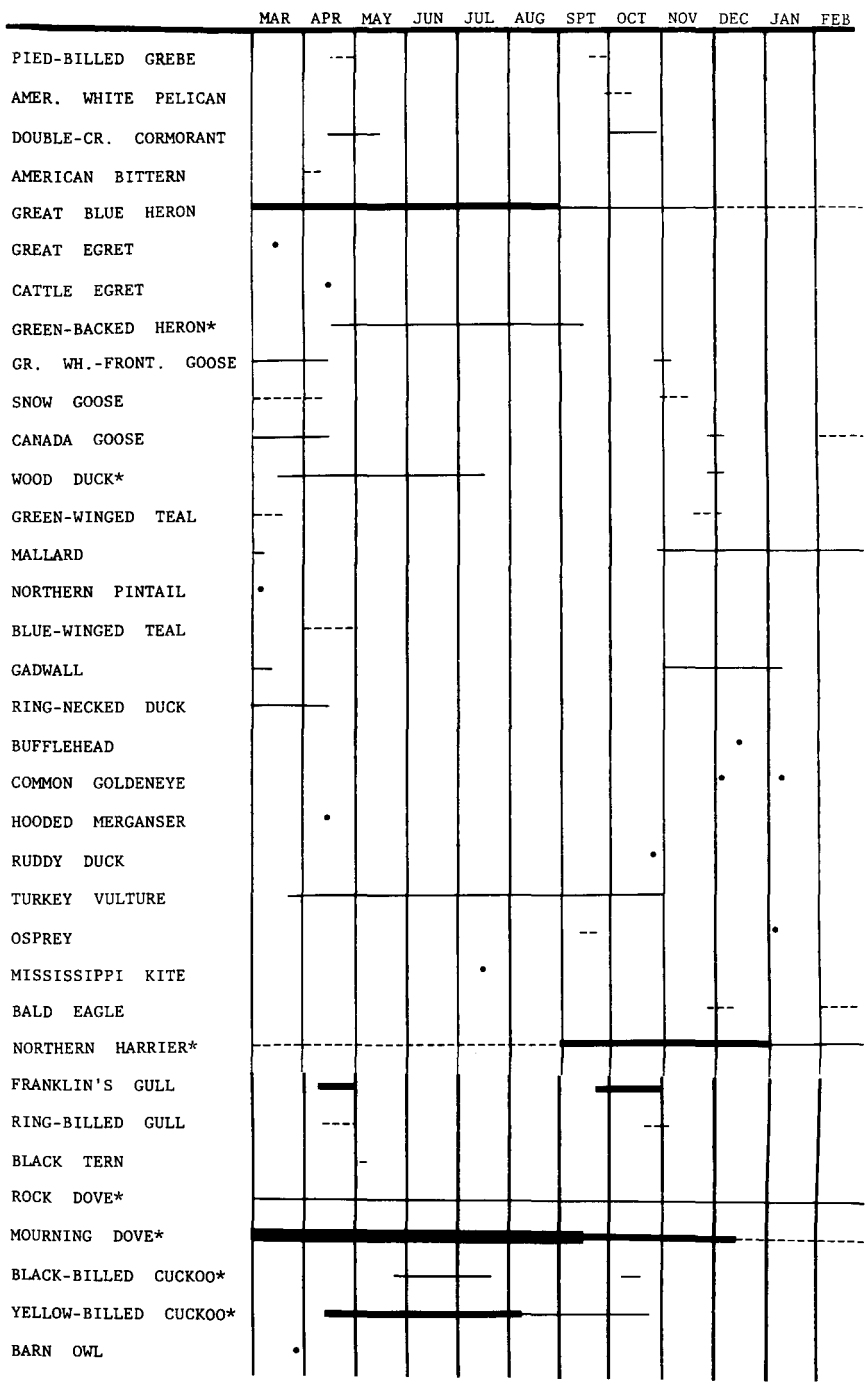
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WOOD DUCK*
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MALLARD
NORTHERN PINTAIL
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GADWALL
RING-NECKED DUCK
BUFFLEHEAD
COMMON GOLDENEYE
HOODED MERGANSER
RUDDY DUCK
TURKEY VULTURE
OSPREY
MISSISSIPPI KITE
BALD EAGLE
NORTHERN HARRIER*
FRANKLIN'S GULL
RING-BILLED GULL
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MOURNING DOVE*
BLACK-BILLED CUCKOO*
YELLOW-BILLED CUCKOO*
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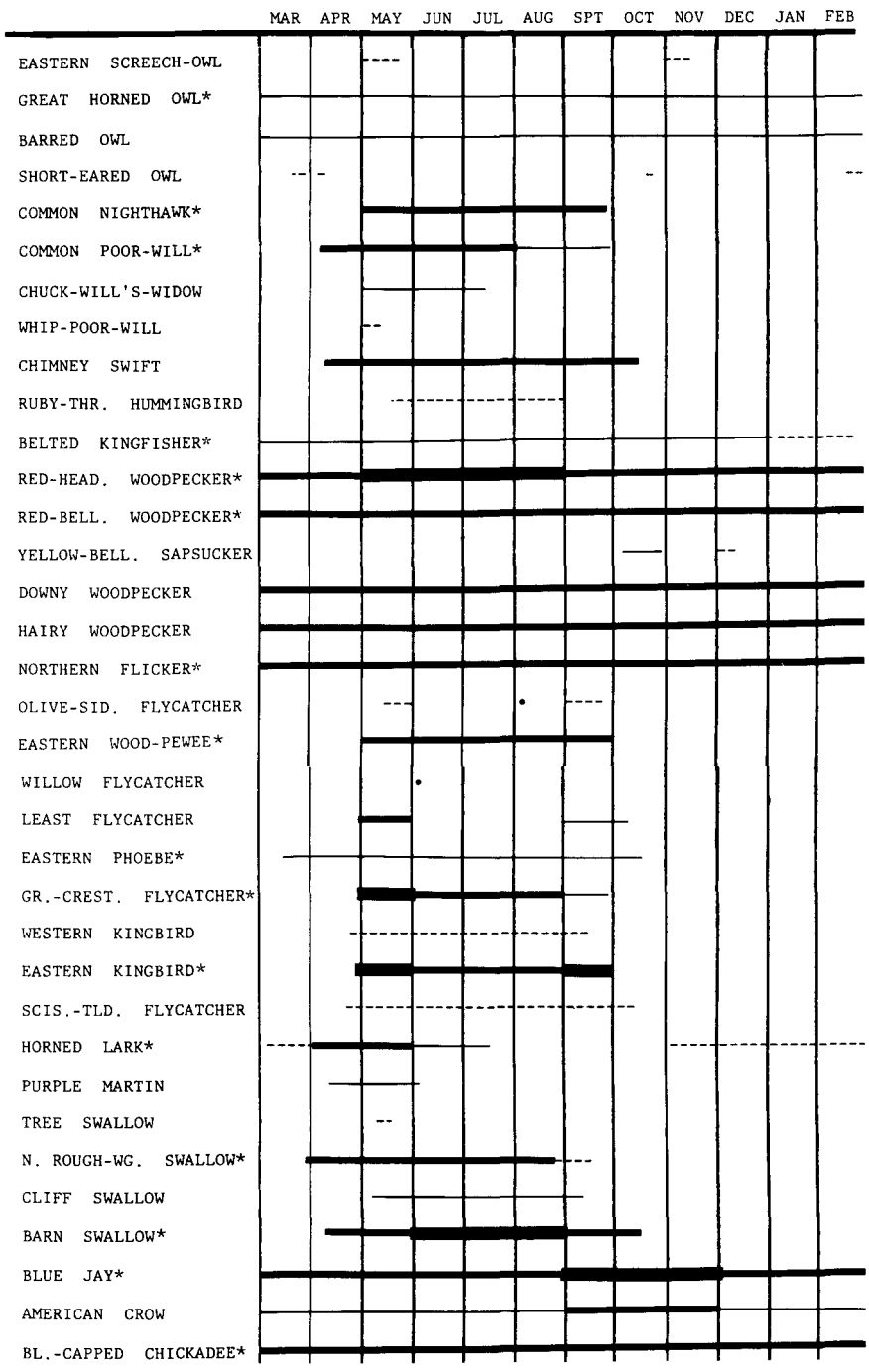
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COMMON POOR-WILL*
CHUCK-WILL'S-WIDOW
WHIP-POOR-WILL
CHIMNEY SWIFT
RUBY-THR. HUMMINGBIRD
BELTED KINGFISHER*
RED-HEAD. WOODPECKER*
RED-BELL. WOODPECKER*
YELLOW-BELL. SAPSUCKER
DOWNY WOODPECKER
HAIRY WOODPECKER
NORTHERN FLICKER*
OLIVE-SID. FLYCATCHER
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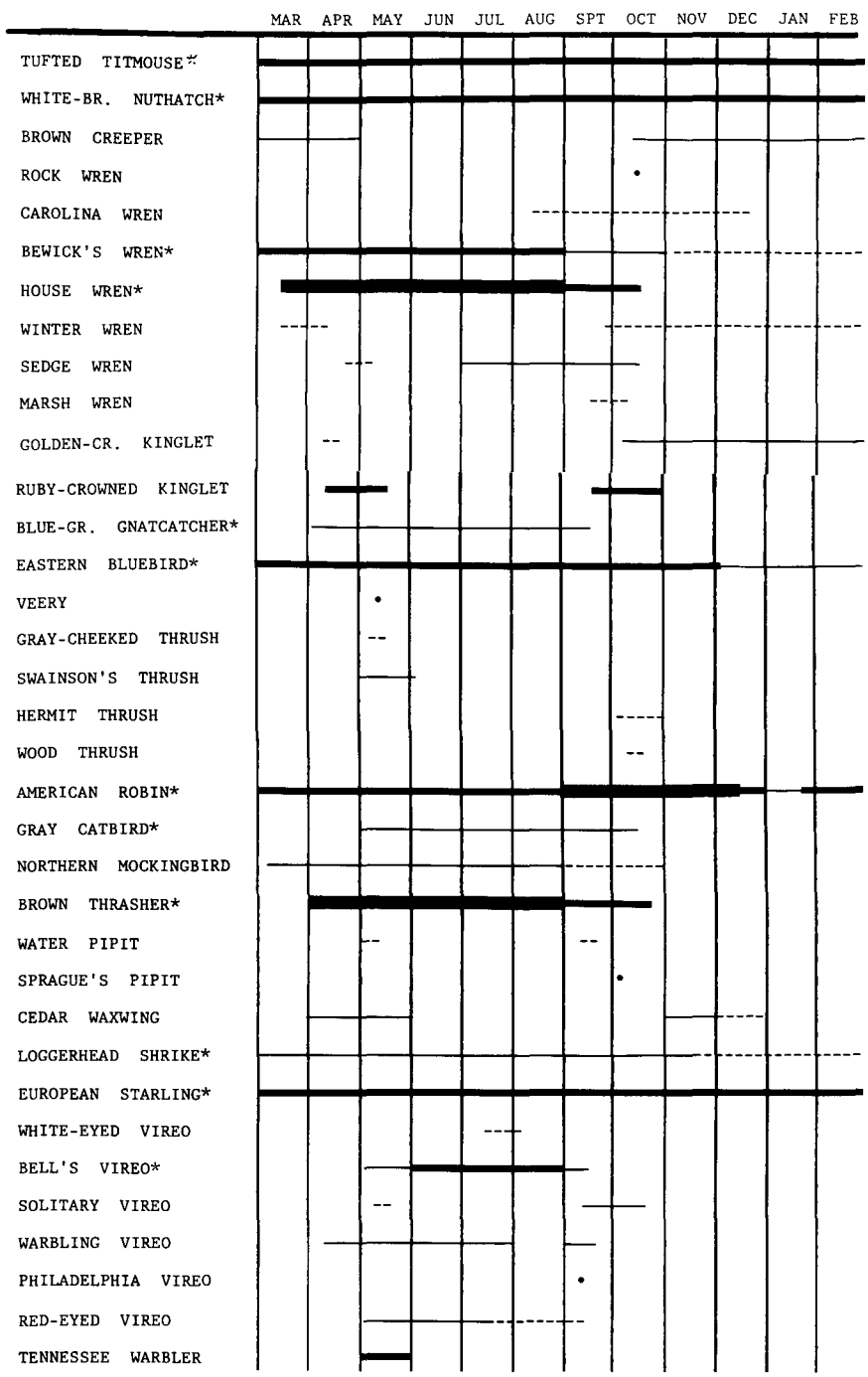
BARN SWALLOW*
BLUE JAY*
AMERICAN CROW
BL.-CAPPED CHICKADEE*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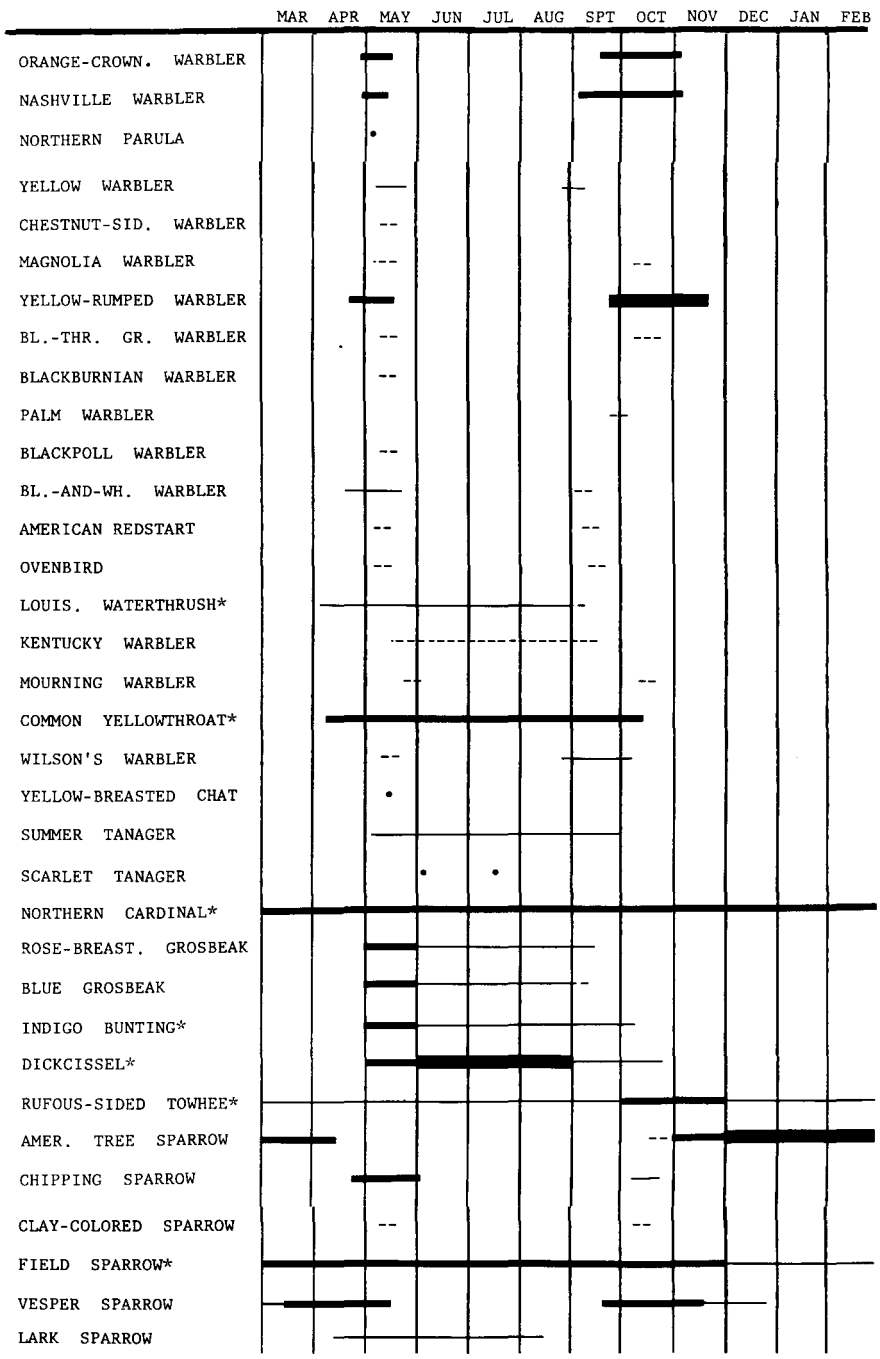
BEWICK'S WREN*
HOUSE WREN*
WINTER WREN
SEDGE WREN
MARSH WREN
GOLDEN-CR. KINGLET
RUBY-CROWNED KINGLET
BLUE-GR. GNATCATCHER*
EASTERN BLUEBIRD*
VEERY
GRAY-CHEEKED THRUSH
SWAINSON'S THRUSH
HERMIT THRUSH
WOOD THRUSH
AMERICAN ROBIN*
GRAY CATBIRD*
NORTHERN MOCKINGBIRD
BROWN THRASHER*
WATER PIPIT
SPRAGUE'S PIPIT
CEDAR WAXWING
LOGGERHEAD SHRIKE*
EUROPEAN STARLING*
WHITE-EYED VIREO
BELL'S VIREO*
SOLITARY VIREO
WARBLING VIREO
PHILADELPHIA VIREO
RED-EYED VIREO
TENNESSEE WARBLER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CHESTNUT-SID. WARBLER
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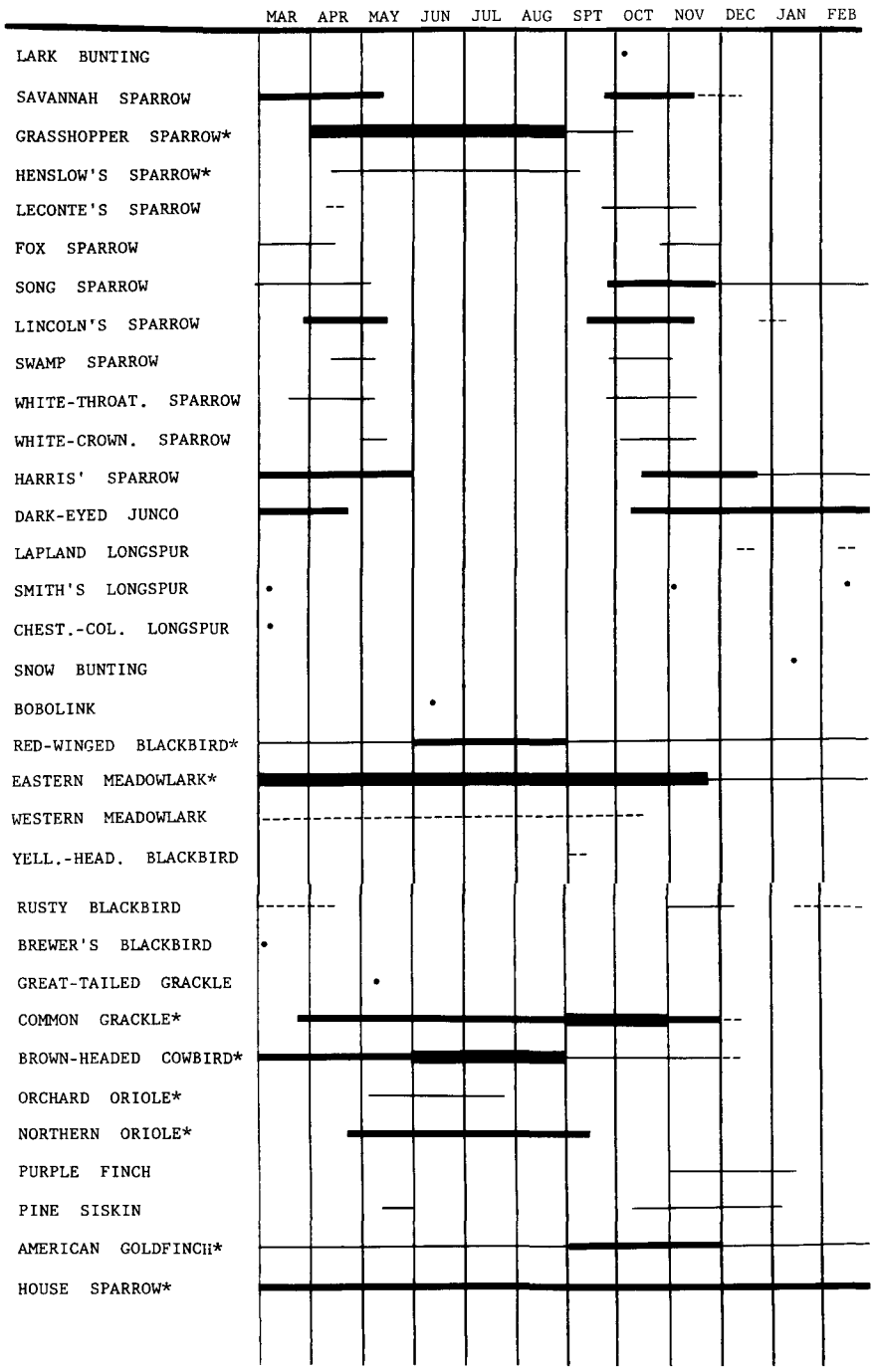
YELLOW-RUMPED WARBLER
BL.-THR. GR. WARBLER
BLACKBURNIAN WARBLER
PALM WARBLER
BLACKPOLL WARBLER
BL.-AND-WH. WARBLER
AMERICAN REDSTART
OVENBIRD
LOUIS. WATERTHRUSH*
KENTUCKY WARBLER
MOURNING WARBLER
COMMON YELLOWTHROAT*
WILSON'S WARBLER
YELLOW-BREASTED CHAT
SUMMER TANAGER
SCARLET TANAGER
NORTHERN CARDINAL*
ROSE-BREAST. GROSBEAK
BLUE GROSBEAK
INDIGO BUNTING*
DICKCISSEL*
RUFOUS-SIDED TOWHEE*
AMER. TREE SPARROW
CHIPPING SPARROW
CLAY-COLORED SPARROW
FIELD SPARROW*
VESPER SPARROW
LARK SPARROW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GRASSHOPPER SPARROW*
HENSLOW'S SPARROW*
LECONTE'S SPARROW
FOX SPARROW
SONG SPARROW
LINCOLN'S SPARROW
SWAMP SPARROW
WHITE-THROAT. SPARROW
WHITE-CROWN. SPARROW
HARRIS' SPARROW
DARK-EYED JUNCO
LAPLAND LONGSPUR
SMITH'S LONGSPUR
CHEST.-COL. LONGSPUR
SNOW BUNTING
BOBOLINK
RED-WINGED BLACKBIRD*
EASTERN MEADOWLARK*
WESTERN MEADOWLARK
YELL.-HEAD. BLACKBIRD
RUSTY BLACKBIRD
BREWER'S BLACKBIRD
GREAT-TAILED GRACKLE
COMMON GRACKLE*
BROWN-HEADED COWBIRD*
ORCHARD ORIOLE*
NORTHERN ORIOLE*
PURPLE FINCH
PINE SISKIN
AMERICAN GOLDFINCH*
HOUSE SPARROW*

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Vascular Flora of Ransom, Richland, and Sargent Counties, North Dakota

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ABSTRACT – This paper reports 866 species of vascular plants for Richland, Ransom, and Sargent counties, North Dakota. Descriptions of the topography, drainage, climate, botanical explorations of the area, and present plant communities are included. Three new records of vascular plants for the state of North Dakota were found as a result of this study. These were *Arabis canadensis*, *Erigeron annuus*, and *Gymnocarpium dryopteris* (collected by Mr. John Challey). The ten largest families for the area, in terms of species diversity, were Asteraceae, Poaceae, Cyperaceae, Fabaceae, Brassicaceae, Rosaceae, Ranunculaceae, Chenopodiaceae, Lamiaceae, and Polygonaceae.

In 1970, with funding from the Sheyenne Valley Grazing Association and the U.S. Forest Service, several range management studies were undertaken by the North Dakota State University Botany Department. It was felt that a floristic survey of Ransom, Richland, and Sargent counties, North Dakota, would be extremely beneficial to these studies. This paper reports the results of floristic work in the three counties from 1970-1983.

This study had several objectives. The first was to compile a list of the vascular plants occurring in the three counties and to support the list with voucher specimens to be filed in the North Dakota State University Herbarium. The second objective was to observe the plant species in their natural habitats and to record this information to gain a better understanding of plant-habitat interaction and plant distribution. Thirdly, it was hoped that this study would provide ideas and incentives for more detailed ecological studies and resource materials for future taxonomic studies.

STUDY AREA

Ransom, Richland, and Sargent counties are located in southeastern North Dakota (Fig. 1). The area is bounded on the north by Barnes and Cass counties, North Dakota. The boundary on the east is the Red River and Bois de Sioux River, whose east banks lie in Minnesota. Marshall and Roberts counties, South Dakota, bound the study area on the south and Lamoure and Dickey counties, North Dakota, on the west.

Physiographically, the study area lies within the western lake section of the lowland province of the Interior Plains. This area can be further subdivided into 1) Drift Prairie (till plain and Glacial Lake Dakota), western part, and 2) Lake Agassiz Basin (Lake Plain and Sheyenne River Delta), eastern part (Fenneman

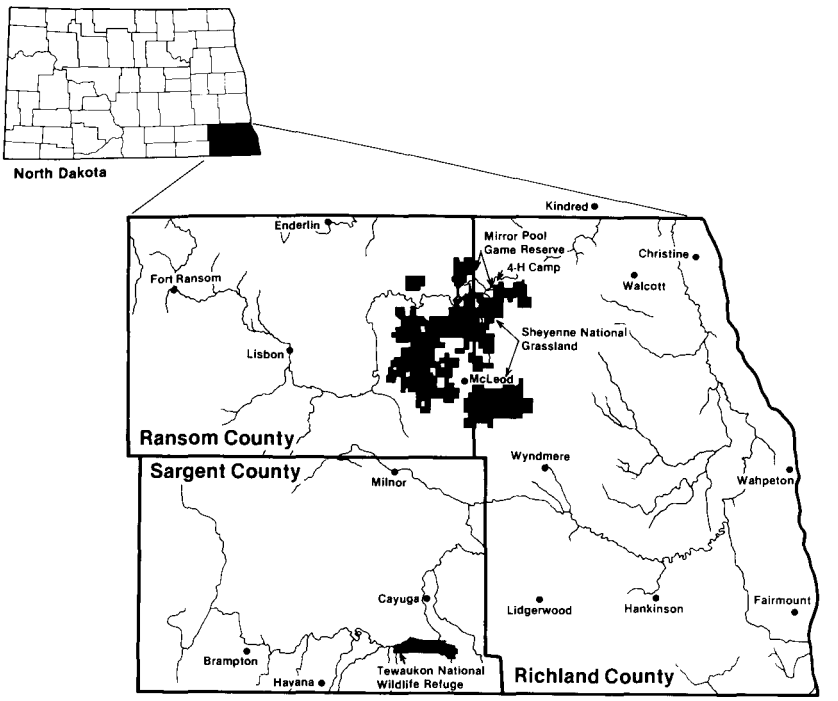

Figure 1. Map of the study area showing major drainage patterns, Sheyenne National Grasslands, Tewaukon National Wildlife Refuge, and major towns.

1931). The till plain is an undulating plain with low and rounded knolls, numerous closed depressions, and few widely spaced streams. The sediments of the till plain are a mixture of sand, silt, and clay. The dominant relief is less than 25 feet (Omodt et al. 1968). Glacial Lake Dakota is underlain by lake deposits of clay with some sand and silt. Glacial Lake Agassiz Plain is of flat, clay-type soils (Omodt et al. 1968). The Sheyenne River Delta is characterized by sandy soil, which through eolian action has been heaped up locally into dunes from 5 to 90 feet high. This area is referred to as the sandhills region.

The topography of the study area generally slopes from west to east and from south to north. Elevation ranges from 1350 feet in the west to 1050 feet in the central part of the area to 950 feet along the eastern border. The entire study area lies east of the Continental Divide. As a result, the drainage is north to Lake Winnipeg, which then flows to Hudson's Bay.

Drainage of the study area is by three main river systems, the Red, the Sheyenne, and the Wild Rice Rivers, and by two lesser rivers, the Maple and the Bois de Sioux. The Red River has its source north of Wahpeton, N.D., where it is formed by the joining of the northward flowing Bois de Sioux and Otter Tail Rivers (Bell 1963). The Sheyenne River enters the study area in northwestern Ransom County, flows south to the vicinity of Fort Ransom where it begins a

gradual turn to the east, flows out through the Sheyenne Delta and onto the ancient lakebed of Glacial Lake Agassiz, where it courses northeastward to join the Red River north of Fargo.

Dainage over much of the western part of Ransom County is somewhat imperfectly established, and small marshy plots from one-half acre to 40 acres in area are found, the greatest number ranging in size from 5 to 20 acres. Engelvale Slough contains the largest body of water. The eastern part of Ransom County is wind-formed hills of choppy, uneven sand, but even here the water table is always near the surface (10-15 feet below surface). There seems to be little or no special topographic arrangement of the sloughs, dunes, and prairies other than their intermixing (McKinstry 1910).

There is little natural drainage in the lake plain of Richland County, and a large part of the runoff from that area moves through man-made systems (Baker 1967). A few permanent Lakes exist, e.g., Lake Elsie, Willard Lake, Gross Lake, Swan Lake, and Horseshoe Lake, mostly south and west of Hankinson. Streams are intermittent and commonly join marshes and ponds.

Extensive areas in central and western Sargent County are dotted by depressions and potholes. These range to more than 40 acres, but three-fourths of them are less than 5 acres (Larsen et al. 1964). The water table is high under much of the area, and the drainage pattern is not well developed. The largest body of water in Sargent County is Lake Tewaukon.

CLIMATE

Climate is a major factor in determining the flora of an area. The study area has a continental climate which can be referred to as a "cool temperate subhumid" type (Omodt et al. 1968). It is characterized by sudden and extreme temperature variations, light to moderate precipitation which tends to be irregular in time and distribution, plentiful sunshine, and nearly continuous air movement.

Temperature of the area is subject to wide fluctuations and rapid changes. Long-term temperature extremes ranged from −41 to 114 degrees F at McLeod, which is located in about the center of the study area (U.S. Dept. of Commerce 1970). The average frost-free (growing) season is about 130 days (Jensen 1972).

Most of the precipitation occurs in the form of rain during the growing season from April through September. The 10-year average precipitation (1961-1970) was 19.8 inches per year (U.S. Dept. of Commerce 1971). The 30-year average snowfall for 1931-1960 was 34 inches per year (Jensen 1972).

Mean summer evaporation from a free water surface for the area is about 38 inches, approximately twice the annual precipitation. The average relative humidity is 68 percent. As the relative humidity decreases, evaporation and transpiration rates increase. The normally low summer relative humidity places additional stress on plants during times of moisture shortage.

The average wind speed in North Dakota is greatest in late winter and early spring and least in the summer. The prevailing winds are from the north-northwest in winter and from the southeast in summer.

PREVIOUS BOTANICAL WORK

The first botanical expedition into the study area was undertaken by Mr. Chas. Geyer, who was employed as a botanist by I. N. Nicollet to collect plants in the Dakota Territory. Several of Geyer's collections were named as new species and published by John Torrey (Nicollet 1843).

Upham (1895) estimated that about 1500 indigenous species of herbaceous plants unhabited the Red River basin and he stated, "probably half attain their geographic limit in this area."

Prof. C. B. Waldron made the first collections represented in the North Dakota State University Herbarium in the summer of 1890 (Bergman 1912). W. B. Bell spent the summers of 1908 and 1909 surveying and collecting plants in Richland and Ransom counties. He listed 45 species of common shrubs, grasses and herbs (Bell 1910). O. A. Stevens collected intensively from the study area throughout his career. His collections represent the vast majority of herbarium specimens on file prior to the present study.

The studies of Geyer, Waldron, Bell, and Stevens were the noteworthy floristic botanical studies of the study area prior to the present study. Other botanical studies in the study area have been ecological in nature (Shunk 1917, Challey 1955, Nelson 1964, and Wanek 1964, 1967).

PLANT COMMUNITIES

Plant communities may be classified and designated in a number of ways. Since plant species generally occur along various kinds of more or less gradual environmental gradients, it is seldom possible to draw sharp community boundaries. Probably one of the more common ways to classify plant communities is based on dominant species. The delineation of a major plant community in this paper is based on dominant species and the associated secondary species as observed in the field. A brief description of the community other than floristic is given. In communities characterized by a large number of species, a seasonal aspect is given along with flowering periods for the more characteristic plants of the communities.

No attempt was made to identify or describe all plant communities or community types in the study area. Rather, a few selected communities are described to give a representation of the broad vegetation types.

The 12 plant communities described and discussed are aquatic, seepage, streambank, elm-basswood, green ash-box elder, quaking aspen, oak-savanna, sand blowout, tall-grass prairie, mixed-grass prairie, sedge meadow, and abandoned fields.

Aquatic Community

An aquatic plant is defined here as a plant which is found in permanent water, i.e., water which remains the entire growing season. Naturally occurring basins, in which swamps, ponds, and lakes form, are scattered throughout the study area. Man-made depressions such as drainage ditches and watering holes also exist. Man-made dams and beaver dams have aided in the making of permanent ponds.

The most common submerged plant species in the aquatic community is *Potamogeton pectinatus*. This plant occurs at various depths in lakes, ponds, and streams. Other pondweeds that occur in this community are *P. nodosus*, *P. richardsonni*, *P. zosteriformis*, *P. foliosus*, *P. friesii*, and *P. gramineus*.

Other submerged aquatic species are *Lemna trisulca*, *Najas marina*, *N. flexilis*, *Ceratophyllum demersum*, and *Zannichellia palustris*. These plants all flower below the water surface in up to five feet of water. Submerged aquatic plants that flower above the water surface are *Myriophyllum spicatum* var. *exalbescens*, *Utricularia vulgaris*, *Elodea canadensis*, *Ranunculus aquatilis* var. *capillaceus*, and *R. longirostris*. Plants of these species also are found in shallow to deep water. Some aquatic plants have large floating leaves with flowers above the water surface. An example of this is *Nuphar luteum* var. *variegatum*, which is found in shallow to deep permanent water. Some aquatic plants are free floating and never become attached. Among the free-floating species are *Lemna perpusilla*, *L. minor*, *Spirodelia polyrhiza*, and *Wolffia columbiana* (the smallest flowering plant).

Seepage Community

The seepage community is often associated with springs that supply water to streams and ponds, where water is plentiful, and where hydrophytic plants are found. Woody plant species associated with the seepage community are *Alnus incana* ssp. *rugosa*, *Salix exigua* ssp. *interior*, *Salix amygdaloides*, *Ostrya virginiana*, and *Betula glandulosa*, var. *glandulifera*. Herbs found in and around the seepage area include *Habenaria hyperborea*, *Mimulus glabratus* var. *fremontii*, *M. ringens*, *Epuisetum fluviatile*, *E. palustre*, *E. arvense*, *Veronica angallis-aquatica*, *V. americana*, *Bidens cernua*, *B. frondosa*, *Typha latifolia*, *T. angustifolia*, *Eupatorium maculatum* var. *bruneri*, *E. perfoliatum*.

Several grasses and sedges are found in seepage areas. Most common grasses of seepages are *Glyceria grandis*, *G. striata*, *Oryzopsis racemosa*, *Leersia oryzoides*, *Beckmannia syzigachne*, and *Spartina pectinata*. Sedges common in seepages are *Carex atherodes*, *C. retrorsa*, *C. vulpinoidea*, *C. aquatilis* var. *altior*, *Scirpus validus* and *S. acutus*. Seepage communities tend to be very local, and just a few feet away, very dry conditions typical of a prairie community usually exist.

Streambank Community

The streambank community consists of plants associated with either permanant or temporary bodies of water. It is characterized by a high and seasonally fluctuating water table. Most of the plants in this community are found along the margins of streams, ponds, and oxbows. Plants found in a streambank community may not be totally dependent upon ponded water during the growing season. The extent of the streambank community in the study area is not large, due to the limited number of streams and rivers.

Some plants of the streambank community are rooted below the water at the edges of the streams and rivers, with their foliage above the water. Examples of streambank species include *Typha latifolia*, *T. angustifolia*, *Sparganium eurycarpum*, *Sagittaria cuneata*, *S. latifolia*, and *Alisma subcordatum*. All these plants may be found on exposed and mud flats as water recedes. Other plant species that may be found on exposed mud flats are *Ranunculus cymbalaria*, *Eleocharis macrostachya*, *E. acicularis*, *Juncus balticus*, and *J. torreyi*.

The Cyperaceae family is well represented in the streambank community. *Carex*, the largest genus, is well represented by *Carex atherodes*, *C. vulpinoidea*, *C. hystricina*, *C. lanuginosa*, and *C. rostrata* along the margins of streams and rivers. Bulrushes also are found along the margin of shallow water, and are represented by *Scirpus validus*, *S. acutus*, and *S. heterochaetus*. In more saline areas, *Scirpus americanus* and *Scirpus maritimus* var. *paludosus* replace the more typical bulrush species. On moist and exposed sandy areas, *Cyperus aristatus*, *C. esculentus*, and *C. rivularis* occur.

The Gramineae family also is well represented in the streambank community. Grass species occurring in shallow water are *Phragmites australis*, *Zizania aquatica*, *Catabrosa aquatica*, *Oryzopis racemosa*, and *Leersia oryzoides*. Other grasses occurring along the margins of streams are *Glyceria grandis*, *G. striata*, *Beckmannia syzigachne*, and *Spartina pectinata*. In areas with high salt content, the prominent grass is *Puccinellia nuttalliana*. Forbs associated with saline areas are *Suadea depressa*, *Salicornia rubra*, and *Heliotropium curassavicum*.

Various forbs growing in moist soil along the margin of streambank communities are *Polygonum coccineum*, *P. lapathifolium*, *P. pensylvanicum*, *P. amphibium*, *Rumex crispus*, *R. maritimus*, *Lysimachia thyrsiflora*, *L. quadriflora*, *Impatiens capensis*, *Asclepias incarnata* ssp. *incarnata*, *Leonurus cardiaca*, *Lycopus americanus*, *L. asper*, *Mentha arvensis*, *Mimulus glabratus* var. *fremontii*, *Bidens cernua*, and *Potentilla anserina*.

The most prominent streambank trees are probably the willows, *Salix eriocephala*, *S. exigua* ssp. *interior* and *S. amygdaloises*. Other trees that grow along streambanks include *Populus deltoides* ssp. *monilifera*, *Ostrya virginiana*, and *Alnus incana* ssp. *rugosa*. A shrubby species, *Amorpha fruticosa*,

is occasionally found. Outside the wooded area of the streambank community there is an abrupt change to the surrounding prairie or woodland community.

Elm-Basswood Woodland Community

The majority of the woodland in the study area is located along the Sheyenne River, Red River, and other smaller river tributaries and ravines. The woodland community consists of the overstory, the understory, and herbaceous strata. The elm-basswood community generally does not extend far from the main water course, except for wooded ravines extending back from the river that act as tributaries. This community is usually located closer to the river than any of the other forest communities because of the trees' very high water requirement. The rich loamy and alluvial soils of this community are usually always moist.

The dominant tree species of the elm-basswood community are *Tilia americana* and *Ulmus americana*. *Populus deltoides* ssp. *monilifera*, *Salix exigua* ssp. *interior*, and *S. amygdaloides* occasionally occur in the community, but their presence seems to be directly related with size and "newness" of the flood plain adjacent to the river. *Celtis occidentalis*, *Ostrya virginiana*, *Ulmus rubra*, and *Betula papyrifera* are interspersed in this community.

A number of understory or shrub species occur in the elm-basswood community. Among these are *Amelanchier alnifolia*, *Celastrus scandens*, *Euonymus atropurpureus*, and *Zanthoxylum americanum*. The number of saplings and shrubs is very small because of the dominance exerted by the larger trees and the shrubs.

There are numerous species of herbaceous plants in this community. One of the earliest plants that appears in spring is *Allium tricoccum*, which sends up large vegetative leaves in May, but which does not flower until July. *Uvularia grandiflora*, *Sanguinaria canadensis*, *Arisaema triphyllum*, and *Dicentra cucullaria* are plants that appear and flower before the trees have their leaves. Ferns that occur on moist wooded slopes in this community are *Athyrium filix-femina* var. *angustum*, *Cystopteris fragilis*, *Dryopteris cristata*, and *Onoclea sensibilis*. *Matteuccia struthiopteris* and *Botrychium virginianum* occur in more level areas.

Sedges and grasses are not well represented in the elm-basswood community. Two sedges, *Carex sprengelii* and *C. rosea*, are commonly found in this community. The grasses are represented by *Elymus virginicus*, *E. villosus*, and *Hystrix patula*. Many other species of herbaceous plants occur, including *Smilacina stellata*, *Trillium cernuum*, *Smilax herbacea*, *Viola canadensis* var. *rugulosa*, *V. pubescens*, *Actaea rubra*, *Polygonatum biflorum*, *Osmorhiza longistylis* var. *longistylis*, *Sanicula marilandica*, *Thalictrum dasycarpum*, *Hydrophyllum virginianum*, *Smilacina racemosa*, *Aquilegia canadensis*, *Cypripedium reginae*, *Asarum canadense*, *Menispermum canadense*, *Phryma leptostachya*, *Urtica dioica* ssp. *gracilis*, *Laportea canadensis*, and *Aralia nudicaulis*. The elm-basswood community usually grades into a more mesic woods (green ash-box elder community) and less often into prairie communities.

Green Ash-Box Elder Community

The green ash-box elder community is characterized by dominant tree species *Fraxinus pennsylvanica* var. *subintegerrima* and *Acer negundo*. This community occurs farther away from the river's water course, and farther up the slope, than the previous community. Green ash-box elder dominates areas where water runoff into ravines, coulees, or draws is sufficient to support woodland vegetation. Such areas are often found along tributaries leading to the major waterways. At the lower end of these tributaries, the typical green ash-box elder community may be replaced by *Populus deltoides* ssp. *monilifers* and some *Salix exigua* ssp. *interior*. The green ash-box elder community comprises much of the woodlands of the study area.

Many other woody species that grow within or along the margins of this community are *Amelanchier alnifolia*, *Amorpha fruticosa*, *Cornus foemina* ssp. *racemosa*, *C. stolonifera*, *Corylus americana*, *Crataegus rotundifolia*, *Lonicera dioica*, *L. tatarica*, *Parthenocissus vitacea*, *Prunus virginiana*, *P. americana*, *Rhamnus catharticus*, *Ribes americanum*, *R. missouriense*, *Rosa blanda*, *Rubus idaeus* ssp. *sachalinensis*, *Symphoricarpos occidentalis*, and *Zanthoxylum americanum*. Bur oak (*Quercus macrocarpa*) is found interspersed in the green ash-box elder community along the upper and drier margins.

Many herbaceous forbs which occurred in the elm-basswood community also occur in or along the margins of the green ash-box elder community. Some of the more characteristic forbs of the green ash-box elder community are *Ellisia nyctelea*, *Arenaria lateriflora*, *Galium boreale*, *Urtica dioica*

ssp. *gracilis*, *Laportea canadensis*, *Verbena urticifolia*, *Apocynum androsaemifolium*, *Parietaria pensylvanica*, *Circaea lutetiana* ssp. *canadensis*, *Nepeta cataria*, and *Arctium minus*.

Grasses and sedges are better represented here than in the elm-basswood community. *Poa pratensis* appears along the margins of the woodland as well as in it. *Elymus virginicus* and *Hystrix patula* seem to be more abundant along its margins. Various sedges, e.g., *Carex blanda*, *C. pensylvanica*, *C. sprengelii*, and *C. rosea* are present in this community.

Quaking Aspen Community

Various woodland communities are scattered throughout the upland prairies. The quaking aspen community generally occurs in light soil of rolling topography. The characteristic tree species of this community is *Populus tremuloides*. Near a major waterway, *Populus deltoides* ssp. *monolifera* may be intermixed with quaking aspen. *Quercus macrocarpa* may be interspersed with quaking aspen on upland sites away from the river.

Smaller woody plants that are found along the margins of the quaking aspen community include *Toxicodendron rydbergii*, *Symphoricarpos occidentalis*, *Ribes missouriense*, and *Rubus idaeus* ssp. *sachalinensis*. These species can be found either along the margin of or in the woodland. Occasionally *Prunus virginiana* and *Rosa blanda* are associated with the quaking aspen community if the conditions are right.

The understory of the quaking aspen community is quite open. *Galium boreale* may become quite thick throughout the understory. *Smilacina stellata* and *Fragaria virginiana* var. *glauca* also occur in this community. Two rare species of *Pyrola*, *P. asarifolia* and *P. secunda*, are restricted to the aspen woodland. Grass species common in this community include *Elymus canadensis*, *E. virginicus*, and *Schizachne purpurascens*.

Oak-Savanna Community

The oak-savanna community is characterized by rolling upland prairie with its associated grasses, interspersed with scattered areas of woodland. This community is predominant in the sandy soils of the sandhills region along the south side of the Sheyenne River. The wooded oak areas appear to be located where ground water is high enough to be utilized by the trees. This community covers only a small percentage of the study area.

Quercus macrocarpa is the dominant tree species of this community. Another woody species often intermixed with the oaks is *Populus tremuloides*. *Pinus banksiana* is found only in one area (northeastern Richland County) associated with the oak-savanna community. This is a planted population of jack pine which is now reproducing itself.

Several shrub species are found associated with the oak-savanna community. *Rhus glabra*, *Symphoricarpos occidentalis*, *Rosa arkansana*, *Rubus idaeus*, *Ribes missouriense*, and *Prunus virginiana* are often found along the margins of these woodlands. *Toxicodendron rydbergii* is often quite thick throughout the entire community, as well as along the areas bordering it.

Grass species of the upland prairie dominate the prairie aspect of the savanna. The dominant grasses are *Bouteloua gracilis*, *B. curtipendula*, *Poa pratensis*, *Stipa comata*, *S. sparta*, and *S. viridula*. Some grass species are found in the wooded oak areas. Among these are *Elymus canadensis*, *E. villosus*, and occasionally *Hystrix patula*.

Forbs of the oak-savanna community that are commonly found in the upland prairie are *Erysimum asperum*, *Thlaspi arvense*, *Potentilla arguta*, *Amorpha nana*, *A. canescens*, *Psoralea esculenta*, *Verbena stricta*, *V. hastata*, *Onosmodium molle* var. *occidentale*, *Penstemon grandiflorus*, *Achillea millefolium* ssp. *lanulosa*, *Artemisia ludoviciana* var. *ludoviciana*, *Chrysopsis villosa*, *Ratibida columnifera*, *Solidago canadensis*, and *Calylophus serrulatus*. Some herbs found in the oak woods are *Galium boreale*, *Urtica dioica* ssp. *gracilis*, *Arenaria lateriflora*, *Asparagus officinalis*, and *Chenopodium album*. *Cannabis sativa* ssp. *sativa* var. *sativa* can be found along the margins of the woods.

Sand Blowout Community

The sand blowout community, characterized by shifting sandy soil, is found interspersed throughout the sandhill area. The constant movement of sand inhibits much vegetation from being established by constantly covering the vegetation. The areas immediately surrounding the blowout are usually stabilized by vegetation and may even develop soil profiles, as is evidenced by buried Paleosols.

Sand blowouts develop where vegetation has been removed by one or more processes. If the vegetation has been removed by one or more processes. If the vegetation of an area is disturbed the winds may begin to blow the light sandy soils. If this process continues the blowout becomes larger. Vegetation can, however, stabilize and ultimately reclaim a blowout.

The primary invader of sand blowouts is *Redfieldia flexuosa*. Subsequently, other grass species appear to become established quickly. Examples of secondary grass invaders are *Cenchrus longispinus*, *Sporobolus cryptandrus*, and *Calamovilafa longifolia*. *Triplasis purpurea* and *Eragrostis spectabilis* are two rare species of grasses that are found in sand blowouts. *Elymus canadensis* is usually found along the margins. *Andropogon hallii* may become established slowly throughout this community. A sedge, *Cyperus schweinitzii*, invades sand blowouts and becomes established very quickly, and in a short period of time may become one of the dominant species of the community.

Numerous forbs may become established in new sand blowouts. Among these are the annuals *Helianthus petiolaris* and *Cycloloma atriplicifolium*, which quickly cover the sand during the growing season and die back in the fall. Other forbs of the sand blowouts are *Corispermum hyssopifolium*, *Artemisia dracunculus*, *Conyza canadensis*, *Tradescantia occidentalis*, *Linum rigidum* var. *rigidum*, *Petalostemum villosum*, *Oenothera nuttallii*, *Euphorbia geyeri*, *Salsola collina*, *S. iberica*, *Lydogesmia juncea*, *Shinnersoseris rostrata*, and *Ambrosia artemisiifolia*.

Tall-Grass Prairie Community

The tall-grass prairie community is dominated by grass species. The dominant grasses of this community are *Andropogon gerardii*, *Sorghastrum nutans*, and *Panicum virgatum*. Other grasses associated with big bluestem are *Bouteloua curtipendula*, *Andropogon scoparius*, *Calamagrostis stricta*, Elynus canadensis, and *Agropyron caninum*.

Forb species that are commonly associated with the tall-grass prairie community are *Zizia aptera*, *Rudbeckia hirta*, *Solidago canadensis* var. *gilvocanescens*, *Hypoxis hirsuta*, *Zigadenus elegans*, *Liatris pycnostachya*, *Gentiana andrewsii*, *G. puberulenta*, *Helianthus rigidus* ssp. *subrhomboideus*, *H. maximiliani*, *Potentilla norvegica*, *Campanula rotundifolia*, *Hieraceum umbellatum*, *Helenium autumnale*, *Sisyrinchium montanum*, *Asclepias verticillata*, *Sonchus arvensis* ssp. *arvensis*, and *Glycyrrhiza lepidota*.

Mixed-Grass Prairie Community

The mixed-grass prairie community is characterized by rolling upland topography. This community has a large number of grasses, some forbs, and few woody species. It is well represented in the sandhills and the Coteau region west of the sandhills. The soils of the mixed-grass type have little water-holding capacity and dry out readily, accounting for the dominance of mid- and short-grasses. Generally there is little runoff on the prairie and available soil water approximates that received from precipitation.

The dominant grasses of this community are *Bouteloua gracilis*, *B. curtipendula*, *Poa pratensis*, *Koeleria pyramidata*, *Stipa comata*, *S. viridula*, *S. spartea*, and *Sporobolus cryptandrus*. Other associated grass species are *Agropyron smithii*, *A. repens*, *Hordeum jubatum*, *Aristida purpurea* var. *longiseta*, *Calamagrostis stricta*, *Elymus canadensis*, and *Phleum pratense*. Occasionally some tall-grass prairie species are found in the mixed-grass prairie community; however, it is more common to find mixed-grass prairie species in the tall-grass prairie community.

Shrubby areas are scattered throughout the mixed-grass prairie. The dominant shrub species is *Symphoricarpos occidentalis*. Other shrubs of this community are *Amorpha canescens*, *Rosa arkansana*, *Salix exigua* ssp. *interior*, and *Spiraea alba*.

Forbs appear quite early in the spring on the mixed prairie. In mid-April *Anemone patens*, *Draba nemorosa*, *Thlaspi arvense*, and *Ranunculus rhomboideus* begin to flower. Other forbs appearing in the spring are *Astragalus crassicarpus*, *A. agrestis*, *Geum triflorum*, *Lomatium foeniculaceum*, *Oxytropis lambertii*, *Allium textile*, *Astragalus missouriensis*, *Lithospermum incisum*, *L. canescens*, *Castilleja sessiliflora*, *Cerastium arvense*, *Androsace occidentalis*, *Erigeron glabellus*, *Erysimum asperum*, *Gaura coccinea*, *Linum perenne* var. *lewissi*, *L. rigidum*, var. *rigidum*, *Penstemon grandiflorus*, *P. albidus*, *P. gracilis*, *Polygala alba*, *Psoralea esculenta*, *Senecio plattensis*, *Heuchera richardsonni*, *Anemone canadensis*, *Sphaeralcea coccinea*, *Viola pedatifida*, *Tradescantia occidentalis*, *Delphinium virescens*, *Erysimum inconspicuum*, *Oenothera villosa*, *Cleome serrulata*, *Allium stellatum*, and *Physalis virginiana*.

The summer flora of this community is represented by numerous species of forbs. These species appear from late June through late July. Among these are *Anemone cylindrica*, *Rosa arkansana*,

Potentilla arguta, *Echinacea angustifolia*, *Gaillardia aristata*, *Psoralea argophylla*, *Petalostemum candidum*, *P. purpureum*, *Lygodesmia juncea*, *Ratibida columnifera*, *Chrysopsis villosa*, *Grindelia squarrosa*, *Verbena stricta*, *V. hastata*, *Amorpha nana*, *Rudbeckia hirta*, *Asclepias speciosa*, *A. viridiflora*, and *Hackelia deflexa*.

The Asteraceae family is well represented in the late summer flora on the mixed-grass prairie. From August into early September these are common species: *Artemisia frigida*, *A. ludoviciana* var. *ludoviciana*, *Ambrosia artemisiifolia*, *Aster ericoides*, *A. ptarmicoides*, *A. simplex* var. *ramosissmus*, *A. sericeus*, *Cirsium arvense*, *C. flodmanii*, *Kuhnia eupatorioides* var. *corymbulosa*, *Liatris punctata*, *Euthamia graminifolia* var. *graminifolia*, *S. missouriensis*, *S. mollis*, *S. nemoralis*, *S. rigida*, *Mentzelia decapetala*, and *Coryphantha vivipara*.

Sedge-Meadow Community

The sedge-meadow community is located in areas with high water tables. These areas also occur where runoff accumulates and remains for a considerable period of time. Fluctuation of the water level in these areas is dependent upon the amount of seasonal precipitation. Sedge-meadow community is located throughout the Sandhill Region, in the southwestern part of Sargent County on the old Glacial Lake Dakota sediments, as well as scattered throughout the study area.

The sedge-meadow community is dominated by *Carex lanuginosa*. Other sedges found associated with the sedge-meadow community are *Carex atherodes*, *C. stricta*, *C. bicknellii*, *C. brevoir*, *C. praegracilis*, *C. sartwellii*, *C. hystericina*, *C. aquatilis* var. *altior*, *C. stipata*, and *C. vulpinoidea*. Other genera of the Cyperaceae family are represented by *Eleocharis erythropoda*, *E. obtusa* var. *ovata*, *Scirpus microcarpus* var. *rubrotinctus*, and *S. americanus* and are usually found along margins where there had been a higher water level earlier in the season. The Juncaceae family is represented by *Juncus balticus*, *J. nodosus*, *J. torreyi*, *J. interior*, and *J. dudleyi*, which are found in moist to dry soil conditions.

Grass species of the sedge-meadow community are similar to those in the streambank community. The soil water situation is similar in the sedge-meadow and streambank communities. Some of the characteristic grasses of the sedge-meadow community are *Beckmannia syzigachne*, *Spartina pectinata*, *Agrostis stolonifera*, *Glyceria grandis*, *Calamagrostis canadensis*, *Glyceria striata*, *Scolochloa festucacea*, and *Echinochloa crusgalli*.

Forbs of the sedge-meadow community also are similar to those found in the streambank community. The sedge-meadow is subject to more seasonal variation of soil water than the streambank community. Forbs that begin to appear in the early spring are *Pedicularis canadensis*, *Eriophorum polystachion*, *Hypoxix hirsuta*, *Oxalis violacea*, *Comandra umbellata* ssp. *pallida*, *Ranunculus macounii*, *R. septentrionalis*, *Cyripedium candidum*, *Ranunculus sceleratus*, *R. abortivus*, *Equisetum arvense*, and *Potentilla anserina*. The summer flora of the sedge-meadow community is characterized by many herbaceous plants which flower from June through July. Among these are *Lilium philadelphicum*, *Lysimachia thyrsiflora*, *Mentha arvensis*, *Teucrium canadense*, *Lycopus americanus*, *L. asper*, *Stachys palustris* ssp. *pilosa*, *Asclepias incarnata*, *Cicuta maculata*, *Sium suave*, *Epilobium ciliatum* ssp. *glandulosum*, *E. leptophyllum*, *Lythrum alatum* var. *alatum*, *Leonurus cardiaca*, *Scutellaria lateriflora*, *Plantago major*, *Lobelia spicata*, *Polygonum coccineum*, *P. lapathifolium*, *Rumex mexicanus*, *R. maritimus* var. *fueginus*, and *Habenaria leucophaea*.

Late summer flora of the sedge-meadow community is characterized by forbs which flower from August through early September. The Asteraceae family is well represented in this flora. Among the species present are *Prenanthes alba*, *Liatris aspera*, *L. ligulistylis*, *Bidens comosa*, *B. vulgata*, *Boltonia asteroides*, *Senecio congestus*, *Eupatorium maculatum* var. *bruneri*, *E. perfoliatum*, *E. rugosum*, *Crepis runcinata*, *Solidago gigantea*, *Helianthus nuttallii* ssp. *rydbergii*, and *Veronia fasciculata* var. *corymbosa*. Other forbs not in the Asteraceae family that appear are *Pedicularis lanceolata*, *Agalinis tenuifolia* var. *parviflora*, *A. aspera*, *Polygonum lapathifolium*, *Lobelia siphilitica*, and *Oxalis stricta*.

Abandoned Fields

Much of the sandhills and other regions of the study area were cultivated early (1890-1930) in attempts to practice general farming. Due to the light soil and drought in the 1930's, much of the plowed prairie was marginal at best for crop production and was bought by the government and allowed to revert to prairie vegetation. These abandoned fields are easily recognized today by the abundance of some species and scarcity or absence of others. Among the common species of

abandoned fields are *Poa pratensis*, *Dichanthelium oligosanthes* var. *scribnerianum*, *Euphorbia esula*, *Cleome serrulata*, *Achillea millefolium* ssp. *lanulosa*, *Artemisia ludoviciana*, *Erigeron strigosus*, and *Solidago rigida*. After many growing seasons of succession native plants gradually become reestablished but theser abandoned fields are still quite evident.

ANNOTATED LIST OF VASCULAR PLANTS OF RICHLAND, RANSOM AND SARGENT COUNTIES.

The following list includes all the native or naturalized vascular plants found in Richland, Ransom, and Sargent counties, North Dakota. Some cultivated plants have been omitted. All of the plants listed have either been collected from the field, are represented by voucher specimens in the North Dakota State University Herbarium, or have been included on the authority of pertinent literature.

The families are arranged according to the familiar sequence of Cronquist (1981). The nomenclature employed follows that of the *Atlas of the Flora of the Great Plains* (Barkley 1977) except where more recent treatments are given in appropriate current monographs and revisions. The genera and species are arranged alphabetically within the families.

A statement on abundance, habitat information, and reproductive phenology is given for each species. For abundance, the terms common, occasional, and rare have been used. A species is considered to be "common" if numerous individuals of that species can be found with ease in appropriate habitats and grows throughout the entire study area, "occasional" if the species is found in large numbers in only some of the apparently suitable habitats or only sporadically throughout the entire study area, and "rare" if the species is restricted to one or two collection sites and individuals are not found in large numbers. Habitat descriptions were made from field notes and herbarium labels. In the case of the lower vascular plants, Pteridophytes, and Gymnosperms, where flowers are not produced, a statement of when reproductive or fruiting bodies are present is given.

EQUISETACEAE (Horsetail Family)

Equisetum arvense L. (Field horsetail)—Common, in wet soils in woodlands and in lowland prairie. Spore-bearing fertile stems appearing in May.

Equisetum x *ferrissii* Clute (Horsetail)—Rare, on sandy banks and moist sand slopes. Strobili appearing between June and July.

Equisetum fluviatile L. (Water horsetail)—Occasional, in swampy places and lowland meadows. Strobili appearing between June and July.

Equisetum hyemale L. (Scouringrush horsetail)—Common, on moist banks and in low prairie. Strobili appearing between June and August.

Equisetum laevigatum A. Br. (Smooth horsetail)—Common, in sandy lowland and moist upland prairie. Strobili appearing between June and July.

Equisetum palustre L. (Marsh horsetail)—Rare, on moist sandy stream banks and in wet boggy areas. Strobili appearing between June and July.

Equisetum pratense Ehrh. (Meadow horsetail)—Rare, on stream banks and in moist woods along the Sheyenne River. Spore-bearing fertile stem appearing in May.

OPHIOGLOSSACEAE (Adder's-tongue Family)

Botrychium virginianum (L.) SW. (Rattlesnake grapefern)—Occasional, in rich moist woodlands. Fertile fronds appearing in July.

Botrychium minganense Vict. (Moonwort)—Rare, in rich moist woodlands. Fertile fronds appearing in mid-June.

Ophioglossum vulgatum L. var. *pseudopodum* (Blake) Farw. (Adder's-tongue fern)—Rare, in lowland meadows. Fertile fronds appearing in early August.

POLYPODIACEAE (Polypody Family)

Athyrium filix-femina (L.) Roth. var. *angustum* (Willd.) Moore (Common lady fern)—Rare, in moist woods and along wooded stream banks. O. A. Stevens 149, Richland Co. Sori present in July.

Cystopteris fragilis (L.) Benth. (Bladder fern)—Occasional, on moist wooded slopes. Sori present in July.

Dryopteris carthusiana (Vill.) H. P. Fuchs. (Spinywood fern)—Rare, on wet wooded banks and boggy areas. R. A. Shunk, August, 1916. Ransom Co. Sori present between July and August.

Dryopteris cristata (L.) A. Gray (Crested woodfern)—Rare, in moist woods, thickets, and boggy areas. R. E. Stewart and H. A. Kantrud 1417, Richland Co. Sori present between July and August.

Gymnocarpium dryopteris (L.) Newm. (Oak fern)—Rare, in moist woods, north-facing slope. Sori present between July and August.

Matteuccia struthiopteris (L.) Todaro. (Ostrich fern)—Occasional, in moist woodland. Fertile frond appearing in July.

Onoclea sensibilis L. (Sensitive fern)—Rare, in wet woods and thickets. O. A. Stevens 833, Richland Co. Fertile frond appearing in early July.

Thelypteris palustris Schott. (Marsh fern)—Rare, in wet woods and wooded boggy areas. R. E. Stewart 984, Richland Co. Sori present between July and August.

CUPRESSACEAE (Cypress Family)

Juniperus virginiana L. (Eastern red cedar)—Common, planted in shelterbelts around farmland and farm yards.

PINACEAE (Pine Family)

Pinus banksiana Lamb. (Jack pine)—Experimental plantings in upland prairie.

ARISTOLOCHIACEAE (Birthwort Family)

Asarum canadense L. (Canada wild ginger)—Occasional, in rich well-shaded woodland. Flowers mid-May to mid-June.

NYMPHAEACEAE (Water Lily Family)

Nuphar luteum (L.) Sibth. & Sm. ssp. *variegatum* (Engelm.) Beal (Yellow pond lily)—Rare, in shallow ponds and quiet streams with permanent water. Flowers early June to late July.

CERATOPHYLLACEAE (Hornwort Family)

Ceratophyllum demersum L. (Hornwort)—Occasional, a submerged aquatic in shallow, quiet water of streams, ponds, and lakes. Flowers June to July.

RANUNCULACEAE (Buttercup Family)

Actaea rubra (Air) Willd. (Red baneberry)—Common, in rich moist woodland and wooded ravines. Flowers late May to early June.

Anemone canadensis L. (Canada anemone)—Common, in moist prairie meadows. Flowers early June to mid-July.

Anemone cylindrica Gray (Cottonweed)—Common, in moist prairie meadows and dry open woodlands. Flowers early June to late July.

Anemone patens L. (Pasque flower)—Occasional, on sandy prairie hillsides and dry upland prairie. Flowers mid-April to mid-May.

Anemone quinquefolia L. (Wood anemone)—Occasional, in wooded areas. Flowers early May to late May.

Anemone virginiana L. (Tall anemone)—Occasional, in rich woodlands, open woods, and thickets. Flowers early June to late August.

Aquilegia canadensis L. (American columbine)—Common, in moist rich woodlands and wooded hillsides. Flowers late May to mid-June.

Caltha palustris L. (Marsh marigold)—Common, in boggy-swampy areas and along margins of ponds, streams, marshes, and lakes. Flowers early May to mid-June.

Clematis virginiana L. (Virgin's bower clematis)—Occasional, forming a herbaceous climbing vine in moist woodlands and moist brushy thickets. Flowers late July to mid-August.

Delphinium virescens Nutt. (White larkspur)—Occasional, in low sandy prairie meadows. Flowers mid-June to mid-July.

Ranunculus abortivus L. (Early wood buttercup)—Occasional, in moist open woods and along margins of ponds, streams, and marshes. Flowers mid-May to mid-June.

Ranunculus acris L. (Tall buttercup)—Rare, along margins of streams, ponds, marshes, and in moist meadows. W. B. Bell 609, Richland Co. Flowers June to July.

Ranunculus aquatilis L. var. *capillaceus* (Thuill.) DC. (White water crowfoot)—Common, in shallow water of ponds, streams, marshes, lakes, and roadside ditches. Flowers early June to mid-August.

Ranunculus cymbalaria Pursh. (Seaside buttercup)—Common, along margins of ponds, streams, marshes, and muddy road ditches. Flowers late May to late August.

Ranunculus flabellaris Raf. (Yellow water crowfoot)—Common, aquatic in shallow water of ponds, streams, marshes, and lakes and seldom wholly emersed. Flowers mid-June to late July.

Ranunculus gmelinii DC. (Small yellow water buttercup)—Occasional, an aquatic of shallow water and muddy shores of ponds, streams, and marshes. Flowers mid-June to early August.

Ranunculus hispidus Michx. (Hispid buttercup)—Occasional, in boggy areas, swampy meadows, and along margins of ponds, lakes, and streams. Flowers early June to early August.

Ranunculus longirostris Godr. (White water crowfoot)—Common, in shallow water of ponds, marshes, lakes, streams, and roadside ditches. Flowers early June to mid-August.

Ranunculus macounii Britt. (Macoun's buttercup)—Occasional, in boggy areas, swampy meadows, and along margins of ponds, streams, and lakes. Flowers early June to early August.

Ranunculus pensylvanicus L. (Bristly buttercup)—Occasional, in boggy areas, moist meadows, and moist roadside ditches near wooded areas. Flowers early July to mid-August.

Ranunculus recurvatus Poir. (Hooked buttercup)—Rare, in swampy woods. O. A. Stevens 428, Richland Co. Flowers May to June.

Ranunculus rhomboideus Goldie (Prairie buttercup)—Occasional, in moist prairie meadows. A. D. Stoesz, May 8, 1934, Richland Co. Flowers mid-April to mid-June.

Ranunculus sceleratus L. (Ditch buttercup)—Occasional, along margins and in shallow water of ponds, streams, marshes, lakes, and swampy meadows. Flower late May to late August.

Ranunculus septentrionalis Poir. (Swamp buttercup)—Occasional, in wet places in the woods and meadows. Flowers late May to mid-June.

Ranunculus subrigidus Drew. (White water crowfood)—Occasional, in pools along streams, small ponds, and potholes. Flowers late May to late June.

Thalictrum dasycarpum Fisch. & Lall. (Purple meadowrue)—Common, in moist rich woodland and along margins of woodland. Flowers early June to late July.

Thalictrum venulosum Trel. (Early meadowrue)—Occasional, along margins of woodland and in bushy thickets. Flowers late May to late June.

BERBERIDACEAE (Barberry Family)

Caulophyllum thalictroides (L.) Michx. (Blue cohosh)—Rare, in rich moist woodland along rivers. H. F. Bergman 1766. Richland Co. Flowers late May.

MENISPERMACEAE (Moonseed Family)

Menispermum canadense L. (Common moonseed)—Occasional, in moist rich woodland. Flowers early June to early July.

PAPAVERACEAE (Poppy Family)

Sanguinaria canadensis L. (Common bloodroot)—Common, in moist rich woodland. Flowers late April to late May.

FUMARIACEAE (Fumitory Family)

Corydalis aurea Willd. ssp. *aurea* (Golden corydalis)—Occasional, in prairie meadows along the margins of woodland, and moist shaded areas. Flowers late May to mid-August.

Dicentra cucullaria (L.) Bernh. (Dutchman's breeches)—Rare, in rich woodland and wooded coulees. Flowers early May to late May.

Fumaria vaillentii Lois. (Golden fumitory)—Rare, escapes from cultivation into disturbed areas. E. S. Sulerud June 6, 1947, Ransom Co. Flowers May to late June.

ULMACEAE (Elm Family)

Celtis occidentalis L. (Common hackberry)—Occasional, along wooded banks of rivers and in wooded coulees. Flowers early May to late May.

Ulmus americana L. (American elm)—Common, in alluvial woodland, wooded coulees, and upland woods. Flowers late April to late May.

Ulmus pumila L. (Siberian elm)—Occasional, planted in shelterbelts and occasionally escapes from cultivation. Flowers late April to late May.

Ulmus rubra Muhl. (Slippery elm)—Rare, in alluvial woodlands and moist wooded coulees. Flowers late April to late May.

CANNABACEAE (Hemp Family)

Cannabis sativa L. ssp. *sativa* var. *sativa* (Common hemp, marijuana)—Rare, in dry sandy prairie and other disturbed places. Flowers late July to late August.

Humulus lupulus L. (Common hops)—Occasional, in sandy wooded areas and brush thickets. Flowers mid-July to mid-August.

URTICACEAE (Nettle Family)

Laportea canadensis (L.) Gaud. (Canada wood nettle)—Occasional, in well shaded moist woodland and damp thickets. Flowers late June to late July.

Parietaria pensylvanica Muhl. (Pennsylvania pellitory)—Occasional, in wooded areas and shrubby thickets. Flowers late June to early August.

Pilea fontana (Lunell) Rydb. (Clearweed)—Rare, in shaded, boggy-seepage areas. Flowers July to late August.

Pilea pumila (L.) Gray (Canada clearweed)—Occasional, in well shaded moist woodlands. Flowers mid-August to early September.

Urtica dioica L. ssp. *gracilis* (Ait.) Seland. (Stinging nettle)—Common, in lowland, wooded riverbanks, dense thickets, and waste places. Flowers late June to mid-August.

FAGACEAE (Beech Family)

Quercus macrocarpa Michx. (Bur oak)—Common, forming savannas in sandhills, and in dry upland woods. Flowers early May to Early June.

BETULACEAE (Birch Family)

Alnus incana (L.) Moench. ssp. *rugosa* (DuRoi.) R. T. Clausen (Speckled alder)—Occasional, in rich woodlands and boggy-seepage areas near woodlands. Flowers mid-April to early May.

Betula glandulosa Michx. var. *glandulifera* (Regel) Gl. (Bog birch)—Occasional, in boggy-seepage areas and along margins of streams. O. A. Stevens 1310, Ransom Co. Flowers May.

Betula papyrifera Marsh. (Paper birch)—Occasional, on higher slopes of rich woodland along streams and rivers. Flowers mid-May.

Betula X *sandbergii* Britt. (Sandberg's birch)—Rare, along margin of mixed woods in sandhills near springs. O. A. Stevens 1307, Ransom Co. Flowers May.

Corylus americana Walt. (Hazel nut)—Occasional, in upland woodlands and thickets. Flowers mid-April to late May.

Ostrya virginiana (Mill.) K. Koch. (Ironwood)—Occasional, on wooded streambanks and in low rich woodlands and wooded coulees. Flowers late April to late May.

NYCTAGINACEAE (Four O'Clock Family)

Mirabilis hirsuta (Pursh) MacM. (Hairy four o'clock)—Occasional, in dry sandy prairie and prairie hillsides. Flowers late June to early August.

Mirabilis linearis (Pursh) Heimerl. (Four o'clock)—Occasional, in dry sandy prairie. Flowers late June to early August.

Mirabilis nyctaginea (Michx). MacM. (Heartleaf four o'clock)—Common, in sandy roadside ditches, dry sandy prairie. Flowers mid-June to late July.

CACTACEAE (Cactus Family)

Coryphantha vivipara (Nutt.) Britt. & Rose. (Call cactus)—Rare, in dry upland prairie. Flowers early June to early July.

CHENOPODIACEAE (Goosefoot Family)

Atriplex rosea L. (Redscale)—Rare, along roadsides and other waste areas. O. A. Stevens August 16, 1947, Richland Co. Flowers July to August.

Atriplex subspicata (Nutt.) Rydb. (Spearscale)—Occasional, in slightly saline soil in wet or poorly drained places and other disturbed areas. W. B. Bell 377, Richland Co. Flowers mid-July to August.

Axyris amaranthoides L. (Common Russian pigweed)—Rare, in cultivated fields and disturbed prairie areas. O. A. Stevens August 10, 1940, Ransom Co. Flowers early July to late August.

Chenopodium album L. (Lamb's quarters)—Common, in cultivated fields and other disturbed waste areas. Flowers mid-June to mid-August.

Chenopodium berlandieri Moq. (Pitseed goosefoot)—Occasional, in disturbed sandy waste places and roadside ditches. Flowers late July to early September.

Chenopodium bushianum Aellen (Goosefoot)—Disturbed, open ground, often in alluvial soil of cultivated fields. Flowers August to September.

Chenopodium desiccatum A. Nels. (Narrowleaf goosefoot)—Common, in dry sandy prairie in sandhills and disturbed waste areas. Flowers mid-July to mid-August.

Chenopodium fremontii Wats. (Fremont goosefoot)—Occasional, in brushy dry woods and waste land. Flowers mid-June to August.

Chenopodium gigantospermum Aellen (Maple leaf goosefoot)—Occasional, in wooded areas and thickets. Flowers early July to early September.

Chenopodium glaucum L. (Pale goosefoot)—Occasional, in moist alkaline soil along margins of marshes, ponds, and lakes. Flowers late July to late August.

Chenopodium rubrum L. (Red goosefoot)—Occasional, along margins of saline marshes and dried-up pond beds, along ditches and stream banks. Flowers mid-August to early September.

Chenopodium standleyanum Aellen—Rare, in dry open woods. Flowers mid-August to early September.

Chenopodium strictum Roth. (Aellen) Wahl.—Occasional, in sand dunes and other disturbed waste places. Flowers mid-August to early September.

Corispermum hyssopifolium L. (Hyssopleaf bugseed)—Rare, in sandy prairie and sand blowouts. A. D. Stoesz August 29, 1934, Richland Co. Flowers mid-August to early September.

Corispermum nitidum Kit. (Bugseed)—Rare, in sandy soil of blowouts. O. A. Stevens 41, Richland Co. Flowers mid-August to early September.

Cycloloma atriplicifolium (Streng.) Coult. (Winged pigweed)—Common, in sand blowouts. Flowers late July to late August.

Kochia scoparia (L.) Schrad. (Burning bush)—Common, in cultivated fields, roadside ditches, and waste places. Flowers mid-July to late August.

Monolepis nuttalliana (Schult.) Green. (Nuttall monolepis)—Occasional, in alkaline prairie, cultivated fields, and other disturbed areas and roadsides. Flowers early May to early June.

Salicornia rubra A. Nels. (Rocky Mountain glasswort)—Rare, along margins of saline lake shores, ponds, marshes, and alkaline flats. Lee 1163, Richland Co. Flowers late July to early September.

Salsola collina Pall. (Thistle)—Occasional, in sandy roadsides and in sand blowouts. Flowers mid-July to early September.

Salsola iberica Sennen & Pau (Common Russian thistle)—Common, in sandy prairie, sand blowouts, and disturbed waste areas. Flowers mid-July to early September.

Suaeda depressa (Pursh.) Wats. (Sea blite)—Occasional, in saline and alkaline flats and along margins of salt marshes and saline ponds. Flowers mid-August to early September.

AMARANTHACEAE (Amaranth Family)

Amaranthus albus L. (Tumbling pigweed)—Occasional, in dry sandy prairie and waste areas. Flowers July to early September

Amaranthus graecizans L. (Creeping pigweed)—Occasional, in sandy roadside ditches, sandy prairie, cultivated fields, and waste places. Flowers mid-June to early September.

Amaranthus retroflexus L. (Rough pigweed)—Common, in cultivated fields, sandy roadside ditches, and waste places. Flowers mid-July to early September.

Amaranthus rudis Sauer. (Water hemp)—Rare, in moist sandy fields and waste places. O. A. Stevens 2476, Sargent Co. Flowers early August.

Amaranthus tuberculatus (Moq.) Sauer. (Pigweed)— Rare, along margins of sloughs and marshes. Flowers mid-August to early September.

PORTULACACEAE (Purslane Family)

Portulaca oleracea L. (Purslane)—Occasional, in cultivated fields, gardens, and sandy waste areas. Flowers mid-July to mid-August.

CARYOPHYLLACEAE (Pink Family)

Agrostemma githago L. (Common corncockle)—Rare, in old fields, prairie areas, roadsides, and other waste areas. W. B. Bell 99, Richland Co. Flowers early July to mid-August.

Arenaria lateriflora L. (Broad-leaved stitchwort)—Common, in rich upland woods, thickets, and sometimes open places. Flowers late May to late June.

Cerastium arvense L. (Prairie chickweed)—Common, in upland to low prairie meadows and brushy thickets along margins of woodland. Flowers late May to early July.

Cerastium brachypodum (Engelm.) Robins. (Chickweed)—Rare, in moist woodlands and wet shaded places. Flowers May to late June.

Cerastium nutans Raf. (Nodding Cerastium)—Rare, in moist woodlands and wet shaded places. O. A. Stevens 806, Richland Co. Flowers May to late June.

Saponaria officinalis L. (Bouncingbet)—Rare, escapes cultivation into disturbed areas and roadsides. Flowers July to late August.

Silene antirrhina L. (Sleepy catchfly)—Occasional, in dry sandy prairie and sandy waste places. Flowers early June to mid-July.

Silene cserei Baumg. (Smooth catchfly)—Occasional, in cultivated fields and roadside ditches and gravelly waste places. O. A. Stevens June 8, 1958, Ransom Co. Flowers early June to mid-July.

Silene drummondii Hook. (Drummond's Campion)—Occasional, on dry sandy prairie hillsides. Flowers early June to mid-July.

Silene noctiflora L. (Night-flowering catchfly)—Occasional, in old fields, roadsides, and disturbed areas. Flowers mid-June to late July.

Silene pratensis (rfaf.) Dogr. & Gren. (Whitecockle)—Rare, in open woods and sandy roadside ditches. Flowers mid-June to late July.

Stellaria crassifolia Ehrh. (Chickweed)—Occasional, in wet, usually shaded places. Flowers May to June.

Stellaria longifolia Muhl. ex Willd. (Long-leaved chickweed)—Common, in moist woodlands and thickets and moist prairie meadows. Flowers late May to mid-July.

Stellaria media (L.) Cyr. (Common chickweed)—Occasional, in cultivated fields, in moist open woodland and waste places. Flowers early June to early September.

Vaccaria pyramidata Medic. (Cowherb)—Occasional, in cultivated fields, roadside ditches, and waste places. W. B. Bell 217, Richland Co. Flowers late June to late July.

POLYGONACEAE (Buckwheat Family)

Polygonum achoreum Blake (Erect knotweed)—Occasional, in roadside ditches and the other waste areas. Flowers early July to early August.

Polygonum amphibium L. (Ladysthumb knotweed)—Occasional, in shallow water of ponds and marshes. Flowers early July to late August.

Polygonum arenastrum Jord. ex Bor. (Prostrate knotweed)—Common, in disturbed prairie areas and other distrubed areas. Flowers early July to late July.

Polygonum coccineum Muhl. (Swamp knotweed)—Common, growing along margins of ponds, lakes, streams, and marshes, and in wet roadside ditches. Flowers early July to late August.

Polygonum convolvulus L. (Wild buckwheat)—Occasional, in low sandy prairie and thickets. Found as a vine coiling around herbs, grasses, and shrubs. Flowers mid-June to early August.

Polygonum hydropiper L. (Marshpepper smartweed)—Occasional, in low wet soil margins of ponds, streams, and marshes. Flowers early August to early September.

Polygonum lapathifolium L. (Willow-leaved smartweed)—Common, along margins of ponds, streams, marshes, and lakes, and in moist cultivated fields. Flowers early July to late August.

Polygonum pensylvanicum L. (Pennsylvania smartweed)—Occasional, along margins of streams and ponds and moist cultivated fields. Flowers July to early September.

Polygonum persicaria L. (Spotted thumb knotweed)—Occasional, on moist floodplains and margins of lakes, ponds, marshes, and streams. Flowers late July to late August.

Polygonum punctatum Ell. (Dotted smartweed)—Rare, in swampy areas and alder swamps. O. A. Stevens 194, Richland Co. Flowers July to August.

Polygonum ramosissimum Michx. (Bushy knotweed)—Occasional, in disturbed prairie areas and other disturbed waste areas. Flowers mid-July to mid-August.

Polygonum scandens L. (Climbing false buckwheat)—Occasional, growing as a vine in brushy-thickets, and swampy woods. Flowers late June to mid-July.

Rumex acetosella L. (Sheep sorrel)—Rare, in low moist, sandy prairie areas in sandhills. R. E. Stewart 1213, Richland Co. Flowers May to June.

Rumex crispus L. (Curly dock)—Occasional, wet disturbed areas and moist roadside ditches. Flowers early June to early July.

Rumex domesticus Hartm. (Dock)—Common, along borders of sloughs and marshes and moist roadside ditches. Flowers late June to late July.

Rumex maritimus L. var. *fueginus* (Phil.) Dusen.—Occasional, in wet roadside ditches and along margins of ponds, marshes, streams, and lakes. Flowers mid-July to early August.

Rumex mexicanus Meisn. (Willowleaf dock)—Occasional, along margins of brackish or saline marshes, ponds, sloughs, lakes, and roadside ditches. Flowers early June to late August.

Rumex occidentalis Wats. (Western dock)—Occasional, in seasonally moist sloughs, marshes, and low wet meadows. Flowers early June to late July.

Rumex orbiculatus Gray (Great water dock)—Rare, in boggy areas and shallow water of marshes. Flowers mid-August.

Rumex stenophyllus Ledeb. (Narrowleaved dock)—Rare, along margins of sloughs, marshes, ponds, and moist roadside ditches. O. A. Stevens September 7, 1961, Richland Co. Flowers late July.

CLUSIACEAE (St. John's-Wort Family)

Hypericum majus (Gray) Britt. (Greater St. John's-wort)—Rare, in moist meadows and waste places. O. A. Stevens 2520, Richland Co. Flowers July to August.

Hypericum perforatum L. (Common St. John's-wort)—Rare, in cultivated fields and roadsides. O. A. Stevens 3152, Ransom Co. Flowers July to August.

TILIACEAE (Basswood Family)

Tilia americana L. (Basswood, linden)—Occasional, in rich alluvial woodlands. Flowers mid-June to late July.

MALVACEAE (Mallow Family)

Abutilon theophrasti Medic. (Velvet leaf)—Rare, in disturbed waste areas. F. Myers September 17, 1963, Ransom Co. Flowers early August to early September.

Hibiscus trionum L. (Flower-of-an-hour)—Occasional, in cultivated fields. Flowers August to September.

Malva neglecta Wallr. (Common mallow)—Rare, in cultivated fields and other disturbed waste places. O. A. Stevens July 29, 1919, Sargent Co. Flowers early August to late August.

Malva rotundifolia Wallr. (Small mallow)—Common, in cultivated fields and other disturbed waste places. Flowers early July to early September.

Sphaeralcea coccinea (Pursh.) Rydb. (Red mallow)—Occasional, in dry upland prairies. Flowers early June to late August.

CISTACEAE (Rock-Rose Family)

Helianthemum bicknellii Fern. (Frost week)—Rare, in dry sandy prairie. A. D. Stoesz July 18, 1934, Ransom Co. Flowers late July.

Hudsonia tomentosa Nutt. (Beach heather)—Rare, in dry sandy prairie and sand dunes. A. D. Stoesz July 19, 1934, Ransom Co. Flowers May to July.

Lechea stricta Leggett (Pinweed)—Rare, in dry sandy prairie. O. A. Stevens September 9, 1936, Richland Co. Flowers late July.

VIOLACEAE (Violet Family)

Viola canadensis L. var. *rugulosa* (Greene) C. L. Hitchc. (Pink wood violet)—Common, in woodlands, thickets, and wooded ravines. Flowers early May to mid-July.

Viola conspersa Reichenb. (Dog violet)—Rare, in rich aspen woods and meadows. O. A. Stevens 419, Richland Co. Flowers late May.

Viola nephrophylla Greene. (Northern bog violet)—Occasional, in moist prairie meadows and open woodlands. Flowers mid-May to mid-June.

Viola nuttalli Pursh. (Nuttall's violet)—Rare, in dry upland prairie. H. F. Bergman 1370, Ransom Co. Flowers early May to mid-June.

Viola pedatifida G. Don. (Prairie violet)—Common, in moist upland prairie. Flowers late May to late June.

Viola pratincola Greene. (Common blue violet)—Occasional, in woodland and prairie meadows. Flowers mid-May to late June.

Viola pubescens Ait. (Yellow wood violet)—Occasional, in rich woodland. Flowers late May to mid-June.

Viola sororia Willd. (Hairy blue violet)—Rare, in dry open woods and moist meadows. Flowers May.

CUCURBITACEAE (Gourd Family)

Echinocystis lobata (Michx.) T. & G. (Wild cucumber)—Common, along margins of open woodlands. Flowers mid-July to early September.

Sicyos angulatus L. (Bur cucumber)—Rare, in moist soil along margins of woodland. Flowers late July to late August.

LOSACEAE (Loasa Family)

Mentzelia decapetala (Pursh). Urban. & Gilg. (evening star)—Rare, on exposed clay prairie hillsides. Flowers late July to late August.

SALICACEAE (Willow Family)

Populus alba L. (White poplar)—Occasional, planted and sometimes escaped into yards and along roadside ditches. Flowers May.

Populus balsamifera L. (Balsam poplar)—Occasional, moist woodland along banks of rivers and streams. Flowers late April to late May.

Populus deltoides Marsh. ssp. *monilifera* (Ait.) Eckenw. (Plains cottonwood)—Common, in moist woodlands along rivers and lake shores, wooded coulees, and commonly planted in shelterbelts. Flowers late April to late May.

Populus tremuloides Michx. (Quaking aspen)—Common, in disturbed sandy soil, moist woodland, sheltered valleys, and sometimes forming scattered stands on sandy prairie. Flowers mid-April to late May.

Salix alba L. (White willow)—Occasional, often planted in shelterbelts and wind breaks. Flowers May.

Salix amygdaloides Anderss. (Peachleaf willow)—Common, in most alluvial woods, along stream banks, in low meadows, and often cultivated in shelterbelts. Flowers mid-May.

Salix bebbiana Sarg. (Bebb willow)—Occasional, in boggy seepage areas near alder swampland. Flowers late April to late May.

Salix candida Flugge. (Hoary willow)—Occasional, in low swampy areas. Flowers late May to early June.

Salix discolor Muhl. (Pussy willow)—Rare, along rivers and lakes and in low moist prairie meadows. W. B. Bell 121, Ransom Co. Flowers late April to mid-May.

Salix eriocephala Michx. (Heart-leaf willow)—Occasional, along banks of rivers and lakes, and in low prairie meadows. Flowers mid-May to late May.

Salix exigua Nutt. ssp. *interior* (Rowlee) Cronq. (Coyote willow)—Common, on flood plains of rivers, along margins of streams and lakes, and in low moist prairie meadows. Flowers late May to early June.

Salix humilis Marsh. (Prairie willow)—Rare, in open woods and prairie thickets. O. A. Stevens July 28, 1966, Richland Co. Flowers in May.

Salix lutea Nutt. (Yellow willow)—Occasional, along banks of rivers, lakes, and in low prairie meadows. Flowers mid-May to lake May.

Salix pedicellaris Pursh. (Meadow willow)—Rare, in wet meadows along oxbows of the Sheyenne River. Flowers mid-May to early June.

Salix pentandra L. (Laurel-leaved willow)—Occasional, introduced from Europe as an ornamental, escaping to marsh borders, ditches, streambanks, and other moist disturbed areas. Flowers mid-May to early June.

Salix petiolaris Sm. (Slender willow)—Rare, in low, rich woodlands and in low prairie meadows, O. A. Stevens September 10, 1952, Richland Co. Flowers May.

Salix serrissima (Baily) Fern. (Augumn willio)—Rare, in boggy-seepage areas. O. A. Stevens 1303, Ransom Co. Flowers early June to late July.

CAPPARACEAE (Caper Family)

Cleome serrulata Pursh. (Bee Plant)—Occasional, in sandy upland prairie. Flowers mid-June to early September.

Polanisia dodecandra (L.) DC. ssp. *trachysperma* (T. & G.) Iltis (Roughseed clammy weed)—Rare, in sandy upland prairie. H. F. Bergman 2381, Richland Co. Flowers late June to early August.

BRASSICACEAE (Mustard Family)

Arabis canadensis L. (Rockcress)—Rare, in wooded ravines. Flowers May.

Arabis divaricarpa A. Nels. (Spreadingpod rockcress)—Occasional, in dry sandy prairie. Flowers early June to late July.

Arabis hirsuta (L.) Scop. var. *pycnocarpa* (M. Hopk.) Roll. (Hairy rockcress)—Common, in sandy prairie. Flowers mid-June to late July.

Berteroa incana (L.) DC. (Hoary false alyssum)—Occasional, in moist sandy roadside ditches. Flowers mid-June to mid-August.

Brassica hirta Moench. (White mustard)—Occasional, in cultivated fields, roadsides, and waste places. Flowers June to August.

Brassica juncea (L.) Coss. (Indian mustard)—Rare, in cultivated fields and waste areas. H. F. Bergman July 12, 1911, Richland Co. Flowers mid-June to mid-August.

Brassica kaber (DC.) Wheeler (Field mustard)—Common, in cultivated fields and waste places. Flowers mid-June to mid-August.

Camelina sativa (L.) Crantz. (Largeseed falseflax)—Rare, in cultivated fields and waste places. Flowers mid-June to mid-August.

Capsella bursa-pastoris (L.) Medic. (Common shepherdpurse)—Common, in waste places and abandoned fields. Flowers late April to late June.

Cardamine bulbosa (Schreb.) B.S.P. (Spring cress)—Occasional, in moist or wet woods, along creek bottoms and marshy meadows. Flowers May.

Cardamine pensylvanica Muhl. (Bitter cress)—Occasional, in wet woods, along springs and streams. Flowers May to June.

Cardaria draba (L.) Desv. (Hoary cress)—Occasional, in cultivated fields, waste places, and along roadsides. Flowers May to August.

Conringia orientalis (L.) Dum. (Hare's-ear mustard)—Occasional, in fields, roadsides, and waste places. Flowers May to July.

Descurainia pinnata (Walt.) Britt. var. *brachycarpa* (Richards.) Fern. (Tansy mustard)—Common, in dry open prairie, sparsely wooded areas, and in disturbed areas. Flowers May to August.

Descurainia richardsonni (Sweet) Schulz.—Occasional, in prairie areas and disturbed areas. Flowers May to July.

Descurainia sophia (L.) Webb. (Flixweed)—Common, in fields and waste places. Flowers May to August.

Draba nemorosa L. (Yellow whitlowwort)—Common, in upland prairie. Flowers May to June.

Draba reptans (Lam.) Fern. (White whitlowwort)—Occasional, in upland prairie. Flowers May.

Erucastrumn gallicum (Willd.) Schulz. (Dog mustard)—Occasional, in cultivated fields, along roadsides, and in waste places. Flowers May to September.

Erysimum asperum (Nutt.) DC. (Western wallflower)—Common, in upland prairie and open woodlands. Flowers May to June.

Erysimum cheiranthoides L. (Wormseed wallflower)—Occasional, in moist prairie along thickets and in open woodlands. Flowers early July to mid-August.

Erysimum inconspicuum (Wats.) MacM. (Small flower wallflower)—Occasional, in upland prairie. Flowers early June to late July.

Hesperis matronalis L. (Sweet rocket)—Occasional, an escaped cultigen, in roadsides and disturbed prairie. Flowers early June to mid-July.

Lepidium densiflorum Schrad. (Prairie pepper grass)—Common, in disturbed and waste places. Flowers late May to late July.

Lesquerella arenosa (Richardson) Rydb. var. *arenosa* (Bladderpod)—Occasional, in dry sandy prairie. Flowers early May to late June.

Lesquerella ludoviciana (Nutt.) Wats. (Foothill bladderpod)—Rare, in dry sandy upland prairie. Flowers early May to late June.

Raphanus sativus L. (Wild radish)—Rare, escapes from cultivation, but doesn't persist long in disturbed areas. H. F. Bergman 2374, Richland Co. Flowers June to July.

Rorippa austriaca (Crantz) Bess. (Watercress)—Occasional, along margins of sloughs, ponds, and marshes. Flowers early July to late August.

Rorippa palustris (L.) Bess. ssp. *glabra* (Schulz.) Stuckey var. *fernaldiana* (Britt. & Abbe) Stuckey. (Marshyellow watercress)—Occasional, along margins of sloughs, ponds, and marshes. Flowers early July to late August.

Sisymbrium altissimum L. (Tumbling hedge mustard)—Common, in cultivated fields and other disturbed areas. Flowers early June to late August.

Sisymbrium loeselii L. (Tall hedge mustard)—Occasional, in cultivated fields and other disturbed places. Flowers mid-June to early August.

Sisymbrium officinale (L.) Scop. (Common hedged mustard)—Occasional, in cultivated fields and disturbed fields. Flowers early July to early September.

Thlaspi arvense L. (Alpine pennycress, French weed)—Common, in cultivated fields and other disturbed places. Flowers mid-April to early August.

ERICACEAE (Heath Family)

Arctostaphylos uva-ursi (L.) Spreng. (Bearberry)—Rare, in wooded areas and on prairie hillsides. L. Thompson July 26, 1961, Richland Co. Flowers mid-May to mid-June.

PYROLACEAE (Wintergreen Family)

Pyrola asarifolia Michx. (Round-leaved wintergreen)—Rare, in rich moist aspen woodland. O. A. Stevens June 12, 1952, Richland Co. Flowers early June to early August.

Pyrola elliptica Nutt. (White-flowered shinleaf)—Rare, in rich moist aspen woodland. O. A. Stevens June 12, 1952, Richland Co. Flowers early June to late July.

Pyrola secunda L. (Wintergreen)—Occasional, in moist and rich woodlands. Flowers early June to late July.

MONOTROPACEAE (Indian Pipe Family)

Monotropa uniflora L. (Common Indian pipe)—Rare, in rich woodland. O. A. Stevens August 12, 1916, Ransom Co. Flowers June to August.

PRIMULACEAE (Primrose Family)

Androsace occidentalis Pursh. (Western rock jasmine)—Occasional, in dry sandy prairie. Flowers late April to late May.

Glaux maritima L. (Common sea milkwort)—Occasional, in low saline prairie and along saline margins of streams, ponds, marshes, and lakes. W. B. Bell August 9, 1909, Ransom Co. Flowers late May to late June.

Lysimachia ciliata L. (Fringed loosestrife)—Common, along margins of woodland and in thickets. Flowers early July to mid-August.

Lysimachia hybrida Michx. (Loosestrife)—Occasional, in low moist prairie. Flowers early July to mid-August.

Lysimachia quadriflora Sims. (Loosestrife)—Occasional to common, in moist prairie meadow. Flowers early July to early August.

Lysimachia thyrsiflora L. (Tufted loosestrife)—Occasional, along margins of streams, ponds, marshes, and lakes. Flowers mid-June to mid-July.

GROSSULARIACEAE (Currant Family)

Ribes americanum Mill. (Black current)—Occasional, in thickets, and swampy lowland. Flowers early May to mid-June.

Ribes cynosbati L. (Prickly gooseberry)—Rare, in moist rich woods. O. A. Stevens 1345, Richland Co. Flowers mid-May to mid-June.

Ribes hirtellum Michx. (Hairystem gooseberry)—Occasional, in rich moist woodlands. Flowers mid-May to mid-June.

Ribes missouriense Nutt. (Missouri gooseberry)—Common, in rich, moist woodlands. Flowers mid-May to mid-June.

Ribes setosum Lindl. (Bristly gooseberry)—Occasional, along woodland margins and in thickets. Flowers May to June.

CRASSULACEAE (Orpine Family)

Penthorum sedoides L. (Ditch stonecrop)—Rare, on moist woodland stream banks. Flowers mid-July to late August.

SAXIFRAGACEAE (Saxifrage Family)

Heuchera richardsonii R. Br. (Richardson alumroot)—Common, in moist sandy prairie. Flowers early June to late July.

Parnassia glauca Raf. (Grass of Parnassus)—Rare, in boggy and seepage areas. Flowers mid-July to mid-August.

Parnassia palustris L. (Northern grass of Parnassus)—Rare, in boggy and seepage areas. Flowers mid-July to late August.

ROSACEAE (Rose Family)

Agrimonia gryposepala Wallr. (Common agrimony)—Rare, in wooded areas. Flowers late June to mid-August.

Agrimonia striata Michx. (Roadside agrimony)—Occasional, in woodland. Flowers mid-June to mid-August.

Amelanchier alnifolia Nutt. (Juneberry)—Common, forming thickets in prairie and edges of woodland. Flowers early May to early June.

Amelanchier humilis Wieg.(Roundleaf service berry)—Rare, in woodland, along margins, and in thickets. S. Stephens and R. Brooks 33455, Ransom Co. Flowers early May.

Crataegus rotundifolia Moench. (Round-leaved hawthorn)—Occasional, in scattered patches on prairie, edges of lowland, and in wooded coulees. Flowers late May to early June.

Crataegus succulenta Link var. *occidentalis* (Britt.) Palmer (Succulent hawthorn)—Occasional, in open woodlands. along streambanks, and in prairie ravines. Flowers May to June.

Fragaria vesca L. var. *americana* Porter. (Wood strawberry)—Occasional, in moist woodland. Flowers late May to mid-July.

Fragaria virginiana Duchn. var. *glauca* Wats. (Wild strawberry)—Common, in woodland and moist prairie. Flowers early May to late June.

Geum aleppicum Jacq. (Yellow avens)—Common, in moist soil of woodland. Flowers mid-June to early August.

Geum canadense Jacq. (White avens)—Occasional, in woodland. Flowers mid-June to late July.

Geum macrophyllum Willd. (Largeleaved avens)—Occasional, in moist woodlands. Flowers mid-June to early August.

Geum triflorum Pursh. (Torch flower)—Common, in upland prairie. Flowers early May to late June.

Potentilla anserina L. (Silverweed cinquefoil)—Occasional, in low prairie areas and along marshes, ponds, and lakes. Flowers late May to late July.

Potentilla arguta Pursh. (White cinquefoil)—Common, in sandy upland prairie. Flowers early June to mid-July.

Potentialla hippiana Lehm. (Cinquefoil)—Occasional, in low moist prairies. Flowers early June to July.

Potentilla norvegica L. (Norwegian cinquefoil)—Occasional, in low moist prairie. Flowers mid-June to mid-August.

Potentilla paradoxa Nutt. (Cinquefoil)—Occasional, in moist prairie. Flowers in mid-June to late July.

Potentilla pensylvanica L. (Pennsylvania cinquefoil)—Common, in moist prairie areas. Flowers late June to mid-August.

Potentilla rivalis Nutt. (Brook cinquefoil)—Occasional, in moist prairie and along margins of marshes. Flowers late July to early September.

Prunus americana Marsh. (American plum)—Occasional, forming thickets along wooded areas and often planted in shelterbelts. Flowers mid-May to mid-June.

Prunus pumila L. var. *besseyi* (Bailey) Gl. (Sand cherry)—Occasional, in open sandy prairie and planted in shelterbelts. Flowers mid-May to mid-June.

Prunus pensylvanica L. (Pin cherry)—Rare, in woodlands and in planted shelterbelts. F. L. Fieldstead 1170, Ransom Co. Flowers mid-May to mid-June.

Prunus virginiana L. Common Chokecherry)—Common, forming thickets along woodland and in the prairie. Flowers late May to mid-June.

Rosa acicularis Lindl. ssp. *sayi* (Schwein.) W. H. Lewis (Prickly wild rose)—Occasional, along woodland margins and in thickets. Flowers early June to early August.

Rosa arkansana Porter. (Prairie wild rose)—Common, in sandy prairie. Flowers mid-June to mid-August.

Rosa blanda Ait. (Smooth wild rose)—Common, along woodland margins and in thickets. Flowers early June to early August.

Rosa woodsii Lindl. (Western wild rose)—Occasional, along margins of woodlands and in wooded coulees. Flowers early June to early July.

Rubus idaeus L. ssp. *sachalinensis* (Levl.) Focke (Red raspberry)—Occasional, in open woods and thickets. Flowers early June to late June.

Rubus occidentalis L. (Black raspberry)—Occasional, in moist woods and fields and often cultivated. Flowers late May to late June.

Rubus pubescens Raf. (Dwarf raspberry)—Occasional, in moist woodlands. Flowers mid-June to late July.

Spiraea alba Du Roi. (Wild spiraea)—Common, in moist prairie meadows. Flowers late June to mid-August.

MIMOSACEAE (Mimosa Family)

Desmanthus illinoensis (Michx.) MacM. (Prairie mimosa)—Rare, in disturbed prairie areas. D. Laurell September 9, 1931, Sargent Co. Flowers July.

FABACEAE (Pea Family)

Amorpha canescens Pursh. (Lead plant amorpha)—Common, in sandy prairie. Flowers early July to early September.

Amorpha fruticosa L. (False indigo)—Occasional, in moist meadows and along margins of streams. Flowers mid-June to early July.

Amorpha nana Nutt. (Dwarf wild indigo)—Occasional, in sandy prairie. Flowers early June to mid-July.

Amphicarpa bracteata (L.) Fern. (American hog peanut)—Occasional, on rich wooded river banks. Flowers late July to late August.

Apios americana Medic. (Ground nut)—Rare, in thickets in sandhills. O. A. Stevens June 6, 1926, Ransom Co. Only specimen from North Dakota. Flowers July to August.

Astragalus adsurgens Pall. var. *robustior* Hook. (Standing milkvetch)—Occasional, on prairie and clay soils and slopes. Flowers early June to late July.

Astragalus agrestis Dougl. ex D. Don. (Field milkvetch)—Occasional, in moist prairie. Flowers late May to early July.

Astragalus bisulcatus (Hook.) A. Gray (Two-grooved milkvetch)—Occasional on prairie hillsides. Flowers early June to mid-July.

Astragalus canadensis L. (Little rattlepod)—Common, in moist prairie and along margins of woodland. Flowers late June to mid-August.

Astragalus crassicarpus Nutt. var. *crassicarpus* (Groundplum milkvetch)—Common, in upland prairie and lowland meadows. Flowers early May to early July.

Astragalus lotiflorus Hook. (Lotus milkvetch)—Rare, in prairie and along open shore of a lake. H. F. Bergman 1411, Richland Co. Flowers mid-May to early July.

Astragalus missouriensis Nutt. (Missouri milkvetch)—Occasional, on dry prairie hillsides. Flowers mid-May to late June.

Astragalus racemosus Pursh. (Creamy poisonvetch)—Rare, on prairie hillsides. Flowers in late June.

Caragana arborescens Lam. (Pea tree)—Common, in planted shelterbelts. Flowers late May to June.

Dalea leporina (Ait.) Bullock. (Foxtail dalea)—Occasional, in open sandy prairie. O. A. Stevens 2474, Sargent Co. Flowers June to early August.

Desmodium canadense (L.) DC. (Canada tickclover)—Occasional, along woodland margins and in thickets. Flowers early July to early August.

Desmodium glutinosum (Muhl.) Wood. (Tick-trefoil)—Rare, in rich woodlands. Flowers early July to early August.

Glycyrrhiza lepidota Pursh (American wild licorice)—Common, in disturbed moist prairie. Flowers late June to early August.

Lathyrus ochroleucus Hook. (Yellow vetchling)—Occasional, along margins of woodland. Flowers late May to early July.

Lathyrus palustris L. (Marsh vetchling)—Occasional, along margins of woodlands and moist thickets. Flowers mid-June to late July.

Lathyrus venosus Muhl. ex. Willd. var. *intonsus* Butt. and St. John (Bushy vetch)—Occasional, along margins of woodland and open woods. Flowers mid-June to mid-July.

Lotus corniculatus L. (Prairie bird's-foot trefoil)—Occasional in disturbed areas, often planted. Flowers June to August.

Lotus purshianus Clem. & Clem. (Pursh deervetch)—Occasional, in disturbed sandy prairie. Flowers early July to mid-August.

Medicago lupulina L. (Black medic)—Common, in moist prairie and roadside ditches. Flowers early June to late August.

Medicago sativa L. (Alfalfa medic)—Common, escapes from cultivation into disturbed prairie areas and road ditches. Flowers mid-June to mid-August.

Melilotus alba Medic. (White sweet clover)—Common, escapes from cultivation into disturbed prairie areas and road ditches. Flowers mid-June to early September.

Melilotus officinalis (l.) Lam. (Yellow sweet clover)—Common, escapes from cultivation into disturbed prairie areas and road ditches. Flowers mid-June to early September.

Oxytropis lambertii Pursh (Purple loco)—Common, in native prairie. Flowers late May to mid-July.

Petalostemum candidum (Willd.) Michx. (White prairie clover)—Common, in dry upland prairie. Flowers early July to late August.

Petalostemum purpureum (Vent.) Rydb. (Purple prairie clover)—Common in dry upland prairie. Flowers early July to late August.

Petalostemum villosum Nutt. (Hairy prairie clover)—Common, in sandy prairie and sand blowouts. Flowers mid-July to late August.

Psoralea argophylla Pursh. (Silver leaf)—Common, in dry upland prairie. Flowers early July to late August.

Psoralea esculenta Pursh. (Indian bread root)—Common, in dry upland prairie. Flowers early June to mid-July.

Strophystyles leiosperma (T. & G.) Piper. (Wild bean)—Occasional, in dry open ground near woodland and in rich woodland. Flowers July to August.

Trifolium campestre Schreb. (Low hop clover)—Rare, escapes from cultivation into disturbed prairie meadows. W. B. Bell 546, Richland Co. Flowers mid-June to mid-August.

Trifolium hybridum L. (Alsike clover)—Occasional, in prairie meadows and road ditches. Flowers early June to mid-August.

Trifolium pratense L. (Red clover)—Occasional, escapes from cultivation into disturbed prairie areas and road ditches. Flowers mid-June to late August.

Trifolium repens L. (White clover)—Common, in meadows, lawns, and moist stream banks. Flowers early June to mid-August.

Vicia americana Muhl. var. *americana* (American vetch)—Common, in prairie thickets and along margins of woodland. Flowers early June to early August.

Vicia americana Muhl. var. *minor* Hook. (Prairie vetch)—Common, in prairie, along thickets, and along margins of woodland. Flowers early June to early August.

ELAEAGNACEAE (Oleaster Family)

Elaeagnus angustifolia L. (Russian olive)—Occasional, in planted shelterbelts, around farmsteads, and escaping into disturbed prairies. Flowers mid-June to mid-July.

Elaeagnus commutata Bernh. (Silverberry)—Occasional, forming thickets on prairie hillsides and growing along fence rows. Flowers early June to early July.

Shepherdia argentea (pursh.) Nutt. (Buffalo berry)—Rare, forming thickets on prairie hillsides. O. A. Stevens August 3, 1958, Ransom Co. Flowers late April to late May.

HALORAGACEAE (Water-Milfoil Family)

Myriophyllum spicatum L. var. *exalbescens* (Fern.) Jeps. (Water milfoil)—Occasional, in shallow ponds, streams, and lakes. Flowers July to August.

LYTHRACEAE (Loosestrife Family)

Ammannia coccinea Rottb.—Rare, along desiccating pond margins and in moist road ditches. Flowers mid-July to mid-August.

Lythrum alatum Pursh var. *alatum* (Loosestrife)—Occasional, along streams and low moist areas. Flowers early July to late August.

Lythrum salicaria L. (Purple loosestrife)—Occasional, escapes from cultivation into moist road ditches and other low areas. Flowers July to August.

ONAGRACEAE (Evening Primrose Family)

Calylophus serrulatus (Nutt.) Raven. (Tooth-leaved evening primrose)—Common, in dry sandy prairies. Flowers early June to mid-August.

Circaea alpina L. (Enchanger's nightshade)—Occasional, in woodland. Flowers July to mid-August.

Circaea lutetiana L. ssp. *canadensis* (L.) Asch. & Magnus. (Enchanter's nightshade)—Occasional, in moist alluvial woods. Flowers early July to mid-August.

Epilobium angustifolium L. (Fireweed willowherb)—Occasional, along margins of woodland and in moist rich soils of woodland. Flowers early July to late August.

Epilobium ciliatum Raf. ssp. *glandulosum* (Lehm.) Hoch & Raven (Glandular willowherb)—Common, in moist soil along streams, ponds, marshes, lakes, and damp thickets. Flowers mid-July to late August.

Epilobium leptophyllum Raf. (Thin-leaf willowherb)—Occasional, along the margins of streams, ponds, marshes, lakes, and damp thickets. Flowers mid-July to mid-August.

Epilobium paniculatum Nutt. (Autumn willowherb)—Rare, in boggy places and along margins of ponds, streams, and lakes. Flowers mid-July to mid-August.

Gaura coccinea Pursh. (Scarlet gaura)—Occasional, in dry upland prairie. Flowers early June to mid-August.

Oenothera biennis L. (Common evening primrose)—Common, in sandy prairie, roadsides, and disturbed areas. Flowers early July to late August.

Oenthera nuttallii Sweet (White-stemmed evening primrose)—Occasional, in sandy prairie and edges of sand blowouts. Flowers late June to late August.

Oenothera villosa Thunb. (Common evening primrose)—Common, in dry sandy prairie. Flowers early June to mid-August.

CORNACEAE (Dogwood Family)

Cornus foemina Mill. ssp. *racemosa* (Lam.) J. S. Wils. (gray dogwood)—Occasional, in woodlands. Flowers late My to early August.

Cornus stolonifera Michx. (Red osier dogwood)—Common, along streams, in moist open woods, and along margins of woodland. Flowers late May to early August.

SANTALACEAE (Sandalwood Family)

Comandra umbellata (L.) Nutt. ssp. *pallida* (A. DC.) Piehl. (Bastard toadflax)—Occasional, on prairie and prairie hillsides. Flowers mid-May to mid-June.

Comandra umbellata (L.) Nutt. ssp. *umbellata* (Bastard toadflax)—Occasional, on prairie and prairie hillsides. Flowers mid-May to mid-June.

CELASTRACEAE (Bittersweet Family)

Celastrus scandens L. (Climbing bittersweet)—Occasional, in rich moist woodland. Flowers early June to late June.

Euonymus atropurpureus Jacq. (Wahoo)—Rare, in rich moist woods. O. A. Stevens June 20, 1938, Richland Co. Flowers late June.

EUPHORBIACEAE (Spurge Family)

Euphorbia geyeri Engelm. (Geyer's spurge)—Occasional, in open sandy prairie. Flowers early July to mid-August.

Euphorbia glyptosperma Engelm. (Ridge-seeded spurge)—Common, in disturbed prairie areas and roadsides. Flowers early July to late August.

Euphorbia esula L. (Leafy spurge)—Common, in disturbed prairie and waste areas. Flowers June to mid-August.

Euphorbia x *pseudovirgata* (Schur.) Soo (Hybrid leafy spurge)—Common, in disturbed prairie and waste areas. Flowers June to mid-August.

Euphorbia serpens H.B.K. (Round-leaved spurge)—Occasional, along prairie roadsides and in waste areas. Flowers early June to late August.

Euphorbia serpyllifolia Pers. (Thyme-leaved spurge)—Occasional, in disturbed prairie areas and waste areas. Flowers early June to late August.

RHAMNACEAE (Buckthorn Family)

Rhamnus alnifolia L'Her. (Alder buckthorn)—Rare, in moist open woodland. O. A. Stevens June 13, 1921, Ransom Co. Flowers late May to early June.

Rhamus catharticus L. (Common buckthorn)—Rare, in woodland, often planted in shelterbelts. O. A. Stevens July 10, 1951, Ransom Co. Flowers late May to early June.

Rhamnus davurica Pall. (Davurian buckthorn)—Rare, planted in shelterbelts. O. A. Stevens 2774, Richland Co. Flowers late May to early June.

VITACEAE (Grape Family)

Parthenocissus vitacea (Knerr.) Hitchc. (Virginia creeper)—Common, in woodland and brushy thickets. Flowers mid-June to early July.

Vitis riparia Michx. (Wild grape)—Occasional, in thickets and rich alluvial woodland. Flowers late June to mid-July.

Vitis vulpina L. (Wild grape)—Occasional, in thickets and rich alluvial woodland. Flowers late June to mid-July.

LINACEAE (Flax Family)

Linum perenne L. var. *lewisii* (Pursh.) Eat. & Wright (Lewis wild flax)—Occasional, in prairie areas. Flowers mid-June to August.

Linum rigidum Pursh. var. *rigidum* (Stiffstem flax)—Occasional, on prairie hillsides, sandy prairie, and sand blowouts. Flowers mid-June to early August.

Linum sulcatum Ridd. (Grooved flax)—Rare, in low sandy prairie. Flowers mid-July to mid-August.

Linum usitatissimum L. (Common flax)—Common, escapes from cultivation, but does not persist. Flowers mid-June to mid-August.

POLYGALACEAE (Milkwort Family)

Polygala alba Nutt. (White milkwort)—Occasional, on dry prairie hillsides. Flowers early June to early September.

Polygala senega L. (Senega snake root)—Rare, in low prairie meadows. Lee July 8, 1891, Ransom Co. Flowers June to July.

Polygala verticillata L. (Whorled milkwort)—Occasional, in low sandy prairie meadows. Flowers late July to early September.

ACERACEAE (Maple Family)

Acer negundo L. (Box-elder)—Common, along, streams and moist coulees. Flowers late April to late May.

Acer saccharum Marsh. (Sugar maple)—Rare, in alluvial woods. H. L. Bolley June 6, 1891, Sargent Co. Flowers early April to late May.

ANACARDIACEAE (Sumac Family)

Rhus glabra L. (Smooth sumac)—Common, forming thickets along the margins of woodlands and prairies. Flowers late June to mid-July.

Toxicodendron rydbergii (Small) Greene. (Poison ivy)—Common, in brush thickets, along margins of woodland, and in open woodland. Flowers late June to mid-July.

RUTACEAE (Rue Family)

Zanthoxylum americanum Mill. (Prickly ash)—Occasional, in moist woods and thickets along the river. Flowers early May to late May.

ZYGOPHYLLACEAE (Caltrop Family)

Tribulus terrestris L. (Puncture vine)—Rare, in disturbed areas and roadsides. N. V. Jaccard September 15, 1934, Sargent Co. Flowers July to August.

OXALIDACEAE (Wood-Sorrel Family)

Oxalis dillenii Jacq. (Wood sorrel)—Occasional, along margins of woodland and in woods. Flowers late June to early August.

Oxalis stricta L. (Upright yellow wood sorrel)—Common, along margins of woodland and moist prairies. Flowers early June to late August.

Oxalis violacea L. (Pink wood sorrel)—Common, in upland prairie. Flowers late May to late June.

BALSAMINACEAE (Touch-Me-Not Family)

Impatiens capensis Meerb. (Spotted touch-me-not)—Occasional, in moist shaded areas along streams and boggy seepage areas. Flowers mid-July to late August.

Impatiens pallida Nutt. (Pale touch-me-not)—Occasional, in moist alluvial woods. Flowers mid-July to early September.

ARALIACEAE (Ginseng Family)

Aralia nudicaulis L. (Wild sarsaparilla)—Occasional, in rich moist woodland. Flowers late May to mid-June.

APIACEAE (Carrot Family)

Anethum graveolens L. (Common dill)—Occasional, in disturbed waste areas and abandoned fields. Flowers early July to late August.

Berula erecta (Huds.) Cov. var. *incisium* (Torr.) Cronq. (Cut-leaved water parsnip)—Occasional, in flowing stream and boggy seepage areas. Flowers mid-July to mid-August.

Carum carvi L. (Common caraway)—Occasional, in abandoned gardens and waste places. Flowers early June to late July.

Cicuta bulbifera L. (Bulbous water hemlock)—Rare, in borders of ponds, swamps, and lakes. Flowers mid-July to mid-August.

Cicuta maculata L. (Water hemlock)—Common, in wet prairie meadows and along margins of streams, ponds, and lakes. Flowers late June to mid-August.

Cryptotaenia canadensis (L.) DC. (Honewort)—Occasional, in rich moist woodland. Flowers early June to mid-July.

Heracleum sphondylium L. ssp. *montanum* (Schleicher) Brig. (Cow parsnip)—Occasional, in wet open woodland. Flowers early June to mid-July.

Lomatium foeniculaceum (Nutt.) Coult. & Rose. (Hairyseed lomatium)—Occasional, in upland prairie. Flowers late April to late May.

Lomatium orientale Coult. & Rose. (Wild parsley)—Occasional, in upland prairie. Flowers late April to late May.

Osmorhiza claytonii (Michx.) Clarke. (Clayton sweet root)—Rare, in well shaded and rich woodlands. Flowers late May to late June.

Osmorhiza longistylis (torr.) D.C. var. *longistylis* (Sweet cicely)—Common, in well shaded rich woodlands. Flowers early June to mid-July.

Pastinaca sativa L. (Wild parsnip)—Occasional, in wooded areas. Flowers mid-June to late August.

Sanicula gregaria Bickn. (Golden sanicle)—Rare, in moist rich woods. O. A. Stevens 1344, Richland Co. Flowers early June to mid-July.

Sanicula marilandica L. (Black snakeroot)—Occasional, in moist rich woods. Flowers early June to mid-July.

Sium suave Walt. (Water parsnip)—Occasional, in shallow water along the margins of marshes, ponds, and lakes. Flowers mid-July to mid-August.

Zizia aptera (Gray) Fern. (Meadow parsnip)—Common, in moist prairie meadow. Flowers early June to mid-July.

Zizia aurea (L.) Koch. (Meadow parsnip)—Occasional, in moist prairie meadow. Flowers late May to early June.

GENTIANACEAE (Gentian Family)

Gentiana andrewsii Griseb. (Closed gentian)—Occasional, in low moist prairie meadows and moist sandy road ditches. Flowers early August to early September.

Gentiana puberulenta Pringle (Downy gentian)—Rare, in low moist prairie meadow and upland prairie. O. A. Stevens 2643, Richland Co. Flowers early August to early September.

APOCYNACEAE (Dogbane Family)

Apocynum androsaemifolium L. var. *androsaemifolium* (Spreading dogbane)—Occasional, in moist woodland and in moist thickets. Flowers early June to mid-July.

Apocynum cannabinum L. (Dogbane)—Occasional, in open woodland and moist prairie meadows. Flowers early June to early August.

Apocynum sibiricum Jacq. (Prairie dogbane)—Occasional, in open woodland and moist prairie meadows. Flowers early June to early August.

ASCLEPIADACEAE (Milkweed Family)

Asclepias incarnata L. ssp. *incarnata* (Swamp milkweed)—Common, along margins of streams, marshes, ponds, and lakes. Flowers late June to early August.

Asclepias languinosa Nutt. (Woolly milkweed)—Rare, in low moist prairie. Flowers June to July.

Asclepias ovalifolia Dcne. (Ovaleaf milkweek)—Occasional, in moist prairie meadows and open woods. Flowers early June to mid-July.

Asclepias speciosa Torr. (Showy milkweek)—Occasional, in prairie and along roadsides. Flowers late June to mid-August.

Asclepias sullivantii Engelm. (Smooth milkweek)—Rare, in moist prairies and roadside ditches. O. A. Stevens 643, Richland Co. Flowers June to July.

Asclepias syriaca L. (Common milkweed)—Common, in low waste areas, moist prairies, and roadsides. Flowers mid-June to mid-August.

Asclepias verticillata L. (Whorled milkweed)—Occasional, in moist prairie. Flowers early June to mid-August.

Asclepias viridiflora Raf. (Green milkweed)—Occasional, in dry upland prairie. Flowers late June to late July.

SOLANACEAE (Nightshade Family)

Datura stramonium L. (Jimson weed)—Rare, in dry soil and waste places, often escapes cultivation. J. Kenward August 24, 1964. Flowers June to late August.

Physalis heterophylla Nees. (Clammy groundcherry)—Occasional, in sandy upland prairie. Flowers mid-June to late July.

Physalis virginiana Mill. (Virginia groundcherry)—Common, in sandy upland prairie and disturbed waste areas.

Solanum ptycanthum Dun. ex DC. (Black nightshade)—Occasional, in disturbed fields and woods or thickets. Flowers late July to early September.

Solanum rostratum Dun. (Buffalo bur nightshade)—Rare, in disturbed areas and dry sand prairie. A. B. Burvee July 27, 1955, Richland Co. Flowers late June to mid-August.

Solanum sarrachoides Sendtner (Viscid nightshade)—Occasional, in disturbed prairie and waste areas. Flowers early June to mid-September.

Solanum triflorum Nutt. (Cut-leaved nightshade)—Occasional, in disturbed sandy prairie and waste places. Flowers early June to mid-September.

CONVOLVULACEAE (Morning-Glory Family)

Convolvulus arvensis L. (Field bindweed)—Common, in cultivated fields and other disturbed areas. Flowers early June to early August.

Convolvulus sepium L. (Large bindweed)—Occasional, in woodlands and along roadsides as a trailing vine. Flowers mid-June to late August.

CUSCUTACEAE (Dodder Family)

Cuscuta cephalanthi Engelm. (Buttonbush dodder)—Rare, in moist woodland as a parasite on forbs. O. A. Stevens August 10, 1916, Ransom Co. Flowers early August to late August.

Cuscuta coryli Engelm. (Hazel dodder)—Occasional, in disturbed areas, growing as a parasite on forbs and shrubs. O. A. Stevens 1464, Ransom Co. Flowers late July to early September.

Cuscuta glomerata Choisy. (Composite dodder)—Rare, along edges of low areas, growing as a parasite on herbs and shrubs. O. A. Stevens 2546, Richland Co. Flowers early August to early September.

Cuscuta gronovii Willd. (Gronovius dodder)—Occasional, in wooded places, growing as a parasite on forbs and shrubs. Flowers early August to early September.

Cuscuta pentagona Engelm. (dodder)—Rare, in dry soils, growing as a parasite on *Solidago*, *Helianthus*, and other native herbs and shrubs. W. B. Bell July 22, 1909, Ransom Co. Flowers early August to early September.

MENYANTHACEAE (Buckbean Family)

Menyanthes trifoliata L. (Buckbean)—Rare, in boggy areas along the Sheyenne River. O. A. Stevens June 6, 1926, Ransom Co. Flowers late May to early June.

POLEMONIACEAE (Phlox Family)

Collomia linearis Nutt. (Narrow-leaf collomia)—Occasional, in dry sandy spots on the prairie and disturbed waste areas. Flowers mid-June to late July.

Phlox pilosa L. ssp. *fulgida* (Wherry) Wherry. (Downy phlox)—Rare, in upland prairie. W. B. Bell July 10, 1908, Richland Co. Flowers late June to early July.

HYDROPHYLLACEAE (Water-leaf Family)

Ellisia nyctelea L. (Common waterpod)—Common, on wooded river banks and cultivated fields. Flowers late May to mid-June.

Hydrophyllum virginianum L. (Virgina water-leaf)—Common, in rich alluvial woods. Flowers late May to mid-June.

BORAGINACEAE (Borage Family)

Cynoglossum oficinale L. (Hound's tongue)—Occasional, in open woods and waste places. Flowers June to July.

Hackelia deflexa (Wahl.) Opiz. (Stickweed)—Occasional, in woodland and thickets. Flowers mid-June to late July.

Hackelia virginiana (L.) I. M. Johnst. (Stickweek)—Occasional, in moist upland woods. Flowers July to August.

Heliotropium curassavicum L. (Heliotrope)—Rare, on saline flats and edge of alkaline lakes. Flowers late July to early August.

Lappula echinta Gilib. (Blue stickseed)—Common, in dry sandy upland prairie and disturbed waste areas. Flowers early June to early August.

Lappula redowskii (Hornem.) Greene.—Occasional, in dry sandy prairie. Flowers late May to late June.

Lithospermum canescens (Michx). Lehm. (Hairy puccoon)—Common, in sandy prairie. Flowers late May to mid-July.

Lithospermum incisum Lehm. (Narrow-leaved puccoon)—Common, in dry upland prairie. Flowers late May to mid-July.

Onosmodium molle Michx. var. *occidentale* (Mack.) I. M. Johnst. (False gromwell)—Occasional, in sandy upland prairie. Flowers early June to mid-July.

VERBENACEAE (Vervain Family)

Phryma leptostachya L. (American lopseed)—Common, in moist rich woodlands. Flowers early July to mid-August.

Verbena bracteata Lag. & Rodr. (Bracted vervain)—Common, in disturbed prairie and along roadsides. Flowers mid-June to late August.

Verbena hastata L. (Blue vervain)—Common, in moist prairie meadows and margins of streams. Flowers early July to early September.

Verbena stricta Vent. (Hoary vervain)—Common, in sandy prairie and disturbed waste places. Flowers early June to early September.

Verbena urticifolia L. (Nettle-leaved vervain)—Occasional, in wooded lowlands and alluvial woods. Flowers early July to early September.

LAMIACEAE (Mint Family)

Agastache foeniculum (Pursh.) O. Ktze. (Fragrant giant hyssop)—Occasional, along the border of woodlands and thickets. Flowers early July to late August.

Dracocephalum parviflorum Nutt. (Dragonhead)—Rare, in moist lowlands near margins of woods. H. F. Bergman July 21, 1911, Richland Co. Flowers late June to mid-August.

Galeopsis tetrahit L. (Hemp nettle)—Rare, in disturbed waste areas. O. A. Stevens 2760, Ransom Co. Flowers July to August.

Glecoma hederacea L. (Creeping Charlie)—Occasional, in disturbed areas and wooded river banks. Flowers late May to mid-July.

Hedeoma hispidum Pursh. (Rough pennyroyal)—Occasional, in sandy prairie. Flowers early June to early August.

Leonurus cardiaca L. (Motherwort)—Occasional, in moist woodland. Flowers late June to late August.

Lycopus americanus Muhl. (American bugleweed)—Common, along margins of streams, marshes, ponds, and lakes. Flowers early June to late August.

Lycopus asper Greene. (Rough bugleweed)—Occasional, along margins of streams, marshes, ponds, and lakes. Flowers early July to late August.

Lycopus uniflorus Michx. (Bugleweed)—Rare, along margins of streams, marshes, ponds, lakes, and other moist areas. Flowers mid-July to late August.

Mentha arvensis L. (Wild mint)—Common, along margins of streams, ponds, marshes, lakes, and other moist places. Flowers early July to early September.

Monarda fistulosa L. var. *fistulosa* (Wild bergamot)—Occasional to common, on upland prairie hillsides and woodland margins. Flowers early July to late August.

Monarda fistulosa L. var. *menthaefolia* (Graham) Fern. (Wild bergamot)—Occasional, upland prairies, hillsides, and woodland margins. Flowers early July to late August.

Nepta cataria L. (Catnip)—Common, in woodlands and dry open woods. Flowers early July to early September.

Physostegia parviflora Nutt. (Obedient plant)—Occasional, along margins of marshes and moist lowland prairies. Flowers early June to early September.

Prunella vulgaris L. (Common selfheal)—Rare, in moist low prairie meadow. O. A. Stevens August 14, 1964, Ransom Co. Flowers June to July.

Pycnanthemum virginianum (L.) Durand & Jackson (Mountain mint)—Rare, in boggy sandy soil and in thickets. Flowers July to August.

Salvia reflexa Hornem. (Lance-leaved sage)—Occasional, in dry sandy prairies, cultivated fields, and other disturbed areas. Flowers early July to mid-August.

Scutellaria galericulata L. (Marsh skullcap)—Occasional, along margins of ponds, streams, marshes, and lakes. Flowers late June to late August.

Scutellaria lateriflora L. (Blue skullcap)—Occasional, on moist wooded river banks and in other moist places. Flowers mid-June to mid-August.

Scutellaria parvula Michx. var. *leonardi* (Epl.) Fern. (Small skullcap)—Occasional, in moist low prairie meadows. Flowers June.

Stachys palustris L. subsp. *pilosa* (Nutt.) Epling. (Hedge nettle)—Common, in moist pririe and along margins of streams, ponds, marshes, and lakes. Flowers late June to late August.

Teucrium canadense L. var. *boreale* (Bickn.) Shinners (Germander)—Occasional to common, in low prairie areas. Flowers early July to mid-August.

HIPPURIDACEAE (Mare's-tail Family)

Hippuris vulgaris L. (Common marestail)—Occasional, in quiet water of marshes, ponds, and lakes. Flowers June to July.

CALLITRICHACEAE (Water Starwort Family)

Callitriche hermaphroditica L. (Submersed water-starwort)—Rare, in ponds, shallow streams, and lakes. Flowers mid-July to early August.

PLANTAGINACEAE (Plaintain Family)

Plantago eriopoda Torr. (Alkali plantain)—Occasional, in low alkaline prairie meadow and stream banks. Flowers early June to mid-July.

Plantago major L. (Common plantain)—Common, in disturbed prairie areas and roadsides. Flowers early July to late August.

Plantago patagonica Jacq. (Prairie plantain)—Occasional, in dry upland prairie. Flowers early July to early August.

Plantago rugelii Dcne. (Rugel's plantain)—Occasional, in wooded areas and disturbed waste places. Flowers mid-July to late August.

OLEACEAE (Olive Family)

Fraxinum pennsylvanica Marsh. var. *pennsylvanica* (Red ash)—Occasional, in woodland along streams and moist coulees. Flowers late April to late May.

Fraxinus pennsylvanica Marsh. var. *subintegerrima* (Vahl.) Fern. (Green ash)—Common, in woodland along streams and in moist coulees. Flowers late April to late May.

SCROPHULARIACEAE (Figwort Family)

Agalinis aspera (Dougl. ex. Benth.) Britt. (Rough gerardia)—Occasional, in moist prairie meadows. Flowers late July to August.

Agalinis tenuifolia (Vahl.) Raf. var. *parviflora* (Nutt.) Penn. (Slender gerardia)—Common, in moist prairie meadows and margins of ponds and marshes. Flowers early August to early September.

Bacopa rotundifolia (Michx.) Wettst. (Water hyssop)—Occasional, in shallow water of streams, ponds, and marshes, and along margins. Flowers mid-July to late August.

Castilleja sessiliflora Pursh. (Downy paintbrush)—Rare, on dry prairie hillsides. Flowers May to mid-June.

Gratiola neglecta Torr. (Hedge hyssop)—Occasional, along margins of ponds, sloughs, marshes, and lakes. Flowers mid-July to mid-August.

Linaria vulgaris Hill. (Butter and eggs.)—Occasional, escapes from cultivation into disturbed prairie and roadsides. W. B. Bell 539, Ransom Co. Flowers mid-June to mid-September.

Lindernia anagallidea (Michx). Penn. (False pimpernel)—Occasional, along streambanks and pond margins. Flowers late July to August.

Lindernia dubia (L.) Penn. (False pimpernel)—Occasional, along muddy shore of streams and ponds. Flowers late July to late August.

Mimulus glabratus H.B.K. var. *fremontii* (Benth.) Grant. (Yellow monkey flower)—Occasional, in shallow water and along margins of streams. Flowers mid-July to late August.

Mimulus guttatus DC. (Common yellow monkey-flower)—Rare, in wet meadow along Mirror Pool, an oxbow along the Sheyenne River. Flowers June to August.

Mimulus ringens L. (Alleghany monkey flower)—Occasional, along margins of ponds, streams, marshes, and lakes, and in marshy lowlands. Flowers early July to late August.

Orthocarpus luteus Nutt. (Owl clover)—Occasional, in upland prairie. Flowers June to July.

Pedicularis canadensis L. (Lousewort)—Occasional, in low, wet sandy prairie. Flowers mid-May to mid-June.

Pedicularis lanceolata Michx. (Swamp lousewort)—Rare, in low, wet sandy prairie. Flowers mid-August to early September.

Penstemon albidus Nutt. (White beardtongue)—Common, in sandy upland prairie. Flowers late May to early August.

Penstemon gracilis Nutt. (Slender beardtongue)—Common, in dry sandy prairie. Flowers mid-June to late July.

Penstemon grandiflorus Nutt. (Large beardbontue)—Common, on dry sandy prairie hillsides. Flowers mid-Jume to mid-July.

CAMPANULACEAE (Bellflower Family)

Campanula aparinoides Pursh. (Marsh bellflower)—Rare, in boggy places in sandhills. W. B. Bell August 6, 1908, Richland Co. Flowers late July to mid-August.

Campanula rapunculoides L. (Creeping bellflower)—Occasional, escapes from cultivation into low moist prairie. Flowers mid-July to early August.

Campanula rotundifolia L. (Harebell)—Occasional, in low sandy prairie meadows. Flowers early June to mid-August.

Lobelia kalmii L. (Kalm's lobelia)—Occasional, in boggy seepage areas and low prairie meadows. Flowers mid-July to late August.

Lobelia siphilitica L. (Great blue lobelia)—Common, in moist sandy prairie meadows and margins of ponds, marshes, streams, and alluvial thickets. Flowers early August to early September.

Lobelia spicata Lam. (Palespike lobelia)—Common, in moist lowland prairie meadows. Flowers early July to mid-August.

RUBIACEAE (Madder Family)

Galium aparine L. (Catchweed bedstraw)—Common, in open wooded areas and thickets. Flowers May to mid-June.

Galium boreale L. (Northern bedstraw)—Common, in open woods and moist prairie. Flowers early June to mid-July.

Galium labradoricum (Wieg.) Wieg. (Bog bedstraw)—Rare, in wet boggy ground. O. A. Stevens June 6, 1926, Ransom Co. Flowers early June to early July.

Galium trifidum L. (Small bedstraw)—Rare, in rich, moist woodland and moist thickets. Flowers mid-July to mid-August.

Galium triflorum Michx. (Sweetscented bedstraw)—Occasional, in rich moist woodland. Flowers early June to mid-July.

Hedyotis longifolia (Gaertn.) Hook. (Bluets)—Occasional, in open woodland and upland prairie. Flowers mid-June to July.

Scrophularia lanceolata Pursh. (Lanceleaf figwort)—Occasional, in woodlands and roadside ditches. Flowers early June to late July.

Verbascum thapsus L. (Common Mullein)—Rare, in disturbed sandy areas and other disturbed places. Flowers late July to late August.

Veronica americana (Raf.) Schwein. ex. Benth. (Brooklime speedwell)—Occasional, in flowing water and boggy areas. Flowers early June to late August.

Veronica anagallis-aquatica L. (Water speedwell)—Occasional, along margins of ponds, streams, marshes, and lakes. Flowers late June to early August.

Veronica peregrina L. var. *xalapensis* (H.B.K.) St. John & Warren. (Purslane speedwell)—Occasional, along margins of streams, marshes, and moist places in cultivated fields. Flowers late May to late June.

OROBANCHACEAE (Broomrape Family)

Orobanche ludoviciana Nutt. (Louisiana broomrape)—Rare, in moist sandy prairie. O. A. Stevens August 10, 1966, Ransom Co. Flowers late July to mid-August.

LENTIBULARIACEAE (Bladderwort Family)

Utricularia vulgaris L. (Bladderwort)—Common, in stagnant water of ponds, streams, and marshes. Flowers early June to August.

CAPRIFOLIACEAE (Honeysuckle Family)

Lonicera dioica L. (Wild honeysuckle)—Occasional, in rich woodland and swamps of sandhills. Flowers late May to mid-June.

Lonicera tatarica L. (Tartarian honeysuckle)—Occasional, in shelterbelts and sandy prairie. Flowers late May to mid-June.

Sambucus canadensis L. (Elderberry)—Rare, in moist alluvial woodland. W. B. Bell July 15, 1908, Richland Co. Flowers late June to mid-July.

Sambucus racemosa L. ssp. *pubens* (Michx.) House (European red elder)—Occasional, in rich alluvial woodland. Flowers May to late June.

Symphoricarpos albus (L.) Blake. (Snowberry)—Occasional, forming thickets on prairie and along margins of woodland. Flowers mid-June to August.

Symphoricarpos occidentalis Hook. (Wolfberry)—Common, forming thickets on dry prairie and along margins of woodland. Flowers mid-June to mid-August.

Viburnum lentago L. (Nannyberry)—Occasional, along margins of woodland and in thickets. Flowers May to mid-June.

Viburnum opulus L. var. *americanum* Ait. (Highbush cranberry)—Occasional, in moist woodland and along margins of woodland. Flowers early June to late June

ASTERACEAE (Aster Family)

Achillea millefolium L. ssp. *lanulosa* (Nutt.) Piper. (Yarrow)—Common, in dry sandy prairie and various disturbed habitats. Flowers early June to early August.

Agoseris glauca (Pursh) Dietr. var. *glauca* (Prairie dandelion)—Occasional, in low moist prairie meadows. Flowers early June to late July.

Ambrosia artemisiifoli L. (Common ragweed)—Common, in upland prairie, disturbed waste areas and roadsides. Flowers late July to mid-August.

Ambrosia psilostachya DC. (Perennial ragweed)—Occasional, in dry sandy prairie and sand blowouts. Flowers early July to early September.

Ambrosia trifida L. (Giant ragweed)—Occasional, in moist lowland prairie and disturbed waste places. Flowers early July to late August.

Antennaria neglecta Greene (Field pussytoes)—Occasional, in dry sandy prairie. Flowers early May to mid-June.

Antennaria neodioica Greene (Northern pussytoes)—Rare, in open woodland and moist prairie. W. B. Bell 747, Richland Co. Flowers early May to early June.

Antennaria parvifolia Nutt. (Smallleaf pussytoes)—Occasional, in dry sandy prairie and open hillsides. Flowers early May to mid-June.

Anthemis cotula L. (Dog fennel)—Rare, in disturbed waste areas and fields. W. B. Bell July 10, 1908, Richland Co. Flowers early July to late August.

Arctium minus Bernh. (Common burdock)—Occasional, in disturbed woodland. Flowers early July to early September.

Artemisia absinthium L. (Absinth wormwood)—Occasional, in disturbed sandy prairie and other disturbed areas. Flowers mid-July to early September.

Artemisia biennis Willd. (Biennial wormwood)—Occasional, in disturbed lowland prairie. Flowers mid-August to early September.

Artemisia campestris L. ssp. *caudata* (Michx.) Hall. & Clem. (Western sagewort)—Occasional, in dry sandy prairie, cultivated fields, and waste places. Flowers mid-July to early September.

Artemisia dracunculus L. (Green sagewort)—Common, in dry sandy prairie. Flowers mid-July to early September.

Artemisia frigida Willd. (Fringed sagewort)—Common, in dry sandy prairie and sand blowouts. Flowers late July to early September.

Artemisia ludoviciana Nutt. var. *ludoviciana* (White sage)—Common, in upland prairie. Flowers mid-July to early September.

Aster brachyactis Blake. (Rayless aster)—Rare, along margins of saline ponds and marshes. O. A. Stevens September 7, 1961, Richland Co. Flowers late July to early September.

Aster ericoides L. (White prairie aster)—Common, in dry prairie and sandy roadsides. Flowers late July to early September.

Aster hesperius A. Gray (Lilac aster)—Occasional, in low moist prairie meadows and moist alluvial woodlands. Flowers early August to early September.

Aster junciformis Rydb. (Slender white aster)—Occasional, in low moist prairie meadows. Flowers early August to early September.

Aster laevis L. (Smooth blue aster)—Common, in moist open woodland and low prairie meadows. Flowers late July to early September.

Aster novae-angliae L. (New England aster)—Occasional, in moist prairie meadows, open woodlands, and along margins of woodlands. Flowers late July to early September.

Aster oblongifolius Nutt. (Aromatic aster)—Occasional, in dry upland prairie and hillsides. Flowers late July to early September.

Aster ptarmicoides (Nees.) T. & G. (White upland aster)—Occasional, in dry sandy prairie and openings in woods. Flowers mid-July to early September.

Aster pubentior Cronq. (Flattop aster)—Occasional, in swampy areas and open woodlands. Flowers late July to early September.

Aster puniceus L. (Swamp aster)—Occasional, along margins of ponds, marshes, and streams. Flowers early August to early September.

Aster sagittifolius Willd. (Arrow-leaved aster)—Rare, in wooded banks of river and open woodland. Flowers late July to early September.

Aster sericeus Vent. (Silky aster)—Occasional, in dry prairie. Flowers late July to early September.

Aster simplex Willd. var. *ramossissimus* (T. & G.) Cronq. (Whitefield aster)—Common, in lowland prairie meadows. Flowers late July to early September.

Aster simplex Willd. var. *simplex* (Panicled aster)—Occasional, in prairie meadows. Flowers late July to early September.

Bidens cernua L. (Nodding beggarticks)—Common, along margins of ponds, streams, marshes, lakes, and other low moist places. Flowers early August to early September.

Bidens comosa (A. Gray) Wieg. (Beggarticks)—Occasional, along margins of ponds, streams, and marshes. Flowers early August to early September.

Bidens connata Muhl. ex Willd. (Purple stem beggarticks)—Occasional, in moist areas and along margins of marshes, ponds, and streams. Flowers mid-August to early Spetember.

Bidens frondosa L. (Devils beggarticks)—Occasional, along margins of streams, ponds, marshes, and lakes. Flowers late July to early September.

Bidens vulgata Greene. (Tall beggarticks)—Occasional, along borders of ponds, streams, marshes, and lakes. Flowers late July to early September.

Boltonia asteroides (L.) L'Her. var. *latisquama* (Gray) Cronq. (False aster)—Occasional, along margins of ponds, streams, and low wet prairie meadows. Flowers mid-July to late August.

Boltonia asteroides (L.) L'Her. var. *recognita* (Fern & Grisc.) Cronq. (White boltonia)—Occasional, along margins of ponds, streams, and low wet prairie meadows. Flowers mid-July to late August.

Centaurea repens L. (Russian knapweed)—Rare, escapes from cultivation into various disturbed ares. V. Casson August 26, 1961, Richland Co. Flowers late June.

Centaurea scabiosa L. (Scabiosa knapweed)—Rare, escapes from cultivation into various disturbed areas. W. R. Humphrey July 20, 1922, Ransom Co. Flowers late June.

Chrysanthemum leucanthemum L. (Ox-eye daisy)—Occasional, escapes cultivation into various disturbed areas. Flowers May to July.

Chrysopsis villosa (Pursh.) Nutt. var. *hispida* (Hook.) Gray. (Golden aster) Common, in dry sandy prairies. Flowers mid-June to early September.

Chrysopsis villosa (Pursh.) Nutt. var. *villosa* (Golden aster)—Common, in dry sandy prairies. Flowers mid-June to early September.

Cirsium altissimum (L.) Spreng. (Tall thistle)—Occasional, along margins of cultivated fields and other waste places. Flowers early July to early September.

Cirsium arvense (L.) Scop. (Canada thistle)—Common, in low disturbed waste areas and along margins of streams, ponds, marshes, and lakes. Flowers July to early September.

Cirsium flodmanii (Rydb.) Arthur. (Floodman thistle)—Common, in moist prairie meadows and roadside ditches. Flowers late June to late August.

Cirsium undulatum (Nutt.) Spreng. (Prairie thistle)—Occasional, in upland prairie. Flowers late June to late August.

Cirsium vulgare (Savi.) Ten. (Bull thistle)—Occasional, in moist prairie and open woodlands. Flowers early July to late August.

Conyza canadensis (L.) Cronq. (Canada horseweed)—Common, in cultivated fields and other disturbed sandy areas. Flowers late July to early September.

Conyza ramosissima Cronq. (Spreading fleabane)—Rare, in disturbed sandy waste places. W. Suess September 11, 1950, Richland Co. Flowers late July to early September.

Coreopsis tinctoria Nutt. (Bugweed)—Rare, in moist banks, roadside ditches, and dry waste places. W. B. Bell 1358, Richland Co. Flowers late July to mid-August.

Crepis runcinata (James) T. & G. (Dandelion hawks-beard)—Occasional, in moist lowland prairie meadows. Flowers early May to mid-July.

Echinacea angustifolia DC. (Purple coneflower)—Common, in dry prairie on open hillsides. Flowers late June to mid-August.

Erigeron annuus (L.) Pers. (Annual fleabane)—Rare, along edge of wooded coulees. Flowers late June to late July.

Erigeron glabellus Nutt. ssp. *pubescens* (Hook.) Cronq. (Smooth fleabane)—Occasional, in low sandy prairie meadow. Flowers June to late July.

Erigeron philadelphicus L. (Philadelphia fleabane)—Common, in moist lowland prairie and open woodlands. Flowers early June to late July.

Erigeron strigosus Muhl. ex. Willd. (Daisy fleabane)—Common, in upland prairie. Flowers mid-June to mid-August.

Eupatorium maculatum L. var. *bruneri* (A. Gray) Breitung. (Joepye weed)—Occasional, in wet ground along margins of ponds, marshes, sloughs, and lakes. Flowers mid-July to early September.

Eupatorium perfoliatum L. (Boneset)—Occasional, in boggy-seepage areas and along margins of streams, ponds, and marshes. Flowers mid-July to early September.

Euatorium rugosum Houtt. (White snakeroot)—Occasional, in moist woods. Flowers late July to early September.

Euthamia graminifolia (L.) Nutt. var. *graminifolia* (Narrow-leafed goldenrod)—Occasional, in sandy prairie. Flowers mid-July to early September.

Euthamia graminifolia (L.) Nutt. var. *major* (Michx.) Moldenke (Narrow-leafed goldenrod)—Occasional, in sandy prairie. Flowers mid-July to early September.

Gaillardia aristata Pursh. (Common gaillardia)—Occasional, on upland prairie hillsides. Flowers early June to late July.

Galinsoga quadriradiata R. & P. (Fringed quickweed)—Rare, in yards and gardens, escapes cultivation in disturbed areas. O. A. Stevens and L. W. Mitich September 4, 1968, Ransom Co. Flowers late July to early September.

Grindelia squarrosa (Pursh.) Dun var. *quasiperennis* Lunell (Curly-top gumweed)—Common, along roadsides, overgrazed pastures, and dry sandy prairies. Flowers mid-July to early September.

Grindelia squarrosa (Pursh.) Dun var. *squarrosa* (Curly-top gumweed)—Occasional, along roadsides, pastures, and dry sandy prairies. Flowers mid-July to early September.

Haplopappus spinulosus (Pursh) DC. (Ironplant goldenweed)—Occasional, in dry prairies. Flowers early July to early September.

Helenium autumnale L. (Common sneezeweed)—Occasional, in low moist prairie. Flowers early August to early September.

Helianthus annuus L. (Common sunflower)—Common, in cultivated fields and other disturbed places. Flowers early July to early September.

Helianthus grosseserratus Martens (Sawtooth sunflower)—Occasional, in prairie and roadside ditches. Flowers mid-July to early September.

Helianthus maximiliani Schrad. (Maximillian sunflower)—Common, in prairie and roadside ditches. Flowers late July to early September.

Helianthus nuttalli T. & G. ssp. *rydbergii* (Britt.) Long. (Nuttall's sunflower)—Occasional, in low open prairie and seasonally moist roadside ditches. Flowers late July to early September.

Helianthus petiolaris Nutt. (Prairie sunflower)—Common, in sandy prairie, sandy roadsides, and other disturbed sandy areas. Flowers mid-June to early September.

Helianthus rigidus (Cass.) Desf. ssp. *subrhomboideus* (Rydb.) Heiser. (Stiff sunflower)—Occasional, in dry sandy prairies. Flowers late July to late August.

Helianthus tuberosus L. (Jerusalem artichoke sunflower)—Occasional, along the margins of woodlands and low moist areas. Flowers early August to early September.

Heliopsis helianthoides (L.) Sweet var. *scabra* (Dun.) Fern. (False sunflower)—Occasional, in moist prairie along margins of woodland and roadside ditches. Flowers early July to late August.

Hieracium umbellatum L. (Narrowleaf hawkweed)—Occasional, along margins of moist open woodland, moist coulees, and moist meadows. Flowers late July to late August.

Iva xanthifolia Nutt. (Marsh elder sumpweed)—Occasional, along roadsides and other disturbed waste places. Flowers late July to early September.

Kuhnia eupatorioides L. var. *corymbulosa* T. & G. (False bonsett)—Occasional, on dry open prairie hillsides. Flowers late July to late August.

Lactuca biennis (Moench.) Fern. (Biennial lettuce)—Occasional, in moist rich woodland. Flowers late July to late August.

Lactuca canadensis L. (Wild lettuce)—Occasional, in moist rich woodland. Flowers early July to mid-August.

Lactuca ludoviciana (Nutt.) DC. (Western lettuce)—Occasional, in moist open woods and low moist disturbed prairie. Flowers late June to late August.

Lactuca oblongifolia Nutt. (Blue wild lettuce)—Common, in prairies an roadsides and other disturbed places. Flowers mid-June to late August.

Lactuca serriola L. (Prickley lettuce)—Occasional, along roadsides and other disturbed areas. Flowers mid-July to late August.

Liatris aspera Michx. (Blazing star)—Occasional, in low sandy prairie meadow. Flowers mid-August to early September.

Liatris ligulistylis (A. Nels.) K. Schum. (Blazing star)—Occasional, in lowland prairie meadows. Flowers mid-August to early September.

Liatris punctata Hook. (Narrow-leaved blazing star)—Common, in dry sandy prairies. Flowers late July to early September.

Liatris pycnostachya Michx. (Tall blazing star)—Occasional, in lowland prairie meadows. Flowers mid-July to early September.

Lygodesmia juncea (Pursh) Hook. (Skeleton weed)—Common, in dry sandy prairie and sand blowouts. Flowers late June to early September.

Matricaria maritima L. (Scentless chamomile)—Rare, along roadsides and disturbed prairies. W. B. Bell 381, Richland Co. Flowers early July to mid-August.

Matricaria matricarioides (Less.) Porter (Pineapple weed)—Occasional, in disturbed waste places and disturbed prairie. Flowers early June to early September.

Prenanthes alba L. (White rattlesnake root)—Occasional, in rich woodland. Flowers late July to mid-August.

Prenanthes racemosa Michx. ssp. *multiflora* Cronq. (Rattlesnake root)—Occasional, in moist prairie meadows and moist stream banks. Flowers early August to early September.

Ratibida columnifera (Nutt.) Wooton. & Standl. (Long-headed coneflower)—Common, in dry upland prairie and disturbed waste areas. Flowers late June to early September.

Ratibida columnifera (Nutt.) Wooton & Standl. forma *pulcherrima* Fern.—Rare, on dry prairie hillsides. Flowers late June to early September.

Rudbeckia hirta L. (Black-eyed Susan)—Common, in low prairie meadows. Flowers early July to early September.

Rudbeckia laciniata L. (Tall coneflower)—Common, along margins of moist open woodland and thickets. Flowers mid-July to early September.

Senecio congestus (R.Br.) DC. (Swamp ragwort)—Occasional, along margins of marshes, ponds, streams, and lakes. O. A. Stevens July 25, 1913, Sargent Co. Flowers early June to mid-August.

Senecio integerrimus Nutt. (Lambstongue ragwort)—Rare, in low sandy prairie and moist coulees. O. A. Stevens and D. R. Moir May 29, 1957, Richland Co. Flowers late May to late June.

Senecio pauperculus Michx. (Balsam groundsel)—Rare, in lowland prairie meadows and stream banks. O. A. Stevens 2948, Richland Co. Flowers late May to late June.

Senecio plattensis Nutt. (Prairie ragwort)—Common, in low to upland prairie. Flowers late May to late June.

Senecio pseudoaureus Rydb. var. *semicordatus* (Mack. & Bush.) T. M. Barkley (Northern ragwort)—Ocasional, in low prairie meadows. Flowers late May to late June.

Senecio tridenticulatus Rydb. (Groundsel)—Rare, in dry sandy prairie. H. F. Bergman 1415, Richland Co. Flowers late May to early July.

Shinnersoseris rostrata (A. Gray) Tomb (Annual skeleton weed)—Rare, in dry sandy prairie and sand blowouts. Flowers late June to late August.

Silphium perfoliatum L. (Cup plant)—Occasional, in rich alluvial woods and wooded stream banks. Flowers mid-August to early September

Solidago canadensis L. var. *gilvocanescens* Rydb. (Canada goldenrod)—Common, in prairie and roadsides. Flowers mid-July to early September.

Solidago canadensis L. var. *scabra* (Muhl.) T. & G. (Canada goldenrod)—Common, in prairie and prairie roadsides. Flowers August to September.

Solidago flexicaulis L. (Broad-leaved goldenrod)—Rare, in rich woodland. Flowers mid-August to early September.

Solidago gigantea Ait. (Tall smooth goldenrod)—Common, in moist lowland and moist open woodland along margins. Flowers mid-July to early September.

Solidago missouriensis Nutt. (Early goldenrod)—Common, in dry sandy prairies. Flowers mid-July to early September.

Solidago mollis Bartl. (Soft goldenrod)—Occasional, in dry prairie. Flowers mid-July to early September.

Solidago nemoralis Ait. (Gray goldenrod)—Occasional, on dry prairie hillsides, sandy soil. Flowers late July to early September.

Solidago riddellii Frank. (Riddell's goldenrod)—Rare, in low sandy prairies. O. A. Stevens 1040, Richland Co. Flowers early August to early September.

Solidago rigida L. (Stiff goldenrod)—Common, in heavily grazed pastures and dry prairie. Flowers late July to early September.

Sonchus arvensis L. ssp. *arvensis* (Perennial sow thistle)—Occasional, in low prairie meadows and disturbed waste areas and fields. Flowers late June to early September.

Sonchus arvensis L. ssp. *uliginosus* (Bieb.) Nyman (sow thistle)—Common, in moist prairie meadows and roadside ditches. Flowers late June to September.

Sonchus asper (L.) Hill. (Spiny sow thistle)—Occasional, in low prairie and disturbed waste areas. Flowers early July to early August.

Sonchus oleraceus L. (Common sow thistle)—Rare, in waste areas. Flowers early May to early September.

Tanacetum vulgare L. (Common tansy)—Rare, escapes from cultivation into disturbed woodland. W. B. Bell 310, Richland Co. Flowers late July to late August.

Taraxacum laevigatum (Willd.) DC. (Redseeded dandelion)—Occasional, in open woodland and disturbed prairie areas. Flowers early May to mid-July.

Taraxacum officinale Weber. (Common dandelion)—Common, in disturbed prairie and other disturbed areas. Flowers early May to late July.

Tragopogon dubius Scop. (Large goatsbeard)—Common, in disturbed prairie and other disturbed areas. Flowers early June to mid-August.

Vernonia fasciculata Michx. var. *corymbosa* (Schwein) Schub. (Western ironweed)—Occasional, in low moist prairie meadows and moist roadside ditches. Flowers early August to early September.

Xanthium strumarium L. (Cocklebur)—Occasional, in culivated fields and other disturbed areas. Flowers mid-July to early September.

ALISMATACEAE (Water Plantain Family)

Alisma gramineum Gmel. (Water plantain)—Occasional, in and along margins of ponds, streams, marshes, and lakes. Flowers late June to early August.

Alisma subcordatum Raf. (European water plantain)—Common, in and along margins of ponds, streams, marshes, and lakes. Flowers late June to late August.

Sagittaria cuneata Sheld. (Duck potato arrowhead)—Occasional, along margins of ponds, streams, marshes, and lakes. Flowers mid-June to late August.

Sagittaria latifolia Willd. (Common arrowhead)—Occasional, in or along margins of ponds, streams, marshes, and lakes. Flowers mid-June to late August.

HYDROCHARITACEAE (Frog's-bit Family)

Elodea canadensis Michx. (Waterweed)—Rare, submerged aquatic in shallow water in marshes and ponds. Flowers late June to mid-August.

JUNCAGINACEAE (Arrowgrass Family)

Triglochin maritima L. var. *elata* (Nutt.) A. Gray (Arrowgrass)—Common, in low saline prairie meadows, and margins of marshes, ponds, and lakes. Flowers early June to late July.

POTAMOGETONACEAE (Pondweed Family)

Potamogeton amplifolius Tuckerm. (Largeleaf pondweed)—Rare, submerged aquatic in lakes, ponds, and marshes. O. A. Stevens and Dr. R. Moir, July 21, 1960, Ransom Co. Flowers June to August.

Potamogeton foliosus Raf. (Leafy pondweed)—Occasional, submerged aquatic in ponds, lakes, and marshes. Flowers June to August.

Potamogeton friesii Rupr. (Pondweed)—Occasional, submerged aquatic in lakes, ponds, and marshes. Flowers June to August.

Potamogeton gramineus L. (Variable leaf pondweed)—Rare, submerged aquatic in ponds, marshes, and lakes. R. L. Ward 1117, Ransom Co. Flowers June to August.

Potamogeton nodosus Poir. (Long-leaved pondweed)—Rare, floating aquatic in ponds, streams, and lakes. Flowers June to August.

Potamogeton pectinatus L. (Sago pondweed)—Common, submerged aquatic in marshes, ponds, streams, and lakes. Flowers June to August.

Potamogeton pusillus L. (Baby pondweed)—Occasional, submerged aquatic in ponds, lakes, and marshes. Flowers June to August.

Potamogeton richardsonii (Benn.) Rydb. (Clasping-leaved pondweed)—Occasional, submerged aquatic in marshes, ponds, lakes, and streams. Flowers mid-July to August.

Potamogeton zosteriformis Fern. (Flatstem pondweed)—Occasional, submerged aquatic in ponds, streams, marshes, and lakes. Flowers mid-July to August.

RUPPIACEAE (Ditchgrass Family)

Ruppia maritima L. (Ditchgrass)—Occasional, in saline ponds, lakes, and marshes. Flowers July to August.

NAJADACEAE (Naiad Family)

Najas flexilis (Willd.) Rostk. and Schmidt (Naiad)—Occasional, submerged aquatic in marshes, ponds, and lakes. Flowers June to August.

Najas marina L. (Naiad)—Occasional, submerged aquatic in alkaline marshes, ponds, and lakes. Flowers June to August.

ZANNICHELLIACEAE (Horned Pondweed Family)

Zannichellia palustris L. (Horned pondweed)—Occasional, submerged aquatic in fresh or brackish water of ponds, marshes, and lakes. Flowers in late July.

ARACEAE (Arum Family)

Arisaema triphyllum (L.) Schott (Jack-in-the pulpit)—Occasional, in rich woodlands. Flowers mid-May to mid-June.

LEMNACEAE (Duckweed Family)

Lemna minor L. (Common duckweed)—Common, floating aquatic on water surfaces of marshes, ponds, and lakes. Present June to August.

Lemna perpusilla Torr. (Duckweed)—Occasional, floating aquatic on water surfaces of marshes, ponds, and lakes. Present June to August.

Lemna triscula L. (Star duckweed)—Common, floating aquatic on water surfaces of marshes, ponds, and lakes. Present June to August.

Spirodela polyrhiza (L.) Schleid. (Giant duck's meat)—Occasional, floating aquatic on water surfaces of marshes, ponds, and lakes. Present June to August.

Wolffia columbiana Karst. (Watermeal)—Rare, floating near the surface of the water in ponds, often mixed with *Lemna minor*. Present August.

COMMELINACEAE (Spiderwort Family)

Tradescantia bracteata Small (Bracted spiderwort)—Occasional, in sandy prairie and edges of sandy blowout and roadsides. Flowers early June to mid-July.

Tradescantia occidentalis (Britt.) Smyth (Prairie spiderwort)—Common, in dry sandy prairie, sand dunes, and sand blowouts. Flowers early June to early August.

JUNCACEAE (Rush Family)

Juncus alpinus Vill. (Alpine rush)—Rare, in low moist meadows. W. B. Bell 108, Ransom Co. Flowers June to July.

Juncus balticus Willd. (Baltic rush)—Common, in low moist meadows, seasonally moist roadside ditches and along margins of ponds, streams, marshes, and lakes. Flowers early July to early August.

Juncus bufonius L. (Toad rush)—Occasional, in low moist sandy prairie, and shallow water along streams and pond margins. Flowers late June to late August.

Juncus dudleyi Wieg. (Dudley rush)—Occasional, in low, moist, sandy meadows. Flowers early July to late August.

Juncus gerardii Lois. (Salt meadow rush)—Rare, along margins of saline marshes. W. B. Bell 694, Richland Co. Flowers June to August.

Juncus interior Wieg. (Inland rush)—Occasional, in low moist sandy meadows. Flowers July to early August.

Juncus longistylus Torr. (Longstyle rush)—Occasional, in low moist sandy meadows and thickets. Flowers late June to late July.

Juncus nodosus L. (Knotted rush)—Occasional, in low moist sandy meadows and along margins of streams, ponds, and marshes. Flowers early July to late August.

Juncus torreyi Cov. (Torrey's rush)—Common, along margins of ponds, streams, marshes, and seasonally moist roadside ditches. Flowers early July to late August.

CYPERACEAE (Sedge Family)

Carex alopecoidea Tuckerm. (Sedge)—Rare, in moist road ditches near Sheyenne River. R. E. Stewart 966, Richland Co. Flowers May to June.

Carex aquatilis Wahl. var. *altoir* (Rydb.) Fern. (Water sedge)—Occasional, emergent zones of ponds, marshes, streams, and lakes. Flowers early May to mid-June.

Carex assiniboiensis W. Boott (Sedge)—Occasional, in rich moist woodland along rivers. Flowers late May to early June.

Carex atherodes Spreng. (Slough sedge)—Common, in wet ground or shallow water along marshes, ponds, streams, and lakes. Flowers June.

Carex aurea Nutt. (Golden sedge)—Occasional, in low moist prairie meadows. Flowers late May to late June.

Carex bebbii Olney ex Fern. (Bebb sedge)—Occasional, in wet soil along margins of marshes, ponds, streams, and lakes. Flowers early June to early July.

Carex bicknellii Britt. (Bicknell sedge)—Occasional, in moist low prairie meadow. Flowers June.

Carex blanda Dew. (Sedge)—Occasional, in woodland along banks of rivers, and woods in sandhills. Flowers May to mid-June.

Carex brevior (Dew.) Mack. (Fescue sedge)—Common, in moist sandy prairie and along margins of ponds, streams, and marshes. Flowers late June to early July.

Carex crawei Dew.—Rare, in low moist prairie meadows. Flowers May to June.

Carex cristatella Britt. (Sedge)—Occasional, in moist rich wooded river banks. Flowers mid-June to early July.

Carex davisii Schwein. & Torr. (Sedge)—Rare, moist soil of aspen woods. O. A. Stevens 832, Richland Co. Flowers May to June.

Carex deweyana Schwein. (Dewey sedge)—Rare, in moist aspen woodland. O. A. Stevens 834, Richland Co. Flowers late May to late June.

Carex disperma Dew. (Sedge)—Occasional, in low wet woods and boggy areas. Flowers early June to July.

Carex eburnea W. Boot. (Bristle-leaved sedges)—Rare, in woodland and thickets. O. A. Stevens July 4, 1926, Richland Co. Flowers late May to early June.

Carex eleocharis Bailey (Needleleaf sedge)—Occasional, in low moist sandy prairie and hillsides. Flowers early June to July.

Carex emoryi Dew. (Sedge)—Occasional, along streams, ponds, marshes, and lakes. Flowers June to July.

Carex filifolia Nutt. (Thread-leaved sedge)—Occasional, in dry sandy prairie and prairie hillsides. Flowers early May to late May.

Carex granularis Muhl. var. *granularis* (Sedge)—Rare, in low wet prairie meadows and edges of ponds and streams. Flowers early June to early July.

Carex granularis Muhl. var. *haleana* (Olney) Porter. (Sedge) — Rare, in wet prairie meadows and edges of streams. Flowers early June to early July.

Carex gravida Bailey var. *gravida* (Sedge)—Occasional, in moist woodlands and low moist prairies. Flowers mid-June.

Carex hallii Olney (Hall sedge)—Rare, in moist prairie. W. B. Bell 61, Ransom Co. Flowers May to June.

Carex heliophila Mack. (Sun sedge)—Common, in upland prairie. Flowers late May to early June.

Carex hystericina Muhl. (Bottlebrush sedge)—Occasional, along margins of boggy seepage areas, streams, ponds, and marshes. Flowers early June to mid-July.

Carex interior Bailey (Inland sedge)—Occasional, in low prairie meadows and along margins of ponds, streams, and marshes. Flowers early June to late June.

Carex lacustris Willd. (River sedge)—Rare, in shallow water of marshes, streams, and ponds. O. A. Stevens 169, Ransom Co. Flowers early June to late June.

Carex laeviconica Dew. (Sedge)—Rare, in moist prairie meadows and borders of marshes and ponds. W. B. Bell 278, Richland Co. Flowers early June to early July.

Carex lanuginosa Michx. (Woolly sedge)—Common, in low moist meadows and borders of ponds, marshes, and streams. Flowers early June to mid-July.

Carex leptalea Wahl. (Sedge)—Rare, in wet woods along margins of oxbows along Sheyenne River. Flowers June.

Carex meadii Dew. (Mead sedge)—Rare, low meadows and upland prairie. O. A. Stevens June 3, 1964, Richland Co. Flowers May to mid-June.

Carex molesta Mack. (Sedge)—Occasional, in moist sandy prairies and along margins of ponds, streams, and marshes. Flowers late June to early July.

Carex obtusata Lilj.—Rare, in dry prairie sandhills and dry open woods. R. E. Stewart 1181, Ransom Co. Flowers May to June.

Carex parryana Dew.—Rare, in moist lowland prairie meadow. Flowers early June to late June.

Carex peckii Howe. (Sedge)—Rare, in upland prairie. O. A. Stevens 1526, Richalnd Co. Flowers late May to mid-June.

Carex pensylvanica Lam. (Pennsylvania sedge)—Common, in dry sandy prairie and wooded areas. Flowers early May to early June.

Carex praegracilis W. Boott. (Clustered-field secge)—Common, in low moist prairie meadows. Flowers early May to early June.

Carex pseudo-cyperus L. (Sedge)—Rare, grows in wet margins of oxbows along the Sheyenne River. Flowers late June to July.

Carex retrorsa Schwein. (Knotsheath sedge)—Occasional, in shallow water of boggy seepage areas and margins of ponds, streams, and marshes. Flowers mid-June to mid-July.

Carex rosea Schkuhr. (Beaked sedge)—Common, in moist rich woodland. Flowers May to mid-June.

Carex rostrata Stokes. (Beaked sedge)—Occaional, in boggy-swampy areas and along margins of ponds, marshes, and streams. Flowers mid-June to early July.

Carex sartwellii Dew. (Sartwell sedge)—Rare, in low moist prairie meadows. Flowers late May to mid-June.

Carex saximontana Mack. (Rocky mountain sedge)—Rare, in rich woodland and prairie. O. A. Stevens 457, Richland Co. Flowers early June to early July.

Carex sprengelii Dew. (Sprengel sedge)—Common, in moist woodland. Flowers early May to early June.

Carex stipata Muhl. (Saw-beak sedge)—Occasional, in low moist prairie and in wooded areas. Flowers May to early July.

Carex stricta Lam. (Sedge)—Rare, along margins of ponds, marshes, streams, and swamps. O. A. Stevens August 4, 1936, Richland Co. Flowers June to early July.

Carex sychnocephala Carey (Sedge)—Rare, in boggy and swampy areas. W. Wanek 220, Richland Co. Flowers mid-May to early June.

Carex tenera Dew. (Sedge)—Rare, in moist woodland. Flowers early June to early July.

Carex tetanica Schkuhr. (Sedge)—Rare, in low sandy prairie. Flowers May to early June.

Carex vulpinoidea Michx. (Fox sedge)—Common, in low meadows and along margins of ponds, streams, and marshes. Flowers mid-June to mid-July.

Cyperus acuminatus Torr. & Hook. (Tapeleaf flatsedge)—Occasional, in wet sandy banks, and mud flats. Flowers early August to early September.

Cyperus aristatus Rottb. (Bearded flatsedge)—Occasional, in wet sandy banks, mud flats, and along margins of ponds, streams, and marshes. Flowers early August to early September.

Cyperus diandrus Torr. (Flatsedge)—Occasional, along margins of ponds, streams, and some lakes. Flowers early August to early September.

Cyperus erythrorhizos Muhl. (Redrooted flatsedge)—Rare, on flood plain of river and other moist sandy areas. O. A. Stevens 3047, Richland Co. Flowers early August to early September.

Cyperus esculentus L. (Chufa flatsedge)—Occasional, along margins of ponds, streams, and some lakes. Flowers early August to early September.

Cyperus odoratus L. (Flatsedge)—Occasional, along margins of ponds and lakes. Flowers early August to September.

Cyperus rivularis Knuth. (Brook flatsedge)—Rare, in wet sandy areas, especially shores. R. A. Shunk August, 1916, Ransom Co. Flowers early August to early September.

Cyperus schweinitzii Torr. (Schweinitz flatsedge)—Common, in very sandy prairie and sand blowouts. Flowers early June to late August.

Eleocharis acicularis (L.) R. & S. (Slender spikerush)—Occasional, on muddy flats and along margins of ponds, marshes, and swamps. Flowers mid-July.

Eleocharis compressa Sulliv. (Flatstem spikesedge)—Occasional, along margins of lakes, marshes, and ponds. W. B. Bell 117, Ransom Co. Flowers mid-June to mid-July.

Eleocharis erythropoda Steud. (Spikesedge)—Occasional, in boggy seepage areas and along margins of ponds, lakes, marshes, and streams. L. Harms 3389, Richland Co. Flowers mid-June to mid-July.

Eleocharis macrostachya Britt. (Creeping spikesedge)—Common, in moist roadside ditches and along margins of ponds, lakes, streams, and marshes. Flowers early June to late July.

Eleocharis obtusa (Willd.) Schult. var. *ovata* (Roth.) Drapalik & Mohlenbrock. (Ovoid spikesedge)—Occasional, in moist roadside ditches and along margins of ponds, marshes, streams, and lakes. Flowers July to August.

Eriophorum polystachion L. (Narrowleaf cotton sedge)—Rare, in low moist prairie meadows and boggy seepage areas. Flowers late May to late June.

Eriophorum viridicarinatum (Engelm.) Fern. (Cotton sedge)—Rare, in low moist prairie meadows and boggy areas. Flowers late May to June.

Hemicarpha drummondii Nees—Rare, in moist, sandy roadside ditch. H. F. Duebbert 144, Sargent Co. Flowers July to mid-August.

Scirpus acutus Muhl. (Hardstem Bulrush)—Common, in clones along the shores and in emergent zones of ponds, streams, marshes, and lakes. Flowers mid-June to mid-July.

Scirpus americanus Pers. (American Bulrush—Common, along margins of ponds, lakes, marshes, and streams. Flowers late May to mid-June.

Scirpus atrovirens Willd. (Greenscale Bulrush)—Common, in seasonally moist roadside ditches and along margins of ponds, lakes, marshes, and streams. Flowers late June to mid-August.

Scirpus fluviatilis (Torr.) Gray (River Bulrush)—Occasional, along banks of rivers, ponds, streams, lakes, marshes, and seasonally moist roadside ditches. Flowers late July to mid-August.

Scirpus heterochaetus Chase (Slender bulrush)—Occasional, in shallow water of ponds, streams, lakes, and marshes. Flowers mid-June to mid-July.

Scirpus maritimus L. var. *paludosus* (A. Nels.) Kukenth. (Prairie bulrush)—Occasional, in very shallow saline ponds and marshes, and seasonally moist roadside ditches. Flowers early July to late August.

Scirpus microcarpus Presl. var. *rubrotinctus* (Fern.) M. E. Jones (Redstem bulrush)—Occasional, along margins of swamps, marshes, ponds, streams, lakes, and other seasonally moist places. Flowers early July to mid-August.

Scirpus pallidus (Britt.) Fern. (Darkgreen bulrush)—Occasional, in seasonally moist roadside ditches and along margins of ponds, lakes, marshes, and streams. Flowers late June to mid-August.

Scirpus validus Vahl. (Soft-stem bulrush)—Common, in clones along the shores and in emergent zones of ponds, streams, marshes, and lakes. Flowers mid-June to mid-July.

POACEAE (Grass Family)

Agrohordeum macounii (Vasey) Lepage.—Occasional, in moist roadside ditches and disturbed prairie. Flowers mid-June to mid-July.

Agropyron caninum (L.) Beauv. spp. *majus Vasey*) C. L. Hitchc. var. *majus* (Slender wheatgrass)—Occasional, in moist to dry sandy prairie. Flowers mid-June to late August.

Agropyron caninum (L.) Beauv. ssp. *majus* (Vasey) C. L. Hitchc. var. *unilaterale* Vasey (Bearded wheatgrass)—Common, sandy prairie. Flowers mid-June to August.

Agropyron cristatum (L.) Gaertn. (Crested Wheatgrass)—Occasional, in roadside ditches and widely planted in prairie pasture. Flowers mid-June to early August.

Agropyron elongatum (Host) Beauv. (Tall wheatgrass)—Occasional, usually planted as a cover crop or wildlife planting on wildlife easement areas. Flowers mid-July to early August.

Agropyron intermedium (Host.) Beauv. (Intermediate wheatgrass)—Occasional, introduced pasture grass, planted in road ditches and pastures. Flowers mid-July to early August.

Agropyron repens (L.) Beauv. (Common quackgrass)—Common, in dry prairie and disturbed areas. Flowers early to late July.

Agropyron smithii Pydb. (Western wheatgrass)—Common, in upland prairie. Flowers mid-June to late July.

Agrostis scabra Willd. (Tickle grass)—Occasional, in low prairie area. Flowers late June to early August.

Agrostis stolonifera L. (Redtop)—Occasional, in low moist prairie and roadside ditches. Flowers early June to late July.

Alopecurus aequalis Sobol. (Shortawn foxtail)—Rare, in low moist prairie meadows and edges of ponds. W. B. Bell 264, Richland Co. Flowers late May to late July.

Andropogon gerardii Vitman (Big bluestem)—Common, in low moist prairie meadows. Flowers mid-July to late August.

Andropogon hallii Hack. (Sand bluestem)—Occasional, in dry sandy prairie, sand blowouts, and sand dunes. Flowers late July to late August.

Andropogon scoparius Michx. (Little bluestem)—Common, in sandy upland prairie and prairie hillsides. Flowers late July to late August.

Aristida purpurea Steud. var. *longiseta* (Steud.) Vasey (Red threeawn)—Occasional, on dry prairie hillsides. Flowers early July.

Avena fatua L. (Wild oat)—Common, in cultivated fields and other disturbed waste areas. Flowers late June to late July.

Avena sativa L. (Common oat)—Common, cultivated but not persisting. Flowers late June to late July.

Beckmannia syzigachne (Steud.) Fern. (American sloughgrass)—Common, in moist soil along marshes, ponds, lakes, and in moist roadside ditches. Flowers late June to late July.

Bouteloua curtipendula (Michx.) Torr. var. *curtipendula* (Side-oats grama)—Common, on dry prairie hillsides. Flowers early July to late August.

Bouteloua gracilis (H.B.K.) Lag. ex Griffiths (Blue grama)—Common, in dry upland prairie. Flowers mid-July to latge August.

Bouteloua hirsuta Lag. (Hairy grama)—Occasional, in dry sandy prairie. Flowers mid-July to late August.

Bromus ciliatus L. (Fringed brome)—Occasional, in moist woodland and along margins of woodland. Flowers early July to late August.

Bromus inermis Leyss. ssp. *inermis* (Smooth brome)—Common, introduced pasture grass, naturalized along roadside ditches and waste areas. Flowers early June to mid-July.

Bromus japonicus Thunb. ex Murr. (Japanese chess)—Occasional, in upland prairie and roadside ditches. Flowers mid-June to late July.

Bromus latiglumis (Shear.) Hitchc. (Earleaf brome)—Rare, in woodland and along margins of woodland in thickets. O. A. Stevens 283, Richland Co. Flowers mid-July to late August.

Bromus pubescens Muhl. ex Willd. (Canada brome)—Rare, in moist open woods and thickets. Flowers late June to August.

Bromus tectorum L. (Cheatgrass brome)—Occasional, in roadside ditches and other disturbed waste areas. Flowers late May to late June.

Buchloe dactyloides (Nutt.) Engelm. (Buffalo-grass)—Occasional, in upland prairie. Flowers June to early July.

Calamagrostis canadensis (Michx.) Beauv. (Bluejoint reedgrass)—Occasional, in moist prairie meadow. Flowers early June to late July.

Calamagrostis montanensis Scribn. (Plains reedgrass)—Rare, in dry upland prairie. L. R. Waldron June 29, 1904, Ransom Co. Flowers late June to mid-August.

Calamagrostis stricta (Timm.) Koel. (Northern reedgrass)—Occasional, in low moist prairie and along the margins of marshes, ponds, and lakes. Flowers mid-June to late August.

Calamovilfa longifolia (Hook.) Scribn. (Prairie sandreed)—Common, in dry sandy prairie and sand blowouts. Flowers mid-July to late August.

Catabrosa aquatica (L.) Beauv. (Common brookgrass)—Rare, in shallow water of streams or springs. O. A. Stevens 360, Richland Co. Flowers early June to mid-July.

Cenchrus longispinus (Hack.) Fern. (Longspine sandbur)—Common, in sand blowouts and dry sandy prairie. Flowers mid-July to mid-August.

Cinna arundinacea L. (Stout woodreed)—Rare, in moist alluvial woods. O. A. Stevens 2761, Ransom Co. Flowers July to August.

Cinna latifolia (Trev. ex Goepp.) Griseb. (Dropping woodreed)—Rare, in moist alluvial woods. O. A. Stevens 1488, Richland Co. Flowers July to August.

Dactylis glomerata L. (Orchardgrass)—Occasional, planted for hay and occasionally growing as an escape. Flowers June to mid-July.

Dichanthelium acuminatum (Sw.) Gould & Clark var. *acuminatum* (Woolly dichanthelium)—Occasional, in prairie and open woods. Flowers mid-July to late August.

Dichanthelium acuminatum (Sw.) Gould & Clark var. *villosum* Gray (Early panic grass)—Rare, in dry sandy prairies and sand dunes. Flowers July to August.

Dichanthelium leibergii (Vasey) Freckmann (Leiberg dichanthelium)—Occasional, in low moist prairie. Flowers early June to late July.

Dichanthelium oligosanthes (Schult.) Gould var. *scribnerianum* (Nash) Gould (Scribner dichanthelium)—Occasional, in dry sandy prairie and sand blowouts. Flowers early July to mid-August.

Dichanthelium wilcoxianum (Vasey) Freckmann (Wilcox dichanthelium)—Occasional, in dry sandy prairie and sandhills. Flowers early June to late July.

Digitaria ischaemum (Scheb. ex Schweigg.) Muhl. (Smooth crabgrass)—Occasional, in lawns and waste area. Flowers August to early September.

Digitaria sanguinalis (L.) Scop. (Large crabgrass)—Occasional, in fields, gardens, lawns and waste places. Flowers July to early September.

Distichlis spicata (L.) Greene var. *stricta* (Torr.) Beetle. (Inland saltgrass)—Occasional, in low moist alkaline prairie. Flowers late June to mid-August.

Echinochloa crusgalli (L.) Beauv. (Common barnyardgrass)—Common, in moist disturbed areas and along margins of ponds and marshes. Flowers July to late August.

Elymus canadensis L. (Canada wild rye)—Common, in low prairie and edges of sand blowouts. Flowers June to early August.

Elymus interruptus Buckl. (Texas wild rye)—Rare, in woods and moist areas. W. J. Wanek 236, Richland Co. Flowers mid-July.

Elymus villosus Muhl. ex. Willd. (Slender wild rye)—Occasional, in woodland and in thickets at the margins of woodlands. Flowers late June to late August.

Elymus virginicus L. (Virginia wild rye)—Occasional, in moist open woodland. Flowers early July to late August.

Eragrostis cilianensis (All.) E. Mosher (Stink grass)—Common, in dry disturbed places and sandy roadside ditches. Flowers early July to late August.

Eragrostis hypnoides (Lam.) B.S.P. (Creeping Lovegrass)—Occasional, in moist soil along marshes, streams, and ponds. Flowers early July to late August.

Eragrostis pectinacea (Michx.) Nees. (Tufted Lovegrass)—Occasional, in disturbed areas and cultivated fields. Flowers July to mid-August.

Eragrostis spectabilis (Pursh.) Steud. (Purple Lovegrass)—Rare, in sandy upland prairie. W. T. Barker 6147, Ransom Co. Flowers August.

Festuca obtusa Biehler (Nodding fescue)—Occasional, in moist woodland. Flowers early June to mid-July.

Festuca octoflora Walt. (Six-weeks fescue)—Occasional, dry upland prairie. Flowers late May to late June.

Festuca pratensis Huds. (Meadow fescue)—Rare, in prairie meadows, pastures, roadsides, and waste areas. O. A. Stevens June 17, 1961, Richland Co. Flowers June to July.

Glyceria borealis (Nash.) Batch. (Northern mannagrass)—Occasional, in shallow water or other moist places. Flowers early June to late August.

Glyceria grandis S. Wats. ex A. Gray (American mannagrass)—Common, along margins of streams, marshes, ponds, and other low moist ground. Flowers early June to late August.

Glyceria striata (Lam.) A. Hitchc. (Fowl mannagrass)—Occasional, along margins of ponds, streams, marshes, and moist ground. Flowers early June to late July.

Helictotrichon hookeri (Scribn.) Henr. (Spike oats)—Occasional, in dry upland prairie and prairie hillsides. Flowers late June to early July.

Hierochloe odorata (L.) Beauv. (Common sweetgrass)—Occasional, in low moist meadows and along margins of marshes and streams. Flowers late May to late June.

Hordeum jubatum L. (Wild barley)—Common, in low prairie fields, meadows, and roadside ditches. Flowers early June to late July.

Hystrix patula Moench. (Common bottlebrush Grass)—Occasional, in rich woodland. Flowers early June to early August.

Koeleria pyramidata (Lam.) Beauv. (Prairie Junegrass)—Common, in dry sandy prairie and edges of sand blowouts. Flowers early June to late July.

Leersia oryzoides (L.) Sw. (Rice cutgrass)—Occasional, in swampy area and wet soil along stream banks. Flowers mid-July to late August.

Leersia virginica Willd. (White cutgrass)—Occasional, in wooded gully and on sandbar of Sheyenne River. Flowers mid-July to late August.

Leptochloa fascicularis (Lam.) Gray (Bearded sprangletop)—Occasional, along margins of saline ponds and streams. Flowers early July to mid-August.

Lolium perenne L. var. *perenne* (Perennial ryegrass)—Rare, escapes cultivation into disturbed areas such as sandbars of the Sheyenne River. Flowers June to July.

Lolium temulentum L. var. *leptochaeton* A. Br. (Poison darnel)—Rare, in edges of fields, waste areas, and roadsides. W. B. Bell 506, Richland Co. Flowers June to July.

Muhlenbergia asperifolia (Ness. & Meyen.) Parodi (Scratchgrass)—Occasional, on dry stream banks and moist soil of ponds and stream margins. Flowers early July to late August.

Muhlenbergia cuspidata (Torr.) Rydb. (Plains muhly)—Occasional, on prairie hillside and dry open prairie. Flowers late July to late August.

Muhlenbergia frondosa (Poir.) Fern. (Wirestem muhly)—Occasional, in moist open woods and woodlands along streams. Flowers mid- to late August.

Muhlenbergia racemosa (Michx.) B.S.P. (Marsh muhly)—Occasional, in low moist prairie meadows and along margins of streams, marshes, and ponds. Flowers late July to mid-August.

Muhlenbergia richardsonis (Trin.) Rydb. (Mat muhly)—Occasional, in low moist prairie meadows and along margins of marshes, ponds, and streams. Flowers late July to mid-August.

Oryzopsis asperifolia Michx. (Rough-leaved ricegrass)—Rare, in rich woodlands and aspen woods. O. A. Stevens 1525, Richland Co. Flowers late May to late June.

Oryzopsis racemosa (Sm.) Ricker. (Black-seed ricegrass)—Occasional, in rich woodlands. Flowers early May to late June.

Panicum capillare L. (Witchgrass panic)—Common, in disturbed prairie areas, roadside ditches, and other waste areas. Flowers mid-July to mid-August.

Panicum miliaceum L. (Broom-corn millet)—Occasional, escapes from cultivation into roadside ditches and disturbed areas. Flowers early July to late August.

Panicum virgatum L. (Switchgrass panic)—Common, in moist prairie and along margins of streams, ponds, and marshes. Flowers mid-July to mid-August.

Phalaris arundinacea L. (Reed canarygrass)—Common, in low wet meadows and along margins of marshes, ponds, and streams. Flowers early June to early August.

Phleum pratense L. (Common timothy)—Common, in low prairie meadows and disturbed waste areas. Flowers early June to late July.

Phragmites australis (Cav.) Trin. (Common reed)—Common, in emergent zones of ponds, streams, lakes, marshes, and roadside ditches. Flowers late July to late August.

Poa annua L. (Annual bluegrass)—Occasional, in prairie and cultivated lawns. Flowers late May to late June.

Poa arida Vasey (Plains bluegrass)—Rare, in saline prairie and in moist saline coulees. O. A. Stevens 361, Ransom Co. Flowers May to June.

Poa compressa L. (Canada bluegrass)—Occasional, in dry prairie and moist shaded woodland. Flowers mid-June to mid-July.

Poa interior Rydb. (Inland bluegrass)—Occasional, on mid-prairie hillsides, between lowland and upland prairie. Flowers early June to late July.

Poa palustris L. (Fowl bluegrass)—Occasional, in low moist prairie and along margins of streams, ponds, and marshes. Flowers early June to early August.

Poa pratensis L. (Kentucky bluegrass)—Common, in sandy prairie and moist meadows. Flowers mid-May to mid-July.

Puccinellia nuttallina (Schult.) Hitchc. (Alkali-grass)—Occasional, in low alkaline prairie, and along margins of alkaline marshes, ponds, and sloughs. Flowers mid-June to mid-July.

Redfieldia flexuosa (Thurb.) Vasey (Common blowout-grass)—Common, in sand blowouts and sand dunes. Flowers mid-July to August.

Schizachne purpurascens (Torr.) Swall. (Common false melic)—Occasional, in moist aspen woods. Flowers late May to late June.

Scholochloa festucacea (Willd.) Link (Common rivergrass)—Occasional, in standing water at the margins of ponds, marshes, and streams. Flowers early June to mid-July.

Secale cereale L. (Common rye)—Common, escapes cultivation into disturbed areas, but does not persist. Flowers May to June.

Setaria glauca (L.) Beauv. (Yellow pigeongrass)—Common, in cultivated areas and other disturbed places. Flowers early July to late August.

Setaria italica (L.) Beauv. (Foxtail millet)—Occasional, escapes cultivation into disturbed roadside ditches and other disturbed areas. Flowers mid-July to mid-August.

Setaria verticillata (L.) Beauv. (Bur pigeongrass)—Occasional, in cultivated fields and disturbed waste areas. Flowers July to late August.

Setaria viridis (L.) Beauv. (Green pigeongrass)—Common, in waste places, cultivated fields, and roadside ditches. Flowers early July to mid-August.

Sorghastrum nutans (L.) Nash (Yellow Indian-grass)—Occasional, in moist tall-grass prairie and moist lowland meadows. Flowers early to late August.

Spartina gracilis Trin. (Alkali cordgrass)—Occasional, in sandy prairie and prairie meadows. Flowers mid-July to mid-August.

Spartina pectinata Link. (Prairie cordgrass)—Common, in low wet prairie meadows and along margins of ponds, marshes, and streams. Flowers mid-July to late August.

Sphenopholis obtusata (Michx.) Scribn. var. *major* (Torr.) Erdman. (Slender wedgegrass)—Occasional, in moist prairie. Flowers late June to late July.

Sphenopholis obtusata (Michx.) Scribn. var. *obtusata* (Prairie wedgegrass)—Occasional, lowland prairie meadows and prairie thickets. Flowers early July to mid-August.

Sporobolus asper (Michx.) Knuth. var. *asper* (Rough dropseed)—Occasional, dry sandy upland prairie. Flowers mid-July to mid-August.

Sporobolus cryptandrus (Torr.) A. Gray (Sand dropseed)—Common, in dry sandy prairie and sandhills. Flowers early July to mid-August.

Sporobolus heterolepis (A. Gray) A. Gray (Prairie dropseed)—Occasional, in low sandy prairie and sandhills. Flowers late July to late August.

Sporobolus neglectus Nash (Small dropseed)—Rare, in disturbed waste areas and dry prairie. P. Tryba September 7, 1961, Richland Co. Flowers mid-August to early September.

Stipa comata Trin. & Rupr. (Needle-and-thread)—Common, in dry sandy prairie and sandy ridges. Flowers late May to late June.

Stipa spartea Trin. (Porcupine needlegrass)—Occasional, in low prairie. Flowers late June to late July.

Stipa viridula Trin. (Green needlegrass)—Common, in dry upland prairie. Flowers early June to mid-July.

Triplasis purpurea (Walt.) Chapm. (Purple sandgrass)—Rare, dry sandy prairie and sandhills. W. Wanek August 20, 1964, Richland Co. Flowers mid-August to early September.

Triticum aestivum L. (Bread wheat)—Common, in cultivated fields and often escaping, but rarely persisting. Flowers late June to mid-July.

Zizania aquatica L. (Wild rice)—Occasional, in quiet waters of ponds, streams, and lakes. Flowers late July to early September.

SPARGANIACEAE (Bur-reed Family)

Sparganium eurycarpum Engelm. (Giant bur-reed)—Occasional, in shallow water and along margins of ponds, marshes, streams, and lakes. Flowers late June to early July.

TYPHACEAE (Cattail Family)

Typha antustifolia L. (Narrow-leaved cattail)—Common, along margins of ponds, lakes, streams, and marshes. Flowers mid-June to mid-July.

Typha x *glauca* Godr. (Hybrid cattail)—Common, along margins of ponds, lakes, streams, and marshes. Flowers mid-June to mid-July.

Typha latifolia L. (Broad-leaved cattail)—Common, along margins of ponds, lakes, streams, and marshes. Flowers mid-June to mid-July.

PONTEDERIACEAE (Pickerelweed Family)

Heteranthera dubia (Jacq.) Mac M. (Water stargrass)—Rare, in quiet water at the edge of the Red River. H. F. Bergman July 4, 1910, Richland Co. Flowers late June to late July.

LILIACEAE (Lily Family)

Allium stellatum Ker (Pink wild onion)—Common, in dry sandy prairie and sandhills. Flowers early July to late August.

Allium textile A. Nels. & Macbr. (Prairie onion)—Common, dry upland prairie to moist lowland prairie. Flowers late May to late June.

Allium tricoccum Ait. (Wild leek)—Occasional, in rich woodland. Flowers early July to late July.

Asparagus officinalis L. (Asparagus)—Occasional, escapes from cultivation into area bordering woodland and moist prairies. Flowers early June to mid-July.

Hypoxis hirsuta (L.) Cov. (Common Yellow stargrass)—Common, in moist low prairie meadows. Flowers late May to late June.

Lilium philadelphicum L. var. *andinum* (Nutt.) Ker (Wild lily)—Occasional, in moist prairie meadows, tall-grass prairie, and moist coulees. Flowers late June to early August.

Maianthemum canadense Desf. var. *interius* Fern. (False lily-of-the-valley)—Rare, in well shaded moist woodland and aspen woodland. O. A. Stevens June 18, 1938, Richland Co. Flowers late May to late June.

Polygonatum biflorum (Walt.) Ell. (Small Solomon's seal)—Common, in moist well shaded rich woodland. Flowers early June to early July.

Smilacina racemosa (L.) Desf. (False Solomon's seal)—Occasional, in moist rich woodlands. Flowers late May to mid-June.

Smilacina stellata (L.) Desf. (Starry false Solomon's seal)—Common, in moist rich woodlands and open aspen woodlands. Flowers late May to late June.

Trillium cernuum L. (Nodding wake robin)—Occasional, in moist rich basswood woodlands and other rich moist woodlands. Flowers late May to late June.

Uvularia grandiflora Sm. (Large bellwort)—Occasional, in moist rich woodland along the Sheyenne River and wooded coulees. Flowers early May to early June.

Zigadenus elegans Pursh. (Mountain Death camuss)—Occasional, in low moist prairie meadows. Flowers early June to mid-July.

IRIDACEAE (Iris Family)

Sisyrinchium montanum Greene (Colorado blue-eyed-grass)—Common, in lowland to upland prairie. Flowers late May to mid-July.

SMILACEAE Vent. (Catbrier Family)

Smilax herbacea L. var. *lasioneuron* (Small) Rydb. (Carrion-flower)—Common, in moist rich woodland and moist wooded ravines. Flowers late May to early July.

ORCHIDACEAE (Orchid Family)

Cypripedium calceolus L. var. *parviflorum* (Salisb.) Fern. (Yellow lady's slipper)—Rare, in rich woods, wet prairies, and moist thickets. Flowers early to late June.

Cypripedium calceolus L. var. *planipetalum* (Fern.) Vict. & Rouss (Yellow lady's slipper)—Rare, in rich woods and moist thickets. Flowers early to late June.

Cypripedium candidum Muhl. ex Willd. (Small white lady's slipper)—Rare, low moist prairie meadow. Flowers early to late June.

Cypripedium reginae Walt. (Showy lady's slipper)—Rare, swampy woodland. Flowers late June to mid-July.

Habenaria hyperborea (L.) R. Br. (Northern bog orchid)—Occasional, in moist rich woodland, aspen woodland, and seepage areas along margins of woodland. Floers mid-June to early August.

Habenaria leucopaea (Nutt.) Gray (Prairie fringed orchid)—Occasional, in low, moist, sandy prairie meadows. Flowers late June to mid-July.

Spiranthes cernua (L.) Rich. (Ladies'-tresses)—Occasional, in low, moist, and sandy prairies. Flowers late August to September.

DISCUSSION

The present study brings the known flora of Ransom, Richland, and Sargent counties to 871 taxa (Tables 1-3). The intensive collecting resulted in many new records for the study area of vascular plants known to occur elsewhere in North Dakota. Gerald Seiler was the first to report the naturalization of *Pinus banksiana*, and located *Arabis canadensis* and *Erigeron annuus*, which are new records for the state. John Challey, who has had a long-time interest in the fauna and flora of the sandhills, has been studying the distribution of rare plants in the sandhill region for the North Dakota Natural Heritage Program for the past two years. He has located several new records for the study area. He found the second record of *Botrychium minganense* for North Dakota and the new state record of *Gymnocarpium dryopteris*.

The flora of this three-county area is the richest and most diverse flora studied to date in North Dakota. Floristic studies of an area are never complete. Plants are constant being introduced and others disappear due to human activity. It is hoped that this study will help us to be more aware of the uniqueness and aid in the preservation of examples of this valuable flora.

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Table 1. Statistical summary of vascular plant families of Richland, Ransom, and Sargent Counties.

Families	Genera	Species	Hybrids	Intraspecific Taxa	Taxa
Equisetaceae	1	6	1	6	7
Ophioglossaceae	2	3	0	3	3
Polypodiaceae	7	8	0	8	8
Cupressaceae	1	1	0	1	1
Pinaceae	1	1	0	1	1
Aristolochiaceae	1	1	0	1	1
Nymphaeaceae	1	1	0	1	1
Ceratophyllaceae	1	1	0	1	1
Ranunculaceae	8	27	0	27	27
Berberidaceae	1	1	0	1	1
Menispermaceae	1	1	0	1	1
Papaveraceae	1	1	0	1	1
Fumariaceae	3	3	0	3	3
Ulmaceae	2	4	0	4	4
Cannabaceae	2	2	0	2	2
Urticaceae	4	5	0	5	5
Fagaceae	1	1	0	1	1
Betulaceae	4	5	1	5	6
Nyctaginaceae	1	3	0	3	3
Cactaceae	1	1	0	1	1
Chenopodiaceae	10	22	0	22	22
Amaranthaceae	1	5	0	5	5
Portulacaceae	1	1	0	1	1
Caryophyllaceae	7	15	0	15	15
Polygonaceae	2	20	0	20	20
Clusiaceae	1	2	0	2	2
Tiliaceae	1	1	0	1	1
Malvaceae	4	5	0	5	5
Cistaceae	3	3	0	3	3
Violaceae	1	8	0	8	8
Cucurbitaceae	2	2	0	2	2
Losaceae	1	1	0	1	1
Salicaceae	2	17	0	17	17
Capparaceae	2	2	0	2	2
Brassicaceae	19	33	0	33	33
Ericaceae	1	1	0	1	1
Pyrolaceae	1	3	0	3	3
Monotropaceae	1	1	0	1	1
Primulaceae	3	6	0	6	6
Grossulariaceae	1	5	0	5	5
Crassulaceae	1	1	0	1	1
Saxifragaceae	2	3	0	3	3
Rosaceae	10	31	0	31	31
Mimosaceae	1	1	0	1	1
Fabaceae	18	39	0	40	40
Elaeagnaceae	2	3	0	3	3
Haloragaceae	1	1	0	1	1
Lythraceae	2	3	0	3	3
Onagraceae	5	11	0	11	11
Cornaceae	1	2	0	2	2

Table 1 continued

Families	Genera	Species	Hybrids	Intraspecific Taxa	Taxa
Santalaceae	1	1	0	2	2
Celastraceae	2	2	0	2	2
Euphorbiaceae	1	5	1	5	6
Rhamnaceae	1	3	0	3	3
Vitaceae	2	3	0	3	3
Linaceae	1	4	0	4	4
Polygalaceae	1	3	0	3	3
Aceraceae	1	2	0	2	2
Anacardiaceae	2	2	0	2	2
Rutaceae	1	1	0	1	1
Zygophyllaceae	1	1	0	1	1
Oxalidaceae	1	3	0	3	3
Balsaminaceae	1	2	0	2	2
Araliaceae	1	1	0	1	1
Apiaceae	12	17	0	17	17
Gentianaceae	1	2	0	2	2
Apocynaceae	1	3	0	3	3
Asclepiadaceae	1	8	0	8	8
Solanaceae	3	7	0	7	7
Convolvulaceae	1	2	0	2	2
Cuscutaceae	1	5	0	5	5
Menyanthaceae	1	1	0	1	1
Polemoniaceae	2	2	0	2	2
Hydrophyllaceae	2	2	0	2	2
Boraginaceae	6	9	0	9	9
Verbenaceae	2	5	0	5	5
Lamiaceae	17	21	0	22	22
Hippuridaceae	1	1	0	1	1
Callitrichaceae	1	1	0	1	1
Plantaginaceae	1	4	0	4	4
Oleaceae	1	1	0	2	2
Scrophulariaceae	11	17	0	17	17
Campanulaceae	2	6	0	6	6
Rubiaceae	5	11	0	11	11
Orobanchaceae	1	1	0	1	1
Lentibulariaceae	1	1	0	1	1
Caprifoliaceae	4	8	0	8	8
Asteraceae	47	115	0	122	122
Alismataceae	2	4	0	4	4
Hydrocharitaceae	1	1	0	1	1
Juncaginaceae	1	1	0	1	1
Potamogetonaceae	1	9	0	9	9
Ruppiaceae	1	1	0	1	1
Najadaceae	1	2	0	2	2
Zannichelliaceae	1	1	0	1	1
Araceae	1	1	0	1	1
Lemnaceae	3	5	0	5	5
Commelinaceae	1	2	0	2	2
Juncaceae	1	9	0	9	9
Cyperaceae	6	73	0	74	74
Poaceae	54	109	1	112	113

Table 1 continued

Families	Genera	Species	Hybrids	Intraspecific Taxa	Taxa
Sparganiaceae	1	1	0	1	1
Typhaceae	1	2	1	2	3
Pontederiaceae	1	1	0	1	1
Liliaceae	10	13	0	13	13
Iridaceae	1	1	0	1	1
Smilaceae	1	1	0	1	1
Orchidaceae	3	6	0	7	7
Totals	385	850	5	866	871

Table 2. Summary of the major groups of vascular plants.

Major Groups	Families	Genera	Species	Hybrids	Intraspecific Taxa	Taxa
Pteridophytes	3	10	17	1	17	18
Conifers	2	2	2	0	2	2
Dicots	83	281	588	2	599	601
Monocots	20	92	243	2	248	250
Totals	108	385	850	5	866	871

Table 3. The ten largest families in terms of diversity of the vascular flora of Richland, Ransom, and Sargent counties.

Families	Genera	Species	Hybrids	Intraspecific Taxa	Taxa
Asteraceae	47	115	0	122	122
Poaceae	54	109	1	112	113
Cyperaceae	6	73	0	74	47
Fabaceae	18	39	0	40	40
Brassicaceae	19	33	0	33	33
Rosaceae	10	31	0	31	31
Ranunculaceae	8	27	0	27	27
Chenopodiaceae	10	22	0	22	22
Lamiaceae	17	21	0	22	22
Polygonaceae	2	20	0	20	20

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North Dakota Fleas. IX. Siphonapterans of Mammals in Southwestern North Dakota

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ABSTRACT — A list of 24 species of fleas from southwestern North Dakota includes eight new records for the area. Of these, *Callistopsyllus terinus campestris* Holland, *Meringis parkeri* Jordan, *Myodopsylla insignis* (Rothschild), *Opisocrostis hirsutus* (Baker), *O. tuberculatus cynomuris* Jellison, and *Thrassis fotus* (Jordan) also constitute new records for the state.

The mammalian fauna of the Northern Great Plains is relatively well known and several surveys also have noted the presence of fleas and other ectoparasites. Areas adjacent to southwestern North Dakota having such reports include Harding County in extreme northwestern South Dakota (Andersen and Jones 1971) and Carter County in the southeastern corner of Montana (Jones et al. 1973, Lampe et al. 1974). Sixteen species of fleas have been recorded from southwestern North Dakota, including 11 species listed by Genoways and Jones (1972). These 11, plus the other five species, are presented in Table 1.

Objectives of this study were to determine the diversity and distribution of mammalian ectoparasites in the southwestern portion of the state. In this paper, only the flea component is presented.

SITES AND METHODS

During the summers of 1976 and 1977, 21 black-tailed prairie dogs (*Cynomys ludovicianus*) and 88 thirteen-lined ground squirrels (*Spermophilus tridecemlineatus*) were collected either by shooting or kill-trapping in the counties south and west of the Missouri River in North Dakota. Additional fleas collected in the summer of 1977 from an unknown number of prairie dogs in Billings County also were incorporated into the study. Lastly, a series of miscellaneous parasites was contributed by a collecting team involved with an extensive mammal survey of the same region (Seabloom et al. 1978). All fleas were preserved in 70% ethanol, bleached in 10% potassium hydroxide, dehydrated, cleared, and mounted by standard methods.

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RESULTS AND DISCUSSION

A total of 450 fleas representing 15 species was identified. Eight of these constitute new geographic records for the area, and six are also new for the state. Each of the six is discussed in the same sequence as listed in Table 1. All accession numbers refer to voucher specimens deposited in the University of North Dakota Parasitology Collection.

Callistopsyllus terinus campestris Holland

No. 1354-1357 from *Peromyscus maniculatus*, Burning Coal Vein area, Slope Co. Fleas examined: 4 males, 10 females.

Until recently, *Callistopsyllus* contained three species, *C. terinus*, *C. deuterus*, and *C. campestris*. Although they show strong affinities with deer mice in western North America, *C. campestris* was described as a northern prairie species, distinct from the more western, montane taxa (Holland 1949). A detailed review of the genus reduced the three species to subspecific status, leaving *C. terinus* as the only valid species (Tipton et al. 1979). Differences between females are minor and unreliable, but males are sufficiently distinctive to allow subspecific identification. All males in our study have the movable process of the clasper bluntly rounded and sternum VIII has a concave posterior margin. None of our specimens show intergradations with *C. t. terinus*, but reports of this subspecies from southeastern Montana (Lampe et al. 1974) and southwestern North Dakota (Genoways and Jones 1972) indicate that it and *C. t. campestris* have overlapping ranges.

Meringis parkeri Jordan

No. 1322 from *Dipodomys ordi*, near Marmath, Slope Co.; No. 1323 from *Peromyscus maniculatus,* about 39 km northeast of Watford City, McKenzie Co. Fleas examined: 1 male, 1 female.

The genus *Meringis* is also widely distributed throughout the western United States, and the 17 or 18 described species are primarily parasites of kangaroo rats (*Dipodomys*). Other ecological associates in arid regions may also serve as hosts. *Meringis parkeri* ranges from southeastern Montana (Jellison and Senger 1973) southward to western Texas (Eads and Menzies 1949). Its occurrence in North Dakota is a northeastward extension of its known range.

Myodopsylla insignis (Rothschild)

No. 1424-1427 from *Myotis keenii*, about 16 km south of Golden Valley, Mercer Co. Fleas examined: 3 males, 3 females.

Across much of the eastern two-thirds of North America, bats (*Myotis*) commonly possess *Myodopsylla insignis*. In the west, *M. gentilis* usually replaces it, but the two species are sympatric in northwestern South Dakota (Andersen and Jones 1971, Easton 1982), and probably throughout the Northern Great Plains. Subsequent to our study, Dood (1980) collected *M. insignis* from the little brown bat (*Myotis lucifugus*) in Benson and Eddy counties in east-central North Dakota.

A third but rarely collected species, *Myodopsylla borealis*, was described from Carter County, Montana, and from southeastern Minnesota (Lewis 1978). One would expect *M. borealis* to also occur across the Dakotas.

Opisocrostis hirsutus (Baker)

No. 1341 from *Spermophilus tridecemlineatus*, near Beach, Golden Valley Co.; No. 1342, 1343 from *Cynomys ludovicianus*, near Fort Rice, Morton Co.; No. 1344, 1345 from *C. lucovicianus*, near Cartwright, McKenzie Co.; No. 1346-1349 from *C. ludovicianus*, Theodore Roosevelt National Park (South Unit), Billings Co. Fleas examined: 21 males, 65 females.

Opisocrostis hirsutus is the most common flea parasitizing prairie dogs (*Cynomys* spp.) throughout their range. In the present study, 85 of 89 fleas recovered from black-tailed prairie dogs were *O. hirsutus*. This flea occasionally occurs on ground squirrels and rabbits.

Opisocrostis tuberculatus cynomuris Jellison

No. 1350 from *Cynomys ludovicianus*, Theodore Roosevelt National Park (South Unit), Billings Co. Fleas examined: 1 male.

In addition to *O. hirsutus*, Jellison (1939, 1947) considered *O. t. cynomuris* to be another flea typical of prairie dogs. He also noted that among white-tailed prairie dogs (*C. gunnisoni*) in Wyoming, most fleas were *O. t. cynomuris*. Among the black-tailed species the reverse was true (i.e., mostly *O. hirsutus*, few *O. t. cynomuris*). Our collections support the latter situation with a flea ratio of 85 to 1. The closely related subspecies *O. t. tuberculatus* and its preferred host, *Spermophilus richardsoni*, are not known to occur in southwestern North Dakota. Although this flea infests other species of *Spermophilus*, it apparently has not yet become part of the flea fauna of thirteen-lined ground squirrels in southwestern North Dakota.

Thrassis fotus (Jordan)

No. 1358 from *Thomomys talpoides*, about 32 km north of Killdeer, Dunn Co.; No. 1359-1362 from *Spermophilus tridecemlineatus*, Bowman Co.; No. 1363 from *S. tridecemlineatus*, Burning Coal Vein area, Slope Co.; No. 1364, 1365 from *Cynomys ludovicianus*, near Fort Rice, Morton Co.; No. 1366, 1367 from *S. tridecemlineatus*, near Flasher, Morton Co.; No. 1368-1370 from *S. tridecemlineatus*, near Cartwright, McKenzie Co. Fleas examined: 16 males, 37 females.

The public health importance of *Thrassis* as a vector of plague in western North America is well documented. The first evidence of this disease in the Great Plains came from infected *Thrassis bacchi bacchi* collected in Divide County (Prince 1943). *Thrassis fotus* is the second species in the genus to be reported from North Dakota, and both have strong affinities for ground squirrels. Stark's (1970) distribution map for *T. fotus* correctly predicted that this flea would be present in southwestern North Dakota, but he failed to include the sympatric species, *T. b. bacchi*. Our collections and those of Genoways and Jones (1972) confirm its presence. During the summer of 1976, 64 of 88 thirteen-lined ground squirrels possessed fleas. With the exception of one specimen of *Opisocrostis*

Table 1. Fleas of mammals in Southwestern North Dakota by host and county*

Parasite	Host	Adams	Billings	Bowman	Dunn	Golden Valley	Grant	Hettinger	McKenzie	Mercer	Morton	Oliver	Slope	Stark	"SW No. Dakota"
PULICIDAE															
Cediopsylla inaequalis inaequalis	*Lepus townsendi*	–	–	3a	–	–	–	–	–	–	–	–	3a	–	–
	Sylvilagus audubonii	–	–	–	–	–	–	–	–	–	–	–	7	–	–
	Sylvilagus sp.	–	–	–	–	–	–	–	–	–	–	–	7	–	–
Euhoplopsyllus glacialis affinis	*Lepus townsendi*	–	–	3a	–	–	–	–	–	–	–	–	3a	–	–
	Sylvilagus audubonii	–	7	–	–	–	–	–	–	–	–	–	–	–	–
Pulex irritans	*Canis latrans*	–	–	–	–	–	–	–	–	–	–	–	–	7	–
	Lepus townsendi	–	–	3a	–	–	–	–	–	–	–	–	3a	–	–
HYSTRICHOPSYLLIDAE															
+*Callistopsyllus terinus campestris*	*Peromyscus maniculatus*	–	–	–	–	–	–	–	–	–	–	–	7	–	–
Callistopsyllus terinus terinus	*Peromyscus maniculatus*	–	–	–	–	–	–	–	–	–	–	–	–	–	5
Epitedia wenmanni wenmanni	*Peromyscus maniculatus*	–	–	–	–	–	–	–	–	–	–	–	–	–	5
Meringis jamesoni	*Onychomys leucogaster*	–	–	–	–	–	–	–	–	–	–	–	–	–	5
	Perognathus fasciatus	–	–	–	–	–	–	–	–	–	–	–	–	–	5
	Peromyscus maniculatus	–	–	–	–	–	–	–	–	–	–	–	–	–	5
+*Meringis parkeri*	*Dipodomys ordi*	–	–	–	–	–	–	–	–	–	–	–	7	–	–
	Peromyscus maniculatus	–	–	–	–	–	–	–	7	–	–	–	–	–	–
ISCHNOPSYLLIDAE															
+*Myodopsylla insignis*	*Myotis keenii*	–	–	–	–	–	–	–	–	7	–	–	–	–	–
LEPTOPSYLLIDAE															
Peromyscopsylla hesperomys	*Microtus pennsylvanicus*	–	–	–	–	–	–	–	–	–	1	–	–	–	–
CERATOPHYLLIDAE															
Foxella ignota albertensis	*Onychomys leucogaster*	–	–	7	–	–	–	–	–	–	–	–	–	–	–
	Peromyscus maniculatus	–	–	–	–	–	–	–	–	–	–	–	–	–	5
	Thomomys talpoides	–	–	7	7	–	–	–	–	–	–	–	–	–	5
Megabothris lucifer	*Microtus pennsylvanicus*	–	–	–	–	–	–	–	7	–	–	–	–	–	5
	Perognathus fasciatus	–	–	–	–	–	–	–	–	–	–	–	–	–	5
	Peromyscus maniculatus	–	–	–	–	–	–	–	–	–	–	–	–	–	5

Megabothris quirini	*Zapus sp.*	–	–	–	7	–	–	–	–	–	–	–	–	–	–
Monopsyllus eumolpi	unknown	–	–	–	–	–	–	–	2	–	–	–	–	–	–
	Eutamias minimus	–	7	–	7	–	–	–	–	–	–	–	4,7	–	5
Monopsyllus exilis	*Onychomys leucogaster*	–	–	–	–	–	–	–	–	–	–	–	–	–	5
Monopsyllus wagneri	*Microtus pennsylvanicus*	–	–	–	–	–	–	–	–	–	–	–	–	–	5
	Neotoma cinerea	–	–	–	5	–	–	–	–	–	–	–	–	–	–
	Onychomys leucogaster	–	–	7	–	–	–	–	–	7	–	–	–	–	–
	Peromyscus maniculatus	–	–	7	7	–	–	–	7	7	–	–	–	–	5
	Sorex cinereus	–	–	–	–	–	–	–	7	–	–	–	–	–	–
	Zapus hudsonius	–	–	–	–	–	–	–	–	–	–	–	–	–	5
	Zapus sp.	–	–	–	7	–	–	–	–	–	–	–	–	–	–
Opisocrostis bruneri	*Cynomys ludovicianus*	–	–	–	–	–	–	–	7	–	–	–	–	–	–
	Microtus pennsylvanicus	–	–	–	–	–	–	–	7	–	–	–	–	–	–
	Perognathus fasciatus	–	–	–	–	–	–	–	–	–	–	–	–	–	5
	Peromyscus maniculatus	–	–	–	–	–	–	–	7	–	–	–	–	–	–
	Spermophilus 13-lineatus	7	–	7	7	7	7	7	7	7	7	7	–	7	5
+*Opisocrostis hirsutus*	*Cynomys ludovicianus*	–	7	–	–	–	–	–	7	–	7	–	–	–	–
	Spermophilus 13-lineatus	–	–	–	–	7	–	–	–	–	–	–	–	–	–
+*Opisocrostis tuberculatus cynomuris*	*Cynomys ludovicianus*	–	7	–	–	–	–	–	–	–	–	–	–	–	–
Orchopeas caedens	"domestic dog"	–	–	–	–	–	–	7	–	–	–	–	–	–	–
Orchopeas leucopus	*Microtus pennsylvanicus*	–	–	–	–	–	–	–	–	–	–	–	–	–	5
	Peromyscus maniculatus	–	–	–	–	–	–	–	–	–	–	–	–	–	5
Orchopeas sexdentatus agilis	*Neotoma cinerea*	–	–	–	7	–	–	–	–	–	–	–	–	–	–
	Sylvilagus audubonii	–	6	–	–	–	–	–	–	–	–	–	–	–	–
Thrassis bacchi bacchi	*Onychomys leucogaster*	–	–	–	–	–	–	–	–	7	–	–	–	–	–
	Spermophilus 13-lineatus	7	–	7	7	7	7	7	7	7	7	7	–	7	5
+*Thrassis fotus*	*Cynomys ludovicianus*	–	–	–	–	–	–	–	–	–	7	–	–	–	–
	Spermophilus 13-lineatus	–	–	7	–	–	–	–	7	–	7	–	7	–	–
	Thomomys talpoides	–	–	–	7	–	–	–	–	–	–	–	–	–	–

+ New state record

[a] Original field notes indicate Slope and Bowman Counties, only.

* Numbers denote references: 1 = Johnson and Traub (1954); 2 = Johnson (1961); 3 = Voth and James (1966); 4 = Woods and Larson (1970); 5 = Genoways and Jones (1972); 6 = Larson (1978); 7 = this paper.

hirsutus, all fleas belonged to one of three species: 106 *O. bruneri*, 98 *T. b. bacchi* and 50 *T. fotus*. Although they are sympatric in southwestern North Dakota. the combination of infestations suggests competitive exclusion. Single species infections were similar (e.g., *O. bruneri* on 16 animals, *T. b. bacchi* on 10, *T. fotus* on 10), but the frequencies of dual infestations were skewed. *Opiscrostis bruneri* occurred with *T. b. bacchi* on 24 animals, but only three had *O. bruneri* plus *T. fotus*. Even more restricted was the single occurrence of *T. fotus* with *T. b. bacchi*. No triple infestations were seen on ground squirrels.

In addition to the new state records, two others are new for southwestern North Dakota. These include *Orchopeas caedens*, a flea typical of tree squirrels, and *Megabothris quirini*, parasitic on mice and voles. Both fleas occur across the northern tier of states. At more northern latitudes, they extend from Alaska to Labrador (Holland 1963).

Five of the six species reported herein as new to the state have geographic ranges which extend into North Dakota from the south and west. Reasons for this reflect host specificity and undetermined climatic/ecologic factors. Except for a successful 1974 transplantation of prairie dogs to Sully's Hill, a national game preserve near Devils Lake, kangaroo rats and prairie dogs do not occur east or north of the Missouri River in North Dakota (Karen Kreil and Robert Seabloom, pers. commun.). Therefore *Meringis parkeri*, *Opisocrostis hirsutus*, and *O. tuberculatus cynomuris* are limited in North Dakota by host distribution. *Callistopsyllus terinus campestris* and *Thrassis fotus* must, however, be limited by other factors since their usual hosts (deer mice and ground squirrels, respectively) extend well beyond southwestern North Dakota.

The new records presented in this report increase the known flea fauna of southwestern North Dakota to 24 species or subspecies. Those known for the entire state now number 52.

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Notes

BREAKUP AND SIBLING DISPERSAL OF TWO SAGE GROUSE BROODS — The timing of breakdown of sibling brood bonds and individual dispersal movements has been documented for several grouse species (Mussehl, 1960, J. Wildl. Manage. 24:60-68; Godfrey and Marshall, 1969, J. Wildl. Manage. 33:609-620; Bowman and Robel, 1977, J. Wildl. Manage. 41:27-34). Though sage grouse (*Centrocercus urophasianus*) brood bonds have been shown to disintegratge at 10-12 weeks (Patterson, 1952, The sage grouse in Wyoming, Sage Books, Inc., Denver; Oakleaf, 1971, The relationship of sage grouse to upland meadows in Nevada, M.S. Thesis, University of Nevada, Reno.), no data have been presented on movements of siblings after the brood breakup process. This note presents data on breakup and subsequent movements of members of two probable sage grouse broods during summer and fall 1981 on the Idaho National Engineering Laboratory (INEL) in southeast Idaho.

Irrigated lawns at the INEL serve as common summer areas for many sage grouse brood hens and broods during late July and August. Grouse were captured from two groups that appeared from association and age to be broods; neither of the broods were marked at hatching. Sex and age in weeks were estimated for each brood member (Pyrah, 1963, Sage grouse investigations, Idaho Fish and Game Dep., Wildl. Restoration. Div. Job Completion Rep. Proj. W-125-R-2). Individuals were fitted with poncho-mounted, solar-powered radio transmitters and relocated at least once daily before dispersal movements were initiated. Dispersal was considered to have begun when an individual grouse ceased using the summer area and had moved over 1 km away. After dispersal movements were initiated, individual grouse were relocated at least twice per month form a fixed-wing airplane.

Brood #1, consisting of four chicks (three females, one male) estimated to be 10 weeks old, and the brood hen were captured on 19 July 1981. The hen deserted the brood on 23 July. Two days later the juvenile male moved to a sagebrush (*Artemisia* spp.) area 18 km southwest and was subsequently killed by a predator. The juvenile females also disbanded at this time but continued to use the summer area for the rest of the summer and much of the fall, occasionally associating during feeding periods. Juvenile female #1 was last located on the summer area on 3 October. Her radio transmitter malfunctioned and no further relocations were recorded. Juvenile female #2 left the summer range on 8 October and was last located on 8 December, 5 km northeast. Juvenile female #3 also ceased using the summer area in early October, but remained in the sagebrush habitat within 1 km until late November when she could not be located again.

Brood #2 (two females) also estimated to be 10 weeks old was captured on 12 August 1981. The brood hen, however, eluded capture. Two days following capture, the brood disbanded. One juvenile departed the summer area on 2 September and was last located on 21 October, 15 km south. The second juvenile

left the summer area on 4 October and was last located on 21 October, 1.8 km northwest.

Brood breakup occurred during the tenth week of age for brood 2 and the eleventh week of age for brood 1. Though it is possible that capture and handling may have hastened breakup, the timing reported here is similar to that recorded in earlier studies (Patterson, op. cit.; Oakleaf, op. cit.).

The time between initial dispersal movements of sibling sage grouse in this study ranged from one to two months. Similar findings were reported for greater prairie chicken (*Tympanuchus cupido*) (Bowman and Robel, op. cit.). In contrast, Godfrey and Marshall (op. cit.) reported that dispersal of ruffed grouse (*Bonasa umbellus*) brood members was rapid and synchronized with several individuals undertaking movements within hours of each other.

We thank J. W. Connelly and R. J. Gates for field assistance and O. D. Markham for manuscript review. Funding was provided by the office of Health and Environment Research, United States Department of Energy. — *Howard W. Browers and Lester D. Flake, Department of Wildlife and Fisheries Sciences, P.O. Box 2206, South Dakota State University, Brookings, SD 57007.*

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NEW NESTING DATES FOR BROWN THRASHERS, LOGGERHEAD SHRIKES, AND AMERICAN ROBINS IN NORTH DAKOTA. — During the summer of 1984 and spring of 1985, my field assistants and I located nests of three species of birds in shelterbelts in Sioux and Morton counties, North Dakota. For each species, we observed eggs or nestlings beyond the dates previously reported in the state. To determine previous extreme egg and nestling dates I consulted Breeding Birds of North Dakota (Stewart, 1978, Breeding birds of North Dakota, Tri-College Center for Environmental Studies, Fargo, N.D.). I also searched the files of the North American Nest Record Card Program (NRCP) at the Cornell Laboratory of Ornithology.

In 1985 we found the first brown thrasher (*Toxostoma rufum*) nest containing two eggs on 21 May. Stewart (op. cit.) reported the earliest eggs on 20 May in 1964. Of the 42 brown thrasher nests located in 1984, two contained viable eggs (three eggs in each nest) on 24 July. The latest date previously reported for brown thrasher eggs in North Dakota was 8 July in 1901 (Stewart op. cit.). Stewart reported extreme dates for observations of nestlings as 16 June and 8 July. We found two nests containing three and four nestlings as early as 6 June in 1985 and one nest containing three nestlings less than six days old on 31 July in 1984.

We located three nests of loggerhead shrikes, (*Lanius ludovicianus*) before laying began in 1985. One appeared complete on 29 April but only contained two eggs on 6 May. Another was under construction from 25 to 28 April, but remained empty until 3 May. We observed a shrike carrying material for lining a nest well under construction on 26 April. This nest was still empty on 1 May but contained five eggs on 7 May. Although Stewart reported shrike eggs as early as 18 April in 1977, we have not found evidence that this is a regular occurrence.

In 1984, we located 13 active nests of loggerhead shrikes. Six of these contained full clutches when we first found them in early June. One of the later nests contained six eggs on 9 July, 20 days later than the latest date previously reported (19 June 1898 in Stewart). On 28 July we found an empty nest and observed newly fledged young roosting in the nest tree.

Stewart reported eggs of American robins (*Turdus migratorius*) as early as 23 April 1973. In 1985 we began searching for nests on 25 April. We found the first nest containing eggs on 30 April, and these hatched on 9 May.

In 1984, we found 30 robin nests. Of these, 14 contained eggs on or after 1 July. The last nest was found on 2 August, just after the birds had finished building. On 4 August this nest contained two eggs. When I checked the nest again on 14 August, it contained three eggs. The latest date for robin eggs reported by Stewart was 30 June 1915. David Blockstein observed three viable eggs in a nest on 27 July 1982 (NRCP data) in McHenry County. The nestlings in our late nest were banded on 21 August. The latest date on which robin nestlings were reported by Stewart was 15 July in 1972. David Blockstein banded three nestlings on 12 August 1982 (NCRP data).

The spring of 1984 was unusually cold and wet (personal observation), which may have delayed nesting. There are, however, relatively few published nest records from North Dakota. Perhaps more extensive obervation of these species at the nest would result in a greater expansion of the reported breeding seasons.

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DRUMMING OF A YELLOW-BELLIED SAPSUCKER — At 6 a.m. on 1 May 1985, a mature male yellow-bellied sapsucker (*Sphyrapicus varius*) alighted on a southern window on the fourth story of Columbia Park Towers, 2200 South 29th Street, Grand Forks, N.D. For about five minutes he perched on the vertical brown aluminum window frame and periodically pecked at the metal frame in groups of about six fast pecks each. One of his feet was on the frame and the other was in the screening of the window. On close examination, the frame where the bird had pecked 30-40 times appeared unmarked.

It is widely documented that many woodpeckers hammer to establish breeding and territorial boundaries, but sapsuckers "do not drum" (Robbins, Bruun, and Zim, 1966, Birds of North America, Golden Press, New York). This observation contradicts that conclusion. — *Robert W. Lewis, 2200 South 29th Street, Grand Forks, ND 58201.*

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Book Reviews

APPRECIATING PRAIRIE

Married to the Wind: A Study of the Prairie Grasslands. Wayne Lynch, 1984. Whitecap Books. 1086 West Third Street, North Vancouver, British Columbia, Canada. 166 pages. $39.95 (Canadian).

This is a gorgeous book, oversize, with well over 100 illustrations, a map of the grasslands, and a geological time scale.

The author is a physician who retired from medical practice to become a wildlife photographer, lecturer, and writer with a conservation conscience. His medical training shows in captions for his photographs: "The eyes of the plains garter snake, as with most snakes, differ from other vertebrates in that they lack a fovea — the area of the retina designed to give greater definition. Although their vision is blurred, snakes readily perceive movement, and their laterally directed eyes give them a very wide field of vision."

In the Introduction, the author describes the three types of Canadian grasslands as tall grass, mixed grass, and fescue grass. In the United States this last is generally referred to as short-grass prairie and is characterized by buffalo grass and blue grama.

Much of what he says about mixed grass prairie applies to fescue and tallgrass prairies and to the contiguous grasslands regions of the northern United States. I became somewhat confused about the author's use of the word "habitat." He speaks of five habitats: flat to gently rolling grassland plains, sandhill areas, wooded valleys called coulees, badlands, and sloughs. My training has taught me to think of habitats as determined by their dominant vegetation, so it is difficult for me to think of badlands as an ecological definition.

Over the millennia creatures have generously produced offspring far beyond what could survive. Natural selection favors those best suited for survival. The author writes, "Thus in the grassland ecosystem each and every plant, insect, bird, reptile and mammal has been selected because of its unique set of characteristics that make it best suited for the environment."

The first chapter, "The Land, Its Face and Its Temperament," treats the origins of the grasslands from the primordial seas through geological upheavals, glaciation, changes in climate, and the arrival of man.

The next five chapters deal with the plants and animals of each of what the author calls habitats and how they evolved to fit together almost as parts of a jig-saw puzzle. The grasslands are the stage and the ecology, physiology, and behavior of animals are used to show how the animals fit the climate and the grasslands.

On this broad canvas the author paints innumerable vignettes. Over 4,000 species of grasses have evolved worldwide. Grasses are unique in that their growth points are located at or just below the surface, so that plants can be clipped repeatedly by man or beast and survive. The author writes, "Grasses are married to the wind, for they all have wind pollinated flowers." He describes the parasitic habit of the brown-headed cowbird and how it evolved. The lack of trees has

made many prairie birds take to the air to project mating songs and choreography, such as the beautiful song of the Sprague's pipit. In one section the author describes the life of prairie dogs, the several species of ground squirrels, burrowing owls, and the prairie rattlesnake — which uses heat detectors to locate its prey.

The sandhills are described in the chapter entitled "Windscapes." An adaptation for survival of the toads is to inflate itself with air. The western hognosed snake is not affected by the toxin of these toads and has developed a specialized pair of teeth in the rear of the palate which can puncture the inflated toad.

In "Layers of Time" the badlands are described. The badlands of southern Alberta are the site of one of the largest collections of prehistoric art in North America. Snakes are numerous in the badlands, where crevices and pipings provide access to areas below the frostline where garter snakes, yellow-bellied racers, bullsnakes, and prairie rattlesnakes often den together.

In "Coulees" the author describes coulees as "forests within the grassland." This may be a local use of the word because a coulee is defined in Webster's dictionary as "a small stream, a dry creek bed, a steep walled valley or ravine." Thus I have always understood a coulee to be a topographic and not a vegetative feature.

In "Water and Wings" the millions of natural depressions left by the glaciers are discussed. These receive the run-off water in the spring and are called sloughs since they usually have no inlet or outlet. Even though they are transient they produce an abundance of wildlife. It is estimated that 80% of the waterfowl in North America are produced in what biologists call the "pothole region" of the mid-continent plains. Man's draining of these sloughs is of great concern to conservationists everywhere.

This book exemplifies the motto, "Conservation through education." In the Epilogue, Lynch writes, "Preserving the grassland ecosystem entails more than setting aside a national park. We must alter how we view our environment, and what we see as our role." A few paragraphs later, he says, "In the introduction of the book I outlined my intention to introduce the reader to the beauty and complexity of Canada's mixed grass prairie. From an appreciation of these qualities may grow a respect and concern for the environment." Mission accomplished.

The photographs are superb — technically crisp and correctly exposed. They also tell a story. The introductory photo of a pasqueflower, one of the earliest of prairie flowers, symbolizes the beginning, and the bison in what could be a sunset symbolizes the end (of the vast bison herds). The picture of a black widow spider emphasizes not only its marking but also the egg sac. The head-on shot of the wolf spider shows the eight eyes of a spider. The portrait of the yellow warbler is razor sharp around the eye.

I only wish a page about cameras, lenses, film and techniques could have been added, or camera used, film type, exposure and shutter setting described for each individual photo. However, I realize that quite often these decisions are not always made by the author.

I sympathize with the author when he writes, "I lie in bed at night visualizing the ultimate muskrat photograph." "However, the definitive photograph of the muskrat still eludes me, and I expect it will continue to appear on my seasonal photo lists for some time to come." This reviewer has taken two "ultimate" pictures of bison bulls fighting. Once I had the wrong setting. The setting should have been f. 16 1/500 (Ektochrome 400). After the fight I checked and the settings were f. 5.6 1/500, way overexposed. In my hurry I had seen only the 6. At another time the setting was right but the picture didn't show the fight — only a cloud of sand.

My most disappointing experience was when I was asked to go along in a "buffalo proof" Jeep and bring a feisty lone six-year-old bull from one huge pasture to another with the rest of the herd. This was going to be the ultimate in spectacular pictures — visions of sugar plums danced in my head! In the process of chasing the bull over sand blowouts and tight turns and occasionally having the Jeep hit by the charging bull, I had all I could do to protect the camera. Oh yes, I got a few shots of the roof of the Jeep, my feet, and some superb angle shots of the steering wheel!! — *Harvey L. Gunderson, University of Nebraska State Museum and Biological Sciences, Lincoln, Nebraska 68580.*

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A TEXT ON BEHAVIOR

Biology of Animal Behavior. James W. Grier. 1984. Times Mirror/Mosby College Publishing, St. Louis. 747 pages. $28.95.

The heightened interest in animal behavior in the last decade has been met with an increasing number of textbooks, as 10 new or revised texts have been published since 1980. Among these, *Biology of Animal Behavior* stands out in several ways. Not only the longest, it also is the broadest in scope, ranging from motivation to movements to mating systems to memory.

The book is intended as an introductory text and assumes a year's course in basic biology. James Grier developed this book for and tested it on his introductory behavior classes at North Dakota State University. The material should also be accessible to an informed layperson who wishes to study independently.

The layout is attractive and makes liberal use of high-quality photographs and easy-to-understand figures (866 illustrations). The drawings and photographs are valuable in showing behavioral concepts and actions.

Biology of Animal Behavior follows a modular arrangement so that chapters and topics can be ordered and either included or excluded at the instructor's desire. This text is also deep enough that few supplementary sources should be required for beginning students.

Unlike most behavior texts, this one includes all three main branches of the field — ethology, comparative psychology, and neurobiology. The book is divided into four parts. The introduction includes a historical comparison of the disciplines within animal behavior, a discussion of the methods of behavioral research, and a two-chapter introduction to behavioral genetics and evolution. The second part deals with ultimate (evolutionary) questions in ethology and

behavioral ecology. These chapters cover maintenance behavior, finding a place to live, communication, play, sociobiology, reproductive ecology, and interspecific behavioral relations. Proximate mechanisms (internal control of behavior) constitute the third section of the book. Topics include physiology of sensory perception, endocrinology, and neurobiology. Two chapters are devoted to behavioral development and learning. The final section consists of a brief chapter about abnormal behavior and one on applied behavior. Three appendices, a bibliography of about 500 references, and a 54-page index round out the book.

A 78-page instructor's manual is also available. It begins with suggestions on how to use the text, including a ranking of each topic as essential, review, important but advanced, peripheral, or applied. The bulk of the manual consists of a chapter-by-chapter guide. Grier provides a summary and rationale for each chapter and a list of errors (there are few). He also suggests extended exercises, discussion topics, and sample test questions.

Grier must be a very good teacher. His concern that students learn the material and that instructors who use his book do so properly is obvious both from the book's style and the major effort put into the instructor's manual. A rookie instructor using this text may feel that Grier is in the next office, ready to guide him or her out of rough spots. Grier makes frequent use of analogies and creative examples. He describes the brain's texture as "about like a soft avocado or banana" and presents an exercise where one can form a rough model of a human brain using one's hands (taken from MacLean 1981, interview on National Public Radio). He also interjects humor on occasion. The text is quite readable although most of the concepts are not simple and the terminology is abundant. No glossary is provided, as it would run dozens of pages. Grier tries to define terms as they are introduced, presenting important ones in boldface.

Grier usually takes the time and space to fully develop the examples he presents. He doesn't just say "this is how an animal works," but goes through the evidence that led biologists to a particular conclusion. He properly emphasizes the tentativeness of scientific conclusions, which he often presents as hypotheses rather than facts.

Equally important is the evolutionary perspective. Grier realizes that most behavior only makes sense in an evolutionary context. Even within his section on proximate mechanisms, he uses a comparative approach to describe behavioral features and structures. He also presents adaptive functions for behavioral mechanisms, for example pointing out that habituation helps an animal deal with "an otherwise overwhelming amount of environmental sensory input, most of which is irrelevant to the animal."

Grier not only presents reviews and interpretations from the scientific literature, but also his own syntheses and summaries. His table summarizing what is known about song-learning in birds is the best half-page presentation I have seen of this complex topic. An example expressing Grier's critical prudence in evaluating scientific research is what he calls the "trained-cricket problem." This situation, mentioned numerous times in the book, refers to the story of a person who trained crickets to jump every time a certain sound was presented. Then the person removed all the legs from the cricket, made the sound, and

upon observing the cricket no longer jumped concluded that the cricket no longer heard the noise, proving that its ears must be located on the legs. Grier's point in relating this anecdote is that we often mistake correlation with causation.

I am generally pleased with the science in *Biology of Animal Behavior* but am disappointed with his treatment of one of the topics that I am most familiar with: behavior and reproduction. Particularly in the sections on parental investment and mating systems, seminal ideas and papers are not stressed and often not even mentioned. Nothing is written about mixed mating strategies within a species or determinants of mate choice. The treatment of behavioral ecology and evolution leans heavily on E. O. Wilson's (1975) *Sociobiology, the New Synthesis*.

The overall strengths of this book include its breadth and depth coupled with Grier's teaching and writing style. The wealth of examples make this book a valuable reference for laypeople and teachers even if they do not use it as a text. Anyone planning research in animal behavior should read Chapter 3 "Observation and Measurement of Behavior." Any teacher of introductory courses in behavior should give serious consideration to *Biology of Animal Behavior*.

I appreciate the comments of Billy Goodman concerning this review. — *David E. Blockstein, Department of Ecology and Behavioral Biology, Bell Museum of Natural History, University of Minnesota, Minneapolis, MN.*

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