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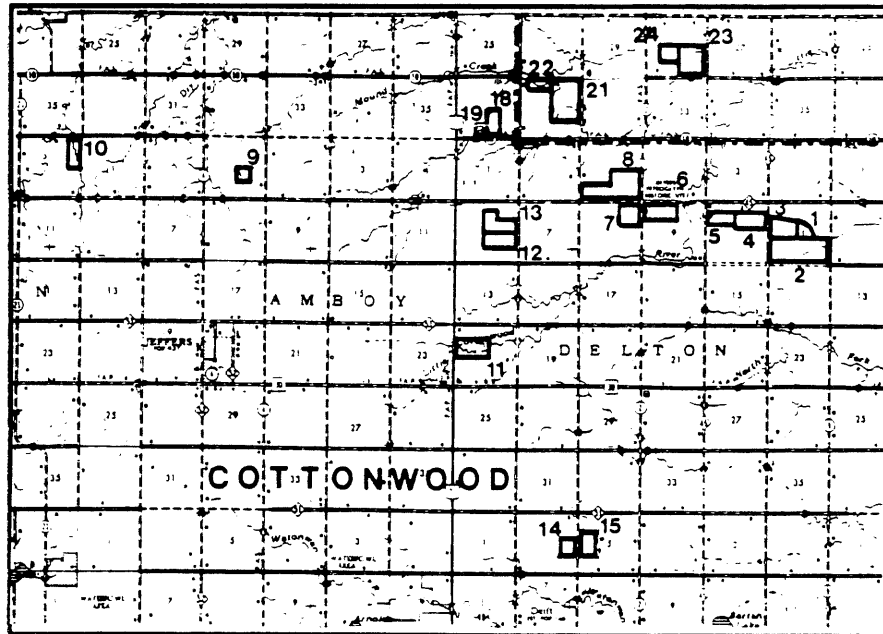
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(Funding for document digitization was provided, in part, by a grant from the Minnesota Historical & Cultural Heritage Program.)

PRAIRIE BUSH CLOVER INVENTORY AND PRESERVE DESIGN

by
Nancy Sather

Minnesota Department of Natural Resources
Section of Wildlife – Natural Heritage Program

March, 1989



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ACKNOWLEDGEMENTS

Funding for this project was made available through Section 15 of the Endangered Species Act by the U.S. Fish and Wildlife Service, Office of Endangered Species, Twin Cities, Minnesota.

The work would not have been possible without previous funding from The Nature Conservancy, Minnesota Chapter Small Grants Program, which permitted the author the opportunity to determine the size of the prairie bush clover population at Red Rock Preserve and to begin exploration of neighboring tracts in 1986 and 1987.

The author wishes to acknowledge the assistance of local volunteers Florence Roefer and Dennis Hageman who provided leads on the location of prairies in Cottonwood and Brown Counties, and spent many hours searching for plants. I also thank Ginger Hageman, Rose Purrington, Ruby Winters, the Ken Walinga family and Stanley Anderson for their time spent in the field.

Joanne Eaton of the Cottonwood County Citizen provided press coverage of the project at the beginning of the summer, resulting in contacts from several landowners regarding their prairies.

The majority of the maps were prepared by Ellen Fuge of the Minnesota Natural Heritage Program, whose graphic abilities and attentiveness to detail are greatly appreciated.

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INTRODUCTION

Prairie bush clover (Lespedeza leptostachya Engelm.) is a federally-threatened prairie legume, known at the beginning of 1988 from 33 sites in 23 counties of Illinois, Iowa, Wisconsin, and Minnesota. The largest known populations of this midwestern endemic appear to be centered in the drainage of the Des Moines River and Cottonwood rivers in southwestern Minnesota and northwestern Iowa.

Populations of prairie bush clover were first documented in northeastern Cottonwood County in 1972 by Dr. Thomas Morley at the Minnesota Historical Society's Jeffers Petroglyph site in Section 8 of Delton Township. This site is part of a physiographic feature known locally as "Red Rock Ridge" because of its discontinuous outcroppings of Sioux Quartzite that underly the Germantown clay loam soils at elevations of 1250 to 1300 feet.

Botanical exploration of prairies near the Jeffers Petroglyph site was intensified in the early 1980's when local farmers began to make application to enroll their native prairies in the state's Prairie Tax Credit Program. During the process of evaluation for this program additional populations of prairie bush clover were discovered in sections 5 and 11 of Delton Township (Wendt and Converse, 1985). In 1986 the Minnesota Chapter of The Nature Conservancy acquired a 24 acre tract in the southwest quarter of the northeast quarter of section 11. This tract was suspected to harbor the largest of the newly discovered populations. Subsequent survey of The Nature Conservancy tract resulted in a population estimate of between 4000 and 6000 plants (Sather, 1987; Sather, 1988a and b). Additional reconnaissance in 1987 confirmed that prairie bush clover was also present in the northeast quarter of section 10, Delton Township (Sather, 1988), but the size of prairie bush clover populations outside the Nature Conservancy's preserve remained unknown.

OBJECTIVES OF INVENTORY

The objectives of the present inventory project were three-fold:

To ascertain as accurately as possible the geographic extent and number of plants in prairie bush clover populations on Red Rock Ridge outside The Nature Conservancy's Red Rock Preserve.

To assign protection priorities to these tracts based on the size and extent of bush clover populations, the quality of their native prairie vegetation and their proximity to the two protected sites.

To determine whether there were additional prairie bush clover populations in nearby areas and to compare their size and community quality with the known populations on Red Rock Ridge.

ELEMENT OCCURRENCES

Element occurrences are defined as those species that are included in the Minnesota list of endangered and threatened species (Minnesota Natural Heritage Program, 1986; Coffin and Pfannmuller, 1988) or that are tracked in the Minnesota Natural Heritage Program database.

SURVEY AREA

The survey area was originally intended to include only Delton township. When it became apparent that additional potential habitat was present in adjoining townships in both Cottonwood and Brown counties the search area was expanded to include prairie remnants in Amboy, Carson, Storden and Germantown townships, Cottonwood County, and Stately and Northstar Townships, Brown County. Map 1 shows the location of the 26 sites visited during the 1988 season.

METHODS

Potential habitat outside the known tracts on Red Rock Ridge was identified by a combination of blue-line aerial photo maps, topographic maps, prairie tax credit records and leads from local residents. Newspaper coverage in the Windom paper brought several responses from Cottonwood County landowners.

Potential sites were screened by DNR volunteers Florence Roefer and Dennis Hageman to assure that at least portions of them were dominated by native prairie vegetation. A total of 26 sites were visited during the 1988 field season. The locations and ownership of these sites are included in Table 1.

Nineteen of the 26 sites were visited at least twice in the summer by DNR botanist Nancy Sather and DNR volunteers Florence Roefer and/or Dennis Hageman. Five sites were visited on a reconnaissance basis only.

The remaining 21 sites were evaluated by means of the Braun Blanquet releve method (Mueller-Dombois and Ellenberg, 1974; Almendinger, 1988). This method provides a complete species list within each recognizable height stratum observed in a 100 square meter area of homogeneous vegetation. The species list includes a visual estimate of cover and abundance, providing a measure of the relative dominance of prairie indicator species, disturbance indicators, and exotics. Within each tract one or more relevés were conducted in the areas of highest quality homogeneous vegetation. The resulting releve data reflect the best quality remnants within any given tract but do not necessarily reflect the condition of the tract as a whole. Releve data were entered into the Heritage Program's releve data base. Table 1 includes the database reference number for each releve. All relevés are included in Appendix I.

Known sites and potential habitat were searched intensively for prairie bush clover by walking systematically throughout the area at intervals of approximately 5 meters. In the case of tracts too large to cover with the available personnel, search areas were defined at intervals of approximately 150 meters throughout the tract in order to determine the geographic extent of the population. Between these areas a reconnaissance search was undertaken. Within each of the separate search areas the intensive search method was used. Field maps were prepared showing the location of all search areas and of areas that were not searched. The location of prairie bush clover subpopulations and their size were mapped within each search area (maps 14-15).

The location of all newly discovered elements was mapped and entered into the Heritage Program database. A list of all element observations in the Minnesota Natural Heritage Program database, along with their collection numbers (if relevant) is included in Table 1.

Voucher specimens were collected for prairie indicator species, species tracked in the Minnesota Natural Heritage Program database, and unknown species. Identifications and nomenclature were determined using Gray's Manual of Botany, 8th edition (Fernald, 1950) and updated to conform with Ownbey's (unpublished) flora of Minnesota. All specimens will be deposited at the University of Minnesota herbarium.

Protection recommendations were based on the author's judgement, taking into account the overall quality of each site, the size and distribution of its element occurrences (if any), and its proximity to other protected or high quality sites. The objective in assigning protection priorities was to design the largest feasible contiguous system of protected natural areas that would protect a combination of elements and assure protection for all occurrences of prairie bush clover.

RESULTS

The locations of all sites visited during the 1988 inventory are presented in map 1 on a county base map.

The site numbers, location, ownership, land use, overall community quality, known element occurrences, present and intended protection status and management needs of each site are presented in Table 1. Site numbers correspond to those used in Map 1.

Three new populations of prairie bush clover were discovered during the 1988 survey, including two populations in Brown County, from which the species was not previously known. These two sites are the SW quarter of the SE quarter of section 29, T108N, R35W (449 plants) and the SW quarter of section 33, T109N, R35 W (1117 plants). The new Cottonwood County population of 187 plants is in the SW quarter of the NW quarter of section 5, T106N, R35W.

All element occurrences on the 26 sites are summarized in Table 1. Those occurrences that are within the boundaries of proposed preserves or the proposed Brown county park are mapped on the appropriate preserve design maps (maps 2,5,8 and 11).

Protection recommendations are presented in the "intended protection status" column of Table 1 and are shown on maps 3,6,9, and 12 of the preserve design maps for each of the four areas where protection is recommended.

Intended protection recommendations include the development of a 541 acre preserve system in sections 11,10, 9 and 5 of Delton township with two major units. The eastern unit of 268 acres would encompass the present Red Rock Preserve (site 1), a buffer zone of the Bretzman pasture (site 2), the Hildebrandt tract (site 3) and the Burger tract (site 4). The western unit of 273 acres would include the present Jeffers Petroglyph Historical Site and the Polzin tract (site 8). Acquisition priorities are rated as follows: 1= highest, 2= high, 3= priority, 4= would afford supplemental protection. Within this preserve system present acquisition priorities are as follows: 1) Hildebrandt tract, because it is contiguous with the present preserve; 1) Burger tract, because it is the highest quality tract in private ownership on the ridge; 2) Polzin tract, because it is high quality native prairie; 4) 80 acres on the north edge of the Bretzman pasture because native species are still present in this portion of the tract and this acquisition would assure an uphill buffer for the remainder of the preserve; 4) restoration of a portion of the Stoderau tract (site 7) to provide continuous protection of the outcrop system and its associated plant community.

Protection recommendations for areas other than Red Rock Ridge include acquisition of: 1) the SW quarter of section 33 in Northstar township, Brown County, harboring a population of over 1000 prairie bush clover plants on a 70 acre tract of good-to-excellent hill prairie on coarse glacial till; 3) the SE quarter of section 29, Stately Township, Brown County. The remaining small prairie bush clover population in Delton Township, Cottonwood County (site 15) can be adequately protected through the Natural Areas Registry Program as long as it remains in the same ownership.

Maps 2-13 are preserve design maps for the four areas with prairie bush clover populations. Each set of 3 maps includes a base map showing topography and element occurrences as recorded in the Minnesota Natural Heritage Program database, a map of ownership and protection status, and a map of vegetation quality. All landowners are mapped but the vegetation maps do not include unsurveyed pastures or croplands not immediately adjacent to proposed preserves.

Maps 14 and 15 show the locations of search areas and prairie bush clover subpopulations on a tract-by-tract basis for tracts in sections 11, 10 , 8 and 5 of Delton Township.

STATUS, LAND USE AND RECOMMENDATIONS FOR PRIORITY SITES

RED ROCK PRESERVE (Site 1)

Natural attributes: This 24 acre Nature Conservancy preserve in SW NW Sec.11 is a heavily forb-dominated recovering prairie. The area includes both dry prairie and rock communities associated with outcroppings of Sioux quartzite, mesic prairie at mid elevations and small remnants of wet prairie near the northwestern corner and central north portions of the tract. Vegetation quality varies from good dry prairie in the southwest corner of the tract to poor quality prairie in the lower portions of the area. The site is important because of its large and highly dispersed population of between 4000 and 6000 prairie bush clover plants (Sather, 1987, 1988a, b). Occurrences of buffalo grass (Buchloe dactyloides), mousetail (Myosurus minimus), and Carolina foxtail (Alopecurus carolinianus) are associated with the outcrops.

Land use: Although portions of the tract were apparently used as flax fields several decades ago (Kohring, personal comm.) areas near the outcrops undoubtedly remained uncultivated, affording refugia for the recolonizing prairie species. Before its enrollment in the Prairie Tax Credit program, the tract was used as pasture. During this area it was subject to wildfire on at least one occasion (Oeltjenbruns, personal communication).

Protection status and management: The tract is fully protected by The Nature Conservancy and is being managed with fire in two burn units.

Recommendations: It is recommended that The Nature Conservancy and/or the state Scientific and Natural Areas Program expand the boundaries of this preserve to include the areas within the proposed preserve boundary shown on Map 8.

STATUS, LAND USE AND RECOMMENDATIONS FOR PRIORITY SITES

HILDEBRANDT TRACT (site 3)

Natural attributes: The 94 acre Hildebrandt tract (site 3) is immediately west of Red Rock Preserve and is similar in species composition. The best quality dry prairie is near the top of the hill in the southeast corner of the tract. Poorer quality midslope vegetation is dominated by a mixture of exotic grasses and native grasses and forbs. During the 1988 inventory a total of 929 prairie bush clover plants were located in midslope positions on this tract with a total of 20 person-hours of searching. Because the tract is so large not all areas of potential habitat were searched. Map 14 shows the location of bush clover subpopulations within search areas. Occurrences of buffalo grass (Buchloe dactyloides) and tumblegrass (Schedonnardus paniculatus) are associated with the outcrops. During the 1986, 1987, and 1988 seasons upland sandpipers (Bartramia longicauda) were observed performing nesting behavior on this tract.

Land use: The Hildebrandt tract was used as native pasture for several decades before its enrollment in the Prairie Tax Credit Program in the early 1980's. During its use as a pasture, it is reported to have been as severely grazed as the neighboring Bretzman tract now is (Hageman, personal communication).

Protection status and management: The Hildebrandt tract is privately owned, but is protected by its enrollment in both the Prairie Tax Credit program and the Natural Areas Registry. By agreement between the absentee owners and The Nature Conservancy the site has been divided into two management units and is being burned by The Nature Conservancy along with the adjacent preserve.

Recommendations: It is recommended that the Hildebrandt tract be first priority for acquisition as an addition to the present Red Rock Preserve, both because of its large population of prairie bush clover and because of its proximity to the preserve.

STATUS, LAND USE AND RECOMMENDATIONS FOR PRIORITY SITES

BURGER TRACT (site 4)

Natural attributes: The 80 acre Burger tract is the highest quality privately-owned prairie remaining on the ridge. The two releves (0174 and 1075) are very representative of the community quality, with widespread distribution of such indicators as Coreopsis and Phlox. Releve 0174 is from a fairly dry facies of the prairie community near the top of the hill at the west end of the tract. Releve 0175 is from near the bottom of the slope in a more mesic to moist area where water is retained by the presence of shallow southward-dipping bedrock just below the soil. Prairie bush clover populations in this prairie are scattered geographically, but small in size. Consultation with the owner confirms that these populations are concentrated in areas that have escaped haymowing in recent years. The most concentrated subpopulation is nearly in the road ditch on the upslope half of the east property boundary.

Land use: The tract has been used continuously as native hay pasture since the 1940's and is mowed annually in late August or early September. Parts of the prairie have been burned by wildfire twice in the past 40 years (Burger, personal communication).

Protection status and management:: This tract is presently enrolled in the Prairie Tax Credit program. Despite the fact that fire has been excluded since a wildfire about two decades ago mulch buildup is restricted by annual late-summer hay mowing. The owner is amenable to avoiding haying the bush clover concentrations to permit the populations to increase.

Recommendations: The Burger tract is probably adequately protected by its enrollment in the Prairie Tax Credit Program as long as it remains in its present ownership. The author recommends enrollment in the Prairie Bank Program or pursuit of an agreement with the landowner that would give The Nature Conservancy or SNA Program right of first refusal when the owner sells.

STATUS, LAND USE AND RECOMMENDATIONS FOR PRIORITY SITES

JEFFERS PETROGLYPH HISTORICAL SITE (site 6)

Natural attributes: The 80 acre Jeffers Petroglyph Historical Site in NW Sec. 8 includes both high quality virgin and restored prairie. Two subpopulations of prairie bush clover are located in the nearly level parking circle and just north of west end of the interpretative trail. In addition to these populations of Lespedeza leptostachya, the site is distinguished by the presence of a population of hybrid bush clover plants (Lespedeza leptostachya x lespedeza capitata).

Land use: The site includes an interpretative program that focuses on the prehistoric petroglyphs carved in the Sioux Quartzite outcrops but also emphasizes the value of the native prairie.

Protection status and management: The Jeffers Petroglyph Historical Site is managed by the Minnesota Historical Society with periodic burning. The prairie bush clover population at the site is vigilently protected by Historical Society personnel.

Recommendations: This site is adequately protected as long as the present management policies and resident manager remain in place. In order to protect against future changes in management it would be wise to enroll the Historical Site in the Minnesota Natural Heritage Register, which recognizes public lands of natural significance.

STATUS, LAND USE AND RECOMMENDATIONS FOR PRIORITY SITES

POLZIN TRACT (site 8)

Natural attributes: The 193 acre Polzin tract in section 5 of Delton township includes a high quality gently sloping upland prairie in the SE quarter of the section and a narrow band of south-dipping Sioux quartzite outcrops in the SW quarter of the section. The prairie community is especially rich in spring flowering species, with widespread distribution of indicators such as Phlox and Coreopsis. Map 15 shows the locations of areas searched and prairie bush clover populations on the Polzin tract. A total of 57 prairie bush clover plants were observed during the 1988 inventory. The majority of these plants (49) were near the foot of the north-facing hill in the east part of the tract. In the more heavily grazed western portion of the site plants were concentrated just outside the fenceline in a small patch of ungrazed prairie. Occurrences of buffalo grass (Buchloe dactyloides), tumblegrass (Schedonnardus paniculatus) and Carolina foxtail (Alopecurus carolinianus) are associated with the outcrops.

Land use: The tract is used as summer pasture. Cattle are put out in midsummer and graze until early autumn. During the dry 1988 season grazing damage was more severe than has been reported for the site in the past.

Protection status and management: The Polzin tract is enrolled in the Natural Areas Registry program but because it is actively grazed throughout most of the summer it is the least protected of the privately-owned bush clover sites in Delton Township. At the present time the pasture is being rented.

Recommendations: It is recommended that the Scientific and Natural Areas program or The Nature Conservancy continue their overtures to the landowners to purchase this property.

STATUS, LAND USE AND RECOMMENDATIONS FOR PRIORITY SITES

WINTERS TRACT (site 15)

Natural attributes: The Winters tract in NW Sec. 5, Carson Township, Cottonwood County consists of a 40 acre native pasture with some persistent prairie species and a 4.5 acre north-facing slope just to the north with a population of 187 prairie bush clover plants. The latter remnant is excellent quality prairie, but is too small even to be enrolled in the Prairie Tax Credit program. The flat portions of the grazed pasture are dominated by Kentucky bluegrass (Poa pratensis) and other exotics, but the slopes are fair quality native prairie. The entire tract could perhaps be restored if grazing pressure were removed and burning was instituted.

Land use: The 40 southern acres are grazed. The owner is a dedicated dairyman and probably does not have any incentive to discontinue grazing. The ungrazed remnant was burned by wildfire in June, 1988 (R. Winters, personal communication)

Protection status and management: The site is owned by the manager of the Petroglyph site, who has agreed to enroll it in the Natural Areas Registry.

Recommendations: This site probably requires no further action to assure protection as long as it remains in its present ownership. The relative importance of the site for the protection of prairie bush clover will become clearer once there is a better knowledge of potential undiscovered sites in nearby counties.

STATUS, LAND USE AND RECOMMENDATIONS FOR PRIORITY SITES

BROWN TRACT (STATELY 29, site 23)

Natural attributes: The Brown tract in SE Sec. 29, Stately Township, Brown County, is a 160 acre pasture with degraded flatlands and fair to excellent quality native prairie on the north facing slopes. A population of 449 prairie bush clover plants was discovered in the southwestern corner of the quarter section during the 1989 inventory. All the north-facing hills east of the known population are potential habitat for prairie bush clover and have not been fully searched for prairie bush clover.

Land use: The entire quarter section is active pasture. A number of the bush clover plants located in 1988 had been damaged by herbicide drift from control of a downhill patch of snowberry (Symphoricarpos occidentalis).

Protection status and management:
The owner has agreed to enroll the site in the Natural Areas Registry.

Recommendations: The owner should be encouraged to discontinue the use of herbicides throughout the pasture until the entire area has been searched for prairie bush clover. Once further inventory has been completed it is likely that the site will be recommended for acquisition.

STATUS, LAND USE AND RECOMMENDATIONS FOR PRIORITY SITES

MEINE TRACT (NORTHSTAR 33, site 25)

Natural attributes: The 120 acre Meine tract in SW Sec. 33, Northstar Township, Brown County, is the top priority site discovered in the 1988 survey. The tract includes 70 acres of fair to excellent quality prairie on a steep gravel ridge. A population of 1117 prairie bush clover plants was discovered at the west end of the north facing slope. Community quality varies both with slope aspect and previous land use. The flat eastern end of the ridge is in agricultural use and the area immediately west of this field appears to be oldfield. Relieve 0188 is from the prairie bush clover area and is representative of the more mesic conditions on the north-facing slope. Relieve 0195 reflects the slightly lower quality of the drier south-facing slopes.

Land use: The entire tract is used as winter pasture , with cattle removed at the time of calving. Although there is no agricultural use in the summer, the ridge is transected by a dirt road which is apparently used for recreational purposes and to provide access to a family dump on the south-facing slope. The bush clover population is protected from vehicular travel by its location on a steep north-facing hill.

Protection status and management: The owners have agreed to enroll the site in the Natural Areas Registry but it is expected that the present practice of winter grazing will continue. The owners expressed some interest in the possibility of selling in the future at the time of the initial Registry visit (Dorff, personal communication.)

Recommendations: The author gives high priority to this tract for acquisition, partly because of the size of the prairie bush clover population and partly because it is the only one known on a coarse glacial till hill prairie in Minnesota.

STATUS, LAND USE AND RECOMMENDATIONS FOR PRIORITY SITES

WALINGA TRACT (site 16)

Natural attributes: Native prairie vegetation appears to be flourishing at this previously known prairie bush clover site. The Walinga family led the author to the occurrence of approximately 30 prairie bush clover plants. cursory exploration revealed a second subpopulation further south on the same north-east facing slope.

Land use: Site 16 was visited for reconnaissance purposes to observe the effects of winter grazing after it was learned that this practice is followed at the Meine tract. The Walinga prairie is not fenced off from the adjoining fields. After the harvest, cattle are turned into the fields to graze on the stubble and are free to graze the steep east facing prairie as well.

Protection status and management: The prairie is enrolled in both the Prairie Tax Credit Program and the Natural Areas registry. The owner says he would remove the prairie from these programs if required to fence the area because it would not be cost effective to fence such a long narrow area as this hillside.

Recommendations: Cooperation of the owner should be sought to obtain permission for a systematic investigation of the size and geographic extent of this population in 1989.

STATUS, LAND USE, AND RECOMMENDATIONS FOR NON-PRIORITY SITES

Community quality is highly dependent on land use history. In general, sites that are being heavily grazed at the present time are highly degraded, with Kentucky bluegrass (Poa pratensis) and smooth brome (Bromus inermis) as the dominant grasses. Although native warm season tall grass species are scarce, both side oats grama (Bouteloua curtipendula) and blue grama (Bouteloua gracilis) attain fairly high visibility on such sites in late summer. Dominant forbs in heavily grazed prairies include several species of goldenrod and asters, with high frequencies of gumweed (Grindelia squarrosa) in the most heavily grazed pastures. The quality of these heavily grazed pastures is also affected by topography. Degradation is greatest in areas with continuous gentle slopes, whereas remnants of good quality prairie persist on steep slopes even in heavily grazed pastures. Several highly degraded sites lie close to or tie together tracts of good to high quality prairie. These tracts are considered to have greater potential for inclusion in a preserve system than isolated tracts of similar quality.

BRETZMAN TRACT (site 2) As can be seen on map 9, this 320 acre tract (site 2) in the S half of Section 11 immediately adjoins Red Rock Preserve and the Hildebrandt tract (site 3) to the south. This heavily grazed pasture was partly broken in the past (Grunig, personal communication), but retains an 80 acre remnant of poor to fair prairie in a strip along its north border. This strip is dominated in areas between the quartzite outcrops by a mixture of Kentucky bluegrass (Poa pratensis), several short native prairie grasses, predominantly blue grama (Bouteloua gracilis), side-oats grama (Bouteloua curtipendula), and dropseed (Sporobolus heterolepis). In the more mesic area east of the center of the section the native component of the vegetation is dominated by species of goldenrod.

Although the prairie has been degraded by grazing it is included as an uphill buffer in the design of a continuous preserve encompassing the present Nature Conservancy's Red Rock Preserve and the Hildebrandt tract, which was grazed to a similar condition a decade ago (Hageman, personal communication). No prairie bush clover was found on site 2 in several searches totalling 4 person hours.

STATUS, LAND USE, AND RECOMMENDATIONS FOR NON-PRIORITY SITES

CALLAHAN TRACT (site 5) This 53 acre field was included in a previous tentative preserve design for Red Rock Ridge. It is dominated by exotic grasses and forbs. The small remaining strip of uncultivated land has been further fragmented by the activity of earthmoving vehicles. At the time of the original preserve plan the Callahan tract may have been viewed as a corridor linking the prairies in the east half of section 10 and section 11 with the Jeffers Petroglyph site in NW section 9 (see map 9). At that time NE section 9 was woodlot, which has subsequently become cultivated land. The occurrence of Buffalo grass (Buchloe dactyloides) is restricted to the edges of isolated outcrops.

The present Preserve Design does not include the Callahan tract because of its poor quality and fragmentation and because there is no longer any link of natural vegetation westward to the Jeffers Petroglyph site. No prairie bush clover was found in a search of about 1 and a half person-hours.

STODERAU TRACT (Site 7) This 40 acre tract is a highly degraded overgrazed pasture lying just west of the Jeffers Petroglyph site and south of the Polzin tract (site 8). The native vegetation has been largely destroyed by overgrazing and is accurately reflected by the releve . Despite the overgrazed nature of the pasture the site includes some of the better outcrops of Sioux Quartzite, connecting the outcrop system at the Petroglyph site with the extensive south-facing outcrop on the west end of the Polzin tract. The outcrops at site 7 retain their distinctive flora because they jut above the surface enough that cattle have not destroyed the vegetation as they have at the edge of outcrops in the pastured portion of site 8. In itself site 7 has very little to recommend it as a natural area, but because of the outcrops and their flora this site might be a candidate for restored prairie tying together portions of a large preserve system once all the priority sites had been acquired. Because of the level of destruction only about 1 hour was spent looking for prairie bush clover at this site.

STATUS, LAND USE, AND RECOMMENDATIONS FOR NON-PRIORITY SITES

KOSEL TRACT (site 12) This 55 acre pasture appears at a distance to be promising potential habitat for prairie bush clover. This heavily grazed northeast- sloping pasture is interrupted by a well-developed system of quartzite outcrops, some of which are associated with natural springs. Unfortunately the the springs are attractive to cattle , resulting in nearly complete devastation of the rock flora by grazing . Element occurrences of buffalo grass (Buchloe dactyloides) and tumblegrass (Schedonardus paniculatus) at this site are restricted to the few rocks with ledges high enough to prevent trampling by cattle.

The pasture is largely dominated to Kentucky bluegrass (Poa pratensis), with infestations of bull thistle (Cirsium vulgare) in the damp swales. Both the north half of the SE quarter and the south half of the NE quarter are used by Walter Kosel as pasture, but the 40 acres in the north half belongs to the Clark family. The retention of prairie vegetation on the northeast facing slopes of this tract is accurately reflected in releve 0183. This area was searched intensively by three people for a total of about 7 person-hours without finding any prairie bush clover .

RYKER TRACT (Site 9) This 23 acre ravine is generally degraded, with prairie vegetation restricted to several hundred square meters of steep east facing slope, immediately bounded on the upland by cropland. The element occurrences of buffalo grass (Buchloe dactyloides) and tumblegrass (Schedonnardus paniculatus) at this site are restricted to the edges of Sioux Quartzite outcrops in the bottom of the ravine. The owner is aware of the need to manage this prairie remnant and inquired whether he should burn it. He would welcome assistance from the DNR.

CONRAD TRACT (site 11) The quality of isolated remnants in this 80 acre pasture is high but the two releves (releves 0181 and 0182) represent the entire geographic area dominated by prairie vegetation. The remainder of the tract is overgrazed pasture dominated by exotic grasses. The floristic richness of releve 0181 is especially high because this east-facing slope of the ravine is being invaded by woodland. The other prairie remnant is a north-facing slope of sufficient size to support a small population of prairie bush clover, but none were found in the 3 person hours spent at the site.

EICHSTADT TRACT (site 10) This 40 acre ravine also suffers from invasion by woody species. The owner is aware of the need for fire and has requested assistance in burning from the Area Wildlife Manager.

STATUS, LAND USE, AND RECOMMENDATIONS FOR NON-PRIORITY SITES

HAGEMAN TRACT (site 21) The 113 acre Hageman pasture must once have been some of the most beautiful landscape in Stately Township. Both maps and blueline photos suggested it would provide excellent prairie bush clover habitat. The majority of the tract is the most highly degraded site visited during the 1988 survey. The releve (0197) reflects the good quality native prairie on only a single steep north-facing hillside. The occurrences of buffalo grass (Buchloe dactyloides) and tumblegrass (Schedonnardus paniculatus) are restricted to cracks of quartzite outcrops in an intermittent stream bed. Several areas are infested with leafy spurge (Euphorbia esula). This tract is one of several optioned by Brown County for the Mound Creek Project, a county reservoir and park system (see map 7). Despite its degradation the pasture has never been broken. The county should be encouraged to manage the hillsides of this and all optioned tracts for their native prairie vegetation.

SCHENK TRACT (site 22) This 14 acre prairie remnant adjoins the Hageman tract to the west and is also under option for the Mound Creek Project. The releve is from a south facing hill just north of Mound Creek and accurately reflects the vegetation of the entire hillside. This site was the most heavily grass-dominated native prairie observed in the 1988 survey. Occurrences of buffalo grass (Buchloe dactyloides) and tumblegrass (Schedonnardus paniculatus) are associated with quartzite outcrops at the base of the hill.

MEIER AND L. POLZIN TRACTS (sites 19 and 19) These two tracts in section 36 of Germantown Township lie south of Red Rock Dells, an existent Cottonwood County Park. The two sites were visited on a reconnaissance trip to explore the flora associated with an extensive exposure of Sioux quartzite outcrops lying upstream of the "dells". The occurrences of buffalo grass (Buchloe dactyloides) and tumblegrass (Schedonnardus paniculatus) on both tracts are associated with these outcrops. The Carolina foxtail (Alopecurus carolinienis) found on the Polzin tract was the only one encountered during the 1988 inventory. The Polzin tract is presently not in agricultural use and includes an area with good development of big bluestem (Andropogon gerardii) between the braided channels of the intermittent stream. The Meier tract is heavily grazed pasture with an extensive population of buffalo grass (Buchloe dactyloides) on extensive flat outcrops. The park itself was not explored botanically. It is comprised of a mowed recreation area and shelter adjoining a deep ravine eroded into a massive outcrop of Sioux Quartzite. It is likely that buffalo grass (Buchloe dactyloides) and tumblegrass (Schedonnardus paniculatus) are also present in the county park. Although presently in private ownership the Hageman, Schenk, Polzin and Meier tracts could complement the existent county park in forming a two mile long wildlife corridor and semi-natural recreation area with the Mound Creek Reservoir and Red Rock Dells Park as its core area.

STATUS, LAND USE, AND RECOMMENDATIONS FOR NON-PRIORITY SITES

ANDERSON TRACT (site 20) This 100 acre recovering prairie is the largest Prairie Tax Credit parcel visited during the 1988 survey. The area is a mosaic of fair quality native prairie on the hillsides and oldfield in the valley. It was grazed by over 100 head of cattle before its enrollment in the Prairie Tax Credit Program (Anderson, personal communication). At the present time the site is used as a pasture for 3 horses and as the grounds for an annual open country horse race. There is considerable invasion by woody species and the entire area is in dire need of a burn if the prairie is to be maintained. North-facing slopes that might afford the best potential prairie bush clover habitat are best developed on the west side of the creek in an area heavily invaded by plum. The Anderson tract is adjoined on the south by additional disturbed prairie land some of which has been mined for gravel. This adjoining prairie includes a better development of north-facing hillsides, with a great abundance of roundheaded bush clover (Lespedeza capitata), which provides a fairly reliable guide to prairie bush clover habitat in native vegetation in this part of the state. This adjoining tract was not searched during the 1988 survey and should be investigated more thoroughly.

PURRINGTON TRACT (site 17) This site near Windom was visited at the invitation of the landowner who hoped to find prairie bush clover. The condition of this prairie is similar to that of the Anderson tract, with considerable woody invasion and a mosaic of slopes exhibiting native prairie and flat areas dominated by exotics. The few north facing slopes warrant more careful search for prairie bush clover because of its proximity to the known populations of prairie bush clover at Walinga prairie (site 16), just across the river.

MOODY TRACT (site 26) This pasture in the SE quarter of section 32 of Northstar Township, Brown County, was investigated because of its proximity to the newly discovered prairie bush clover population in Northstar 33. The tract is a highly degraded pasture with very few persisting native species. The adjoining Groebner property appears to have been less degraded and is a top priority for investigation in 1989.

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11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0174
DATE: 21 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Burger Prairie
Location: S of NE of S. 10, T. 107N, R. 35W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 70, Rank: A, Site Size (a.): 80
Soil Atlas Mapping-Unit: 66,
Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1270, Slope (deg./aspect): 25N

Best Prairie Remnant on Red Rock Ridge. In Prairie Tax Credit
Owner aware of *Lespedeza leptostachya* EO.

Graminoids, Height: 1-2, Cover: C

3.2 *Stipa spartea* Trin.
1.2 *Andropogon gerardii* Vitman
1.1 *Panicum* cf. *wilcoxianum* Vasey
1.2 *Poa pratensis* L.
1.2 *Sorghastrum nutans* (L.) Nash
1.2 *Sporobolus heterolepis* (Gray) Gray
+.2 *Koeleria macrantha* (Ledeb.) Schultes
+.1 *Panicum* cf. *leibergii* (Vasey) Scribn.
+.1 *Phleum pratense* L.

Forbs, Height 1-2, Cover C

2.1 *Heuchera richardsonii* R. Br.
1.2 *Amorpha canescens* Pursh
1.1 *Anemone cylindrica* Gray
1.2 *Aster ericoides* L.
1.1 *Oenothera*
1.1 *Petalostemon candidum* Michx.
1.1 *Petalostemon purpureum* (Vent.) Rydb.
1.2 *Psoralea argophylla* Pursh
1.1 *Psoralea esculenta* Pursh
1.2 *Solidago nemoralis* Ait.
1.1 *Trifolium pratense* L.
1.1 *Trifolium repens* L.
1.1 *Zizia aptera* (Gray) Fern.
R.1 *Linum*
R.1 *Taraxacum officinale* Weber
+.1 *Achillea millefolium* L.
+.1 *Antennaria neglecta* Greene

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0174 Continued, Page 2

Forbs, Height 1-2, Cover C

+ .2 Artemisia ludoviciana Nutt. ssp. ludoviciana
+ .2 Aster oblongifolius Nutt.
+ .1 Astragalus crassicaupus Nutt.
+ .1 Cirsium flodmani (Rydb.) Arthur
+ .1 Delphinium virescens Nutt.
+ .1 Echinacea angustifolia DC. var. angustifolia
+ .1 Erigeron strigosus Muhl.
+ .2 Galium boreale L.
+ .1 Gentiana puberulenta Pringle
+ .1 Helianthus rigidus (Cass.) Desf.
+ .1 Liatris aspera Michx.
+ .1 Physalis heterophylla Nees var. heterophylla
+ .1 Potentilla arguta Pursh
+ .1 Rosa arkansana Porter
+ .1 Solidago rigida L.
+ .1 Tragopogon dubius Scop.
+ .1 Vicia americana Muhl. ex Willd. var. americana
+ .2 Viola pedatifida G. Don

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVÉ REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVÉ NUMBER: 0175
DATE: 21 JUN 1988
BY: PS
7 County, MN
Quadrangle Code: 409511 (09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Burger Prairie
Location: SE of NE of S. 10, T. 07N, R. 5W
Heritage Community Element: P
Element Occurrence Size (a.): 70, Rank: A, Site Size (a.): 80
Soil Atlas Mapping-Unit: 66,
Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----
Relevé Size (sq. m): 100, Elev. (ft.): 1250, Slope (deg./aspect): 25N

Mesic portion of prairie, just above Quartzite outcrops near center of north side of tract. Best remnant on Red Rock Ridge. Owner aware of EC (*Lespedeza leptostachya*), in PTC

Graminoids, Height: 1-2, Cover: C

- 3.2 *Stipa spartea* Trin.
- 2.2 *Sporobolus heterolepis* (Gray) Gray
- 1.2 *Andropogon gerardii* Vitman
- 1.1 *Poa pratensis* L.
- +1 *Carex*
- +2 *Panicum*

Forbs, Height 1-2, Cover I

- 2.2 *Helianthus rigidus* (Cass.) Desf.
- 2.2 *Solidago nemoralis* Ait.
- 2.2 *Zizia aptera* (Gray) Fern.
- 1.2 *Achillea millefolium* L.
- 1.2 *Artemisia ludoviciana* Nutt. ssp. *ludoviciana*
- 1.1 *Aster lanceolatus* Willd. ssp. *lanceolatus*
- 1.2 *Coreopsis palmata* Nutt.
- 1.2 *Euthamia gymnospermoides* Greene
- 1.1 *Heuchera richardsonii* R. Br.
- 1.2 *Phlox pilosa* L.
- 1.2 *Psoralea esculenta* Pursh
- +1 *Amorpha canescens* Pursh
- +1 *Anemone cylindrica* Gray
- +2 *Aster sericeus* Vent.
- +1 *Aster laevis* L.
- +1 *Cirsium* cf. *discolor* (Muhl.) Spreng.
- +1 *Cirsium flodmani* (Rydb.) Arthur
- +1 *Erigeron strigosus* Muhl.
- +2 *Lathyrus venosus* Muhl. ex Willd.
- +2 *Lespedeza leptostachya* Engelm.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark
! +.2 *Epigaea repens* L. var. *glab.* Fern. fl ##
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0175
DATE: 21 JUN 1988
BY: PS
7 County, MN
Quadrangle Code: 409511 (09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: urger Prairie
Location: E of E of S. 0, T. 07N, R. 5W
Heritage Community Element: P
Element Occurrence Size (a.): 70, Rank: , Site Size (a.): 80
Soil Atlas Mapping-Unit: 66,
Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1250, Slope (deg./aspect): 25N

Mesic portion of prairie, just above Quartzite outcrops near center of north side of tract. Best remnant on Red Rock Ridge. Owner aware of EO (*Lespedeza leptostachya*), in PTC and Registry.

Graminoids, Height: 1-2, Cover: C

- 3.2 *Stipa spartea* Trin.
- 2.2 *Sporobolus heterolepis* (Gray) Gray
- 1.2 *Andropogon gerardii* Vitman
- 1.1 *Poa pratensis* L.
- +1 *Carex*
- +2 *Panicum*

Forbs, Height 1-2, Cover I

- 2.2 *Helianthus rigidus* (Cass.) Desf.
- 2.2 *Solidago nemoralis* Ait.
- 2.2 *Zizia aptera* (Gray) Fern.
- 1.2 *Achillea millefolium* L.
- 1.2 *Artemisia ludoviciana* Nutt. ssp. *ludoviciana*
- 1.1 *Aster lanceolatus* Willd. ssp. *lanceolatus*
- 1.2 *Coreopsis palmata* Nutt.
- 1.2 *Euthamia gymnospermoides* Greene
- 1.1 *Heuchera richardsonii* R. Br.
- 1.2 *Phlox pilosa* L.
- 1.2 *Psoralea esculenta* Pursh
- +1 *Amorpha canescens* Pursh
- +1 *Anemone cylindrica* Gray
- +2 *Aster sericeus* Vent.
- +1 *Aster laevis* L.
- +1 *Cirsium* cf. *discolor* (Muhl.) Spreng.
- +1 *Cirsium flodmani* (Rydb.) Arthur
- +1 *Erigeron strigosus* Muhl.
- +2 *Lathyrus venosus* Muhl. ex Willd.
- +2 *Lespedeza leptostachya* Engelm.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 *Epigaea repens* L. var. *glab.* Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0175 Continued, Page 2

Forbs, Height 1-2, Cover I

+ .2 Liatris aspera Michx.
+ .2 Lythrum alatum Pursh var. alatum
+ .1 Oenothera
+ .1 Petalostemon candidum Michx.
+ .1 Petalostemon purpureum (Vent.) Rydb.
+ .2 Rosa arkansana Porter
+ .2 Solidago canadensis L.
+ .1 Taraxacum officinale Weber
+ .1 Trifolium pratense L.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0176
DATE: 21 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Callahan field
Location: SE of NW of S. 10, T. 107N, R. 35W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 5, Rank: D, Site Size (a.): 53
Soil Atlas Mapping-Unit: 66,
Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1250, Slope (deg./aspect): 15N

Difficult to tell whether this area has been broken in past, dominated by old field vegetation, recently disturbed by earth moving equipment. Buchloe at edges of rocks.

Broadleaf Deciduous, Height: 2-3, Cover: P

1.3 Symphoricarpos occidentalis Hook.

Graminoids, Height 1-2, Cover C

3.3 Poa pratensis L. var. pratensis

1.2 Bromus inermis Leyss. var. inermis

+2 Agropyron repens (L.) Beauv. var. subulatum (Schreb.) Reichenb.

+1 Sorghastrum nutans (L.) Nash

Forbs, Height 1-2, Cover I

+2 Ambrosia artemisiifolia L.

+1 Asclepias syriaca L.

+1 Cirsium arvense (L.) Scop.

+1 Lactuca pulchella (Pursh) DC.

+1 Rosa arkansana Porter

+1 Sonchus arvensis L.

+1 Tragopogon dubius Scop.

+1 Verbena hastata L.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0177
DATE: 21 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Red Rock Preserve
Location: SW of NE of S. 11, T. 107N, R. 35W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 40, Rank: BC, Site Size (a.): 40
Soil Atlas Mapping-Unit: 66,
Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1270, Slope (deg./aspect): 20N

Releve in burned unit of tract about 50 meters north and 50 meters east of sw corner.

Graminoids, Height: 1-2, Cover: C

- 2.2 Bromus inermis Leyss. var. inermis
- 2.2 Sporobolus heterolepis (Gray) Gray
- 1.2 Poa pratensis L. var. pratensis
- +1 Agropyron cf. trachycaulum (Link) Malte
- +1 Andropogon gerardii Vitman
- +2 Panicum cf. wilcoxianum Vasey
- +1 Phleum pratense L.

Forbs, Height 1-2, Cover I

- 3.2 Helianthus maximiliani Schrad.
- 2.2 Euthamia gymnospermoides Greene
- 2.2 Solidago nemoralis Ait. var. nemoralis
- 1.1 Anemone cylindrica Gray
- 1.2 Artemisia ludoviciana Nutt. ssp. ludoviciana
- 1.2 Aster lanceolatus Willd. ssp. simplex (Willd.) Jones
- 1.2 Aster laevis L. var. laevis
- 1.1 Helianthus rigidus (Cass.) Desf.
- 1.2 Lespedeza capitata Michx.
- 1.2 Lespedeza leptostachya Engelm.
- 1.2 Petalostemon purpureum (Vent.) Rydb.
- 1.1 Rosa arkansana Porter
- 1.2 Solidago rigida L. var. rigida
- 1.1 Zizia aptera (Gray) Fern.
- R.1 Heuchera richardsonii R. Br.
- R.1 Sonchus arvensis L.
- +2 Achillea millefolium L.
- +1 Amorpha canescens Pursh
- +1 Amorpha canescens Pursh

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0177 Continued, Page 2

Forbs, Height 1-2, Cover I

+ .2 Antennaria neglecta Greene
+ .1 Asclepias syriaca L.
+ .1 Cirsium flodmani (Rydb.) Arthur
+ .1 Convolvulus arvensis L.
+ .2 Desmodium canadense (L.) DC.
+ .1 Erigeron strigosus Muhl.
+ .1 Liatris aspera Michx.
+ .2 Melilotus alba Medic.
+ .1 Oenothera biennis L.
+ .2 Physalis heterophylla Nees var. heterophylla
+ .1 Potentilla arguta Pursh
+ .2 Ratibida pinnata (Vent.) Barnh.
+ .1 Taraxacum officinale Weber
+ .1 Tragopogon dubius Scop.
+ .1 Vicia americana Muhl. ex Willd. var. americana
+ .2 Viola pedatifida G. Don

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0178
DATE: 21 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Bretzman pasture
Location: NE of SW of S. 11, T. 107N, R. 35W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 80, Rank: CD, Site Size (a.): 320
Soil Atlas Mapping-Unit: 66,
Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1285, Slope (deg./aspect): 0

Mainly degraded pasture, area with native species about 40 m south of Preserve boundary, *Bouteloua* spp. very visible here in fall, *Buchloe dactyloides* on rocks, searched unsuccessfully for *L. lepto*.

Graminoids, Height: 1-2, Cover: C

- 2.2 *Bouteloua curtipendula* (Michx.) Torr.
- 2.2 *Bouteloua gracilis* (HBK.) Lag. ex Steud.
- 2.2 *Bromus inermis* Leyss. var. *inermis*
- 2.2 *Poa pratensis* L. var. *pratensis*
- 1.2 *Stipa spartea* Trin.
- +1 *Agropyron* cf. *trachycaulum* (Link) Malte
- +1 *Carex*
- +1 *Panicum* cf. *leibergii* (Vasey) Scribn.
- +1 *Panicum* cf. *wilcoxianum* Vasey
- +1 *Phleum pratense* L.
- +1 *Sporobolus heterolepis* (Gray) Gray

Forbs, Height 1-2, Cover I

- 2.2 *Euthamia gymnospermoides* Greene
- 2.2 *Solidago nemoralis* Ait. var. *nemoralis*
- 1.2 *Achillea millefolium* L.
- 1.1 *Taraxacum officinale* Weber
- R.1 *Heuchera richardsonii* R. Br.
- R.1 *Liatris aspera* Michx.
- R.1 *Lithospermum canescens* (Michx.) Lehm.
- R.1 *Potentilla arguta* Pursh
- +3 *Antennaria neglecta* Greene
- +2 *Aster lanceolatus* Willd. ssp. *simplex* (Willd.) Jones
- +1 *Cirsium flodmani* (Rydb.) Arthur
- +1 *Erigeron strigosus* Muhl.
- +1 *Hedeoma hispida* Pursh
- +1 *Onosmodium molle* Michx.
- +2 *Oxalis dillenii* Jacq. ssp. *dillenii*

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0178 Continued, Page 2

Forbs, Height 1-2, Cover I

- + .1 Solidago rigida L.
- + .1 Trifolium pratense L.
- + .1 Vicia americana Muhl. ex Willd. var. americana
- + .2 Viola pedatifida G. Don
- + .2 Zizia aptera (Gray) Fern.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0179
DATE: 22 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Hildebrandt-Cullen Prairie
Location: SE of NW of S. 11, T. 107N, R. 35W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 81, Rank: BC, Site Size (a.): 94
Soil Atlas Mapping-Unit: 66,
Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1260, Slope (deg./aspect): 10N

In burned portion of tract about 80 meters west of Preserve fenceline near top of hill. No Lespedeza located within area of this releve later in summer.

Graminoids, Height: 1-2, Cover: C

- 2.2 Andropogon gerardii Vitman
- 2.2 Stipa spartea Trin.
- +1 Agropyron cf. trachycaulum (Link) Malte
- +2 Bromus inermis Leyss. var. inermis
- +1 Carex
- +2 Poa pratensis L. var. pratensis
- +1 Sporobolus heterolepis (Gray) Gray

Forbs, Height 1-2, Cover I

- 1.2 Amorpha canescens Pursh
- 1.2 Artemisia ludoviciana Nutt. ssp. ludoviciana
- 1.3 Coreopsis palmata Nutt.
- 1.2 Euthamia gymnospermoides Greene
- 1.2 Solidago canadensis L.
- 1.2 Solidago rigida L.
- R.1 Gentiana puberulenta Pringle
- R.1 Vicia americana Muhl. ex Willd. var. americana
- +2 Achillea millefolium L.
- +1 Allium stellatum Ker
- +1 Aster sericeus Vent.
- +2 Aster lanceolatus Willd. ssp. simplex (Willd.) Jones
- +1 Cirsium flodmani (Rydb.) Arthur
- +1 Heuchera richardsonii R. Br.
- +1 Liatris aspera Michx.
- +2 Phlox pilosa L.
- +1 Viola pedatifida G. Don
- +2 Zizia aptera (Gray) Fern.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVÉ REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVÉ NUMBER: 0180
DATE: 22 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Red Rock Preserve
Location: SW of NE of S. 11, T. 107N, R. 35W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 40, Rank: BC, Site Size (a.): 40
Soil Atlas Mapping-Unit: 66,
Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----

Relevé Size (sq. m): 100, Elev. (ft.): 1260, Slope (deg./aspect): 15N

Midslope in west part of unburned unit of Preserve.

Broadleaf Deciduous, Height: 1-2, Cover: R

+2 Symphoricarpos occidentalis Hook.

Graminoids, Height 1-2, Cover C

2.2 Poa pratensis L. var. pratensis
2.2 Sporobolus heterolepis (Gray) Gray
1.2 Stipa spartea Trin.
+1 Andropogon gerardii Vitman
+2 Bromus inermis Leyss. var. inermis
+2 Carex heliophila Mack.
+2 Panicum cf. wilcoxianum Vasey

Forbs, Height 1-2, Cover I

2.2 Helianthus maximiliani Schrad.
2.2 Phlox pilosa L.
2.2 Ratibida pinnata (Vent.) Barnh.
2.2 Solidago canadensis L.
1.2 Lespedeza leptostachya Engelm.
1.2 Zizia aptera (Gray) Fern.
+1 Achillea millefolium L.
+1 Amorpha canescens Pursh
+1 Anemone cylindrica Gray
+1 Asclepias syriaca L.
+1 Cirsium flodmani (Rydb.) Arthur
+1 Cirsium arvense (L.) Scop.
+1 Erigeron strigosus Muhl.
+2 Euthamia gymnospermoides Greene
+2 Helianthus rigidus (Cass.) Desf.

----- EXAMPLE RECORD -----

!	Cover.	Sociability	Genus	Species	Author	Variety	Author	Remark	!
!		+2	Epigaea	repens	L. var.	glab.	Fern.	fl ##	!

----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0180 Continued, Page 2

Forbs, Height 1-2, Cover I

+ .1 Heuchera richardsonii R. Br.
+ .2 Melilotus alba Medic.
+ .1 Potentilla arguta Pursh
+ .1 Rosa arkansana Porter
+ .1 Sonchus arvensis L.
+ .1 Tragopogon dubius Scop.
+ .1 Viola pedatifida G. Don

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0181
DATE: 22 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Conrad pasture, east draw
Location: SE of NE of S. 0, T. 107N, R. 36W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 1, Rank: BD, Site Size (a.): 80
Soil Atlas Mapping-Unit: 66,
Other Data Collected:

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1360, Slope (deg./aspect): 55E

Tiny remnant with prairie species, severely invaded by shrubs in east facing draw on south side of creek.

Broadleaf Deciduous, Height: 2-4, Cover: P

- 3.2 Symphoricarpos occidentalis Hook.
- R.1 Prunus americana Marsh. var. americana
- R.1 Ulmus americana L.
- +1 Acer negundo L.
- +2 Rhus radicans L.
- +2 Ulmus cf. thomasii Sarg.

Graminoids, Height 1-2, Cover C

- 2.2 Bromus inermis Leyss. var. inermis
- 2.2 Poa pratensis L. var. pratensis
- 2.2 Stipa viridula Trin.
- +1 Agropyron trachycaulum (Link) Malte
- +2 Andropogon gerardii Vitman
- +1 Bromus cf. ciliatus L.
- +2 Muhlenbergia
- +2 Panicum cf. wilcoxianum Vasey
- +1 Phleum pratense L.
- +2 Spartina pectinata Link
- +1 Stipa spartea Trin.

Forbs, Height 1-2, Cover I

- 2.2 Solidago rigida L. var. rigida
- 1.1 Amorpha canescens Pursh
- 1.1 Aster oblongifolius Nutt.
- 1.2 Delphinium virescens Nutt.
- 1.2 Echinacea angustifolia DC. var. angustifolia
- 1.1 Grindelia squarrosa (Pursh) Dunal

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0181 Continued, Page 2

Forbs, Height 1-2, Cover I

1.2 *Liatris aspera* Michx.
1.1 *Trifolium pratense* L.
R.1 *Apocynum sibiricum* Jacq.
R.1 *Lathyrus venosus* Muhl. ex Willd.
+.1 *Anemone cylindrica* Gray
+.2 *Antennaria neglecta* Greene
+.2 *Artemisia ludoviciana* Nutt. ssp. *ludoviciana*
+.1 *Asclepias verticillata* L.
+.2 *Aster sericeus* Vent.
+.1 *Aster laevis* L. var. *laevis*
+.1 *Cirsium flodmani* (Rydb.) Arthur
+.1 *Equisetum laevigatum* A. Br.
+.1 *Erigeron strigosus* Muhl. var. *strigosus*
+.1 *Glycyrrhiza lepidota* Pursh var. *lepidota*
+.1 *Heuchera richardsonii* R. Br.
+.1 *Kuhnia eupatorioides* L. var. *corymbulosa* T. & G.
+.1 *Lithospermum canescens* (Michx.) Lehm.
+.1 *Medicago lupulina* L.
+.1 *Melilotus alba* Medic.
+.1 *Melilotus officinalis* (L.) Pallas
+.1 *Oenothera*
+.1 *Onosmodium molle* Michx.
+.1 *Petalostemon purpureum* (Vent.) Rydb.
+.1 *Polygonatum*
+.2 *Psoralea argophylla* Pursh
+.1 *Psoralea esculenta* Pursh
+.1 *Ratibida pinnata* (Vent.) Barnh.
+.1 *Rosa arkansana* Porter
+.1 *Sisyrinchium* cf. *campestre* Bickn.
+.1 *Solidago* cf. *missouriensis* Nutt.
+.1 *Solidago canadensis* L.
+.2 *Solidago nemoralis* Ait.
+.1 *Taraxacum officinale* Weber
+.1 *Tragopogon dubius* Scop.
+.1 *Verbena hastata* L.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVÉ REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVÉ NUMBER: 0182
DATE: 22 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Conrad pasture, n-facing slope
Location: SE of NE of S. 0, T. 107N, R. 36W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 5, Rank: B, Site Size (a.): 80
Soil Atlas Mapping-Unit: 66,
Other Data Collected:

----- PLOT CHARACTERISTICS -----
Relevé Size (sq. m): 100, Elev. (ft.): 1360, Slope (deg./aspect): 35N

Remnant of prairie vegetation on north-facing slope, very nice, would be interesting to see adjoining flat area to south without grazing. This area is south of the stream.

Broadleaf Deciduous, Height: 2-3, Cover: P

2.2 *Symphoricarpos occidentalis* Hook.

Graminoids, Height 1-2, Cover C

2.2 *Bromus inermis* Leyss. var. *inermis*
2.2 *Phleum pratense* L.
2.2 *Poa pratensis* L. var. *pratensis*
2.2 *Sporobolus heterolepis* (Gray) Gray
1.1 *Stipa viridula* Trin.
+.1 *Agropyron* cf. *trachycaulum* (Link) Malte
+.2 *Andropogon gerardii* Vitman
+.1 *Koeleria macrantha* (Ledeb.) Schultes
+.2 *Muhlenbergia* cf.
+.1 *Stipa spartea* Trin.

Forbs, Height 1-2, Cover I

2.2 *Artemisia ludoviciana* Nutt. ssp. *ludoviciana*
2.2
1.2 *Astragalus crassicaupus* Nutt. var. *crassicaupus*
1.1 *Echinacea angustifolia* DC. var. *angustifolia*
1.1 *Onosmodium molle* Michx.
1.2 *Ratibida pinnata* (Vent.) Barnh.
1.2 *Solidago nemoralis* Ait. var. *nemoralis*
1.1 *Viola pedatifida* G. Don
R.1 *Aster oblongifolius* Nutt. var. *oblongifolius*
R.1 *Medicago sativa* L.
R.1 *Melilotus officinalis* (L.) Pallas
+.1 *Achillea millefolium* L.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 *Epigaea repens* L. var. *glab.* Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0182 Continued, Page 2

Forbs, Height 1-2, Cover I

- + .1 Anemone cylindrica Gray
- + .1 Cirsium flodmani (Rydb.) Arthur
- + .1 Delphinium virescens Nutt.
- + .1 Erigeron strigosus Muhl. var. strigosus
- + .1 Fragaria virginiana Duchesne ssp. virginiana
- + .1 Kuhnia eupatorioides L. var. corymbulosa T. & G.
- + .2 Liatris aspera Michx.
- + .1 Lithospermum canescens (Michx.) Lehm.
- + .1 Oenothera
- + .1 Petalostemon purpureum (Vent.) Rydb.
- + .1 Polygonatum cf.
- + .1 Potentilla arguta Pursh
- + .2 Psoralea esculenta Pursh
- + .1 Rosa arkansana Porter var. arkansana
- + .1 Taraxacum officinale Weber
- + .1 Tragopogon dubius Scop.
- + .1 Verbena hastata L.
- + .1 Zigadenus elegans Pursh
- + .2 Zizia aptera (Gray) Fern.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0183
DATE: 22 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Clark pasture
Location: SE of NE of S. 12, T. 107, R. 36
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 33, Rank: C, Site Size (a.): 40
Soil Atlas Mapping-Unit: 66,
Other Data Collected:

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1360, Slope (deg./aspect): 15NE

Near top of hill in north unit of pasture used by Kosell. Grazed but 1
ss degraded th an expected in this area.

Graminoids, Height: 1-2, Cover: C

- 3.3 Bromus inermis Leyss. var. inermis
- 3.3 Poa pratensis L. var. pratensis
- 2.3 Muhlenbergia
- 1.1 Panicum cf. leibergii (Vasey) Scribn.
- 1.2 Phleum pratense L.
- +1 Bouteloua gracilis (HBK.) Lag. ex Steud.
- +2 Sporobolus heterolepis (Gray) Gray
- +1 Stipa spartea Trin.

Forbs, Height 1-2, Cover I

- 2.2 Artemisia ludoviciana Nutt. ssp. ludoviciana
- 2.2 Euthamia gymnospermoides Greene
- 2.3 Solidago nemoralis Ait. var. nemoralis
- 1.1 Achillea millefolium L.
- 1.2 Antennaria neglecta Greene
- 1.1 Cirsium flodmani (Rydb.) Arthur
- 1.2 Solidago rigida L.
- 1.2 Verbena hastata L.
- 1.2 Viola pedatifida G. Don
- R.1 Amorpha canescens Pursh
- R.1 Echinacea angustifolia DC. var. angustifolia
- R.1 Erigeron strigosus Muhl. var. strigosus
- R.1 Petalostemon purpureum (Vent.) Rydb.
- R.1 Rosa arkansana Porter
- +1 Anemone cylindrica Gray
- +1 Aster ericoides L. ssp. ericoides
- +1 Aster oblongifolius Nutt.
- +1 Geum triflorum Pursh

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0183 Continued, Page 2

Forbs, Height 1-2, Cover I

+1 Heuchera richardsonii R. Br.
+1 Lithospermum canescens (Michx.) Lehm.
+1 Physalis heterophylla Nees var. heterophylla
+1 Potentilla arguta Pursh
+1 Psoralea esculenta Pursh
+1 Ratibida pinnata (Vent.) Barnh.
+1 Trifolium pratense L.
+1 Trifolium repens L.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVÉ REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVÉ NUMBER: 0184
DATE: 22 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Kosell pasture
Location: NE of SE of S. 12, T. 107N, R. 36W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 55, Rank: C, Site Size (a.): 80
Soil Atlas Mapping-Unit: 66,
Other Data Collected:

----- PLOT CHARACTERISTICS -----
Relevé Size (sq. m): 100, Elev. (ft.): 1380, Slope (deg./aspect): 10NE

In flat area just S of fence between N and S units of pasture used by
osell. Buchloe, Schedonnardus on nearby rocks.

Broadleaf Deciduous, Height: 2-3, Cover: P

3.2 Symphoricarpos occidentalis Hook.

Graminoids, Height 1-2, Cover C

3.3 Poa pratensis L. var. pratensis
2.2 Bromus inermis Leyss. var. inermis
2.2 Phleum pratense L.
1.2 Stipa spartea Trin.
+.1 Carex
+.1 Sorghastrum nutans (L.) Nash
+.1 Sporobolus heterolepis (Gray) Gray

Forbs, Height 1-2, Cover I

2.2 Antennaria neglecta Greene
2.2 Liatris aspera Michx.
2.2 Solidago canadensis L.
2.1 Solidago rigida L.
1.2 Artemisia ludoviciana Nutt. ssp. ludoviciana
1.2 Euthamia gymnospermoides Greene
1.1 Heuchera richardsonii R. Br.
1.2 Psoralea argophylla Pursh
1.2 Solidago nemoralis Ait. var. nemoralis
1.1 Verbena hastata L.
1.1 Zizia aptera (Gray) Fern.
R.1 Apocynum sibiricum Jacq.
R.1 Cirsium vulgare (Savi) Tenore
R.1 Lithospermum canescens (Michx.) Lehm.
R.1 Tragopogon dubius Scop.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0184 Continued, Page 2

Forbs, Height 1-2, Cover I

R.1 Trifolium repens L.
R.1 Vicia americana Muhl. ex Willd. var. americana
R.1 Zigadenus elegans Pursh
+.1 Achillea millefolium L.
+.1 Amorpha canescens Pursh
+.1 Anemone cylindrica Gray
+.1 Aster ericoides L.
+.1 Aster oblongifolius Nutt.
+.1 Cirsium flodmani (Rydb.) Arthur
+.1 Erigeron strigosus Muhl.
+.1 Grindelia squarrosa (Pursh) Dunal
+.1 Petalostemon purpureum (Vent.) Rydb.
+.1 Potentilla recta L.
+.1 Viola pedatifida G. Don

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVÉ REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVÉ NUMBER: 0185
DATE: 22 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Jeffers Petroglyph
Location: N of W of S. 9, T. 107N, R. 35W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 80, Rank: A, Site Size (a.): 80
Soil Atlas Mapping-Unit: 66,
Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----
Relevé Size (sq. m): 100, Elev. (ft.): 1280, Slope (deg./aspect): 0

In managed area in center of parking circle. Area was burned in May, 1986. *Lespedeza leptostachy* and hybrid *Lespedeza x capitata* present.

Graminoids, Height: 1-2, Cover: C

3.3 *Andropogon gerardii* Vitma
3.3 *Sorghastrum nutans* (L.) N 1
2.2 *Panicum cf. virgatum* L.
1.2 *Bromus inermis* Leyss. var. *inermis*
1.2 *Poa pratensis* L. var. *pratensis*
1.2 *Sporobolus heterolepis* (Gray) Gray
+.2 *Schizachyrium scoparium* (Michx.) Nash
+.2 *Stipa spartea* Trin.

Forbs, Height 1-2, Cover I

2.2 *Amorpha canescens* Pursh
2.2 *Solidago canadensis* L.
1.2 *Coreopsis palmata* Nutt.
1.2 *Helianthus rigidus* (Cass.) Desf.
1.1 *Heuchera richardsonii* R. Br.
1.2 *Lespedeza leptostachya* Engelm.
1.1 *Petalostemon candidum* Michx.
1.1 *Phlox pilosa* L.
1.2 *Psoralea argophylla* Pursh
1.2 *Solidago rigida* L. var. *rigida*
1.2 *Zizia aptera* (Gray) Fern.
R.1 *Melilotus officinalis* (L.) Pallas
+.1 *Achillea millefolium* L.
+.2 *Anemone cylindrica* Gray
+.2 *Artemisia ludoviciana* Nutt. ssp. *ludoviciana*
+.2 *Aster sericeus* Vent.
+.2 *Aster oblongifolius* Nutt. var. *oblongifolius*
+.1 *Astragalus crassicaupus* Nutt.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0185 Continued, Page 2

Forbs, Height 1-2, Cover I

+1 *Cirsium flodmani* (Rydb.) Arthur
+1 *Erigeron strigosus* Muhl.
+1 *Gentiana puberulenta* Pringle
+1 *Lathyrus venosus* Muhl. ex Willd.
+2 *Lespedeza capitata* Michx.
+2 *Lespedeza* (L. capitata X L. leptostachya)
+1 *Liatris aspera* Michx.
+2 *Oenothera*
+2 *Pedicularis canadensis* L.
+1 *Petalostemon purpureum* (Vent.) Rydb.
+1 *Physalis heterophylla* Nees
+1 *Potentilla arguta* Pursh
+1 *Psoralea esculenta* Pursh
+1 *Vicia americana* Muhl. ex Willd.

----- EXAMPLE RECORD -----

! Cover.Sociability	Genus Species	Author	Variety	Author	Remark	!
! +.2	<i>Epigaea repens</i>	L. var. glab.	Fern.	fl ##	!	!

----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0186
DATE: 22 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409512 (V09C)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Eichstadt ravine
Location: NW of NE of S. 2, T. 107N, R. 37W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 40, Rank: BC, Site Size (a.): 40
Soil Atlas Mapping-Unit: 66,
Other Data Collected:

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1290, Slope (deg./aspect): 25W

Prairie never broken, not grazed for years. Homestead in same family as at settlement. In Prairie Tax Credit. Owner aware of need to burn and has requested burn from area wildlife manager.

Broadleaf Deciduous, Height: 2-3, Cover: P

2.2 Symphoricarpos occidentalis Hook.
+.1 Rhus radicans L.

Needleleaf Evergreen, Height 3-4, Cover B

R.1 Juniperus virginiana L.

Graminoids, Height 1-2, Cover C

3.2 Andropogon gerardii Vitman
2.2 Poa pratensis L. var. pratensis
2.2 Sporobolus heterolepis (Gray) Gray
1.2 Panicum
1.2 Stipa viridula Trin.
+.2 Schizachyrium scoparium (Michx.) Nash
+.1 Stipa spartea Trin.

Forbs, Height 1-2, Cover I

2.2 Solidago rigida L.
1.2 Aster oblongifolius Nutt.
1.2 Echinacea angustifolia DC. var. angustifolia
1.2 Liatris aspera Michx.
1.2 Psoralea esculenta Pursh
1.2
R.1 Asclepias verticillata L.
R.1 Oenothera biennis L.
+.2 Achillea millefolium L.
+.1 Amorpha canescens Pursh

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0186 Continued, Page 2

Forbs, Height 1-2, Cover I

+ .2 *Artemisia ludoviciana* Nutt. ssp. *ludoviciana*
+ .1 *Asclepias syriaca* L.
+ .1 *Aster sericeus* Vent.
+ .1 *Aster laevis* L.
+ .1 *Astragalus crassicaupus* Nutt. var. *crassicaupus*
+ .1 *Equisetum laevigatum* A. Br.
+ .1 *Erigeron strigosus* Muhl.
+ .1 *Fragaria virginiana* Duchesne ssp. *virginiana*
+ .2 *Glycyrrhiza lepidota* Pursh
+ .1 *Kuhnia eupatorioides* L.
+ .2 *Lithospermum canescens* (Michx.) Lehm.
+ .1 *Lygodesmia juncea* (Pursh) Hook.
+ .2 *Melilotus officinalis* (L.) Pallas
+ .1 *Oenothera*
+ .1 *Physalis heterophylla* Nees var. *heterophylla*
+ .1 *Potentilla arguta* Pursh
+ .1 *Rosa arkansana* Porter
+ .2 *Solidago canadensis* L.
+ .1 *Solidago missouriensis* Nutt. var. *missouriensis*
+ .1 *Tragopogon dubius* Scop.
+ .1 *Vicia americana* Muhl. ex Willd. var. *americana*
+ .2 *Zizia aptera* (Gray) Fern.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0187
DATE: 31 AUG 1988
BY: Nancy P. Sather
Brown County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Brown pasture
Location: SW of SE of S. 29, T. 108N, R. 35W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 100, Rank: BC, Site Size (a.): 160
Soil Atlas Mapping-Unit: 66,
Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1160, Slope (deg./aspect): 25N

Fairly steep scarcely grazed hill in pasture. *Lespedeza leptostachya*
somewhat damaged by herbicide drift. Enrolled in registry early 1989.
449 *Lespedeza leptostachya*, more potential habitat to east.

Graminoids, Height: 1-2, Cover: C

- 3.2 *Bouteloua curtipendula* (Michx.) Torr.
- 3.2 *Stipa spartea* Trin.
- 2.2 *Panicum* cf. *wilcoxianum* Vasey
- 2.2
- 2.2 *Sporobolus heterolepis* (Gray) Gray

Forbs, Height 1-2, Cover I

- 3.2 *Solidago nemoralis* Ait.
- 2.2 *Artemisia ludoviciana* Nutt. ssp. *ludoviciana*
- 2.2 *Aster ericoides* L.
- 2.2 *Kuhnia eupatorioides* L.
- 2.2 *Lespedeza leptostachya* Engelm.
- 2.2 *Petalostemon purpureum* (Vent.) Rydb.
- 1.1 *Anemone cylindrica* Gray
- 1.2 *Aster sericeus* Vent.
- 1.2 *Petalostemon candidum* Michx.
- 1.1 *Physalis heterophylla* Nees var. *heterophylla*
- 1.1 *Psoralea argophylla* Pursh
- 1.2 *Ratibida pinnata* (Vent.) Barnh.
- 1.2 *Solidago rigida* L.
- R.1 *Astragalus crassicaupus* Nutt. var. *crassicaupus*
- R.1 *Melilotus officinalis* (L.) Pallas
- +1 *Achillea millefolium* L.
- +1 *Allium stellatum* Ker
- +1 *Amorpha canescens* Pursh
- +1 *Antennaria neglecta* Greene
- +1 *Asclepias verticillata* L.
- +1 *Cirsium flodmani* (Rydb.) Arthur

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0187 Continued, Page 2

Forbs, Height 1-2, Cover I

+ .1 Echinacea angustifolia DC. var. angustifolia
+ .1 Equisetum laevigatum A. Br.
+ .1 Erigeron strigosus Muhl. var. strigosus
+ .2 Geum triflorum Pursh
+ .1 Grindelia squarrosa (Pursh) Dunal
+ .1 Heuchera richardsonii R. Br.
+ .1 Lactuca cf. canadensis L.
+ .1 Liatris punctata Hook.
+ .1 Linum
+ .1 Monarda fistulosa L.
+ .1 Onosmodium molle Michx.
+ .1 Oxalis dillenii Jacq. ssp. dillenii
+ .1 Potentilla arguta Pursh
+ .1 Psoralea esculenta Pursh
+ .1
+ .1 Sonchus arvensis L.
+ .1 Viola pedatifida G. Don
+ .1 Zizia aptera (Gray) Fern.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0188
DATE: 14 SEP 1988
BY: Nancy P. Sather
Brown County, MN
Quadrangle Code: 4409521 (V09A)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Meine pasture
Location: W of SW of S. 33, T. 109N, R. 35W
Heritage Community Element: Gravel Prairie
Element Occurrence Size (a.): 70, Rank: AC, Site Size (a.): 120
Soil Atlas Mapping-Unit: 66,
Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1070, Slope (deg./aspect): 35N

Very steep north-facing gravel hill. Pastured in winter but not summer
1114 prairie bush clover near west end of north-facing slope. Owner
aware of EO, enrolled in registry early 1989.

Graminoids, Height: 1-2, Cover: C

- 3.1 Bouteloua curtipendula (Michx.) Torr.
- 2.2 Sporobolus heterolepis (Gray) Gray
- 2.2 Stipa spartea Trin.
- 1.2 Panicum cf. wilcoxianum Vasey
- 1.2 Poa pratensis L. var. pratensis
- +1 Andropogon gerardii Vitman
- +1 Schizachyrium scoparium (Michx.) Nash
- +1 Sorghastrum nutans (L.) Nash

Forbs, Height 1-2, Cover I

- 3.2 Aster laevis L. var. laevis
- 3.2 Solidago cf. canadensis L.
- 2.2 Aster sericeus Vent.
- 2.1 Helianthus rigidus (Cass.) Desf.
- 2.1 Heuchera richardsonii R. Br.
- 2.2 Lespedeza leptostachya Engelm.
- 2.2 Petalostemon purpureum (Vent.) Rydb.
- 2.2 Viola pedatifida G. Don
- 1.1 Amorpha canescens Pursh
- 1.1 Anemone cylindrica Gray
- 1.2 Artemisia frigida Willd.
- 1.2 Coreopsis palmata Nutt.
- 1.2 Equisetum laevigatum A. Br.
- 1.1 Petalostemon candidum Michx.
- 1.2 Potentilla arguta Pursh
- 1.2 Solidago rigida L.
- +1 Allium stellatum Ker
- +1 Aster ericoides L.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0188 Continued, Page 2

Forbs, Height 1-2, Cover I

+ .1 Astragalus crassicaupus Nutt. var. crassicaupus
+ .1 Cirsium flodmani (Rydb.) Arthur
+ .1 Erigeron strigosus Muhl.
+ .1 Gentiana puberulenta Pringle
+ .2 Geum triflorum Pursh
+ .2 Heterotheca villosa (Pursh) Shinnars
+ .1 Liatris punctata Hook.
+ .1 Phlox pilosa L.
+ .1 Physalis heterophylla Nees var. heterophylla
+ .1 Psoralea esculenta Pursh
+ .1 Ratibida pinnata (Vent.) Barnh.
+ .1 Rosa arkansana Porter
+ .1 Verbena cf. hastata L.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0189
DATE: 20 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Winters pasture
Location: SW of NW of S. 5, T. 106N, R. 35W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 7, Rank: C, Site Size (a.): 28
Soil Atlas Mapping-Unit: 66,
Other Data Collected:

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1450, Slope (deg./aspect): 10NE

This releve in pastured area where prairie species visible near top of hill near northeast part of actual pasture. This is not area where *Lespedeza leptostachya* subsequently found.

Graminoids, Height: 1-2, Cover: C

4.3 *Poa compressa* L.
2.2 *Bromus inermis* Leyss. var. *inermis*
R.1 *Agropyron*

Forbs, Height 1-2, Cover C

2.2 *Solidago nemoralis* Ait.
2.2 *Solidago rigida* L. var. *rigida*
1.2 *Anemone cylindrica* Gray
1.2 *Anemone*
1.2 *Artemisia ludoviciana* Nutt. ssp. *ludoviciana*
1.2 *Aster oblongifolius* Nutt. var. *oblongifolius*
1.2 *Taraxacum officinale* Weber
R.1 *Agoseris glauca* (Pursh) Raf. var. *glauca*
R.1 *Gentiana puberulenta* Pringle
R.1 *Onosmodium molle* Michx.
+.1 *Achillea millefolium* L.
+.1 *Aster sericeus* Vent.
+.2 *Astragalus crassicaupus* Nutt. var. *crassicaupus*
+.1 *Cirsium flodmani* (Rydb.) Arthur
+.2 *Coreopsis palmata* Nutt.
+.1 *Lithospermum canescens* (Michx.) Lehm.
+.1 *Petalostemon candidum* Michx.
+.1 *Physalis heterophylla* Nees var. *heterophylla*
+.1 *Rosa arkansana* Porter var. *arkansana*
+.1 *Zizia aptera* (Gray) Fern.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 *Epigaea repens* L. var. *glab.* Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0190
DATE: 20 JUN 1988
BY: Nancy P. Sather
7 County, MN
Quadrangle Code: 409511 (09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Winters pasture
Location: W of W of S. 5, T. 06N, R. 5W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 7, Rank: B, Site Size (a.): 28
Soil Atlas Mapping-Unit: 66,
Other Data Collected:

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1450, Slope (deg./aspect): 25NE

On steeper NE-facing slope, still in actual pasture, but area similar to area where *Lespedeza leptostachys* subsequently found, should be searched more carefully.

Graminoids, Height: 1-2, Cover: I

- 1.2 *Muhlenbergia cf. richardsonis* (Trin.) Rydb.
- 1.2 *Sorghastrum nutans* (L.) Nash
- +2 *Andropogon gerardii* Vitman
- +2 *Bromus inermis* Leyss. var. *inermis*
- +2 *Panicum*

Forbs, Height 1-2, Cover C

- 3.3 *Antennaria neglecta* Greene
- 2.2 *Artemisia ludoviciana* Nutt. ssp. *ludoviciana*
- 2.2 *Aster sericeus* Vent.
- 2.2 *Solidago nemoralis* Ait. var. *nemoralis*
- 2.2 *Solidago rigida* L. var. *rigida*
- 2.3 *Taraxacum officinale* Weber
- 1.1 *Achillea millefolium* L. ssp. *millefolium*
- 1.2 *Aster oblongifolius* Nutt. var. *oblongifolius*
- 1.2 *Coreopsis palmata* Nutt.
- R.1 *Anemone cylindrica* Gray
- R.1 *Echinacea*
- R.1 *Lithospermum canescens* (Michx.) Lehm.
- R.1 *Melilotus officinalis* (L.) Pallas
- +1 *Allium stellatum* Ker
- +1 *Astragalus crassicaulus* Nutt. var. *crassicaulus*
- +1 *Cirsium flodmani* (Rydb.) Arthur
- +2 *Equisetum laevigatum* A. Br.
- +2 *Erigeron strigosus* Muhl. var. *strigosus*
- +1 *Euthamia gymnospermoides* Greene
- +2 *Geum triflorum* Pursh
- +1 *Helianthus rigidus* (Cass.) Desf. ssp. *rigidus*

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0190 Continued, Page 2

Forbs, Height 1-2, Cover C

+ .1 Lathyrus venosus Muhl. ex Willd. var. intonsus Butt. & St. John
+ .2 Linum
+ .1 Oenothera
+ .1 Onosmodium molle Michx.
+ .1 Petalostemon candidum Michx.
+ .1 Phlox pilosa L.
+ .1 Physalis heterophylla Nees var. heterophylla
+ .2 Psoralea esculenta Pursh
+ .2
+ .1 Verbena hastata L.
+ .1 Viola pedatifida G. Don
+ .2 Zizia aptera (Gray) Fern.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVÉ REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVÉ NUMBER: 0191
DATE: 20 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Baerg prairie
Location: SE of NE of S. 6, T. 106N, R. 35W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 20, Rank: AB, Site Size (a.): 30
Soil Atlas Mapping-Unit: 66,
Other Data Collected:

----- PLOT CHARACTERISTICS -----
Relevé Size (sq. m): 100, Elev. (ft.): 1455, Slope (deg./aspect): 25NW

Relevé on west and northwest-facing slopes of small isolated hill
Spring aspect excellent. Revisited and less impressive in Sept. Too
steep to have been disturbed. Good wet-mesic spot just east.

Graminoids, Height: 1-2, Cover: C

3.2 Poa pratensis L. var. pratensis
1.2 Andropogon gerardii Vitman
1.2 Schizachyrium scoparium (Michx.) Nash
1.2 Stipa spartea Trin.
+.2 Bromus inermis Leyss. var. inermis
+.1 Panicum

Forbs, Height 1-2, Cover C

3.2 Coreopsis palmata Nutt.
3.2 Solidago nemoralis Ait. var. nemoralis
2.1 Amorpha canescens Pursh
2.1 Artemisia ludoviciana Nutt. ssp. ludoviciana
2.2 Helianthus rigidus (Cass.) Desf. ssp. rigidus
2.2 Phlox pilosa L.
2.1 Rosa arkansana Porter var. arkansana
1.2 Aster oblongifolius Nutt. var. oblongifolius
1.2 Echinacea angustifolia DC. var. angustifolia
1.1 Potentilla arguta Pursh
1.1 Ratibida pinnata (Vent.) Barnh.
R.1 Cirsium flodmani (Rydb.) Arthur
R.1 Liatris aspera Michx.
R.1 Tragopogon dubius Scop.
+.1 Achillea millefolium L. ssp. millefolium
+.1 Asclepias cf. ovalifolia Dcne.
+.1 Asclepias syriaca L.
+.1 Asclepias viridiflora Raf.
+.1 Aster sericeus Vent.
+.1 Astragalus crassicaulus Nutt. var. crassicaulus

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0191 Continued, Page 2

Forbs, Height 1-2, Cover C

+ .1 Erigeron strigosus Muhl. var. strigosus
+ .2 Euthamia gymnospermoides Greene
+ .2 Helianthus maximiliani Schrad.
+ .1 Heliopsis
+ .1 Oenothera
+ .1 Onosmodium molle Michx.
+ .2 Pedicularis canadensis L.
+ .1 Petalostemon candidum Michx.
+ .1 Petalostemon purpureum (Vent.) Rydb.
+ .2 Physalis heterophylla Nees var. heterophylla
+ .1 Psoralea esculenta Pursh
+ .2 Solidago rigida L. var. rigida
+ .1 Zizia aptera (Gray) Fern.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0192

DATE: 20 JUN 1988

BY: Nancy P. Sather

Cottonwood County, MN

Quadrangle Code: 4409512 (V09C)

MINNESOTA NATURAL HERITAGE PROGRAM

Department of Natural Resources

Box 7, 500 Lafayette Road

St. Paul, Minnesota 55146

(612) 296-3344

Site Name: Ryker ravine

Location: NW of SE of S. 5, T. 107N, R. 36

Heritage Community Element: Mesic Blacksoil Prairie

Element Occurrence Size (a.): 10, Rank: BC, Site Size (a.): 23

Soil Atlas Mapping-Unit: 66,

Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1355, Slope (deg./aspect): 25E

Small prairie remnant in ravine. Needs burning. Buchloe and Scheddonar
dus on quartzite bedrocks in valley. In prairie tax credit, owner is
interested in burning.

Broadleaf Deciduous, Height: 2-3, Cover: P

2.2 Symphoricarpos occidentalis Hook.

Graminoids, Height 1-2, Cover C

- 3.2 Poa pratensis L. var. pratensis
- 2.3 Bromus inermis Leyss. var. inermis
- 2.2 Sporobolus heterolepis (Gray) Gray
- 1.2 Andropogon gerardii Vitman
- 1.2 Sorghastrum nutans (L.) Nash
- 1.2 Stipa spartea Trin.
- 1.2 Stipa viridula Trin.
- +1 Panicum
- +2 Schizachyrium scoparium (Michx.) Nash

Forbs, Height 1-2, Cover C

- 2.2 Geum triflorum Pursh
- 1.1 Achillea millefolium L. ssp. millefolium
- 1.1 Amorpha canescens Pursh
- 1.2 Artemisia ludoviciana Nutt. ssp. ludoviciana
- 1.2 Aster lanceolatus Willd. ssp. simplex (Willd.) Jones
- 1.1 Cirsium flodmani (Rydb.) Arthur
- 1.1 Heuchera richardsonii R. Br.
- 1.1 Petalostemon candidum Michx.
- 1.2 Rosa arkansana Porter var. arkansana
- 1.1 Taraxacum officinale Weber
- R.1 Astragalus crassicaupus Nutt. var. crassicaupus
- R.1 Psoralea esculenta Pursh
- +1 Asclepias syriaca L.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0192 Continued, Page 2

Forbs, Height 1-2, Cover C

+1 Astragalus cf. canadensis L.
+1 Delphinium virescens Nutt.
+1 Lithospermum canescens (Michx.) Lehm.
+1 Medicago sativa L.
+1 Melilotus officinalis (L.) Pallas
+1 Verbena hastata L.
+1 Viola pedatifida G. Don

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVÉ REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVÉ NUMBER: 0193
DATE: 21 JUN 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Polzin pasture
Location: SW of SE of S. 5, T. 107, R. 35W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 136, Rank: BC, Site Size (a.): 193
Soil Atlas Mapping-Unit: 66,
Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----
Relevé Size (sq. m): 100, Elev. (ft.): 1290, Slope (deg./aspect): 2E

Relevé in nearly flat area at crest of hill, west end active pasture,
heavily grazed in 1988. Spring quality of this prairie was best this y
year. Bush clover is at base of n-facing slope east end.

Graminoids, Height: 1-2, Cover: C

- 3.2 *Poa pratensis* L. var. *pratensis*
- 2.2 *Andropogon gerardii* Vitman
- 2.2 *Sporobolus heterolepis* (Gray) Gray
- 2.2 *Stipa spartea* Trin.
- 1.1 *Phleum pratense* L.
- +2 *Alopecurus carolinianus* Walt.
- +1 *Koeleria macrantha* (Ledeb.) Schultes
- +2 *Muhlenbergia richardsonis* (Trin.) Rydb.
- +2 *Panicum*

Forbs, Height 1-2, Cover C

- 2.2 *Liatris aspera* Michx.
- 2.2 *Trifolium repens* L.
- 1.2 *Amorpha canescens* Pursh
- 1.2 *Antennaria neglecta* Greene
- 1.2 *Aster sericeus* Vent.
- 1.2 *Coreopsis palmata* Nutt.
- 1.2 *Euthamia gymnospermoides* Greene
- 1.1 *Heuchera richardsonii* R. Br.
- 1.2
- 1.2 *Solidago missouriensis* Nutt.
- R.1 *Lespedeza capitata* Michx.
- R.1 *Plantago patagonica* Jacq.
- R.1 *Tragopogon dubius* Scop.
- +1 *Achillea millefolium* L. ssp. *millefolium*
- +1 *Anemone cylindrica* Gray
- +1 *Artemisia ludoviciana* Nutt. ssp. *ludoviciana*
- +1 *Aster ericoides* L. ssp. *ericoides*

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0193 Continued, Page 2

Forbs, Height 1-2, Cover C

- + .1 Aster oblongifolius Nutt. var. oblongifolius
- + .1 Cirsium flodmani (Rydb.) Arthur
- + .1 Delphinium virescens Nutt.
- + .2 Draba nemorosa L.
- + .1 Erigeron strigosus Muhl. var. strigosus
- + .1 Gentiana puberulenta Pringle
- + .2 Geum triflorum Pursh
- + .1 Helianthus rigidus (Cass.) Desf. ssp. rigidus
- + .1 Lathyrus venosus Muhl. ex Willd.
- + .1 Linum
- + .1 Lithospermum canescens (Michx.) Lehm.
- + .1 Melilotus officinalis (L.) Pallas
- + .1 Oenothera
- + .1 Petalostemon candidum Michx.
- + .1 Petalostemon purpureum (Vent.) Rydb.
- + .1 Phlox pilosa L.
- + .1 Potentilla arguta Pursh
- + .1 Psoralea esculenta Pursh
- + .1
- + .1 Solidago rigida L. var. rigida
- + .1 Taraxacum officinale Weber
- + .1 Tradescantia bracteata Small
- + .1 Trifolium pratense L.
- + .1 Verbena hastata L.
- + .1 Zizia aptera (Gray) Fern.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0194
DATE: 17 SEP 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Winters prairie
Location: SW of NW of S. 5, T. 106N, R. 35W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 10, Rank: B, Site Size (a.): 40
Soil Atlas Mapping-Unit: 66,
Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1450, Slope (deg./aspect): 20NW

Ungrazed prairie remnant north of pasture fence. Relve is on north-west facing slope near road. Bush clover on W, N and E facing slopes (E-facing downhill of rock pile). Wildfire here June 1988.

Graminoids, Height: 1-2, Cover: C

2.2 Andropogon gerardii Vitman
1.2 Bromus inermis Leyss. var. inermis
1.2 Muhlenbergia
1.2 Panicum cf. wilcoxianum Vasey
1.2 Sorghastrum nutans (L.) Nash
1.2 Sporobolus heterolepis (Gray) Gray
+.2 Bouteloua curtipendula (Michx.) Torr.
+.2 Koeleria macrantha (Ledeb.) Schultes
+.2 Poa pratensis L. var. pratensis
+.2 Schizachyrium scoparium (Michx.) Nash
+.1 Setaria

Forbs, Height 1-2, Cover I

3.2 Solidago nemoralis Ait.
2.2 Amorpha canescens Pursh
2.2 Aster ericoides L.
2.2 Aster laevis L.
2.2 Coreopsis palmata Nutt.
2.2 Solidago canadensis L.
1.2 Artemisia ludoviciana Nutt. ssp. ludoviciana
1.1 Convolvulus sepium L.
1.2 Echinacea angustifolia DC.
1.1 Gentiana puberulenta Pringle
1.2 Helianthus rigidus (Cass.) Desf.
1.2 Lathyrus venosus Muhl. ex Willd.
1.2 Lespedeza capitata Michx.
1.2 Lespedeza leptostachya Engelm.
1.2 Liatris aspera Michx.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0194 Continued, Page 2

Forbs, Height 1-2, Cover I

1.2 Phlox pilosa L.
1.1 Rosa arkansana Porter var. arkansana
1.2 Solidago missouriensis Nutt.
1.2 Solidago rigida L. var. rigida
+.1 Ambrosia artemisiifolia L.
+.1 Asclepias syriaca L.
+.1 Aster sericeus Vent.
+.1 Chenopodium album L.
+.2 Euthamia gymnospermoides Greene
+.2 Helianthus maximiliani Schrad.
+.1 Medicago sativa L.
+.2 Melilotus alba Medic.
+.1 Mirabilis nyctaginea (Michx.) MacM.
+.1 Onosmodium molle Michx.
+.2 Petalostemon candidum Michx.
+.1 Physalis heterophylla Nees var. heterophylla
+.1 Potentilla arguta Pursh
+.2 Pycnanthemum virginianum (L.) Durand & Jackson
+.1 Ratibida pinnata (Vent.) Barnh.
+.2 Verbena hastata L.
+.2 Zizia aptera (Gray) Fern.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0195
DATE: 16 SEP 1988
BY: Nancy P. Sather
Brown County, MN
Quadrangle Code: 4409521 (V09A)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Meine prairie
Location: SW of SW of S. 33, T. 109N, R. 35W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 70, Rank: BC, Site Size (a.): 120
Soil Atlas Mapping-Unit: 66,
Other Data Collected:

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1290, Slope (deg./aspect): 15S

In gently sloping area just uphill and west of family dump on south side of hill. More xeric and more disturbed than Lespedeza area.

Graminoids, Height: 1-2, Cover: C

2.2 Bouteloua curtipendula (Michx.) Torr.
2.2 Bromus inermis Leyss. var. inermis
2.2 Sporobolus heterolepis (Gray) Gray
1.2 Bouteloua gracilis (HBK.) Lag. ex Steud.
1.2 Panicum cf. wilcoxianum Vasey
1.2 Poa pratensis L. var. pratensis
+.2 Muhlenbergia
+.1 Sporobolus cryptandrus (Torr.) Gray

Forbs, Height 1-2, Cover I

2.2 Aster ericoides L.
1.2 Petalostemon purpureum (Vent.) Rydb.
1.2 Rosa arkansana Porter
1.2 Salsola iberica Sennen & Pau
1.2 Solidago canadensis L. var. canadensis
1.2 Solidago missouriensis Nutt. var. missouriensis
1.1 Solidago rigida L.
+.1 Amaranthus
+.1 Ambrosia artemisiifolia L.
+.1 Amorpha canescens Pursh
+.1 Anemone cylindrica Gray
+.1 Artemisia frigida Willd.
+.1 Asclepias cf. ovalifolia Dcne.
+.1 Asclepias syriaca L.
+.1 Asclepias verticillata L.
+.1 Astragalus
+.1 Cirsium flodmani (Rydb.) Arthur
+.1 Echinacea angustifolia DC.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0195 Continued, Page 2

Forbs, Height 1-2, Cover I

+ .1 Equisetum laevigatum A. Br.
+ .1 Geum triflorum Pursh
+ .2 Heterotheca villosa (Pursh) Shinnars
+ .1 Liatris aspera Michx.
+ .2 Liatris punctata Hook.
+ .1 Mirabilis nyctaginea (Michx.) MacM.
+ .1 Oenothera biennis L.
+ .1 Onosmodium molle Michx.
+ .1 Potentilla arguta Pursh
+ .1 Ratibida pinnata (Vent.) Barnh.
+ .2 Solidago nemoralis Ait.
+ .1 Sporobolus cryptandrus (Torr.) Gray var. cryptandrus
+ .1 Tragopogon dubius Scop.
+ .1 Verbena hastata L.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0196
DATE: 24 SEP 1988
BY: Nancy P. Sather
Cottonwood County, MN
Quadrangle Code: 4409513 (V08D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Anderson prairie
Location: SE of SW of S. 21, T. 107N, R. 37W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 10, Rank: BC, Site Size (a.): 100
Soil Atlas Mapping-Unit: 66,
Other Data Collected:

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1370, Slope (deg./aspect): 10W

Releve near top of west-facing slope at southeast end of prairie, about 30 m. north of section line. In PTC. Grazed by 180 head cattle until 6 years ago. Bad mulch buildup here. Needs fire.

Broadleaf Deciduous, Height: 2-4, Cover: P

- 2.2 *Ulmus cf. thomasi* Sarg.
- +1 *Symphoricarpos occidentalis* Hook.

Graminoids, Height 1-2, Cover C

- 2.2 *Bouteloua curtipendula* (Michx.) Torr.
- 2.2 *Sorghastrum nutans* (L.) Nash
- 2.2 *Sporobolus heterolepis* (Gray) Gray
- 1.2 *Muhlenbergia*
- 1.2 *Poa pratensis* L. var. *pratensis*
- +1 *Setaria*

Forbs, Height 1-2, Cover I

- 2.2 *Aster ericoides* L.
- 2.2 *Aster laevis* L.
- 2.2 *Solidago nemoralis* Ait.
- 1.1 *Amorpha canescens* Pursh
- 1.2 *Aster sericeus* Vent.
- 1.2 *Helianthus rigidus* (Cass.) Desf.
- 1.1 *Solidago rigida* L.
- 1.2 *Viola pedatifida* G. Don
- R.1 *Castilleja*
- R.1 *Lygodesmia juncea* (Pursh) Hook.
- +1 *Achillea millefolium* L.
- +2 *Asclepias syriaca* L.
- +1 *Aster oblongifolius* Nutt.
- +1 *Astragalus*
- +1 *Cirsium flodmani* (Rydb.) Arthur

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 *Epigaea repens* L. var. *glab.* Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0196 Continued, Page 2

Forbs, Height 1-2, Cover I

+ .1 Equisetum laevigatum A. Br.
+ .1 Gentiana puberulenta Pringle
+ .2 Glycyrrhiza lepidota Pursh
+ .1 Liatris aspera Michx.
+ .1 Mirabilis nyctaginea (Michx.) MacM.
+ .1 Monarda fistulosa L.
+ .1 Oenothera
+ .1 Onosmodium molle Michx.
+ .1 Petalostemon purpureum (Vent.) Rydb.
+ .1 Potentilla arguta Pursh
+ .1 Psoralea argophylla Pursh
+ .1 Psoralea esculenta Pursh
+ .1 Pycnanthemum virginianum (L.) Durand & Jackson
+ .2 Ratibida pinnata (Vent.) Barnh.
+ .1 Rosa arkansana Porter
+ .1 Zizia aptera (Gray) Fern.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0197
DATE: 27 AUG 1988
BY: Nancy P. Sather
Brown County, MN
Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM
Department of Natural Resources
Box 7, 500 Lafayette Road
St. Paul, Minnesota 55146
(612) 296-3344

Site Name: Hageman pasture
Location: NW of NE of S. 31, T. 108N, R. 35W
Heritage Community Element: Mesic Blacksoil Prairie
Element Occurrence Size (a.): 2, Rank: BD, Site Size (a.): 113
Soil Atlas Mapping-Unit: 66,
Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----
Releve Size (sq. m): 100, Elev. (ft.): 1130, Slope (deg./aspect): 25N

The most highly degraded pasture visited in 1989. Some areas have
Euphorbia esula. Relieve from only remaining slope dominated by native
prairie. Area optioned to become county park and reservoir.

Broadleaf Deciduous, Height: 2-3, Cover: P

1.2 Symphoricarpos occidentalis Hook.

Graminoids, Height 1-2, Cover C

- 2.2 Poa pratensis L. var. pratensis
- 2.2 Stipa spartea Trin.
- 1.2 Bouteloua curtipendula (Michx.) Torr.
- 1.2 Bromus inermis Leyss. var. inermis
- 1.1 Panicum cf. wilcoxianum Vasey
- 1.2 Sporobolus heterolepis (Gray) Gray
- +1.1 Bouteloua gracilis (HBK.) Lag. ex Steud.

Forbs, Height 1-2, Cover I

- 1.2 Amorpha canescens Pursh
- 1.2 Anemone cylindrica Gray
- 1.2 Artemisia ludoviciana Nutt. ssp. ludoviciana
- 1.2 Aster sericeus Vent.
- 1.2 Aster ericoides L.
- 1.1 Equisetum laevigatum A. Br.
- 1.2 Geum triflorum Pursh
- 1.2 Grindelia squarrosa (Pursh) Dunal
- 1.2 Heuchera richardsonii R. Br.
- 1.2 Kuhnia eupatorioides L.
- 1.1 Petalostemon purpureum (Vent.) Rydb.
- 1.2 Solidago nemoralis Ait. var. nemoralis
- 1.2 Verbena hastata L.
- 1.2 Viola pedatifida G. Don
- R.1 Cirsium arvense (L.) Scop.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

Releve Number 0197 Continued, Page 2

Forbs, Height 1-2, Cover I

+ .1 Achillea millefolium L.
+ .1 Allium stellatum Ker
+ .1 Antennaria neglecta Greene
+ .1 Asclepias syriaca L.
+ .1 Cirsium flodmani (Rydb.) Arthur
+ .1 Echinacea angustifolia DC.
+ .1 Lathyrus venosus Muhl. ex Willd. var. intonsus Butt. & St. John

+ .1 Linum
+ .1 Melilotus alba Medic.
+ .1 Mirabilis nyctaginea (Michx.) MacM.
+ .1 Oenothera biennis L.
+ .1 Oenothera
+ .1 Onosmodium molle Michx.
+ .1 Oxalis dillenii Jacq. ssp. dillenii
+ .1 Oxalis violacea L.
+ .1 Physalis heterophylla Nees var. heterophylla
+ .1 Potentilla arguta Pursh
+ .1 Psoralea esculenta Pursh
+ .1 Rosa arkansana Porter var. arkansana
+ .2 Solidago canadensis L.
+ .2 Solidago missouriensis Nutt. var. missouriensis
+ .1 Taraxacum officinale Weber
+ .1 Tragopogon dubius Scop.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----

11:42 THURSDAY, MARCH 30, 1989

----- RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

DNR RELEVE NUMBER: 0198

DATE: 27 AUG 1988

BY: Nancy P. Sather

Brown County, MN

Quadrangle Code: 4409511 (V09D)

MINNESOTA NATURAL HERITAGE PROGRAM

Department of Natural Resources

Box 7, 500 Lafayette Road

St. Paul, Minnesota 55146

(612) 296-3344

Site Name: Shenk prairie

Location: NE of NW of S. 31, T. 108N, R. 35W

Heritage Community Element: Mesic Blacksoil Prairie

Element Occurrence Size (a.): 14, Rank: BC, Site Size (a.): 14

Soil Atlas Mapping-Unit: 66,

Other Data Collected: Rare Plant Element

----- PLOT CHARACTERISTICS -----

Releve Size (sq. m): 100, Elev. (ft.): 1130, Slope (deg./aspect): 15S

South-facing hillside dominated almost exclusively by prairie grasses. Area has been optioned for County park and reservoir (Mound Creek Project). Buchloe on rocks.

Broadleaf Deciduous, Height: 2-4, Cover: B

R.1 Acer negundo L.

R.1 Fraxinus pennsylvanica Marsh.

Graminoids, Height 1-2, Cover C

3.3 Bouteloua curtipendula (Michx.) Torr.

2.2 Schizachyrium scoparium (Michx.) Nash var. frequens
(Hubbard) Gould

1.3 Bouteloua gracilis (HBK.) Lag. ex Steud.

1.2 Poa pratensis L. var. pratensis

1.2 Sporobolus heterolepis (Gray) Gray

1.2 Stipa spartea Trin.

+2 Andropogon gerardii Vitman

+2 Sorghastrum nutans (L.) Nash

+2 Sporobolus cryptandrus (Torr.) Gray var. cryptandrus

Forbs, Height 1-2, Cover B

1.2 Artemisia ludoviciana Nutt. ssp. ludoviciana

1.2 Solidago rigida L. var. rigida

R.1 Ambrosia artemisiifolia L.

R.1 Lactuca cf. canadensis L.

+1 Achillea millefolium L. ssp. millefolium

+1 Allium stellatum Ker

+1 Anemone cylindrica Gray

+1 Antennaria neglecta Greene

+2 Aster ericoides L. ssp. ericoides

+1 Cirsium flodmani (Rydb.) Arthur

+1 Echinacea angustifolia DC. var. angustifolia

----- EXAMPLE RECORD -----

!	Cover.	Sociability	Genus	Species	Author	Variety	Author	Remark	!
!		+2	Epigaea	repens	L.	var. glab.	Fern.	fl ##	!

----- FOR CODES, SEE RELEVE CODE SHEET OR RELEVE MANUAL -----

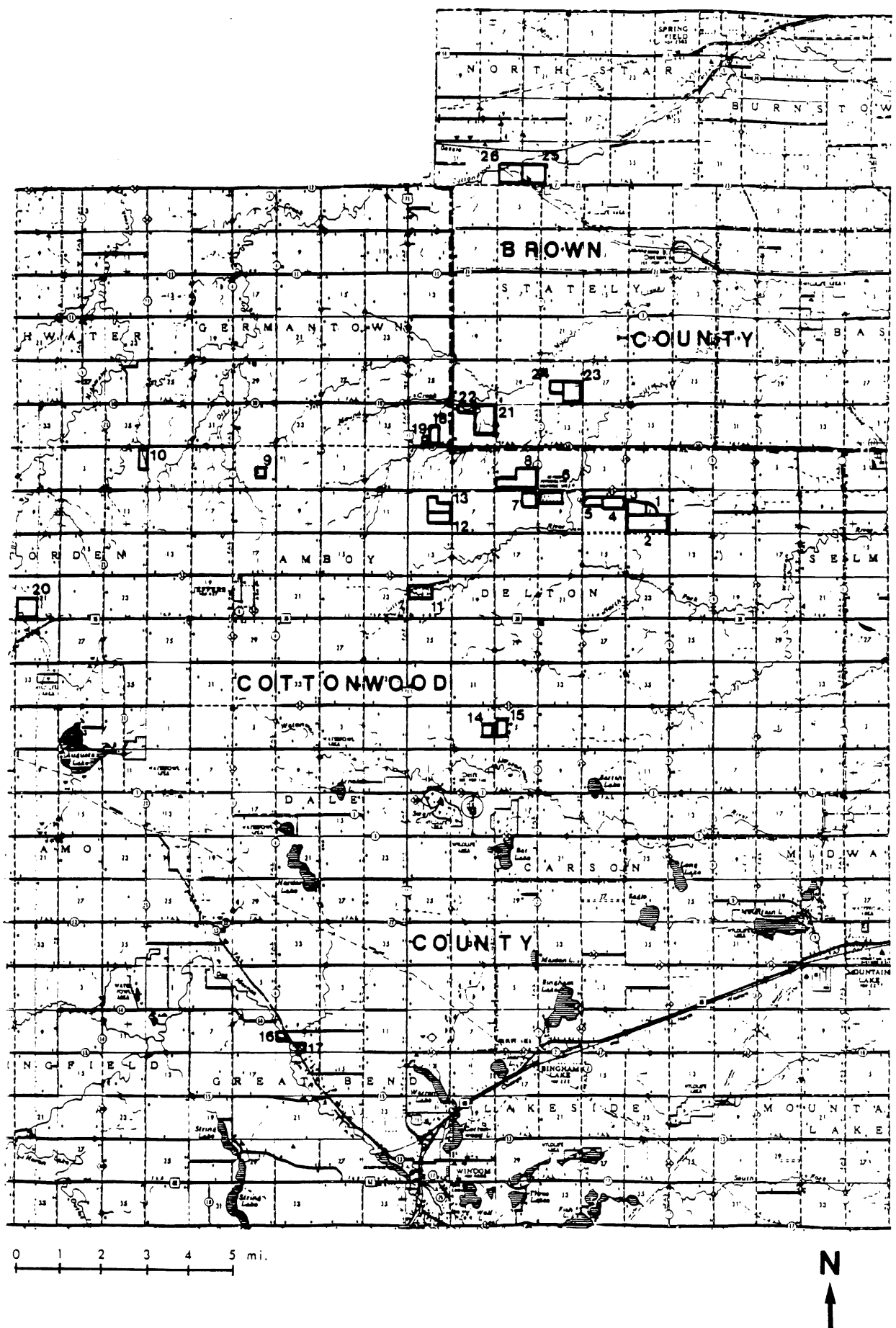
11:42 THURSDAY, MARCH 30, 1989

Releve Number 0198 Continued, Page 2

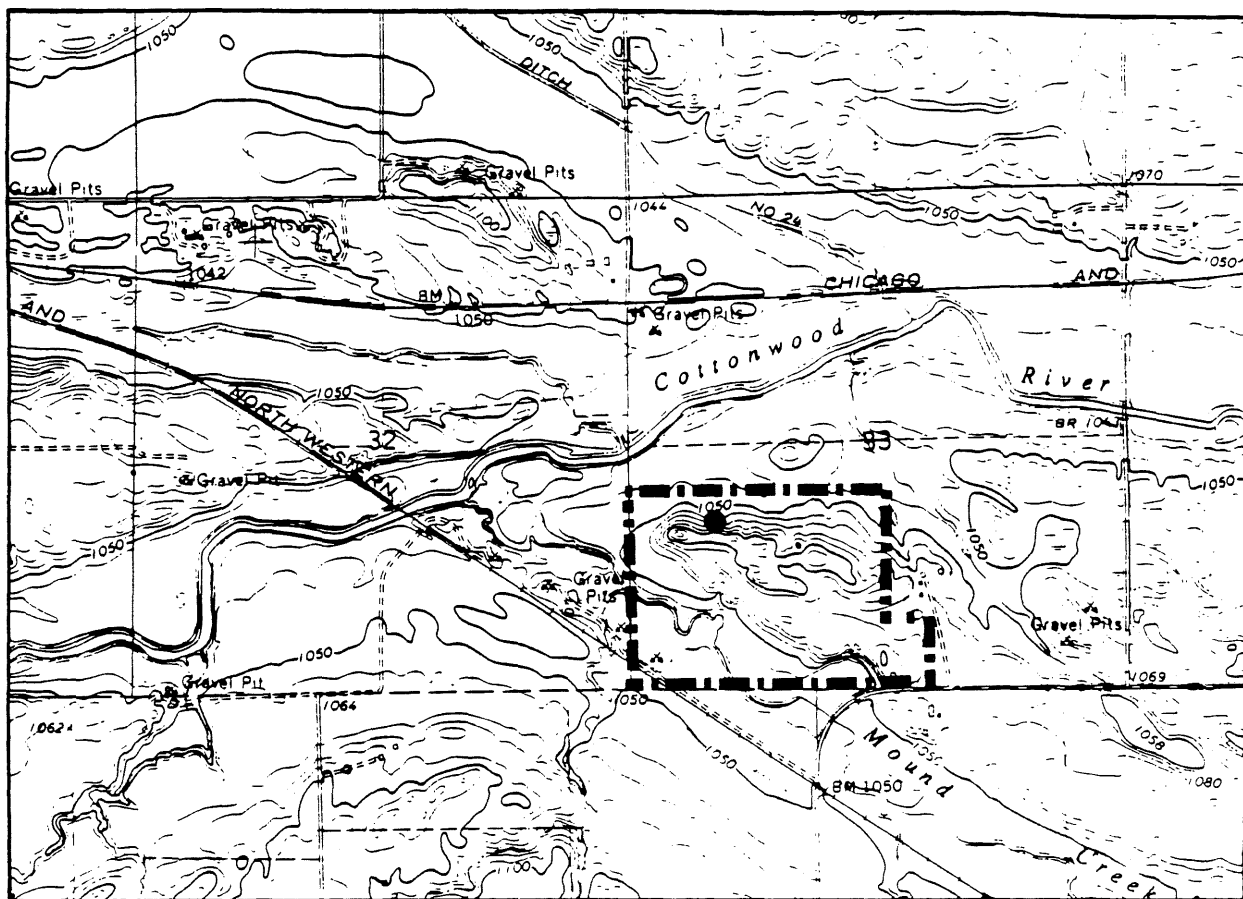
Forbs, Height 1-2, Cover B

- +1 Geum triflorum Pursh
- +2 Lygodesmia juncea (Pursh) Hook.
- +1 Mirabilis nyctaginea (Michx.) MacM.
- +1 Oxalis dillenii Jacq. ssp. dillenii
- +1 Physalis heterophylla Nees var. heterophylla
- +2 Ratibida pinnata (Vent.) Barnh.

----- EXAMPLE RECORD -----
! Cover.Sociability Genus Species Author Variety Author Remark !
! +.2 Epigaea repens L. var. glab. Fern. fl ## !
----- FOR CODES, SEE RELEVÉ CODE SHEET OR RELEVÉ MANUAL -----



Map 1. Locality map of 26 sites surveyed for *Lespedeza leptostachya* in 1988.



SCALE 1:24 000

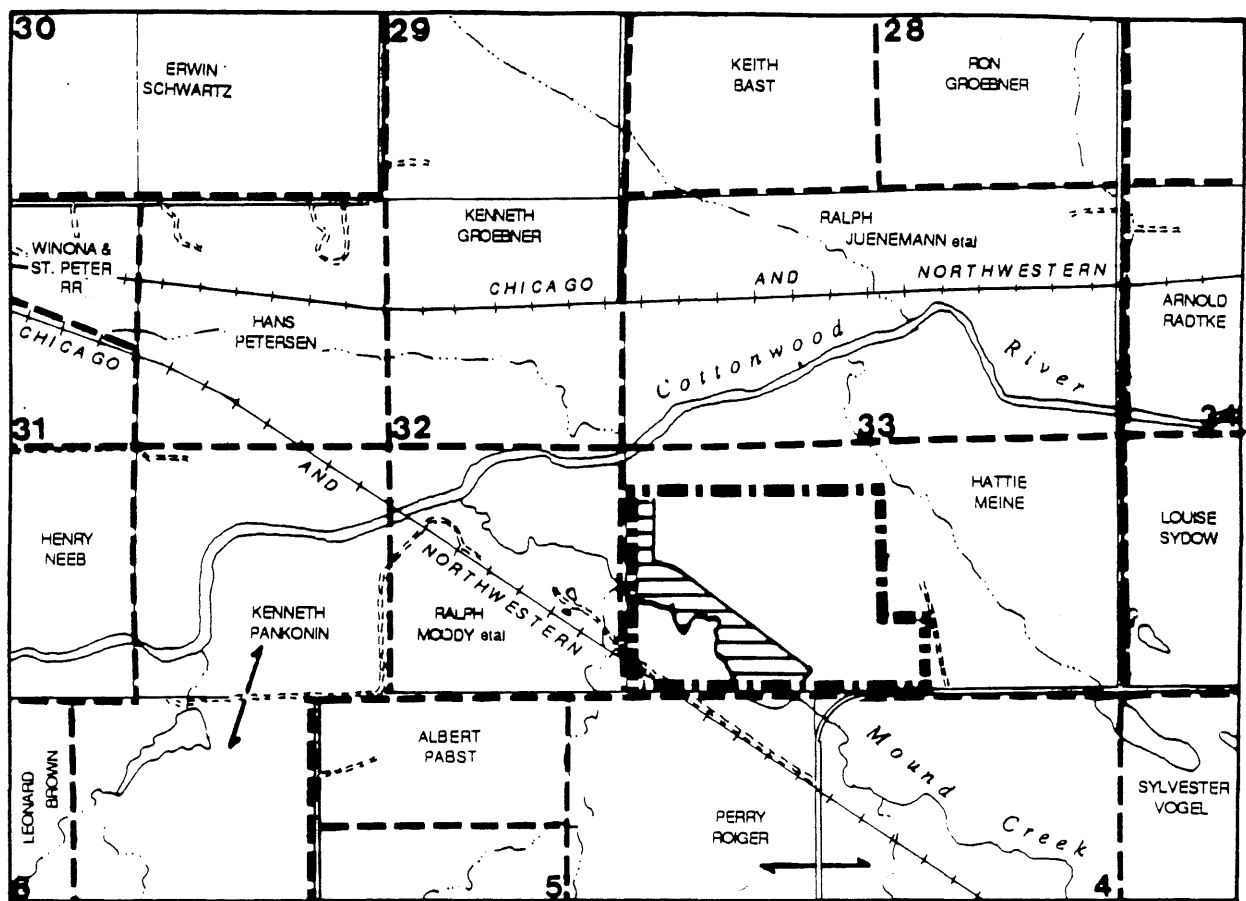
1 MILE

--- Proposed preserve boundary

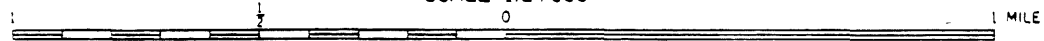
● *Lespedeza leptostachya*

N
↑

Map 2. Topography and element occurrences of North Star 33.



SCALE 1:24,000



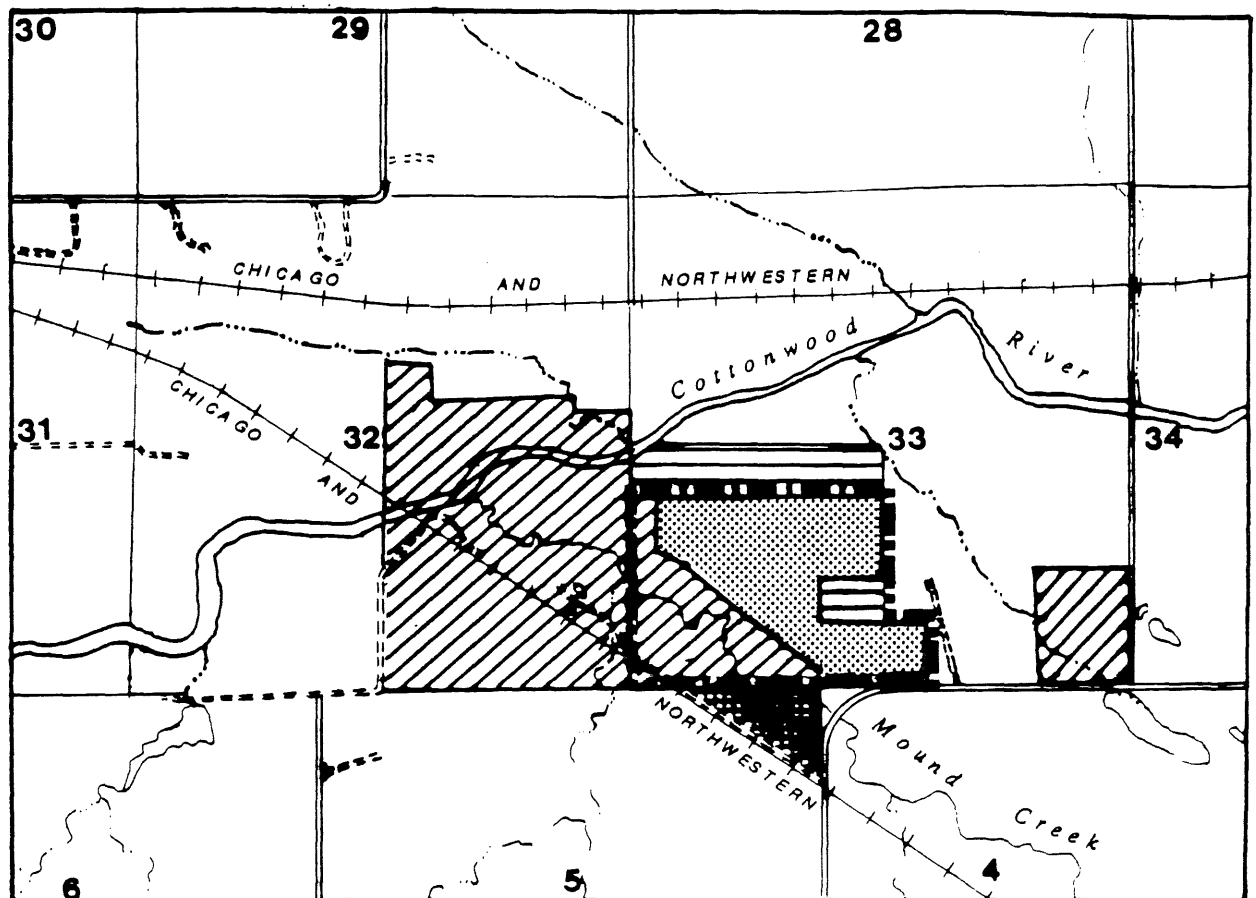
--- Proposed preserve boundary

--- Property line

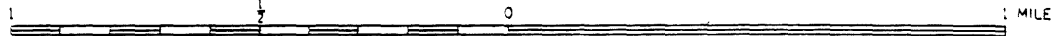
▨ CRP land




Map 3. Ownership and protection status of North Star 33 and surrounding area.





SCALE 1:24 000




--- Proposed preserve boundary

 High quality native prairie

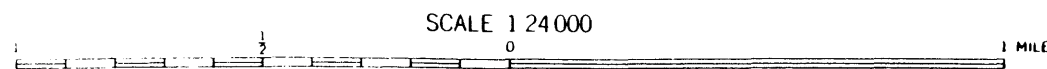
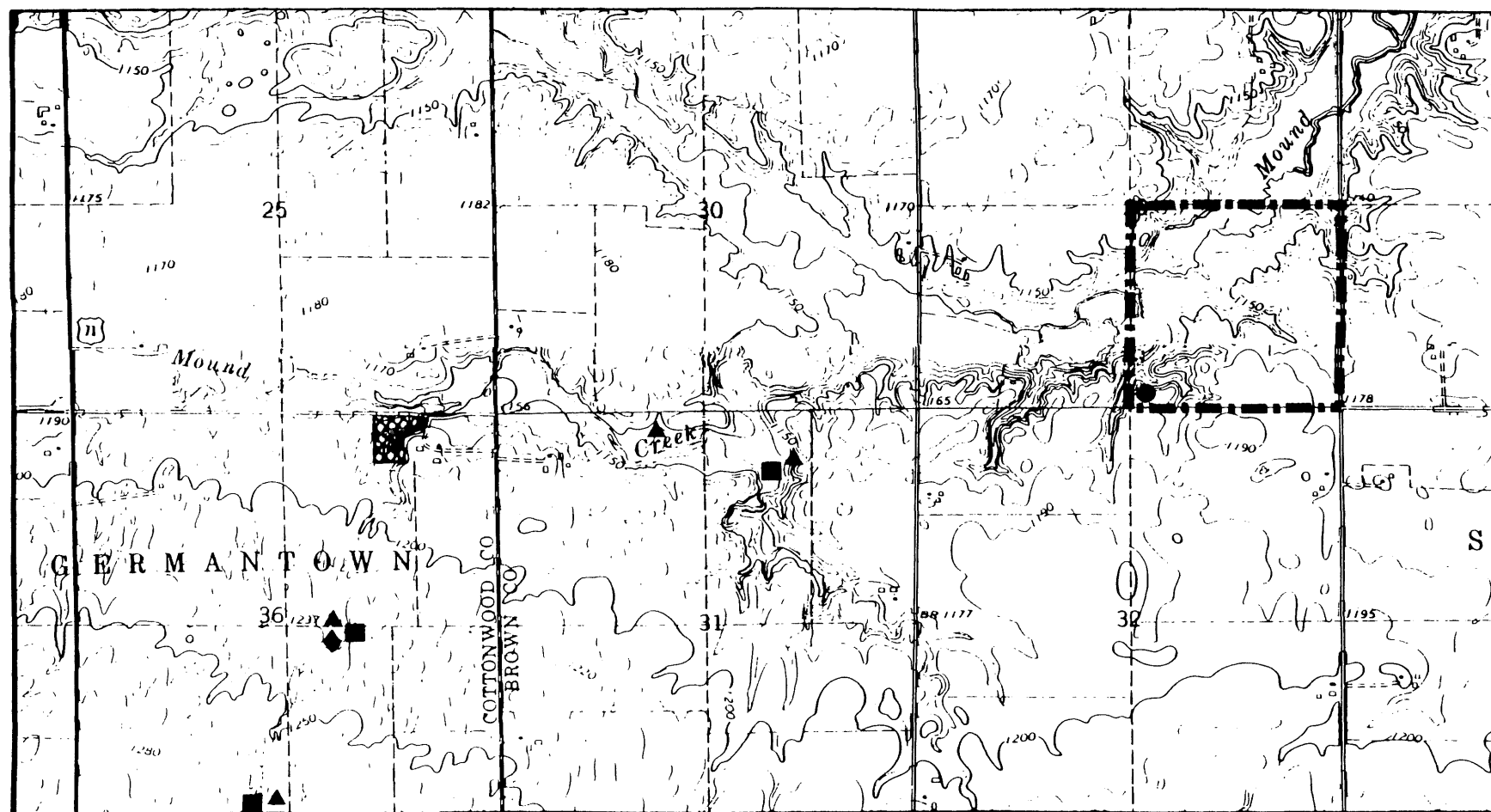
 Degraded native prairie

 Destroyed native prairie

 Cultivated field

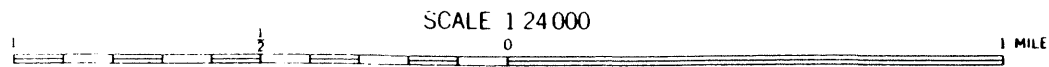
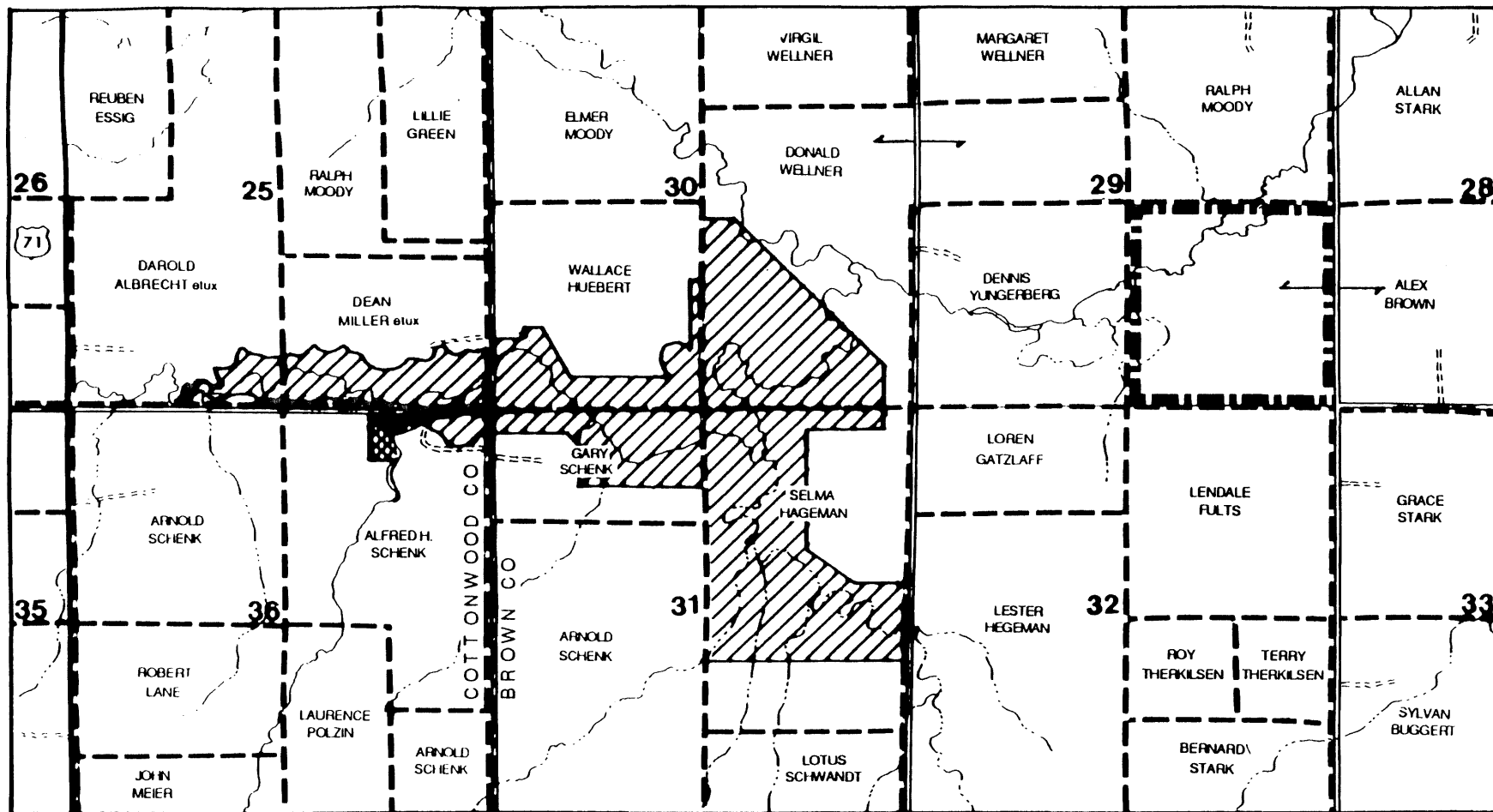


Map 4. Vegetation quality of North Star 33 and significant neighboring parcels.



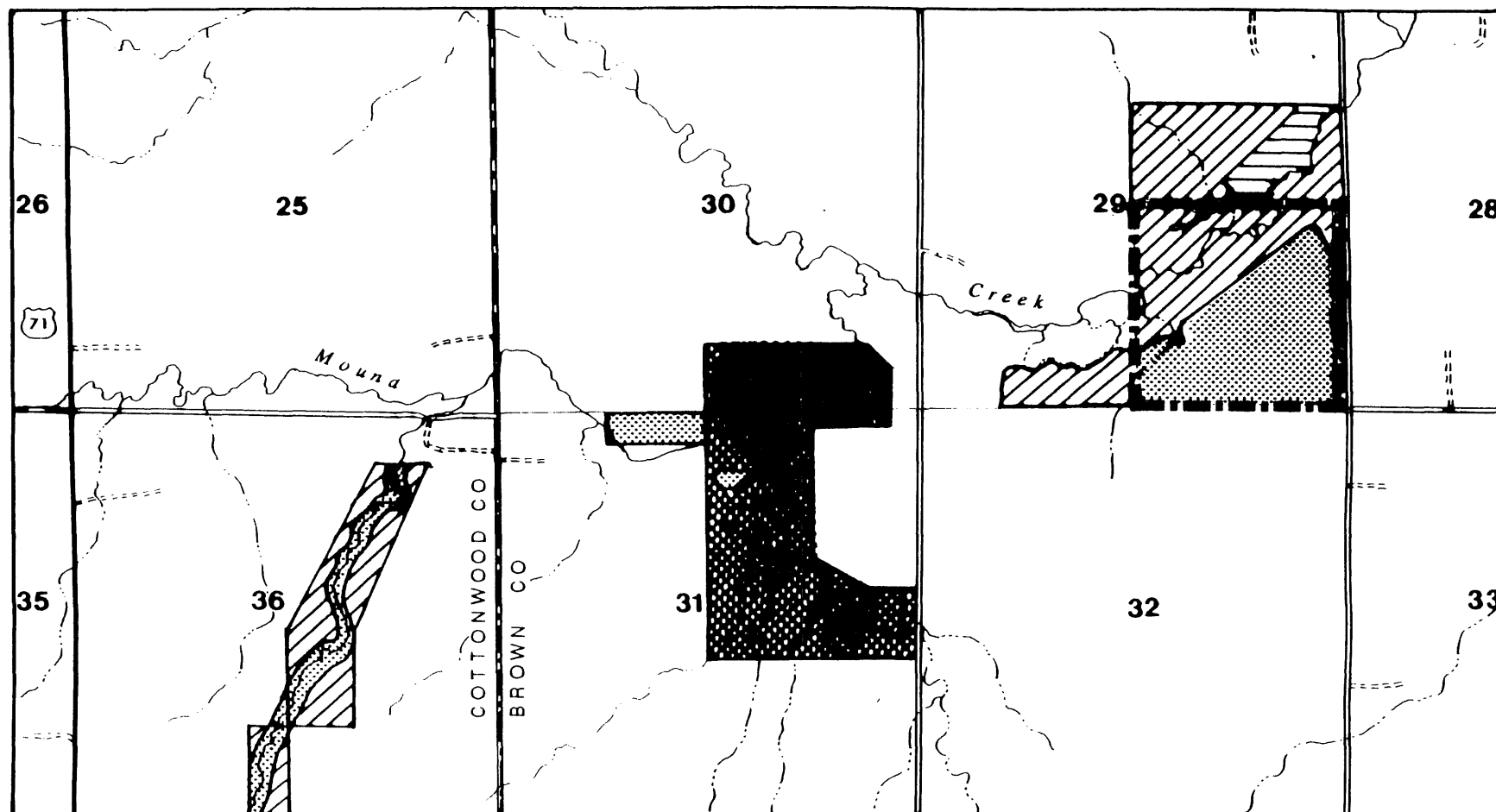
- | | |
|---------------------------------|------------------------------------|
| --- Proposed preserve boundary | ◆ <i>Alopecurus carolinianus</i> |
| ● <i>Lespedeza leptostachya</i> | ■ <i>Buchloe dactyloides</i> |
| ▨ Red Rock Dells County Park | ▲ <i>Schedonnardus paniculatus</i> |

Map 5. Topography and element occurrences of Stately 29.



- Proposed preserve boundary
- - - Property line
- ▨ Proposed county park
- ▩ Red Rock Dells County Park

Map 6. Ownership and protection status of State 29 and surrounding area.



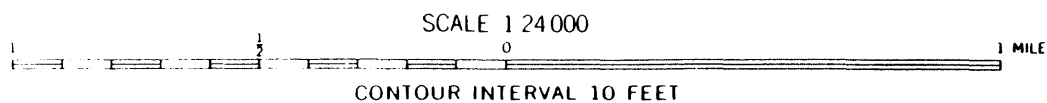
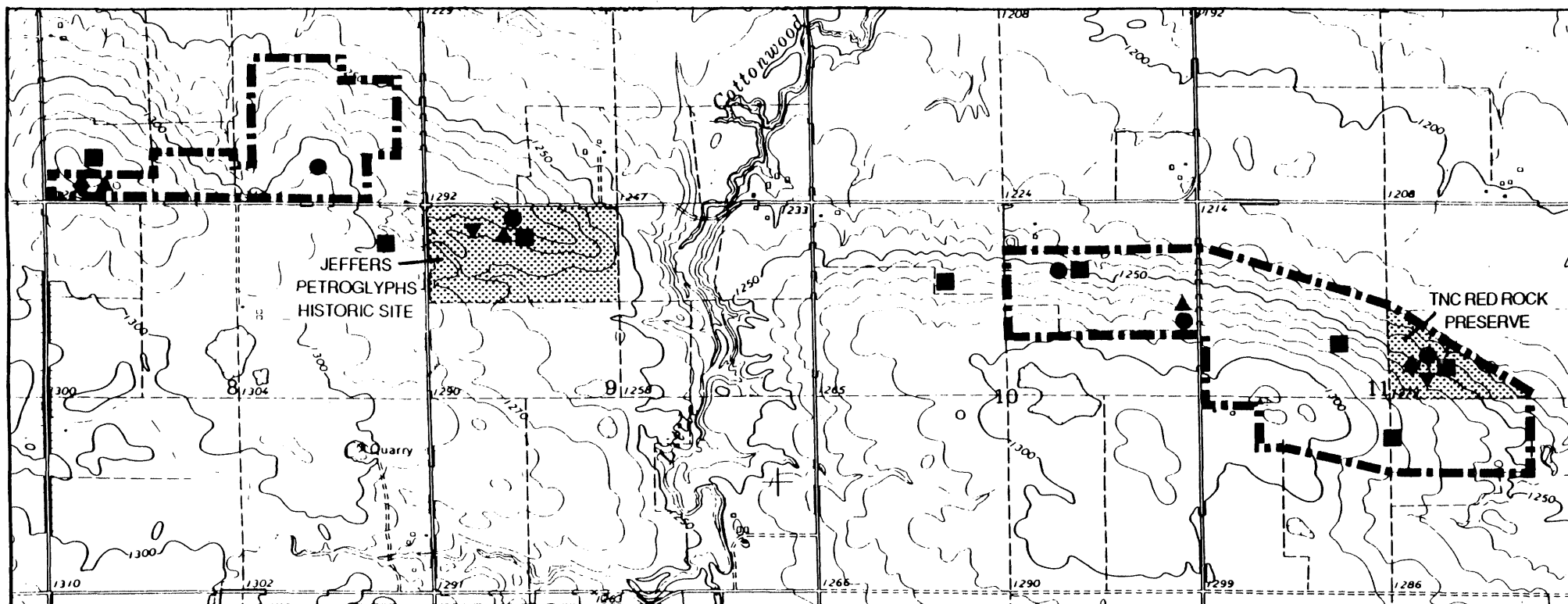
SCALE 1:24,000

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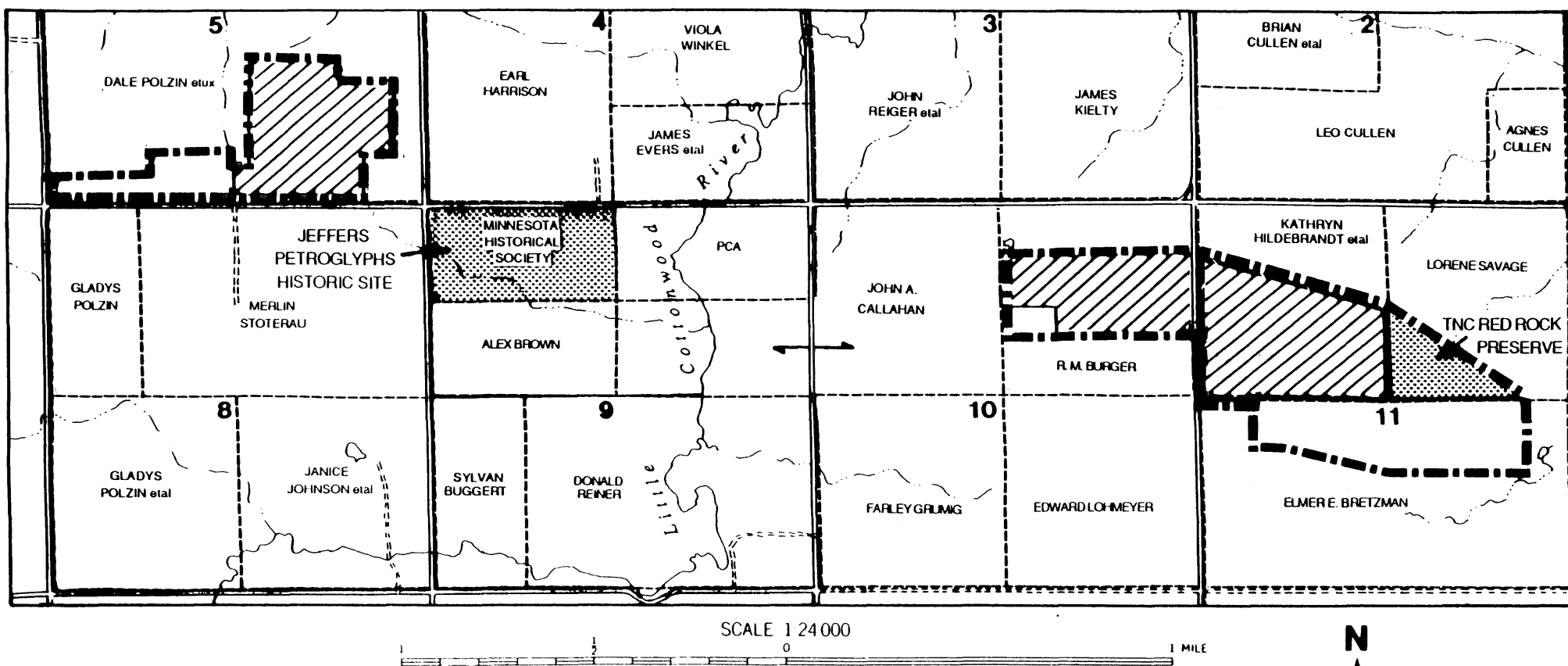
- | | |
|--------------------------------|--------------------------------|
| --- Proposed preserve boundary | Highly degraded native prairie |
| High quality native prairie | Cultivated field |
| Degraded native prairie | |

Map 7. Vegetation quality of State 29 and significant neighboring parcels.

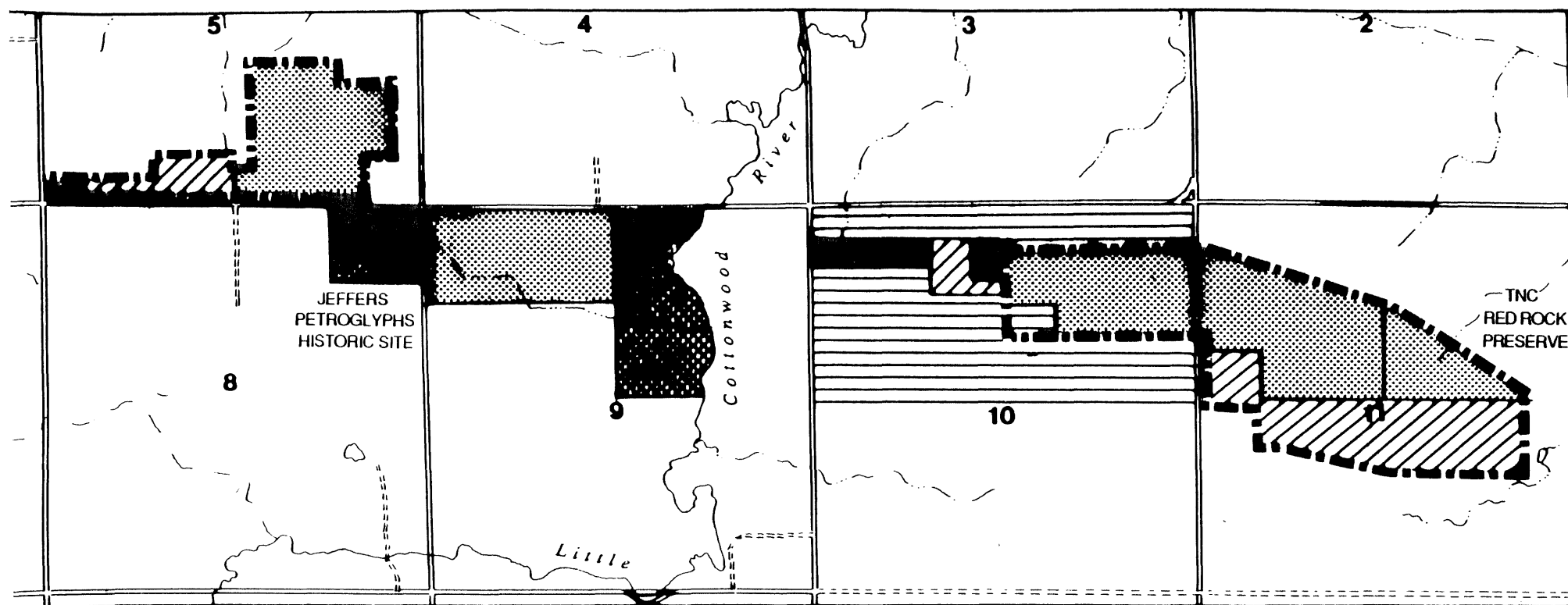


- Proposed preserve boundary
- ◆ *Alopecurus carolinianus*
- *Buchloe dactyloides*
- ▲ *Schedonnardus paniculatus*
- *Lespedeza leptostachya*
- ▼ *Myosurus minimus*

Map 8. Topography and element occurrences of Delton 5 and Delton 10 and 11.



Map 9. Ownership and protection status of Delton 5, Delton 10 and 11 and surrounding area.

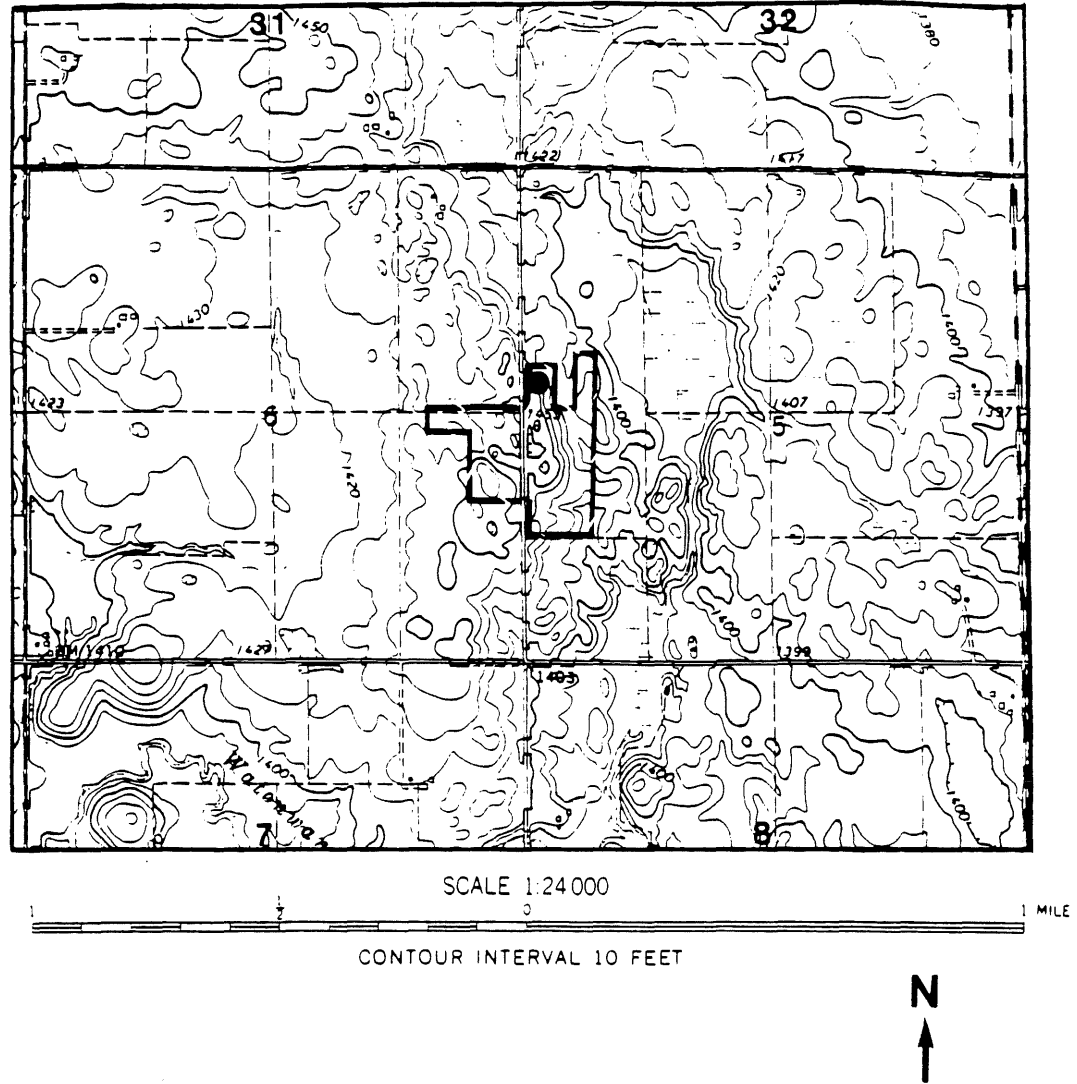


SCALE 1:24 000
1 2 0 1 MILE

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- Proposed preserve boundary
- High quality native prairie
- Degraded native prairie
- Highly degraded native prairie
- Cultivated field

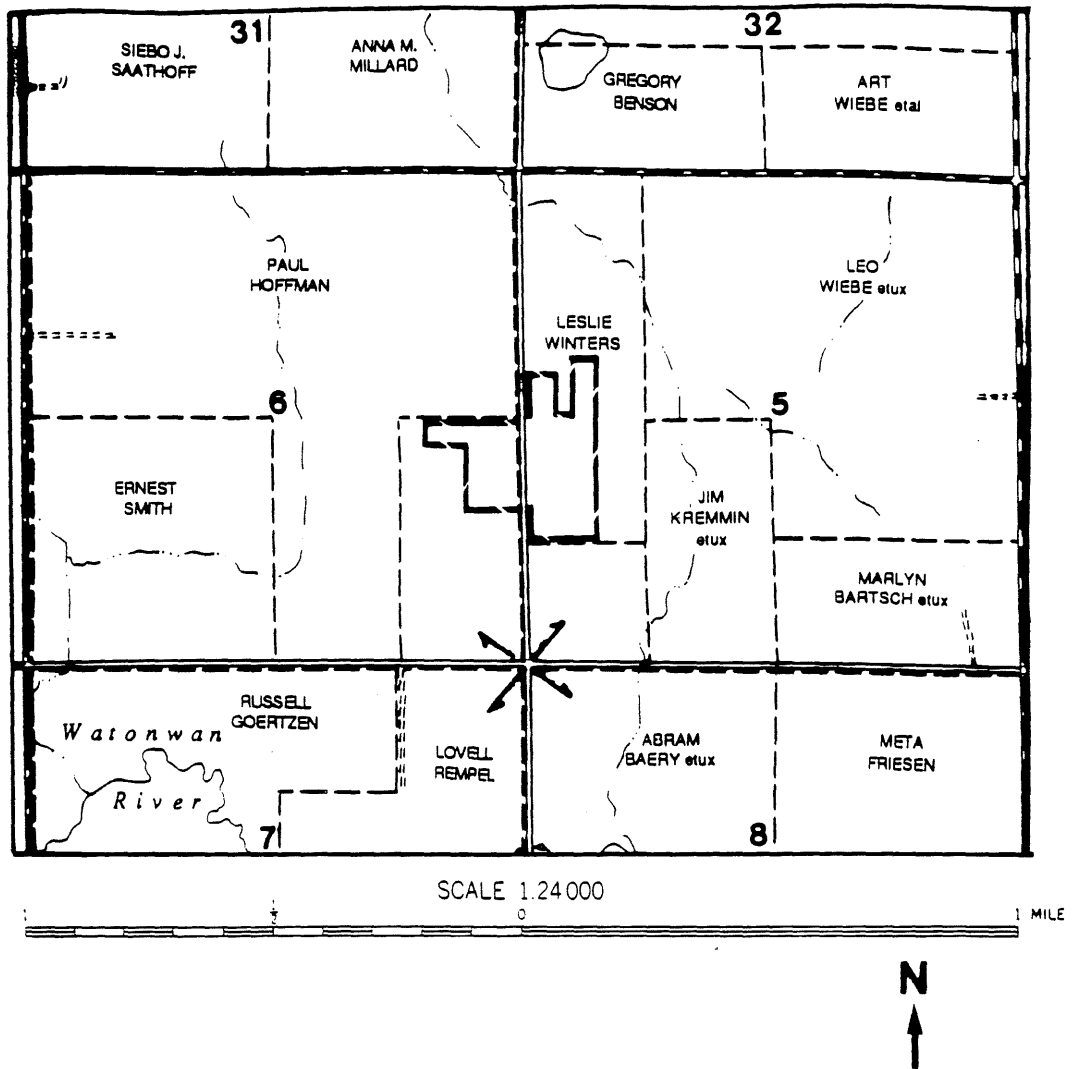
Map 10. Vegetation quality of Delton 5, Delton 10 and 11 and significant neighboring parcels.



— Potential preserve boundary

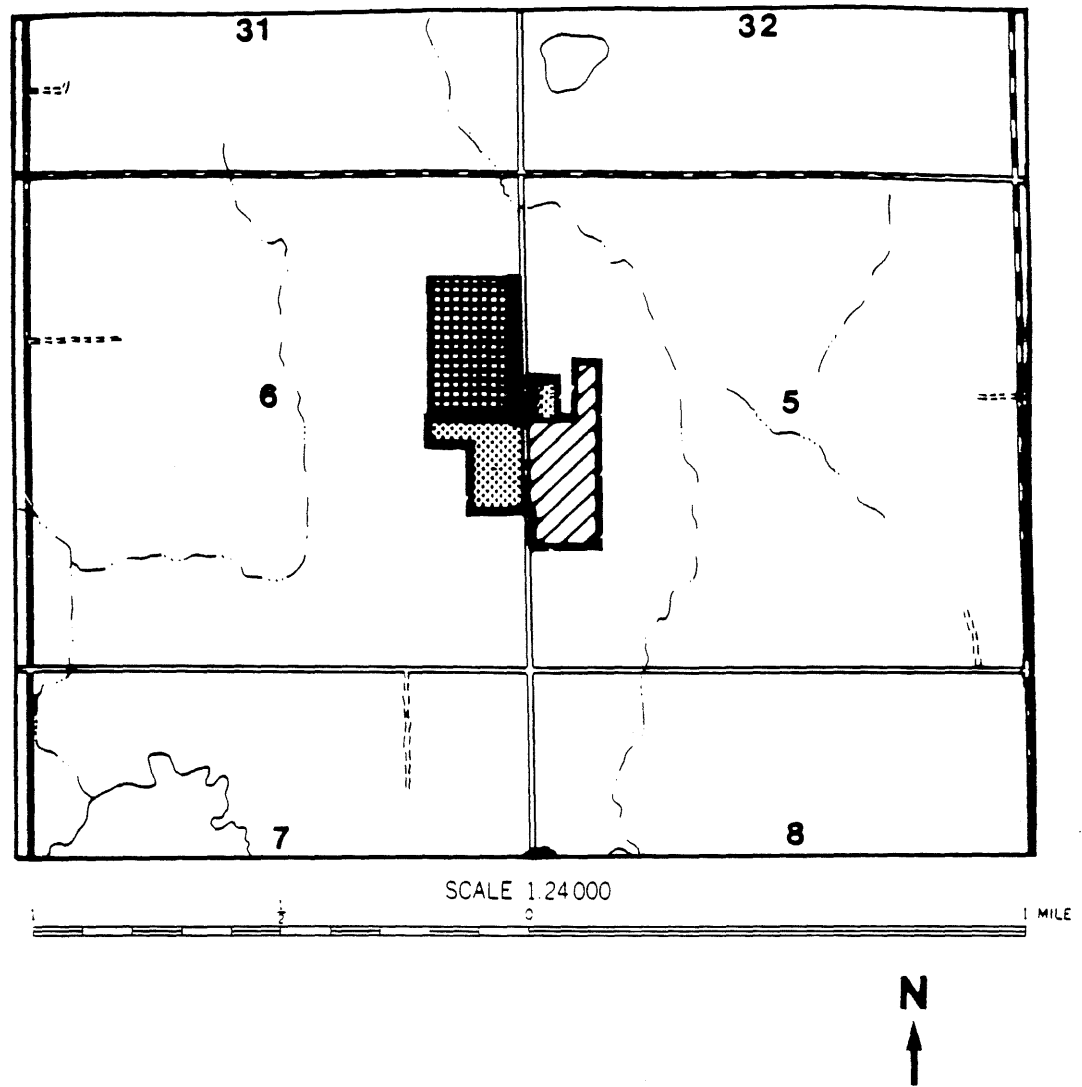
● *Lespedeza leptostachya*




Map 11. Topography and element occurrences of Carson 5 and 6.



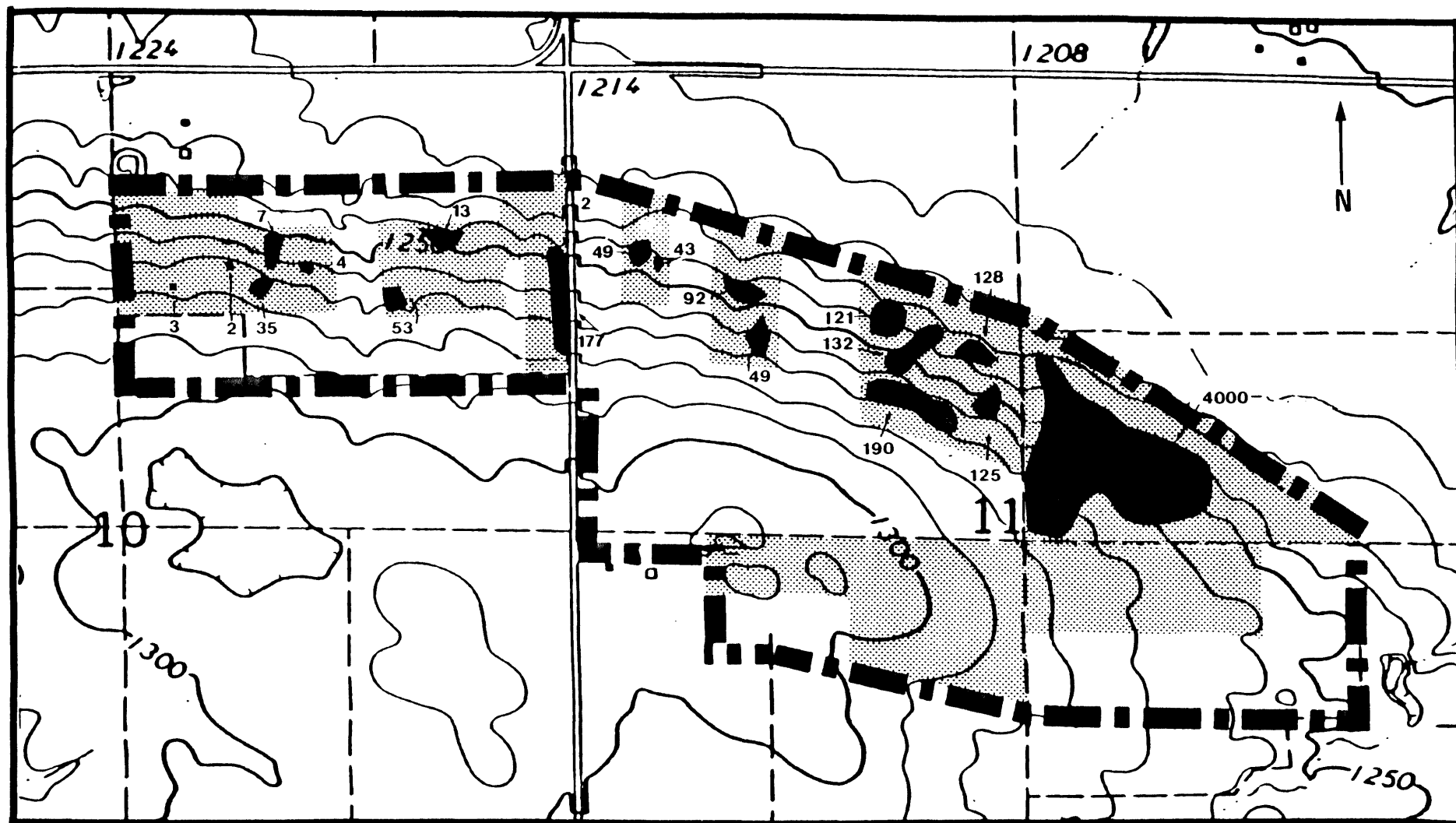
- Potential preserve boundary
- - - Property line

Map 12. Ownership and protection status of Carson 5 and 6 and surrounding area.



- Potential preserve boundary
-  High quality native prairie
-  Degraded native prairie
-  Destroyed native prairie

Map 13. Vegetation quality of Carson 5 and 6 and significant neighboring parcels.

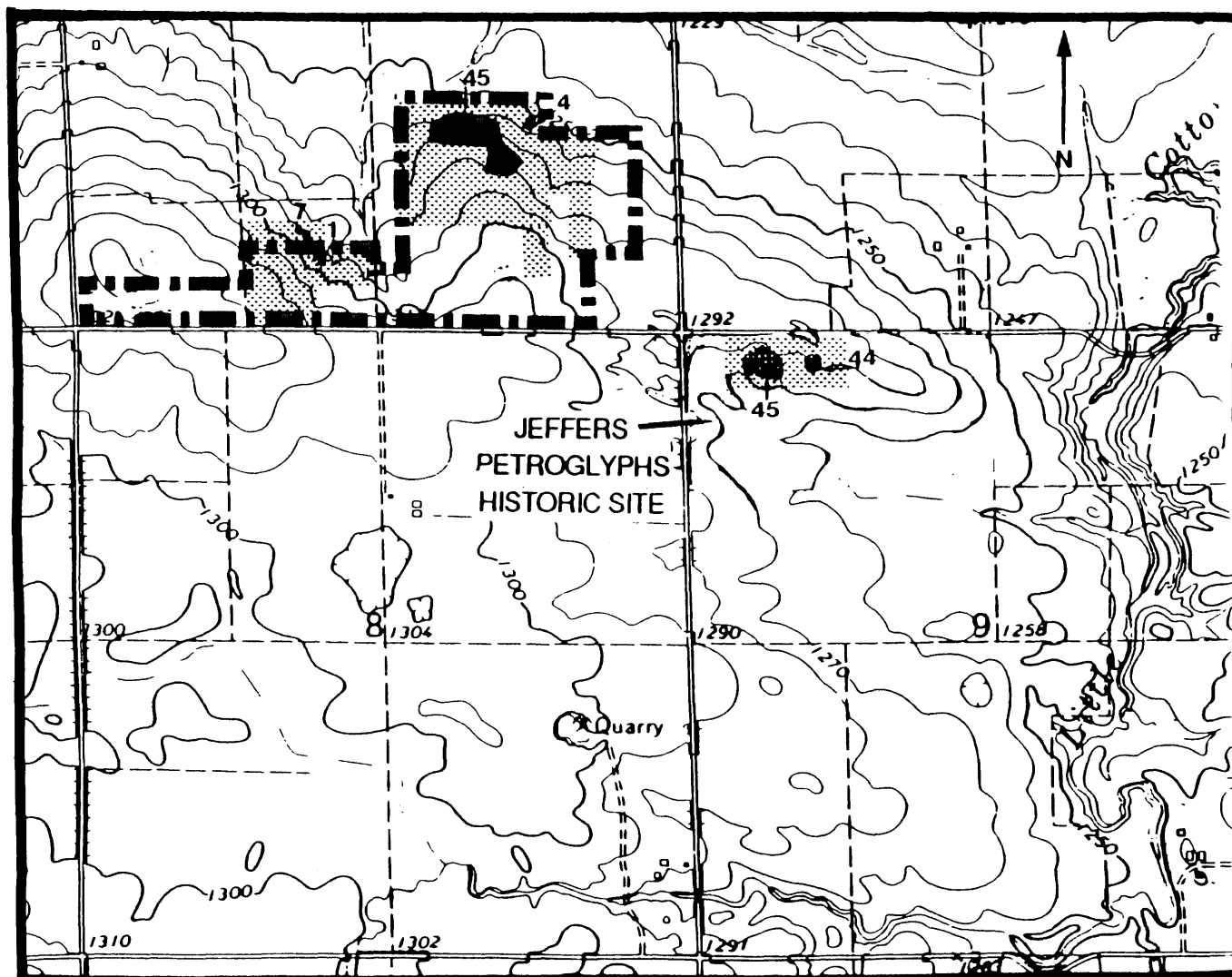


Map 14. Location of *Lespedeza* subpopulations in Delton 10 and 11

Areas searched
Lespedeza
 Proposed preserve boundary
 1—

Number of plants

0 ————— 1/2
 miles



Map 15. Location of Lеспедеза populations in Delton 5 and 8

Lеспедеза subpopulations

Areas searched

Proposed preserve boundary

0 ————— 1/2
mile

Table 1. Sites surveyed during 1988 prairie bush clover inventory.

Site number	Relay number	Legal description and county	Owner	Present land use	Previous land use	Condition	Elements present	Collection number of elements collected	Present protection status	Intended protection status	Management needs
1	0177 0180	SWNE Sec 11 T107N, R35W Cottonwood County	The Nature Conservancy	Red Rock Preserve	Portions cultivated before 1960	Recovering prairie	Lespedeza leptostachya Buchloe dactyloides Alopecurus carolinianus Myosurus minimus	Sather, N.P. (86-5N) Sather & Smith (86-107) Sather (86-94) Sather, N.P. (86-46)	Preserve	As is	Burned 1988 Continue burning
2	0178	S1/2 Sec 11 T107N, R35W Cottonwood County	Elmer Bretzman	Pasture	Portions plowed in past	Degraded pasture some portions native	Buchloe dactyloides	Sather, N.P. (88-181)	None	Northern acres in Preserve	Stop grazing Burn
3	0179	S1/2 NW1/4 Sec 11 T107N, R35W Cottonwood County	K. Hildebrand et al.	Not in agricultural use	Pasture until 1970's	Recovering prairie	Buchloe dactyloides Schedonnardus paniculatus Lespedeza leptostachya Bartramia longicauda	Smith, W.R. (7627) Sather N.P. (88-180) Sather 1987 sight record Sather 1987 sight record	78.5 acres in Prairie Tax Credit Natural Areas Registry	Preserve	Burned 1988 Continue burning
4	0174 0175	S1/2 NE1/4 Sec 10 T107N, R35W Cottonwood County	Ellen Burger	Hayland, mowed in September if adequate summer rainfall	Hayland since 1940's	Excellent prairie	Buchloe dactyloides Lespedeza leptostachya	Sather, N.P. (88-91) Sather, N.P. (1988 sight record)	51 acres in Prairie Tax Credit	Preserve	Stop haying in area of Lespedeza populations
5	0176	SE1/4 NW1/4 Sec 10 T107N, R35W Cottonwood County	John Callahan	Part not in agricultural use	Pasture	Oldfield vegetation dominant	Buchloe dactyloides	Sather, N.P. 1988 (sight record)	None	None	
6	0185	N1/2 NW1/4 Sec 9 T107N, R35W Cottonwood County	Minnesota Historical Society	Historical site, some restored prairie	Pasture, south half plowed in past	Excellent native and good restored prairie	Buchloe dactyloides Lespedeza leptostachya Myosurus minimus Schedonnardus paniculatus	Roefer, Y. (S.N.) Roefer, Y. (S.N.) Roefer, Y. (S.N.) Ownbey CB. Clements SE(6172)	Historical Site Managed as Prairie	As is	Continue burning
7	0173	NE1/4 Sec 8 T107N, R35W Cottonwood County	Merlin Stoderau	Overgrazed pasture	Overgrazed pasture	Highly degraded native pasture	Buchloe dactyloides	Sather, N.P. (88-95)	None	Would tie together Preserve system in long run	Total restoration of prairie
8	0193	S1/2 SW1/4 & SE1/4 Sec 5, T107N, R35W Cottonwood County	Dale Folsin	Pasture	Pasture	Good native prairie becoming increasingly grazed	Lespedeza leptostachya Buchloe dactyloides Schedonnardus paniculatus	Converse, C. (2492) Sather, N.P. (88-183) Sather, N.P. (88-182)	Natural Areas registry	Preserve	Stop grazing
9	0192	NW1/4 SE1/4 Sec 5 T107N, R36W Cottonwood County	Lawrence Ryker	Not in agricultural use "wildlife area"	Pasture	Recovering prairie remnant degraded by former grazing	Buchloe dactyloides Schedonnardus paniculatus	Sather, N.P. (88-97) Sather, N.P. (88-185)	9 acres in Prairie Tax Credit	As is	Burn
10	0186	NW1/4 NE1/4 Sec 2 T107N, R37W Cottonwood County	Frieda Richstadt	Not in agricultural use. Bees.	No agricultural use in past 30 years	Fairly good native prairie heavily invaded by shrubs			26 acres in Prairie Tax Credit	As is	Burn
11	0181 0182	S1/2 NW1/4 Sec 24 T107N, R36W Cottonwood County	Harold Conrad	Pasture	Pasture	Degraded to highly degraded some good remnants		Sather, N.P. (88-184) Sather, N.P. (88-185)	None	None	
12	0184	N1/2 SE1/4 Sec 12 T107N, R36W Cottonwood County	Agnes Kosel	Pasture	Pasture	Highly degraded native pasture	Buchloe dactyloides Schedonnardus paniculatus		None	None	
13	0183	S1/2 NE1/4 Sec 12 T107N, R36W Cottonwood County	Ardeen Clark et al	Pasture	Pasture	Degraded native pasture to moderately degraded native prairie			None	None	

Table 1. Continued.

Site number	Releve number	Legal description and county	Owner	Present land use	Previous land use	Condition	Elements present	Collection number of elements collected	Present protection status	Intended protection status	Management needs
14	0191	SE1/4 NE1/4 Sec 6 T106N, R35W Cottonwood County	Abram Baerg	Not in agricultural use	Unknown	Good native prairie			None	Possible registry	Burn
15	0189 0190 0194	SW1/4 NW1/4 Sec 5 T106N, R35W Cottonwood County	Leslie Winters	40 acres in pasture 4.5 acres not in agricultural use	Pasture	Degraded pasture to good native prairie	Lespedeza leptostachya	Sather or Winters (88-01)	Agreement to enter Natural Areas Registry	Registry	
16	none		Kenneth Walings	Winter pasture	Winter pasture	Good to excellent native prairie	Lespedeza leptostachya		19.7 acres in Prairie Tax Credit Natural Areas Registry	As is	Burn
17	none	SWSE Sec 9 and NUNWNE Sec 16 T105N, R36W Cottonwood County	Douglas Purrington	Not in agricultural use	Unknown	Native prairie invaded by oldfield species			38 acres in Prairie Tax Credit	As is	Burn
18	none	W1/2 SE1/4 Sec 36 T108N, R36W Cottonwood County	Larry Polzin	Pasture	Unknown	Poor prairie some areas look restored	Buchloe dactyloides Schedonnardus paniculatus Alopecurus carolinianus	Sather & Hageman (88-08) Sather & Hageman (88-10) Sather & Hageman (88-09)	None	Encourage acquisition by Cottonwood County Parks	Stop grazing
19	none	SE1/4 SW1/4 Sec 36 T108N, R36W Cottonwood County	John Meier	Pasture	Pasture	Degraded native pasture	Buchloe dactyloides Schedonnardus paniculatus	Sather & Hageman (88-14) Sather & Hageman (88-15)	None	Encourage acquisition by Cottonwood County Parks	Stop grazing
20	0196	SE1/4 SW1/4 Sec 21 T107N, R37W Cottonwood County	Stanley Anderson	Horse pasture, about 3 horses	Pasture	Good native prairie being invaded by shrubs			36.4 acres in Prairie Tax Credit including another tract not surveyed	As is	Burn
21	0197	NW1/4 NE1/4 and W1/2 SE1/4 Sec 31 T108N, R35W Brown County	Selma Hageman	Overgrazed pasture	Pasture	Highly degraded native pasture	Buchloe dactyloides Schedonnardus paniculatus	Sather & Hageman (eight record) Sather & Hageman (eight record)	Optioned for Mound Creek Project (County Park and Reservoir)	Encourage County Park to manage as prairie	Control Euphorbia esula, Stop grazing, Burn
22	0198	NE1/4 NW1/4 Sec 31 T108N, R35W Brown County	Gary Schenk	Not in agricultural use	Pasture	Good recovering native prairie	Buchloe dactyloides Schedonnardus paniculatus	Sather & Hageman (88-03) Sather & Hageman (88-02)	Optioned for Mound Creek Project (County Park and Reservoir)	Encourage County Park to manage as prairie	Burn
23	0187	SE1/4 Sec 29 T108N, R35W Brown County	Alex Brown	Pasture	Pasture	Degraded to good native pasture and prairie	Lespedeza leptostachya	Sather & Hageman (88-07)	Agreement to enter Natural Areas Registry	Preserve	Stop grazing Burn
24	none	NE1/4 SW1/4 Sec 29 T108N, R35W Brown County	Dennie Yungerberg	Pine plantation	Unknown	Poor to good native, planted to pine			None	None	
25	0188 0193	SW1/4 Sec 33 T109N, R35W Brown County	Hattie Maine	Winter pasture	Pasture	Mosaic excellent good and degraded native prairie and oldfield	Lespedeza leptostachya	Sather & Hageman (88-16)	Agreement to enter Natural Areas Registry	Registry Preserve	Stop grazing
26	none	SE1/4 Sec 32 T109N, R35W Brown County	Ralph Moody	Pasture	Pasture	Highly degraded native prairie			None	None at present	

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Minnesota Department of Natural Resources, Section of Wildlife
Natural Heritage and Nongame Wildlife Programs
Box 7, 500 Lafayette Road
St. Paul, MN 55155

(612) 296-3344