

Autecology of Prairie Wild Rose on the Northern Mixed Grass Prairie

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The autecology of Prairie wild rose, *Rosa arkansana*, is one of the prairie plant species included in a long ecological study conducted at the NDSU Dickinson Research Extension Center during 67 growing seasons from 1946 to 2012 that quantitatively describes the changes in growth and development during the annual growing season life history and the changes in abundance through time as affected by management treatments for the intended purpose of the development and establishment of scientific standards for proper management of native rangelands of the Northern Plains. The introduction to this study can be found in report DREC 16-1093 (Manske 2016a).

The autecology of Prairie wild rose includes data from both prairie wild rose and western wild rose. Whole intact plants of these two species can be separated in the field, however, during ecological studies ideal taxonomic specimens are rarely encountered. Most of the information included in this report is from Prairie wild rose with some inclusion from Western wild rose.

Prairie wild rose, *Rosa arkansana* Porter, is a member of the rose family, Rosaceae, and is a native, perennial, deciduous shrub or subshrub. Aerial growth is stout erect flexible widely branching herbaceous to slightly woody stems that regrow annually from stout horizontal roots. The stems grow to 4-20 inches (1-5 dm) tall and die back partly or completely to near the stem base from drought or freezing. Stems are densely covered with small bristly prickles. The new stems are nonwoody and the old stems deposit lignin around the cell walls. The root system has very stout deep vertical roots that descend to 10-12 feet (3-3.7 m) below the soil surface, and has stout widespread horizontal roots near the soil surface. Regeneration is by vegetative and sexual reproduction. Vegetative growth is sprouts from the root crowns and stout horizontal roots. Sexual reproduction is from perfect bisexual fragrant showy flowers with both male and female organs that emerge during May-August. Pollination is by insects. The fruit is a hip that is usually retained on the plant through winter. The seeds are achenes and distributed by birds and mammals. Seeds can survive in the seed bank several years and usually have low germination rates. Fire top kills aerial stems and activates sprout growth from the root crowns and stout horizontal roots. This summary

information on growth development and regeneration of prairie wild rose was based on the works of Stevens 1963, Great Plains Flora Association 1986, Stubbendieck et al. 2003, Hauser 2006a, and Johnson and Larson 2007.

Western wild rose, Woods rose, *Rosa woodsii* Lindl., is a member of the rose family, Rosaceae, and is a native, long lived perennial, deciduous shrub. Aerial growth has numerous erect, stout woody stems 3-10 feet (1-3 m) tall; stems are branched above; stems and branches are usually covered with straight thorns. The root system is relatively shallow with branching fibrous roots; several vertical roots descend to 4-6 feet (1.2-1.8 m) below the soil surface, a system of rhizomes interconnect the stem bases and are capable of aggressive growth forming dense nearly impenetrable thickets. Regeneration is by vegetative and sexual reproduction. Vegetative growth is sprouts from the root crowns and rhizome system. Stems that bend and touch soil can develop adventitious roots and then develop aerial stems and are capable of surviving as independent plants. Sexual reproduction is from perfect bisexual fragrant showy flowers with both male and female organs that emerge during May-July. Pollination is by insects. The fruit is a hip that remains on the plant after the leaves have fallen. The seeds are achenes and distribution is by birds and mammals. Seeds can survive in the seed bank several years, however, there is little seedling growth and establishment. Fire top kills aerial stems and activates sprout growth from the root crowns and rhizomes. This summary information on growth development and regeneration of western wild rose was based on the works of Stevens 1963, Great Plains Flora Association 1986, Mozingo 1987, Hauser 2006b, Larson and Johnson 2007, Stubbendieck et al. 2011, and Pavek and Skinner 2013.

Procedures

The 1955-1962 Study

Prairie wild rose plant growth in height was determined by measuring ungrazed stems from ground level to top of leaf or to the tip of the inflorescence of an average of 10 plants of each species at approximately 7 to 10 day intervals during the growing seasons of 1955 to 1962 from early May

until early September. Dates of first flower (anthesis) were recorded as observed. These growth in height and flower data were reported in Goetz 1963.

The 1969-1971 Study

The range of flowering time of Prairie wild rose and Western wild rose were determined by recording daily observations of plants at anthesis on several prairie habitat type collection locations distributed throughout 4,569 square miles of southwestern North Dakota. The daily observed flowering plant data collected during the growing seasons of 1969 to 1971 from April to August were reported as flower sample periods with 7 to 8 day duration in Zaczkowski 1972.

The 1984-1985 Study

Prairie wild rose plant growth in height was determined by measuring stems from ground level to top of stem or leaf or to the tip of the inflorescence of 12 grazed specimens (ungrazed specimens were not available) randomly selected on three replications of grazed sandy, shallow, silty, and clayey ecological sites biweekly during June, July, and August of the growing seasons of 1984 and 1985. Phenological growth stage of each specimen was recorded as vegetative, budding, anthesis, seed developing, seed shedding, or mature. Percentage of stem dryness of each specimen was recorded as 0, 0-2, 2-25, 25-50, 50-75, 75-98, or 100 percent dry. Mean stem weight was determined by clipping at ground level 12 specimens at typical phenological growth stages at biweekly sample dates on separate grazed areas of the sandy, shallow, silty, and clayey ecological sites. Clipped stems at each sample site were placed in separate labeled paper bags of known weight, oven dried at 62° C (144° F), and weighed in grams.

The 1983-2012 Study

A long-term study on change in abundance of Prairie wild rose was conducted during active plant growth of July and August each growing season of 1983 to 2012 (30 years) on native rangeland pastures at the Dickinson Research Extension Center ranch located near Manning, North Dakota. Effects from three management treatments were evaluated: 1) long-term nongrazing, 2) traditional seasonlong grazing, and 3) twice-over rotation grazing. Each treatment had two replications, each with data collection sites on sandy, shallow, and silty ecological sites. Each ecological site of the two grazed treatments had matching paired plots, one grazed and the other with an ungrazed enclosure. The sandy, shallow, and silty ecological sites were each replicated two times on the nongrazed treatment, three times on the seasonlong treatment,

and six times on the twice-over treatment.

During the initial phase of this study, 1983 to 1986, the long-term nongrazed and seasonlong treatments were at different locations and moved to the permanent study locations in 1987. The data collected on those two treatments during 1983 to 1986 were not included in this report.

Abundance of Prairie wild rose was determined with plant species stem density by 0.1 m² frame density method and with plant species basal cover by the ten-pin point frame method (Cook and Stubbendieck 1986).

The stem density method was used to count individual stems of each plant species rooted inside twenty five 0.1 m² quadrats placed along permanent transect lines at each sample site both inside (ungrazed) and outside (grazed) each enclosure. Stem density per 0.1 m² quadrat, relative stem density, percent frequency, relative percent frequency, and importance value were determined from the stem density data. Plant species stem density data collection was 1984, 1986 to 2012 on the twice-over treatment and was 1987 to 2012 on the long-term nongrazed and seasonlong treatments. However, stem density data was not collected during 1991, 1993 to 1997 on the sandy, shallow, and silty ecological sites of all three management treatments, stem density data was not collected during 1992 on the sandy ecological site of all three management treatments, and stem density data was not collected during 1999 on the sandy and silty ecological sites of the long-term nongrazed treatment.

The point frame method was used to collect data at 2000 points along permanent transect lines at each sample site both inside (ungrazed) and outside (grazed) each enclosure. Basal cover, relative basal cover, percent frequency, relative percent frequency, and importance value were determined from the ten-pin point frame data. Point frame data collection period was 1983 to 2012 on the twice-over treatment and was 1987 to 2012 on the long-term nongrazed and seasonlong treatments. However, point frame data was not collected during 1992 on the sandy ecological sites of all three treatments.

During some growing seasons, the point frame method or the stem density method did not document the presence of a particular plant species which will be reflected in the data summary tables as an 0.00 or as a blank spot.

Results

Prairie wild rose resumed growth in mid to late April and developed as a single stalk with

branching bushy crown than can grow in height to 50 cm (20 in) when protected from grazing. On the fall grazed pasture of the 1955-1962 study, the earliest first flowers appeared on 13 June, the mean first flowers occurred on 19 June, and the flower period, from the 1969-1971 study, extended from mid June to late July (table 1) (Goetz 1963, Zaczkowski 1972). A mean mature height of 18.9 cm (7.4 in) with an annual variance in height from 13.0 cm to 25.0 cm (5.1 in to 9.8 in) was reached during late July (table 2) (Goetz 1963).

Changes in phenological growth stages from the 1984-1985 study are summarized on tables 3, 4, 5, and 6. A total of 2,769 wild rose stems were sampled during this study, with 972 stems (35.1%) from the sandy sites, 951 stems (34.3%) from the shallow sites, 475 stems (17.2%) from the silty sites, and 371 stems (13.4%) from the clayey sites. Prairie wild rose does grow on all of the ecological sites but shows preference for the habitats of the sandy and shallow ecological sites. All of the wild rose stems growing on native rangeland pastures occupied by cattle during the summer, early June until mid October, were grazed. None of the wild rose stems reached a maximum height greater than 20 cm (8 in) which is only 40% of the normal height. The maximum height reached at the vegetative stage was 11.2 cm (4.4 in), at the budding stage was 12.4 cm (4.9 in), at the anthesis stage was 19.9 cm (7.8 in), at the seed developing stage was 17.9 cm (7.0 in), and at the mature stage was 15.5 cm (6.1 in) (tables 3, 4, 5, and 6). All of these maximum stem heights were reached during the early portion of the grazing season in June. The maximum stem heights at each phenological growth stage reached on the clayey ecological site were shorter than those reached on the sandy and shallow ecological sites.

As a result of 100% of the wild rose stems being grazed, 95.6% of the total stem population remained at the vegetative and budding stages or prematurely became senescent and dried to the mature stage. The budding stage usually refers to the development of flower buds and a small number of stems at budding stage during June had flower buds. Most of the stems at budding stage developed buds that produced short branches and small leaves on the remaining portions of the lower stems. These buds would not have developed had the plant not been grazed. Only 4.4% of the total stem population developed into the anthesis and seed developing stages. None of the stems developed fruits or seeds.

Phenological development of wild rose stems progressed with regularity on the sandy and shallow ecological sites. A total of 48 stems (5.9%) on the sandy sites and 36 stems (4.6%) on the shallow sites reached anthesis stage during late June

to late July and reached seed development stage (a post anthesis stage) during late June to late August. Phenological development to the anthesis and seed developing stages was quite irregular on the silty and clayey ecological sites. A total of 7 stems (2.0%) on the silty sites and 8 stems (2.7%) on the clayey ecological sites reached the anthesis and seed developing stages.

Mean wild rose stem weights were heaviest on the sandy (mean 0.92 g) ecological sites and were significantly greater than the weights of the wild rose stems on the silty (mean 0.57 g) and clayey (mean 0.59 g) ecological sites (tables 3, 4, 5, and 6).

Plant species composition in rangeland ecosystems is variable during a growing season and dynamic among growing seasons. The 1983-2012 study attempts to quantify these increasing or decreasing changes in individual plant species abundance during 30 growing seasons by comparing differences in the importance values of individual species during multiple year periods. Importance value is an old technique that combines relative density or relative cover with relative frequency producing a scale of 0 to 200 that ranks individual species abundance within a plant community relative to the individual abundance of the other species in that community during a growing season. Density importance value ranks the forbs and shrubs and basal cover importance value ranks the grasses, upland sedges, forbs, and shrubs in a community. The quantity of change in the importance values of an individual species across time indicates the magnitude of the increases or decreases in abundance of that species relative to the changes in abundance of the other species.

Wild rose stems were present at the beginning of the study on the sandy, shallow, and silty ecological sites of the nongrazed treatment, on the grazed sandy and shallow ecological sites of the seasonlong treatment, and on the ungrazed and grazed sandy and shallow ecological sites of the twice-over treatment (tables 7 and 8).

On the sandy site of the nongrazed treatment, prairie wild rose was present during 52.6% and 48.0% of the years that density and basal cover data were collected, respectively. Wild rose stem abundance increased during the low precipitation period of 1988 to 1991, then decreased to low abundance during 1993 to 2003. During 2004 to 2012, the abundance greatly increased (tables 7 and 8). The density importance values on the sandy site of the nongrazed treatment were substantially greater during 2006 to 2012 than those on the ungrazed and grazed sandy sites of the seasonlong and twice-over

treatments (table 7).

On the grazed sandy site of the seasonlong treatment, prairie wild rose was present during 100.0% and 88.0% of the years that density and basal cover data was collected, respectively, and on the ungrazed sandy site, wild rose was present during 52.6% and 32.0% of the years that density and basal cover data were collected, respectively. The cover importance values had a decreasing trend during 1987 to 2012. The cover importance values on the ungrazed sandy site were greater during 2003 to 2012 than those on the grazed sandy site (table 8). The density importance values on the grazed sandy site had an increasing trend during 1987 to 2004, then a slight decreasing trend during 2005 to 2012. The density importance values on the ungrazed sandy site had an increasing trend during 2003 to 2012 and were greater on the ungrazed sandy site during 2003 to 2012 than those on the grazed sandy site (table 7).

On the ungrazed sandy sites of the twice-over treatment, prairie wild rose was present during 100.0% and 96.6% of the years that density and basal cover data were collected, respectively. The abundance of wild rose stems increased during 1984 to 2004, and decreased during 2005 to 2012. On the grazed sandy sites of the twice-over treatment, prairie wild rose was present 100.0% and 100.0% of the years that density and basal cover were collected, respectively. The abundance of wild rose stems increased during 1984 to 2000, and decreased during 2005 to 2012 (tables 7 and 8). The cover importance values on the ungrazed sandy site were greater during 1990 to 2012 than those on the grazed sandy site (table 8). The density importance values on the ungrazed sandy site were greater during 1999 to 2012 than those on the grazed sandy site (table 7).

On the shallow site of the nongrazed treatment, prairie wild rose was present during 42.1% and 34.6% of the years that density and basal cover data were collected, respectively. Wild rose stems were not abundant during 1987 to 2012, except during 2010 the density increased to 0.8 stems/m² (tables 7 and 8). The abundance of wild rose stems on the shallow site of the nongrazed treatment were substantially less during 1988 to 2012 than those on the ungrazed and grazed shallow sites of the seasonlong and twice-over treatments (tables 7 and 8).

On the grazed shallow site of the seasonlong treatment, prairie wild rose was present during 85.0% and 80.8% of the years that density and basal cover were collected, respectively, and on the ungrazed shallow sites, wild rose was present during 50.0% and 42.3% of the years that density and basal cover data were collected, respectively. The cover

importance values increased during 1987, then remained relatively steady during 1988 to 2008, and then decreased to zero during 2009 to 2012. The cover importance values on the ungrazed shallow site were greater during 2004 to 2012 than those on the grazed shallow site (table 8). The density importance values increased during 1989, then remained relatively steady during 1998 to 2012. The density importance values on the ungrazed shallow site were greater during 2003 to 2012 than those on the grazed shallow site (table 7).

On the ungrazed and grazed shallow site on the twice-over treatment, prairie wild rose was present on the ungrazed shallow site during 95.5% and 96.7% and on the grazed shallow site during 95.5% and 96.7% of the years that density and basal cover data were collected, respectively. The cover importance values increased during 1987 to 1995, then during 1996 to 2012 the importance values had a slow steady decrease. The cover importance values on the ungrazed shallow site were greater during 1993 to 1997 and 2005 to 2012 than those on the grazed shallow site (table 8). On the grazed shallow site, the density importance values increased during 1984 to 1998, then slowly decreased during 1999 to 2012. On the ungrazed shallow site, the density importance values increased during 1984 to 1990, then remained relatively steady during 1998 to 2007, and then increased during 2008 to 2012. The density importance values on the ungrazed shallow site were greater during 1984 to 1990 and 2008 to 2012 than those on the grazed shallow site (table 7).

On the silty site of the nongrazed treatment, prairie wild rose was present during 89.5% and 53.8% of the years that density and basal cover data were collected, respectively. The abundance of wild rose stems were low and consistent. Stem numbers greatly increased during 1987 to 1991, decreased during 1993 to 1995, and remained relatively steady during 1996 to 2012, except during 2010 the density increased to 2.2 stems/m² (tables 7 and 8). On the silty site of the nongrazed treatment, the density importance values were greater during 1987 to 1992, 1998 to 2005, and 2010 to 2012 than those on the ungrazed silty site of the seasonlong treatment. The density importance values on the silty site of the nongrazed treatment were greater during 1987 to 1992, 2000 to 2006, and 2010 to 2012 than those on the grazed silty site of the seasonlong treatment (table 7). The mean cover importance value on the silty site of the nongrazed treatment was 2.83 and was substantially greater than the 0.2 and 0.9 cover importance values on the ungrazed and grazed silty sites of the seasonlong treatment and greater than the 0.11 and 0.01 cover importance values on the ungrazed and grazed silty sites of the twice-over treatment, respectively (table 8).

On the ungrazed and grazed silty sites of the seasonlong treatment, prairie wild rose was present on the ungrazed silty site during 45.0% and 7.7% and on the grazed silty site during 65.0% and 26.9% of the years that density and basal cover data were collected, respectively. Wild rose stems were not abundant. The density method determined wild rose stems present on the ungrazed silty site during 2004 to 2012 and on the grazed silty site during 1989 and 1998 to 2011. The density importance values on the ungrazed silty site were greater during 2004 to 2007 and 2010 to 2012 than those on the grazed silty site (table 7). The point frame method determined wild rose stems present on the ungrazed silty site during 2003 to 2005 and on the grazed silty site during 1993 and 2001 to 2007. The cover importance values on the grazed silty site were greater during 1993 and 2001 to 2007 than those on the ungrazed silty site (table 8).

On the ungrazed and grazed silty sites of the twice-over treatment, prairie wild rose was present on the ungrazed silty site during 4.5% and 16.7% and on the grazed silty site during 4.5% and 6.7% of the years that density and basal cover data were collected, respectively. Wild rose stems were sparse. The density method determined wild rose present on the ungrazed silty site during 1989 and on the grazed silty site during 2007 (table 7). The point frame method determined wild rose stems present on the ungrazed silty site during 1989 to 1993 and 2002 and on the grazed silty site during 1991 and 2003. The cover importance values on the ungrazed silty site were greater during 1989 to 1993 than those on the grazed silty site (table 8).

Densities of wild rose stems were irregular during 1987 to 2005 on the sandy site of the nongrazed treatment and were consistent during 2006 to 2012 (7 yrs) with a mean density of 5.4 stems/m². The densities on the sandy site of the nongrazed treatment were greater during 2006 to 2012 (7 yrs) than those on the grazed sandy sites of the seasonlong and twice-over treatments (table 9).

Densities of wild rose stems were irregular during 1987 to 1990 on the grazed sandy site of the seasonlong treatment and were consistent during 1998 to 2012 (15 yrs) with a mean density of 2.1 stems/m². The mean density on the ungrazed sandy site was 3.8 stems/m² and were greater than those on the grazed sandy site during 2003 to 2012 (10 yrs) (table 9).

Densities of wild rose stems were irregular during 1983 to 1990 on the grazed sandy site of the twice-over treatment and were consistent during 1998 to 2012 (15 yrs) with a mean density of 2.5 stems/m².

The mean density on the ungrazed sandy site was 4.6 stems/m² and were greater than those on the grazed sandy site during 1998 to 2012 (15 yrs) (table 9).

Densities of wild rose stems were sparse and irregular during 1998 to 2012 (15 years) on the shallow site of the nongrazed treatment and had a mean density of 0.2 stems/m² (table 9).

Densities of wild rose stems were irregular during 1987 to 2003 on the grazed shallow site of the seasonlong treatment and were consistent during 2004 to 2012 (9 yrs) with a mean density of 2.7 stems/m². The mean densities on the ungrazed shallow site was 5.8 stems/m² and were greater than those on the grazed shallow site during 2003 to 2012 (10 yrs) (table 9).

Densities of wild rose stems were irregular during 1984 to 1990 on the grazed shallow site of the twice-over treatment and were consistent during 2005 to 2012 (8 yrs) with a mean density of 2.1 stems/m². The mean density on the ungrazed shallow site was 2.5 stems/m² and were greater than those on the grazed shallow site during 1984 to 1990 (7 yrs) and 2003 to 2012 (10 yrs) (table 9).

Densities of wild rose were low and consistent during 1987 to 2012 on the silty site of the nongrazed treatment. The mean density during 2000 to 2012 (13 yrs) was 0.7 stems/m². The densities on the silty site of the nongrazed treatment were greater during 1987 to 1992 (6 yrs) and 2000 to 2012 (13 yrs) than those on the grazed silty sites of the seasonlong and twice-over treatments (table 9).

Densities of wild rose stems were irregular during 1987 to 1997 on the grazed silty site of the seasonlong treatment and were more consistent during 2003 to 2012 (10 yrs) with a mean density of 0.1 stems/m². The mean density on the ungrazed silty site was 0.4 stems/m² and were greater than those on the grazed silty site during 2004 to 2012 (9 yrs) (table 9).

Densities of wild rose stems were extremely sparse during 1984 to 2012 on the ungrazed and grazed silty sites of the twice-over treatment. The mean density during 1998 to 2012 (15 yrs) was 0.0 stems/m² on the ungrazed and 0.0 stems/m² on the grazed silty sites (table 9).

Discussion

Prairie wild rose is a minor subdominant component of healthy mixed grass prairie plant communities. Prairie wild roses can grow in sandy, shallow, silty, and clayey ecological sites; it shows a strong preference for the sandy and shallow sites and

has problems growing in the silty and clayey sites. Each year prairie wild rose resumes growth during mid to late April. Vegetative growth in height continues during May and June. Flower buds appear during late May to early June. The flower period (anthesis) occurs during mid June to late July. Stems protected from grazing reach maximum mature height of 50 cm (20 in) during late July. Stems growing in fall grazed pastures reach mature heights of 13.0 cm to 25.0 cm (5.1 in to 9.8 in) and stems growing in summer grazed (early June to mid October) pastures reach mean height of 15.4 cm (6.0 in) with a range of 11.2 to 19.9 cm (4.4 in to 7.8 in). Mean grazed stem weights on sandy sites were 0.92 g, on shallow sites were 0.65 g, on silty sites were 0.57 g, and on clayey sites were 0.59 g. Following pollination by insects, seeds, and fruits develop. The fruits (hips) are retained on the plant through winter; wild roses do not have a seed shedding phenological stage towards the latter portion of the growing season. Senescence of rose stems usually begins in mid July and progressively increases as the growing season advances. Low precipitation events can increase the rates of dryness. The stems of prairie wild rose die back partly or completely to ground level during the winter. The stems of western wild rose usually have little die back except during cold winter temperatures.

Prairie wild rose stem abundance greatly increased under two conditions. During the severe drought of 1988 and the low precipitation during 1989 to 1992, grass growth and development greatly decreased, however, during the same five year period, prairie wild rose was able to increase in abundance as a result of the plants extensive root system and deep descending vertical roots. Rose stem abundance also increased when the integrity of the grass community had degraded. Grass plants produce double the leaf biomass than the plants need for photosynthesis to survive. The extra quantity of leaf biomass needs to be removed annually or the litter accumulates as mulch and standing dead that restricts water and sunlight from reaching the soil surface. These conditions cause degradation of the grasses with reduced biomass production, decreased grass density, and reduced belowground resource uptake of water and nutrients. After 12 to 20 years without grazing, the grass plants lose their competitiveness that permits the prairie wild rose plants to greatly increase in stem abundance on the nongrazed and ungrazed sites.

Prairie wild rose stem abundance decreased under two conditions. The replicated shallow ecological sites of the long-term nongrazed treatment have consolidated parent material within less than 30 cm (12 in) of the soil surface that is much harder than

that under the shallow sites of the seasonlong and twice-over treatments. Long-term nongrazing not only causes plant community degradation but also causes problems with soil structure that prevents or restricts root penetration resulting in greatly decreasing wild rose stem abundance. The second condition was annual grazing by both the traditional seasonlong and biologically effective twice-over rotation treatments caused rose stem abundance to decrease. All of the prairie wild rose stems growing in native rangeland pastures were grazed. Grazed rose stems do not develop through the natural phenological growth stages and stop progress at the vegetative stage or at the post anthesis stage. The quantity of leaf area remaining on grazed rose stems is inadequate to replace expended carbohydrates. Many grazed rose stems attempt to produce short branches with leaves on the lower portions of remaining stems which almost always do not develop past the open bud stage. These conditions result in the reduction of prairie wild rose stem abundance.

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Table 1. First flower and flower period of *Rosa arkansana*, Prairie wild rose, and *Rosa woodsii*, Western wild rose.

	Apr	May	Jun	Jul	Aug	Sep
Prairie wild rose						
First Flower 1955-1962						
Earliest			13			
Mean			19			
Flower Period 1969-1971			XX	XX	XX	
Western wild rose						
Flower Period 1969-1971			XX			

First Flower data from Goetz 1963.

Flower Period Data from Zaczkowski 1972.

Table 2. Autecology of *Rosa arkansana*, Prairie wild rose, with growing season changes in mature height.

Data Period	Minimum Annual Mature Height cm	Maximum Annual Mature Height cm	Mean Mature Height cm	Percent of Mature Height Attained					
				Apr %	May %	Jun %	Jul %	Aug %	Sep %
1955-1962	13.0	25.0	18.9			93.3	100.0		

Data from Goetz 1963.

Table 3. Phenological growth stage changes during the growing season for *Rosa arkansana*, Prairie wild rose, 1984-1985.

Site	8 Jun	23 Jun	8 Jul	23 Jul	8 Aug	23 Sep
Sandy						
% Population						
Veg	86.4	90.5	89.4	93.3	84.0	81.1
Bud	13.6	6.3	6.8	1.5	5.9	2.4
Anth		0.5	1.4			
Seed Dev		2.1	2.5	5.2	10.1	14.2
Seed Shed						
Mat		0.5				2.4
Mean Height (cm)						
Veg	9.0	8.3	7.6	8.6	8.7	8.6
Bud	9.9	12.4	6.5	9.0	7.3	5.6
Anth		10.4	9.3			
Seed Dev		17.9	12.7	14.3	8.9	9.2
Seed Shed						
Mat		15.5				9.2
% Dryness						
Veg	3.4	3.9	7.8	27.7	22.7	44.8
Bud	3.2	0.6	5.8	37.5	15.2	25.0
Anth		2.0	2.0			
Seed Dev		2.0	7.8	25.0	45.6	18.1
Seed Shed						
Mat		2.0				87.5
Mean Weight (g)	1.05	0.85	0.82	0.92	0.99	0.91

Phenological Growth Stages: Vegetative (Veg), Budding (Bud), Anthesis (Anth), Seed Developing (Seed Dev), Seed Shedding (Seed Shed), Mature (Mat).

Table 4. Phenological growth stage changes during the growing season for *Rosa arkansana*, Prairie wild rose, 1984-1985.

Site	8 Jun	23 Jun	8 Jul	23 Jul	8 Aug	23 Sep
Shallow						
% Population						
Veg	98.8	90.7	97.0	90.0	90.4	77.8
Bud	1.2	6.6	1.2	1.4	5.2	10.2
Anth		0.5	0.6	4.3		
Seed Dev		2.2	1.2	3.6	3.5	12.0
Seed Shed						
Mat				0.7	0.9	
Mean Height (cm)						
Veg	8.2	6.6	7.5	7.5	7.4	7.9
Bud	6.4	10.3	7.7	7.7	8.2	7.0
Anth		8.9	9.3	11.5		
Seed Dev		9.9	9.3	9.2	9.8	9.3
Seed Shed						
Mat				13.1	10.4	
% Dryness						
Veg	3.1	6.0	10.8	16.6	22.0	23.5
Bud	0.0	0.5	1.0	13.5	29.9	14.2
Anth		2.0	25.0	25.0		
Seed Dev		2.0	1.0	20.8	37.9	32.1
Seed Shed						
Mat				25.0	50.0	
Mean Weight (g)	0.68	0.93	0.50	0.84	0.56	0.38

Phenological Growth Stages: Vegetative (Veg), Budding (Bud), Anthesis (Anth), Seed Developing (Seed Dev), Seed Shedding (Seed Shed), Mature (Mat).

Table 5. Phenological growth stage changes during the growing season for *Rosa arkansana*, Prairie wild rose, 1984-1985.

Site	8 Jun	23 Jun	8 Jul	23 Jul	8 Aug	23 Sep
Silty						
% Population						
Veg	90.0	96.4	95.2	88.9	85.7	91.4
Bud	10.0	1.8	4.8	7.9	8.2	6.9
Anth		1.8				
Seed Dev				3.2	6.1	1.7
Seed Shed						
Mat						
Mean Height (cm)						
Veg	11.2	8.5	7.0	7.6	7.4	8.1
Bud	9.6	7.9	8.1	8.3	6.2	7.6
Anth		19.9				
Seed Dev				9.5	7.5	8.4
Seed Shed						
Mat						
% Dryness						
Veg	0.8	2.7	11.4	22.8	27.5	26.9
Bud	1.0	0.0	13.5	30.8	13.5	25.5
Anth		0.0				
Seed Dev				37.5	41.7	75.0
Seed Shed						
Mat						
Mean Weight (g)	0.59	-	0.70	0.70	0.53	0.32

Phenological Growth Stages: Vegetative (Veg), Budding (Bud), Anthesis (Anth), Seed Developing (Seed Dev), Seed Shedding (Seed Shed), Mature (Mat).

Table 6. Phenological growth stage changes during the growing season for *Rosa arkansana*, Prairie wild rose, 1984-1985.

Site	8 Jun	23 Jun	8 Jul	23 Jul	8 Aug	23 Sep
Clayey						
% Population						
Veg	96.6	96.9	89.4	93.3	81.1	93.1
Bud	3.4	1.5	6.7	3.3	10.8	3.4
Anth			1.0			
Seed Dev			2.9	3.3	8.1	
Seed Shed						
Mat		1.5				3.4
Mean Height (cm)						
Veg	6.3	6.8	6.8	6.1	6.7	6.6
Bud	3.6	8.6	9.1	8.9	4.5	6.1
Anth			7.4			
Seed Dev			7.8	4.1	9.8	
Seed Shed						
Mat		5.0				9.2
% Dryness						
Veg	2.8	4.6	5.2	7.7	34.9	24.6
Bud	2.0	0.0	11.3	50.0	25.5	2.0
Anth			2.0			
Seed Dev			8.3	25.0	25.0	
Seed Shed						
Mat		2.0				25.0
Mean Weight (g)	0.66	-	0.47	0.42	0.55	0.87

Phenological Growth Stages: Vegetative (Veg), Budding (Bud), Anthesis (Anth), Seed Developing (Seed Dev), Seed Shedding (Seed Shed), Mature (Mat).

Table 7. Autecology of *Rosa arkansana*, Prairie wild rose, with growing season changes in density importance value, 1983-2012.

Ecological Site Year Period	Nongrazed	Seasonlong		Twice-over	
		Ungrazed	Grazed	Ungrazed	Grazed
Sandy					
1983-1987	0.00	0.00	9.65	8.83	12.77
1988-1992	9.94	0.00	3.28	13.34	15.80
1993-1998	0.00	0.00	9.33	15.73	16.73
1999-2003	0.18	2.67	11.56	20.52	14.18
2004-2009	23.57	14.34	7.58	18.56	13.85
2010-2012	33.39	18.86	9.47	17.66	11.26
Shallow					
1983-1987	0.00	0.00	1.21	5.89	3.84
1988-1992	0.00	0.00	3.14	10.69	6.85
1993-1998	1.14	0.00	14.05	3.32	15.22
1999-2003	1.06	6.70	19.45	4.33	9.84
2004-2009	0.31	29.66	16.08	6.82	8.29
2010-2012	3.02	34.18	13.02	9.47	7.29
Silty					
1983-1987	8.61	0.00	0.00	0.00	0.00
1988-1992	29.19	0.00	0.27	0.09	0.00
1993-1998	2.12	0.00	2.48	0.00	0.00
1999-2003	4.38	0.00	2.22	0.00	0.00
2004-2009	1.31	1.33	0.61	0.00	0.42
2010-2012	6.14	3.31	0.76	0.00	0.00

Table 8. Autecology of *Rosa arkansana*, Prairie wild rose, with growing season changes in basal cover importance value, 1983-2012.

Ecological Site Year Period	Nongrazed	Seasonlong		Twice-over	
		Ungrazed	Grazed	Ungrazed	Grazed
Sandy					
1983-1987	0.50	0.00	2.69	0.98	1.58
1988-1992	1.42	0.00	2.00	5.39	3.43
1993-1998	0.09	0.00	0.66	2.76	2.56
1999-2003	0.00	0.55	0.99	3.58	1.48
2004-2009	0.61	1.53	0.58	2.72	0.83
2010-2012	0.82	1.43	0.28	1.51	0.48
Shallow					
1983-1987	5.15	0.00	2.87	0.79	0.76
1988-1992	0.69	0.00	1.46	2.57	3.07
1993-1998	0.36	0.00	1.18	1.70	1.25
1999-2003	0.04	0.37	1.21	1.20	1.26
2004-2009	0.07	2.77	1.38	1.06	0.85
2010-2012	0.07	1.47	0.00	0.86	0.21
Silty					
1983-1987	3.03	0.00	0.00	0.00	0.00
1988-1992	11.06	0.00	0.00	0.25	0.03
1993-1998	2.02	0.00	0.11	0.35	0.00
1999-2003	0.41	0.05	0.18	0.02	0.03
2004-2009	0.12	0.02	0.13	0.00	0.00
2010-2012	0.09	0.00	0.00	0.00	0.00

Table 9. Autecology of *Rosa arkansana*, Prairie wild rose, with growing season changes in density, 1983-2012.

Ecological Site Year Period	Nongrazed	Seasonlong		Twice-over	
		Ungrazed	Grazed	Ungrazed	Grazed
Sandy					
1983-1987	0.00	0.00	0.11	0.11	0.22
1988-1992	0.15	0.00	0.05	0.18	0.18
1993-1998	0.00	0.00	0.15	0.36	0.32
1999-2003	0.02	0.41	0.30	0.45	0.26
2004-2009	0.35	0.37	0.19	0.46	0.25
2010-2012	0.57	0.39	0.11	0.51	0.23
Shallow					
1983-1987	0.00	0.00	0.01	0.18	0.09
1988-1992	0.00	0.00	0.06	0.13	0.08
1993-1998	0.04	0.00	0.20	0.11	0.33
1999-2003	0.02	0.45	0.38	0.19	0.37
2004-2009	0.01	0.54	0.31	0.26	0.24
2010-2012	0.04	0.71	0.21	0.27	0.20
Silty					
1983-1987	0.12	0.00	0.00	0.00	0.00
1988-1992	0.50	0.00	0.01	0.01	0.00
1993-1998	0.04	0.00	0.05	0.00	0.00
1999-2003	0.09	0.00	0.05	0.00	0.00
2004-2009	0.02	0.03	0.02	0.00	0.01
2010-2012	0.13	0.05	0.01	0.00	0.00

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Appendix
Autecology Data
of Prairie Wild Rose

Table 1. Autecology study of <i>Rosa arkansana</i> with growing season changes in phenological growth stage, mean height, and mean weight, 1984.													
8 Jun							23 Jun						
Site: Sandy	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	
% Population							89.8	9.3	0.8				
Mean Height (cm)							6.6	12.7	10.4				
% Dryness							3.4	1.1	2.0				
Mean Weight	1.23												
8 Jul							23 Jul						
Site: Sandy	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	
% Population	81.1	12.2	2.2	4.4			94.4	2.8		2.8			
Mean Height (cm)	6.1	6.5	9.3	12.7			6.5	9.0		6.9			
% Dryness	3.3	5.8	2.0	7.8			15.2	37.5		25.0			
Mean Weight	0.89						1.31						
8 Aug							23 Aug						
Site: Sandy	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	
% Population	79.2	9.7		11.1			83.3	4.2		9.7		2.8	
Mean Height (cm)	7.1	7.3		7.7			7.3	5.6		8.5		7.6	
% Dryness	24.0	15.2		41.2			44.6	25.0		64.0		75.0	
Mean Weight	1.22						1.04						

Table 2. Autecology study of <i>Rosa arkansana</i> with growing season changes in phenological growth stage, mean height, and mean weight, 1985.													
8 Jun							23 Jun						
Site: Sandy	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	
% Population	86.4	13.6					91.5	1.4		5.6		1.4	
Mean Height (cm)	9.0	9.9					11.0	8.6		17.9		15.5	
% Dryness	3.4	3.2					4.3	0.0		2.0		2.0	
Mean Weight (g)	0.87						0.85						
8 Jul							23 Jul						
Site: Sandy	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	
% Population	100.0						91.9			8.1			
Mean Height (cm)	9.1						11.1			17.3			
% Dryness	12.3						40.2			25.0			
Mean Weight (g)	0.74						0.53						
8 Aug							23 Aug						
Site: Sandy	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	
% Population	91.5			8.5			78.2			20.0		1.8	
Mean Height (cm)	10.8			11.4			11.0			14.6		12.5	
% Dryness	21.4			50.0			44.9			32.2		100.0	
Mean Weight (g)	0.75						0.77						

Phenological Growth Stages: Vegetative (Veg), Budding (Bud), Anthesis (Anth), Seed Developing (Seed Dev), Seed Shedding (Seed Shed), Mature (Mat).

Table 5. Autecology study of *Rosa arkansana* with growing season changes in phenological growth stage, mean height, and mean weight, 1984.

	8 Jun						23 Jun					
Site: Silty	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat
% Population							94.4		5.6			
Mean Height (cm)							6.0		19.9			
% Dryness							0.7		0.0			
Mean Weight (g)	0.64											
	8 Jul						23 Jul					
Site: Silty	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat
% Population	91.3	8.7					86.1	13.9				
Mean Height (cm)	5.3	8.1					7.3	8.3				
% Dryness	5.9	13.5					14.0	30.8				
Mean Weight (g)	1.01						0.90					
	8 Aug						23 Aug					
Site: Silty	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat
% Population	80.6	11.1		8.3			88.2	11.8				
Mean Height (cm)	7.0	6.2		7.5			7.0	7.6				
% Dryness	22.2	13.5		41.7			27.0	25.5				
Mean Weight (g)	0.64						--					

Table 6. Autecology study of *Rosa arkansana* with growing season changes in phenological growth stage, mean height, and mean weight, 1985.

	8 Jun						23 Jun					
Site: Silty	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat
% Population	90.0	10.0					97.3	2.7				
Mean Height (cm)	11.2	9.6					9.7	7.9				
% Dryness	0.8	1.0					4.7	0.0				
Mean Weight (g)	0.54						--					
	8 Jul						23 Jul					
Site: Silty	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat
% Population	100.0						92.6			7.4		
Mean Height (cm)	8.9						8.1			9.5		
% Dryness	16.8						31.5			37.5		
Mean Weight (g)	0.38						0.49					
	8 Aug						23 Aug					
Site: Silty	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat	Veg	Bud	Anth	Seed Dev	Seed Shed	Mat
% Population	100.0						95.8			4.2		
Mean Height (cm)	8.3						9.5			8.4		
% Dryness	32.7						26.7			75.0		
Mean Weight (g)	0.41						0.32					

Phenological Growth Stages: Vegetative (Veg), Budding (Bud), Anthesis (Anth), Seed Developing (Seed Dev), Seed Shedding (Seed Shed), Mature (Mat).

Table 9.	Density analysis for native range on the nongrazed grazing system at the Dickinson Research Extension Center.					
System:	West/East					
Pasture:	NG-W & E				Relative	
Site:	Sandy, ungrazed		Relative	Percent	Percent	Importance
Species:	Rosa arkansana	Density	Density	Frequency	Frequency	Value
1983				No Data		
1984				No Data		
1985				No Data		
1986				No Data		
1987						
1988						
1989		0.44	11.11	9.09	16.98	28.09
1990		0.02	0.37	0.37	1.35	1.72
1991				No Densities Collected		
1992				No Densities Collected		
1993				No Densities Collected		
1994				No Densities Collected		
1995				No Densities Collected		
1996				No Densities Collected		
1997				No Densities Collected		
1998						
1999						
2000						
2001						
2002		0.02	0.13	2.00	0.79	0.92
2003						
2004						
2005						
2006		0.64	15.21	46.00	19.73	34.94
2007		0.36	13.45	30.00	15.19	28.64
2008		0.62	28.76	42.00	28.99	57.75
2009		0.46	8.04	34.00	12.06	20.10
2010		0.52	23.00	34.00	25.00	48.00
2011		0.40	5.08	22.00	6.32	11.40
2012		0.78	19.17	54.00	21.58	40.76

Table 10.	Density analysis for native range on the 4.5 month seasonlong grazing system at the Dickinson Research Extension Center.					
System:	West/East/North					
Pasture:	NR-9-12				Relative	
Site:	Sandy, ungrazed		Relative	Percent	Percent	Importance
Species:	Rosa arkansana	Density	Density	Frequency	Frequency	Value
1983	No Data					
1984	No Data					
1985	No Data					
1986	No Data					
1987						
1988						
1989						
1990						
1991	No Densities Collected					
1992	No Densities Collected					
1993	No Densities Collected					
1994	No Densities Collected					
1995	No Densities Collected					
1996	No Densities Collected					
1997	No Densities Collected					
1998						
1999						
2000						
2001						
2002						
2003		0.41	4.84	22.67	8.52	13.36
2004		0.43	5.31	28.00	12.28	17.59
2005		0.37	5.16	25.33	9.29	14.45
2006		0.44	4.53	25.33	9.52	14.05
2007		0.23	5.27	20.00	7.57	12.84
2008		0.37	5.28	21.33	9.32	14.60
2009		0.37	4.53	24.00	7.98	12.52
2010		0.52	11.89	28.00	17.07	28.96
2011		0.27	5.95	12.00	5.56	11.51
2012		0.39	5.27	24.00	10.84	16.11

Table 11.	Density analysis for native range on the 4.5 month seasonlong grazing system at the Dickinson Research Extension Center.					
System:	West/East/North					
Pasture:	NR-9-12				Relative	
Site:	Sandy, grazed		Relative	Percent	Percent	Importance
Species:	Rosa arkansana	Density	Density	Frequency	Frequency	Value
1983				No Data		
1984				No Data		
1985				No Data		
1986				No Data		
1987		0.11	3.76	9.33	5.89	9.65
1988		0.03	1.06	2.67	2.38	3.44
1989		0.03	0.48	2.67	1.08	1.55
1990		0.08	1.21	5.33	3.64	4.86
1991				No Densities Collected		
1992				No Densities Collected		
1993				No Densities Collected		
1994				No Densities Collected		
1995				No Densities Collected		
1996				No Densities Collected		
1997				No Densities Collected		
1998		0.15	2.75	12.00	6.58	9.33
1999		0.11	1.27	0.95	3.23	4.51
2000		0.39	5.04	22.67	8.91	13.94
2001		0.43	4.19	28.00	7.74	11.93
2002		0.27	4.38	18.67	10.11	14.49
2003		0.29	4.24	20.00	8.71	12.95
2004		0.21	3.22	13.33	6.52	9.74
2005		0.24	2.56	16.00	4.75	7.31
2006		0.13	3.06	10.67	4.71	7.77
2007		0.13	1.44	9.33	2.55	4.00
2008		0.17	3.31	14.67	6.05	9.36
2009		0.27	2.38	16.00	4.92	7.30
2010		0.13	3.88	12.00	8.28	12.16
2011		0.12	2.75	9.33	4.86	7.61
2012		0.09	3.11	9.33	5.53	8.64

Table 12.	Density analysis for native range on the twice-over rotation grazing system at the Dickinson Research Extension Center.					
System:	West/East					
Pasture:	NR-1-6				Relative	
Site:	Sandy, ungrazed		Relative	Percent	Percent	Importance
Species:	<i>Rosa arkansana</i>	Density	Density	Frequency	Frequency	Value
1983	No Densities Collected					
1984	0.19	4.55	8.00	3.21	7.76	
1985	No Densities Collected					
1986	0.16	3.77	10.67	5.31	9.08	
1987	0.18	4.21	10.67	5.44	9.65	
1988	0.11	5.06	6.67	5.20	10.26	
1989	0.07	3.73	6.00	5.05	8.78	
1990	0.36	8.59	16.00	12.40	20.99	
1991	No Densities Collected					
1992	No Densities Collected					
1993	No Densities Collected					
1994	No Densities Collected					
1995	No Densities Collected					
1996	No Densities Collected					
1997	No Densities Collected					
1998	0.36	7.51	18.00	8.23	15.73	
1999	0.32	8.41	16.00	9.56	17.97	
2000	0.48	10.03	20.00	10.67	20.70	
2001	0.53	12.73	22.00	12.69	25.41	
2002	0.47	8.44	19.33	9.64	18.08	
2003	0.46	9.72	20.67	10.72	20.44	
2004	0.39	9.21	20.67	9.95	19.17	
2005	0.26	6.64	16.00	8.03	14.67	
2006	0.41	7.03	18.67	10.01	17.03	
2007	0.49	7.76	25.33	11.58	19.34	
2008	0.46	9.51	24.00	12.10	21.61	
2009	0.73	9.35	24.00	10.16	19.51	
2010	0.66	10.25	28.67	13.34	23.59	
2011	0.40	4.72	18.67	7.34	12.06	
2012	0.47	5.79	25.33	11.53	17.32	

Table 13.	Density analysis for native range on the twice-over rotation grazing system at the Dickinson Research Extension Center.					
System:	West/East					
Pasture:	NR-1-6				Relative	
Site:	Sandy, grazed		Relative	Percent	Percent	Importance
Species:	<i>Rosa arkansana</i>	Density	Density	Frequency	Frequency	Value
1983	No Densities Collected					
1984	0.21	6.33	9.33	5.22	11.55	
1985	No Densities Collected					
1986	0.19	4.74	12.67	5.95	10.69	
1987	0.26	6.67	19.33	9.39	16.06	
1988	0.21	10.50	17.33	12.12	22.61	
1989	0.19	5.40	12.67	7.70	13.11	
1990	0.14	4.19	10.00	7.50	11.69	
1991	No Densities Collected					
1992	No Densities Collected					
1993	No Densities Collected					
1994	No Densities Collected					
1995	No Densities Collected					
1996	No Densities Collected					
1997	No Densities Collected					
1998	0.32	8.52	16.00	8.20	16.73	
1999	0.25	6.84	9.94	7.21	14.05	
2000	0.30	8.34	13.33	7.31	15.65	
2001	0.24	4.49	12.67	4.81	9.31	
2002	0.24	6.48	16.67	9.36	15.84	
2003	0.25	7.05	16.67	9.02	16.07	
2004	0.29	9.00	18.67	11.51	20.51	
2005	0.18	4.51	15.33	6.88	11.39	
2006	0.19	5.88	14.67	8.13	14.01	
2007	0.32	5.55	16.67	8.60	14.15	
2008	0.14	3.76	11.33	7.37	11.13	
2009	0.36	4.67	17.33	7.26	11.92	
2010	0.29	5.39	18.00	9.05	14.44	
2011	0.16	2.19	9.33	4.02	6.21	
2012	0.23	4.31	16.00	8.82	13.13	

Table 14. Points analysis for native range on the nongrazed grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NG-W & E		Relative		Relative	
Site:	Sandy, ungrazed	Basal	Basal	Percent	Percent	Importance
Species:	<i>Rosa arkansana</i>	Cover	Cover	Frequency	Frequency	Value
1983				No Data		
1984				No Data		
1985				No Data		
1986				No Data		
1987		0.05	0.23	0.50	0.27	0.50
1988		0.10	0.33	1.00	0.44	0.77
1989		0.05	0.18	0.50	0.24	0.42
1990		0.25	1.52	2.00	1.39	2.90
1991		0.20	0.64	2.00	0.93	1.57
1992				No Points Collected		
1993						
1994						
1995						
1996						
1997		0.05	0.22	0.50	0.29	0.51
1998						
1999						
2000						
2001						
2002						
2003						
2004		0.03	0.09	0.25	0.14	0.23
2005						
2006		0.23	0.93	2.25	1.18	2.12
2007		0.08	0.32	0.75	0.41	0.73
2008						
2009		0.05	0.26	0.50	0.34	0.60
2010		0.18	0.67	1.75	0.89	1.56
2011						
2012		0.10	0.37	1.00	0.52	0.89

Table 15. Points analysis for native range on the 4.5 month seasonlong grazing system at the Dickinson Research Extension Center.						
System:	West/East/North					
Pasture:	NR-9-12		Relative		Relative	
Site:	Sandy, ungrazed	Basal	Basal	Percent	Percent	Importance
Species:	Rosa arkansana	Cover	Cover	Frequency	Frequency	Value
1983				No Data		
1984				No Data		
1985				No Data		
1986				No Data		
1987						
1988						
1989						
1990						
1991						
1992				No Points Collected		
1993						
1994						
1995						
1996						
1997						
1998						
1999						
2000						
2001						
2002						
2003		0.30	1.16	3.00	1.59	2.75
2004		0.45	1.57	4.00	1.78	3.35
2005		0.37	1.38	3.17	1.48	2.86
2006		0.25	1.32	2.17	1.44	2.77
2007						
2008		0.02	0.10	0.17	0.12	0.22
2009						
2010		0.23	1.35	2.33	1.63	2.99
2011		0.03	0.17	0.33	0.23	0.40
2012		0.10	0.43	0.83	0.47	0.89

Table 16. Points analysis for native range on the 4.5 month seasonlong grazing system at the Dickinson Research Extension Center.						
System:	West/East/North					
Pasture:	NR-9-12		Relative		Relative	
Site:	Sandy, grazed	Basal	Basal	Percent	Percent	Importance
Species:	Rosa arkansana	Cover	Cover	Frequency	Frequency	Value
1983		No Data				
1984		No Data				
1985		No Data				
1986		No Data				
1987		0.40	1.36	3.00	1.32	2.69
1988		0.03	0.13	0.36	0.16	0.29
1989		0.07	0.41	0.67	0.46	0.87
1990		0.27	1.05	2.67	1.24	2.29
1991		0.40	2.16	3.67	2.38	4.55
1992	No Points Collected					
1993		0.07	0.34	0.67	0.51	0.85
1994						
1995		0.02	0.09	0.17	0.10	0.19
1996		0.10	0.30	1.00	0.44	0.74
1997		0.07	0.23	0.67	0.32	0.55
1998		0.15	0.70	1.50	0.94	1.64
1999		0.13	0.44	1.17	0.50	0.95
2000		0.05	0.20	0.50	0.27	0.47
2001		0.05	0.14	0.50	0.22	0.37
2002		0.23	0.90	2.33	1.19	2.08
2003		0.13	0.45	1.33	0.61	1.06
2004		0.15	0.50	1.50	0.68	1.18
2005		0.07	0.22	0.67	0.29	0.51
2006		0.15	0.56	1.50	0.75	1.31
2007		0.05	0.16	0.33	0.15	0.31
2008		0.02	0.08	0.17	0.10	0.18
2009						
2010		0.07	0.23	0.67	0.35	0.58
2011						
2012		0.03	0.11	0.33	0.16	0.26

Table 17. Points analysis for native range on the twice-over rotation grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NR-1-6		Relative		Relative	
Site:	Sandy, ungrazed	Basal	Basal	Percent	Percent	Importance
Species:	Rosa arkansana	Cover	Cover	Frequency	Frequency	Value
1983						
1984		0.10	0.28	1.05	0.43	0.71
1985		0.08	0.31	0.83	0.44	0.75
1986		0.14	0.58	1.39	0.70	1.28
1987		0.12	0.52	1.19	0.67	1.19
1988		0.60	2.10	5.88	2.77	4.87
1989		0.50	2.10	4.00	2.09	4.20
1990		0.57	2.93	5.34	2.91	5.84
1991		0.63	3.22	4.83	3.41	6.63
1992	No Points Collected					
1993		0.42	1.06	3.50	1.59	2.64
1994		0.17	0.95	1.58	1.04	1.99
1995		0.63	2.70	5.83	3.00	5.69
1996		0.28	0.80	2.67	1.10	1.90
1997		0.20	0.79	2.00	1.10	1.89
1998		0.16	1.03	1.58	1.43	2.46
1999		0.15	0.80	1.42	0.98	1.78
2000		0.32	1.49	2.92	1.82	3.32
2001		0.13	0.39	1.25	0.69	1.08
2002		0.40	2.78	3.67	3.39	6.17
2003		0.44	2.48	3.92	3.08	5.56
2004		0.43	1.95	3.67	2.20	4.15
2005		0.43	1.86	3.83	2.22	4.09
2006		0.14	1.11	1.42	1.41	2.52
2007		0.19	1.27	1.75	1.41	2.67
2008		0.08	0.79	0.75	0.95	1.74
2009		0.08	0.52	0.75	0.63	1.15
2010		0.23	1.28	2.08	1.55	2.83
2011		0.07	0.45	0.67	0.56	1.01
2012		0.05	0.30	0.50	0.38	0.68

Table 18. Points analysis for native range on the twice-over rotation grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NR-1-6	Relative		Relative		Importance
Site:	Sandy, grazed	Basal	Basal	Percent	Percent	Importance
Species:	<i>Rosa arkansana</i>	Cover	Cover	Frequency	Frequency	Value
1983		0.22	0.38	1.83	0.56	0.94
1984		0.15	0.48	1.55	0.67	1.15
1985		0.17	0.57	1.52	0.72	1.29
1986		0.15	0.73	1.51	0.86	1.59
1987		0.37	1.37	3.25	1.58	2.95
1988		0.49	2.08	4.20	2.30	4.38
1989		0.15	0.79	1.50	1.02	1.81
1990		0.47	2.15	4.33	2.36	4.51
1991		0.32	1.38	2.83	1.64	3.02
1992	No Points Collected					
1993		0.53	1.10	4.33	1.96	3.07
1994		0.28	1.41	2.83	1.68	3.09
1995		0.48	2.15	4.50	2.26	4.41
1996		0.35	1.10	3.33	1.65	2.75
1997		0.13	0.45	1.25	0.61	1.06
1998		0.07	0.45	0.67	0.54	0.99
1999		0.13	0.45	1.25	0.60	1.05
2000		0.15	0.64	1.42	0.86	1.50
2001		0.08	0.33	0.75	0.38	0.71
2002		0.13	0.46	1.33	0.61	1.07
2003		0.39	1.37	3.42	1.69	3.05
2004		0.23	0.78	2.08	0.97	1.75
2005		0.12	0.42	1.08	0.51	0.94
2006		0.10	0.42	1.00	0.56	0.98
2007		0.05	0.19	0.50	0.26	0.44
2008		0.03	0.19	0.33	0.23	0.43
2009		0.04	0.19	0.42	0.25	0.44
2010		0.08	0.33	0.75	0.41	0.74
2011		0.04	0.18	0.42	0.24	0.42
2012		0.03	0.12	0.33	0.16	0.28

Table 19. Density analysis for native range on the nongrazed grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NG-W & E				Relative	
Site:	Shallow, ungrazed		Relative	Percent	Percent	Importance
Species:	Rosa arkansana	Density	Density	Frequency	Frequency	Value
1983		No Data				
1984		No Data				
1985		No Data				
1986		No Data				
1987						
1988						
1989						
1990						
1991	No Densities Collected					
1992						
1993	No Densities Collected					
1994	No Densities Collected					
1995	No Densities Collected					
1996	No Densities Collected					
1997	No Densities Collected					
1998		0.04	0.43	0.21	0.71	1.14
1999	No Densities Collected					
2000		0.04	0.87	2.00	1.43	2.30
2001						
2002		0.02	0.18	2.00	0.66	0.84
2003		0.02	0.29	2.00	0.79	1.09
2004						
2005		0.02	0.13	2.00	0.63	0.76
2006						
2007						
2008						
2009		0.02	0.34	2.00	0.75	1.09
2010		0.08	3.39	6.00	3.85	7.24
2011						
2012		0.04	0.65	4.00	1.16	1.81

Table 20. Density analysis for native range on the 4.5 month seasonlong grazing system at the Dickinson Research Extension Center.						
System:	West/East/North					
Pasture:	NR-9-12				Relative	
Site:	Shallow, ungrazed		Relative	Percent	Percent	Importance
Species:	Rosa arkansana	Density	Density	Frequency	Frequency	Value
1983		No Data				
1984		No Data				
1985		No Data				
1986		No Data				
1987						
1988						
1989						
1990						
1991		No Densities Collected				
1992						
1993		No Densities Collected				
1994		No Densities Collected				
1995		No Densities Collected				
1996		No Densities Collected				
1997		No Densities Collected				
1998						
1999						
2000						
2001						
2002						
2003		0.45	18.58	17.33	14.94	33.52
2004		0.65	18.77	24.00	16.22	34.99
2005		0.51	9.18	22.67	8.46	17.64
2006		0.45	17.44	21.33	14.41	31.85
2007		0.40	15.38	18.67	11.97	27.35
2008		0.56	20.00	24.00	17.14	37.14
2009		0.67	17.36	21.33	11.59	28.96
2010		0.67	16.67	22.67	11.56	28.23
2011		0.76	19.00	25.33	12.93	31.93
2012		0.71	23.87	26.67	18.52	42.39

Table 21. Density analysis for native range on the 4.5 month seasonlong grazing system at the Dickinson Research Extension Center.							
System:	West/East/North						
Pasture:	NR-9-12				Relative		
Site:	Shallow, grazed		Relative	Percent	Percent	Importance	
Species:	Rosa arkansana	Density	Density	Frequency	Frequency	Value	
1983		No Data					
1984		No Data					
1985		No Data					
1986		No Data					
1987		0.01	0.48	1.33	0.72	1.21	
1988							
1989		0.23	6.83	14.67	5.73	12.56	
1990							
1991		No Densities Collected					
1992							
1993		No Densities Collected					
1994		No Densities Collected					
1995		No Densities Collected					
1996		No Densities Collected					
1997		No Densities Collected					
1998		0.20	7.92	6.67	6.13	14.05	
1999		0.32	13.47	3.63	7.20	20.67	
2000		0.32	8.70	10.67	7.21	15.90	
2001		0.19	3.63	6.67	3.67	7.30	
2002		0.49	16.23	16.00	11.04	27.27	
2003		0.56	14.32	24.00	11.77	26.09	
2004		0.31	9.68	12.00	9.82	19.51	
2005		0.24	6.55	16.00	6.87	13.43	
2006		0.37	8.16	20.00	9.99	18.15	
2007		0.20	5.88	13.33	5.98	11.86	
2008		0.32	8.90	17.33	9.98	18.87	
2009		0.39	6.84	22.67	7.80	14.64	
2010		0.19	6.14	14.67	8.18	14.32	
2011		0.21	4.34	10.67	3.21	7.55	
2012		0.24	8.66	14.67	8.52	17.18	

Table 22. Density analysis for native range on the twice-over rotation grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NR-1-6				Relative	
Site:	Shallow, ungrazed		Relative	Percent	Percent	Importance
Species:	Rosa arkansana	Density	Density	Frequency	Frequency	Value
1983	No Densities Collected					
1984		0.17	2.73	7.33	2.17	4.90
1985	No Densities Collected					
1986		0.23	3.37	12.00	3.35	6.72
1987		0.13	2.63	8.67	3.42	6.06
1988		0.15	9.70	11.33	9.61	19.30
1989		0.13	4.20	8.00	5.13	9.33
1990		0.23	7.87	11.33	6.27	14.14
1991	No Densities Collected					
1992	No Densities Collected					
1993	No Densities Collected					
1994	No Densities Collected					
1995	No Densities Collected					
1996	No Densities Collected					
1997	No Densities Collected					
1998		0.11	1.14	6.67	2.19	3.32
1999		0.13	1.43	2.19	2.73	4.16
2000		0.15	1.30	8.00	2.31	3.61
2001		0.28	1.94	11.33	2.79	4.73
2002		0.17	1.52	8.67	2.44	3.96
2003		0.20	2.12	10.00	3.08	5.19
2004		0.16	2.73	14.00	5.62	8.36
2005		0.21	2.34	11.33	2.92	5.26
2006		0.21	1.53	11.33	2.68	4.22
2007		0.28	1.68	14.67	3.64	5.31
2008		0.30	5.29	14.67	6.67	11.96
2009		0.37	2.35	14.00	3.43	5.78
2010		0.37	6.28	18.67	7.15	13.43
2011		0.14	2.06	6.67	2.12	4.18
2012		0.29	4.64	17.33	6.17	10.81

Table 23. Density analysis for native range on the twice-over rotation grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NR-1-6				Relative	
Site:	Shallow, grazed		Relative	Percent	Percent	Importance
Species:	Rosa arkansana	Density	Density	Frequency	Frequency	Value
1983	No Densities Collected					
1984	0.09	2.11	6.67	2.16	4.27	
1985	No Densities Collected					
1986	0.08	1.35	6.67	1.80	3.14	
1987	0.11	1.73	7.33	2.39	4.12	
1988	0.13	5.64	9.33	5.93	11.57	
1989	0.13	2.50	9.33	3.89	6.39	
1990	0.07	3.83	5.33	3.59	7.42	
1991	No Densities Collected					
1992	No Densities Collected					
1993	No Densities Collected					
1994	No Densities Collected					
1995	No Densities Collected					
1996	No Densities Collected					
1997	No Densities Collected					
1998	0.33	8.96	12.00	6.26	15.22	
1999	0.27	5.47	14.12	4.29	9.76	
2000	0.57	6.73	12.67	4.37	11.09	
2001	0.36	3.26	13.33	3.40	6.66	
2002	0.25	5.01	11.33	4.86	9.87	
2003	0.39	5.37	17.33	6.45	11.82	
2004	0.37	6.05	13.33	5.09	11.14	
2005	0.23	3.73	10.00	2.94	6.67	
2006	0.24	3.43	10.67	3.59	7.02	
2007	0.21	4.14	12.00	4.72	8.86	
2008	0.15	5.53	10.67	6.35	11.88	
2009	0.26	2.07	10.00	2.11	4.18	
2010	0.27	4.55	10.67	3.90	8.45	
2011	0.14	2.62	6.00	1.67	4.29	
2012	0.20	4.87	10.67	4.26	9.12	

Table 24. Points analysis for native range on the nongrazed grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NG-W & E		Relative		Relative	
Site:	Shallow, ungrazed	Basal	Basal	Percent	Percent	Importance
Species:	Rosa arkansana	Cover	Cover	Frequency	Frequency	Value
1983		No Data				
1984		No Data				
1985		No Data				
1986		No Data				
1987		0.55	2.37	5.50	2.78	5.15
1988		0.25	1.00	1.50	0.85	1.86
1989		0.15	0.77	1.50	0.82	1.58
1990						
1991						
1992						
1993						
1994						
1995		0.13	0.74	1.25	0.90	1.64
1996						
1997						
1998		0.03	0.23	0.25	0.27	0.50
1999						
2000						
2001						
2002		0.03	0.09	0.25	0.11	0.20
2003						
2004		0.03	0.10	0.25	0.14	0.23
2005						
2006		0.03	0.07	0.25	0.11	0.18
2007						
2008						
2009						
2010						
2011						
2012		0.03	0.08	0.25	0.12	0.20

Table 25. Points analysis for native range on the 4.5 month seasonlong grazing system at the Dickinson Research Extension Center.						
System:	West/East/North					
Pasture:	NR-9-12		Relative		Relative	
Site:	Shallow, ungrazed	Basal	Basal	Percent	Percent	Importance
Species:	Rosa arkansana	Cover	Cover	Frequency	Frequency	Value
1983		No Data				
1984		No Data				
1985		No Data				
1986		No Data				
1987						
1988						
1989						
1990						
1991						
1992						
1993						
1994						
1995						
1996						
1997						
1998						
1999						
2000						
2001						
2002		0.05	0.21	0.50	0.29	0.49
2003		0.18	0.50	1.83	0.88	1.38
2004		0.57	1.43	5.33	2.30	3.74
2005		0.67	1.81	6.00	2.57	4.38
2006		0.23	0.92	1.83	1.10	2.02
2007		0.28	1.09	2.67	1.50	2.59
2008		0.08	0.49	0.83	0.71	1.19
2009		0.20	1.21	1.83	1.47	2.68
2010		0.32	1.43	3.00	1.90	3.33
2011		0.07	0.25	0.67	0.40	0.65
2012		0.05	0.16	0.50	0.28	0.44

Table 26. Points analysis for native range on the 4.5 month seasonlong grazing system at the Dickinson Research Extension Center.						
System:	West/East/North					
Pasture:	NR-9-12		Relative		Relative	
Site:	Shallow, grazed	Basal	Basal	Percent	Percent	Importance
Species:	Rosa arkansana	Cover	Cover	Frequency	Frequency	Value
1983		No Data				
1984		No Data				
1985		No Data				
1986		No Data				
1987		0.37	1.29	3.33	1.58	2.87
1988		0.10	0.31	1.00	0.46	0.77
1989		0.07	0.52	0.67	0.57	1.09
1990		0.23	0.98	2.33	1.54	2.51
1991		0.17	0.64	1.67	0.94	1.58
1992		0.10	0.55	1.00	0.81	1.37
1993		0.43	0.99	3.00	1.55	2.54
1994		0.02	0.07	0.17	0.12	0.19
1995		0.27	1.46	2.67	1.59	3.05
1996		0.00	0.00	0.00	0.00	0.00
1997		0.13	0.44	1.33	0.66	1.10
1998		0.02	0.08	0.17	0.12	0.20
1999		0.02	0.04	0.17	0.08	0.12
2000		0.15	0.43	1.33	0.75	1.18
2001		0.10	0.28	1.00	0.46	0.73
2002		0.10	0.29	1.00	0.48	0.77
2003		0.43	1.35	3.67	1.88	3.23
2004		0.33	1.02	3.00	1.41	2.43
2005		0.35	0.88	3.17	1.32	2.20
2006		0.27	0.94	2.50	1.29	2.23
2007		0.10	0.26	1.00	0.44	0.70
2008		0.10	0.26	1.00	0.44	0.70
2009						
2010						
2011						
2012						

Table 27. Points analysis for native range on the twice-over rotation grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NR-1-6		Relative		Relative	
Site:	Shallow, ungrazed	Basal	Basal	Percent	Percent	Importance
Species:	<i>Rosa arkansana</i>	Cover	Cover	Frequency	Frequency	Value
1983						
1984		0.15	0.47	1.50	0.70	1.17
1985		0.08	0.24	0.83	0.41	0.64
1986		0.05	0.19	0.50	0.25	0.44
1987		0.10	0.36	1.02	0.53	0.89
1988		0.32	1.28	2.85	1.53	2.81
1989		0.07	0.36	0.67	0.45	0.80
1990		0.48	1.88	4.01	2.25	4.13
1991		0.13	0.55	1.33	0.84	1.39
1992		0.37	1.65	3.67	2.08	3.74
1993		0.80	1.58	5.33	2.22	3.80
1994		0.14	0.62	1.17	0.68	1.30
1995		0.25	1.16	2.42	1.30	2.46
1996		0.17	0.54	1.67	0.79	1.33
1997		0.07	0.22	0.67	0.33	0.55
1998		0.06	0.31	0.58	0.42	0.73
1999		0.08	0.27	0.75	0.35	0.62
2000		0.06	0.19	0.42	0.25	0.44
2001		0.23	0.85	1.92	1.01	1.86
2002		0.05	0.23	0.42	0.27	0.50
2003		0.27	1.14	2.42	1.43	2.57
2004		0.18	0.57	1.58	0.73	1.30
2005		0.22	0.73	2.08	0.92	1.65
2006		0.11	0.42	1.00	0.52	0.95
2007		0.03	0.19	0.33	0.22	0.41
2008		0.10	0.57	1.00	0.67	1.24
2009		0.08	0.37	0.83	0.46	0.83
2010		0.15	0.81	1.42	0.98	1.79
2011		0.04	0.17	0.42	0.23	0.39
2012		0.04	0.17	0.42	0.23	0.40

Table 28. Points analysis for native range on the twice-over rotation grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NR-1-6		Relative		Relative	
Site:	Shallow, grazed	Basal	Basal	Percent	Percent	Importance
Species:	Rosa arkansana	Cover	Cover	Frequency	Frequency	Value
1983		0.08	0.15	0.83	0.28	0.43
1984		0.10	0.32	1.00	0.43	0.74
1985		0.07	0.21	0.67	0.31	0.52
1986		0.03	0.15	0.35	0.18	0.33
1987		0.21	0.81	1.87	0.97	1.79
1988		0.27	1.18	2.72	1.65	2.83
1989		0.27	1.15	2.35	1.34	2.49
1990		0.30	1.34	3.00	1.56	2.90
1991		0.38	1.48	3.67	1.85	3.32
1992		0.33	1.68	3.33	2.13	3.81
1993		0.29	1.27	2.82	1.58	2.86
1994		0.13	0.53	1.25	0.67	1.20
1995		0.15	0.74	1.50	0.87	1.61
1996		0.07	0.20	0.67	0.38	0.58
1997		0.03	0.09	0.33	0.14	0.23
1998		0.06	0.46	0.58	0.55	1.01
1999		0.11	0.32	1.00	0.46	0.78
2000		0.13	0.40	0.92	0.49	0.88
2001		0.08	0.22	0.75	0.33	0.54
2002		0.12	0.32	1.00	0.41	0.74
2003		0.27	1.45	2.42	1.92	3.37
2004		0.23	0.71	2.33	0.99	1.70
2005		0.22	0.62	2.00	0.83	1.44
2006		0.09	0.31	0.92	0.43	0.74
2007		0.03	0.14	0.33	0.19	0.33
2008		0.02	0.06	0.17	0.08	0.15
2009		0.08	0.33	0.75	0.42	0.75
2010		0.07	0.20	0.58	0.25	0.45
2011						

Table 29. Density analysis for native range on the nongrazed grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NG-W & E				Relative	
Site:	Silty, ungrazed		Relative	Percent	Percent	Importance
Species:	Rosa arkansana	Density	Density	Frequency	Frequency	Value
1983		No Data				
1984		No Data				
1985		No Data				
1986		No Data				
1987		0.12	3.10	3.10	5.51	8.61
1988		0.70	20.09	11.41	23.90	43.99
1989		0.74	9.54	4.90	19.00	28.54
1990		0.42	6.72	4.34	17.14	23.86
1991		No Densities Collected				
1992		0.12	8.33	7.22	12.03	20.36
1993		No Densities Collected				
1994		No Densities Collected				
1995		No Densities Collected				
1996		No Densities Collected				
1997		No Densities Collected				
1998		0.04	0.56	0.56	1.56	2.12
1999		No Densities Collected				
2000		0.10	1.05	8.00	2.94	4.00
2001		0.08	0.86	8.00	2.42	3.27
2002		0.10	1.08	8.00	2.82	3.90
2003		0.08	2.33	8.00	4.00	6.33
2004		0.02	1.39	2.00	2.00	3.39
2005		0.04	0.46	4.00	1.38	1.84
2006		0.02	0.18	2.00	1.09	1.27
2007						
2008		0.04	0.56	2.00	0.82	1.38
2009						
2010		0.22	5.56	18.00	6.82	12.37
2011		0.02	0.35	2.00	0.88	1.23
2012		0.14	2.36	6.00	2.46	4.82

Table 30. Density analysis for native range on the 4.5 month seasonlong grazing system at the Dickinson Research Extension Center.						
System:	West/East/North					
Pasture:	NR-9-12				Relative	
Site:	Silty, ungrazed		Relative	Percent	Percent	Importance
Species:	Rosa arkansana	Density	Density	Frequency	Frequency	Value
1983		No Data				
1984		No Data				
1985		No Data				
1986		No Data				
1987						
1988						
1989						
1990						
1991		No Densities Collected				
1992						
1993		No Densities Collected				
1994		No Densities Collected				
1995		No Densities Collected				
1996		No Densities Collected				
1997		No Densities Collected				
1998						
1999						
2000						
2001						
2002						
2003						
2004		0.03	0.53	2.67	1.33	1.87
2005		0.03	0.30	2.67	0.61	0.90
2006		0.04	1.01	2.67	1.33	2.34
2007		0.03	0.23	1.33	0.43	0.65
2008		0.03	0.39	2.67	1.04	1.43
2009		0.04	0.47	1.33	0.33	0.80
2010		0.01	0.74	1.33	1.04	1.78
2011		0.09	2.14	6.67	3.62	5.76
2012		0.04	0.91	2.67	1.48	2.39

Table 31. Density analysis for native range on the 4.5 month seasonlong grazing system at the Dickinson Research Extension Center.						
System:	West/East/North					
Pasture:	NR-9-12				Relative	
Site:	Silty, grazed		Relative	Percent	Percent	Importance
Species:	Rosa arkansana	Density	Density	Frequency	Frequency	Value
1983		No Data				
1984		No Data				
1985		No Data				
1986		No Data				
1987						
1988						
1989		0.01	0.42	1.33	0.64	1.06
1990						
1991	No Densities Collected					
1992						
1993	No Densities Collected					
1994	No Densities Collected					
1995	No Densities Collected					
1996	No Densities Collected					
1997	No Densities Collected					
1998		0.05	0.89	2.67	1.59	2.48
1999		0.13	1.08	0.76	3.24	4.32
2000		0.04	0.35	4.00	2.44	2.79
2001		0.03	0.20	2.67	1.04	1.24
2002		0.04	0.28	4.00	1.64	1.92
2003		0.01	0.16	1.33	0.69	0.85
2004						
2005		0.01	0.14	1.33	0.40	0.54
2006		0.01	0.10	1.33	0.44	0.54
2007						
2008		0.04	0.53	2.67	0.94	1.47
2009		0.05	0.52	2.67	0.59	1.11
2010		0.01	0.55	1.33	0.98	1.53
2011		0.01	0.21	1.33	0.53	0.74
2012						

Table 32. Density analysis for native range on the twice-over rotation grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NR-1-6				Relative	
Site:	Silty, ungrazed		Relative	Percent	Percent	Importance
Species:	Rosa arkansana	Density	Density	Frequency	Frequency	Value
1983	No Densities Collected					
1984						
1985	No Densities Collected					
1986						
1987						
1988						
1989		0.01	0.11	0.67	0.23	0.34
1990						
1991	No Densities Collected					
1992						
1993	No Densities Collected					
1994	No Densities Collected					
1995	No Densities Collected					
1996	No Densities Collected					
1997	No Densities Collected					
1998						
1999						
2000						
2001						
2002						
2003						
2004						
2005						
2006						
2007						
2008						
2009						
2010						
2011						
2012						

Table 33. Density analysis for native range on the twice-over rotation grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NR-1-6				Relative	
Site:	Silty, grazed		Relative	Percent	Percent	Importance
Species:	Rosa arkansana	Density	Density	Frequency	Frequency	Value
1983	No Densities Collected					
1984						
1985	No Densities Collected					
1986						
1987						
1988						
1989						
1990						
1991	No Densities Collected					
1992						
1993	No Densities Collected					
1994	No Densities Collected					
1995	No Densities Collected					
1996	No Densities Collected					
1997	No Densities Collected					
1998						
1999						
2000						
2001						
2002						
2003						
2004						
2005						
2006						
2007	0.01	1.11	1.33	1.39	2.50	
2008						
2009						
2010						
2011						
2012						

Table 34. Points analysis for native range on the nongrazed grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NG-W & E		Relative		Relative	
Site:	Silty, ungrazed	Basal	Basal	Percent	Percent	Importance
Species:	Rosa arkansana	Cover	Cover	Frequency	Frequency	Value
1983		No Data				
1984		No Data				
1985		No Data				
1986		No Data				
1987		0.40	1.44	3.50	1.59	3.03
1988		2.75	12.32	21.00	12.24	24.57
1989		0.05	0.11	0.50	0.18	0.29
1990		2.00	9.26	16.00	9.58	18.84
1991		2.10	5.94	13.00	5.68	11.62
1992						
1993		1.20	3.11	7.50	3.73	6.84
1994						
1995		0.43	1.99	4.25	2.38	4.38
1996		0.10	0.35	1.00	0.53	0.88
1997						
1998						
1999		0.05	0.30	0.50	0.37	0.67
2000		0.10	0.37	1.00	0.50	0.86
2001						
2002		0.05	0.20	0.50	0.30	0.50
2003						
2004		0.03	0.11	0.25	0.15	0.26
2005		0.05	0.19	0.50	0.28	0.47
2006						
2007						
2008						
2009						
2010						
2011						
2012		0.03	0.12	0.25	0.15	0.28

Table 35. Points analysis for native range on the 4.5 month seasonlong grazing system at the Dickinson Research Extension Center.						
System:	West/East/North					
Pasture:	NR-9-12		Relative		Relative	
Site:	Silty, ungrazed	Basal	Basal	Percent	Percent	Importance
Species:	Rosa arkansana	Cover	Cover	Frequency	Frequency	Value
1983		No Data				
1984		No Data				
1985		No Data				
1986		No Data				
1987						
1988						
1989						
1990						
1991						
1992						
1993						
1994						
1995						
1996						
1997						
1998						
1999						
2000						
2001						
2002						
2003		0.03	0.11	0.33	0.14	0.25
2004						
2005		0.02	0.06	0.17	0.08	0.14
2006						
2007						
2008						
2009						
2010						
2011						
2012						

Table 36. Points analysis for native range on the 4.5 month seasonlong grazing system at the Dickinson Research Extension Center.						
System:	West/East/North					
Pasture:	NR-9-12		Relative		Relative	
Site:	Silty, grazed	Basal	Basal	Percent	Percent	Importance
Species:	Rosa arkansana	Cover	Cover	Frequency	Frequency	Value
1983		No Data				
1984		No Data				
1985		No Data				
1986		No Data				
1987						
1988						
1989						
1990						
1991						
1992						
1993		0.13	0.24	1.00	0.43	0.67
1994						
1995						
1996						
1997						
1998						
1999						
2000						
2001		0.05	0.17	0.50	0.24	0.42
2002		0.02	0.07	0.17	0.08	0.15
2003		0.03	0.14	0.33	0.17	0.32
2004						
2005		0.03	0.13	0.33	0.16	0.29
2006		0.03	0.14	0.33	0.17	0.31
2007		0.02	0.08	0.17	0.10	0.18
2008						
2009						
2010						
2011						
2012						

Table 37. Points analysis for native range on the twice-over rotation grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NR-1-6		Relative		Relative	
Site:	Silty, ungrazed	Basal	Basal	Percent	Percent	Importance
Species:	Rosa arkansana	Cover	Cover	Frequency	Frequency	Value
1983						
1984						
1985						
1986						
1987						
1988						
1989		0.02	0.07	0.17	0.11	0.18
1990		0.05	0.21	0.50	0.29	0.50
1991		0.07	0.27	0.50	0.27	0.55
1992						
1993		0.47	0.77	3.50	1.31	2.09
1994						
1995						
1996						
1997						
1998						
1999						
2000						
2001						
2002		0.01	0.04	0.08	0.05	0.09
2003						
2004						
2005						
2006						
2007						
2008						
2009						
2010						
2011						
2012						

Table 38. Points analysis for native range on the twice-over rotation grazing system at the Dickinson Research Extension Center.						
System:	West/East					
Pasture:	NR-1-6		Relative		Relative	
Site:	Silty, grazed	Basal	Basal	Percent	Percent	Importance
Species:	<i>Rosa arkansana</i>	Cover	Cover	Frequency	Frequency	Value
1983						
1984						
1985						
1986						
1987						
1988						
1989						
1990						
1991		0.02	0.07	0.17	0.10	0.17
1992						
1993						
1994						
1995						
1996						
1997						
1998						
1999						
2000						
2001						
2002						
2003		0.03	0.11	0.08	0.05	0.16
2004						
2005						
2006						
2007						
2008						
2009						
2010						
2011						
2012						