

Annual Status Report:

1997 Plant Community Monitoring for
Scotts Bluff National Monument



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based upon data collected by Sean Jenkins², Mike DeBacker, Lisa Thomas,
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Introduction

The six parks of the Prairie Cluster LTEM Program include native prairie, savanna/woodland and glade remnants, as well as restored prairie communities. In order to manage these communities, park managers employ prescribed fire, woody removal, mowing and the use of herbicide and biological control measures for exotic species. Simultaneously, park managers continue to restore native vegetation to disturbed sites. Managers of the Prairie Cluster parks need to know if their management strategies are effective in maintaining and restoring native grassland communities.

Scotts Bluff National Monument was created in 1919 to protect the historic and scientific integrity of Scotts Bluff, a massive promontory that rises nearly 800 feet above the North Platte River. Maintenance and restoration of the native prairie landscape seen by overland emigrants between 1840-70 is a park goal. The vegetation is primarily mixed grass prairie with the upper slopes and bluff tops supporting Pine/Juniper woodlands. Several areas of the monument have been restored to prairie vegetation including one beginning in 1997.

Objectives

The purpose of plant community monitoring in the Prairie Cluster LTEM parks is to detect and describe long-term changes in grassland plant communities. Two years of vegetation data will be used to establish a vegetation baseline in representative areas of each park. Plant community monitoring was initiated in 1997 with the establishment of thirty permanent monitoring sites in four of the six Prairie Cluster parks. These sites will be monitored again in 1998. Baseline data in the two remaining parks will be collected in 1998 and 1999. This report applies diversity and other community indices, as well as structural and compositional summaries to describe the current status of the plant communities that were monitored in 1997.

Plant Communities Monitored

Mixed Grass Prairie: Mixed grass prairie dominates the landscape at Scotts Bluff NM. Initial ordination and classification analysis were used to differentiate three vegetation types within the mixed grass prairie community: Stipa/Carex Mixed Grass Prairie; Degraded Stipa/Carex Mixed Grass Prairie; and Stipa/Carex Mixed Grass Prairie, Saddle Rock Unit. The degraded Stipa/Carex type is differentiated from the Stipa/Carex type by the relative frequency and cover of the exotic brome grasses. The degraded sites tend to be in the lower slope positions where historic disturbance was probably greatest. The saddle rock type is adjacent to the recent golf course restoration and will serve as a standard to which to compare future monitoring in the restoration.

Pine/Juniper Woodland: At the union of the steeply rising bluffs and the rolling prairie lies the pine/juniper woodland community. The pine/juniper woodland possesses unique species not found in the surrounding prairie and is a significant addition to the total

diversity of the prairie landscape at Scotts Bluff. The potential impacts of the reintroduction of prescribed fire on the pine/juniper woodlands are of particular interest to park managers. Consequently, the pine woodlands were selected as a monitoring priority.

Restored Prairie: A long term goal at Scotts Bluff NM is to restore the native prairie landscape seen by overland emigrants. A major component of this project is the restoration of prairie communities to disturbed sites. The recent golf course restoration will be monitored to document progress and to provide feedback for future efforts.

Methods

A stratified random sampling design was used for selection of sampling sites within each management unit. In large units that incorporate a varied topography or heterogeneous vegetation, the unit was stratified by soil type, slope position and aspect, before randomly locating sampling sites. In smaller, more homogeneous units, sampling sites were randomly located within even areal segments.

Foliar cover of herbaceous and shrub species was estimated within ten 10 m² circular plots placed along paired 50 m transects. Overstory tree data was also collected where applicable. A detailed description of sampling methods and community summary variables is provided in *Protocol Design for Plant Community Monitoring* (Jenkins et al. 1997).

Nine transect pairs were established in the mixed grass prairie (four in degraded Stipa/Carex; three in Stipa/Carex and two in the Saddle Rock unit). Two transect pairs were established in the pine/juniper community for a total of 11 transect pairs (110 10 m² plots) at SCBL. They were sampled twice during the 1997 growing season; May 14th through the 23rd, and July 14 - 23. Tree overstory data was collected during the spring sampling period. One hundred three vascular plant specimens were collected for identification and reference purposes (Appendix A). The specimens are stored in the Prairie Cluster LTEM Reference Herbarium.

Jenkins, S.E., G. Willson, M. DeBacker and L.T. Thomas, 1997. Protocol Design For Plant Community Monitoring. Draft.

1997 Vegetation Summary: Stipa/Carex Mixed Grass Prairie.

The Stipa/Carex prairie type is the least disturbed and the best example of native mixed grass prairie on the monument. *Carex filifolia* (black-root sedge) and *Stipa comata* (needle-and-thread grass) occur in 100% of the sample plots with a mean cover of 41% and 25% respectively (Table 3). The dominance of these two species is reflected in low evenness (0.435) which measures the disparity in abundance among species (Table 1a). A total of 44 species occur in the sample plots including several notable species characteristic of mixed grass prairie: *Leucocrinum montanum* (mountain lily); *Astragalus missouriensis* (milk vetch); and *Psoraleidium tenuiflorum* (gray scurf pea); *Lathyrus polymorphus* (wild pea) (Tables 1a & 3). *Bromus japonicus* (Japanese brome) is the most common exotic (Table 4). Collectively, exotic species have a low relative frequency (4%) and cover (.4%) (Table 1b).

Table 1a. Community Summary: Richness and Shannon Diversity.

<u>Richness (S)</u>	<u>Diversity (H')</u>	<u>Evenness (E)</u>
44 (300m ²)	1.64	0.435

Table 1b. Community Summary: Relative Frequency and Cover of Exotic Species.

Number of Exotic Species: 3
 Number of Native Species: 41
 Exotic Ratio (R): 0.068

<u>Origin</u>	<u>Relative Frequency</u>	<u>Relative Cover</u>
Native	95.96%	99.57%
Exotic	4.04%	0.43%

Table 2a. Community Structure Summary: Shrub, Herbaceous and Ground Cover.

<u>Structural Component</u>	<u>Mean Percent Cover</u>
Shrub	17.10%
Herbs	82.68%
Bare Soil	15.75%

Table 3. Community Composition Summary: Herbaceous and Shrub Species.

Species	Common Name	Frequency	Mean Cover	Importance Value
<i>CAREX FILIFOLIA</i>	Sedge	100.00%	41.17%	0.2912
<i>STIPA COMATA</i>	Needle-and-thread grass	100.00%	25.50%	0.1996
<i>BOUTELOUA GRACILIS</i>	Blue gramma-grass	56.67%	2.94%	0.0384
<i>SPHAERALCEA COCCINEA</i>	Scarlet mallow	70.00%	0.50%	0.0374
<i>PASCOPYRUM SMITHII</i>	Western wheatgrass	56.67%	2.50%	0.0369
<i>GAURA COCCINEA</i>	Scarlet gaura	66.67%	0.75%	0.0366
<i>YUCCA GLAUCA</i>	Soap plant	36.67%	5.36%	0.0300
<i>BOUTELOUA CURTIPENDULA</i>	Side-oats gramma-grass	30.00%	7.78%	0.0288
<i>SCHIZACHYRIUM SCOPARIUM</i>	Little bluestem	16.67%	18.70%	0.0266
<i>RHUS AROMATICA</i>	Squaw-bush	16.67%	17.10%	0.0251
<i>ZIGADENUS VENENOSUS</i>	Death camas	40.00%	0.71%	0.0219
<i>LATHYRUS POLYMORPHUS</i>	Vetchling, wild pea	30.00%	3.78%	0.0218
<i>BROMUS JAPONICUS</i>	Japanese chess	33.33%	1.00%	0.0188
<i>CHENOPODIUM PRATERICOLA</i>	Narrow-leaf goosefoot	30.00%	0.50%	0.0160
<i>LEUCOCRINUM MONTANUM</i>	Mountain lily	26.67%	1.12%	0.0152
<i>OPUNTIA MACRORHIZA</i>	Plains prickly pear	23.33%	0.50%	0.0125
<i>ASTRAGALUS GRACILIS</i>	Milk-vetch	20.00%	0.92%	0.0112
<i>LYGODESMIA JUNCEA</i>	Skeleton-weed	20.00%	0.92%	0.0112
<i>OPUNTIA POLYACANTHA</i>	Plains prickly pear	20.00%	0.92%	0.0112
<i>ERYSIMUM ASPERUM</i>	Western wallflower	20.00%	0.50%	0.0107
<i>KOELERIA MACRANTHA</i>	Junegrass	13.33%	0.50%	0.0071
<i>LIATRIS PUNCTATA</i>	Blazing star, gay feather	13.33%	0.50%	0.0071
<i>MACHAERANTHERA PINNATIFIDA</i>	Aster	13.33%	0.50%	0.0071
<i>PHLOX HOODII</i>	Phlox, Sweet William	13.33%	0.50%	0.0071
<i>GUTIERREZIA SAROTHRÆ</i>	Matchbrush	10.00%	0.50%	0.0053
<i>LITHOSPERMUM INCISUM</i>	Narrow-leaved puccoon	10.00%	0.50%	0.0053
<i>NOTHOCALAIS CUSPIDATA</i>	False dandelion	10.00%	0.50%	0.0053
<i>OPUNTIA FRAGILIS</i>	Little prickly pear	10.00%	0.50%	0.0053
<i>CALAMOVILFA LONGIFOLIA</i>	Sand-reed	3.33%	15.00%	0.0046
<i>MUHLENBERGIA CUSPIDATA</i>	Muhly	6.67%	3.00%	0.0045
<i>HELIANTHUS ANNUUS</i>	Common sunflower	6.67%	1.75%	0.0040
<i>KRASCHENINNIKOVIA LANATA</i>	White sage, winter fat	6.67%	1.75%	0.0040
<i>ASTRAGALUS MISSOURIENSIS</i>	Nuttall milk-vetch	6.67%	0.50%	0.0036
<i>MIRABILIS LINEARIS</i>	Narrow-leaved umbrella-wort	6.67%	0.50%	0.0036
<i>ORYZOPSIS HYMENOIDES</i>	Indian ricegrass	6.67%	0.50%	0.0036
<i>PSORALIDIUM TENUIFLORUM</i>	Gray scurf-pea	6.67%	0.50%	0.0036
<i>SOLIDAGO MISSOURIENSIS</i>	Missouri goldenrod	6.67%	0.50%	0.0036
<i>VICIA AMERICANA</i>	American vetch	6.67%	0.50%	0.0036

Species	Common Name	Frequency	Mean Cover	Importance Value
<i>COMANDRA UMBELLATA</i>	Bastard toad-flax	3.33%	0.50%	0.0018
<i>LACTUCA SERRIOLA</i>	Prickly lettuce	3.33%	0.50%	0.0018
<i>POA PRATENSIS</i>	Kentucky bluegrass	3.33%	0.50%	0.0018
<i>ROSA ARKANSANA</i>	Dwarf prairie rose	3.33%	0.50%	0.0018
<i>THERMOPSIS RHOMBIFOLIA</i>	Buckbean	3.33%	0.50%	0.0018
<i>VIOLA NUTTALLII</i>	Yellow prairie violet	3.33%	0.50%	0.0018

Table 4. Community Composition Summary: Exotic Species.

Species	Common Name	Frequency	Mean Cover	Importance Value
<i>BROMUS JAPONICUS</i>	Japanese chess	33.3%	1.00%	0.01878
<i>LACTUCA SERRIOLA</i>	Prickly lettuce	3.3%	0.50%	0.00178
<i>POA PRATENSIS</i>	Kentucky bluegrass	3.3%	0.50%	0.00178

1997 Vegetation Summary: Degraded Stipa/Carex Mixed Grass Prairie.

The degraded Stipa/Carex mixed grass prairie type is differentiated from the previous by the high frequency and cover of exotic species. In this community, two of the top four species in terms of importance value are exotic grasses, and *Bromus tectorum* (downy brome) replaces *Stipa comata* as second (Tables 3 & 4). Species richness (47) is slightly higher because of the increased number of exotic species (Tables 1a & 1b).

Consequently, diversity (1.85) is slightly higher. This fact exemplifies the necessity to consider a range of indexes when characterizing a community. For example, the relative frequency and cover of exotics (25% and 34% respectively) demonstrates more clearly the difference between the two types. Despite these problems, characteristic mixed grass species also occur such as: *Viola nutallii* (prairie violet) *Psoralea argophylla* (silvery scurf pea) and *Astragalus gracilis* (milk vetch) (Table 3).

Table 1a. Community Summary: Richness and Shannon Diversity.

<u>Richness (S)</u>	<u>Diversity (H')</u>	<u>Evenness (E)</u>
47 (400m ²)	1.85	0.481

Table 1b. Community Summary: Relative Frequency and Cover of Exotic Species.

Number of Exotic 5
 Number of Native Species: 42
 Exotic Ratio (R): 0.106

<u>Origin</u>	<u>Relative Frequency</u>	<u>Relative Cover</u>
Native	74.79%	66.01%
Exotic	25.21%	33.99%

Table 2a. Community Structure Summary: Shrub, Herbaceous and Ground Cover.

<u>Structural Component</u>	<u>Mean Percent Cover</u>
Shrub	3.00%
Herbs	91.14%
Bare Soil	11.64%

Table 3. Community Composition Summary: Herbaceous and Shrub Species.

Species	Common Name	Frequency	Mean Cover	Importance Value
<i>CAREX FILIFOLIA</i>	Sedge	97.50%	32.15%	0.2276
<i>BROMUS TECTORUM</i>	Junegrass, downy chess	95.00%	22.95%	0.1738
<i>STIPA COMATA</i>	Needle-and-thread grass	95.00%	17.08%	0.1433
<i>BROMUS JAPONICUS</i>	Japanese chess	85.00%	10.54%	0.0978
<i>PASCOPYRUM SMITHII</i>	Western wheatgrass	82.50%	6.03%	0.0745
<i>SPHAERALCEA COCCINEA</i>	Scarlet mallow	72.50%	2.02%	0.0496
<i>GAURA COCCINEA</i>	Scarlet gaura	45.00%	0.50%	0.0270
<i>LYGODESMIA JUNCEA</i>	Skeleton-weed	37.50%	0.50%	0.0225
<i>LACTUCA SERRIOLA</i>	Prickly lettuce	35.00%	0.68%	0.0214
<i>MIRABILIS LINEARIS</i>	Narrow-leaved umbrella-wort	25.00%	0.50%	0.0150
<i>BOUTELOUA GRACILIS</i>	Blue gramma-grass	22.50%	0.50%	0.0135
<i>SCHIZACHYRIUM SCOPARIUM</i>	Little bluestem	5.00%	38.75%	0.0135
<i>SOLIDAGO MISSOURIENSIS</i>	Missouri goldenrod	7.50%	11.00%	0.0088
<i>PSORALEA ARGOPHYLLA</i>	Silvery scurf-pea	10.00%	5.38%	0.0087
<i>OPUNTIA POLYACANTHA</i>	Plains prickly pear	12.50%	1.50%	0.0082
<i>BOUTELOUA CURTIPENDULA</i>	Side-oats gramma-grass	10.00%	1.12%	0.0063
<i>OPUNTIA MACRORHIZA</i>	Plains prickly pear	10.00%	0.50%	0.0060
<i>CALAMOVILFA LONGIFOLIA</i>	Sand-reed	5.00%	9.00%	0.0053
<i>KOELERIA MACRANTHA</i>	Junegrass (p. 761)	7.50%	2.17%	0.0052
<i>PSORALIDIUM TENUIFLORUM</i>	Gray scurf-pea	5.00%	7.75%	0.0050
<i>CAREX DURIUSCULA</i>	Sedge	7.50%	1.33%	0.0048
<i>DESCURAINIA PINNATA</i>	Tansy-mustard	7.50%	0.50%	0.0045
<i>FESTUCA OCTAFLORA</i>	Six-weeks Fescue	7.50%	0.50%	0.0045
<i>LITHOSPERMUM INCISUM</i>	Narrow-leaved puccoon	7.50%	0.50%	0.0045
<i>PHLOX HOODII</i>	Phlox, Sweet William	7.50%	0.50%	0.0045
<i>MUHLENBERGIA CUSPIDATA</i>	Muhly	5.00%	1.75%	0.0033
<i>ASTRAGALUS GRACILIS</i>	Milk-vetch	5.00%	0.50%	0.0030
<i>CALYLOPHUS SERRULATUS</i>	Evening-primrose	5.00%	0.50%	0.0030
<i>CHENOPODIUM PRATERICOLA</i>	Narrow-leaf goosefoot	5.00%	0.50%	0.0030
<i>VICIA AMERICANA</i>	American vetch	5.00%	0.50%	0.0030
<i>VIOLA NUTTALLII</i>	Yellow prairie violet	5.00%	0.50%	0.0030
<i>ASCLEPIAS PUMILA</i>	Milkweed	2.50%	3.00%	0.0018
<i>LATHYRUS PALUSTRIS</i>	Marsh pea	2.50%	3.00%	0.0018
<i>OPUNTIA FRAGILIS</i>	Little prickly pear	2.50%	3.00%	0.0018
<i>RHUS AROMATICA</i>	Squaw-bush	2.50%	3.00%	0.0018
<i>TOXICODENDRON RADICANS</i>	Common poison-ivy	2.50%	3.00%	0.0018
<i>ERYSIMUM ASPERUM</i>	Western wallflower	2.50%	0.50%	0.0015
<i>FESTUCA OCCIDENTALIS</i>	Western fescue	2.50%	0.50%	0.0015
<i>HELIANTHUS ANNUUS</i>	Common sunflower	2.50%	0.50%	0.0015
<i>KUHNIA EUPATORIOIDES</i>	False boneset	2.50%	0.50%	0.0015

Species	Common Name	Frequency	Mean Cover	Importance Value
<i>MELILOTUS ALBUS</i>	White sweet clover	2.50%	0.50%	0.0015
<i>MELILOTUS OFFICINALIS</i>	Yellow sweet clover	2.50%	0.50%	0.0015
<i>NOTHOCALAIS CUSPIDATA</i>	False dandelion	2.50%	0.50%	0.0015
<i>PHYSALIS HEDERIFOLIA</i> var. <i>COMATA</i>	Ground cherry	2.50%	0.50%	0.0015
<i>SPOROBOLUS CRYPTANDRUS</i>	Sand dropseed	2.50%	0.50%	0.0015
<i>YUCCA GLAUCA</i>	Soap plant	2.50%	0.50%	0.0015
<i>ZIGADENUS VENENOSUS</i>	Death camas	2.50%	0.50%	0.0015

Table 4. Community Composition Summary: Exotic Species.

Species	Common Name	Frequency	Mean Cover	Importance Value
<i>BROMUS TECTORUM</i>	Junegrass, downy chess	95.0%	22.95%	0.17384
<i>BROMUS JAPONICUS</i>	Japanese chess	85.0%	10.54%	0.09780
<i>LACTUCA SERRIOLA</i>	Prickly lettuce	35.0%	0.68%	0.02136
<i>MELILOTUS ALBUS</i>	White sweet clover	2.5%	0.50%	0.00150
<i>MELILOTUS OFFICINALIS</i>	Yellow sweet clover	2.5%	0.50%	0.00150

1997 Vegetation Summary: Stipa/Carex Mixed Grass Prairie, Saddle Rock Unit.

Areas monitored in the Saddle Rock unit are adjacent to the recent golf course restoration. These sites will serve as a baseline for comparison to future monitoring within the restored area. Species richness and diversity are lowest among all communities sampled at SCBL. The exotic species *Salsola kali* (Russian thistle) and *Amaranthus retroflexus* (rough pigweed) are found only in this unit, and a greater total number of exotic species are present than in the degraded type. However, exotic species have lower relative frequency and cover values than in the degraded type (Table 1b). The higher frequency of *Krascheninnikovia lanata* (winter fat) (60%) visually differentiates this type from grasslands in the south unit. Bare soil has a mean percent cover value of 27%, higher than grassland communities in the south unit. This fact may be the result of the reintroduction of fire into the Saddle rock unit and the subsequent removal of grass litter.

Table 1a. Community Summary: Richness and Shannon Diversity.

<u>Richness (S)</u>	<u>Diversity (H')</u>	<u>Evenness (E)</u>
32 (200m ²)	1.50	0.432

Table 1b. Community Summary: Relative Frequency and Cover of Exotic Species.

Number of Exotic Species: 6
 Number of Native Species: 26
 Exotic Ratio (R): 0.189

<u>Origin</u>	<u>Relative Frequency</u>	<u>Relative Cover</u>
Native	82.66%	97.15%
Exotic	17.34%	2.85%

Table 2a. Community Structure Summary: Shrub, Herbaceous and Ground Cover

<u>Structural Component</u>	<u>Mean Percent Cover</u>
Shrub	0.0%
Herbs	64.83%
Bare Soil	26.83%

Table 3. Community Composition Summary: Herbaceous and Shrub Species.

Species	Common Name	Frequency	Mean Cover	Importance Value
<i>CAREX FILIFOLIA</i>	Sedge	100.00%	36.50%	0.3393
<i>STIPA COMATA</i>	Needle-and-thread grass	100.00%	11.73%	0.1482
<i>PASCOPYRUM SMITHII</i>	Western wheatgrass	75.00%	6.67%	0.0819
<i>BOUTELOUA GRACILIS</i>	Blue gramma-grass	85.00%	4.65%	0.0796
<i>KRASCHENINNIKOVIA LANATA</i>	White sage, winter fat	60.00%	4.96%	0.0576
<i>CHENOPODIUM PRATERICOLA</i>	Narrow-leaf goosefoot	55.00%	2.27%	0.0414
<i>SPHAERALCEA COCCINEA</i>	Scarlet mallow	65.00%	0.69%	0.0410
<i>TRAGOPOGON DUBIUS</i>	Fistulous goat's beard	65.00%	0.50%	0.0401
<i>BROMUS TECTORUM</i>	Junegrass, downy chess	45.00%	2.94%	0.0362
<i>FESTUCA OCTAFLORA</i>	Six-weeks Fescue	35.00%	0.50%	0.0216
<i>SALSOLA KALI</i>	Russian thistle	25.00%	0.50%	0.0154
<i>LEUCOCRINUM MONTANUM</i>	Mountain lily	20.00%	0.50%	0.0123
<i>GAURA COCCINEA</i>	Scarlet gaura	15.00%	0.50%	0.0092
<i>BOUTELOUA CURTIPENDULA</i>	Side-oats gramma-grass	10.00%	1.75%	0.0071
<i>LYGODESMIA JUNCEA</i>	Skeleton-weed	10.00%	1.75%	0.0071
<i>DESCURAINIA PINNATA</i>	Tansy-mustard	10.00%	0.50%	0.0062
<i>SENECIO CANUS</i>	Gray groundsel	10.00%	0.50%	0.0062
<i>SPOROBOLUS CRYPTANDRUS</i>	Sand dropseed	10.00%	0.50%	0.0062
<i>AMARANTHUS RETROFLEXUS</i>	Redroot, rough pigweed	5.00%	0.50%	0.0031
<i>ARTEMISIA FRIGIDA</i>	Prairie-sagewort	5.00%	0.50%	0.0031
<i>ASTRAGALUS GRACILIS</i>	Milk-vetch	5.00%	0.50%	0.0031
<i>CORYPHANTHA VIVIPARA</i>	Pincushion cactus	5.00%	0.50%	0.0031
<i>ERYSIMUM ASPERUM</i>	Western wallflower	5.00%	0.50%	0.0031
<i>HELIANTHUS ANNUUS</i>	Common sunflower	5.00%	0.50%	0.0031
<i>MACHAERANTHERA PINNATIFIDA</i>	Aster	5.00%	0.50%	0.0031
<i>MIRABILIS LINEARIS</i>	Narrow-leaved umbrella-wort	5.00%	0.50%	0.0031
<i>OPUNTIA MACRORHIZA</i>	Plains prickly pear	5.00%	0.50%	0.0031
<i>OPUNTIA POLYACANTHA</i>	Plains prickly pear	5.00%	0.50%	0.0031
<i>POA PRATENSIS</i>	Kentucky bluegrass	5.00%	0.50%	0.0031
<i>TARAXACUM OFFICINALE</i>	Common dandelion	5.00%	0.50%	0.0031
<i>YUCCA GLAUCA</i>	Soap plant	5.00%	0.50%	0.0031
<i>ZIGADENUS VENENOSUS</i>	Death camas	5.00%	0.50%	0.0031

Table 4. Community Composition Summary: Exotic Species.

Species	Common Name	Frequency	Mean Cover	Importance Value
<i>TRAGOPOGON DUBIUS</i>	Fistulous goat's beard	65.0%	0.50%	0.04008
<i>BROMUS TECTORUM</i>	Junegrass, downy chess	45.0%	2.94%	0.03623
<i>SALSOLA KALI</i>	Russian thistle	25.0%	0.50%	0.01542
<i>AMARANTHUS RETROFLEXUS</i>	Redroot, rough pigweed	5.0%	0.50%	0.00308
<i>POA PRATENSIS</i>	Kentucky bluegrass	5.0%	0.50%	0.00308
<i>TARAXACUM OFFICINALE</i>	Common dandelion	5.0%	0.50%	0.00308

1997 Vegetation Summary: Pine/Juniper Woodland.

The pine/juniper woodland community is the most species rich and diverse community sampled at Scotts Bluff NM (Table 1a). Several species are unique to this community including: *Senecio integerrimus* (single-stemmed groundsel); *Cymopterus acaulis* (wild parsley); and *Oxytropis sericea* (locoweed); *Cercocarpus montanus* (mountain mohogany); *Oryzopsis hymenoides* (rice grass) (Table 3). Five of the 51 total species are exotic; however, these species have low relative frequency and cover values (9% and 3% respectively) (Table 1b). The woodland overstory is composed of three species: *Juniperus scopulorum* (rocky mountain juniper); *Juniperus virginiana* (red cedar); and *Pinus ponderosa* (ponderosa pine) (Table 5). Together, these species occur at a density of 700 trees/hectare (Table 2b).

Table 1a. Community Summary: Richness and Shannon Diversity.

<u>Richness (S)</u>	<u>Diversity (H')</u>	<u>Evenness (E)</u>
51 (200m ²)	2.37	0.603

Table 1b. Community Summary: Relative Frequency and Cover of Exotic Species.

Number of Exotic Species: 5
 Number of Native Species: 46
 Exotic Ratio (R): 0.098

<u>Origin</u>	<u>Relative Frequency</u>	<u>Relative Cover</u>
Native	90.80%	97.23%
Exotic	9.20%	2.77%

Table 2a. Community Structure Summary: Shrub, Herbaceous and Ground Cover.

<u>Structural Component</u>	<u>Mean Percent Cover</u>
Shrub	3.67%
Herbs	55.90%
Bare Soil	65.50%

Table 2b. Community Structure Summary: Tree Overstory.

Density (trees/hectare)	Basal Area (m ² /hectare)	Mean DBH (cm)
665.00	5.88	10.31

Table 3. Community Composition Summary: Herbaceous and Shrub Species.

Species	Common Name	Frequency	Mean Cover	Importance Value
<i>CAREX FILIFOLIA</i>	Sedge	90.00%	21.97%	0.1962
<i>THERMOPSIS RHOMBIFOLIA</i>	Buckbean	70.00%	13.07%	0.0995
<i>CEROCARPUS MONTANUS</i>	Mountain mahogany	80.00%	7.09%	0.0729
<i>STIPA COMATA</i>	Needle-and-thread grass	75.00%	5.07%	0.0554
<i>SCHIZACHYRIUM SCOPARIUM</i>	Little bluestem	75.00%	4.73%	0.0533
<i>YUCCA GLAUCA</i>	Soap plant	80.00%	3.72%	0.0499
<i>BOUTELOUA CURTIPENDULA</i>	Side-oats gramma-grass	80.00%	3.56%	0.0488
<i>RHUS AROMATICA</i>	Squaw-bush	75.00%	3.63%	0.0462
<i>KOELERIA MACRANTHA</i>	Junegrass	85.00%	1.38%	0.0361
<i>BROMUS JAPONICUS</i>	Japanese chess	90.00%	1.06%	0.0357
<i>LATHYRUS POLYMORPHUS</i>	Vetchling, wild pea	80.00%	0.81%	0.0301
<i>ELYMUS LANCEOLATUS</i>	Wild rye	60.00%	0.92%	0.0231
<i>SOLIDAGO MISSOURIENSIS</i>	Missouri goldenrod	50.00%	1.50%	0.0217
<i>VICIA AMERICANA</i>	American vetch	60.00%	0.50%	0.0210
<i>GUTIERREZIA SAROTHRAE</i>	Matchbrush	50.00%	0.75%	0.0185
<i>ARTEMISIA FRIGIDA</i>	Prairie-sagewort	50.00%	0.50%	0.0175
<i>RIBES CEREUM</i>	Gooseberry	35.00%	1.21%	0.0144
<i>OXYTROPIS SERICEA</i>	White locoweed	40.00%	0.50%	0.0140
<i>POA PRATENSIS</i>	Kentucky bluegrass	30.00%	1.75%	0.0137
<i>TETRANEURIS ACAULIS</i>	Bitterweed	30.00%	0.50%	0.0105
<i>PHLOX HOODII</i>	Phlox, Sweet William	25.00%	0.50%	0.0087
<i>ZIGADENUS VENENOSUS</i>	Death camas	25.00%	0.50%	0.0087
<i>ERIGERON CANUS</i>	Fleabane	20.00%	0.50%	0.0070
<i>KRASCHENINNIKOVIA LANATA</i>	White sage, winter fat	20.00%	0.50%	0.0070
<i>PASCOPYRUM SMITHII</i>	Western wheatgrass	20.00%	0.50%	0.0070

Species	Common Name	Frequency	Mean Cover	Importance Value
<i>TARAXACUM OFFICINALE</i>	Common dandelion	20.00%	0.50%	0.0070
<i>OPUNTIA POLYACANTHA</i>	Plains prickly pear	15.00%	1.33%	0.0063
<i>ANTENNARIA MICROPHYLLA</i>	Pink pussy-toes	15.00%	0.50%	0.0052
<i>CHENOPODIUM PRATERICOLA</i>	Narrow-leaf goosefoot	15.00%	0.50%	0.0052
<i>CYMOPTERUS ACAULIS</i>	Wild parsley	15.00%	0.50%	0.0052
<i>GAURA COCCINEA</i>	Scarlet gaura	15.00%	0.50%	0.0052
<i>LYGODESMIA JUNCEA</i>	Skeleton-weed	15.00%	0.50%	0.0052
<i>ROSA ARKANSANA</i>	Dwarf prairie rose	15.00%	0.50%	0.0052
<i>BRICKELLIA GRANDIFLORA</i>	Aster	10.00%	0.50%	0.0035
<i>ERIOGONUM SPR</i>		10.00%	0.50%	0.0035
<i>MUHLENBERGIA SPP</i>		10.00%	0.50%	0.0035
<i>ORYZOPSIS HYMENOIDES</i>	Indian ricegrass	10.00%	0.50%	0.0035
<i>ANTENNARIA ROSEA</i>	Pink pussytoes	5.00%	0.50%	0.0017
<i>BOUTELOUA GRACILIS</i>	Blue gramma-grass	5.00%	0.50%	0.0017
<i>BROMUS TECTORUM</i>	Junegrass, downy chess	5.00%	0.50%	0.0017
<i>COMANDRA UMBELLATA</i>	Bastard toad-flax	5.00%	0.50%	0.0017
<i>CYMOPTERUS MONTANUS</i>	Cymopterus	5.00%	0.50%	0.0017
<i>HEDEOMA DRUMMONDII</i>	Drummond false pennyroyal	5.00%	0.50%	0.0017
<i>NOTHOCALAIS CUSPIDATA</i>	False dandelion	5.00%	0.50%	0.0017
<i>OENOTHERA CANESCENS</i>	Common evening-primrose	5.00%	0.50%	0.0017
<i>OENOTHERA CESPITOSA</i>	Evening-primrose	5.00%	0.50%	0.0017
<i>OPUNTIA MACRORHIZA</i>	Plains prickly pear	5.00%	0.50%	0.0017
<i>SENECIO INTEGERRIMUS</i>	Single-stemmed groundsel	5.00%	0.50%	0.0017
<i>SYMPHORICARPOS OCCIDENTALIS</i>	Wolfberry	5.00%	0.50%	0.0017
<i>TOXICODENDRON RADICANS</i>	Common poison-ivy	5.00%	0.50%	0.0017
<i>TRAGOPOGON DUBIUS</i>	Fistulous goat's beard	5.00%	0.50%	0.0017

Table 4. Community Composition Summary: Exotic Species.

Species	Common Name	Frequency	Mean Cover	Importance Value
<i>BROMUS JAPONICUS</i>	Japanese chess	90.0%	1.06%	0.03571
<i>POA PRATENSIS</i>	Kentucky bluegrass	30.0%	1.75%	0.01368
<i>TARAXACUM OFFICINALE</i>	Common dandelion	20.0%	0.50%	0.00699
<i>BROMUS TECTORUM</i>	Junegrass, downy chess	5.0%	0.50%	0.00175
<i>TRAGOPOGON DUBIUS</i>	Fistulous goat's beard	5.0%	0.50%	0.00175

Table 5. Community Composition Summary: Tree Species.

Species	Overstory				Regeneration* (individuals/m ²)		
	Condition	Density (trees/hectare)	Basal Area m ² /hectare	Mean DBH (cm)	Seedlings	Small Saplings	Large Saplings
<i>Juniperus scopulorum</i>	Live						
<i>Juniperus virginiana</i>	Live	330.0	2.288	8.7			
<i>Juniperus virginiana</i>	Dead	15.00	0.090	8.5			
<i>Pinus ponderosa</i>	Live	335.00	3.600	10.9			
<i>Pinus ponderosa</i>	Dead	20.00	0.165	10.1			

*Sampling protocols for regeneration data have been refined, regeneration data will be reported beginning in 1998.