BIODIVERSITY OF OPEN SPACE GRASSLANDS AT A SUBURBAN/AGRICULTURAL INTERFACE

PART I

VEGETATION

Final Report to: Biological Resources Division
United States Geological Survey
4512 McMurry Avenue
Fort Collins, Colorado 8052503400
[Contract No. 1445-CA09-96-0025]

and

Department of Open Space/Real Estate
City of Boulder
P. O. Box 791
Boulder, Colorado 80306

Prepared by: Barry C. Bennett, Carl E. Bock, and Jane H. Bock
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University of Colorado
Boulder, Colorado 80309-0334

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ABSTRACT

The grasslands that surround Boulder, Colorado are distinctive in that there is both a diverse array of native plant communities and a significant level of exotic plant invasion. Factors that contribute to community diversity include soil and topographic heterogeneity as well as a variety of land uses. Causes for the exotic plant invasion are primarily related to the process of suburbanization, which includes: habitat fragmentation, increased seed source, terrestrial eutrophication, creation of bare soil, and disruption of the natural disturbance regime.

The composition of grassland plant communities on Boulder grasslands was determined with a cluster analysis of the presence and absence data of 177 native species on 1177 quadrats that were located on 68 plots. Seven primary communities were discovered: shale, shortgrass, mixed-grass/foothills, mixed-grass/mesas, xeric tallgrass, mesic tallgrass and irrigated meadow. The plots on the uplands had a greater richness of native species and a lower richness of exotic species than the lowlands. Most of the exotic species on the uplands were monocarpic, while most of the exotic species from the lowlands were polycarpic. A principal components analysis of eleven cover and diversity variables produced an ordination that ordered the plots along an exotic to native gradient for the first component and along a wet to dry gradient for the second. It is suggested that the best method for managing the Open Space grasslands for the conservation of

biodiversity is to attempt replication of pre-historic disturbance regimes, especially bison and fire.

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CHAPTER I

CONSERVING BIODIVERSITY IN A SUBURBAN CONTEXT

Abstract

Opportunities for the conservation of biodiversity range in scale from *ex situ* conservation efforts in botanical gardens and zoos to ecosystem conservation in protected parks and wilderness areas. As the scale of conservation changes, the problems and opportunities for that conservation change. Expanding suburban areas provide an often-overlooked opportunity for the conservation of biodiversity, but the management requirements are greater than in more remote ecosystems. The main factors that complicate suburban conservation are habitat fragmentation, invasion by exotic organisms, terrestrial eutrophication and direct human impacts, but it is observed that these factors can also be beneficial to conservation efforts.

Scale and Conservation

Much of the literature in the field of conservation biology has focused on either the protection and management of nature reserves, or the *ex situ* conservation

Table 1.1. Available conservation opportunities at various landscape scales.

Landscape Context	Conservation Opportunities
Urban	Parks, Zoos, and Botanical Gardens
Suburban	Open Space, Greenbelts
Intensive Agriculture	Agroecology, Old Field Restoration
Managed Forest/Rangeland	Sustainable Management, Buffer Zones
Nature Reserves	National and State Parks, Wilderness

of threatened species in zoos and botanical gardens (e.g. Frankel and Soulé 1981). However, these two approaches to conservation are not sufficient because most of the terrestrial biodiversity lies in the 95% of the landscape that is not protected in nature reserves, and *ex situ* conservation cannot address the estimated 10 million species on earth (Pimentel et al. 1992).

It can be useful to examine conservation opportunities on a continuum of scale that ranges from single species propagation efforts to complete protection of ecosystems. This also can be viewed from a human disturbance landscape perspective, ranging from dense urban areas to remote wilderness areas (Table 1.1). The opportunities and challenges to conservation change as we move along this gradient.

Urban conservation generally is relegated to parks, zoos and botanical gardens, and is most effective in saving individual species that are on the brink of extinction. The area requirements are small, but requirements of money and labor are large, due to the continuous management that is necessary for maintenance (Murphy

1988). Zoos and botanical gardens are able to support conservation efforts through charging the public for access to the grounds. Natural ecosystems have been protected within some cities, such as Rock Creek Park in Washington D.C. and Fairmont Park in Philadelphia (Murphy 1988), but without vigorous management these areas are prone to the loss of native species over time (Noss 1983, Drayton and Primack 1996).

The other end of the continuum is the attempt to conserve whole ecosystems in a wilderness context. The labor requirements are small, in fact the ideal is to eliminate human impacts and "let nature take its course". The primary benefit of wilderness conservation is that whole systems are conserved, not just the obvious species, and it is more efficient at conserving biodiversity than single-species efforts (Noss 1996). The drawbacks of whole system conservation are that the area requirements are very large if viable populations and natural disturbance regimes are to be maintained, some human impact is inevitable (especially through recreation), and many biological systems no longer exist in an undisturbed state.

More recently the conservation value of areas that fall between these two extremes has been recognized. This can range from semi-natural buffer areas around wilderness to small remnants within a developed (or more correctly, denatured; Soulé 1990) landscape. Western and Pearl (1989) estimate that 50% of the terrestrial area of the earth is devoted to agriculture, 20% to commercial forests, 25% is occupied by human settlements, and 5% is unmanaged and uninhabited. Due to population and political pressures, it is unlikely that the unmanaged/uninhabited area will increase greatly in the future, so effective management of the other 95% of the landscape is

critical to the conservation of biodiversity.

On a global scale, semi-natural areas of agriculture and managed forests contain the most biodiversity (Pimentel et al. 1992), so that effective conservation of these areas is crucial (Westman 1990, Franklin 1993). Many of these ecosystems are only lightly or moderately impacted by humans through logging, grazing or hunting. When these impacts are kept to sustainable levels, the ecosystem processes often remain relatively intact. The semi-natural matrix is critical to the maintenance of nature reserves due to its capacity to connect reserves and buffer them from more highly disturbed landscapes (Franklin 1993).

Areas used for intensive agriculture are highly modified systems, but they still have potential for conservation. Many native arthropods and soil microorganisms exist in agricultural contexts, and agroecological methods such as intercrops, shelterbelts, and a reduction in pesticide use can enhance the diversity of these organisms (Pimentel et al. 1992). Traditional agriculture practices are critical also in the conservation of crop genetic diversity (Frankel 1978, Altieri and Merrick 1987).

One of the greatest threats to the conservation of biodiversity is the massive habitat alteration associated with the expansion of human settlements. Area occupied by urban lands in the United States (defined as denser than 620 individuals/mi.^{2}) increased by 22 million acres between 1960 and 1980 (McDonnell and Pickett 1990). Much of this growth, especially in the United States, is due to the rapid expansion of suburban areas, at the expense of habitats in the semi-natural matrix.

Although much habitat is lost to suburban growth, there exists here a significant, and often overlooked, opportunity for conservation. Remnants of semi-

natural areas often occur within expanding suburban developments. The most effective way to conserve these fragments is through the purchase of the property by local and regional governments (Press et al. 1996). Over 1.1 million acres of land in the U.S. have been protected in this manner. Funding for these purchases often comes from property taxes, sales taxes, local ballot initiatives, grants, and public-private partnerships. Reasons for public support of these purchases are varied, and include habitat conservation, greenbelts to preserve local identity, and recreational opportunities.

Factors Affecting Conservation Values of Suburban Habitat Fragments

Suburban open spaces present unique opportunities for the conservation of biodiversity. The landscape context of suburban open space presents special difficulties to the maintenance of biodiversity, but it also presents benefits that are not available in larger, more remote nature reserves. Factors that are of central concern to the management of suburban protected areas are habitat fragmentation, exotic organisms, terrestrial eutrophication, and direct human impacts.

Habitat Fragmentation

Challenges. A common condition of habitat remnants within a suburban matrix is their relatively small size. This is usually the result of habitat fragmentation, which effects the natural ecosystem both by reducing its size and isolating it from other similar habitats (Wilcove et al 1986, Saunders et al 1991). Island biogeographic theory and metapopulation models predict that both of these processes lead to extinction and a resultant loss of biodiversity within fragments

(Spellerberg 1990, Kareiva and Wennergren 1995) due to both stochasticity (Gilpin and Soulé 1986) and loss of genetic variation (Allendorf and Leary 1986). Organisms that are most susceptible to extinction are those that have large space requirements and poor means of dispersal. In general, plants are better able to survive in fragments than animals because they are able to maintain higher levels of heterozygosity and buffer stochastic events through seed banks (Lesica and Allendorf 1992), but many plants are dependent upon animals for pollination or dispersal, and losses of an animal can lead to secondary extinctions of other organisms (Wilcove et al. 1986, Jennersten 1988).

The suburban landscape matrix affects habitat fragments along its edge through changes in both abiotic and biotic conditions (Murcia 1995). Abiotic effects, such as radiation, wind and water are especially pronounced when the physiognomy of the remnant is very different from the surrounding matrix (Saunders et al. 1991). Biotic effects, which include both domestic organisms (cats, dogs) and human commensals (cowbirds, jays and crows), may extend up to 600m inside forest fragments (Wilcove et al. 1986).

Habitats that have an evolutionary history of disturbance such as fire or large herbivore grazing are especially hard to manage within a suburban matrix. Fragmentation coupled with fire suppression virtually eliminates wildfire frequency, and the use of prescribed fires may face some public opposition. Grazing systems composed of a diversity of migratory animals, such as those found on the Great Plains, are very difficult to replicate on small grazing units.

Preservation of suburban fragments is complicated by predicted global climate change. Warming temperatures might require shifts of several hundred kilometers for some species in the next fifty years (Quinn and Karr 1993). As the climate changes, some species will be lost from fragments, but the suburban landscape around these fragments can be an effective barrier to the immigration of many new species.

Benefits. Despite the difficulties, small fragment conservation can be very important because often it is all that we have left (Shafer 1995, Turner and Corlett 1996). The small size of most open space land purchases (<400ha) coincides with the habitat requirements of many endangered plants (Press et al. 1996). These habitat fragments can also be used as a seed source for the reestablishment of the communities in other areas (Franklin 1993, Shafer 1995, Turner and Corlett 1996). Having replicates of a habitat type in several fragments also helps buffer the habitat against catastrophe or disease (Shafer 1995).

Exotic Organisms

Challenges. Perhaps the greatest threat to conserving native ecosystems within suburban habitats is the invasion by exotic (nonindigenous) organisms. Exotic plant species usually are more common in suburban landscapes than in rural systems (McDonnell et al. 1993). Potential reasons for this include the creation of bare soil, habitat fragmentation, disruption of natural disturbance regimes, increased nitrogen input, and increased seed source.

The presence of bare soil facilitates the invasion of exotic species into native ecosystems. Many exotic plants are able to spread very rapidly as a result of linear soil disturbances that are associated with road, trail, and railroad construction (Baker

1986, Mack 1986, Milchunas 1989, Huenneke 1997). It also has been shown that soil disturbances in discrete patches can increase the ability of an exotic plant to invade a native community (Bergelson et al. 1993). Communities that naturally have a greater percentage of bare ground, such as open grasslands and sand dunes, also are more likely to be invaded by exotic plants than communities such as closed forests (Baker 1986). Exceptions are communities that have bare ground as a result of soil nutrient deficiencies, such as serpentine communities in California (Huenneke et al. 1990), and shale communities in Colorado (see Chapter II), that seem to be resistant to exotic species invasion despite the large percentage of bare ground.

Many of the factors that effect native communities in habitat fragments also encourage the invasion by exotic species. As species are lost from a fragment, it is likely that niches in the habitat will open up to allow new species to invade. Also, as a fragment becomes smaller, its surface to area ratio increases, so that the increased invasion by exotics around the edge affects more of the fragment (Temple 1990, Hester and Hobbs 1992, Huenneke 1997).

Suburban habitat fragments often have drastically altered disturbance regimes, which can tip the competitive balance in the community towards exotic species. Increased fire frequency in areas not adapted to fires has been shown to increase the frequency of exotic species (Bridgewater and Blackshall 1981), while suppression of fire in fire adapted areas also has been shown to favor exotics (Curtis and Partch 1948). Similar effects have been found with grazing systems. Grazing in historically grazed areas generally does not increase in exotic species (Diaz et al. 1994), while grazing in historically ungrazed areas can cause the invasion of exotic species (Mack

1986). The presence of exotic species in a community can change the disturbance regime; for example, exotic grasses can increase the fire frequency (D'Antonio and Vitousek 1992). Hobbs and Huenneke (1992) describe how management of small habitat fragments is especially difficult because disturbance is essential to the maintenance of many ecosystems, but also can promote the invasion of exotic species.

Suburban areas are especially susceptible to terrestrial eutrophication caused by increased atmospheric nitrogen deposition from anthropogenic sources such as automobile and industrial emissions, and drift from chemical fertilizers. Several areas with large human populations (Los Angeles, East Coast of United States, and the Netherlands) have been shown to have at least a 10 fold increase in nitrogen deposition (Riggan et al. 1985, Bobbink and Willems 1987, Wedin and Tilman 1996). The addition of nitrogen to a plant community can increase exotic species (Laurenroth et al. 1978, Bridgewater and Backshall 1981, Hobbs et al. 1988, Huenneke et al. 1990, Hester and Hobbs 1992, Wedin and Tilman 1996), or decrease the diversity of native plants (Bobbink and Willems 1987, Pysek and Leps 1991, ten Harkel and van der Meulen 1995). Nitrogen added to a system by both native (Maron and Connors 1996) and non-native (Vitousek 1990) nitrogen fixers also has been shown to increase exotic plant invasion.

Many species planted for landscaping in suburban areas potentially can invade adjacent protected sites (Baker 1986, Hobbs and Humphries 1995). An analysis of invasive woody exotic plants in North America showed that 85% were purposely introduced for landscaping purposes (Reichard 1997). Suburban areas also harbor

both plants and animals that have evolved commensalistic relationships with human habitation, such as dandelions (*Taraxacum offininale*) and house mice (*Mus musculus*), that can spread into nearby natural ecosystems.

Benefits. Exotic species generally are thought to have a negative effect on the communities that they invade. An alternative viewpoint is put forth by Johnson and Mayeux (1992). They argue that plant community composition is not stable over long time scales, and changed even before human influence. They also argue that there have been more plant species introductions than extinctions in California since human settlement, therefore causing an increase in richness. They seem to use this reasoning to call for a relaxation of grazing laws on Western United States rangeland. This can be a dangerous line of reasoning because it ignores the fact that the changes in community structure are occurring at a rate that is much faster than pre-historical changes. Also, increases in species richness at a regional scale may be due to a temporary disequilibrium and are definitely leading to a loss of biodiversity at a global scale due to local extinctions of narrowly distributed species (Mooney 1988).

Within a suburban landscape context, certain exotic organisms can be valuable tools for conservation efforts. Many exotic species have evolved with human disturbance, and have been selected to provide food, fiber, or medicines (Lugo 1990). Exotic species can be used to replace extinct species or to help communities recover from anthropogenic disturbances. The value of exotic organisms will increase as more and more ecosystems are impacted by humans due to population growth, and as global climate changes affect fragmented landscapes which may lead to extirpation of many native species (Williams 1997). The idea that new, working

communities can be created through new combinations of species has been variously named "synthetic communities" (Bridgewater 1988), "recombinant ecology" (Soulé 1990) "mixecology" (Soulé 1990), and "possible landscapes" (Nassauer 1995).

Direct Human Impacts

Challenges. One of the challenges to conserving vegetation in suburban environments is the impact of the people within that environment. Humans constitute the animal species with the greatest mass, and suburban open spaces are heavily trampled through recreational activities. This trampling causes changes in both plant community composition and in soil properties (Liddle 1975, Ikeda and Okutomi 1992). Other direct human impacts include poaching, flower picking, and the collection of plants for food, tea or medicines.

The coexistence of people and habitat fragments also can make it difficult to manage open spaces effectively. The use of controlled burning and removal of exotic organisms can anger certain segments of the public (Soulé 1990, Temple 1990). The use of herbicides must also be restricted in suburban areas due to the negative effects of these chemicals on public health (Liebman and Dyck 1993).

Benefits. One factor that often is overlooked in the literature is that the public in suburban areas can be used as a resource. If people are educated about the importance of their local open space, it is likely that some will volunteer their time or money for projects such as fence building, weed removal, or research.

Conclusions

Many problems must be faced when trying to conserve biodiversity within a suburban context. There also are benefits that are associated with each of these problems, which makes suburban areas an important link in the global conservation strategy. By necessity, suburban parcels are small in size, which increases the chances of species extinctions and exotic species invasion. The small size is effective for conserving rare habitats, for protecting against disease, for use as a seed source for revegetation, and for allowing experimentation on the creation of new communities. Exotic species are especially problematic in suburban areas, but some of them may have beneficial uses, especially in replacing ecosystem functions lost by extirpated native species. Managing for native diversity is difficult because natural disturbance regimes usually are disrupted, and the public may object to some management practices. It should be remembered, though, that suburban conservation often is possible only through the support of local governments, and public volunteers can be a useful tool. Education and involvement of the public on open space issues is important for successful conservation efforts.

CHAPTER II

PLANT COMMUNITIES ON BOULDER OPEN SPACE GRASSLANDS

Abstract

A large diversity of plant community types and relatively high levels of exotic plant invasion characterize the grasslands surrounding Boulder, Colorado. Sixty-eight plots were established on grasslands around Boulder with various land uses and landscape contexts in order to determine the composition of the native plant communities and the distribution of exotic species. Each plot was sampled using 12 $1m^2$ quadrats in both 1995 and 1996. A cluster analysis was used to classify 1177 quadrats based on the presence and absence of 177 native species. It was determined that there were seven primary communities; shale, shortgrass prairie, mixed grass prairie/foothills, mixed grass prairie/mesas, xeric tallgrass, mesic tallgrass and irrigated meadow. The lowland plots had a greater richness of exotic species and a lower richness of native species. The plant communities found here are compared

with other studies of grasslands in the region in the past eighty years, and the biggest differences are the increases in exotic species and the native grass *Agropyron smithii*.

Introduction

Grassland plant communities along the eastern base of the Colorado Front Range are complex and diverse. Some of these communities are unique to this region, some are common on the Western Great Plains, and others are disjunct relicts of prairie vegetation that generally occurs only on the Eastern Great Plains (Vestal 1914, Livingston 1953, Hanson and Dahl 1956, Branson et al. 1965, Moir 1969, Baker and Galatowitsch 1985, and Santanachote 1991). Reasons for this high diversity of communities may include increased precipitation (compared to the adjacent plains region), higher water table, greater soil and topographic variability, and interactions with the adjacent montane vegetation.

Vestal (1914) first described the variety of grassland communities in the Boulder area, but historical land use changes doubtless have modified these grasslands over the past 80 years. The rapid growth of the City of Boulder coupled with additional tracts of land plowed for agriculture have greatly reduced the extent of grassland communities in the area. Remaining grasslands are impacted by human uses in many ways, including: continued history of livestock grazing, introduction of exotic species, atmospheric deposition of nutrients and pesticides, and alteration of natural disturbance regimes and animal distributions (see Chapter I).

The objective of this study was to determine native grassland plant communities managed as open space by the City of Boulder, Colorado, and to

compare these results with descriptions of grasslands in the Boulder Valley over the past 80 years. A secondary objective was to examine the frequency and composition of exotic plant invasions into these communities, and to determine if the exotic species are functionally different from the native species.

Material and Methods

Study Area

This research took place on the grasslands that are part of City of Boulder Open Space, in Boulder County, Colorado. Many land parcels surrounding the city have been purchased by the city of Boulder through a special tax for the purpose of aesthetics, recreation, and biological and cultural conservation. Grasslands occur on two main landforms on the Open Space property, lowlands and uplands. The lowland grasslands occur in a piedmont valley created by Boulder and South Boulder Creeks, and are either flood irrigated or have a naturally high water table. Upland grasslands are found on several mesas in the area, and at the base of the Front Range foothills adjacent to Ponderosa Pine (*Pinus ponderosa*) Woodland.

Grasslands on City of Boulder Open Space have been subjected to a variety of land uses both historically and during the study. Most were used for grazing by cattle and horses. Some areas were grazed continuously, others seasonally, while some areas have been protected within grazing exclosures. Most irrigated meadows were cut in the summer for hay, while others were plowed and planted with alfalfa (*Medicago sativa*) or other row crops.

Sixty-six 200m diameter study plots were established on the City of Boulder Open Space and two plots in Chautauqua Meadow on City of Boulder Mountain Parks. Each plot was marked with a central re-bar stake, and its position was determined using maps and Global Positioning System (Table 2.1, Fig. 2.1.). These plots were established as part of a larger project in which songbird, raptor, grasshopper and rodent densities also were measured. The plots were located on both uplands (36 plots) and lowlands (32 plots) and included a variety of land uses, including grazing, haying, and recreation. Some of the plots were intentionally established near developed areas and recreational paths, while others were located relatively remote from human uses.

Vegetation Sampling.

Vegetation was sampled on each of the 68 plots during July 1995 and again in July 1996. At each plot, a 50m transect was established in a due west direction from the plot center, and $1m^2$ nested quadrats were sampled every 4m (12 quadrats per plot per year) for presence and absence of all vascular plant species (nomenclature from Great Plains Flora Association 1986, synonymies with Weber and Whitman 1996 in Appendix 1). Nested quadrats were similar to those described by Smith et al. (1987), and consisted of a $0.0625m^2$ quadrat, nested within a $0.25m^2$ quadrat, nested within a $1m^2$ quadrat. Species occurring in the smallest quadrat were recorded, followed by species occurring in the next larger quadrat but not the smallest, followed by species occurring in only the largest quadrat. Summed frequency values were then computed by determining the frequency of each species in all of the sub-quadrats. For example, a species occurring in the smallest sub-quadrat would also be considered to be present

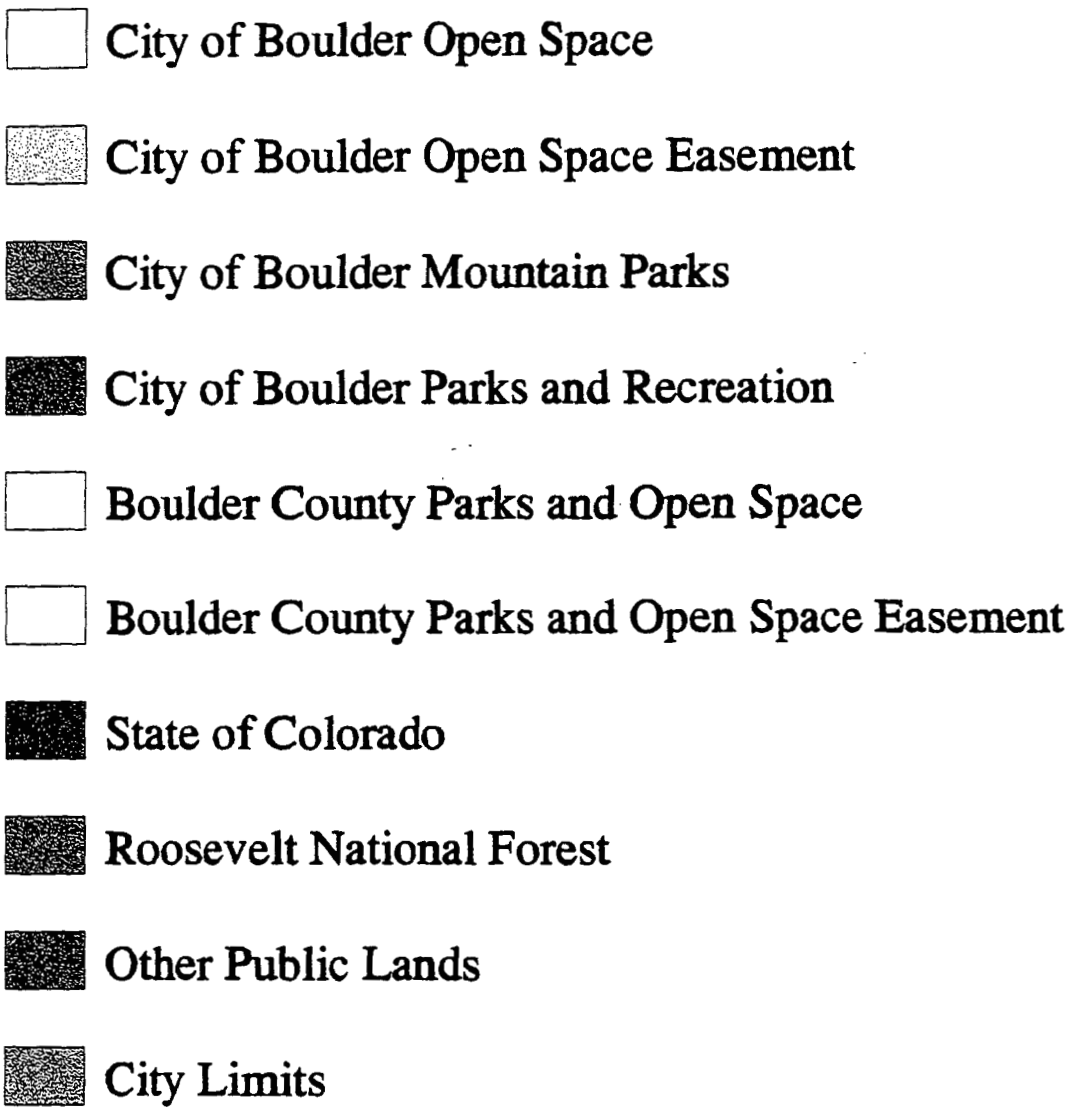
Table 2.1: Locations and habitats of the 68 study plots. Location data were collected from GPS (66 plots) or map analysis (11 plots). Co-ordinates are State Plane Zone 501, NAD83. Data provided by Sandy Haire. Irrigated plots occurred on uplands. Some lowlands were also irrigated. Plots were considered grazed (cattle or horses) or used by prairie dogs if there was any use between 1994 and 1996. Several of the prairie dog towns were extirpated by plague in 1994.

Plot#	East	North	Position	Land Use	Other
1	3057918	1262144	Upland	Ungrazed	
2	3058049	1262782	Upland	Ungrazed	
3	3058775	1265001	Upland	Ungrazed	Prairie Dogs
4	3059866	1268821	Upland	Ungrazed	
5	3059366	1269140	Upland	Ungrazed	
6	3063806	1271574	Upland	Grazed	
7	3064918	1271643	Upland	Grazed	
8	3063821	1272276	Upland	Grazed	
9	3064463	1272702	Upland	Grazed	
10	3066364	1271828	Upland	Grazed	
11	3066693	1271206	Upland	Grazed	
12	3061719	1277934	Upland	Grazed	
13	3062363	1277705	Upland	Grazed	
14	3065860	1275591	Upland	Grazed	
15	3065922	1275990	Upland	Grazed	
16	3070500	1272898	Upland	Grazed	Prairie Dogs
17	3070101	1273349	Upland	Grazed	Prairie Dogs
18	3071612	1278202	Upland	Grazed	Prairie Dogs
19	3073860	1278617	Irrigated	Mowed	Plowed
20	3077317	1278035	Irrigated	Mowed	Plowed
21	3075779	1275923	Irrigated	Mowed	Plowed
22	3077381	1275457	Irrigated	Mowed	Plowed
23	3098308	1266853	Upland	Ungrazed	Revegetated
24	3098147	1266037	Upland	Ungrazed	Revegetated
25	3074328	1263758	Irrigated	Grazed/Mowed	
26	3074982	1263758	Irrigated	Grazed/Mowed	
27	3072570	1257346	Upland	Ungrazed	Prairie Dogs
28	3070105	1229743	Upland	Grazed	
29	3069777	1229810	Upland	Grazed	
30	3081756	1259897	Upland	Grazed	Prairie Dogs
31	3080658	1259853	Upland	Grazed	Prairie Dogs
32	3091424	1245936	Irrigated	Grazed/Mowed	Plowed
33	3092209	1245937	Irrigated	Grazed/Mowed	Plowed

Table 2.1: Locations and habitats of the 68 study plots (cont.).

Plot#	East	North	Position	Land Use	Other
34	3078549	1243461	Lowland	Grazed/Mowed	
35	3080265	1241925	Lowland	Grazed/Mowed	
36	3079741	1241127	Lowland	Grazed	
37	3078758	1238378	Lowland	Grazed/Mowed	
38	3077638	1236684	Lowland	Grazed/Mowed	
39	3093787	1240763	Irrigated	Mowed	
40	3093833	1240212	Irrigated	Mowed	
41	3080801	1237289	Lowland	Grazed/Mowed	
42	3081036	1236415	Lowland	Grazed/Mowed	
43	3078967	1234559	Lowland	Grazed	
44	3079691	1233598	Lowland	Grazed	
45	3080068	1233118	Lowland	Grazed	
46	3082655	1233974	Lowland	Ungrazed	
47	3082899	1234026	Lowland	Ungrazed	
48	3083492	1234185	Lowland	Grazed	
49	3081036	1233121	Lowland	Grazed/Mowed	
50	3082483	1232281	Lowland	Grazed/Mowed	
51	3081473	1231978	Lowland	Grazed/Mowed	
52	3082703	1230293	Upland	Grazed	
53	3083473	1230524	Upland	Grazed	
54	3072738	1227408	Lowland	Grazed	
55	3071697	1227491	Upland	Grazed	
56	3072179	1226463	Lowland	Ungrazed	
57	3071703	1226467	Upland	Ungrazed	
58	3074464	1226978	Lowland	Ungrazed	
59	3074393	1226613	Lowland	Ungrazed	
60	3071956	1217577	Upland	Grazed	
61	3073111	1218263	Upland	Grazed	
62	3072979	1216674	Upland	Grazed	Prairie Dogs
63	3077453	1215445	Upland	Grazed	
64	3077986	1215826	Upland	Grazed	
65	3078193	1214038	Upland	Grazed	Prairie Dogs
66	3093289	1239999	Lowland	Grazed	
101	3060170	1241526	Upland	Ungrazed	Burned 4/95
102	3060140	1242436	Upland	Ungrazed	Burned 4/96

Figure 2.1: Map showing the locations and plot numbers of the 68 study plots in relation to city limits and publicly owned lands.



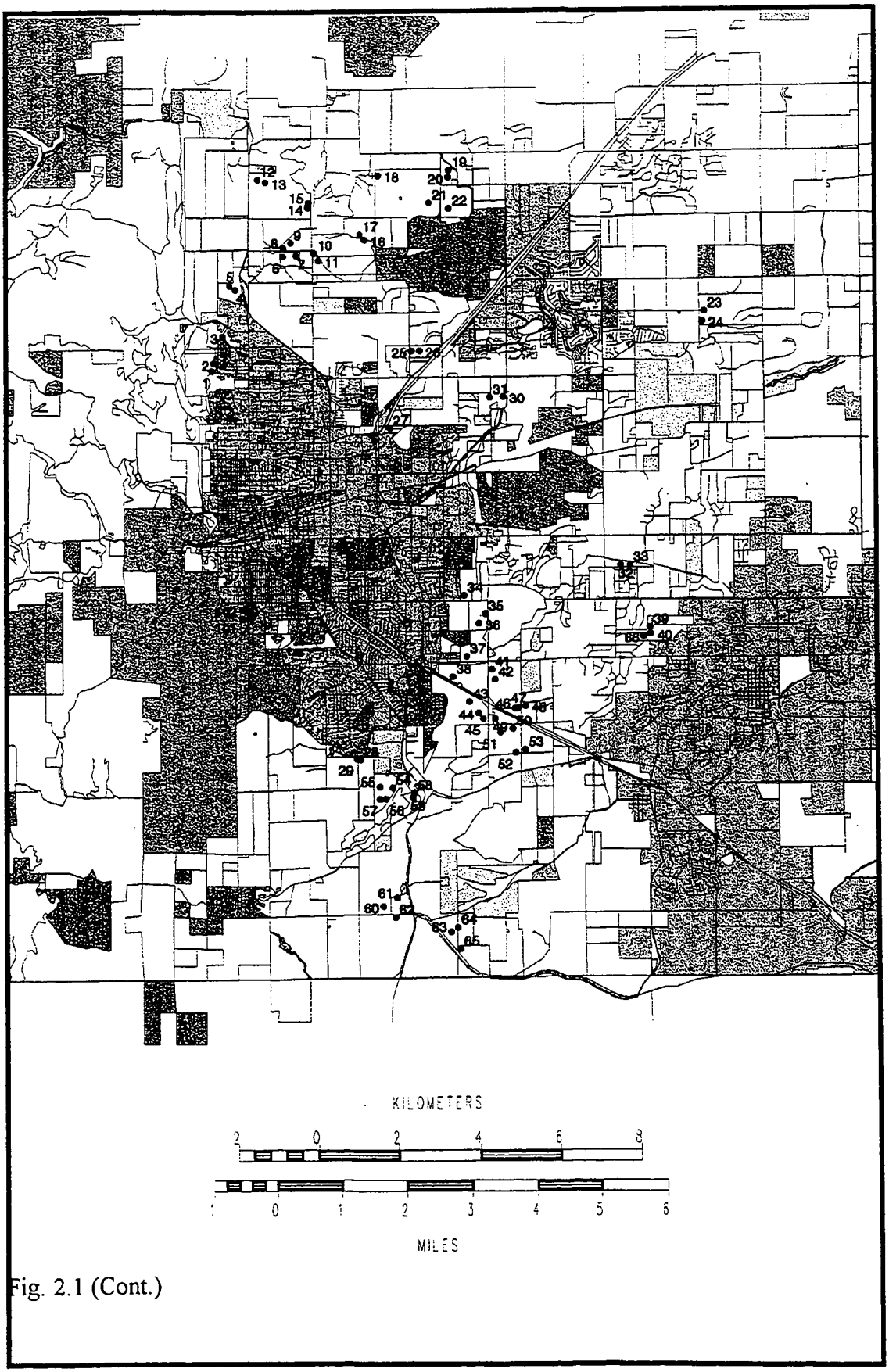


Fig. 2.1 (Cont.)

in both of the sub-quadrats within which it was nested. A species present in only the largest quadrat would be considered to be present in one of the three quadrats. This method allowed for the discrimination between the frequencies of the dominant species, while simultaneously receiving information on the rarer species.

Statistical Analysis.

A total of 1632 nested quadrats were sampled in 1995 and 1996. For purposes of identifying plant communities, only positively identified native species were used (determination as a native based on Weber 1995). The data set was reduced by selecting only those native species that were in at least three $1m^2$ quadrats, and selecting only quadrats that had at least three native species. This removed all exotics and very rare native species from the analysis as well as quadrats that did not have a significant native species component. The resulting matrix consisted of 1177 quadrats by 177 native species.

A cluster analysis was performed on this data set using the program SPSS (1990). The analysis used Sorenson's similarity coefficient based on the presence and absence of each species in each of the $1m^2$ quadrats, and average linkage between groups was used for agglomeration. It was decided that $1m^2$ was an appropriate scale for classification because several plots appeared to consist of more than one plant community, but at the scale of the quadrat, the vegetation was relatively homogeneous.

The output was examined for natural cluster breaks, and it was determined that there were seven main plant communities and several smaller communities. Dominant species for each of the communities were considered to be those species

with at least 50% summed-frequency, while sub-dominants were those species between 25% and 50%. Although exotic plant species were not used for classification purposes, their frequencies in each community type were recorded and described.

Plants were grouped into plant functional types based on origin (native or exotic), systematics (graminoid or forb), life history (monocarpic or polycarpic) and physiology (C_3 or C_4 photosynthesis). Graminoids were considered to be plants in the Poaceae, Cyperaceae, and Juncaceae families, and forbs to be vascular plants in all other families. The graminoids share the ecological traits of linear leaves, wind pollination, and physical, rather than chemical, defenses against herbivory. Plants were determined to be monocarpic (flower once) or polycarpic (multiple years of flowering) based on descriptions in the Great Plains Flora (1986). Graminoids were separated by photosynthetic pathway (C_3 or C_4) based on Waller and Lewis (1979) (plant functional types for all species used in the study are shown in Appendix 1).

Results

Cluster Analysis

The final cluster of the agglomerative cluster analysis separated the two lowland plant communities that occur on soils that are often saturated with water during the growing season from the upland plant communities that occur on drier soils (Fig. 2.2). The drier sites were separated into two groups. Shortgrass and mixed-grass/foothills communities were dominated by *Agropyron smithii*, which was rare in the other three upland communities. The irrigated meadow community had a

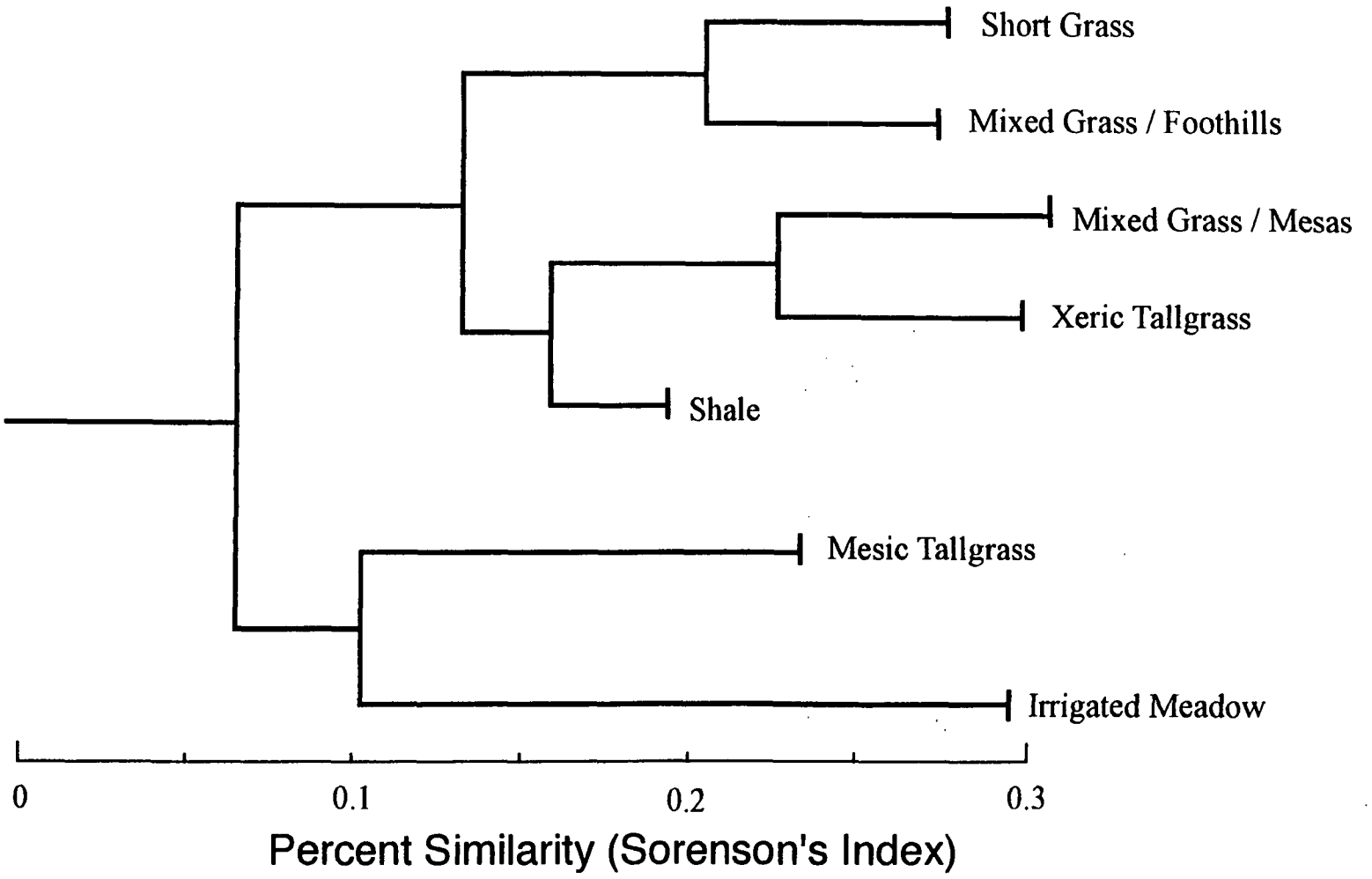


Figure 2.2: Dendogram of the relationship of the seven primary communities determined from the cluster analysis. Position of the end bars indicate the similarity within each community.

relatively high level of internal similarity, but was relatively dissimilar to all of the other communities (Fig. 2.2). The similarity coefficients between the communities are smaller than what would be expected using a traditional relevé approach (Mueller-Dombois and Ellenberg 1974) because of the smaller size of the $1m^2$ quadrats and the non-subjective selection of the quadrat locations.

On some of the plots all quadrats were classified as the same community, but for most of the plots, more than one community was present (Table 2.2). The lowland plots tended to have more plant communities per plot (greater spatial heterogeneity) than the upland plots (Table 2.1, Table 2.2). The dominant plant community for each plot can be seen in Figure 2.3.

Description of Plant Communities

Shale Community. The shale community was restricted to three plots north of Boulder that occurred on soils derived from shale. The three dominant native species were *Linum perenne*, *Aristida purpurea*, and *Bouteloua curtipendula* (Table2.3; complete community composition is listed in Appendix 2). Two species, *Stipa neomexicana*, and *Physaria bellii* were restricted to the shale community (Table 2.4). *Physaria bellii* is a rare and endangered plant that is found only in this area on shale derived soils. Very few exotic species were able to invade this community, but two annual species (*Alyssum minus* and *Bromus japonicus*) were the most frequently sampled species in the community (Table 2.3).

Shortgrass Prairie. The shortgrass prairie community classified the largest number of quadrats (Table 2.2), and probably was composed of several closely related community types that are not discriminated here. This community generally

Table 2.2: Number of quadrats classified into each of the seven main plant communities. The "other" category consists of several small, unrelated clusters. The "exotic" category are quadrats that had less than three native species present, and were not used in the classification.

	Plant Community								
Plot	Shale	Shortgrass	Mixed-grass Foothills	Mixed-grass Mesas	Xeric Tallgrass	Mesic Tallgrass	Irrigated Meadow	Other	Exotic
1		1	22					1	
2			23					1	
3								13	11
4		3	17					4	
5	22	2							
6		24							
7		20	2					2	
8		24							
9		24							
10		19						4	1
11	1	12						6	5
12	24								
13	24								
14		24							
15		6						15	3
16		24							
17		4						1	19
18								16	8
19									24
20								1	23
21									24
22									24
23								18	6
24								11	13
25								1	23
26									24
27								12	12
28				22				2	
29				24					
30		24							
31		11						5	8
32									24
33									24
34							7	5	12

Table 2.2 Numer of quadrats per community (cont.)

	Plant Community								
Plot	Shale	Shortgrass	Mixed-grass Foothills	Mixed-grass Mesas	Xeric Tallgrass	Mesic Tallgrass	Irrigated Meadow	Other	Exotic
35								10	14
36						2		22	
37						3		14	7
38							15	6	3
39									24
40									24
41							21		3
42							5		19
43						21	1		2
44						1	8	1	14
45				1	23				
46						20		4	
47						23		1	
48					15	1		7	1
49						1	8	13	2
50						19		3	2
51						24			
52				24					
53				24					
54			1	1	17	3		1	1
55				24					
56		2		4	2	1		11	4
57		1		18	3	1			1
58				5	3	11		5	
59				2		22			
60				24					
61				24					
62		20	1		1			2	
63		12						9	3
64								6	18
65		22						1	1
66									24
101			23		1				
102			22					2	
TOT	71	279	111	197	65	153	65	236	455

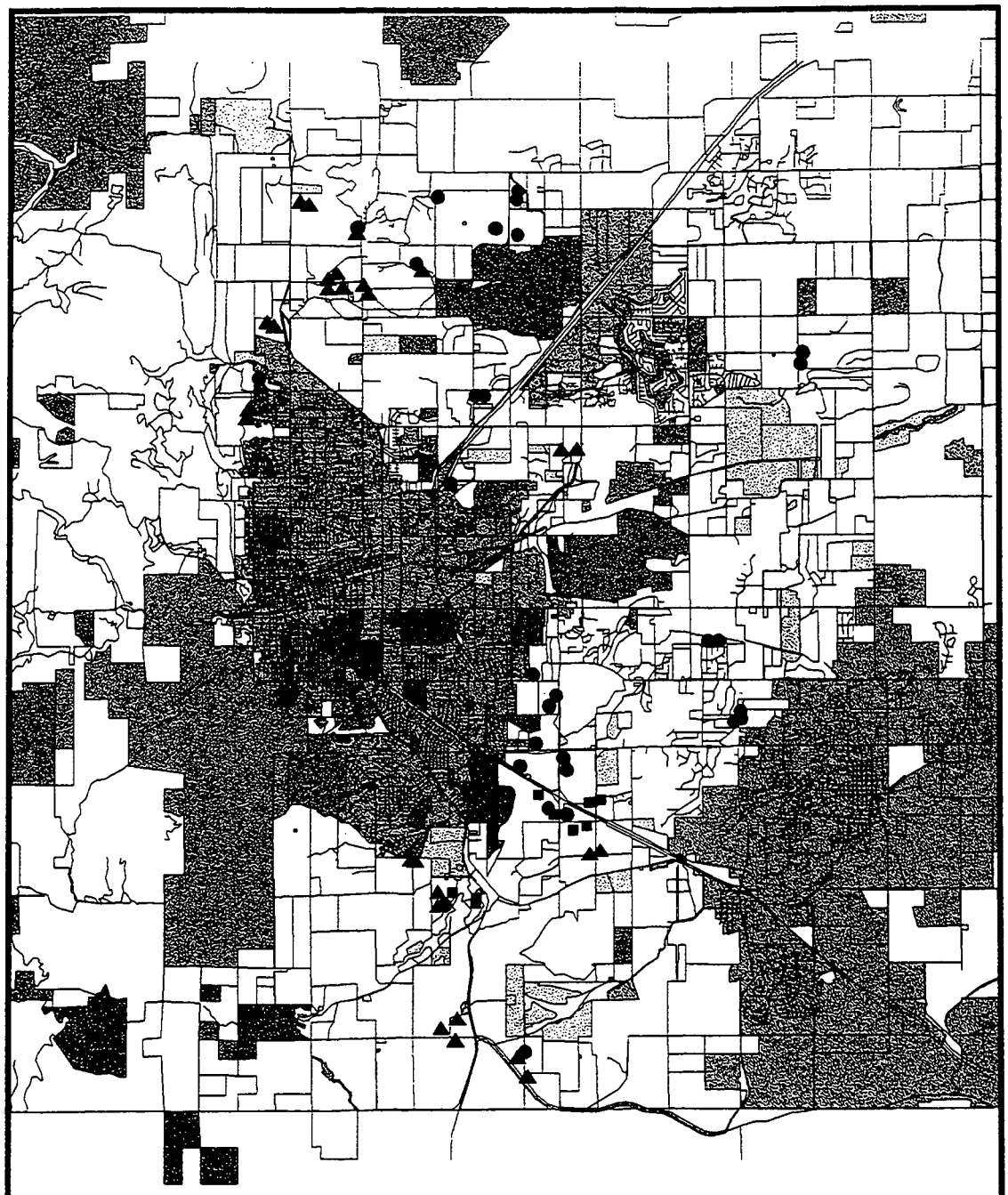

▲ Shale
▲ Shortgrass
▲ Mixed/Foothills
▲ Mixed/Mesas
■ Xeric Tallgrass
■ Mesic Tallgrass
● Irr. Meadow
● Other
● Exotic

Table 2.3: Dominant and sub-dominant species for each of the seven main plant communities. SF is the summed-frequency for each species. N is the number of nested quadrats.

Shale N=71

Native species	SF	Exotic species	SF
Linum perenne	53%	*Alyssum minus*	90%
Aristida purpurea	52%	*Bromus japonicus*	69%
Bouteloua curtipendula	51%		
Helianthus pumilus	49%	*Tragopogon dubius*	34%
Evolvulus nuttallianus	44%		
Bouteloua gracilis	36%		
Andropogon gerardii	35%		
Stipa comata	32%		
Stipa neomexicana	27%		
Psoralea tenuiflora	27%		
Lesquerella montana	25%		

Shortgrass N=279

Native species	SF	Exotic species	SF
Agropyron smithii	83%	*Bromus japonicus*	64%
Bouteloua gracilis	59%	*Alyssum minus*	58%
Buchloe dactyloides	38%	*Bromus tectorum*	37%
Sphaeralcea coccinea	33%	*Convolvulus arvensis*	29%
Artemisia frigida	30%		
Plantago patagonica	27%		

Mixed-grass/Foothills N=111

Native species	SF	Exotic species	SF
Agropyron smithii	82%	*Bromus japonicus*	80%
Artemisia ludoviciana	69%	*Alyssum minus*	56%
Aster falcatus	57%		
Carex heliophylla	46%	*Tragopogon dubius*	46%
Ambrosia psilostachya	44%	*Poa pratensis*	43%
Psoralea tenuiflora	34%		

Table 2.3 Dominant and Sub-dominant species (Cont.)

Mixed-grass/Mesas N=197

Native species	SF	Exotic species	SF
Andropogon gerardii	61%	*Bromus japonicus*	57%
Carex heliophylla	58%		
Bouteloua gracilis	49%	*Poa compressa*	42%
Stipa comata	46%	*Tagopogon dubius*	33%
Psoralea tenuiflora	42%		
Ambrosia psilostachya	41%		
Koeleria pyramidata	34%		
Bouteloua curtipendula	33%		
Liatris punctata	26%		
Panicum virgatum	25%		

Xeric Tallgrass N=65

Native species	SF	Exotic species	SF
Andropogon gerardii	82%	*Poa pratensis*	70%
Ambrosia psilostachya	65%	*Plantago lanceolata*	61%
		Bromus japonicus	55%
Andropogon scoparius	25%	*Cichorium intybus*	45%
		Poa compressa	38%
		Taraxacum officinale	32%
		Convolvulus arvensis	27%
		Dianthus armeria	25%

Mesic Tallgrass N=153

Native species	SF	Exotic species	SF
Sporobolus asper	64%	*Plantago lanceolata*	72%
		Poa pratensis	51%
		Poa compressa	51%
Andropogon gerardii	40%	*Taraxacum officinale*	39%
Panicum virgatum	36%	*Trifolium pratense*	37%
Sorghastrum nutans	34%	*Festuca pratensis*	37%
Eleocharis compressa	32%	*Phleum pratense*	35%
Aster falcatus	32%	*Convolvulus arvensis*	32%
Juncus longistylis	29%	*Agrostis stolonifera*	30%
Dicanthelium oligosanthes	29%		

Table 2.3 Dominant and Sub-dominant species (Cont.)

Irrigated Meadow N=65			
Native species	**SF**	**Exotic species**	**SF**
Juncus balticus	67%	*Festuca pratensis*	63%
Eleocharis compressa	58%	*Poa pratensis*	51%
Carex praegracilis	35%	*Trifolium hybridum*	48%
Carex nebrascensis	35%	*Taraxacum officinale*	34%
		Agrostis stolonifera	30%

Table 2.4: Synoptic table showing summed-frequency values for native plant species in each of the seven main grassland communities. S = Shale, SG = Shortgrass, MF = Mixed-grass/Foothills, MM = Mixed-grass/Mesas, XT = Xeric Tallgrass, MT = Mesic Tallgrass, Meadow, IM = Irrigated Meadow.

Species	S	SG	MF	MM	XT	MT	IM
Oryzopsis hymenoides	4%	1%	.	.	.	.	.
Gaura coccinea	10%	7%	1%	.	.	.	.
Hybanthus verticillatus	9%	1%	.	.	.	.	.
Astragalus sericoleucus	22%	1%	.	.	.	.	.
Senecio spartioides	16%	.	.	1%	1%	3%	.
Physaria bellii	13%	.	.	.	.	.	.
Evolvulus nuttallianus	44%	4%	2%	2%	.	.	.
Helianthus pumilus	49%	2%	1%	.	.	.	.
Stipa neomexicana	27%	.	.	.	.	.	.
Linum perenne	53%	13%	11%	4%	.	.	.
Sporobolus cryptandrus	.	6%	.	.	2%	.	.
Aristida purpurea	52%	20%	1%	5%	2%	.	.
Sphaeralcea coccinea	1%	33%	6%	.	1%	.	.
Astragalus drummondii	3%	4%	7%	.	.	.	.
Euphorbia robusta	8%	.	.	1%	.	.	.
Artemesia dramunculus	0%	5%	10%	.	.	.	.
Musineon divaricatum	9%	5%	.	1%	.	1%	.
Gutierrezia sarothrae	23%	11%	9%	6%	1%	.	.
Oxytropis lambertii	8%	1%	.	3%	.	.	.
Artemesia frigida	24%	30%	2%	10%	6%	1%	.
Plantago patagonica	.	27%	2%	9%	1%	.	.
Viola nuttallii	13%	1%	11%	2%	.	.	.
Poa sandbergii	.	7%	.	1%	.	.	.
Lesquerella montana	25%	1%	.	11%	.	.	.
Gaillardia aristata	5%	.	.	4%	.	.	.
Astragalus agrestis	.	7%	11%	.	.	.	.
Chrysopis villosa	8%	8%	1%	22%	1%	.	.
Erysimum asperum	7%	.	2%	6%	.	.	.
Astragalus flexuosus	.	2%	8%	1%	.	.	.
Yucca glauca	1%	1%	4%	5%	1%	.	.
Festuca octoflora	.	8%	.	4%	5%	1%	.
Cirsium undulatum	3%	.	2%	4%	.	.	.
Helianthus annuus	.	1%	.	5%	.	.	.
Stipa comata	32%	10%	2%	46%	1%	.	.
Comandra umbellata	16%	2%	.	2%	.	.	.

Table 2.4: Native species by plant community (Cont.)

Species	S	SG	MF	MM	XT	MT	IM
Senecio plattensis	6%	.	2%	4%	.	1%	.
Stipa viridula	13%	4%	11%	.	.	.	.
Lomatium orientale	.	1%	4%	3%	.	.	.
Allium textile	3%	2%	1%	5%	1%	.	.
Echinocereus viridiflorus	.	2%	.	15%	.	.	.
Eriogonum alatum	2%	.	2%	8%	.	.	.
Artemesia campestris	.	1%	.	13%	.	.	.
Sitanion hystrix	14%	4%	.	20%	3%	1%	.
Paronychia jamesii	3%	.	.	6%	.	.	.
Schedonnardus paniculatus	.	3%	.	4%	.	.	.
Liatris punctata	8%	3%	24%	26%	.	.	.
Bouteloua gracilis	36%	59%	19%	49%	18%	4%	.
Cerastium arvense	.	.	7%	.	.	.	.
Buchloe dactyloides	1%	38%	3%	13%	7%	.	.
Thelesperma megapotamicum	15%	3%	2%	.	.	.	.
Bouteloua curtipendula	51%	8%	5%	33%	10%	2%	.
Mertensia lanceolata	.	.	4%	1%	.	.	.
Erigeron divergens	.	8%	13%	8%	11%	2%	.
Bouteloua hirsuta	3%	.	.	4%	3%	4%	.
Agropyron smithii	16%	83%	82%	2%	5%	7%	4%
Artemesia ludoviciana	10%	8%	69%	13%	2%	1%	.
Arenaria fendleri	.	.	.	18%	.	.	.
Koeleria pyramidata	2%	.	11%	34%	1%	.	.
Chenopodium dessicatum	.	3%	.	4%	.	.	.
Opuntia macrorhiza	6%	6%	11%	18%	4%	2%	.
Psoralea tenuiflora	27%	17%	34%	42%	14%	13%	.
Vicia americana	5%	.	4%	.	.	.	.
Tragia ramosa	3%	.	4%	16%	.	.	.
Carex heliophylla	.	5%	46%	58%	22%	2%	.
Dalea purpurea	7%	.	.	14%	2%	.	.
Grindelia squarrosa	8%	6%	5%	1%	21%	1%	.
Ratibida columnifera	6%	2%	4%	3%	5%	5%	.
Potentilla fissa	.	.	.	4%	.	.	.
Muhlenbergia wrightii	.	.	.	7%	.	.	.
Stipa spartea	.	.	7%	.	.	.	.
Muhlenbergia montana	.	.	1%	2%	.	4%	.
Dalea candida	5%	.	.	1%	10%	.	.
Symphoricarpos occidentalis	.	.	4%	1%	.	1%	.
Ambrosia psilostachya	10%	1%	44%	41%	65%	16%	.

Table 2.4: Native species by plant community (Cont.)

Species	S	SG	MF	MM	XT	MT	IM
Aster porteri	.	.	8%	22%	6%	7%	.
Lupinus argenteus	.	.	5%	1%	4%	.	.
Oxalis dillenii	.	.	.	9%	7%	1%	.
Aster falcatus	3%	13%	57%	14%	18%	32%	1%
Andropogon gerardii	35%	.	19%	61%	82%	40%	.
Andropogon scoparius	2%	.	1%	18%	25%	13%	.
Achillea millefolium	.	1%	9%	.	4%	8%	.
Dicanthelium oligosanthes	.	.	.	1%	.	29%	.
Sporobolus asper	.	.	2%	10%	13%	64%	.
Sorghastrum nutans	.	.	.	10%	8%	34%	.
Panicum virgatum	.	.	.	25%	6%	36%	11%
Cirsium flodmanii	.	.	.	.	.	.	.
Rosa arkansana	.	.	14%	1%	2%	14%	.
Potentilla gracilis	.	.	.	1%	2%	4%	.
Asclepias speciosa	.	.	.	.	2%	6%	.
Equisetum laevigatum	.	.	.	1%	.	9%	4%
Iris missouriensis	.	.	.	.	.	5%	.
Hordeum jubatum	.	.	.	.	4%	.	1%
Juncus longistylis	.	.	.	1%	3%	29%	18%
Juncus balticus	.	.	.	2%	17%	6%	67%
Eleocharis compressa	.	.	.	.	.	32%	58%
Spartina pectinata	.	.	.	.	.	.	2%
Prunella vulgaris	.	.	.	.	.	21%	2%
Carex praegracilis	.	.	.	.	10%	11%	35%
Eleocharis macrostachya	.	.	.	.	.	5%	10%
Carex nebrascensis	.	.	.	.	4%	.	35%
Carex lanuginosa	.	.	.	.	.	9%	10%
Triglochin maritima	.	.	.	.	.	.	16%

occurred on plots with a history of prairie dog activity or areas that were heavily grazed by cattle or horses. The dominant native species were *Agropyron smithii*, and *Bouteloua gracilis,* and the dominant exotics were *Bromus japonicus* and *Alyssum minus* (Table 2.3).

Mixed-grass Prairie/Foothills. Almost all of the quadrats in this community occurred on plots that were ungrazed, and at the base of the foothills near Ponderosa Pine Woodland. The dominant native species were *Agropyron smithii*, *Artemisia ludoviciana,* and *Aster falcatus,* and the dominant exotics were *Bromus japonicus* and *Alyssum minus* (Table 2.3). *Stipa spartea* was found only in this community (Table 2.4).

Mixed-grass Prairie/Mesas. Most of the quadrats that were classified in this community were found on grazed mesa tops and gravelly benches near South Boulder Creek (Table 2.2). These mesas were derived from ancient streambeds that have resisted erosion (Lee 1900). The dominant native species were *Andropogon gerardii* and *Carex heliophylla*. There were also four other native species with summed-frequencies over 40% (Table 2.3). *Bromus japonicus* was the lone dominant exotic species.

Xeric Tallgrass. The xeric tallgrass plots occurred primarily on three plots in South Boulder that were grazed by cattle (Table 2.2). Two native species, *Andropogon gerardii* and *Ambrosia psolistachya,* dominated this community, but otherwise the community was dominated mostly by exotic species (Table 2.3). This community contained exotic species that are common to drier sites (*Bromus*

japonicus), as well as species that are common to wetter sites (*Plantago lanceolata* and *Taraxacum officinale*) (Table 2.5).

Mesic Tallgrass. This community most resembled the tallgrass prairie of the Eastern Great Plains. Some of the quadrats in this community came from grazed areas, but the majority of the quadrats were from grazing exclosures and irrigated hayfields with a significant native species composition. The four most frequent native species (*Sporobolus asper, Andropogon gerardii, Panicum virgatum,* and *Sorghastrum nutans*; Table 2.3) were all grasses that are considered common components of the tallgrass prairie (Hulbert 1988, Collins 1989). There were many exotic species that co-occurred with the native tallgrass species, and most of these are C_3 meadow grasses that are commonly planted for pasture improvement (*Poa sp., Festuca pratensis, Phleum pratense* and *Agrostis stolonifera*).

Irrigated Meadow. This community was found on irrigated hayfields southeast of Boulder. The dominant native plants were monocots other than grasses that are commonly found in wetlands, such as *Juncus balticus, Eleocharis compressa,* and *Carex spp.* The dominant exotic species were mostly European pasture grasses (Table 2.3).

Other Communities. There were 236 quadrats with at least three native species that classified into several minor communities (Table 2.2). One of these communities occurred on an abandoned wheat field that had been revegetated with several grass species (plots 23 and 24). Another community was found in several wet areas with poor drainage and was dominated by *Hordeum jubatum.*

Table 2.5: Synoptic table showing summed-frequency values for exotic plant species in each of the seven grassland communities. See Table 2.5 for community abbreviations.

Species	S	SH	MF	MM	XT	MT	IM
Verbena bracteata	.	2%	.	.	.	.	.
Hordeum vulgare	.	1%	.	2%	.	.	.
Centaurea diffusa	8%	20%	.	.	.	1%	.
Sysimbrium altissimum	.	3%	3%	3%	.	.	.
Bromus tectorum	1%	37%	11%	13%	3%	.	.
Scorzonera laciniata	2%	17%	2%	1%	2%	.	.
Erodium cicutarium	.	23%	4%	.	9%	.	.
Carduus nuttans	2%	1%	8%	.	1%	.	.
Alyssum minus	90%	58%	56%	20%	.	2%	.
Camelina microcarpa	4%	7%	3%	12%	1%	.	.
Lepidium densiflorum	.	7%	1%	12%	9%	.	.
Veronica peregrina	.	1%	.	.	.	.	1%
Silene antirrhina	.	4%	4%	13%	6%	.	.
Tragopogon dubius	34%	21%	46%	33%	10%	2%	.
Bromus japonicus	69%	64%	80%	57%	55%	15%	8%
Lactuca serriola	0%	2%	18%	1%	8%	1%	.
Conringia orientalis	.	.	2%	.	.	.	.
Lepidium campestre	.	4%	6%	3%	8%	2%	2%
Hypericum perforatum	.	1%	.	6%	1%	.	.
Melilotus alba	.	.	.	.	1%	2%	.
Convolvulus arvensis	2%	29%	4%	2%	27%	32%	1%
Conyza canadensis	.	.	.	.	10%	.	.
Linaria dalmatica	.	.	1%	.	.	.	.
Poa compressa	1%	5%	16%	42%	38%	51%	8%
Melilotus officinale	.	1%	.	.	10%	10%	.
Dianthus armeria	.	.	.	2%	25%	4%	.
Rumex acetosella	.	.	1%	8%	7%	2%	.
Cichorium intybus	.	1%	1%	8%	45%	20%	7%
Poa pratensis	.	6%	43%	21%	70%	51%	51%
Bromus inermis	.	1%	4%	.	.	3%	.
Trifolium repens	.	.	.	1%	1%	1%	2%
Rumex crispus	.	.	.	.	14%	1%	7%
Medicago lupulina	.	.	.	.	4%	9%	.
Medicago sativa	.	.	.	.	.	.	.
Plantago lanceolata	.	4%	1%	5%	61%	72%	10%
Daucus carota	.	.	.	1%	.	8%	1%
Taraxacum officinale	1%	3%	6%	4%	32%	39%	34%
Dactylis glomerata	.	.	.	1%	12%	10%	3%
Cirsium arvense	.	.	.	.	2%	7%	1%

Table 2.5: Exotic species by plant community (Cont.)

Species	S	SH	MF	MM	XT	MT	IM
Phleum pratense	.	.	.	1%	6%	35%	22%
Lotus tenuis	.	.	.	.	.	2%	16%
Agropyron repens	.	.	.	.	.	.	5%
Trifolium pratense	.	.	.	.	12%	37%	18%
Agrostis stolonifera	.	.	.	1%	8%	30%	30%
Juncus gerardii	.	.	.	.	4%	1%	6%
Ambrosia artemisiifolia	.	.	.	.	.	.	8%
Festuca pratensis	.	.	.	.	8%	37%	63%
Plantago major	.	.	.	.	.	.	2%
Trifolium hybribum	.	.	.	1%	7%	1%	48%
Polygonum persicaria	.	.	.	.	.	.	12%
Apocynum cannabinum	.	.	.	.	.	3%	1%
Trifolium fragiferum	.	.	.	.	.	.	14%

A large portion of these quadrats occurred in similar areas as the mesic tallgrass prairie, but on areas that had accumulated a dense layer of dead grass material which limited the growth of the C_4 tallgrass species (Knapp and Seastedt 1986). The areas were often dominated by the native plant *Rosa arkansana*, and native grass species were rare, while *Dactylis glomerata* and several other European C_3 grasses and forbs were quite common.

There were also 455 quadrats that did not have at least three native species present. Many of these quadrats were on hayfields or plowed agricultural land (mostly alfalfa), but some of the quadrats occurred within native communities where the soil had been disturbed and exotic species had invaded.

Plant Functional Types

There was a distinct difference between the plant functional types of native and exotic plants on the Boulder grasslands (Table 2.6). Native C_4 graminoids were common in all communities except the irrigated meadow, but there were no exotic C_4 graminoids in any of the communities. Native monocarpic plants were rare in all community types, but exotic monocarpic grasses and forbs were common on the drier community types. The exotic polycarpic plants were most common in the three wettest communities, which had irrigation or natural surface water at some point during the summer. These same four wet communities also had the lowest richness of native polycarpic forbs.

Table 2.6: Plant species richness/m^2 of native and exotic species, separated by community and plant functional type, including total richness for each community and average richness for each plant functional type.

Native Species

	Plant Functional Types					
Community	**PC_4G**	**PC_3G**	**PF**	**MC_3G**	**MF**	**Total**
Shale	2.4	1.5	8.8	0	0	**12.7**
Shortgrass	1.7	1.3	3.9	0.1	0.5	**7.5**
Mixed-Grass/Foothills	0.7	1.9	6.6	0	0.1	**9.3**
Mixed-Grass/Mesas	3.4	2.2	7.1	0.1	0.5	**13.3**
Xeric Tallgrass	2.2	1.0	2.9	0	0	**6.1**
Mesic Tallgrass	2.7	1.1	2.5	0.3	0	**6.6**
Irrigated Meadow	0.2	3.1	0.6	0	0	**3.9**
Average	**1.9**	**1.7**	**4.6**	**0.1**	**0.2**	

Exotic Species

	Plant Functional Types					
Community	**PC_4G**	**PC_3G**	**PF**	**MC_3G**	**MF**	**Total**
Shale	0	0	0.1	0.7	1.8	**2.6**
Shortgrass	0	0.2	0.5	1.2	2.3	**4.2**
Mixed-Grass/Foothills	0	0.8	0.2	1.0	2.2	**4.2**
Mixed-Grass/Mesas	0	0.8	0.6	0.9	1.6	**3.9**
Xeric Tallgrass	0	1.8	3.4	0.7	1.5	**7.4**
Mesic Tallgrass	0	2.4	2.6	0.2	0.5	**5.7**
Irrigated Meadow	0	2.3	2.1	0.1	0.4	**4.9**
Average	**0.0**	**1.2**	**1.4**	**0.7**	**1.5**	

Key to Plant Functional Types

PC4G = Polycarpic C_4 Graminoids
PC3G = Polycarpic C_3 Graminoids
PF = Polycarpic Forbs (including sub-shrubs)
MC3G = Monocarpic C_3 Graminoids
MF = Monocarpic Forbs

Discussion

Similarity to Other Published Works

Shale. This community was similar to the *Stipa comata-Bouteloua gracilis-Bouteloua curtipendula* association described by Hanson (1955) approximately 30km to the north of the community sampled here (72% similarity based on presence/absence using Sorenson's coefficient). The main differences are that Hanson's plots had more *Stipa comata, Andropogon scoparius,* and *Sphaeralcea coccinea,* less *Linum perenne, Lesquerella montana,* and *Tragopogon dubius,* and his plots contained no *Stipa neomexicana, S. viridula,* or *Physaria bellii.* There was also no A*lyssum mimus* on Hanson's plots because it had not invaded this region at the time of his study (Weber 1976).

Moir (1969) described three communities on the shale soils north of Boulder. His *Stipa neomexicana* community most closely resembles the shale community described here. The main differences are that Moir's community had 100% frequency of *Stipa neomexicana,* and no *Linum perenne* or *Alyssum minus,* and very little *Bromus japonicus.* The lack of *Linum perenne* and *Alyssum minus* on Moir's plots, while most other plants had similar frequencies between the two studies suggests that they were added to the community between 1967 and 1995.

Shortgrass and Mixed-grass/Foothills. The shortgrass prairie was similar to shortgrass prairie described in the Boulder area by Vestal (1914), and by other authors on the Western Great Plains (Shantz 1919, Costello 1944). The main difference is that in this study there was a higher frequency of *Agropyron smithii,* and most of the exotics from this study were not present in the earlier studies. The mixed-

grass/foothills community described here most closely resembles the wheat-grass association described by Vestal (1914).

Mixed-grass/Mesas, Xeric Tallgrass, and Mesic Tallgrass. These three communities were floristically related, and tended to intergrade into each other. They all had species in common with tallgrass prairie or true prairie on the Eastern Great Plains, and several authors have described these similarities. The mixed-grass mesa community closely resembled the *Andropogon scoparius* community of Hanson and Dahl (1956), the stony soil community of Branson et al. (1965), and the xeric tallgrass of Baker and Galatowitsch (1985). Vestal's (1914) bunch-grass association and Moir's (1969) *Andropogon gerardii – Poa pratensis* community seemed to have elements from both the mixed-grass mesa and xeric tallgrass communities.

What we have described here as mesic tallgrass prairie does not seem to have been described before in Colorado. It differs from the other tallgrass descriptions in that it is dominated in frequency by *Sporobolus asper*, and the tallgrass species primarily occurred with wetland species (*Carex spp.*, *Juncus spp.*, and *Eleocharis spp.*) rather than mixed-grass species (*Chrysopis villosa, Koelaria pyramidata, Liatris punctata,* and *Stipa comata*).

Plant Functional Types

The most obvious change in the grassland vegetation between this study and that of Vestal (1914) was the addition of many C_3 exotic species. This also can be seen in herbarium specimens (Weber 1995). Exotic annual plants that have invaded the uplands (*Alyssum minus* and *Bromus spp.*) were found in high densities both on grazed and ungrazed grasslands. These species complete their life cycle in early

spring before the perennial plants in the community are most active. It has been hypothesized that this keeps these plants from competing with the rest of the vegetation (Weber 1995), but early spring is when most perennials and native annuals must germinate and competition at this stage may be critical (Hanson and Dahl 1956, Campbell 1997).

A component of the upland prairies that was noticeably deficient in this study was native monocarpic plants. Native annuals are generally frequent components of native shortgrass and mixed-grass prairies, especially on prairie dog towns (Bennett 1993). There were 37 species of native monocarpic forbs sampled on the plots (Appendix 2), but all of them were relatively rare. Prairie dog towns in the study were dominated mostly by exotic species, which may account for the rarity of the native annuals.

The exotic C_3 pasture grasses that were common on all of the wetter plots were not mentioned by Vestal (1914), with the exception of *Poa pratensis*. These pasture grasses may have been introduced since that time or Vestal may not have examined those areas that had recently been seeded with pasture grasses. *Poa pratensis* may have been already naturalized in the area by 1914, but it is also possible that much of the *Poa pratensis* was actually the native counterpart, *Poa agassizensis*.

Changes in the frequency and distribution of native species since Vestal's study were not as obvious as the addition of exotics. Some differences could be due to actual changes in vegetation, but they also could be due simply to differences in sampling methods or locations. One change that most likely has occurred is the

increase in *Agropyron smithii* on the uplands. *Agropyron smithii* is considered a native species to this area, but it is also commonly planted from seed for range improvement, which may be partly responsible for its increase in density.

The increase in *Agropyron smithii*, in association with the increase in C_3 exotics, indicates a possible overall shift from C_4 to C_3 dominance in the grasslands around Boulder. This shift may have been due to the addition of exotic seed source to the system, which allowed the exotic species to invade. Another possible explanation is that the C_3 species are favored by terrestrial eutrophication (Chapter I). C_4 plants have been shown to have higher nitrogen use efficiencies (Brown 1978), and are more common in nitrogen limiting habitats (Barnes et al. 1983). The anthropogenic increases in atmospheric nitrogen deposition may have shifted the competitive balance in favor of C_3 species in some situations. This may be linked to the decrease in the importance of mycorrhizae in determining the vegetation. Mycorrhizal densities have been shown to be higher in C_4 dominated prairie than on C_3 dominated pastures (Miller et al. 1995).

CHAPTER III

MULTIVARIATE ANALYSIS OF PLANT FUNCTIONAL TYPES IN A HETEROGENOUS SUBURBAN GRASSLAND

Abstract

A principal components analysis was performed on eleven variables that described the structure of heterogeneous grassland communities on the City of Boulder Open Space in Colorado. Six of the variables were measurements of the cover of different plant functional types, two variables measured cover of bare ground and litter, and three variables were measurements of diversity. The first axis of the ordination described a gradient from plots with a high cover of exotic species to plots characterized by a large diversity of native plants. This axis was used to rate the plots for their vegetation quality and conservation value. The second axis corresponded to a moisture gradient from mesic to xeric, which was positively correlated with bare ground and negatively correlated with cover of exotic pasture grasses. The third axis

described a gradient from many exotic species to presence of bare ground and the fourth axis was correlated with heterogeneity with the plot.

Introduction

Grassland plant communities surrounding Boulder, Colorado are diverse in their species composition (Chapter II). This is due to a high spatial variability in the soil, topography and land use in the area. Boulder is located at the ecotone between Rocky Mountain forest and Great Plains grassland and also harbors several plant species and communities that are disjunct from distributions in the Eastern United States (Weber and Wittman 1996). The grasslands have been heavily fragmented in the last 100 years due to suburban and agricultural development.

These grassland fragments have been subjected to a wide variety of disturbance regimes. Most of the fragments have been heavily grazed by cattle at some point during this period, but for some of the fragments, the grazing has been fairly constant while others are grazed only during the winter or have been completely protected from grazing for a period of time. Other disturbances include mowing, recreation and atmospheric deposition of nutrients and herbicides.

Heterogeneity of the plant communities also is increased by the variable introduction of exotic species into the fragments. These introductions are often restricted to a small number of fragments. The exotic species also tend to respond to different historical land uses. The addition of exotic plants can displace native plants, or even alter ecosystem function (Vitousek 1986).

There were three primary goals of this research. The first was to relate these heterogeneous plots to each other in an ordination based upon community characteristics rather than the dominant species. The second goal was to determine the land use and landscape factors that shape the plant community structure on the Boulder grasslands. The last goal was to reduce data complexity, and develop a few composite variables, to describe the vegetation for use in comparisons with animal community measurements that have been taken on the same plots.

Materials and Methods

Background

Principal components analysis (PCA) is one of the most popular multi-variate statistical methods used in the study of vegetation (James and McCulloch 1990). The most common use of PCA in vegetation analysis is the ordination of sites based on the measurement of cover, or some other value of importance for a group of species. The limitation of this method is that PCA is most useful when the variables are near normally distributed (James and McCulloch 1990), and this condition is generally only met for common species in data sets with low β-diversity. Species most often deviate from normal distribution when they are not present in many of the sampling sites. An alternative use of PCA for data sets with high levels of β-diversity, is to analyze community structure by using plant functional types as variables.

The use of plant functional types is instructive because it is at that level that most land management practices have their effects. The drawback of this method is that the experimenter must subjectively choose the variables used in the analysis.

There are many ways in which to separate species of a community into groups, and the combinations of all of these ways can create so many variables that it approaches a species based method. For best results, the experimenter needs to choose the variables that are most important to the community being studied that will produce interpretable descriptive results.

Recently the study of plant functional types has received an increasing amount of attention (Golluscio and Sala 1993; Paruelo and Lauenroth 1996). Plant functional types (also called guilds or functional groups) are groups of species that have similar traits and roles in the ecosystem (Paruelo and Lauenroth 1996). Plants within a single functional type are thought to have an "ecological redundancy" (Walker 1992) that provide similar services to an ecosystem. However, this does not make multiple species within an ecosystem expendable because redundant species buffer the ecosystem against environmental change (Tilman and Downing 1994; Walker 1995). Redundancy is a difficult concept to measure in the field because there are many factors that affect how a species functions in an ecosystem, and some of these functions may not be obvious.

Two factors that often are used to separate plant functional types are photosynthetic pathway and growth form. Grasses with C_3 and C_4 photosynthetic pathways have been shown to have different effects on an ecosystem due to differences in phenology, habitat and structure. In the high plains, the C_3 grasses are also called cool-season grasses because they are most active in cool seasons, and are most common at high latitudes, high elevations and in shade conditions (Paruelo and Lauenroth 1996). C_4 (warm-season) grasses are most active in hot summer months,

and are most common in environments that are hot and wet, and especially where most of the precipitation falls in the summer (Paruelo and Lauenroth 1996). C_4 grasses are thought also to have higher maximum photosynthetic rates, higher nitrogen and water use efficiency, and to be more resistant to herbivory and decay, although there are exceptions to all of these (Caswell et al. 1973; Waller and Lewis 1979; Barnes et al. 1983; Paruelo and Lauenroth 1996).

There are several different methods by which plants can be divided based on growth form. One of the simplest and most common divisions is graminoid, forb, shrub and tree. Graminoids are considered to be grasses and grasslike plants (Poaceae, Cyperaceae and Juncaceae). These plants tend to be different functionally from forbs due to their wind pollination, linear leaves, and a greater reliance on physical rather than chemical defenses to herbivory. More detailed groupings may include non-vascular plants, sub-shrubs and succulents.

Life history has a large bearing on the function of a plant within an ecosystem. Long-lived perennial plants lend an ecosystem temporal stability, or "inertia" (Westman 1978). Communities dominated by annual plants are more likely to fluctuate over time (Hobbs and Mooney 1995). A problem with grouping plants into annuals and perennials is that biennial plants are not included in either. This problem can be addressed by combining annuals and biennials into a common class of monocarps, which are species that die after flowering. Polycarps are the multiple flowering species that usually create the structure of an ecosystem.

Native and exotic plants are not usually considered separate functional groups, but in communities in which they both have a significant presence it can be important

to separate them. The invasion of exotic plants has been shown to radically alter ecosystem function (Vitousek 1986; Walker and Smith 1997). Exotic plants tend to be fast growing with a large reproductive output. They are also usually generalists in their interaction with mycorrhizae, pollinators and seed dispersers (Bazzaz 1986).

Bare ground and plant litter are not plant functional types, but can be important determinants of community composition. Bare ground is important for seed germination of many plants. Litter has been shown to be important in a large variety of ecosystem and community processes (Hulbert 1969; Knapp and Seastedt 1986; Pierson and Mack 1990; Carson and Peterson 1990; Naeth et al. 1991).

Field Methods

Field data were collected from the same 68 plots that were used for plant community classification in Chapter II (Fig. 2.1, Table 2.1). Two sets of field data were used; frequency data from 1995 and 1996 described in Chapter II, and cover data collected in 1995 and 1996. Cover was sampled at each of the 68 study plots in both June and August of each year. During each sampling period, transects were established 100m due east and west from the plot center. Six point samples were measured at random points on a 1m semi-circle with an optical point projector at 4m intervals along these transects. This sampling resulted in 300 points per plot per sampling period (1200 total points). Living plant material was classified to species, dead material was recorded as litter, and rock and soil as bare ground. In the event of overlapping vegetation, all species under the vertical line were recorded..

Statistical Analysis

Variables Used in Analysis. Eleven variables were chosen for use in the principal components analysis. Eight of the variables were based on measurements of cover. Because these variables represent proportions, they were transformed with an angular transformation to improve normality (Sokal and Rohlf 1981). The richness and heterogeneity variables were left untransformed for analysis.

JUNE COVER OF NATIVE FORBS – The cover of monocarpic forbs was not a significant factor on most of the plots, so the monocarpic and polycarpic forbs were lumped together. Cover and diversity of native forbs was lower in August than in June due to senescence of many species, so June cover was used in the analysis.

JUNE COVER OF NATIVE C_3 POLYCARPIC GRASSES – These were cool-season mid-grasses such as *Agropyron smithii* and *Stipa spp.*

AUGUST COVER OF NATIVE C_4 POLYCARPIC GRASSES – These were the grasses that are most typical of both the tallgrass prairie (e.g. *Andropogon spp.*) and the shortgrass prairie (*Bouteloua gracilis* and *Buchloë dactyloides*). August cover was used because the species are warm season grasses that were most active in mid-summer.

JUNE COVER OF EXOTIC MONOCARPIC PLANTS – Annual exotic graminoids and forbs seemed to occupy similar niches, and often were found together, so they have been lumped together in this analysis. The most common plants were annual *Bromus spp.* and mustards (*Alyssum minus* and *Descurania spp.*).

JUNE COVER OF EXOTIC POLYCARPIC FORBS – This was a rather diverse group that includes taprooted rosettes (*Taraxacum officinale* and *Plantago*

spp.), clovers (*Trifolium spp.*), and deep rooted clonal species (*Cirsium arvense* and *Convolvulus arvense*).

JUNE COVER OF EXOTIC POLYCARPIC C_3 GRASSES – These were mostly European pasture grasses that had been planted intentionally for cattle forage (*Poa spp., Phleum pratense, Festuca pratensis, Dactylis glomerata,* and *Agropyron repens*).

JUNE COVER OF BARE GROUND AND JUNE COVER OF LITTER – For both of the years studied, any litter present in June was from at least the previous year's growth. Both of these variables were sampled only on points without live vegetative cover.

RICHNESS/M^2 OF NATIVE SPECIES AND RICHNESS/M^2 OF EXOTIC SPECIES – For these two variables, richness was defined as the average number of native or exotic species that occurred within each $1m^2$ quadrat during frequency sampling in July 1995 and 1996.

HETEROGENEITY – Heterogeneity is a measure of the change in plant communities within a plot. We used a simple measure of heterogeneity, which is the total number of species sampled in 24 $1m^2$ quadrats on each plot, divided by the average number of species per quadrat. Twelve of the quadrats on each plot were sampled in 1995 and 12 in 1996, so this variable is a combination of both spatial and temporal heterogeneity (Collins 1987).

Principal Components Analysis. A principal components analysis was performed using the eleven variables after transformation of the cover variables.

SPSS (1990) FACTOR was used for the analysis, which extracted four factors and used a varimax rotation.

Plot Identification. Plots are identified on the ordination diagrams in three different ways; plot numbers, dominant plant community and landscape context/land use. The plot numbers refer to the plot numbers in Table 2.1 and Figure 2.1. The dominant plant community was determined by using the communities that were described from the quadrat based clustering in Chapter II (Table 2.2). The dominant community for each plot was the community that occurred on the most quadrats on that plot. Plots dominated by minor communities were classified as "other". Plots that were dominated by quadrats that had less than three native species per m^2 were classified as exotic. Landscape context and land use was combined to create one variable to describe the plots. Three landscape contexts were recognized: uplands north of Boulder, uplands south of Boulder, and lowlands. Three land uses also were recognized; grazed, ungrazed and irrigated hayfields. There also were two plots that were restored prairie on an abandoned wheat field, and several plots that showed evidence of severe soil disturbance within the last 10 – 20 years.

Results

The first factor extracted from the principal component analysis explained 40.6% of the variance in the data set. This factor corresponded with relatively large loadings from six variables (Table 3.1), and described a gradient from plots dominated by exotic polycarpic grasses and forbs to plots with high levels of native

Table 3.1: Rotated factor matrix of the principal components analysis.

	Factor 1	Factor 2	Factor 3	Factor 4
Richness/m2 of Native Species	0.83993	0.13208	-0.28076	-0.13498
June Cover of Litter	0.83311	0.16394	0.18754	0.06401
August Cover of Native C_4 Grasses	0.80983	-0.03800	0.31697	0.23099
June Cover of Exotic Polycarpic Forbs	-0.74766	-0.23654	0.28865	0.10415
June Cover of Native Forbs	0.67497	0.23919	-0.35832	-0.02366
June Cover of Exotic Monocarpic Plants	0.19400	0.86810	0.05806	-0.00491
June Cover of Native C_3 Grasses	0.06225	0.85448	-0.22185	0.02349
June Cover of Exotic Polycarpic C_3 Grasses	-0.51440	-0.76638	0.07718	-0.20069
June Cover of Bare Ground	0.00924	0.54051	-0.41908	0.33688
Richness/m2 of Exotic Species	0.08953	-0.11498	0.83507	-0.15929
Heterogeneity	0.00278	0.11589	0.15584	0.92752

C_4 grasses, native forbs, high richness of native species and June cover of litter. Because this factor generally described a gradient from exotic dominated plots with few natives to plots with many native species and few exotic species, it corresponded well with the value of these plots for the purposes of native prairie conservation. On the ordination diagrams, we have drawn subjective vertical lines to separate the highest quality plots from moderate and low quality plots (Figure 3.1), the locations of which can be seen in Figure 3.2.

The second factor explained 18.0% of the variance, and correlated strongly with three variables: positively with cover of exotic monocarpic plants and native C_3 grasses, and negatively with cover of exotic polycarpic grasses (Table 3.1). This very roughly describes a moisture gradient from wet lowlands to dry uplands. The third factor explained 9.6% of the variance, and described a gradient from a high richness of exotic species to high cover of bare ground and native forbs. The fourth factor explained 8.6% of the variance, and was positively correlated with heterogeneity.

The ordination diagrams that relate the first two principal components to the plant communities and landscape/land use are useful for visualizing the relationships of the plots to one another based on the variables used in the analysis (Figures 3.3 and 3.4). Examination of the plant community ordination (Figure 3.3) shows that the communities tended to group in similar regions, but the grouping was by no means absolute. The land use/landscape context ordination (Figure 3.4) also shows a certain level of mixing among each of the groups.

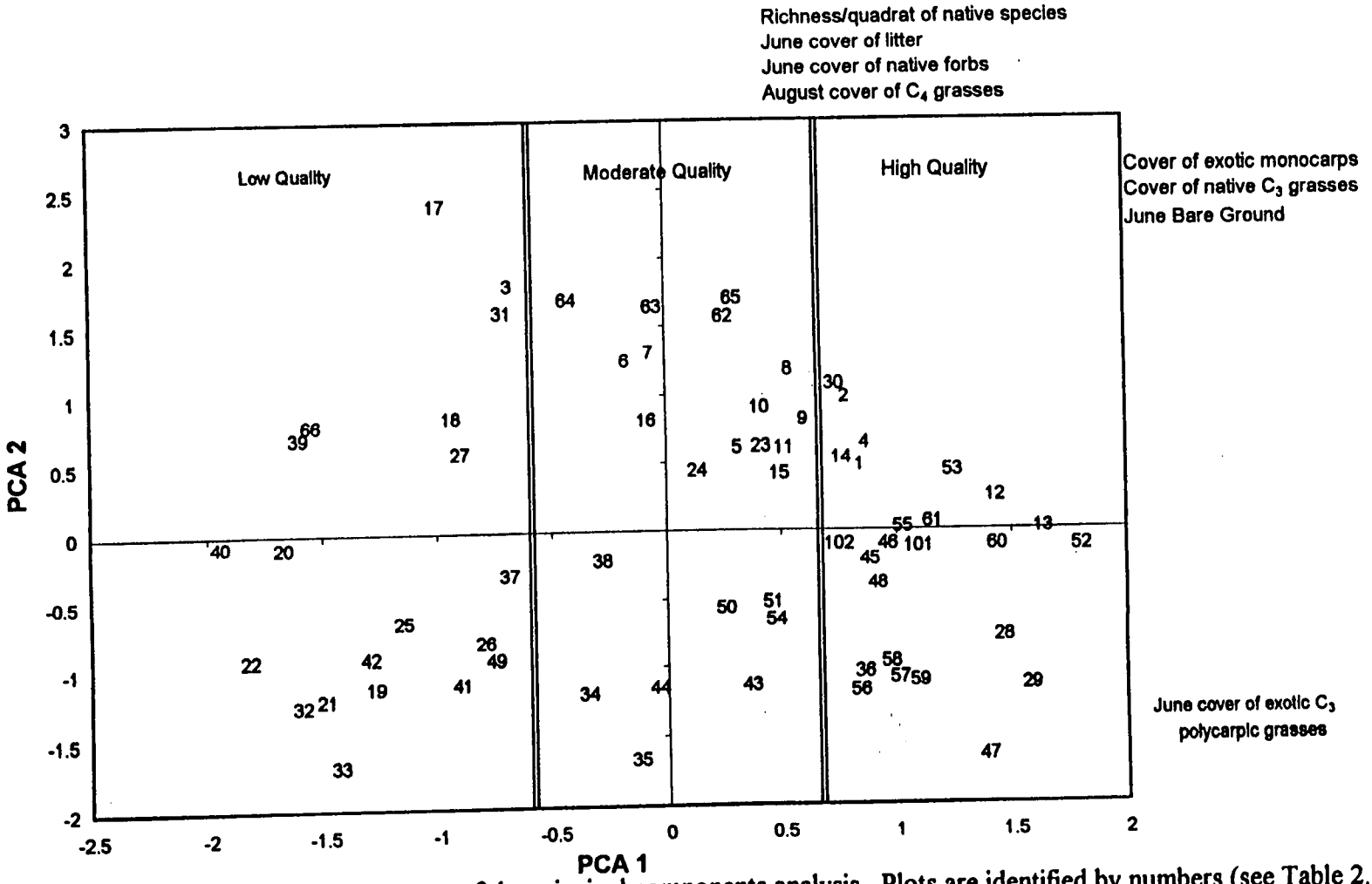
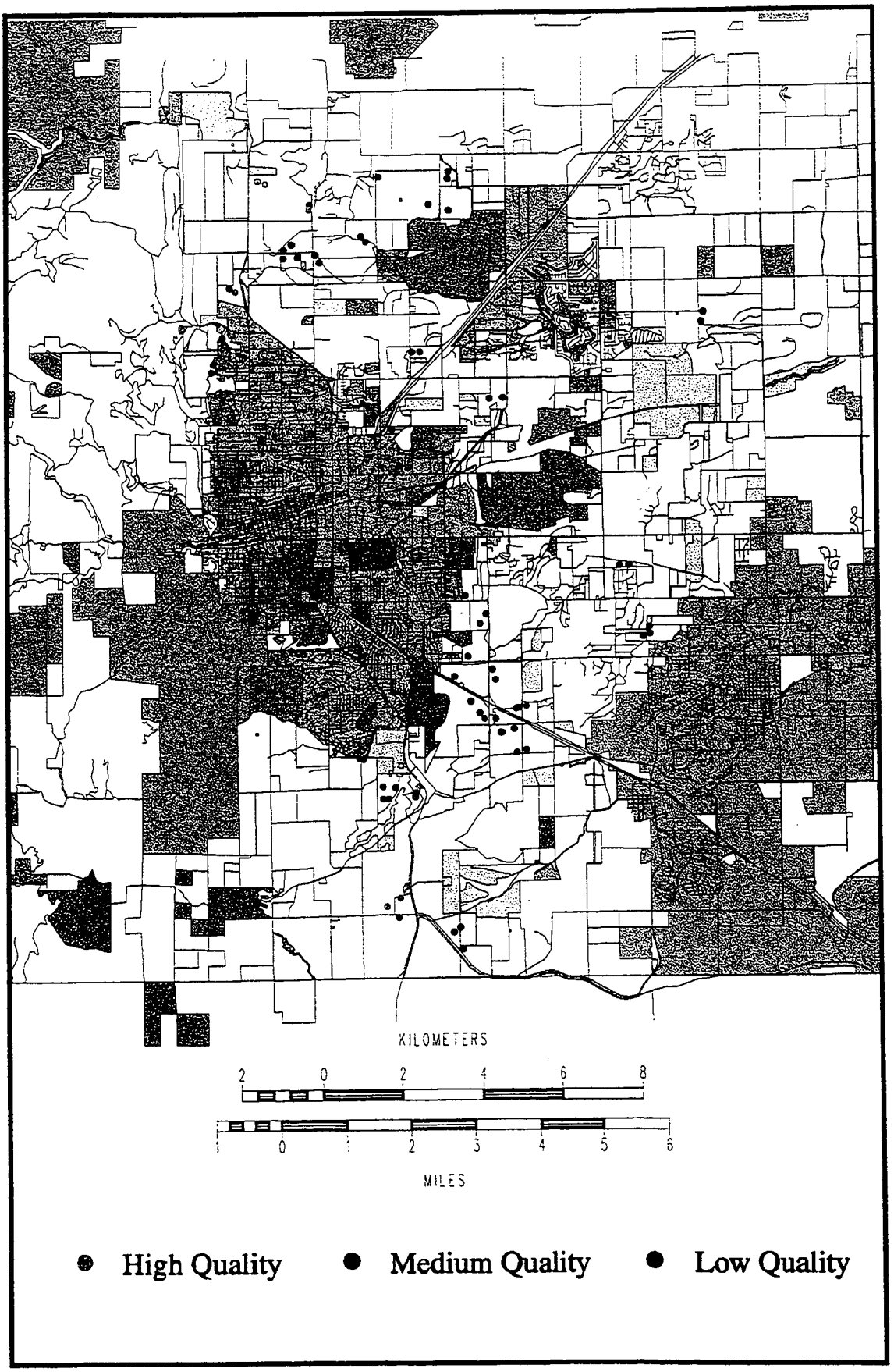


Figure 3.1: Ordination of the first two axes of the principal components analysis. Plots are identified by numbers (see Table 2.1 and Fig. 2.1).


KILOMETERS
2 0 2 4 6 8
1 0 1 2 3 4 5 6
MILES
High Quality
Medium Quality
Low Quality

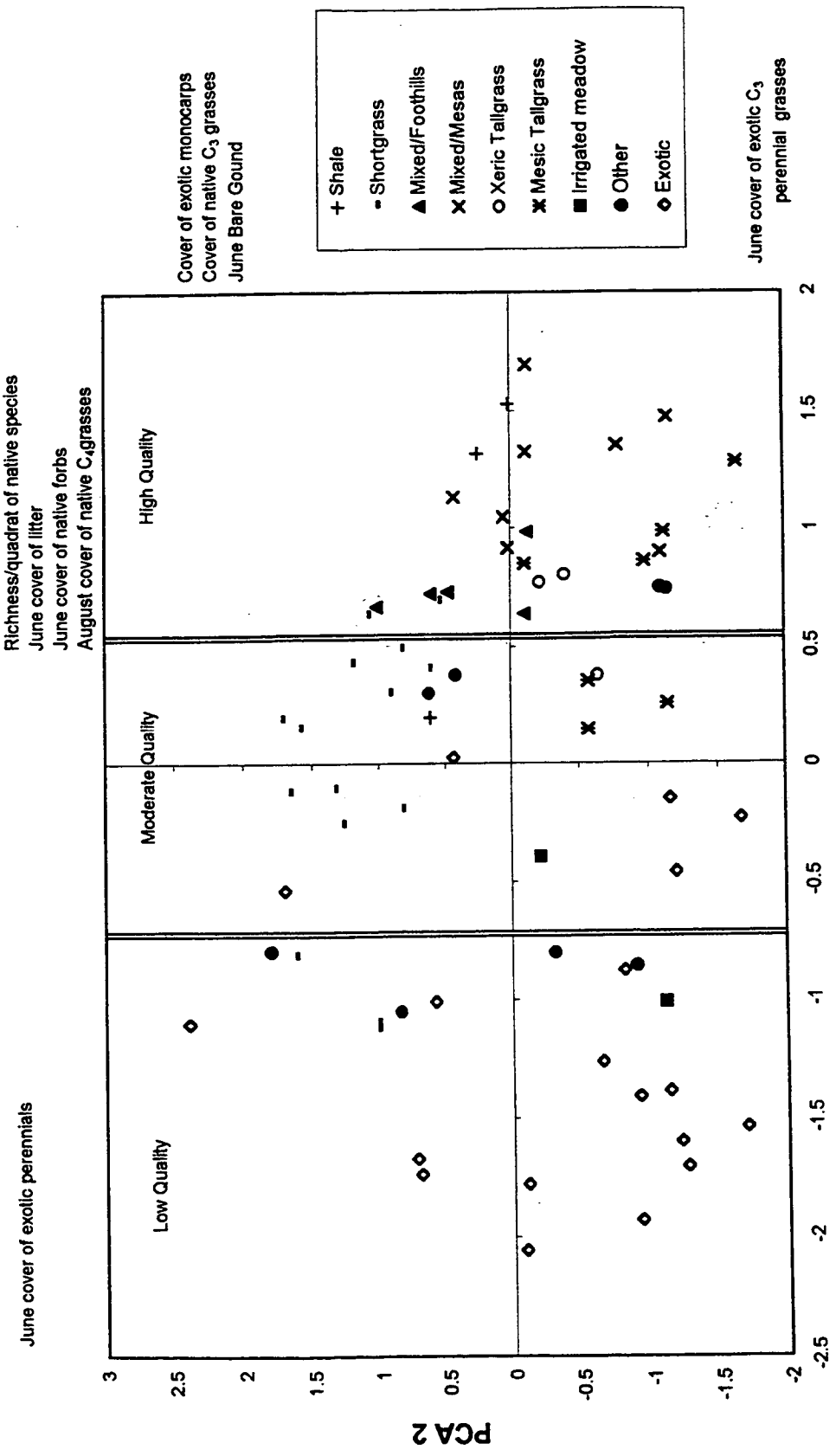


Figure 3.3: Ordination of the first 2 axes of the principal components analysis. Plots are identified by their dominant plant community.

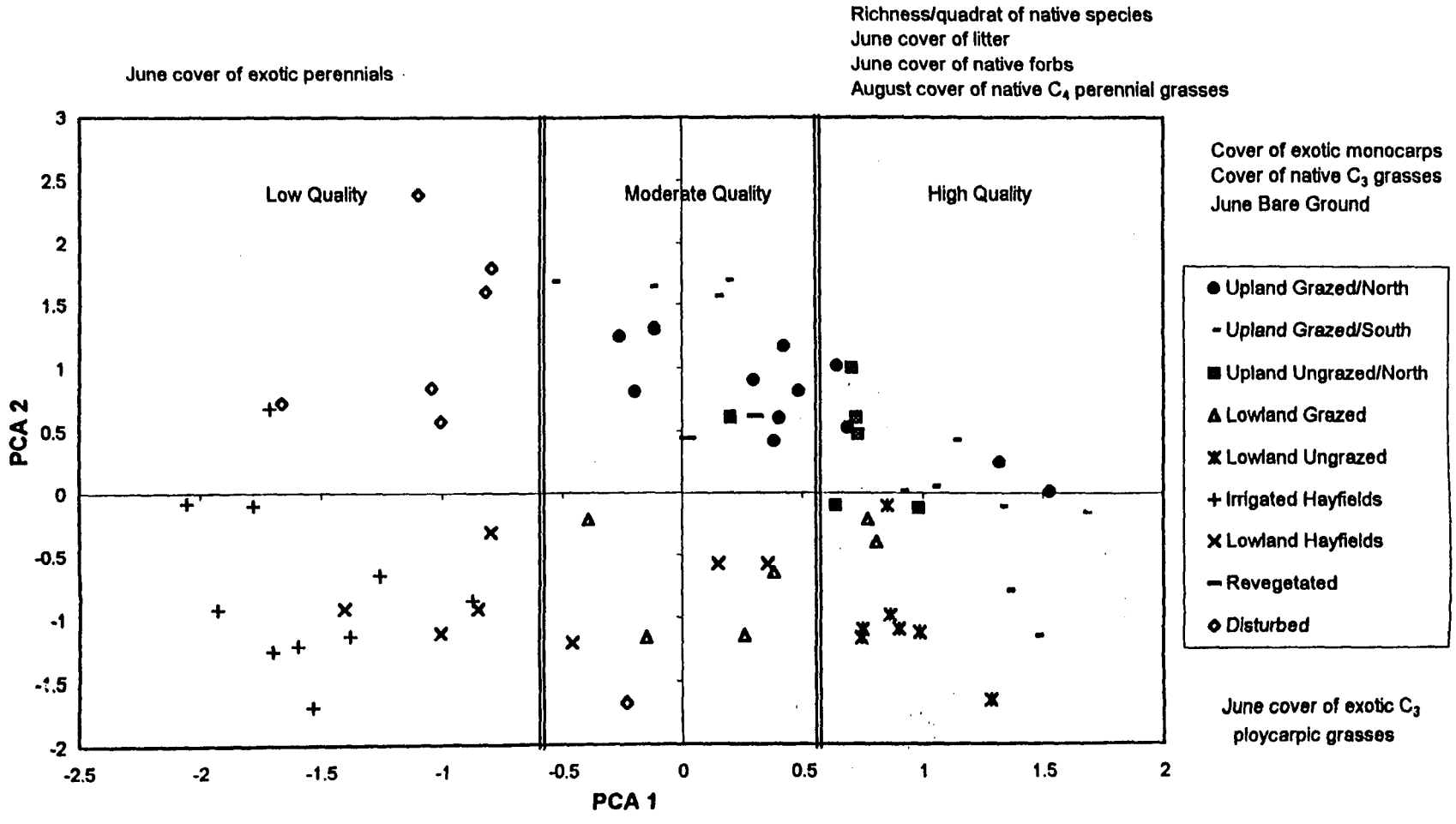


Figure 3.4: Ordination of the first 2 axes of the principal components analysis. Plots are identified by their landscape context and land use.

Discussion

The first axis of the principal components analysis was by far the most important factor in ordinating the plots. This factor explained more than twice as much of the variation than any of the other factors. The gradient that it describes is from communities with a high cover of polycarpic exotics to communities with a high diversity of native species. It is possible that exotic species have invaded areas that were naturally low in species richness, but it is more likely that the exotics have displaced the native species, or that the exotics invaded the areas after the native species were lost due to anthropogenic disturbance. The correlation of June litter cover with the first axis may be due to lower levels of disturbance on these plots, or a result of the higher cover of C_4 plants in August on these plots.

The second axis is interesting because it separated two different types of exotic species, the polycarpic grasses and the monocarps. This axis separates the lowland and irrigated plots from the drier ones, with the exception of plots 28 and 29 which occur on an escarpment that may supply a near-surface water table (Figure 3.1). The correlation of native C_3 grasses with bare ground and exotic monocarps is not as obvious, but may be due to the preference of the native C_3 grasses for the drier upland areas.

The upper right-hand corners of the graphs are noticeably empty. It is in this area that good quality shortgrass areas, especially prairie dog towns, would be located. Milchunas et al. (1989) found that shortgrass prairie at the Pawnee Grasslands in Colorado were relatively resistant to invasion by exotic plants. At Wind Cave National Park in South Dakota, shortgrass prairie on active prairie dog

towns had very few exotic species, but when the prairie dogs were removed, exotic species were able to invade (Bennett 1993). The lack of high quality shortgrass areas may be due to the fact that these habitat types do not have a long history in this area, or may be due to the loss of the disturbance regime that maintained these communities. The prairie dog colonies in the Boulder area are susceptible to bubonic plague outbreaks, and most of the colonies were exterminated by plague during the study which may have allowed invasion by exotic plants. It is likely that the greater amounts of exotic plants on Boulder Open Space shortgrass is a result of atmospheric nitrogen deposition and other factors associated with suburban habitat fragments (Chapter I).

The assignment of the three quality classes was subjective, but these cutoffs corresponded well to observations that we had made during three years of fieldwork on these plots. The one exception to this is plot #5 which we would consider a high quality plot, but the richness of the plot is low because of the large amounts of bare ground on the shale soils. An important point to realize is that this is a measurement of these communities at one point in time. Grasslands are known to change structure and composition relatively rapidly, and respond readily to land management and climatic changes (Dodd et al. 1995). How these plots are managed will determine whether they improve or decline in quality.

There are several possibilities to expand this analysis. Instead of combining the two years, they could be analyzed separately so that annual changes in the variables can be assessed. This can be useful to determine the short-term effects of land management changes. Discriminant function analysis could be performed on the

same data set to force the grouping of the plots with respect to the plant communities. The four extracted principal components also could be correlated with data on animal species. It is likely that the factors that are most important in structuring plant communities may be different from the ones that are important in structuring animal communities.

CHAPTER IV

MANAGEMENT OPTIONS FOR BOULDER GRASSLANDS

Ecosystem Management of Great Plains Grasslands

Disturbance History

Effective management of Great Plains grasslands is a difficult task because grassland communities show strong responses to disturbance regimes, and the large scale disturbances that once dominated the Great Plains no longer occur. The three most important kinds of disturbance on the Great Plains were drought, grazing and fire. In the tallgrass prairie, fire was likely more important than grazing, while shorter grasslands were mostly impacted by grazing. A gradient probably occurred between these two extremes, so that most regions were affected by both disturbances.

The Great Plains grasslands are likely of a relatively recent (post-Pleistocene) origin (Axelrod 1985). Since that time, two events have drastically altered the region. The first event occurred approximately 10,000 years ago when humans first entered the area. At this time, massive extinctions of large mammal species occurred in North America (Martin 1987). For the next 10,000 years, grassland communities evolved under the dominant effects of three animal species, bison (*Bison bison*),

with cattle. Cattle have been shown to be fundamentally different from bison in their grazing methods at both large and small scales (Schwartz and Ellis 1981). At the landscape scale, cattle prefer the moist lowland areas during the warm months, while bison are most often found on the uplands. At a smaller scale, cattle are more selective grazers, avoiding C_4 grasses and eating mostly C_3 grasses and forbs.

Three other factors distinguish livestock grazing systems from natural grazing systems. The first is the reduction in the diversity of grazers. Grazing by a diversity of species will theoretically result in a more diverse vegetation (Howe 1994b). The second factor is the increase in animal densities on livestock systems as a result of food, mineral and water supplementation, predator control and veterinary practices (McNaughton 1993). The final factor is the reduced mobility of grazers in livestock systems. It is likely that large bison cow/calf herds migrated widely, grazing areas severely, but not returning until the area had time to recover. The method of rotational grazing is an attempt to partially recreate this facet of the native grazing system. This method, when used properly, can result in improved vegetation. Unfortunately, many livestock managers are following a system of short grazing periods and short rest periods at livestock densities at least twice as high as conventional levels (e.g. Savory 1983), which is leading to range deterioration (Willms et al. 1990).

On the mixed and shortgrass prairies, prairie dogs (*Cynomys ludovicianus*) are a keystone species that many native plants and animals depend on historically (Miller et al. 1994). The concentration of prairie dog activity on prairie dog towns creates a

patch structure on the landscape that has a large effect on the vegetation and the activity of animals (Whicker and Detling 1988).

Fire

With the exception of the shortgrass prairie, fire was an important disturbance affecting the vegetation on Great Plains grasslands before European settlement. For areas that have evolved with fire, its exclusion can be thought of as a disturbance to the system (Biondini et al. 1989). In the tallgrass prairie, fire should be considered as a necessary component for its preservation (Hulbert 1969). Spring burning of tallgrass areas usually results in dramatic increases in biomass and flowering of the tallgrass species due to increased available light, temperature and nitrogen (Hulbert 1988). Fire has also been shown to reduce densities of invasive woody plants and C_3 grasses, especially *Bromus spp.* and *Poa spp.* (Curtis and Partch 1948, Collins 1987, Bock and Bock 1989, Santanachote 1992). If non-native grasses have also evolved in a fire-adapted system, burning is less likely to remove them (Bock and Bock 1992).

While fire may have apparent permanent effects on an ecosystem (Bock and Bock 1989, D'Antonio and Vitousek 1992), usually repeated fires are necessary to obtain management objectives. Gibson and Hulbert (1987) found that a fire cycle of four to eight years resulted in maximum diversity in Kansas tallgrass prairie. Shorter fire cycles resulted in dominance by C_4 tallgrass species and longer fire cycles resulted in reduction of C_4 grasses and an increase in *Poa pratensis, Bromus japonicus* and several forbs.

The season of burning has a strong effect on the resultant vegetation (Biondini et al. 1989, Howe 1994a). Howe (1994b) argues that the present practice of spring

burning is not necessarily the best method for tallgrass conservation. Spring burning encourages the C_4 tallgrass species, but it is historically inaccurate, and comes at the expense of a wide variety of native forbs.

Other Disturbances and Interactions

There are several small scale disturbances that are important on Great Plains grasslands, including fecal pats, harvester ant mounds, bison wallows and mounds of burrowing animals such as prairie dogs, gophers and badgers (Collins and Barber 1985, Coffin and Lauenroth 1988, Uno 1989). While these disturbances are small and affect a small part of the grassland, they result in bare soil and usually add to the diversity of the vegetation.

There also are strong interactions among disturbances. For example, bison are strongly attracted to areas that have been burned in the previous year (Bock and Bock 1989, Vinton et al. 1993). Prairie dog towns are locations of increased bison wallowing, and increased grazing by both bison and pronghorn (*Antilocarpa americana*) (Koford 1958, Coppock et al .1983, Wydeven and Dahlgren 1985, Krueger 1986, Whicker and Detling 1988).

Conservation Opportunities for Boulder Grasslands

General Strategies

The grasslands on the City of Boulder Open Space constitute a significant biological resource with high conservation value. Vegetation is very diverse. This is true both at a small scale, with some areas averaging over 25 species per m^2, and at a landscape scale, with several fundamentally different community types co-existing

within a relatively small region. Some of these community types are rare, and significant in their own right, especially the tallgrass, shale, and mesa communities. Fortunately, this land is publicly owned and managed by a department with considerable funds per unit area and a mandate for the conservation of natural systems. As the Open Space Department matures, funds will need to be transferred from acquisitions to management to maintain the conservation value of these areas.

There are many problems that must be faced if conservation of these grasslands is to be successful. These problems include reduction and fragmentation of the grassland, alteration of the disturbance regime, invasion of many exotic plants and animals, inputs of anthropogenic nitrogen, and trampling of vegetation by recreational users. Many of these problems are related, and proper management should be able to mitigate some of the effects.

There should be three primary goals when managing the grasslands for conservation value: 1) control and reduction of exotic plant densities, 2) maintenance of native plant populations and communities, and 3) restoration of native communities on degraded areas. The first two goals are intractably linked because increases in exotic plants will degrade native communities and management of exotic species will not be effective without addressing the causal roles of the original invasion and managing the native plants along with the exotics (Luken 1997, Woods 1997).

The primary effort for management of exotic species on Boulder grasslands should be directed at the ecosystem (Hobbs and Humphries 1995) or community level (Woods 1997). One of the primary factors causing the invasion of exotic species is

the alteration of the natural disturbance regime (Huenneke 1997). This can be caused either by the increase or decrease in the intensity, frequency or quality of a disturbance. Often the restoration of the pre-settlement disturbance regime will favor the native species over exotic species.

Where possible, exotic species that do not respond to ecosystem management should be managed through hand weeding and judicious mowing. This approach is only effective for certain species, such as large monocarpic plants like knapweed (*Centaurea diffusa*) and Mediterranean sage (*Salvia aethiopis*). Volunteers could be recruited from local groups, through advertising and through the community service program.

Biological control is a viable method for those species for which effective measures have been discovered. There are some dangers of impacts on non-target species but previous results in the United States have been very positive (DeLoach 1997). Plants of local concern for which biological control measures have been developed include knapweed, Mediterranean sage, bindweed (*Convolvulus arvensis*) and leafy spurge (*Euphorbia uralensis*). At least 14 different biological controls have been used to control knapweed, and two tephritid flies were found to reduce seed output on diffuse knapweed by 75% to 95% (DeLoach 1997).

The use of herbicides to control exotic species should be used only when all other options have proven futile and even then extreme care should be taken. The potential heath effects of herbicides coupled with the juxtaposition of Boulder grasslands with dense human populations, makes large-scale applications unadvisable. When herbicides are to be used, they should be used in conjunction with

management strategies to enhance native plant populations, or else the newly created openings in the vegetation are likely to be reinvaded by exotics (Hobbs and Humphries 1995, Luken 1997).

Specific Strategies

The plots that were described in Chapter III as being of highest quality should generally be maintained with the current management strategy (Figure 3.1). Because these areas have an especially high conservation value they should be monitored for changes in exotic plant cover and native plant richness. The moderate quality plots are where native plant communities are currently most at risk. The bulk of the management resources should be directed to these areas before the native communities become further degraded. The low quality plots have little conservation value and care should just be taken that they do not serve as exotic seed sources for more natural areas. These low quality areas are also prime candidates for future prairie restoration.

The North Boulder upland area is the best location for the initial reintroduction of bison. The presence of bison on Open Space not only makes ecological sense, but would also inspire more public support for the Open Space mission. Using bison as a management tool would be most effective if stocked at light to moderate densities and allowed to graze in large enclosures. Clements (1936) estimated that pre-settlement bison densities across the Great Plains were about $10/mi^2$, although others have somewhat lower estimates. A good starting point would allow a herd of 20 on Boulder Valley Ranch and an additional 10 if the Beech property east of Foothills Highway was added. The agricultural fields northwest of

Boulder Reservoir could be revegetated and eventually added to the available grazing area.

The lowlands along the floodplain of South Boulder Creek are all areas of potential tallgrass prairie vegetation and should be managed for that purpose. The current areas of tallgrass prairie are all in moderate condition because they contain a significant component of exotic C_3 grasses. Most of these areas should be burned in the springtime on a three to five year rotation with careful monitoring for potential damage to native C_3 grasses and forbs. Small areas should be left unburned for experimental comparison. Winter grazing by cattle (or bison) could be continued, but the densities should be reduced.

The irrigated hayfields on the South Boulder Creek floodplain contain several tallgrass species with very low cover. These areas can be managed to encourage the spread of the tallgrass species at the expense of the C_3 graminoids. This could be accomplished through the elimination of mid-summer haying and a reintroduction of fire. There have been several successful tallgrass prairie restoration projects on the eastern Great Plains, but very little, if any, work has been done in Colorado. Since the tallgrass is such a valuable conservation resource, and restricted to such a small area, restoration efforts are very important (Kathleen Keeler, pers. Comm.).

The uplands on the mesas south of Boulder contain high quality grasslands. The main threat to these areas seems to be the replacement of the prairie by ponderosa pine forest. The controlled burning program to halt the invasion of the pines should be intensified and accompanied by appropriate physical thinning (axing) of saplings. The South Boulder region contains some large Open Space parcels.

These areas also would make a good location for the reintroduction of bison. The area north of South Boulder Creek would be a good starting point, and an underpass or road crossing across Highway 170 would open up another large parcel in the Dowdy Draw area.

Two of the plots that I sampled (23 and 24) were on an abandoned wheat field that had been restored as a mixed-grass prairie. The results of the restoration were moderately successful. A matrix of native grasses has developed without a significant problem of exotic plants, which is likely due to the lack of nitrogen in the soil (judging from the yellowness of the grasses). What the community lacks is a native forb component. A second stage of restoration should be undertaken on the plots by adding seeds of native forbs.

The Boulder area is fortunate in that the population of Boulder has a strong conservation ethic, and the populace is even willing to pay extra taxes to preserve open spaces around their city. This is still a rare phenomenon in the United States. Unfortunately, the presence of the city and its population is damaging to the ecosystems that the population wishes to preserve. Aggressive management practices, coupled with public education may be the only way that the unique ecosystems of this area can be preserved.

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Appendix 1: List of species encountered in the study separated by plant functional type. Synonomies are shown between Great Plains Flora Association (1986) and Weber and Whitman (1996). N/A = Species not in Great Plains Flora.

Native Polycarpic C_4 Graminoids

GP Flora (1986)	Weber and Whitman (1996)	Family
Andropogon gerardii		Poaceae
Aristida purpurea		Poaceae
Bouteloua curtipendula		Poaceae
Bouteloua gracilis	*Chondrosum gracile*	Poaceae
Bouteloua hirsuta	*Chondrosum hirsutum*	Poaceae
Buchloe dactyloides		Poaceae
Calamovilfa longifolia		Poaceae
Distichlis spicata	*Distichlis stricta*	Poaceae
N/A	*Muhlenbergia wrightii*	Poaceae
Muhlenbergia asperifolia		Poaceae
Muhlenbergia montana		Poaceae
Muhlenbergia racemosa	*Muhlenbergia racemosa*	Poaceae
Panicum virgatum		Poaceae
Andropogon scoparius	*Schizachyrium scoparium*	Poaceae
Schedonnardus paniculatus		Poaceae
Sorghastrum nutans	*Sorghastrum avenaceum*	Poaceae
Spartina pectinata		Poaceae
Sporobolus airoides		Poaceae
Sporobolus asper		Poaceae
Sporobolus cryptandrus		Poaceae
Sporobolus heterolepis		Poaceae

Native Polycarpic C_3 Graminoids

GP Flora (1986)	Weber and Whitman (1996)	Family
Carex heliophylla	*Carex pensylvanica*	Cyperaceae
Carex lanuginosa		Cyperaceae
Carex nebrascensis		Cyperaceae
Carex scoparia		Cyperaceae
N/A	*Carex simulata*	Cyperaceae
Carex praegracilis		Cyperaceae
Carex stipata		Cyperaceae
Carex brevior		Cyperaceae
Eleocharis compressa	*Eleocharis elliptica*	Cyperaceae
Eleocharis macrostachya	*Eleocharis palustris*	Cyperaceae
Scirpus acutus	*Schenoplectus lacustris*	Cyperaceae
Juncus balticus	*Juncus arcticus*	Juncaceae
Juncus longistylis		Juncaceae
Juncus nodosus		Juncaceae
Agropyron smithii	*Pascopyrum smithii*	Poaceae
Alopecurus aequalis		Poaceae
Calamagrostis canadensis		Poaceae
Dicanthelium acuminatum		Poaceae
Danthonia spicata		Poaceae

Appendix 1: Continued

Native Polycarpic C_3 Graminoids (Cont.)

GP Flora (1986)	Weber and Whitman (1996)	Family
Glyceria grandis		Poaceae
Hordeum jubatum	*Critesion jubatum*	Poaceae
Koeleria pyramidata	*Koeleria macrantha*	Poaceae
Oryzopsis hymenoides	*Achnatherum hymenoides*	Poaceae
Poa arida		Poaceae
Poa juncifolia		Poaceae
Poa palustris		Poaceae
Poa sandbergii	*Poa secunda*	Poaceae
Sitanion hystrix	*Elymus elymoides*	Poaceae
Sitanion longifolius	*Elymus longifolius*	Poaceae
Stipa comata	*Hesperostipa comata*	Poaceae
Stipa neomexicana	*Hesperostipa neomexicana*	Poaceae
Stipa robusta	*Achnatherum robustum*	Poaceae
Stipa spartea	*Hesperostipa spartea*	Poaceae
Stipa viridula	*Nassella viridula*	Poaceae

Native Monocarpic C_3 Graminoids

GP Flora (1986)	Weber and Whitman (1996)	Family
Cyperus aristatus		Cyperaceae
Juncus bufonius		Juncaceae
Dicanthelium oligosanthes		Poaceae
Festuca octoflora	*Vulpia octoflora*	Poaceae

Native Monocarpic Forbs

GP Flora (1986)	Weber and Whitman (1996)	Family
Ambrosia tomentosa		Asteraceae
Cirsium ochrocentrum		Asteraceae
Cirsium undulatum		Asteraceae
Dyssodia papposa		Asteraceae
Erigeron divergens		Asteraceae
Grindelia squarrosa		Asteraceae
Helianthus annuus		Asteraceae
Rudbeckia hirta		Asteraceae
Cryptantha minima		Boraginaceae
N/A	*Oreocarya virgata*	Boraginaceae
Lappula redowskii		Boraginaceae
Descurainia pinnata		Brassicaceae
Draba reptans		Brassicaceae
Cerastium nutans		Caryophylaceae
Chenopodium dessicatum		Chenopodiaceae
Chenopodium incanum		Chenopodiaceae
Equisetum arvense		Equisetaceae
Equisetum laevigatum	*Hippochaete laevigata*	Equisetaceae
Euphorbia marginata	*Agaloma marginata*	Euphorbiaceae
Euphorbia glyptosperma	*Chamaesyce glyptosperma*	Euphorbiaceae
Euphorbia spathulata	*Tithymalus spathulatus*	Euphorbiaceae

Appendix 1: Continued

Native Monocarpic Forbs (Cont.)

GP Flora (1986)	Weber and Whitman (1996)	Family
Phacelia heterophylla		Hydrophylaceae
Hedeoma hispidum		Lamiaceae
Dracocephalum parviflorum		Lamiaceae
Monarda pectinata		Lamiaceae
Teucrium canadense		Lamiaceae
N/A	*Epilobium paniculatum*	Onagraceae
Gaura parviflora	*Guara mollis*	Onagraceae
Oenothera villosa		Onagraceae
Oxalis dillenii		Onagraceae
Argemone polyanthemos		Papaveraceae
Plantago patagonica		Plantaginaceae
Collomia linearis		Polemoniaceae
N/A	*Ipomopsis aggregata*	Polemoniaceae
Polygonum douglasii		Polygonaceae
Androsace occidentalis		Primulaceae
Centunculus minimus	*Anagallis minima*	Primulaceae

Native Polycarpic Forbs

GP Flora (1986)	Weber and Whitman (1996)	Family
Yucca glauca		Agavaceae
Alisma triviale		Alismataceae
Allium textile		Alliaceae
Rhus aromatica		Anacardiaceae
Toxicodendron rydbergii		Anacardiaceae
Lomatium orientale		Apiaceae
Musineon divaricatum		Apiaceae
Asclepias engelmanniana		Asclepiadaceae
Asclepias incarnata		Asclepiadaceae
Asclepias pumila		Asclepiadaceae
Asclepias speciosa		Asclepiadaceae
Asclepias stenophylla		Asclepiadaceae
Asclepias viridiflora		Asclepiadaceae
Achillea millefolium	*Achillea lanulosa*	Asteraceae
Ambrosia trifida		Asteraceae
Ambrosia psilostachya		Asteraceae
Antennaria microphylla	*Antennaria rosea*	Asteraceae
Arnica fulgens		Asteraceae
Artemisia dranunculus	*Oligosporus dranunculus*	Asteraceae
Artemisia frigida		Asteraceae
Artemisia campestris	*Oligosporus pacificus*	Asteraceae
Artemisia ludoviciana		Asteraceae
Aster falcatus	*Virgulus falcatus*	Asteraceae
Aster laevis		Asteraceae
N/A	*Aster porteri*	Asteraceae
Aster ericoides		Asteraceae
Chrysothamnus nauseosus		Asteraceae

Appendix 1: Continued

Native Polycarpic Forbs (Cont.)

GP Flora (1986)	Weber and Whitman (1996)	Family
Cirsium flodmanii		Asteraceae
Erigeron speciosus		Asteraceae
Gaillardia aristata		Asteraceae
Gutierrezia sarothrae		Asteraceae
Helianthus pumilus		Asteraceae
Helianthus rigidus		Asteraceae
Chrysopis villosa	*Heterotheca villosa*	Asteraceae
Iva axillaris		Asteraceae
Kuhnia eupatoriodes	*Brickella eupatoriodes*	Asteraceae
Liatris punctata		Asteraceae
Lygodesmia juncea		Asteraceae
Haplopappus spinulosus	*Machaeranthera pinnatifida*	Asteraceae
Microseris cuspidata		Asteraceae
Solidago rigida	*Oligoneuron rigidum*	Asteraceae
Senecio pseudoaureas	*Packera pseudaurea*	Asteraceae
Picradeniopsis oppositifolia		Asteraceae
Ratibida columnifera		Asteraceae
Senecio integerimus		Asteraceae
Solidago missouriensis		Asteraceae
Senecio plattensis	*Packera plattensis*	Asteraceae
Senecio spartioides	*Hymenopappus filifolius*	Asteraceae
Solidago nemoralis	*Solidago nana*	Asteraceae
Solidago mollis		Asteraceae
Solidago sparsiflora	*Solidago velutina*	Asteraceae
Solidago gigantea		Asteraceae
Thelesperma megapotamicum		Asteraceae
Townsendia exscapa		Asteraceae
Cryptantha jamesii	*Oreocarya suffruticosa*	Boraginaceae
Lithospermum incisum		Boraginaceae
Mertensia lanceolata		Boraginaceae
Onosmodium molle		Boraginaceae
Barberea orthoceras		Brassicaceae
Erysimum asperum		Brassicaceae
Lesquerella montana		Brassicaceae
N/A	*Physaria bellii*	Brassicaceae
Stanleya pinnata		Brassicaceae
Coryphantha missouriensis		Cactaceae
Coryphantha vivipara		Cactaceae
Echinocereus viridiflorus		Cactaceae
Opuntia macrorhiza		Cactaceae
Opuntia fragilis		Cactaceae
Opuntia polyacantha		Cactaceae
Campanula rotundifolia		Campanulaceae
Symphoricarpos occidentalis		Caprifoliaceae
Arenaria fendleri	*Ergemone fendleri*	Caryophylaceae
Cerastium arvense	*Cerastium strictum*	Caryophylaceae
Silene drummondii	*Gastrolychnis drummondii*	Caryophylaceae

Appendix 1: Continued

Native Polycarpic Forbs (Cont.)

GP Flora (1986)	Weber and Whitman (1996)	Family
Paronychia jamesii		Caryophylaceae
N/A	*Silene scouleri*	Caryophylaceae
Ceratoides lanata	*Krascheninnikovia lanata*	Chenopodiaceae
Atriplex canescens		Chenopodiaceae
Tradescantia occidentalis		Commelinaceae
Evolvulus nuttallianus		Convolvulaceae
Euphorbia fendleri	*Chamaesyce fendleri*	Euphorbiaceae
Euphorbia robusta	*Tithymalus brachyceras*	Euphorbiaceae
Tragia ramosa		Euphorbiaceae
Amorpha nana		Fabaceae
Astragalus adsurgens		Fabaceae
Astragalus bisulcatus		Fabaceae
Astragalus flexuosus		Fabaceae
Astragalus agrestis		Fabaceae
Astragalus drummondii		Fabaceae
Astragalus gracilis		Fabaceae
Astragalus shortianus		Fabaceae
Astragalus sericoleucus	*Orophaca tridactylica*	Fabaceae
Dalea candida		Fabaceae
Dalea purpurea		Fabaceae
Glycyrrhiza lepidota		Fabaceae
Hedysarum boreale		Fabaceae
N/A	*Lathyrus eucosmus*	Fabaceae
Lupinus argenteus		Fabaceae
Oxytropis lambertii		Fabaceae
Oxytropis sericea		Fabaceae
Psoralea argophylla	*Psoralidium argophyllum*	Fabaceae
Psoralea tenuiflora	*Psoralidium tenuiflorum*	Fabaceae
Thermopsis divaricarpa		Fabaceae
Vicia americana		Fabaceae
N/A	*Geranium caespitosum*	Geraniaceae
Iris missouriensis		Iridaceae
Sisyrinchium montanum		Iridaceae
Triglochin maritima		Juncaginaceae
Lycopus americanus		Lamiaceae
Mentha arvensis		Lamiaceae
Monarda fistulosa		Lamiaceae
Prunella vulgaris		Lamiaceae
Scutellaria brittonii		Lamiaceae
Calochortus gunnisonii		Liliaceae
Leucocrinum montanum		Liliaceae
Smilacena stellata	*Maianthemum stellatum*	Liliaceae
Zigadenos venenosus	*Toxicoscordion venenosum*	Liliaceae
Linum perenne	*Adenolinum lewisii*	Linaceae
Mentzelia nuda	*Nuttallia nuda*	Loasaceae
N/A	*Nuttallia speciosa*	Loasaceae
Sphaeralcea coccinea		Malvaceae

Appendix 1: Continued

Native Polycarpic Forbs (Cont.)

GP Flora (1986)	Weber and Whitman (1996)	Family
Mirabilis hirsutus	*Oxybaphus hirsutus*	Nyctaginaceae
Mirabilis linearis	*Oxybaphus linearis*	Nyctaginaceae
Mirabilis nyctaginea	*Oxybaphus nyctagineus*	Nyctaginaceae
Calylophus serrulatus		Onagraceae
N/A	*Epilobium glandulosum*	Onagraceae
Gaura coccinea		Onagraceae
Oenothera howardii	*Oenothera howardii*	Onagraceae
Orobanche fasciculata	*Aphyllon fasciculatum*	Onagraceae
Eriogonum alatum	*Pterogonum alatum*	Polygonaceae
Eriogonum brevicaule		Polygonaceae
Eriogonum effusum		Polygonaceae
Talinum parviflorum		Portulacaceae
Lysmachia ciliata		Primulaceae
Clematis hirsutissima	*Coriflora hirsutissima*	Ranunculaceae
Delphinium virescens		Ranunculaceae
Ranunculus macounii		Ranunculaceae
Thalictrum dasycarpum		Ranunculaceae
Ceanothus herbaceus		Rhamnaceae
Ceanothus velutinus		Rhamnaceae
Potentilla fissa	*Drymocallis fissa*	Rosaceae
Potentilla gracilis		Rosaceae
Potentilla hippiana		Rosaceae
Prunus pumila	*Cerasus pumila*	Rosaceae
Rosa arkansana		Rosaceae
Populus deltoides		Salicaceae
Salix exigua		Salicaceae
Comandra umbellata		Santalaceae
Castilleja sessiflora		Scrophulaceae
Penstemon angustifolius		Scrophulaceae
Penstemon gracilis		Scrophulaceae
Penstemon secundiflorus		Scrophulaceae
Veronica catenata		Scrophulaceae
Physalis hederaefolia		Solanaceae
Physalis heterophylla		Solanaceae
Physalis virginiana		Solanaceae
Lippia cuneifolia	*Phyla cuneifolia*	Verbenaceae
Verbena ambrosifolia	*Glandularia bipinnatifida*	Verbenaceae
Verbena hastata		Verbenaceae
Hybanthus verticillatus		Violaceae
Viola nuttallii		Violaceae

Exotic Monocarpic C_4 Graminoids

GP Flora (1986)	Weber and Whitman (1996)	Family
Panicum capillare		Poaceae
Setaria glauca		Poaceae

Appendix 1: Continued

Exotic Monocarpic C_3 Graminoids

GP Flora (1986)	Weber and Whitman (1996)	Family
Aegilops cylindrica	*Cylindropyrum cylindricum*	Poaceae
Avena fatua		Poaceae
N/A	*Briza media*	Poaceae
Bromus japonicus		Poaceae
Bromus tectorum	*Anisantha tectorum*	Poaceae
Hordeum vulgare		Poaceae
Lolium perenne		Poaceae
N/A	*Triticum aestivum*	Poaceae

Exotic Polycarpic C_3 Graminoids

GP Flora (1986)	Weber and Whitman (1996)	Family
Juncus gerardii		Juncaceae
Agropyron cristatum		Poaceae
Agropyron repens	*Elytrigia repens*	Poaceae
Agrostis stolonifera	*Agrostis gigantea*	Poaceae
Bromus inermis	*Bromopsis inermis*	Poaceae
Dactylis glomerata		Poaceae
Festuca pratensis		Poaceae
Phalaris arundinacea	*Phalaroides arundinacea*	Poaceae
Phleum pratense		Poaceae
Poa compressa		Poaceae
Poa pratensis		Poaceae

Exotic Monocarpic Forbs

GP Flora (1986)	Weber and Whitman (1996)	Family
Daucus carota		Apiaceae
Ambrosia artemisiifolia		Asteraceae
Arctium minus		Asteraceae
Carduus nuttans		Asteraceae
Centaurea diffusa	*Acosta diffusa*	Asteraceae
Cirsium vulgare		Asteraceae
Conyza canadensis		Asteraceae
Iva xanthifolia	*Cyclachaena xanthifolia*	Asteraceae
Lactuca serriola		Asteraceae
Scorzonera laciniata	*Podospermum lacinatum*	Asteraceae
Sonchus asper		Asteraceae
Tragopogon dubius		Asteraceae
Tragopogon porrifolius		Asteraceae
Cynoglossum officinale		Boraginaceae
Alyssum minus	*Alyssum parviflorum*	Brassicaceae
Arabis glabra	*Turritis glabra*	Brassicaceae
Camelina microcarpa		Brassicaceae
Capsella bursa-pastoris		Brassicaceae
Chorispora tenella		Brassicaceae
Conringia orientalis		Brassicaceae
Descurainia sophia		Brassicaceae

Appendix 1: Continued

Exotic Monocarpic Forbs (Cont.)

GP Flora (1986)	Weber and Whitman (1996)	Family
Lepidium campestre	*Neolepia campestre*	Brassicaceae
Lepidium densiflorum		Brassicaceae
Brassica kaber	*Sinapis arvensis*	Brassicaceae
Sysimbrium altissimum		Brassicaceae
Thlaspi arvense		Brassicaceae
Triodanis perfoliata		Campanulaceae
Silene antirrhina		Caryophylaceae
Chenopodium album		Chenopodiaceae
Kochia scoparia	*Bassia sieversiana*	Chenopodiaceae
Salsola iberica	*Salsola australis*	Chenopodiaceae
Dipsacus fullonum		Dipsacaceae
Euphorbia serpyllifolia	*Chamaesyce serpyllifolia*	Euphorbiaceae
Euphorbia dentata	*Poinsettia dentata*	Euphorbiaceae
Medicago lupulina		Fabaceae
Melilotus albus		Fabaceae
Melilotus officinale		Fabaceae
Erodium cicutarium		Geraniaceae
N/A	*Salvia aethiopis*	Lamiaceae
Malva neglecta		Malvaceae
Polygonum convolvulus	*Fallopia convolvulus*	Polygonaceae
Polygonum persicaria	*Persicaria maculata*	Polygonaceae
N/A	*Polygonum argyrocoleon*	Polygonaceae
Gallium aparine		Rubiaceae
Verbascum thapsus		Scrophulaceae
Veronica peregrina		Scrophulaceae
N/A	*Solanum physalifolium*	Solanaceae
Solanum rostratum		Solanaceae
Solanum triflorum		Solanaceae
Verbena bracteata		Verbenaceae
Viola rafinesquii	*Viola kitaibeliana*	Violaceae

Exotic Polycarpic Forbs

GP Flora (1986)	Weber and Whitman (1996)	Family
Pastinacea sativa		Apiaceae
Apocynum cannabinum		Apocynaceae
Asparagus officinalis		Asparagaceae
Cichorium intybus		Asteraceae
Cirsium arvense	*Breea arvensis*	Asteraceae
Taraxacum officinale		Asteraceae
Cardaria chalepensis		Brassicaceae
Lepidium latifolium	*Cardaria latifolia*	Brassicaceae
Cerastium vulgatum	*Cerastium fontanum*	Caryophylaceae
Dianthus armeria		Caryophylaceae
Saponaria officinalis		Caryophylaceae
N/A	*Spergularia media*	Caryophylaceae
Convolvulus arvensis		Convolvulaceae

Appendix 1: Continued

Exotic Polycarpic Forbs (Cont.)

GP Flora (1986)	Weber and Whitman (1996)	Family
Elaeagnus angustifolia		Eleagnaceae
Coronilla varia	*Securigera varia*	Fabaceae
Lotus tenuis		Fabaceae
Medicago sativa		Fabaceae
Trifolium fragiferum		Fabaceae
Trifolium hybridum		Fabaceae
Trifolium pratense		Fabaceae
Trifolium repens		Fabaceae
Hypericum perforatum		Hypericaceae
Marrubium vulgare		Lamiaceae
Nepeta cataria		Lamiaceae
Plantago lanceolata		Plantaginaceae
Plantago major		Plantaginaceae
Rumex acetosella	*Acetosella vulgaris*	Polygonaceae
Rumex crispus		Polygonaceae
Linaria dalmatica	*Linaria genistifolia*	Scrophulaceae
Ulmus pumila		Ulmaceae

Appendix 2: Plant species compostion of the eight dominant grassland communities. SF is the summed-frequency of each species. N is the number of quadrats.

Shale N=71

Native species	SF	Exotic species	SF
Linum perenne	53%	*Alyssum minus*	90%
Aristida purpurea	52%	*Bromus japonicus*	69%
Bouteloua curtipendula	51%	*Tragopogon dubius*	34%
Helianthus pumilus	49%	*Centaurea diffusa*	8%
Evolvulus nuttallianus	44%	*Camelina microcarpa*	4%
Bouteloua gracilis	36%	*Convolvulus arvensis*	2%
Andropogon gerardii	35%	*Carduus nuttans*	2%
Stipa comata	32%	*Scorzonera laciniata*	2%
Stipa neomexicana	27%	*Bromus tectorum*	1%
Psoralea tenuiflora	27%	*Poa compressa*	1%
Lesquerella montana	25%	*Taraxacum officinale*	1%
Artemisia frigida	24%	*Lactuca serriola*	0%
Gutierrezia sarothrae	23%		
Astragalus sericoleucus	22%		
Eriogonum brevicaule	17%		
Senecio spartioides	16%		
Agropyron smithii	16%		
Comandra umbellatum	16%		
Thelesperma megapotamicum	15%		
Sitanion longifolium	14%		
Stipa viridula	13%		
Physaria bellii	13%		
Viola nuttallii	13%		
Ambrosia psilostachya	10%		
Artemisia ludoviciana	10%		
Gaura coccinea	10%		
Musineon divaricatum	9%		
Hybanthus verticillatus	9%		
Grindelia squarrosa	8%		
Chrysopis villosa	8%		
Euphorbia robusta	8%		
Oxytropis lambertii	8%		
Liatris punctata	8%		
Erysimum asperum	7%		
Dalea purpurea	7%		
Senecio plattensis	6%		
Opuntia macrorhiza	6%		
Ratibida columnifera	6%		
Gaillardia aristata	5%		
Dalea candida	5%		
Vicia americana	5%		
Oryzopsis hymenoides	4%		
Allium textile	3%		
Cirsium undulatum	3%		
Oenothera howardii	3%		
Bouteloua hirsuta	3%		
Aster falcatus	3%		

Appendix 2: Plant species compostion (cont.)

Shale (Cont.)

Native species	SF	Exotic species	SF
Townsendia exscapa	3%		
Paronychia jamesii	3%		
Tragia ramosa	3%		
Astragalus drummondii	3%		
Andropogon scoparius	2%		
Rhus aromatica	2%		
Draba reptans	2%		
Eriogonum alatum	2%		
Koeleria pyramidata	2%		
Cryptantha jamesii	2%		
Coryphantha vivipara	2%		
Buchloe dactyloides	1%		
Yucca glauca	1%		
Dyssodia papposa	1%		
Coryphantha missouriensis	1%		
Scutellaria brittonii	1%		
Leucocrinum montanum	1%		
Sphaeralcea coccinea	1%		
Argemone polyanthemos	1%		
Prunus pumila	1%		
Asclepias pumila	0%		
Artemisia dranunculus	0%		
Euphorbia fendleri	0%		
Calochortus gunnisonii	0%		
Penstemon secundiflorus	0%		

Appendix 2: Plant species compostion (cont.)

Shortgrass N=279

Native species	SF	Exotic species	SF
Agropyron smithii	83%	*Bromus japonicus*	64%
Bouteloua gracilis	59%	*Alyssum minus*	58%
Buchloe dactyloides	38%	*Bromus tectorum*	37%
Sphaeralcea coccinea	33%	*Convolvulus arvensis*	29%
Artemisia frigida	30%	*Erodium cicutarium*	23%
Plantago patagonica	27%	*Tragopogon dubius*	21%
Aristda purpurea	20%	*Centaurea diffusa*	20%
Psoralea tenuiflora	17%	*Scorzonera laciniata*	17%
Aster falcatus	13%	*Lepidium densiflorum*	7%
Linum perenne	13%	*Camelina microcarpa*	7%
Gutierrezia sarothrae	11%	*Poa pratensis*	6%
Stipa comata	10%	*Poa compressa*	5%
Artemisia ludoviciana	8%	*Lepidium campestre*	4%
Chrysopis villosa	8%	*Plantago lanceolata*	4%
Bouteloua curtipendula	8%	*Silene antirrhina*	4%
Festuca octoflora	8%	*Sysimbrium altissimum*	3%
Erigeron divergens	8%	*Taraxacum officinale*	3%
Gaura coccinea	7%	*Verbena bracteata*	2%
Astragalus agrestis	7%	*Lactuca serriola*	2%
Poa sandbergii	7%	*Bromus inermis*	1%
Sporobolus cryptandrus	6%	*Melilotus officinale*	1%
Grindelia squarrosa	6%	*Hypericum perforatum*	1%
Opuntia macrorhiza	6%	*Hordeum vulgare*	1%
Musineon divaricatum	5%	*Veronica peregrina*	1%
Artemisia dranunculus	5%	*Carduus nuttans*	1%
Carex heliophylla	5%	*Cichorium intybus*	1%
Astragalus drummondii	4%		
Sitanion hystrix	4%		
Stipa viridula	4%		
Evolvulus nuttalianus	4%		
Schedonnardus paniculatus	3%		
Thelesperma megapotamicum	3%		
Liatris punctata	3%		
Descurania pinnata	3%		
Opuntia polyacantha	3%		
Chenopodium dessicatum	3%		
Allium textile	2%		
Ratibida columnifera	2%		
Sitanion longifolius	2%		
Helianthus pumilus	2%		
Haplopappus spinulosus	2%		
Comandra umbellata	2%		
Draba reptans	2%		
Echinocereus viridiflorus	2%		
Astragalus flexuosus	2%		
Yucca glauca	1%		
Achillea millefolium	1%		
Artemisia campestre	1%		

Appendix 2: Plant species compostion (cont.)

Shortgrass (Cont.)

Native species	SF	Exotic species	SF
Opuntia fragilis	1%		
Astragalus sericoleucus	1%		
Oxytropis lambertii	1%		
Ambrosia psilostachya	1%		
Chrysothamnus nauseosus	1%		
Eriogonum effusum	1%		
Lomatium orientale	1%		
Euphorbia glyptosperma	1%		
Androsace occidentalis	1%		
Oryzopsis hymenoides	1%		
Asclepias pumila	1%		
Lesquerella montana	1%		
Monarda pectinata	1%		
Leucocrinum montanum	1%		
Helianthus anuus	1%		
Coryphantha missouriensis	1%		
Penstemon secundiflorus	1%		
Hybanthus verticilatus	1%		
Viola nuttallii	1%		
Lygodesmia juncea	1%		
Orobanche fasciculatum	1%		
Polygonum douglasii	1%		
Delphhinium virescens	1%		

Appendix 2: Plant species compostion (cont.)

Mixed-grass/Foothills N=111

Native species	SF	Exotic species	SF
Agropyron smithii	82%	*Bromus japonicus*	80%
Artemisia ludoviciana	69%	*Alyssum minus*	56%
Aster falcatus	57%	*Tragopogon dubius*	46%
Carex heliophylla	46%	*Poa pratensis*	43%
Ambrosia psilostachya	44%	*Lactuca serriola*	18%
Psoralea tenuiflora	34%	*Poa compressa*	16%
Liatris punctata	24%	*Bromus tectorum*	11%
Andropogon gerardii	19%	*Carduus nuttans*	8%
Bouteloua gracilis	19%	*Taraxacum officinale*	6%
Rosa arkansana	14%	*Lepidium campestre*	6%
Erigeron divergens	13%	*Bromus inermis*	4%
Stipa viridula	11%	*Convolvulus arvensis*	4%
Opuntia macrorhiza	11%	*Erodium cicutarium*	4%
Viola nuttallii	11%	*Silene antirrhina*	4%
Koelaria pyramidata	11%	*Camelina microcarpa*	3%
Astragalus agrestis	11%	*Sysimbrium altissimum*	3%
Linum perenne	11%	*Scorzonera laciniata*	2%
Artemisia dranunculus	10%	*Conringia orientalis*	2%
Achillea millefolium	9%	*Plantago lanceolata*	1%
Gutierrezia sarothrae	9%	*Linaria dalmatica*	1%
Astragalus flexuosus	8%	*Rumex acetosella*	1%
Aster porteri	8%	*Cichorium intybus*	1%
Cerastium arvense	7%	*Lepidium densiflorum*	1%
Astragalus drummondii	7%		
Stipa spartea	7%		
Sphaeralcea coccinea	6%		
Lupinus argenteus	5%		
Grindelia squarrosa	5%		
Bouteloua gracilis	5%		
Lomatium orientale	4%		
Symphoricarpos occidentalis	4%		
Tragia ramosa	4%		
Yucca glauca	4%		
Vicia americana	4%		
Ratibida columnifera	4%		
Mertensia lanceolata	4%		
Solidago nemoralis	3%		
Buchloe dactyloides	3%		
Scutellaria brittonii	3%		
Asclepias pumila	2%		
Evolvulus nuttalianus	2%		
Stipa comata	2%		
Senecio plattensis	2%		
Physalis hederaefolia	2%		
Artemisia frigida	2%		
Cirsium undulatum	2%		
Onosmodium molle	2%		
Erysimum asperum	2%		

Appendix 2: Plant species compostion (cont.)

Mixed-grass/Foothills (Cont.)

Native species	SF	Exotic species	SF
Euphorbia spatheolata	2%		
Thelesperma divaricarpa	2%		
Androsace occidentalis	2%		
Sporobolus asper	2%		
Plantago patagonica	2%		
Eriogonum alatum	2%		
Aristda purpurea	1%		
Chrysothamnus nauseosus	1%		
Gaura coccinea	1%		
Muhlenbergia montana	1%		
Andropogon scoparius	1%		
Allium textile	1%		
Helianthus rigidus	1%		
Opuntia fagilis	1%		
Cerastium nuttans	1%		
Tradescantia occidentalis	1%		
Leucocrinum montanum	1%		
Zigadenos venenosus	1%		
Penstemon secundiflorus	1%		
Helianthus pumilus	1%		
Chrysopis villosa	1%		
Calochortus gunnisonii	1%		
Mirabilis linearis	1%		
Polygonum douglasii	1%		

Appendix 2: Plant species compostion (cont.)

Mixed-grass/Mesas N=197

Native species	SF	Exotic species	SF
Andropogon gerardii	61%	*Bromus japonicus*	57%
Carex heliophylla	58%	*Poa compressa*	42%
Bouteloua gracilis	49%	*Tagopogon dubius*	33%
Stipa comata	46%	*Poa pratensis*	21%
Psoralea tenuiflora	42%	*Alyssum minus*	20%
Ambrosia psilostachya	41%	*Silene antirrhina*	13%
Koeleria pyramidata	34%	*Bromus tectorum*	13%
Bouteloua curtipendula	33%	*Lepidium densiflorum*	12%
Liatris punctata	26%	*Camelina microcarpa*	12%
Panicum virgatum	25%	*Cichorium intybus*	8%
Aster porteri	22%	*Rumex acetosella*	8%
Chrysopsis villosa	22%	*Hypericum perforatum*	6%
Sitanion longifolium	20%	*Plantago lanceolata*	5%
Andropogon scoparius	18%	*Taraxacum officinale*	4%
Opuntia macrorhiza	18%	*Lepidium campestre*	3%
Arenaria fendleri	18%	*Sysimbrium altissimum*	3%
Tragia ramosa	16%	*Dianthus armeria*	2%
Echinocereus viridiflorus	15%	*Hordeum vulgare*	2%
Aster falcatus	14%	*Convolvulus arvensis*	2%
Dalea purpurea	14%	*Lactuca serriola*	1%
Buchloe dactyloides	13%	*Daucus carrota*	1%
Artemisia ludoviciana	13%	*Dactylis glomerata*	1%
Artemisia campestris	13%	*Scorzonera laciniata*	1%
Lesquerella montana	11%	*Agrostis stolonifera*	1%
Sorghastrum nutans	10%	*Trifolium hybridum*	1%
Artemisia frigida	10%	*Phleum pratensis*	1%
Sporobolus asper	10%	*Trifolium reptans*	1%
Oxalis dillenii	9%	*Chenopodium album*	1%
Plantago patagonica	9%		
Eriogonum alatum	8%		
Erigeron divergens	8%		
Muhlenbergia wrightii	7%		
Gutierrezia sarothrae	6%		
Erysimum asperum	6%		
Paronychia jamesii	6%		
Allium textile	5%		
Yucca glauca	5%		
Aristida purpurea	5%		
Helianthus annuus	5%		
Chenopodium dessicatum	4%		
Schedonardus paniculatus	4%		
Festuca octoflora	4%		
Bouteloua hirsuta	4%		
Antennaria microphylla	4%		
Cirsium undulatum	4%		
Gaillardia aristata	4%		
Senecio plattensis	4%		
Potentilla fissa	4%		

Appendix 2: Plant species compostion (cont.)

Mixed-grass/Mesas (Cont.)

Native species	SF	Exotic species	SF
Linum perenne	4%		
Lomatium orientale	3%		
Descurania pinnata	3%		
Oxytropis lambertii	3%		
Onosmodium molle	3%		
Talinum parviflorum	3%		
Draba reptans	3%		
Ratibida columnifera	3%		
Kuhnia eupatriodes	3%		
Silene scoulerii	3%		
Agropyron smithii	2%		
Comandra umbellatum	2%		
Juncus balticus	2%		
Monarda pectinata	2%		
Calylophus serrulatus	2%		
Viola nuttallii	2%		
Muhlenbergia montana	2%		
Evolvulus nuttalianus	2%		
Mirabilis linearis	2%		
Senecio spartioides	1%		
Coryphantha missouriensis	1%		
Dalea candida	1%		
Juncus longistylus	1%		
Potentilla gracilis	1%		
Solidago mollis	1%		
Mertensia lanceolata	1%		
Astragalus flexuosus	1%		
Dicanthelium oligosanthes	1%		
Opuntia fragilis	1%		
Tradescantia occidentalis	1%		
Euphorbia robusta	1%		
Grindellia squarrosa	1%		
Poa sandbergii	1%		
Asclepias engelmanniana	1%		
Helianthus rigidus	1%		
Rosa arkansana	1%		
Euphorbia spatheolata	1%		
Phacelia heterophylla	1%		
Leucocrinum montanum	1%		
Lupinus argenteus	1%		
Astragalus shortianus	1%		
Musineon divaricatum	1%		
Helianthis pumilus	1%		
Cryptantha jamesii	1%		
Chrysopis villosa	1%		
Symphoricarpos occidentalis	1%		
Equisetum laevigatum	1%		
Sisyrinchium montanum	1%		

Appendix 2: Plant species compostion (cont.)

Mixed-grass/Mesas (Cont.)

Native species	SF	Exotic species	SF
Polygonum douglasii	1%		

Appendix 2: Plant species compostion (cont.)

Xeric Tallgrass N=65

Native species	SF	Exotic species	SF
Andropogon gerardii	82%	*Poa pratensis*	70%
Ambrosia psilostachya	65%	*Plantago lanceolata*	61%
Andropogon scoparius	25%	*Bromus japonicus*	55%
Carex heliophylla	22%	*Cichorium intybus*	45%
Grindellia squarrosa	21%	*Poa compressa*	38%
Bouteloua gracilis	18%	*Taraxacum officinale*	32%
Aster falcatus	18%	*Convolvulus arvensis*	27%
Juncus balticus	17%	*Dianthus armeria*	25%
Psoralea tenuiflora	14%	*Lotus tenuis*	17%
Sporobolus asper	13%	*Alyssum minus*	16%
Erigeron divergens	11%	*Rumex crispus*	14%
Dalea candida	10%	*Dactylis glomerata*	12%
Bouteloua curtipendula	10%	*Trifolium pratensis*	12%
Carex praegracilis	10%	*Tagopogon dubius*	10%
Sorghastrum nutans	8%	*Melilotus officinale*	10%
Buchloe dactyloides	7%	*Conyza canadensis*	10%
Oxalis dillenii	7%	*Lepidium densiflorum*	9%
Aster porteri	6%	*Erodium cicutarium*	9%
Panicum virgatum	6%	*Lactuca serriola*	8%
Artemisia frigida	6%	*Festuca pratensis*	8%
Ratibida columnifera	5%	*Lepidium campestre*	8%
Agropyron smithii	5%	*Agrostis stolonifera*	8%
Festuca octoflora	5%	*Trifolium hybridum*	7%
Carex nebraskensis	4%	*Rumex acetosella*	7%
Opuntia macrorhiza	4%	*Phleum pratensis*	6%
Lupinus argenteus	4%	*Silene antirrhina*	6%
Achillea millefolium	4%	*Juncus gerardii*	4%
Hordeum jubatum	4%	*Medicago lupulina*	4%
Juncus longistylus	3%	*Bromus tectorum*	3%
Bouteloua hirsuta	3%	*Scorzonera laciniata*	2%
Sitanion hystrix	3%	*Cirsium arvense*	2%
Artemisia ludoviciana	2%	*Melilotus alba*	1%
Asclepias speciosa	2%	*Camelina microcarpa*	1%
Sitanion longifolium	2%	*Hypericum perforatum*	1%
Dalea purpurea	2%	*Trifolium reptans*	1%
Aristida purpurea	2%	*Carduus nuttans*	1%
Potentilla gracilis	2%	*Polygonum argyrocoleon*	1%
Rosa arkansana	2%	*Verbascum thapsus*	1%
Sporobolus cryptandrus	2%		
Thermopsis divaricarpa	2%		
Lippia cuneifolia	2%		
Stipa comata	1%		
Plantago patagonica	1%		
Allium textile	1%		
Asclepias viridifolia	1%		
Distichlis spicata	1%		
Koeleria pyramidata	1%		
Chrysopis villosa	1%		

Appendix 2: Plant species compostion (cont.)

Xeric Tallgrass (Cont.)

Native species	SF	Exotic species	SF
Gutierrezia sarothrae	1%		
Yucca glauca	1%		
Senecio spartioides	1%		
Astragalus shortianus	1%		
Chrysothamnus nauseosus	1%		
Sphaeralcea coccinea	1%		
Gaura parviflora	1%		

Appendix 2: Plant species compostion (cont.)

Mesic Tallgrass N=153

Native species	SF	Exotic species	SF
Sporobolus asper	64%	*Plantago lanceolata*	72%
Andropogon gerardii	40%	*Poa pratensis*	51%
Panicum virgatum	36%	*Poa compressa*	51%
Sorghastrum nutans	34%	*Taraxacum officinale*	39%
Eleocharis compressa	32%	*Trifolium pratense*	37%
Aster falcatus	32%	*Festuca pratensis*	37%
Juncus longistylis	29%	*Phleum pratense*	35%
Dicanthelium oligosanthes	29%	*Convolvulus arvensis*	32%
Prunella vulgaris	21%	*Agrostis stolonifera*	30%
Ambrosia psilostachya	16%	*Cichorium intybus*	20%
Rosa arkansana	14%	*Bromus japonicus*	15%
Andropogon scoparius	13%	*Dactylis glomerata*	10%
Psoralea tenuiflora	13%	*Melilotus officianale*	10%
Carex praegracilis	11%	*Medicago lupulina*	9%
Equisetum laevigatum	9%	*Daucus carota*	8%
Carex lanuginosa	9%	*Cirsium arvense*	7%
Achilea millefolium	8%	*Diathus armeria*	4%
Agropyron smithii	7%	*Apocynum cannabinum*	3%
Aster porteri	7%	*Bromus inermis*	3%
Sysrinchium montanum	7%	*Alyssum minus*	2%
Juncus balticus	6%	*Tragopogon dubius*	2%
Asclepias speciosa	6%	*Melilotus albus*	2%
Ratibida columnifera	5%	*Rumex acetosella*	2%
Iris missouriensis	5%	*Lotus tenuis*	2%
Eleocharis macrostachya	5%	*Lepidium campestre*	2%
Buchloe dactyloides	4%	*Rumex crispus*	1%
Potentilla gracilis	4%	*Trifolium hybridum*	1%
Muhlenbergia montana	4%	*Lactuca serriola*	1%
Bouteloua gracilis	4%	*Juncus gerardii*	1%
Senecio spartioides	3%	*Centaurea diffusa*	1%
Opuntia macrorhiza	2%	*Trifolium repens*	1%
Erigeron divergens	2%		
Carex brevior	2%		
Carex stipata	2%		
Carex heliophylla	2%		
Bouteloua curtipendula	2%		
Muhlenbergia asperifolia	1%		
Grindelia squarosa	1%		
Musineon divaricatum	1%		
Ranunculus macounii	1%		
Artemisia frigida	1%		
Symphoricarpos occidentalis	1%		
Festuca octoflora	1%		
Artemisia ludoviciana	1%		
Asclepias viridiflora	1%		
Distichlis spicata	1%		
Oxalis dilenii	1%		
Asclepias stenophylla	1%		

Appendix 2: Plant species compostion (cont.)

Mesic Tallgrass (Cont.)

Native species	SF	Exotic species	SF
Senecio plattensis	1%		
Sitanion hystrix	1%		

Appendix 2: Plant species compostion (cont.)

Irrigated Meadow N=65

Native species	SF	Exotic species	SF
Juncus balticus	67%	*Festuca pratensis*	63%
Eleocharis compressa	58%	*Poa pratensis*	51%
Carex praegracilis	35%	*Trifolium hybridum*	48%
Carex nebraskensis	35%	*Taraxacum officinale*	34%
Juncus longistylis	18%	*Agrostis stolonifera*	30%
Triglochin maritima	16%	*Phleum pratensis*	22%
Panicum virgatum	11%	*Trifolium pratensis*	18%
Carex lanuginosa	10%	*Lotus tenuis*	16%
Eleocharis macrostachya	10%	*Trifolium fragiferum*	14%
Sisyrinchium montanum	6%	*Polygonum persicaria*	12%
Cyperus aristata	6%	*Plantago lanceolata*	10%
Ranunculus macounii	5%	*Bromus japonicus*	8%
Juncus nodosus	4%	*Ambrosia artemisifoila*	8%
Agropyron smithii	4%	*Poa compressa*	8%
Equisetum laevigatum	4%	*Cichorium intybus*	7%
Polygonum douglasii	2%	*Rumex crispus*	7%
Alopecurus aequalis	2%	*Juncus gerardii*	6%
Spartina pectinata	2%	*Agropyron repens*	5%
Prunella vulgaris	2%	*Dactylis glomerata*	3%
Hordeum jubatum	1%	*Lepidium campestre*	2%
Aster falcatus	1%	*Trifolium repens*	2%
		Plantago major	2%
		Convolvulus arvensis	1%
		Daucus carrota	1%
		Apocynum cannabinum	1%
		Cirsium arvense	1%
		Veronica peregrina	1%

Appendix 3: Cover and frequency of all species on all 68 plots during each sampling period 1994-1996.

Key to Fields

Column

1 Plot number (see Table 2.1 and Fig. 2.1)

2 Species name (also bare ground, litter and unknown)

3 Origin of species
- e = exotic
- n = native
- u = unknown

4 Life history of species
- m = monocarpic
- p = polycarpic
- u = unknown

5 Part94 = Summed frequency of 12 nested quadrats to the west of the plot center, sampled in 1994 (for comparison to July95 and July96)

6 July95 = Summed frequency of 12 nested quadrats to the west of the plot center, sampled in July 1995

7 July95 = Summed frequency of 12 nested quadrats to the west of the plot center, sampled in July 1996

8 All94 = Summed frequency of 50 nested quadrats (25 west and 25 east of the plot center), sampled in 1994

9 June95 = Percent cover of 300 points sampled at 50 stations (25 west and 25 east) in June 1995

10 June96 = Percent cover of 300 points sampled at 50 stations (25 west and 25 east) in June 1996

11 Aug95 = Percent cover of 300 points sampled at 50 stations (25 west and 25 east) in August 1995

12 Aug96 = Percent cover of 300 points sampled at 50 stations (25 west and 25 east) in August 1996

13 IMP = Importance value, calculated as the average of the relative values of columns 6 through 12

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
1	*Agropyron smithii*	n	p	91.7%	100.0%	97.2%	87.3%	6.2%	5.3%	8.0%	6.3%	13.4%
1	*Artemisia ludoviciana*	n	p	69.4%	61.1%	75.0%	60.0%	3.6%	2.3%	3.8%	5.3%	8.5%
1	*Carex heliophylla*	n	p	41.7%	52.8%	66.7%	36.7%	5.8%	4.3%	3.5%	2.0%	7.7%
1	*Bromus japonicus*	e	m	100.0%	100.0%	77.8%	89.3%	1.6%	3.3%			5.7%
1	*Andropogon gerardii*	n	p	13.9%		2.8%	28.0%	1.3%	2.0%	5.1%	3.0%	4.4%
1	*Yucca glauca*	n	p	8.3%	13.9%	5.6%	14.0%	2.3%	2.3%	3.5%	1.3%	3.7%
1	*Psoralea tenuiflora*	n	p	44.4%	30.6%	25.0%	28.7%		1.0%	4.2%	1.0%	3.3%
1	*Allysum minus*	e	m	25.0%	33.3%	50.0%	45.3%	2.3%	1.3%			3.1%
1	*Heterotheca villosa*	n	p	13.9%	2.8%	2.8%	21.3%	1.0%	2.6%	3.2%	1.0%	3.0%
1	*Tragopogon dubius*	e	m	47.2%	44.4%	50.0%	30.7%	0.6%	1.6%	0.3%		2.8%
1	*Bromus tectorum*	e	m	38.9%	25.0%	22.2%	12.7%	5.2%				2.5%
1	*Aster falcatus*	n	p	38.9%	47.2%	27.8%	16.0%	0.6%	0.7%	0.6%	1.0%	2.5%
1	*Poa compressa*	e	p	30.6%	19.4%	22.2%	21.3%	1.0%	0.7%	1.6%	1.0%	2.4%
1	*Helianthus rigidus*	n	p			8.3%	13.3%	1.3%	2.0%	1.0%	1.3%	2.3%
1	*Poa pratensis*	e	p	2.8%	19.4%	33.3%	15.3%	2.6%		1.0%		2.1%
1	*Ambrosia psilostachya*	n	p	25.0%	19.4%	27.8%	18.0%		1.0%		1.3%	2.0%
1	*Erigeron divergens*	n	m	27.8%	16.7%	25.0%	30.7%	0.3%	0.7%		0.3%	1.6%
1	*Tragia ramosa*	n	p		19.4%	19.4%		0.3%		1.3%	1.0%	1.6%
1	*Cerastium arvense*	n	p	27.8%	30.6%	30.6%	16.7%	0.3%	0.7%			1.5%
1	*Rosa arkansana*	n	p	13.9%	13.9%	2.8%	10.7%	0.3%	1.0%	1.3%	0.7%	1.5%
1	*Liatris punctata*	n	p	11.1%	11.1%	8.3%	14.0%		1.0%	1.0%	0.3%	1.3%
1	*Koeleria macrantha*	n	p	16.7%	8.3%	11.1%	26.7%		0.7%		0.7%	1.2%
1	*Opuntia macrorhiza*	n	p	27.8%	11.1%	19.4%	18.7%	0.3%	0.3%		0.3%	1.1%
1	*Bouteloua curtipendula*	n	p		8.3%	2.8%	2.7%	0.6%	1.0%	0.3%		0.9%
1	*Gutierrezia sarothrae*	n	p	25.0%	16.7%	19.4%	9.3%			0.3%	0.3%	0.9%
1	*Lactuca serriola*	e	m	8.3%	8.3%	36.1%	12.7%					0.9%
1	*Vicia americana*	n	p	13.9%	33.3%	8.3%	11.3%		0.3%			0.9%
1	*Linum usitatissimum*	e	m	2.8%	8.3%	5.6%	28.7%	0.6%	0.3%			0.9%
1	*Lomatium oriental*	n	p	5.6%			20.0%	1.3%				0.7%
1	*Aster porteri*	n	p		11.1%	16.7%	7.3%		0.3%			0.7%
1	*Astragalus egrestis*	n	p	5.6%	5.6%	11.1%	13.3%	1.0%				0.7%
1	*Bouteloua gracilis*	n	p		8.3%		6.0%	0.6%	0.3%	0.3%		0.6%
1	*Artemisia frigida*	n	p	11.1%	8.3%	11.1%	7.3%	0.3%		0.3%		0.6%
1	*Cirsium undulatum*	n	m		11.1%	5.6%	3.3%			0.6%		0.5%
1	*Lepidium campestre*	e	m	33.3%	19.4%		14.7%					0.5%
1	*Convolvulus arvensis*	e	p	16.7%	11.1%	8.3%	4.0%			0.3%		0.5%
1	*Astragalus flexuosus*	n	p				5.3%		0.7%	0.6%		0.5%
1	*Astragalus drummondii*	n	p	2.8%			6.7%	1.0%		0.3%		0.5%
1	*Sphaeralcea coccinia*	n	p	11.1%	13.9%	13.9%	6.7%					0.5%
1	*Eriogonum alatum*	n	p	11.1%	5.6%	8.3%	11.3%			0.3%		0.5%
1	*Penstemon secundiflorus*	n	p	16.7%	2.8%		18.7%			0.6%		0.5%
1	*Artemisia dranunculus*	n	p						0.3%	1.0%		0.4%
1	*Sysimbrium altissimum*	e	m		16.7%		6.7%					0.4%
1	*Gaura coccinea*	n	p	16.7%		2.8%	14.7%	0.3%		0.3%		0.4%
1	*Drymocallis fissia*	n	p				0.7%	0.3%	0.3%		0.3%	0.4%
1	*Physalis hederaefolia*	n	p		5.6%	11.1%					0.3%	0.4%
1	*Stipa comata*	n	p					0.6%	0.3%			0.3%
1	*Stipa viridula*	n	p						0.3%		0.3%	0.3%
1	*Grindelia squarrosa*	n	m	2.8%		2.8%	4.7%		0.3%	0.3%		0.3%
1	*Ratibida columnifera*	n	p	5.6%	2.8%	5.6%	4.7%				0.3%	0.3%
1	*Euphorbia spathulata*	n	m	5.6%			24.7%					0.3%
1	*Phacelia heterophylla*	n	m							1.0%		0.3%
1	*Leucocrinum montanum*	n	p	8.3%		5.6%	7.3%	0.3%				0.3%
1	*Viola nuttallii*	n	p	8.3%	2.8%	2.8%	8.0%	0.3%				0.3%
1	*Aristida purpurea*	n	p				8.0%	0.3%				0.2%
1	*Allium textile*	n	p	19.4%			12.7%					0.2%
1	*Asclepias pumila*	n	p								0.3%	0.2%
1	*Asclepias stenophylla*	n	p								0.3%	0.2%
1	*Podospermum laciniatum*	e	m	2.8%		5.6%	4.7%					0.2%
1	*Descurainia sophia*	e	m	16.7%			12.0%					0.2%
1	*Paronychia jamesii*	n	p				3.3%	0.3%		0.3%		0.2%
1	*Evolvulus nuttalianus*	n	p				2.7%		0.3%			0.2%
1	*Euphorbia robusta*	n	p				3.3%		0.3%			0.2%
1	*Dalea purpurea*	n	p	5.6%			10.0%			0.3%		0.2%
1	*Oenothera brachycarpa*	n	p			2.8%					0.3%	0.2%
1	*Plantago petegonica*	n	m	2.8%	11.1%		0.7%					0.2%
1	*Comandra umbellata*	n	p								0.3%	0.2%
1	*Hybanthus verticillatus*	n	p	2.8%			6.0%			0.3%		0.2%
1	*Bromus inermis*	e	p						0.3%			0.1%

Appendix 3 (Cont.)

Plot	Species			% of Quadrats Present				% Cover				IMP
				Part94	July95	July96	All94	June95	June96	Aug95	Aug96	
1	*Sporobolus asper*	n	p				5.3%		0.3%			0.1%
1	*Musineon divaricatum*	n	p				4.0%					0.1%
1	*Asclepias speciosa*	n	p				3.3%			0.3%		0.1%
1	*Senecio plattensis*	n	p				3.3%					0.1%
1	*Onosmodium molle*	n	p	5.6%		2.8%	3.3%					0.1%
1	*Draba reptans*	n	m	8.3%			4.0%					0.1%
1	*Erysimum asperum*	n	p				5.3%					0.1%
1	*Lepidium densiflorum*	e	m		5.6%							0.1%
1	*Triodanis perfoliata*	e	m	11.1%			4.7%					0.1%
1	*Silene antirrhina*	e	m	2.8%	2.8%		3.3%					0.1%
1	*Erodium cicutarium*	e	m	19.4%			6.7%					0.1%
1	*Androsace occidentalis*	n	m	36.1%			8.7%					0.1%
1	*Viola kitaibeliana*	e	m	8.3%			5.3%					0.1%
1	Unk. Forb - 758	u	u	8.3%			2.7%	0.3%				0.1%
1	Unk. Forb -933	u	u					0.3%				0.0%
1	*Agropyron repens*	e	p				3.3%					0.0%
1	*Bouteloua hirsuta*	n	p				2.0%					0.0%
1	*Hordeum jubatum*	n	u				0.7%					0.0%
1	*Schizachyrium scoparium*	n	p				0.7%					0.0%
1	Unk. Grass - 155	u	u				0.7%					0.0%
1	*Nothocalis cuspidata*	n	p				2.7%					0.0%
1	*Taraxacum officianale*	e	p				2.0%					0.0%
1	*Lithospermum incisum*	n	p				0.7%					0.0%
1	*Camelina microcarpa*	e	m				3.3%					0.0%
1	*Lesquerella montana*	n	u				1.3%					0.0%
1	*Opuntia fragilis*	n	p	5.6%			1.3%					0.0%
1	*Astragalus shortianus*	n	p				2.7%					0.0%
1	*Lupinus argenteus*	n	p				0.7%					0.0%
1	*Psoralea argophylla*	n	p				3.3%					0.0%
1	*Oxalis dillenii*	n	m				0.7%					0.0%
1	*Gallium aparine*	e	m	13.9%			3.3%					0.0%
1	*Verbena bracteata*	e	m				0.7%					0.0%
1	Unk. Forb - 762	u	u				1.3%					0.0%
1	Bare Ground							11.7%	14.5%	9.3%	11.0%	0.0%
1	Litter							42.5%	44.7%	43.3%	58.1%	0.0%
2	*Agropyron smithii*	n	p	100.0%	91.7%	86.1%	90.7%	8.0%	6.9%	7.8%	4.4%	12.8%
2	*Bromus japonicus*	e	m	100.0%	97.2%	100.0%	100.0%	8.9%	3.3%			7.4%
2	*Allysum minus*	e	m	100.0%	97.2%	100.0%	87.3%	8.9%	3.3%			7.2%
2	*Artemisia ludoviciana*	n	p	63.9%	52.8%	63.9%	44.7%	4.8%	3.6%	2.9%	2.0%	6.6%
2	*Yucca glauca*	n	p	5.6%	8.3%	8.3%	12.7%	2.9%	3.3%	2.6%	5.4%	5.7%
2	*Aster porteri*	n	p	8.3%	36.1%	19.4%	11.3%	2.9%	2.3%	5.6%	2.0%	5.4%
2	*Heterotheca villosa*	n	p	25.0%			36.0%	2.5%	3.0%	4.6%	2.0%	4.6%
2	*Erigeron divergens*	n	m	66.7%	36.1%	36.1%	31.3%	2.2%	2.0%	1.6%	2.7%	4.5%
2	*Psoralea tenuiflora*	n	p	58.3%	58.3%	47.2%	39.3%	1.0%	2.3%	2.9%	0.7%	4.3%
2	*Andropogon gerardii*	n	p	19.4%		33.3%	22.7%	1.0%	2.0%	2.6%	3.4%	4.2%
2	*Aster falcatus*	n	p	52.8%	47.2%	55.6%	35.3%	0.6%	0.7%	1.6%	1.0%	3.4%
2	*Tragopogon dubius*	e	m	2.8%	36.1%	52.8%	16.0%	1.0%	2.0%	0.3%		2.4%
2	*Linum usitatissimum*	e	m	72.2%	36.1%	50.0%	60.7%	1.0%				2.2%
2	*Ambrosia psilostachya*	n	p	61.1%	38.9%	47.2%	30.0%	0.6%	0.3%			1.9%
2	*Gutierrezia sarothrae*	n	p	8.3%	8.3%	36.1%	23.3%		0.7%		1.0%	1.6%
2	*Convolvulus arvensis*	e	p				16.7%	1.3%	1.0%	1.0%	0.7%	1.5%
2	*Astragalus agrestis*	n	p	47.2%		47.2%	21.3%	1.3%	0.7%			1.5%
2	*Bromus tectorum*	e	m	36.1%	41.7%	11.1%	28.7%	1.0%				1.4%
2	*Bromus inermis*	e	p	2.8%	8.3%	19.4%	7.3%		1.6%	0.3%	0.3%	1.3%
2	*Lactuca serriola*	e	m	44.4%	11.1%	41.7%	24.7%		0.3%		0.3%	1.3%
2	*Viola nuttallii*	n	p	33.3%	44.4%	22.2%	23.3%					1.3%
2	*Ratibida columnifera*	n	p	13.9%	2.8%	11.1%	9.3%		1.0%		0.7%	1.0%
2	*Lepidium campestre*	e	m	11.1%	33.3%		32.0%			0.3%		0.9%
2	*Astragalus flexuosus*	n	p	16.7%	33.3%	5.6%	13.3%			1.0%	0.3%	0.9%
2	*Buchloe dactyloides*	n	p		2.8%		3.3%	1.0%		0.7%		0.8%
2	*Carex heliophylla*	n	p	5.6%	5.6%	25.0%	1.3%					0.7%
2	*Bouteloua curtipendula*	n	p				0.7%		1.0%	0.7%	0.3%	0.7%
2	*Aristida purpurea*	n	p		5.6%	5.6%	6.0%	1.3%				0.6%
2	*Opuntia macrorhiza*	n	p	8.3%	16.7%	13.9%	2.7%	0.3%				0.6%
2	*Astragalus drummondii*	n	p	13.9%	5.6%	16.7%	11.3%			0.3%		0.6%
2	*Erodium cicutarium*	e	m	50.0%	16.7%	13.9%	16.7%					0.6%
2	*Linum lewisii*	n	p						2.0%			0.6%
2	*Lomatium oriental*	n	p	30.6%	8.3%		24.0%	0.3%				0.5%
2	*Artemisia frigida*	n	p	8.3%			6.0%			0.7%	0.3%	0.5%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
2	*Sphaeralcea coccinia*	n	p				24.7%				0.3%	0.5%
2	*Cirsium undulatum*	n	m	2.8%			4.0%		1.0%			0.4%
2	*Senecio plattensis*	n	p	33.3%	11.1%	2.8%	17.3%					0.4%
2	*Tragia ramosa*	n	p	58.3%			31.3%					0.4%
2	*Rosa arkansana*	n	p				3.3%		0.3%	0.3%	0.3%	0.4%
2	*Hybanthus verticillatus*	n	p	11.1%			2.7%		0.7%	0.3%		0.4%
2	*Poa compressa*	e	p				2.7%	0.3%			0.3%	0.3%
2	*Grindelia squarrosa*	n	m	5.6%		2.8%	4.0%			0.7%		0.3%
2	*Taraxacum officianale*	e	p	2.8%	11.1%	8.3%	4.0%					0.3%
2	*Evolvulus nuttalianus*	n	p		11.1%	11.1%						0.3%
2	*Euphorbia spathulata*	n	m		11.1%		12.7%					0.3%
2	*Androsace occidentalis*	n	m	44.4%			25.3%					0.3%
2	*Penstemon secundiflorus*	n	p				10.7%		0.3%	0.3%		0.3%
2	*Agropyron repens*	e	p					0.3%			0.3%	0.2%
2	*Liatris punctata*	n	p		2.8%	8.3%						0.2%
2	*Descurainia sophia*	e	m	19.4%			14.7%					0.2%
2	*Silene antirrhina*	e	m		2.8%	2.8%	8.0%					0.2%
2	*Dalea purpurea*	n	p							0.7%		0.2%
2	*Leucocrinum montanum*	n	p				2.7%	0.6%				0.2%
2	Unk. Forb -783	u	u	2.8%			0.7%	0.6%				0.2%
2	*Carex sp.*	u	p				6.7%					0.1%
2	*Bouteloua gracilis*	n	p	2.8%			0.7%			0.3%		0.1%
2	*Poa pratensis*	e	p	5.6%	2.8%		2.7%					0.1%
2	*Allium textile*	n	p	8.3%			8.7%					0.1%
2	*Rhus triobata*	n	p					0.3%				0.1%
2	*Podospermum laciniatum*	e	m				2.7%	0.3%				0.1%
2	*Onosmodium molle*	n	p	2.8%	2.8%		1.3%					0.1%
2	*Camelina microcarpa*	e	m		2.8%		1.3%					0.1%
2	*Draba reptans*	n	m	13.9%			9.3%					0.1%
2	*Sysimbrium altissimum*	e	m	2.8%			6.7%					0.1%
2	*Opuntia polyacantha*	n	p	2.8%			0.7%	0.3%				0.1%
2	*Triodanis perfoliata*	e	m				8.0%					0.1%
2	*Cerastium arvense*	n	p		2.8%	2.8%	1.3%					0.1%
2	*Cerastium nuttans*	n	m		8.3%							0.1%
2	*Paronychia jamesii*	n	p					0.3%				0.1%
2	*Tradescantia occidentalis*	n	p	5.6%		8.3%	1.3%					0.1%
2	*Euphorbia robusta*	n	p						0.3%			0.1%
2	*Gaura coccinea*	n	p				11.3%					0.1%
2	*Plantago patagonica*	n	m		2.8%		6.7%					0.1%
2	*Viola kitaibeliana*	e	m				6.7%					0.1%
2	Unk. Forb -764	u	u				7.3%					0.1%
2	*Hordeum jubatum*	n	u				1.3%					0.0%
2	*Vulpia octoflora*	n	m	8.3%			2.0%					0.0%
2	Unk. Grass - 157	u	u				1.3%					0.0%
2	*Antennaria rosea*	n	p				1.3%					0.0%
2	*Arnica fulgens*	n	p			2.8%						0.0%
2	*Nothocalis cuspidata*	n	p				0.7%					0.0%
2	*Lappula redowskii*	n	m				2.7%					0.0%
2	*Mertensia lanceolata*	n	p	8.3%			2.7%					0.0%
2	*Erysimum asperum*	n	p				1.3%					0.0%
2	*Lepidium densiflorum*	e	m				4.0%					0.0%
2	*Lesquerella montana*	n	u				0.7%					0.0%
2	*Coryphantha missouriensis*	n	p				0.7%					0.0%
2	*Securigera varia*	x	x			2.8%						0.0%
2	*Medicago lupulina*	e	m				0.7%					0.0%
2	*Oenothera brachycarpa*	n	p				1.3%					0.0%
2	*Populus deltoides*	n	p	2.8%			2.0%					0.0%
2	*Veronica peregrina*	e	m		2.8%							0.0%
2	*Physalis hederaefolia*	n	p		2.8%							0.0%
2	Unk. Forb -766	u	u	2.8%			0.7%					0.0%
2	Unk. Forb -768	u	u				2.0%					0.0%
2	Unk. Forb -770	u	u	8.3%			2.0%					0.0%
2	Unk. Forb -771	u	u				0.7%					0.0%
2	Unk. Forb -773	u	u				3.3%					0.0%
2	Unk. Forb -775	u	u				0.7%					0.0%
2	Unk. Forb -776	u	u				0.7%					0.0%
2	Unk. Forb -777	u	u				2.0%					0.0%
2	Unk. Forb -778	u	u				1.3%					0.0%
2	Unk. Forb -779	u	u				2.0%					0.0%

Appendix 3 (Cont.)

Plot	Species			% of Quadrats Present				% Cover				IMP
				Part94	July95	July96	All94	June95	June96	Aug95	Aug96	
2	Bare Ground							10.2%	8.2%	2.9%	10.5%	0.0%
2	Litter							34.1%	46.1%	56.9%	60.5%	0.0%
3	*Convolvulus arvensis*	e	p	97.2%	100.0%	100.0%	83.3%	7.9%	13.0%	19.9%	8.6%	23.3%
3	*Bromus tectorum*	e	m	94.4%	94.4%	91.7%	88.7%	18.0%	9.7%			13.0%
3	*Allysum minus*	e	m	77.8%	100.0%	83.3%	86.0%	22.2%	3.6%			12.0%
3	*Bromus japonicus*	e	m	94.4%	97.2%	91.7%	82.7%		3.6%			7.0%
3	*Agropyron smithii*	n	p			2.8%	26.7%	2.5%	3.9%	3.3%	2.3%	4.8%
3	*Psoralea tenuiflora*	n	p	8.3%	25.0%	22.2%	26.7%			6.0%	2.0%	4.8%
3	*Tragopogon dubius*	e	m	8.3%	55.6%	88.9%	28.0%	0.6%	1.3%	1.0%		4.6%
3	*Poa pratensis*	e	p	11.1%	30.6%	50.0%	2.7%	0.6%		1.7%	1.3%	3.2%
3	*Gutierrezia sarothrae*	n	p	13.9%	8.3%	13.9%	10.0%	1.6%	0.6%	0.3%	2.0%	2.4%
3	*Sphaeralcea coccinia*	n	p	2.8%	19.4%	38.9%	12.0%	0.3%	0.6%	0.7%	0.7%	2.4%
3	*Ambrosia psilostachya*	n	p				10.7%	0.6%	0.3%	0.7%	2.7%	2.1%
3	*Erodium cicutarium*	e	m		27.8%	5.6%	4.7%	4.1%				1.7%
3	*Erigeron flagellaris*	n	p	8.3%			6.0%			1.0%	2.0%	1.5%
3	*Heterotheca villosa*	n	p	8.3%	2.8%	2.8%	11.3%		0.3%	1.0%	1.3%	1.5%
3	*Aster falcatus*	n	p	11.1%	16.7%	2.8%	12.7%		1.0%	0.3%	0.3%	1.3%
3	*Poa compressa*	e	p	8.3%	5.6%	2.8%	4.0%		1.9%	0.7%		1.1%
3	*Podospermum laciniatum*	e	m		13.9%		8.7%	0.6%	1.3%			1.0%
3	*Vicia americana*	n	p	16.7%	16.7%	8.3%	6.7%	0.9%	0.3%			1.0%
3	*Lactuca serriola*	e	m	11.1%		16.7%	7.3%				0.7%	0.9%
3	*Opuntia macrorhiza*	n	p	13.9%	8.3%	8.3%	10.7%		0.3%		0.3%	0.9%
3	*Sitanion longifolium*	n	u		11.1%	2.8%	0.7%	0.3%	1.3%			0.8%
3	*Saponaria officianalis*	e	p				4.0%	0.9%		1.3%		0.8%
3	*Meliotus officinalis*	e	m	5.6%	2.8%	5.6%	8.0%		1.0%	0.3%		0.8%
3	*Erigeron divergens*	n	m			2.8%			1.9%			0.6%
3	*Artemisia frigida*	n	p				8.0%		0.3%		0.3%	0.5%
3	*Grindelia squarrosa*	n	m	2.8%	8.3%	5.6%	1.3%				0.3%	0.5%
3	*Rumex crispus*	e	p							1.3%		0.5%
3	*Aristida purpurea*	n	p				2.0%				0.7%	0.4%
3	*Ratibida columnifera*	n	p				0.7%		0.6%		0.3%	0.4%
3	*Lepidium campestre*	e	m				2.0%	0.6%	0.6%			0.4%
3	*Astragalus drummondii*	n	p	2.8%	2.8%	2.8%	2.0%	0.3%	0.6%			0.4%
3	*Gaura coccinea*	n	p	8.3%	5.6%		3.3%		0.3%	0.3%		0.4%
3	*Physalis heterophylla*	n	p			5.6%				0.3%	0.3%	0.4%
3	*Artemisia ludoviciana*	n	p								0.7%	0.3%
3	*Taraxacum officianale*	e	p		5.6%	8.3%						0.3%
3	*Sysimbrium altissimum*	e	m				2.7%	0.3%		0.3%		0.3%
3	*Gaura parviflora*	n	m		5.6%	8.3%						0.3%
3	*Aegilops cylindrica*	e	m	5.6%	2.8%		1.3%	0.3%				0.2%
3	*Sporobolus cryptandrus*	n	p								0.3%	0.2%
3	*Stipa comata*	n	p								0.3%	0.2%
3	*Yucca glauca*	n	p	5.6%		5.6%	1.3%					0.1%
3	*Thelesperma megapotamicum*	n	p							0.3%		0.1%
3	*Opuntia fragilis*	n	p				2.7%					0.1%
3	*Medicago sativa*	e	p				2.7%					0.1%
3	*Marrubium vulgare*	e	p		2.8%							0.1%
3	*Veronica peregrina*	e	m		2.8%							0.1%
3	*Physalis virginiana*	n	u			2.8%	0.7%					0.1%
3	*Verbena bractaeta*	e	m			2.8%						0.1%
3	Unk. Forb -934	u	u					0.3%				0.1%
3	Unk. Forb -935	u	u					0.3%				0.1%
3	*Juncus arcticus*	n	p				0.7%					0.0%
3	*Poa sandbergii*	n	p				0.7%					0.0%
3	*Stipa viridula*	n	p				1.3%					0.0%
3	*Liatris punctata*	n	p				1.3%					0.0%
3	*Camelina microcarpa*	e	m				1.3%					0.0%
3	*Nepeta cataria*	e	p				0.7%					0.0%
3	*Plantago patagonica*	n	m				2.0%					0.0%
3	*Clematis hirsutissima*	n	p				1.3%					0.0%
3	*Viola nuttallii*	n	p				2.0%					0.0%
3	Unk. Forb -780	u	u				2.0%					0.0%
3	Unk. Forb -781	u	u				2.0%					0.0%
3	Bare Ground							7.9%	4.5%	3.0%	3.7%	0.0%
3	Litter							28.5%	46.8%	56.1%	68.8%	0.0%
4	*Agropyron smithii*	n	p	100.0%	100.0%	91.7%	78.7%	5.8%	5.3%	9.6%	4.0%	13.6%
4	*Stipa comata*	n	p			2.8%		2.6%	7.3%	7.9%	7.0%	9.8%
4	*Bromus japonicus*	e	m	22.2%	100.0%	94.4%	47.3%	7.3%	4.6%			7.5%
4	*Carduus nuttans*	e	m	97.2%	100.0%		80.0%	13.4%				6.3%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
4	*Artemisia ludoviciana*	n	p	36.1%	61.1%	38.9%	19.3%	3.2%	3.0%	1.0%	2.3%	5.4%
4	*Psoralea tenuiflora*	n	p	36.1%	52.8%	44.4%	32.7%	0.3%	0.3%	5.3%	0.7%	4.8%
4	*Bouteloua curtipendula*	n	p		16.7%	27.8%	24.7%	2.9%	2.6%	1.0%	2.0%	4.2%
4	*Artemisia dranunculus*	n	p	55.6%	44.4%	36.1%	43.3%	1.0%	1.0%	2.3%	1.3%	4.2%
4	*Poa pratensis*	e	p	22.2%	30.6%	33.3%	5.3%	0.3%	2.3%	1.7%	1.7%	3.5%
4	*Allysum minus*	e	m			88.9%			4.6%			3.2%
4	*Bouteloua gracilis*	n	p	11.1%	13.9%	22.2%	28.0%	3.2%	1.0%	1.0%	1.0%	3.1%
4	*Astragalus drummondii*	n	p	33.3%	27.8%	30.6%	40.7%	1.9%	2.0%	0.3%		2.9%
4	*Yucca glauca*	n	p				8.7%	1.3%	1.7%	1.0%	1.7%	2.3%
4	*Aster falcatus*	n	p	30.6%	36.1%	30.6%	14.0%		0.3%	0.7%	0.7%	2.1%
4	*Tragopogon dubius*	e	m	16.7%	50.0%	47.2%	16.0%	0.3%	0.3%			2.1%
4	*Sphaeralcea coccinia*	n	p	27.8%	25.0%	13.9%	36.7%	0.3%	0.7%		0.3%	1.7%
4	*Liatris punctata*	n	p	16.7%	30.6%	16.7%	14.7%		1.0%			1.3%
4	*Carex heliophylla*	n	p		8.3%	8.3%	2.0%	0.6%	1.0%	0.3%	0.3%	1.1%
4	*Podospermum laciniatum*	e	m	13.9%	13.9%	19.4%	14.0%	0.6%	0.3%			1.1%
4	*Opuntia macrorhiza*	n	p	22.2%	22.2%	19.4%	16.7%	0.3%				1.0%
4	*Buchloe dactyloides*	n	p	8.3%	13.9%	2.8%	7.3%			1.0%	0.3%	0.9%
4	*Stipa viridula*	n	p	8.3%	5.6%	8.3%	6.7%	0.6%	0.3%		0.3%	0.8%
4	*Grindelia squarrosa*	n	m	11.1%	2.8%	2.8%	2.7%	0.3%	0.3%		1.0%	0.8%
4	*Andropogon gerardii*	n	p				0.7%		0.3%	0.7%	0.7%	0.7%
4	*Poa compressa*	e	p	11.1%	11.1%	16.7%	6.0%		0.3%			0.7%
4	*Heterotheca villosa*	n	p					0.6%	0.7%	0.3%	0.3%	0.7%
4	*Taraxacum officinale*	e	p	11.1%	11.1%	19.4%	8.0%	0.3%				0.7%
4	*Viola nuttallii*	n	p	19.4%	19.4%		12.7%	0.6%				0.7%
4	*Musineon divaricatum*	n	p	55.6%			44.0%					0.6%
4	*Chrysothamnus nauseosus*	n	p		5.6%	5.6%			0.7%		0.3%	0.6%
4	*Astragalus agrestis*	n	p	22.2%		5.6%	16.7%	0.3%		0.3%		0.6%
4	*Gaura coccinea*	n	p	19.4%	8.3%	5.6%	15.3%	0.6%				0.6%
4	*Agropyron repens*	e	p				38.0%					0.5%
4	*Aristida purpurea*	n	p				11.3%				0.7%	0.5%
4	*Artemisia frigida*	n	p				6.0%	1.0%			0.3%	0.5%
4	*Erigeron divergens*	n	m	13.9%	5.6%	2.8%	3.3%	0.3%		0.7%		0.5%
4	*Helianthus pumilus*	n	p				5.3%		0.3%	0.3%	0.3%	0.5%
4	*Senecio plattensis*	n	p	25.0%	8.3%	5.6%	9.3%	0.6%				0.5%
4	*Vicia americana*	n	p	8.3%	8.3%	11.1%	6.7%		0.3%			0.5%
4	*Erodium cicutarium*	e	m	19.4%	2.8%		24.7%	0.3%				0.5%
4	*Lomatium oriental*	n	p	27.8%	13.9%		12.7%					0.4%
4	*Mertensia lanceolata*	n	p	22.2%	2.8%	2.8%	6.7%	1.0%				0.4%
4	*Draba reptans*	n	m	19.4%			25.3%					0.4%
4	*Astragalus flexuosus*	n	p	11.1%	11.1%		12.7%					0.4%
4	*Bromus tectorum*	e	m	58.3%			19.3%					0.3%
4	*Thelesperma megapotamicum*	n	p							0.3%	0.3%	0.3%
4	*Berberea orthoceras*	n	u	36.1%			14.7%	0.3%				0.3%
4	*Euphorbia spathulata*	n	m	19.4%			16.7%			0.3%		0.3%
4	*Androsace occidentalis*	n	m	38.9%			21.3%					0.3%
4	*Schizachyrium scoparium*	n	p								0.3%	0.2%
4	*Allium textile*	n	p	8.3%	5.6%		5.3%					0.2%
4	*Gutierrezia sarothrae*	n	p						0.7%			0.2%
4	*Ratibida columnifera*	n	p		2.8%	5.6%	1.3%					0.2%
4	*Camelina microcarpa*	e	m	5.6%			13.3%					0.2%
4	*Oxytropis sericea*	n	p		5.6%				0.3%			0.2%
4	*Linum usitatissimum*	e	m		2.8%		11.3%					0.2%
4	*Ambrosia psilostachya*	n	p		2.8%	2.8%	0.7%					0.1%
4	*Lactuca serriola*	e	m	8.3%	2.8%		5.3%					0.1%
4	*Lappula redowskii*	n	m				5.3%					0.1%
4	*Onosmodium molle*	n	p				1.3%	0.3%				0.1%
4	*Descurainia pinnata*	n	m				6.0%					0.1%
4	*Coryphantha missouriensis*	n	p	8.3%			4.0%					0.1%
4	*Coryphantha vivipara*	n	p		5.6%							0.1%
4	*Triodanis perfoliata*	e	m	2.8%			4.7%					0.1%
4	*Silene antirrhina*	e	m	16.7%	2.8%		4.0%					0.1%
4	*Convolvulus arvensis*	e	p					0.3%				0.1%
4	*Leucocrinum montanum*	n	p				9.3%					0.1%
4	*Linum lewisii*	n	p	11.1%			5.3%					0.1%
4	*Hybanthus verticillatus*	n	p	8.3%			10.0%					0.1%
4	Unk. Forb -784	u	u				5.3%					0.1%
4	*Koeleria macrantha*	n	p				1.3%					0.0%
4	*Panicum virgatum*	n	p				2.0%					0.0%
4	*Asclepias pumila*	n	p				1.3%					0.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
4	*Arnica fulgens*	n	p	2.8%			0.7%					0.0%
4	*Cirsium undulatum*	n	m	2.8%			0.7%					0.0%
4	*Erigeron flagellaris*	n	p				2.0%					0.0%
4	*Gaillardia aristata*	n	p				0.7%					0.0%
4	*Machaeranthera pinnatifida*	n	p				2.7%					0.0%
4	*Nothocalis cuspidata*	n	p				2.7%					0.0%
4	*Lepidium campestre*	e	m				1.3%					0.0%
4	*Opuntia fragilis*	n	p				1.3%					0.0%
4	*Arenaria fendlerii*	n	p				0.7%					0.0%
4	*Evolvulus nuttalianus*	n	p				3.3%					0.0%
4	*Tragia ramosa*	n	p				3.3%					0.0%
4	*Astragalus tridactylicus*	n	p				0.7%					0.0%
4	*Dalea purpurea*	n	p	5.6%			1.3%					0.0%
4	*Calochortus gunnisonii*	n	p		2.8%							0.0%
4	*Zygadenus venenosus*	n	p				0.7%					0.0%
4	*Orobanche fasciculata*	n	p				1.3%					0.0%
4	*Eriogonum effusum*	n	p	5.6%			1.3%					0.0%
4	*Delphinium viresens*	n	p				1.3%					0.0%
4	*Penstemon secundiflorus*	n	p				1.3%					0.0%
4	Bare Ground							3.8%	2.0%	2.3%	2.3%	0.0%
4	Litter							43.1%	54.5%	61.6%	69.7%	0.0%
5	*Stipa comata*	n	p	100.0%	91.7%	91.7%	54.0%	4.3%	7.1%	5.7%	4.3%	16.4%
5	*Agropyron smithii*	n	p	47.2%	36.1%	55.6%	40.0%	1.7%	1.4%	4.0%	1.7%	7.6%
5	*Artemisia ludoviciana*	n	p	16.7%	30.6%	27.8%	38.7%	1.0%	2.7%	0.7%	1.7%	5.0%
5	*Bouteloua curtipendula*	n	p	61.1%	55.6%	75.0%	34.0%	1.3%	1.4%	0.7%	0.7%	4.7%
5	*Eriogonum brevicaule*	n	p	44.4%	66.7%	36.1%	32.7%	1.0%	1.0%	0.7%	1.3%	4.4%
5	*Allysum minus*	e	m	22.2%	50.0%	94.4%	30.0%	2.3%	1.0%			4.1%
5	*Stipa viridula*	n	p	27.8%	36.1%	44.4%	17.3%	3.0%	0.7%	0.3%		3.4%
5	*Gutierrezia sarothrae*	n	p	33.3%	19.4%	36.1%	11.3%		1.0%		2.0%	2.9%
5	*Musineon divaricatum*	n	p	77.8%	30.6%	30.6%	51.3%	2.0%				2.6%
5	*Astragalus tridactylicus*	n	p	11.1%	47.2%	33.3%	10.7%		0.7%	0.3%	1.0%	2.6%
5	*Helianthus pumilus*	n	p	25.0%	11.1%	13.9%	12.0%	1.0%		0.3%	1.3%	2.2%
5	*Physaria bellii*	n	p	22.2%	50.0%	27.8%	23.3%	0.3%	0.3%		0.3%	2.1%
5	*Astragalus drummondii*	n	p	19.4%	8.3%	8.3%	10.7%	2.3%	0.7%			1.8%
5	*Bouteloua gracilis*	n	p	8.3%	11.1%	25.0%	4.0%	0.7%	0.7%	0.3%	0.3%	1.7%
5	*Poa pratensis*	e	p				9.3%	0.3%	0.7%	0.3%	1.0%	1.6%
5	*Psoralea tenuiflora*	n	p	11.1%	11.1%	5.6%	18.7%		0.7%	0.3%	0.7%	1.6%
5	*Grindelia squarrosa*	n	m	8.3%	19.4%	27.8%	6.0%			0.3%	0.7%	1.5%
5	*Tragopogon dubius*	e	m	16.7%	22.2%	41.7%	12.7%		0.7%			1.5%
5	*Linum lewisii*	n	p	25.0%		41.7%	21.3%	0.3%	0.3%	0.3%		1.5%
5	*Linum usitatissimum*	e	m	44.4%	41.7%	36.1%	10.7%				0.3%	1.5%
5	*Koeleria macrantha*	n	p	2.8%		2.8%	7.3%		0.7%		1.3%	1.4%
5	*Evolvulus nuttalianus*	n	p	27.8%	27.8%	16.7%	15.3%			0.3%	0.3%	1.4%
5	*Bromus japonicus*	e	m	5.6%	5.6%	2.8%	29.3%	0.7%	0.7%			1.3%
5	*Oxytropis lambertii*	n	p	36.1%	16.7%	38.9%	16.0%			0.3%		1.3%
5	*Vicia americana*	n	p	8.3%	19.4%	8.3%	20.7%	0.7%	0.3%			1.2%
5	*Aristida purpurea*	n	p	8.3%	16.7%	13.9%	8.0%	0.3%	0.7%			1.1%
5	*Oryzopsis hymenoides*	n	p	11.1%	11.1%	11.1%	12.0%		0.7%	0.3%		1.1%
5	*Prunus besseyi*	n	p	11.1%	5.6%		6.0%	0.3%			1.0%	1.1%
5	*Opuntia macrorhiza*	n	p	11.1%	11.1%	5.6%	17.3%		0.3%	0.3%		1.0%
5	*Dalea candida*	n	p	33.3%	13.9%	13.9%	12.0%		0.3%	0.3%		1.0%
5	*Buchloe dactyloides*	n	p			5.6%	5.3%			1.0%		0.9%
5	*Gaillardia aristata*	n	p		22.2%	5.6%	1.3%	1.0%				0.9%
5	*Carex heliophylla*	n	p				10.0%	1.3%				0.8%
5	*Allium textile*	n	p	33.3%	19.4%		30.7%					0.8%
5	*Rhus trilobata*	n	p		5.6%	8.3%	1.3%				0.7%	0.7%
5	*Liatris punctata*	n	p	2.8%	8.3%	22.2%	8.0%		0.3%			0.7%
5	*Gaura coccinea*	n	p		11.1%	13.9%	6.0%				0.3%	0.7%
5	*Erysimum asperum*	n	p		11.1%	22.2%		0.3%				0.6%
5	*Comandra umbellata*	n	p	30.6%	8.3%	8.3%	8.7%			0.3%		0.6%
5	*Yucca glauca*	n	p	5.6%	2.8%	5.6%	5.3%	0.3%	0.3%			0.5%
5	*Aster porteri*	n	p							0.7%		0.5%
5	*Senecio plattensis*	n	p	27.8%	2.8%	5.6%	12.0%	0.3%				0.5%
5	*Poa compressa*	e	p	8.3%			4.0%		0.7%			0.4%
5	*Barbarea orthoceras*	n	u	8.3%			7.3%	0.7%				0.4%
5	*Camelina microcarpa*	e	m		11.1%		8.0%	0.3%				0.4%
5	*Draba reptans*	n	m	13.9%	13.9%		12.0%					0.4%
5	*Lesquerella montana*	n	u	22.2%		19.4%	8.0%					0.4%
5	*Euphorbia robusta*	n	p		19.4%	8.3%	1.3%					0.4%

Appendix 3 (Cont.)

Plot	Species			% of Quadrats Present				% Cover				IMP
				Part94	July95	July96	All94	June95	June96	Aug95	Aug96	
5	*Scutellaria brittonia*	n	p			11.1%	4.7%		0.3%			0.4%
5	*Sphaeralcea coccinia*	n	p	5.6%	2.8%	2.8%	6.7%			0.3%		0.4%
5	*Oenothera brachycarpa*	n	p	30.6%	13.9%	2.8%	9.3%					0.4%
5	*Ambrosia psilostachya*	n	p			2.8%	6.0%		0.3%			0.3%
5	*Arnica fulgens*	n	p				0.7%	0.7%				0.3%
5	*Aster falcatus*	n	p	11.1%		8.3%	11.3%					0.3%
5	*Lactuca serriola*	e	m				4.7%			0.3%		0.3%
5	*Podospermum laciniatum*	e	m		11.1%	5.6%	6.0%					0.3%
5	*Descurainia sophia*	e	m				0.7%	0.7%				0.3%
5	*Rosa arkansana*	n	p				4.7%		0.3%			0.3%
5	*Penstemon secundiflorus*	n	p			2.8%	6.0%		0.3%			0.3%
5	*Lomatium oriental*	n	p				1.3%	0.3%				0.2%
5	*Asclepias pumila*	n	p	13.9%	2.8%	2.8%	7.3%					0.2%
5	*Erigeron divergens*	n	m	5.6%			2.0%	0.3%				0.2%
5	*Townsendia exscapa*	n	p			13.9%	1.3%					0.2%
5	*Cerastium arvense*	n	p				2.7%	0.3%				0.2%
5	*Geranium caespitosum*	n	p		5.6%			0.3%				0.2%
5	*Viola nuttallii*	n	p	8.3%	8.3%		6.7%					0.2%
5	Unk. Forb -937	u	u					0.3%				0.2%
5	Unk. Forb -936	u	p					0.3%				0.2%
5	*Andropogon gerardii*	n	p				4.0%					0.1%
5	*Bromus tectorum*	e	m	2.8%			8.0%					0.1%
5	*Artemisia frigida*	n	p			5.6%	1.3%					0.1%
5	*Hymenopappus filifolius*	n	p				6.7%					0.1%
5	*Lappula redowskii*	n	m		5.6%							0.1%
5	*Coryphantha missouriensis*	n	p		5.6%	2.8%						0.1%
5	*Paronychia jamesii*	n	p			2.8%	4.7%					0.1%
5	*Silene antirrhina*	e	m				3.3%					0.1%
5	*Euphorbia spathulata*	n	m				3.3%					0.1%
5	*Tragia ramosa*	n	p				6.0%					0.1%
5	*Leucocrinum montanum*	n	p		5.6%		0.7%					0.1%
5	*Hybanthus verticillatus*	n	p				3.3%					0.1%
5	Unk. Forb -785	u	u				4.7%					0.1%
5	*Dicanthelium oligosanthes*	n	m				2.7%					0.0%
5	*Hordeum jubetum*	n	u				0.7%					0.0%
5	*Schizachyrium scoparium*	n	p				2.0%					0.0%
5	*Heterotheca villosa*	n	p		2.8%							0.0%
5	*Nothocalis cuspidata*	n	p				0.7%					0.0%
5	*Lepidium campestre*	e	m				1.3%					0.0%
5	*Triodanis perfoliata*	e	m				2.0%					0.0%
5	*Symphoricarpos occidentalis*	n	p				2.0%					0.0%
5	*Chamaesyce serpyllifolia*	e	m				2.7%					0.0%
5	*Astragalus agrestis*	n	p				2.7%					0.0%
5	*Dalea purpurea*	n	p				1.3%					0.0%
5	*Calochortus gunnisonii*	n	p			2.8%						0.0%
5	*Zygadenos venenosus*	n	p				0.7%					0.0%
5	*Oxybaphus linearis*	n	p				1.3%					0.0%
5	*Androsace occidentalis*	n	m				0.7%					0.0%
5	Bare Ground							42.9%	42.2%	39.7%	37.2%	0.0%
5	Litter							25.9%	30.3%	41.7%	41.9%	0.0%
6	*Agropyron smithii*	n	p	94.4%	100.0%	100.0%	96.0%	12.3%	6.4%	13.5%	7.6%	20.0%
6	*Centaurea diffusa*	e	u	97.2%	72.2%	86.1%	43.3%	4.2%	5.4%	11.2%	4.0%	12.8%
6	*Allysum minus*	e	m	94.4%	97.2%	97.2%	79.3%	12.3%	2.3%			9.3%
6	*Convolvulus arvensis*	e	p	44.4%	97.2%	91.7%	52.0%	3.2%	2.7%	4.6%	2.0%	8.8%
6	*Bromus japonicus*	e	m	63.9%	58.3%	86.1%	54.7%	1.9%	7.0%			6.9%
6	*Artemisia ludoviciana*	n	p	5.6%	50.0%	44.4%	16.0%	1.6%	1.3%	2.0%	2.0%	4.6%
6	*Erigeron flagellaris*	n	p		33.3%	19.4%	26.0%	1.9%	2.0%	2.0%	1.7%	4.3%
6	*Poa compressa*	e	p	27.8%	19.4%	16.7%	11.3%	2.3%	3.0%	1.0%	1.7%	3.9%
6	*Sphaeralcea coccinia*	n	p	36.1%	55.6%	44.4%	47.3%	1.0%	1.0%	1.3%	0.3%	3.9%
6	*Aster falcatus*	n	p	50.0%	30.6%	52.8%	34.7%	0.6%	0.7%	0.3%	1.0%	3.2%
6	*Poa pratensis*	e	p	2.8%	8.3%	8.3%	11.3%	1.6%		2.0%	2.3%	2.9%
6	*Artemisia frigida*	n	p	30.6%	22.2%	38.9%	24.0%	0.3%		1.3%	0.3%	2.2%
6	*Astragalus agrestis*	n	p	5.6%	27.8%	41.7%	13.3%				0.7%	1.8%
6	*Bouteloua gracilis*	n	p	8.3%	36.1%	13.9%	4.0%	0.6%	1.0%		0.3%	1.7%
6	*Bromus tectorum*	e	m	13.9%	22.2%		37.3%	1.0%	0.7%			1.6%
6	*Psoralea tenuiflora*	n	p		8.3%	16.7%	9.3%		0.3%	1.3%	0.3%	1.4%
6	*Aristida purpurea*	n	p	16.7%	5.6%	5.6%	20.0%	0.3%		1.0%		1.0%
6	*Buchloe dactyloides*	n	p		11.1%	8.3%	6.7%	0.6%	0.7%			0.9%
6	*Lomatium oriental*	n	p	13.9%	22.2%	2.8%	6.7%	0.3%				0.6%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
6	*Ratibida columnifera*	n	p		8.3%	13.9%					0.3%	0.6%
6	*Astragalus drummondii*	n	p		13.9%	8.3%	0.7%	0.3%				0.5%
6	*Linum usitatissimum*	e	m			2.8%	0.7%		0.7%		0.3%	0.5%
6	*Phyla cuneifolia*	n	p								1.0%	0.5%
6	*Tragopogon dubius*	e	m			2.8%	5.3%	1.0%				0.4%
6	*Androsace occidentalis*	n	m	2.8%			18.0%					0.4%
6	*Gutierrezia sarothrae*	n	p	8.3%		2.8%	4.7%		0.3%			0.3%
6	*Heterotheca villosa*	n	p	8.3%	2.8%		4.0%	0.3%		0.3%		0.3%
6	*Silene antirrhina*	e	m				16.0%					0.3%
6	*Erodium cicutarium*	e	m					1.0%				0.3%
6	*Leucocrinum montanum*	n	p					0.6%	0.3%			0.3%
6	*Linum lewisii*	n	p	8.3%		8.3%	2.7%			0.3%		0.3%
6	*Podospermum laciniatum*	e	m			2.8%	0.7%	0.3%				0.2%
6	*Camelina microcarpa*	e	m		2.8%		8.0%					0.2%
6	*Descurainia pinnata*	n	m	2.8%			10.0%					0.2%
6	*Lepidium densiflorum*	e	m	11.1%	8.3%		2.7%					0.2%
6	*Chenopodium incanum*	n	m		8.3%		0.7%					0.2%
6	*Evolvulus nuttalianus*	n	p				10.0%					0.2%
6	*Melilotus officinalis*	e	m								0.3%	0.2%
6	*Gaura coccinea*	n	p		8.3%		3.3%					0.2%
6	*Schedonnardus paniculatus*	n	p							0.3%		0.1%
6	*Allium textile*	n	p	2.8%	2.8%		2.0%					0.1%
6	*Ambrosia psilostachya*	n	p				2.7%					0.1%
6	*Chrysothamnus nauseosus*	n	p	11.1%			2.7%					0.1%
6	*Cirsium undulatum*	n	m		2.8%		2.0%					0.1%
6	*Lactuca serriola*	e	m	5.6%			2.7%					0.1%
6	*Liatris punctata*	n	p		5.6%		0.7%					0.1%
6	*Thelesperma megapotamicum*	n	p		8.3%							0.1%
6	*Lithospermum incisum*	n	p				5.3%					0.1%
6	*Draba reptans*	n	m	5.6%			5.3%					0.1%
6	*Lepidium campestre*	e	m			5.6%	2.7%					0.1%
6	*Lesquerella montana*	n	u		2.8%	2.8%						0.1%
6	*Opuntia macrorhiza*	n	p			2.8%	2.7%					0.1%
6	*Agaloma marginata*	n	u				3.3%					0.1%
6	*Astragalus flexuosus*	n	p						0.3%			0.1%
6	*Plantago patagonica*	n	m	11.1%			6.7%					0.1%
6	*Viola nuttallii*	n	p		5.6%							0.1%
6	Unk. Forb -788	u	u		2.8%		1.3%					0.1%
6	*Koeleria macrantha*	n	p				0.7%					0.0%
6	*Stipa comata*	n	p				1.3%					0.0%
6	*Mertensia lanceolata*	n	p				0.7%					0.0%
6	*Sysimbrium altissimum*	e	m				1.3%					0.0%
6	*Silene scoulerii*	n	p				1.3%					0.0%
6	*Tradescantia occidentalis*	n	p				2.0%					0.0%
6	*Calochortus gunnisonii*	n	p		2.8%							0.0%
6	*Oxybaphus linearis*	n	p		2.8%							0.0%
6	*Physalis hederaefolia*	n	p				1.3%					0.0%
6	Bare Ground							18.2%	9.4%	7.6%	8.0%	0.0%
6	Litter							31.8%	54.5%	49.8%	65.8%	0.0%
7	*Agropyron smithii*	n	p	91.7%	91.7%	86.1%	93.3%	7.2%	9.8%	14.3%	5.3%	16.9%
7	*Allysum minus*	e	m	47.2%	66.7%	75.0%	54.0%	16.6%	2.0%			8.3%
7	*Bromus japonicus*	e	m	11.1%	83.3%	72.2%	37.3%	7.5%	8.2%			7.7%
7	*Bouteloua gracilis*	n	p	22.2%	52.8%	52.8%	26.7%	3.6%	2.0%	4.6%	2.0%	6.3%
7	*Centaurea diffusa*	e	u	13.9%	30.6%	55.6%	22.0%	1.3%	4.2%	2.0%	4.0%	6.2%
7	*Convolvulus arvensis*	e	p	22.2%	38.9%	25.0%	28.0%	1.3%	4.9%	5.5%	1.7%	6.1%
7	*Aster falcatus*	n	p	41.7%	16.7%	30.6%	33.3%		2.6%	1.3%	1.7%	3.4%
7	*Stipa comata*	n	p	33.3%	47.2%	25.0%	16.7%		2.0%	1.0%	1.0%	2.9%
7	*Carex heliophylla*	n	p	16.7%	2.8%	8.3%	28.7%	1.3%	1.3%	1.6%	1.7%	2.8%
7	*Bromus tectorum*	e	m	25.0%	38.9%		21.3%	4.2%	2.0%			2.7%
7	*Aristida purpurea*	n	p	11.1%	25.0%	5.6%	12.0%	0.3%	0.3%	2.0%	1.7%	2.4%
7	*Artemisia frigida*	n	p	30.6%	30.6%	50.0%	27.3%	0.7%		1.0%	0.3%	2.4%
7	*Heterotheca villosa*	n	p	13.9%	5.6%	2.8%	20.0%	0.7%	0.7%	1.6%	1.7%	2.3%
7	*Psoralea tenuiflora*	n	p	16.7%	25.0%	25.0%	12.0%		0.3%	2.0%	0.7%	2.1%
7	*Artemisia ludoviciana*	n	p	2.8%		11.1%	19.3%	1.0%	1.6%	0.7%	1.0%	2.0%
7	*Sphaeralcea coccinia*	n	p	8.3%	22.2%	13.9%	29.3%	0.3%		1.6%	0.3%	1.9%
7	*Lepidium campestre*	e	m	13.9%	44.4%	41.7%	8.0%	0.7%		0.3%		1.8%
7	*Tragopogon dubius*	e	m	16.7%	36.1%	36.1%	10.7%	0.3%	0.7%	0.3%		1.7%
7	*Poa compressa*	e	p	2.8%	2.8%	27.8%	6.7%	0.7%	1.0%	1.0%	0.3%	1.6%
7	*Poa pratensis*	e	p	13.9%	25.0%	8.3%	7.3%	1.3%		0.3%	0.3%	1.3%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
7	*Astragalus egrestis*	n	p	36.1%	25.0%	16.7%	12.0%		0.3%	0.3%	0.3%	1.2%
7	*Eriogonum effusum*	n	p	8.3%	2.8%		12.7%		0.3%		1.7%	1.2%
7	*Erigeron divergens*	n	m	36.1%	22.2%	19.4%	12.0%		0.3%	0.3%		1.1%
7	*Linum lewisii*	n	p	8.3%	13.9%	11.1%	16.7%		0.3%	0.3%		0.9%
7	*Descurainia pinnata*	n	m	19.4%	13.9%		33.3%	0.3%				0.8%
7	*Bouteloua curtipendula*	n	p		8.3%	8.3%		0.3%			0.7%	0.7%
7	*Helianthus pumilus*	n	p	2.8%			0.7%	0.3%		1.3%	0.3%	0.7%
7	*Silene antirrhina*	e	m	22.2%	5.6%	8.3%	30.7%					0.7%
7	*Androsace occidentalis*	n	m	30.6%			40.7%					0.7%
7	*Draba reptans*	n	m	13.9%	16.7%		23.3%					0.6%
7	*Musineon divaricatum*	n	p		5.6%		6.7%	0.7%				0.4%
7	*Gutierrezia sarothrae*	n	p	5.6%	2.8%	5.6%	6.7%				0.3%	0.4%
7	*Astragalus drummondii*	n	p		2.8%	5.6%	6.0%		0.7%			0.4%
7	*Oxytropis lambertii*	n	p	11.1%	11.1%	8.3%	4.0%					0.4%
7	*Plantago patagonica*	n	m	2.8%		8.3%	13.3%					0.4%
7	Unk. Forb -792	u	u		22.2%		0.7%					0.4%
7	*Buchloe dactyloides*	n	p		2.8%	8.3%	4.7%	0.3%				0.3%
7	*Cirsium undulatum*	n	m	2.8%	5.6%	8.3%	2.0%					0.3%
7	*Opuntia polyacantha*	n	p	2.8%		2.8%	6.0%				0.3%	0.3%
7	*Astragalus tridactylicus*	n	p	2.8%	5.6%	8.3%	6.7%					0.3%
7	*Monarda pectinata*	n	m	13.9%		8.3%	13.3%					0.3%
7	*Allium textile*	n	p		2.8%		9.3%					0.2%
7	*Ratibida columnifera*	n	p	5.6%	8.3%	2.8%	1.3%					0.2%
7	*Lappula redowskii*	n	m				14.0%					0.2%
7	*Camelina microcarpa*	e	m	19.4%	2.8%		11.3%					0.2%
7	*Evolvulus nuttalianus*	n	p	8.3%			8.7%	0.3%				0.2%
7	*Leucocrinum montanum*	n	p		11.1%							0.2%
7	*Gaura coccinea*	n	p		8.3%		1.3%					0.2%
7	*Orobanche fasciculata*	n	p		11.1%		1.3%					0.2%
7	Unk. Forb -752	u	u	2.8%		8.3%	0.7%					0.2%
7	Unk. Forb -791	u	u			11.1%	0.7%					0.2%
7	Unk. Forb -917	u	u		2.8%			0.7%				0.2%
7	*Stipa viridula*	n	p			8.3%						0.1%
7	*Vulpia octoflora*	n	m				7.3%					0.1%
7	*Lomatium oriental*	n	p	8.3%			6.0%					0.1%
7	*Artemisia dranunculus*	n	p		2.8%		1.3%					0.1%
7	*Carduus nuttans*	e	m						0.3%			0.1%
7	*Grindelia squarrosa*	n	m			2.8%	3.3%					0.1%
7	*Lactuca serriola*	e	m				4.7%					0.1%
7	*Liatris punctata*	n	p		2.8%		2.0%					0.1%
7	*Machaeranthera pinnatifida*	n	p	5.6%	2.8%	2.8%	3.3%					0.1%
7	*Podospermum laciniatum*	e	m				4.0%					0.1%
7	*Taraxacum officianale*	e	p		2.8%	2.8%						0.1%
7	*Descurainia sophia*	e	m				1.3%	0.3%				0.1%
7	*Erysimum asperum*	n	p					0.3%				0.1%
7	*Lesquerella montana*	n	u	11.1%			5.3%					0.1%
7	*Sysimbrium altissimum*	e	m	5.6%			4.0%					0.1%
7	*Opuntia macrorhiza*	n	p			5.6%	3.3%					0.1%
7	*Ceratoides lanata*	n	p				3.3%					0.1%
7	*Astragalus flexuosus*	n	p			5.6%						0.1%
7	*Hypericum perforatum*	e	p		5.6%							0.1%
7	*Delphinium virescens*	n	p					0.3%				0.1%
7	*Comandra umbellata*	n	p				4.7%					0.1%
7	Unk. Forb -789	u	u	5.6%		2.8%	1.3%					0.1%
7	Unk. Forb -790	u	u				4.0%					0.1%
7	*Yucca glauca*	n	p				2.7%					0.0%
7	*Ambrosia psilostachya*	n	p				0.7%					0.0%
7	*Thelesperma megapotamicum*	n	p				2.7%					0.0%
7	*Onosmodium molle*	n	p				0.7%					0.0%
7	*Arabis glabra*	e	m				0.7%					0.0%
7	*Lepidium densiflorum*	e	m				0.7%					0.0%
7	*Triodanis perfoliata*	e	m				1.3%					0.0%
7	*Silene scoulerii*	n	p				2.0%					0.0%
7	*Tradescantia occidentalis*	n	p				2.0%					0.0%
7	*Agaloma marginata*	n	u	5.6%			1.3%					0.0%
7	*Astragalus shortianus*	n	p			2.8%						0.0%
7	*Calochortus gunnisonii*	n	p		2.8%							0.0%
7	*Polygonum sawatchense*	n	m	5.6%			1.3%					0.0%
7	*Physalis virginiana*	n	u			2.8%	0.7%					0.0%

Appendix 3 (Cont.)

Plot	Species			% of Quadrats Present				% Cover				IMP
				Part94	July95	July96	All94	June95	June96	Aug95	Aug96	
7	Unk. Forb -874	u	u			2.8%						0.0%
7	Bare Ground							17.3%	8.8%	8.8%	5.7%	0.0%
7	Litter							30.0%	45.4%	47.9%	67.0%	0.0%
8	*Bouteloua gracilis*	n	p	50.0%	41.7%	80.6%	44.7%	4.9%	5.7%	7.3%	5.3%	16.3%
8	*Allysum minus*	e	m	83.3%	100.0%	100.0%	90.0%	13.6%	4.7%			11.1%
8	*Aristida purpurea*	n	p	63.9%	75.0%	47.2%	51.3%	2.9%	1.7%	3.3%	3.0%	8.9%
8	*Agropyron smithii*	n	p	55.6%	63.9%	80.6%	75.3%	2.9%	1.7%	2.3%	1.3%	7.9%
8	*Bromus japonicus*	e	m	100.0%	100.0%	55.6%	98.0%	8.8%	1.0%			7.0%
8	*Erodium cicutarium*	e	m	97.2%	94.4%	80.6%	90.0%	5.8%	0.7%			6.2%
8	*Buchloe dactyloides*	n	p	33.3%	30.6%	30.6%	15.3%	1.3%	3.0%	0.3%	2.7%	5.3%
8	*Psoralea tenuiflora*	n	p	36.1%	38.9%	30.6%	22.0%	0.3%	1.0%	1.3%	0.7%	3.6%
8	*Bromus tectorum*	e	m	63.9%	72.2%	2.8%	49.3%	4.9%				3.2%
8	*Stipa comata*	n	p	8.3%	11.1%	8.3%	18.0%	2.9%	0.7%	1.3%	0.3%	3.0%
8	*Artemisia frigida*	n	p	16.7%	27.8%	41.7%	24.7%		0.3%	0.3%	0.7%	2.4%
8	*Convolvulus arvensis*	e	p	13.9%	25.0%		33.3%	1.9%	0.7%	0.3%	0.3%	2.3%
8	*Sphaeralcea coccinia*	n	p	50.0%	27.8%	33.3%	32.7%	1.0%			0.7%	2.2%
8	*Artemisia ludoviciana*	n	p	8.3%	16.7%	22.2%	8.0%			0.7%	1.0%	1.9%
8	*Centaurea diffusa*	e	u	22.2%	13.9%	41.7%	20.0%			0.3%	0.7%	1.9%
8	*Sporobolus cryptandrus*	n	p	27.8%	33.3%	22.2%	2.0%	1.6%	0.7%			1.8%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
8	*Bouteloua curtipendula*	n	p			5.6%	4.0%		0.7%	0.3%	1.0%	1.4%
8	*Erigeron divergens*	n	m				0.7%	0.6%	0.3%		1.3%	1.2%
8	*Gutierrezia sarothrae*	n	p		8.3%	19.4%	5.3%				1.0%	1.2%
8	*Schedonnardus paniculatus*	n	p		5.6%	25.0%	8.0%				0.7%	1.0%
8	*Aster falcatus*	n	p		8.3%					0.3%	0.7%	0.8%
8	*Podospermum laciniatum*	e	m		2.8%	44.4%						0.8%
8	*Plantago patagonica*	n	m	38.9%	5.6%	19.4%	26.0%					0.8%
8	*Musineon divaricatum*	n	p	13.9%	16.7%		10.7%	0.3%	0.3%			0.7%
8	*Tragopogon dubius*	e	m	5.6%	16.7%	11.1%	8.7%	0.3%				0.7%
8	*Bromus inermis*	e	p			8.3%	1.3%		0.3%		0.3%	0.6%
8	*Rosa arkansana*	n	p								1.0%	0.6%
8	*Silene antirrhina*	e	m	38.9%	2.8%		27.3%					0.5%
8	*Helianthus pumilus*	n	p	2.8%	2.8%	5.6%	0.7%			0.3%		0.4%
8	*Heterotheca villosa*	n	p	11.1%	8.3%	8.3%	11.3%					0.4%
8	*Linum usitatissimum*	e	m	11.1%	2.8%	13.9%	11.3%					0.4%
8	*Evolvulus nuttalianus*	n	p	13.9%	2.8%	2.8%	12.0%					0.3%
8	Unk. Forb -954	u	u							0.3%		0.3%
8	*Koeleria macrantha*	n	p				12.7%					0.2%
8	*Sporobolus cryptandrus*	n	p				14.7%					0.2%
8	*Liatris punctata*	n	p								0.3%	0.2%
8	*Draba reptans*	n	m	19.4%			12.0%					0.2%
8	*Opuntia macrorhiza*	n	p	5.6%	5.6%		4.7%					0.2%
8	*Androsace occidentalis*	n	m	2.8%			15.3%					0.2%
8	*Panicum virgatum*	n	p				5.3%					0.1%
8	*Poa compressa*	e	p	8.3%			4.0%					0.1%
8	*Vulpia octoflora*	n	m	27.8%			9.3%					0.1%
8	*Allium textile*	n	p		5.6%		1.3%					0.1%
8	*Erigeron flagellaris*	n	p			5.6%						0.1%
8	*Lactuca serriola*	e	m		2.8%		2.7%					0.1%
8	*Lappula redowskii*	n	m				4.0%					0.1%
8	*Camelina microcarpa*	e	m		2.8%		2.0%					0.1%
8	*Opuntia fragilis*	n	p			2.8%	6.0%					0.1%
8	*Tradescantia occidentalis*	n	p		2.8%	2.8%						0.1%
8	*Astragalus flexuosus*	n	p				4.0%					0.1%
8	*Astragalus drummondii*	n	p	2.8%		2.8%	1.3%					0.1%
8	*Dalea candida*	n	p				3.3%					0.1%
8	*Linum lewisii*	n	p		5.6%		1.3%					0.1%
8	*Gaura coccinea*	n	p			5.6%	1.3%					0.1%
8	Unk. Forb -789	u	u		8.3%							0.1%
8	*Hordeum jubatum*	n	u	2.8%			1.3%					0.0%
8	*Oryzopsis hymenoides*	n	p				0.7%					0.0%
8	*Yucca glauca*	n	p				0.7%					0.0%
8	*Asclepias stenophylla*	n	p			2.8%						0.0%
8	*Chrysothamnus nauseosus*	n	p				2.0%					0.0%
8	*Nothocalis cuspidata*	n	p				2.0%					0.0%
8	*Descurainia sophia*	e	m				2.0%					0.0%
8	*Lepidium campestre*	e	m				0.7%					0.0%
8	*Lepidium densiflorum*	e	m				2.0%					0.0%
8	*Coryphantha missouriensis*	n	p				1.3%					0.0%
8	*Echinocereus viridiflorus*	n	p	8.3%			2.0%					0.0%
8	*Ceratoides lanata*	n	p				0.7%					0.0%
8	*Astragalus egrestis*	n	p	2.8%		2.8%	0.7%					0.0%
8	*Monarda fistulosa*	n	p				1.3%					0.0%
8	*Scutellaria brittonia*	n	p				2.7%					0.0%
8	*Leucocrinum montanum*	n	p				0.7%					0.0%
8	*Oxybaphus linearis*	n	p				1.3%					0.0%
8	*Penstemon secundiflorus*	n	p				0.7%					0.0%
8	Bare Ground							11.0%	20.5%	16.3%	26.6%	0.0%
8	Litter							34.7%	55.9%	64.8%	50.5%	0.0%
9	*Bouteloua gracilis*	n	p	52.8%	83.3%	88.9%	67.3%	8.4%	8.8%	6.6%	8.7%	21.1%
9	*Allysum minus*	e	m	91.7%	100.0%	100.0%	96.7%	15.2%	6.7%			11.9%
9	*Bromus japonicus*	e	m	100.0%	100.0%	52.8%	97.3%	6.5%				5.4%
9	*Agropyron smithii*	n	p	41.7%	86.1%	77.8%	54.0%	0.6%	1.0%	1.0%	0.7%	5.1%
9	*Psoralea tenuiflora*	n	p	27.8%	13.9%	22.2%	17.3%	0.3%	1.0%	3.3%	1.7%	5.1%
9	*Erodium cicutarium*	e	m	72.2%	58.3%	58.3%	71.3%	4.9%	0.7%			4.4%
9	*Buchloe dactyloides*	n	p	30.6%	22.2%	16.7%	16.7%	1.0%	0.7%	0.7%	3.3%	4.1%
9	*Convolvulus arvensis*	e	p	36.1%	36.1%	41.7%	41.3%	1.6%	0.7%	1.3%	0.3%	3.8%
9	*Heterotheca villosa*	n	p	55.6%	44.4%	55.6%	41.3%	1.3%	0.7%	0.3%	0.7%	3.5%
9	*Bromus tectorum*	e	m	25.0%	52.8%		68.7%	5.8%				3.4%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
9	*Sphaeralcea coccinia*	n	p	47.2%	44.4%	36.1%	40.7%	0.6%	1.0%	0.7%	0.7%	3.4%
9	*Aristida purpurea*	n	p	11.1%	38.9%	36.1%	32.0%	0.6%	0.7%		1.0%	2.7%
9	*Sporobolus cryptandrus*	n	p	25.0%	33.3%	36.1%	14.0%	1.6%	0.3%	0.3%		2.1%
9	*Artemisia frigida*	n	p	33.3%	11.1%	8.3%	45.3%	0.3%	1.0%		0.7%	2.0%
9	*Plantago patagonica*	n	m	61.1%	36.1%	41.7%	50.7%					1.9%
9	*Erigeron divergens*	n	m						1.0%		2.0%	1.8%
9	*Stipa comata*	n	p	5.6%	5.6%	5.6%	10.7%	1.0%	0.7%	0.7%	0.3%	1.7%
9	*Artemisia ludoviciana*	n	p	13.9%	2.8%	16.7%	15.3%			0.7%	1.0%	1.7%
9	*Tragopogon dubius*	e	m	5.6%	33.3%	30.6%	24.7%	0.3%	0.3%			1.6%
9	*Schedonnardus paniculatus*	n	p	8.3%	8.3%	27.8%	2.0%			0.3%	0.7%	1.3%
9	*Centaurea diffusa*	e	u		11.1%	13.9%	5.3%	0.3%	0.3%	0.3%	0.3%	1.2%
9	*Evolvulus nuttalianus*	n	p	11.1%	5.6%	11.1%	14.0%		0.3%	0.7%		1.2%
9	*Podospermum laciniatum*	e	m		25.0%	30.6%	0.7%		0.3%			1.0%
9	*Bouteloua curtipendula*	n	p	16.7%	11.1%	13.9%	5.3%		0.7%			0.8%
9	*Gutierrezia sarothrae*	n	p	2.8%	8.3%	11.1%	8.0%		0.3%		0.3%	0.8%
9	*Silene antirrhina*	e	m	33.3%	8.3%		40.0%					0.7%
9	*Vulpia octoflora*	n	m	13.9%	2.8%		22.0%					0.4%
9	*Aster falcatus*	n	p				4.0%		0.7%			0.4%
9	*Opuntia macrorhiza*	n	p	19.4%	5.6%	8.3%	9.3%	0.3%				0.4%
9	*Opuntia polyacantha*	n	p	5.6%	8.3%	13.9%	2.7%					0.4%
9	*Astragalus drummondii*	n	p		8.3%	13.9%	2.7%					0.4%
9	*Yucca glauca*	n	p							0.3%		0.3%
9	*Musineon divaricatum*	n	p	11.1%	13.9%		3.3%	0.3%				0.3%
9	*Artemisia dranunculus*	n	p				4.7%			0.3%		0.3%
9	*Erigeron flagellaris*	n	p			16.7%						0.3%
9	*Lepidium densiflorum*	e	m		19.4%		2.7%					0.3%
9	*Echinocereus viridiflorus*	n	p	2.8%		16.7%	1.3%					0.3%
9	*Opuntia fragilis*	n	p			11.1%			0.3%			0.3%
9	*Gaura coccinea*	n	p		11.1%	8.3%	1.3%					0.3%
9	*Lesquerella montana*	n	u						0.3%			0.2%
9	*Scutellaria brittonia*	n	p	2.8%			5.3%		0.3%			0.2%
9	*Linum usitatissimum*	e	m	5.6%	5.6%	5.6%	5.3%					0.2%
9	Unk. Forb -789	u	u		11.1%							0.2%
9	*Hordeum jubatum*	n	u				2.7%	0.3%				0.1%
9	*Asclepias pumila*	n	p			8.3%						0.1%
9	*Cirsium undulatum*	n	m					0.3%				0.1%
9	*Liatris punctata*	n	p	13.9%		2.8%	3.3%					0.1%
9	*Camelina microcarpa*	e	m	5.6%			5.3%					0.1%
9	*Draba reptans*	n	m	25.0%			7.3%					0.1%
9	*Coryphantha missouriensis*	n	p	2.8%	8.3%		0.7%					0.1%
9	*Astragalus agrestis*	n	p			5.6%						0.1%
9	*Androsace occidentalis*	n	m				8.0%					0.1%
9	Unk. Forb -920	u	u		8.3%							0.0%
9	*Poa compressa*	e	p				3.3%					0.0%
9	*Allium textile*	n	p				2.0%					0.0%
9	*Dyssodia papposa*	n	m		2.8%							0.0%
9	*Nothocalis cuspidata*	n	p				0.7%					0.0%
9	*Hymenopappus filifolius*	n	p				2.0%					0.0%
9	*Lappula redowskii*	n	m	8.3%			2.0%					0.0%
9	*Tradescantia occidentalis*	n	p		2.8%							0.0%
9	*Tragia ramosa*	n	p				1.3%					0.0%
9	*Dalea candida*	n	p			2.8%						0.0%
9	*Dalea purpurea*	n	p		2.8%		0.7%					0.0%
9	*Monarda pectinata*	n	m				0.7%					0.0%
9	*Oxybaphus linearis*	n	p				2.7%					0.0%
9	Unk. Forb -966	u	u			2.8%						0.0%
9	Bare Ground							15.2%	22.2%	15.6%	23.1%	0.0%
9	Litter							33.0%	48.8%	66.8%	54.5%	0.0%
10	*Bouteloua gracilis*	n	p	80.6%	75.0%	83.3%	66.7%	10.9%	10.0%	12.4%	8.0%	22.8%
10	*Agropyron smithii*	n	p	75.0%	83.3%	88.9%	66.0%	5.6%	5.4%	3.9%	1.3%	11.1%
10	*Allysum minus*	e	m	66.7%	72.2%	94.4%	41.3%	11.2%	4.0%			8.8%
10	*Bromus japonicus*	e	m	86.1%	75.0%	77.8%	67.3%	4.6%	3.7%			7.0%
10	*Stipa comata*	n	p	11.1%	33.3%	30.6%	11.3%	1.3%	2.7%	2.0%	3.0%	5.8%
10	*Centaurea diffusa*	e	u		19.4%	25.0%	12.0%	1.0%	2.3%	2.0%	3.3%	5.5%
10	*Buchloe dactyloides*	n	p	19.4%	2.8%	19.4%	14.7%	0.7%	0.7%	2.0%	2.3%	3.7%
10	*Yucca glauca*	n	p	13.9%	5.6%	5.6%	9.3%	1.0%	1.3%	1.6%	0.7%	2.4%
10	*Sphaeralcea coccinia*	n	p	5.6%	38.9%	19.4%	23.3%	0.3%	0.3%	0.3%	0.3%	2.2%
10	*Artemisia frigida*	n	p	19.4%	16.7%	25.0%	12.0%	1.0%	0.7%	0.3%	0.3%	2.0%
10	*Bromus tectorum*	e	m		44.4%		12.7%	3.0%				1.9%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
10	*Plantago patagonica*	n	m	41.7%	25.0%	30.6%	31.3%					1.7%
10	*Bouteloua curtipendula*	n	p	16.7%	13.9%	13.9%	20.0%	0.3%	0.3%	0.3%	0.3%	1.5%
10	*Heterotheca villosa*	n	p	25.0%		22.2%	22.7%	0.7%	0.7%	0.3%		1.5%
10	*Vulpia octoflora*	n	m	44.4%	52.8%		14.7%	0.3%				1.4%
10	*Podospermum laciniatum*	e	m	13.9%	33.3%	11.1%	5.3%	1.0%			0.3%	1.4%
10	*Eriogonum effusum*	n	p	36.1%	5.6%	19.4%	20.0%	0.3%	0.3%	0.7%		1.4%
10	*Helianthus pumilus*	n	p	8.3%	30.6%		13.3%			1.0%		1.3%
10	*Psoralea tenuiflora*	n	p	13.9%	8.3%	8.3%	18.0%		0.3%	1.0%		1.3%
10	*Tragopogon dubius*	e	m	27.7%	13.9%	19.4%	11.3%	0.7%				1.1%
10	*Gutierrezia sarothrae*	n	p	19.4%	2.8%	16.7%	8.7%			0.3%	0.3%	0.9%
10	*Stipa viridula*	n	p	2.8%	5.6%	8.3%	4.7%	0.3%	0.7%			0.7%
10	*Aristida purpurea*	n	p	36.1%	8.3%	2.8%	20.7%					0.6%
10	*Poa compressa*	e	p	8.3%	8.3%		4.0%	0.7%		0.3%		0.6%
10	*Machaeranthera pinnatifida*	n	p		8.3%	8.3%	0.7%	0.3%	0.3%			0.6%
10	*Bromus inermis*	e	p				6.7%	0.7%	0.3%			0.5%
10	*Astragalus flexuosus*	n	p		16.7%		2.7%		0.3%			0.5%
10	*Allium textile*	n	p		5.6%	5.6%	5.3%	0.3%				0.4%
10	*Lappula redowskii*	n	m	19.4%	5.6%		14.7%					0.4%
10	*Camelina microcarpa*	e	m		5.6%		3.3%	0.7%				0.4%
10	*Descurainia pinnata*	n	m		11.1%			0.7%				0.4%
10	*Descurainia sophia*	e	m	2.8%			8.7%	0.7%				0.4%
10	*Opuntia macrorhiza*	n	p	5.6%	5.6%		7.3%			0.3%		0.4%
10	*Gaura coccinea*	n	p	5.6%	16.7%		6.0%					0.4%
10	*Rosa arkansana*	n	p				4.7%	0.7%	0.3%			0.4%
10	*Koeleria macrantha*	n	p				14.0%					0.3%
10	*Poa sandbergii*	n	p			13.9%						0.3%
10	*Liatris punctata*	n	p			2.8%	0.7%				0.3%	0.3%
10	*Ratibida columnifera*	n	p	2.8%		2.8%	2.0%			0.3%		0.3%
10	*Solidago sp.*	u	p				2.0%				0.3%	0.3%
10	*Draba reptans*	n	m	13.9%	2.8%		14.0%					0.3%
10	*Convolvulus arvensis*	e	p	2.8%		11.1%	6.0%					0.3%
10	*Hedysarum boreale*	n	p				1.3%		0.3%	0.3%		0.3%
10	*Linum usitatissimum*	e	m		2.8%	8.3%	4.0%					0.3%
10	*Comandra umbellata*	n	p		2.8%	13.9%						0.3%
10	*Musineon divaricatum*	n	p	5.6%			6.0%		0.3%			0.2%
10	*Ambrosia psilostachya*	n	p	5.6%			2.7%		0.3%			0.2%
10	*Artemisia dranunculus*	n	p	5.6%	8.3%		4.7%					0.2%
10	*Aster falcatus*	n	p			2.8%			0.3%			0.2%
10	Unk. Forb -874	u	u			11.1%						0.2%
10	*Oryzopsis hymenoides*	n	p					0.3%				0.1%
10	*Schedonnardus paniculatus*	n	p			2.8%						0.1%
10	*Sporobolus cryptandrus*	n	p			2.8%						0.1%
10	*Triticum aestivum*	e	m				2.0%	0.3%				0.1%
10	*Rhus trilobata*	n	p						0.3%			0.1%
10	*Artemisia ludoviciana*	n	p	2.8%		2.8%	4.0%					0.1%
10	*Carduus nuttans*	e	m						0.3%			0.1%
10	*Lactuca serriola*	e	m	5.6%			3.3%					0.1%
10	*Nothocalis cuspidata*	n	p	5.6%			3.3%					0.1%
10	*Opuntia fragilis*	n	p	5.6%			3.3%					0.1%
10	*Opuntia polyacantha*	n	p			5.6%						0.1%
10	*Chenopodium dessicatum*	n	m		5.6%		0.7%					0.1%
10	*Evolvulus nuttalianus*	n	p				3.3%					0.1%
10	*Marrubium vulgare*	e	p				4.7%					0.1%
10	*Calochortus gunnisonii*	n	p						0.3%			0.1%
10	*Linum lewisii*	n	p	13.9%			7.3%					0.1%
10	*Oenothera brachycarpa*	n	p	5.6%		5.6%	1.3%					0.1%
10	*Orobanche fasciculata*	n	p		2.8%		1.3%					0.1%
10	*Androsace occidentalis*	n	m	8.3%			6.7%					0.1%
10	*Delphinium viresens*	n	p		2.8%							0.1%
10	Unk. Forb -793	u	u	2.8%			0.7%	0.3%				0.1%
10	Unk. Forb -7994	u	u	16.7%			6.7%					0.1%
10	Unk. Forb -797	u	u	5.6%		2.8%	3.3%					0.1%
10	*Andropogon gerardii*	n	p	2.8%			0.7%					0.0%
10	*Panicum virgatum*	n	p				0.7%					0.0%
10	*Chrysothamnus nauseosus*	n	p	2.8%			0.7%					0.0%
10	*Cirsium ochrocentrum*	n	m				0.7%					0.0%
10	*Thelesperma megapotamicum*	n	p				2.0%					0.0%
10	*Mertensia lanceolata*	n	p	8.3%			2.0%					0.0%
10	*Silene antirrhina*	e	m	2.8%			1.3%					0.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
10	*Ceratoides lanata*	n	p				0.7%					0.0%
10	*Chamaesyce glyptosperma*	n	m				1.3%					0.0%
10	*Astragalus drummondii*	n	p				1.3%					0.0%
10	*Dalea candida*	n	p				2.0%					0.0%
10	*Oxytropis lambertii*	n	p				0.7%					0.0%
10	*Psoralea argophylla*	n	p				0.7%					0.0%
10	Unk. Forb -796	u	u				2.0%					0.0%
10	Bare Ground							25.7%	22.1%	27.4%	25.6%	0.0%
10	Litter							24.4%	40.8%	43.3%	53.5%	0.0%
11	*Bouteloua gracilis*	n	p	38.9%	25.0%	44.4%	62.7%	13.0%	9.2%	12.0%	11.0%	16.5%
11	*Agropyron smithii*	n	p	88.9%	80.6%	100.0%	88.0%	8.3%	6.5%	5.8%	4.7%	13.0%
11	*Rhus trilobata*	n	p		2.8%	5.6%	16.0%	0.7%	9.2%	9.7%	6.7%	8.5%
11	*Convolvulus arvensis*	e	p	61.1%	58.3%	61.1%	15.3%	1.0%	2.3%	1.9%	1.7%	4.7%
11	*Bromus japonicus*	e	m	22.2%	50.0%	77.8%	41.3%	3.0%	1.6%			4.6%
11	*Centaurea diffusa*	e	u	44.4%	33.3%	50.0%	12.7%	0.3%	1.6%	1.9%	2.7%	3.9%
11	*Allysum minus*	e	m	33.3%	61.1%	69.4%	15.3%	1.3%	2.3%			3.8%
11	*Gutierrezia sarothrae*	n	p	50.0%	22.2%	33.3%	14.7%	2.3%	1.0%	1.9%	1.3%	3.4%
11	*Symphoricarpos occidentalis*	n	p		16.7%	13.9%	4.7%	3.7%	0.7%	1.6%	1.3%	2.9%
11	*Stipa viridula*	n	p	8.3%	22.2%	33.3%	9.3%	0.7%	0.7%	2.3%	1.3%	2.8%
11	*Bouteloua curtipendula*	n	p	2.8%	25.0%	5.6%	18.0%	1.0%	2.0%	1.6%	1.0%	2.7%
11	*Ceratoides lanata*	n	p	11.1%	8.3%	16.7%	21.3%	1.0%	2.0%	1.0%	0.7%	2.3%
11	*Yucca glauca*	n	p	11.1%	2.8%	8.3%	6.7%	0.7%	2.3%	2.3%	0.7%	2.1%
11	*Artemisia frigida*	n	p	25.0%	22.2%	25.0%	14.7%		0.3%	1.3%	0.7%	1.9%
11	*Bromus inermis*	e	p	44.4%	13.9%	16.7%	14.7%	2.0%	0.3%			1.6%
11	*Stipa comata*	n	p	5.6%	13.9%	16.7%	6.0%	0.3%	1.0%	0.6%	1.0%	1.6%
11	*Sphaeralcea coccinia*	n	p	50.0%	27.8%	22.2%	20.0%	0.3%		0.3%		1.6%
11	*Astragalus flexuosus*	n	p	27.8%	11.1%	16.7%	21.3%	0.3%	0.3%	0.3%	0.7%	1.5%
11	*Linum usitatissimum*	e	m			41.7%	18.7%	0.3%	0.3%			1.3%
11	*Buchloe dactyloides*	n	p	8.3%	8.3%	5.6%	10.7%		1.0%		1.0%	1.1%
11	*Bromus tectorum*	e	m	5.6%	19.4%	8.3%	1.3%	0.7%	1.0%			1.0%
11	*Psoralea tenuiflora*	n	p	11.1%	2.8%	2.8%	7.3%	0.3%	0.3%	1.6%	0.3%	1.0%
11	*Musineon divaricatum*	n	p	8.3%	2.8%		16.0%	1.3%	0.3%			0.9%
11	*Podospermum laciniatum*	e	m	5.6%	16.7%	13.9%	6.0%	0.3%	0.3%			0.9%
11	*Tragopogon dubius*	e	m		11.1%	8.3%	12.0%	1.0%				0.9%
11	*Machaeranthera pinnatifida*	n	p		8.3%	2.8%	4.7%	0.3%		1.0%	0.3%	0.8%
11	*Camelina microcarpa*	e	m	13.9%	22.2%		8.0%	0.7%				0.8%
11	*Gaura coccinea*	n	p	2.8%	11.1%	11.1%	6.0%		0.3%		0.3%	0.8%
11	*Eriogonum effusum*	n	p			2.8%	7.3%	0.3%	0.3%	0.6%	0.3%	0.8%
11	*Helianthus pumilus*	n	p		16.7%	5.6%	8.7%					0.6%
11	*Rosa arkansana*	n	p				6.0%	0.3%		0.3%	0.7%	0.6%
11	*Artemisia ludoviciana*	n	p	8.3%			13.3%	0.3%			0.3%	0.5%
11	*Descurainia pinnata*	n	m	2.8%	5.6%		14.0%	0.3%				0.5%
11	*Draba reptans*	n	m	5.6%			19.3%	0.3%				0.5%
11	*Sysimbrium altissimum*	e	m	16.7%	16.7%	2.8%	4.0%					0.5%
11	*Atriplex canescens*	n	p		5.6%						1.0%	0.5%
11	*Linum lewisii*	n	p	27.8%	11.1%		12.0%					0.5%
11	*Oxybaphus linearis*	n	p		5.6%		2.0%		0.6%		0.3%	0.5%
11	*Rumex crispus*	e	p		5.6%	16.7%			0.3%			0.5%
11	*Sitanion hystrix*	n	p	8.3%	8.3%		10.7%					0.4%
11	*Melilotus officinalis*	e	m		11.1%	11.1%						0.4%
11	*Plantago patagonica*	n	m				17.3%					0.4%
11	*Aristida purpurea*	n	p	8.3%			6.7%				0.3%	0.3%
11	*Vulpia octoflora*	n	m		5.6%		10.7%					0.3%
11	*Aster falcatus*	n	p				2.0%		0.7%		0.3%	0.3%
11	*Opuntia macrorhiza*	n	p	2.8%	2.8%	5.6%	6.0%					0.3%
11	*Oryzopsis hymenoides*	n	p	2.8%		11.1%	2.0%					0.2%
11	*Poa compressa*	e	p				10.0%					0.2%
11	*Poa pratensis*	e	p					0.7%				0.2%
11	*Allium textile*	n	p	2.8%	5.6%		6.7%					0.2%
11	*Artemisia dranunculus*	n	p	5.6%	2.8%		6.7%					0.2%
11	*Taraxacum officianale*	e	p			8.3%	2.7%					0.2%
11	*Hedysarum boreale*	n	p				2.7%	0.3%	0.3%			0.2%
11	Unk. Forb -922	u	u		8.3%							0.1%
11	*Panicum virgatum*	n	p	13.9%			4.0%					0.1%
11	*Poa sandbergii*	n	p						0.3%			0.1%
11	*Schedonnardus paniculatus*	n	p			2.8%						0.1%
11	*Lactuca serriola*	e	m	2.8%			4.0%					0.1%
11	*Nothocalis cuspidata*	n	p	2.8%			2.7%					0.1%
11	*Hymenopappus filifolius*	n	p		2.8%							

Appendix 3 (Cont.)

Plot	Species			% of Quadrats Present				% Cover				IMP
				Part94	July95	July96	All94	June95	June96	Aug95	Aug96	
11	*Physaria bellii*	n	p	5.6%	2.8%		1.3%					0.1%
11	*Opuntia fragilis*	n	p	2.8%		5.6%	0.7%					0.1%
11	*Astragalus tridactylicus*	n	p	5.6%	2.8%		1.3%					0.1%
11	*Calochortus gunnisonii*	n	p		2.8%							0.1%
11	*Oenothera brachycarpa*	n	p			2.8%						0.1%
11	*Comandra umbellata*	n	p				3.3%					0.0%
11	*Andropogon gerardii*	n	p				0.7%					0.0%
11	*Bouteloua hirsuta*	n	p				0.7%					0.0%
11	*Chrysothamnus nauseosus*	n	p	2.8%			2.0%					0.0%
11	*Cirsium ochrocentrum*	n	m				0.7%					0.0%
11	*Heterotheca villosa*	n	p	8.3%			2.0%					0.0%
11	*Liatris punctata*	n	p				2.0%					0.0%
11	*Thelesperma megapotamicum*	n	p				2.0%					0.0%
11	*Lappula redowskii*	n	m				1.3%					0.0%
11	*Mertensia lanceolata*	n	p				2.0%					0.0%
11	*Lesquerella montana*	n	u				1.3%					0.0%
11	*Chenopodium album*	e	m	2.8%			0.7%					0.0%
11	*Astragalus gracilis*	n	p				2.0%					0.0%
11	*Nepeta cataria*	e	p				2.0%					0.0%
11	*Leucocrinum montanum*	n	p	2.8%			0.7%					0.0%
11	*Viola nuttallii*	n	p				2.0%					0.0%
11	Unk. Forb -7994	u	u	2.8%			0.7%					0.0%
11	Bare Ground							21.3%	15.4%	10.4%	10.3%	0.0%
11	Litter							31.0%	35.3%	41.2%	49.0%	0.0%
12	*Helianthus pumilus*	n	p	75.0%	75.0%	72.2%	66.0%	10.0%	1.7%	9.6%	3.7%	11.4%
12	*Allysum minus*	e	m	100.0%	100.0%	91.7%	78.0%	19.0%	4.6%			10.3%
12	*Evolvulus nuttalianus*	n	p	77.8%	91.7%	86.1%	59.3%	1.6%	2.3%	5.1%	5.7%	9.0%
12	*Bouteloua gracilis*	n	p	55.6%	47.2%	47.2%	29.3%	3.2%	7.6%	2.0%	6.3%	8.9%
12	*Bromus japonicus*	e	m	100.0%	100.0%	100.0%	86.0%	7.1%	3.6%			7.4%
12	*Andropogon gerardii*	n	p	5.6%	22.2%	38.9%	30.0%	5.5%	2.0%	6.5%	3.3%	7.3%
12	*Bouteloua curtipendula*	n	p		19.4%	13.9%	4.0%	4.2%	5.3%	2.7%	6.3%	7.2%
12	*Aristida purpurea*	n	p	66.7%	80.6%	80.6%	64.7%	2.3%	3.6%	2.0%	1.7%	6.8%
12	*Linum lewisii*	n	p	30.6%	63.9%		46.7%	3.9%		0.3%	1.0%	3.1%
12	*Psoralea tenuiflora*	n	p	47.2%	44.4%	27.8%	26.0%	0.3%	0.3%	0.3%	2.3%	2.7%
12	*Gutierrezia sarothrae*	n	p	2.8%	5.6%	11.1%	12.7%		0.3%	1.4%	2.7%	2.1%
12	*Linum usitatissimum*	e	m	36.1%	2.8%	72.2%	31.3%		0.3%			1.6%
12	*Tragopogon dubius*	e	m	2.8%	22.2%	58.3%	4.7%	0.3%	0.3%			1.5%
12	*Thelesperma megapotamicum*	n	p	13.9%	25.0%	25.0%	11.3%	0.3%		0.3%	0.7%	1.4%
12	*Ambrosia psilostachya*	n	p	11.1%	25.0%	30.6%	4.7%			0.3%	0.7%	1.3%
12	*Artemisia frigida*	n	p	22.2%	5.6%	33.3%	34.0%			0.3%		1.2%
12	*Hybanthus verticillatus*	n	p		22.2%	8.3%		0.3%		0.3%	1.0%	1.1%
12	*Gaura coccinea*	n	p	13.9%	16.7%	19.4%	12.0%	0.3%	0.3%			0.8%
12	*Comandra umbellata*	n	p		13.9%	13.9%		0.3%	0.7%	0.3%		0.9%
12	*Viola nuttallii*	n	p	36.1%	8.3%	25.0%	29.3%					0.9%
12	*Sitanion longifolium*	n	u	19.4%	16.7%	25.0%	14.7%					0.9%
12	*Stipa comata*	n	p				14.0%	0.3%		0.7%	0.7%	0.8%
12	*Hymenopappus filifolius*	n	p		11.1%	11.1%	4.7%		0.3%		0.3%	0.8%
12	*Agropyron smithii*	n	p	11.1%	8.3%		10.7%	0.6%	0.3%			0.7%
12	*Senecio plattensis*	n	p		16.7%	11.1%	10.0%	0.3%				0.6%
12	*Lesquerella montana*	n	u	8.3%		22.2%	18.0%					0.6%
12	*Euphorbia robusta*	n	p	16.7%		19.4%	17.3%	0.3%				0.6%
12	*Dalea purpurea*	n	p		8.3%	13.9%	8.7%				0.3%	0.6%
12	*Musineon divaricatum*	n	p	8.3%			22.7%		0.3%			0.5%
12	*Artemisia ludoviciana*	n	p				22.7%			0.3%		0.5%
12	*Eriogonum alatum*	n	p	13.9%	5.6%	8.3%	10.0%			0.3%		0.5%
12	*Schizachyrium scoparium*	n	p							0.3%	0.7%	0.4%
12	*Aster falcatus*	n	p	5.6%			10.7%	0.3%		0.3%		0.4%
12	*Cirsium undulatum*	n	m		2.8%	8.3%	0.7%			0.7%		0.4%
12	*Koeleria macrantha*	n	p			8.3%	12.0%					0.3%
12	*Descurainia sophia*	e	m				24.7%					0.3%
12	*Draba reptans*	n	m				22.0%					0.3%
12	*Convolvulus arvensis*	e	p		5.6%	2.8%				0.3%		0.3%
12	*Mentzelia speciosa*	n	u				4.0%	0.3%		0.3%		0.3%
12	*Oenothera brachycarpa*	n	p		2.8%		6.7%				0.3%	0.3%
12	*Stipa neomexicana*	n	p				4.0%		0.3%			0.2%
12	*Heterotheca villosa*	n	p	11.1%	2.8%		11.3%					0.2%
12	*Camelina microcarpa*	e	m	8.3%			12.0%					0.2%
12	*Sysimbrium altissimum*	e	m	8.3%			16.7%					0.2%
12	*Euphorbia spathulata*	n	m	8.3%			12.7%					0.2%

Appendix 3 (Cont.)

Plot	Species			% of Quadrats Present				% Cover				
				Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
12	*Leucocrinum montanum*	n	p				12.7%					0.2%
12	*Rosa arkansana*	n	p				2.7%	0.3%			0.3%	0.2%
12	*Bouteloua hirsuta*	n	p					0.3%				0.1%
12	*Bromus tectorum*	e	m	5.6%			7.3%					0.1%
12	*Carduus nuttans*	e	m			8.3%						0.1%
12	*Centaurea diffusa*	e	u			8.3%						0.1%
12	*Dyssodia papposa*	n	m			8.3%					0.3%	0.1%
12	*Kuhnia eupatoriodes*	n	p									0.1%
12	*Lactuca serriola*	e	m	2.8%			6.0%					0.1%
12	*Listris punctata*	n	p		5.6%		2.0%				0.3%	0.1%
12	*Machaeranthera pinnatifida*	n	p								0.3%	0.1%
12	*Oligoneuron rigidum*	n	p									0.1%
12	*Ratibida columnifera*	n	p		2.8%	2.8%	4.0%					0.1%
12	*Townsendia exscapa*	n	p				4.0%					0.1%
12	*Opuntia macrorhiza*	n	p			2.8%	4.0%					0.1%
12	*Paronychia jamesii*	n	p		2.8%		7.3%					0.1%
12	*Astragalus tridactylicus*	n	p	8.3%			7.3%					0.1%
12	*Sphaeralcea coccinia*	n	p				4.0%					0.1%
12	*Argemone polyanthemos*	n	m	8.3%	2.8%	2.8%	4.0%					0.1%
12	*Castilleja sessiflora*	n	p				6.0%					0.0%
12	*Bromus inermis*	e	p				0.7%					0.0%
12	*Stipa robusta*	n	p				3.3%					0.0%
12	*Yucca glauca*	n	p				1.3%					0.0%
12	*Allium textile*	n	p				3.3%					0.0%
12	*Lomatium oriental*	n	p	8.3%			2.0%					0.0%
12	*Asclepias speciosa*	n	p				2.0%					0.0%
12	*Erigeron flagellaris*	n	p				2.0%					0.0%
12	*Nothocalis cuspidata*	n	p	2.8%			0.7%					0.0%
12	*Cryptantha virgata*	n	m				1.3%					0.0%
12	*Mertensia lanceolata*	n	p	2.8%			2.7%					0.0%
12	*Onosmodium molle*	n	p				0.7%					0.0%
12	*Erysimum asperum*	n	p				2.0%					0.0%
12	*Lepidium campestre*	e	m				2.0%					0.0%
12	*Lepidium densiflorum*	e	m				0.7%					0.0%
12	*Stanleya pinnata*	n	p			2.8%						0.0%
12	*Cerastium nuttans*	n	m				2.0%					0.0%
12	*Astragalus drummondii*	n	p				2.0%					0.0%
12	*Astragalus shortianus*	n	p				2.0%					0.0%
12	*Psoralea argophylla*	n	p	5.6%			1.3%					0.0%
12	*Vicia americana*	n	p				2.0%					0.0%
12	*Penstemon secundiflorus*	n	p				1.3%					0.0%
12	Unk. Forb -802	u	u	2.8%			0.7%					0.0%
12	Unk. Forb -805	u	u	5.6%			2.0%					0.0%
12	Unk. Forb -808	u	u	2.8%			0.7%					0.0%
12	Bare Ground							4.5%	7.6%	6.5%	11.7%	0.0%
12	Litter							34.1%	58.1%	58.4%	49.3%	0.0%
13	*Andropogon gerardii*	n	p	63.9%	55.6%	88.9%	66.7%	6.7%	1.4%	9.6%	7.2%	10.4%
13	*Bouteloua curtipendula*	n	p	30.6%	77.8%	69.4%	29.3%	10.3%	6.4%	3.0%	4.2%	9.8%
13	*Bouteloua gracilis*	n	p	63.9%	44.4%	47.2%	33.3%	3.8%	3.4%	5.0%	8.5%	8.5%
13	*Helianthus pumilus*	n	p	41.7%	66.7%	44.4%	50.0%	6.7%	2.0%	6.0%	3.3%	7.6%
13	*Aristida purpurea*	n	p	50.0%	63.9%	52.8%	57.3%	5.4%	2.4%	4.0%	2.3%	8.6%
13	*Stipa neomexicana*	n	p	47.2%	75.0%	83.3%	54.0%	1.6%	2.0%	3.6%	3.9%	6.4%
13	*Allysum minus*	e	m	86.1%	100.0%	100.0%	56.0%	4.2%	1.7%			4.9%
13	*Bromus japonicus*	e	m	69.4%	97.2%	100.0%	38.7%	2.6%	0.7%			3.8%
13	*Schizachyrium scoparium*	n	p	13.9%		13.9%	14.0%	3.2%	1.7%	1.7%	2.0%	3.1%
13	*Evolvulus nuttalianus*	n	p	2.8%	16.7%	22.2%	54.0%	1.0%	1.4%	2.3%	0.7%	3.0%
13	*Linum lewisii*	n	p	75.0%	27.8%		50.0%	3.5%	0.7%	0.7%		2.3%
13	*Psoralea tenuiflora*	n	p	19.4%	38.9%	33.3%	28.7%	1.0%	0.3%	1.0%	0.7%	2.2%
13	*Astragalus tridactylicus*	n	p		22.2%	33.3%	18.7%	0.6%	1.4%		1.0%	2.0%
13	*Artemisia frigida*	n	p	80.6%	50.0%	47.2%	38.7%			0.7%		1.9%
13	*Gutierrezia sarothrae*	n	p	8.3%	36.1%	36.1%	11.3%	0.6%	0.3%	0.7%	1.0%	1.9%
13	*Hymenopappus filifolius*	n	p	27.8%	33.3%	38.9%	27.3%	0.6%	0.3%	0.7%		1.7%
13	*Lesquerella montana*	n	u	72.2%	61.1%	50.0%	32.0%					1.7%
13	*Musineon divaricatum*	n	p	16.7%	2.8%		38.0%		1.7%			1.2%
13	*Heterotheca villosa*	n	p	2.8%	27.8%	13.9%	4.0%	0.6%	0.3%	0.3%	0.3%	1.1%
13	*Thelesperma megapotamicum*	n	p		8.3%	27.8%	2.7%	1.0%	0.7%		0.3%	1.1%
13	*Hybanthus verticillatus*	n	p	16.7%	5.6%	16.7%	10.7%	0.3%			2.0%	1.1%
13	*Stipa comata*	n	p		22.2%		3.3%	0.3%	1.4%			1.0%
13	*Sitanion longifolium*	n	u	33.3%	19.4%	22.2%	22.0%	0.3%				0.9%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
13	*Tragopogon dubius*	e	m	5.6%	30.6%	27.8%	4.0%		0.3%			0.9%
13	*Comandra umbellata*	n	p	22.2%	41.7%	8.3%	7.3%			0.7%		0.9%
13	*Viola nuttallii*	n	p	66.7%	30.6%	2.8%	41.3%					0.9%
13	*Bouteloua hirsuta*	n	p	33.3%	2.8%	16.7%	12.0%	1.3%		0.3%		0.8%
13	*Linum usitatissimum*	e	m			41.7%					1.0%	0.8%
13	*Ratibida columnifera*	n	p	16.7%	11.1%	16.7%	8.0%				0.7%	0.7%
13	*Agropyron smithii*	n	p			2.8%	10.7%	0.6%	0.3%	0.3%		0.6%
13	*Cryptantha virgata*	n	m		11.1%		1.3%	1.0%				0.4%
13	*Draba reptans*	n	m	41.7%			34.0%					0.4%
13	*Paronychia jamesii*	n	p	2.8%	5.6%	5.6%	8.7%				0.3%	0.4%
13	*Dalea purpurea*	n	p		16.7%	2.8%	1.3%			0.3%		0.4%
13	*Koeleria macrantha*	n	p				4.0%	0.3%	0.3%			0.3%
13	*Yucca glauca*	n	p				2.7%		0.7%			0.3%
13	*Centaurea diffusa*	e	u	2.8%		27.8%	0.7%					0.3%
13	*Oligoneuron rigidum*	n	p								1.0%	0.3%
13	*Descurainia sophia*	e	m	44.4%			22.0%					0.3%
13	*Opuntia macrorhiza*	n	p	8.3%	16.7%	2.8%	3.3%					0.3%
13	*Tragia ramosa*	n	p		2.8%	13.9%	1.3%	0.3%				0.3%
13	*Gaura coccinea*	n	p				8.0%				0.7%	0.3%
13	*Oenothera brachycarpa*	n	p	8.3%			11.3%				0.3%	0.3%
13	*Eriogonum alatum*	n	p				0.7%	0.6%		0.3%		0.3%
13	*Allium textile*	n	p	33.3%			14.0%					0.2%
13	*Artemisia ludoviciana*	n	p			8.3%	2.0%				0.3%	0.2%
13	*Aster falcatus*	n	p			8.3%					0.3%	0.2%
13	*Erigeron flagellaris*	n	p	2.8%	2.8%		4.0%		0.3%			0.2%
13	*Liatris punctata*	n	p		5.6%	2.8%	6.7%					0.2%
13	*Senecio plattensis*	n	p		2.8%		6.0%				0.3%	0.2%
13	*Taraxacum officianale*	e	p		2.8%	2.8%	1.3%		0.3%			0.2%
13	*Cryptantha jamesii*	n	p	13.9%		11.1%	4.7%					0.2%
13	*Mertensia lanceolata*	n	p				13.3%	0.3%				0.2%
13	*Camelina microcarpa*	e	m	2.8%	5.6%		13.3%					0.2%
13	*Chorispora tenella*	e	m	27.8%			14.0%					0.2%
13	*Erysimum asperum*	n	p	16.7%		8.3%	10.7%					0.2%
13	*Chamaesyce fendleri*	n	p	5.6%		2.8%	6.0%			0.3%		0.2%
13	*Euphorbia robusta*	n	p	2.8%			9.3%	0.3%				0.2%
13	*Euphorbia spathulata*	n	m	22.2%			12.7%					0.2%
13	*Leucocrinum montanum*	n	p				7.3%	0.3%				0.2%
13	Unk. Forb -814	u	u	19.4%			4.7%			0.3%		0.2%
13	*Carex heliophylla*	n	p					0.3%				0.1%
13	*Bromus tectorum*	e	m	2.8%	8.3%		0.7%					0.1%
13	*Buchloe dactyloides*	n	p			5.6%						0.1%
13	*Poa compressa*	e	p			8.3%						0.1%
13	*Ambrosia psilostachya*	n	p			2.8%	2.7%					0.1%
13	*Cirsium undulatum*	n	m	5.6%	8.3%		3.3%					0.1%
13	*Iva xanthifolia*	e	m						0.3%			0.1%
13	*Lactuca serriola*	e	m	2.8%		2.8%	4.7%					0.1%
13	*Machaeranthera pinnatifida*	n	p	2.8%			7.3%					0.1%
13	*Townsendia exscapa*	n	p			2.8%	7.3%					0.1%
13	*Sysimbrium altissimum*	e	m	22.2%			12.0%					0.1%
13	*Astragalus bisulcatus*	n	p				0.7%			0.3%		0.1%
13	*Hedysarum boreale*	n	p				9.3%					0.1%
13	*Psoralea argophylla*	n	p	25.0%			6.0%					0.1%
13	*Argemone polyanthemos*	n	m								0.3%	0.1%
13	*Polygonum sp.*	u	m			5.6%						0.1%
13	*Castilleja sessiflora*	n	p	5.6%			2.7%	0.3%				0.1%
13	Unk. Forb -812	u	u	8.3%			7.3%					0.1%
13	Unk. Forb -963	u	u			5.6%						0.1%
13	*Asclepias speciosa*	n	p				0.7%					0.0%
13	*Carduus nuttans*	e	m			2.8%						0.0%
13	*Grindelia squarrosa*	n	m		2.8%							0.0%
13	*Nothocalis cuspidata*	n	p				2.0%					0.0%
13	*Lappula redowskii*	n	m				2.7%					0.0%
13	*Triodanis perfoliata*	e	m	13.9%			3.3%					0.0%
13	*Silene antirrhina*	e	m	5.6%			1.3%					0.0%
13	*Astragalus flexuosus*	n	p	5.6%			1.3%					0.0%
13	*Astragalus drummondii*	n	p				3.3%					0.0%
13	*Astragalus shortianus*	n	p				0.7%					0.0%
13	*Dalea candida*	n	p				0.7%					0.0%
13	*Zygadenos venenosus*	n	p				2.7%					0.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
13	*Sphaeralcea coccinia*	n	p				2.0%					0.0%
13	*Orobanche fasciculata*	n	p	2.8%			0.7%					0.0%
13	*Ipomopsis aggregata*	n	m				1.3%					0.0%
13	*Rosa arkansana*	n	p				0.7%					0.0%
13	*Penstemon secundiflorus*	n	p	8.3%			2.0%					0.0%
13	Unk. Forb -809	u	u				3.3%					0.0%
13	Unk. Forb -810	u	u				0.7%					0.0%
13	Unk. Forb -811	u	u				0.7%					0.0%
13	Unk. Forb -813	u	u	2.8%			0.7%					0.0%
13	Bare Ground							14.1%	12.8%	13.6%	13.0%	0.0%
13	Litter							25.6%	54.4%	44.4%	44.6%	0.0%
14	*Bouteloua gracilis*	n	p	86.1%	88.9%	94.4%	63.3%	7.9%	7.6%	8.0%	12.2%	14.1%
14	*Bromus japonicus*	e	m	97.2%	97.2%	97.2%	90.0%	18.3%	4.3%			9.3%
14	*Agropyron smithii*	n	p	91.7%	83.3%	86.1%	74.0%	3.5%	3.3%	6.7%	4.0%	8.8%
14	*Artemisia frigida*	n	p	86.1%	55.6%	63.9%	73.3%	2.5%	1.0%	2.6%	1.7%	4.9%
14	*Tragopogon dubius*	e	m	41.7%	61.1%	88.9%	43.3%	1.3%	2.6%		2.0%	4.5%
14	*Bromus tectorum*	e	m	91.7%	100.0%	41.7%	60.7%	7.9%				4.4%
14	*Buchloe dactyloides*	n	p	41.7%	41.7%	38.9%	32.7%	0.9%	1.6%	1.6%	4.0%	4.1%
14	*Convolvulus arvensis*	e	p		8.3%		8.7%	5.0%	2.3%	1.6%	5.0%	4.1%
14	*Psoralea tenuiflora*	n	p	63.9%	36.1%	33.3%	48.0%	2.2%	0.7%	2.6%	1.3%	3.6%
14	*Sphaeralcea coccinia*	n	p	61.1%	61.1%	72.2%	46.7%	1.3%		0.3%	0.7%	3.1%
14	*Heterotheca villosa*	n	p	22.2%	8.3%	13.9%	28.0%	2.5%	0.3%	1.9%	2.6%	2.7%
14	*Thelesperma megapotamicum*	n	p	41.7%	27.8%	33.3%	14.7%	0.3%		2.6%	1.3%	2.4%
14	*Solidago nana*	n	p					1.3%	2.0%	2.2%	1.3%	2.2%
14	*Bouteloua curtipendula*	n	p	11.1%	2.8%	36.1%	3.3%	0.3%	1.0%	1.3%	1.3%	1.9%
14	*Allysum minus*	e	m		8.3%	25.0%	24.7%	1.6%	2.0%			1.9%
14	*Aristida purpurea*	n	p	38.9%	11.1%	36.1%	23.3%	0.6%	0.7%	0.3%	1.3%	1.8%
14	*Dipsacus sylvestris*	e	m						0.3%	2.2%	2.0%	1.5%
14	*Centaurea diffusa*	e	u				2.0%	0.9%	0.7%	1.0%	1.0%	1.1%
14	*Lactuca serriola*	e	m	27.8%	16.7%	13.9%	32.7%				0.7%	1.0%
14	*Opuntia polyacantha*	n	p	41.7%	19.4%	8.3%	22.7%	0.6%	0.3%		0.3%	1.0%
14	*Astragalus agrestis*	n	p	2.8%		16.7%	8.0%	0.6%			2.0%	1.0%
14	*Astragalus drummondii*	n	p	2.8%	22.2%	13.9%	10.0%		0.3%		0.3%	0.9%
14	*Linum usitatissimum*	e	m	27.8%	16.7%	13.9%	32.0%				0.3%	0.9%
14	*Poa compressa*	e	p				8.7%	0.9%	0.3%	1.0%		0.8%
14	*Sitanion longifolium*	n	u	19.4%	27.8%	11.1%	16.0%	0.3%				0.8%
14	*Yucca glauca*	n	p		5.6%		0.7%	0.9%		0.6%	1.0%	0.8%
14	*Opuntia macrorhiza*	n	p		19.4%	30.6%				0.3%		0.8%
14	*Gaura coccinea*	n	p	16.7%	19.4%	22.2%	10.7%	0.3%				0.8%
14	*Stipa comata*	n	p	11.1%		8.3%	6.7%	0.9%		1.0%		0.7%
14	*Bromus inermis*	e	p				0.7%		1.6%			0.6%
14	*Liatris punctata*	n	p	13.9%	5.6%	13.9%	5.3%	0.6%			0.3%	0.6%
14	*Taraxacum officianale*	e	p		8.3%		3.3%	0.9%	0.7%			0.6%
14	*Sysimbrium altissimum*	e	m	25.0%	11.1%	8.3%	20.7%	0.3%				0.6%
14	*Salvia aethiopis*	e	m			5.6%	0.7%	0.3%	1.0%			0.6%
14	*Artemisia dranunculus*	n	p		11.1%	5.6%	1.3%	0.3%	0.3%			0.5%
14	*Draba reptans*	n	m	52.8%			34.7%	0.3%				0.5%
14	*Vulpia octoflora*	n	m	44.4%			18.7%		0.3%			0.4%
14	*Ambrosia psilostachya*	n	p				12.7%	0.3%			0.7%	0.4%
14	*Chrysothamnus nauseosus*	n	p		16.7%	8.3%	5.3%					0.4%
14	*Cirsium arvense*	e	p				4.7%		0.3%	0.3%	0.3%	0.4%
14	*Gutierrezia sarothrae*	n	p			11.1%	2.7%	0.3%			0.7%	0.4%
14	*Evolvulus nuttalianus*	n	p	22.2%		2.8%	13.3%	0.3%			0.3%	0.4%
14	*Melilotus officinalis*	e	m				4.0%	0.6%			0.7%	0.4%
14	*Erodium cicutarium*	e	m		2.8%	8.3%	22.0%					0.4%
14	*Bouteloua hirsuta*	n	p				2.7%	1.3%				0.3%
14	*Aster falcatus*	n	p		5.6%		5.3%			0.3%		0.3%
14	*Lygodesmia juncea*	n	p	2.8%	13.9%		0.7%	0.3%				0.3%
14	*Descurainia sophia*	e	m	30.6%			22.7%					0.3%
14	*Opuntia fragilis*	n	p	16.7%		16.7%	4.7%					0.3%
14	*Hedeoma hispidum*	n	m	27.8%		2.8%	20.7%					0.3%
14	*Argemone polyathemos*	n	m		2.8%	2.8%			0.3%		0.3%	0.3%
14	*Veronica catenata*	n	u						0.7%		0.3%	0.3%
14	*Eleocharis elliptica*	n	u								0.7%	0.2%
14	*Artemisia ludoviciana*	n	p	2.8%			4.0%	0.3%			0.3%	0.2%
14	*Carduus nuttans*	e	m		5.6%		4.0%			0.3%		0.2%
14	*Podospermum lacinatum*	e	m				2.0%		0.3%			0.2%
14	*Lappula redowskii*	n	m	19.4%			18.7%					0.2%
14	*Symphoricarpos occidentalis*	n	p				2.7%			0.3%	0.3%	0.2%

Appendix 3 (Cont.)

Plot	Species			% of Quadrats Present				% Cover				IMP
				Part94	July95	July96	Alt94	June95	June96	Aug95	Aug96	
14	*Tragia ramosa*	n	p				5.3%	0.3%		0.3%		0.2%
14	*Plantago patagonica*	n	m	19.4%			14.0%					0.2%
14	*Androsace occidentalis*	n	m	36.1%			17.3%					0.2%
14	*Hybanthus verticillatus*	n	p		13.9%			0.3%			0.3%	0.1%
14	*Carex nebrascensis*	n	p				2.7%					0.1%
14	*Carex praegracilis*	e	p					0.6%			0.3%	0.1%
14	*Dactylis glomerata*	e	p				6.7%			0.3%		0.1%
14	*Poa pratensis*	e	m				2.0%			0.3%		0.1%
14	*Setaria glauca*	n	p				1.3%		0.3%		0.3%	0.1%
14	*Stipa viridula*	n	m									0.1%
14	*Cirsium undulatum*	e	m				2.7%					0.1%
14	*Iva xanthifolia*	n	p				2.7%					0.1%
14	*Ratibida columnifera*	e	m		2.8%		5.3%					0.1%
14	*Camelina microcarpa*	e	m	5.6%			6.7%					0.1%
14	*Lepidium densiflorum*	n	m	8.3%				0.3%				0.1%
14	*Euphorbia spathulata*	n	p				2.0%					0.1%
14	*Dalea purpurea*	n	p	8.3%	2.8%		2.7%					0.1%
14	*Oxytropis lambertii*	n	m		2.8%							0.1%
14	*Monarda pectinata*	n	p			8.3%						0.1%
14	*Leucocrinum montanum*	n	p	16.7%			7.3%		0.3%			0.1%
14	*Orobanche fasciculata*	e	m									0.1%
14	*Verbascum thapsus*	n	p	2.8%	2.8%		8.7%					0.1%
14	*Viola nuttallii*	u	u	8.3%			4.7%					0.0%
14	Unk. Forb -816	n	p				0.7%					0.0%
14	*Oryzopsis hymenoides*	n	p				4.0%					0.0%
14	*Sporobolus asper*	n	p	5.6%			1.3%					0.0%
14	*Allium textile*	n	p	2.8%			1.3%					0.0%
14	*Lomatium oriental*	n	p	2.8%			2.7%					0.0%
14	*Musineon divaricatum*	e	p				1.3%					0.0%
14	*Cichorium intybus*	n	m	2.8%			3.3%					0.0%
14	*Grindelia squarrosa*	n	p		2.8%		0.7%					0.0%
14	*Machaeranthera pinnatifida*	n	p				0.7%					0.0%
14	*Hymenopappus filifolius*	n	p				0.7%					0.0%
14	*Mertensia lanceolata*	e	m				1.3%					0.0%
14	*Lepidium campestre*	n	p			2.8%						0.0%
14	*Echinocereus viridiflorus*	n	p				4.0%					0.0%
14	*Chamaesyce fendlerii*	n	p				1.3%					0.0%
14	*Vicia americana*	e	p		2.8%							0.0%
14	*Marrubium vulgare*	n	p				2.0%					0.0%
14	*Calochortus gunnisonii*	n	u		2.8%							0.0%
14	*Mentzelia nuda*	n	p	8.3%			2.7%					0.0%
14	*Oxybaphus linearis*	n	p			2.8%						0.0%
14	*Eriogonum effusum*	n	p				0.7%					0.0%
14	*Castilleja sessiflora*	n	p	2.8%			2.0%					0.0%
14	*Penstemon secundiflorus*	n	p				1.3%					0.0%
14	*Verbena ambrosifolia*	u	u				1.3%					0.0%
14	Unk. Forb -815	u	u				2.0%					0.0%
14	Unk. Forb -819							3.8%	9.9%	3.8%	8.3%	0.0%
14	Bare Ground							25.2%	52.6%	56.1%	39.6%	0.0%
14	Litter							6.0%	5.7%	7.2%	9.0%	12.6%
15	*Bouteloua gracilis*	n	p	47.2%	16.7%	11.1%	48.0%	14.4%	1.0%	5.5%	2.7%	10.7%
15	*Agropyron smithii*	n	p	52.8%	44.4%	33.3%	66.0%	7.4%	0.3%			5.6%
15	*Bromus japonicus*	e	m	33.3%	83.3%	33.3%	54.0%	2.0%	2.4%	1.6%	2.3%	4.1%
15	*Heterotheca villosa*	n	p	16.7%	5.6%	5.6%	25.3%	2.3%	1.0%	1.3%	1.7%	3.9%
15	*Artemisia frigida*	n	p	16.7%	25.0%	8.3%	50.7%	2.3%	2.4%			3.7%
15	*Allysum minus*	e	m	22.2%	47.2%	25.0%	16.0%		0.7%	1.6%	1.7%	3.1%
15	*Gutierrezia sarothrae*	n	p	16.7%	22.2%	27.8%	16.7%	1.3%		1.0%		2.6%
15	*Psoralea tenuiflora*	n	p	33.3%	30.6%	30.6%	24.7%	1.3%	1.0%	1.0%	0.7%	2.5%
15	*Bouteloua curtipendula*	n	p	22.2%	5.6%	25.0%	10.0%	2.3%			1.3%	2.4%
15	*Centaurea diffusa*	e	u	11.1%	19.4%	25.0%	10.7%	0.7%	1.0%	1.6%	1.3%	2.3%
15	*Buchloe dactyloides*	n	p	5.6%	8.3%	2.8%	11.3%	0.3%	1.4%	1.3%	2.0%	2.3%
15	*Rosa arkansana*	n	p		5.6%	2.8%	2.0%		0.3%	1.0%	1.3%	2.2%
15	*Aristida purpurea*	n	p	16.7%	16.7%	16.7%	18.7%	0.3%	0.3%		0.7%	2.2%
15	*Ambrosia psilostachya*	n	p	11.1%	33.3%	33.3%	10.0%	0.7%		1.3%	0.3%	1.9%
15	*Symphoricarpos occidentalis*	n	p		16.7%	22.2%	8.7%		1.4%		1.0%	1.8%
15	*Oryzopsis hymenoides*	n	p	8.3%	8.3%	19.4%	2.0%				0.3%	1.7%
15	*Tragopogon dubius*	e	m	11.1%	30.6%	22.2%	7.3%	1.0%		0.3%	1.0%	1.7%
15	*Chamaesyce fendlerii*	n	p	22.2%	25.0%	22.2%	6.7%		0.3%		0.7%	1.6%
15	*Evolvulus nuttalianus*	n	p	33.3%	11.1%	16.7%	28.7%					

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
15	*Salvia aethiopis*	e	m			8.3%			0.7%	1.3%	1.3%	1.6%
15	*Opuntia polyacantha*	n	p	19.4%	16.7%	11.1%	15.3%	0.3%	0.7%	0.3%		1.5%
15	*Gaura coccinea*	n	p	8.3%	25.0%	19.4%	14.0%			0.3%		1.4%
15	*Artemisia ludoviciana*	n	p	30.6%	11.1%	2.8%	16.0%	0.7%	0.3%	0.7%	0.3%	1.3%
15	*Solidago nana*	n	p	2.8%		8.3%	4.7%			1.0%	1.7%	1.3%
15	*Dalea candida*	n	p	5.6%	11.1%	5.6%	14.0%	0.7%	0.3%	0.3%		1.1%
15	*Eriogonum effusum*	n	p	16.7%	19.4%	8.3%	5.3%		0.3%	0.7%		1.1%
15	*Stipa viridula*	n	p	25.0%	2.8%		13.3%	0.7%		1.0%	0.3%	1.0%
15	*Musineon divaricatum*	n	p	19.4%	19.4%		24.7%					0.8%
15	*Hymenopappus filifolius*	n	p	8.3%	2.8%	8.3%	2.0%	1.3%	0.3%			0.8%
15	Unk. Forb -820	u	u	11.1%	8.3%		6.7%	1.3%			0.3%	0.8%
15	*Poa pratensis*	e	p		2.8%	8.3%			0.7%		0.3%	0.7%
15	*Aster falcatus*	n	p	8.3%			7.3%		0.3%	1.0%		0.7%
15	*Nothocalis cuspidata*	n	p						1.4%			0.7%
15	*Ratibida columnifera*	n	p		5.6%		2.0%	0.7%		0.3%	0.7%	0.7%
15	*Sphaeralcea coccinia*	n	p	22.2%	5.6%	5.6%	20.7%			0.3%		0.7%
15	*Yucca glauca*	n	p	8.3%	8.3%		8.0%		0.3%	0.3%		0.6%
15	*Erodium cicutarium*	e	m			11.1%	16.0%					0.6%
15	*Comandra umbellata*	n	p	5.6%	11.1%	8.3%	4.0%			0.3%		0.6%
15	*Eleocharis macrostachya*	n	p								1.3%	0.5%
15	*Aster porteri*	n	p		11.1%					0.7%		0.5%
15	*Chrysothamnus nauseosus*	n	p		2.8%	2.8%	2.0%		0.3%		0.3%	0.5%
15	*Lactuca serriola*	e	m	8.3%	8.3%		11.3%	0.3%				0.5%
15	*Lesquerella montana*	n	u		8.3%		6.7%		0.3%			0.5%
15	*Astragalus tridactylicus*	n	p	11.1%	8.3%	5.6%	2.7%			0.3%		0.5%
15	*Linum lewisii*	n	p	5.6%	5.6%		23.3%					0.5%
15	*Linum usitatissimum*	e	m	8.3%		2.8%	14.7%		0.3%			0.5%
15	*Liatris punctata*	n	p	11.1%	5.6%	8.3%	3.3%					0.4%
15	*Thelesperma megapotamicum*	n	p	8.3%	8.3%	2.8%	3.3%	0.3%				0.4%
15	*Descurainia sophia*	e	m	8.3%			22.7%					0.4%
15	*Tragia ramosa*	n	p							0.7%	0.3%	0.4%
15	*Astragalus flexuosus*	n	p	13.9%	11.1%		4.0%			0.3%		0.4%
15	*Astragalus drummondii*	n	p	8.3%	5.6%	2.8%	6.7%	0.3%				0.4%
15	*Geranium viscosissimum*	u	u						0.7%			0.4%
15	*Hybanthus verticillatus*	n	p		8.3%	5.6%				0.3%		0.4%
15	*Bromus tectorum*	e	m	2.8%	2.8%		12.0%					0.3%
15	*Carduus nuttans*	e	m				0.7%	1.0%				0.3%
15	*Sysimbrium altissimum*	e	m		2.8%	8.3%	2.7%					0.3%
15	*Euphorbia spathulata*	n	m	5.6%			16.7%					0.3%
15	*Geranium caespitosum*	n	p								0.7%	0.3%
15	*Plantago patagonica*	n	m	2.8%		5.6%	6.7%					0.3%
15	*Penstemon secundiflorus*	n	p	2.8%	2.8%	2.8%	1.3%				0.3%	0.3%
15	*Bouteloua hirsuta*	n	p	8.3%			2.0%	0.7%				0.2%
15	*Poa compressa*	e	p						0.3%			0.2%
15	*Sitanion hystrix*	n	p	2.8%			6.0%	0.3%				0.2%
15	*Stipa comata*	n	p	2.8%	2.8%		7.3%					0.2%
15	*Helianthus annuus*	n	m				0.7%		0.3%			0.2%
15	*Machaeranthera pinnatifida*	n	p		5.6%		4.7%					0.2%
15	*Mertensia lanceolata*	n	p	5.6%			1.3%		0.3%			0.2%
15	*Opuntia fragilis*	n	p			8.3%	0.7%					0.2%
15	*Convolvulus arvensis*	e	p		8.3%		3.3%					0.2%
15	*Solanum physalifolium*	e	u			8.3%	2.0%					0.2%
15	*Viola nuttallii*	n	p			8.3%						0.2%
15	*Carex heliophylla*	n	p								0.3%	0.1%
15	Unk. Grass - 160	u	u	2.8%		2.8%	0.7%					0.1%
15	*Allium textile*	n	p	5.6%			6.7%					0.1%
15	*Cirsium undulatum*	n	m	2.8%		2.8%	2.0%					0.1%
15	*Lappula redowskii*	n	m	2.8%			6.0%					0.1%
15	*Camelina microcarpa*	e	m				6.7%					0.1%
15	*Draba reptans*	n	m	2.8%			7.3%					0.1%
15	*Lepidium campestre*	e	m				3.3%					0.1%
15	*Opuntia macrorhiza*	n	p			2.8%	4.0%					0.1%
15	*Oxytropis lambertii*	n	p		2.8%		4.7%					0.1%
15	*Leucocrinum montanum*	n	p	8.3%			4.0%					0.1%
15	*Oxybaphus linearis*	n	p		2.8%		0.7%					0.1%
15	*Oenothera brachycarpa*	n	p				4.0%					0.1%
15	*Argemone polyathemos*	n	m		2.8%		0.7%					0.1%
15	Unk. Forb -920	u	u					0.3%				0.1%
15	*Schizachyrium scoparium*	n	p				1.3%					0.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				IMP
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	
15	*Schedonnardus paniculatus*	n	p	2.8%			0.7%					0.0%
15	*Arnica fulgens*	n	p				0.7%					0.0%
15	*Grindelia squarrosa*	n	m	2.8%			0.7%					0.0%
15	*Podospermum laciniatum*	e	m				1.3%					0.0%
15	*Cryptantha minima*	n	m				2.7%					0.0%
15	*Onosmodium molle*	n	p	2.8%			0.7%					0.0%
15	*Lepidium densiflorum*	e	m				2.0%					0.0%
15	*Euphorbia robusta*	n	p				0.7%					0.0%
15	*Hedeoma hispidum*	n	m				0.7%					0.0%
15	*Monarda pectinata*	n	m				1.3%					0.0%
15	*Scutellaria brittonia*	n	p				0.7%					0.0%
15	*Orobanche fasciculata*	n	p				2.7%					0.0%
15	Bare Ground							23.4%	31.8%	23.1%	27.7%	0.0%
15	Litter							25.1%	40.9%	42.0%	36.0%	0.0%
16	*Agropyron smithii*	n	p	75.0%	100.0%	100.0%	86.0%	12.4%	22.0%	12.4%	15.3%	24.6%
16	*Convolvulus arvensis*	e	p	80.6%	86.1%	86.1%	86.0%	15.6%	8.3%	12.1%	6.3%	17.1%
16	*Buchloe dactyloides*	n	p	52.8%	47.2%	47.2%	55.3%	5.1%	4.3%	4.2%	9.0%	9.9%
16	*Aristida purpurea*	n	p	69.4%	61.1%	83.3%	43.3%	3.2%	2.7%	2.3%	4.7%	7.7%
16	*Linum usitatissimum*	e	m	94.4%	100.0%		52.0%	8.9%				4.7%
16	*Bouteloua gracilis*	n	p	13.9%	13.9%	5.6%	32.7%	3.2%	2.3%	2.9%	2.7%	4.3%
16	*Gutierrezia sarothrae*	n	p	5.6%	58.3%	5.6%	40.0%	2.2%		4.9%		3.9%
16	*Psoralea tenuiflora*	n	p	22.2%	25.0%	44.4%	16.7%	3.5%	1.0%	1.3%	1.0%	3.6%
16	*Bromus japonicus*	e	m		30.6%	41.7%	5.3%	1.0%	1.0%			2.1%
16	*Centaurea diffusa*	e	u	11.1%	27.8%	11.1%	18.0%	1.9%		1.3%		1.9%
16	*Bromus tectorum*	e	m	22.2%	27.8%	25.0%	28.0%	0.3%				1.7%
16	*Erodium cicutarium*	e	m			47.2%	0.7%	1.6%	0.7%			1.6%
16	*Allysum minus*	e	m	16.7%	41.7%		12.7%	1.0%				1.2%
16	*Sphaeralcea coccinia*	n	p	13.9%	13.9%	25.0%	14.0%	0.6%				1.2%
16	*Evolvulus nuttalianus*	n	p	19.4%	8.3%	27.8%	6.0%				0.3%	1.0%
16	*Helianthus annuus*	n	m		8.3%	8.3%		1.9%	0.3%	0.3%		0.8%
16	*Liatris punctata*	n	p	19.4%	8.3%	13.9%	6.7%	0.3%		0.3%	0.3%	0.9%
16	*Penstemon secundiflorus*	n	p	16.7%		16.7%	5.3%	1.0%			0.3%	0.8%
16	*Comandra umbellata*	n	p	8.3%	5.6%	5.6%	6.7%		0.3%		0.7%	0.7%
16	*Yucca glauca*	n	p	5.6%		2.8%	4.0%	1.3%	0.3%	0.3%		0.6%
16	*Musineon divaricatum*	n	p	13.9%	13.9%		6.7%	1.0%				0.6%
16	*Chrysothamnus nauseosus*	n	p	8.3%			4.7%			1.0%	0.7%	0.6%
16	*Machaeranthera pinnatifida*	n	p	11.1%	8.3%	5.6%	4.0%	0.3%		0.3%	0.3%	0.6%
16	*Argemone polyanthemos*	n	m			5.6%	1.3%	0.6%		0.7%	0.3%	0.6%
16	*Plantago patagonica*	n	m	16.7%			30.0%					0.6%
16	*Descurainia pinnata*	n	m		27.8%		2.7%					0.5%
16	*Sysimbrium altissimum*	e	m	5.6%	8.3%		10.0%	0.6%				0.5%
16	*Gaura coccinea*	n	p		19.4%	2.8%	2.7%	0.3%				0.5%
16	*Camelina microcarpa*	e	m		22.2%		2.0%					0.4%
16	*Lepidium densiflorum*	e	m		8.3%		13.3%					0.4%
16	*Artemisia frigida*	n	p				3.3%			0.7%		0.3%
16	*Lepidium campestre*	e	m		11.1%	2.8%	0.7%					0.3%
16	*Stipa viridula*	n	p	2.8%	5.6%		0.7%	0.6%				0.2%
16	*Artemisia dranunculus*	n	p	5.6%	5.6%		2.7%					0.2%
16	*Heterotheca villosa*	n	p				2.0%	0.3%		0.3%		0.2%
16	*Lappula redowskii*	n	m				10.0%					0.2%
16	*Chenopodium dessicatum*	n	m	8.3%	2.8%		8.7%					0.2%
16	*Salsola iberica*	e	m	2.8%	2.8%		5.3%					0.2%
16	*Dalea candida*	n	p		2.8%			0.3%		0.3%		0.2%
16	*Bouteloua curtipendula*	n	p	8.3%	2.8%		2.0%					0.1%
16	*Poa pratensis*	e	p						0.3%			0.1%
16	*Schedonnardus paniculatus*	n	p				2.7%					0.1%
16	*Sitanion longifolium*	n	u			2.8%						0.1%
16	*Sporobolus cryptandrus*	n	p			5.6%						0.1%
16	*Vulpia octoflora*	n	m			5.6%						0.1%
16	*Antennaria rosea*	n	p		8.3%							0.1%
16	*Lygodesmia juncea*	n	p				6.0%					0.1%
16	*Picradeniopsis oppositifolia*	n	p				4.7%					0.1%
16	*Taraxacum officianale*	e	p			2.8%						0.1%
16	*Thelesperma megapotamicum*	n	p	2.8%	2.8%		0.7%					0.1%
16	*Tragopogon dubius*	e	m		8.3%					0.3%		0.1%
16	*Agaloma marginata*	n	u									0.1%
16	*Monarda pectinata*	n	m				2.7%					0.1%
16	*Oxybaphus linearis*	n	p	5.6%			4.7%					0.1%
16	*Eriogonum effusum*	n	p	5.6%			4.0%					0.1%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
16	*Polygonum sawatchense*	n	m	8.3%			6.0%					0.1%
16	*Phyla cuneifolia*	n	p							0.3%		0.1%
16	*Verbena ambrosifolia*	n	p	5.6%		2.8%	1.3%					0.1%
16	Unk. Forb -967	u	u			2.8%						0.1%
16	*Bouteloua hirsuta*	n	p				2.0%					0.0%
16	*Allium textile*	n	p				1.3%					0.0%
16	*Artemisia ludoviciana*	n	p				1.3%					0.0%
16	*Aster falcatus*	n	p				1.3%					0.0%
16	*Cirsium undulatum*	n	m				0.7%					0.0%
16	*Lactuca serriola*	e	m				1.3%					0.0%
16	*Arabis glabra*	e	m				0.7%					0.0%
16	*Opuntia polyacantha*	n	p				1.3%					0.0%
16	*Mentzelia speciosa*	n	u		2.8%							0.0%
16	*Oenothera nuttallii?*	n	p	2.8%			0.7%					0.0%
16	Unk. Forb -819	u	u				0.7%					0.0%
16	Unk. Forb -924	u	u		2.8%							0.0%
16	Bare Ground							10.8%	17.3%	13.7%	14.7%	0.0%
16	Litter							20.1%	39.0%	40.1%	43.3%	0.0%
17	*Agropyron smithii*	n	p	100.0%	97.2%	100.0%	100.0%	24.7%	25.7%	7.3%	17.7%	30.1%
17	*Convolvulus arvensis*	e	p	94.4%	100.0%	77.8%	96.0%	16.6%	2.6%	8.9%	5.7%	17.9%
17	*Buchloe dactyloides*	n	p	38.9%	33.3%	44.4%	48.7%	3.3%	2.3%	7.9%	5.3%	11.2%
17	*Erodium cicutarium*	e	m	22.2%	77.8%	77.8%	33.3%	26.2%	6.2%			10.6%
17	*Bromus tectorum*	e	m	33.3%	55.6%	97.2%	14.0%	5.1%	6.5%			6.8%
17	*Bromus japonicus*	e	m	8.3%	33.3%	80.6%	2.7%	1.5%	13.0%			6.5%
17	*Aristida purpurea*	n	p	30.6%	5.6%	8.3%	29.3%		0.3%	0.7%	1.0%	2.1%
17	*Thlaspi arvense*	e	m	16.7%	33.3%		4.7%	3.3%				1.5%
17	*Gutierrezia sarothrae*	n	p	2.8%	2.8%		32.7%	1.5%		0.3%		1.4%
17	*Lepidium densiflorum*	e	m	25.0%	8.3%		34.7%					1.2%
17	*Centaurea diffusa*	e	u		8.3%		8.7%	2.1%		0.3%		1.0%
17	*Sysimbrium altissimum*	e	m	8.3%	8.3%		18.0%	1.8%				1.0%
17	*Camelina microcarpa*	e	m		27.8%			1.2%				0.9%
17	*Lepidium campestre*	e	m	19.4%	22.2%	5.6%	7.3%	0.3%				0.9%
17	*Descurainia sophia*	e	m	33.3%	11.1%		10.7%	1.2%				0.8%
17	*Lesquerella montana*	n	u	22.2%	13.9%		16.0%					0.8%
17	*Bouteloua gracilis*	n	p	2.8%			4.7%	0.3%	1.0%		0.7%	0.7%
17	*Vulpia octoflora*	n	m			19.4%						0.5%
17	*Juncus arcticus*	n	p			8.3%					0.3%	0.4%
17	*Asclepias pumila*	n	p	16.7%		8.3%	5.3%					0.4%
17	*Artemisia ludoviciana*	n	p				2.7%	0.3%	1.0%			0.4%
17	*Chenopodium album*	e	m	2.8%	11.1%		5.3%					0.4%
17	*Lactuca serriola*	e	m		8.3%			0.3%				0.3%
17	*Carex sp.*	u	p								0.3%	0.2%
17	*Heterotheca villosa*	n	p				0.7%			0.3%		0.2%
17	*Allysum minus*	e	m	5.6%	2.8%		4.0%					0.2%
17	*Melilotus sp.*	e	m		2.8%					0.3%		0.2%
17	*Polygonum sawatchense*	n	m		2.8%		1.3%	0.3%				0.2%
17	*Poa pratensis*	e	p		2.8%							0.1%
17	*Schedonnardus paniculatus*	n	p	5.6%			4.0%					0.1%
17	*Yucca glauca*	n	p	5.6%			3.3%					0.1%
17	*Ambrosia psilostachya*	n	p		5.6%							0.1%
17	*Aster falcatus*	n	p	11.1%			3.3%					0.1%
17	*Dyssodia papposa*	n	m			2.8%						0.1%
17	*Grindelia squarrosa*	n	m				0.7%	0.3%				0.1%
17	*Helianthus annuus*	n	m		2.8%							0.1%
17	*Tragopogon dubius*	e	m		2.8%							0.1%
17	*Lappula redowskii*	n	m				3.3%					0.1%
17	*Linum usitatissimum*	e	m				2.7%					0.1%
17	*Sphaeralcea coccinia*	n	p		2.8%							0.1%
17	*Oxybaphus linearis*	n	p	8.3%			5.3%					0.1%
17	*Gaura coccinea*	n	p	5.6%			4.7%					0.1%
17	*Plantago patagonica*	n	m				2.7%					0.1%
17	*Androsace occidentalis*	n	m	5.6%			3.3%					0.1%
17	*Bromus inermis*	e	p					0.3%				0.0%
17	*Artemisia frigida*	n	p				0.7%					0.0%
17	*Liatris punctata*	n	p				1.3%					0.0%
17	*Sonchus asper*	e	m				0.7%					0.0%
17	*Salsola iberica*	e	m	2.8%			1.3%					0.0%
17	*Psoralea tenuiflora*	n	p				1.3%					0.0%
17	Bare Ground							0.9%	8.5%	4.0%	7.3%	0.0%

Appendix 3 (Cont.)

Plot	Species			% of Quadrats Present				% Cover				
				Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
17	Litter							8.4%	32.9%	69.9%	61.7%	0.0%
18	*Agropyron smithii*	n	p	100.0%	100.0%	100.0%	86.0%	13.2%	10.3%	11.1%	11.7%	27.4%
18	*Convolvulus arvensis*	e	p	100.0%	100.0%	91.7%	98.0%	9.5%	13.2%	8.8%	5.3%	23.4%
18	*Iva axillaris*	n	p	27.8%	25.0%	72.2%	49.3%	2.0%	2.6%	3.9%	4.3%	9.8%
18	*Aster falcatus*	n	p	47.2%	22.2%	16.7%	22.7%	3.0%	4.6%	6.2%	1.7%	7.9%
18	*Gutierrezia sarothrae*	n	p	11.1%	2.8%		38.0%	1.0%	4.0%	3.3%	7.7%	7.8%
18	*Distichlis spicata*	n	p	8.3%	47.2%	41.7%	9.3%		0.7%	0.7%	0.7%	3.8%
18	*Taraxacum officianale*	e	p		16.7%	30.6%			0.3%	0.3%		1.7%
18	*Gaura coccinea*	n	p				12.0%	1.3%	1.3%			1.4%
18	*Poa pratensis*	e	p		13.9%	19.4%			0.7%			1.3%
18	*Musineon divaricatum*	n	p	33.3%			22.0%	1.3%				1.2%
18	*Melilotus officinalis*	e	m	33.3%	2.8%		23.3%	0.3%	0.3%	0.3%		1.2%
18	*Polygonum sawatchense*	n	m		22.2%			0.3%				0.8%
18	*Bouteloua gracilis*	n	p		22.2%							0.7%
18	*Bromus inermis*	e	p						0.7%	1.3%		0.7%
18	*Buchloe dactyloides*	n	p		8.3%			1.0%				0.7%
18	*Lactuca serriola*	e	m	2.8%	11.1%	8.3%	3.3%					0.7%
18	*Agrostis gigantea*	e	p		13.9%	5.6%						0.6%
18	*Aristida purpurea*	n	p				3.3%		1.0%		0.3%	0.6%
18	*Hordeum jubatum*	n	u		8.3%	11.1%						0.6%
18	*Sporobolus asper*	n	p		13.9%	5.6%						0.6%
18	*Allysum minus*	e	m	2.8%	2.8%		12.7%	0.3%				0.6%
18	*Sysimbrium altissimum*	e	m				17.3%				0.3%	0.5%
18	*Solidago multiradiata*	u	u	8.3%			2.0%	0.7%				0.5%
18	*Medicago lupulina*	e	m			13.9%						0.5%
18	*Rumex crispus*	e	p		8.3%	8.3%						0.5%
18	*Carex sp.*	u	p		13.9%							0.4%
18	*Eleocharis macrostachya*	n	p		8.3%	5.6%						0.4%
18	*Linum lewisii*	n	p	38.9%			12.0%					0.4%
18	*Grindelia squarrosa*	n	m		5.6%				0.3%			0.3%
18	*Astragalus agrestis*	n	p	8.3%	2.8%		2.7%			0.3%		0.3%
18	*Sphaeralcea coccinia*	n	p	2.8%			0.7%	0.7%				0.3%
18	*Rosa arkansana*	n	p	22.2%			6.7%		0.3%			0.3%
18	*Tragopogon dubius*	e	m		2.8%	2.8%						0.2%
18	*Conringia orientalis*	e	m			2.8%	2.0%					0.2%
18	*Hybanthus verticillatus*	n	p	2.8%			7.3%				0.3%	0.2%
18	*Agropyron cristatum*	e	p									0.1%
18	*Carduus nutans*	e	m			2.8%					0.3%	0.1%
18	*Cirsium undulatum*	n	m				0.7%					0.1%
18	*Dyssodia papposa*	n	m		2.8%						0.3%	0.1%
18	*Liatris punctata*	n	p									0.1%
18	*Mertensia lanceolata*	n	p	11.1%			2.7%					0.1%
18	*Descurainia sophia*	e	m				3.3%					0.1%
18	*Thlaspi arvense*	e	m	2.8%	2.8%		0.7%					0.1%
18	*Psoralea tenuiflora*	n	p	2.8%			0.7%		0.3%			0.1%
18	*Oenothera brachycarpa*	n	p					0.3%				0.1%
18	Unk. Forb -824	u	u	8.3%			2.0%					0.1%
18	*Allium textile*	n	p				1.3%					0.0%
18	*Apocynum sibericum*	e	p				0.7%					0.0%
18	*Ambrosia psilostachya*	n	p	5.6%			1.3%					0.0%
18	*Artemisia frigida*	n	p				1.3%					0.0%
18	*Podospermum laciniatum*	e	m				0.7%					0.0%
18	*Astragalus bisulcatus*	n	p	2.8%			0.7%					0.0%
18	*Viola nuttallii*	n	p				0.7%					0.0%
18	Unk. Forb -822	u	u	2.8%			0.7%					0.0%
18	Unk. Forb -823	u	u	2.8%								0.0%
18	Bare Ground							50.3%	35.8%	38.2%	25.3%	0.0%
18	Litter							14.8%	23.5%	24.5%	42.7%	0.0%
19	*Dactylis glomerata*	e	p	52.8%	55.6%	66.7%	66.0%	48.3%	21.7%	23.6%	15.7%	27.6%
19	*Bromus inermis*	e	p	16.7%	75.0%	8.3%	44.6%	7.9%	20.1%	3.9%	31.4%	17.0%
19	*Taraxacum officianale*	e	p	100.0%	77.8%	97.2%	66.0%	8.9%	4.9%	1.9%	6.9%	12.2%
19	*Medicago sativa*	e	p	97.2%	55.6%	41.7%	88.0%	6.3%	3.9%	3.9%	7.8%	10.0%
19	*Convolvulus arvensis*	e	p	41.7%	50.0%	55.6%	39.3%	1.7%	4.9%	3.2%	9.2%	8.7%
19	*Agropyron repens*	e	p			44.4%	4.7%	14.6%	1.3%	10.0%		6.9%
19	*Poa pratensis*	e	p	16.7%	25.0%	36.1%	9.3%	1.7%	1.6%	0.6%	1.6%	3.5%
19	*Bromus tectorum*	e	m	50.0%		22.2%	27.3%	2.0%				1.7%
19	*Bromus japonicus*	e	m		8.3%	22.2%	6.7%	1.7%				1.5%
19	*Carex stipata*	n	p				2.7%	1.0%	1.0%	1.9%	0.7%	1.1%
19	*Lactuca serriola*	e	m	16.7%	5.6%	2.8%	32.0%			0.3%		1.1%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
19	*Chenopodium dessicatum*	n	m	27.8%	8.3%		34.0%					1.1%
19	*Agropyron smithii*	n	p	41.7%			15.3%		2.3%			0.9%
19	*Cirsium arvense*	e	p				10.7%	1.0%	1.0%		1.3%	0.9%
19	*Lolium perenne*	e	m				30.7%	0.3%				0.8%
19	*Podospermum lacinatum*	e	m	47.2%			34.0%	0.3%				0.8%
19	*Capsella bursa-pastoris*	e	m	33.3%		2.8%	14.0%	0.3%				0.5%
19	*Descurainia sophia*	e	m	5.6%			18.7%	0.3%				0.5%
19	*Trifolium pratense*	e	p	25.0%	5.6%		10.7%					0.5%
19	*Thlaspi arvense*	e	m	11.1%			15.3%		0.3%			0.4%
19	*Erodium cicutarium*	e	m	16.7%			11.3%		0.6%			0.4%
19	*Polygonum aviculare*	e	m			11.1%						0.4%
19	*Asclepias speciosa*	n	p				1.3%			0.6%	0.3%	0.3%
19	*Tragopogon dubius*	e	m			5.6%	4.0%					0.3%
19	*Triticum aestivum*	e	m				10.0%					0.2%
19	*Camelina microcarpa*	e	m	5.6%			6.7%					0.2%
19	*Glyceria grandis*	n	p							0.3%		0.1%
19	*Hordeum jubatum*	n	u	2.8%			1.3%				0.3%	0.1%
19	*Panicum virgatum*	n	p								0.3%	0.1%
19	*Phleum pratense*	e	p						0.3%			0.1%
19	*Sinapis arvensis*	e	m				3.3%					0.1%
19	*Thalictrum dasycarpum*	n	p				2.0%	0.3%				0.1%
19	*Carex praegracilis*	n	p				0.7%					0.0%
19	*Equisetum arvense*	n	m				2.0%					0.0%
19	*Rosa arkansana*	n	p				0.7%					0.0%
19	Unk. Forb -826	u	u				0.7%					0.0%
19	Bare Ground							0.7%	1.6%	4.5%	1.3%	0.0%
19	Litter							2.6%	34.6%	45.0%	23.2%	0.0%
20	*Dactylis glomerata*	e	p	75.0%	75.0%	30.6%	30.0%	16.7%	12.2%	4.9%	24.1%	19.0%
20	*Medicago sativa*	e	p	88.9%	69.4%	38.9%	55.3%	8.0%	3.9%	13.0%	7.5%	16.2%
20	*Taraxacum officianale*	e	p	77.8%	50.0%	33.3%	78.7%	22.1%	4.3%	2.9%	5.9%	13.5%
20	*Bromus inermis*	e	p		8.3%		34.0%	9.0%	10.9%	2.9%	20.9%	11.5%
20	*Convolvulus arvensis*	e	p	33.3%	38.9%	36.1%	25.3%	3.7%	6.3%	2.9%	5.3%	9.0%
20	*Lactuca serriola*	e	m	61.1%	16.7%	5.6%	46.7%	5.0%		1.9%		4.0%
20	*Bromus tectorum*	e	m	13.9%	11.1%		24.0%	9.0%	3.0%			3.6%
20	*Agropyron repens*	e	p	8.3%	30.6%	8.3%	2.0%	1.3%	0.3%		7.5%	3.5%
20	*Festuca pratensis*	e	p			22.2%		0.7%	1.0%	2.9%		2.8%
20	*Cirsium arvense*	e	p	2.8%	8.3%	5.6%	14.7%	1.7%	1.6%		2.1%	2.2%
20	*Poa pratensis*	e	p	25.0%	11.1%	19.4%	6.0%	0.3%	1.0%			2.0%
20	*Zea mais*	e	m			27.8%			0.7%			1.6%
20	*Rosa arkansana*	n	p	8.3%	5.6%	11.1%	2.0%		1.0%	0.3%	1.6%	1.6%
20	*Descurainia sophia*	e	m	25.0%		2.8%	46.7%					1.4%
20	*Thlaspi arvense*	e	m	38.9%			50.0%					1.3%
20	*Chenopodium dessicatum*	n	m	16.7%	2.8%	5.6%	16.7%			0.3%		1.0%
20	*Triticum aestivum*	e	m			8.3%	16.0%					0.8%
20	*Avena fatua*	e	m			8.3%		0.7%				0.5%
20	*Sinapis arvensis*	e	m				18.0%					0.5%
20	*Poinsetta dentata*	e	m			11.1%						0.5%
20	*Carex stipata*	n	p			8.3%						0.4%
20	*Podospermum lacinatum*	e	m	8.3%		2.8%	10.7%					0.4%
20	*Carex stipata*	n	p		5.6%			0.3%				0.3%
20	*Hordeum jubatum*	n	u	2.8%		2.8%	0.7%	1.0%				0.3%
20	*Camelina microcarpa*	e	m				10.7%	0.3%				0.3%
20	*Moldavica parviflora*	n	m				10.0%					0.3%
20	*Lolium perenne*	e	m				7.3%					0.2%
20	*Phleum pratense*	e	p					0.3%	0.3%			0.2%
20	*Helianthus annuus*	n	m	2.8%			6.0%					0.2%
20	*Capsella bursa-pastoris*	e	m	8.3%			6.0%					0.2%
20	*Alopecurus aequalis*	n	p			2.8%						0.1%
20	*Calamovilfa longifolia*	n	p	8.3%			2.0%					0.1%
20	*Cichorium intybus*	e	p					0.3%				0.1%
20	*Medicago lupulina*	e	m				2.0%					0.1%
20	*Trifolium pratense*	e	p								0.5%	0.1%
20	*Carduus nuttans*	e	m	2.8%			0.7%					0.0%
20	*Tragopogon dubius*	e	m				1.3%					0.0%
20	*Melilotus officinalis*	e	m				1.3%					0.0%
20	*Trifolium hybribum*	e	u				1.3%					0.0%
20	*Trifolium repens*	e	p	2.8%			1.3%					0.0%
20	*Malva neglecta*	e	m				1.3%					0.0%
20	*Rumex crispus*	e	p	2.8%			0.7%					0.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
20	Bare Ground							1.7%	34.9%	6.8%	0.5%	0.0%
20	Litter							17.7%	18.8%	61.0%	24.1%	0.0%
21	*Agropyron repens*	e	p	61.1%	50.0%	66.7%	35.3%	20.8%	60.1%	8.0%		25.2%
21	*Bromus inermis*	e	p	44.4%	30.6%		69.4%	27.6%	7.4%	23.6%		16.7%
21	*Convolvulus arvensis*	e	p	33.3%	38.9%	47.2%	24.7%	7.8%	2.3%	5.6%		9.4%
21	*Medicago sativa*	e	p	80.6%	63.9%		48.7%	7.5%		6.0%		7.6%
21	*Taraxacum officianale*	e	p	50.0%	58.3%		44.0%	12.1%	0.3%	0.3%		6.4%
21	*Zea mais*	e	m			58.3%			0.7%			4.3%
21	*Dactylis glomerata*	e	p	16.7%	36.1%		22.7%	5.0%	2.3%	0.7%		3.9%
21	*Poa pratensis*	e	p		22.2%			1.6%	2.3%	3.3%		2.7%
21	*Cirsium arvense*	e	p		8.3%	5.6%	39.3%	2.8%		0.3%		2.7%
21	*Alopecurus aequalis*	n	p			22.2%						1.6%
21	*Festuca pratensis*	e	p	2.8%			38.0%			0.7%		1.6%
21	*Eleocharis elliptica*	n	u				7.3%			0.7%		0.5%
21	*Trifolium hybribum*	e	u				12.7%					0.5%
21	*Trifolium pratense*	e	p				8.7%	0.3%				0.4%
21	*Polygonum sawatchense*	n	m		8.3%							0.4%
21	*Carex lanuginosa*	n	p				6.0%					0.2%
21	*Carex stipata*	n	p				0.7%		1.0%			0.2%
21	*Bromus tectorum*	e	m	5.6%			3.3%	0.3%				0.2%
21	*Lactuca serriola*	e	m	27.8%			6.7%					0.2%
21	*Capsella bursa-pastoris*	e	m	8.3%			2.0%	0.9%				0.2%
21	*Chenopodium album*	e	m	11.1%			4.7%					0.1%
21	*Ambrosia psilostachya*	n	p				2.0%					0.1%
21	*Aster falcatus*	n	p				2.0%					0.1%
21	*Carduus nuttans*	e	m	8.3%			2.0%					0.1%
21	*Podospermum laciniatum*	e	m	11.1%			2.7%					0.1%
21	*Allysum minus*	e	m				2.7%					0.1%
21	*Lepidium campestre*	e	m				2.0%					0.1%
21	*Plantago lanceolata*	e	p	2.8%	2.8%		0.7%					0.0%
21	*Carex nebrascensis*	n	p				0.7%					0.0%
21	*Cirsium undulatum*	n	m				1.3%					0.0%
21	*Tragopogon dubius*	e	m	5.6%			1.3%					0.0%
21	*Camelina microcarpa*	e	m				1.3%					0.0%
21	*Descurainia sophia*	e	m	2.8%			0.7%					0.0%
21	*Sysimbrium altissimum*	e	m	5.6%			1.3%					0.0%
21	*Thlaspi arvense*	e	m	5.6%			1.3%					0.0%
21	Bare Ground							1.9%	14.4%	8.3%		0.0%
21	Litter							11.5%	9.1%	42.5%		0.0%
22	*Medicago sativa*	e	p	88.9%	86.1%	44.4%	77.3%	27.0%	1.3%	18.4%	1.0%	20.3%
22	*Dactylis glomerata*	e	p	19.4%	11.1%		63.3%	25.7%	7.0%	9.2%	5.6%	13.2%
22	*Bromus inermis*	e	p	61.1%	63.9%	8.3%	31.3%	14.7%	4.3%	4.3%	4.3%	11.5%
22	*Agropyron repens*	e	p	13.9%	16.7%	16.7%	26.7%	5.3%	8.0%	4.3%	10.3%	10.8%
22	*Convolvulus arvensis*	e	p	16.7%	16.7%	16.7%	38.0%	1.6%	8.3%	6.3%	7.6%	10.2%
22	*Triticum aestivum*	e	m	5.6%			1.3%		34.2%			7.3%
22	*Taraxacum officianale*	e	p	50.0%	22.2%	11.1%	50.7%	11.9%	0.3%	5.3%		7.1%
22	*Hordeum vulgare*	e	m			91.7%					1.0%	5.6%
22	*Poa pratensis*	e	p	11.1%	2.8%		20.0%	2.5%	2.0%	1.0%	2.0%	2.8%
22	*Descurainia sophia*	e	m	61.1%	2.8%		24.7%	5.0%				1.8%
22	*Fallopia convolvulus*	e	m			27.8%					0.3%	1.7%
22	*Chenopodium album*	e	m	2.8%		22.2%	1.3%					1.3%
22	*Cirsium arvense*	e	p			8.3%	6.0%	0.9%	0.3%		0.7%	1.2%
22	*Kochia iranica*	e	m		16.7%					0.3%		1.1%
22	*Alopecurus aequalis*	n	p			2.8%					1.3%	0.7%
22	*Centaurea diffusa*	e	u	2.8%			0.7%		1.3%	0.3%	0.7%	0.7%
22	*Bromus inermis*	e	p	5.6%			3.3%			1.3%		0.5%
22	*Agropyron smithii*	n	p		2.8%		3.3%	0.3%				0.3%
22	*Lactuca serriola*	e	m	13.9%			8.0%					0.3%
22	*Podospermum laciniatum*	e	m	5.6%			7.3%					0.3%
22	*Polygonum sawatchense*	n	m		2.8%		3.3%					0.2%
22	*Bromus tectorum*	e	m	5.6%			4.7%					0.2%
22	*Tragopogon dubius*	e	m	2.8%			5.3%					0.2%
22	*Solanum rostratum*	e	m			2.8%						0.1%
22	*Capsella bursa-pastoris*	e	m	11.1%			2.7%					0.1%
22	*Rumex crispus*	e	p				2.7%					0.1%
22	*Verbena bracteata*	e	m				2.0%					0.1%
22	Unk. Forb -828	u	u	2.8%			2.7%					0.0%
22	*Helianthus annuus*	n	m				1.3%					0.0%
22	*Lepidium campestre*	e	m				0.7%					0.0%

Appendix 3 (Cont.)

Plot	Species			% of Quadrats Present				% Cover				IMP
				Part94	July95	July96	All94	June95	June96	Aug95	Aug96	
22	*Sysimbrium altissimum*	e	m				1.3%					0.0%
22	*Melilotus officinalis*	e	m	2.8%			0.7%					0.0%
22	*Trifolium hybribum*	e	u				0.7%					0.0%
22	Bare Ground							1.3%	24.3%	3.9%	11.9%	0.0%
22	Litter							3.8%	8.6%	45.4%	53.3%	0.0%
23	*Bouteloua curtipendula*	n	p	72.2%	75.0%	86.1%	78.0%	22.3%	12.4%	15.2%	23.3%	35.7%
23	*Agropyron smithii*	n	p	97.2%	100.0%	97.2%	94.7%	9.0%	6.7%	11.3%	6.0%	22.7%
23	*Convolvulus arvensis*	e	p	27.8%	47.2%	33.3%	47.3%	5.3%	1.7%	3.0%	2.3%	8.7%
23	*Bromus japonicus*	e	m	19.4%	52.8%	22.2%	52.0%	8.0%	1.7%			7.2%
23	*Schizachyrium scoparium*	n	p	27.8%	50.0%	5.6%	22.7%	3.3%	2.3%	3.3%	2.3%	6.8%
23	*Panicum virgatum*	n	p	8.3%	8.3%	27.8%	14.7%	3.0%	1.3%	1.7%	3.0%	5.2%
23	*Bromus tectorum*	e	m	33.3%	30.6%	13.9%	56.7%	2.0%				3.8%
23	*Lactuca serriola*	e	m	30.6%	33.3%	11.1%	24.7%					2.2%
23	*Tragopogon dubius*	e	m		25.0%	16.7%	4.7%		0.3%		0.3%	1.9%
23	*Taraxacum officianale*	e	p	2.8%	2.8%	8.3%	0.7%			1.3%		1.0%
23	*Helianthus annuus*	n	m	13.9%	19.4%		8.7%					0.9%
23	*Bromus inermis*	e	p		5.6%		4.7%			0.3%	0.3%	0.6%
23	*Physalis virginiana*	n	u		8.3%	8.3%						0.6%
23	*Podospermum lacinatum*	e	m			11.1%	2.0%					0.5%
23	*Camelina microcarpa*	e	m		8.3%		8.0%					0.5%
23	*Melilotus alba*	e	m		5.6%			0.3%			0.3%	0.4%
23	*Allysum minus*	e	m				8.7%					0.3%
23	*Descurainia sophia*	e	m	11.1%	5.6%		5.3%					0.3%
23	*Aristida purpurea*	n	p		5.6%							0.2%
23	*Bouteloua gracilis*	n	p						0.3%			0.2%
23	*Sporobolus cryptandrus*	n	p			2.8%						0.1%
23	*Asclepias speciosa*	n	p				2.7%					0.1%
23	*Sysimbrium altissimum*	e	m	5.6%			2.7%					0.1%
23	*Aster falcatus*	n	p				1.3%					0.0%
23	*Cirsium arvense*	e	p				0.7%					0.0%
23	*Opuntia macrorhiza*	n	p				1.3%					0.0%
23	Bare Ground							13.6%	8.4%	9.9%	9.3%	0.0%
23	Litter							33.2%	64.8%	54.0%	52.7%	0.0%
24	*Bouteloua curtipendula*	n	p	86.1%	83.3%	86.1%	80.7%	23.5%	16.2%	17.6%	27.7%	44.8%
24	*Agropyron smithii*	n	p	97.2%	80.6%	86.1%	95.3%	8.5%	3.7%	10.0%	3.3%	20.8%
24	*Convolvulus arvensis*	e	p	13.9%	58.3%	58.3%	47.3%	5.6%	2.4%	4.0%	3.0%	12.4%
24	*Bromus japonicus*	e	m	8.3%	33.3%	27.8%	22.7%	1.0%	1.0%			4.1%
24	*Podospermum lacinatum*	e	m	16.7%	22.2%	27.8%	5.3%	2.0%				2.7%
24	*Tragopogon dubius*	e	m	8.3%	36.1%	8.3%	3.3%	0.3%	0.3%		0.7%	2.3%
24	*Panicum virgatum*	n	p	8.3%		19.4%	8.7%	1.0%	0.3%	0.3%	1.0%	2.2%
24	*Schizachyrium scoparium*	n	p		8.3%	5.6%	2.7%	0.3%	1.4%			1.5%
24	*Helianthus annuus*	n	m	25.0%	19.4%		15.3%					1.4%
24	*Camelina microcarpa*	e	m		22.2%		8.0%	1.0%				1.4%
24	*Triticum aestivum*	e	m				2.7%	3.6%				1.2%
24	*Meliotus alba*	e	m	2.8%	13.9%	11.1%	0.7%				0.7%	1.2%
24	*Lactuca serriola*	e	m		16.7%		8.7%					1.0%
24	*Psoralea tenuiflora*	n	p		5.6%	5.6%	0.7%	0.7%		0.3%		0.8%
24	*Allysum minus*	e	m		5.6%	11.1%						0.6%
24	*Taraxacum officianale*	e	p		5.6%	8.3%						0.5%
24	*Bromus tectorum*	e	m	8.3%	8.3%		2.0%					0.4%
24	*Polygonum sp.*	u	m			8.3%	1.3%					0.4%
24	*Yucca glauca*	n	p			5.6%						0.2%
24	*Descurainia sophia*	e	m	2.8%			1.3%					0.1%
24	*Gaura coccinea*	n	p				2.0%					0.1%
24	*Physalis virginiana*	n	u			2.8%						0.1%
24	Unk. Forb -831	u	m				1.3%					0.1%
24	*Sysimbrium altissimum*	e	m				0.7%					0.0%
24	Bare Ground							18.6%	27.7%	22.9%	22.7%	0.0%
24	Litter							34.0%	47.0%	44.9%	41.0%	0.0%
25	*Festuca pratensis*	e	p	91.7%	88.9%	100.0%	56.0%	23.7%	17.1%	17.1%	23.6%	26.1%
25	*Poa pratensis*	e	p	41.7%	72.2%	100.0%	68.7%	14.8%	25.2%	9.5%	13.1%	20.9%
25	*Trifolium hybribum*	e	u	22.2%	36.1%	83.3%	55.3%	3.3%	13.5%	6.9%	6.7%	12.0%
25	*Bromus inermis*	e	p			13.9%	52.7%	8.9%	12.6%	2.6%	6.4%	8.5%
25	*Trifolium pratense*	e	p	2.8%	8.3%	25.0%	26.7%	3.3%	2.9%	0.3%	2.4%	3.7%
25	*Convolvulus arvensis*	e	p			25.0%	44.0%	1.3%	1.0%	3.3%	0.7%	3.6%
25	*Hordeum jubatum*	n	u	36.1%	55.6%	8.3%	13.3%	1.6%	0.6%	1.0%		3.4%
25	*Trifolium fragiferum*	e	p			66.7%		6.3%			0.7%	3.0%
25	*Taraxacum officianale*	e	p		2.8%	50.0%	19.3%	0.7%			1.0%	2.3%
25	*Cichorium intybus*	e	p		8.3%	50.0%			2.3%	1.0%		2.2%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
25	*Agropyron smithii*	n	p	16.7%	8.3%		13.3%	6.3%				2.0%
25	*Lotus tenuis*	e	p	22.2%	30.6%	5.6%	8.0%		0.3%	0.7%	0.3%	1.9%
25	*Poa juncifolia*	n	p	25.0%	33.3%		6.0%			0.7%		1.6%
25	*Agropyron repens*	e	p			13.9%		0.3%		3.3%		1.4%
25	*Rumex crispus*	e	p	25.0%	8.3%	19.4%	12.7%	0.3%	0.3%			1.3%
25	*Polygonum aviculare*	e	m	8.3%	16.7%		2.7%			0.7%		0.9%
25	*Ambrosia tomentosa*	n	m		5.6%	8.3%	2.0%	0.3%		1.0%		0.8%
25	*Carex simulata*	n	p	33.3%	11.1%		8.0%	0.3%				0.7%
25	*Dactylis glomerata*	e	p				0.7%	0.7%		0.3%	1.3%	0.6%
25	*Medicago sativa*	e	p				2.7%	0.7%	0.6%	0.3%	0.7%	0.6%
25	*Medicago lupulina*	e	m				8.0%	0.7%				0.4%
25	*Chenopodium album*	e	m	2.8%			9.3%					0.3%
25	*Melilotus officinalis*	e	m				7.3%		0.3%			0.3%
25	*Plantago major*	e	p	2.8%	2.8%	5.6%	1.3%					0.3%
25	*Eleocharis elliptica*	n	u								1.0%	0.2%
25	*Poa compressa*	e	p				4.7%					0.2%
25	*Iva axillaris*	n	p		2.8%		2.7%					0.2%
25	*Aster falcatus*	n	p				0.7%	0.3%				0.1%
25	*Allysum minus*	e	m				0.7%	0.3%				0.1%
25	*Camelina microcarpa*	e	m				2.0%					0.1%
25	*Plantago lanceolata*	e	p			5.6%						0.1%
25	*Lactuca serriola*	e	m				1.3%					0.0%
25	*Podospermum laciniatum*	e	m				0.7%					0.0%
25	*Lepidium campestre*	e	m				0.7%					0.0%
25	Unk. Forb -833	u	u				0.7%					0.0%
25	Bare Ground							7.6%	4.2%	9.9%	4.4%	0.0%
25	Litter							18.4%	19.0%	41.4%	37.7%	0.0%
26	*Festuca pratensis*	e	p	100.0%	97.2%	100.0%	70.0%	17.7%	35.0%	20.1%	25.4%	34.4%
26	*Bromus inermis*	e	p		88.9%	58.3%	55.3%	22.5%	11.2%	4.3%	10.0%	17.6%
26	*Poa pratensis*	e	p	77.8%	100.0%	94.4%	70.7%	12.0%	12.2%	5.7%	8.7%	17.6%
26	*Trifolium hybribum*	e	u	72.2%	100.0%	61.1%	57.3%	0.6%	4.0%	5.7%		9.4%
26	*Trifolium fragiferum*	e	p	30.6%		30.6%	30.7%	11.4%				4.2%
26	*Convolvulus arvensis*	e	p	5.6%	11.1%	22.2%	52.0%	1.9%	1.3%	0.7%		3.6%
26	*Dactylis glomerata*	e	p	8.3%	13.9%	50.0%	7.3%	0.6%	1.0%	0.7%	0.3%	2.7%
26	*Trifolium pratense*	e	p		38.9%	25.0%		2.5%			0.3%	2.3%
26	*Melilotus officinalis*	e	m		30.6%	27.8%	6.7%					1.8%
26	*Medicago lupulina*	e	m	2.8%	5.6%		26.0%	0.6%			0.7%	1.4%
26	*Taraxacum officianale*	e	p	8.3%	11.1%	19.4%	4.0%			0.3%		1.1%
26	*Rumex crispus*	e	p	8.3%	22.2%	13.9%	5.3%					1.1%
26	*Camelina microcarpa*	e	m		22.2%							0.6%
26	*Lepidium campestre*	e	m	8.3%	2.8%	11.1%	4.7%					0.5%
26	*Agropyron smithii*	n	p						2.0%			0.4%
26	*Polygonum aviculare*	e	m			13.9%	1.3%					0.4%
26	*Agropyron repens*	e	p			2.8%						0.1%
26	*Poa compressa*	e	p				3.3%					0.1%
26	*Asclepias viridiflora*	n	p		2.8%							0.1%
26	*Ambrosia psilostachya*	n	p				2.0%					0.1%
26	*Aster falcatus*	n	p				2.0%					0.1%
26	*Cichorium intybus*	e	p						0.3%			0.1%
26	*Iva axillaris*	n	p				3.3%					0.1%
26	*Lactuca serriola*	e	m		2.8%		1.3%					0.1%
26	*Tragopogon dubius*	e	m				2.0%					0.1%
26	*Allysum minus*	e	m				2.7%					0.1%
26	*Medicago sativa*	e	p			2.8%						0.1%
26	Unk. Forb -834	u	u				0.7%					0.0%
26	Bare Ground							6.6%	1.7%	4.7%	5.0%	0.0%
26	Litter							23.4%	31.4%	57.9%	49.5%	0.0%
27	*Convolvulus arvensis*	e	p	100.0%	100.0%	100.0%	100.0%	10.9%	27.1%	28.8%	14.0%	38.7%
27	*Barberea orthoceras*	n	u	86.1%	91.7%	22.2%	86.7%	11.3%	0.7%			10.7%
27	*Lactuca serriola*	e	m	2.8%	33.3%	94.4%	0.7%	0.3%	4.2%	0.7%	4.0%	6.3%
27	*Marrubium vulgare*	e	p	2.8%		19.4%	16.7%	2.0%	4.9%	0.7%	5.3%	6.2%
27	*Verbena bracteata*	e	m	55.6%	72.2%	88.9%	34.7%		1.3%	0.7%		5.5%
27	*Rumex crispus*	e	p	8.3%	19.4%	8.3%	12.0%	5.0%				3.0%
27	*Astragalus agrestis*	n	p	22.2%	38.9%	33.3%	14.7%		0.3%			2.3%
27	*Androsace occidentalis*	n	m	19.4%	22.2%	55.6%	6.7%		1.0%			2.1%
27	*Erodium cicutarium*	e	m		22.2%	13.9%		2.0%	1.6%			2.0%
27	*Melilotus officinalis*	e	m				5.3%		6.2%			1.8%
27	Unk. Forb -836	u	u		72.2%		0.7%					1.8%
27	*Tragopogon dubius*	e	m		8.3%	50.0%		0.3%			0.7%	1.7%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
27	*Plantago patagonica*	n	m	2.8%	8.3%	19.4%	16.7%		1.0%			1.5%
27	*Bromus tectorum*	e	m		5.6%	36.1%			2.3%			1.4%
27	*Asclepias pumila*	n	p				6.0%	0.7%	0.3%	1.0%	0.3%	1.2%
27	*Silene antirrhina*	e	m		11.1%	36.1%			0.7%			1.1%
27	*Gaura coccinea*	n	p	2.8%	11.1%	11.1%	6.0%	0.7%				1.0%
27	*Kochia iranica*	e	m			19.4%	4.0%			1.0%		0.9%
27	*Aster porteri*	n	p						3.3%			0.8%
27	*Allysum minus*	e	m			16.7%		1.0%	0.3%			0.8%
27	*Chamaesyce glyptosperma*	n	m	11.1%	8.3%	22.2%	3.3%					0.8%
27	*Psoralea tenuiflora*	n	p	2.8%		5.6%	2.0%	0.3%	0.3%	1.0%		0.8%
27	*Melilotus alba*	e	m				9.3%				0.7%	0.7%
27	*Centaurea diffusa*	e	u			19.4%	2.0%	0.3%				0.6%
27	*Thelesperma megapotamicum*	n	p				9.3%			0.7%		0.6%
27	*Evolvulus nuttalianus*	n	p	5.6%		2.8%	12.7%					0.6%
27	*Taraxacum officianale*	e	p		2.8%	5.6%					0.7%	0.5%
27	*Chenopodium dessicatum*	n	m		16.7%		1.3%					0.5%
27	*Verbascum thapsus*	e	m			8.3%					0.7%	0.5%
27	*Solanum triflorum*	e	m		19.4%							0.5%
27	*Bromus japonicus*	e	m			13.9%			0.3%			0.4%
27	*Podospermum laciniatum*	e	m		8.3%	8.3%						0.4%
27	*Linum lewisii*	n	p				0.7%	0.7%				0.3%
27	*Viola nuttallii*	n	p					0.7%				0.3%
27	*Ambrosia psilostachya*	n	p			2.8%					0.3%	0.2%
27	*Cirsium arvense*	e	p		8.3%							0.2%
27	*Monarda pectinata*	n	m			11.1%						0.2%
27	*Rosa arkansana*	n	p								0.3%	0.2%
27	*Penstemon secundiflorus*	n	p				0.7%	0.3%				0.2%
27	*Poa pratensis*	e	p			2.8%						0.1%
27	Unk. Grass - 193	u	p		5.6%							0.1%
27	*Asclepias viridiflora*	n	p		2.8%	2.8%						0.1%
27	*Cichorium intybus*	e	p					0.3%				0.1%
27	*Nepeta cataria*	e	p				2.0%					0.1%
27	*Sphaeralcea coccinia*	n	p							0.3%		0.1%
27	*Oxybaphus linearis*	n	p							0.3%		0.1%
27	*Polygonum sp.*	u	m			5.6%						0.1%
27	Unk. Forb -925	u	u		2.8%							0.1%
27	Unk. Forb -835	u	m				0.7%					0.0%
27	Bare Ground							40.7%	15.0%	26.8%	20.9%	0.0%
27	Litter							22.5%	29.1%	38.1%	52.2%	0.0%
28	*Poa compressa*	e	p	94.4%	86.1%	88.9%	90.0%	9.3%	9.8%	16.2%	5.3%	17.5%
28	*Ambrosia psilostachya*	n	p	66.7%	69.4%	77.8%	60.0%	1.0%	2.8%	3.3%	6.9%	7.7%
28	*Andropogon gerardii*	n	p	25.0%	27.8%	50.0%	36.7%	0.3%	3.8%	4.3%	4.6%	6.0%
28	*Sporobolus asper*	n	p	41.7%	75.0%	22.2%	39.3%	1.0%	2.2%	3.0%	4.6%	5.6%
28	*Bouteloua gracilis*	n	p	36.1%	38.9%	30.6%	46.0%	2.0%	3.8%	0.7%	3.3%	5.0%
28	*Aster falcatus*	n	p	36.1%	38.9%	47.2%	42.0%	1.3%	2.8%	0.7%	2.3%	4.3%
28	*Panicum virgatum*	n	p	33.3%	47.2%	38.9%	38.7%	0.7%	1.3%	3.0%	2.0%	4.0%
28	*Artemisia ludoviciana*	n	p	69.4%	36.1%	44.4%	66.0%	1.0%	2.2%	1.0%	1.6%	4.0%
28	*Aster porteri*	n	p		25.0%	33.3%		1.7%	1.6%	2.0%	0.7%	2.9%
28	*Carex heliophylla*	n	p	44.4%	25.0%	27.8%	36.0%	1.3%	1.6%	1.0%	0.7%	2.8%
28	*Bouteloua curtipendula*	n	p	50.0%	16.7%	41.7%	20.0%	2.0%		2.0%		2.5%
28	*Psoralea tenuiflora*	n	p	55.6%	33.3%	52.8%	43.3%		0.6%	0.3%	0.7%	2.3%
28	*Bromus japonicus*	e	m	27.8%	27.8%	8.3%	32.0%	3.0%	0.3%			2.2%
28	*Muhlenbergia wrightii*	n	p	25.0%	27.8%	5.6%	20.0%	1.0%	0.6%	1.7%	1.0%	2.2%
28	*Sorghastrum avenaceum*	n	p	33.3%	22.2%	22.2%	18.7%		1.3%	1.0%	1.0%	2.0%
28	*Acetosella vulgaris*	e	p		36.1%	22.2%	0.7%	2.0%	0.9%			2.0%
28	*Schedonnardus paniculatus*	n	p	33.3%	33.3%	27.8%	14.7%	0.7%			1.6%	1.9%
28	*Koeleria macrantha*	n	p	25.0%	16.7%	27.8%	47.3%	0.3%	0.6%	0.3%	0.3%	1.8%
28	*Tragopogon dubius*	e	m	36.1%	27.8%	2.8%	37.3%	1.0%	0.3%			1.4%
28	*Opuntia macrorhiza*	n	p	27.8%	16.7%	36.1%	22.7%	0.7%	0.3%			1.4%
28	*Tragia ramosa*	n	p	13.9%	25.0%	16.7%	28.7%			0.7%	0.3%	1.3%
28	*Oxalis dillenii*	n	m	27.8%	19.4%	22.2%	44.0%	0.3%				1.2%
28	*Arenaria fendlerii*	n	p	8.3%	22.2%	13.9%	27.3%	0.3%			0.3%	1.1%
28	*Allysum minus*	e	m	25.0%		11.1%	27.3%	1.0%	0.3%			1.0%
28	*Dalea purpurea*	n	p	33.3%	19.4%	19.4%	30.0%			0.3%		1.0%
28	*Poa pratensis*	e	p			13.9%			2.2%			0.9%
28	*Schizachyrium scoparium*	n	p	13.9%			18.7%	0.3%	0.6%		1.0%	0.9%
28	*Liatris punctata*	n	p	11.1%	5.6%	5.6%	9.3%		0.3%	0.7%	0.3%	0.7%
28	*Aristida purpurea*	n	p	11.1%		5.6%	14.0%		0.3%	0.7%		0.6%
28	*Dactylis glomerata*	e	p	11.1%	8.3%	5.6%	2.7%	0.7%	0.3%			0.6%

Appendix 3 (Cont.)

					% of Quadrats Present				% Cover				
Plot	Species				Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
28	*Dianthus armeria*	e	p		33.3%		2.8%	46.7%					0.6%
28	*Juncus longistylis*	n	p			16.7%	5.6%			0.3%	0.3%		0.5%
28	*Agropyron smithii*	n	p		5.6%	8.3%	5.6%	6.0%		0.3%	0.3%		0.5%
28	*Poa arida*	n	p		5.6%	11.1%		6.7%	0.3%		0.3%		0.5%
28	*Kuhnia eupatoriodes*	n	p		8.3%		22.2%	2.0%	0.3%				0.5%
28	*Plantago patagonica*	n	m		30.6%	2.8%	16.7%	16.0%					0.5%
28	*Muhlenbergia montana*	n	p						0.7%		0.3%		0.4%
28	*Allium textile*	n	p		19.4%	13.9%		14.0%					0.4%
28	*Gutierrezia sarothrae*	n	p		8.3%	2.8%	5.6%	10.0%	0.3%				0.4%
28	*Camelina microcarpa*	e	m		22.2%	8.3%	2.8%	22.0%					0.4%
28	*Hypericum perforatum*	e	p		8.3%		8.3%	28.7%					0.4%
28	*Linum lewisii*	n	p		11.1%	5.6%	19.4%	6.7%					0.4%
28	*Bromus inermis*	e	p				8.3%				0.3%	0.3%	0.3%
28	*Buchloe dactyloides*	n	p					2.7%			0.3%	0.3%	0.3%
28	*Sitanion longifolium*	n	u		13.9%	2.8%		23.3%					0.3%
28	*Grindelia squarrosa*	n	m			8.3%	5.6%			0.3%			0.3%
28	*Helianthus rigidus*	n	p			8.3%			0.3%				0.3%
28	*Plantago lanceolata*	e	p			8.3%			0.3%				0.3%
28	*Lomatium oriental*	n	p		13.9%			18.7%					0.2%
28	*Gaillardia aristata*	n	p				2.8%	2.7%		0.3%			0.2%
28	*Senecio plattensis*	n	p		8.3%		2.8%	10.7%					0.2%
28	*Lepidium campestre*	e	m		19.4%	8.3%	2.8%	5.3%					0.2%
28	*Opuntia fragilis*	n	p		8.3%			15.3%					0.2%
28	*Silene antirrhina*	e	m		13.9%		2.8%	14.7%					0.2%
28	*Polygonum sawatchense*	n	m		8.3%	2.8%	8.3%	2.0%					0.2%
28	*Juncus arcticus*	n	p					8.7%					0.1%
28	*Alopecurus aequalis*	n	p		5.6%	2.8%	2.8%	5.3%					0.1%
28	*Bromus tectorum*	e	m		8.3%			2.7%		0.3%			0.1%
28	*Dicanthelium oligosanthes*	n	m					2.0%				0.3%	0.1%
28	*Lolium perenne*	e	m		11.1%			6.0%					0.1%
28	*Musineon divaricatum*	n	p		5.6%			8.7%					0.1%
28	*Ambrosia artemesifolia*	e	m			5.6%							0.1%
28	*Artemisia frigida*	n	p					1.3%	0.3%				0.1%
28	*Lactuca serriola*	e	m		2.8%	8.3%		0.7%					0.1%
28	*Podospermum laciniatum*	e	m				2.8%	8.7%					0.1%
28	*Taraxacum officianale*	e	p			5.6%		0.7%					0.1%
28	*Convolvulus arvensis*	e	p					5.3%					0.1%
28	*Euphorbia spathulata*	n	m		5.6%	2.8%		4.0%					0.1%
28	*Amorpha nana*	n	p								0.3%		0.1%
28	*Linum usitatissimum*	e	m		8.3%			5.3%					0.1%
28	*Drymocallis fissia*	n	p					2.0%			0.3%		0.1%
28	*Rosa arkansana*	n	p						0.3%				0.1%
28	*Comandra umbellata*	n	p			8.3%							0.1%
28	*Veronica peregrina*	e	m			5.6%							0.1%
28	*Viola nuttallii*	n	p		19.4%			8.0%					0.1%
28	Unk. Forb -920	u	u						0.3%				0.1%
28	*Carex brevior*	n	p					3.3%					0.0%
28	*Eleocharis elliptica*	n	u					2.0%					0.0%
28	*Avena fatua*	e	m					1.3%					0.0%
28	*Bouteloua hirsuta*	n	p		8.3%			3.3%					0.0%
28	Unk. Grass - 194	u	p			2.8%							0.0%
28	*Asclepias speciosa*	n	p					0.7%					0.0%
28	*Centaurea diffusa*	e	u			2.8%							0.0%
28	*Cichorium intybus*	e	p					0.7%					0.0%
28	*Cirsium undulatum*	n	m		2.8%			2.0%					0.0%
28	*Nothocalis cuspidata*	n	p					2.7%					0.0%
28	*Ratibida columnifera*	n	p		2.8%			3.3%					0.0%
28	*Lappula redowskii*	n	m		5.6%			1.3%					0.0%
28	*Draba reptans*	n	m		2.8%			3.3%					0.0%
28	*Erysimum asperum*	n	p					2.0%					0.0%
28	*Lesquerella montana*	n	u					3.3%					0.0%
28	*Paronychia jamesii*	n	p					1.3%					0.0%
28	*Evolvulus nuttalianus*	n	p					0.7%					0.0%
28	*Astragalus sp.*	n	u					1.3%					0.0%
28	*Medicago lupulina*	e	m		2.8%			0.7%					0.0%
28	*Oxytropis lambertii*	n	p					0.7%					0.0%
28	*Scutellaria brittonia*	n	p					2.7%					0.0%
28	*Teucrium canadense*	n	m					1.3%					0.0%
28	*Oxybaphus linearis*	n	p					0.7%					0.0%

Appendix 3 (Cont.)

Plot	Species			% of Quadrats Present				% Cover				IMP
				Part94	July95	July96	All94	June95	June96	Aug95	Aug96	
28	*Gaura coccinea*	n	p				0.7%					0.0%
28	*Oenothera brachycarpa*	n	p		2.8%							0.0%
28	*Eriogonum alatum*	n	p				2.0%					0.0%
28	*Rumex crispus*	e	p			2.8%						0.0%
28	*Talinum parviflorum*	n	u	5.6%			2.7%					0.0%
28	*Androsace occidentalis*	n	m				2.0%					0.0%
28	Unk. Forb -839	u	u				1.3%					0.0%
28	Bare Ground							11.0%	5.4%	7.6%	6.3%	0.0%
28	Litter							52.7%	51.9%	47.0%	54.3%	0.0%
29	*Poa compressa*	e	p	91.7%	91.7%	94.4%	76.7%	11.1%	7.3%	3.7%	6.3%	13.3%
29	*Andropogon gerardii*	n	p	52.8%	52.8%	38.9%	55.3%	3.0%	8.0%	8.4%	5.6%	10.5%
29	*Bouteloua gracilis*	n	p	33.3%	52.8%	69.4%	40.7%	1.0%	2.0%	1.7%	4.3%	5.3%
29	*Ambrosia psilostachya*	n	p	47.2%	30.6%	75.0%	40.0%	0.7%	5.3%	0.7%	3.6%	5.2%
29	*Panicum virgatum*	n	p	61.1%	58.3%	52.8%	38.7%		2.3%	3.3%	1.3%	4.6%
29	*Aster porteri*	n	p		41.7%	38.9%		3.0%	2.3%	0.7%	3.0%	4.2%
29	*Psoralea tenuiflora*	n	p	41.7%	33.3%	55.6%	40.0%		2.0%	1.7%	3.3%	4.1%
29	*Artemisia ludoviciana*	n	p	41.7%	38.9%	25.0%	53.3%	2.3%	0.7%	1.3%	1.3%	3.7%
29	*Bouteloua curtipendula*	n	p	30.6%	30.6%	50.0%	15.3%	0.3%	3.3%	2.0%		3.3%
29	*Muhlenbergia wrightii*	n	p	22.2%	8.3%	16.7%	18.0%	1.0%	2.7%	0.7%	4.3%	3.3%
29	*Sporobolus asper*	n	p	22.2%	5.6%	25.0%	34.7%	0.3%	0.7%	2.3%	3.3%	3.1%
29	*Sorghastrum nevenaceum*	n	p	27.8%	16.7%	27.8%	22.7%	0.3%	1.3%	2.7%		2.5%
29	*Carex heliophylla*	n	p	44.4%	11.1%	25.0%	33.3%	2.0%	0.7%	0.7%	0.3%	2.2%
29	*Tragia ramosa*	n	p	36.1%	38.9%	44.4%	25.3%		0.3%	0.3%	1.0%	2.1%
29	*Drymocallis fissia*	n	p	22.2%	25.0%	16.7%	8.7%	1.7%	1.3%	0.3%		1.9%
29	*Dalea purpurea*	n	p	27.8%	44.4%	33.3%	21.3%			0.3%	0.7%	1.8%
29	*Koeleria macrantha*	n	p	52.8%	16.7%	25.0%	49.3%	1.0%			0.3%	1.7%
29	*Opuntia macrorhiza*	n	p	19.4%	38.9%	16.7%	23.3%		0.3%	0.7%		1.6%
29	*Oxalis dillenii*	n	m	5.6%	33.3%	25.0%	17.3%	0.3%		1.0%		1.6%
29	*Aster falcatus*	n	p	8.3%		11.1%	30.0%	1.0%	0.7%	0.7%	0.3%	1.5%
29	*Allysum minus*	e	m			11.1%	18.7%	2.7%	0.3%			1.5%
29	*Arenaria fendlerii*	n	p	47.2%	19.4%	30.6%	32.7%		1.0%			1.5%
29	*Bromus japonicus*	e	m	5.6%	11.1%	2.8%	36.7%	2.0%				1.4%
29	*Liatris punctata*	n	p	22.2%	27.8%	13.9%	12.0%		0.3%		1.0%	1.2%
29	*Tragopogon dubius*	e	m	41.7%	2.8%	38.9%	32.7%		0.7%			1.2%
29	*Bouteloua hirsuta*	n	p	5.6%			9.3%				3.3%	1.1%
29	*Stipa comata*	n	p	8.3%		8.3%	10.7%	1.0%		0.7%	0.7%	1.1%
29	*Agropyron smithii*	n	p	8.3%	8.3%	5.6%	12.7%	0.3%		0.7%	0.7%	1.0%
29	*Buchloe dactyloides*	n	p	2.8%	5.6%		0.7%	1.0%	0.3%	0.7%	0.3%	0.9%
29	*Camelina microcarpa*	e	m	19.4%	11.1%	22.2%	20.7%	0.3%				0.9%
29	*Helianthus rigidus*	n	p		5.6%		7.3%	0.7%	0.3%		1.0%	0.8%
29	*Gutierrezia sarothrae*	n	p	8.3%	8.3%	22.2%	5.3%	0.3%				0.6%
29	*Aristida purpurea*	n	p	2.8%	13.9%		4.7%		0.3%		0.3%	0.5%
29	*Schizachyrium scoparium*	n	p	16.7%	2.8%		13.3%			0.3%	0.3%	0.5%
29	*Artemisia frigida*	n	p			2.8%	6.0%	0.3%	1.0%			0.5%
29	*Kuhnia eupatoriodes*	n	p			22.2%		0.3%			0.3%	0.5%
29	*Paronychia jamesii*	n	p	2.8%	13.9%	5.6%	8.0%					0.4%
29	*Hypericum perforatum*	e	p	2.8%		13.9%	3.3%			0.3%		0.4%
29	*Plantago patagonica*	n	m	8.3%	11.1%	5.6%	13.3%					0.4%
29	*Bromus tectorum*	e	m			2.8%	10.0%		0.3%			0.3%
29	*Allium textile*	n	p	16.7%		2.8%	14.0%	0.3%				0.3%
29	*Lomatium oriental*	n	p	36.1%			16.7%	0.3%				0.3%
29	*Dalea candida*	n	p		5.6%	5.6%					0.3%	0.3%
29	*Rosa arkansana*	n	p				13.3%			0.3%		0.3%
29	*Eleocharis elliptica*	n	u				2.0%		0.7%			0.2%
29	*Poa arida*	n	p				3.3%			0.3%		0.2%
29	*Schedonnardus paniculatus*	n	p		2.8%	5.6%	2.7%					0.2%
29	*Heterotheca villosa*	n	p		2.8%		2.7%	0.3%				0.2%
29	*Lepidium densiflorum*	e	m			11.1%	0.7%					0.2%
29	*Dianthus armeria*	e	p				13.3%					0.2%
29	*Evolvulus nuttalianus*	n	p	5.6%			2.7%			0.3%		0.2%
29	*Linum usitatissimum*	e	m	5.6%			10.0%		0.3%			0.2%
29	*Eriogonum alatum*	n	p	8.3%			2.0%			0.3%		0.2%
29	*Juncus arcticus*	n	p				4.7%					0.1%
29	*Juncus longistylis*	n	p			5.6%						0.1%
29	*Hordeum jubatum*	n	u	8.3%			10.0%					0.1%
29	*Muhlenbergia montana*	n	p			8.3%						0.1%
29	*Sitanion longifolium*	n	u			5.6%						0.1%
29	*Musineon divaricatum*	n	p	2.8%			6.0%					0.1%
29	*Ratibida columnifera*	n	p			2.8%	3.3%					0.1%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
29	*Senecio plattensis*	n	p	5.6%			2.0%	0.3%				0.1%
29	*Draba reptans*	n	m				5.3%					0.1%
29	*Erysimum asperum*	n	p			2.8%	2.7%					0.1%
29	*Lepidium campestre*	e	m				1.3%		0.3%			0.1%
29	*Lesquerella montana*	n	u		2.8%		2.7%				0.3%	0.1%
29	*Echinocereus viridiflorus*	n	p				2.7%					0.1%
29	*Opuntia fragilis*	n	p	2.8%			4.7%					0.1%
29	*Silene antirrhina*	e	m				6.7%					0.1%
29	*Hedysarum boreale*	n	p				2.0%		0.3%			0.1%
29	*Meliotus officinalis*	e	m	30.6%			11.3%					0.1%
29	*Oxytropis lambertii*	n	p				4.0%					0.1%
29	*Linum lewisii*	n	p			5.6%	2.0%					0.1%
29	*Oxybaphus linearis*	n	p				1.3%			0.3%		0.1%
29	*Gaura coccinea*	n	p		2.8%		0.7%					0.1%
29	*Talinum parviflorum*	n	u			8.3%						0.1%
29	*Ceanothus herbaceous*	n	p								0.3%	0.1%
29	*Comandra umbellata*	n	p				2.0%		0.3%			0.1%
29	Unk. Forb -919	u	u					0.3%				0.1%
29	*Dicanthelium oligosanthes*	n	m				0.7%					0.0%
29	*Lolium perenne*	e	m	2.8%			0.7%					0.0%
29	*Setaria glauca*	e	m				0.7%					0.0%
29	*Gaillardia aristata*	n	p			2.8%						0.0%
29	*Lactuca serriola*	e	m	2.8%			0.7%					0.0%
29	*Lappula redowskii*	n	m				0.7%					0.0%
29	*Lithospermum incisum*	n	p				0.7%					0.0%
29	*Cerastium arvense*	n	p				2.0%					0.0%
29	*Tradescantia occidentalis*	n	p			2.8%	0.7%					0.0%
29	*Euphorbia spathulata*	n	m				1.3%					0.0%
29	*Astragalus shortianus*	n	p				2.0%					0.0%
29	*Lotus tenuis*	e	p				1.3%					0.0%
29	*Vicia americana*	n	p				2.7%					0.0%
29	*Scutellaria brittonia*	n	p				2.7%					0.0%
29	*Leucocrinum montanum*	n	p	8.3%			2.0%					0.0%
29	*Calylophus serrulata*	n	p				0.7%					0.0%
29	*Penstemon gracilis*	n	p	2.8%			0.7%					0.0%
29	*Physalis sp.*	n	u				0.7%					0.0%
29	*Viola nuttallii*	n	p	2.8%			0.7%					0.0%
29	Bare Ground							12.4%	15.0%	15.7%	13.2%	0.0%
29	Litter							47.7%	37.0%	46.8%	39.1%	0.0%
30	*Bouteloua gracilis*	n	p	88.9%	97.2%	97.2%	89.3%	7.7%	16.8%	5.0%	21.0%	27.3%
30	*Buchloe dactyloides*	n	p	69.4%	88.9%	80.6%	66.7%	3.1%	2.7%	6.4%	6.7%	13.6%
30	*Bromus tectorum*	e	m	97.2%	100.0%	50.0%	99.3%	25.2%	0.7%			11.5%
30	*Agropyron smithii*	n	p	55.6%	38.9%	44.4%	21.3%	3.1%	5.1%	3.7%	1.7%	8.4%
30	*Podospermum lecinatum*	e	m	69.4%	88.9%	80.6%	53.3%	2.8%	1.0%		0.3%	5.3%
30	*Plantago patagonica*	n	m	83.3%	72.2%	97.2%	64.0%		0.3%			4.4%
30	*Bromus japonicus*	e	m	63.9%	69.4%	44.4%	64.0%					3.1%
30	*Artemisia dranunculus*	n	p	13.9%	27.8%	30.6%	33.3%			1.3%	1.0%	3.0%
30	*Vulpia octoflora*	n	m	52.8%	94.4%	11.1%	50.7%	0.5%				2.7%
30	*Sitanion hystrix*	n	p	50.0%	80.6%		58.7%	1.3%				2.6%
30	*Tragopogon dubius*	e	m	11.1%	11.1%	38.9%	9.3%	0.8%	1.3%	0.3%	0.7%	2.5%
30	*Camelina microcarpa*	e	m	27.8%	61.1%	16.7%	23.3%	1.0%				2.0%
30	*Lepidium densiflorum*	e	m	30.6%	36.1%	33.3%	18.7%					1.6%
30	*Convolvulus arvensis*	e	p				3.3%	0.5%	0.7%	0.3%	1.3%	1.3%
30	*Heterotheca villosa*	n	p				4.7%	0.3%	0.7%	0.7%	0.3%	1.1%
30	*Stipa comata*	n	p				11.3%	1.5%		0.3%	0.3%	1.0%
30	*Allysum minus*	e	m	5.6%	13.9%	5.6%	4.0%	1.8%				0.9%
30	*Sphaeralcea coccinia*	n	p	8.3%	11.1%	5.6%	24.0%			0.3%		0.9%
30	*Carex heliophylla*	n	p				11.3%	1.3%		0.3%		0.8%
30	*Echinocereus viridiflorus*	n	p	2.8%	8.3%	19.4%	8.0%					0.7%
30	*Kuhnia eupatoriodes*	n	p				2.0%	0.3%		0.7%		0.6%
30	*Hordeum vulgare*	e	m	11.1%	11.1%		17.3%					0.5%
30	*Grindelia squarrosa*	n	m	5.6%		13.9%	1.3%				0.3%	0.5%
30	*Opuntia macrorhiza*	n	p	16.7%	13.9%	2.8%	11.3%					0.5%
30	*Artemisia frigida*	n	p		8.3%		2.0%	0.3%	0.3%			0.4%
30	*Aster falcatus*	n	p	8.3%		11.1%	2.0%		0.3%			0.4%
30	*Aristida purpurea*	n	p				2.0%				0.7%	0.3%
30	*Draba reptans*	n	m		2.8%		8.7%	0.3%				0.3%
30	*Psoralea tenuiflora*	n	p				0.7%			0.3%		0.3%
30	*Poa sandbergii*	n	p						0.3%			0.2%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
30	*Yucca glauca*	n	p				0.7%	0.3%			0.3%	0.2%
30	*Cirsium ochrocentrum*	n	m				0.7%		0.3%			0.2%
30	*Descurainia pinnata*	n	m				6.7%	0.3%				0.2%
30	*Erodium cicutarium*	e	m				5.3%	0.5%				0.2%
30	*Musineon divaricatum*	n	p		2.8%		0.7%					0.1%
30	*Lactuca serriola*	e	m	8.3%			6.0%					0.1%
30	*Lappula redowskii*	n	m				4.7%					0.1%
30	*Sysimbrium altissimum*	e	m				4.0%					0.1%
30	*Androsace occidentalis*	n	m				8.0%					0.1%
30	*Koeleria macrantha*	n	p				2.0%					0.0%
30	*Sporobolus asper*	n	p				0.7%					0.0%
30	*Allium textile*	n	p				2.7%					0.0%
30	*Lygodesmia juncea*	n	p				2.0%					0.0%
30	*Thelesperma megapotamicum*	n	p				0.7%					0.0%
30	*Gaura coccinea*	n	p				0.7%					0.0%
30	*Eriogonum effusum*	n	p				0.7%					0.0%
30	*Viola nuttallii*	n	p		2.8%							0.0%
30	Bare Ground							16.7%	4.7%	6.4%	4.7%	0.0%
30	Litter							30.6%	64.6%	73.8%	60.7%	0.0%
31	*Convolvulus arvensis*	e	p	36.1%	52.8%	77.8%	38.0%	8.1%	13.3%	8.4%	13.7%	25.4%
31	*Bromus tectorum*	e	m	100.0%	100.0%	97.2%	72.7%	26.7%	13.0%			19.3%
31	*Agropyron smithii*	n	p	38.9%	30.6%	27.8%	48.7%	5.5%	3.3%	7.4%	4.3%	13.6%
31	*Plantago patagonica*	n	m	91.7%	63.9%	94.4%	80.0%	2.0%	9.6%		0.3%	10.6%
31	*Sysimbrium altissimum*	e	m	19.4%	44.4%	30.6%	18.0%	4.2%	0.7%			4.0%
31	*Artemisia dranunculus*	n	p	52.8%	13.9%	22.2%	33.3%			0.7%	1.0%	3.1%
31	*Verbena bractaeta*	e	m		5.6%	11.1%	2.7%	0.3%	1.7%	1.7%	1.3%	3.1%
31	*Artemisia frigida*	n	p	38.9%	19.4%	30.6%	25.3%	0.3%	0.3%			2.4%
31	*Lappula redowskii*	n	m				40.7%	1.6%				1.8%
31	*Lepidium densiflorum*	e	m	5.6%	22.2%	27.8%	13.3%					1.8%
31	*Bromus japonicus*	e	m		16.7%	8.3%	16.7%		0.7%			1.4%
31	*Bouteloua gracilis*	n	p		25.0%	19.4%					0.3%	1.4%
31	*Buchloe dactyloides*	n	p	8.3%	11.1%	11.1%	2.0%				1.0%	1.3%
31	*Chamaesyce glyptosperma*	n	m		13.9%	11.1%	2.7%				0.3%	1.0%
31	*Aster falcatus*	n	p			13.9%	1.3%		0.3%	0.3%		0.8%
31	*Sphaeralcea coccinia*	n	p	2.8%	5.6%	5.6%	2.0%	0.3%	0.3%	0.3%		0.8%
31	*Aristida purpurea*	n	p				2.0%		0.7%		0.7%	0.7%
31	*Gutierrezia sarothrae*	n	p		8.3%		6.0%		0.7%			0.6%
31	*Lactuca serriola*	e	m		2.8%	19.4%						0.6%
31	*Erodium cicutarium*	e	m		2.8%	8.3%		0.7%	0.3%			0.6%
31	*Monarda pectinata*	n	m	19.4%	8.3%		12.0%					0.6%
31	*Taraxacum officianale*	e	p		5.6%	13.9%						0.5%
31	*Chenopodium dessicatum*	n	m		5.6%		2.7%			0.3%		0.5%
31	*Marrubium vulgare*	e	p					0.3%	1.3%			0.5%
31	*Veronica peregrina*	e	m		13.9%	5.6%						0.5%
31	*Hordeum vulgare*	e	m		11.1%		1.3%					0.4%
31	*Androsace occidentalis*	n	m		8.3%		2.0%	0.3%				0.4%
31	*Vulpia octoflora*	n	m		8.3%		1.3%					0.3%
31	*Solanum triflorum*	e	m				0.7%			0.3%		0.3%
31	*Allium textile*	n	p		5.6%							0.2%
31	*Heterotheca villosa*	n	p				1.3%				0.3%	0.2%
31	*Lygodesmia juncea*	n	p							0.3%		0.2%
31	*Allysum minus*	e	m				7.3%					0.2%
31	*Draba reptans*	n	m				2.7%	0.3%				0.2%
31	*Psoralea tenuiflora*	n	p							0.3%		0.2%
31	*Verbascum thapsus*	e	m								0.3%	0.2%
31	*Descurainia sophia*	e	m				2.7%					0.1%
31	*Lepidium latifolium*	e	p				1.3%					0.0%
31	Bare Ground							25.7%	8.6%	10.4%	9.7%	0.0%
31	Litter							23.5%	45.2%	69.6%	66.7%	0.0%
32	*Bromus inermis*	e	p	72.2%	91.7%		84.7%	52.1%	31.5%	31.0%	11.4%	28.6%
32	*Medicago sativa*	e	p	61.1%	94.4%	100.0%	48.7%	12.1%	17.8%	35.3%	23.1%	26.8%
32	*Dactylis glomerata*	e	p	19.4%	72.2%	100.0%	14.7%	22.5%	20.2%	12.6%	23.7%	22.6%
32	*Convolvulus arvensis*	e	p	58.3%	33.3%	30.6%	46.0%	0.7%	10.9%	6.1%	9.2%	10.1%
32	*Taraxacum officianale*	e	p	27.8%	19.4%	33.3%	33.3%	0.3%	1.9%	0.6%	1.6%	5.0%
32	*Festuca pratensis*	e	p			8.3%	1.3%	2.6%	2.2%	1.2%	1.3%	1.7%
32	*Chenopodium album*	e	m	33.3%			20.0%					1.0%
32	*Cirsium arvense*	e	p		8.3%		6.7%			1.2%		0.9%
32	*Lactuca serriola*	e	m	2.8%	11.1%		4.7%	0.7%				0.8%
32	*Descurainia sophia*	e	m	11.1%	2.8%		2.7%	1.3%				0.4%

Appendix 3 (Cont.)

Plot	Species			% of Quadrats Present				% Cover				IMP
				Part94	July95	July96	All94	June95	June96	Aug95	Aug96	
32	*Malva neglecta*	e	m		8.3%			0.3%				0.4%
32	*Alopecurus aequalis*	n	p		8.3%							0.3%
32	*Amaranthus sp.*	u	m	19.4%			4.7%					0.2%
32	*Avena fatua*	e	m				1.3%					0.1%
32	*Phleum pratense*	e	p			2.8%						0.1%
32	*Poa pratensis*	e	p				2.0%					0.1%
32	*Arctium minus*	e	m					0.3%		0.3%		0.1%
32	*Tragopogon dubius*	e	m	2.8%			0.7%	0.3%				0.1%
32	*Thlaspi arvense*	e	m				2.0%					0.1%
32	*Chamaesyce glyptosperma*	n	m	8.3%			2.0%					0.1%
32	*Oxybaphus linearis*	n	p				2.7%					0.1%
32	*Eriogonum sp.*	n	u	2.8%			2.0%					0.1%
32	*Fallopia convolvulus*	e	m	2.8%			2.0%					0.0%
32	*Bromus tectorum*	e	m				0.7%					0.0%
32	*Capsella burse-pastoris*	e	m				0.7%					0.0%
32	*Plantago lanceolata*	e	p	2.8%			0.7%					0.0%
32	Bare Ground							1.0%	2.2%	2.5%	4.1%	0.0%
32	Litter							5.9%	13.4%	9.2%	25.6%	0.0%
33	*Bromus inermis*	e	p	100.0%	97.2%	100.0%	96.0%	45.0%	43.7%	42.8%	20.7%	45.4%
33	*Dactylis glomerata*	e	p		5.6%	11.1%	47.3%	24.8%	17.2%	21.6%	14.1%	17.8%
33	*Festuca pratensis*	e	p	2.8%	30.6%	27.8%	19.3%	22.2%	6.1%	3.6%	1.6%	10.3%
33	*Taraxacum officianale*	e	p	2.8%	19.4%	27.8%	41.3%	1.3%	4.9%	2.9%	4.3%	7.9%
33	*Medicago sativa*	e	p	2.8%	19.4%		34.0%	3.9%	4.5%	8.5%	1.6%	6.4%
33	*Cirsium arvense*	e	p	8.3%	8.3%	27.8%	17.3%	0.3%	3.2%	0.7%	2.3%	4.5%
33	*Convolvulus arvensis*	e	p			13.9%	13.3%	0.6%	3.6%	3.3%	4.3%	4.0%
33	*Cardaria chalepensis*	n	p	11.1%		30.6%	3.3%					2.0%
33	*Oxybaphus nyctagineus*	n	p		11.1%		6.7%					1.2%
33	*Aster falcatus*	u	m		2.8%							0.2%
33	*Polygonum sp.*	e	m			2.8%						0.2%
33	*Lactuca serriola*	e	p				2.0%					0.1%
33	*Poa pratensis*						0.7%					0.0%
33	Bare Ground							0.3%	0.6%	2.0%	7.9%	0.0%
33	Litter							1.6%	16.2%	14.7%	43.3%	0.0%
34	*Festuca pratensis*	e	p	25.0%	52.8%	75.0%	41.3%	11.8%	16.7%	11.6%	15.7%	17.5%
34	*Juncus arcticus*	n	p	86.1%	83.3%	91.7%	74.0%	3.6%	4.0%	2.6%	3.3%	9.4%
34	*Dactylis glomerata*	e	p	75.0%	72.2%	77.8%	43.3%	4.6%	6.0%	1.0%	5.7%	8.7%
34	*Lotus tenuis*	e	p	50.0%	19.4%	38.9%	57.3%	15.0%	3.7%	5.3%	4.0%	8.6%
34	*Poa pratensis*	e	p	52.8%	38.9%	30.6%	72.0%	4.6%	6.7%	2.0%	6.7%	7.9%
34	*Spartina pectinata*	n	p				16.0%	2.9%		10.6%	16.0%	7.7%
34	*Carex stipata*	n	p	44.4%			60.7%	8.8%	6.7%	7.0%		6.8%
34	*Carex nebrascensis*	n	p	41.7%	30.6%	47.2%	53.3%	3.9%	2.3%	0.7%	2.7%	5.1%
34	*Trifolium pratense*	e	p	44.4%	30.6%	44.4%	28.7%	3.3%	1.3%	0.3%	0.7%	3.6%
34	*Agrostis gigantea*	e	p	2.8%	11.1%	30.6%	4.0%	6.2%	0.7%	0.3%	1.7%	2.7%
34	*Taraxacum officinale*	e	p	47.2%	11.1%	38.9%	40.7%	0.3%	0.7%		1.7%	2.6%
34	*Carex sp.*	u	p		8.3%	8.3%		7.8%	1.0%		2.0%	2.3%
34	*Phleum pratense*	e	p	36.1%	11.1%		37.3%	2.9%	1.3%		0.7%	2.1%
34	*Carex lanuginosa*	n	p			50.0%	2.0%	0.3%			3.7%	1.8%
34	*Ranunculus macounii*	n	p	22.2%		27.8%	34.7%	0.7%			1.3%	1.7%
34	*Rosa arkansana*	n	p	16.7%	25.0%	22.2%	4.0%	0.3%		0.3%	0.7%	1.7%
34	*Elecocharis elliptica*	n	u			25.0%		4.2%			0.7%	1.3%
34	*Aster falcatus*	n	p	22.2%	8.3%	27.8%	5.3%				0.3%	1.0%
34	*Trifolium hybribum*	e	u	19.4%		16.7%	18.0%	1.0%				0.9%
34	*Plantago lanceolata*	e	p	27.8%	11.1%	5.6%	18.0%					0.9%
34	*Andropogon gerardii*	n	p	2.8%		16.7%	0.7%				1.0%	0.6%
34	*Agropyron repens*	e	p	16.7%			14.7%	1.3%				0.5%
34	*Briza media*	e	u					3.3%				0.5%
34	*Bromus inermis*	e	p			5.6%				1.0%	0.3%	0.5%
34	*Achillea lanulosa*	n	p		2.8%	8.3%	4.7%				0.7%	0.5%
34	*Monarda fistulosa*	n	p							2.0%		0.5%
34	*Cirsium arvense*	e	p				11.3%	0.7%				0.3%
34	*Cerastium arvense*	n	p		8.3%							0.3%
34	*Polygonum aviculare*	e	m	8.3%		11.1%	2.0%				0.3%	0.3%
34	Unk. Forb -916	u	u	5.6%			11.3%	0.7%				0.3%
34	*Carex brevior*	n	p				1.3%	1.3%				0.2%
34	*Asclepias speciosa*	n	p				3.3%				0.3%	0.2%
34	*Rumex crispus*	e	p	8.3%			8.0%					0.2%
34	Unk. Forb -914	u	u	2.8%		11.1%	0.7%					0.2%
34	*Agropyron cristatum*	e	p								0.3%	0.1%
34	*Phalaris arundinacea*	e	p					0.3%				0.1%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
34	*Daucus carota*	e	m			2.8%		0.3%				0.1%
34	*Cerastium nuttans*	n	m					0.3%				0.1%
34	*Medicago lupulina*	e	m					0.7%				0.1%
34	*Trifolium repens*	e	p						0.3%			0.1%
34	*Acetosella vulgaris*	e	p				2.7%					0.1%
34	Unk. Forb -927	u	u		2.8%							0.1%
34	Unk. Grass - 192	u	u	2.8%			0.7%					0.0%
34	*Hippochaete laevigata*	n	m				0.7%					0.0%
34	Unk. Forb -915	u	u	2.8%			0.7%					0.0%
34	Bare Ground							1.3%	8.3%	3.0%	8.3%	0.0%
34	Litter							7.5%	37.3%	54.6%	22.0%	0.0%
35	*Bromus inermis*	e	p	100.0%	100.0%	100.0%	100.0%	58.1%	51.8%	59.6%	51.2%	61.9%
35	*Rosa arkansana*	n	p	30.6%	25.0%	33.3%	19.3%	1.0%	2.0%	1.3%	1.0%	4.3%
35	*Convolvulus arvensis*	e	p	36.1%	16.7%	41.7%	28.7%	1.7%			0.3%	4.0%
35	*Lupinus argenteus*	n	p	25.0%	13.9%	11.1%	10.0%	3.6%	1.6%	0.3%	3.0%	3.4%
35	*Achillea lanulosa*	n	p	41.7%	27.8%	30.6%	15.3%		0.3%	0.7%	0.3%	3.3%
35	*Medicago sativa*	e	p	11.1%	8.3%	19.4%	28.7%	0.3%	1.6%		0.7%	3.0%
35	*Hippochaete laevigata*	n	m	30.6%	16.7%	36.1%	11.3%		0.3%		0.3%	2.7%
35	*Poa pratensis*	e	p	8.3%	8.3%	22.2%	2.7%	1.7%	0.3%	0.7%	0.7%	2.0%
35	*Trifolium pratense*	e	p	16.7%	33.3%	2.8%	8.7%	0.3%				1.9%
35	*Aster falcatus*	n	p	22.2%	13.9%	11.1%	10.0%		1.0%			1.7%
35	*Dactylis glomerata*	e	p	27.8%	16.7%	8.3%	8.0%			1.0%		1.6%
35	*Taraxacum officinale*	e	p	11.1%	25.0%	11.1%	3.3%					1.6%
35	*Symphoricarpos occidentalis*	n	p			2.8%	8.0%	0.3%	0.3%	0.3%	0.7%	0.9%
35	*Agrostis gigantea*	e	p	13.9%	8.3%	5.6%	3.3%				0.3%	0.8%
35	*Plantago lanceolata*	e	p	11.1%		8.3%	7.3%					0.7%
35	*Andropogon gerardii*	n	p				3.3%	0.3%	1.0%	0.3%	0.3%	0.6%
35	*Solidago sparsiflora*	n	p	8.3%	8.3%	2.8%	2.0%	0.7%				0.6%
35	*Saponaria officianalis*	e	p	2.8%	8.3%		0.7%				0.7%	0.6%
35	*Packeria pseudoaureas*	n	p			13.9%						0.5%
35	*Melilotus alba*	e	m	5.6%	5.6%	5.6%	1.3%					0.5%
35	*Poa compressa*	e	p		2.8%	5.6%		0.3%				0.4%
35	*Asclepias speciosa*	n	p		2.8%	8.3%	0.7%					0.4%
35	*Lepidium campestre*	e	m	5.6%	5.6%	2.8%	2.0%					0.4%
35	*Dicanthelium oligosanthes*	n	m			8.3%						0.3%
35	*Phleum pratense*	e	p	13.9%	2.8%		3.3%					0.3%
35	*Ambrosia psilostachya*	n	p				0.7%	1.0%	0.3%			0.3%
35	*Aster laevis*	n	p			8.3%						0.3%
35	*Allysum minus*	e	m		8.3%							0.3%
35	*Glycyrrhiza lepidota*	n	p				0.7%	0.3%			1.0%	0.3%
35	*Carduus nuttans*	e	m	2.8%		2.8%	2.0%					0.2%
35	*Agropyron smithii*	n	p					0.3%				0.1%
35	*Cichorium intybus*	e	p					0.3%				0.1%
35	*Verbascum thapsus*	e	m	8.3%			2.0%					0.1%
35	*Cirsium undulatum*	n	m				0.7%					0.0%
35	*Ranunculus macounii*	n	p	2.8%			0.7%					0.0%
35	Bare Ground							4.6%	2.3%	0.3%	0.7%	0.0%
35	Litter							25.1%	37.1%	35.4%	38.9%	0.0%
36	*Dactylis glomerata*	e	p	83.3%	97.2%	75.0%	58.0%	12.8%	12.1%	5.9%	4.6%	11.2%
36	*Poa pratensis*	e	p	22.2%	52.8%	58.3%	45.3%	6.9%	6.2%	5.5%	5.9%	7.6%
36	*Rosa arkansana*	n	p	50.0%	75.0%	69.4%	41.3%	5.6%	4.6%	6.5%	5.6%	7.5%
36	*Andropogon gerardii*	n	p	58.3%	25.0%	44.4%	39.3%	3.3%	3.6%	8.5%	11.9%	7.2%
36	*Juncus arcticus*	n	p	58.3%	58.3%	50.0%	71.3%	3.6%	4.3%	3.6%	5.3%	6.3%
36	*Agrostis gigantea*	e	p	19.4%	25.0%	33.3%	32.7%	5.3%		4.2%	6.9%	4.5%
36	*Panicum virgatum*	n	p	33.3%	30.6%	27.8%	22.0%	1.0%	1.0%	3.3%	8.6%	3.9%
36	*Phleum pratense*	e	p	69.4%	50.0%	55.6%	18.7%	3.6%	1.3%	0.3%	1.0%	3.1%
36	*Lotus tenuis*	e	p	27.8%	41.7%	27.8%	28.7%	4.9%	1.0%	1.0%	1.3%	3.1%
36	*Carex stipata*	n	p	2.8%	5.6%	11.1%	24.0%	2.6%		8.1%		2.8%
36	*Achillea lanulosa*	n	p	47.2%	44.4%	36.1%	29.3%	1.3%	1.3%	1.0%	1.3%	2.7%
36	*Hippochaete laevigata*	n	m	41.7%	44.4%	61.1%	45.3%	0.7%	0.3%	0.7%	0.3%	2.7%
36	*Poa compressa*	e	p	8.3%	47.2%	36.1%	6.0%	3.3%		1.0%	1.0%	2.3%
36	*Apocynum sibericum*	e	p	11.1%			22.7%	1.6%	1.0%	3.3%	4.0%	2.3%
36	*Carex sp.*	u	p		2.8%		4.0%	3.6%			5.9%	1.8%
36	*Festuca pratensis*	e	p		25.0%		5.3%	3.3%	1.3%	0.3%	1.7%	1.8%
36	*Agropyron repens*	e	p	19.4%	27.8%	41.7%	8.7%	0.3%	1.3%	0.3%		1.7%
36	*Agropyron smithii*	n	p	8.3%	8.3%	11.1%	16.0%	0.7%	1.3%	2.3%	1.3%	1.7%
36	*Sorghastrum avenaceum*	n	p	2.8%	8.3%	19.4%	12.7%	1.0%	1.3%	1.0%	1.7%	1.7%
36	*Carex nebrascensis*	n	p				6.7%	1.6%	1.6%	2.6%	1.3%	1.6%
36	*Iris missouriensis*	n	p	13.9%	22.2%	36.1%	9.3%	1.3%	0.3%		0.7%	1.5%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
36	*Spartina pectinata*	n	p		2.8%	8.3%		0.3%		3.3%	1.3%	1.1%
36	*Taraxacum officianale*	e	p	8.3%	19.4%	25.0%	10.0%	0.3%	0.7%			1.1%
36	*Packeria pseudoaureas*	n	p		5.6%	13.9%	12.0%	0.3%	1.0%		1.0%	1.0%
36	*Plantago lanceolata*	e	p	25.0%	22.2%	5.6%	24.7%	1.0%				1.0%
36	*Cirsium floodmanii*	n	p	8.3%	8.3%	11.1%	18.7%	0.3%		0.3%	0.7%	0.9%
36	*Bromus inermis*	e	p	5.6%	13.9%	8.3%	4.7%	0.3%	0.7%	1.3%		0.9%
36	*Trifolium pratense*	e	p	27.8%	27.8%	2.8%	14.0%	1.0%		0.3%		0.9%
36	*Dicanthelium oligosanthes*	n	m	5.6%	22.2%	25.0%	3.3%	0.3%				0.8%
36	*Schizachyrium scoparium*	n	p	66.7%		2.8%	45.3%			0.3%		0.8%
36	*Ambrosia psilostachya*	n	p	16.7%	13.9%	5.6%	16.0%	0.3%	0.3%	0.7%		0.8%
36	*Aster falcatus*	n	p	8.3%	11.1%	19.4%	10.0%		0.3%	0.7%		0.8%
36	*Carex praegracilis*	n	p				2.0%		2.3%			0.7%
36	*Convolvulus arvensis*	e	p		19.4%	19.4%	6.0%					0.7%
36	*Potentilla gracilis*	n	p		8.3%	19.4%	1.3%	0.7%			0.7%	0.7%
36	*Carex lanuginosa*	n	p				15.3%		1.3%			0.6%
36	*Eleocharis elliptica*	n	u			8.3%	6.0%	1.6%			0.3%	0.6%
36	*Mentha arvensis*	n	p				10.7%		0.3%	1.0%		0.5%
36	*Artemisia dranunculus*	n	p		16.7%		7.3%			0.3%		0.4%
36	*Cirsium arvense*	e	p				15.3%			0.3%	0.3%	0.4%
36	*Comandra umbellata*	n	p	16.7%	2.8%	2.8%	18.7%					0.4%
36	*Asclepias speciosa*	n	p	2.8%			4.0%	0.3%		0.3%	0.7%	0.3%
36	*Solidago sparsiflora*	n	p	5.6%			14.7%	0.3%				0.3%
36	*Lepidium campestre*	e	m	2.8%	11.1%		6.0%					0.3%
36	*Medicago lupulina*	e	m	8.3%	13.9%		8.7%					0.3%
36	Unk. Forb -842	u	u	19.4%		2.8%	8.7%		0.3%			0.3%
36	Unk. Forb -946	u	u					0.7%	0.3%		0.7%	0.3%
36	*Carex brevior*	n	p				4.0%				1.0%	0.2%
36	*Bromus japonicus*	e	m		2.8%	2.8%	2.7%	0.3%				0.2%
36	*Sporobolus heterolepis*	n	p			13.9%						0.2%
36	*Toxicodendron rydbergii*	n	p			13.9%						0.2%
36	*Pastinacea sativa*	e	p				6.0%				0.3%	0.2%
36	*Ambrosia artemesifolia*	e	m			13.9%						0.2%
36	*Aster laevis*	n	p			8.3%	6.0%					0.2%
36	*Glycyrrhiza lepidota*	n	p							0.7%	0.3%	0.2%
36	*Lupinus argenteus*	n	p	11.1%			2.7%	0.3%			0.3%	0.2%
36	*Vicia americana*	n	p		8.3%	2.8%						0.2%
36	*Acetosella vulgaris*	e	p		8.3%	2.8%	0.7%					0.2%
36	*Rumex crispus*	e	p					0.3%	0.3%			0.2%
36	Unk. Forb -928	u	p		13.9%							0.2%
36	*Scirpus acutus*	n	p				8.0%					0.1%
36	*Juncus longistylis*	n	p				5.3%	0.3%				0.1%
36	*Bouteloua gracilis*	n	p			5.6%					0.3%	0.1%
36	*Muhlenbergia asperifolia*	n	p				2.0%				0.3%	0.1%
36	*Sporobolus asper*	n	p		2.8%	2.8%	1.3%					0.1%
36	*Artemisia ludoviciana*	n	p				4.0%					0.1%
36	*Lactuca serriola*	e	m		2.8%		0.7%					0.1%
36	*Tragopogon dubius*	e	m		5.6%		2.7%					0.1%
36	*Symphoricarpos occidentalis*	n	p		5.6%	2.8%						0.1%
36	*Medicago sativa*	e	p			2.8%				0.3%		0.1%
36	*Lycopus americanus*	n	p				1.3%	0.3%				0.1%
36	*Smilacena stellata*	n	p	33.3%			8.0%					0.1%
36	Unk. Forb -754	u	u	2.8%			4.0%					0.1%
36	Unk. Forb -970	u	u								0.7%	0.1%
36	*Amorpha nana*	n	p	2.8%			0.7%					0.0%
36	*Melilotus alba*	e	m				2.0%					0.0%
36	*Trifolium hybribum*	e	u				0.7%					0.0%
36	*Epilobium paniculatum*	n	m				1.3%					0.0%
36	Bare Ground							1.6%	1.0%			0.0%
36	Litter							20.4%	47.2%	30.9%	20.8%	0.0%
37	*Dactylis glomerata*	e	p	75.0%	97.2%	100.0%	84.0%	19.9%	21.0%	26.5%	14.9%	21.5%
37	*Bromus inermis*	e	p	88.9%	72.2%	63.9%	86.7%	25.1%	11.4%	8.7%	8.3%	14.4%
37	*Trifolium pratense*	e	p	50.0%	97.2%	91.7%	53.3%	3.1%	7.0%	8.6%	5.0%	9.1%
37	*Poa pratensis*	e	p	47.2%	66.7%	52.8%	48.7%	5.8%	6.7%	5.2%	5.6%	7.8%
37	*Dicanthelium oligosanthes*	n	m	61.1%	55.6%	58.3%	38.7%	1.8%	1.9%	1.2%	4.0%	4.6%
37	*Plantago lanceolata*	e	p	16.7%	58.3%	61.1%	52.0%	5.8%	1.6%	1.2%	0.3%	4.6%
37	*Rosa arkansana*	n	p	13.9%	33.3%	38.9%	18.0%	2.1%	2.2%	5.8%	1.0%	3.7%
37	*Acetosella vulgaris*	e	p	44.4%	52.8%	50.0%	26.0%	2.1%	1.0%	2.6%		3.3%
37	*Andropogon gerardii*	n	p	5.6%	19.4%	19.4%	1.3%	2.4%	2.2%	2.3%	4.3%	3.1%
37	*Taraxacum officianale*	e	p	22.2%	58.3%	22.2%	19.3%	0.3%	0.6%	5.8%		3.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
37	*Phleum pratense*	e	p	50.0%	5.6%	88.9%	39.3%	1.8%	1.0%		0.7%	2.9%
37	*Convolvulus arvensis*	e	p	50.0%	22.2%	38.9%	39.3%	4.6%	1.0%	1.2%		2.9%
37	*Sorghastrum avenaceum*	n	p		2.8%			0.6%	1.0%		5.6%	1.8%
37	*Hippochaete laevigata*	n	m	25.0%	25.0%	27.8%	35.3%	0.3%	0.3%			1.7%
37	*Agrostis gigantea*	e	p			41.7%	10.7%	1.8%	1.3%			1.4%
37	*Trifolium hybridum*	e	u	27.8%		22.2%	35.3%	0.3%	1.6%			1.4%
37	*Potentilla gracilis*	n	p	2.8%	30.6%	19.4%	0.7%	0.3%	1.0%		0.3%	1.2%
37	*Festuca pratensis*	e	p		11.1%	11.1%			1.6%		1.3%	1.0%
37	*Carex sp.*	u	p	22.2%	16.7%	16.7%	7.3%	0.6%		0.3%	0.3%	0.9%
37	*Carex brevior*	n	p	11.1%		16.7%	20.0%		0.6%			0.8%
37	*Spartina pectinata*	n	p	8.3%			2.0%	1.5%		1.2%	1.0%	0.8%
37	*Achillea lanulosa*	n	p	8.3%	13.9%	25.0%	4.7%	0.3%				0.8%
37	*Agropyron repens*	e	p	16.7%	5.6%	8.3%	12.7%	0.3%		0.9%		0.7%
37	*Panicum virgatum*	n	p			25.0%		0.6%		0.6%	0.3%	0.7%
37	*Medicago lupulina*	e	m	25.0%	8.3%		15.3%				0.3%	0.5%
37	*Aster falcatus*	n	p		8.3%			0.3%	0.6%		0.3%	0.4%
37	*Sporobolus asper*	n	p		5.6%	8.3%	1.3%			0.3%		0.3%
37	*Apocynum sibericum*	e	p				0.7%		0.3%	1.4%		0.3%
37	*Cichorium intybus*	e	p			2.8%	0.7%	0.6%		0.6%		0.3%
37	*Lotus tenuis*	e	p		2.8%	8.3%	1.3%	0.3%			0.3%	0.3%
37	*Oxalis dillenii*	n	m	13.9%		11.1%	4.0%			0.6%		0.3%
37	*Carex nebrascensis*	n	p	2.8%		2.8%	0.7%			0.9%		0.2%
37	*Carex praegracilis*	n	p			5.6%	2.0%		0.3%			0.2%
37	*Ambrosia artemesifolia*	e	m				10.0%					0.2%
37	*Lepidium campestre*	e	m			5.6%	4.0%					0.2%
37	*Cerastium nutans*	n	m			11.1%						0.2%
37	*Medicago sativa*	e	p	2.8%			2.7%			0.3%		0.2%
37	*Erodium cicutarium*	e	m					0.6%	0.3%			0.2%
37	*Prunella vulgaris*	n	p			8.3%		0.6%				0.2%
37	*Polygonum aviculare*	e	m							1.2%		0.2%
37	*Carex stipata*	n	p			5.6%			0.3%			0.1%
37	*Eleocharis elliptica*	n	u				2.7%		0.3%			0.1%
37	*Juncus arcticus*	n	p	2.8%			6.0%					0.1%
37	*Schizachyrium scoparium*	n	p				4.7%					0.1%
37	*Setaria glauca*	e	m								0.3%	0.1%
37	*Vulpia octoflora*	n	m			8.3%						0.1%
37	*Ambrosia trifida*	n	p							0.3%		0.1%
37	*Ambrosia psilostachya*	n	p					0.3%				0.1%
37	*Cirsium arvense*	e	p	8.3%			3.3%					0.1%
37	*Packeria pseudoaureas*	n	p								0.3%	0.1%
37	*Barbarea orthoceras*	n	u	5.6%			4.7%					0.1%
37	*Lepidium densiflorum*	e	m				4.7%					0.1%
37	*Iris missouriensis*	n	p			8.3%						0.1%
37	*Sisyrinchium montanum*	n	p						0.3%			0.1%
37	*Oxybaphus nyctagineus*	n	p				2.0%		0.3%			0.1%
37	*Epilobium leptocarpum*	u	u								0.3%	0.1%
37	*Muhlenbergia montana*	n	p			2.8%						0.0%
37	Unk. Grass - 165	u	u				2.0%					0.0%
37	*Carduus nuttans*	e	m				2.0%					0.0%
37	*Erigeron flagellaris*	n	p				0.7%					0.0%
37	*Tragopogon dubius*	e	m				0.7%					0.0%
37	*Cynoglossum officinale*	e	m				1.3%					0.0%
37	*Thlaspi arvense*	e	m				0.7%					0.0%
37	*Chenopodium album*	e	m				1.3%					0.0%
37	*Rumex crispus*	e	p				2.0%					0.0%
37	*Verbascum thapsus*	e	m				1.3%					0.0%
37	Unk. Forb -844	u	u				0.7%					0.0%
37	Bare Ground							7.0%	11.1%	4.6%	6.6%	0.0%
37	Litter							8.6%	21.3%	18.2%	38.6%	0.0%
38	*Eleocharis elliptica*	n	u	66.7%	72.2%	66.7%	60.0%	17.9%	6.6%	4.7%	7.1%	11.4%
38	*Festuca pratensis*	e	p	13.9%	44.4%	11.1%	21.3%	10.7%	8.6%	4.7%	13.2%	9.7%
38	*Poa pratensis*	e	p	41.7%	16.7%	33.3%	36.0%	2.2%	12.2%	2.7%	5.4%	6.9%
38	*Carex nebrascensis*	n	p	27.8%	41.7%	27.8%	33.3%	7.9%	6.3%	3.0%	4.1%	6.6%
38	*Spartina pectinata*	n	p		8.3%		6.0%			6.0%	13.2%	5.5%
38	*Agrostis gigantea*	e	p	47.2%	30.6%	16.7%	64.0%	1.3%	1.0%	1.0%	8.1%	4.6%
38	*Juncus arcticus*	n	p	58.3%	38.9%	55.6%	40.0%	2.2%	1.3%	1.7%	2.0%	4.3%
38	*Phleum pratense*	e	p	47.2%	52.8%	8.3%	48.7%	4.7%	4.3%		1.4%	4.1%
38	*Carex stipata*	n	p				26.7%	12.9%		2.7%		3.7%
38	*Persicaria maculata*	e	m	25.0%	27.8%	52.8%	34.7%	5.7%	1.0%			3.3%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
38	*Trifolium hybribum*	e	u	58.3%	33.3%	50.0%	50.0%	2.5%	0.3%		0.3%	3.0%
38	*Agropyron repens*	e	p	55.6%	5.6%	38.9%	28.7%	2.2%	2.6%	1.0%	1.0%	2.9%
38	*Cichorium intybus*	e	p	38.9%	36.1%	22.2%	29.3%	2.2%	1.3%	0.7%	0.7%	2.7%
38	*Bromus japonicus*	e	m	22.2%	25.0%	61.1%	6.7%	0.6%	3.0%			2.5%
38	*Sporobolus airoides*	n	p	8.3%	2.8%	16.7%	4.7%		7.2%			2.0%
38	*Andropogon gerardii*	n	p		2.8%			1.3%		1.3%	4.7%	1.8%
38	*Bromus tectorum*	e	m	19.4%	25.0%	25.0%	8.7%	3.1%	1.0%			1.8%
38	*Poa compressa*	e	p	19.4%	38.9%	2.8%	19.3%	1.6%	0.7%			1.5%
38	*Bouteloua gracilis*	n	p	25.0%	16.7%	25.0%	8.0%		0.7%	0.7%	0.3%	1.4%
38	*Lepidium campestre*	e	m	22.2%	22.2%	25.0%	11.3%	1.6%				1.3%
38	*Juncus longistylis*	n	p	27.8%	25.0%	5.6%	21.3%		0.3%			1.0%
38	*Panicum virgatum*	n	p	2.8%	2.8%	2.8%	9.3%		0.3%	1.0%	1.0%	1.0%
38	*Cirsium arvense*	e	p				17.3%	2.5%	1.0%			1.0%
38	*Hordeum jubatum*	n	u	38.9%	5.6%		24.7%	0.6%	1.0%			0.9%
38	*Ambrosia artemesifolia*	e	m	13.9%	25.0%	8.3%	12.7%					0.9%
38	*Convolvulus arvensis*	e	p				4.0%	0.6%	0.7%	1.3%	0.3%	0.9%
38	*Trifolium pratense*	e	p		25.0%			1.3%	0.3%		0.7%	0.9%
38	*Agropyron smithii*	n	p	2.8%	27.8%		2.7%	0.3%		0.3%		0.8%
38	*Trifolium repens*	e	p	11.1%	16.7%		19.3%			0.3%		0.8%
38	Unk. Forb -847	u	u	2.8%		25.0%	11.3%					0.7%
38	*Carex heliophylla*	n	p			19.4%		0.3%	0.3%		0.3%	0.6%
38	*Cyperus aristatus*	n	m			30.6%						0.6%
38	*Talinum parviflorum*	n	u	5.6%		19.4%	8.0%		0.3%			0.6%
38	*Dactylis glomerata*	e	p	8.3%	11.1%	8.3%	2.0%		0.7%			0.5%
38	*Taraxacum officianale*	e	p			22.2%		0.3%	0.3%			0.5%
38	*Carex praegracilis*	n	p	5.6%			4.7%		0.3%		1.0%	0.4%
38	*Juncus gerardii*	e	p			19.4%						0.4%
38	*Hippochaete laevigata*	n	m	8.3%	5.6%	8.3%	6.0%	0.3%				0.4%
38	*Polygonum aviculare*	e	m	2.8%	16.7%		0.7%				0.3%	0.4%
38	*Rumex crispus*	e	p	2.8%		8.3%	3.3%				0.7%	0.4%
38	*Alopecurus aequalis*	n	p		5.6%	8.3%						0.3%
38	*Capsella bursa-pastoris*	e	m		2.8%	8.3%		0.3%				0.3%
38	*Sysimbrium altissimum*	e	m		8.3%	2.8%			0.3%			0.3%
38	*Chenopodium album*	e	m	8.3%		13.9%	4.7%					0.3%
38	*Potentilla hippiana*	n	p		8.3%					0.3%		0.3%
38	Unk. Forb -920	u	u							0.7%		0.3%
38	*Buchloe dactyloides*	n	p			8.3%						0.2%
38	*Asclepias speciosa*	n	p				5.3%	0.3%	0.3%			0.2%
38	*Lepidium densiflorum*	e	m	5.6%	5.6%		4.7%					0.2%
38	*Thermopsis divaricarpa*	n	p	2.8%	5.6%	2.8%	2.7%					0.2%
38	*Prunella vulgaris*	n	p					0.3%	0.3%			0.2%
38	*Oxybaphus hirsuta*	n	p	5.6%	5.6%	2.8%	2.7%					0.2%
38	*Oxybaphus linearis*	n	p				2.0%			0.3%		0.2%
38	*Plantago lanceolata*	e	p	13.9%	5.6%		7.3%					0.2%
38	*Verbena hastata*	n	p				8.7%					0.2%
38	Unk. Forb -964	u	u			11.1%						0.2%
38	*Carex scoparia*	n	p				2.7%					0.1%
38	*Carex brevior*	n	p				4.0%		0.3%			0.1%
38	*Eleocharis macrostachya*	n	p		2.8%							0.1%
38	*Eragrostis sp. (annual)*	e	m							0.3%		0.1%
38	*Poa palustris*	n	p							0.3%		0.1%
38	*Sorghastrum avenaceum*	n	p	5.6%			3.3%					0.1%
38	*Lactuca serriola*	e	m				0.7%			0.3%		0.1%
38	*Packeria pseudoaureas*	n	p			2.8%						0.1%
38	*Camelina microcarpa*	e	m		5.6%							0.1%
38	*Thlaspi arvense*	e	m					0.3%				0.1%
38	*Medicago lupulina*	e	m				2.7%					0.1%
38	*Melilotus alba*	e	m				4.0%					0.1%
38	*Lycopus americanus*	n	p								0.7%	0.1%
38	*Oenothera strigosa*	n	m							0.3%		0.1%
38	*Centunculus minimus*	n	m					0.3%				0.1%
38	*Potentilla gracilis*	n	p								0.3%	0.1%
38	*Veronica peregrina*	e	m		2.8%							0.1%
38	Unk. Forb -754	u	u				2.7%					0.1%
38	*Opuntia macrorhiza*	n	p				1.3%					0.0%
38	*Equisetum arvense*	n	m				2.0%					0.0%
38	*Glycyrrhiza lepidota*	n	p				2.0%					0.0%
38	*Epilobium glandulosum*	n	p				0.7%					0.0%
38	*Acetosella vulgaris*	e	p				2.0%					0.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
38	*Rosa arkansana*	n	p	5.6%			1.3%					0.0%
38	Unk. Forb -845	u	u				2.0%					0.0%
38	Unk. Forb -846	u	u				1.3%					0.0%
38	Bare Ground							3.8%	6.9%	5.3%	2.7%	0.0%
38	Litter							7.9%	28.3%	59.0%	30.2%	0.0%
39	*Medicago sativa*	e	p	80.6%	13.9%	63.9%	44.7%	27.4%	22.4%	27.9%	4.7%	23.7%
39	*Agropyron cristatum*	e	p	41.7%	69.4%	61.1%	32.0%	3.8%	10.9%	11.1%	13.0%	18.0%
39	*Bromus inermis*	e	p		58.3%	66.7%	4.0%	12.4%	5.6%	8.5%	7.6%	14.5%
39	*Convolvulus arvensis*	e	p	88.9%	58.3%	50.0%	90.0%	7.3%	3.3%	7.2%	2.3%	12.2%
39	*Agropyron smithii*	n	p	88.9%	25.0%	27.8%	64.7%	2.5%	4.6%	4.3%	0.3%	7.0%
39	*Melilotus officinalis*	e	m	11.1%	58.3%	2.8%	24.0%		1.7%		0.7%	3.9%
39	*Bromus japonicus*	e	m	16.7%	11.1%		40.0%	8.3%	0.3%			3.1%
39	*Allysum minus*	e	m		11.1%	5.6%	32.7%	5.7%				2.7%
39	*Bromus tectorum*	e	m		2.8%		30.0%	6.1%	1.3%			2.4%
39	*Aster falcatus*	n	p	2.8%	5.6%	2.8%	24.0%	1.9%	1.0%	1.6%	0.7%	2.3%
39	*Poa pratensis*	e	p				13.3%	0.6%	3.3%	1.3%	0.3%	1.7%
39	*Podospermum laciniatum*	e	m	11.1%			29.3%	2.9%	1.3%			1.7%
39	*Melilotus alba*	e	m				4.0%			0.3%	2.0%	1.0%
39	*Poa compressa*	e	p				4.0%	0.6%			1.7%	0.9%
39	*Triticum aestivum*	e	m	16.7%	11.1%		8.7%					0.7%
39	*Camelina microcarpa*	e	m		8.3%		6.7%	0.6%				0.6%
39	*Rosa arkansana*	n	p							0.3%	1.3%	0.6%
39	*Tragopogon dubius*	e	m	22.2%			16.7%					0.5%
39	*Taraxacum officianale*	e	p			2.8%	6.0%	0.3%				0.4%
39	Unk. Forb -849	u	u		8.3%		1.3%					0.4%
39	*Carex brevior*	n	p				4.0%		0.3%		0.3%	0.3%
39	*Thlaspi arvense*	e	m	11.1%			9.3%	0.3%				0.3%
39	*Dactylis glomerata*	e	p				4.0%	0.3%				0.2%
39	*Rumex crispus*	e	p			2.8%	0.7%					0.2%
39	*Hordeum jubatum*	n	u						0.3%			0.1%
39	*Ambrosia trifida*	n	p							0.3%		0.1%
39	*Aster laevis*	n	p								0.3%	0.1%
39	*Sinapis arvensis*	e	m	8.3%			2.0%					0.1%
39	*Kochia iranica*	e	m								0.3%	0.1%
39	*Acetosella vulgaris*	e	p				2.7%					0.1%
39	Unk. Forb -862	u	p							0.3%		0.1%
39	Unk. Forb -959	u	u						0.3%			0.1%
39	*Avena fatua*	e	m				1.3%					0.0%
39	*Ambrosia psilostachya*	n	p				1.3%					0.0%
39	*Cirsium arvense*	e	p				0.7%					0.0%
39	*Lactuca serriola*	e	m				1.3%					0.0%
39	*Descurainia sophia*	e	m	2.8%			0.7%					0.0%
39	*Lepidium campestre*	e	m				0.7%					0.0%
39	*Chenopodium album*	e	m				0.7%					0.0%
39	Bare Ground							7.0%	13.2%	6.6%	15.9%	0.0%
39	Litter							11.8%	30.0%	30.2%	48.5%	0.0%
40	*Medicago sativa*	e	p	94.4%	94.4%	97.2%	75.3%	41.6%	37.0%	54.2%	31.0%	46.7%
40	*Bromus inermis*	e	p	97.2%	100.0%	100.0%	74.0%	21.6%	13.0%	6.0%	6.3%	22.1%
40	*Convolvulus arvensis*	e	p	50.0%	44.4%	52.8%	69.3%	2.5%	1.9%	0.7%	2.3%	9.2%
40	*Dactylis glomerata*	e	p	33.3%	5.6%	41.7%	32.7%	3.2%	8.5%	2.0%	3.7%	7.3%
40	*Agropyron cristatum*	e	p				16.0%	7.3%	4.4%	5.3%	6.7%	5.7%
40	*Agropyron smithii*	n	p				8.7%	4.1%	2.2%		0.3%	1.6%
40	*Ambrosia artemesifolia*	e	m	8.3%	5.6%		2.0%				1.0%	0.7%
40	*Rumex crispus*	e	p	5.6%	2.8%	8.3%	3.3%			0.3%		0.7%
40	*Bromus japonicus*	e	m	11.1%	2.8%		6.7%	1.0%				0.6%
40	*Camelina microcarpa*	e	m	5.6%	5.6%		5.3%	0.3%				0.6%
40	*Rosa arkansana*	n	p				7.3%	0.6%		0.3%	0.3%	0.6%
40	*Aster falcatus*	n	p				3.3%	0.3%			1.0%	0.5%
40	*Avena fatua*	e	m		5.6%		2.0%					0.4%
40	*Poa compressa*	e	p				3.3%	1.0%	0.3%			0.4%
40	*Poa pratensis*	e	p	8.3%			6.0%	1.0%				0.4%
40	*Triticum aestivum*	e	m	13.9%	2.8%	2.8%	3.3%					0.4%
40	*Taraxacum officianale*	e	p		2.8%		7.3%					0.4%
40	*Tragopogon dubius*	e	m			2.8%	3.3%	0.3%				0.3%
40	*Agropyron repens*	e	p				1.3%	0.6%				0.2%
40	*Allysum minus*	e	m				2.7%	0.3%				0.2%
40	*Lepidium campestre*	e	m				5.3%					0.2%
40	*Glycyrrhiza lepidota*	n	p				2.7%			0.3%		0.2%
40	*Bouteloua curtipendula*	n	p								0.3%	0.1%

Appendix 3 (Cont.)

Plot	Species			% of Quadrats Present				% Cover				IMP
				Part94	July95	July96	All94	June95	June96	Aug95	Aug96	
40	*Festuca pratensis*	e	p				1.3%					0.1%
40	*Panicum virgatum*	n	p				2.0%			0.3%		0.1%
40	*Stipa viridula*	n	p								0.3%	0.1%
40	*Cirsium arvense*	e	p				1.3%					0.1%
40	*Podospermum laciniatum*	e	m					0.3%	0.3%			0.1%
40	*Descurainia pinnata*	n	m				2.0%	0.3%				0.1%
40	*Trifolium repens*	e	p				1.3%					0.1%
40	*Sphaeralcea coccinia*	n	p				1.3%					0.1%
40	Unk. Forb -850	u	u	5.6%			1.3%					0.0%
40	*Carex sp.*	u	p				0.7%					0.0%
40	*Bromus tectorum*	e	m				0.7%					0.0%
40	*Sysimbrium altissimum*	e	m				0.7%					0.0%
40	Bare Ground							5.1%	10.1%	8.3%	8.0%	0.0%
40	Litter							8.6%	22.2%	22.3%	38.7%	0.0%
41	*Festuca pratensis*	e	p	97.2%	100.0%	100.0%	99.3%	59.1%	55.7%	55.6%	57.9%	48.0%
41	*Carex praegracilis*	n	p	63.9%	52.8%	88.9%	72.0%	6.6%	7.1%		1.3%	6.9%
41	*Poa pratensis*	e	p	50.0%	100.0%	100.0%	25.3%	4.3%	2.3%	2.6%	1.3%	6.2%
41	*Trifolium hybribum*	e	u	66.7%	75.0%	97.2%	55.3%		0.3%	4.0%		5.3%
41	*Trifolium fragiferum*	e	p	30.6%	55.6%	5.6%	45.3%	6.6%	3.2%		5.4%	5.0%
41	*Juncus arcticus*	n	p	63.9%	58.3%	88.9%	53.3%	0.3%	4.9%	0.3%		4.8%
41	*Carex nebrascensis*	n	p	41.7%	19.4%	44.4%	27.3%	2.6%	4.9%	0.7%	1.3%	3.5%
41	*Taraxacum officianale*	e	p	19.4%	50.0%	61.1%	29.3%	1.3%	0.3%	0.7%	0.3%	3.2%
41	*Eleocharis elliptica*	n	u	69.4%	50.0%	44.4%	34.7%		0.6%	0.7%	0.3%	2.9%
41	*Triglochin maritimum*	n	p	41.7%	36.1%	47.2%	32.0%	1.0%	0.6%			2.6%
41	*Phleum pratense*	e	p	58.3%	22.2%	16.7%	36.7%		0.6%		1.0%	1.9%
41	*Agrostis gigantea*	e	p		22.2%	47.2%			0.6%	1.7%	0.7%	1.8%
41	*Trifolium pratense*	e	p		36.1%	19.4%		0.7%	2.6%	0.3%	0.3%	1.7%
41	*Carex lanuginosa*	n	p	55.6%		2.8%	20.7%	0.3%		2.6%		1.1%
41	*Plantago major*	e	p	19.4%			18.0%	1.0%	0.6%		1.0%	0.9%
41	*Sisyrinchium montanum*	n	p	19.4%	13.9%	5.6%	20.0%					0.8%
41	*Juncus longistylis*	n	p	8.3%	19.4%		9.3%					0.6%
41	*Juncus gerardii*	e	p			19.4%	2.7%		0.3%			0.5%
41	*Prunella vulgaris*	n	p	22.2%	2.8%	2.8%	18.0%					0.5%
41	*Carex stipata*	n	p	5.6%	5.6%		3.3%			1.0%		0.4%
41	*Eleocharis macrostachya*	n	p		16.7%							0.3%
41	*Poa arida*	e	m	2.8%	8.3%		0.7%		1.0%			0.2%
41	*Ambrosia artemesifolia*	n	p									0.2%
41	*Panicum virgatum*	n	p							0.7%		0.1%
41	*Sporobolus airoides*	e	p		2.8%						0.3%	0.1%
41	*Apocynum sibericum*	n	p	13.9%			3.3%					0.1%
41	*Asclepias speciosa*	e	p						0.6%			0.1%
41	*Cichorium intybus*	e	p							0.3%		0.1%
41	*Plantago lanceolata*	e	p									0.1%
41	*Rumex crispus*	e	p		2.8%							0.1%
41	Unk. Forb -948	u	u					0.3%				0.0%
41	*Dactylis glomerata*	e	p				1.3%					0.0%
41	*Hordeum jubatum*	n	u	5.6%			1.3%					0.0%
41	*Lotus tenuis*	e	p	2.8%			2.0%					0.0%
41	*Medicago lupulina*	e	m				0.7%					0.0%
41	Unk. Forb -851	u	u	8.3%			2.0%					0.0%
41	Bare Ground							3.3%	0.3%	0.7%	1.0%	0.0%
41	Litter							12.5%	13.3%	28.1%	27.6%	0.0%
42	*Festuca pratensis*	e	p	100.0%	100.0%	100.0%	100.0%	48.3%	46.6%	51.8%	53.2%	40.9%
42	*Poa pratensis*	e	p	91.7%	100.0%	100.0%	48.7%	10.3%	6.8%	4.6%	2.0%	9.0%
42	*Trifolium hybribum*	e	u	50.0%	77.8%	72.2%	80.0%	0.3%		7.8%	0.3%	6.3%
42	*Trifolium pratense*	e	p		91.7%	80.6%		3.6%	5.8%	2.9%	3.7%	6.3%
42	*Trifolium fragiferum*	e	p	80.6%	33.3%		44.0%	6.3%	5.8%		8.7%	5.3%
42	*Carex nebrascensis*	n	p	44.4%	8.3%	11.1%	56.7%	8.6%	10.0%	2.9%		5.0%
42	*Phleum pratense*	e	p	94.4%	69.4%	69.4%	67.3%		2.9%			4.7%
42	*Carex praegracilis*	n	p	13.9%	2.8%	27.8%	42.0%	6.0%	7.1%		0.3%	3.6%
42	*Taraxacum officianale*	e	p	52.8%	33.3%	63.9%	43.3%	1.0%	0.3%	1.0%	1.7%	3.6%
42	*Juncus arcticus*	n	p	8.3%	22.2%	66.7%	40.7%	1.3%	1.0%	0.3%		3.0%
42	*Agrostis gigantea*	e	p		55.6%	80.6%	2.7%			0.3%	0.3%	2.9%
42	*Dactylis glomerata*	e	p	5.6%	16.7%	8.3%	7.3%	5.6%	0.6%	1.3%	0.3%	1.9%
42	*Eleocharis elliptica*	n	u	13.9%	2.8%	8.3%	43.3%		1.3%	2.3%	0.3%	1.8%
42	*Carex sp.*	u	p	2.8%	16.7%	19.5%	3.4%			2.6%		1.3%
42	*Triglochin maritimum*	n	p	13.9%		13.9%	26.7%		1.0%	0.7%	0.3%	1.2%
42	*Convolvulus arvensis*	e	p				3.3%		0.3%	1.3%	0.3%	0.4%
42	*Sisyrinchium montanum*	n	p				19.3%					0.4%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
42	*Carex lanuginosa*	n	p				14.0%		0.3%			0.3%
42	*Hippocheete laevigata*	n	m	2.8%		8.3%	6.7%					0.3%
42	*Lotus tenuis*	e	p	2.8%	11.1%	2.8%	0.7%					0.3%
42	*Eleocharis macrostachya*	n	p			8.3%						0.2%
42	*Juncus longistylis*	n	p		5.6%		2.7%					0.2%
42	*Juncus nodosus*	n	p			8.3%						0.2%
42	*Melilotus alba*	e	m				1.3%	1.0%				0.2%
42	*Plantago major*	e	p				8.7%					0.2%
42	*Salix exigua*	n	p	2.8%	2.8%	8.3%	0.7%					0.1%
42	*Apocynum sibericum*	e	p	2.8%	2.8%	2.8%	1.3%					0.1%
42	*Prunella vulgaris*	n	p	5.6%			5.3%					0.1%
42	*Plantago lanceolata*	e	p		2.8%		1.3%					0.1%
42	*Ranunculus macounii*	n	p	5.6%			3.3%					0.0%
42	*Asclepias speciosa*	n	p				2.0%					0.0%
42	*Medicago lupulina*	e	m				0.7%					0.0%
42	*Rosa arkansana*	n	p				0.7%					0.0%
42	Bare Ground							1.0%	0.3%	0.7%	1.0%	0.0%
42	Litter							6.6%	9.7%	19.5%	27.4%	0.0%
43	*Festuca pratensis*	e	p	33.3%	19.4%	19.4%	58.0%	18.4%	13.9%	11.9%	8.4%	14.5%
43	*Panicum virgatum*	n	p	16.7%	66.7%	83.3%	4.0%	7.6%	5.3%	14.4%	9.8%	12.1%
43	*Andropogon gerardii*	n	p	91.7%	91.7%	75.0%	61.3%	6.3%	4.6%	5.8%	5.7%	10.1%
43	*Juncus arcticus*	n	p	19.4%			56.7%	6.9%	9.3%	9.6%	5.4%	8.7%
43	*Plantago lanceolata*	e	p	94.4%	83.3%	66.7%	70.0%	6.3%	4.0%	5.4%	1.0%	8.2%
43	*Poa pratensis*	e	p	16.7%	36.1%	69.4%	55.3%	3.0%	5.0%	1.6%	4.4%	6.9%
43	*Agrostis gigantea*	e	p		58.3%	52.8%		5.3%		9.3%	3.4%	6.3%
43	*Carex nebrascensis*	n	p	16.7%			34.7%	1.6%	3.3%	3.8%	2.4%	3.4%
43	*Carex praegracilis*	n	p	30.6%	11.1%	30.6%	23.3%	2.0%	2.3%		3.0%	3.3%
43	*Phleum pratense*	e	p	41.7%	19.4%	22.2%	54.7%	2.0%	3.0%			3.1%
43	*Poa compressa*	e	p	72.2%	55.6%	25.0%	35.3%	0.3%			0.3%	2.5%
43	*Eleocharis elliptica*	n	u	8.3%	5.6%	2.8%	41.3%	1.6%	3.3%	0.3%		2.3%
43	*Bromus japonicus*	e	m	16.7%	52.8%	16.7%	4.0%	1.0%	0.3%			1.8%
43	*Taraxacum officianale*	e	p	47.2%	16.7%	25.0%	25.3%		0.3%	1.0%		1.6%
43	*Cichorium intybus*	e	p		38.9%	22.2%	11.3%	0.3%				1.5%
43	*Carex stipata*	n	p		8.3%		17.3%			3.8%		1.3%
43	*Sporobolus asper*	n	p		11.1%	36.1%		0.7%		0.6%		1.2%
43	*Juncus longistylis*	n	p		13.9%	19.4%						0.7%
43	*Dicanthelium oligosanthes*	n	m	22.2%	13.9%	13.9%	5.3%			0.3%		0.7%
43	*Cirsium arvense*	e	p				13.3%	1.3%	0.3%		0.3%	0.7%
43	*Ambrosia psilostachya*	n	p		19.4%	8.3%						0.6%
43	*Convolvulus arvensis*	e	p	8.3%	8.3%	16.7%	4.7%					0.6%
43	*Schizachyrium scoparium*	n	p	16.7%	5.6%	11.1%	5.3%	0.3%				0.5%
43	*Medicago lupulina*	e	m	16.7%	13.9%		9.3%					0.5%
43	*Trifolium repens*	e	p	22.2%	2.8%	8.3%	13.3%					0.5%
43	*Prunella vulgaris*	n	p	16.7%		8.3%	18.0%					0.5%
43	*Rumex crispus*	e	p	8.3%		8.3%	10.0%	0.7%				0.5%
43	*Aster falcatus*	n	p	2.8%	13.9%	2.8%	1.3%	0.3%				0.4%
43	*Bouteloua gracilis*	n	p		16.7%							0.3%
43	*Hordeum jubatum*	n	u				6.0%	0.7%				0.3%
43	*Opuntia macrorhiza*	n	p		8.3%	5.6%						0.3%
43	*Lotus tenuis*	e	p				5.3%		0.3%		0.3%	0.3%
43	*Trifolium pratense*	e	p		11.1%		0.7%		0.3%			0.3%
43	*Rosa arkansana*	n	p	2.8%		2.8%	4.7%			0.6%		0.3%
43	*Carex brevior*	n	p	8.3%	2.8%		2.7%	0.3%				0.2%
43	*Buchloe dactyloides*	n	p			8.3%						0.2%
43	*Muhlenbergia asperifolia*	n	p		5.6%	2.8%						0.2%
43	*Sorghastrum avenaceum*	n	p							0.6%	0.3%	0.2%
43	*Engeron divergens*	n	m	11.1%	5.6%		2.7%					0.2%
43	*Lactuca serriola*	e	m	8.3%	8.3%		3.3%					0.2%
43	*Plantago major*	e	p				1.3%			0.6%		0.2%
43	*Agropyron repens*	e	p			5.6%						0.1%
43	*Dactylis glomerata*	e	p						0.3%			0.1%
43	*Distichlis spicata*	n	p			2.8%						0.1%
43	*Asclepias pumila*	n	p				4.0%					0.1%
43	*Asclepias speciosa*	n	p			2.8%	2.7%					0.1%
43	*Ambrosia artemesifolia*	e	m	16.7%			4.7%					0.1%
43	*Aster porteri*	n	p			2.8%						0.1%
43	*Carduus nuttans*	e	m	2.8%			6.0%					0.1%
43	*Grindelia squarrosa*	n	m	11.1%			2.7%					0.1%
43	*Lepidium campestre*	e	m	11.1%		2.8%	4.0%					0.1%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
43	*Dalea purpurea*	n	p			2.8%						0.1%
43	*Glycyrrhiza lepidota*	n	p								0.3%	0.1%
43	*Melilotus officinalis*	e	m	11.1%			4.0%					0.1%
43	*Trifolium hybribum*	e	u		2.8%							0.1%
43	*Mentha arvensis*	n	p					0.3%				0.1%
43	*Oxalis dillenii*	n	m	5.6%	5.6%		1.3%					0.1%
43	Unk. Forb -852	u	p				3.3%					0.1%
43	Unk. Forb -946	u	u								0.3%	0.1%
43	*Agropyron smithii*	n	p				2.0%					0.0%
43	*Cirsium undulatum*	n	m				1.3%					0.0%
43	*Cerastium vulgatum*	e	p	2.8%			0.7%					0.0%
43	*Silene antirrhina*	e	m				2.0%					0.0%
43	*Sisyrinchium montanum*	n	p				0.7%					0.0%
43	Bare Ground							2.3%	0.7%	2.2%	0.7%	0.0%
43	Litter							30.6%	43.4%	27.9%	53.7%	0.0%
44	*Festuca pratensis*	e	p	100.0%	100.0%	100.0%	91.3%	52.1%	39.9%	48.8%	40.0%	39.5%
44	*Juncus arcticus*	n	p	77.8%	94.4%	94.4%	56.7%	8.5%	5.6%	4.0%	8.3%	11.0%
44	*Poa pratensis*	e	p	38.9%	58.3%	97.2%	42.7%	6.2%	6.6%	6.8%	6.0%	9.7%
44	*Phleum pratense*	e	p	16.7%	33.3%	38.9%	33.3%	1.3%	2.6%	1.2%	2.3%	4.1%
44	*Andropogon gerardii*	n	p		8.3%		0.7%	2.6%	2.0%	6.8%	8.7%	3.7%
44	*Agrostis gigantea*	e	p		61.1%	36.1%		1.0%		2.2%	3.7%	3.5%
44	*Eleocharis elliptica*	n	u	61.1%	11.1%	55.6%	39.3%	1.0%	1.0%	0.3%	0.3%	3.3%
44	*Taraxacum officianale*	e	p	50.0%	41.7%	22.2%	40.0%	1.3%		0.6%		3.0%
44	*Panicum virgatum*	n	p	13.9%	25.0%	19.4%	3.3%	1.3%		4.7%	2.7%	2.6%
44	*Trifolium pratense*	e	p	41.7%	13.9%	8.3%	30.7%	1.0%	0.3%	3.1%		2.1%
44	*Dactylis glomerata*	e	p				14.7%	2.0%	3.0%	0.6%	0.7%	1.6%
44	*Melilotus officinalis*	e	m		11.1%		21.3%	1.3%	1.0%	2.2%		1.6%
44	*Cirsium arvense*	e	p	11.1%	27.8%	16.7%	8.7%	0.7%		0.3%		1.5%
44	*Eleocharis macrostachya*	n	p		47.2%							1.1%
44	*Medicago lupulina*	e	m				9.3%	0.3%	0.7%	0.9%	2.7%	1.1%
44	*Plantago lanceolata*	e	p		2.8%		18.0%	0.3%	1.0%	1.2%	0.7%	1.1%
44	*Rumex crispus*	e	p		25.0%	8.3%	6.7%	0.3%			0.3%	1.1%
44	*Lotus tenuis*	e	p		16.7%	13.9%	2.0%				0.3%	0.9%
44	*Convolvulus arvensis*	e	p				18.0%	0.3%	0.3%	0.3%		0.7%
44	*Bromus inermis*	e	p				6.0%	1.3%	0.3%	0.9%		0.6%
44	*Ambrosia artemesifolia*	e	m	25.0%	16.7%	2.8%	6.7%					0.6%
44	*Ambrosia psilostachya*	n	p				12.0%	0.3%	0.7%		0.3%	0.6%
44	*Psoralea tenuiflora*	n	p				5.3%		0.3%	1.2%	0.7%	0.5%
44	*Juncus longistylis*	n	p	5.6%	8.3%	2.8%	1.3%			0.9%		0.4%
44	*Muhlenbergia asperifolia*	n	p	2.8%			11.3%			0.3%	0.3%	0.4%
44	*Poa compressa*	e	p		11.1%		2.7%			0.3%		0.4%
44	*Agropyron smithii*	n	p				6.0%		0.3%	0.6%		0.3%
44	*Cichorium intybus*	e	p		2.8%		4.0%	0.7%				0.3%
44	*Bouteloua gracilis*	n	p							0.6%	0.3%	0.2%
44	*Erigeron divergens*	n	m						1.0%			0.2%
44	*Gutierrezia sarothrae*	n	p				2.0%		0.3%	0.3%		0.2%
44	*Lactuca serriola*	e	m	5.6%	2.8%	2.8%	3.3%					0.2%
44	*Lepidium campestre*	e	m				6.0%					0.2%
44	*Carex nebrascensis*	n	p	5.6%			2.0%					0.1%
44	*Carex stipata*	n	p		2.8%		1.3%					0.1%
44	*Agropyron repens*	e	p		2.8%				0.3%			0.1%
44	*Bouteloua curtipendula*	n	p						0.3%		0.3%	0.1%
44	*Bromus japonicus*	e	m				4.7%					0.1%
44	*Buchloe dactyloides*	n	p						0.3%			0.1%
44	*Hordeum jubatum*	n	u		5.6%							0.1%
44	*Schizachyrium scoparium*	n	p				0.7%	0.7%				0.1%
44	*Spartina pectinata*	n	p		2.8%							0.1%
44	*Asclepias pumila*	n	p				2.0%					0.1%
44	*Aster falcatus*	n	p				2.0%		0.3%			0.1%
44	*Aster porteri*	n	p								0.3%	0.1%
44	*Liatris punctata*	n	p								0.3%	0.1%
44	*Tragopogon dubius*	e	m				2.0%				0.3%	0.1%
44	*Sisyrinchium montanum*	n	p	8.3%	2.8%		2.7%					0.1%
44	*Gaura coccinea*	n	p						0.3%			0.1%
44	Unk. Forb -853	u	u	8.3%			2.7%					0.1%
44	*Erigeron flagellaris*	n	p							0.3%		0.0%
44	*Verbascum thapsus*	e	m							0.3%		0.0%
44	Bare Ground							0.7%	1.3%	1.6%	0.3%	0.0%
44	Litter							14.8%	30.0%	8.4%	20.0%	0.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
45	*Andropogon gerardii*	n	p	88.9%	75.0%	80.6%	70.0%	10.0%	10.2%	20.1%	16.7%	18.3%
45	*Poa pratensis*	e	p	102.8%	33.3%	83.3%	60.0%	17.1%	5.0%	4.9%	8.0%	11.2%
45	*Ambrosia psilostachya*	n	p	94.4%	66.7%	86.1%	79.3%	4.8%	2.3%	4.2%	2.7%	7.0%
45	*Bromus japonicus*	e	m	66.7%	88.9%	61.1%	58.0%	9.4%	3.6%			6.1%
45	*Erigeron divergens*	n	m	50.0%	36.1%	19.4%	40.0%	4.2%	4.0%	2.6%	2.7%	4.9%
45	*Bouteloua gracilis*	n	p	27.8%	30.6%	36.1%	27.3%	1.6%	5.3%	2.9%	2.7%	4.8%
45	*Poa compressa*	e	p	16.7%	63.9%	69.4%	15.3%	1.9%	1.7%	1.6%	1.7%	3.9%
45	*Lotus tenuis*	e	p		38.9%	52.8%	2.0%	1.0%	2.3%	0.3%	4.0%	3.3%
45	*Carex heliophylla*	n	p	33.3%	69.4%		18.7%	2.9%	2.0%	2.3%	0.7%	3.2%
45	*Grindelia squarrosa*	n	m	27.8%	44.4%	63.9%	22.0%		2.0%	0.3%	0.7%	2.7%
45	*Plantago lanceolata*	e	p	19.4%	44.4%	47.2%	22.0%	1.3%	1.0%	1.3%	0.7%	2.7%
45	*Taraxacum officianale*	e	p	38.9%	47.2%	30.6%	28.7%	0.6%	0.7%	0.3%		1.9%
45	*Rumex crispus*	e	p	16.7%	13.9%	58.3%	8.7%	0.3%		0.3%	2.0%	1.9%
45	*Allysum minus*	e	m	16.7%	38.9%	2.8%	58.0%		0.3%			1.6%
45	*Buchloe dactyloides*	n	p	8.3%	13.9%	8.3%	23.3%	0.3%	0.7%	1.3%	0.7%	1.5%
45	*Cichorium intybus*	e	p	8.3%	16.7%	13.9%	8.0%	0.6%	1.0%	0.3%		1.1%
45	*Psoralea tenuiflora*	n	p	2.8%	8.3%		12.7%	0.3%	1.3%	0.6%	0.7%	1.1%
45	*Phleum pratense*	e	p	27.8%	8.3%	13.9%	8.0%	1.0%			1.3%	1.0%
45	*Lactuca serriola*	e	m	8.3%	30.6%	8.3%	29.3%					1.0%
45	*Bouteloua curtipendula*	n	p		16.7%		2.7%			1.0%	1.7%	0.9%
45	*Bromus tectorum*	e	m	5.6%	13.9%		33.3%	1.0%				0.9%
45	*Schizachyrium scoparium*	n	p	16.7%	5.6%	8.3%	15.3%	0.3%		0.6%	0.7%	0.9%
45	*Aster falcatus*	n	p	5.6%	5.6%	11.1%	3.3%	0.3%	0.7%	1.0%		0.8%
45	*Conyza canadensis*	e	m	2.8%	52.8%		2.0%			0.3%	0.3%	0.8%
45	*Convolvulus arvensis*	e	p		2.8%		4.0%	1.0%		1.0%	0.7%	0.8%
45	*Trifolium hybribum*	e	u	5.6%	25.0%	22.2%	2.0%	0.3%			0.3%	0.8%
45	*Erodium cicutarium*	e	m		16.7%	22.2%	9.3%	0.6%				0.8%
45	Unk. Grass - 174	u	u	8.3%	25.0%	22.2%	2.0%					0.7%
45	*Carex praegracilis*	n	p			36.1%						0.6%
45	*Panicum capillare*	e	m								2.3%	0.6%
45	*Sitanion hystrix*	n	p	19.4%	13.9%		23.3%	0.3%				0.6%
45	*Heterotheca villosa*	n	p		2.8%		10.0%		0.3%	0.6%	0.7%	0.6%
45	*Lepidium densiflorum*	e	m		38.9%	8.3%						0.6%
45	*Melilotus alba*	e	m		2.8%	2.8%	0.7%			0.3%	1.7%	0.6%
45	*Phyla cuneifolia*	n	p		8.3%		3.3%	0.6%	0.3%	0.3%	0.7%	0.6%
45	*Lepidium campestre*	e	m	11.1%	25.0%	11.1%	4.7%					0.5%
45	*Carex nebrascensis*	n	p	8.3%	5.6%	16.7%	2.0%				0.3%	0.4%
45	*Agropyron smithii*	n	p	2.8%	16.7%		0.7%	0.6%				0.4%
45	*Aristida purpurea*	n	p				1.3%	0.3%	0.3%		1.0%	0.4%
45	*Bouteloua hirsuta*	n	p				2.7%				1.7%	0.4%
45	*Hordeum jubatum*	n	u		5.6%	2.8%	18.7%					0.4%
45	*Sporobolus cryptandrus*	n	p		8.3%				1.0%			0.4%
45	*Artemisia frigida*	n	p		8.3%		9.3%		0.3%			0.4%
45	*Silene antirrhina*	e	m		33.3%		2.0%					0.4%
45	*Juncus longistylis*	n	p		13.9%	2.8%		0.3%				0.3%
45	*Agrostis gigantea*	e	p		11.1%	5.6%					0.3%	0.3%
45	*Dactylis glomerata*	e	p	2.8%		11.1%	1.3%		0.3%			0.3%
45	*Stipa viridula*	n	p					0.6%		0.6%		0.3%
45	*Vulpia octoflora*	n	m		27.8%		0.7%					0.3%
45	*Tragopogon dubius*	e	m	2.8%	5.6%		15.3%					0.3%
45	*Medicago lupulina*	e	m	2.8%			8.7%		0.7%			0.3%
45	*Plantago patagonica*	n	m	5.6%	5.6%		13.3%					0.3%
45	*Carex sp.*	u	p		13.9%		2.0%					0.2%
45	*Muhlenbergia asperifolia*	n	p								0.7%	0.2%
45	*Panicum virgatum*	n	p								0.7%	0.2%
45	*Cirsium undulatum*	n	m				5.3%			0.3%		0.2%
45	*Gutierrezia sarothrae*	n	p	2.8%			4.7%				0.3%	0.2%
45	*Oxytropis lambertii*	n	p				4.0%		0.3%			0.2%
45	*Trifolium pratense*	e	p				8.7%	0.3%				0.2%
45	Unk. Forb -856	u	u		8.3%		3.3%					0.2%
45	*Agropyron repens*	e	p				4.7%					0.1%
45	*Koeleria macrantha*	n	p								0.3%	0.1%
45	*Sitanion longifolium*	n	u		8.3%							0.1%
45	*Sorghastrum avenaceum*	n	p					0.3%				0.1%
45	*Stipa comata*	n	p						0.3%			0.1%
45	*Podospermum lacinatum*	e	m				7.3%					0.1%
45	*Opuntia macrorhiza*	n	p	8.3%	2.8%	2.8%	4.0%					0.1%
45	*Paronychia jamesii*	n	p							0.3%		0.1%
45	*Trifolium repens*	e	p		2.8%			0.3%				0.1%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				IMP
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	
45	*Monarda pectinata*	n	m				5.3%					0.1%
45	Unk. Grass - 172	u	u				2.0%					0.0%
45	Unk. Grass - 173	u	u	2.8%			0.7%					0.0%
45	*Yucca glauca*	n	p				0.7%					0.0%
45	*Asclepias speciosa*	n	p				2.7%					0.0%
45	*Cirsium arvense*	e	p				0.7%					0.0%
45	*Helianthus annuus*	n	m				0.7%					0.0%
45	*Liatris punctata*	n	p				2.0%					0.0%
45	*Camelina microcarpa*	e	m		2.8%							0.0%
45	*Draba reptans*	n	m	5.6%			1.3%					0.0%
45	*Lesquerella montana*	n	u				1.3%					0.0%
45	*Coryphantha missouriensis*	n	p				2.0%					0.0%
45	*Astragalus shortianus*	n	p				2.0%					0.0%
45	*Dalea purpurea*	n	p				2.0%					0.0%
45	*Gaura coccinea*	n	p				0.7%					0.0%
45	*Polygonum aviculare*	e	m		2.8%							0.0%
45	*Populus deltoides*	n	p	2.8%			0.7%					0.0%
45	*Verbascum thapsus*	e	m				1.3%					0.0%
45	*Viola nuttallii*	n	p				0.7%					0.0%
45	Unk. Forb -855	u	p				1.3%					0.0%
45	Unk. Forb -857	u	u				0.7%					0.0%
45	Bare Ground							8.7%	8.6%	10.4%	6.7%	0.0%
45	Litter							26.5%	43.6%	39.6%	34.0%	0.0%
46	*Sporobolus asper*	n	p	63.9%	86.1%	80.6%	84.7%	11.4%	12.2%	21.0%	13.0%	18.6%
46	*Poa pratensis*	e	p	83.3%	69.4%	61.1%	77.3%	6.6%	6.3%	9.4%	10.0%	11.8%
46	*Aster falcatus*	n	p	55.6%	58.3%	69.4%	36.0%	2.2%	1.3%	4.2%	0.7%	4.8%
46	*Convolvulus arvensis*	e	p	77.8%	61.1%	66.7%	48.0%	3.5%	1.6%	1.9%	0.3%	4.8%
46	*Carex praegracilis*	n	p				18.7%	6.3%	2.6%	4.2%	3.7%	4.4%
46	*Rosa arkansana*	n	p	5.6%	5.6%	5.6%	25.3%	7.0%	4.6%	1.0%	2.3%	4.4%
46	*Psoralea tenuiflora*	n	p	13.9%	50.0%	44.4%	26.0%	1.3%	1.3%	2.6%	3.0%	4.2%
46	*Plantago lanceolata*	e	p	66.7%	50.0%	47.2%	54.0%	3.8%	1.0%	0.6%	1.3%	4.2%
46	*Bromus japonicus*	e	m	25.0%	55.6%	47.2%	26.0%	5.1%	1.3%			3.7%
46	*Panicum virgatum*	n	p	25.0%	5.6%	16.7%	26.7%	1.6%	1.3%	5.8%	2.3%	3.5%
46	*Agropyron smithii*	n	p	61.1%	25.0%	41.7%	20.7%	2.8%	0.7%	1.9%	1.7%	3.2%
46	*Juncus arcticus*	n	p				31.3%	0.6%	2.0%	4.2%	3.0%	3.0%
46	*Dicanthelium oligosanthes*	n	m	33.3%	11.1%	44.4%	26.0%	2.5%	1.3%	1.0%		2.6%
46	*Melilotus officinalis*	e	m	27.8%	44.4%	36.1%	10.7%	3.2%				2.2%
46	*Ambrosia psilostachya*	n	p		36.1%	5.6%	26.0%	0.9%	0.3%	1.9%	0.3%	1.9%
46	*Cirsium arvense*	e	p			8.3%	20.0%	1.6%	0.7%	1.9%	1.7%	1.9%
46	*Achillea lanulosa*	n	p	22.2%	25.0%	27.8%	10.0%	1.3%	1.0%		0.3%	1.8%
46	*Medicago lupulina*	e	m	44.4%	58.3%		29.3%	0.9%				1.6%
46	*Taraxacum officianale*	e	p	30.6%	50.0%	25.0%	8.7%	0.3%				1.5%
46	*Carex nebrascensis*	n	p				10.0%	1.6%	0.7%		2.0%	1.3%
46	*Festuca pratensis*	e	p	27.8%	8.3%	8.3%	22.7%	1.3%		1.9%		1.3%
46	*Sorghastrum avenaceum*	n	p	2.8%	2.8%	16.7%	1.3%		1.6%	1.3%	0.3%	1.3%
46	*Ratibida columnifera*	n	p	8.3%	33.3%	22.2%	11.3%		0.3%			1.2%
46	*Poa compressa*	e	p	16.7%	33.3%	16.7%	10.7%					1.0%
46	*Agrostis gigantea*	e	p	19.4%	16.7%	19.4%	12.7%					0.8%
46	*Chrysothamnus nauseosus*	n	p	5.6%	11.1%	8.3%	2.7%	0.9%	0.7%		0.3%	0.8%
46	*Lepidium campestre*	e	m	27.8%	8.3%		29.3%	0.6%				0.8%
46	*Andropogon gerardii*	n	p				4.0%	0.3%	1.0%	0.3%	0.3%	0.6%
46	*Asclepias speciosa*	n	p			5.6%	10.0%			1.0%	0.3%	0.6%
46	*Melilotus alba*	e	m		16.7%		9.3%	0.3%		0.6%		0.6%
46	*Yucca glauca*	n	p				3.3%		0.7%	0.3%	0.7%	0.5%
46	*Erigeron divergens*	n	m	5.6%	8.3%	8.3%	7.3%	0.6%				0.5%
46	*Opuntia macrorhiza*	n	p	13.9%		16.7%	6.0%	0.3%				0.5%
46	*Carex lanuginosa*	n	p				3.3%		1.0%			0.4%
46	*Phleum pratense*	e	p	16.7%	5.6%	11.1%	5.3%					0.4%
46	*Sitanion longifolium*	n	u	16.7%	5.6%	5.6%	6.7%					0.3%
46	*Grindelia squarrosa*	n	m		5.6%	2.8%				0.3%	0.3%	0.3%
46	*Alysum minus*	e	m	5.6%	8.3%		11.3%					0.3%
46	*Dactylis glomerata*	e	p			2.8%	0.7%				0.3%	0.2%
46	*Muhlenbergia asperifolia*	n	p	5.6%			7.3%				0.3%	0.2%
46	*Packeria pseudoaureas*	n	p	5.6%	8.3%		2.7%					0.2%
46	*Solidago gigantea*	n	p			2.8%			0.3%			0.2%
46	*Tragopogon dubius*	e	m	8.3%			10.0%					0.2%
46	*Eleocharis elliptica*	n	u				6.7%					0.1%
46	*Juncus longistylis*	n	p	16.7%			5.3%					0.1%
46	*Bromus inermis*	e	p		5.6%							0.1%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
46	*Schizachyrium scoparium*	n	p				2.0%		0.3%			0.1%
46	*Sporobolus cryptandrus*	n	p			2.8%						0.1%
46	*Carduus nuttans*	e	m	2.8%			5.3%					0.1%
46	*Heterotheca villosa*	n	p				0.7%			0.3%		0.1%
46	*Lactuca serriola*	e	m	2.8%	2.8%		2.0%					0.1%
46	*Podospermum laciniatum*	e	m	16.7%			4.0%					0.1%
46	*Camelina microcarpa*	e	m				4.7%					0.1%
46	*Chenopodium fremontii?*	n	m							0.3%		0.1%
46	*Elaegnus angustifolia*	e	p			2.8%						0.1%
46	*Polygonum aviculare*	e	m	16.7%			4.0%					0.1%
46	*Rumex crispus*	e	p							0.3%		0.1%
46	*Carex heliophylla*	n	p				1.3%					0.0%
46	*Carex stipata*	n	p				2.0%					0.0%
46	*Aristida purpurea*	n	p	2.8%			2.7%					0.0%
46	*Bouteloua gracilis*	n	p				2.0%					0.0%
46	Unk. Grass - 175	u	u				2.7%					0.0%
46	*Lepidium densiflorum*	e	m	11.1%			2.7%					0.0%
46	*Dalea purpurea*	n	p				0.7%					0.0%
46	*Glycyrrhiza lepidota*	n	p				2.0%					0.0%
46	*Gaura coccinea*	n	p				2.7%					0.0%
46	*Gaura parviflora*	n	m		2.8%							0.0%
46	Bare Ground							1.3%	0.7%	1.9%	0.7%	0.0%
46	Litter							29.7%	53.3%	29.4%	50.5%	0.0%
47	*Poa pratensis*	e	p	69.4%	100.0%	91.7%	86.7%	18.4%	14.0%	16.0%	12.1%	21.1%
47	*Rosa arkansana*	n	p	44.4%	25.0%	41.7%	49.3%	12.5%	14.6%	17.2%	16.3%	17.8%
47	*Andropogon gerardii*	n	p	69.4%	94.4%	77.8%	52.0%	3.0%	2.7%	16.0%	1.0%	9.6%
47	*Sporobolus asper*	n	p	77.8%	58.3%	66.7%	69.3%	3.9%	4.7%	11.9%	2.3%	9.4%
47	*Panicum virgatum*	n	p	69.4%	69.4%	41.7%	43.3%	3.9%	1.7%	4.7%	0.3%	5.8%
47	*Cirsium arvense*	e	p	50.0%	38.9%	72.2%	43.3%	0.7%	1.7%	1.3%	2.6%	5.1%
47	*Juncus arcticus*	n	p	38.9%	41.7%	25.0%	40.0%	4.3%	1.3%	1.6%	2.3%	4.8%
47	*Plantago lanceolata*	e	p		13.9%	2.8%	34.7%	4.3%	0.7%	4.4%	4.2%	4.4%
47	*Asclepias speciosa*	n	p	38.9%	36.1%	36.1%	28.0%	1.0%	0.7%	1.9%	0.7%	3.2%
47	*Carex stipata*	n	p	52.8%	33.3%	33.3%	25.3%	3.0%		2.2%		3.1%
47	*Aster falcatus*	n	p	27.8%	30.6%	47.2%	14.7%	0.7%	0.3%	0.9%	0.3%	2.6%
47	*Ambrosia psilostachya*	n	p	27.8%	22.2%	38.9%	14.0%	1.3%		1.9%	0.7%	2.5%
47	*Agropyron smithii*	n	p				18.7%	2.3%		2.5%		1.4%
47	*Eleocharis elliptica*	n	u	16.7%	2.8%	47.2%	6.7%	0.3%				1.3%
47	*Convolvulus arvensis*	e	p		19.4%		12.0%		1.0%	0.9%		1.2%
47	*Carex praegracilis*	n	p				2.0%		2.0%		1.6%	1.1%
47	*Apocynum sibericum*	e	p						0.3%		2.3%	0.8%
47	*Agrostis gigantea*	e	p	25.0%		5.6%	17.3%	0.7%				0.7%
47	*Schizachyrium scoparium*	n	p			2.8%	3.3%	1.0%	0.7%	0.3%		0.6%
47	*Muhlenbergia asperifolia*	n	p	11.1%		5.6%	12.0%				0.3%	0.5%
47	*Dicanthelium oligosanthes*	n	m	22.2%	2.8%	11.1%	5.3%					0.4%
47	*Melilotus alba*	e	m				16.7%			0.3%		0.4%
47	*Rumex crispus*	e	p	2.8%		13.9%	0.7%	0.3%				0.4%
47	*Bromus japonicus*	e	m				4.0%	1.0%				0.3%
47	*Asclepias stenophylla*	n	p		11.1%							0.3%
47	*Solidago missouriensis*	n	p								0.7%	0.2%
47	*Taraxacum officianale*	e	p		8.3%		0.7%					0.2%
47	*Carex nebrascensis*	n	p				2.0%			0.3%		0.1%
47	*Juncus longistylis*	n	p				2.7%					0.1%
47	*Bouteloua hirsuta*	n	p					0.3%				0.1%
47	*Hordeum jubatum*	n	u	5.6%			2.7%					0.1%
47	*Phleum pratense*	e	p		5.6%							0.1%
47	*Sporobolus cryptandrus*	n	p						0.3%			0.1%
47	*Erodium cicutarium*	e	m					0.3%				0.1%
47	*Carex brevior*	n	p	2.8%			0.7%					0.0%
47	*Poa compressa*	e	p				2.0%					0.0%
47	*Sorghastrum avenaceum*	n	p				1.3%					0.0%
47	*Carduus nuttans*	e	m				1.3%					0.0%
47	*Cichorium intybus*	e	p				1.3%					0.0%
47	*Lepidium latifolium*	e	p				0.7%					0.0%
47	*Trifolium repens*	e	p				0.7%					0.0%
47	Unk. Forb -752	u	u				0.7%					0.0%
47	Bare Ground							0.3%		0.3%	0.3%	0.0%
47	Litter							36.5%	53.5%	15.4%	52.0%	0.0%
48	*Schizachyrium scoparium*	n	p	58.3%	58.3%	63.9%	34.7%	4.9%	7.3%	9.3%	11.3%	9.5%
48	*Poa pratensis*	e	p	83.3%	83.3%	80.6%	68.7%	7.2%	6.7%	7.1%	4.7%	8.8%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
48	*Andropogon gerardii*	n	p	61.1%	77.8%	55.6%	40.7%	4.9%	5.0%	11.5%	6.0%	8.2%
48	*Sporobolus asper*	n	p	44.4%	72.2%	55.6%	56.7%	4.9%	4.7%	8.4%	6.3%	7.8%
48	*Carex praegracilis*	n	p	8.3%	5.6%	11.1%	19.3%	11.1%	7.0%	7.4%	6.3%	7.4%
48	*Plantago lanceolata*	e	p	80.6%	77.8%	86.1%	48.7%	3.6%	4.0%	1.9%	4.3%	6.2%
48	*Ambrosia psilostachya*	n	p	66.7%	72.2%	75.0%	61.3%	3.9%	1.0%	4.0%	3.0%	5.4%
48	*Cichorium intybus*	e	p	69.4%	83.3%	36.1%	40.0%	2.0%	1.0%	2.8%	0.3%	3.4%
48	*Convolvulus arvensis*	e	p	52.8%	80.6%	41.7%	58.0%	2.0%	0.3%	2.2%		3.4%
48	*Melilotus officinalis*	e	m	16.7%	47.2%	36.1%	18.0%	2.3%	5.7%			3.4%
48	*Melilotus alba*	e	m	63.9%	13.9%	2.8%	46.7%	0.3%		7.7%	2.0%	2.7%
48	*Aster falcatus*	n	p	16.7%	36.1%	19.4%	40.0%	2.3%	1.0%	1.9%	0.7%	2.5%
48	*Bromus japonicus*	e	m	13.9%	41.7%	19.4%	36.7%	3.3%	1.3%			2.4%
48	*Juncus arcticus*	n	p				17.3%	2.0%		2.2%	4.7%	2.1%
48	*Poa compressa*	e	p	25.0%	25.0%	8.3%	34.7%	3.0%	1.0%	2.2%		2.1%
48	*Agropyron smithii*	n	p	25.0%	27.8%	16.7%	20.7%	2.3%		1.9%	0.3%	1.8%
48	*Asclepias speciosa*	n	p	13.9%	36.1%	13.9%	18.7%	1.3%	0.3%	1.5%		1.6%
48	*Agrostis gigantea*	e	p		8.3%	5.6%	8.0%	1.3%		3.4%	0.7%	1.3%
48	*Taraxacum officianale*	e	p	8.3%	25.0%	52.8%	2.0%	0.7%				1.3%
48	*Glycyrrhiza lepidota*	n	p	25.0%	11.1%	11.1%	28.0%	0.3%	0.7%	1.9%	0.3%	1.3%
48	*Distichlis spicata*	n	p	19.4%	27.8%	30.6%	8.7%			0.3%	0.7%	1.2%
48	*Psoralea tenuiflora*	n	p	5.6%	13.9%		11.3%	0.7%	1.0%	0.6%	0.7%	1.0%
48	*Juncus gerardii*	e	p	11.1%	16.7%	25.0%	6.7%		0.3%		0.3%	0.9%
48	*Bouteloua gracilis*	n	p	5.6%	13.9%	2.8%	13.3%	0.3%	0.3%	0.6%	0.7%	0.8%
48	*Ratibida columnifera*	n	p	8.3%	19.4%	8.3%	19.3%			0.6%		0.8%
48	*Bouteloua curtipendula*	n	p	8.3%	2.8%	5.6%	20.0%	0.3%	0.3%		0.7%	0.7%
48	*Panicum virgatum*	n	p			2.8%	10.0%	1.3%		0.9%	0.3%	0.7%
48	*Eleocharis elliptica*	n	u				0.7%	1.6%	0.7%		0.3%	0.6%
48	*Heterotheca villosa*	n	p				13.3%	1.0%		0.6%	0.3%	0.6%
48	*Festuca pratensis*	e	p	8.3%			15.3%	0.7%	0.3%	0.6%		0.5%
48	*Stipa comata*	n	p	13.9%	5.6%		16.7%	0.7%	0.3%			0.5%
48	*Aristida purpurea*	n	p		8.3%		6.7%		0.3%		0.3%	0.4%
48	*Phleum pratense*	e	p			11.1%			0.7%			0.4%
48	*Artemisia frigida*	n	p	11.1%	5.6%	13.9%	11.3%					0.4%
48	*Cirsium arvense*	e	p	11.1%		2.8%	10.0%			0.3%	0.7%	0.4%
48	*Tragopogon dubius*	e	m		8.3%	5.6%	11.3%					0.4%
48	*Dalea candida*	n	p	2.8%	5.6%	11.1%	8.0%	0.3%				0.4%
48	*Medicago lupulina*	e	m	13.9%	5.6%		21.3%			0.3%		0.4%
48	*Rosa arkansana*	n	p			8.3%	2.7%		0.7%		0.3%	0.4%
48	*Carex heliophylla*	n	p		2.8%	8.3%	6.7%			0.3%		0.3%
48	*Muhlenbergia asperifolia*	n	p	19.4%			4.7%			0.3%	0.7%	0.3%
48	*Achillea lanulosa*	n	p		11.1%	5.6%	2.0%					0.3%
48	*Erigeron divergens*	n	m		8.3%	5.6%	8.0%					0.3%
48	*Rumex crispus*	e	p		2.8%	11.1%	0.7%		0.3%			0.3%
48	*Verbascum thapsus*	e	m	8.3%	2.8%		10.7%			0.3%	0.3%	0.3%
48	*Danthonia spicata*	n	p			13.9%						0.2%
48	*Dicanthelium oligosanthes*	n	m				2.0%	0.3%			0.3%	0.2%
48	*Sorghastrum avenaceum*	n	p		8.3%	8.3%						0.2%
48	*Sporobolus heterolepis*	n	p								0.7%	0.2%
48	*Asclepias pumila*	n	p				8.7%		0.3%			0.2%
48	*Gutierrezia sarothrae*	n	p		2.8%		1.3%	0.7%				0.2%
48	*Liatris punctata*	n	p				18.0%					0.2%
48	*Opuntia macrorhiza*	n	p	2.8%		2.8%	2.7%		0.3%			0.2%
48	*Phyla cuneifolia*	n	p				6.7%			0.9%		0.2%
48	Unk. Forb -860	u	u	33.3%			8.0%	0.3%				0.2%
48	*Carex lanuginosa*	n	p						0.3%			0.1%
48	*Bromus tectorum*	e	m					0.3%				0.1%
48	*Sitanion longifolium*	n	u		2.8%	5.6%	1.3%					0.1%
48	*Sporobolus cryptandrus*	n	p						0.3%			0.1%
48	*Yucca glauca*	n	p	2.8%		2.8%	5.3%					0.1%
48	*Aster porteri*	n	p		8.3%							0.1%
48	*Erigeron flagellaris*	n	p	8.3%			2.0%		0.3%			0.1%
48	*Grindelia squarrosa*	n	m				1.3%		0.3%			0.1%
48	*Lactuca serriola*	e	m	2.8%	2.8%		3.3%					0.1%
48	*Packeria pseudoaureas*	n	p		2.8%	2.8%						0.1%
48	*Onosmodium molle*	n	p				5.3%					0.1%
48	*Alysum minus*	e	m				6.7%					0.1%
48	*Camelina microcarpa*	e	m				3.3%	0.3%				0.1%
48	*Lepidium campestre*	e	m				4.0%					0.1%
48	*Gaura coccinea*	n	p				2.7%	0.3%				0.1%
48	*Oxalis dillenii*	n	m	8.3%	5.6%		2.0%					0.1%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
48	*Plantago patagonica*	n	m				4.0%					0.1%
48	Unk. Forb -861	u	u	5.6%		5.6%	1.3%					0.1%
48	*Bouteloua hirsuta*	n	p				2.0%					0.0%
48	*Buchloe dactyloides*	n	p		2.8%							0.0%
48	*Koeleria macrantha*	n	p	8.3%			3.3%					0.0%
48	*Carduus nuttans*	e	m				2.0%					0.0%
48	*Sonchus asper*	e	m				2.0%					0.0%
48	*Solidago sparsiflora*	n	p				0.7%					0.0%
48	*Thelesperma megapotamicum*	n	p				3.3%					0.0%
48	*Draba reptans*	n	m				0.7%					0.0%
48	*Dalea purpurea*	n	p	2.8%	2.8%		0.7%					0.0%
48	*Psoralea argophylla*	n	p				0.7%					0.0%
48	*Gaura parviflora*	n	m			2.8%						0.0%
48	*Penstemon angustifolius*	n	p				2.0%					0.0%
48	*Ulmus pumilia*	e	p				0.7%					0.0%
48	Unk. Forb -754	u	u				2.0%					0.0%
48	Bare Ground							3.3%	1.0%	2.8%	1.3%	0.0%
48	Litter							23.9%	44.7%	13.3%	40.5%	0.0%
49	*Festuca pratensis*	e	p	75.0%	94.4%	91.7%	84.7%	37.0%	33.0%	32.7%	37.3%	34.9%
49	*Carex praegracilis*	n	p	27.8%	38.9%	69.4%	16.7%	10.2%	1.3%		5.1%	5.3%
49	*Taraxacum officianale*	e	p	55.6%	52.8%	75.0%	53.3%	3.0%	3.7%	1.0%	0.6%	4.8%
49	*Poa pratensis*	e	p	25.0%	22.2%	11.1%	29.3%	3.3%	4.0%	4.0%	3.5%	4.4%
49	*Lotus tenuis*	e	p	30.6%	66.7%	86.1%	8.0%	2.3%	1.3%		3.8%	4.1%
49	*Trifolium fragiferum*	e	p	19.4%		63.9%	32.0%	5.6%	4.0%		2.5%	4.0%
49	*Plantago lanceolata*	e	p	61.1%	30.6%	47.2%	58.7%	2.0%	1.3%	2.0%	1.0%	3.7%
49	*Phleum pratense*	e	p	25.0%	25.0%	19.4%	54.0%	3.6%	2.7%	0.3%	1.6%	3.4%
49	*Trifolium hybribum*	e	u	52.8%	72.2%	22.2%	32.7%			3.0%	1.0%	3.2%
49	*Panicum virgatum*	n	p	8.3%	41.7%	52.8%	26.0%	1.3%	0.3%	0.3%	1.6%	2.7%
49	*Eleocharis elliptica*	n	u	25.0%	11.1%	30.6%	45.3%	1.3%	1.0%	0.7%	2.5%	2.6%
49	*Hordeum jubatum*	n	u	61.1%	47.2%	41.7%	24.0%		0.3%		2.2%	2.4%
49	*Agrostis gigantea*	e	p		13.9%	30.6%	14.0%		0.3%	1.3%	4.5%	2.3%
49	*Poa compressa*	e	p	36.1%	41.7%	8.3%	27.3%	0.3%	0.3%	1.3%	1.3%	2.1%
49	*Juncus arcticus*	n	p	22.2%	13.9%	16.7%	39.3%	1.3%	0.7%		0.6%	1.8%
49	*Convolvulus arvensis*	e	p	11.1%	13.9%	19.4%	22.0%	0.3%	1.0%	1.0%	0.3%	1.6%
49	*Carex sp.*	u	p		41.7%		4.0%			2.6%		1.5%
49	*Carex nebrascensis*	n	p	13.9%	5.6%	8.3%	10.0%	2.3%	1.0%		1.0%	1.3%
49	*Cichorium intybus*	e	p	33.3%	19.4%	19.4%	24.7%					1.1%
49	*Juncus longistylis*	n	p		19.4%	16.7%	12.0%					0.8%
49	*Bromus inermis*	e	p		5.6%	16.7%	0.7%		2.0%			0.8%
49	*Distichlis spicata*	n	p	16.7%	8.3%	8.3%	6.0%		1.0%	0.7%	0.3%	0.8%
49	*Poa juncifolia*	n	p		19.4%				2.0%			0.8%
49	*Rosa arkansana*	n	p	2.8%		5.6%	12.0%		0.7%	0.7%	0.3%	0.7%
49	*Dactylis glomerata*	e	p				3.3%	0.3%	0.7%	0.7%	0.6%	0.6%
49	*Muhlenbergia asperifolia*	n	p	2.8%	16.7%	22.2%	0.7%					0.6%
49	*Sporobolus asper*	n	p	16.7%	2.8%	11.1%	10.7%		0.3%	0.3%		0.6%
49	*Polygonum sawatchense*	n	m	8.3%	19.4%	13.9%	2.0%					0.6%
49	*Andropogon gerardii*	n	p				9.3%		0.3%	0.7%	0.6%	0.5%
49	*Chenopodium incanum*	n	m	27.8%	2.8%	13.9%	8.7%	0.3%			0.3%	0.5%
49	*Trifolium pratense*	e	p		8.3%	19.4%		0.3%				0.5%
49	*Sisyrinchium montanum*	n	p	5.6%	5.6%	5.6%	17.3%					0.5%
49	*Rumex crispus*	e	p		16.7%	11.1%	1.3%					0.5%
49	*Juncus nodosus*	n	p			13.9%	8.0%					0.4%
49	*Poa arida*	n	p		5.6%	16.7%						0.4%
49	*Bromus japonicus*	e	m	2.8%	2.8%	13.9%	3.3%					0.3%
49	*Sonchus uliginosus*	u	u						0.7%		1.0%	0.3%
49	*Melilotus officinalis*	e	m	8.3%		5.6%	12.0%					0.3%
49	*Plantago major*	e	p	8.3%	2.8%	16.7%	2.0%					0.3%
49	*Eleocharis macrostachya*	n	p		11.1%							0.2%
49	*Hippocheete laevigata*	n	m				11.3%					0.2%
49	*Prunella vulgaris*	n	p			2.8%	9.3%					0.2%
49	*Agropyron repens*	e	p				4.7%					0.1%
49	*Setaria glauca*	e	m	2.8%			4.0%					0.1%
49	*Sorghastrum avenaceum*	n	p								0.6%	0.1%
49	*Asparagus officinalis*	e	p								0.6%	0.1%
49	*Ambrosia artemesifolia*	e	m			2.8%	0.7%					0.1%
49	*Grindelia squarrosa*	n	m				2.7%				0.3%	0.1%
49	*Podospermum laciniatum*	e	m	2.8%			5.3%					0.1%
49	Unk. Forb -948	u	u					0.3%				0.1%
49	*Carex lanuginosa*	n	p				2.0%					0.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
49	*Carex brevior*	n	p				1.3%					0.0%
49	Unk. Grass - 178	u	u	11.1%			2.7%					0.0%
49	*Asclepias stenophylla*	n	p				1.3%					0.0%
49	*Aster falcatus*	n	p		2.8%							0.0%
49	*Cirsium arvense*	e	p				2.0%					0.0%
49	*Tragopogon porrifolius*	e	m	2.8%			0.7%					0.0%
49	*Cerastium arvense*	n	p	2.8%			0.7%					0.0%
49	*Spergularia media*	e	p	8.3%			2.0%					0.0%
49	*Meliotus alba*	e	m				0.7%					0.0%
49	*Verbena hastata*	n	p				0.7%					0.0%
49	Unk. Forb -862	u	p				0.7%					0.0%
49	Unk. Forb -864	u	u				2.7%					0.0%
49	Bare Ground							10.2%	8.3%	6.9%	5.1%	0.0%
49	Litter							14.8%	27.7%	39.9%	19.7%	0.0%
50	*Festuca pratensis*	e	p	100.0%	94.4%	83.3%	52.7%	8.4%	6.5%	10.3%	12.3%	13.8%
50	*Plantago lanceolata*	e	p	88.9%	100.0%	94.4%	95.3%	6.4%	7.8%	8.3%	10.0%	13.2%
50	*Sporobolus asper*	n	p	22.2%	25.0%	19.4%	81.3%	5.7%	5.2%	4.0%	2.0%	6.6%
50	*Poa compressa*	e	p	66.7%	61.1%	75.0%	82.7%	3.7%	3.9%	1.7%	2.0%	6.1%
50	*Dactylis glomerata*	e	p	30.6%	27.8%	50.0%	40.0%	3.7%	5.6%	2.3%	3.3%	5.8%
50	*Sorghastrum avenaceum*	n	p		38.9%		34.0%	3.4%	3.9%	4.7%	3.7%	5.6%
50	*Trifolium pratense*	e	p	88.9%	83.3%	127.8%	83.3%	2.4%		0.7%	1.0%	4.8%
50	*Eleocharis elliptica*	n	u	36.1%	58.3%	88.9%	46.7%	4.1%	2.0%	1.0%		4.4%
50	*Phleum pratense*	e	p	50.0%	69.4%	75.0%	46.7%	5.4%	1.0%	0.3%	0.7%	4.4%
50	*Poa pratensis*	e	p	16.7%	66.7%	83.3%	4.0%	0.3%	0.7%	2.7%	4.3%	4.3%
50	*Schizachyrium scoparium*	n	p		16.7%	22.2%	44.7%	3.4%	1.3%	1.3%	3.3%	3.7%
50	*Taraxacum officianale*	e	p	100.0%	66.7%	91.7%	47.3%	0.7%	1.0%	1.0%	0.3%	3.5%
50	*Agrostis gigantea*	e	p	80.6%	41.7%	66.7%	63.3%		1.0%	0.3%	0.3%	2.7%
50	*Andropogon gerardii*	n	p	11.1%	25.0%	25.0%	20.0%	0.7%	1.3%	1.0%	2.7%	2.5%
50	*Panicum virgatum*	n	p	16.7%	25.0%	36.1%	18.0%	0.3%		2.0%	1.0%	2.0%
50	*Carex brevior*	n	p	2.8%	22.2%	8.3%	6.0%	4.7%		0.7%		1.9%
50	*Apocynum sibericum*	e	p	11.1%	13.9%	30.6%	8.0%	1.0%	1.0%		1.3%	1.6%
50	*Rosa arkansana*	n	p	22.2%	19.4%	22.2%	19.3%	0.7%		0.3%	1.0%	1.3%
50	*Prunella vulgaris*	n	p	13.9%	25.0%	16.7%	30.7%		0.3%			1.0%
50	*Carex lanuginosa*	n	p	19.4%	2.8%	30.6%	12.0%		0.7%		0.7%	0.9%
50	*Meliotus officinalis*	e	m	22.2%	22.2%	38.9%	12.0%					0.9%
50	*Erigeron divergens*	n	m				24.7%		0.7%		1.0%	0.8%
50	*Aster falcatus*	n	p			16.7%	10.7%	0.3%		0.3%	0.7%	0.7%
50	*Medicago lupulina*	e	m		11.1%	19.4%	26.0%					0.7%
50	*Sisyrinchium montanum*	n	p		25.0%	11.1%	14.7%					0.7%
50	*Juncus longistylis*	n	p		27.8%	16.7%	0.7%					0.6%
50	Unk. Grass - 180	u	u	94.4%			43.3%					0.6%
50	*Juncus arcticus*	n	p	30.6%			35.3%					0.5%
50	*Dicanthelium oligosanthes*	n	m	11.1%	13.9%		17.3%					0.4%
50	*Convolvulus arvensis*	e	p		8.3%	8.3%	0.7%	0.7%				0.4%
50	*Bromus inermis*	e	p			2.8%	2.7%				1.0%	0.3%
50	*Musineon divaricatum*	n	p		19.4%							0.3%
50	*Trifolium hybribum*	e	u	47.2%			19.3%					0.3%
50	*Buchloe dactyloides*	n	p			8.3%	2.0%		0.3%			0.2%
50	*Danthonia spicata*	n	p				14.0%					0.2%
50	*Muhlenbergia montana*	n	p			11.1%	4.7%					0.2%
50	*Antennaria rosea*	n	p		2.8%		5.3%				0.3%	0.2%
50	*Erigeron flagellaris*	n	p		2.8%		5.3%	0.3%				0.2%
50	*Meliotus alba*	e	m	11.1%	2.8%		4.0%		0.3%			0.2%
50	*Agropyron repens*	e	p	2.8%			0.7%	0.3%				0.1%
50	*Bouteloua gracilis*	n	p							0.3%		0.1%
50	*Dicanthelium ecuminatum*	n	p			5.6%						0.1%
50	*Muhlenbergia asperifolia*	n	p	8.3%		5.6%	2.0%					0.1%
50	*Cichorium intybus*	e	p			5.6%	2.0%					0.1%
50	*Cirsium floodmanii*	n	p					0.3%				0.1%
50	*Helianthus sp.*	u	u		8.3%							0.1%
50	*Liatris punctata*	n	p		5.6%							0.1%
50	*Packeria pseudoaureas*	n	p			5.6%						0.1%
50	*Iris missouriensis*	n	p	2.8%			0.7%		0.3%			0.1%
50	*Plantago major*	e	p				1.3%				0.3%	0.1%
50	*Viola nuttallii*	n	p							0.3%		0.1%
50	Unk. Forb -948	u	u					0.3%				0.1%
50	*Asclepias speciosa*	n	p				2.0%					0.0%
50	*Asclepias stenophylla*	n	p				0.7%					0.0%
50	*Erigeron speciosus*	n	p				1.3%					0.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
50	*Rudbeckia hirta*	n	m				0.7%					0.0%
50	*Solidago sparsiflora*	u	u				1.3%					0.0%
50	*Lepidium campestre*	e	m		2.8%							0.0%
50	*Hippochaete laevigata*	n	m				1.3%					0.0%
50	*Dalea purpurea*	n	p				0.7%					0.0%
50	*Lotus tenuis*	e	p				2.0%					0.0%
50	*Psoralea tenuiflora*	n	p		2.8%							0.0%
50	*Oxalis dillenii*	n	m				2.0%					0.0%
50	*Potentilla hippiana*	n	p				1.3%					0.0%
50	Unk. Forb -865	u	u				0.7%					0.0%
50	Unk. Forb -866	u	u				2.0%					0.0%
50	Unk. Forb -968	u	u			2.8%						0.0%
50	Bare Ground							11.1%	4.2%	7.3%	6.3%	0.0%
50	Litter							31.4%	51.0%	49.2%	40.5%	0.0%
51	*Plantago lanceolata*	e	p	100.0%	100.0%	94.4%	94.0%	12.7%	5.6%	8.3%	4.3%	12.2%
51	*Poa compressa*	e	p	86.1%	105.6%	94.4%	90.7%	10.4%	3.7%	5.6%	4.3%	10.1%
51	*Festuca pratensis*	e	p	66.7%	86.1%	88.9%	38.0%	5.2%	7.3%	4.0%	5.6%	9.3%
51	*Sporobolus asper*	n	p	16.7%	94.4%	80.6%	74.7%	1.0%	2.0%	4.0%	4.7%	6.7%
51	*Phleum pratense*	e	p	91.7%	66.7%	77.8%	88.0%	11.1%	0.3%	0.3%	0.3%	5.2%
51	*Poa pratensis*	e	p	50.0%	80.6%	25.0%	44.0%	3.3%	2.7%	2.0%	1.7%	4.5%
51	*Andropogon gerardii*	n	p		38.9%	69.4%		0.7%	3.0%	4.0%	1.3%	4.2%
51	*Trifolium pratense*	e	p	80.6%	77.8%	91.7%	72.7%	2.9%	1.3%	1.3%		4.2%
51	*Sorghastrum avenaceum*	n	p	11.1%	63.9%	52.8%	24.7%	0.7%	1.0%	1.3%	3.3%	3.7%
51	*Eleocharis elliptica*	n	u	72.2%	50.0%	83.3%	40.7%	2.9%	1.0%		1.3%	3.3%
51	*Bromus inermis*	e	p	2.8%			37.4%	1.0%	2.7%	0.3%	3.7%	3.0%
51	*Juncus longistylis*	n	p	8.3%	61.1%	55.6%	3.3%	5.9%	1.0%	0.3%	0.3%	2.9%
51	*Dactylis glomerata*	e	p	25.0%	13.9%	8.3%	38.7%	3.9%	2.0%	0.7%	0.7%	2.7%
51	*Schizachyrium scoparium*	n	p	27.8%	19.4%	41.7%	25.3%	2.0%	1.3%	0.3%	2.3%	2.7%
51	*Taraxacum officianale*	e	p	2.8%	52.8%	69.4%	2.7%	1.3%	0.7%	0.3%	1.0%	2.3%
51	*Dicanthelium oligosanthes*	n	m	11.1%	80.6%	72.2%	4.7%	0.7%		1.0%	0.3%	2.2%
51	*Panicum virgatum*	n	p	5.6%	47.2%	25.0%	36.7%		0.7%	2.0%		2.2%
51	*Convolvulus arvensis*	e	p	47.2%	63.9%	58.3%	42.0%	0.7%		0.3%	0.3%	2.1%
51	*Agrostis gigantea*	e	p	55.6%	50.0%	44.4%	32.7%			1.0%		1.7%
51	*Prunella vulgaris*	n	p	5.6%	47.2%	86.1%	2.7%		0.3%		0.3%	1.6%
51	*Erigeron flagellaris*	n	p	19.4%			45.3%	0.3%	1.3%	0.3%	0.3%	1.3%
51	*Rosa arkansana*	n	p	11.1%	22.2%	11.1%	8.7%	0.3%		0.7%	1.3%	1.2%
51	*Aster falcatus*	n	p	19.4%	22.2%	8.3%	26.0%		0.3%	0.3%		0.9%
51	*Medicago lupulina*	e	m	30.6%			40.7%	0.7%	0.3%		0.3%	0.9%
51	*Melilotus officinalis*	e	m	41.7%			52.0%	0.7%		0.3%		0.9%
51	*Trifolium hybridum*	e	u	75.0%		5.6%	70.7%					0.9%
51	*Juncus arcticus*	n	p	44.4%		13.9%	21.3%	1.0%	0.7%			0.8%
51	*Buchloe dactyloides*	n	p		5.6%	25.0%				0.3%	1.0%	0.8%
51	*Carex praegracilis*	n	p	2.8%		72.2%	0.7%					0.7%
51	*Iris missouriensis*	n	p		8.3%	30.6%	0.7%	0.7%				0.5%
51	*Potentilla gracilis*	n	p		13.9%	22.2%					0.3%	0.5%
51	*Eleocharis macrostachya*	n	p		36.1%							0.4%
51	*Melilotus alba*	e	m	8.3%			28.7%					0.4%
51	*Muhlenbergia montana*	n	p			30.6%	1.3%					0.3%
51	*Solidago sparsiflora*	n	p				23.3%					0.3%
51	*Lepidium campestre*	e	m	11.1%			20.7%					0.3%
51	*Trifolium repens*	e	p						1.0%			0.3%
51	*Sisyrinchium montanum*	n	p	5.6%	16.7%	8.3%	4.0%					0.3%
51	*Cichorium intybus*	e	p	16.7%			8.0%		0.3%			0.2%
51	*Packera pseudaureas*	n	p						0.3%	0.3%		0.2%
51	*Ranunculus macounii*	n	p		8.3%			0.3%				0.2%
51	Unk. Forb -948	u	u						0.7%			0.2%
51	*Agropyron smithii*	n	p						0.3%			0.1%
51	*Asclepias speciosa*	n	p		8.3%							0.1%
51	*Liatris punctata*	n	p								0.3%	0.1%
51	*Onosmodium molle*	n	p					0.3%				0.1%
51	*Apocynum sibericum*	e	p			2.8%						0.0%
51	*Artemisia dranunculus*	n	p				2.7%					0.0%
51	*Psoralea tenuiflora*	n	p				2.7%					0.0%
51	Unk. Forb -867	u	u	2.8%			2.7%					0.0%
51	Unk. Forb -868	u	u				0.7%					0.0%
51	Bare Ground							4.2%	8.6%	3.6%	7.0%	0.0%
51	Litter							25.4%	49.5%	57.1%	53.5%	0.0%
52	*Andropogon gerardii*	n	p	44.4%	75.0%	69.4%	72.0%	9.0%	11.6%	5.7%	7.9%	14.9%
52	*Bouteloua gracilis*	n	p	77.8%	77.8%	75.0%	83.3%	3.8%	2.0%	5.0%	4.0%	7.8%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
52	*Stipa comata*	n	p	38.9%	72.2%	55.6%	63.3%	2.2%	2.3%	1.3%	2.3%	4.9%
52	*Bromus japonicus*	e	m	63.9%	91.7%	91.7%	52.0%	5.8%	1.3%			4.5%
52	*Erigeron divergens*	n	m	47.2%	36.1%	30.6%	57.3%	4.2%	2.0%	1.7%	1.3%	4.4%
52	*Heterotheca villosa*	n	p	52.8%	8.3%	63.9%	47.3%	1.3%	1.0%	3.0%	2.6%	4.2%
52	*Schizachyrium scoparium*	n	p	44.4%	77.8%	44.4%	39.3%	1.9%	1.0%	2.0%	1.3%	3.8%
52	*Liatris punctata*	n	p	52.8%	47.2%	44.4%	42.0%	1.6%	0.3%	2.7%	1.7%	3.6%
52	*Carex heliophylla*	n	p	50.0%	61.1%	75.0%	71.3%	1.3%	1.0%	0.7%	1.0%	3.5%
52	*Psoralea tenuiflora*	n	p	38.9%	27.8%	36.1%	33.3%	2.2%	1.0%	1.7%	2.0%	3.5%
52	*Echinocereus viridiflorus*	n	p	47.2%	47.2%	80.6%	70.0%	0.3%		1.3%	0.3%	2.7%
52	*Bouteloua curtipendula*	n	p	5.6%	44.4%	16.7%	1.3%	0.6%	0.3%	1.7%	1.3%	2.1%
52	*Koeleria macrantha*	n	p	58.3%	69.4%	38.9%	76.0%		0.3%			2.0%
52	*Panicum virgatum*	n	p	30.6%		52.8%	11.3%	1.0%	0.7%	1.3%	0.7%	2.0%
52	*Artemisia campestris*	n	p	16.7%	33.3%	36.1%	4.7%	1.0%	1.3%	1.0%	0.3%	2.0%
52	*Yucca glauca*	n	p	27.8%	33.3%	36.1%	26.0%	0.6%	1.0%	0.3%	0.3%	1.8%
52	*Tragopogon dubius*	e	m	11.1%	41.7%	22.2%	24.0%	1.3%	0.7%		0.7%	1.8%
52	*Ambrosia psilostachya*	n	p	22.2%	30.6%	27.8%	18.0%	0.6%		0.3%	1.7%	1.7%
52	*Lesquerella montana*	n	u	58.3%	44.4%	44.4%	60.0%					1.5%
52	*Eriogonum alatum*	n	p	8.3%	16.7%	16.7%	18.7%	0.3%		2.0%	0.3%	1.5%
52	*Silene antirrhina*	e	m	50.0%	55.6%	33.3%	23.3%	1.0%				1.4%
52	*Poa compressa*	e	p	5.6%	19.4%	16.7%	10.0%	1.9%	0.3%	0.3%		1.3%
52	*Helianthus annuus*	n	m	13.9%	55.6%	19.4%	3.3%	1.0%	0.7%			1.3%
52	*Paronychia jamesii*	n	p	19.4%	19.4%	5.6%	22.0%	0.6%		0.7%	0.7%	1.2%
52	*Bromus tectorum*	e	m	50.0%	19.4%	44.4%	12.7%	0.6%	0.3%			1.1%
52	*Solidago mollis*	n	p	5.6%	19.4%	19.4%	18.7%		0.7%	0.3%	0.3%	1.1%
52	*Artemisia frigida*	n	p	8.3%	11.1%	16.7%	20.7%		0.3%	0.3%	0.7%	1.0%
52	*Opuntia macrorhiza*	n	p	25.0%		8.3%	15.3%			1.3%	0.7%	1.0%
52	*Lepidium densiflorum*	e	m	22.2%	25.0%	33.3%	20.0%					0.8%
52	*Comandra umbellata*	n	p	8.3%	8.3%	13.9%	8.0%	0.3%	0.3%	0.3%	0.3%	0.8%
52	*Buchloe dactyloides*	n	p	25.0%	5.6%	2.8%	8.0%	1.0%	0.3%		0.3%	0.7%
52	*Antennaria rosea*	n	p		44.4%						0.7%	0.7%
52	*Sitanion longifolium*	n	u	8.3%	50.0%		16.7%					0.6%
52	*Allysum minus*	e	m	2.8%	8.3%	16.7%	0.7%	0.3%	0.7%			0.6%
52	*Silene scoulerii*	n	p	16.7%	22.2%	11.1%	28.0%					0.6%
52	*Bouteloua hirsuta*	n	p	16.7%	13.9%	16.7%	9.3%		0.3%			0.5%
52	*Sorghastrum avenaceum*	n	p	5.6%		8.3%	11.3%			0.3%	0.3%	0.5%
52	*Artemisia ludoviciana*	n	p	8.3%	16.7%	2.8%	12.7%				0.3%	0.5%
52	*Gaillardia aristata*	n	p	2.8%	8.3%	25.0%	4.0%	0.3%				0.5%
52	*Astragalus flexuosus*	n	p	5.6%	2.8%	19.4%	2.7%	0.3%	0.3%			0.5%
52	*Oxytropis lambertii*	n	p	5.6%		8.3%	12.0%		0.7%			0.5%
52	*Linum lewisii*	n	p	5.6%	8.3%	19.4%	8.0%		0.3%			0.5%
52	*Aster porteri*	n	p	2.8%			14.7%	0.3%		0.3%		0.4%
52	*Cryptantha jamesii*	n	p	13.9%	8.3%		3.3%	1.0%				0.4%
52	*Onosmodium molle*	n	p			36.1%	1.3%					0.4%
52	*Draba reptans*	n	m	11.1%	22.2%		8.7%	0.3%				0.4%
52	*Phacelia heterophylla*	n	m	30.6%	11.1%		12.7%			0.3%		0.4%
52	*Rosa arkansana*	n	p	2.8%			0.7%		1.0%			0.4%
52	*Poa pratensis*	e	p		16.7%				0.3%			0.3%
52	*Vulpia octoflora*	n	m	13.9%	5.6%	16.7%	6.7%					0.3%
52	*Aster falcatus*	n	p	11.1%	2.8%	5.6%	11.3%				0.3%	0.3%
52	*Cirsium undulatum*	n	m	11.1%	13.9%	8.3%	10.7%					0.3%
52	*Ratibida columnifera*	n	p	13.9%		22.2%	5.3%					0.3%
52	*Sysimbrium altissimum*	e	m	33.3%	8.3%		11.3%	0.3%				0.3%
52	*Plantago patagonica*	n	m	11.1%	11.1%	13.9%	7.3%					0.3%
52	*Setaria glauca*	e	m				1.3%	0.6%				0.2%
52	*Helianthus rigidus*	n	p	19.4%			9.3%				0.3%	0.2%
52	*Camelina microcarpa*	e	m	8.3%	11.1%	5.6%	2.7%					0.2%
52	*Descurainia pinnata*	n	m		16.7%							0.2%
52	*Erysimum asperum*	n	p	2.8%	2.8%	11.1%	2.0%					0.2%
52	*Dalea purpurea*	n	p		16.7%		4.0%					0.2%
52	*Drymocallis fissia*	n	p				6.0%	0.3%				0.2%
52	*Prunus besseyi*	n	p		13.9%	2.8%		0.3%				0.2%
52	*Viola nuttallii*	n	p	22.2%	2.8%	5.6%	7.3%					0.2%
52	Unk. Forb -905	u	u	8.3%	11.1%		2.7%	0.3%				0.2%
52	*Aristida purpurea*	n	p		2.8%		4.0%					0.1%
52	*Poa sandbergii*	n	p			13.9%						0.1%
52	*Sporobolus airoides*	n	p							0.3%		0.1%
52	*Allium textile*	n	p	11.1%	2.8%		6.7%					0.1%
52	*Asclepias viridiflora*	n	p	8.3%	2.8%		6.7%					0.1%
52	*Erigeron flagellaris*	n	p			11.1%	2.0%					0.1%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
52	*Lactuca serriola*	e	m	5.6%		2.8%	2.7%					0.1%
52	*Podospermum laciniatum*	e	m					0.3%				0.1%
52	*Senecio plattensis*	n	p			8.3%						0.1%
52	*Taraxacum officinale*	e	p			5.6%						0.1%
52	*Thelesperma megapotamicum*	n	p				7.3%					0.1%
52	*Coryphantha missouriensis*	n	p						0.3%			0.1%
52	*Cerastium nuttans*	n	m								0.3%	0.1%
52	*Tradescantia occidentalis*	n	p		8.3%		0.7%					0.1%
52	*Sisyrinchium montanum*	n	p	2.8%		8.3%	0.7%					0.1%
52	*Oxybaphus linearis*	n	p	8.3%			4.7%					0.1%
52	Unk. Forb -824	u	u		5.6%			0.3%				0.1%
52	Unk. Forb -871	u	p		2.8%		9.3%					0.1%
52	Unk. Forb -888	u	u			5.6%						0.1%
52	*Stipa viridula*	n	p				0.7%					0.0%
52	*Lomatium orientat*	n	p	2.8%			0.7%					0.0%
52	*Nothocalis cuspidata*	n	p				2.0%					0.0%
52	*Lappula redowskii*	n	m				2.0%					0.0%
52	*Descurainia sophia*	e	m				2.7%					0.0%
52	*Chenopodium dessicatum*	n	m		2.8%							0.0%
52	*Euphorbia robusta*	n	p	2.8%			0.7%					0.0%
52	*Astragalus bisulcatus*	n	p				0.7%					0.0%
52	*Astragalus shortianus*	n	p				0.7%					0.0%
52	*Dalea candida*	n	p				1.3%					0.0%
52	*Linum usitatissimum*	e	m				4.0%					0.0%
52	*Gaura coccinea*	n	p		2.8%		0.7%					0.0%
52	*Orobanche fasciculata*	n	p				0.7%					0.0%
52	*Castilleja sessiflora*	n	p	2.8%			2.0%					0.0%
52	Unk. Forb -874	u	u	2.8%			0.7%					0.0%
52	Unk. Forb -875	u	u	2.8%			0.7%					0.0%
52	Bare Ground							12.2%	13.6%	12.3%	11.6%	0.0%
52	Litter							37.2%	51.7%	51.3%	53.5%	0.0%
53	*Andropogon gerardii*	n	p	91.7%	83.3%	83.3%	87.3%	15.7%	11.9%	11.6%	9.6%	17.8%
53	*Psoralea tenuiflora*	n	p	72.2%	47.2%	66.7%	53.3%	5.6%	4.8%	6.3%	6.6%	9.4%
53	*Stipa comata*	n	p	86.1%	94.4%	94.4%	61.3%	3.4%	2.9%	5.3%	3.0%	7.6%
53	*Bromus japonicus*	e	m	80.6%	100.0%	100.0%	84.7%	12.5%	4.5%			7.5%
53	*Carex heliophylla*	n	p	86.1%	88.9%	91.7%	84.7%	2.2%	4.2%	2.6%	2.0%	6.7%
53	*Bouteloua gracilis*	n	p	80.6%	66.7%	30.6%	70.7%	0.6%	1.3%	1.3%	3.0%	4.2%
53	*Erigeron divergens*	n	m	8.3%	30.6%	22.2%	26.0%	2.2%	1.0%	1.0%	3.0%	3.2%
53	*Ambrosia psilostachya*	n	p	16.7%	44.4%	30.6%	34.7%	1.3%	1.0%	1.0%	2.0%	3.0%
53	*Rosa arkansana*	n	p	22.2%		8.3%	17.3%	2.5%	1.6%	2.3%	2.0%	2.9%
53	*Bromus tectorum*	e	m	8.3%	41.7%	16.7%	24.0%	7.2%	1.0%			2.8%
53	*Artemisia campestris*	n	p	33.3%	44.4%	69.4%	24.0%	0.3%	0.6%	0.7%	1.7%	2.8%
53	*Tragopogon dubius*	e	m	25.0%	52.8%	41.7%	38.0%	1.6%	1.3%		0.3%	2.5%
53	*Artemisia frigida*	n	p	11.1%	36.1%	13.9%	17.3%		2.3%	0.7%	0.7%	2.0%
53	*Echinocereus viridiflorus*	n	p	72.2%	33.3%	77.8%	40.0%	0.3%			0.3%	2.0%
53	*Bouteloua curtipendula*	n	p	11.1%	41.7%	36.1%	2.7%	0.6%		1.7%		1.7%
53	*Sitanion longifolium*	n	u	33.3%	75.0%	8.3%	35.3%	0.6%		0.3%		1.7%
53	*Lepidium densiflorum*	e	m	50.0%	36.1%	52.8%	37.3%	0.3%				1.6%
53	*Sysimbrium altissimum*	e	m	27.8%	38.9%	2.8%	36.7%	1.9%			0.3%	1.5%
53	*Poa compressa*	e	p	16.7%		25.0%	21.3%	0.3%	0.3%	1.3%		1.2%
53	*Allysum minus*	e	m	2.8%	16.7%	50.0%	3.3%	0.6%	0.6%			1.2%
53	*Aster falcatus*	n	p	19.4%		5.6%	8.0%	0.3%	0.3%	1.3%	0.7%	1.0%
53	*Poa pratensis*	e	p		8.3%	8.3%		0.6%	1.0%		0.7%	0.9%
53	*Schizachyrium scoparium*	n	p	2.8%	16.7%	13.9%	5.3%	0.6%		1.0%		0.9%
53	*Koeleria macrantha*	n	p	27.8%	8.3%	16.7%	27.3%	0.6%				0.8%
53	*Yucca glauca*	n	p	5.6%		8.3%	6.0%		0.3%	0.3%	1.0%	0.8%
53	*Heterotheca villosa*	n	p	2.8%	8.3%	19.4%	24.7%	0.3%		0.3%		0.8%
53	*Buchloe dactyloides*	n	p		33.3%		8.7%	0.6%		0.3%		0.7%
53	*Liatris punctata*	n	p	2.8%	8.3%	5.6%	10.7%	0.3%	0.3%	0.3%	0.3%	0.7%
53	*Plantago patagonica*	n	m	2.8%	19.4%	16.7%	18.7%					0.7%
53	*Vulpia octoflora*	n	m	5.6%	13.9%	19.4%	5.3%	0.6%				0.6%
53	*Bouteloua hirsuta*	n	p	2.8%	5.6%	30.6%	2.7%					0.5%
53	*Cirsium undulatum*	n	m	13.9%	16.7%	5.6%	11.3%	0.6%				0.5%
53	*Descurainia pinnata*	n	m	33.3%	19.4%		18.0%					0.5%
53	*Monarda pectinata*	n	m	13.9%	11.1%	16.7%	7.3%	0.3%				0.5%
53	*Phyla cuneifolia*	n	p						0.3%		1.0%	0.5%
53	*Agropyron smithii*	n	p				6.0%	0.6%	0.6%			0.4%
53	*Artemisia ludoviciana*	n	p					0.6%			0.7%	0.4%
53	*Camelina microcarpa*	e	m		2.8%	8.3%	18.0%					0.4%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
53	*Aster porteri*	n	p	2.8%	2.8%		8.0%			0.3%		0.3%
53	*Silene antirrhina*	a	m		11.1%		4.7%	0.6%				0.3%
53	*Eriogonum alatum*	n	p		2.8%	16.7%	4.7%					0.3%
53	Unk. Forb -931	u	u		16.7%				0.3%			0.3%
53	*Aristida purpurea*	n	p	8.3%			6.7%			0.3%		0.2%
53	*Hymenopappus filifolius*	n	p		5.6%		0.7%			0.3%		0.2%
53	*Taraxacum officinale*	e	p			8.3%		0.3%				0.2%
53	*Draba reptans*	n	m	8.3%	5.6%		5.3%	0.3%				0.2%
53	*Opuntia macrorhiza*	n	p		8.3%	2.8%	4.7%					0.2%
53	*Silene scouleri*	n	p	2.8%			18.0%					0.2%
53	*Dalea purpurea*	n	p	2.8%		5.6%	2.7%				0.3%	0.2%
53	*Leucocrinum montanum*	n	p		11.1%				0.3%			0.2%
53	*Sphaeralcea coccinia*	n	p				3.3%			0.3%		0.2%
53	Unk. Forb -874	u	u			11.1%	1.3%					0.2%
53	*Muhlenbergia wrightii*	n	p			5.6%						0.1%
53	*Sorghastrum avenaceum*	n	p			8.3%						0.1%
53	*Sporobolus asper*	n	p					0.6%				0.1%
53	*Sporobolus cryptandrus*	n	p						0.3%			0.1%
53	*Antennaria rosea*	n	p		5.6%							0.1%
53	*Gaillardia aristata*	n	p	2.8%		2.8%	1.3%					0.1%
53	*Grindelia squarrosa*	n	m		8.3%		1.3%					0.1%
53	*Helianthus rigidus*	n	p				1.3%	0.3%				0.1%
53	*Thelesperma megapotamicum*	n	p				2.0%				0.3%	0.1%
53	*Cryptantha virgata*	n	m			8.3%						0.1%
53	*Onosmodium molle*	n	p						0.3%			0.1%
53	*Lesquerella montana*	n	u			2.8%	5.3%					0.1%
53	*Chenopodium dessicatum*	n	m		11.1%		1.3%					0.1%
53	*Astragalus adsurgens*	n	p					0.3%				0.1%
53	*Astragalus egrestis*	n	p		2.8%		2.0%					0.1%
53	*Linum lewisii*	n	p				4.0%					0.1%
53	*Drymocallis fissia*	n	p					0.6%				0.1%
53	Unk. Forb -888	u	u			8.3%						0.1%
53	*Juncus arcticus*	n	p				0.7%					0.0%
53	*Hordeum jubatum*	n	u				3.3%					0.0%
53	*Allium textile*	n	p				1.3%					0.0%
53	*Asclepias speciosa*	n	p	2.8%			2.0%					0.0%
53	*Gutierrezia sarothrae*	n	p		2.8%							0.0%
53	*Lactuca serriola*	e	m				0.7%					0.0%
53	*Nothocalis cuspidata*	n	p				0.7%					0.0%
53	*Podospermum laciniatum*	e	m		2.8%							0.0%
53	*Cryptantha jamesii*	n	p	5.6%			3.3%					0.0%
53	*Paronychia jamesii*	n	p				1.3%					0.0%
53	*Tradescantia occidentalis*	n	p		2.8%							0.0%
53	*Evolvulus nuttalianus*	n	p				1.3%					0.0%
53	*Astragalus tridactylicus*	n	p		2.8%							0.0%
53	*Erodium cicutarium*	e	m				1.3%					0.0%
53	*Phacelia heterophylla*	n	m				2.0%					0.0%
53	*Oxybaphus linearis*	n	p				0.7%					0.0%
53	*Calylophus serrulata*	n	p				0.7%					0.0%
53	*Gaura coccinea*	n	p				2.0%					0.0%
53	*Delphinium virescens*	n	p		2.8%							0.0%
53	*Physalis sp.*	n	u	2.8%			0.7%					0.0%
53	*Viola nuttallii*	n	p		2.8%							0.0%
53	Unk. Forb -876	u	u				2.0%					0.0%
53	Unk. Forb -877	u	u				2.0%					0.0%
53	Unk. Forb -878	u	u				0.7%					0.0%
53	Bare Ground							7.8%	4.5%	8.3%	8.6%	0.0%
53	Litter							22.9%	52.1%	50.7%	52.0%	0.0%
54	*Poa pratensis*	e	p	36.1%	75.0%	86.1%	11.3%	4.0%	8.9%	6.5%	10.2%	10.5%
54	*Andropogon gerardii*	n	p	75.0%	100.0%	75.0%	48.0%	2.3%	2.6%	11.7%	5.3%	8.8%
54	*Plantago lanceolata*	e	p	97.2%	83.3%	77.8%	80.0%	2.0%	5.3%	1.6%	3.0%	6.8%
54	*Cichorium intybus*	e	p	63.9%	80.6%	80.6%	43.3%	2.3%	3.6%	2.0%	1.7%	5.6%
54	*Juncus arcticus*	n	p	33.3%	50.0%	16.7%	34.7%	4.3%	3.6%	2.6%	3.0%	5.5%
54	*Poa compressa*	e	p	25.0%	27.8%	11.1%	36.7%	6.4%	3.6%	0.3%	0.7%	4.7%
54	*Spartina pectinata*	n	p					1.3%	1.0%	5.5%	7.3%	4.1%
54	*Agrostis gigantea*	e	p	8.3%	8.3%	11.1%	42.7%			5.9%	3.6%	3.3%
54	*Phleum pratense*	e	p		8.3%	13.9%	20.0%	1.0%	6.0%	3.3%	0.3%	3.3%
54	*Festuca pratensis*	e	p	11.1%	36.1%	16.7%	22.0%	0.7%	3.0%	2.9%	1.7%	3.2%
54	*Panicum virgatum*	n	p	41.7%	44.4%	13.9%	40.0%	0.7%	1.3%	2.0%	1.3%	2.8%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
54	*Dianthus armeria*	e	p	63.9%	61.1%	66.7%	32.0%		0.3%			2.3%
54	*Trifolium pratense*	e	p	22.2%	27.8%	38.9%	12.0%	0.3%	2.0%	0.3%	1.0%	2.1%
54	*Bouteloua gracilis*	n	p	22.2%	25.0%	16.7%	15.3%	1.0%	0.3%	2.6%	0.7%	2.0%
54	*Dactylis glomerata*	e	p	11.1%	38.9%	27.8%	6.7%	0.7%	2.0%	1.3%		2.0%
54	*Sorghastrum avenaceum*	n	p	11.1%	25.0%	8.3%	14.7%	1.0%	0.7%	2.0%	1.3%	2.0%
54	*Carex nebrascensis*	n	p				20.0%	1.0%	0.3%	3.3%	1.3%	1.9%
54	*Ambrosia psilostachya*	n	p	58.3%	47.2%	50.0%	14.7%	0.3%		0.3%	0.7%	1.9%
54	*Carex sp.*	u	p		2.8%			2.3%		2.0%	1.3%	1.7%
54	*Convolvulus arvensis*	e	p	27.8%	27.8%	30.6%	11.3%	0.7%	0.7%	0.7%		1.5%
54	*Erigeron flagellaris*	n	p	11.1%	8.3%	30.6%	20.0%		1.7%	0.3%	0.3%	1.4%
54	*Acetosella vulgaris*	e	p	30.6%	16.7%	38.9%	12.7%	0.3%	1.0%		0.3%	1.4%
54	*Bromus japonicus*	e	m		41.7%	41.7%	1.3%	0.3%	0.3%			1.3%
54	*Carex stipata*	n	p				16.7%	1.3%	1.7%			1.2%
54	*Eleocharis elliptica*	n	u				10.0%		0.3%	2.0%	1.7%	1.2%
54	*Buchloe dactyloides*	n	p		13.9%	11.1%	10.7%		0.3%	0.3%	1.3%	1.0%
54	*Schizachyrium scoparium*	n	p	25.0%	16.7%		24.0%	1.0%				1.0%
54	*Cirsium arvense*	e	p	5.6%	11.1%		32.7%		0.3%	1.0%		1.0%
54	*Taraxacum officianale*	e	p		16.7%	27.8%	12.0%			0.7%	0.3%	1.0%
54	*Dalea candida*	n	p	16.7%	30.6%	19.4%	9.3%			0.3%		0.9%
54	*Psoralea tenuiflora*	n	p	47.2%	16.7%	11.1%	17.3%		0.3%	0.3%	0.3%	0.9%
54	*Allysum minus*	e	m	30.6%	8.3%	36.1%	10.0%					0.8%
54	*Carex heliophylla*	n	p	13.9%	8.3%	16.7%	5.3%		0.3%	0.7%		0.7%
54	*Aster falcatus*	n	p	25.0%	19.4%	11.1%	8.0%	0.3%		0.3%		0.7%
54	Unk. Forb -932	u	u		33.3%	16.7%						0.7%
54	*Medicago lupulina*	e	m	8.3%		16.7%	8.7%		0.7%		0.3%	0.6%
54	*Lupinus argenteus*	n	p	8.3%	5.6%	16.7%	3.3%		0.7%			0.5%
54	*Oxalis dillenii*	n	m	2.8%	11.1%	27.8%	0.7%					0.5%
54	*Agropyron smithii*	n	p		2.8%	8.3%	3.3%		0.3%	0.7%		0.4%
54	*Calamagrostis canadensis*	n	p					1.0%				0.4%
54	*Aster porteri*	n	p		5.6%		5.3%		0.3%	0.7%		0.4%
54	*Tragopogon dubius*	e	m	19.4%	8.3%	11.1%	9.3%					0.4%
54	*Prunella vulgaris*	n	p				9.3%	0.3%	0.3%			0.4%
54	*Carex lanuginosa*	n	p						1.0%			0.3%
54	*Achillea lanulosa*	n	p		2.8%	5.6%	0.7%		0.7%			0.3%
54	*Artemisia ludoviciana*	n	p	16.7%	2.8%	11.1%	5.3%					0.3%
54	*Hippochaete laevigata*	n	m				14.0%			0.3%		0.3%
54	*Erodium cicutarium*	e	m		2.8%	5.6%	2.0%	0.3%				0.3%
54	*Carex brevior*	n	p		8.3%		4.0%					0.2%
54	*Agropyron repens*	e	p	2.8%			9.3%					0.2%
54	*Heterotheca villosa*	n	p				2.0%	0.3%				0.2%
54	*Lepidium campestre*	e	m	19.4%	5.6%		7.3%					0.2%
54	*Astragalus shortianus*	n	p			2.8%			0.7%			0.2%
54	*Melilotus alba*	e	m		8.3%		4.0%					0.2%
54	*Rosa arkansana*	n	p				4.0%			0.7%		0.2%
54	*Aristida purpurea*	n	p								0.3%	0.1%
54	*Bouteloua curtipendula*	n	p				8.0%					0.1%
54	*Bromus tectorum*	e	m		5.6%							0.1%
54	*Stipa comata*	n	p			8.3%						0.1%
54	*Apocynum sibericum*	e	p				3.3%					0.1%
54	*Artemisia frigida*	n	p		5.6%							0.1%
54	*Carduus nuttans*	e	m			2.8%	1.3%					0.1%
54	*Grindelia squarrosa*	n	m			8.3%						0.1%
54	*Camelina microcarpa*	e	m	2.8%			4.0%					0.1%
54	*Opuntia macrorhiza*	n	p	5.6%	2.8%		5.3%					0.1%
54	*Dalea purpurea*	n	p			5.6%	1.3%					0.1%
54	*Thermopsis divaricarpa*	n	p	5.6%	2.8%	5.6%	1.3%					0.1%
54	*Plantago major*	e	p				6.7%					0.1%
54	*Rumex crispus*	e	p				1.3%		0.3%			0.1%
54	*Potentilla gracilis*	n	p		5.6%							0.1%
54	*Verbena hastata*	n	p				3.3%					0.1%
54	*Verbena sp.*	u	u				6.0%					0.1%
54	*Scirpus acutus*	n	p				1.3%					0.0%
54	*Juncus bufonius*	n	m		2.8%		2.0%					0.0%
54	*Juncus longistylis*	n	p				0.7%					0.0%
54	*Setaria glauca*	e	m				0.7%					0.0%
54	Unk. Grass - 182	u	u				2.0%					0.0%
54	*Alisma triviale*	n	p				0.7%					0.0%
54	*Asclepias speciosa*	n	p				2.7%					0.0%
54	*Artemisia campestris*	n	p				0.7%					0.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
54	*Cirsium undulatum*	n	m				0.7%					0.0%
54	*Cirsium vulgare*	e	m				1.3%					0.0%
54	*Gutierrezia sarothrae*	n	p				2.0%					0.0%
54	*Liatris punctata*	n	p	2.8%			2.0%					0.0%
54	*Senecio plattensis*	n	p				1.3%					0.0%
54	*Lepidium densiflorum*	e	m			2.8%						0.0%
54	*Echinocereus viridiflorus*	n	p				2.7%					0.0%
54	*Opuntia fragilis*	n	p		2.8%							0.0%
54	*Trifolium hybribum*	e	u				0.7%					0.0%
54	*Polygonum sawatchense*	n	m		2.8%							0.0%
54	*Ranunculus macounii*	n	p				0.7%					0.0%
54	Unk. Forb -880	u	u				0.7%					0.0%
54	Unk. Forb -881	u	u				1.3%					0.0%
54	Unk. Forb -882	u	u				0.7%					0.0%
54	Unk. Forb -883	u	u				0.7%					0.0%
54	Bare Ground							18.4%	5.3%	10.7%	5.6%	0.0%
54	Litter							43.8%	38.1%	24.4%	45.2%	0.0%
55	*Andropogon gerardii*	n	p	88.9%	91.7%	86.1%	83.3%	2.0%	8.9%	3.3%	3.4%	10.2%
55	*Panicum virgatum*	n	p	8.3%	50.0%	30.6%	52.0%	3.0%	5.3%	4.3%	1.6%	7.5%
55	*Bouteloua gracilis*	n	p	80.6%	69.4%	75.0%	58.7%	2.0%	1.3%	5.3%	2.5%	7.4%
55	*Erigeron flagellaris*	n	p	25.0%	41.7%	50.0%	40.7%	3.3%	3.3%	4.0%	1.3%	6.6%
55	*Poa compressa*	e	p	33.3%	38.9%	25.0%	49.3%	3.3%	1.7%	2.6%	1.6%	5.6%
55	*Tragia ramosa*	n	p	52.8%	66.7%	72.2%	50.7%		2.3%	3.6%	0.6%	4.7%
55	*Stipa comata*	n	p	38.9%	41.7%	61.1%	40.0%	1.0%	2.6%	0.3%	0.6%	3.3%
55	*Psoralea tenuiflora*	n	p	30.6%	50.0%	33.3%	32.7%		1.0%	2.0%	1.3%	3.2%
55	*Carex heliophylla*	n	p	55.6%	50.0%	63.9%	44.0%		1.0%	0.7%	1.3%	3.0%
55	*Bouteloua curtipendula*	n	p	30.6%	30.6%	22.2%	19.3%	1.0%	0.7%	0.7%	1.9%	2.9%
55	*Poa pratensis*	e	p		5.6%	36.1%		2.3%	1.3%	0.3%	1.3%	2.9%
55	*Koeleria macrantha*	n	p	8.3%	44.4%	72.2%	7.3%		3.3%	0.3%		2.4%
55	*Opuntia macrorhiza*	n	p	22.2%	44.4%	33.3%	34.0%	1.7%	0.3%		0.3%	2.3%
55	*Schizachyrium scoparium*	n	p	47.2%	22.2%	22.2%	47.3%	1.3%	0.3%	0.3%	0.3%	2.1%
55	*Allysum minus*	e	m	61.1%	36.1%	88.9%	24.7%	0.7%	1.0%			2.1%
55	*Tragopogon dubius*	e	m	63.9%	52.8%	52.8%	65.3%					1.8%
55	*Acetosella vulgaris*	e	p		16.7%	25.0%	28.7%	0.7%	0.7%	0.7%	0.3%	1.8%
55	*Artemisia frigida*	n	p	47.2%	25.0%	30.6%	25.3%			0.3%	0.9%	1.6%
55	*Bromus japonicus*	e	m	27.8%	33.3%	52.8%	18.0%	0.3%	1.0%			1.5%
55	*Dalea purpurea*	n	p	47.2%	36.1%	27.8%	35.3%		0.3%	0.7%		1.5%
55	*Aster porteri*	n	p	8.3%	5.6%	13.9%	2.0%	0.3%	2.0%	0.3%	0.3%	1.3%
55	*Gutierrezia sarothrae*	n	p	2.8%	27.8%	27.8%	4.7%		0.3%		0.9%	1.3%
55	*Buchloe dactyloides*	n	p	13.9%		11.1%	14.7%	0.7%			0.9%	1.2%
55	*Sorghastrum avenaceum*	n	p	36.1%	22.2%	22.2%	29.3%		0.7%		0.3%	1.2%
55	*Paronychia jamesii*	n	p	30.6%	16.7%	19.4%	16.7%			0.3%	0.6%	1.1%
55	*Aster falcatus*	n	p	13.9%	8.3%	19.4%	15.3%	0.3%	0.7%	0.3%		1.0%
55	*Liatris punctata*	n	p	8.3%	36.1%	22.2%	13.3%		0.3%			0.9%
55	*Arenaria fendlerii*	n	p	2.8%	11.1%	11.1%	23.3%		0.7%		0.3%	0.9%
55	*Hypericum perforatum*	e	p	27.8%	16.7%	25.0%	26.0%				0.3%	0.9%
55	*Talinum parviflorum*	n	u	22.2%	19.4%	13.9%	23.3%	0.3%		0.3%		0.9%
55	*Ambrosia psilostachya*	n	p	27.8%	8.3%	27.8%	11.3%		0.3%		0.3%	0.8%
55	*Cichorium intybus*	e	p	5.6%	5.6%	8.3%	2.0%	0.7%	0.3%	0.3%		0.8%
55	*Heterotheca villosa*	n	p	16.7%	22.2%	22.2%	12.0%		0.3%			0.7%
55	*Silene antirrhina*	e	m	25.0%	25.0%	41.7%	8.7%					0.7%
55	*Aristida purpurea*	n	p	19.4%	2.8%	5.6%	9.3%		0.3%	0.3%	0.3%	0.6%
55	*Camelina microcarpa*	e	m	27.8%	11.1%	33.3%	18.7%					0.6%
55	*Eriogonum alatum*	n	p	11.1%	16.7%	2.8%	10.7%			0.7%		0.6%
55	*Taraxacum officianale*	e	p	8.3%		33.3%	2.7%			0.3%		0.5%
55	*Lepidium densiflorum*	e	m	16.7%	2.8%	25.0%	7.3%	0.3%				0.5%
55	*Sitanion longifolium*	n	u	11.1%	16.7%	8.3%	8.7%					0.4%
55	*Evolvulus nuttalianus*	n	p	36.1%	5.6%	19.4%	10.0%					0.4%
55	*Erodium cicutarium*	e	m					0.7%	0.3%			0.4%
55	*Calylophus serrulata*	n	p	36.1%	16.7%	13.9%	12.0%					0.4%
55	*Plantago patagonica*	n	m		11.1%	22.2%	10.7%					0.4%
55	*Agropyron smithii*	n	p					0.7%				0.3%
55	*Senecio plattensis*	n	p		11.1%	19.4%						0.3%
55	*Echinocereus viridiflorus*	n	p	13.9%	11.1%	2.8%	10.0%					0.3%
55	*Dianthus armeria*	e	p	8.3%	2.8%		22.7%					0.3%
55	*Oxytropis lambertii*	n	p		27.8%							0.3%
55	*Oxybaphus linearis*	n	p	5.6%	2.8%	13.9%	4.7%		0.3%			0.3%
55	*Oxalis dillenii*	n	m		8.3%	2.8%	15.3%					0.3%
55	*Veronica peregrina*	e	m					0.7%				0.3%

Appendix 3 (Cont.)

Plot	Species			% of Quadrats Present				% Cover				IMP
				Part94	July95	July96	All94	June95	June96	Aug95	Aug96	
55	*Sporobolus asper*	n	p			2.8%	1.3%			0.3%		0.2%
55	*Cirsium floodmanii*	n	p	5.6%			2.7%	0.3%				0.2%
55	*Lactuca serriola*	e	m	8.3%	5.6%	11.1%	4.7%					0.2%
55	*Ratibida columnifera*	n	p	2.8%	13.9%	5.6%	0.7%					0.2%
55	*Onosmodium molle*	n	p		11.1%	2.8%			0.3%			0.2%
55	*Lepidium campestre*	e	m		8.3%	11.1%	2.0%					0.2%
55	*Chenopodium dessicatum*	n	m	11.1%	5.6%	5.6%	6.0%					0.2%
55	*Euphorbia robusta*	n	p	11.1%	2.8%	11.1%	3.3%					0.2%
55	*Astragalus shortianus*	n	p	2.8%		8.3%	0.7%		0.3%			0.2%
55	*Dalea candida*	n	p		5.6%		12.0%					0.2%
55	*Plantago lanceolata*	e	p			8.3%			0.3%			0.2%
55	*Drymocallis fissia*	n	p	8.3%		19.4%	3.3%					0.2%
55	*Bouteloua hirsuta*	n	p		8.3%		3.3%					0.1%
55	*Sporobolus cryptandrus*	n	p			2.8%			0.3%			0.1%
55	*Allium textile*	n	p		11.1%							0.1%
55	*Asclepias pumila*	n	p	2.8%			5.3%					0.1%
55	*Antennaria rosea*	n	p		5.6%	2.8%						0.1%
55	*Artemisia campestris*	n	p	2.8%	8.3%	5.6%	0.7%					0.1%
55	*Artemisia ludoviciana*	n	p	25.0%			11.3%					0.1%
55	*Gaillardia aristata*	n	p			11.1%						0.1%
55	*Lesquerella montana*	n	u			11.1%	2.7%					0.1%
55	*Opuntia fragilis*	n	p	11.1%		8.3%	6.0%					0.1%
55	*Campanula rotundifolia*	n	p			8.3%			0.3%			0.1%
55	*Cerastium arvense*	n	p						0.3%			0.1%
55	*Tradescantia occidentalis*	n	p									0.1%
55	*Convolvulus arvensis*	e	p	11.1%		2.8%	2.7%					0.1%
55	*Comandra umbellata*	n	p				2.7%		0.3%			0.1%
55	*Musineon divaricatum*	n	p	8.3%			2.0%					0.0%
55	*Apocynum sibericum*	e	p				2.0%					0.0%
55	*Grindelia squarrosa*	n	m				1.3%					0.0%
55	*Senecio integerimus*	n	p				1.3%					0.0%
55	*Draba reptans*	n	m	2.8%			0.7%					0.0%
55	*Erysimum asperum*	n	p	2.8%		2.8%	0.7%					0.0%
55	*Monarda pectinata*	n	m			2.8%						0.0%
55	*Oenothera brachycarpa*	n	p		2.8%							0.0%
55	*Polygonum sawatchense*	n	m		2.8%							0.0%
55	*Ceanothus herbaceous*	n	p	5.6%			3.3%					0.0%
55	*Ceanothus velutinus*	n	p		2.8%							0.0%
55	*Penstemon secundiflorus*	n	p				0.7%					0.0%
55	Unk. Forb -884	u	u	2.8%			0.7%					0.0%
55	Unk. Forb -885	u	u				0.7%					0.0%
55	Unk. Forb -932	u	u			5.6%						0.0%
55	Bare Ground							38.9%	20.9%	31.0%	30.0%	0.0%
55	Litter							33.6%	33.8%	36.3%	46.6%	0.0%
56	*Poa pratensis*	e	p	125.0%	63.9%	77.8%	100.0%	13.5%	10.6%	11.0%	14.5%	19.9%
56	*Andropogon gerardii*	n	p	36.1%	22.2%	22.2%	45.3%	6.6%	6.3%	8.8%	11.5%	11.8%
56	*Poa compressa*	e	p		41.7%	44.4%	26.7%	5.6%	2.0%	7.1%	3.7%	7.6%
56	*Cichorium intybus*	e	p	22.2%	55.6%	55.6%	42.7%	2.6%	4.6%	1.6%	3.4%	7.0%
56	*Plantago lanceolata*	e	p	69.4%	50.0%	36.1%	69.3%	4.6%	1.3%	3.9%	1.4%	6.5%
56	*Juncus arcticus*	n	p	33.3%	52.8%	77.8%	38.7%	1.3%	3.0%	1.6%	0.7%	5.6%
56	*Spartina pectinata*	n	p	41.7%	2.8%	33.3%	20.0%	1.6%		5.2%	2.7%	3.8%
56	*Bouteloua gracilis*	n	p	36.1%	38.9%	19.4%	18.0%	1.3%	0.7%	2.6%	2.0%	3.4%
56	*Cirsium arvense*	e	p	47.2%	33.3%	38.9%	23.3%	0.3%	1.3%	2.3%	1.0%	3.4%
56	*Carex sp.*	u	p		30.6%			6.9%		1.3%	1.4%	3.3%
56	*Aster falcatus*	n	p	19.4%	19.4%	27.8%	18.7%	0.3%	1.0%		0.7%	2.0%
56	*Psoralea tenuiflora*	n	p	16.7%	19.4%	13.9%	24.0%	0.7%	1.0%	0.3%	0.3%	1.9%
56	*Bromus japonicus*	e	m	22.2%	27.8%	19.4%	16.7%	1.3%	0.3%			1.8%
56	*Panicum virgatum*	n	p	16.7%	5.6%	11.1%	25.3%	0.3%	0.3%	0.6%	1.0%	1.6%
56	*Dianthus armeria*	e	p	33.3%	8.3%	27.8%	34.0%					1.5%
56	*Agropyron smithii*	n	p	22.2%	16.7%	22.2%	17.3%		0.3%	0.3%		1.4%
56	*Stipa comata*	n	p	5.6%	19.4%	13.9%	8.0%		1.0%		0.7%	1.4%
56	*Rosa arkansana*	n	p	19.4%	2.8%	22.2%	8.0%	0.3%			1.4%	1.2%
56	*Iris missouriensis*	n	p		5.6%	8.3%	4.0%	1.3%	0.7%			1.0%
56	*Schizachyrium scoparium*	n	p	5.6%	16.7%	2.8%	5.3%	0.7%			0.3%	0.8%
56	*Tragopogon dubius*	e	m	11.1%	11.1%	8.3%	19.3%					0.8%
56	*Carex heliophylla*	n	p		16.7%	11.1%	0.7%		0.3%			0.7%
56	*Eleocharis elliptica*	n	u		16.7%					1.3%		0.7%
56	*Buchloe dactyloides*	n	p	8.3%	11.1%	8.3%	3.3%		0.3%		0.3%	0.7%
56	*Sporobolus asper*	n	p		11.1%			0.3%	0.3%	0.6%		0.6%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
56	*Lepidium campestre*	e	m	11.1%	16.7%	11.1%	4.0%					0.6%
56	*Acetosella vulgaris*	e	p		2.8%	19.4%	4.0%	0.3%				0.6%
56	*Agrostis gigantea*	e	p		13.9%		2.7%				0.7%	0.5%
56	*Phleum pratense*	e	p			2.8%	2.0%		1.0%			0.5%
56	*Sorghastrum avenaceum*	n	p		8.3%					0.3%	1.0%	0.5%
56	*Liatris punctata*	n	p	8.3%	2.8%	8.3%	3.3%			0.3%	0.3%	0.5%
56	*Lupinus argenteus*	n	p		11.1%		2.0%			0.6%	0.3%	0.5%
56	*Muhlenbergia racemosa*	n	p		5.6%					0.6%	0.3%	0.4%
56	*Allium textile*	n	p	11.1%	11.1%		9.3%					0.4%
56	*Camelina microcarpa*	e	m	19.4%	16.7%		5.3%					0.4%
56	*Ambrosia psilostachya*	n	p		5.6%			0.3%			0.3%	0.3%
56	*Artemisia ludoviciana*	n	p				4.0%			0.3%	0.3%	0.3%
56	*Taraxacum officianale*	e	p			13.9%	0.7%					0.3%
56	*Opuntia macrorhiza*	n	p			2.8%	4.7%		0.3%			0.3%
56	*Carex nebrascensis*	n	p						0.3%	0.3%		0.2%
56	*Sitanion longifolium*	n	u	8.3%	2.8%		2.0%				0.3%	0.2%
56	*Arnica fulgens*	n	p		11.1%							0.2%
56	*Artemisia frigida*	n	p	13.9%	2.8%	2.8%	3.3%					0.2%
56	*Aster porteri*	n	p		5.6%	2.8%						0.2%
56	*Erigeron flagellaris*	n	p		8.3%		1.3%					0.2%
56	*Helianthus pumilus*	n	p		11.1%							0.2%
56	*Hippochaete laevigata*	n	m			2.8%	4.7%					0.2%
56	Unk. Forb -932	u	u		8.3%							0.2%
56	Unk. Forb -965	u	u			8.3%						0.2%
56	*Carex stipata*	n	p						0.3%			0.1%
56	*Juncus longistylis*	n	p		2.8%			0.3%				0.1%
56	*Aristida purpurea*	n	p	2.8%			2.7%					0.1%
56	*Dactylis glomerata*	e	p			2.8%						0.1%
56	*Asclepias engelmanniana*	n	p								0.3%	0.1%
56	*Heterotheca villosa*	n	p	2.8%		2.8%	4.0%					0.1%
56	*Allysum minus*	e	m				3.3%					0.1%
56	*Opuntia fragilis*	n	p		2.8%							0.1%
56	*Silene antirrhina*	e	m		5.6%							0.1%
56	*Chenopodium dessicatum*	n	m		2.8%							0.1%
56	*Convolvulus arvensis*	e	p				2.0%			0.3%		0.1%
56	*Dalea candida*	n	p		2.8%							0.1%
56	*Gaura coccinea*	n	p		2.8%							0.1%
56	*Plantago patagonica*	n	m		2.8%		0.7%					0.1%
56	*Potentilla gracilis*	n	p	2.8%	5.6%		0.7%					0.1%
56	*Comandra umbellata*	n	p			2.8%	0.7%					0.1%
56	Unk. Forb -920	u	u					0.3%				0.1%
56	*Dicanthelium oligosanthes*	n	m				0.7%					0.0%
56	*Koeleria macrantha*	n	p				2.0%					0.0%
56	*Apocynum sibericum*	e	p				0.7%					0.0%
56	*Gutierrezia sarothrae*	n	p				2.0%					0.0%
56	*Lesquerella montana*	n	u				1.3%					0.0%
56	*Echinocereus viridiflorus*	n	p				1.3%					0.0%
56	*Dalea purpurea*	n	p				1.3%					0.0%
56	*Oxytropis lambertii*	n	p				0.7%					0.0%
56	*Trifolium repens*	e	p	2.8%			0.7%					0.0%
56	*Oxalis dillenii*	n	m				1.3%					0.0%
56	Unk. Forb -886	u	u				2.0%					0.0%
56	Bare Ground							6.6%	3.3%	5.2%	5.1%	0.0%
56	Litter							42.4%	59.3%	43.2%	43.9%	0.0%
57	*Poa pratensis*	e	p	88.9%	80.6%	94.4%	73.3%	11.7%	9.3%	8.5%	13.5%	17.6%
57	*Andropogon gerardii*	n	p	75.0%	91.7%	94.4%	65.3%	4.3%	10.3%	14.4%	13.2%	16.9%
57	*Poa compressa*	e	p	41.7%	61.1%	77.8%	50.0%	6.0%	5.7%	7.5%	4.6%	10.6%
57	*Cichorium intybus*	e	p	25.0%	36.1%	33.3%	42.7%	2.7%	2.0%	1.3%	1.6%	4.3%
57	*Psoralea tenuiflora*	n	p	52.8%	69.4%	52.8%	30.7%	0.7%	1.3%	1.3%	1.6%	4.0%
57	*Panicum virgatum*	n	p	75.0%	36.1%	38.9%	41.3%		1.0%	1.3%	1.6%	3.1%
57	*Plantago lanceolata*	e	p	2.8%	8.3%		44.0%	3.7%	0.3%	1.0%		2.6%
57	*Carex sp.*	u	p					2.3%		3.6%	2.3%	2.4%
57	*Aster porteri*	n	p		61.1%	38.9%				2.0%	1.3%	2.4%
57	*Juncus arcticus*	n	p	8.3%	25.0%	16.7%	42.0%	0.7%	1.3%	0.7%		2.3%
57	*Bouteloua gracilis*	n	p	30.6%	30.6%	16.7%	16.7%	0.7%	1.0%	1.0%	1.3%	2.3%
57	*Erigeron flagellaris*	n	p	36.1%	33.3%	38.9%	14.7%	1.3%		0.3%	1.3%	2.3%
57	*Carex heliophylla*	n	p	13.9%	25.0%	8.3%	12.7%	0.3%	1.7%	0.3%	1.0%	1.8%
57	*Dianthus armeria*	e	p	52.8%	2.8%	13.9%	54.0%	1.0%	0.3%			1.8%
57	*Bromus japonicus*	e	m	16.7%	52.8%	27.8%	10.7%		0.3%			1.6%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
57	*Aster falcatus*	n	p	5.6%	11.1%	22.2%	17.3%	1.0%	0.3%		0.3%	1.4%
57	*Convolvulus arvensis*	e	p		27.8%		12.0%			1.0%	1.6%	1.4%
57	*Schizachyrium scoparium*	n	p	16.7%	30.6%	22.2%	10.7%			0.3%	0.7%	1.3%
57	*Spartina pectinata*	n	p				6.0%	1.3%		2.0%	0.3%	1.2%
57	*Bouteloua curtipendula*	n	p	8.3%	30.6%	5.6%	4.0%	0.7%		0.7%		1.0%
57	*Opuntia macrorhiza*	n	p	5.6%	25.0%	19.4%	12.0%					0.9%
57	*Iris missouriensis*	n	p				8.0%		0.3%	1.0%	1.3%	0.9%
57	*Rosa arkansana*	n	p		2.8%				0.7%	1.6%	0.7%	0.9%
57	*Tragopogon dubius*	e	m	11.1%	30.6%		12.0%				0.3%	0.8%
57	*Buchloe dactyloides*	n	p	13.9%	16.7%	5.6%	7.3%			0.3%	0.3%	0.7%
57	*Koeleria macrantha*	n	p	2.8%	13.9%	5.6%	7.3%	0.3%	0.3%			0.7%
57	*Sorghastrum avenaceum*	n	p	5.6%	11.1%	8.3%	16.7%		0.3%			0.7%
57	*Artemisia ludoviciana*	n	p	27.8%	13.9%	11.1%	8.7%		0.3%			0.7%
57	*Cirsium arvense*	e	p				5.3%	0.3%	0.3%	1.0%	0.3%	0.7%
57	*Oxalis dillenii*	n	m	19.4%	30.6%	8.3%	6.7%					0.7%
57	*Acetosella vulgaris*	e	p	11.1%	8.3%	22.2%	4.7%	0.3%				0.7%
57	*Agropyron smithii*	n	p		13.9%		3.3%			1.0%	0.3%	0.6%
57	*Dicanthelium oligosanthes*	n	m	11.1%	2.8%	19.4%	7.3%	0.3%				0.6%
57	*Sporobolus asper*	n	p		11.1%	19.4%	7.3%					0.6%
57	*Hypericum perforatum*	e	p	19.4%	8.3%	16.7%	10.7%					0.6%
57	*Sitanion longifolium*	n	u	2.8%	8.3%	11.1%	3.3%			0.3%		0.5%
57	*Achillea lanulosa*	n	p				11.3%		0.3%	0.3%		0.4%
57	*Lomatium oriental*	n	p	19.4%	2.8%		11.3%					0.3%
57	*Asclepias engelmanniana*	n	p	5.6%	5.6%	8.3%	2.0%					0.3%
57	*Ambrosia psilostachya*	n	p	8.3%	5.6%	8.3%	2.0%					0.3%
57	*Artemisia frigida*	n	p		8.3%	2.8%	2.7%		0.3%			0.3%
57	*Taraxacum officianale*	e	p			8.3%			0.3%			0.3%
57	Unk. Forb -965	u	u			16.7%						0.3%
57	*Carex stipata*	n	p						0.7%			0.2%
57	*Juncus longistylis*	n	p					0.7%				0.2%
57	*Aristida purpurea*	n	p		2.8%		1.3%		0.3%			0.2%
57	*Stipa viridula*	n	p	5.6%			7.3%			0.3%		0.2%
57	*Allysum minus*	e	m	2.8%		2.8%	1.3%	0.3%				0.2%
57	*Camelina microcarpa*	e	m	2.8%	11.1%		4.0%					0.2%
57	*Lepidium campestre*	e	m		13.9%							0.2%
57	*Dalea purpurea*	n	p	2.8%	2.8%		2.0%				0.3%	0.2%
57	*Medicago lupulina*	e	m	5.6%			13.3%					0.2%
57	*Talinum parviflorum*	n	u			8.3%	1.3%					0.2%
57	*Muhlenbergia racemosa*	n	p			8.3%						0.1%
57	*Stipa comata*	n	p			2.8%					0.3%	0.1%
57	Unk. Grass - 199	u	u						0.3%			0.1%
57	*Allium textile*	n	p		5.6%		1.3%					0.1%
57	*Liatris punctata*	n	p		2.8%		0.7%			0.3%		0.1%
57	*Lepidium densiflorum*	e	m			5.6%	2.0%					0.1%
57	*Lesquerella montana*	n	u				0.7%	0.3%				0.1%
57	*Opuntia fragilis*	n	p		5.6%							0.1%
57	*Symphoricarpos occidentalis*	n	p			8.3%						0.1%
57	*Silene antirrhina*	e	m		2.8%		2.0%					0.1%
57	*Erodium cicutarium*	e	m		5.6%							0.1%
57	*Oxybaphus linearis*	n	p		2.8%		0.7%					0.1%
57	*Plantago patagonica*	n	m				4.0%					0.1%
57	*Eriogonum alatum*	n	p				3.3%			0.3%		0.1%
57	*Drymocallis fissia*	n	p				2.7%			0.3%		0.1%
57	Unk. Forb -774	u	u					0.3%				0.1%
57	*Agrostis gigantea*	e	p				1.3%					0.0%
57	*Phleum pretense*	e	p				0.7%					0.0%
57	*Artemesia campestris*	n	p				2.0%					0.0%
57	*Heterotheca villosa*	n	p		2.8%							0.0%
57	*Packeria pseudoaureas*	n	p			2.8%						0.0%
57	*Senecio plattensis*	n	p				2.0%					0.0%
57	*Erysimum asperum*	n	p			2.8%						0.0%
57	*Echinocereus viridiflorus*	n	p				0.7%					0.0%
57	*Arenaria fendlerii*	n	p				1.3%					0.0%
57	*Cerastium arvense*	n	p	2.8%			0.7%					0.0%
57	*Silene scoulerii*	n	p				1.3%					0.0%
57	*Evolvulus nuttalianus*	n	p				2.0%					0.0%
57	*Tragia ramosa*	n	p				0.7%					0.0%
57	*Astragalus shortianus*	n	p				0.7%					0.0%
57	*Trifolium repens*	e	p				2.7%					0.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
57	*Calylophus serrulata*	n	p	2.8%			0.7%					0.0%
57	*Penstemon gracilis*	n	p	5.6%			1.3%					0.0%
57	Unk. Forb -887	u	u	2.8%			0.7%					0.0%
57	Bare Ground							11.3%	3.7%	5.9%	3.0%	0.0%
57	Litter							47.3%	56.7%	40.0%	46.7%	0.0%
58	*Poa compressa*	e	p	77.8%	58.3%	63.9%	62.7%	6.5%	4.0%	5.8%	4.0%	9.3%
58	*Panicum virgatum*	n	p	8.3%	16.7%	5.6%	52.0%	6.9%	5.0%	6.5%	6.3%	8.7%
58	*Plantago lanceolata*	e	p	97.2%	77.8%	72.2%	73.3%	4.9%	2.7%	3.9%	1.0%	7.6%
58	*Poa pratensis*	e	p	58.3%	41.7%	33.3%	50.0%	3.6%	5.6%	1.3%	6.3%	7.4%
58	*Cichorium intybus*	e	p	69.4%	72.2%	75.0%	48.7%	3.3%	3.3%	2.9%	2.3%	7.0%
58	*Sporobolus asper*	n	p	16.7%	33.3%	38.9%	33.3%	2.6%	2.7%	6.2%	5.0%	6.7%
58	*Andropogon gerardii*	n	p	38.9%	27.8%	38.9%	11.3%	2.3%	1.7%	3.6%	3.0%	4.4%
58	*Sorghastrum avenaceum*	n	p	41.7%	41.7%	33.3%	33.3%	1.6%	1.3%	1.9%	2.3%	4.0%
58	*Aster falcatus*	n	p	30.6%	33.3%	36.1%	36.7%	0.7%	1.3%	2.3%	0.7%	3.3%
58	*Eleocharis elliptica*	n	u		5.6%		22.7%	2.0%	2.3%	2.9%	1.7%	3.2%
58	*Carex lanuginosa*	n	p		5.6%		13.3%	4.9%		0.6%	2.7%	2.7%
58	*Convolvulus arvensis*	e	p	8.3%	11.1%	11.1%	14.7%	0.3%	2.3%	2.3%	1.0%	2.5%
58	*Rosa arkansana*	n	p				4.7%	1.6%	2.0%	1.3%	3.0%	2.5%
58	*Psoralea tenuiflora*	n	p	38.9%	50.0%	19.4%	9.3%	0.7%		0.6%	1.7%	2.2%
58	*Bromus japonicus*	e	m	16.7%	55.6%	52.8%	4.7%		0.3%			2.0%
58	*Dianthus armeria*	e	p	47.2%	33.3%	38.9%	42.7%					2.0%
58	*Agrostis gigantea*	e	p				31.3%	1.0%		2.6%	0.7%	1.8%
58	*Bouteloua gracilis*	n	p	27.8%	41.7%	22.2%	8.7%				1.7%	1.7%
58	*Ambrosia psilostachya*	n	p	8.3%	16.7%	19.4%	20.7%	1.0%	0.7%	0.6%		1.7%
58	*Allysum minus*	e	m	8.3%	36.1%	36.1%	2.0%	0.3%	0.3%			1.4%
58	*Agropyron smithii*	n	p	30.6%	27.8%	13.9%	11.3%	0.7%		0.3%	0.3%	1.3%
58	*Carex praegracilis*	n	p			16.7%	2.0%		1.7%	1.0%		1.2%
58	*Aster porteri*	n	p		16.7%	27.8%	2.7%		0.3%	0.3%	0.7%	1.2%
58	*Cirsium arvense*	e	p				11.3%	1.3%	1.3%	0.6%		1.2%
58	*Phleum pratense*	e	p	33.3%	5.6%	13.9%	13.3%	0.7%	0.7%		0.3%	1.1%
58	*Hippochaete laevigata*	n	m	22.2%	19.4%	19.4%	12.0%			0.6%	0.3%	1.1%
58	*Carex stipata*	n	p				18.0%			2.3%		1.0%
58	*Tragopogon dubius*	e	m	19.4%	27.8%	27.8%	6.7%					1.0%
58	*Juncus arcticus*	n	p	2.8%		8.3%	26.0%	0.7%				0.8%
58	*Buchloe dactyloides*	n	p	5.6%		25.0%	6.7%			1.0%		0.8%
58	*Distichlis spicata*	n	p			5.6%	0.7%	1.0%	0.3%		1.0%	0.8%
58	*Bouteloua curtipendula*	n	p		16.7%	19.4%						0.6%
58	*Muhlenbergia wrightii*	n	p				0.7%		0.7%		1.3%	0.6%
58	*Potentilla gracilis*	n	p		16.7%	5.6%						0.4%
58	*Allium textile*	n	p	27.8%	11.1%		6.7%					0.3%
58	*Centaurea diffusa*	e	u	8.3%	8.3%	2.8%	5.3%					0.3%
58	*Senecio plattensis*	n	p	8.3%	5.6%		7.3%	0.3%				0.3%
58	*Opuntia macrorhiza*	n	p		5.6%	11.1%						0.3%
58	*Trifolium repens*	e	p		16.7%							0.3%
58	*Scirpus acutus*	n	p				10.7%					0.2%
58	*Hordeum jubatum*	n	u	11.1%	8.3%	2.8%	3.3%					0.2%
58	Unk. Grass - 183	u	u	11.1%			4.7%		0.3%			0.2%
58	*Achillea lanulosa*	n	p	5.6%	11.1%		2.7%					0.2%
58	*Erigeron flagellaris*	n	p	5.6%		8.3%	4.0%					0.2%
58	*Packeria pseudoaureas*	n	p		5.6%				0.3%			0.2%
58	*Podospermum laciniatum*	e	m			11.1%						0.2%
58	*Medicago lupulina*	e	m	16.7%		2.8%	8.7%					0.2%
58	*Juncus longistylis*	n	p				4.7%					0.1%
58	*Agropyron repens*	e	p				2.7%			0.3%		0.1%
58	*Dactylis glomerata*	e	p		5.6%							0.1%
58	*Asclepias incarnata*	n	p			2.8%				0.3%		0.1%
58	*Asclepias speciosa*	n	p				0.7%			0.3%		0.1%
58	*Artemisia campestris*	n	p	8.3%			3.3%					0.1%
58	*Grindelia squarrosa*	n	m			8.3%						0.1%
58	*Camelina microcarpa*	e	m		5.6%							0.1%
58	*Lepidium campestre*	e	m			2.8%	1.3%					0.1%
58	*Opuntia fragilis*	n	p			8.3%						0.1%
58	*Thermopsis divaricarpa*	n	p					0.3%				0.1%
58	*Carex nebrascensis*	n	p				0.7%					0.0%
58	*Festuca pratensis*	e	p				2.0%					0.0%
58	*Schizachyrium scoparium*	n	p	2.8%			2.0%					0.0%
58	*Spartina pectinata*	n	p				0.7%					0.0%
58	*Daucus carota*	e	m				0.7%					0.0%
58	*Apocynum sibericum*	e	p				2.7%					0.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
58	*Lactuca serriola*	e	m	5.6%			1.3%					0.0%
58	*Taraxacum officianale*	e	p	2.8%			2.0%					0.0%
58	*Dalea purpurea*	n	p			2.8%						0.0%
58	*Melilotus officinalis*	e	m	5.6%			1.3%					0.0%
58	*Acetoselia vulgaris*	e	p			2.8%						0.0%
58	Bare Ground							2.0%	2.7%	1.9%	2.0%	0.0%
58	Litter							49.0%	56.1%	45.5%	50.8%	0.0%
59	*Poa pratensis*	e	p	25.0%	19.4%	27.8%	25.3%	2.0%	12.5%	0.9%	4.3%	7.4%
59	*Carex heliophylla*	n	p		30.6%		0.7%	9.9%	2.3%	7.6%	4.6%	7.2%
59	*Cirsium arvense*	e	p	2.8%	2.8%	5.6%	42.7%	4.3%	5.6%	5.0%	6.6%	7.1%
59	*Sporobolus asper*	n	p	94.4%	91.7%	77.8%	36.7%	0.3%	1.3%	5.4%	6.3%	6.7%
59	*Juncus arcticus*	n	p				50.7%	7.2%	3.0%	3.5%	5.0%	6.4%
59	*Plantago lanceolata*	e	p	100.0%	97.2%	83.3%	40.0%	3.0%	2.6%	2.5%	1.7%	6.3%
59	*Panicum virgatum*	n	p	83.3%	69.4%	44.4%	55.3%	3.6%	1.3%	5.4%	2.0%	6.1%
59	*Eleocharis elliptica*	n	u	33.3%	33.3%	16.7%	51.3%	6.3%	1.3%	6.6%	0.7%	5.9%
59	*Daucus carota*	e	m	19.4%	58.3%	72.2%	14.7%		2.3%	0.9%	4.3%	4.4%
59	*Aster falcatus*	n	p	63.9%	69.4%	58.3%	42.0%			0.9%	2.6%	3.7%
59	*Cichorium intybus*	e	p	41.7%	52.8%	72.2%	14.0%	1.0%	1.0%	0.9%	1.0%	3.3%
59	*Carex nebrascensis*	n	p				21.3%	1.6%	1.0%	2.5%	4.6%	3.1%
59	*Poa compressa*	e	p	63.9%	55.6%	44.4%	28.7%	0.3%	1.0%	0.9%	1.0%	3.0%
59	*Andropogon gerardii*	n	p	8.3%	11.1%	22.2%	10.7%		0.3%	4.1%	2.6%	2.5%
59	*Carex stipata*	n	p				41.3%	0.3%		4.7%		2.1%
59	*Agrostis gigantea*	e	p	27.8%	22.2%	16.7%	32.7%	1.0%	0.3%	1.3%	0.3%	2.0%
59	*Sorghastrum avenaceum*	n	p	8.3%	30.6%	52.8%	4.0%	1.0%	0.3%	0.9%	0.3%	2.0%
59	*Taraxacum officianale*	e	p	27.8%	38.9%	38.9%	12.0%	0.3%		0.3%	1.0%	1.8%
59	*Aster porteri*	n	p		38.9%	44.4%	4.7%		0.3%	0.6%	0.3%	1.7%
59	*Convolvulus arvensis*	e	p	22.2%	36.1%	36.1%	11.3%	0.3%	0.3%		0.3%	1.6%
59	*Rosa arkansana*	n	p	8.3%	16.7%	13.9%	8.0%	0.7%	1.0%	1.3%	0.3%	1.5%
59	*Hippochaete laevigata*	n	m	25.0%	33.3%	30.6%	12.7%					1.2%
59	*Schizachyrium scoparium*	n	p		8.3%	22.2%	12.7%			0.6%	0.3%	1.0%
59	*Musineon divaricatum*	n	p					2.0%	1.3%			1.0%
59	*Agropyron repens*	e	p	8.3%			19.3%	0.3%	0.7%	0.6%		0.9%
59	*Solidego sparsiflora*	u	u	22.2%	36.1%		14.7%	0.3%				0.9%
59	*Packeria pseudoaureas*	n	p			38.9%			0.7%			0.8%
59	*Psoralea tenuiflora*	n	p	5.6%	22.2%	11.1%	3.3%			0.6%	0.3%	0.8%
59	*Agropyron smithii*	n	p		16.7%	16.7%		0.3%		0.3%		0.7%
59	*Ambrosia psilostachya*	n	p	11.1%	16.7%	22.2%	5.3%					0.7%
59	*Bouteloua curtipendula*	n	p	5.6%	25.0%	11.1%	1.3%			0.3%		0.6%
59	*Achillea lanulosa*	n	p	5.6%	13.9%	11.1%	4.7%	0.3%				0.6%
59	*Dianthus armeria*	e	p	41.7%	8.3%	8.3%	10.0%					0.5%
59	*Juncus longistylis*	n	p			5.6%	8.7%			0.3%		0.4%
59	*Asclepias speciosa*	n	p			13.9%					0.7%	0.4%
59	*Bromus inermis*	e	p		8.3%	11.1%						0.3%
59	Unk. Grass - 186	u	u	8.3%			2.0%	0.7%		0.6%		0.3%
59	*Asclepias viridiflora*	n	p	2.8%	13.9%		5.3%					0.3%
59	*Aster laevis*	n	p				1.3%			0.6%	0.7%	0.3%
59	Unk. Forb -889	u	u	2.8%			0.7%		1.0%			0.3%
59	*Scirpus acutus*	n	p				8.7%					0.2%
59	*Phleum pratense*	e	p	2.8%		8.3%	0.7%		0.3%			0.2%
59	*Cirsium floodmanii*	n	p	5.6%	2.8%		2.0%			0.3%		0.2%
59	*Lysmachia ciliata*	n	u								0.7%	0.2%
59	*Agropyron cristatum*	e	p								0.3%	0.1%
59	*Bouteloua gracilis*	n	p		5.6%							0.1%
59	*Hordeum jubatum*	n	u				0.7%			0.3%		0.1%
59	*Apocynum sibericum*	e	p	8.3%			5.3%					0.1%
59	*Artemisia ludoviciana*	n	p			8.3%						0.1%
59	*Medicago lupulina*	e	m								0.3%	0.1%
59	*Medicago sativa*	e	p						0.3%			0.1%
59	*Prunella vulgaris*	n	p				0.7%		0.3%			0.1%
59	*Oenothera strigosa*	n	m				3.3%					0.1%
59	*Verbena hastata*	n	p				0.7%				0.3%	0.1%
59	*Dactylis glomerata*	e	p		2.8%							0.0%
59	*Muhlenbergia asperifolia*	n	p			2.8%						0.0%
59	Unk. Grass - 187	u	p				1.3%					0.0%
59	*Allium textile*	n	p	5.6%			1.3%					0.0%
59	*Erigeron flagellaris*	n	p		2.8%							0.0%
59	*Lactuca serriola*	e	m				0.7%					0.0%
59	*Dalea candida*	n	p			2.8%						0.0%
59	*Trifolium repens*	e	p	8.3%			2.0%					0.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
59	*Mentha arvensis*	n	p				0.7%					0.0%
59	*Rumex crispus*	e	p				2.0%					0.0%
59	Unk. Forb -891	u	u				1.3%					0.0%
59	Bare Ground							1.3%	0.7%	0.3%	0.7%	0.0%
59	Litter							51.6%	56.8%	38.5%	45.9%	0.0%
60	*Carex heliophylla*	n	p	100.0%	91.7%	94.4%	88.7%	9.2%	6.4%	8.5%	5.6%	14.8%
60	*Aster porteri*	n	p	2.8%	55.6%	47.2%	6.7%	3.3%	2.4%	4.6%	6.6%	7.8%
60	*Stipa comata*	n	p	100.0%	66.7%	72.2%	74.7%	3.6%	3.0%	1.6%	1.3%	6.4%
60	*Heterotheca villosa*	n	p	63.9%	52.8%	61.1%	57.3%	1.6%	1.7%	2.3%	2.0%	5.1%
60	*Liatris punctata*	n	p	55.6%	50.0%	69.4%	42.0%	0.3%	1.4%	1.6%	3.3%	4.6%
60	*Arenaria fendleri*	n	p	61.1%	41.7%	66.7%	55.3%	2.0%	0.3%	0.3%	3.3%	4.3%
60	*Andropogon gerardii*	n	p	13.9%	11.1%	5.6%	39.3%	3.3%	4.1%	1.6%	0.3%	4.2%
60	*Koeleria macrantha*	n	p	47.2%	30.6%	75.0%	50.0%	1.0%	1.7%	0.7%	1.3%	3.7%
60	*Bromus japonicus*	e	m	19.4%	61.1%	97.2%	11.3%	1.3%	2.0%			3.4%
60	*Bouteloua curtipendula*	n	p	58.3%	50.0%	38.9%	16.0%	0.3%	1.0%	0.7%	2.0%	2.9%
60	*Muhlenbergia montana*	n	p			5.6%			2.0%	2.6%	2.3%	2.7%
60	*Poa compressa*	e	p	8.3%	25.0%	16.7%	12.7%	3.0%	0.7%	1.0%	0.3%	2.6%
60	*Bouteloua gracilis*	n	p	22.2%	38.9%	25.0%	18.7%	1.0%	0.3%	0.7%	1.7%	2.5%
60	*Schizachyrium scoparium*	n	p	8.3%	27.8%	11.1%	26.0%		1.0%	1.3%	2.0%	2.5%
60	*Ambrosia psilostachya*	n	p	52.8%	38.9%	55.6%	43.3%	0.3%	0.3%	0.3%	0.7%	2.4%
60	*Tragopogon dubius*	e	m	30.6%	44.4%	55.6%	13.3%	0.3%	1.0%	0.3%		2.1%
60	*Muhlenbergia wrightii*	n	p			2.8%	2.0%	1.0%	1.4%	2.3%	0.3%	2.0%
60	*Poa pratensis*	e	p	16.7%	27.8%	16.7%	7.3%	1.6%	1.4%	0.3%	0.3%	2.0%
60	*Psoralea tenuiflora*	n	p	27.8%	22.2%	36.1%	32.7%			1.0%	1.0%	1.9%
60	*Buchloe dactyloides*	n	p	16.7%	33.3%	22.2%	34.7%	0.3%		0.3%	1.0%	1.8%
60	*Eriogonum alatum*	n	p	19.4%	19.4%	30.6%	15.3%	1.0%		1.3%		1.7%
60	*Aristida purpurea*	n	p	8.3%	16.7%	13.9%	12.7%	0.7%	0.7%	1.3%		1.6%
60	*Sitanion longifolium*	n	u	33.3%	41.7%	38.9%	18.0%	0.3%	0.7%			1.6%
60	*Lomatium orientat*	n	p	77.8%	11.1%	8.3%	69.3%	0.3%				1.3%
60	*Lesquerella montana*	n	u	27.8%		55.6%	40.7%		0.3%			1.3%
60	*Aster falcatus*	n	p	16.7%	27.8%	2.8%	13.3%	0.3%	0.7%			1.0%
60	*Camelina microcarpa*	e	m		11.1%	38.9%	2.0%					0.7%
60	*Campanula rotundifolia*	n	p	66.7%			56.0%					0.7%
60	*Paronychia jamesii*	n	p			8.3%	4.7%			0.3%	1.0%	0.7%
60	*Bouteloua hirsuta*	n	p	2.8%			9.3%		1.0%	0.3%		0.6%
60	*Antennaria rosea*	n	p		2.8%		3.3%	0.3%	1.0%			0.6%
60	*Erysimum asperum*	n	p	22.2%	8.3%	22.2%	16.7%					0.6%
60	*Dalea purpurea*	n	p	11.1%	2.8%	16.7%	11.3%				0.3%	0.5%
60	*Agropyron smithii*	n	p				11.3%	0.7%				0.4%
60	*Artemisia frigida*	n	p	25.0%	2.8%	5.6%	16.0%	0.3%				0.4%
60	*Calylophus serrulata*	n	p				2.7%		0.3%	0.3%	0.3%	0.4%
60	*Allium textile*	n	p	2.8%	5.6%		6.0%	0.3%				0.3%
60	*Cirsium floodmanii*	n	p	8.3%	8.3%	5.6%	5.3%					0.3%
60	*Gaillardia aristata*	n	p			2.8%	13.3%				0.3%	0.3%
60	*Gutierrezia sarothrae*	n	p			8.3%	2.0%				0.3%	0.3%
60	*Nothocalis cuspidata*	n	p		2.8%			0.3%	0.3%			0.3%
60	*Allysum minus*	e	m	5.6%		22.2%	3.3%					0.3%
60	*Opuntia macrorhiza*	n	p	2.8%	13.9%	2.8%	9.3%					0.3%
60	*Hypericum perforatum*	e	p				14.0%		0.3%			0.3%
60	*Poa sp.*	u	u	2.8%			18.0%					0.2%
60	*Artemisia campestris*	n	p		2.8%	2.8%			0.3%			0.2%
60	*Chrysothamnus nauseosus*	n	p			2.8%			0.3%			0.2%
60	*Oxytropis lambertii*	n	p	5.6%	5.6%		2.7%		0.3%			0.2%
60	Unk. Forb -894	u	u				4.7%				0.3%	0.2%
60	*Bromus tectorum*	e	m		2.8%		2.7%					0.1%
60	*Sorghastrum avenaceum*	n	p		5.6%							0.1%
60	*Sporobolus cryptandrus*	n	p						0.3%			0.1%
60	*Erigeron divergens*	n	m				0.7%	0.3%				0.1%
60	*Grindelia squarrosa*	n	m		5.6%		1.3%					0.1%
60	*Podospermum laciniatum*	e	m		8.3%							0.1%
60	*Senecio plattensis*	n	p				6.7%					0.1%
60	*Draba reptans*	n	m			5.6%						0.1%
60	*Melandrium drummondii*	n	p	13.9%			8.0%					0.1%
60	*Chenopodium album*	e	m			8.3%						0.1%
60	*Chenopodium dessicatum*	n	m	8.3%	8.3%		2.0%					0.1%
60	*Euphorbia robusta*	n	p	19.4%			10.7%					0.1%
60	*Euphorbia spathulata*	n	m		8.3%							0.1%
60	*Astragalus egrestis*	n	p				4.0%					0.1%
60	*Calochortus gunnisonii*	n	p	8.3%			4.0%					0.1%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				IMP
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	
60	*Zygadenus venenosus*	n	p	13.9%			5.3%					0.1%
60	*Plantago patagonica*	n	m			8.3%						0.1%
60	*Polygonum sawatchense*	n	m		5.6%							0.1%
60	*Castilleja sessiflora*	n	p	2.8%			4.0%					0.1%
60	*Viola nuttallii*	n	p		2.8%		2.0%					0.1%
60	Unk. Forb -893	u	u				4.7%					0.1%
60	Unk. Forb -895	u	u	30.6%			8.7%					0.1%
60	Unk. Forb -896	u	u	8.3%			4.0%					0.1%
60	Unk. Forb -897	u	u	2.8%			4.7%					0.1%
60	Unk. Forb -900	u	u				6.7%					0.1%
60	Unk. Forb -926	u	u					0.3%				0.0%
60	*Asclepias speciosa*	n	p				0.7%					0.0%
60	*Artemisia ludoviciana*	n	p				2.0%					0.0%
60	*Mertensia lanceolata*	n	p	5.6%			3.3%					0.0%
60	*Opuntia fragilis*	n	p				1.3%					0.0%
60	*Silene scouleri*	n	p			2.8%						0.0%
60	*Tradescantia occidentalis*	n	p				1.3%					0.0%
60	*Astragalus shortianus*	n	p	5.6%			2.0%					0.0%
60	*Leucocrinum montanum*	n	p				1.3%					0.0%
60	*Oenothera brachycarpa*	n	p		2.8%							0.0%
60	*Orobanche fasciculata*	n	p				1.3%					0.0%
60	*Delphinium viresens*	n	p		2.8%							0.0%
60	*Comandra umbellata*	n	p			2.8%						0.0%
60	Unk. Forb -899	u	u	13.9%			3.3%					0.0%
60	Bare Ground							11.8%	10.5%	8.8%	8.3%	0.0%
60	Litter							49.3%	50.7%	55.6%	53.6%	12.8%
61	*Carex heliophylla*	n	p	100.0%	100.0%	100.0%	76.0%	9.5%	8.9%	7.0%	3.7%	8.4%
61	*Andropogon gerardii*	n	p	77.8%	75.0%	69.4%	39.3%	4.9%	6.0%	3.7%	4.0%	7.0%
61	*Poa compressa*	e	p			2.8%	31.3%	8.2%	2.2%	6.6%	3.3%	6.4%
61	*Stipa comata*	n	p	77.8%	83.3%	72.2%	54.7%	6.9%	2.2%	1.0%	2.0%	4.9%
61	*Ambrosia psilostachya*	n	p	33.3%	66.7%	80.6%	38.0%	0.7%	1.6%	2.0%	3.3%	4.6%
61	*Aster falcatus*	n	p			11.1%	29.3%	1.3%	2.2%	4.0%	4.3%	4.0%
61	*Bouteloua curtipendula*	n	p		47.2%	36.1%	2.7%	0.7%	0.9%	1.7%	5.4%	3.6%
61	*Bromus japonicus*	e	m	5.6%	52.8%	80.6%	24.7%	2.6%	2.5%			3.6%
61	*Koeleria macrantha*	n	p	72.2%	41.7%	61.1%	54.7%	0.7%	1.9%	1.3%	0.7%	2.4%
61	*Bouteloua gracilis*	n	p	36.1%	30.6%	16.7%	23.3%		0.9%	1.0%	2.3%	2.4%
61	*Poa pratensis*	e	p	30.6%	8.3%	13.9%	34.7%	3.3%	0.3%		1.7%	2.4%
61	*Heterotheca villosa*	n	p	33.3%	47.2%	58.3%	20.7%	0.3%	0.6%	1.3%		2.4%
61	*Tragopogon dubius*	e	m	16.7%	38.9%	25.0%	37.3%	1.3%	0.9%		0.7%	2.3%
61	*Arenaria fendlerii*	n	p	61.1%	36.1%	44.4%	35.3%	0.7%	0.6%		1.0%	2.3%
61	*Muhlenbergia montana*	n	p		11.1%			1.0%	1.3%	1.0%	2.7%	2.1%
61	*Liatris punctata*	n	p		52.8%	36.1%	17.3%	0.7%	0.3%	0.7%		1.9%
61	*Psoralea tenuiflora*	n	p	25.0%	25.0%	13.9%	22.0%		0.6%	1.3%	1.3%	1.9%
61	*Erigeron flagellaris*	n	p	72.2%	38.9%	38.9%	38.0%	1.0%				1.8%
61	*Agropyron smithii*	n	p	8.3%		2.8%	16.0%	0.3%	0.9%	1.0%	2.0%	1.7%
61	*Buchloe dactyloides*	n	p	22.2%	30.6%	27.8%	17.3%	1.0%	0.6%	0.7%		1.7%
61	*Aster porteri*	n	p			8.3%	1.3%	1.0%	1.9%	0.7%	1.0%	1.6%
61	*Lomatium oriental*	n	p	72.2%	27.8%	5.6%	64.0%					1.4%
61	*Muhlenbergia wrightii*	n	p		11.1%	33.3%	2.7%			1.3%		1.1%
61	*Sitanion longifolium*	n	u			66.7%			0.9%			1.1%
61	*Bromus tectorum*	e	m		25.0%	44.4%	3.3%		0.3%			1.0%
61	*Hordeum vulgare*	e	m	11.1%	36.1%		8.0%	0.7%		0.7%		1.0%
61	*Artemisia frigida*	n	p	33.3%	11.1%	13.9%	19.3%	0.3%			0.3%	0.8%
61	*Opuntia macrorhiza*	n	p	5.6%	11.1%	11.1%	10.7%	0.3%	0.9%			0.8%
61	*Schizachyrium scoparium*	n	p	5.6%	2.8%	13.9%	9.3%		0.3%	0.7%		0.7%
61	*Allysum minus*	e	m		8.3%	27.8%	2.0%	0.3%	0.3%			0.7%
61	*Erysimum asperum*	n	p	5.6%	13.9%	27.8%	12.7%					0.7%
61	*Bouteloua hirsuta*	n	p				2.0%			1.7%		0.6%
61	*Eriogonum elatum*	n	p		5.6%	5.6%	2.0%	0.7%		0.7%		0.6%
61	*Sporobolus asper*	n	p					1.0%		0.3%	0.3%	0.5%
61	*Allium textile*	n	p	13.9%	25.0%		15.3%					0.5%
61	*Artemisia campestris*	n	p			2.8%	1.3%	0.7%	0.3%	0.3%		0.5%
61	*Coryphantha missouriensis*	n	p	11.1%	8.3%	13.9%	3.3%				0.3%	0.5%
61	*Chenopodium dessicatum*	n	m		27.8%	8.3%	1.3%					0.5%
61	*Artemisia ludoviciana*	n	p		19.4%	8.3%	6.0%					0.4%
61	*Erigeron divergens*	n	m						0.9%		0.3%	0.4%
61	*Mertensia lanceolata*	n	p	27.8%	19.4%		12.7%					0.4%
61	*Camelina microcarpa*	e	m				7.3%	0.7%	0.3%			0.4%
61	*Lesquerella montana*	n	u	8.3%		19.4%	8.7%					0.4%

Appendix 3 (Cont.)

					% of Quadrats Present				% Cover				IMP
Plot	Species				Part94	July95	July96	All94	June95	June96	Aug95	Aug96	
61	*Silene antirrhina*	e	m			13.9%	19.4%	2.7%					0.4%
61	*Viola nuttallii*	n	p		33.3%	16.7%		12.0%				0.3%	0.4%
61	*Aristida purpurea*	n	p		2.8%	11.1%	2.8%	4.0%				0.3%	0.3%
61	*Cirsium undulatum*	n	m		8.3%	8.3%		5.3%					0.3%
61	Unk. Forb -902	u	u		33.3%			17.3%					0.3%
61	*Musineon divaricatum*	n	p			8.3%			0.3%				0.2%
61	*Grindelia squarrosa*	n	m					0.7%		0.6%			0.2%
61	*Descurainia pinnata*	n	m			16.7%		2.0%					0.2%
61	*Draba reptans*	n	m			13.9%		2.0%					0.2%
61	*Oxytropis lambertii*	n	p			8.3%	2.8%	4.0%					0.2%
61	*Hypericum perforatum*	e	p		2.8%	11.1%	2.8%	3.3%					0.2%
61	Unk. Forb -905	u	u					3.3%	0.7%				0.2%
61	*Carex sp.*	u	p						0.3%				0.1%
61	*Sorghastrum avenaceum*	n	p				2.8%			0.3%			0.1%
61	*Vulpia octoflora*	n	m			2.8%	5.6%						0.1%
61	*Achillea lanulosa*	n	p					4.0%					0.1%
61	*Antennaria rosea*	n	p					4.0%					0.1%
61	*Gaillardia aristata*	n	p				5.6%						0.1%
61	*Nothocalis cuspidata*	n	p		5.6%			2.7%	0.3%				0.1%
61	*Senecio plattensis*	n	p		2.8%			6.7%					0.1%
61	*Lepidium campestre*	e	m				2.8%	5.3%					0.1%
61	*Opuntia fragilis*	n	p					4.0%					0.1%
61	*Campanula rotundifolia*	n	p				2.8%	4.0%					0.1%
61	*Paronychia jamesii*	n	p			5.6%		2.7%					0.1%
61	*Silene scouleri*	n	p			2.8%	2.8%						0.1%
61	*Kochia iranica*	e	m					4.0%					0.1%
61	*Euphorbia robusta*	n	p		2.8%	2.8%		1.3%					0.1%
61	*Phacelia heterophylla*	n	m					4.7%					0.1%
61	*Scutellaria brittonia*	n	p							0.3%			0.1%
61	*Leucocrinum montanum*	n	p					0.7%		0.3%			0.1%
61	*Oxybaphus linearis*	n	p				5.6%						0.1%
61	*Comandra umbellata*	n	p				5.6%						0.1%
61	Unk. Forb -903	u	u		2.8%			4.7%					0.1%
61	Unk. Forb -904	u	u		11.1%	2.8%		5.3%					0.1%
61	*Poa sp.*	u	u					2.7%					0.0%
61	*Lactuca serriola*	e	m					2.0%					0.0%
61	*Podospermum laciniatum*	e	m					0.0%					0.0%
61	*Taraxacum officinale*	e	p					1.3%					0.0%
61	*Lappula redowskii*	n	m					1.3%					0.0%
61	*Lepidium densiflorum*	e	m				2.8%						0.0%
61	*Tradescantia occidentalis*	n	p			2.8%							0.0%
61	*Astragalus shortianus*	n	p					0.7%					0.0%
61	*Calylophus serrulata*	n	p		8.3%			2.7%					0.0%
61	*Gaura coccinea*	n	p					1.3%					0.0%
61	*Plantago patagonica*	n	m					0.7%					0.0%
61	*Androsace occidentalis*	n	m					2.7%					0.0%
61	Bare Ground								13.8%	10.1%	11.0%	10.7%	0.0%
61	Litter								34.1%	46.2%	48.5%	47.8%	0.0%
62	*Agropyron smithii*	n	p		97.2%	91.7%	91.7%	97.3%	10.2%	6.4%	10.5%	4.0%	15.8%
62	*Buchloe dactyloides*	n	p		63.9%	63.9%	58.3%	48.0%	2.8%	1.3%	4.6%	4.0%	8.2%
62	*Allysum minus*	e	m		33.3%	50.0%	55.6%	78.0%	15.2%	5.4%			7.8%
62	*Bromus japonicus*	e	m		66.7%	69.4%	83.3%	74.7%	12.4%	4.7%			7.7%
62	*Bromus tectorum*	e	m		61.1%	94.4%	75.0%	44.0%	7.5%	8.0%			7.4%
62	*Aster falcatus*	n	p		2.8%	5.6%	16.7%	36.0%	3.1%	3.0%	4.3%	4.3%	6.9%
62	*Bouteloua gracilis*	n	p		50.0%	55.6%	38.9%	36.7%	1.2%	6.4%	1.6%	2.7%	6.5%
62	*Carex heliophylla*	n	p		13.9%	25.0%	13.9%	42.0%	2.8%	5.7%	2.6%	2.7%	6.3%
62	*Artemisia frigida*	n	p		30.6%	38.9%	38.9%	21.3%	0.3%	0.3%	0.7%	1.3%	2.9%
62	*Ambrosia psilostachya*	n	p		16.7%	19.4%	19.4%	21.3%		1.7%	1.3%	1.0%	2.7%
62	*Erodium cicutarium*	e	m		33.3%	44.4%	33.3%	17.3%	3.1%	0.3%		0.3%	2.5%
62	*Plantago patagonica*	n	m		27.8%	41.7%	75.0%	12.7%		0.7%			2.4%
62	*Grindelia squarrosa*	n	m		2.8%	19.4%	38.9%	6.0%				2.0%	2.2%
62	*Poa sandbergii*	n	p		61.1%	47.2%		26.0%	2.2%	0.7%			1.8%
62	*Andropogon gerardii*	n	p		5.6%	2.8%	2.8%	7.3%		1.0%	1.3%	0.7%	1.5%
62	*Poa compressa*	e	p		8.3%	5.6%		5.3%	0.3%	0.3%	1.0%	0.3%	1.0%
62	*Taraxacum officinale*	e	p		8.3%	16.7%	8.3%	18.7%	0.6%			0.3%	1.0%
62	*Artemisia campestris*	n	p				30.6%		0.3%	0.3%		0.3%	0.9%
62	*Artemisia ludoviciana*	n	p					4.7%	1.2%	0.7%		0.7%	0.9%
62	*Lometium oriental*	n	p		27.8%	11.1%		41.3%					0.8%
62	*Tragopogon dubius*	e	m		2.8%	13.9%		18.7%	0.3%	0.7%			0.8%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
62	*Camelina microcarpa*	e	m	50.0%	25.0%		26.0%					0.8%
62	*Chrysothamnus nauseosus*	n	p	2.8%	2.8%	2.8%	2.0%		0.3%	0.7%	0.3%	0.7%
62	*Silene antirrhina*	e	m		19.4%	16.7%	4.7%					0.7%
62	*Sphaeralcea coccinia*	n	p	25.0%	11.1%	13.9%	18.0%					0.7%
62	*Poa pratensis*	e	p				20.0%	1.2%				0.6%
62	*Lepidium densiflorum*	e	m	2.8%	22.2%	5.6%	6.7%					0.6%
62	*Psoralea tenuiflora*	n	p		11.1%		12.7%		0.3%	0.3%		0.6%
62	*Androsace occidentalis*	n	m	16.7%	19.4%		12.7%		0.3%			0.6%
62	*Podospermum laciniatum*	e	m		16.7%		10.7%		0.3%			0.5%
62	*Allium textile*	n	p	19.4%	13.9%		9.3%					0.4%
62	*Erigeron flagellaris*	n	p			19.4%						0.4%
62	*Lepidium campestre*	e	m				12.7%			0.3%		0.4%
62	*Artemisia dranunculus*	n	p	5.6%			6.7%	0.3%		0.3%		0.3%
62	*Heterotheca villosa*	n	p	5.6%	8.3%	2.8%	4.7%					0.3%
62	*Ratibida columnifera*	n	p	5.6%		5.6%	9.3%					0.3%
62	*Hypericum perforatum*	e	p			13.9%						0.3%
62	*Delphinium virescens*	n	p		11.1%					0.3%		0.3%
62	Unk. Forb -908	u	u	2.8%			8.7%	0.6%				0.3%
62	*Bouteloua curtipendula*	n	p							0.3%		0.2%
62	*Koeleria macrantha*	n	p				4.7%		0.3%			0.2%
62	*Stipa comata*	n	p						0.7%			0.2%
62	*Draba reptans*	n	m		11.1%							0.2%
62	*Opuntia macrorhiza*	n	p	2.8%		5.6%	3.3%	0.3%				0.2%
62	*Potentilla gracilis*	n	p							0.3%		0.2%
62	*Veronica peregrina*	e	m		13.9%							0.2%
62	*Viola nuttallii*	n	p	2.8%			12.0%					0.2%
62	*Aristida purpurea*	n	p	2.8%			2.7%		0.3%			0.1%
62	*Schedonnardus paniculatus*	n	p			2.8%						0.1%
62	*Sitanion hystrix*	n	p	5.6%	2.8%		1.3%					0.1%
62	*Achillea lanulosa*	n	p				2.7%		0.3%			0.1%
62	*Aster porteri*	n	p			2.8%		0.3%				0.1%
62	*Carduus nuttans*	e	m			5.6%						0.1%
62	*Cirsium undulatum*	n	m			2.8%	4.7%					0.1%
62	*Lactuca serriola*	e	m	2.8%			3.3%					0.1%
62	*Liatris punctata*	n	p			2.8%						0.1%
62	*Lappula redowskii*	n	m	8.3%			3.3%					0.1%
62	*Erysimum asperum*	n	p				3.3%					0.1%
62	*Lesquerella montana*	n	u				0.7%		0.3%			0.1%
62	*Sysimbrium altissimum*	e	m					0.3%				0.1%
62	*Opuntia fragilis*	n	p	2.8%			5.3%					0.1%
62	*Arenaria fendlerii*	n	p						0.3%			0.1%
62	*Tradescantia occidentalis*	n	p	2.8%			0.7%	0.3%				0.1%
62	*Astragalus agrestis*	n	p				4.0%					0.1%
62	*Leucocrinum montanum*	n	p				4.7%					0.1%
62	*Gaura coccinea*	n	p			2.8%						0.1%
62	*Verbena bractaeta*	e	m			2.8%						0.0%
62	*Agropyron repens*	e	p				1.3%					0.0%
62	*Vulpia octoflora*	n	m	2.8%			2.0%					0.0%
62	*Erigeron divergens*	n	m				2.7%					0.0%
62	*Gutierrezia sarothrae*	n	p				0.7%					0.0%
62	*Descurainia sophia*	e	m	5.6%			1.3%					0.0%
62	*Chenopodium dessicatum*	n	m		2.8%							0.0%
62	*Euphorbia spathulata*	n	m		2.8%							0.0%
62	*Vicia americana*	n	p				1.3%					0.0%
62	*Polygonum sawatchense*	n	m		2.8%							0.0%
62	Bare Ground							9.3%	8.4%	8.2%	10.0%	0.0%
62	Litter							23.6%	40.5%	61.2%	65.1%	0.0%
63	*Agropyron smithii*	n	p	97.2%	100.0%	97.2%	96.7%	10.4%	7.6%	13.1%	8.2%	20.6%
63	*Allysum minus*	e	m	66.7%	88.9%	100.0%	60.7%	16.2%	5.0%			10.7%
63	*Bromus japonicus*	e	m	66.7%	86.1%	88.9%	69.3%	7.4%	9.6%			10.0%
63	*Bouteloua gracilis*	n	p	19.4%	50.0%	30.6%	40.7%	2.9%	5.3%	5.9%	3.0%	8.9%
63	*Buchloe dactyloides*	n	p	80.6%	52.8%	58.3%	82.7%	0.3%	2.0%	3.3%	4.6%	8.1%
63	*Poa sandbergii*	n	p	91.7%	33.3%		90.0%	7.8%	1.3%			4.6%
63	*Agropyron cristatum*	e	p	25.0%	47.2%	33.3%	12.0%	1.6%	1.3%	3.0%	0.7%	4.2%
63	*Poa compressa*	e	p	16.7%	27.8%	8.3%	18.0%	1.0%		2.6%	3.0%	3.9%
63	*Bromus inermis*	e	p	38.9%	2.8%	38.9%	11.3%	0.3%	1.7%	1.6%	1.3%	3.1%
63	*Centaurea diffusa*	e	u	5.6%	2.8%		22.0%	0.3%	0.7%	2.3%	2.6%	3.1%
63	*Musineon divaricatum*	n	p	69.4%	38.9%		66.0%	2.3%	0.3%			2.5%
63	*Poa pratensis*	e	p		47.2%	52.8%	9.3%	0.3%				2.2%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
63	*Convolvulus arvensis*	e	p	13.9%	5.6%	33.3%	4.0%	0.3%	2.0%	0.3%	0.3%	2.0%
63	*Podospermum lacinatum*	e	m	30.6%	19.4%	44.4%	12.0%	1.0%		0.3%		1.9%
63	*Sphaeralcea coccinia*	n	p	8.3%	19.4%	16.7%	30.7%		0.3%	0.3%	0.3%	1.6%
63	*Aster falcatus*	n	p	13.9%	8.3%	27.8%	20.0%			0.7%		1.3%
63	*Koeleria macrantha*	n	p	8.3%			12.0%		0.7%		1.0%	1.0%
63	*Carex heliophylla*	n	p				5.3%			0.3%	1.3%	0.9%
63	*Stipa viridula*	n	p	11.1%	16.7%	16.7%	4.7%		0.3%			0.9%
63	*Psoralea tenuiflora*	n	p	2.8%		2.8%	14.0%			0.3%	1.0%	0.9%
63	*Gutierrezia sarothrae*	n	p	11.1%	11.1%	13.9%	6.0%		0.3%	0.3%		0.8%
63	*Erodium cicutarium*	e	m	13.9%	22.2%	2.8%	18.7%					0.8%
63	*Lomatium orientat*	n	p	11.1%	13.9%		10.7%	0.6%				0.6%
63	*Arnica fulgens*	n	p		11.1%		9.3%	0.6%				0.5%
63	*Vicia americana*	n	p	5.6%			10.7%	0.6%	0.3%			0.5%
63	*Allium textile*	n	p		13.9%		6.0%					0.4%
63	*Opuntia macrorhiza*	n	p	8.3%	11.1%	8.3%	3.3%					0.4%
63	*Plantago patagonica*	n	m	5.6%	5.6%		15.3%					0.4%
63	*Achillea lanulosa*	n	p	11.1%		8.3%	10.7%					0.3%
63	*Camelina microcarpa*	e	m	19.4%	8.3%		7.3%					0.3%
63	*Medicago sativa*	e	p			2.8%	2.0%	0.6%				0.3%
63	*Schedonnardus paniculatus*	n	p			8.3%						0.2%
63	*Sitanion hystrix*	n	p	2.8%	8.3%		1.3%					0.2%
63	*Erigeron divergens*	n	m				1.3%				0.3%	0.2%
63	*Grindelia squarrosa*	n	m			8.3%						0.2%
63	*Heterotheca villosa*	n	p				9.3%					0.2%
63	*Androsace occidentalis*	n	m	8.3%			12.0%					0.2%
63	*Bouteloua curtipendula*	n	p					0.3%				0.1%
63	*Bromus tectorum*	e	m				6.7%					0.1%
63	*Phleum pratense*	e	p			2.8%						0.1%
63	*Vulpia octoflora*	n	m	5.6%			5.3%					0.1%
63	*Artemisia frigida*	n	p				3.3%					0.1%
63	*Iva xanthifolia*	e	m				6.7%					0.1%
63	*Lactuca serriola*	e	m	2.8%			5.3%					0.1%
63	*Tragopogon dubius*	e	m						0.3%			0.1%
63	*Lepidium campestre*	e	m	2.8%			4.0%					0.1%
63	*Opuntia fragilis*	n	p				1.3%	0.3%				0.1%
63	*Calochortus gunnisonii*	n	p				6.0%					0.1%
63	*Gaura coccinea*	n	p	8.3%			8.7%					0.1%
63	Unk. Forb -904	u	u		2.8%							0.1%
63	*Artemisia ludoviciana*	n	p				0.7%					0.0%
63	*Liatris punctata*	n	p				0.7%					0.0%
63	*Nothocalis cuspidata*	n	p				1.3%					0.0%
63	*Taraxacum officianale*	e	p				2.7%					0.0%
63	*Draba reptans*	n	m				2.0%					0.0%
63	*Astragalus agrestis*	n	p				2.0%					0.0%
63	*Hypericum perforatum*	e	p				0.7%					0.0%
63	*Oxybaphus linearis*	n	p	5.6%			2.0%					0.0%
63	*Plantago lanceolata*	e	p				0.7%					0.0%
63	*Drymocallis fissia*	n	p				0.7%					0.0%
63	*Rosa arkansana*	n	p				0.7%					0.0%
63	Bare Ground							16.2%	10.9%	10.5%	9.5%	0.0%
63	Litter							28.5%	50.2%	55.1%	62.8%	0.0%
64	*Agropyron smithii*	n	p	72.2%	91.7%	97.2%	85.3%	23.1%	10.3%	16.2%	10.7%	26.3%
64	*Centaurea diffusa*	e	u	11.1%	19.4%	5.6%	47.3%	3.6%	4.6%	7.3%	7.0%	9.9%
64	*Allysum minus*	e	m	83.3%	83.3%	88.9%	67.3%	12.3%	3.3%			9.7%
64	*Bromus japonicus*	e	m	80.6%	86.1%	94.4%	52.7%	7.0%	6.3%			9.6%
64	*Poa compressa*	e	p	25.0%	36.1%	33.3%	34.7%	1.7%	2.6%	3.0%	2.3%	5.9%
64	*Poa pratensis*	e	p	25.0%	75.0%	52.8%	16.7%	1.9%	0.7%	2.6%	0.7%	5.6%
64	*Bouteloua gracilis*	n	p	5.6%		13.9%	28.7%	3.3%	2.3%	1.3%	4.0%	4.8%
64	*Carex heliophylla*	n	p	2.8%			14.0%	0.8%	3.0%	2.0%	1.7%	3.1%
64	*Buchloe dactyloides*	n	p		5.6%		52.0%			0.3%	1.3%	1.8%
64	*Psoralea tenuiflora*	n	p				34.7%	0.3%		2.0%	0.7%	1.7%
64	*Bromus tectorum*	e	m	30.6%	19.4%	13.9%	7.3%	2.2%				1.5%
64	*Convolvulus arvensis*	e	p	19.4%	16.7%	13.9%	6.0%	0.3%	1.0%			1.3%
64	*Potentilla gracilis*	n	p		16.7%	16.7%	1.3%	0.8%	0.3%	0.3%		1.3%
64	*Poa sandbergii*	n	p	47.2%			40.0%	1.7%	0.3%			1.2%
64	*Koeleria macrantha*	n	p				34.0%		0.7%		0.3%	1.0%
64	*Arnica fulgens*	n	p	16.7%	13.9%		12.7%	0.8%	0.7%			1.0%
64	*Aster falcatus*	n	p		5.6%		14.7%	0.8%			1.0%	1.0%
64	*Bouteloua curtipendula*	n	p							2.0%	0.3%	0.9%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
64	*Lepidium campestre*	e	m		13.9%	19.4%	4.7%					0.9%
64	*Erodium cicutarium*	e	m	33.3%	8.3%		22.0%	1.1%				0.9%
64	*Podospermum laciniatum*	e	m		11.1%	13.9%	2.0%	0.3%				0.7%
64	*Taraxacum officianale*	e	p	16.7%	5.6%	19.4%	4.0%					0.7%
64	*Erigeron divergens*	n	m			8.3%	12.7%				0.3%	0.6%
64	*Tragopogon dubius*	e	m		5.6%	16.7%						0.6%
64	*Musineon divaricatum*	n	p	8.3%			20.0%	0.6%				0.5%
64	*Achillea lanulosa*	n	p		8.3%	5.6%	5.3%	0.3%				0.5%
64	*Aristida purpurea*	n	p				6.0%				0.7%	0.4%
64	*Stipa viridula*	n	p	5.6%	8.3%	5.6%	1.3%					0.4%
64	*Lomatium oriental*	n	p	22.2%			20.0%	0.3%				0.4%
64	*Gutierrezia sarothrae*	n	p				7.3%		0.3%		0.3%	0.4%
64	*Astragalus agrestis*	n	p				12.0%				0.3%	0.4%
64	*Ambrosia psilostachya*	n	p		2.8%	2.8%				0.3%		0.3%
64	*Artemisia frigida*	n	p				8.0%		0.3%			0.3%
64	*Grindelia squarrosa*	n	m			2.8%	2.7%				0.3%	0.3%
64	*Medicago lupulina*	e	m		2.8%	8.3%	0.7%					0.3%
64	*Plantago lanceolata*	e	p		8.3%				0.3%			0.3%
64	*Andropogon gerardii*	n	p				9.3%					0.2%
64	*Phleum pratense*	e	p	8.3%	2.8%	2.8%	2.0%					0.2%
64	Unk. Grass - 190	u	u	25.0%			12.0%					0.2%
64	*Opuntia macrorhiza*	n	p				4.0%		0.3%			0.2%
64	*Lathyrus eucosmus*	n	p				9.3%					0.2%
64	*Androsace occidentalis*	n	m				9.3%					0.2%
64	*Agropyron cristatum*	e	p			5.6%						0.1%
64	*Yucca glauca*	n	p								0.3%	0.1%
64	*Allium textile*	n	p				3.3%					0.1%
64	*Cirsium undulatum*	n	m				0.7%			0.3%		0.1%
64	*Conyza canadensis*	e	m				4.7%					0.1%
64	*Lactuca serriola*	e	m		2.8%							0.1%
64	*Liatris punctata*	n	p							0.3%		0.1%
64	*Nothocalis cuspidata*	n	p				3.3%					0.1%
64	*Mertensia lanceolata*	n	p				4.0%					0.1%
64	*Camelina microcarpa*	e	m				3.3%					0.1%
64	*Draba reptans*	n	m				4.0%					0.1%
64	*Lesquerella montana*	n	u				6.7%					0.1%
64	*Dalea candida*	n	p				4.7%	0.3%				0.1%
64	*Sphaeralcea coccinia*	n	p				3.3%					0.1%
64	*Oenothera brachycarpa*	n	p				5.3%					0.1%
64	*Plantago patagonica*	n	m				4.7%					0.1%
64	*Acetosella vulgaris*	e	p	8.3%	2.8%		2.0%					0.1%
64	*Rumex crispus*	e	p		5.6%							0.1%
64	*Verbena bracteata*	e	m	5.6%		2.8%	1.3%					0.1%
64	Unk. Forb -910	u	u				4.7%					0.1%
64	*Vulpia octoflora*	n	m				0.7%					0.0%
64	*Artemisia ludoviciana*	n	p				2.7%					0.0%
64	*Heterotheca villosa*	n	p				0.7%					0.0%
64	*Ratibida columnifera*	n	p				0.7%					0.0%
64	*Lappula redowskii*	n	m				0.7%					0.0%
64	*Lithospermum incisum*	n	p				0.7%					0.0%
64	*Opuntia fragilis*	n	p				1.3%					0.0%
64	*Silene antirrhina*	e	m				0.7%					0.0%
64	*Chenopodium dessicatum*	n	m				0.7%					0.0%
64	*Dalea purpurea*	n	p				1.3%					0.0%
64	*Oxytropis lambertii*	n	p				2.7%					0.0%
64	*Vicia americana*	n	p				2.7%					0.0%
64	*Hypericum perforatum*	e	p				0.7%					0.0%
64	*Calochortus gunnisonii*	n	p				1.3%					0.0%
64	*Zygadenos venenosus*	n	p				0.7%					0.0%
64	*Gaura coccinea*	n	p				1.3%					0.0%
64	*Eriogonum alatum*	n	p				2.7%					0.0%
64	*Rosa arkansana*	n	p				2.0%					0.0%
64	*Solanum rostratum*	e	m	5.6%			1.3%					0.0%
64	Unk. Forb -909	u	u				2.0%					0.0%
64	Bare Ground							13.1%	16.2%	14.9%	16.3%	0.0%
64	Litter							23.4%	46.4%	47.0%	51.3%	0.0%
65	*Agropyron smithii*	n	p	91.7%	97.2%	100.0%	86.7%	12.0%	8.9%	16.8%	11.0%	19.6%
65	*Allysum minus*	e	m	19.4%	58.3%	100.0%	49.3%	15.9%	8.6%			8.5%
65	*Buchloe dactyloides*	n	p	83.3%	69.4%	77.8%	64.0%	4.5%	1.9%	5.3%	3.7%	8.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
65	*Centaurea diffusa*	e	u	25.0%	19.4%	13.9%	40.0%	3.0%	1.9%	7.9%	2.3%	5.9%
65	*Aster falcatus*	n	p	69.4%	44.4%	63.9%	42.7%	3.6%	3.8%	2.3%	2.0%	5.7%
65	*Plantago patagonica*	n	m	100.0%	91.7%	97.2%	60.0%	1.2%	3.2%	0.3%		4.9%
65	*Bouteloua gracilis*	n	p	5.6%	22.2%	36.1%	26.7%	1.2%	3.2%	1.0%	4.0%	4.5%
65	*Erodium cicutarium*	e	m	61.1%	80.6%	2.8%	58.0%	8.7%	1.0%			4.1%
65	*Artemisia frigida*	n	p	50.0%	61.1%	58.3%	27.3%	1.8%	1.3%	2.0%	1.0%	4.0%
65	*Grindelia squarrosa*	n	m	22.2%	25.0%	41.7%	25.3%		0.6%	4.3%	2.3%	4.0%
65	*Bromus japonicus*	e	m	2.8%	11.1%	36.1%	26.7%	6.0%	5.1%			3.7%
65	*Erigeron divergens*	n	m			94.4%	1.3%		2.9%		3.0%	3.5%
65	*Bromus tectorum*	e	m		33.3%	50.0%	9.3%	3.6%	5.1%			3.4%
65	*Sphaeralcea coccinia*	n	p	88.9%	58.3%	55.6%	35.3%	1.5%	1.0%	0.3%	0.3%	3.0%
65	*Carex heliophylla*	n	p		30.6%	27.8%		2.1%	1.0%	1.0%	0.3%	2.0%
65	*Achillea lanulosa*	n	p	25.0%	19.4%	11.1%	29.3%	0.6%	0.3%		0.3%	1.3%
65	*Chenopodium dessicatum*	n	m	22.2%	47.2%		11.3%	1.2%		0.3%		1.2%
65	*Poa pratensis*	e	p			33.3%	4.0%	2.7%				1.1%
65	*Poa sandbergii*	n	p		25.0%	33.3%	2.0%		1.0%			1.1%
65	*Vicia americana*	n	p				6.7%	1.5%		0.3%	0.3%	0.7%
65	*Poa compressa*	e	p			11.1%	12.0%		0.3%	0.3%		0.6%
65	*Gutierrezia sarothrae*	n	p	5.6%	16.7%	13.9%	7.3%		0.3%			0.6%
65	*Taraxacum officianale*	e	p	33.3%		2.8%	19.3%		0.3%	0.3%		0.6%
65	*Verbena bracteata*	e	m		25.0%	13.9%						0.6%
65	*Sysimbrium altissimum*	e	m	2.8%	22.2%		3.3%	0.6%				0.5%
65	*Silene antirrhina*	e	m	2.8%	30.6%		5.3%					0.5%
65	*Convolvulus arvensis*	e	p		5.6%	13.9%				0.7%		0.5%
65	*Astragalus agrestis*	n	p	19.4%	11.1%	11.1%	10.7%					0.5%
65	*Androsace occidentalis*	n	m	16.7%		2.8%	26.7%					0.5%
65	*Lomatium oriental*	n	p	16.7%	5.6%		13.3%					0.3%
65	*Artemisia ludoviciana*	n	p							0.3%	0.3%	0.3%
65	*Tragopogon dubius*	e	m		5.6%	13.9%						0.3%
65	*Lappula redowskii*	n	m	22.2%			15.3%					0.3%
65	*Descurainia pinnata*	n	m		11.1%		7.3%	0.3%				0.3%
65	*Draba reptans*	n	m		8.3%		12.0%					0.3%
65	*Lepidium densiflorum*	e	m	8.3%	8.3%	5.6%	6.7%					0.3%
65	*Collomia linearis*	n	m		8.3%		10.0%					0.3%
65	*Vulpia octoflora*	n	m	2.8%	11.1%		0.7%					0.2%
65	*Musineon divaricatum*	n	p	13.9%			13.3%					0.2%
65	*Aster porteri*	n	p								0.3%	0.2%
65	*Psoralea tenuiflora*	n	p			2.8%	4.0%		0.3%			0.2%
65	*Polygonum sawatchense*	n	m		11.1%							0.2%
65	*Juncus arcticus*	n	p				3.3%					0.1%
65	*Agropyron repens*	e	p					0.6%				0.1%
65	*Bromus inermis*	e	p					0.3%				0.1%
65	*Festuca pratensis*	e	p						0.3%			0.1%
65	*Poa arida*	n	p				4.0%					0.1%
65	*Arnica fulgens*	n	p	2.8%			5.3%					0.1%
65	*Cichorium intybus*	e	p				3.3%	0.3%				0.1%
65	*Heterotheca villosa*	n	p	8.3%			4.0%					0.1%
65	*Lactuca serriola*	e	m		2.8%		6.0%					0.1%
65	*Podospermum laciniatum*	e	m				5.3%	0.3%				0.1%
65	*Camelina microcarpa*	e	m		2.8%		0.7%					0.1%
65	*Lepidium campestre*	e	m				5.3%					0.1%
65	*Potentilla gracilis*	n	p		5.6%							0.1%
65	Unk. Forb -909	u	u				4.7%					0.1%
65	*Aristida purpurea*	n	p		2.8%							0.0%
65	*Koeleria macrantha*	n	p				2.0%					0.0%
65	*Poa sp.*	u	u	5.6%			1.3%					0.0%
65	Unk. Grass - 191	u	u	8.3%			2.0%					0.0%
65	*Allium textile*	n	p				2.7%					0.0%
65	*Ambrosia artemesifolia*	e	m				2.0%					0.0%
65	*Ambrosia psilostachya*	n	p				2.0%					0.0%
65	*Artemisia dranunculus*	n	p		2.8%							0.0%
65	*Cirsium arvense*	e	p				0.7%					0.0%
65	*Helianthus annuus*	n	m				2.0%					0.0%
65	*Nothocalis cuspidata*	n	p	2.8%			0.7%					0.0%
65	*Ratibida columnifera*	n	p				0.7%					0.0%
65	*Coryphantha missouriensis*	n	p	2.8%			1.3%					0.0%
65	*Cerastium arvense*	n	p	2.8%			1.3%					0.0%
65	*Tradescantia occidentalis*	n	p				0.7%					0.0%
65	*Medicago lupulina*	e	m				1.3%					0.0%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
65	*Trifolium hybribum*	e	u				0.7%					0.0%
65	*Hypericum perforatum*	e	p	2.8%			0.7%					0.0%
65	*Gymnosteris parvula?*	n	m				0.7%					0.0%
65	*Acetosella vulgaris*	e	p				0.7%					0.0%
65	*Veronica peregrina*	e	m		2.8%			14.7%	9.3%	13.2%	6.6%	0.0%
65	Bare Ground							11.7%	38.3%	43.2%	62.1%	0.0%
65	Litter							33.4%	31.9%	17.7%	26.2%	41.3%
66	*Dactylis glomerata*	e	p	100.0%	100.0%	100.0%	100.0%	14.3%	8.0%	2.0%	4.3%	16.3%
66	*Agropyron smithii*	n	p	91.7%	100.0%	97.2%	98.0%	3.6%	13.7%	1.7%	11.3%	13.0%
66	*Trifolium pratense*	e	p	13.9%	66.7%	86.1%	19.3%	3.6%	2.6%	1.3%	1.3%	8.5%
66	*Convolvulus arvensis*	e	p	50.0%	75.0%	66.7%	56.0%	4.5%	2.9%		0.3%	7.5%
66	*Taraxacum officianale*	e	p	75.0%	58.3%	69.4%	60.7%	1.0%	0.6%	0.3%	0.3%	3.3%
66	*Plantago lanceolata*	e	p	11.1%	36.1%	36.1%	15.3%	1.0%	2.2%		6.0%	2.4%
66	*Medicago sativa*	e	p				0.7%	1.3%	0.3%			1.6%
66	*Tragopogon pomifolius*	e	m	5.6%	19.4%	13.9%	8.0%			0.3%	0.3%	1.0%
66	*Cirsium arvense*	e	p	11.1%	5.6%	5.6%	10.0%	0.3%				1.0%
66	*Camelina microcarpa*	e	m	8.3%	13.9%		16.0%	0.3%	0.3%		1.3%	0.5%
66	*Bromus inermis*	e	p									0.5%
66	*Ambrosia psilostachya*	n	p		11.1%		5.3%		0.3%			0.5%
66	Unk. Forb -862	u	p		16.7%			1.0%		0.3%		0.4%
66	*Poa pratensis*	e	p					0.3%			0.3%	0.4%
66	*Aster falcatus*	n	p		5.6%	2.8%	0.7%					0.3%
66	*Lactuca serriola*	e	m	5.6%			10.0%	0.3%	0.3%			0.3%
66	*Podospermum lacinatum*	e	m				5.3%		0.3%			0.3%
66	*Rosa arkansana*	n	p	13.9%			5.3%				0.7%	0.2%
66	*Agropyron cristatum*	e	p						0.3%			0.2%
66	*Medicago lupulina*	e	m				3.3%				0.3%	0.1%
66	*Stipa viridula*	n	p					0.6%				0.1%
66	*Artemisia frigida*	n	p			2.8%						0.1%
66	*Solidago gigantea*	n	p				1.3%	0.3%				0.1%
66	*Rumex crispus*	e	p	5.6%			1.3%					0.1%
66	Unk. Forb -912	u	p	5.6%	2.8%		0.7%					0.0%
66	*Grindelia squarrosa*	n	m	2.8%			1.3%					0.0%
66	Unk. Forb -911	u	p					13.3%	10.9%	15.4%	6.6%	0.0%
66	Bare Ground							20.8%	25.2%	60.9%	40.7%	0.0%
66	Litter							7.5%	4.7%	7.8%	8.9%	8.5%
101	*Poa compressa*	e	p		25.0%	47.2%		6.0%	4.1%	6.3%	7.3%	8.2%
101	*Aster falcatus*	n	p		86.1%	83.3%		4.1%	7.2%	3.4%	5.6%	7.2%
101	*Poa pratensis*	e	p		69.4%	80.6%		3.8%	7.2%	5.0%	2.0%	6.7%
101	*Carex heliophylla*	n	p		69.4%	100.0%		8.2%	3.5%	4.4%	5.3%	6.5%
101	*Andropogon gerardii*	n	p		38.9%	47.2%		3.8%	2.5%	4.4%	4.0%	5.5%
101	*Artemisia ludoviciana*	n	p		69.4%	75.0%		2.5%	1.9%	3.8%	2.3%	4.6%
101	*Agropyron smithii*	n	p		72.2%	86.1%		2.8%	1.3%	2.8%	3.0%	4.1%
101	*Ambrosia psilostachya*	n	p		55.6%	75.0%		2.8%	1.6%	2.2%	1.0%	3.2%
101	*Rosa arkansana*	n	p		52.8%	52.8%		2.8%	1.9%			2.5%
101	*Bromus japonicus*	e	m		58.3%	58.3%		7.5%	1.3%	0.6%		2.2%
101	*Bromus inermis*	e	p					0.3%	1.6%	1.3%	1.7%	2.1%
101	*Stipa spartea*	n	p		36.1%	27.8%		2.2%	1.6%	0.6%		1.9%
101	*Achillea lanulosa*	n	p		27.8%	44.4%		0.3%	0.3%	0.6%	1.7%	1.8%
101	*Bouteloua curtipendula*	n	p		47.2%	36.1%		0.6%	1.9%	0.6%		1.8%
101	*Tragopogon dubius*	e	m		50.0%	36.1%		0.6%	0.3%			1.8%
101	*Allysum minus*	e	m		66.7%	69.4%		0.6%	0.6%	0.9%	0.3%	1.6%
101	*Koeleria macrantha*	n	p		33.3%	47.2%		0.3%	0.3%	1.3%	0.3%	1.5%
101	*Stipa viridula*	n	p		36.1%	44.4%		0.3%	1.6%	0.9%	0.7%	1.2%
101	*Bouteloua gracilis*	n	p		16.7%	8.3%		0.9%	2.2%	0.3%	0.7%	1.1%
101	*Helianthus rigidus*	n	p		5.6%			0.3%	0.6%			1.1%
101	*Liatris punctata*	n	p		36.1%	36.1%		1.9%	0.9%	0.3%		0.9%
101	*Sporobolus asper*	n	p		13.9%			2.2%	0.9%			0.8%
101	*Bromus tectorum*	e	m		2.8%				0.6%		2.3%	0.8%
101	*Muhlenbergia wrightii*	n	p							0.3%	0.3%	0.6%
101	*Symphoricarpos occidentalis*	n	p		22.2%	16.7%				0.3%		0.5%
101	*Lactuca serriola*	e	m		33.3%	5.6%						0.5%
101	*Lathyrus eucosmus*	n	p					0.9%	0.9%			0.4%
101	*Dactylis glomerata*	e	p						0.6%	0.6%	0.3%	0.4%
101	*Asclepias pumila*	n	p		16.7%	5.6%			0.3%	0.3%		0.4%
101	*Grindelia squarrosa*	n	m		11.1%	2.8%					0.7%	0.4%
101	*Psoralea tenuiflora*	n	p		8.3%	13.9%		0.3%		0.3%		0.4%
101	*Heterotheca villosa*	n	p							0.9%		0.3%
101	*Solidago nana*	n	p						0.3%	0.6%	0.3%	0.3%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
101	*Astragalus flexuosus*	n	p		19.4%	2.8%						0.3%
101	*Lupinus argenteus*	n	p		13.9%	13.9%						0.3%
101	*Thermopsis divaricarpa*	n	p		2.8%					0.9%		0.3%
101	*Scutellaria brittonia*	n	p		11.1%	13.9%						0.3%
101	*Taraxacum officianale*	e	p		8.3%			0.3%				0.2%
101	*Mertensia lanceolata*	n	p		5.6%	11.1%						0.2%
101	*Onosmodium molle*	n	p		5.6%	5.6%					0.3%	0.2%
101	*Lepidium campestre*	e	m		5.6%	2.8%			0.3%			0.2%
101	*Convolvulus arvensis*	e	p						0.3%	0.3%		0.2%
101	*Aristida purpurea*	n	p					0.3%				0.1%
101	*Muhlenbergia montana*	n	p			8.3%						0.1%
101	*Sporobolus airoides*	n	p							0.3%		0.1%
101	*Stipa comata*	n	p			5.6%			0.3%			0.1%
101	*Lomatium oriental*	n	p		8.3%							0.1%
101	*Arnica fulgens*	n	p					0.3%				0.1%
101	*Aster porteri*	n	p							0.3%		0.1%
101	*Gutierrezia sarothrae*	n	p		8.3%							0.1%
101	*Ratibida columnifera*	n	p		2.8%	8.3%						0.1%
101	*Solidago sparsiflora*	u	u							0.3%		0.1%
101	*Erysimum asperum*	n	p			8.3%						0.1%
101	*Opuntia macrorhiza*	n	p		2.8%						0.3%	0.1%
101	*Silene antirrhina*	e	m		2.8%	8.3%						0.1%
101	*Zygadenos venenosus*	n	p		8.3%							0.1%
101	*Polygonum sawatchense*	n	m		5.6%							0.1%
101	*Androsace occidentalis*	n	m		8.3%							0.1%
101	*Drymocallis fissia*	n	p						0.3%			0.1%
101	*Viola nuttallii*	n	p		5.6%	5.6%						0.1%
101	*Allium textile*	n	p		2.8%							0.0%
101	*Artemisia dranunculus*	n	p			2.8%						0.0%
101	*Packeria pseudoaureas*	n	p			2.8%						0.0%
101	*Sysimbrium altissimum*	e	m		2.8%							0.0%
101	*Euphorbia spathulata*	n	m		2.8%							0.0%
101	*Leucocrinum montanum*	n	p			2.8%						0.0%
101	*Plantago lanceolata*	e	p			2.8%						0.0%
101	Bare Ground							8.5%	3.5%	5.6%	2.0%	0.0%
101	Litter							27.0%	42.5%	41.3%	48.7%	0.0%
102	*Poa pratensis*	e	p		86.1%	75.0%		17.0%	8.5%	7.5%	4.5%	11.3%
102	*Ambrosia psilostachya*	n	p		66.7%	83.3%		2.5%	5.4%	2.3%	11.6%	8.1%
102	*Aster falcatus*	n	p		77.8%	77.8%		5.7%	4.4%	7.2%	5.1%	7.9%
102	*Artemisia ludoviciana*	n	p		91.7%	77.8%		6.3%	4.7%	7.2%	2.4%	7.5%
102	*Poa compressa*	e	p		30.6%	8.3%		3.2%	3.8%	13.8%	3.1%	6.3%
102	*Carex heliophylla*	n	p		16.7%	80.6%		1.3%	4.4%	5.9%	3.1%	5.2%
102	*Andropogon gerardii*	n	p		27.8%	27.8%		1.6%	2.8%	5.6%	5.5%	4.7%
102	*Bromus japonicus*	e	m		69.4%	50.0%		8.8%	2.8%			4.5%
102	*Agropyron smithii*	n	p		58.3%	44.4%		3.2%	1.9%	4.9%	2.1%	4.4%
102	*Tragopogon dubius*	e	m		30.6%	72.2%		0.9%	1.6%		0.3%	2.3%
102	*Helianthus rigidus*	n	p					1.3%	3.5%	2.0%	2.1%	2.2%
102	*Solidago nana*	n	p		16.7%	30.6%		2.5%	2.5%	0.3%		2.0%
102	*Psoralea tenuiflora*	n	p		8.3%	47.2%			0.3%	0.7%	2.7%	1.9%
102	*Liatris punctata*	n	p		25.0%	52.8%			0.6%	0.7%	0.3%	1.6%
102	*Achillea lanulosa*	n	p		22.2%			1.3%	1.6%	0.7%	0.3%	1.3%
102	*Astragalus agrestis*	n	p		25.0%	16.7%		0.9%	0.3%	0.3%	0.3%	1.1%
102	*Bouteloua curtipendula*	n	p		16.7%	33.3%		0.6%	0.3%			1.0%
102	*Stipa viridula*	n	p		13.9%	5.6%		1.9%		0.7%		0.8%
102	*Lactuca serriola*	e	m		36.1%	11.1%		0.3%				0.8%
102	*Allysum minus*	e	m		38.9%	2.8%		0.9%				0.8%
102	*Sporobolus asper*	n	p							1.0%	1.4%	0.6%
102	*Aster porteri*	n	p						0.9%	1.3%	0.3%	0.6%
102	*Grindelia squarrosa*	n	m		5.6%	8.3%		0.3%			0.7%	0.5%
102	*Helianthus pumilus*	n	p					0.9%		0.3%	0.7%	0.5%
102	*Camelina microcarpa*	e	m		19.4%	2.8%		0.9%				0.5%
102	*Bromus inermis*	e	p		8.3%			1.3%				0.4%
102	*Dactylis glomerata*	e	p						0.6%		0.7%	0.4%
102	*Artemisia dranunculus*	n	p		8.3%	2.8%					0.7%	0.4%
102	*Carex sp.*	u	p		16.7%							0.3%
102	*Bromus tectorum*	e	m		5.6%			0.9%				0.3%
102	*Koeleria macrantha*	n	p		2.8%	2.8%					0.7%	0.3%
102	*Solidago missouriensis*	n	p								1.0%	0.3%
102	*Opuntia macrorhiza*	n	p			19.4%						0.3%

Appendix 3 (Cont.)

				% of Quadrats Present				% Cover				
Plot	Species			Part94	July95	July96	All94	June95	June96	Aug95	Aug96	IMP
102	*Lupinus argenteus*	n	p		16.7%	5.6%						0.3%
102	*Rosa arkansana*	n	p		11.1%			0.3%			0.3%	0.3%
102	*Aristida purpurea*	n	p					0.3%	0.3%		0.3%	0.2%
102	*Schizachyrium scoparium*	n	p			8.3%					0.3%	0.2%
102	*Stipa comata*	n	p		13.9%							0.2%
102	*Taraxacum officianale*	e	p			5.6%		0.3%	0.3%			0.2%
102	*Mertensia lanceolata*	n	p		2.8%	11.1%						0.2%
102	*Conringia orientalis*	e	m		13.9%							0.2%
102	*Sysimbrium altissimum*	e	m			5.6%		0.3%	0.3%			0.2%
102	*Thermopsis divaricarpa*	n	p		13.9%							0.2%
102	*Calochortus gunnisonii*	n	p		11.1%							0.2%
102	*Linaria genistifolia*	e	u			11.1%						0.2%
102	*Verbena bracteata*	e	m					0.3%		0.7%		0.2%
102	*Bouteloua gracilis*	n	p			2.8%			0.3%			0.1%
102	*Buchloe dactyloides*	n	p						0.3%			0.1%
102	*Poa sp.*	u	u					0.3%				0.1%
102	*Stipa spartea*	n	p					0.3%				0.1%
102	*Erigeron divergens*	n	m					0.3%				0.1%
102	*Packeria pseudoaureas*	n	p					0.3%				0.1%
102	*Podospermum lacinatum*	e	m					0.3%				0.1%
102	*Ratibida columnifera*	n	p						0.3%			0.1%
102	*Onosmodium molle*	n	p								0.3%	0.1%
102	*Descurainia sophia*	e	m					0.3%				0.1%
102	*Erysimum asperum*	n	p			8.3%						0.1%
102	*Opuntia fragilis*	n	p		8.3%							0.1%
102	*Symphoricarpos occidentalis*	n	p								0.3%	0.1%
102	*Silene antirrhina*	e	m		5.6%							0.1%
102	*Astragalus flexuosus*	n	p			5.6%						0.1%
102	*Oxybaphus linearis*	n	p		5.6%							0.1%
102	*Eriogonum effusum*	n	p						0.3%			0.1%
102	*Penstemon secundiflorus*	n	p		5.6%							0.1%
102	Unk. Forb -906	u	u					0.3%				0.1%
102	*Viola kitaibeliana*	e	m		2.8%							0.0%
102	*Viola nuttallii*	n	p			2.8%						0.0%
102	Bare Ground							7.6%	10.7%	0.7%	4.8%	0.0%
102	Litter							24.0%	36.0%	36.4%	43.8%	0.0%