

Rocky Flats Bluestem Grassland Study
OSMP Studies 3587

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Study



ESCO Associates Inc.

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ROCKY FLATS

96/97

Report of Findings
Rocky Flats Bluestem Grassland Study
1996/1997
Jefferson and Boulder Counties, CO

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April 1998

INTRODUCTION

Grasslands of the Rocky Flats alluvial surface have attracted interest for some time because of their distinctive plant species composition that includes big bluestem and little bluestem, both grasses with their central distribution in the eastern Great Plains and both requiring greater moisture than is typically present in the western Great Plains. Branson et al. (1965) studied these areas along with grasslands growing on different soils nearby and documented the basic nature and distinction of these grasslands. They pointed out the paradox of coincidental occurrence of mountain and plains species on the grasslands occupying the surface of the Rocky Flats alluvium and speculated on the reasons that these species requiring more moisture than climate would normally provide would occur here. The nature of this ecosystem has also been acknowledged by the U.S. Soil Conservation Service (now Natural Resources Conservation Service) in the description for Cobble Foothill range site (December 1975) in which co-dominance of big bluestem, little bluestem, and mountain muhly is acknowledged. Also set forth in the range site description is the dependence of the type on the occurrence of soils in which 1) high rock volume reduces the volume of effective soil and magnifies incident moisture and 2) argillic B horizons (heavy-textured subsoils) accompany high moisture-holding capacities. Similar observations were made previously by Branson et al.

The Rocky Flats alluvial surface has been the subject of geomorphic/quaternary stratigraphic studies for some time also. Many researchers have examined the age of the surface and its relationship to other terraces along the east slope of the Front Range. In one of the most recent studies, Birkeland et al. (1996) placed the age at something older than 1.69 to 1.82 million years, making it one of the oldest, if not the oldest geological surface in Colorado.

In late October 1994, at the request of Western Aggregates, seeking to permit gravel mining on the site, ESCO Associates undertook an examination of a grassland area in W2 Sec. 16, R70W, T2S. Purposes of this examination were 1) to begin to assess the extent and distinguishing characteristics of the grassland, 2) to document through limited quantitative sampling the species composition/density in the proposed Phase 2 mining area in W2 Sec. 16, and the upper portions of the Woman Creek drainage, and 3) to set forth the critical features of a reclamation plan for the Sec. 16 grassland were it to be mined and reclaimed. Comparison of the Section 16

Phase 2 proposed mining area and the Woman Creek drainage was undertaken to provide some technical basis for discussion of the degree to which conservation of the Woman Creek drainage would protect plant community characteristics that may be deemed important in the Section 16 Phase 2 mining area, especially warm season grass abundance and overall species composition and richness.

Results of these 1994 studies were reported in detail in ESCO (1994). Although this grassland had been referred to as Xeric Tallgrass Prairie (CNHP 1993), it will be referred to simply as Bluestem Grassland here to avoid presupposition that this ecosystem is necessarily like or unlike any other that exists and may have been categorized previously.

Since that time, interest has continued in the degree to which this grassland ecosystem in general, and its representation in the school section (Section 16), constitutes a valuable resource that should be perpetuated even to the exclusion of development of other resources that may be represented on the site such as gravel resources, commercial/industrial development, or other uses.

In 1996, ESCO Associates undertook the data collection portion of a study of these grasslands as they occur in Section 16 on Rocky Flats, in adjacent areas of the Rocky Flats surface, and elsewhere in northern Jefferson County and adjacent Boulder County. This study was part of a joint effort between Jefferson County Open Space Department, Jefferson County Nature Association, the Jefferson County Soil Conservation District, the Colorado State Land Board, and Western Aggregates, which mines gravel on Rocky Flats in the area where these grasslands occur. Data have been collected from a total of 33 sample sites in both 1996 and 1997.

METHODS

Quantitative data from the sample sites were collected in August 1996 as well as in April/May, June, and August/September 1997. Quantitative sampling has taken two forms, cover sampling and frequency/presence sampling. Cover sampling has provided reliable estimates of the abundance of the more common and extensive species at each of the sites, while frequency data have provided a look at the less common as well as the dominant species.

Sample Location

Samples were located subjectively with consideration of incorporating the variability of each site. A few samples thought to be clearly different were included to provide a context for the other sites. Sample locations are shown on Maps 1 through 3. At each location, the end points of the sample transect were marked with a rebar stake driven flush with the ground (for subsequent use with a metal detector), a fiberglass or steel post, and a cairn of rocks. Jefferson County Open Space personnel surveyed these endpoints with Global Positioning System (GPS) equipment to establish permanent record of them.

Cover

The point intercept method of cover assessment was chosen because it provides superior objectivity and repeatability; the inherent tendency to collect the most information on the more abundant species has been countered through use of a total vascular species inventory along the sample transect (see below). In addition, frequency plot data have been collected in one late summer and one spring sampling to provide further details of the abundance of less common species.

Point intercept cover sampling was developed early in the history of plant ecology (Levy and Madden 1933), and translated into varying forms by subsequent researchers (Goodall 1952, Winkworth and Goodall 1962).

Cover data were tabulated as interceptions of a point with plant species, soil, standing dead plant material (produced in a previous year), litter (fallen dead plant material), or rock. Plant material produced during the sample year and still standing was tallied by species. The point was optically projected using a Cover-Point Model 5 Optical Point Projector. The sample was taken at a randomly located and randomly oriented 50 m transect. Permanent marking of the endpoints was accomplished as described above.

Frequency

Frequency data were collected in August 1996 and April/May 1997. These data were taken in each of ten plots located at 5m intervals along each 50m transect. At the suggestion of the technical committee overseeing the study, data were separately collected and tabulated from 20cm x 50cm plots and 100cmx100cm plots. In each plot, all species present were tallied. For each species, the number of plots in which the plant was observed was divided by the number of plots observed (10). Thus, for example, if Species A occurred in seven plots, its frequency for the transect is 7/10, or 70 percent.

Species Presence

In June 1997, in order to assess the presence of any species that had not been apparent in May 1997 sampling, sample transects were revisited in June 1997. At this time, all species present within one meter to either side were tallied. This provided a means of expeditiously monitoring species composition without the lengthy frequency plot process.

RESULTS

Cover data from August 1996 are present in Table 96-1, and those from August 1997 are presented in Table 97-1. Frequency data from August 1996 and May 1997 are not included here because of their great volume and are available upon request. Species presence data from June 1997 are likewise available upon request.

Big bluestem is a species with presettlement distribution centered in areas with annual precipitation of greater than about 30 inches. Its presence has attracted attention to grassland ecosystems in the piedmont of the Front Range of Colorado because the average annual precipitation in this area is only about 13 to 18 inches and moisture-loving species such as big bluestem are not common. In addition, native grasslands of any sort in our area are rare now that residential and commercial development by humans has extended across our landscapes so far and fast.

Because it is a key primary species of interest, most of the sampled grassland ecosystems have a strong presence of big bluestem (Andropogon gerardii) which varied in 1997 from 0 to 35 percent cover and averaged 9.1 percent cover over all samples. However, the distinguishing composition of the Rocky Flats Bluestem Grassland is the simultaneous presence of big bluestem and mountain muhly (Muhlenbergia montana). The latter varied in 1997 from 0 to 18 percent cover and averaged 4.1 percent over all samples. Little bluestem (Schizachyrium scoparium) is often present and in some years visually very conspicuous, but its presence is intermittent. It averaged 1.2 percent cover in August 1997 sampling. Besides the graminoid dominants, the extensive presence of the endemic Porter's aster (Aster porteri) seems to distinguish these environments and may suggest some important things about the nature and significance of the ecosystems.

Review of the data from all sampled sites reveals that the ecosystems present on the Rocky Flats alluvial surface on the Flatirons series soils that are referred to here as Rocky Flats Bluestem Grassland are characterized by the dominance of big bluestem, mountain muhly, and Porter's aster. Samples 1, 2, 3, 4, 5, 10, 11, 15, 16, 17, 18, 19, 21, 22, 23, and CC-1, all sites on the main Rocky Flats surface on Flatirons series soils, averaged 8.0 percent cover by big bluestem, 7.8 percent cover by mountain muhly, 1.9 percent cover by little bluestem, and 6.3 percent cover by Porter's aster. Cover by these same species in all other samples averaged 10.2, 0.6, 0.5 and 0.8 percents, respectively. Thus, big bluestem was actually more abundant in the non-typical areas than in the main area of what is being referred to here as Rocky Flats Bluestem grassland. However, mountain muhly and Porter's aster are greatly more abundant in the Rocky Flats Bluestem grassland and little bluestem is slightly more abundant.

DISCUSSION

Abundant presence of big bluestem has been a guiding general concept in identifying areas for inclusion in the study. The co-dominance of mountain muhly is characteristic of the grassland ecosystems on Rocky Flats and in my opinion separates them from the other occurrences of big bluestem-dominated grasslands in Jefferson, Boulder and El Paso Counties along the Front Range of Colorado. By comparison, tallgrass occurrences in the City of Boulder Open Space tallgrass

natural areas are for the most part distinctly moister than the Rocky Flats sites and in any case do not include much if any representation of mountain muhly (see ESCO 1991, 1992, 1993, 1994, 1995, 1996). Data from the Rocky Flats Environmental Technology Site (PTI 1997) demonstrate that sites adjacent to those of the current study have shown the same species composition. Big bluestem is a component of a large number of Front Range foothill plant communities, where they have been, in recent years less heavily grazed and summer moisture has been abundant (see for example ESCO 1998). Data from the U.S. Air Force Academy (ESCO 1991) show one area (sample 006) with species composition similar to the Rocky Flats Bluestem Grassland. However, the presences of big bluestem and Porter's aster are somewhat weaker than is the case on Rocky Flats.

Of the sites examined during this study, it is apparent to me that of the some 25 to 50 species present, most are species with fairly wide ecological amplitudes whose presence is not particularly diagnostic of the ecological nature of this plant community. Since most of these areas have experienced grazing by domestic livestock over the past 130 years or longer, including periods of abusive grazing intensity, most of these ecosystems are in a state of recovery or disequilibrium that affects their species composition. This condition of modification has allowed various opportunistic species of wide ecological amplitude to occupy sites that they might not have in presettlement times, or has allowed them to exist in abundances that are much different than they typically presented in presettlement times. Examples of species that fall into this category may include many native annual and biennial forbs (along with most introduced annual and biennial forbs), prickly pear cactus, and most other cacti, and perennial forbs such as purple prairie clover, blanket flower, spotted gayfeather, and narrowleaf scurfpea.

The task at hand in evaluation of the significance of particular plant communities is to to concientiously and truthfully determine whether a given plant community of apparently differing species composition and limited extent is a significant natural feature worthy of preservation, or whether it is a vestige of human land management and chanceas reflected in short term abundance of opportunistic species is of critical central importance.

In evaluation of the data to ascertain whether the Rocky Flats Bluestem grasslands are really

different from other bluestem-dominated grasslands, species that occur with great fidelity or in distinctly different abundance on only the RFB sites were sought. Conversely, species conspicuous by their absence on RFB sites only could contribute to interpretation of the community.

Of species observed during 1996 and 1997 sampling, none are rare. Species considered rare by CNHP that are known to occur in the general area include Aristida basiramea and Viola pedatifida, both of which were specifically sought and neither of which was found.

Fendler sandwort (Eremogone fendleri aka Arenaria fendleri) and James nailwort (Paronychia jamesii), while not rare, are strongly associated with the samples in which big bluestem, mountain muhly, and Porter's aster are dominant. These two species may be present in response to past grazing use (witness their absence in the long-ungrazed sample CC-1 and their somewhat lower abundance in sample 15 through 19 in the recently ungrazed Rocky Flats Environmental Technology Site Buffer Zone). Similarly Solidago simplex (aka S. decumbens, S. spathulata) and S. nana, both mountain species, though not as commonly present as the sandwort and nailwort show a strong fidelity with the RFB sites. The frequency of occurrence of these species in the samples from this study is illustrated in Figure 1. These species are, I believe, useful in describing the distinctive features of the RFB and in understanding its basic ecology.

James nailwort is a species of the (dry) high plains (not the relatively moist tallgrass portion of the plains, however). In consideration of the presence of Fendler sandwort, Porter aster, and the goldenrods from moister environments, the occurrence of James nailwort in the most of the RFB samples is another example of the same paradox posed by the co-occurrence of big bluestem and mountain muhly.

Porter aster is an endemic species of the east slope mountains in Colorado. It has wide distribution in the foothills of Boulder and Jefferson Counties, but is usually present in small amounts. Its presence in the RFB grasslands in amounts of 4 to 8 percent absolute cover (9 to 18 percent of total vegetation cover) is substantially greater than its general occurrence. Note the relative vegetation cover of this and the other dominants in Figure 2. It should also be noted that it occurred abundantly in the ungrazed sample (CC-1) lest it be assumed that its

presence relates to grazing effects only.

If the Rocky Flats alluvial surface has been in place and has been essentially undisturbed for one and one-half to two million years across a great many shifts in climate over a period including most of the Pleistocene, in a geomorphic/geographic position that is naturally transitional, then the presence of evidence of diverse former plant communities from past ages and climates is not surprising. Maybe it is not surprising, but it does, I believe, point to a significance in its antiquity, historic, and educational value.

Given the various climatic changes of the Pleistocene that accompanied glacial formation and advance, there have likely been ample periods of cool, moist climate providing the opportunity for mountain species to be present on this site. The time in which the bluestems, nominally reflective of warm moist climate, may have been added to the site, whether earlier or later is not known and numbers among the important questions potentially to be answered during research by geologists and ecologists on this site in years to come.

Figure 1. Frequency of Selected Diagnostic Species

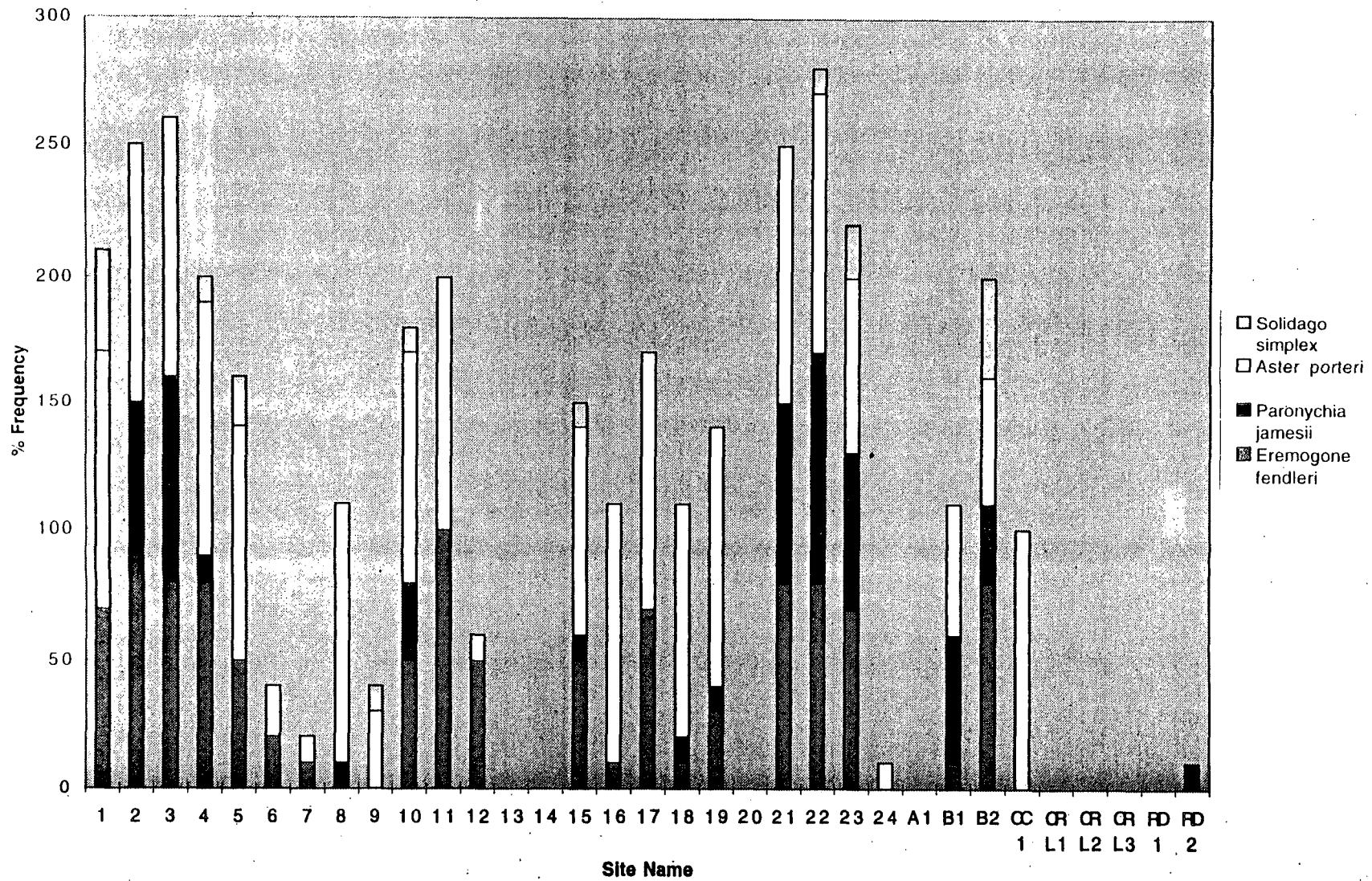


Figure 2. Relative Vegetation Cover of Selected Species

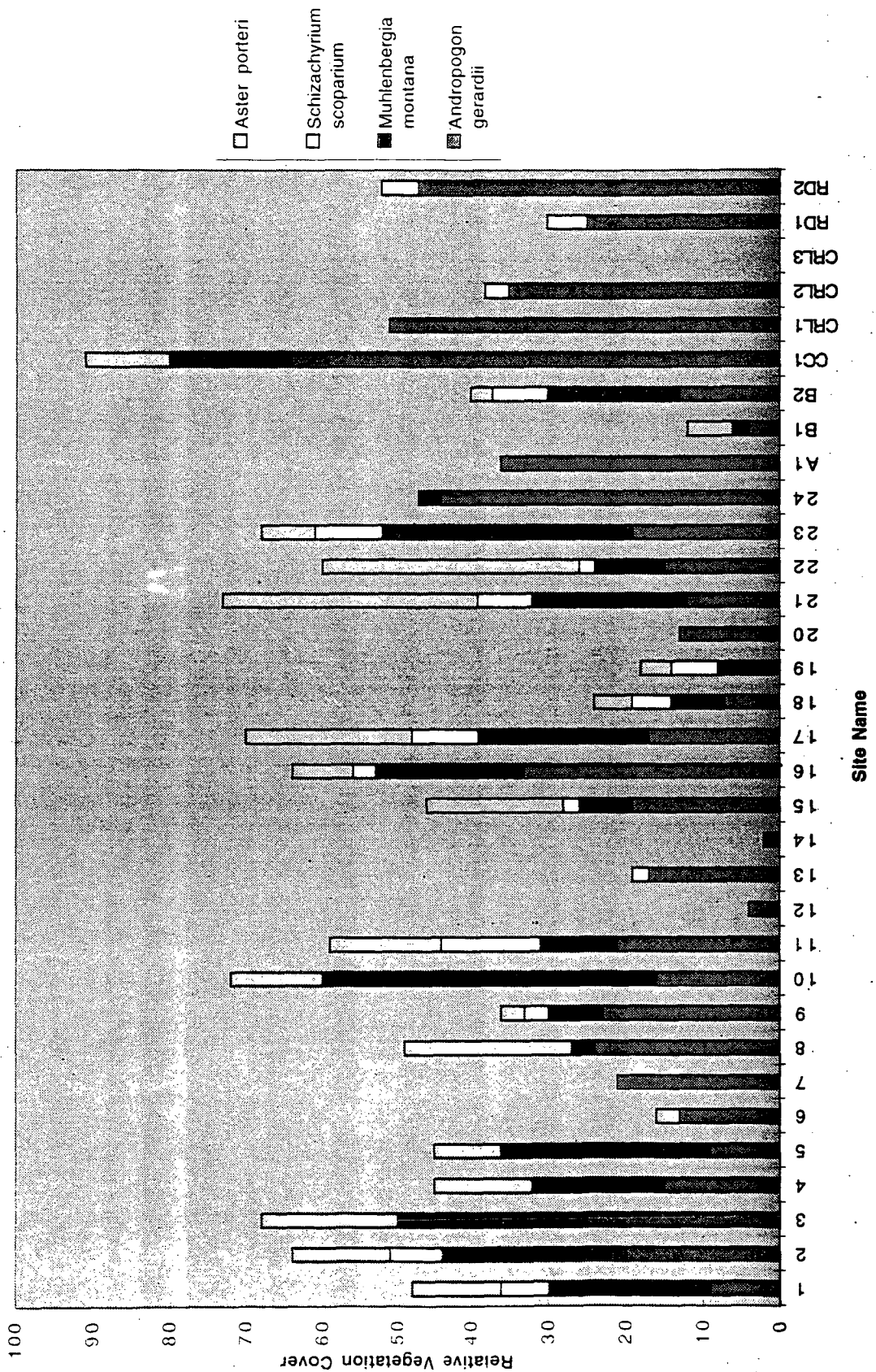


Table 96-1. Cover Data - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - Sept., 1996

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
NATIVE ANNUAL & BIENNIAL FORBS					
<i>Chenopodium leptophyllum</i>	0.00	3.23	0.00	0.00	0.00
<i>Cirsium undulatum</i>	0.06	48.39	0.15	0.10	0.20
<i>Descurainia incana</i>	0.00	3.23	0.00	0.00	0.00
<i>Erysimum asperum</i>	0.10	51.61	0.23	0.10	0.20
<i>Frasera speciosa</i>	0.00	3.23	0.00	0.00	0.00
<i>Grindelia squarrosa</i>	0.16	58.06	0.38	0.16	0.34
<i>Hedeoma hispidum</i>	0.00	3.23	0.00	0.00	0.00
<i>Oligosporus pacificus</i>	0.19	38.71	0.45	0.19	0.41
<i>Plantago patagonica</i>	0.00	9.68	0.00	0.00	0.00
<i>Pterogonum alatum</i>	0.06	67.74	0.15	0.10	0.20
<i>Silene antirrhina</i>	0.00	19.35	0.00	0.00	0.00
TOTAL NATIVE ANN. & BIEN. FORBS	0.6	100.0	1.4	0.6	1.4
INTRODUCED ANNUAL & BIENNIAL FORBS					
<i>Acosta diffusa</i>	0.03	22.58	0.08	0.03	0.07
<i>Alyssum minus</i>	0.90	61.29	2.10	1.06	2.25
<i>Camelina microcarpa</i>	0.16	12.90	0.38	0.16	0.34
<i>Carduus nutans ssp. macrolepis</i>	0.00	16.13	0.00	0.00	0.00
<i>Erodium cicutarium</i>	0.00	3.23	0.00	0.00	0.00
<i>Lactuca serriola</i>	0.00	32.26	0.00	0.00	0.00
<i>Lepidium densiflorum</i>	0.00	9.68	0.00	0.00	0.00
<i>Neolepia campestre</i>	0.03	9.68	0.08	0.03	0.07
<i>Podospermum laciniatum</i>	0.00	19.35	0.00	0.00	0.00
<i>Polygonum arenastrum</i>	0.00	3.23	0.00	0.00	0.00
<i>Salsola australis</i>	0.00	3.23	0.00	0.00	0.00
<i>Sisymbrium altissimum</i>	0.00	3.23	0.00	0.00	0.00
<i>Tragopogon dubius ssp. major</i>	0.10	77.42	0.23	0.10	0.20
<i>Verbascum blattaria</i>	0.00	3.23	0.00	0.00	0.00
<i>Verbascum thapsus</i>	0.00	3.23	0.00	0.00	0.00
TOTAL INTRO. ANN. & BIEN. FORBS	1.2	87.1	2.9	1.4	2.9
INTRODUCED ANNUAL GRASSES					
<i>Anisantha tectorum</i>	0.19	16.13	0.45	0.23	0.48
<i>Bromus japonicus</i>	1.00	67.74	2.33	1.16	2.46
TOTAL INTRO. ANN. GRASSES	1.2	74.2	2.8	1.4	2.9
NATIVE PERENNIAL FORBS					
<i>Acetosella vulgaris</i>	0.00	3.23	0.00	0.00	0.00
<i>Achillea lanulosa</i>	0.03	19.35	0.08	0.03	0.07
<i>Adenolinum lewisii</i>	0.06	22.58	0.15	0.06	0.14
<i>Allium spp.</i>	0.00	3.23	0.00	0.00	0.00
<i>Allium textile</i>	0.03	6.45	0.08	0.03	0.07
<i>Ambrosia psilostachya var. coronopifolia</i>	0.48	74.19	1.13	0.55	1.16
<i>Amerosedum lanceolatum</i>	0.00	9.68	0.00	0.00	0.00
<i>Anemone multifida ssp. globosa</i>	0.00	3.23	0.00	0.00	0.00
<i>Antennaria parvifolia</i>	0.00	19.35	0.00	0.00	0.00
<i>Antennaria pulcherrima ssp. anaphaloides</i>	0.00	3.23	0.00	0.00	0.00
<i>Antennaria rosea</i>	0.06	19.35	0.15	0.06	0.14
<i>Aphyllon fasciculatum</i>	0.00	3.23	0.00	0.00	0.00
<i>Artemisia frigida</i>	0.32	67.74	0.75	0.39	0.82
<i>Artemisia ludoviciana</i>	0.68	87.10	1.58	0.77	1.64
<i>Asclepias pumila</i>	0.00	3.23	0.00	0.00	0.00
<i>Asclepias spp.</i>	0.00	6.45	0.00	0.00	0.00
<i>Asclepias stenophylla</i>	0.00	9.68	0.00	0.00	0.00
<i>Asclepias virdiflora</i>	0.00	9.68	0.00	0.00	0.00
<i>Aster porteri</i>	3.65	74.19	8.49	3.90	8.25
<i>Astragalus agrestis</i>	0.00	6.45	0.00	0.00	0.00
<i>Astragalus miser var. oblongifolius</i>	0.00	6.45	0.00	0.00	0.00
<i>Brickellia rosmarinifolia ssp. chlorolepis</i>	0.00	3.23	0.00	0.00	0.00
<i>Calochortus nuttallii</i>	0.00	3.23	0.00	0.00	0.00
<i>Calylophus serrulatus</i>	0.00	12.90	0.00	0.00	0.00
<i>Campanula rotundifolia</i>	0.00	3.23	0.00	0.00	0.00
<i>Castilleja spp.</i>	0.00	3.23	0.00	0.00	0.00
<i>Cerastium strictum</i>	0.03	19.35	0.08	0.13	0.27

Table 96-1. Cover Data - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - Sept., 1996

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
NATIVE PERENNIAL FORBS (concluded)					
Claytonia megarhiza	0.00	3.23	0.00	0.00	0.00
Claytonia spp.	0.03	9.68	0.08	0.03	0.07
Comandra umbellata ssp. pallida	0.03	29.03	0.08	0.03	0.07
Dalea candida var. oligophylla	0.00	12.90	0.00	0.00	0.00
Dalea purpurea	0.00	80.65	0.00	0.00	0.00
Delphinium nuttallianum	0.00	3.23	0.00	0.00	0.00
Drymocallis fissa	0.00	22.58	0.00	0.00	0.00
Eremogone fendleri	0.45	61.29	1.05	0.45	0.95
Erigeron flagellaris	0.87	48.39	2.03	0.94	1.98
Eriogonum flavum var. flavum	0.00	12.90	0.00	0.00	0.00
Evolvulus nuttalianus	0.00	6.45	0.00	0.00	0.00
Gaillardia aristata	0.06	67.74	0.15	0.06	0.14
Gastrolychnis drummondii	0.00	9.68	0.00	0.00	0.00
Gaura coccinea	0.00	16.13	0.00	0.03	0.07
Gutierrezia sarothrae	0.10	29.03	0.23	0.10	0.20
Helianthus pumilus	0.10	6.45	0.23	0.10	0.20
Heliomeris multiflora	0.00	3.23	0.00	0.00	0.00
Heterotheca fulcrata	0.52	74.19	1.20	0.52	1.09
Heterotheca villosa	1.00	61.29	2.33	1.06	2.25
Lesquerella ludoviciana	0.00	3.23	0.00	0.00	0.00
Lesquerella montana	0.03	64.52	0.08	0.06	0.14
Lesquerella spp.	0.00	9.68	0.00	0.00	0.00
Liatris punctata	0.65	90.32	1.50	0.68	1.43
Lithospermum ruderale	0.00	19.35	0.00	0.00	0.00
Lygodesmia juncea	0.00	3.23	0.00	0.00	0.00
Mertensia ciliata	0.00	3.23	0.00	0.00	0.00
Mertensia lanceolata	0.00	3.23	0.00	0.00	0.00
Oenothera villosa	0.00	6.45	0.00	0.00	0.00
Oligoneuron rigidum	0.00	3.23	0.00	0.00	0.00
Oligosporus dracuncululus ssp. glaucus	0.19	9.68	0.45	0.19	0.41
Onosmodium molle ssp. occidentale	0.00	3.23	0.00	0.00	0.00
Oreocarya spp.	0.00	22.58	0.00	0.03	0.07
Oxalis dillenii	0.00	3.23	0.00	0.00	0.00
Oxybaphus hirsutus	0.00	16.13	0.00	0.00	0.00
Oxybaphus linearis	0.00	19.35	0.00	0.00	0.00
Oxytropis sericea	0.00	9.68	0.00	0.00	0.00
Oxytropis x sericea	0.00	19.35	0.00	0.00	0.00
Paronychia jamesii	0.10	58.06	0.23	0.10	0.20
Penstemon angustifolius	0.03	6.45	0.08	0.03	0.07
Penstemon strictus	0.00	19.35	0.00	0.00	0.00
Penstemon virens	0.00	3.23	0.00	0.00	0.00
Phacelia heterophylla	0.06	22.58	0.15	0.06	0.14
Pneumonanthe affinis	0.03	6.45	0.08	0.03	0.07
Pneumonanthe bigelovii	0.00	3.23	0.00	0.00	0.00
Pneumonanthe spp.	0.00	3.23	0.00	0.00	0.00
Potentilla hippiana	0.03	12.90	0.08	0.10	0.20
Potentilla pulcherrima	0.00	3.23	0.00	0.00	0.00
Psoralidium argophyllum	0.00	9.68	0.00	0.00	0.00
Psoralidium tenuiflorum	0.48	93.55	1.13	0.48	1.02
Ratibida columnifera	0.00	29.03	0.00	0.00	0.00
Senecio spartioides	0.13	38.71	0.30	0.13	0.27
Silene scouleri ssp. hallii	0.00	3.23	0.00	0.00	0.00
Solidago missouriensis	0.00	3.23	0.00	0.00	0.00
Solidago simplex var. nana	0.16	48.39	0.38	0.16	0.34
Sphaeralcea coccinea	0.03	6.45	0.08	0.06	0.14
Talinum parviflorum	0.00	29.03	0.00	0.00	0.00
Thelesperma filifolium	0.00	6.45	0.00	0.00	0.00
Thelesperma megapotamicum	0.00	3.23	0.00	0.00	0.00
Tithymalus brachyceras	0.00	9.68	0.00	0.00	0.00
Townsendia hookeri	0.10	9.68	0.23	0.16	0.34
Tradescantia occidentalis	0.00	6.45	0.00	0.00	0.00
Viola spp.	0.00	3.23	0.00	0.00	0.00
Virgulus falcatus	0.10	19.35	0.23	0.10	0.20
TOTAL NATIVE PERENNIAL FORBS	10.6	100.0	24.8	11.5	24.6

Table 96-1. Cover Data - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - Sept., 1996

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
INTRODUCED PERENNIAL FORBS					
<i>Arabis hirsuta</i>	0.00	16.13	0.00	0.00	0.00
<i>Breca arvensis</i>	0.00	3.23	0.00	0.00	0.00
<i>Convolvulus arvensis</i>	0.00	6.45	0.00	0.00	0.00
<i>Daucus carota</i>	0.03	6.45	0.08	0.03	0.07
<i>Hypericum perforatum</i>	0.29	80.65	0.68	0.35	0.75
<i>Linaria genistifolia</i> ssp. <i>dalmatica</i>	0.00	12.90	0.00	0.00	0.00
<i>Taraxacum officinale</i>	0.00	22.58	0.00	0.00	0.00
TOTAL INTRO. PERENNIAL FORBS	0.3	83.9	0.8	0.4	0.8
NATIVE PERENNIAL GRASSES (cool)					
<i>Carex filifolia</i>	0.00	3.23	0.00	0.00	0.00
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	3.32	93.55	7.74	3.87	8.19
<i>Elymus elymoides</i>	0.00	3.23	0.00	0.00	0.00
<i>Elymus lanceolatus</i> fm. <i>dasystachya</i>	0.06	3.23	0.15	0.06	0.14
<i>Elymus longifolius</i>	0.03	64.52	0.08	0.03	0.07
<i>Hesperostipa comata</i>	1.84	61.29	4.28	1.97	4.16
<i>Juncus interior</i>	0.13	29.03	0.30	0.13	0.27
<i>Koeleria macrantha</i>	1.48	93.55	3.46	1.58	3.34
<i>Nassella viridula</i>	0.29	3.23	0.68	0.32	0.68
<i>Pascopyrum smithii</i>	0.03	25.81	0.08	0.06	0.14
<i>Poa agassizensis</i>	1.84	64.52	4.28	2.13	4.50
<i>Poa compressa</i>	2.61	74.19	6.09	2.90	6.14
<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>	0.00	3.23	0.00	0.00	0.00
TOTAL NATIVE PERENNIAL GRASSES (c)	11.6	100.0	27.1	13.1	27.6
INTRODUCED PERENNIAL GRASSES (cool)					
<i>Bromopsis inermis</i>	0.00	3.23	0.00	0.00	0.00
TOTAL INTRO. PERENNIAL GRASSES (c)	0.0	3.2	0.0	0.0	0.0
NATIVE PERENNIAL GRASSES (warm)					
<i>Andropogon gerardii</i>	8.32	100.00	19.38	8.97	18.96
<i>Aristida purpurea</i>	0.35	80.65	0.83	0.45	0.95
<i>Bouteloua curtipendula</i>	0.71	90.32	1.65	0.71	1.50
<i>Buchloe dactyloides</i>	0.13	35.48	0.30	0.16	0.34
<i>Calamovilfa longifolia</i>	0.00	3.23	0.00	0.03	0.07
<i>Chondrosium gracile</i>	1.19	96.77	2.78	1.26	2.66
<i>Chondrosium hirsutum</i>	0.26	48.39	0.60	0.26	0.55
<i>Muhlenbergia cuspidata</i>	0.00	3.23	0.00	0.00	0.00
<i>Muhlenbergia montana</i>	2.77	67.74	6.46	2.94	6.21
<i>Schizachyrium scoparium</i>	1.94	93.55	4.51	2.10	4.43
<i>Sorghastrum avenaceum</i>	0.68	61.29	1.58	0.68	1.43
<i>Sporobolus asper</i>	0.03	16.13	0.08	0.03	0.07
<i>Sporobolus cryptandrus</i>	0.03	3.23	0.08	0.03	0.07
<i>Sporobolus heterolepis</i>	0.23	38.71	0.53	0.23	0.48
TOTAL NATIVE PERENNIAL GRASSES (w)	16.6	100.0	38.8	17.8	37.7
NATIVE SHRUBS					
<i>Chrysothamnus</i> spp.	0.00	3.23	0.00	0.00	0.00
<i>Eriogonum effusum</i>	0.10	9.68	0.23	0.10	0.20
<i>Rhus aromatica</i> ssp. <i>trilobata</i>	0.00	3.23	0.00	0.00	0.00
<i>Rosa sayi</i>	0.00	9.68	0.00	0.00	0.00
<i>Rosa woodsii</i>	0.00	3.23	0.00	0.00	0.00
<i>Yucca glauca</i>	0.03	22.58	0.08	0.03	0.07
TOTAL NATIVE SHRUBS	0.1	35.5	0.3	0.1	0.3
NATIVE TREES					
<i>Pinus ponderosa</i> ssp. <i>scopulorum</i>	0.00	3.23	0.00	0.00	0.00
TOTAL NATIVE TREES	0.0	3.2	0.0	0.0	0.0
FERNS					
<i>Selaginella densa</i>	0.23	12.90	0.53	0.35	0.75
TOTAL FERNS	0.2	12.9	0.5	0.4	0.8

Table 96-1. Cover Data - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - Sept., 1996

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
MOSS					
Moss	0.00	6.45	0.00	0.00	0.00
TOTAL MOSS	0.0	6.5	0.0	0.0	0.0
LICHEN					
Xanthoparmelia chlorochloa	0.00	3.23	0.00	0.00	0.00
TOTAL LICHEN	0.0	3.2	0.0	0.0	0.0
SUCCULENT					
Coryphantha vivipara var. vivipara	0.00	3.23	0.00	0.00	0.00
Echinocereus viridiflorus	0.03	41.94	0.08	0.03	0.07
Opuntia fragilis	0.00	19.35	0.00	0.00	0.00
Opuntia macrorhiza	0.29	96.77	0.68	0.39	0.82
Opuntia polyacantha	0.00	9.68	0.00	0.00	0.00
Pediocactus simpsonii var. minor	0.00	16.13	0.00	0.03	0.07
TOTAL SUCCULENT	0.3	100.0	0.8	0.5	1.0
MUSHROOMS					
Fungus	0.00	3.23	0.00	0.00	0.00
TOTAL MUSHROOMS	0.0	3.2	0.0	0.0	0.0
Standing dead	3.32	96.77		3.45	
Litter	40.00	100.00		40.00	
Bare soil	8.55	96.77		8.55	
Rock	5.19	80.65		5.19	
TOTALS					
TOTAL VEGETATION COVER	42.9 (s=9.1)		100.0	47.3 (s=12.2)	100.0
GROUND COVER (Litter+Rock+Veg+St.Dead)	91.5			95.9	
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 41.8 Std.Dev.= 6.7)					

Table 96-1. Cover Data - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - Sept., 1996

PLANT SPECIES	Percent Follar Cover*									
	----- SAMPLE NUMBER -----									
	A1	B1	B2	CC1	CR1	CR2	CR3	RD1	RD2	
NATIVE ANNUAL & BIENNIAL FORBS										
<i>Chenopodium leptophyllum</i>										
<i>Cirsium undulatum</i>	P	P			P	P	(1)	P	P	
<i>Descurainia incana</i>										
<i>Erysimum asperum</i>	P	1	P			P		P	P	
<i>Frasera speciosa</i>										
<i>Grindelia squarrosa</i>		2	P	2	P	P	P	P	P	
<i>Hedeoma hispidum</i>										
<i>Oligosporus pacificus</i>	P		P					P	P	
<i>Plantago patagonica</i>		P								
<i>Pterogonum alatum</i>	P	P	P			P				
<i>Silene antirrhina</i>					P	P				
TOTAL NATIVE ANN. & BIEN. FORBS	P	3	P	2	P	P	(1)	P	P	
INTRODUCED ANNUAL & BIENNIAL FORBS										
<i>Acosta diffusa</i>		P	P							
<i>Alyssum minus</i>	P		P	3		P	1	11(3)	2(1)	
<i>Camelina microcarpa</i>										
<i>Carduus nutans ssp. macrolepis</i>						P				
<i>Erodium cicutarium</i>										
<i>Lactuca serriola</i>				P	P					
<i>Lepidium densiflorum</i>	P									
<i>Neolepia campestre</i>				P						
<i>Podospermum laciniatum</i>	P		P							
<i>Polygonum arenastrum</i>										
<i>Salsola australis</i>										
<i>Sisymbrium altissimum</i>										
<i>Tragopogon dubius ssp. major</i>	1	P	P	P	P	P	P	P	P	
<i>Verbascum blattaria</i>										
<i>Verbascum thapsus</i>										
TOTAL INTRO. ANN. & BIEN. FORBS	1	P	P	3	P	P	1	11(3)	2(1)	
INTRODUCED ANNUAL GRASSES										
<i>Anisantha tectorum</i>				P				1	5(1)	
<i>Bromus japonicus</i>	P			(1)	1	P	1			
TOTAL INTRO. ANN. GRASSES	P	---	---	(1)	1	P	1	1	5(1)	
NATIVE PERENNIAL FORBS										
<i>Acetosella vulgaris</i>										
<i>Achillea lanulosa</i>				P						
<i>Adenolinum lewisii</i>	P					P	P			
<i>Allium spp.</i>		P								
<i>Allium textile</i>										
<i>Ambrosia psilostachya var. coronopifolia</i>	P		P	1	2	P	1	1		
<i>Amerosedum lanceolatum</i>										
<i>Anemone multifida ssp. globosa</i>										
<i>Antennaria parvifolia</i>										
<i>Antennaria pulcherrima ssp. anaphaloides</i>										
<i>Antennaria rosea</i>		1								
<i>Aphyllon fasciculatum</i>										
<i>Artemisia frigida</i>	4	P	P			P	P	(2)	1	
<i>Artemisia ludoviciana</i>	P	P	P		P	3	2	P	1(1)	
<i>Asclepias pumila</i>							P			
<i>Asclepias spp.</i>				P						
<i>Asclepias stenophylla</i>										
<i>Asclepias viridiflora</i>										
<i>Aster porteri</i>		2	5	7	P					
<i>Astragalus agrestis</i>										
<i>Astragalus miser var. oblongifolius</i>						P	P			
<i>Brickellia rosmarinifolia ssp. chlorolepis</i>										
<i>Calochortus nuttallii</i>										
<i>Calylophus serrulatus</i>			P							
<i>Campanula rotundifolia</i>			P							
<i>Castilleja spp.</i>										
<i>Cerastium strictum</i>						P	P		(1)	

Table 96-1. Cover Data - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - Sept., 1996

PLANT SPECIES	Percent Follar Cover*									
	----- SAMPLE NUMBER -----									
	AT	B1	B2	CC1	CR1	CR2	CR3	RD1	RD2	
NATIVE PERENNIAL FORBS (concluded)										
Claytonia megarhiza										
Claytonia spp.										
Comandra umbellata ssp. pallida		1	P							P
Dalea candida var. oligophylla										
Dalea purpurea	P	P	P	P		P	P	P		P
Delphinium nuttallianum										
Drymocallis fissa										
Eremogone fendleri	P	P	1							
Erigeron flagellaris	4	9	P			P				
Eriogonum flavum var. flavum	P							P		P
Evolvulus nuttallianus							P			
Gaillardia aristata	P		P	P		P				
Gastrolychnis drummondii	P		P							
Gaura coccinea										
Gutierrezia sarothrae	P	1	P			P	P			
Helianthus pumilus						2	1			
Heliomeris multiflora										
Heterotheca fulcrata	1	P	1	P		3	P			
Heterotheca villosa	6	P	5		1(1)	1	1	P		6
Lesquerella ludoviciana										
Lesquerella montana	P	(1)	1	P		P				
Lesquerella spp.										
Liatris punctata	P	P	3		1	P	P	2(1)		P
Lithospermum ruderales	P	P				P	P			1
Lygodesmia juncea										
Mertensia ciliata										
Mertensia lanceolata										
Oenothera villosa										
Oligoneuron rigidum										
Oligosporus dracunculus ssp. glaucus					3	3	P			
Onosmodium molle ssp. occidentale										
Oreocarya spp.	P							P		P
Oxalis dillenii										
Oxybaphus hirsutus										
Oxybaphus linearis						P				P
Oxytropis sericea								P		P
Oxytropis x sericea	P		P			P	P			
Paronychia jamesii	P	P								P
Penstemon angustifolius										
Penstemon strictus		P					P	P		
Penstemon virens										
Phacelia heterophylla					P			P		P
Pneumonanthe affinis										
Pneumonanthe bigelovii										
Pneumonanthe spp.				P						
Potentilla hippiana			P							
Potentilla pulcherrima										
Psoralidium argophyllum								P		P
Psoralidium tenuiflorum	P	P	P	P	1	1	P	P		P
Ratibida columnifera	P	P			P	P	P			
Senecio spartioides	P	P			P	P		P		P
Silene scouleri ssp. hallii										
Solidago missouriensis										
Solidago simplex var. nana	P		1	P						
Sphaeralcea coccinea							1(1)			
Talinum parviflorum										
Thelesperma filifolium								P		P
Thelesperma megapotamicum	P									
Tithymalus brachyceras	P		P							
Townsendia hookeri		P	3(2)							
Tradescantia occidentalis								P		P
Viola spp.			P							
Virgulus falcatus		P			1		P			
TOTAL NATIVE PERENNIAL FORBS	15	14(1)	20(2)	8	9(1)	13	6(1)	3(3)	9(2)	

PLANT SPECIES	Percent Foliar Cover*									
	----- SAMPLE NUMBER -----									
	A1	B1	B2	CC1	CR1	CR2	CR3	RD1	RD2	
MOSS										
Moss										
TOTAL MOSS	---	---	---	---	---	---	---	---	---	---
LICHEN										
Xanthoparmelia chlorochloa										
TOTAL LICHEN	---	---	---	---	---	---	---	---	---	---
SUCCULENT										
Coryphantha vivipara var. vivipara										
Echinocereus viridiflorus										
Opuntia fragilis										
Opuntia macrorhiza	1	P	P	P	P	P	P	P	P	P
Opuntia polyacantha								P		P
Pediocactus simpsonii var. minor	P		(1)				P			P
TOTAL SUCCULENT	1	P	(1)	P	P	P	P	P	P	P
MUSHROOMS										
Fungus										
TOTAL MUSHROOMS	---	---	---	---	---	---	---	---	---	---
Standing dead	1	4	2	3	5(3)	1	8	3	3	
Litter	40	21	34	27	27	30	49	26	22	
Bare soil	10	22	11	9	1	1	3	10	4	
Rock	4	4	10	3		8		19	17	
TOTALS	100	100	100	100	100	100	100	100	100	
TOTAL VEGETATION COVER	45(1)	49(3)	43(4)	58(6)	67(14)	60(12)	40(3)	42(9)	54(7)	
GROUND COVER (Litter+Rock+Veg+St.Dead)	90(1)	78(3)	89(4)	91(6)	99(17)	99(12)	97(3)	90(9)	96(7)	
SPECIES DENSITY (# of species/100 sq.m.)	47	47	50	35	31	47	40	38	45	
(AVERAGE= 41.8 Std.Dev.= 6.7)										

*P=Present within 1 m. on either side of the cover transect, but not quantitatively encountered.

PLANT SPECIES	Percent Foliar Cover*									
	----- SAMPLE NUMBER -----									
	1	2	3	4	5	8	9	10	11	
NATIVE PERENNIAL FORBS (concluded)										
<i>Claytonia megarhiza</i>										P
<i>Claytonia</i> spp.										P
<i>Comandra umbellata</i> ssp. <i>pallida</i>										P
<i>Dalea candida</i> var. <i>oligophylla</i>						P				
<i>Dalea purpurea</i>	P	P	P	P	P	P	P	P	P	P
<i>Delphinium nuttalianum</i>										
<i>Drymocallis fissa</i>				P	P	P	P	P		
<i>Eremogone fendleri</i>	P	P	1	P	P			P		4
<i>Erigeron flagellaris</i>							7(1)	1		P
<i>Erigonum flavum</i> var. <i>flavum</i>										P
<i>Evolvulus nuttalianus</i>										
<i>Gaillardia aristata</i>	P	P	P	P	P					P
<i>Gastrolychnis drummondii</i>										
<i>Gaura coccinea</i>		P								
<i>Gutierrezia sarothrae</i>										
<i>Helianthus pumilus</i>										
<i>Heliomeris multiflora</i>										
<i>Heterotheca fulcrata</i>	P	P	1	1	1	P	2	6		
<i>Heterotheca villosa</i>							P	P		2
<i>Lesquerella ludoviciana</i>										P
<i>Lesquerella montana</i>		P	P				P	P		
<i>Lesquerella</i> spp.										
<i>Liatris punctata</i>	P	P	2	P	P	P	P	1		P
<i>Lithospermum ruderale</i>										
<i>Lygodesmia juncea</i>										
<i>Mertensia ciliata</i>										
<i>Mertensia lanceolata</i>										
<i>Oenothera villosa</i>					P					
<i>Oligoneuron rigidum</i>										
<i>Oligosporus dracunculus</i> ssp. <i>glauca</i>										
<i>Onosmodium molle</i> ssp. <i>occidentale</i>										
<i>Oreocarya</i> spp.	P								P	
<i>Oxalis dillenii</i>						P				
<i>Oxybaphus hirsutus</i>	P			P	P	P		P		
<i>Oxybaphus linearis</i>										
<i>Oxytropis sericea</i>					P					
<i>Oxytropis x sericea</i>					P					
<i>Paronychia jamesii</i>		P	2	P	P	P	P	1		
<i>Penstemon angustifolius</i>								1		P
<i>Penstemon strictus</i>										
<i>Penstemon virens</i>										P
<i>Phacelia heterophylla</i>										P
<i>Pneumonanthe affinis</i>										
<i>Pneumonanthe bigelovii</i>										
<i>Pneumonanthe</i> spp.										
<i>Potentilla hippiana</i>										
<i>Potentilla pulcherrima</i>										
<i>Psoraleidium argophyllum</i>										
<i>Psoraleidium tenuiflorum</i>	P	P	2	P	P	4	P			
<i>Ratibida columnifera</i>							P	P		
<i>Senecio spartioides</i>										
<i>Silene scouleri</i> ssp. <i>hallii</i>										P
<i>Solidago missouriensis</i>										
<i>Solidago simplex</i> var. <i>nana</i>	2	P	P	P	P		P	P		
<i>Sphaeralcea coccinea</i>										
<i>Talinum parviflorum</i>							P	P		
<i>Thelesperma filifolium</i>										
<i>Thelesperma megapotamicum</i>										
<i>Tithymalus brachyceras</i>										
<i>Townsendia hookeri</i>										
<i>Tradescantia occidentalis</i>										
<i>Viola</i> spp.										
<i>Virgulus falcatus</i>		2								
TOTAL NATIVE PERENNIAL FORBS	10	5	14	7(1)	9(1)	10	14(1)	14	14(2)	

Table 96-1. Cover Data - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - Sept., 1996

PLANT SPECIES	Percent Foliar Cover*									
	----- SAMPLE NUMBER -----									
	1	2	3	4	5	8	9	10	11	
INTRODUCED PERENNIAL FORBS										
<i>Arabis hirsuta</i>			P							
<i>Breca arvensis</i>										
<i>Convolvulus arvensis</i>					P					
<i>Daucus carota</i>										
<i>Hypericum perforatum</i>	P	P	P	1	2	1	1	P	P	
<i>Linaria genistifolia</i> ssp. <i>dalmatica</i>										
<i>Taraxacum officinale</i>										
TOTAL INTRO. PERENNIAL FORBS	P	P	P	1	2	1	1	P	P	
NATIVE PERENNIAL GRASSES (cool)										
<i>Carex filifolia</i>										P
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	3	P	P	2	P	4(1)	3	P	2(2)	
<i>Elymus elymoides</i>										P
<i>Elymus lanceolatus</i> fm. <i>dasystachya</i>										
<i>Elymus longifolius</i>	P	P	P	P	P		P	P		
<i>Hesperostipa comata</i>				P						P
<i>Juncus interior</i>	P	P	P							P
<i>Koeleria macrantha</i>	3	1	P	3	1	P	P	4		P
<i>Nassella viridula</i>										
<i>Pascopyrum smithii</i>	(1)					1		P		
<i>Poa agassizensis</i>	P				P	5	1			P
<i>Poa compressa</i>	3(1)	2	6(1)	4	2	1(1)	P	4(1)		P
<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>										
TOTAL NATIVE PERENNIAL GRASSES (c)	9(2)	3	6(1)	9	3	11(2)	4	8(1)		2(2)
INTRODUCED PERENNIAL GRASSES (cool)										
<i>Bromopsis inermis</i>										
TOTAL INTRO. PERENNIAL GRASSES (c)	---	---	---	---	---	---	---	---	---	---
NATIVE PERENNIAL GRASSES (warm)										
<i>Andropogon gerardii</i>	4	5	4(1)	4	6	22(1)	6	5	11(2)	
<i>Aristida purpurea</i>	1	1	P	1	1	P	2(1)	P		
<i>Bouteloua curtipendula</i>	1	P	P	P	P		1	1		
<i>Buchloe dactyloides</i>										
<i>Calamovilfa longifolia</i>										
<i>Chondrosium gracile</i>	1	P	P	3	5	1	1	P	3	
<i>Chondrosium hirsutum</i>	P	P	1	P	1		5	1		
<i>Muhlenbergia cuspidata</i>										
<i>Muhlenbergia montana</i>	4	5	2	10	6	2	P	9	6(1)	
<i>Schizachyrium scoparium</i>	4	5	3	P	P	P	P	P	1	
<i>Sorghastrum avenaceum</i>	P		P	9	3	2	1	P		
<i>Sporobolus asper</i>					1	P				
<i>Sporobolus cryptandrus</i>										
<i>Sporobolus heterolepis</i>			4		P	P		P	3	
TOTAL NATIVE PERENNIAL GRASSES (w)	15	16	14(1)	27	23	27(1)	16(1)	16	24(3)	
NATIVE SHRUBS										
<i>Chrysothamnus</i> spp.										
<i>Eriogonum effusum</i>										
<i>Rhus aromatica</i> ssp. <i>trilobata</i>						P				
<i>Rosa sayi</i>										
<i>Rosa woodsii</i>										
<i>Yucca glauca</i>										
TOTAL NATIVE SHRUBS	---	---	---	---	---	P	---	---	---	---
NATIVE TREES										
<i>Pinus ponderosa</i> ssp. <i>scopulorum</i>										
TOTAL NATIVE TREES	---	---	---	---	---	---	---	---	---	---
FERNS										
<i>Selaginella densa</i>			1		1			P	5(4)	
TOTAL FERNS	---	---	1	---	1	---	---	P	5(4)	

Table 96-1. Cover Data - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - Sept., 1996

PLANT SPECIES	Percent Follar Cover*									
	----- SAMPLE NUMBER -----									
	12	13	14	15	16	17	18	19	20	
NATIVE PERENNIAL FORBS (concluded)										
Claytonia megarhiza										
Claytonia spp.						P				
Comandra umbellata ssp. pallida	P									
Dalea candida var. oligophylla	P					P				
Dalea purpurea	P	P		P			P	P		
Delphinium nuttallianum		P								
Drymocallis fissa										
Eremogone fendleri	3			P	1		P	P		
Erigeron flagellaris	P	5(1)	1	P	P	P				P
Eriogonum flavum var. flavum										
Evolvulus nuttallianus			P							
Gaillardia aristata	P			P	P	P	P	P	P	P
Gastrolychnis drummondii						P				
Gaura coccinea			P			P				
Gutierrezia sarothrae	1	1	P							P
Helianthus pumilus										
Heliomeris multiflora										P
Heterotheca fulcrata	P	P	P	P		P		P		
Heterotheca villosa	3(1)	1	3							P
Lesquerella ludoviciana										
Lesquerella montana		P	P	P	P	P		P	P	
Lesquerella spp.	P									P
Liatis punctata	P	1		P	P	P	P			P
Lithospermum ruderale	P		P							
Lygodesmia juncea			P							
Mertensia ciliata							P			
Mertensia lanceolata								P		
Oenothera villosa					P					
Oligoneuron rigidum	P									
Oligosporus dracunculus ssp. glaucus										
Onosmodium molle ssp. occidentale			P							
Oreocarya spp.	(1)					P				
Oxalis dillenii										
Oxybaphus hirsutus										
Oxybaphus linearis			P							P
Oxytropis sericea	P									
Oxytropis x sericea										
Paronychia jamesii		P		P		P	P	P		
Penstemon angustifolius										
Penstemon strictus		P								P
Penstemon virens										
Phacelia heterophylla	P	2	P							
Pneumonanthe affinis	1									
Pneumonanthe bigelovii										
Pneumonanthe spp.										
Potentilla hippiana	P			1					(2)	
Potentilla pulcherrima	P									
Psoraleidum argophyllum	P									
Psoraleidum tenuiflorum	1	1	1	P	P	P	P	P	P	P
Ratibida columnifera	P					P				P
Senecio spartioides		1	2							P
Silene scouleri ssp. hallii										P
Solidago missouriensis						P				
Solidago simplex var. nana				1	P	P				
Sphaeralcea coccinea			P							
Talinum parviflorum				P	P		P	P		
Thelesperma filifolium										
Thelesperma megapotamicum										
Tithymalus brachyceras										
Townsendia hookeri	P									
Tradescantia occidentalis										
Viola spp.										
Virgulus falcatus	P									P
TOTAL NATIVE PERENNIAL FORBS	11(4)	13(1)	10	10(4)	13(1)	9	5	13(5)	2	

PLANT SPECIES	Percent Follar Cover*								
	----- SAMPLE NUMBER -----								
	12	13	14	15	16	17	18	19	20
MOSS									
Moss									
TOTAL MOSS	---	---	---	---	---	---	---	---	---
LICHEN									
Xanthoparmelia chlorochloa									
TOTAL LICHEN	---	---	---	---	---	---	---	---	---
SUCCULENT									
Coryphantha vivipara var. vivipara									
Echinocereus viridiflorus		1	P			P			P
Opuntia fragilis									
Opuntia macrorhiza	P	P	P	P	1	P	P	P	P
Opuntia polyacantha	P								
Pediocactus simpsonii var. minor									
TOTAL SUCCULENT	P	1	P	P	1	P	P	P	P
MUSHROOMS									
Fungus									P
TOTAL MUSHROOMS	---	---	---	---	---	---	---	---	P
Standing dead	4	3	3	13	4(1)	5	1	1	5
Litter	32	50	48	46	40	57	55	57	61
Bare soil	6	6	3	2	11		2	2	5
Rock		2		2	2		2	1	
TOTALS	100	100	100	100	100	100	100	100	100
TOTAL VEGETATION COVER	58(11)	39(2)	46(6)	37(8)	43(4)	38(1)	40	39(6)	29(1)
GROUND COVER (Litter+Rock+Veg+St. Dead)	94(11)	94(2)	97(6)	98(8)	89(5)	100(1)	98	98(6)	95(1)
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 41.8 Std.Dev.= 6.7)	59	40	44	38	35	48	37	44	42

Table 96-1. Cover Data - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - Sept., 1996

PLANT SPECIES	Percent Foliar Cover*			
	----- SAMPLE NUMBER -----			
	21	22	23	24
NATIVE ANNUAL & BIENNIAL FORBS				
<i>Chenopodium leptophyllum</i>				P
<i>Cirsium undulatum</i>				P
<i>Descurainia incana</i>				
<i>Erysimum asperum</i>	P	P		P
<i>Frasera speciosa</i>				
<i>Grindelia squarrosa</i>				1
<i>Hedeoma hispidum</i>				
<i>Oligosporus pacificus</i>				1
<i>Plantago patagonica</i>				
<i>Pterogonum alatum</i>	P	P	P	(1)
<i>Silene antirrhina</i>			P	
TOTAL NATIVE ANN. & BIEN. FORBS	P	P	P	2(1)
INTRODUCED ANNUAL & BIENNIAL FORBS				
<i>Acosta diffusa</i>				P
<i>Alyssum minus</i>		P		P
<i>Camelina microcarpa</i>				4
<i>Carduus nutans ssp. macrolepis</i>				P
<i>Erodium cicutarium</i>				
<i>Lactuca serriola</i>				P
<i>Lepidium densiflorum</i>				
<i>Neolepia campestre</i>				
<i>Podospermum laciniatum</i>				
<i>Polygonum arenastrum</i>				
<i>Salsola australis</i>				
<i>Sisymbrium altissimum</i>				
<i>Tragopogon dubius ssp. major</i>				1
<i>Verbascum blattaria</i>				
<i>Verbascum thapsus</i>				
TOTAL INTRO. ANN. & BIEN. FORBS	---	P	---	5
INTRODUCED ANNUAL GRASSES				
<i>Anisantha tectorum</i>				P
<i>Bromus japonicus</i>				6
TOTAL INTRO. ANN. GRASSES	---	---	---	6
NATIVE PERENNIAL FORBS				
<i>Acetosella vulgaris</i>				
<i>Achillea lanulosa</i>				
<i>Adenolinum lewisii</i>				2
<i>Allium spp.</i>				
<i>Allium textile</i>				
<i>Ambrosia psilostachya var. coronopifolia</i>				P
<i>Amerosedum lanceolatum</i>				
<i>Anemone multifida ssp. globosa</i>				
<i>Antennaria parvifolia</i>		P		
<i>Antennaria pulcherrima ssp. anaphaloides</i>				
<i>Antennaria rosea</i>	1		P	P
<i>Aphyllon fasciculatum</i>				
<i>Artemisia frigida</i>		P		P
<i>Artemisia ludoviciana</i>	P			1
<i>Asclepias pumila</i>				
<i>Asclepias spp.</i>				
<i>Asclepias stenophylla</i>				
<i>Asclepias viridiflora</i>				
<i>Aster porteri</i>	5	15	2	P
<i>Astragalus agrestis</i>				
<i>Astragalus miser var. oblongifolius</i>				
<i>Brickellia rosmarinifolia ssp. chlorolepis</i>				P
<i>Calochortus nuttallii</i>				
<i>Calylophus serrulatus</i>			P	
<i>Campanula rotundifolia</i>				
<i>Castilleja spp.</i>				
<i>Cerastium strictum</i>			P	

PLANT SPECIES	Percent Foliar Cover*			
	----- SAMPLE NUMBER -----			
	21	22	23	24
NATIVE PERENNIAL FORBS (concluded)				
<i>Claytonia megarhiza</i>			P	
<i>Claytonia</i> spp.	1		P	
<i>Comandra umbellata</i> ssp. <i>pallida</i>	P	P	P	P
<i>Dalea candida</i> var. <i>oligophylla</i>				P
<i>Dalea purpurea</i>		P	P	P
<i>Delphinium nuttallianum</i>				
<i>Drymocallis fissa</i>	P		P	
<i>Eremogone fendleri</i>	1	2	P	1
<i>Erigeron flagellaris</i>				P
<i>Eriogonum flavum</i> var. <i>flavum</i>				
<i>Evolvulus nuttalianus</i>				
<i>Gaillardia aristata</i>	P	P	1	1
<i>Gastrolychnis drummondii</i>				
<i>Gaura coccinea</i>			(1)	P
<i>Gutierrezia sarothrae</i>				
<i>Helianthus pumilus</i>				
<i>Heliomeris multiflora</i>				
<i>Heterotheca fulcrata</i>	P	P	P	
<i>Heterotheca villosa</i>	P	1	1	P
<i>Lesquerella ludoviciana</i>				
<i>Lesquerella montana</i>	P	P	P	P
<i>Lesquerella</i> spp.				
<i>Liatris punctata</i>	5	2	1	1
<i>Lithospermum ruderale</i>				
<i>Lygodesmia juncea</i>				
<i>Mertensia ciliata</i>				
<i>Mertensia lanceolata</i>				
<i>Oenothera villosa</i>				
<i>Oligoneuron rigidum</i>				
<i>Oligosporus dracunculus</i> ssp. <i>glaucus</i>				
<i>Onosmodium molle</i> ssp. <i>occidentale</i>				
<i>Oreocarya</i> spp.				
<i>Oxalis dillenii</i>				
<i>Oxybaphus hirsutus</i>				
<i>Oxybaphus linearis</i>		P		P
<i>Oxytropis sericea</i>				
<i>Oxytropis x sericea</i>				P
<i>Paronychia jamesii</i>	P	P	P	
<i>Penstemon angustifolius</i>				
<i>Penstemon strictus</i>				P
<i>Penstemon virens</i>				
<i>Phacelia heterophylla</i>				P
<i>Pneumonanthe affinis</i>				
<i>Pneumonanthe bigelovii</i>			P	
<i>Pneumonanthe</i> spp.				
<i>Potentilla hippiana</i>				
<i>Potentilla pulcherrima</i>				
<i>Psoralidium argophyllum</i>				
<i>Psoralidium tenuiflorum</i>	1	P	1	2
<i>Ratibida columnifera</i>				P
<i>Senecio spartioides</i>				1
<i>Silene scouleri</i> ssp. <i>hallii</i>				
<i>Solidago missouriensis</i>				
<i>Solidago simplex</i> var. <i>nana</i>		P	1	
<i>Sphaeralcea coccinea</i>				
<i>Talinum parviflorum</i>	P	P	P	
<i>Thelesperma filifolium</i>				
<i>Thelesperma megapotamicum</i>				
<i>Tithymalus brachyceras</i>				P
<i>Townsendia hookeri</i>				
<i>Tradescantia occidentalis</i>				
<i>Viola</i> spp.				
<i>Virgulus falcatus</i>				
TOTAL NATIVE PERENNIAL FORBS	14	20	7(1)	9

Table 96-1. Cover Data - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - Sept., 1996

PLANT SPECIES	Percent Foliar Cover*			
	----- SAMPLE NUMBER -----			
	21	22	23	24
INTRODUCED PERENNIAL FORBS				
<i>Arabis hirsuta</i>		P		
<i>Breea arvensis</i>				
<i>Convolvulus arvensis</i>				
<i>Daucus carota</i>				
<i>Hypericum perforatum</i>	1	P	P	P
<i>Linaria genistifolia</i> ssp. <i>dalmatica</i>				
<i>Taraxacum officinale</i>				P
TOTAL INTRO. PERENNIAL FORBS	1	P	P	P
NATIVE PERENNIAL GRASSES (cool)				
<i>Carex filifolia</i>				
<i>Carex pennsylvanica</i> ssp. <i>heliophila</i>	1	2(2)	2	1(2)
<i>Elymus elymoides</i>				
<i>Elymus lanceolatus</i> fm. <i>dasystachya</i>				
<i>Elymus longifolius</i>	P	P		P
<i>Hesperostipa comata</i>		1	P	4
<i>Juncus interior</i>				
<i>Koeleria macrantha</i>	3	P	P	P
<i>Nassella viridula</i>				
<i>Pascopyrum smithii</i>				
<i>Poa agassizensis</i>	P	P		
<i>Poa compressa</i>	P	1		P
<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>				
TOTAL NATIVE PERENNIAL GRASSES (c)	4	4(2)	2	5(2)
INTRODUCED PERENNIAL GRASSES (cool)				
<i>Bromopsis inermis</i>				
TOTAL INTRO. PERENNIAL GRASSES (c)	---	---	---	---
NATIVE PERENNIAL GRASSES (warm)				
<i>Andropogon gerardii</i>	3	10	11(1)	13
<i>Aristida purpurea</i>	P		P	P
<i>Cottoneaster curtispindula</i>	1	1	P	P
<i>Buchloe dactyloides</i>		P	P	(1)
<i>Calamovilfa longifolia</i>				
<i>Chondrosium gracile</i>	P	2	P	3
<i>Chondrosium hirsutum</i>	P	P	P	
<i>Muhlenbergia cuspidata</i>				
<i>Muhlenbergia montana</i>	3	2	12	P
<i>Schizachyrium scoparium</i>	6	1	3	1(1)
<i>Sorghastrum avenaceum</i>		P	P	
<i>Sporobolus asper</i>				
<i>Sporobolus cryptandrus</i>				
<i>Sporobolus heterolepis</i>	P	P		
TOTAL NATIVE PERENNIAL GRASSES (w)	13	16	26(1)	17(2)
NATIVE SHRUBS				
<i>Chrysothamnus</i> spp.				P
<i>Eriogonum effusum</i>				
<i>Rhus aromatica</i> ssp. <i>trilobata</i>				
<i>Rosa sayi</i>				
<i>Rosa woodsii</i>				
<i>Yucca glauca</i>				
TOTAL NATIVE SHRUBS	---	---	---	P
NATIVE TREES				
<i>Pinus ponderosa</i> ssp. <i>scopulorum</i>				
TOTAL NATIVE TREES	---	---	---	---
FERNS				
<i>Selaginella densa</i>				
TOTAL FERNS	---	---	---	---

PLANT SPECIES	Percent Foliar Cover*			
	----- SAMPLE NUMBER -----			
	21	22	23	24
MOSS				P
Moss				P
TOTAL MOSS	---	---	---	P
LICHEN				
Xanthoparmelia chlorochloa				
TOTAL LICHEN	---	---	---	---
SUCCULENT				
Coryphantha vivipara var. vivipara				P
Echinocereus viridiflorus	P	P	P	P
Opuntia fragilis	P			
Opuntia macrorhiza	P	P	P	P
Opuntia polyacantha				
Pediocactus simpsonii var. minor				
TOTAL SUCCULENT	P	P	P	P
MUSHROOMS				
Fungus				
TOTAL MUSHROOMS	---	---	---	---
Standing dead	3	3	5	3
Litter	45	41	48	47
Bare soil	9	7	6	3
Rock	11	9	6	3
TOTALS	100	100	100	100
TOTAL VEGETATION COVER	32	40(2)	35(2)	44(5)
GROUND COVER (Litter+Rock+Veg+St.Dead)	91	93(2)	94(2)	97(5)
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 41.8 Std.Dev.= 6.7)	34	38	37	57

Table 97-1. Species Present- All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - May, 1997 Page 1 of 12

PLANT SPECIES	FREQUENCY (%)	Percent Foliar Cover*								
		----- SAMPLE NUMBER -----								
		A1	BOS1	BOS2	CC1	CRL1	CRL2	CRL3	RD1	RD2
NATIVE ANNUAL & BIENNIAL FORBS										
<i>Acroclasia dispersa</i>	3.03					P	P	P		P
<i>Androsace occidentalis</i>	15.15									
<i>Cirsium undulatum</i>	45.45	P		P		P	P	P	P	P
<i>Collinsia parviflora</i>	3.03						P			
<i>Descurainia pinnata</i>	6.06									
<i>Draba reptans</i>	60.61	P				P		P		
<i>Draba spp.</i>	6.06					P	P			
<i>Erigeron divergens</i>	12.12					P				
<i>Erysimum asperum</i>	69.70			P			P		P	P
<i>Frasera speciosa</i>	3.03									
<i>Grindelia squarrosa</i>	45.45		P		P		P			
<i>Oligosporus pacificus</i>	48.48	P		P		P			P	P
<i>Oreocarya virgata</i>	9.09								P	
<i>Pterogonum alatum</i>	69.70	P	P	P		P				
<i>Silene antirrhina</i>	12.12					P	P	P	P	
TOTAL NATIVE ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL & BIENNIAL FORBS										
<i>Acosta diffusa</i>	24.24			P						
<i>Alyssum minus</i>	66.67	P	P		P		P	P	P	P
<i>Camelina microcarpa</i>	21.21									
<i>Carduus nutans ssp. macrolepis</i>	18.18									
<i>Chorispora tenella</i>	3.03							P		
<i>Cynoglossum officinale</i>	6.06									
<i>Descurainia sophia</i>	3.03									
<i>Erodium cicutarium</i>	9.09							P		
<i>Lactuca serriola</i>	30.30					P				
<i>Podospermum laciniatum</i>	21.21	P								
<i>Sisymbrium altissimum</i>	12.12		P			P				
<i>Tragopogon dubius ssp. major</i>	78.79	P	P	P	P	P	P	P	P	P
<i>Verbascum thapsus</i>	3.03									
TOTAL INTRO. ANN. & BIEN. FORBS	87.9	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL GRASSES										
<i>Anisantha tectorum</i>	27.27	P							P	P
<i>Bromus japonicus</i>	45.45				P	P	P	P		
TOTAL INTRO. ANN. GRASSES	63.6	P	---	---	P	P	P	P	P	P
NATIVE PERENNIAL FORBS										
<i>Acetosella vulgaris</i>	3.03									
<i>Achillea lanulosa</i>	12.12									
<i>Adenolinum lewisii</i>	18.18	P	P				P	P		
<i>Allium textile</i>	81.82	P	P	P	P			P	P	
<i>Ambrosia psilostachya var. coronopifolia</i>	78.79	P		P	P	P	P	P	P	P
<i>Amerosedum lanceolatum</i>	9.09									
<i>Antennaria corymbosa</i>	18.18									
<i>Antennaria parvifolia</i>	3.03									
<i>Antennaria spp.</i>	12.12									
<i>Aphyllon fasciculatum</i>	12.12									
<i>Apocynum cannabinum</i>	6.06									
<i>Argemone polyanthemus</i>	3.03									
<i>Arnica fulgens</i>	9.09									
<i>Artemisia frigida</i>	63.64	P	P	P				P	P	P
<i>Artemisia ludoviciana</i>	90.91	P	P	P		P	P	P	P	P
<i>Asclepias viridiflora</i>	3.03									P
<i>Aster porteri</i>	72.73		P	P	P					
<i>Astragalus adsurgens var. robustior</i>	9.09									
<i>Astragalus agrestis</i>	6.06		P					P		
<i>Astragalus drummondii</i>	3.03						P			
<i>Astragalus flexuosus</i>	3.03									
<i>Astragalus miser var. oblongifolius</i>	3.03									
<i>Astragalus shortianus</i>	33.33					P		P		P
<i>Calochortus gunnisonii</i>	3.03									
<i>Calylophus serrulatus</i>	15.15			P						

Table 97-1. Species Present-- All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - May, 1997 Page 4 of 12

PLANT SPECIES	FREQUENCY (%)	Percent Foliar Cover*								
		----- SAMPLE NUMBER -----								
		A1	BOS1	BOS2	CC1	CRL1	CRL2	CRL3	RD1	RD2
NATIVE SHRUBS										
Chrysothamnus nauseosus	3.03									
Eriogonum effusum	9.09						P		P	P
Padus virginiana ssp. melanocarpa	3.03									
Rhus aromatica ssp. trilobata	3.03									
Rosa sayi	3.03									
Rosa woodsii	6.06					P	P			
Seriphidium tridentatum	3.03								P	
Yucca glauca	18.18					P	P		P	P
TOTAL NATIVE SHRUBS	30.3					P	P		P	P
FERNS										
Selaginella densa	18.18									
TOTAL FERNS	18.2									
BRYOPHYTES										
Moss	3.03									
TOTAL BRYOPHYTES	3.0									
LICHEN										
Cladonia lichen	6.06									
Lichen	3.03									
Lichen spp.	3.03									
TOTAL LICHEN	9.1									
SUCCULENT										
Coryphantha missouriensis	6.06							P		P
Coryphantha vivipara var. vivipara	3.03									
Echinocereus viridiflorus	57.58			P			P			P
Opuntia fragilis	21.21	P								
Opuntia macrohiza	87.88	P	P		P		P	P	P	P
Opuntia polyacantha	6.06		P							P
Pediocactus simpsonii	6.06									
TOTAL SUCCULENT	93.9	P	P	P	P		P	P	P	P
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 43.8 Std.Dev.= 9.0)		41	41	55	22	39	47	45	38	36

*P=Present within 1 m. on either side of the cover transect.

Table 97-1. Species Present- All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - May, 1997 Page 5 of 12

PLANT SPECIES	Percent Foliar Cover*											
	----- SAMPLE NUMBER -----											
	1	2	3	4	5	6	7	8	9	10	11	12
NATIVE ANNUAL & BIENNIAL FORBS												
<i>Acrolasia dispersa</i>												
<i>Androsace occidentalis</i>												
<i>Cirsium undulatum</i>		P			P	P	P					P
<i>Collinsia parviflora</i>												
<i>Descurainia pinnata</i>												
<i>Draba reptans</i>	P	P	P	P	P			P	P	P	P	P
<i>Draba spp.</i>												
<i>Erigeron divergens</i>			P			P			P			
<i>Erysimum asperum</i>	P	P	P	P	P	P			P		P	P
<i>Frasera speciosa</i>												P
<i>Grindelia squarrosa</i>	P	P			P	P	P	P	P	P	P	P
<i>Oligosporus pacificus</i>				P	P	P	P		P		P	P
<i>Oreocarya virgata</i>						P	P					
<i>Pterogonum alatum</i>	P	P	P	P	P	P	P	P	P	P	P	P
<i>Silene antirrhina</i>												
TOTAL NATIVE ANN. & BIEN. FORBS	P	P	P	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL & BIENNIAL FORBS												
<i>Acosta diffusa</i>						P	P					
<i>Alyssum minus</i>				P	P	P	P	P		P	P	P
<i>Camelina microcarpa</i>										P		
<i>Carduus nutans ssp. macrolepis</i>												P
<i>Chorispora tenella</i>												
<i>Cynoglossum officinale</i>						P						P
<i>Descurainia sophia</i>												
<i>Erodium cicutarium</i>												
<i>Lactuca serriola</i>				P					P			
<i>Podospermum laciniatum</i>						P	P	P				
<i>Sisymbrium altissimum</i>												
<i>Tragopogon dubius ssp. major</i>					P	P	P	P	P	P	P	P
<i>Verbascum thapsus</i>												
TOTAL INTRO. ANN. & BIEN. FORBS	---	---	---	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL GRASSES												
<i>Anisantha tectorum</i>						P	P		P		P	
<i>Bromus japonicus</i>	P			P		P						
TOTAL INTRO. ANN. GRASSES	P	---	---	P	---	P	P	---	P	---	P	---
NATIVE PERENNIAL FORBS												
<i>Acetosella vulgaris</i>												
<i>Achillea lanulosa</i>						P		P		P		P
<i>Adenolinum lewisii</i>												
<i>Allium textile</i>	P	P	P	P	P	P	P	P	P	P	P	P
<i>Ambrosia psilostachya var. coronopifolia</i>	P	P	P	P	P	P	P	P	P	P	P	P
<i>Amerosedum lanceolatum</i>					P					P	P	
<i>Antennaria corymbosa</i>		P	P			P						
<i>Antennaria parvifolia</i>												
<i>Antennaria spp.</i>											P	P
<i>Aphyllon fasciculatum</i>		P					P		P	P		
<i>Apocynum cannabinum</i>						P						
<i>Argemone polyanthemus</i>												
<i>Arnica fulgens</i>								P			P	P
<i>Artemisia frigida</i>				P		P	P	P	P		P	P
<i>Artemisia ludoviciana</i>	P	P	P	P	P	P	P	P	P	P	P	P
<i>Asclepias viridiflora</i>												
<i>Aster porteri</i>	P	P	P	P	P	P	P	P	P	P	P	P
<i>Astragalus adsurgens var. robustior</i>											P	P
<i>Astragalus agrestis</i>												
<i>Astragalus drummondii</i>												
<i>Astragalus flexuosus</i>												
<i>Astragalus miser var. oblongifolius</i>												
<i>Astragalus shortianus</i>						P	P				P	P
<i>Calochortus gunnisonii</i>												
<i>Calylophus serrulatus</i>							P					

Table 97-1. Species Present- All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - May, 1997 Page 6 of 12

PLANT SPECIES	Percent Follar Cover*											
	----- SAMPLE NUMBER -----											
	1	2	3	4	5	6	7	8	9	10	11	12
NATIVE PERENNIAL FORBS (continued)												
<i>Castilleja integra</i>												
<i>Castilleja sessiliflora</i>												P
<i>Cerastium strictum</i>						P					P	P
<i>Chlorocrepis</i> spp.												
<i>Claytonia megarhiza</i>										P		
<i>Claytonia</i> spp.												
<i>Comandra umbellata</i> ssp. <i>pallida</i>						P		P			P	P
<i>Dalea candida</i> var. <i>oligophylla</i>					P							
<i>Dalea purpurea</i>					P			P	P			
<i>Delphinium nuttallianum</i>				P	P			P		P		
<i>Drymocallis fissa</i>				P	P					P		P
<i>Eremogone fendleri</i>	P	P	P	P	P	P	P	P	P	P	P	P
<i>Erigeron flagellaris</i>						P	P			P		P
<i>Eriogonum flavum</i> var. <i>flavum</i>						P						
<i>Euphorbia</i> spp.												P
<i>Gaillardia aristata</i>	P		P	P	P	P			P	P	P	P
<i>Gastrollychnis drummondii</i>												
<i>Gaura coccinea</i>												
<i>Gutierrezia sarothrae</i>						P						P
<i>Harbouria trachypleura</i>											P	
<i>Helianthus pumilus</i>												
<i>Heterotheca fulcrata</i>			P	P	P	P	P	P	P	P	P	P
<i>Heterotheca villosa</i>	P	P	P			P	P	P	P		P	P
<i>Hybanthus verticillatus</i>												
<i>Ipomopsis spicata</i>												P
<i>Lactuca tatarica</i> ssp. <i>pulchella</i>												
<i>Lesquerella montana</i>	P	P	P	P	P		P	P	P	P	P	P
<i>Leucocrinum montanum</i>		P				P						P
<i>Liatris punctata</i>	P	P	P	P		P	P	P	P	P	P	P
<i>Lithospermum incisum</i>												
<i>Lithospermum ruderaie</i>				P		P	P					
<i>Lomatium orientale</i>	P	P	P	P	P	P	P	P	P	P	P	P
<i>Lupinus argenteus</i>									P			
<i>Mertensia lanceolata</i>		P	P	P	P	P				P	P	P
<i>Monarda pectinata</i>												
<i>Musineon divaricatum</i>												
<i>Nothocalais cuspidata</i>	P				P		P		P		P	
<i>Oenothera villosa</i>					P							
<i>Oligoneuron rigidum</i>												P
<i>Oligosporus dracunculus</i> ssp. <i>glaucus</i>												
<i>Onosmodium molle</i> ssp. <i>occidentale</i>												
<i>Orobanche ludoviciana</i>						P						
<i>Oxalis dillenii</i>								P				
<i>Oxytropis sericea</i>											P	
<i>Oxytropis x sericea</i>					P	P	P					P
<i>Packera</i> spp.												
<i>Paronychia jamesii</i>		P	P	P				P	P	P		
<i>Penstemon secundiflorus</i>						P	P					
<i>Penstemon</i> spp.												
<i>Penstemon strictus</i>												
<i>Penstemon virens</i>	P	P	P			P	P	P	P	P		
<i>Phacelia hastata</i>												
<i>Phacelia heterophylla</i>						P	P		P			
<i>Pneumonanthe bigelovii</i>											P	P
<i>Potentilla effusa</i>												
<i>Potentilla hippiana</i>												
<i>Potentilla pulcherrima</i>												P
<i>Psoralidium argophyllum</i>												
<i>Psoralidium tenuiflorum</i>		P	P	P			P	P				
<i>Pulsatilla patens</i> ssp. <i>hirsutissima</i>											P	
<i>Ratibida columnifera</i>						P						
<i>Senecio integerrimus</i>	P	P	P	P	P	P	P	P	P	P		P
<i>Senecio spartioides</i>						P	P	P	P		P	
<i>Solidago nana</i>									P			

Table 97-2. Species Present - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - June, 1997 Page 8 of 12

PLANT SPECIES	PRESENCE*												
	----- SAMPLE NUMBER -----												
	2	3	4	5	6	7	8	9	10	11	12	13	
NATIVE SHRUBS													
<i>Chrysothamnus nauseosus</i>													
<i>Eriogonum effusum</i>													
<i>Rhus aromatica</i> ssp. <i>triobata</i>							P						
<i>Rosa sayi</i>													
<i>Yucca glauca</i>												P	
TOTAL NATIVE SHRUBS	---	---	---	---	---	---	P	---	---	---	---	P	
NATIVE TREES													
<i>Pinus ponderosa</i> ssp. <i>scopulorum</i>													
TOTAL NATIVE TREES	---	---	---	---	---	---	---	---	---	---	---	---	
FERNS													
<i>Selaginella densa</i>	P	P	P							P			
TOTAL FERNS	P	P	P	---	---	---	---	---	---	P	---	---	
SUCCULENT													
<i>Coryphantha vivipara</i> var. <i>vivipara</i>													
<i>Echinocereus viridiflorus</i>			P	P	P	P		P	P			P	
<i>Opuntia fragilis</i>					P	P							
<i>Opuntia macrorhiza</i>	P	P	P	P	P	P	P	P	P		P	P	
<i>Opuntia polyacantha</i>													
<i>Pediocactus simpsonii</i>													
TOTAL SUCCULENT	P	P	P	P	P	P	P	P	P	---	P	P	
SPECIES DENSITY (# of species/5 sq.m.)	28	35	44	27	48	64	37	44	41	53	69	44	
(AVERAGE= 41.6 Std.Dev. = 11.3)													

Table 97-1. Species Present- All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO -- May, 1997 Page 9 of 12

PLANT SPECIES	Percent Foliar Cover*											
	----- SAMPLE NUMBER -----											
	13	14	15	16	17	18	19	20	21	22	23	24
NATIVE ANNUAL & BIENNIAL FORBS												
<i>Acroasia dispersa</i>												
<i>Androsace occidentalis</i>	P	P										
<i>Cirsium undulatum</i>	P	P										P
<i>Collinsia parviflora</i>												
<i>Descurainia pinnata</i>	P											P
<i>Draba reptans</i>			P	P	P		P		P	P	P	
<i>Draba spp.</i>												
<i>Erigeron divergens</i>												
<i>Erysimum asperum</i>	P	P	P	P	P			P	P	P	P	P
<i>Frasera speciosa</i>												
<i>Grindelia squarrosa</i>						P	P					P
<i>Oligosporus pacificus</i>	P						P				P	P
<i>Oreocarya virgata</i>												
<i>Pterogonum alatum</i>	P		P				P		P	P	P	P
<i>Silene antirrhina</i>												
TOTAL NATIVE ANN. & BIEN. FORBS	P	P	P	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL & BIENNIAL FORBS												
<i>Acosta diffusa</i>		P			P	P	P	P				
<i>Alyssum minus</i>	P	P				P	P	P		P		P
<i>Camelina microcarpa</i>	P	P					P	P		P		P
<i>Carduus nutans ssp. macrolepis</i>	P	P						P				P
<i>Chorispora tenella</i>												
<i>Cynoglossum officinale</i>												
<i>Descurainia sophia</i>		P										
<i>Erodium cicutarium</i>	P	P										
<i>Lactuca serriola</i>	P	P		P		P		P			P	P
<i>Podospermum laciniatum</i>		P						P				P
<i>Sisymbrium altissimum</i>		P										P
<i>Tragopogon dubius ssp. major</i>	P	P	P	P	P	P	P	P				P
<i>Verbascum thapsus</i>		P										
TOTAL INTRO. ANN. & BIEN. FORBS	P	P	P	P	P	P	P	P	---	P	P	P
INTRODUCED ANNUAL GRASSES												
<i>Anisantha tectorum</i>	P											P
<i>Bromus japonicus</i>	P	P		P	P	P	P	P				P
TOTAL INTRO. ANN. GRASSES	P	P	---	P	P	P	P	P	---	---	---	P
NATIVE PERENNIAL FORBS												
<i>Acetosella vulgaris</i>						P						
<i>Achillea lanulosa</i>												
<i>Adenolinum lewisii</i>								P				P
<i>Allium textile</i>	P	P	P	P	P	P			P	P	P	P
<i>Ambrosia psilostachya var. coronopifolia</i>		P	P	P	P	P	P					P
<i>Amerosedum lanceolatum</i>												
<i>Antennaria corymbosa</i>									P	P	P	
<i>Antennaria parvifolia</i>												P
<i>Antennaria spp.</i>									P	P		
<i>Aphyllon fasciculatum</i>												
<i>Apocynum cannabinum</i>											P	
<i>Argemone polyanthemos</i>	P											
<i>Arnica fulgens</i>												
<i>Artemisia frigida</i>	P	P			P	P	P	P		P	P	P
<i>Artemisia ludoviciana</i>	P	P	P	P	P	P	P	P	P			P
<i>Asclepias viridiflora</i>												
<i>Aster porteri</i>			P	P	P	P	P		P	P	P	P
<i>Astragalus adsurgens var. robustior</i>	P											
<i>Astragalus agrestis</i>												
<i>Astragalus drummondii</i>												
<i>Astragalus flexuosus</i>	P											
<i>Astragalus miser var. oblongifolius</i>							P					
<i>Astragalus shortianus</i>								P			P	P
<i>Calochortus gunnisonii</i>		P										
<i>Calylophus serrulatus</i>			P		P						P	

Table 97-2. Species Present - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - June, 1997 Page 1 of 12

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ----- SAMPLE NUMBER -----									
		A-1	B-1	B-2	CC-1	CR-1	CR-3	CRL-2	RD-1	RD-2	1
NATIVE ANNUAL & BIENNIAL FORBS											
<i>Boechera drummondii</i>	3.03										
<i>Cirsium undulatum</i>	42.42	P	P	P		P	P	P	P	P	
<i>Collomia linearis</i>	6.06										
<i>Draba reptans</i>	18.18		P	P	P		P				
<i>Erigeron divergens</i>	3.03										
<i>Erysimum asperum</i>	42.42		P	P				P	P	P	
<i>Frasera speciosa</i>	3.03										
<i>Grindelia squarrosa</i>	42.42		P		P	P	P	P			
<i>Hedeoma hispidum</i>	9.09					P					
<i>Oligosporus pacificus</i>	36.36	P		P					P	P	
<i>Oreocarya virgata</i>	15.15	P							P	P	
<i>Plantago patagonica</i>	12.12	P	P					P			
<i>Pterogonum alatum</i>	69.70	P	P	P				P		P	
<i>Silene antirrhina</i>	36.36	P	P			P		P		P	
<i>Tithymalus spathulatus</i>	3.03							P			
TOTAL NATIVE ANN. & BIEN. FORBS	97.0	P	P	P	P	P	P	P	P	P	
INTRODUCED ANNUAL & BIENNIAL FORBS											
<i>Acosta diffusa</i>	27.27		P		P						
<i>Alyssum minus</i>	63.64	P	P	P	P		P	P		P	
<i>Camelina microcarpa</i>	24.24		P								
<i>Carduus nutans ssp. macrolepis</i>	9.09										
<i>Conringia orientalis</i>	3.03										
<i>Cynoglossum officinale</i>	3.03										
<i>Erodium cicutarium</i>	3.03										
<i>Lactuca serriola</i>	39.39					P		P			
<i>Lepidium densiflorum</i>	18.18	P	P								
<i>Noccaea montana</i>	3.03				P						
<i>Plantago lanceolata</i>	3.03										
<i>Podospermum laciniatum</i>	18.18				P		P				
<i>Sisymbrium altissimum</i>	9.09							P			
<i>Tragopogon dubius ssp. major</i>	75.76	P	P	P	P	P	P	P		P	
<i>Turritis glabra</i>	3.03										
<i>Verbascum blattaria</i>	3.03										
<i>Verbascum thapsus</i>	3.03										
TOTAL INTRO. ANN. & BIEN. FORBS	90.9	P	P	P	P	P	P	P	---	P	
NATIVE ANNUAL GRASSES											
<i>Vulpia octoflora</i>	3.03		P								
TOTAL NATIVE ANN. GRASSES	3.0	---	P	---	---	---	---	---	---	---	
INTRODUCED ANNUAL GRASSES											
<i>Anisantha tectorum</i>	18.18	P				P			P	P	
<i>Bromus japonicus</i>	57.58	P			P	P	P	P			
TOTAL INTRO. ANN. GRASSES	63.6	P	---	---	P	P	P	P	P	---	
NATIVE PERENNIAL FORBS											
<i>Achillea lanulosa</i>	15.15				P						
<i>Adenolinum lewisii</i>	18.18	P					P	P			
<i>Allium textile</i>	51.52	P	P	P	P					P	
<i>Ambrosia psilostachya var. coronopifolia</i>	75.76	P	P	P	P	P	P	P	P	P	
<i>Amerosedum lanceolatum</i>	12.12										
<i>Antennaria corymbosa</i>	15.15										
<i>Antennaria parvifolia</i>	3.03										
<i>Antennaria rosea</i>	3.03										
<i>Antennaria spp.</i>	12.12		P								
<i>Aphyllon fasciculatum</i>	12.12			P					P		
<i>Apocynum cannabinum</i>	6.06										
<i>Argemone polyanthemus</i>	3.03										
<i>Arnica fulgens</i>	3.03										
<i>Artemisia frigida</i>	60.61	P	P	P			P	P	P	P	
<i>Artemisia ludoviciana</i>	87.88	P	P	P		P	P	P	P	P	
<i>Asclepias asperula</i>	6.06										
<i>Asclepias pumila</i>	3.03						P				

Table 97-2. Species Present - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - June, 1997 Page 2 of 12

PLANT SPECIES	FREQUENCY (%)	PRESENCE*										
		----- SAMPLE NUMBER -----										
		A-1	B-1	B-2	CC-1	CR-1	CR-3	CRL-2	RD-1	RD-2	1	
NATIVE PERENNIAL FORBS (continued)												
<i>Asclepias viridiflora</i>	30.30	P			P	P					P	P
<i>Aster porteri</i>	72.73		P	P	P							P
<i>Astragalus agrestis</i>	3.03											P
<i>Astragalus crassicaarpus</i>	27.27	P		P				P	P			
<i>Astragalus drummondii</i>	6.06							P	P			
<i>Astragalus flexuosus</i>	12.12							P	P			
<i>Calochortus gunnisonii</i>	12.12						P					
<i>Calylophus serrulatus</i>	18.18	P		P								
<i>Campanula rotundifolia</i>	6.06			P								
<i>Castilleja chromosa</i>	3.03											
<i>Castilleja linariifolia</i>	3.03											
<i>Castilleja sessiliflora</i>	24.24	P	P	P								
<i>Chlorocrepis spp.</i>	3.03							P				
<i>Comandra umbellata ssp. pallida</i>	21.21	P		P								
<i>Dalea candida var. oligophylla</i>	6.06		P									
<i>Dalea purpurea</i>	69.70	P	P				P	P	P	P		
<i>Delphinium nuttalianum</i>	3.03					P						
<i>Delphinium ramosum</i>	3.03							P				
<i>Drymocallis fissa</i>	18.18											
<i>Eremogone fendleri</i>	69.70		P	P	P							P
<i>Erigeron flagellaris</i>	45.45	P	P					P				P
<i>Eriogonum flavum var. flavum</i>	9.09										P	
<i>Eriogonum subalpinum</i>	3.03	P										
<i>Evolvulus nuttalianus</i>	6.06							P				
<i>Gaillardia aristata</i>	75.76	P	P	P	P							P
<i>Gastrolychnis drummondii</i>	18.18	P		P								
<i>Gaura coccinea</i>	27.27	P	P			P	P	P				
<i>Gutierrezia sarothrae</i>	21.21		P	P			P					
<i>Harbouria trachypleura</i>	12.12			P								
<i>Helianthus pumilus</i>	15.15	P					P	P				
<i>Heterotheca fulcrata</i>	54.55			P			P	P				P
<i>Heterotheca villosa</i>	60.61	P	P	P		P	P	P	P	P		
<i>Hymenopappus filifolius</i>	3.03											
<i>Ipomopsis spicata</i>	15.15	P		P								
<i>Lesquerella montana</i>	69.70	P	P	P				P	P	P		P
<i>Leucocrinum montanum</i>	27.27	P		P			P		P			
<i>Liatris punctata</i>	78.79	P	P	P		P	P	P	P	P		P
<i>Lithospermum ruderae</i>	24.24						P	P				
<i>Lomatium orientale</i>	12.12					P						
<i>Lygodesmia juncea</i>	3.03											
<i>Mertensia lanceolata</i>	9.09				P							
<i>Musineon divaricatum</i>	18.18		P	P								
<i>Nothocalais cuspidata</i>	3.03											
<i>Oenothera villosa</i>	12.12		P									
<i>Oligoneuron rigidum</i>	9.09				P			P				
<i>Oligosporus dracuncululus ssp. glaucus</i>	15.15					P	P	P				
<i>Onosmodium molle ssp. occidentale</i>	24.24					P			P	P		
<i>Oxalis dillenii</i>	3.03											
<i>Oxybaphus hirsutus</i>	9.09				P							
<i>Oxybaphus linearis</i>	21.21	P	P	P				P				
<i>Oxytropis sericea</i>	3.03						P					
<i>Oxytropis x sericea</i>	42.42	P		P			P	P	P	P		
<i>Paronychia jamesii</i>	57.58		P	P					P	P		
<i>Penstemon secundiflorus</i>	21.21	P					P	P	P			
<i>Penstemon virens</i>	18.18				P			P				
<i>Phacelia heterophylla</i>	9.09										P	
<i>Phlox longifolia</i>	9.09							P			P	
<i>Pneumonanthe affinis</i>	6.06				P							
<i>Pneumonanthe bigelovii</i>	3.03											
<i>Potentilla hippiana</i>	15.15			P								
<i>Potentilla pensylvanica</i>	6.06											
<i>Psoralidium tenuiflorum</i>	90.91	P	P	P		P	P	P	P	P		P
<i>Pulsatilla patens ssp. hirsutissima</i>	3.03											
<i>Ratibida columnifera</i>	27.27	P	P					P	P			

Table 97-2. Species Present - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - June, 1997 Page 4 of 12

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ----- SAMPLE NUMBER -----									
		A-1	B-1	B-2	CC-1	CR-1	CR-3	CRL-2	RD-1	RD-2	1
NATIVE SHRUBS											
<i>Chrysothamnus nauseosus</i>	3.03										
<i>Eriogonum effusum</i>	9.09					P			P	P	
<i>Rhus aromatica</i> ssp. <i>trilobata</i>	3.03										
<i>Rosa sayi</i>	9.09					P		P			
<i>Yucca glauca</i>	24.24		P			P	P	P	P	P	
TOTAL NATIVE SHRUBS	33.3	---	P	---	---	P	P	P	P	P	---
NATIVE TREES											
<i>Pinus ponderosa</i> ssp. <i>scopulorum</i>	3.03		P								
TOTAL NATIVE TREES	3.0	---	P	---	---	---	---	---	---	---	---
FERNS											
<i>Selaginella densa</i>	12.12										
TOTAL FERNS	12.1	---	---	---	---	---	---	---	---	---	---
SUCCULENT											
<i>Coryphantha vivipara</i> var. <i>vivipara</i>	3.03										
<i>Echinocereus viridiflorus</i>	51.52	P		P				P			
<i>Opuntia fragilis</i>	6.06										
<i>Opuntia macrorhiza</i>	87.88	P	P	P	P	P	P	P	P	P	
<i>Opuntia polyacantha</i>	6.06								P	P	
<i>Pediocactus simpsonii</i>	3.03										
TOTAL SUCCULENT	90.9	P	P	P	P	P	P	P	P	P	---
SPECIES DENSITY (# of species/5 sq.m.) (AVERAGE= 41.6 Std.Dev.= 11.3)		58	58	59	35	32	47	55	33	37	29

*P=Present within the 100 sq. m. cover transect.

Table 97-2. Species Present - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - June, 1997 Page 10 of 12

PLANT SPECIES	PRESENCE*										
	----- SAMPLE NUMBER -----										
	14	15	16	17	18	19	20	21	22	23	24
NATIVE PERENNIAL FORBS (continued)											
<i>Asclepias viridiflora</i>								P			P
<i>Aster porteri</i>		P	P	P	P	P		P	P	P	P
<i>Astragalus agrestis</i>											
<i>Astragalus crassicaepus</i>											P
<i>Astragalus drummondii</i>											
<i>Astragalus flexuosus</i>	P										
<i>Calochortus gunnisonii</i>											
<i>Calylophus serrulatus</i>		P		P						P	
<i>Campanula rotundifolia</i>											
<i>Castilleja chromosa</i>											
<i>Castilleja linariifolia</i>	P										
<i>Castilleja sessiliflora</i>								P	P	P	
<i>Chlorocephalus spp.</i>											
<i>Comandra umbellata ssp. pallida</i>								P			P
<i>Dalea candida var. oligophylla</i>											
<i>Dalea purpurea</i>	P	P			P			P	P	P	
<i>Delphinium nuttallianum</i>											
<i>Delphinium ramosum</i>											
<i>Drymocallis fissa</i>											
<i>Eremogone fendleri</i>		P	P	P	P		P	P	P	P	P
<i>Erigeron flagellaris</i>	P	P	P	P			P				
<i>Eriogonum flavum var. flavum</i>											
<i>Eriogonum subalpinum</i>											
<i>Evolvulus nuttallianus</i>											
<i>Gaillardia aristata</i>		P	P	P	P	P	P	P	P	P	P
<i>Gastrolychnis drummondii</i>				P			P		P	P	
<i>Gaura coccinea</i>	P						P			P	
<i>Gutierrezia sarothrae</i>							P				
<i>Harbounia trachypleura</i>											
<i>Helianthus pumilus</i>							P	P			
<i>Heterotheca fulcrata</i>		P						P	P		
<i>Heterotheca villosa</i>	P						P	P	P	P	P
<i>Hymenopappus filifolius</i>											
<i>Ipomopsis spicata</i>									P	P	
<i>Lesquerella montana</i>	P		P	P			P	P	P		
<i>Leucocrinum montanum</i>							P				
<i>Liatris punctata</i>		P	P				P	P	P	P	P
<i>Lithospermum ruderale</i>	P										
<i>Lomatium orientale</i>	P										
<i>Lygodesmia juncea</i>	P										
<i>Mertensia lanceolata</i>											
<i>Musineon divaricatum</i>									P		
<i>Nothocalais cuspidata</i>											
<i>Oenothera villosa</i>			P								
<i>Oligoneuron rigidum</i>											
<i>Oligosporus dracunculus ssp. glaucus</i>							P				
<i>Onosmodium molle ssp. occidentale</i>	P										
<i>Oxalis dillenii</i>											
<i>Oxybaphus hirsutus</i>											
<i>Oxybaphus linearis</i>	P						P		P		
<i>Oxytropis sericea</i>											
<i>Oxytropis x sericea</i>										P	P
<i>Paronychia jamesii</i>				P	P			P	P	P	
<i>Penstemon secundiflorus</i>							P				P
<i>Penstemon virens</i>											
<i>Phacelia heterophylla</i>											P
<i>Phlox longifolia</i>											
<i>Pneumonanthe affinis</i>											
<i>Pneumonanthe bigelovii</i>										P	
<i>Potentilla hippiana</i>		P				P		P		P	
<i>Potentilla sylvanica</i>											
<i>Psoraleidium tenuiflorum</i>	P	P	P	P	P	P	P	P	P	P	P
<i>Pulsatilla patens ssp. hirsutissima</i>											
<i>Ratibida columnifera</i>	P			P			P				P

Table 97-2. Species Present - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - June, 1997 Page 12 of 12

PLANT SPECIES	PRESENCE*										
	----- SAMPLE NUMBER -----										
	14	15	16	17	18	19	20	21	22	23	24
NATIVE SHRUBS											
<i>Chrysothamnus nauseosus</i>											P
<i>Eriogonum effusum</i>											
<i>Rhus aromatica</i> ssp. <i>trilobata</i>											
<i>Rosa sayi</i>							P				
<i>Yucca glauca</i>	P										
TOTAL NATIVE SHRUBS	P	---	---	---	---	---	P	---	---	---	P
NATIVE TREES											
<i>Pinus ponderosa</i> ssp. <i>scopulorum</i>											
TOTAL NATIVE TREES	---	---	---	---	---	---	---	---	---	---	---
FERNS											
<i>Selaginella densa</i>											
TOTAL FERNS	---	---	---	---	---	---	---	---	---	---	---
SUCCULENT											
<i>Coryphantha vivipara</i> var. <i>vivipara</i>											P
<i>Echinocereus viridiflorus</i>	P			P			P	P	P	P	P
<i>Opuntia fragilis</i>											
<i>Opuntia macrorhiza</i>	P		P	P	P	P	P	P	P		P
<i>Opuntia polyacantha</i>											
<i>Pediocactus simpsonii</i>									P		
TOTAL SUCCULENT	P	---	P	P	P	P	P	P	P	P	P
SPECIES DENSITY (# of species/5 sq.m.) (AVERAGE= 41.6 Std.Dev.= 11.3)	41	30	30	33	30	28	38	39	44	35	47

Table 97-3. Cover Data - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - Sept., 1997

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
NATIVE ANNUAL & BIENNIAL FORBS					
<i>Chenopodium leptophyllum</i>	0.00	6.06	0.00	0.00	0.00
<i>Cirsium undulatum</i>	0.06	42.42	0.14	0.06	0.13
<i>Cryptantha</i> spp.	0.00	3.03	0.00	0.00	0.00
<i>Erigeron divergens</i>	0.03	9.09	0.07	0.03	0.07
<i>Erysimum asperum</i>	0.00	24.24	0.00	0.00	0.00
<i>Frasera speciosa</i>	0.00	3.03	0.00	0.00	0.00
<i>Grindelia squarrosa</i>	0.03	48.48	0.07	0.03	0.07
<i>Hedeoma hispidum</i>	0.00	6.06	0.00	0.00	0.00
<i>Oligosporus pacificus</i>	0.03	36.36	0.07	0.03	0.07
<i>Oreocarya virgata</i>	0.00	12.12	0.00	0.00	0.00
<i>Polygonum douglasii</i>	0.00	3.03	0.00	0.00	0.00
<i>Pterogonum alatum</i>	0.03	66.67	0.07	0.03	0.07
<i>Silene antirrhina</i>	0.00	27.27	0.00	0.00	0.00
TOTAL NATIVE ANN. & BIEN. FORBS	0.2	100.0	0.4	0.2	0.4
INTRODUCED ANNUAL & BIENNIAL FORBS					
<i>Acosta diffusa</i>	0.12	21.21	0.27	0.12	0.26
<i>Alyssum minus</i>	0.64	60.61	1.44	0.64	1.37
<i>Camelina microcarpa</i>	0.00	15.15	0.00	0.00	0.00
<i>Carduus nutans</i> ssp. <i>macrolepis</i>	0.09	12.12	0.21	0.09	0.20
<i>Erodium cicutarium</i>	0.00	3.03	0.00	0.03	0.07
<i>Lactuca serriola</i>	0.09	36.36	0.21	0.09	0.20
<i>Lepidium densiflorum</i>	0.00	12.12	0.00	0.00	0.00
<i>Neolepia campestre</i>	0.00	3.03	0.00	0.00	0.00
<i>Podospermum laciniatum</i>	0.00	3.03	0.00	0.00	0.00
<i>Senecio vulgaris</i>	0.00	3.03	0.00	0.00	0.00
<i>Sisymbrium altissimum</i>	0.06	6.06	0.14	0.06	0.13
<i>Solanum rostratum</i>	0.06	6.06	0.14	0.06	0.13
<i>Tragopogon dubius</i> ssp. <i>major</i>	0.09	48.48	0.21	0.09	0.20
<i>Verbascum blattaria</i>	0.00	3.03	0.00	0.00	0.00
<i>Verbascum thapsus</i>	0.00	3.03	0.00	0.00	0.00
TOTAL INTRO. ANN. & BIEN. FORBS	1.2	87.9	2.6	1.2	2.6
INTRODUCED ANNUAL GRASSES					
<i>Anisantha tectorum</i>	0.03	12.12	0.07	0.03	0.07
<i>Bromus japonicus</i>	0.36	63.64	0.82	0.39	0.85
TOTAL INTRO. ANN. GRASSES	0.4	63.6	0.9	0.4	0.9
NATIVE PERENNIAL FORBS					
<i>Achillea lanulosa</i>	0.00	12.12	0.00	0.00	0.00
<i>Adenolinum lewisii</i>	0.06	18.18	0.14	0.06	0.13
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>	1.24	72.73	2.81	1.33	2.88
<i>Amerosedum lanceolatum</i>	0.00	6.06	0.00	0.00	0.00
<i>Antennaria corymbosa</i>	0.03	30.30	0.07	0.03	0.07
<i>Antennaria pulcherrima</i> ssp. <i>anaphaloides</i>	0.00	15.15	0.00	0.00	0.00
<i>Apocynum cannabinum</i>	0.00	6.06	0.00	0.00	0.00
<i>Argemone polyanthemus</i>	0.00	3.03	0.00	0.00	0.00
<i>Artemisia frigida</i>	0.33	60.61	0.75	0.39	0.85
<i>Artemisia ludoviciana</i>	0.82	90.91	1.85	1.00	2.16
<i>Asclepias pumila</i>	0.00	3.03	0.00	0.00	0.00
<i>Asclepias stenophylla</i>	0.00	3.03	0.00	0.00	0.00
<i>Asclepias viridiflora</i>	0.00	24.24	0.00	0.00	0.00
<i>Aster porteri</i>	3.45	75.76	7.81	3.61	7.79
<i>Aster</i> spp.	0.00	3.03	0.00	0.00	0.00
<i>Astragalus agrestis</i>	0.00	6.06	0.00	0.00	0.00
<i>Astragalus crassicaarpus</i>	0.03	12.12	0.07	0.03	0.07
<i>Astragalus flexuosus</i>	0.00	3.03	0.00	0.00	0.00
<i>Astragalus shortianus</i>	0.00	3.03	0.00	0.00	0.00
<i>Astragalus</i> spp.	0.00	3.03	0.00	0.00	0.00
<i>Brickellia eupatorioides</i>	0.00	6.06	0.00	0.00	0.00
<i>Calochortus gunnisonii</i>	0.00	3.03	0.00	0.00	0.00
<i>Calylophus serrulatus</i>	0.00	9.09	0.00	0.00	0.00
<i>Campanula rotundifolia</i>	0.00	6.06	0.00	0.00	0.00
<i>Cerastium strictum</i>	0.06	6.06	0.14	0.06	0.13

Table 97-3. Cover Data - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - Sept., 1997

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
<i>Comandra umbellata</i> ssp. <i>pallida</i>	0.03	24.24	0.07	0.03	0.07
<i>Dalea purpurea</i>	0.03	69.70	0.07	0.06	0.13
<i>Drymocallis fissa</i>	0.00	21.21	0.00	0.00	0.00
<i>Eremogone fendleri</i>	0.15	60.61	0.34	0.15	0.33
<i>Erigeron flagellaris</i>	0.94	24.24	2.12	1.00	2.16
<i>Eriogonum flavum</i> var. <i>flavum</i>	0.00	12.12	0.00	0.00	0.00
<i>Evolvulus nuttalianus</i>	0.00	3.03	0.00	0.00	0.00
<i>Gaillardia aristata</i>	0.00	60.61	0.00	0.00	0.00
<i>Gastrolychnis drummondii</i>	0.00	9.09	0.00	0.00	0.00
<i>Gaura coccinea</i>	0.03	3.03	0.07	0.03	0.07
<i>Gutierrezia sarothrae</i>	0.15	21.21	0.34	0.15	0.33
<i>Helianthus pumilus</i>	0.06	12.12	0.14	0.06	0.13
<i>Heterotheca fulcrata</i>	0.33	66.67	0.75	0.33	0.72
<i>Heterotheca villosa</i>	1.00	51.52	2.26	1.03	2.23
<i>Lesquerella montana</i>	0.00	54.55	0.00	0.00	0.00
<i>Liatris punctata</i>	0.82	81.82	1.85	0.82	1.77
<i>Lithospermum incisum</i>	0.00	6.06	0.00	0.00	0.00
<i>Lithospermum ruderales</i>	0.00	6.06	0.00	0.00	0.00
<i>Lomatium orientale</i>	0.00	3.03	0.00	0.00	0.00
<i>Lygodesmia juncea</i>	0.00	3.03	0.00	0.00	0.00
<i>Oenothera villosa</i>	0.00	6.06	0.00	0.00	0.00
<i>Oligoneuron rigidum</i>	0.03	3.03	0.07	0.03	0.07
<i>Oligosporus dracunculus</i> ssp. <i>glaucus</i>	0.27	9.09	0.62	0.27	0.59
<i>Onosmodium molle</i> ssp. <i>occidentale</i>	0.00	6.06	0.00	0.00	0.00
<i>Oxalis dillenii</i>	0.00	3.03	0.00	0.00	0.00
<i>Oxybaphus hirsutus</i>	0.00	15.15	0.00	0.00	0.00
<i>Oxybaphus linearis</i>	0.00	21.21	0.00	0.00	0.00
<i>Oxytropis lamberti</i>	0.00	12.12	0.00	0.00	0.00
<i>Oxytropis sericea</i>	0.00	27.27	0.00	0.00	0.00
<i>Oxytropis</i> spp.	0.00	3.03	0.00	0.00	0.00
<i>Paronychia jamesii</i>	0.09	54.55	0.21	0.09	0.20
<i>Penstemon angustifolius</i>	0.00	6.06	0.00	0.00	0.00
<i>Penstemon secundiflorus</i>	0.00	21.21	0.00	0.00	0.00
<i>Penstemon virens</i>	0.00	12.12	0.00	0.00	0.00
<i>Phacelia heterophylla</i>	0.12	27.27	0.27	0.12	0.26
<i>Pneumonanthe affinis</i>	0.03	6.06	0.07	0.03	0.07
<i>Pneumonanthe bigelovii</i>	0.00	3.03	0.00	0.00	0.00
<i>Pneumonanthe parryi</i>	0.00	3.03	0.00	0.00	0.00
<i>Potentilla effusa</i>	0.00	12.12	0.00	0.00	0.00
<i>Potentilla plattensis</i>	0.00	3.03	0.00	0.00	0.00
<i>Potentilla pulcherrima</i>	0.00	3.03	0.00	0.00	0.00
<i>Psoraleidium lanceolatum</i>	0.00	3.03	0.00	0.00	0.00
<i>Psoraleidium tenuiflorum</i>	1.58	87.88	3.56	1.58	3.40
<i>Ratibida columnifera</i>	0.06	30.30	0.14	0.06	0.13
<i>Senecio integerrimus</i>	0.00	27.27	0.00	0.00	0.00
<i>Senecio spartioides</i>	0.12	36.36	0.27	0.12	0.26
<i>Solidago missouriensis</i>	0.03	3.03	0.07	0.03	0.07
<i>Solidago mollis</i>	0.00	42.42	0.00	0.00	0.00
<i>Solidago nana</i>	0.00	6.06	0.00	0.00	0.00
<i>Solidago simplex</i> var. <i>nana</i>	0.03	3.03	0.07	0.03	0.07
<i>Sphaeralcea coccinea</i>	0.00	6.06	0.00	0.00	0.00
<i>Talinum parviflorum</i>	0.00	6.06	0.00	0.00	0.00
<i>Thelesperma megapotamicum</i>	0.03	12.12	0.07	0.03	0.07
<i>Tithymalus brachyceras</i>	0.00	6.06	0.00	0.00	0.00
<i>Townsendia exscapa</i>	0.03	15.15	0.07	0.03	0.07
<i>Townsendia grandiflora</i>	0.00	3.03	0.00	0.00	0.00
Unknown nyctaginaceae	0.00	3.03	0.00	0.00	0.00
<i>Virgulus falcatus</i>	0.03	12.12	0.07	0.03	0.07
TOTAL NATIVE PERENNIAL FORBS	12.0	100.0	27.2	12.6	27.3

Table 97-3. Cover Data -- All Sites, Bluestem Grassland Study, Jeff. & Bidr. Co., CO -- Sept., 1997

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
INTRODUCED PERENNIAL FORBS					
<i>Arabis hirsuta</i>	0.00	6.06	0.00	0.00	0.00
<i>Cichorium intybus</i>	0.00	3.03	0.00	0.00	0.00
<i>Daucus carota</i>	0.00	6.06	0.00	0.00	0.00
<i>Hypericum perforatum</i>	0.58	66.67	1.30	0.58	1.24
<i>Linaria genistifolia</i> ssp. <i>dalmatica</i>	0.00	15.15	0.00	0.00	0.00
<i>Taraxacum officinale</i>	0.00	9.09	0.00	0.00	0.00
<i>Verbena bracteata</i>	0.00	3.03	0.00	0.00	0.00
TOTAL INTRO. PERENNIAL FORBS	0.6	81.8	1.3	0.6	1.2
NATIVE PERENNIAL GRASSES (cool)					
<i>Carex nebrascensis</i>	0.00	3.03	0.00	0.00	0.00
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	2.21	90.91	5.00	2.27	4.91
<i>Elymus elymoides</i>	0.09	15.15	0.21	0.09	0.20
<i>Elymus lanceolatus</i> fm. <i>dasystachya</i>	0.00	3.03	0.00	0.00	0.00
<i>Elymus longifolius</i>	0.03	30.30	0.07	0.03	0.07
<i>Hesperostipa comata</i>	2.30	57.58	5.21	2.33	5.04
<i>Juncus arcticus</i> ssp. <i>ater</i>	0.00	3.03	0.00	0.00	0.00
<i>Juncus interior</i>	0.00	27.27	0.00	0.00	0.00
<i>Juncus longistylis</i>	0.00	3.03	0.00	0.00	0.00
<i>Koeleria macrantha</i>	0.76	78.79	1.71	0.85	1.83
<i>Nassella viridula</i>	0.30	3.03	0.68	0.30	0.65
<i>Pascopyrum smithii</i>	0.03	12.12	0.07	0.03	0.07
<i>Poa agassizensis</i>	1.42	54.55	3.22	1.55	3.34
<i>Poa compressa</i>	2.91	69.70	6.58	3.03	6.54
TOTAL NATIVE PERENNIAL GRASSES (c)	10.1	100.0	22.7	10.5	22.6
INTRODUCED PERENNIAL GRASSES (cool)					
<i>Bromopsis inermis</i>	0.00	3.03	0.00	0.00	0.00
<i>Poa pratensis</i>	0.21	6.06	0.48	0.21	0.46
TOTAL INTRO. PERENNIAL GRASSES (c)	0.2	9.1	0.5	0.2	0.5
NATIVE PERENNIAL GRASSES (warm)					
<i>Andropogon gerardii</i>	9.12	96.97	20.62	9.76	21.07
<i>Aristida purpurea</i>	0.15	69.70	0.34	0.15	0.33
<i>Bouteloua curtipendula</i>	1.03	81.82	2.33	1.12	2.42
<i>Buchloe dactyloides</i>	0.24	9.09	0.55	0.24	0.52
<i>Chondrosium gracile</i>	1.55	90.91	3.49	1.58	3.40
<i>Chondrosium hirsutum</i>	0.30	48.48	0.68	0.30	0.65
<i>Muhlenbergia montana</i>	4.09	69.70	9.25	4.12	8.90
<i>Muhlenbergia wrightii</i>	0.00	3.03	0.00	0.00	0.00
<i>Schizachyrium scoparium</i>	1.18	72.73	2.67	1.18	2.55
<i>Sorghastrum avenaceum</i>	0.67	54.55	1.51	0.67	1.44
<i>Sporobolus asper</i>	0.06	6.06	0.14	0.06	0.13
<i>Sporobolus cryptandrus</i>	0.00	12.12	0.00	0.00	0.00
<i>Sporobolus heterolepis</i>	0.27	39.39	0.62	0.27	0.59
TOTAL NATIVE PERENNIAL GRASSES (w)	18.7	100.0	42.2	19.5	42.0
NATIVE SHRUBS					
<i>Eriogonum effusum</i>	0.06	9.09	0.14	0.06	0.13
<i>Rhus aromatica</i> ssp. <i>trilobata</i>	0.00	3.03	0.00	0.00	0.00
<i>Rosa sayi</i>	0.03	9.09	0.07	0.03	0.07
<i>Yucca glauca</i>	0.09	21.21	0.21	0.12	0.26
TOTAL NATIVE SHRUBS	0.2	27.3	0.4	0.2	0.5
NATIVE TREES					
<i>Pinus ponderosa</i> ssp. <i>scopulorum</i>	0.00	3.03	0.00	0.00	0.00
TOTAL NATIVE TREES	0.0	3.0	0.0	0.0	0.0
FERNS					
<i>Selaginella densa</i>	0.15	15.15	0.34	0.21	0.46
TOTAL FERNS	0.2	15.2	0.3	0.2	0.5

Table 97-3. Cover Data - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - Sept., 1997

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
BRYOPHYTES					
Moss	0.00	3.03	0.00	0.00	0.00
TOTAL BRYOPHYTES	0.0	3.0	0.0	0.0	0.0
LICHEN					
Lichen	0.12	12.12	0.27	0.12	0.26
Lichen spp.	0.06	6.06	0.14	0.06	0.13
Xanthoparmelia chlorochloa	0.00	3.03	0.00	0.00	0.00
TOTAL LICHEN	0.2	21.2	0.4	0.2	0.4
SUCCULENT					
Echinocereus viridiflorus	0.12	60.61	0.27	0.18	0.39
Opuntia fragilis	0.03	6.06	0.07	0.03	0.07
Opuntia macrorhiza	0.30	87.88	0.68	0.33	0.72
Opuntia polyacantha	0.00	6.06	0.00	0.00	0.00
TOTAL SUCCULENT	0.5	93.9	1.0	0.5	1.2
MUSHROOMS					
Fungus	0.00	9.09	0.00	0.00	0.00
TOTAL MUSHROOMS	0.0	9.1	0.0	0.0	0.0
Standing dead	0.97	30.30		0.97	
Litter	40.58	100.00		40.58	
Bare soil	6.97	90.91		6.97	
Rock	7.24	90.91		7.24	
TOTALS	100.0			102.1	
TOTAL VEGETATION COVER	44.2 (s=11.1)		100.0	46.3 (s=12.6)	100.0
GROUND COVER (Litter+Rock+Veg+St.Dead)	93.0			95.1	
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 37.2 Std.Dev.= 7.8)					

PLANT SPECIES	Percent Foliar Cover*									
	----- SAMPLE NUMBER -----									
	A-1	BOS-1	BOS-2	CC-1	CRL-1	CRL-2	CRL-3	RD-1	RD-2	
<i>Comandra umbellata ssp. pallida</i>	P									P
<i>Dalea purpurea</i>		1				P	P	P		P
<i>Drymocallis fissa</i>										
<i>Eremogone fendleri</i>		P	1			P		P		
<i>Erigeron flagellaris</i>		18(1)								
<i>Eriogonum flavum var. flavum</i>								P		P
<i>Evolvulus nuttallianus</i>							P			
<i>Gaillardia aristata</i>	P		P	P						
<i>Gastrollychnis drummondii</i>	P		P							
<i>Gaura coccinea</i>										
<i>Gutierrezia sarothrae</i>	P	4					P			
<i>Helianthus pumilus</i>						2	P			
<i>Heterotheca fulcrata</i>	P		P	P		3				
<i>Heterotheca villosa</i>	8		3		1	2	P	1	1	
<i>Lesquerella montana</i>	P							P		P
<i>Liatris punctata</i>	5	5	1		2	1	P	P		P
<i>Lithospermum incisum</i>										
<i>Lithospermum ruderaie</i>							P			
<i>Lomatium orientale</i>										P
<i>Lygodesmia juncea</i>										
<i>Oenothera villosa</i>										
<i>Oligoneuron rigidum</i>										
<i>Oligosporus dracunculus ssp. glaucus</i>						5				
<i>Onosmodium moile ssp. occidentale</i>					P					
<i>Oxalis dillenii</i>										
<i>Oxybaphus hirsutus</i>										
<i>Oxybaphus linearis</i>		P	P			P	P			
<i>Oxytropis lambertii</i>										P
<i>Oxytropis sericea</i>	P	P	P				P	P		
<i>Oxytropis spp.</i>										
<i>Paronychia jamesii</i>	P	P						P		P
<i>Penstemon angustifolius</i>										
<i>Penstemon secundiflorus</i>	P						P			P
<i>Penstemon virens</i>		P				P				
<i>Phacelia heterophylla</i>								P		P
<i>Pneumonanthe affinis</i>										
<i>Pneumonanthe bigelovii</i>				P						
<i>Pneumonanthe parryi</i>										
<i>Potentilla effusa</i>										
<i>Potentilla plattensis</i>										
<i>Potentilla pulcherrima</i>										
<i>Psoraleidum lanceolatum</i>								P		
<i>Psoraleidum tenuiflorum</i>	2	1	1		8	5	6	1	1	
<i>Ratibida columnifera</i>	P	P			P	P				
<i>Senecio integerrimus</i>		P	P							
<i>Senecio spartioides</i>	P		P			1		P		
<i>Solidago missouriensis</i>										
<i>Solidago mollis</i>				P						
<i>Solidago nana</i>										
<i>Solidago simplex var. nana</i>										
<i>Sphaeralcea coccinea</i>							P			
<i>Talinum parviflorum</i>										
<i>Thelesperma megapotamicum</i>	1							P		P
<i>Tithymalus brachyceras</i>	P									
<i>Townsendia exscapa</i>		P	1							
<i>Townsendia grandiflora</i>										
Unknown nyctaginaceae										
<i>Virgulus falcatus</i>		P	1		P					
TOTAL NATIVE PERENNIAL FORBS	20(2)	34(1)	10	6	14	25	19(2)	5(1)	3	

PLANT SPECIES	Percent Foliar Cover*									
	----- SAMPLE NUMBER -----									
	A-1	BOS-1	BOS-2	CC-1	CRL-1	CRL-2	CRL-3	RD-1	RD-2	
BRYOPHYTES										
Moss										
TOTAL BRYOPHYTES	---	---	---	---	---	---	---	---	---	---
LICHEN										
Lichen										
Lichen spp.										
Xanthoparmelia chlorochloa										
TOTAL LICHEN	---	---	---	---	---	---	---	---	---	---
SUCCULENT										
Echinocereus viridiflorus	1		P			P				P
Opuntia fragilis										
Opuntia macrorhiza	P	1				P	P	1		P
Opuntia polyacantha								P		P
TOTAL SUCCULENT	1	1	P	---	---	P	P	1		P
MUSHROOMS										
Fungus										
TOTAL MUSHROOMS	---	---	---	---	---	---	---	---	---	---
Standing dead					2					1
Litter	34	27	47	50	30	28	44	58	32	
Bare soil	10	17	14	4			2	6	6	
Rock	1	3	9	2		7		16	23	
TOTALS	100	100	100	100	100	100	100	100	100	100
TOTAL VEGETATION COVER	55(4)	53(3)	30	44	68(13)	65	54(2)	20(1)	38	
GROUND COVER (Litter+Rock+Veg+St.Dead)	90(4)	83(3)	86	96	100(13)	100	98(2)	94(1)	94	
SPECIES DENSITY (# of species/100 sq.m.)	40	41	37	24	24	38	33	38	41	
(AVERAGE= 37.2 Std.Dev.= 7.8)										

*P=Present within 1 m. on either side of the cover transect, but not quantitatively encountered.

Table 97-3. Cover Data - All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO - Sept., 1997

PLANT SPECIES	Percent Follar Cover*								
	----- SAMPLE NUMBER -----								
	1	2	3	4	5	6	7	8	9
NATIVE ANNUAL & BIENNIAL FORBS									
<i>Chenopodium leptophyllum</i>									
<i>Cirsium undulatum</i>					P	P	1		
<i>Cryptantha</i> spp.									
<i>Erigeron divergens</i>									
<i>Erysimum asperum</i>						P			
<i>Fraseria speciosa</i>									
<i>Grindelia squarrosa</i>	P		P		P	P		P	
<i>Hedeoma hispidum</i>									
<i>Oligosporus pacificus</i>					P	1	P		P
<i>Oreocarya virgata</i>						P	P		
<i>Polygonum douglasii</i>									
<i>Pterogonum alatum</i>	P	P	P	P	P	P	P	P	1
<i>Silene antirrhina</i>									
TOTAL NATIVE ANN. & BIEN. FORBS	P	P	P	P	P	1	1	P	1
INTRODUCED ANNUAL & BIENNIAL FORBS									
<i>Acosta diffusa</i>							3	P	
<i>Alyssum minus</i>				P	P	1	5	P	
<i>Camelina microcarpa</i>						P			
<i>Carduus nutans</i> ssp. <i>macrolepis</i>									
<i>Erodium cicutarium</i>									
<i>Lactuca serriola</i>						P	P		
<i>Lepidium densiflorum</i>									P
<i>Neolepia campestre</i>									
<i>Podospermum laciniatum</i>									
<i>Senecio vulgaris</i>									
<i>Sisymbrium altissimum</i>									
<i>Solanum rostratum</i>									
<i>Tragopogon dubius</i> ssp. <i>major</i>							1	P	P
<i>Verbascum blattaria</i>									
<i>Verbascum thapsus</i>									
TOTAL INTRO. ANN. & BIEN. FORBS	---	---	---	P	P	5	5	P	P
INTRODUCED ANNUAL GRASSES									
<i>Anisantha tectorum</i>							P		
<i>Bromus japonicus</i>							P	1	P
TOTAL INTRO. ANN. GRASSES	---	---	---	---	---	P	1	P	P
NATIVE PERENNIAL FORBS									
<i>Achillea lanulosa</i>						P		P	
<i>Adenolinum lewisii</i>									
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>	2			4	2	1	P	P	P
<i>Amerosedum lanceolatum</i>									
<i>Antennaria corymbosa</i>			P			P			
<i>Antennaria pulcherrima</i> ssp. <i>anaphaloides</i>		P		P					
<i>Apocynum cannabinum</i>						P			
<i>Argemone polyanthemus</i>									
<i>Artemisia frigida</i>						2	1	P	P
<i>Artemisia ludoviciana</i>	P	P	P	P	3	P	1	2	1(2)
<i>Asclepias pumila</i>									
<i>Asclepias stenophylla</i>	P								
<i>Asclepias viridiflora</i>	P	P						P	
<i>Aster porteri</i>	4	6	5	6	4(1)	1	P	8	1
<i>Aster</i> spp.									
<i>Astragalus agrestis</i>									
<i>Astragalus crassicaarpus</i>									
<i>Astragalus flexuosus</i>									
<i>Astragalus shortianus</i>									
<i>Astragalus</i> spp.									
<i>Brickellia eupatorioides</i>									
<i>Calochortus gunnisonii</i>									
<i>Calylophus serrulatus</i>							P		
<i>Campanula rotundifolia</i>									
<i>Cerastium strictum</i>							P		

Table 97-3. Cover Data -- All Sites, Bluestem Grassland Study, Jeff. & Bldr. Co., CO -- Sept., 1997

PLANT SPECIES	Percent Foliar Cover*								
	----- SAMPLE NUMBER -----								
	1	2	3	4	5	6	7	8	9
<i>Comandra umbellata</i> ssp. <i>pallida</i>						P			
<i>Dalea purpurea</i>		P	P	P	P	P	P	P	P
<i>Dryocallis fissa</i>		P		P	P	P		P	P
<i>Eremogone fendleri</i>	P		P	P		P	P	P	
<i>Erigeron flagellaris</i>						1(1)	1		6
<i>Eriogonum flavum</i> var. <i>flavum</i>						P			
<i>Evolvulus nuttalianus</i>									
<i>Gaillardia aristata</i>			P	P	P	P			
<i>Gastrolychnis drummondii</i>									
<i>Gaura coccinea</i>									
<i>Gutierrezia sarothrae</i>						P			
<i>Helianthus pumilus</i>									
<i>Heterotheca fulcrata</i>	P	2	P	1	P	P		P	1
<i>Heterotheca villosa</i>						P	10(1)		1
<i>Lesquerella montana</i>	P		P			P	P	P	P
<i>Liatis punctata</i>	P	1	P	P		P	P	P	P
<i>Lithospermum incisum</i>								P	
<i>Lithospermum ruderale</i>									
<i>Lomatium orientale</i>									
<i>Lygodesmia juncea</i>									
<i>Oenothera villosa</i>					P				
<i>Oligoneuron rigidum</i>									
<i>Oligosporus dracunculus</i> ssp. <i>glaucus</i>									
<i>Onosmodium molle</i> ssp. <i>occidentale</i>									
<i>Oxalis dillenii</i>								P	
<i>Oxybaphus hirsutus</i>				P	P	P			P
<i>Oxybaphus linearis</i>							P		
<i>Oxytropis lambertii</i>							P		
<i>Oxytropis sericea</i>				P		P			
<i>Oxytropis</i> spp.									
<i>Paronychia jamesii</i>	P	P	P	P	1				P
<i>Penstemon angustifolius</i>							P		
<i>Penstemon secundiflorus</i>						P			
<i>Penstemon virens</i>						P			
<i>Phacelia heterophylla</i>						P	P		P
<i>Pneumonanthe affinis</i>									
<i>Pneumonanthe bigelovii</i>									
<i>Pneumonanthe parryi</i>									
<i>Potentilla effusa</i>									
<i>Potentilla plattensis</i>									
<i>Potentilla pulcherrima</i>									
<i>Psoralidium lanceolatum</i>									
<i>Psoralidium tenuiflorum</i>	1	1	P	1	P	4	1	4	
<i>Ratibida columnifera</i>									
<i>Senecio integerrimus</i>			P	P	P				
<i>Senecio spartioides</i>						P	P	P	P
<i>Solidago missouriensis</i>									
<i>Solidago mollis</i>	P			P	P	P			P
<i>Solidago nana</i>		P		P					
<i>Solidago simplex</i> var. <i>nana</i>									1
<i>Sphaeralcea coccinea</i>									
<i>Talinum parviflorum</i>									
<i>Thelesperma megapotamicum</i>									
<i>Tithymalus brachyceras</i>						P			
<i>Townsendia exscapa</i>						P			
<i>Townsendia grandiflora</i>					P				
Unknown <i>nyctaginaceae</i>					P				
<i>Virgulus falcatus</i>									
TOTAL NATIVE PERENNIAL FORBS	7	10	5	12	10(1)	9(1)	14(1)	14	11(2)

PLANT SPECIES	Percent Follar Cover*								
	----- SAMPLE NUMBER -----								
	1	2	3	4	5	6	7	8	9
INTRODUCED PERENNIAL FORBS									
<i>Arabis hirsuta</i>			P						
<i>Cichorium intybus</i>								P	
<i>Daucus carota</i>							P		
<i>Hypericum perforatum</i>	P	P	2	P	P	1		P	1
<i>Linaria genistifolia</i> ssp. <i>dalmatica</i>							P		
<i>Taraxacum officinale</i>						P			
<i>Verbena bracteata</i>								P	
TOTAL INTRO. PERENNIAL FORBS	P	P	2	P	P	1	P	P	1
NATIVE PERENNIAL GRASSES (cool)									
<i>Carex nebrascensis</i>									
<i>Carex pensylvanica</i> ssp. <i>helophila</i>	4	1	4	P	2	1	P	2	P
<i>Elymus elymoides</i>					P		P		
<i>Elymus lanceolatus</i> fm. <i>dasystachya</i>									
<i>Elymus longifolius</i>	P		P			P			
<i>Hesperostipa comata</i>				P	P	1	5		
<i>Juncus arcticus</i> ssp. <i>ater</i>						P			
<i>Juncus interior</i>	P	P	P		P				
<i>Juncus longistylis</i>									
<i>Koeleria macrantha</i>	P	1	P	1		1		1	
<i>Nassella viridula</i>									
<i>Pascopyrum smithii</i>							P		
<i>Poa agassizensis</i>						6	P	3(1)	
<i>Poa compressa</i>	2	4	1	1	6	6		1	P
TOTAL NATIVE PERENNIAL GRASSES (c)	6	6	5	2	8	15	5	7(1)	P
INTRODUCED PERENNIAL GRASSES (cool)									
<i>Bromopsis inermis</i>									
<i>Poa pratensis</i>									
TOTAL INTRO. PERENNIAL GRASSES (c)	---	---	---	---	---	---	---	---	---
NATIVE PERENNIAL GRASSES (warm)									
<i>Andropogon gerardii</i>	3	10	7	7	4	5	12(1)	9	7
<i>Aristida purpurea</i>	P	P	P		P	P	P	P	1
<i>Bouteloua curtipendula</i>	P	2	P	2	P	P	5(1)	1	1
<i>Buchloe dactyloides</i>									
<i>Chondrosium gracile</i>	6	2	P	11	2	1	10	1	1
<i>Chondrosium hirsutum</i>	P	P	2	3	1		P		3
<i>Muhlenbergia montana</i>	7	10	7	8(1)	12	P	P	1	2
<i>Muhlenbergia wrightii</i>									
<i>Schizachyrium scoparium</i>	2	3	P	P		P			1
<i>Sorghastrum avenaceum</i>	2	1	P	3	2			3	P
<i>Sporobolus asper</i>									
<i>Sporobolus cryptandrus</i>									
<i>Sporobolus heterolepis</i>		P	P	P	P	P		P	
TOTAL NATIVE PERENNIAL GRASSES (w)	20	28	16	34(1)	21	6	27(2)	15	16
NATIVE SHRUBS									
<i>Eriogonum effusum</i>									
<i>Rhus aromatica</i> ssp. <i>trilobata</i>								P	
<i>Rosa sayi</i>									
<i>Yucca glauca</i>									
TOTAL NATIVE SHRUBS	---	---	---	---	---	---	---	P	---
NATIVE TREES									
<i>Pinus ponderosa</i> ssp. <i>scopulorum</i>									
TOTAL NATIVE TREES	---	---	---	---	---	---	---	---	---
FERNS									
<i>Selaginella densa</i>			P	P	5(2)				
TOTAL FERNS	---	---	P	P	5(2)	---	---	---	---

PLANT SPECIES	Percent Foliar Cover*								
	----- SAMPLE NUMBER -----								
	1	2	3	4	5	6	7	8	9
BRYOPHYTES									
Moss						P			
TOTAL BRYOPHYTES	---	---	---	---	---	P	---	---	---
LICHEN									
Lichen							2		
Lichen spp.									
<i>Xanthoparmelia chlorochloa</i>									
TOTAL LICHEN	---	---	---	---	---	---	2	---	---
SUCCULENT									
<i>Echinocereus viridiflorus</i>				P	P	P	2		P
<i>Opuntia fragilis</i>						P	1		
<i>Opuntia macrorhiza</i>	1	2	P	P	P	1	P	1	1(1)
<i>Opuntia polyacantha</i>									
TOTAL SUCCULENT	1	2	P	P	P	1	3	1	1(1)
MUSHROOMS									
Fungus	P								
TOTAL MUSHROOMS	P	---	---	---	---	---	---	---	---
Standing dead		3		2	3				
Litter	51	29	56	32	25	38	23	44	40
Bare soil	8	15	12	14	22	2	10	9	
Rock	7	7	4	4	6	22	9	10	30
TOTALS	100	100	100	100	100	100	100	100	100
TOTAL VEGETATION COVER	34	46	28	48(1)	44(3)	38(1)	58(3)	37(1)	30(3)
GROUND COVER (Litter+Rock+Veg+St.Dead)	92	85	88	86(1)	78(3)	98(1)	90(3)	91(1)	100(3)
SPECIES DENSITY (# of species/100 sq.m.)	30	28	32	35	37	62	44	36	35
(AVERAGE= 37.2 Std.Dev. = 7.8)									

PLANT SPECIES	Percent Foliar Cover*								
	----- SAMPLE NUMBER -----								
	10	11	12	13	14	15	16	17	18
NATIVE ANNUAL & BIENNIAL FORBS									
<i>Chenopodium leptophyllum</i>				P					
<i>Cirsium undulatum</i>			P	P	P			P	
<i>Cryptantha</i> spp.				P					
<i>Erigeron divergens</i>					P				
<i>Erysimum asperum</i>		P		P		P	P		
<i>Frasera speciosa</i>			P						
<i>Grindelia squarrosa</i>	P	P				P			
<i>Hedeoma hispidum</i>		P							
<i>Oligosporus pacificus</i>		P	P						
<i>Oreocarya virgata</i>									
<i>Polygonum douglasii</i>									P
<i>Pterogonum alatum</i>	P	P	P	P					
<i>Silene antirrhina</i>			P			P		P	P
TOTAL NATIVE ANN. & BIEN. FORBS	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL & BIENNIAL FORBS									
<i>Acosta diffusa</i>						P		P	
<i>Alyssum minus</i>	P	P	P	3	8				
<i>Camelina microcarpa</i>				P	P				
<i>Carduus nutans</i> ssp. <i>macrolepis</i>				1	P				
<i>Erodium cicutarium</i>					(1)				
<i>Lactuca serriola</i>				1	1		P	P	P
<i>Lepidium densiflorum</i>	P								
<i>Neolepia campestris</i>									
<i>Podospermum laciniatum</i>					P				
<i>Senecio vulgaris</i>									
<i>Sisymbrium altissimum</i>				P	2				
<i>Solanum rostratum</i>									
<i>Tragopogon dubius</i> ssp. <i>major</i>	P	P	P	1	P	P		P	
<i>Verbascum blattaria</i>									P
<i>Verbascum thapsus</i>					P				
TOTAL INTRO. ANN. & BIEN. FORBS	P	P	P	6	11(1)	P	P	P	P
INTRODUCED ANNUAL GRASSES									
<i>Anisantha tectorum</i>									
<i>Bromus japonicus</i>		P		1	4	P	P	P	P
TOTAL INTRO. ANN. GRASSES	---	P	---	1	4	P	P	P	P
NATIVE PERENNIAL FORBS									
<i>Achillea lanulosa</i>			P						
<i>Adenolinum lewisii</i>				1					
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>	P		7(2)		6	1	1(1)	1	P
<i>Amerosedum lanceolatum</i>	P	P							
<i>Antennaria corymbosa</i>	P	P	P					P	
<i>Antennaria pulcherrima</i> ssp. <i>anaphaloides</i>									
<i>Apocynum cannabinum</i>									
<i>Argemone polyanthemus</i>				P					
<i>Artemisia frigida</i>	P	P	P	2	1	P			
<i>Artemisia ludoviciana</i>	P	3	1	1	P	1	1(1)	P	P
<i>Asclepias pumila</i>									
<i>Asclepias stenophylla</i>									
<i>Asclepias viridiflora</i>		P							
<i>Aster porteri</i>	3	6	P			10(1)	3	10	2
<i>Aster</i> spp.									
<i>Astragalus agrestis</i>				P	P				
<i>Astragalus crassicaulus</i>		P			P				
<i>Astragalus flexuosus</i>									
<i>Astragalus shortianus</i>									
<i>Astragalus</i> spp.			P						
<i>Brickellia eupatorioides</i>									
<i>Calochortus gunnisonii</i>			P						
<i>Calylophus serrulatus</i>						P			
<i>Campanula rotundifolia</i>									
<i>Cerastium strictum</i>			1						

PLANT SPECIES	Percent Foliar Cover*								
	----- SAMPLE NUMBER -----								
	10	11	12	13	14	15	16	17	18
<i>Comandra umbellata ssp. pallida</i>		P	P						
<i>Dalea purpurea</i>	P	P	P		P	P		P	(1)
<i>Drymocallis fissa</i>	P								
<i>Eremogone fendleri</i>		1	1			P	P	P	
<i>Erigeron flagellaris</i>	1		1	P		3			
<i>Eriogonum flavum var. flavum</i>		P							
<i>Evolvulus nuttalianus</i>									
<i>Gaillardia aristata</i>	P	P	P			P	P	P	P
<i>Gastrolychnis drummondii</i>								P	
<i>Gaura coccinea</i>									
<i>Gutierrezia sarothrae</i>			1		P				
<i>Helianthus pumilus</i>									
<i>Heterotheca fulcrata</i>	1	P	1		P	P	P	1	
<i>Heterotheca villosa</i>		P	3	2	P				
<i>Lesquerella montana</i>		P		P	P	P		P	
<i>Liatris punctata</i>	P	P	1	P		P		P	
<i>Lithospermum incisum</i>			P						
<i>Lithospermum ruderale</i>					P				
<i>Lomatium orientale</i>									
<i>Lygodesmia juncea</i>					P				
<i>Oenothera villosa</i>			P						
<i>Oligoneuron rigidum</i>			1						
<i>Oligosporus dracunculus ssp. glaucus</i>				3					
<i>Onosmodium molle ssp. occidentale</i>					P				
<i>Oxalis dillenii</i>									
<i>Oxybaphus hirsutus</i>	P								
<i>Oxybaphus linearis</i>					P				
<i>Oxytropis lambertii</i>						P			
<i>Oxytropis sericea</i>		P							
<i>Oxytropis spp.</i>								P	
<i>Paronychia jamesii</i>	P	P				P			P
<i>Penstemon angustifolius</i>									
<i>Penstemon secundiflorus</i>				P					
<i>Penstemon virens</i>			P						
<i>Phacelia heterophylla</i>			P	4	P				
<i>Pneumonanthe affinis</i>			1						
<i>Pneumonanthe bigelovii</i>									
<i>Pneumonanthe parryi</i>		P							
<i>Potentilla effusa</i>									
<i>Potentilla plattensis</i>			P						
<i>Potentilla pulcherrima</i>	P								
<i>Psoralidium lanceolatum</i>									
<i>Psoralidium tenuiflorum</i>			4	3	2	P	P	P	P
<i>Ratibida columnifera</i>			P		P	P		P	
<i>Senecio integerrimus</i>	P								P
<i>Senecio spartioides</i>				2	1				
<i>Solidago missouriensis</i>								1	
<i>Solidago mollis</i>	P	P				P	P		
<i>Solidago nana</i>									
<i>Solidago simplex var. nana</i>									
<i>Sphaeralcea coccinea</i>					P				
<i>Talinum parviflorum</i>									
<i>Thelesperma megapotamicum</i>									
<i>Tithymalus brachyceras</i>									
<i>Townsendia exscapa</i>			P			P			
<i>Townsendia grandiflora</i>									
Unknown nyctaginaceae									
<i>Virgulus falcatus</i>									
TOTAL NATIVE PERENNIAL FORBS	5	10	23(2)	18	10	15(1)	5(2)	13	2(1)

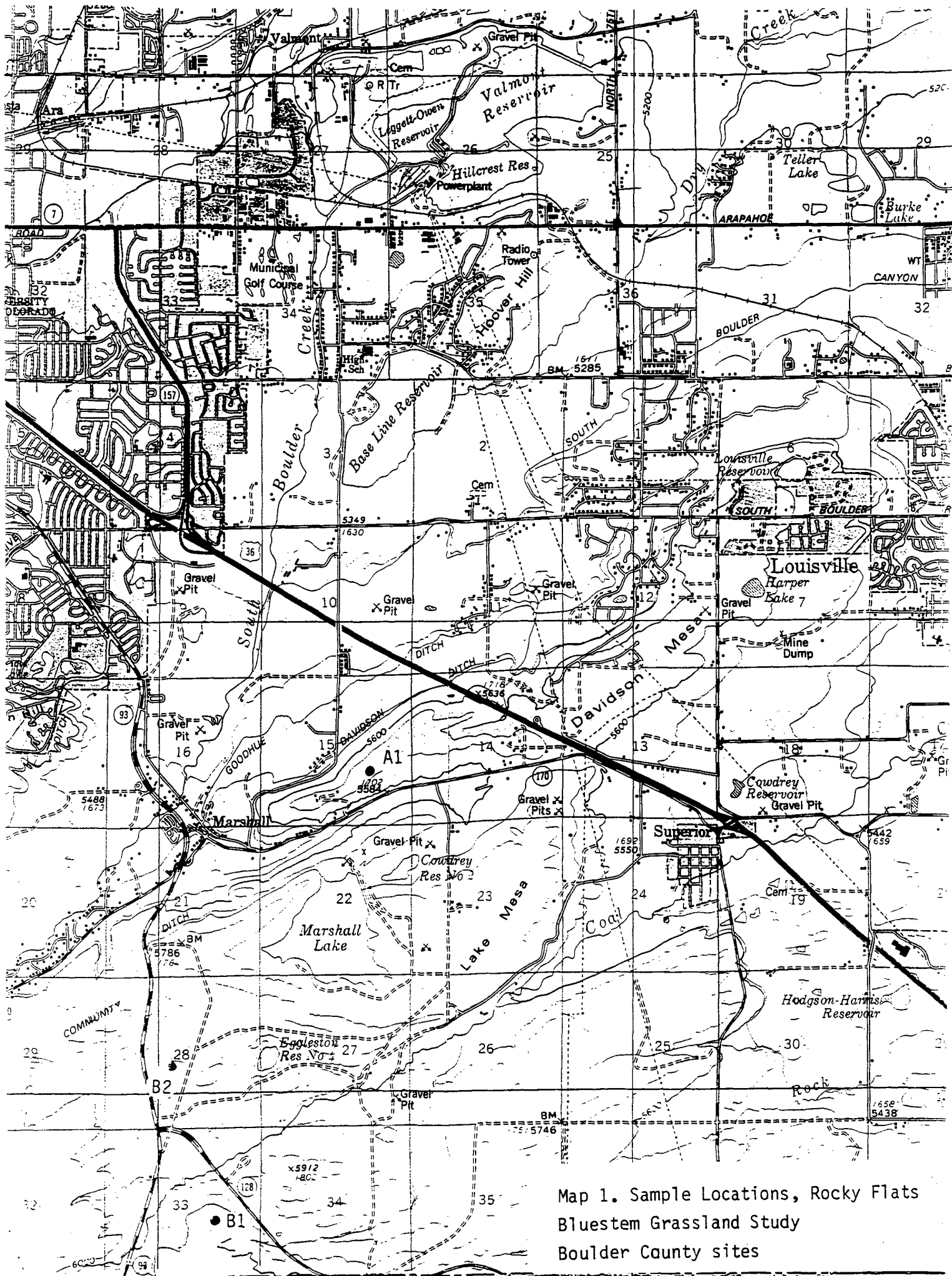
PLANT SPECIES	Percent Follar Cover*									
	----- SAMPLE NUMBER -----									
	10	11	12	13	14	15	16	17	18	
BRYOPHYTES										
Moss										
TOTAL BRYOPHYTES	---	---	---	---	---	---	---	---	---	---
LICHEN										
Lichen										
Lichen spp.										
Xanthoparmelia chlorochloa	P					1		1		
TOTAL LICHEN	P	---	---	---	---	1	---	1	---	---
SUCCULENT										
Echinocereus viridiflorus	P	(1)		1(1)	P	P				
Opuntia fragilis										
Opuntia macrorhiza	P	P	P	P	P	P	P	P	1	
Opuntia polyacantha										
TOTAL SUCCULENT	P	(1)	P	1(1)	P	P	P	P	1	
MUSHROOMS										
Fungus										
TOTAL MUSHROOMS	---	---	---	P	P	---	---	---	---	---
Standing dead			1			2				
Litter	43	53	38	47	52	35	50	49	57	
Bare soil	16	1	5	3	1	3	2	4	1	
Rock	16	7	2	3		3	8	1	1	
TOTALS	100	100	100	100	100	100	100	100	100	
TOTAL VEGETATION COVER	25	39(1)	54(5)	47(2)	47(1)	57(4)	40(4)	46	41(1)	
GROUND COVER (Litter+Rock+Veg+St.Dead)	84	99(1)	95(5)	97(2)	99(1)	97(4)	98(4)	96	99(1)	
SPECIES DENSITY (# of species/100 sq.m.)	36	45	52	38	42	45	25	38	25	
(AVERAGE= 37.2 Std.Dev.= 7.8)										

PLANT SPECIES	Percent Foliar Cover*					
	----- SAMPLE NUMBER -----					
	19	20	21	22	23	24
NATIVE ANNUAL & BIENNIAL FORBS						
<i>Chenopodium leptophyllum</i>		P				
<i>Cirsium undulatum</i>						P
<i>Cryptantha</i> spp.						
<i>Erigeron divergens</i>						P
<i>Erysimum asperum</i>			P			
<i>Frasera speciosa</i>						
<i>Grindelia squarrosa</i>	P	P				P
<i>Hedeoma hispidum</i>						
<i>Oligosporus pacificus</i>					P	P
<i>Oreocarya virgata</i>						
<i>Polygonum douglasii</i>						
<i>Pterogonum alatum</i>			P	P	P	P
<i>Silene antirrhina</i>						
TOTAL NATIVE ANN. & BIEN. FORBS	P	P	P	P	P	P
INTRODUCED ANNUAL & BIENNIAL FORBS						
<i>Acosta diffusa</i>	P	1				
<i>Alyssum minus</i>		1		P		P
<i>Camelina microcarpa</i>		P				P
<i>Carduus nutans</i> ssp. <i>macrolepis</i>		1				1
<i>Erodium cicutarium</i>						
<i>Lactuca serriola</i>	P	1				P
<i>Lepidium densiflorum</i>		P				
<i>Neolepia campestre</i>						
<i>Podospermum laciniatum</i>						
<i>Senecio vulgaris</i>						
<i>Sisymbrium altissimum</i>						
<i>Solanum rostratum</i>						
<i>Tragopogon dubius</i> ssp. <i>major</i>	P	1	P			P
<i>Verbascum blattaria</i>						
<i>Verbascum thapsus</i>						
TOTAL INTRO. ANN. & BIEN. FORBS	P	5	P	P	---	1
INTRODUCED ANNUAL GRASSES						
<i>Anisantha tectorum</i>						P
<i>Bromus japonicus</i>	P	2				2
TOTAL INTRO. ANN. GRASSES	P	2	---	---	---	2
NATIVE PERENNIAL FORBS						
<i>Achillea lanulosa</i>	P					
<i>Adenolinum lewisii</i>		P				P
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>	1					1
<i>Amerosedum lanceolatum</i>						
<i>Antennaria corymbosa</i>			1			P
<i>Antennaria pulcherrima</i> ssp. <i>anaphaloides</i>	P			P	P	
<i>Apocynum cannabinum</i>					P	
<i>Argemone polyanthemos</i>						
<i>Artemisia frigida</i>	P	1			P	
<i>Artemisia ludoviciana</i>	P	P	P			P
<i>Asclepias pumila</i>						
<i>Asclepias stenophylla</i>						
<i>Asclepias viridiflora</i>			P			
<i>Aster porteri</i>	2(1)		14(1)	16(1)	4	P
<i>Aster</i> spp.					P	
<i>Astragalus agrestis</i>						
<i>Astragalus crassicaarpus</i>		P				
<i>Astragalus flexuosus</i>						
<i>Astragalus shortianus</i>						
<i>Astragalus</i> spp.						
<i>Brickellia eupatorioides</i>						P
<i>Calochortus gunnisonii</i>						
<i>Calylophus serrulatus</i>					P	
<i>Campanula rotundifolia</i>						
<i>Cerastium strictum</i>						

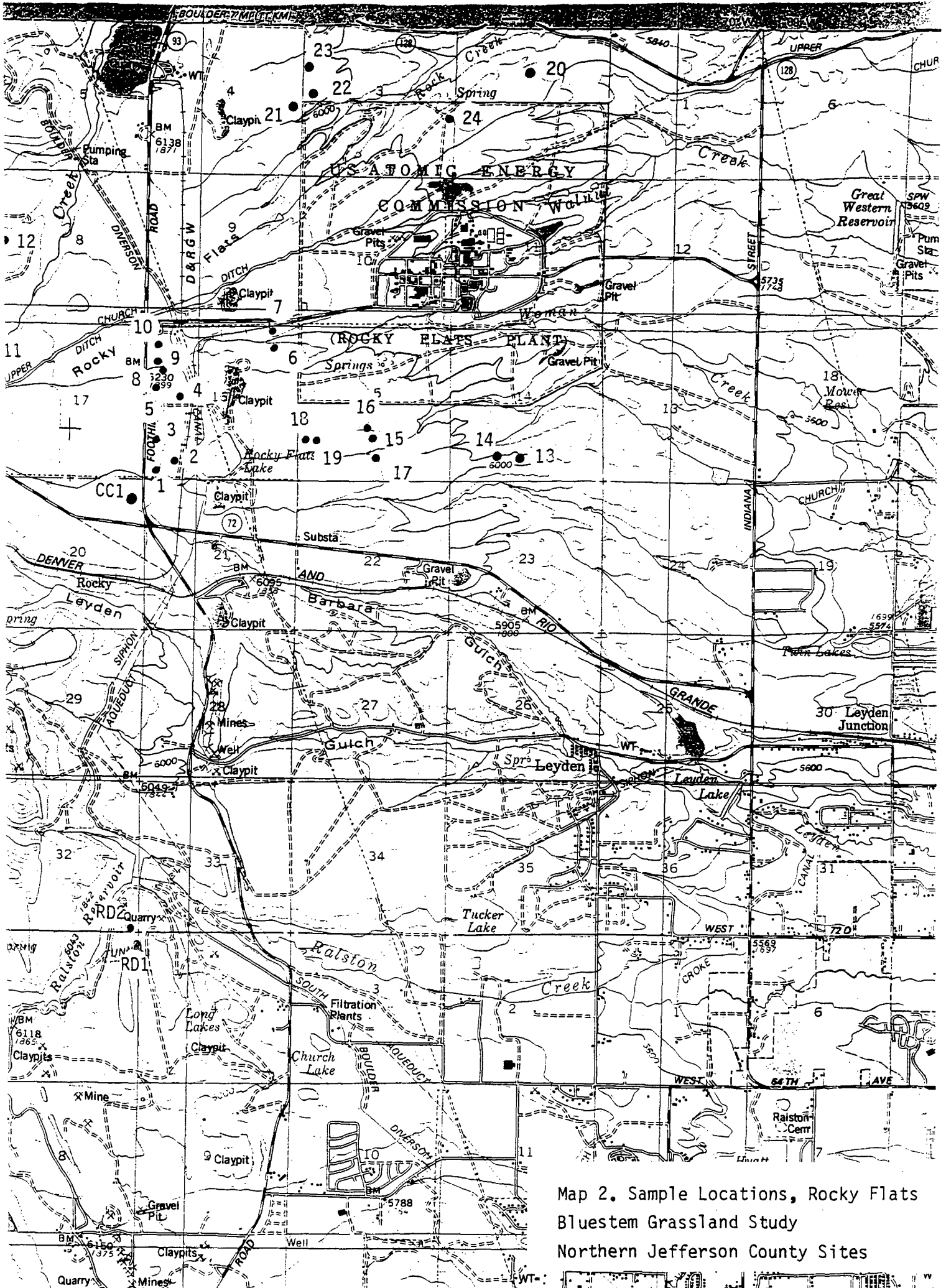
PLANT SPECIES	Percent Foliar Cover*					
	----- SAMPLE NUMBER -----					
	19	20	21	22	23	24
<i>Comandra umbellata</i> ssp. <i>pallida</i>			1	P	P	
<i>Dalea purpurea</i>			P	P	P	
<i>Drymocallis fissa</i>						
<i>Eremogone fendleri</i>		P	1	P	1	P
<i>Erigeron flagellaris</i>						
<i>Eriogonum flavum</i> var. <i>flavum</i>						
<i>Evolvulus nuttalianus</i>						
<i>Gaillardia aristata</i>	P	P	P	P	P	P
<i>Gastrolychnis drummondii</i>						
<i>Gaura coccinea</i>						1
<i>Gutierrezia sarothrae</i>		P				
<i>Helianthus pumilus</i>		P	P			
<i>Heterotheca fulcrata</i>			P	P	1	
<i>Heterotheca villosa</i>		1	P	P		
<i>Lesquerella montana</i>		P	P	P	P	
<i>Liatris punctata</i>		P	1	2	5	3
<i>Lithospermum incisum</i>						
<i>Lithospermum ruderales</i>						
<i>Lomatium orientale</i>						
<i>Lygodesmia juncea</i>						
<i>Oenothera villosa</i>						
<i>Oligoneuron rigidum</i>						
<i>Oligosporus dracunculus</i> ssp. <i>glaucus</i>		1				
<i>Onosmodium molle</i> ssp. <i>occidentale</i>						
<i>Oxalis dillenii</i>						
<i>Oxybaphus hirsutus</i>						
<i>Oxybaphus linearis</i>		P				
<i>Oxytropis lambertii</i>					P	
<i>Oxytropis sericea</i>		P				
<i>Oxytropis</i> spp.						
<i>Paronychia jamesii</i>	P		P	2	P	
<i>Penstemon angustifolius</i>				P		
<i>Penstemon secundiflorus</i>		P				P
<i>Penstemon virens</i>						
<i>Phacelia heterophylla</i>						P
<i>Pneumonanthe affinis</i>					P	
<i>Pneumonanthe bigelovii</i>						
<i>Pneumonanthe parryi</i>						
<i>Potentilla effusa</i>	P		P	P	P	
<i>Potentilla plattensis</i>						
<i>Potentilla pulcherrima</i>						
<i>Psoralidium lanceolatum</i>						
<i>Psoralidium tenuiflorum</i>	P	2	P	1	P	3
<i>Ratibida columnifera</i>		2				P
<i>Senecio integerrimus</i>			P		P	
<i>Senecio spartioides</i>		P				P
<i>Solidago missouriensis</i>						
<i>Solidago mollis</i>			P	P	P	
<i>Solidago nana</i>						
<i>Solidago simplex</i> var. <i>nana</i>						
<i>Sphaeralcea coccinea</i>						
<i>Talinum parviflorum</i>	P			P		
<i>Thelesperma megapotamicum</i>		P				
<i>Tithymalus brachyceras</i>						
<i>Townsendia exscapa</i>						
<i>Townsendia grandiflora</i>						
Unknown nyctaginaceae						
<i>Virgulus falcatus</i>		P				
TOTAL NATIVE PERENNIAL FORBS	3(1)	7	18(1)	21(1)	11	8

PLANT SPECIES	Percent Foliar Cover*					
	----- SAMPLE NUMBER -----					
	19	20	21	22	23	24
INTRODUCED PERENNIAL FORBS						
<i>Arabis hirsuta</i>						
<i>Cichorium intybus</i>						
<i>Daucus carota</i>	P					
<i>Hypericum perforatum</i>		P	P	P	P	P
<i>Linaria genistifolia</i> ssp. <i>dalmatica</i>	P					
<i>Taraxacum officinale</i>	P					
<i>Verbena bracteata</i>						
TOTAL INTRO. PERENNIAL FORBS	P	P	P	P	P	P
NATIVE PERENNIAL GRASSES (cool)						
<i>Carex nebrascensis</i>						
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>		5	1	2	3	1
<i>Elymus elymoides</i>				P		
<i>Elymus lanceolatus</i> fm. <i>dasytachya</i>			P			1
<i>Elymus longifolius</i>						
<i>Hesperostipa comata</i>		9		2		6
<i>Juncus arcticus</i> ssp. <i>ater</i>						
<i>Juncus interior</i>	P					
<i>Juncus longistylis</i>						
<i>Koeleria macrantha</i>	P	1	2	P	4	P
<i>Nassella viridula</i>						
<i>Pascopyrum smithii</i>						
<i>Poa agassizensis</i>	7(2)	4		P		1
<i>Poa compressa</i>	27(4)		P	P		P
TOTAL NATIVE PERENNIAL GRASSES (c)	34(6)	19	3	4	7	9
INTRODUCED PERENNIAL GRASSES (cool)						
<i>Bromopsis inermis</i>						
<i>Poa pratensis</i>						
TOTAL INTRO. PERENNIAL GRASSES (c)	---	---	---	---	---	---
NATIVE PERENNIAL GRASSES (warm)						
<i>Andropogon gerardii</i>	P	5(3)	5(1)	7(1)	10	17(1)
<i>Aristida purpurea</i>	P	P	P		P	
<i>Bouteloua curtipendula</i>	2	1	P	5	1	P
<i>Buchloe dactyloides</i>	1					
<i>Chondrosium gracile</i>	4	P	1	3	1	P
<i>Chondrosium hirsutum</i>			P	P	P	
<i>Muhlenbergia montana</i>	4		8	4	18	1
<i>Muhlenbergia wrightii</i>						
<i>Schizachyrium scoparium</i>	3		3	1	5	
<i>Sorghastrum avenaceum</i>	2		1	2	P	
<i>Sporobolus asper</i>						
<i>Sporobolus cryptandrus</i>				P		
<i>Sporobolus heterolepis</i>			1	P		
TOTAL NATIVE PERENNIAL GRASSES (w)	16	6(3)	19(1)	22(1)	35	18(1)
NATIVE SHRUBS						
<i>Eriogonum effusum</i>						
<i>Rhus aromatica</i> ssp. <i>trilobata</i>						
<i>Rosa sayi</i>		1				
<i>Yucca glauca</i>						
TOTAL NATIVE SHRUBS	---	1	---	---	---	---
NATIVE TREES						
<i>Pinus ponderosa</i> ssp. <i>scopulorum</i>						
TOTAL NATIVE TREES	---	---	---	---	---	---
FERNS						
<i>Selaginella densa</i>						
TOTAL FERNS	---	---	---	---	---	---

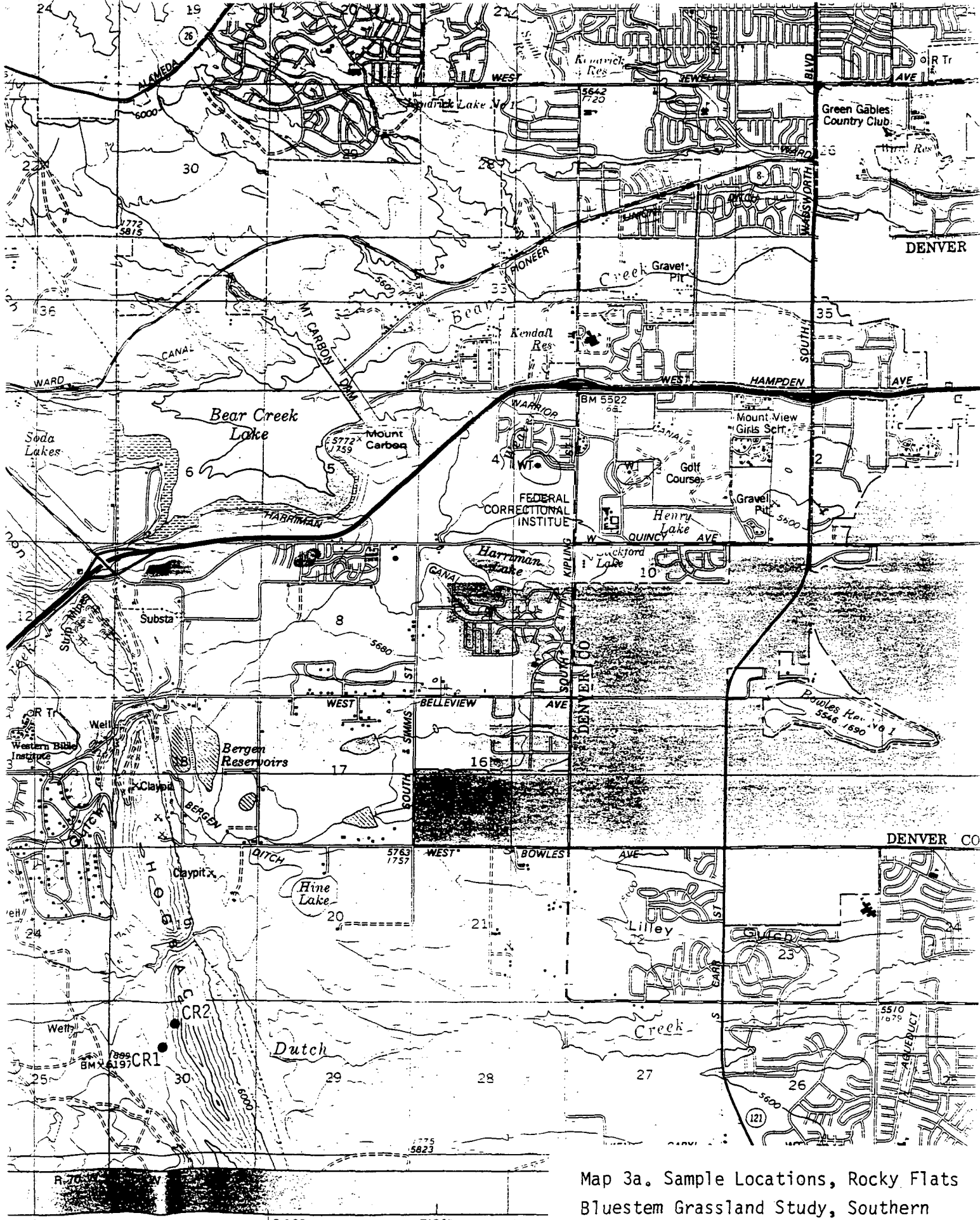
PLANT SPECIES	Percent Foliar Cover*					
	----- SAMPLE NUMBER -----					
	19	20	21	22	23	24
BRYOPHYTES						
Moss						
TOTAL BRYOPHYTES	---	---	---	---	---	---
LICHEN						
Lichen						
Lichen spp.						
<i>Xanthoparmelia chlorochloa</i>						
TOTAL LICHEN	---	---	1	P	1	---
SUCCULENT						
<i>Echinocereus viridiflorus</i>	P	P	P	P	P	P
<i>Opuntia fragilis</i>						
<i>Opuntia macrorhiza</i>	P	P	P	P	1	
<i>Opuntia polyacantha</i>						
TOTAL SUCCULENT	P	P	P	P	P	1
MUSHROOMS						
Fungus						
TOTAL MUSHROOMS	---	---	---	---	---	---
Standing dead						
Litter	41	51	32	29	26	48
Bare soil	3	8	13	4	8	7
Rock	3	1	14	9	7	4
TOTALS	100	100	100	100	100	100
TOTAL VEGETATION COVER	53(7)	40(3)	41(2)	47(2)	54	39(1)
GROUND COVER (Litter+Rock+Veg+St.Dead)	97(7)	92(3)	87(2)	96(2)	92	93(1)
SPECIES DENSITY (# of species/100 sq.m.)	33	42	38	37	35	40
(AVERAGE= 37.2 Std.Dev.= 7.8)						



Map 1. Sample Locations, Rocky Flats
 Bluestem Grassland Study
 Boulder County sites



Map 2. Sample Locations, Rocky Flats
Bluestem Grassland Study
Northern Jefferson County Sites



Map 3a. Sample Locations, Rocky Flats Bluestem Grassland Study, Southern Jefferson County Sites, Part 1

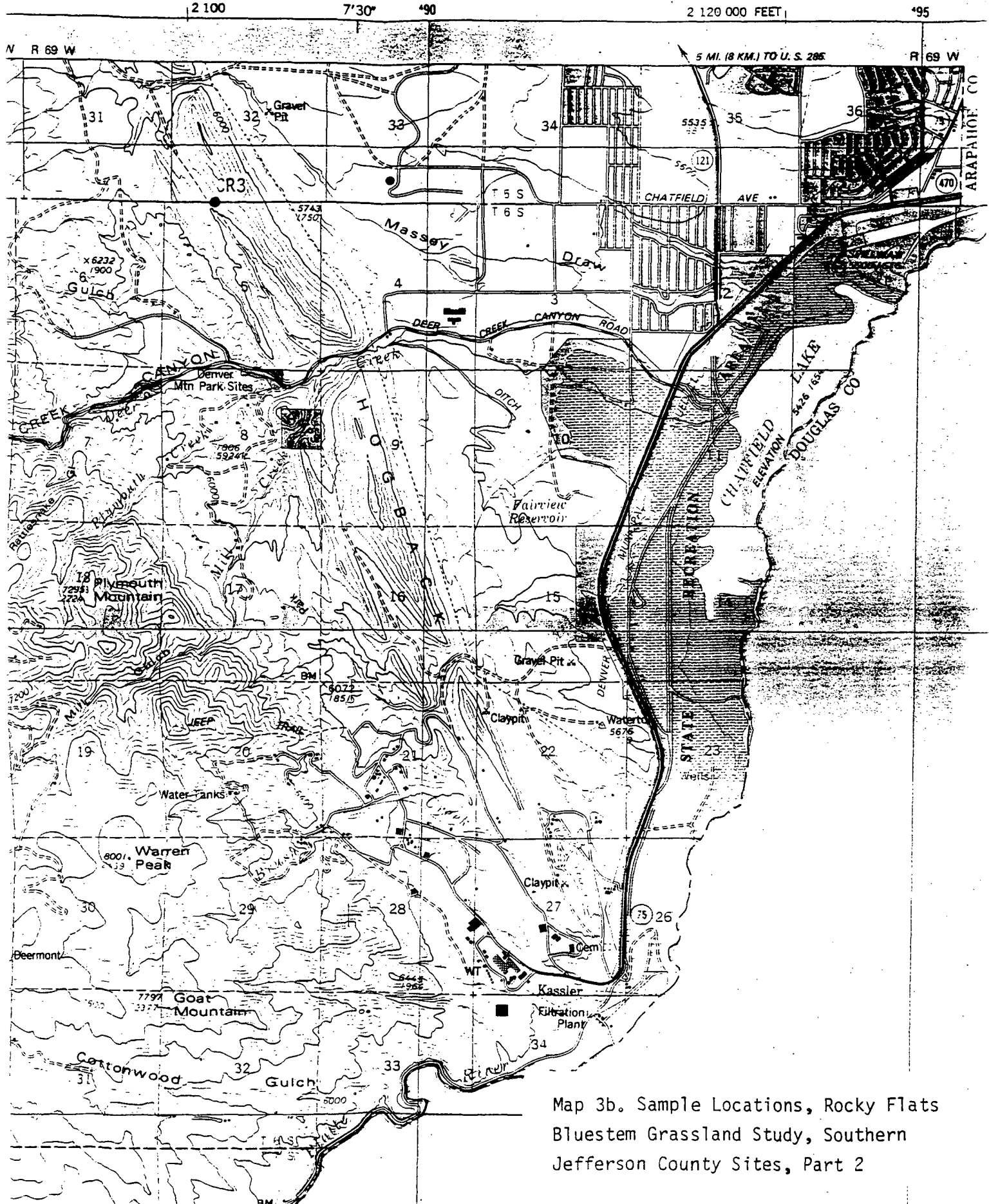
1:100,000 COLORADO 7'30" 190



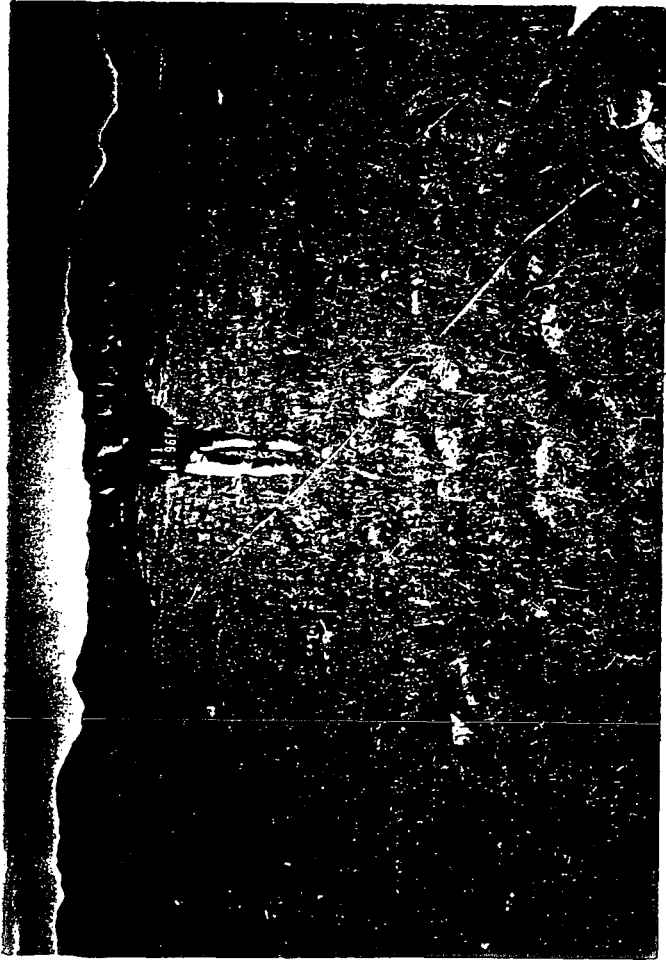
JEFFERSON COUNTY, COLO

COUNTY MAP SERIES (TOPOGRAPHIC)

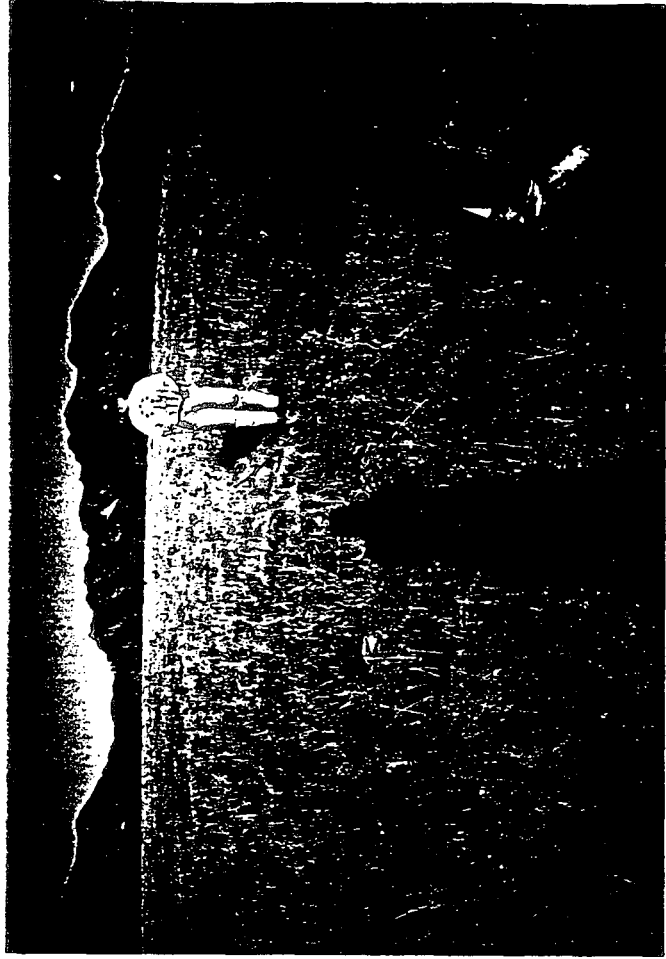
SHEET 2 OF 2



Map 3b. Sample Locations, Rocky Flats Bluestem Grassland Study, Southern Jefferson County Sites, Part 2



Photograph 1. Antenna Ridge, Sample A1.



Photograph 2. Boulder City Open Space, Sample B1.



Photograph 3. Boulder City Open Space, Sample B2.



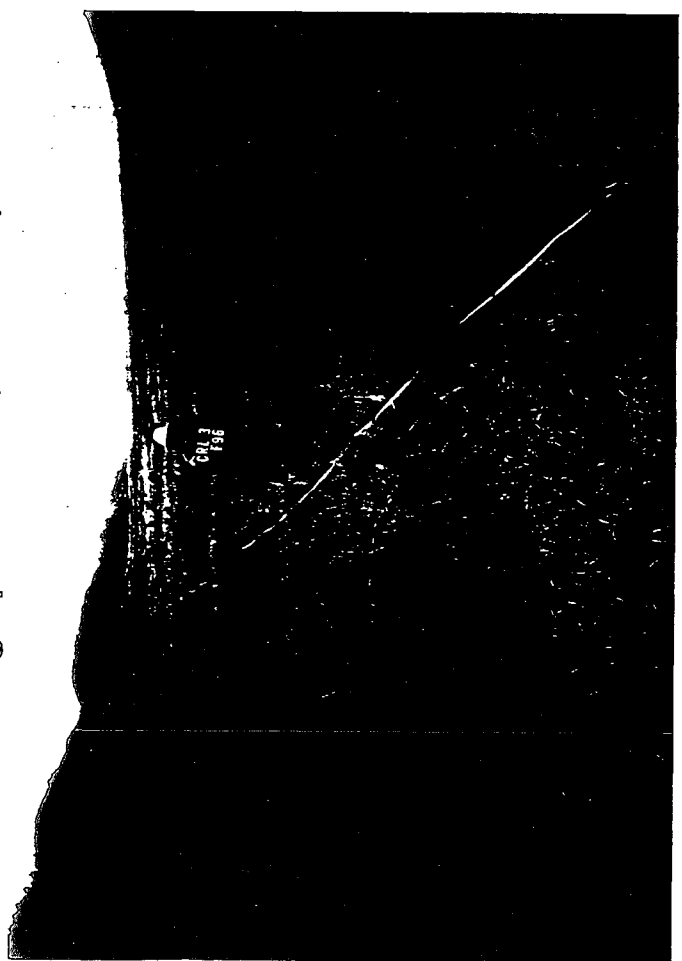
Photograph 4. Coal Creek, Sample CC1.



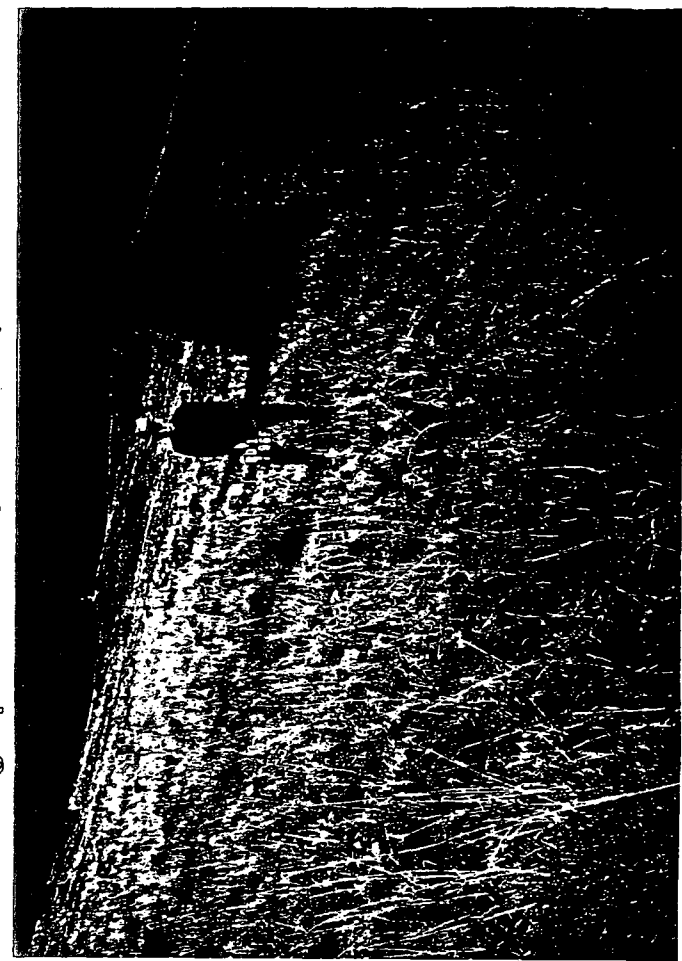
Photograph 5. Ken Caryl Ranch, Sample CR1.



Photograph 6. Ken Caryl Ranch, Sample CR2.



Photograph 7. Ken Caryl Ranch, Sample CR3.



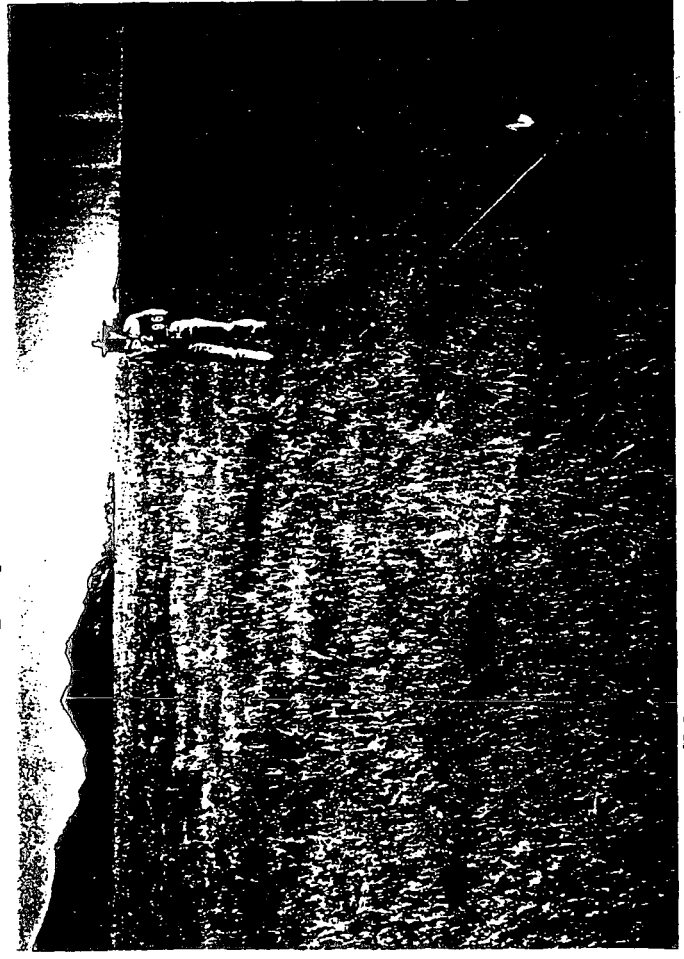
Photograph 8. Ralston Dike, Sample RD1.



Photograph 9. Raiston Dike, Sample RD2.



Photograph 10. Section 16, Sample 1.



Photograph 11. Section 16, Sample 2.



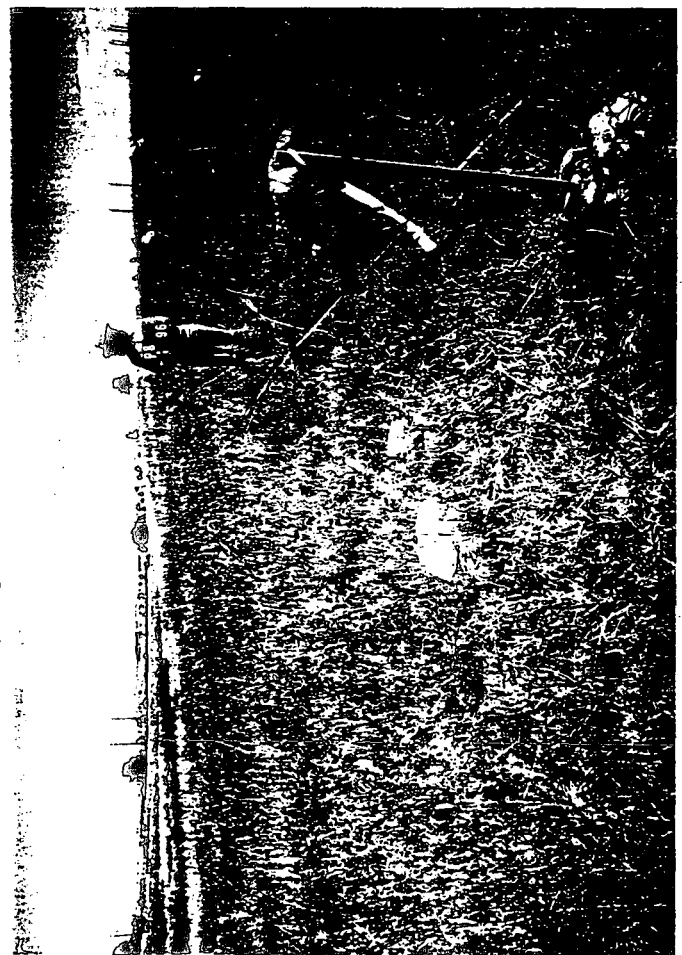
Photograph 12. Section 16, Sample 3.



Photograph 13. Section 16, Sample 4.



Photograph 14. Section 16, Sample 5.



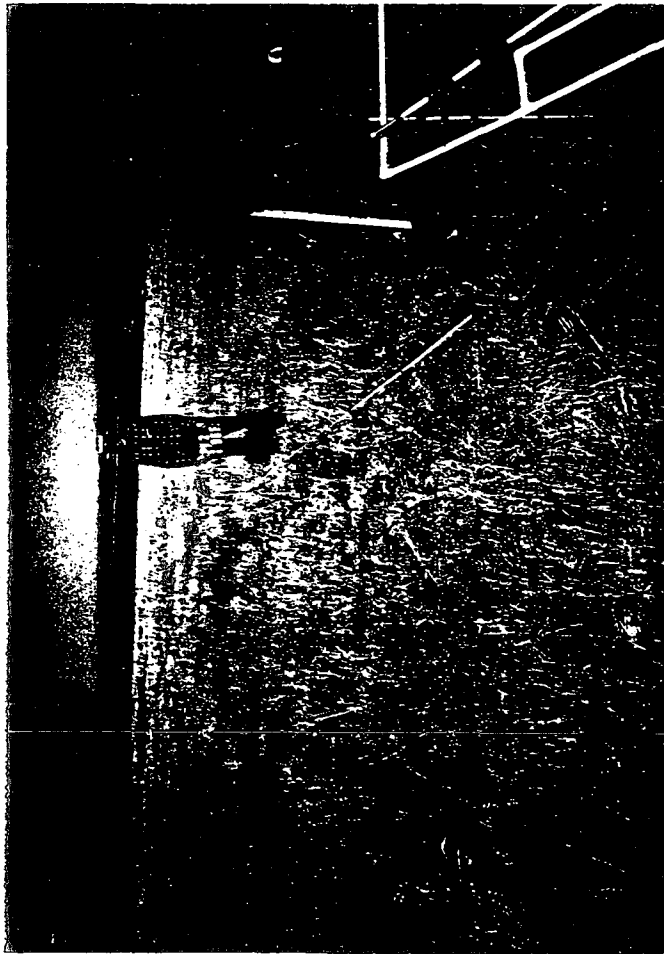
Photograph 15. Rocky Flats, Sample 8.



Photograph 16. Rocky Flats, Sample 9.



Photograph 17. Rocky Flats, Sample 10.



Photograph 19. Plainview, Sample 12.

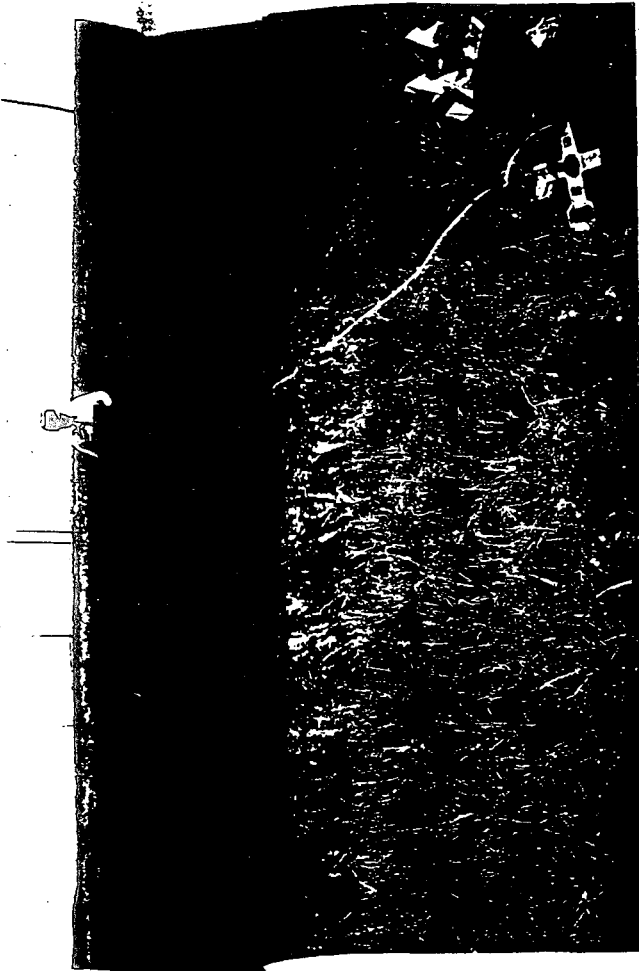
Photograph 18. Plainview, Sample 11.



Photograph 20. Rocky Flats, Sample 13.



Photograph 21. Rocky Flats, Sample 14.



Photograph 22. Rocky Flats, Sample 15.



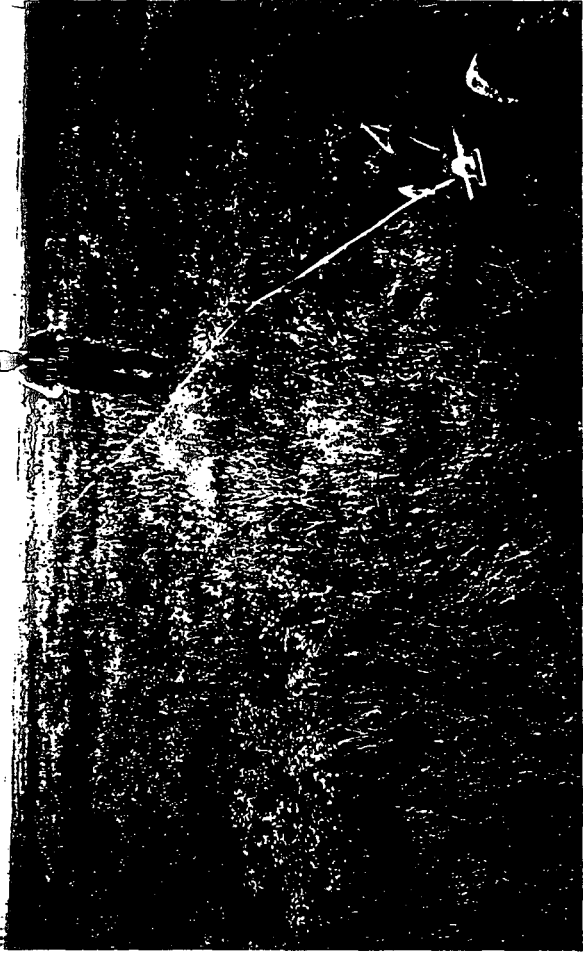
Photograph 23. Rocky Flats, Sample 16.



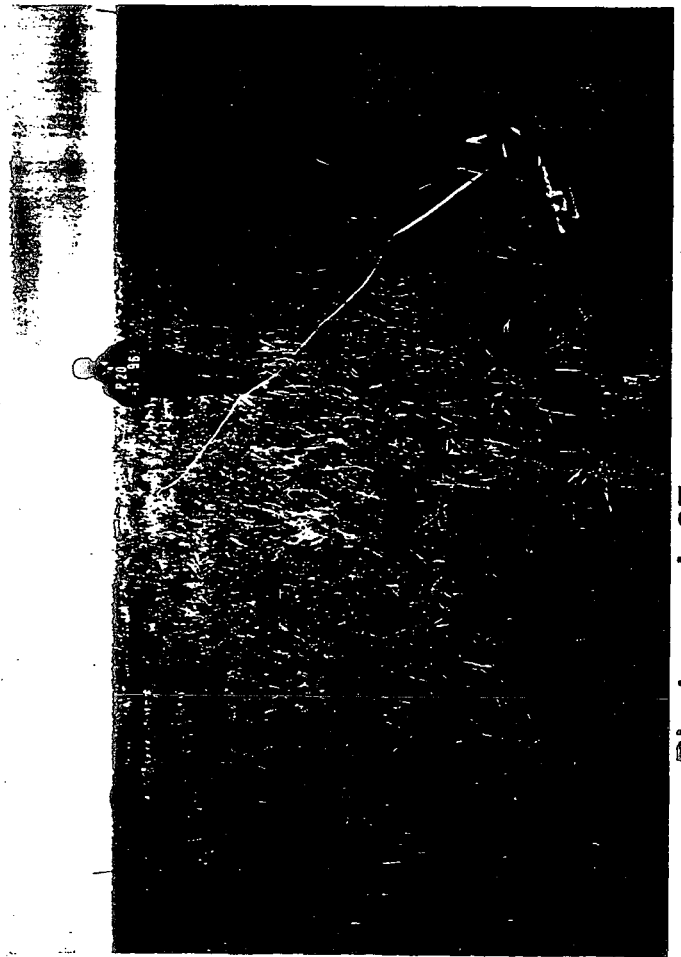
Photograph 24. Rocky Flats, Sample 17.



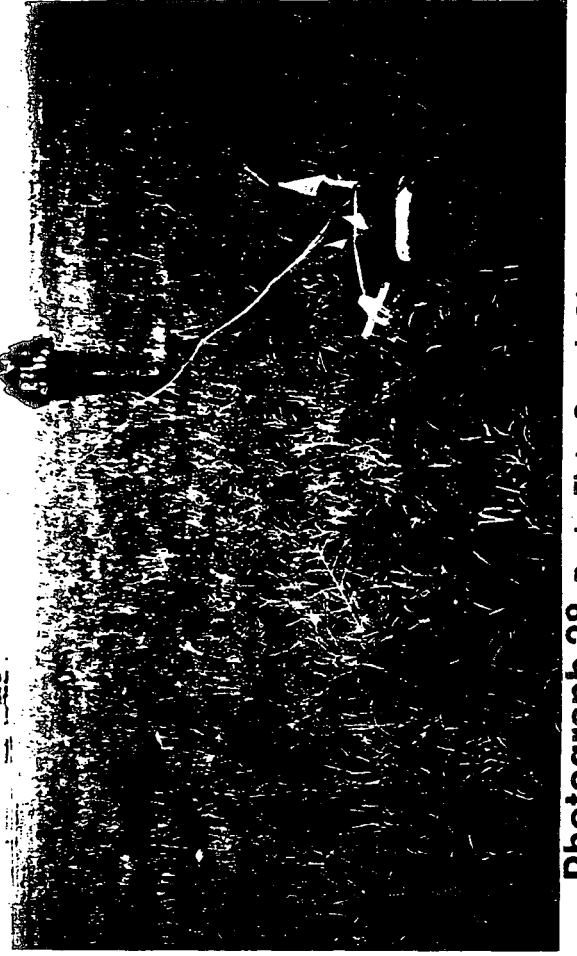
Photograph 25. Rocky Flats, Sample 18.



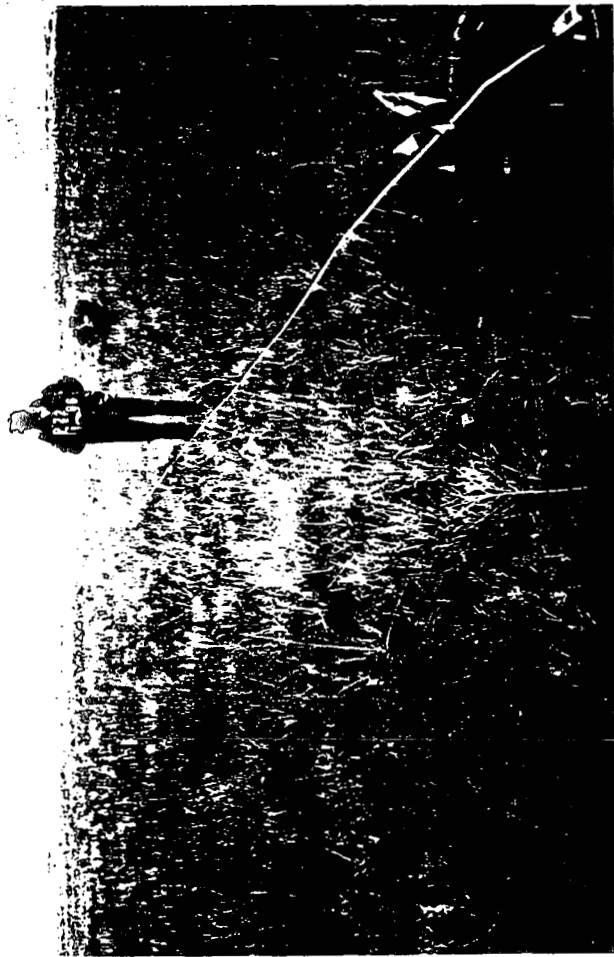
Photograph 26. Rocky Flats, Sample 19.



Photograph 27. Rocky Flats, Sample 20.



Photograph 28. Rocky Flats, Sample 21.



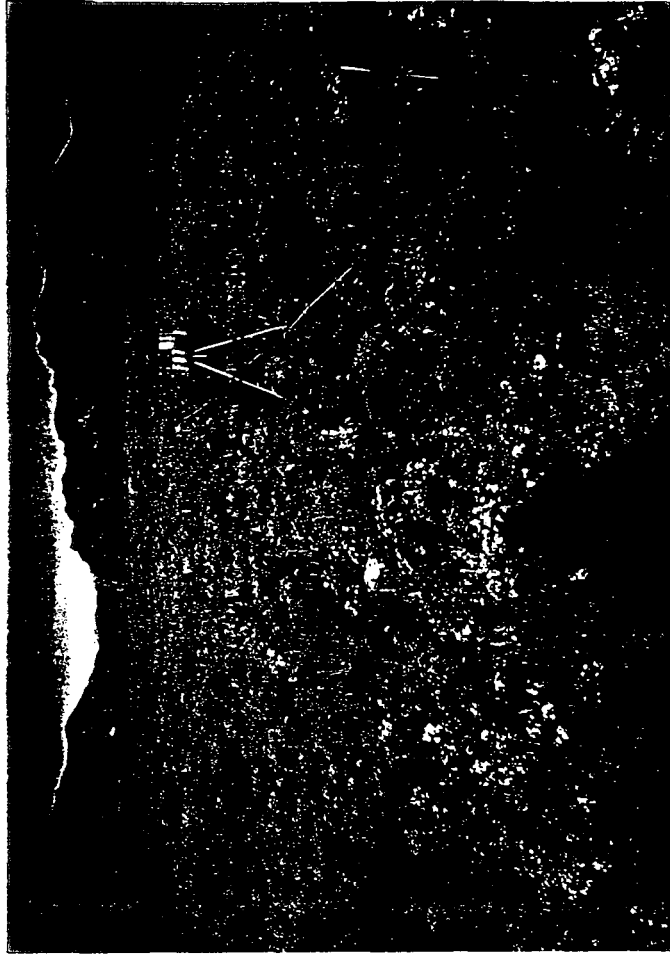
Photograph 29. Rocky Flats, Sample 22.



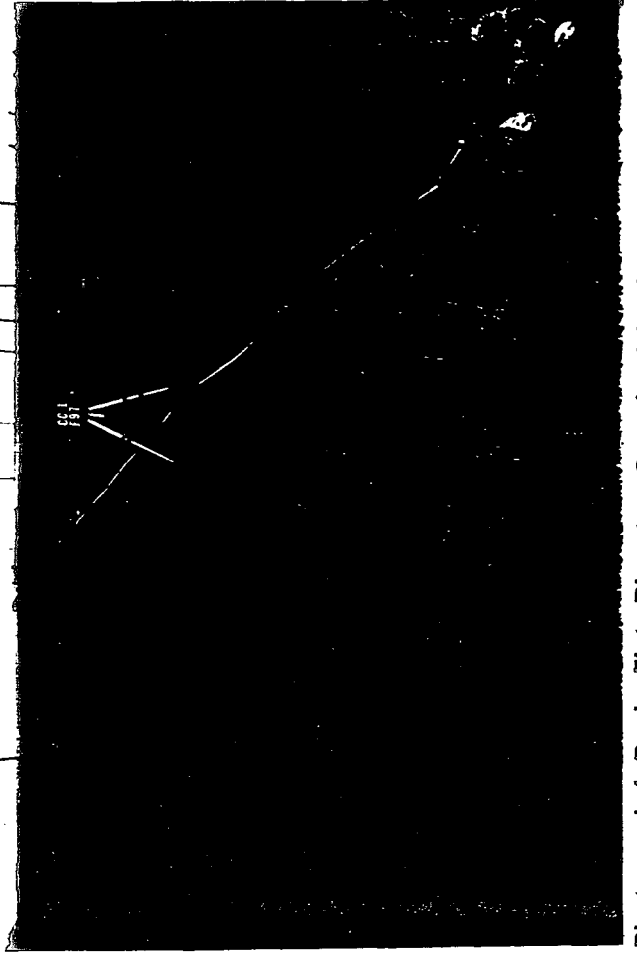
Photograph 30. Rocky Flats, Sample 23.



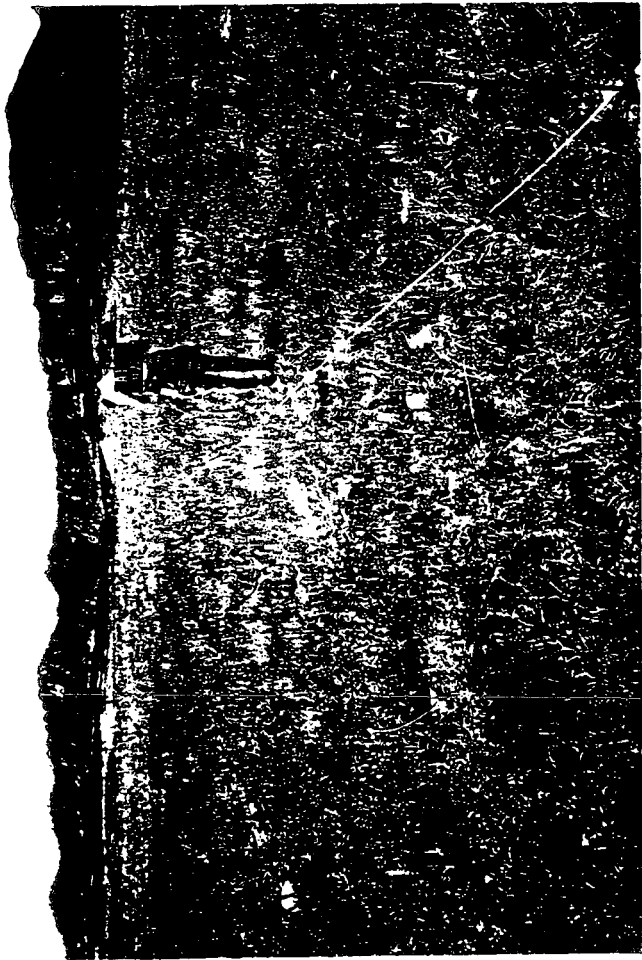
Photograph 31. Rocky Flats, Sample 24.



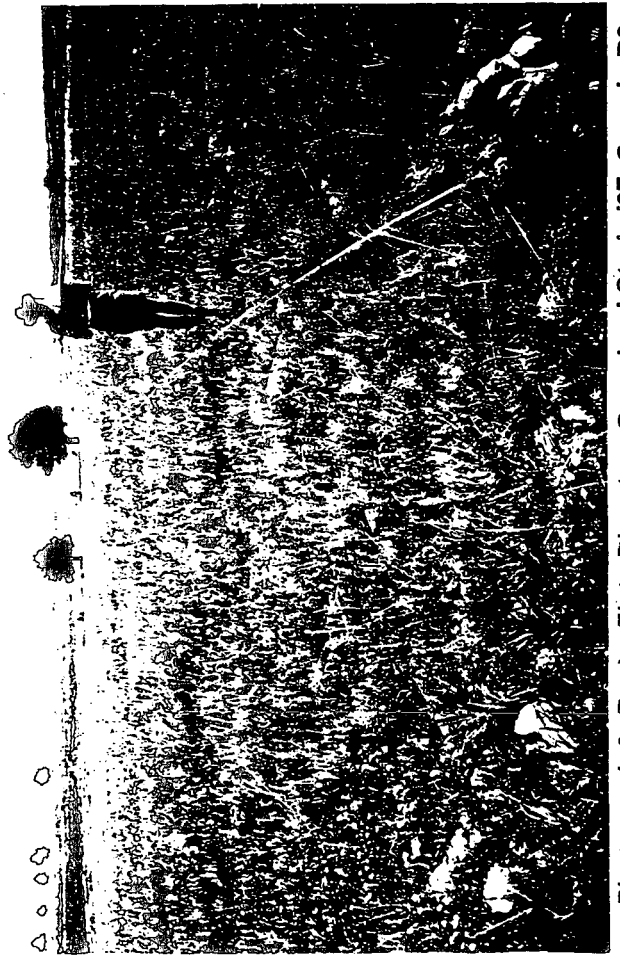
Photograph 2. Rocky Flats Bluestem Grassland Study '97, Sample B1.



Photograph 4. Rocky Flats Bluestem Grassland Study '97, Sample CC1.



Photograph 1. Rocky Flats Bluestem Grassland Study '97, Sample A1.



Photograph 3. Rocky Flats Bluestem Grassland Study '97, Sample B2.



Photograph 5. Rocky Flats Bluestem Grassland Study '97, Sample CR1.



Photograph 6. Rocky Flats Bluestem Grassland Study '97, Sample CR2.



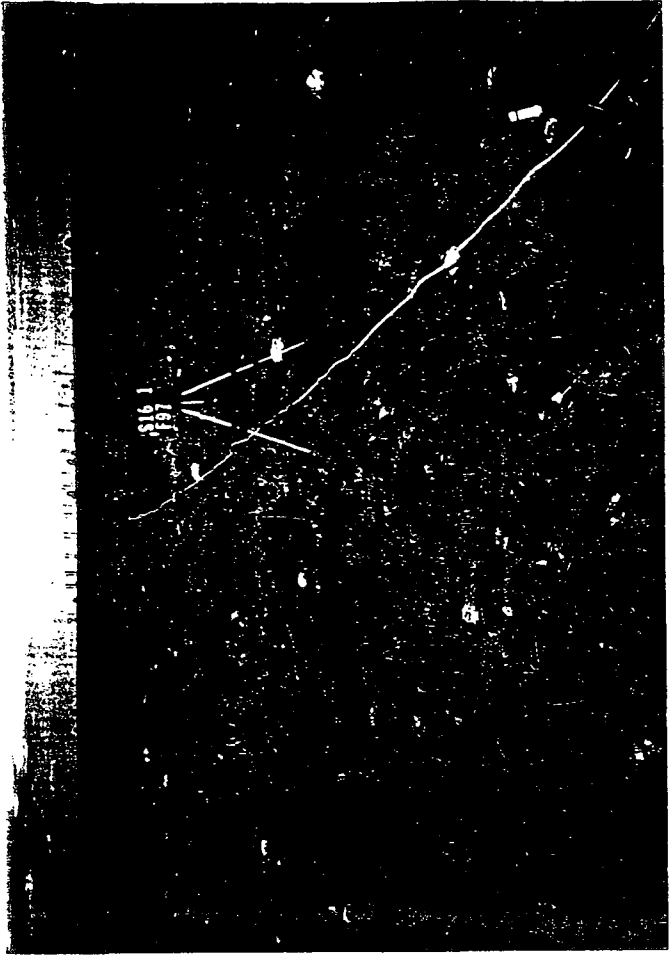
Photograph 7. Rocky Flats Bluestem Grassland Study '97, Sample CR3.



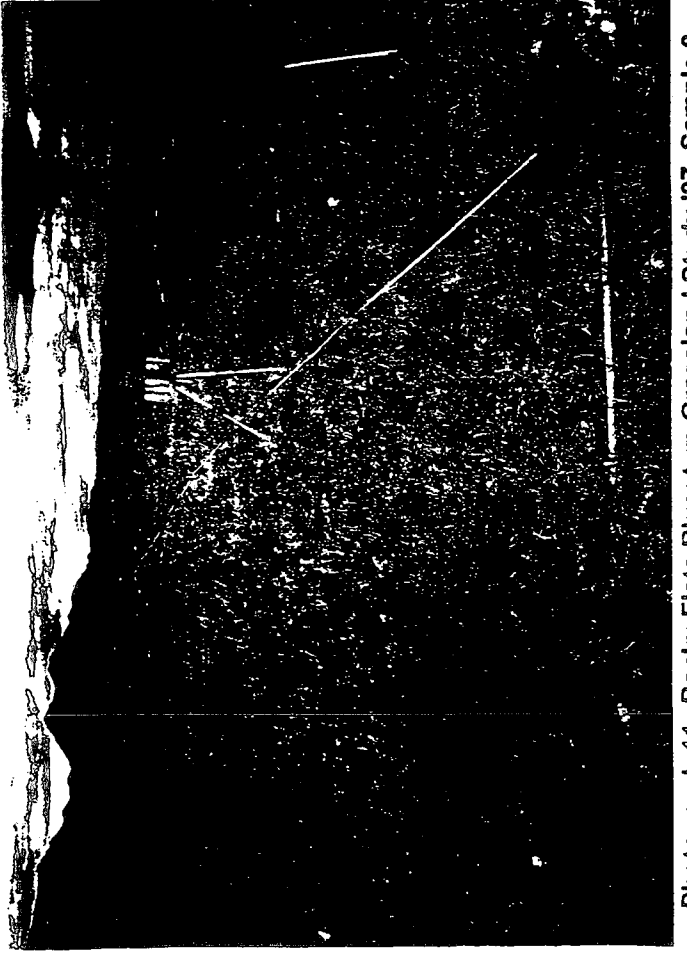
Photograph 8. Rocky Flats Bluestem Grassland Study '97, Sample RD1.



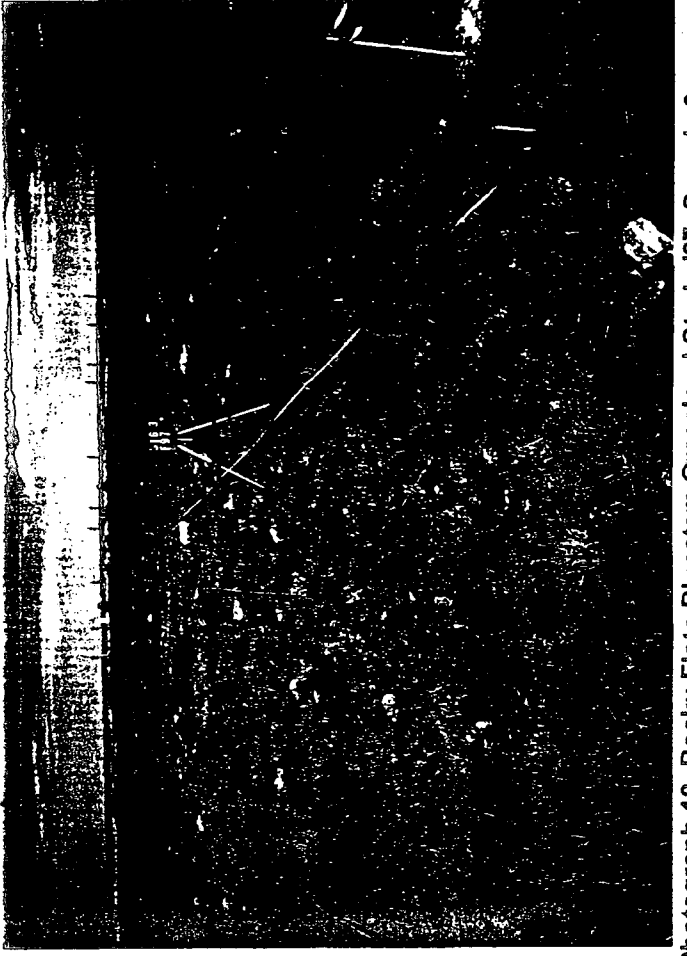
Photograph 9. Rocky Flats Bluestem Grassland Study '97, Sample RD2.



Photograph 10. Rocky Flats Bluestem Grassland Study '97, Sample 1.



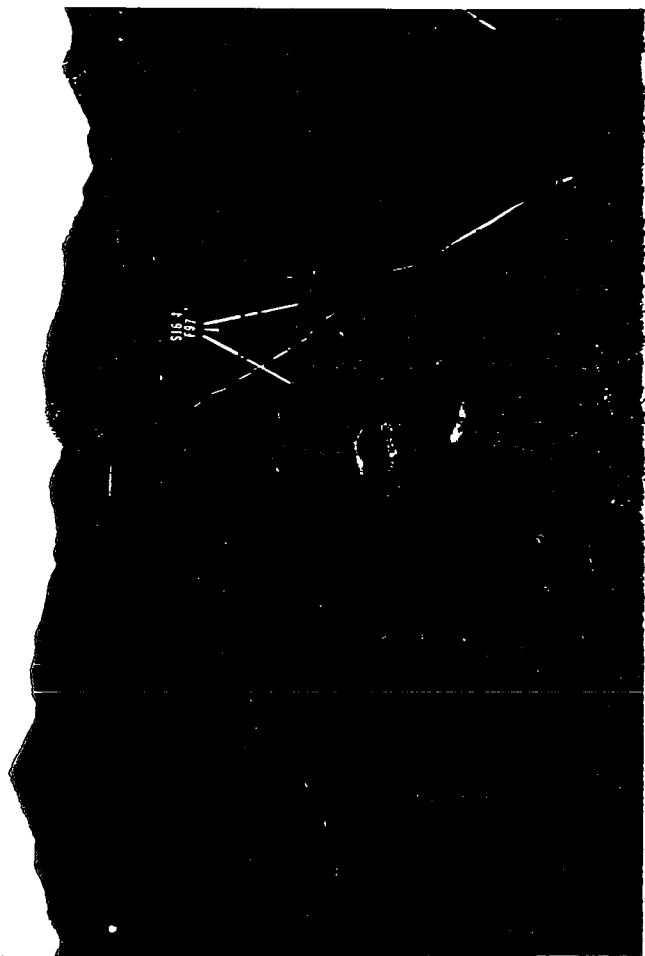
Photograph 11. Rocky Flats Bluestem Grassland Study '97, Sample 2.



Photograph 12. Rocky Flats Bluestem Grassland Study '97, Sample 3.



Photograph 14. Rocky Flats Bluestem Grassland Study '97, Sample 5.



Photograph 13. Rocky Flats Bluestem Grassland Study '97, Sample 4.



Photograph 16. Rocky Flats Bluestem Grassland Study '97, Sample 7.



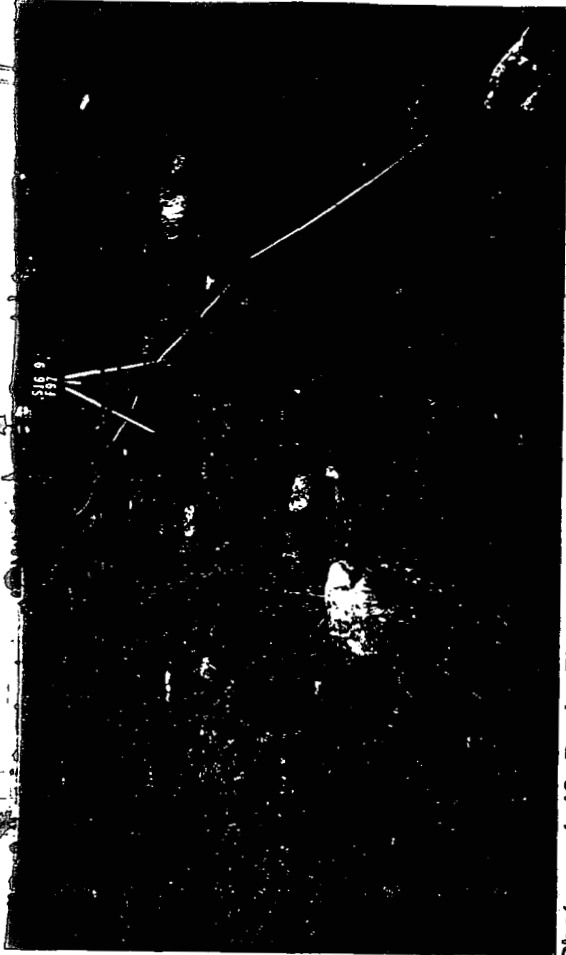
Photograph 15. Rocky Flats Bluestem Grassland Study '97, Sample 6.



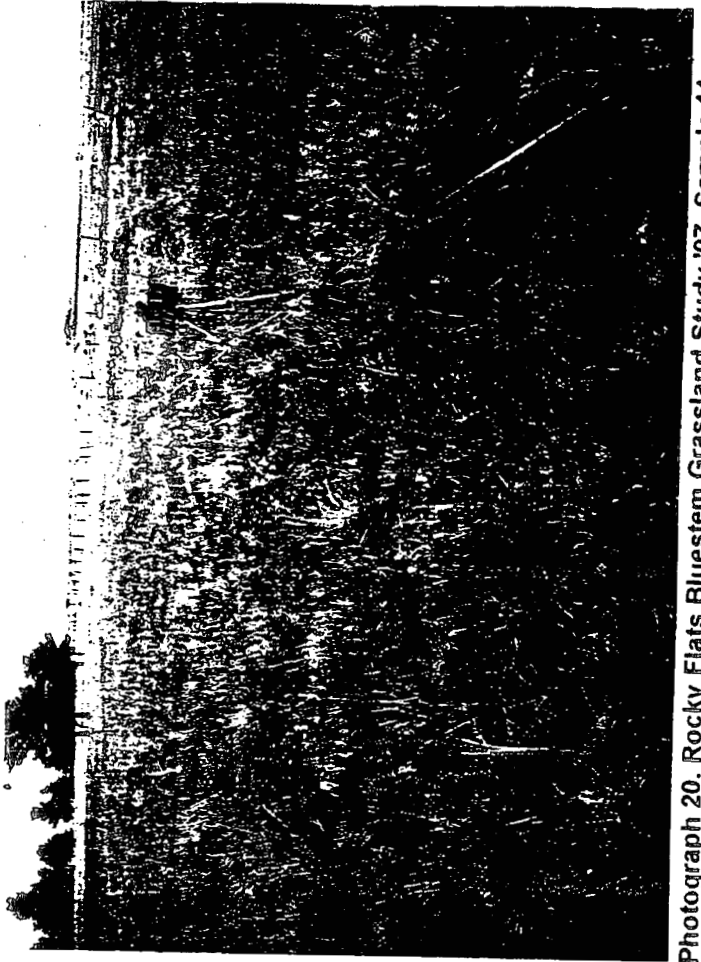
Photograph 17. Rocky Flats Bluestem Grassland Study '97, Sample 8.



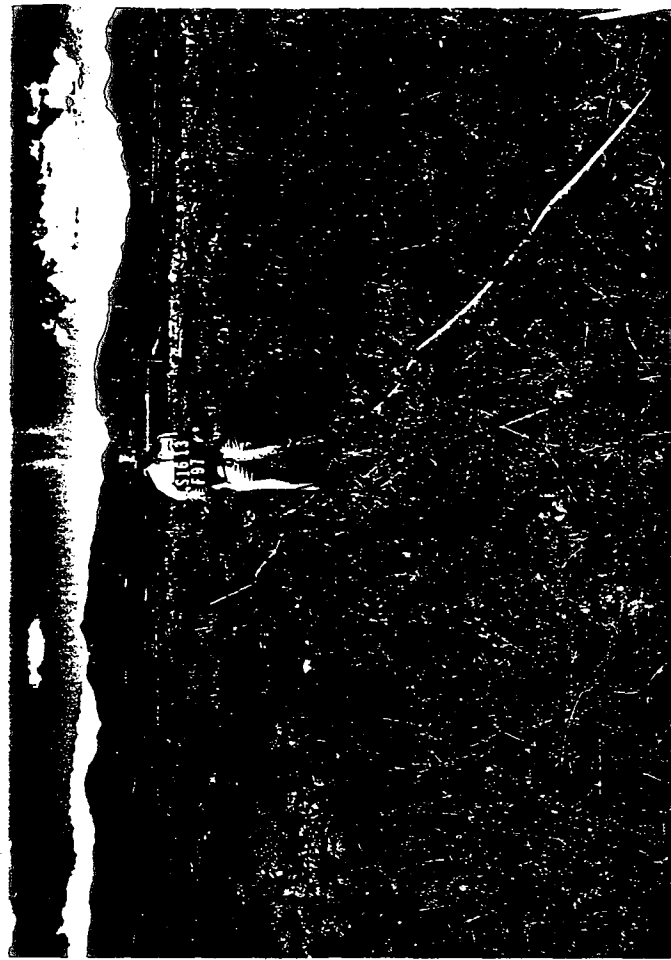
Photograph 19. Rocky Flats Bluestem Grassland Study '97, Sample 10.



Photograph 18. Rocky Flats Bluestem Grassland Study '97, Sample 9.



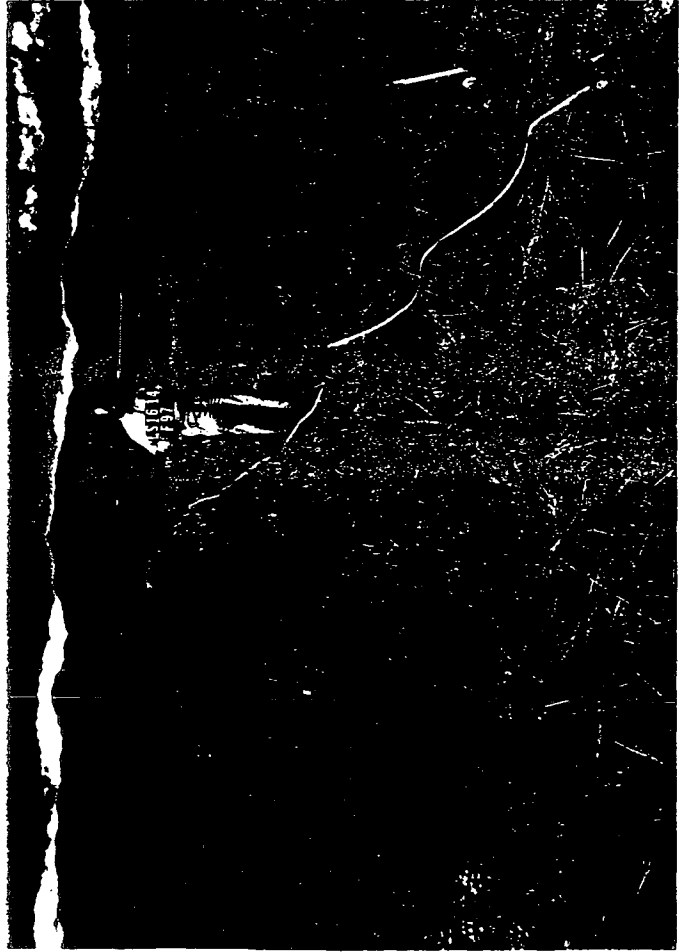
Photograph 20. Rocky Flats Bluestem Grassland Study '97, Sample 11.



Photograph 21. Rocky Flats Bluestem Grassland Study '97, Sample 12.



Photograph 22. Rocky Flats Bluestem Grassland Study '97, Sample 13.



Photograph 23. Rocky Flats Bluestem Grassland Study '97, Sample 14.



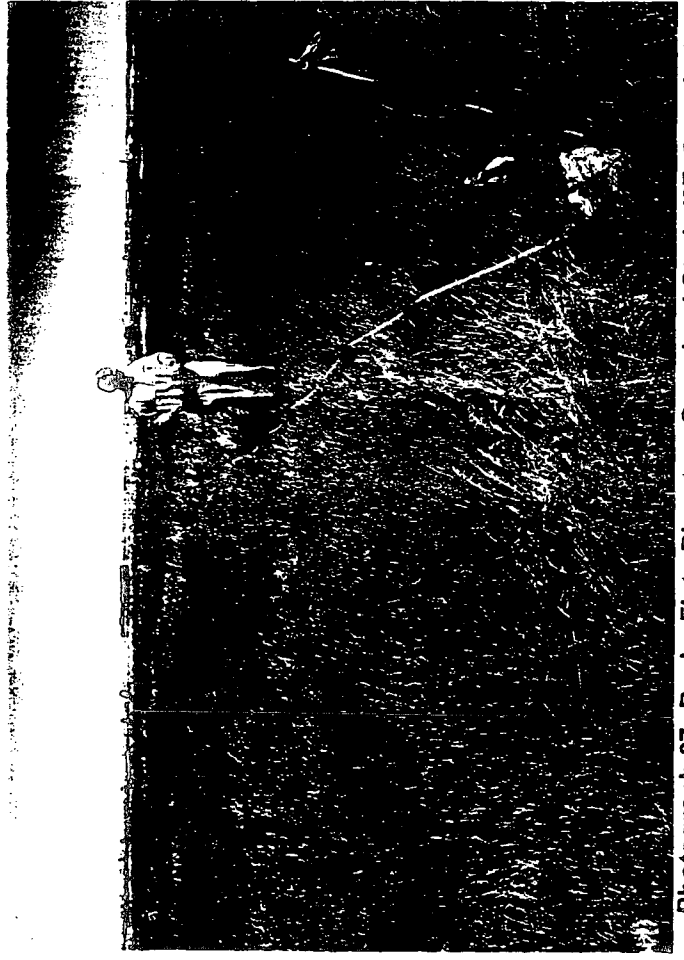
Photograph 24. Rocky Flats Bluestem Grassland Study '97, Sample 15.



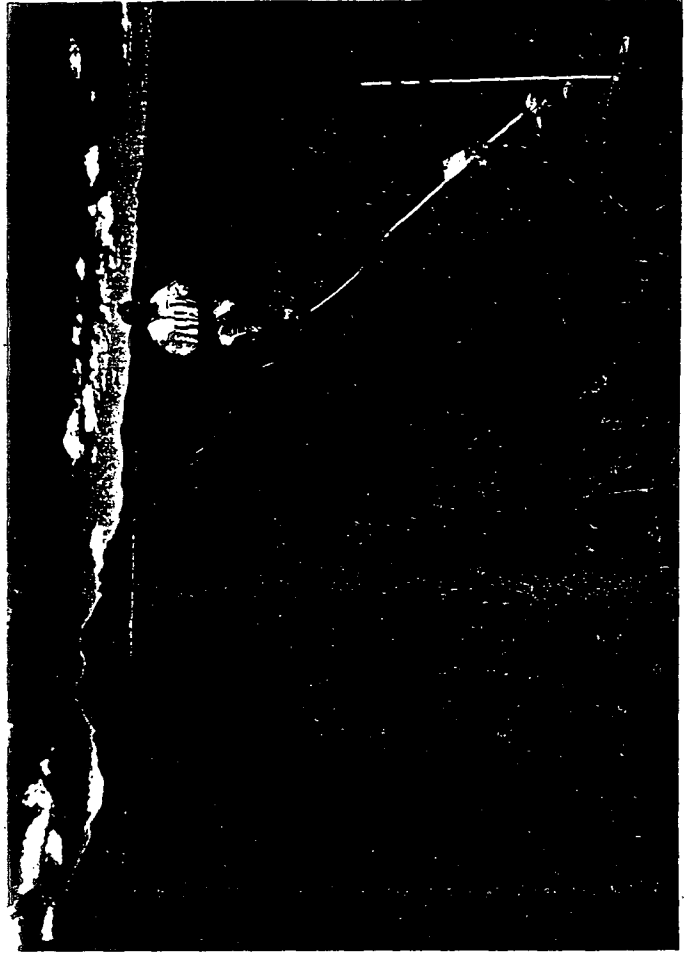
Photograph 25. Rocky Flats Bluestem Grassland Study '97, Sample 16.



Photograph 26. Rocky Flats Bluestem Grassland Study '97, Sample 17.



Photograph 27. Rocky Flats Bluestem Grassland Study '97, Sample 18.



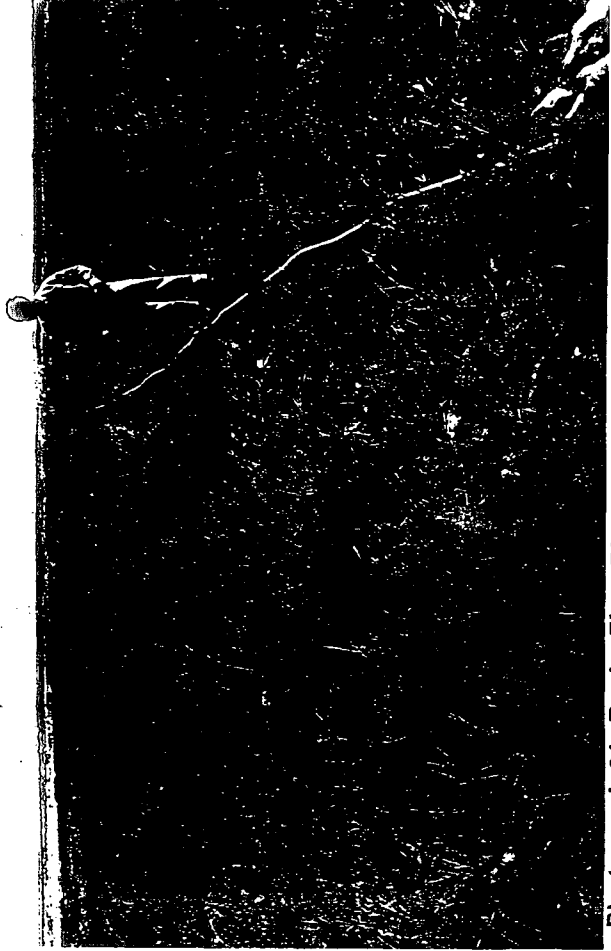
Photograph 28. Rocky Flats Bluestem Grassland Study '97, Sample 19.



Photograph 29. Rocky Flats Bluestem Grassland Study '97, Sample 20.



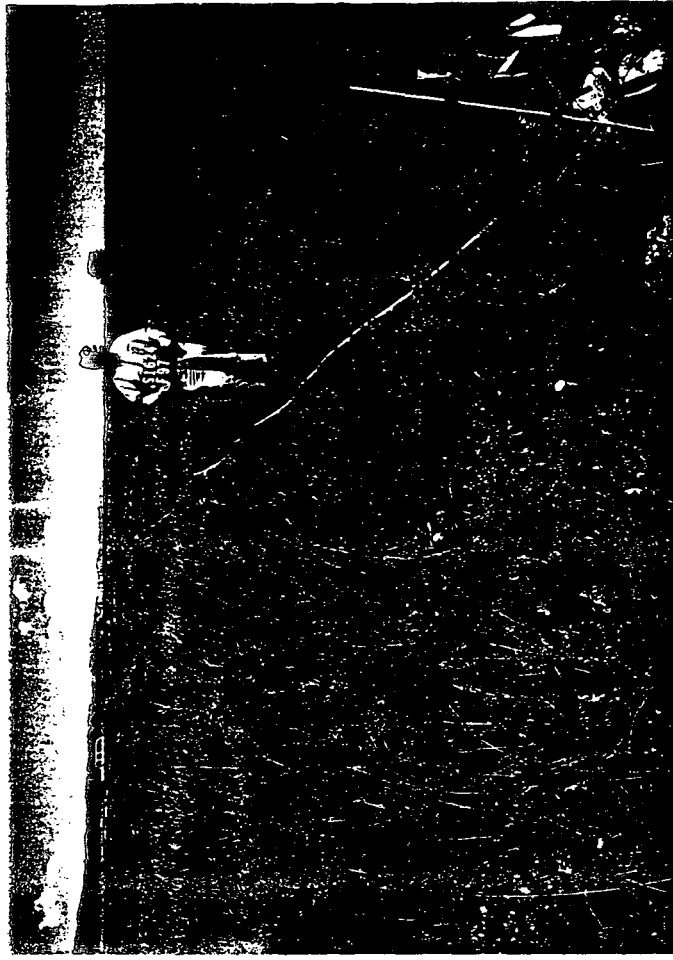
Photograph 30. Rocky Flats Bluestem Grassland Study '97, Sample 21.



Photograph 31. Rocky Flats Bluestem Grassland Study '97, Sample 22.



Photograph 32. Rocky Flats Bluestem Grassland Study '97, Sample 23.



Photograph 33. Rocky Flats Bluestem Grassland Study '97, Sample 24.