

Diffuse Knapweed Control Studies - Toi  
OSMP Studies 3583

Study



ESCO Associates, Inc.

ESCO

K  
N  
A  
P  
W  
E  
E  
D

C  
O  
N  
T  
R  
O  
L

2000



**ESCO**

## **Data Report**

Diffuse Knapweed Control Studies -  
Tordon Spray Application  
Boulder City and County Open Space  
**Year 2000 Sampling**

Prepared for:

City of Boulder Open Space  
66 So. Cherryvale Rd.  
Boulder, CO 80303

Prepared by:

ESCO Associates Inc.  
P.O. Box 18775  
Boulder, CO 80308

**April 2001**

## INTRODUCTION

Studies reported here from 2000 follow up work undertaken in 1996, 1997, 1998 and 1999 with the intent of documenting effects of an application of Tordon herbicide that occurred in May 1996 on approximately 800 acres of land infested by diffuse knapweed (*Acosta diffusa*). Objectives in 2000 were to continue assessment of the impact of the herbicide on the target plant (knapweed) as well as other broadleaf plant species, especially the native species. 2000 observations were made at times selected to be comparable with early and late season observations made in previous years. Early season observations were made in April 1996 (prior to spraying), June 1997, 1998, 1999, and 2000. Late season observations were made in late August of 1996 and 1997, early September of 1998 and 1999, and late September of 2000. Early and late season observations allow assessment of partially different sets of plant species that comprise the vegetational cover of these grasslands these different times of year.

## METHODS

### Sample Location

Permanent sample locations were established in 1996 and were placed subjectively to incorporate the variability of the treatment area. At each sample location, the end points of the sample transect were marked with a rebar stake driven flush with the ground and with a Carsonite flat fiberglass post. The rebar stakes can be located with a metal detector. The Carsonite posts are labeled to indicate the origin and endpoint. Samples with an "S" prefix are located within the sprayed area and samples with a "C" prefix are present in unsprayed areas. Sites S-1 and S-2 were located within the sprayed area on the wind-exposed upland just west of Coalton Road ("terrace escarpment" soils; see Map 1). Site S-3 was located on a mid-slope area (Kutch series; moderately deep) and site S-4 was placed in a swale area on deep soils (McClave series). Control sample C-2 was placed on a wind-exposed upland site with shallow ("terrace escarpment") soils similar to spray sites S-1 and S-2. Control sample C-1 (Valmont series deep soils) was more comparable to the less wind-exposed sites with deeper soils of spray samples S-3 and S-4. Sample S-2 is located in an area transitional between "terrace escarpment" soils and valmont series soils, and thus is transitional between deep and shallow soils. All soils in the study area are very fine in the fine earth (< 2mm) fraction – varying from loam to clay in the surface layers, but mostly in the clay loam USDA textural class. Sample locations are shown on Map 1. In addition, in 2000 another transect (S-5) was

added to the study. It is located on the Kelsall parcel in an area that was sprayed in Spring 2000 to control diffuse knapweed and sulfur cinquefoil (*Potentilla recta*). This transect was sampled on 10 May 2000 to acquire information from pre-spray conditions. It was sampled at the same time as the others in September 2000. Transect S-5 is located on Shingle-Samsil soils on a north-northwest facing slope (Map 1). The area in which S-5 is located was sprayed shortly after sampling took place. No other transects were sprayed in 2000.

### **Cover**

Cover data were collected using a point intercept method in which data were recorded as interceptions of a point with plant species, litter, standing dead plant material, soil or rock. These cover data are presented in Tables 1-3 (data from early season 2000), and Tables 11-13 (data from late season 2000). Plant material produced during 2000 and still standing was tallied by species. Litter was considered to be any organic material that had fallen, or had substantially fallen to the soil surface. Standing dead was any dead plant material that was produced in previous years but which was still standing and had not lodged or broken off to become litter. Inorganic materials greater than 1 cm in diameter were considered rock. The cover sampling points were optically projected using a Cover-Point Optical Point Projection Device. Two hundred points were collected at each transect and distributed evenly along the 50 meter transect with a pair of points collected at each 0.5 meter mark. The pair of points were sampled on opposite sides, 0.5 m from the transect.

The point intercept method of cover assessment was chosen because it provides superior objectivity and repeatability. Because more abundant species are more likely to be "hit", this method collects more information about abundant species than about rare species. This inherent tendency has been countered in two ways. First, all vascular plant species present within one meter to either side of the sample transect were tallied. Besides pure documentation of their presence, this tally gives a measure of species "density" that is useful in itself. In addition, frequency plot data have been collected to provide further details of the abundance of less common species (see **Frequency**, below).

### **Frequency**

Frequency data were collected in ten subplots located along each 50 m transect. These data are presented in Tables 4-10 (early season 2000 data) and 15-21 (late season

2000 data). All subplots measured 1 m X 5 m and were placed to the right of the transect as viewed from the origin. In each plot, all species present were tallied. For each species, the number of plots in which the plant was observed was divided by ten (the number of plots observed). Thus, for example, if Species A occurred in seven plots, its frequency for the transect is 7/10, or 70 percent. In addition, as described above, all species present within 1 meter to either side of the 50 meter sample transect were tallied and a value of species density expressed as the number of species per 100 square meters calculated.

### **Knapweed Density**

In the course of early and late season sampling, the sample plots along the transects were assessed for knapweed density. The density knapweed within each of the ten 1 m X 1 m frequency plots was determined by direct count. Rosette-stage and bolted plants were tallied separately. These data are presented in Tables 10 (early season 2000) and 20 (late season 2000).

### **Sampling Dates**

In 2000, early season sampling occurred on June 12 (except S-5 which was sampled on May 10 to precede spraying) and late season sampling was conducted on September 28.

## **RESULTS**

Results from 2000 observations are presented in Tables 1 through 26. Data collected in 1996, 1997, 1998 and 1999 (ESCO 1997, 1998, 1999, 2000) have been reported in detail previously and are summarized in this document. Knapweed cover results for 1996, 1997, 1998, 1999 and 2000 are graphically illustrated in Figure 1. Knapweed frequency results for the same period are illustrated in Figure 2; knapweed density results are illustrated in Figure 3. Relative cover by lifeform and species density by lifeform data from 2000 are depicted in Figures 4 and 5, respectively. Relative cover by lifeform for all early season sample dates (1996-2000) is presented in Figures 6a and 6b. The same for all late season sample dates (1996-2000) are presented in Figures 7a and 7b. Species density by lifeform is similarly depicted in for early season data in Figures 8a and 8b and for late season dates in Figures 9a and 9b. A compilation of total vegetation cover for all sample dates is presented in Figure 10. Table 23 contains a tally of species presence by transect for 2000 sampling.

When this study was initiated in 1996, one of the objectives was to compare the extent of fully developed plant cover before spraying to observations made later in the year and in subsequent years. Therefore, the April 1996 sampling separately assessed the extent of both knapweed and other plants living at the time of sampling and the extent of standing dead material apparently produced in 1995. These two measures were combined to provide a "total" value that approximates the plant species cover that might have been expected in late season of 1995 and would be at least roughly comparable to late season observations in subsequent years.

#### REFERENCES CITED

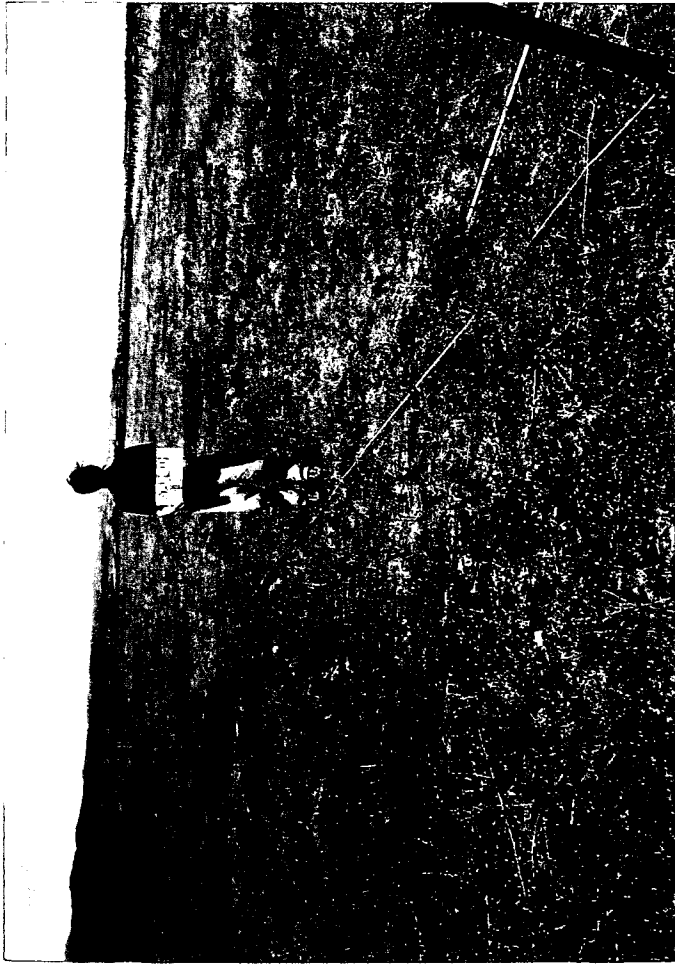
ESCO Associates Inc. 1997. Report of Findings. Diffuse Knapweed Control Studies – Tordon Spray Application. Boulder City and County Open Space. 1996 Data. Prepared for City of Boulder Open Space, 66 So. Cherryvale Rd., Boulder, CO 80303.

ESCO Associates Inc. 1998. Report of Findings. Diffuse Knapweed Control Studies – Tordon Spray Application. Boulder City and County Open Space. 1997 Data. Prepared for City of Boulder Open Space, 66 So. Cherryvale Rd., Boulder, CO 80303.

ESCO Associates Inc. 1999. Report of Findings. Diffuse Knapweed Control Studies – Tordon Spray Application. Boulder City and County Open Space. 1998 Data. Prepared for City of Boulder Open Space, 66 So. Cherryvale Rd., Boulder, CO 80303.

ESCO Associates Inc. 2000. Report of Findings. Diffuse Knapweed Control Studies – Tordon Spray Application. Boulder City and County Open Space. 1999 Data. Prepared for City of Boulder Open Space, 66 So. Cherryvale Rd., Boulder, CO 80303.

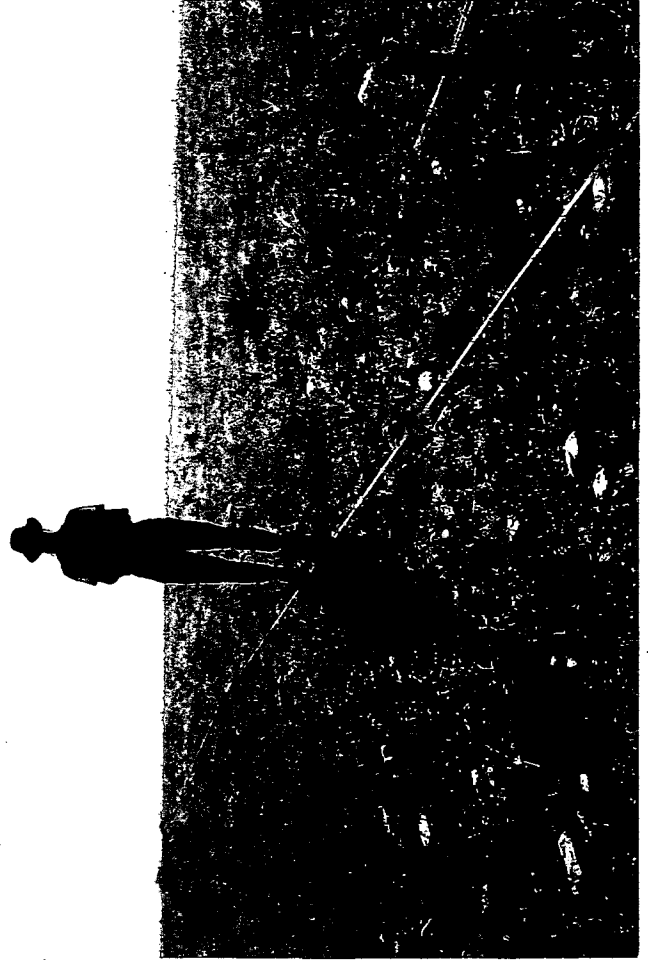




Photograph 1. Tordon Control, Transect 1, 2000.



Photograph 2. Tordon Control, Transect 2, 2000.



Photograph 3. Tordon Spray, Transect 1, 2000.



Photograph 4. Tordon Spray, Transect 2, 2000.





**Photograph 5. Tordon Spray, Transect 3, 2000.**



**Photograph 6. Tordon Spray, Transect 4, 2000.**



**Photograph 7. Tordon Spray, Transect 5, 2000.**

Figure 1a. Knapweed Cover Results, Pre- and Post- Spray, Early Season Sampling Dates 1996-2000.

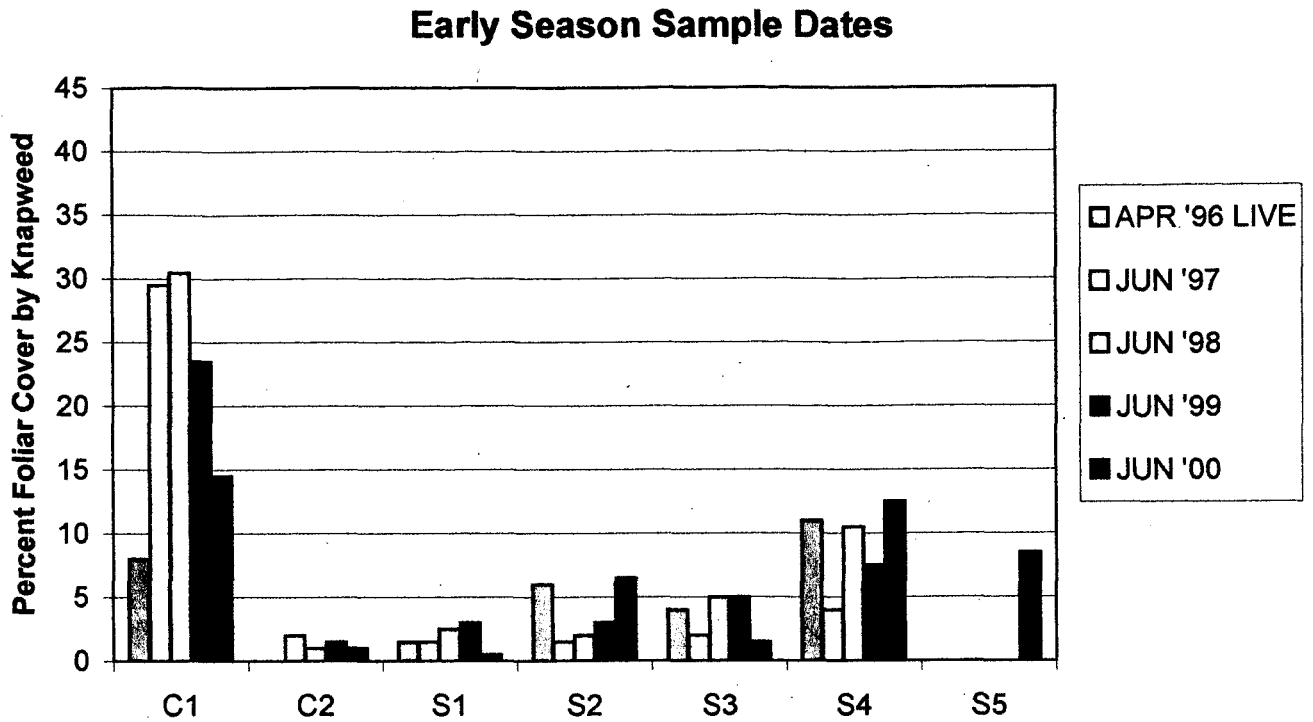


Figure 1b. Knapweed Cover Results, Post- Spray, Late Season Sampling Dates 1996-2000.

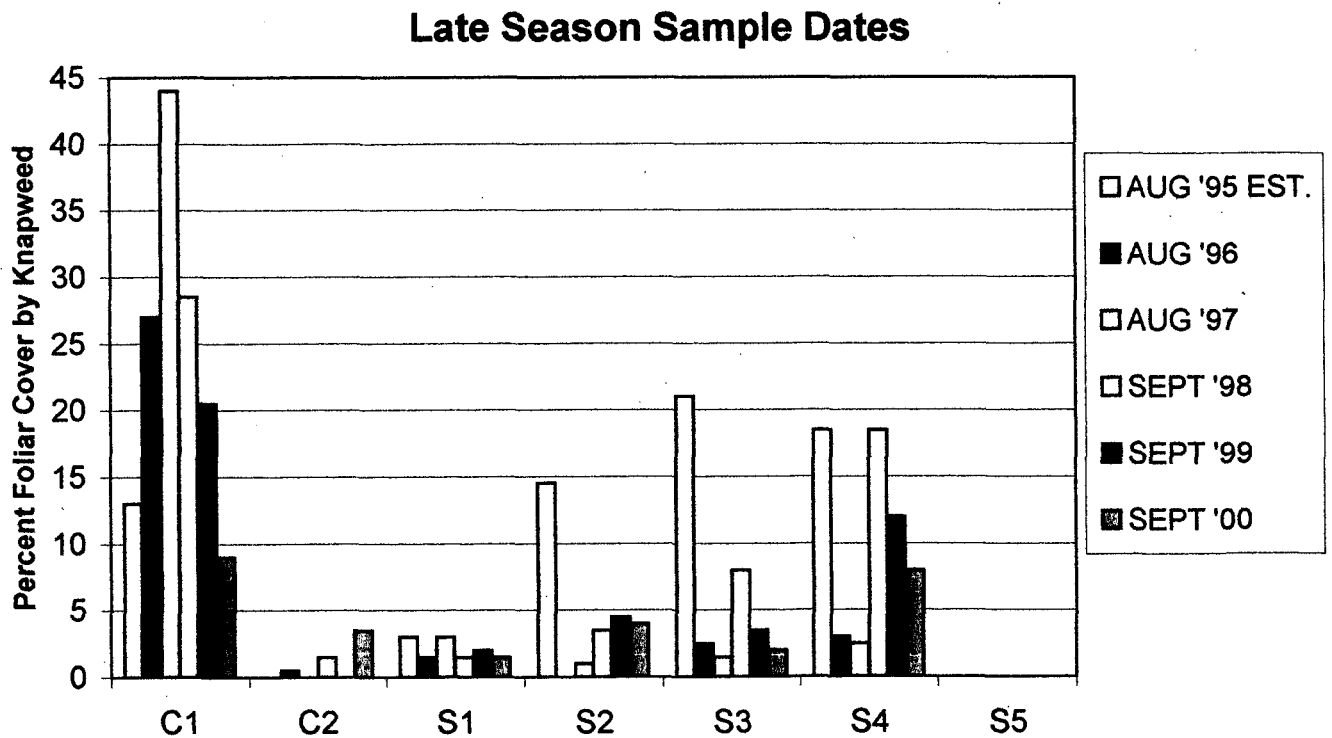


Figure 2a. Knapweed Frequency Results, Pre- and Post- Spray, Early Season Sampling Dates 1996-2000.

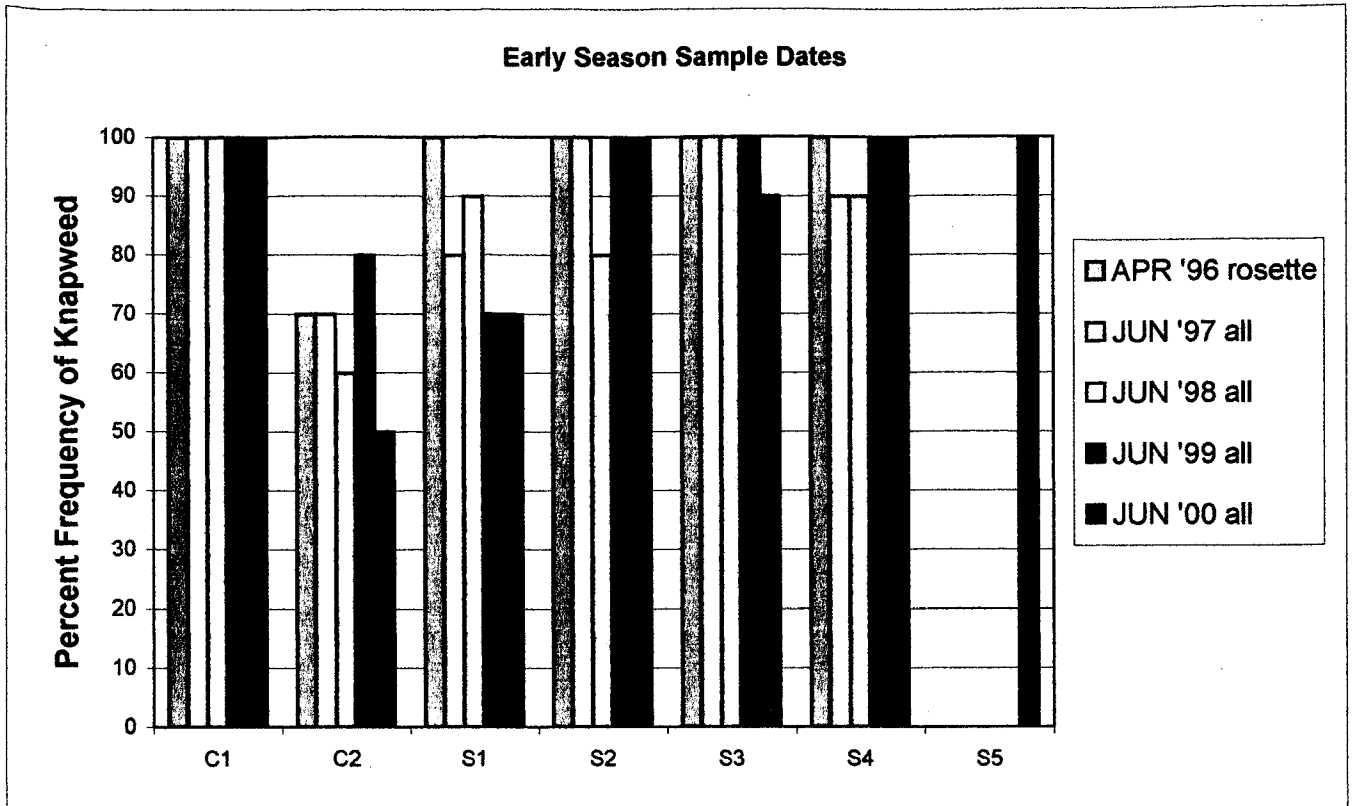


Figure 2b. Knapweed Frequency Results, Post- Spray, Late Season Sampling Dates 1996-2000.

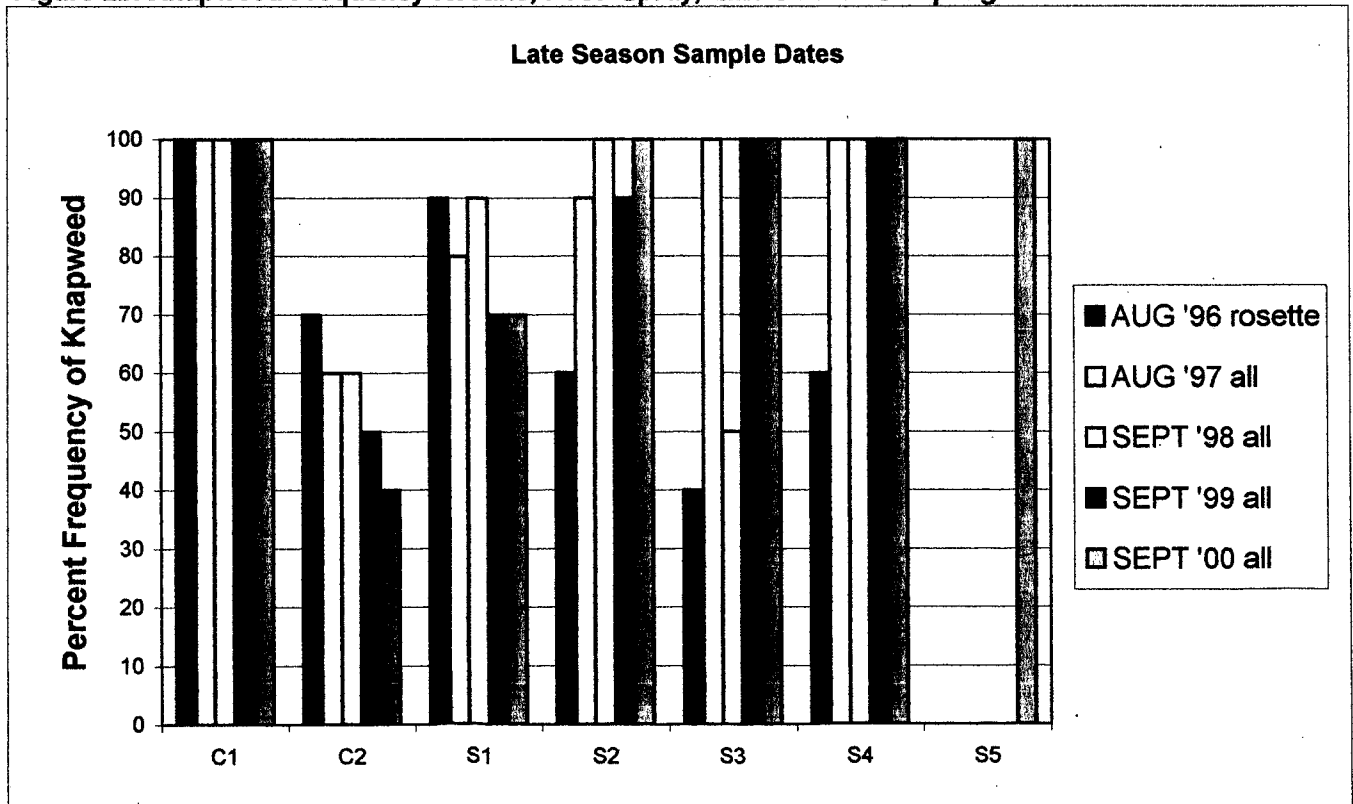


























Figure 10a. Total Vegetation Cover, Early Season Sampling Dates, 1996-2000.

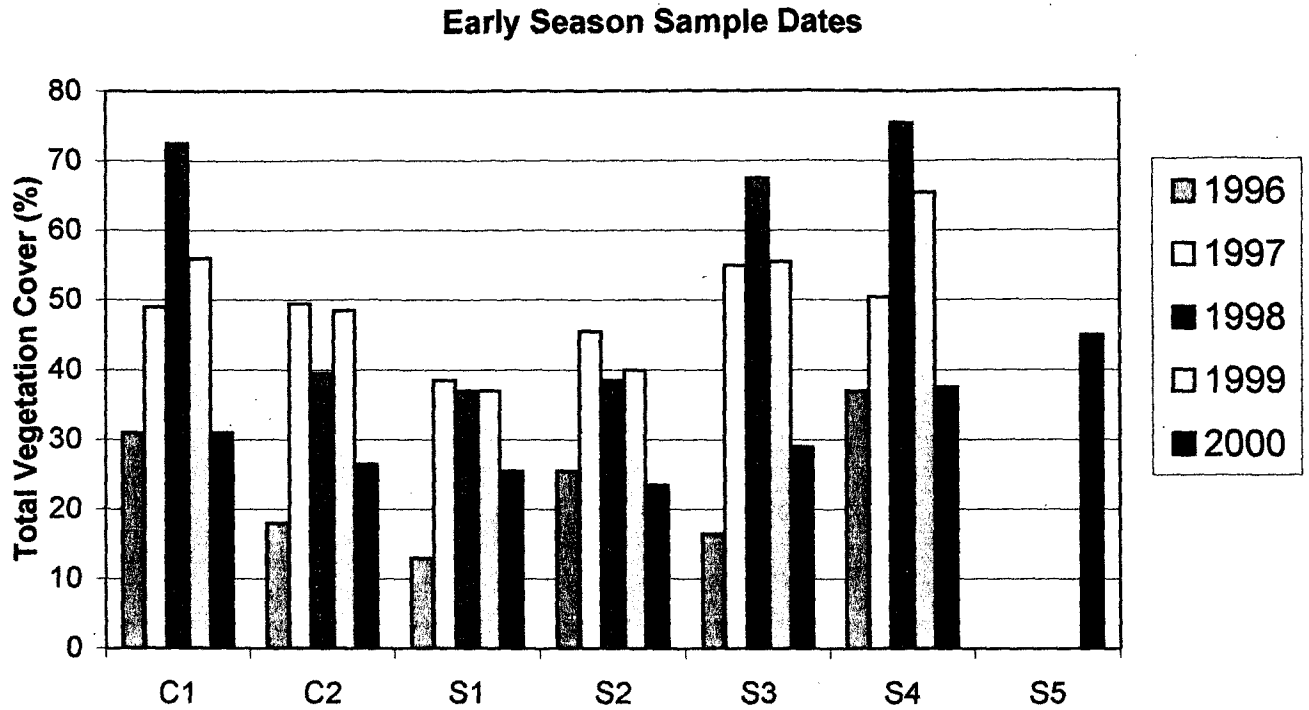
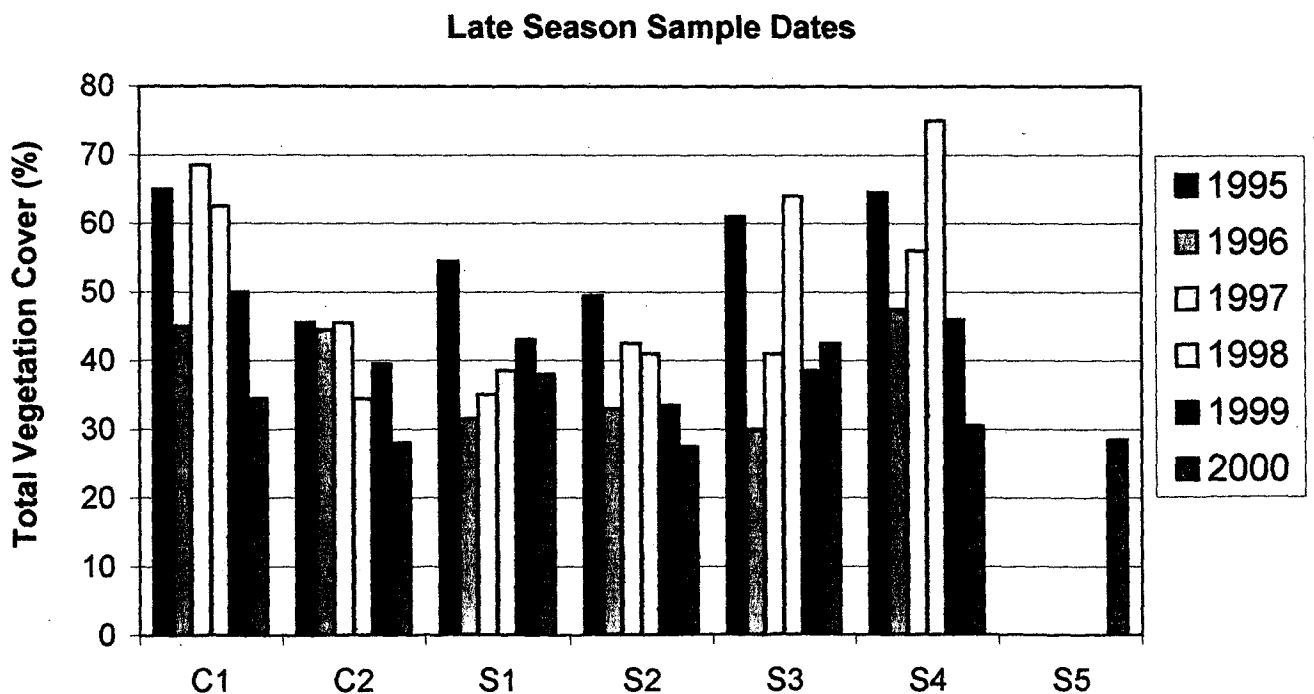


Figure 10b. Total Vegetation Cover, Late Season Sampling Dates, 1996-2000.



\*1995 data was projected from Spring 1996 cover sampling. It includes all live and recent dead hits.

Figure 11a. Native Perennial Forb Cover, Early Season Sampling Dates, 1996-2000.

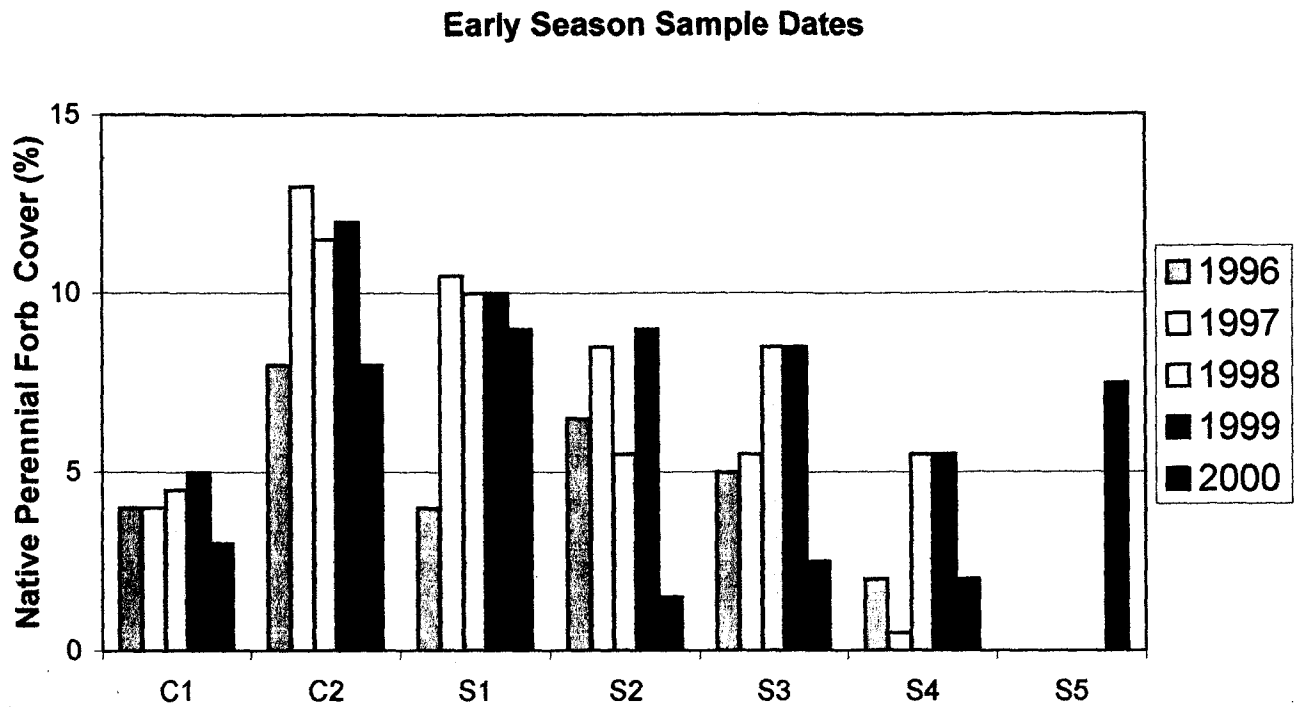
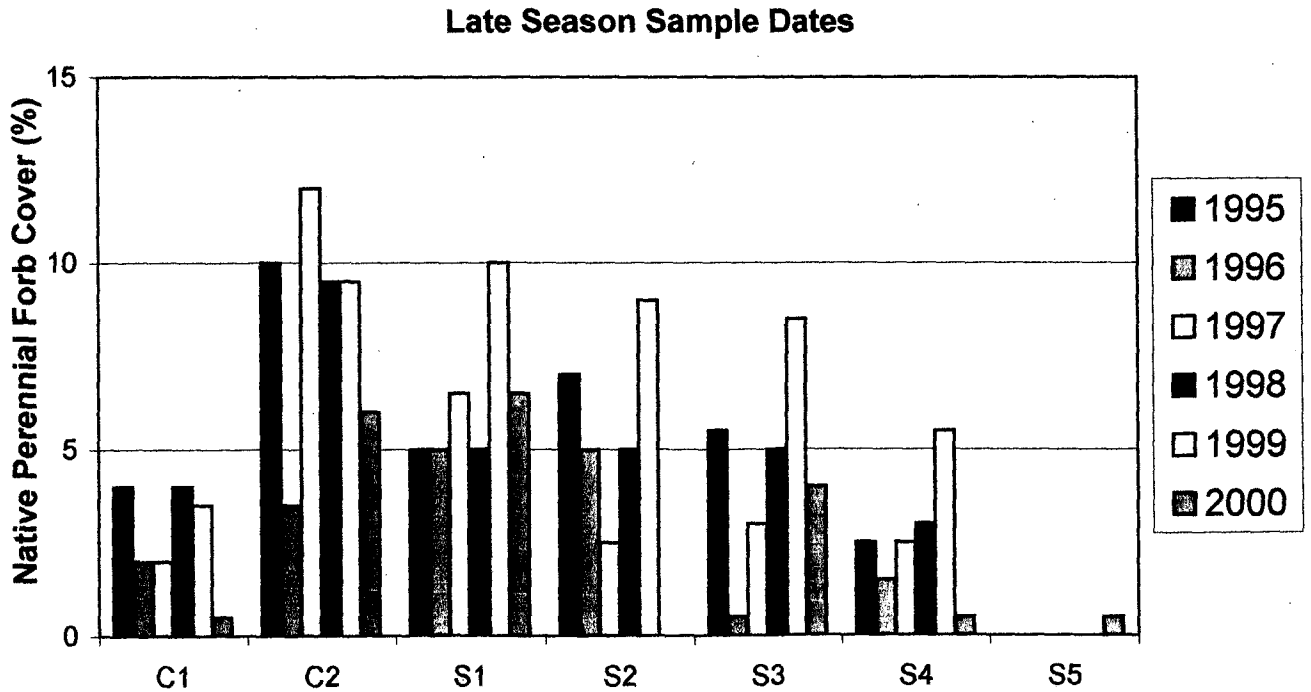


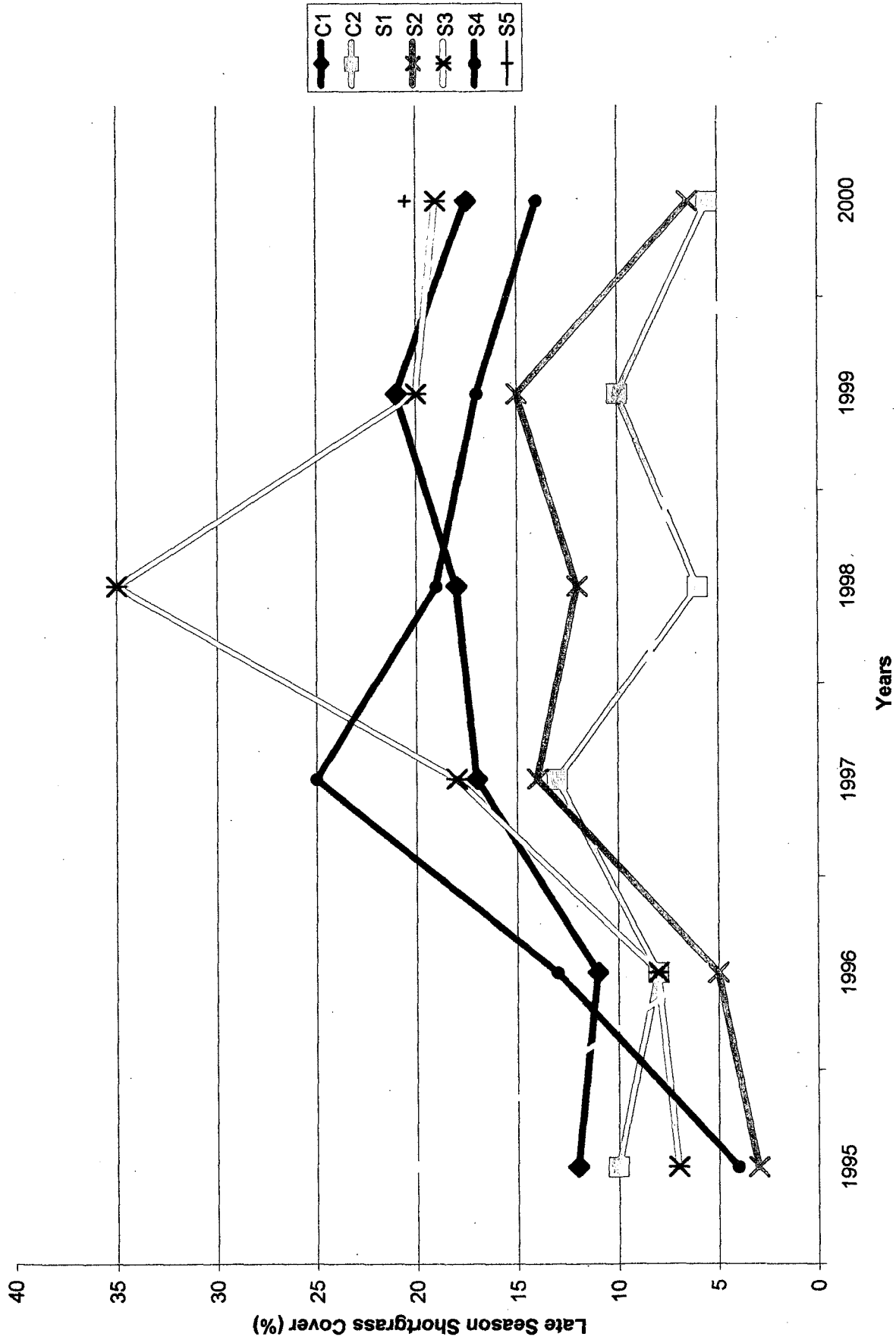
Figure 11b. Native Perennial Forb Cover, Late Season Sampling Dates, 1996-2000.



\*1995 data was projected from Spring 1996 cover sampling. It includes all live and recent dead hits.



Figure 12. Patterns of Shortgrass Species\* Abundance in Late Season Observations 1996-2000.



\* Combined cover of *Buchloe dactyloides*, *Chondrosium (Bouteloua) gracile*, and *Chondrosium hirsutum*. 1995 data estimated from April 1996 observations (see text).

Figure 13. Patterns of Frequency of *Viola nuttallii* along study transects in Early Season Observations 1996-2000.

*Viola nuttallii*

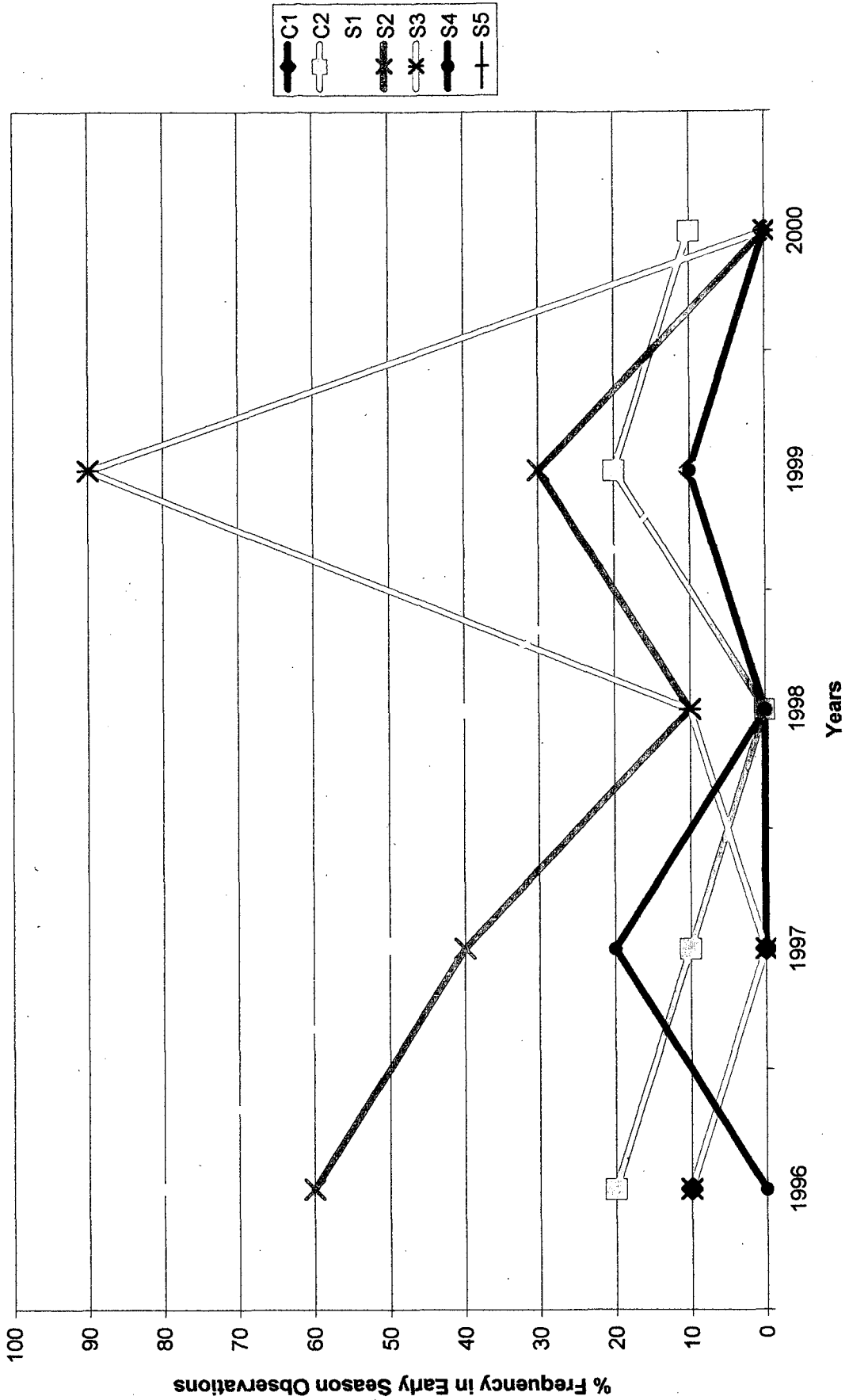


Figure 14. Patterns of Frequency of *Lesquerella montana* along study transects in Early Season Observations 1996-2000.

*Lesquerella montana*

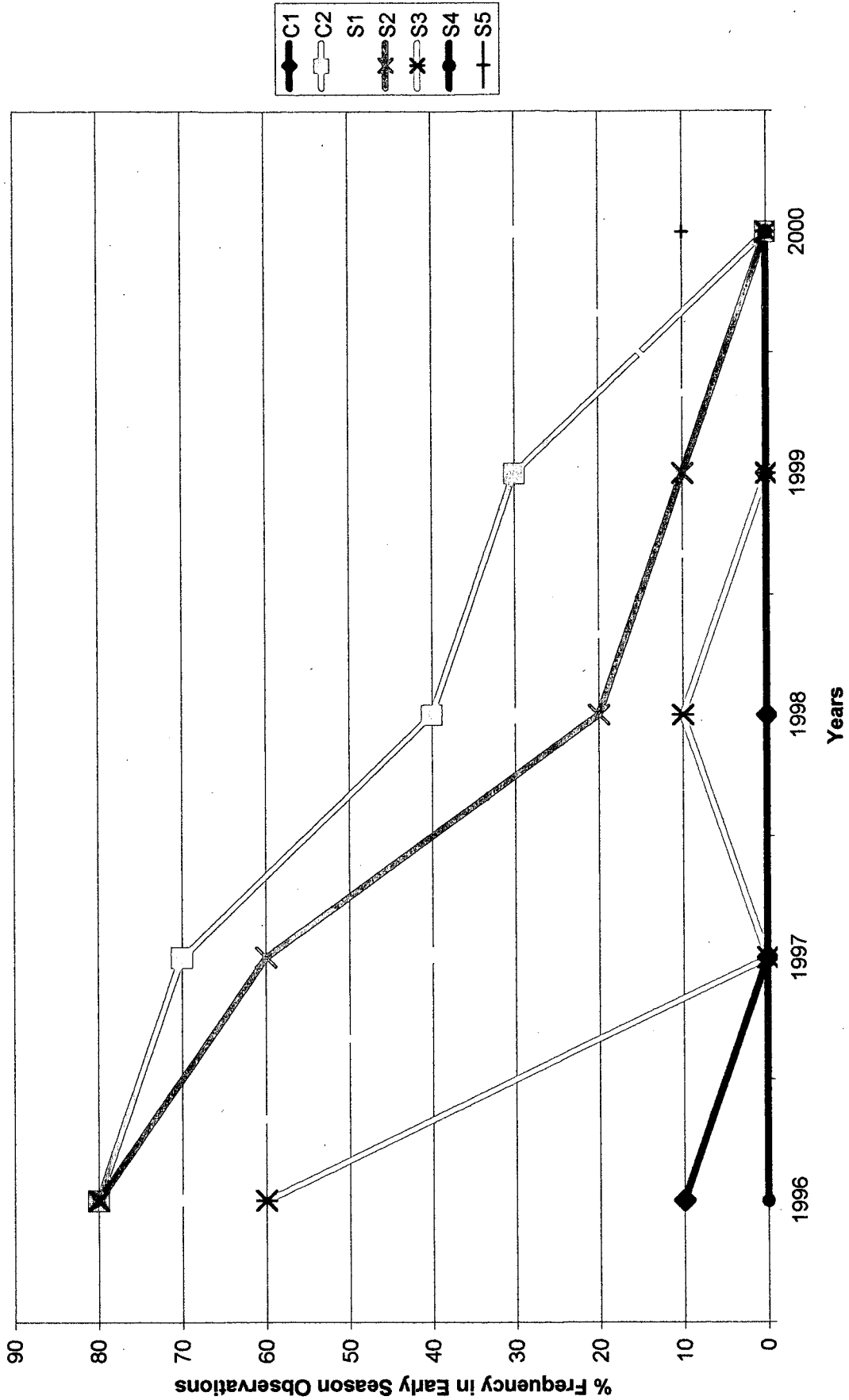


Figure 15. Patterns of *Senecio integerrimus* along study transects in Early Season Observations 1996-2000.

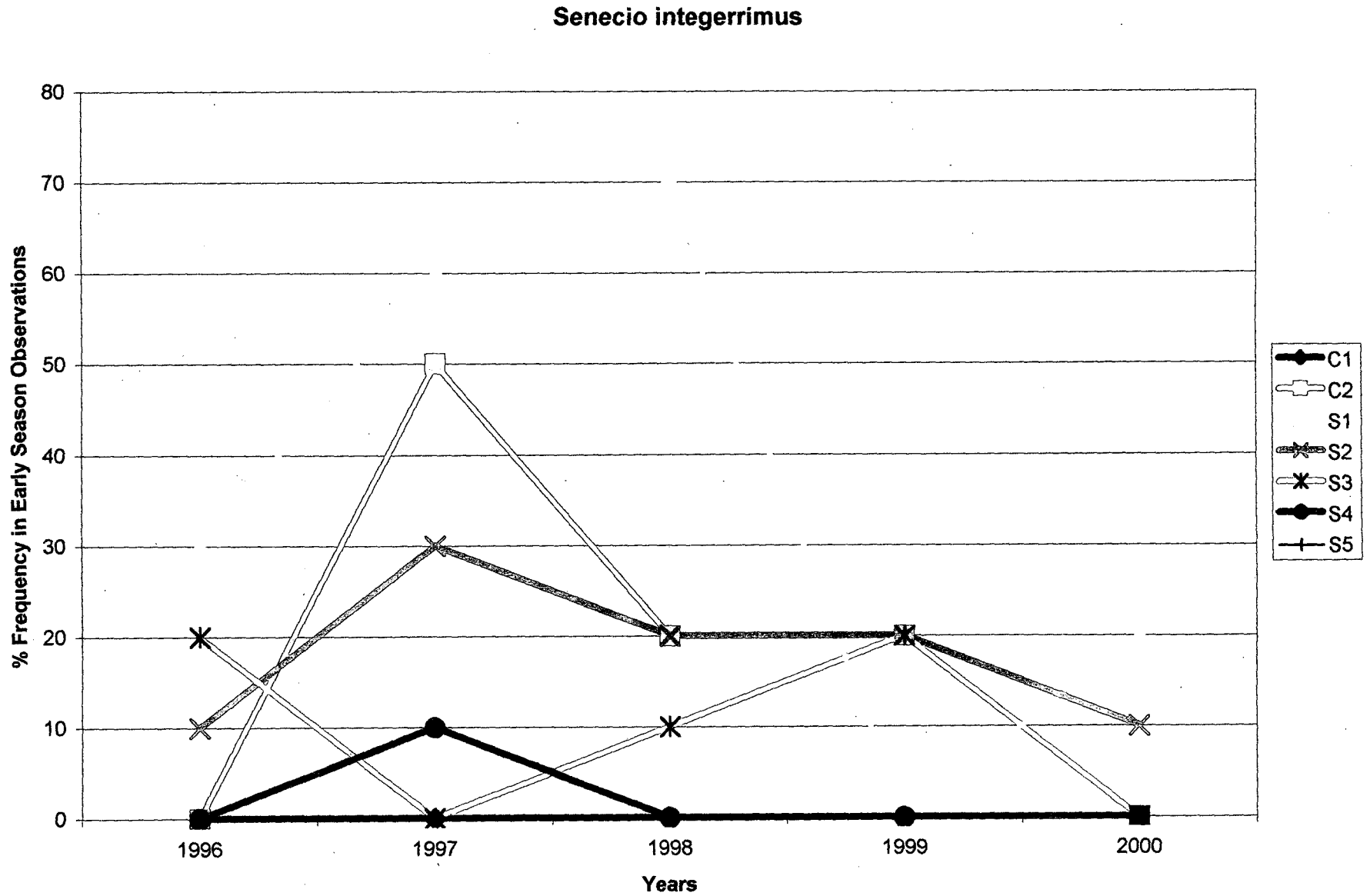


Figure 16. Patterns of Frequency of *Psoralidium tenuiflorum* along study transects in Late Season Observations 1996-2000.

*Psoralidium tenuiflorum*

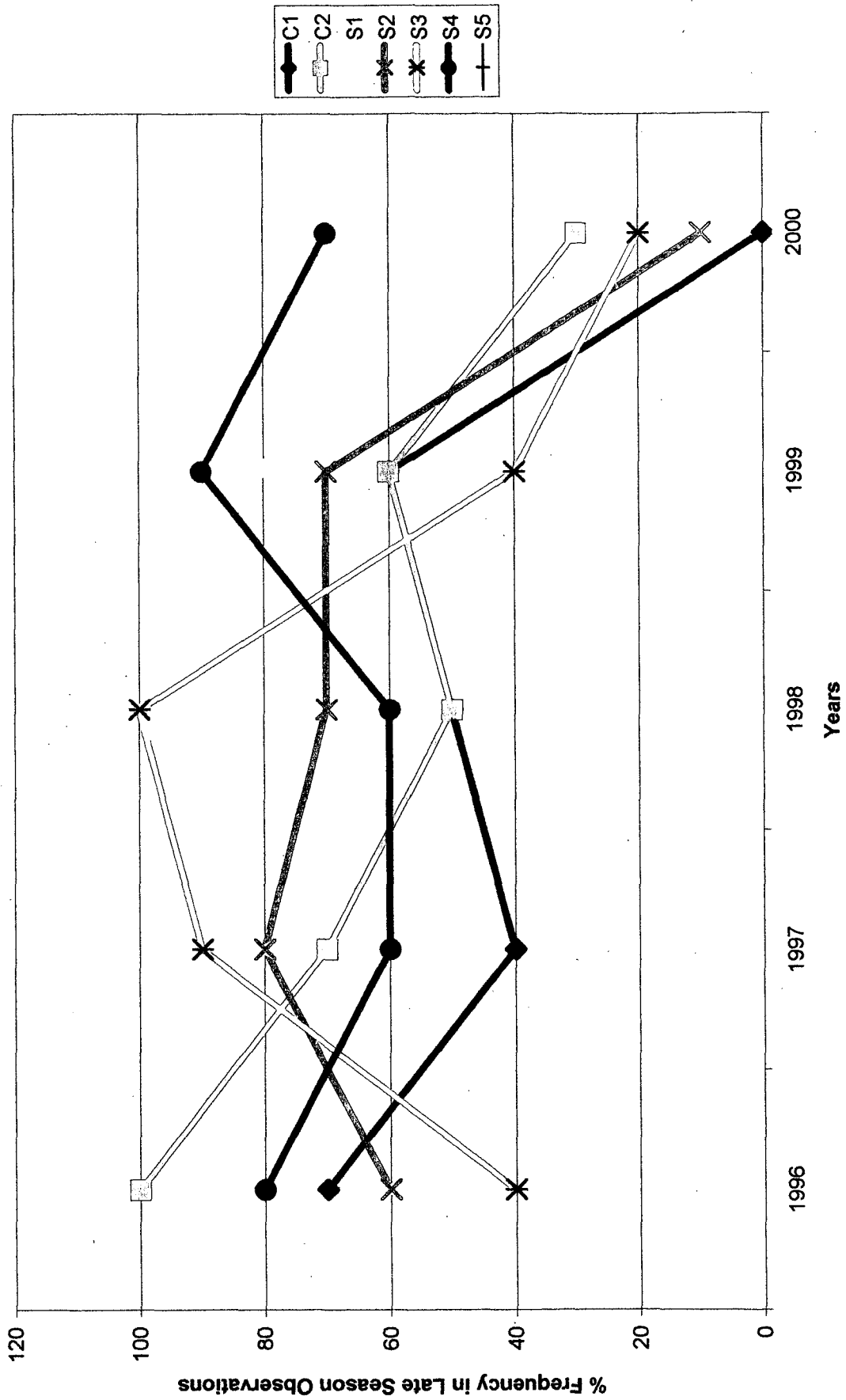


Figure 17. Patterns of Frequency of *Ratibida columnifera* along study transects in Early Season Observations 1996-2000.

*Ratibida columnifera*

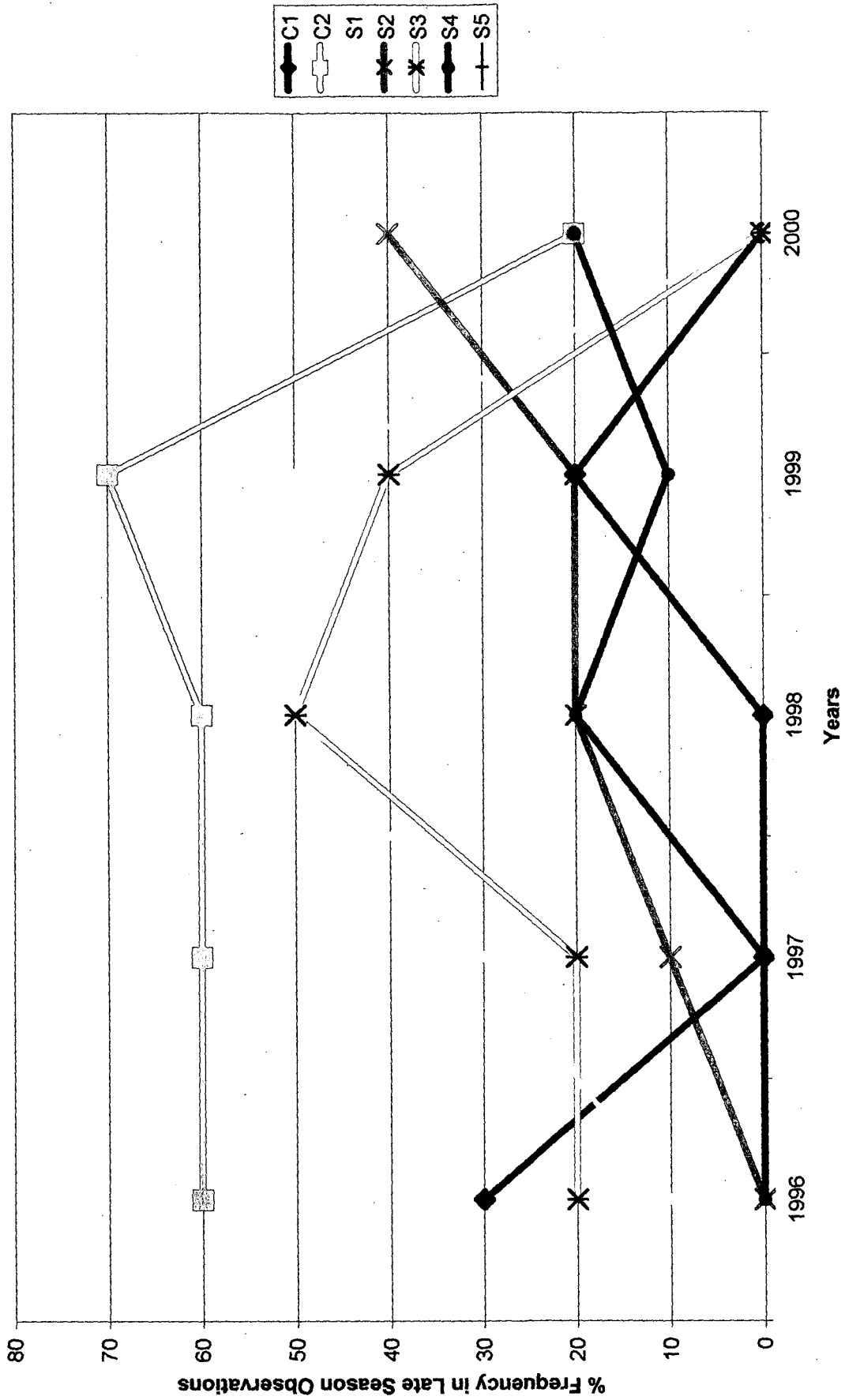
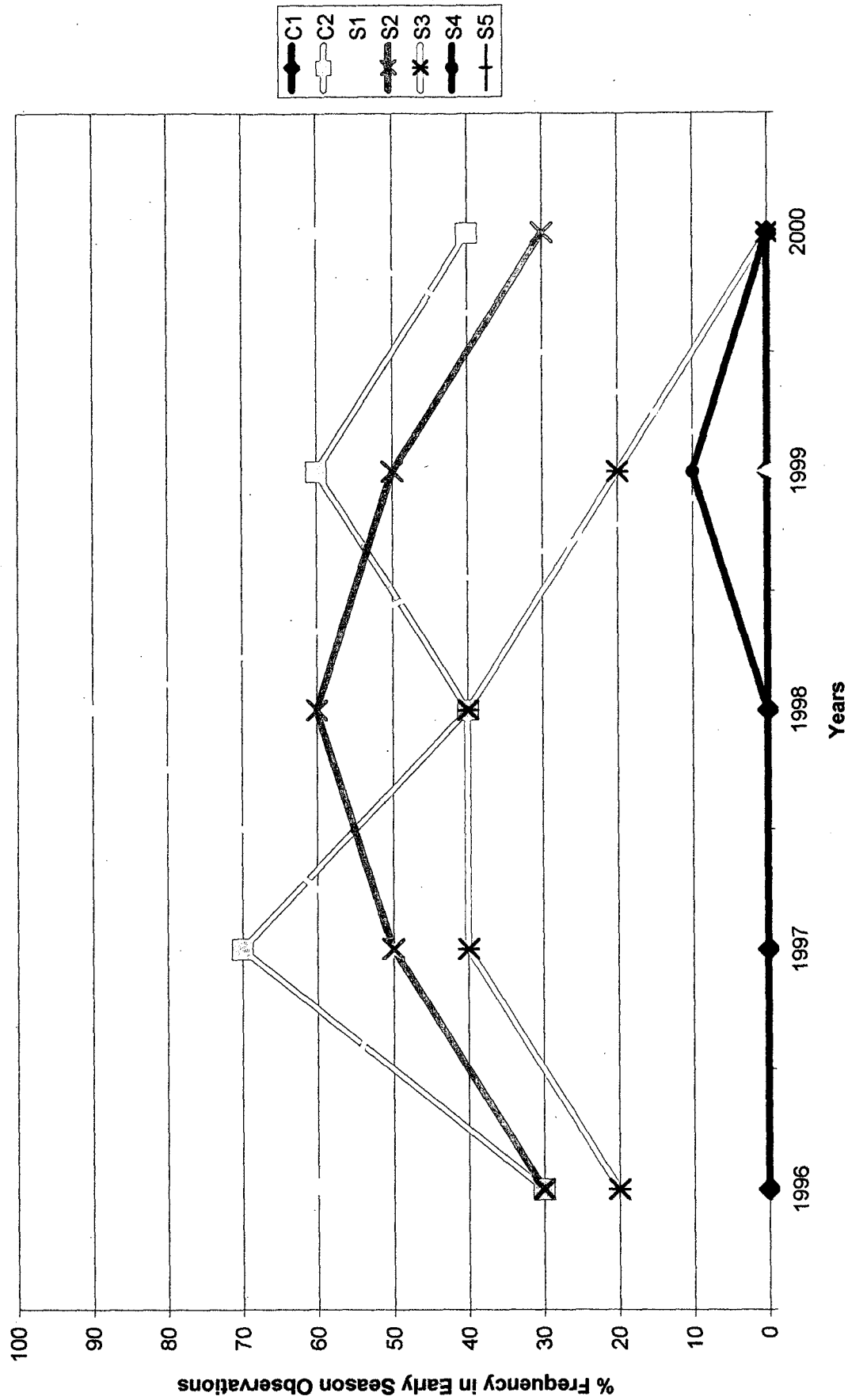


Figure 18. Patterns of Frequency of *Castilleja sessiliflora* along study transects in Early Season Observations 1996-2000.

### *Castilleja sessiliflora*



**Table 1. Cover Data - Control Transect 1, Tordon Post-Spray Study  
City of Boulder Open Space, CO - June 2000**

PLANT SPECIES	AVERAGE		RELATIVE	AVERAGE		RELATIVE	Percent Foliar Cover*
	COVER (%)	FREQUENCY (%)	VEGETATION COVER (%)	COVER-ALL (%)	VEGETATION COVER-ALL (%)		
							---Sample Number--- Control 1
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>							
<i>Androsace septentrionalis</i>	0.00	100.00	0.00	0.00	0.00		P
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>0.0</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>		P
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>							
<i>Acosta diffusa</i>	14.50	100.00	46.77	14.50	46.03		14.5
<i>Alyssum parviflorum</i>	0.50	100.00	1.61	0.50	1.59		0.5
<i>Neolepia campestre</i>	0.00	100.00	0.00	0.00	0.00		P
<i>Verbascum blattaria</i>	0.00	100.00	0.00	0.00	0.00		P
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>15.0</b>	<b>100.0</b>	<b>48.4</b>	<b>15.0</b>	<b>47.6</b>		15.0
<b>INTRODUCED ANNUAL GRASSES</b>							
<i>Anisantha tectorum</i>	0.00	100.00	0.00	0.00	0.00		P
<i>Bromus japonicus</i>	2.00	100.00	6.45	2.00	6.35		2.0
<b>TOTAL INTRO. ANN. GRASSES</b>	<b>2.0</b>	<b>100.0</b>	<b>6.5</b>	<b>2.0</b>	<b>6.3</b>		2.0
<b>NATIVE PERENNIAL FORBS</b>							
<i>Achillea lanulosa</i>	0.00	100.00	0.00	0.00	0.00		P
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>	0.00	100.00	0.00	0.00	0.00		P
<i>Astragalus agrestis</i>	0.00	100.00	0.00	0.00	0.00		P
<i>Heterotheca villosa</i>	2.00	100.00	6.45	2.00	6.35		2.0
<i>Psoralidium tenuiflorum</i>	0.00	100.00	0.00	0.00	0.00		P
<i>Sphaeralcea coccinea</i>	0.50	100.00	1.61	0.50	1.59		0.5
<i>Virgulus falcatus</i>	0.50	100.00	1.61	0.50	1.59		0.5
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>3.0</b>	<b>100.0</b>	<b>9.7</b>	<b>3.0</b>	<b>9.5</b>		3.0
<b>INTRODUCED PERENNIAL FORBS</b>							
<i>Convolvulus arvensis</i>	0.00	100.00	0.00	0.00	0.00		P
<i>Potentilla recta</i>	0.00	100.00	0.00	0.00	0.00		P
<b>TOTAL INTRO. PERENNIAL FORBS</b>	<b>0.0</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>		P
<b>NATIVE PERENNIAL GRASSES (cool)</b>							
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	0.50	100.00	1.61	0.50	1.59		0.5
<i>Elymus elymoides</i>	0.00	100.00	0.00	0.00	0.00		P
<i>Festuca rubra</i>	0.00	100.00	0.00	0.00	0.00		P
<i>Pascopyrum smithii</i>	0.00	100.00	0.00	0.00	0.00		P
<i>Poa agassizensis</i>	0.00	100.00	0.00	0.00	0.00		P
<i>Poa compressa</i>	0.50	100.00	1.61	0.50	1.59		0.5
<i>Poa secunda</i>	0.00	100.00	0.00	0.00	0.00		P
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>1.0</b>	<b>100.0</b>	<b>3.2</b>	<b>1.0</b>	<b>3.2</b>		1.0
<b>NATIVE PERENNIAL GRASSES (warm)</b>							
<i>Andropogon gerardii</i>	0.00	100.00	0.00	0.00	0.00		P
<i>Bouteloua curtipendula</i>	0.50	100.00	1.61	0.50	1.59		0.5
<i>Buchloe dactyloides</i>	8.00	100.00	25.81	8.00	25.40		8.0
<i>Chondrosium gracile</i>	1.50	100.00	4.84	1.50	4.76		1.5
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>10.0</b>	<b>100.0</b>	<b>32.3</b>	<b>10.0</b>	<b>31.7</b>		10.0
<b>NATIVE SUBSHRUBS</b>							
<i>Artemisia frigida</i>	0.00	100.00	0.00	0.50	1.59		(0.5)
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>0.0</b>	<b>100.0</b>	<b>0.0</b>	<b>0.5</b>	<b>1.6</b>		(0.5)
<b>SUCCULENT</b>							
<i>Echinocereus viridiflorus</i>	0.00	100.00	0.00	0.00	0.00		P
<i>Opuntia macrorhiza</i>	0.00	100.00	0.00	0.00	0.00		P
<b>TOTAL SUCCULENT</b>	<b>0.0</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>		P



**Table 1. Cover Data - Control Transect 1, Tordon Post-Spray Study  
City of Boulder Open Space, CO - June 2000**

PLANT SPECIES	AVERAGE		RELATIVE	AVERAGE		RELATIVE	Percent Foliar Cover*
	COVER	FREQUENCY	VEGETATION	COVER-ALL	VEGETATION	COVER-ALL	
	(%)	(%)	(%)	(%)	(%)	(%)	---Sample Number---
							Control 1
Standing dead	2.50	100.00		2.50			2.5
Litter	60.50	100.00		60.50			60.5
Bare soil	6.00	100.00		6.00			6.0
TOTALS	100.0			100.5			100
TOTAL VEGETATION COVER	31.0 (s=0.0)		100.0	31.5 (s=0.0)	100.0		31.0(0.5)
GROUND COVER (Litter+Rock+Veg+St.Deed)	94.0			94.5			94(1)
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 30.0 Std.Dev.= 0.0)							30

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

**Table 2. Cover Data - Control Transect 2, Tordon Post-Spray Study  
City of Boulder Open Space, CO - June 2000.**

PLANT SPECIES	AVERAGE		RELATIVE	AVERAGE		RELATIVE	Percent Foliar Cover* ---Sample Number---
	COVER (%)	FREQUENCY (%)	VEGETATION COVER (%)	COVER-ALL (%)	VEGETATION COVER-ALL (%)		
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>							
<i>Erigeron divergens</i>	1.00	100.00	3.77	1.00	3.77	1.0	
<i>Pterogonum alatum</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>1.0</b>	<b>100.0</b>	<b>3.8</b>	<b>1.0</b>	<b>3.8</b>	<b>1.0</b>	
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>							
<i>Acosta diffusa</i>	1.00	100.00	3.77	1.00	3.77	1.0	
<i>Neolepia campestre</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Tragopogon dubius</i> ssp. <i>major</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>1.0</b>	<b>100.0</b>	<b>3.8</b>	<b>1.0</b>	<b>3.8</b>	<b>1.0</b>	
<b>INTRODUCED ANNUAL GRASSES</b>							
<i>Bromus japonicus</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<b>TOTAL INTRO. ANN. GRASSES</b>	<b>0.0</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	P
<b>NATIVE PERENNIAL FORBS</b>							
<i>Artemisia ludoviciana</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Aster porteri</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Astragalus agrestis</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Castilleja sessiliflora</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Dalea purpurea</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Eremogone fendleri</i>	1.00	100.00	3.77	1.00	3.77	1.0	
<i>Gastrolychnis drummondii</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Heterotheca villosa</i>	5.00	100.00	18.87	5.00	18.87	5.0	
<i>Hymenopappus filifolius</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Liatris punctata</i>	0.50	100.00	1.89	0.50	1.89	0.5	
<i>Lomatium orientale</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Oenothera howardii</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Oligosporus dracunculus</i> ssp. <i>glaucus</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Oxytropis x sericea</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Paronychia jamesii</i>	1.00	100.00	3.77	1.00	3.77	1.0	
<i>Penstemon secundiflorus</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Psoralidium tenuiflorum</i>	0.50	100.00	1.89	0.50	1.89	0.5	
<i>Ratibida columnifera</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Townsendia hookeri</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Viola nuttallii</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>8.0</b>	<b>100.0</b>	<b>30.2</b>	<b>8.0</b>	<b>30.2</b>	<b>8.0</b>	
<b>NATIVE PERENNIAL GRASSES (cool)</b>							
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	6.00	100.00	22.64	6.00	22.64	6.0	
<i>Elymus elymoides</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Hesperostipa comata</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Koeleria macrantha</i>	1.00	100.00	3.77	1.00	3.77	1.0	
<i>Pascopyrum smithii</i>	4.50	100.00	16.98	4.50	16.98	4.5	
<i>Poa compressa</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>11.5</b>	<b>100.0</b>	<b>43.4</b>	<b>11.5</b>	<b>43.4</b>	<b>11.5</b>	
<b>NATIVE PERENNIAL GRASSES (warm)</b>							
<i>Andropogon gerardii</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Aristida purpurea</i>	1.00	100.00	3.77	1.00	3.77	1.0	
<i>Bouteloua curtipendula</i>	0.50	100.00	1.89	0.50	1.89	0.5	
<i>Buchloe dactyloides</i>	1.50	100.00	5.66	1.50	5.66	1.5	
<i>Chondrosum gracile</i>	1.50	100.00	5.66	1.50	5.66	1.5	
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>4.5</b>	<b>100.0</b>	<b>17.0</b>	<b>4.5</b>	<b>17.0</b>	<b>4.5</b>	

**Table 2. Cover Data - Control Transect 2, Tordon Post-Spray Study  
City of Boulder Open Space, CO - June 2000.**

PLANT SPECIES	AVERAGE		RELATIVE	AVERAGE		RELATIVE	Percent Foliar Cover*
	COVER	FREQUENCY	VEGETATION	COVER-ALL	VEGETATION	COVER-ALL	
	(%)	(%)	(%)	(%)	(%)	(%)	---Sample Number--- Control 2
<b>NATIVE SUBSHRUBS</b>							
Artemisia frigida	0.50	100.00	1.89	0.50	1.89		0.5
Gutierrezia sarothrae	0.00	100.00	0.00	0.00	0.00		P
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>0.5</b>	<b>100.0</b>	<b>1.9</b>	<b>0.5</b>	<b>1.9</b>		<b>0.5</b>
<b>SUCCULENT</b>							
Opuntia macrorhiza	0.00	100.00	0.00	0.00	0.00		P
<b>TOTAL SUCCULENT</b>	<b>0.0</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>		<b>P</b>
<b>PARASITE</b>							
Aphyllon fasciculatum	0.00	100.00	0.00	0.00	0.00		P
<b>TOTAL PARASITE</b>	<b>0.0</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>		<b>P</b>
Standing dead	4.50	100.00		4.50			4.5
Litter	53.00	100.00		53.00			53.0
Bare soil	11.00	100.00		11.00			11.0
Rock	5.00	100.00		5.00			5.0
<b>TOTALS</b>	<b>100.0</b>			<b>100.0</b>			<b>100</b>
<b>TOTAL VEGETATION COVER</b>	<b>26.5 (s=0.0)</b>		<b>100.0</b>	<b>26.5 (s=0.0)</b>	<b>100.0</b>		<b>26.5</b>
<b>GROUND COVER (Litter+Rock+Veg+St. Dead)</b>	<b>89.0</b>			<b>89.0</b>			<b>89</b>
<b>SPECIES DENSITY (# of species/100 sq.m.)</b> <b>(AVERAGE= 41.0 Std.Dev.= 0.0)</b>							<b>41</b>

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

**Table 3. Cover Data - Spray Area, Transects 1-5, Tordon Post-Spray Study  
City of Boulder Open Space, CO - June 2000.**

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>					
<i>Boechera fendleri</i>	0.00	20.00	0.00	0.00	0.00
<i>Cirsium undulatum</i>	0.00	20.00	0.00	0.00	0.00
<i>Erigeron divergens</i>	0.30	60.00	0.96	0.30	0.93
<i>Erysimum asperum</i>	0.00	40.00	0.00	0.00	0.00
<i>Grindelia squarrosa</i>	0.00	80.00	0.00	0.00	0.00
<i>Oligosporus pacificus</i>	0.00	20.00	0.00	0.00	0.00
<i>Plantago patagonica</i>	0.10	40.00	0.32	0.10	0.31
<i>Pterogonum alatum</i>	0.00	40.00	0.00	0.00	0.00
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>0.4</b>	<b>80.0</b>	<b>1.3</b>	<b>0.4</b>	<b>1.2</b>
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>					
<i>Acosta diffusa</i>	5.80	100.00	18.53	5.90	18.38
<i>Alyssum parviflorum</i>	0.30	100.00	0.96	0.30	0.93
<i>Neolepia campestre</i>	0.10	60.00	0.32	0.20	0.62
<i>Plantago lanceolata</i>	0.00	20.00	0.00	0.00	0.00
<i>Podospermum laciniatum</i>	0.30	80.00	0.96	0.30	0.93
<i>Tragopogon dubius ssp. major</i>	0.00	100.00	0.00	0.00	0.00
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>6.5</b>	<b>100.0</b>	<b>20.8</b>	<b>6.7</b>	<b>20.9</b>
<b>INTRODUCED ANNUAL GRASSES</b>					
<i>Bromus japonicus</i>	0.50	80.00	1.60	0.50	1.56
<b>TOTAL INTRO. ANN. GRASSES</b>	<b>0.5</b>	<b>80.0</b>	<b>1.6</b>	<b>0.5</b>	<b>1.6</b>
<b>NATIVE PERENNIAL FORBS</b>					
<i>Achillea lanulosa</i>	0.30	80.00	0.96	0.30	0.93
<i>Antennaria corymbosa</i>	0.30	40.00	0.96	0.30	0.93
<i>Antennaria rosea</i>	0.00	20.00	0.00	0.00	0.00
<i>Arnica fulgens</i>	0.60	40.00	1.92	0.60	1.87
<i>Artemisia ludoviciana</i>	0.10	40.00	0.32	0.10	0.31
<i>Aster porteri</i>	0.20	60.00	0.64	0.20	0.62
<i>Astragalus agrestis</i>	0.00	40.00	0.00	0.00	0.00
<i>Astragalus tridactylicus</i>	0.00	20.00	0.00	0.00	0.00
<i>Calochortus nuttallii</i>	0.10	20.00	0.32	0.10	0.31
<i>Castilleja sessiliflora</i>	0.10	40.00	0.32	0.10	0.31
<i>Comandra umbellata ssp. pallida</i>	0.00	20.00	0.00	0.00	0.00
<i>Cymopterus acaulis</i>	0.00	20.00	0.00	0.00	0.00
<i>Dalea candida var. oligophylla</i>	0.00	20.00	0.00	0.00	0.00
<i>Dalea purpurea</i>	0.00	40.00	0.00	0.00	0.00
<i>Erigeron flagellaris</i>	0.20	20.00	0.64	0.20	0.62
<i>Erigeron pumilus</i>	0.20	20.00	0.64	0.20	0.62
<i>Gaillardia aristata</i>	0.00	20.00	0.00	0.00	0.00
<i>Gastrolychnis drummondii</i>	0.00	20.00	0.00	0.00	0.00
<i>Gaura coccinea</i>	0.00	40.00	0.00	0.00	0.00
<i>Heterotheca villosa</i>	1.00	40.00	3.19	1.00	3.12
<i>Hymenopappus filifolius</i>	0.10	20.00	0.32	0.10	0.31
<i>Lesquerella montana</i>	0.00	40.00	0.00	0.00	0.00
<i>Liatris punctata</i>	0.10	40.00	0.32	0.20	0.62
<i>Lithospermum incisum</i>	0.00	20.00	0.00	0.00	0.00
<i>Lomatium orientale</i>	0.00	80.00	0.00	0.00	0.00
<i>Mertensia lanceolata</i>	0.20	40.00	0.64	0.20	0.62
<i>Musineon divaricatum</i>	0.10	20.00	0.32	0.10	0.31
<i>Nothocalais cuspidata</i>	0.00	20.00	0.00	0.00	0.00
<i>Oenothera howardii</i>	0.00	20.00	0.00	0.00	0.00
<i>Oenothera villosa</i>	0.00	20.00	0.00	0.00	0.00
<i>Oligosporus dracunculus ssp. glaucus</i>	0.10	20.00	0.32	0.10	0.31
<i>Oxybaphus linearis</i>	0.00	20.00	0.00	0.00	0.00
<i>Oxytropis x sericea</i>	0.00	20.00	0.00	0.00	0.00

**Table 3. Cover Data - Spray Area, Transects 1-5, Tordon Post-Spray Study  
City of Boulder Open Space, CO - June 2000.**

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
<b>NATIVE PERENNIAL FORBS (continued)</b>					
<i>Paronychia jamesii</i>	0.00	20.00	0.00	0.00	0.00
<i>Penstemon</i> spp.	0.00	20.00	0.00	0.00	0.00
<i>Psoraleidum tenuiflorum</i>	0.30	100.00	0.96	0.30	0.93
<i>Ratibida columnifera</i>	0.20	60.00	0.64	0.20	0.62
<i>Rumex triangulivalvis</i>	0.00	20.00	0.00	0.00	0.00
<i>Senecio integerrimus</i>	0.00	40.00	0.00	0.00	0.00
<i>Solidago</i> spp.	0.00	20.00	0.00	0.00	0.00
<i>Sphaeralcea coccinea</i>	0.00	60.00	0.00	0.00	0.00
<i>Tithymalus brachyceras</i>	0.00	40.00	0.00	0.00	0.00
<i>Townsendia hookeri</i>	0.20	40.00	0.64	0.20	0.62
<i>Vicia americana</i>	0.00	40.00	0.00	0.00	0.00
<i>Virgulus falcatus</i>	0.10	100.00	0.32	0.10	0.31
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>4.5</b>	<b>100.0</b>	<b>14.4</b>	<b>4.6</b>	<b>14.3</b>
<b>INTRODUCED PERENNIAL FORBS</b>					
<i>Cichorium intybus</i>	0.00	20.00	0.00	0.00	0.00
<i>Convolvulus arvensis</i>	0.00	20.00	0.00	0.00	0.00
<i>Hypericum perforatum</i>	0.00	20.00	0.00	0.00	0.00
<i>Potentilla recta</i>	0.10	40.00	0.32	0.10	0.31
<i>Taraxacum officinale</i>	0.20	60.00	0.64	0.20	0.62
<b>TOTAL INTRO. PERENNIAL FORBS</b>	<b>0.3</b>	<b>80.0</b>	<b>1.0</b>	<b>0.3</b>	<b>0.9</b>
<b>NATIVE PERENNIAL GRASSES (cool)</b>					
<i>Carex eleocharis</i>	0.00	20.00	0.00	0.00	0.00
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	2.70	100.00	8.63	2.70	8.41
<i>Elymus elymoides</i>	0.10	20.00	0.32	0.10	0.31
<i>Festuca rubra</i>	0.00	20.00	0.00	0.00	0.00
<i>Hesperostipa comata</i>	0.00	20.00	0.00	0.00	0.00
<i>Koeleria macrantha</i>	0.90	100.00	2.88	0.90	2.80
<i>Nassella viridula</i>	0.10	20.00	0.32	0.10	0.31
<i>Pascopyrum smithii</i>	3.50	100.00	11.18	3.50	10.90
<i>Poa agassizensis</i>	0.60	40.00	1.92	0.60	1.87
<i>Poa compressa</i>	0.30	60.00	0.96	0.30	0.93
<i>Poa fendleriana</i>	0.00	20.00	0.00	0.00	0.00
<i>Poa secunda</i>	0.70	40.00	2.24	0.90	2.80
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>8.9</b>	<b>100.0</b>	<b>28.4</b>	<b>9.1</b>	<b>28.3</b>
<b>NATIVE PERENNIAL GRASSES (warm)</b>					
<i>Andropogon gerardii</i>	0.30	20.00	0.96	0.30	0.93
<i>Aristida purpurea</i>	0.30	60.00	0.96	0.30	0.93
<i>Bouteloua curtipendula</i>	0.50	40.00	1.60	0.50	1.56
<i>Buchloe dactyloides</i>	4.50	100.00	14.38	4.60	14.33
<i>Chondrosium gracile</i>	3.30	100.00	10.54	3.50	10.90
<i>Chondrosium hirsutum</i>	0.10	20.00	0.32	0.10	0.31
<i>Muhlenbergia montana</i>	0.00	20.00	0.00	0.00	0.00
<i>Schizachyrium scoparium</i>	0.90	60.00	2.88	0.90	2.80
<i>Sporobolus heterolepis</i>	0.10	20.00	0.32	0.10	0.31
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>10.0</b>	<b>100.0</b>	<b>31.9</b>	<b>10.3</b>	<b>32.1</b>
<b>NATIVE SUBSHRUBS</b>					
<i>Artemisia frigida</i>	0.10	80.00	0.32	0.10	0.31
<i>Gutierrezia sarothrae</i>	0.00	40.00	0.00	0.00	0.00
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>0.1</b>	<b>80.0</b>	<b>0.3</b>	<b>0.1</b>	<b>0.3</b>
<b>NATIVE SHRUBS</b>					
<i>Chrysothamnus nauseosus</i>	0.00	20.00	0.00	0.00	0.00
<b>TOTAL NATIVE SHRUBS</b>	<b>0.0</b>	<b>20.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>

**Table 3. Cover Data - Spray Area, Transects 1-5, Tordon Post-Spray Study  
City of Boulder Open Space, CO - June 2000.**

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
<b>LICHEN</b>					
Cladonia spp.	0.00	20.00	0.00	0.00	0.00
Xanthoparmelia chlorochroa	0.00	20.00	0.00	0.00	0.00
<b>TOTAL LICHEN</b>	<b>0.0</b>	<b>40.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>SUCCULENT</b>					
Opuntia fragilis	0.00	20.00	0.00	0.00	0.00
Opuntia macrorhiza	0.00	100.00	0.00	0.00	0.00
<b>TOTAL SUCCULENT</b>	<b>0.0</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>AGAVOIDS</b>					
Yucca glauca	0.10	20.00	0.32	0.10	0.31
<b>TOTAL AGAVOIDS</b>	<b>0.1</b>	<b>20.0</b>	<b>0.3</b>	<b>0.1</b>	<b>0.3</b>
Standing dead	4.80	80.00		4.80	
Litter	50.90	100.00		50.90	
Bare soil	10.40	100.00		10.40	
Rock	2.60	60.00		2.60	
<b>TOTALS</b>	<b>100.0</b>			<b>100.8</b>	
<b>TOTAL VEGETATION COVER</b>	<b>31.3 (s=8.1)</b>		<b>100.0</b>	<b>32.1 (s=9.0)</b>	<b>100.0</b>
<b>GROUND COVER (Litter+Rock+Veg+St.Deat)</b>	<b>89.6</b>			<b>90.4</b>	
<b>SPECIES DENSITY (# of species/100 sq.m.)</b> <b>(AVERAGE= 39.4 Std.Dev.= 9.3)</b>					

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

**Table 3. Cover Data - Spray Area, Transects 1-5, Tordon Post-Spray Study  
City of Boulder Open Space, CO - June 2000.**

PLANT SPECIES

Percent Foliar Cover\*

	—Sample Number—				
	Spray 1	Spray 2	Spray 3	Spray 4	Spray 5
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>					
<i>Boechera fendleri</i>					P
<i>Cirsium undulatum</i>	P				
<i>Erigeron divergens</i>	P	0.5	1.0		
<i>Erysimum asperum</i>		P			P
<i>Grindelia squarrosa</i>	P	P	P		P
<i>Oligosporus pacificus</i>					P
<i>Plantago patagonica</i>		0.5	P		
<i>Pterogonum alatum</i>	P	P			
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	P	1.0	1.0	—	P
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>					
<i>Acosta diffusa</i>	0.5	6.5	1.5	12.5	8.0(0.5)
<i>Alyssum parviflorum</i>	P	P	1.0	P	0.5
<i>Neolepia campestre</i>		P	0.5(0.5)		P
<i>Plantago lanceolata</i>		P			
<i>Podospermum laciniatum</i>		P	P	P	1.5
<i>Tragopogon dubius ssp. major</i>	P	P	P	P	P
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	0.5	6.5	3.0(0.5)	12.5	10.0(0.5)
<b>INTRODUCED ANNUAL GRASSES</b>					
<i>Bromus japonicus</i>	P	P	2.5	P	
<b>TOTAL INTRO. ANN. GRASSES</b>	P	P	2.5	P	—
<b>NATIVE PERENNIAL FORBS</b>					
<i>Achillea lanulosa</i>		P	0.5	1.0	P
<i>Antennaria corymbosa</i>	1.0		0.5		
<i>Antennaria rosea</i>		P			
<i>Arnica fulgens</i>				0.5	2.5
<i>Artemisia ludoviciana</i>			P		0.5
<i>Aster porteri</i>	P	0.5			0.5
<i>Astragalus agrestis</i>	P				P
<i>Astragalus tridactylus</i>	P				
<i>Calochortus nuttallii</i>					0.5
<i>Castilleja sessiliflora</i>	0.5	P			
<i>Comandra umbellata ssp. pallida</i>	P				
<i>Cymopterus acaulis</i>					P
<i>Dalea candida var. oligophylla</i>		P			
<i>Dalea purpurea</i>	P	P			
<i>Erigeron flagellaris</i>					1.0
<i>Erigeron pumilus</i>					1.0
<i>Gaillardia aristata</i>	P				
<i>Gastrolychnis drummondii</i>	P				
<i>Gaura coccinea</i>			P	P	
<i>Heterotheca villosa</i>	5.0		P		
<i>Hymenopappus filifolius</i>	0.5				
<i>Lesquerella montana</i>	P				P
<i>Liatris punctata</i>	0.5(0.5)	P			
<i>Lithospermum incisum</i>					P
<i>Lomatium orientale</i>	P	P	P		P
<i>Mertensia lanceolata</i>			P		1.0
<i>Musineon divaricatum</i>					0.5
<i>Nothocalais cuspidata</i>					P
<i>Oenothera howardii</i>	P				
<i>Oenothera villosa</i>					P
<i>Oligosporus dracuncululus ssp. glaucus</i>		0.5			
<i>Oxybaphus linearis</i>		P			
<i>Oxytropis x sericea</i>	P				

**Table 3. Cover Data - Spray Area, Transects 1-5, Tordon Post-Spray Study**  
**City of Boulder Open Space, CO - June 2000.**

PLANT SPECIES

Percent Foliar Cover\*

	—Sample Number—				
	Spray 1	Spray 2	Spray 3	Spray 4	Spray 5
<b>NATIVE PERENNIAL FORBS (continued)</b>					
<i>Paronychia jamesii</i>	P				
<i>Penstemon</i> spp.					P
<i>Psoralidium tenuiflorum</i>	0.5	0.5	P	0.5	P
<i>Ratibida columnifera</i>	P	P	1.0		
<i>Rumex triangulivalvis</i>				P	
<i>Senecio integerimus</i>	P	P			
<i>Solidago</i> spp.	P				
<i>Sphaeralcea coccinea</i>			P	P	P
<i>Tithymalus brachyceras</i>	P		P		
<i>Townsendia hookeri</i>	1.0	P			
<i>Vicia americana</i>				P	P
<i>Virgulus falcatus</i>	P	P	0.5	P	P
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>9.0(0.5)</b>	<b>1.5</b>	<b>2.5</b>	<b>2.0</b>	<b>7.5</b>
<b>INTRODUCED PERENNIAL FORBS</b>					
<i>Cichorium intybus</i>				P	
<i>Convolvulus arvensis</i>			P		
<i>Hypericum perforatum</i>			P		
<i>Potentilla recta</i>				P	0.5
<i>Taraxacum officinale</i>		P		P	1.0
<b>TOTAL INTRO. PERENNIAL FORBS</b>	<b>—</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>1.5</b>
<b>NATIVE PERENNIAL GRASSES (cool)</b>					
<i>Carex eleocharis</i>					P
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	3.0	3.0	1.0	1.0	5.5
<i>Elymus elymoides</i>	0.5				
<i>Festuca rubra</i>			P		
<i>Hesperostipa comata</i>	P				
<i>Koeleria macrantha</i>	0.5	0.5	0.5	P	3.0
<i>Nassella viridula</i>	0.5				
<i>Pascopyrum smithii</i>	1.5	3.5	6.5	3.5	2.5
<i>Poa agassizensis</i>			0.5	2.5	
<i>Poa compressa</i>		P	1.0		0.5
<i>Poa fendleriana</i>					P
<i>Poa secunda</i>				P	3.5(1.0)
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>6.0</b>	<b>7.0</b>	<b>9.5</b>	<b>7.0</b>	<b>15.0(1.0)</b>
<b>NATIVE PERENNIAL GRASSES (warm)</b>					
<i>Andropogon gerardii</i>	1.5				
<i>Aristida purpurea</i>	1.0	0.5	P		
<i>Bouteloua curtipendula</i>	2.0		0.5		
<i>Buchloe dactyloides</i>	0.5	3.5	8.0	7.5	3.0(0.5)
<i>Chondrosium gracile</i>	P	3.0	0.5	8.5	4.5(1.0)
<i>Chondrosium hirsutum</i>	0.5				
<i>Muhlenbergia montana</i>	P				
<i>Schizachyrium scoparium</i>	3.0	0.5	1.0		
<i>Sporobolus heterolepis</i>	0.5				
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>9.0</b>	<b>7.5</b>	<b>10.0</b>	<b>16.0</b>	<b>7.5(1.5)</b>
<b>NATIVE SUBSHRUBS</b>					
<i>Artemisia frigida</i>	P	P		P	0.5
<i>Gutierrezia sarothrae</i>		P			P
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>P</b>	<b>P</b>	<b>—</b>	<b>P</b>	<b>0.5</b>
<b>NATIVE SHRUBS</b>					
<i>Chrysothamnus nauseosus</i>				P	
<b>TOTAL NATIVE SHRUBS</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>P</b>	<b>—</b>



**Table 3. Cover Data - Spray Area, Transects 1-5, Tordon Post-Spray Study**  
**City of Boulder Open Space, CO - June 2000.**

Percent Foliar Cover\*

PLANT SPECIES

	---Sample Number---				
	Spray 1	Spray 2	Spray 3	Spray 4	Spray 5
<b>LICHEN</b>					
Cladonia spp.			P		
Xanthoparmelia chlorochroa					P
<b>TOTAL LICHEN</b>	--	--	P	--	P
<b>SUCCULENT</b>					
Opuntia fragilis					P
Opuntia macrorhiza	P	P	P	P	P
<b>TOTAL SUCCULENT</b>	P	P	P	P	P
<b>AGAVOIDS</b>					
Yucca glauca	0.5				
<b>TOTAL AGAVOIDS</b>	0.5	--	--	--	--
<b>Standing dead</b>	1.5	3.5	3.0		16.0
<b>Litter</b>	50.0	45.5	63.5	58.0	37.5
<b>Bare soil</b>	16.0	22.5	4.5	4.5	4.5
<b>Rock</b>	7.5	5.0	0.5		
<b>TOTALS</b>	100	100	100	100	100
<b>TOTAL VEGETATION COVER</b>	25.0(0.5)	23.5	28.5(0.5)	37.5	42.0(3.0)
<b>GROUND COVER (Litter+Rock+Veg+St. Dead)</b>	84(1)	78	96(1)	96	96(3)
<b>SPECIES DENSITY (# of species/100 sq.m.)</b> (AVERAGE= 39.4 Std.Dev.= 9.3)	50	39	36	26	46

\*P= Present within 1 m. on either side of the cove

**Table 4. Frequency Data - Control Transect 1, Tordon Post-Spray Study,  
City of Boulder Open Space, June 2000.**

PLANT SPECIES	FREQUENCY (%)	PRESENCE*									
		—Sample Number—									
		1	2	3	4	5	6	7	8	9	10
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Androsace septentrionalis</i>	10.00										P
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>10.0</b>	—	—	—	—	—	—	—	—	P	—
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Acosta diffusa</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Alyssum parviflorum</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Neolepia campestre</i>	20.00	P				P					
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>100.0</b>	P	P	P	P	P	P	P	P	P	P
<b>INTRODUCED ANNUAL GRASSES</b>											
<i>Anisantha tectorum</i>	10.00				P						
<i>Bromus japonicus</i>	100.00	P	P	P	P	P	P	P	P	P	P
<b>TOTAL INTRO. ANN. GRASSES</b>	<b>100.0</b>	P	P	P	P	P	P	P	P	P	P
<b>NATIVE PERENNIAL FORBS</b>											
<i>Achillea lanulosa</i>	10.00				P						
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>	10.00										P
<i>Astragalus agrestis</i>	10.00		P								
<i>Heterotheca villosa</i>	40.00	P	P							P	P
<i>Psoralidium tenuiflorum</i>	40.00		P			P		P			P
<i>Sphaeralcea coccinea</i>	30.00			P				P	P		
<i>Virgulus falcatus</i>	20.00								P		P
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>90.0</b>	P	P	P	P	P	—	P	P	P	P
<b>INTRODUCED PERENNIAL FORBS</b>											
<i>Convolvulus arvensis</i>	20.00									P	P
<i>Potentilla recta</i>	20.00						P		P		
<b>TOTAL INTRO. PERENNIAL FORBS</b>	<b>40.0</b>	—	—	—	—	—	P	—	P	P	P
<b>NATIVE PERENNIAL GRASSES (cool)</b>											
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Elymus elymoides</i>	10.00	P									
<i>Festuca rubra</i>	10.00		P								
<i>Pascopyrum smithii</i>	90.00	P	P	P	P	P	P	P	P	P	
<i>Poa agassizensis</i>	30.00	P	P			P					
<i>Poa compressa</i>	30.00		P	P				P			
<i>Poa secunda</i>	20.00					P	P				
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>100.0</b>	P	P	P	P	P	P	P	P	P	P
<b>NATIVE PERENNIAL GRASSES (warm)</b>											
<i>Andropogon gerardii</i>	10.00		P								
<i>Buchloe dactyloides</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Chondrosium gracile</i>	70.00	P	P	P	P	P	P	P			
<i>Muhlenbergia montana</i>	10.00						P				
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>100.0</b>	P	P	P	P	P	P	P	P	P	P
<b>NATIVE SUBSHRUBS</b>											
<i>Artemisia frigida</i>	60.00		P		P	P		P		P	P
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>60.0</b>	—	P	—	P	P	—	P	—	P	P

**Table 4. Frequency Data - Control Transect 1, Tordon Post-Spray Study,  
City of Boulder Open Space, June 2000.**

PLANT SPECIES	FREQUENCY (%)	PRESENCE*									
		---Sample Number---									
		1	2	3	4	5	6	7	8	9	10
SUCCULENT											
Echinocereus viridiflorus	20.00								P		P
Opuntia macrorhiza	70.00		P	P		P	P		P	P	P
TOTAL SUCCULENT	70.0	--	P	P	--	P	P	--	P	P	P
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 11.7 Std.Dev.= 1.8)		11	16	10	10	13	11	11	11	11	13

\*P= Present within 1 m X 5m plot on right side (when standing at origin and facing the endpoint) of the cover transect.

**Table 5. Frequency Data - Control Transect 2, Tordon Post-Spray Study,  
City of Boulder Open Space, June 2000.**

PLANT SPECIES	FREQUENCY (%)	PRESENCE*									
		---Sample Number---									
		1	2	3	4	5	6	7	8	9	10
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Erigeron divergens</i>	40.00	P	P	P	P						
<i>Pterogonum alatum</i>	30.00								P	P	P
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>70.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Acosta diffusa</i>	50.00	P	P	P	P	P					
<i>Neolepia campestre</i>	10.00			P							
<i>Tragopogon dubius</i> ssp. <i>major</i>	40.00		P	P	P	P					
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>50.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>
<b>INTRODUCED ANNUAL GRASSES</b>											
<i>Bromus japonicus</i>	10.00			P							
<b>TOTAL INTRO. ANN. GRASSES</b>	<b>10.0</b>	<b>—</b>	<b>—</b>	<b>P</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>
<b>NATIVE PERENNIAL FORBS</b>											
<i>Artemisia ludoviciana</i>	20.00				P				P		
<i>Aster porteri</i>	20.00	P			P						
<i>Astragalus agrestis</i>	20.00				P	P					
<i>Castilleja sessiliflora</i>	40.00			P	P	P				P	
<i>Dalea purpurea</i>	30.00				P					P	P
<i>Eremogone fendleri</i>	30.00								P	P	P
<i>Gastrolychnis drummondii</i>	10.00							P			
<i>Heterotheca villosa</i>	80.00			P	P	P	P	P	P	P	P
<i>Hymenopappus filifolius</i>	30.00			P	P						P
<i>Liatris punctata</i>	60.00				P		P	P	P	P	P
<i>Lomatium orientale</i>	10.00					P					
<i>Oenothera howardii</i>	20.00					P	P				
<i>Oligosporus dracunculus</i> ssp. <i>glaucus</i>	10.00						P				
<i>Oxytropis x sericea</i>	20.00								P		P
<i>Paronychia jamesii</i>	30.00						P		P	P	
<i>Penstemon secundiflorus</i>	40.00				P				P	P	P
<i>Psoralidium tenuiflorum</i>	40.00			P	P				P	P	
<i>Ratibida columnifera</i>	30.00				P		P	P			
<i>Townsendia hookeri</i>	20.00				P					P	
<i>Viola nuttallii</i>	10.00					P					
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>90.0</b>	<b>P</b>	<b>—</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>NATIVE PERENNIAL GRASSES (cool)</b>											
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	70.00				P	P	P	P	P	P	P
<i>Elymus elymoides</i>	20.00							P			P
<i>Hesperostipa comata</i>	60.00				P	P		P	P	P	P
<i>Koeleria macrantha</i>	80.00	P	P	P	P			P	P	P	P
<i>Pascopyrum smithii</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Poa compressa</i>	10.00	P									
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>NATIVE PERENNIAL GRASSES (warm)</b>											
<i>Andropogon gerardii</i>	50.00			P				P	P	P	P
<i>Aristida purpurea</i>	60.00				P		P	P	P	P	P
<i>Bouteloua curtipendula</i>	40.00			P		P	P				
<i>Buchloe dactyloides</i>	50.00	P	P	P	P	P					
<i>Chondrosum gracile</i>	90.00	P	P	P	P		P	P	P	P	P
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>NATIVE SUBSHRUBS</b>											
<i>Artemisia frigida</i>	70.00		P		P	P	P		P	P	P
<i>Gutierrezia sarothrae</i>	10.00		P								
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>70.0</b>	<b>—</b>	<b>P</b>	<b>—</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>—</b>	<b>P</b>	<b>P</b>	<b>P</b>

**Table 5. Frequency Data - Control Transect 2, Tordon Post-Spray Study,  
City of Boulder Open Space, June 2000.**

PLANT SPECIES	FREQUENCY (%)	PRESENCE*									
		---Sample Number---									
		1	2	3	4	5	6	7	8	9	10
SUCCULENT											
Opuntia macrorhiza	10.00		P								
TOTAL SUCCULENT	10.0	--	P	--	--	--	--	--	--	--	--
EPIPHYTE(PARASITE)											
Aphyllon fasciculatum	10.00					P					
TOTAL EPIPHYTE(PARASITE)	10.0	--	--	--	--	P	--	--	--	--	--
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 14.8 Std.Dev.= 4.3)		8	10	15	23	15	13	12	17	18	17

\*P= Present within 1 m X 5m plot on right side (when standing at origin and facing the endpoint) of the cover transect.



**Table 6. Frequency Data - Spray Transect 1, Tordon Post-Spray Study,  
City of Boulder Open Space, June 2000.**

PLANT SPECIES	FREQUENCY (%)	PRESENCE*									
		---Sample Number---									
		2	3	4	5	6	7	8	9	10	
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Erigeron divergens</i>	50.00	P					P	P	P	P	
<b>NATIVE PERENNIAL GRASSES (warm)</b>											
<i>Andropogon gerardii</i>	20.00		P	P							
<i>Aristida purpurea</i>	60.00	P	P		P	P		P	P		
<i>Bouteloua curtipendula</i>	80.00	P		P	P	P	P		P	P	
<i>Buchloe dactyloides</i>	50.00		P		P	P		P		P	
<i>Chondrosium gracile</i>	90.00	P	P	P	P	P	P		P	P	
<i>Muhlenbergia montana</i>	10.00							P			
<i>Schizachyrium scoparium</i>	70.00		P	P	P	P	P			P	
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	
<b>NATIVE SUBSHRUBS</b>											
<i>Artemisia frigida</i>	20.00		P		P						
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>20.0</b>	<b>--</b>	<b>P</b>	<b>--</b>	<b>P</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	
<b>SUCCULENT</b>											
<i>Opuntia macrorhiza</i>	10.00									P	
<b>TOTAL SUCCULENT</b>	<b>10.0</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>P</b>	<b>--</b>	
<b>SPECIES DENSITY (# of species/100 sq.m.)</b> (AVERAGE= 19.1 Std.Dev.= 2.5)		19	21	15	20	20	19	21	17	16	23

\*P= Present within 1 m X 5m plot on right side (when standing at origin and facing the endpoint) of the cover transect.





**Table 7. Frequency Data - Spray Transect 2, Tordon Post-Spray Study,  
City of Boulder Open Space, June 2000.**

PLANT SPECIES	FREQUENCY (%)	PRESENCE*									
		—Sample Number—									
		2	3	4	5	6	7	8	9	10	
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Erigeron divergens</i>	60.00	P	P	P	P		P			P	
<b>NATIVE SUBSHRUBS</b>											
<i>Artemisia frigida</i>	20.00		P			P					
<i>Gutierrezia sarothrae</i>	20.00		P						P		
<b>TOTAL NATIVE SUBSHRUBS</b>	30.0	—	P	—	—	P	—	—	—	P	
<b>SUCCULENT</b>											
<i>Opuntia macrorhiza</i>	10.00						P				
<b>TOTAL SUCCULENT</b>	10.0	—	—	—	—	—	P	—	—	—	
<b>SPECIES DENSITY (# of species/100 sq.m.)</b> (AVERAGE= 13.3 Std.Dev.= 1.4)		14	14	16	14	14	13	11	12	13	12

\*P= Present within 1 m X 5m plot on right side (when standing at origin and facing the endpoint) of the cover transect.



**Table 8. Frequency Data - Spray Transect 3, Tordon Post-Spray Study,  
City of Boulder Open Space, June 2000.**

PLANT SPECIES	FREQUENCY (%)	PRESENCE*									
		—Sample Number—									
		2	3	4	5	6	7	8	9	10	
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
Erigeron divergens	60.00	P			P	P	P		P	P	
<b>LICHEN</b>											
Cladonia spp.	10.00			P							
<b>TOTAL LICHEN</b>	<b>10.0</b>	—	—	—	P	—	—	—	—	—	
<b>SUCCULENT</b>											
Opuntia macrorhiza	10.00	P									
<b>TOTAL SUCCULENT</b>	<b>10.0</b>	—	P	—	—	—	—	—	—	—	
<b>SPECIES DENSITY (# of species/100 sq.m.)</b>											
<b>(AVERAGE= 11.3 Std.Dev.= 3.8)</b>		7	18	5	13	13	10	9	12	15	

\*P= Present within 1 m X 5m plot on right side (when standing at origin and facing the endpoint) of the cover transect.

**Table 9. Frequency Data - Spray Transect 4, Tordon Post-Spray Study,  
City of Boulder Open Space, June 2000.**

PLANT SPECIES	FREQUENCY (%)	PRESENCE*									
		---Sample Number---									
		2	3	4	5	6	7	8	9	10	
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Acosta diffusa</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Alyssum parviflorum</i>	80.00			P	P	P	P	P	P	P	P
<i>Podospermum laciniatum</i>	40.00			P				P	P		P
<i>Tragopogon dubius ssp. major</i>	10.00			P							
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>INTRODUCED ANNUAL GRASSES</b>											
<i>Bromus japonicus</i>	100.00	P	P	P	P	P	P	P	P	P	P
<b>TOTAL INTRO. ANN. GRASSES</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>NATIVE PERENNIAL FORBS</b>											
<i>Achillea lanulosa</i>	20.00				P					P	
<i>Gaura coccinea</i>	10.00										P
<i>Psoralea tenuiflorum</i>	50.00			P		P	P			P	P
<i>Rumex triangulivalvis</i>	10.00					P					
<i>Sphaeralcea coccinea</i>	10.00									P	
<i>Vicia americana</i>	10.00			P							
<i>Virgulus falcatus</i>	50.00		P	P					P	P	P
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>80.0</b>	<b>--</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>--</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>INTRODUCED PERENNIAL FORBS</b>											
<i>Cichorium intybus</i>	30.00				P	P	P				
<i>Potentilla recta</i>	10.00					P					
<i>Taraxacum officinale</i>	10.00										P
<b>TOTAL INTRO. PERENNIAL FORBS</b>	<b>40.0</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>P</b>
<b>NATIVE PERENNIAL GRASSES (cool)</b>											
<i>Carex pensylvanica ssp. heliophila</i>	50.00	P	P	P				P			P
<i>Koeleria macrantha</i>	40.00	P	P	P						P	
<i>Pascopyrum smithii</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Poa agassizensis</i>	60.00	P	P	P	P	P		P			
<i>Poa secunda</i>	10.00										P
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>NATIVE PERENNIAL GRASSES (warm)</b>											
<i>Buchloe dactyloides</i>	90.00	P	P	P		P	P	P	P	P	P
<i>Chondrosum gracile</i>	80.00			P	P	P	P	P	P	P	P
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>NATIVE SUBSHRUBS</b>											
<i>Artemisia frigida</i>	10.00	P									
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>10.0</b>	<b>P</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>
<b>SUCCULENT</b>											
<i>Opuntia macrorhiza</i>	20.00							P			P
<b>TOTAL SUCCULENT</b>	<b>20.0</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>P</b>	<b>--</b>	<b>--</b>	<b>P</b>
<b>SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 10.0 Std.Dev.= 2.3)</b>											
		8	8	14	8	11	9	9	8	12	13

\*P= Present within 1 m X 5m plot on right side (when standing at origin and facing the endpoint) of the cover transect.

**Table 10. Frequency Data - Spray Transect 5, Tordon Post-Spray Study,  
City of Boulder Open Space, June 2000.**

PLANT SPECIES	FREQUENCY (%)	PRESENCE*									
		—Sample Number—									
		2	3	4	5	6	7	8	9	10	
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Boechera fendleri</i>	10.00						P				
<i>Erysimum asperum</i>	40.00	P					P	P	P		
<i>Grindelia squarrosa</i>	40.00			P				P	P	P	
<i>Oligosporus pacificus</i>	30.00		P					P	P		
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>80.0</b>	<b>P</b>	<b>P</b>	<b>—</b>	<b>P</b>	<b>—</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Acosta diffusa</i>	100.00	P	P	P	P	P	P	P	P	P	
<i>Alyssum parviflorum</i>	90.00	P	P	P	P	P	P	P	P	P	
<i>Neolepia campestre</i>	40.00	P					P	P			
<i>Podospermum laciniatum</i>	60.00	P	P	P		P			P	P	
<i>Tragopogon dubius ssp. major</i>	30.00	P				P			P		
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	
<b>NATIVE PERENNIAL FORBS</b>											
<i>Achillea lanulosa</i>	10.00								P		
<i>Arnica fulgens</i>	80.00	P	P	P	P	P	P	P		P	
<i>Artemisia ludoviciana</i>	80.00	P	P	P		P	P	P	P	P	
<i>Astragalus agrestis</i>	30.00	P				P	P				
<i>Calochortus nuttallii</i>	20.00	P					P				
<i>Cymopterus acaulis</i>	50.00					P		P	P	P	
<i>Erigeron pumilus</i>	90.00	P	P	P	P	P	P	P	P	P	
<i>Lesquerella montana</i>	10.00							P			
<i>Mertensia lanceolata</i>	30.00	P	P					P			
<i>Musineon divaricatum</i>	80.00	P	P	P	P		P	P	P	P	
<i>Nothocalais cuspidata</i>	30.00				P	P		P			
<i>Oenothera villosa</i>	30.00							P	P	P	
<i>Penstemon spp.</i>	50.00			P		P	P	P	P		
<i>Psoraleidum tenuiflorum</i>	40.00		P	P				P		P	
<i>Sphaeralcea coccinea</i>	10.00							P			
<i>Vicia americana</i>	40.00	P	P			P			P		
<i>Virgulus falcatus</i>	100.00	P	P	P	P	P	P	P	P	P	
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	
<b>INTRODUCED PERENNIAL FORBS</b>											
<i>Potentilla recta</i>	50.00	P		P			P	P		P	
<i>Taraxacum officinale</i>	80.00	P	P	P		P	P	P	P	P	
<b>TOTAL INTRO. PERENNIAL FORBS</b>	<b>80.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>—</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>—</b>	<b>P</b>	
<b>NATIVE PERENNIAL GRASSES (cool)</b>											
<i>Carex pensylvanica ssp. heliophila</i>	80.00		P	P	P	P	P	P	P	P	
<i>Koeleria macrantha</i>	70.00	P		P	P	P		P	P	P	
<i>Pascopyrum smithii</i>	100.00	P	P	P	P	P	P	P	P	P	
<i>Poa agassizensis</i>	10.00	P									
<i>Poa compressa</i>	40.00		P		P	P				P	
<i>Poa fendleriana</i>	20.00			P			P				
<i>Poa secunda</i>	70.00	P	P	P	P		P	P	P		
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	
<b>NATIVE PERENNIAL GRASSES (warm)</b>											
<i>Buchloe dactyloides</i>	100.00	P	P	P	P	P	P	P	P	P	
<i>Chondrosium gracile</i>	100.00	P	P	P	P	P	P	P	P	P	
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	
<b>NATIVE SUBSHRUBS</b>											
<i>Artemisia frigida</i>	50.00	P	P			P		P		P	
<i>Gutierrezia sarothrae</i>	40.00	P						P	P	P	
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>70.0</b>	<b>P</b>	<b>P</b>	<b>—</b>	<b>—</b>	<b>P</b>	<b>—</b>	<b>P</b>	<b>P</b>	<b>P</b>	

**Table 10. Frequency Data - Spray Transect 5, Tordon Post-Spray Study,  
City of Boulder Open Space, June 2000.**

PLANT SPECIES	FREQUENCY (%)	PRESENCE*									
		—Sample Number—									
		2	3	4	5	6	7	8	9	10	
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Boechera fendleri</i>	10.00						P				
<b>LICHEN</b>											
<i>Xanthoparmelia chlorochroa</i>	10.00								P		
<b>TOTAL LICHEN</b>	10.0	—	—	—	—	—	—	—	P	—	
<b>SUCCULENT</b>											
<i>Opuntia fragilis</i>	20.00				P					P	
<i>Opuntia macrorhiza</i>	50.00				P	P	P	P		P	
<b>TOTAL SUCCULENT</b>	60.0	—	—	—	P	P	P	P	—	P	
<b>SPECIES DENSITY (# of species/100 sq.m.)</b> (AVERAGE= 21.1 Std.Dev.= 2.5)		25	20	19	17	23	20	24	23	20	

\*P= Present within 1 m X 5m plot on right side (when standing at origin and facing the endpoint) of the cover transect.

Table 11. Kapweed (*Acosta diffusa*) Density, Tordon Post-Spray Study, City of Boulder Open Space, June 2000.

	AVERAGE	MAXIMUM	Subplot Number									
			# of individuals / sq.m.									
			1	2	3	4	5	6	7	8	9	10
C1 Rosette	18	29	22	27	13	29	20	24	10	4	20	8
C1 Bolt	22	38	38	24	10	33	31	21	8	18	25	14
C1 Dead	1	2	1	2	0	2	0	0	0	0	0	0
C2 Rosette	8	32	32	32	16	3	0	0	0	0	0	0
C2 Bolt	2	11	2	11	1	1	0	0	0	0	0	1
C2 Dead	0	2	2	0	0	0	0	0	0	0	0	0
S1 Rosette	2	13	0	0	0	1	1	0	0	4	13	3
S1 Bolt	1	3	0	0	0	0	0	0	0	2	3	3
S1 Dead	0	0	0	0	0	0	0	0	0	0	0	0
S2 Rosette	15	40	13	3	8	40	37	3	9	6	23	7
S2 Bolt	5	25	7	0	1	5	25	4	2	0	6	4
S2 Dead	0	0	0	0	0	0	0	0	0	0	0	0
S3 Rosette	7	29	11	29	9	5	1	3	5	2	1	3
S3 Bolt	3	17	1	6	17	4	1	0	1	0	0	0
S3 Dead	0	1	0	0	1	0	0	0	0	0	0	0
S4 Rosette	27	91	91	52	3	0	49	30	19	23	6	0
S4 Bolt	9	19	19	12	9	0	10	12	19	1	2	1
S4 Dead	0	2	0	2	0	0	0	0	0	0	0	0
S5 Rosette	3	9	2	0	0	6	1	9	3	2	2	0
S5 Bolt	7	18	4	0	9	13	0	5	18	15	6	4
S5 Dead	1	3	0	0	0	0	3	2	0	0	0	0

**Table 12. Cover Data - Control Transect 1, Tordon Post-Spray Study  
City of Boulder Open Space, CO - Sept. 2000**

PLANT SPECIES	AVERAGE		RELATIVE	AVERAGE		RELATIVE	Percent Foliar Cover*
	COVER	FREQUENCY	VEGETATION	COVER-ALL	VEGETATION	COVER-ALL	
	(%)	(%)	(%)	(%)	(%)	(%)	---Sample Number---
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>							
<i>Grindelia squarrosa</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>0.0</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>P</b>
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>							
<i>Acosta diffusa</i>	9.00	100.00	26.09	9.00	26.09	26.09	9.0
<i>Alyssum parviflorum</i>	1.50	100.00	4.35	1.50	4.35	4.35	1.5
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>10.5</b>	<b>100.0</b>	<b>30.4</b>	<b>10.5</b>	<b>30.4</b>	<b>30.4</b>	<b>10.5</b>
<b>INTRODUCED ANNUAL GRASSES</b>							
<i>Bromus japonicus</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<b>TOTAL INTRO. ANN. GRASSES</b>	<b>0.0</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>P</b>
<b>NATIVE PERENNIAL FORBS</b>							
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Heterotheca villosa</i>	0.50	100.00	1.45	0.50	1.45	1.45	0.5
<i>Liatris punctata</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Oligosporus dracuncululus</i> ssp. <i>glaucus</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Oxybaphus linearis</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Sphaeralcea coccinea</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Virgulus falcatus</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>0.5</b>	<b>100.0</b>	<b>1.4</b>	<b>0.5</b>	<b>1.4</b>	<b>1.4</b>	<b>0.5</b>
<b>INTRODUCED PERENNIAL FORBS</b>							
<i>Convolvulus arvensis</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Hypericum perforatum</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Potentilla recta</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<b>TOTAL INTRO. PERENNIAL FORBS</b>	<b>0.0</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>P</b>
<b>NATIVE PERENNIAL GRASSES (cool)</b>							
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	0.50	100.00	1.45	0.50	1.45	1.45	0.5
<i>Pascopyrum smithii</i>	1.00	100.00	2.90	1.00	2.90	2.90	1.0
<i>Poa agassizensis</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Poa compressa</i>	1.50	100.00	4.35	1.50	4.35	4.35	1.5
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>3.0</b>	<b>100.0</b>	<b>8.7</b>	<b>3.0</b>	<b>8.7</b>	<b>8.7</b>	<b>3.0</b>
<b>NATIVE PERENNIAL GRASSES (warm)</b>							
<i>Andropogon gerardii</i>	0.50	100.00	1.45	0.50	1.45	1.45	0.5
<i>Aristida purpurea</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Bouteloua curtipendula</i>	0.50	100.00	1.45	0.50	1.45	1.45	0.5
<i>Buchloe dactyloides</i>	5.50	100.00	15.94	5.50	15.94	15.94	5.5
<i>Chondrosium gracile</i>	12.00	100.00	34.78	12.00	34.78	34.78	12.0
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>18.5</b>	<b>100.0</b>	<b>53.6</b>	<b>18.5</b>	<b>53.6</b>	<b>53.6</b>	<b>18.5</b>
<b>NATIVE SUBSHRUBS</b>							
<i>Artemisia frigida</i>	1.50	100.00	4.35	1.50	4.35	4.35	1.5
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>1.5</b>	<b>100.0</b>	<b>4.3</b>	<b>1.5</b>	<b>4.3</b>	<b>4.3</b>	<b>1.5</b>
<b>SUCCULENT</b>							
<i>Echinocereus viridiflorus</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<i>Opuntia macrorhiza</i>	0.50	100.00	1.45	0.50	1.45	1.45	0.5
<i>Opuntia polyacantha</i>	0.00	100.00	0.00	0.00	0.00	0.00	P
<b>TOTAL SUCCULENT</b>	<b>0.5</b>	<b>100.0</b>	<b>1.4</b>	<b>0.5</b>	<b>1.4</b>	<b>1.4</b>	<b>0.5</b>



**Table 12. Cover Data - Control Transect 1, Tordon Post-Spray Study  
City of Boulder Open Space, CO - Sept. 2000**

PLANT SPECIES	AVERAGE		RELATIVE	RELATIVE		Percent Foliar Cover*
	COVER	FREQUENCY	VEGETATION	AVERAGE	VEGETATION	
	(%)	(%)	(%)	COVER-ALL	COVER-ALL	---Sample Number---
				(%)	(%)	Control 1
Litter	59.50	100.00		59.50		59.5
Bare soil	6.00	100.00		6.00		6.0
TOTALS	100.0			100.0		100
TOTAL VEGETATION COVER	34.5 (s=0.0)		100.0	34.5 (s=0.0)	100.0	34.5
GROUND COVER (Litter+Rock+Veg+St.Dead)	94.0			94.0		94
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 27.0 Std.Dev.= 0.0)						27

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

**Table 13. Cover Data - Control Transect 2. Tordon Post-Spray Study,  
City of Boulder Open Space, CO - Sept. 2000.**

PLANT SPECIES	AVERAGE		RELATIVE	AVERAGE		RELATIVE	Percent Foliar Cover*
	COVER (%)	FREQUENCY (%)	VEGETATION COVER (%)	COVER-ALL (%)	VEGETATION COVER-ALL (%)		
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>							
<i>Erigeron divergens</i>	1.00	100.00	3.57	1.00	3.57	1.0	
<i>Grindelia squarrosa</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Pterogonum alatum</i>	0.50	100.00	1.79	0.50	1.79	0.5	
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>1.5</b>	<b>100.0</b>	<b>5.4</b>	<b>1.5</b>	<b>5.4</b>	<b>1.5</b>	
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>							
<i>Acosta diffusa</i>	3.50	100.00	12.50	3.50	12.50	3.5	
<i>Tragopogon dubius</i> ssp. <i>major</i>	0.00	100.00	0.00	0.00	0.00	P	
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>3.5</b>	<b>100.0</b>	<b>12.5</b>	<b>3.5</b>	<b>12.5</b>	<b>3.5</b>	
<b>NATIVE PERENNIAL FORBS</b>							
<i>Artemisia ludoviciana</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Aster porteri</i>	0.50	100.00	1.79	0.50	1.79	0.5	
<i>Astragalus agrestis</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Dalea purpurea</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Erigeron flagellaris</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Helianthus pumilus</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Heterotheca fulcrata</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Heterotheca villosa</i>	4.50	100.00	16.07	4.50	16.07	4.5	
<i>Liatris punctata</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Nothocalais cuspidata</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Oligosporus caudatus</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Oxybaphus linearis</i>	0.50	100.00	1.79	0.50	1.79	0.5	
<i>Oxytropis x sericea</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Paronychia jamesii</i>	0.50	100.00	1.79	0.50	1.79	0.5	
<i>Penstemon secundiflorus</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Psoralidium tenuiflorum</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Ratibida columnifera</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Solidago</i> spp.	0.00	100.00	0.00	0.00	0.00	P	
<i>Sphaeralcea coccinea</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Townsendia hookeri</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Virgulus falcatus</i>	0.00	100.00	0.00	0.00	0.00	P	
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>6.0</b>	<b>100.0</b>	<b>21.4</b>	<b>6.0</b>	<b>21.4</b>	<b>6.0</b>	
<b>NATIVE PERENNIAL GRASSES (cool)</b>							
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	6.50	100.00	23.21	6.50	23.21	6.5	
<i>Hesperostipa comata</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Koeleria macrantha</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Pascopyrum smithii</i>	0.50	100.00	1.79	0.50	1.79	0.5	
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>7.0</b>	<b>100.0</b>	<b>25.0</b>	<b>7.0</b>	<b>25.0</b>	<b>7.0</b>	
<b>NATIVE PERENNIAL GRASSES (warm)</b>							
<i>Andropogon gerardii</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Aristida purpurea</i>	0.50	100.00	1.79	0.50	1.79	0.5	
<i>Bouteloua curtipendula</i>	4.00	100.00	14.29	4.00	14.29	4.0	
<i>Buchloe dactyloides</i>	2.50	100.00	8.93	2.50	8.93	2.5	
<i>Chondrosium gracile</i>	3.00	100.00	10.71	3.00	10.71	3.0	
<i>Chondrosium hirsutum</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Schizachyrium scoparium</i>	0.00	100.00	0.00	0.00	0.00	P	
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>10.0</b>	<b>100.0</b>	<b>35.7</b>	<b>10.0</b>	<b>35.7</b>	<b>10.0</b>	
<b>NATIVE SUBSHRUBS</b>							
<i>Artemisia frigida</i>	0.00	100.00	0.00	0.00	0.00	P	
<i>Gutierrezia sarothrae</i>	0.00	100.00	0.00	0.00	0.00	P	
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>0.0</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	

---Sample Number---  
Control 2

**Table 13. Cover Data - Control Transect 2. Tordon Post-Spray Study,  
City of Boulder Open Space, CO - Sept. 2000.**

PLANT SPECIES	AVERAGE		RELATIVE	AVERAGE	RELATIVE	Percent Foliar Cover* ---Sample Number---
	COVER (%)	FREQUENCY (%)	VEGETATION COVER (%)	COVER-ALL (%)	VEGETATION COVER-ALL (%)	
<b>LICHEN</b>						
Xanthoparmelia chlorochroa	0.00	100.00	0.00	0.00	0.00	P
<b>TOTAL LICHEN</b>	0.0	100.0	0.0	0.0	0.0	P
<b>SUCCULENT</b>						
Opuntia macrorhiza	0.00	100.00	0.00	0.00	0.00	P
<b>TOTAL SUCCULENT</b>	0.0	100.0	0.0	0.0	0.0	P
Litter	48.00	100.00		48.00		48.0
Bare soil	16.00	100.00		16.00		16.0
Rock	8.00	100.00		8.00		8.0
<b>TOTALS</b>	100.0			100.0		100
<b>TOTAL VEGETATION COVER</b>	28.0 (s=0.0)		100.0	28.0 (s=0.0)	100.0	28.0
<b>GROUND COVER (Litter+Rock+Veg+St. Dead)</b>	84.0			84.0		84
<b>SPECIES DENSITY (# of species/100 sq.m.)</b> (AVERAGE= 41.0 Std.Dev.= 0.0)						41

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

**Table 14. Cover Data - Spray Transects. Tordon Post-Spray Study,  
City of Boulder Open Space, CO - Sept. 2000.**

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>					
<i>Erigeron divergens</i>	0.10	40.00	0.30	0.10	0.30
<i>Erysimum asperum</i>	0.00	40.00	0.00	0.00	0.00
<i>Grindelia squarrosa</i>	0.00	80.00	0.00	0.00	0.00
<i>Plantago patagonica</i>	0.00	20.00	0.00	0.00	0.00
<i>Pterogonum alatum</i>	0.00	40.00	0.00	0.00	0.00
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>0.1</b>	<b>100.0</b>	<b>0.3</b>	<b>0.1</b>	<b>0.3</b>
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>					
<i>Acosta diffusa</i>	3.10	100.00	9.34	3.10	9.28
<i>Alyssum parviflorum</i>	0.10	60.00	0.30	0.10	0.30
<i>Plantago lanceolata</i>	0.00	20.00	0.00	0.00	0.00
<i>Podospermum laciniatum</i>	0.00	20.00	0.00	0.00	0.00
<i>Tragopogon dubius</i> ssp. <i>major</i>	0.00	100.00	0.00	0.00	0.00
<i>Verbascum blattaria</i>	0.30	20.00	0.90	0.30	0.90
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>3.5</b>	<b>100.0</b>	<b>10.5</b>	<b>3.5</b>	<b>10.5</b>
<b>INTRODUCED ANNUAL GRASSES</b>					
<i>Bromus japonicus</i>	0.00	40.00	0.00	0.00	0.00
<b>TOTAL INTRO. ANN. GRASSES</b>	<b>0.0</b>	<b>40.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>NATIVE PERENNIAL FORBS</b>					
<i>Achillea lanulosa</i>	0.20	60.00	0.60	0.20	0.60
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>	0.20	20.00	0.60	0.20	0.60
<i>Antennaria corymbosa</i>	0.00	20.00	0.00	0.00	0.00
<i>Antennaria rosea</i>	0.00	40.00	0.00	0.00	0.00
<i>Artemisia ludoviciana</i>	0.20	60.00	0.60	0.20	0.60
<i>Aster porteri</i>	0.10	100.00	0.30	0.10	0.30
<i>Astragalus agrestis</i>	0.00	20.00	0.00	0.00	0.00
<i>Astragalus shortianus</i>	0.00	20.00	0.00	0.00	0.00
<i>Dalea candida</i> var. <i>oligophylla</i>	0.00	40.00	0.00	0.00	0.00
<i>Dalea purpurea</i>	0.10	60.00	0.30	0.10	0.30
<i>Erigeron flagellaris</i>	0.00	60.00	0.00	0.00	0.00
<i>Gaillardia aristata</i>	0.00	40.00	0.00	0.00	0.00
<i>Heterotheca fulcrata</i>	0.10	40.00	0.30	0.10	0.30
<i>Heterotheca villosa</i>	0.30	60.00	0.90	0.30	0.90
<i>Hymenopappus filifolius</i>	0.20	20.00	0.60	0.20	0.60
<i>Lesquerella montana</i>	0.00	40.00	0.00	0.00	0.00
<i>Liatris punctata</i>	0.10	40.00	0.30	0.10	0.30
<i>Lithospermum incisum</i>	0.00	20.00	0.00	0.00	0.00
<i>Oligosporus caudatus</i>	0.00	20.00	0.00	0.00	0.00
<i>Oligosporus dracunculus</i> ssp. <i>glaucus</i>	0.00	20.00	0.00	0.00	0.00
<i>Oxybaphus linearis</i>	0.00	40.00	0.00	0.00	0.00
<i>Oxytropis x sericea</i>	0.00	40.00	0.00	0.00	0.00
<i>Paronychia jamesii</i>	0.10	20.00	0.30	0.10	0.30
<i>Psoralidium tenuiflorum</i>	0.10	80.00	0.30	0.10	0.30
<i>Ratibida columnifera</i>	0.00	40.00	0.00	0.00	0.00
<i>Solidago</i> spp.	0.00	60.00	0.00	0.00	0.00
<i>Sphaeralcea coccinea</i>	0.00	40.00	0.00	0.00	0.00
<i>Townsendia hookeri</i>	0.50	20.00	1.51	0.50	1.50
<i>Virgulus falcatus</i>	0.10	100.00	0.30	0.10	0.30
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>2.3</b>	<b>100.0</b>	<b>6.9</b>	<b>2.3</b>	<b>6.9</b>

**Table 14. Cover Data - Spray Transects. Tordon Post-Spray Study,  
City of Boulder Open Space, CO - Sept. 2000.**

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
<b>INTRODUCED PERENNIAL FORBS</b>					
<i>Cichorium intybus</i>	0.10	20.00	0.30	0.10	0.30
<i>Convolvulus arvensis</i>	0.00	20.00	0.00	0.00	0.00
<i>Hypericum perforatum</i>	0.00	40.00	0.00	0.00	0.00
<i>Potentilla recta</i>	0.10	40.00	0.30	0.10	0.30
<i>Rumex crispus</i>	0.00	20.00	0.00	0.00	0.00
<b>TOTAL INTRO. PERENNIAL FORBS</b>	<b>0.2</b>	<b>80.0</b>	<b>0.6</b>	<b>0.2</b>	<b>0.6</b>
<b>NATIVE PERENNIAL GRASSES (cool)</b>					
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	2.90	100.00	8.73	3.00	8.98
<i>Hesperostipa comata</i>	1.20	20.00	3.61	1.20	3.59
<i>Koeleria macrantha</i>	1.20	80.00	3.61	1.20	3.59
<i>Pascopyrum smithii</i>	2.30	100.00	6.93	2.30	6.89
<i>Poa agassizensis</i>	0.40	40.00	1.20	0.40	1.20
<i>Poa compressa</i>	0.90	80.00	2.71	0.90	2.69
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>8.9</b>	<b>100.0</b>	<b>26.8</b>	<b>9.0</b>	<b>26.9</b>
<b>INTRODUCED PERENNIAL GRASSES (cool)</b>					
<i>Bromopsis inermis</i>	0.00	20.00	0.00	0.00	0.00
<b>TOTAL INTRO. PERENNIAL GRASSES (c)</b>	<b>0.0</b>	<b>20.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>NATIVE PERENNIAL GRASSES (warm)</b>					
<i>Andropogon gerardii</i>	0.00	20.00	0.00	0.00	0.00
<i>Aristida purpurea</i>	0.10	60.00	0.30	0.10	0.30
<i>Bouteloua curtipendula</i>	4.50	100.00	13.55	4.50	13.47
<i>Buchloe dactyloides</i>	5.70	100.00	17.17	5.80	17.37
<i>Chondrosum gracile</i>	5.70	100.00	17.17	5.70	17.07
<i>Chondrosum hirsutum</i>	1.00	40.00	3.01	1.00	2.99
<i>Schizachyrium scoparium</i>	0.90	40.00	2.71	0.90	2.69
<i>Sorghastrum avenaceum</i>	0.10	20.00	0.30	0.10	0.30
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>18.0</b>	<b>100.0</b>	<b>54.2</b>	<b>18.1</b>	<b>54.2</b>
<b>NATIVE SUBSHRUBS</b>					
<i>Artemisia frigida</i>	0.10	80.00	0.30	0.10	0.30
<i>Gutierrezia sarothrae</i>	0.00	40.00	0.00	0.00	0.00
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>0.1</b>	<b>80.0</b>	<b>0.3</b>	<b>0.1</b>	<b>0.3</b>
<b>LICHEN</b>					
<i>Cladonia</i> spp.	0.10	20.00	0.30	0.10	0.30
<i>Xanthoparmelia chlorochroa</i>	0.00	20.00	0.00	0.00	0.00
<b>TOTAL LICHEN</b>	<b>0.1</b>	<b>40.0</b>	<b>0.3</b>	<b>0.1</b>	<b>0.3</b>
<b>SUCCULENT</b>					
<i>Opuntia fragilis</i>	0.00	20.00	0.00	0.00	0.00
<i>Opuntia macrorhiza</i>	0.00	100.00	0.00	0.00	0.00
<i>Opuntia polyacantha</i>	0.00	20.00	0.00	0.00	0.00
<b>TOTAL SUCCULENT</b>	<b>0.0</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>AGAVOIDS</b>					
<i>Yucca glauca</i>	0.00	20.00	0.00	0.00	0.00
<b>TOTAL AGAVOIDS</b>	<b>0.0</b>	<b>20.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>

**Table 14. Cover Data - Spray Transects. Tordon Post-Spray Study,  
City of Boulder Open Space, CO - Sept. 2000.**

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
Standing dead	0.20	40.00		0.20	
Litter	54.70	100.00		54.70	
Bare soil	9.60	100.00		9.60	
Rock	2.30	40.00		2.30	
TOTALS	100.0			100.2	
TOTAL VEGETATION COVER	33.2 (s=6.7)		100.0	33.4 (s=6.5)	100.0
GROUND COVER (Litter+Rock+Veg+St.Dead)	90.4			90.6	
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 32.0 Std.Dev.= 6.7)					

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

**Table 14. Cover Data - Spray Transects. Tordon Post-Spray Study,  
City of Boulder Open Space, CO - Sept. 2000.** Percent Foliar Cover\*

PLANT SPECIES	—Sample Number—				
	Spray 1	Spray 2	Spray 3	Spray 4	Spray 5
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>					
<i>Erigeron divergens</i>	0.5		P		
<i>Erysimum asperum</i>	P				P
<i>Grindelia squarrosa</i>		P	P	P	P
<i>Plantago patagonica</i>		P			
<i>Pterogonum alatum</i>	P	P			
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>0.5</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>					
<i>Acosta diffusa</i>	1.5	4.0	2.0	8.0	P
<i>Alyssum parviflorum</i>		P	P		0.5
<i>Plantago lanceolata</i>				P	
<i>Podospermum laciniatum</i>				P	
<i>Tragopogon dubius</i> ssp. <i>major</i>	P	P	P	P	P
<i>Verbascum blattaria</i>				1.5	
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>1.5</b>	<b>4.0</b>	<b>2.0</b>	<b>9.5</b>	<b>0.5</b>
<b>INTRODUCED ANNUAL GRASSES</b>					
<i>Bromus japonicus</i>			P		P
<b>TOTAL INTRO. ANN. GRASSES</b>	<b>—</b>	<b>—</b>	<b>P</b>	<b>—</b>	<b>P</b>
<b>NATIVE PERENNIAL FORBS</b>					
<i>Achillea lanulosa</i>		P	1.0	P	
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>			1.0		
<i>Antennaria corymbosa</i>	P				
<i>Antennaria rosea</i>		P	P		
<i>Artemisia ludoviciana</i>	P		1.0		P
<i>Aster porteri</i>	0.5	P	P	P	P
<i>Astragalus agrestis</i>			P		
<i>Astragalus shortianus</i>	P				
<i>Dalea candida</i> var. <i>oligophylla</i>	P		P		
<i>Dalea purpurea</i>	P	P	0.5		
<i>Erigeron flagellaris</i>		P		P	P
<i>Gaillardia aristata</i>	P		P		
<i>Heterotheca fulcrata</i>	0.5		P		
<i>Heterotheca villosa</i>	1.0		0.5	P	
<i>Hymenopappus filifolius</i>	1.0				
<i>Lesquerella montana</i>	P		P		
<i>Liatris punctata</i>	0.5	P			
<i>Lithospermum incisum</i>	P				
<i>Oligosporus caudatus</i>		P			
<i>Oligosporus dracunculus</i> ssp. <i>glauca</i>					P
<i>Oxybaphus linearis</i>		P		P	
<i>Oxytropis x sericea</i>	P		P		
<i>Paronychia jamesii</i>	0.5				
<i>Psoraleidum tenuiflorum</i>	P	P	P	0.5	
<i>Ratibida columnifera</i>		P		P	
<i>Sciidago</i> spp.	P		P	P	
<i>Sphaeralcea coccinea</i>			P	P	
<i>Townsendia hookeri</i>	2.5				
<i>Virgulus falcatus</i>	P	P	P	P	0.5
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>6.5</b>	<b>P</b>	<b>4.0</b>	<b>0.5</b>	<b>0.5</b>

**Table 14. Cover Data - Spray Transects. Tordon Post-Spray Study,  
City of Boulder Open Space, CO - Sept. 2000.**

PLANT SPECIES

Percent Foliar Cover\*

	—Sample Number—				
	Spray 1	Spray 2	Spray 3	Spray 4	Spray 5
<b>INTRODUCED PERENNIAL FORBS</b>					
<i>Cichorium intybus</i>				0.5	
<i>Convolvulus arvensis</i>			P		
<i>Hypericum perforatum</i>	P		P		
<i>Potentilla recta</i>				0.5	P
<i>Rumex crispus</i>				P	
<b>TOTAL INTRO. PERENNIAL FORBS</b>	P	—	P	1.0	P
<b>NATIVE PERENNIAL GRASSES (cool)</b>					
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	4.0	6.5(0.5)	2.0	1.5	0.5
<i>Hesperostipa comata</i>	6.0				
<i>Koeleria macrantha</i>	4.5	0.5	P		1.0
<i>Pascopyrum smithii</i>	P	2.5	5.5	1.0	2.5
<i>Poa agassizensis</i>			P		2.0
<i>Poa compressa</i>		0.5	P	3.0	1.0
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	14.5	10.0(0.5)	7.5	5.5	7.0
<b>INTRODUCED PERENNIAL GRASSES (cool)</b>					
<i>Bromopsis inermis</i>				P	
<b>TOTAL INTRO. PERENNIAL GRASSES (c)</b>	—	—	—	P	—
<b>NATIVE PERENNIAL GRASSES (warm)</b>					
<i>Andropogon gerardii</i>	P				
<i>Aristida purpurea</i>	P	P	0.5		
<i>Bouteloua curtipendula</i>	8.0	6.0	8.5	P	P
<i>Buchloe dactyloides</i>	P	4.0	7.5	4.0(0.5)	13.0
<i>Chondrosum gracile</i>	P	2.5	9.0	9.5	7.5
<i>Chondrosum hirsutum</i>	2.5		2.5		
<i>Schizachyrium scoparium</i>	3.5		1.0		
<i>Sorghastrum avenaceum</i>	0.5				
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	14.5	12.5	29.0	13.5(0.5)	20.5
<b>NATIVE SUBSHRUBS</b>					
<i>Artemisia frigida</i>	P	0.5		P	P
<i>Gutierrezia sarothrae</i>		P			P
<b>TOTAL NATIVE SUBSHRUBS</b>	P	0.5	—	P	P
<b>LICHEN</b>					
<i>Cladonia</i> spp.	0.5				
<i>Xanthoparmelia chlorochroa</i>		P			
<b>TOTAL LICHEN</b>	0.5	P	—	—	—
<b>SUCCULENT</b>					
<i>Opuntia fragilis</i>					P
<i>Opuntia macrorhiza</i>	P	P	P	P	P
<i>Opuntia polyacantha</i>					P
<b>TOTAL SUCCULENT</b>	P	P	P	P	P
<b>AGAVOIDS</b>					
<i>Yucca glauca</i>	P				
<b>TOTAL AGAVOIDS</b>	P	—	—	—	—



**Table 14. Cover Data - Spray Transects. Tordon Post-Spray Study,  
City of Boulder Open Space, CO - Sept. 2000.** Percent Foliar Cover\*

PLANT SPECIES

	---Sample Number---				
	Spray 1	Spray 2	Spray 3	Spray 4	Spray 5
Standing dead		0.5		0.5	
Litter	41.5	48.5	56.0	59.5	68.0
Bare soil	14.5	18.5	1.5	10.0	3.5
Rock	6.0	5.5			
TOTALS	100	100	100	100	100
TOTAL VEGETATION COVER	38.0	27.0(0.5)	42.5	30.0(0.5)	28.5
GROUND COVER (Litter+Rock+Veg+St.Deed)	86	82(1)	99	90(1)	97
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 32.0 Std.Dev.= 6.7)	41	29	37	28	25

\*P= Present within 1 m. on either side of the cove

**Table 15. Frequency Data - Control Transect 1, Tordon Post-Spray Study,  
City of Boulder Open Space, Sept. 2000.**

PLANT SPECIES	FREQUENCY (%)	PRESENCE*									
		—Sample Number—									
		1	2	3	4	5	6	7	8	9	10
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Grindelia squarrosa</i>	10.00						P				
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	10.0	--	--	--	--	--	P	--	--	--	--
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Acosta diffusa</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Alyssum parviflorum</i>	80.00	P	P	P		P	P	P		P	P
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	100.0	P	P	P	P	P	P	P	P	P	P
<b>INTRODUCED ANNUAL GRASSES</b>											
<i>Bromus japonicus</i>	50.00				P			P	P	P	P
<b>TOTAL INTRO. ANN. GRASSES</b>	50.0	--	--	--	P	--	--	P	P	P	P
<b>NATIVE PERENNIAL FORBS</b>											
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>	30.00						P	P			P
<i>Heterotheca villosa</i>	50.00	P	P	P				P			P
<i>Liatris punctata</i>	10.00							P			
<i>Oligosporus dracuncululus</i> ssp. <i>glaucus</i>	20.00		P					P			
<i>Oxybaphus linearis</i>	20.00					P					P
<i>Sphaeralcea coccinea</i>	40.00	P		P		P		P			
<i>Virgulus falcatus</i>	50.00	P	P			P		P		P	
<b>TOTAL NATIVE PERENNIAL FORBS</b>	80.0	P	P	P	--	P	P	P	--	P	P
<b>INTRODUCED PERENNIAL FORBS</b>											
<i>Convolvulus arvensis</i>	10.00									P	
<i>Hypericum perforatum</i>	10.00			P							
<i>Potentilla recta</i>	40.00			P	P		P		P		
<b>TOTAL INTRO. PERENNIAL FORBS</b>	50.0	--	--	P	P	--	P	--	P	P	--
<b>NATIVE PERENNIAL GRASSES (cool)</b>											
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	10.00					P					
<i>Pascopyrum smithii</i>	70.00	P	P	P	P		P		P	P	
<i>Poa agassizensis</i>	10.00							P			
<i>Poa compressa</i>	80.00			P	P	P	P	P	P	P	P
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	100.0	P	P	P	P	P	P	P	P	P	P
<b>NATIVE PERENNIAL GRASSES (warm)</b>											
<i>Andropogon gerardii</i>	20.00	P	P								
<i>Aristida purpurea</i>	20.00						P	P			
<i>Buchloe dactyloides</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Chondrosium gracile</i>	100.00	P	P	P	P	P	P	P	P	P	P
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	100.0	P	P	P	P	P	P	P	P	P	P
<b>NATIVE SUBSHRUBS</b>											
<i>Artemisia frigida</i>	90.00	P	P	P		P	P	P	P	P	P
<b>TOTAL NATIVE SUBSHRUBS</b>	90.0	P	P	P	--	P	P	P	P	P	P
<b>SUCCULENT</b>											
<i>Echinocereus viridiflorus</i>	40.00		P	P				P			P
<i>Opuntia macrorhiza</i>	60.00		1			P	P	P	P	P	
<i>Opuntia polyacantha</i>	20.00				P		P				
<b>TOTAL SUCCULENT</b>	90.0	--	1	P	P	P	P	P	P	P	P
<b>SPECIES DENSITY (# of species/100 sq.m.)</b>											
(AVERAGE= 11.4 Std.Dev.= 2.5)		10	12	12	8	11	13	17	9	11	11

\*P=Present within 1m X 5m plot on right side (when standing at origin and facing the endpoint) of the cover transect.

Table 16. Frequency Data - Control Transect 2, Tordon Post-Spray Study,  
City of Boulder Open Space, Sept. 2000.

	FREQUENCY (%)	PRESENCE*									
		---Sample Number---									
		1	2	3	4	5	6	7	8	9	10
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Erigeron divergens</i>	40.00		P		P	P					P
<i>Grindelia squarrosa</i>	10.00	P									
<i>Pterogonum alatum</i>	70.00	P			P		P	P	P	P	P
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>90.0</b>	<b>P</b>	<b>P</b>	<b>—</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Acosta diffusa</i>	40.00	P	P	P					P		
<i>Tragopogon dubius</i> ssp. major	10.00					P					
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>50.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>—</b>	<b>P</b>	<b>—</b>	<b>—</b>	<b>P</b>	<b>—</b>	<b>—</b>
<b>NATIVE PERENNIAL FORBS</b>											
<i>Artemisia ludoviciana</i>	10.00				P						
<i>Aster porteri</i>	50.00	P	P		P			P	P		
<i>Astragalus agrestis</i>	10.00				P						
<i>Dalea purpurea</i>	30.00				P	P				P	
<i>Erigeron flagellaris</i>	10.00	P									
<i>Helianthus pumilus</i>	10.00										P
<i>Heterotheca fulcrata</i>	10.00										P
<i>Heterotheca villosa</i>	70.00		P		P	P	P	P	P	P	
<i>Liatis punctata</i>	50.00			P	P				P	P	
<i>Nothocalais cuspidata</i>	20.00					P	P				
<i>Oligosporus caudatus</i>	20.00			P	P						
<i>Oxytropis x sericea</i>	10.00										P
<i>Paronychia jamesii</i>	60.00		P		P		P	P	P	P	
<i>Penstemon secundiflorus</i>	30.00				P				P	P	
<i>Psoraleidum tenuiflorum</i>	30.00		P		P				P		
<i>Ratibida columnifera</i>	20.00				P			P			
<i>Sphaeralcea coccinea</i>	10.00	P									
<i>Townsendia hookeri</i>	40.00				P	P		P	P		
<i>Virgulus falcatus</i>	30.00			P		P	P				
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>NATIVE PERENNIAL GRASSES (cool)</b>											
<i>Carex pennsylvanica</i> ssp. heliophila	90.00	P	P	P	P	P	P	P	P		P
<i>Hesperostipa comata</i>	10.00							P			
<i>Koeleria macrantha</i>	70.00	P	P	P	P			P	P		P
<i>Pascopyrum smithii</i>	40.00	P	P	P		P					
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>90.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>—</b>	<b>P</b>
<b>NATIVE PERENNIAL GRASSES (warm)</b>											
<i>Andropogon gerardii</i>	30.00			P						P	P
<i>Aristida purpurea</i>	60.00					P	P	P	P	P	P
<i>Bouteloua curtipendula</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Buchloe dactyloides</i>	40.00	P	P	P			P				
<i>Chondrosium gracile</i>	70.00	P	P		P		P	P		P	P
<i>Chondrosium hirsutum</i>	30.00							P	P	P	
<i>Schizachyrium scoparium</i>	30.00						P	P		P	
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>NATIVE SUBSHRUBS</b>											
<i>Artemisia frigida</i>	80.00	P	P	P	P	P	P	P			P
<i>Gutierrezia sarothrae</i>	30.00	P	P	P							
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>80.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>—</b>	<b>—</b>	<b>P</b>

**Table 16. Frequency Data - Control Transect 2, Tordon Post-Spray Study,  
City of Boulder Open Space, Sept. 2000.**

	FREQUENCY (%)	PRESENCE*									
		---Sample Number---									
		1	2	3	4	5	6	7	8	9	10
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Erigeron divergens</i>	40.00		P		P	P				P	
<b>LICHEN</b>											
<i>Xanthoparmelia chlorochroa</i>	10.00		P								
<b>TOTAL LICHEN</b>	10.0	--	P	--	--	--	--	--	--	--	--
<b>SUCCULENT</b>											
<i>Opuntia macrorhiza</i>	30.00	P	P	P							
<b>TOTAL SUCCULENT</b>	30.0	P	P	P	--	--	--	--	--	--	--
<b>SPECIES DENSITY (# of species/100 sq.m.)</b> (AVERAGE= 14.1 Std.Dev.= 2.3)		15	16	13	19	12	13	15	14	13	11

\*P=Present within 1m X 5m plot on right side (when standing at origin and facing the endpoint) of the cover transect.

**Table 17. Frequency Data - Spray Transect 1, Tordon Post-Spray Study,  
City of Boulder Open Space, Sept. 2000.**

	FREQUENCY (%)	PRESENCE*									
		---Sample Number---									
		1	2	3	4	5	6	7	8	9	10
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Erigeron divergens</i>	30.00		P						P	P	
<i>Pterogonum alatum</i>	30.00					P	P				P
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>50.0</b>	--	P	--	--	P	P	--	P	P	--
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Acosta diffusa</i>	70.00				P	P	P	P	P	P	P
<i>Tragopogon dubius</i> ssp. major	10.00						P				
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>70.0</b>	--	--	--	P	P	P	P	P	P	P
<b>NATIVE PERENNIAL FORBS</b>											
<i>Antennaria corymbosa</i>	20.00	P		P							
<i>Artemisia ludoviciana</i>	10.00				P						
<i>Aster porteri</i>	40.00						P	P	P		P
<i>Astragalus shortianus</i>	30.00	P		P		P					
<i>Dalea candida</i> var. oligophylla	40.00				P	P	P				P
<i>Dalea purpurea</i>	50.00	P				P	P		P		P
<i>Gaillardia aristata</i>	20.00				P						P
<i>Heterotheca fulcrata</i>	60.00	P	P		P	P	P		P		
<i>Heterotheca villosa</i>	80.00	P	P	P	P	P	P	P	P		
<i>Hymenopappus filifolius</i>	80.00	P	P	P	P	P	P	P			P
<i>Lesquerella montana</i>	10.00					P					
<i>Liatris punctata</i>	90.00	P	P	P	P	P	P	P	P	P	
<i>Lithospermum incisum</i>	20.00							P	P		
<i>Oxytropis x sericea</i>	60.00			P		P	P		P	P	P
<i>Paronychia jamesii</i>	70.00	P	P	P	P		P			P	P
<i>Psoralidium tenuiflorum</i>	70.00	P	P	P				P	P	P	P
<i>Townsendia hookeri</i>	80.00	P		P	P	P	P	P	P		P
<i>Virgulus falcatus</i>	50.00						P	P	P	P	P
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>100.0</b>	P	P	P	P	P	P	P	P	P	P
<b>INTRODUCED PERENNIAL FORBS</b>											
<i>Hypericum perforatum</i>	10.00	P									
<b>TOTAL INTRO. PERENNIAL FORBS</b>	<b>10.0</b>	P	--	--	--	--	--	--	--	--	--
<b>NATIVE PERENNIAL GRASSES (cool)</b>											
<i>Carex pensylvanica</i> ssp. heliophila	90.00	P	P	P	P	P		P	P	P	P
<i>Hesperostipa comata</i>	30.00	P	P		P						
<i>Koeleria macrantha</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Pascopyrum smithii</i>	60.00					P	P	P	P	P	P
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>100.0</b>	P	P	P	P	P	P	P	P	P	P
<b>NATIVE PERENNIAL GRASSES (warm)</b>											
<i>Andropogon gerardii</i>	20.00				P	P					
<i>Aristida purpurea</i>	50.00				P	P	P	P	P		
<i>Bouteloua curtipendula</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Buchloe dactyloides</i>	40.00							P	P	P	P
<i>Chondrosum gracile</i>	70.00		P		P		P	P	P	P	P
<i>Chondrosum hirsutum</i>	90.00	P	P	P	P	P	P	P		P	P
<i>Schizachyrium scoparium</i>	80.00	P	P	P	P	P	P	P		P	
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>100.0</b>	P	P	P	P	P	P	P	P	P	P
<b>NATIVE SUBSHRUBS</b>											
<i>Artemisia frigida</i>	50.00		P	P	P	P			P		
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>50.0</b>	--	P	P	P	P	--	--	P	--	--

**Table 17. Frequency Data - Spray Transect 1, Tordon Post-Spray Study,  
City of Boulder Open Space, Sept. 2000.**

	FREQUENCY (%)	PRESENCE*									
		---Sample Number---									
		1	2	3	4	5	6	7	8	9	10
NATIVE ANNUAL & BIENNIAL FORBS											
<i>Erigeron divergens</i>	30.00		P						P	P	
LICHEN											
<i>Cladonia</i> spp.	10.00										P
TOTAL LICHEN	10.0	--	--	--	--	--	--	--	--	--	P
SUCCULENT											
<i>Opuntia macrorhiza</i>	20.00				P					P	
TOTAL SUCCULENT	20.0	--	--	--	P	--	--	--	--	P	--
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 18.6 Std.Dev.= 2.5)		17	15	15	21	22	21	19	20	18	18

\*P=Present within 1m X 5m plot on right side (when standing at origin and facing the endpoint) of the cover transect.

**Table 18. Frequency Data - Spray Transect 2, Tordon Post-Spray Study,  
City of Boulder Open Space, Sept. 2000.**

	FREQUENCY (%)	PRESENCE*									
		---Sample Number---									
		1	2	3	4	5	6	7	8	9	10
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Grindelia squarrosa</i>	10.00									P	
<i>Plantago patagonica</i>	10.00			P							
<i>Pterogonum alatum</i>	10.00			P							
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>20.0</b>	--	--	P	--	--	--	--	--	P	--
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Acosta diffusa</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Alyssum parviflorum</i>	10.00								P		
<i>Tragopogon dubius ssp. major</i>	30.00				P		P		P		
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>100.0</b>	P	P	P	P	P	P	P	P	P	P
<b>NATIVE PERENNIAL FORBS</b>											
<i>Achillea lanulosa</i>	10.00						P				
<i>Antennaria rosea</i>	10.00					P					
<i>Aster porteri</i>	50.00		P	P	P	P			P		
<i>Dalea purpurea</i>	30.00	P			P						P
<i>Erigeron flagellaris</i>	80.00	P	P	P	P	P	P	P	P		
<i>Liatris punctata</i>	30.00					P		P			P
<i>Oligosporus caudatus</i>	20.00						P		P		
<i>Oxybaphus linearis</i>	20.00	P							P		
<i>Psoralegium tenuiflorum</i>	10.00			P							
<i>Ratibida columnifera</i>	40.00							P	P	P	P
<i>Virgulus falcatus</i>	70.00	P			P	P	P	P	P		P
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>100.0</b>	P	P	P	P	P	P	P	P	P	P
<b>NATIVE PERENNIAL GRASSES (cool)</b>											
<i>Carex pensylvanica ssp. heliophila</i>	90.00	P	P	P	P		P	P	P	P	P
<i>Koeleria macrantha</i>	40.00				P			P		P	P
<i>Pascopyrum smithii</i>	100.00	P	P	P	P	P	P	P	P	P	P
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>100.0</b>	P	P	P	P	P	P	P	P	P	P
<b>NATIVE PERENNIAL GRASSES (warm)</b>											
<i>Aristida purpurea</i>	40.00			P				P	P	P	
<i>Bouteloua curtipendula</i>	80.00	P	P	P	P	P		P	P		P
<i>Buchloe dactyloides</i>	40.00							P	P	P	P
<i>Chondrosium gracile</i>	90.00	P	P	P	P	P		P	P	P	P
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>90.0</b>	P	P	P	P	P	--	P	P	P	P
<b>NATIVE SUBSHRUBS</b>											
<i>Artemisia frigida</i>	70.00		P		P	P	P	P	P	P	
<i>Gutierrezia sarothrae</i>	70.00	P	P	P	P	P	P	P	P		
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>90.0</b>	P	P	P	P	P	P	P	P	P	--
<b>LICHEN</b>											
<i>Xanthoparmelia chlorochroa</i>	20.00			P	P						
<b>TOTAL LICHEN</b>	<b>20.0</b>	--	--	P	P	--	--	--	--	--	--
<b>SUCCULENT</b>											
<i>Opuntia macrorhiza</i>	10.00						P				
<b>TOTAL SUCCULENT</b>	<b>10.0</b>	--	--	--	--	--	P	--	--	--	--
<b>SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 11.9 Std.Dev.= 2.2)</b>											
		10	9	13	14	11	11	14	16	10	11

\*P=Present within 1m X 5m plot on right side (when standing at origin and facing the endpoint) of the cover transect.

**Table 19. Frequency Data - Spray Transect 3, Tordon Post-Spray Study,  
City of Boulder Open Space, Sept. 2000.**

	FREQUENCY (%)	PRESENCE*									
		---Sample Number---									
		1	2	3	4	5	6	7	8	9	10
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Erigeron divergens</i>	40.00	P	P		P		P				
<i>Grindelia squarrosa</i>	10.00	P									
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>40.0</b>	<b>P</b>	<b>P</b>	<b>--</b>	<b>P</b>	<b>--</b>	<b>P</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Acosta diffusa</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Alyssum parviflorum</i>	60.00	P				P	P	P	P		P
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>INTRODUCED ANNUAL GRASSES</b>											
<i>Bromus japonicus</i>	70.00	P	P				P	P	P	P	P
<b>TOTAL INTRO. ANN. GRASSES</b>	<b>70.0</b>	<b>P</b>	<b>P</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>NATIVE PERENNIAL FORBS</b>											
<i>Achillea lanulosa</i>	20.00		P			P					
<i>Artemisia ludoviciana</i>	20.00	P	P								
<i>Aster porteri</i>	30.00			P	P				P		
<i>Astragalus agrestis</i>	10.00								P		
<i>Dalea candida</i> var. <i>oligophylla</i>	10.00			P							
<i>Dalea purpurea</i>	60.00	P	P	P	P		P				P
<i>Gaillardia aristata</i>	10.00	P									
<i>Heterotheca fulcrata</i>	20.00		P		P						
<i>Heterotheca villosa</i>	50.00	P	P	P			P		P		
<i>Lesquerella montana</i>	30.00	P	P	P							
<i>Oxytropis x sericea</i>	10.00		P								
<i>Psoralea tenuiflorum</i>	20.00	P	P								
<i>Solidago</i> spp.	10.00						P				
<i>Sphaeralcea coccinea</i>	20.00				P		P				
<i>Virgulus falcatus</i>	90.00	P		P	P	P	P	P	P	P	P
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>INTRODUCED PERENNIAL FORBS</b>											
<i>Convolvulus arvensis</i>	30.00	P	P		P						
<i>Hypericum perforatum</i>	30.00							P	P	P	
<b>TOTAL INTRO. PERENNIAL FORBS</b>	<b>60.0</b>	<b>P</b>	<b>P</b>	<b>--</b>	<b>P</b>	<b>--</b>	<b>--</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>--</b>
<b>NATIVE PERENNIAL GRASSES (cool)</b>											
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	20.00	P	P								
<i>Koeleria macrantha</i>	60.00	P	P		P		P	P	P		
<i>Pascopyrum smithii</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Poa agassizensis</i>	40.00	P					P	P			P
<i>Poa compressa</i>	40.00		P	P			P	P			
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>NATIVE PERENNIAL GRASSES (warm)</b>											
<i>Bouteloua curtipendula</i>	60.00	P	P	P	P		P		P		
<i>Buchloe dactyloides</i>	70.00	P			P	P	P	P	P		P
<i>Chondrosium gracile</i>	100.00	P	P	P	P	P	P	P	P	P	P
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>100.0</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>
<b>SUCCULENT</b>											
<i>Opuntia macrorhiza</i>	10.00		P								
<b>TOTAL SUCCULENT</b>	<b>10.0</b>	<b>--</b>	<b>P</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>
<b>SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 12.5 Std.Dev.= 4.7)</b>		<b>20</b>	<b>19</b>	<b>11</b>	<b>13</b>	<b>7</b>	<b>16</b>	<b>11</b>	<b>13</b>	<b>6</b>	<b>9</b>

\*P=Present within 1m X 5m plot on right side (when standing at origin and facing the endpoint) of the cover transect.



**Table 20. Frequency Data - Spray Transect 4, Tordon Post-Spray Study,  
City of Boulder Open Space, Sept. 2000.**

	FREQUENCY (%)	PRESENCE*									
		---Sample Number---									
		1	2	3	4	5	6	7	8	9	10
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Grindelia squarrosa</i>	10.00								P		
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	10.0	--	--	--	--	--	--	--	P	--	--
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Acosta diffusa</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Podospermum laciniatum</i>	20.00					P			P		
<i>Tragopogon dubius</i> ssp. <i>major</i>	10.00					P					
<i>Verbascum blattaria</i>	30.00				P	P	P				
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	100.0	P	P	P	P	P	P	P	P	P	P
<b>NATIVE PERENNIAL FORBS</b>											
<i>Achillea lanulosa</i>	20.00				P					P	
<i>Aster porteri</i>	10.00										P
<i>Erigeron flagellaris</i>	10.00			P							
<i>Heterotheca villosa</i>	30.00	P	P					P			
<i>Oxybaphus linearis</i>	20.00		P							P	
<i>Psoralidium tenuiflorum</i>	70.00	P	P	P				P		P	P
<i>Ratibida columnifera</i>	20.00		P		P						
<i>Rumex crispus</i>	10.00					P					
<i>Sphaeralcea coccinea</i>	20.00	P		P							
<i>Virgulus falcatus</i>	60.00		P		P				P	P	P
<b>TOTAL NATIVE PERENNIAL FORBS</b>	100.0	P	P	P	P	P	P	P	P	P	P
<b>INTRODUCED PERENNIAL FORBS</b>											
<i>Cichorium intybus</i>	30.00					P	P	P			
<i>Potentilla recta</i>	10.00				P						
<b>TOTAL INTRO. PERENNIAL FORBS</b>	40.0	--	--	--	P	P	P	P	--	--	--
<b>NATIVE PERENNIAL GRASSES (cool)</b>											
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	80.00	P	P	P	P		P	P	P	P	
<i>Pascopyrum smithii</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Poa compressa</i>	10.00					P					
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	100.0	P	P	P	P	P	P	P	P	P	P
<b>NATIVE PERENNIAL GRASSES (warm)</b>											
<i>Bouteloua curtipendula</i>	20.00				P		P				
<i>Buchloe dactyloides</i>	90.00	P	P	P	P		P	P	P	P	P
<i>Chondrosium gracile</i>	100.00	P	P	P	P	P	P	P	P	P	P
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	100.0	P	P	P	P	P	P	P	P	P	P
<b>NATIVE SUBSHRUBS</b>											
<i>Artemisia frigida</i>	10.00	P									
<b>TOTAL NATIVE SUBSHRUBS</b>	10.0	P	--	--	--	--	--	--	--	--	--
<b>SUCCULENT</b>											
<i>Opuntia macrorhiza</i>	20.00						P			P	
<b>TOTAL SUCCULENT</b>	20.0	--	--	--	--	--	P	--	--	P	--
<b>SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 9.1 Std.Dev.= 1.4)</b>											
		9	10	8	11	9	11	7	9	10	7

\*P=Present within 1m X 5m plot on right side (when standing at origin and facing the endpoint) of the cover transect.

**Table 21. Frequency Data - Spray Transect 5, Tordon Post-Spray Study,  
City of Boulder Open Space, Sept. 2000.**

	FREQUENCY (%)	PRESENCE*									
		—Sample Number—									
		1	2	3	4	5	6	7	8	9	10
<b>NATIVE ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Grindelia squarrosa</i>	10.00				P						
<b>TOTAL NATIVE ANN. &amp; BIEN. FORBS</b>	<b>10.0</b>	—	—	—	P	—	—	—	—	—	—
<b>INTRODUCED ANNUAL &amp; BIENNIAL FORBS</b>											
<i>Acosta diffusa</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Alyssum parviflorum</i>	80.00	P	P	P		P		P	P	P	P
<i>Tragopogon dubius</i> ssp. <i>major</i>	50.00	P	P	P						P	P
<b>TOTAL INTRO. ANN. &amp; BIEN. FORBS</b>	<b>100.0</b>	P	P	P	P	P	P	P	P	P	P
<b>INTRODUCED ANNUAL GRASSES</b>											
<i>Bromus japonicus</i>	10.00								P		
<b>TOTAL INTRO. ANN. GRASSES</b>	<b>10.0</b>	—	—	—	—	—	—	—	P	—	—
<b>NATIVE PERENNIAL FORBS</b>											
<i>Artemisia ludoviciana</i>	80.00	P	P	P		P	P	P		P	P
<i>Aster porteri</i>	10.00								P		
<i>Erigeron flagellaris</i>	50.00	P	P	P		P	P				
<i>Oligosporus dracuncululus</i> ssp. <i>glaucus</i>	10.00									P	
<i>Virgulus falcatus</i>	80.00	P	P	P	P	P	P		P	P	
<b>TOTAL NATIVE PERENNIAL FORBS</b>	<b>100.0</b>	P	P	P	P	P	P	P	P	P	P
<b>INTRODUCED PERENNIAL FORBS</b>											
<i>Potentilla recta</i>	10.00		P								
<b>TOTAL INTRO. PERENNIAL FORBS</b>	<b>10.0</b>	—	P	—	—	—	—	—	—	—	—
<b>NATIVE PERENNIAL GRASSES (cool)</b>											
<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	70.00			P	P	P	P	P	P		P
<i>Koeleria macrantha</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Pascopyrum smithii</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Poa agassizensis</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Poa compressa</i>	90.00	P	P	P	P	P	P	P	P	P	P
<b>TOTAL NATIVE PERENNIAL GRASSES (c)</b>	<b>100.0</b>	P	P	P	P	P	P	P	P	P	P
<b>NATIVE PERENNIAL GRASSES (warm)</b>											
<i>Bouteloua curtipendula</i>	30.00	P				P			P		
<i>Buchloe dactyloides</i>	100.00	P	P	P	P	P	P	P	P	P	P
<i>Chondrosium gracile</i>	100.00	P	P	P	P	P	P	P	P	P	P
<b>TOTAL NATIVE PERENNIAL GRASSES (w)</b>	<b>100.0</b>	P	P	P	P	P	P	P	P	P	P
<b>NATIVE SUBSHRUBS</b>											
<i>Artemisia frigida</i>	50.00	P	P			P		P			P
<i>Gutierrezia sarothrae</i>	40.00	P						P	P	P	
<b>TOTAL NATIVE SUBSHRUBS</b>	<b>70.0</b>	P	P	—	—	P	—	P	P	P	P
<b>SUCCULENT</b>											
<i>Opuntia fragilis</i>	10.00						P				
<i>Opuntia macrorhiza</i>	40.00				P	P		P			P
<i>Opuntia polyacantha</i>	20.00				P		P				
<b>TOTAL SUCCULENT</b>	<b>50.0</b>	—	—	—	P	P	P	P	—	—	P
<b>SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 13.4 Std.Dev.= 1.1)</b>											
		15	14	13	12	15	13	12	14	13	13

\*P=Present within 1m X 5m plot on right side (when standing at origin and facing the endpoint) of the cover transect.

Table 22. Knapweed (*Acosta diffusa*) Density, Tordon Post-Spray Study, City of Boulder Open Space, Sept. 2000.

	AVERAGE	MAXIMUM	Subplot Number # of individuals / sq.m.									
			1	2	3	4	5	6	7	8	9	10
C1 Rosette	20	54	2	49	1	51	14	54	19	0	10	2
C1 Bolt	23	43	25	17	17	30	36	43	15	13	21	12
C1 Dead	0	0	0	0	0	0	0	0	0	0	0	0
C2 Rosette	9	54	24	54	15	1	0	0	0	0	0	0
C2 Bolt	1	7	2	7	1	1	0	0	0	0	0	1
C2 Dead	0	1	0	0	0	1	0	0	0	0	0	0
S1 Rosette	1	6	0	0	0	0	0	1	1	0	0	6
S1 Bolt	0	2	0	0	0	1	2	0	0	0	1	0
S1 Dead	0	0	0	0	0	0	0	0	0	0	0	0
S2 Rosette	16	42	11	1	13	37	42	4	8	9	32	7
S2 Bolt	5	20	6	1	0	4	20	4	2	1	6	4
S2 Dead	0	0	0	0	0	0	0	0	0	0	0	0
S3 Rosette	8	26	16	18	26	10	2	1	2	4	0	0
S3 Bolt	3	11	4	4	11	3	1	0	11	1	0	0
S3 Dead	0	0	0	0	0	0	0	0	0	0	0	0
S4 Rosette	35	124	124	64	9	0	58	29	53	4	4	0
S4 Bolt	8	24	24	8	9	1	11	9	15	1	2	0
S4 Dead	0	0	0	0	0	0	0	0	0	0	0	0
S5 Rosette	0	0	0	0	0	0	0	0	0	0	0	0
S5 Bolt	0	2	0	0	0	0	0	0	0	0	1	2
S5 Dead	4	12	2	2	2	5	1	7	12	10	1	0

Table 23. Relative Cover by Lifeform, Tordon Post-Spray Study, City of Boulder Open Space - Spring Sample Dates, June 2000.

Percent Relative Cover (All-Hits)<sup>1</sup>

----- SAMPLE NUMBER and DATE OF SAMPLING-----

LIFEFORM	Control 1					Control 2					Spray 1				
	1996	1997	1998	1999	2000	1996	1997	1998	1999	2000	1996	1997	1998	1999	2000
Nat. Ann. & Bien. Forbs	0	2.0	2.6	0	0	0	0	3.7	6.7	3.8	2.8	0	1.3	5.2	0
Int. Ann. & Bien. Forbs	62.3	64.7	55.6	54.2	47.6	0	4.8	4.9	3.8	3.8	13.9	3.8	6.5	7.8	2.0
Nat. Ann. Grass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Int. Ann. Grass	18.8	4.9	9.3	6.7	6.3	0	0	0	0	0	0	0	0	0	0
Nat. Per. Forbs	11.6	7.8	6.0	8.3	9.5	44.4	24.8	28.4	22.9	30.2	36.1	26.9	26.0	26.0	37.3
Int. Per. Forbs	1.4	2.0	0.7	0	0	0	0	1.2	0	0	0	0	0	0	0
Nat. Per. Grass (c)	2.9	2.9	9.9	7.5	3.2	52.8	44.8	25.9	25.7	43.4	33.3	38.5	26.0	7.8	23.5
Int. Per. Grass (c)	0	0	0	0	0	0	0	0	0.0	0.0	0	0	0	0	0
Nat. Per. Grass (w)	2.9	15.7	15.2	23.3	31.7	2.8	24.8	32.1	39.0	17.0	11.1	29.5	36.4	49.4	35.3
Native Subshrubs	0	0	0.7	0	1.6	0	0	3.7	1.0	1.9	0	0	0	1.3	0
Native Shrubs	0	0	0	0	0	0	0	0	0	0	2.8	0	3.9	1.3	0
Other*	0	0	0	0	0	0	1	0	1.0	0	0	1.3	0.0	1.3	0

Percent Relative Cover (All-Hits)<sup>1</sup>

----- SAMPLE NUMBER and DATE OF SAMPLING-----

LIFEFORM	Spray 2					Spray 3					Spray 4					Spray 5
	1996	1997	1998	1999	2000	1996	1997	1998	1999	2000	1996	1997	1998	1999	2000	2000
Nat. Ann. & Bien. Forbs	0	0.9	3.8	2.4	4.3	1.9	3.9	5.8	2.6	3.4	0	0.9	0	0	0	0
Int. Ann. & Bien. Forbs	33.8	3.8	6.4	9.8	27.7	31.5	7.8	11.5	20.5	12.1	53.7	18.2	28.4	19.7	33.3	23.3
Nat. Ann. Grass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Int. Ann. Grass	4.6	4.7	5.1	2.4	0	16.7	14.1	5.0	3.4	8.6	4.6	11.8	2.5	7.3	0	0
Nat. Per. Forbs	21.5	16.0	14.1	22.0	6.4	29.6	8.6	12.2	8.5	8.6	3.7	0.9	6.8	8.0	5.3	16.7
Int. Per. Forbs	1.5	0.9	0	0	0	1.9	0.8	0	2.6	0	0	0	0	0.7	0	3.3
Nat. Per. Grass (c)	29.2	30.2	35.9	22.0	29.8	11.1	27.3	20.9	18.8	32.8	32.4	55.5	50.0	34.3	18.7	35.6
Int. Per. Grass (c)	0	0	0	0	0	0	0	0	0	0	0	0	0	4.4	0	0
Nat. Per. Grass (w)	7.7	32.1	24.4	41.5	31.9	3.7	36.7	43.2	42.7	34.5	3.7	12.7	12.3	24.8	42.7	20.0
Native Subshrubs	1.5	11.3	10.3	0.0	0.0	1.9	0.8	0.7	0	0	0.0	0.0	0.0	0.7	0.0	1.1
Native Shrubs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other*	0	0	0	0	0	1.9	0	0.7	0.9	0	1.9	0	0	0	0	0

\* Category includes bryophytes, mushrooms, lichens, and succulents.

<sup>1</sup> Due to rounding errors, these values may not sum exactly to 100

Table 24. Relative Cover by Lifeform, Tordon Post-Spray Study, City of Boulder Open Space - Fall Sample Dates, September 2000.

Percent Relative Cover (All-Hits)<sup>1</sup>

----- SAMPLE NUMBER and DATE OF SAMPLING -----

LIFEFORM	Control 1						Control 2						Spray 1					
	1995	1996	1997	1998	1999	2000	1995	1996	1997	1998	1999	2000	1995	1996	1997	1998	1999	2000
Nat. Ann. & Bien. Forbs	0	4.2	0	2.9	0	0	1.0	1.1	0	1.4	4.9	5.4	0.8	0	4.2	0	3.4	1.3
Int. Ann. & Bien. Forbs	38.4	58.9	64.1	46.4	48.5	30.4	0.0	2.1	0	4.2	1.2	12.5	6.7	4.8	8.5	3.8	4.5	3.9
Nat. Ann. Grass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Int. Ann. Grass	25.4	1.1	1.4	3.6	0	0	2.1	0	0	1.4	0	0	0	0	0	0	0	0
Nat. Per. Forbs	5.8	5.3	2.8	5.7	6.9	1.4	20.8	29.8	25.3	26.8	23.2	21.4	12.5	15.9	18.3	12.7	16.9	17.1
Int. Per. Forbs	0.7	0	2.8	0.7	0	0	0	0	0	1.4	0	0	0	0	0	0	0	0
Nat. Per. Grass (c)	10.9	3.2	1.4	6.4	4.0	8.7	39.6	28.7	34.7	21.1	20.7	25.0	31.7	31.7	22.5	30.4	9.0	38.2
Int. Per. Grass (c)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nat. Per. Grass (w)	18.8	27.4	27.5	33.6	40.6	53.6	34.4	38.3	40	35.2	50.0	35.7	47.5	44.7	46.5	49.4	64.0	38.2
Native Subshrubs	0	0	0	0	0	4.3	0	0	0	8.5	0	0	0	0	0	0	1.1	0
Native Shrubs	0	0	0	0	0	0	2.1	0	0	0	0	0	0.8	3.2	0	1.3	1.1	0
Other*	0	0	0	0.7	0	1.4	0.0	0	0	0	0	0	0	0	0	2.6	0.0	1.3

Percent Relative Cover (All-Hits)<sup>1</sup>

----- SAMPLE NUMBER and DATE OF SAMPLING -----

LIFEFORM	Spray 2						Spray 3						Spray 4						Spray 5
	1995	1996	1997	1998	1999	2000	1995	1996	1997	1998	1999	2000	1995	1996	1997	1998	1999	2000	2000
Nat. Ann. & Bien. Forbs	0	0	0	0	1.5	0	1.3	0	0	0.7	0	0	0	0	0.7	0	0	0	0
Int. Ann. & Bien. Forbs	33.9	2.7	6.4	8.2	14.7	14.5	36.0	8.2	4.5	12.6	16.0	4.7	42.7	9.0	9.6	32.1	26.9	31.1	1.8
Nat. Ann. Grass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Int. Ann. Grass	3.5	1.4	4.3	1.2	0	0	8.7	13.1	4.5	2.2	3.7	0	9.9	6.3	3	1.2	0	0	0
Nat. Per. Forbs	13	16.2	5.3	11.8	5.9	0	11.3	1.6	6.7	7.4	11.1	9.4	2.9	3.6	3.7	3.7	4.3	1.6	1.8
Int. Per. Forbs	0.9	0	0	0	0	0	0.7	1.6	6.7	0.0	1.2	0	0	0	0	0.6	1.1	3.3	0
Nat. Per. Grass (c)	31.3	50	28.7	40.0	23.5	38.2	29.3	36.1	29.2	20.7	16.0	17.6	38.0	52.3	35.6	34.6	31.2	18.0	24.6
Int. Per. Grass (c)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nat. Per. Grass (w)	11.3	27	44.7	30.6	52.9	45.5	10.7	39.3	46.1	56.3	51.9	68.2	5.3	25.2	43.7	27.8	36.6	45.9	71.9
Native Subshrubs	6.1	0	10.6	8.2	1.5	1.8	1.3	0	0	0	0	0	0	0	1.5	0	0	0	0
Native Shrubs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other*	0	2.8	0	0	0	0	0.7	0	2.2	0	0	0	1.2	3.6	2.2	0	0	0	0

\* Category includes bryophytes, mushrooms, lichens, and succulents.

<sup>1</sup> Due to rounding errors, these values may not sum exactly to 100.0

1995 data was estimated based on data collected in the spring of 1996.

Table 25. Species Density by Lifeform, Tordon Post-Spray Study, City of Boulder Open Space - Spring Sample Dates, June 2000

Number of Species / 100 sq. m.

----- SAMPLE NUMBER and DATE OF SAMPLING-----

LIFEFORM	Control 1					Control 2					Spray 1				
	1996	1997	1998	1999	2000	1996	1997	1998	1999	2000	1996	1997	1998	1999	2000
Nat. Ann. & Bien. Forbs	2	4	3	2	1	4	5	6	7	2	4	5	6	5	4
Int. Ann. & Bien. Forbs	8	8	9	9	4	3	7	6	6	3	3	4	5	4	3
Nat. Ann. Grass	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0
Int. Ann. Grass	2	2	2	2	2	1	1	1	1	1	0	1	1	0	1
Nat. Per. Forbs	15	14	16	18	7	20	35	34	33	20	24	31	36	36	24
Int. Per. Forbs	1	3	2	3	2	1	2	1	2	0	1	1	1	1	0
Nat. Per. Grass (c)	3	4	6	7	7	4	7	8	7	6	3	6	7	4	6
Int. Per. Grass (c)	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
Nat. Per. Grass (w)	3	4	6	6	5	5	7	7	7	5	5	7	8	7	9
Native Subshrubs	0	0	1	2	1	0	0	1	2	2	1	1	1	1	1
Native Shrubs	0	0	0	0	0	0	0	0	0	0	2	1		1	0
Other*	2	2	4	4	2	3	1	3	2	2	3	2	2	2	1

Number of Species / 100 sq. m.

----- SAMPLE NUMBER and DATE OF SAMPLING-----

LIFEFORM	Spray 2					Spray 3					Spray 4					Spray 5
	1996	1997	1998	1999	2000	1996	1997	1998	1999	2000	1996	1997	1998	1999	2000	2000
Nat. Ann. & Bien. Forbs	5	5	8	6	5	5	6	7	7	3	3	8	5	3	0	4
Int. Ann. & Bien. Forbs	7	7	6	4	6	6	8	8	7	5	6	10	9	9	4	5
Nat. Ann. Grass	0	1	0	0	0	0	2	0	1	0	0	2	0	1	0	0
Int. Ann. Grass	1	1	1	1	1	2	1	2	1	1	1	2	2	2	1	0
Nat. Per. Forbs	22	24	25	19	15	23	19	24	27	12	15	17	14	20	8	21
Int. Per. Forbs	1	1	1		1	1	3	3	3	2	2	1	2	2	3	2
Nat. Per. Grass (c)	4	5	5	6	4	5	5	5	6	6	5	6	6	6	5	8
Int. Per. Grass (c)	0	0	1	0	0	0	0	1	1	0	0	1	2	1	0	0
Nat. Per. Grass (w)	5	4	4	4	4	3	7	4	5	5	2	2	0	5	2	2
Native Subshrubs	1	1	1	2	2	1	1	1	0	0	1	1	1	2	1	2
Native Shrubs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Other*	4	1	1	2	1	3	1	1	2	2	3	3	1	2	1	3

\* Category includes bryophytes, mushrooms, lichens, and succulents.

Table 26. Species Density by Lifeform, Tordon Post-Spray Study, City of Boulder Open Space - Fall Sample Dates, September 2000

Number of Species / 100 sq. m.

----- SAMPLE NUMBER and DATE OF SAMPLING-----

LIFEFORM	Control 1						Control 2						Spray 1					
	1995	1996	1997	1998	1999	2000	1995	1996	1997	1998	1999	2000	1995	1996	1997	1998	1999	2000
Nat. Ann. & Bien. Forbs	2	3	4	1	1	1	4	5	4	3	5	3	4	4	4	4	3	3
Int. Ann. & Bien. Forbs	8	3	6	6	5	2	3	4	6	3	3	2	3	1	3	3	3	2
Nat. Ann. Grass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Int. Ann. Grass	2	1	1	2	1	1	2	1	1	1	0	0	0	0	1	0	0	0
Nat. Per. Forbs	15	15	11	17	14	7	21	30	28	18	23	21	24	20	29	19	23	19
Int. Per. Forbs	1	1	3	2	4	3	1	1	4	1	2	0	1	0	2	0	1	1
Nat. Per. Grass (c)	3	4	3	4	3	4	4	5	5	5	6	4	3	6	6	6	5	4
Int. Per. Grass (c)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nat. Per. Grass (w)	3	4	4	5	4	5	5	7	7	6	7	7	5	7	7	7	7	8
Native Subshrubs	0	0	0	1	2	1	0	0	0	1	2	2	1	0	1	1	2	1
Native Shrubs	0	0	0	0	0	0	1	0	0	0	0	0	2	1	1	1	1	0
Other*	2	2	3	4	4	3	3	5	4	1	2	2	3	2	2	2	1	2

Number of Species / 100 sq. m.

----- SAMPLE NUMBER and DATE OF SAMPLING-----

LIFEFORM	Spray 2						Spray 3						Spray 4						Spray 5
	1995	1996	1997	1998	1999	2000	1995	1996	1997	1998	1999	2000	1995	1996	1997	1998	1999	2000	2000
Nat. Ann. & Bien. Forbs	5	4	7	4	2	3	6	2	5	5	2	2	3	2	5	2	3	1	2
Int. Ann. & Bien. Forbs	7	4	8	3	6	3	6	4	6	8	5	3	6	4	9	7	6	5	3
Nat. Ann. Grass	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Int. Ann. Grass	1	2	1	1	1	0	2	2	1	1	1	1	1	1	1	1	1	0	1
Nat. Per. Forbs	22	16	18	12	11	11	24	16	12	15	14	17	15	10	10	12	14	11	5
Int. Per. Forbs	1	0	1	0	1	0	1	1	3	3	3	2	2	1	2	4	2	2	1
Nat. Per. Grass (c)	4	4	5	5	4	4	5	6	5	6	5	5	5	7	6	4	5	3	5
Int. Per. Grass (c)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Nat. Per. Grass (w)	5	5	5	5	6	4	3	7	5	4	4	6	2	3	2	2	2	3	3
Native Subshrubs	1	0	1	1	2	2	1	0	1	1	1	0	1	0	1	1	2	1	2
Native Shrubs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other*	4	4	4	1	2	2	3	2	4	2	5	1	3	3	3	1	3	1	3

\* Category includes bryophytes, mushrooms, lichens, and succulents.