ESCO KNAPWEED 2001

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ESCO

Data Report

Diffuse Knapweed Control Studies -
Tordon Spray Application
Boulder City and County Open Space
Year 2001 Sampling

Prepared for:

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INTRODUCTION

Studies reported here from 2001 follow up work undertaken in 1996, 1997, 1998, 1999, and 2000 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 2001 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. 2001 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, 2000, and 2001. Late season observations were made in late August of 1996 and 1997, early September of 1998 and 1999, late September of 2000, and late August of 2001. 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 were labeled to indicate the origin and endpoint. Samples with an "S" prefix were located within the sprayed area and samples with a "C" prefix were placed 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 was 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 was 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 2001), and Tables 12-14 (data from late season 2001). Plant material produced during 2001 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 2001 data) and 15-21 (late season 2001 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 11 (early season 2001) and 22 (late season 2001).

Sampling Dates

In 2001, early season sampling occurred on June 20 and 21 and late season sampling was conducted on September 22 and 23.

RESULTS

Results from 2001 observations are presented in Tables 1 through 27. Data collected in 1996, 1997, 1998, 1999, and 2000 (ESCO 1997, 1998, 1999, 2000, 2001) have been reported in detail previously and are summarized in this document. Knapweed cover results for 1996, 1997, 1998, 1999, 2000, and 2001 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 2001 are depicted in Figures 4 and 5, respectively. Relative cover by lifeform for all early season sample dates (1996-2001) is presented in Figures 6a and 6b. The same for all late season sample dates (1996-2001) is presented in Figures 7a and 7b. Species density by lifeform is similarly depicted 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. Species present in the entire sampling area are shown in Table 27.

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.

DISCUSSION

As can be seen in Figure 1, cover by knapweed in general increased in 2001 both on sprayed and non-sprayed areas. In early season observations, cover by knapweed was up from 2000 levels on three of the original four 1996 transects in sprayed areas (i.e. S2, S3, and S4). In late season observations, knapweed cover was up from 2000 levels in all sites except C2 (and S5 where it has been non-measurable in the late season each year). 1998 through 2000 was a period of increasing dryness during which above average precipitation changed to below average precipitation. The diffuse knapweed cover responded accordingly declining in the knapweed-suitable control area (C1) at a steady pace and reaching its lowest abundance of the study period in late season 2000. With the return of slightly above-average moisture in 2001, total vegetation cover responded upward. Likewise, the abundance of knapweed also sprung upward again. The proportional response of knapweed was larger than that of total vegetation cover. This attests to the status of this weed (and of course many other weeds) as an opportunist. Density data (Figures 3a and 3b) also show the 2001 revitalization of knapweed.

It is of interest to note that the return of knapweed to the spray transects in 2001 has been earlier and proportionally larger than on the C1 control transect.

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.

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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.

Figure 1a.Knapweed Cover Results, Pre- and Post- Spray, Early Season Sampling Dates 1996-2001

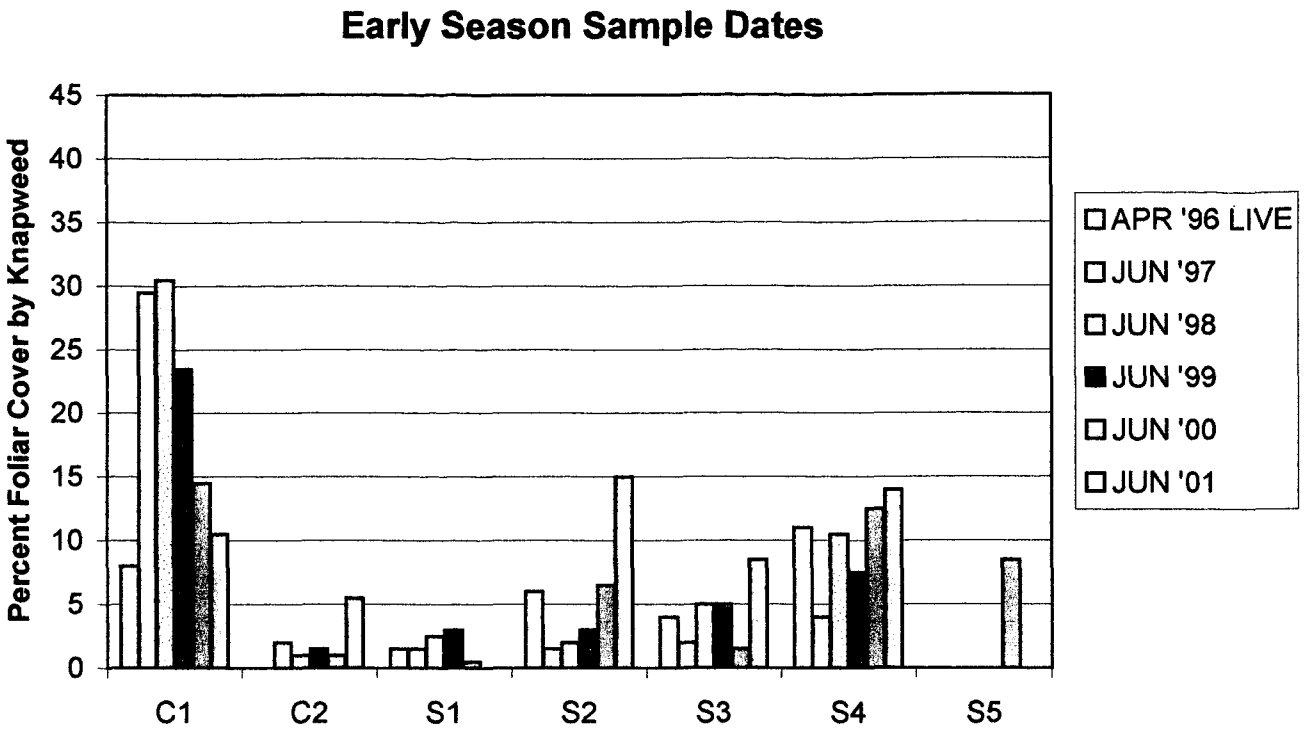


Figure 1b. Knapweed Cover Results, Post- Spray, Late Season Sampling Dates 1996-2001

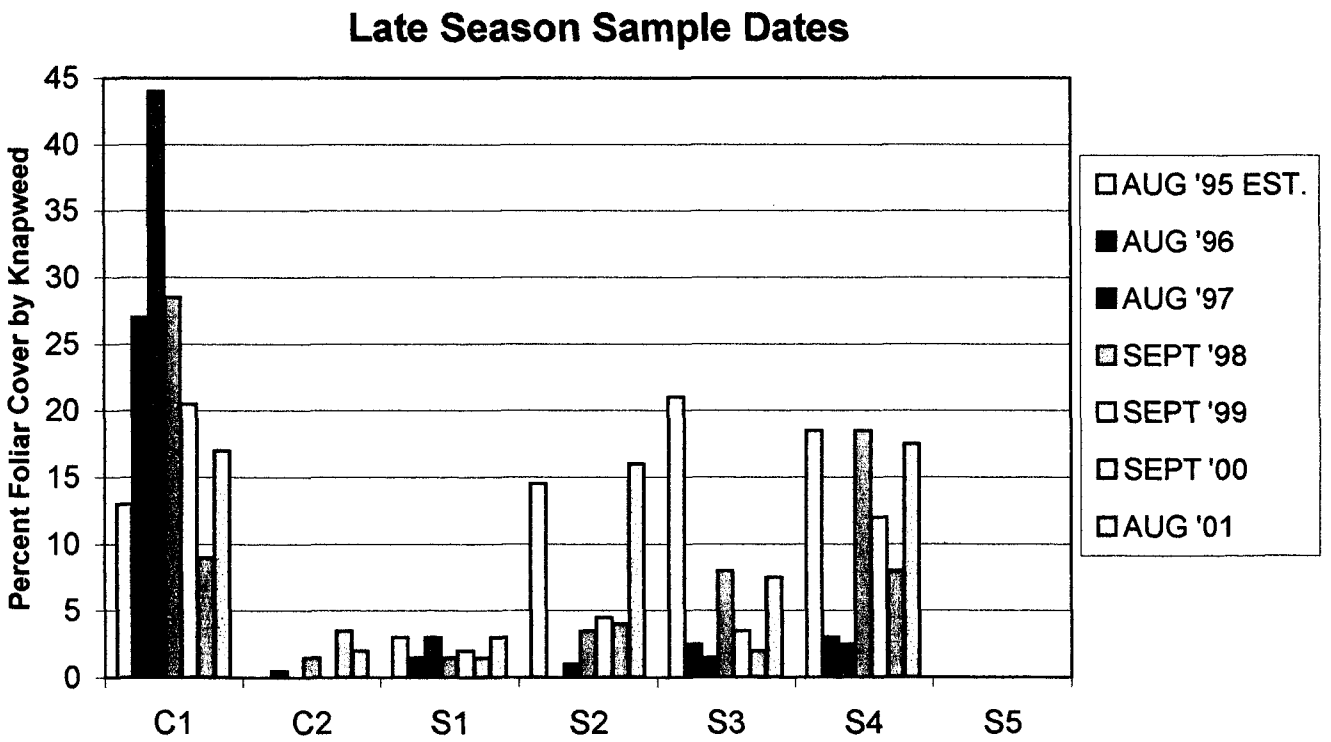


Figure 2a. Knapweed Frequency Results, Pre- and Post- Spray, Early Season Sampling Dates 1996-2001

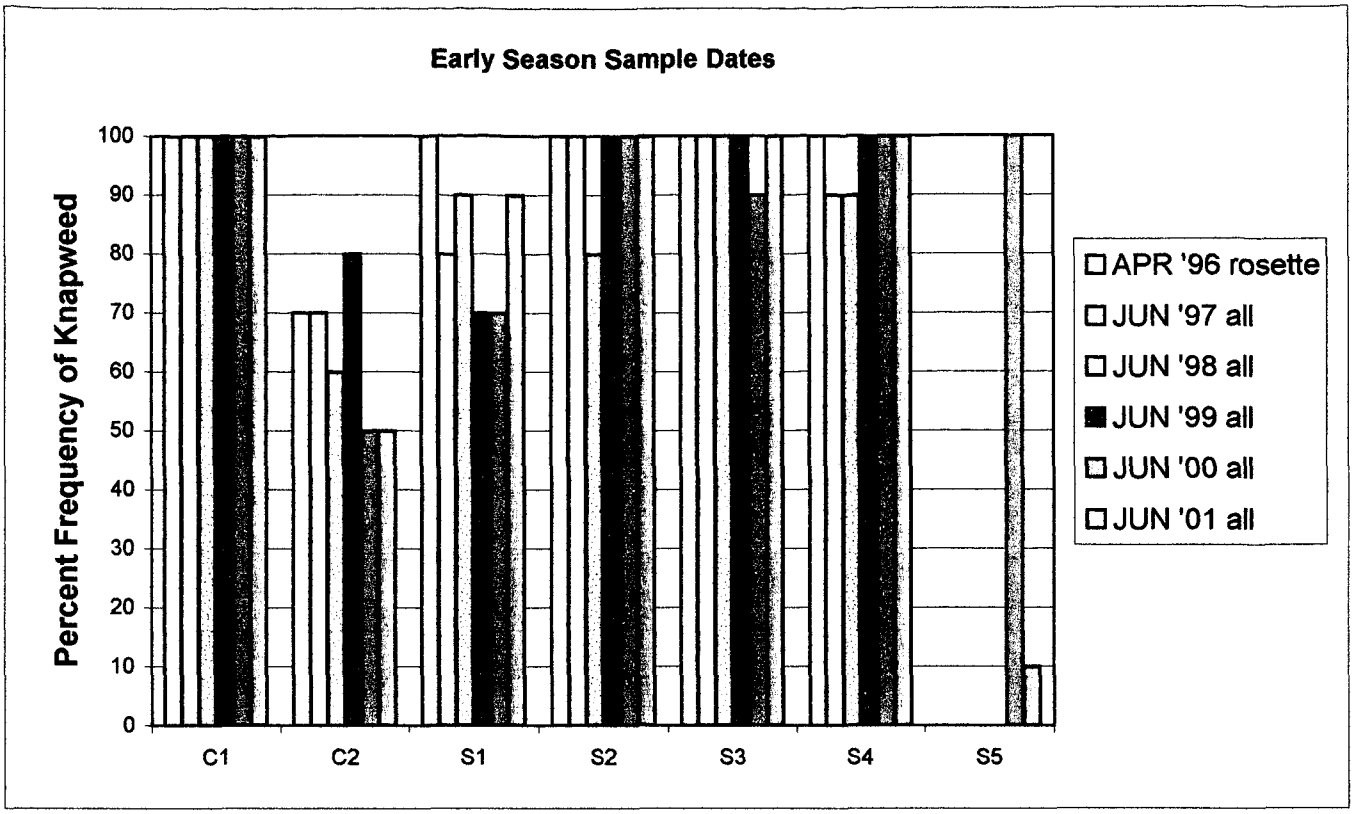


Figure 2b. Knapweed Frequency Results, Post- Spray, Late Season Sampling Dates 1996-2001

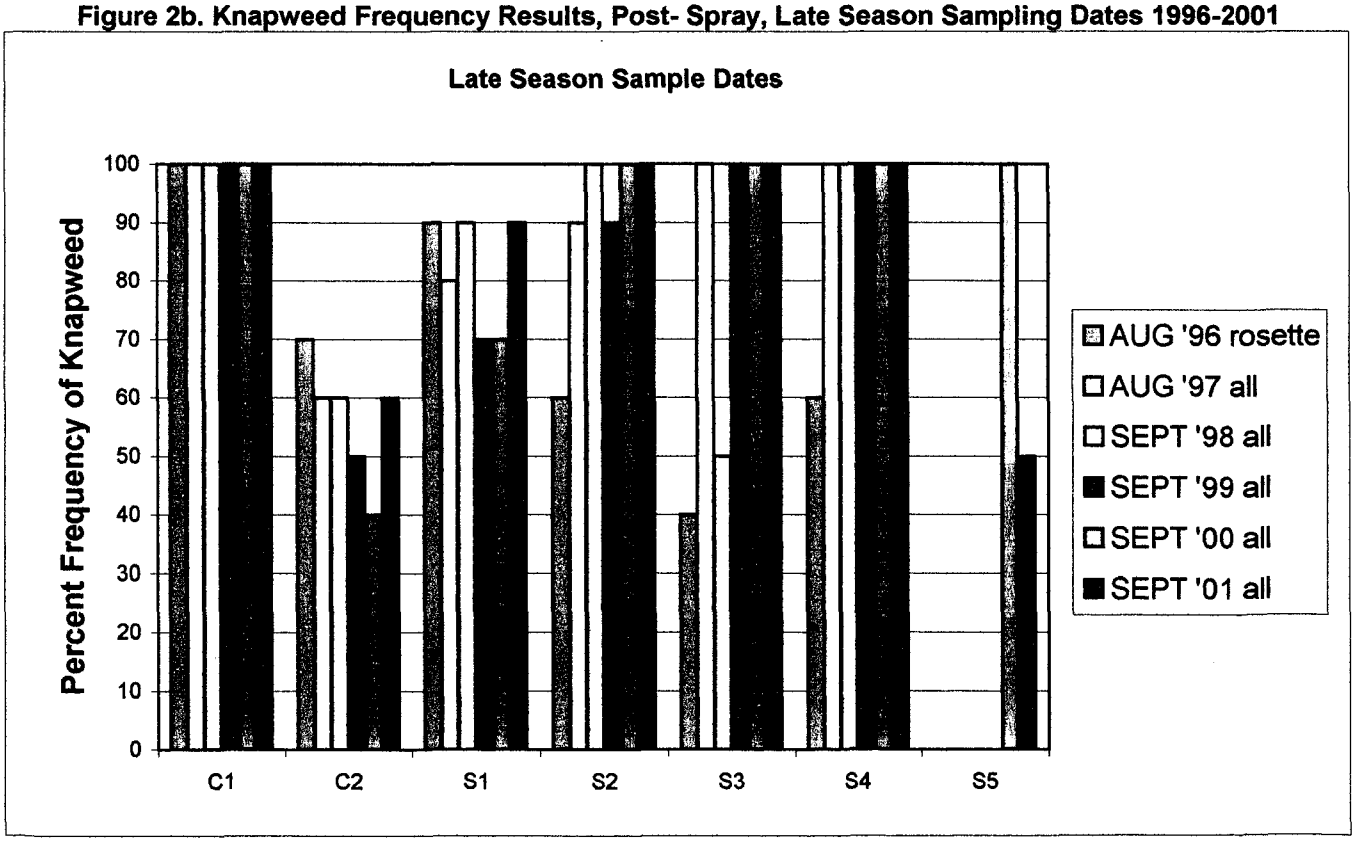


Figure 3a. Knapweed Average Density Results, Post- Spray, Early Season Sampling Dates 1996-2001

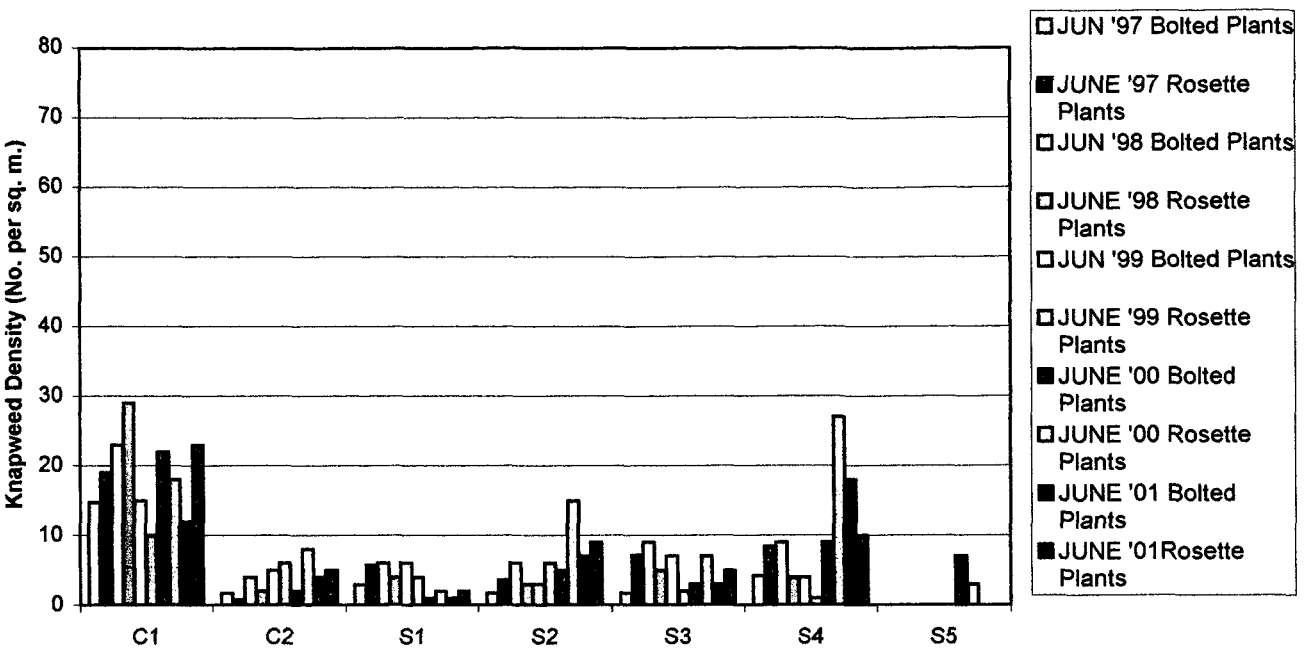


Figure 3b. Knapweed Average Density Results, Post- Spray, Late Season Sampling Dates 1996-2001

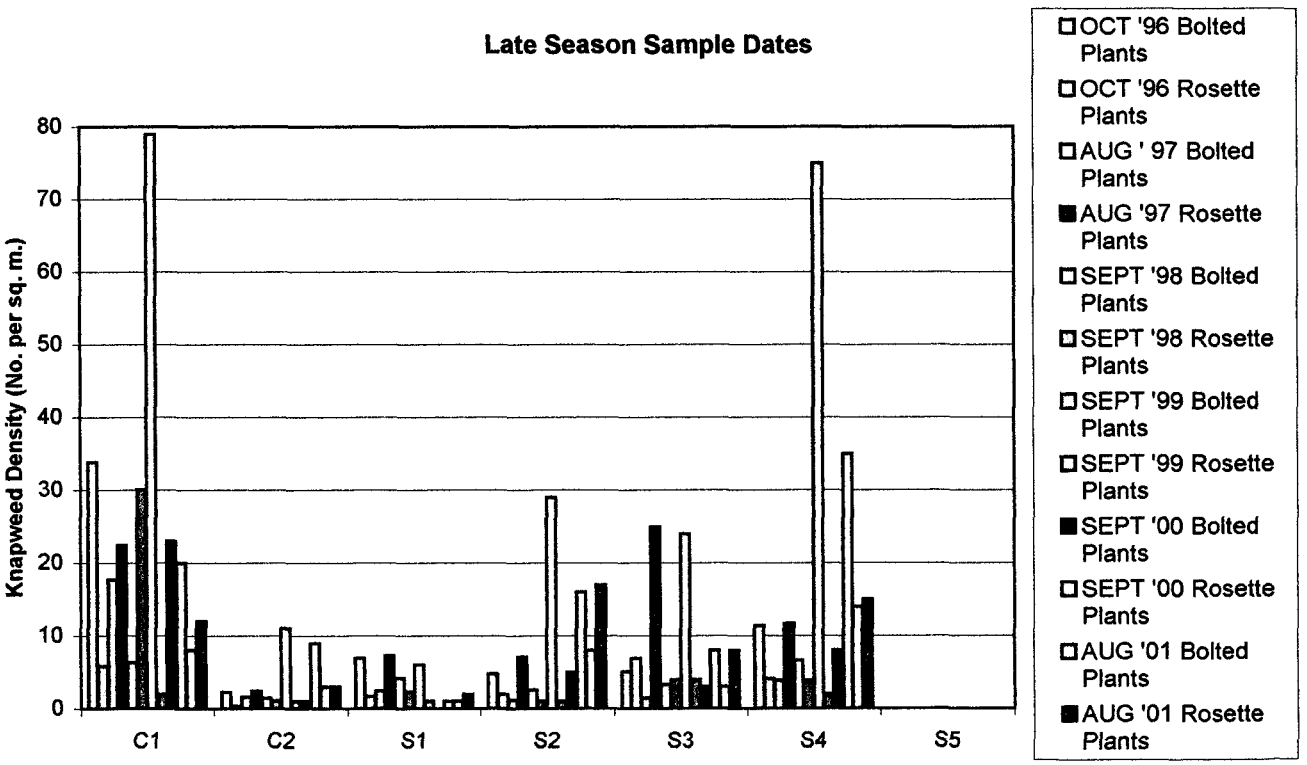


Figure 4. Relative Vegetation Cover by Lifeform, Tordon Study, City of Boulder Open Space - June and Aug. 2001

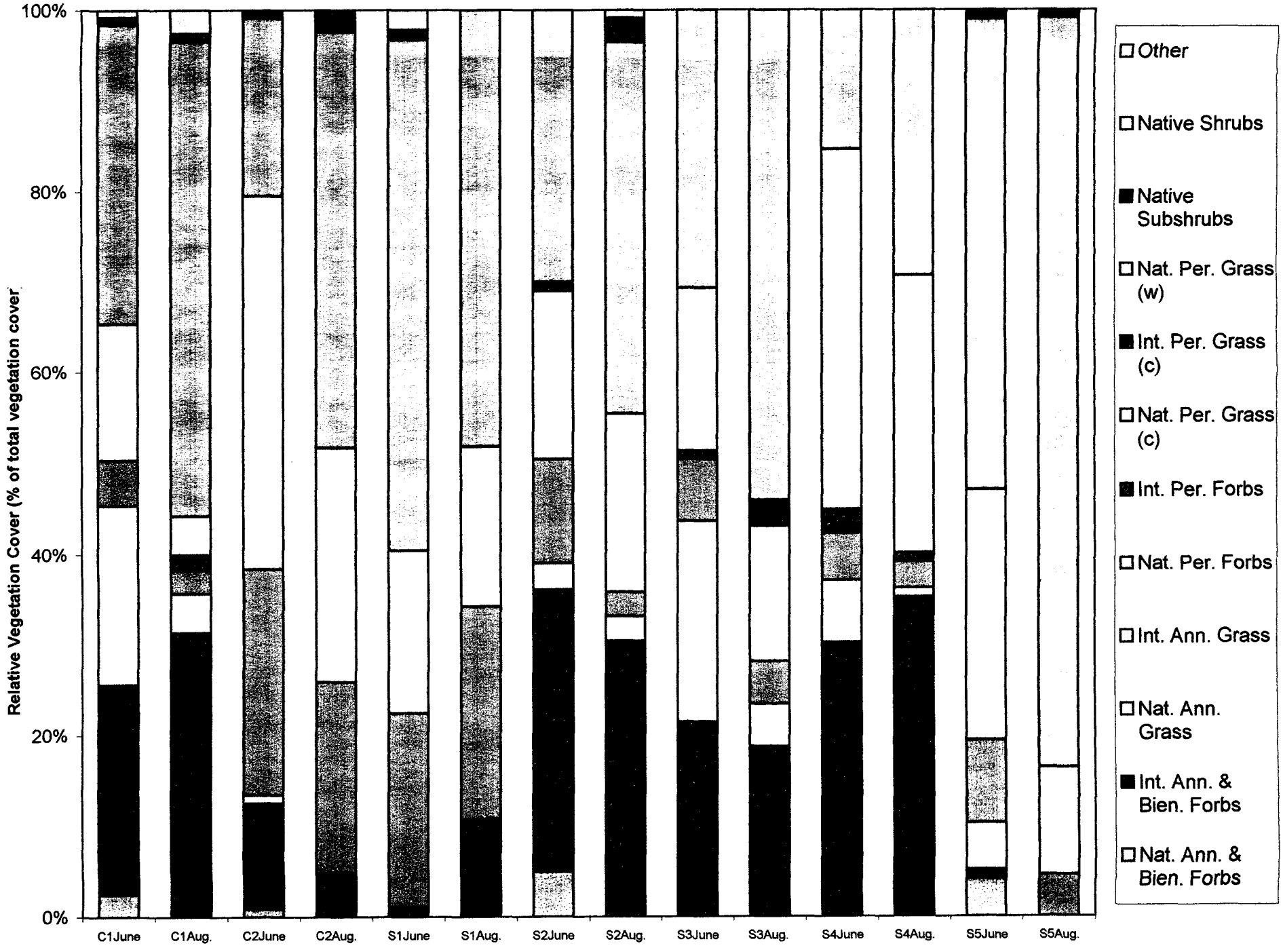


Figure 5. Species Density by Lifeform, Tordon Study, City of Boulder Open Space, June and Aug. 2001

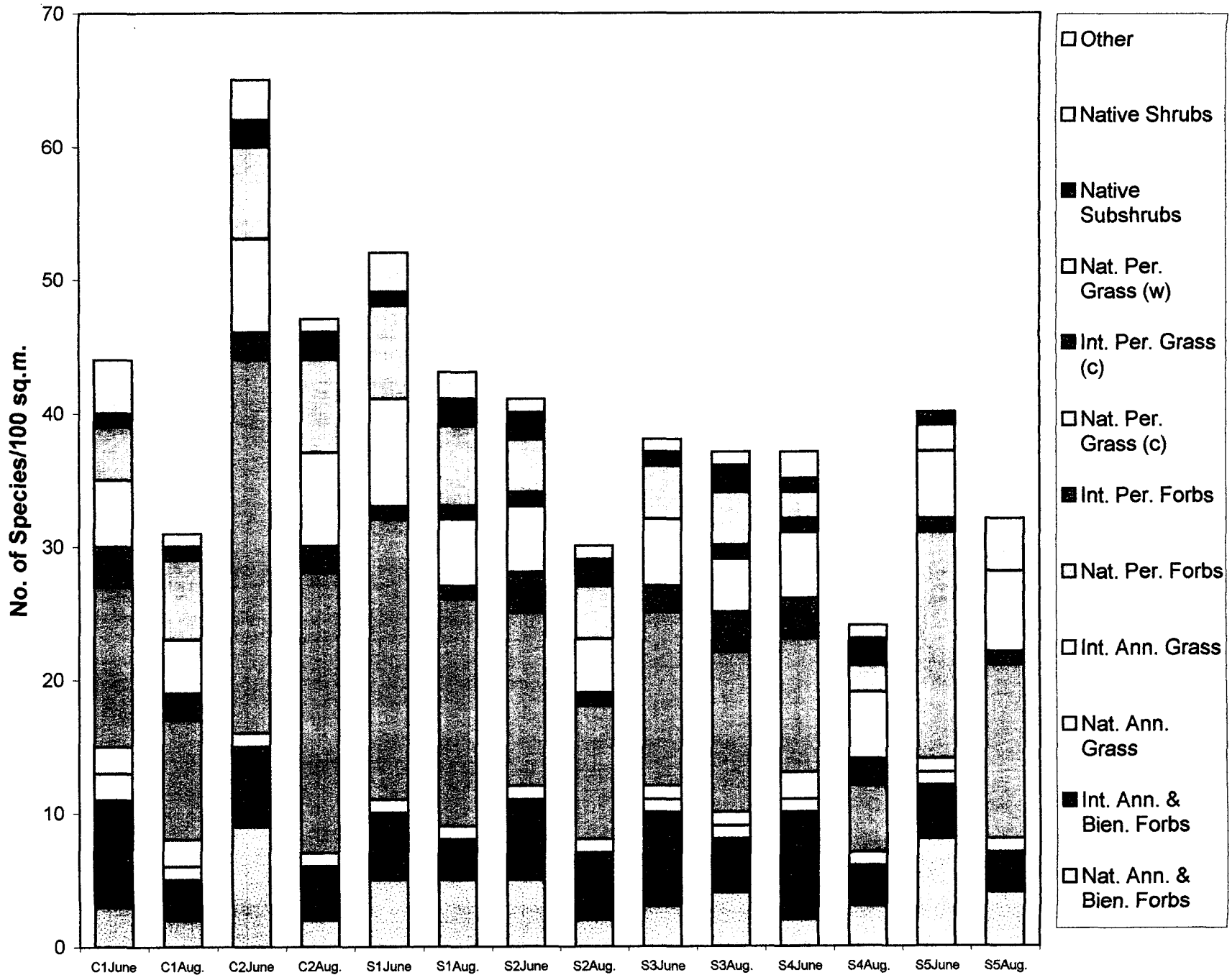


Figure 6a. Relative Cover by Lifeform, Early Season Sampling: Samples C2, S1, and S2. Tordon Study, City of Boulder Open Space, 1996-2001

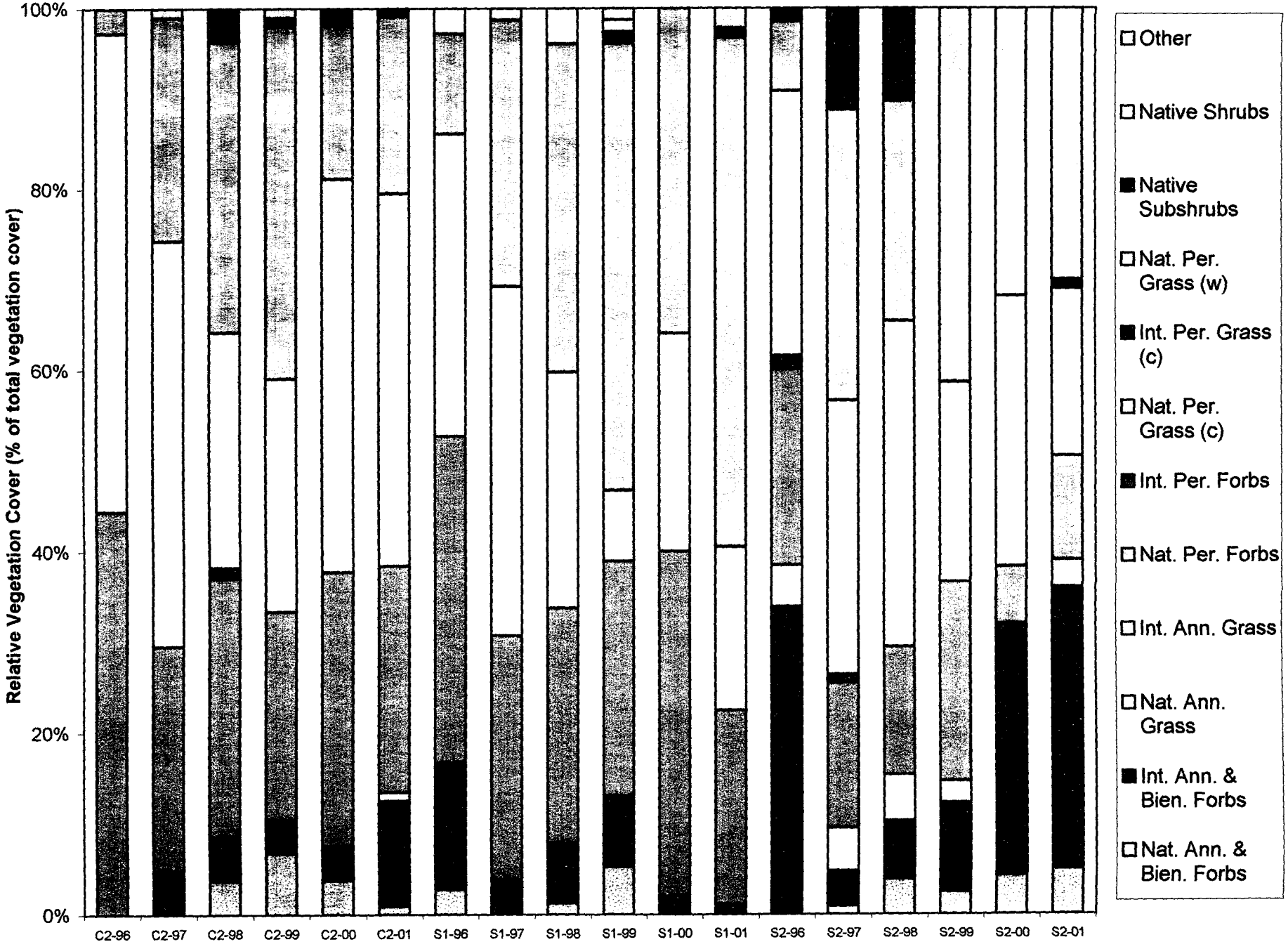


Figure 6b. Relative Cover by Lifeform, Early Season Sampling: Samples C1, S3, S4 and S5. Tordon Study, City of Boulder Open Space, 1996-2001

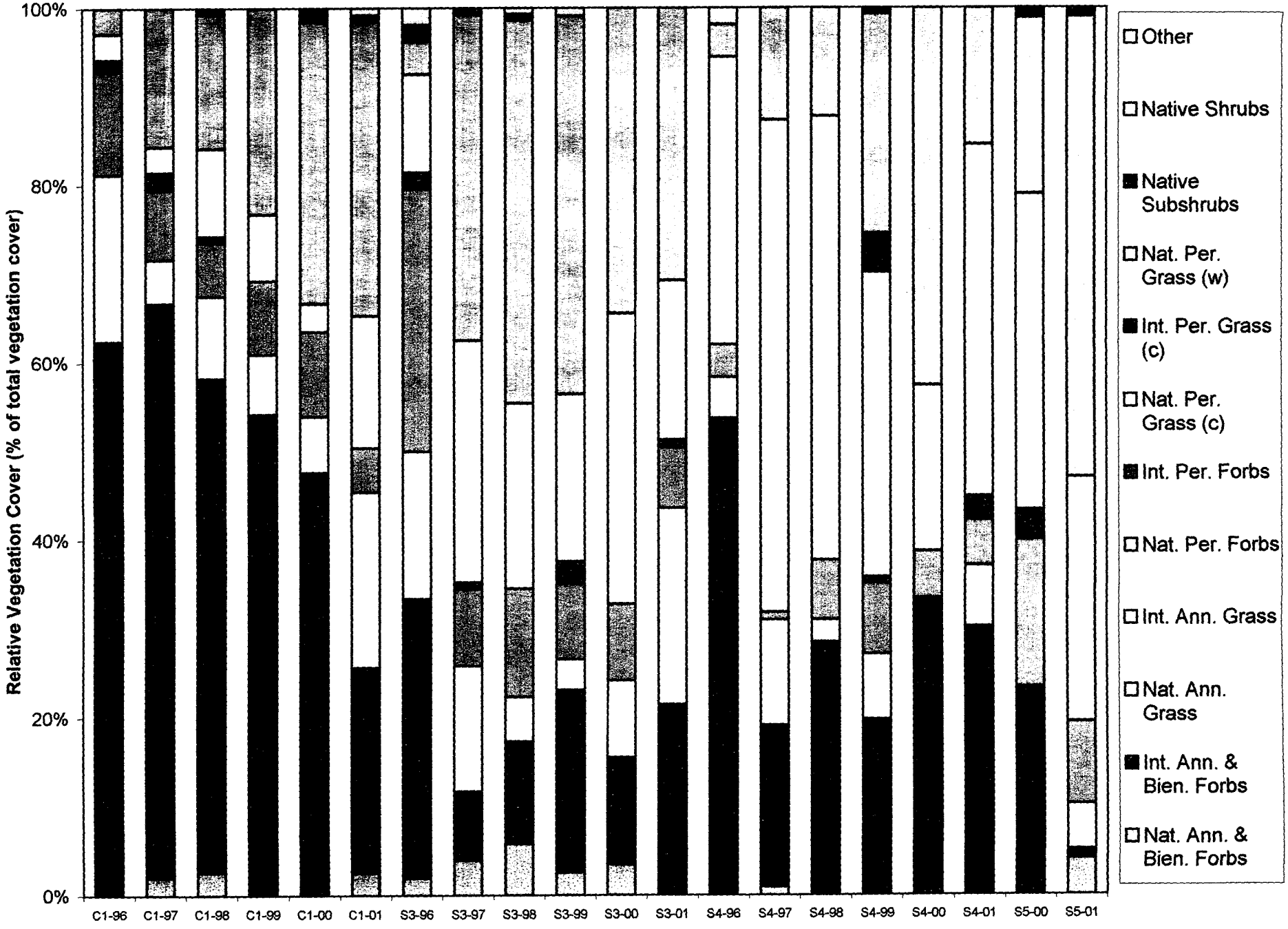


Figure 7a. Relative Cover by Lifeform, Late Season Sampling: Samples C2, S1, and S2. Tordon Study, City of Boulder Open Space, 1995-2001

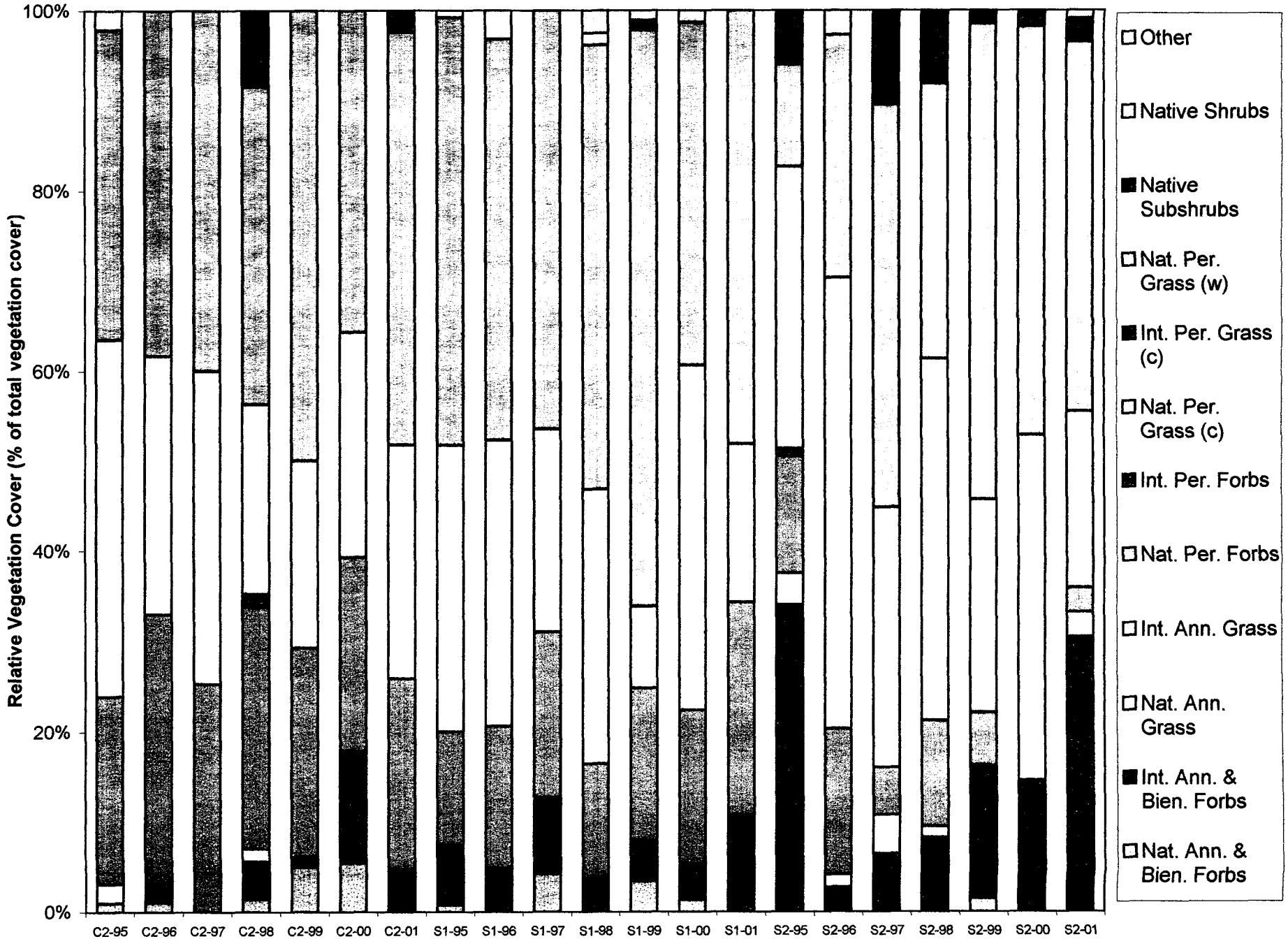


Figure 7b. Relative Cover by Lifeform, Late Season Sampling: Samples C1, S3, S4 and S5. Tordon Study, City of Boulder Open Space, 1995-2001

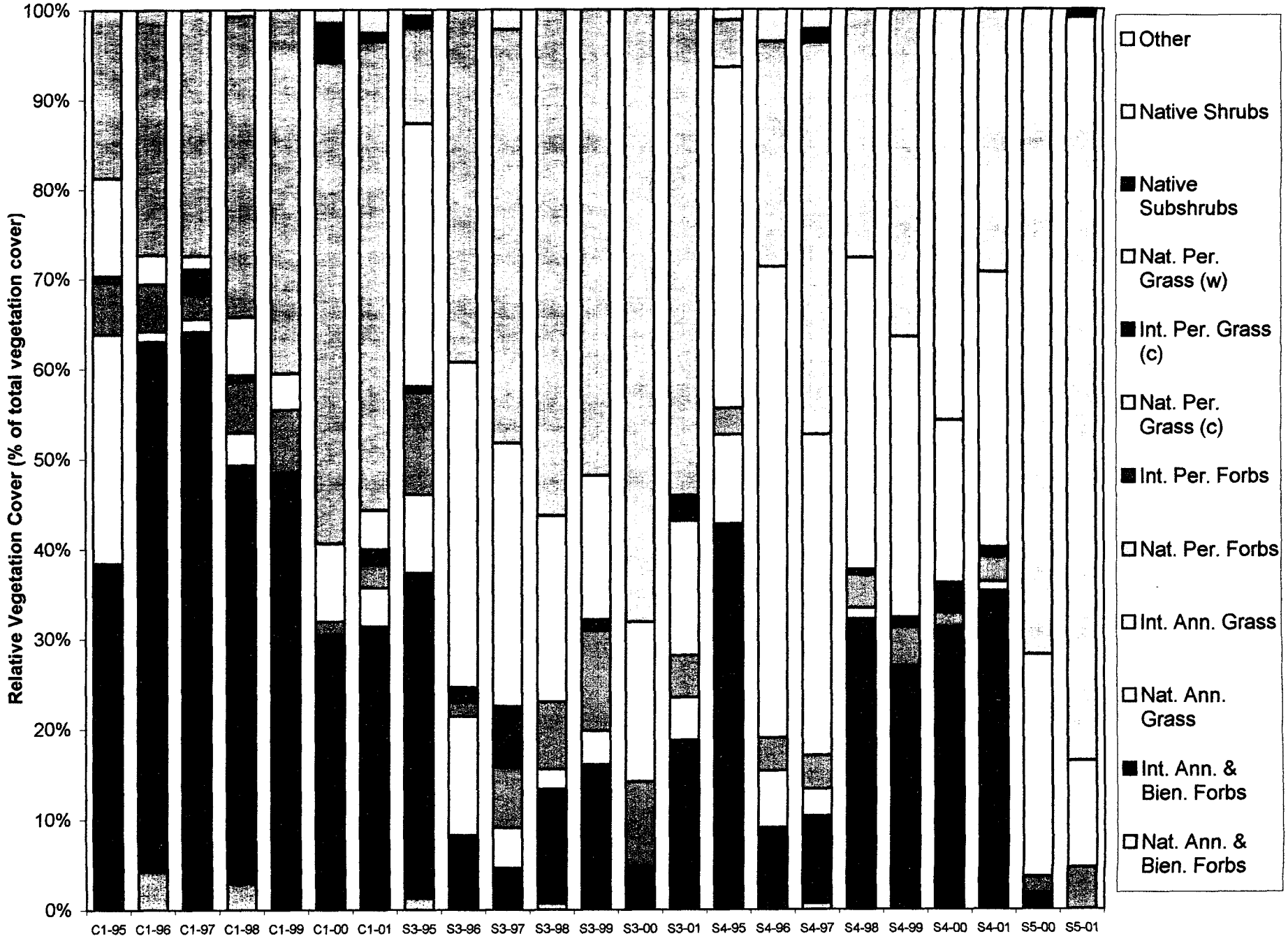


Figure 8a. Species Density by Lifeform, Early Season Sampling: Samples C2, S1, and S2. Tordon Study, City of Boulder Open Space, 1996-2001

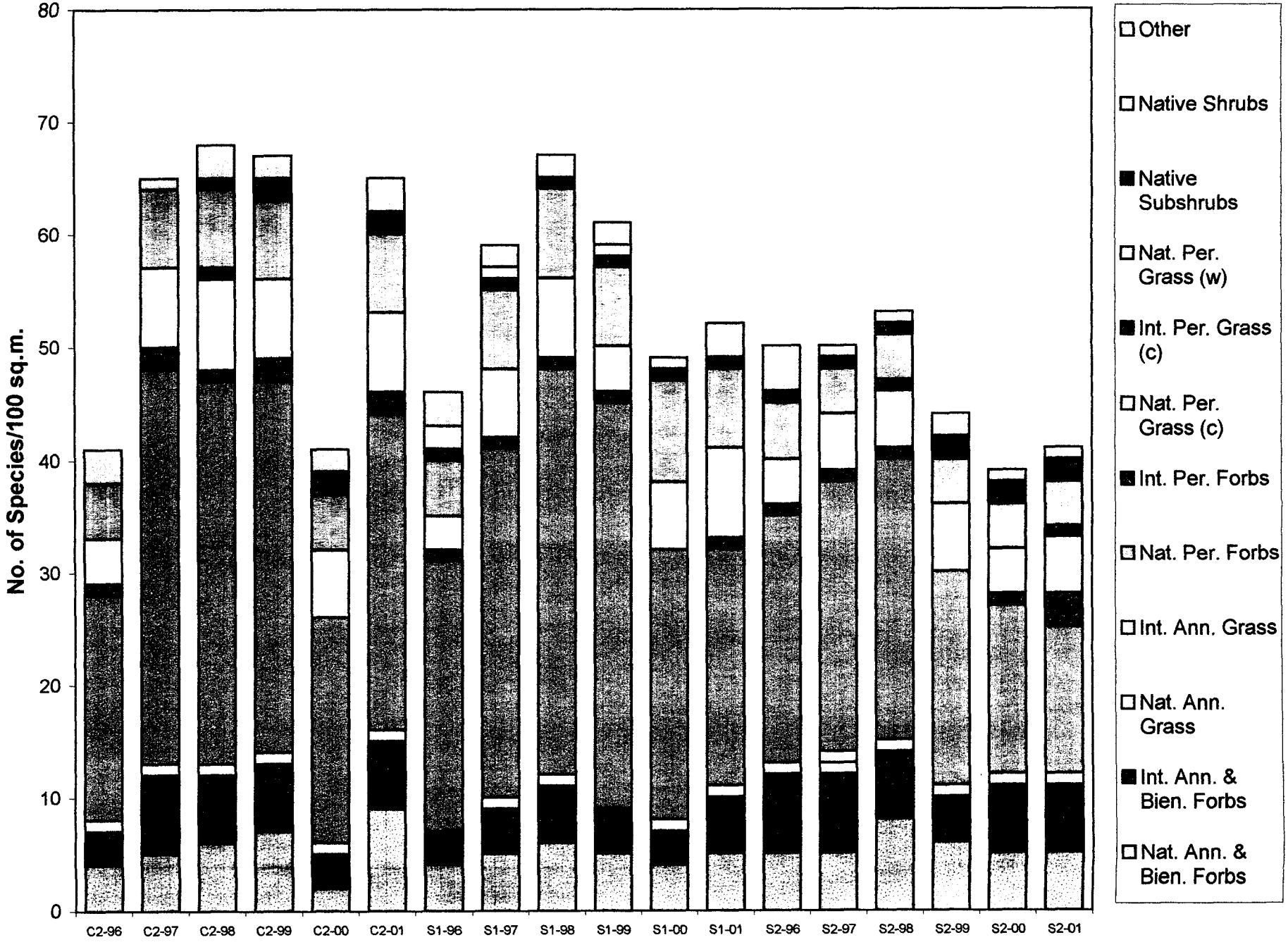


Figure 8b. Species Density by Lifeform, Early Season Sampling: Samples C1, S3, S4 and S5. Tordon Study, City of Boulder Open Space, 1996-2001

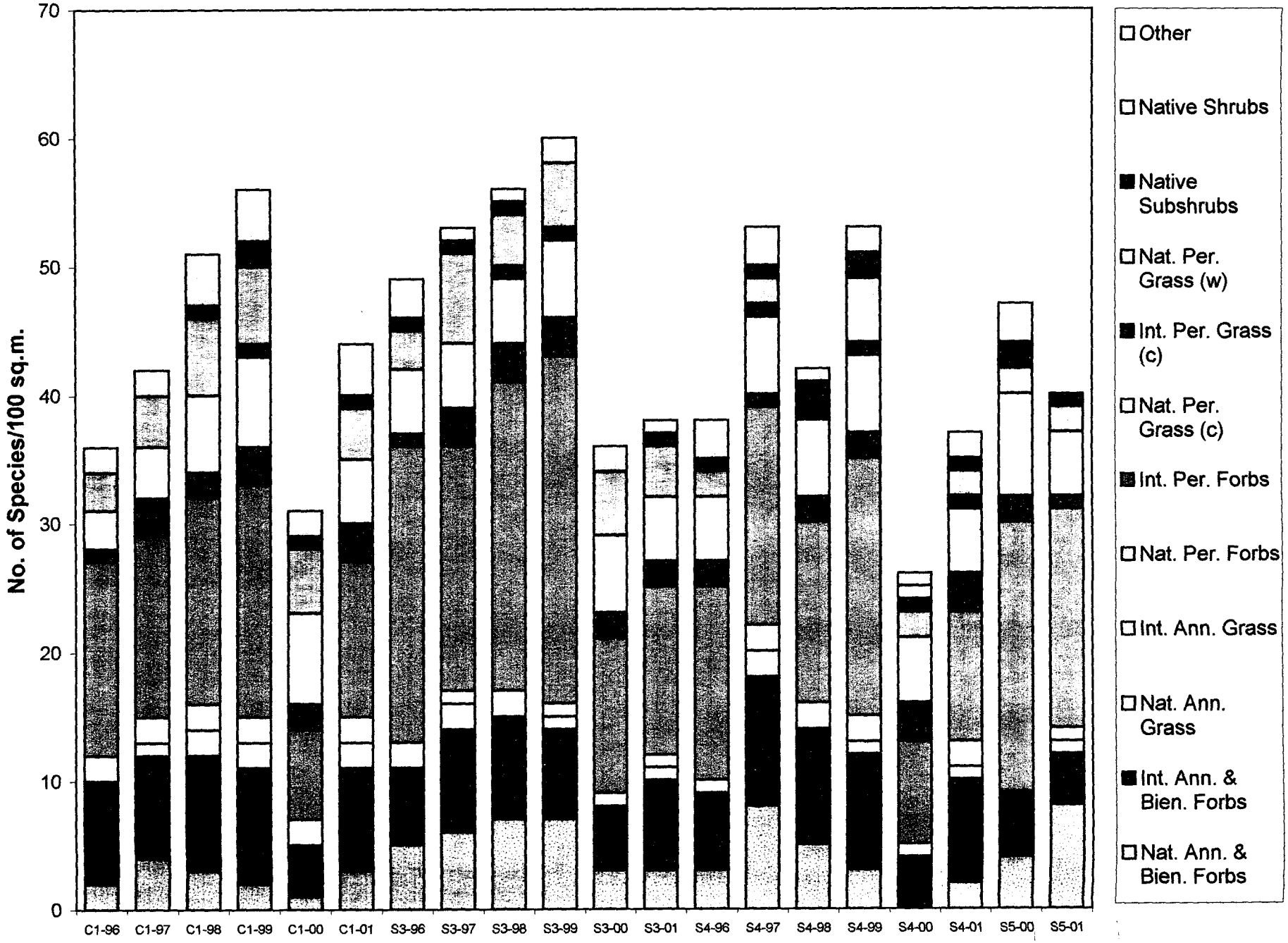


Figure 9a. Species Density by Lifeform, Late Season Sampling: Samples C2, S1, and S2. Tordon Study, City of Boulder Open Space, 1995-2001

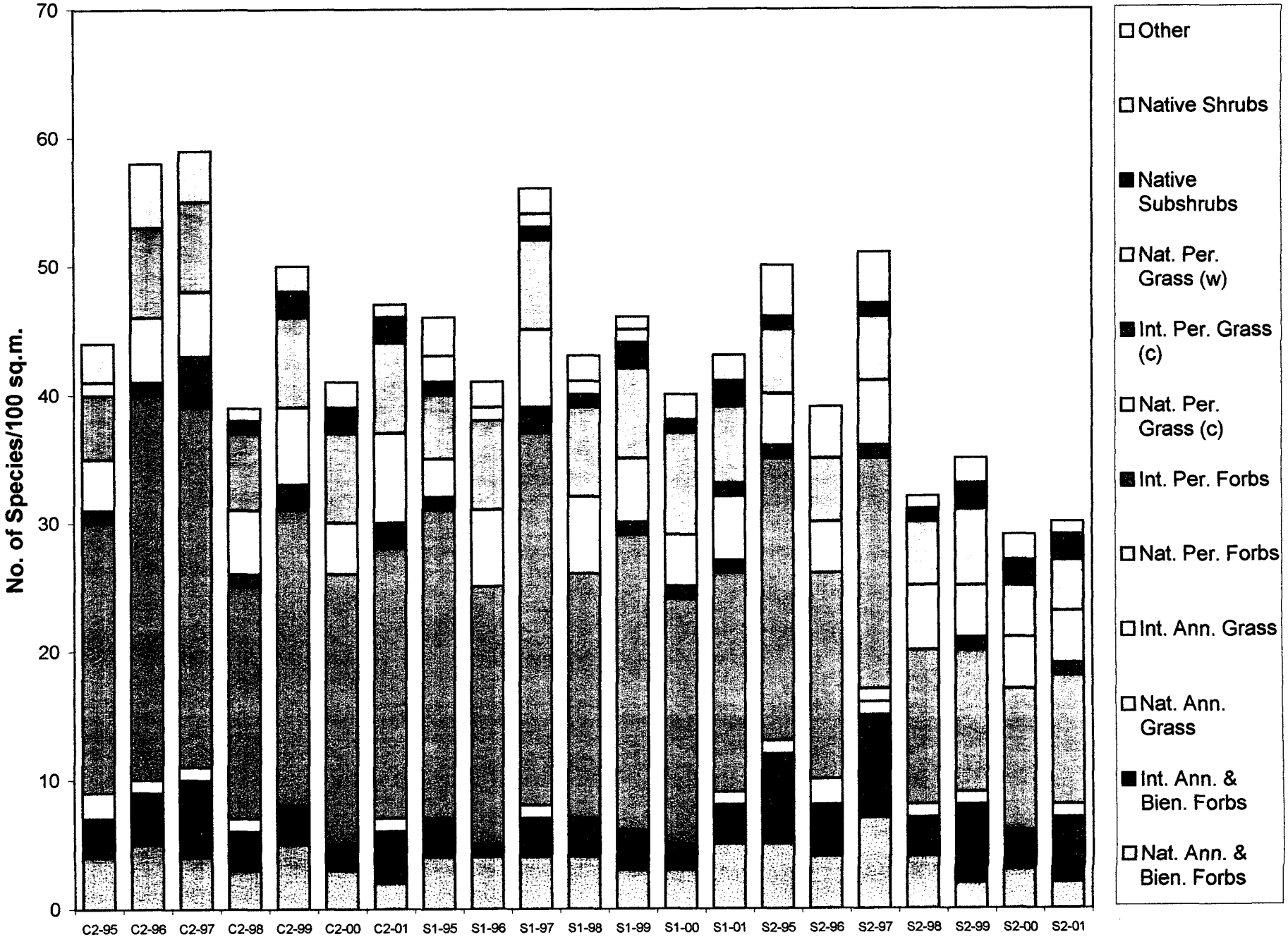


Figure 9b. Species Density by Lifeform, Late Season Sampling: Samples C1, S3, S4 and S5.
Tordon Study, City of Boulder Open Space, 1995-2001

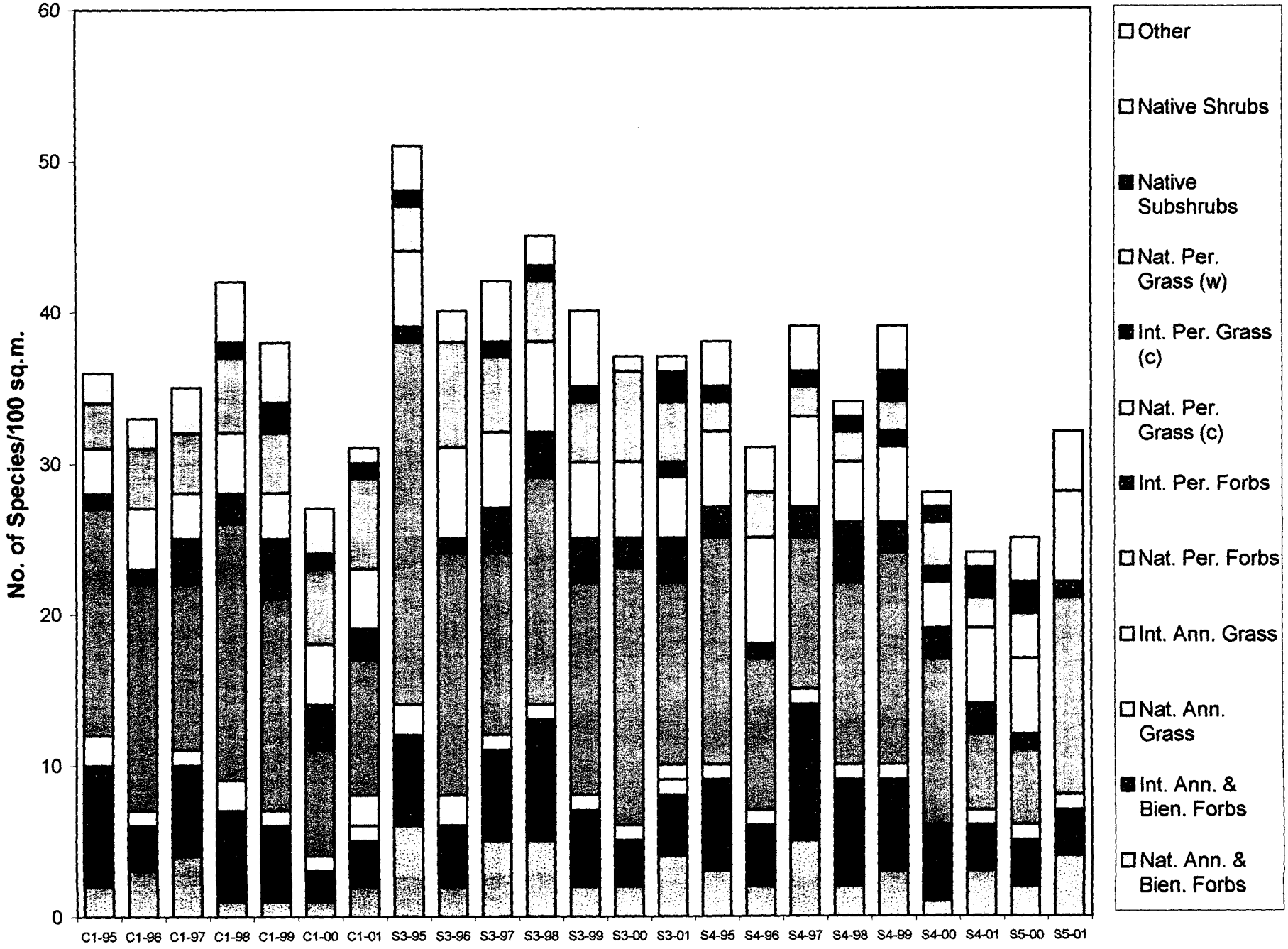


Figure 10a. Total Vegetation Cover, Early Season Sampling Dates, 1996-2001

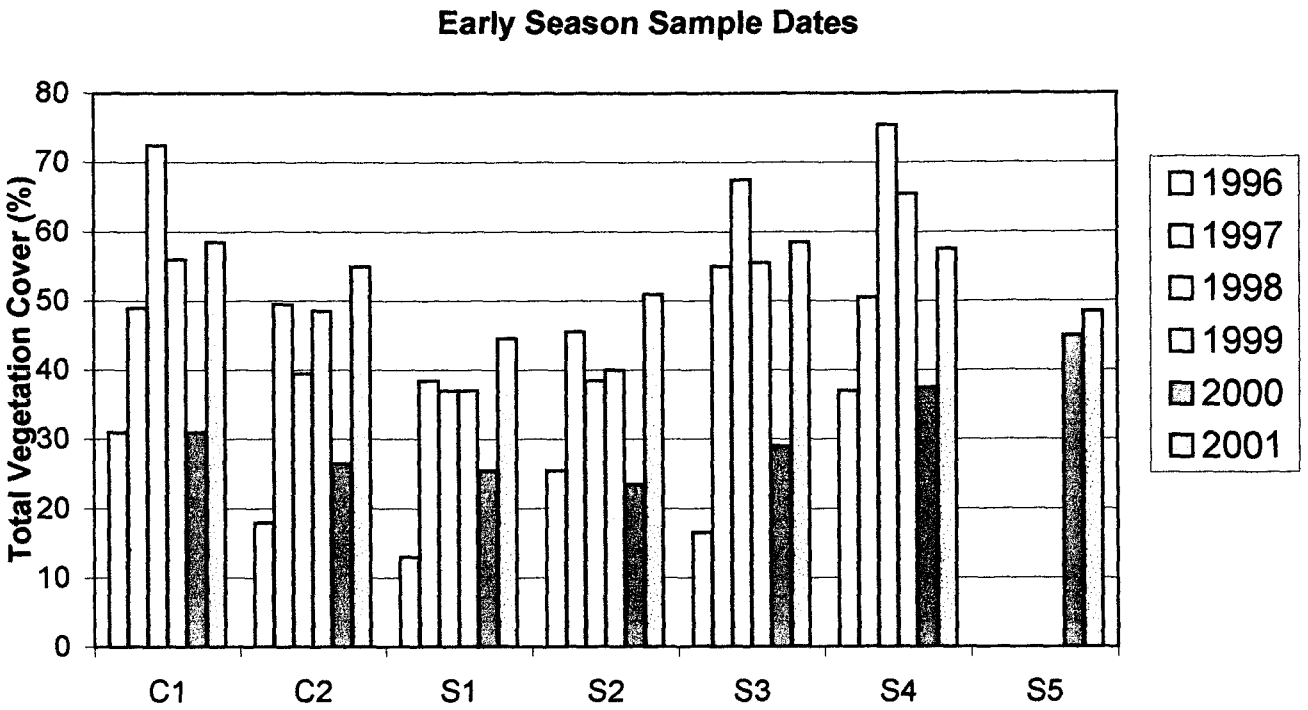
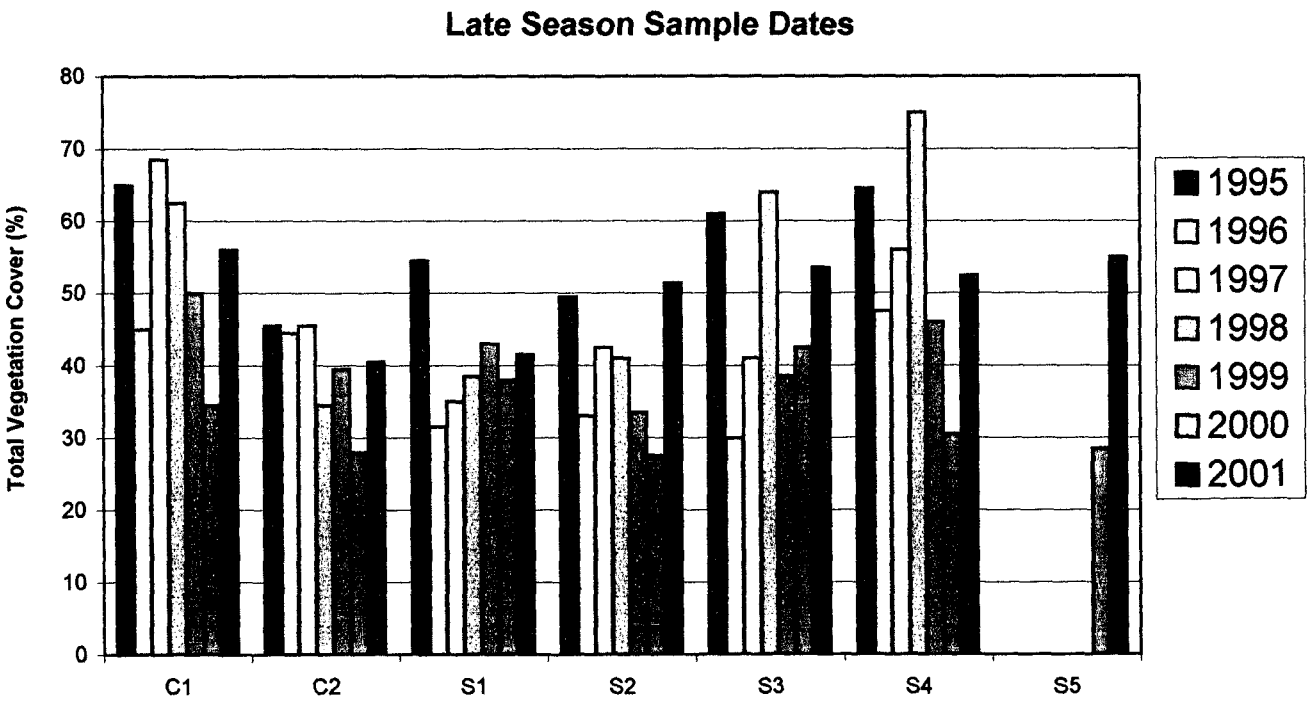


Figure 10b. Total Vegetation Cover, Late Season Sampling Dates, 1996-2001



*1995 data were projected from Spring 1996 cover sampling. They include all live and recent dead hits.

Figure 11a. Native Perennial Forb Cover, Early Season Sampling Dates, 1996-2001

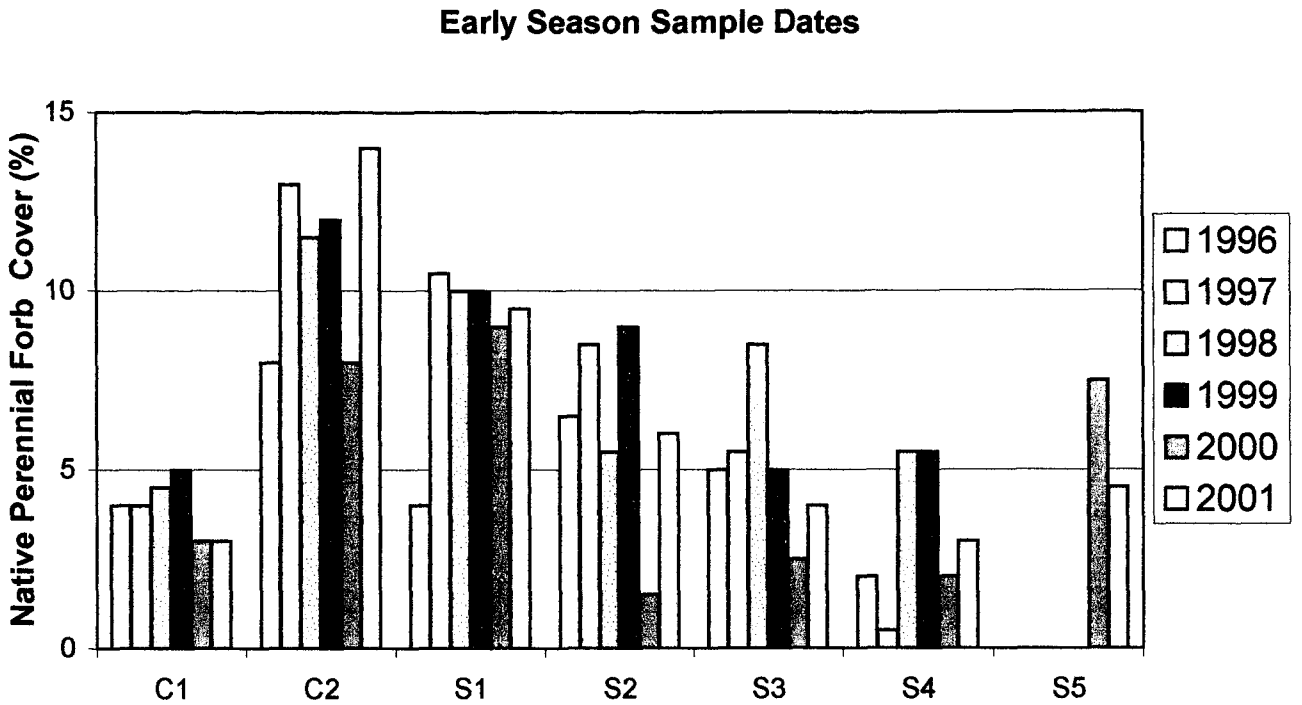
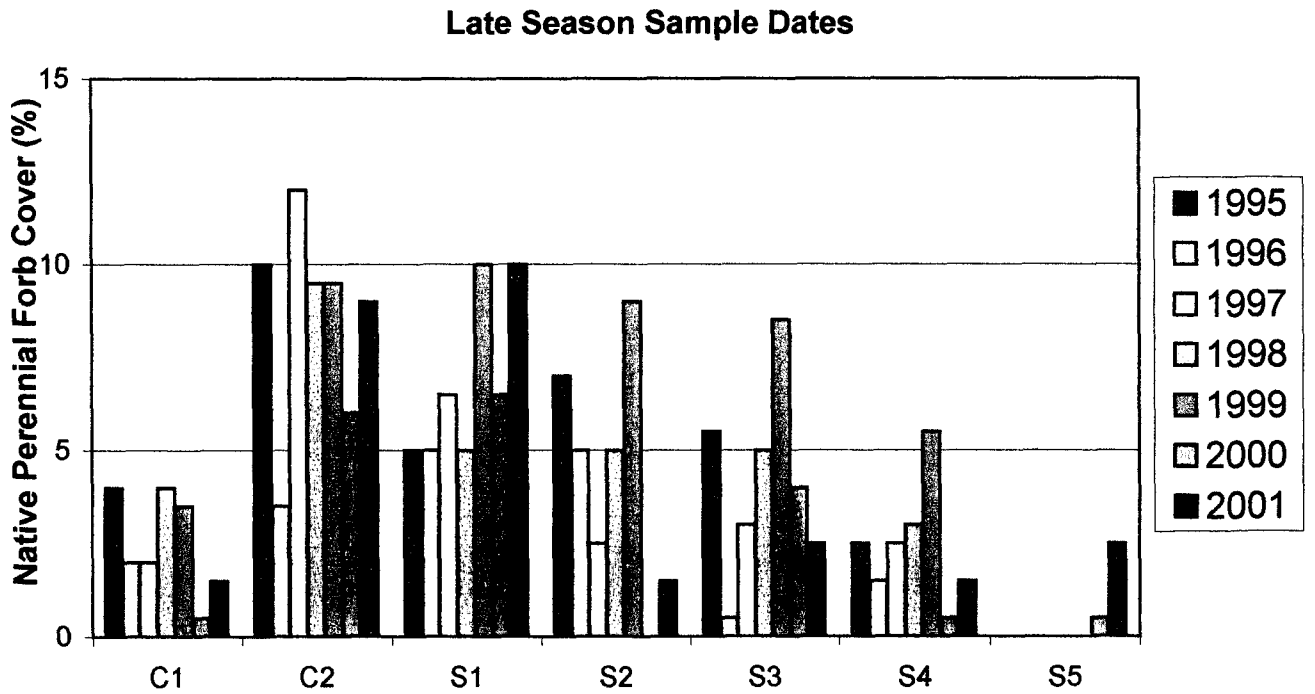
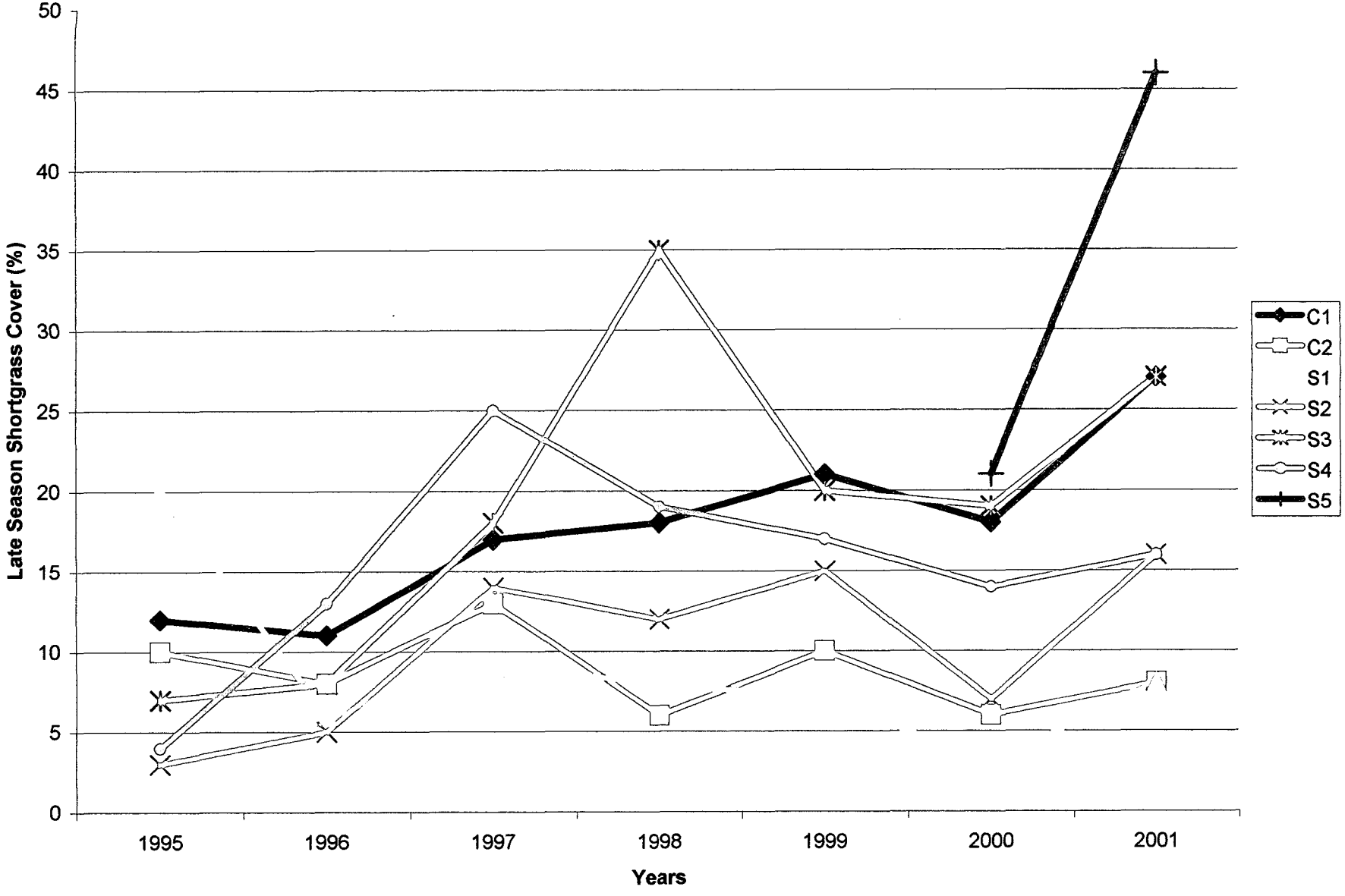


Figure 11b. Native Perennial Forb Cover, Late Season Sampling Dates, 1996-2001



*1995 data were projected from Spring 1996 cover sampling. They include all live and recent dead hits.

Figure 12. Patterns of Shortgrass Species* Abundance in Late Season Observations 1996-2001



* Combined cover of *Buchloe dactyloides, Chondrosum (Bouteloua) gracile*, and *Chondrosum 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 1996-2001

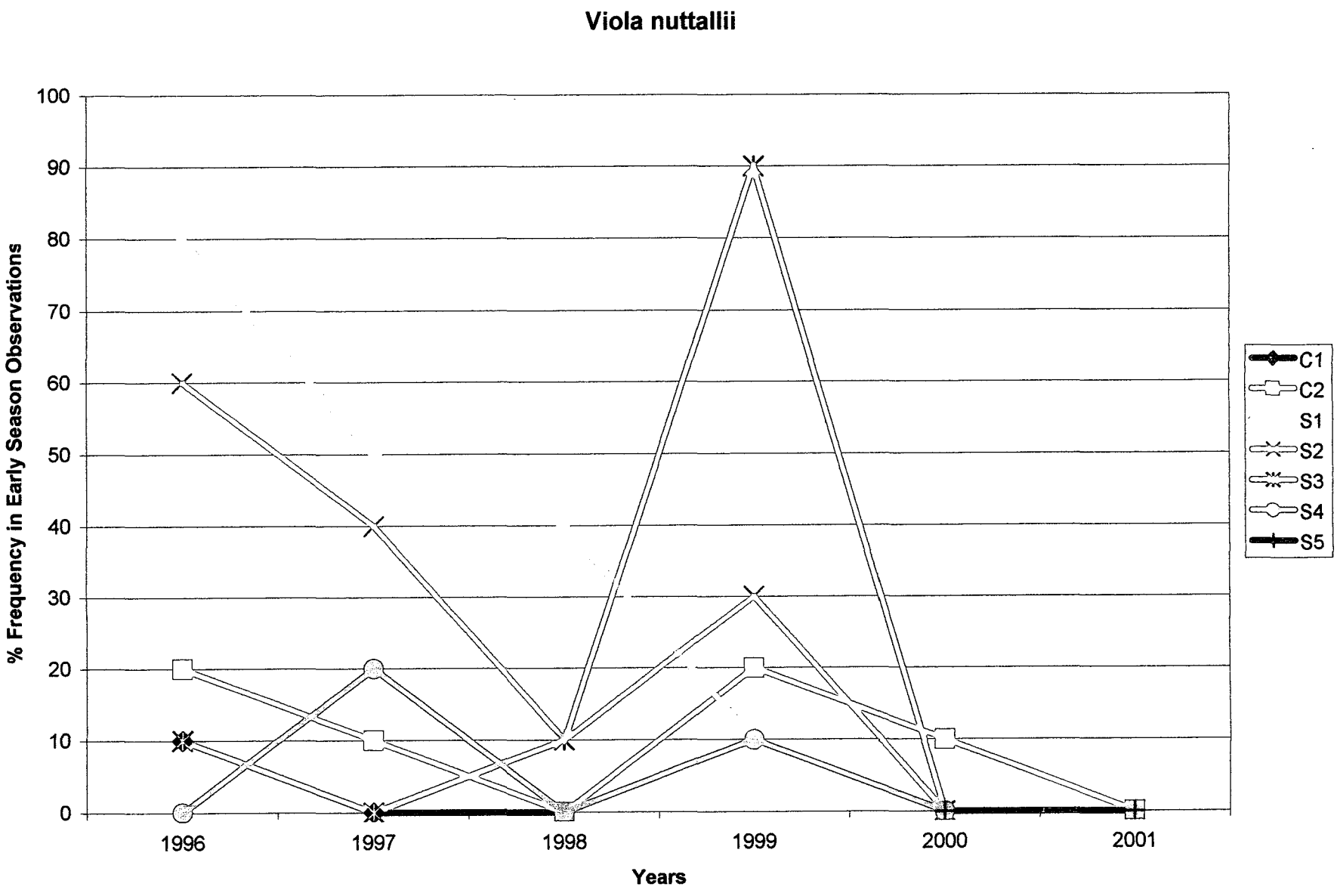


Figure 14. Patterns of Frequency of *Lesquerella montana* along study transects in Early Season Observations 1996-2001

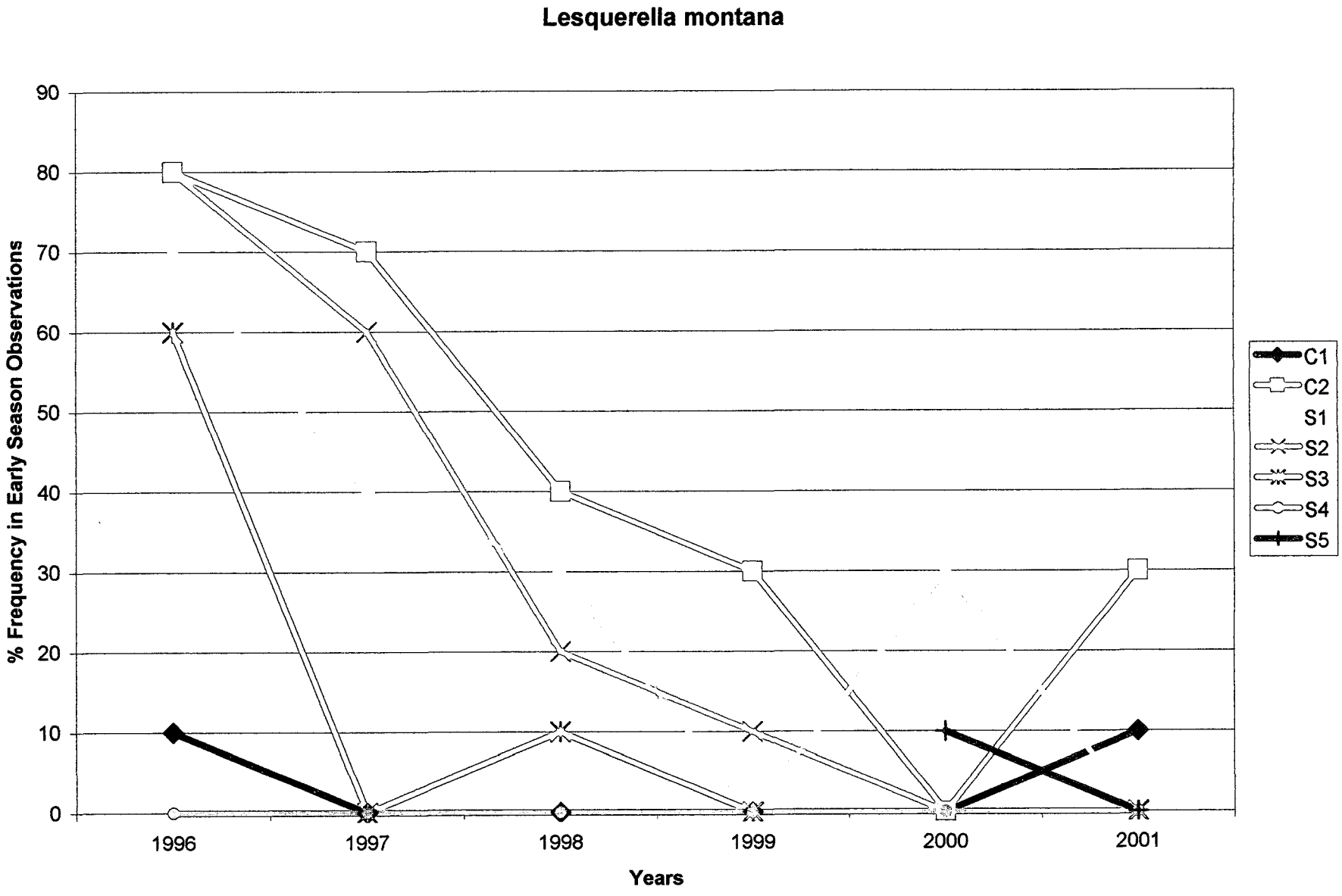


Figure 15. Patterns of Frequency of *Senecio integerrimus* along study transects in Early Season Observations 1996-2001

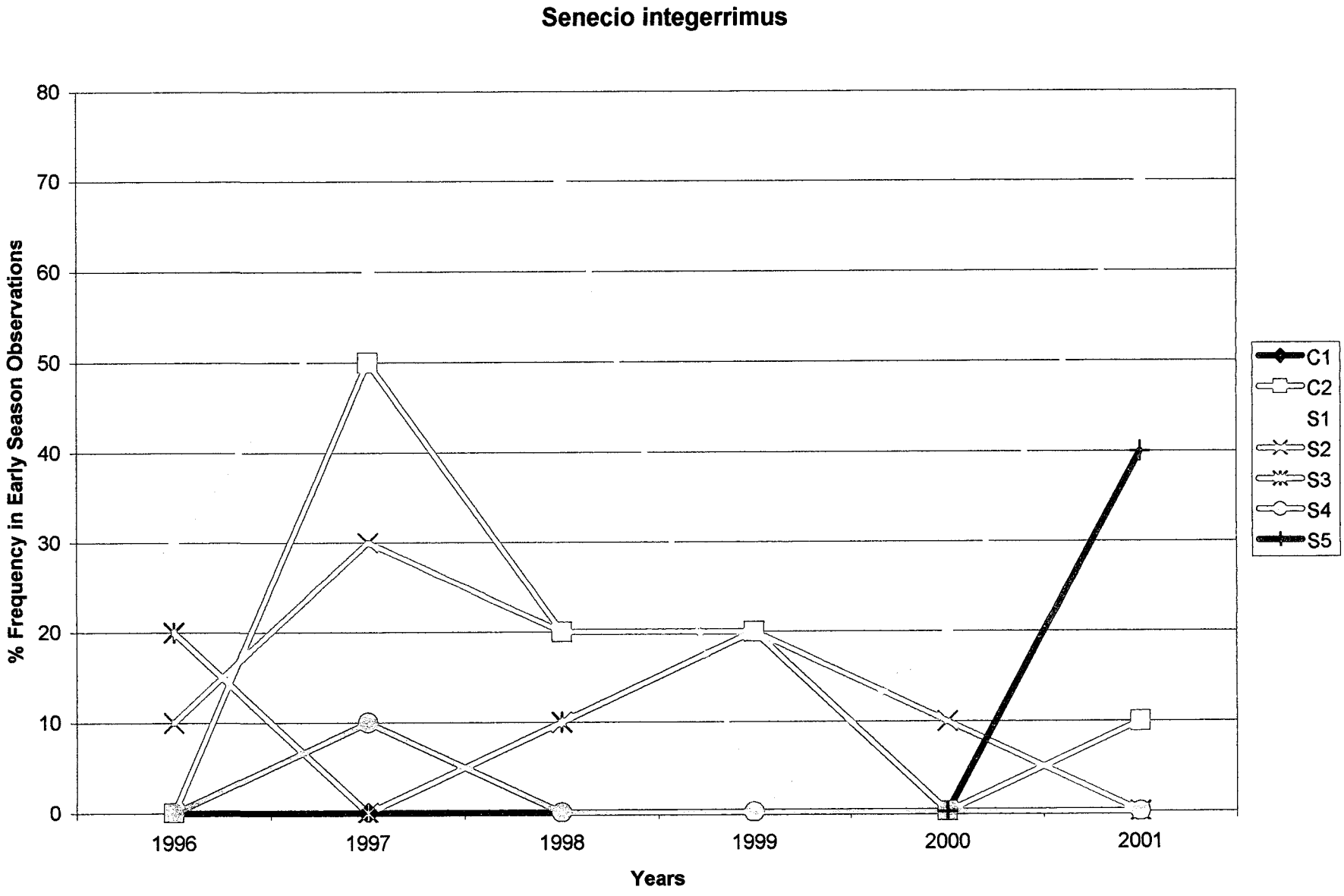


Figure 16. Patterns of Frequency of *Psoralidium tenuiflorum* along study transects in Late Season Observations 1996-2001

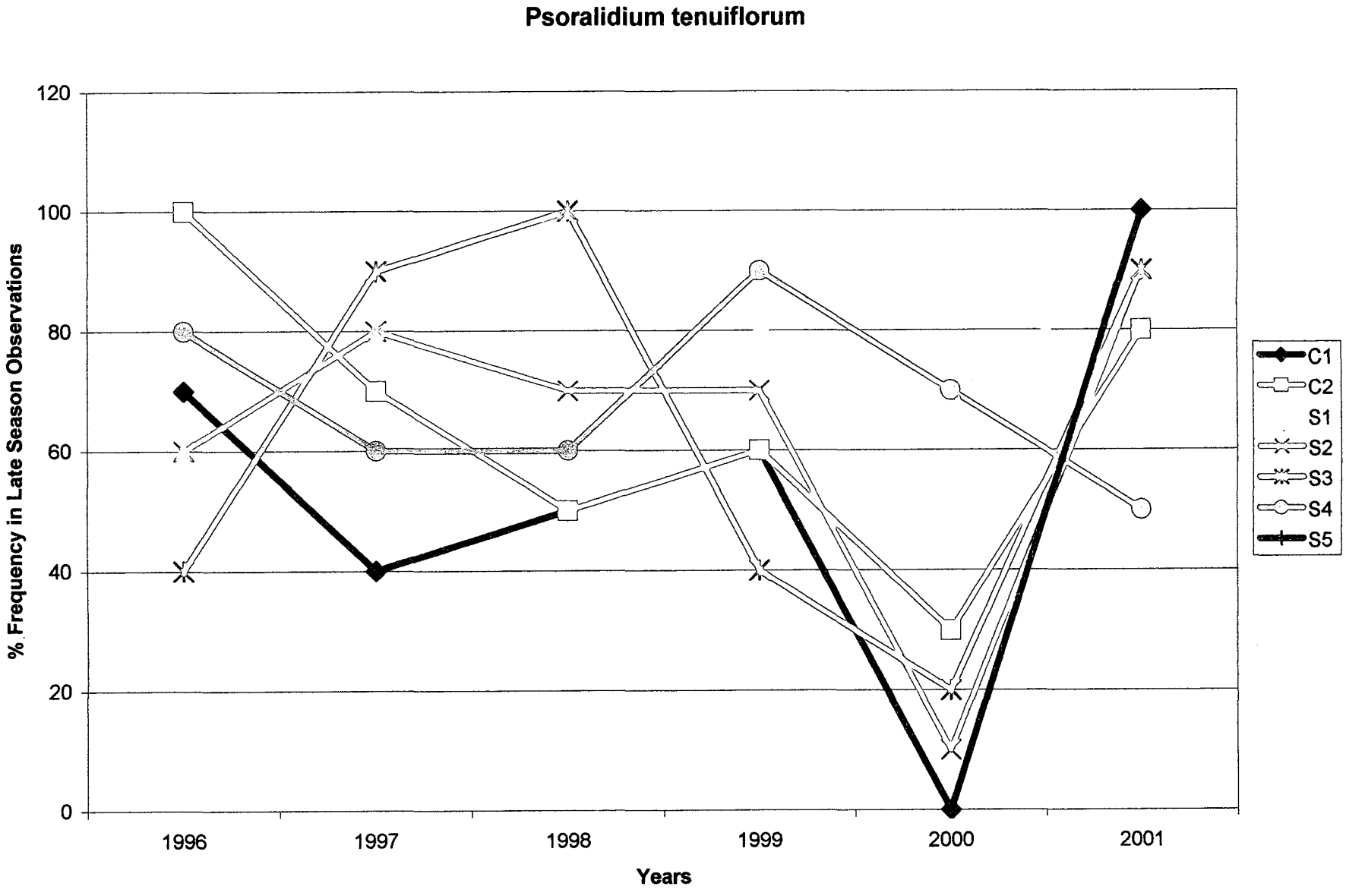


Figure 17. Patterns of Frequency of *Ratibida columnifera* along study transects in Early Season Observations 1996-2001

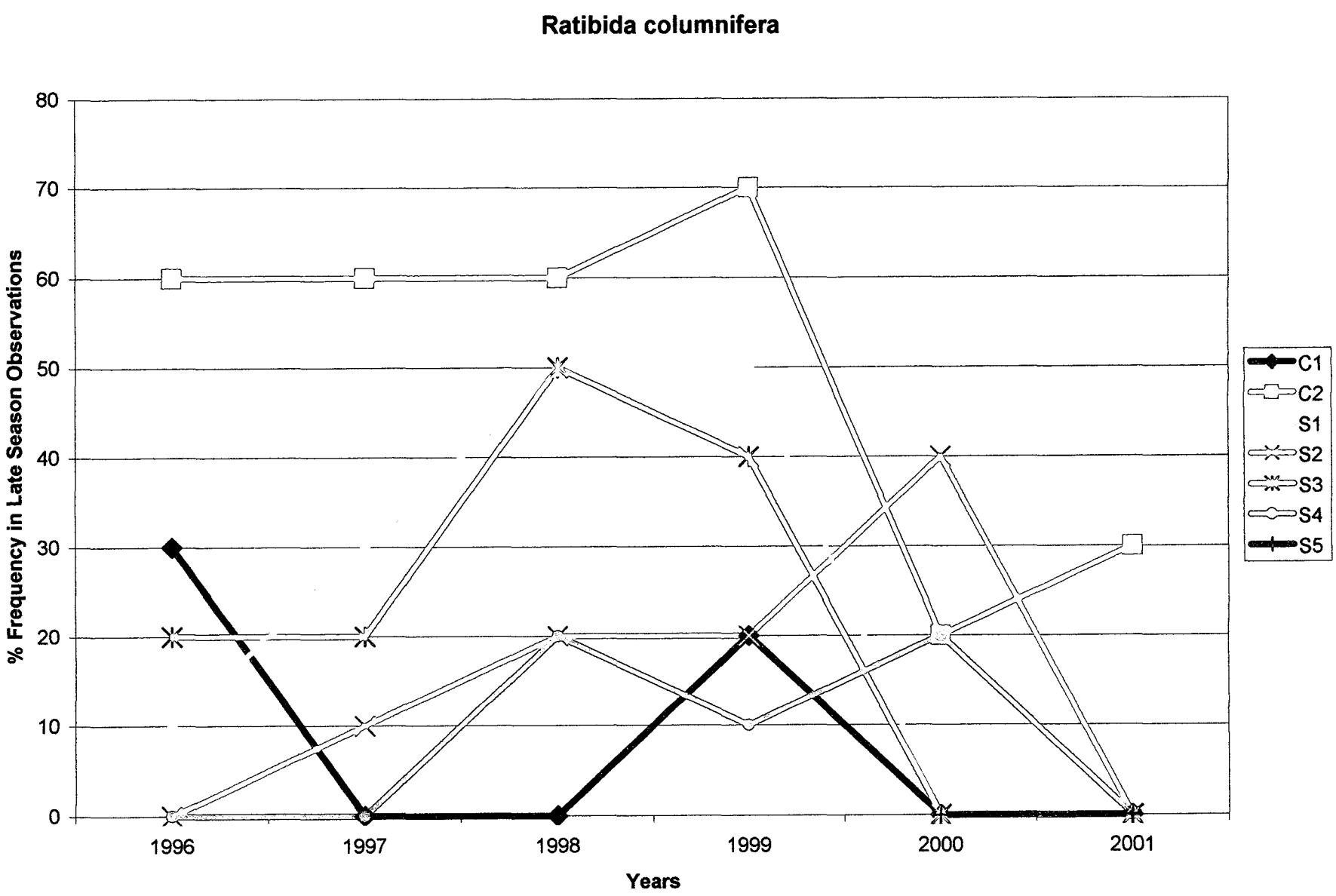


Figure 18. Patterns of Frequency of *Castilleja sessiliflora* along study transects in Early Season Observations 1996-2001

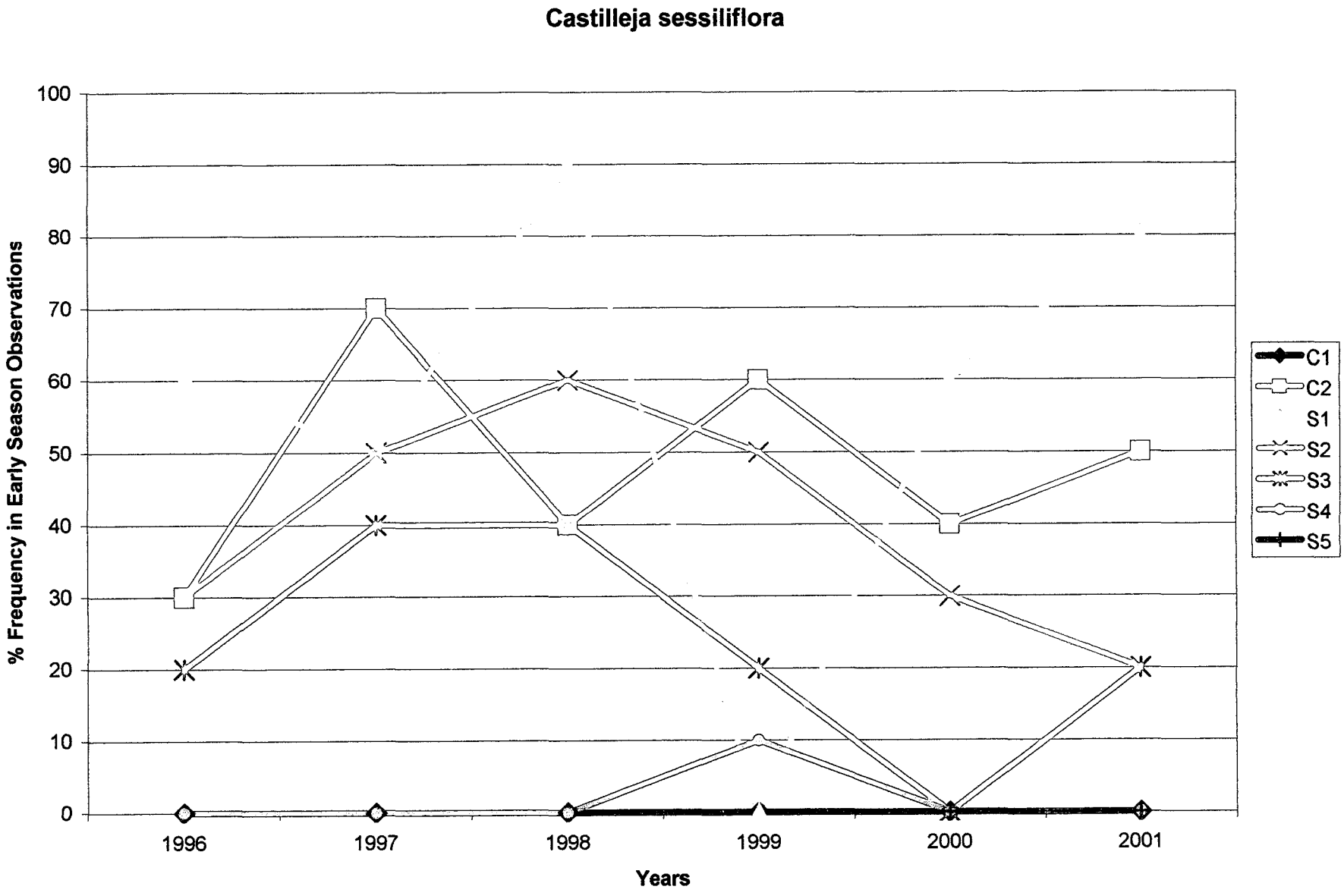


Table 1. Cover Data - Control Transect 1, Tordon Post-Spray Study, City of Boulder Open Space, CO - June 2001

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)	Percent Foliar Cover* ----Sample Number---- Control 1
NATIVE ANNUAL & BIENNIAL FORBS						
Androsace septentrionalis	0.50	100.00	0.85	0.50	0.83	0.5
Plantago patagonica	0.50	100.00	0.85	0.50	0.83	0.5
Silene antirrhina	0.50	100.00	0.85	0.50	0.83	0.5
TOTAL NATIVE ANN. & BIEN. FORBS	1.5	100.0	2.6	1.5	2.5	1.5
INTRODUCED ANNUAL & BIENNIAL FORBS						
Acosta diffusa	10.50	100.00	17.95	10.50	17.36	10.5
Alyssum parviflorum	2.50	100.00	4.27	3.00	4.96	2.5(0.5)
Camelina microcarpa	0.00	100.00	0.00	0.00	0.00	P
Erodium cicutarium	0.50	100.00	0.85	0.50	0.83	0.5
Lappula redowskii	0.00	100.00	0.00	0.00	0.00	P
Neolepia campestre	0.00	100.00	0.00	0.00	0.00	P
Podospermum laciniatum	0.00	100.00	0.00	0.00	0.00	P
Verbascum blattaria	0.00	100.00	0.00	0.00	0.00	P
TOTAL INTRO. ANN. & BIEN. FORBS	13.5	100.0	23.1	14.0	23.1	13.5(0.5)
NATIVE ANNUAL GRASSES						
Critesion pusillum	0.00	100.00	0.00	0.00	0.00	P
Vulpia octoflora	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE ANN. GRASSES	0.0	100.0	0.0	0.0	0.0	P
INTRODUCED ANNUAL GRASSES						
Anisantha tectorum	5.50	100.00	9.40	5.50	9.09	5.5
Bromus japonicus	6.00	100.00	10.26	6.50	10.74	6.0(0.5)
TOTAL INTRO. ANN. GRASSES	11.5	100.0	19.7	12.0	19.8	11.5(0.5)
NATIVE PERENNIAL FORBS						
Astragalus agrestis	0.00	100.00	0.00	0.00	0.00	P
Erigeron flagellaris	0.00	100.00	0.00	0.00	0.00	P
Erigeron spp.	0.00	100.00	0.00	0.00	0.00	P
Gaura coccinea	0.00	100.00	0.00	0.00	0.00	P
Heterotheca villosa	0.50	100.00	0.85	0.50	0.83	0.5
Lesquerella montana	0.00	100.00	0.00	0.00	0.00	P
Liatris punctata	0.00	100.00	0.00	0.50	0.83	(0.5)
Lithospermum spp.	0.50	100.00	0.85	0.50	0.83	0.5
Musineon divaricatum	0.50	100.00	0.85	0.50	0.83	0.5
Oligosporus dracunculus ssp. glaucus	0.00	100.00	0.00	0.00	0.00	P
Psoralidium tenuiflorum	0.00	100.00	0.00	0.00	0.00	P
Sphaeralcea coccinea	1.00	100.00	1.71	1.00	1.65	1.0
TOTAL NATIVE PERENNIAL FORBS	2.5	100.0	4.3	3.0	5.0	2.5(0.5)
INTRODUCED PERENNIAL FORBS						
Cichorium intybus	0.00	100.00	0.00	0.00	0.00	P
Convolvulus arvensis	0.00	100.00	0.00	0.00	0.00	P
Potentilla recta	0.00	100.00	0.00	0.00	0.00	P
TOTAL INTRO. PERENNIAL FORBS	0.0	100.0	0.0	0.0	0.0	P
NATIVE PERENNIAL GRASSES (cool)						
Elymus elymoides	0.50	100.00	0.85	0.50	0.83	0.5
Koeleria macrantha	0.00	100.00	0.00	0.00	0.00	P
Pascopyrum smithii	2.50	100.00	4.27	3.00	4.96	2.5(0.5)
Poa agassizensis	0.00	100.00	0.00	0.00	0.00	P
Poa compressa	5.50	100.00	9.40	5.50	9.09	5.5
TOTAL NATIVE PERENNIAL GRASSES (c)	8.5	100.0	14.5	9.0	14.9	8.5(0.5)

Table 1. Cover Data - Control Transect 1, Tordon Post-Spray Study, City of Boulder Open Space, CO - June 2001

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)	Percent Foliar Cover* ----Sample Number---- Control 1
NATIVE PERENNIAL GRASSES (warm)						
Andropogon gerardii	1.00	100.00	1.71	1.00	1.65	1.0
Aristida purpurea	0.50	100.00	0.85	0.50	0.83	0.5
Buchloe dactyloides	8.50	100.00	14.53	8.50	14.05	8.5
Chondrosum gracile	10.00	100.00	17.09	10.00	16.53	10.0
TOTAL NATIVE PERENNIAL GRASSES (w)	20.0	100.0	34.2	20.0	33.1	20.0
NATIVE SUBSHRUBS						
Artemisia frigida	0.50	100.00	0.85	0.50	0.83	0.5
TOTAL NATIVE SUBSHRUBS	0.5	100.0	0.9	0.5	0.8	0.5
SUCCULENT						
Echinocereus viridiflorus	0.00	100.00	0.00	0.00	0.00	P
Opuntia fragilis	0.00	100.00	0.00	0.00	0.00	P
Opuntia macrorhiza	0.50	100.00	0.85	0.50	0.83	0.5
Opuntia polyacantha	0.00	100.00	0.00	0.00	0.00	P
TOTAL SUCCULENT	0.5	100.0	0.9	0.5	0.8	0.5
Standing dead	2.50	100.00		2.50		2.5
Litter	37.00	100.00		37.00		37.0
Bare soil	2.00	100.00		2.00		2.0
TOTALS	100.0			102.0		100
TOTAL VEGETATION COVER	58.5 (s=0.0)		100.0	60.5 (s=0.0)	100.0	58.5(2.0)
GROUND COVER (Litter+Rock+Veg+St.Dead)	98.0			100.0		98(2)
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 44.0 Std.Dev.= 0.0)						44

*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 2001

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)	Percent Foliar Cover* ----Sample Number---- Control 2
NATIVE ANNUAL & BIENNIAL FORBS						
Collomia linearis	0.00	100.00	0.00	0.00	0.00	P
Draba reptans	0.00	100.00	0.00	0.00	0.00	P
Erigeron divergens	0.00	100.00	0.00	0.00	0.00	P
Erysimum asperum	0.00	100.00	0.00	0.00	0.00	P
Grindelia squarrosa	0.50	100.00	0.91	0.50	0.89	0.5
Oreocarya virgata	0.00	100.00	0.00	0.00	0.00	P
Plantago patagonica	0.00	100.00	0.00	0.00	0.00	P
Pterogonum alatum	0.00	100.00	0.00	0.00	0.00	P
Silene antirrhina	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE ANN. & BIEN. FORBS	0.5	100.0	0.9	0.5	0.9	0.5
INTRODUCED ANNUAL & BIENNIAL FORBS						
Acosta diffusa	5.50	100.00	10.00	6.50	11.61	5.5(1.0)
Alyssum parviflorum	0.00	100.00	0.00	0.00	0.00	P
Lactuca serriola	0.00	100.00	0.00	0.00	0.00	P
Lepidium densiflorum	0.00	100.00	0.00	0.00	0.00	P
Podospermum laciniatum	0.00	100.00	0.00	0.00	0.00	P
Tragopogon dubius ssp. major	0.00	100.00	0.00	0.00	0.00	P
TOTAL INTRO. ANN. & BIEN. FORBS	5.5	100.0	10.0	6.5	11.6	5.5(1.0)
INTRODUCED ANNUAL GRASSES						
Bromus japonicus	0.50	100.00	0.91	0.50	0.89	0.5
TOTAL INTRO. ANN. GRASSES	0.5	100.0	0.9	0.5	0.9	0.5
NATIVE PERENNIAL FORBS						
Artemisia ludoviciana	1.50	100.00	2.73	1.50	2.68	1.5
Aster porteri	0.00	100.00	0.00	0.00	0.00	P
Astragalus agrestis	0.50	100.00	0.91	0.50	0.89	0.5
Castilleja sessiliflora	0.00	100.00	0.00	0.00	0.00	P
Dalea purpurea	0.00	100.00	0.00	0.00	0.00	P
Eremogone fendleri	0.00	100.00	0.00	0.00	0.00	P
Erigeron flagellaris	1.00	100.00	1.82	1.00	1.79	1.0
Gaillardia aristata	0.00	100.00	0.00	0.00	0.00	P
Gastrolychnis drummondii	0.00	100.00	0.00	0.00	0.00	P
Gaura coccinea	0.00	100.00	0.00	0.00	0.00	P
Helianthus pumilus	0.00	100.00	0.00	0.00	0.00	P
Heterotheca villosa	8.00	100.00	14.55	8.00	14.29	8.0
Hymenopappus filifolius	0.00	100.00	0.00	0.00	0.00	P
Lesquerella montana	0.00	100.00	0.00	0.00	0.00	P
Liatris punctata	2.00	100.00	3.64	2.00	3.57	2.0
Lithospermum spp.	0.00	100.00	0.00	0.00	0.00	P
Lomatium orientale	0.00	100.00	0.00	0.00	0.00	P
Musineon divaricatum	0.00	100.00	0.00	0.00	0.00	P
Oenothera villosa	0.00	100.00	0.00	0.00	0.00	P
Oligosporus dracunculus ssp. glaucus	0.00	100.00	0.00	0.00	0.00	P
Oxytropis lambertii	0.00	100.00	0.00	0.00	0.00	P
Paronychia jamesii	0.00	100.00	0.00	0.00	0.00	P
Penstemon secundiflorus	0.00	100.00	0.00	0.00	0.00	P
Psoralidium tenuiflorum	1.00	100.00	1.82	1.00	1.79	1.0
Ratibida columnifera	0.00	100.00	0.00	0.00	0.00	P
Senecio integerrimus	0.00	100.00	0.00	0.00	0.00	P
Tithymalus brachyceras	0.00	100.00	0.00	0.00	0.00	P
Viola spp.	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE PERENNIAL FORBS	14.0	100.0	25.5	14.0	25.0	14.0

Table 2. Cover Data - Control Transect 2, Tordon Post-Spray Study, City of Boulder Open Space, CO - June 2001

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)	Percent Foliar Cover* ----Sample Number---- Control 2
INTRODUCED PERENNIAL FORBS						
Cichorium intybus	0.00	100.00	0.00	0.00	0.00	P
Taraxacum officinale	0.00	100.00	0.00	0.00	0.00	P
TOTAL INTRO. PERENNIAL FORBS	0.0	100.0	0.0	0.0	0.0	P
NATIVE PERENNIAL GRASSES (cool)						
Carex pensylvanica ssp. heliophila	4.00	100.00	7.27	4.00	7.14	4.0
Elymus elymoides	0.50	100.00	0.91	0.50	0.89	0.5
Hesperostipa comata	7.00	100.00	12.73	7.00	12.50	7.0
Koeleria macrantha	1.50	100.00	2.73	1.50	2.68	1.5
Pascopyrum smithii	10.00	100.00	18.18	10.00	17.86	10.0
Poa agassizensis	0.00	100.00	0.00	0.00	0.00	P
Poa compressa	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE PERENNIAL GRASSES (c)	23.0	100.0	41.8	23.0	41.1	23.0
NATIVE PERENNIAL GRASSES (warm)						
Andropogon gerardii	1.00	100.00	1.82	1.00	1.79	1.0
Aristida purpurea	2.00	100.00	3.64	2.00	3.57	2.0
Bouteloua curtipendula	2.00	100.00	3.64	2.00	3.57	2.0
Buchloe dactyloides	3.50	100.00	6.36	3.50	6.25	3.5
Chondrosum gracile	2.00	100.00	3.64	2.00	3.57	2.0
Muhlenbergia montana	0.50	100.00	0.91	0.50	0.89	0.5
Schizachyrium scoparium	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE PERENNIAL GRASSES (w)	11.0	100.0	20.0	11.0	19.6	11.0
NATIVE SUBSHRUBS						
Artemisia frigida	0.50	100.00	0.91	0.50	0.89	0.5
Gutierrezia sarothrae	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE SUBSHRUBS	0.5	100.0	0.9	0.5	0.9	0.5
SUCCULENT						
Echinocereus viridiflorus	0.00	100.00	0.00	0.00	0.00	P
Opuntia macrorhiza	0.00	100.00	0.00	0.00	0.00	P
TOTAL SUCCULENT	0.0	100.0	0.0	0.0	0.0	P
PARASITE						
Aphyllon fasciculatum	0.00	100.00	0.00	0.00	0.00	P
TOTAL PARASITE	0.0	100.0	0.0	0.0	0.0	P
Standing dead	4.50	100.00		4.50		4.5
Litter	27.50	100.00		27.50		27.5
Bare soil	6.00	100.00		6.00		6.0
Rock	7.00	100.00		7.00		7.0
TOTALS	100.0			101.0		100
TOTAL VEGETATION COVER	55.0 (s=0.0)		100.0	56.0 (s=0.0)	100.0	55.0(1.0)
GROUND COVER (Litter+Rock+Veg+St.Dead)	94.0			95.0		94(1)
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 65.0 Std.Dev.= 0.0)						65

*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 Spray Study, City of Boulder Open Space, CO - June 2001

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
NATIVE ANNUAL & BIENNIAL FORBS					
Androsace septentrionalis	0.10	20.00	0.19	0.10	0.19
Cirsium undulatum	0.00	20.00	0.00	0.00	0.00
Collinsia parviflora	0.00	20.00	0.00	0.00	0.00
Collomia linearis	0.10	20.00	0.19	0.10	0.19
Descurainia incana	0.00	20.00	0.00	0.00	0.00
Descurainia pinnata	0.00	20.00	0.00	0.00	0.00
Draba reptans	0.20	60.00	0.38	0.20	0.38
Grindelia squarrosa	0.00	60.00	0.00	0.00	0.00
Plantago patagonica	0.50	100.00	0.96	0.50	0.96
Pterogonum alatum	0.00	40.00	0.00	0.00	0.00
Silene antirrhina	0.00	80.00	0.00	0.00	0.00
TOTAL NATIVE ANN. & BIEN. FORBS	0.9	100.0	1.7	0.9	1.7
INTRODUCED ANNUAL & BIENNIAL FORBS					
Acosta diffusa	7.50	100.00	14.42	7.50	14.34
Alyssum parviflorum	1.40	100.00	2.69	1.50	2.87
Camelina microcarpa	0.10	100.00	0.19	0.10	0.19
Erodium cicutarium	0.00	20.00	0.00	0.00	0.00
Lactuca serriola	0.10	80.00	0.19	0.10	0.19
Lepidium densiflorum	0.00	20.00	0.00	0.00	0.00
Neolepia campestre	0.10	40.00	0.19	0.10	0.19
Podospermum laciniatum	0.10	40.00	0.19	0.10	0.19
Tragopogon dubius ssp. major	0.00	80.00	0.00	0.00	0.00
Verbascum blattaria	0.00	20.00	0.00	0.00	0.00
TOTAL INTRO. ANN. & BIEN. FORBS	9.3	100.0	17.9	9.4	18.0
NATIVE ANNUAL GRASSES					
Critesion pusillum	0.00	40.00	0.00	0.00	0.00
Vulpia octoflora	0.00	20.00	0.00	0.00	0.00
TOTAL NATIVE ANN. GRASSES	0.0	60.0	0.0	0.0	0.0
INTRODUCED ANNUAL GRASSES					
Anisantha tectorum	0.00	20.00	0.00	0.00	0.00
Bromus japonicus	4.20	100.00	8.08	4.20	8.03
TOTAL INTRO. ANN. GRASSES	4.2	100.0	8.1	4.2	8.0
NATIVE PERENNIAL FORBS					
Achillea lanulosa	0.00	60.00	0.00	0.00	0.00
Allium textile	0.00	60.00	0.00	0.00	0.00
Antennaria rosea	0.00	20.00	0.00	0.00	0.00
Arnica fulgens	0.00	20.00	0.00	0.00	0.00
Artemisia ludoviciana	0.10	40.00	0.19	0.10	0.19
Asclepias viridiflora	0.00	20.00	0.00	0.00	0.00
Aster porteri	0.10	20.00	0.19	0.10	0.19
Astragalus agrestis	0.10	20.00	0.19	0.10	0.19
Brickellia rosmarinifolia ssp. chlorolepis	0.10	40.00	0.19	0.10	0.19
Calochortus gunnisonii	0.00	40.00	0.00	0.00	0.00
Castilleja sessiliflora	0.20	60.00	0.38	0.20	0.38
Dalea candida var. oligophylla	0.00	60.00	0.00	0.00	0.00
Dalea purpurea	0.00	80.00	0.00	0.00	0.00
Erigeron flagellaris	0.60	80.00	1.15	0.70	1.34
Eriogonum flavum var. flavum	0.40	20.00	0.77	0.40	0.76
Gaillardia spp.	0.00	20.00	0.00	0.00	0.00
Gaura coccinea	0.00	20.00	0.00	0.00	0.00
Helianthus pumilus	0.00	20.00	0.00	0.00	0.00
Heterotheca villosa	1.00	60.00	1.92	1.00	1.91
Leucocrinum montanum	0.10	20.00	0.19	0.10	0.19

Table 3. Cover Data - Spray Area, Transects 1-5, Tordon Spray Study, City of Boulder Open Space, CO - June 2001

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
NATIVE PERENNIAL FORBS (concluded)					
Liatris punctata	0.10	40.00	0.19	0.10	0.19
Lithospermum spp.	0.40	100.00	0.77	0.40	0.76
Lomatium orientale	0.00	20.00	0.00	0.00	0.00
Musineon divaricatum	0.00	80.00	0.00	0.00	0.00
Nothocalais cuspidata	0.00	20.00	0.00	0.00	0.00
Oenothera howardii	0.00	40.00	0.00	0.00	0.00
Oligosporus dracunculus ssp. glaucus	0.00	40.00	0.00	0.00	0.00
Paronychia jamesii	0.00	40.00	0.00	0.00	0.00
Psoralidium tenuiflorum	1.80	100.00	3.46	1.80	3.44
Senecio integerrimus	0.00	40.00	0.00	0.00	0.00
Solidago spp.	0.20	20.00	0.38	0.20	0.38
Sphaeralcea coccinea	0.00	60.00	0.00	0.00	0.00
Tithymalus brachyceras	0.00	20.00	0.00	0.00	0.00
Townsendia hookeri	0.10	40.00	0.19	0.10	0.19
Viola spp.	0.00	20.00	0.00	0.00	0.00
Virgulaster ascendens	0.00	20.00	0.00	0.00	0.00
TOTAL NATIVE PERENNIAL FORBS	5.3	100.0	10.2	5.4	10.3
INTRODUCED PERENNIAL FORBS					
Breea arvensis	0.00	20.00	0.00	0.00	0.00
Cardaria chalepensis	0.00	20.00	0.00	0.00	0.00
Cichorium intybus	0.20	40.00	0.38	0.20	0.38
Convolvulus arvensis	0.10	20.00	0.19	0.10	0.19
Potentilla recta	0.10	20.00	0.19	0.10	0.19
Taraxacum officinale	0.00	80.00	0.00	0.00	0.00
TOTAL INTRO. PERENNIAL FORBS	0.4	100.0	0.8	0.4	0.8
NATIVE PERENNIAL GRASSES (cool)					
Carex pensylvanica ssp. heliophila	2.80	100.00	5.38	2.80	5.35
Elymus longifolius	0.00	20.00	0.00	0.00	0.00
Hesperostipa comata	0.00	20.00	0.00	0.00	0.00
Koeleria macrantha	1.60	100.00	3.08	1.60	3.06
Nassella viridula	0.00	20.00	0.00	0.00	0.00
Pascopyrum smithii	4.80	100.00	9.23	4.80	9.18
Poa agassizensis	2.10	100.00	4.04	2.10	4.02
Poa compressa	1.60	100.00	3.08	1.60	3.06
TOTAL NATIVE PERENNIAL GRASSES (c)	12.9	100.0	24.8	12.9	24.7
INTRODUCED PERENNIAL GRASSES (cool)					
Phleum pratense	0.00	20.00	0.00	0.00	0.00
Thinopyrum intermedium	0.10	20.00	0.19	0.10	0.19
TOTAL INTRO. PERENNIAL GRASSES (c)	0.1	40.0	0.2	0.1	0.2
NATIVE PERENNIAL GRASSES (warm)					
Andropogon gerardii	0.10	20.00	0.19	0.10	0.19
Aristida purpurea	0.70	60.00	1.35	0.70	1.34
Bouteloua curtipendula	2.20	60.00	4.23	2.20	4.21
Buchloe dactyloides	9.30	100.00	17.88	9.30	17.78
Chondrosum gracile	6.20	100.00	11.92	6.30	12.05
Chondrosum hirsutum	0.00	20.00	0.00	0.00	0.00
Muhlenbergia montana	0.00	20.00	0.00	0.00	0.00
TOTAL NATIVE PERENNIAL GRASSES (w)	18.5	100.0	35.6	18.6	35.6
NATIVE SUBSHRUBS					
Artemisia frigida	0.20	80.00	0.38	0.20	0.38
Gutierrezia sarothrae	0.00	40.00	0.00	0.00	0.00
TOTAL NATIVE SUBSHRUBS	0.2	100.0	0.4	0.2	0.4

Table 3. Cover Data - Spray Area, Transects 1-5, Tordon Spray Study, City of Boulder Open Space, CO - June 2001

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
LICHEN					
Lichen spp.	0.10	20.00	0.19	0.10	0.19
TOTAL LICHEN	0.1	20.0	0.2	0.1	0.2
SUCCULENT					
Opuntia fragilis	0.00	20.00	0.00	0.00	0.00
Opuntia macrorhiza	0.00	80.00	0.00	0.00	0.00
TOTAL SUCCULENT	0.0	80.0	0.0	0.0	0.0
AGAVOIDS					
Yucca glauca	0.10	20.00	0.19	0.10	0.19
TOTAL AGAVOIDS	0.1	20.0	0.2	0.1	0.2
Standing dead	4.80	100.00		4.80	
Litter	32.60	100.00		32.60	
Bare soil	9.00	100.00		9.00	
Rock	1.60	80.00		1.60	
TOTALS	100.0			100.3	
TOTAL VEGETATION COVER	52.0 (s=6.0)		100.0	52.3 (s=6.0)	100.0
GROUND COVER (Litter+Rock+Veg+St.Dead)	91.0			91.3	
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 41.6 Std.Dev.= 6.0)					

Table 3. Cover Data - Spray Area, Transects 1-5, Tordon Spray Study, City of Boulder Open Space, CO - June 2001

Percent Foliar Cover*

PLANT SPECIES	----Sample Number----				
	Spray 1	Spray 2	Spray 3	Spray 4	Spray 5
NATIVE ANNUAL & BIENNIAL FORBS					
Androsace septentrionalis					0.5
Cirsium undulatum	P				
Collinsia parviflora					P
Collomia linearis					0.5
Descurainia incana					P
Descurainia pinnata					P
Draba reptans	P	0.5			0.5
Grindelia squarrosa	P	P	P		
Plantago patagonica	P	2.0	P	P	0.5
Pterogonum alatum	P	P			
Silene antirrhina		P	P	P	P
TOTAL NATIVE ANN. & BIEN. FORBS	P	2.5	P	P	2.0
INTRODUCED ANNUAL & BIENNIAL FORBS					
Acosta diffusa	P	15.0	8.5	14.0	P
Alyssum parviflorum	0.5	P	3.5	2.5(0.5)	0.5
Camelina microcarpa	P	0.5	P	P	P
Erodium cicutarium				P	
Lactuca serriola	P	0.5	P	P	
Lepidium densiflorum					P
Neolepia campestre		P	0.5		
Podospermum laciniatum			P	0.5	
Tragopogon dubius ssp. major	P	P	P	P	
Verbascum blattaria				P	
TOTAL INTRO. ANN. & BIEN. FORBS	0.5	16.0	12.5	17.0(0.5)	0.5
NATIVE ANNUAL GRASSES					
Critesion pusillum			P	P	
Vulpia octoflora					P
TOTAL NATIVE ANN. GRASSES	---	---	P	P	P
INTRODUCED ANNUAL GRASSES					
Anisantha tectorum				P	
Bromus japonicus	P	1.5	13.0	4.0	2.5
TOTAL INTRO. ANN. GRASSES	P	1.5	13.0	4.0	2.5
NATIVE PERENNIAL FORBS					
Achillea lanulosa		P	P	P	
Allium textile	P	P			P
Antennaria rosea	P				
Arnica fulgens					P
Artemisia ludoviciana			P		0.5
Asclepias viridiflora	P				
Aster porteri		0.5			
Astragalus agrestis	0.5				
Brickellia rosmarinifolia ssp. chlorolepis	P	0.5			
Calochortus gunnisonii				P	P
Castilleja sessiliflora	1.0	P	P		
Dalea candida var. oligophylla	P	P			P
Dalea purpurea	P	P	P	P	
Erigeron flagellaris	1.5	1.5(0.5)		P	P
Eriogonum flavum var. flavum			2.0		
Gaillardia spp.	P				
Gaura coccinea					P
Helianthus pumilus					P
Heterotheca villosa	4.5		P	0.5	
Leucocrinum montanum	0.5				

Table 3. Cover Data - Spray Area, Transects 1-5, Tordon Spray Study, City of Boulder Open Space, CO - June 2001

PLANT SPECIES	Percent Foliar Cover* ----Sample Number---- Spray 1	Spray 2	Spray 3	Spray 4	Spray 5
NATIVE PERENNIAL FORBS (concluded)					
Liatris punctata	0.5				P
Lithospermum spp.	P	P	0.5	0.5	1.0
Lomatium orientale					P
Musineon divaricatum	P	P	P		P
Nothocalais cuspidata				P	
Oenothera howardii	P	P			
Oligosporus dracunculus ssp. glaucus			P		P
Paronychia jamesii	P		P		
Psoralidium tenuiflorum	0.5	3.0	0.5	2.0	3.0
Senecio integerrimus	P				P
Solidago spp.			1.0		
Sphaeralcea coccinea			P	P	P
Tithymalus brachyceras	P				
Townsendia hookeri	0.5	P			
Viola spp.					P
Virgulaster ascendens				P	
TOTAL NATIVE PERENNIAL FORBS	9.5	5.5(0.5)	4.0	3.0	4.5
INTRODUCED PERENNIAL FORBS					
Breea arvensis		P			
Cardaria chalepensis		P			
Cichorium intybus				1.0	P
Convolvulus arvensis			0.5		
Potentilla recta				0.5	
Taraxacum officinale	P	P	P	P	
TOTAL INTRO. PERENNIAL FORBS	P	P	0.5	1.5	P
NATIVE PERENNIAL GRASSES (cool)					
Carex pensylvanica ssp. heliophila	5.0	4.5	1.0	2.0	1.5
Elymus longifolius	P				
Hesperostipa comata	P				
Koeleria macrantha	2.5	1.5	1.5	1.0	1.5
Nassella viridula	P				
Pascopyrum smithii	0.5	3.5	6.0	7.0	7.0
Poa agassizensis	P	P	0.5	10.0	P
Poa compressa	P	P	1.5	3.0	3.5
TOTAL NATIVE PERENNIAL GRASSES (c)	8.0	9.5	10.5	23.0	13.5
INTRODUCED PERENNIAL GRASSES (cool)					
Phleum pratense				P	
Thinopyrum intermedium		0.5			
TOTAL INTRO. PERENNIAL GRASSES (c)	---	0.5	---	P	---
NATIVE PERENNIAL GRASSES (warm)					
Andropogon gerardii	0.5				
Aristida purpurea	2.0	1.0	0.5		
Bouteloua curtipendula	7.5	3.0	0.5		
Buchloe dactyloides	12.5	7.5	10.0	4.0	12.5
Chondrosum gracile	2.5	4.0	7.0	5.0	12.5(0.5)
Chondrosum hirsutum	P				
Muhlenbergia montana	P				
TOTAL NATIVE PERENNIAL GRASSES (w)	25.0	15.5	18.0	9.0	25.0(0.5)
NATIVE SUBSHRUBS					
Artemisia frigida	0.5	P		P	0.5
Gutierrezia sarothrae		P	P		
TOTAL NATIVE SUBSHRUBS	0.5	P	P	P	0.5

Table 3. Cover Data - Spray Area, Transects 1-5, Tordon Spray Study, City of Boulder Open Space, CO - June 2001

PLANT SPECIES	Percent Foliar Cover* ----Sample Number---- Spray 1	Spray 2	Spray 3	Spray 4	Spray 5
LICHEN					
Lichen spp.	0.5				
TOTAL LICHEN	0.5	—	—	—	—
SUCCULENT					
Opuntia fragilis				P	
Opuntia macrorhiza	P	P	P	P	
TOTAL SUCCULENT	P	P	P	P	—
AGAVOIDS					
Yucca glauca	0.5				
TOTAL AGAVOIDS	0.5	—	—	—	—
Standing dead	11.0	3.5	4.5	3.5	1.5
Litter	28.0	30.0	33.0	32.0	40.0
Bare soil	11.0	14.0	4.0	6.5	9.5
Rock	5.5	1.5		0.5	0.5
TOTALS	100	100	100	100	100
TOTAL VEGETATION COVER	44.5	51.0(0.5)	58.5	57.5(0.5)	48.5(0.5)
GROUND COVER (Litter+Rock+Veg+St.Dead)	89	86(1)	96	94(1)	91(1)
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 41.6 Std.Dev.= 6.0)	52	41	38	37	40

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

Table 4. Frequency Data - Control Transect 1, Tordon Post-Spray Study, City of Boulder Open Space, June 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ---Sample Number--- 1	2	3	4	5	6	7	8	9	10
NATIVE ANNUAL & BIENNIAL FORBS											
Androsace septentrionalis	40.00				P			P	P	P	
Plantago patagonica	90.00	P	P	P	P	P		P	P	P	P
Silene antirrhina	60.00	P	P	P			P		P	P	
TOTAL NATIVE ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL & BIENNIAL FORBS											
Acosta diffusa	100.00	P	P	P	P	P	P	P	P	P	P
Alyssum parviflorum	100.00	P	P	P	P	P	P	P	P	P	P
Camelina microcarpa	10.00			P							
Erodium cicutarium	70.00		P	P		P	P		P	P	P
Lappula redowskii	10.00			P							
Neolepia campestre	10.00		P								
Podospermum laciniatum	30.00		P						P		P
TOTAL INTRO. ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE ANNUAL GRASSES											
Critesion pusillum	30.00	P				P					P
Vulpia octoflora	90.00	P	P	P	P	P	P		P	P	P
TOTAL NATIVE ANN. GRASSES	90.0	P	P	P	P	P	P	---	P	P	P
INTRODUCED ANNUAL GRASSES											
Anisantha tectorum	100.00	P	P	P	P	P	6	P	P	P	P
Bromus japonicus	100.00	P	P	P	P	P	P	P	P	P	P
TOTAL INTRO. ANN. GRASSES	100.0	P	P	P	P	P	6	P	P	P	P
NATIVE PERENNIAL FORBS											
Astragalus agrestis	20.00	P	P								
Erigeron flagellaris	10.00		P								
Erigeron spp.	10.00							P			
Gaura coccinea	20.00						P				P
Heterotheca villosa	50.00	P	P		P					P	P
Lesquerella montana	10.00	P									
Liatris punctata	10.00						P				
Lithospermum spp.	70.00	P	P	P		P	P		P	P	
Oligosporus dracunculus ssp. glaucus	20.00	P					P				
Psoralidium tenuiflorum	100.00	P	P	P	P	P	P	P	P	P	P
Sphaeralcea coccinea	60.00			P	P	P	P	P	P		
TOTAL NATIVE PERENNIAL FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED PERENNIAL FORBS											
Cichorium intybus	10.00		P								
Convolvulus arvensis	20.00									P	P
Potentilla recta	40.00			P	P		P		P		
TOTAL INTRO. PERENNIAL FORBS	70.0	---	P	P	P	---	P	---	P	P	P
NATIVE PERENNIAL GRASSES (cool)											
Elymus elymoides	50.00	P	P	P						P	P
Koeleria macrantha	10.00						P				
Pascopyrum smithii	60.00	P	P	P	P	P			P		
Poa agassizensis	90.00	P	P	P	P	P		P	P	P	P
Poa compressa	60.00			P	P		P	P	P	P	
TOTAL NATIVE PERENNIAL GRASSES (c)	100.0	P	P	P	P	P	P	P	P	P	P

Table 4. Frequency Data - Control Transect 1, Tordon Post-Spray Study, City of Boulder Open Space, June 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ---Sample Number--- 1	2	3	4	5	6	7	8	9	10
NATIVE PERENNIAL GRASSES (warm)											
Andropogon gerardii	20.00	P	P								
Aristida purpurea	20.00						P	P			
Buchloe dactyloides	100.00	P	P	P	P	P	P	P	P	P	P
Chondrosum gracile	100.00	P	P	P	P	P	P	P	P	P	P
TOTAL NATIVE PERENNIAL GRASSES (w)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE SUBSHRUBS											
Artemisia frigida	90.00	P	P		P	P	P	P	P	P	P
TOTAL NATIVE SUBSHRUBS	90.0	P	P	---	P	P	P	P	P	P	P
SUCCULENT											
Echinocereus viridiflorus	20.00			P							P
Opuntia fragilis	20.00				P		P				
Opuntia macrorhiza	70.00		P	P	P		P		P	P	P
Opuntia polyacantha	30.00						P			P	P
TOTAL SUCCULENT	70.0	---	P	P	P	---	P	---	P	P	P
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 20.3 Std.Dev.= 2.9)		21	24	22	19	16	23	15	21	21	21

*P= Present within 1 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 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ---Sample Number--- 1	2	3	4	5	6	7	8	9	10
NATIVE ANNUAL & BIENNIAL FORBS											
Collomia linearis	10.00		P								
Draba reptans	10.00			P							
Erigeron divergens	60.00			P	P	P			P	P	P
Erysimum asperum	10.00							P			
Grindelia squarrosa	10.00		P								
Oreocarya virgata	10.00									P	
Plantago patagonica	50.00	P	P				P	P	P		
Pterogonum alatum	80.00	P	P		P	P	P	P	P		P
Silene antirrhina	10.00	P									
TOTAL NATIVE ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL & BIENNIAL FORBS											
Acosta diffusa	50.00	P	P	P	P	P					
Alyssum parviflorum	60.00	P	P	P	P	P					P
Lactuca serriola	20.00		P			P					
Lepidium densiflorum	10.00	P									
Podospermum laciniatum	60.00	P	P	P		P	P	P			
Tragopogon dubius ssp. major	40.00			P		P	P	P			
TOTAL INTRO. ANN. & BIEN. FORBS	80.0	P	P	P	P	P	P	P	—	—	P
INTRODUCED ANNUAL GRASSES											
Bromus japonicus	80.00	P	P	P	P	P	P	P	P		
TOTAL INTRO. ANN. GRASSES	80.0	P	P	P	P	P	P	P	P	—	—
NATIVE PERENNIAL FORBS											
Artemisia ludoviciana	10.00				P						
Aster porteri	80.00	P	P		P		P	P	P	P	P
Astragalus agrestis	30.00			P	P	P					
Castilleja sessiliflora	50.00			P	P	P				P	P
Dalea purpurea	50.00				P		P		P	P	P
Eremogone fendleri	50.00					P		P	P	P	P
Erigeron flagellaris	80.00	P	P	P	P	P	P		P	P	
Gaillardia aristata	20.00								P		P
Gastrolychnis drummondii	10.00						P				
Gaura coccinea	20.00			P			P				
Helianthus pumilus	10.00										P
Heterotheca villosa	100.00	P	P	P	P	P	P	P	P	P	P
Hymenopappus filifolius	60.00				P		P	P	P	P	P
Lesquerella montana	30.00					P		P		P	
Liatris punctata	90.00		P	P	P	P	P	P	P	P	P
Lithospermum spp.	30.00			P	P	P					
Lomatium orientale	10.00					P					
Musineon divaricatum	30.00	P	P	P							
Oenothera villosa	10.00					P					
Oligosporus dracunculus ssp. glaucus	10.00						P				
Oxytropis lambertii	20.00									P	P
Paronychia jamesii	60.00		P		P			P	P	P	P
Penstemon secundiflorus	60.00				P	P		P	P	P	P
Psoralidium tenuiflorum	80.00	P	P	P	P	P		P		P	P
Ratibida columnifera	30.00			P			P	P			
Senecio integerrimus	10.00			P							
Tithymalus brachyceras	10.00										P
Viola spp.	10.00									P	
TOTAL NATIVE PERENNIAL FORBS	100.0	P	P	P	P	P	P	P	P	P	P

Table 5. Frequency Data - Control Transect 2, Tordon Post-Spray Study, City of Boulder Open Space, June 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ----Sample Number---- 1	2	3	4	5	6	7	8	9	10
INTRODUCED PERENNIAL FORBS											
Cichorium intybus	10.00	P									
Taraxacum officinale	10.00			P							
TOTAL INTRO. PERENNIAL FORBS	20.0	P	—	P	—	—	—	—	—	—	—
NATIVE PERENNIAL GRASSES (cool)											
Carex pensylvanica ssp. heliophila	90.00		P	P	P	P	P	P	P	P	P
Elymus elymoides	30.00							P	P		P
Hesperostipa comata	80.00		P		P	P	P	P	P	P	P
Koeleria macrantha	100.00	P	P	P	P	P	P	P	P	P	P
Pascopyrum smithii	70.00	P	P	P	P	P	P	P			
Poa agassizensis	10.00		P								
Poa compressa	10.00	P									
TOTAL NATIVE PERENNIAL GRASSES (c)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL GRASSES (warm)											
Andropogon gerardii	30.00			P						P	P
Aristida purpurea	80.00		P	P		P	P	P	P	P	P
Bouteloua curtipendula	80.00			P	P	P	P	P	P	P	P
Buchloe dactyloides	100.00	P	P	P	P	P	P	P	P	P	P
Chondrosum gracile	70.00	P	P	P	P			P		P	P
Muhlenbergia montana	10.00								P		
Schizachyrium scoparium	10.00									P	
TOTAL NATIVE PERENNIAL GRASSES (w)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE SUBSHRUBS											
Artemisia frigida	100.00	P	P	P	P	P	P	P	P	P	P
Gutierrezia sarothrae	50.00	P	P		P	P	P				
TOTAL NATIVE SUBSHRUBS	100.0	P	P	P	P	P	P	P	P	P	P
SUCCULENT											
Echinocereus viridiflorus	10.00	P									
Opuntia macrorhiza	20.00	P	P								
TOTAL SUCCULENT	20.0	P	P	—	—	—	—	—	—	—	—
PARASITE											
Aphyllon fasciculatum	10.00						P				
TOTAL PARASITE	10.0	—	—	—	—	—	P	—	—	—	—
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 26.1 Std.Dev.= 2.0)		23	27	28	27	29	25	26	23	26	27

*P= Present within 1 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 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* —Sample Number— 1	2	3	4	5	6	7	8	9	10
NATIVE ANNUAL & BIENNIAL FORBS											
Draba reptans	10.00							P			
Grindelia squarrosa	10.00								P		
Plantago patagonica	10.00							P			
Pterogonum alatum	10.00						P				
TOTAL NATIVE ANN. & BIEN. FORBS	30.0	—	—	—	—	—	P	P	P	—	—
INTRODUCED ANNUAL & BIENNIAL FORBS											
Acosta diffusa	90.00	P	P		P	P	P	P	P	P	P
Alyssum parviflorum	50.00	P		P		P	P				P
Camelina microcarpa	10.00								P		
Lactuca serriola	10.00					P					
Tragopogon dubius ssp. major	10.00	P									
TOTAL INTRO. ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL GRASSES											
Bromus japonicus	20.00	P									P
TOTAL INTRO. ANN. GRASSES	20.0	P	—	—	—	—	—	—	—	—	P
NATIVE PERENNIAL FORBS											
Allium textile	20.00						P				P
Antennaria rosea	10.00	P									
Asclepias viridiflora	10.00				P						
Astragalus agrestis	60.00		P	P		P	P		P	P	
Brickellia rosmarinifolia ssp. chlorolepis	20.00					P	P				
Castilleja sessiliflora	80.00	P	P	P	P	P			P	P	P
Dalea purpurea	50.00		P	P		P	P		P		
Erigeron flagellaris	40.00							P	P	P	P
Gaillardia spp.	10.00			P							
Heterotheca villosa	90.00	P	P	P	P	P	P	P	P		P
Liatris punctata	30.00		P			P				P	
Lithospermum spp.	50.00		P	P	P				P		P
Musineon divaricatum	10.00		P								
Oenothera howardii	60.00			P	P	P	P			P	P
Paronychia jamesii	50.00		P		P				P	P	P
Psoralidium tenuiflorum	90.00		P	P	P	P	P	P	P	P	P
Senecio integerrimus	70.00	P	P	P	P	P			P	P	
Tithymalus brachyceras	20.00	P			P						
Townsendia hookeri	80.00	P	P	P	P	P		P		P	P
TOTAL NATIVE PERENNIAL FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED PERENNIAL FORBS											
Taraxacum officinale	20.00							P		P	
TOTAL INTRO. PERENNIAL FORBS	20.0	—	—	—	—	—	—	P	—	P	—
NATIVE PERENNIAL GRASSES (cool)											
Carex pensylvanica ssp. heliophila	90.00	P	P	P	P	P	P	P	P		P
Elymus longifolius	70.00	P	P	P	P	P		P			P
Hesperostipa comata	10.00		P								
Koeleria macrantha	100.00	P	P	P	P	P	P	P	P	P	P
Nassella viridula	20.00							P			P
Pascopyrum smithii	60.00					P	P	P	P	P	P
Poa agassizensis	10.00				P						
Poa compressa	10.00	P									
TOTAL NATIVE PERENNIAL GRASSES (c)	100.0	P	P	P	P	P	P	P	P	P	P

Table 6. Frequency Data - Spray Transect 1, Tordon Post-Spray Study, City of Boulder Open Space, June 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ---Sample Number--- 1	2	3	4	5	6	7	8	9	10
NATIVE PERENNIAL GRASSES (warm)											
Andropogon gerardii	30.00	P					P	P			
Aristida purpurea	70.00	P	P		P	P		P	P	P	
Bouteloua curtipendula	100.00	P	P	P	P	P	P	P	P	P	P
Buchloe dactyloides	100.00	P	P	P	P	P	P	P	P	P	P
Chondrosum gracile	40.00					P	P		P	P	
Chondrosum hirsutum	20.00						P				P
Muhlenbergia montana	20.00								P	P	
TOTAL NATIVE PERENNIAL GRASSES (w)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE SUBSHRUBS											
Artemisia frigida	40.00		P		P	P				P	
TOTAL NATIVE SUBSHRUBS	40.0	—	P	—	P	P	—	—	—	P	—
SUCCULENT											
Opuntia macrorhiza	10.00									P	
TOTAL SUCCULENT	10.0	—	—	—	—	—	—	—	—	P	—
AGAVOIDS											
Yucca glauca	40.00	P				P	P	P			
TOTAL AGAVOIDS	40.0	P	—	—	—	P	P	P	—	—	—
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 19.4 Std.Dev.= 1.8)		19	20	16	19	23	19	18	20	20	20

*P= Present within 1 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 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ---Sample Number--- 1	2	3	4	5	6	7	8	9	10
NATIVE ANNUAL & BIENNIAL FORBS											
Draba reptans	10.00						P				
Grindelia squarrosa	20.00							P			P
Plantago patagonica	80.00	P	P	P	P		P	P	P		P
Pterogonum alatum	20.00			P						P	
Silene antirrhina	40.00	P	P			P				P	
TOTAL NATIVE ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL & BIENNIAL FORBS											
Acosta diffusa	100.00	P	P	P	P	P	P	P	P	P	P
Alyssum parviflorum	90.00	P		P	P	P	P	P	P	P	P
Camelina microcarpa	20.00	P		P							
Lactuca serriola	20.00	P					P				
Neolepia campestre	30.00	P	P								P
Tragopogon dubius ssp. major	50.00	P	P		P		P	P			
TOTAL INTRO. ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL GRASSES											
Bromus japonicus	100.00	P	P	P	P	P	P	P	P	P	P
TOTAL INTRO. ANN. GRASSES	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL FORBS											
Allium textile	10.00		P								
Aster porteri	50.00		P	P		P		P			P
Brickellia rosmarinifolia ssp. chlorolepis	20.00			P					P		
Castilleja sessiliflora	20.00			P		P					
Dalea candida var. oligophylla	20.00				P					P	
Dalea purpurea	20.00				P					P	
Erigeron flagellaris	100.00	P	P	P	P	P	P	P	P	P	P
Lithospermum spp.	40.00	P					P	P			P
Musineon divaricatum	80.00	P	P	P	P	P	P	P	P		
Oenothera howardii	10.00									P	
Psoralidium tenuiflorum	90.00	P		P	P	P	P	P	P	P	P
Townsendia hookeri	20.00	P			P						
TOTAL NATIVE PERENNIAL FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED PERENNIAL FORBS											
Breea arvensis	10.00								P		
Cardaria chalepensis	20.00		P			P					
Taraxacum officinale	30.00							P	P		P
TOTAL INTRO. PERENNIAL FORBS	50.0	---	P	---	---	P	---	P	P	---	P
NATIVE PERENNIAL GRASSES (cool)											
Carex pensylvanica ssp. heliophila	90.00	P	P	P	P	P		P	P	P	P
Koeleria macrantha	80.00	P	P	P	P	P		P		P	P
Pascopyrum smithii	100.00	P	P	P	P	P	P	P	P	P	P
Poa agassizensis	30.00	P		P					P		
Poa compressa	10.00			P							
TOTAL NATIVE PERENNIAL GRASSES (c)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL GRASSES (warm)											
Aristida purpurea	40.00			P			P			P	P
Bouteloua curtipendula	70.00	P		P	P	P			P	P	P
Buchloe dactyloides	90.00	P	P	P	P	P	P	P	P		P
Chondrosum gracile	60.00	P	P	P	P	P		P			
TOTAL NATIVE PERENNIAL GRASSES (w)	100.0	P	P	P	P	P	P	P	P	P	P

Table 7. Frequency Data - Spray Transect 2, Tordon Post-Spray Study, City of Boulder Open Space, June 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* —Sample Number— 1	2	3	4	5	6	7	8	9	10
NATIVE SUBSHRUBS											
Artemisia frigida	50.00		P		P		P		P	P	
Gutierrezia sarothrae	30.00			P		P		P			
TOTAL NATIVE SUBSHRUBS	80.0	---	P	P	P	P	P	P	P	P	---
SUCCULENT											
Opuntia macrorhiza	10.00						P				
TOTAL SUCCULENT	10.0	---	---	---	---	---	P	---	---	---	---
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 17.8 Std.Dev.= 2.1)		21	17	22	18	17	16	18	16	16	17

*P= Present within 1 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 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ---Sample Number--- 1	2	3	4	5	6	7	8	9	10
NATIVE ANNUAL & BIENNIAL FORBS											
Grindelia squarrosa	10.00						P				
Plantago patagonica	70.00				P	P	P	P	P	P	P
Silene antirrhina	20.00						P				P
TOTAL NATIVE ANN. & BIEN. FORBS	70.0	---	---	---	P	P	P	P	P	P	P
INTRODUCED ANNUAL & BIENNIAL FORBS											
Acosta diffusa	100.00	P	P	P	P	P	P	P	P	P	P
Alyssum parviflorum	90.00	P		P	P	P	P	P	P	P	P
Camelina microcarpa	40.00						P	P	P	P	
Lactuca serriola	40.00				P		P	P			P
Neolepia campestre	50.00			P	P	P				P	P
Podospermum laciniatum	70.00	P	P		P	P		P	P		P
Tragopogon dubius ssp. major	50.00		P			P		P	P	P	
TOTAL INTRO. ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL GRASSES											
Bromus japonicus	100.00	P	P	P	P	P	P	P	P	P	P
TOTAL INTRO. ANN. GRASSES	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL FORBS											
Achillea lanulosa	30.00		P						P	P	
Artemisia ludoviciana	20.00	P	P								
Castilleja sessiliflora	20.00		P						P		
Dalea purpurea	10.00				P						
Eriogonum flavum var. flavum	80.00	P		P		P	P	P	P	P	P
Heterotheca villosa	40.00	P		P					P		P
Lithospermum spp.	80.00	P		P		P	P	P	P	P	P
Musineon divaricatum	30.00	P	P						P		
Oligosporus dracunculus ssp. glaucus	10.00						P				
Paronychia jamesii	10.00								P		
Psoralidium tenuiflorum	90.00	P	P	P	P	P	P	P	P		P
Solidago spp.	10.00							P			
Sphaeralcea coccinea	20.00				P	P					
TOTAL NATIVE PERENNIAL FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED PERENNIAL FORBS											
Convolvulus arvensis	30.00	P	P	P							
Taraxacum officinale	60.00		P			P	P		P	P	P
TOTAL INTRO. PERENNIAL FORBS	80.0	P	P	P	---	P	P	---	P	P	P
NATIVE PERENNIAL GRASSES (cool)											
Carex pensylvanica ssp. heliophila	30.00	P		P						P	
Koeleria macrantha	90.00	P	P	P	P		P	P	P	P	P
Pascopyrum smithii	100.00	P	P	P	P	P	P	P	P	P	P
Poa agassizensis	50.00	P	P	P						P	P
Poa compressa	50.00		P	P	P		P	P			
TOTAL NATIVE PERENNIAL GRASSES (c)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL GRASSES (warm)											
Aristida purpurea	10.00									P	
Bouteloua curtipendula	30.00	P	P	P							
Buchloe dactyloides	100.00	P	P	P	P	P	P	P	P	P	P
Chondrosum gracile	60.00	P		P	P	P	P				P
TOTAL NATIVE PERENNIAL GRASSES (w)	100.0	P	P	P	P	P	P	P	P	P	P

Table 8. Frequency Data - Spray Transect 3, Tordon Post-Spray Study, City of Boulder Open Space, June 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ----Sample Number---- 1	2	3	4	5	6	7	8	9	10
NATIVE SUBSHRUBS											
Gutierrezia sarothrae	10.00		P								
TOTAL NATIVE SUBSHRUBS	10.0	—	P	—	—	—	—	—	—	—	—
SUCCULENT											
Opuntia macrorhiza	20.00		P			P					
TOTAL SUCCULENT	20.0	—	P	—	—	P	—	—	—	—	—
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 17.3 Std.Dev.= 1.3)		18	19	17	15	16	18	16	19	17	18

*P= Present within 1 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 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ----Sample Number---- 1	2	3	4	5	6	7	8	9	10
NATIVE ANNUAL & BIENNIAL FORBS											
Plantago patagonica	40.00			P					P	P	P
TOTAL NATIVE ANN. & BIEN. FORBS	40.0	—	—	P	—	—	—	—	P	P	P
INTRODUCED ANNUAL & BIENNIAL FORBS											
Acosta diffusa	100.00	P	P	P	P	P	P	P	P	P	P
Alyssum parviflorum	100.00	P	P	P	P	P	P	P	P	P	P
Camelina microcarpa	20.00								P		P
Erodium cicutarium	20.00								P	P	
Podospermum laciniatum	40.00			P	P				P		P
Tragopogon dubius ssp. major	20.00				P				P		
Verbascum blattaria	20.00				P	P					
TOTAL INTRO. ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE ANNUAL GRASSES											
Critesion pusillum	50.00	P	P					P	P		P
TOTAL NATIVE ANN. GRASSES	50.0	P	P	—	—	—	—	P	P	—	P
INTRODUCED ANNUAL GRASSES											
Anisantha tectorum	10.00					P					
Bromus japonicus	90.00	P	P	P	P	P	P	P	P	P	
TOTAL INTRO. ANN. GRASSES	90.0	P	P	P	P	P	P	P	P	P	—
NATIVE PERENNIAL FORBS											
Achillea lanulosa	40.00			P	P	P				P	
Calochortus gunnisonii	20.00				P				P		
Dalea purpurea	10.00		P								
Erigeron flagellaris	40.00		P	P		P					P
Heterotheca villosa	20.00	P	P								
Lithospermum spp.	40.00	P	P	P					P		
Nothocalais cuspidata	10.00							P			
Psoralidium tenuiflorum	50.00	P	P					P		P	P
Sphaeralcea coccinea	30.00	P	P	P							
Virgulaster ascendens	10.00										P
TOTAL NATIVE PERENNIAL FORBS	90.0	P	P	P	P	P	—	P	P	P	P
INTRODUCED PERENNIAL FORBS											
Cichorium intybus	40.00		P				P	P	P		
Potentilla recta	10.00				P						
Taraxacum officinale	40.00	P	P		P		P				
TOTAL INTRO. PERENNIAL FORBS	60.0	P	P	—	P	—	P	P	P	—	—
NATIVE PERENNIAL GRASSES (cool)											
Carex pensylvanica ssp. heliophila	60.00	P	P	P	P		P	P			
Koeleria macrantha	40.00			P			P		P	P	
Pascopyrum smithii	90.00	P	P	P	P	P	P		P	P	P
Poa agassizensis	20.00				P	P					
Poa compressa	40.00			P		P		P			P
TOTAL NATIVE PERENNIAL GRASSES (c)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL GRASSES (warm)											
Buchloe dactyloides	100.00	P	P	P	P	P	P	P	P	P	P
Chondrosum gracile	30.00			P				P	P		
TOTAL NATIVE PERENNIAL GRASSES (w)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE SUBSHRUBS											
Artemisia frigida	20.00	P	P								
TOTAL NATIVE SUBSHRUBS	20.0	P	P	—	—	—	—	—	—	—	—

Table 9. Frequency Data - Spray Transect 4, Tordon Post-Spray Study, City of Boulder Open Space, June 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ----Sample Number---- 1	2	3	4	5	6	7	8	9	10
SUCCULENT											
Opuntia fragilis	10.00						P				
Opuntia macrorhiza	10.00									P	
TOTAL SUCCULENT	20.0	---	---	---	---	---	P	---	---	P	---
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 12.9 Std.Dev.= 2.2)		13	16	15	14	11	10	11	16	11	12

*P= Present within 1 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 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ----Sample Number---- 1	2	3	4	5	6	7	8	9	10
NATIVE ANNUAL & BIENNIAL FORBS											
Androsace septentrionalis	30.00				P	P	P				
Collinsia parviflora	20.00						P		P		
Collomia linearis	30.00							P	P	P	
Descurainia incana	20.00	P	P								
Descurainia pinnata	10.00									P	
Draba reptans	90.00	P	P	P		P	P	P	P	P	P
Plantago patagonica	80.00			P	P	P	P	P	P	P	P
Silene antirrhina	70.00	P	P			P	P	P		P	P
TOTAL NATIVE ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL & BIENNIAL FORBS											
Acosta diffusa	10.00							P			
Alyssum parviflorum	100.00	P	P	P	P	P	P	P	P	P	P
Camelina microcarpa	50.00					P	P	P	P		P
Lepidium densiflorum	10.00	P									
TOTAL INTRO. ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE ANNUAL GRASSES											
Vulpia octoflora	10.00							P			
TOTAL NATIVE ANN. GRASSES	10.0	---	---	---	---	---	---	P	---	---	---
INTRODUCED ANNUAL GRASSES											
Bromus japonicus	100.00	P	P	P	P	P	P	P	P	P	P
TOTAL INTRO. ANN. GRASSES	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL FORBS											
Allium textile	20.00				P	P					
Arnica fulgens	90.00	P	P	P	P		P	P	P	P	P
Artemisia ludoviciana	80.00	P	P	P		P	P	P		P	P
Calochortus gunnisonii	70.00	P	P		P		P	P	P	P	
Erigeron flagellaris	30.00						P	P	P		
Gaura coccinea	10.00	P									
Helianthus pumilus	40.00				P	P	P	P			
Liatris punctata	10.00							P			
Lithospermum spp.	100.00	P	P	P	P	P	P	P	P	P	P
Lomatium orientale	10.00						P				
Musineon divaricatum	90.00	P	P	P	P	P		P	P	P	P
Oligosporus dracunculus ssp. glaucus	10.00								P		
Psoralidium tenuiflorum	100.00	P	P	P	P	P	P	P	P	P	P
Senecio integerrimus	40.00						P	P		P	P
Sphaeralcea coccinea	40.00							P	P	P	P
Viola spp.	20.00			P					P		
TOTAL NATIVE PERENNIAL FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED PERENNIAL FORBS											
Cichorium intybus	20.00	P							P		
TOTAL INTRO. PERENNIAL FORBS	20.0	P	---	---	---	---	---	---	P	---	---
NATIVE PERENNIAL GRASSES (cool)											
Carex pensylvanica ssp. heliophila	40.00			P		P		P	P		
Koeleria macrantha	100.00	P	P	P	P	P	P	P	P	P	P
Pascopyrum smithii	100.00	P	P	P	P	P	P	P	P	P	P
Poa agassizensis	90.00	P	P	P	P	P	P		P	P	P
Poa compressa	50.00	P	P	P	P					P	
TOTAL NATIVE PERENNIAL GRASSES (c)	100.0	P	P	P	P	P	P	P	P	P	P

Table 10. Frequency Data - Spray Transect 5, Tordon Post-Spray Study, City of Boulder Open Space, June 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ---Sample Number--- 1	2	3	4	5	6	7	8	9	10
NATIVE PERENNIAL GRASSES (warm)											
Buchloe dactyloides	100.00	P	P	P	P	P	P	P	—	P	P
Chondrosum gracile	100.00	P	P	P	P	P	P	P	P	P	P
TOTAL NATIVE PERENNIAL GRASSES (w)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE SUBSHRUBS											
Artemisia frigida	40.00	P	P			P		P			
TOTAL NATIVE SUBSHRUBS	40.0	P	P	—	—	P	—	P	—	—	—
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 20.3 Std.Dev.= 2.9)		21	18	17	17	20	22	26	23	21	18

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

Table 11. Knapweed (*Acosta diffusa*) Density, Tordon Post-Spray Study, City of Boulder Open Space, June, 2001

			Subplot Number # of Individuals Per Square Meter									
	AVERAGE	MAXIMUM	1	2	3	4	5	6	7	8	9	10
C1 Rosette	23.2	52	23	15	20	25	9	19	42	12	52	15
C1 Bolt	11.7	33	5	29	2	33	5	16	8	0	17	2
C1 Dead	2.9	7	1	5	0	3	0	8	3	2	7	0
C2 Rosette	4.8	26	14	26	4	4	0	0	0	0	0	0
C2 Bolt	3.8	24	8	24	5	1	0	0	0	0	0	0
C2 Dead	0	0	0	0	0	0	0	0	0	0	0	0
S1 Rosette	1.7	8	2	0	0	1	1	0	1	1	8	3
S1 Bolt	0.8	5	0	0	0	1	0	0	0	2	0	5
S1 Dead	0	0	0	0	0	0	0	0	0	0	0	0
S2 Rosette	8.6	19	7	3	3	19	15	2	10	8	15	4
S2 Bolt	7	26	5	2	9	7	26	3	3	4	5	6
S2 Dead	0	0	0	0	0	0	0	0	0	0	0	0
S3 Rosette	5.4	16	12	9	16	8	1	2	1	4	1	0
S3 Bolt	3.3	12	4	2	12	8	3	1	0	3	0	0
S3 Dead	0	0	0	0	0	0	0	0	0	0	0	0
S4 Rosette	10.3	23	23	22	7	2	13	10	16	5	5	0
S4 Bolt	18.1	68	68	24	6	0	35	16	24	7	1	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	0	0	0	0	0	0	0	0	0	0	0
S5 Dead	0	0	0	0	0	0	0	0	0	0	0	0

Table 12. Cover Data - Control Transect 1, Tordon Post-Spray Study, City of Boulder Open Space, CO - August 2001

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)	Percent Foliar Cover* ----Sample Number---- Control 1
NATIVE ANNUAL & BIENNIAL FORBS						
Androsace septentrionalis	0.00	100.00	0.00	0.00	0.00	P
Grindelia squarrosa	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE ANN. & BIEN. FORBS	0.0	100.0	0.0	0.0	0.0	P
INTRODUCED ANNUAL & BIENNIAL FORBS						
Acosta diffusa	17.00	100.00	30.36	17.50	30.43	17.0(0.5)
Alyssum parviflorum	0.50	100.00	0.89	0.50	0.87	0.5
Verbascum blattaria	0.00	100.00	0.00	0.00	0.00	P
TOTAL INTRO. ANN. & BIEN. FORBS	17.5	100.0	31.3	18.0	31.3	17.5(0.5)
NATIVE ANNUAL GRASSES						
Vulpia octoflora	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE ANN. GRASSES	0.0	100.0	0.0	0.0	0.0	P
INTRODUCED ANNUAL GRASSES						
Anisantha tectorum	0.00	100.00	0.00	0.00	0.00	P
Bromus japonicus	2.50	100.00	4.46	2.50	4.35	2.5
TOTAL INTRO. ANN. GRASSES	2.5	100.0	4.5	2.5	4.3	2.5
NATIVE PERENNIAL FORBS						
Ambrosia psilostachya var. coronopifolia	0.50	100.00	0.89	0.50	0.87	0.5
Dalea purpurea	0.00	100.00	0.00	0.00	0.00	P
Erigeron flagellaris	0.00	100.00	0.00	0.00	0.00	P
Heterotheca villosa	0.50	100.00	0.89	0.50	0.87	0.5
Liatris punctata	0.00	100.00	0.00	0.00	0.00	P
Oligosporus dracunculus ssp. glaucus	0.00	100.00	0.00	0.00	0.00	P
Psoralidium tenuiflorum	0.50	100.00	0.89	0.50	0.87	0.5
Sphaeralcea coccinea	0.00	100.00	0.00	0.00	0.00	P
Virgulus ericoides (group)	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE PERENNIAL FORBS	1.5	100.0	2.7	1.5	2.6	1.5
INTRODUCED PERENNIAL FORBS						
Convolvulus arvensis	0.00	100.00	0.00	0.00	0.00	P
Potentilla recta	1.00	100.00	1.79	1.00	1.74	1.0
TOTAL INTRO. PERENNIAL FORBS	1.0	100.0	1.8	1.0	1.7	1.0
NATIVE PERENNIAL GRASSES *(cool)*						
Carex pensylvanica ssp. heliophila	0.00	100.00	0.00	0.00	0.00	P
Pascopyrum smithii	1.50	100.00	2.68	1.50	2.61	1.5
Poa agassizensis	0.00	100.00	0.00	0.00	0.00	P
Poa compressa	1.00	100.00	1.79	1.00	1.74	1.0
TOTAL NATIVE PERENNIAL GRASSES (c)	2.5	100.0	4.5	2.5	4.3	2.5
NATIVE PERENNIAL GRASSES (warm)						
Andropogon gerardii	1.00	100.00	1.79	1.50	2.61	1.0(0.5)
Aristida purpurea	0.00	100.00	0.00	0.00	0.00	P
Bouteloua curtipendula	1.00	100.00	1.79	1.00	1.74	1.0
Buchloe dactyloides	7.50	100.00	13.39	7.50	13.04	7.5
Chondrosum gracile	19.50	100.00	34.82	20.00	34.78	19.5(0.5)
Sporobolus cryptandrus	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE PERENNIAL GRASSES (w)	29.0	100.0	51.8	30.0	52.2	29.0(1.0)
NATIVE SUBSHRUBS						
Artemisia frigida	0.50	100.00	0.89	0.50	0.87	0.5
TOTAL NATIVE SUBSHRUBS	0.5	100.0	0.9	0.5	0.9	0.5

Table 12. Cover Data - Control Transect 1, Tordon Post-Spray Study, City of Boulder Open Space, CO - August 2001

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)	Percent Foliar Cover* ---Sample Number--- Control 1
SUCCULENT						
Opuntia macrorhiza	1.50	100.00	2.68	1.50	2.61	1.5
TOTAL SUCCULENT	1.5	100.0	2.7	1.5	2.6	1.5
Litter	31.00	100.00		31.00		31.0
Bare soil	13.00	100.00		13.00		13.0
TOTALS	100.0			101.5		100
TOTAL VEGETATION COVER	56.0 (s=0.0)		100.0	57.5 (s=0.0)	100.0	56.0(1.5)
GROUND COVER (Litter+Rock+Veg+St.Dead)	87.0			88.5		87(2)
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 13. Cover Data - Control Transect 2, Tordon Post Spray Study, City of Boulder Open Space, CO - August 2001

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)	Percent Foliar Cover* ---Sample Number--- Control 2
NATIVE ANNUAL & BIENNIAL FORBS						
Erigeron divergens	0.00	100.00	0.00	0.00	0.00	P
Pterogonum alatum	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE ANN. & BIEN. FORBS	0.0	100.0	0.0	0.0	0.0	P
INTRODUCED ANNUAL & BIENNIAL FORBS						
Acosta diffusa	2.00	100.00	4.94	2.00	4.71	2.0
Alyssum parviflorum	0.00	100.00	0.00	0.00	0.00	P
Neolepia campestre	0.00	100.00	0.00	0.00	0.00	P
Tragopogon dubius ssp. major	0.00	100.00	0.00	0.00	0.00	P
TOTAL INTRO. ANN. & BIEN. FORBS	2.0	100.0	4.9	2.0	4.7	2.0
INTRODUCED ANNUAL GRASSES						
Bromus japonicus	0.00	100.00	0.00	0.00	0.00	P
TOTAL INTRO. ANN. GRASSES	0.0	100.0	0.0	0.0	0.0	P
NATIVE PERENNIAL FORBS						
Artemisia ludoviciana	1.00	100.00	2.47	1.00	2.35	1.0
Asclepias pumila	0.00	100.00	0.00	0.00	0.00	P
Aster porteri	0.00	100.00	0.00	0.00	0.00	P
Astragalus agrestis	0.00	100.00	0.00	0.00	0.00	P
Astragalus shortianus	0.00	100.00	0.00	0.00	0.00	P
Cerastium strictum	0.00	100.00	0.00	0.00	0.00	P
Dalea purpurea	0.00	100.00	0.00	0.00	0.00	P
Eremogone fendleri	0.00	100.00	0.00	0.00	0.00	P
Helianthus pumilus	0.50	100.00	1.23	0.50	1.18	0.5
Heterotheca villosa	4.00	100.00	9.88	4.00	9.41	4.0
Hymenopappus filifolius	0.00	100.00	0.00	0.00	0.00	P
Liatris punctata	1.50	100.00	3.70	1.50	3.53	1.5
Lomatium orientale	0.00	100.00	0.00	0.00	0.00	P
Oenothera howardii	0.00	100.00	0.00	0.00	0.00	P
Oligosporus dracunculus ssp. glaucus	0.00	100.00	0.00	0.00	0.00	P
Oxybaphus linearis	0.50	100.00	1.23	0.50	1.18	0.5
Paronychia jamesii	0.50	100.00	1.23	0.50	1.18	0.5
Penstemon virens	0.00	100.00	0.00	0.00	0.00	P
Psoralidium tenuiflorum	1.00	100.00	2.47	1.00	2.35	1.0
Ratibida columnifera	0.00	100.00	0.00	0.00	0.00	P
Sphaeralcea coccinea	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE PERENNIAL FORBS	9.0	100.0	22.2	9.0	21.2	9.0
INTRODUCED PERENNIAL FORBS						
Hypericum perforatum	0.00	100.00	0.00	0.00	0.00	P
Linaria genistifolia ssp. dalmatica	0.00	100.00	0.00	0.00	0.00	P
TOTAL INTRO. PERENNIAL FORBS	0.0	100.0	0.0	0.0	0.0	P
NATIVE PERENNIAL GRASSES (cool)						
Carex pensylvanica ssp. heliophila	5.50	100.00	13.58	5.50	12.94	5.5
Elymus longifolius	0.00	100.00	0.00	0.00	0.00	P
Hesperostipa comata	1.00	100.00	2.47	1.00	2.35	1.0
Juncus interior	0.00	100.00	0.00	0.00	0.00	P
Koeleria macrantha	0.50	100.00	1.23	0.50	1.18	0.5
Pascopyrum smithii	4.00	100.00	9.88	4.00	9.41	4.0
Poa compressa	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE PERENNIAL GRASSES (c)	11.0	100.0	27.2	11.0	25.9	11.0

Table 13. Cover Data - Control Transect 2, Tordon Post Spray Study, City of Boulder Open Space, CO - August 2001

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)	Percent Foliar Cover* ---Sample Number---- Control 2
NATIVE PERENNIAL GRASSES (warm)						
Andropogon gerardii	0.00	100.00	0.00	0.00	0.00	P
Aristida purpurea	3.00	100.00	7.41	3.50	8.24	3.0(0.5)
Bouteloua curtipendula	6.50	100.00	16.05	6.50	15.29	6.5
Buchloe dactyloides	6.00	100.00	14.81	7.50	17.65	6.0(1.5)
Chondrosum gracile	2.00	100.00	4.94	2.00	4.71	2.0
Muhlenbergia montana	0.00	100.00	0.00	0.00	0.00	P
Schizachyrium scoparium	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE PERENNIAL GRASSES (w)	17.5	100.0	43.2	19.5	45.9	17.5(2.0)
NATIVE SUBSHRUBS						
Artemisia frigida	1.00	100.00	2.47	1.00	2.35	1.0
Gutierrezia sarothrae	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE SUBSHRUBS	1.0	100.0	2.5	1.0	2.4	1.0
SUCCULENT						
Opuntia macrorhiza	0.00	100.00	0.00	0.00	0.00	P
TOTAL SUCCULENT	0.0	100.0	0.0	0.0	0.0	P
Standing dead	1.00	100.00		1.00		1.0
Litter	34.00	100.00		34.00		34.0
Bare soil	21.00	100.00		21.00		21.0
Rock	3.50	100.00		3.50		3.5
TOTALS	100.0			102.0		100
TOTAL VEGETATION COVER	40.5 (s=0.0)		100.0	42.5 (s=0.0)	100.0	40.5(2.0)
GROUND COVER (Litter+Rock+Veg+St.Dead)	79.0			81.0		79(2)
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 47.0 Std.Dev.= 0.0)						47

*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 - August 2001

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
NATIVE ANNUAL & BIENNIAL FORBS					
Cirsium undulatum	0.00	20.00	0.00	0.00	0.00
Collomia linearis	0.00	20.00	0.00	0.00	0.00
Erigeron divergens	0.00	40.00	0.00	0.00	0.00
Grindelia squarrosa	0.00	60.00	0.00	0.00	0.00
Oligosporus pacificus	0.00	20.00	0.00	0.00	0.00
Plantago patagonica	0.00	100.00	0.00	0.00	0.00
Pterogonum alatum	0.00	60.00	0.00	0.00	0.00
Silene antirrhina	0.00	40.00	0.00	0.00	0.00
TOTAL NATIVE ANN. & BIEN. FORBS	0.0	100.0	0.0	0.0	0.0
INTRODUCED ANNUAL & BIENNIAL FORBS					
Acosta diffusa	8.80	100.00	17.32	9.00	17.34
Alyssum parviflorum	0.50	100.00	0.98	0.60	1.16
Camelina microcarpa	0.00	20.00	0.00	0.00	0.00
Dianthus armeria	0.00	20.00	0.00	0.00	0.00
Lactuca serriola	0.10	20.00	0.20	0.10	0.19
Lepidium densiflorum	0.00	20.00	0.00	0.00	0.00
Tragopogon dubius ssp. major	0.10	60.00	0.20	0.10	0.19
Verbascum blattaria	0.20	20.00	0.39	0.20	0.39
TOTAL INTRO. ANN. & BIEN. FORBS	9.7	100.0	19.1	10.0	19.3
NATIVE ANNUAL GRASSES					
Vulpia octoflora	0.00	20.00	0.00	0.00	0.00
TOTAL NATIVE ANN. GRASSES	0.0	20.0	0.0	0.0	0.0
INTRODUCED ANNUAL GRASSES					
Bromus japonicus	0.90	100.00	1.77	0.90	1.73
TOTAL INTRO. ANN. GRASSES	0.9	100.0	1.8	0.9	1.7
NATIVE PERENNIAL FORBS					
Achillea lanulosa	0.30	40.00	0.59	0.30	0.58
Allium textile	0.00	20.00	0.00	0.00	0.00
Antennaria rosea	0.00	20.00	0.00	0.00	0.00
Arnica fulgens	0.00	20.00	0.00	0.00	0.00
Artemisia ludoviciana	0.10	60.00	0.20	0.10	0.19
Aster porteri	0.20	60.00	0.39	0.20	0.39
Astragalus adsurgens var. robustior	0.00	20.00	0.00	0.00	0.00
Astragalus shortianus	0.00	20.00	0.00	0.00	0.00
Astragalus spatulatus	0.30	20.00	0.59	0.30	0.58
Brickellia rosmarinifolia ssp. chlorolepis	0.00	20.00	0.00	0.00	0.00
Comandra umbellata ssp. pallida	0.00	20.00	0.00	0.00	0.00
Dalea purpurea	0.10	20.00	0.20	0.10	0.19
Eremogone fendleri	0.00	20.00	0.00	0.00	0.00
Erigeron flagellaris	0.00	40.00	0.00	0.00	0.00
Gaura coccinea	0.00	20.00	0.00	0.00	0.00
Helianthus pumilus	0.00	40.00	0.00	0.00	0.00
Heterotheca villosa	0.70	80.00	1.38	0.70	1.35
Liatris punctata	0.20	80.00	0.39	0.20	0.39
Lithospermum incisum	0.00	20.00	0.00	0.00	0.00
Mertensia lanceolata	0.00	20.00	0.00	0.00	0.00
Musineon divaricatum	0.00	20.00	0.00	0.00	0.00
Nothocalais cuspidata	0.00	20.00	0.00	0.00	0.00
Oligosporus dracunculus ssp. glaucus	0.10	40.00	0.20	0.10	0.19
Paronychia jamesii	0.10	20.00	0.20	0.10	0.19
Penstemon virens	0.00	20.00	0.00	0.00	0.00
Psoralidium tenuiflorum	0.80	100.00	1.57	0.80	1.54
Ratibida columnifera	0.10	60.00	0.20	0.10	0.19

Table 14. Cover Data - Spray Transects, Tordon Post-Spray Study, City of Boulder Open Space, CO - August 2001

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
NATIVE PERENNIAL FORBS (concluded)					
Senecio integerrimus	0.10	20.00	0.20	0.10	0.19
Sphaeralcea coccinea	0.10	40.00	0.20	0.10	0.19
Tithymalus brachyceras	0.00	20.00	0.00	0.00	0.00
Townsendia hookeri	0.00	20.00	0.00	0.00	0.00
Virgulus ericoides (group)	0.40	100.00	0.79	0.40	0.77
TOTAL NATIVE PERENNIAL FORBS	3.6	100.0	7.1	3.6	6.9
INTRODUCED PERENNIAL FORBS					
Cardaria chalepensis	0.00	20.00	0.00	0.00	0.00
Cichorium intybus	0.00	20.00	0.00	0.00	0.00
Convolvulus arvensis	0.00	20.00	0.00	0.00	0.00
Hypericum perforatum	0.00	40.00	0.00	0.00	0.00
Potentilla recta	0.10	20.00	0.20	0.10	0.19
Taraxacum officinale	0.00	80.00	0.00	0.00	0.00
TOTAL INTRO. PERENNIAL FORBS	0.1	100.0	0.2	0.1	0.2
NATIVE PERENNIAL GRASSES (cool)					
Carex pensylvanica ssp. heliophila	3.10	100.00	6.10	3.40	6.55
Hesperostipa comata	0.00	20.00	0.00	0.00	0.00
Koeleria macrantha	0.50	100.00	0.98	0.50	0.96
Nassella viridula	0.20	40.00	0.39	0.20	0.39
Pascopyrum smithii	2.60	100.00	5.12	2.60	5.01
Poa agassizensis	1.90	40.00	3.74	1.90	3.66
Poa compressa	1.20	80.00	2.36	1.20	2.31
TOTAL NATIVE PERENNIAL GRASSES (c)	9.5	100.0	18.7	9.8	18.9
INTRODUCED PERENNIAL GRASSES (cool)					
Poa pratensis	0.30	40.00	0.59	0.30	0.58
TOTAL INTRO. PERENNIAL GRASSES (c)	0.3	40.0	0.6	0.3	0.6
NATIVE PERENNIAL GRASSES (warm)					
Andropogon gerardii	0.00	20.00	0.00	0.00	0.00
Aristida purpurea	0.40	60.00	0.79	0.40	0.77
Bouteloua curtipendula	3.20	80.00	6.30	3.30	6.36
Buchloe dactyloides	9.90	100.00	19.49	10.10	19.46
Chondrosum gracile	12.30	100.00	24.21	12.50	24.08
Panicum virgatum	0.00	20.00	0.00	0.00	0.00
Schizachyrium scoparium	0.40	20.00	0.79	0.40	0.77
TOTAL NATIVE PERENNIAL GRASSES (w)	26.2	100.0	51.6	26.7	51.4
NATIVE SUBSHRUBS					
Artemisia frigida	0.40	100.00	0.79	0.40	0.77
Gutierrezia sarothrae	0.00	80.00	0.00	0.00	0.00
TOTAL NATIVE SUBSHRUBS	0.4	100.0	0.8	0.4	0.8
SUCCULENT					
Opuntia macrorhiza	0.10	80.00	0.20	0.10	0.19
TOTAL SUCCULENT	0.1	80.0	0.2	0.1	0.2
AGAVOIDS					
Yucca glauca	0.00	20.00	0.00	0.00	0.00
TOTAL AGAVOIDS	0.0	20.0	0.0	0.0	0.0

Table 14. Cover Data - Spray Transects, Tordon Post-Spray Study, City of Boulder Open Space, CO - August 2001

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)
Standing dead	0.40	60.00		0.40	
Litter	30.50	100.00		30.50	
Bare soil	16.30	100.00		16.30	
Rock	2.00	80.00		2.00	
TOTALS	100.0			101.1	
TOTAL VEGETATION COVER	50.8 (s=5.4)		100.0	51.9 (s=5.4)	100.0
GROUND COVER (Litter+Rock+Veg+St.Dead)	83.7			84.8	
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 32.8 Std.Dev.= 6.3)					

Table 14. Cover Data - Spray Transects, Tordon Post-Spray Study, City of Boulder Open Space, CO - August 2001

PLANT SPECIES	Percent Foliar Cover* ----Sample Number---- Spray 1	Spray 2	Spray 3	Spray 4	Spray 5
NATIVE ANNUAL & BIENNIAL FORBS					
Cirsium undulatum	P				
Collomia linearis					P
Erigeron divergens	P		P		
Grindelia squarrosa			P	P	P
Oligosporus pacificus	P				
Plantago patagonica	P	P	P	P	P
Pterogonum alatum	P	P		P	
Silene antirrhina			P		P
TOTAL NATIVE ANN. & BIEN. FORBS	P	P	P	P	P
INTRODUCED ANNUAL & BIENNIAL FORBS					
Acosta diffusa	3.0(0.5)	16.0(0.5)	7.5	17.5	P
Alyssum parviflorum	(0.5)	0.5	2.0	P	P
Camelina microcarpa					P
Dianthus armeria		P			
Lactuca serriola			0.5		
Lepidium densiflorum		P			
Tragopogon dubius ssp. major	0.5	P	P		
Verbascum blattaria				1.0	
TOTAL INTRO. ANN. & BIEN. FORBS	3.5(1.0)	16.5(0.5)	10.0	18.5	P
NATIVE ANNUAL GRASSES					
Vulpia octoflora			P		
TOTAL NATIVE ANN. GRASSES	—	—	P	—	—
INTRODUCED ANNUAL GRASSES					
Bromus japonicus	P	1.5	2.5	0.5	P
TOTAL INTRO. ANN. GRASSES	P	1.5	2.5	0.5	P
NATIVE PERENNIAL FORBS					
Achillea lanulosa			0.5	1.0	
Allium textile			P		
Antennaria rosea	P				
Arnica fulgens					P
Artemisia ludoviciana	P		P		0.5
Aster porteri	P	0.5	0.5		
Astragalus adsurgens var. robustior	P				
Astragalus shortianus	P				
Astragalus spatulatus	1.5				
Brickellia rosmarinifolia ssp. chlorolepis		P			
Comandra umbellata ssp. pallida	P				
Dalea purpurea	0.5				
Eremogone fendleri			P		
Erigeron flagellaris		P		P	
Gaura coccinea	P				
Helianthus pumilus		P			P
Heterotheca villosa	3.0		P	P	0.5
Liatris punctata	1.0	P	P		P
Lithospermum incisum					P
Mertensia lanceolata					P
Musineon divaricatum					P
Nothocalais cuspidata					P
Oligosporus dracunculus ssp. glaucus		0.5			P
Paronychia jamesii	0.5				
Penstemon virens	P				
Psoralidium tenuiflorum	1.5	0.5	0.5	0.5	1.0
Ratibida columnifera	P	P	0.5		

Table 14. Cover Data - Spray Transects, Tordon Post-Spray Study, City of Boulder Open Space, CO - August 2001

Percent Foliar Cover*

PLANT SPECIES	----Sample Number----				
	Spray 1	Spray 2	Spray 3	Spray 4	Spray 5
NATIVE PERENNIAL FORBS (concluded)					
Senecio integerrimus	0.5				
Sphaeralcea coccinea			P		0.5
Tithymalus brachyceras			P		
Townsendia hookeri		P			
Virgulus ericoides (group)	1.5	P	0.5	P	P
TOTAL NATIVE PERENNIAL FORBS	10.0	1.5	2.5	1.5	2.5
INTRODUCED PERENNIAL FORBS					
Cardaria chalepensis		P			
Cichorium intybus				P	
Convolvulus arvensis			P		
Hypericum perforatum			P	P	
Potentilla recta				0.5	
Taraxacum officinale	P	P	P		P
TOTAL INTRO. PERENNIAL FORBS	P	P	P	0.5	P
NATIVE PERENNIAL GRASSES (cool)					
Carex pensylvanica ssp. heliophila	5.0	6.0(1.5)	3.5	1.0	P
Hesperostipa comata	P				
Koeleria macrantha	1.0	P	1.0	P	0.5
Nassella viridula	1.0				P
Pascopyrum smithii	0.5	3.0	3.5	2.0	4.0
Poa agassizensis				9.5	P
Poa compressa		0.5	P	3.5	2.0
TOTAL NATIVE PERENNIAL GRASSES (c)	7.5	9.5(1.5)	8.0	16.0	6.5
INTRODUCED PERENNIAL GRASSES (cool)					
Poa pratensis	P		1.5		
TOTAL INTRO. PERENNIAL GRASSES (c)	P	---	1.5	---	---
NATIVE PERENNIAL GRASSES (warm)					
Andropogon gerardii	P				
Aristida purpurea	2.0	P			P
Bouteloua curtipendula	9.0	5.0(0.5)	2.0		P
Buchloe dactyloides	4.5	11.0(1.0)	14.5	2.5	17.0
Chondrosum gracile	3.0	4.5(1.0)	12.5	13.0	28.5
Panicum virgatum			P		
Schizachyrium scoparium	2.0				
TOTAL NATIVE PERENNIAL GRASSES (w)	20.5	20.5(2.5)	29.0	15.5	45.5
NATIVE SUBSHRUBS					
Artemisia frigida	P	1.5	P	P	0.5
Gutierrezia sarothrae	P	P	P	P	
TOTAL NATIVE SUBSHRUBS	P	1.5	P	P	0.5
SUCCULENT					
Opuntia macrorhiza	P	0.5	P	P	
TOTAL SUCCULENT	P	0.5	P	P	---
AGAVOIDS					
Yucca glauca	P				
TOTAL AGAVOIDS	P	---	---	---	---

Table 14. Cover Data - Spray Transects, Tordon Post-Spray Study, City of Boulder Open Space, CO - August 2001

PLANT SPECIES	Percent Foliar Cover* ----Sample Number---- Spray 1	Spray 2	Spray 3	Spray 4	Spray 5
Standing dead	0.5	0.5	1.0		
Litter	28.5	31.5	32.5	30.0	30.0
Bare soil	24.5	13.5	12.0	16.5	15.0
Rock	5.0	3.0	1.0	1.0	
TOTALS	100	100	100	100	100
TOTAL VEGETATION COVER	41.5(1.0)	51.5(4.5)	53.5	52.5	55.0
GROUND COVER (Litter+Rock+Veg+St.Dead)	76(1)	87(5)	88	84	85
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 32.8 Std.Dev.= 6.3)	41	31	36	24	32

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

Table 15. Frequency Data - Control Transect 1, Tordon Post-Spray Study, City of Boulder Open Space, August 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ----Sample Number---- 1	2	3	4	5	6	7	8	9	10
INTRODUCED ANNUAL & BIENNIAL FORBS											
Acosta diffusa	100.00	P	P	P	P	P	P	P	P	P	P
Alyssum parviflorum	30.00								P	P	P
TOTAL INTRO. ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE ANNUAL GRASSES											
Vulpia octoflora	10.00								P		
TOTAL NATIVE ANN. GRASSES	10.0	—	—	—	—	—	—	—	P	—	—
INTRODUCED ANNUAL GRASSES											
Anisantha tectorum	50.00	P			P	P	P			P	
Bromus japonicus	100.00	P	P	P	P	P	P	P	P	P	P
TOTAL INTRO. ANN. GRASSES	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL FORBS											
Ambrosia psilostachya var. coronopifolia	20.00						P				P
Dalea purpurea	10.00			P							
Erigeron flagellaris	10.00										P
Heterotheca villosa	30.00	P	P								P
Liatris punctata	20.00						P				P
Oligosporus dracunculus ssp. glaucus	30.00	P	P				P				
Psoralidium tenuiflorum	90.00	P	P	P	P	P		P	P	P	P
Sphaeralcea coccinea	20.00			P				P			
Virgulus ericoides (group)	20.00	P							P		
TOTAL NATIVE PERENNIAL FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED PERENNIAL FORBS											
Convolvulus arvensis	10.00									P	
Potentilla recta	40.00			P	P		P		P		
TOTAL INTRO. PERENNIAL FORBS	50.0	—	—	P	P	—	P	—	P	P	—
NATIVE PERENNIAL GRASSES (cool)											
Carex pensylvanica ssp. heliophila	20.00		P	P							
Pascopyrum smithii	70.00	P		P	P	P	P			P	P
Poa agassizensis	60.00		P	P		P	P		P		P
Poa compressa	60.00			P	P			P	P	P	P
TOTAL NATIVE PERENNIAL GRASSES (c)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL GRASSES (warm)											
Andropogon gerardii	20.00	P	P								
Aristida purpurea	20.00						P	P			
Bouteloua curtipendula	10.00		P								
Buchloe dactyloides	100.00	P	P	P	P	P	P	P	P	P	P
Chondrosum gracile	100.00	P	P	P	P	P	P	P	P	P	P
Sporobolus cryptandrus	10.00									P	
TOTAL NATIVE PERENNIAL GRASSES (w)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE SUBSHRUBS											
Artemisia frigida	90.00	P	P		P	P	P	P	P	P	P
TOTAL NATIVE SUBSHRUBS	90.0	P	P	—	P	P	P	P	P	P	P
SUCCULENT											
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= 12.0 Std.Dev.= 1.8)		11	13	12	10	10	14	10	12	13	15

*P= Present within 1 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, August 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ----Sample Number---- 1	2	3	4	5	6	7	8	9	10
NATIVE ANNUAL & BIENNIAL FORBS											
Erigeron divergens	20.00	P					P				
Pterogonum alatum	10.00							P			
TOTAL NATIVE ANN. & BIEN. FORBS	30.0	P	—	—	—	—	P	P	—	—	—
INTRODUCED ANNUAL & BIENNIAL FORBS											
Acosta diffusa	60.00	P	P	P	P	P	P				
Alyssum parviflorum	40.00		P	P		P	P				
Tragopogon dubius ssp. *major*	30.00			P	P				P		
TOTAL INTRO. ANN. & BIEN. FORBS	70.0	P	P	P	P	P	P	—	P	—	—
INTRODUCED ANNUAL GRASSES											
Bromus japonicus	40.00	P		P		P	P				
TOTAL INTRO. ANN. GRASSES	40.0	P	—	P	—	P	P	—	—	—	—
NATIVE PERENNIAL FORBS											
Artemisia ludoviciana	20.00				P				P		
Aster porteri	30.00					P			P		P
Dalea purpurea	40.00				P	P			P	P	
Eremogone fendleri	40.00						P	P		P	P
Heterotheca villosa	80.00			P	P	P	P	P	P	P	P
Hymenopappus filifolius	20.00									P	P
Liatris punctata	80.00	P	P	P	P			P	P	P	P
Oenothera howardii	10.00								P		
Oligosporus dracunculus ssp. glaucus	30.00	P				P	P				
Paronychia jamesii	40.00							P	P	P	P
Penstemon virens	40.00						P		P	P	P
Psoralidium tenuiflorum	40.00				P				P	P	P
TOTAL NATIVE PERENNIAL FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED PERENNIAL FORBS											
Hypericum perforatum	10.00									P	
TOTAL INTRO. PERENNIAL FORBS	10.0	—	—	—	—	—	—	—	—	P	—
NATIVE PERENNIAL GRASSES (cool)											
Carex pensylvanica ssp. *heliophila*	60.00			P	P	P	P	P	P		
Hesperostipa comata	60.00					P	P	P	P	P	P
Koeleria macrantha	80.00	P	P			P	P	P	P	P	P
Pascopyrum smithii	60.00	P	P	P	P	P	P				
Poa compressa	10.00	P									
TOTAL NATIVE PERENNIAL GRASSES (c)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL GRASSES (warm)											
Andropogon gerardii	60.00			P	P		P		P	P	P
Aristida purpurea	90.00	P	P	P	P	P	P	P	P	P	
Bouteloua curtipendula	90.00		P	P	P	P	P	P	P	P	P
Buchloe dactyloides	90.00	P	P	P	P	P	P		P	P	P
Chondrosum gracile	90.00	P	P		P	P	P	P	P	P	P
Schizachyrium scoparium	30.00					P				P	P
TOTAL NATIVE PERENNIAL GRASSES (w)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE SUBSHRUBS											
Artemisia frigida	100.00	P	P	P	P	P	P	P	P	P	P
Gutierrezia sarothrae	10.00						P				
TOTAL NATIVE SUBSHRUBS	100.0	P	P	P	P	P	P	P	P	P	P

Table 16. Frequency Data - Control Transect 2, Tordon Post-Spray Study, City of Boulder Open Space, August 2001

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	---	---	---	---	---	---	---	---
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 15.2 Std.Dev.= 3.0)		12	11	13	15	17	19	12	19	18	16

*P= Present within 1 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, August 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ----Sample Number---- 1	2	3	4	5	6	7	8	9	10
NATIVE ANNUAL & BIENNIAL FORBS											
Erigeron divergens	20.00	P	P								
Oligosporus pacificus	10.00					P					
Pterogonum alatum	40.00				P	P	P				P
TOTAL NATIVE ANN. & BIEN. FORBS	60.0	P	P	---	P	P	P	---	---	---	P
INTRODUCED ANNUAL & BIENNIAL FORBS											
Acosta diffusa	90.00	P	P		P	P	P	P	P	P	P
Alyssum parviflorum	50.00	P	P	P			P	P			
Tragopogon dubius ssp. major	10.00	P									
TOTAL INTRO. ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL GRASSES											
Bromus japonicus	40.00	P	P							P	P
TOTAL INTRO. ANN. GRASSES	40.0	P	P	---	---	---	---	---	---	P	P
NATIVE PERENNIAL FORBS											
Antennaria rosea	10.00	P									
Aster porteri	40.00				P	P	P			P	
Astragalus adsurgens var. robustior	10.00		P								
Astragalus spatulatus	30.00	P	P	P							
Dalea purpurea	30.00	P					P	P			
Gaura coccinea	10.00		P								
Heterotheca villosa	70.00	P	P	P	P	P		P	P		
Liatris punctata	90.00	P	P	P		P	P	P	P	P	P
Paronychia jamesii	50.00		P	P	P				P	P	
Penstemon virens	10.00		P								
Psoralidium tenuiflorum	80.00	P	P	P	P	P	P	P	P		
Ratibida columnifera	40.00		P			P			P		P
Senecio integerrimus	20.00		P	P							
Virgulus ericoides (group)	40.00		P	P					P		P
TOTAL NATIVE PERENNIAL FORBS	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL GRASSES (cool)											
Carex pensylvanica ssp. heliophila	100.00	P	P	P	P	P	P	P	P	P	P
Hesperostipa comata	40.00	P	P	P				P			
Koeleria macrantha	100.00	P	P	P	P	P	P	P	P	P	P
Nassella viridula	10.00										P
Pascopyrum smithii	60.00					P	P	P	P	P	P
TOTAL NATIVE PERENNIAL GRASSES (c)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL GRASSES (warm)											
Andropogon gerardii	50.00	P	P	P	P	P					
Aristida purpurea	80.00	P	P	P	P	P	P	P	P		
Bouteloua curtipendula	100.00	P	P	P	P	P	P	P	P	P	P
Buchloe dactyloides	100.00	P	P	P	P	P	P	P	P	P	P
Chondrosum gracile	90.00	P	P	P	P	P	P	P	P		P
Schizachyrium scoparium	90.00	P	P	P	P	P	P	P	P	P	
TOTAL NATIVE PERENNIAL GRASSES (w)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE SUBSHRUBS											
Artemisia frigida	30.00		P		P					P	
Gutierrezia sarothrae	40.00					P	P			P	P
TOTAL NATIVE SUBSHRUBS	60.0	---	P	---	P	P	P	---	---	P	P
SUCCULENT											
Opuntia macrorhiza	10.00									P	
TOTAL SUCCULENT	10.0	---	---	---	---	---	---	---	---	P	---

Table 17. Frequency Data - Spray Transect 1, Tordon Post-Spray Study, City of Boulder Open Space, August 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ----Sample Number---- 1	2	3	4	5	6	7	8	9	10
AGAVOIDS											
Yucca glauca	10.00	P									
TOTAL AGAVOIDS	10.0	P	—	—	—	—	—	—	—	—	—
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 16.9 Std.Dev.= 3.3)		21	24	17	15	18	16	15	15	14	14

*P= Present within 1 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, August 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* —Sample Number— 1	2	3	4	5	6	7	8	9	10
NATIVE ANNUAL & BIENNIAL FORBS											
Plantago patagonica	20.00		P				P				
Pterogonum alatum	40.00			P	P					P	P
TOTAL NATIVE ANN. & BIEN. FORBS	60.0	---	P	P	P	---	P	---	---	P	P
INTRODUCED ANNUAL & BIENNIAL FORBS											
Acosta diffusa	100.00	P	P	P	P	P	P	P	P	P	P
Alyssum parviflorum	70.00		P	P		P		P	P	P	P
Tragopogon dubius ssp. major	20.00						P			P	
TOTAL INTRO. ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL GRASSES											
Bromus japonicus	80.00	P	P	P	P	P	P	P			P
TOTAL INTRO. ANN. GRASSES	80.0	P	P	P	P	P	P	P	---	---	P
NATIVE PERENNIAL FORBS											
Aster porteri	60.00		P	P		P			P	P	P
Brickellia rosmarinifolia ssp. chlorolepis	10.00							P			
Erigeron flagellaris	10.00										P
Liatris punctata	70.00		P	P		P		P	P	P	P
Oligosporus dracunculus ssp. glaucus	20.00						P		P		
Psoralidium tenuiflorum	90.00	P	P	P	P	P	P	P	P	P	
Ratibida columnifera	20.00							P			P
Virgulus ericoides (group)	40.00	P					P	P			P
TOTAL NATIVE PERENNIAL FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED PERENNIAL FORBS											
Cardaria chalepensis	10.00		P								
Taraxacum officinale	10.00						P				
TOTAL INTRO. PERENNIAL FORBS	20.0	---	P	---	---	---	P	---	---	---	---
NATIVE PERENNIAL GRASSES (cool)											
Carex pensylvanica ssp. heliophila	60.00	P	P		P			P		P	P
Koeleria macrantha	60.00		P	P	P	P	P				P
Pascopyrum smithii	100.00	P	P	P	P	P	P	P	P	P	P
Poa compressa	20.00			P					P		
TOTAL NATIVE PERENNIAL GRASSES (c)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL GRASSES (warm)											
Aristida purpurea	30.00			P						P	P
Bouteloua curtipendula	70.00	P	P			P		P	P	P	P
Buchloe dactyloides	90.00		P	P	P	P	P	P	P	P	P
Chondrosum gracile	90.00	P	P		P	P	P	P	P	P	P
TOTAL NATIVE PERENNIAL GRASSES (w)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE SUBSHRUBS											
Artemisia frigida	60.00		P		P	P	P		P		P
Gutierrezia sarothrae	70.00	P		P	P	P	P	P		P	
TOTAL NATIVE SUBSHRUBS	100.0	P	P	P	P	P	P	P	P	P	P
SUCCULENT											
Opuntia macrorhiza	10.00						P				
TOTAL SUCCULENT	10.0	---	---	---	---	---	P	---	---	---	---
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 13.1 Std.Dev.= 2.0)		9	15	13	11	13	14	14	12	14	16

*P= Present within 1 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, August 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ----Sample Number---- 1	2	3	4	5	6	7	8	9	10
NATIVE ANNUAL & BIENNIAL FORBS											
Erigeron divergens	40.00		P		P	P					P
Grindelia squarrosa	20.00	P					P				
Plantago patagonica	20.00				P						P
Silene antirrhina	10.00							P			
TOTAL NATIVE ANN. & BIEN. FORBS	70.0	P	P	---	P	P	P	P	---	---	P
INTRODUCED ANNUAL & BIENNIAL FORBS											
Acosta diffusa	100.00	P	P	P	P	P	P	P	P	P	P
Alyssum parviflorum	100.00	P	P	P	P	P	P	P	P	P	P
Lactuca serriola	30.00					P		P			P
Tragopogon dubius ssp. major	20.00								P		P
TOTAL INTRO. ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE ANNUAL GRASSES											
Vulpia octoflora	10.00									P	
TOTAL NATIVE ANN. GRASSES	10.0	---	---	---	---	---	---	---	---	P	---
INTRODUCED ANNUAL GRASSES											
Bromus japonicus	100.00	P	P	P	P	P	P	P	P	P	P
TOTAL INTRO. ANN. GRASSES	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL FORBS											
Allium textile	10.00		P								
Artemisia ludoviciana	20.00	P	P								
Aster porteri	10.00		P								
Heterotheca villosa	30.00	P	P						P		
Liatris punctata	30.00		P			P					P
Psoralidium tenuiflorum	100.00	P	P	P	P	P	P	P	P	P	P
Ratibida columnifera	30.00			P					P		P
Sphaeralcea coccinea	20.00				P			P			
Virgulus ericoides (group)	30.00			P		P	P				
TOTAL NATIVE PERENNIAL FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED PERENNIAL FORBS											
Convolvulus arvensis	10.00		P								
Hypericum perforatum	10.00								P		
Taraxacum officinale	10.00									P	
TOTAL INTRO. PERENNIAL FORBS	30.0	---	P	---	---	---	---	---	P	P	---
NATIVE PERENNIAL GRASSES (cool)											
Carex pensylvanica ssp. heliophila	20.00	P	P								
Koeleria macrantha	50.00	P	P	P	P			P			
Pascopyrum smithii	100.00	P	P	P	P	P	P	P	P	P	P
Poa compressa	70.00	P	P	P	P	P		P			P
TOTAL NATIVE PERENNIAL GRASSES (c)	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED PERENNIAL GRASSES (cool)											
Poa pratensis	10.00	P									
TOTAL INTRO. PERENNIAL GRASSES (c)	10.0	P	---	---	---	---	---	---	---	---	---
NATIVE PERENNIAL GRASSES (warm)											
Bouteloua curtipendula	70.00	P		P	P	P	P		P	P	
Buchloe dactyloides	100.00	P	P	P	P	P	P	P	P	P	P
Chondrosum gracile	100.00	P	P	P	P	P	P	P	P	P	P
Panicum virgatum	10.00	P									
TOTAL NATIVE PERENNIAL GRASSES (w)	100.0	P	P	P	P	P	P	P	P	P	P

Table 19. Frequency Data - Spray Transect 3, Tordon Post-Spray Study, City of Boulder Open Space, August 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ----Sample Number---- 1	2	3	4	5	6	7	8	9	10
NATIVE SUBSHRUBS											
Artemisia frigida	10.00							P			
Gutierrezia sarothrae	10.00	P									
TOTAL NATIVE SUBSHRUBS	20.0	P	—	—	—	—	—	P	—	—	—
SUCCULENT											
Opuntia macrorhiza	20.00		P			P					
TOTAL SUCCULENT	20.0	—	P	—	—	P	—	—	—	—	—
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 13.3 Std.Dev.= 2.6)		17	18	12	13	14	10	13	12	10	14

*P= Present within 1 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, City of Boulder Open Space, August 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* ----Sample Number---- 1	2	3	4	5	6	7	8	9	10
NATIVE ANNUAL & BIENNIAL FORBS											
Grindelia squarrosa	10.00							P			
Plantago patagonica	10.00									P	
TOTAL NATIVE ANN. & BIEN. FORBS	20.0	—	—	—	—	—	—	P	—	P	—
INTRODUCED ANNUAL & BIENNIAL FORBS											
Acosta diffusa	100.00	P	P	P	P	P	P	P	P	P	P
Alyssum parviflorum	40.00	P		P	P					P	
Verbascum blattaria	20.00				P	P					
TOTAL INTRO. ANN. & BIEN. FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL GRASSES											
Bromus japonicus	90.00	P	P	P	P		P	P	P	P	P
TOTAL INTRO. ANN. GRASSES	90.0	P	P	P	P	—	P	P	P	P	P
NATIVE PERENNIAL FORBS											
Achillea lanulosa	30.00				P	P				P	
Heterotheca villosa	10.00										P
Psoralidium tenuiflorum	70.00	P	P	P			P		P	P	P
Virgulus ericoides (group)	20.00							P			P
TOTAL NATIVE PERENNIAL FORBS	100.0	P	P	P	P	P	P	P	P	P	P
INTRODUCED PERENNIAL FORBS											
Cichorium intybus	40.00	P		P	P	P					
Hypericum perforatum	10.00			P							
Potentilla recta	10.00				P						
TOTAL INTRO. PERENNIAL FORBS	40.0	P	—	P	P	P	—	—	—	—	—
NATIVE PERENNIAL GRASSES (cool)											
Carex pensylvanica ssp. heliophila	70.00	P	P		P	P	P	P		P	
Koeleria macrantha	10.00									P	
Pascopyrum smithii	80.00		P	P	P	P	P		P	P	P
Poa agassizensis	60.00		P		P	P		P		P	P
Poa compressa	40.00				P	P		P		P	
TOTAL NATIVE PERENNIAL GRASSES (c)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL GRASSES (warm)											
Buchloe dactyloides	100.00	P	P	P	P	P	P	P	P	P	P
Chondrosum gracile	80.00		P	P	P	P	P	P	P	P	
TOTAL NATIVE PERENNIAL GRASSES (w)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE SUBSHRUBS											
Artemisia frigida	10.00	P									
Gutierrezia sarothrae	10.00								P		
TOTAL NATIVE SUBSHRUBS	20.0	P	—	—	—	—	—	—	P	—	—
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 9.2 Std.Dev.= 2.2)		8	8	9	13	10	7	9	7	13	8

*P= Present within 1 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, August 2001

PLANT SPECIES	FREQUENCY (%)	PRESENCE* —Sample Number— 1	2	3	4	5	6	7	8	9	10
NATIVE ANNUAL & BIENNIAL FORBS											
Plantago patagonica	40.00						P	P	P		P
TOTAL NATIVE ANN. & BIEN. FORBS	40.0	—	—	—	—	—	P	P	P	—	P
INTRODUCED ANNUAL & BIENNIAL FORBS											
Acosta diffusa	50.00				P	P	P	P	P		
Alyssum parviflorum	80.00		P	P	P	P	P		P	P	P
Camelina microcarpa	10.00										P
TOTAL INTRO. ANN. & BIEN. FORBS	90.0	—	P	P	P	P	P	P	P	P	P
INTRODUCED ANNUAL GRASSES											
Bromus japonicus	100.00	P	P	P	P	P	P	P	P	P	P
TOTAL INTRO. ANN. GRASSES	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL FORBS											
Artemisia ludoviciana	80.00	P	P	P		P	P	P		P	P
Helianthus pumilus	10.00				P						
Lithospermum incisum	10.00				P						
Oligosporus dracunculus ssp. glaucus	10.00								P		
Psoralidium tenuiflorum	80.00	P	P		P		P	P	P	P	P
Sphaeralcea coccinea	20.00									P	P
Virgulus ericoides (group)	90.00	P	P	P	P	P	P	P	P	P	
TOTAL NATIVE PERENNIAL FORBS	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL GRASSES (cool)											
Carex pensylvanica ssp. heliophila	20.00					P	P				
Koeleria macrantha	60.00	P	P	P					P	P	P
Nassella viridula	10.00		P								
Pascopyrum smithii	100.00	P	P	P	P	P	P	P	P	P	P
Poa agassizensis	30.00	P		P					P		
Poa compressa	30.00					P	P		P		
TOTAL NATIVE PERENNIAL GRASSES (c)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE PERENNIAL GRASSES (warm)											
Aristida purpurea	10.00									P	
Bouteloua curtipendula	30.00				P			P	P		
Buchloe dactyloides	100.00	P	P	P	P	P	P	P	P	P	P
Chondrosum gracile	100.00	P	P	P	P	P	P	P	P	P	P
TOTAL NATIVE PERENNIAL GRASSES (w)	100.0	P	P	P	P	P	P	P	P	P	P
NATIVE SUBSHRUBS											
Artemisia frigida	40.00		P			P		P			P
TOTAL NATIVE SUBSHRUBS	40.0	—	P	—	—	P	—	P	—	—	P
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 10.8 Std.Dev.= 1.5)		9	10	9	11	10	12	10	14	11	12

*P= Present within 1 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, August, 2001

			Subplot Number # of Individuals Per Square Meter									
	AVERAGE	MAXIMUM	1	2	3	4	5	6	7	8	9	10
C1 Rosette	11.7	21	4	16	12	21	13	19	11	2	13	6
C1 Bolt	8.2	28	3	17	2	28	3	13	6	0	9	1
C1 Dead	0	0	0	0	0	0	0	0	0	0	0	0
C2 Rosette	2.5	18	18	7	0	0	0	0	0	0	0	0
C2 Bolt	2.8	19	3	19	6	0	0	0	0	0	0	0
C2 Dead	0	0	0	0	0	0	0	0	0	0	0	0
S1 Rosette	1.8	6	0	0	0	1	5	0	3	2	6	1
S1 Bolt	1	6	0	0	0	0	0	0	0	3	1	6
S1 Dead	0	0	0	0	0	0	0	0	0	0	0	0
S2 Rosette	16.8	40	6	15	12	22	31	13	9	16	40	4
S2 Bolt	7.8	24	4	3	12	8	24	4	4	8	8	3
S2 Dead	0	0	0	0	0	0	0	0	0	0	0	0
S3 Rosette	7.6	22	14	15	22	7	3	2	3	5	5	0
S3 Bolt	3.3	16	4	1	16	7	2	0	0	3	0	0
S3 Dead	0	0	0	0	0	0	0	0	0	0	0	0
S4 Rosette	14.7	52	52	18	14	9	20	14	13	3	4	0
S4 Bolt	14.3	43	43	19	4	2	26	14	26	7	2	0
S4 Dead	0.2	1	0	1	0	0	1	0	0	0	0	0
S5 Rosette	0.1	1	0	0	0	0	0	0	0	1	0	0
S5 Bolt	0	0	0	0	0	0	0	0	0	0	0	0
S5 Dead	0	0	0	0	0	0	0	0	0	0	0	0

Table 23. Relative Cover by Lifeform, Tordon Post-Spray Study, City of Boulder Open Space - Spring Sample Dates, June 2001

Percent Relative Cover (All-Hits)[1]

------ *SAMPLE NUMBER*-----

LIFEFORM	Control 1						Control 2						Spray 1					
	1996	1997	1998	1999	2000	2001	1996	1997	1998	1999	2000	2001	1996	1997	1998	1999	2000	2001
Nat. Ann. & Bien. Forbs	0.0	2.0	2.6	0	0	2.5	0.0	0.0	3.7	6.7	3.8	0.9	2.8	0.0	1.3	5.2	0.0	0.0
Int. Ann. & Bien. Forbs	62.3	64.7	55.6	54.2	47.6	23.1	0.0	4.8	4.9	3.8	3.8	11.6	13.9	3.8	6.5	7.8	2.0	1.1
Nat. Ann. Grass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	19.8	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0
Nat. Per. Forbs	11.6	7.8	6.0	8.3	9.5	5.0	44.4	24.8	28.4	22.9	30.2	25.0	36.1	26.9	26.0	26.0	37.3	21.3
Int. Per. Forbs	1.4	2.0	0.7	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nat. Per. Grass (c)	2.9	2.9	9.9	7.5	3.2	14.9	52.8	44.8	25.9	25.7	43.4	41.1	33.3	38.5	26.0	7.8	23.5	18.0
Int. Per. Grass (c)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	33.1	2.8	24.8	32.1	39.0	17.0	19.6	11.1	29.5	36.4	49.4	35.3	56.2
Native Subshrubs	0.0	0.0	0.7	0.0	1.6	0.8	0.0	0.0	3.7	1.0	1.9	0.9	0.0	0.0	0.0	1.3	0.0	1.1
Native Shrubs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	3.9	1.3	0.0	0.0
Other*	0.0	0.0	0.0	0.0	0.0	0.8	0.0	1.0	0.0	1.0	0.0	0.0	0.0	1.3	0.0	1.3	0.0	2.2

Percent Relative Cover (All-Hits)[1]

------ *SAMPLE NUMBER*-----

LIFEFORM	Spray 2						Spray 3						Spray 4						Spray 5	
	1996	1997	1998	1999	2000	2001	1996	1997	1998	1999	2000	2001	1996	1997	1998	1999	2000	2001	2000	2001
Nat. Ann. & Bien. Forbs	0.0	0.9	3.8	2.4	4.3	4.9	1.9	3.9	5.8	2.6	3.4	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	4.1
Int. Ann. & Bien. Forbs	33.8	3.8	6.4	9.8	27.7	31.1	31.5	7.8	11.5	20.5	12.1	21.4	53.7	18.2	28.4	19.7	33.3	30.2	23.3	1.0
Nat. Ann. Grass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	2.9	16.7	14.1	5.0	3.4	8.6	22.2	4.6	11.8	2.5	7.3	0.0	6.9	0.0	5.1
Nat. Per. Forbs	21.5	16.0	14.1	22.0	6.4	11.5	29.6	8.6	12.2	8.5	8.6	6.8	3.7	0.9	6.8	8.0	5.3	5.2	16.7	9.2
Int. Per. Forbs	1.5	0.9	0.0	0.0	0.0	0.0	1.9	0.8	0.0	2.6	0.0	0.9	0.0	0.0	0.0	0.7	0.0	2.6	3.3	0.0
Nat. Per. Grass (c)	29.2	30.2	35.9	22.0	29.8	18.4	11.1	27.3	20.9	18.8	32.8	17.9	32.4	55.5	50.0	34.3	18.7	39.7	35.6	27.6
Int. Per. Grass (c)	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	0.0	0.0	0.0
Nat. Per. Grass (w)	7.7	32.1	24.4	41.5	31.9	30.1	3.7	36.7	43.2	42.7	34.5	30.8	3.7	12.7	12.3	24.8	42.7	15.5	20.0	52.0
Native Subshrubs	1.5	11.3	10.3	0.0	0.0	0.0	1.9	0.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	1.1	1.0
Native Shrubs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other*	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.7	0.9	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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

[1] 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, August 2001

Percent Relative Cover (All-Hits)[1]

------ *SAMPLE NUMBER*-----

LIFEFORM	Control 1							Control 2							Spray 1						
	1995	1996	1997	1998	1999	2000	2001	1995	1996	1997	1998	1999	2000	2001	1995	1996	1997	1998	1999	2000	2001
Nat. Ann. & Bien. Forbs	0.0	4.2	0.0	2.9	0.0	0.0	0.0	1.0	1.1	0.0	1.4	4.9	5.4	0.0	0.8	0.0	4.2	0.0	3.4	1.3	0.0
Int. Ann. & Bien. Forbs	38.4	58.9	64.1	46.4	48.5	30.4	31.3	0.0	2.1	0.0	4.2	1.2	12.5	4.7	6.7	4.8	8.5	3.8	4.5	3.9	10.7
Nat. Ann. Grass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	4.3	2.1	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nat. Per. Forbs	5.8	5.3	2.8	5.7	6.9	1.4	2.6	20.8	29.8	25.3	26.8	23.2	21.4	21.2	12.5	15.9	18.3	12.7	16.9	17.1	23.5
Int. Per. Forbs	0.7	0.0	2.8	0.7	0.0	0.0	1.7	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nat. Per. Grass (c)	10.9	3.2	1.4	6.4	4.0	8.7	4.3	39.6	28.7	34.7	21.1	20.7	25.0	25.9	31.7	31.7	22.5	30.4	9.0	38.2	17.6
Int. Per. Grass (c)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	52.2	34.4	38.3	40.0	35.2	50.0	35.7	45.9	47.5	44.7	46.5	49.4	64.0	38.2	48.2
Native Subshrubs	0.0	0.0	0.0	0.0	0.0	4.3	0.9	0.0	0.0	0.0	8.5	0.0	0.0	2.4	0.0	0.0	0.0	0.0	1.1	0.0	0.0
Native Shrubs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.8	3.2	0.0	1.3	1.1	0.0	0.0
Other*	0.0	0.0	0.0	0.7	0.0	1.4	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	1.3	0.0

Percent Relative Cover (All-Hits)[1]

------ *SAMPLE NUMBER*-----

LIFEFORM	Spray 2							Spray 3							Spray 4							Spray 5	
	1995	1996	1997	1998	1999	2000	2001	1995	1996	1997	1998	1999	2000	2001	1995	1996	1997	1998	1999	2000	2001	2000	2001
Nat. Ann. & Bien. Forbs	0.0	0.0	0.0	0.0	1.5	0.0	0.0	1.3	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Int. Ann. & Bien. Forbs	33.9	2.7	6.4	8.2	14.7	14.5	30.4	36.0	8.2	4.5	12.6	16.0	4.7	18.7	42.7	9.0	9.6	32.1	26.9	31.1	35.2	1.8	0.0
Nat. Ann. Grass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	2.7	8.7	13.1	4.5	2.2	3.7	0.0	4.7	9.9	6.3	3.0	1.2	0.0	0.0	1.0	0.0	0.0
Nat. Per. Forbs	13.0	16.2	5.3	11.8	5.9	0.0	2.7	11.3	1.6	6.7	7.4	11.1	9.4	4.7	2.9	3.6	3.7	3.7	4.3	1.6	2.9	1.8	4.5
Int. Per. Forbs	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.7	1.6	6.7	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.6	1.1	3.3	1.0	0.0	0.0
Nat. Per. Grass (c)	31.3	50.0	28.7	40.0	23.5	38.2	19.6	29.3	36.1	29.2	20.7	16.0	17.6	15.0	38.0	52.3	35.6	34.6	31.2	18.0	30.5	24.6	11.8
Int. Per. Grass (c)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nat. Per. Grass (w)	11.3	27.0	44.7	30.6	52.9	45.5	41.1	10.7	39.3	46.1	56.3	51.9	68.2	54.2	5.3	25.2	43.7	27.8	36.6	45.9	29.5	71.9	82.7
Native Subshrubs	6.1	0.0	10.6	8.2	1.5	1.8	2.7	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.9
Native Shrubs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other*	0.0	2.8	0.0	0.0	0.0	0.0	0.9	0.7	0.0	2.2	0.0	0.0	0.0	0.0	1.2	3.6	2.2	0.0	0.0	0.0	0.0	0.0	0.0

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

[1] 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 2001

Number of Species / 100 sq. m.

------ *SAMPLE NUMBER*-----

LIFEFORM	Control 1						Control 2						Spray 1					
	1996	1997	1998	1999	2000	2001	1996	1997	1998	1999	2000	2001	1996	1997	1998	1999	2000	2001
Nat. Ann. & Bien. Forbs	2	4	3	2	1	3	4	5	6	7	2	9	4	5	6	5	4	5
Int. Ann. & Bien. Forbs	8	8	9	9	4	8	3	7	6	6	3	6	3	4	5	4	3	5
Nat. Ann. Grass	0	1	2	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Int. Ann. Grass	2	2	2	2	2	2	1	1	1	1	1	1	0	1	1	0	1	1
Nat. Per. Forbs	15	14	16	18	7	12	20	35	34	33	20	28	24	31	36	36	24	21
Int. Per. Forbs	1	3	2	3	2	3	1	2	1	2	0	2	1	1	1	1	0	1
Nat. Per. Grass (c)	3	4	6	7	7	5	4	7	8	7	6	7	3	6	7	4	6	8
Int. Per. Grass (c)	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Nat. Per. Grass (w)	3	4	6	6	5	4	5	7	7	7	5	7	5	7	8	7	9	7
Native Subshrubs	0	0	1	2	1	1	0	0	1	2	2	2	1	1	1	1	1	1
Native Shrubs	0	0	0	0	0	0	0	0	0	0	0	0	2	1		1	0	0
Other*	2	2	4	4	2	4	3	1	3	2	2	3	3	2	2	2	1	3

Number of Species / 100 sq. m.

------ *SAMPLE NUMBER*-----

LIFEFORM	Spray 2						Spray 3						Spray 4						Spray 5	
	1996	1997	1998	1999	2000	2001	1996	1997	1998	1999	2000	2001	1996	1997	1998	1999	2000	2001	2000	2001
Nat. Ann. & Bien. Forbs	5	5	8	6	5	5	5	6	7	7	3	3	3	8	5	3	0	2	4	8
Int. Ann. & Bien. Forbs	7	7	6	4	6	6	6	8	8	7	5	7	6	10	9	9	4	8	5	4
Nat. Ann. Grass	0	1	0	0	0	0	0	2	0	1	0	1	0	2	0	1	0	1	0	1
Int. Ann. Grass	1	1	1	1	1	1	2	1	2	1	1	1	1	2	2	2	1	2	0	1
Nat. Per. Forbs	22	24	25	19	15	13	23	19	24	27	12	13	15	17	14	20	8	10	21	17
Int. Per. Forbs	1	1	1		1	3	1	3	3	3	2	2	2	1	2	2	3	3	2	1
Nat. Per. Grass (c)	4	5	5	6	4	5	5	5	5	6	6	5	5	6	6	6	5	5	8	5
Int. Per. Grass (c)	0	0	1	0	0	1	0	0	1	1	0	0	0	1	2	1	0	1	0	0
Nat. Per. Grass (w)	5	4	4	4	4	4	3	7	4	5	5	4	2	2	0	5	2	2	2	2
Native Subshrubs	1	1	1	2	2	2	1	1	1	0	0	1	1	1	1	2	1	1	2	1
Native Shrubs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Other*	4	1	1	2	1	1	3	1	1	2	2	1	3	3	1	2	1	2	3	0

* 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, August 2001

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	2001	1995	1996	1997	1998	1999	2000	2001	1995	1996	1997	1998	1999	2000	2001
Nat. Ann. & Bien. Forbs	2	3	4	1	1	1	2	4	5	4	3	5	3	2	4	4	4	4	3	3	5
Int. Ann. & Bien. Forbs	8	3	6	6	5	2	3	3	4	6	3	3	2	4	3	1	3	3	3	2	3
Nat. Ann. Grass	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Int. Ann. Grass	2	1	1	2	1	1	2	2	1	1	1	0	0	1	0	0	1	0	0	0	1
Nat. Per. Forbs	15	15	11	17	14	7	9	21	30	28	18	23	21	21	24	20	29	19	23	19	17
Int. Per. Forbs	1	1	3	2	4	3	2	1	1	4	1	2	0	2	1	0	2	0	1	1	1
Nat. Per. Grass (c)	3	4	3	4	3	4	4	4	5	5	5	6	4	7	3	6	6	6	5	4	5
Int. Per. Grass (c)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Nat. Per. Grass (w)	3	4	4	5	4	5	6	5	7	7	6	7	7	7	5	7	7	7	7	8	6
Native Subshrubs	0	0	0	1	2	1	1	0	0	0	1	2	2	2	1	0	1	1	2	1	2
Native Shrubs	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	1	1	1	1	0	0
Other*	2	2	3	4	4	3	1	3	5	4	1	2	2	1	3	2	2	2	1	2	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	2001	1995	1996	1997	1998	1999	2000	2001	1995	1996	1997	1998	1999	2000	2001	2000	2001
Nat. Ann. & Bien. Forbs	5	4	7	4	2	3	2	6	2	5	5	2	2	4	3	2	5	2	3	1	3	2	4
Int. Ann. & Bien. Forbs	7	4	8	3	6	3	5	6	4	6	8	5	3	4	6	4	9	7	6	5	3	3	3
Nat. Ann. Grass	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Int. Ann. Grass	1	2	1	1	1	0	1	2	2	1	1	1	1	1	1	1	1	1	1	0	1	1	1
Nat. Per. Forbs	22	16	18	12	11	11	10	24	16	12	15	14	17	12	15	10	10	12	14	11	5	5	13
Int. Per. Forbs	1	0	1	0	1	0	1	1	1	3	3	3	2	3	2	1	2	4	2	2	2	1	1
Nat. Per. Grass (c)	4	4	5	5	4	4	4	5	6	5	6	5	5	4	5	7	6	4	5	3	5	5	6
Int. Per. Grass (c)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0
Nat. Per. Grass (w)	5	5	5	5	6	4	4	3	7	5	4	4	6	4	2	3	2	2	2	3	2	3	4
Native Subshrubs	1	0	1	1	2	2	2	1	0	1	1	1	0	2	1	0	1	1	2	1	2	2	0
Native Shrubs	0	0	0	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	1	3	2	4	2	5	1	1	3	3	3	1	3	1	1	3	0

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

SPECIES	COMMON	SYNONYM	C1 June	C1 Aug.	C2 June	C2 Aug.	S1 June	S1 Aug.
NATIVE ANNUAL & BIENNIAL FORBS								
Androsace septentrionalis	pygmyflower rockjasmine		X	X				
Cirsium undulatum	wavyleaf thistle						X	X
Collinsia parviflora	baby blue-eyes							
Collomia linearis	linearleaf collomia				X			
Descurainia incana	Richardson tansymustard	Descurainia richardsonii						
Descurainia pinnata	pinnate tansymustard							
Draba reptans	whitlowwort				X		X	
Erigeron divergens	spreading fleabane				X	X		X
Erysimum asperum	wallflower				X			
Grindelia squarrosa	gumweed			X	X		X	
Oligosporus pacificus	sagewort	O. campestris ssp. caudatus						X
Oreocarya virgata	miner's candle	Cryptantha virgata			X			
Plantago patagonica	woolly plantain		X		X		X	X
Pterogonum alatum	winged buckwheat	Eriogonum alatum			X	X	X	X
Silene antirrhina	sleepy catchfly		X		X			
INTRODUCED ANNUAL & BIENNIAL FORBS								
Acosta diffusa	diffuse knapweed	Centaurea diffusa	X	X	X	X	X	X
Alyssum parviflorum	alyssum	A. minus	X	X	X	X	X	X
Camelina microcarpa	littlepod falseflax		X				X	
Dianthus armeria	deptford pink							
Erodium cicutarium	filaree		X					
Lactuca serriola	prickly lettuce				X		X	
Lappula redowskii	early stickseed		X					
Lepidium densiflorum	denseflower pepperweed				X			
Neolepia campestre	field pepperweed	Lepidium campestre	X			X		
Podospermum laciniatum	false salsify	Scorzonera laciniatium	X		X			
Tragopogon dubius ssp. major	salsify				X	X	X	X
Verbascum blattaria	moth mullein		X	X				
NATIVE ANNUAL GRASSES								
Critesion pusillum	little barley		X					
Vulpia octoflora	six-weeks fescue	Festuca octoflora	X	X				
INTRODUCED ANNUAL GRASSES								
Anisantha tectorum	cheatgrass	Bromus tectorum	X	X				
Bromus japonicus	Japanese brome		X	X	X	X	X	X

SPECIES	COMMON	SYNONYM	C1 June	C1 Aug.	C2 June	C2 Aug.	S1 June	S1 Aug.
NATIVE PERENNIAL FORBS								
Achillea lanulosa	western yarrow							
Allium textile	prairie onion						X	
Ambrosia psilostachya var. coronopifolia	ragweed			X				
Antennaria rosea	rose pussytoes						X	X
Arnica fulgens	arnica							
Artemisia ludoviciana	pasture sage				X	X		X
Asclepias pumila	milkweed					X		
Asclepias viridiflora	greenflower milkweed						X	
Aster porteri	porter aster				X	X		X
Astragalus adsurgens var. robustior	milk vetch							X
Astragalus agrestis	field milkvetch		X		X	X	X	
Astragalus shortianus	milk vetch					X		X
Astragalus spatulatus	spoonleaf milkvetch							X
Brickellia rosmarinifolia ssp. chlorolepis	brickellia	Kuhnia chlorolepis					X	
Calochortus gunnisonii	Gunnison mariposa-lily							
Castilleja sessiliflora	largeflowered paintbrush	Castilleja grandiflora			X		X	
Cerastium strictum	mouse-ear	Cerastium arvense				X		
Comandra umbellata ssp. pallida	bastard toadflax							X
Dalea candida var. oligophylla	white prairie clover						X	
Dalea purpurea	purple prairie clover			X	X	X	X	X
Eremogone fendleri	desert sandwort	Arenaria fendleri			X	X		
Erigeron flagellaris	whiplash fleabane		X	X	X		X	
Erigeron spp.	fleabane		X					
Eriogonum flavum var. flavum	wild buckwheat	E. jamesii var. flavescens						
Gaillardia aristata	blanket-flower				X			
Gaillardia spp.	blanketflower						X	
Gastrolychnis drummondii	Drummond campion	Melandrium drummondii, Lychnis drummondii			X			
Gaura coccinea	scarlet gaura		X		X			X
Helianthus pumilus	sunflower				X	X		
Heterotheca villosa	golden aster		X	X	X	X	X	X
Hymenopappus filifolius	threadleaf hymenopappus				X	X		
Lesquerella montana	bladderpod		X		X			
Leucocrinum montanum	sand lily						X	
Liatris punctata	gayfeather		X	X	X	X	X	X
Lithospermum incisum	narrowleaf puccoon							
Lithospermum spp.	puccoon		X		X		X	
Lomatium orientale	biscuitroot				X	X		
Mertensia lanceolata	bluebells							
Musineon divaricatum	musineom		X		X		X	
Nothocalais cuspidata	false dandelion							
Oenothera howardii	Howard eveningprimrose	O. jamesii				X	X	
Oenothera villosa	evening-primrose	Oenothera strigosa			X			
Oligosporus dracunculus ssp. glaucus	wild tarragon	Artemisia dracunculus ssp. glaucus	X	X	X	X		
Oxybaphus linearis	umbrellawort					X		

SPECIES	COMMON	SYNONYM	C1 June	C1 Aug.	C2 June	C2 Aug.	S1 June	S1 Aug.
NATIVE PERENNIAL FORBS (concluded)								
Oxytropis lambertii	locoweed				X			
Paronychia jamesii	nailwort				X	X	X	X
Penstemon secundiflorus	sidebells beard-tongue				X			
Penstemon virens	green beard-tongue					X		X
Psoralidium tenuiflorum	scurfpea	Psoralea tenuiflora	X	X	X	X	X	X
Ratibida columnifera	prairie coneflower				X	X		X
Senecio integerrimus	lambstongue groundsel				X		X	X
Solidago spp.	goldenrod							
Sphaeralcea coccinea	copper mallow		X	X		X		
Tithymalus brachyceras	robust spurge	Tithymalus montanus			X		X	
Townsendia hookeri	Hooker's easter daisy						X	
Viola spp.	violet				X			
Virgulaster ascendens	Pacific aster	Aster ascendens, chilensis, adsurgens etc.						
Virgulus ericoides (group)	white prairie aster	Aster ericoides (group)		X				X
INTRODUCED PERENNIAL FORBS								
Breea arvensis	Canada thistle	Cirsium arvense						
Cardaria chalepensis	whitetop	Lepidium chalepensis						
Cichorium intybus	chicory		X		X			
Convolvulus arvensis	field bindweed		X	X				
Hypericum perforatum	klamath weed, St. Johnswort					X		
Linaria genistifolia ssp. dalmatica	dalmation toadflax	Linaria dalmatica				X		
Potentilla recta	sulfur cinquifoil		X	X				
Taraxacum officinale	common dandelion				X		X	X
NATIVE PERENNIAL GRASSES (cool)								
Carex pensylvanica ssp. heliophila	sun sedge	Carex heliophila		X	X	X	X	X
Elymus elymoides	bottlebrush squirreltail	Sitanion hystrix	X		X			
Elymus longifolius	bottlebrush squirreltail	Sitanion longifolium				X	X	
Hesperostipa comata	needle-and-thread	Stipa comata			X	X	X	X
Juncus interior	rush					X		
Koeleria macrantha	junegrass	Koeleria cristata	X		X	X	X	X
Nassella viridula	green needlegrass	Stipa viridula					X	X
Pascopyrum smithii	western wheatgrass	Agropyron smithii	X	X	X	X	X	X
Poa agassizensis	Agassiz bluegrass		X	X	X		X	
Poa compressa	Canada bluegrass		X	X	X	X	X	
INTRODUCED PERENNIAL GRASSES (cool)								
Phleum pratense	timothy							
Poa pratensis	Kentucky bluegrass							X
Thinopyrum intermedium	intermediate wheatgrass	Agropyron intermedium						

SPECIES	COMMON	SYNONYM	C1 June	C1 Aug.	C2 June	C2 Aug.	S1 June	S1 Aug.
NATIVE PERENNIAL GRASSES (warm)								
Andropogon gerardii	big bluestem, turkeyfoot		X	X	X	X	X	X
Aristida purpurea	three-awn		X	X	X	X	X	X
Bouteloua curtipendula	sideoats grama			X	X	X	X	X
Buchloe dactyloides	buffalograss		X	X	X	X	X	X
Chondrosum gracile	blue grama grass	Bouteloua gracilis	X	X	X	X	X	X
Chondrosum hirsutum	hairy grama	Bouteloua hirsuta					X	
Muhlenbergia montana	mountain muhly				X	X	X	
Panicum virgatum	switchgrass							
Schizachyrium scoparium	little bluestem	Andropogon scoparium			X	X		X
Sporobolus cryptandrus	sand dropseed			X				
NATIVE SUBSHRUBS								
Artemisia frigida	fringed sage		X	X	X	X	X	X
Gutierrezia sarothrae	snakeweed				X	X		X
LICHEN								
Lichen spp.	lichen						X	
SUCCULENT								
Echinocereus viridiflorus	hen-and-chickens		X		X			
Opuntia fragilis	brittle cactus		X					
Opuntia macrorhiza	prickly-pear cactus		X	X	X	X	X	X
Opuntia polyacantha	pricklypear cactus		X					
PARASITE								
Aphyllon fasciculatum	purple broomrape				X			
AGAVOIDS								
Yucca glauca	Spanish bayonet						X	X

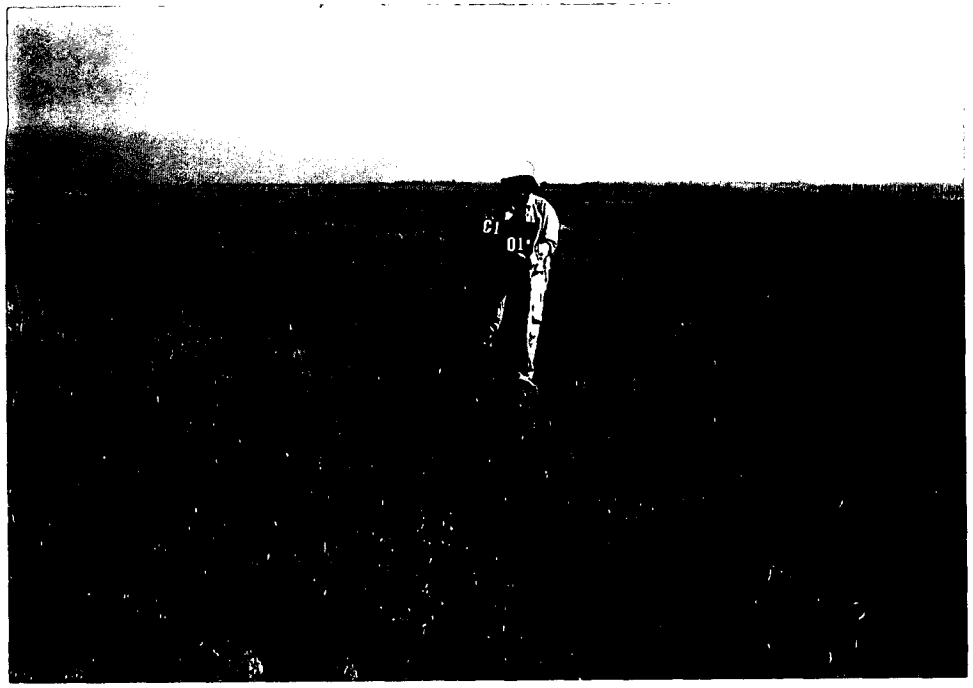
SPECIES	COMMON	SYNONYM	S2 June	S2 Aug.	S3 June	S3 Aug.	S4 June	S4 Aug.	S5 June	S5 Aug.
NATIVE ANNUAL & BIENNIAL FORBS										
Androsace septentrionalis	pygmyflower rockjasmine								X	
Cirsium undulatum	wavyleaf thistle									
Collinsia parviflora	baby blue-eyes								X	
Collomia linearis	linearleaf collomia								X	X
Descurainia incana	Richardson tansymustard	Descurainia richardsonii							X	
Descurainia pinnata	pinnate tansymustard								X	
Draba reptans	whitlowwort		X						X	
Erigeron divergens	spreading fleabane					X				
Erysimum asperum	wallflower									
Grindelia squarrosa	gumweed		X		X	X		X		X
Oligosporus pacificus	sagewort	O. campestris ssp. caudatus								
Oreocarya virgata	miner's candle	Cryptantha virgata								
Plantago patagonica	woolly plantain		X	X	X	X	X	X	X	X
Pterogonum alatum	winged buckwheat	Eriogonum alatum	X	X				X		
Silene antirrhina	sleepy catchfly		X		X	X	X		X	X
INTRODUCED ANNUAL & BIENNIAL FORBS										
Acosta diffusa	diffuse knapweed	Centaurea diffusa	X	X	X	X	X	X	X	X
Alyssum parviflorum	alyssum	A. minus	X	X	X	X	X	X	X	X
Camelina microcarpa	littlepod falseflax		X		X		X		X	X
Dianthus armeria	deptford pink			X						
Erodium cicutarium	filaree						X			
Lactuca serriola	prickly lettuce		X		X	X	X			
Lappula redowskii	early stickseed									
Lepidium densiflorum	denseflower pepperweed			X					X	
Neolepia campestre	field pepperweed	Lepidium campestre	X		X					
Podospermum laciniatum	false salsify	Scorzonera laciniatium			X		X			
Tragopogon dubius ssp. major	salsify		X	X	X	X	X			
Verbascum blattaria	moth mullein						X	X		
NATIVE ANNUAL GRASSES										
Critesion pusillum	little barley				X		X			
Vulpia octoflora	six-weeks fescue	Festuca octoflora				X			X	
INTRODUCED ANNUAL GRASSES										
Anisantha tectorum	cheatgrass	Bromus tectorum					X			
Bromus japonicus	Japanese brome		X	X	X	X	X	X	X	X

SPECIES	COMMON	SYNONYM	S2 June	S2 Aug.	S3 June	S3 Aug.	S4 June	S4 Aug.	S5 June	S5 Aug.
NATIVE PERENNIAL FORBS										
Achillea lanulosa	western yarrow		X		X	X	X	X		
Allium textile	prairie onion		X			X			X	
Ambrosia psilostachya var. coronopifolia	ragweed									
Antennaria rosea	rose pussytoes									
Arnica fulgens	arnica								X	X
Artemisia ludoviciana	pasture sage				X	X			X	X
Asclepias pumila	milkweed									
Asclepias viridiflora	greenflower milkweed									
Aster porteri	porter aster		X	X		X				
Astragalus adsurgens var. robustior	milk vetch									
Astragalus agrestis	field milkvetch									
Astragalus shortianus	milk vetch									
Astragalus spatulatus	spoonleaf milkvetch									
Brickellia rosmarinifolia ssp. chlorolepis	brickellia	Kuhnia chlorolepis	X	X						
Calochortus gunnisonii	Gunnison mariposa-lily						X		X	
Castilleja sessiliflora	largeflowered paintbrush	Castilleja grandiflora	X		X					
Cerastium strictum	mouse-ear	Cerastium arvense								
Comandra umbellata ssp. pallida	bastard toadflax									
Dalea candida var. oligophylla	white prairie clover		X						X	
Dalea purpurea	purple prairie clover		X		X		X			
Eremogone fendleri	desert sandwort	Arenaria fendleri				X				
Erigeron flagellaris	whiplash fleabane		X	X			X	X	X	
Erigeron spp.	fleabane									
Eriogonum flavum var. flavum	wild buckwheat	E. jamesii var. flavescens			X					
Gaillardia aristata	blanket-flower									
Gaillardia spp.	blanketflower									
Gastrolychnis drummondii	Drummond campion	Melandrium drummondii, Lychnis drumm								
Gaura coccinea	scarlet gaura								X	
Helianthus pumilus	sunflower			X					X	X
Heterotheca villosa	golden aster				X	X	X	X		X
Hymenopappus filifolius	threadleaf hymenopappus									
Lesquerella montana	bladderpod									
Leucocrinum montanum	sand lily									
Liatris punctata	gayfeather			X		X			X	X
Lithospermum incisum	narrowleaf puccoon									X
Lithospermum spp.	puccoon		X		X		X		X	
Lomatium orientale	biscuitroot								X	
Mertensia lanceolata	bluebells									X
Musineon divaricatum	musineom		X		X				X	X
Nothocalais cuspidata	false dandelion						X			X
Oenothera howardii	Howard eveningprimrose	O. jamesii	X							
Oenothera villosa	evening-primrose	Oenothera strigosa								
Oligosporus dracunculus ssp. glaucus	wild tarragon	Artemisia dracunculus ssp. glaucus		X	X				X	X
Oxybaphus linearis	umbrellawort									

SPECIES	COMMON	SYNONYM	S2 June	S2 Aug.	S3 June	S3 Aug.	S4 June	S4 Aug.	S5 June	S5 Aug.
NATIVE PERENNIAL FORBS (concluded)										
Oxytropis lambertii	locoweed									
Paronychia jamesii	nailwort				X					
Penstemon secundiflorus	sidebells beard-tongue									
Penstemon virens	green beard-tongue									
Psoralidium tenuiflorum	scurfpea	Psoralea tenuiflora	X	X	X	X	X	X	X	X
Ratibida columnifera	prairie coneflower			X		X				
Senecio integerrimus	lambstongue groundsel								X	
Solidago spp.	goldenrod				X					
Sphaeralcea coccinea	copper mallow				X	X	X		X	X
Tithymalus brachyceras	robust spurge	Tithymalus montanus				X				
Townsendia hookeri	Hooker's easter daisy		X	X						
Viola spp.	violet								X	
Virgulaster ascendens	Pacific aster	Aster ascendens, chilensis, adsurgens et					X			
Virgulus ericoides (group)	white prairie aster	Aster ericoides (group)		X		X		X		X
INTRODUCED PERENNIAL FORBS										
Breea arvensis	Canada thistle	Cirsium arvense	X							
Cardaria chalepensis	whitetop	Lepidium chalepensis	X	X						
Cichorium intybus	chicory						X	X	X	
Convolvulus arvensis	field bindweed				X	X				
Hypericum perforatum	klamath weed, St. Johnswort					X		X		
Linaria genistifolia ssp. dalmatica	dalmation toadflax	Linaria dalmatica								
Potentilla recta	sulfur cinquifoil						X	X		
Taraxacum officinale	common dandelion		X	X	X	X	X			X
NATIVE PERENNIAL GRASSES (cool)										
Carex pensylvanica ssp. heliophila	sun sedge	Carex heliophila	X	X	X	X	X	X	X	X
Elymus elymoides	bottlebrush squirreltail	Sitanion hystrix								
Elymus longifolius	bottlebrush squirreltail	Sitanion longifolium								
Hesperostipa comata	needle-and-thread	Stipa comata								
Juncus interior	rush									
Koeleria macrantha	junegrass	Koeleria cristata	X	X	X	X	X	X	X	X
Nassella viridula	green needlegrass	Stipa viridula								X
Pascopyrum smithii	western wheatgrass	Agropyron smithii	X	X	X	X	X	X	X	X
Poa agassizensis	Agassiz bluegrass		X		X		X	X	X	X
Poa compressa	Canada bluegrass		X	X	X	X	X	X	X	X
INTRODUCED PERENNIAL GRASSES (cool)										
Phleum pratense	timothy						X			
Poa pratensis	Kentucky bluegrass					X				
Thinopyrum intermedium	intermediate wheatgrass	Agropyron intermedium	X							

Table 27. Species Present in All Study Transects, Tordon Post-Spray Study, City of Boulder Open Space, CO - 2001

SPECIES	COMMON	SYNONYM	S2 June	S2 Aug.	S3 June	S3 Aug.	S4 June	S4 Aug.	S5 June	S5 Aug.
NATIVE PERENNIAL GRASSES (warm)										
Andropogon gerardii	big bluestem, turkeyfoot		X	X	X					X
Aristida purpurea	three-awn		X	X	X	X				X
Bouteloua curtipendula	sideoats grama		X	X	X	X	X	X	X	X
Buchloe dactyloides	buffalograss		X	X	X	X	X	X	X	X
Chondrosum gracile	blue grama grass	Bouteloua gracilis	X	X	X	X	X	X	X	X
Chondrosum hirsutum	hairy grama	Bouteloua hirsuta								
Muhlenbergia montana	mountain muhly									
Panicum virgatum	switchgrass					X				
Schizachyrium scoparium	little bluestem	Andropogon scoparium								
Sporobolus cryptandrus	sand dropseed									
NATIVE SUBSHRUBS										
Artemisia frigida	fringed sage		X	X		X	X	X	X	X
Gutierrezia sarothrae	snakeweed		X	X	X	X		X		
LICHEN										
Lichen spp.	lichen									
SUCCULENT										
Echinocereus viridiflorus	hen-and-chickens						X			
Opuntia fragilis	brittle cactus									
Opuntia macrorhiza	prickly-pear cactus		X	X	X	X	X	X		
Opuntia polyacantha	pricklypear cactus									
PARASITE										
Aphyllon fasciculatum	purple broomrape									
AGAVOIDS										
Yucca glauca	Spanish bayonet									



Photograph 1. Tordon Control Transect 1, June 2001

Photograph 2. Tordon Control Transect 2, June 2001

Photograph 3. Tordon Spray Transect 1, June 2001

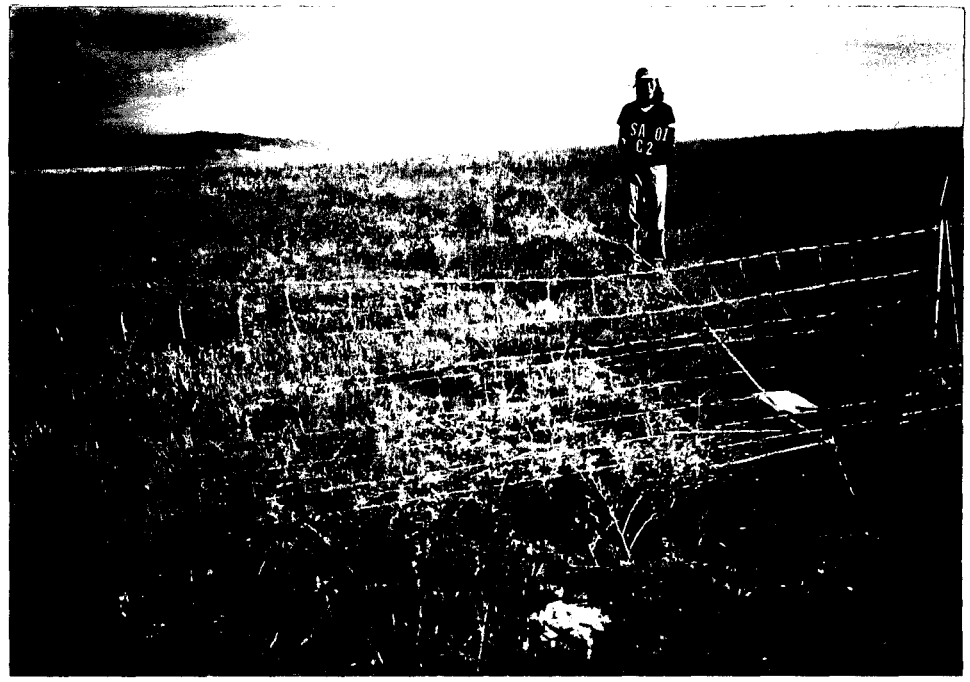
Photograph 4. Tordon Spray Transect 2, June 2001

Photograph 5. Tordon Spray Transect 3, June 2001

Photograph 6. Tordon Spray Transect 4, June 2001

Photograph 7. Tordon Spray Transect 5, June 2001

Photograph 1. Tordon Control Transect 1, August 2001



Photograph 2. Tordon Control Transect 2, August 2001

Photograph 3. Tordon Spray Transect 1, August 2001

Photograph 4. Tordon Spray Transect 2, August 2001

Photograph 5. Tordon Spray Transect 3, August 2001

Photograph 6. Tordon Spray Transect 4, August 2001

Photograph 7. Tordon Spray Transect 5, August 2001

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

Scale 1:20 000

BOULDER AREA, COLORADO — SHEET NUMBER 30

R. 70 W. | R. 69 W.

210 000 FEET

(Joins sheet 29)

(Joins sheet 26)

2 100 000 FEET

2 090 000 FEET

(Joins sheet 31)

T. 1 S.

2 225 000 FEET

JEFFERSON COUNTY

Rock Creek

Eggleston Reservoir No. 1

Hodgson-Harris Reservoir

MARSHALL

BASELINE

COMMUNITY DITCH

Map 1. Sample Transect Locations
Superior Associates
Tordon Spray Area

C=Control transects S=Spray transects

Land division corners are approximately positioned on this map.

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Colorado coordinate system, north zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Colorado Agricultural Experiment Station.

Department of Agriculture, Soil Conservation Service, and the Colorado Agricultural Experiment Station.