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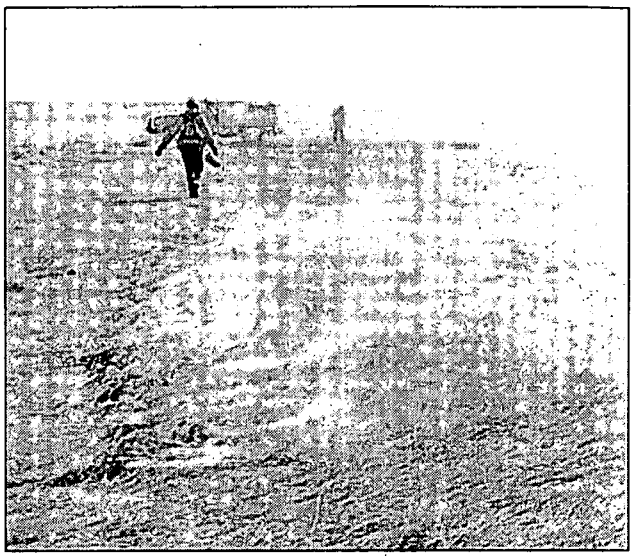
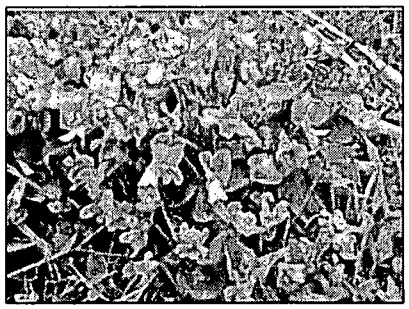
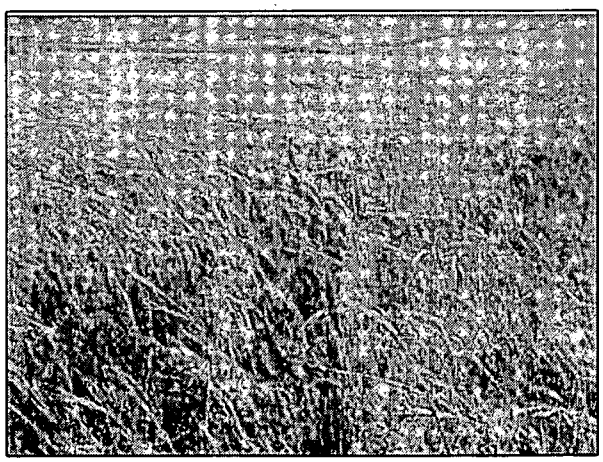
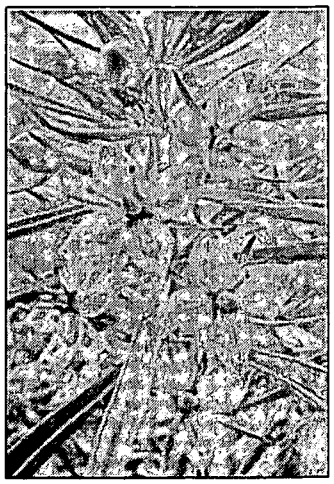
2000 Annual Vegetation Report for the Rocky Flats Environmental Technology Site









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SW-A-005615

2000 Annual Vegetation Report for the Rocky Flats Environmental Technology Site

Kaiser-Hill, LLC
Rocky Flats Environmental Technology Site
Golden, Colorado 80402-0464

May 2001

Doc. no. 8601454.004 0202 0501 0375

ADMIN RECORD

SW-A-005615

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Acronyms and Abbreviations

CNHP	Colorado Natural Heritage Program
DOE	U.S. Department of Energy
GPS	global positioning system
K-H	Kaiser Hill Company
QA/QC	quality assurance and quality control
Site	Rocky Flats Environmental Technology Site

Executive Summary

The Kaiser-Hill Company (K-H) Ecology Group conducts ecological monitoring of the Site's natural resources to ensure regulatory compliance and to preserve and protect those resources during cleanup and closure operations. Ecological monitoring is an integral aspect of determining whether the management objectives and goals for the plant communities at the Site are being achieved. One component of the ecological monitoring program is annual vegetation monitoring, the goal of which is to assess the status and quality of the plant communities on the Site, document any trends, and assess the effectiveness of various management techniques. This report summarizes the results of the vegetation monitoring that was conducted at the Rocky Flats Environmental Technology Site (the Site) during 2000.

At an elevation of approximately 6,000 ft, the Site contains a unique ecotonal mixture of mountain and prairie plant species resulting from the topography of the area and its proximity to the mountain front. The Buffer Zone, the area surrounding the Industrial Area, is one of the largest remaining undeveloped areas of its kind along the Colorado Piedmont. A number of plant communities present at the Site have been identified as increasingly rare and unique by the K-H Ecology Group and the Colorado Natural Heritage Program (CNHP). These communities include the xeric tallgrass prairie, tall upland shrubland, wetlands, and Great Plains riparian woodland communities. Small inclusions of a number of other increasingly rare plant communities are also found on the Site. Many of these communities support populations of increasingly rare animals as well, including the federally protected Preble's meadow jumping mouse, and other uncommon species such as the grasshopper sparrow, loggerhead shrike, Merriam's shrew, black crowned night heron, and hops blue and Arogos skipper butterflies.

Vegetation monitoring is conducted at the Site using several methods to meet the monitoring objectives. During 2000, these objectives included species richness inventories, noxious weed and rare plant species mapping, photographic documentation, qualitative habitat assessment surveys, quantitative monitoring of long-term plant community changes, quantitative assessments of the effectiveness of herbicide applications and potential associated impacts to the native plant communities, and an evaluation of the effects of a prescribed burn on the xeric tallgrass prairie.

As a result of the 2000 field work, a total of seven new records of vascular plant species are reported for the Site. This increase brings the total number of plant species known to occur on the Site to 592. None of the new species recorded on the Site in 2000 is a rare species or state-listed noxious weed. Four plant species of concern listed by the CNHP as rare or imperiled occur at the Site. During 2000, populations of mountain-loving sedge, forktip three-awn, carrionflower greenbriar, and dwarf wild indigo were visited and evaluated. All four species were observed in vegetative, flowering, and fruiting condition, and their populations appeared to be healthy.

Tall Upland Shrubland

During 2000, species richness and qualitative abundance were assessed in the tall upland shrubland management units at the Site. A total of 363 plant species were recorded, of which 82 percent were native species. This was an increase over past inventories of the tall upland shrubland, which documented 352 species in 1997 and 333 species in 1996. The tall upland shrubland continues to be the richest plant community at the Site, despite the fact that it represents less than one percent of the Site's total area. The most critical management issue in the tall upland shrubland, as well as the greatest threat, is from noxious weeds. Canada thistle is common throughout the tall upland shrubland patches, particularly on the downhill sides where more moisture is available. Diffuse knapweed is present on the grasslands surrounding most of the tall upland shrubland and is invading into the openings within the tall upland shrubland patches. Without effective control in these upper drainages of Rock Creek, diffuse knapweed will become increasingly problematic, and will be more difficult to control near the tall upland shrubland. One other weed species of particular concern in the tall upland shrubland is bouncing bet. Small patches were observed in four of the ten tall upland shrubland management units. Spot control planned for FY2001 should control and begin to eradicate this weed from these locations.

Aside from these concerns, the tall upland shrubland appeared generally healthy. No substantial signs of disease, predation, injury, or die-off of any of the dominant tall upland shrubland species were observed. Most appeared to have flowered and produced fruit during 2000. In general, the tall upland shrubland continues to be a plant community of high importance, providing critical habitat for many plant species found nowhere else at the Site. In addition, the tall upland shrubland provides important forage and wildlife habitat for many birds, as well as the deer population on the Site.

Mesic Mixed Grassland

During 2000, three permanent monitoring sites (TR02, TR04, and TR11) in the mesic mixed grassland community were monitored to reassess conditions and determine whether changes observed in the 1999 data were simply an anomaly or part of a longer-term change. The 1999 data showed a large compositional shift from dominance by cool-season species to warm-season species since the sites were last monitored in 1995. Monitoring in 2000 was conducted to determine whether this shift could be documented for a second year. The results from 2000 continue to substantiate the overall increase in warm-season graminoid cover observed at all sites and in the community overall since 1995. The reduced cover of Japanese brome (a non-native species) and increased cover of native, perennial graminoids—blue grama and side-oats grama—has improved the quality of these grasslands and should reduce the potential for soil erosion and accidental wildfires. In addition, species richness has remained stable, and diversity and native foliar cover have increased.

Weed Monitoring and Control

Sitewide weed mapping continued for selected species, as a means of monitoring the distribution of specific noxious weed species on the Site, identifying high-priority treatment areas, and tracking the effectiveness of weed control efforts. The species with the greatest extent on the Site during 2000 were diffuse knapweed (2,223 acres), common mullein (1,010 acres), and musk thistle (792 acres). Since 1998, the total Site acreage infested by diffuse knapweed, musk thistle, and common mullein has decreased, largely due to the aerial herbicide applications conducted in May 1999 and May 2000. Diffuse knapweed acreage across the Site has decreased by almost 700 acres during this time, and musk thistle has decreased by almost 900 acres. Common mullein distribution has not been affected as much by the herbicide applications, however. Results of the 2000 mapping effort have been used to establish weed control plans for 2001. Several areas still needing control have been identified for larger-scale treatment, as well as spot control in 2001.

Physical and mechanical weed control measures at the Site in 2000 consisted of grading, mowing, and selective hand control. Mowing was done along the margins of the main east and west access roads, in addition to several miles of firebreak roads in the Buffer Zone, to prevent the roadside weeds from going to seed and spreading further. Grading was conducted along firebreak roads in the Buffer Zone, to maintain these firebreak roads, and timing was selected to have maximum impact on the roadside weeds. Hand control in 2000 was conducted at several locations to control localized infestations of scotch thistle, annual rye, bouncing bet, and dame's rocket. Hand control consisted of hand pulling, using sickles or sling blades, and spot herbicide spraying. The use of hand control has proven valuable in preventing these small infestations from becoming larger problems.

During 2000, a new biological control insect for Canada thistle (*Cirsium arvense*) was released at the Site. Approximately 200 adults of *Urophora carduii*, a gall-forming fly, were released at two locations in the Rock Creek drainage where other methods of controlling Canada thistle are impractical. The insects were obtained from the Colorado Department of Agriculture in an attempt to establish a reproducing population at the Site.

Herbicide applications of Tordon 22K and Transline were used to control several hundred acres of noxious weed–infested grasslands at the Site during 2000. Primary target species were diffuse knapweed, musk thistle, and mullein; however, other less aggressive exotic species such as goatsbeard, curly-top gumweed, alyssum, wild lettuce, small-seeded false flax, and some of the tansymustards were also controlled. Approximately 75 acres were treated on the ground, while almost 1,022 acres were treated with a helicopter during 2000.

Monitoring results from recent herbicide applications continue to indicate that progress is being made in the control of noxious weeds at the Site. The 2000 aerial herbicide application reduced the total number of acres infested by diffuse knapweed (in the spray areas) by 409 acres, from 510 acres in 1999 to 101 acres in 2000. This represents an 80

percent reduction in the total number of diffuse knapweed–infested acres in the areas that were sprayed in 2000. In the areas sprayed by helicopter in spring 1999, many still contain little diffuse knapweed. However, at some locations, the effectiveness of the control has lessened, and diffuse knapweed has begun to increase. Although Tordon 22K is known to typically have a 3- to 4-year residual impact on diffuse knapweed, several factors might explain the shortened control period at some of the treated areas. Control at the Site has typically been best on the flat areas on top of the pediment, where the herbicide was applied most evenly. However, variations exist in the evenness of the herbicide application, even from the air, and missed flight lines and continued disturbances (largely from burrowing mammals) remain problematic. Control on the hillsides has been less consistent than on the flat areas, and this is where the diffuse knapweed has been returning most quickly. Without spot control to continually treat the missed or disturbed areas within the larger treated areas, diffuse knapweed can begin to return almost immediately. As a result, improvements in spot treatment of problem areas are planned for FY2001.

Quantitative monitoring of the impact of Tordon 22K on diffuse knapweed and native species on the xeric tallgrass prairie at the Site continues to provide valuable information for management decisions. Results have shown good control of diffuse knapweed, the primary target species, four years after herbicide treatment. In the treatment area, initial declines in species richness were transitory, and no changes in overall foliar cover were observed. Although species diversity, overall forb cover, native forb cover, and non-native forb cover declined initially in the treatment plot as a result of the herbicide application, these measures were reversed by 1999, and with the exception of non-native forb cover, they are no longer significantly different from the control area. Additionally, the reduced competition from forbs has improved the vigor and cover of the graminoid species. The results from the study at the Site are consistent with other studies that have examined the effect of Tordon 22K on grassland communities elsewhere. Continued monitoring in 2001 will provide additional information for management of the grassland communities at the Site.

Revegetation Monitoring

During 2000, one project disturbed a previously reclaimed area (approximately 0.5 acres) on a hillside in the Woman Creek drainage at the Site. It was revegetated using a site-specific native seed mix. Monitoring of several large revegetation projects that were done in 1999 was continued in 2000. Results were mixed, and as a result, current administrative and cultural controls were modified. At one revegetation effort, most of the grasses that initially came up in 2000 were non-native reclamation grasses that were not in the specified seed mix provided to the project. An investigation into the cause of this problem was inconclusive, and as a result, Site projects that conduct revegetation are now required to have the seed mix visually inspected by a qualified ecologist prior to planting. At other locations, the straw used for mulch contained viable seed heads. As a result, virtually none of the desired native seed species germinated, but instead, a wheat monoculture resulted. Straw used for projects on the Site now must be threshed (i.e., seed heads removed).

Prescribed Burn

In April 2000, a 48-acre prescribed burn was conducted by the U.S. Forest Service on the xeric tallgrass prairie in the south Buffer Zone at the Site. The objectives of the prescribed burn were to reduce litter, increase the vigor and health of the native species, benefit the warm-season graminoid species, and help recycle nutrients for plant growth. Monitoring results have shown several positive results from the fire. Species richness and diversity have not been affected. Plant litter was reduced by 77 percent (from 4,152 lbs/acre to 963 lbs/acre) in the burned area, lowering the potential for a catastrophic wildfire in this area of the Buffer Zone. One of the goals of the prescribed burn was to increase the dominance of the warm-season graminoid species, especially those that are the characteristic species of the xeric tallgrass prairie. This was accomplished by timing the fire so that it would have the greatest detrimental effect on the cool-season species.

Data from within the prescribed burn area showed that cool-season cover was reduced significantly after the fire, and warm-season graminoid cover increased significantly. In fact, results indicated that the species composition of the burn area was shifted from a cool-season-dominated community to a warm-season-dominated community. Qualitative observations of the burn area also showed that flowering of most of the native graminoid species increased as a result of the fire, in comparison to areas that were not burned, even with the dry summer conditions experienced during 2000. In general, the results of the 2000 spring prescribed burn on the xeric tallgrass prairie have demonstrated the utility of fire as a tool for effective management and restoration of the prairie ecosystems at the Site. With clearly stated objectives, the use of prescribed fire, integrated with other resource management techniques, can help maintain the viability and sustainability of the prairie ecosystems at the Site. Continued monitoring of these transects will provide a better understanding of the longer-term implications for fire on the xeric tallgrass prairie at the Site.

Summary

The ecological resources at the Site continue to provide an important island of biodiversity in a region where much of the native diversity is rapidly being lost to urbanization. However, the results also continue to underscore the serious issues that threaten the quality and long-term sustainability of the Site's ecological resources. These threats come primarily from noxious weeds, human disturbances, and plant litter build-up, the latter of which has resulted from an absence of wildfires and/or grazing over the past several decades. However, the data indicate that, beneath the sometimes visually dominant weedy appearance, the native plant communities are still present and viable. The management actions taken in recent years, such as weed control and prescribed burns, have improved the condition of the grasslands at many locations across the Site. Continued active management of these native communities is necessary if they are to survive over the long term and maintain their ecological value. Through good stewardship and use of best management practices, the Site's current ecological resource

management plan and vegetation management program provide direction for managing the resources in a sustainable manner. As stewards of the ecological resources at the Site, Kaiser-Hill and the Department of Energy continue to strive to preserve and maintain these unique resources into the future.

1. Introduction

Rocky Flats Environmental Technology Site (Site) is a U.S. Department of Energy (DOE) facility located on the Colorado Piedmont east of the Front Range between Boulder and Golden, Colorado. The Site is located in Jefferson County, approximately 16 miles northwest of downtown Denver (Figure 1). In production from 1951 through 1989, the Site manufactured nuclear weapons components for the Cold War. Since shutdown, it has been classified as a Superfund site and is currently undergoing cleanup and closure. One of the DOE's goals for natural resource management has been to preserve the unique ecological resources found at the Site (K-H 1997a).

At an elevation of approximately 6,000 feet, the Site contains a unique ecotonal mixture of mountain and prairie plant species, resulting from the topography and proximity to the mountain front. The Buffer Zone, the area surrounding the Industrial Area, is one of the largest remaining undeveloped areas of its kind along the Colorado Piedmont (approx. 5,600 acres; K-H 1997b). A number of plant communities at the Site have been identified as increasingly rare and unique by the Kaiser-Hill Company (K-H) Ecology Group and the Colorado Natural Heritage Program (CNHP). The largest communities include the xeric tallgrass prairie, tall upland shrubland, wetlands, and Great Plains riparian woodland communities (CNHP 1994, 1995). Small inclusions of a number of other increasingly rare plant communities are also found on the Site. Many of these communities support populations of increasingly rare animals as well; including the federally protected Preble's meadow jumping mouse, and other uncommon species such as the grasshopper sparrow, loggerhead shrike, Merriam's shrew, black crowned night heron, and hops blue and Arogos skipper butterflies (CNHP 1994, 1995).

The K-H Ecology Group conducts ecological monitoring of the Site's natural resources to ensure regulatory compliance and to preserve and protect those resources during cleanup and closure operations. The goal of vegetation monitoring is to assess the status and quality of the plant communities on the Site, document any trends, and assess the effectiveness of various management techniques. Ecological monitoring provides integral data for determining whether the management objectives and goals for the plant communities at the Site are being achieved (K-H 1997a,b). Annual reports are produced to synthesize and interpret the information, providing the DOE with important and timely information necessary for wise stewardship and best management of the Site's ecological resources.

This report summarizes the results of the vegetation monitoring conducted during 2000. Several monitoring techniques were used to evaluate the status and condition of the plant communities on the Site. General descriptions of the methods used are outlined in the following section, with summaries of the monitoring results presented in subsequent sections. Detailed technical reports for each of the specific monitoring activities conducted in 2000 are found in Appendix B.

2. Methods

Vegetation monitoring is conducted at the Site using several methods designed to meet the monitoring objectives. During 2000, monitoring included species richness inventories, noxious weed and rare plant species mapping, photographic documentation, qualitative habitat assessment surveys, quantitative monitoring of long-term plant community changes, quantitative assessments to determine the effectiveness of herbicide applications and potential associated impacts to the native plant communities, and quantitative evaluations of the prescribed burn on the xeric tallgrass prairie.

2.1 High-Value Vegetation Surveys

The goal of the high-value vegetation monitoring is to qualitatively assess the status and condition of the high-value plant communities (xeric tallgrass prairie, tall upland shrubland, selected wetlands, and Great Plains riparian woodland) on the Site and to document any changes in these areas. The high-value plant communities at the Site that are monitored are those identified by the K-H Ecology Group and the CNHP as containing significant or rare ecological resources at both the local and regional scale (K-H 1997b; CNHP 1994, 1995). Small inclusions of other increasingly rare plant communities that are tracked by the CNHP also occur on Site, but these are not currently monitored. Table 1 presents the dominant and subdominant plant communities listed by the CNHP that occur at the Site (CNHP 1999). The ranking system used by the CNHP to indicate the global and state rarity of the communities is explained in Appendix A.

The objectives of the high-value vegetation monitoring are to qualitatively:

- Assess the species richness of the plant communities
- Identify any rare plant populations
- Document the locations and continued presence of any rare plant populations
- Identify and document any infestations of noxious weeds
- Document the effectiveness of weed control applications
- Assess the impacts of disturbance on the plant communities
- Provide a general assessment of the overall status and quality of the plant communities at the Site.

2.1.1 Species Richness Surveys

The tall upland shrubland community was monitored in 2000 as part of the rotating schedule for monitoring high-value vegetation communities on the Site. This community was monitored previously in 1998. Species richness was inventoried in each of the ten tall upland shrubland management units (Figure 2). Inventories were conducted by traversing each management unit twice during the growing season (in spring and late summer) and recording all vascular plant species observed. Attempts were made to visit, as completely as possible, all areas and microhabitats that occur within each management unit.

2.1.2 Weed Mapping Surveys

Sitewide weed mapping continued for selected species, as a means of monitoring the distribution of specific noxious weed species on the Site, identifying high-priority treatment areas, and tracking the effectiveness of weed control efforts. Weed mapping was conducted on foot during the high-value vegetation surveys in the tall upland shrubland and from a vehicle using binoculars for the remainder of the Site. Species were mapped during their respective flowering periods and/or when they were most visible. The species mapped during 2000 included diffuse knapweed (*Centaurea diffusa*), musk thistle (*Carduus nutans*), common mullein (*Verbascum thapsus*), Russian knapweed (*Centaurea repens*), annual rye (*Secale cereale*), Scotch thistle (*Onopordum acanthium*), dame's rocket (*Hesperis matronalis*), bouncing bet (*Saponaria officinalis*), and jointed goatgrass (*Aegilops cylindrica*). Canada thistle (*Cirsium arvense*) was not mapped because it is common throughout most of the wetlands on the Site, and the wetlands map therefore provides a good indication of the infested areas.

Three species—diffuse knapweed, musk thistle, and common mullein—were mapped based on infestation densities. The other species listed above were mapped by presence/absence only. Infestation areas were classified in general density categories of high, medium, low, and scattered, based on a subjective interpretation of the extent, visual density, need for control, and aggressive nature of the species. In general, a high-density category indicated an area that was dominated by a nearly solid infestation and/or very high cover of the species. A medium-density category was used where the infestation provided less cover and was less homogeneous in the distribution of the species. The low-density category was used where the species was present in fewer numbers and did not visually dominate the landscape, but was beginning to establish a foothold in the community and was in need of control. The scattered-density category indicated a sporadic occurrence of the species. The noxious weed populations and distributions were drawn in the field on 44×34-inch sitewide base maps. It should be noted that the boundaries shown on the maps are approximate and are based on professional judgement. They should not be interpreted as a precise outline of the distribution of these species, because no surveying or global positioning system (GPS) equipment was used to locate boundary edges, nor do the maps necessarily represent every location of the species on the Site.

2.1.3 Photographic Documentation Surveys

Photographs were taken at selected permanent high-value vegetation photo-point locations during 2000. Photographs were taken in the same compass directions as past photographs from these photo points. Comparisons were made to past photographs to evaluate changes in the plant communities.

2.1.4 Qualitative Habitat Assessment and Rare Plant Surveys

Qualitative habitat assessments were made in each of the high-value vegetation community management units on the Site during 2000. Assessment objectives dealt primarily with habitat loss, threats to the plant community, weed issues, rare plant species, the health of dominant plant species in the community, and general community quality. Attempts were also made to revisit each of the locations where CNHP-listed plant species of special concern are known to occur. These species include the mountain-loving sedge (*Carex oreocharis*), forktip three-awn (*Aristida basiramea*), dwarf wild indigo (*Amorpha nana*), and carrionflower greenbriar (*Smilax herbacea* var. *lasioneuron*). Population locations were originally mapped during the 1997 field season. Locations are revisited annually to confirm the continued presence of these species on the Site and to evaluate any concerns regarding them.

Further details on the qualitative methods used in 2000 are found in the document *High-Value Vegetation Survey Plan for the Rocky Flats Environmental Technology Site* (K-H 1997c) and *The Environmental Management Department Operating Procedures Manual* (DOE 1995a).

2.2 Quantitative Vegetation Monitoring Techniques

The objectives of the quantitative vegetation monitoring are to assess plant community changes over time (i.e., trends) and/or changes in response to management actions (e.g., herbicide application, prescribed fire). In 2000, quantitative vegetation monitoring was used for evaluating long-term trends on the mesic mixed grassland, evaluating the effects of herbicide applications on the noxious weed diffuse knapweed and on native prairie species, and evaluating the effect of a prescribed burn on the xeric tallgrass prairie at the Site.

Quantitative methods used to assess plant communities included:

- Belt transects (species richness, woody plant and cactus density)
- Point-intercept transects (foliar and basal cover)
- Quadrats (species frequency and selected plant densities).

General descriptions of these methods are provided below. For more detailed information on the quantitative methods used in 2000 for specific projects, refer to the technical reports in Appendix B or the *Environmental Monitoring Department Operating Procedures Manual* (DOE 1995a) and the *High Value Vegetation Survey Plan for the Rocky Flats Environmental Technology Site* (K-H 1997c).

2.2.1 Belt Transects

Species richness was measured in a 2-m-wide belt centered along each permanent 50-m transect. Every plant species rooted within the 100-m^2 area was recorded. In addition, the densities of woody plant and cactus stems were counted by species for the 100-m^2 area and recorded.

2.2.2 Point-Intercept Transects

Basal cover and foliar cover estimates were made using a point-intercept method along each of the 50-m transects. A 2-m-long rod, with a 6-mm diameter, was dropped vertically at 50-cm increments along the transect to record a total of 100 intercept points. Two types of hits were recorded:

- Basal cover hits indicated what material the rod contacted at the ground surface. Hits could be vegetation (live plants), litter (fallen dead material), rock (pebbles and cobbles that were greater than the rod diameter), bare ground, or water, in that order of priority based on the protection from erosion provided by each type of cover. A basal vegetation hit was recorded only if the rod was touching the stem or crown of the plant where the plant entered the ground.
- Foliar vegetation hits (defined as a portion of a plant touching the rod) were recorded in three categories, as defined by height and growth form. The topmost hit of each growth form was recorded. The growth forms measured were herbaceous, woody <2 m in height, and woody >2 m in height.

2.2.3 Quadrats

Frequency information by species was gathered by randomly locating five 1-m^2 quadrats along each transect and recording all species present in each plot. Density counts were made of selected weed species (which varied depending on the individual study) within each of the quadrats.

2.3 Data Analyses

Prior to analysis, all data were checked for quality assurance and quality control (QA/QC), following accepted methods for ecological data at the Site (K-H 1997d). Descriptive and graphical comparisons and summaries of the data were prepared for most data sets. Appropriate statistical analyses were also conducted on the data where feasible. Further details on the specific analyses conducted on particular data sets are found in the technical reports in Appendix B.

3. Results and Discussion

3.1 Tall Upland Shrubland

During 2000, species richness and qualitative abundance were sampled in the tall upland shrubland management units (Figure 2) at the Site. A total of 363 plant species were recorded in the tall upland shrubland at the Site during 2000 (Table 2). Of these, 82 percent were native species. This was an increase over past inventories of the tall upland shrubland, which documented 352 species in 1997 and 333 species in 1996. The percentage of native species has not changed since 1997. The tall upland shrubland continues to be the richest plant community at the Site, despite the fact that it represents less than one percent of the Site's total area. To compare past years' results with the 2000 inventory, a Sorensen similarity index (an index that is used to compare the similarity of species composition between samples; Brower and Zar 1977) was conducted, using presence/absence data. Comparisons between all combinations of years yielded values ranging from 0.90 to 0.92, indicating a very high floristic similarity between years, as would be expected. The small differences in species observed during the different years are mostly a result of the slight differences in routes used to traverse the management units, and of the natural variability in abundance of individual species from year to year.

Examination of the qualitative habitat assessment data from the tall upland shrubland management units in 2000 revealed concerns similar to those reported previously (K-H 1997e; K-H 1998). The most critical management issue in the tall upland shrubland, as well as the greatest threat, is from noxious weeds. Canada thistle is common throughout the tall upland shrubland patches, particularly on the downhill sides where more moisture is available. Diffuse knapweed is present on the grasslands surrounding most of the tall upland shrubland and is invading into the openings within the tall upland shrubland patches. In May 2000, most of the xeric tallgrass prairie areas on the pediments above the tall upland shrubland in Rock Creek were treated by helicopter with Tordon 22K, to control the diffuse knapweed infestations on the grasslands. On the hillsides, however, the proximity to the shrubland and wetland areas and the steepness of the hillsides precluded aerial spraying. Without effective control in these upper drainages of Rock Creek, diffuse knapweed will become increasingly problematic, and will be more difficult to control near the tall upland shrubland.

One other weed species of particular concern is bouncing bet (*Saponaria officinalis*). Small patches were observed in four of the ten tall upland shrubland management units. This species is just beginning to establish at the Site, and with active control efforts, it can be eradicated before it becomes a bigger problem. Numerous other weed species found in the tall upland shrubland included stinging nettle (*Urtica dioica*), mullein (*Verbascum thapsus*), dalmatian toadflax (*Linaria dalmatica*), musk thistle (*Carduus nutans*), and smooth brome (*Bromus inermis*). Further discussion concerning weed control is found later in this report.

Some small areas of erosion were noted, primarily from deer use and a coyote den located at one tall upland shrubland management unit. None of these areas warranted any corrective action. Some of the management units have retained trash that has blown in from offsite locations. The aesthetic value of these areas would be improved by removing this trash.

Aside from these concerns, the tall upland shrubland appeared generally healthy. There were a few observations of tent caterpillars on some of the chokecherry (*Prunus virginiana*), but they did not appear any more abundant than in the past. Besides this, no substantial signs of disease, predation, injury, or die-off of any of the dominant tall upland shrubland species were observed. Most appeared to have flowered and produced fruit during 2000.

In general, the tall upland shrubland continues to be a plant community of high importance at the Site. It contains a high diversity of plant life, with more than half the plant species known to occur at the Site being found in association with this community. Many species of plants are restricted to this community at the Site. In addition, the tall upland shrubland provides important forage and wildlife habitat for many birds, as well as the deer population on the Site.

The detailed technical report for the tall upland shrubland and other high-value plant community monitoring conducted in 2000 is found in Appendix B.

3.2 Mesic Mixed Grassland Monitoring

During 2000, three permanent monitoring sites (TR02, TR04, and TR11; Figure 3) in the mesic mixed grassland community at the Site were monitored to reassess conditions and determine whether changes observed in the 1999 data were simply an anomaly or part of a longer-term change (DOE 1995b; K-H 1997b, 2000). The 1999 data showed a large compositional shift from dominance by cool-season species to warm-season species since the sites were last monitored in 1995. Monitoring in 2000 was conducted to determine whether this shift could be documented for a second year.

A total of 138 species were recorded at all three mesic mixed grassland sites that were monitored in 2000. The number of species found at each site varied from 89 (TR02) to 110 (TR11) (Table 3). The percentage of native species found across all sites combined was 80 percent, with individual sites ranging from 76 to 83 percent (Table 3). Total community species richness was little changed in 2000 as compared to previous years. At specific sites, however, some differences were noted. At TR04, a loss of 11 species from the number recorded in 1999 was observed. The 89 species recorded at TR04 was the lowest number reported since 1993 (Table 3). Many of these were native species, but were species that typically occur very infrequently, so their disappearance for a season is not cause for alarm. The decrease may have been due to the summer drought in 2000 and the hot, southwest-facing aspect of this site. At TR02, the number of species observed in 1999 was lower by 15, compared to 1995, but the number rebounded by 10 species in

2000 (Table 3). The loss of richness in 1999 was a response to the application of Tordon 22K as part of the weed control program at the Site. The rebound in species richness the year following the Tordon 22K herbicide application correlates well with data from other monitoring at the Site that have shown a similar response (K-H 1998, 1999, 2000). At TR11, no difference in species richness was noted in 2000 compared to the past several years (Table 3).

Total foliar cover for the mesic mixed grassland community declined in 2000 compared to past measurements and was, in fact, the lowest ever recorded at these monitoring sites (Figure 4). Both total graminoid cover and total forb cover across all sites combined showed similar responses (Table 4). The best explanation for the decline in cover is the drought conditions that occurred during the summer of 2000. Qualitative observations of the prairie in 2000 showed that many species withered and went dormant in mid-summer. Species diversity (a measure that combines species richness and abundance; Shannon-Weaver; Brower and Zar 1977) showed little change from that in 1999 and still remained higher than that from 1993–1995. The relative cover of native plant species continued to increase in 2000 and reached nearly 80 percent, the highest recorded in the community since monitoring began in 1993 (Table 4). The decrease in non-native cover is largely a result of the loss of cover of Japanese brome, an exotic grass species, which has shown a similar pattern of decline since 1995 (Figure 5). These data suggest that the quality of the mesic mixed grassland has improved over the past several years.

While total non-native foliar cover has decreased in the community, non-native forb cover has changed little across all sites combined, indicating that the weeds (mostly forbs) are still a problem in general (Table 4). However, at TR02, where the aerial herbicide application was conducted in 1999, declines in both native and non-native forb cover were observed (Table 5). In 2000, native forb cover began to increase while non-native cover continued to decline (Table 5). Forb cover should return to pre-treatment levels at TR02 over the next few years, based on other studies at the Site and elsewhere (K-H 1998, 1999, 2000; Rice and Toney 1996; Rice et al. 1997).

The cool- versus warm-season graminoid composition of the mesic mixed grassland continued to shift further toward the warm-season component in 2000 (Table 4, Figure 6). In 1993–1995, cool-season graminoids dominated the grassland, providing approximately 70 percent of the relative cover, while warm-season graminoids accounted for 5–14 percent. However, in 1999, cool-season graminoid cover dropped to about 50 percent of the total cover, while warm-season graminoid cover increased to approximately 32 percent. In 2000, the cool-season graminoids accounted for only 40 percent of the relative cover, and warm-season graminoid species became the dominant cover, at approximately 45 percent. The loss of cool-season graminoid cover on the mesic mixed grassland is due largely to the 36-percent reduction in the cover of Japanese brome and 7-percent loss of western wheatgrass observed from 1995 to 2000 (Table 4). In 1994 and 1995, Japanese brome had the highest cover of all species on the mesic mixed grassland (Table 4).

The graminoid species accounting for the increase in warm-season cover are blue grama and side-oats grama, both native grasses. Figure 7 illustrates the change in foliar cover for the dominant species on the mesic mixed grassland from 1993 to 2000. Although relative cover values are mentioned here because they are the best measure of actual species composition of the vegetation present, the absolute or actual cover of these species also declined or increased by similar amounts. The lack of data from 1996–1998, however, limits understanding whether the increases in warm-season graminoid cover actually started prior to 1999. This illustrates the difficulty of interpreting change when continuous data sets are not available.

Taken separately, individual sites also showed these differences, although with some variation. The change in cool-season versus warm-season graminoid composition was most pronounced at TR04, where the warm-season cover has increased by over 50 percent and cool-season species have declined by the same amount from 1995 to 2000 (Table 6). The species that accounts for nearly 39 percent of the increase is blue grama.

At TR02, the change in cool- vs. warm-season graminoid composition has also been dramatic. Relative foliar cover of warm-season graminoids increased from 8 percent in 1995 to just over 50 percent in 2000, with most of this increase coming from blue grama and sideoats grama (Table 5). Relative foliar cover of cool-season graminoids decreased from 66 percent to 38 percent during the same time period (Table 5). This site received an aerial herbicide treatment of Tordon 22K (applied in mid-May 1999), which could account for some of this change. Due to the timing of the herbicide application in 1999, most of the cool-season graminoid species would have been growing and getting ready to flower. Thus, by the time the herbicide actually took effect on the target species and some of the non-target species, the opportunity for the cool-season graminoid species to take advantage of the reduced competition would have passed. Instead, the warm-season graminoid species, which would have just started their growth period, would have been able to take advantage of the reduced competition and higher summer precipitation, thus accounting for much of the increase in cover.

At TR11, increased warm-season and decreased cool-season graminoid cover has also been observed, with warm-season cover increasing by 24 percent and cool-season cover decreasing by 19 percent from 1995 to 2000 (Table 7). Here, increases in the cover of blue grama, side-oats grama, and big bluestem largely account for the increase in warm-season cover (Table 7). Thus, although a shift in cover composition was noted across all sites, the shift was not of equal magnitude at every site.

From a management standpoint, the shift in graminoid composition observed in 1999 and 2000 is a beneficial one. Japanese brome and downy brome, commonly referred to as cheatgrasses, are both non-native species that have taken over millions of acres across the western United States (Pellant and Hall 1994). Areas infested by these cool-season annual grasses often have lower species richness and diversity, less ecosystem stability, increased potential for soil erosion, more frequent wildfires, and lower wildlife and livestock utilization (Rosentreter 1994). Infestation by these grasses has been mentioned previously as a potential management concern for the Site (DOE 1995b). The concern is

lessened by the reduction of these species in the mesic mixed grassland, as seen in the last two years of data, and a shift to a more perennial, warm-season graminoid composition. Whether cheatgrass cover will continue to remain low or begin to increase at some point is uncertain at this time. The reason for the loss of cheatgrass cover is unknown, but it could be due to climatic variations or possibly a cyclic response of the different species over time. Monitoring of these locations in the future will assess the status of this trend over time.

In general, the quality of the mesic mixed grassland at these sites has improved over the past several years, due to the loss of cover of exotic species and the increase in cover of native species. Future monitoring will evaluate whether these trends continue. The detailed technical report for the mesic mixed grassland monitoring conducted in 2000 is found in Appendix B.

3.3 Rare Plants

Observations were made during 2000 of each of the plant species of concern listed by the CNHP as rare or imperiled that occur on the Site. Populations of mountain-loving sedge, forktip three-awn, carrionflower greenbriar, and dwarf wild indigo were visited and evaluated. All four species were observed in vegetative, flowering, and fruiting condition, and their populations appeared to be doing well. Figure 8 shows the known locations where these species have been observed on the Site.

3.4 Site Flora

As a result of the 2000 field work, a total of seven new records of vascular plant species are reported for the Site. Plant nomenclature follows that of GPFA (1986), Weber (1976), and Weber (1990), in that order of determination. The new plant species reported for the Site are:

Astragalus parryi Gray	Parry's Milkvetch
Cyperus acuminatus Torr. & Hook.	Taperleaf Flatsedge
Eleocharis obtusa (Willd.) J.A. Schult.	Blunt Spikerush
Limosella aquatica L.	Mudwort
Lygodesmia juncea (Pursh) Hook	Skeleton-weed
Panicum dichotomiflorum Michx.	Fall Panicum
Stipa robusta (Vasey) Scribn.	Sleepy Grass

None of the new species recorded on the Site in 2000 is a rare species or state-listed noxious weed. The total number of vascular plant species recorded for the Site is now 592. The complete list of plant species known to occur at Rocky Flats as of the end of the 2000 field season is found in Appendix C. Voucher specimens of these species are maintained in the Site herbarium.

3.5 Vegetation Management

Active natural resource management is an important component of the Site's ecology program. In order to achieve the DOE's goal of preserving and sustaining the natural resources in the Buffer Zone at the Site, it has become essential to apply an adaptive ecosystem management approach. At present, the most serious threat to the native plant communities on the Site is from noxious weed infestations. Although many species of weeds exist in the plant communities at the Site, most are not especially problematic. However, under the Colorado Noxious Weed Act (CRS 1996), a number of particularly noxious weeds must be controlled by property owners to prevent their spread to surrounding lands. Some of these weeds pose a significant threat to the plant communities at the Site. During 2000, the Site's vegetation management program used a variety of methods to address these problems. In addition, monitoring was conducted to ascertain the effectiveness of ground and aerial herbicide applications on diffuse knapweed, and to assess any associated impacts to native species, evaluate the effectiveness of a prescribed burn for prairie restoration and management, and map the distribution of various weed species. A general synopsis of the activities and monitoring conducted during 2000 for vegetation management is presented below. Additional, more detailed information outlining the Site's vegetation management program and related monitoring activities conducted in 2000 can be found in the technical reports in Appendix B.

3.5.1 Vegetation Management at the Site in 2000

During 2000, the vegetation management program at the Site continued to work toward controlling infestations of several noxious weed species in the Buffer Zone. Several methods were applied to control current infestations and prevent new ones from starting. These included the use of administrative and cultural controls, physical and mechanical methods, biological controls, and chemical controls. Strides were made in controlling several large infestations of diffuse knapweed, musk thistle, and mullein, in addition to other, smaller infestations of scotch thistle, annual rye, bouncing bet, and dame's rocket. A 48-acre prescribed burn was conducted to improve the quality of the xeric tallgrass prairie at a location in the south Buffer Zone (see Appendix D for photographic documentation of the prescribed burn and associated monitoring).

During 2000, one project disturbed a previously reclaimed area (approximately ½ acre) on a hillside in the Woman Creek drainage at the Site. It was revegetated using a site-specific native seed mix. Photographs were taken after the revegetation and will be used for comparison to future photographs to document the progress of the reclamation. Monitoring of several large revegetation projects that were done in 1999 (K-H 2000) was continued in 2000. Results at these projects were mixed, and consequently, current administrative and cultural controls were modified. At one revegetation effort, most of the grasses that initially came up in 2000 were non-native reclamation grasses that were not in the specified seed mix provided to the project. An investigation into the cause of this problem was inconclusive, and as a result, Site projects that involve revegetation are now required to have the seed mix visually inspected by a qualified ecologist prior to

planting. At other locations, the straw used for mulch contained viable seed heads. As a result, virtually none of the desired native seed species germinated, but instead, a wheat monoculture resulted (Figure 9). Straw used for projects on the Site now must be threshed (i.e., seed heads removed). For each of these projects, photo monitoring and qualitative assessments of the resulting revegetation effort were initiated in 1999 and continued in 2000, to evaluate the effectiveness of the revegetation efforts and to continue learning what works best for conditions at the Site. Results of the photo monitoring efforts are found in Appendix E.

As part of the ongoing vegetation management program, the sharing of information and planning strategies with other local agency weed coordinators and resource managers is important, because coordination of efforts between land owners is essential for long-term control. During 2000, the K-H Ecology Group disseminated information on weed control and vegetation management to onsite personnel, through meetings, personal communication, and Site newspaper articles. In addition, K-H ecologists attended regional weed control meetings with other agencies' weed control specialists, and the annual 2000 Colorado Weed Management Association conference, to keep up to date with the most recent knowledge and advances in weed control.

Physical and mechanical controls used at the Site in 2000 consisted of mowing, grading, and selective hand control. Mowing was done along the margins of the main east and west access roads, in addition to several miles of firebreak roads in the Buffer Zone, to prevent the roadside weeds from going to seed and spreading further, and for safety purposes as well (Figure 10). Mowing was also conducted on the xeric tallgrass prairie adjacent to a firebreak road in the northern Buffer Zone, where annual rye has begun to invade the prairie. Mowing was conducted at the time when the seed heads were starting to form. The plan is to continue to mow the annual rye annually until the seed bank is exhausted.

Grading was conducted along approximately 18 miles of firebreak roads in the Buffer Zone, to maintain these firebreak roads and to prevent roadside weeds from going to seed and spreading further (Figure 10). Additional grading efforts were conducted along a few sections of Buffer Zone road to lower the height of the rock rows on either side of the road, so that the mowing equipment can be used more effectively in these areas. One problem that was observed in late summer in these latter areas, however, was that a prolific crop of jointed goatgrass (*Aegiliops cylindrica*), an exotic grass, was now coming up. This species has become an increasing problem along the Buffer Zone firebreak road edges as the grading has spread the seeds around the roads.

Hand control in 2000 was conducted at several locations to control localized infestations of scotch thistle, annual rye, bouncing bet, and dame's rocket. Hand control consisted of hand pulling, using sickles or sling blades, and spot herbicide spraying. The use of hand control has proven valuable in preventing these small infestations from becoming larger, much more costly problems.

During 2000, a new biological control insect for Canada thistle was released at the Site. Approximately 200 adults of *Urophora carduii*, a gall-forming fly, were released at two locations in the Rock Creek drainage where other methods of controlling Canada thistle are impractical. The insects were obtained from the Colorado Department of Agriculture in an attempt to establish a reproducing population at the Site. The release sites will be observed during 2001 to see if the flies have become established and to determine the level of impact on the thistles, if any. Sixty-six biocontrol beetles (*Chrysolina quadrigemina*) for St. John's-wort (*Hypericum perforatum*) were collected on Site and re-released at an infestation near the Lindsay Ranch where very few of these beetles were present to help control it.

Also during 2000, observations were made of one of the biological control species (*Urophora quadrifasciata*) used for controlling diffuse knapweed. Most of the diffuse knapweed populations in the northern Buffer Zone had these seed-head flies on them in low numbers. Although not released on Site, it is likely that they have migrated from a biocontrol research project being conducted north of the Site, on Boulder County Open Space, and from other releases conducted by Boulder County (Owsley 2000). Their presence at the Site is a positive development, and they may help to lower the number of seeds produced per plant.

Previously, biological control insects have also been released at the Site to control musk thistle, St. John's-wort, dalmatian toadflax, and diffuse knapweed. The insects continue to generally do a good job of containing infestations of musk thistle and St. John's-wort. They have been much less effective, however, at controlling infestations of dalmatian toadflax and diffuse knapweed. All the biological control insects released at the Site have been approved by the U.S. Department of Agriculture.

Herbicide applications were used to control several hundred acres of noxious weed–infested grasslands at the Site during 2000. Figures 11 and 12 show the locations of ground and aerial applications of the herbicides Tordon 22K and Transline in 2000. Primary target species were diffuse knapweed, musk thistle, and common mullein; however, other less aggressive exotic species such as goatsbeard (*Tragopogon dubius*), curly-top gumweed (*Grindelia squarrosa*), alyssum (*Alyssum minus*), wild lettuce (*Lactuca serriola*), small-seeded false flax (*Camelina microcarpa*), and some of the tansymustards (*Descurania* ssp.) were also controlled. Approximately 75 acres were treated on the ground, while almost 1,022 acres were treated with a helicopter during 2000 (Figures 11 and 12).

The residual effect of the Tordon 22K is expected to help provide continuing control of these species for the next few years, precluding the need for annual retreatment at these locations. However, because diffuse knapweed will return to pre-treatment levels if nothing else is done, and because some spots were missed at many treatment locations, a feasibility study was conducted to evaluate using spot control to keep infestations at these locations from returning as quickly. Hand control using a backpack sprayer with Roundup was conducted at a location treated by helicopter in 1999. During a one-hour period, an area of approximately 2–3 acres was spot treated to control individual plants

coming up. Most plants treated were found growing in association with old small-mammal burrows and mounds where continuing disturbance reduces the long-term viability of the applications. Results suggest that spot control of this type on foot would be very time consuming and costly for large areas. It would be more feasible to use a truck or 4-wheel all-terrain vehicle with a mounted spray bar system to cover larger areas in shorter periods of time for spot control. Plans are being developed to initiate larger-scale spot control during 2001 to control the noxious weeds that have begun to return to previously treated areas. More information on the aerial and ground herbicide monitoring results follows below and can also be found in the technical reports in Appendix B.

A 48-acre prescribed burn was conducted in April 2000, on the xeric tallgrass prairie in the south Buffer Zone, to improve the quality of the prairie habitat. More detailed results of the prescribed burn are discussed later in this report and can also be found in Appendices B and D.

3.5.2 Weed Monitoring

3.5.2.1 Weed Mapping

The 2000 weed distribution maps for diffuse knapweed, musk thistle, and common mullein are shown in Figures 13 through 15, respectively. Six additional species—annual rye, Russian knapweed, Scotch thistle, dame's rocket, bouncing bet, and jointed goatgrass—were mapped in 2000 because of their aggressive nature and their recent appearance at various locations on the Site. The distributions of these species are shown in Figures 16 and 17. After being entered into the Site Geographic Information System (GIS), the overall extent of these species across the Site was estimated by species and by infestation level. Table 8 contains the estimated total acreage and acreage-by-density category for each of the listed species, based on the 2000 maps. The species with the greatest extent on the 6,485-acre Site (K-H 1997c) were diffuse knapweed (2,223 acres), common mullein (1,010 acres), and musk thistle (792 acres). The total acreages for annual rye, Russian knapweed, Scotch thistle, dame's rocket, bouncing bet, and jointed goatgrass are also shown in Table 8. It should be noted that all these acreages are approximate and should not be interpreted as exact areas. These values also represent only known locations of these species. It is possible that unmapped infestations are present as well.

Table 9 shows the annual total infested acreages for diffuse knapweed, musk thistle, and common mullein from 1997 to 2000. Most of the large increases in infestation acreages from 1997 to 1998 were a result of the time of year in which mapping was conducted. Mapping in 1997 was conducted in August for each of the species. Beginning in 1998, weed mapping was conducted for each species when that species was in flower and/or most visible. Therefore, the higher visibility of the species at the time of mapping allowed more accurate estimates of their infestation levels in 1998, 1999, and 2000, and thus the resulting higher acreages mapped.

Since 1998, the total Site acreage infested by diffuse knapweed and musk thistle has decreased, largely due to the aerial herbicide applications conducted in May 1999 and May 2000. Diffuse knapweed acreage across the Site has decreased by almost 700 acres during this time, and musk thistle has decreased by almost 900 acres. Common mullein distribution has not been affected as much by the herbicide applications, however—from 1999 to 2000, a decrease of approximately 58 acres was observed.

The effectiveness of the herbicide applications has been monitored largely through the use of the GIS. Analyses using the GIS have proven useful not only for determining the effectiveness of the control efforts, but also for showing problems with the application techniques and helping improve the weed control efforts at the Site. Figures 18 through 20 show the locations of the aerial herbicide application in 1999, and the pre- and post-treatment diffuse knapweed densities at these locations in 1998, 1999, and 2000, respectively.

Approximately 1,500 acres were treated by helicopter with Tordon 22K in 1999. In 2000, approximately 1,022 acres were treated aerially with Tordon 22K and Transline. Figures 21 and 22 show the locations of the 2000 aerial herbicide application and the pre- and post-treatment diffuse knapweed densities from 1999 and 2000, respectively. The maps illustrate the dramatic reduction in the amount of diffuse knapweed in response to the spraying. As reported in the 1999 annual vegetation report, the total amount of diffuse knapweed was reduced by 683 acres, from 878 acres in 1998 to 195 acres at the locations treated in 1999 (Table 10). This represented a 78 percent reduction in the total number of diffuse knapweed–infested acres in the areas that were sprayed in 1999. Figure 23 shows graphically how the diffuse knapweed has been affected in the 1999 spray areas. At the 2000 spray locations, an 80 percent decline in the total number of diffuse knapweed–infested acres was observed (Table 11; Figure 24). In practical terms, this means that essentially no adult diffuse knapweed plants were observed at these locations.

The elimination of adult plants from these areas meant that no new seed was added to the seed bank and no plants were available to blow away from these infestations, further infesting other areas. The 2000 mapping effort, however, revealed that diffuse knapweed has begun to return to several of the areas treated in May 1999 (Figure 20). Figure 23 shows that the lower density categories had the greatest increases in diffuse knapweed density in 2000. Although Tordon 22K is known to typically have a 3- to 4-year residual impact on diffuse knapweed, several reasons might explain the shortened control period in the treated areas.

Control at the Site has typically been best on the flat areas on top of the pediment, where the herbicide was applied most evenly. However, variations exist in the evenness of the herbicide application, even from the air, and missed flight lines and continued disturbances (largely from burrowing mammals) remain problematic (Figure 20). Without spot control to continually treat the missed or disturbed areas within the larger treated areas, diffuse knapweed begins to return almost immediately. Observations of

some of the treated burrow mounds have shown that, a year after treatment, they can support a solid stand of diffuse knapweed again. Additionally, missed flight lines that were not observed during the first year after treatment have appeared during the second year, continuing to decrease the overall effectiveness of the treatment (Figure 25).

Control on the hillsides is less consistent than on the flat areas, and overall diffuse knapweed densities have been reduced by lesser amounts at these locations. It is unknown why control has been less effective on the hillsides. Perhaps the steepness of the hillsides forces the helicopter to fly slightly higher, thus reducing the amount of herbicide that reaches the ground surface. Possibly, using a larger droplet size during applications on the hillsides might improve the effectiveness there.

Overall, the aerial application of Tordon 22K for control of diffuse knapweed and other noxious weed species has been beneficial and generally improved the quality and appearance of the Site's grasslands. The initial response has been increased vigor, health, and flowering of the grasses, reduced abundance of diffuse knapweed and other weeds, and an initial decline in the abundance of some native forbs. Other studies on the grasslands at the Site have shown that the native forb component returns to the level found in untreated areas after approximately 3 years. (For more specific information on the longer-term effects of Tordon 22K on the grasslands at the Site, from both aerial and ground-based applications, see the following sections below, the Technical Reports in Appendix B of this report, and past annual vegetation reports for the Site [K-H 1998, 1999, 2000]).

3.5.2.2 Aerial Herbicide Application Monitoring

Monitoring continued in 2000 at the plots that were used to evaluate the 1999 aerial herbicide application and its effects on diffuse knapweed density and frequency. A total of 30 control and 30 treatment plots were set out at three locations in the Buffer Zone prior to the aerial herbicide application in May 1999 (Figure 26). Monitoring of diffuse knapweed density and frequency was conducted pre- and post-treatment. Results in 2000 continued to show excellent control of the diffuse knapweed at these locations. Initial cover amounts for diffuse knapweed (seedlings and rosettes) at the control and treatment plots prior to aerial herbicide application were not statistically different, averaging approximately 7 and 9 percent, respectively (Figure 27). However, approximately 3 months after the herbicide application, diffuse knapweed cover amounts (seedlings, rosettes, and adults) were statistically different between the late summer control and treatment plots, averaging 25 and less than 1 percent, respectively (Figure 27). In 2000, diffuse knapweed cover in the treatment plots remained significantly lower than in the control plots in both the spring and summer (Figure 27). Diffuse knapweed frequency in the control plots has decreased only slightly over time and was not significantly different (Figure 28). In the treatment plots, however, the frequency of diffuse knapweed dropped substantially, from 83 percent before treatment to 10 percent, where it remains 1½ years after treatment (Figure 28). One of the control quadrats, photographed the year following the herbicide application, is shown in Figure 29. Figures 30 and 31 show the diffuse knapweed infestation in the area at the AS-2 plot before and after herbicide application.

Drift-card results from the 2000 aerial herbicide application showed that no substantial herbicide drift was observed in any sensitive habitats adjacent to the spray areas. These results continue to underscore the value of the large-scale herbicide applications for controlling the diffuse knapweed at the Site. While the use of chemical controls has dramatically improved the quality of the grasslands at the Site, in the long term, integration with other weed control techniques is ultimately the goal. Further information on the aerial herbicide monitoring results is contained in the technical reports found in Appendix B.

3.5.2.3 Ground Herbicide Application Monitoring on Diffuse Knapweed and Native Plant Species

The use of herbicides for weed control, while usually effective on the target species, also typically affects other species as well. Because of the importance of the xeric tallgrass prairie at the Site, the effect of the herbicide Tordon 22K on the noxious diffuse knapweed, as well as on native species that occur on the xeric tallgrass prairie, was examined to provide important information for weed control and resource management activities at the Site. The study was initiated in 1997 and used both a control plot (unsprayed) and a treatment plot (sprayed), each with five 50-m transects (Figure 32). The variables measured included species richness, cover, frequency, and diffuse knapweed density. The treatment plot was sprayed with Tordon 22K (application rate: 1 pint/acre) in June 1997. Monitoring was conducted pre-treatment in 1997 and post-treatment during each year since then.

In 1997 and 1998, after the herbicide application, a number of measured plant-community variables showed declines as a result of the herbicide application. In addition to diffuse knapweed, forbs in general were affected. Overall forb cover decreased considerably, and species richness, cactus density, and species diversity all declined initially (K-H 1998, 1999). Data from the 1999 and 2000 field seasons, however, have shown the expected reversal of many of these initial responses (K-H 2000).

Although overall species richness in the treatment plot declined by 12 species immediately after the herbicide application in 1997, overall species richness had essentially returned to pretreatment levels by 1999 (only one species less than the original number; Figure 33). Currently, species richness is higher in the treatment plot than in the control plot. The declines observed in both the control and treatment plots in 2000, relative to 1999, are best explained by the very dry winter and summer in 2000. A Sorensen coefficient of similarity index (an index used to evaluate species similarity between locations), was used to evaluate the species composition similarity within the control and treatment plots from spring 1997 to summer 2000. Index values of 0.82 for the control plot and 0.86 for the treatment plot suggest a very high similarity in species richness between pre- and post-treatment for both plots. Additional comparisons of similarity between the control plot and the treatment plot, for spring 1997 and summer 2000, showed essentially no difference either, thus indicating that no long-term loss of species occurred as a result of the herbicide application. Examination of the species lists

through time (from 1997 through 2000) for both the control and treatment plots (Tables 12 and 13), shows little difference in the overall species richness of either plot. The data show numerous species in both plots that appear and disappear during different years. For those few species, in either plot, that were present to begin with but disappeared during the course of the study, examination of the cover and frequency data showed that these species occurred in very small amounts to begin with. Thus, it is not really possible to attribute their disappearance to the herbicide or any other factor, but rather, it is most likely just part of the natural variation on the grassland.

Species diversity (a measure combining species richness and abundance; Shannon-Weaver) declined immediately after the herbicide application in the treatment plot, reaching its lowest level in summer 1998, when it was significantly different from the control plot (Figure 34). However, in 1999, species diversity in the treatment plot was no longer significantly different from the control plot. Continued gains in spring 2000 were reversed, however, in summer 2000. The loss of species diversity is largely attributable to the loss of forb cover; both measures showed parallel responses (Figure 35). It is interesting that the control plot showed no loss in either species diversity or forb cover as a result of the drought in summer 2000 (Figures 34 and 35)—in fact, both measures increased. This suggests that the loss shown in the treatment plot is either a response to the combined stresses from the drought and the herbicide, or perhaps increased competition from the graminoids. Continued monitoring will reveal whether species diversity on the xeric tallgrass prairie at the Site returns to pre-treatment levels next year.

The effect on diffuse knapweed, the primary target species of the herbicide application, has been dramatic. The herbicide application reduced and continues to control the diffuse knapweed in the treatment plot, where diffuse knapweed densities remain far below their original values (Figure 36). Diffuse knapweed cover also remains at less than 2 percent of the total relative foliar cover (Table 14). In the control plot, however, diffuse knapweed densities have fluctuated widely on a seasonal and annual basis, and continue to increase from pre-treatment levels (Figure 36).

The effective control of diffuse knapweed observed in the treatment plot is critical, because the longer the control continues, the fewer adult plants there are to produce additional seeds and blow across the landscape spreading the seeds. Thus, the control of diffuse knapweed documented from 1997 through 2000 in the treatment plot has reduced and continues to control diffuse knapweed seed production in the area. This has substantially reduced the chances for spread of the species from this area. Both of these criteria are important for controlling diffuse knapweed. Another important consideration, however, is that with time, diffuse knapweed density will begin to increase again in the treatment plot as a result of the seed bank that remains, and from immigration of new seed from offsite sources (e.g., grasslands and mining areas to the west). If no further control measures are taken, the densities will again reach, and could potentially exceed, pre-treatment levels in a few years. In fact, although diffuse knapweed densities continue to be controlled to low levels, frequency data for diffuse knapweed in the treatment plot showed that, after bottoming out at 20 percent in 1998, diffuse knapweed frequency

increased to 44 percent in 1999, and to 48 percent in 2000 (Table 15). Clearly, diffuse knapweed is slowly returning to the area.

It is also important to recognize that these data are from a small area of the grassland. Therefore, monitoring should be done at various scales to better evaluate the overall effectiveness of the herbicide application. In the larger area surrounding the treatment plot, which received the same herbicide application, weed mapping results have begun to show an increase and return of diffuse knapweed to the larger area. Thus, although the herbicide application in the treatment plot continues to control the diffuse knapweed, long-term integrated weed control using multiple methods is necessary for sustainable control of this species. Additionally, spot control of missed areas or small locations where infestations have begun to return would help extend the length of effective control across the larger area. The use of spot control methods becomes especially important because of the potential long-term impacts to the native plants in the community in response to repeated large-scale, long-term herbicide applications. Cooperative weed control in conjunction with surrounding landowners would help address the issue of seed being transported onto the Site. More details on the weed mapping that has been done at the Site during the same time frame as this study are available elsewhere in this and earlier versions of the Annual Vegetation Report for the Site (K-H 1998, 1999, 2000).

The response of the non-target species on the xeric tallgrass prairie varied but fell within generally expected parameters. Total absolute (actual) cover on the xeric tallgrass prairie was not substantially affected by the herbicide treatment—changes in the treatment plot generally paralleled changes in the control plot (Figure 37). This is important because it demonstrates that no large, barren, unvegetated areas were created on the prairie as a result of the herbicide application. Instead, other species (graminoids) expanded, moving in and filling in the canopy to replace the species that were reduced by the spraying.

The forb, or non-grass, component of the prairie, both non-native and native, was affected by the herbicide treatment. This was not unexpected, because the herbicide Tordon 22K, though considered a selective herbicide, affects a number of plant families. Two growing seasons after the herbicide application, however, total relative forb cover in the treatment plot was no longer significantly different from the control plot (Figure 35). The significant loss of forb cover observed in the treatment plot during the summer of 2000 may have resulted from either the combined stress from the drought and the herbicide application or increased competition from the graminoids.

Although native relative forb cover was equal in the control and treatment plots prior to the herbicide application, after treatment, the native relative forb cover dropped significantly in the treatment plot (Figure 38). However, by 1999, native relative forb cover was no longer significantly different from the control plot, and it remained that way through spring 2000. Examination of the non-native relative forb cover showed that by spring 2000, the difference in total forb cover between the control and treatment plots was due to the higher non-native forb cover in the control plot. The non-native forb cover in the treatment plot was still being controlled by the herbicide treatment and was significantly below that found in the control plot. The loss of native forb cover in the

treatment plot during the late summer of 2000 is likely explained by the reasons mentioned above.

The information on the forbs is important because it is not desirable to re-treat the area with a broadleaf herbicide if the native forb component of the community has not returned to its former level of abundance. Repeated broadcast applications of herbicide without allowing appropriate time for the native forbs to rebound could potentially stress them to the point of elimination from the grassland—an undesirable result. In a situation where the native species have not completely returned to pre-treatment levels, a broadcast application of a more species-specific herbicide—such as Transline, which controls diffuse knapweed very effectively, with less impact on other species—might be useful as a follow-up. This would continue to give the native species a chance to return. Drawbacks to Transline, however, are its higher cost and its lack of a multi-year residual effect. Therefore, more frequent retreatment would be required to maintain effective control.

The loss of forb cover in the treatment plot did not cause a loss of overall foliar cover—as mentioned above, the total foliar cover in the treatment plot paralleled the response in the control plot. The loss of relative forb cover was offset by an increase in relative graminoid cover in response to reduced competition from forb species (Figure 39). The increase in relative graminoid cover in the treatment plot began after the herbicide application, and it continues four growing seasons after the herbicide treatment.

One of the most affected non-target species groups was cacti. The density of the twistspine prickly pear cactus has been reduced by about 87 percent, and hedgehog cactus by over 50 percent, since the herbicide application in 1997 (Figures 40 and 41). Most of the cacti turned yellow after the herbicide application and later died. Continued monitoring will document whether the cacti begin to return to the treatment plot, but any return will be gradual because cacti grow slowly.

Data from the Site are consistent with data from other studies that have shown an initial decline in species diversity, loss of forb and weed cover, and increase in graminoid vigor and cover after spraying with Tordon 22K. Rice and Toney (1996) reported decreases in forb cover due to herbicide treatments on native prairie in Montana. They reported that these responses were transitory, however, and that forb values returned to pre-treatment levels after about three years. Rice et al. (1997) found that species diversity also declined after spraying with Tordon 22K, but recovered after 2–3 years. Both of these studies also indicated that, as a result of lost weed and other forb cover (i.e., reduced competition), the graminoid component of the community responded vigorously. In the Lolo National Forest in Montana, Henry (1998) reported that, two years after spraying with Tordon 22K, a mountain grassland community had a 95 percent reduction in weed biomass and an 86 percent decrease in forb biomass. Associated with this was a 714 percent increase in grass biomass.

In general, the use of Tordon 22K on the xeric tallgrass prairie at the Site has proven beneficial, with little long-term impact to species richness and diversity, or loss of native

forb cover. Continued monitoring will document the recovery of the xeric tallgrass prairie under the conditions present at the Site. This information will be useful for developing improved weed-control strategies and provide for better long-term management of the Site's grassland communities. More detailed information on these monitoring results is available in Appendix B.

3.5.3 Prescribed Burn Monitoring

Monitoring was conducted on the xeric tallgrass prairie at the Site during the summers of 1999 and 2000 to collect pre- and post-burn vegetation data at locations where a 48-acre prescribed burn was conducted in April 2000 (Figure 42). Data were collected from ten 50-m transects in the control (unburned) area, and ten in the treatment (burned) area, for comparison. All control and treatment monitoring areas were treated with the herbicide Tordon 22K, applied by helicopter, in May 1999.

Analysis of the data shows that species richness was not affected by the fire. Both control and treatment plots increased by six species from 1999 to 2000 (Table 16). Species diversity increased only slightly as a result of the burn—from 0.931 in 1999 to 0.963 in 2000. Cactus densities declined, but similar declines were observed in both the control and treatment areas; therefore, these declines are best explained as a response to the herbicide application, rather than to the prescribed burn (Table 17). Similar losses of cactus density have been observed at other monitoring locations for herbicide effects where no prescribed fire has been used (see other sections of this annual report or K-H 1999, 2000).

One of the objectives of the prescribed burn was to reduce the amount of dead plant litter on the prairie, thereby reducing the potential for a wildfire and also recycling nutrients back to the plants. Ground cover data showed that surface litter decreased significantly, by approximately 7 percent, with a corresponding increase in rock and bare ground cover. Although a 7 percent reduction in litter cover at the ground surface doesn't sound significant, it must be remembered that this value was determined using a point-intercept method of measuring cover, and thus records only what is present at the ground surface. This method does not measure the actual amount or depth of the litter present. The biomass data, on the other hand, showed that overall biomass was reduced by 77 percent (from 4,152 lbs/acre to 963 lbs/acre) in the burned areas, so it is clear that the fuel available for a wildfire was reduced (Figure 43). The fact that the cover of litter at the ground surface was not completely removed is actually beneficial, because it means there was still some cover protecting the ground surface from wind and/or water erosion. For these reasons, the fire accomplished what it was designed to do. The amount of biomass available as fuel on the grassland was reduced, but the ground surface itself remained protected from wind and water erosion as the vegetation returned throughout the summer. Additionally, the fire recycled nutrients that were tied up in the dead plant litter and stimulated the growth of the perennial grass species.

By the end of the growing season, total foliar cover on the grassland was essentially unchanged by the fire. Total foliar cover was approximately 2.5 percent less in 2000 than

in 1999, in both the control and treatment plots (Tables 18 and 19). Forb cover increased only slightly in the treatment area, compared to the control (Tables 18 and 19). In general, however, forb cover was depressed in both the control and treatment plots, most likely as a result of the herbicide application from 1999 and/or the low precipitation received during the spring and early summer of 2000.

Overall graminoid cover also remained essentially unchanged as a result of the fire (Tables 18 and 19). However, the ratio of cool-season to warm-season graminoids was changed as a result of the burn. One of the goals of the prescribed burn was to increase the dominance of the warm-season graminoid species, especially those that are the characteristic species of the xeric tallgrass prairie. This was done by timing the fire so that it would have the greatest detrimental effect on the cool-season species. In the unburned control plot, neither cool-season nor warm-season graminoid cover changed significantly from 1999 to 2000 (Table 18, Figure 44). In the treatment plot, however, cool-season cover was reduced significantly after the fire, and warm-season graminoid cover increased significantly (Table 19, Figure 44). The prescribed burn shifted the species composition of the treatment plots from a cool-season-dominated community to a warm-season-dominated community. The warm-season species that showed increases in the treatment areas included big bluestem, little bluestem, blue grama, and side-oats grama (Table 19). Big bluestem and little bluestem showed declines in cover at the unburned control locations (Table 18). The cool-season graminoids that showed decreases in the treatment plot were Canada bluegrass, Kentucky bluegrass (*Poa pratensis*), and sun sedge (Table 19). The data show that the prescribed burn helped push the species composition in the direction of one of the management goals. Continued prescribed burns in the same area every few years would help continue to promote the dominance of the warm-season species.

One dominant warm-season species that did not increase as a result of the fire was mountain muhly, a montane warm-season species (Tables 18 and 19). Why this is the case is unknown. It actually showed a slight increase in the control plots, but a slight decline in the treatment plots. Perhaps the timing of the fire was not appropriate for this species, or some other factor(s) affected its response. Studies from ponderosa pine forests in Arizona have shown that mountain muhly generally decreases in density after a fire, but fully recovers after approximately three years (FEIS 2001). It would be useful to gather further information on the response of mountain muhly to fire under the prairie conditions here at the Site, because this species forms a dominant and unique part of the xeric tallgrass prairie species composition on the Rocky Flats Alluvium—a species composition that is not found elsewhere along the Front Range (Buckner 2000).

In general, the warm-season graminoids responded to the burn as anticipated, although the dry spring and early summer caused the height and overall flowering response to be somewhat less than optimum. Had normal precipitation occurred, it is likely that a greater response of the warm-season graminoids would have been seen, because many species began to wither and go dormant in late July and August (Figures 45 and 46). The response of the dominant warm-season species frequency in the treatment area generally paralleled that of the cover data (Table 20). Big bluestem frequency remained

unchanged, while little bluestem, blue grama, hairy grama, and side-oats grama increased. Mountain muhly frequency decreased in the burn area, while increasing in the control area.

With respect to the noxious weed diffuse knapweed, both the control and treatment areas showed no significant changes (Tables 18, 19, and 20). The slight increases in the cover and frequency of diffuse knapweed were not statistically significant in either the control or treatment plots, suggesting that the fire did not affect diffuse knapweed abundance. The significant loss of twistspine cactus density shown in both the control and treatment plots is best explained by the herbicide application at all the monitoring locations in spring 1999. Results from studies elsewhere at the Site have shown a similar decline in response to the herbicide alone.

Direct comparisons to studies conducted elsewhere on the response of the tallgrass prairie to fire are difficult to make because of differences in location, soil types, precipitation amounts, community composition, variation in conditions before and after burning, fire frequency, and monitoring methods. No other comparable data were available on the response of the xeric tallgrass prairie to fire. However, an attempt was made to compare the Site data to responses of the mesic tallgrass prairie to fire that have been recorded elsewhere around the country (Collins and Wallace 1990).

With respect to species richness, Collins and Gibson (1990) state that there "appears to be no clear relationship between fire and species richness during the year in which the fire occurred." They report results from several studies, some showing increases in species richness and others showing decreases in response to fire. Data from the Site burn showed no difference in species richness in the burned area compared to the unburned locations.

Collins and Gibson (1990) also report that most studies show a loss of species diversity after a fire because of an increase in dominance by the matrix species (i.e., species occupying the greatest amount of space in a community). Data from the Site showed a slight increase in species diversity in response to the burn. This response may have been confounded, however, by the herbicide application in the year before the fire. It is also well documented that a spring fire enhances the productivity and vigor of warm-season graminoids, while reducing that of the cool-season species (Ewing and Engle 1988; Collins and Wallace 1990). The increase in warm-season graminoid cover and reduction in cool-season graminoid cover from the Site burn substantiate this occurrence on the xeric tallgrass prairie in Colorado as well. Qualitative observations also concurred with the literature that there appeared to be an increase in flowering of many of the warm-season species within the burn area compared to those outside the burn area (Svejcar 1990).

The results of the spring 2000 prescribed burn on the xeric tallgrass prairie demonstrate the utility of fire as a tool for effective management and restoration of the prairie ecosystems at the Site. Continued monitoring of these transects will provide a better understanding of the longer-term implications for fire on the xeric tallgrass prairie at the

Site. With clearly stated objectives, the use of prescribed burns, integrated with other resource management techniques, can help maintain the viability and sustainability of the prairie ecosystems at the Site.

3.5.4 Photographic Monitoring

Photographic monitoring at selected permanent photo-point locations continued to show good control of diffuse knapweed at those locations where herbicide applications have been made over the past few years. These and other photo monitoring results are presented in Appendix E.

4. Conclusions

Vegetation monitoring in 2000 continued to document the generally high quality of the native plant communities at the Site. The Site continues to provide a haven for many increasingly rare plant communities that are disappearing rapidly from the Front Range of Colorado. The results, however, also continue to underscore the issues that threaten the quality and long-term sustainability of the Site's ecological resources. These threats come primarily from noxious weeds, human disturbances, and plant litter build up. Active resource management being practiced at the Site has helped alleviate some of these threats. Aerial and ground herbicide applications have dramatically reduced the amount of diffuse knapweed and other weeds on the prairie, enhanced the vigor and health of many native graminoid species, and improved the aesthetic appearance of the grasslands. Integration of the chemical controls with administrative, cultural, mechanical, and biocontrol weed control methods has continued to work to control and prevent introduction of other noxious weed infestations. A prescribed burn on the xeric tallgrass prairie in April 2000 demonstrated the usefulness of fire as a prairie management and restoration tool at the Site. The response of the grassland in the burn area has been positive, and the use of prescribed burns should be pursued in the future for management of the ecological resources at the Site.

Although recent herbicide applications have successfully controlled diffuse knapweed in the treated areas, with minimal impact on other prairie species, long-term noxious weed control and management of the plant communities at the Site requires the integration of multiple management techniques. Sole reliance on herbicide applications for resource management is not wise. Integration of current weed control methods with prescribed burns, increased use of available biocontrol agents, and potentially carefully controlled grazing, would increase the options available to help enhance the quality and vigor of the native plant communities. This would further enhance conditions for the native species, thus allowing them to better compete with the noxious weed species that threaten the sustainability of these communities. Without an integrated approach, diffuse knapweed levels will return to pre-treatment levels every few years, requiring ongoing, continual herbicide applications. Long-term reliance on herbicides is not a practical solution, because repeated applications are likely to be detrimental to many of the native prairie species, and to be prohibitively expensive. Additionally, coordinated efforts with offsite agencies and property owners, as well as onsite projects, are needed to prevent the constant reintroduction of noxious weed seed into treated areas from offsite sources.

Despite these concerns, however, the data from 2000 continue to indicate that beneath the sometimes visually dominant weedy appearance, the native plant communities are still present and viable. The Site represents some of the last remaining strongholds for many of the increasingly rare plant communities that were once more common along the base of the Front Range. Monitoring results indicate that management actions are having their

desired effects. Continued proactive integrated management of these native communities should provide a lasting legacy for future generations.

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6. Glossary

Annual – A plant that lives its entire life cycle during the course of a single growing season.

Biocontrol – A method of weed control that uses insects or fungi to stress, damage, or destroy the plant tissue of undesirable species.

Biodiversity – The existence of a wide range of different types of organisms in a given place at a given time.

Biomass – A measure of the productivity of a community, usually measured by clipping the vegetation and obtaining the dry weight of the vegetation; expressed per unit area (grams/square meter).

Control – The plot, quadrat, transect, site, or location, that receives no treatment or management action (e.g., weed control, prescribed burning, mowing). It serves as an unaffected plot that can be compared to the treatment plot to evaluate whether or not the treatment had any impact.

Cool-season graminoids – Grasses that green up early in the growing season (March–May) and produce mature fruits by late June or early July.

Cover – Vegetation cover is a measure of abundance for individual plant species in a specified area. The cover of different species can be grouped and summed to provide the cover for that grouping of species (e.g., graminoid cover or forb cover).

Density – A measure of the number of individuals per unit area.

Diversity – A measure of the number of species present and their relative abundance in a community.

Dominant plant species – One or more species that occur in the greatest abundance (usually based on cover or biomass) in a given plant community.

Ecotonal – An ecotone is the boundary area between two different plant communities.

Forbs – Herbaceous, broad-leaved, non-woody plant species.

GIS – Geographic information system

GPS – Global positioning system

Graminoids – Grasses, sedges, or rushes.

Litter – Dead plant matter that has accumulated on the surface of the ground.

Management units – Arbitrary divisions of the different plant communities at the Site used to facilitate vegetation sampling. Roads, fence lines, and streams were often used as boundaries.

Mesic – Referring to conditions of moderate moisture or water availability.

Perennial – A plant whose lifecycle spans multiple years.

Prescribed burn or fire – A planned, controlled fire, intentionally set to burn off the vegetation to meet a set of management objectives.

Relict – Persistent remnants of a pre-existing, once more widespread flora or fauna that now exist in more restricted or isolated areas.

Riparian – On or pertaining to the banks of a stream (e.g., riparian vegetation or riparian woodland).

Species richness – The complete list and number of species found in a given area.

Species richness similarity – A mathematical coefficient that quantifies how similar or dissimilar the species composition of two communities is. A common coefficient is the Sorensen coefficient of similarity index, which compares species lists between two areas by taking into account the total number of species present in each community and the number in common between them.

Target species – Species specifically chosen for weed control (e.g., diffuse knapweed or musk thistle).

Treatment – The plot, quadrat, transect, site, or location, that receives a specific management action (e.g., weed control, prescribed burn, mowing).

Vascular plants – Plants that have xylem and phloem (i.e., conductive tissue) for internal movement of water, minerals, and nutrients. This excludes plants such as mosses, liverworts, and hornworts that have no such tissues.

Warm-season graminoids – Grasses that green up later in the growing season (late May–June) and don't produce mature fruits until September.

Xeric – Dry or characterized by scant moisture; tolerating or adapted to arid conditions.

Figures

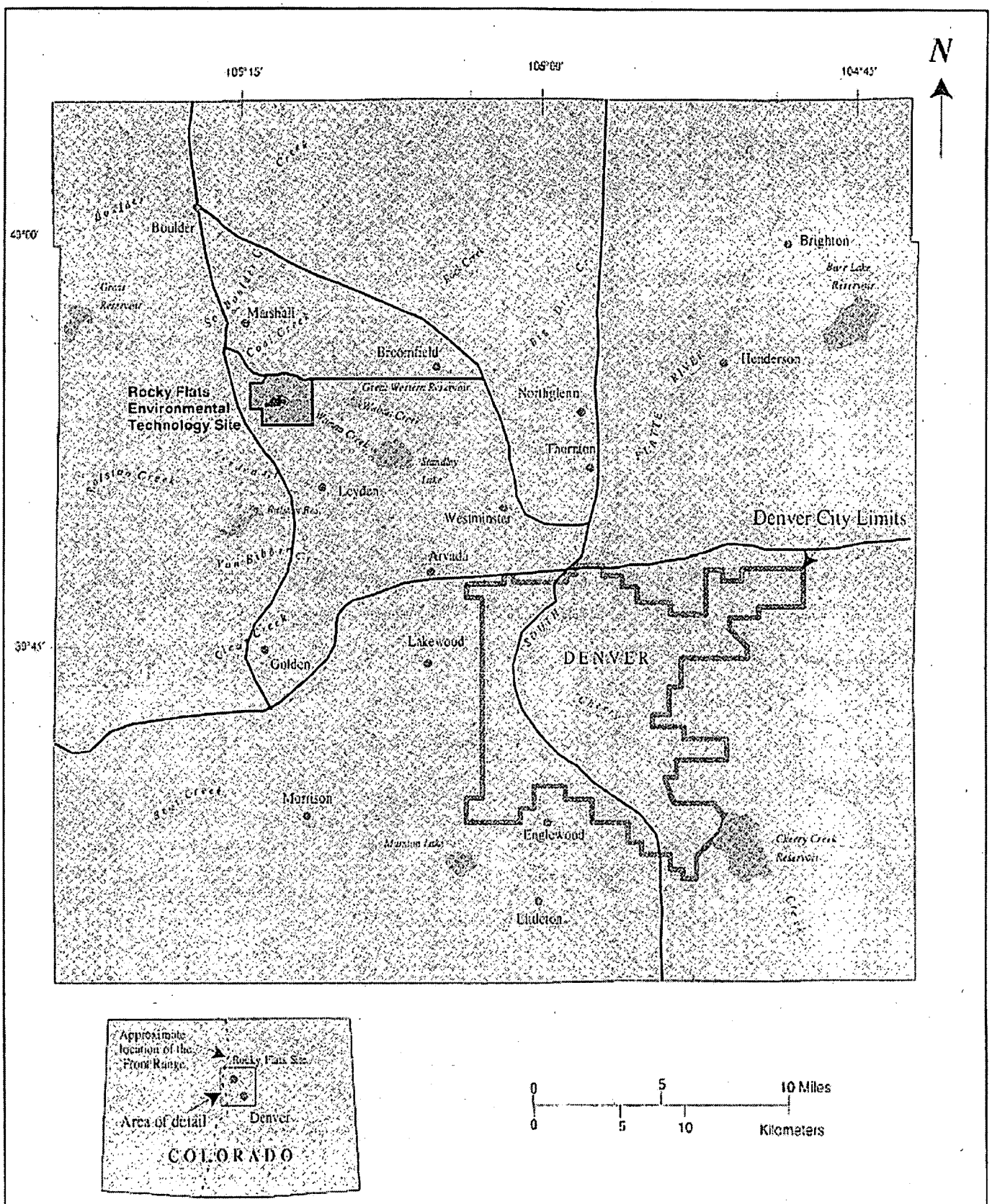
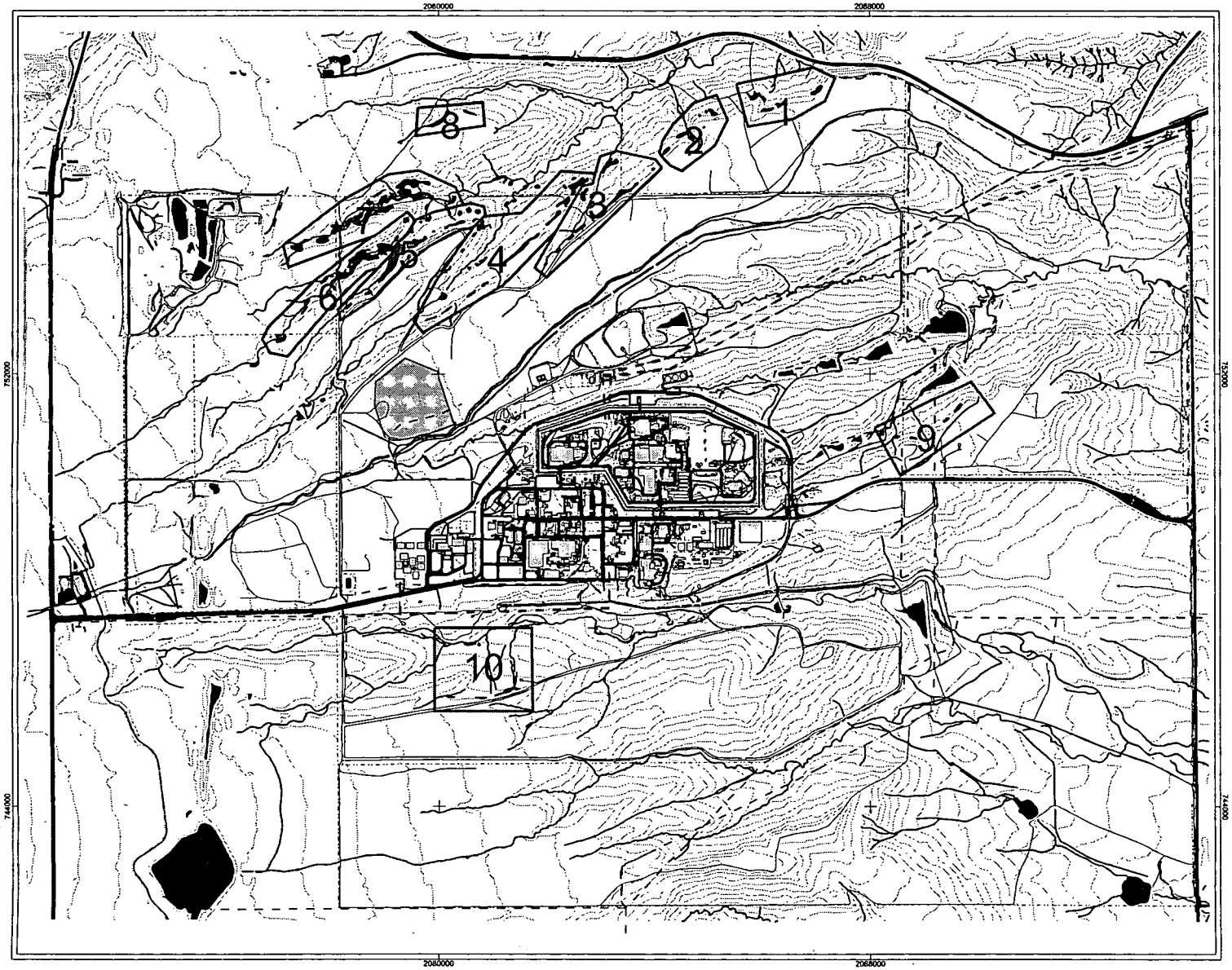


Figure 1

LOCATION OF THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE



Tall Upland Shrubland Management Units

Figure 2

LEGEND

- Management Unit Boundary w/Number
- Tall Upland Shrubland

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Management unit and tall upland shrubland data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent™

For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2K-0158

May 3, 2001

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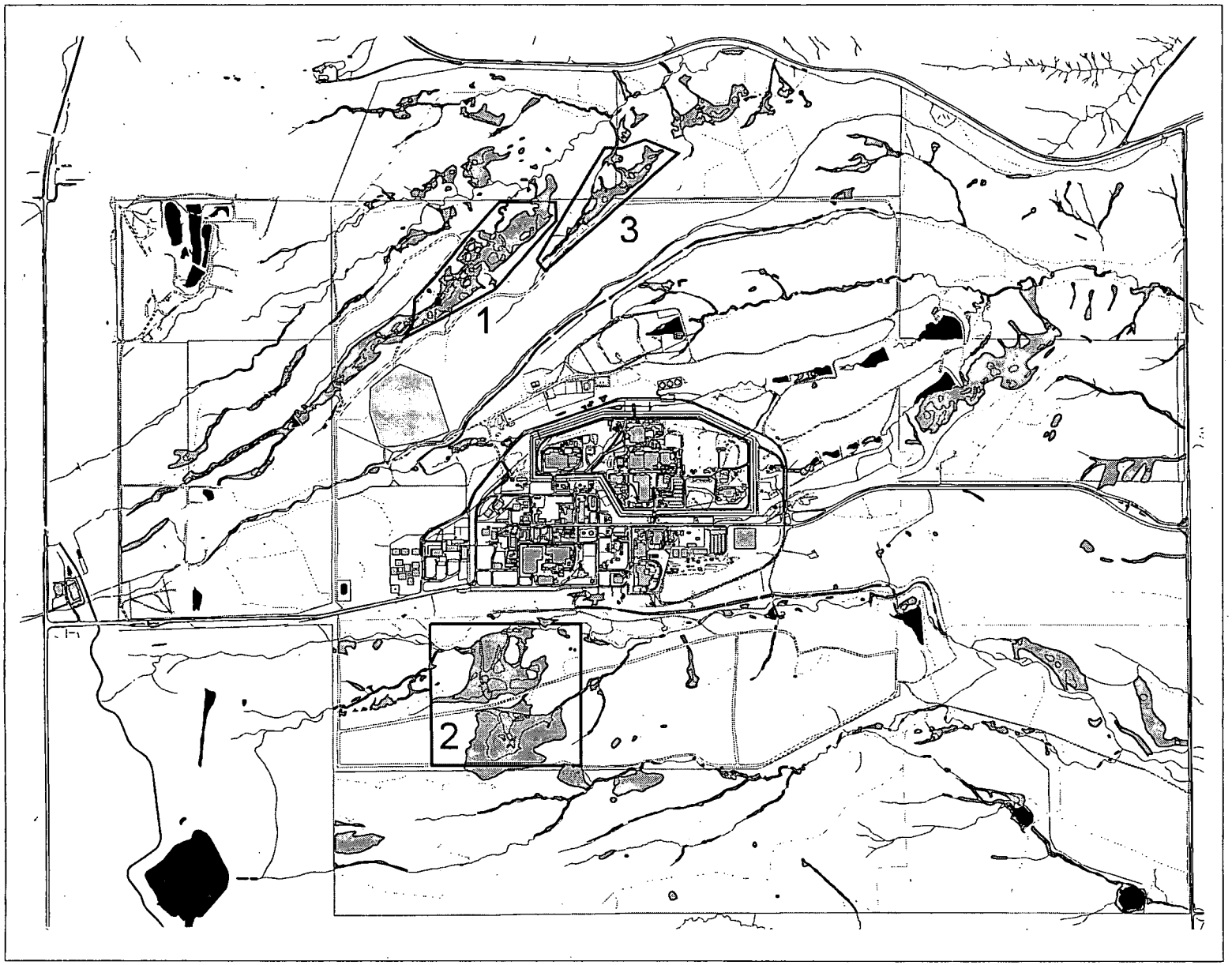

Wetland Management Units

Figure 3

MAP LEGEND

- Wetlands (Combined Wet Meadow/Marsh, Short Marsh, and Tall Marsh Habitat Types)
- Wetland Management Units

Standard Map Features

- New Landfill
- Buildings
- Lakes & Ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads

DATA SOURCE:
Management Unit and wetland boundaries provided by Exponent.
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G R&L, Las Vegas.
Digitized from the orthophotographs, 1/85
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours.
The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution.
The DEM post-processing performed by MK, Winter 1997.

Note:
These locations approximate the boundaries of the Management Units. The boundaries are not exact and should not be treated as such.

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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent

For: Kaiser-Hill Company, LLC

MAP ID: 2k-0158

March 14, 2000

\\Kaiser-Hill\GIS\EIS-O-projects\projects\2k-0158\management units spx\Wetland Management Unit view

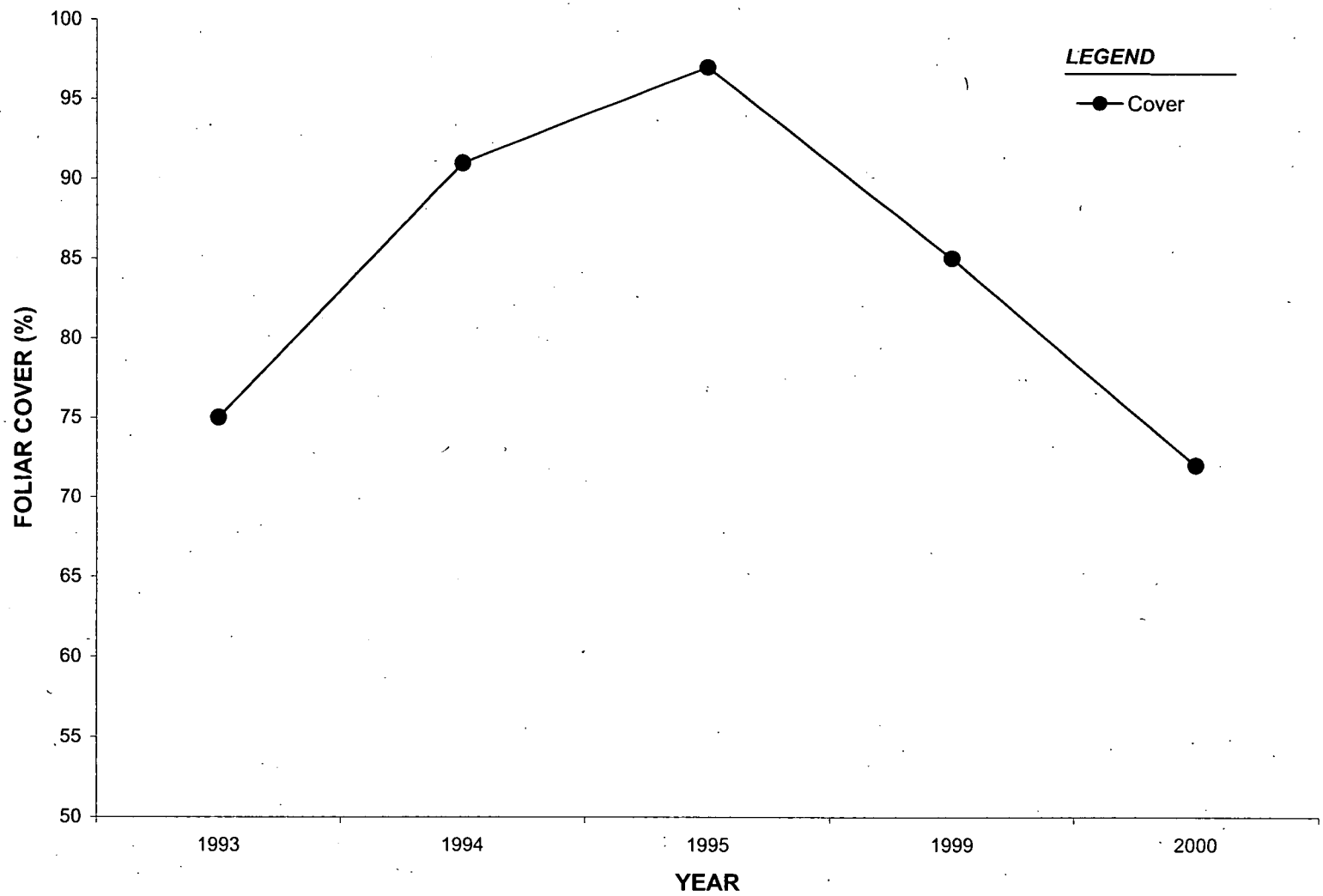

Figure 4. Mesic mixed grassland total foliar cover.

\\Boulder1\Groups\Graphics\1454\2001\mesic final tables for report.xls Fig. 2 Foliar Cover figure 5/3/01 CO

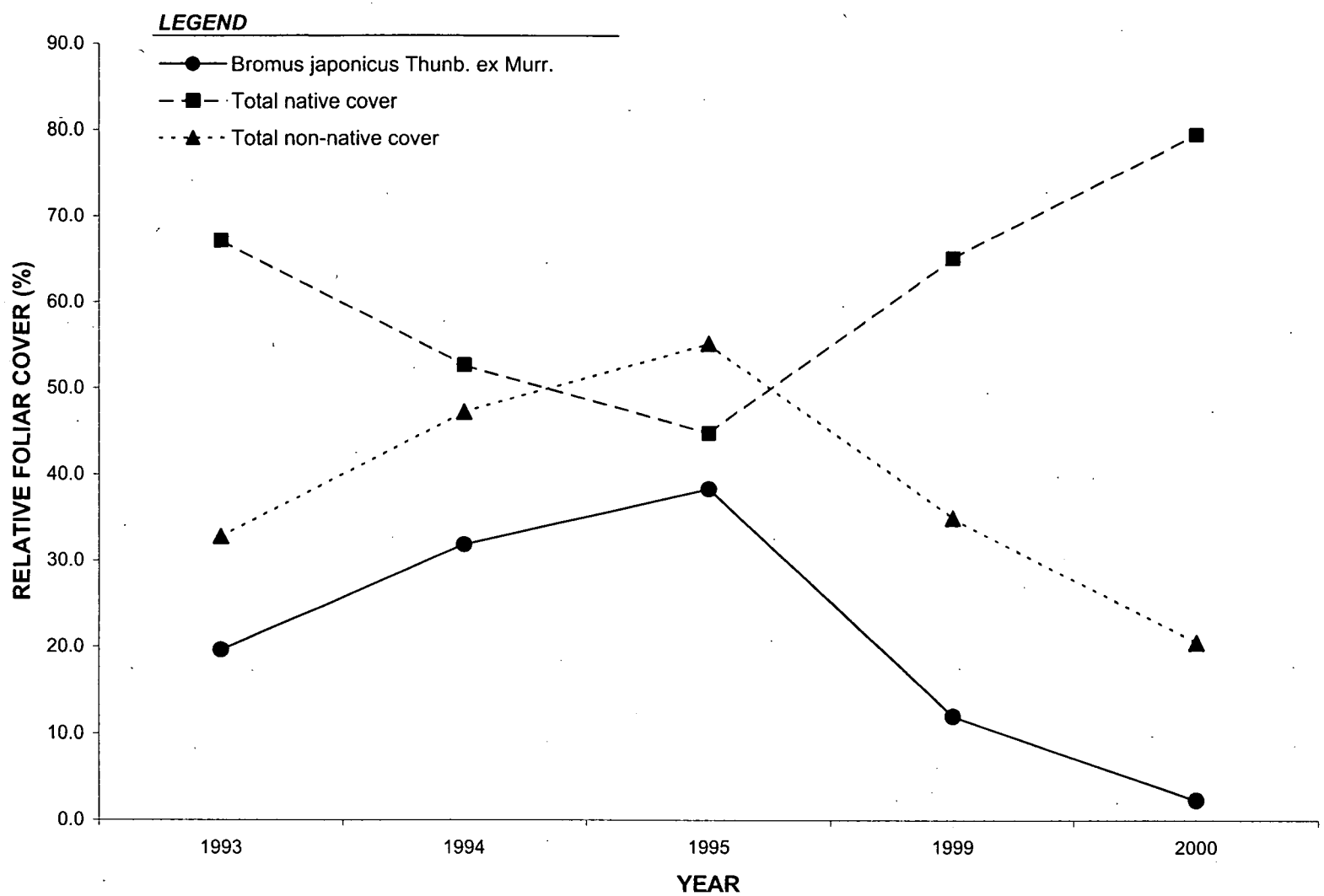

Figure 5. Native vs. non-native cover changes in relation to Japanese Brome on the mesic mixed grassland.

\\Boulder1\Groups\Graphics\1454\2001\mesic final tables for report.xls Fig 3 Native, nonnative, BRJA1 5/3/01 CO

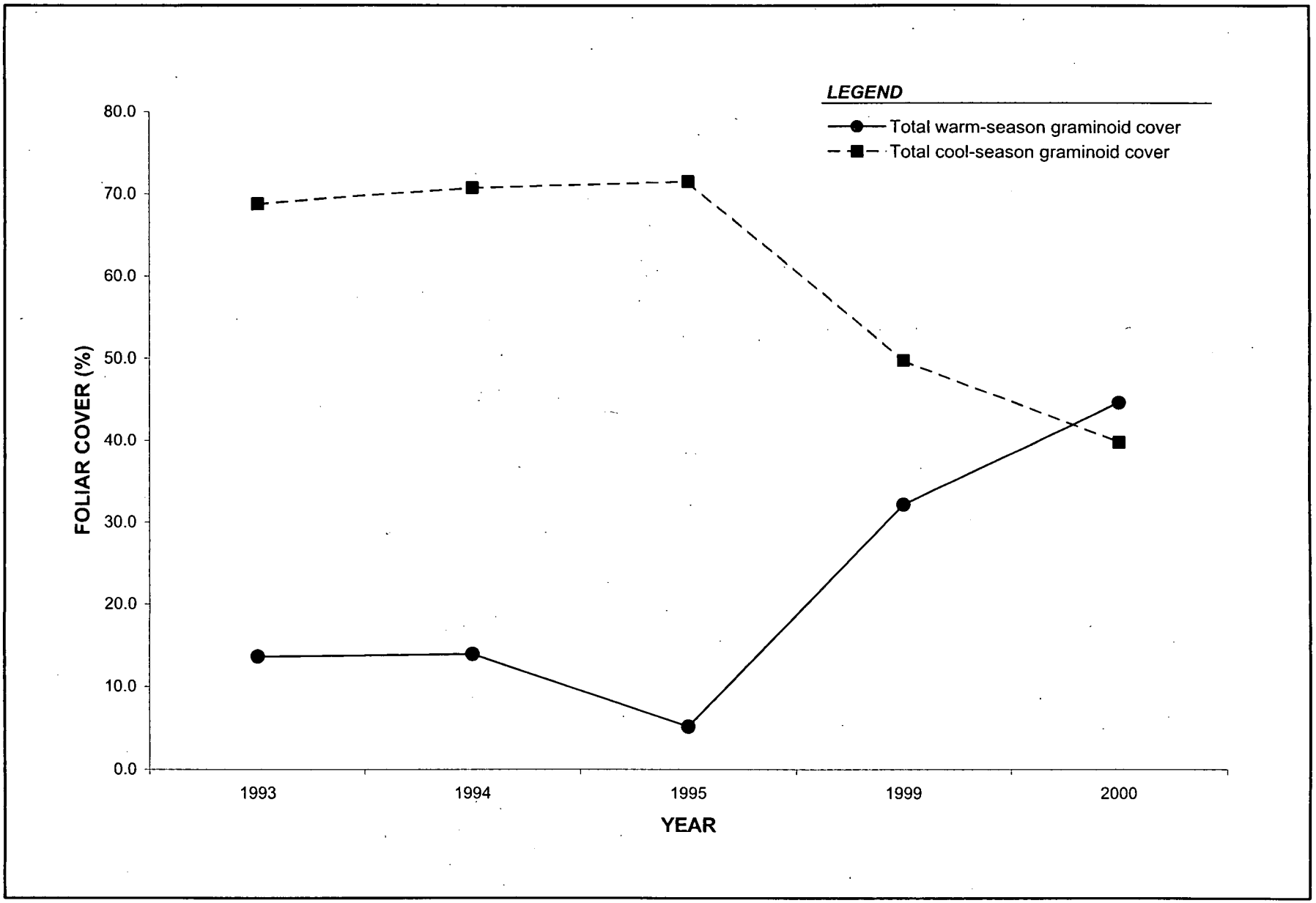

Figure 6. 1993-2000 mesic grassland graminoid cover changes.

\\Boulder1\Groups\Graphics\1454\2001\mesic final tables for report.xls Fig 4 93-2k Gram Cover Changes 5/3/01 CO

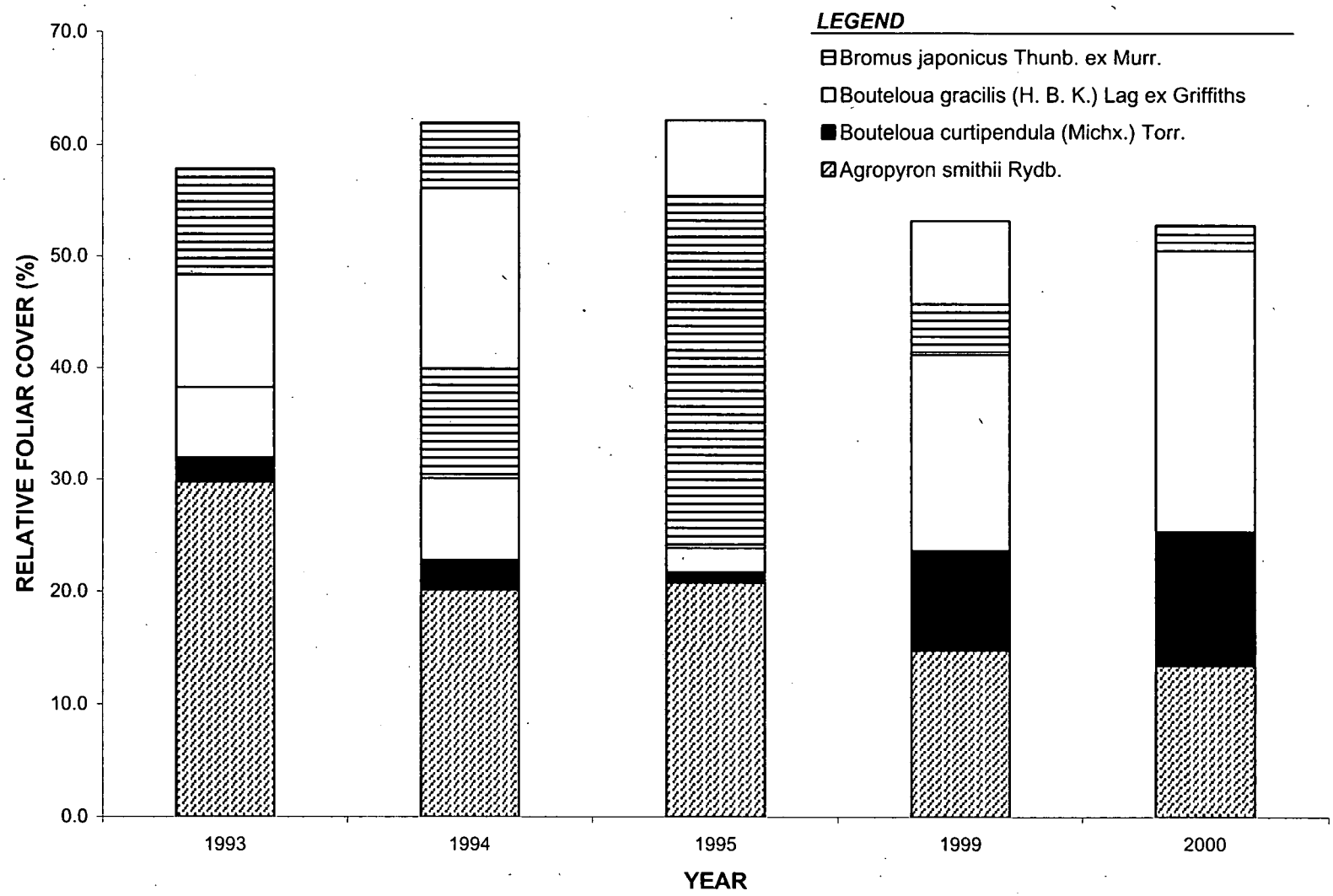

Figure 7. 1993-2000 mesic grassland graminoid changes.

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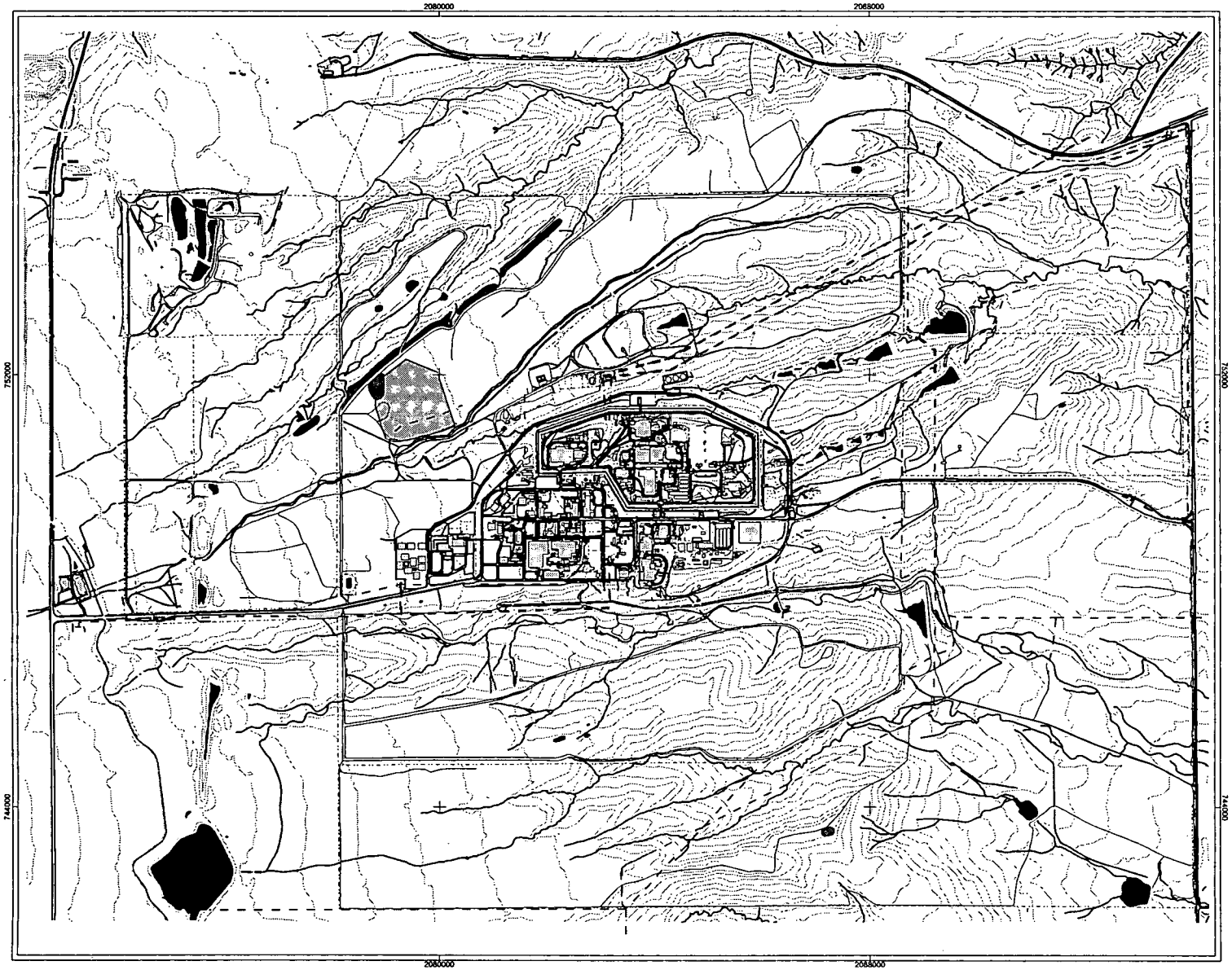

Rare and Imperiled Plants Distribution
Colorado Natural Heritage Program
Species of Concern

Figure 8

LEGEND

- Dwarf Wild Indigo (Amorpha nana)
- Forktip Three-awn (Aristida basiramea)
- Mountain-Loving Sedge (Carex oreocharis)
- Carrionflower Greenbriar (Smilax herbacea)

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours.
The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution.
The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Location data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2k-0074

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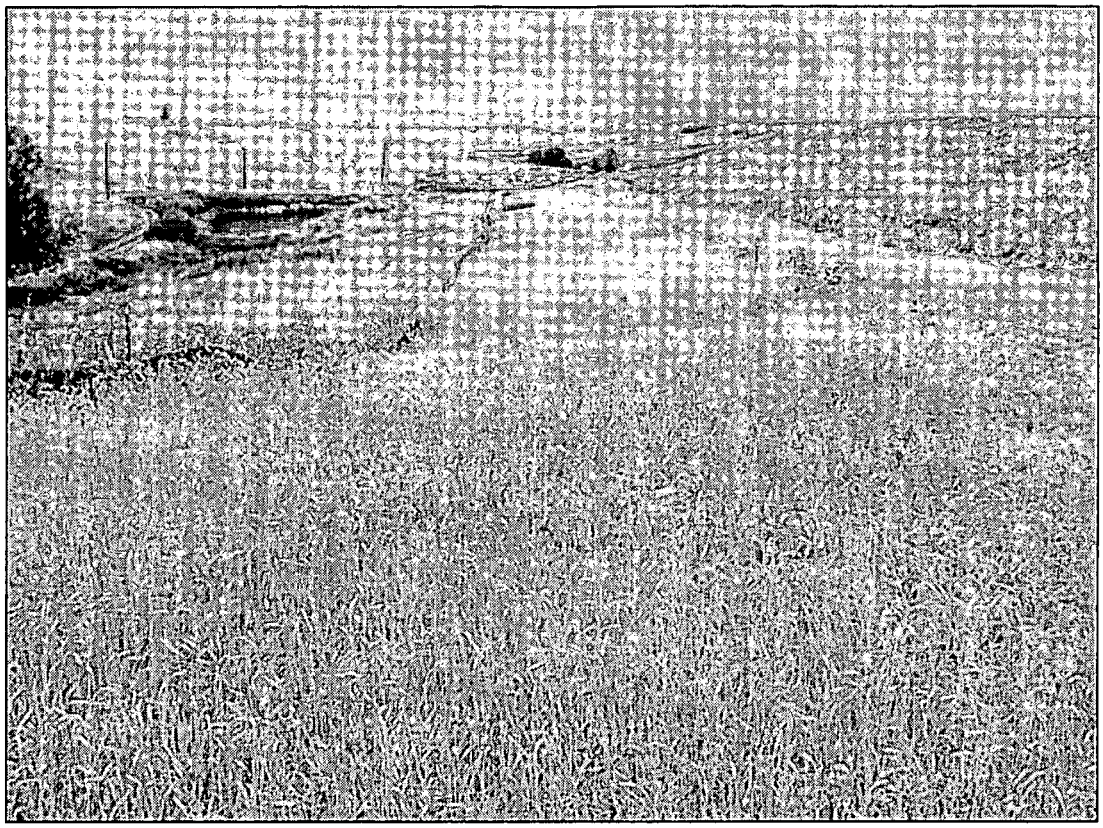
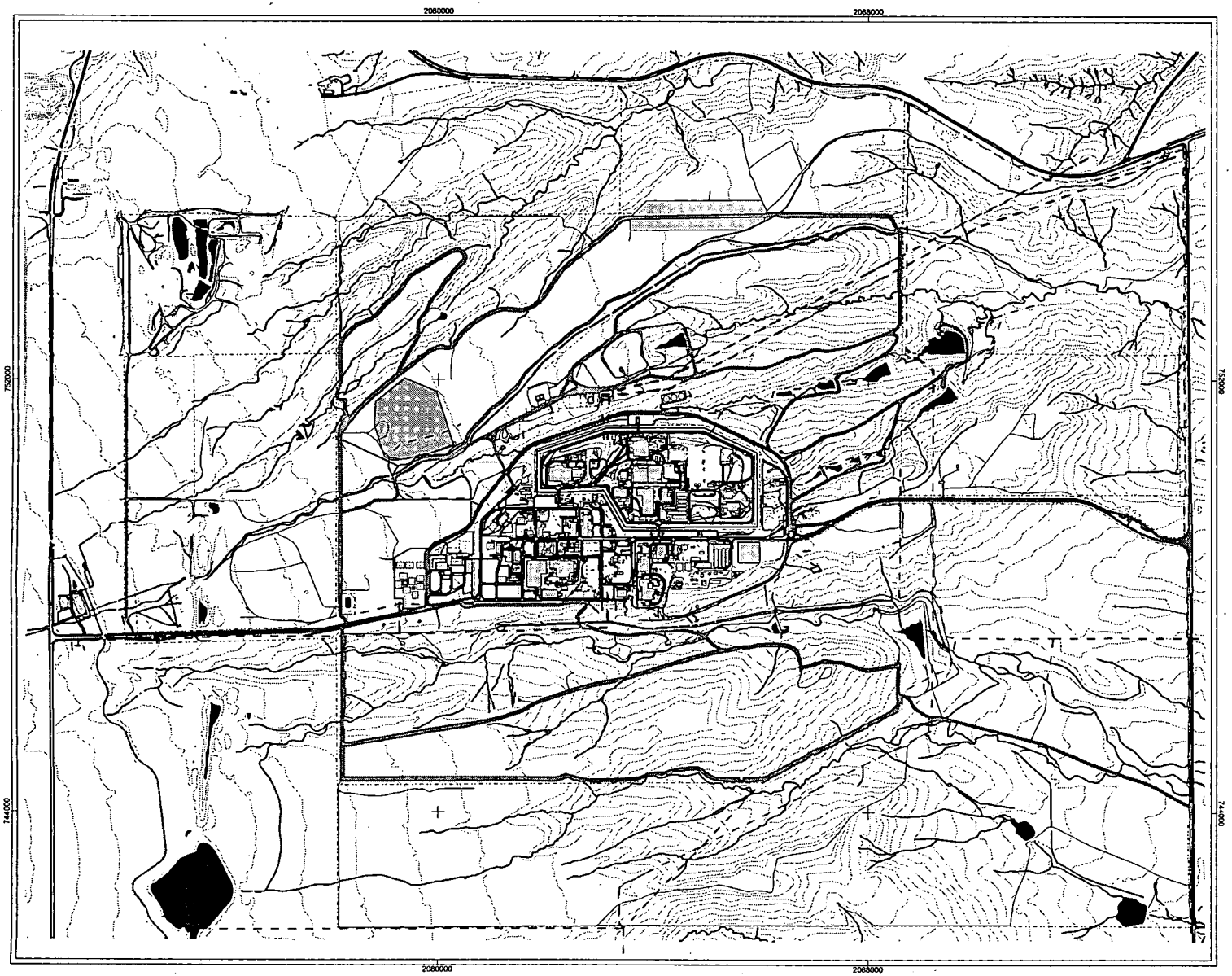


Figure 9. Wheat monoculture.

A wheat (*Triticum aestivum*) monoculture resulted at this revegetation location in 2000 when the crimped wheat straw used for mulch contained viable seedheads. Monitoring in 2001 will determine whether any of the seeded species begin to germinate.



FY2000 Road Grading and Mowing Operation Locations for Weed Control

Figure 10

LEGEND

- Annual Rye Mowing
- Roadside Mowing
- Roadside Mowing and Grading

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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1000 0 1000 2000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent

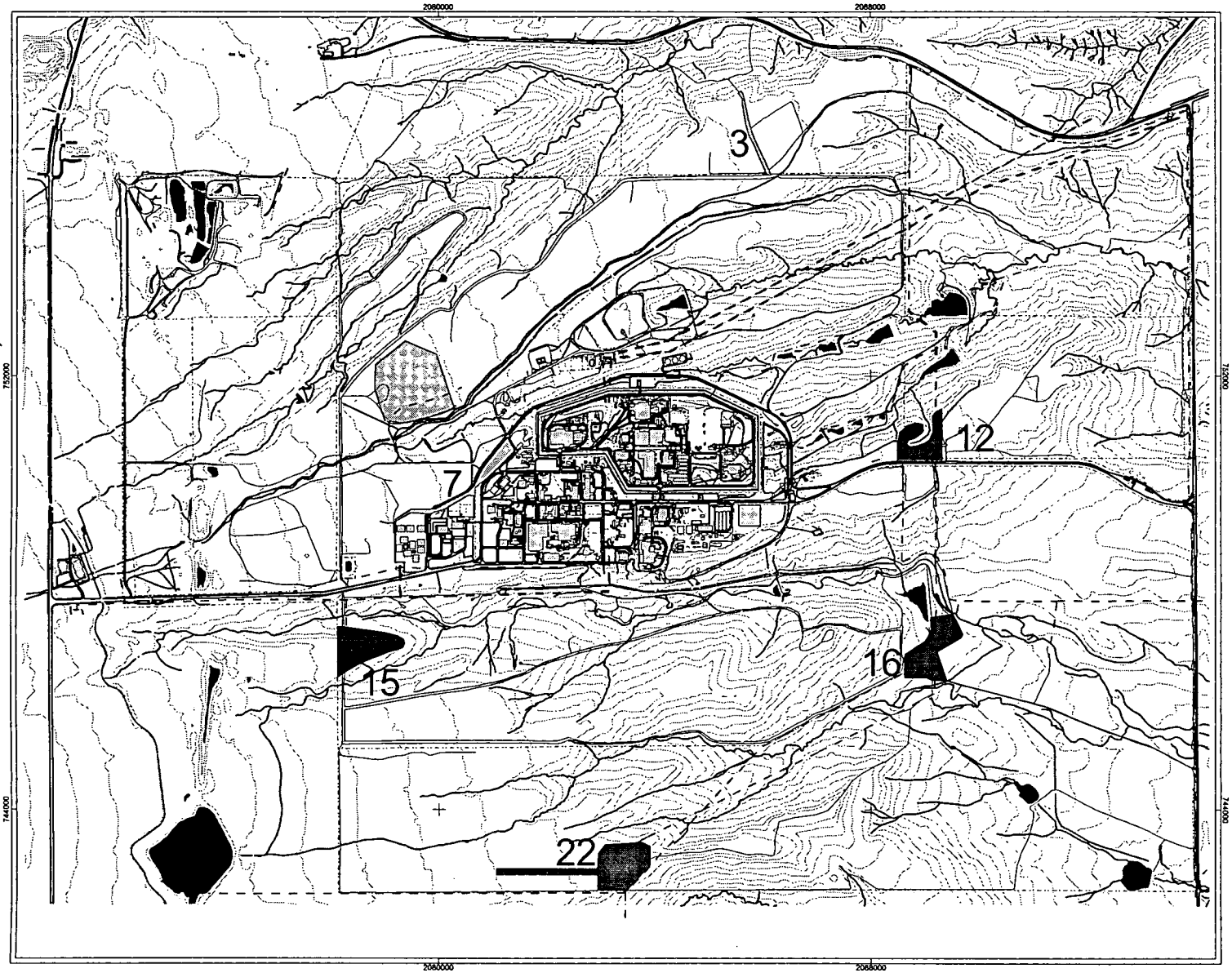
For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 01-0404

May 3, 2001

\\Gisserv\GIS\ECO-projects\projects\01-0404\figures 2-4 and 2-5 apr 2k roadside mowing and grading figure 2-2



FY2000 Ground Herbicide Application Locations

Figure 11

LEGEND

- Tordon Spray Locations
- Transline Spray Locations

(Numbers are acres treated)

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours.
The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution.
The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Location data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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1000 0 1000 2000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

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RFETS GIS Dept. 303-966-7707

MAP ID: 01-0404

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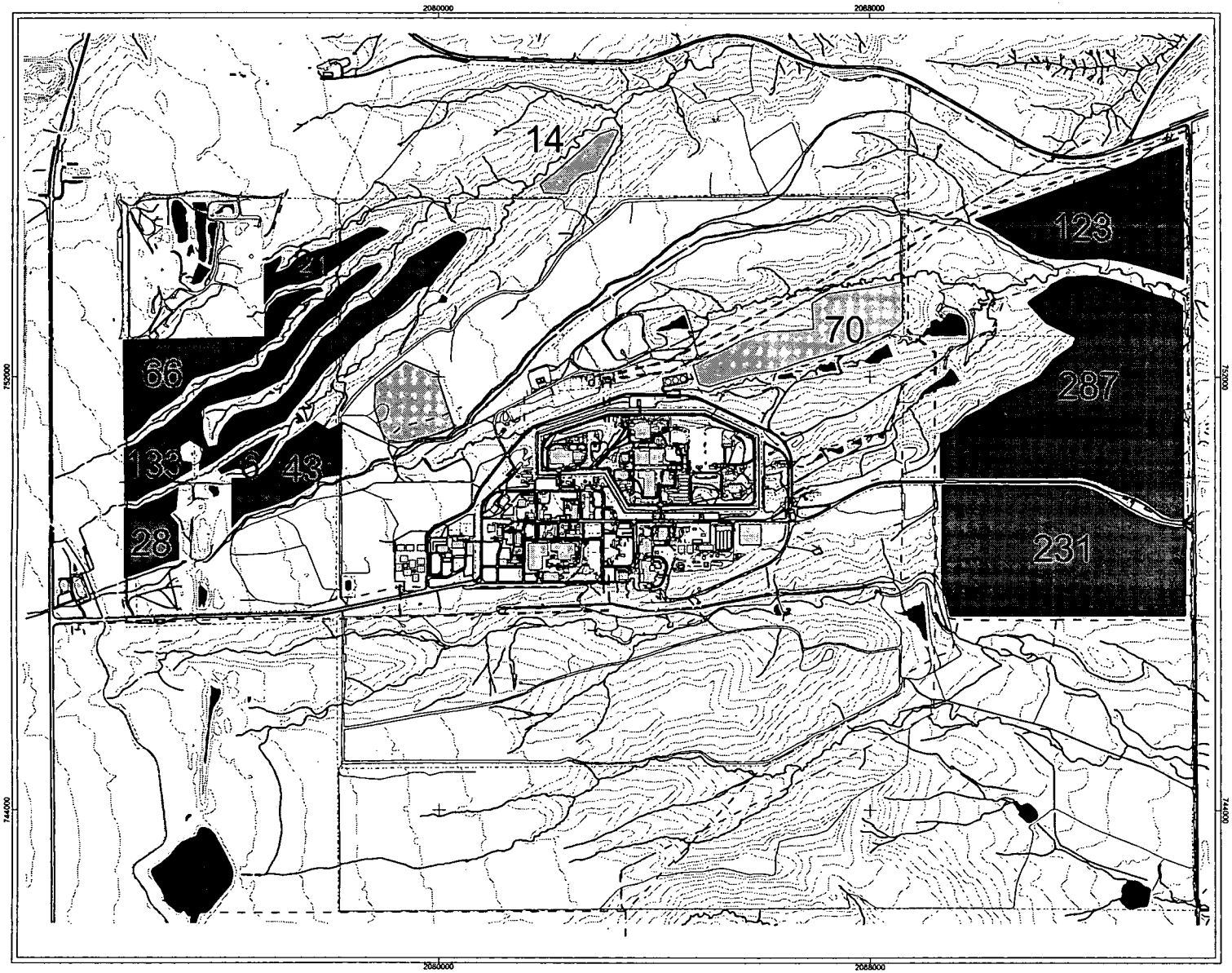
\\Gaia\r\GIS\ECO\projects\01-0404\2000 ground applications locations (actual)



FY2000 Aerial Herbicide Application Locations

Figure 12

LEGEND

- Tordon Spray Locations
- Transline Spray Locations

(Numbers are acres treated)

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Location data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
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RFETS GIS Dept. 303-966-7707

MAP ID: 01-0404

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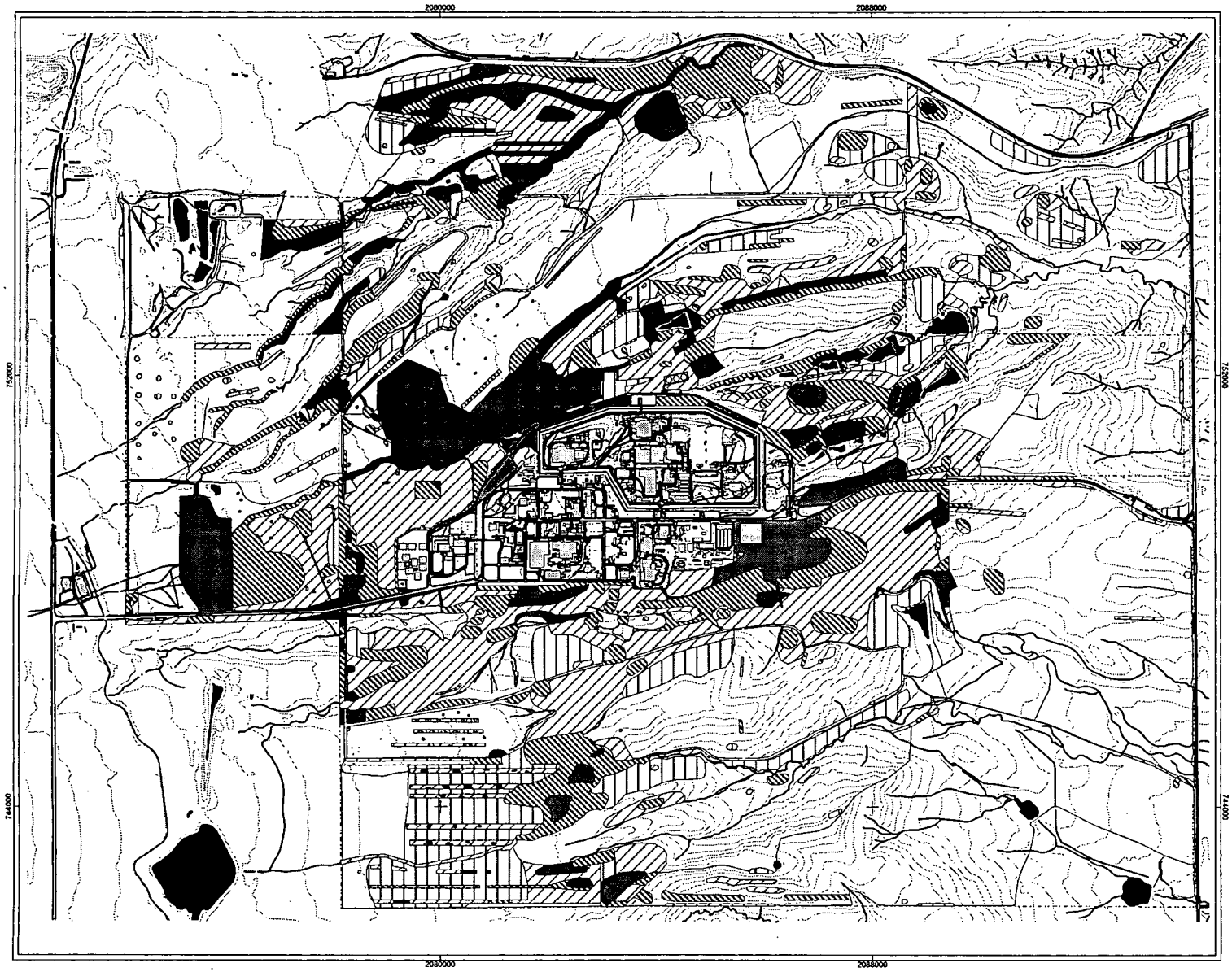
\\Gaia\VGIS\ECO-projects\projects\01-0404\2000 aerial herbicide locations



2000 Diffuse Knapweed (Centaurea diffusa) Distribution

Figure 13

MAP LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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1000 0 1000 2000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
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Prepared by: Exponent®

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RFETS GIS Dept. 303-966-7707

MAP ID: 2K-0419

May 3, 2001

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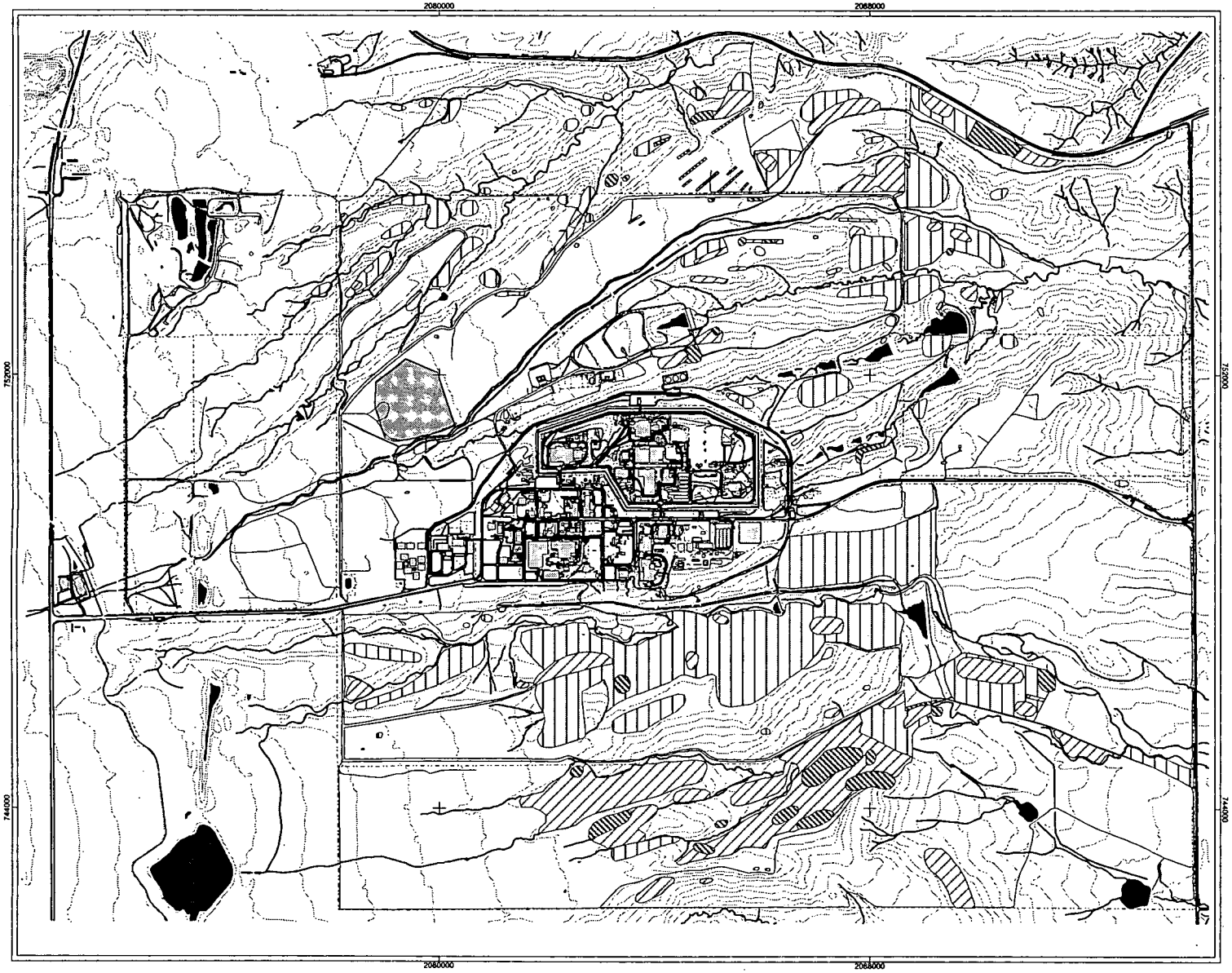

2000 Musk Thistle (Carduus nutans) Distribution

Figure 14

MAP LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
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RFETS GIS Dept. 303-966-7707

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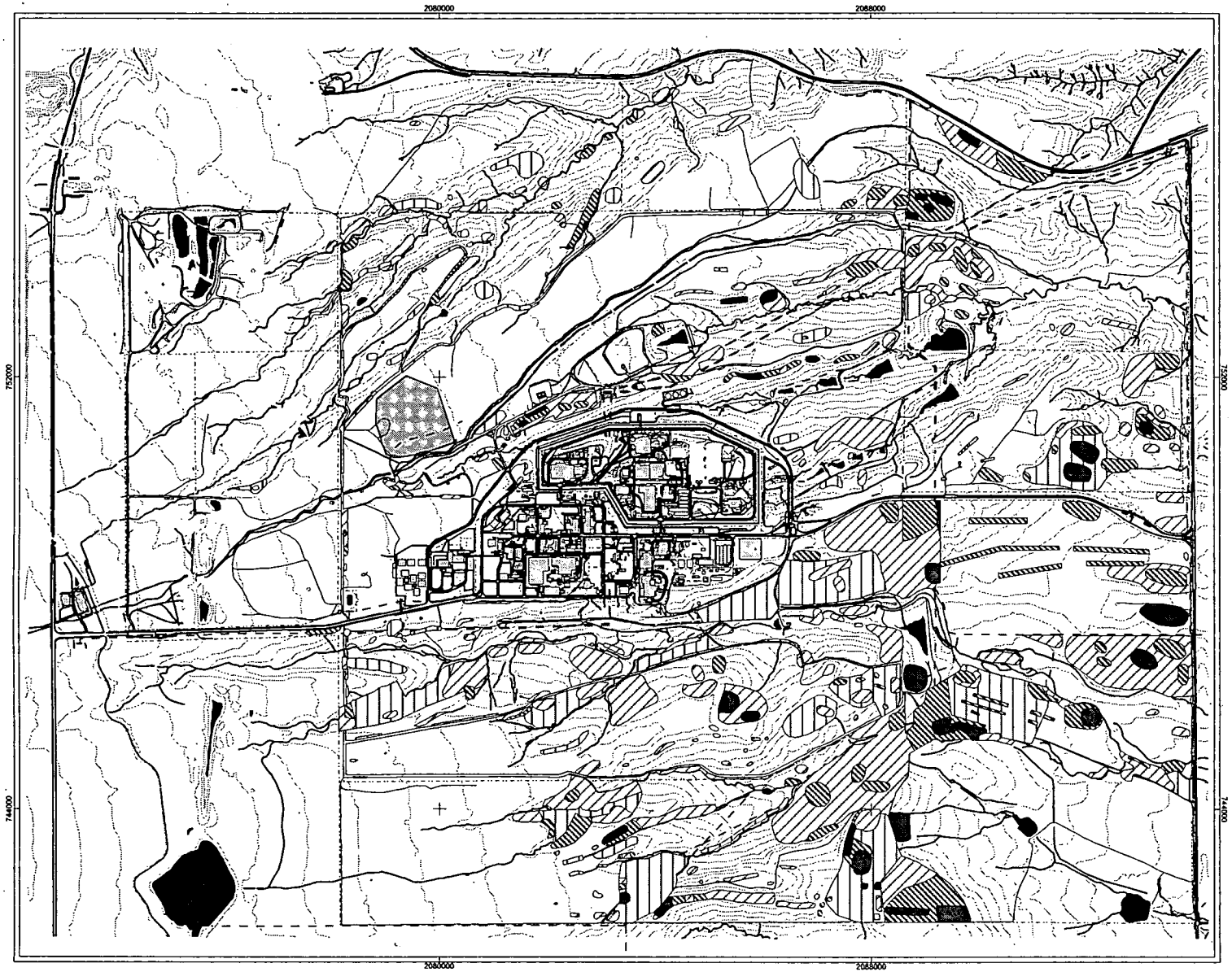

2000 Mullein (Verbascum thapsus) Distribution

Figure 15

LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs. 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
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Prepared by: Exponent®

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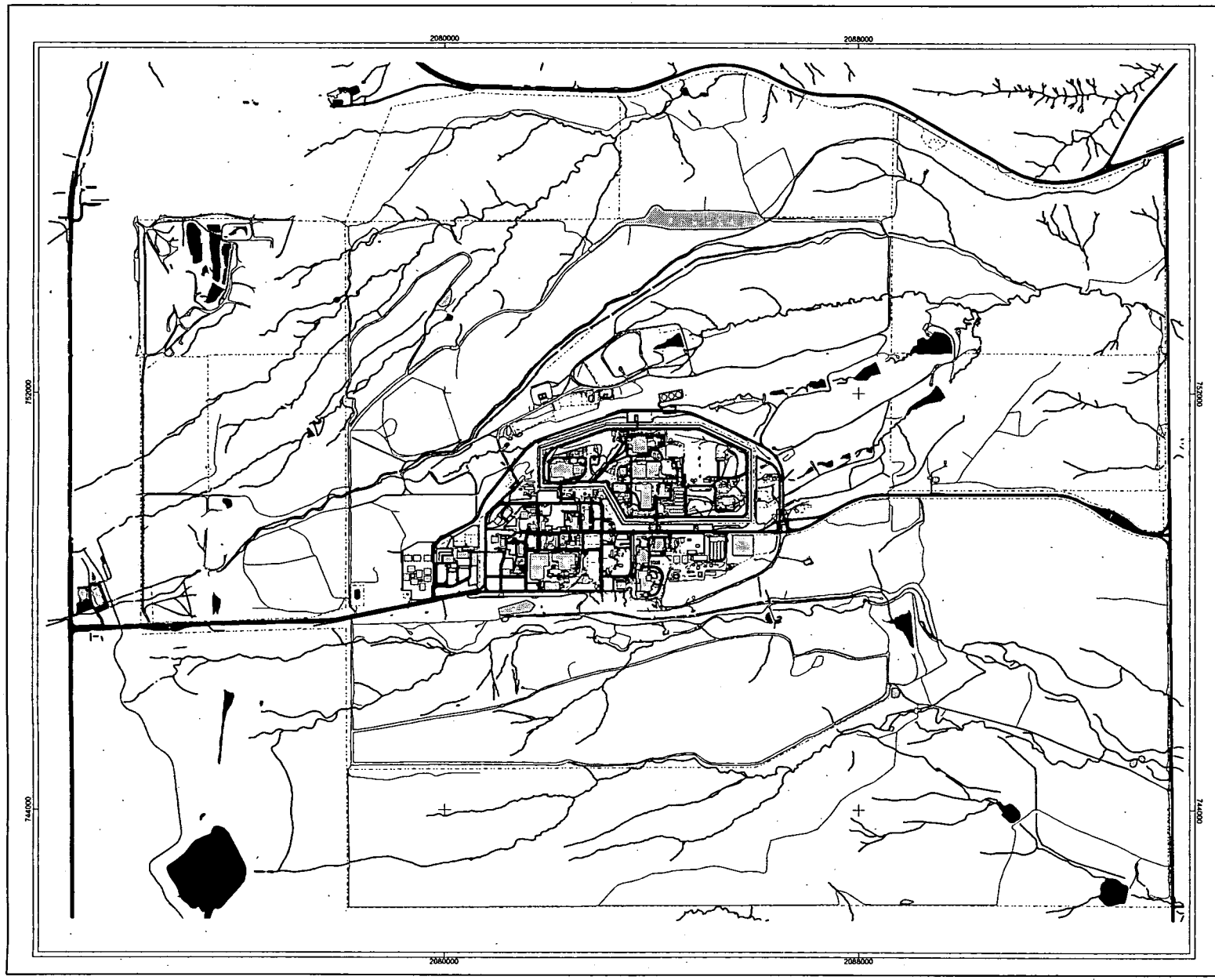
RFETS GIS Dept. 303-966-7707

MAP ID: 01-0081

May 3, 2001

\\Gisrv\GIS\ECO-projects\projects\01-0081\veth00 apr\ 2000 Mullein Distribution



2000 Scotch Thistle (Onopordim acanthium), Russian Knapweed (Centaurea repens), Dame's Rocket (Hesperis matronalis), Bouncing Bet (Saponaria officinalis), and Annual Rye (Secale cereale) Distribution

Figure 16

LEGEND

- Scotch Thistle Infestations
- Russian Knapweed Infestations
- Dame's Rocket Infestations
- Annual Rye Infestations
- Bouncing Bet Infestations

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours.
The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution.
The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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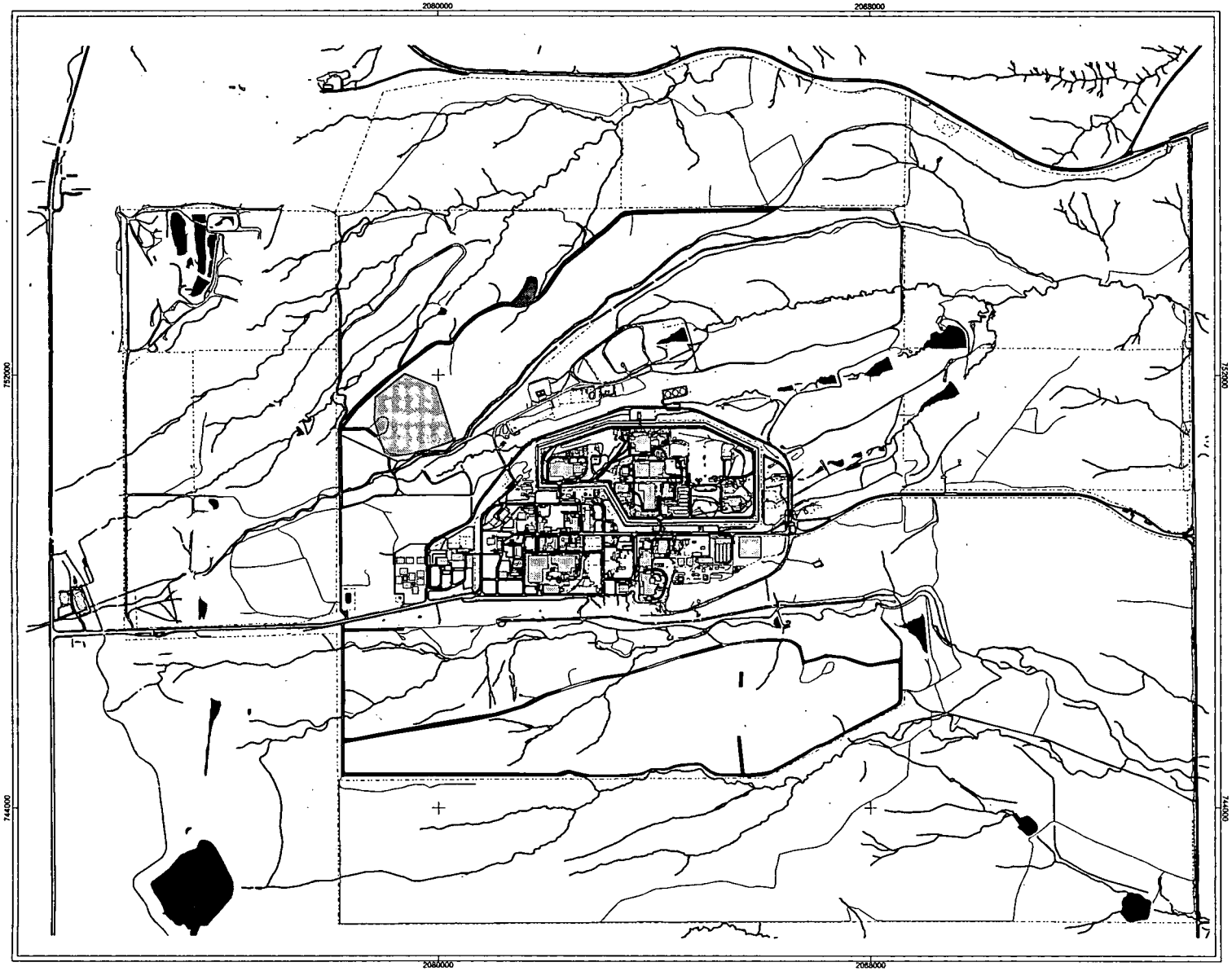
State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®
For: Kaiser-Hill Company, LLC
RFETS GIS Dept. 303-966-7707
MAP ID: 01-0036
May 3, 2001

\\Gisrv\GIS\ECO-projects\projects\01-0036\weedmaps2k_sprintsc weeds mapped



2000 Jointed Goatgrass (Aegilops cylindrica) Distribution

Figure 17

LEGEND

Jointed Goatgrass Infestations

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
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For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

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May 3, 2001

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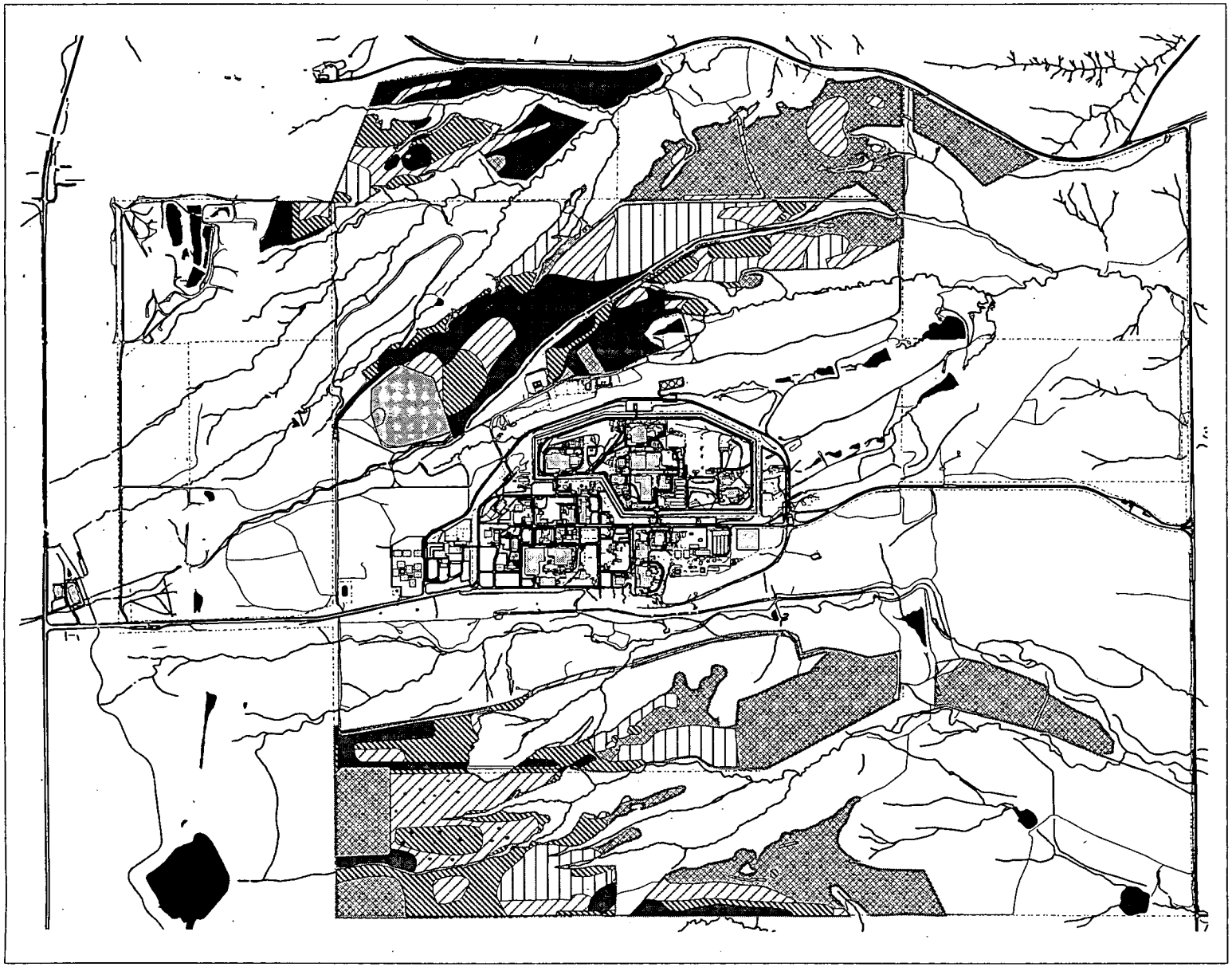

1998 Diffuse Knapweed Pre-Aerial Herbicide Application Distribution (1999 Application)

Figure 18

MAP LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas
- 1999 Aerial Spray Areas

Standard Map Features

- Buildings
- Lakes & Ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- New landfill

DATA SOURCE:
1999 weed distributions provided by Exponent.
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Note:
These locations approximate the boundaries of infestation areas. Infestation areas shown on this map only represent those that overlapped with the aerial herbicide application locations (i.e. this map does not represent the extent of diffuse knapweed at the Site). K-H Ecology Group POC: Karan North 303-966-9876.

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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
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Prepared by: Exponent®

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RFETS GIS Dept. 303-966-7707

MAP ID: K2-0017

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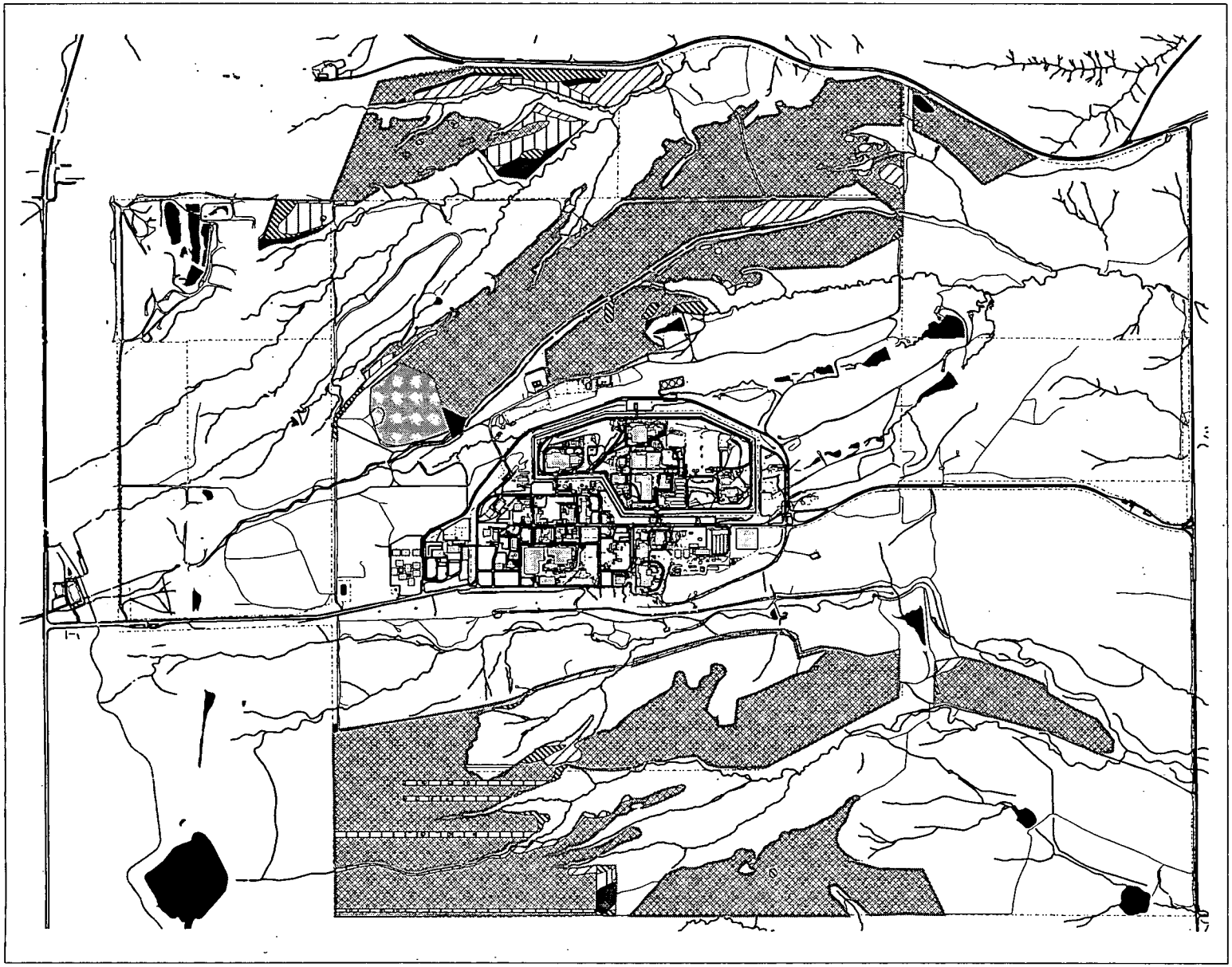
\\Gisrv\GIS\ECO-projects\projects\k2-0017\cad\299 apr\1998 Diffuse Knapweed Pre-Herbicide Application



1999 Diffuse Knapweed Post-Aerial Herbicide Application Distribution (1999 Application)

Figure 19

MAP LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas
- 1999 Aerial Spray Areas

Standard Map Features

- Buildings
- Lakes & Ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- New landfill

DATA SOURCE:
1999 weed distributions provided by Exponent.
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
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The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution.
The DEM post-processing performed by MK, Winter 1997.

Note:
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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

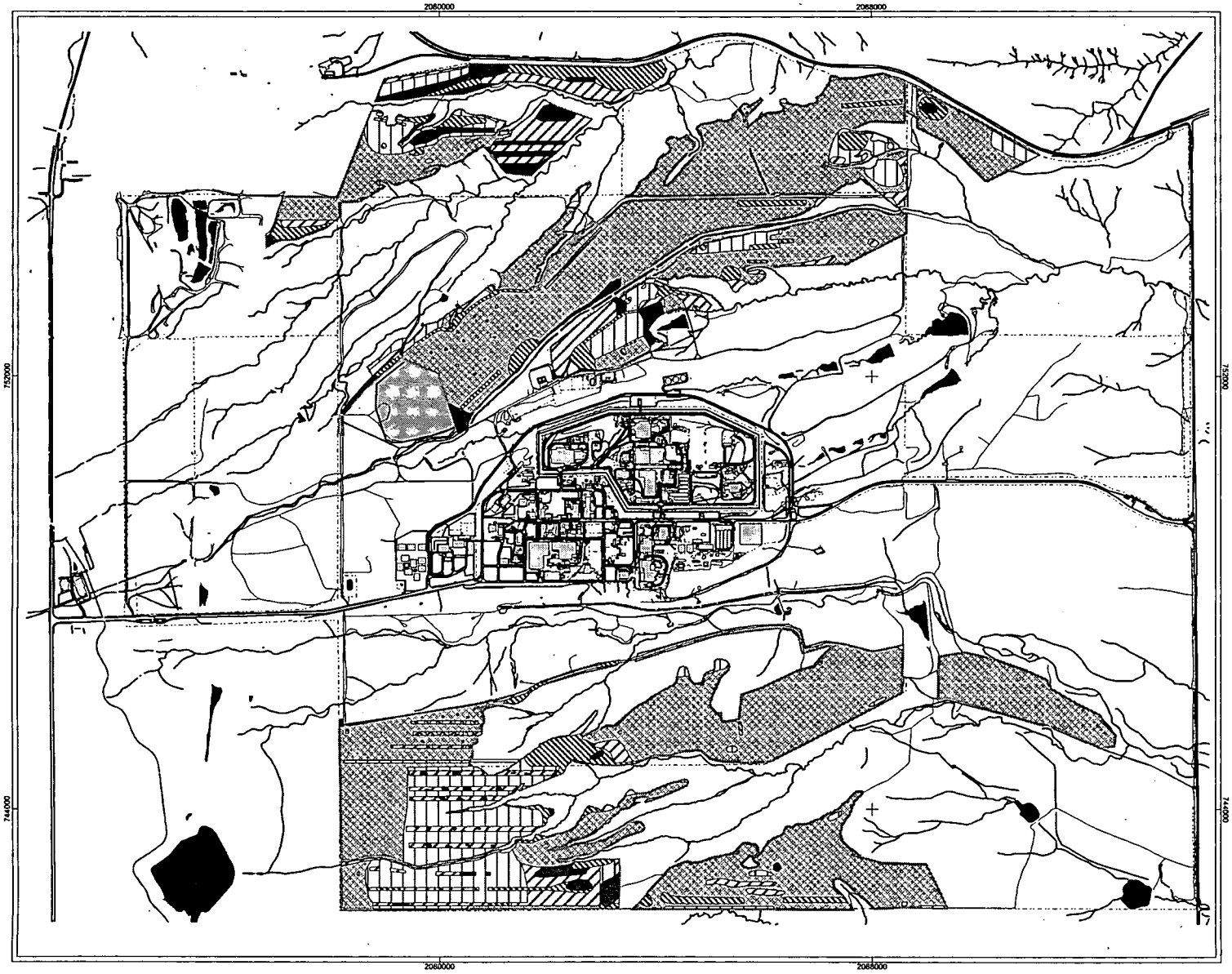
For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: K2-0017

May 3, 2001

\\Cesar\GIS\ECO-projects\projects\k2-0017\cad\299.apr\1999 Diffuse Knapweed Post-Herbicide Application



2000 Diffuse Knapweed Post-Aerial Herbicide Application Distribution (1999 Application)

Figure 20

MAP LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas
- 1999 Aerial Spray Areas

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours.
The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution.
The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC: Karan North 303-966-9876.

N

1:23552

1000 0 1000 2000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent

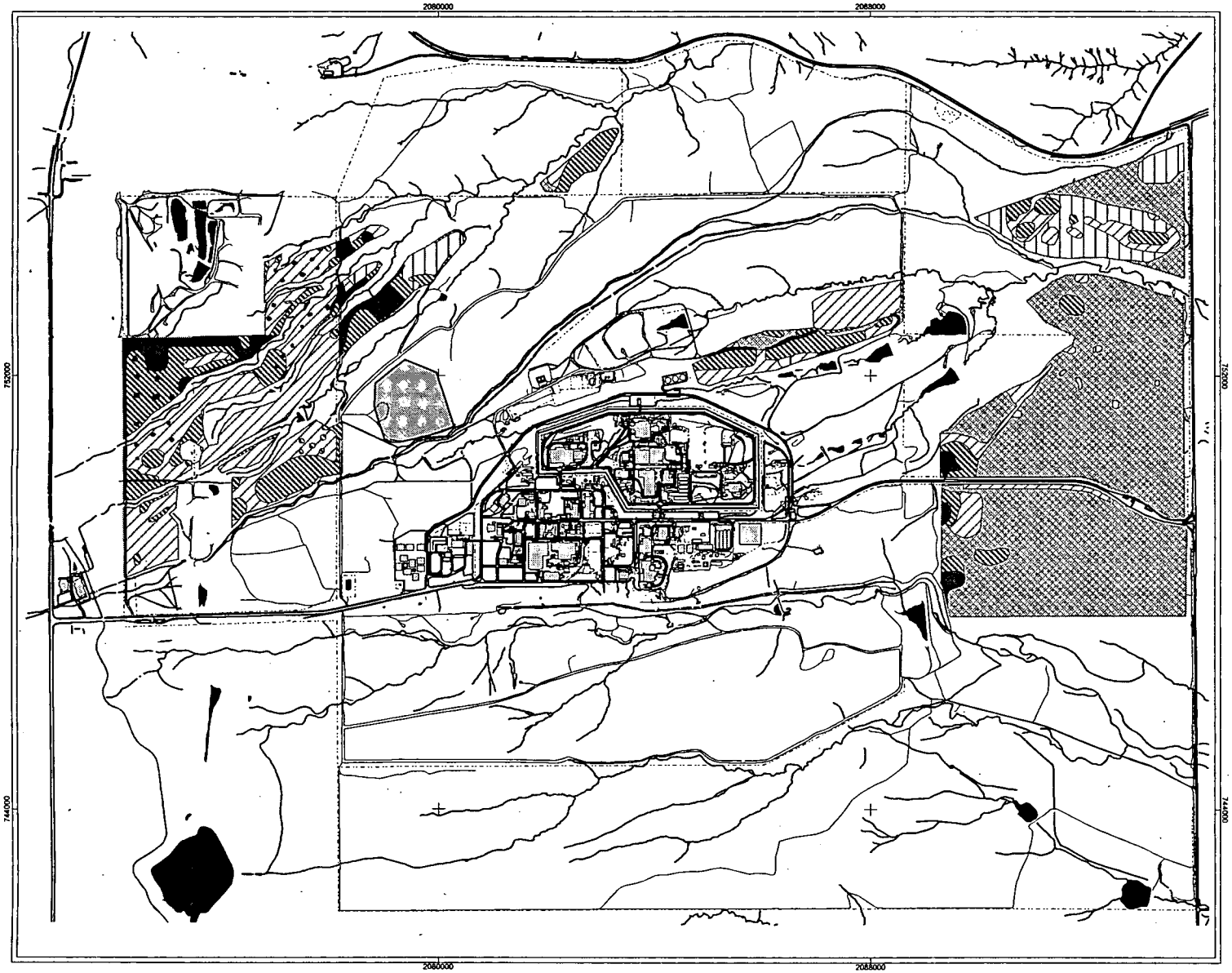
For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2K-0419

May 3, 2001

\\Gisarv\GIS\ECO-projects\projects\23-0419\ced00 apr\2000 CEDI (1999 Aerial Clip Map)



1999 Diffuse Knapweed Pre-Aerial Herbicide Application Distribution (2000 Application)

Figure 21

MAP LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas
- 2000 Aerial Spray Areas

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours.
The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution.
The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

N

1:23552

1000 0 1000 2000 Feet

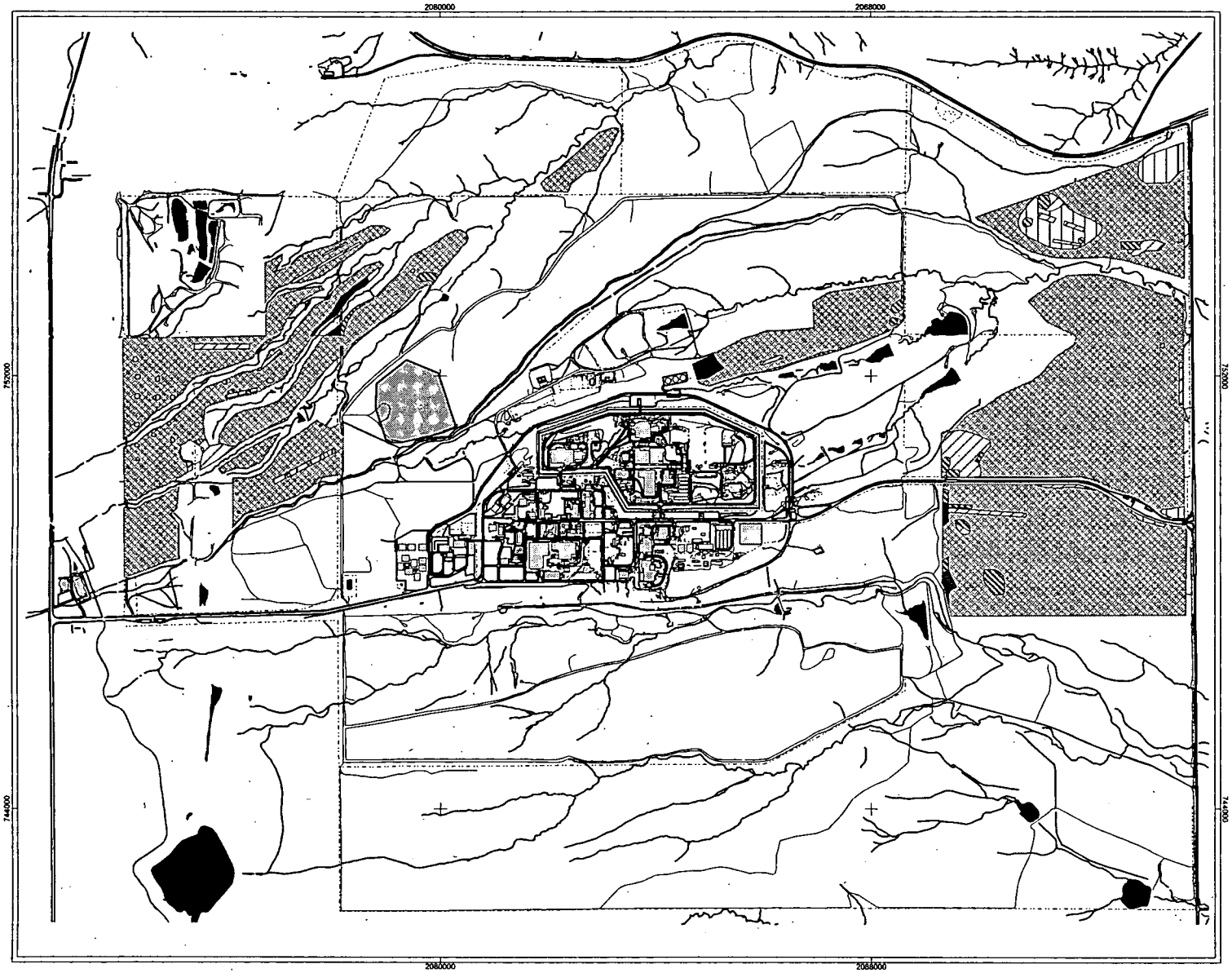
State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®
For: Kaiser-Hill Company, LLC
RFETS GIS Dept. 303-966-7707

MAP ID: 2K-0419
May 3, 2001

\\Gisarv\GIS\ECO-projects\projects\2k-0419\ced00.apr\1999 CEDI Pre-treatment (2000 application)



2000 Diffuse Knapweed Post-Aerial Herbicide Application Distribution (2000 Application)

Figure 22

MAP LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas
- 2000 Aerial Spray Areas

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

N

1:23552

1000 0 1000 2000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2K-0419

May 3, 2001

\\Gisserv\GIS\ECO-projects\projects\2k-0419\ced00.apr\2000 CEDI Post-treatment (2000 application)

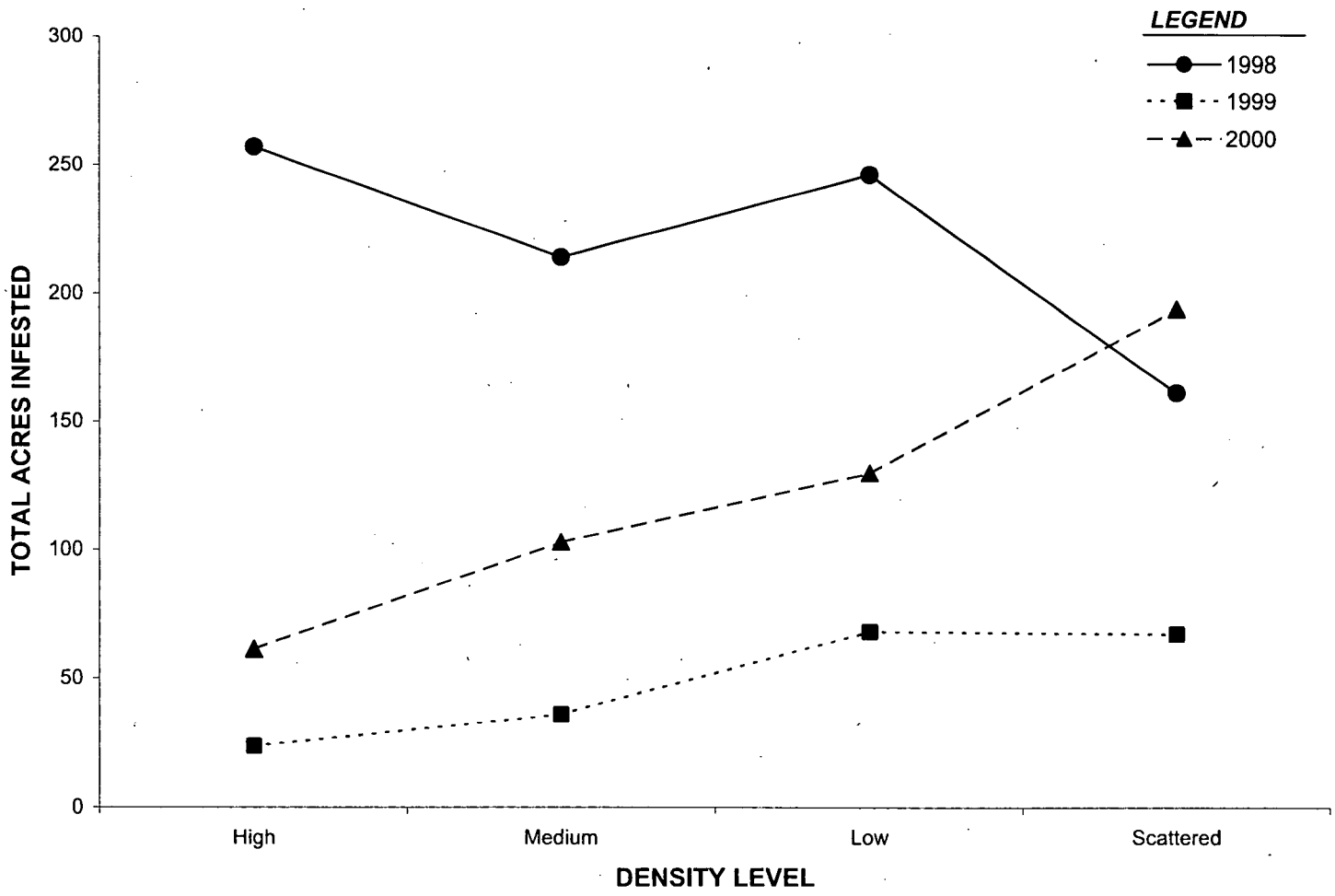


Figure 23. 1998-2000 diffuse knapweed change within 1999 aerial spray locations.

\\Boulder1\Groups\Graphics\1454\2001\2000ClipMapAreas for report.xls Figure 1-12 5/3/01 CO

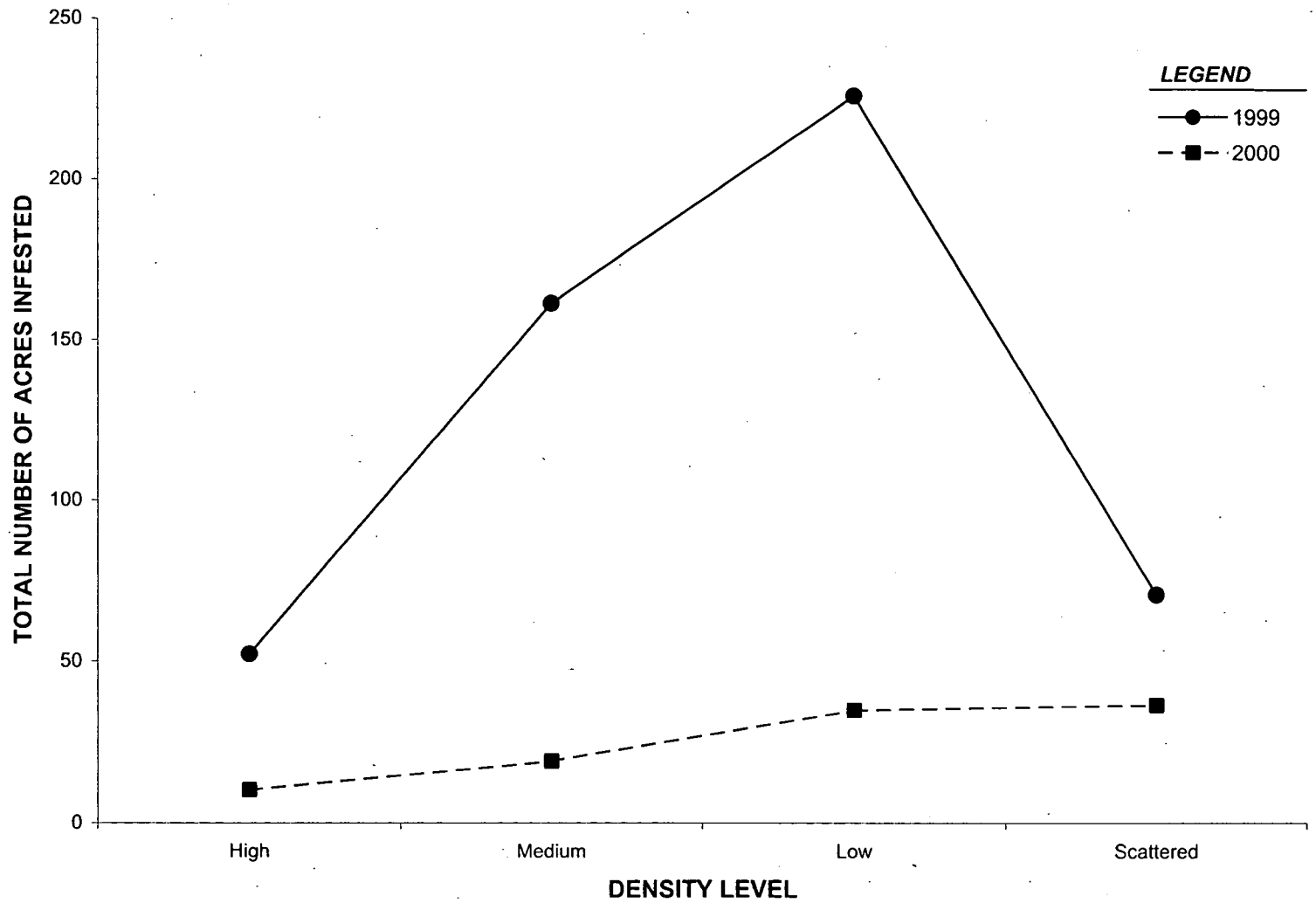
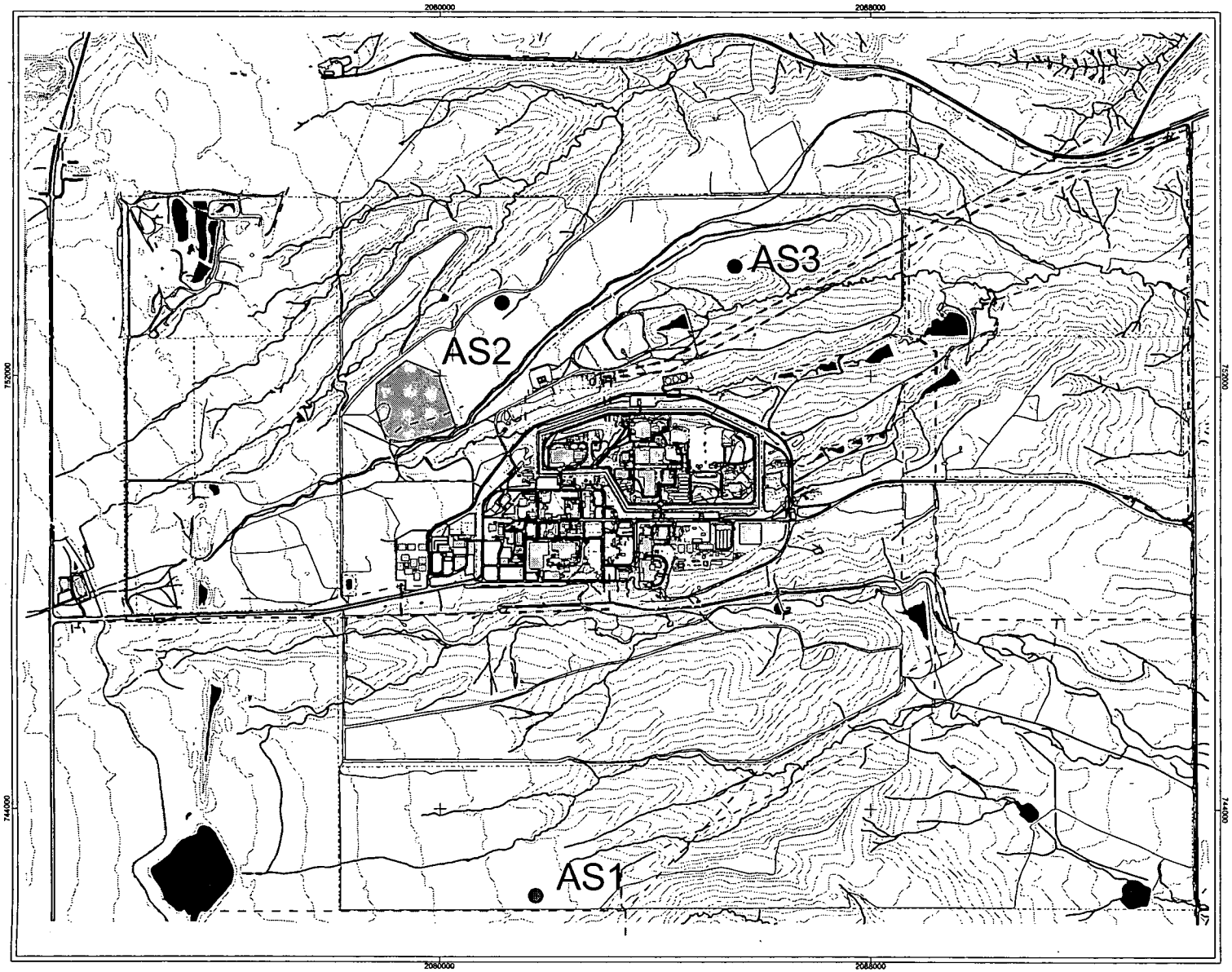


Figure 24. Pre- and post-treatment diffuse knapweed levels at 2000 aerial herbicide application locations.

\\Boulder1\Groups\Graphics\1454\2001\2K AERIAL APP CLIPMAPAREAS for report.xls Figure 1-13 5/3/01 CO

Figure 25. Missed flightline.

The darker area down the center of this photograph illustrates a missed flightline and how the diffuse knapweed is prevelant in an otherwise visibly clean area. Spot control is necessary for control of areas like this that are missed occasionally during the large-scale spraying applications.



Aerial Herbicide Monitoring Plot Locations

Figure 26

LEGEND

- Control Plot

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Location data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

N

1:23552

1000 0 1000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®
For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2k-0038

May 3, 2001

\\Gasm\GIS\ECO-projects\projects\2k-0038\veg monitoring locations 2001.apr\Aerial plots

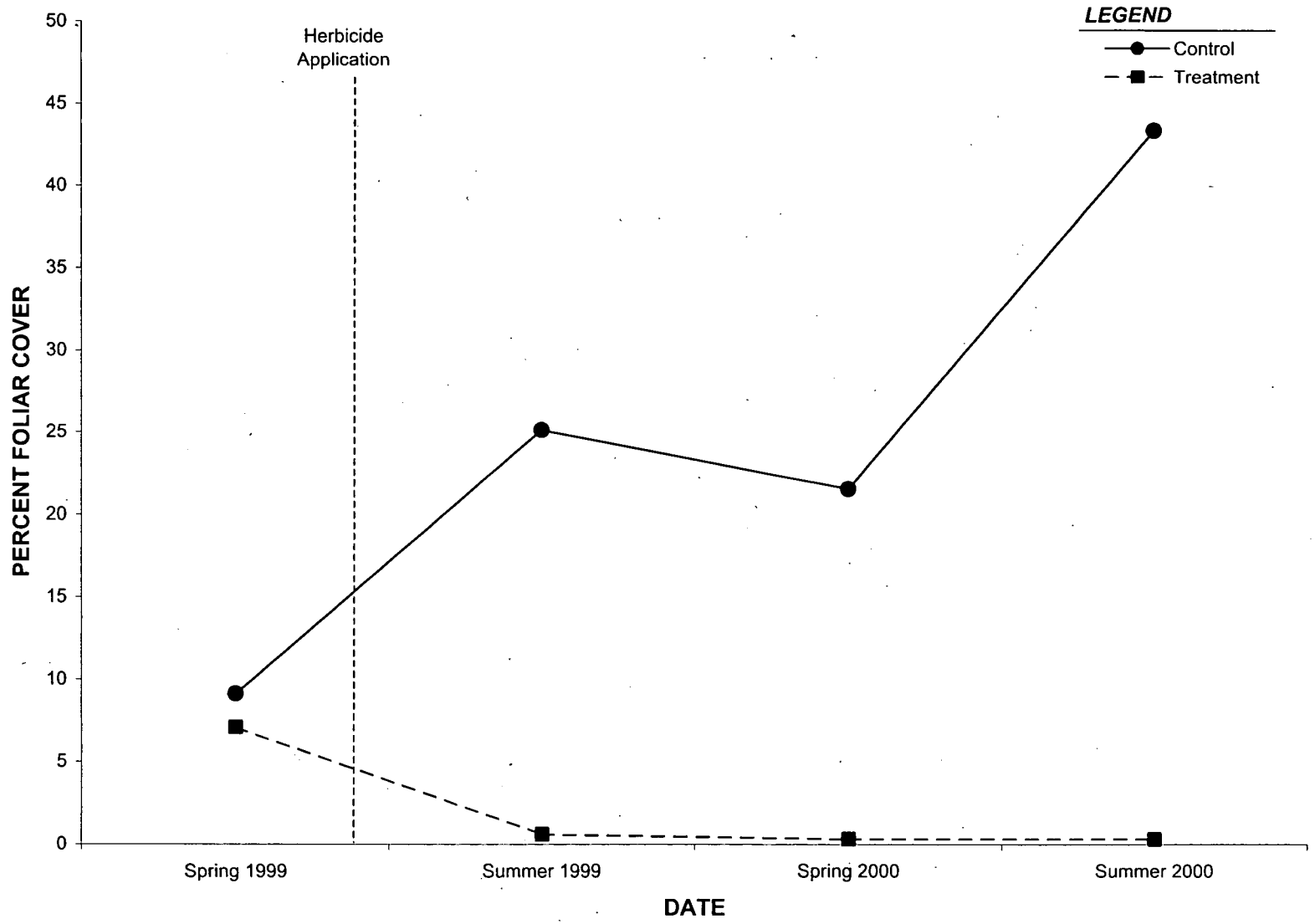


Figure 27. Diffuse knapweed foliar cover.

\\Boulder1\Groups\Graphics\1454\2001\aerial monitoring analyses for report.xls Figure 3 5/3/01 CO

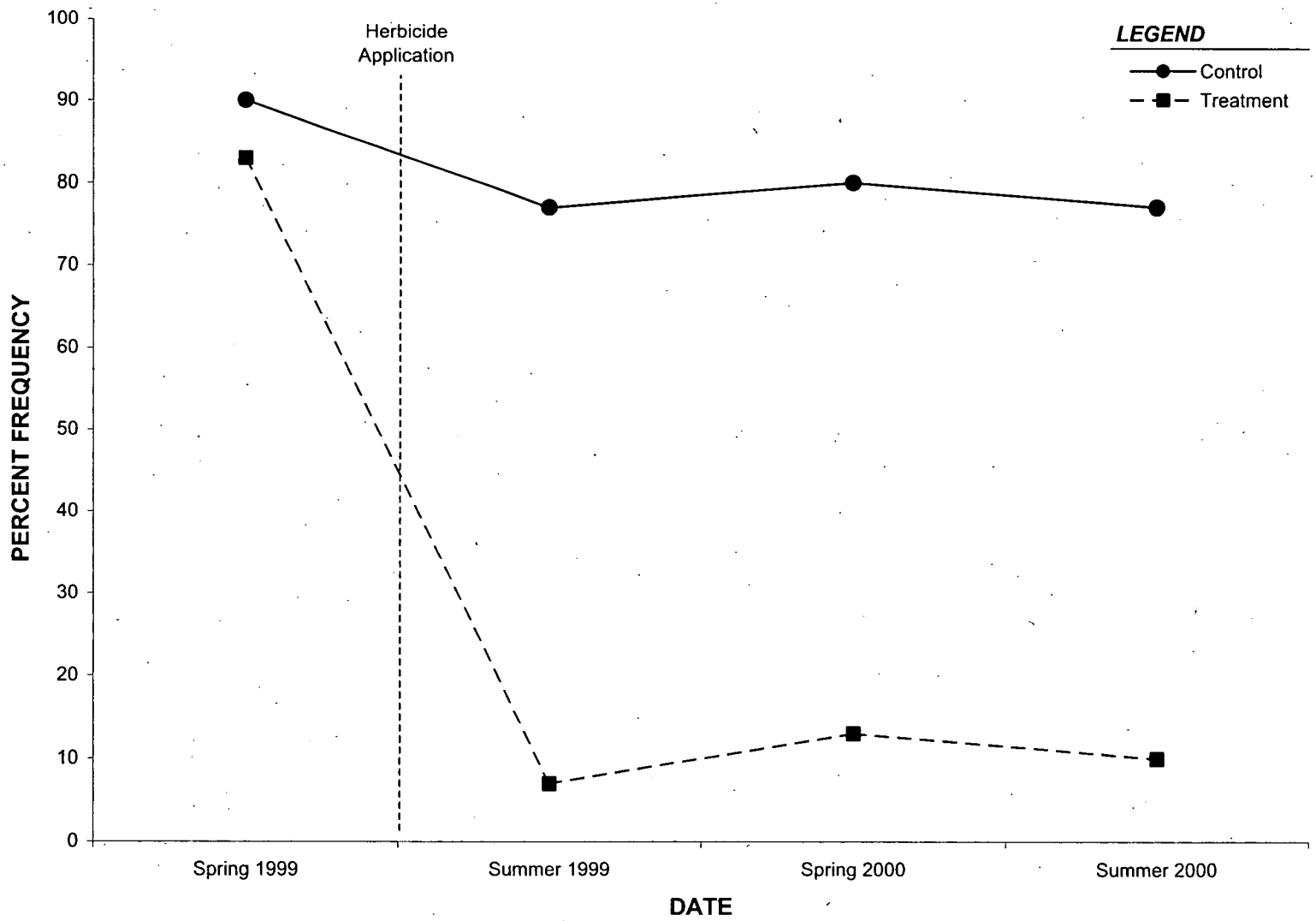


Figure 28. Diffuse knapweed frequency.

Figure 29. In this untreated control plot, the diffuse knapweed has buried the quadrat. This is what the entire area would have looked like in 2000 had it not been sprayed. The grass response was similar to that after a fire, with increased flowering as seen here.

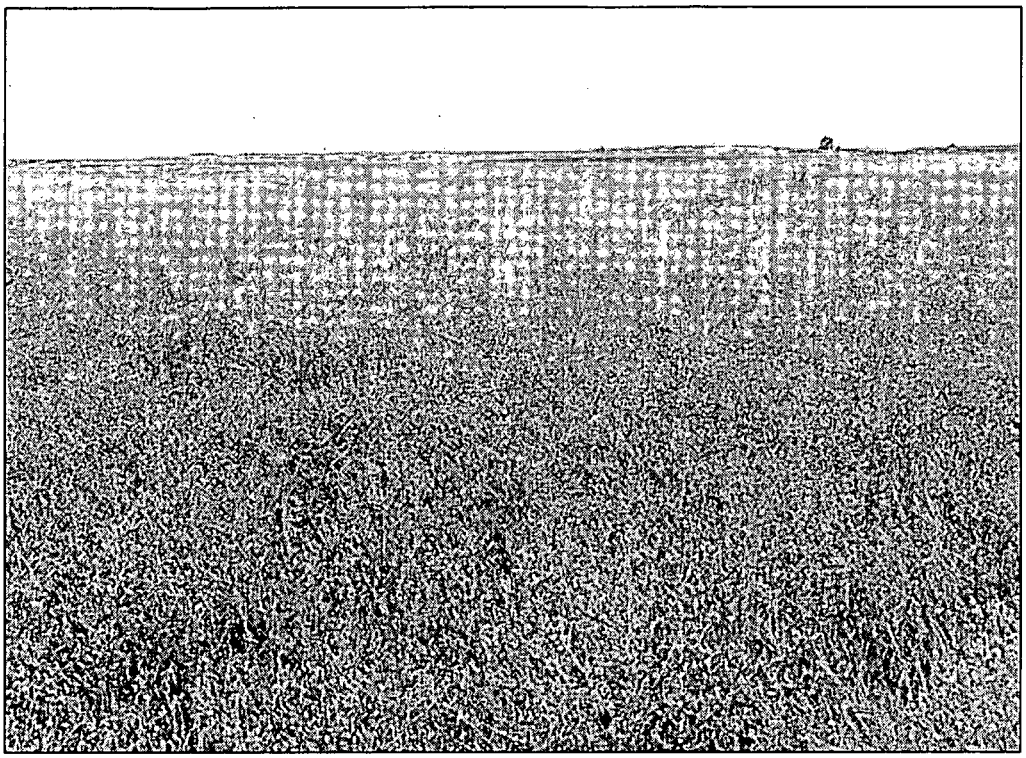


Figure 30. The xeric tallgrass prairie at this location was heavily infested with diffuse knapweed as seen here in 1997.

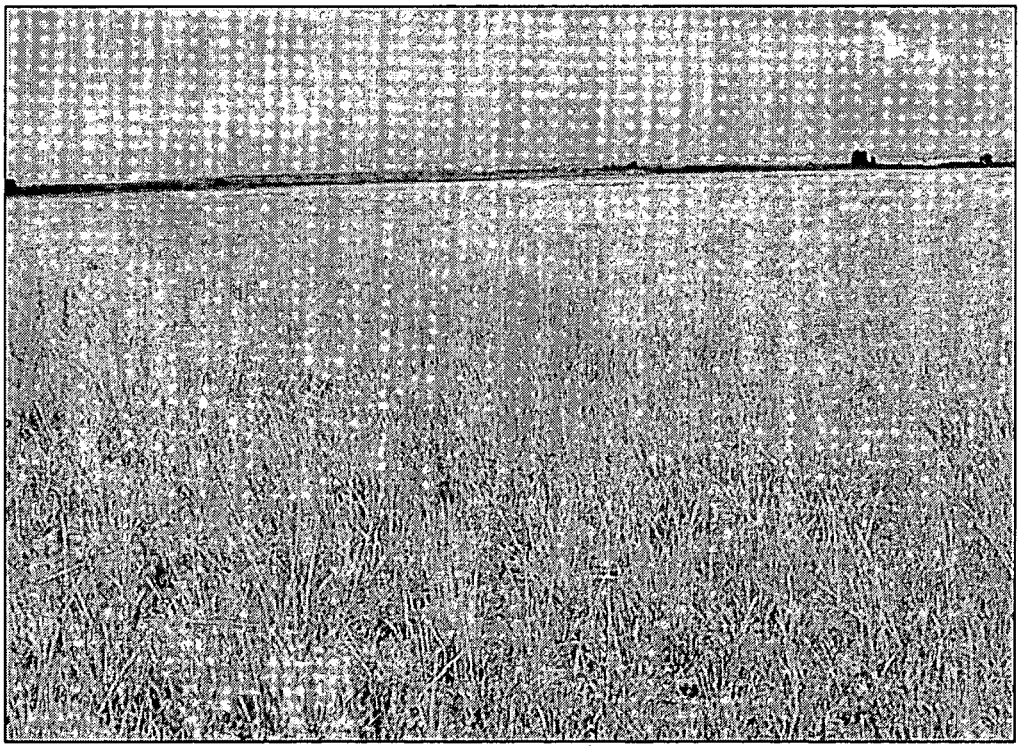
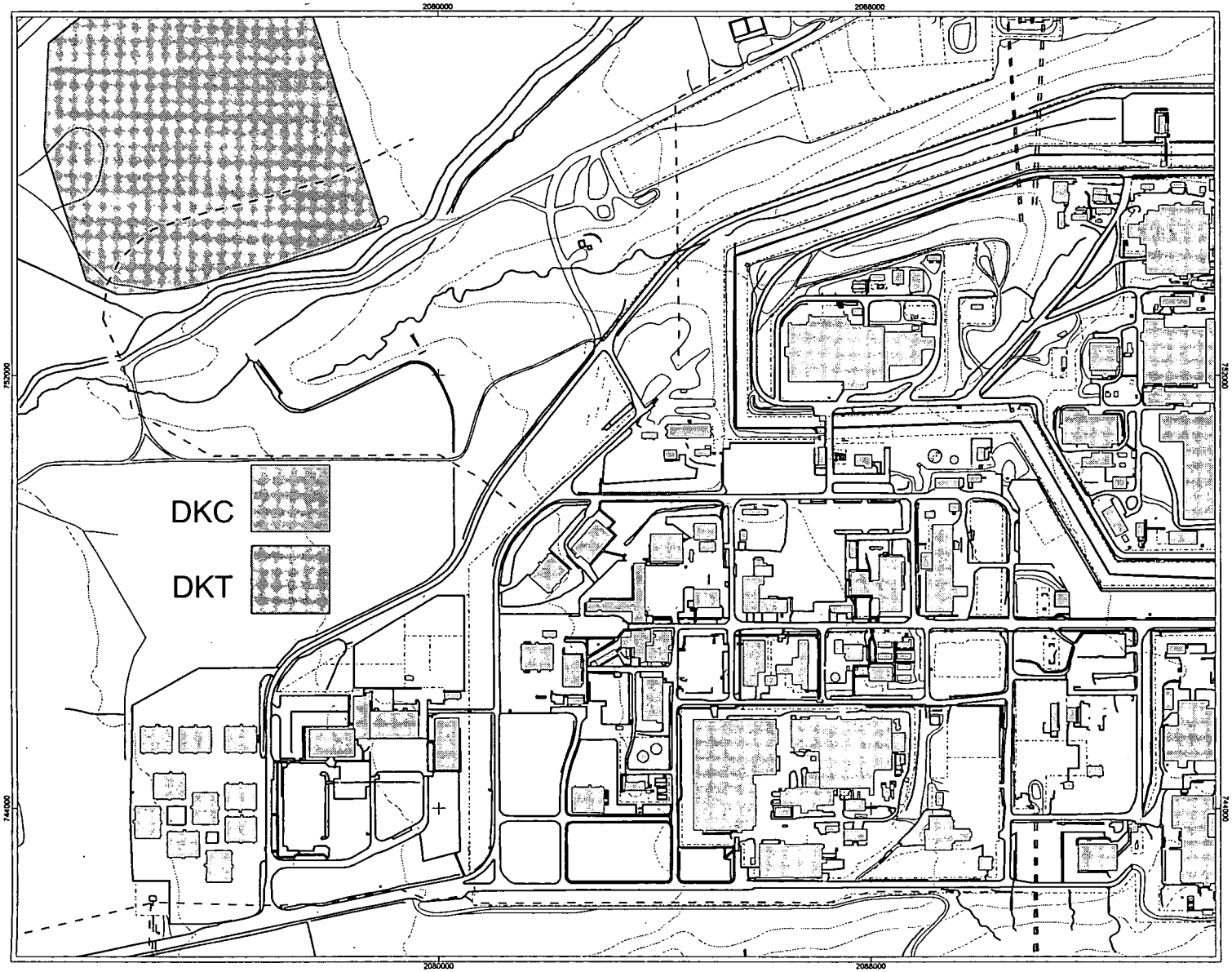


Figure 31. In 2000, 2 years after being treated by helicopter with Tordon 22K, the same location (note trees on horizon) has no diffuse knapweed and the prairie grasses have responded well.



Diffuse Knapweed Herbicide Monitoring Plot Locations

Figure 32

LEGEND

- Control Plot
- Treatment Plot

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
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Data Source Ecology Features:
Location data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

N

1:5566

200 0 200 400 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2k-0038

May 3, 2001

\\Gasan\GIS\ECO-projects\projects\23-0038-veg monitoring locations 2001 apr\CEDI plots

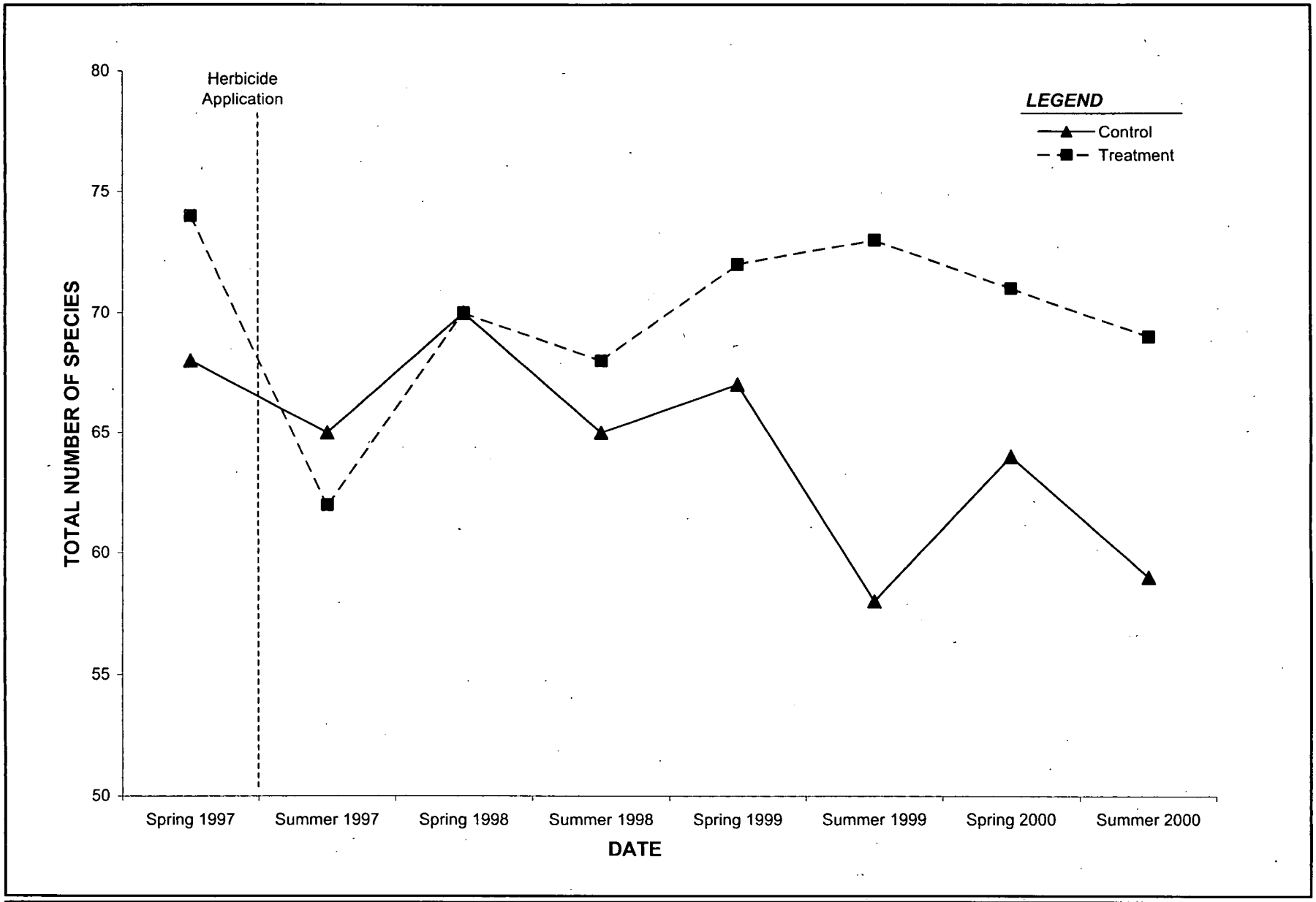


Figure 33. Diffuse knapweed herbicide monitoring study - species richness summary.

\\Boulder1\Groups\Graphics\1454\2001\2k CEDI tables and figures for report.xls Figure 3 5/3/01 CO

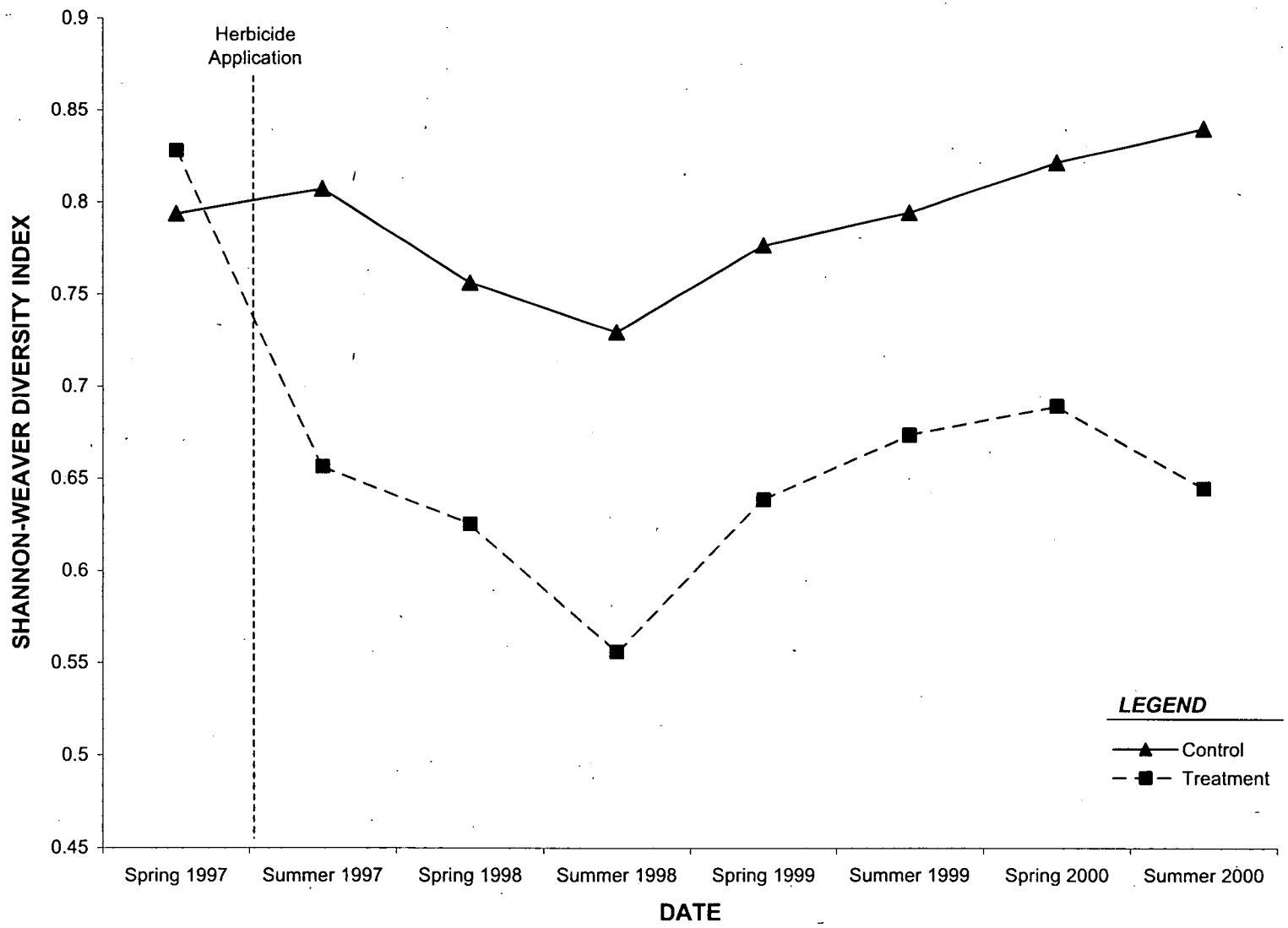


Figure 34. Diffuse knapweed herbicide monitoring study–Shannon-Weaver Diversity Index.

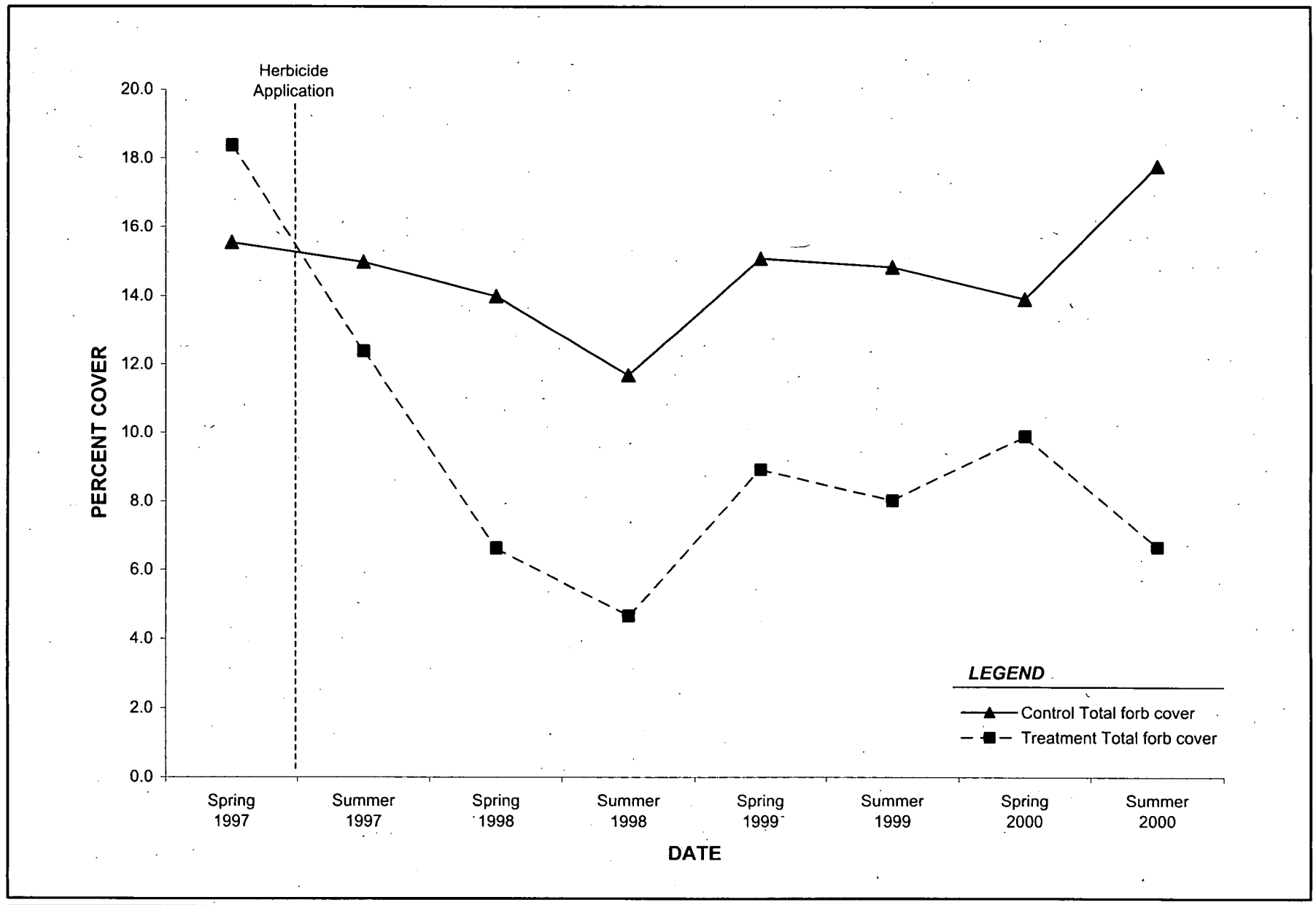


Figure 35. Diffuse knapweed herbicide monitoring study–Total relative forb cover.

\\\Boulder1\Groups\Graphics\1454\2001\2k CEDI tables and figures for report.xls Figure 10 5/3/01 CO

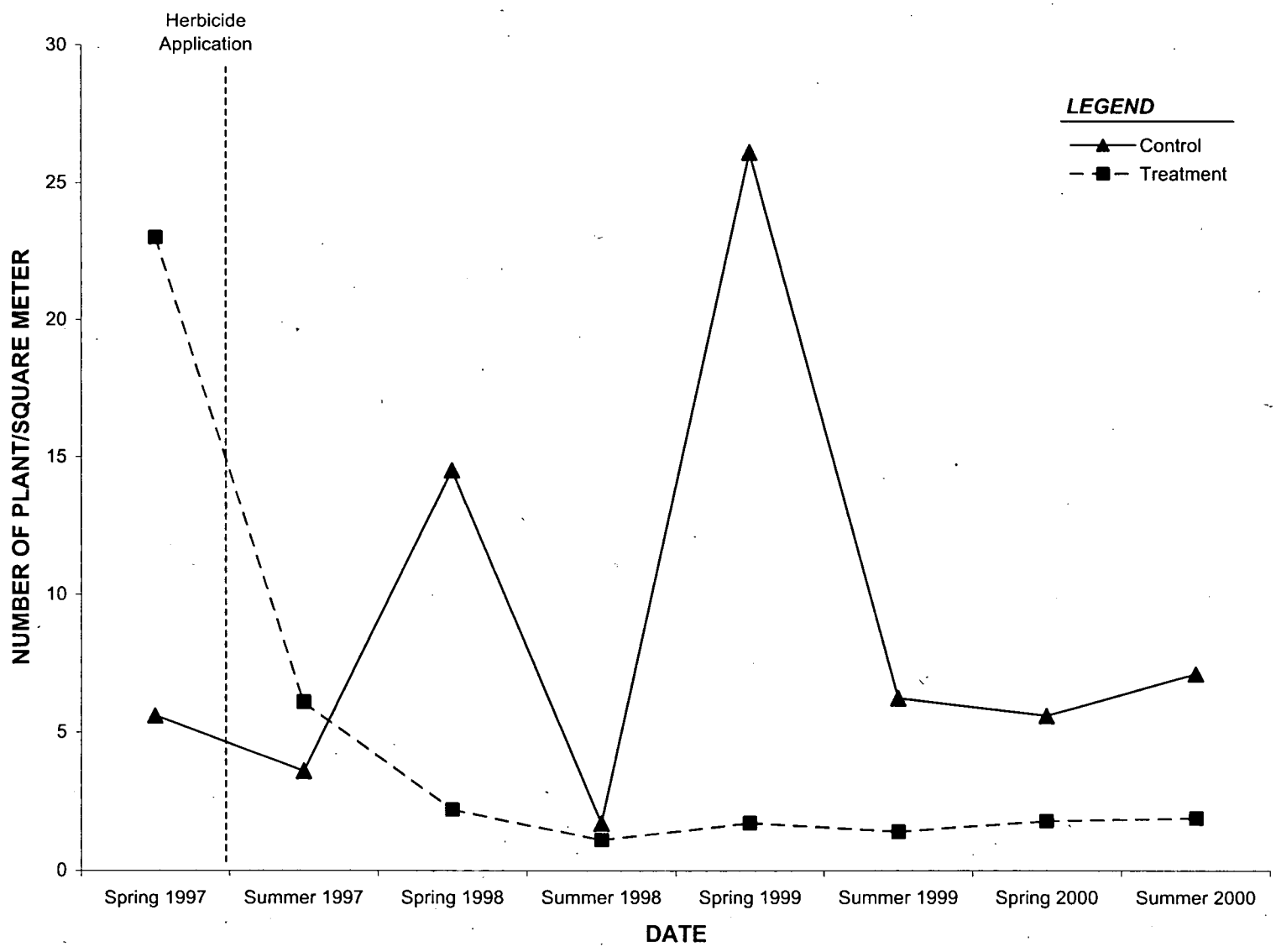


Figure 36. Diffuse knapweed herbicide monitoring study–Diffuse knapweed density.

\\Boulder1\Groups\Graphics\1454\2001\2k CEDI tables and figures for report.xls Figure 5 5/3/01 CO

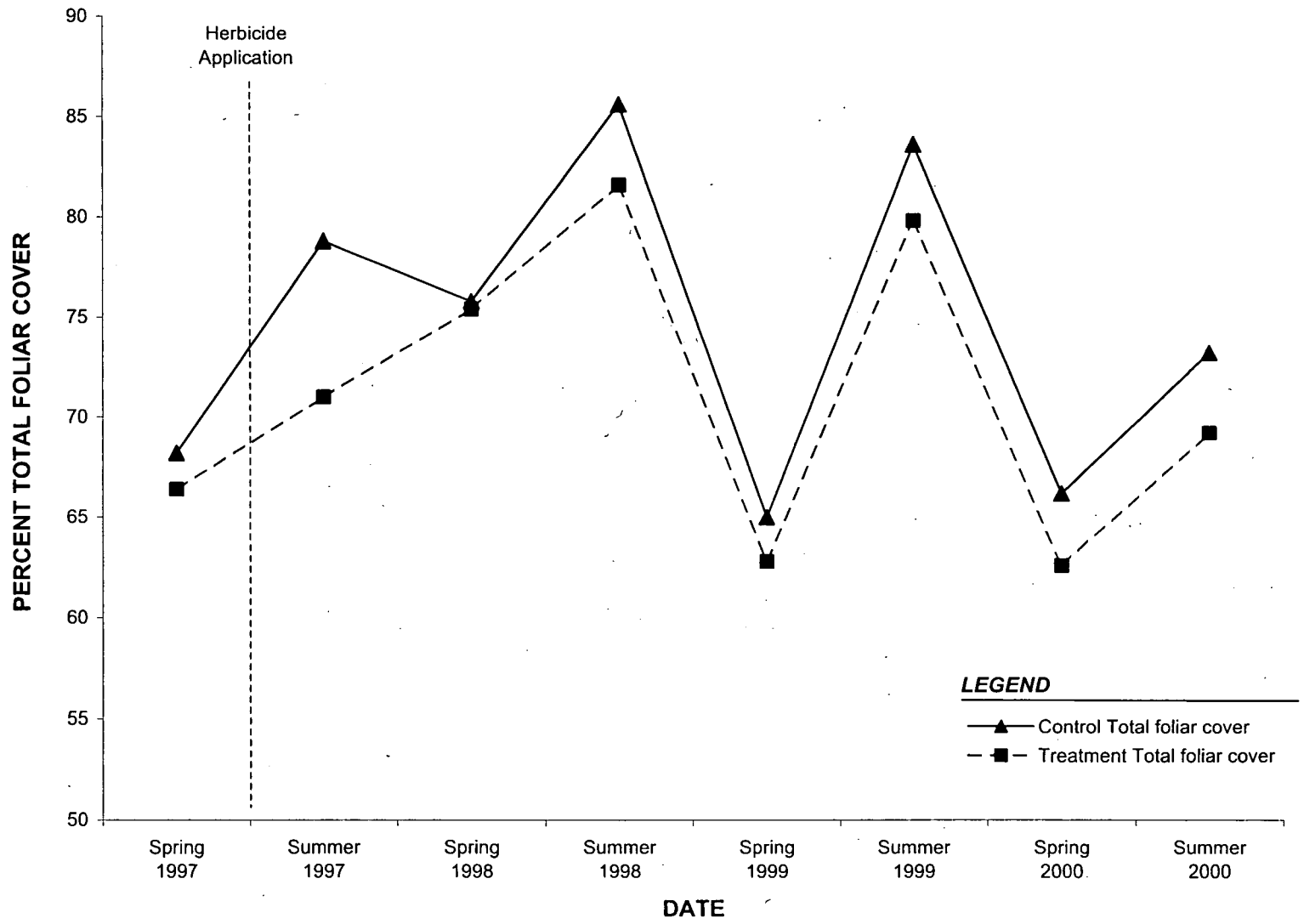


Figure 37. Diffuse knapweed herbicide monitoring study–Total foliar cover.

\\Boulder1\Groups\Graphics\1454\2001\2k CEDI tables and figures for report.xls Figure 9 5/3/01 CO

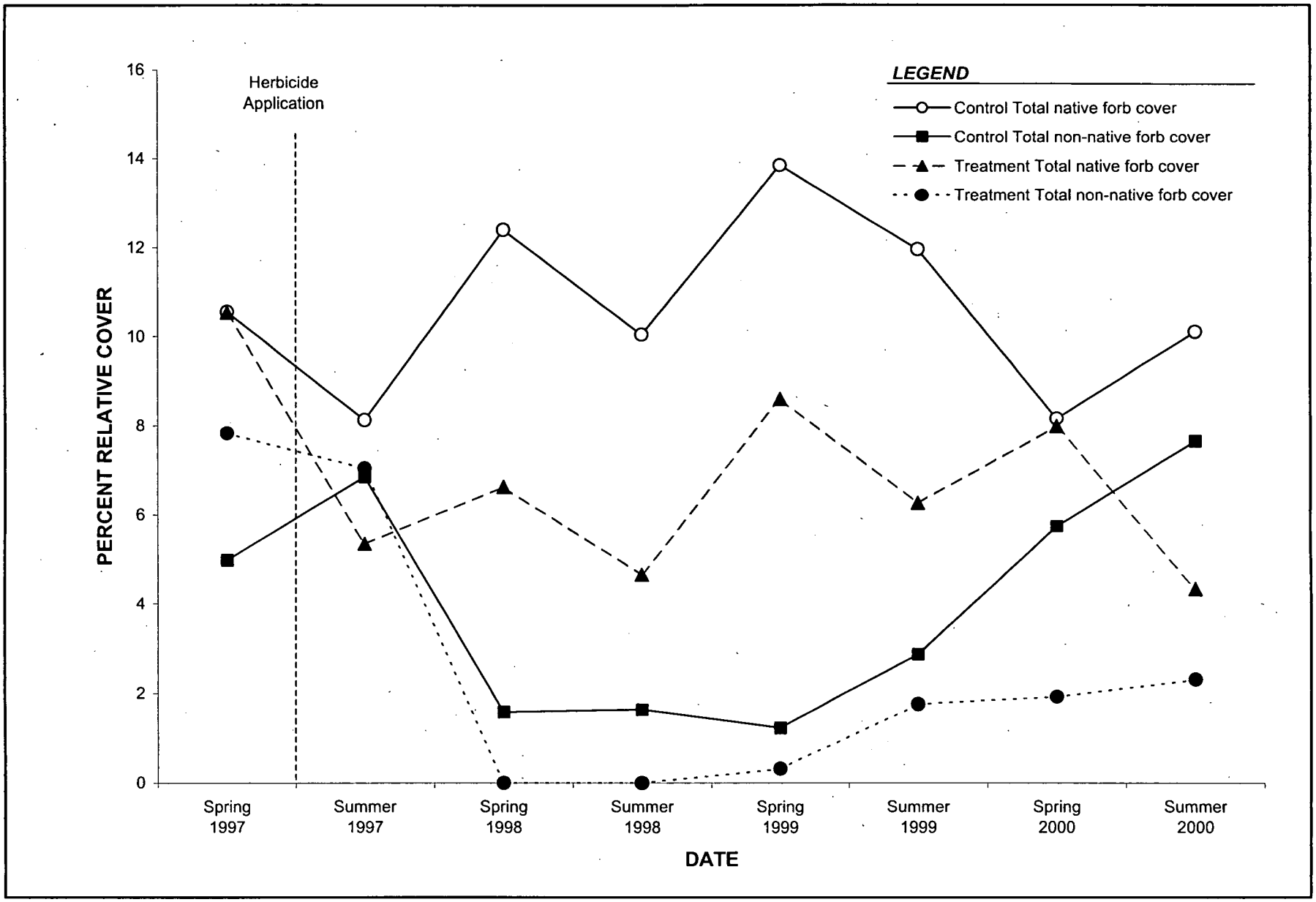


Figure 38. Diffuse knapweed herbicide monitoring study–Native vs. non-native forb cover.

\\Boulder1\Groups\Graphics\1454\2001\2k CEDI tables and figures for report.xls Figure 11 5/3/01 CO

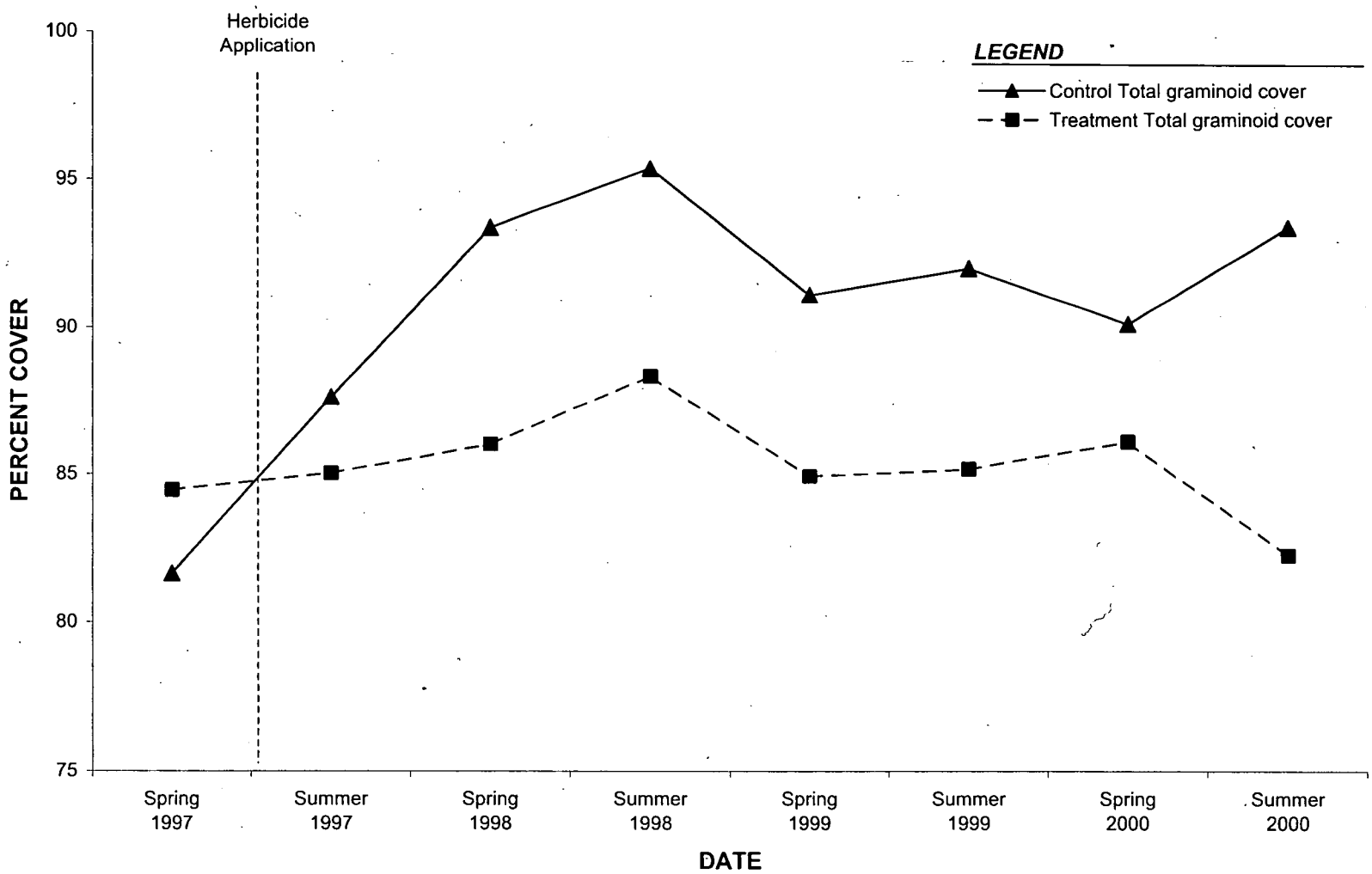


Figure 39. Diffuse knapweed herbicide monitoring study–Total relative graminoid cover.

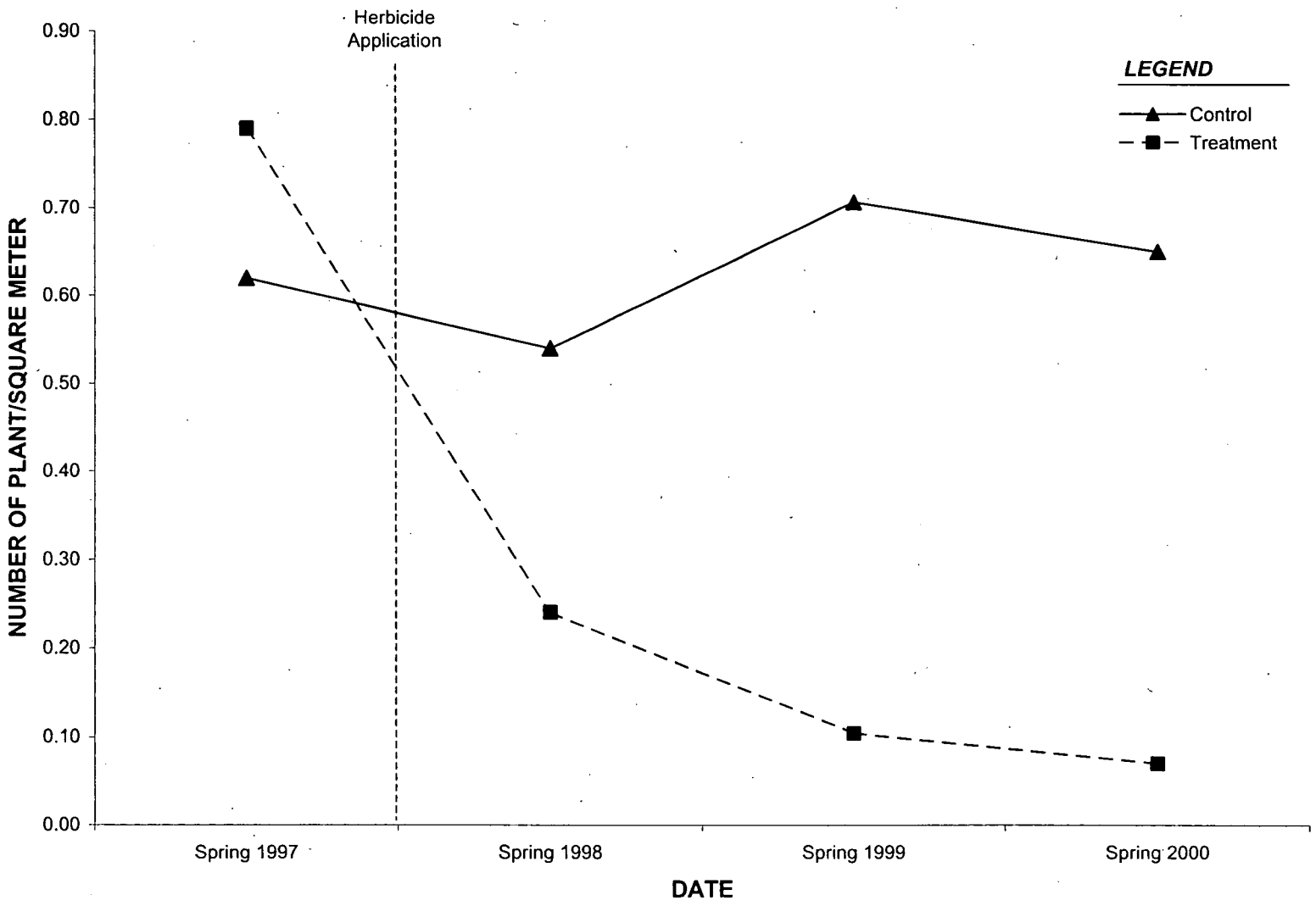


Figure 40. Diffuse knapweed herbicide monitoring study–Twistspine prickly pear cactus density.

\\Boulder1\Groups\Graphics\1454\2001\2k CEDI tables and figures for report.xls Figure 6 5/3/01 CO

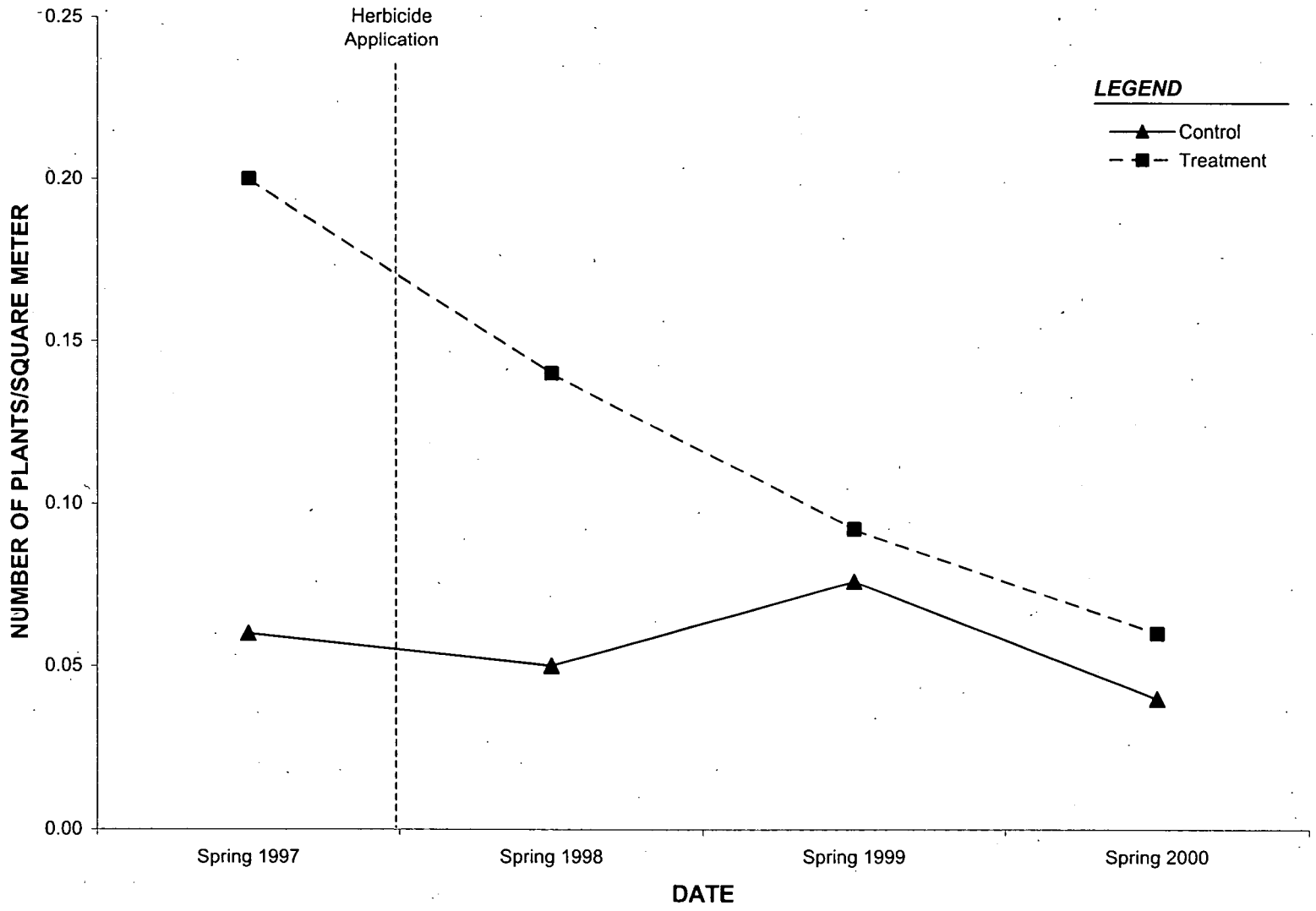
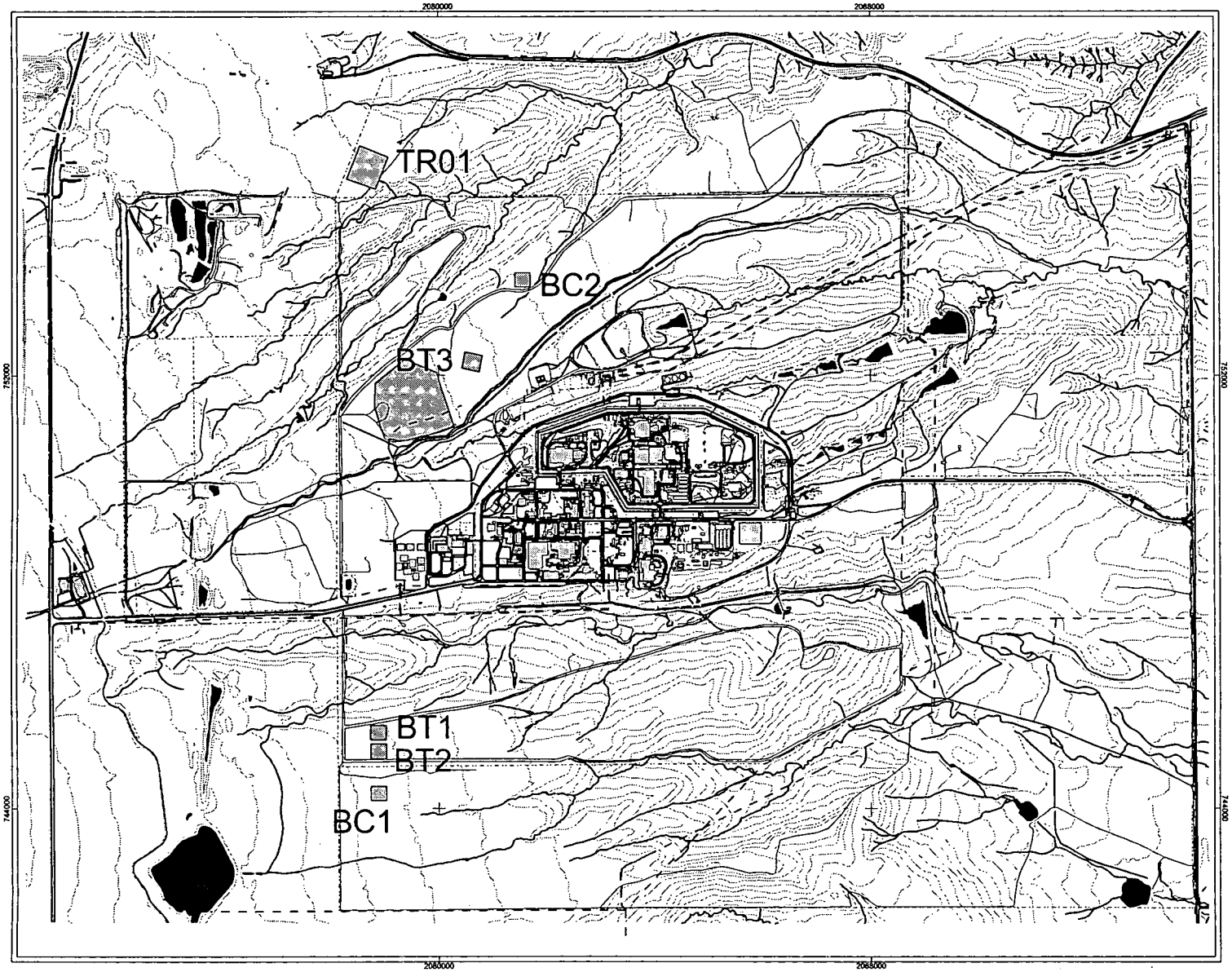


Figure 41. Diffuse knapweed herbicide monitoring study–Hedgehog cactus density.

\\Boulder1\Groups\Graphics\1454\2001\2k CEDI tables and figures for report.xls Figure 7 5/3/01 CO



Prescribed Burn Monitoring Plot Locations

Figure 42

LEGEND

- Control Plots
- Treatment Plots

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Location data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

N

1:23552

1000 0 1000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2k-0038

May 3, 2001

\\Gasrv\GIS\ECO-projects\project\2k-0038\wg monitoring locations 2001 apr\Burn plots

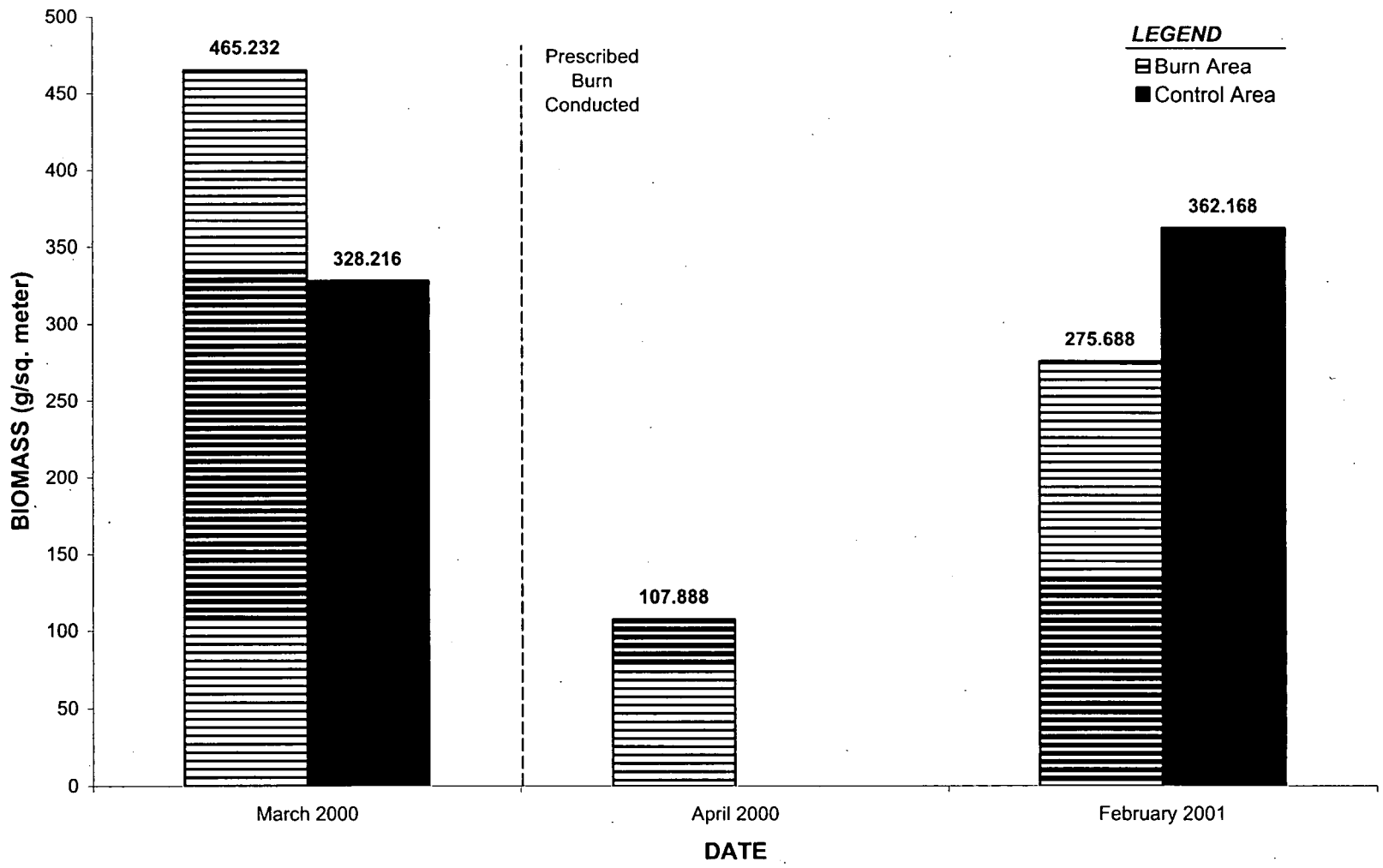


Figure 43. Prescribed burn biomass changes.

\\Boulder1\Groups\Graphics\1454\2001\burn biomass values for report.xls Figure 6-5 5/3/01 CO

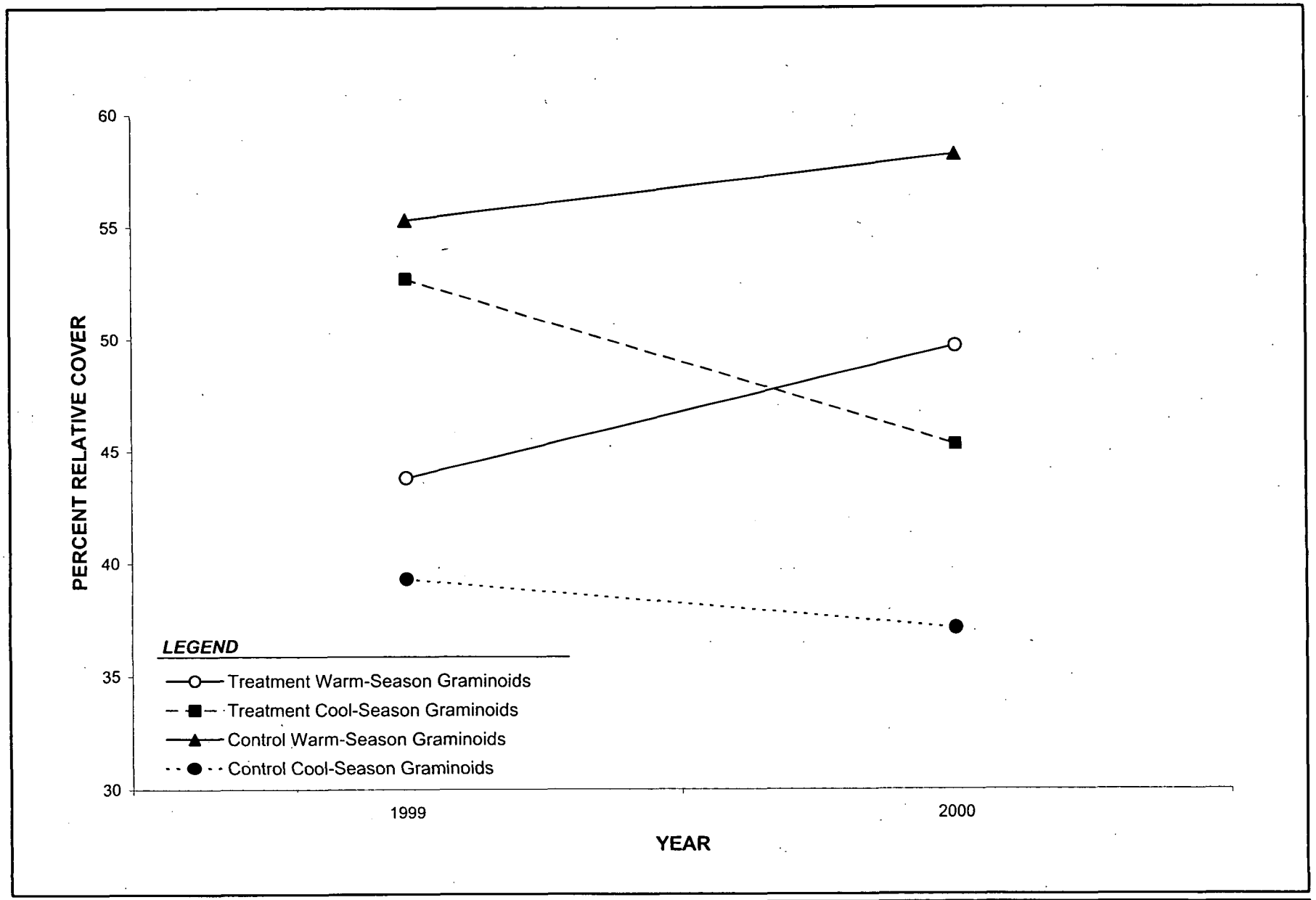
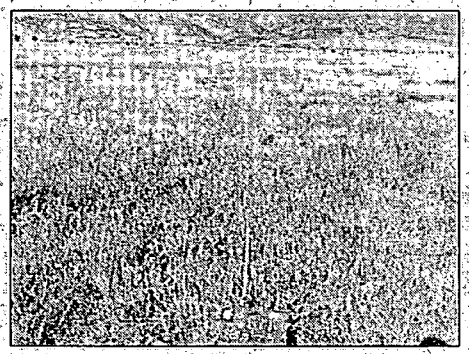


Figure 44. Pre- and post-burn cool-season vs. warm-season graminoid cover.

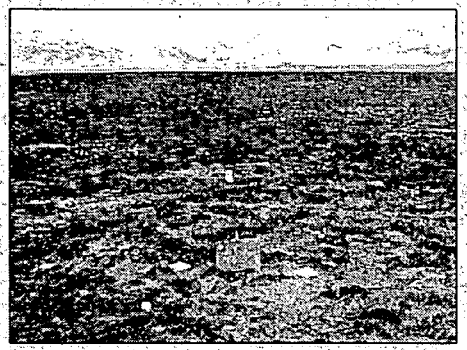
\\Boulder1\Groups\Graphics\1454\2001\2ktables for report.xls Figure 2 5/3/01 CO

Figure 45. Time Series of 2000 Prescribed Burn Area at Rocky Flats Environmental Technology Site

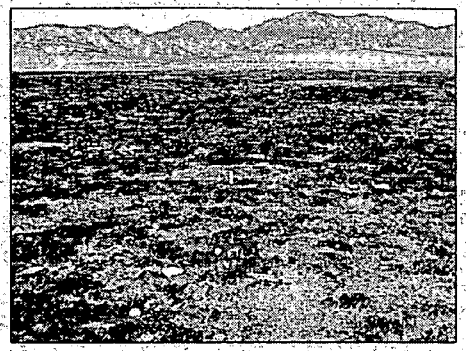
Prescribed Burn Conducted on April 6, 2000



9/15/99



4/7/00



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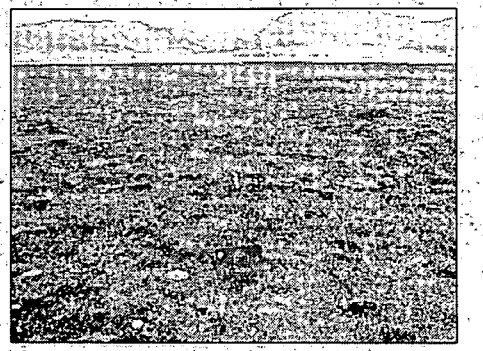

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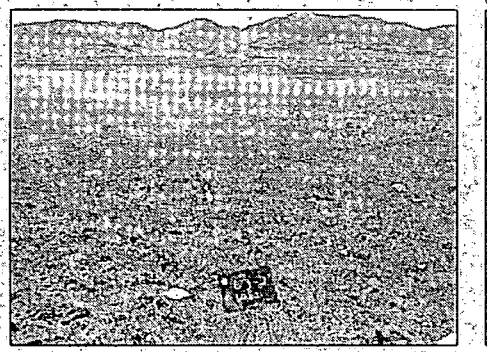

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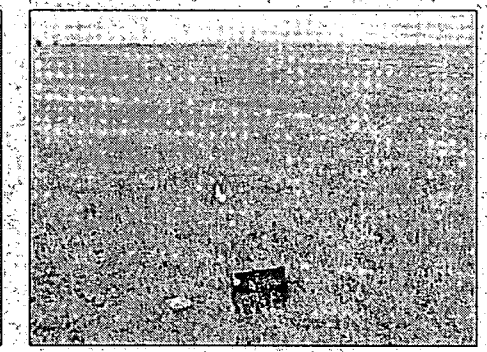

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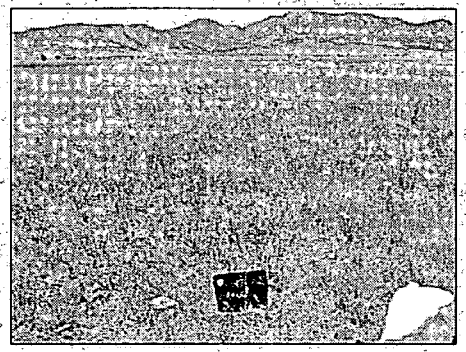

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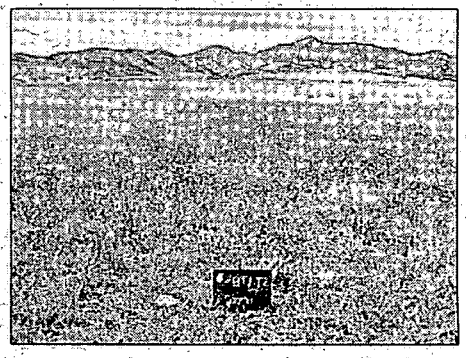
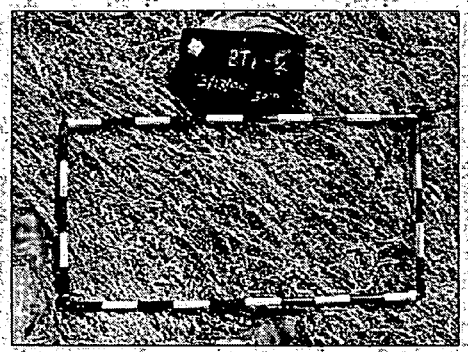


9/27/00

Figure 46. Time Series of Ground Surface in 2000 Prescribed Burn Area
at Rocky Flats Environmental Technology Site
Prescribed Burn Conducted on April 6, 2000



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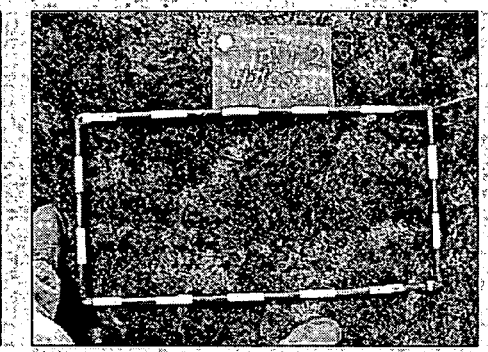
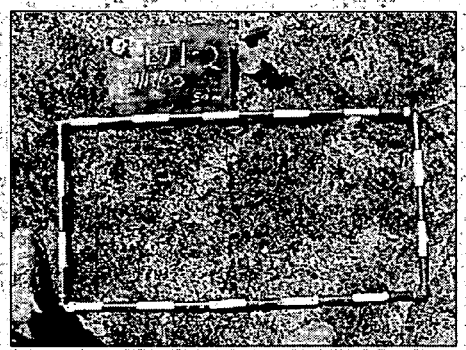
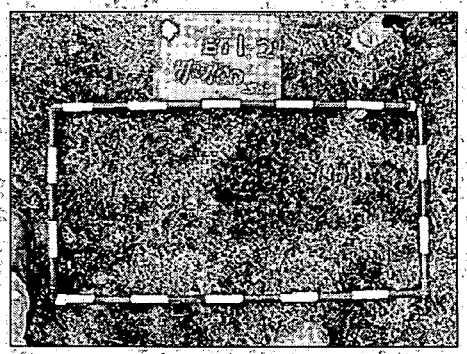


4/7/00



4/17/00



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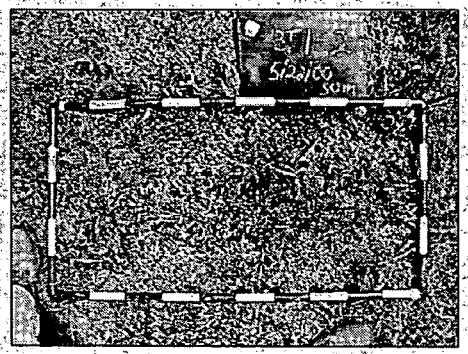

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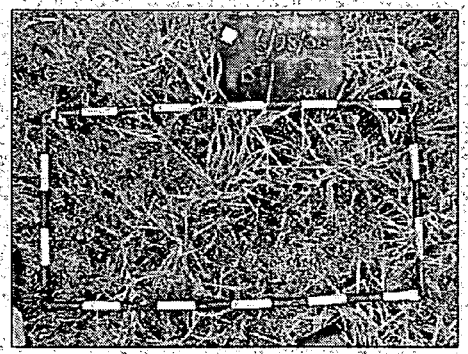

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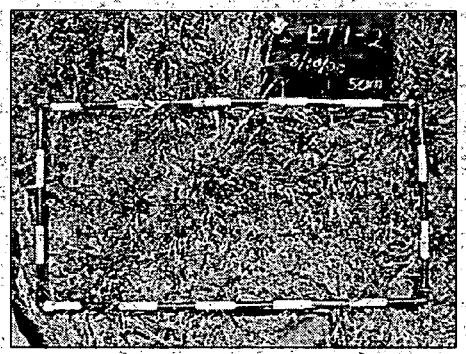
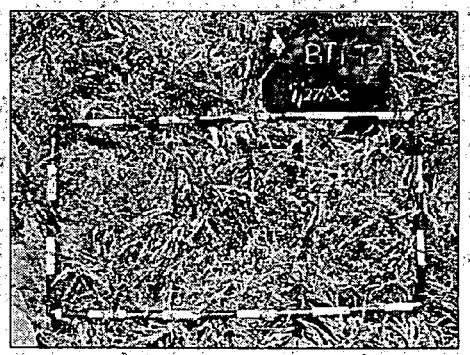


8/10/00



9/27/00

Tables

Table 1. Colorado Natural Heritage Program Rankings for Plant Communities found at Rocky Flats

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Dominant Community Types At Rocky Flats Listed by CNHP

ANDROPOGON GERARDII-SCHIZACHYRIUM SCOPARIUM Xeric Tallgrass Prairies G2 S2

PASCOPYRUM SMITHII PLAINS SWALE GRASSLAND Shortgrass Prairie GU S?

PASCOPYRUM SMITHII-BOUTELOUA GRACILIS Great Plains Shortgrass Prairie G5 S4

POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SALIX EXIGUA Plains Cottonwood Riparian Woodland G4? S3

POPULUS DELTOIDES SSP. MONILIFERA/SYMPHORICARPOS OCCIDENTALIS Plains Cottonwood Riparian Woodland G2G3 S2

PRUNUS VIRGINIANA Foothills Riparian Shrubland G4Q S3

SALIX EXIGUA/BARE GROUND Coyote Willow/Bare Ground G5 S5

SALIX EXIGUA/MESIC GRAMINOID Coyote Willow/Mesic Graminoid G5 S5

STIPA COMATA - EAST Great Plains Mixed Grass Prairies G2 S2

Sub-Dominant Community Types at Rocky Flats Listed by CNHP

ANDROPOGON GERARDII-SPOROBOLUS HETEROLEPIS Xeric Tallgrass Prairies G2 S1S2

CAREX NEBRASCENSIS Wet Meadows G4 S3

CAREX PRAEGRACILIS Clustered Sedge Wetland G3 S2

ELEOCHARIS PALUSTRIS Emergent Wetland G5 S4

PASCOPYRUM SMITHII-STIPA VIRIDULA Great Plains Mixed Grass Prairie G4 S2

RHUS TRILOBATA Skunkbrush Riparian Shrubland G2 S2

SPARTINA PECTINATA Prairie Slough Grass G3? S3

STIPA NEOMEXICANA Great Plains Mixed Grass Prairies G3 S2

SYMPHORICARPOS OCCIDENTALIS Snowberry Shrubland G4G5 S3

See Appendix A for meanings of Colorado Natural Heritage Ranking system codes.

Table 2. 2000, 1997, and 1996 Tall Upland Shrubland Species Richness

Family	Scientific Name	Speccode	Native	2000	1997	1996
ACERACEAE	Acer glabrum Torr.	ACGL1	Y	X	X	X
ACERACEAE	Acer negundo L. var. interius (Britt.) Sarg.	ACNE1	Y	X	X	X
AGAVACEAE	Yucca glauca Nutt.	YUGL1	Y	X	X	X
ALISMATACEAE	Alisma trivale Pursh	ALTR1	Y	X		
ALISMATACEAE	Sagittaria latifolia Willd.	SALA1	Y	X	X	X
AMARANTHACEAE	Amaranthus retroflexus L.	AMRE1	Y	X		
ANACARDIACEAE	Rhus aromatica Ait. var. trilobata (Nutt.) A. Gray	RHAR1	Y	X	X	X
ANACARDIACEAE	Toxicodendron rydbergii (Small) Greene	TORY1	Y	X	X	X
APIACEAE	Cicuta maculata L. var. angustifolia Hook.	CIMA1	Y	X	X	X
APIACEAE	Conium maculatum L.	COMA1	N	X	X	
APIACEAE	Harbouria trachypleura (Gray) C. & R.	HATR1	Y	X	X	X
APIACEAE	Heracleum sphondylium L. ssp. montanum (Schleich.) Briq.	HESP1	Y	X	X	X
APIACEAE	Ligusticum porteri C. & R.	LIPO1	Y	X	X	X
APIACEAE	Lomatium orientale Coult. & Rose	LOOR1	Y	X	X	X
APIACEAE	Musineon divaricatum (Pursh.) Nutt. var. hookeri T. & G.	MUDI1	Y	X	X	X
APIACEAE	Osmorhiza chiliensis H. & A.	OSCH1	Y	X	X	X
APIACEAE	Osmorhiza longistylis (Torr.) DC var. longistylis	OSLO1	Y	X	X	X
APOCYNACEAE	Apocynum cannabinum L.	APCA1	Y	X	X	X
ASCLEPIADACEAE	Asclepias incarnata L.	ASIN1	Y	X	X	X
ASCLEPIADACEAE	Asclepias speciosa Torr.	ASSP1	Y	X	X	X
ASCLEPIADACEAE	Asclepias viridiflora Raf.	ASVI1	Y	X	X	X
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	Y	X	X	X
ASTERACEAE	Ambrosia artemisiifolia L.	AMAR1	Y			X
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	Y	X	X	X
ASTERACEAE	Ambrosia trifida L.	AMTR1	Y	X	X	X
ASTERACEAE	Antennaria microphylla Rydb.	ANMI1	Y	X	X	X
ASTERACEAE	Antennaria parvifolia Nutt.	ANPA1	Y	X	X	X
ASTERACEAE	Arctium minus Bernh.	ARMI1	Y	X	X	X
ASTERACEAE	Arnica fulgens,Pursh.	ARFU1	Y	X	X	X
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	ARCA1	Y	X	X	X
ASTERACEAE	Artemisia dracunculus L.	ARDR1	Y	X	X	X
ASTERACEAE	Artemisia frigida Willd.	ARFR1	Y	X	X	X
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	Y	X	X	X
ASTERACEAE	Aster ericoides L.	ASER1	Y			X
ASTERACEAE	Aster falcatus Lindl.	ASFA1	Y	X	X	
ASTERACEAE	Aster fendleri A. Gray	ASFE1	Y		X	
ASTERACEAE	Aster hesperius A. Gray var. hersperius	ASHE1	Y	X	X	
ASTERACEAE	Aster laevis L. var. geyeri A. Gray	ASLA1	Y	X	X	X
ASTERACEAE	Aster porteri Gray	ASPO1	Y	X	X	X
ASTERACEAE	Bidens frondosa L.	BIFR1	Y	X	X	X
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	N	X	X	X
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	N	X	X	X
ASTERACEAE	Chrysopsis fulcrata Greene	CHFU1	Y	X	X	X
ASTERACEAE	Chrysopsis villosa Pursh.	CHVI1	Y	X	X	X
ASTERACEAE	Cichorium intybus L.	CIIN1	N		X	
ASTERACEAE	Cirsium arvense (L.) Scop.	CIAR1	N	X	X	X
ASTERACEAE	Cirsium undulatum (Nutt.) Spreng.	CIUN1	Y	X	X	X
ASTERACEAE	Cirsium vulgare (Savi) Ten.	CIVU1	N	X	X	X
ASTERACEAE	Conyza canadensis (L.) Cronq.	COCA1	Y	X	X	X
ASTERACEAE	Crepis occidentalis Nutt.	CROC1	Y	X	X	X
ASTERACEAE	Erigeron canus A. Gray	ERCA1	Y	X		X
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	Y	X	X	X
ASTERACEAE	Erigeron flagellaris A. Gray	ERFL1	Y	X	X	X
ASTERACEAE	Erigeron speciosa (Lindl.) DC. var. macranthus (Nutt.) Cronq.	ERSP1	Y	X	X	X
ASTERACEAE	Gaillardia aristata Pursh.	GAAR1	Y	X	X	X
ASTERACEAE	Gnapthalium chilense Spreng.	GNCH1	Y	X	X	
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	Y	X	X	X
ASTERACEAE	Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	Y	X	X	X
ASTERACEAE	Helianthus annuus L.	HEAN1	Y	X		
ASTERACEAE	Helianthus nuttallii T. & G.	HENU1	Y	X	X	X
ASTERACEAE	Helianthus pumilus Nutt.	HEPU1	Y	X	X	X
ASTERACEAE	Helianthus rigidus (Cass.) Desf. ssp. subrhomboideus (Rydb.) Heiser	HERI1	Y	X	X	X

Table 2. (cont.)

Family	Scientific Name	Speccode	Native	2000	1997	1996
ASTERACEAE	Heliomeris multiflora Nuttall	HEMU1	Y	X	X	X
ASTERACEAE	Hymenopappus filifolius Hook. var. cinereus (Rydb.) I. M. Johnst.	HYFI1	Y	X	X	X
ASTERACEAE	Kuhnia chlorolepis Woot. & Standl.	KUCH1	Y	X		X
ASTERACEAE	Kuhnia eupatorioides L.	KUEU1	Y	X	X	X
ASTERACEAE	Lactuca oblongifolia Nutt.	LAOB1	Y		X	X
ASTERACEAE	Lactuca serriola L.	LASE1	N	X	X	X
ASTERACEAE	Liatris punctata Hook.	LIPU1	Y	X	X	X
ASTERACEAE	Microseris cuspidata (Pursh.) Sch. Bip.	MICU1	Y	X		X
ASTERACEAE	Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	Y	X	X	X
ASTERACEAE	Scorzonera laciniata L.	SCLA1	N	X	X	X
ASTERACEAE	Senecio fendleri Gray	SEFE1	Y	X	X	X
ASTERACEAE	Senecio integerrimus Nutt.	SEIN1	Y	X	X	X
ASTERACEAE	Senecio plattensis Nutt.	SEPL1	Y	X	X	X
ASTERACEAE	Senecio spartioides T. & G.	SESP1	Y	X	X	X
ASTERACEAE	Solidago canadensis L.	SOCA1	Y	X	X	X
ASTERACEAE	Solidago gigantea Ait.	SOGI1	Y	X	X	X
ASTERACEAE	Solidago missouriensis Nutt.	SOMI1	Y	X	X	X
ASTERACEAE	Solidago mollis Bart.	SOMO1	Y	X	X	X
ASTERACEAE	Solidago rigida L.	SORI1	Y	X	X	X
ASTERACEAE	Sonchus arvensis L. ssp. arvensis L.	SOAR1	N	X		
ASTERACEAE	Sonchus asper (L.) Hill	SOAS1	N		X	
ASTERACEAE	Sonchus sp.	SON1				X
ASTERACEAE	Taraxacum officinale Weber	TAOF1	N	X	X	X
ASTERACEAE	Thelesperma megapotanicum (Spreng.) O. Ktze.	THME1	Y	X	X	X
ASTERACEAE	Townsendia grandiflora (Nutt.)	TOGR1	Y	X	X	X
ASTERACEAE	Townsendia hookeri Beaman	TOHO1	Y	X	X	X
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	N	X	X	X
ASTERACEAE	Xanthium strumarium L.	XAST1	Y			X
BERBERIDACEAE	Berberis repens Lindl.	BERE1	Y	X	X	X
BETULACEAE	Betula occidentalis Hook.	BEOC1	Y	X	X	X
BORAGINACEAE	Asperugo procumbens L.	ASPR1	N	X	X	X
BORAGINACEAE	Cynoglossum officinale L.	CYOF1	N	X	X	X
BORAGINACEAE	Hackelia floribunda (Lehm.) I. M. Johnst.	HAFL1	Y		X	
BORAGINACEAE	Lappula redowskii (Hornem.) Greene	LARE1	Y		X	
BORAGINACEAE	Lithospermum incisum Lehm.	LIIN1	Y	X		
BORAGINACEAE	Lithospermum multiflorum Torr.	LIMU1	Y	X	X	X
BORAGINACEAE	Mertensia lanceolata (Pursh.) A. DC.	MELA1	Y	X	X	X
BORAGINACEAE	Onosmodium molle Michx. var. occidentale (Mack.) Johnst.	ONMO1	Y	X	X	X
BRASSICACEAE	Alyssum alyssoides (L.) L.	ALAL1	N	X	X	X
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	N	X	X	X
BRASSICACEAE	Arabis fendleri (S. Wats.) Greene var. fendleri	ARFE3	Y	X	X	X
BRASSICACEAE	Arabis glabra (L.) Bernh.	ARGL1	N	X	X	X
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	Y	X		X
BRASSICACEAE	Barbarea vulgaris R. Br.	BAVU1	N	X	X	X
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	CAMI1	N	X	X	X
BRASSICACEAE	Descurainia pinnata (Walt.) Britt.	DEPI1	Y	X	X	X
BRASSICACEAE	Descurainia richardsonii (Sweet) Schultz	DERI1	Y	X	X	X
BRASSICACEAE	Descurainia sophia (L.) Webb ex Prantl.	DESO1	N	X	X	X
BRASSICACEAE	Draba nemorosa L.	DRNE1	Y	X	X	
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	ERCA2	Y	X	X	X
BRASSICACEAE	Lepidium campestre (L.) R. Br.	LECA1	N	X	X	X
BRASSICACEAE	Lepidium densiflorum Schrad.	LEDE1	Y		X	
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	LEMO1	Y	X	X	X
BRASSICACEAE	Nasturtium officinale R. Br.	NAOF1	N	X	X	X
BRASSICACEAE	Physaria vitulifera Rydb.	PHVI1	Y			X
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	N	X	X	X
BRASSICACEAE	Thlaspi arvense L.	THAR1	N	X	X	X
CACTACEAE	Coryphantha missouriensis (Sweet) Britt. & Rose	COMI1	Y	X	X	X
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	Y	X	X	X
CACTACEAE	Opuntia fragilis (Nutt.) Haw.	OPFR1	Y	X	X	X
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	Y	X	X	X
CACTACEAE	Pediocactus simpsonii (Engelm.) Britt. & Rose	PESI1	Y	X	X	X

Table 2. (cont.)

Family	Scientific Name	Speccode	Native	2000	1997	1996
CAMPANULACEAE	Campanula rotundifolia L.	CARO1	Y	X	X	X
CAMPANULACEAE	Lobelia siphilitica L. var. ludoviciana A. DC.	LOSI1	Y	X	X	
CANNABACEAE	Humulus lupulus L. var. lupuloides E. Small	HULU1	Y	X	X	X
CAPRIFOLIACEAE	Symphoricarpos occidentalis Hook.	SYOC1	Y	X	X	X
CAPRIFOLIACEAE	Symphoricarpos oreophilus Gray	SYOR1	Y	X	X	X
CAPRIFOLIACEAE	Viburnum opulus L. var. americanum Ait	VIOP1	N	X	X	X
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	ARFE2	Y	X	X	X
CARYOPHYLLACEAE	Cerastium arvense L.	CEAR1	Y	X	X	X
CARYOPHYLLACEAE	Cerastium vulgatum L.	CEVU1	N	X	X	X
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	PAJA1	Y	X	X	X
CARYOPHYLLACEAE	Saponaria officinalis L.	SAOF1	N	X	X	X
CARYOPHYLLACEAE	Silene antirrhina L.	SIAN1	Y	X	X	X
CARYOPHYLLACEAE	Silene drummondii Hook.	SIDR1	Y	X	X	X
CARYOPHYLLACEAE	Silene pratensis (Raf.)Godr. & Gren	SIPR1	N	X	X	X
CARYOPHYLLACEAE	Stellaria longifolia Muhl. ex Willd.	STLO1	Y	X	X	
CHENOPODIACEAE	Chenopodium album L.	CHAL1	N	X		X
CHENOPODIACEAE	Chenopodium berlandieri Moq.	CHBE1	Y	X		X
CHENOPODIACEAE	Chenopodium fremontii S. Wats.	CHFR1	Y	X	X	X
CHENOPODIACEAE	Chenopodium leptophyllum Nutt. ex Moq.	CHLE2	Y	X	X	
CHENOPODIACEAE	Chenopodium overi Aellen	CHOV1	Y		X	
CHENOPODIACEAE	Salsola iberica Senn. &.Pau.	SAIB1	N	X		X
CLUSIACEAE	Hypericum majus (A. Gray) Britt.	HYMA1	Y	X		
CLUSIACEAE	Hypericum perforatum L.	HYPE1	N	X	X	X
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	TROC1	Y.	X	X	X
CONVOLVULACEAE	Convolvulus arvensis L.	COAR1	N	X	X	X
CRASSULACEAE	Sedum lanceolatum Torr.	SELA1	Y	X	X	X
CUPRESSACEAE	Juniperus communis L.	JUCO1	Y	X	X	X
CUPRESSACEAE	Juniperus scopulorum Sarg.	JUSC1	T		X	
CYPERACEAE	Carex aurea Nutt.	CAAU1	Y		X	
CYPERACEAE	Carex brevior (Dew.) Mack. ex Lunell.	CABR1	Y	X	X	X
CYPERACEAE	Carex douglasii F. Boott.	CADO1	Y	X		
CYPERACEAE	Carex eleocharis Bailey	CAEL1	Y	X	X	
CYPERACEAE	Carex heliophila Mack.	CAHE1	Y	X	X	X
CYPERACEAE	Carex hystericina Muhl. ex Willd.	CAHY1	Y	X	X	X
CYPERACEAE	Carex interior Bailey	CAIN1	Y	X	X	X
CYPERACEAE	Carex lanuginosa Michx.	CALA1	Y	X	X	X
CYPERACEAE	Carex nebrascensis Dew.	CANE1	Y	X	X	X
CYPERACEAE	Carex oreocharis Holm.	CAOR1	Y	X	X	
CYPERACEAE	Carex praegracilis W. Boott.	CAPR1	Y	X	X	X
CYPERACEAE	Carex scoparia Schkuhr. ex Willd.	CASC1	Y	X	X	
CYPERACEAE	Carex simulata Mack.	CASI1	Y	X	X	
CYPERACEAE	Carex stipata Muhl.	CAST1	Y		X	
CYPERACEAE	Eleocharis macrostachya Britt.	ELMA1	Y	X	X	X
CYPERACEAE	Scirpus pallidus (Britt.) Fern	SCPA1	Y	X	X	
CYPERACEAE	Scirpus pungens Vahl	SCPU1	Y			X
CYPERACEAE	Scirpus validus Vahl.	SCVA1	Y	X	X	X
EQUISETACEAE	Equisetum laevigatum A. Br.	EQLA1	Y	X	X	X
EUPHORBIACEAE	Euphorbia robusta (Engelm.) Small	EURO1	Y	X	X	X
EUPHORBIACEAE	Euphorbia spathulata Lam.	EUSP1	Y	X	X	
FABACEAE	Amorpha fruticosa L.	AMFR1	Y	X	X	X
FABACEAE	Astragalus adsurgens Pall. var. robustior Hook.	ASAD1	Y	X	X	X
FABACEAE	Astragalus agrestis Dougl. ex G. Don	ASAG1	Y	X	X	X
FABACEAE	Astragalus canadensis L.	ASCA1	Y		X	X
FABACEAE	Astragalus drummondii Dougl. ex Hook.	ASDR1	Y	X	X	X
FABACEAE	Astragalus flexuosus (Hook.) G. Don	ASFL1	Y	X	X	X
FABACEAE	Astragalus shortianus Nutt. ex T.&G.	ASSH1	Y	X	X	X
FABACEAE	Astragalus tridactylicus Gray	ASTR1	Y	X	X	X
FABACEAE	Dalea candida Michx. ex Willd. var. oligophylla (Torr.) Shinners.	DACA1	Y	X	X	X
FABACEAE	Dalea purpurea Vent	DAPU1	Y	X	X	X
FABACEAE	Glycyrrhiza lepidota Pursh.	GLLE1	Y	X	X	X
FABACEAE	Lathyrus eucosmus Butters and St. John	LAEU1	Y	X	X	X
FABACEAE	Lathyrus polymorphus Nutt. ssp. incanus (Sm. & Rydb.) C. L. Hitchc.	LAPO1	Y			X

Table 2. (cont.)

Family	Scientific Name	Speccode	Native	2000	1997	1996
FABACEAE	Lupinus argenteus Pursh ssp. ingratus (Greene) Harmon	LUAR2	Y	X	X	X
FABACEAE	Lupinus argenteus Pursh var. argenteus	LUAR1	Y	X	X	X
FABACEAE	Melilotus officinalis (L.) Pall.	MEOF1	N	X	X	X
FABACEAE	Oxytropis lambertii Pursh.	OXLA1	Y	X	X	X
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	Y	X	X	X
FABACEAE	Thermopsis rhombifolia var. divaricarpa (Nels.) Isely	THRH1	Y	X	X	X
FABACEAE	Vicia americana Muhl. ex Willd.	VIAM1	Y	X	X	X
GENTIANACEAE	Gentiana affinis Griseb.	GEAF1	Y	X	X	X
GENTIANACEAE	Swertia radiata (Kell.) O. Ktze.	SWRA1	Y	X	X	X
GERANIACEAE	Erodium cicutarium (L.) L'Her.	ERCI1	N	X	X	X
GERANIACEAE	Geranium caespitosum James ssp. caespitosum	GECA1	Y	X	X	X
GROSSULARIACEAE	Ribes aureum Pursh	RIAU1	Y	X	X	X
GROSSULARIACEAE	Ribes cereum Dougl.	RICE1	Y	X	X	X
HYDROPHYLLACEAE	Hydrophyllum fendleri (Gray) Heller	HYFE1	Y	X	X	X
HYDROPHYLLACEAE	Phacelia heterophylla Pursh.	PHHE1	Y	X	X	X
IRIDACEAE	Iris missouriensis Nutt.	IRMI1	Y	X	X	X
IRIDACEAE	Sisyrinchium montanum Greene	SIMO1	Y	X	X	
JUNCACEAE	Juncus balticus Willd.	JUBA1	Y	X	X	X
JUNCACEAE	Juncus dudleyi Wieg.	JUDU1	Y	X	X	X
JUNCACEAE	Juncus ensifolius Wikst. var. montanus (Englm.) C. L. Hitchc.	JUEN1	Y	X	X	X
JUNCACEAE	Juncus interior Wieg.	JUIN1	Y		X	
JUNCACEAE	Juncus longistylis Torr.	JULO1	Y	X	X	
JUNCACEAE	Juncus nodosus L.	JUNO1	Y	X	X	X
JUNCACEAE	Juncus torreyi Cov.	JUTO1	Y	X		X
LAMIACEAE	Lycopus americanus Muhl. ex Barton	LYAM1	Y	X	X	X
LAMIACEAE	Marrubium vulgare L.	MAVU1	N		X	
LAMIACEAE	Mentha arvensis L.	MEAR1	Y	X	X	X
LAMIACEAE	Monarda fistulosa L. var. menthifolia (Grah.) Fern.	MOFI1	Y	X	X	X
LAMIACEAE	Nepeta cataria L.	NECA1	N	X	X	X
LAMIACEAE	Prunella vulgaris L.	PRVU1	Y	X	X	X
LAMIACEAE	Scutellaria brittonii Porter	SCBR1	Y	X	X	X
LEMNACEAE	Lemna minor L.	LEMI1	Y	X	X	X
LILIACEAE	Allium cernuum Roth	ALCE1	Y	X	X	X
LILIACEAE	Allium geyeri S. Wats.	ALGE1	Y			X
LILIACEAE	Allium textile A. Nels. & Macbr.	ALTE1	Y	X	X	X
LILIACEAE	Asparagus officinalis L.	ASOF1	N	X	X	X
LILIACEAE	Calochortus gunnisonii S. Wats.	CAGU1	Y	X	X	X
LILIACEAE	Leucocrinum montanum Nutt.	LEMO2	Y	X	X	X
LILIACEAE	Smilacina stellata (L.) Desf.	SMST1	Y	X	X	X
LILIACEAE	Zigadenus venenosus Wats. var. gramineus (Rydb.) Walsh ex Peck	ZIVE1	Y	X	X	X
LINACEAE	Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	LIPE1	Y	X	X	X
LYTHRACEAE	Lythrum alatum Pursh.	LYAL1	Y	X	X	
MALVACEAE	Malva neglecta Wallr.	MANE1	N			X
MALVACEAE	Sidalcea candida Gray	SICA1	Y	X	X	X
MALVACEAE	Sphaeralcea coccinea (Pursh.) Rydb.	SPCO1	Y	X	X	
NYCTAGINACEAE	Mirabilis hirsuta (Pursh.) MacM.	MIHI1	Y	X	X	X
NYCTAGINACEAE	Mirabilis linearis (Pursh.) Heimerl	MILI1	Y	X	X	X
NYCTAGINACEAE	Mirabilis nyctaginea (Michx.) MacM.	MINY1	Y	X	X	X
ONAGRACEAE	Calylophus serrulatus (Nutt.) Raven	CASE2	Y	X	X	X
ONAGRACEAE	Epilobium ciliatum Raf. ssp. glandulosum (Lehm.) Hock & Raven	EPCI1	Y	X	X	X
ONAGRACEAE	Epilobium paniculatum Nutt.	EPPA1	Y	X	X	X
ONAGRACEAE	Gaura coccinea Pursh.	GACO1	Y	X	X	X
ONAGRACEAE	Gaura parviflora Dougl.	GAPA1	Y	X		X
ONAGRACEAE	Oenothera howardii (A. Nels.) W. L. Wagner	OEHO1	Y	X	X	X
ONAGRACEAE	Oenothera villosa Thunb. ssp. strigosa (Rydb.) Dietrich & Raven	OEVI1	Y	X	X	X
OROBANCHACEAE	Orobanche fasciculata Nutt.	ORFA1	Y		X	
OXALIDACEAE	Oxalis dillenii Jacq.	OXDI1	N	X	X	X
PINACEAE	Pinus ponderosa Laws	PIPO1	Y	X	X	X
PINACEAE	Pseudotsuga menziesii (Mirb.) Franco	PSME1	Y	X	X	X
PLANTAGINACE	Plantago lanceolata L.	PLLA1	N	X	X	X
PLANTAGINACE	Plantago major L.	PLMA1	N	X	X	
POACEAE	Aegilops cylindrica Host	AECY1	N	X	X	

Table 2. (cont.)

Family	Scientific Name	Speccode	Native	2000	1997	1996
POACEAE	Agropyron caninum (L.) Beauv. ssp. majus (Vasey) C. L. Hitchc.	AGCA1	Y	X	X	X
POACEAE	Agropyron cristatum (L.) Gaertn.	AGCR1	N	X	X	X
POACEAE	Agropyron dasystachyum (Hook.) Scribn.	AGDA1	Y	X	X	X
POACEAE	Agropyron desertorum (Fisch.) Schult.	AGDE1	N	X	X	X
POACEAE	Agropyron griffithsii Scribn. & Smith	AGGR1	Y	X	X	X
POACEAE	Agropyron intermedium (Host) Beauv.	AGIN1	N	X	X	X
POACEAE	Agropyron repens (L.) Beauv.	AGRE1	N	X	X	X
POACEAE	Agropyron smithii Rydb.	AGSM1	Y	X	X	X
POACEAE	Agrostis scabra Willd.	AGSC1	Y	X	X	X
POACEAE	Agrostis stolonifera L.	AGST1	N	X	X	X
POACEAE	Andropogon gerardii Vitman	ANGE1	Y	X	X	X
POACEAE	Andropogon scoparius Michx.	ANSC1	Y	X	X	X
POACEAE	Aristida purpurea Nutt. var. longiseta (Steud.) Vasey	ARFE1	Y		X	
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	Y	X	X	X
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	Y	X	X	X
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	Y	X	X	X
POACEAE	Bouteloua hirsuta Lag	BOHI1	Y	X	X	X
POACEAE	Bromus briziformis F. & M.	BRBR1	N	X	X	X
POACEAE	Bromus inermis Leyss. ssp. inermis	BRIN1	N	X	X	X
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	N	X	X	X
POACEAE	Bromus tectorum L.	BRTE1	N	X	X	X
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	BUDA1	Y	X		X
POACEAE	Ceratochloa marginata (Nees ex Stued.) Jackson	CEMA1	Y	X	X	X
POACEAE	Dactylis glomerata L.	DAGL1	N	X	X	X
POACEAE	Danthonia spicata (L.) Beauv. ex R. & S.	DASP1	Y	X		
POACEAE	Dichanthelium oligosanthes (Schultz) Gould var. scribnerianum (Nash) G	DIOL1	Y	X	X	
POACEAE	Elymus canadensis L.	ELCA1	Y	X	X	X
POACEAE	Festuca ovina L. var. rydbergii St. Yves	FEOV1	Y	X	X	X
POACEAE	Festuca pratensis Huds.	FEPR1	Y	X		X
POACEAE	Glyceria grandis S. Wats. ex A. Gray	GLGR1	Y	X	X	X
POACEAE	Glyceria striata (Lam.) Hitchc.	GLST1	Y	X	X	X
POACEAE	Hordeum brachyantherum Nevski	HOBR1	Y	X		
POACEAE	Hordeum jubatum L.	HOJU1	Y	X	X	X
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1	Y	X	X	X
POACEAE	Muhlenbergia asperifolia (Nees. & Mey.) Parodi	MUAS1	Y	X		
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	Y	X	X	X
POACEAE	Muhlenbergia racemosa (Michx.) B. S. P.	MURA1	Y	X	X	X
POACEAE	Muhlenbergia wrightii Vasey	MUWR1	Y	X		
POACEAE	Oryzopsis hymenoides (R. & S.) Ricker	ORHY1	Y	X	X	X
POACEAE	Panicum virgatum L.	PAVI1	Y	X	X	X
POACEAE	Phleum pratense L.	PHPR1	N	X	X	X
POACEAE	Poa annua L.	POAN1	N			X
POACEAE	Poa compressa L.	POCO1	N	X	X	X
POACEAE	Poa palustris L.	POPA1	N	X	X	X
POACEAE	Poa pratensis L.	POPR1	N	X	X	X
POACEAE	Secale cereale L.	SECE1	N		X	
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	Y	X	X	X
POACEAE	Sorghastrum nutans (L.) Nash	SONU1	Y	X	X	X
POACEAE	Spartina pectinata Link	SPPE1	Y	X	X	X
POACEAE	Sporobolus asper (Michx.) Kunth	SPAS1	Y	X	X	
POACEAE	Sporobolus cryptandrus (Torr.) A. Gray	SPCR1	Y	X	X	X
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	Y	X	X	X
POACEAE	Stipa comata Trin. & Rupr.	STCO1	Y	X	X	X
POACEAE	Stipa neomexicana (Thur.) Scribn.	STNE1	Y	X		
POACEAE	Stipa robusta (Vasey) Scribn.	STRO1	Y	X		
POACEAE	Stipa spartea Trinius	STSP1	Y	X	X	X
POACEAE	Stipa viridula Trin.	STVI1	Y	X	X	X
POACEAE	X Agrohordeum macounii (Vasey) Lepage	AGMA1	N		X	X
POLEMONIACEAE	Collomia linearis Nutt.	COLI1	Y	X	X	X
POLEMONIACEAE	Ipomopsis spicata (Nutt.) V. Grant ssp. spicata	IPSP1	Y	X	X	X
POLYGONACEAE	Eriogonum alatum Torr.	ERAL1	Y	X	X	X
POLYGONACEAE	Eriogonum jamesii Benth.	ERJA1	Y	X	X	

Table 2. (cont.)

Family	Scientific Name	Speccode	Native	2000	1997	1996
POLYGONACEAE	Eriogonum umbellatum Torr.	ERUM1	Y	X	X	X
POLYGONACEAE	Polygonum arenastrum Jord. ex Bor.	POAR1	N	X		X
POLYGONACEAE	Polygonum convolvulus L.	POCO2	N	X	X	X
POLYGONACEAE	Polygonum douglasii Greene	PODO1	Y		X	
POLYGONACEAE	Polygonum hydropiper L.	POHY1	N	X	X	X
POLYGONACEAE	Polygonum pensylvanicum L.	POPE1	Y	X		
POLYGONACEAE	Polygonum persicaria L.	POPE2	N	X	X	X
POLYGONACEAE	Polygonum ramosissimum Michx.	PORA1	Y	X	X	X
POLYGONACEAE	Polygonum sawatchense Small	POSA1	Y		X	
POLYGONACEAE	Rumex acetosella L.	RUAC1	N	X	X	X
POLYGONACEAE	Rumex crispus L.	RUCR1	N	X	X	X
POLYGONACEAE	Rumex obtusifolius L.	RUOB1	N	X	X	X
POLYGONACEAE	Rumex salicifolius Weinm. ssp. triangulivalvis Danser	RUSA1	Y	X	X	X
POLYPODIACEAE	Cystopteris fragilis (L.) Bernh.	CYFR1	Y	X	X	X
PORTULACACEAE	Claytonia rosea Rydb.	CLRO1	Y	X	X	X
PRIMULACEAE	Androsace occidentalis Pursh.	ANOC1	Y	X		
PRIMULACEAE	Lysimachia ciliata L.	LYCI1	Y	X	X	X
RANUNCULACEAE	Anemone cylindrica A. Gray	ANCY1	Y	X	X	X
RANUNCULACEAE	Anemone patens L.	ANPA2	Y	X		X
RANUNCULACEAE	Clematis ligusticifolia Nutt.	CLLI1	Y	X	X	X
RANUNCULACEAE	Delphinium nuttalianum Pritz. ex Walpers	DENU1	Y	X	X	X
RANUNCULACEAE	Delphinium virescens Nutt. ssp. penardii (Huth) Ewan	DEVI1	Y	X	X	X
RANUNCULACEAE	Ranunculus macounii Britt.	RAMA1	Y	X	X	X
RANUNCULACEAE	Thalictrum dasycarpum Fisch. & Ave-Lall	THDA1	Y	X	X	X
RHAMNACEAE	Ceanothus herbaceus Raf. var. pubescens (T. & G.)	CEHE1	Y	X	X	X
ROSACEAE	Agrimonia striata Michx.	AGST2	Y	X	X	X
ROSACEAE	Amelanchier alnifolia Nutt.	AMAL1	Y	X	X	X
ROSACEAE	Crataegus erythropoda Ashe	CRER1	Y	X	X	X
ROSACEAE	Crataegus succulenta Link var. occidentalis (Britton) E. J. Palm.	CRSU1	Y	X	X	X
ROSACEAE	Geum aleppicum Jacq.	GEAL1	Y	X	X	X
ROSACEAE	Geum macrophyllum Willd.	GEMA1	Y	X	X	X
ROSACEAE	Physocarpus monogynus (Torr.) Coult.	PHMO1	Y	X	X	X
ROSACEAE	Physocarpus opulifolius (L.) Raf.	PHOP1	Y	X	X	X
ROSACEAE	Potentilla fissa Nutt.	POFI1	Y	X	X	X
ROSACEAE	Potentilla gracilis Dougl. ex Hook. var. glabrata (Lehm.) C. L. Hitchc.	POGR1	Y	X	X	X
ROSACEAE	Potentilla hippiana Lehm.	POHI1	Y	X	X	X
ROSACEAE	Potentilla norvegica L.	PONO1	Y	X	X	
ROSACEAE	Potentilla paradoxa Nutt.	POPA2	Y		X	
ROSACEAE	Potentilla pensylvanica L.	POPE4	Y	X		
ROSACEAE	Prunus americana Marsh.	PRAM1	Y	X	X	X
ROSACEAE	Prunus pumila L. var. besseyi (Bailey) Gl.	PRPU1	Y	X	X	X
ROSACEAE	Prunus virginiana L. var. melanocarpa (A. Nels.) Sarg.	PRVI1	Y	X	X	X
ROSACEAE	Pyrus malus L.	PYMA1	N	X	X	X
ROSACEAE	Rosa acicularis Lindl.	ROAC1	Y		X	X
ROSACEAE	Rosa arkansana Porter	ROAR1	Y	X	X	X
ROSACEAE	Rosa woodsii Lindl.	ROWO1	Y	X	X	X
ROSACEAE	Rubus deliciosus Torr.	RUDE1	Y	X		
ROSACEAE	Rubus idaeus L. ssp. sachalinensis (Levl.) Focke var. sachalinensis	RUID1	Y	X	X	X
RUBIACEAE	Galium aparine L.	GAAP1	Y	X	X	X
RUBIACEAE	Galium septentrionale Roemer & Schultes	GASE1	Y	X	X	X
SALICACEAE	Populus alba L.	POAL1	Y	X		
SALICACEAE	Populus angustifolia James	POAN3	Y	X	X	X
SALICACEAE	Populus deltoides Marsh. ssp. monilifera (Ait.) Eckenw.	PODE1	Y	X	X	X
SALICACEAE	Populus x acuminata Rydb.	POAC1	Y	X	X	
SALICACEAE	Salix amygdaloides Anderss.	SAAM1	Y	X	X	X
SALICACEAE	Salix exigua Nutt. ssp. interior (Rowlee) Cronq.	SAEX1	Y	X	X	X
SALICACEAE	Salix irrorata Andersson	SAIR1	Y	X	X	X
SALICACEAE	Salix lutea Nutt.	SALU1	Y	X		
SANTALACEAE	Comandra umbellata (L.) Nutt.	COUM1	Y	X	X	X
SAXIFRAGACEAE	Heuchera parvifolia Nutt. ex T.& G.	HEPA1	Y	X	X	X
SCROPHULARIACEAE	Castilleja sessiliflora Pursh.	CASE3	Y	X	X	X
SCROPHULARIACEAE	Collinsia parviflora Doug. ex Lindl.	COPA1	Y	X	X	X

Table 2. (cont.)

Family	Scientific Name	Speccode	Native	2000	1997	1996
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1	N	X	X	X
SCROPHULARIACEAE	Mimulus glabratus H. B. K. var. fremontii (Benth.) A. L. Grant	MIGL1	Y	X		
SCROPHULARIACEAE	Penstemon secundiflorus Benth.	PESE1	Y	X	X	X
SCROPHULARIACEAE	Penstemon virens Penn.	PEVI1	Y	X	X	X
SCROPHULARIACEAE	Penstemon virgatus Gray ssp. asa-grayi Crosswhite	PEVI2	Y	X	X	X
SCROPHULARIACEAE	Scrophularia lanceolata Pursh.	SCLA2	Y	X	X	X
SCROPHULARIACEAE	Verbascum blattaria L.	VEBL1	N	X	X	X
SCROPHULARIACEAE	Verbascum thapsus L.	VETH1	N	X	X	X
SCROPHULARIACEAE	Veronica americana (Raf.) Schwein. ex Benth.	VEAM1	Y		X	X
SCROPHULARIACEAE	Veronica anagallis-aquatica L.	VEAN1	N	X	X	X
SMILACACEAE	Smilax herbacea L. var. lasioneura (Small) Rydb..	SMHE1	Y	X	X	X
SOLANACEAE	Physalis heterophylla Nees	PHHE2	Y	X	X	X
SOLANACEAE	Physalis virginiana P. Mill.	PHVI2	Y	X	X	X
SOLANACEAE	Solanum triflorum Nutt.	SOTR1	Y	X		
TYPHACEAE	Typha latifolia L.	TYLA1	Y	X	X	X
ULMACEAE	Ulmus pumila L.	ULPU1	N			X
URTICACEAE	Parietaria pensylvanica Muhl. ex Willd.	PAPE1	Y	X	X	X
URTICACEAE	Urtica dioica L. ssp. gracilis (Ait.) Seland.	URDI1	Y	X	X	X
VERBENACEAE	Verbena bracteata Lag. & Rodr.	VEBR1	Y	X	X	X
VERBENACEAE	Verbena hastata L.	VEHA1	Y	X	X	X
VIOLACEAE	Viola nuttallii Pursh.	VINU1	Y	X	X	X
VIOLACEAE	Viola rydbergii Greene	VIRY1	Y	X	X	X
VIOLACEAE	Viola scopulorum (Gray) Greene	VISC1	Y	X	X	X
VIOLACEAE	Viola sororia Willd.	VISO1	Y	X	X	X
VITACEAE	Vitis riparia Michx.	VIRI1	Y	X	X	X
	Total Number of Species			363	352	333
	Total Number of Species Observed During All 3 Years				398	
	Percent Native Species			82	82	81

Table 3. 1993-2000 Mesic Grassland Species Richness Summary

				TR02					TR04					TR11				
Family	**Scientific Name**	**Speccode**	**Native**	**1993**	**1994**	**1995**	**1999**	**2000**	**1993**	**1994**	**1995**	**1999**	**2000**	**1993**	**1994**	**1995**	**1999**	**2000**
AGAVACEAE	Yucca glauca Nutt.	YUGL1	Y	X	X	X	X	X						X	X	X	X	X
APIACEAE	Harbouria trachypleura (Gray) C. & R.	HATR1	Y	X														
APIACEAE	Lomatium orientale Coult. & Rose	LOOR1	Y		X	X	X	X		X	X	X	X		X	X	X	X
APIACEAE	Musineon divaricatum (Pursh.) Nutt. var. hookeri T. & G.	MUDI1	Y		X	X	X	X		X	X	X	X		X	X	X	X
ASCLEPIADACEAE	Asclepias pumila (Gray) Vail	ASPU1	Y	X	X	X	X	X										
ASCLEPIADACEAE	Asclepias speciosa Torr.	ASSP1	Y											X		X	X	X
ASCLEPIADACEAE	Asclepias viridiflora Raf.	ASVI1	Y								X					X		
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	Y		X	X	X		X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Arnica fulgens Pursh.	ARFU1	Y							X					X	X	X	X
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	ARCA1	Y				X		X			X					X	X
ASTERACEAE	Artemisia dracunculus L.	ARDR1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Artemisia frigida Willd.	ARFR1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Aster falcatus Lindl.	ASFA1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Aster porteri Gray	ASPO1	Y	X	X	X	X	X				X	X	X	X	X	X	X
ASTERACEAE	Aster sp.	AST1							X	X								
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	N	X	X	X	X	X	X		X	X				X	X	X
ASTERACEAE	Chrysopsis fulcrata Greene	CHFU1	Y	X			X	X					X	X	X	X	X	X
ASTERACEAE	Chrysopsis villosa Pursh.	CHVI1	Y	X	X	X	X	X	X	X	X	X	X			X	X	X
ASTERACEAE	Cirsium arvense (L.) Scop.	CIAR1	N		X				X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Cirsium undulatum (Nutt.) Spreng.	CIUN1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Crepis occidentalis Nutt.	CROC1	Y												X			
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	Y	X	X	X	X	X	X	X	X	X	X		X		X	X
ASTERACEAE	Erigeron flagellaris A. Gray	ERFL1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Helianthus annuus L.	HEAN1	Y			X						X			X	X		
ASTERACEAE	Helianthus petiolaris Nutt.	HEPE1	Y				X	X			X	X	X			X	X	X
ASTERACEAE	Helianthus pumilus Nutt.	HEPU1	Y	X	X	X	X	X	X	X				X	X			
ASTERACEAE	Helianthus sp.	HEL1				X					X				X			
ASTERACEAE	Hymenopappus filifolius Hook. var. cinereus (Rydb.) I. M. Johnst.	HYFI1	Y	X		X	X	X						X				
ASTERACEAE	Kuhnia chlorolepis Woot. & Standl.	KUCH1	Y			X	X	X	X					X		X	X	X
ASTERACEAE	Kuhnia eupatorioides L.	KUEU1	Y	X	X	X	X	X	X	X	X	X	X		X	X	X	X
ASTERACEAE	Kuhnia sp.	KUH1								X					X			
ASTERACEAE	Lactuca serriola L.	LASE1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Liatris punctata Hook.	LIPU1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Microseris cuspidata (Pursh.) Sch. Bip.	MICU1	Y		X	X	X	X		X	X		X		X	X	X	X
ASTERACEAE	Picradeniopsis oppositifolia (Nutt.) Rydb.	PIOP1	Y												X	X	X	X
ASTERACEAE	Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Scorzonera laciniata L.	SCLA1	N	X	X	X	X	X	X	X	X	X	X		X	X	X	X
ASTERACEAE	Senecio integerrimus Nutt.	SEIN1	Y		X					X	X	X	X		X			X
ASTERACEAE	Senecio plattensis Nutt.	SEPL1	Y		X	X	X	X		X					X	X	X	X
ASTERACEAE	Senecio spartioides T. & G.	SESP1	Y	X	X	X	X	X						X	X	X	X	X
ASTERACEAE	Solidago missouriensis Nutt.	SOMI1	Y						X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Solidago mollis Bart.	SOMO1	Y						X									
ASTERACEAE	Solidago rigida L.	SORI1	Y		X	X	X	X										

Table 3. (cont.)

				TR02					TR04					TR11				
Family	Scientific Name	Speccode	Native	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
ASTERACEAE	Solidago sp.	SOL2								X					X			
ASTERACEAE	Sonchus asper (L.) Hill	SOAS1	N									X						
ASTERACEAE	Taraxacum laevigatum (Willd.) DC.	TALA1	N			X												
ASTERACEAE	Taraxacum officinale Weber	TAOF1	N	X	X	X	X	X	X	X	X	X	X		X	X	X	X
ASTERACEAE	Thelesperma megapotanicum (Spreng.) O. Ktze.	THME1	Y			X												
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BORAGINACEAE	Lappula redowskii (Hornem.) Greene	LARE1	Y		X	X	X	X		X	X				X	X	X	X
BORAGINACEAE	Lithospermum incisum Lehm.	LIIN1	Y		X		X	X				X	X	X	X	X	X	X
BORAGINACEAE	Onosmodium molle Michx. var. occidentale (Mack.) Johnst.	ONMO1	Y	X	X	X	X	X				X	X					
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BRASSICACEAE	Arabis fendleri (S. Wats.) Greene var. fendleri	ARFE3	Y												X			
BRASSICACEAE	Arabis glabra (L.) Bernh.	ARGL1	N							X	X	X	X					
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	Y									X						
BRASSICACEAE	Arabis sp.	ARA1			X													
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	CAMI1	N		X	X		X	X	X	X	X	X	X	X	X	X	X
BRASSICACEAE	Descurainia pinnata (Walt.) Britt.	DEPI1	Y		X	X	X	X		X	X	X	X		X	X	X	X
BRASSICACEAE	Descurainia richardsonii (Sweet) Schultz	DERI1	Y					X		X	X	X			X	X	X	X
BRASSICACEAE	Descurainia sophia (L.) Webb ex Prantl.	DESO1	N					X						X				
BRASSICACEAE	Descurainia sp.	DES1								X								
BRASSICACEAE	Draba reptans (Lam.) Fern.	DRRE1	Y		X	X				X	X	X	X		X	X	X	
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	ERCA2	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BRASSICACEAE	Erysimum repandum L.	ERRE1	N							X	X	X						
BRASSICACEAE	Lepidium campestre (L.) R. Br.	LECA1	N				X	X				X	X					
BRASSICACEAE	Lepidium densiflorum Schrad.	LEDE1	Y			X				X	X							
BRASSICACEAE	Lepidium sp.	LEP1								X					X	X		
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	LEMO1	Y	X	X	X	X	X						X	X	X	X	X
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	N	X	X	X	X	X	X	X	X	X		X	X	X	X	X
BRASSICACEAE	Thlaspi arvense L.	THAR1	N			X				X	X							
BRASSICACEAE	Brassicaceae sp.	BR1				X									X			
CACTACEAE	Coryphantha missouriensis (Sweet) Britt. & Rose	COMI1	Y		X	X	X	X		X	X	X	X		X	X		X
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CACTACEAE	Opuntia fragilis (Nutt.) Haw.	OPFR1	Y	X	X	X			X	X	X	X		X	X	X	X	X
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CACTACEAE	Opuntia polyacantha Haw.	OPPO1	Y						X									
CACTACEAE	Pediocactus simpsonii (Engelm.) Britt. & Rose	PESI1	Y		X													
CAMPANULACEAE	Triodanis leptocarpa (Nutt.) Nieuw.	TRLE1	Y			X												
CAMPANULACEAE	Triodanis sp.	TRI2			X					X								
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	PAJA1	Y		X													
CARYOPHYLLACEAE	Silene antirrhina L.	SIAN1	Y		X	X		X		X	X	X			X	X	X	X
CARYOPHYLLACEAE	Silene drummondii Hook.	SIDR1	Y			X									X		X	X
CHENOPODIACEAE	Chenopodium album L.	CHAL1	N				X											
CHENOPODIACEAE	Chenopodium leptophyllum Nutt. ex Moq.	CHLE2	Y	X	X	X			X	X	X	X	X	X	X	X		
CHENOPODIACEAE	Chenopodiaceae sp.	CH1				X												
CLUSIACEAE	Hypericum perforatum L.	HYPE1	N	X	X	X	X		X	X		X	X	X	X	X	X	X
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	TROC1	Y		X	X	X	X		X	X	X	X		X	X	X	X
CONVOLVULACEAE	Calystegia sepium (L.) R. Br. ssp. angulata Brummitt	CASE1	Y															X
CONVOLVULACEAE	Convolvulus arvensis L.	COAR1	N	X	X	X	X	X								X	X	
CONVOLVULACEAE	Evolvulus nuttallianus R. & S.	EVNU1	Y	X	X	X	X	X	X		X	X	X	X	X	X	X	X

Table 3. (cont.)

				TR02					TR04					TR11				
Family	Scientific Name	Speccode	Native	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
CYPERACEAE	Carex sp.	CAR1								X								
CYPERACEAE	Carex eleocharis Bailey	CAEL1	Y	X	X	X			X	X	X	X	X	X			X	X
CYPERACEAE	Carex heliophila Mack.	CAHE1	Y		X	X	X	X		X		X	X		X	X	X	X
CYPERACEAE	Carex interior Bailey	CAIN1	Y												X			
CYPERACEAE	Carex oreocharis Holm.	CAOR1	Y		X									X				
EUPHORBIACEAE	Euphorbia dentata Michx.	EUDE1	Y												X		X	X
EUPHORBIACEAE	Euphorbia marginata Pursh.	EUMA1	Y			X										X		
EUPHORBIACEAE	Euphorbia robusta (Engelm.) Small	EURO1	Y		X	X		X								X		
EUPHORBIACEAE	Euphorbia spathulata Lam.	EUSP1	Y		X	X	X	X		X	X	X			X	X	X	X
FABACEAE	Astragalus agrestis Dougl. ex G. Don	ASAG1	Y		X			X	X	X	X	X	X		X		X	
FABACEAE	Astragalus crassicarpus Nutt.	ASCR1	Y		X	X				X	X	X	X					X
FABACEAE	Astragalus drummondii Dougl. ex Hook.	ASDR1	Y						X	X	X		X					
FABACEAE	Astragalus flexuosus (Hook.) G. Don	ASFL1	Y	X	X	X	X	X				X						
FABACEAE	Astragalus lotiflorus Hook.	ASLO1	Y									X	X					
FABACEAE	Astragalus shortianus Nutt. ex T.&G.	ASSH1	Y		X	X				X					X	X	X	X
FABACEAE	Astragalus sp.	AST2			X													
FABACEAE	Astragalus tridactylicus Gray	ASSE1	Y		X													
FABACEAE	Dalea candida Michx. ex Willd. var. oligophylla (Torr.) Shinners.	DACA1	Y	X		X	X	X			X			X	X	X	X	X
FABACEAE	Dalea purpurea Vent	DAPU1	Y	X	X	X	X	X			X	X	X	X	X	X	X	X
FABACEAE	Lathyrus eucosmus Butters and St. John	LAEU1	Y														X	
FABACEAE	Melilotus officinalis (L.) Pall.	MEOF1	N						X									
FABACEAE	Oxytropis lambertii Pursh.	OXLA1	Y		X	X	X	X								X	X	
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FABACEAE	Trifolium sp.	TRI1													X			
FABACEAE	Vicia americana Muhl. ex Willd.	VIAM1	Y	X	X	X	X		X	X	X	X	X	X	X	X	X	X
GERANIACEAE	Erodium cicutarium (L.) L'Her.	ERCI1	N		X	X	X	X		X	X	X	X			X	X	X
HYDROPHYLLACEAE	Phacelia heterophylla Pursh.	PHHE1	Y		X									X	X	X	X	X
JUNCACEAE	Juncus dudleyi Wieg.	JUDU1	Y													X		
JUNCACEAE	Juncus interior Wieg.	JUIN1	Y														X	
LAMIACEAE	Hedeoma hispidum Pursh.	HEHI1	Y						X					X				
LAMIACEAE	Nepeta cataria L.	NECA1	N			X												
LAMIACEAE	Scutellaria brittonii Porter	SCBR1	Y												X		X	
LILIACEAE	Allium textile A. Nels. & Macbr.	ALTE1	Y	X	X	X	X	X		X	X			X	X	X	X	X
LILIACEAE	Calochortus gunnisonii S. Wats.	CAGU1	Y								X			X		X		
LILIACEAE	Leucocrinum montanum Nutt.	LEMO2	Y		X	X	X	X			X	X	X		X	X	X	X
LINACEAE	Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	LIPE1	Y	X	X	X	X	X	X	X	X	X	X				X	X
LINACEAE	Linum pratense (Nort.) Small	LIPR1	Y									X						
MALVACEAE	Sphaeralcea coccinea (Pursh.) Rydb.	SPCO1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NYCTAGINACEAE	Mirabilis linearis (Pursh.) Heimerl	MILI1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ONAGRACEAE	Epilobium paniculatum Nutt.	EPPA1	Y	X							X							
ONAGRACEAE	Gaura coccinea Pursh.	GACO1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ONAGRACEAE	Oenothera howardii (A. Nels.) W. L. Wagner	OEHO1	Y							X	X	X	X					
OROBANCHACEAE	Orobanche fasciculata Nutt.	ORFA1	Y								X	X	X		X	X	X	X
PLANTAGINACE	Plantago lanceolata L.	PLLA1	N						X	X		X	X					
PLANTAGINACE	Plantago patagonica Jacq.	PLPA1	Y					X	X		X	X	X			X		X
POACEAE	Agropyron intermedium (Host) Beauv.	AGIN1	N						X	X								
POACEAE	Agropyron smithii Rydb.	AGSM1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Andropogon gerardii Vitman	ANGE1	Y	X	X	X	X	X			X	X	X	X	X	X	X	X

Table 3. (cont.)

				TR02					TR04					TR11				
Family	Scientific Name	Speccode	Native	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
POACEAE	Andropogon scoparius Michx.	ANSC1	Y	X	X	X	X	X						X	X	X	X	X
POACEAE	Aristida purpurea Nutt. var. longiseta (Steud.) Vasey	ARFE1	Y	X	X	X			X	X	X			X	X	X		
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmg	ARLO1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Aristida sp.	ARI1								X								
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Bouteloua hirsuta Lag	BOHI1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Bouteloua sp.	BOU1								X								
POACEAE	Bromus inermis Leyss. ssp. inermis	BRIN1	N	X	X	X	X	X										
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Bromus tectorum L.	BRTE1	N	X		X		X	X	X	X	X	X	X	X	X	X	X
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	BUDA1	Y	X	X	X	X	X	X	X	X	X	X		X	X	X	X
POACEAE	Festuca octoflora Walt.	FEOC1	Y													X		
POACEAE	Festuca pratensis Huds.	FEPR1	Y				X	X				X						
POACEAE	Hordeum brachyantherum Nevski	HOBR1	Y					X										
POACEAE	Hordeum jubatum L.	HOJU1	Y						X		X	X	X		X			
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	Y						X	X						X		
POACEAE	Muhlenbergia wrightii Vasey	MUWR1	Y		X			X	X		X	X	X	X	X	X	X	X
POACEAE	Poa compressa L.	POCO1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Poa pratensis L.	POPR1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Schedonnardus paniculatus (Nutt.) Trel.	SCPA2	N									X	X					
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	Y	X	X	X	X	X	X					X		X	X	X
POACEAE	Sporobolus asper (Michx.) Kunth	SPAS1	Y				X	X					X				X	X
POACEAE	Sporobolus cryptandrus (Torr.) A. Gray	SPCR1	Y	X	X							X	X					
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	Y					X							X	X	X	X
POACEAE	*Stipa comata Trin. & Rupr.*	STCO1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Stipa sp.	STI1													X			
POACEAE	Stipa viridula Trin.	STVI1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Triticum aestivum L.	TRAE1	N							X								
POACEAE	Poaceae sp.	PO1				X												
POLEMONIACEAE	Collomia linearis Nutt.	COLI1	Y		X			X			X				X	X		X
POLEMONIACEAE	Microsteris gracilis (Hook.) Greene	MIGR1	Y							X	X	X						
POLYGONACEAE	Eriogonum alatum Torr.	ERAL1	Y	X	X	X	X	X						X			X	
POLYGONACEAE	Polygonum aviculare L.	POAV1	N						X									
POLYGONACEAE	Polygonum ramosissimum Michx.	PORA1	Y									X	X					
POLYGONACEAE	Polygonum sawatchense Small	POSA1	Y			X				X	X							
POLYGONACEAE	Polygonum sp.	POL1				X												
PRIMULACEAE	Androsace occidentalis Pursh.	ANOC1	Y															X
RANUNCULACEAE	Delphinium nuttalianum Pritz. ex Walpers	DENU1	Y														X	
RANUNCULACEAE	Delphinium sp.	DEL1								X					X			
RANUNCULACEAE	Delphinium virescens Nutt. ssp. penardii (Huth) Ewan	DEVI1	Y								X					X	X	X
ROSACEAE	Rosa acicularis Lindl.	ROAC1	Y	X					X					X		X		
ROSACEAE	Rosa arkansana Porter	ROAR1	Y		X	X	X	X		X	X	X	X		X	X	X	X
SANTALACEAE	Comandra umbellata (L.) Nutt.	COUM1	Y		X	X		X		X		X	X		X		X	X
SCROPHULARIACEAE	*Castilleja sessiliflora Pursh.*	CASE3	Y															X
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCROPHULARIACEAE	Penstemon angustifolius Nutt. ex Pursh	PEAN1	Y		X													

Table 3. (cont.)

				TR02					TR04					TR11				
Family	**Scientific Name**	**Speccode**	**Native**	**1993**	**1994**	**1995**	**1999**	**2000**	**1993**	**1994**	**1995**	**1999**	**2000**	**1993**	**1994**	**1995**	**1999**	**2000**
SCROPHULARIACEAE	Penstemon secundiflorus Benth.	PESE1	Y			X	X	X							X	X	X	X
SCROPHULARIACEAE	Penstemon virens Penn.	PEVI1	Y		X	X		X							X	X	X	X
SCROPHULARIACEAE	Penstemon virgatus Gray ssp. asa-grayi Crosswhite	PEVI2	Y														X	X
SCROPHULARIACEAE	Verbascum blattaria L.	VEBL1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCROPHULARIACEAE	Verbascum thapsus L.	VETH1	N		X								X	X	X		X	X
SCROPHULARIACEAE	Veronica peregrina L. var. xalapensis (H. B. K.) St. John & Warren	VEPE1	Y								X							
SOLANACEAE	Physalis heterophylla Nees	PHHE2	Y											X				
SOLANACEAE	Physalis sp.	PHY1								X								
SOLANACEAE	Physalis virginiana P. Mill.	PHVI2	Y								X							
TYPHACEAE	Typha latifolia L.	TYLA1	Y						X	X								
VERBENACEAE	Verbena bracteata Lag. & Rodr.	VEBR1	Y							X		X						
VIOLACEAE	Hybanthus verticillatus (Ort.) Baill.	HYVE1	Y		X	X	X	X							X	X	X	X
VIOLACEAE	Viola nuttallii Pursh.	VINU1	Y			X	X	X			X				X	X	X	X
	Unidentified sp.	UNKN						X										
	Total Number of Species			75	107	108	93	103	75	95	97	100	89	76	106	110	111	110
	Percent Native Species			77	81	80	80	80	72	76	79	76	76	79	83	83	82	83

Table 4. 1993-2000 Mesic Grassland Foliar Cover - Community

					Absolute Cover (%)					Relative Cover (%)				
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
Opuntia macrorhiza Engelm.	OPMA1	C	Y		0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Lepidium sp.	LEP1	F			0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N		0.9	2.1	2.1	2.5	1.7	1.2	2.2	2.2	2.9	2.4
Camelina microcarpa Andrz. ex DC.	CAMI1	F	N		0.3	1.3	1.0	0.1	0.0	0.3	1.4	1.0	0.1	0.0
Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	F	N		1.0	0.1	1.4	0.1	0.1	1.3	0.1	1.4	0.1	0.2
Centaurea diffusa Lam.	CEDI1	F	N		0.1	0.2	0.5	0.5	1.0	0.2	0.2	0.5	0.7	1.4
Cirsium arvense (L.) Scop.	CIAR1	F	N		0.1	0.0	0.0	0.3	0.1	0.1	0.0	0.0	0.3	0.2
Convolvulus arvensis L.	COAR1	F	N		0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0
Hypericum perforatum L.	HYPE1	F	N		0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1
Lactuca serriola L.	LASE1	F	N		0.1	0.0	0.5	0.3	0.0	0.1	0.0	0.6	0.3	0.0
Linaria dalmatica (L.) Mill.	LIDA1	F	N		0.5	1.0	0.9	0.4	0.6	0.6	1.1	0.9	0.5	0.8
Scorzonera laciniata L.	SCLA1	F	N		0.5	1.5	1.8	2.3	0.7	0.7	1.7	1.8	2.8	1.1
Sisymbrium attissimum L.	SIAL1	F	N		0.2	0.3	0.6	0.0	0.0	0.2	0.3	0.6	0.0	0.0
Tragopogon dubius Scop.	TRDU1	F	N		0.9	0.1	1.3	0.5	0.2	1.3	0.2	1.4	0.6	0.3
Verbascum blattaria L.	VEBL1	F	N		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Verbascum thapsus L.	VETH1	F	N		0.0	0.0	0.0	0.5	0.7	0.0	0.0	0.0	0.6	0.9
Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	F	Y		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Ambrosia psilostachya DC.	AMPS1	F	Y		0.3	0.1	0.1	0.3	0.1	0.3	0.1	0.1	0.3	0.2
Artemisia dracunculus L.	ARDR1	F	Y		0.1	0.3	0.7	0.7	0.8	0.1	0.3	0.7	0.8	1.2
Artemisia frigida Willd.	ARFR1	F	Y		0.2	0.3	0.3	0.1	0.0	0.3	0.3	0.3	0.1	0.0
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y		1.5	0.6	1.4	0.3	0.3	1.8	0.6	1.5	0.3	0.4
Aster falcatus Lindl.	ASFA1	F	Y		0.8	0.3	0.7	0.8	0.5	1.1	0.3	0.7	0.9	0.8
Astragalus flexuosus (Hook.) G. Don	ASFL1	F	Y		0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.1	0.1	0.0
Aster porteri Gray	ASPO1	F	Y		0.1	0.0	0.3	0.0	0.3	0.1	0.0	0.3	0.0	0.4
Chrysopsis villosa Pursh.	CHVI1	F	Y		0.5	0.2	0.1	0.0	0.2	0.8	0.2	0.1	0.0	0.3
Cirsium undulatum (Nutt.) Spreng.	CIUN1	F	Y		0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1
Comandra umbellata (L.) Nutt.	COUM1	F	Y		0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0
Dalea candida Michx. ex Willd. var. oligophylla (Torr.) Shinners.	DACA1	F	Y		0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.0
Dalea purpurea Vent	DAPU1	F	Y		0.1	0.2	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.1
Descurainia pinnata (Walt.) Britt.	DEPI1	F	Y		0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Descurainia richardsonii (Sweet) Schultz	DERI1	F	Y		0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0
Eriogonum alatum Torr.	ERAL1	F	Y		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Erysimum capitatum (Nutt.) DC.	ERCA2	F	Y		0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Erigeron divergens T. & G.	ERDI1	F	Y		0.1	0.1	0.0	0.1	0.1	0.2	0.1	0.0	0.1	0.1
Erigeron flagellaris A. Gray	ERFL1	F	Y		0.3	0.5	0.2	0.5	0.4	0.4	0.5	0.2	0.5	0.6
Euphorbia dentata Michx.	EUDE1	F	Y		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Evolvulus nuttallianus R. & S.	EVNU1	F	Y		0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0
Gaura coccinea Pursh.	GACO1	F	Y		0.0	0.2	0.1	0.0	0.0	0.0	0.2	0.1	0.0	0.0
Grindelia squarrosa (Pursh.) Dun.	GRSQ1	F	Y		0.1	0.2	1.0	0.2	0.0	0.2	0.2	1.0	0.2	0.0
Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	F	Y		0.1	0.3	0.5	0.8	0.3	0.1	0.3	0.5	0.9	0.4
Helianthus petiolaris Nutt.	HEPE1	F	Y		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Helianthus pumilus Nutt.	HEPU1	F	Y		0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1
Kuhnia chlorolepis Woot. & Standl.	KUCH1	F	Y		0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Kuhnia eupatorioides L.	KUEU1	F	Y		0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.2
Lesquerella montana (A. Gray) Wats.	LEMO1	F	Y		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Lithospermum incisum Lehm.	LIIN1	F	Y		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	LIPE1	F	Y		0.2	0.5	0.0	0.0	0.0	0.3	0.5	0.0	0.0	0.0
Liatris punctata Hook.	LIPU1	F	Y		0.1	0.1	0.6	0.0	0.1	0.2	0.1	0.6	0.0	0.1
Lomatium orientale Coult. & Rose	LOOR1	F	Y		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Mirabilis linearis (Pursh.) Heimerl	MILI1	F	Y		0.2	0.2	0.1	0.1	0.1	0.3	0.2	0.1	0.2	0.1
Onosmodium molle Michx. var. occidentale (Mack.) Johnst.	ONMO1	F	Y		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2
Phacelia heterophylla Pursh.	PHHE1	F	Y		0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Polygonum sawatchense Small	POSA1	F	Y		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Psoralea tenuiflora Pursh.	PSTE1	F	Y		2.5	2.2	4.8	2.9	1.5	3.3	2.4	4.9	3.3	2.2
Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	F	Y		0.4	0.1	0.5	0.4	0.1	0.6	0.1	0.5	0.5	0.1

Table 4. (cont.)

Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	Absolute Cover (%) 1993	1994	1995	1999	2000	Relative Cover (%) 1993	1994	1995	1999	2000
Solidago missouriensis Nutt.	SOMI1	F	Y		0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1
Sphaeralcea coccinea (Pursh.) Rydb.	SPCO1	F	Y		0.3	0.2	0.1	0.5	0.3	0.4	0.2	0.1	0.6	0.5
Vicia americana Muhl. ex Willd.	VIAM1	F	Y		0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Poaceae sp.	PO1	G			0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Agropyron intermedium (Host) Beauv.	AGIN1	G	N	C	0.8	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0
Bromus inermis Leyss. ssp. inermis	BRIN1	G	N	C	0.1	0.1	0.2	1.1	0.9	0.2	0.2	0.2	1.4	1.2
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	14.5	29.1	37.1	10.5	1.7	19.6	31.8	38.2	12.0	2.3
Bromus tectorum L.	BRTE1	G	N	C	0.3	3.9	3.7	4.7	2.2	0.3	4.2	3.8	5.2	2.9
Poa compressa L.	POCO1	G	N	C	1.4	0.9	1.2	1.8	0.9	1.8	1.0	1.2	2.0	1.3
Poa pratensis L.	POPR1	G	N	C	2.9	2.6	1.0	4.6	3.7	3.6	2.8	1.0	5.2	5.2
Schedonnardus paniculatus (Nutt.) Trel.	SCPA2	G	N	C	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.2	0.1
Agropyron smithii Rydb.	AGSM1	G	Y	C	21.7	18.1	20.2	12.1	9.5	29.7	20.1	20.8	14.8	13.4
Aristida purpurea Nutt. var. longiseta (Steud.) Vasey	ARFE1	G	Y	C	0.1	0.2	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmg	ARLO1	G	Y	C	1.1	0.5	0.8	0.6	1.1	1.4	0.6	0.8	0.7	1.6
Carex eleocharis Bailey	CAEL1	G	Y	C	2.9	0.1	0.2	0.1	0.3	3.9	0.1	0.2	0.2	0.5
Carex heliophila Mack.	CAHE1	G	Y	C	0.0	4.1	2.2	2.5	3.1	0.0	4.5	2.3	3.0	4.2
Carex oreocharis Holm.	CAOR1	G	Y	C	1.1	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0
Hordeum jubatum L.	HOJU1	G	Y	C	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	0.1	0.1	0.0	0.4	0.2	0.2	0.1	0.0	0.5	0.3
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.3
Stipa comata Trin. & Rupr.	STCO1	G	Y	C	3.9	3.1	1.2	2.1	3.5	4.7	3.3	1.3	2.4	4.6
Stipa viridula Trin.	STVI1	G	Y	C	0.7	1.7	1.5	1.9	1.4	0.8	1.9	1.6	2.2	1.9
Andropogon gerardii Vitman	ANGE1	G	Y	W	3.2	1.7	1.8	2.7	2.5	4.0	1.9	1.9	3.1	3.3
Andropogon scoparius Michx.	ANSC1	G	Y	W	0.1	0.2	0.0	0.2	0.1	0.2	0.2	0.0	0.2	0.1
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	1.6	2.4	0.9	7.1	8.5	2.2	2.7	1.0	8.8	11.9
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	4.4	6.5	2.1	14.4	17.1	6.2	7.3	2.1	17.6	25.1
Bouteloua hirsuta Lag	BOHI1	G	Y	W	0.4	0.9	0.1	0.1	0.0	0.6	1.0	0.1	0.1	0.0
Buchloe dactyloides (Nutt.) Engelm.	BUDA1	G	Y	W	0.1	0.5	0.1	1.8	2.7	0.2	0.6	0.1	2.1	4.0
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Muhlenbergia wrightii Vasey	MUWR1	G	Y	W	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.1
Sporobolus cryptandrus (Torr.) A. Gray	SPCR1	G	Y	W	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	G	Y	W	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0
Yucca glauca Nutt.	YUGL1	S	Y		0.4	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0
Total foliar cover					74.7	91.3	97.0	84.7	70.7	99.9	100.0	100.0	100.0	100.0
Total forb cover					12.7	13.9	22.6	15.6	10.9	16.9	15.2	23.3	18.1	15.6
Total native forb cover					8.1	7.2	12.3	8.1	5.7	10.9	7.9	12.6	9.3	8.2
Total non-native forb cover					4.6	6.7	10.3	7.5	5.3	6.0	7.3	10.7	8.8	7.4
Total graminoid cover					61.5	77.3	74.4	69.1	59.7	82.4	84.7	76.7	81.9	84.4
Total native cover					50.1	47.9	43.4	54.3	56.0	67.2	52.7	44.7	65.1	79.5
Total non-native cover					24.6	43.4	53.5	30.3	14.7	32.7	47.2	55.2	34.9	20.5
Total warm-season graminoid cover					10.0	12.5	5.0	26.4	31.0	13.6	13.9	5.2	32.1	44.6
Total cool-season graminoid cover					51.5	64.8	69.3	42.7	28.7	68.8	70.8	71.5	49.7	39.8

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (1500).

Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).

All cover values presented are means (n =15).

Native categories: Y = Native, N = Non-Native

Form categories: C = Cactus, F = Forb, G = Graminoid

Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 5. 1993-2000 Mesic Grassland Foliar Cover by Species at TR02

					Frequency					Absolute Cover					Relative Cover				
					TR02														
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N		20	40	60	80		0.8	1.6	2.0	2.0		1.2	1.8	2.1	2.6	
Centaurea diffusa Lam.	CEDI1	F	N		20	60	60	60	80	0.4	0.6	1.6	1.4	2.4	0.6	0.7	1.6	1.8	3.4
Convolvulus arvensis L.	COAR1	F	N				20	20				0.2	0.2				0.2	0.3	
Hypericum perforatum L.	HYPE1	F	N				20					0.2					0.2		
Lactuca serriola L.	LASE1	F	N				20					0.2					0.2		
Linaria dalmatica (L.) Mill.	LIDA1	F	N						20					0.2					0.3
Scorzonera laciniata L.	SCLA1	F	N			100	80	40	40		1.8	1.6	1.2	0.6		2.0	1.6	1.6	0.8
Sisymbrium altissimum L.	SIAL1	F	N			20					0.2					0.2			
Tragopogon dubius Scop.	TRDU1	F	N		60	20	80			1.2	0.4	3.0			1.8	0.5	3.1		
Ambrosia psilostachya DC.	AMPS1	F	Y				20					0.2					0.2		
Artemisia frigida Willd.	ARFR1	F	Y		40	60	40			0.4	0.8	0.6			0.6	0.9	0.6		
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y		20	20	40			0.4	0.4	0.4			0.6	0.5	0.4		
Aster ericoides L.	ASER1	F	Y		60	20	40			0.6	0.2	0.4			0.9	0.2	0.4		
Aster falcatus Lindl.	ASFA1	F	Y					20	40				0.2	0.4				0.3	0.6
Astragalus flexuosus (Hook.) G. Don	ASFL1	F	Y			20	20				0.4	0.2				0.5	0.2		
Aster porteri Gray	ASPO1	F	Y		20		40		20	0.2		0.6		0.2	0.3		0.6		0.3
Chrysopsis villosa Pursh.	CHVI1	F	Y		80	20	20		40	1.4	0.4	0.4		0.6	2.1	0.5	0.4		0.8
Cirsium undulatum (Nutt.) Spreng.	CIUN1	F	Y			20					0.2					0.2			
Dalea candida Michx. ex Willd. var. oligophylla (Torr.) Shinners.	DACA1	F	Y				20					0.2					0.2		
Dalea purpurea Vent	DAPU1	F	Y						20					0.2					0.3
Eriogonum alatum Torr.	ERAL1	F	Y				20					0.2					0.2		
Erysimum capitatum (Nutt.) DC.	ERAS1	F	Y			20					0.2					0.2			
Erigeron divergens T. & G.	ERDI1	F	Y		20				20	0.4				0.2	0.6				0.3
Erigeron flagellaris A. Gray	ERFL1	F	Y		20	40	20		40	0.4	0.4	0.4		0.8	0.6	0.5	0.4		1.1
Evolvulus nuttallianus R. & S.	EVNU1	F	Y		20					0.2					0.3				
Gaura coccinea Pursh.	GACO1	F	Y			20	20				0.2	0.2				0.2	0.2		
Grindelia squarrosa (Pursh.) Dun.	GRSQ1	F	Y		20	20	60			0.2	0.2	1.2			0.3	0.2	1.2		
Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	F	Y				60	20	20			0.6	0.2	0.2			0.6	0.3	0.3
Helianthus pumilus Nutt.	HEPU1	F	Y					20	20				0.2	0.2				0.3	0.3
Lesquerella montana (A. Gray) Wats.	LEMO1	F	Y				20					0.2					0.2		
Lithospermum incisum Lehm.	LIIN1	F	Y						20					0.2					0.3
Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	LIPE1	F	Y			40					1.2					1.4			
Liatris punctata Hook.	LIPU1	F	Y		20	20	40		20	0.2	0.2	1.8		0.2	0.3	0.2	1.9		0.3
Mirabilis linearis (Pursh.) Heimerl	MILI1	F	Y		20	40				0.2	0.4				0.3	0.5			
Onosmodium molle Michx. var. occidentale (Mack.) Johnst.	ONMO1	F	Y						20					0.4					0.6
Psoralea tenuiflora Pursh.	PSTE1	F	Y		80	60	100	80	80	2.4	2.2	7.6	1.4	1.4	3.5	2.5	7.8	1.8	2.0
Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	F	Y		80		80	20		1.2		1.2	0.2		1.8		1.2	0.3	
Sphaeralcea coccinea (Pursh.) Rydb.	SPCO1	F	Y		20	20	20	40	40	0.6	0.6	0.4	0.4	0.4	0.9	0.7	0.4	0.5	0.6
Poaceae sp.	PO1	G					20					0.2					0.2		
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	100	100	100	100	20	5.6	18.4	27.6	3.8	0.2	8.2	20.9	28.4	4.9	0.3
Bromus inermis Leyss. ssp. inermis	BRIN1	G	N	C	20	20	20	40	40	0.4	0.4	0.6	3.2	2.6	0.6	0.5	0.6	4.1	3.6
Poa compressa L.	POCO1	G	N	C	40	40	20	20	40	1.0	0.4	0.2	0.4	0.6	1.5	0.5	0.2	0.5	0.8
Poa pratensis L.	POPR1	G	N	C	20	20		20	40	0.2	0.2		0.2	0.4	0.3	0.2		0.3	0.6
Agropyron smithii Rydb.	AGSM1	G	Y	C	100	100	100	100	100	27.6	29.0	30.6	18.2	16.6	40.5	33.0	31.5	23.5	23.2
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	G	Y	C	60	20	40	40	80	1.2	0.6	0.4	0.6	1.2	1.8	0.7	0.4	0.8	1.7

Table 5. (cont.)

					Frequency					Absolute Cover					Relative Cover				
					TR02														
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
Carex eleocharis Bailey	CAEL1	G	Y	C	40		20			3.4		0.2			5.0		0.2		
Carex heliophila Mack.	CAHE1	G	Y	C		40	20	40	40		3.6	2.8	3.2	3.6		4.1	2.9	4.1	5.0
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C				40	20				0.4	0.2				0.5	0.3
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C					20					0.2					0.3
Stipa comata Trin. & Rupr.	STCO1	G	Y	C	40	40	20	20	20	1.8	1.0	0.6	0.2	0.8	2.6	1.1	0.6	0.3	1.1
Stipa viridula Trin.	STVI1	G	Y	C	20	40	40	80	20	0.2	0.6	1.0	1.0	0.6		0.7	1.0	1.3	0.8
Andropogon gerardii Vitman	ANGE1	G	Y	W	40	40	40	40	40	2.2	1.4	1.8	1.6	0.6	3.2	1.6	1.9	2.1	0.8
Andropogon scoparius Michx.	ANSC1	G	Y	W	40	20		20		0.4	0.2		0.4		0.6	0.2		0.5	
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	80	80	40	80	80	3.2	4.8	2.6	14.8	14.6	4.7	5.5	2.7	19.1	20.4
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	80	100	60	100	100	6.8	11.8	2.8	20.6	17.4	10.0	13.4	2.9	26.6	24.3
Bouteloua hirsuta Lag	BOHI1	G	Y	W	60	60				1.2	2.0				1.8	2.3			
Buchloe dactyloides (Nutt.) Engelm.	BUDA1	G	Y	W	40	60	20	80	100	0.4	1.0	0.2	1.4	3.4	0.6	1.1	0.2	1.8	4.7
Sporobolus cryptandrus (Torr.) A. Gray	SPCR1	G	Y	W	20					0.2					0.3				
Yucca glauca Nutt.	YUGL1	S	Y		20					1.2					1.8				
Total foliar cover										68.2	88.0	97.2	77.4	71.6	99.7	100.0	100.0	100.0	100.0
Total forb cover										11.2	12.6	25.6	7.4	8.6	16.4	14.3	26.3	9.6	12.0
Total native forb cover										8.8	8.0	16.8	2.6	5.4	12.9	9.1	17.3	3.4	7.5
Total non-native forb cover										2.4	4.6	8.8	4.8	3.2	3.5	5.2	9.1	6.2	4.5
Total graminoid cover										55.8	75.4	71.6	70.0	63.0	81.5	85.7	73.7	90.4	88.0
Total native cover										58.6	64.0	59.8	65.0	64.6	85.6	72.7	61.5	84.0	90.2
Total non-native cover										9.6	24.0	37.2	12.4	7.0	14.1	27.3	38.3	16.0	9.8
Total warm-season graminoid cover										14.4	21.2	7.4	38.8	36.0	21.1	24.1	7.6	50.1	50.3
Total cool-season graminoid cover										41.4	54.2	64.0	31.2	27.0	60.4	61.6	65.8	40.3	37.7

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (500).
Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).
All cover values presented are means (n = 5).
Native categories: Y = Native, N = Non-Native
Form categories: C = Cactus, F = Forb, G = Graminoid
Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 6. 1993-2000 Mesic Grassland Foliar Cover by Species at TR04

					Frequency					Absolute Cover					Relative Cover				
										TR04									
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
Opuntia macrorhiza Engelm.	OPHU1	C	Y			20					0.2					0.2			
Lepidium sp.	LEP1	F				20					0.2					0.2			
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N		40	40	40	60	80	0.8	1.8	1.4	2.6	2.2	1.1	2.0	1.4	3.0	3.4
Camelina microcarpa Andrz. ex DC.	CAMI1	F	N		20	60	60			0.2	1.2	1.2			0.3	1.3	1.2		
Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	F	N		60	40	40			1.4	0.4	2.0			2.0	0.4	2.0		
Hypericum perforatum L.	HYPE1	F	N						20					0.2					0.3
Lactuca serriola L.	LASE1	F	N				20					0.2					0.2		
Linaria dalmatica (L.) Mill.	LIDA1	F	N		20	80	60	40	40	0.6	0.8	1.4	0.6	0.4	0.8	0.9	1.4	0.7	0.6
Scorzonera laciniata L.	SCLA1	F	N		60	60	100	100	60	1.4	2.8	3.8	5.6	1.4	2.0	3.1	3.9	6.5	2.2
Sisymbrium altissimum L.	SIAL1	F	N			40	20				0.4	0.6				0.4	0.6		
Tragopogon dubius Scop.	TRDU1	F	N		40		60	60	60	0.6		0.8	1.4	0.6	0.8		0.8	1.6	0.9
Ambrosia psilostachya DC.	AMPS1	F	Y		20	20				0.4	0.2				0.6	0.2			
Artemisia dracunculus L.	ARDR1	F	Y		20	40	80	40	80	0.2	0.8	1.8	2.0	2.4	0.3	0.9	1.8	2.3	3.7
Artemisia frigida Willd.	ARFR1	F	Y		20			20		0.2			0.2		0.3			0.2	
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y		20		20		20	0.2		0.6		0.2	0.3		0.6		0.3
Aster ericoides L.	ASER1	F	Y		60	40	80			1.4	0.6	1.8			2.0	0.7	1.8		
Aster falcatus Lindl.	ASFA1	F	Y					80	80				1.8	1.2				2.1	1.9
Astragalus flexuosus (Hook.) G. Don	ASFL1	F	Y					20					0.2					0.2	
Chrysopsis villosa Pursh.	CHVI1	F	Y		20	20				0.2	0.2				0.3	0.2			
Descurainia pinnata (Walt.) Britt.	DEPI1	F	Y			20					0.2					0.2			
Erigeron divergens T. & G.	ERDI1	F	Y			20					0.2					0.2			
Erigeron flagellaris A. Gray	ERFL1	F	Y		20	20	20	20	20	0.2	0.6	0.2	1.0	0.2	0.3	0.7	0.2	1.2	0.3
Evolvulus nuttallianus R. & S.	EVNU1	F	Y					20					0.2					0.2	
Gaura coccinea Pursh.	GACO1	F	Y			40	20				0.4	0.2				0.4	0.2		
Grindelia squarrosa (Pursh.) Dun.	GRSQ1	F	Y		20	20	60	60		0.2	0.4	1.4	0.6		0.3	0.4	1.4	0.7	
Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	F	Y		20	40	40	60	60	0.2	0.6	0.6	1.2	0.6	0.3	0.7	0.6	1.4	0.9
Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	LIPE1	F	Y		20	20				0.6	0.2				0.8	0.2			
Mirabilis linearis (Pursh.) Heimerl	MILI1	F	Y		20	20	20	40	20	0.2	0.2	0.2	0.4	0.2	0.3	0.2	0.2	0.5	0.3
Polygonum sawatchense Small	POSA1	F	Y				20					0.2					0.2		
Psoralea tenuiflora Pursh.	PSTE1	F	Y		80	80	100	100	60	1.4	2.4	3.6	4.2	1.8	2.0	2.6	3.7	4.9	2.8
Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	F	Y			20	40	20			0.4	0.4	0.2			0.4	0.4	0.2	
Solidago missouriensis Nutt.	SOMI1	F	Y						20					0.2					0.3
Sphaeralcea coccinea (Pursh.) Rydb.	SPCO1	F	Y		20			60	60	0.2			1.2	0.6	0.3			1.4	0.9
Vicia americana Muhl. ex Willd.	VIAM1	F	Y			20					0.2					0.2			
Agropyron intermedium (Host) Beauv.	AGIN1	G	N	C	20					2.4					3.4				
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	100	100	100	100	80	26.8	44.6	46.6	10.2	1.4	37.6	48.7	47.3	11.9	2.2
Bromus tectorum L.	BRTE1	G	N	C		40	40	40	40		4.2	3.0	2.4	0.6		4.6	3.0	2.8	0.9
Poa compressa L.	POCO1	G	N	C	60	60	80	80	60	0.8	0.8	1.6	1.2	0.6	1.1	0.9	1.6	1.4	0.9
Poa pratensis L.	POPR1	G	N	C	60	80	40	80	80	2.0	1.6	1.2	6.8	5.2	2.8	1.7	1.2	7.9	8.1
Schedonnardus paniculatus (Nutt.) Trel.	SCPA2	G	N	C				20	20				0.6	0.2				0.7	0.3
Agropyron smithii Rydb.	AGSM1	G	Y	C	100	100	100	100	100	20.4	14.4	19.0	11.8	6.4	28.6	15.7	19.3	13.7	10.0
Aristida purpurea Nutt. var. longiseta (Steud.) Vasey	ARFE1	G	Y	C	20	20				0.2	0.2				0.3	0.2			
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmg	ARLO1	G	Y	C		20	20	20	60		0.2	0.4	0.2	0.8		0.2	0.4	0.2	1.2
Carex eleocharis Bailey	CAEL1	G	Y	C	40	20	20	20	20	1.8	0.4	0.4	0.4	0.2	2.5	0.4	0.4	0.5	0.3
Carex heliophila Mack.	CAHE1	G	Y	C				20	40				0.2	0.8				0.2	1.2

Table 6. (cont.)

					Frequency					Absolute Cover					Relative Cover				
										TR04									
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
Hordeum jubatum L.	HOJU1	G	Y	C					20					0.2					0.3
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	20	20				0.2	0.2				0.3	0.2			
Stipa comata Trin. & Rupr.	STCO1	G	Y	C		20		20			0.2		0.2			0.2		0.2	
Stipa viridula Trin.	STVI1	G	Y	C		40	40	40	20		0.6	0.8	0.4	0.2		0.7	0.8	0.5	0.3
Andropogon gerardii Vitman	ANGE1	G	Y	W				20					0.2					0.2	
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	40	40	20	40	40	0.4	1.6	0.2	4.0	4.6	0.6	1.7	0.2	4.7	7.2
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	80	80	80	100	100	5.4	6.2	2.6	20.4	26.6	7.6	6.8	2.6	23.7	41.4
Bouteloua hirsuta Lag	BOHI1	G	Y	W		20	20	20			0.4	0.2	0.2			0.4	0.2	0.2	
Buchloe dactyloides (Nutt.) Engelm.	BUDA1	G	Y	W		20		100	80		0.6		3.4	4.2		0.7		4.0	6.5
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W	20					0.2					0.3				
Muhlenbergia wrightii Vasey	MUWR1	G	Y	W			20					0.2					0.2		
Total foliar cover										71.2	91.6	98.6	86.0	64.2	100.0	100.0	100.0	100.0	100.0
Total forb cover										10.6	15.2	22.4	23.4	12.2	14.9	16.6	22.7	27.2	19.0
Total native forb cover										5.6	7.6	11.0	13.2	7.4	7.9	8.3	11.2	15.3	11.5
Total non-native forb cover										5.0	7.4	11.4	10.2	4.8	7.0	8.1	11.6	11.9	7.5
Total graminoid cover										60.6	76.2	76.2	62.6	52.0	85.1	83.2	77.3	72.8	81.0
Total native cover										34.2	32.8	34.8	54.6	51.4	48.0	35.8	35.3	63.5	80.1
Total non-native cover										37.0	58.6	63.8	31.4	12.8	52.0	64.0	64.7	36.5	19.9
Total warm-season graminoid cover										6.0	8.8	3.2	28.2	35.4	8.4	9.6	3.2	32.8	55.1
Total cool-season graminoid cover										54.6	67.4	73.0	34.4	16.6	76.7	73.6	74.0	40.0	25.9

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (500).
Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).
All cover values presented are means (n = 5).
Native categories: Y = Native, N = Non-Native
Form categories: C = Cactus, F = Forb, G = Graminoid
Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 7. 1993-2000 Mesic Grassland Foliar Cover by Species at TR11

					Frequency					Absolute Cover					Relative Cover				
					TR11														
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N		60	60	60	80	40	1.2	2.8	3.0	2.8	2.8	1.4	3.0	3.2	3.1	3.7
Camelina microcarpa Andrz. ex DC.	CAMI1	F	N		20	60	40	20		0.6	2.8	1.8	0.2		0.7	3.0	1.9	0.2	
Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	F	N		60		60	20	40	1.6		2.2	0.2	0.4	1.9		2.3	0.2	0.5
Centaurea diffusa Lam.	CEDI1	F	N					20	20				0.2	0.6				0.2	0.8
Cirsium arvense (L.) Scop.	CIAR1	F	N		20			20	20	0.2			0.8	0.4	0.2			0.9	0.5
Convolvulus arvensis L.	COAR1	F	N		20					0.2					0.2				
Lactuca serriola L.	LASE1	F	N		20		80	60		0.2		1.2	0.8		0.2		1.3	0.9	
Linaria dalmatica (L.) Mill.	LIDA1	F	N		40	40	60	60	60	0.8	2.2	1.2	0.6	1.2	0.9	2.3	1.3	0.7	1.6
Scorzonera laciniata L.	SCLA1	F	N					20	20				0.2	0.2				0.2	0.3
Sisymbrium altissimum L.	SIAL1	F	N		20	20	20			0.6	0.2	1.2			0.7	0.2	1.3		
Tragopogon dubius Scop.	TRDU1	F	N		60		20	20		1.0		0.2	0.2		1.2		0.2	0.2	
Verbascum blattaria L.	VEBL1	F	N						20					0.2					0.3
Verbascum thapsus L.	VETH1	F	N					40	40				1.6	2.0				1.8	2.6
Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	F	Y				20					0.2					0.2		
Ambrosia psilostachya DC.	AMPS1	F	Y		20	20	20	40	40	0.4	0.2	0.2	0.8	0.4	0.5	0.2	0.2	0.9	0.5
Artemisia dracunculus L.	ARDR1	F	Y				20					0.2					0.2		
Artemisia frigida Willd.	ARFR1	F	Y				20					0.2					0.2		
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y		100	60	100	60	60	3.8	1.4	3.2	0.8	0.6	4.5	1.5	3.4	0.9	0.8
Aster ericoides L.	ASER1	F	Y		40					0.4					0.5				
Aster falcatus Lindl.	ASFA1	F	Y					40					0.4					0.4	
Aster porteri Gray	ASPO1	F	Y				20		40			0.2		0.6			0.2		0.8
Cirsium undulatum (Nutt.) Spreng.	CIUN1	F	Y						20					0.2					0.3
Comandra umbellata (L.) Nutt.	COUM1	F	Y					20					0.2					0.2	
Dalea candida Michx. ex Willd. var. oligophylla (Torr.) Shinners.	DACA1	F	Y			20		20			0.2		0.4			0.2		0.4	
Dalea purpurea Vent	DAPU1	F	Y		20	40				0.2	0.6				0.2	0.6			
Descurainia richardsonii (Sweet) Schultz	DERI1	F	Y			40	20				0.4	0.2				0.4	0.2		
Erigeron divergens T. & G.	ERDI1	F	Y					20					0.2					0.2	
Erigeron flagellaris A. Gray	ERFL1	F	Y		40	20		40	20	0.4	0.4		0.4	0.2	0.5	0.4		0.4	0.3
Euphorbia dentata Michx.	EUDE1	F	Y						20					0.2					0.3
Grindelia squarrosa (Pursh.) Dun.	GRSQ1	F	Y				40					0.4					0.4		
Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	F	Y			20	20	20			0.2	0.2	1.0			0.2	0.2	1.1	
Helianthus petiolaris Nutt.	HEPE1	F	Y				20					0.2					0.2		
Kuhnia chlorolepis Wootl. & Standl.	KUCH1	F	Y		20					0.2					0.2				
Kuhnia eupatorioides L.	KUEU1	F	Y			20	20	20	40		0.4	0.4	0.4	0.4		0.4	0.4	0.4	0.5
Liatris punctata Hook.	LIPU1	F	Y		20					0.2					0.2				
Lomatium orientale Coult. & Rose	LOOR1	F	Y				20					0.2					0.2		
Mirabilis linearis (Pursh.) Heimerl	MILI1	F	Y		20					0.2					0.2				
Phacelia heterophylla Pursh.	PHHE1	F	Y		20					0.4					0.5				
Psoralea tenuiflora Pursh.	PSTE1	F	Y		100	100	100	80	80	3.8	2.0	3.2	3.0	1.4	4.5	2.1	3.4	3.3	1.8
Ratibida columnifera (Nutt.) Wootl. & Standl.	RACO1	F	Y					60	20				0.8	0.2				0.9	0.3
Solidago missouriensis Nutt.	SOMI1	F	Y			20					0.2					0.2			
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	100	100	100	100	100	11.0	24.4	37.2	17.4	3.4	13.0	25.8	39.1	19.2	4.5
Bromus tectorum L.	BRTE1	G	N	C	40	60	80	80	80	0.8	7.6	8.0	11.6	6.0	0.9	8.1	8.4	12.8	7.9
Poa compressa L.	POCO1	G	N	C	40	40	40	40	40	2.4	1.6	1.8	3.8	1.6	2.8	1.7	1.9	4.2	2.1
Poa pratensis L.	POPR1	G	N	C	60	80	80	60	60	6.6	6.0	1.8	6.8	5.4	7.8	6.4	1.9	7.5	7.1

Table 7. (cont.)

					Frequency					Absolute Cover					Relative Cover				
										TR11									
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
Agropyron smithii Rydb.	AGSM1	G	Y	C	100	80	100	80	100	17.0	11.0	11.0	6.4	5.4	20.1	11.7	11.6	7.1	7.1
Aristida purpurea Nutt. var. longiseta (Steud.) Vasey	ARFE1	G	Y	C		40					0.4					0.4			
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmg	ARLO1	G	Y	C	40	40	60	40	60	2.0	0.8	1.6	1.0	1.4	2.4	0.8	1.7	1.1	1.8
Carex eleocharis Bailey	CAEL1	G	Y	C	40				20	3.6				0.8	4.3				1.0
Carex heliophila Mack.	CAHE1	G	Y	C		100	100	100	100		8.8	3.8	4.2	4.8		9.3	4.0	4.6	6.3
Carex oreocharis Holm.	CAOR1	G	Y	C	60					3.2					3.8				
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	20			40	40	0.2			0.8	0.4	0.2			0.9	0.5
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C					40					0.4					0.5
Stipa comata Trin. & Rupr.	STCO1	G	Y	C	100	60	80	60	100	9.8	8.2	3.0	6.0	9.6	11.6	8.7	3.2	6.6	12.6
Stipa viridula Trin.	STVI1	G	Y	C	20	60	60	40	40	2.0	4.0	2.8	4.4	3.4	2.4	4.2	2.9	4.9	4.5
Andropogon gerardii Vitman	ANGE1	G	Y	W	80	60	60	80	100	7.4	3.8	3.6	6.4	7.0	8.7	4.0	3.8	7.1	9.2
Andropogon scoparius Michx.	ANSC1	G	Y	W		40		20	20		0.4		0.2	0.2		0.4		0.2	0.3
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	40	40		80	80	1.2	0.8		2.4	6.2	1.4	0.8		2.6	8.1
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	40	100	60	100	100	1.0	1.6	0.8	2.2	7.4	1.2	1.7	0.8	2.4	9.7
Bouteloua hirsuta Lag	BOHI1	G	Y	W		20					0.2					0.2			
Buchloe dactyloides (Nutt.) Engelm.	BUDA1	G	Y	W				40	40				0.6	0.6				0.7	0.8
Muhlenbergia wrightii Vasey	MUWR1	G	Y	W		20			20		0.4			0.2		0.4			0.3
Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	G	Y	W		20		20			0.4		0.4			0.4		0.4	
Total foliar cover										84.6	94.4	95.2	90.6	76.2	100.0	100.0	100.0	100.0	100.0
Total forb cover										16.4	14.0	19.8	16.0	12.0	19.4	14.8	20.8	17.7	15.7
Total native forb cover										10.0	6.0	9.0	8.4	4.2	11.8	6.4	9.5	9.3	5.5
Total non-native forb cover										6.4	8.0	10.8	7.6	7.8	7.6	8.5	11.3	8.4	10.2
Total graminoid cover										68.2	80.4	75.4	74.6	64.2	80.6	85.2	79.2	82.3	84.3
Total native cover										57.4	46.8	35.6	43.4	52.0	67.8	49.6	37.4	47.9	68.2
Total non-native cover										27.2	47.6	59.6	47.2	24.2	32.2	50.4	62.6	52.1	31.8
Total warm-season graminoid cover										9.6	7.6	4.4	12.2	21.6	11.3	8.1	4.6	13.5	28.3
Total cool-season graminoid cover										58.6	72.8	71.0	62.4	42.6	69.3	77.1	74.6	68.9	55.9

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (500).

Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).

All cover values presented are means (n = 5).

Native categories: Y = Native, N = Non-Native

Form categories: C = Cactus, F = Forb, G = Graminoid

Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 8. 2000 Estimated Weed Infestation Acreage Summary for Rocky Flats Environmental Technology Site

	2000 Acreage				
		Density Level			
Common Name	**Site Total**	**High**	**Medium**	**Low**	**Scattered**
Diffuse Knapweed	2223	510	531	771	412
Musk Thistle	792	0	55	242	494
Mullein	1010	69	184	451	307
Jointed Goatgrass	69	NA	NA	NA	NA
Annual Rye	28	NA	NA	NA	NA
Scotch Thistle	4	NA	NA	NA	NA
Russian Knapweed	1	NA	NA	NA	NA
Bouncingbet	1	NA	NA	NA	NA
Dame's Rocket	1	NA	NA	NA	NA

All values are approximate acreages. NA = Data not collected by density level.
See text for density level descriptions.

Table 9. Comparison of 1997-2000 Weed Infestation Extents at Rocky Flats Environmental Technology Site

			Density Level			
Weed Species	**Year**	**Site Total**	**High**	**Medium**	**Low**	**Scattered**
Diffuse Knapweed	1997	2678	696	893	658	431
	1998	2913	761	778	987	388
	1999	2295	466	613	873	343
	2000	2223	510	531	771	412
Musk Thistle	1997	474	2	270	202	0
	1998	1685	32	515	1035	102
	1999	1353	1	311	684	357
	2000	792	0	55	242	494
Mullein	1997	575	117	238	203	17
	1998	867	168	225	460	13
	1999	1068	130	204	450	284
	2000	1010	69	184	451	307

All values are approximate acreages.
See text for density level descriptions.

Table 10. 1999 Aerial Herbicide Application. Comparison of 1998, 1999, and 2000 Diffuse Knapweed Pre- and Post-Aerial Herbicide Application Infestation Levels at Rocky Flats Environmental Technology Site

		Diffuse Knapweed Density Level			
Year	**Total**	**High**	**Medium**	**Low**	**Scattered**
1998	878	257	214	246	161
1999 (Herbicide Applied)	195	24	36	68	67
Change (acres)	-683	-233	-178	-178	-94
Percent Change (1998 to 1999)	-78	-91	-83	-72	-58

Values are approximate number of acres.

		Diffuse Knapweed Density Level			
Year	**Total**	**High**	**Medium**	**Low**	**Scattered**
1998	878	257	214	246	161
1999 (Herbicide Applied)	195	24	36	68	67
2000	487	61	103	130	194
Change (acres) from 1999	292	37	67	62	127
Percent Change from 1998 to 2000	-45	-76	-52	-47	20

Values are approximate number of acres.

Table 11. Pre- and Post-Treatment Diffuse Knapweed Levels at 2000 Aerial Herbicide Application Locations

		Diffuse Knapweed Density Level			
Year	Total	High	Medium	Low	Scattered
1999	510	52	161	226	70
2000 (Herbicide Applied)	101	10	19	35	36
Change from 1999	409	42	142	191	34
Percent Change from 1999	-80	-81	-88	-85	-49

Values are approximate number of acres.

Table 12. 1997-2000 Diffuse Knapweed Monitoring Study Species Richness Summary - Control Plot

Family	Scientific Name	Speccode	Native	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
APIACEAE	Lomatium orientale Coult. & Rose	LOOR1	Y	X	X	X	X	X		X	X
ASCLEPIADACEAE	Asclepias stenophylla A. Gray	ASST1	Y	X	X	X	X	X	X	X	X
ASCLEPIADACEAE	Asclepias viridiflora Raf.	ASVI1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Antennaria parvifolia Nutt.	ANPA1	Y	X	X	X		X	X		
ASTERACEAE	Arnica fulgens Pursh.	ARFU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	ARCA1	Y	X	X		X			X	X
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Aster porteri Gray	ASPO1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	N	X	X	X	X				
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	N	X	X	X	X	X	X	X	X
ASTERACEAE	Chrysopsis fulcrata Greene	CHFU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Chrysopsis villosa Pursh.	CHVI1	Y			X	X			X	
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	Y				X	X		X	
ASTERACEAE	Erigeron flagellaris A. Gray	ERFL1	Y	X	X	X	X		X		X
ASTERACEAE	Gaillardia aristata Pursh.	GAAR1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Lactuca serriola L.	LASE1	N	X	X	X	X	X	X		
ASTERACEAE	Liatris punctata Hook.	LIPU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Microseris cuspidata (Pursh.) Sch. Bip.	MICU1	Y	X		X		X			
ASTERACEAE	Scorzonera laciniata L.	SCLA1	N	X	X	X		X		X	
ASTERACEAE	Senecio plattensis Nutt.	SEPL1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Solidago mollis Bart.	SOMO1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Solidago rigida L.	SORI1	Y		X	X	X	X	X	X	X
ASTERACEAE	Taraxacum officinale Weber	TAOF1	N	X	X	X	X	X	X	X	X
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	N	X	X	X	X	X	X	X	X
BORAGINACEAE	Lithospermum incisum Lehm.	LIIN1	Y	X	X	X		X		X	X
BORAGINACEAE	Mertensia lanceolata (Pursh.) A. DC.	MELA1	Y			X		X			X
BRASSICACEAE	Alyssum alyssoides (L.) L.	ALAL1	N			X					
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	N	X	X	X	X	X	X	X	X
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	Y			X	X				
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	CAMI1	N	X	X	X	X	X	X		
BRASSICACEAE	Draba reptans (Lam.) Fern.	DRRE1	Y	X	X	X		X			
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	ERCA2	Y	X	X	X	X	X	X	X	X
BRASSICACEAE	Lepidium campestre (L.) R. Br.	LECA1	N	X	X	X	X	X	X	X	X
BRASSICACEAE	Lepidium densiflorum Schrad.	LEDE1	Y	X	X						
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	LEMO1	Y	X	X	X	X	X	X	X	X
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	N	X	X						
CACTACEAE	Coryphantha missouriensis (Sweet) Britt. & Rose	COMI1	Y	X				X			
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	Y	X	X	X	X	X	X	X	X
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	Y	X	X	X	X	X	X	X	X
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	ARFE2	Y	X	X	X	X	X	X	X	X

Table 12. (cont.)

Family	Scientific Name	Speccode	Native	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	PAJA1	Y	X			X			X	
CARYOPHYLLACEAE	Silene antirrhina L.	SIAN1	Y	X	X	X		X		X	
CLUSIACEAE	Hypericum perforatum L.	HYPE1	N	X	X	X	X	X	X	X	X
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	TROC1	Y	X							
CYPERACEAE	Carex heliophila Mack.	CAHE1	Y	X	X	X	X	X	X	X	X
CYPERACEAE	Eleocharis compressa Sulliv.	ELCO1	Y	X	X	X	X	X	X	X	X
FABACEAE	Dalea purpurea Vent	DAPU1	Y	X	X	X	X	X	X	X	X
FABACEAE	Oxytropis lambertii Pursh.	OXLA1	Y	X					X		
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	Y	X	X	X	X	X	X	X	X
JUNCACEAE	Juncus interior Wieg.	JUIN1	Y		X	X	X	X	X	X	X
LILIACEAE	Allium textile A. Nels. & Macbr.	ALTE1	Y	X	X	X	X	X	X	X	X
LILIACEAE	Leucocrinum montanum Nutt.	LEMO2	Y	X		X		X			
NYCTAGINACEAE	Mirabilis linearis (Pursh.) Heimerl	MILI1	Y								X
ONAGRACEAE	Oenothera villosa Thunb. ssp. strigosa (Rydb.) Dietrich & Raven	OEVI1	Y	X	X	X	X	X	X	X	X
OROBANCHACEAE	Orobanche fasciculata Nutt.	ORFA1	Y	X				X		X	
PLANTAGINACE	Plantago lanceolata L.	PLLA1	N	X	X	X	X	X	X	X	X
POACEAE	Agropyron smithii Rydb.	AGSM1	Y	X							X
POACEAE	Andropogon gerardii Vitman	ANGE1	Y	X	X	X	X	X	X	X	X
POACEAE	Andropogon scoparius Michx.	ANSC1	Y	X	X	X	X	X	X	X	X
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	Y		X				X	X	X
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	Y	X	X	X	X	X	X	X	X
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	Y	X	X	X	X	X	X	X	X
POACEAE	Bouteloua hirsuta Lag	BOHI1	Y	X	X	X	X	X	X	X	X
POACEAE	Bromus inermis Leyss. ssp. inermis	BRIN1	N	X	X	X	X	X	X	X	X
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	N	X	X	X	X	X	X	X	
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1	Y	X	X	X	X	X	X	X	X
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	Y	X	X	X	X	X	X	X	X
POACEAE	Muhlenbergia wrightii Vasey	MUWR1	Y							X	
POACEAE	Poa compressa L.	POCO1	N	X	X	X	X	X	X	X	X
POACEAE	Poa pratensis L.	POPR1	N	X	X	X	X	X	X	X	X
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	Y	X	X		X	X	X	X	X
POACEAE	Sorghastrum nutans (L.) Nash	SONU1	Y		X	X	X		X	X	X
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	Y	X	X	X	X	X	X	X	X
POACEAE	Stipa comata Trin. & Rupr.	STCO1	Y				X		X		
POLYGONACEAE	Eriogonum alatum Torr.	ERAL1	Y			X	X			X	X
POLYGONACEAE	Polygonum convolvulus L.	POCO2	N			X					
POLYGONACEAE	Polygonum ramosissimum Michx.	PORA1	Y			X	X				
PORTULACACEAE	Talinum parviflorum Nutt.	TAPA1	Y		X	X	X	X	X	X	X
ROSACEAE	Prunus virginiana L. var. melanocarpa (A. Nels.) Sarg.	PRVI1	Y	X	X	X	X	X	X	X	X
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1	N					X		X	
SCROPHULARIACEAE	Penstemon virens Penn.	PEVI1	Y	X	X	X	X	X	X	X	X
SCROPHULARIACEAE	Verbascum blattaria L.	VEBL1	N	X	X	X	X	X	X	X	X
SCROPHULARIACEAE	Veronica peregrina L. var. xalapensis (H. B. K.) St. John & Warren	VEPE1	Y			X	X	X			

Table 12. (cont.)

Family	Scientific Name	Speccode	Native	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
VIOLACEAE	Viola nuttallii Pursh.	VINU1	Y					X			
	Number of Species			68	65	70	65	67	58	64	59
	Percent Native Species			75	74	74	77	76	76	78	81

Table 13: 1997-2000 Diffuse Knapweed Monitoring Study Species Richness Summary - Treatment Plot

Family	Scientific Name	Speccode	Native	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
		UNKN							X		
APIACEAE	Lomatium orientale Coult. & Rose	LOOR1	Y	X	X	X	X	X	X	X	X
ASCLEPIADACEAE	Asclepias stenophylla A. Gray	ASST1	Y	X			X	X	X	X	X
ASCLEPIADACEAE	Asclepias viridiflora Raf.	ASVI1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Antennaria parvifolia Nutt.	ANPA1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Arnica fulgens Pursh.	ARFU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	ARCA1	Y	X	X	X					
ASTERACEAE	Artemisia frigida Willd.	ARFR1	Y	X							
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Aster porteri Gray	ASPO1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	N	X					X	X	X
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	N	X	X	X	X	X	X	X	X
ASTERACEAE	Chrysopsis fulcrata Greene	CHFU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Chrysopsis villosa Pursh.	CHVI1	Y			X	X				
ASTERACEAE	Cirsium arvense (L.) Scop.	CIAR1	N	X		X		X			
ASTERACEAE	Conyza canadensis (L.) Cronq.	COCA1	Y						X		X
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	Y	X	X		X	X		X	X
ASTERACEAE	Erigeron flagellaris A. Gray	ERFL1	Y	X	X	X					X
ASTERACEAE	Gaillardia aristata Pursh.	GAAR1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Lactuca serriola L.	LASE1	N	X	X		X	X	X	X	X
ASTERACEAE	Liatris punctata Hook.	LIPU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Microseris cuspidata (Pursh.) Sch. Bip.	MICU1	Y	X		X		X		X	
ASTERACEAE	Scorzonera laciniata L.	SCLA1	N	X	X						X
ASTERACEAE	Senecio plattensis Nutt.	SEPL1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Senecio spartioides T. & G.	SESP1	Y		X		X	X	X	X	X
ASTERACEAE	Solidago mollis Bart.	SOMO1	Y	X	X	X	X		X	X	X
ASTERACEAE	Sonchus arvensis L. ssp. arvensis L.	SOAR1	N							X	X
ASTERACEAE	Taraxacum officinale Weber	TAOF1	N	X	X	X	X	X	X	X	X
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	N	X	X	X	X	X	X	X	X
BORAGINACEAE	Mertensia lanceolata (Pursh.) A. DC.	MELA1	Y	X							
BRASSICACEAE	Alyssum alyssoides (L.) L.	ALAL1	N	X							
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	N	X	X	X	X	X	X	X	X
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	Y	X	X			X	X	X	X
BRASSICACEAE	Barbarea vulgaris R. Br.	BAVU1	N	X	X	X		X	X	X	X
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	CAMI1	N	X		X	X	X	X	X	
BRASSICACEAE	Draba reptans (Lam.) Fern.	DRRE1	Y				X				
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	ERCA2	Y	X	X	X	X	X	X	X	X
BRASSICACEAE	Lepidium campestre (L.) R. Br.	LECA1	N	X	X	X	X	X	X	X	X
BRASSICACEAE	Lepidium densiflorum Schrad.	LEDE1	Y	X	X	X	X		X	X	

Table 13. (cont.)

Family	Scientific Name	Speccode	Native	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	LEMO1	Y	X	X	X	X	X	X	X	X
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	N			X		X	X		
CACTACEAE	Coryphantha missouriensis (Sweet) Britt. & Rose	COMI1	Y	X							
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	Y	X	X	X	X	X	X	X	X
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	Y	X	X	X	X	X	X	X	X
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	ARFE2	Y	X	X	X	X	X	X	X	X
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	PAJA1	Y	X	X	X	X	X	X	X	X
CARYOPHYLLACEAE	Silene antirrhina L.	SIAN1	Y	X	X	X	X	X	X	X	X
CLUSIACEAE	Hypericum perforatum L.	HYPE1	N	X	X	X	X	X	X	X	X
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	TROC1	Y	X		X	X	X	X	X	
CRASSULACEAE	Sedum lanceolatum Torr.	SELA1	Y	X	X	X	X	X	X	X	X
CYPERACEAE	Carex heliophila Mack.	CAHE1	Y	X	X	X	X	X	X	X	X
CYPERACEAE	Eleocharis compressa Sulliv.	ELCO1	Y	X	X	X	X	X	X	X	X
FABACEAE	Dalea purpurea Vent	DAPU1	Y	X	X	X	X	X	X	X	X
FABACEAE	Medicago lupulina L.	MELU1	N	X							
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	Y	X	X	X	X	X	X	X	X
HYDROPHYLLACEAE	Phacelia heterophylla Pursh.	PHHE1	Y		X	X	X	X	X	X	X
JUNCACEAE	Juncus interior Wieg.	JUIN1	Y			X	X	X	X		X
LAMIACEAE	Hedeoma hispidum Pursh.	HEHI1	Y			X				X	
LILIACEAE	Allium textile A. Nels. & Macbr.	ALTE1	Y	X	X	X	X	X	X	X	
ONAGRACEAE	Oenothera villosa Thunb. ssp. strigosa (Rydb.) Dietrich & Raven	OEVI1	Y					X	X	X	X
OROBANCHACEAE	Orobanche fasciculata Nutt.	ORFA1	Y		X	X	X	X		X	X
PLANTAGINACE	Plantago lanceolata L.	PLLA1	N	X	X	X	X	X	X	X	X
PLANTAGINACE	Plantago patagonica Jacq.	PLPA1	Y	X							
POACEAE	Agropyron smithii Rydb.	AGSM1	Y			X		X			
POACEAE	Andropogon gerardii Vitman	ANGE1	Y	X	X	X	X	X	X	X	X
POACEAE	Andropogon scoparius Michx.	ANSC1	Y	X	X	X	X	X	X	X	X
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	Y						X		X
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	Y	X	X	X	X	X	X	X	X
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	Y	X	X	X	X	X	X	X	X
POACEAE	Bouteloua hirsuta Lag	BOHI1	Y	X	X	X	X	X	X	X	X
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	N	X	X	X	X	X	X	X	X
POACEAE	Bromus tectorum L.	BRTE1	N	X	X	X	X	X	X	X	X
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	BUDA1	Y	X	X		X	X	X	X	X
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1	Y	X	X	X	X	X	X	X	X
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	Y	X	X	X	X	X	X	X	X
POACEAE	Muhlenbergia wrightii Vasey	MUWR1	Y			X	X	X		X	X
POACEAE	Panicum capillare L.	PACA1	Y						X		
POACEAE	Poa compressa L.	POCO1	N	X	X	X	X	X	X	X	X
POACEAE	Poa pratensis L.	POPR1	N	X	X	X	X	X	X	X	X
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	Y	X	X		X	X	X	X	X
POACEAE	Sorghastrum nutans (L.) Nash	SONU1	Y		X	X	X		X	X	X

Table 13. (cont.)

Family	Scientific Name	Speccode	Native	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	Y	X	X	X	X	X	X	X	X
POACEAE	Stipa comata Trin. & Rupr.	STCO1	Y			X					
POLEMONIACEAE	Collomia linearis Nutt.	COLI1	Y	X		X	X	X	X		
POLYGONACEAE	Eriogonum alatum Torr.	ERAL1	Y	X	X	X	X	X	X	X	X
POLYGONACEAE	Polygonum arenastrum Jord. ex Bor.	POAR1	N					X			
POLYGONACEAE	Polygonum ramosissimum Michx.	PORA1	Y			X	X	X	X		
POLYGONACEAE	Rumex crispus L.	RUCR1	N	X		X	X	X	X	X	
PORTULACACEAE	Talinum parviflorum Nutt.	TAPA1	Y	X				X	X	X	X
ROSACEAE	Potentilla gracilis Dougl. ex Hook. var. glabrata (Lehm.) C. L. Hitchc.	POGR1	Y	X							
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1	N							X	X
SCROPHULARIACEAE	Penstemon virens Penn.	PEVI1	Y	X	X	X	X	X	X	X	X
SCROPHULARIACEAE	Veronica peregrina L. var. xalapensis (H. B. K.) St. John & Warren	VEPE1	Y			X	X	X	X		
	Number of Species			74	62	70	68	72	73	71	69
	Percent Native Species			73	77	77	79	75	76	75	75

Table 14. 1997-2000 Diffuse Knapweed Monitoring Study Foliar Cover Summary - Treatment Plot

					Frequency (%)								Absolute Cover (%)								Relative Cover (%)							
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudle	ALMI1	F	N						20	20	20						0.2	0.2	0.2						0.3	0.3	0.3	
Centaurea diffusa Lam.	CEDI1	F	N		100	100				20	40	60	4.4	4.8				0.6	0.4	1.2	6.6	6.8				0.8	0.6	1.7
Hypericum perforatum L.	HYPE1	F	N		20	20				–	20	20	0.2	0.2					0.2	0.2	0.3	0.3					0.3	0.3
Lactuca serriola L.	LASE1	F	N							20								0.2								0.3		
Lepidium campestre (L.) R. Br.	LECA1	F	N		20								0.2								0.3							
Plantago lanceolata L.	PLLA1	F	N		20								0.2								0.3							
Tragopogon dubius Scop.	TRDU1	F	N		20					40	40	20	0.2					0.4	0.4	0.2	0.3					0.5	0.6	0.3
Allium textile A. Nels. & Macbr.	ALTE1	F	Y		20	20	20						0.2	0.2	0.2						0.3	0.3	0.3					
Ambrosia psilostachya DC.	AMPS1	F	Y		80					20	40	60	1.6					0.2	0.6	1.0	2.4					0.3	1.0	1.4
Arenaria fendleri A. Gray	ARFE2	F	Y		20								0.4								0.6							
Arnica fulgens Pursh.	ARFU1	F	Y		60	20	20	40	40		20		0.6	0.2	0.4	0.4	0.8		0.6		0.9	0.3	0.5	0.5	1.3		1.0	
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y		20	60		60		60	40	20	0.4	1.0		0.6		0.6	0.6	0.2	0.6	1.4		0.7		0.8	1.0	0.3
Aster portari Gray	ASPO1	F	Y		80	100	60	60	60	80	20	40	2.0	2.0	1.8	2.6	2.6	3.2	0.6	0.4	3.0	2.8	2.4	3.2	4.1	4.0	1.0	0.6
Asclepias stenophylla A. Gray	ASST1	F	Y		20			20					0.2			0.2					0.3			0.2				
Dalea purpurea Vent	DAPU1	F	Y			20	20				20			0.2	0.2				0.2			0.3	0.3				0.3	
Grindelia squarrosa (Pursh.) Dun.	GRSQ1	F	Y		60	20	20		20		20	20	0.6	0.2	0.2		0.2		0.4	0.2	0.9	0.3	0.3		0.3		0.6	0.3
Lesquerella montana (A. Gray) Wats.	LEMO1	F	Y							20	40							0.2	0.4							0.3	0.6	
Liatris punctata Hook.	LIPU1	F	Y		20		20			40	60	40	0.2		0.2			0.6	0.8	0.4	0.3		0.3			0.8	1.3	0.6
Lomatium orientale Coult. & Rose	LOOR1	F	Y		60		80		80		40		0.8		1.6		1.2		0.4		1.2		2.1		1.9		0.6	
Penstemon virens Penn.	PEVI1	F	Y				20					20			0.2					0.2			0.3					0.3
Senecio plattensis Nutt.	SEPL1	F	Y				20								0.2								0.3					
Senecio spartioides T. & G.	SESP1	F	Y							20	20	20						0.2	0.4	0.4						0.3	0.6	0.6
Talinum parviflorum Nutt.	TAPA1	F	Y									20								0.2								0.3
Tradescantia occidentalis (Britt.) Smyth	TROC1	F	Y						20								0.4								0.6			
Veronica peregrina L. var. xalapensis (H. B. K.) St. John & Warren	VEPE1	F	Y						20								0.2								0.3			
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	60	80	40	60	40	40	20		2.2	2.4	2.0	2.2	1.2	0.8	0.2		3.3	3.4	2.7	2.7	1.9	1.0	0.3	
Bromus tectorum L.	BRTE1	G	N	C	20		40	40		20			1.8		1.2	0.6		0.6			2.7		1.6	0.7		0.8		
Poa compressa L.	POCO1	G	N	C	100	100	100	100	100	100	100	100	12.2	12.4	25.0	31.6	23.8	22.8	20.4	13.0	18.4	17.5	33.2	38.7	37.9	28.6	32.6	18.8
Poa pratensis L.	POPR1	G	N	C	20	20	20					20	0.2	0.4	0.2					0.2	0.3	0.6	0.3					0.3
Carex heliophila Mack.	CAHE1	G	Y	C	60	40	60	40	40	40	20	60	0.8	1.2	0.8	0.8	0.6	0.8	1.0	2.0	1.2	1.7	1.1	1.0	1.0	1.0	1.6	2.9
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	40	20			20		20		0.2	0.2			0.2		0.2		0.3	0.3			0.3		0.3	
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C				20		20						0.2		0.2						0.2		0.3		
Andropogon gerardii Vitman	ANGE1	G	Y	W	80	100	80	100	100	100	100	100	5	8.2	5.4	7.8	4.6	10.2	5.4	9.4	7.5	11.5	7.2	9.6	7.3	12.8	8.6	13.6
Andropogon scoparius Michx.	ANSC1	G	Y	W	80	60	80	60	40	40	60	80	1.6	1	1	1	0.8	1.4	1.8	1.2	2.4	1.4	1.3	1.2	1.3	1.8	2.9	1.7
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	60	40	60	20	60	80	40	80	0.8	0.4	1.4	0.2	1.6	2	0.6	2.4	1.2	0.6	1.9	0.2	2.5	2.5	1.0	3.5
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	40	20	80			80	60	40	0.6	0.2	1.2			0.8	1	1.2	0.9	0.3	1.6			1.0	1.6	1.7
Bouteloua hirsuta Lag	BOHI1	G	Y	W	80			20	40		80	20	0.8			0.2	0.6		1	0.2	1.2			0.2	1.0		1.6	0.3
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W	100	100	100	100	100	100	100	100	26.4	35.2	31.6	32.6	23	32.6	24.2	34.4	39.8	49.6	41.9	40.0	36.6	40.9	38.7	49.7
Sorghastrum nutans (L.) Nash	SONU1	G	Y	W						20	20							0.2	0.2							0.3	0.3	
Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	G	Y	W	60	20	40	40	40	40	20	40	1.6	0.6	0.6	0.6	0.8	1	0.4	0.6	2.4	0.8	0.8	0.7	1.3	1.3	0.6	0.9
Total foliar cover													66.4	71.0	75.4	81.6	62.8	79.8	62.6	69.2	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total forb cover													12.2	8.8	5.0	3.8	5.6	6.4	6.2	4.6	18.4	12.4	6.6	4.7	8.9	8.0	9.9	6.6
Total native forb cover													7.0	3.8	5.0	3.8	5.4	5.0	5.0	3.0	10.5	5.4	6.6	4.7	8.6	6.3	8.0	4.3
Total non-native forb cover													5.2	5.0	0.0	0.0	0.2	1.4	1.2	1.6	7.8	7.0	0.0	0.0	0.3	1.8	1.9	2.3
Total graminoid cover													54.2	62.2	70.4	77.8	57.2	73.4	56.4	64.6	81.6	87.6	93.4	95.3	91.1	92.0	90.1	93.4
Total native cover													44.8	50.8	47.0	47.2	37.6	54.2	40.8	54.4	67.5	71.5	62.3	57.8	59.9	67.9	65.2	78.6
Total non-native cover													21.6	20.2	28.4	34.4	25.2	25.6	21.8	14.8	32.5	28.5	37.7	42.2	40.1	32.1	34.8	21.4
Total warm-season graminoid cover													36.8	45.6	41.2	42.4	31.4	48.2	34.6	49.4	55.4	64.2	54.6	52.0	50.0	60.4	55.3	71.4
Total cool-season graminoid cover													17.4	16.6	29.2	35.4	25.8	25.2	21.8	15.2	26.2	23.4	38.7	43.4	41.1	31.6	34.8	22.0

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (500).

Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).

All cover values presented are means (n = 5).

Native categories: Y = Native, N = Non-Native

Form categories: C = Cactus, F = Forb, G = Graminoid

Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 15. 1997-2000 Diffuse Knapweed Monitoring Study Species Frequency Summary - Treatment Plot

Family	Scientific Name	Native	Speccode	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
			UNKN						4		
APIACEAE	Lomatium orientale Coult. & Rose	Y	LOOR1	80	8	92	72	92	24	88	16
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	Y	ACMI1							4	
ASTERACEAE	Ambrosia psilostachya DC.	Y	AMPS1	32	32	12	16	16	12	28	28
ASTERACEAE	Arnica fulgens Pursh.	Y	ARFU1	16	12	16	12	20	8	20	8
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	Y	ARCA1	4	4	4					
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	Y	ARLU1	36	36	32	16	24	16	20	16
ASTERACEAE	Aster porteri Gray	Y	ASPO1	80	84	80	72	80	72	44	48
ASTERACEAE	Centaurea diffusa Lam.	N	CEDI1	80	60	52	20	44	44	44	48
ASTERACEAE	Chrysopsis fulcrata Greene	Y	CHFU1					4	4	4	
ASTERACEAE	Erigeron divergens T. & G.	Y	ERDI1	4						4	
ASTERACEAE	Erigeron flagellaris A. Gray	Y	ERFL1		4						4
ASTERACEAE	Gaillardia aristata Pursh.	Y	GAAR1	8	4		4	4	4	4	8
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	Y	GRSQ1	20	16	12		12	4	4	4
ASTERACEAE	Lactuca serriola L.	N	LASE1	20	8			28	16	4	
ASTERACEAE	Liatris punctata Hook.	Y	LIPU1	20	20	28	20	28	24	28	16
ASTERACEAE	Microseris cuspidata (Pursh.) Sch. Bip.	Y	MICU1	4		4		8			
ASTERACEAE	Scorzonera laciniata L.	N	SCLA1	4	4						
ASTERACEAE	Senecio plattensis Nutt.	Y	SEPL1	24	12	20	4	12	4	4	4
ASTERACEAE	Taraxacum officinale Weber	N	TAOF1	4							
ASTERACEAE	Tragopogon dubius Scop.	N	TRDU1	12	8		4	8	4	20	28
BORAGINACEAE	Mertensia lanceolata (Pursh.) A. DC.	Y	MELA1	4							
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	N	ALMI1	4	4	16	4	8	4	4	4
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	Y	ARHI1	4				4	4	4	4
BRASSICACEAE	Barbarea vulgaris R. Br.	N	BAVU1	4							
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	N	CAMI1					4			
BRASSICACEAE	Draba reptans (Lam.) Fern.	Y	DRRE1				4				
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	Y	ERCA2	4				8	8	12	4
BRASSICACEAE	Lepidium campestre (L.) R. Br.	N	LECA1	16	8	16	12	20	12	4	
BRASSICACEAE	Lepidium densiflorum Schrad.	Y	LEDE1	12	8						
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	Y	LEMO1	12	16	12	12	20	20	12	12
CACTACEAE	Echinocereus viridiflorus Engelm.	Y	ECVI1	40	36	28	32	28	24	20	20
CACTACEAE	Opuntia macrorhiza Engelm.	Y	OPMA1	64	76	20	32	24	28	16	20
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	Y	ARFE2	52	40	28	28	28	24	28	16
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	Y	PAJA1	12	12	4	4	4	4	4	4
CARYOPHYLLACEAE	Silene antirrhina L.	Y	SIAN1	4		28		24	8	12	4
CLUSIACEAE	Hypericum perforatum L.	N	HYPE1	16	8	72	12	36	24	20	36
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	Y	TROC1	4		4		4	4	4	
CYPERACEAE	Carex heliophila Mack.	Y	CAHE1	32	40	52	40	36	28	36	36
FABACEAE	Dalea purpurea Vent	Y	DAPU1	12	12	8	12	12	12	16	16
FABACEAE	Psoralea tenuiflora Pursh.	Y	PSTE1	20	8	16	16	12	16	20	20
JUNCACEAE	Juncus interior Wieg.	Y	JUIN1				4				

Table 15. (cont.)

Family	Scientific Name	Native	Speccode	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
LILIACEAE	Allium textile A. Nels. & Macbr.	Y	ALTE1	36	12	24	12	28	16		
ONAGRACEAE	Oenothera villosa Thunb. ssp. strigosa (Rydb:) Dietrich & Raven	Y	OEVI1					4	4	4	4
OROBANCHACEAE	Orobanche fasciculata Nutt.	Y	ORFA1		4	4	4	20		40	12
POACEAE	Andropogon gerardii Vitman	Y	ANGE1	68	64	64	64	64	68	64	60
POACEAE	Andropogon scoparius Michx.	Y	ANSC1	20	40	20	20	20	28	28	32
POACEAE	Bouteloua curtipendula (Michx.) Torr.	Y	BOCU1	8	32	28	12	24	32	20	36
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	Y	BOGR1	16	28	16	24	36	48	36	48
POACEAE	Bouteloua hirsuta Lag	Y	BOHI1	16			4	8	20	12	12
POACEAE	Bromus japonicus Thunb. ex Murr.	N	BRJA1	36	32	32	36	40	24	24	12
POACEAE	Bromus tectorum L.	N	BRTE1	8	4	12	8		12	12	8
POACEAE	Koeleria pyramidata (Lam.) Beauv.	Y	KOPY1	36	20	28	20	20	32	24	24
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	Y	MUMO1	96	96	92	92	96	100	96	96
POACEAE	Poa compressa L.	N	POCO1	96	96	100	100	100	100	100	100
POACEAE	Poa pratensis L.	N	POPR1			4	4	8	4		
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	Y	SIHY1						4	4	4
POACEAE	Sorghastrum nutans (L.) Nash	Y	SONU1				4		4		4
POLEMONIACEAE	Collomia linearis Nutt.	Y	COLI1	4		4	4	4	4		
POLYGONACEAE	Polygonum ramosissimum Michx.	Y	PORA1			4	8	8	4		
POLYGONACEAE	Rumex crispus L.	N	RUCR1	4							
PORTULACACEAE	Talinum parviflorum Nutt.	Y	TAPA1					12	28	4	20
SCROPHULARIACEAE	Penstemon virens Penn.	Y	PEVI1	16		28	12	28	24	20	16
SCROPHULARIACEAE	Veronica peregrina L. var. xalapensis (H. B. K.) St. John & Warren	Y	VEPE1			72	32	60	16		

Numbers shown are percent frequency (n = 25).

Table 16. Prescribed Burn Pre- and Post-Burn Species Richness (1999-2000)

				Control		Treatment	
Family	**Scientific Name**	**Speccode**	**Native**	**1999**	**2000**	**1999**	**2000**
AGAVACEAE	Yucca glauca Nutt.	YUGL1	Y				
ANACARDIACEAE	Rhus aromatica Ait. var. trilobata (Nutt.) A. Gray	RHAR1	Y	X	X		
APIACEAE	Lomatium orientale Coult. & Rose	LOOR1	Y	X		X	
ASCLEPIADACEAE	Asclepias speciosa Torr.	ASSP1	Y			X	X
ASCLEPIADACEAE	Asclepias stenophylla A. Gray	ASST1	Y	X	X	X	X
ASCLEPIADACEAE	Asclepias viridiflora Raf.	ASVI1	Y	X	X	X	X
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	Y	X	X		
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	Y	X	X	X	X
ASTERACEAE	Antennaria parvifolia Nutt.	ANPA1	Y	X	X	X	X
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	ARCA1	Y			X	X
ASTERACEAE	Artemisia dracunculus L.	ARDR1	Y				
ASTERACEAE	Artemisia frigida Willd.	ARFR1	Y	X	X	X	X
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	Y	X	X	X	X
ASTERACEAE	Aster falcatus Lindl.	ASFA1	Y				
ASTERACEAE	Aster porteri Gray	ASPO1	Y	X	X	X	X
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	N				X
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	N	X	X	X	X
ASTERACEAE	Chrysanthemum leucanthemum L.	CHLE1	N				
ASTERACEAE	Chrysopsis fulcrata Greene	CHFU1	Y	X	X	X	X
ASTERACEAE	Chrysopsis villosa Pursh.	CHVI1	Y	X	X	X	X
ASTERACEAE	Cirsium arvense (L.) Scop.	CIAR1	N				
ASTERACEAE	Cirsium undulatum (Nutt.) Spreng.	CIUN1	Y			X	X
ASTERACEAE	Conyza canadensis (L.) Cronq.	COCA1	Y				X
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	Y	X		X	X
ASTERACEAE	Erigeron flagellaris A. Gray	ERFL1	Y				X
ASTERACEAE	Gaillardia aristata Pursh.	GAAR1	Y	X	X	X	X
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	Y		X	X	X
ASTERACEAE	Helianthus annuus L.	HEAN1	Y				X
ASTERACEAE	Helianthus pumilus Nutt.	HEPU1	Y	X	X		
ASTERACEAE	Helianthus rigidus (Cass.) Desf. ssp. subrhomboideus (Rydb.) Heise	HERI1	Y	X	X		
ASTERACEAE	Kuhnia chlorolepis Woot. & Standl.	KUCH1	Y				
ASTERACEAE	Kuhnia eupatorioides L.	KUEU1	Y				
ASTERACEAE	Lactuca serriola L.	LASE1	N		X	X	X
ASTERACEAE	Liatris punctata Hook.	LIPU1	Y	X	X	X	X
ASTERACEAE	Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	Y				X
ASTERACEAE	Scorzonera laciniata L.	SCLA1	N				
ASTERACEAE	Senecio plattensis Nutt.	SEPL1	Y	X	X	X	X
ASTERACEAE	Senecio spartioides T. & G.	SESP1	Y			X	X
ASTERACEAE	Solidago mollis Bart.	SOMO1	Y	X	X	X	
ASTERACEAE	Taraxacum officinale Weber	TAOF1	N		X	X	X
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	N	X	X	X	X
BORAGINACEAE	Cryptantha virgata (Porter) Payson	CRVI1	Y			X	X
BORAGINACEAE	Lappula redowskii (Hornem.) Greene	LARE1	Y				
BORAGINACEAE	Lithospermum incisum Lehm.	LIIN1	Y			X	X
BRASSICACEAE	Alyssum alyssoides (L.) L.	ALAL1	N		X		
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	N	X	X	X	X
BRASSICACEAE	Arabis fendleri (S. Wats.) Greene var. fendleri	ARFE3	Y		X		
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	Y	X	X	X	X
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	CAMI1	N				
BRASSICACEAE	Draba reptans (Lam.) Fern.	DRRE1	Y		X		
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	ERCA2	Y	X	X	X	X
BRASSICACEAE	Lepidium campestre (L.) R. Br.	LECA1	N				
BRASSICACEAE	Lepidium densiflorum Schrad.	LEDE1	Y		X		X
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	LEMO1	Y	X	X	X	X
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	N				
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	Y	X	X	X	X
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	Y	X	X	X	X
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	ARFE2	Y	X	X	X	X
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	PAJA1	Y	X	X	X	X
CARYOPHYLLACEAE	Silene antirrhina L.	SIAN1	Y				X
CARYOPHYLLACEAE	Silene drummondii Hook.	SIDR1	Y	X	X		
CHENOPODIACEAE	Chenopodium leptophyllum Nutt. ex Moq.	CHLE2	Y				
CHENOPODIACEAE	Kochia scoparia (L.) Schrad.	KOSC1	N		X		
CHENOPODIACEAE	Salsola iberica Senn. & Pau.	SAIB1	N		X		

Table 16. (cont.)

				Control		Treatment	
Family	Scientific Name	Speccode	Native	1999	2000	1999	2000
CLUSIACEAE	Hypericum perforatum L.	HYPE1	N	X	X	X	X
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	TROC1	Y				
CONVOLVULACEAE	Convolvulus arvensis L.	COAR1	N				X
CRASSULACEAE	Sedum lanceolatum Torr.	SELA1	Y				
CYPERACEAE	Carex heliophila Mack.	CAHE1	Y	X	X	X	X
EUPHORBIACEAE	Euphorbia robusta (Engelm.) Small	EURO1	Y			X	X
FABACEAE	Astragalus agrestis Dougl. ex G. Don	ASAG1	Y		X	X	X
FABACEAE	Astragalus shortianus Nutt. ex T.&G.	ASSH1	Y				
FABACEAE	Dalea purpurea Vent	DAPU1	Y	X	X	X	X
FABACEAE	Melilotus officinalis (L.) Pall.	MEOF1	N				X
FABACEAE	Oxytropis lambertii Pursh.	OXLA1	Y				
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	Y	X	X	X	X
GERANIACEAE	Erodium cicutarium (L.) L'Her.	ERCI1	N			X	X
HYDROPHYLLACEAE	Phacelia heterophylla Pursh.	PHHE1	Y				
JUNCACEAE	Juncus interior Wieg.	JUIN1	Y	X	X	X	X
LILIACEAE	Allium textile A. Nels. & Macbr.	ALTE1	Y	X	X	X	
NYCTAGINACEAE	Mirabilis linearis (Pursh.) Heimerl	MILI1	Y	X	X	X	X
ONAGRACEAE	Calylophus serrulatus (Nutt.) Raven	CASE2	Y	X			
ONAGRACEAE	Gaura coccinea Pursh.	GACO1	Y				
OROBANCHACEAE	Orobanche fasciculata Nutt.	ORFA1	Y	X			
PLANTAGINACE	Plantago lanceolata L.	PLLA1	N			X	X
POACEAE	Aegilops cylindrica Host	AECY1	N			X	
POACEAE	Agropyron smithii Rydb.	AGSM1	Y			X	X
POACEAE	Andropogon gerardii Vitman	ANGE1	Y	X	X	X	X
POACEAE	Andropogon scoparius Michx.	ANSC1	Y	X	X	X	X
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmg	ARLO1	Y	X	X	X	X
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	Y	X	X	X	X
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	Y	X	X	X	X
POACEAE	Bouteloua hirsuta Lag	BOHI1	Y	X	X	X	X
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	N	X	X	X	X
POACEAE	Bromus tectorum L.	BRTE1	N	X	X	X	X
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	BUDA1	Y	X	X		X
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1	Y	X	X	X	X
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	Y	X	X	X	X
POACEAE	Muhlenbergia wrightii Vasey	MUWR1	Y	X	X		
POACEAE	Panicum capillare L.	PACA1	Y			X	X
POACEAE	Poa compressa L.	POCO1	N	X	X	X	X
POACEAE	Poa pratensis L.	POPR1	N	X	X	X	X
POACEAE	Setaria viridis (L.) Beauv.	SEVI1	N			X	X
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	Y	X	X	X	X
POACEAE	Sorghastrum nutans (L.) Nash	SONU1	Y	X	X	X	X
POACEAE	Sporobolus asper (Michx.) Kunth	SPAS1	Y			X	X
POACEAE	Sporobolus cryptandrus (Torr.) A. Gray	SPCR1	Y			X	X
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	Y	X	X	X	X
POACEAE	Stipa comata Trin. & Rupr.	STCO1	Y	X	X	X	X
POLEMONIACEAE	Ipomopsis spicata (Nutt.) V. Grant ssp. spicata	IPSP1	Y	X	X		
POLYGONACEAE	Eriogonum alatum Torr.	ERAL1	Y	X	X	X	X
POLYGONACEAE	Eriogonum umbellatum Torr.	ERUM1	Y				
PORTULACACEAE	Talinum parviflorum Nutt.	TAPA1	Y	X	X	X	X
ROSACEAE	Potentilla fissa Nutt.	POFI1	Y	X	X		
ROSACEAE	Potentilla hippiana Lehm.	POHI1	Y	X	X		
ROSACEAE	Rosa arkansana Porter	ROAR1	Y				
SANTALACEAE	Comandra umbellata (L.) Nutt.	COUM1	Y	X	X		
SCROPHULARIACEAE	Castilleja sessiliflora Pursh.	CASE3	Y	X	X	X	
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1	N	X	X	X	X
SCROPHULARIACEAE	Penstemon secundiflorus Benth.	PESE1	Y				
SCROPHULARIACEAE	Penstemon virens Penn.	PEVI1	Y	X	X	X	X
SCROPHULARIACEAE	Verbascum thapsus L.	VETH1	N			X	X
SELAGINELLACEAE	Selaginella densa Rydb.	SEDE1	Y				X
	Total Species Richness			66	72	73	79
	Percent Native Species			86	81	78	77
	Mean # Species/Quadrat			12.7	12	10.6	10.7

Table 17. Pre- and Post-Burn Cactus Densities

		Density (plants/m^2)		
Scientific Name	**Site**	**1999**	**2000**	**% Change**
Opuntia macorhiza	Control	25.4	10.0	-61
	Treatment	98.2	37.4	-62
Echinocereus viridiflorus	Control	43.8	31.0	-29
	Treatment	55.0	73.6	34

Sample size (n=10)

Table 18. Prescribed Burn Pre-Burn vs. Post-Burn Control Plot Foliar Cover Summary

					Frequency		Absolute Cover		Relative Cover	
Scientific Name	Speccode	Form	Native	Cool/Warm Season	1999	2000	1999	2000	1999	2000
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N			10		0.1		0.1
Linaria dalmatica (L.) Mill.	LIDA1	F	N		30	20	0.4	0.2	0.5	0.3
Arenaria fendleri A. Gray	ARFE2	F	Y		20	30	0.2	0.4	0.3	0.5
Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	F	Y		10		0.1		0.1	
Aster porteri Gray	ASPO1	F	Y		10		0.3		0.4	
Chrysopsis villosa Pursh.	CHVI1	F	Y		20		0.2		0.3	
Eriogonum alatum Torr.	ERAL1	F	Y		10		0.2		0.3	
Lesquerella montana (A. Gray) Wats.	LEMO1	F	Y			10		0.1		0.1
Liatris punctata Hook.	LIPU1	F	Y		80	90	2.2	2.3	2.8	3.0
Paronychia jamesii T. & G.	PAJA1	F	Y			10		0.1		0.1
Penstemon virens Penn.	PEVI1	F	Y		10		0.1		0.1	
Psoralea tenuiflora Pursh.	PSTE1	F	Y		40	30	0.5	0.4	0.6	0.5
Solidago mollis Bart.	SOMO1	F	Y		10		0.1		0.1	
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	30		0.4		0.5	
Bromus tectorum L.	BRTE1	G	N	C	20	20	0.5	0.5	0.6	0.7
Poa compressa L.	POCO1	G	N	C	90	100	10.2	7.5	12.9	9.8
Poa pratensis L.	POPR1	G	N	C	80	70	5.8	5.6	7.3	7.3
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	G	Y	C	60	20	0.9	0.3	1.1	0.4
Carex heliophila Mack.	CAHE1	G	Y	C	90	100	4.9	5.3	6.2	6.9
Juncus interior Wieg.	JUIN1	G	Y	C	10		0.1		0.1	
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	100	90	4	3.9	5.1	5.1
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C		30		0.4		0.5
Stipa comata Trin. & Rupr.	STCO1	G	Y	C	80	90	4.3	5	5.4	6.5
Andropogon gerardii Vitman	ANGE1	G	Y	W	100	100	14.3	13.4	18.1	17.4
Andropogon scoparius Michx.	ANSC1	G	Y	W	60	50	1.8	0.9	2.3	1.2
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	80	90	3	3.3	3.8	4.3
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	90	100	2.5	2.7	3.2	3.5
Bouteloua hirsuta Lag	BOHI1	G	Y	W	40	80	0.8	1.1	1.0	1.4
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W	90	90	18.5	20.3	23.4	26.4
Sorghastrum nutans (L.) Nash	SONU1	G	Y	W	80	70	2.3	2.3	2.9	3.0
Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	G	Y	W	30	30	0.6	0.7	0.8	0.9
Total foliar cover							79.2	76.8	100.0	100.0
Total forb cover							4.3	3.6	5.4	4.7
Total native forb cover							3.9	3.3	4.9	4.3
Total non-native forb cover							0.4	0.3	0.5	0.4

Table 18. (cont.)

Scientific Name	Speccode	Form	Native	Cool/Warm Season	Frequency 1999	Frequency 2000	Absolute Cover 1999	Absolute Cover 2000	Relative Cover 1999	Relative Cover 2000
Total graminoid cover							74.9	73.2	94.6	95.3
Total warm-season graminoid cover							43.8	44.7	55.3	58.2
Total cool-season graminoid cover							31.1	28.5	39.3	37.1
Total native cover							61.9	62.9	78.2	81.9
Total non-native cover							17.3	13.9	21.8	18.1

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (1500).

Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represente

All cover values presented are means (n = 10).

Native categories: Y = Native, N = Non-Native

Form categories: C = Cactus, F = Forb, G = Graminoid

Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 19. Prescribed Burn Pre-Burn vs. Post-Burn Treatment Plot Foliar Cover Summary

					Frequency		Absolute Cover		Relative Cover	
Scientific Name	Speccode	Form	Native	Cool/Warm Season	1999	2000	1999	2000	1999	2000
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N		10		0.1		0.1	
Centaurea diffusa Lam.	CEDI1	F	N		10	30	0.1	0.3	0.1	0.4
Linaria dalmatica (L.) Mill.	LIDA1	F	N		10	10	0.1	0.1	0.1	0.1
Verbascum thapsus L.	VETH1	F	N			10		0.1		0.1
Arenaria fendleri A. Gray	ARFE2	F	Y		10		0.1		0.1	
Artemisia frigida Willd.	ARFR1	F	Y		10		0.1		0.1	
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y		10	30	0.1	0.4	0.1	0.5
Chrysopsis villosa Pursh.	CHVI1	F	Y		10		0.1		0.1	
Liatris punctata Hook.	LIPU1	F	Y		80	90	1.6	2.2	2.1	2.9
Penstemon virens Penn.	PEVI1	F	Y		10		0.1		0.1	
Psoralea tenuiflora Pursh.	PSTE1	F	Y		20	50	0.3	0.6	0.4	0.8
Aegilops cylindrica Host	AECY1	G	N	C	10		0.1		0.1	
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	40		0.9		1.2	
Bromus tectorum L.	BRTE1	G	N	C	10	20	0.3	0.5	0.4	0.7
Poa compressa L.	POCO1	G	N	C	100	100	23.3	17.6	30.2	23.6
Poa pratensis L.	POPR1	G	N	C	100	90	7.7	5.9	10.0	7.9
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	G	Y	C	20	30	0.2	0.3	0.3	0.4
Carex heliophila Mack.	CAHE1	G	Y	C	90	90	3.3	2.9	4.3	3.9
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	60	50	0.8	0.8	1.0	1.1
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C		20		0.2		0.3
Stipa comata Trin. & Rupr.	STCO1	G	Y	C	80	90	4.1	5.6	5.3	7.5
Andropogon gerardii Vitman	ANGE1	G	Y	W	100	100	14.4	17.4	18.7	23.3
Andropogon scoparius Michx.	ANSC1	G	Y	W	70	80	1.8	2	2.3	2.7
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	40	90	1	2.3	1.3	3.1
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	80	90	1.3	1.9	1.7	2.5
Bouteloua hirsuta Lag	BOHI1	G	Y	W	30	10	0.3	0.1	0.4	0.1
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W	100	100	13.2	11.8	17.1	15.8
Sorghastrum nutans (L.) Nash	SONU1	G	Y	W	50	50	1.6	1.5	2.1	2.0
Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	G	Y	W	10	10	0.2	0.1	0.3	0.1
Total foliar cover							77.2	74.6	100.0	100.0
Total forb cover							2.7	3.7	3.5	5.0
Total native forb cover							2.4	3.2	3.1	4.3
Total non-native forb cover							0.3	0.5	0.4	0.7
Total graminoid cover							74.5	70.9	96.5	95.0
Total warm-season graminoid cover							33.8	37.1	43.8	49.7
Total cool-season graminoid cover							40.7	33.8	52.7	45.3

Table 19. (cont.)

Scientific Name	Speccode	Form	Native	Cool/Warm Season	Frequency 1999	Frequency 2000	Absolute Cover 1999	Absolute Cover 2000	Relative Cover 1999	Relative Cover 2000
Total native cover							44.6	50.1	57.8	67.2
Total non-native cover							32.6	24.5	42.2	32.8

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (1500).

Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).

All cover values presented are means (n = 10).

Native categories: Y = Native, N = Non-Native

Form categories: C = Cactus, F = Forb, G = Graminoid

Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 20. Prescribed Burn Pre- and Post-Burn Species Frequency (1999-2000)

				Control		Treatment		Change		
Family	Scientific Name	Native	Speccode	1999	2000	1999	2000	Control	Treatment	Difference
APIACEAE	Lomatium orientale Coult. & Rose	Y	LOOR1	16		16		-16	-16	0
ASCLEPIADACEAE	Asclepias stenophylla A. Gray	Y	ASST1				2	0	2	2
ASCLEPIADACEAE	Asclepias viridiflora Raf.	Y	ASVI1	2	2			0	0	0
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	Y	ACMI1	6	4			-2	0	2
ASTERACEAE	Ambrosia psilostachya DC.	Y	AMPS1	2	2	8	10	0	2	2
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	Y	ARCA1			2		0	-2	2
ASTERACEAE	Artemisia frigida Willd.	Y	ARFR1	6	2	8	4	-4	-4	0
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	Y	ARLU1	4	8	26	24	4	-2	6
ASTERACEAE	Aster porteri Gray	Y	ASPO1	30	2	10	6	-28	-4	24
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	N	CANU1				2	0	2	2
ASTERACEAE	Centaurea diffusa Lam.	N	CEDI1		2	6	16	2	10	8
ASTERACEAE	Chrysopsis fulcrata Greene	Y	CHFU1	8	8	2	2	0	0	0
ASTERACEAE	Chrysopsis villosa Pursh.	Y	CHVI1	26	12	2		-14	-2	12
ASTERACEAE	Cirsium undulatum (Nutt.) Spreng.	Y	CIUN1			2	2	0	0	0
ASTERACEAE	Conyza canadensis (L.) Cronq.	Y	COCA1				2	0	2	2
ASTERACEAE	Erigeron divergens T. & G.	Y	ERDI1			4		0	-4	4
ASTERACEAE	Erigeron flagellaris A. Gray	Y	ERFL1				6	0	6	6
ASTERACEAE	Gaillardia aristata Pursh.	Y	GAAR1	8	18	12	8	10	-4	14
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	Y	GRSQ1			8	8	0	0	0
ASTERACEAE	Helianthus pumilus Nutt.	Y	HEPU1	2	2			0	0	0
ASTERACEAE	Lactuca serriola L.	N	LASE1				2	0	2	2
ASTERACEAE	Liatris punctata Hook.	Y	LIPU1	82	86	52	60	4	8	4
ASTERACEAE	Senecio plattensis Nutt.	Y	SEPL1	6	6	4	4	0	0	0
ASTERACEAE	Solidago mollis Bart.	Y	SOMO1	6	6			0	0	0
ASTERACEAE	Taraxacum officinale Weber	N	TAOF1			2	10	0	8	8
ASTERACEAE	Tragopogon dubius Scop.	N	TRDU1		2	2	10	2	8	6
BRASSICACEAE	Alyssum alyssoides (L.) L.	N	ALAL1		2			2	0	2
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	N	ALMI1	8	4	18		-4	-18	14
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	Y	ARHI1	8	4	8	2	-4	-6	2
BRASSICACEAE	Draba reptans (Lam.) Fern.	Y	DRRE1		2			2	0	2
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	Y	ERCA2	4	4	4	2	0	-2	2
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	Y	LEMO1	34	48	54	80	14	26	12
CACTACEAE	Echinocereus viridiflorus Engelm.	Y	ECVI1	46	34	48	46	-12	-2	10
CACTACEAE	Opuntia macrorhiza Engelm.	Y	OPMA1	28	12	58	36	-16	-22	6
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	Y	ARFE2	32	22	14	10	-10	-4	6
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	Y	PAJA1	22	20	4		-2	-4	2
CARYOPHYLLACEAE	Silene antirrhina L.	Y	SIAN1				2	0	2	2
CLUSIACEAE	Hypericum perforatum L.	N	HYPE1	4	6	2	2	2	0	2
CYPERACEAE	Carex heliophila Mack.	Y	CAHE1	94	96	84	82	2	-2	4
FABACEAE	Astragalus agrestis Dougl. ex G. Don	Y	ASAG1			4	4	0	0	0
FABACEAE	Dalea purpurea Vent	Y	DAPU1	10	10	4	6	0	2	2
FABACEAE	Psoralea tenuiflora Pursh.	Y	PSTE1	26	40	18	20	14	2	12
JUNCACEAE	Juncus interior Wieg.	Y	JUIN1	4	4	8	2	0	-6	6

Table 20. (cont.)

				Control		Treatment		Change		
Family	Scientific Name	Native	Speccode	1999	2000	1999	2000	Control	Treatment	Difference
LILIACEAE	Allium textile A. Nels. & Macbr.	Y	ALTE1	4				-4	0	4
POACEAE	Agropyron smithii Rydb.	Y	AGSM1			2	2	0	0	0
POACEAE	Andropogon gerardii Vitman	Y	ANGE1	64	64	76	76	0	0	0
POACEAE	Andropogon scoparius Michx.	Y	ANSC1	56	54	38	40	-2	2	4
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	Y	ARLO1	14	12	4	14	-2	10	12
POACEAE	Bouteloua curtipendula (Michx.) Torr.	Y	BOCU1	74	66	44	50	-8	6	14
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	Y	BOGR1	78	60	58	68	-18	10	28
POACEAE	Bouteloua hirsuta Lag	Y	BOHI1	52	60	18	30	8	12	4
POACEAE	Bromus japonicus Thunb. ex Murr.	N	BRJA1	4		14	2	-4	-12	8
POACEAE	Bromus tectorum L.	N	BRTE1	2	2	4	4	0	0	0
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	Y	BUDA1	2	2			0	0	0
POACEAE	Koeleria pyramidata (Lam.) Beauv.	Y	KOPY1	62	74	28	32	12	4	8
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	Y	MUMO1	76	78	76	64	2	-12	14
POACEAE	Poa compressa L.	N	POCO1	56	52	84	88	-4	4	8
POACEAE	Poa pratensis L.	N	POPR1	38	38	48	50	0	2	2
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	Y	SIHY1	18	22		6	4	6	2
POACEAE	Sorghastrum nutans (L.) Nash	Y	SONU1	24	22			-2	0	2
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	Y	SPHE1	8	8			0	0	0
POACEAE	Stipa comata Trin. & Rupr.	Y	STCO1	34	42	50	58	8	8	0
POLYGONACEAE	Eriogonum alatum Torr.	Y	ERAL1	38	22	12	10	-16	-2	14
PORTULACACEAE	Talinum parviflorum Nutt.	Y	TAPA1	4	10			6	0	6
ROSACEAE	Potentilla fissa Nutt.	Y	POFI1	2	2			0	0	0
ROSACEAE	Potentilla hippiana Lehm.	Y	POHI1	2	2			0	0	0
SANTALACEAE	Comandra umbellata (L.) Nutt.	Y	COUM1	6	16			10	0	10
SCROPHULARIACEAE	Castilleja sessiliflora Pursh.	Y	CASE3	2	2			0	0	0
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	N	LIDA1	14	14	2	2	0	0	0
SCROPHULARIACEAE	Penstemon virens Penn.	Y	PEVI1	8	2	2	4	-6	2	8
SCROPHULARIACEAE	Verbascum thapsus L.	N	VETH1			2		0	-2	2

Sample size (n=50)

Appendix A

The Colorado Natural Heritage Program (CNHP), located at the Colorado State University in Fort Collins, Colorado, maintains the listing of all the rare and imperiled animals, plants, and plant communities in Colorado. An explanation of their ranking system can found be found by clicking here. This information is from the 1999 Conservation Status Handbook: Colorado's Animals, Plants, and Plant Communities of Special Concern, Vol. 3, No. 2. More information on the CNHP is can be found at their website:

http://www.cnhp.colostate.edu/

The information contained in Appendix A is an excerpt from:

CONSERVATION STATUS HANDBOOK: Colorado's Animals, Plants, and Plant Communities of Special Concern. Produced by the Colorado Natural Heritage Program, Fort Collins, CO. May 1999, Vol. 3, No. 2.

For more information, the full document is available on-line at: http://www.cnhp.colostate.edu or by contacting:

Colorado Natural Heritage Program
Room 254 General Services Bldg.
Colorado State University
Fort Collins, Colorado 80523

The Natural Heritage Ranking System

Information is gathered by CNHP on Colorado's plants, animals, and plant communities. Each of these species and communities is considered an **element of natural diversity**, or simply an **element**. Each element is assigned a rank that indicates its relative degree of rarity or imperilment on a five-point scale (e.g., 1 = critically imperiled because of extreme rarity, 5 = demonstrably secure). The primary criterion for ranking elements is the number of occurrences, i.e., the number of known distinct localities or populations. This factor is weighted more heavily because, all other factors being equal, an element found in one place is more imperiled than something found in twenty-one places. Also of importance is the size of the geographic range, the number of individuals, trends in both population and distribution, identifiable threats, and the number of already protected occurrences. However, the emphasis remains on the number of occurrences, such that ranks are an index of known biological rarity.

Element conservation ranks are assigned both in terms of the element's abundance within Colorado (its State or S-rank) and over its entire range (its Global or G-rank). A complete description of each of the Natural Heritage ranks is provided in Table 1.

Conservation prioritites are determined by examining G-rank , S-rank, and the element occurrence tracking status collectively. CNHP actively collects, maps, and electronically processes specific occurrence information for elements that have a tracking status of Y (yes) and P (partial) and W (watchlisted) as discussed on page 10 of this document.

This single rank system works readily for all natural communities and species, except those species that are migratory. Those animals that migrate may spend only a portion of their life cycles within the state. In these cases, it is necessary to distinguish between breeding, non-breeding, and resident species. As noted in Table 1, ranks followed by a "B", e.g., S1B, indicate that the rank applies only to the status of breeding occurrences. Similarly, ranks followed by an "N", e.g., S4N, refer to nonbreeding status, typically during migration and winter. Elements without this notation are believed to be year-round residents within the state.

Table 1. Definition of Colorado Natural Heritage Conservation Ranks.

Global conservation ranks are based on the range-wide status of a species. State conservation ranks are based on the status of a species in an individual state. State and Global ranks are denoted, respectively, with an "S" or a "G" followed by a character. **These ranks should not be interpreted as legal designations.**

G/S1	Critically imperiled globally/state because of rarity (5 or fewer occurrences in the world/state; or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction.
G/S2	Imperiled globally/state because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extinction throughout its range.
G/S3	Vulnerable through its range or found locally in a restricted range (21 to 100 occurrences).
G/S4	Apparently secure globally/state, though it might be quite rare in parts of its range, especially at the periphery.
G/S5	Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
GX	Presumed extinct.
G#?	Indicates uncertainty about an assigned global rank.
G/SU	Unable to assign rank due to lack of available information.
GQ	Indicates uncertainty about taxonomic status.
G/SH	Historically known, but not verified for an extended period, usually.
G#T#	Trinomial rank (T) is used for subspecies or varieties. These species or subspecies are ranked on the same criteria as G1-G5.
S#B	Refers to the breeding season imperilment of elements that are not permanent residents.
S#N	Refers to the non-breeding season imperilment of elements that are not permanent residents. Where no consistent location can be discerned for migrants or non-breeding populations, a rank of SZN is used
SZ	Migrant whose occurrences are too irregular, transitory, and/or dispersed to be reliably identified, mapped, and protected.
SA	Accidental in the state.
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Notes: Where two numbers appear in a state or global rank (e.g., S2S3), the actual rank of the element falls between the two numbers.
represents rank (1-5)

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Natural Heritage conservation ranks should not be interpreted as legal designations. Although most species protected under state or federal endangered species laws are extremely rare, not all rare species receive legal protection. Legal status is designated by either the U.S. Fish and Wildlife Service under the Endangered Species Act or by the Colorado Division of

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Federal Status

The US Fish and Wildlife Service (USFWS) is directed by the Endangered Species Act (ESA) to identify and protect threatened and endangered plants and animals. The USFWS revised its candidate system in 1996 thus eliminating the old categories of C2 and C3. The categories being used to rank listed and candidate species and the associated CNHP code are provided below.

Endangered Species Act (USFWS)

LE - Listed Endangered - defined as a species, subspecies, or variety in danger of extinction throughout all or a significant portion of its range.

E(S/A) - Endangered - treated as endangered due to its similarity of appearance with a listed species.

LT - Listed Threatened - defined as a species, subspecies, or variety likely to become endangered in the foreseeable future throughout all or a significant portion of its range.

P - Proposed - taxa formally proposed for listing as Endangered or Threatened (a proposal has been published in the Federal Register, but not a final rule).

C - Candidate (formerly C1) - taxa for which substantial biological information exists on file to support a proposal to list as Endangered or Threatened, but no proposal has yet been published in the Federal Register.

The US Forest Service (USFS) and the US Bureau of Land Management (BLM) have adopted policies to ensure that agency actions do not result in the decline of species and the subsequent listing as Endangered or Threatened by the USFWS. The categories being used by the USFS and the BLM along with the associated CNHP are provided below.

Other Agency Status (e.g., Agency Status)

FS - Sensitive - those plants and animal species identified by the Regional Forester for which population viability is a concern as evidenced by i) significant current or predicted downward trends in population numbers or density and ii) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

BLM - Sensitive - those species found on public lands, designated by a State Director, that could easily become endangered or extinct in a state. The protection provided for sensitive species is the same as that provided for C (candidate) species.

State Status

The Colorado Division of Wildlife has developed categories of imperilment for nongame species (refer to the Colorado Division of Wildlife's Chapter 10-Nongame Wildlife of the Wildlife Commissions regulations). The categories being used and the associated CNHP codes are provided below.

T - Threatened - those species or subspecies of wildlife which, as determined by the Commission, are not in immediate jeopardy of extinction but are vulnerable because they exist in such small numbers, are so extremely restricted in their range, or are experiencing such low recruitment or survival that they may become extinct.

E - Endangered - those species or subspecies of native wildlife whose prospects for survival or recruitment within this state are in jeopardy, as determined by the Commission.

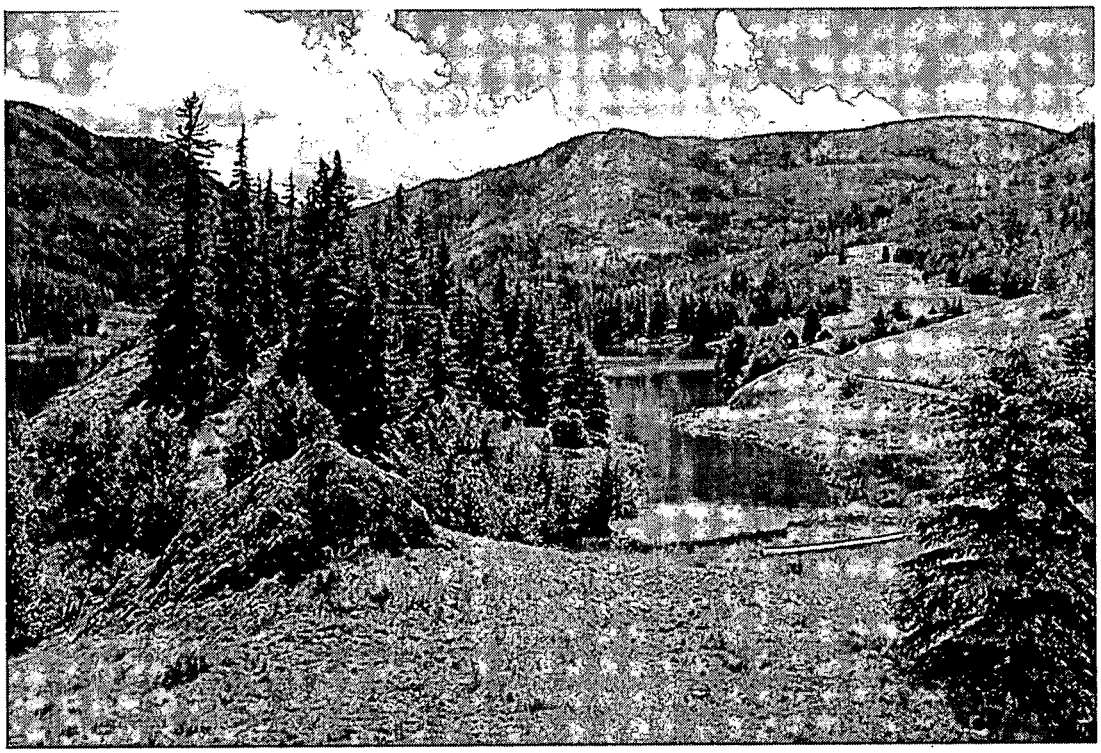
SC - Special Concern - species or subspecies of native wildlife which have been removed from the state threatened or endangered list within the last five years; are proposed for federal listing (or are a federal listing "candidate species") and are not already state listed; have experienced, based on the best available data, a downward trend in numbers or distribution lasting at least five years which may lead to a threatened or endangered status; or are otherwise determined to be vulnerable in Colorado.

Comments Welcomed - Help Needed!

CNHP plays an important role as a member of the Natural Heritage Network in determining the global consevation rankings for all elements whose range extends into Colorado as well as developing our state consevation ranks. All ranks can change with new information; we depend on experts, agency personnel, naturalists, and others to submit occurrence information on species and plant communities found on this listing, and to otherwise comment on ranks and status. Examples of CNHP animal, plant and plant community survey forms are provided in Appendix 1.

CONSERVATION STATUS HANDBOOK

Colorado's Animals, Plants, and Plant Communities of Special Concern



Natural Heritage Program
COLORADO

May 1999
Volume 3, No. 2

Colorado State University

Great Outdoors Colorado

The Nature Conservancy

Colorado Natural Heritage Program
Room 254 General Servives Bldg.
Colorado State University
Fort Collins, Colorado 80523

Photographs by Steve Kettler, Gwen Kittel, Renée Rondeau, and Susan Spackman
Logo Design by Lee Grunau, computer enhancement by Greg Nelson

ACKNOWLEDGMENTS

The Colorado Natural Heritage Program is grateful to the following who thoughtfully invested their time, energy, and knowledge to ensure the Natural Heritage conservation status list is as up-to-date and accurate as possible:

For Animals:

The status of Colorado's fauna cannot be adequately addressed without the volumes of information that are located and maintained in biological museums. The following institutions have been instrumental to our understanding of Coloradan fauna: C. P. Gillete Insect Biodiversity Museum, Ray Stanford Lepidoptera Collection, Denver Museum of Natural History, University of Colorado Museum, University of Northern Colorado Museum, and the U.S.G.S. Biological Resources Division Collection at the Museum of Southwestern Biology at Albequerque, New Mexico. We would also like to thank the following individuals associated with the above institutions for their enthusiasm and support of our efforts: Boris Kondratieff, Paul Opler, Ray Stanford, Cheri Jones, Dave Armstrong, Jim Fitzgerald, Cindy Ramotnik, and Mike Bogan.

There were a number of individuals who offered time, energy, expertise, and perspective which helped to shape the development of the list of zoological conservation priorities at CNHP. For agreeing to assist with this effort, we are extremely grateful to the following persons: Dave Armstrong, Kevin Bestgen, Carl Bock, Mike Carter, Ken Giesen, Geoff Hammerson, Hugh Kingery, Fritz Knopf, Ron Lambeth, Lauren Livo, Chuck Loeffler, Carron Meaney, Kirk Navo, Tom Nessler, Chris Pague, Bob Righter, Bruce Rosenlund, Chris Schultz, Gary Skiba, Hobart Smith, Jay Thompson, John Toolen, Lee Upham, Ron West, and Bruce Wunder. Additionally, we would like to thank Larry Master, chief zoologist for the Natural Heritage Network, for his advice and guidance in this effort.

For Plants:

The Colorado Rare Plant Technical Committee dedicates their time to provide expertise to continuously review this list of plants of concern. Special thanks to Carol Spurrier (BLM), Andy Kratz (USFS), Tim Hogan (CU Herbarium), Janet Coles (CNHP), Jan McKee (USFWS), Carol Dawson (DBG), William Weber (CU), Ron Hartman (RM Herbarium), Bill Jennings (local expert), and Betsy Neely (TNC). The herbaria of the area also provide extremely important information to assess the rarity of the plants of Colorado. The herbaria most frequently used in this way are: University of Colorado, Colorado

State University, Rocky Mountain (Wyoming State University), Colorado College, Kathryn Kalmbach (Denver Botanic Gardens), and the Universitys of Northern and Southern Colorado. We would also like to thank the Botany Department of the Home Office of The Nature Conservancy for technical support and coordinating global information. An important part of continuing an ongoing look at the rarity of the plants of Colorado comes from those who contribute data, especially the numerous biologists of the U.S. Forest Service, and the Bureau of Land Management. We would like to thank these individuals and encourage this ongoing practice.

For Plant Communities:

Marion Reid and Pat Comer of The Nature Conservancy's Western Conservation Science Department, Denny Grossman and staff at the Nature Conservancy's Home Office, Tom Andrews, Barry Johnston, Dean Erhard and numerous ecologists of the U.S. Forest Service, the Colorado Riparian Association, Colorado Riparian Task Force, Betsy Neely, Holly Richter of The Nature Conservancy of Colorado, William Baker of the University of Wyoming, Sue Galatowitsch, David Cooper, and the Colorado Natural Areas Program.

For General Support:

Great Outdoors Colorado, Colorado Department of Natural Resources, Colorado Division of Wildlife, Colorado Division of State Parks, Colorado Natural Areas Program, Colorado State Forest, Colorado Department of Transportation, U.S. Forest Service Rocky Mountain Region II, University of Colorado, Colorado State University, The Nature Conservancy, U.S. Fish and Wildlife Service, Federal Highway Administration, Environmental Protection Agency, Bureau of Land Management, Bureau of Reclamation, National Park Service, Department of Energy, Air Force Academy, Peterson Air Force Base, Jefferson County, Delta County, Mesa County, Las Animas County, Saguache County, Park County, Routt County, Douglas County, El Paso County, Larimer County, City of Fort Collins, Pitkin County, Summit County, City of Boulder, Boulder County, Denver Water Board, El Paso Department of Transportation, Colorado Springs Utilities, Colorado Native Plant Society, San Isabel Foundation, Aspen Wilderness Workshop, National Fish and Wildlife Foundation, American Mountain Foundation, The Conservation Fund, Cannon Exploration Grants Program, Earthwatch, Design Workshop, Bioresources, ENSR, Carter & Burgess, Dames & Moore, and ERO, Jane Ragle and John Smith, Dave Armstrong, Cate and Steve Werner, Kathlyn Fayette, Peter Davis, William Vanderpoel, Fred Karstedt, Caroline Coleman, Matt Wills, Robert Poole, David Hughes, Randall Ferguson, Bob Barford, and Vince McElligott.

Special thanks to the CSU Student Chapter of the Society of Conservation Biology, and the myriad of individual interns and volunteers who have

contributed to various aspects of CNHP's operations, including field surveys, museum and herbaria canvassing, mapping and data processing, GIS, administrative functions, plant and animal rarity ranking, natural history species abstracts, and much, much more. Your time and effort have truly been invaluable to the success of the Colorado Natural Heritage Program.

DIRECTOR'S NOTE

Thank you for your interest in Colorado's natural heritage. By using this book as a reference to help you understand which species and natural communities are of greatest conservation concern in the state, you are demonstrating your commitment to the long-term health of our environment.

The Colorado Natural Heritage Program has published this handbook each year since 1993 as a way of sharing information regarding the conservation status of imperiled plants and animals, as well as natural communities of concern. The citizens of Colorado have embraced this information, using it to help inform public discussions regarding a wide variety of topics, from how to conduct responsible land development to which species should be targeted for conservation as we proceed with open space programs in our local communities.

Within this document you will find information about the most unusual and precious species and natural communities in the state. Each is accompanied by status information that will help you judge relative rarity and imperilment, that can be used to help set conservation priorities. The resources available for land preservation and environmental conservation will always be limited, so the ability to set meaningful priorities becomes more and more valuable over time. As Colorado's landscape continues to change, we hope that you will become involved in decisions about land use in your community, and will be mindful of the precious biological resources that live there.

Mary L. Klein

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CHAPTER 1: INTRODUCTION

What's New?

Since the last publication of "Colorado's Natural Heritage: Rare and Imperiled Animals, Plants, and Natural Communities, Vol. 3, No. 1" many changes have occurred. The first change is in the name. We have adopted the term "handbook" to convey the intent of developing a useful reference that be be consulted often. Vertebrate state conservation ranks have undergone an intensive expert peer review process, global conservation ranks were updated by the Natural Heritage Network via The Nature Conservancy, and a significant number of plants and plant communities have been determined to be rare or imperiled enough to be added to the list. Specific changes that have been made are documented in the chapter introductions.

As with Vol. 3, No.1, this edition will be made available on the internet. It can be downloaded from the CNHP web site at: http://www.cnhp.colostate.edu Hard copies of the document will be available from CNHP. Contributions of $10 to cover the costs of shipping and handling are appreciated.

As always, we appreciate any comments, corrections, or related data that you may have to offer. Our address, phone numbers, and e-mail addresses are at the end of this Chapter. Field forms to assist in reporting locations of rare species or significant plant communities are located in Appendix 1.

Colorado's Natural Heritage

Just as ancient artifacts and historic buildings represent our cultural heritage, a diversity of plant and animal species and their habitats represent our "natural heritage". Colorado's natural heritage encompasses a wide variety of ecosystems from tallgrass prairie and shortgrass high plains to alpine cirques and rugged peaks, from canyon lands and sagebrush deserts to dense subalpine spruce-fir forests and wide-open tundra.

These widely diversified habitats are determined by water availability, temperature extremes, altitude, geologic history, and land use history. The species that inhabit each of these ecosystems have adapted to the specific set of conditions found there. But, because human influence today touches every part of the Colorado environment, we are responsible for understanding our impacts and carefully planning our actions to ensure that our natural heritage persists for future generations.

Some generalist species, like house finches have flourished over the last century, having adapted to habitats altered by humans. However, many other species are specialized to survive in vulnerable Colorado habitats; among them are Bell's twinpod, the Arkansas darter, and the Pawnee montane skipper. These species have special requirements for survival which may be threatened by competition from non-native species and incompatible land management. Many of these have become imperiled not only in Colorado, but throughout their range of distribution, some existing in less than five populations in the entire world! The decline of these specialized species often indicates disruptions that could permanently alter entire ecosystems. Thus, recognition of rare and imperiled species is crucial to maintaining Colorado's diverse natural heritage.

Colorado is inhabited by some 800 vertebrate species and/or subspecies, and tens of thousands of invertebrate species. In addition, there are approximately 3,100 species of vascular plants and 1,200 nonvascular species. Finally, there are more than 450 recognized plant communities that represent terrestrial and wetland ecosystems. It is this rich natural heritage that has provided the basis for Colorado's diverse economy. Some components of this heritage have always been rare, while others have become imperiled with human-induced changes in the landscape. This document identifies the most rare and imperiled elements of Colorado's biological diversity.

What is Biological Diversity?

Protecting biological diversity has become an important management issue for many natural resource professionals. Biological diversity at its most basic level includes the full range of life on earth, from species such as bacteria, viruses, and protists, through multicellular kingdoms of plants, animals, and fungi. At finer levels of organization, biological diversity includes the genetic variation within species, both among geographically separated populations and among individuals within single populations. On a wider scale, diversity includes variations in the biological communities in which species live, the ecosystems in which communities exist, and the interactions between these organizational levels. All levels are necessary for the continued survival of species and plant communities, and all are important for the well-being of humans. It stands to reason that natural diversity should be of concern to all people.

The biological diversity of an area can be described at four levels:

1. Genetic Diversity -- the genetic variation within a population and among populations of a plant or animal species. The genetic makeup of a species is variable between populations of a species

within its geographic range. Loss of a population results in a loss of genetic diversity for that species and a reduction of total biological diversity for the region. This unique genetic information cannot be reclaimed.

2. Species Diversity -- the total number and abundance of plant and animal species and subspecies in an area.

3. Community Diversity -- the variety of natural communities within an area. These communities may be diagnostic or even endemic to an area. It is within communities that all life dwells.

4. Landscape Diversity -- the type, condition, pattern, and connectedness of natural communities. A landscape consisting of a mosaic of natural communities may contain one multifaceted ecosystem, such as a wetland ecosystem. A landscape also may contain several distinct ecosystems, such as a riparian corridor meandering through shortgrass prairie. Fragmentation of landscapes, loss of connections and migratory corridors, and loss of natural communities all result in a loss of biological diversity for a region. Humans and the results of their activities are integral parts of most landscapes.

The conservation of natural diversity must include all levels of diversity: genetic, species, community, and landscape. Each level is dependent on the other levels and inextricably linked. In addition, and all too often omitted, humans are also linked to all levels of this hierarchy. We at the Colorado Natural Heritage Program believe that healthy natural and human environments go hand in hand, and that recognition of the most imperiled elements is an important step in comprehensive conservation planning.

The Colorado Natural Heritage Program

To place this document in context, it is useful to understand the history and functions of the Colorado Natural Heritage Program (CNHP). CNHP is the state's primary, comprehensive, biological diversity data center, gathering information and field observations to help develop statewide conservation priorities. After operating in Colorado for 14 years, the Program was relocated from the State Division of Parks and Outdoor Recreation to the University of Colorado Museum in 1992, and finally to the College of Natural Resources at Colorado State University, where it has operated since 1994. CNHP is part of an international network of conservation data centers that use the Biological and Conservation Data System developed by The Nature Conservancy. There are 85

conservation data centers, including one in each of the 50 United States. Information collected by the Heritage Programs throughout the globe provides a means to protect species before the need for legal endangerment status arises.

The multi-disciplinary team of scientists, information managers, and conservation planners gathers comprehensive information on rare, threatened, and endangered species and significant plant communities of Colorado. Life history, status, and locational data are incorporated into a continually updated data system. Sources include published and unpublished literature, museum and herbarium labels, and field surveys conducted by knowledgeable naturalists, experts, agency personnel, and our own staff of botanists, ecologists, and zoologists. Information management staff carefully plot the data on 1:24,000 scale USGS maps. The data are digitized into a geographical information system (GIS) and the tabular data are entered into the Biological and Conservation Data System.

Concentrating on site-specific data for each element of natural diversity allows us to evaluate the significance of each element to the conservation of Colorado's, and indeed the nation's, natural biological diversity. The Element Occurrence database can be accessed by many categories, including taxonomic group, county, quadrangle map, source, observation date, watershed, management area, township, range, and section, precision, conservation unit, global/state conservation rank, and federal/state legal status. By using species imperilment ranks and occurrence quality ratings, priorities can be established for the protection of the most sensitive or imperiled sites. This updated locational database and priority-setting system is an effective, proactive land-planning tool.

CNHP has effective partnerships with several state and federal agencies, including the Colorado Natural Areas Program, Colorado Department of Natural Resources, Colorado Division of Wildlife, Bureau of Land Management, U.S. Fish and Wildlife Service, and the U.S. Forest Service. Numerous local governments and private entities also work closely with CNHP. Use of the data by many different individuals and organizations, including Great Outdoors Colorado, encourages a proactive approach to development and conservation thereby reducing the potential for conflict.

The Natural Heritage Ranking System

Information is gathered by CNHP on Colorado's plants, animals, and plant communities. Each of these species and communities is considered an **element of natural diversity**, or simply an **element**. Each element is assigned a rank that indicates its relative degree of rarity or imperilment on a five-point scale (e.g., 1 = critically imperiled because of extreme rarity, 5 = demonstrably secure). The primary criterion for ranking elements is the number of occurrences, i.e., the number of known distinct localities or populations. This factor is weighted more heavily because, all other factors being equal, an element found in one place is more imperiled than something found in twenty-one places. Also of importance is the size of the geographic range, the number of individuals, trends in both population and distribution, identifiable threats, and the number of already protected occurrences. However, the emphasis remains on the number of occurrences, such that ranks are an index of known biological rarity.

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G/S1	Critically imperiled globally/state because of rarity (5 or fewer occurrences in the world/state; or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction.
G/S2	Imperiled globally/state because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extinction throughout its range.
G/S3	Vulnerable through its range or found locally in a restricted range (21 to 100 occurrences).
G/S4	Apparently secure globally/state, though it might be quite rare in parts of its range, especially at the periphery.
G/S5	Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
GX	Presumed extinct.
G#?	Indicates uncertainty about an assigned global rank.
G/SU	Unable to assign rank due to lack of available information.
GQ	Indicates uncertainty about taxonomic status.
G/SH	Historically known, but not verified for an extended period, usually.
G#T#	Trinomial rank (T) is used for subspecies or varieties. These species or subspecies are ranked on the same criteria as G1-G5.
S#B	Refers to the breeding season imperilment of elements that are not permanent residents.
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The US Fish and Wildlife Service (USFWS) is directed by the Endangered Species Act (ESA) to identify and protect threatened and endangered plants and animals. The USFWS revised its candidate system in 1996 thus eliminating the old categories of C2 and C3. The categories being used to rank listed and candidate species and the associated CNHP code are provided below.

Endangered Species Act (USFWS)

LE - Listed Endangered - defined as a species, subspecies, or variety in danger of extinction throughout all or a significant portion of its range.

E(S/A) - Endangered - treated as endangered due to its similarity of appearance with a listed species.

LT - Listed Threatened - defined as a species, subspecies, or variety likely to become endangered in the foreseeable future throughout all or a significant portion of its range.

P - Proposed - taxa formally proposed for listing as Endangered or Threatened (a proposal has been published in the Federal Register, but not a final rule).

C - Candidate (formerly C1) - taxa for which substantial biological information exists on file to support a proposal to list as Endangered or Threatened, but no proposal has yet been published in the Federal Register.

The US Forest Service (USFS) and the US Bureau of Land Management (BLM) have adopted policies to ensure that agency actions do not result in the decline of species and the subsequent listing as Endangered or Threatened by the USFWS. The categories being used by the USFS and the BLM along with the associated CNHP are provided below.

Other Agency Status (e.g., Agency Status)

FS - Sensitive - those plants and animal species identified by the Regional Forester for which population viability is a concern as evidenced by i) significant current or predicted downward trends in population numbers or density and ii) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

BLM - Sensitive - those species found on public lands, designated by a State Director, that could easily become endangered or extinct in a state. The protection provided for sensitive species is the same as that provided for C (candidate) species.

State Status

The Colorado Division of Wildlife has developed categories of imperilment for nongame species (refer to the Colorado Division of Wildlife's Chapter 10-Nongame Wildlife of the Wildlife Commissions regulations). The categories being used and the associated CNHP codes are provided below.

T - Threatened - those species or subspecies of wildlife which, as determined by the Commission, are not in immediate jeopardy of extinction but are vulnerable because they exist in such small numbers, are so extremely restricted in their range, or are experiencing such low recruitment or survival that they may become extinct.

E - Endangered - those species or subspecies of native wildlife whose prospects for survival or recruitment within this state are in jeopardy, as determined by the Commission.

SC - Special Concern - species or subspecies of native wildlife which have been removed from the state threatened or endangered list within the last five years; are proposed for federal listing (or are a federal listing "candidate species") and are not already state listed; have experienced, based on the best available data, a downward trend in numbers or distribution lasting at least five years which may lead to a threatened or endangered status; or are otherwise determined to be vulnerable in Colorado.

Comments Welcomed - Help Needed!

CNHP plays an important role as a member of the Natural Heritage Network in determining the global consevation rankings for all elements whose range extends into Colorado as well as developing our state consevation ranks. All ranks can change with new information; we depend on experts, agency personnel, naturalists, and others to submit occurrence information on species and plant communities found on this listing, and to otherwise comment on ranks and status. Examples of CNHP animal, plant and plant community survey forms are provided in Appendix 1.

We may be contacted by mail at the following address:

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Thank you for your assistance! We look forward to working with you.

CHAPTER 2: ZOOLOGY

Townsend's big-eared bat
Plecotus townsendii

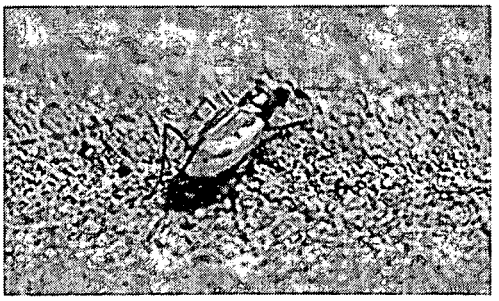
Introduction

The list of zoological elements of conservation concern in Colorado has changed substantially since last publication in 1997. Changes in EO tracking status are as follows:

EO tracking change	Number of Elements	EO tracking change	Number of Elements	EO tracking change	Number of Elements
No to W	3	W to No	27	Y to No	163
No to P	7	W to P	1	Y to W	7
No to Y	9	W to Y	6	Y to P	15

The zoology team uses a combination of factors to determine the conservation priority status of zoological elements in Colorado. In the lists that follow, we present the global rank, the state rank, and the EO tracking status for all zoological elements that we consider conservation priorities in Colorado. When using these lists, it is important to consider all three of these values to understand the conservation priority. None of the factors should be used in isolation. State conservation rank is no longer the primary determining factor in assigning information management priorities. Information management activity is now reflected by the EO tracking status. We actively solicit data for elements whose EO tracking status is: Yes (**Y**), Partial (**P**), or Watch List (**W**) which are employed as follows:

Y = "Yes" indicates that all locational data are maintained in the BCD. It is used for elements that conform to the criteria listed below.



San Luis dunes tiger beetle
Cicindela theatina

P = "Partial" indicates that only those occurrences of very high environmental quality or those within a specified population will be

maintained in the BCD. All other occurrences will be maintained in the observation/monitoring database. It is used for elements that marginally meet the criteria listed below with regard to their populations in Colorado or for elements with restricted geographic ranges and for which the majority or all populations within these ranges occur in Colorado.

W = "Watchlisted" indicates that observations/occurrences will be maintained in the manual files and observation/monitoring database. It is used for elements that harbor conservation priority, but that priority is not specifically derived from the criteria listed below.

The EO tracking prioritization criteria used are as follows:

Rare - Can be considered in terms of geographic range, habitat specificity, and local population size. Rabinowitz (1981) defines seven forms of rarity:

1. Constantly sparse over a large range and in several habitats;
2. Constantly sparse in a specific habitat but over a large range;
3. Constantly sparse and geographically restricted in several habitats;
4. Constantly sparse and geographically restricted in a specific habitat;
5. Locally abundant over a large range in a specific habitat (see endemic below);
6. Locally abundant in several habitats but restricted geographically (see endemic below);
7. Locally abundant in a specific habitat but restricted geographically (see endemic below).

Evolutionarily distinct or isolated - Is considered disjunct in time or space respectively. For more mobile elements, we focus on disconnects in space. Discontinuity in the spatial range of a mobile element identifies a potentially distinct group, in an evolutionary sense, that merits conservation focus. For less mobile elements, disconnect in time is of greater significance. That is, if an element is relatively sedentary, the individuals at the edges of the distribution range will have little, if any, genetic communication with those individuals at the core of the range.

Endemic - Is restricted in geographic or habitat distribution. For our purposes, we define geographic endemism (number 6 by Rabinowitz above) in terms of physiogeographic regions. A geographic endemic worth conservation consideration might be restricted in global distribution to the Colorado Plateau. Habitat endemism (number 5 by Rabinowitz above) we define in terms of soil type, vegetative cover, substrate, food source, etc. A habitat endemic worthy of conservation priority might be restricted in global

range to sand dunes, oil shale, or to riparian areas in western North America (in all cases, the element must not occur in other habitats). An element may also be both a habitat endemic as well as a geographic endemic (number 7 by Rabinowitz above).

Trend - Will be used sparingly and to limited extent. It will generally be reserved for use only with those elements that do not quite meet any of the above criteria and for which we have reliable trend data. Interpretation of trend data can be misleading depending on the temporal and spatial scale at which the analysis occurs; the same data can yield opposite trends at varied temporal scales. Moreover, we do not have long-term, reliable trend data for many zoological elements.

Amphibians

Order ANURA		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Acris crepitans	northern cricket frog	P	G5	SH	BLM		SC
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain pop.)	Y	G4T1Q	S1	FS	C	E
Bufo debilis	green toad	Y	G5	S2			
Gastrophryne olivacea	Great Plains narrowmouth toad	Y	G5	S1			SC
Hyla arenicolor	canyon treefrog	Y	G5	S2	BLM		SC
Rana blairi	plains leopard frog	Y	G5	S3			SC
Rana pipiens	northern leopard frog	W	G5	S3	FS/BLM		SC
Rana sylvatica	wood frog	Y	G5	S3	FS		
Scaphiopus couchii	Couch's spadefoot	Y	G5	S1			SC
Spea intermontana	Great Basin spadefoot	Y	G5	S3	BLM		SC

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Birds

Order ANSERIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Bucephala islandica	Barrow's Goldeneye	Y	G5	S2B, SZN	BLM		SC

Order APODIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Cypseloides niger	Black Swift	Y	G4	S3B	FS		

Order CHARADRIIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Catoptrophorus semipalmatus	Willet	Y	G5	S1B, SZN			
Charadrius alexandrinus nivosus	Western Snowy Plover	Y	G4T3	S1B, SZN	FS/BLM		SC
Charadrius melodus	Piping Plover	Y	G3	S1B, SZN		LT	T
Charadrius montanus	Mountain Plover	Y	G2	S2B, SZN	FS/BLM	C	SC
Himantopus mexicanus	Black-necked Stilt	Y	G5	S3B, SZN			
Numenius americanus	Long-billed Curlew	Y	G5	S2B, SZN	FS/BLM		SC
Phalaropus tricolor	Wilson's Phalarope	Y	G5	S4B, S4N			
Sterna antillarum	Least Tern	Y	G4	S1B			E
Sterna forsteri	Forster's Tern	Y	G5	S2B, S4N			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Order CICONIIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Egretta thula	Snowy Egret	Y	G5	S2B, SZN			
Plegadis chihi	White-faced Ibis	Y	G5	S2B, SZN	FS/BLM		

Order CUCULIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	Y	G5T3	SR	FS		

Order FALCONIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Accipiter gentilis	Northern Goshawk	W	G5	S3B, SZN	FS/BLM		
Buteo regalis	Ferruginous Hawk	Y	G4	S3B, S4N	FS/BLM		SC
Falco mexicanus	Prairie Falcon	W	G5	S4B, S4N			
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B, SZN		LE	
Haliaeetus leucocephalus	Bald Eagle	Y	G4	S1B, S3N		LT	T

Order GALLIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Centrocercus sp 1	Gunnison Sage Grouse	Y	G1	S1	BLM		SC
Centrocercus urophasianus	Sage Grouse	Y	G5	S4	BLM		SC
Lagopus leucurus	White-tailed Ptarmigan	P	G5	S4			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Tympanuchus cupido pinnatus	Greater Prairie-Chicken	Y	G4T4	S3	FS		
Tympanuchus pallidicinctus	Lesser Prairie-Chicken	Y	G3	S2	FS	C	T
Tympanuchus phasianellus columbianus	Columbian Sharp-tailed Grouse	Y	G4T3	S2	FS/BLM		
Tympanuchus phasianellus jamesi	Plains Sharp-tailed Grouse	Y	G4T4	S1			E

Order GRUIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Grus americana	Whooping Crane	Y	G1	SAN			E
Grus canadensis tabida	Greater Sandhill Crane	Y	G5T4	S2B, S4N	FS		T

Order PASSERIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Aimophila cassinii	Cassin's Sparrow	W	G5	S4B			
Aimophila ruficeps	Rufous-crowned Sparrow	Y	G5	S2			
Amphispiza belli	Sage Sparrow	P	G5	S3B, SZN			
Calcarius mccownii	McCown's Longspur	Y	G5	S2B, SZN			
Calcarius ornatus	Chestnut-collared Longspur	Y	G5	S1B, SZN			
Catharus fuscescens	Veery	W	G5	S3B, SZN			
Dendroica graciae	Grace's Warbler	Y	G5	S3B, SZN			
Dolichonyx oryzivorus	Bobolink	W	G5	S3B, SZN			
Empidonax traillii	Willow Flycatcher	W	G5	S4			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Empidonax traillii extimus	Southwestern Willow Flycatcher	Y	G5T2	SR	FS	LE	E
Leucosticte australis	Brown-capped Rosy-Finch	P	G4	S3B, S4N			
Loxia leucoptera	White-winged Crossbill	W	G5	S1B, SZN			
Seiurus aurocapillus	Ovenbird	Y	G5	S2B, SZN			
Toxostoma bendirei	Bendire's Thrasher	Y	G4G5	SR			
Toxostoma curvirostre	Curve-billed Thrasher	W	G5	S3			
Vireo vicinior	Gray Vireo	Y	G4	S2B, SZN			

Order PELECANIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Pelecanus erythrorhynchos	American White Pelican	Y	G3	S1B, SZN	BLM		SC

Order PICIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Melanerpes lewis	Lewis's Woodpecker	W	G5	S4	FS		

Order STRIGIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Asio flammeus	Short-eared Owl	Y	G5	S2B, SZN			
Athene cunicularia	Burrowing Owl	W	G4	S4B	FS		T
Glaucidium gnoma	Northern Pygmy-Owl	W	G5	S3B			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Strix occidentalis lucida	Mexican Spotted Owl	Y	G3T3	S1B, SUN		LT	T

Crayfish and Shrimp

Order DECAPODA		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Orconectes neglectus	a crayfish	Y	G5	S2			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Fish

Order CYPRINIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Catostomus latipinnis	flannelmouth sucker	W	G3G4	S3	BLM		SC
Catostomus plebeius	Rio Grande sucker	Y	G3G4	S1			E
Gila cypha	humpback chub	Y	G1	S1		LE	T
Gila elegans	bonytail chub	Y	G1	SX		LE	E
Gila pandora	Rio Grande chub	Y	G3	S1?	BLM		SC
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC
Nocomis biguttatus	hornyhead chub	Y	G5	SX			
Phoxinus eos	northern redbelly dace	Y	G5	S1			E
Phoxinus erythrogaster	southern redbelly dace	Y	G5	S1	FS		E
Ptychocheilus lucius	Colorado pikeminnow	Y	G1	S1		LE	T
Xyrauchen texanus	razorback sucker	Y	G1	S1		LE	E

Order PERCIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Etheostoma cragini	Arkansas darter	Y	G3	S2	FS	C	T

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Order SALMONIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BLM		SC
Oncorhynchus clarki stomias	greenback cutthroat trout	Y	G4T2T3	S2		LT	T
Oncorhynchus clarki virginalis	Rio Grande cutthroat trout	Y	G4T3	S3	FS/BLM		SC
Prosopium williamsoni	mountain whitefish	Y	G5	S3			

Order SCORPAENIFORMES		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Cottus beldingi	paiute sculpin	Y	G5	SU			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Insects

Order COLEOPTERA		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Cicindela formosa gibsoni	a tiger beetle	Y	G5T1	S1			
Cicindela lepida	Little white tiger beetle	Y	G4	S2			
Cicindela macra macra	a tiger beetle	Y	G5T5	S1?			
Cicindela nebraskana	a tiger beetle	Y	G4	S2			
Cicindela obsoleta santaclarae	a tiger beetle	Y	G5T5	S1?			
Cicindela scutellaris yampae	a tiger beetle	Y	G5T1	S1			
Cicindela theatina	San Luis dunes tiger beetle	Y	G1	S1			
Eleodes hirtipennis	a circus bettle	Y	G?	S1			

Order DIPTERA		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Proctacanthus sp 1	a robber fly	Y	G?	S?			

Order HEMIPTERA		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Notonecta unifasciata	a backswimmer	Y	G?	S1			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Order LEPIDOPTERA

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Acronicta albarufa	Barrens daggermoth	Y	G3G4	SH	FS		
Agapema homogena	Rocky Mountain agapema	Y	G?	S2			
Amblyscirtes simius	Simius roadside skipper	Y	G4	S3			
Anisota oslari	a silk moth	Y	G?	S1			
Atrytone arogos	Arogos skipper	Y	G3G4	S2			
Atrytonopsis hianna	Dusted skipper	Y	G4G5	S2			
Boloria acrocnema	Uncompahgre fritillary	Y	G2	S2		LE	
Boloria selene sabulocollis	Sandhill fritillary	Y	G5T2	S2			
Callophrys comstocki	Comstock's hairstreak	Y	G3	S1			
Callophrys mossii schryveri	Moss's elfin	Y	G4T3	S2S3			
Celastrina humulus	Hops feeding azure	Y	G2	S2			
Coloradia doris	a buckmoth	W	G5	S3S4			
Coloradia luski	a buckmoth	Y	G4	S1?			
Decodes stevensi	Stevens' tortricid moth	Y	G?	S1	FS		
Doa ampla	a moth	Y	G?	S1			
Erebia theano	Theano alpine	Y	G4	S3			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Erebia theano demmia	Demmia alpine	Y	G4T3	S2		
Erynnis martialis	Mottled dusky wing	Y	G4	S2S3		
Ethmia monachella	Lost ethmiid moth	Y	GH	SH	FS	
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2		
Euphilotes rita emmeli	Desert buckwheat blue	Y	G4T2	S2		
Euphilotes spaldingi	Spalding's blue	Y	G3G4	S2		
Euphyes bimacula	Two-spotted skipper	Y	G4	S3		
Euproserpinus wiesti	Wiest's sphinx moth	Y	G2G3	S2		
Eurystrymon favonius ontario	Northern hairstreak	Y	G4T4	S1		
Grammia sp 1	a tiger moth	Y	G?	S?		
Hemileuca diana	a buckmoth	Y	G?	S2		
Hemileuca magnifica	a buckmoth	Y	G3	S1		
Hemileuca neomoegeni	a buckmoth	Y	G?	S1		
Hemileuca oliviae	a buckmoth	W	G5	S3S4		
Hesperia leonardus montana	Pawnee montane skipper	Y	G4T1	S1		LT
Hesperia ottoe	Ottoe skipper	Y	G3G4	S2		
Hesperopsis libya	Mohave sooty-wing	Y	G5	S2		
Hyles gallii	Galium sphinx moth	Y	G?	S3?		

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Incisalia fotis	Early elfin	Y	G3	S1	
Lycaeides idas sublivens	Dark blue	P	G5T?	S3	
Ochlodes yuma	Yuma skipper	Y	G5	S2	
Oeneis alberta	Alberta arctic	Y	G5	S2	
Oeneis jutta reducta	Rocky Mountain arctic jutta	Y	G5TU	S3	
Oeneis polixenes	Polixenes arctic	Y	G5	S2	
Oeneis taygete	White-veined arctic	Y	G5?	S2	
Pachysphinx modesta	Modest sphinx moth	Y	G?	S3?	
Papilio indra minori	Short-tailed black swallowtail	Y	G5TU	S2	
Paratrytone snowi	Snow's skipper	W	G4	S3	
Phragmatobia assimilans	Large ruby tiger moth	Y	G5	S?	
Phyciodes batesii	Tawny crescent	Y	G4	S2	FS
Polites origenes	Cross-line skipper	Y	G5	S3	
Polites rhesus	Rhesus skipper	Y	G4	S2S3	
Proserpinus flavofasciata	Yellow-banded day sphinx	Y	G4	S1	
Proserpinus juanita	a sphinx moth	W	G?	S3S4	
Pyrgus ruralis	Two-banded skipper	W	G4	S3	
Pyrgus xanthus	Xanthus skipper	Y	G3G4	S2	

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Sagenosoma elsa	a sphinx moth	Y	G?	S1?			
Sandia mcfarlandi	Sandia hairstreak	Y	G4	S1			
Satyrium fuliginosum	Sooty gossamer wing	W	G4	S3			
Satyrodes eurydice fumosa	Smoky eyed brown butterfly	Y	G5T3T4	S1			
Speyeria idalia	Regal fritillary	Y	G3	S1			
Speyeria nokomis nokomis	Great Basin silverspot butterfly	Y	G4T2	S1	BLM		
Sphinx dollii	a sphinx moth	Y	G?	S2?			
Sphinx drupiferarum	Wild cherry sphinx moth	Y	G4	S3			
Sphinx perelegans	a sphinx moth	Y	G?	S1?			
Sphinx separata	a sphinx moth	Y	G?	S1?			
Stinga morrisoni	Morrison's skipper	Y	G4	S3			
Zestusa dorus	Short-tailed Arizona skipper	Y	G4	S1			

Order ODONATA

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Aeshna persephone	Persephone's darner	Y	G3	S1			
Argia alberta	Paiute dancer	Y	G4	S2?			
Arigomphus cornutus	Horned clubtail	Y	G4	S1			
Gomphus intricatus	Brimstone clubtail	Y	G4	S1			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Hesperagrion heterodoxum	Painted damsel	Y	G5	S1			
Ischnura barberi	Desert forktail	Y	G4	SU			
Libellula composita	Bleached skimmer	Y	G3	S1			
Libellula nodisticta	Hoary skimmer	Y	G3	S1			
Libellula subornata	Desert whitetail	Y	G4	S4			
Progomphus obscurus	Common sanddragon	Y	G5	S1S2			
Somatochlora ensigera	Lemon-faced emerald	Y	G4	S1			
Somatochlora hudsonica	Hudsonian emerald	W	G5	S2S3			
Sympetrum costiferum	Saffron-bordered meadowfly	Y	G5	S1?			
Sympetrum madidum	Red-veined meadowfly	Y	G4	S1			
Tetragoneuria petechialis	Stripe-winged baskettail	Y	G4	S2			
Order ORTHOPTERA		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Daihinibaenetes giganteus	Giant sand treader cricket	Y	G?	S1			
Order TRICHOPTERA		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Oecetis immobilis	longhorned caddisfly	Y	G?	S1			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Mammals

Order CARNIVORA		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Conepatus mesoleucus	common hog-nosed skunk	Y	G4	SH			
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Spilogale putorius	eastern spotted skunk	Y	G5	S2			
Vulpes macrotis	kit fox	Y	G4	S1			E
Vulpes velox	swift fox	Y	G3	S3	FS	C	SC

Order CHIROPTERA		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Euderma maculatum	spotted bat	Y	G4	S2	FS/BLM		
Myotis thysanodes	fringed myotis	P	G5	S3	FS		
Nyctinomops macrotis	big free-tailed bat	Y	G5	S1?	BLM		
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		
Tadarida brasiliensis	Brazilian free-tailed bat	W	G5	S1			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Order INSECTIVORA

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Blarina hylophaga	short-tailed shrew	Y	G5	SH			
Sorex hoyi montanus	pygmy shrew	Y	G5T2T3	S2	FS		
Sorex nanus	dwarf shrew	Y	G4	S2	FS		
Sorex preblei	Preble's shrew	Y	G4	S1			

Order RODENTIA

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Cynomys gunnisoni	Gunnison's prairie dog	Y	G5	S5			
Cynomys leucurus	white-tailed prairie dog	Y	G4	S5			
Cynomys ludovicianus	black-tailed prairie dog	P	G4	S4			
Dipodomys ordii priscus	Ord's kangaroo rat subsp.	Y	G5T4T5	S3			
Lagurus curtatus	sagebrush vole	Y	G5	S?			
Neotoma albigula brevicauda	white-throated woodrat subsp.	Y	G5T2	S2			
Neotoma micropus	southern plains woodrat	Y	G5	S3			
Pappogeomys castanops	yellow-faced pocket gopher	W	G5	S4			
Perognathus fasciatus callistus	olive-backed pocket mouse subsp.	Y	G5T3T4	S2?			
Perognathus fasciatus infraluteus	olive-backed pocket mouse subsp.	Y	G5T?	S2?			
Perognathus flavescens apache	plains pocket mouse subsp.	W	G5T4	SH			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Perognathus flavescens caryi	plains pocket mouse subsp.	Y	G5T3T4	S3
Perognathus flavescens relictus	plains pocket mouse subsp.	Y	G5T2	S2
Perognathus flavus hopiensis	silky pocket mouse subsp.	Y	G5T4	SH
Perognathus flavus sanluisi	silky pocket mouse subsp.	Y	G5T3	S3
Perognathus parvus	Great Basin pocket mouse	Y	G5	S1?
Reithrodontomys montanus montanus	plains harvest mouse subsp.	Y	G5T3T4	SH
Spermophilus spilosoma cryptospilotus	spotted ground squirrel subsp.	P	G5T4	S1
Spermophilus tridecemlineatus blanca	thirteen-lined ground squirrel subsp.	Y	G5T3	S3
Tamias dorsalis	cliff chipmunk	Y	G5	S2
Tamias quadrivittatus	Colorado chipmunk	P	G5	S5
Tamias rufus	Hopi chipmunk	P	G5	S5
Thomomys bottae cultellus	Botta's pocket gopher subsp.	Y	G5T3Q	S3
Thomomys bottae howelli	Botta's pocket gopher subsp.	Y	G5T4	S3
Thomomys bottae pervagus	Botta's pocket gopher subsp.	Y	G5T3	S3
Thomomys bottae rubidus	Botta's pocket gopher subsp.	Y	G5T1	S1
Thomomys talpoides agrestis	northern pocket gopher subsp.	P	G5T3	S3
Thomomys talpoides macrotis	northern pocket gopher subsp.	Y	G5T1	S1
Zapus hudsonius luteus	meadow jumping mouse subsp.	Y	G5T2	S1

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Zapus hudsonius preblei	meadow jumping mouse subsp.	Y	G5T2	S1	FS	LT	SC

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Mussels and Snails

Order BASOMMATOPHORA		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Acroloxus coloradensis	Rocky Mountain capshell	Y	G?	S2	FS/BLM		SC
Ferrissia fragilis	fragile ancylid	Y	G4	SH			
Ferrissia walkeri	cloche ancylid	Y	G?	S3			
Lymnaea stagnalis	swampy lymnaea	Y	G5	S2			
Physa cupreonitens	hot springs physa	Y	G?	S2			
Physa skinneri	glass physa	Y	G?	S2			
Physa utahensis	banded physa	Y	G1	S1			
Promenetus exacuous	sharp sprite	Y	G?	S2			
Promenetus umbilicatellus	umbilicate sprite	Y	G?	S3			

Order MESOGASTROPODA		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Valvata sincera	mossy valvata	Y	G?	S3			

Order UNIONOIDA		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Anodonta grandis	giant floater	Y	G5	S1			
Anodontoides ferussacianus	cylindrical papershell	Y	G5	S2			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Uniomerus tetralasmus	pondhorn	Y	G4	S1			

Order VENEROIDA		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Pisidium sanguinichristi	Sangre de Christo peaclam	Y	G1Q	S?			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

Reptiles

Order SQUAMATA		**CNHP Status and Ranking**			**Regulatory Status**		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Cnemidophorus neotesselatus	triploid Colorado checkered whiptail	Y	G2Q	S2			
Cnemidophorus velox	plateau striped whiptail	Y	G5	S4			
Coluber constrictor mormon	western yellowbelly racer	Y	G5T5	S3			
Crotalus viridis concolor	midget faded rattlesnake	Y	G5T4	S3?	BLM		SC
Elaphe guttata	corn snake	Y	G5	S3			
Eumeces multivirgatus gaigeae	variable skink	Y	G5T5	S3			
Gambelia wislizenii	longnose leopard lizard	Y	G5	S1	BLM		SC
Lampropeltis getula	common kingsnake	Y	G5	S1	BLM		SC
Leptotyphlops dulcis	Texas blind snake	Y	G5	S1	FS		SC
Liochlorophis vernalis	smooth green snake	P	G5	S4			
Phrynosoma cornutum	Texas horned lizard	Y	G4G5	S3	FS/BLM		SC
Rhinocheilus lecontei	longnose snake	W	G5	S1?			
Sceloporus magister	desert spiny lizard	Y	G5	S2	BLM		SC
Sistrurus catenatus	massasauga	Y	G3G4	S2	BLM		SC
Sonora semiannulata	ground snake	W	G5	S3			

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

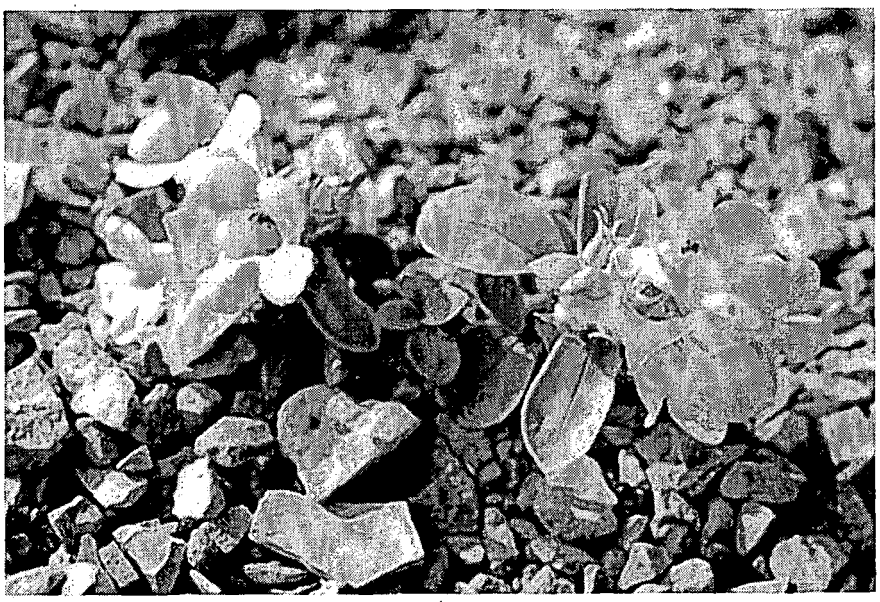
Tantilla hobartsmithi	southwestern blackhead snake	Y	G5	S2?			
Thamnophis cyrtopsis	blackneck garter snake	W	G5	S2?			
Thamnophis proximus	western ribbon snake	W	G5	SH			
Tropidoclonion lineatum	lined snake	Y	G5	S3	FS		
Urosaurus ornatus	tree lizard	Y	G5	S4			

Order TESTUDINES

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Chrysemys picta	painted turtle	P	G5	S5			
Kinosternon flavescens	yellow mud turtle	Y	G5	S1	FS		SC

Neither the Global Rank nor State Rank in isolation determine tracking status. Please refer to text preceeding these tables for explanation.

CHAPTER 3: BOTANY



Parachute penstemon (*Penstemon debilis*)

Introduction

The botany team is currently reviewing the entire Colorado flora to determine a more complete list of the state's rare and imperiled species. This is an ongoing process as information is acquired and the species status change. The current list includes 493 species. The botany team uses two forms of tracking status Y (yes) and W (watchlist). A species marked with a Y indicates a full tracking status and all data are entered into the Biological Conservation Datasystem. For watchlist (W) species, all data are acquired and kept in manual files but are not entered into the Biological Conservation Datasystem. These watchlist species (10) are noteworthy because they are uncommon, but are less of a conservation priority by CNHP standards. If more data are accrued and the threats to these species do not increase they may be taken off the list altogether. In contrast, if the threats to these species increase we will be in a good position to add them to the Y category.

List Content and Nomenclature

Nomenclature follows Weber and Wittmann (1992) and Kartesz (1994). Where the nomenclature of these references differ, both of the names appear in alphabetical order in the list, and their synonyms are provided.

Plant Species

Scientific Name	Synonym	Common Name	CNHP Status and Ranking			Regulatory Status		
			Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Abronia carletonii		Carlton's Sand Verbena	Y	G4	S1			
Abronia nana		Dwarf Sand Verbena	Y	G4	S1			
Abutilon incanum		Hoary Mallow	Y	G5	S1			
Acer grandidentatum		Bigtooth Maple	Y	G4	S1			
Acorus calamus		Sweet Flag	Y	G?	SH			
Adiantum aleuticum		Aleutian Maidenhair Fern	Y	G5?	S1			
Adiantum capillus-veneris		Southern Maiden-Hair	Y	G5	S2	FS		
Agastache foeniculum		Lavender Hyssop	Y	G4G5	S1			
Aletes anisatus		Rocky Mountain Aletes	W	G3G4	S3S4			
Aletes humilis		Larimer Aletes	Y	G2G3	S2S3	FS		
Aletes latilobus	*Lomatium latilobum*	Canyonlands Lomatium	Y	G1	S1	BLM		
Aletes lithophilus	*Neoparrya lithophila*	Rock-Loving Neoparrya	Y	G2	S2	FS/BLM		
Aletes macdougalii ssp breviradiatus		Mesa Verde Aletes	Y	G3G4T3?Q	S1			
Aletes nuttallii	*Lomatium nuttallii*	Dog Parsley	Y	G3G4	S1			
Aletes sessiliflorus		New Mexico False Carrot	Y	G3	S1?			
Aletes tenuifolius	*Musineon tenuifolium*	Slender Parsley	Y	G4	S3			

Plant Species

Scientific Name	Synonym	Common Name	CNHP Status and Ranking			Regulatory Status		
			Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Allium nevadense		Nevada Onion	Y	G4	S2			
Allium schoenoprasum var sibiricum		Wild Chives	Y	G5T5	S1			
Alsinanthe stricta	*Minuartia stricta*	Rock Sandwort	Y	G5	S1			
Ambrosia linearis		Plains Ragweed	Y	G2	S2	FS		
Amorpha nana		Dwarf Wild Indigo	Y	G5	S2S3			
Amsonia jonesii		Jones Blue Star	Y	G4	S1	BLM		
Anagallis minima		Chaffweed	Y	G5	S1			
Anemone riparia	*Anemone virginiana var riparia*	White-Flowered Anemone	Y	G5T4T5	SH			
Anemone virginiana var riparia	*Anemone riparia*	White-Flowered Anemone	Y	G5T4T5	SH			
Anticlea vaginatus	*Zigadenus vaginatus*	Alcove Death Camas	Y	G2	S2			
Apios americana		American Groundnut	Y	G5	S1			
Aquilegia chrysantha var rydbergii		Golden Columbine	Y	G4T1Q	S1	BLM		
Aquilegia micrantha var mancosana		Mancos Columbine	Y	G5THQ	SH			
Aquilegia saximontana		Rocky Mountain Columbine	Y	G3	S3			
Arabidopsis salsuginea	*Thellungiella salsuginea*	Salt-Lick Mustard	Y	G4G5	S1			

Plant Species

Scientific Name	Synonym	Common Name	CNHP Status and Ranking			Regulatory Status		
			Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Arabis crandallii	*Boechera crandallii*	Crandall's Rock-Cress	Y	G4	S2	BLM		
Arabis fernaldiana var fernaldiana	*Boechera fernaldiana*	Park Rockcress	Y	G3G4T3T4	S2			
Arabis gunnisoniana	*Boechera gunnisoniana*	A Rock Cress	Y	G3	S3			
Arabis oxylobula	*Boechera oxylobula*	A Rock Cress	Y	G3	S3			
Aralia racemosa		American Spikenard	Y	G5	S1			
Argillochloa dasyclada	*Festuca dasyclada*	Utah Fescue	Y	G3	S3			
Aristida basiramea		Forktip Three-Awn	Y	G5	S1			
Armeria maritima ssp sibirica	*Armeria scabra ssp sibirica*	Sea Pink	Y	G5T5	S1	FS		
Armeria scabra ssp sibirica	*Armeria maritima ssp sibirica*	Sea Pink	Y	G5T5	S1	FS		
Arnica alpina var tomentosa	*Arnica angustifolia ssp tomentosa*	Alpine Arnica	Y	G5T5	S1			
Arnica angustifolia ssp tomentosa	*Arnica alpina var tomentosa*	Alpine Arnica	Y	G5T5	S1			
Artemisia pattersonii		Patterson's Wormwood	Y	G3	S3			
Artemisia pygmaea	*Seriphidium pygmaeum*	Pigmy Sagebrush	Y	G4	S1			
Asclepias involucrata		Dwarf Milkweed	Y	G5	S1			
Asclepias macrosperma		Large-Seeded Milkweed	Y	G4	S1			
Asclepias macrotis		Long-Hood Milkweed	Y	G4	S2			

Plant Species

Scientific Name	Synonym	Common Name	CNHP Status and Ranking			Regulatory Status		
			Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Asclepias oenotheroides		Zizotes Milkweed	Y	G4G5	S1			
Asclepias stenophylla		Narrow-Leaved Milkweed	Y	G4G5	S2			
Asclepias uncialis		Dwarf Milkweed	Y	G3?	S1S2	FS/BLM		
Askellia nana	*Crepis nana*	Dwarf Hawksbeard	Y	G5	S2			
Asplenium adiantum-nigrum		Black Spleenwort	Y	G5	S1			
Asplenium platyneuron		Ebony Spleenwort	Y	G5	S1			
Asplenium resiliens		Black-Stemmed Spleenwort	Y	G5	S1			
Asplenium septentrionale		Grass-Fern	W	G4G5	S3S4			
Asplenium trichomanes-ramosum		Green Spleenwort	Y	G4	S1S2			
Aster alpinus var vierhapperi		Alpine Aster	Y	G5TU	S1			
Aster novae-angliae	*Virgulus novae-angliae*	New England Aster	Y	G5	S1SE?			
Aster perelegans	*Eucephaius perelegans*	Nuttall Aster	Y	G5	S1			
Astragalus allochrous var playanus	*Astragalus wootonii var wootonii*	Wooton Milkvetch	Y	G4T3?	S1			
Astragalus anisus		Gunnison Milkvetch	Y	G2	S2	FS/BLM		
Astragalus aretioides	*Orophaca aretioides*	Cushion Orophaca	Y	G4	S1	BLM		

Plant Species

Scientific Name	Synonym	Common Name	CNHP Status and Ranking			Regulatory Status		
			Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Astragalus argophyllus var martinii		Meadow Milkvetch	Y	G5T4	S1			
Astragalus bodinii		Bodin Milkvetch	Y	G4	S2			
Astragalus brandegeei		Brandegee Milkvetch	Y	G3G4	S1S2	BLM		
Astragalus calycosus var scaposus		Torrey's Milkvetch	Y	G5T3?	S2			
Astragalus cerussatus		A Milk-Vetch	Y	G2	S2			
Astragalus chloodes		Grass Milkvetch	Y	G3	S?			
Astragalus cibarius		Browse Milkvetch	Y	G4	S1			
Astragalus coltonii var moabensis		Colton Milkvetch	Y	G4T3?	S2			
Astragalus cronquistii		Cronquist Milkvetch	Y	G2	S2	BLM		
Astragalus debequaeus		Debeque Milkvetch	Y	G2	S2	BLM		
Astragalus deterior		Cliff-Palace Milkvetch	Y	G2	S2			
Astragalus detritalis		Debris Milkvetch	Y	G3	S2	BLM		
Astragalus duchesnensis		Duchesne Milkvetch	Y	G3	S1S2	BLM		
Astragalus gilviflorus	*Orophaca triphylla*	Plains Milkvetch	Y	G5	S1			
Astragalus hamiltonii	*Astragalus lonchocarpus var hamiltonii*	Hamilton Milkvetch	Y	G1	S1			

Plant Species

Scientific Name	Synonym	Common Name	CNHP Status and Ranking			Regulatory Status		
			Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Astragalus humillimus		Mancos Milkvetch	Y	G1	S1		LE	
Astragalus hyalinus	*Orophaca hyalina*	Summer Orophaca	Y	G4	S1?			
Astragalus jejunus		Starvling Milkvetch	Y	G3	S1	BLM		
Astragalus lentiginosus var chartaceus		San Pitch Valley Milk-Vetch	Y	G5T3Q	S1			
Astragalus linifolius		Grand Junction Milkvetch	Y	G3Q	S3	BLM		
Astragalus lonchocarpus var hamiltonii	*Astragalus hamiltonii*	Hamilton Milkvetch	Y	G1	S1			
Astragalus lutosus		Dragon Milkvetch	W	G4	S3S4			
Astragalus microcymbus		Skiff Milkvetch	Y	G1	S1	BLM		
Astragalus missouriensis var humistratus		Missouri Milk-Vetch	Y	G5T2	S1?			
Astragalus molybdenus		Leadville Milkvetch	Y	G3	S2	FS		
Astragalus musiniensis		Ferron Milkvetch	Y	G3?	S1	BLM		
Astragalus naturitensis		Naturita Milkvetch	Y	G2G3	S2S3	BLM		
Astragalus nelsonianus		Nelson Milkvetch	Y	G2	S1	BLM		
Astragalus newberryi		Newberry's Milk-Vetch	Y	G5	S1			
Astragalus oocalycis		Arboles Milkvetch	Y	G4	S2S3			

Plant Species

Scientific Name	Synonym	Common Name	CNHP Status and Ranking			Regulatory Status		
			Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Astragalus osterhoutii		Osterhout Milkvetch	Y	G1	S1		LE	
Astragalus piscator		Fisher Towers Milkvetch	Y	G1?	S1	BLM		
Astragalus plattensis		Platte River Milkvetch	Y	G5	S1			
Astragalus proximus		Aztec Milkvetch	Y	G4	S2	FS		
Astragalus rafaelensis		San Rafael Milkvetch	Y	G3	S1	BLM		
Astragalus ripleyi		Ripley Milkvetch	Y	G3	S2	FS/BLM		
Astragalus saurinus		Dinosaur Milkvetch	Y	G3	S?			
Astragalus schmolliae		Schmoll Milkvetch	Y	G1	S1			
Astragalus sesquiflorus		Sandstone Milkvetch	Y	G3?	S1	BLM		
Astragalus sparsiflorus		Front Range Milkvetch	Y	G3?	S3?			
Astragalus tortipes		Sleeping Ute Milkvetch	Y	G1	S1		C	
Astragalus wetherillii		Wetherill Milkvetch	Y	G3	S3			
Astragalus wootonii var wootonii	*Astragalus allochrous var playanus*	Wooton Milkvetch	Y	G4T3?	S1			
Astrolepis cochisensis		Scaly Cloak Fern	Y	G5?	S1			
Azaleastrum albiflorum	*Rhododendron albiflorum*	White-Flowered Azalea	Y	G4	S2			
Besseya ritteriana		Ritter's Coral-Drops	Y	G3?	S3?			

Plant Species

Scientific Name	Synonym	Common Name	CNHP Status and Ranking			Regulatory Status		
			Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Besseya wyomingensis		Kittentail	Y	G5	S1			
Betula papyrifera		Paper Birch	Y	G5	S1			
Boechera crandallii	*Arabis crandallii*	Crandall's Rock-Cress	Y	G4	S2	BLM		
Boechera fernaldiana	*Arabis fernaldiana var fernaldiana*	Park Rockcress	Y	G3G4T3T4	S2			
Boechera gunnisoniana	*Arabis gunnisoniana*	A Rock Cress	Y	G3	S3			
Boechera oxylobula	*Arabis oxylobula*	A Rock Cress	Y	G3	S3			
Bolophyta alpina	*Parthenium alpinum*	Wyoming Feverfew	Y	G3	S1	FS		
Bolophyta ligulata	*Parthenium ligulatum*	Ligulate Feverfew	Y	G3	S2	BLM		
Bolophyta tetraneuris	*Parthenium tetraneuris*	Arkansas River Feverfew	Y	G3	S3			
Bothriochloa springfieldii		Springfield Bluestem	Y	G4?	S1			
Botrychium campestre		Prairie Moonwort	Y	G3	S1	FS		
Botrychium echo		Reflected Moonwort	Y	G2	S2	FS		
Botrychium hesperium		Western Moonwort	Y	G3	S2			
Botrychium lanceolatum	*Botrychium lanceolatum var lanceolatum*	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lanceolatum var lanceolatum	*Botrychium lanceolatum*	Lance-Leaved Moonwort	Y	G5T4	S2S3			

Plant Species

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Botrychium lineare		Narrowleaf Grapefern	Y	G1	S1	FS		
Botrychium lunaria		Common Moonwort	Y	G5	S2S3			
Botrychium minganense		Mingan Moonwort	Y	G4	S1			
Botrychium multifidum	*Botrychium multifidum ssp coulteri*	Leathery Grape Fern	Y	G5	S1			
Botrychium multifidum ssp coulteri	*Botrychium multifidum*	Leathery Grape Fern	Y	G5	S1			
Botrychium pallidum		Pale Moonwort	Y	G2	S2	FS		
Botrychium pinnatum		Northern Moonwort	Y	G4?	S1			
Botrychium simplex		Least Moonwort	Y	G5	S1			
Botrychium virginianum	*Botrypus virginianus ssp europaeus*	Rattlesnake Fern	Y	G5	S1			
Botrypus virginianus ssp europaeus	*Botrychium virginianum*	Rattlesnake Fern	Y	G5	S1			
Boykinia jamesii	*Telesonix jamesii*	James' Telesonix	Y	G4	S2?			
Braya glabella	*Braya glabella var glabella*	Arctic Braya	Y	G5	S1	FS		
Braya glabella var glabella	*Braya glabella*	Arctic Braya	Y	G5	S1	FS		
Braya humilis		Alpine Braya	Y	G4	S2			
Bupleurum americanum	*Bupleurum triradiatum ssp arcticum*	Thoroughwax	Y	G5	S1			

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Bupleurum triradiatum ssp arcticum	*Bupleurum americanum*	Thoroughwax	Y	G5	S1			
Caesalpinia repens		Creeping Rush-Pea	Y	G2	S1			
Callitriche heterophylla		Large Water-Starwort	Y	G5	S1			
Calochortus flexuosus		Weak-Stemmed Mariposa Lily	Y	G4	S1			
Camissonia andina		Mountain Camissonia	Y	G4	S1			
Camissonia eastwoodiae		Eastwood Evening-Primrose	Y	G3?	S1			
Campanula aparinoides		Marsh Bellflower	Y	G5	SH			
Carex capitata ssp arctogena		Round-Headed Sedge	Y	G5T4?	S1			
Carex concinna		Low Northern Sedge	Y	G4G5	S1	BLM		
Carex crawei		Crawe Sedge	Y	G5	S1			
Carex diandra		Lesser Panicled Sedge	Y	G5	S1			
Carex gravida var lunelliana		Heavy Sedge	Y	G5TU	SU			
Carex lasiocarpa		Slender Sedge	Y	G5	S1			
Carex leptalea		Bristle-Stalk Sedge	Y	G5	S1			
Carex limosa		Mud Sedge	Y	G5	S2			
Carex livida		Livid Sedge	Y	G5	S1	FS		

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Carex molesta		Troublesome Sedge	Y	G4	S1			
Carex oreocharis		A Sedge	Y	G3	S1			
Carex peckii		Peck Sedge	Y	G4G5	SH			
Carex retrorsa		Retrorse Sedge	Y	G5	S1			
Carex sartwellii		Sartwell's Sedge	Y	G4	S1			
Carex saximontana		Rocky Mountain Sedge	Y	G5	S1			
Carex scirpoidea		Canadian Single-Spike Sedge	Y	G5	S2			
Carex sprengelii		Sprengel's Sedge	Y	G5?	S2S3			
Carex sychnocephala		Many-Headed Sedge	Y	G4	S1			
Carex tenuiflora		Slender-Flower Sedge	Y	G5	S1			
Carex torreyi		Torrey Sedge	Y	G4	S1			
Carex viridula		Green Sedge	Y	G5?	S1			
Castilleja lineata		Marsh-Meadow Indian-Paintbrush	Y	G4?	S1			
Castilleja puberula		Downy Indian-Paintbrush	Y	G2G3	S?			
Ceanothus martinii		Utah Mountain Lilac	Y	G4	S1			
Centaurium arizonicum		Arizona Centaury	Y	G5?	S1			

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Centaurium exaltatum		Great Basin Centaury	Y	G5	S1			
Cheilanthes eatonii		Eaton's Lip Fern	Y	G5?	S2			
Cheilanthes standleyi	*Notholaena standleyi*	Standley's Cloak Fern	Y	G4	S1			
Cheilanthes wootonii		Wooton's Lip Fern	Y	G5	S1			
Chenopodium cycloides		Sandhill Goosefoot	Y	G3G4	S1	FS		
Chionophila jamesii		Rocky Mountain Snowlover	W	G4?	S3S4			
Cirsium barnebyi		Barneby's Thistle	Y	G3	S1			
Cirsium ownbeyi		Ownbey Thistle	Y	G3	S2	BLM		
Cirsium perplexans		Rocky Mountain Thistle	Y	G2	S2	BLM		
Cirsium scapanolepis		Mountain-Slope Thistle	Y	G1	S1			
Cleome multicaulis		Slender Spiderflower	Y	G2G3	S2S3	BLM		
Cleomella angustifolia		Northern Rhombo-Pod	Y	G5	S1			
Cleomella palmerana	*Cleomella palmeriana*	Rocky Mountain Rhombopod	Y	G3?	S3			
Cleomella palmeriana	*Cleomella palmerana*	Rocky Mountain Rhombopod	Y	G3?	S3			
Collomia grandiflora		Showy Collomia	Y	G5	S1			
Comarum palustre		Marsh Cinquefoil	Y	G5	S1S2			

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Commelina dianthifolia		Birdbill Day-Flower	Y	G5	S1?			
Conimitella williamsii		Williams Bishop's Cap	Y	G3	SH			
Conopholis alpina var mexicana		Squaw-Root	Y	G5T5	S1			
Corispermum navicula		A Bugseed	Y	G?	S1			
Corydalis caseana ssp brandegeei	*Corydalis caseana ssp brandegei*	Sierra Corydalis	W	G5T3T4	S3S4			
Corydalis caseana ssp brandegei	*Corydalis caseana ssp brandegeei*	Sierra Corydalis	W	G5T3T4	S3S4			
Crataegus chrysocarpa		Yellow Hawthorn	Y	G5	S1			
Crataegus saligna		Willow Hawthorn	Y	G2?	S2?			
Crepis nana	*Askellia nana*	Dwarf Hawksbeard	Y	G5	S2			
Crocanthemum bicknellii	*Helianthemum bicknellii*	Frostweed	Y	G5	S2			
Cryptantha aperta	*Oreocarya aperta*	Grand Junction Cat's-Eye	Y	GH	SH			
Cryptantha breviflora	*Oreocarya breviflora*	Short-Flower Cryptanth	Y	G4	S1			
Cryptantha caespitosa	*Oreocarya caespitosa*	Tufted Cryptanth	Y	G4	S2	BLM		
Cryptantha cana	*Oreocarya cana*	Mountain Cat's-Eye	Y	G5	S2			
Cryptantha cinerea var pustulosa		Catseye	Y	G5T?	S1			
Cryptantha elata	*Oreocarya elata*	Tall Cryptanth	Y	G3	S2			

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Cryptantha longiflora	*Oreocarya longiflora*	Long-Flower Cat's-Eye	Y	G3	S2			
Cryptantha mensana	*Oreocarya mensana*	Carbon Cryptanth	Y	G3	S1			
Cryptantha osterhoutii	*Oreocarya osterhoutii*	Osterhout Cryptanth	Y	G3	S2	BLM		
Cryptantha rollinsii	*Oreocarya rollinsii*	Rollins Cryptanth	Y	G3	S2	BLM		
Cryptantha stricta	*Oreocarya stricta*	Erect Cryptanth	Y	G3	S3			
Cryptantha weberi	*Oreocarya weberi*	Weber's Catseye	Y	G2	S2			
Cryptogramma stelleri		Slender Rock-Brake	Y	G5	S2	BLM		
Cylactis arctica ssp acaulis	*Rubus arcticus ssp acaulis*	Nagoon Berry	Y	G5T5	S1	FS		
Cymopterus duchesnensis		Uinta Basin Spring-Parsley	Y	G2	S1	BLM		
Cymopterus planosus		Rocky Mountain Wavewing	W	G3G4	S3S4			
Cypripedium calceolus ssp parviflorum	*Cypripedium pubescens*	Yellow Lady's-Slipper	Y	G5	S2			
Cypripedium fasciculatum		Purple Lady's-Slipper	Y	G4	S3	FS		
Cypripedium pubescens	*Cypripedium calceolus ssp parviflorum*	Yellow Lady's-Slipper	Y	G5	S2			
Cystopteris montana		Mountain Bladder Fern	Y	G5	S1			
Cystopteris utahensis		Utah Bladderfern	Y	G3?	S1			

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Delphinium alpestre	*Delphinium ramosum var. Alpestre*	Colorado Larkspur	Y	G3	S2			
Delphinium ramosum var. Alpestre	*Delphinium alpestre*	Colorado Larkspur	Y	G3	S2			
Descurainia ramosissima		Villa Grove Tansy-Mustard	Y	G3?	S3?			
Desmodium rigidum		Rigid Tick-Trefoil	Y	G?Q	SX			
Dichanthelium acuminatum var sericeum		A Grass	Y	G5T?	S1			
Dimorphocarpa wislizeni		Spectacle-Pod	Y	G4G5	S1SE?			
Diphasiastrum alpinum	*Lycopodium alpinum*	Alpine Clubmoss	Y	G5	S1S2			
Draba borealis		Northern Rockcress	Y	G4	S2			
Draba crassa		Thick-Leaf Whitlow-Grass	Y	G3	S3			
Draba exunguiculata		Clawless Draba	Y	G2	S2			
Draba fladnizensis		Arctic Draba	Y	G4	S2S3			
Draba globosa		Rockcress Draba	Y	G3	S1			
Draba graminea		San Juan Whitlow-Grass	Y	G2	S2			
Draba grayana		Gray's Peak Whitlow-Grass	Y	G2	S2			
Draba incerta		Yellowstone Whitlow-Grass	Y	G5	S1			

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Draba lonchocarpa	*Draba lonchocarpa var lonchocarpa*	Lancepod Whitlowgrass	Y	G4T4	S2			
Draba lonchocarpa var lonchocarpa	*Draba lonchocarpa*	Lancepod Whitlowgrass	Y	G4T4	S2			
Draba macounii		Macoun Draba	Y	G3G4	SU			
Draba oligosperma		Woods Draba	Y	G5	S2			
Draba porsildii		Porsild Draba	Y	G3G4	S1			
Draba rectifructa		Mountain Whitlow-Grass	Y	G3?	S2			
Draba smithii		Smith Whitlow-Grass	Y	G2	S2	FS		
Draba spectabilis	*Draba spectabilis var oxyloba*	Draba	Y	G3?T3Q	S3			
Draba spectabilis var oxyloba	*Draba spectabilis*	Draba	Y	G3?T3Q	S3			
Draba streptobrachia		Colorado Divide Whitlow-Grass	Y	G3	S3			
Draba ventosa		Tundra Draba	Y	G3	S1			
Draba weberi		Weber's Draba	Y	G1	S1			
Drosera rotundifolia		Roundleaf Sundew	Y	G5	S2	FS		
Drymaria effusa var depressa		Spreading Drymaria	Y	G4T4	S1SE?			
Dryopteris expansa		Spreading Wood Fern	Y	G5	S1			

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Echinocereus reichenbachii var perbellus		Lace Hedgehog Cactus	Y	G5T?	S1			
Elatine triandra		Longstem Water-Wort	Y	G5	S1			
Enceliopsis nudicaulis		Nakedstem	Y	G5	S1			
Enneapogon desvauxii		Spike Pappusgrass	Y	G5	S1			
Epipactis gigantea		Helleborine	Y	G4	S2	FS		
Equisetum variegatum var variegatum	*Hippochaete variegata*	Variegated Scouringrush	Y	G5T?	S1			
Erigeron humilis		Low Fleabane	Y	G4	S1			
Erigeron kachinensis		Kachina Daisy	Y	G2	S1	BLM		
Erigeron lanatus		Woolly Fleabane	Y	G3G4	S1	FS		
Erigeron philadelphicus		Philadelphia Fleabane	Y	G5	S1			
Erigeron wilkenii		Wilken Fleabane	Y	G1	S1			
Eriogonum acaule		Single-Stemmed Wild Buckwheat	Y	G3	S1	BLM		
Eriogonum brandegeei		Brandegee Wild Buckwheat	Y	G1G2	S1S2	FS/BLM		
Eriogonum clavellatum		Comb Wash Buckwheat	Y	G1G2	S1	BLM		
Eriogonum coloradense		Colorado Wild Buckwheat	Y	G2	S2	BLM		

Plant Species

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Eriogonum contortum		Grand Buckwheat	Y	G3	S2	BLM		
Eriogonum ephedroides		Ephedra Buckwheat	Y	G3	S1	BLM		
Eriogonum exilifolium		Dropleaf Buckwheat	Y	G3	S2			
Eriogonum leptocladon var leptocladon		Sand Buckwheat	Y	G5T?	S1			
Eriogonum leptocladon var ramosissimum		Eastwood Sand Buckwheat	Y	G5T5	S1			
Eriogonum lonchophyllum var saurinum	*Eriogonum saurinum*	Dinosaur Buckwheat	Y	G4T3	S1			
Eriogonum palmerianum		Palmer Buckwheat	Y	G4	S1			
Eriogonum pauciflorum var pauciflorum		Few-Flowered Wild Buckwheat	Y	G5T4	S1			
Eriogonum pelinophilum		Clay-Loving Wild Buckwheat	Y	G2Q	S2		LE	
Eriogonum saurinum	*Eriogonum lonchophyllum var saurinum*	Dinosaur Buckwheat	Y	G4T3	S1			
Eriogonum scabrellum		Westwater Buckwheat	Y	G3	S1			
Eriogonum tumulosum		Woodside Buckwheat	Y	G3	S2	BLM		
Eriogonum viridulum		Duchesne Buckwheat	Y	G4Q	S1	BLM		
Eriophorum altaicum var neogaeum		Altai Cottongrass	Y	G4T?	S3	FS		

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Eriophorum gracile		Slender Cottongrass	Y	G5	S2			
Erocallis triphylla	*Lewisia triphylla*	Dwarf Spring Beauty	Y	G4?	S2			
Eucephaius perelegans	*Aster perelegans*	Nuttall Aster	Y	G5	S1			
Eustoma grandiflorum	*Eustoma russellianum*	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	*Eustoma grandiflorum*	Showy Prairie Gentian	W	G5	S3			
Eutrema edwardsii ssp penlandii	*Eutrema penlandii*	Penland Alpine Fen Mustard	Y	G1G2	S1S2		LT	
Eutrema penlandii	*Eutrema edwardsii ssp penlandii*	Penland Alpine Fen Mustard	Y	G1G2	S1S2		LT	
Festuca campestris		Big Rough Fescue	Y	G4?	SH			
Festuca dasyclada	*Argillochloa dasyclada*	Utah Fescue	Y	G3	S3			
Festuca hallii		Hall Fescue	Y	G3G4	SH	FS		
Forsellesia meionandra	*Glossopetalon spinescens var meionandrum*	Utah Greesebush	Y	G5T3	S3			
Forsellesia planitierum	*Glossopetalon planitierum*	Texas Greesebush	Y	G4	S1			
Frasera coloradensis		Colorado Green Gentian	Y	G3	S3	FS		
Frasera paniculata		Tufted Green Gentian	Y	G4	S1	BLM		
Fritillaria pudica		Yellow Bell	Y	G5	S1			
Gastrolychnis kingii	*Silene kingii*	King's Campion	Y	G2G4Q	S1			

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Gaura neomexicana ssp coloradensis		Colorado Butterfly Weed	Y	G3T2	S1	FS	PT	
Gaura neomexicana ssp neomexicana		New Mexico Butterfly Weed	Y	G3T3	S1			
Gentianella tortuosa		Utah Gentian	Y	G3	S1	BLM		
Gilia capillaris	*Gilia sinistra*	Left-Hand Gilia	Y	G4	S1			
Gilia haydenii		San Juan Gilia	Y	G3	S2			
Gilia penstemonoides		Black Canyon Gilia	Y	G3	S3	FS		
Gilia sedifolia		Stonecrop Gilia	Y	G1	S1			
Gilia sinistra	*Gilia capillaris*	Left-Hand Gilia	Y	G4	S1			
Gilia stenothyrsa		Narrow-Stem Gilia	Y	G2	S1	BLM		
Glossopetalon planitierum	*Forsellesia planitierum*	Texas Greesebush	Y	G4	S1			
Glossopetalon spinescens var meionandrum	*Forsellesia meionandra*	Utah Greesebush	Y	G5T3	S3			
Goodyera repens		Dwarf Rattlesnake-Plantain	W	G5	S3			
Grindelia arizonica		Arizona Gumweed	Y	G3?	S2			
Grindelia fastigiata		Pointed Gumwed	Y	G3	S3?			
Grindelia inornata		Colorado Gumweed	Y	G2?	S2?			

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Gutierrezia pomariensis		Orchard Snakeweed	Y	G2	S2			
Gymnocarpium dryopteris		Oak Fern	Y	G5	S2S3			
Hackelia gracilenta		Mesa Verde Stickseed	Y	G2	S2			
Halimolobos virgata		Virgate Halimolobos	Y	G4	S1?			
Hedyotis nigricans		Narrowleaf Bluet	Y	G5	S1			
Helenium microcephalum		Small-Head Sneezeweed	Y	G5?	S1			
Helianthemum bicknellii	*Crocanthemum bicknellii*	Frostweed	Y	G5	S2			
Herrickia horrida		Canadian River Spiny Aster	Y	G2?	S1			
Hesperochiron pumilus		Dwarf Hesperochiron	Y	G4	SH			
Heterocodon rariflorum		Western Pearl-Flower	Y	G5	SH			
Heuchera hallii		Front Range Alum-Root	Y	G3	S3			
Heuchera richardsonii		Richardson Alum-Root	Y	G5	S1			
Heuchera rubescens		Red Alum-Root	Y	G5	S1			
Hippochaete variegata	*Equisetum variegatum var variegatum*	Variegated Scouringrush	Y	G5T?	S1			
Hymenoxys helenioides	*Picardenia helenioides*	Intermountain Bitterweed	Y	G3?Q	S1			
Hypoxis hirsuta		Yellow Stargrass	Y	G5	SH			

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Iliamna crandallii		Crandall's Wild-Hollyhock	Y	GHQ	SH			
Iliamna grandiflora		Large-Flower Globe-Mallow	Y	G3?Q	S1			
Ipomopsis aggregata ssp weberi		Rabbit Ears Gilia	Y	G5T2	S2	FS		
Ipomopsis congesta ssp crebrifolia		Compact Gilia	Y	G5T4?	S1			
Ipomopsis globularis		Globe Gilia	Y	G2	S2			
Ipomopsis multiflora		Many-Flowered Gilia	Y	G4?	S1			
Ipomopsis polyantha		Pagosa Gilia	Y	G1	S1	FS/BLM		
Isoetes echinospora	*Isoetes setacea ssp muricata*	Spiny-Spored Quillwort	Y	G5	S2			
Isoetes echinospora ssp muricata		Spiny-Spored Quillwort	Y	G5T5?	S2			
Isoetes occidentalis		Western Quillwort	Y	G4G5	S1S2			
Isoetes setacea ssp muricata	*Isoetes echinospora*	Spiny-Spored Quillwort	Y	G5	S2			
Juncus brachycephalus		Small-Headed Rush	Y	G5	S1			
Juncus brevicaudatus		Narrow-Panicled Rush	Y	G5	S1			
Juncus bryoides		Minute Rush	Y	G4	S1			
Juncus tweedyi		Tweedy Rush	Y	G3Q	S1			
Juncus vaseyi		Vasey Bulrush	Y	G5?	S1			

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Krigia biflora		Two-Flowered Dwarf Dandelion	Y	G5	S1			
Leptodactylon watsonii		Watson's Prickly-Phlox	Y	G3?	S2			
Leptodon smithii		A Moss	Y	G?	S1			
Lesquerella arenosa var argillosa		Secund Bladderpod	Y	G5T2	S1			
Lesquerella calcicola		Rocky Mountain Bladderpod	Y	G2	S2			
Lesquerella congesta		Dudley Bluffs Bladderpod	Y	G1	S1		LT	
Lesquerella parviflora		Piceance Bladderpod	Y	G2G3	S2S3	BLM		
Lesquerella pruinosa		Pagosa Bladderpod	Y	G2	S2	FS/BLM		
Lesquerella vicina		Good-Neighbor Bladderpod	Y	G2	S2	BLM		
Lewisia rediviva		Bitteroot	Y	G5	S2			
Lewisia triphylla	*Erocallis triphylla*	Dwarf Spring Beauty	Y	G4?	S2			
Liatris lancifolia		Gay-Feather	Y	G4	S1			
Liatris ligulistylis		Gay-Feather	Y	G5?	S1S2			
Lilium philadelphicum		Wood Lily	W	G5	S3			
Limnorchis ensifolia	*Platanthera sparsiflora var ensifolia*	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Limnorchis zothecina	*Platanthera zothecina*	Alcove Bog Orchid	Y	G2	S1			

Plant Species

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			Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Linum aristatum	*Mesynium aristatum*	Bristle Flax	Y	G5	SH			
Linum kingii	*Mesyniopsis kingii*	Yellow Flax	Y	G5	SU			
Listera borealis		Northern Twayblade	Y	G4	S2	BLM		
Listera convallarioides		Broad-Leaved Twayblade	Y	G5	S2			
Lomatium bicolor var bicolor		Wasatch Biscuitroot	Y	G4T3T4	S1			
Lomatium bicolor var leptocarpum		Oregon Biscuitroot	Y	G4T?	S2			
Lomatium concinnum		Colorado Desert-Parsley	Y	G2	S2	BLM		
Lomatium eastwoodiae		Eastwood Desert-Parsley	W	G3G4	S3S4			
Lomatium foeniculaceum ssp macdougalii		Desert-Parsley	Y	G5T4T5	S1			
Lomatium latilobum	*Aletes latilobus*	Canyonlands Lomatium	Y	G1	S1	BLM		
Lomatium nuttallii	*Aletes nuttallii*	Dog Parsley	Y	G3G4	S1			
Lupinus crassus		Payson Lupine	Y	G2	S2	BLM		
Lycopodium alpinum	*Diphasiastrum alpinum*	Alpine Clubmoss	Y	G5	S1S2			
Lycopodium annotinum var pungens	*Lycopodium dubium*	Stiff Clubmoss	Y	G5TU	SU			
Lycopodium dubium	*Lycopodium annotinum var pungens*	Stiff Clubmoss	Y	G5TU	SU			

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Lygodesmia doloresensis		Dolores Skeletonplant	Y	G1Q	S1	BLM		
Lysimachia thyrsiflora	*Naumburgia thyrsiflora*	Tufted Loosestrife	Y	G5	SH			
Machaeranthera coloradoensis		Colorado Tansy-Aster	Y	G2?	S2	FS		
Mahonia haematocarpa		Colorado Mahonia	Y	G5	SH			
Malaxis brachypoda	*Malaxis monophyllos ssp brachypoda*	White Adder's-Mouth	Y	G4Q	S1	FS		
Malaxis monophyllos ssp brachypoda	*Malaxis brachypoda*	White Adder's-Mouth	Y	G4Q	S1	FS		
Mentzelia argillosa	*Nuttallia argillosa*	Arapien Stickleaf	Y	G3	S2	BLM		
Mentzelia chrysantha	*Nuttallia chrysantha*	Golden Blazing Star	Y	G1G2	S1S2	BLM		
Mentzelia cronquistii	*Nuttallia cronquistii*	Cronquist's Stickleaf	Y	G3?Q	S2S3			
Mentzelia densa	*Nuttallia densa*	Arkansas Canyon Stickleaf	Y	G2	S2	BLM		
Mentzelia multicaulis	*Nuttallia multicaulis*	Many-Stem Stickleaf	Y	G2G3	S2			
Mentzelia pterosperma	*Nuttallia pterosperma*		Y	G3?	S3?			
Mentzelia sinuata	*Nuttallia sinuata*	Wavy-Leaf Stickleaf	Y	G3?	S2			
Mentzelia speciosa	*Nuttallia speciosa*	Jeweled Blazingstar	Y	G3?	S3?			
Mertensia alpina		Alpine Bluebells	Y	G4?	S1			

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Mesyniopsis kingii	*Linum kingii*	Yellow Flax	Y	G5	SU			
Mesynium aristatum	*Linum aristatum*	Bristle Flax	Y	G5	SH			
Mimulus eastwoodiae		Eastwood Monkey-Flower	Y	G3?	S1	BLM		
Mimulus gemmiparus		Weber Monkey-Flower	Y	G2	S2	FS		
Mimulus ringens		Square-Stem Monkeyflower	Y	G5	SH			
Minuartia nuttallii	*Minuopsis nuttallii*	Nuttall Sandwort	Y	G5	S1	BLM		
Minuartia stricta	*Alsinanthe stricta*	Rock Sandwort	Y	G5	S1			
Minuopsis nuttallii	*Minuartia nuttallii*	Nuttall Sandwort	Y	G5	S1	BLM		
Mirabilis decumbens	*Oxybaphus decumbens*	Great Plains Four-O'clock	Y	G5	S1			
Mirabilis rotundifolia	*Oxybaphus rotundifolia*	Round-Leaf Four-O'clock	Y	G2	S2			
Monardella odoratissima		Mountain Wild Mint	Y	G4G5	S2			
Monolepis pusilla		Red Poverty-Weed	Y	G5	SH			
Muhlenbergia depauperata		Sixweeks Muhly	Y	G5	S1			
Muscaria monticola	*Saxifraga cespitosa ssp monticola*	Tundra Saxifrage	Y	G5T5	S1			
Musineon tenuifolium	*Aletes tenuifolius*	Slender Parsley	Y	G4	S3			
Myosurus cupulatus		Horseshoe Mousetail	Y	G4	S1?			

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Myosurus cupulatus	*Myosurus nitidus*	Western Mouse-Tail	Y	G2G4	S1?			
Myosurus nitidus	*Myosurus cupulatus*	Western Mouse-Tail	Y	G2G4	S1?			
Myriophyllum verticillatum		Whorled Water-Milfoil	Y	G5	S1			
Nama densum		Matted Fiddleleaf	Y	G5	S1			
Nama dichotomum		Livemore Fiddleleaf	Y	G4	S1			
Nama hispidum		Rough Fiddleleaf	Y	G4	S1			
Naumburgia thyrsiflora	*Lysimachia thyrsiflora*	Tufted Loosestrife	Y	G5	SH			
Neoparrya lithophila	*Aletes lithophilus*	Rock-Loving Neoparrya	Y	G2	S2	FS/BLM		
Nolina texana		Texas Beargrass	Y	G5	S1			
Notholaena standleyi	*Cheilanthes standleyi*	Standley's Cloak Fern	Y	G4	S1			
Nuttallia argillosa	*Mentzelia argillosa*	Arapien Stickleaf	Y	G3	S2	BLM		
Nuttallia chrysantha	*Mentzelia chrysantha*	Golden Blazing Star	Y	G1G2	S1S2	BLM		
Nuttallia cronquistii	*Mentzelia cronquistii*	Cronquist's Stickleaf	Y	G3?Q	S2S3			
Nuttallia densa	*Mentzelia densa*	Arkansas Canyon Stickleaf	Y	G2	S2	BLM		
Nuttallia multicaulis	*Mentzelia multicaulis*	Many-Stem Stickleaf	Y	G2G3	S2			
Nuttallia pterosperma	*Mentzelia pterosperma*		Y	G3?	S3?			

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Nuttallia sinuata	*Mentzelia sinuata*	Wavy-Leaf Stickleaf	Y	G3?	S2			
Nuttallia speciosa	*Mentzelia speciosa*	Jeweled Blazingstar	Y	G3?	S3?			
Oenothera acutissima		Narrow-Leaf Evening Primrose	Y	G2	S2	BLM		
Oenothera harringtonii		Arkansas Valley Evening Primrose	Y	G2	S2			
Oenothera kleinii		Wolf Creek Evening Primrose	Y	GHQ	SX			
Oenothera longissima		Long-Stem Evening-Primrose	Y	G4	S1			
Onoclea sensibilis		Sensitive Fern	Y	G5	SH			
Oonopsis engelmannii		Engelmann Goldenweed	Y	G2G3	S2?			
Oonopsis foliosa	*Oonopsis foliosa var monocephala*	Single-Head Goldenweed	Y	G3G4T2	S2			
Oonopsis foliosa var monocephala	*Oonopsis foliosa*	Single-Head Goldenweed	Y	G3G4T2	S2			
Oonopsis sp 1		Pueblo Goldenweed	Y	G1G2	S1S2			
Oreocarya aperta	*Cryptantha aperta*	Grand Junction Cat's-Eye	Y	GH	SH			
Oreocarya breviflora	*Cryptantha breviflora*	Short-Flower Cryptanth	Y	G4	S1			
Oreocarya caespitosa	*Cryptantha caespitosa*	Tufted Cryptanth	Y	G4	S2	BLM		
Oreocarya cana	*Cryptantha cana*	Mountain Cat's-Eye	Y	G5	S2			
Oreocarya elata	*Cryptantha elata*	Tall Cryptanth	Y	G3	S2			

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Oreocarya longiflora	*Cryptantha longiflora*	Long-Flower Cat's-Eye	Y	G3	S2			
Oreocarya mensana	*Cryptantha mensana*	Carbon Cryptanth	Y	G3	S1			
Oreocarya osterhoutii	*Cryptantha osterhoutii*	Osterhout Cryptanth	Y	G3	S2	BLM		
Oreocarya rollinsii	*Cryptantha rollinsii*	Rollins Cryptanth	Y	G3	S2	BLM		
Oreocarya stricta	*Cryptantha stricta*	Erect Cryptanth	Y	G3	S3			
Oreocarya weberi	*Cryptantha weberi*	Weber's Catseye	Y	G2	S2			
Oreoxis humilis		Pikes Peak Spring Parsley	Y	G1	S1			
Orophaca aretioides	*Astragalus aretioides*	Cushion Orophaca	Y	G4	S1	BLM		
Orophaca hyalina	*Astragalus hyalinus*	Summer Orophaca	Y	G4	S1?			
Orophaca triphylla	*Astragalus gilviflorus*	Plains Milkvetch	Y	G5	S1			
Oryzopsis contracta		An Indian Ricegrass	Y	G3G4	SU			
Oxybaphus decumbens	*Mirabilis decumbens*	Great Plains Four-O'clock	Y	G5	S1			
Oxybaphus rotundifolia	*Mirabilis rotundifolia*	Round-Leaf Four-O'clock	Y	G2	S2			
Oxytropis besseyi var obnapiformis	*Oxytropis nana var obnapiformis*	Bessey Locoweed	Y	G5T2	S2			
Oxytropis nana var obnapiformis	*Oxytropis besseyi var obnapiformis*	Bessey Locoweed	Y	G5T2	S2			
Oxytropis parryi		Parry Oxytrope	Y	G5	S1			

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Packera debilis	*Senecio debilis*	Rocky Mountain Ragwort	Y	G3G4	S1?			
Packera pauciflora	*Senecio pauciflorus*	Few-Flowered Ragwort	Y	G4G5	S1S2			
Packera paupercula	*Senecio pauperculus*	Balsam Ragweed	Y	G5	S1			
Paludella squarrosa		A Moss	Y	G3G5	S1			
Papaver kluanensis	*Papaver radicatum ssp kluanense*	Alpine Poppy	W	G5T3?	S3			
Papaver radicatum ssp kluanense	*Papaver kluanensis*	Alpine Poppy	W	G5T3?	S3			
Parnassia kotzebuei		Kotzebue Grass-Of-Parnassus	Y	G4	S2			
Parthenium alpinum	*Bolophyta alpina*	Wyoming Feverfew	Y	G3	S1	FS		
Parthenium ligulatum	*Bolophyta ligulata*	Ligulate Feverfew	Y	G3	S2	BLM		
Parthenium tetraneuris	*Bolophyta tetraneuris*	Arkansas River Feverfew	Y	G3	S3			
Pediocactus knowltonii		Knowlton Cactus	Y	G1	S1		LE	
Pediomelum aromaticum		Paradox Breadroot	Y	G3	S2	BLM		
Pediomelum megalanthum		Large-Flowered Breadroot	W	G4?	S3S4			
Pellaea atropurpurea		Purple Cliff-Brake	Y	G5	S2S3			
Pellaea breweri		Brewer's Cliff-Brake	Y	G5	S2			
Pellaea glabella ssp simplex	*Pellaea suksdorfiana*	Smooth Cliff-Brake	Y	G5T4?	S2			

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Pellaea suksdorfiana	*Pellaea glabella ssp simplex*	Smooth Cliff-Brake	Y	G5T4?	S2			
Pellaea wrightiana		Wright's Cliff-Brake	Y	G5	S2			
Penstemon acaulis var yampaensis	*Penstemon yampaensis*	Yampa Beardtongue	Y	G3Q	S3			
Penstemon angustifolius var vernalensis		Vernal Narrow-Leaf Penstemon	Y	G5T3	S1			
Penstemon breviculus		Little Penstemon	Y	G3Q	S2			
Penstemon cyathophorus		Middle Park Penstemon	W	G3G4	S3S4			
Penstemon debilis		Parachute Penstemon	Y	G1	S1		C	
Penstemon degeneri		Degener Beardtongue	Y	G2	S2	FS/BLM		
Penstemon eriantherus		Crested Beardtongue	Y	G4	SU			
Penstemon fremontii var glabrescens		Fremont's Beardtongue	Y	G3T?	S?			
Penstemon gibbensii		Gibben's Beardtongue	Y	G1	S1	BLM		
Penstemon grahamii		Graham Beardtongue	Y	G2	S2		C	
Penstemon harbourii		Harbour Beardtongue	W	G3G4	S3S4			
Penstemon harringtonii		Harrington Beardtongue	Y	G3	S3	FS/BLM		
Penstemon jamesii		James' Beard-Tongue	Y	G4	S1			

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Penstemon laricifolius ssp exilifolius		Larch-Leaf Beardtongue	Y	G4T2	S2			
Penstemon lentus		Abajo Penstemon	Y	G4Q	S2			
Penstemon mensarum		Grand Mesa Penstemon	Y	G3	S3			
Penstemon parviflorus		Small-Flower Beardtongue	Y	GHQ	SX			
Penstemon penlandii		Penland Beardtongue	Y	G1	S1		LE	
Penstemon radicosus		Matroot Penstemon	Y	G5	S1			
Penstemon retrorsus		Adobe Beardtongue	Y	G3	S3			
Penstemon scariosus var albifluvis		White River Penstemon	Y	G4T1	S1		C	
Penstemon scariosus var cyanomontanus		Plateau Penstemon	Y	G4T?	S2			
Penstemon utahensis		Utah Penstemon	Y	G4	S2			
Penstemon yampaensis	*Penstemon acaulis var yampaensis*	Yampa Beardtongue	Y	G3Q	S3			
Phacelia constancei		Constance Phacelia	Y	G4	S1			
Phacelia denticulata		Rocky Moutain Phacelia	Y	G3?	S3?			
Phacelia formosula		North Park Phacelia	Y	G1	S1		LE	
Phacelia incana		Hoary Phacelia	Y	G3	S1			

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Phacelia integrifolia		Gyp Phacelia	Y	G4	S1			
Phacelia scopulina var submutica	*Phacelia submutica*	Debeque Phacelia	Y	G4T2	S2	FS	C	
Phacelia submutica	*Phacelia scopulina var submutica*	Debeque Phacelia	Y	G4T2	S2	FS	C	
Phippsia algida		Snow Grass	Y	G5	S2			
Phlox caryophylla		Pagosa Phlox	Y	G4	S2			
Phlox kelseyi ssp salina		Marsh Phlox	Y	G4T3?	S1			
Physaria alpina		Avery Peak Twinpod	Y	G2?	S2?			
Physaria bellii		Bell's Twinpod	Y	G2	S2			
Physaria obcordata		Piceance Twinpod	Y	G2	S2		LT	
Physaria rollinsii		Rollin's Twinpod	Y	G2	S2			
Picardenia helenioides	*Hymenoxys helenioides*	Intermountain Bitterweed	Y	G3?Q	S1			
Platanthera sparsiflora var ensifolia	*Limnorchis ensifolia*	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Platanthera zothecina	*Limnorchis zothecina*	Alcove Bog Orchid	Y	G2	S1			
Poliomintha incana		Purple Sage	Y	G5	S1			
Polygonum sagittatum	*Truellum sagittatum*	Arrow-Leaved Tearthumb	Y	G5	S1			
Polypodium hesperium		Western Polypody	Y	G5	S1S2			

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Polystichum scopulinum		Crag Holly Fern	Y	G5	S1			
Portulaca halimoides	*Portulaca parvula*	Dwarf Purslane	Y	G4?	S1			
Portulaca parvula	*Portulaca halimoides*	Dwarf Purslane	Y	G4?	S1			
Potamogeton diversifolius		Waterthread Pondweed	Y	G5	SU			
Potentilla ambigens		Southern Rocky Mountain Cinquefoil	Y	G3	S1S2			
Potentilla effusa var rupincola	*Potentilla rupincola*	Rocky Mountain Cinquefoil	Y	G5?T2	S2	FS		
Potentilla rupincola	*Potentilla effusa var rupincola*	Rocky Mountain Cinquefoil	Y	G5?T2	S2	FS		
Primula egaliksensis		Greenland Primrose	Y	G4	S2	FS		
Proatriplex pleiantha		Mancos Saltbush	Y	G3	S1			
Prosopis glandulosa		Honey Mesquite	Y	G5?	S1			
Ptilagrostis mongholica ssp porteri	*Ptilagrostis porteri*	Porter Feathergrass	Y	G3G5T2	S2	FS		
Ptilagrostis porteri	*Ptilagrostis mongholica ssp porteri*	Porter Feathergrass	Y	G3G5T2	S2	FS		
Puccinellia parishii		Parish's Alkali Grass	Y	G2	S1			
Pyrola picta		Pictureleaf Wintergreen	W	G4G5	S3			
Ranunculus gelidus ssp grayi	*Ranunculus karelinii*	Tundra Buttercup	Y	G4G5	S2			

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Ranunculus karelinii	*Ranunculus gelidus ssp grayi*	Tundra Buttercup	Y	G4G5	S2			
Reverchonia arenaria		Sand Reverchonia	Y	G4G5	S1			
Rhododendron albiflorum	*Azaleastrum albiflorum*	White-Flowered Azalea	Y	G4	S2			
Ribes americanum		American Currant	Y	G5	S1			
Ribes niveum		Snow Gooseberry	Y	G3?	S1			
Rorippa coloradensis		Colorado Watercress	Y	GH	SH			
Rotala ramosior		Toothcup	Y	G5	S1			
Rubus arcticus ssp acaulis	*Cylactis arctica ssp acaulis*	Nagoon Berry	Y	G5T5	S1	FS		
Sagittaria calycina var calycina	*Sagittaria montevidensis ssp calycina*	Long-Lobe Arrowhead	Y	G5T5?	S1			
Sagittaria montevidensis ssp calycina	*Sagittaria calycina var calycina*	Long-Lobe Arrowhead	Y	G5T5?	S1			
Salix candida		Hoary Or.Silver Willow	Y	G5	S2			
Salix lanata ssp calcicola		Lime-Loving Willow	Y	G4T4	S1	FS		
Salix myrtillifolia		Low Blueberry Willow	Y	G5	S1	FS		
Salix serissima		Autumn Willow	Y	G4	S1	FS		
Sapindus drummondii	*Sapindus saponaria var drummondii*	Soapberry	Y	G5T5	S1			

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Sapindus saponaria var drummondii	*Sapindus drummondii*	Soapberry	Y	G5T5	S1			
Sarcostemma crispum		Twinevine	Y	G4G5	S1			
Saussurea weberi		Weber Saussurea	Y	G3Q	S2	BLM		
Saxifraga cespitosa ssp monticola	*Muscaria monticola*	Tundra Saxifrage	Y	G5T5	S1			
Saxifraga foliolosa	*Spatularia foliolosa*	Leafy Saxifrage	Y	G4	S1			
Schoenoplectus saximontanus	*Scirpus saximontanus*	Rocky Mountain Bulrush	Y	G5	S1			
Scirpus rollandii	*Trichophorum pumilum*	Little Bulrush	Y	G3Q	S2	FS		
Scirpus saximontanus	*Schoenoplectus saximontanus*	Rocky Mountain Bulrush	Y	G5	S1			
Sclerocactus glaucus		Uinta Basin Hookless Cactus	Y	G3	S3		LT	
Sclerocactus mesae-verdae		Mesa Verde Cactus	Y	G2	S2		LT	
Scorpidium scorpioides		-	Y	G4G5	S?			
Selaginella selaginoides		Northern Spike-Moss	Y	G5	SH			
Selaginella weatherbiana		Weatherby's Spike-Moss	W	G3G4	S3S4			
Senecio debilis	*Packera debilis*	Rocky Mountain Ragwort	Y	G3G4	S1?			
Senecio pauciflorus	*Packera pauciflora*	Few-Flowered Ragwort	Y	G4G5	S1S2			
Senecio pauperculus	*Packera paupercula*	Balsam Ragweed	Y	G5	S1			

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Senecio sphaerocephalus		Rough-Head Groundsel	Y	G4G5	S2			
Seriphidium pygmaeum	*Artemisia pygmaea*	Pigmy Sagebrush	Y	G4	S1			
Silene kingii	*Gastrolychnis kingii*	King's Campion	Y	G2G4Q	S1			
Silphium laciniatum		Compass-Plant	Y	G5	SH			
Sisyrinchium demissum		Blue-Eyed Grass	Y	G5	S2			
Sisyrinchium pallidum		Pale Blue-Eyed Grass	Y	G2G3	S2			
Smilax lasioneura		Carrion-Flower	W	G5	S3S4			
Solidago ptarmicoides	*Unamia alba*	Prairie Goldenrod	Y	G5	S2S3			
Sparganium eurycarpum		Broodfruit Burreed	Y	G5	S2S3?			
Spatularia foliolosa	*Saxifraga foliolosa*	Leafy Saxifrage	Y	G4	S1			
Sphaeromeria argentea		Nuttall's False-Sagebrush	Y	G3?	S1?			
Sphaeromeria capitata		Rock-Tansy	Y	G3	S1	BLM		
Spiranthes diluvialis		Ute Ladies' Tresses	Y	G2	S2		LT	
Sporobolus flexuosus		Mesa Dropseed	Y	G5	S1S2			
Stellaria irrigua		Altai Chickweed	Y	G4?	S2			
Stipa richardsonii		Richardson Needlegrass	Y	G5	SU			

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Subularia aquatica		Water Awlwort	Y	G5	S1			
Sullivantia hapemanii var purpusii		Hanging Garden Sullivantia	Y	G3T3	S3	FS		
Telesonix jamesii	*Boykinia jamesii*	James' Telesonix	Y	G4	S2?			
Thalictrum heliophilum		Sun-Loving Meadowrue	Y	G3	S3			
Thamnosma texana		Dutchman's Breeches	Y	G5	SH			
Thellungiella salsuginea	*Arabidopsis salsuginea*	Salt-Lick Mustard	Y	G4G5	S1			
Thelypodiopsis juniperorum		Juniper Tumble Mustard	Y	G1	S1			
Thelypodium paniculatum		Northwestern Thelypody	Y	G2G3	S1			
Thelypodium sagittatum	*Thelypodium sagittatum ssp sagittatum*	Slender Thelypody	Y	G4	S1			
Thelypodium sagittatum ssp sagittatum	*Thelypodiium sagittatum*	Slender Thelypody	Y	G4	S1			
Tonestus lyallii		Lyall Haplopappus	Y	G5	S1?			
Townsendia fendleri		Fendler's Townsend-Daisy	Y	G3?	S1			
Townsendia glabella		Gray's Townsend-Daisy	Y	S2?	S2?			
Townsendia rothrockii		Rothrock Townsend-Daisy	Y	G2?	S2?			
Townsendia strigosa		Strigose Easter-Daisy	Y	G4	S1	BLM		

Plant Species

Scientific Name	Synonym	Common Name	CNHP Status and Ranking			Regulatory Status		
			Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Trichophorum pumilum	*Scirpus rollandii*	Little Bulrush	Y	G3Q	S2	FS		
Trifolium andinum		Mountain Clover	Y	G3	S1	BLM		
Trifolium kingii		King Clover	Y	G4	S1			
Trillium ovatum		Western Wake-Robin	W	G5	S3			
Triodanis leptocarpa		Slim-Pod Venus' Looking-Glass	Y	G5?	S1?			
Triteleia grandiflora		Wild Hyacinth	Y	G4	S1			
Truellum sagittatum	*Polygonum sagittatum*	Arrow-Leaved Tearthumb	Y	G5	S1			
Unamia alba	*Solidago ptarmicoides*	Prairie Goldenrod	Y	G5	S2S3			
Utricularia ochroleuca		Northern Bladderwort	Y	G4?	S1?			
Vernonia baldwinii ssp interior		Baldwin Ironweed	Y	G5T?	S1			
Vernonia fasciculata ssp corymbosa		Fascicled Ironweed	Y	G5T?	S1			
Viola pedatifida		Prairie Violet	Y	G5	S2			
Viola selkirkii		Selkirk Violet	Y	G5?	S1	FS		
Virgulus novae-angliae	*Aster novae-angliae*	New England Aster	Y	G5	S1SE?			
Woodsia neomexicana		New Mexico Cliff Fern	Y	G4?	S2			
Woodsia plummerae		Plummer's Cliff Fern	Y	G5	SU			

Plant Species

Scientific Name	Synonym	Common Name	CNHP Status and Ranking			Regulatory Status		
			Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Zigadenus vaginatus	*Anticlea vaginatus*	Alcove Death Camas	Y	G2	S			

CHAPTER 4: ECOLOGY

Montane grassland (*Festuca arizonica-Muhlenbergia filiculmis)*

Introduction

In order to answer the most basic questions necessary to ensure good management and conservation decisions, and to direct our limited conservation resources to the specific places where they will have the greatest impact, we must have clear answers regarding what plant communities exist, how rare they are, and the status of their condition. In cooperation with the Nature Conservancy, the Heritage programs have developed a standard for classification, inventory, and mapping work by all U.S. federal agencies, including the National Park Service, the National Forest Service, and the Fish and Wildlife Service. These agencies, along with other academic and professional conservation and management organizations, are increasingly becoming partners with the Heritage programs and The Nature Conservancy in the ongoing development and application of the classification and its provision to a burgeoning number of users and contributors (Maybury 1999).

Recognizing the need for a national and international system for classifying terrestrial communities to carry out its mission effectively, the Natural Heritage network, in conjunction with the Nature Conservancy, undertook development of the U.S. National Vegetation Classification System. A team of more than 100 Conservancy and Heritage ecologists established the standardized classification framework and defined the first iteration of U.S. communities within it. The *International Classification of Ecological Communities: Terrestrial Vegetation of the United States by Anderson et al. 1998 can be found on the World Wide Web at* www.tnc.org. *The following list is a subset of the international list of plant communities, including those that are classified as rare, imperiled, and common.*

List Content and Nomenclature:

The Colorado Natural Heritage Program collects information on rare and imperiled natural communities, as well as high quality examples of common native communities. Together these constitute our "coarse filter" approach to conservation. The coarse filter concept states that if aggregates (e.g., plant communities) are managed well, the components of these aggregates (e.g., plants animals, microbes, ecological processes, etc.) will be managed as well. Thus, plant communities are used to identify and formulate conservation strategies for all the components of native ecological systems, including both the rare and common as well as the known and unknown.

In various Natural Heritage Program literature from around the West, the following terms may appear: "plant community," "plant association," "natural community," and "community type." These terms all denote "a plant community of definite floristic composition, presenting a uniform physiognomy, and growing in uniform habitat conditions" (Third International Botanical Congress 1910). As used here, this concept applies to existing vegetation regardless of successional status.

Plant community naming conventions are as follows:

a) Diagnostic upper canopy level species are named first. A dash (-) indicates that the next named species occurs within the same vegetation layer. A slash (/) indicates a change to a different layer.

b) Parentheses are placed around named species when that species is not always present within a plot classified as a particular plant association. Species not in parentheses are assumed to have high constancy within that plant association.

c) Plant nomenclature follows Kartesz (1994), except in cases where the taxonomic status of a taxon compels use of Weber and Wittmann (1992).

Plant Communities

Scientific Name	Common Name	Global	State Rank
ABIES CONCOLOR-PICEA PUNGENS-POPULUS ANGUSTIFOLIA/ACER GLABRUM	Montane Riparian Forests	G2	S2
ABIES CONCOLOR/ACER GLABRUM	Mixed Montane Forests	G5	S3
ABIES CONCOLOR/ARCTOSTAPHYLOS UVA-URSI	Mixed Montane Forests	G5	S2
ABIES CONCOLOR/ERIGERON EXIMIUS	Mixed Montane Forests	G5	S1S2
ABIES CONCOLOR/ERIGERON EXIMIUS-GALIUM TRIFLORUM	Mixed Montane Forests	GU	SU
ABIES CONCOLOR/FESTUCA ARIZONICA	Mixed Montane Forests	G5	S1
ABIES CONCOLOR/MAHONIA REPENS	Mixed Montane Forests	G5	S4
ABIES CONCOLOR/QUERCUS GAMBELII	Mixed Montane Forests	G5	S2?
ABIES CONCOLOR/SYMPHORICARPOS OREOPHILUS	Mixed Montane Forests	G5	SU
ABIES CONCOLOR/VACCINIUM MYRTILLUS	Mixed Montane Forests	G5	S3
ABIES LASIOCARPA - PICEA ENGELMANNII - POPULUS ANGUSTIFOLIA / LONICERA INVOLUCRATA	Montane Riparian Forest	G4	S3
ABIES LASIOCARPA-PICEA ENGELMANNII RIBBON FOREST	Krummholz	GU	S?
ABIES LASIOCARPA-PICEA ENGELMANNII TREE ISLAND	Krummholz	GU	S?
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	Montane Riparian Forests	G5	S5
ABIES LASIOCARPA-PICEA ENGELMANNII/CALAMAGROSTIS CANADENSIS	Montane Riparian Forests	G5	S3

Plant Communities

Scientific Name	Common Name	Global	State Rank
ABIES LASIOCARPA-PICEA ENGELMANNII/CAREX AQUATILIS	Subalpine Riparian/Wetland Forest	G3	S3
ABIES LASIOCARPA-PICEA ENGELMANNII/EQUISETUM ARVENSE	Coniferous Wetland Forests	G4	S2
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	G5	S5
ABIES LASIOCARPA-PICEA ENGELMANNII/RIBES SPP.	Coniferous Wetland Forests	G5	S3
ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	Montane Riparian Forest	G5	S4
ABIES LASIOCARPA/CAREX GEYERI	Subalpine Forests	G5	S2S3
ABIES LASIOCARPA/ERIGERON EXIMIUS	Subalpine Forests	G5	S4
ABIES LASIOCARPA/MOSS	Subalpine Forests	G5	S2?
ABIES LASIOCARPA/RUBUS PARVIFLORUS	Subalpine Forests	G5	S2
ABIES LASIOCARPA/SALIX BRACHYCARPA	Krummholz	G3G4	S3S4
ABIES LASIOCARPA/SALIX GLAUCA	Krummholz	GU	S?
ABIES LASIOCARPA/VACCINIUM MYRTILLUS	Subalpine Forests	G5	S5
ABIES LASIOCARPA/VACCINIUM SCOPARIUM	Subalpine Forests	G5	S5
ACER NEGUNDO ALLIANCE	Riparian Forest	GQ	SQ
ACER NEGUNDO-POPULUS ANGUSTIFOLIA/CELTIS RETICULATA	Narrowleaf Cottonwood Riparian Forests	G1Q	S1Q
ACER NEGUNDO-POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Narrowleaf Cottonwood Riparian Forests	G2	S2

Plant Communities

Scientific Name	Common Name	Global	State Rank
ACER NEGUNDO/BETULA OCCIDENTALIS	Boxelder/River Birch	G1G2	S1
ACER NEGUNDO/CORNUS SERICEA	Montane Riparian Deciduous Forest	G3?	S2
ACER NEGUNDO/HIPPOCHAETE HYEMALIS	Montane Riparian Deciduous Forest	GU	SU
ACER NEGUNDO/PRUNUS VIRGINIANA	Montane Riparian Deciduous Forest	G3	S2
ALNUS INCANA-CORNUS SERICEA	Thinleaf Alder-Red-Oiser Dogwood Riparian Shrubland	G3G4	S3
ALNUS INCANA-MIXED SALIX SPECIES	Thinleaf Alder-Mixed Willow Species	G3	S3
ALNUS INCANA-SALIX DRUMMONDIANA	Montane Riparian Shrubland	G3	S3
ALNUS INCANA/EQUISETUM ARVENSE	Montane Riparian Shrublands	G3?	S3
ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparian Shrubland	G3G4Q	S3
ALNUS INCANA/MESIC GRAMINOID	Montane Riparian Shrubland	G5Q	S3
AMELANCHIER UTAHENSIS/CAREX GEYERI	Mixed Mountain Shrublands	GU	S2S3
AMELANCHIER UTAHENSIS/CERCOCARPUS MONTANUS	Mixed Mountain Shrublands	GU	S1?
AMELANCHIER UTAHENSIS/PSEUDOROEGNERIA SPICATA	Mixed Mountain Shrublands	G2G3	S2S3
ANDROPOGON GERARDII-CALAMOVILFA LONGIFOLIA	Tallgrass Prairies	G3	S2
ANDROPOGON GERARDII-SCHIZACHYRIUM SCOPARIUM	Xeric Tallgrass Prairies	G2	S2
ANDROPOGON GERARDII-SORGHASTRUM NUTANS-(SPARTINA PECTINATA)	Wet Prairies	G2	S1S2

Plant Communities

Scientific Name	Common Name	Global	State Rank
ANDROPOGON GERARDII-SPOROBOLUS HETEROLEPIS	Xeric Tallgrass Prairies	G2	S1S2
ANDROPOGON HALLII-CALAMOVILFA LONGIFOLIA	Northern Sandhill Prairies	G5	S2
ANDROPOGON HALLII-STIPA COMATA	Great Plains Mixed Grass Prairie	G3	S1
AQUILEGIA COERULEA-CIRSIUM SCOPULORUM ALPINE TALUS	Alpine Fellfields	GU	SU
AQUILEGIA MICRANTHA-MIMULUS EASTWOODIAE	Hanging Gardens	G2G3	S2S3
ARCTOSTAPHYLOS PATULA	Montane Shrublands	G2	S2
ARENARIA HOOKERI BARRENS	Shortgrass Prairies (Sandstone Breaks)	GU	S2
ARTEMISIA ARBUSCULA/FESTUCA IDAHOENSIS	Western Slope Sagebrush Shrublands	G5	S2?
ARTEMISIA ARCTICA SSP SAXICOLA	Alpine Meadows	GU	SU
ARTEMISIA BIGELOVII/ORYZOPSIS HYMENOIDES	Plains Escarpment Prairies (Limestone Breaks)	G3	S3?
ARTEMISIA CANA-PURSHIA TRIDENTATA	Western Slope Sagebrush Shrublands	G4	S2S3
ARTEMISIA CANA/FESTUCA IDAHOENSIS	Western Slope Sagebrush Shrublands	G4	SU
ARTEMISIA CANA/FESTUCA THURBERI	Western Slope Sagebrush Shrublands	G2G3	S2S3
ARTEMISIA FILIFOLIA/ANDROPOGON HALLII	Northern Sandhill Prairies	G3	S2
ARTEMISIA LONGILOBA/PASCOPYRUM SMITHII	Western Slope Sagebrush Shrublands	GU	SU
ARTEMISIA LONGILOBA/POA SECUNDA	Western Slope Sagebrush Shrublands	G3Q	SU

Plant Communities

Scientific Name	Common Name	Global	State Rank
ARTEMISIA LONGILOBA/PSEUDOROEGNERIA SPICATA	Western Slope Sagebrush Shrublands	GU	SU
ARTEMISIA NOVA/LEYMUS SALINUS	West Slope Shrubland	GU	SU
ARTEMISIA NOVA/PSEUDOROEGNERIA SPICATA	Western Slope Sagebrush Shrublands	G5	S2?
ARTEMISIA NOVA/STIPA COMATA	Western Slope Sagebrush Shrublands	G4	S2?
ARTEMISIA TRIDENTATA SSP. TRIDENTATA/LEYMUS CINEREUS	Sagebrush Bottomland Shrublands	G2G3	S1
ARTEMISIA TRIDENTATA SSP. TRIDENTATA/PASCOPYRUM SMITHII	Sagebrush Bottomland Shrublands	G2G3	S2S3
ARTEMISIA TRIDENTATA SSP. TRIDENTATA/STIPA COMATA	Western Slope Sagebrush Shrubland	G5	S3?
ARTEMISIA TRIDENTATA SSP. VASEYANA/BALSAMORHIZA SAGITTATA	Western Slope Sagebrush Shrublands	G5	S3S4
ARTEMISIA TRIDENTATA SSP. VASEYANA/CAREX GEYERI	West Slope Sagebrush Shrubland	G3	SU
ARTEMISIA TRIDENTATA SSP. VASEYANA/FESTUCA IDAHOENSIS	Western Slope Sagebrush Shrublands	GU	S3S4
ARTEMISIA TRIDENTATA SSP. VASEYANA/FESTUCA THURBERI	Western Slope Sagebrush Shrublands	GU	S1S2
ARTEMISIA TRIDENTATA SSP. VASEYANA/LEUCOPOA KINGII	Western Slope Sagebrush Shrublands	G3	S1S2
ARTEMISIA TRIDENTATA SSP. VASEYANA/LEYMUS CINEREUS	Western Slope Sagebrush Shrubland	G4	SU
ARTEMISIA TRIDENTATA SSP. VASEYANA/PASCOPYRUM SMITHII	Sagebrush Bottomland Shrublands	G3	S1S2
ARTEMISIA TRIDENTATA SSP. VASEYANA/PSEUDOROEGNERIA SPICATA	Western Slope Sagebrush Shrublands	G5	S2
ARTEMISIA TRIDENTATA SSP. VASEYANA/STIPA COMATA		G5	SU

Plant Communities

Scientific Name	Common Name	Global	State Rank
ARTEMISIA TRIDENTATA SSP. VASEYANA/SYMPHORICARPOS OREOPHILUS/AGROPYRON TRACHYCAULUM	West Slope Sagebrush Shrubland	G3G4	S3S4
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS-PURSHIA TRIDENTATA/AGSP	Mesic Sagebrush Shrublands	GU	SU
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/ELYMUS LANCEOLATUS	Western Slope Sagebrush Shrublands	G3	S1
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/LEYMUS AMBIGUUS	Mixed Foothill Shrublands	G3	S2
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/ORYZOPSIS HYMENOIDES	Xeric Sagebrush Shrublands	GU	S2S3
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/PASCOPYRUM SMITHII	Sagebrush Bottomland Shrublands	GU	SU
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/PSEUDOROEGNERIA SPICATA	Xeric Sagebrush Shrublands	G5	S3?
ARTEMISIA TRIPARTITA/FESTUCA IDAHOENSIS	Mixed Foothill Shrublands	G4G5	S1?
ATHYRIUM DISTENTIFOLIUM ALPINE TALUS	Alpine Fellfields	GU	SU
ATRIPLEX CANESCENS/BOUTELOUA GRACILIS	Shortgrass Prairies	G3	S3
ATRIPLEX CANESCENS/HILARIA JAMESII	Shortgrass Prairies	G3G4	SU
ATRIPLEX CANESCENS/SPOROBOLUS AIROIDES	Great Plains Shrubland	G5Q	SU
ATRIPLEX CONFERTIFOLIA-SARCOBATUS VERMICULATUS	Saline Bottomland Shrublands	GU	SU
ATRIPLEX CONFERTIFOLIA/HILARIA JAMESII	Cold Desert Shrublands	G3	S2
ATRIPLEX CONFERTIFOLIA/LEYMUS SALINUS	Cold Desert Shrublands	G3G5	S3

Plant Communities

Scientific Name	Common Name	Global	State Rank
ATRIPLEX CONFERTIFOLIA/ORYZOPSIS HYMENOIDES	Cold Desert Shrublands	G2	S2
ATRIPLEX CONFERTIFOLIA/PSEUDOROEGNERIA SPICATA	Cold Desert Shrublands	G3	S2S3
ATRIPLEX CONFERTIFOLIA/STIPA COMATA	Cold Desert Shrublands	G1G2	S1S2
ATRIPLEX CORRUGATA SHALE BARREN	Alkali Mat Saltbush Shrublands	G5	S2?
ATRIPLEX CUNEATA/FRANKENIA JAMESII SHALE BARREN	Alkali Mat Saltbush Shrublands	GU	SU
ATRIPLEX GARDNERI/HILARIA JAMESII	Gardner's Mat Saltbush Shrublands	G3G5	S1?
ATRIPLEX GARDNERI/LEYMUS SALINUS	Gardner's Mat Saltbush Shrublands	G2?	S2?
ATRIPLEX GARDNERI/ORYZOPSIS HYMENOIDES	Gardner's Mat Saltbush Shrublands	G3	S2
BACCHARIS SALICINA	Groundsel Tree	G1G2Q	S1S2Q
BETULA GLANDULOSA/MESIC FORB-MESIC GRAMINOID	Subalpine Riparian Shrubland	G3G4	S3
BETULA OCCIDENTALIS-CORNUS SERICEA	Lower Montane Riparian Shrublands	G3	S1S2
BETULA OCCIDENTALIS/MESIC FORB	Foothills Riparian Shrubland	G3	S2
BETULA OCCIDENTALIS/MESIC GRAMINOID	Lower Montane Riparian Shrublands	G3	S2
BOTHRIOCHLOA LAGUROIDES SSP TORREYANA	Silver Beard Grass	G1G2Q	S1S2Q
BOUTELOUA CURTIPENDULA-SCHIZACHYRIUM SCOPARIUM-(ERIOGONUM FLAVUM)	Great Plains Mixed Grass Praires	GU	S1

Plant Communities

Scientific Name	Common Name	Global	State Rank
BOUTELOUA ERIOPODA-BOUTELOUA HIRSUTA	Shortgrass Prairie	G2	SU
BOUTELOUA ERIOPODA-HILARIA JAMESII	Shortgrass Prairie	G3	SU
BOUTELOUA GRACILIS-BOUTELOUA CURTIPENDULA	Shortgrass Prairie	G5	SU
BOUTELOUA GRACILIS-BOUTELOUA HIRSUTA	Shortgrass Prairie	G3G4	SU
BOUTELOUA GRACILIS-BUCHLOE DACTYLOIDES	Shortgrass Prairie	G2?	S2?
BOUTELOUA GRACILIS-HILARIA JAMESII	Shortgrass Prairie	G3G4	S3
CALAMAGROSTIS CANADENSIS	Montane Wet Meadows	G4Q	S4
CALAMAGROSTIS STRICTA	Slimstem Reedgrass	GU	S1?Q
CALTHA LEPTOSEPALA	Montane Wet Meadows	G4	S4
CARDAMINE CORDIFOLIA-MERTENSIA CILIATA-SENECIO TRIANGULARIS	Alpine Wetlands	G4	S4
CAREX AQUATILIS	Montane Wet Meadows	G5	S4
CAREX AQUATILIS-CAREX UTRICULATA	Montane Wet Meadows	G4	S4
CAREX AQUATILIS-CAREX UTRICULATA PERCHED WETLAND	Wet Meadow-Perched Wetland	G3	S3
CAREX ARAPAHOENSIS ALPINE TALUS	Alpine Fellfields	GU	SU
CAREX BIPARTITA ALPINE WETLAND	Alpine Wetlands	GU	SU
CAREX CAPILLARIS-POLYGONUM VIVIPARUM	Alpine Wetlands	GU	SU

Plant Communities

Scientific Name	Common Name	Global	State Rank
CAREX DIANDRA	Quaking Fen	GU	SU
CAREX EBENEA-TRIFOLIUM PARRYI	Montane Wet Meadows	GU	SU
CAREX ELEOCHARIS MONTANE TURF	Alpine Wetlands	GU	SU
CAREX ELYNOIDES-OREOXIS SPP	Dry Alpine Meadows	G4	S4
CAREX FOENEA	Montane Riparian Meadow	GU	S1?Q
CAREX FOENEA-GEUM ROSSII ALPINE TALUS	Alpine Fellfields	GU	SU
CAREX HAYDENIANA	Alpine Wetlands	GU	SU
CAREX ILLOTA	Alpine Wetlands	GU	S1?Q
CAREX LANUGINOSA	Montane Wet Meadows	G3?	S3
CAREX LASIOCARPA	Montane Wetland	G4	S1
CAREX LIMOSA	Montane Wetland	G3	S1S2
CAREX MICROGLOCHIN	Alpine Wetlands	GU	SU
CAREX MICROPTERA	Montane Wetland	G4	S2?
CAREX NARDINA VAR HEPBURNII ALPINE TALUS	Alpine Fellfields	GU	SU
CAREX NEBRASCENSIS	Wet Meadows	G4	S3
CAREX NIGRICANS-JUNCUS DRUMMONDII	Alpine Wetlands	GU	SU

Plant Communities

Scientific Name	Common Name	Global	State Rank
CAREX PERGLOBOSA	Alpine Fellfields	GU	SU
CAREX PRAEGRACILIS	Clustered Sedge Wetland	G3	S2
CAREX PYRENAICA	Alpine Wetlands	GU	SU
CAREX RUPESTRIS-GEUM ROSSII	Alpine Meadows	G4	S4
CAREX RUPESTRIS-TRIFOLIUM DASYPHYLLUM	Alpine Meadows	G3G4	S3S4
CAREX SAXATILIS	Wet Meadow	G3	S2
CAREX SCOPULORUM-CALTHA LEPTOSEPALA	Alpine Wetlands	G4	S4
CAREX SCOPULORUM-ELYMUS TRACHYCAULUS	Alpine Wetlands	GU	SU
CAREX SIMULATA	Wet Meadow	G3	S3
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	G5	S4
CAREX UTRICULATA PERCHED WETLAND	Beaked Sedge Perched Wetland	G3?	S3
CAREX VERNACULA	Alpine Wetlands	GU	SU
CAREX VESICARIA	Montane Wetland	G2	S1
CATABROSA AQUATICA-MIMULUS SPP.	Spring Wetland	GU	S3
CELTIS RETICULATA	Hackberry	G1G2Q	S1S2Q
CERCOCARPUS LEDIFOLIUS/PSEUDOROEGNERIA SPICATA	Mixed Mountain Shrublands	G5	S2

Plant Communities

Scientific Name	Common Name	Global	State Rank
CERCOCARPUS MONTANUS-RHUS TRILOBATA/ANDROPOGON GERARDII	Mixed Foothill Shrublands	G2G3	S2S3
CERCOCARPUS MONTANUS/BOUTELOUA CURTIPENDULA	Foothills Shrubland	G5	SU
CERCOCARPUS MONTANUS/ELYMUS LANCEOLATA X PSEUDOROEGNERIA SPICATA	Mountain Mahogany/Griffith's Wheatgrass Shrubland	G3	S3
CERCOCARPUS MONTANUS/ELYTRIGIA DASYSTACHYA	Mixed Mountain Shrublands	GU	SU
CERCOCARPUS MONTANUS/MUHLENBERGIA MONTANA	Mixed Mountain Shrublands	GU	S2
CERCOCARPUS MONTANUS/PSEUDOROEGNERIA SPICATA	Mixed Mountain Shrublands	G4	S3
CERCOCARPUS MONTANUS/STIPA COMATA	Mixed Foothill Shrublands	G2	S2
CERCOCARPUS MONTANUS/STIPA NEOMEXICANA	Foothills Shrubland	G2G3	S2S3
CERCOCARPUS MONTANUS/STIPA SCRIBNERI	Foothills Shrubland	G3	S3
CIRSIUM SCOPULORUM-POLEMONIUM VISCOSUM ALPINE TALUS	Alpine Fellfields	GU	SU
CLAYTONIA MEGARHIZA	Alpine Fellfields	GU	SU
COLEOGYNE RAMOSISSIMA/HILARIA JAMESII	Cold Desert Shrublands	G5	SU
CORNUS SERICEA	Foohthills Riparian Shrubland	G4	S3
CORYLUS CORNUTA	Lower Montane Forests	G3	S1
CRATAEGUS RIVULARIS	Foothills Riparian Shrubland	GUQ	S2Q

Plant Communities

Scientific Name	Common Name	Global	State Rank
DANTHONIA INTERMEDIA	Montane Grasslands	GU	S3S4
DANTHONIA PARRYI	Montane Grasslands	G3	S3
DESCHAMPSIA CESPITOSA	Mesic Alpine Meadow	G4?	S4
DESCHAMPSIA CESPITOSA-ACHILLEA MILLIFOLIUM	Mesic Alpine Meadows	G5	S5
DESCHAMPSIA CESPITOSA-CALTHA LEPTOSEPALA	Mesic Alpine Meadows	G5?	S4
DESCHAMPSIA CESPITOSA-CAREX NEBRASCENSIS	Montane Wet Meadows	G3	S1
DESCHAMPSIA CESPITOSA-GEUM ROSSII	Mesic Alpine Meadows	G5	S5
DESCHAMPSIA CESPITOSA-LIGUSTICUM TENUIFOLIUM	Mesic Alpine Meadows	GU	SU
DESCHAMPSIA CESPITOSA-POTENTILLA DIVERSIFOLIA	Mesic Alpine Meadows	G5	S5
DISTICHLIS SPICATA	Salt Meadows	G5	S3
DRYAS OCTOPETALA/CAREX RUPESTRIS	Alpine Scrub	G5	S4
ELEOCHARIS ACICULARIS	Slender Spike Rush	G3G4Q	S3S4Q
ELEOCHARIS ELLIPTICA VAR. COMPRESSA	Spike Rush	G3Q	S3Q
ELEOCHARIS PALUSTRIS	Emergent Wetland	G5	S4
ELEOCHARIS QUINQUEFLORA	Alpine Wetlands	G4	S3S4
ELEOCHARIS QUINQUEFLORA-TRIGLOCHIN SPP.	Alkaline Spring Wetland	GU	S2

Plant Communities

Scientific Name	Common Name	Global	State Rank
ELEOCHARIS ROSTELLATA	Emergent Wetland	G2G3	S2S3
EQUISETUM HYMENALE	Scouring Rush	GU	SU
FESTUCA ARIZONICA-MUHLENBERGIA FILICULMIS	Montane Grasslands	G2	S2
FESTUCA ARIZONICA-MUHLENBERGIA MONTANA	Montane Grasslands	GU	SU
FESTUCA IDAHOENSIS	Alpine Meadows	G3	SU
FESTUCA IDAHOENSIS-ELYMUS TRACHYCAULUS	Montane Grasslands	G3	S1
FESTUCA IDAHOENSIS-FESTUCA THURBERI	Montane Grasslands	G3G4	S3S4
FESTUCA IDAHOENSIS-GERANIUM VISCOSISSIMUM	Montane Grasslands	G2G3	S2S3
FESTUCA THURBERI-LATHYRUS LEUCANTHUS	Montane Grasslands	G4	S4
FORESTIERA PUBESCENS	Foothills Riparian Shrubland	G1G2	S1
FRANKENIA JAMESII/ORYZOPSIS HYMENOIDES	Foothills Shrubland	GU	SU
FRAXINUS ANOMALA/QUERCUS GAMBELII	West Slope Riparian Woodland	GUQ	S1Q
GEUM ROSSII-POLYGONUM BISTORTOIDES	Alpine Meadows	G4G5	S4S5
GEUM ROSSII-SIBBALDIA PROCUMBENS	Mesic Alpine Meadows	GU	SU
GEUM ROSSII/TRIFOLIUM SPP.	Alpine Meadows	G3G4	S3S4
GLYCERIA BOREALIS	Montane Emergent Wetland	G3?	S3

Plant Communities

Scientific Name	Common Name	Global	State Rank
HEUCHERA BRACTEATA-HEUCHERA PARVIFLORA VAR NIVALIS	Alpine Fellfields	GU	SU
HILARIA JAMESII	Western Slope Grasslands	G3	S1
HILARIA JAMESII-SPOROBOLUS AIROIDES	Great Plains Grassland	G2?	SU
HIPPURIS VULGARIS		G5	S4
HORDEUM JUBATUM	Western Slope Grasslands	G2G4	S1
JUNCUS BALTICUS VAR. MONTANUS	Western Slope Wet Meadows	G5	S5
JUNCUS DRUMMONDII-CAREX SPP.	Alpine Wetlands	GU	SU
JUNIPERUS MONOSPERMA-(PINUS EDULIS)/CERCOCARPUS MONTANUS/SCHIZACHYRIUM SCOPARIUM	Foothills Pinyon-Juniper Woodlands	GU	SU
JUNIPERUS MONOSPERMA/BOUTELOUA CURTIPENDULA	Foothills Pinyon-Juniper Woodlands	G5	S3S4
JUNIPERUS MONOSPERMA/BOUTELOUA ERIOPODA	Juniper Woodland	GU	S2S3
JUNIPERUS MONOSPERMA/BOUTELOUA GRACILIS	Foothills Pinyon-Juniper Woodlands	G5	S3S4
JUNIPERUS MONOSPERMA/BOUTELOUA HIRSUTA	Great Plains Juniper Woodland	G4	S2S3
JUNIPERUS MONOSPERMA/CERCOCARPUS MONTANUS-RIBES CEREUM	Foothills Pinyon-Juniper Woodlands	GU	SU
JUNIPERUS MONOSPERMA/STIPA NEOMEXICANA	Foothills Pinyon-Juniper Woodlands	GU	S3
JUNIPERUS OSTEOSPERMA/AMELANCHIER UTAHENSIS-PHILADELPHUS MICROPHYLLUS/LEYMUS SALINUS	Mesic Western Slope Pinyon-Juniper Woodlands	GU	SU

Plant Communities

Scientific Name	Common Name	Global	State Rank
JUNIPERUS OSTEOSPERMA/ARTEMISIA NOVA/ROCK WOODLAND	Utah Juniper/Black Sagebrush/Rock Woodlands	G5	SU
JUNIPERUS OSTEOSPERMA/ARTEMISIA TRIDENTATA	Xeric Western Slope Pinyon-Juniper Woodlands	G5	SU
JUNIPERUS OSTEOSPERMA/COLEOGYNE RAMOSISSIMA	West Slope Juniper Woodland	GU	SU
JUNIPERUS OSTEOSPERMA/LEYMUS SALINUS	Mesic Western Slope Pinyon-Juniper Woodlands	GU	SU
JUNIPERUS OSTEOSPERMA/STIPA COMATA		G2	S2?
JUNIPERUS OSTEOSPERMA/SYMPHORICARPOS OREOPHILUS	Mesic Western Slope Pinyon-Juniper Woodlands	GU	SU
JUNIPERUS SCOPULORUM	Riparian Woodland	GU	S3S4
JUNIPERUS SCOPULORUM/ARTEMISIA TRIDENTATA	Foothills Pinyon-Juniper Woodlands	G2	S2
JUNIPERUS SCOPULORUM/CERCOCARPUS MONTANUS	Foothills Pinyon-Juniper Woodlands/Scarp Woodlands	G2	S2
JUNIPERUS SCOPULORUM/CERCOCARPUS MONTANUS-RHUS TRILOBATA	Scarp Woodlands	GU	SU
JUNIPERUS SCOPULORUM/CORNUS SERICEA	Riparian Woodland	G4	S2
JUNIPERUS SCOPULORUM/PSEUDOROEGNERIA SPICATA	Xeric Western Slope Pinyon-Juniper Woodlands	G4	S2S3
JUNIPERUS SCOPULORUM/PURSHIA TRIDENTATA	Foothills Pinyon-Juniper Woodlands	G2	S2
JUNIPERUS SCOPULORUM/SCHIZACHYRIUM SCOPARIUM	Scarp Woodlands	G3	S2S3
KOBRESIA MYOSUROIDES-CAREX RUPESTRIS VAR DRUMMONDIANA	Dry Alpine Meadows	G3	S3?
KOBRESIA MYOSUROIDES-GEUM ROSSII	Alpine Meadows	G5	S5

Plant Communities

Scientific Name	Common Name	Global	State Rank
KOBRESIA MYOSUROIDES-THALICTRUM ALPINUM	Extreme Rich Fens	G1?	S1
KOBRESIA MYOSUROIDES-TRIFOLIUM DASYPHYLLUM	Alpine Meadows	GU	SU
KOBRESIA SIMPLICIUSCULA-SCIRPUS PUMILUS	Extreme Rich Fen	G2?	S1
KRASCHENINNIKOVIA LANATA/ORYZOPSIS HYMENOIDES	Western Slope Grasslands	G4	S3?
KRASCHENINNIKOVIA LANATA/PASCOPHYRUM SMITHII-BOUTELOUA	Western Slope Grasslands	G4	SU
LEYMUS CINEREUS	Western Slope Grasslands	G4	S1S2
LIGUSTICUM PORTERI-LUPINUS PARVIFLORUS SSP MYRIANTHUS	Alpine Meadows	GU	SU
LIGUSTICUM PORTERI-VICIA AMERICANA	Alpine Meadows	G3	S3?
LIGUSTICUM TENUIFOLIUM-TROLLIUS LAXUS SSP ALBIFLORUS	Alpine Wetlands	GU	SU
MUHLENBERGIA ASPERIFOLIA	Western Slope Salt Meadows	GU	SU
MUHLENBERGIA ASPERIFOLIA	Great Plains Salt Meadows	GU	S?
MUHLENBERGIA FILICULMIS	Montane Grasslands	G2	S2
MUHLENBERGIA MONTANA-DANTHONIA PARRYI	Montane Grasslands	G3G4	S2?
MUHLENBERGIA MONTANA-STIPA COMATA	Montane Grasslands	G2	S2
MUHLENBERGIA TORREYI	Shortgrass Prairies	GU	SU
MYRIOPHYLLUM EXALBESCENS WETLAND	Western Slope Floating/Submerged Palustrine Wetlands	GU	SU

Plant Communities

Scientific Name	Common Name	Global	State Rank
NOLINA TEXANA	Desert Shrubland	GU	S1
NUPHAR LUTEUM SSP POLYSEPALUM	Western Slope Floating/Submergent Palustrine Wetlands	G5	S3
OPUNTIA IMBRICATA/HILARIA JAMESII	Shortgrass Prairies	GU	S3
ORYZOPSIS HYMENOIDES SHALE BARREN	Western Slope Grasslands	G2	S2
ORYZOPSIS HYMENOIDES-PSORALIDIUM LANCEOLATUM		G3Q	S1
PANICUM OBTUSUM-BUCHLOE DACTYLOIDES	Vine Mesquite-Buffalo Grass	G?Q	S1S2Q
PARONYCHIA PULVINATA-SILENE ACAULIS VAR SUBACAULIS	Alpine Fellfields	G5	S5
PASCOPYRUM SMITHII	Western Slope Grasslands	G3G5Q	S2
PASCOPYRUM SMITHII PLAINS SWALE GRASSLAND	Shortgrass Prairie	GU	S?
PASCOPYRUM SMITHII-BOUTELOUA GRACILIS	Great Plains Shortgrass Prairie	G5	S4
PASCOPYRUM SMITHII-STIPA VIRIDULA	Great Plains Mixed Grass Prairie	G4	S2
PENTAPHYLLOIDES FLORIBUNDA/DESCHAMPSIA CESPITOSA	Montane Riparian Shrubland	G4	S3S4
PHIPPSIA ALGIDA	Alpine Wetlands	GU	SU
PHRAGMITES AUSTRALIS	Western Slope Marshes	G4	S3
PICEA ENGELMANNII/CORNUS SERICEA	Montane Riparian Forests	GU	SU
PICEA ENGELMANNII/GEUM ROSSII	Krummholz	GU	SU

Plant Communities

Scientific Name	Common Name	Global	State Rank
PICEA ENGELMANNII/POLEMONIUM PULCHERRIMUM	Subalpine Forests	G5	S4
PICEA ENGELMANNII/SAXIFRAGA BRONCHIALIS	Subalpine Forests	GU	SU
PICEA ENGELMANNII/TRIFOLIUM DASYPHYLLUM	Timberline Forests	G2	S2
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	G3	S3
PICEA PUNGENS/ALNUS INCANA-CORYLUS CORNUTA	Foothills Riparian Forest	GU	SU
PICEA PUNGENS/ARCTOSTAPHYLOS UVA-URSI	Mixed Montane Forests	G3	S3
PICEA PUNGENS/ARNICA CORDIFOLIA	Mixed Montane Forests	G3	S3?
PICEA PUNGENS/BARE GROUND		GU	SU
PICEA PUNGENS/BETULA OCCIDENTALIS	Montane Riparian Woodland	G2	S2
PICEA PUNGENS/CAREX FOENEA	Mixed Montane Forests	G4	S2
PICEA PUNGENS/CORNUS SERICEA	Montane Riparian Forest	G4	S2
PICEA PUNGENS/EQUISETUM ARVENSE	Montane Riparian Forest	G3?	S2?
PICEA PUNGENS/ERIGERON EXIMIUS	Mixed Montane Forests	G4	S3
PICEA PUNGENS/FESTUCA ARIZONICA	Mixed Montane Forests	G4	S3
PICEA PUNGENS/LINNEA BOREALIS	Mixed Montane Forests	G4	S1
PINUS ARISTATA/FESTUCA ARIZONICA	Montane Woodlands	G4	S3

Plant Communities

Scientific Name	Common Name	Global	State Rank
PINUS ARISTATA/FESTUCA THURBERI	Lower Montane Woodlands	G3	S2
PINUS ARISTATA/JUNIPERUS COMMUNIS	Montane Woodlands	GU	SU
PINUS ARISTATA/RIBES MONTIGENUM	Upper Montane Woodlands	G2G4	S1
PINUS ARISTATA/TRIFOLIUM DASYPHYLLUM	Upper Montane Woodlands	G2	S2
PINUS ARISTATA/VACCINUM MYRTILLUS	Montane Woodlands	GU	SU
PINUS CONTORTA/CAREX GEYERI	Persistent Lodgepole Pine Forests	G5	S4
PINUS CONTORTA/JUNIPERUS COMMUNIS	Persistent Lodgepole Pine Forests	G5	S3
PINUS CONTORTA/SHEPHERDIA CANADENSIS	Persistent Lodgepole Pine Forests	G3G4	S3S4
PINUS CONTORTA/VACCINIUM SCOPARIUM	Seral Lodgepole Pine Forests	G5	S4
PINUS EDULIS-JUNIPERUS OSTEOSPERMA/PASCOPYRUM SMITHII	Xeric Western Slope Pinyon-Juniper Woodlands	GU	SU
PINUS EDULIS-JUNIPERUS OSTEOSPERMA/STIPA COMATA	Xeric Western Slope Pinyon-Juniper Woodlands	GU	SU
PINUS EDULIS-JUNIPERUS SCOPULORUM	Foothills Pinyon-Juniper Woodlands	GU	SU
PINUS EDULIS/ARTEMISIA TRIDENTATA	Xeric Western Slope Pinyon-Juniper Woodlands	G5	S3?
PINUS EDULIS/CERCOCARPUS LEDIFOLIUS	Mesic Western Slope Pinyon-Juniper Woodlands	G3	S3
PINUS EDULIS/CERCOCARPUS MONTANUS	Mesic Western Slope Pinyon-Juniper Woodlands	G5	S4
PINUS EDULIS/COLEOGYNE RAMOSISSIMA	West Slope Pinon Woodland	G3	SU

Plant Communities

Scientific Name	Common Name	Global	State Rank
PINUS EDULIS/COWANIA MEXICANA	Xeric Western Slope Pinyon-Juniper Woodlands	G5	S3?
PINUS EDULIS/LEYMUS AMBIGUUS	Foothills Pinyon-Juniper Woodlands	GU	SU
PINUS EDULIS/POA FENDLERIANA	Xeric Western Slope Pinyon-Juniper Woodlands	G5	S4?
PINUS EDULIS/PSEUDOROEGNERIA SPICATA	Xeric Western Slope Pinyon-Juniper Woodlands	G4	S4
PINUS EDULIS/PURSHIA TRIDENTATA	Mesic Western Slope Pinyon-Juniper Woodlands	G5	S4
PINUS EDULIS/QUERCUS GAMBELII	Foothills Pinyon-Juniper Woodlands	G5	S5
PINUS EDULIS/QUERCUS X PAUCILOBA	Foothills Pinyon-Juniper Woodlands	G5	S2
PINUS EDULIS/STIPA COMATA	Xeric Western Slope Pinyon-Juniper Woodlands	G2	S2
PINUS EDULIS/STIPA SCRIBNERI	Two-Needle Pinyon/Scribner's Needle Grass	G3	S1?
PINUS FLEXILIS/ARCTOSTAPHYLOS UVA-URSI	Lower Montane Woodlands	G4?	S2?
PINUS FLEXILIS/CALAMAGROSTIS PURPURASCENS	Upper Montane Woodlands	G4	S4
PINUS FLEXILIS/JUNIPERUS COMMUNIS	Lower Montane Woodlands	G5	S3
PINUS FLEXILIS/LEUCOPOA KINGII	Lower Montane Woodlands	G4	S2S3
PINUS PONDEROSA/ARCTOSTAPHYLOS PATULA	Western Slope Ponderosa Pine Woodlands	G4	S1
PINUS PONDEROSA/ARCTOSTAPHYLOS UVA-URSI	Lower Montane Forests	G5	S3
PINUS PONDEROSA/BOUTELOUA GRACILIS	Foothills Ponderosa Pine Savannas	G5	S4

Plant Communities

Scientific Name	Common Name	Global	State Rank
PINUS PONDEROSA/CAREX GEYERI	Lower Montane Forests	G4	S2S3
PINUS PONDEROSA/CAREX INOPS	Foothills Ponderosa Pine Savannas	G3	S2
PINUS PONDEROSA/CAREX ROSSII	Lower Montane Forests	G5	S3S4
PINUS PONDEROSA/CERCOCARPUS MONTANUS	Western Slope Ponderosa Pine Woodlands	G4	S4
PINUS PONDEROSA/CERCOCARPUS MONTANUS	Foothills Ponderosa Pine Scrub Woodlands	G4	S4
PINUS PONDEROSA/CERCOCARPUS MONTANUS/ANDROPOGON GERARDII	Foothills Ponderosa Pine Scrub Woodlands	G2	S2?
PINUS PONDEROSA/FESTUCA ARIZONICA	Lower Montane Forests	G4G5	S4
PINUS PONDEROSA/FESTUCA IDAHOENSIS	Western Slope Ponderosa Pine Woodlands	G5	S3
PINUS PONDEROSA/LEUCOPOA KINGII	Foothills Ponderosa Pine Savannas	G3	S3
PINUS PONDEROSA/MUHLENBERGIA MONTANA	Foothills Ponderosa Pine Savannas	G5	S2S3
PINUS PONDEROSA/ORYZOPSIS HYMENOIDES	Western Slope Ponderosa Pine Woodlands	G1	S1
PINUS PONDEROSA/PURSHIA TRIDENTATA	Foothills Ponderosa Pine Scrub Woodlands	G4?	S3?
PINUS PONDEROSA/QUERCUS GAMBELII	Foothills Ponderosa Pine Scrub Woodlands	G5	S4
PINUS PONDEROSA/QUERCUS X PAUCILOBA	Foothills Ponderosa Pine Scrub Woodlands	G2	S1S2
PINUS PONDEROSA/RIBES CEREUM	Foothills Ponderosa Pine Scrub Woodlands	GU	SU
PINUS PONDEROSA/ROSA WOODSII	Foothills Ponderosa Pine Savannas	G4	S4

Plant Communities

Scientific Name	Common Name	Global	State Rank
POA ARCTICA SSP GRAYANA	Alpine Meadows	GU	SU
POA GLAUCA	Alpine Meadows	GU	SU
POA LETTERMANII	Alpine Meadows	GU	SU
POA NERVOSA-STIPA LETTERMANII	Montane Grasslands	G2	S2?
POLEMONIUM VISCOSUM	Alpine Meadows	G3G4	S3S4
POLYGONUM AMPHIBUM	Montane Wet Meadows	G4	S3
POPOPULUS TREMULOIDES/AMELANCHIER ALNIFOLIA-SYMPHORICARPOS OREOPHILUS/THALICTRUM FENDLERI	Persistent Aspen Forests	G5	S3S4
POPULUS ACUMINATA	Montane Riparian Forest	GU	SU
POPULUS ANGUSTIFOLIA SAND DUNE FOREST		G1	S1
POPULUS ANGUSTIFOLIA-JUNIPERUS SCOPULORUM	Montane Riparian Forest	G2G3	S2
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	G4	S4
POPULUS ANGUSTIFOLIA-PSEUDOTSUGA MENZIESII	Montane Riparian Forest	G2?	S2
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	G3?	S3
POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	Montane Riparian Forest	G3?	S2
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Cottonwood Riparian Forest	G4	S3

Plant Communities

Scientific Name	Common Name	Global	State Rank
POPULUS ANGUSTIFOLIA/CRATAEGUS RIVULARIS	Narrowleaf Cottonwood Riparian Forests	G2?	S2?
POPULUS ANGUSTIFOLIA/MIXED SALIX SPECIES	Narrowleaf Cottonwood/Mixed Willows Montane Riparian Forest	G3	S3
POPULUS ANGUSTIFOLIA/PASCOPYRUM SMITHII	Narrowleaf Cottonwood/Western Wheatgrass	G1Q	S1Q
POPULUS ANGUSTIFOLIA/PRUNUS VIRGINIANA	Narrowleaf Cottonwood/Common Chokecherry	G2G3	S1
POPULUS ANGUSTIFOLIA/RHUS TRILOBATA	Narrowleaf Cottonwood/Skunkbrush	G3	S3
POPULUS ANGUSTIFOLIA/SALIX DRUMMONDIANA-ACER GLABRUM		G1?	S1?
POPULUS ANGUSTIFOLIA/SALIX ERIOCEPHALA VAR. LIGULIFOLIA-SHEPHERDIA ARGENTEA	Narrowleaf Cottonwood Riparian Forests	G1	S1
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	Narrowleaf Cottonwood Riparian Forests	G4	S4
POPULUS ANGUSTIFOLIA/SALIX IRRORATA	Foothills Riparian Woodland	G2?	S2
POPULUS ANGUSTIFOLIA/SALIX LUCIDA VAR. CAUDATA		G1Q	S1Q
POPULUS ANGUSTIFOLIA/SYMPHORICARPOS ALBUS	Montane Riparian Forest	G2Q	S2Q
POPULUS ANGUSTIFOLIA/SYMPHORICARPOS OREOPHILUS		GU	S3
POPULUS BALSAMIFERA	Montane Riparian Woodland	GU	SU
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SALIX EXIGUA	Plains Cottonwood Riparian Woodland	G4?	S3
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SPARTINA PECTINATA	Plains Cottonwood Riparian Woodland	G1G2	S1

Plant Communities

Scientific Name	Common Name	Global	State Rank
POPULUS DELTOIDES SSP. MONILIFERA/CAREX LANUGINOSA	Plains Cottonwood Riparian Woodland	G1?	S1
POPULUS DELTOIDES SSP. MONILIFERA/DISTICHLIS SPICATA	Plains Cottonwood Riparian Forests	GU	S1?Q
POPULUS DELTOIDES SSP. MONILIFERA/PANICUM VIRGATUM	Plains Cottonwood Riparian Forests	G1G2	S1
POPULUS DELTOIDES SSP. MONILIFERA/PRUNUS VIRGINIANA	Plains Cottonwood/Choke Cherry	G1Q	S1Q
POPULUS DELTOIDES SSP. MONILIFERA/RHUS TRILOBATA	Plains Cottonwood/Skunkbush Riparian Woodland	GU	S1
POPULUS DELTOIDES SSP. MONILIFERA/SYMPHORICARPOS OCCIDENTALIS	Plains Cottonwood Riparian Woodland	G2G3	S2
POPULUS DELTOIDES SSP. WISLIZENII/RHUS TRILOBATA	Fremont's Cottonwood Riparian Forests	G2	S2
POPULUS DELTOIDES SSP. WISLIZENII/SALIX EXIGUA	Fremonts Cottonwood Riparian Forests	GU	S1S2
POPULUS DELTOIDES/MUHLENBERGIA ASPERIFOLIA	Plains Cottonwood/Alkali Muhly	G2Q	S1Q
POPULUS DELTOIDES/PASCOPYRUM SMITHII-PANICUM OBTUSUM	Plains Cottonwood/Western Wheatgrass-Vine Mesquite	G1G2Q	S1S2Q
POPULUS DELTOIDES/SPOROBOLUS AIROIDES	Plains Cottonwood/Alkali Sacaton	G2Q	S2Q
POPULUS DELTOIDES/SPOROBOLUS ASPER	Plains Cottonwood/Rough Dropseed	G1Q	S1Q
POPULUS DELTOIDES/SPOROBOLUS CRYPTANDRUS	Plains Cottonwood/Sand Dropseed	G1G2Q	S1S2Q
POPULUS FREMONTII-SALIX GOODDINGII	Fremont's Cottonwood-Gooddings Black Willow	G2	S1
POPULUS TREMULOIDES-(PINUS PONDEROSA)/DANTHONIA PARRYI	Montane Forest	GU	S3S4
POPULUS TREMULOIDES-ABIES LASIOCARPA/JUNIPERUS COMMUNIS	Aspen Forests	G3G4	S4

Plant Communities

Scientific Name	Common Name	Global	State Rank
POPULUS TREMULOIDES/ACER GLABRUM	Montane Riparian Forests	G2	S1S2
POPULUS TREMULOIDES/ALNUS INCANA	Montane Riparian Forests	G3	S3
POPULUS TREMULOIDES/BETULA OCCIDENTALIS		G2G3	S2
POPULUS TREMULOIDES/CAREX FOENEA	Aspen Forests	G4	S4
POPULUS TREMULOIDES/CAREX GEYERI	Aspen Forests	G4	S4
POPULUS TREMULOIDES/CEANOTHUS VELUTINUS	Aspen Forests	G2G3	S2S3
POPULUS TREMULOIDES/CORNUS SERICEA	Montane Riparian Woodland	G3	S2S3
POPULUS TREMULOIDES/CORYLUS CORNUTA	Montane Riparian Forests	G3	S1
POPULUS TREMULOIDES/FESTUCA THURBERI	Aspen Forests	G4	S4
POPULUS TREMULOIDES/JUNIPERUS COMMUNIS	Persistent Aspen Forests	G4	S4
POPULUS TREMULOIDES/LIGULARIA BIGELOVII	Aspen Wetland Forests	G2G3	S2S3
POPULUS TREMULOIDES/LONICERA INVOLUCRATA	Montane Riparian Forests	G3	S3
POPULUS TREMULOIDES/PTERIDIUM AQUILINUM	Aspen Wetland Forests	G4	S3S4
POPULUS TREMULOIDES/RIBES MONTIGENUM	Montane Riparian Forests	G2	S2
POPULUS TREMULOIDES/SALIX DRUMMONDIANA		GU	SU
POPULUS TREMULOIDES/SHEPHERDIA CANADENSIS	Persistent Aspen Forests	G4	S3?

Plant Communities

Scientific Name	Common Name	Global	State Rank
POPULUS TREMULOIDES/SYMPHORICARPOS OREOPHILUS/CAREX GEYERI	Persistent Aspen Forests	G5	S5
POPULUS TREMULOIDES/TALL FORBS	Montane Aspen Forest	G5	S5
POPULUS TREMULOIDES/THALICTRUM FENDLERI	Persistent Aspen Forests	G5	S5
POPULUS TREMULOIDES/VACCINIUM MYRTILLUS	Aspen Forests	G3	S3
POPULUS TREMULOIDES/VERATRUM TENUIPETALUM	Aspen Wetland Forests	G4	S3
POTAMOGETON DIVERSIFOLIUS	Great Plains Floating/Submergent Palustrine Wetlands	G3	S1
POTAMOGETON FILIFORMIS	Montane Floating/Submergent Palustrine Wetlands	GU	SU
POTAMOGETON FOLIOSUS	Montane Floating/Submergent Palustrine Wetlands	G3	S3
POTAMOGETON NATANS	Montane Floating/Submergent Weltand	G5?	S1
POTRT/AMAL2-SYOR2/THFE	Western Slope Mesic Aspen Forests	G5	S3S4
PRIMULA PARRYI	Alpine Wetlands	GU	SU
PRUNUS VIRGINIANA	Foothills Riparian Shrubland	G4Q	S3
PSEUDOROEGNERIA SPICATA	Western Slope Grasslands	G2?	S2?
PSEUDOROEGNERIA SPICATA ORYZOPSIS HYMENOIDES	Western Slope Grasslands	G3	SP
PSEUDOROEGNERIA SPICATA-BOUTELOUA GRACILIS	Western Slope Grasslands	G3	S1
PSEUDOROEGNERIA SPICATA-POA FENDLERIANA	Western Slope Grasslands	G2G3	S2S3

Plant Communities

Scientific Name	Common Name	Global	State Rank
PSEUDOROEGNERIA SPICATA-POA SECUNDA	Montane Grasslands	G4	S1
PSEUDOTSUGA MENSIEZII/ACER GLABRUM	Lower Montane Forests	G4	S1
PSEUDOTSUGA MENZIESII/ARCTOSTAPHYLOS UVA-URSI	Lower Montane Forests	G4	S3
PSEUDOTSUGA MENZIESII/BETULA OCCIDENTALIS	Montane Riparian Forest	G3?	S3
PSEUDOTSUGA MENZIESII/CAREX GEYERI	Lower Montane Forests	G5Q	S3
PSEUDOTSUGA MENZIESII/CAREX ROSSII	Lower Montane Forests	G3	S3
PSEUDOTSUGA MENZIESII/CORNUS SERICEA	Lower Montane Riparian Forests	G4	S2
PSEUDOTSUGA MENZIESII/FESTUCA ARIZONICA	Lower Montane Forests	G5	S2S3
PSEUDOTSUGA MENZIESII/JAMESIA AMERICANA	Lower Montane Forests	G3G4	S3
PSEUDOTSUGA MENZIESII/JUNIPERUS COMMUNIS	Lower Montane Forests	G5	SU
PSEUDOTSUGA MENZIESII/MAHONIA REPENS	Douglas Fir/Creeping Oregon-Grape	G5	S1?
PSEUDOTSUGA MENZIESII/PAXISTIMA MYRSINITES	Lower Montane Forests	G2G3	S2S3
PSEUDOTSUGA MENZIESII/PHYSOCARPUS MONOGYNUS	Lower Montane Forests	G4	S4
PSEUDOTSUGA MENZIESII/QUERCUS GAMBELII	Western Slope Douglas Fir Forests	G5	S4
PSEUDOTSUGA MENZIESII/SYMPHORICARPOS OREOPHILUS	Western Slope Douglas Fir Forests	G5	S4
PUCCINELLIA AIROIDES	Western Slope Salt Meadows	G4	S1

Plant Communities

Scientific Name	Common Name	Global	State Rank
PURSHIA TRIDENTATA/ATEMESIA FRIGIDA/STIPA COMATA	Mixed Foothill Shrublands	G1G2	S1S2
PURSHIA TRIDENTATA/MUHLENBERGIA MONTANA	Mixed Foothill Shrublands	G2	S2
QUERCUS GAMBELII-AMELANCHIER UTAHENSIS	Mixed Mountain Shrubland	G3G5	SU
QUERCUS GAMBELII-CERCOCARPUS MONTANUS/CAREX GEYERI	Mixed Mountain Shrublands	G3	S3
QUERCUS GAMBELII-CERCOCARPUS MONTANUS/MUHLENBERGIA MONTANA	Mesic Oak Thickets	GU	SU
QUERCUS GAMBELII/CAREX INOPS	Mesic Oak Thickets	GU	SU
QUERCUS GAMBELII/PACHYSTIMA MYRSINITES	Mixed Mountain Shrublands	GU	SU
QUERCUS GAMBELII/POA AGASSIZENSIS	Mixed Mountain Shrublands	GUQ	SUQ
QUERCUS GAMBELII/STIPA COMATA		GU	SU
QUERCUS GAMBELII/SYMPHORICARPOS OREOPHILUS	Mixed Mountain Shrublands	G5	S3S4
RANUNCULUS TRICHOPHYLLUS	Montane Floating/Submergent Palustrine Wetlands	GU	SU
REDFIELDIA FLEXUOSA		G1?	S1?
RHUS TRILOBATA	Skunkbrush Riparian Shrubland	G2	S2
RHUS TRILOBATA-PHILADELPHUS MICROPHYLLUS	Shrubland	GU	S2
RIBES CEREUM/LEYMUS AMBIGUUS	Mixed Foothill Shrublands	G2	S2?
RIBES MONTIGENUM ALPINE TALUS/SCREE	Alpine Fellfields	GU	SU

Plant Communities

Scientific Name	Common Name	Global	State Rank
RORIPPA CURVIPES VAR ALPINA	Alpine Wetlands	GU	SU
RUBUS IDAEUS ALPINE SCREE	Alpine Fellfields	GU	SU
SALICORNIA RUBRA	Western Slope Salt Meadows	G2	S1?
SALIX AMYGDALOIDES/CAREX LANUGINOSA	Peachleaf Willow Alliance	G2	SU
SALIX ARCTICA/GEUM ROSSII	Alpine Willow Scrub	G4	S4?
SALIX BEBBIANA	Montane Willow Carrs	G3?	S2
SALIX BOOTHII/CALAMAGROSTIS CANADENSIS	Booth Willow/Canadian Reed Grass	G4	S2
SALIX BOOTHII/CAREX UTRICULATA	Booth's Willow/Beaked Sedge	G4	S3
SALIX BOOTHII/MESIC FORB	Booth's Willow/Mesic Forb	G3	S3
SALIX BOOTHII/MESIC GRAMINOID	Riparian Willow Carr	G3	S3
SALIX BRACHYCARPA/CAREX AQUALTILS	Subalpine Riparian/Wetland Carr	G2G3	S2S3
SALIX BRACHYCARPA/DESCHAMPSIA CESPITOSA-GEUM ROSSII	Alpine Willow Scrub	G4	S3S4
SALIX BRACHYCARPA/MESIC FORB	Alpine Willow Scrub	G4	S4
SALIX DRUMMONDIANA/CALAMAGROSTIS CANADENSIS	Lower Montane Willow Carrs	G3	S3
SALIX DRUMMONDIANA/CAREX UTRICULATA	Montane Willow Carr	GU	S3
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	G4	S4

Plant Communities

Scientific Name	Common Name	Global	State Rank
SALIX ERIOCEPHALA VAR LIGULIFOLIA-SALIX EXIGUA	Strapleaf Willow-Coyote Willow	G2G3	S2S3
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	Montane Willow Carr	G2G3	S2S3
SALIX EXIGUA/BARE GROUND	Coyote Willow/Bare Ground	G5	S5
SALIX EXIGUA/ELEOCHARIS PALUSTRIS	Coyote Willow/Spikerush	GU	S2S4
SALIX EXIGUA/HIPPOCHAETE HYEMALIS	Lower Montane Riparian Shrubland	GU	S2S4
SALIX EXIGUA/MESIC GRAMINOID	Coyote Willow/Mesic Graminoid	G5	S5
SALIX EXIGUA/SCIRPUS PUNGENS	Coyote Willow/Bulrush	GU	S2S4
SALIX GEYERIANA-SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carrs	G3	S3
SALIX GEYERIANA-SALIX MONTICOLA/CAREX AQUATILIS	Montane Riparian Willow Carr	GU	S3
SALIX GEYERIANA-SALIX MONTICOLA/MESIC FORB	Geyer's Willow-Rocky Mountain Willow/Mesic Forb	G3	S3
SALIX GEYERIANA-SALIX MONTICOLA/MESIC GRAMINOID	Montane Riparian Willow Carr	GU	S3
SALIX GEYERIANA/CALAMAGROSTIS CANADENSIS	Montane Riparian Willow Carr	G5	S3
SALIX GEYERIANA/CAREX AQUATILIS	Montane Willow Carr	G3?	S3
SALIX GEYERIANA/CAREX UTRICULATA	Geyer's Willow/Beaked Sedge	G5	S3
SALIX GEYERIANA/MESIC FORB	Montane Willow Carr	G3	S3
SALIX GEYERIANA/MESIC GRAMINOID	Geyer's Willow/Mesic Graminoid	GU	S3

Plant Communities

Scientific Name	Common Name	Global	State Rank
SALIX LUCIDA SSP. CAUDATA	Montane Riparian Shrubland	G3Q	S2S3
SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carr	G3	S3
SALIX MONTICOLA/CAREX AQUATILIS	Montane Riparian Willow Carr	G3	S3
SALIX MONTICOLA/CAREX UTRICULATA	Montane Riparian Willow Carr	G3	S3
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	G3	S3
SALIX MONTICOLA/MESIC GRAMINOID	Montane Riparian Willow Carr	G3	S3
SALIX PLANIFOLIA/CALAMAGROSTIS CANADENSIS	Subalpine Riparian Willow Carr	G3	S3
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	G4	S4
SALIX PLANIFOLIA/CAREX AQUATILIS	Subalpine Riparian Willow Carr	G5	S4
SALIX PLANIFOLIA/CAREX SCOPULORUM	Subalpine Riparian Willow Carr	G4	S4
SALIX PLANIFOLIA/DESCHAMPSIA CESPITOSA	Subalpine Riparian Willow Carr	G2G3	S3
SALIX PLANIFOLIA/MESIC FORBS	Planeleaf Willow/Mesic Forbs	G4	S4
SALIX WOLFII/CALAMAGROSTIS CANADENSIS	Subalpine Riparian Willow Carr	G3	S2S3
SALIX WOLFII/CAREX AQUATILIS	Subalpine Riparian Willow Carr	G4	S3
SALIX WOLFII/CAREX UTRICULATA	Subalpine Riparian Willow Carr	G4	S3
SALIX WOLFII/MESIC FORB	Subalpine Riparian Willow Carr	G3	S3

Plant Communities

Scientific Name	Common Name	Global	State Rank
SARCOBATUS VERMICULATUS/BOUTELOUA GRACILIS	Saline Bottomland Shrublands	GU	SU
SARCOBATUS VERMICULATUS/DISTICHLIS SPICATA	Saline Bottomland Shrublands	G4	S1
SARCOBATUS VERMICULATUS/SPOROBOLUS AIROIDES	Saline Bottomland Shrublands	G3?	SU
SARCOBATUS VERMICULATUS/SUAEDA TORREYANA	Saline Bottomland Shrublands	G2G3	S2S3
SAXIFRAGA CHRYSANTHA ALPINE ROCK OUTCROP	Alpine Fellfields	GU	SU
SAXIFRAGA ODONTOLOMA	Alpine Wetlands	GU	SU
SAXIFRAGA RIVULARIS ALPINE ROCK OUTCROP	Alpine Fellfields	GU	SU
SCHIZACHYRIUM SCOPARIUM	Loess Prairies	G1?	S1?
SCHIZACHYRIUM SCOPARIUM-BOUTELOUA CURTIPENDULA	Great Plains Mixed Grass Prairies (Sandstone/Gravel Breaks)	G3	S2
SCIRPUS MARITIMUS	Emergent Wetland (Marsh)	G4	S2
SCIRPUS PUNGENS	Bulrush	G3G4	S3
SCIRPUS TABERNAEMONTANI-SCIRPUS ACUTUS	Great Plains Marshes	G3	S2S3
SEDUM RHODANTHUM ALPINE WETLAND	Alpine Wetlands	GU	SU
SENECIO TARAXACOIDES-OXYRIA DIGYNA ALPINE TALUS	Alpine Fellfields	GU	SU
SHEPHERDIA ARGENTEA	Foothills Riparian Shrubland	G3G4	S1
SIBBALDIA PROCUMBENS	Mesic Alpine Meadows	G4G5	S4S5

Plant Communities

Scientific Name	Common Name	Global	State Rank
SPARGANIUM ANGUSTIFOLIUM	Montane Floating/Submergent Palustrine Wetlands	GU	SU
SPARGANIUM EURYCARPUM	Foothills/Plains Floating/Submergent Palustrine Wetlands	GU	S2
SPARTINA GRACILIS	Western Slope Salt Meadows	GU	SU
SPARTINA PECTINATA	Prairie Slough Grass	G3?	S3
SPOROBOLUS AIROIDES	Great Plains Salt Meadows	G3Q	S3
SPOROBOLUS AIROIDES-PANICUM OBTUSUM	Alkali Sacaton-Vine Mesquite	G2	S2
STIPA COMATA - EAST	Great Plains Mixed Grass Prairies	G2	S2
STIPA COMATA - WEST	Western Slope Grasslands	G2	S2
STIPA COMATA-BOUTELOUA GRACILIS	Montane Grasslands	G5	S2S3
STIPA COMATA-ORYZOPSIS HYMENOIDES		G2	S1
STIPA NEOMEXICANA	Great Plains Mixed Grass Prairies	G3	S2
STIPA VIRIDULA	Great Plains Mixed Grass Prairies	GU	S?
SYMPHORICARPOS OCCIDENTALIS	Snowberry Shrubland	G4G5	S3
TRIFOLIUM DASYPHYLLUM ALPINE FELLFIELD	Alpine Fellfields	G4	S4?
TRIFOLIUM PARRYI ALPINE FELLFIELD	Alpine Fellfields	GU	SU
TRIGLOCHIN MARITIMA	Western Slope Salt Meadows	GU	SU

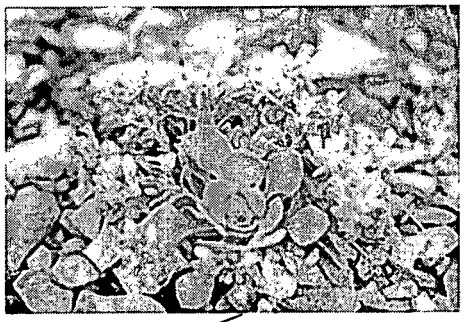
Plant Communities

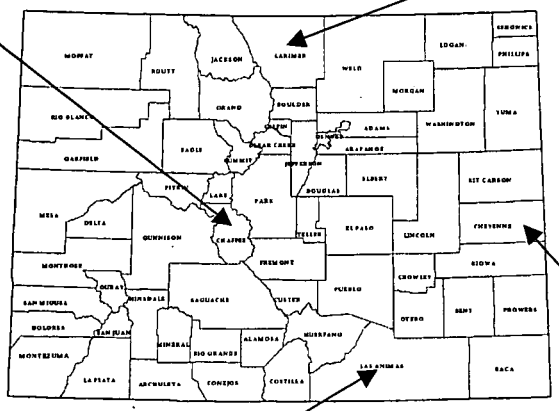
Scientific Name	Common Name	Global	State Rank
TYPHA ANGUSTIFOLIA-TYPHA LATIFOLIA	Narrow-Leaf Cattail Marsh	G5	S3
TYPHA DOMINGUENSIS	Western Slope Marshes	GU	S1
UTRICULARIA VULGARIS	Montane Floating/Submergent Wetland	G3?	S1
VACCINIUM CESPITOSUM/VACCINIUM SCOPARIUM	Alpine Scrub	G4	S1?

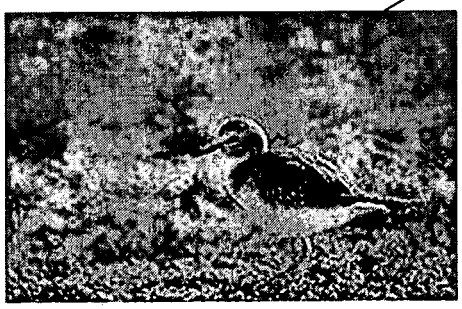
CHAPTER 5: COUNTY OCCURRENCES

boreal toad Southern Rocky Mtn. population
(Bufo boreas Pop 1)

Bell's twinpod
(Physaria bellii)



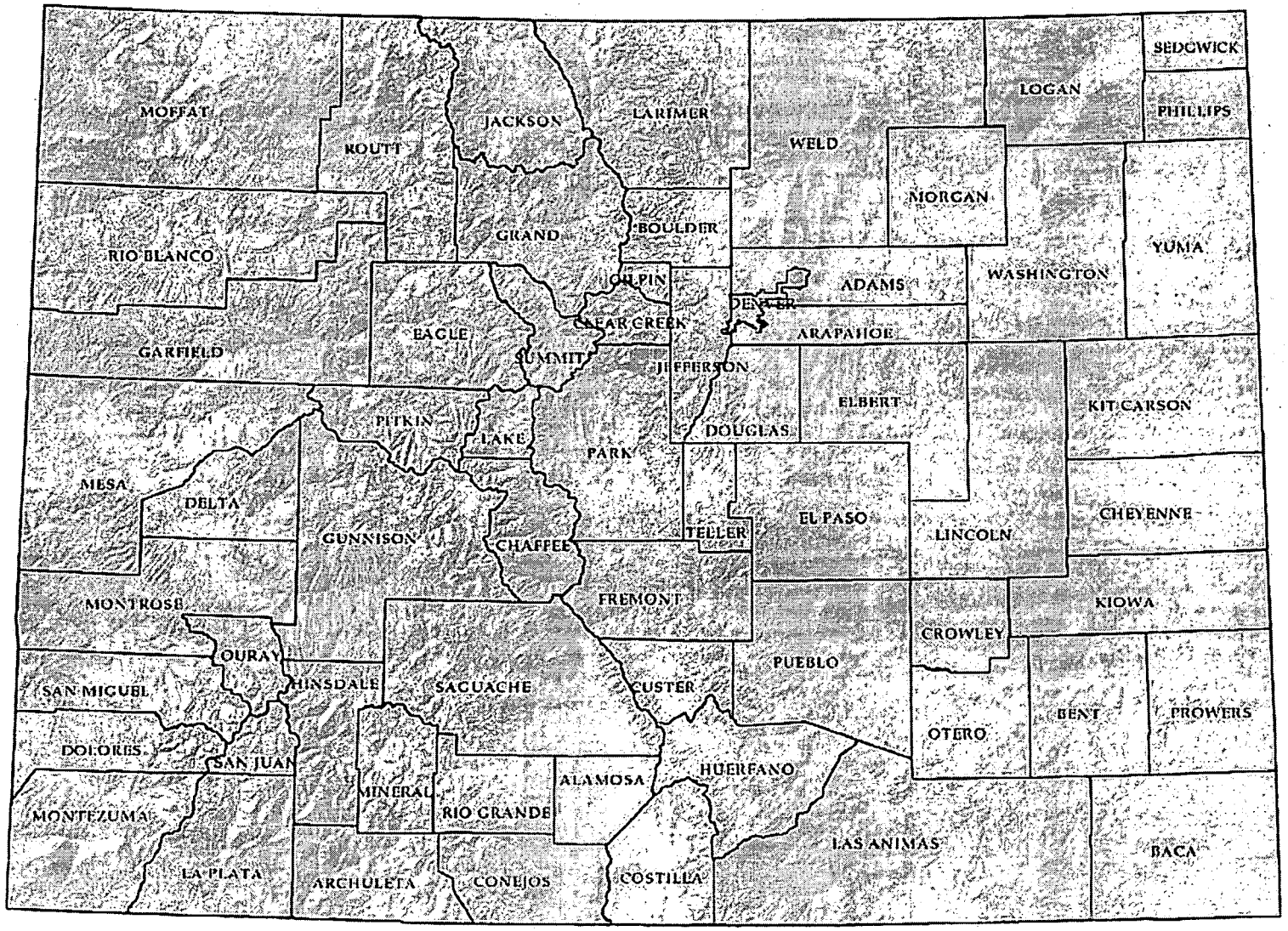




Mountain Plover
(Charadius montanus)

Three-sided bullrush and plains cottonwood / Switchgrass
(Scripus pungens and *Populus deltoides spp. monolifera / Panicium viragatum)*

Colorado Counties



County: Adams

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Egretta thula	Snowy Egret	Y	G5	S2B,			

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2			
Hesperia ottoe	Ottoe skipper	Y	G3G4	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Zapus hudsonius preblei	meadow jumping mouse subsp.	Y	G5T2	S1	FS	LT	SC

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Asclepias uncialis	Dwarf Milkweed	Y	G3?	S1S2	FS/BL		
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			
Schoenoplectus saximontanus	Rocky Mountain Bulrush	Y	G5	S1			
Scirpus saximontanus	Rocky Mountain Bulrush	Y	G5	S1			
Viola pedatifida	Prairie Violet	Y	G5	S2			

County: Alamosa

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Asio flammeus	Short-eared Owl	Y	G5	S2B,			
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius alexandrinus nivosus	Western Snowy Plover	Y	G4T3	S1B,	FS/BL		SC
Cypseloides niger	Black Swift	Y	G4	S3B	FS		
Himantopus mexicanus	Black-necked Stilt	Y	G5	S3B,			
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Plegadis chihi	White-faced Ibis	Y	G5	S2B,	FS/BL		
Sterna forsteri	Forster's Tern	Y	G5	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Catostomus plebeius	Rio Grande sucker	Y	G3G4	S1			E
Gila pandora	Rio Grande chub	Y	G3	S1?	BLM		SC
Oncorhynchus clarki virginalis	Rio Grande cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Cicindela theatina	San Luis dunes tiger beetle	Y	G1	S1			
Daihinibaenetes giganteus	Giant sand treader cricket	Y	G?	S1			
Eleodes hirtipennis	a circus bettle	Y	G?	S1			
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2			
Polites rhesus	Rhesus skipper	Y	G4	S2S3			
Pyrgus xanthus	Xanthus skipper	Y	G3G4	S2			
Sphinx dollii	a sphinx moth	Y	G?	S2?			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Perognathus flavescens relictus	plains pocket mouse subsp.	Y	G5T2	S2			
Perognathus flavus sanluisi	silky pocket mouse subsp.	Y	G5T3	S3			
Spermophilus tridecemlineatus blanca	thirteen-lined ground squirrel subsp.	Y	G5T3	S3			
Thomomys talpoides agrestis	northern pocket gopher subsp.	P	G5T3	S3			

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Promenetus umbilicatellus	umbilicate sprite	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
CAREX SIMULATA	Wet Meadow	Y	G3	S3			

CATABROSA AQUATICA-MIMULUS	Spring Wetland	Y	GU	S3
DISTICHLIS SPICATA	Salt Meadows	Y	G5	S3
ELEOCHARIS PALUSTRIS	Emergent Wetland	Y	G5	S4
FESTUCA ARIZONICA-MUHLENBERGIA	Montane Grasslands	Y	GU	SU
HIPPURIS VULGARIS		Y	G5	S4
ORYZOPSIS HYMENOIDES-PSORALIDIUM		Y	G3Q	S1
PHRAGMITES AUSTRALIS	Western Slope Marshes	Y	G4	S3
PINUS EDULIS/STIPA SCRIBNERI	Two-Needle Pinyon/Scribner's Needle Grass	Y	G3	S1?
POLYGONUM AMPHIBUM	Montane Wet Meadows	Y	G4	S3
POPULUS ANGUSTIFOLIA SAND DUNE FOREST		Y	G1	S1
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
POPULUS ANGUSTIFOLIA/RHUS TRILOBATA	Narrowleaf Cottonwood/Skunkbrush	Y	G3	S3
SALICORNIA RUBRA	Western Slope Salt Meadows	Y	G2	S1?
SALIX EXIGUA/BARE GROUND	Coyote Willow/Bare Ground	Y	G5	S5
SARCOBATUS VERMICULATUS/DISTICHLIS SPICATA	Saline Bottomland Shrublands	Y	G4	S1
SCIRPUS MARITIMUS	Emergent Wetland (Marsh)	Y	G4	S2
SCIRPUS PUNGENS	Bulrush	Y	G3G4	S3
STIPA COMATA-ORYZOPSIS HYMENOIDES		Y	G2	S1

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Astragalus bodinii	Bodin Milkvetch	Y	G4	S2			
Cleome multicaulis	Slender Spiderflower	Y	G2G3	S2S3	BLM		
Cryptantha cinerea var pustulosa	Catseye	Y	G5T?	S1			
Draba smithii	Smith Whitlow-Grass	Y	G2	S2	FS		
Liatris ligulistylis	Gay-Feather	Y	G5?	S1S2			
Rorippa coloradensis	Colorado Watercress	Y	GH	SH			
Sisyrinchium demissum	Blue-Eyed Grass	Y	G5	S2			
Woodsia neomexicana	New Mexico Cliff Fern	Y	G4?	S2			

County: Arapahoe

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Callophrys mossii schryveri	Moss's elfin	Y	G4T3	S2S3			
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2			
Hesperia ottoe	Ottoe skipper	Y	G3G4	S2			
Ischnura barberi	Desert forktail	Y	G4	SU			
Sympetrum costiferum	Saffron-bordered meadowfly	Y	G5	S1?			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Zapus hudsonius preblei	meadow jumping mouse subsp.	Y	G5T2	S1	FS	LT	SC

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Anodonta grandis	giant floater	Y	G5	S1			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ANDROPOGON GERARDII-SCHIZACHYRIUM	Xeric Tallgrass Prairies	Y	G2	S2			
ANDROPOGON GERARDII-SORGHASTRUM NUTANS-(SPARTINA PECTINATA)	Wet Prairies	Y	G2	S1S2			
BOUTELOUA GRACILIS-BUCHLOE DACTYLOIDES	Shortgrass Prairie	Y	G2?	S2?			
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SALIX EXIGUA	Plains Cottonwood Riparian Woodland	Y	G4?	S3			
SPOROBOLUS AIROIDES	Great Plains Salt Meadows	Y	G3Q	S3			
STIPA COMATA - EAST	Great Plains Mixed Grass Prairies	Y	G2	S2			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			
Ribes americanum	American Currant	Y	G5	S1			

County: Archuleta

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C_	E
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Dendroica graciae	Grace's Warbler	Y	G5	S3B,			
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Gila pandora	Rio Grande chub	Y	G3	S1?	BLM		SC
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC
Oncorhynchus clarki virginalis	Rio Grande cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Speyeria nokomis nokomis	Great Basin silverspot butterfly	Y	G4T2	S1	BLM		

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	Montane Riparian Forest	Y	G5	S4			
ACER NEGUNDO-POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Narrowleaf Cottonwood Riparian Forests	Y	G2	S2			
ACER NEGUNDO/CORNUS SERICEA	Montane Riparian Deciduous Forest	Y	G3?	S2			
ALNUS INCANA-CORNUS SERICEA	Thinleaf Alder-Red-Oiser Dogwood Riparian Shrubland	Y	G3G4	S3			
ALNUS INCANA-SALIX DRUMMONDIANA	Montane Riparian Shrubland	Y	G3	S3			
ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparian Shrubland	Y	G3G4Q	S3			
ALNUS INCANA/MESIC GRAMINOID	Montane Riparian Shrubland	Y	G5Q	S3			
CALTHA LEPTOSEPALA	Montane Wet Meadows	Y	G4	S4			

CARDAMINE CORDIFOLIA-MERTENSIA	Alpine Wetlands	Y	G4	S4
CAREX AQUATILIS-CAREX UTRICULATA	Montane Wet Meadows	Y	G4	S4
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4
CAREX VERNACULA	Alpine Wetlands	Y	GU	SU
FESTUCA ARIZONICA-MUHLENBERGIA	Montane Grasslands	Y	GU	SU
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA-PSEUDOTSUGA	Montane Riparian Forest	Y	G2?	S2
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Cottonwood Riparian Forest	Y	G4	S3
POPULUS ANGUSTIFOLIA/RHUS TRILOBATA	Narrowleaf Cottonwood/Skunkbrush	Y	G3	S3
POPULUS ANGUSTIFOLIA/SALIX ERIOCEPHALA VAR. LIGULIFOLIA-SHEPHERDIA	Narrowleaf Cottonwood Riparian Forests	Y	G1	S1
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	Narrowleaf Cottonwood Riparian Forests	Y	G4	S4
POPULUS TREMULOIDES/CORNUS SERICEA	Montane Riparian Woodland	Y	G3	S2S3
POPULUS TREMULOIDES/TALL FORBS	Montane Aspen Forest	Y	G5	S5
PSEUDOTSUGA MENSIEZII/ACER GLABRUM	Lower Montane Forests	Y	G4	S1
SALIX BEBBIANA	Montane Willow Carrs	Y	G3?	S2
SALIX DRUMMONDIANA/CAREX UTRICULATA	Montane Willow Carr	Y	GU	S3
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	Y	G4	S4
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	Montane Willow Carr	Y	G2G3	S2S3
SALIX MONTICOLA/MESIC	Montane Riparian Willow Carr	Y	G3	S3
SHEPHERDIA ARGENTEA	Foothills Riparian Shrubland	Y	G3G4	S1

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Astragalus oocalycis	Arboles Milkvetch	Y	G4	S2S3			
Astragalus proximus	Aztec Milkvetch	Y	G4	S2	FS		
Botrychium lunaria	Common Moonwort	Y	G5	S2S3			
Botrychium pinnatum	Northern Moonwort	Y	G4?	S1			
Calochortus flexuosus	Weak-Stemmed Mariposa Lily	Y	G4	S1			
Cryptogramma stelleri	Slender Rock-Brake	Y	G5	S2	BLM		
Draba spectabilis	Draba	Y	G3?T3Q	S3			
Draba spectabilis var oxyloba	Draba	Y	G3?T3Q	S3			
Epipactis gigantea	Helleborine	Y	G4	S2	FS		
Erigeron philadelphicus	Philadelphia Fleabane	Y	G5	S1			
Gaura neomexicana ssp neomexicana	New Mexico Butterfly Weed	Y	G3T3	S1			
Goodyera repens	Dwarf Rattlesnake-Plantain	W	G5	S3			
Ipomopsis polyantha	Pagosa Gilia	Y	G1	S1	FS/BL		

Lesquerella pruinosa	Pagosa Bladderpod	Y	G2	S2	FS/BL		
Liatris ligulistylis	Gay-Feather	Y	G5?	S1S2			
Lilium philadelphicum	Wood Lily	W	G5	S3			
Limnorchis ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Pediocactus knowltonii	Knowlton Cactus	Y	G1	S1		LE	
Penstemon lentus	Abajo Penstemon	Y	G4Q	S2			
Phlox caryophylla	Pagosa Phlox	Y	G4	S2			
Platanthera sparsiflora var ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Pyrola picta	Pictureleaf Wintergreen	W	G4G5	S3			
Viola pedatifida	Prairie Violet	Y	G5	S2			

Reptiles

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Thamnophis cyrtopsis	blackneck garter snake	W	G5	S2?			

County: Baca

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo debilis	green toad	Y	G5	S2			
Gastrophryne olivacea	Great Plains narrowmouth toad	Y	G5	S1			SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Tympanuchus pallidicinctus	Lesser Prairie-Chicken	Y	G3	S2	FS	C	T
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2			
Polites rhesus	Rhesus skipper	Y	G4	S2S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Conepatus mesoleucus	common hog-nosed skunk	Y	G4	SH			
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Neotoma micropus	southern plains woodrat	Y	G5	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SALIX EXIGUA	Plains Cottonwood Riparian Woodland	Y	G4?	S3			
POPULUS DELTOIDES/PASCOPYRUM SMITHII-PANICUM OBTUSUM	Plains Cottonwood/Western Wheatgrass-Vine Mesquite	Y	G1G2Q	S1S2Q			
POPULUS DELTOIDES/SPOROBOLUS CRYPTANDRUS	Plains Cottonwood/Sand Dropseed	Y	G1G2Q	S1S2Q			
SCHIZACHYRIUM SCOPARIUM-BOUTELOUA	Great Plains Mixed Grass Prairies (Sandstone/Gravel Breaks)	Y	G3	S2			

Plants

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Asclepias uncialis	Dwarf Milkweed	Y	G3?	S1S2	FS/BL		
Asplenium resiliens	Black-Stemmed Spleenwort	Y	G5	S1			
Cheilanthes eatonii	Eaton's Lip Fern	Y	G5?	S2			
Frasera coloradensis	Colorado Green Gentian	Y	G3	S3	FS		
Pellaea atropurpurea	Purple Cliff-Brake	Y	G5	S2S3			
Pellaea wrightiana	Wright's Cliff-Brake	Y	G5	S2			
Sapindus drummondii	Soapberry	Y	G5T5	S1			

Sapindus saponaria var drummondii	Soapberry	Y	G5T5	S1			
Woodsia neomexicana	New Mexico Cliff Fern	Y	G4?	S2			

Reptiles

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Kinosternon flavescens	yellow mud turtle	Y	G5	S1	FS		SC
Leptotyphlops dulcis	Texas blind snake	Y	G5	S1	FS		SC
Phrynosoma cornutum	Texas horned lizard	Y	G4G5	S3	FS/BL		SC
Rhinocheilus lecontei	longnose snake	W	G5	S1?			
Sistrurus catenatus	massasauga	Y	G3G4	S2	BLM		SC
Sonora semiannulata	ground snake	W	G5	S3			
Thamnophis cyrtopsis	blackneck garter snake	W	G5	S2?			
Thamnophis proximus	western ribbon snake	W	G5	SH			

County: Bent

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo debilis	green toad	Y	G5	S2			
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius alexandrinus nivosus	Western Snowy Plover	Y	G4T3	S1B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Cicindela lepida	Little white tiger beetle	Y	G4	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Neotoma micropus	southern plains woodrat	Y	G5	S3			

Plants

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Asclepias uncialis	Dwarf Milkweed	Y	G3?	S1S2	FS/BL		
Frasera coloradensis	Colorado Green Gentian	Y	G3	S3	FS		

Reptiles

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Phrynosoma cornutum	Texas horned lizard	Y	G4G5	S3	FS/BL		SC
Rhinocheilus lecontei	longnose snake	W	G5	S1?			
Sistrurus catenatus	massasauga	Y	G3G4	S2	BLM		SC
Sonora semiannulata	ground snake	W	G5	S3			
Thamnophis cyrtopsis	blackneck garter snake	W	G5	S2?			

County: Boulder

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Cypseloides niger	Black Swift	Y	G4	S3B	FS		
Dolichonyx oryzivorus	Bobolink	W	G5	S3B,			
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Himantopus mexicanus	Black-necked Stilt	Y	G5	S3B,			
Pelecanus erythrorhynchos	American White Pelican	Y	G3	S1B,	BLM		SC

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Nocomis biguttatus	hornyhead chub	Y	G5	SX			
Oncorhynchus clarki stomias	greenback cutthroat trout	Y	G4T2T3	S2		LT	T
Phoxinus eos	northern redbelly dace	Y	G5	S1			E
Phoxinus erythrogaster	southern redbelly dace	Y	G5	S1	FS		E

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Atrytone arogos	Arogos skipper	Y	G3G4	S2			
Callophrys mossii schryveri	Moss's elfin	Y	G4T3	S2S3			
Celastrina humulus	Hops feeding azure	Y	G2	S2			
Erebia theano	Theano alpine	Y	G4	S3			
Erynnis martialis	Mottled dusky wing	Y	G4	S2S3			
Euphyes bimacula	Two-spotted skipper	Y	G4	S3			
Hesperia ottoe	Ottoe skipper	Y	G3G4	S2			
Oeneis jutta reducta	Rocky Mountain arctic jutta	Y	G5TU	S3			
Paratrytone snowi	Snow's skipper	W	G4	S3			
Polites origenes	Cross-line skipper	Y	G5	S3			
Pyrgus ruralis	Two-banded skipper	W	G4	S3			
Somatochlora hudsonica	Hudsonian emerald	W	G5	S2S3			
Speyeria idalia	Regal fritillary	Y	G3	S1			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		
Thomomys talpoides macrotis	northern pocket gopher subsp.	Y	G5T1	S1			

Zapus hudsonius preblei	meadow jumping mouse subsp.	Y	G5T2	S1	FS	LT	SC

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Acroloxus coloradensis	Rocky Mountain capshell	Y	G?	S2	FS/BL		SC
Anodontoides ferussacianus	cylindrical papershell	Y	G5	S2			
Physa utahensis	banded physa	Y	G1	S1			
Promenetus exacuous	sharp sprite	Y	G?	S2			
Promenetus umbilicatellus	umbilicate sprite	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/CALAMAGROSTIS CANADENSIS	Montane Riparian Forests	Y	G5	S3			
ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparian Shrubland	Y	G3G4Q	S3			
ANDROPOGON GERARDII-SCHIZACHYRIUM	Xeric Tallgrass Prairies	Y	G2	S2			
ANDROPOGON GERARDII-SORGHASTRUM NUTANS-(SPARTINA PECTINATA)	Wet Prairies	Y	G2	S1S2			
BETULA OCCIDENTALIS/MESIC FORB	Foothills Riparian Shrubland	Y	G3	S2			
CAREX DIANDRA	Quaking Fen	Y	GU	SU			
CERCOCARPUS MONTANUS-RHUS TRILOBATA/ANDROPOGON GERARDII	Mixed Foothill Shrublands	Y	G2G3	S2S3			
CERCOCARPUS MONTANUS/STIPA COMATA	Mixed Foothill Shrublands	Y	G2	S2			
CERCOCARPUS MONTANUS/STIPA NEOMEXICANA	Foothills Shrubland	Y	G2G3	S2S3			
CERCOCARPUS MONTANUS/STIPA SCRIBNERI	Foothills Shrubland	Y	G3	S3			
DANTHONIA PARRYI	Montane Grasslands	Y	G3	S3			
DISTICHLIS SPICATA	Salt Meadows	Y	G5	S3			
JUNIPERUS SCOPULORUM/CERCOCARPUS MONTANUS	Foothills Pinyon-Juniper Woodlands/Scarp Woodlands	Y	G2	S2			
PHIPPSIA ALGIDA	Alpine Wetlands	Y	GU	SU			
PINUS PONDEROSA/CERCOCARPUS MONTANUS/ANDROPOGON GERARDII	Foothills Ponderosa Pine Scrub Woodlands	Y	G2	S2?			
PINUS PONDEROSA/LEUCOPOA KINGII	Foothills Ponderosa Pine Savannas	Y	G3	S3			
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3			
PSEUDOTSUGA MENZIESII/BETULA OCCIDENTALIS	Montane Riparian Forest	Y	G3?	S3			
PSEUDOTSUGA MENZIESII/AMESIA AMERICANA	Lower Montane Forests	Y	G3G4	S3			
PURSHIA TRIDENTATA/MUHLENBERGIA MONTANA	Mixed Foothill Shrublands	Y	G2	S2			
SALIX BEBBIANA	Montane Willow Carrs	Y	G3?	S2			
SALIX DRUMMONDIANA/CALAMAGROSTIS CANADENSIS	Lower Montane Willow Carrs	Y	G3	S3			
SALIX GEYERIANA-SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carrs	Y	G3	S3			

STIPA COMATA - EAST	Great Plains Mixed Grass Prairies	Y	G2	S2			
STIPA NEOMEXICANA	Great Plains Mixed Grass Prairies	Y	G3	S2			

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Acorus calamus	Sweet Flag	Y	G?	SH			
Aletes humilis	Larimer Aletes	Y	G2G3	S2S3	FS		
Amorpha nana	Dwarf Wild Indigo	Y	G5	S2S3			
Apios americana	American Groundnut	Y	G5	S1			
Aquilegia saximontana	Rocky Mountain Columbine	Y	G3	S3			
Aristida basiramea	Forktip Three-Awn	Y	G5	S1			
Askellia nana	Dwarf Hawksbeard	Y	G5	S2			
Asplenium adiantum-nigrum	Black Spleenwort	Y	G5	S1			
Betula papyrifera	Paper Birch	Y	G5	S1			
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS		
Botrychium hesperium	Western Moonwort	Y	G3	S2			
Botrychium lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lanceolatum var lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lineare	Narrowleaf Grapefern	Y	G1	S1	FS		
Botrychium minganense	Mingan Moonwort	Y	G4	S1			
Botrychium pallidum	Pale Moonwort	Y	G2	S2	FS		
Carex diandra	Lesser Panicled Sedge	Y	G5	S1			
Carex oreocharis	A Sedge	Y	G3	S1			
Carex saximontana	Rocky Mountain Sedge	Y	G5	S1			
Carex sychnocephala	Many-Headed Sedge	Y	G4	S1			
Carex torreyi	Torrey Sedge	Y	G4	S1			
Crataegus chrysocarpa	Yellow Hawthorn	Y	G5	S1			
Crepis nana	Dwarf Hawksbeard	Y	G5	S2			
Cypripedium fasciculatum	Purple Lady's-Slipper	Y	G4	S3	FS		
Draba exunguiculata	Clawless Draba	Y	G2	S2			
Draba fladnizensis	Arctic Draba	Y	G4	S2S3			
Draba porsildii	Porsild Draba	Y	G3G4	S1			
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			
Gaura neomexicana ssp coloradensis	Colorado Butterfly Weed	Y	G3T2	S1	FS	PT	
Juncus vaseyi	Vasey Bulrush	Y	G5?	S1			
Liatris ligulistylis	Gay-Feather	Y	G5?	S1S2			
Lilium philadelphicum	Wood Lily	W	G5	S3			
Listera convallarioides	Broad-Leaved Twayblade	Y	G5	S2			
Lycopodium annotinum var pungens	Stiff Clubmoss	Y	G5TU	SU			
Lycopodium dubium	Stiff Clubmoss	Y	G5TU	SU			
Malaxis brachypoda	White Adder's-Mouth	Y	G4Q	S1	FS		
Malaxis monophyllos ssp brachypoda	White Adder's-Mouth	Y	G4Q	S1	FS		

Muscaria monticola	Tundra Saxifrage	Y	G5T5	S1		
Oxytropis parryi	Parry Oxytrope	Y	G5	S1		
Papaver kluanensis	Alpine Poppy	W	G5T3?	S3		
Papaver radicatum ssp kluanense	Alpine Poppy	W	G5T3?	S3		
Phippsia algida	Snow Grass	Y	G5	S2		
Physaria bellii	Bell's Twinpod	Y	G2	S2		
Potentilla effusa var rupincola	Rocky Mountain Cinquefoil	Y	G5?T2	S2	FS	
Potentilla rupincola	Rocky Mountain Cinquefoil	Y	G5?T2	S2	FS	
Pyrola picta	Pictureleaf Wintergreen	W	G4G5	S3		
Ranunculus gelidus ssp grayi	Tundra Buttercup	Y	G4G5	S2		
Ranunculus karelinii	Tundra Buttercup	Y	G4G5	S2		
Saxifraga cespitosa ssp monticola	Tundra Saxifrage	Y	G5T5	S1		
Spiranthes diluvialis	Ute Ladies' Tresses	Y	G2	S2		LT
Viola pedatifida	Prairie Violet	Y	G5	S2		

County: Chaffee

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Oncorhynchus clarki stomias	greenback cutthroat trout	Y	G4T2T3	S2		LT	T

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Lycaeides idas sublivens	Dark blue	P	G5T?	S3			
Oeneis taygete	White-veined arctic	Y	G5?	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
BETULA OCCIDENTALIS/MESIC FORB	Foothills Riparian Shrubland	Y	G3	S2			
FESTUCA ARIZONICA-MUHLENBERGIA	Montane Grasslands	Y	GU	SU			
PINUS ARISTATA/TRIFOLIUM DASYPHYLLUM	Upper Montane Woodlands	Y	G2	S2			
POPULUS ANGUSTIFOLIA-JUNIPERUS SCOPULORUM	Montane Riparian Forest	Y	G2G3	S2			
POPULUS ANGUSTIFOLIA-PSEUDOTSUGA	Montane Riparian Forest	Y	G2?	S2			
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3			
POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	Montane Riparian Forest	Y	G3?	S2			

Plants

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Aletes lithophilus	Rock-Loving Neoparrya	Y	G2	S2	FS/BL		
Askellia nana	Dwarf Hawksbeard	Y	G5	S2			
Bolophyta tetraneuris	Arkansas River Feverfew	Y	G3	S3			
Botrychium lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			

Botrychium lanceolatum var lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3	
Botrychium lunaria	Common Moonwort	Y	G5	S2S3	
Braya glabella	Arctic Braya	Y	G5	S1	FS
Braya glabella var glabella	Arctic Braya	Y	G5	S1	FS
Braya humilis	Alpine Braya	Y	G4	S2	
Carex concinna	Low Northern Sedge	Y	G4G5	S1	BLM
Crepis nana	Dwarf Hawksbeard	Y	G5	S2	
Cystopteris montana	Mountain Bladder Fern	Y	G5	S1	
Draba crassa	Thick-Leaf Whitlow-Grass	Y	G3	S3	
Draba fladnizensis	Arctic Draba	Y	G4	S2S3	
Draba grayana	Gray's Peak Whitlow-Grass	Y	G2	S2	
Draba lonchocarpa	Lancepod Whitlowgrass	Y	G4T4	S2	
Draba lonchocarpa var lonchocarpa	Lancepod Whitlowgrass	Y	G4T4	S2	
Draba oligosperma	Woods Draba	Y	G5	S2	
Draba porsildii	Porsild Draba	Y	G3G4	S1	
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3	
Draba ventosa	Tundra Draba	Y	G3	S1	
Epipactis gigantea	Helleborine	Y	G4	S2	FS
Erigeron lanatus	Woolly Fleabane	Y	G3G4	S1	FS
Eriogonum brandegeei	Brandegee Wild Buckwheat	Y	G1G2	S1S2	FS/BL
Lilium philadelphicum	Wood Lily	W	G5	S3	
Listera borealis	Northern Twayblade	Y	G4	S2	BLM
Neoparrya lithophila	Rock-Loving Neoparrya	Y	G2	S2	FS/BL
Papaver kluanensis	Alpine Poppy	W	G5T3?	S3	
Papaver radicatum ssp kluanense	Alpine Poppy	W	G5T3?	S3	
Parthenium tetraneuris	Arkansas River Feverfew	Y	G3	S3	
Ranunculus gelidus ssp grayi	Tundra Buttercup	Y	G4G5	S2	
Ranunculus karelinii	Tundra Buttercup	Y	G4G5	S2	
Sisyrinchium pallidum	Pale Blue-Eyed Grass	Y	G2G3	S2	
Townsendia strigosa	Strigose Easter-Daisy	Y	G4	S1	BLM

County: Cheyenne

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Grus americana	Whooping Crane	Y	G1	SAN			E
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ARTEMISIA FILIFOLIA/ANDROPOGON HALLII	Northern Sandhill Prairies	Y	G3	S2			
BOUTELOUA GRACILIS-BUCHLOE DACTYLOIDES	Shortgrass Prairie	Y	G2?	S2?			
POPULUS DELTOIDES SSP. MONILIFERA/PANICUM VIRGATUM	Plains Cottonwood Riparian Forests	Y	G1G2	S1			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Asclepias uncialis	Dwarf Milkweed	Y	G3?	S1S2	FS/BL		

Reptiles

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Sistrurus catenatus	massasauga	Y	G3G4	S2	BLM		SC

County: Clear Creek

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Cypseloides niger	Black Swift	Y	G4	S3B	FS		
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Loxia leucoptera	White-winged Crossbill	W	G5	S1B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Oncorhynchus clarki stomias	greenback cutthroat trout	Y	G4T2T3	S2		LT	T

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Agapema homogena	Rocky Mountain agapema	Y	G?	S2			
Erebia theano	Theano alpine	Y	G4	S3			
Oeneis polixenes	Polixenes arctic	Y	G5	S2			
Paratrytone snowi	Snow's skipper	W	G4	S3			
Pyrgus ruralis	Two-banded skipper	W	G4	S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Lynx canadensis	lynx	Y	G5	S1	FS		E
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4			
PARONYCHIA PULVINATA-SILENE ACAULIS VAR SUBACAULIS	Alpine Fellfields	Y	G5	S5			
PHIPPSIA ALGIDA	Alpine Wetlands	Y	GU	SU			
PINUS ARISTATA/JUNIPERUS COMMUNIS	Montane Woodlands	Y	GU	SU			
PINUS ARISTATA/TRIFOLIUM DASYPHYLLUM	Upper Montane Woodlands	Y	G2	S2			
PINUS ARISTATA/VACCINUM MYRTILLUS	Montane Woodlands	Y	GU	SU			
SALIX BRACHYCARPA/MESIC FORB	Alpine Willow Scrub	Y	G4	S4			
SALIX PLANIFOLIA/CAREX	Subalpine Riparian Willow Carr	Y	G5	S4			

Plants

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Aquilegia saximontana	Rocky Mountain Columbine	Y	G3	S3			

Askellia nana	Dwarf Hawksbeard	Y	G5	S2	
Aster alpinus var vierhapperi	Alpine Aster	Y	G5TU	S1	
Botrychium campestre	Prairie Moonwort	Y	G3	S1	FS
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS
Botrychium hesperium	Western Moonwort	Y	G3	S2	
Botrychium lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3	
Botrychium lanceolatum var lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3	
Botrychium lunaria	Common Moonwort	Y	G5	S2S3	
Botrychium minganense	Mingan Moonwort	Y	G4	S1	
Carex capitata ssp arctogena	Round-Headed Sedge	Y	G5T4?	S1	
Carex concinna	Low Northern Sedge	Y	G4G5	S1	BLM
Carex leptalea	Bristle-Stalk Sedge	Y	G5	S1	
Crepis nana	Dwarf Hawksbeard	Y	G5	S2	
Cypripedium calceolus ssp parviflorum	Yellow Lady's-Slipper	Y	G5	S2	
Cypripedium pubescens	Yellow Lady's-Slipper	Y	G5	S2	
Draba crassa	Thick-Leaf Whitlow-Grass	Y	G3	S3	
Draba exunguiculata	Clawless Draba	Y	G2	S2	
Draba fladnizensis	Arctic Draba	Y	G4	S2S3	
Draba globosa	Rockcress Draba	Y	G3	S1	
Draba grayana	Gray's Peak Whitlow-Grass	Y	G2	S2	
Draba porsildii	Porsild Draba	Y	G3G4	S1	
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3	
Dryopteris expansa	Spreading Wood Fern	Y	G5	S1	
Erigeron humilis	Low Fleabane	Y	G4	S1	
Goodyera repens	Dwarf Rattlesnake-Plantain	W	G5	S3	
Listera borealis	Northern Twayblade	Y	G4	S2	BLM
Mimulus gemmiparus	Weber Monkey-Flower	Y	G2	S2	FS
Oxytropis parryi	Parry Oxytrope	Y	G5	S1	
Papaver kluanensis	Alpine Poppy	W	G5T3?	S3	
Papaver radicatum ssp kluanense	Alpine Poppy	W	G5T3?	S3	
Parnassia kotzebuei	Kotzebue Grass-Of-Parnassus	Y	G4	S2	
Phippsia algida	Snow Grass	Y	G5	S2	
Potentilla effusa var rupincola	Rocky Mountain Cinquefoil	Y	G5?T2	S2	FS
Potentilla rupincola	Rocky Mountain Cinquefoil	Y	G5?T2	S2	FS
Ranunculus gelidus ssp grayi	Tundra Buttercup	Y	G4G5	S2	
Ranunculus karelinii	Tundra Buttercup	Y	G4G5	S2	
Saxifraga foliolosa	Leafy Saxifrage	Y	G4	S1	
Spatularia foliolosa	Leafy Saxifrage	Y	G4	S1	

County: Conejos

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Asio flammeus	Short-eared Owl	Y	G5	S2B,			
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Cypseloides niger	Black Swift	Y	G4	S3B	FS		
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Catostomus plebeius	Rio Grande sucker	Y	G3G4	S1			E
Gila pandora	Rio Grande chub	Y	G3	S1?	BLM		SC
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC
Oncorhynchus clarki virginalis	Rio Grande cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Euphilotes spaldingi	Spalding's blue	Y	G3G4	S2			
Speyeria nokomis nokomis	Great Basin silverspot butterfly	Y	G4T2	S1	BLM		

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Lynx canadensis	lynx	Y	G5	S1	FS		E
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Perognathus flavus sanluisi	silky pocket mouse subsp.	Y	G5T3	S3			
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		
Thomomys bottae pervagus	Botta's pocket gopher subsp.	Y	G5T3	S3			

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Valvata sincera	mossy valvata	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	Montane Riparian Forest	Y	G5	S4			

ALNUS INCANA-MIXED SALIX	Thinleaf Alder-Mixed Willow Species	Y	G3	S3
CALTHA LEPTOSEPALA	Montane Wet Meadows	Y	G4	S4
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4
FESTUCA ARIZONICA-MUHLENBERGIA	Montane Grasslands	Y	GU	SU
PHRAGMITES AUSTRALIS	Western Slope Marshes	Y	G4	S3
PICEA PUNGENS/BARE GROUND		Y	GU	SU
PICEA PUNGENS/CORNUS SERICEA	Montane Riparian Forest	Y	G4	S2
PINUS ARISTATA/FESTUCA	Montane Woodlands	Y	G4	S3
PINUS PONDEROSA/FESTUCA ARIZONICA	Lower Montane Forests	Y	G4G5	S4
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	Narrowleaf Cottonwood Riparian Forests	Y	G4	S4
PSEUDOTSUGA MENZIESII/JUNIPERUS COMMUNIS	Lower Montane Forests	Y	G5	SU
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	Montane Willow Carr	Y	G2G3	S2S3
SALIX GEYERIANA-SALIX MONTICOLA/MESIC FORB	Geyer's Willow-Rocky Mountain Willow/Mesic Forb	Y	G3	S3
SALIX GEYERIANA-SALIX MONTICOLA/MESIC GRAMINOID	Montane Riparian Willow Carr	Y	GU	S3
SALIX LUCIDA SSP. CAUDATA	Montane Riparian Shrubland	Y	G3Q	S2S3
SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carr	Y	G3	S3
SALIX MONTICOLA/CAREX	Montane Riparian Willow Carr	Y	G3	S3
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3
SALIX MONTICOLA/MESIC	Montane Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4
SPARGANIUM EURYCARPUM	Foothills/Plains Floating/Submergent Palustrine Wetlands	Y	GU	S2

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Aletes lithophilus	Rock-Loving Neoparrya	Y	G2	S2	FS/BL		
Askellia nana	Dwarf Hawksbeard	Y	G5	S2			
Astragalus allochrous var playanus	Wooton Milkvetch	Y	G4T3?	S1			
Astragalus brandegeei	Brandegee Milkvetch	Y	G3G4	S1S2	BLM		
Astragalus proximus	Aztec Milkvetch	Y	G4	S2	FS		
Astragalus ripleyi	Ripley Milkvetch	Y	G3	S2	FS/BL		
Astragalus wootonii var wootonii	Wooton Milkvetch	Y	G4T3?	S1			
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS		
Botrychium hesperium	Western Moonwort	Y	G3	S2			
Botrychium lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lanceolatum var lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lunaria	Common Moonwort	Y	G5	S2S3			

Botrychium pallidum	Pale Moonwort	Y	G2	S2	FS
Carex limosa	Mud Sedge	Y	G5	S2	
Carex oreocharis	A Sedge	Y	G3	S1	
Comarum palustre	Marsh Cinquefoil	Y	G5	S1S2	
Crepis nana	Dwarf Hawksbeard	Y	G5	S2	
Cryptogramma stelleri	Slender Rock-Brake	Y	G5	S2	BLM
Cystopteris montana	Mountain Bladder Fern	Y	G5	S1	
Draba spectabilis	Draba	Y	G3?T3Q	S3	
Draba spectabilis var oxyloba	Draba	Y	G3?T3Q	S3	
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3	
Ipomopsis multiflora	Many-Flowered Gilia	Y	G4?	S1	
Isoetes echinospora	Spiny-Spored Quillwort	Y	G5	S2	
Isoetes setacea ssp muricata	Spiny-Spored Quillwort	Y	G5	S2	
Limnorchis ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3	
Neoparrya lithophila	Rock-Loving Neoparrya	Y	G2	S2	FS/BL
Platanthera sparsiflora var ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3	
Pyrola picta	Pictureleaf Wintergreen	W	G4G5	S3	
Stellaria irrigua	Altai Chickweed	Y	G4?	S2	

County: Costilla

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Catostomus plebeius	Rio Grande sucker	Y	G3G4	S1			E
Gila pandora	Rio Grande chub	Y	G3	S1?	BLM		SC
Oncorhynchus clarki virginalis	Rio Grande cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Cicindela theatina	San Luis dunes tiger beetle	Y	G1	S1			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Lynx canadensis	lynx	Y	G5	S1	FS		E
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Perognathus flavus sanluisi	silky pocket mouse subsp.	Y	G5T3	S3			
Thomomys talpoides agrestis	northern pocket gopher subsp.	P	G5T3	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
CAREX NEBRASCENSIS	Wet Meadows	Y	G4	S3			
POPULUS ANGUSTIFOLIA SAND DUNE FOREST		Y	G1	S1			
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	Montane Willow Carr	Y	G2G3	S2S3			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Bolophyta tetraneuris	Arkansas River Feverfew	Y	G3	S3			
Cleome multicaulis	Slender Spiderflower	Y	G2G3	S2S3	BLM		
Parthenium tetraneuris	Arkansas River Feverfew	Y	G3	S3			

County: Crowley

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius alexandrinus nivosus	Western Snowy Plover	Y	G4T3	S1B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Mustela nigripes	black-footed ferret	Y	G1	SH			E

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
SPOROBOLUS AIROIDES	Great Plains Salt Meadows	Y	G3Q	S3			

Reptiles

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Sistrurus catenatus	massasauga	Y	G3G4	S2	BLM		SC

County: Custer

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Strix occidentalis lucida	Mexican Spotted Owl	Y	G3T3	S1B,		LT	T

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Oncorhynchus clarki stomias	greenback cutthroat trout	Y	G4T2T3	S2		LT	T

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Atrytonopsis hianna	Dusted skipper	Y	G4G5	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Lynx canadensis	lynx	Y	G5	S1	FS		E
Sorex nanus	dwarf shrew	Y	G4	S2	FS		

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
PINUS ARISTATA/FESTUCA	Montane Woodlands	Y	G4	S3			
PINUS ARISTATA/FESTUCA THURBERI	Lower Montane Woodlands	Y	G3	S2			
PINUS ARISTATA/TRIFOLIUM DASYPHYLLUM	Upper Montane Woodlands	Y	G2	S2			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Askellia nana	Dwarf Hawksbeard	Y	G5	S2			
Carex oreocharis	A Sedge	Y	G3	S1			
Crepis nana	Dwarf Hawksbeard	Y	G5	S2			
Cypripedium calceolus ssp parviflorum	Yellow Lady's-Slipper	Y	G5	S2			
Cypripedium pubescens	Yellow Lady's-Slipper	Y	G5	S2			
Draba smithii	Smith Whitlow-Grass	Y	G2	S2	FS		
Goodyera repens	Dwarf Rattlesnake-Plantain	W	G5	S3			
Hypoxis hirsuta	Yellow Stargrass	Y	G5	SH			
Liatris ligulistylis	Gay-Feather	Y	G5?	S1S2			
Lilium philadelphicum	Wood Lily	W	G5	S3			
Listera convallarioides	Broad-Leaved Twayblade	Y	G5	S2			
Salix serissima	Autumn Willow	Y	G4	S1	FS		
Stellaria irrigua	Altai Chickweed	Y	G4?	S2			

Viola pedatifida	Prairie Violet	Y	G5	S2

County: Delta

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC
Spea intermontana	Great Basin spadefoot	Y	G5	S3	BLM		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Catoptrophorus semipalmatus	Willet	Y	G5	S1B,			
Egretta thula	Snowy Egret	Y	G5	S2B,			
Grus americana	Whooping Crane	Y	G1	SAN			E
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC
Xyrauchen texanus	razorback sucker	Y	G1	S1		LE	E

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Hesperopsis libya	Mohave sooty-wing	Y	G5	S2			
Lycaeides idas sublivens	Dark blue	P	G5T?	S3			
Ochlodes yuma	Yuma skipper	Y	G5	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Tadarida brasiliensis	Brazilian free-tailed bat	W	G5	S1			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	Montane Riparian Forests	Y	G5	S5			
ALNUS INCANA-SALIX DRUMMONDIANA	Montane Riparian Shrubland	Y	G3	S3			
AQUILEGIA MICRANTHA-MIMULUS EASTWOODIAE	Hanging Gardens	Y	G2G3	S2S3			
ATRIPLEX CONFERTIFOLIA/HILARIA JAMESII	Cold Desert Shrublands	Y	G3	S2			
ATRIPLEX CONFERTIFOLIA/LEYMUS SALINUS	Cold Desert Shrublands	Y	G3G5	S3			

ATRIPLEX CORRUGATA SHALE BARREN	Alkali Mat Saltbush Shrublands	Y	G5	S2?
DISTICHLIS SPICATA	Salt Meadows	Y	G5	S3
JUNIPERUS OSTEOSPERMA/AMELANCHIER UTAHENSIS-PHILADELPHUS MICROPHYLLUS/LEYMUS SALINUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	GU	SU
JUNIPERUS OSTEOSPERMA/STIPA COMATA		Y	G2	S2?
PHRAGMITES AUSTRALIS	Western Slope Marshes	Y	G4	S3
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
PINUS EDULIS/CERCOCARPUS MONTANUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	G5	S4
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Cottonwood Riparian Forest	Y	G4	S3
POPULUS ANGUSTIFOLIA/RHUS TRILOBATA	Narrowleaf Cottonwood/Skunkbrush	Y	G3	S3
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	Narrowleaf Cottonwood Riparian Forests	Y	G4	S4
POPULUS DELTOIDES SSP. WISLIZENII/RHUS TRILOBATA	Fremont's Cottonwood Riparian Forests	Y	G2	S2
POPULUS TREMULOIDES/PTERIDIUM AQUILINUM	Aspen Wetland Forests	Y	G4	S3S4
POPULUS TREMULOIDES/TALL FORBS	Montane Aspen Forest	Y	G5	S5
PSEUDOTSUGA MENZIESII/CORNUS SERICEA	Lower Montane Riparian Forests	Y	G4	S2
SARCOBATUS VERMICULATUS/DISTICHLIS SPICATA	Saline Bottomland Shrublands	Y	G4	S1
SARCOBATUS VERMICULATUS/SUAEDA	Saline Bottomland Shrublands	Y	G2G3	S2S3
SPARTINA GRACILIS	Western Slope Salt Meadows	Y	GU	SU
TYPHA ANGUSTIFOLIA-TYPHA LATIFOLIA	Narrow-Leaf Cattail Marsh	Y	G5	S3

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Astragalus linifolius	Grand Junction Milkvetch	Y	G3Q	S3	BLM		
Astragalus wetherillii	Wetherill Milkvetch	Y	G3	S3			
Centaurium arizonicum	Arizona Centaury	Y	G5?	S1			
Cirsium perplexans	Rocky Mountain Thistle	Y	G2	S2	BLM		
Comarum palustre	Marsh Cinquefoil	Y	G5	S1S2			
Cryptantha longiflora	Long-Flower Cat's-Eye	Y	G3	S2			
Draba spectabilis	Draba	Y	G3?T3Q	S3			
Draba spectabilis var oxyloba	Draba	Y	G3?T3Q	S3			
Epipactis gigantea	Helleborine	Y	G4	S2	FS		
Eriogonum pelinophilum	Clay-Loving Wild Buckwheat	Y	G2Q	S2		LE	
Lomatium concinnum	Colorado Desert-Parsley	Y	G2	S2	BLM		
Mimulus eastwoodiae	Eastwood Monkey-Flower	Y	G3?	S1	BLM		
Oreocarya longiflora	Long-Flower Cat's-Eye	Y	G3	S2			
Pediomelum megalanthum	Large-Flowered Breadroot	W	G4?	S3S4			
Penstemon mensarum	Grand Mesa Penstemon	Y	G3	S3			
Penstemon retrorsus	Adobe Beardtongue	Y	G3	S3			
Sclerocactus glaucus	Uinta Basin Hookless Cactus	Y	G3	S3		LT	

Reptiles

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Coluber constrictor mormon	western yellowbelly racer	Y	G5T5	S3			
Tantilla hobartsmithi	southwestern blackhead snake	Y	G5	S2?			

County: Denver

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Zapus hudsonius preblei	meadow jumping mouse subsp.	Y	G5T2	S1	FS	LT	SC

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Asclepias uncialis	Dwarf Milkweed	Y	G3?	S1S2	FS/BL		
Astragalus plattensis	Platte River Milkvetch	Y	G5	S1			
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			

County: Dolores

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5			
ACER NEGUNDO-POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Narrowleaf Cottonwood Riparian Forests	Y	G2	S2			
ALNUS INCANA-SALIX DRUMMONDIANA	Montane Riparian Shrubland	Y	G3	S3			
CARDAMINE CORDIFOLIA-MERTENSIA	Alpine Wetlands	Y	G4	S4			
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4			
CRATAEGUS RIVULARIS	Foothills Riparian Shrubland	Y	GUQ	S2Q			
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3			
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4			
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Cottonwood Riparian Forest	Y	G4	S3			
POPULUS ANGUSTIFOLIA/CRATAEGUS	Narrowleaf Cottonwood Riparian Forests	Y	G2?	S2?			
RHUS TRILOBATA	Skunkbrush Riparian Shrubland	Y	G2	S2			
SALIX BEBBIANA	Montane Willow Carrs	Y	G3?	S2			
SALIX BRACHYCARPA/MESIC FORB	Alpine Willow Scrub	Y	G4	S4			
SALIX DRUMMONDIANA/CALAMAGROSTIS CANADENSIS	Lower Montane Willow Carrs	Y	G3	S3			
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	Y	G4	S4			
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	Montane Willow Carr	Y	G2G3	S2S3			
SALIX EXIGUA/BARE GROUND	Coyote Willow/Bare Ground	Y	G5	S5			
SALIX GEYERIANA-SALIX MONTICOLA/MESIC FORB	Geyer's Willow-Rocky Mountain Willow/Mesic Forb	Y	G3	S3			
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3			

SALIX MONTICOLA/MESIC	Montane Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4
SALIX WOLFII/CAREX AQUATILIS	Subalpine Riparian Willow Carr	Y	G4	S3

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Draba spectabilis	Draba	Y	G3?T3Q	S3			
Draba spectabilis var oxyloba	Draba	Y	G3?T3Q	S3			
Penstemon lentus	Abajo Penstemon	Y	G4Q	S2			

County: Douglas

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Seiurus aurocapillus	Ovenbird	Y	G5	S2B,			
Strix occidentalis lucida	Mexican Spotted Owl	Y	G3T3	S1B,		LT	T
Tympanuchus phasianellus jamesi	Plains Sharp-tailed Grouse	Y	G4T4	S1			E

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Phoxinus eos	northern redbelly dace	Y	G5	S1			E

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Callophrys mossii schryveri	Moss's elfin	Y	G4T3	S2S3			
Celastrina humulus	Hops feeding azure	Y	G2	S2			
Cicindela nebraskana	a tiger beetle	Y	G4	S2			
Erynnis martialis	Mottled dusky wing	Y	G4	S2S3			
Hesperia leonardus montana	Pawnee montane skipper	Y	G4T1	S1		LT	
Hesperia ottoe	Ottoe skipper	Y	G3G4	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Thomomys talpoides macrotis	northern pocket gopher subsp.	Y	G5T1	S1			
Zapus hudsonius preblei	meadow jumping mouse subsp.	Y	G5T2	S1	FS	LT	SC

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ALNUS INCANA/EQUISETUM	Montane Riparian Shrublands	Y	G3?	S3			
ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparian Shrubland	Y	G3G4Q	S3			
ANDROPOGON GERARDII-SCHIZACHYRIUM	Xeric Tallgrass Prairies	Y	G2	S2			
ANDROPOGON GERARDII-SPOROBOLUS HETEROLEPIS	Xeric Tallgrass Prairies	Y	G2	S1S2			
CAREX LANUGINOSA	Montane Wet Meadows	Y	G3?	S3			
CERCOCARPUS MONTANUS/STIPA COMATA	Mixed Foothill Shrublands	Y	G2	S2			
DANTHONIA PARRYI	Montane Grasslands	Y	G3	S3			
FESTUCA ARIZONICA-MUHLENBERGIA	Montane Grasslands	Y	GU	SU			
MUHLENBERGIA MONTANA-DANTHONIA PARRYI	Montane Grasslands	Y	G3G4	S2?			

PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
PINUS PONDEROSA/CERCOCARPUS MONTANUS/ANDROPOGON GERARDII	Foothills Ponderosa Pine Scrub Woodlands	Y	G2	S2?
PINUS PONDEROSA/FESTUCA ARIZONICA	Lower Montane Forests	Y	G4G5	S4
PINUS PONDEROSA/MUHLENBERGIA MONTANA	Foothills Ponderosa Pine Savannas	Y	G5	S2S3
PINUS PONDEROSA/QUERCUS GAMBELII	Foothills Ponderosa Pine Scrub Woodlands	Y	G5	S4
POPULUS DELTOIDES SSP. MONILIFERA/PRUNUS VIRGINIANA	Plains Cottonwood/Choke Cherry	Y	G1Q	S1Q
QUERCUS GAMBELII-CERCOCARPUS MONTANUS/MUHLENBERGIA MONTANA	Mesic Oak Thickets	Y	GU	SU
SALIX AMYGDALOIDES/CAREX LANUGINOSA	Peachleaf Willow Alliance	Y	G2	SU
SALIX BEBBIANA	Montane Willow Carrs	Y	G3?	S2
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	Montane Willow Carr	Y	G2G3	S2S3
SALIX EXIGUA/MESIC GRAMINOID	Coyote Willow/Mesic Graminoid	Y	G5	S5
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Carex peckii	Peck Sedge	Y	G4G5	SH			
Gaura neomexicana ssp coloradensis	Colorado Butterfly Weed	Y	G3T2	S1	FS	PT	
Heuchera richardsonii	Richardson Alum-Root	Y	G5	S1			
Lilium philadelphicum	Wood Lily	W	G5	S3			
Onoclea sensibilis	Sensitive Fern	Y	G5	SH			
Ribes americanum	American Currant	Y	G5	S1			
Viola pedatifida	Prairie Violet	Y	G5	S2			
Viola selkirkii	Selkirk Violet	Y	G5?	S1	FS		
Woodsia neomexicana	New Mexico Cliff Fern	Y	G4?	S2			

County: Eagle

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Bucephala islandica	Barrow's Goldeneye	Y	G5	S2B,	BLM		SC
Cypseloides niger	Black Swift	Y	G4	S3B	FS		
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Grus canadensis tabida	Greater Sandhill Crane	Y	G5T4	S2B,	FS		T

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Lymnaea stagnalis	swampy lymnaea	Y	G5	S2			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	Montane Riparian Forest	Y	G5	S4			
ALNUS INCANA-CORNUS SERICEA	Thinleaf Alder-Red-Oiser Dogwood Riparian Shrubland	Y	G3G4	S3			
ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparián Shrubland	Y	G3G4Q	S3			
BETULA OCCIDENTALIS/MESIC FORB	Foothills Riparian Shrubland	Y	G3	S2			
CARDAMINE CORDIFOLIA-MERTENSIA	Alpine Wetlands	Y	G4	S4			
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4			

CAREX SCOPULORUM-CALTHA LEPTOSEPALA	Alpine Wetlands	Y	G4	S4
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4
CORNUS SERICEA	Foothills Riparian Shrubland	Y	G4	S3
DANTHONIA INTERMEDIA	Montane Grasslands	Y	GU	S3S4
DESCHAMPSIA CESPITOSA-LIGUSTICUM	Mesic Alpine Meadows	Y	GU	SU
ELEOCHARIS QUINQUEFLORA	Alpine Wetlands	Y	G4	S3S4
JUNIPERUS OSTEOSPERMA/ARTEMISIA	Xeric Western Slope Pinyon-Juniper Woodlands	Y	G5	SU
JUNIPERUS SCOPULORUM/CORNUS SERICEA	Riparian Woodland	Y	G4	S2
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
PINUS EDULIS-JUNIPERUS OSTEOSPERMA/STIPA COMATA	Xeric Western Slope Pinyon-Juniper Woodlands	Y	GU	SU
POPULUS ANGUSTIFOLIA-JUNIPERUS SCOPULORUM	Montane Riparian Forest	Y	G2G3	S2
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Cottonwood Riparian Forest	Y	G4	S3
POPULUS ANGUSTIFOLIA/SALIX ERIOCEPHALA VAR. LIGULIFOLIA-SHEPHERDIA	Narrowleaf Cottonwood Riparian Forests	Y	G1	S1
POPULUS TREMULOIDES/ACER GLABRUM	Montane Riparian Forests	Y	G2	S1S2
QUERCUS GAMBELII-AMELANCHIER UTAHENSIS	Mixed Mountain Shrubland	Y	G3G5	SU
SALIX DRUMMONDIANA/CALAMAGROSTIS CANADENSIS	Lower Montane Willow Carrs	Y	G3	S3
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	Y	G4	S4
SALIX EXIGUA/BARE GROUND	Coyote Willow/Bare Ground	Y	G5	S5
SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carr	Y	G3	S3
SALIX MONTICOLA/CAREX UTRICULATA	Montane Riparian Willow Carr	Y	G3	S3
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CALAMAGROSTIS CANADENSIS	Subalpine Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4
SALIX WOLFII/CAREX UTRICULATA	Subalpine Riparian Willow Carr	Y	G4	S3
SHEPHERDIA ARGENTEA	Foothills Riparian Shrubland	Y	G3G4	S1

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Botrychium lunaria	Common Moonwort	Y	G5	S2S3			
Cypripedium fasciculatum	Purple Lady's-Slipper	Y	G4	S3	FS		
Draba rectifructa	Mountain Whitlow-Grass	Y	G3?	S2			
Eriophorum altaicum var neogaeum	Altai Cottongrass	Y	G4T?	S3	FS		
Gymnocarpium dryopteris	Oak Fern	Y	G5	S2S3			
Limnorchis ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Listera borealis	Northern Twayblade	Y	G4	S2	BLM		

Lycopodium annotinum var pungens	Stiff Clubmoss	Y	G5TU	SU	
Lycopodium dubium	Stiff Clubmoss	Y	G5TU	SU	
Penstemon cyathophorus	Middle Park Penstemon	W	G3G4	S3S4	
Penstemon harringtonii	Harrington Beardtongue	Y	G3	S3	FS/BL
Platanthera sparsiflora var ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3	

County: El Paso

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Dendroica graciae	Grace's Warbler	Y	G5	S3B,			
Dolichonyx oryzivorus	Bobolink	W	G5	S3B,			
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Grus americana	Whooping Crane	Y	G1	SAN			E
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Seiurus aurocapillus	Ovenbird	Y	G5	S2B,			
Strix occidentalis lucida	Mexican Spotted Owl	Y	G3T3	S1B,		LT	T

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Etheostoma cragini	Arkansas darter	Y	G3	S2	FS	C	T
Oncorhynchus clarki stomias	greenback cutthroat trout	Y	G4T2T3	S2		LT	T

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Amblyscirtes simius	Simius roadside skipper	Y	G4	S3			
Atrytonopsis hianna	Dusted skipper	Y	G4G5	S2			
Callophrys mossii schryveri	Moss's elfin	Y	G4T3	S2S3			
Celastrina humulus	Hops feeding azure	Y	G2	S2			
Cicindela nebraskana	a tiger beetle	Y	G4	S2			
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2			
Hemileuca diana	a buckmoth	Y	G?	S2			
Paratrytone snowi	Snow's skipper	W	G4	S3			
Polites origenes	Cross-line skipper	Y	G5	S3			
Polites rhesus	Rhesus skipper	Y	G4	S2S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Conepatus mesoleucus	common hog-nosed skunk	Y	G4	SH			
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		
Zapus hudsonius preblei	meadow jumping mouse subsp.	Y	G5T2	S1	FS	LT	SC

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ALNUS INCANA-CORNUS SERICEA	Thinleaf Alder-Red-Oiser Dogwood Riparian Shrubland	Y	G3G4	S3			
ALNUS INCANA/MESIC GRAMINOID	Montane Riparian Shrubland	Y	G5Q	S3			
ANDROPOGON GERARDII-CALAMOVILFA	Tallgrass Prairies	Y	G3	S2			
ANDROPOGON GERARDII-SCHIZACHYRIUM	Xeric Tallgrass Prairies	Y	G2	S2			
ANDROPOGON GERARDII-SPOROBOLUS HETEROLEPIS	Xeric Tallgrass Prairies	Y	G2	S1S2			
ARTEMISIA FILIFOLIA/ANDROPOGON HALLII	Northern Sandhill Prairies	Y	G3	S2			
CERCOCARPUS MONTANUS/STIPA COMATA	Mixed Foothill Shrublands	Y	G2	S2			
CORYLUS CORNUTA	Lower Montane Forests	Y	G3	S1			
DANTHONIA PARRYI	Montane Grasslands	Y	G3	S3			
DISTICHLIS SPICATA	Salt Meadows	Y	G5	S3			
MUHLENBERGIA TORREYI	Shortgrass Prairies	Y	GU	SU			
PINUS EDULIS/STIPA SCRIBNERI	Two-Needle Pinyon/Scribner's Needle Grass	Y	G3	S1?			
PINUS PONDEROSA/CAREX INOPS	Foothills Ponderosa Pine Savannas	Y	G3	S2			
PINUS PONDEROSA/QUERCUS GAMBELII	Foothills Ponderosa Pine Scrub Woodlands	Y	G5	S4			
POPULUS ANGUSTIFOLIA/PRUNUS VIRGINIANA	Narrowleaf Cottonwood/Comm on Chokecherry	Y	G2G3	S1			
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	Narrowleaf Cottonwood Riparian Forests	Y	G4	S4			
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SALIX EXIGUA	Plains Cottonwood Riparian Woodland	Y	G4?	S3			
POPULUS DELTOIDES SSP. MONILIFERA/SYMPHORICARPOS OCCIDENTALIS	Plains Cottonwood Riparian Woodland	Y	G2G3	S2			
PSEUDOTSUGA MENZIESII/BETULA OCCIDENTALIS	Montane Riparian Forest	Y	G3?	S3			
QUERCUS GAMBELII-CERCOCARPUS MONTANUS/MUHLENBERGIA MONTANA	Mesic Oak Thickets	Y	GU	SU			
QUERCUS GAMBELII/CAREX INOPS	Mesic Oak Thickets	Y	GU	SU			
SALIX EXIGUA/MESIC GRAMINOID	Coyote Willow/Mesic Graminoid	Y	G5	S5			
SCHIZACHYRIUM SCOPARIUM	Loess Prairies	Y	G1?	S1?			
SCHIZACHYRIUM SCOPARIUM-BOUTELOUA	Great Plains Mixed Grass Prairies (Sandstone/Gravel Breaks)	Y	G3	S2			
SYMPHORICARPOS OCCIDENTALIS	Snowberry Shrubland	Y	G4G5	S3			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Ambrosia linearis	Plains Ragweed	Y	G2	S2	FS		
Amorpha nana	Dwarf Wild Indigo	Y	G5	S2S3			
Aquilegia chrysantha var rydbergii	Golden Columbine	Y	G4T1Q	S1	BLM		
Aquilegia saximontana	Rocky Mountain Columbine	Y	G3	S3			
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS		
Botrychium lineare	Narrowleaf Grapefern	Y	G1	S1	FS		

Botrychium lunaria	Common Moonwort	Y	G5	S2S3		
Botrychium simplex	Least Moonwort	Y	G5	S1		
Botrychium virginianum	Rattlesnake Fern	Y	G5	S1		
Botrypus virginianus ssp europaeus	Rattlesnake Fern	Y	G5	S1		
Boykinia jamesii	James' Telesonix	Y	G4	S2?		
Carex crawei	Crawe Sedge	Y	G5	S1		
Carex leptalea	Bristle-Stalk Sedge	Y	G5	S1		
Carex oreocharis	A Sedge	Y	G3	S1		
Carex torreyi	Torrey Sedge	Y	G4	S1		
Cheilanthes eatonii	Eaton's Lip Fern	Y	G5?	S2		
Commelina dianthifolia	Birdbill Day-Flower	Y	G5	S1?		
Cypripedium calceolus ssp parviflorum	Yellow Lady's-Slipper	Y	G5	S2		
Cypripedium pubescens	Yellow Lady's-Slipper	Y	G5	S2		
Draba exunguiculata	Clawless Draba	Y	G2	S2		
Eriogonum brandegeei	Brandegee Wild Buckwheat	Y	G1G2	S1S2	FS/BL	
Goodyera repens	Dwarf Rattlesnake-Plantain	W	G5	S3		
Heuchera richardsonii	Richardson Alum-Root	Y	G5	S1		
Hypoxis hirsuta	Yellow Stargrass	Y	G5	SH		
Juncus brachycephalus	Small-Headed Rush	Y	G5	S1		
Juncus brevicaudatus	Narrow-Panicled Rush	Y	G5	S1		
Liatris ligulistylis	Gay-Feather	Y	G5?	S1S2		
Lilium philadelphicum	Wood Lily	W	G5	S3		
Malaxis brachypoda	White Adder's-Mouth	Y	G4Q	S1	FS	
Malaxis monophyllos ssp brachypoda	White Adder's-Mouth	Y	G4Q	S1	FS	
Mertensia alpina	Alpine Bluebells	Y	G4?	S1		
Nama dichotomum	Livemore Fiddleleaf	Y	G4	S1		
Oenothera harringtonii	Arkansas Valley Evening Primrose	Y	G2	S2		
Oreoxis humilis	Pikes Peak Spring Parsley	Y	G1	S1		
Papaver kluanensis	Alpine Poppy	W	G5T3?	S3		
Papaver radicatum ssp kluanense	Alpine Poppy	W	G5T3?	S3		
Pellaea atropurpurea	Purple Cliff-Brake	Y	G5	S2S3		
Physaria bellii	Bell's Twinpod	Y	G2	S2		
Potentilla ambigens	Southern Rocky Mountain Cinquefoil	Y	G3	S1S2		
Ptilagrostis mongholica ssp porteri	Porter Feathergrass	Y	G3G5T2	S2	FS	
Ptilagrostis porteri	Porter Feathergrass	Y	G3G5T2	S2	FS	
Pyrola picta	Pictureleaf Wintergreen	W	G4G5	S3		
Ribes americanum	American Currant	Y	G5	S1		
Solidago ptarmicoides	Prairie Goldenrod	Y	G5	S2S3		
Spiranthes diluvialis	Ute Ladies' Tresses	Y	G2	S2		LT
Telesonix jamesii	James' Telesonix	Y	G4	S2?		
Unamia alba	Prairie Goldenrod	Y	G5	S2S3		
Viola pedatifida	Prairie Violet	Y	G5	S2		
Viola selkirkii	Selkirk Violet	Y	G5?	S1	FS	

Woodsia neomexicana	New Mexico Cliff Fern	Y	G4?	S2			
Woodsia plummerae	Plummer's Cliff Fern	Y	G5	SU			

Reptiles

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Sistrurus catenatus	massasauga	Y	G3G4	S2	BLM		SC

County: Elbert

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Rana blairi	plains leopard frog	Y	G5	S3			SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Tympanuchus phasianellus jamesi	Plains Sharp-tailed Grouse	Y	G4T4	S1			E

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Etheostoma cragini	Arkansas darter	Y	G3	S2	FS	C	T

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Boloria selene sabulocollis	Sandhill fritillary	Y	G5T2	S2			
Callophrys mossii schryveri	Moss's elfin	Y	G4T3	S2S3			
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Zapus hudsonius preblei	meadow jumping mouse subsp.	Y	G5T2	S1	FS	LT	SC

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ANDROPOGON GERARDII-SPOROBOLUS HETEROLEPIS	Xeric Tallgrass Prairies	Y	G2	S1S2			
ANDROPOGON HALLII-CALAMOVILFA LONGIFOLIA	Northern Sandhill Prairies	Y	G5	S2			
ANDROPOGON HALLII-STIPA	Great Plains Mixed Grass Prairie	Y	G3	S1			
BOUTELOUA GRACILIS-BUCHLOE DACTYLOIDES	Shortgrass Prairie	Y	G2?	S2?			
JUNIPERUS SCOPULORUM/SCHIZACHYRIUM SCOPARIUM	Scarp Woodlands	Y	G3	S2S3			
PASCOPYRUM SMITHII-STIPA VIRIDULA	Great Plains Mixed Grass Prairie	Y	G4	S2			
POPULUS ACUMINATA	Montane Riparian Forest	Y	GU	SU			
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SALIX EXIGUA	Plains Cottonwood Riparian Woodland	Y	G4?	S3			
POPULUS DELTOIDES SSP. MONILIFERA/PANICUM VIRGATUM	Plains Cottonwood Riparian Forests	Y	G1G2	S1			
POPULUS DELTOIDES/SPOROBOLUS CRYPTANDRUS	Plains Cottonwood/Sand Dropseed	Y	G1G2Q	S1S2Q			
SALIX AMYGDALOIDES/CAREX LANUGINOSA	Peachleaf Willow Alliance	Y	G2	SU			
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	Montane Willow Carr	Y	G2G3	S2S3			

SALIX EXIGUA/MESIC GRAMINOID	Coyote Willow/Mesic Graminoid	Y	G5	S5			
SALIX LUCIDA SSP. CAUDATA	Montane Riparian Shrubland	Y	G3Q	S2S3			
SCHIZACHYRIUM SCOPARIUM-BOUTELOUA	Great Plains Mixed Grass Prairies (Sandstone/Gravel Breaks)	Y	G3	S2			
SPARTINA PECTINATA	Prairie Slough Grass	Y	G3?	S3			

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Ambrosia linearis	Plains Ragweed	Y	G2	S2	FS		
Viola pedatifida	Prairie Violet	Y	G5	S2			

County: Fremont

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Strix occidentalis lucida	Mexican Spotted Owl	Y	G3T3	S1B,		LT	T

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Etheostoma cragini	Arkansas darter	Y	G3	S2	FS	C	T
Phoxinus erythrogaster	southern redbelly dace	Y	G5	S1	FS		E

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Amblyscirtes simius	Simius roadside skipper	Y	G4	S3			
Callophrys mossii schryveri	Moss's elfin	Y	G4T3	S2S3			
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Conepatus mesoleucus	common hog-nosed skunk	Y	G4	SH			
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		
Thomomys bottae rubidus	Botta's pocket gopher subsp.	Y	G5T1	S1			

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Ferrissia walkeri	cloche ancylid	Y	G?	S3			
Valvata sincera	mossy valvata	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ALNUS INCANA/MESIC GRAMINOID	Montane Riparian Shrubland	Y	G5Q	S3			
ARTEMISIA BIGELOVII/ORYZOPSIS HYMENOIDES	Plains Escarpment Prairies (Limestone	Y	G3	S3?			
BETULA OCCIDENTALIS/MESIC FORB	Foothills Riparian Shrubland	Y	G3	S2			
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4			
JUNIPERUS SCOPULORUM	Riparian Woodland	Y	GU	S3S4			
PINUS EDULIS/STIPA SCRIBNERI	Two-Needle Pinyon/Scribner's Needle Grass	Y	G3	S1?			
PINUS PONDEROSA/LEUCOPOA KINGII	Foothills Ponderosa Pine Savannas	Y	G3	S3			
POPULUS ACUMINATA	Montane Riparian Forest	Y	GU	SU			

POPULUS ANGUSTIFOLIA-JUNIPERUS SCOPULORUM	Montane Riparian Forest	Y	G2G3	S2
POPULUS ANGUSTIFOLIA-PSEUDOTSUGA	Montane Riparian Forest	Y	G2?	S2
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	Montane Riparian Forest	Y	G3?	S2
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	Narrowleaf Cottonwood Riparian Forests	Y	G4	S4
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SALIX EXIGUA	Plains Cottonwood Riparian Woodland	Y	G4?	S3
PSEUDOTSUGA MENZIESII/BETULA OCCIDENTALIS	Montane Riparian Forest	Y	G3?	S3
QUERCUS GAMBELII-CERCOCARPUS MONTANUS/MUHLENBERGIA MONTANA	Mesic Oak Thickets	Y	GU	SU
SALIX EXIGUA/BARE GROUND	Coyote Willow/Bare Ground	Y	G5	S5
SALIX EXIGUA/MESIC GRAMINOID	Coyote Willow/Mesic Graminoid	Y	G5	S5
STIPA COMATA - EAST	Great Plains Mixed Grass Prairies	Y	G2	S2
STIPA NEOMEXICANA	Great Plains Mixed Grass Prairies	Y	G3	S2

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Aquilegia chrysantha var rydbergii	Golden Columbine	Y	G4T1Q	S1	BLM		
Asclepias uncialis	Dwarf Milkweed	Y	G3?	S1S2	FS/BL		
Asplenium platyneuron	Ebony Spleenwort	Y	G5	S1			
Astragalus brandegeei	Brandegee Milkvetch	Y	G3G4	S1S2	BLM		
Bolophyta alpina	Wyoming Feverfew	Y	G3	S1	FS		
Bolophyta tetraneuris	Arkansas River Feverfew	Y	G3	S3			
Cheilanthes eatonii	Eaton's Lip Fern	Y	G5?	S2			
Cheilanthes wootonii	Wooton's Lip Fern	Y	G5	S1			
Eriogonum brandegeei	Brandegee Wild Buckwheat	Y	G1G2	S1S2	FS/BL		
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			
Heuchera richardsonii	Richardson Alum-Root	Y	G5	S1			
Mentzelia chrysantha	Golden Blazing Star	Y	G1G2	S1S2	BLM		
Mentzelia densa	Arkansas Canyon Stickleaf	Y	G2	S2	BLM		
Mirabilis rotundifolia	Round-Leaf Four-O'clock	Y	G2	S2			
Nuttallia chrysantha	Golden Blazing Star	Y	G1G2	S1S2	BLM		
Nuttallia densa	Arkansas Canyon Stickleaf	Y	G2	S2	BLM		
Oenothera harringtonii	Arkansas Valley Evening Primrose	Y	G2	S2			
Oonopsis sp 1	Pueblo Goldenweed	Y	G1G2	S1S2			
Oxybaphus rotundifolia	Round-Leaf Four-O'clock	Y	G2	S2			
Parthenium alpinum	Wyoming Feverfew	Y	G3	S1	FS		
Parthenium tetraneuris	Arkansas River Feverfew	Y	G3	S3			
Penstemon degeneri	Degener Beardtongue	Y	G2	S2	FS/BL		
Ribes niveum	Snow Gooseberry	Y	G3?	S1			

Sarcostemma crispum	Twinevine	Y	G4G5	S1
Thamnosma texana	Dutchman's Breeches	Y	G5	SH
Viola pedatifida	Prairie Violet	Y	G5	S2
Woodsia neomexicana	New Mexico Cliff Fern	Y	G4?	S2

County: Garfield

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC
Spea intermontana	Great Basin spadefoot	Y	G5	S3	BLM		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Bucephala islandica	Barrow's Goldeneye	Y	G5	S2B,	BLM		SC
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Cypseloides niger	Black Swift	Y	G4	S3B	FS		
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Grus canadensis tabida	Greater Sandhill Crane	Y	G5T4	S2B,	FS		T
Plegadis chihi	White-faced Ibis	Y	G5	S2B,	FS/BL		
Tympanuchus phasianellus columbianus	Columbian Sharp-tailed Grouse	Y	G4T3	S2	FS/BL		
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Erebia theano	Theano alpine	Y	G4	S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		
Tadarida brasiliensis	Brazilian free-tailed bat	W	G5	S1			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/RIBES SPP.	Coniferous Wetland Forests	Y	G5	S3			

ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	Montane Riparian Forest	Y	G5	S4
ABIES LASIOCARPA/RUBUS PARVIFLORUS	Subalpine Forests	Y	G5	S2
ACER NEGUNDO-POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Narrowleaf Cottonwood Riparian Forests	Y	G2	S2
ACER NEGUNDO/CORNUS SERICEA	Montane Riparian Deciduous Forest	Y	G3?	S2
ACER NEGUNDO/PRUNUS	Montane Riparian Deciduous Forest	Y	G3	S2
ALNUS INCANA-CORNUS SERICEA	Thinleaf Alder-Red-Oiser Dogwood Riparian Shrubland	Y	G3G4	S3
AMELANCHIER UTAHENSIS/CAREX GEYERI	Mixed Mountain Shrublands	Y	GU	S2S3
AQUILEGIA MICRANTHA-MIMULUS EASTWOODIAE	Hanging Gardens	Y	G2G3	S2S3
ARTEMISIA NOVA/PSEUDOROEGNERIA SPICATA	Western Slope Sagebrush Shrublands	Y	G5	S2?
ARTEMISIA TRIDENTATA SSP. VASEYANA/FESTUCA THURBERI	Western Slope Sagebrush Shrublands	Y	GU	S1S2
ARTEMISIA TRIDENTATA SSP. VASEYANA/PSEUDOROEGNERIA SPICATA	Western Slope Sagebrush Shrublands	Y	G5	S2
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/ORYZOPSIS HYMENOIDES	Xeric Sagebrush Shrublands	Y	GU	S2S3
ATRIPLEX CONFERTIFOLIA/LEYMUS SALINUS	Cold Desert Shrublands	Y	G3G5	S3
ATRIPLEX CONFERTIFOLIA/ORYZOPSIS	Cold Desert Shrublands	Y	G2	S2
ATRIPLEX CONFERTIFOLIA/PSEUDOROEGNERIA SPICATA	Cold Desert Shrublands	Y	G3	S2S3
BETULA OCCIDENTALIS/MESIC FORB	Foothills Riparian Shrubland	Y	G3	S2
CARDAMINE CORDIFOLIA-MERTENSIA	Alpine Wetlands	Y	G4	S4
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4
CAREX AQUATILIS-CAREX UTRICULATA	Montane Wet Meadows	Y	G4	S4
CAREX NEBRASCENSIS	Wet Meadows	Y	G4	S3
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4
CATABROSA AQUATICA-MIMULUS	Spring Wetland	Y	GU	S3
CERCOCARPUS MONTANUS/PSEUDOROEGNERIA SPICATA	Mixed Mountain Shrublands	Y	G4	S3
CORNUS SERICEA	Foohthills Riparian Shrubland	Y	G4	S3
DESCHAMPSIA CESPITOSA	Mesic Alpine Meadow	Y	G4?	S4
DISTICHLIS SPICATA	Salt Meadows	Y	G5	S3
ELEOCHARIS QUINQUEFLORA	Alpine Wetlands	Y	G4	S3S4
FESTUCA IDAHOENSIS-ELYMUS TRACHYCAULUS	Montane Grasslands	Y	G3	S1
FESTUCA IDAHOENSIS-FESTUCA THURBERI	Montane Grasslands	Y	G3G4	S3S4
GEUM ROSSII-SIBBALDIA PROCUMBENS	Mesic Alpine Meadows	Y	GU	SU
GEUM ROSSII/TRIFOLIUM SPP.	Alpine Meadows	Y	G3G4	S3S4
JUNCUS BALTICUS VAR. MONTANUS	Western Slope Wet Meadows	Y	G5	S5
LEYMUS CINEREUS	Western Slope Grasslands	Y	G4	S1S2
PICEA ENGELMANNII/CORNUS SERICEA	Montane Riparian Forests	Y	GU	SU

PICEA PUNGENS/BETULA OCCIDENTALIS	Montane Riparian Woodland	Y	G2	S2
PICEA PUNGENS/CORNUS SERICEA	Montane Riparian Forest	Y	G4	S2
PINUS EDULIS/CERCOCARPUS MONTANUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	G5	S4
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	Montane Riparian Forest	Y	G3?	S2
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Cottonwood Riparian Forest	Y	G4	S3
POPULUS ANGUSTIFOLIA/RHUS TRILOBATA	Narrowleaf Cottonwood/Skunkbrush	Y	G3	S3
POPULUS DELTOIDES SSP. WISLIZENII/RHUS TRILOBATA	Fremont's Cottonwood Riparian Forests	Y	G2	S2
POPULUS TREMULOIDES/ACER GLABRUM	Montane Riparian Forests	Y	G2	S1S2
POPULUS TREMULOIDES/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
POPULUS TREMULOIDES/CEANOTHUS VELUTINUS	Aspen Forests	Y	G2G3	S2S3
POPULUS TREMULOIDES/PTERIDIUM AQUILINUM	Aspen Wetland Forests	Y	G4	S3S4
POPULUS TREMULOIDES/TALL FORBS	Montane Aspen Forest	Y	G5	S5
PSEUDOROEGNERIA SPICATA	Western Slope Grasslands	Y	G2?	S2?
PSEUDOROEGNERIA SPICATA ORYZOPSIS HYMENOIDES	Western Slope Grasslands	Y	G3	SP
PSEUDOROEGNERIA SPICATA-POA SECUNDA	Montane Grasslands	Y	G4	S1
PSEUDOTSUGA MENZIESII/CORNUS SERICEA	Lower Montane Riparian Forests	Y	G4	S2
PSEUDOTSUGA MENZIESII/PAXISTIMA MYRSINITES	Lower Montane Forests	Y	G2G3	S2S3
PSEUDOTSUGA MENZIESII/SYMPHORICARPOS OREOPHILUS	Western Slope Douglas Fir Forests	Y	G5	S4
QUERCUS GAMBELII-AMELANCHIER UTAHENSIS	Mixed Mountain Shrubland	Y	G3G5	SU
QUERCUS GAMBELII-CERCOCARPUS MONTANUS/CAREX GEYERI	Mixed Mountain Shrublands	Y	G3	S3
QUERCUS GAMBELII/PACHYSTIMA MYRSINITES	Mixed Mountain Shrublands	Y	GU	SU
QUERCUS GAMBELII/SYMPHORICARPOS OREOPHILUS	Mixed Mountain Shrublands	Y	G5	S3S4
SALIX BOOTHII/MESIC FORB	Booth's Willow/Mesic Forb	Y	G3	S3
SALIX BOOTHII/MESIC GRAMINOID	Riparian Willow Carr	Y	G3	S3
SALIX BRACHYCARPA/DESCHAMPSIA CESPITOSA-GEUM ROSSII	Alpine Willow Scrub	Y	G4	S3S4
SALIX BRACHYCARPA/MESIC FORB	Alpine Willow Scrub	Y	G4	S4
SALIX DRUMMONDIANA/CAREX UTRICULATA	Montane Willow Carr	Y	GU	S3
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	Y	G4	S4
SALIX MONTICOLA/CAREX UTRICULATA	Montane Riparian Willow Carr	Y	G3	S3
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4
SALIX PLANIFOLIA/CAREX	Subalpine Riparian Willow Carr	Y	G5	S4
SALIX WOLFII/CAREX AQUATILIS	Subalpine Riparian Willow Carr	Y	G4	S3

SALIX WOLFII/MESIC FORB	Subalpine Riparian Willow Carr	Y	G3	S3			
VACCINIUM CESPITOSUM/VACCINIUM	Alpine Scrub	Y	G4	S1?			

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Allium nevadense	Nevada Onion	Y	G4	S2			
Argillochloa dasyclada	Utah Fescue	Y	G3	S3			
Asplenium trichomanes-ramosum	Green Spleenwort	Y	G4	S1S2			
Astragalus argophyllus var martinii	Meadow Milkvetch	Y	G5T4	S1			
Astragalus debequaeus	Debeque Milkvetch	Y	G2	S2	BLM		
Astragalus linifolius	Grand Junction Milkvetch	Y	G3Q	S3	BLM		
Astragalus wetherillii	Wetherill Milkvetch	Y	G3	S3			
Botrychium lunaria	Common Moonwort	Y	G5	S2S3			
Carex diandra	Lesser Panicled Sedge	Y	G5	S1			
Ceanothus martinii	Utah Mountain Lilac	Y	G4	S1			
Cryptantha cana	Mountain Cat's-Eye	Y	G5	S2			
Cryptantha mensana	Carbon Cryptanth	Y	G3	S1			
Cypripedium calceolus ssp parviflorum	Yellow Lady's-Slipper	Y	G5	S2			
Cypripedium pubescens	Yellow Lady's-Slipper	Y	G5	S2			
Draba spectabilis	Draba	Y	G3?T3Q	S3			
Draba spectabilis var oxyloba	Draba	Y	G3?T3Q	S3			
Eriogonum contortum	Grand Buckwheat	Y	G3	S2	BLM		
Festuca dasyclada	Utah Fescue	Y	G3	S3			
Iliamna grandiflora	Large-Flower Globe-Mallow	Y	G3?Q	S1			
Lesquerella parviflora	Piceance Bladderpod	Y	G2G3	S2S3	BLM		
Limnorchis ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Listera borealis	Northern Twayblade	Y	G4	S2	BLM		
Mentzelia argillosa	Arapien Stickleaf	Y	G3	S2	BLM		
Monardella odoratissima	Mountain Wild Mint	Y	G4G5	S2			
Nuttallia argillosa	Arapien Stickleaf	Y	G3	S2	BLM		
Oreocarya cana	Mountain Cat's-Eye	Y	G5	S2			
Oreocarya mensana	Carbon Cryptanth	Y	G3	S1			
Pellaea atropurpurea	Purple Cliff-Brake	Y	G5	S2S3			
Pellaea breweri	Brewer's Cliff-Brake	Y	G5	S2			
Pellaea glabella ssp simplex	Smooth Cliff-Brake	Y	G5T4?	S2			
Pellaea suksdorfiana	Smooth Cliff-Brake	Y	G5T4?	S2			
Penstemon debilis	Parachute Penstemon	Y	G1	S1		C	
Penstemon harringtonii	Harrington Beardtongue	Y	G3	S3	FS/BL		
Penstemon mensarum	Grand Mesa Penstemon	Y	G3	S3			
Phacelia scopulina var submutica	Debeque Phacelia	Y	G4T2	S2	FS	C	
Phacelia submutica	Debeque Phacelia	Y	G4T2	S2	FS	C	
Platanthera sparsiflora var ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Pyrola picta	Pictureleaf Wintergreen	W	G4G5	S3			

Sclerocactus glaucus	Uinta Basin Hookless Cactus	Y	G3	S3		LT	
Sullivantia hapemanii var purpusii	Hanging Garden Sullivantia	Y	G3T3	S3	FS		
Thalictrum heliophilum	Sun-Loving Meadowrue	Y	G3	S3			

Reptiles

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Coluber constrictor mormon	western yellowbelly racer	Y	G5T5	S3			
Crotalus viridis concolor	midget faded rattlesnake	Y	G5T4	S3?	BLM		SC
Gambelia wislizenii	longnose leopard lizard	Y	G5	S1	BLM		SC

County: Gilpin

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Oncorhynchus clarki stomias	greenback cutthroat trout	Y	G4T2T3	S2		LT	T

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Callophrys mossii schryveri	Moss's elfin	Y	G4T3	S2S3			
Erebia theano	Theano alpine	Y	G4	S3			
Pyrgus ruralis	Two-banded skipper	W	G4	S3			

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Promenetus umbilicatellus	umbilicate sprite	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	Y	G4	S4			
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4			
SALIX PLANIFOLIA/CAREX	Subalpine Riparian Willow Carr	Y	G5	S4			

Plants

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Aquilegia saximontana	Rocky Mountain Columbine	Y	G3	S3			
Aster alpinus var vierhapperi	Alpine Aster	Y	G5TU	S1			
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS		
Carex oreocharis	A Sedge	Y	G3	S1			
Draba exunguiculata	Clawless Draba	Y	G2	S2			
Draba porsildii	Porsild Draba	Y	G3G4	S1			
Dryopteris expansa	Spreading Wood Fern	Y	G5	S1			
Lycopodium annotinum var pungens	Stiff Clubmoss	Y	G5TU	SU			
Lycopodium dubium	Stiff Clubmoss	Y	G5TU	SU			
Papaver kluanensis	Alpine Poppy	W	G5T3?	S3			
Papaver radicatum ssp kluanense	Alpine Poppy	W	G5T3?	S3			

County: Grand

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana sylvatica	wood frog	Y	G5	S3	FS		

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Bucephala islandica	Barrow's Goldeneye	Y	G5	S2B,	BLM		SC
Centrocercus sp 1	Gunnison Sage Grouse	Y	G1	S1	BLM		SC
Cypseloides niger	Black Swift	Y	G4	S3B	FS		
Grus americana	Whooping Crane	Y	G1	SAN			E
Grus canadensis tabida	Greater Sandhill Crane	Y	G5T4	S2B,	FS		T
Tympanuchus phasianellus columbianus	Columbian Sharp-tailed Grouse	Y	G4T3	S2	FS/BL		

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC
Oncorhynchus clarki stomias	greenback cutthroat trout	Y	G4T2T3	S2		LT	T

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Oeneis jutta reducta	Rocky Mountain arctic jutta	Y	G5TU	S3			
Pyrgus ruralis	Two-banded skipper	W	G4	S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Sorex hoyi montanus	pygmy shrew	Y	G5T2T3	S2	FS		

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Promenetus umbilicatellus	umbilicate sprite	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5			
ALNUS INCANA-CORNUS SERICEA	Thinleaf Alder-Red-Oiser Dogwood Riparian Shrubland	Y	G3G4	S3			

ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparian Shrubland	Y	G3G4Q	S3
AMELANCHIER UTAHENSIS/PSEUDOROEGNERIA SPICATA	Mixed Mountain Shrublands	Y	G2G3	S2S3
ARTEMISIA CANA/FESTUCA	Western Slope Sagebrush Shrublands	Y	G2G3	S2S3
ARTEMISIA TRIDENTATA SSP. TRIDENTATA/LEYMUS CINEREUS	Sagebrush Bottomland Shrublands	Y	G2G3	S1
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/PASCOPYRUM SMITHII	Sagebrush Bottomland Shrublands	Y	GU	SU
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/PSEUDOROEGNERIA SPICATA	Xeric Sagebrush Shrublands	Y	G5	S3?
BETULA GLANDULOSA/MESIC FORB-MESIC GRAMINOID	Subalpine Riparian Shrubland	Y	G3G4	S3
CALAMAGROSTIS CANADENSIS	Montane Wet Meadows	Y	G4Q	S4
CAREX AQUATILIS-CAREX UTRICULATA	Montane Wet Meadows	Y	G4	S4
CAREX FOENEA	Montane Riparian Meadow	Y	GU	S1?Q
CAREX RUPESTRIS-GEUM ROSSII	Alpine Meadows	Y	G4	S4
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4
DESCHAMPSIA CESPITOSA-GEUM ROSSII	Mesic Alpine Meadows	Y	G5	S5
JUNIPERUS SCOPULORUM/PSEUDOROEGNERIA SPICATA	Xeric Western Slope Pinyon-Juniper Woodlands	Y	G4	S2S3
KOBRESIA MYOSUROIDES-GEUM ROSSII	Alpine Meadows	Y	G5	S5
PARONYCHIA PULVINATA-SILENE ACAULIS VAR SUBACAULIS	Alpine Fellfields	Y	G5	S5
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Cottonwood Riparian Forest	Y	G4	S3
PSEUDOROEGNERIA SPICATA-BOUTELOUA GRACILIS	Western Slope Grasslands	Y	G3	S1
SALIX ARCTICA/GEUM ROSSII	Alpine Willow Scrub	Y	G4	S4?
SALIX BOOTHII/MESIC FORB	Booth's Willow/Mesic Forb	Y	G3	S3
SALIX BOOTHII/MESIC GRAMINOID	Riparian Willow Carr	Y	G3	S3
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	Y	G4	S4
SALIX EXIGUA/BARE GROUND	Coyote Willow/Bare Ground	Y	G5	S5
SALIX GEYERIANA-SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carrs	Y	G3	S3
SALIX GEYERIANA/CALAMAGROSTIS CANADENSIS	Montane Riparian Willow Carr	Y	G5	S3
SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carr	Y	G3	S3
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CAREX	Subalpine Riparian Willow Carr	Y	G5	S4
SALIX WOLFII/CALAMAGROSTIS CANADENSIS	Subalpine Riparian Willow Carr	Y	G3	S2S3
SALIX WOLFII/CAREX AQUATILIS	Subalpine Riparian Willow Carr	Y	G4	S3
SALIX WOLFII/CAREX UTRICULATA	Subalpine Riparian Willow Carr	Y	G4	S3
SCIRPUS PUNGENS	Bulrush	Y	G3G4	S3

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Aletes nuttallii	Dog Parsley	Y	G3G4	S1			
Aster alpinus var vierhapperi	Alpine Aster	Y	G5TU	S1			
Astragalus bodinii	Bodin Milkvetch	Y	G4	S2			
Astragalus osterhoutii	Osterhout Milkvetch	Y	G1	S1		LE	
Botrychium lunaria	Common Moonwort	Y	G5	S2S3			
Botrychium minganense	Mingan Moonwort	Y	G4	S1			
Botrychium simplex	Least Moonwort	Y	G5	S1			
Carex leptalea	Bristle-Stalk Sedge	Y	G5	S1			
Carex limosa	Mud Sedge	Y	G5	S2			
Cryptogramma stelleri	Slender Rock-Brake	Y	G5	S2	BLM		
Cylactis arctica ssp acaulis	Nagoon Berry	Y	G5T5	S1	FS		
Cypripedium fasciculatum	Purple Lady's-Slipper	Y	G4	S3	FS		
Cystopteris montana	Mountain Bladder Fern	Y	G5	S1			
Draba crassa	Thick-Leaf Whitlow-Grass	Y	G3	S3			
Draba exunguiculata	Clawless Draba	Y	G2	S2			
Draba grayana	Gray's Peak Whitlow-Grass	Y	G2	S2			
Draba lonchocarpa	Lancepod Whitlowgrass	Y	G4T4	S2			
Draba lonchocarpa var lonchocarpa	Lancepod Whitlowgrass	Y	G4T4	S2			
Drosera rotundifolia	Roundleaf Sundew	Y	G5	S2	FS		
Dryopteris expansa	Spreading Wood Fern	Y	G5	S1			
Eriophorum gracile	Slender Cottongrass	Y	G5	S2			
Ipomopsis aggregata ssp weberi	Rabbit Ears Gilia	Y	G5T2	S2	FS		
Juncus vaseyi	Vasey Bulrush	Y	G5?	S1			
Lewisia rediviva	Bitteroot	Y	G5	S2			
Listera borealis	Northern Twayblade	Y	G4	S2	BLM		
Lomatium nuttallii	Dog Parsley	Y	G3G4	S1			
Mimulus gemmiparus	Weber Monkey-Flower	Y	G2	S2	FS		
Papaver kluanensis	Alpine Poppy	W	G5T3?	S3			
Papaver radicatum ssp kluanense	Alpine Poppy	W	G5T3?	S3			
Parnassia kotzebuei	Kotzebue Grass-Of-Parnassus	Y	G4	S2			
Penstemon cyathophorus	Middle Park Penstemon	W	G3G4	S3S4			
Penstemon harringtonii	Harrington Beardtongue	Y	G3	S3	FS/BL		
Penstemon penlandii	Penland Beardtongue	Y	G1	S1		LE	
Rubus arcticus ssp acaulis	Nagoon Berry	Y	G5T5	S1	FS		
Trillium ovatum	Western Wake-Robin	W	G5	S3			

County: Gunnison

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Centrocercus sp 1	Gunnison Sage Grouse	Y	G1	S1	BLM		SC
Cypseloides niger	Black Swift	Y	G4	S3B	FS		
Dolichonyx oryzivorus	Bobolink	W	G5	S3B,			
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Lycaeides idas sublivens	Dark blue	P	G5T?	S3			
Oeneis taygete	White-veined arctic	Y	G5?	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		
Sorex hoyi montanus	pygmy shrew	Y	G5T2T3	S2	FS		
Sorex nanus	dwarf shrew	Y	G4	S2	FS		

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Promenetus umbilicatellus	umbilicate sprite	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA - PICEA ENGELMANNII - POPULUS ANGUSTIFOLIA / LONICERA INVOLUCRATA	Montane Riparian Forest	Y	G4	S3			
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	Montane Riparian Forests	Y	G5	S5			

ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5
ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	Montane Riparian Forest	Y	G5	S4
ABIES LASIOCARPA/RUBUS PARVIFLORUS	Subalpine Forests	Y	G5	S2
ALNUS INCANA-MIXED SALIX	Thinleaf Alder-Mixed Willow Species	Y	G3	S3
ALNUS INCANA-SALIX DRUMMONDIANA	Montane Riparian Shrubland	Y	G3	S3
ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparian Shrubland	Y	G3G4Q	S3
BETULA GLANDULOSA/MESIC FORB-MESIC GRAMINOID	Subalpine Riparian Shrubland	Y	G3G4	S3
CALAMAGROSTIS CANADENSIS	Montane Wet Meadows	Y	G4Q	S4
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
PICEA PUNGENS/CORNUS SERICEA	Montane Riparian Forest	Y	G4	S2
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Cottonwood Riparian Forest	Y	G4	S3
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	Narrowleaf Cottonwood Riparian Forests	Y	G4	S4
POPULUS BALSAMIFERA	Montane Riparian Woodland	Y	GU	SU
POPULUS TREMULOIDES/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
POPULUS TREMULOIDES/SHEPHERDIA CANADENSIS	Persistent Aspen Forests	Y	G4	S3?
SALIX BOOTHII/CAREX UTRICULATA	Booth's Willow/Beaked Sedge	Y	G4	S3
SALIX BOOTHII/MESIC FORB	Booth's Willow/Mesic Forb	Y	G3	S3
SALIX BRACHYCARPA/MESIC FORB	Alpine Willow Scrub	Y	G4	S4
SALIX DRUMMONDIANA/CALAMAGROSTIS CANADENSIS	Lower Montane Willow Carrs	Y	G3	S3
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	Y	G4	S4
SALIX GEYERIANA/CAREX AQUATILIS	Montane Willow Carr	Y	G3?	S3
SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carr	Y	G3	S3
SALIX MONTICOLA/CAREX UTRICULATA	Montane Riparian Willow Carr	Y	G3	S3
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4
SALIX PLANIFOLIA/CAREX	Subalpine Riparian Willow Carr	Y	G5	S4
SALIX WOLFII/CALAMAGROSTIS CANADENSIS	Subalpine Riparian Willow Carr	Y	G3	S2S3
SALIX WOLFII/CAREX AQUATILIS	Subalpine Riparian Willow Carr	Y	G4	S3

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Arabis crandallii	Crandall's Rock-Cress	Y	G4	S2	BLM		
Arnica alpina var tomentosa	Alpine Arnica	Y	G5T5	S1			

Arnica angustifolia ssp tomentosa	Alpine Arnica	Y	G5T5	S1	
Askellia nana	Dwarf Hawksbeard	Y	G5	S2	
Asplenium trichomanes-ramosum	Green Spleenwort	Y	G4	S1S2	
Astragalus anisus	Gunnison Milkvetch	Y	G2	S2	FS/BL
Astragalus brandegeei	Brandegee Milkvetch	Y	G3G4	S1S2	BLM
Astragalus microcymbus	Skiff Milkvetch	Y	G1	S1	BLM
Astragalus molybdenus	Leadville Milkvetch	Y	G3	S2	FS
Boechera crandallii	Crandall's Rock-Cress	Y	G4	S2	BLM
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS
Botrychium lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3	
Botrychium lanceolatum var lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3	
Botrychium pallidum	Pale Moonwort	Y	G2	S2	FS
Braya glabella	Arctic Braya	Y	G5	S1	FS
Braya glabella var glabella	Arctic Braya	Y	G5	S1	FS
Braya humilis	Alpine Braya	Y	G4	S2	
Carex viridula	Green Sedge	Y	G5?	S1	
Comarum palustre	Marsh Cinquefoil	Y	G5	S1S2	
Crepis nana	Dwarf Hawksbeard	Y	G5	S2	
Cryptogramma stelleri	Slender Rock-Brake	Y	G5	S2	BLM
Cystopteris montana	Mountain Bladder Fern	Y	G5	S1	
Draba crassa	Thick-Leaf Whitlow-Grass	Y	G3	S3	
Draba globosa	Rockcress Draba	Y	G3	S1	
Draba incerta	Yellowstone Whitlow-Grass	Y	G5	S1	
Draba lonchocarpa	Lancepod Whitlowgrass	Y	G4T4	S2	
Draba lonchocarpa var lonchocarpa	Lancepod Whitlowgrass	Y	G4T4	S2	
Draba oligosperma	Woods Draba	Y	G5	S2	
Draba porsildii	Porsild Draba	Y	G3G4	S1	
Draba rectifructa	Mountain Whitlow-Grass	Y	G3?	S2	
Draba spectabilis	Draba	Y	G3?T3Q	S3	
Draba spectabilis var oxyloba	Draba	Y	G3?T3Q	S3	
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3	
Draba ventosa	Tundra Draba	Y	G3	S1	
Drosera rotundifolia	Roundleaf Sundew	Y	G5	S2	FS
Equisetum variegatum var variegatum	Variegated Scouringrush	Y	G5T?	S1	
Erigeron humilis	Low Fleabane	Y	G4	S1	
Erigeron lanatus	Woolly Fleabane	Y	G3G4	S1	FS
Eriogonum coloradense	Colorado Wild Buckwheat	Y	G2	S2	BLM
Eriophorum altaicum var neogaeum	Altai Cottongrass	Y	G4T?	S3	FS
Eriophorum gracile	Slender Cottongrass	Y	G5	S2	
Gilia penstemonoides	Black Canyon Gilia	Y	G3	S3	FS
Hippochaete variegata	Variegated Scouringrush	Y	G5T?	S1	
Limnorchis ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3	
Listera borealis	Northern Twayblade	Y	G4	S2	BLM

Lomatium bicolor var bicolor	Wasatch Biscuitroot	Y	G4T3T4	S1	
Lomatium concinnum	Colorado Desert-Parsley	Y	G2	S2	BLM
Machaeranthera coloradoensis	Colorado Tansy-Aster	Y	G2?	S2	FS
Muscaria monticola	Tundra Saxifrage	Y	G5T5	S1	
Papaver kluanensis	Alpine Poppy	W	G5T3?	S3	
Papaver radicatum ssp kluanense	Alpine Poppy	W	G5T3?	S3	
Penstemon mensarum	Grand Mesa Penstemon	Y	G3	S3	
Platanthera sparsiflora var ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3	
Ranunculus gelidus ssp grayi	Tundra Buttercup	Y	G4G5	S2	
Ranunculus karelinii	Tundra Buttercup	Y	G4G5	S2	
Salix candida	Hoary Or Silver Willow	Y	G5	S2	
Salix lanata ssp calcicola	Lime-Loving Willow	Y	G4T4	S1	FS
Saxifraga cespitosa ssp monticola	Tundra Saxifrage	Y	G5T5	S1	
Stellaria irrigua	Altai Chickweed	Y	G4?	S2	
Sullivantia hapemanii var purpusii	Hanging Garden Sullivantia	Y	G3T3	S3	FS

County: Hinsdale

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Gila pandora	Rio Grande chub	Y	G3	S1?	BLM		SC
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC
Oncorhynchus clarki virginalis	Rio Grande cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Boloria acrocnema	Uncompahgre fritillary	Y	G2	S2		LE	
Erebia theano	Theano alpine	Y	G4	S3			
Oeneis taygete	White-veined arctic	Y	G5?	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	Montane Riparian Forest	Y	G5	S4			
ALNUS INCANA-SALIX DRUMMONDIANA	Montane Riparian Shrubland	Y	G3	S3			
CARDAMINE CORDIFOLIA-MERTENSIA	Alpine Wetlands	Y	G4	S4			
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4			
CAREX MICROPTERA	Montane Wetland	Y	G4	S2?			
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4			
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3			
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	Narrowleaf Cottonwood Riparian Forests	Y	G4	S4			

SALIX BOOTHII/MESIC FORB	Booth's Willow/Mesic Forb	Y	G3	S3
SALIX DRUMMONDIANA/CALAMAGROSTIS CANADENSIS	Lower Montane Willow Carrs	Y	G3	S3
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	Y	G4	S4
SALIX GEYERIANA-SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carrs	Y	G3	S3
SALIX GEYERIANA-SALIX MONTICOLA/CAREX AQUATILIS	Montane Riparian Willow Carr	Y	GU	S3
SALIX MONTICOLA/CAREX UTRICULATA	Montane Riparian Willow Carr	Y	G3	S3
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3
SALIX MONTICOLA/MESIC	Montane Riparian Willow Carr	Y	G3	S3
SALIX WOLFII/CAREX AQUATILIS	Subalpine Riparian Willow Carr	Y	G4	S3
SALIX WOLFII/MESIC FORB	Subalpine Riparian Willow Carr	Y	G3	S3

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS		
Botrychium lunaria	Common Moonwort	Y	G5	S2S3			
Botrychium simplex	Least Moonwort	Y	G5	S1			
Draba crassa	Thick-Leaf Whitlow-Grass	Y	G3	S3			
Draba graminea	San Juan Whitlow-Grass	Y	G2	S2			
Draba spectabilis	Draba	Y	G3?T3Q	S3			
Draba spectabilis var oxyloba	Draba	Y	G3?T3Q	S3			
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3			
Erigeron humilis	Low Fleabane	Y	G4	S1			
Eriophorum altaicum var neogaeum	Altai Cottongrass	Y	G4T?	S3	FS		
Gilia penstemonoides	Black Canyon Gilia	Y	G3	S3	FS		
Lesquerella pruinosa	Pagosa Bladderpod	Y	G2	S2	FS/BL		
Lilium philadelphicum	Wood Lily	W	G5	S3			
Machaeranthera coloradoensis	Colorado Tansy-Aster	Y	G2?	S2	FS		
Pyrola picta	Pictureleaf Wintergreen	W	G4G5	S3			
Ranunculus gelidus ssp grayi	Tundra Buttercup	Y	G4G5	S2			
Ranunculus karelinii	Tundra Buttercup	Y	G4G5	S2			
Salix candida	Hoary Or Silver Willow	Y	G5	S2			
Stellaria irrigua	Altai Chickweed	Y	G4?	S2			

County: Huerfano

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Strix occidentalis lucida	Mexican Spotted Owl	Y	G3T3	S1B,		LT	T
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Oncorhynchus clarki stomias	greenback cutthroat trout	Y	G4T2T3	S2		LT	T
Oncorhynchus clarki virginalis	Rio Grande cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Amblyscirtes simius	Simius roadside skipper	Y	G4	S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
DANTHONIA PARRYI	Montane Grasslands	Y	G3	S3			
PINUS ARISTATA/FESTUCA THURBERI	Lower Montane Woodlands	Y	G3	S2			
PINUS ARISTATA/VACCINUM MYRTILLUS	Montane Woodlands	Y	GU	SU			
PINUS EDULIS/LEYMUS AMBIGUUS	Foothills Pinyon-Juniper Woodlands	Y	GU	SU			
STIPA COMATA-BOUTELOUA	Montane Grasslands	Y	G5	S2S3			

Plants

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Agastache foeniculum	Lavender Hyssop	Y	G4G5	S1			
Aletes lithophilus	Rock-Loving Neoparrya	Y	G2	S2	FS/BL		
Asclepias uncialis	Dwarf Milkweed	Y	G3?	S1S2	FS/BL		
Askellia nana	Dwarf Hawksbeard	Y	G5	S2			
Crepis nana	Dwarf Hawksbeard	Y	G5	S2			
Draba grayana	Gray's Peak Whitlow-Grass	Y	G2	S2			

Draba rectifructa	Mountain Whitlow-Grass	Y	G3?	S2	
Festuca campestris	Big Rough Fescue	Y	G4?	SH	
Lilium philadelphicum	Wood Lily	W	G5	S3	
Neoparrya lithophila	Rock-Loving Neoparrya	Y	G2	S2	FS/BL
Oenothera harringtonii	Arkansas Valley Evening Primrose	Y	G2	S2	
Oxytropis parryi	Parry Oxytrope	Y	G5	S1	
Pyrola picta	Pictureleaf Wintergreen	W	G4G5	S3	
Viola pedatifida	Prairie Violet	Y	G5	S2	

County: Jackson

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC
Rana sylvatica	wood frog	Y	G5	S3	FS		

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Asio flammeus	Short-eared Owl	Y	G5	S2B,			
Catoptrophorus semipalmatus	Willet	Y	G5	S1B,			
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Grus americana	Whooping Crane	Y	G1	SAN			E
Grus canadensis tabida	Greater Sandhill Crane	Y	G5T4	S2B,	FS		T
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Pelecanus erythrorhynchos	American White Pelican	Y	G3	S1B,	BLM		SC
Plegadis chihi	White-faced Ibis	Y	G5	S2B,	FS/BL		
Sterna forsteri	Forster's Tern	Y	G5	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC
Oncorhynchus clarki stomias	greenback cutthroat trout	Y	G4T2T3	S2		LT	T

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Hyles gallii	Galium sphinx moth	Y	G?	S3?			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Acroloxus coloradensis	Rocky Mountain capshell	Y	G?	S2	FS/BL		SC

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA/VACCINIUM MYRTILLUS	Subalpine Forests	Y	G5	S5			
ARTEMISIA NOVA/STIPA COMATA	Western Slope Sagebrush Shrublands	Y	G4	S2?			
ARTEMISIA TRIDENTATA SSP. VASEYANA/PASCOPYRUM SMITHII	Sagebrush Bottomland Shrublands	Y	G3	S1S2			
ARTEMISIA TRIDENTATA SSP. VASEYANA/PSEUDOROEGNERIA SPICATA	Western Slope Sagebrush Shrublands	Y	G5	S2			
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS-PURSHIA TRIDENTATA/AGSP	Mesic Sagebrush Shrublands	Y	GU	SU			
CAREX AQUATILIS-CAREX UTRICULATA	Montane Wet Meadows	Y	G4	S4			
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4			
DESCHAMPSIA CESPITOSA-CAREX NEBRASCENSIS	Montane Wet Meadows	Y	G3	S1			
DESCHAMPSIA CESPITOSA-GEUM ROSSII	Mesic Alpine Meadows	Y	G5	S5			
NUPHAR LUTEUM SSP POLYSEPALUM	Western Slope Floating/Submergent Palustrine Wetlands	Y	G5	S3			
SALIX GEYERIANA-SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carrs	Y	G3	S3			
SALIX PLANIFOLIA/CAREX	Subalpine Riparian Willow Carr	Y	G5	S4			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Allium schoenoprasum var sibiricum	Wild Chives	Y	G5T5	S1			
Azaleastrum albiflorum	White-Flowered Azalea	Y	G4	S2			
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS		
Botrychium lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lanceolatum var lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lunaria	Common Moonwort	Y	G5	S2S3			
Botrychium minganense	Mingan Moonwort	Y	G4	S1			
Botrychium pallidum	Pale Moonwort	Y	G2	S2	FS		
Carex lasiocarpa	Slender Sedge	Y	G5	S1			
Carex limosa	Mud Sedge	Y	G5	S2			
Carex livida	Livid Sedge	Y	G5	S1	FS		
Carex viridula	Green Sedge	Y	G5?	S1			
Comarum palustre	Marsh Cinquefoil	Y	G5	S1S2			
Cypripedium fasciculatum	Purple Lady's-Slipper	Y	G4	S3	FS		
Drosera rotundifolia	Roundleaf Sundew	Y	G5	S2	FS		
Eriophorum gracile	Slender Cottongrass	Y	G5	S2			
Ipomopsis aggregata ssp weberi	Rabbit Ears Gilia	Y	G5T2	S2	FS		
Lewisia rediviva	Bitteroot	Y	G5	S2			
Penstemon cyathophorus	Middle Park Penstemon	W	G3G4	S3S4			
Penstemon radicosus	Matroot Penstemon	Y	G5	S1			
Phacelia formosula	North Park Phacelia	Y	G1	S1		LE	

Pyrola picta	Pictureleaf Wintergreen	W	G4G5	S3
Rhododendron albiflorum	White-Flowered Azalea	Y	G4	S2
Sagittaria calycina var calycina	Long-Lobe Arrowhead	Y	G5T5?	S1
Sagittaria montevidensis ssp calycina	Long-Lobe Arrowhead	Y	G5T5?	S1
Selaginella selaginoides	Northern Spike-Moss	Y	G5	SH
Sisyrinchium pallidum	Pale Blue-Eyed Grass	Y	G2G3	S2
Trillium ovatum	Western Wake-Robin	W	G5	S3

County: Jefferson

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Seiurus aurocapillus	Ovenbird	Y	G5	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Atrytone arogos	Arogos skipper	Y	G3G4	S2			
Callophrys mossii schryveri	Moss's elfin	Y	G4T3	S2S3			
Celastrina humulus	Hops feeding azure	Y	G2	S2			
Cicindela nebraskana	a tiger beetle	Y	G4	S2			
Doa ampla	a moth	Y	G?	S1			
Erynnis martialis	Mottled dusky wing	Y	G4	S2S3			
Grammia sp 1	a tiger moth	Y	G?	S?			
Hesperia leonardus montana	Pawnee montane skipper	Y	G4T1	S1		LT	
Hesperia ottoe	Ottoe skipper	Y	G3G4	S2			
Paratrytone snowi	Snow's skipper	W	G4	S3			
Polites origenes	Cross-line skipper	Y	G5	S3			
Speyeria idalia	Regal fritillary	Y	G3	S1			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Zapus hudsonius preblei	meadow jumping mouse subsp.	Y	G5T2	S1	FS	LT	SC

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ANDROPOGON GERARDII-SCHIZACHYRIUM	Xeric Tallgrass Prairies	Y	G2	S2			
CAREX NEBRASCENSIS	Wet Meadows	Y	G4	S3			
CERCOCARPUS MONTANUS/STIPA COMATA	Mixed Foothill Shrublands	Y	G2	S2			
DANTHONIA PARRYI	Montane Grasslands	Y	G3	S3			
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3			

PINUS FLEXILIS/ARCTOSTAPHYLOS UVA-URSI	Lower Montane Woodlands	Y	G4?	S2?
PINUS PONDEROSA/ARCTOSTAPHYLOS UVA-URSI	Lower Montane Forests	Y	G5	S3
PINUS PONDEROSA/CERCOCARPUS MONTANUS	Foothills Ponderosa Pine Scrub Woodlands	Y	G4	S4
PINUS PONDEROSA/CERCOCARPUS MONTANUS/ANDROPOGON GERARDII	Foothills Ponderosa Pine Scrub Woodlands	Y	G2	S2?
PINUS PONDEROSA/LEUCOPOA KINGII	Foothills Ponderosa Pine Savannas	Y	G3	S3
PINUS PONDEROSA/MUHLENBERGIA MONTANA	Foothills Ponderosa Pine Savannas	Y	G5	S2S3
PINUS PONDEROSA/QUERCUS GAMBELII	Foothills Ponderosa Pine Scrub Woodlands	Y	G5	S4
PSEUDOTSUGA MENZIESII/CAREX GEYERI	Lower Montane Forests	Y	G5Q	S3
PSEUDOTSUGA MENZIESII/JAMESIA AMERICANA	Lower Montane Forests	Y	G3G4	S3
QUERCUS GAMBELII-CERCOCARPUS MONTANUS/MUHLENBERGIA MONTANA	Mesic Oak Thickets	Y	GU	SU
STIPA COMATA - EAST	Great Plains Mixed Grass Prairies	Y	G2	S2

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Agastache foeniculum	Lavender Hyssop	Y	G4G5	S1			
Amorpha nana	Dwarf Wild Indigo	Y	G5	S2S3			
Aquilegia saximontana	Rocky Mountain Columbine	Y	G3	S3			
Aristida basiramea	Forktip Three-Awn	Y	G5	S1			
Asplenium trichomanes-ramosum	Green Spleenwort	Y	G4	S1S2			
Carex saximontana	Rocky Mountain Sedge	Y	G5	S1			
Carex torreyi	Torrey Sedge	Y	G4	S1			
Cypripedium calceolus ssp parviflorum	Yellow Lady's-Slipper	Y	G5	S2			
Cypripedium pubescens	Yellow Lady's-Slipper	Y	G5	S2			
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			
Goodyera repens	Dwarf Rattlesnake-Plantain	W	G5	S3			
Lilium philadelphicum	Wood Lily	W	G5	S3			
Malaxis brachypoda	White Adder's-Mouth	Y	G4Q	S1	FS		
Malaxis monophyllos ssp brachypoda	White Adder's-Mouth	Y	G4Q	S1	FS		
Mimulus gemmiparus	Weber Monkey-Flower	Y	G2	S2	FS		
Papaver kluanensis	Alpine Poppy	W	G5T3?	S3			
Papaver radicatum ssp kluanense	Alpine Poppy	W	G5T3?	S3			
Physaria bellii	Bell's Twinpod	Y	G2	S2			
Potentilla ambigens	Southern Rocky Mountain Cinquefoil	Y	G3	S1S2			
Ribes americanum	American Currant	Y	G5	S1			
Sisyrinchium demissum	Blue-Eyed Grass	Y	G5	S2			
Spiranthes diluvialis	Ute Ladies' Tresses	Y	G2	S2		LT	
Viola pedatifida	Prairie Violet	Y	G5	S2			

County: Kiowa

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius alexandrinus nivosus	Western Snowy Plover	Y	G4T3	S1B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ANDROPOGON HALLII-CALAMOVILFA LONGIFOLIA	Northern Sandhill Prairies	Y	G5	S2			
ARTEMISIA FILIFOLIA/ANDROPOGON HALLII	Northern Sandhill Prairies	Y	G3	S2			
ATRIPLEX CANESCENS/SPOROBOLUS AIROIDES	Great Plains Shrubland	Y	G5Q	SU			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Ambrosia linearis	Plains Ragweed	Y	G2	S2	FS		
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			

Reptiles

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Sistrurus catenatus	massasauga	Y	G3G4	S2	BLM		SC

County: Kit Carson

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Euphyes bimacula	Two-spotted skipper	Y	G4	S3			
Speyeria idalia	Regal fritillary	Y	G3	S1			

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Anodonta grandis	giant floater	Y	G5	S1			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Asclepias uncialis	Dwarf Milkweed	Y	G3?	S1S2	FS/BL		

County: La Plata

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	Y	G5T3	SR	FS		
Dendroica graciae	Grace's Warbler	Y	G5	S3B,			
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Tympanuchus phasianellus columbianus	Columbian Sharp-tailed Grouse	Y	G4T3	S2	FS/BL		
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Speyeria nokomis nokomis	Great Basin silverspot butterfly	Y	G4T2	S1	BLM		

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		
Tadarida brasiliensis	Brazilian free-tailed bat	W	G5	S1			

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Valvata sincera	mossy valvata	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ABIES CONCOLOR-PICEA PUNGENS-POPULUS ANGUSTIFOLIA/ACER GLABRUM	Montane Riparian Forests	Y	G2	S2			
ABIES LASIOCARPA - PICEA ENGELMANNII - POPULUS ANGUSTIFOLIA / LONICERA INVOLUCRATA	Montane Riparian Forest	Y	G4	S3			
ABIES LASIOCARPA-PICEA ENGELMANNII/CALAMAGROSTIS CANADENSIS	Montane Riparian Forests	Y	G5	S3			
ACER NEGUNDO-POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Narrowleaf Cottonwood Riparian Forests	Y	G2	S2			
ELEOCHARIS ACICULARIS	Slender Spike Rush	Y	G3G4Q	S3S4Q			
ELEOCHARIS QUINQUEFLORA	Alpine Wetlands	Y	G4	S3S4			
PICEA PUNGENS/CORNUS SERICEA	Montane Riparian Forest	Y	G4	S2			

POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	Montane Riparian Forest	Y	G3?	S2
POPULUS ANGUSTIFOLIA/SALIX ERIOCEPHALA VAR. LIGULIFOLIA-SHEPHERDIA	Narrowleaf Cottonwood Riparian Forests	Y	G1	S1
POPULUS TREMULOIDES/CORNUS SERICEA	Montane Riparian Woodland	Y	G3	S2S3
PSEUDOTSUGA MENZIESII/CORNUS SERICEA	Lower Montane Riparian Forests	Y	G4	S2
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	Y	G4	S4
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	Montane Willow Carr	Y	G2G3	S2S3
SALIX EXIGUA/MESIC GRAMINOID	Coyote Willow/Mesic Graminoid	Y	G5	S5
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4
SALIX WOLFII/MESIC FORB	Subalpine Riparian Willow Carr	Y	G3	S3

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Aralia racemosa	American Spikenard	Y	G5	S1			
Astragalus oocalycis	Arboles Milkvetch	Y	G4	S2S3			
Astragalus proximus	Aztec Milkvetch	Y	G4	S2	FS		
Astragalus rafaelensis	San Rafael Milkvetch	Y	G3	S1	BLM		
Bupleurum americanum	Thoroughwax	Y	G5	S1			
Bupleurum triradiatum ssp arcticum	Thoroughwax	Y	G5	S1			
Carex viridula	Green Sedge	Y	G5?	S1			
Collomia grandiflora	Showy Collomia	Y	G5	S1			
Cypripedium calceolus ssp parviflorum	Yellow Lady's-Slipper	Y	G5	S2			
Cypripedium pubescens	Yellow Lady's-Slipper	Y	G5	S2			
Draba graminea	San Juan Whitlow-Grass	Y	G2	S2			
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3			
Erigeron philadelphicus	Philadelphia Fleabane	Y	G5	S1			
Eriophorum altaicum var neogaeum	Altai Cottongrass	Y	G4T?	S3	FS		
Goodyera repens	Dwarf Rattlesnake-Plantain	W	G5	S3			
Lilium philadelphicum	Wood Lily	W	G5	S3			
Machaeranthera coloradoensis	Colorado Tansy-Aster	Y	G2?	S2	FS		
Pediocactus knowltonii	Knowlton Cactus	Y	G1	S1		LE	
Penstemon lentus	Abajo Penstemon	Y	G4Q	S2			
Phlox caryophylla	Pagosa Phlox	Y	G4	S2			
Polypodium hesperium	Western Polypody	Y	G5	S1S2			
Pyrola picta	Pictureleaf Wintergreen	W	G4G5	S3			
Salix candida	Hoary Or Silver Willow	Y	G5	S2			
Sisyrinchium demissum	Blue-Eyed Grass	Y	G5	S2			
Stellaria irrigua	Altai Chickweed	Y	G4?	S2			
Woodsia neomexicana	New Mexico Cliff Fern	Y	G4?	S2			

County: Lake

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Dolichonyx oryzivorus	Bobolink	W	G5	S3B,			

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Oeneis polixenes	Polixenes arctic	Y	G5	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Lynx canadensis	lynx	Y	G5	S1	FS		E
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Lymnaea stagnalis	swampy lymnaea	Y	G5	S2			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	Montane Riparian Forest	Y	G5	S4			
CARDAMINE CORDIFOLIA-MERTENSIA	Alpine Wetlands	Y	G4	S4			
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4			
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4			
PICEA PUNGENS/EQUISETUM	Montane Riparian Forest	Y	G3?	S2?			
PINUS ARISTATA/FESTUCA THURBERI	Lower Montane Woodlands	Y	G3	S2			
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	Y	G4	S4			
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	Montane Willow Carr	Y	G2G3	S2S3			
SALIX GEYERIANA-SALIX MONTICOLA/MESIC FORB	Geyer's Willow-Rocky Mountain Willow/Mesic Forb	Y	G3	S3			
SALIX GEYERIANA/CAREX AQUATILIS	Montane Willow Carr	Y	G3?	S3			
SALIX MONTICOLA/CAREX UTRICULATA	Montane Riparian Willow Carr	Y	G3	S3			
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4			
SALIX PLANIFOLIA/CAREX	Subalpine Riparian Willow Carr	Y	G5	S4			
SALIX WOLFII/CAREX AQUATILIS	Subalpine Riparian Willow Carr	Y	G4	S3			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Askellia nana	Dwarf Hawksbeard	Y	G5	S2			
Astragalus molybdenus	Leadville Milkvetch	Y	G3	S2	FS		
Botrychium lunaria	Common Moonwort	Y	G5	S2S3			
Braya humilis	Alpine Braya	Y	G4	S2			
Crepis nana	Dwarf Hawksbeard	Y	G5	S2			
Draba crassa	Thick-Leaf Whitlow-Grass	Y	G3	S3			
Draba exunguiculata	Clawless Draba	Y	G2	S2			
Draba globosa	Rockcress Draba	Y	G3	S1			
Draba lonchocarpa	Lancepod Whitlowgrass	Y	G4T4	S2			
Draba lonchocarpa var lonchocarpa	Lancepod Whitlowgrass	Y	G4T4	S2			
Draba oligosperma	Woods Draba	Y	G5	S2			
Draba porsildii	Porsild Draba	Y	G3G4	S1			
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3			
Draba ventosa	Tundra Draba	Y	G3	S1			
Ipomopsis globularis	Globe Gilia	Y	G2	S2			
Liatris ligulistylis	Gay-Feather	Y	G5?	S1S2			
Listera borealis	Northern Twayblade	Y	G4	S2	BLM		
Machaeranthera coloradoensis	Colorado Tansy-Aster	Y	G2?	S2	FS		
Papaver kluanensis	Alpine Poppy	W	G5T3?	S3			
Papaver radicatum ssp kluanense	Alpine Poppy	W	G5T3?	S3			
Ptilagrostis mongholica ssp porteri	Porter Feathergrass	Y	G3G5T2	S2	FS		
Ptilagrostis porteri	Porter Feathergrass	Y	G3G5T2	S2	FS		
Ranunculus gelidus ssp grayi	Tundra Buttercup	Y	G4G5	S2			
Ranunculus karelinii	Tundra Buttercup	Y	G4G5	S2			
Stipa richardsonii	Richardson Needlegrass	Y	G5	SU			

County: Larimer

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana sylvatica	wood frog	Y	G5	S3	FS		

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Calcarius ornatus	Chestnut-collared Longspur	Y	G5	S1B,			
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Cypseloides niger	Black Swift	Y	G4	S3B	FS		
Dolichonyx oryzivorus	Bobolink	W	G5	S3B,			
Grus americana	Whooping Crane	Y	G1	SAN			E
Grus canadensis tabida	Greater Sandhill Crane	Y	G5T4	S2B,	FS		T
Himantopus mexicanus	Black-necked Stilt	Y	G5	S3B,			
Loxia leucoptera	White-winged Crossbill	W	G5	S1B,			
Seiurus aurocapillus	Ovenbird	Y	G5	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Oncorhynchus clarki stomias	greenback cutthroat trout	Y	G4T2T3	S2		LT	T

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Amblyscirtes simius	Simius roadside skipper	Y	G4	S3			
Atrytone arogos	Arogos skipper	Y	G3G4	S2			
Atrytonopsis hianna	Dusted skipper	Y	G4G5	S2			
Boloria selene sabulocollis	Sandhill fritillary	Y	G5T2	S2			
Callophrys mossii schryveri	Moss's elfin	Y	G4T3	S2S3			
Celastrina humulus	Hops feeding azure	Y	G2	S2			
Cicindela macra macra	a tiger beetle	Y	G5T5	S1?			
Coloradia luski	a buckmoth	Y	G4	S1?			
Erynnis martialis	Mottled dusky wing	Y	G4	S2S3			
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2			
Euphyes bimacula	Two-spotted skipper	Y	G4	S3			
Hesperia ottoe	Ottoe skipper	Y	G3G4	S2			
Pachysphinx modesta	Modest sphinx moth	Y	G?	S3?			
Paratrytone snowi	Snow's skipper	W	G4	S3			
Polites origenes	Cross-line skipper	Y	G5	S3			

Polites rhesus	Rhesus skipper	Y	G4	S2S3
Pyrgus ruralis	Two-banded skipper	W	G4	S3
Satyrium fuliginosum	Sooty gossamer wing	W	G4	S3
Satyrodes eurydice fumosa	Smoky eyed brown butterfly	Y	G5T3T4	S1
Somatochlora hudsonica	Hudsonian emerald	W	G5	S2S3

Mammals

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		
Sorex hoyi montanus	pygmy shrew	Y	G5T2T3	S2	FS		
Zapus hudsonius preblei	meadow jumping mouse subsp.	Y	G5T2	S1	FS	LT	SC

Mussels and Snails

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Anodonta grandis	giant floater	Y	G5	S1			

Plant Communities

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
ABIES LASIOCARPA-PICEA ENGELMANNII/CALAMAGROSTIS CANADENSIS	Montane Riparian Forests	Y	G5	S3			
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5			
ALNUS INCANA/EQUISETUM	Montane Riparian Shrublands	Y	G3?	S3			
ALNUS INCANA/MESIC GRAMINOID	Montane Riparian Shrubland	Y	G5Q	S3			
ANDROPOGON GERARDII-SCHIZACHYRIUM	Xeric Tallgrass Prairies	Y	G2	S2			
ARTEMISIA TRIDENTATA SSP. VASEYANA/FESTUCA IDAHOENSIS	Western Slope Sagebrush Shrublands	Y	GU	S3S4			
ARTEMISIA TRIDENTATA SSP. VASEYANA/LEUCOPOA KINGII	Western Slope Sagebrush Shrublands	Y	G3	S1S2			
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/LEYMUS AMBIGUUS	Mixed Foothill Shrublands	Y	G3	S2			
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/PSEUDOROEGNERIA SPICATA	Xeric Sagebrush Shrublands	Y	G5	S3?			
ARTEMISIA TRIPARTITA/FESTUCA IDAHOENSIS	Mixed Foothill Shrublands	Y	G4G5	S1?			
ATRIPLEX CANESCENS/BOUTELOUA GRACILIS	Shortgrass Prairies	Y	G3	S3			
CALAMAGROSTIS CANADENSIS	Montane Wet Meadows	Y	G4Q	S4			
CALTHA LEPTOSEPALA	Montane Wet Meadows	Y	G4	S4			
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4			
CAREX NEBRASCENSIS	Wet Meadows	Y	G4	S3			
CAREX SIMULATA	Wet Meadow	Y	G3	S3			
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4			
CATABROSA AQUATICA-MIMULUS	Spring Wetland	Y	GU	S3			
CERCOCARPUS MONTANUS-RHUS TRILOBATA/ANDROPOGON GERARDII	Mixed Foothill Shrublands	Y	G2G3	S2S3			

CERCOCARPUS MONTANUS/ELYMUS LANCEOLATA X PSEUDOROEGNERIA SPICATA	Mountain Mahogany/Griffith's Wheatgrass Shrubland	Y	G3	S3
CERCOCARPUS MONTANUS/MUHLENBERGIA MONTANA	Mixed Mountain Shrublands	Y	GU	S2
CERCOCARPUS MONTANUS/STIPA COMATA	Mixed Foothill Shrublands	Y	G2	S2
CERCOCARPUS MONTANUS/STIPA NEOMEXICANA	Foothills Shrubland	Y	G2G3	S2S3
CERCOCARPUS MONTANUS/STIPA SCRIBNERI	Foothills Shrubland	Y	G3	S3
CORYLUS CORNUTA	Lower Montane Forests	Y	G3	S1
DANTHONIA PARRYI	Montane Grasslands	Y	G3	S3
DISTICHLIS SPICATA	Salt Meadows	Y	G5	S3
ELEOCHARIS QUINQUEFLORA	Alpine Wetlands	Y	G4	S3S4
ELEOCHARIS QUINQUEFLORA-TRIGLOCHIN SPP.	Alkaline Spring Wetland	Y	GU	S2
GLYCERIA BOREALIS	Montane Emergent Wetland	Y	G3?	S3
JUNCUS BALTICUS VAR. MONTANUS	Western Slope Wet Meadows	Y	G5	S5
JUNIPERUS SCOPULORUM/CERCOCARPUS MONTANUS	Foothills Pinyon-Juniper Woodlands/Scarp Woodlands	Y	G2	S2
JUNIPERUS SCOPULORUM/PURSHIA TRIDENTATA	Foothills Pinyon-Juniper Woodlands	Y	G2	S2
MUHLENBERGIA MONTANA-STIPA COMATA	Montane Grasslands	Y	G2	S2
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
PICEA PUNGENS/ALNUS INCANA-CORYLUS CORNUTA	Foothills Riparian Forest	Y	GU	SU
PICEA PUNGENS/CORNUS SERICEA	Montane Riparian Forest	Y	G4	S2
PINUS CONTORTA/VACCINIUM SCOPARIUM	Seral Lodgepole Pine Forests	Y	G5	S4
PINUS FLEXILIS/LEUCOPOA KINGII	Lower Montane Woodlands	Y	G4	S2S3
PINUS PONDEROSA/CERCOCARPUS MONTANUS/ANDROPOGON GERARDII	Foothills Ponderosa Pine Scrub Woodlands	Y	G2	S2?
PINUS PONDEROSA/LEUCOPOA KINGII	Foothills Ponderosa Pine Savannas	Y	G3	S3
PINUS PONDEROSA/ROSA WOODSII	Foothills Ponderosa Pine Savannas	Y	G4	S4
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
POPULUS ANGUSTIFOLIA/PRUNUS VIRGINIANA	Narrowleaf Cottonwood/Common Chokecherry	Y	G2G3	S1
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	Narrowleaf Cottonwood Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA/SYMPHORICARPOS ALBUS	Montane Riparian Forest	Y	G2Q	S2Q
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SALIX EXIGUA	Plains Cottonwood Riparian Woodland	Y	G4?	S3
POPULUS TREMULOIDES/CORYLUS CORNUTA	Montane Riparian Forests	Y	G3	S1
POTAMOGETON NATANS	Montane Floating/Submergent Weltand	Y	G5?	S1
PSEUDOROEGNERIA SPICATA-POA SECUNDA	Montane Grasslands	Y	G4	S1
PURSHIA TRIDENTATA/ATEMESIA FRIGIDA/STIPA COMATA	Mixed Foothill Shrublands	Y	G1G2	S1S2
PURSHIA TRIDENTATA/MUHLENBERGIA MONTANA	Mixed Foothill Shrublands	Y	G2	S2

RIBES CEREUM/LEYMUS AMBIGUUS	Mixed Foothill Shrublands	Y	G2	S2?
SALIX BRACHYCARPA/DESCHAMPSIA CESPITOSA-GEUM ROSSII	Alpine Willow Scrub	Y	G4	S3S4
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	Y	G4	S4
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	Montane Willow Carr	Y	G2G3	S2S3
SALIX GEYERIANA-SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carrs	Y	G3	S3
SALIX GEYERIANA-SALIX MONTICOLA/MESIC GRAMINOID	Montane Riparian Willow Carr	Y	GU	S3
SALIX GEYERIANA/CALAMAGROSTIS CANADENSIS	Montane Riparian Willow Carr	Y	G5	S3
SALIX GEYERIANA/CAREX UTRICULATA	Geyer's Willow/Beaked Sedge	Y	G5	S3
SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carr	Y	G3	S3
SALIX MONTICOLA/CAREX UTRICULATA	Montane Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CALAMAGROSTIS CANADENSIS	Subalpine Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4
SALIX PLANIFOLIA/CAREX	Subalpine Riparian Willow Carr	Y	G5	S4
SALIX PLANIFOLIA/DESCHAMPSIA CESPITOSA	Subalpine Riparian Willow Carr	Y	G2G3	S3
SCIRPUS MARITIMUS	Emergent Wetland (Marsh)	Y	G4	S2
SCIRPUS TABERNAEMONTANI-SCIRPUS	Great Plains Marshes	Y	G3	S2S3
SPARGANIUM ANGUSTIFOLIUM	Montane Floating/Submergent Palustrine Wetlands	Y	GU	SU
STIPA COMATA-BOUTELOUA	Montane Grasslands	Y	G5	S2S3
TYPHA ANGUSTIFOLIA-TYPHA LATIFOLIA	Narrow-Leaf Cattail Marsh	Y	G5	S3
UTRICULARIA VULGARIS	Montane Floating/Submergent Wetland	Y	G3?	S1

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Acorus calamus	Sweet Flag	Y	G?	SH			
Agastache foeniculum	Lavender Hyssop	Y	G4G5	S1			
Aletes humilis	Larimer Aletes	Y	G2G3	S2S3	FS		
Aquilegia saximontana	Rocky Mountain Columbine	Y	G3	S3			
Aristida basiramea	Forktip Three-Awn	Y	G5	S1			
Azaleastrum albiflorum	White-Flowered Azalea	Y	G4	S2			
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS		
Botrychium hesperium	Western Moonwort	Y	G3	S2			
Botrychium lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lanceolatum var lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lunaria	Common Moonwort	Y	G5	S2S3			
Botrychium minganense	Mingan Moonwort	Y	G4	S1			
Botrychium multifidum	Leathery Grape Fern	Y	G5	S1			
Botrychium multifidum ssp coulteri	Leathery Grape Fern	Y	G5	S1			
Carex diandra	Lesser Panicled Sedge	Y	G5	S1			

Carex lasiocarpa	Slender Sedge	Y	G5	S1		
Carex limosa	Mud Sedge	Y	G5	S2		
Carex livida	Livid Sedge	Y	G5	S1	FS	
Carex peckii	Peck Sedge	Y	G4G5	SH		
Carex saximontana	Rocky Mountain Sedge	Y	G5	S1		
Cypripedium calceolus ssp parviflorum	Yellow Lady's-Slipper	Y	G5	S2		
Cypripedium fasciculatum	Purple Lady's-Slipper	Y	G4	S3	FS	
Cypripedium pubescens	Yellow Lady's-Slipper	Y	G5	S2		
Draba fladnizensis	Arctic Draba	Y	G4	S2S3		
Draba grayana	Gray's Peak Whitlow-Grass	Y	G2	S2		
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3		
Dryopteris expansa	Spreading Wood Fern	Y	G5	S1		
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3		
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3		
Festuca hallii	Hall Fescue	Y	G3G4	SH	FS	
Gaura neomexicana ssp coloradensis	Colorado Butterfly Weed	Y	G3T2	S1	FS	PT
Ipomopsis aggregata ssp weberi	Rabbit Ears Gilia	Y	G5T2	S2	FS	
Isoetes echinospora	Spiny-Spored Quillwort	Y	G5	S2		
Isoetes setacea ssp muricata	Spiny-Spored Quillwort	Y	G5	S2		
Juncus tweedyi	Tweedy Rush	Y	G3Q	S1		
Juncus vaseyi	Vasey Bulrush	Y	G5?	S1		
Liatris ligulistylis	Gay-Feather	Y	G5?	S1S2		
Lilium philadelphicum	Wood Lily	W	G5	S3		
Listera borealis	Northern Twayblade	Y	G4	S2	BLM	
Listera convallarioides	Broad-Leaved Twayblade	Y	G5	S2		
Mimulus gemmiparus	Weber Monkey-Flower	Y	G2	S2	FS	
Parnassia kotzebuei	Kotzebue Grass-Of-Parnassus	Y	G4	S2		
Pellaea atropurpurea	Purple Cliff-Brake	Y	G5	S2S3		
Penstemon laricifolius ssp exilifolius	Larch-Leaf Beardtongue	Y	G4T2	S2		
Physaria bellii	Bell's Twinpod	Y	G2	S2		
Polypodium hesperium	Western Polypody	Y	G5	S1S2		
Potentilla ambigens	Southern Rocky Mountain Cinquefoil	Y	G3	S1S2		
Potentilla effusa var rupincola	Rocky Mountain Cinquefoil	Y	G5?T2	S2	FS	
Potentilla rupincola	Rocky Mountain Cinquefoil	Y	G5?T2	S2	FS	
Rhododendron albiflorum	White-Flowered Azalea	Y	G4	S2		
Ribes americanum	American Currant	Y	G5	S1		
Salix candida	Hoary Or Silver Willow	Y	G5	S2		
Salix serissima	Autumn Willow	Y	G4	S1	FS	
Sisyrinchium pallidum	Pale Blue-Eyed Grass	Y	G2G3	S2		
Solidago ptarmicoides	Prairie Goldenrod	Y	G5	S2S3		
Spiranthes diluvialis	Ute Ladies' Tresses	Y	G2	S2		LT
Subularia aquatica	Water Awlwort	Y	G5	S1		
Unamia alba	Prairie Goldenrod	Y	G5	S2S3		

Viola selkirkii	Selkirk Violet	Y	G5?	S1	FS

County: Las Animas

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Bufo debilis	green toad	Y	G5	S2			
Hyla arenicolor	canyon treefrog	Y	G5	S2	BLM		SC
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Aimophila ruficeps	Rufous-crowned Sparrow	Y	G5	S2			
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Eurystrymon favonius ontario	Northern hairstreak	Y	G4T4	S1			
Sagenosoma elsa	a sphinx moth	Y	G?	S1?			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Neotoma micropus	southern plains woodrat	Y	G5	S3			
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		
Tadarida brasiliensis	Brazilian free-tailed bat	W	G5	S1			
Thomomys bottae cultellus	Botta's pocket gopher subsp.	Y	G5T3Q	S3			
Zapus hudsonius luteus	meadow jumping mouse subsp.	Y	G5T2	S1			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ANDROPOGON GERARDII-SCHIZACHYRIUM	Xeric Tallgrass Prairies	Y	G2	S2			
BOUTELOUA ERIOPODA-HILARIA JAMESII	Shortgrass Prairie	Y	G3	SU			
BOUTELOUA GRACILIS-BOUTELOUA CURTIPENDULA	Shortgrass Prairie	Y	G5	SU			
BOUTELOUA GRACILIS-HILARIA JAMESII	Shortgrass Prairie	Y	G3G4	S3			
CERCOCARPUS MONTANUS/STIPA COMATA	Mixed Foothill Shrublands	Y	G2	S2			
CERCOCARPUS MONTANUS/STIPA NEOMEXICANA	Foothills Shrubland	Y	G2G3	S2S3			
DANTHONIA PARRYI	Montane Grasslands	Y	G3	S3			
JUNIPERUS MONOSPERMA-(PINUS EDULIS)/CERCOCARPUS MONTANUS/SCHIZACHYRIUM SCOPARIUM	Foothills Pinyon-Juniper Woodlands	Y	GU	SU			

JUNIPERUS MONOSPERMA/BOUTELOUA ERIOPODA	Juniper Woodland	Y	GU	S2S3
JUNIPERUS MONOSPERMA/BOUTELOUA GRACILIS	Foothills Pinyon-Juniper Woodlands	Y	G5	S3S4
JUNIPERUS MONOSPERMA/STIPA NEOMEXICANA	Foothills Pinyon-Juniper Woodlands	Y	GU	S3
JUNIPERUS SCOPULORUM/CERCOCARPUS MONTANUS-RHUS TRILOBATA	Scarp Woodlands	Y	GU	SU
NOLINA TEXANA	Desert Shrubland	Y	GU	S1
PINUS EDULIS/QUERCUS GAMBELII	Foothills Pinyon-Juniper Woodlands	Y	G5	S5
PINUS EDULIS/QUERCUS X	Foothills Pinyon-Juniper Woodlands	Y	G5	S2
PINUS PONDEROSA/BOUTELOUA GRACILIS	Foothills Ponderosa Pine Savannas	Y	G5	S4
PINUS PONDEROSA/CERCOCARPUS MONTANUS/ANDROPOGON GERARDII	Foothills Ponderosa Pine Scrub Woodlands	Y	G2	S2?
POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	Montane Riparian Forest	Y	G3?	S2
POPULUS DELTOIDES/SPOROBOLUS CRYPTANDRUS	Plains Cottonwood/Sand Dropseed	Y	G1G2Q	S1S2Q
POPULUS TREMULOIDES/JUNIPERUS COMMUNIS	Persistent Aspen Forests	Y	G4	S4
PSEUDOTSUGA MENZIESII/QUERCUS GAMBELII	Western Slope Douglas Fir Forests	Y	G5	S4
QUERCUS GAMBELII-CERCOCARPUS MONTANUS/MUHLENBERGIA MONTANA	Mesic Oak Thickets	Y	GU	SU
SALIX EXIGUA/ELEOCHARIS PALUSTRIS	Coyote Willow/Spikerush	Y	GU	S2S4
SARCOBATUS VERMICULATUS/BOUTELOUA GRACILIS	Saline Bottomland Shrublands	Y	GU	SU
SCHIZACHYRIUM SCOPARIUM-BOUTELOUA	Great Plains Mixed Grass Prairies (Sandstone/Gravel Breaks)	Y	G3	S2
STIPA COMATA-BOUTELOUA	Montane Grasslands	Y	G5	S2S3
STIPA NEOMEXICANA	Great Plains Mixed Grass Prairies	Y	G3	S2

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Adiantum capillus-veneris	Southern Maiden-Hair	Y	G5	S2	FS		
Agastache foeniculum	Lavender Hyssop	Y	G4G5	S1			
Amorpha nana	Dwarf Wild Indigo	Y	G5	S2S3			
Asclepias macrotis	Long-Hood Milkweed	Y	G4	S2			
Asclepias oenotheroides	Zizotes Milkweed	Y	G4G5	S1			
Asclepias uncialis	Dwarf Milkweed	Y	G3?	S1S2	FS/BL		
Asplenium platyneuron	Ebony Spleenwort	Y	G5	S1			
Asplenium resiliens	Black-Stemmed Spleenwort	Y	G5	S1			
Bolophyta tetraneuris	Arkansas River Feverfew	Y	G3	S3			
Cheilanthes eatonii	Eaton's Lip Fern	Y	G5?	S2			
Cheilanthes standleyi	Standley's Cloak Fern	Y	G4	S1			
Cheilanthes wootonii	Wooton's Lip Fern	Y	G5	S1			
Chenopodium cycloides	Sandhill Goosefoot	Y	G3G4	S1	FS		
Commelina dianthifolia	Birdbill Day-Flower	Y	G5	S1?			

Cypripedium calceolus ssp parviflorum	Yellow Lady's-Slipper	Y	G5	S2	
Cypripedium pubescens	Yellow Lady's-Slipper	Y	G5	S2	
Draba smithii	Smith Whitlow-Grass	Y	G2	S2	FS
Eriophorum gracile	Slender Cottongrass	Y	G5	S2	
Frasera coloradensis	Colorado Green Gentian	Y	G3	S3	FS
Goodyera repens	Dwarf Rattlesnake-Plantain	W	G5	S3	
Herrickia horrida	Canadian River Spiny Aster	Y	G2?	S1	
Hypoxis hirsuta	Yellow Stargrass	Y	G5	SH	
Liatris ligulistylis	Gay-Feather	Y	G5?	S1S2	
Lilium philadelphicum	Wood Lily	W	G5	S3	
Lomatium foeniculaceum ssp macdougalii	Desert-Parsley	Y	G5T4T5	S1	
Mirabilis rotundifolia	Round-Leaf Four-O'clock	Y	G2	S2	
Nolina texana	Texas Beargrass	Y	G5	S1	
Notholaena standleyi	Standley's Cloak Fern	Y	G4	S1	
Oenothera harringtonii	Arkansas Valley Evening Primrose	Y	G2	S2	
Oonopsis foliosa	Single-Head Goldenweed	Y	G3G4T2	S2	
Oonopsis foliosa var monocephala	Single-Head Goldenweed	Y	G3G4T2	S2	
Oxybaphus rotundifolia	Round-Leaf Four-O'clock	Y	G2	S2	
Parthenium tetraneuris	Arkansas River Feverfew	Y	G3	S3	
Pellaea atropurpurea	Purple Cliff-Brake	Y	G5	S2S3	
Pellaea glabella ssp simplex	Smooth Cliff-Brake	Y	G5T4?	S2	
Pellaea suksdorfiana	Smooth Cliff-Brake	Y	G5T4?	S2	
Pellaea wrightiana	Wright's Cliff-Brake	Y	G5	S2	
Portulaca halimoides	Dwarf Purslane	Y	G4?	S1	
Portulaca parvula	Dwarf Purslane	Y	G4?	S1	
Pyrola picta	Pictureleaf Wintergreen	W	G4G5	S3	
Sapindus drummondii	Soapberry	Y	G5T5	S1	
Sapindus saponaria var drummondii	Soapberry	Y	G5T5	S1	
Sarcostemma crispum	Twinevine	Y	G4G5	S1	
Viola pedatifida	Prairie Violet	Y	G5	S2	
Woodsia neomexicana	New Mexico Cliff Fern	Y	G4?	S2	

Reptiles

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Eumeces multivirgatus gaigeae	variable skink	Y	G5T5	S3			
Leptotyphlops dulcis	Texas blind snake	Y	G5	S1	FS		SC
Phrynosoma cornutum	Texas horned lizard	Y	G4G5	S3	FS/BL		SC
Rhinocheilus lecontei	longnose snake	W	G5	S1?			
Sonora semiannulata	ground snake	W	G5	S3			
Thamnophis cyrtopsis	blackneck garter snake	W	G5	S2?			

County: Lincoln

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Etheostoma cragini	Arkansas darter	Y	G3	S2	FS	C	T

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2			
Libellula composita	Bleached skimmer	Y	G3	S1			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Spilogale putorius	eastern spotted skunk	Y	G5	S2			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ARTEMISIA FILIFOLIA/ANDROPOGON HALLII	Northern Sandhill Prairies	Y	G3	S2			
ELEOCHARIS ELLIPTICA VAR. COMPRESSA	Spike Rush	Y	G3Q	S3Q			
ELEOCHARIS PALUSTRIS	Emergent Wetland	Y	G5	S4			
PANICUM OBTUSUM-BUCHLOE DACTYLOIDES	Vine Mesquite-Buffalo Grass	Y	G?Q	S1S2Q			
PASCOPYRUM SMITHII	Western Slope Grasslands	Y	G3G5Q	S2			
SPOROBOLUS AIROIDES	Great Plains Salt Meadows	Y	G3Q	S3			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Ambrosia linearis	Plains Ragweed	Y	G2	S2	FS		

Reptiles

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Sistrurus catenatus	massasauga	Y	G3G4	S2	BLM		SC

County: Logan

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Tympanuchus cupido pinnatus	Greater Prairie-Chicken	Y	G4T4	S3	FS		

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Mustela nigripes	black-footed ferret	Y	G1	SH			E

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ARTEMISIA FILIFOLIA/ANDROPOGON HALLII	Northern Sandhill Prairies	Y	G3	S2			
ATRIPLEX CANESCENS/BOUTELOUA GRACILIS	Shortgrass Prairies	Y	G3	S3			
BOUTELOUA GRACILIS-BUCHLOE DACTYLOIDES	Shortgrass Prairie	Y	G2?	S2?			
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SALIX EXIGUA	Plains Cottonwood Riparian Woodland	Y	G4?	S3			
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SPARTINA PECTINATA	Plains Cottonwood Riparian Woodland	Y	G1G2	S1			
POPULUS DELTOIDES SSP. MONILIFERA/CAREX LANUGINOSA	Plains Cottonwood Riparian Woodland	Y	G1?	S1			
POPULUS DELTOIDES SSP. MONILIFERA/SYMPHORICARPOS OCCIDENTALIS	Plains Cottonwood Riparian Woodland	Y	G2G3	S2			
SALIX EXIGUA/BARE GROUND	Coyote Willow/Bare Ground	Y	G5	S5			
SCHIZACHYRIUM SCOPARIUM-BOUTELOUA	Great Plains Mixed Grass Prairies (Sandstone/Gravel Breaks)	Y	G3	S2			
TYPHA ANGUSTIFOLIA-TYPHA LATIFOLIA	Narrow-Leaf Cattail Marsh	Y	G5	S3			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Cryptantha cana	Mountain Cat's-Eye	Y	G5	S2			
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			
Oreocarya cana	Mountain Cat's-Eye	Y	G5	S2			

County: Mesa

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Hyla arenicolor	canyon treefrog	Y	G5	S2	BLM		SC
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC
Spea intermontana	Great Basin spadefoot	Y	G5	S3	BLM		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Asio flammeus	Short-eared Owl	Y	G5	S2B,			
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Calcarius ornatus	Chestnut-collared Longspur	Y	G5	S1B,			
Centrocercus sp 1	Gunnison Sage Grouse	Y	G1	S1	BLM		SC
Dendroica graciae	Grace's Warbler	Y	G5	S3B,			
Egretta thula	Snowy Egret	Y	G5	S2B,			
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Grus canadensis tabida	Greater Sandhill Crane	Y	G5T4	S2B,	FS		T
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Gila cypha	humpback chub	Y	G1	S1		LE	T
Gila elegans	bonytail chub	Y	G1	SX		LE	E
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC
Xyrauchen texanus	razorback sucker	Y	G1	S1		LE	E

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Callophrys comstocki	Comstock's hairstreak	Y	G3	S1			
Ochlodes yuma	Yuma skipper	Y	G5	S2			
Papilio indra minori	Short-tailed black swallowtail	Y	G5TU	S2			
Polites rhesus	Rhesus skipper	Y	G4	S2S3			
Pyrgus ruralis	Two-banded skipper	W	G4	S3			
Speyeria nokomis nokomis	Great Basin silverspot butterfly	Y	G4T2	S1	BLM		

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Perognathus parvus	Great Basin pocket mouse	Y	G5	S1?			
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		
Tadarida brasiliensis	Brazilian free-tailed bat	W	G5	S1			
Vulpes macrotis	kit fox	Y	G4	S1			E

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Ferrissia fragilis	fragile ancylid	Y	G4	SH			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA/CAREX GEYERI	Subalpine Forests	Y	G5	S2S3			
ACER NEGUNDO-POPULUS ANGUSTIFOLIA/CELTIS RETICULATA	Narrowleaf Cottonwood Riparian Forests	Y	G1Q	S1Q			
ACER NEGUNDO/HIPPOCHAETE HYEMALIS	Montane Riparian Deciduous Forest	Y	GU	SU			
ALNUS INCANA-CORNUS SERICEA	Thinleaf Alder-Red-Oiser Dogwood Riparian Shrubland	Y	G3G4	S3			
ALNUS INCANA-MIXED SALIX	Thinleaf Alder-Mixed Willow Species	Y	G3	S3			
ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparian Shrubland	Y	G3G4Q	S3			
AQUILEGIA MICRANTHA-MIMULUS EASTWOODIAE	Hanging Gardens	Y	G2G3	S2S3			
ARCTOSTAPHYLOS PATULA	Montane Shrublands	Y	G2	S2			
ARTEMISIA CANA/FESTUCA	Western Slope Sagebrush Shrublands	Y	G2G3	S2S3			
ARTEMISIA NOVA/LEYMUS SALINUS	West Slope Shrubland	Y	GU	SU			
ARTEMISIA TRIDENTATA SSP. TRIDENTATA/STIPA COMATA	Western Slope Sagebrush Shrubland	Y	G5	S3?			
ARTEMISIA TRIDENTATA SSP. VASEYANA/STIPA COMATA		Y	G5	SU			
ATRIPLEX CONFERTIFOLIA/HILARIA JAMESII	Cold Desert Shrublands	Y	G3	S2			
ATRIPLEX CONFERTIFOLIA/LEYMUS SALINUS	Cold Desert Shrublands	Y	G3G5	S3			
ATRIPLEX CONFERTIFOLIA/ORYZOPSIS	Cold Desert Shrublands	Y	G2	S2			
ATRIPLEX CORRUGATA SHALE BARREN	Alkali Mat Saltbush Shrublands	Y	G5	S2?			
ATRIPLEX GARDNERI/HILARIA	Gardner's Mat Saltbush Shrublands	Y	G3G5	S1?			
ATRIPLEX GARDNERI/LEYMUS SALINUS	Gardner's Mat Saltbush Shrublands	Y	G2?	S2?			
BETULA OCCIDENTALIS-CORNUS SERICEA	Lower Montane Riparian Shrublands	Y	G3	S1S2			
BETULA OCCIDENTALIS/MESIC FORB	Foothills Riparian Shrubland	Y	G3	S2			
CORNUS SERICEA	Foohthills Riparian Shrubland	Y	G4	S3			
ELEOCHARIS PALUSTRIS	Emergent Wetland	Y	G5	S4			
FESTUCA IDAHOENSIS-ELYMUS TRACHYCAULUS	Montane Grasslands	Y	G3	S1			
FORESTIERA PUBESCENS	Foothills Riparian Shrubland	Y	G1G2	S1			

FRAXINUS ANOMALA/QUERCUS GAMBELII	West Slope Riparian Woodland	Y	GUQ	S1Q
HILARIA JAMESII	Western Slope Grasslands	Y	G3	S1
JUNIPERUS OSTEOSPERMA/COLEOGYNE RAMOSISSIMA	West Slope Juniper Woodland	Y	GU	SU
JUNIPERUS OSTEOSPERMA/LEYMUS SALINUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	GU	SU
JUNIPERUS SCOPULORUM/CORNUS SERICEA	Riparian Woodland	Y	G4	S2
ORYZOPSIS HYMENOIDES SHALE BARREN	Western Slope Grasslands	Y	G2	S2
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
PICEA PUNGENS/CORNUS SERICEA	Montane Riparian Forest	Y	G4	S2
PINUS EDULIS/CERCOCARPUS LEDIFOLIUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	G3	S3
PINUS EDULIS/CERCOCARPUS MONTANUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	G5	S4
PINUS EDULIS/COLEOGYNE RAMOSISSIMA	West Slope Pinon Woodland	Y	G3	SU
PINUS EDULIS/COWANIA MEXICANA	Xeric Western Slope Pinyon-Juniper Woodlands	Y	G5	S3?
PINUS EDULIS/PSEUDOROEGNERIA SPICATA	Xeric Western Slope Pinyon-Juniper Woodlands	Y	G4	S4
PINUS EDULIS/QUERCUS GAMBELII	Foothills Pinyon-Juniper Woodlands	Y	G5	S5
PINUS EDULIS/STIPA COMATA	Xeric Western Slope Pinyon-Juniper Woodlands	Y	G2	S2
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA-PSEUDOTSUGA	Montane Riparian Forest	Y	G2?	S2
POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	Montane Riparian Forest	Y	G3?	S2
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Cottonwood Riparian Forest	Y	G4	S3
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	Narrowleaf Cottonwood Riparian Forests	Y	G4	S4
POPULUS DELTOIDES SSP. WISLIZENII/RHUS TRILOBATA	Fremont's Cottonwood Riparian Forests	Y	G2	S2
POPULUS TREMULOIDES-ABIES LASIOCARPA/JUNIPERUS COMMUNIS	Aspen Forests	Y	G3G4	S4
POPULUS TREMULOIDES/CAREX GEYERI	Aspen Forests	Y	G4	S4
POPULUS TREMULOIDES/SYMPHORICARPOS OREOPHILUS/CAREX GEYERI	Persistent Aspen Forests	Y	G5	S5
POPULUS TREMULOIDES/TALL FORBS	Montane Aspen Forest	Y	G5	S5
PSEUDOTSUGA MENZIESII/QUERCUS GAMBELII	Western Slope Douglas Fir Forests	Y	G5	S4
QUERCUS GAMBELII-AMELANCHIER UTAHENSIS	Mixed Mountain Shrubland	Y	G3G5	SU
QUERCUS GAMBELII-CERCOCARPUS MONTANUS/CAREX GEYERI	Mixed Mountain Shrublands	Y	G3	S3
QUERCUS GAMBELII/PACHYSTIMA MYRSINITES	Mixed Mountain Shrublands	Y	GU	SU
QUERCUS GAMBELII/POA AGASSIZENSIS	Mixed Mountain Shrublands	Y	GUQ	SUQ
QUERCUS GAMBELII/SYMPHORICARPOS OREOPHILUS	Mixed Mountain Shrublands	Y	G5	S3S4
SALIX EXIGUA/HIPPOCHAETE HYEMALIS	Lower Montane Riparian Shrubland	Y	GU	S2S4

SALIX EXIGUA/MESIC GRAMINOID	Coyote Willow / Mesic Graminoid	Y	G5	S5
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3
SARCOBATUS VERMICULATUS/DISTICHLIS SPICATA	Saline Bottomland Shrublands	Y	G4	S1
SARCOBATUS VERMICULATUS/SUAEDA	Saline Bottomland Shrublands	Y	G2G3	S2S3
SCIRPUS TABERNAEMONTANI-SCIRPUS	Great Plains Marshes	Y	G3	S2S3
STIPA COMATA - WEST	Western Slope Grasslands	Y	G2	S2

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Adiantum capillus-veneris	Southern Maiden-Hair	Y	G5	S2	FS		
Aletes latilobus	Canyonlands Lomatium	Y	G1	S1	BLM		
Allium nevadense	Nevada Onion	Y	G4	S2			
Amsonia jonesii	Jones Blue Star	Y	G4	S1	BLM		
Argillochloa dasyclada	Utah Fescue	Y	G3	S3			
Astragalus argophyllus var martinii	Meadow Milkvetch	Y	G5T4	S1			
Astragalus cibarius	Browse Milkvetch	Y	G4	S1			
Astragalus debequaeus	Debeque Milkvetch	Y	G2	S2	BLM		
Astragalus linifolius	Grand Junction Milkvetch	Y	G3Q	S3	BLM		
Astragalus musiniensis	Ferron Milkvetch	Y	G3?	S1	BLM		
Astragalus naturitensis	Naturita Milkvetch	Y	G2G3	S2S3	BLM		
Astragalus piscator	Fisher Towers Milkvetch	Y	G1?	S1	BLM		
Astragalus rafaelensis	San Rafael Milkvetch	Y	G3	S1	BLM		
Astragalus wetherillii	Wetherill Milkvetch	Y	G3	S3			
Centaurium arizonicum	Arizona Centaury	Y	G5?	S1			
Centaurium exaltatum	Great Basin Centaury	Y	G5	S1			
Cirsium perplexans	Rocky Mountain Thistle	Y	G2	S2	BLM		
Comarum palustre	Marsh Cinquefoil	Y	G5	S1S2			
Cryptantha aperta	Grand Junction Cat's-Eye	Y	GH	SH			
Cryptantha elata	Tall Cryptanth	Y	G3	S2			
Cryptantha longiflora	Long-Flower Cat's-Eye	Y	G3	S2			
Cryptantha osterhoutii	Osterhout Cryptanth	Y	G3	S2	BLM		
Draba rectifructa	Mountain Whitlow-Grass	Y	G3?	S2			
Epipactis gigantea	Helleborine	Y	G4	S2	FS		
Eriogonum contortum	Grand Buckwheat	Y	G3	S2	BLM		
Eriogonum leptocladon var leptocladon	Sand Buckwheat	Y	G5T?	S1			
Eriogonum palmerianum	Palmer Buckwheat	Y	G4	S1			
Festuca dasyclada	Utah Fescue	Y	G3	S3			
Gilia stenothyrsa	Narrow-Stem Gilia	Y	G2	S1	BLM		
Heuchera rubescens	Red Alum-Root	Y	G5	S1			
Juncus bryoides	Minute Rush	Y	G4	S1			
Lesquerella parviflora	Piceance Bladderpod	Y	G2G3	S2S3	BLM		
Limnorchis ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			

Listera borealis	Northern Twayblade	Y	G4	S2	BLM		
Lomatium bicolor var leptocarpum	Oregon Biscuitroot	Y	G4T?	S2			
Lomatium latilobum	Canyonlands Lomatium	Y	G1	S1	BLM		
Lygodesmia doloresensis	Dolores Skeletonplant	Y	G1Q	S1	BLM		
Mimulus eastwoodiae	Eastwood Monkey-Flower	Y	G3?	S1	BLM		
Muhlenbergia depauperata	Sixweeks Muhly	Y	G5	S1			
Myosurus cupulatus	Horseshoe Mousetail	Y	G4	S1?			
Nama dichotomum	Livemore Fiddleleaf	Y	G4	S1			
Oreocarya aperta	Grand Junction Cat's-Eye	Y	GH	SH			
Oreocarya elata	Tall Cryptanth	Y	G3	S2			
Oreocarya longiflora	Long-Flower Cat's-Eye	Y	G3	S2			
Oreocarya osterhoutii	Osterhout Cryptanth	Y	G3	S2	BLM		
Pediomelum aromaticum	Paradox Breadroot	Y	G3	S2	BLM		
Pediomelum megalanthum	Large-Flowered Breadroot	W	G4?	S3S4			
Penstemon mensarum	Grand Mesa Penstemon	Y	G3	S3			
Penstemon utahensis	Utah Penstemon	Y	G4	S2			
Phacelia constancei	Constance Phacelia	Y	G4	S1			
Phacelia scopulina var submutica	Debeque Phacelia	Y	G4T2	S2	FS	C	
Phacelia submutica	Debeque Phacelia	Y	G4T2	S2	FS	C	
Platanthera sparsiflora var ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Portulaca halimoides	Dwarf Purslane	Y	G4?	S1			
Portulaca parvula	Dwarf Purslane	Y	G4?	S1			
Sclerocactus glaucus	Uinta Basin Hookless Cactus	Y	G3	S3		LT	
Sporobolus flexuosus	Mesa Dropseed	Y	G5	S1S2			
Thalictrum heliophilum	Sun-Loving Meadowrue	Y	G3	S3			
Townsendia strigosa	Strigose Easter-Daisy	Y	G4	S1	BLM		

Reptiles

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Coluber constrictor mormon	western yellowbelly racer	Y	G5T5	S3			
Crotalus viridis concolor	midget faded rattlesnake	Y	G5T4	S3?	BLM		SC
Gambelia wislizenii	longnose leopard lizard	Y	G5	S1	BLM		SC
Tantilla hobartsmithi	southwestern blackhead snake	Y	G5	S2?			
Thamnophis cyrtopsis	blackneck garter snake	W	G5	S2?			

County: Mineral

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Cypseloides niger	Black Swift	Y	G4	S3B	FS		
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gila pandora	Rio Grande chub	Y	G3	S1?	BLM		SC
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC
Oncorhynchus clarki virginalis	Rio Grande cutthroat trout	Y	G4T3	S3	FS/BL		SC

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Valvata sincera	mossy valvata	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ABIES CONCOLOR-PICEA PUNGENS-POPULUS ANGUSTIFOLIA/ACER GLABRUM	Montane Riparian Forests	Y	G2	S2			
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	Montane Riparian Forest	Y	G5	S4			
ABIES LASIOCARPA/ERIGERON EXIMIUS	Subalpine Forests	Y	G5	S4			
ABIES LASIOCARPA/VACCINIUM MYRTILLUS	Subalpine Forests	Y	G5	S5			
ALNUS INCANA-MIXED SALIX	Thinleaf Alder-Mixed Willow Species	Y	G3	S3			
ALNUS INCANA-SALIX DRUMMONDIANA	Montane Riparian Shrubland	Y	G3	S3			
ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparian Shrubland	Y	G3G4Q	S3			

CARDAMINE CORDIFOLIA-MERTENSIA	Alpine Wetlands	Y	G4	S4
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4
CAREX AQUATILIS-CAREX UTRICULATA	Montane Wet Meadows	Y	G4	S4
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4
DANTHONIA PARRYI	Montane Grasslands	Y	G3	S3
ELEOCHARIS QUINQUEFLORA	Alpine Wetlands	Y	G4	S3S4
FESTUCA ARIZONICA-MUHLENBERGIA	Montane Grasslands	Y	G2	S2
FESTUCA ARIZONICA-MUHLENBERGIA	Montane Grasslands	Y	GU	SU
MUHLENBERGIA FILICULMIS	Montane Grasslands	Y	G2	S2
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
PINUS ARISTATA/FESTUCA	Montane Woodlands	Y	G4	S3
PINUS ARISTATA/FESTUCA THURBERI	Lower Montane Woodlands	Y	G3	S2
PINUS PONDEROSA/FESTUCA ARIZONICA	Lower Montane Forests	Y	G4G5	S4
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA-PSEUDOTSUGA	Montane Riparian Forest	Y	G2?	S2
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
PSEUDOTSUGA MENZIESII/MAHONIA REPENS	Douglas Fir/Creeping Oregon-Grape	Y	G5	S1?
SALIX GEYERIANA/CALAMAGROSTIS CANADENSIS	Montane Riparian Willow Carr	Y	G5	S3
SALIX GEYERIANA/CAREX UTRICULATA	Geyer's Willow/Beaked Sedge	Y	G5	S3
SALIX MONTICOLA/CAREX	Montane Riparian Willow Carr	Y	G3	S3
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3
SALIX MONTICOLA/MESIC	Montane Riparian Willow Carr	Y	G3	S3

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Aster alpinus var vierhapperi	Alpine Aster	Y	G5TU	S1			
Astragalus brandegeei	Brandegee Milkvetch	Y	G3G4	S1S2	BLM		
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS		
Botrychium lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lanceolatum var lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lunaria	Common Moonwort	Y	G5	S2S3			
Botrychium pinnatum	Northern Moonwort	Y	G4?	S1			
Cryptantha weberi	Weber's Catseye	Y	G2	S2			
Draba rectifructa	Mountain Whitlow-Grass	Y	G3?	S2			
Draba smithii	Smith Whitlow-Grass	Y	G2	S2	FS		
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3			
Erigeron philadelphicus	Philadelphia Fleabane	Y	G5	S1			
Eriophorum altaicum var neogaeum	Altai Cottongrass	Y	G4T?	S3	FS		
Gilia penstemonoides	Black Canyon Gilia	Y	G3	S3	FS		
Goodyera repens	Dwarf Rattlesnake-Plantain	W	G5	S3			

Lilium philadelphicum	Wood Lily	W	G5	S3
Oenothera kleinii	Wolf Creek Evening Primrose	Y	GHQ	SX
Oreocarya weberi	Weber's Catseye	Y	G2	S2
Potentilla ambigens	Southern Rocky Mountain Cinquefoil	Y	G3	S1S2
Pyrola picta	Pictureleaf Wintergreen	W	G4G5	S3
Stellaria irrigua	Altai Chickweed	Y	G4?	S2

County: Moffat

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC
Spea intermontana	Great Basin spadefoot	Y	G5	S3	BLM		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Grus canadensis tabida	Greater Sandhill Crane	Y	G5T4	S2B,	FS		T
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Tympanuchus phasianellus columbianus	Columbian Sharp-tailed Grouse	Y	G4T3	S2	FS/BL		
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gila cypha	humpback chub	Y	G1	S1		LE	T
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC
Xyrauchen texanus	razorback sucker	Y	G1	S1		LE	E

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Cicindela scutellaris yampae	a tiger beetle	Y	G5T1	S1			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Euderma maculatum	spotted bat	Y	G4	S2	FS/BL		
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Perognathus fasciatus callistus	olive-backed pocket mouse subsp.	Y	G5T3T4	S2?			
Perognathus parvus	Great Basin pocket mouse	Y	G5	S1?			
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		
Tamias dorsalis	cliff chipmunk	Y	G5	S2			

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Valvata sincera	mossy valvata	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5			
ACER NEGUNDO-POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Narrowleaf Cottonwood Riparian Forests	Y	G2	S2			
ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparian Shrubland	Y	G3G4Q	S3			
ARTEMISIA CANA-PURSHIA TRIDENTATA	Western Slope Sagebrush Shrublands	Y	G4	S2S3			
ARTEMISIA NOVA/PSEUDOROEGNERIA SPICATA	Western Slope Sagebrush Shrublands	Y	G5	S2?			
ARTEMISIA NOVA/STIPA COMATA	Western Slope Sagebrush Shrublands	Y	G4	S2?			
ARTEMISIA TRIDENTATA SSP. TRIDENTATA/LEYMUS CINEREUS	Sagebrush Bottomland Shrublands	Y	G2G3	S1			
ARTEMISIA TRIDENTATA SSP. VASEYANA/PSEUDOROEGNERIA SPICATA	Western Slope Sagebrush Shrublands	Y	G5	S2			
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/ELYMUS LANCEOLATUS	Western Slope Sagebrush Shrublands	Y	G3	S1			
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/PASCOPYRUM SMITHII	Sagebrush Bottomland Shrublands	Y	GU	SU			
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/PSEUDOROEGNERIA SPICATA	Xeric Sagebrush Shrublands	Y	G5	S3?			
ATRIPLEX CONFERTIFOLIA/LEYMUS SALINUS	Cold Desert Shrublands	Y	G3G5	S3			
ATRIPLEX CONFERTIFOLIA/PSEUDOROEGNERIA SPICATA	Cold Desert Shrublands	Y	G3	S2S3			
ATRIPLEX CONFERTIFOLIA/STIPA COMATA	Cold Desert Shrublands	Y	G1G2	S1S2			
ATRIPLEX GARDNERI/LEYMUS SALINUS	Gardner's Mat Saltbush Shrublands	Y	G2?	S2?			
ATRIPLEX GARDNERI/ORYZOPSIS HYMENOIDES	Gardner's Mat Saltbush Shrublands	Y	G3	S2			
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4			
CAREX NEBRASCENSIS	Wet Meadows	Y	G4	S3			
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4			
CERCOCARPUS LEDIFOLIUS/PSEUDOROEGNERIA SPICATA	Mixed Mountain Shrublands	Y	G5	S2			
CERCOCARPUS MONTANUS/PSEUDOROEGNERIA SPICATA	Mixed Mountain Shrublands	Y	G4	S3			
DISTICHLIS SPICATA	Salt Meadows	Y	G5	S3			
ELEOCHARIS PALUSTRIS	Emergent Wetland	Y	G5	S4			
JUNCUS BALTICUS VAR. MONTANUS	Western Slope Wet Meadows	Y	G5	S5			
MUHLENBERGIA ASPERIFOLIA	Western Slope Salt Meadows	Y	GU	SU			
PASCOPYRUM SMITHII	Western Slope Grasslands	Y	G3G5Q	S2			
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3			
PINUS EDULIS/CERCOCARPUS LEDIFOLIUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	G3	S3			
PINUS EDULIS/PSEUDOROEGNERIA SPICATA	Xeric Western Slope Pinyon-Juniper Woodlands	Y	G4	S4			
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Cottonwood Riparian Forest	Y	G4	S3			

POPULUS ANGUSTIFOLIA/CRATAEGUS	Narrowleaf Cottonwood Riparian Forests	Y	G2?	S2?
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	Narrowleaf Cottonwood Riparian Forests	Y	G4	S4
POPULUS DELTOIDES SSP. WISLIZENII/RHUS TRILOBATA	Fremont's Cottonwood Riparian Forests	Y	G2	S2
QUERCUS GAMBELII-CERCOCARPUS MONTANUS/CAREX GEYERI	Mixed Mountain Shrublands	Y	G3	S3
RHUS TRILOBATA	Skunkbrush Riparian Shrubland	Y	G2	S2
SALIX BOOTHII/MESIC GRAMINOID	Riparian Willow Carr	Y	G3	S3
SALIX EXIGUA/BARE GROUND	Coyote Willow/Bare Ground	Y	G5	S5
SALIX EXIGUA/MESIC GRAMINOID	Coyote Willow/Mesic Graminoid	Y	G5	S5
SALIX LUCIDA SSP. CAUDATA	Montane Riparian Shrubland	Y	G3Q	S2S3
SCIRPUS MARITIMUS	Emergent Wetland (Marsh)	Y	G4	S2
SCIRPUS PUNGENS	Bulrush	Y	G3G4	S3
SHEPHERDIA ARGENTEA	Foothills Riparian Shrubland	Y	G3G4	S1
SPARTINA GRACILIS	Western Slope Salt Meadows	Y	GU	SU
SPOROBOLUS AIROIDES	Great Plains Salt Meadows	Y	G3Q	S3

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Adiantum capillus-veneris	Southern Maiden-Hair	Y	G5	S2	FS		
Anticlea vaginatus	Alcove Death Camas	Y	G2	S2			
Arabis fernaldiana var fernaldiana	Park Rockcress	Y	G3G4T3	S2			
Astragalus detritalis	Debris Milkvetch	Y	G3	S2	BLM		
Astragalus duchesnensis	Duchesne Milkvetch	Y	G3	S1S2	BLM		
Astragalus hamiltonii	Hamilton Milkvetch	Y	G1	S1			
Astragalus lonchocarpus var hamiltonii	Hamilton Milkvetch	Y	G1	S1			
Astragalus nelsonianus	Nelson Milkvetch	Y	G2	S1	BLM		
Astragalus wetherillii	Wetherill Milkvetch	Y	G3	S3			
Boechera fernaldiana	Park Rockcress	Y	G3G4T3	S2			
Bolophyta ligulata	Ligulate Feverfew	Y	G3	S2	BLM		
Cirsium ownbeyi	Ownbey Thistle	Y	G3	S2	BLM		
Cryptantha breviflora	Short-Flower Cryptanth	Y	G4	S1			
Cryptantha caespitosa	Tufted Cryptanth	Y	G4	S2	BLM		
Cryptantha rollinsii	Rollins Cryptanth	Y	G3	S2	BLM		
Cymopterus duchesnensis	Uinta Basin Spring-Parsley	Y	G2	S1	BLM		
Cystopteris utahensis	Utah Bladderfern	Y	G3?	S1			
Draba oligosperma	Woods Draba	Y	G5	S2			
Epipactis gigantea	Helleborine	Y	G4	S2	FS		
Erigeron wilkenii	Wilken Fleabane	Y	G1	S1			
Eriogonum lonchophyllum var saurinum	Dinosaur Buckwheat	Y	G4T3	S1			
Eriogonum saurinum	Dinosaur Buckwheat	Y	G4T3	S1			
Eriogonum tumulosum	Woodside Buckwheat	Y	G3	S2	BLM		
Eriogonum viridulum	Duchesne Buckwheat	Y	G4Q	S1	BLM		
Fritillaria pudica	Yellow Bell	Y	G5	S1			

Juncus bryoides	Minute Rush	Y	G4	S1			
Lewisia rediviva	Bitteroot	Y	G5	S2			
Limnorchis zothecina	Alcove Bog Orchid	Y	G2	S1			
Oenothera acutissima	Narrow-Leaf Evening Primrose	Y	G2	S2	BLM		
Oreocarya breviflora	Short-Flower Cryptanth	Y	G4	S1			
Oreocarya caespitosa	Tufted Cryptanth	Y	G4	S2	BLM		
Oreocarya rollinsii	Rollins Cryptanth	Y	G3	S2	BLM		
Oxytropis besseyi var obnapiformis	Bessey Locoweed	Y	G5T2	S2			
Oxytropis nana var obnapiformis	Bessey Locoweed	Y	G5T2	S2			
Parthenium ligulatum	Ligulate Feverfew	Y	G3	S2	BLM		
Pellaea breweri	Brewer's Cliff-Brake	Y	G5	S2			
Pellaea glabella ssp simplex	Smooth Cliff-Brake	Y	G5T4?	S2			
Pellaea suksdorfiana	Smooth Cliff-Brake	Y	G5T4?	S2			
Penstemon acaulis var yampaensis	Yampa Beardtongue	Y	G3Q	S3			
Penstemon gibbensii	Gibben's Beardtongue	Y	G1	S1	BLM		
Penstemon scariosus var albifluvis	White River Penstemon	Y	G4T1	S1		C	
Penstemon scariosus var cyanomontanus	Plateau Penstemon	Y	G4T?	S2			
Penstemon yampaensis	Yampa Beardtongue	Y	G3Q	S3			
Platanthera zothecina	Alcove Bog Orchid	Y	G2	S1			
Spiranthes diluvialis	Ute Ladies' Tresses	Y	G2	S2		LT	
Townsendia strigosa	Strigose Easter-Daisy	Y	G4	S1	BLM		
Trifolium andinum	Mountain Clover	Y	G3	S1	BLM		
Zigadenus vaginatus	Alcove Death Camas	Y	G2	S2			

Reptiles

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Coluber constrictor mormon	western yellowbelly racer	Y	G5T5	S3			

County: Montezuma

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Aimophila ruficeps	Rufous-crowned Sparrow	Y	G5	S2			
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Asio flammeus	Short-eared Owl	Y	G5	S2B,			
Dendroica graciae	Grace's Warbler	Y	G5	S3B,			
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Strix occidentalis lucida	Mexican Spotted Owl	Y	G3T3	S1B,		LT	T
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Lynx canadensis	lynx	Y	G5	S1	FS		E
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Perognathus flavus hopiensis	silky pocket mouse subsp.	Y	G5T4	SH			
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		
Tadarida brasiliensis	Brazilian free-tailed bat	W	G5	S1			
Vulpes macrotis	kit fox	Y	G4	S1			E

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	Montane Riparian Forests	Y	G5	S5			
ACER NEGUNDO-POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Narrowleaf Cottonwood Riparian Forests	Y	G2	S2			
ALNUS INCANA-CORNUS SERICEA	Thinleaf Alder-Red-Oiser Dogwood Riparian Shrubland	Y	G3G4	S3			
ATRIPLEX CORRUGATA SHALE BARREN	Alkali Mat Saltbush Shrublands	Y	G5	S2?			
ATRIPLEX CUNEATA/FRANKENIA JAMESII SHALE BARREN	Alkali Mat Saltbush Shrublands	Y	GU	SU			
CARDAMINE CORDIFOLIA-MERTENSIA	Alpine Wetlands	Y	G4	S4			
CELTIS RETICULATA	Hackberry	Y	G1G2Q	S1S2Q			
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4			

POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Cottonwood Riparian Forest	Y	G4	S3
POPULUS ANGUSTIFOLIA/SALIX ERIOCEPHALA VAR. LIGULIFOLIA-SHEPHERDIA	Narrowleaf Cottonwood Riparian Forests	Y	G1	S1
QUERCUS GAMBELII-CERCOCARPUS MONTANUS/CAREX GEYERI	Mixed Mountain Shrublands	Y	G3	S3
SHEPHERDIA ARGENTEA	Foothills Riparian Shrubland	Y	G3G4	S1

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Acer grandidentatum	Bigtooth Maple	Y	G4	S1			
Adiantum capillus-veneris	Southern Maiden-Hair	Y	G5	S2	FS		
Aletes macdougalii ssp breviradiatus	Mesa Verde Aletes	Y	G3G4T3?	S1			
Aquilegia micrantha var mancosana	Mancos Columbine	Y	G5THQ	SH			
Astragalus cronquistii	Cronquist Milkvetch	Y	G2	S2	BLM		
Astragalus deterior	Cliff-Palace Milkvetch	Y	G2	S2			
Astragalus humillimus	Mancos Milkvetch	Y	G1	S1		LE	
Astragalus naturitensis	Naturita Milkvetch	Y	G2G3	S2S3	BLM		
Astragalus newberryi	Newberry's Milk-Vetch	Y	G5	S1			
Astragalus schmolliae	Schmoll Milkvetch	Y	G1	S1			
Astragalus tortipes	Sleeping Ute Milkvetch	Y	G1	S1		C	
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS		
Botrychium lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lanceolatum var lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lunaria	Common Moonwort	Y	G5	S2S3			
Botrychium pinnatum	Northern Moonwort	Y	G4?	S1			
Calochortus flexuosus	Weak-Stemmed Mariposa Lily	Y	G4	S1			
Collomia grandiflora	Showy Collomia	Y	G5	S1			
Draba graminea	San Juan Whitlow-Grass	Y	G2	S2			
Epipactis gigantea	Helleborine	Y	G4	S2	FS		
Eriogonum clavellatum	Comb Wash Buckwheat	Y	G1G2	S1	BLM		
Eriogonum leptocladon var ramosissimum	Eastwood Sand Buckwheat	Y	G5T5	S1			
Hackelia gracilenta	Mesa Verde Stickseed	Y	G2	S2			
Iliamna grandiflora	Large-Flower Globe-Mallow	Y	G3?Q	S1			
Pediomelum megalanthum	Large-Flowered Breadroot	W	G4?	S3S4			
Penstemon breviculus	Little Penstemon	Y	G3Q	S2			
Penstemon lentus	Abajo Penstemon	Y	G4Q	S2			
Penstemon parviflorus	Small-Flower Beardtongue	Y	GHQ	SX			
Penstemon utahensis	Utah Penstemon	Y	G4	S2			
Phlox caryophylla	Pagosa Phlox	Y	G4	S2			
Proatriplex pleiantha	Mancos Saltbush	Y	G3	S1			
Pyrola picta	Pictureleaf Wintergreen	W	G4G5	S3			
Sclerocactus mesae-verdae	Mesa Verde Cactus	Y	G2	S2		LT	

Reptiles

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Gambelia wislizenii	longnose leopard lizard	Y	G5	S1	BLM		SC
Lampropeltis getula	common kingsnake	Y	G5	S1	BLM		SC
Sceloporus magister	desert spiny lizard	Y	G5	S2	BLM		SC

County: Montrose

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Hyla arenicolor	canyon treefrog	Y	G5	S2	BLM		SC
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Centrocercus sp 1	Gunnison Sage Grouse	Y	G1	S1	BLM		SC
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gomphus intricatus	Brimstone clubtail	Y	G4	S1			
Speyeria nokomis nokomis	Great Basin silverspot butterfly	Y	G4T2	S1	BLM		

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Euderma maculatum	spotted bat	Y	G4	S2	FS/BL		
Neotoma albigula brevicauda	white-throated woodrat subsp.	Y	G5T2	S2			
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Physa utahensis	banded physa	Y	G1	S1			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ACER NEGUNDO/BETULA OCCIDENTALIS	Boxelder/River Birch	Y	G1G2	S1			
ALNUS INCANA/MESIC GRAMINOID	Montane Riparian Shrubland	Y	G5Q	S3			
AQUILEGIA MICRANTHA-MIMULUS EASTWOODIAE	Hanging Gardens	Y	G2G3	S2S3			
ARCTOSTAPHYLOS PATULA	Montane Shrublands	Y	G2	S2			
ARTEMISIA CANA/FESTUCA	Western Slope Sagebrush Shrublands	Y	G2G3	S2S3			
ARTEMISIA TRIDENTATA SSP. VASEYANA/PASCOPYRUM SMITHII	Sagebrush Bottomland Shrublands	Y	G3	S1S2			
ATRIPLEX CONFERTIFOLIA/HILARIA JAMESII	Cold Desert Shrublands	Y	G3	S2			

ATRIPLEX CONFERTIFOLIA/LEYMUS SALINUS	Cold Desert Shrublands	Y	G3G5	S3
BETULA OCCIDENTALIS/MESIC FORB	Foothills Riparian Shrubland	Y	G3	S2
BETULA OCCIDENTALIS/MESIC GRAMINOID	Lower Montane Riparian Shrublands	Y	G3	S2
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4
ELEOCHARIS ROSTELLATA	Emergent Wetland	Y	G2G3	S2S3
FORESTIERA PUBESCENS	Foothills Riparian Shrubland	Y	G1G2	S1
HILARIA JAMESII	Western Slope Grasslands	Y	G3	S1
JUNIPERUS OSTEOSPERMA/AMELANCHIER UTAHENSIS-PHILADELPHUS MICROPHYLLUS/LEYMUS SALINUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	GU	SU
JUNIPERUS OSTEOSPERMA/ARTEMISIA	Utah Juniper/Black Sagebrush/Rock Woodlands	Y	G5	SU
JUNIPERUS OSTEOSPERMA/STIPA COMATA		Y	G2	S2?
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
PICEA PUNGENS/CORNUS SERICEA	Montane Riparian Forest	Y	G4	S2
PINUS EDULIS/STIPA COMATA	Xeric Western Slope Pinyon-Juniper Woodlands	Y	G2	S2
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Cottonwood Riparian Forest	Y	G4	S3
POPULUS ANGUSTIFOLIA/RHUS TRILOBATA	Narrowleaf Cottonwood/Skunkbrush	Y	G3	S3
POPULUS ANGUSTIFOLIA/SALIX ERIOCEPHALA VAR. LIGULIFOLIA-SHEPHERDIA	Narrowleaf Cottonwood Riparian Forests	Y	G1	S1
POPULUS DELTOIDES SSP. WISLIZENII/RHUS TRILOBATA	Fremont's Cottonwood Riparian Forests	Y	G2	S2
POPULUS DELTOIDES SSP. WISLIZENII/SALIX EXIGUA	Fremonts Cottonwood Riparian Forests	Y	GU	S1S2
POPULUS FREMONTII-SALIX GOODDINGII	Fremont's Cottonwood-Gooddings Black Willow	Y	G2	S1
POPULUS TREMULOIDES/CEANOTHUS VELUTINUS	Aspen Forests	Y	G2G3	S2S3
PSEUDOTSUGA MENZIESII/CAREX GEYERI	Lower Montane Forests	Y	G5Q	S3
PSEUDOTSUGA MENZIESII/CORNUS SERICEA	Lower Montane Riparian Forests	Y	G4	S2
PSEUDOTSUGA MENZIESII/PAXISTIMA MYRSINITES	Lower Montane Forests	Y	G2G3	S2S3
QUERCUS GAMBELII-CERCOCARPUS MONTANUS/CAREX GEYERI	Mixed Mountain Shrublands	Y	G3	S3
RHUS TRILOBATA	Skunkbrush Riparian Shrubland	Y	G2	S2
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	Montane Willow Carr	Y	G2G3	S2S3
SALIX EXIGUA/BARE GROUND	Coyote Willow/Bare Ground	Y	G5	S5
SALIX EXIGUA/MESIC GRAMINOID	Coyote Willow/Mesic Graminoid	Y	G5	S5
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3
SARCOBATUS VERMICULATUS/SUAEDA	Saline Bottomland Shrublands	Y	G2G3	S2S3
SHEPHERDIA ARGENTEA	Foothills Riparian Shrubland	Y	G3G4	S1
SPARTINA GRACILIS	Western Slope Salt Meadows	Y	GU	SU

SPOROBOLUS AIROIDES	Great Plains Salt Meadows	Y	G3Q	S3			
STIPA COMATA - WEST	Western Slope Grasslands	Y	G2	S2			

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Adiantum capillus-veneris	Southern Maiden-Hair	Y	G5	S2	FS		
Astragalus linifolius	Grand Junction Milkvetch	Y	G3Q	S3	BLM		
Astragalus naturitensis	Naturita Milkvetch	Y	G2G3	S2S3	BLM		
Astragalus rafaelensis	San Rafael Milkvetch	Y	G3	S1	BLM		
Astragalus sesquiflorus	Sandstone Milkvetch	Y	G3?	S1	BLM		
Astragalus wetherillii	Wetherill Milkvetch	Y	G3	S3			
Calochortus flexuosus	Weak-Stemmed Mariposa Lily	Y	G4	S1			
Cirsium perplexans	Rocky Mountain Thistle	Y	G2	S2	BLM		
Cryptantha longiflora	Long-Flower Cat's-Eye	Y	G3	S2			
Cypripedium calceolus ssp parviflorum	Yellow Lady's-Slipper	Y	G5	S2			
Cypripedium pubescens	Yellow Lady's-Slipper	Y	G5	S2			
Draba spectabilis	Draba	Y	G3?T3Q	S3			
Draba spectabilis var oxyloba	Draba	Y	G3?T3Q	S3			
Epipactis gigantea	Helleborine	Y	G4	S2	FS		
Erigeron kachinensis	Kachina Daisy	Y	G2	S1	BLM		
Eriogonum pelinophilum	Clay-Loving Wild Buckwheat	Y	G2Q	S2		LE	
Gilia penstemonoides	Black Canyon Gilia	Y	G3	S3	FS		
Lesquerella vicina	Good-Neighbor Bladderpod	Y	G2	S2	BLM		
Limnorchis ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Lomatium concinnum	Colorado Desert-Parsley	Y	G2	S2	BLM		
Lupinus crassus	Payson Lupine	Y	G2	S2	BLM		
Mimulus eastwoodiae	Eastwood Monkey-Flower	Y	G3?	S1	BLM		
Monardella odoratissima	Mountain Wild Mint	Y	G4G5	S2			
Oreocarya longiflora	Long-Flower Cat's-Eye	Y	G3	S2			
Pediomelum aromaticum	Paradox Breadroot	Y	G3	S2	BLM		
Penstemon breviculus	Little Penstemon	Y	G3Q	S2			
Penstemon lentus	Abajo Penstemon	Y	G4Q	S2			
Penstemon mensarum	Grand Mesa Penstemon	Y	G3	S3			
Penstemon retrorsus	Adobe Beardtongue	Y	G3	S3			
Platanthera sparsiflora var ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Sclerocactus glaucus	Uinta Basin Hookless Cactus	Y	G3	S3		LT	
Sporobolus flexuosus	Mesa Dropseed	Y	G5	S1S2			
Sullivantia hapemanii var purpusii	Hanging Garden Sullivantia	Y	G3T3	S3	FS		
Trifolium kingii	King Clover	Y	G4	S1			

County: Morgan

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Grus americana	Whooping Crane	Y	G1	SAN			E
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Tympanuchus cupido pinnatus	Greater Prairie-Chicken	Y	G4T4	S3	FS		

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2			
Euphyes bimacula	Two-spotted skipper	Y	G4	S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Spilogale putorius	eastern spotted skunk	Y	G5	S2			

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Anodonta grandis	giant floater	Y	G5	S1			
Anodontoides ferussacianus	cylindrical papershell	Y	G5	S2			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SALIX EXIGUA	Plains Cottonwood Riparian Woodland	Y	G4?	S3			
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SPARTINA PECTINATA	Plains Cottonwood Riparian Woodland	Y	G1G2	S1			
POPULUS DELTOIDES SSP. MONILIFERA/SYMPHORICARPOS OCCIDENTALIS	Plains Cottonwood Riparian Woodland	Y	G2G3	S2			
SCIRPUS TABERNAEMONTANI-SCIRPUS	Great Plains Marshes	Y	G3	S2S3			
TYPHA ANGUSTIFOLIA-TYPHA LATIFOLIA	Narrow-Leaf Cattail Marsh	Y	G5	S3			

Plants

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			
Spiranthes diluvialis	Ute Ladies' Tresses	Y	G2	S2		LT	

County: Otero

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo debilis	green toad	Y	G5	S2			
Scaphiopus couchii	Couch's spadefoot	Y	G5	S1			SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Aimophila ruficeps	Rufous-crowned Sparrow	Y	G5	S2			
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius alexandrinus nivosus	Western Snowy Plover	Y	G4T3	S1B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Amblyscirtes simius	Simius roadside skipper	Y	G4	S3			
Cicindela lepida	Little white tiger beetle	Y	G4	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Neotoma micropus	southern plains woodrat	Y	G5	S3			
Tadarida brasiliensis	Brazilian free-tailed bat	W	G5	S1			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ARTEMISIA BIGELOVII/ORYZOPSIS HYMENOIDES	Plains Escarpment Prairies (Limestone	Y	G3	S3?			
BOUTELOUA GRACILIS-HILARIA JAMESII	Shortgrass Prairie	Y	G3G4	S3			
CERCOCARPUS MONTANUS-RHUS TRILOBATA/ANDROPOGON GERARDII	Mixed Foothill Shrublands	Y	G2G3	S2S3			
DISTICHLIS SPICATA	Salt Meadows	Y	G5	S3			
ELEOCHARIS PALUSTRIS	Emergent Wetland	Y	G5	S4			
JUNIPERUS MONOSPERMA/BOUTELOUA CURTIPENDULA	Foothills Pinyon-Juniper Woodlands	Y	G5	S3S4			
MUHLENBERGIA ASPERIFOLIA	Great Plains Salt Meadows	Y	GU	S?			
POPULUS ANGUSTIFOLIA/PASCOPYRUM	Narrowleaf Cottonwood/Western	Y	G1Q	S1Q			
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SALIX EXIGUA	Plains Cottonwood Riparian Woodland	Y	G4?	S3			
POPULUS DELTOIDES/PASCOPYRUM SMITHII-PANICUM OBTUSUM	Plains Cottonwood/Western Wheatgrass-Vine Mesquite	Y	G1G2Q	S1S2Q			
POPULUS DELTOIDES/SPOROBOLUS AIROIDES	Plains Cottonwood/Alkali Sacaton	Y	G2Q	S2Q			
POPULUS DELTOIDES/SPOROBOLUS CRYPTANDRUS	Plains Cottonwood/Sand Dropseed	Y	G1G2Q	S1S2Q			

RHUS TRILOBATA-PHILADELPHUS MICROPHYLLUS	Shrubland	Y	GU	S2
SALIX EXIGUA/BARE GROUND	Coyote Willow/Bare Ground	Y	G5	S5
SALIX EXIGUA/SCIRPUS PUNGENS	Coyote Willow/Bulrush	Y	GU	S2S4
SCIRPUS PUNGENS	Bulrush	Y	G3G4	S3
SPOROBOLUS AIROIDES	Great Plains Salt Meadows	Y	G3Q	S3
SPOROBOLUS AIROIDES-PANICUM OBTUSUM	Alkali Sacaton-Vine Mesquite	Y	G2	S2

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Asclepias uncialis	Dwarf Milkweed	Y	G3?	S1S2	FS/BL		
Asplenium platyneuron	Ebony Spleenwort	Y	G5	S1			
Echinocereus reichenbachii var perbellus	Lace Hedgehog Cactus	Y,	G5T?	S1			
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			
Oenothera harringtonii	Arkansas Valley Evening Primrose	Y	G2	S2			

Reptiles

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Cnemidophorus neotesselatus	triploid Colorado checkered whiptail	Y	G2Q	S2			
Lampropeltis getula	common kingsnake	Y	G5	S1	BLM		SC
Phrynosoma cornutum	Texas horned lizard	Y	G4G5	S3	FS/BL		SC
Rhinocheilus lecontei	longnose snake	W	G5	S1?			
Sistrurus catenatus	massasauga	Y	G3G4	S2	BLM		SC
Sonora semiannulata	ground snake	W	G5	S3			

County: Ouray

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Cypseloides niger	Black Swift	Y	G4	S3B	FS		
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Lycaeides idas sublivens	Dark blue	P	G5T?	S3			
Speyeria nokomis nokomis	Great Basin silverspot butterfly	Y	G4T2	S1	BLM		

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Mustela nigripes	black-footed ferret	Y	G1	SH			E

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ABIES CONCOLOR/MAHONIA REPENS	Mixed Montane Forests	Y	G5	S4			
ABIES LASIOCARPA - PICEA ENGELMANNII - POPULUS ANGUSTIFOLIA / LONICERA INVOLUCRATA	Montane Riparian Forest	Y	G4	S3			
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	Montane Riparian Forest	Y	G5	S4			
ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparian Shrubland	Y	G3G4Q	S3			
BETULA GLANDULOSA/MESIC FORB-MESIC GRAMINOID	Subalpine Riparian Shrubland	Y	G3G4	S3			
CAREX AQUATILIS-CAREX UTRICULATA PERCHED WETLAND	Wet Meadow-Perched Wetland	Y	G3	S3			
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4			
CAREX UTRICULATA PERCHED WETLAND	Beaked Sedge Perched Wetland	Y	G3?	S3			
ELEOCHARIS PALUSTRIS	Emergent Wetland	Y	G5	S4			
PINUS EDULIS/CERCOCARPUS MONTANUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	G5	S4			
PINUS PONDEROSA/QUERCUS GAMBELII	Foothills Ponderosa Pine Scrub Woodlands	Y	G5	S4			
POLYGONUM AMPHIBUM	Montane Wet Meadows	Y	G4	S3			

POPULUS ANGUSTIFOLIA-JUNIPERUS SCOPULORUM	Montane Riparian Forest	Y	G2G3	S2
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Cottonwood Riparian Forest	Y	G4	S3
POPULUS ANGUSTIFOLIA/CRATAEGUS	Narrowleaf Cottonwood Riparian Forests	Y	G2?	S2?
POPULUS ANGUSTIFOLIA/SALIX ERIOCEPHALA VAR. LIGULIFOLIA-SHEPHERDIA	Narrowleaf Cottonwood Riparian Forests	Y	G1	S1
POPULUS TREMULOIDES-(PINUS PONDEROSA)/DANTHONIA PARRYI	Montane Forest	Y	GU	S3S4
POPULUS TREMULOIDES/ACER GLABRUM	Montane Riparian Forests	Y	G2	S1S2
POPULUS TREMULOIDES/FESTUCA THURBERI	Aspen Forests	Y	G4	S4
POPULUS TREMULOIDES/PTERIDIUM AQUILINUM	Aspen Wetland Forests	Y	G4	S3S4
POTAMOGETON FOLIOSUS	Montane Floating/Submergent Palustrine Wetlands	Y	G3	S3
PSEUDOTSUGA MENSIEZII/ACER GLABRUM	Lower Montane Forests	Y	G4	S1
PSEUDOTSUGA MENZIESII/CAREX GEYERI	Lower Montane Forests	Y	G5Q	S3
PSEUDOTSUGA MENZIESII/CORNUS SERICEA	Lower Montane Riparian Forests	Y	G4	S2
PSEUDOTSUGA MENZIESII/PAXISTIMA MYRSINITES	Lower Montane Forests	Y	G2G3	S2S3
QUERCUS GAMBELII-AMELANCHIER UTAHENSIS	Mixed Mountain Shrubland	Y	G3G5	SU
QUERCUS GAMBELII/POA AGASSIZENSIS	Mixed Mountain Shrublands	Y	GUQ	SUQ
SALIX DRUMMONDIANA/CALAMAGROSTIS CANADENSIS	Lower Montane Willow Carrs	Y	G3	S3
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Adiantum aleuticum	Aleutian Maidenhair Fern	Y	G5?	S1			
Adiantum capillus-veneris	Southern Maiden-Hair	Y	G5	S2	FS		
Astragalus wetherillii	Wetherill Milkvetch	Y	G3	S3			
Cirsium perplexans	Rocky Mountain Thistle	Y	G2	S2	BLM		
Cryptogramma stelleri	Slender Rock-Brake	Y	G5	S2	BLM		
Cystopteris montana	Mountain Bladder Fern	Y	G5	S1			
Draba crassa	Thick-Leaf Whitlow-Grass	Y	G3	S3			
Draba graminea	San Juan Whitlow-Grass	Y	G2	S2			
Draba incerta	Yellowstone Whitlow-Grass	Y	G5	S1			
Draba rectifructa	Mountain Whitlow-Grass	Y	G3?	S2			
Draba spectabilis	Draba	Y	G3?T3Q	S3			
Draba spectabilis var oxyloba	Draba	Y	G3?T3Q	S3			
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3			
Gilia penstemonoides	Black Canyon Gilia	Y	G3	S3	FS		

Iliamna grandiflora	Large-Flower Globe-Mallow	Y	G3?Q	S1	
Lesquerella vicina	Good-Neighbor Bladderpod	Y	G2	S2	BLM
Limnorchis ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3	
Lomatium concinnum	Colorado Desert-Parsley	Y	G2	S2	BLM
Monardella odoratissima	Mountain Wild Mint	Y	G4G5	S2	
Pellaea atropurpurea	Purple Cliff-Brake	Y	G5	S2S3	
Platanthera sparsiflora var ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3	
Polypodium hesperium	Western Polypody	Y	G5	S1S2	
Woodsia neomexicana	New Mexico Cliff Fern	Y	G4?	S2	

County: Park

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius alexandrinus nivosus	Western Snowy Plover	Y	G4T3	S1B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Grus americana	Whooping Crane	Y	G1	SAN			E
Pelecanus erythrorhynchos	American White Pelican	Y	G3	S1B,	BLM		SC

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Oncorhynchus clarki stomias	greenback cutthroat trout	Y	G4T2T3	S2		LT	T

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Cicindela nebraskana	a tiger beetle	Y	G4	S2			
Hesperia leonardus montana	Pawnee montane skipper	Y	G4T1	S1		LT	
Oeneis alberta	Alberta arctic	Y	G5	S2			
Oeneis polixenes	Polixenes arctic	Y	G5	S2			
Somatochlora hudsonica	Hudsonian emerald	W	G5	S2S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E
Mustela nigripes	black-footed ferret	Y	G1	SH			E

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Physa skinneri	glass physa	Y	G?	S2			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
DANTHONIA PARRYI	Montane Grasslands	Y	G3	S3			
ELEOCHARIS QUINQUEFLORA-TRIGLOCHIN SPP.	Alkaline Spring Wetland	Y	GU	S2			
FESTUCA ARIZONICA-MUHLENBERGIA	Montane Grasslands	Y	G2	S2			

FESTUCA ARIZONICA-MUHLENBERGIA	Montane Grasslands	Y	GU	SU
KOBRESIA MYOSUROIDES-THALICTRUM	Extreme Rich Fens	Y	G1?	S1
KOBRESIA SIMPLICIUSCULA-SCIRPUS PUMILUS	Extreme Rich Fen	Y	G2?	S1
PENTAPHYLLOIDES FLORIBUNDA/DESCHAMPSIA CESPITOSA	Montane Riparian Shrubland	Y	G4	S3S4
PHIPPSIA ALGIDA	Alpine Wetlands	Y	GU	SU
PINUS ARISTATA/FESTUCA	Montane Woodlands	Y	G4	S3
PINUS ARISTATA/FESTUCA THURBERI	Lower Montane Woodlands	Y	G3	S2
PINUS ARISTATA/JUNIPERUS COMMUNIS	Montane Woodlands	Y	GU	SU
PINUS ARISTATA/RIBES	Upper Montane Woodlands	Y	G2G4	S1
PINUS ARISTATA/TRIFOLIUM DASYPHYLLUM	Upper Montane Woodlands	Y	G2	S2
POPULUS TREMULOIDES/LONICERA INVOLUCRATA	Montane Riparian Forests	Y	G3	S3
PUCCINELLIA AIROIDES	Western Slope Salt Meadows	Y	G4	S1
SALICORNIA RUBRA	Western Slope Salt Meadows	Y	G2	S1?
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4
SALIX PLANIFOLIA/CAREX	Subalpine Riparian Willow Carr	Y	G5	S4

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Aquilegia saximontana	Rocky Mountain Columbine	Y	G3	S3			
Arabidopsis salsuginea	Salt-Lick Mustard	Y	G4G5	S1			
Armeria maritima ssp sibirica	Sea Pink	Y	G5T5	S1	FS		
Armeria scabra ssp sibirica	Sea Pink	Y	G5T5	S1	FS		
Askellia nana	Dwarf Hawksbeard	Y	G5	S2			
Astragalus bodinii	Bodin Milkvetch	Y	G4	S2			
Astragalus molybdenus	Leadville Milkvetch	Y	G3	S2	FS		
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS		
Botrychium lunaria	Common Moonwort	Y	G5	S2S3			
Botrychium pallidum	Pale Moonwort	Y	G2	S2	FS		
Braya humilis	Alpine Braya	Y	G4	S2			
Carex leptalea	Bristle-Stalk Sedge	Y	G5	S1			
Carex livida	Livid Sedge	Y	G5	S1	FS		
Carex oreocharis	A Sedge	Y	G3	S1			
Carex scirpoidea	Canadian Single-Spike Sedge	Y	G5	S2			
Carex tenuiflora	Slender-Flower Sedge	Y	G5	S1			
Carex viridula	Green Sedge	Y	G5?	S1			
Crepis nana	Dwarf Hawksbeard	Y	G5	S2			
Cylactis arctica ssp acaulis	Nagoon Berry	Y	G5T5	S1	FS		
Cypripedium calceolus ssp parviflorum	Yellow Lady's-Slipper	Y	G5	S2			
Cypripedium pubescens	Yellow Lady's-Slipper	Y	G5	S2			
Draba borealis	Northern Rockcress	Y	G4	S2			

Draba crassa	Thick-Leaf Whitlow-Grass	Y	G3	S3		
Draba exunguiculata	Clawless Draba	Y	G2	S2		
Draba fladnizensis	Arctic Draba	Y	G4	S2S3		
Draba grayana	Gray's Peak Whitlow-Grass	Y	G2	S2		
Draba incerta	Yellowstone Whitlow-Grass	Y	G5	S1		
Draba oligosperma	Woods Draba	Y	G5	S2		
Draba porsildii	Porsild Draba	Y	G3G4	S1		
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3		
Eriogonum brandegeei	Brandegee Wild Buckwheat	Y	G1G2	S1S2	FS/BL	
Eriogonum coloradense	Colorado Wild Buckwheat	Y	G2	S2	BLM	
Eriophorum altaicum var neogaeum	Altai Cottongrass	Y	G4T?	S3	FS	
Eriophorum gracile	Slender Cottongrass	Y	G5	S2		
Eutrema edwardsii ssp penlandii	Penland Alpine Fen Mustard	Y	G1G2	S1S2		LT
Eutrema penlandii	Penland Alpine Fen Mustard	Y	G1G2	S1S2		LT
Hymenoxys helenioides	Intermountain Bitterweed	Y	G3?Q	S1		
Ipomopsis globularis	Globe Gilia	Y	G2	S2		
Lilium philadelphicum	Wood Lily	W	G5	S3		
Machaeranthera coloradoensis	Colorado Tansy-Aster	Y	G2?	S2	FS	
Oxytropis parryi	Parry Oxytrope	Y	G5	S1		
Packera pauciflora	Few-Flowered Ragwort	Y	G4G5	S1S2		
Papaver kluanensis	Alpine Poppy	W	G5T3?	S3		
Papaver radicatum ssp kluanense	Alpine Poppy	W	G5T3?	S3		
Parnassia kotzebuei	Kotzebue Grass-Of-Parnassus	Y	G4	S2		
Phippsia algida	Snow Grass	Y	G5	S2		
Picardenia helenioides	Intermountain Bitterweed	Y	G3?Q	S1		
Potentilla effusa var rupincola	Rocky Mountain Cinquefoil	Y	G5?T2	S2	FS	
Potentilla rupincola	Rocky Mountain Cinquefoil	Y	G5?T2	S2	FS	
Primula egaliksensis	Greenland Primrose	Y	G4	S2	FS	
Ptilagrostis mongholica ssp porteri	Porter Feathergrass	Y	G3G5T2	S2	FS	
Ptilagrostis porteri	Porter Feathergrass	Y	G3G5T2	S2	FS	
Ranunculus gelidus ssp grayi	Tundra Buttercup	Y	G4G5	S2		
Ranunculus karelinii	Tundra Buttercup	Y	G4G5	S2		
Rubus arcticus ssp acaulis	Nagoon Berry	Y	G5T5	S1	FS	
Salix candida	Hoary Or Silver Willow	Y	G5	S2		
Salix lanata ssp calcicola	Lime-Loving Willow	Y	G4T4	S1	FS	
Salix myrtillifolia	Low Blueberry Willow	Y	G5	S1	FS	
Salix serissima	Autumn Willow	Y	G4	S1	FS	
Saussurea weberi	Weber Saussurea	Y	G3Q	S2	BLM	
Scirpus rollandii	Little Bulrush	Y	G3Q	S2	FS	
Senecio pauciflorus	Few-Flowered Ragwort	Y	G4G5	S1S2		
Sisyrinchium pallidum	Pale Blue-Eyed Grass	Y	G2G3	S2		
Solidago ptarmicoides	Prairie Goldenrod	Y	G5	S2S3		
Thellungiella salsuginea	Salt-Lick Mustard	Y	G4G5	S1		

Trichophorum pumilum	Little Bulrush	Y	G3Q	S2	FS		
Unamia alba	Prairie Goldenrod	Y	G5	S2S3			

County: Phillips

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ANDROPOGON HALLII-CALAMOVILFA LONGIFOLIA	Northern Sandhill Prairies	Y	G5	S2			

County: Pitkin

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Cypseloides niger	Black Swift	Y	G4	S3B	FS		
Loxia leucoptera	White-winged Crossbill	W	G5	S1B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA - PICEA ENGELMANNII - POPULUS ANGUSTIFOLIA / LONICERA INVOLUCRATA	Montane Riparian Forest	Y	G4	S3			
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA/RUBUS PARVIFLORUS	Subalpine Forests	Y	G5	S2			
ARTEMISIA TRIDENTATA SSP. VASEYANA/CAREX GEYERI	West Slope Sagebrush Shrubland	Y	G3	SU			
ARTEMISIA TRIDENTATA SSP. VASEYANA/SYMPHORICARPOS OREOPHILUS/AGROPYRON TRACHYCAULUM	West Slope Sagebrush Shrubland	Y	G3G4	S3S4			
CAREX AQUATILIS-CAREX UTRICULATA	Montane Wet Meadows	Y	G4	S4			
CAREX RUPESTRIS-TRIFOLIUM DASYPHYLLUM	Alpine Meadows	Y	G3G4	S3S4			
GEUM ROSSII/TRIFOLIUM SPP.	Alpine Meadows	Y	G3G4	S3S4			
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3			
PICEA PUNGENS/CORNUS SERICEA	Montane Riparian Forest	Y	G4	S2			
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4			

POPULUS ANGUSTIFOLIA-PSEUDOTSUGA	Montane Riparian Forest	Y	G2?	S2
POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	Montane Riparian Forest	Y	G3?	S2
POPULUS ANGUSTIFOLIA/PRUNUS VIRGINIANA	Narrowleaf Cottonwood/Comm on Chokecherry	Y	G2G3	S1
PSEUDOTSUGA MENZIESII/CAREX GEYERI	Lower Montane Forests	Y	G5Q	S3
PSEUDOTSUGA MENZIESII/CORNUS SERICEA	Lower Montane Riparian Forests	Y	G4	S2
PSEUDOTSUGA MENZIESII/QUERCUS GAMBELII	Western Slope Douglas Fir Forests	Y	G5	S4
PSEUDOTSUGA MENZIESII/SYMPHORICARPOS OREOPHILUS	Western Slope Douglas Fir Forests	Y	G5	S4
QUERCUS GAMBELII-AMELANCHIER UTAHENSIS	Mixed Mountain Shrubland	Y	G3G5	SU
QUERCUS GAMBELII-CERCOCARPUS MONTANUS/CAREX GEYERI	Mixed Mountain Shrublands	Y	G3	S3
QUERCUS GAMBELII/SYMPHORICARPOS OREOPHILUS	Mixed Mountain Shrublands	Y	G5	S3S4
SALIX DRUMMONDIANA/CALAMAGROSTIS CANADENSIS	Lower Montane Willow Carrs	Y	G3	S3
SALIX DRUMMONDIANA/CAREX UTRICULATA	Montane Willow Carr	Y	GU	S3
SALIX PLANIFOLIA/CALAMAGROSTIS CANADENSIS	Subalpine Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4
SALIX PLANIFOLIA/CAREX	Subalpine Riparian Willow Carr	Y	G5	S4
SALIX PLANIFOLIA/DESCHAMPSIA CESPITOSA	Subalpine Riparian Willow Carr	Y	G2G3	S3

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Arnica alpina var tomentosa	Alpine Arnica	Y	G5T5	S1			
Arnica angustifolia ssp tomentosa	Alpine Arnica	Y	G5T5	S1			
Askellia nana	Dwarf Hawksbeard	Y	G5	S2			
Astragalus molybdenus	Leadville Milkvetch	Y	G3	S2	FS		
Braya glabella	Arctic Braya	Y	G5	S1	FS		
Braya glabella var glabella	Arctic Braya	Y	G5	S1	FS		
Crepis nana	Dwarf Hawksbeard	Y	G5	S2			
Cypripedium calceolus ssp parviflorum	Yellow Lady's-Slipper	Y	G5	S2			
Cypripedium pubescens	Yellow Lady's-Slipper	Y	G5	S2			
Cystopteris montana	Mountain Bladder Fern	Y	G5	S1			
Draba crassa	Thick-Leaf Whitlow-Grass	Y	G3	S3			
Draba globosa	Rockcress Draba	Y	G3	S1			
Draba grayana	Gray's Peak Whitlow-Grass	Y	G2	S2			
Draba lonchocarpa	Lancepod Whitlowgrass	Y	G4T4	S2			
Draba lonchocarpa var lonchocarpa	Lancepod Whitlowgrass	Y	G4T4	S2			
Draba oligosperma	Woods Draba	Y	G5	S2			
Draba porsildii	Porsild Draba	Y	G3G4	S1			
Draba spectabilis	Draba	Y	G3?T3Q	S3			

Draba spectabilis var oxyloba	Draba	Y	G3?T3Q	S3	
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3	
Draba ventosa	Tundra Draba	Y	G3	S1	
Erigeron humilis	Low Fleabane	Y	G4	S1	
Erigeron lanatus	Woolly Fleabane	Y	G3G4	S1	FS
Eriogonum coloradense	Colorado Wild Buckwheat	Y	G2	S2	BLM
Eriophorum altaicum var neogaeum	Altai Cottongrass	Y	G4T?	S3	FS
Iliamna grandiflora	Large-Flower Globe-Mallow	Y	G3?Q	S1	
Limnorchis ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3	
Machaeranthera coloradoensis	Colorado Tansy-Aster	Y	G2?	S2	FS
Papaver kluanensis	Alpine Poppy	W	G5T3?	S3	
Papaver radicatum ssp kluanense	Alpine Poppy	W	G5T3?	S3	
Penstemon harringtonii	Harrington Beardtongue	Y	G3	S3	FS/BL
Penstemon mensarum	Grand Mesa Penstemon	Y	G3	S3	
Platanthera sparsiflora var ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3	
Sullivantia hapemanii var purpusii	Hanging Garden Sullivantia	Y	G3T3	S3	FS

County: Prowers

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius alexandrinus nivosus	Western Snowy Plover	Y	G4T3	S1B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Tympanuchus pallidicinctus	Lesser Prairie-Chicken	Y	G3	S2	FS	C	T
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Etheostoma cragini	Arkansas darter	Y	G3	S2	FS	C	T

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Cicindela lepida	Little white tiger beetle	Y	G4	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Neotoma micropus	southern plains woodrat	Y	G5	S3			
Spilogale putorius	eastern spotted skunk	Y	G5	S2			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
POPULUS DELTOIDES/SPOROBOLUS AIROIDES	Plains Cottonwood/Alkali Sacaton	Y	G2Q	S2Q			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Asclepias uncialis	Dwarf Milkweed	Y	G3?	S1S2	FS/BL		
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			
Frasera coloradensis	Colorado Green Gentian	Y	G3	S3	FS		

Reptiles

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Kinosternon flavescens	yellow mud turtle	Y	G5	S1	FS		SC
Phrynosoma cornutum	Texas horned lizard	Y	G4G5	S3	FS/BL		SC
Rhinocheilus lecontei	longnose snake	W	G5	S1?			

County: Pueblo

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Dendroica graciae	Grace's Warbler	Y	G5	S3B,			
Seiurus aurocapillus	Ovenbird	Y	G5	S2B,			
Strix occidentalis lucida	Mexican Spotted Owl	Y	G3T3	S1B,		LT	T

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Etheostoma cragini	Arkansas darter	Y	G3	S2	FS	C	T
Oncorhynchus clarki stomias	greenback cutthroat trout	Y	G4T2T3	S2		LT	T
Phoxinus erythrogaster	southern redbelly dace	Y	G5	S1	FS		E

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Amblyscirtes simius	Simius roadside skipper	Y	G4	S3			
Atrytonopsis hianna	Dusted skipper	Y	G4G5	S2			
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2			
Polites rhesus	Rhesus skipper	Y	G4	S2S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Anodonta grandis	giant floater	Y	G5	S1			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ARTEMISIA BIGELOVII/ORYZOPSIS HYMENOIDES	Plains Escarpment Prairies (Limestone	Y	G3	S3?			
ARTEMISIA FILIFOLIA/ANDROPOGON HALLII	Northern Sandhill Prairies	Y	G3	S2			
BOUTELOUA GRACILIS-HILARIA JAMESII	Shortgrass Prairie	Y	G3G4	S3			
FRANKENIA JAMESII/ORYZOPSIS HYMENOIDES	Foothills Shrubland	Y	GU	SU			
JUNIPERUS MONOSPERMA/BOUTELOUA CURTIPENDULA	Foothills Pinyon-Juniper Woodlands	Y	G5	S3S4			

JUNIPERUS MONOSPERMA/BOUTELOUA GRACILIS	Foothills Pinyon-Juniper Woodlands	Y	G5	S3S4			
OPUNTIA IMBRICATA/HILARIA	Shortgrass Prairies	Y	GU	S3			
PHRAGMITES AUSTRALIS	Western Slope Marshes	Y	G4	S3			
POPULUS DELTOIDES/PASCOPYRUM SMITHII-PANICUM OBTUSUM	Plains Cottonwood/Western Wheatgrass-Vine Mesquite	Y	G1G2Q	S1S2Q			
SARCOBATUS VERMICULATUS/SPOROBOLUS AIROIDES	Saline Bottomland Shrublands	Y	G3?	SU			
SCIRPUS PUNGENS	Bulrush	Y	G3G4	S3			
SPOROBOLUS AIROIDES	Great Plains Salt Meadows	Y	G3Q	S3			
STIPA NEOMEXICANA	Great Plains Mixed Grass Prairies	Y	G3	S2			

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Aquilegia saximontana	Rocky Mountain Columbine	Y	G3	S3			
Asclepias uncialis	Dwarf Milkweed	Y	G3?	S1S2	FS/BL		
Bolophyta tetraneuris	Arkansas River Feverfew	Y	G3	S3			
Cheilanthes eatonii	Eaton's Lip Fern	Y	G5?	S2			
Chenopodium cycloides	Sandhill Goosefoot	Y	G3G4	S1	FS		
Commelina dianthifolia	Birdbill Day-Flower	Y	G5	S1?			
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			
Mentzelia chrysantha	Golden Blazing Star	Y	G1G2	S1S2	BLM		
Mirabilis rotundifolia	Round-Leaf Four-O'clock	Y	G2	S2			
Nuttallia chrysantha	Golden Blazing Star	Y	G1G2	S1S2	BLM		
Oenothera harringtonii	Arkansas Valley Evening Primrose	Y	G2	S2			
Oonopsis sp 1	Pueblo Goldenweed	Y	G1G2	S1S2			
Oxybaphus rotundifolia	Round-Leaf Four-O'clock	Y	G2	S2			
Parthenium tetraneuris	Arkansas River Feverfew	Y	G3	S3			
Viola pedatifida	Prairie Violet	Y	G5	S2			

Reptiles

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Sistrurus catenatus	massasauga	Y	G3G4	S2	BLM		SC
Thamnophis cyrtopsis	blackneck garter snake	W	G5	S2?			

County: Rio Blanco

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC
Spea intermontana	Great Basin spadefoot	Y	G5	S3	BLM		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Cypseloides niger	Black Swift	Y	G4	S3B	FS		
Dolichonyx oryzivorus	Bobolink	W	G5	S3B,			
Grus canadensis tabida	Greater Sandhill Crane	Y	G5T4	S2B,	FS		T
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC
Xyrauchen texanus	razorback sucker	Y	G1	S1		LE	E

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Valvata sincera	mossy valvata	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5			
ACER NEGUNDO-POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Narrowleaf Cottonwood Riparian Forests	Y	G2	S2			
ACER NEGUNDO/PRUNUS	Montane Riparian Deciduous Forest	Y	G3	S2			
ALNUS INCANA-CORNUS SERICEA	Thinleaf Alder-Red-Oiser Dogwood Riparian Shrubland	Y	G3G4	S3			

ALNUS INCANA-MIXED SALIX	Thinleaf Alder-Mixed Willow Species	Y	G3	S3
ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparian Shrubland	Y	G3G4Q	S3
AMELANCHIER UTAHENSIS/CAREX GEYERI	Mixed Mountain Shrublands	Y	GU	S2S3
AMELANCHIER UTAHENSIS/CERCOCARPUS MONTANUS	Mixed Mountain Shrublands	Y	GU	S1?
ARTEMISIA TRIDENTATA SSP. TRIDENTATA/LEYMUS CINEREUS	Sagebrush Bottomland Shrublands	Y	G2G3	S1
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/PASCOPYRUM SMITHII	Sagebrush Bottomland Shrublands	Y	GU	SU
ATRIPLEX CONFERTIFOLIA/LEYMUS SALINUS	Cold Desert Shrublands	Y	G3G5	S3
ATRIPLEX CONFERTIFOLIA/ORYZOPSIS	Cold Desert Shrublands	Y	G2	S2
ATRIPLEX CONFERTIFOLIA/PSEUDOROEGNERIA SPICATA	Cold Desert Shrublands	Y	G3	S2S3
BETULA OCCIDENTALIS/MESIC FORB	Foothills Riparian Shrubland	Y	G3	S2
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4
CAREX NEBRASCENSIS	Wet Meadows	Y	G4	S3
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4
CATABROSA AQUATICA-MIMULUS	Spring Wetland	Y	GU	S3
CERCOCARPUS MONTANUS/PSEUDOROEGNERIA SPICATA	Mixed Mountain Shrublands	Y	G4	S3
CORNUS SERICEA	Foohthills Riparian Shrubland	Y	G4	S3
DESCHAMPSIA CESPITOSA	Mesic Alpine Meadow	Y	G4?	S4
DISTICHLIS SPICATA	Salt Meadows	Y	G5	S3
ELEOCHARIS PALUSTRIS	Emergent Wetland	Y	G5	S4
FESTUCA IDAHOENSIS-ELYMUS TRACHYCAULUS	Montane Grasslands	Y	G3	S1
JUNIPERUS OSTEOSPERMA/LEYMUS SALINUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	GU	SU
LEYMUS CINEREUS	Western Slope Grasslands	Y	G4	S1S2
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
PINUS EDULIS/CERCOCARPUS LEDIFOLIUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	G3	S3
PINUS EDULIS/CERCOCARPUS MONTANUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	G5	S4
PINUS EDULIS/PSEUDOROEGNERIA SPICATA	Xeric Western Slope Pinyon-Juniper Woodlands	Y	G4	S4
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	Montane Riparian Forest	Y	G3?	S2
POPULUS ANGUSTIFOLIA/RHUS TRILOBATA	Narrowleaf Cottonwood/Skunkbrush	Y	G3	S3
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	Narrowleaf Cottonwood Riparian Forests	Y	G4	S4
POPULUS TREMULOIDES/TALL FORBS	Montane Aspen Forest	Y	G5	S5
PSEUDOROEGNERIA SPICATA	Western Slope Grasslands	Y	G2?	S2?
PSEUDOROEGNERIA SPICATA ORYZOPSIS HYMENOIDES	Western Slope Grasslands	Y	G3	SP
PSEUDOTSUGA MENSIEZII/ACER GLABRUM	Lower Montane Forests	Y	G4	S1

PSEUDOTSUGA MENZIESII/SYMPHORICARPOS OREOPHILUS	Western Slope Douglas Fir Forests	Y	G5	S4
QUERCUS GAMBELII-CERCOCARPUS MONTANUS/CAREX GEYERI	Mixed Mountain Shrublands	Y	G3	S3
QUERCUS GAMBELII/SYMPHORICARPOS OREOPHILUS	Mixed Mountain Shrublands	Y	G5	S3S4
SALIX BEBBIANA	Montane Willow Carrs	Y	G3?	S2
SALIX BOOTHII/MESIC FORB	Booth's Willow/Mesic Forb	Y	G3	S3
SALIX BOOTHII/MESIC GRAMINOID	Riparian Willow Carr	Y	G3	S3
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	Y	G4	S4
SALIX EXIGUA/BARE GROUND	Coyote Willow/Bare Ground	Y	G5	S5
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3
SALIX WOLFII/MESIC FORB	Subalpine Riparian Willow Carr	Y	G3	S3
SARCOBATUS VERMICULATUS/DISTICHLIS SPICATA	Saline Bottomland Shrublands	Y	G4	S1
SCIRPUS PUNGENS	Bulrush	Y	G3G4	S3
TYPHA ANGUSTIFOLIA-TYPHA LATIFOLIA	Narrow-Leaf Cattail Marsh	Y	G5	S3
TYPHA DOMINGUENSIS	Western Slope Marshes	Y	GU	S1

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Argillochloa dasyclada	Utah Fescue	Y	G3	S3			
Astragalus detritalis	Debris Milkvetch	Y	G3	S2	BLM		
Astragalus duchesnensis	Duchesne Milkvetch	Y	G3	S1S2	BLM		
Bolophyta ligulata	Ligulate Feverfew	Y	G3	S2	BLM		
Ceanothus martinii	Utah Mountain Lilac	Y	G4	S1			
Cryptantha caespitosa	Tufted Cryptanth	Y	G4	S2	BLM		
Cryptantha rollinsii	Rollins Cryptanth	Y	G3	S2	BLM		
Cymopterus duchesnensis	Uinta Basin Spring-Parsley	Y	G2	S1	BLM		
Eriogonum ephedroides	Ephedra Buckwheat	Y	G3	S1	BLM		
Festuca dasyclada	Utah Fescue	Y	G3	S3			
Gentianella tortuosa	Utah Gentian	Y	G3	S1	BLM		
Gilia stenothyrsa	Narrow-Stem Gilia	Y	G2	S1	BLM		
Lesquerella congesta	Dudley Bluffs Bladderpod	Y	G1	S1		LT	
Lesquerella parviflora	Piceance Bladderpod	Y	G2G3	S2S3	BLM		
Listera convallarioides	Broad-Leaved Twayblade	Y	G5	S2			
Oreocarya caespitosa	Tufted Cryptanth	Y	G4	S2	BLM		
Oreocarya rollinsii	Rollins Cryptanth	Y	G3	S2	BLM		
Oxytropis besseyi var obnapiformis	Bessey Locoweed	Y	G5T2	S2			
Oxytropis nana var obnapiformis	Bessey Locoweed	Y	G5T2	S2			
Oxytropis parryi	Parry Oxytrope	Y	G5	S1			
Parthenium ligulatum	Ligulate Feverfew	Y	G3	S2	BLM		
Penstemon grahamii	Graham Beardtongue	Y	G2	S2		C	
Penstemon scariosus var albifluvis	White River Penstemon	Y	G4T1	S1		C	

Physaria obcordata	Piceance Twinpod	Y	G2	S2		LT	
Pyrola picta	Pictureleaf Wintergreen	W	G4G5	S3			
Sullivantia hapemanii var purpusii	Hanging Garden Sullivantia	Y	G3T3	S3	FS		
Thalictrum heliophilum	Sun-Loving Meadowrue	Y	G3	S3			

Reptiles

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Coluber constrictor mormon	western yellowbelly racer	Y	G5T5	S3			

County: Rio Grande

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Asio flammeus	Short-eared Owl	Y	G5	S2B,			
Egretta thula	Snowy Egret	Y	G5	S2B,			
Grus canadensis tabida	Greater Sandhill Crane	Y	G5T4	S2B,	FS		T
Plegadis chihi	White-faced Ibis	Y	G5	S2B,	FS/BL		

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Gila pandora	Rio Grande chub	Y	G3	S1?	BLM		SC
Oncorhynchus clarki virginalis	Rio Grande cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Amblyscirtes simius	Simius roadside skipper	Y	G4	S3			
Pyrgus ruralis	Two-banded skipper	W	G4	S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Perognathus flavus sanluisi	silky pocket mouse subsp.	Y	G5T3	S3			

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Valvata sincera	mossy valvata	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	Montane Riparian Forest	Y	G5	S4			
ALNUS INCANA-MIXED SALIX	Thinleaf Alder-Mixed Willow Species	Y	G3	S3			
ALNUS INCANA-SALIX DRUMMONDIANA	Montane Riparian Shrubland	Y	G3	S3			
ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparian Shrubland	Y	G3G4Q	S3			
ALNUS INCANA/MESIC GRAMINOID	Montane Riparian Shrubland	Y	G5Q	S3			
CORNUS SERICEA	Foothills Riparian Shrubland	Y	G4	S3			
JUNCUS BALTICUS VAR. MONTANUS	Western Slope Wet Meadows	Y	G5	S5			
KRASCHENINNIKOVIA LANATA/ORYZOPSIS HYMENOIDES	Western Slope Grasslands	Y	G4	S3?			
PINUS PONDEROSA/FESTUCA ARIZONICA	Lower Montane Forests	Y	G4G5	S4			

POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	Montane Willow Carr	Y	G2G3	S2S3
SALIX LUCIDA SSP. CAUDATA	Montane Riparian Shrubland	Y	G3Q	S2S3
SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carr	Y	G3	S3
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Aletes lithophilus	Rock-Loving Neoparrya	Y	G2	S2	FS/BL		
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS		
Cleome multicaulis	Slender Spiderflower	Y	G2G3	S2S3	BLM		
Draba fladnizensis	Arctic Draba	Y	G4	S2S3			
Draba rectifructa	Mountain Whitlow-Grass	Y	G3?	S2			
Gilia penstemonoides	Black Canyon Gilia	Y	G3	S3	FS		
Lilium philadelphicum	Wood Lily	W	G5	S3			
Machaeranthera coloradoensis	Colorado Tansy-Aster	Y	G2?	S2	FS		
Neoparrya lithophila	Rock-Loving Neoparrya	Y	G2	S2	FS/BL		
Sisyrinchium demissum	Blue-Eyed Grass	Y	G5	S2			

County: Routt

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Dolichonyx oryzivorus	Bobolink	W	G5	S3B,			
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Grus canadensis tabida	Greater Sandhill Crane	Y	G5T4	S2B,	FS		T
Tympanuchus phasianellus columbianus	Columbian Sharp-tailed Grouse	Y	G4T3	S2	FS/BL		

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC
Prosopium williamsoni	mountain whitefish	Y	G5	S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Valvata sincera	mossy valvata	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA/VACCINIUM MYRTILLUS	Subalpine Forests	Y	G5	S5			
ACER NEGUNDO-POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Narrowleaf Cottonwood Riparian Forests	Y	G2	S2			
ALNUS INCANA-CORNUS SERICEA	Thinleaf Alder-Red-Oiser Dogwood Riparian Shrubland	Y	G3G4	S3			
ALNUS INCANA-MIXED SALIX	Thinleaf Alder-Mixed Willow Species	Y	G3	S3			
ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparian Shrubland	Y	G3G4Q	S3			
BETULA GLANDULOSA/MESIC FORB-MESIC GRAMINOID	Subalpine Riparian Shrubland	Y	G3G4	S3			

CALAMAGROSTIS CANADENSIS	Montane Wet Meadows	Y	G4Q	S4
CALAMAGROSTIS STRICTA	Slimstem Reedgrass	Y	GU	S1?Q
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4
CAREX AQUATILIS-CAREX UTRICULATA	Montane Wet Meadows	Y	G4	S4
CAREX NEBRASCENSIS	Wet Meadows	Y	G4	S3
CAREX SAXATILIS	Wet Meadow	Y	G3	S2
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4
DESCHAMPSIA CESPITOSA-GEUM ROSSII	Mesic Alpine Meadows	Y	G5	S5
ELEOCHARIS QUINQUEFLORA	Alpine Wetlands	Y	G4	S3S4
NUPHAR LUTEUM SSP POLYSEPALUM	Western Slope Floating/Submergent Palustrine Wetlands	Y	G5	S3
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	Cottonwood Riparian Forest	Y	G4	S3
POPULUS ANGUSTIFOLIA/CRATAEGUS	Narrowleaf Cottonwood Riparian Forests	Y	G2?	S2?
POPULUS ANGUSTIFOLIA/PRUNUS VIRGINIANA	Narrowleaf Cottonwood/Comm on Chokecherry	Y	G2G3	S1
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	Narrowleaf Cottonwood Riparian Forests	Y	G4	S4
POPULUS TREMULOIDES/PTERIDIUM AQUILINUM	Aspen Wetland Forests	Y	G4	S3S4
POPULUS TREMULOIDES/VERATRUM TENUIPETALUM	Aspen Wetland Forests	Y	G4	S3
QUERCUS GAMBELII/SYMPHORICARPOS OREOPHILUS	Mixed Mountain Shrublands	Y	G5	S3S4
SALIX BOOTHII/CALAMAGROSTIS CANADENSIS	Booth Willow/Canadian Reed Grass	Y	G4	S2
SALIX BOOTHII/CAREX UTRICULATA	Booth's Willow/Beaked Sedge	Y	G4	S3
SALIX BOOTHII/MESIC GRAMINOID	Riparian Willow Carr	Y	G3	S3
SALIX DRUMMONDIANA/CALAMAGROSTIS CANADENSIS	Lower Montane Willow Carrs	Y	G3	S3
SALIX DRUMMONDIANA/CAREX UTRICULATA	Montane Willow Carr	Y	GU	S3
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	Montane Willow Carr	Y	G2G3	S2S3
SALIX EXIGUA/BARE GROUND	Coyote Willow/Bare Ground	Y	G5	S5
SALIX EXIGUA/MESIC GRAMINOID	Coyote Willow/Mesic Graminoid	Y	G5	S5
SALIX GEYERIANA-SALIX MONTICOLA/MESIC FORB	Geyer's Willow-Rocky Mountain Willow/Mesic Forb	Y	G3	S3
SALIX GEYERIANA/CAREX UTRICULATA	Geyer's Willow/Beaked Sedge	Y	G5	S3
SALIX GEYERIANA/MESIC FORB	Montane Willow Carr	Y	G3	S3
SALIX GEYERIANA/MESIC	Geyer's Willow/Mesic Graminoid	Y	GU	S3
SALIX PLANIFOLIA/CALAMAGROSTIS CANADENSIS	Subalpine Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CAREX	Subalpine Riparian Willow Carr	Y	G5	S4
SALIX WOLFII/MESIC FORB	Subalpine Riparian Willow Carr	Y	G3	S3

SCIRPUS TABERNAEMONTANI-SCIRPUS	Great Plains Marshes	Y	G3	S2S3			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Azaleastrum albiflorum	White-Flowered Azalea	Y	G4	S2			
Botrychium multifidum	Leathery Grape Fern	Y	G5	S1			
Botrychium multifidum ssp coulteri	Leathery Grape Fern	Y	G5	S1			
Cypripedium fasciculatum	Purple Lady's-Slipper	Y	G4	S3	FS		
Iliamna crandallii	Crandall's Wild-Hollyhock	Y	GHQ	SH			
Iliamna grandiflora	Large-Flower Globe-Mallow	Y	G3?Q	S1			
Ipomopsis aggregata ssp weberi	Rabbit Ears Gilia	Y	G5T2	S2	FS		
Liatris ligulistylis	Gay-Feather	Y	G5?	S1S2			
Limnorchis ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Listera convallarioides	Broad-Leaved Twayblade	Y	G5	S2			
Lomatium bicolor var leptocarpum	Oregon Biscuitroot	Y	G4T?	S2			
Penstemon harringtonii	Harrington Beardtongue	Y	G3	S3	FS/BL		
Platanthera sparsiflora var ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Pyrola picta	Pictureleaf Wintergreen	W	G4G5	S3			
Rhododendron albiflorum	White-Flowered Azalea	Y	G4	S2			
Salix serissima	Autumn Willow	Y	G4	S1	FS		
Trillium ovatum	Western Wake-Robin	W	G5	S3			

County: Saguache

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Asio flammeus	Short-eared Owl	Y	G5	S2B,			
Centrocercus sp 1	Gunnison Sage Grouse	Y	G1	S1	BLM		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Egretta thula	Snowy Egret	Y	G5	S2B,			
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Grus canadensis tabida	Greater Sandhill Crane	Y	G5T4	S2B,	FS		T
Himantopus mexicanus	Black-necked Stilt	Y	G5	S3B,			
Plegadis chihi	White-faced Ibis	Y	G5	S2B,	FS/BL		

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Gila pandora	Rio Grande chub	Y	G3	S1?	BLM		SC
Oncorhynchus clarki virginalis	Rio Grande cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Amblyscirtes simius	Simius roadside skipper	Y	G4	S3			
Boloria acrocnema	Uncompahgre fritillary	Y	G2	S2		LE	
Cicindela theatina	San Luis dunes tiger beetle	Y	G1	S1			
Daihinibaenetes giganteus	Giant sand treader cricket	Y	G?	S1			
Libellula nodisticta	Hoary skimmer	Y	G3	S1			
Oeneis alberta	Alberta arctic	Y	G5	S2			
Oeneis taygete	White-veined arctic	Y	G5?	S2			
Paratrytone snowi	Snow's skipper	W	G4	S3			
Polites rhesus	Rhesus skipper	Y	G4	S2S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Perognathus flavescens relictus	plains pocket mouse subsp.	Y	G5T2	S2			
Perognathus flavus sanluisi	silky pocket mouse subsp.	Y	G5T3	S3			
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		
Spermophilus tridecemlineatus blanca	thirteen-lined ground squirrel subsp.	Y	G5T3	S3			
Tadarida brasiliensis	Brazilian free-tailed bat	W	G5	S1			
Thomomys talpoides agrestis	northern pocket gopher subsp.	P	G5T3	S3			

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Physa cupreonitens	hot springs physa	Y	G?	S2			
Promenetus umbilicatellus	umbilicate sprite	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ABIES CONCOLOR-PICEA PUNGENS-POPULUS ANGUSTIFOLIA/ACER GLABRUM	Montane Riparian Forests	Y	G2	S2			
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	Montane Riparian Forest	Y	G5	S4			
ALNUS INCANA-MIXED SALIX	Thinleaf Alder-Mixed Willow Species	Y	G3	S3			
ALNUS INCANA/MESIC FORB	Thinleaf Alder/Mesic Forb Riparian Shrubland	Y	G3G4Q	S3			
ALNUS INCANA/MESIC GRAMINOID	Montane Riparian Shrubland	Y	G5Q	S3			
ATRIPLEX CANESCENS/BOUTELOUA GRACILIS	Shortgrass Prairies	Y	G3	S3			
BETULA OCCIDENTALIS/MESIC FORB	Foothills Riparian Shrubland	Y	G3	S2			
CALAMAGROSTIS CANADENSIS	Montane Wet Meadows	Y	G4Q	S4			
CALAMAGROSTIS STRICTA	Slimstem Reedgrass	Y	GU	S1?Q			
CARDAMINE CORDIFOLIA-MERTENSIA	Alpine Wetlands	Y	G4	S4			
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4			
CAREX LANUGINOSA	Montane Wet Meadows	Y	G3?	S3			
CAREX LASIOCARPA	Montane Wetland	Y	G4	S1			
CAREX SIMULATA	Wet Meadow	Y	G3	S3			
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4			
CERCOCARPUS MONTANUS/MUHLENBERGIA MONTANA	Mixed Mountain Shrublands	Y	GU	S2			
DANTHONIA PARRYI	Montane Grasslands	Y	G3	S3			
DISTICHLIS SPICATA	Salt Meadows	Y	G5	S3			
ELEOCHARIS PALUSTRIS	Emergent Wetland	Y	G5	S4			
FESTUCA ARIZONICA-MUHLENBERGIA	Montane Grasslands	Y	G2	S2			
FESTUCA ARIZONICA-MUHLENBERGIA	Montane Grasslands	Y	GU	SU			
KRASCHENINNIKOVIA LANATA/PASCOPHYRUM SMITHII-BOUTELOUA GRACILIS	Western Slope Grasslands	Y	G4	SU			
MUHLENBERGIA FILICULMIS	Montane Grasslands	Y	G2	S2			
ORYZOPSIS HYMENOIDES-PSORALIDIUM		Y	G3Q	S1			
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3			
PICEA PUNGENS/CORNUS SERICEA	Montane Riparian Forest	Y	G4	S2			
PINUS ARISTATA/FESTUCA	Montane Woodlands	Y	G4	S3			
PINUS ARISTATA/FESTUCA THURBERI	Lower Montane Woodlands	Y	G3	S2			

PINUS EDULIS/STIPA COMATA	Xeric Western Slope Pinyon-Juniper Woodlands	Y	G2	S2
PINUS EDULIS/STIPA SCRIBNERI	Two-Needle Pinyon/Scribner's Needle Grass	Y	G3	S1?
PINUS PONDEROSA/FESTUCA ARIZONICA	Lower Montane Forests	Y	G4G5	S4
POPULUS ANGUSTIFOLIA SAND DUNE FOREST		Y	G1	S1
POPULUS ANGUSTIFOLIA-JUNIPERUS SCOPULORUM	Montane Riparian Forest	Y	G2G3	S2
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	Montane Riparian Forest	Y	G3?	S2
POPULUS ANGUSTIFOLIA/RHUS TRILOBATA	Narrowleaf Cottonwood/Skunkbrush	Y	G3	S3
POPULUS ANGUSTIFOLIA/SALIX DRUMMONDIANA-ACER GLABRUM		Y	G1?	S1?
POPULUS ANGUSTIFOLIA/SALIX LUCIDA VAR. CAUDATA		Y	G1Q	S1Q
POPULUS TREMULOIDES/ACER GLABRUM	Montane Riparian Forests	Y	G2	S1S2
POPULUS TREMULOIDES/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
POPULUS TREMULOIDES/BETULA OCCIDENTALIS		Y	G2G3	S2
POPULUS TREMULOIDES/CORNUS SERICEA	Montane Riparian Woodland	Y	G3	S2S3
POPULUS TREMULOIDES/SALIX DRUMMONDIANA		Y	GU	SU
POPULUS TREMULOIDES/TALL FORBS	Montane Aspen Forest	Y	G5	S5
PSEUDOTSUGA MENSIEZII/ACER GLABRUM	Lower Montane Forests	Y	G4	S1
PSEUDOTSUGA MENZIESII/BETULA OCCIDENTALIS	Montane Riparian Forest	Y	G3?	S3
QUERCUS GAMBELII/STIPA COMATA		Y	GU	SU
QUERCUS GAMBELII/SYMPHORICARPOS OREOPHILUS	Mixed Mountain Shrublands	Y	G5	S3S4
SALIX BEBBIANA	Montane Willow Carrs	Y	G3?	S2
SALIX BRACHYCARPA/CAREX AQUALTILS	Subalpine Riparian/Wetland Carr	Y	G2G3	S2S3
SALIX GEYERIANA-SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carrs	Y	G3	S3
SALIX GEYERIANA-SALIX MONTICOLA/MESIC GRAMINOID	Montane Riparian Willow Carr	Y	GU	S3
SALIX GEYERIANA/CAREX AQUATILIS	Montane Willow Carr	Y	G3?	S3
SALIX GEYERIANA/MESIC FORB	Montane Willow Carr	Y	G3	S3
SALIX LUCIDA SSP. CAUDATA	Montane Riparian Shrubland	Y	G3Q	S2S3
SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carr	Y	G3	S3
SALIX MONTICOLA/CAREX UTRICULATA	Montane Riparian Willow Carr	Y	G3	S3
SALIX MONTICOLA/MESIC	Montane Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CALAMAGROSTIS CANADENSIS	Subalpine Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4
SALIX PLANIFOLIA/CAREX	Subalpine Riparian Willow Carr	Y	G5	S4
SALIX PLANIFOLIA/DESCHAMPSIA CESPITOSA	Subalpine Riparian Willow Carr	Y	G2G3	S3

SARCOBATUS VERMICULATUS/DISTICHLIS SPICATA	Saline Bottomland Shrublands	Y	G4	S1			
SPOROBOLUS AIROIDES	Great Plains Salt Meadows	Y	G3Q	S3			
STIPA COMATA-ORYZOPSIS HYMENOIDES		Y	G2	S1			

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Aletes lithophilus	Rock-Loving Neoparrya	Y	G2	S2	FS/BL		
Astragalus anisus	Gunnison Milkvetch	Y	G2	S2	FS/BL		
Astragalus bodinii	Bodin Milkvetch	Y	G4	S2			
Astragalus cerussatus	A Milk-Vetch	Y	G2	S2			
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS		
Cleome multicaulis	Slender Spiderflower	Y	G2G3	S2S3	BLM		
Cryptantha weberi	Weber's Catseye	Y	G2	S2			
Draba fladnizensis	Arctic Draba	Y	G4	S2S3			
Draba grayana	Gray's Peak Whitlow-Grass	Y	G2	S2			
Draba rectifructa	Mountain Whitlow-Grass	Y	G3?	S2			
Draba smithii	Smith Whitlow-Grass	Y	G2	S2	FS		
Epipactis gigantea	Helleborine	Y	G4	S2	FS		
Eriogonum coloradense	Colorado Wild Buckwheat	Y	G2	S2	BLM		
Eriophorum altaicum var neogaeum	Altai Cottongrass	Y	G4T?	S3	FS		
Limnorchis ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Machaeranthera coloradoensis	Colorado Tansy-Aster	Y	G2?	S2	FS		
Neoparrya lithophila	Rock-Loving Neoparrya	Y	G2	S2	FS/BL		
Oreocarya weberi	Weber's Catseye	Y	G2	S2			
Platanthera sparsiflora var ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Sisyrinchium demissum	Blue-Eyed Grass	Y	G5	S2			
Sisyrinchium pallidum	Pale Blue-Eyed Grass	Y	G2G3	S2			
Stellaria irrigua	Altai Chickweed	Y	G4?	S2			

County: San Juan

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Cypseloides niger	Black Swift	Y	G4	S3B	FS		

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Oncorhynchus clarki virginalis	Rio Grande cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Boloria acrocnema	Uncompahgre fritillary	Y	G2	S2		LE	

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Lynx canadensis	lynx	Y	G5	S1	FS		E

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Valvata sincera	mossy valvata	Y	G?	S3			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ABIES CONCOLOR-PICEA PUNGENS-POPULUS ANGUSTIFOLIA/ACER GLABRUM	Montane Riparian Forests	Y	G2	S2			
ABIES LASIOCARPA - PICEA ENGELMANNII - POPULUS ANGUSTIFOLIA / LONICERA INVOLUCRATA	Montane Riparian Forest	Y	G4	S3			
ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	Montane Riparian Forest	Y	G5	S4			
CALTHA LEPTOSEPALA	Montane Wet Meadows	Y	G4	S4			
CARDAMINE CORDIFOLIA-MERTENSIA	Alpine Wetlands	Y	G4	S4			
CAREX VERNACULA	Alpine Wetlands	Y	GU	SU			
DANTHONIA PARRYI	Montane Grasslands	Y	G3	S3			
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4			
POPULUS ANGUSTIFOLIA-PSEUDOTSUGA	Montane Riparian Forest	Y	G2?	S2			
SALIX DRUMMONDIANA/CALAMAGROSTIS CANADENSIS	Lower Montane Willow Carrs	Y	G3	S3			
SALIX GEYERIANA-SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carrs	Y	G3	S3			
SALIX PLANIFOLIA/CALAMAGROSTIS CANADENSIS	Subalpine Riparian Willow Carr	Y	G3	S3			
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Asplenium trichomanes-ramosum	Green Spleenwort	Y	G4	S1S2			
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS		
Botrychium hesperium	Western Moonwort	Y	G3	S2			
Botrychium lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lanceolatum var lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lunaria	Common Moonwort	Y	G5	S2S3			
Botrychium minganense	Mingan Moonwort	Y	G4	S1			
Botrychium pallidum	Pale Moonwort	Y	G2	S2	FS		
Botrychium pinnatum	Northern Moonwort	Y	G4?	S1			
Cryptogramma stelleri	Slender Rock-Brake	Y	G5	S2	BLM		
Cystopteris montana	Mountain Bladder Fern	Y	G5	S1			
Draba borealis	Northern Rockcress	Y	G4	S2			
Draba fladnizensis	Arctic Draba	Y	G4	S2S3			
Draba graminea	San Juan Whitlow-Grass	Y	G2	S2			
Draba porsildii	Porsild Draba	Y	G3G4	S1			
Draba spectabilis	Draba	Y	G3?T3Q	S3			
Draba spectabilis var oxyloba	Draba	Y	G3?T3Q	S3			
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3			
Eriophorum altaicum var neogaeum	Altai Cottongrass	Y	G4T?	S3	FS		
Eriophorum gracile	Slender Cottongrass	Y	G5	S2			
Machaeranthera coloradoensis	Colorado Tansy-Aster	Y	G2?	S2	FS		
Parnassia kotzebuei	Kotzebue Grass-Of-Parnassus	Y	G4	S2			
Stellaria irrigua	Altai Chickweed	Y	G4?	S2			

County: San Miguel

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E
Hyla arenicolor	canyon treefrog	Y	G5	S2	BLM		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Amphispiza belli	Sage Sparrow	P	G5	S3B,			
Asio flammeus	Short-eared Owl	Y	G5	S2B,			
Dendroica graciae	Grace's Warbler	Y	G5	S3B,			
Falco peregrinus anatum	American Peregrine Falcon	Y	G4T3	S3B,		LE	
Strix occidentalis lucida	Mexican Spotted Owl	Y	G3T3	S1B,		LT	T
Vireo vicinior	Gray Vireo	Y	G4	S2B,			

Fish

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Gila robusta	roundtail chub	Y	G2G3	S2	BLM		SC
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Erebia theano	Theano alpine	Y	G4	S3			
Pyrgus ruralis	Two-banded skipper	W	G4	S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	Montane Riparian Forests	Y	G5	S5			
ATRIPLEX CONFERTIFOLIA/HILARIA JAMESII	Cold Desert Shrublands	Y	G3	S2			
ATRIPLEX CONFERTIFOLIA/LEYMUS SALINUS	Cold Desert Shrublands	Y	G3G5	S3			
BETULA OCCIDENTALIS/MESIC GRAMINOID	Lower Montane Riparian Shrublands	Y	G3	S2			
CAREX AQUATILIS	Montane Wet Meadows	Y	G5	S4			
CAREX UTRICULATA	Beaked Sedge Montane Wet Meadows	Y	G5	S4			
FORESTIERA PUBESCENS	Foothills Riparian Shrubland	Y	G1G2	S1			

JUNIPERUS OSTEOSPERMA/AMELANCHIER UTAHENSIS-PHILADELPHUS MICROPHYLLUS/LEYMUS SALINUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	GU	SU
JUNIPERUS OSTEOSPERMA/LEYMUS SALINUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	GU	SU
PINUS EDULIS/CERCOCARPUS MONTANUS	Mesic Western Slope Pinyon-Juniper Woodlands	Y	G5	S4
PINUS EDULIS/STIPA COMATA	Xeric Western Slope Pinyon-Juniper Woodlands	Y	G2	S2
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA/BETULA OCCIDENTALIS	Montane Riparian Forest	Y	G3?	S2
PSEUDOTSUGA MENSIEZII/ACER GLABRUM	Lower Montane Forests	Y	G4	S1
SALIX BRACHYCARPA/MESIC FORB	Alpine Willow Scrub	Y	G4	S4
SALIX DRUMMONDIANA/CALAMAGROSTIS CANADENSIS	Lower Montane Willow Carrs	Y	G3	S3
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	Y	G4	S4
SALIX EXIGUA/MESIC GRAMINOID	Coyote Willow/Mesic Graminoid	Y	G5	S5
SALIX GEYERIANA-SALIX MONTICOLA/MESIC FORB	Geyer's Willow-Rocky Mountain Willow/Mesic Forb	Y	G3	S3
SALIX GEYERIANA-SALIX MONTICOLA/MESIC GRAMINOID	Montane Riparian Willow Carr	Y	GU	S3
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4
SALIX PLANIFOLIA/CAREX	Subalpine Riparian Willow Carr	Y	G5	S4
SARCOBATUS VERMICULATUS/SUAEDA	Saline Bottomland Shrublands	Y	G2G3	S2S3

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Artemisia pygmaea	Pigmy Sagebrush	Y	G4	S1			
Astragalus naturitensis	Naturita Milkvetch	Y	G2G3	S2S3	BLM		
Astragalus wetherillii	Wetherill Milkvetch	Y	G3	S3			
Calochortus flexuosus	Weak-Stemmed Mariposa Lily	Y	G4	S1			
Cryptogramma stelleri	Slender Rock-Brake	Y	G5	S2	BLM		
Draba fladnizensis	Arctic Draba	Y	G4	S2S3			
Draba graminea	San Juan Whitlow-Grass	Y	G2	S2			
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3			
Eriophorum altaicum var neogaeum	Altai Cottongrass	Y	G4T?	S3	FS		
Limnorchis ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Lygodesmia doloresensis	Dolores Skeletonplant	Y	G1Q	S1	BLM		
Mimulus eastwoodiae	Eastwood Monkey-Flower	Y	G3?	S1	BLM		
Penstemon breviculus	Little Penstemon	Y	G3Q	S2			
Penstemon lentus	Abajo Penstemon	Y	G4Q	S2			
Platanthera sparsiflora var ensifolia	Canyon Bog-Orchid	Y	G4G5T3?	S3			
Seriphidium pygmaeum	Pigmy Sagebrush	Y	G4	S1			
Stellaria irrigua	Altai Chickweed	Y	G4?	S2			

County: Sedgwick

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Tympanuchus cupido pinnatus	Greater Prairie-Chicken	Y	G4T4	S3	FS		

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Anodontoides ferussacianus	cylindrical papershell	Y	G5	S2			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SALIX EXIGUA	Plains Cottonwood Riparian Woodland	Y	G4?	S3			
POPULUS DELTOIDES SSP. MONILIFERA-(SALIX AMYGDALOIDES)/SPARTINA PECTINATA	Plains Cottonwood Riparian Woodland	Y	G1G2	S1			
POPULUS DELTOIDES SSP. MONILIFERA/SYMPHORICARPOS OCCIDENTALIS	Plains Cottonwood Riparian Woodland	Y	G2G3	S2			
SALIX EXIGUA/MESIC GRAMINOID	Coyote Willow/Mesic Graminoid	Y	G5	S5			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			

County: Summit

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Bufo boreas pop 1	boreal toad (Southern Rocky Mountain population)	Y	G4T1Q	S1	FS	C	E

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Aegolius funereus	Boreal Owl	P	G5	S2	FS		
Bucephala islandica	Barrow's Goldeneye	Y	G5	S2B,	BLM		SC
Grus americana	Whooping Crane	Y	G1	SAN			E

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	Y	G4T3	S3	FS/BL		SC

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Oeneis jutta reducta	Rocky Mountain arctic jutta	Y	G5TU	S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Gulo gulo	wolverine	Y	G4	S1	FS		E
Lynx canadensis	lynx	Y	G5	S1	FS		E

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ARTEMISIA CANA/FESTUCA IDAHOENSIS	Western Slope Sagebrush Shrublands	Y	G4	SU			
ARTEMISIA CANA/FESTUCA	Western Slope Sagebrush Shrublands	Y	G2G3	S2S3			
ARTEMISIA TRIDENTATA SSP. VASEYANA/FESTUCA THURBERI	Western Slope Sagebrush Shrublands	Y	GU	S1S2			
ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS/PSEUDOROEGNERIA SPICATA	Xeric Sagebrush Shrublands	Y	G5	S3?			
BETULA GLANDULOSA/MESIC FORB-MESIC GRAMINOID	Subalpine Riparian Shrubland	Y	G3G4	S3			
CAREX PRAEGRACILIS	Clustered Sedge Wetland	Y	G3	S2			
DESCHAMPSIA CESPITOSA-LIGUSTICUM	Mesic Alpine Meadows	Y	GU	SU			
MYRIOPHYLLUM EXALBESCENS WETLAND	Western Slope Floating/Submerged Palustrine Wetlands	Y	GU	SU			
NUPHAR LUTEUM SSP. POLYSEPALUM	Western Slope Floating/Submergent Palustrine Wetlands	Y	G5	S3			
PENTAPHYLLOIDES FLORIBUNDA/DESCHAMPSIA CESPITOSA	Montane Riparian Shrubland	Y	G4	S3S4			
PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3			
PINUS ARISTATA/FESTUCA THURBERI	Lower Montane Woodlands	Y	G3	S2			

POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	Montane Riparian Forests	Y	G4	S4
POPULUS ANGUSTIFOLIA/ALNUS INCANA	Montane Riparian Forest	Y	G3?	S3
POPULUS TREMULOIDES/ALNUS INCANA	Montane Riparian Forests	Y	G3	S3
POPULUS TREMULOIDES/TALL FORBS	Montane Aspen Forest	Y	G5	S5
POTAMOGETON NATANS	Montane Floating/Submergent Weltand	Y	G5?	S1
PSEUDOTSUGA MENSIEZII/ACER GLABRUM	Lower Montane Forests	Y	G4	S1
SALIX BRACHYCARPA/MESIC FORB	Alpine Willow Scrub	Y	G4	S4
SALIX DRUMMONDIANA/CAREX UTRICULATA	Montane Willow Carr	Y	GU	S3
SALIX DRUMMONDIANA/MESIC FORB	Drummonds Willow/Mesic Forb	Y	G4	S4
SALIX GEYERIANA-SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carrs	Y	G3	S3
SALIX GEYERIANA-SALIX MONTICOLA/MESIC FORB	Geyer's Willow-Rocky Mountain Willow/Mesic Forb	Y	G3	S3
SALIX GEYERIANA-SALIX MONTICOLA/MESIC GRAMINOID	Montane Riparian Willow Carr	Y	GU	S3
SALIX GEYERIANA/CAREX AQUATILIS	Montane Willow Carr	Y	G3?	S3
SALIX GEYERIANA/CAREX UTRICULATA	Geyer's Willow/Beaked Sedge	Y	G5	S3
SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	Montane Willow Carr	Y	G3	S3
SALIX MONTICOLA/MESIC FORB	Montane Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CALAMAGROSTIS CANADENSIS	Subalpine Riparian Willow Carr	Y	G3	S3
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	Subalpine Riparian Willow Carr	Y	G4	S4
SALIX PLANIFOLIA/CAREX	Subalpine Riparian Willow Carr	Y	G5	S4
SALIX WOLFII/CAREX AQUATILIS	Subalpine Riparian Willow Carr	Y	G4	S3

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Aquilegia saximontana	Rocky Mountain Columbine	Y	G3	S3			
Armeria maritima ssp sibirica	Sea Pink	Y	G5T5	S1	FS		
Armeria scabra ssp sibirica	Sea Pink	Y	G5T5	S1	FS		
Askellia nana	Dwarf Hawksbeard	Y	G5	S2			
Astragalus molybdenus	Leadville Milkvetch	Y	G3	S2	FS		
Botrychium lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lanceolatum var lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3			
Botrychium lunaria	Common Moonwort	Y	G5	S2S3			
Braya humilis	Alpine Braya	Y	G4	S2			
Carex concinna	Low Northern Sedge	Y	G4G5	S1	BLM		
Carex limosa	Mud Sedge	Y	G5	S2			
Conimitella williamsii	Williams Bishop's Cap	Y	G3	SH			
Crepis nana	Dwarf Hawksbeard	Y	G5	S2			
Cryptogramma stelleri	Slender Rock-Brake	Y	G5	S2	BLM		
Cypripedium fasciculatum	Purple Lady's-Slipper	Y	G4	S3	FS		
Cystopteris montana	Mountain Bladder Fern	Y	G5	S1			

Draba borealis	Northern Rockcress	Y	G4	S2		
Draba crassa	Thick-Leaf Whitlow-Grass	Y	G3	S3		
Draba exunguiculata	Clawless Draba	Y	G2	S2		
Draba fladnizensis	Arctic Draba	Y	G4	S2S3		
Draba grayana	Gray's Peak Whitlow-Grass	Y	G2	S2		
Draba lonchocarpa	Lancepod Whitlowgrass	Y	G4T4	S2		
Draba lonchocarpa var lonchocarpa	Lancepod Whitlowgrass	Y	G4T4	S2		
Draba porsildii	Porsild Draba	Y	G3G4	S1		
Draba rectifructa	Mountain Whitlow-Grass	Y	G3?	S2		
Draba spectabilis	Draba	Y	G3?T3Q	S3		
Draba spectabilis var oxyloba	Draba	Y	G3?T3Q	S3		
Draba streptobrachia	Colorado Divide Whitlow-Grass	Y	G3	S3		
Draba weberi	Weber's Draba	Y	G1	S1		
Eutrema edwardsii ssp penlandii	Penland Alpine Fen Mustard	Y	G1G2	S1S2		LT
Eutrema penlandii	Penland Alpine Fen Mustard	Y	G1G2	S1S2		LT
Goodyera repens	Dwarf Rattlesnake-Plantain	W	G5	S3		
Ipomopsis globularis	Globe Gilia	Y	G2	S2		
Listera borealis	Northern Twayblade	Y	G4	S2	BLM	
Lycopodium annotinum var pungens	Stiff Clubmoss	Y	G5TU	SU		
Lycopodium dubium	Stiff Clubmoss	Y	G5TU	SU		
Oxytropis parryi	Parry Oxytrope	Y	G5	S1		
Papaver kluanensis	Alpine Poppy	W	G5T3?	S3		
Papaver radicatum ssp kluanense	Alpine Poppy	W	G5T3?	S3		
Parnassia kotzebuei	Kotzebue Grass-Of-Parnassus	Y	G4	S2		
Penstemon cyathophorus	Middle Park Penstemon	W	G3G4	S3S4		
Penstemon harringtonii	Harrington Beardtongue	Y	G3	S3	FS/BL	
Phippsia algida	Snow Grass	Y	G5	S2		
Ptilagrostis mongholica ssp porteri	Porter Feathergrass	Y	G3G5T2	S2	FS	
Ptilagrostis porteri	Porter Feathergrass	Y	G3G5T2	S2	FS	
Ranunculus gelidus ssp grayi	Tundra Buttercup	Y	G4G5	S2		
Ranunculus karelinii	Tundra Buttercup	Y	G4G5	S2		
Saussurea weberi	Weber Saussurea	Y	G3Q	S2	BLM	

County: Teller

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Accipiter gentilis	Northern Goshawk	W	G5	S3B,	FS/BL		
Tympanuchus phasianellus jamesi	Plains Sharp-tailed Grouse	Y	G4T4	S1			E

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Hesperia leonardus montana	Pawnee montane skipper	Y	G4T1	S1		LT	

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Plecotus townsendii pallescens	Townsend's big-eared bat subsp.	Y	G4T4	S2	BLM		

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ALNUS INCANA/MESIC GRAMINOID	Montane Riparian Shrubland	Y	G5Q	S3			
ANDROPOGON GERARDII-SPOROBOLUS HETEROLEPIS	Xeric Tallgrass Prairies	Y	G2	S1S2			
BETULA OCCIDENTALIS/MESIC FORB	Foothills Riparian Shrubland	Y	G3	S2			
DANTHONIA PARRYI	Montane Grasslands	Y	G3	S3			
FESTUCA ARIZONICA-MUHLENBERGIA	Montane Grasslands	Y	GU	SU			
PINUS ARISTATA/FESTUCA	Montane Woodlands	Y	G4	S3			
PINUS ARISTATA/TRIFOLIUM DASYPHYLLUM	Upper Montane Woodlands	Y	G2	S2			
PINUS PONDEROSA/FESTUCA ARIZONICA	Lower Montane Forests	Y	G4G5	S4			
POPULUS ACUMINATA	Montane Riparian Forest	Y	GU	SU			
POPULUS ANGUSTIFOLIA-PSEUDOTSUGA	Montane Riparian Forest	Y	G2?	S2			
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	Narrowleaf Cottonwood Riparian Forests	Y	G4	S4			
POPULUS ANGUSTIFOLIA/SALIX IRRORATA	Foothills Riparian Woodland	Y	G2?	S2			
SALIX EXIGUA/BARE GROUND	Coyote Willow/Bare Ground	Y	G5	S5			
SALIX GEYERIANA-SALIX MONTICOLA/MESIC FORB	Geyer's Willow-Rocky Mountain Willow/Mesic Forb	Y	G3	S3			

Plants

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Aquilegia saximontana	Rocky Mountain Columbine	Y	G3	S3			
Botrychium echo	Reflected Moonwort	Y	G2	S2	FS		
Botrychium hesperium	Western Moonwort	Y	G3	S2			

Botrychium lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3	
Botrychium lanceolatum var lanceolatum	Lance-Leaved Moonwort	Y	G5T4	S2S3	
Botrychium lunaria	Common Moonwort	Y	G5	S2S3	
Botrychium pallidum	Pale Moonwort	Y	G2	S2	FS
Botrychium simplex	Least Moonwort	Y	G5	S1	
Botrychium virginianum	Rattlesnake Fern	Y	G5	S1	
Botrypus virginianus ssp europaeus	Rattlesnake Fern	Y	G5	S1	
Boykinia jamesii	James' Telesonix	Y	G4	S2?	
Carex oreocharis	A Sedge	Y	G3	S1	
Cypripedium calceolus ssp parviflorum	Yellow Lady's-Slipper	Y	G5	S2	
Cypripedium pubescens	Yellow Lady's-Slipper	Y	G5	S2	
Draba fladnizensis	Arctic Draba	Y	G4	S2S3	
Draba rectifructa	Mountain Whitlow-Grass	Y	G3?	S2	
Eriophorum gracile	Slender Cottongrass	Y	G5	S2	
Goodyera repens	Dwarf Rattlesnake-Plantain	W	G5	S3	
Isoetes echinospora	Spiny-Spored Quillwort	Y	G5	S2	
Isoetes setacea ssp muricata	Spiny-Spored Quillwort	Y	G5	S2	
Mertensia alpina	Alpine Bluebells	Y	G4?	S1	
Oreoxis humilis	Pikes Peak Spring Parsley	Y	G1	S1	
Solidago ptarmicoides	Prairie Goldenrod	Y	G5	S2S3	
Telesonix jamesii	James' Telesonix	Y	G4	S2?	
Unamia alba	Prairie Goldenrod	Y	G5	S2S3	
Woodsia neomexicana	New Mexico Cliff Fern	Y	G4?	S2	

County: Washington

Birds

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Tympanuchus cupido pinnatus	Greater Prairie-Chicken	Y	G4T4	S3	FS		

Insects

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
ANDROPOGON HALLII-CALAMOVILFA LONGIFOLIA	Northern Sandhill Prairies	Y	G5	S2			
ATRIPLEX CANESCENS/BOUTELOUA GRACILIS	Shortgrass Prairies	Y	G3	S3			
BOUTELOUA GRACILIS-BUCHLOE DACTYLOIDES	Shortgrass Prairie	Y	G2?	S2?			
POPULUS DELTOIDES SSP. MONILIFERA/CAREX LANUGINOSA	Plains Cottonwood Riparian Woodland	Y	G1?	S1			
SPOROBOLUS AIROIDES	Great Plains Salt Meadows	Y	G3Q	S3			
SYMPHORICARPOS OCCIDENTALIS	Snowberry Shrubland	Y	G4G5	S3			

Plants

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Astragalus plattensis	Platte River Milkvetch	Y	G5	S1			
Cryptantha cana	Mountain Cat's-Eye	Y	G5	S2			
Oreocarya cana	Mountain Cat's-Eye	Y	G5	S2			

County: Weld

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Calcarius mccownii	McCown's Longspur	Y	G5	S2B,			
Calcarius ornatus	Chestnut-collared Longspur	Y	G5	S1B,			
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Grus americana	Whooping Crane	Y	G1	SAN			E
Himantopus mexicanus	Black-necked Stilt	Y	G5	S3B,			
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Pelecanus erythrorhynchos	American White Pelican	Y	G3	S1B,	BLM		SC
Plegadis chihi	White-faced Ibis	Y	G5	S2B,	FS/BL		
Tympanuchus cupido pinnatus	Greater Prairie-Chicken	Y	G4T4	S3	FS		

Fish

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Nocomis biguttatus	hornyhead chub	Y	G5	SX			
Phoxinus eos	northern redbelly dace	Y	G5	S1			E

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Euphilotes rita coloradensis	Colorado blue	Y	G4T2T3	S2			
Euproserpinus wiesti	Wiest's sphinx moth	Y	G2G3	S2			
Polites rhesus	Rhesus skipper	Y	G4	S2S3			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Zapus hudsonius preblei	meadow jumping mouse subsp.	Y	G5T2	S1	FS	LT	SC

Mussels and Snails

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Anodontoides ferussacianus	cylindrical papershell	Y	G5	S2			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ANDROPOGON HALLII-CALAMOVILFA LONGIFOLIA	Northern Sandhill Prairies	Y	G5	S2			
ARTEMISIA FILIFOLIA/ANDROPOGON HALLII	Northern Sandhill Prairies	Y	G3	S2			
ATRIPLEX CANESCENS/BOUTELOUA GRACILIS	Shortgrass Prairies	Y	G3	S3			

BOUTELOUA CURTIPENDULA-SCHIZACHYRIUM SCOPARIUM-(ERIOGONUM FLAVUM)	Great Plains Mixed Grass Praires	Y	GU	S1
CAREX NEBRASCENSIS	Wet Meadows	Y	G4	S3
CAREX PRAEGRACILIS	Clustered Sedge Wetland	Y	G3	S2
CERCOCARPUS MONTANUS/STIPA COMATA	Mixed Foothill Shrublands	Y	G2	S2
DISTICHLIS SPICATA	Salt Meadows	Y	G5	S3
JUNIPERUS SCOPULORUM/SCHIZACHYRIUM SCOPARIUM	Scarp Woodlands	Y	G3	S2S3
POPULUS DELTOIDES SSP. MONILIFERA/CAREX LANUGINOSA	Plains Cottonwood Riparian Woodland	Y	G1?	S1
PRUNUS VIRGINIANA	Foothills Riparian Shrubland	Y	G4Q	S3
SALIX EXIGUA/BARE GROUND	Coyote Willow/Bare Ground	Y	G5	S5
SCHIZACHYRIUM SCOPARIUM-BOUTELOUA	Great Plains Mixed Grass Prairies (Sandstone/Gravel Breaks)	Y	G3	S2
STIPA COMATA-BOUTELOUA	Montane Grasslands	Y	G5	S2S3
SYMPHORICARPOS OCCIDENTALIS	Snowberry Shrubland	Y	G4G5	S3

Plants

		CNHP Status and Ranking			Regulatory Status		
Scientific Name	**Common Name**	**Tracking Status**	**Global Rank**	**State Rank**	**Agency Sensitive**	**Federal Status**	**State Status**
Aletes nuttallii	Dog Parsley	Y	G3G4	S1			
Asclepias uncialis	Dwarf Milkweed	Y	G3?	S1S2	FS/BL		
Astragalus gilviflorus	Plains Milkvetch	Y	G5	S1			
Bolophyta alpina	Wyoming Feverfew	Y	G3	S1	FS		
Chenopodium cycloides	Sandhill Goosefoot	Y	G3G4	S1	FS		
Cryptantha cana	Mountain Cat's-Eye	Y	G5	S2			
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			
Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			
Gaura neomexicana ssp coloradensis	Colorado Butterfly Weed	Y	G3T2	S1	FS	PT	
Lomatium nuttallii	Dog Parsley	Y	G3G4	S1			
Oreocarya cana	Mountain Cat's-Eye	Y	G5	S2			
Orophaca triphylla	Plains Milkvetch	Y	G5	S1			
Parthenium alpinum	Wyoming Feverfew	Y	G3	S1	FS		
Rorippa coloradensis	Colorado Watercress	Y	GH	SH			
Spiranthes diluvialis	Ute Ladies' Tresses	Y	G2	S2		LT	

County: Yuma

Amphibians

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Rana pipiens	northern leopard frog	W	G5	S3	FS/BL		SC

Birds

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Buteo regalis	Ferruginous Hawk	Y	G4	S3B,	FS/BL		SC
Calcarius ornatus	Chestnut-collared Longspur	Y	G5	S1B,			
Charadrius montanus	Mountain Plover	Y	G2	S2B,	FS/BL	C	SC
Numenius americanus	Long-billed Curlew	Y	G5	S2B,	FS/BL		SC
Tympanuchus cupido pinnatus	Greater Prairie-Chicken	Y	G4T4	S3	FS		

Insects

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Atrytone arogos	Arogos skipper	Y	G3G4	S2			

Mammals

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Blarina hylophaga	short-tailed shrew	Y	G5	SH			
Mustela nigripes	black-footed ferret	Y	G1	SH			E
Spilogale putorius	eastern spotted skunk	Y	G5	S2			

Plant Communities

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
ANDROPOGON GERARDII-SORGHASTRUM NUTANS-(SPARTINA PECTINATA)	Wet Prairies	Y	G2	S1S2			
ARTEMISIA FILIFOLIA/ANDROPOGON HALLII	Northern Sandhill Prairies	Y	G3	S2			
ELEOCHARIS PALUSTRIS	Emergent Wetland	Y	G5	S4			
POPULUS DELTOIDES SSP. MONILIFERA/PANICUM VIRGATUM	Plains Cottonwood Riparian Forests	Y	G1G2	S1			
SALIX EXIGUA/MESIC GRAMINOID	Coyote Willow/Mesic Graminoid	Y	G5	S5			
SCHIZACHYRIUM SCOPARIUM	Loess Prairies	Y	G1?	S1?			
SCIRPUS TABERNAEMONTANI-SCIRPUS	Great Plains Marshes	Y	G3	S2S3			
SPARTINA PECTINATA	Prairie Slough Grass	Y	G3?	S3			

Plants

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status
Astragalus hyalinus	Summer Orophaca	Y	G4	S1?			
Astragalus piscator	Fisher Towers Milkvetch	Y	G1?	S1	BLM		
Astragalus plattensis	Platte River Milkvetch	Y	G5	S1			
Botrychium campestre	Prairie Moonwort	Y	G3	S1	FS		
Eustoma grandiflorum	Showy Prairie Gentian	W	G5	S3			

Eustoma russellianum	Showy Prairie Gentian	W	G5	S3			
Orophaca hyalina	Summer Orophaca	Y	G4	S1?			

Reptiles

Scientific Name	Common Name	CNHP Status and Ranking			Regulatory Status		
		Tracking Status	Global Rank	State Rank	Agency Sensitive	Federal Status	State Status
Kinosternon flavescens	yellow mud turtle	Y	G5	S1		FS	SC

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Rumpp, N. L. 1986. Two New Tiger Beetles of the Genus *Cicindela* from the Western United States (Cicindelidae: Coleoptera). Bull. S. California Acad. Sci. vol. 85, pp. 139-151. [*Cicindela scutellaris yampae*]

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APPENDIX 1: FIELD FORMS

This Box to be completed by CNHP Office		
Project name: _____		
New: Y N	Update: Y N	Update eonum: _____

COLORADO NATURAL HERITAGE PROGRAM
VERTEBRATE ELEMENT OCCURRENCE FIELD FORM

General:
Element Common Name: _____
Element Scientific Name: _____
Quadname: _____ Quadcode (if known): _____
Surveysite Name (from 7.5 Quad): _____
County: _____ Elevation (range if applicable): _____
Legal Description (TRS & quarter quarter): _____
UTM Zone: _____ Northing: _____ Easting: _____
Observer: _____ Survey Date: _____

Directions to location:
Prominent landmarks: _____

Driving and hiking directions: _____

Occurrence data:
NUMBER OF INDIVIDUALS: _____ AGE AND SEX (if known): _____
REPRODUCTIVE EVIDENCE: _____
EVIDENCE OF DISEASE, PREDATION OR INJURY: _____
EODATA ADDITIONAL COMMENTS: _____

General Habitat Description: _____

ASPECT: _____ **PERCENT SLOPE:** _____ **MOISTURE:** MESIC XERIC HYDRIC
RELIEF (hilltop, upperslope, midslope, lower slope, valley bottom, etc): _____
DOMINANT PLANT COMMUNITY: _____
ASSOCIATED VERTEBRATE TAXA: _____

Management comments (past/present/future recommendations): _____

PREDOMINANT LAND USES: _____
EXOTIC SPECIES: _____

Protection comments (Are there any protection plans or strategies in place): _____

Land Owner: _____
Owner comments (special requests, permissions, circumstances): _____

Additional Comments: _____

Photo numbers (if applicable): _____
Specimens: Y N **Collection Numbers**: _____

CNHP Office Below This Line

VIABILITY: A B C D (likelihood of long-term survival, based on intrinsic biological factors)
comments_____

QUALITY: A B C D (population size, productivity, vigor of individuals)
comments_____

CONDITION: A B C D (habitat pristine/degraded, recoverable)
comments_____

Eorank summary comments: _____

Eorank:A B C D I **Eorank date:**_____

Datasens: Y N Boundaries on a map: Y N Photos: Y N
Sourcecode: COUS
Bestsource: Colorado Natural Heritage Program

This Box to be completed by CNHP Office
Project name: _____
New: Y N Update: Y N Update eonum: _____

COLORADO NATURAL HERITAGE PROGRAM
INVERTEBRATE ELEMENT OCCURRENCE FIELD FORM

General:
Element Common Name: _____
Element Scientific Name: _____
Quadname: _____ Quadcode (if known): _____
Surveysite Name (from 7.5 Quad): _____
County: _____ Elevation (range if applicable): _____
Legal Description (TRS & quarter quarter): _____
UTM Zone: _____ Northing: _____ Easting: _____
Observer: _____ Survey Date: _____

Directions to location:
Prominent landmarks: _____

Driving and hiking directions: _____

Eodata:
NUMBER OF INDIVIDUALS: _____ AGE AND SEX (if known): _____
REPRODUCTIVE EVIDENCE: _____
EVIDENCE OF DISEASE, PREDATION OR INJURY: _____
EODATA ADDITIONAL COMMENTS: _____

General Habitat Description: _____

ASPECT: _____ **PERCENT SLOPE**: _____ **MOISTURE**: MESIC XERIC HYDRIC
RELIEF (hilltop, upperslope, midslope, lower slope, valley bottom, etc): _____
DOMINANT PLANT COMMUNITY: _____
ASSOCIATED INVERTEBRATE TAXA: _____

Management comments (past/present/future recommendations): _____

PREDOMINANT LAND USES: _____
EXOTIC SPECIES: _____

Protection comments (Are there any protection plans or strategies in place): _____

Land Owner: _____

Owner comments (special requests, permissions, circumstances): _____

Additional Comments: _____

Photo numbers (if applicable): _____

Specimens: Y N **Collection Numbers**: _____

CNHP Office Below This Line

VIABILITY: A B C D (likelihood of long-term survival, based on intrinsic biological factors)

comments_____

QUALITY: A B C D (population size, productivity, vigor of individuals)

comments_____

CONDITION: A B C D (habitat pristine/degraded, recoverable)

comments_____

Eorank summary comments: _____

Eorank:A B C D I **Eorank date:**_____

Datasens: Y N Boundaries on a map: Y N Photos: Y N

Sourcecode: COUS

Bestsource: Colorado Natural Heritage Program

PLANT SPECIES OF SPECIAL CONCERN SURVEY FORM
COLORADO NATURAL HERITAGE PROGRAM
COLORADO STATE UNIVERSITY-COLLEGE OF NATURAL RESOURCES
254 GENERAL SERVICES BLDG., FT. COLLINS, CO 80523

DATE OF SURVEY: _____
OBSERVER(S): _____

TAXONOMY
SCIENTIFIC NAME: _____
COMMON NAME: _____

LOCATION (attach a copy of pertinent 7.5' or 15' topographic map section with locations of populations/subpopulations outlined, one map for each sensitive species described)
SURVEY SITE NAME: _____
COUNTY: _____ USGS QUADRANGLE: _____
TOWNSHIP: _____ RANGE: _____ SECTION: _____ 1/4 SEC.: _____
ADDITIONAL T/R/S, SECTIONS OR 1/4 SECS.: _____
UTM ZONE AND COORDINATES: _____
ELEVATION (at population center and range of population if known): _____
NATIONAL FOREST/BLM DISTRICT: _____
LAND OWNERSHIP/MANAGEMENT (if not USFS/BLM): _____
DIRECTIONS TO SITE (refer to roads, trails, geographic features, etc).: _____
_____
_____
_____

HABITAT
VEGETATION STRUCTURE WITHIN POPULATION AREA
TOTAL TREE COVER (%): _____
TOTAL SHRUB COVER (%): _____
TOTAL FORB COVER (%): _____
TOTAL GRAMINOID COVER (%): _____
TOTAL MOSS/LICHEN COVER (%): _____
TOTAL BARE GROUND COVER (%): _____
ASSOCIATED PLANT COMMUNITY (list dominant species currently present, include age structure if known): __
_____
_____
HABITAT TYPE: _____
ADDITIONAL ASSOCIATED PLANT SPECIES: _____
_____
ASPECT (S, SE, NNW, etc.): _____ % SLOPE: _____
SLOPE SHAPE (concave, convex, straight, etc.): _____
LIGHT EXPOSURE (open, shaded, partial shade, etc.): _____
MOISTURE (dry, moist, saturated, inundated, seasonal seepage, etc.): _____
PARENT MATERIAL: _____
GEOMORPHIC LAND FORM (e.g. glaciated mountain slopes and ridges, alpine glacial valley, rolling uplands, breaklands, alluvial-colluvial-lacustrine, rockslides): _____
SOIL TEXTURE: _____
EVIDENCE OF THREATS AND DISTURBANCE (be specific; effects on populations viability): _____
_____

POPULATION SIZE

ESTIMATED NUMBER OF INDIVIDUALS (or exact count, if feasible; if plants are spreading vegetatively, indicate number of aerial stems): _____

NUMBER OF SUB POPULATIONS (if applicable): _____

SIZE OF AREA COVERED BY POPULATION (acres): _____

BIOLOGY

PHENOLOGY (percentage flowering, fruiting, vegetative): _____

_____

ANY SYMBIOTIC OR PARASITIC RELATIONSHIPS (e.g. pollinators)? _____

_____

EVIDENCE OF DISEASE, PREDATION OR INJURY? _____

_____

REPRODUCTIVE SUCCESS (evidence of seed dispersal and establishment): _____

_____

DOCUMENTATION

PHOTOGRAPH TAKEN (if so, indicate photographer and repository): _____

_____

SPECIMEN TAKEN (if so, list collector, collection number, and repository): _____

_____

IDENTIFICATION (list name of person making determination, and/or name of flora or book used): _____

_____

ECODATA PLOT NUMBER (attach photocopied data sheets): _____

COMMENTS:

COLORADO NATURAL HERITAGE PROGRAM
NATURAL COMMUNITY OCCURRENCE RECORD

Project name: _____
(ID:___) New?: ____ UPD?: ____
Scientific Name:_____ (EONUM): _____
(SiteName): _____ SurveySite: _____-_____
(Precision) __ County (code) : CO_____/ CO_____/ CO _____
QuadName (s): _____ (QuadCode):_____/_____/_____
(DotNum): ____/____/____ (Physprov) : ____ (Watershed): _____
(Lat): _____(S): _____ (N): _____
(Long): _____ (E): _____ (W): _____
TownRange:_____ Sections(s): ____, ____, ____, ____ Meridian: _____
TRSNote:_____
UTM: ZONE: _____ N _____ E _____
Directions:_____
_____
_____

SurveyDate: ____-____-____ (yr-m-d) (LastobsDate): ____-_____-_____(yr-m-d) (Firstobs):_ ___-_____-____ (yr-m-d) EORANK: _____ (Size + Condition + Landscape Context = predicted viability (e.g. "big + not weedy + excellent surroundings = A")
EOCOMM: _____
EoRankDate: _____ (year-month-day)
EORANKCOM:
Size:_____
(How big is it now and how does that related to its presettlement extent?)
Condition : _____
(Quality of biotic and abiotic features/processes, stand maturity, species composition, stability of substrate, water quality, etc).
Landscape context : _____
(Quality of biotic and abiotic factors/processes of surrounding landscape, structure, extent, condition (fragmentation, hydrologic manipulation, etc.)
EODATA: Method used:_____(Ocular estimation, quantitative transect or plot)
Total Tree cover: _____% Tree cover (%) by species: _____
_____
_____
_____

Total Shrub cover: _____% Shrub cover (%) by species:_____
_____
_____
_____
_____

Total Graminoid cover: _____% Gram cover (%) species: _____
_____
_____

Total Forb cover: _____% Forb cover (%) by species: _____
_____
_____

Soils:_____ Slope_____ Aspect _____ Top. Pos. _____

Other comments (age class, reproduction, etc.): _____

Gendesc: _____

MinElev: _____ MaxElev: _____

ManName: _____ (CNTND1) : _____ (Public Land name of largest unit)

ManName: _____ (CNTND2) : _____ (Public Land name of medium unit)

ManName: _____ (CNTND3) : _____ (Public Land name of smallest unit)

Mgmtcom (What recommendations do you have for changing how this occurrence is being managed?):
_____
_____
_____

Predominant Land Use:
_____

ProtCom (Known or observed threats to occurrence):
_____
_____

Owner Name (Private land):
_____

OwnerCom:_____
(disposition, e.g. concerned about Federal regulations, etc)
Comments: _____
DataSens : ___ (Y/N; Location of rare plant or animal threatened by collectors or does the landowner request confidentiality?) Boundaries: ____ (Drawn on map provided? Y/N) Photos: _____ (initials, roll #, frame #)
Specimens: _____
BestSource:_____
Sourcecodes: _____COUS / _____COUS
_____COUS/_____COUS
Transcriber: _____(yr-m-d, initials) Mapper: _____ (yr-m-d, initials)
(QC1): _____ (yr-m-d, initials)
Map Margin book completed? ____ EOLOG book completed?____

Include sketch if helpful:

Addendum

Scientific Name	Common Name	CNHP Status and Ranking: Tracking Status	Global Rank	State Rank	Regulatory Status: Agency Sensitive	Federal Status	State Status	County
Birds								
Charadrius melodus	Piping Plover	Y	G3T?Q	S1B,SZN		LT	T	Bent Kiowa Prowers
Haliaeetus leucocephalus	Bald Eagle	Y	G4T?Q	S1B,S3N		LT	T	Adams Alamosa Archuleta Baca Bent Conejos Douglas Eagle Fremont Garfield Grand Gunnison Jefferson Kiowa La Plata Logan Mesa Mineral Moffat Montezuma Morgan Otero Park Pitkin Prowers Rio Blanco Rio Grande Routt Saguache Sedgwick Washington Weld Yuma
Fish								
Ptychocheilus lucius	Colorado pikeminnow	Y	G1T?Q	S1		LE	T	Delta Mesa Moffat Rio Blanco
Mammals								
Vulpes velox	swift fox	Y	G3T?QS3			C	SC	Baca El Paso Elbert Larimer Otero Pueblo Weld

Appendix B

This Appendix contains the Technical Reports for the 2000 Annual Vegetation Report for the Rocky Flats Environmental Technology Site. To view and print these reports simply click on the desired report below. The reports are saved in .pdf format and so the free Adobe Acrobat Viewer is needed to view them.

2000 High-Value Vegetation Surveys

Summary of the 2000 Vegetation Management Program at the Rocky Flats Environmental Technology Site

2000 Mesic Mixed Grassland Monitoring Summary

Monitoring Summary for Diffuse Knapweed Control Study

Aerial Herbicide Application Diffuse Knapweed Monitoring

2000 Buffer Zone Prescribed Burn: Pre- and Post-Burn Monitoring Summary

Report 1

High-Value Vegetation Survey

1. 2000 High-Value Vegetation Surveys

1.1 Introduction

The goal of the high-value vegetation monitoring is to qualitatively assess the status and quality of the high-value plant communities (xeric tallgrass prairie, tall upland shrubland, selected wetlands, and Great Plains riparian woodland) at the Rocky Flats Environmental Technology Site (the Site) and to document any changes. These qualitative surveys evaluate conditions on a community-wide scale across the Site as a whole. This qualitative information, coupled with other quantitative monitoring data gathered at specific locations within the plant communities, provides important information at appropriate scales to be useful for resource management. The high-value plant communities at the Site are those identified by Site ecologists and the Colorado Natural Heritage Program (CNHP) as containing significant or rare ecological resources at both the local and regional scale (Kaiser-Hill [K-H] 1997a; CNHP 1994, 1995).

Objectives of the high-value vegetation monitoring are to qualitatively:

- Assess the species richness of the plant communities
- Identify any rare plant populations, and document the locations and continued presence of any rare plant populations
- Identify and document any infestations of noxious weeds
- Document the effectiveness of weed-control efforts
- Assess the impacts of disturbance on the plant communities
- Provide a general assessment of the overall status and quality of the plant communities.

1.2 Methods

1.2.1 Species Richness Inventory

As part of the rotating schedule for monitoring high-value vegetation communities on the Site, the tall upland shrubland community was monitored in 2000. Species richness was inventoried in each of the ten tall upland shrubland management units (Figure 1-1). Inventories were conducted by traversing each management unit twice during the growing season (spring and late summer) and recording all vascular plant species observed. All species occurring within approximately 2 m of each tall upland shrubland patch were recorded. Attempts were made to visit, as completely as possible, all areas and microhabitats that occur within each management unit.

1.2.2 Weed Mapping

Sitewide weed mapping continued for selected species as a means of identifying high-priority treatment areas, monitoring the distribution of specific noxious weed species, and tracking the effectiveness of weed control. Weed mapping was conducted on foot during the high-value vegetation surveys and from a vehicle using binoculars for the remainder of the Site. Species were mapped during their respective flowering periods and/or when they were most visible. The species mapped in 2000 included diffuse knapweed (*Centaurea diffusa*), musk thistle (*Carduus nutans*), common mullein.(*Verbascum thapsus*), Russian knapweed (*Centaurea repens*), annual rye (*Secale cereale*), Scotch thistle (*Onopordum acanthium*), Dame's rocket (*Hesperis matronalis*), bouncing bet (*Saponaria officinalis*), and jointed goatgrass (*Aegilops cylindrica*). Canada thistle (*Cirsium arvense*) was not mapped, because it is common throughout most of the wetlands and riparian corridors on the Site, and therefore, the wetlands map would provide a good indication of the infested areas. Dalmatian toadflax (*Linaria dalmatica*) was not mapped in 2000.

Infestation areas of the three dominant noxious weeds mapped (diffuse knapweed, musk thistle, and mullein) were classified into general density categories of high, medium, low, and scattered, based on a subjective interpretation of the extent, visual density, need for control, and aggressive nature of the species. The other six species were mapped for presence/absence. In general, a high-density category indicated that an area was dominated by a nearly solid infestation and/or very high cover of the species. A medium-density category was used where the infestation provided less cover and was less homogeneous in the distribution of the species. The low-density category was used where individuals of the species were present in fewer numbers and were not visually dominating the landscape, but were beginning to establish a foothold in the community and were in need of control. The scattered-density category was used only in a few cases and indicated a sporadic occurrence of the species.

The noxious weed populations and distributions for the four dominant species mapped were drawn in the field on 44- × 34-inch sitewide base maps. The distributions of the other species were drawn on 11- × 17-inch sitewide base maps. With regard to the resulting maps, it should be noted that the boundaries shown on the maps are only approximate and are based on professional judgement. They should not be interpreted as a precise outline of the distribution of these species, because no surveying or global positioning system (GPS) equipment was used to locate boundary edges, nor do the maps necessarily represent every location of the species on the Site. Attempts were made to visit the entire Site, but some infestations may still have been missed.

1.2.3 Photographic Documentation

Photographs were taken at several of the permanent photo points during the summer of 2000 to document changes resulting from herbicide applications. Photographs were

taken from established photo points in the same compass directions as past photographs. Photographs were then compared to those taken previously.

1.2.4 Qualitative Habitat Assessments

Qualitative habitat assessments were made in all of the high-value vegetation community management units on the Site during 2000. Assessment objectives dealt primarily with habitat loss, threats to the plant community, weed issues, rare plant species, dominant plant species health in the community, and general community quality. Attempts were also made to revisit populations of CNHP–listed plant species of special concern that are known to occur on the Site. These species include the mountain-loving sedge (*Carex oreocharis*), forktip three-awn (*Aristida basiramea*), dwarf wild indigo (*Amorpha nana*), and carrionflower greenbriar (*Smilax herbacea* var. *lasioneuron*). Population locations were mapped originally during the 1997 field season. Most locations have been revisited annually to confirm the continued presence of these species on the Site and to evaluate any concerns about them. Further details on the methods used are found in the *High-Value Vegetation Survey Plan for the Rocky Flats Environmental Technology Site* (K-H 1997b), the *Environmental Management Department Operating Procedures Manual* (DOE 1995), and 2000 *Ecological Field Sampling Plans for the Rocky Flats Environmental Technology Site* (K-H 2000a).

1.3 Results and Discussion

1.3.1 Site Flora

As a result of the 2000 field work, a total of seven new records of vascular plant species are reported for the Site. Plant nomenclature follows that of GPFA (1986), Weber (1976), and Weber (1990), in that order of determination. The new plant species reported for the Site are:

Astragalus parryi Gray	Parry's Milkvetch
Cyperus acuminatus Torr. & Hook.	Taperleaf Flatsedge
Eleocharis obtusa (Willd.) J.A. Schult.	Blunt Spikerush
Limosella aquatica L.	Mudwort
Lygodesmia juncea (Pursh) Hook	Skeleton-weed
Panicum dichotomiflorum Michx.	Fall Panicum
Stipa robusta (Vasey) Scribn.	Sleepy Grass

None of the new species recorded on the Site in 2000 is a rare species or state-listed noxious weed. The total number of vascular plant species recorded for the Site is now 592. The complete list of plant species known to occur at Rocky Flats as of the end of the 2000 field season is found in Appendix B. Voucher specimens of these species are maintained in the Site herbarium.

1.3.2 Tall Upland Shrubland

A total of 363 plant species were recorded in the tall upland shrubland at the Site during 2000 (Table 1-1). Of these, 82 percent were native species. This was an increase over past inventories of the tall upland shrubland, which documented 352 species in 1997 and 333 species in 1996. The percentage of native species did not change since 1997. In order to compare past year's results with the 2000 inventory, a Sorensen similarity index (Brower and Zar 1977) was conducted, using presence/absence data. Comparisons between all combinations of years yielded values ranging from .90 to .92, indicating a very high floristic similarity between years, as would be expected. Examination of the species lists from all three years shows no substantial difference in the inventory results (Table 1-1). The different species observed during the different years are mostly a result of the slight differences in routes used to traverse the management units, and of the natural variability in abundance of individual species.

Examination of the qualitative habitat assessment data from the tall upland shrubland management units in 1999 revealed concerns similar to those reported previously (K-H 1997c; K-H 1998). The most critical management issue in the tall upland shrubland, as well as the greatest threat, is from noxious weeds. Canada thistle is common throughout the tall upland shrubland patches, particularly on the downhill sides of the patches where more moisture is available. Diffuse knapweed is present on the grasslands surrounding most of the tall upland shrubland and is invading into the openings within the tall upland shrubland patches. In May 2000, most of the xeric tallgrass prairie areas on the pediments above the tall upland shrubland in Rock Creek were treated with Tordon 22K by helicopter, to control the diffuse knapweed infestations on the grasslands. On the hillsides, however, the proximity to the shrubland and wetland areas and the steepness of the hillsides precluded aerial spraying. Without effective control in these upper drainages of Rock Creek, diffuse knapweed will become increasingly problematic, and will be more difficult to control near the tall upland shrubland.

One other weed species of particular concern is bouncing bet (*Saponaria officinalis*). Small patches were observed in four of the ten tall upland shrubland management units. This species is just beginning to establish at the Site, and with proactive control, it can be eradicated before it becomes a bigger problem. Numerous other weed species found in the tall upland shrubland included stinging nettle (*Urtica dioica*), mullein (*Verbascum thapsus*), dalmatian toadflax (*Linaria dalmatica*), musk thistle (*Carduus nutans*), and smooth brome (*Bromus inermis*). Further discussion concerning weed control is found later in this technical report.

Some small areas of erosion were noted, primarily from deer use and a coyote den located at one tall upland shrubland management unit. None of these areas warranted any corrective action. Some of the management units have retained trash that has blown in from offsite locations. The aesthetic value of these areas would be improved by removing this trash.

Aside from these concerns, the tall upland shrubland in general appeared healthy. There were a few observations of tent caterpillars on some of the chokecherry (*Prunus*

virginiana), but they did not appear any more abundant than in the past. Besides this, no substantial signs of disease, predation, injury, or die-off of any of the dominant tall upland shrubland species were observed. Most appeared to have flowered and produced fruit during 2000.

In general, the tall upland shrubland continues to be a plant community of high importance at the Site. It contains a high diversity of plant life, with over half the plant species known to occur at the Site being found in association with this community. Many species of plants are restricted to this community at the Site. In addition, the tall upland shrubland provides important forage and wildlife habitat for many birds as well as the deer population on the Site.

Management of the tall upland shrubland should focus on weed control and improving the conditions for native species. Weed control is challenging within the tall upland shrubland, because of the roughness of the terrain and the time and labor involved in conducting weed control. Most control efforts will have to be done by hand and/or backpack spraying. As an alternative means of improving conditions for the native species, prescribed burns should be considered for management of the tall upland shrubland. The dominant shrub species in the tall upland shrubland are fire adapted and will resprout quickly after a burn (FEIS 2000). A wildfire in 1994 burned through Management Unit One of the tall upland shrubland at the eastern end of Rock Creek. The shrubland there has returned with healthy, vigorous growth. Properly timed, the fire could be used to clean out much of the debris in the understory of the shrublands, leaving much of the taller woody growth intact, stimulating woody growth, and increasing nutrient cycling in these areas.

Qualitative habitat assessments of the other plant communities (xeric tallgrass prairie, mesic grasslands, wetlands, riparian woodlands/shrublands) at the Site show similar management concerns. Management issues continue to revolve around noxious weed control and the need for management action to enhance conditions for native species. Besides weed control, integration of other management techniques—such as the use of prescribed burns (see the Technical Report on the prescribed fire conducted in spring 2000 in this annual report), mowing, and though currently precluded, the use of limited and restricted grazing—implemented on larger scale—would benefit these communities.

1.3.3 Rare-Plant Monitoring

Onsite populations of mountain-loving sedge, forktip three-awn, carrionflower greenbriar, and dwarf wild indigo, (all species listed as rare and imperiled by the Colorado Natural Heritage Program [CNHP 1999]) were revisited during 2000. All four species were observed in vegetative, flowering, and fruiting condition, and their populations appeared to be doing well.

1.3.4 Revegetation and Plant Community Disturbance in 2000

During 2000, one project disturbed a previously reclaimed area (approximately ½ acre) on a hillside in the Woman Creek drainage at the Site. It was revegetated using a site-specific native seed mix. Photographs were taken after the revegetation and will be used for comparison to future photographs to document the progress of the reclamation. In 1999, several projects disturbed the native plant communities at different locations in the Buffer Zone. The locations and photographs of these disturbances were provided in the 1999 *Annual Vegetation Report for the Rocky Flats Environmental Technology Site*. A total of approximately 22.6 acres of plant community was disturbed in the Buffer Zone in 1999. Most of this disturbance was in the mesic mixed grassland, reclaimed grassland, and a small amount of Great Plains riparian woodland. At the conclusion of each project, the disturbed areas were revegetated using certified weed-free, native seed mixes and weed-free mulch. Photographs and maps of the project areas and revegetation efforts are found on the CD-ROM in the 1999 annual vegetation report.

During 2000, the revegetation efforts in the areas of these projects were observed and photographed. Photographs linked to maps can be found on the CD-ROM in Appendix D of this annual report. At several of the projects, problems were encountered that have led to changes in revegetation policies at the Site. At the McKay Ditch Pipeline project, the dominant species that came up in 2000 was smooth brome (*Bromus inermis*). This species is an exotic grass that is not approved for use in revegetation projects at the Site because of its aggressive nature—it invades the native grasslands and displaces the native species. An investigation as to how this species appeared in such large quantities in the revegetation area was inconclusive, because it was not included in the recommended seed mix. As a result of this situation, all seed mixes that are used at the Site must now be inspected by a qualified ecologist prior to planting.

At two other revegetation projects (East Trenches and Solar Pond projects) that began in 1999, the dominant species of plant that came up was winter wheat (*Triticum aestivum*). An investigation revealed that the straw used to mulch the area still contained numerous seed heads. As a result of this problem, revegetation efforts are now required to use straw that is certified weed free, and is free of seed heads (threshed straw).

Other disturbances to the native plant communities on the Site during 2000 came primarily from unauthorized off-road driving. Several off-road locations showed evidence of spinning tires removing the vegetation entirely, creating bare spots. From a resource management standpoint, these incidents create two problems. First, unauthorized off-road driving spreads weed seeds from the Buffer Zone road edges further into undisturbed areas of the native prairie. Second, the bare spots created by spinning tires create disturbances in the previously undisturbed native prairie, which then become islands of weeds that spread seed into the surrounding native prairie. Given the weed control issues at the Site, unauthorized off-road driving is inconsistent with the Buffer Zone resource management policy. The current policy is to preserve and maintain the high-quality ecological resources found at the Site. Administrative efforts were taken during 1999, and continue at present, to address and eliminate this problem.

1.3.5 Weed Mapping

The 2000 weed distribution maps for diffuse knapweed, musk thistle, and common mullein are shown in Figures 1-2 through 1-4, respectively. Six additional species—annual rye, Russian knapweed, Scotch thistle, dame's rocket, bouncing bet, and jointed goatgrass—were mapped in 2000 because of their aggressive nature and their recent appearance at various locations on the Site. The distributions of these species are shown in Figures 1-5 and 1-6. After being entered into the Site Geographic Information System (GIS), the overall extent of these species across the Site was estimated by species and by infestation level. Table 1-2 contains the estimated total acreage and acreage-by-density category for each of the listed species, based on the 2000 maps. The species with the greatest extent on the 6,485-acre Site (K-H 1997c) were diffuse knapweed (2,223 acres), common mullein (1,010 acres), and musk thistle (792 acres). The total acreages for annual rye, Russian knapweed, Scotch thistle, dame's rocket, bouncing bet, and jointed goatgrass are also shown in Table 1-2. It should be noted that all these acreages are approximate and should not be interpreted as exact areas. These values are also only representative of known locations for these species. It is possible that unmapped infestations are present as well.

Table 1-3 shows the annual total infested acreages for diffuse knapweed, musk thistle, and common mullein from 1997 to 2000. Most of the large increases in infestation acreages from 1997 to 1998 were a result of the time of year in which mapping was conducted. Mapping in 1997 was conducted in August for each of the species. Beginning in 1998, weed mapping was conducted for each species when that species was in flower and/or most visible. Therefore, the higher visibility of the species at the time of mapping allowed more accurate estimates of their infestation levels in 1998, 1999, and 2000, and thus the resulting higher acreages.

Since 1998, the total Site acreage infested by diffuse knapweed and musk thistle has decreased, largely due to the aerial herbicide applications conducted in May 1999 and May 2000. Diffuse knapweed acreage across the Site has decreased by almost 700 acres during this time, and musk thistle has decreased by almost 900 acres. Common mullein distribution has not been affected as much by the herbicide applications, however—from 1999 to 2000, a decrease of approximately 58 acres was observed.

The effectiveness of the herbicide applications has been monitored through the use of the GIS. Figures 1-7 through 1-9 show the locations of the aerial herbicide application in 1999, and the pre- and post-treatment diffuse knapweed densities at these locations in 1998, 1999, and 2000, respectively. Approximately 1,500 acres were treated by helicopter with Tordon 22K in 1999. In 2000, approximately 1,022 acres were treated aerially with Tordon 22K and Transline. Figures 1-10 and 1-11 show the locations of the 2000 aerial herbicide application and the pre- and post-treatment diffuse knapweed densities from 1999 and 2000, respectively. The maps visually show the dramatic reduction in the amount of diffuse knapweed in response to the spraying. As reported in the 1999 annual vegetation report, the total amount of diffuse knapweed was reduced by 683 acres, from 878 acres in 1998 to 195 acres at the locations treated in 1999 (Table

1-4). This represented a 78 percent reduction in the total number of diffuse knapweed–infested acres in the areas that were sprayed in 1999. Figure 1-12 shows graphically how the diffuse knapweed has been affected in the 1999 spray areas. At the 2000 spray locations, an 80 percent decline in the total number of diffuse knapweed–infested acres was observed (Table 1-5; Figure 1-13). In practical terms, this means that essentially no adult diffuse knapweed plants were observed at these locations. The elimination of adult plants from these areas meant no new seed was added to the seed bank and no plants were available to blow away from these infestations, further infesting other areas. The 2000 mapping effort, however, revealed that diffuse knapweed has begun to return to several of the areas treated in May 1999 (Figure 1-9). Figure 1-12 shows that the lower density categories had the greatest increases in diffuse knapweed density in 2000. Although Tordon 22K is known to typically have a 3- to 4-year residual impact on diffuse knapweed, several reasons might explain the shortened control period in the treated areas.

Control at the Site has typically been best on the flat areas on top of the pediment, where the herbicide was applied most evenly. However, variations exist in the evenness of the herbicide application, even from the air, and missed flight lines and continued disturbances (largely from burrowing mammals) remain problematic (Figure 1-9). Without spot control to continually treat the missed or disturbed areas within the larger treated areas, diffuse knapweed begins to return almost immediately. Observations of some of the treated burrow mounds have shown that, a year after treatment, they can support a solid stand of diffuse knapweed again. Additionally, missed flight lines that were not observed during the first year after treatment have appeared during the second year, continuing to decrease the overall effectiveness of the treatment (Figure 1-14).

Control on the hillsides is less consistent than on the flat areas, and overall diffuse knapweed densities have been reduced by lesser amounts at these locations. It is unknown why control has been less effective on the hillsides. Perhaps the steepness of the hillsides forces the helicopter to fly slightly higher, thus reducing the amount of herbicide that reaches the ground surface. Possibly, using a larger droplet size during applications on the hillsides might improve the effectiveness there.

Overall, the aerial application of Tordon 22K for control of diffuse knapweed and other noxious weed species has been beneficial and generally improved the quality and appearance of the Site's grasslands. The initial response has been increased vigor, health, and flowering of the grasses, reduced abundance of diffuse knapweed and other weeds, and an initial decline in the abundance of some native forbs. (For more specific information on the longer-term effects of Tordon 22K on the grasslands at the Site, from both aerial and ground-based applications, see the Technical Reports in Appendix A of this report and past annual vegetation reports for the Site [K-H 1998, 1999, 2000b]).

1.4 Conclusions

Qualitative monitoring of the high-value plant communities during 2000 revealed both positive and negative findings. Floristically, the tall upland shrubland remains diverse

and has not changed substantially since monitoring began. No new noxious weeds were found at the Site during 2000. The rare and imperiled plant species populations (as listed by the CNHP) at the Site appear to be healthy; all four rare species were observed in vegetative and flowering condition during 2000. As a whole, the ecological resources of the Site remain of high quality and constitute a significant component of the larger surrounding intact regional ecosystem.

Although monitoring suggests that the plant communities appear to be doing well in general, several management concerns are apparent. The threat from weeds continues to be the highest management priority. Several weed species continue to degrade the quality of the plant communities at the Site. Diffuse knapweed, dalmatian toadflax, musk thistle, common mullein, and Canada thistle are the most significant noxious weed problems. The sizes of some infestations at the Site continue to challenge control efforts. Other smaller infestations of newly discovered or recently invaded species like bouncing bet, Scotch thistle, Russian thistle, and dame's rocket, continue to be controlled, with the goal of eradication. The Site's vegetation management program has applied various methods to control weeds on the Site in recent years (see past and current annual vegetation reports for the Site). Although most of these efforts have focused on the weed problems in the grasslands in recent years, the weed problem continues to grow along the streams and wetlands and thus needs to be addressed there as well. Continued weed control efforts need to focus on spot control after the large-scale aerial applications in order to keep these areas free of weeds for longer durations.

Litter buildup continues to be a problem in the plant communities at the Site, and the use of prescribed burning would help alleviate this. The Department of Energy's (DOE's) shift toward a more active ecological resource management program at the Site in recent years continues to address these issues. As cleanup and closure of the Site proceeds, it will be important to maintain the desire and commitment to preserve and maintain the high quality of the Site's unique ecological resources for future generations.

1.5 References

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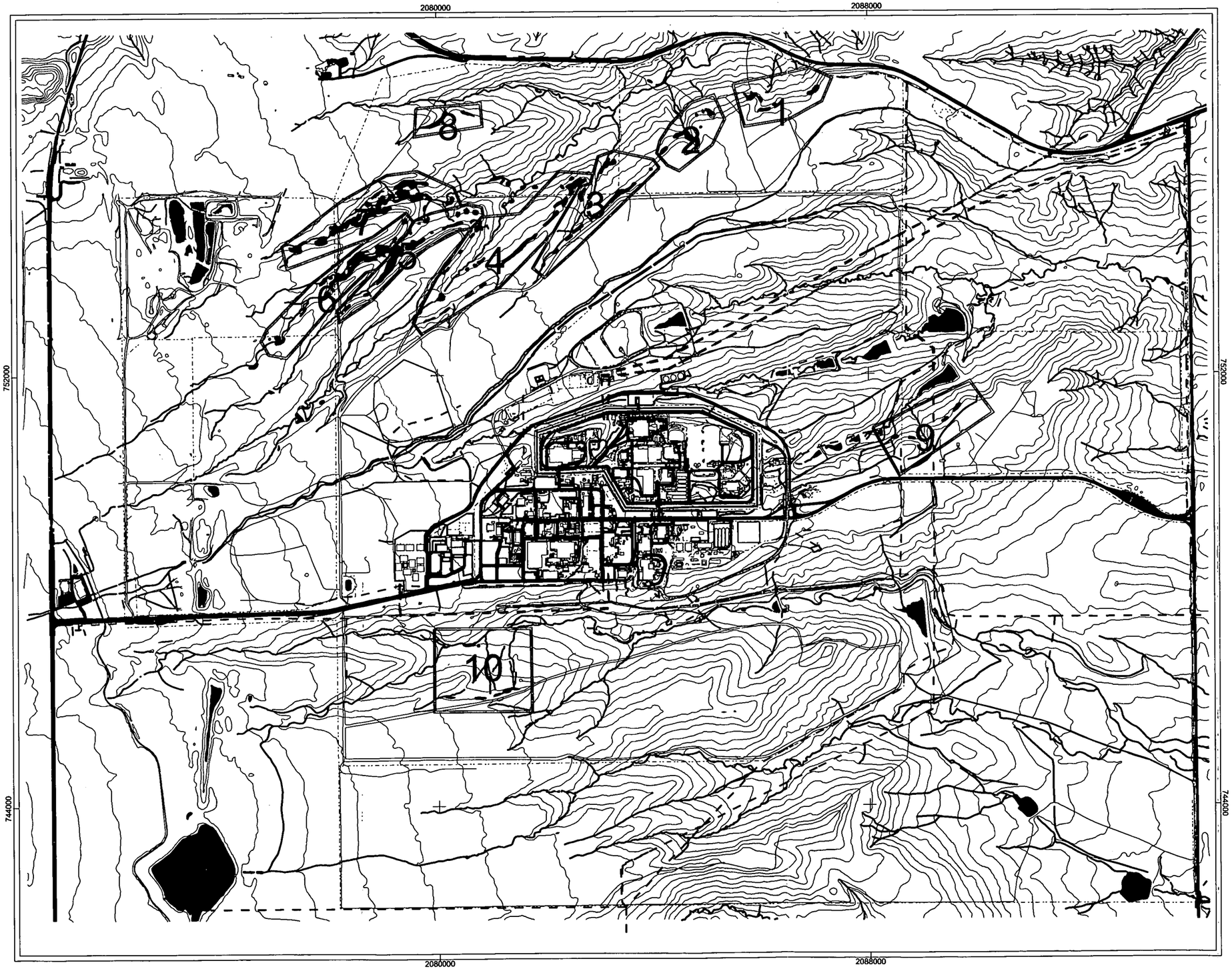

Tall Upland Shrubland Management Units

Figure 1-1

LEGEND

- Management Unit Boundary w/Number
- Tall Upland Shrubland

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours.
The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution.
The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Management unit and tall upland shrubland data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2K-0158

May 3, 2001

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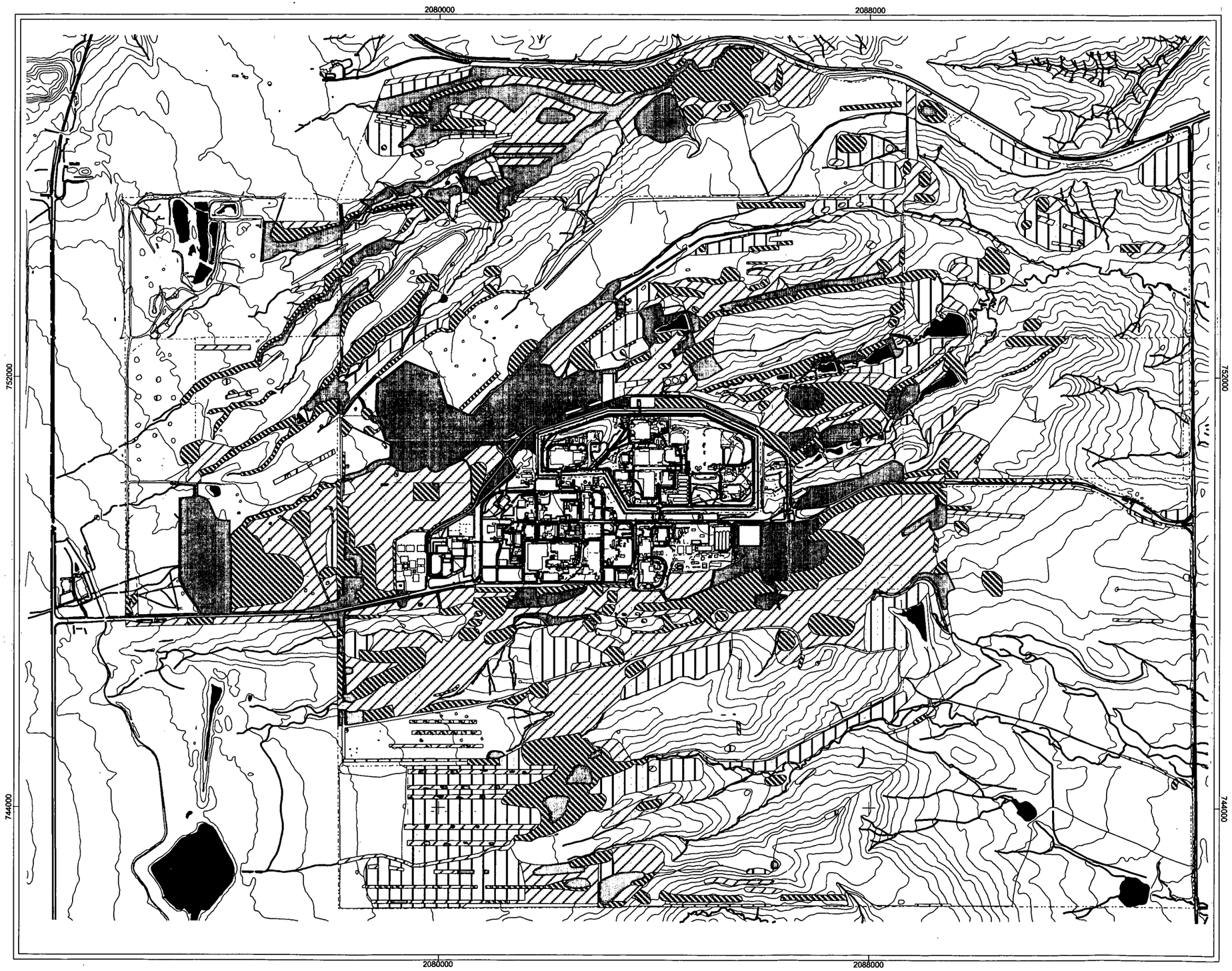

2000 Diffuse Knapweed (Centaurea diffusa) Distribution

Figure 1-2

MAP LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours.
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The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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State Plane Coordinate Projection
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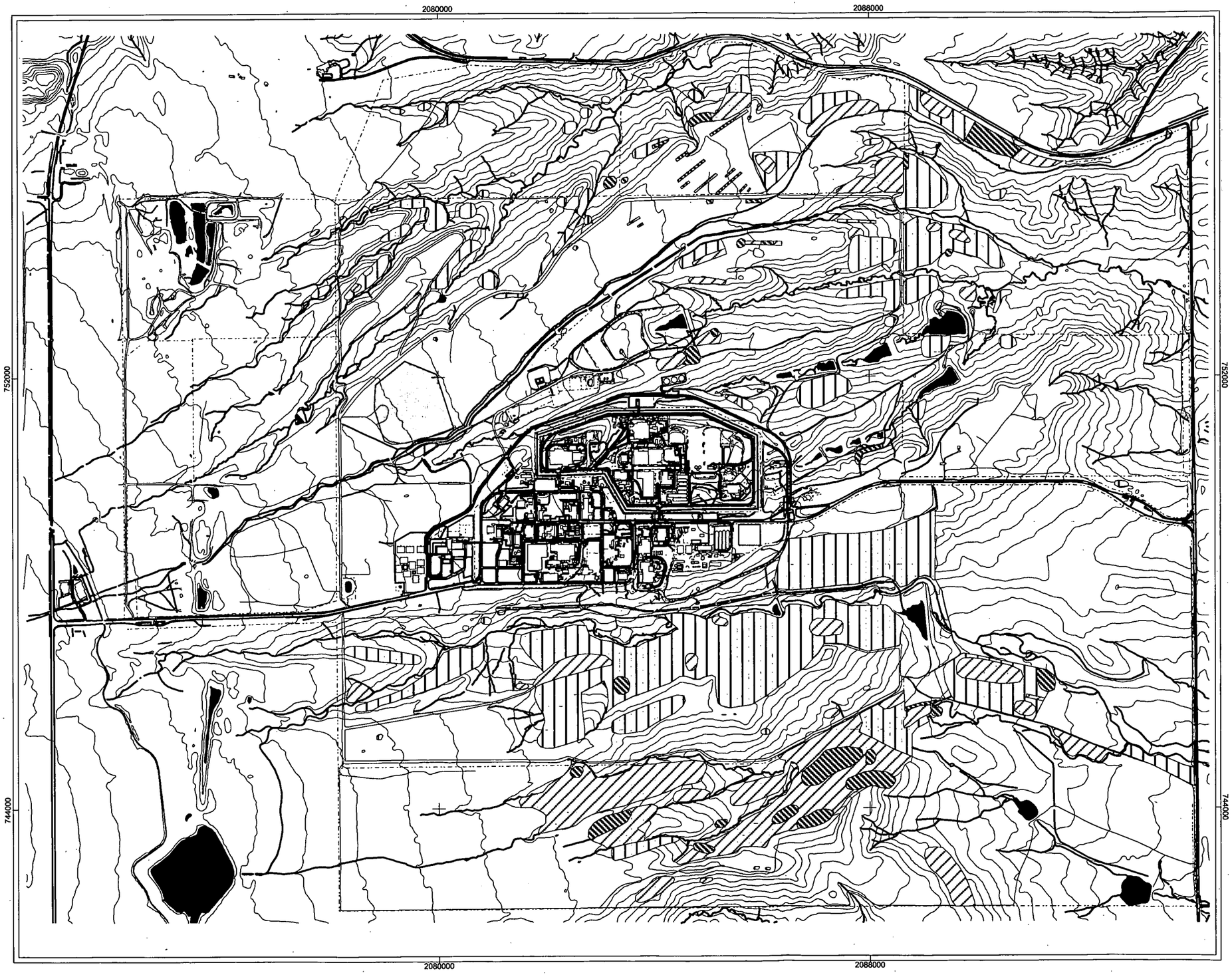
RFETS GIS Dept. 303-966-7707

MAP ID: 2K-0419

May 3, 2001

\\Gisrv\GIS\ECO-projects\projects\2k-0419\ced\00.apr\2000 CEDI Distribution



2000 Musk Thistle (Carduus nutans) Distribution

Figure 1-3

MAP LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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RFETS GIS Dept. 303-966-7707

MAP ID: 01-0063

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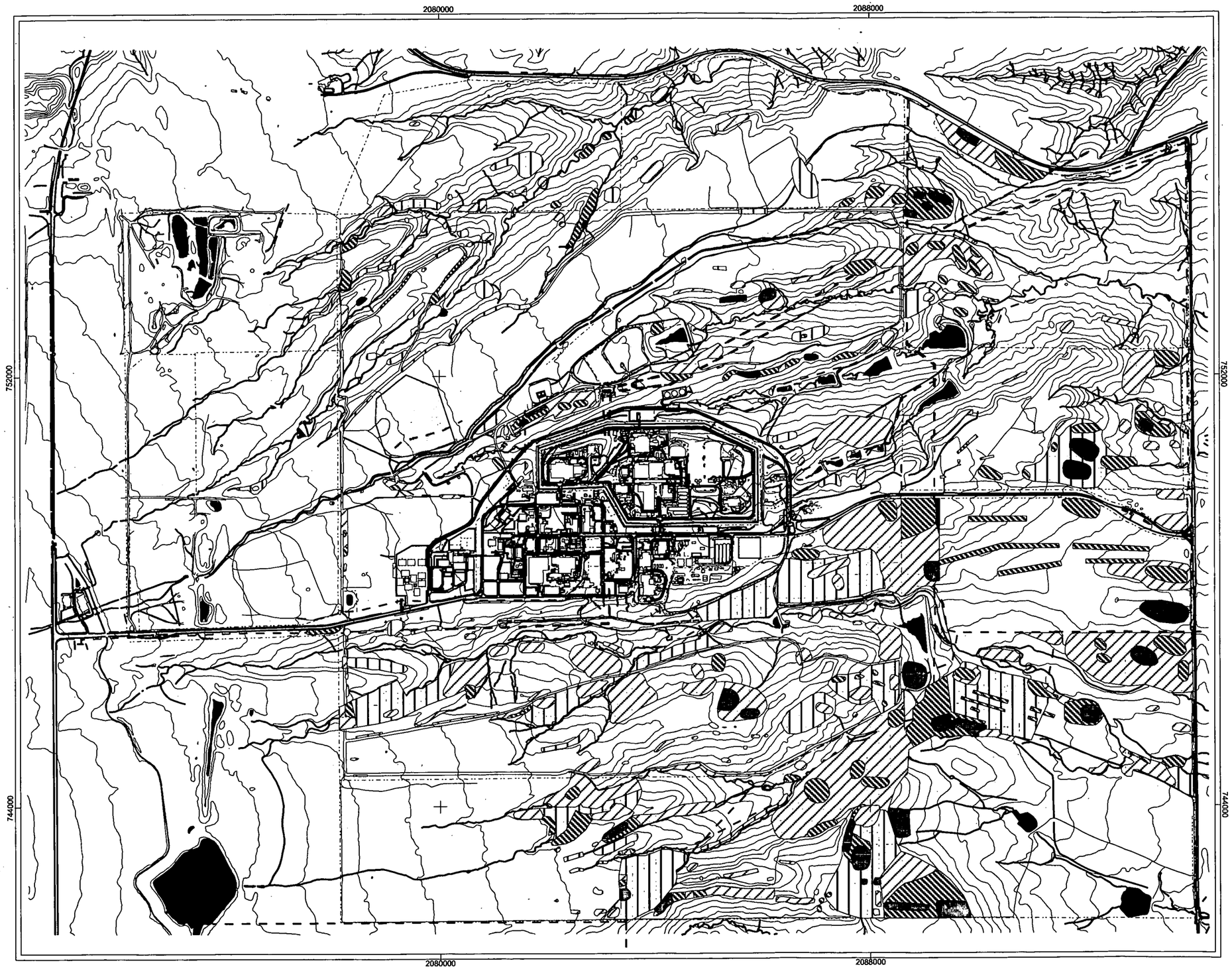

2000 Mullein (Verbascum thapsus) Distribution

Figure 1-4

LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours.
The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution.
The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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MAP ID: 01-0081

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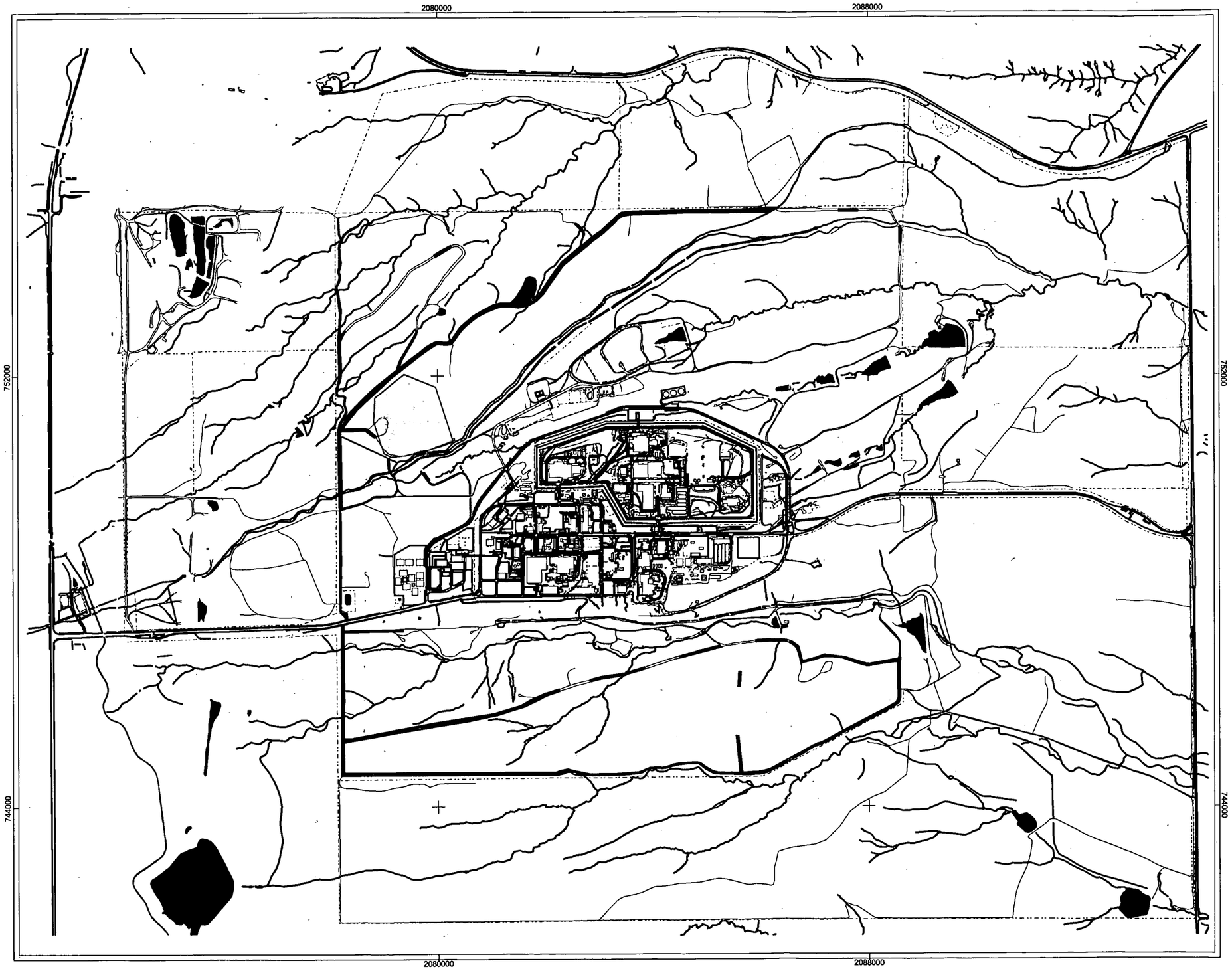
\\Gissrv\GIS\ECO-projects\projects\01-0081\weth00.apr\ 2000 Mullein Distribution



2000 Jointed Goatgrass (Aegilops cylindrica) Distribution

Figure 1-5

LEGEND

Jointed Goatgrass Infestations

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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RFETS GIS Dept. 303-966-7707

MAP ID: 01-0036

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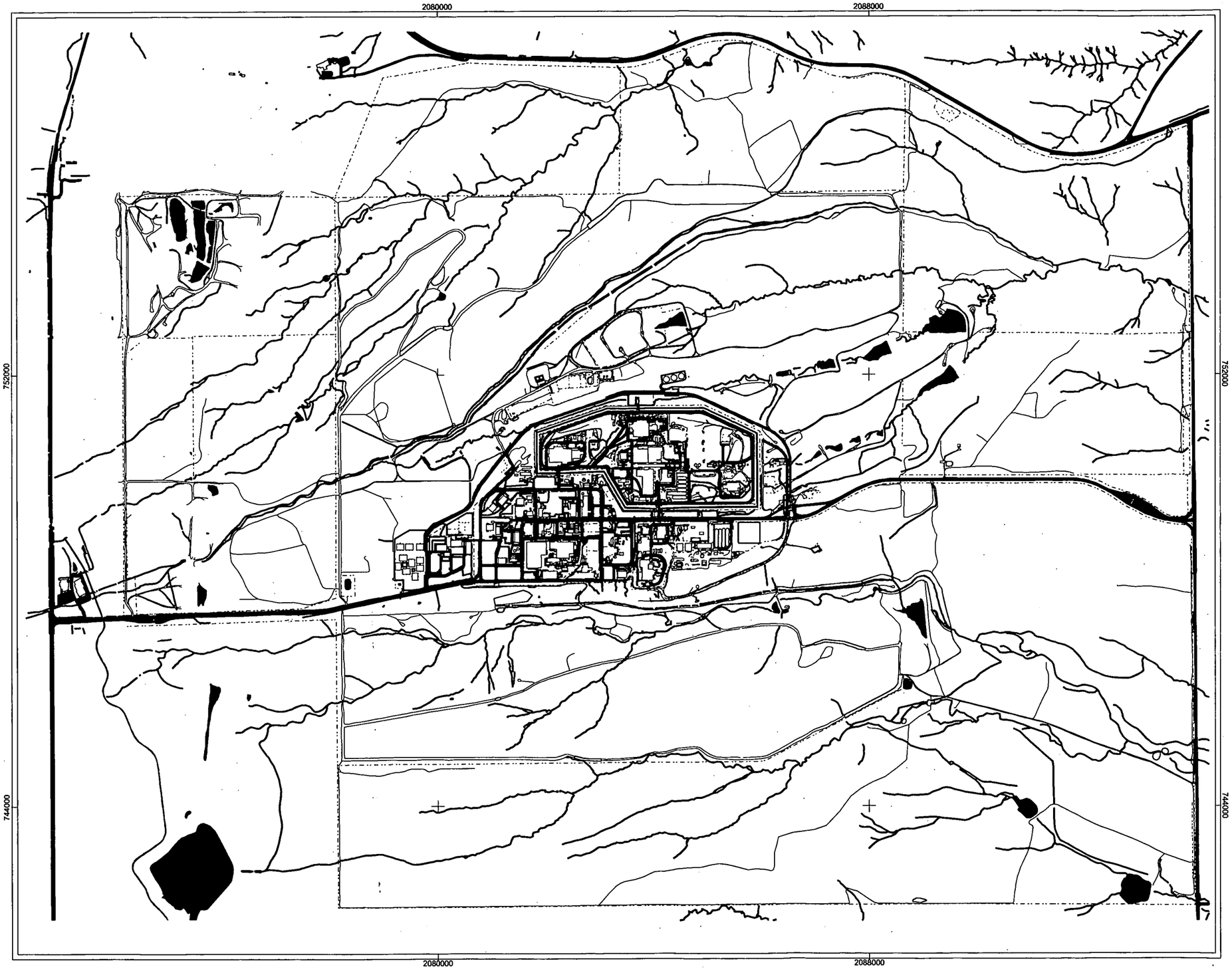
\\Gissrv\GIS\ECO-projects\projects\01-0036\weed\maps2k.apr\jointed goatgrass 2000



2000 Scotch Thistle (Onopordim acanthium), Russian Knapweed (Centaurea repens), Dame's Rocket (Hesperis matronalis), Bouncing Bet (Saponaria officinalis), and Annual Rye (Secale cereale) Distribution

Figure 1-6

LEGEND

- Scotch Thistle Infestations
- Russian Knapweed Infestations
- Dame's Rocket Infestations
- Annual Rye Infestations
- Bouncing Bet Infestations

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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MAP ID: 01-0036
May 3, 2001

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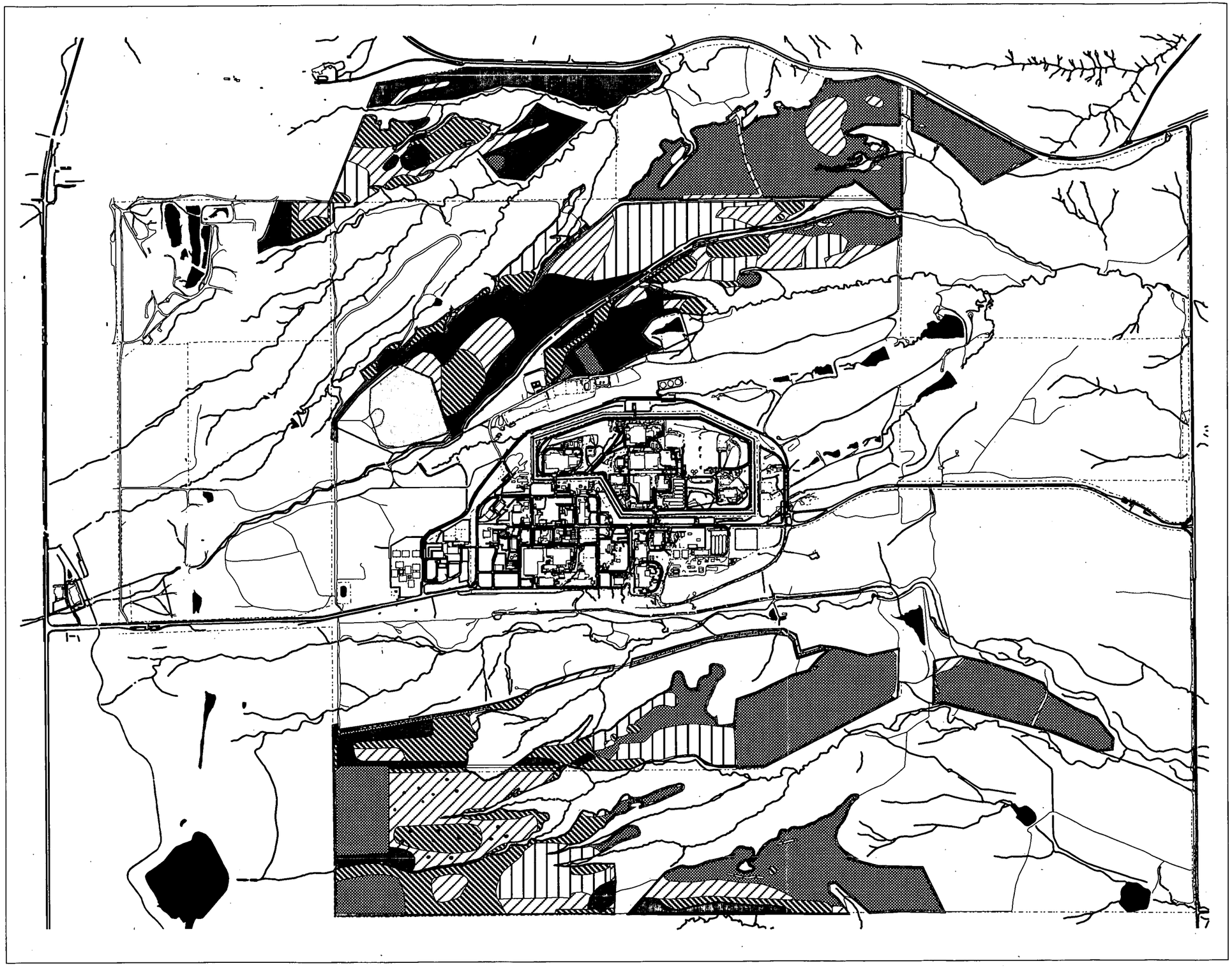

1998 Diffuse Knapweed Pre-Aerial Herbicide Application Distribution (1999 Application)

Figure 1-7

MAP LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas
- 1999 Aerial Spray Areas

Standard Map Features

- Buildings
- Lakes & Ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- New landfill

DATA SOURCE:
1999 weed distributions provided by Exponent.
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Note:
These locations approximate the boundaries of infestation areas. Infestation areas shown on this map only represent those that overlapped with the aerial herbicide application locations (i.e. this map does not represent the extent of diffuse knapweed at the Site). K-H Ecology Group POC: Karan North 303-966-9876.

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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
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Prepared by: Exponent®

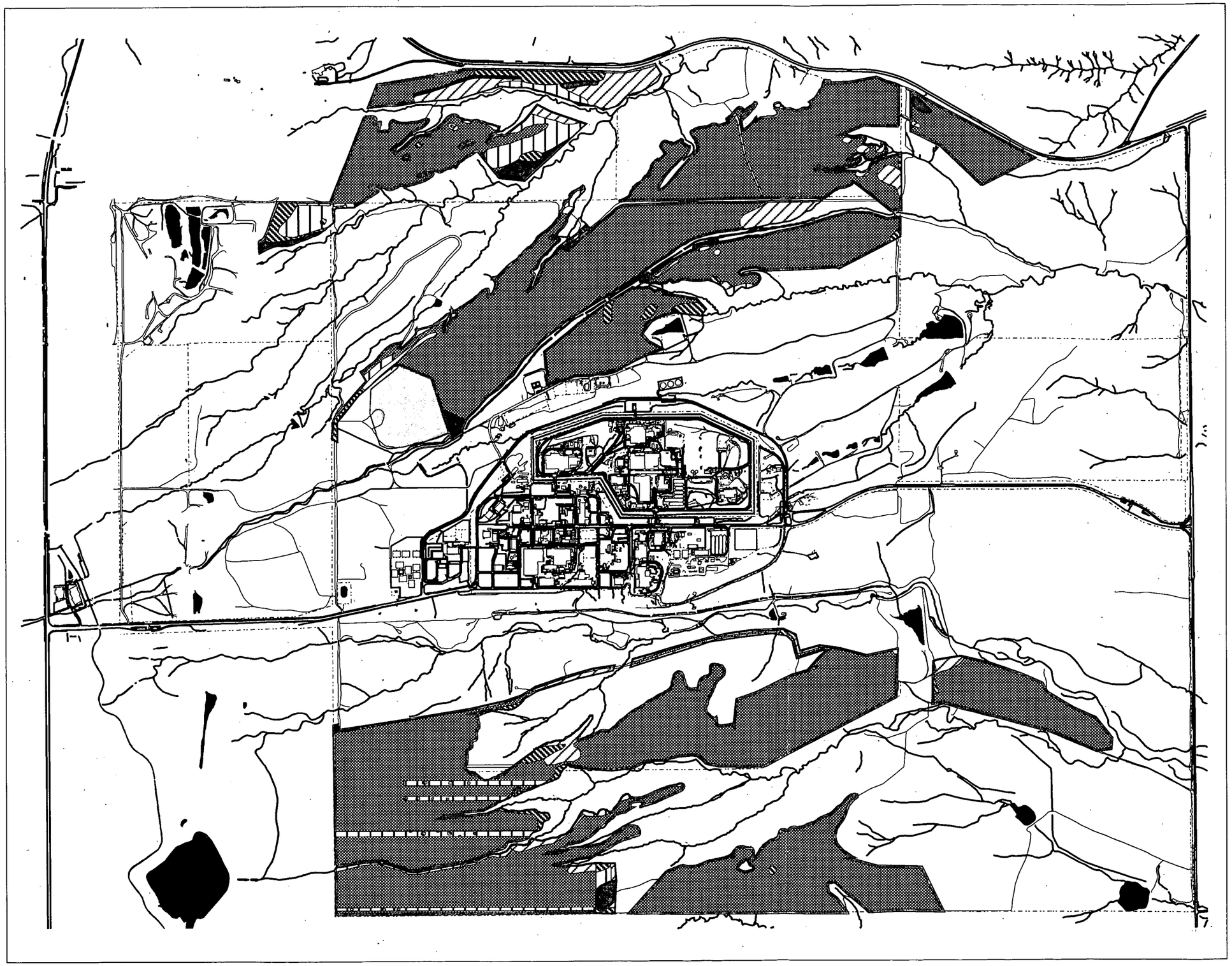
For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: K2-0017

May 3, 2001

\\Gissrv\GIS\ECO-projects\projects\k2-0017\cedi299.apr\1998 Diffuse Knapweed Pre-Herbicide Application



1999 Diffuse Knapweed Post-Aerial Herbicide Application Distribution (1999 Application)

Figure 1-8

MAP LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas
- 1999 Aerial Spray Areas

Standard Map Features

- Buildings
- Lakes & Ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- New landfill

DATA SOURCE:
1999 weed distributions provided by Exponent.
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Note:
These locations approximate the boundaries of infestation areas. Infestation areas shown on this map only represent those that overlapped with the aerial herbicide application locations (i.e. this map does not represent the extent of diffuse knapweed at the Site). K-H Ecology Group POC: Karan North 303-966-9876.

N

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1000 0 1000 2000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: K2-0017

May 3, 2001

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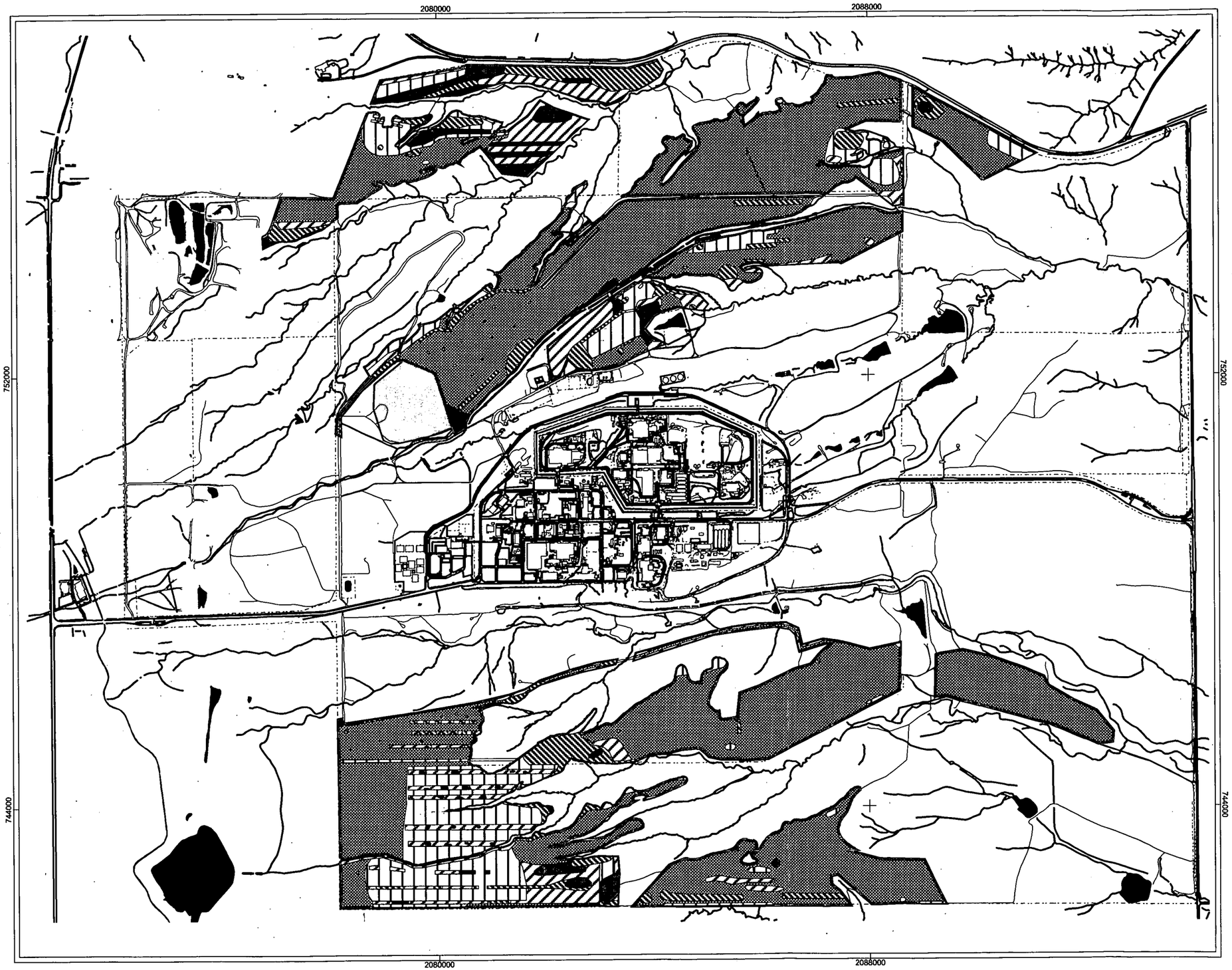


2000 Diffuse Knapweed Post-Aerial Herbicide Application Distribution (1999 Application)

Figure 1-9

MAP LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas
- 1999 Aerial Spray Areas

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours.
The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution.
The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

N

1:23552

1000 0 1000 2000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

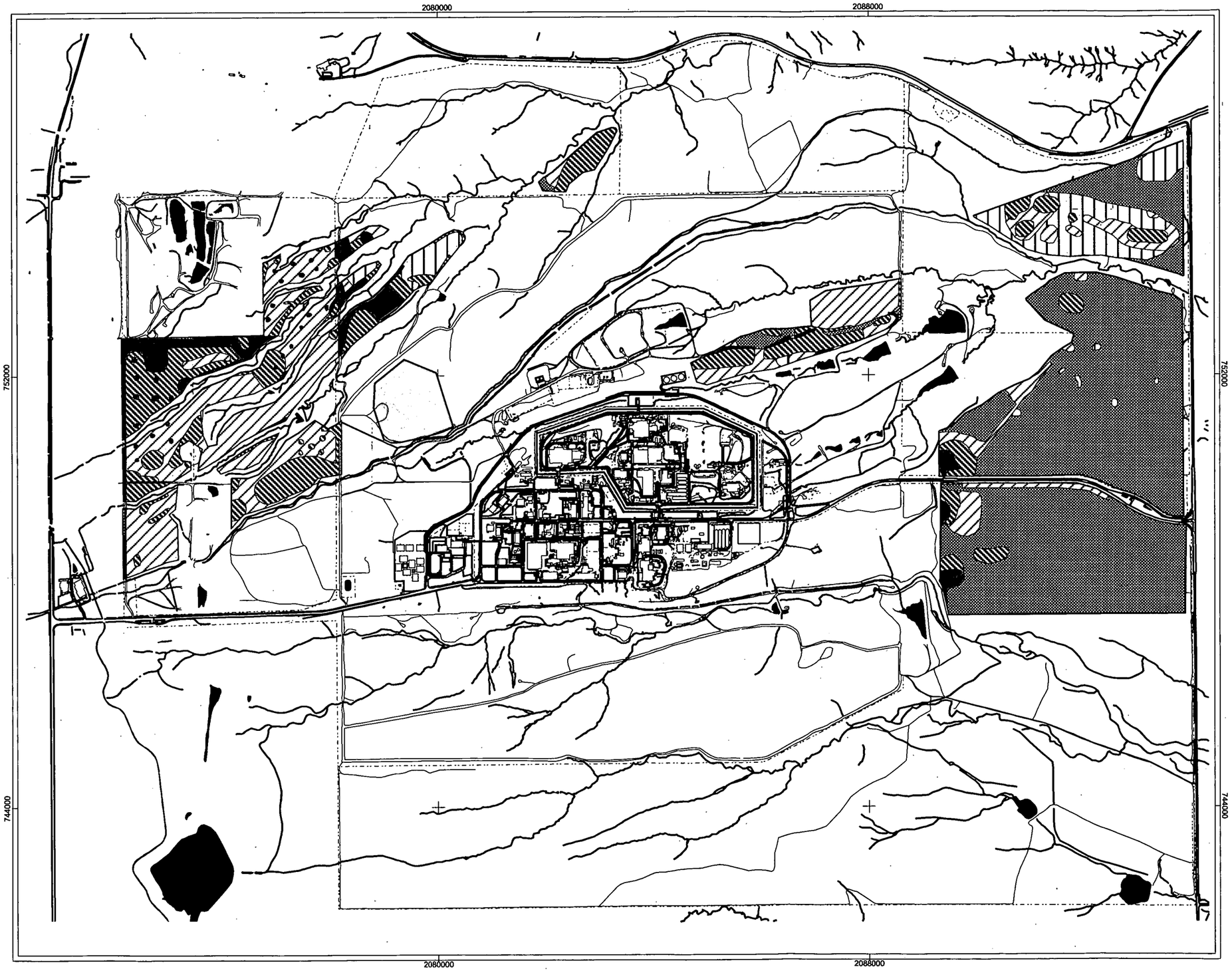
For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2K-0419

May 3, 2001

\\Gissrv\GIS\ECO-projects\projects\2k-0419\ced00.apr\2000 CEDI (1999 Aerial Clip Map)



1999 Diffuse Knapweed Pre-Aerial Herbicide Application Distribution (2000 Application)

Figure 1-10

MAP LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas
- 2000 Aerial Spray Areas

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
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The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
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N

1:23552

1000 0 1000 2000 Feet

State Plane Coordinate Projection
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RFETS GIS Dept. 303-966-7707

MAP ID: 2K-0419

May 3, 2001

\\Gissrv\GIS\ECO-projects\projects\2k-0419\ced00.apr\1999 CEDI Pre-treatment (2000 application)

2000 Diffuse Knapweed Post-Aerial Herbicide Application Distribution (2000 Application)

Figure 1-11

MAP LEGEND

- High Density Areas
- Medium Density Areas
- Low Density Areas
- Scattered Density Areas
- 2000 Aerial Spray Areas

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Weed distribution data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

N

1:23552

1000 0 1000 2000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2K-0419

May 3, 2001

\\Gissrv\GIS\ECO-projects\projects\2k-0419\ced00.apr\2000 CEDI Post-treatment (2000 application)

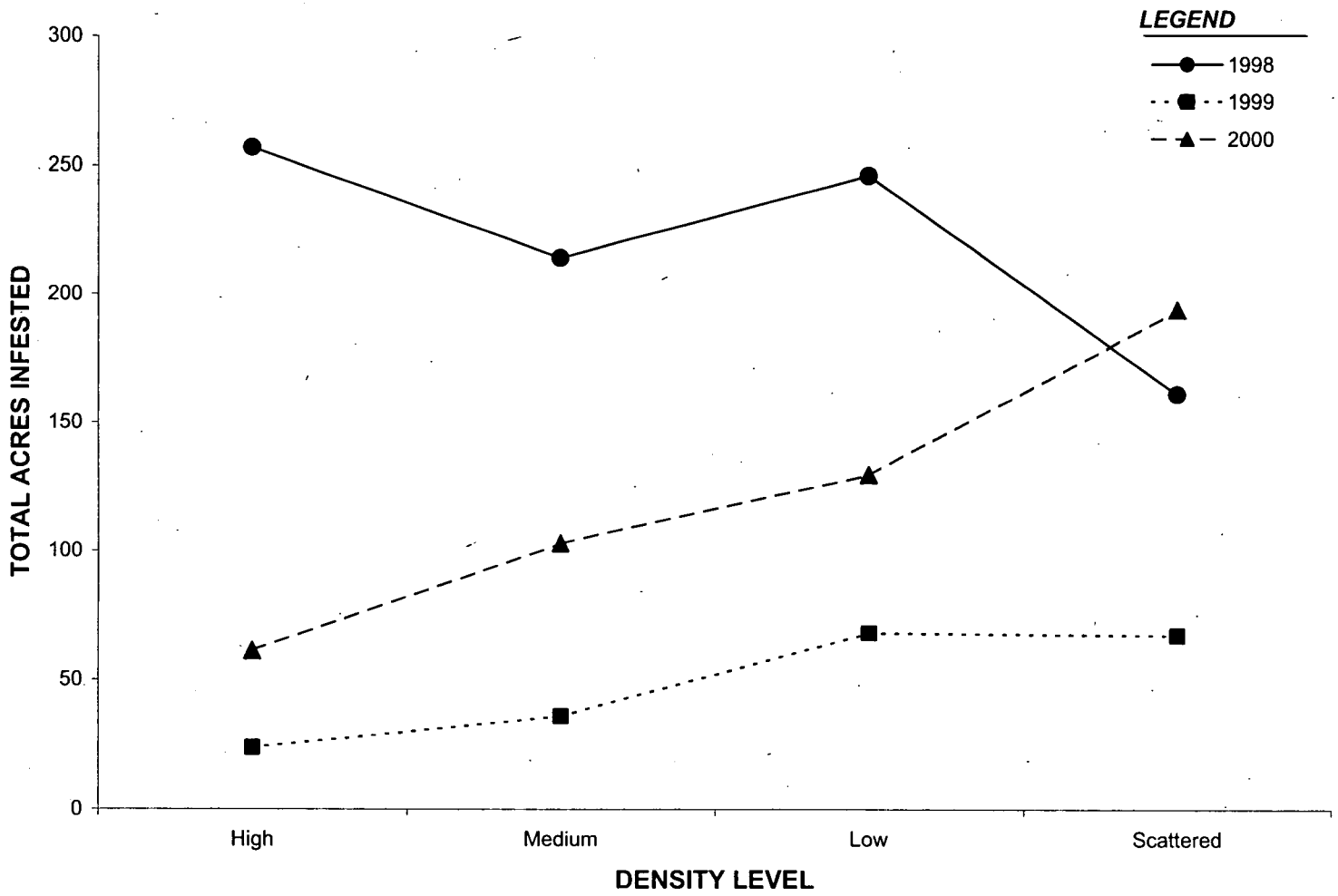

Figure 1-12. 1998-2000 diffuse knapweed change within may 1999 aerial spray locations.

\\Boulder1\Groups\Graphics\Projects\1638\2000ClipMapAreas.xls Figure 1-12 5/3/01 CO

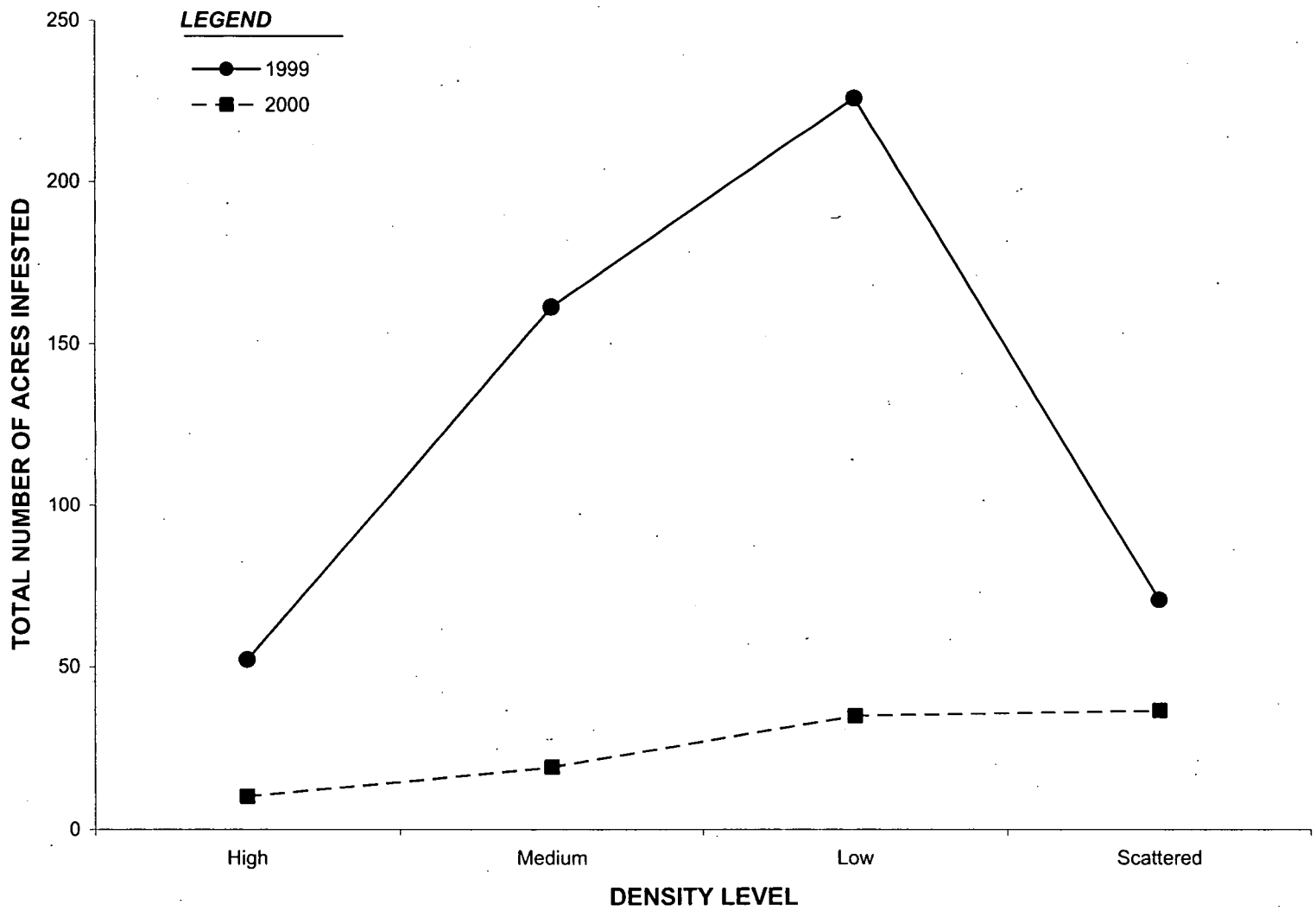

Figure 1-13. Pre- and Post- treatment diffuse knapweed levels at 2000 aerial herbicide application locations.

\\Boulder1\Groups\Graphics\Projects\1638\2K AERIAL APP CLIPMAPAREAS.xls Figure 1-13 5/3/01 CO

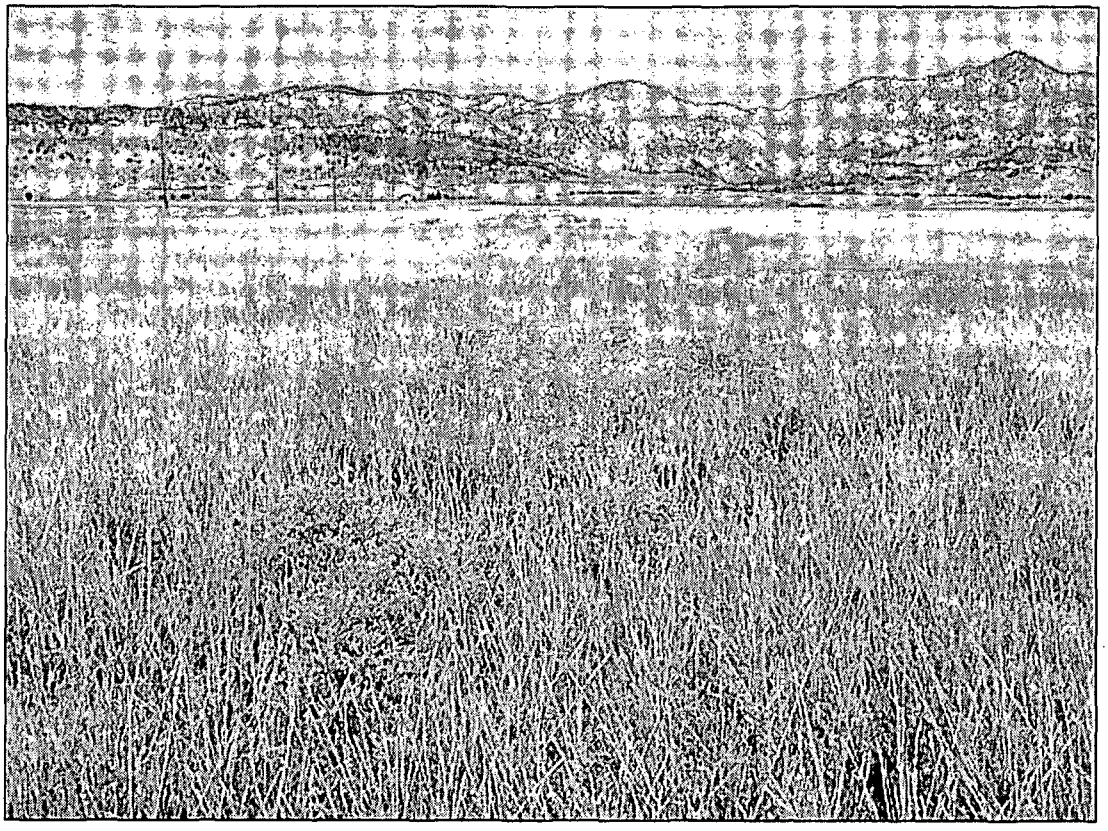

Figure 1-14. Missed flightline.

The darker area down the center of this photograph illustrates a missed flightline and how the diffuse knapweed is prevelant in an otherwise visibly clean area. Spot control is necessary for control of areas like this that are missed occasionally during the large-scale spraying applications.

Table 1-1. 2000, 1997, and 1996 Tall Upland Shrubland Species Richness

Family	Scientific Name	Speccode	Native	2000	1997	1996
ACERACEAE	Acer glabrum Torr.	ACGL1	Y	X	X	X
ACERACEAE	Acer negundo L. var. interius (Britt.) Sarg.	ACNE1	Y	X	X	X
AGAVACEAE	Yucca glauca Nutt.	YUGL1	Y	X	X	X
ALISMATACEAE	Alisma trivale Pursh	ALTR1	Y	X		
ALISMATACEAE	Sagittaria latifolia Willd.	SALA1	Y	X	X	X
AMARANTHACEAE	Amaranthus retroflexus L.	AMRE1	Y	X		
ANACARDIACEAE	Rhus aromatica Ait. var. trilobata (Nutt.) A. Gray	RHAR1	Y	X	X	X
ANACARDIACEAE	Toxicodendron rydbergii (Small) Greene	TORY1	Y	X	X	X
APIACEAE	Cicuta maculata L. var. angustifolia Hook.	CIMA1	Y	X	X	X
APIACEAE	Conium maculatum L.	COMA1	N	X	X	
APIACEAE	Harbouria trachypleura (Gray) C. & R.	HATR1	Y	X	X	X
APIACEAE	Heracleum sphondylium L. ssp. montanum (Schleich.) Briq.	HESP1	Y	X	X	X
APIACEAE	Ligusticum porteri C. & R.	LIPO1	Y	X	X	X
APIACEAE	Lomatium orientale Coult. & Rose	LOOR1	Y	X	X	X
APIACEAE	Musineon divaricatum (Pursh.) Nutt. var. hookeri T. & G.	MUDI1	Y	X	X	X
APIACEAE	Osmorhiza chiliensis H. & A.	OSCH1	Y	X	X	X
APIACEAE	Osmorhiza longistylis (Torr.) DC var. longistylis	OSLO1	Y	X	X	X
APOCYNACEAE	Apocynum cannabinum L.	APCA1	Y	X	X	X
ASCLEPIADACEAE	Asclepias incarnata L.	ASIN1	Y	X	X	X
ASCLEPIADACEAE	Asclepias speciosa Torr.	ASSP1	Y	X	X	X
ASCLEPIADACEAE	Asclepias viridiflora Raf.	ASVI1	Y	X	X	X
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	Y	X	X	X
ASTERACEAE	Ambrosia artemisiifolia L.	AMAR1	Y			X
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	Y	X	X	X
ASTERACEAE	Ambrosia trifida L.	AMTR1	Y	X	X	X
ASTERACEAE	Antennaria microphylla Rydb.	ANMI1	Y	X	X	X
ASTERACEAE	Antennaria parvifolia Nutt.	ANPA1	Y	X	X	X
ASTERACEAE	Arctium minus Bernh.	ARMI1	Y	X	X	X
ASTERACEAE	Arnica fulgens Pursh.	ARFU1	Y	X	X	X
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	ARCA1	Y	X	X	X
ASTERACEAE	Artemisia dracunculus L.	ARDR1	Y	X	X	X
ASTERACEAE	Artemisia frigida Willd.	ARFR1	Y	X	X	X
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	Y	X	X	X
ASTERACEAE	Aster ericoides L.	ASER1	Y			X
ASTERACEAE	Aster falcatus Lindl.	ASFA1	Y	X	X	
ASTERACEAE	Aster fendleri A. Gray	ASFE1	Y		X	
ASTERACEAE	Aster hesperius A. Gray var. hersperius	ASHE1	Y	X	X	
ASTERACEAE	Aster laevis L. var. geyeri A. Gray	ASLA1	Y	X	X	X
ASTERACEAE	Aster porteri Gray	ASPO1	Y	X	X	X
ASTERACEAE	Bidens frondosa L.	BIFR1	Y	X	X	X
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	N	X	X	X
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	N	X	X	X
ASTERACEAE	Chrysopsis fulcrata Greene	CHFU1	Y	X	X	X
ASTERACEAE	Chrysopsis villosa Pursh.	CHVI1	Y	X	X	X
ASTERACEAE	Cichorium intybus L.	CIIN1	N		X	
ASTERACEAE	Cirsium arvense (L.) Scop.	CIAR1	N	X	X	X
ASTERACEAE	Cirsium undulatum (Nutt.) Spreng.	CIUN1	Y	X	X	X
ASTERACEAE	Cirsium vulgare (Savi) Ten.	CIVU1	N	X	X	X
ASTERACEAE	Conyza canadensis (L.) Cronq.	COCA1	Y	X	X	X
ASTERACEAE	Crepis occidentalis Nutt.	CROC1	Y	X	X	X
ASTERACEAE	Erigeron canus A. Gray	ERCA1	Y	X		X
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	Y	X	X	X
ASTERACEAE	Erigeron flagellaris A. Gray	ERFL1	Y	X	X	X
ASTERACEAE	Erigeron speciosa (Lindl.) DC. var. macranthus (Nutt.) Cronq.	ERSP1	Y	X	X	X
ASTERACEAE	Gaillardia aristata Pursh.	GAAR1	Y	X	X	X
ASTERACEAE	Gnapthalium chilense Spreng.	GNCH1	Y	X	X	
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	Y	X	X	X
ASTERACEAE	Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	Y	X	X	X
ASTERACEAE	Helianthus annuus L.	HEAN1	Y	X		
ASTERACEAE	Helianthus nuttallii T. & G.	HENU1	Y	X	X	X
ASTERACEAE	Helianthus pumilus Nutt.	HEPU1	Y	X	X	X
ASTERACEAE	Helianthus rigidus (Cass.) Desf. ssp. subrhomboideus (Rydb.) Heiser	HERI1	Y	X	X	X

Table 1-1. (cont.)

Family	Scientific Name	Speccode	Native	2000	1997	1996
ASTERACEAE	Heliomeris multiflora Nuttall	HEMU1	Y	X	X	X
ASTERACEAE	Hymenopappus filifolius Hook. var. cinereus (Rydb.) I. M. Johnst.	HYFI1	Y	X	X	X
ASTERACEAE	Kuhnia chlorolepis Woot. & Standl.	KUCH1	Y	X		X
ASTERACEAE	Kuhnia eupatorioides L.	KUEU1	Y	X	X	X
ASTERACEAE	Lactuca oblongifolia Nutt.	LAOB1	Y		X	X
ASTERACEAE	Lactuca serriola L.	LASE1	N	X	X	X
ASTERACEAE	Liatris punctata Hook.	LIPU1	Y	X	X	X
ASTERACEAE	Microseris cuspidata (Pursh.) Sch. Bip.	MICU1	Y	X		X
ASTERACEAE	Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	Y	X	X	X
ASTERACEAE	Scorzonera laciniata L.	SCLA1	N	X	X	X
ASTERACEAE	Senecio fendleri Gray	SEFE1	Y	X	X	X
ASTERACEAE	Senecio integerrimus Nutt.	SEIN1	Y	X	X	X
ASTERACEAE	Senecio plattensis Nutt.	SEPL1	Y	X	X	X
ASTERACEAE	Senecio spartioides T. & G.	SESP1	Y	X	X	X
ASTERACEAE	Solidago canadensis L.	SOCA1	Y	X	X	X
ASTERACEAE	Solidago gigantea Ait.	SOGI1	Y	X	X	X
ASTERACEAE	Solidago missouriensis Nutt.	SOMI1	Y	X	X	X
ASTERACEAE	Solidago mollis Bart.	SOMO1	Y	X	X	X
ASTERACEAE	Solidago rigida L.	SORI1	Y	X	X	X
ASTERACEAE	Sonchus arvensis L. ssp. arvensis L.	SOAR1	N	X		
ASTERACEAE	Sonchus asper (L.) Hill	SOAS1	N		X	
ASTERACEAE	Sonchus sp.	SON1				X
ASTERACEAE	Taraxacum officinale Weber	TAOF1	N	X	X	X
ASTERACEAE	Thelesperma megapotanicum (Spreng.) O. Ktze.	THME1	Y	X	X	X
ASTERACEAE	Townsendia grandiflora (Nutt.)	TOGR1	Y	X	X	X
ASTERACEAE	Townsendia hookeri Beaman	TOHO1	Y	X	X	X
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	N	X	X	X
ASTERACEAE	Xanthium strumarium L.	XAST1	Y			X
BERBERIDACEAE	Berberis repens Lindl.	BERE1	Y	X	X	X
BETULACEAE	Betula occidentalis Hook.	BEOC1	Y	X	X	X
BORAGINACEAE	Asperugo procumbens L.	ASPR1	N	X	X	X
BORAGINACEAE	Cynoglossum officinale L.	CYOF1	N	X	X	X
BORAGINACEAE	Hackelia floribunda (Lehm.) I. M. Johnst.	HAFL1	Y		X	
BORAGINACEAE	Lappula redowskii (Hornem.) Greene	LARE1	Y		X	
BORAGINACEAE	Lithospermum incisum Lehm.	LIIN1	Y	X		
BORAGINACEAE	Lithospermum multiflorum Torr.	LIMU1	Y	X	X	X
BORAGINACEAE	Mertensia lanceolata (Pursh.) A. DC.	MELA1	Y	X	X	X
BORAGINACEAE	Onosmodium molle Michx. var. occidentale (Mack.) Johnst.	ONMO1	Y	X	X	X
BRASSICACEAE	Alyssum alyssoides (L.) L.	ALAL1	N	X	X	X
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	N	X	X	X
BRASSICACEAE	Arabis fendleri (S. Wats.) Greene var. fendleri	ARFE3	Y	X	X	X
BRASSICACEAE	Arabis glabra (L.) Bernh.	ARGL1	N	X	X	X
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	Y	X		X
BRASSICACEAE	Barbarea vulgaris R. Br.	BAVU1	N	X	X	X
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	CAMI1	N	X	X	X
BRASSICACEAE	Descurainia pinnata (Walt.) Britt.	DEPI1	Y	X	X	X
BRASSICACEAE	Descurainia richardsonii (Sweet) Schultz	DERI1	Y	X	X	X
BRASSICACEAE	Descurainia sophia (L.) Webb ex Prantl.	DESO1	N	X	X	X
BRASSICACEAE	Draba nemorosa L.	DRNE1	Y	X	X	
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	ERCA2	Y	X	X	X
BRASSICACEAE	Lepidium campestre (L.) R. Br.	LECA1	N	X	X	X
BRASSICACEAE	Lepidium densiflorum Schrad.	LEDE1	Y		X	
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	LEMO1	Y	X	X	X
BRASSICACEAE	Nasturtium officinale R. Br.	NAOF1	N	X	X	X
BRASSICACEAE	Physaria vitulifera Rydb.	PHVI1	Y			X
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	N	X	X	X
BRASSICACEAE	Thlaspi arvense L.	THAR1	N	X	X	X
CACTACEAE	Coryphantha missouriensis (Sweet) Britt. & Rose	COMI1	Y	X	X	X
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	Y	X	X	X
CACTACEAE	Opuntia fragilis (Nutt.) Haw.	OPFR1	Y	X	X	X
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	Y	X	X	X
CACTACEAE	Pediocactus simpsonii (Engelm.) Britt. & Rose	PESI1	Y	X	X	X

Table 1-1. (cont.)

Family	Scientific Name	Speccode	Native	2000	1997	1996
CAMPANULACEAE	Campanula rotundifolia L.	CARO1	Y	X	X	X
CAMPANULACEAE	Lobelia siphilitica L. var. ludoviciana A. DC.	LOSI1	Y	X	X	
CANNABACEAE	Humulus lupulus L. var. lupuloides E. Small	HULU1	Y	X	X	X
CAPRIFOLIACEAE	Symphoricarpos occidentalis Hook.	SYOC1	Y	X	X	X
CAPRIFOLIACEAE	Symphoricarpos oreophilus Gray	SYOR1	Y	X	X	X
CAPRIFOLIACEAE	Viburnum opulus L. var. americanum Ait	VIOP1	N	X	X	X
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	ARFE2	Y	X	X	X
CARYOPHYLLACEAE	Cerastium arvense L.	CEAR1	Y	X	X	X
CARYOPHYLLACEAE	Cerastium vulgatum L.	CEVU1	N	X	X	X
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	PAJA1	Y	X	X	X
CARYOPHYLLACEAE	Saponaria officinalis L.	SAOF1	N	X	X	X
CARYOPHYLLACEAE	Silene antirrhina L.	SIAN1	Y	X	X	X
CARYOPHYLLACEAE	Silene drummondii Hook.	SIDR1	Y	X	X	X
CARYOPHYLLACEAE	Silene pratensis (Raf.)Godr. & Gren	SIPR1	N	X	X	X
CARYOPHYLLACEAE	Stellaria longifolia Muhl. ex Willd.	STLO1	Y	X	X	
CHENOPODIACEAE	Chenopodium album L.	CHAL1	N	X		X
CHENOPODIACEAE	Chenopodium berlandieri Moq.	CHBE1	Y	X		X
CHENOPODIACEAE	Chenopodium fremontii S. Wats.	CHFR1	Y	X	X	X
CHENOPODIACEAE	Chenopodium leptophyllum Nutt. ex Moq.	CHLE2	Y	X	X	
CHENOPODIACEAE	Chenopodium overi Aellen	CHOV1	Y		X	
CHENOPODIACEAE	Salsola iberica Senn. & Pau.	SAIB1	N	X		X
CLUSIACEAE	Hypericum majus (A. Gray) Britt.	HYMA1	Y	X		
CLUSIACEAE	Hypericum perforatum L.	HYPE1	N	X	X	X
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	TROC1	Y	X	X	X
CONVOLVULACEAE	Convolvulus arvensis L.	COAR1	N	X	X	X
CRASSULACEAE	Sedum lanceolatum Torr.	SELA1	Y	X	X	X
CUPRESSACEAE	Juniperus communis L.	JUCO1	Y	X	X	X
CUPRESSACEAE	Juniperus scopulorum Sarg.	JUSC1	T		X	
CYPERACEAE	Carex aurea Nutt.	CAAU1	Y		X	
CYPERACEAE	Carex brevior (Dew.) Mack. ex Lunell.	CABR1	Y	X	X	X
CYPERACEAE	Carex douglasii F. Boott.	CADO1	Y	X		
CYPERACEAE	Carex eleocharis Bailey	CAEL1	Y	X	X	
CYPERACEAE	Carex heliophila Mack.	CAHE1	Y	X	X	X
CYPERACEAE	Carex hystericina Muhl. ex Willd.	CAHY1	Y	X	X	X
CYPERACEAE	Carex interior Bailey	CAIN1	Y	X	X	X
CYPERACEAE	Carex lanuginosa Michx.	CALA1	Y	X	X	X
CYPERACEAE	Carex nebrascensis Dew.	CANE1	Y	X	X	X
CYPERACEAE	Carex oreocharis Holm.	CAOR1	Y	X	X	
CYPERACEAE	Carex praegracilis W. Boott.	CAPR1	Y	X	X	X
CYPERACEAE	Carex scoparia Schkuhr. ex Willd.	CASC1	Y	X	X	
CYPERACEAE	Carex simulata Mack.	CASI1	Y	X	X	
CYPERACEAE	Carex stipata Muhl.	CAST1	Y		X	
CYPERACEAE	Eleocharis macrostachya Britt.	ELMA1	Y	X	X	X
CYPERACEAE	Scirpus pallidus (Britt.) Fern	SCPA1	Y	X	X	
CYPERACEAE	Scirpus pungens Vahl	SCPU1	Y			X
CYPERACEAE	Scirpus validus Vahl.	SCVA1	Y	X	X	X
EQUISETACEAE	Equisetum laevigatum A. Br.	EQLA1	Y	X	X	X
EUPHORBIACEAE	Euphorbia robusta (Engelm.) Small	EURO1	Y	X	X	X
EUPHORBIACEAE	Euphorbia spathulata Lam.	EUSP1	Y	X	X	
FABACEAE	Amorpha fruticosa L.	AMFR1	Y	X	X	X
FABACEAE	Astragalus adsurgens Pall. var. robustior Hook.	ASAD1	Y	X	X	X
FABACEAE	Astragalus agrestis Dougl. ex G. Don	ASAG1	Y	X	X	X
FABACEAE	Astragalus canadensis L.	ASCA1	Y		X	X
FABACEAE	Astragalus drummondii Dougl. ex Hook.	ASDR1	Y	X	X	X
FABACEAE	Astragalus flexuosus (Hook.) G. Don	ASFL1	Y	X	X	X
FABACEAE	Astragalus shortianus Nutt. ex T.&G.	ASSH1	Y	X	X	X
FABACEAE	Astragalus tridactylicus Gray	ASTR1	Y	X	X	X
FABACEAE	Dalea candida Michx. ex Willd. var. oligophylla (Torr.) Shinners.	DACA1	Y	X	X	X
FABACEAE	Dalea purpurea Vent	DAPU1	Y	X	X	X
FABACEAE	Glycyrrhiza lepidota Pursh.	GLLE1	Y	X	X	X
FABACEAE	Lathyrus eucosmus Butters and St. John.	LAEU1	Y	X	X	X
FABACEAE	Lathyrus polymorphus Nutt. ssp. incanus (Sm. & Rydb.) C. L. Hitchc.	LAPO1	Y			X

Table 1-1. (cont.)

Family	Scientific Name	Speccode	Native	2000	1997	1996
FABACEAE	Lupinus argenteus Pursh ssp. ingratus (Greene) Harmon	LUAR2	Y	X	X	X
FABACEAE	Lupinus argenteus Pursh var. argenteus	LUAR1	Y	X	X	X
FABACEAE	Melilotus officinalis (L.) Pall.	MEOF1	N	X	X	X
FABACEAE	Oxytropis lambertii Pursh.	OXLA1	Y	X	X	X
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	Y	X	X	X
FABACEAE	Thermopsis rhombifolia var. divaricarpa (Nels.) Isely	THRH1	Y	X	X	X
FABACEAE	Vicia americana Muhl. ex Willd.	VIAM1	Y	X	X	X
GENTIANACEAE	Gentiana affinis Griseb.	GEAF1	Y	X	X	X
GENTIANACEAE	Swertia radiata (Kell.) O. Ktze.	SWRA1	Y	X	X	X
GERANIACEAE	Erodium cicutarium (L.) L'Her.	ERCI1	N	X	X	X
GERANIACEAE	Geranium caespitosum James ssp. caespitosum	GECA1	Y	X	X	X
GROSSULARIACEAE	Ribes aureum Pursh	RIAU1	Y	X	X	X
GROSSULARIACEAE	Ribes cereum Dougl.	RICE1	Y	X	X	X
HYDROPHYLLACEAE	Hydrophyllum fendleri (Gray) Heller	HYFE1	Y	X	X	X
HYDROPHYLLACEAE	Phacelia heterophylla Pursh.	PHHE1	Y	X	X	X
IRIDACEAE	Iris missouriensis Nutt.	IRMI1	Y	X	X	X
IRIDACEAE	Sisyrinchium montanum Greene	SIMO1	Y	X	X	
JUNCACEAE	Juncus balticus Willd.	JUBA1	Y	X	X	X
JUNCACEAE	Juncus dudleyi Wieg.	JUDU1	Y	X	X	X
JUNCACEAE	Juncus ensifolius Wikst. var. montanus (Englm.) C. L. Hitchc.	JUEN1	Y	X	X	X
JUNCACEAE	Juncus interior Wieg.	JUIN1	Y		X	
JUNCACEAE	Juncus longistylis Torr.	JULO1	Y	X	X	
JUNCACEAE	Juncus nodosus L.	JUNO1	Y	X	X	X
JUNCACEAE	Juncus torreyi Cov.	JUTO1	Y	X		X
LAMIACEAE	Lycopus americanus Muhl. ex Barton	LYAM1	Y	X	X	X
LAMIACEAE	Marrubium vulgare L.	MAVU1	N		X	
LAMIACEAE	Mentha arvensis L.	MEAR1	Y	X	X	X
LAMIACEAE	Monarda fistulosa L. var. menthifolia (Grah.) Fern.	MOFI1	Y	X	X	X
LAMIACEAE	Nepeta cataria L.	NECA1	N	X	X	X
LAMIACEAE	Prunella vulgaris L.	PRVU1	Y	X	X	X
LAMIACEAE	Scutellaria brittonii Porter	SCBR1	Y	X	X	X
LEMNACEAE	Lemna minor L.	LEMI1	Y	X	X	X
LILIACEAE	Allium cernuum Roth	ALCE1	Y	X	X	X
LILIACEAE	Allium geyeri S. Wats.	ALGE1	Y			X
LILIACEAE	Allium textile A. Nels. & Macbr.	ALTE1	Y	X	X	X
LILIACEAE	Asparagus officinalis L.	ASOF1	N	X	X	X
LILIACEAE	Calochortus gunnisonii S. Wats.	CAGU1	Y	X	X	X
LILIACEAE	Leucocrinum montanum Nutt.	LEMO2	Y	X	X	X
LILIACEAE	Smilacina stellata (L.) Desf.	SMST1	Y	X	X	X
LILIACEAE	Zigadenus venenosus Wats. var. gramineus (Rydb.) Walsh ex Peck	ZIVE1	Y	X	X	X
LINACEAE	Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	LIPE1	Y	X	X	X
LYTHRACEAE	Lythrum alatum Pursh.	LYAL1	Y	X	X	
MALVACEAE	Malva neglecta Wallr.	MANE1	N			X
MALVACEAE	Sidalcea candida Gray	SICA1	Y	X	X	X
MALVACEAE	Sphaeralcea coccinea (Pursh.) Rydb.	SPCO1	Y	X	X	
NYCTAGINACEAE	Mirabilis hirsuta (Pursh.) MacM.	MIHI1	Y	X	X	X
NYCTAGINACEAE	Mirabilis linearis (Pursh.) Heimerl	MILI1	Y	X	X	X
NYCTAGINACEAE	Mirabilis nyctaginea (Michx.) MacM.	MINY1	Y	X	X	X
ONAGRACEAE	Calylophus serrulatus (Nutt.) Raven	CASE2	Y	X	X	X
ONAGRACEAE	Epilobium ciliatum Raf. ssp. glandulosum (Lehm.) Hock & Raven	EPCI1	Y	X	X	X
ONAGRACEAE	Epilobium paniculatum Nutt.	EPPA1	Y	X	X	X
ONAGRACEAE	Gaura coccinea Pursh.	GACO1	Y	X	X	X
ONAGRACEAE	Gaura parviflora Dougl.	GAPA1	Y	X		X
ONAGRACEAE	Oenothera howardii (A. Nels.) W. L. Wagner	OEHO1	Y	X	X	X
ONAGRACEAE	Oenothera villosa Thunb. ssp. strigosa (Rydb.) Dietrich & Raven	OEVI1	Y	X	X	X
OROBANCHACEAE	Orobanche fasciculata Nutt.	ORFA1	Y		X	
OXALIDACEAE	Oxalis dillenii Jacq.	OXDI1	N	X	X	X
PINACEAE	Pinus ponderosa Laws	PIPO1	Y	X	X	X
PINACEAE	Pseudotsuga menziesii (Mirb.) Franco	PSME1	Y	X	X	X
PLANTAGINACE	Plantago lanceolata L.	PLLA1	N	X	X	X
PLANTAGINACE	Plantago major L.	PLMA1	N	X	X	
POACEAE	Aegilops cylindrica Host	AECY1	N	X	X	

Table 1-1. (cont.)

Family	Scientific Name	Speccode	Native	2000	1997	1996
POACEAE	Agropyron caninum (L.) Beauv. ssp. majus (Vasey) C. L. Hitchc.	AGCA1	Y	X	X	X
POACEAE	Agropyron cristatum (L.) Gaertn.	AGCR1	N	X	X	X
POACEAE	Agropyron dasystachyum (Hook.) Scribn.	AGDA1	Y	X	X	X
POACEAE	Agropyron desertorum (Fisch.) Schult.	AGDE1	N	X	X	X
POACEAE	Agropyron griffithsii Scribn. & Smith	AGGR1	Y	X	X	X
POACEAE	Agropyron intermedium (Host) Beauv.	AGIN1	N	X	X	X
POACEAE	Agropyron repens (L.) Beauv.	AGRE1	N	X	X	X
POACEAE	Agropyron smithii Rydb.	AGSM1	Y	X	X	X
POACEAE	Agrostis scabra Willd.	AGSC1	Y	X	X	X
POACEAE	Agrostis stolonifera L.	AGST1	N	X	X	X
POACEAE	Andropogon gerardii Vitman	ANGE1	Y	X	X	X
POACEAE	Andropogon scoparius Michx.	ANSC1	Y	X	X	X
POACEAE	Aristida purpurea Nutt. var. longiseta (Steud.) Vasey	ARFE1	Y		X	
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	Y	X	X	X
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	Y	X	X	X
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	Y	X	X	X
POACEAE	Bouteloua hirsuta Lag	BOHI1	Y	X	X	X
POACEAE	Bromus briziformis F. & M.	BRBR1	N	X	X	X
POACEAE	Bromus inermis Leyss. ssp. inermis	BRIN1	N	X	X	X
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	N	X	X	X
POACEAE	Bromus tectorum L.	BRTE1	N	X	X	X
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	BUDA1	Y	X		X
POACEAE	Ceratochloa marginata (Nees ex Stued.) Jackson	CEMA1	Y	X	X	X
POACEAE	Dactylis glomerata L.	DAGL1	N	X	X	X
POACEAE	Danthonia spicata (L.) Beauv. ex R. & S.	DASP1	Y	X		
POACEAE	Dichanthelium oligosanthes (Schultz) Gould var. scribnerianum (Nash) G	DIOL1	Y	X	X	
POACEAE	Elymus canadensis L.	ELCA1	Y	X	X	X
POACEAE	Festuca ovina L. var. rydbergii St. Yves	FEOV1	Y	X	X	X
POACEAE	Festuca pratensis Huds.	FEPR1	Y	X		X
POACEAE	Glyceria grandis S. Wats. ex A. Gray	GLGR1	Y	X	X	X
POACEAE	Glyceria striata (Lam.) Hitchc.	GLST1	Y	X	X	X
POACEAE	Hordeum brachyantherum Nevski	HOBR1	Y	X		
POACEAE	Hordeum jubatum L.	HOJU1	Y	X	X	X
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1	Y	X	X	X
POACEAE	Muhlenbergia asperifolia (Nees. & Mey.) Parodi	MUAS1	Y	X		
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	Y	X	X	X
POACEAE	Muhlenbergia racemosa (Michx.) B. S. P.	MURA1	Y	X	X	X
POACEAE	Muhlenbergia wrightii Vasey	MUWR1	Y	X		
POACEAE	Oryzopsis hymenoides (R. & S.) Ricker	ORHY1	Y	X	X	X
POACEAE	Panicum virgatum L.	PAVI1	Y	X	X	X
POACEAE	Phleum pratense L.	PHPR1	N	X	X	X
POACEAE	Poa annua L.	POAN1	N			X
POACEAE	Poa compressa L.	POCO1	N	X	X	X
POACEAE	Poa palustris L.	POPA1	N	X	X	X
POACEAE	Poa pratensis L.	POPR1	N	X	X	X
POACEAE	Secale cereale L.	SECE1	N		X	
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	Y	X	X	X
POACEAE	Sorghastrum nutans (L.) Nash	SONU1	Y	X	X	X
POACEAE	Spartina pectinata Link	SPPE1	Y	X	X	X
POACEAE	Sporobolus asper (Michx.) Kunth	SPAS1	Y	X	X	
POACEAE	Sporobolus cryptandrus (Torr.) A. Gray	SPCR1	Y	X	X	X
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	Y	X	X	X
POACEAE	Stipa comata Trin. & Rupr.	STCO1	Y	X	X	X
POACEAE	Stipa neomexicana (Thur.) Scribn.	STNE1	Y	X		
POACEAE	Stipa robusta (Vasey) Scribn.	STRO1	Y	X		
POACEAE	Stipa spartea Trinius	STSP1	Y	X	X	X
POACEAE	Stipa viridula Trin.	STVI1	Y	X	X	X
POACEAE	X Agrohordeum macounii (Vasey) Lepage	AGMA1	N		X	X
POLEMONIACEAE	Collomia linearis Nutt.	COLI1	Y	X	X	X
POLEMONIACEAE	Ipomopsis spicata (Nutt.) V. Grant ssp. spicata	IPSP1	Y	X	X	X
POLYGONACEAE	Eriogonum alatum Torr.	ERAL1	Y	X	X	X
POLYGONACEAE	Eriogonum jamesii Benth.	ERJA1	Y	X	X	

Table 1-1. (cont.)

Family	Scientific Name	Speccode	Native	2000	1997	1996
POLYGONACEAE	Eriogonum umbellatum Torr.	ERUM1	Y	X	X	X
POLYGONACEAE	Polygonum arenastrum Jord. ex Bor.	POAR1	N	X		X
POLYGONACEAE	Polygonum convolvulus L.	POCO2	N	X	X	X
POLYGONACEAE	Polygonum douglasii Greene	PODO1	Y		X	
POLYGONACEAE	Polygonum hydropiper L.	POHY1	N	X	X	X
POLYGONACEAE	Polygonum pensylvanicum L.	POPE1	Y	X		
POLYGONACEAE	Polygonum persicaria L.	POPE2	N	X	X	X
POLYGONACEAE	Polygonum ramosissimum Michx.	PORA1	Y	X	X	X
POLYGONACEAE	Polygonum sawatchense Small	POSA1	Y		X	
POLYGONACEAE	Rumex acetosella L.	RUAC1	N	X	X	X
POLYGONACEAE	Rumex crispus L.	RUCR1	N	X	X	X
POLYGONACEAE	Rumex obtusifolius L.	RUOB1	N	X	X	X
POLYGONACEAE	Rumex salicifolius Weinm. ssp. triangulivalvis Danser	RUSA1	Y	X	X	X
POLYPODIACEAE	Cystopteris fragilis (L.) Bernh.	CYFR1	Y	X	X	X
PORTULACACEAE	Claytonia rosea Rydb.	CLRO1	Y	X	X	X
PRIMULACEAE	Androsace occidentalis Pursh.	ANOC1	Y	X		
PRIMULACEAE	Lysimachia ciliata L.	LYCI1	Y	X	X	X
RANUNCULACEAE	Anemone cylindrica A. Gray	ANCY1	Y	X	X	X
RANUNCULACEAE	Anemone patens L.	ANPA2	Y	X		X
RANUNCULACEAE	Clematis ligusticifolia Nutt.	CLLI1	Y	X	X	X
RANUNCULACEAE	Delphinium nuttalianum Pritz. ex Walpers	DENU1	Y	X	X	X
RANUNCULACEAE	Delphinium virescens Nutt. ssp. penardii (Huth) Ewan	DEVI1	Y	X	X	X
RANUNCULACEAE	Ranunculus macounii Britt.	RAMA1	Y	X	X	X
RANUNCULACEAE	Thalictrum dasycarpum Fisch. & Ave-Lall	THDA1	Y	X	X	X
RHAMNACEAE	Ceanothus herbaceus Raf. var. pubescens (T. & G.)	CEHE1	Y	X	X	X
ROSACEAE	Agrimonia striata Michx.	AGST2	Y	X	X	X
ROSACEAE	Amelanchier alnifolia Nutt.	AMAL1	Y	X	X	X
ROSACEAE	Crataegus erythropoda Ashe	CRER1	Y	X	X	X
ROSACEAE	Crataegus succulenta Link var. occidentalis (Britton) E. J. Palm.	CRSU1	Y	X	X	X
ROSACEAE	Geum aleppicum Jacq.	GEAL1	Y	X	X	X
ROSACEAE	Geum macrophyllum Willd.	GEMA1	Y	X	X	X
ROSACEAE	Physocarpus monogynus (Torr.) Coult.	PHMO1	Y	X	X	X
ROSACEAE	Physocarpus opulifolius (L.) Raf.	PHOP1	Y	X	X	X
ROSACEAE	Potentilla fissa Nutt.	POFI1	Y	X	X	X
ROSACEAE	Potentilla gracilis Dougl. ex Hook. var. glabrata (Lehm.) C. L. Hitchc.	POGR1	Y	X	X	X
ROSACEAE	Potentilla hippiana Lehm.	POHI1	Y	X	X	X
ROSACEAE	Potentilla norvegica L.	PONO1	Y	X	X	
ROSACEAE	Potentilla paradoxa Nutt.	POPA2	Y		X	
ROSACEAE	Potentilla pensylvanica L.	POPE4	Y	X		
ROSACEAE	Prunus americana Marsh.	PRAM1	Y	X	X	X
ROSACEAE	Prunus pumila L. var. besseyi (Bailey) Gl.	PRPU1	Y	X	X	X
ROSACEAE	Prunus virginiana L. var. melanocarpa (A. Nels.) Sarg.	PRVI1	Y	X	X	X
ROSACEAE	Pyrus malus L.	PYMA1	N	X	X	X
ROSACEAE	Rosa acicularis Lindl.	ROAC1	Y		X	X
ROSACEAE	Rosa arkansana Porter	ROAR1	Y	X	X	X
ROSACEAE	Rosa woodsii Lindl.	ROWO1	Y	X	X	X
ROSACEAE	Rubus deliciosus Torr.	RUDE1	Y	X		
ROSACEAE	Rubus idaeus L. ssp. sachalinensis (Levl.) Focke var. sachalinensis	RUID1	Y	X	X	X
RUBIACEAE	Galium aparine L.	GAAP1	Y	X	X	X
RUBIACEAE	Galium septentrionale Roemer & Schultes	GASE1	Y	X	X	X
SALICACEAE	Populus alba L.	POAL1	Y	X		
SALICACEAE	Populus angustifolia James	POAN3	Y	X	X	X
SALICACEAE	Populus deltoides Marsh. ssp. monilifera (Ait.) Eckenw.	PODE1	Y	X	X	X
SALICACEAE	Populus x acuminata Rydb.	POAC1	Y	X	X	
SALICACEAE	Salix amygdaloides Anderss.	SAAM1	Y	X	X	X
SALICACEAE	Salix exigua Nutt. ssp. interior (Rowlee) Cronq.	SAEX1	Y	X	X	X
SALICACEAE	Salix irrorata Andersson	SAIR1	Y	X	X	X
SALICACEAE	Salix lutea Nutt.	SALU1	Y	X		
SANTALACEAE	Comandra umbellata (L.) Nutt.	COUM1	Y	X	X	X
SAXIFRAGACEAE	Heuchera parvifolia Nutt. ex T.& G.	HEPA1	Y	X	X	X
SCROPHULARIACEAE	Castilleja sessiliflora Pursh.	CASE3	Y	X	X	X
SCROPHULARIACEAE	Collinsia parviflora Doug. ex Lindl.	COPA1	Y	X	X	X

Table 1-1. (cont.)

Family	Scientific Name	Speccode	Native	2000	1997	1996
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1	N	X	X	X
SCROPHULARIACEAE	Mimulus glabratus H. B. K. var. fremontii (Benth.) A. L. Grant	MIGL1	Y	X		
SCROPHULARIACEAE	Penstemon secundiflorus Benth.	PESE1	Y	X	X	X
SCROPHULARIACEAE	Penstemon virens Penn.	PEVI1	Y	X	X	X
SCROPHULARIACEAE	Penstemon virgatus Gray ssp. asa-grayi Crosswhite	PEVI2	Y	X	X	X
SCROPHULARIACEAE	Scrophularia lanceolata Pursh.	SCLA2	Y	X	X	X
SCROPHULARIACEAE	Verbascum blattaria L.	VEBL1	N	X	X	X
SCROPHULARIACEAE	Verbascum thapsus L.	VETH1	N	X	X	X
SCROPHULARIACEAE	Veronica americana (Raf.) Schwein. ex Benth.	VEAM1	Y		X	X
SCROPHULARIACEAE	Veronica anagallis-aquatica L.	VEAN1	N	X	X	X
SMILACACEAE	Smilax herbacea L. var. lasioneura (Small) Rydb..	SMHE1	Y	X	X	X
SOLANACEAE	Physalis heterophylla Nees	PHHE2	Y	X	X	X
SOLANACEAE	Physalis virginiana P. Mill.	PHVI2	Y	X	X	X
SOLANACEAE	Solanum triflorum Nutt.	SOTR1	Y	X		
TYPHACEAE	Typha latifolia L.	TYLA1	Y	X	X	X
ULMACEAE	Ulmus pumila L.	ULPU1	N			X
URTICACEAE	Parietaria pensylvanica Muhl. ex Willd.	PAPE1	Y	X	X	X
URTICACEAE	Urtica dioica L. ssp. gracilis (Ait.) Seland.	URDI1	Y	X	X	X
VERBENACEAE	Verbena bracteata Lag. & Rodr.	VEBR1	Y	X	X	X
VERBENACEAE	Verbena hastata L.	VEHA1	Y	X	X	X
VIOLACEAE	Viola nuttallii Pursh.	VINU1	Y	X	X	X
VIOLACEAE	Viola rydbergii Greene	VIRY1	Y	X	X	X
VIOLACEAE	Viola scopulorum (Gray) Greene	VISC1	Y	X	X	X
VIOLACEAE	Viola sororia Willd.	VISO1	Y	X	X	X
VITACEAE	Vitis riparia Michx.	VIRI1	Y	X	X	X
	Total Number of Species			363	352	333
	Total Number of Species Observed During All 3 Years				398	
	Percent Native Species			82	82	81

Table 1-2. 2000 Estimated Weed Infestation Acreage Summary for Rocky Flats Environmental Technology Site

	2000 Acreage				
		Density Level			
Common Name	**Site Total**	**High**	**Medium**	**Low**	**Scattered**
Diffuse Knapweed	2223	510	531	771	412
Musk Thistle	792	0	55	242	494
Mullein	1010	69	184	451	307
Jointed Goatgrass	69	NA	NA	NA	NA
Annual Rye	28	NA	NA	NA	NA
Scotch Thistle	4	NA	NA	NA	NA
Russian Knapweed	1	NA	NA	NA	NA
Bouncingbet	1	NA	NA	NA	NA
Dame's Rocket	1	NA	NA	NA	NA

All values are approximate acreages. NA = Data not collected by density level.

See text for density level descriptions.

Table 1-3. Comparison of 1997-2000 Weed Infestation Extents at Rocky Flats Environmental Technology Site

			Density Level			
Weed Species	**Year**	**Site Total**	**High**	**Medium**	**Low**	**Scattered**
Diffuse Knapweed	1997	2678	696	893	658	431
	1998	2913	761	778	987	388
	1999	2295	466	613	873	343
	2000	2223	510	531	771	412
Musk Thistle	1997	474	2	270	202	0
	1998	1685	32	515	1035	102
	1999	1353	1	311	684	357
	2000	792	0	55	242	494
Mullein	1997	575	117	238	203	17
	1998	867	168	225	460	13
	1999	1068	130	204	450	284
	2000	1010	69	184	451	307

All values are approximate acreages.

See text for density level descriptions.

Table 1-4. 1999 Aerial Herbicide Application. Comparison of 1998, 1999, and 2000 Diffuse Knapweed Pre- and Post-Aerial Herbicide Application Infestation Levels at Rocky Flats Environmental Technology Site

		Diffuse Knapweed Density Level			
Year	Total	High	Medium	Low	Scattered
1998	878	257	214	246	161
1999 (Herbicide Applied)	195	24	36	68	67
Change (acres)	-683	-233	-178	-178	-94
Percent Change (1998 to 1999)	-78	-91	-83	-72	-58

Values are approximate number of acres.

		Diffuse Knapweed Density Level			
Year	Total	High	Medium	Low	Scattered
1998	878	257	214	246	161
1999 (Herbicide Applied)	195	24	36	68	67
2000	487	61	103	130	194
Change (acres) from 1999	292	37	67	62	127
Percent Change from 1998 to 2000	-45	-76	-52	-47	20

Values are approximate number of acres.

Table 1-5. Comparison of 1998 and 1999 Diffuse Knapweed Pre- and Post-Aerial Herbicide Application Infestation Levels at Rocky Flats Environmental Technology Site

		Diffuse Knapweed Density Level			
Year	Total	High	Medium	Low	Scattered
1998	878	257	214	246	161
1999	195	24	36	68	67
Change	-683	-233	-178	-178	-94
Percent Change	-78	-91	-83	-72	-58

Values are approximate number of acres.

Total area sprayed by helicopter with Tordon 22K in 1999 was approximately 1500 acres.

		Diffuse Knapweed Density Level			
Year	Total	High	Medium	Low	Scattered
1998	878	257	214	246	161
1999	195	24	36	68	67
2000	487	61	103	130	194
Change from 1999	292	37	67	62	127
Percent Increase from 1999					

Values are approximate number of acres.

Total area sprayed by helicopter with Tordon 22K in 1999 was approximately 1500 acres.

Report 2

Vegetation Management Program

2. Summary of the 2000 Vegetation Management Program at the Rocky Flats Environmental Technology Site

2.1 Introduction

The vegetation management program at the Rocky Flats Environmental Technology Site (the Site) continued to direct a multi-faceted attack on the noxious weeds at the Site during 2000. The regulatory framework governing weed control at the Site includes (K-H 1997a):

- Federal Noxious Weed Act, Section 15—Management of Undesirable Plants on Federal Lands
- Federal Noxious Weed Act, Title 7—Agriculture, Chapter 61—Noxious Weeds
- Colorado Weed Management Act, § 35-5.5-115, C.R.S. (1996 Supp.)
- Jefferson County, Colorado, Undesirable Plant Management Plan
- Memorandum of Understanding for the Establishment of a Federal Interagency Committee for the Management of Noxious and Exotic Weeds.

The Site vegetation management program is guided by the Integrated Weed Control Strategy plan (K-H 1997a), and by the annual vegetation management plans (previously called annual weed control plans; K-H 1997b, 1999, 2000a) that specify weed control efforts for each year at the Site. The integrated strategy for the Site includes the use of administrative and cultural, mechanical and physical, biological, and chemical control methods. This report summarizes, by method, the weed control and revegetation/ reclamation activities conducted at the Site during FY2000.

2.2 Administrative and Cultural Controls

During 2000, one project disturbed a previously reclaimed area (approximately ½ acre) on a hillside in the Woman Creek drainage at the Site. It was revegetated using a site-specific native seed mix. Photographs were taken after the revegetation and will be compared to future photographs to document the progress of the reclamation. Monitoring of several large revegetation projects that were done in 1999 (K-H 2000b) was continued in 2000. Results were mixed, and as a result, current administrative and cultural controls were modified. At one revegetation effort, most of the grasses that initially came up in 2000 were non-native reclamation grasses that were not in the specified seed mix provided to the project. An investigation into the cause of this problem was inconclusive,

and as a result, Site projects that conduct revegetation are now required to have the seed mix visually inspected by a qualified ecologist prior to planting. At other locations, the straw used for mulch contained viable seed heads. As a result, virtually none of the desired native seed species germinated, but instead, a wheat monoculture resulted (Figure 2-1). Straw used for projects on the Site now must be threshed straw (i.e., seed heads removed).

For each of these projects, photo monitoring and qualitative assessments of the resulting revegetation effort was initiated in 1999 and continued in 2000, in order to evaluate the effectiveness of the revegetation efforts and to continue learning what works best for conditions at the Site. Additional monitoring conducted in 2000, related to weed control, consisted of mapping the distribution of several weed species on the Site, including diffuse knapweed (*Centaurea diffusa*), musk thistle (*Carduus nutans*), common mullein (*Verbascum thapsus*), dame's rocket (*Hesperis matronalis*), annual rye (*Secale cereale*), jointed goatgrass (*Aegilops cylindrica*), bouncingbet (*Saponaria officinalis*), Russian knapweed (*Centaurea repens*), and scotch thistle (*Onopordum acanthium*). Other monitoring included both qualitative and quantitative monitoring of herbicide impacts to native and target species. Results of these monitoring efforts are summarized in other sections of this annual report and in the 1999 Annual Vegetation Report (K-H 2000b).

As part of the ongoing vegetation management program, the sharing of information and planning strategies with other local agency weed coordinators and resource managers is important, because coordination of efforts between land owners is essential for long-term control. During 2000, the K-H Ecology Group disseminated information on weed control and vegetation management to onsite personnel, through meetings, personal communication, and Site newspaper articles. In addition, K-H Ecologists attended regional weed control meetings and the annual 2000 Colorado Weed Management Association conference to keep up to date with the most recent knowledge and advances in weed control.

2.3 Physical and Mechanical Controls

Physical and mechanical controls used at the Site in 2000 consisted of mowing, grading, and selective hand control. Mowing was done along the margins of the main east and west access roads, in addition to several miles of firebreak roads in the Buffer Zone, to prevent the roadside weeds from going to seed and spreading further (Figure 2-2). Mowing was also conducted on the xeric tallgrass prairie adjacent to a firebreak road in the northern Buffer Zone, where annual rye has begun to invade the prairie. Mowing was conducted at the time when the seed heads were starting to form. The plan is to continue to mow the annual rye annually until the seed bank is exhausted.

Grading was conducted along approximately 18 miles of firebreak roads in the Buffer Zone, to maintain these firebreak roads and prevent roadside weeds from going to seed and spreading further (Figure 2-2). Additional grading efforts were conducted along a few sections of Buffer Zone road to lower the height of the rock rows on either side of the road, so that the mowing equipment can be used more effectively in these areas. One

problem that was observed in late summer in these latter areas, however, was that a prolific crop of jointed goatgrass (*Aegiliops cylindrica*), an exotic grass, was now coming up. This species has become an increasing problem along the Buffer Zone firebreak road edges as the grading has spread the the seeds around the roads.

Hand control in 2000 was conducted at several locations to control localized infestations of scotch thistle, annual rye, bouncingbet, and dame's rocket. Hand control consisted of hand pulling, using sickles or sling blades, and spot herbicide spraying. The use of hand control has proven valuable to prevent these small infestations from becoming larger problems.

2.4 Biological Control

During 2000, a new biological control insect for Canada thistle (*Cirsium arvense*) was released at the Site. Approximately 200 adults of *Urophora carduii*, a gall-forming fly, were released at two locations in the Rock Creek drainage where other methods of controlling Canada thistle are impractical (Figure 2-3). The insects were obtained from the Colorado Department of Agriculture in an attempt to establish a reproducing population at the Site. The release sites will be observed during 2001 to see if the flies have become established and to determine the level of impact on the thistles, if any. Sixty-six biocontrol beetles for St. John's-wort were collected on Site and re-released at an infestation near the Lindsay Ranch where very few beetles were present to help control it.

Also during 2000, observations were made of one of the biological control species (*Urophora quadrifasciata*) used for controlling diffuse knapweed. Most of the diffuse knapweed populations in the northern Buffer Zone had these seed head flies on them in low numbers. Although not released on Site, it is likely that they have migrated from a biocontrol research project being conducted north of the Site, on Boulder County Open Space, and from other releases conducted by Boulder County (Owsley 2000). Their presence at the Site is a positive development, and they may help to lower the number of seeds produced per plant.

Previously, biological control insects have also been released at the Site to control musk thistle, St. John's-wort (*Hypericum perforatum*), dalmatian toadflax, and diffuse knapweed. The insects continue to generally do a good job of containing infestations of musk thistle and St. John's-wort. They have been much less effective, however, at controlling infestations of dalmatian toadflax and diffuse knapweed. All the biological control insects released at the Site have been approved by the U.S. Department of Agriculture.

2.5 Chemical Control

Herbicide applications were used to control several hundred acres of noxious weed-infested grasslands at the Site during 2000. Figures 2-4 and 2-5 show the locations of

ground and aerial applications of the herbicide Tordon 22K and Transline in 2000. Primary target species were diffuse knapweed, musk thistle, and mullein; however, other less aggressive exotic species such as goatsbeard (*Tragopogon dubius*), curly-top gumweed (*Grindelia squarrosa*), alyssum (*Alyssum minus*), wild lettuce (*Lactuca serriola*), small-seeded false flax (*Camelina microcarpa*), and some of the tansymustards (*Descurania* ssp.) were also controlled. Approximately 75 acres were treated on the ground, while almost 1,022 acres were treated with a helicopter during 2000 (Figures 2-4 and 2-5).

The residual effect of the Tordon 22K is expected to help provide continuing control of these species for the next few years, precluding the need for annual retreatment at these locations. However, because diffuse knapweed will return to pre-treatment levels if nothing else is done, and because at many treatment locations some spots were missed, a feasibility study was conducted to evaluate using spot control to keep infestations at these locations from returning as quickly. Hand control using a backpack sprayer with Roundup was conducted at a location treated by helicopter in 1999. During a one-hour period, an area of approximately 2–3 acres was spot treated to control individual plants coming up. Most plants treated were found growing in association with old small mammal burrows and mounds where continuing disturbance reduces the long-term viability of the applications. Results suggest that spot control of this type on foot would be very time consuming and costly for large areas. It would be more feasible to use a truck or 4-wheel all terrain vehicle with a mounted spray bar system to cover larger areas in shorter periods of time for spot control. Plans are being developed to initiate larger-scale spot control during 2001 to control the noxious weeds that have begun to return to previously treated areas.

2.6 Conclusion

During 2000, the vegetation management program at the Site continued to work toward controlling infestations of several noxious weed species in the Buffer Zone. Several methods were applied to control current infestations and prevent new ones. These methods included the use of administrative and cultural controls, physical and mechanical methods, biological controls, and chemical controls. Progress was made in controlling several large infestations of diffuse knapweed, musk thistle, and mullein, in addition to smaller infestations of scotch thistle, annual rye, and dame's rocket. Using the knowledge gained from onsite monitoring of the current efforts, and by keeping in contact with other local agency weed coordinators and resource managers, improvements will continue to be made to the vegetation management program at the Site.

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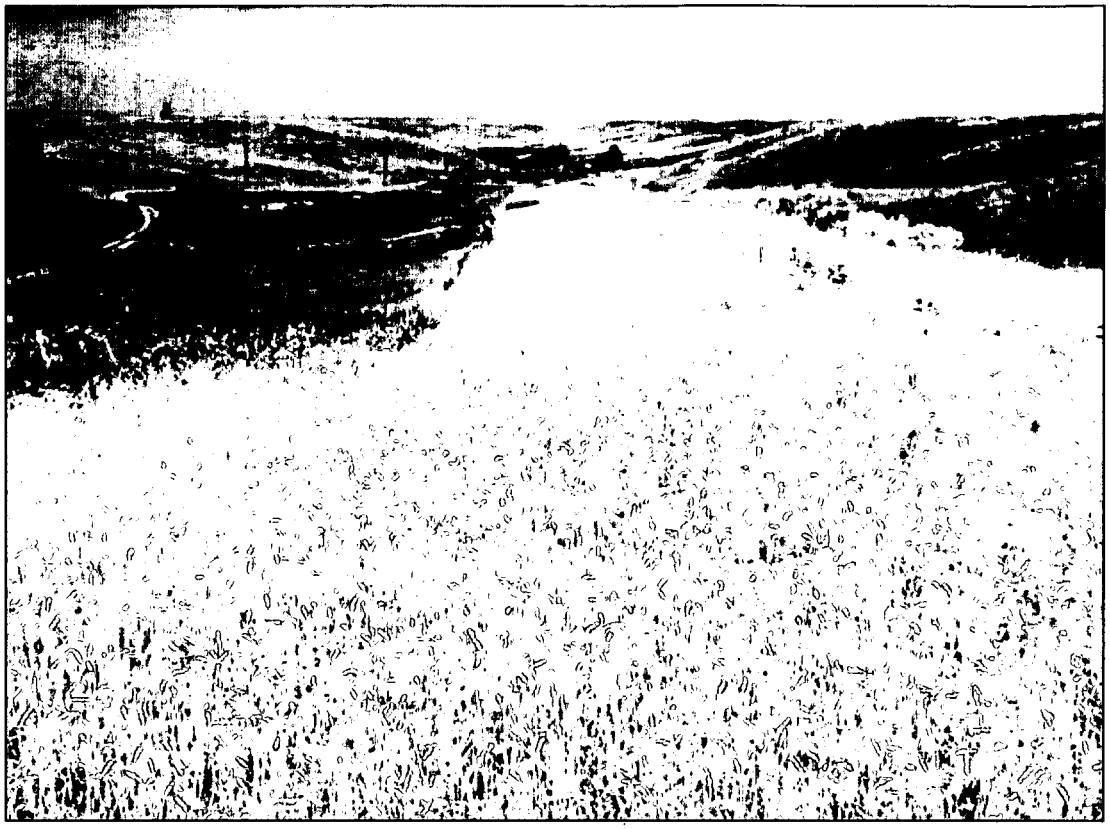

Figure 2-1. Wheat monoculture.

A wheat (*Triticum aestivum*) monoculture resulted at this revegetation location in 2000 when the crimped wheat straw used for mulch contained viable seedheads. Monitoring in 2001 will determine whether any of the seeded species begin to germinate.

Report 3

Mesic Mixed Grassland

3. 2000 Mesic Mixed Grassland Monitoring Summary

3.1 Purpose

Monitoring is an integral part of determining whether the management objectives and goals for the plant communities at Rocky Flats Environmental Technology Site (the Site) are being achieved (K-H 1997a,b). Consistent with this goal, long-term quantitative monitoring is necessary to determine whether changes are taking place in the plant communities that would otherwise go undetected through the use of broader-scale qualitative monitoring techniques.

During 2000, three permanent monitoring sites (TR02, TR04, and TR11) in the mesic mixed grassland community were monitored to reassess conditions and determine whether changes observed in the 1999 data were simply an anomaly or part of a longer-term change (DOE 1995a; K-H 1997c, 2000a). The 1999 data showed a large compositional shift from a dominance by cool-season species to warm-season species since the sites were last monitored in 1995. Monitoring in 2000 was conducted to determine whether this shift could be documented for a second year.

3.2 Background Information

The plant communities monitored at the Site from 1993 through 1995 were organized along a soil-moisture (hydrologic) gradient that ranged from xeric (dry) to mesic (moderate moisture) to hydric (wet). This system followed the plant community classification that was outlined in the baseline study (DOE 1992), which identified xeric (xeric mixed grassland), mesic (mesic mixed grassland), and hydric (riparian) communities at the Site. Since the mesic mixed grassland sites were monitored in 1995, weed control efforts had been conducted at some locations. In May 1999, site TR02 was sprayed with Tordon 22K by helicopter to control the noxious weed diffuse knapweed (*Centaurea diffusa*).

3.3 Methods

During 2000, the mesic mixed grassland sites—TR02, TR04, and TR11 (Figure 3-1)—were monitored for species richness, cover, and frequency. The sampling methods and procedures used at these sites during 2000 were the same as those used in 1993–1995 and 1999, with the addition of the measure for species frequency that was added in 1999. A total of fifteen 50-m transects (five at each site) were monitored in 2000. Transects were sampled in the spring and again in late summer. Species richness and frequency were monitored during both sampling sessions. Cover was sampled only during the late-summer session. Species richness was determined in a 2-m-wide belt centered along the length of each 50-m transect. Every plant species rooted within the 100-m^2 area was

recorded. In addition, the numbers of woody plant stems and cactus stems were counted and recorded for the 100-m^2 area during the spring sample session only.

Basal cover and foliar cover were estimated using a point-intercept method along each 50-m transect. A 2-m-long, 6-mm-diameter rod was dropped vertically at 50-cm intervals along the transect to record a total of 100 intercept points. Two categories of hits were recorded, basal and foliar. Basal cover hits were recorded based on what material was hit by the rod at the ground surface. Hits could be vegetation (live plants), litter (fallen dead material), rock (pebbles and cobbles greater than the rod diameter), bare ground, or water, in that order of priority based on the protection from erosion provided by each type of cover. Basal vegetation hits were recorded by species only if the rod was touching the stem or crown of the plant where the plant entered the ground. Foliar vegetation hits (defined as a portion of a plant touching the rod) were recorded by species in three categories as defined by height and growth form. The topmost hit of each growth form was recorded. The growth forms measured were herbaceous, woody <2 m in height, and woody >2 m in height.

Frequency information by species was gathered by randomly locating 25 1-m^2 quadrats (five per transect) at each site. Additionally, a single photograph was taken of each transect during the late summer sampling session to visually document the condition of the transect. Photographs were taken from near the 0-m end of the transect, near the permanent marker, looking toward the 50-m endpoint. A placard was placed in the photograph against the 0-m endpoint to provide the site and transect number, and date.

For more detailed information on these methods, see the *Ecological Monitoring Program, Final Program Plan* (DOE 1993), the *Environmental Management Operating Procedures Manual, Volume V, Ecology, 5-51200-OPS-EE* (DOE 1995b), and the *1999* [and 2000] *Ecological Field Monitoring Plan*[s] *for the Rocky Flats Environmental Technology Site* (K-H 1999a, 2000b).

Species richness data were summarized by generating a species list for each site. To make the 1999 and 2000 data compatible with past data analyses, belt-transect data, point-intercept data, and quadrat data were combined to provide overall species richness for analysis. Other species richness variables were calculated from the species lists and used for comparison. Basal cover data are reported as total percent cover of vegetation, litter, rock, and bare ground. Foliar cover data are reported as frequency, absolute cover, and relative cover for each species encountered. Frequency from the cover data was defined as the percent of point-intercept transects on which a species occurred, out of the total possible five sampled at each site. Absolute foliar cover was the percentage of the number of hits on a species out of the total number of hits possible at a site (500). This value is the actual cover of a species. Relative foliar cover was the number of hits a species had relative to the total number of vegetative hits recorded per site (i.e., the percent of total vegetative cover [100 percent] represented by the species). Both absolute and relative foliar cover values are presented as means. For values calculated at the community level, data from all three sites were combined prior to analysis. A Shannon-Weaver diversity index was used to calculate diversity and was conducted using the

relative foliar cover data (Brower and Zar 1977). Frequency based on quadrats (n=25) was defined as the number of quadrats in which a species was recorded, divided by 25 (the total number of quadrats possible), and multiplied by 100. Descriptive comparisons were made between the 1993–1995, 1999, and 2000 data sets to examine potential changes over time. Appropriate parametric and non-parametric statistical analyses were used for some comparisons.

3.4 Results

A total of 138 species were recorded at all three mesic mixed grassland sites that were monitored in 2000. The number of species found at each site varied from 89 (TR02) to 110 (TR11) (Table 3-1). The percentage of native species found across all sites combined was 80 percent, with individual sites ranging from 76 to 83 percent (Table 3-1).

Overall cactus and woody plant densities across all three sites were 0.28 and 1.14 plants/m^2, respectively (Table 3-2). Cactus density, composed of twistspine prickly pear (*Opuntia macorhiza*) and hedgehog cactus (*Echinocereus viridiflorus*), was highest at site TR11 (0.29 plants/m^2), and lowest at TR02 (0.20 plants/m^2; Table 3-2). Woody plant density, composed of Spanish bayonet (*Yucca glauca*) and/or prairie wild rose (*Rosa arkansana*) was highest at TR02 (2.25 plants/m^2) and lowest at TR11 (0.40 plants/m^2; Table 3-2).

Basal vegetation cover in 2000 was 5.7 percent for the mesic mixed grassland community. Other ground cover classifications, in descending order of importance, came from litter (73.5 percent), rock (14.3 percent), and bare ground (6.5 percent). Total foliar cover for the mesic mixed grassland community in 2000 was 70.7 percent, with individual sites ranging from 64.2 percent at TR04 to 76.2 percent at TR11 (Tables 3-3 through 3-6). Total native relative foliar cover averaged approximately 80 percent across all sites (Table 3-3). Graminoid cover provided approximately 84 percent of the relative vegetation cover, with cool-season and warm-season grasses providing approximately 40 and 45 percent, respectively (Table 3-3). Forbs provided about 16 percent relative cover (Table 3-3). Shannon-Weaver diversity indices were calculated for the mesic mixed grassland cover data for 1993, 1994, 1995, 1999, and 2000. From 1993 to 1995, diversity values declined slightly, from 1.160 to 1.057. In 1999 and 2000, however, the values had increased to 1.256 and 1.219, respectively.

The mesic mixed grassland community (all 3 sites combined) in 2000 was dominated by the native species blue grama (*Bouteloua gracilis*; 25.1 percent), western wheatgrass (*Agropyron smithii*; 13.4 percent), and sideoats grama (*Bouteloua curtipendula*; 11.9 percent; Table 3-3). Japanese brome (*Bromus japonicus*), an exotic grass that in the early and mid-1990's was the dominant species on the mesic grasslands, contributed only 2.3 percent of the relative cover in 2000 (Table 3-3). Considerable variation existed among individual mesic grassland sites in terms of dominant species. Site TR02 was dominated by blue grama, western wheatgrass, and sideoats grama (Table 3-4). At TR04, the dominant species were blue grama, western wheatgrass, and Kentucky bluegrass; the

latter is an exotic species (Table 3-5). Site TR11 was dominated by the native species needle and thread grass (*Stipa comata*), blue grama, and big bluestem (*Andropogon gerardii*; Table 3-6).

Species frequency results from the 1999 and 2000 quadrat data for both spring and summer sampling sessions are found in Table 3-7. Although different sites had differing frequencies for the various species, the more commonly occurring species included blue grama, western wheatgrass, Japanese brome, and wild alfalfa (*Psorelea tenuiflora*).

3.5 Discussion

The permanent transects at the mesic mixed grassland sites TR02, TR04, and TR11 were monitored during 2000, and the data were compared to those from 1993–1995 and 1999. The primary reason for monitoring the mesic grassland sites again in 2000 was to determine whether changes in species composition observed in the 1999 data, as compared to the 1993–1995 data, were a temporal perturbation or evidence of a longer-term change.

Total community species richness was little changed in 2000 as compared to previous years. At specific sites, however, some differences were noted. At TR04, a loss of 11 species from the number recorded in 1999 was observed. The 89 species recorded at TR04 was the lowest number reported since 1993 (Table 3-1). Many of these were native species, but were species that typically occur very infrequently, so their disappearance for a season is not cause for alarm. The decrease may have been due to the summer drought in 2000 and the hot, southwest-facing aspect of this site. At TR02, the decrease of 15 species observed in 1999, compared to 1995, rebounded in 2000 (Table 3-1). The loss of richness in 1999 was a response to the application of Tordon 22K as part of the weed control program at the Site. The rebound in species richness the following year correlates well with data from other monitoring at the Site that have shown a similar response to Tordon 22K applications (K-H 1998, 1999b, 2000a). At TR11, no difference in species richness was noted in 2000 compared to the past several years (Table 3-1).

Total foliar cover for the mesic mixed grassland community declined compared to past measurements and was, in fact, the lowest ever recorded at these monitoring sites (Figure 3-2). Both total graminoid cover and total forb cover across all sites combined, respectively, showed a similar response (Table 3-3). The best explanation for the decline in cover is the drought conditions that occurred during the summer of 2000. Qualitative observations of the prairie in 2000 showed that many species withered and went dormant in mid-summer. Species diversity (Shannon-Weaver) showed little change from that in 1999 and still remained higher than that from 1993–1995. The relative cover of native plant species continued to increase in 2000 and reached nearly 80 percent, the highest ever recorded in the community since monitoring began in 1993 (Table 3-3). The decrease in non-native cover is largely a result of the loss of cover of Japanese brome, an exotic grass species, which has shown a similar pattern of decline since 1995 (Figure 3-3).

While total non-native foliar cover has decreased in the community, non-native forb cover has changed little across all sites combined, indicating that the weeds (mostly forbs) are still a problem in general (Table 3-3). However, at TR02, where the aerial herbicide application was conducted in 1999, declines in both native and non-native forb cover were observed (Table 3-4). In 2000, native forb cover began to increase while non-native cover continued to decline (Table 3-4). Forb cover should return to pre-treatment levels at TR02 over the next few years, based on other studies here at the Site and elsewhere (K-H 1998, 1999b, 2000a; Rice and Toney 1996; Rice et al. 1997).

The cool- versus warm-season graminoid composition of the mesic mixed grassland continued to shift further toward the warm-season component in 2000 (Table 3-3, Figure 3-4). In 1993–1995, cool-season graminoids dominated the grassland, providing approximately 70 percent of the relative cover, while warm-season graminoids accounted for 5–14 percent. However, in 1999, cool-season graminoid cover dropped to about 50 percent of the total cover, while warm-season graminoid cover increased to approximately 32 percent. In 2000, the cool-season graminoids accounted for only 40 percent of the relative cover, and warm-season graminoid species became the dominant cover, at approximately 45 percent. The loss of cool-season graminoid cover on the mesic mixed grassland is due largely to the 36-percent reduction in the cover of Japanese brome and 7-percent loss of western wheatgrass observed from 1995 to 2000 (Table 3-3). In1994 and 1995, Japanese brome had the highest cover of all species on the mesic mixed grassland (Table 3-3).

The graminoid species accounting for the increase in warm-season cover are blue grama and side-oats grama, both native grasses. Figure 3-5 illustrates the change in foliar cover for the dominant species on the mesic mixed grassland from 1993 to 2000. Although relative cover values are mentioned here because they are the best measure of actual species composition of the vegetation present, the absolute or actual cover of these species also declined or increased by similar amounts. The lack of data from 1996–1998, however, limits understanding whether the increases in warm-season graminoid cover actually started prior to 1999. This illustrates the difficulty of interpreting change when continuous data sets are not available.

Taken separately, individual sites also showed these differences, although with some variation. The change in cool-season versus warm-season graminoid composition was most pronounced at TR04, where the warm-season cover has increased by over 50 percent and cool-season species have declined by as much from 1995 to 2000 (Table 3-5). The species that accounts for nearly 39 percent of this increase is blue grama.

At TR02, the change in cool- vs. warm-season graminoid composition has also been dramatic. Relative foliar cover of warm-season graminoids increased from 8 percent in 1995 to just over 50 percent in 2000, with most of this increase coming from blue grama and sideoats grama (Table 3-4). Relative foliar cover of cool-season graminoids decreased from 66 percent to 38 percent during the same time period (Table 3-4). This site received an aerial herbicide treatment of Tordon 22K (applied in mid-May 1999),

which could account for some of this change. Due to the timing of the herbicide application in 1999, most of the cool-season graminoid species would have been growing and getting ready to flower. Thus, by the time the herbicide actually took effect on the target species and some of the non-target species, the opportunity for the cool-season graminoid species to take advantage of the reduced competition would have passed. Instead, the warm-season graminoid species, which would have just started their growth period, would have been able to take advantage of the reduced competition and higher summer precipitation, thus accounting for much of the increase in cover.

At TR11, increased warm-season and decreased cool-season graminoid cover has also been observed, with warm-season cover increasing by 24 percent and cool-season cover decreasing by 19 percent from 1995 to 2000 (Table 3-6). Here, increases in the cover of blue grama, side-oats grama, and big bluestem largely account for the increase in warm-season cover (Table 3-6). Thus, although a shift in cover composition was noted across all sites, the shift was not of equal magnitude at every site.

From a management standpoint, the shift in graminoid composition observed in 1999 and 2000 is a beneficial one. Japanese brome and downy brome, commonly referred to as cheatgrasses, are both non-native species that have taken over millions of acres across the western United States (Pellant and Hall 1994). Areas infested by these cool-season annual grasses often have lower species richness and diversity, less ecosystem stability, increased potential for soil erosion, more frequent wildfires, and lower wildlife and livestock utilization (Rosentreter 1994). Infestation by these grasses has been mentioned previously as a potential management concern for the Site (DOE 1995a). The concern is lessened by the reduction of these species in the mesic mixed grassland, as seen in the last two years of data, and a shift to a more perennial, warm-season graminoid composition. Whether cheatgrass cover continues to remain low or begins to increase at some point is uncertain at this time. The reason for the loss of cheatgrass cover is unknown, but it could be due to climatic variations or possibly a cyclic response of the different species over time. Monitoring of these locations in the future will assess the status of this trend over time.

3.6 Conclusions

In general, the 2000 monitoring data showed that the quality of the prairie at the mesic mixed grassland sites has increased since the early to mid-1990s. Species richness has remained stable, and diversity and native foliar cover have increased. The most unexpected change, however, has been the overall increase in warm-season graminoid cover observed at all sites and in the community overall. The reduced cover of Japanese brome and increased cover of native, perennial graminoids like blue grama and side-oats grama should reduce the potential for soil erosion and accidental fire, in addition to providing higher quality habitat. The question asked in 1999 after this change was first observed was whether this shift was only a short-term change or an indication of a longer-term trend. The lack of data from 1996–1998 for these sites makes this difficult to interpret with certainty, but the data from 2000 continue to substantiate this change and show that it has shifted even more in the direction of a warm-season-dominated

community. Monitoring in future years will show whether this change was merely a perturbation in the grassland or perhaps part of a larger cyclic pattern in the community composition of the grassland, in response to larger environmental variables. Either way, the 1999 and 2000 results indicate a beneficial shift, and suggest that the overall quality of the mesic mixed grassland at these locations has improved somewhat since they were monitored earlier in the decade.

The 2000 results from quantitative monitoring, combined with qualitative assessments of Site ecological resources from other monitoring efforts, continue to suggest that active management of the grassland communities on the Site is necessary to maintain the quality and health of these communities, and to preserve these resources for future generations. The need for weed control on the mesic mixed grassland is still a high priority at some locations. The vegetation management program at the Site continues to address the noxious weed issues. As in the other grassland communities at the Site, the buildup of dead plant litter that results from a lack of fire and grazing is also a problem, and progress is being made in instituting and continuing the use of prescribed burns for resource management at the Site.

In conclusion, the mesic mixed grassland remains a dominant plant community at the Site. As such, its preservation is important for providing habitat for many of the wildlife species at the Site, and because it is an increasingly rare community in the region as development continues to transform the landscape around the boundaries of the Site. As good stewards of the ecological resources at the Site, DOE and K-H will continue to use best management practices to preserve this disappearing landscape for the American public.

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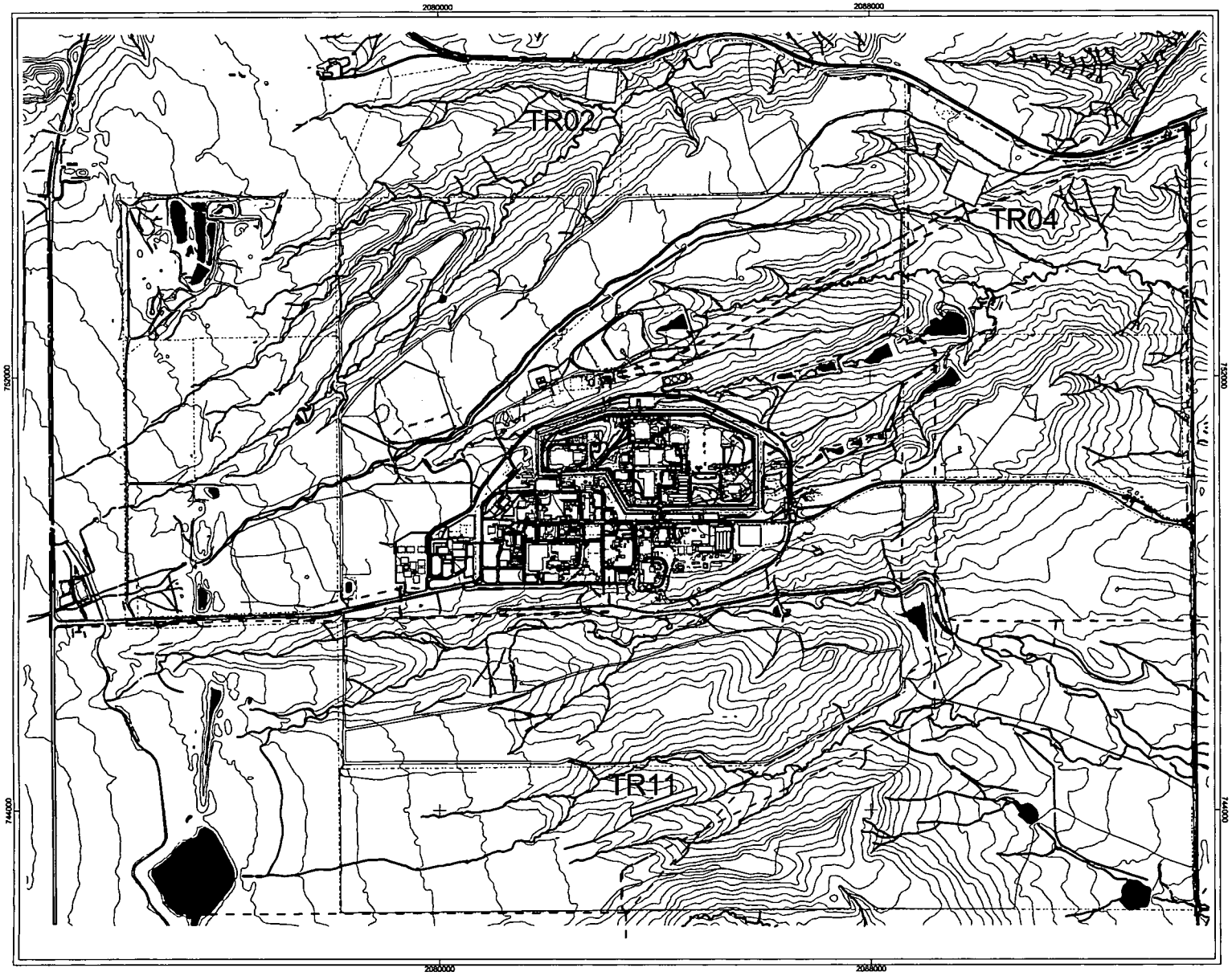

Mesic Grassland Monitoring Locations

Figure 3-1

LEGEND

- Mesic Grassland Monitoring Locations

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours.
The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution.
The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Location data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

N

1:23552

1000 0 1000 2000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2k-0038

May 3, 2001

\\Glasry\GIS\ECO-projects\projects\2k-0038\reg monitoring locations 2001 apr\mesic Ecmp sites

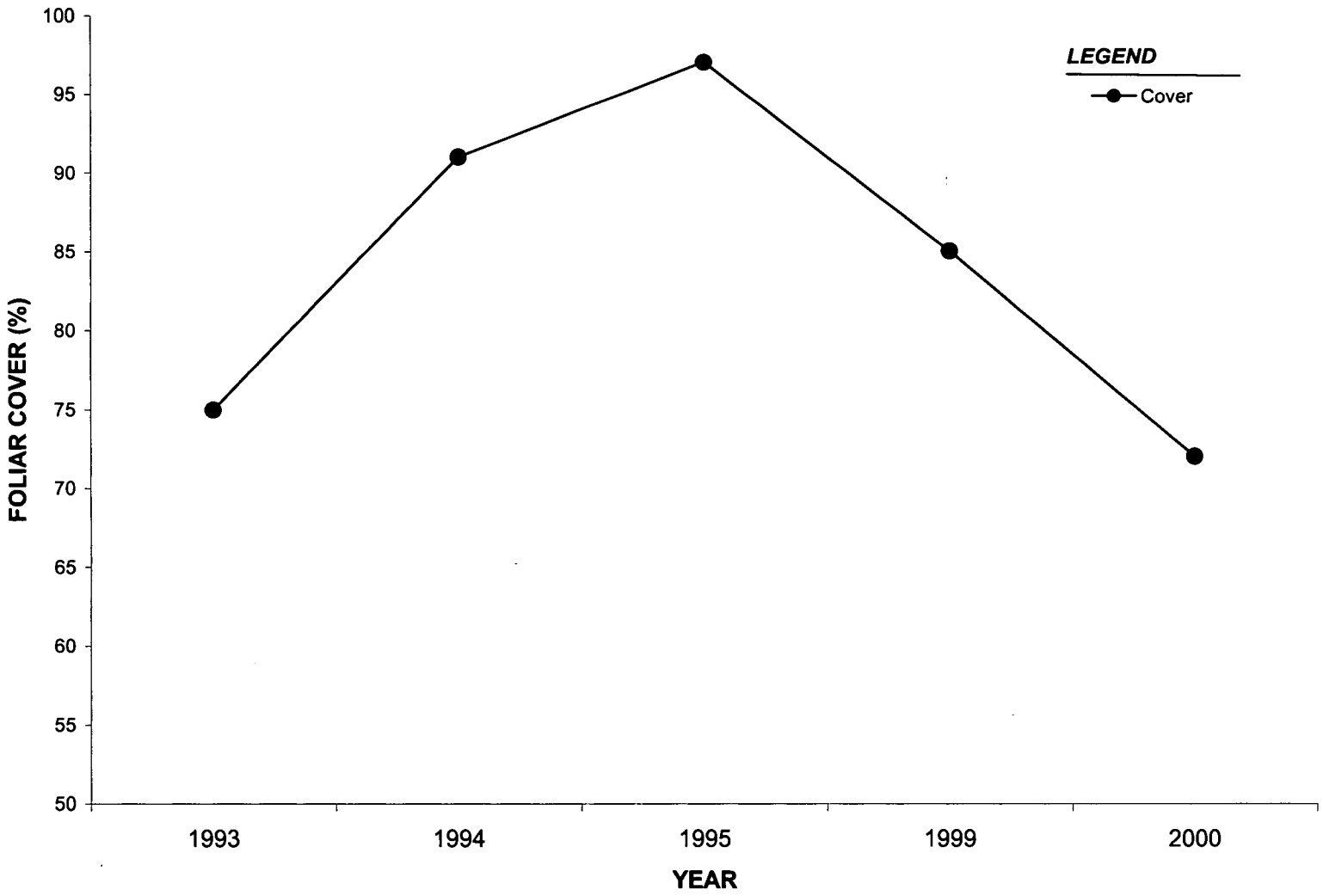

Figure 3-2. Mesic mixed grassland total foliar cover.

\\Boulder1\Groups\Graphics\1454\2001\mesic final tables.xls Fig. 2 Foliar Cover figure 5/3/01 CO

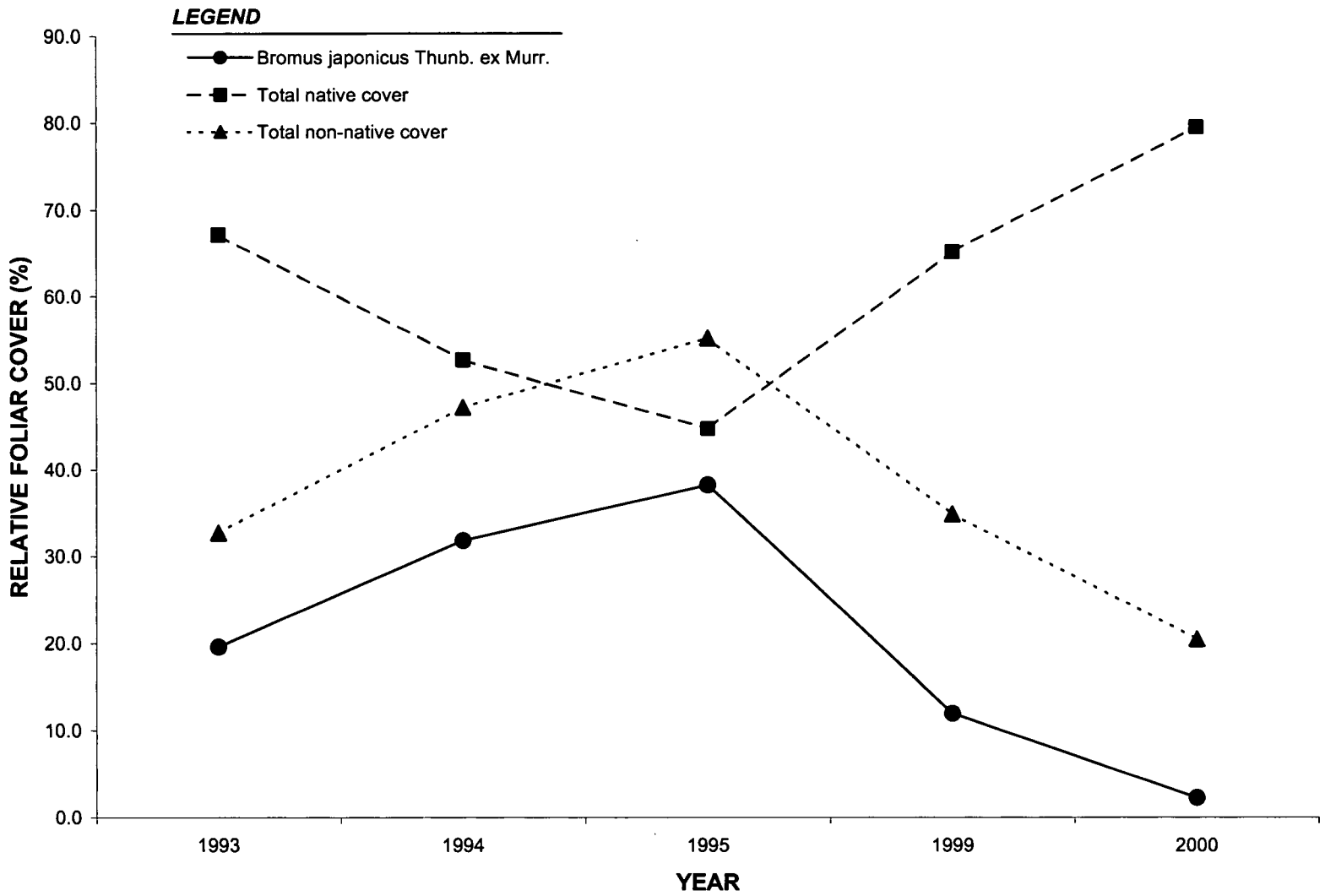

Figure 3-3. Native vs. non-native cover changes in relation to Japanese Brome on the mesic mixed grassland.

\\Boulder1\Groups\Graphics\1454\2001\mesic final tables.xls Fig 3 Native, nonnative, BRJA1 5/3/01 CO

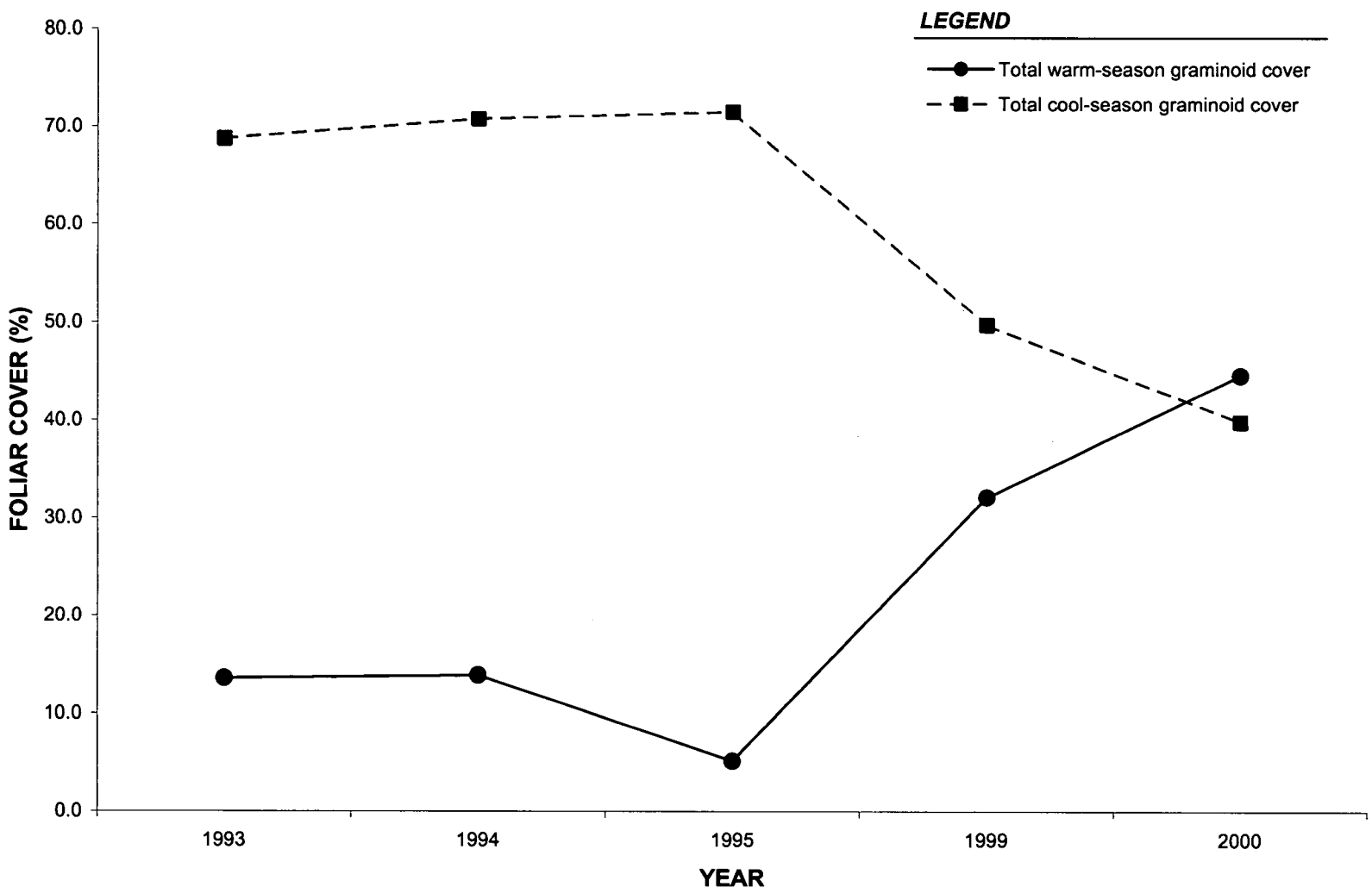

Figure 3-4. 1993-2000 mesic grassland graminoid cover changes.

\\Boulder1\Groups\Graphics\1454\2001\mesic final tables.xls Fig 4 93-2k Gram Cover Changes 5/3/01 CO

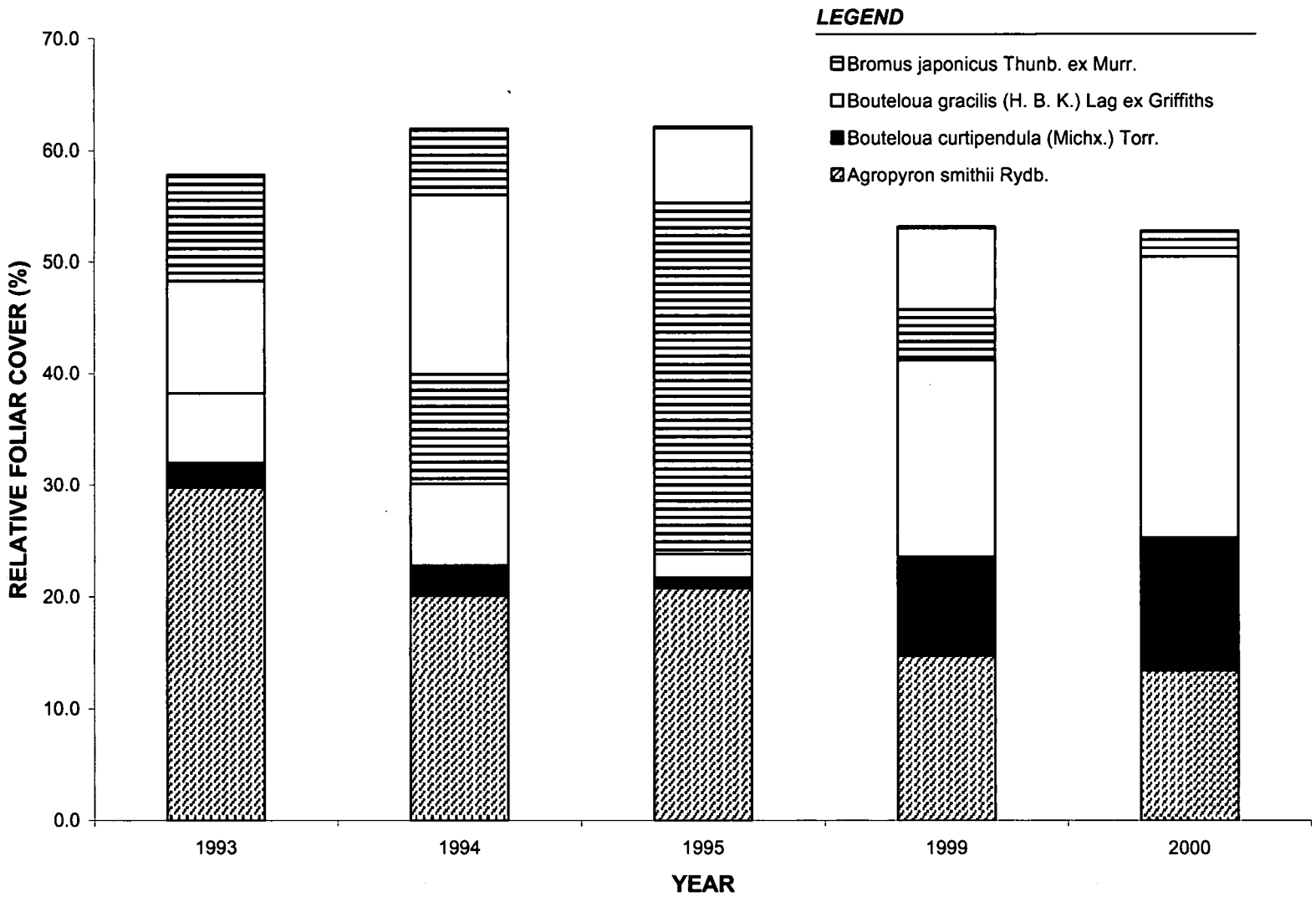

Figure 3-5. 1993-2000 mesic grassland graminoid changes.

\\Boulder1\Groups\Graphics\1454\2001\mesic final tables.xls Fig 5 93-2k Graminoid Changes 5/3/01 CO

Table 3-1. 1993-2000 Mesic Grassland Species Richness Summary

				TR02					TR04					TR11				
Family	**Scientific Name**	**Speccode**	**Native**	**1993**	**1994**	**1995**	**1999**	**2000**	**1993**	**1994**	**1995**	**1999**	**2000**	**1993**	**1994**	**1995**	**1999**	**2000**
AGAVACEAE	Yucca glauca Nutt.	YUGL1	Y	X	X	X	X	X						X	X	X	X	X
APIACEAE	Harbouria trachypleura (Gray) C. & R.	HATR1	Y	X														
APIACEAE	Lomatium orientale Coult. & Rose	LOOR1	Y		X	X	X	X		X	X	X	X		X	X	X	X
APIACEAE	Musineon divaricatum (Pursh.) Nutt. var. hookeri T. & G.	MUDI1	Y		X	X	X	X		X	X	X	X		X	X	X	X
ASCLEPIADACEAE	Asclepias pumila (Gray) Vail	ASPU1	Y	X	X	X	X	X										
ASCLEPIADACEAE	Asclepias speciosa Torr.	ASSP1	Y											X		X	X	X
ASCLEPIADACEAE	Asclepias viridiflora Raf.	ASVI1	Y								X					X		
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	Y		X	X	X		X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Arnica fulgens Pursh.	ARFU1	Y							X					X	X	X	X
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	ARCA1	Y				X		X			X					X	X
ASTERACEAE	Artemisia dracunculus L.	ARDR1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Artemisia frigida Willd.	ARFR1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Aster falcatus Lindl.	ASFA1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Aster porteri Gray	ASPO1	Y	X	X	X	X	X				X	X	X	X	X	X	X
ASTERACEAE	Aster sp.	AST1							X	X								
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	N	X	X	X	X	X	X		X	X				X	X	X
ASTERACEAE	Chrysopsis fulcrata Greene	CHFU1	Y	X			X	X					X	X	X	X	X	X
ASTERACEAE	Chrysopsis villosa Pursh.	CHVI1	Y	X	X	X	X	X	X	X	X	X	X			X	X	X
ASTERACEAE	Cirsium arvense (L.) Scop.	CIAR1	N		X				X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Cirsium undulatum (Nutt.) Spreng.	CIUN1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Crepis occidentalis Nutt.	CROC1	Y												X			
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	Y	X	X	X	X	X	X	X	X	X	X		X		X	X
ASTERACEAE	Erigeron flagellaris A. Gray	ERFL1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Helianthus annuus L.	HEAN1	Y			X						X			X	X		
ASTERACEAE	Helianthus petiolaris Nutt.	HEPE1	Y				X	X			X	X	X			X	X	X
ASTERACEAE	Helianthus pumilus Nutt.	HEPU1	Y	X	X	X	X	X	X	X				X	X			
ASTERACEAE	Helianthus sp.	HEL1				X					X				X			
ASTERACEAE	Hymenopappus filifolius Hook. var. cinereus (Rydb.) I. M. Johnst.	HYFI1	Y	X		X	X	X						X				
ASTERACEAE	Kuhnia chlorolepis Woot. & Standl.	KUCH1	Y			X	X	X	X					X		X	X	X
ASTERACEAE	Kuhnia eupatorioides L.	KUEU1	Y	X	X	X	X	X	X	X	X	X	X		X	X	X	X
ASTERACEAE	Kuhnia sp.	KUH1								X					X			
ASTERACEAE	Lactuca serriola L.	LASE1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Liatris punctata Hook.	LIPU1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Microseris cuspidata (Pursh.) Sch. Bip.	MICU1	Y		X	X	X	X		X	X		X		X	X	X	X
ASTERACEAE	Picradeniopsis oppositifolia (Nutt.) Rydb.	PIOP1	Y												X	X	X	X
ASTERACEAE	Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Scorzonera laciniata L.	SCLA1	N	X	X	X	X	X	X	X	X	X	X		X	X	X	X
ASTERACEAE	Senecio integerrimus Nutt.	SEIN1	Y		X					X	X	X	X		X			X
ASTERACEAE	Senecio plattensis Nutt.	SEPL1	Y		X	X	X	X		X					X	X	X	X
ASTERACEAE	Senecio spartioides T. & G.	SESP1	Y	X	X	X	X	X						X	X	X	X	X
ASTERACEAE	Solidago missouriensis Nutt.	SOMI1	Y						X	X	X	X	X	X	X	X	X	X
ASTERACEAE	Solidago mollis Bart.	SOMO1	Y						X									
ASTERACEAE	Solidago rigida L.	SORI1	Y		X	X	X	X										

Table 3-1. (cont.)

				TR02					TR04					TR11				
Family	Scientific Name	Speccode	Native	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
ASTERACEAE	Solidago sp.	SOL2								X					X			
ASTERACEAE	Sonchus asper (L.) Hill	SOAS1	N									X						
ASTERACEAE	Taraxacum laevigatum (Willd.) DC.	TALA1	N			X												
ASTERACEAE	Taraxacum officinale Weber	TAOF1	N	X	X	X	X	X	X	X	X	X	X		X	X	X	X
ASTERACEAE	Thelesperma megapotanicum (Spreng.) O. Ktze.	THME1	Y			X												
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BORAGINACEAE	Lappula redowskii (Hornem.) Greene	LARE1	Y		X	X	X	X		X	X				X	X	X	X
BORAGINACEAE	Lithospermum incisum Lehm.	LIIN1	Y		X		X	X				X	X	X	X	X	X	X
BORAGINACEAE	Onosmodium molle Michx. var. occidentale (Mack.) Johnst.	ONMO1	Y	X	X	X	X	X				X	X					
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BRASSICACEAE	Arabis fendleri (S. Wats.) Greene var. fendleri	ARFE3	Y												X			
BRASSICACEAE	Arabis glabra (L.) Bernh.	ARGL1	N							X	X	X	X					
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	Y									X						
BRASSICACEAE	Arabis sp.	ARA1			X													
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	CAMI1	N		X	X		X	X	X	X	X	X	X	X	X	X	X
BRASSICACEAE	Descurainia pinnata (Walt.) Britt.	DEPI1	Y		X	X	X	X		X	X	X	X		X	X	X	X
BRASSICACEAE	Descurainia richardsonii (Sweet) Schultz	DERI1	Y					X		X	X	X			X	X	X	X
BRASSICACEAE	Descurainia sophia (L.) Webb ex Prantl.	DESO1	N					X						X				
BRASSICACEAE	Descurainia sp.	DES1								X								
BRASSICACEAE	Draba reptans (Lam.) Fern.	DRRE1	Y		X	X				X	X	X	X		X	X	X	
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	ERCA2	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BRASSICACEAE	Erysimum repandum L.	ERRE1	N							X	X	X						
BRASSICACEAE	Lepidium campestre (L.) R. Br.	LECA1	N				X	X				X	X					
BRASSICACEAE	Lepidium densiflorum Schrad.	LEDE1	Y			X				X	X							
BRASSICACEAE	Lepidium sp.	LEP1								X					X	X		
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	LEMO1	Y	X	X	X	X	X						X	X	X	X	X
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	N	X	X	X	X	X	X	X	X	X		X	X	X	X	X
BRASSICACEAE	Thlaspi arvense L.	THAR1	N			X				X	X							
BRASSICACEAE	Brassicaceae sp.	BR1				X									X			
CACTACEAE	Coryphantha missouriensis (Sweet) Britt. & Rose	COMI1	Y		X	X	X	X		X	X	X	X		X	X		X
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CACTACEAE	Opuntia fragilis (Nutt.) Haw.	OPFR1	Y	X	X	X			X	X	X	X		X	X	X	X	X
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CACTACEAE	Opuntia polyacantha Haw.	OPPO1	Y						X									
CACTACEAE	Pediocactus simpsonii (Engelm.) Britt. & Rose	PESI1	Y		X													
CAMPANULACEAE	Triodanis leptocarpa (Nutt.) Nieuw.	TRLE1	Y			X												
CAMPANULACEAE	Triodanis sp.	TRI2			X					X								
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	PAJA1	Y		X													
CARYOPHYLLACEAE	Silene antirrhina L.	SIAN1	Y		X	X		X		X	X	X			X	X	X	X
CARYOPHYLLACEAE	Silene drummondii Hook.	SIDR1	Y			X									X		X	X
CHENOPODIACEAE	Chenopodium album L.	CHAL1	N				X											
CHENOPODIACEAE	Chenopodium leptophyllum Nutt. ex Moq.	CHLE2	Y	X	X	X			X	X	X	X	X	X	X	X		
CHENOPODIACEAE	Chenopodiaceae sp.	CH1				X												
CLUSIACEAE	Hypericum perforatum L.	HYPE1	N	X	X	X	X		X	X		X	X	X	X	X	X	X
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	TROC1	Y		X	X	X	X		X	X	X	X		X	X	X	X
CONVOLVULACEAE	Calystegia sepium (L.) R. Br. ssp. angulata Brummitt	CASE1	Y															X
CONVOLVULACEAE	Convolvulus arvensis L.	COAR1	N	X	X	X	X	X								X	X	
CONVOLVULACEAE	Evolvulus nuttallianus R. & S.	EVNU1	Y	X	X	X	X	X	X		X	X	X	X	X	X	X	X

Table 3-1. (cont.)

				TR02					TR04					TR11				
Family	Scientific Name	Speccode	Native	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
CYPERACEAE	Carex sp.	CAR1								X								
CYPERACEAE	Carex eleocharis Bailey	CAEL1	Y	X	X	X			X	X	X	X	X	X			X	X
CYPERACEAE	Carex heliophila Mack.	CAHE1	Y		X	X	X	X		X		X	X		X	X	X	X
CYPERACEAE	Carex interior Bailey	CAIN1	Y												X			
CYPERACEAE	Carex oreocharis Holm.	CAOR1	Y		X									X				
EUPHORBIACEAE	Euphorbia dentata Michx.	EUDE1	Y												X		X	X
EUPHORBIACEAE	Euphorbia marginata Pursh.	EUMA1	Y			X										X		
EUPHORBIACEAE	Euphorbia robusta (Engelm.) Small	EURO1	Y		X	X		X								X		
EUPHORBIACEAE	Euphorbia spathulata Lam.	EUSP1	Y		X	X	X	X		X	X	X			X	X	X	X
FABACEAE	Astragalus agrestis Dougl. ex G. Don	ASAG1	Y		X			X	X	X	X	X	X		X		X	
FABACEAE	Astragalus crassicarpus Nutt.	ASCR1	Y		X	X				X	X	X	X					X
FABACEAE	Astragalus drummondii Dougl. ex Hook.	ASDR1	Y						X	X	X		X					
FABACEAE	Astragalus flexuosus (Hook.) G. Don	ASFL1	Y	X	X	X	X	X				X						
FABACEAE	Astragalus lotiflorus Hook.	ASLO1	Y									X	X					
FABACEAE	Astragalus shortianus Nutt. ex T.&G.	ASSH1	Y		X	X				X					X	X	X	X
FABACEAE	Astragalus sp.	AST2			X													
FABACEAE	Astragalus tridactylicus Gray	ASSE1	Y		X													
FABACEAE	Dalea candida Michx. ex Willd. var. oligophylla (Torr.) Shinners.	DACA1	Y	X		X	X	X			X			X	X	X	X	X
FABACEAE	Dalea purpurea Vent	DAPU1	Y	X	X	X	X	X			X	X	X	X	X	X	X	X
FABACEAE	Lathyrus eucosmus Butters and St. John	LAEU1	Y														X	
FABACEAE	Melilotus officinalis (L.) Pall.	MEOF1	N						X									
FABACEAE	Oxytropis lambertii Pursh.	OXLA1	Y		X	X	X	X								X	X	
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FABACEAE	Trifolium sp.	TRI1													X			
FABACEAE	Vicia americana Muhl. ex Willd.	VIAM1	Y	X	X	X	X		X	X	X	X	X	X	X	X	X	X
GERANIACEAE	Erodium cicutarium (L.) L'Her.	ERCI1	N		X	X	X	X		X	X	X	X			X	X	X
HYDROPHYLLACEAE	Phacelia heterophylla Pursh.	PHHE1	Y		X									X	X	X	X	X
JUNCACEAE	Juncus dudleyi Wieg.	JUDU1	Y													X		
JUNCACEAE	Juncus interior Wieg.	JUIN1	Y														X	
LAMIACEAE	Hedeoma hispidum Pursh.	HEHI1	Y						X					X				
LAMIACEAE	Nepeta cataria L.	NECA1	N			X												
LAMIACEAE	Scutellaria brittonii Porter	SCBR1	Y												X		X	
LILIACEAE	Allium textile A. Nels. & Macbr.	ALTE1	Y	X	X	X	X	X		X	X			X	X	X	X	X
LILIACEAE	Calochortus gunnisonii S. Wats.	CAGU1	Y								X			X		X		
LILIACEAE	Leucocrinum montanum Nutt.	LEMO2	Y		X	X	X	X			X	X	X		X	X	X	X
LINACEAE	Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	LIPE1	Y	X	X	X	X	X	X	X	X	X	X				X	X
LINACEAE	Linum pratense (Nort.) Small	LIPR1	Y									X						
MALVACEAE	Sphaeralcea coccinea (Pursh.) Rydb.	SPCO1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NYCTAGINACEAE	Mirabilis linearis (Pursh.) Heimerl	MILI1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ONAGRACEAE	Epilobium paniculatum Nutt.	EPPA1	Y	X							X							
ONAGRACEAE	Gaura coccinea Pursh.	GACO1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ONAGRACEAE	Oenothera howardii (A. Nels.) W. L. Wagner	OEHO1	Y							X	X	X	X					
OROBANCHACEAE	Orobanche fasciculata Nutt.	ORFA1	Y								X	X	X		X	X	X	X
PLANTAGINACE	Plantago lanceolata L.	PLLA1	N						X	X		X	X					
PLANTAGINACE	Plantago patagonica Jacq.	PLPA1	Y					X	X		X	X	X			X		X
POACEAE	Agropyron intermedium (Host) Beauv.	AGIN1	N						X	X								
POACEAE	Agropyron smithii Rydb.	AGSM1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Andropogon gerardii Vitman	ANGE1	Y	X	X	X	X	X			X	X	X	X	X	X	X	X

Table 3-1. (cont.)

				TR02					TR04					TR11				
Family	Scientific Name	Speccode	Native	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
POACEAE	Andropogon scoparius Michx.	ANSC1	Y	X	X	X	X	X						X	X	X	X	X
POACEAE	Aristida purpurea Nutt. var. longiseta (Steud.) Vasey	ARFE1	Y	X	X	X			X	X	X			X	X	X		
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Aristida sp.	ARI1								X								
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Bouteloua hirsuta Lag	BOHI1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Bouteloua sp.	BOU1								X								
POACEAE	Bromus inermis Leyss. ssp. inermis	BRIN1	N	X	X	X	X	X										
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Bromus tectorum L.	BRTE1	N	X		X		X	X	X	X	X	X	X	X	X	X	X
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	BUDA1	Y	X	X	X	X	X	X	X	X	X	X		X	X	X	X
POACEAE	Festuca octoflora Walt.	FEOC1	Y													X		
POACEAE	Festuca pratensis Huds.	FEPR1	Y				X	X				X						
POACEAE	Hordeum brachyantherum Nevski	HOBR1	Y					X										
POACEAE	Hordeum jubatum L.	HOJU1	Y						X		X	X	X		X			
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	Y						X	X						X		
POACEAE	Muhlenbergia wrightii Vasey	MUWR1	Y		X			X	X		X	X	X	X	X	X	X	X
POACEAE	Poa compressa L.	POCO1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Poa pratensis L.	POPR1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Schedonnardus paniculatus (Nutt.) Trel.	SCPA2	N									X	X					
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	Y	X	X	X	X	X	X					X		X	X	X
POACEAE	Sporobolus asper (Michx.) Kunth	SPAS1	Y				X	X					X				X	X
POACEAE	Sporobolus cryptandrus (Torr.) A. Gray	SPCR1	Y	X	X							X	X					
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	Y					X							X	X	X	X
POACEAE	Stipa comata Trin. & Rupr.	STCO1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Stipa sp.	STI1													X			
POACEAE	Stipa viridula Trin.	STVI1	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POACEAE	Triticum aestivum L.	TRAE1	N							X								
POACEAE	Poaceae sp.	PO1				X												
POLEMONIACEAE	Collomia linearis Nutt.	COLI1	Y		X			X			X				X	X		X
POLEMONIACEAE	Microsteris gracilis (Hook.) Greene	MIGR1	Y							X	X	X						
POLYGONACEAE	Eriogonum alatum Torr.	ERAL1	Y	X	X	X	X	X						X			X	
POLYGONACEAE	Polygonum aviculare L.	POAV1	N						X									
POLYGONACEAE	Polygonum ramosissimum Michx.	PORA1	Y									X	X					
POLYGONACEAE	Polygonum sawatchense Small	POSA1	Y			X				X	X							
POLYGONACEAE	Polygonum sp.	POL1				X												
PRIMULACEAE	Androsace occidentalis Pursh.	ANOC1	Y															X
RANUNCULACEAE	Delphinium nuttalianum Pritz. ex Walpers	DENU1	Y														X	
RANUNCULACEAE	Delphinium sp.	DEL1								X					X			
RANUNCULACEAE	Delphinium virescens Nutt. ssp. penardii (Huth) Ewan	DEVI1	Y								X					X	X	X
ROSACEAE	Rosa acicularis Lindl.	ROAC1	Y	X					X					X		X		
ROSACEAE	Rosa arkansana Porter	ROAR1	Y		X	X	X	X		X	X	X	X		X	X	X	X
SANTALACEAE	Comandra umbellata (L.) Nutt.	COUM1	Y		X	X		X		X		X	X		X		X	X
SCROPHULARIACEAE	Castilleja sessiliflora Pursh.	CASE3	Y															X
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCROPHULARIACEAE	Penstemon angustifolius Nutt. ex Pursh	PEAN1	Y		X													

Table 3-1. (cont.)

				TR02					TR04					TR11				
Family	Scientific Name	Speccode	Native	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
SCROPHULARIACEAE	Penstemon secundiflorus Benth.	PESE1	Y			X	X	X							X	X	X	X
SCROPHULARIACEAE	Penstemon virens Penn.	PEVI1	Y		X	X		X							X	X	X	X
SCROPHULARIACEAE	Penstemon virgatus Gray ssp. asa-grayi Crosswhite	PEVI2	Y														X	X
SCROPHULARIACEAE	Verbascum blattaria L.	VEBL1	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCROPHULARIACEAE	Verbascum thapsus L.	VETH1	N		X								X	X	X		X	X
SCROPHULARIACEAE	Veronica peregrina L. var. xalapensis (H. B. K.) St. John & Warren	VEPE1	Y								X							
SOLANACEAE	Physalis heterophylla Nees	PHHE2	Y											X				
SOLANACEAE	Physalis sp.	PHY1								X								
SOLANACEAE	Physalis virginiana P. Mill.	PHVI2	Y								X							
TYPHACEAE	Typha latifolia L.	TYLA1	Y						X	X								
VERBENACEAE	Verbena bracteata Lag. & Rodr.	VEBR1	Y							X		X						
VIOLACEAE	Hybanthus verticillatus (Ort.) Baill.	HYVE1	Y		X	X	X	X							X	X	X	X
VIOLACEAE	Viola nuttallii Pursh.	VINU1	Y			X	X	X			X				X	X	X	X
	Unidentified sp.	UNKN						X										
	Total Number of Species			75	107	108	93	103	75	95	97	100	89	76	106	110	111	110
	Percent Native Species			77	81	80	80	80	72	76	79	76	76	79	83	83	82	83

TABLE 3-2. WOODY STEM AND CACTUS DENSITIES AT ECMP SITES (1993-1995, 1999, and 2000)

	Cactus Density (cacti/sq. meter)					Woody Stem Density (stems/sq. meter)				
Site	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
Mesic Mixed Grassland	0.34	0.32	0.36	0.27	0.28	0.70	0.86	1.15	1.15	1.14
TR02	0.43	0.25	0.47	0.29	0.20	1.24	1.32	2.17	2.01	2.25
TR04	0.27	0.24	0.25	0.21	0.36	0.46	0.67	0.79	0.91	0.78
TR11	0.32	0.47	0.37	0.31	0.29	0.41	0.60	0.55	0.53	0.40

Site values are based on n=5.
Community values are based on n=15.

Table 3-3. 1993-2000 Mesic Grassland Foliar Cover - Community

					Absolute Cover (%)					Relative Cover (%)				
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
Opuntia macrorhiza Engelm.	OPMA1	C	Y		0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Lepidium sp.	LEP1	F			0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N		0.9	2.1	2.1	2.5	1.7	1.2	2.2	2.2	2.9	2.4
Camelina microcarpa Andrz. ex DC.	CAMI1	F	N		0.3	1.3	1.0	0.1	0.0	0.3	1.4	1.0	0.1	0.0
Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	F	N		1.0	0.1	1.4	0.1	0.1	1.3	0.1	1.4	0.1	0.2
Centaurea diffusa Lam.	CEDI1	F	N		0.1	0.2	0.5	0.5	1.0	0.2	0.2	0.5	0.7	1.4
Cirsium arvense (L.) Scop.	CIAR1	F	N		0.1	0.0	0.0	0.3	0.1	0.1	0.0	0.0	0.3	0.2
Convolvulus arvensis L.	COAR1	F	N		0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0
Hypericum perforatum L.	HYPE1	F	N		0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1
Lactuca serriola L.	LASE1	F	N		0.1	0.0	0.5	0.3	0.0	0.1	0.0	0.6	0.3	0.0
Linaria dalmatica (L.) Mill.	LIDA1	F	N		0.5	1.0	0.9	0.4	0.6	0.6	1.1	0.9	0.5	0.8
Scorzonera laciniata L.	SCLA1	F	N		0.5	1.5	1.8	2.3	0.7	0.7	1.7	1.8	2.8	1.1
Sisymbrium altissimum L.	SIAL1	F	N		0.2	0.3	0.6	0.0	0.0	0.2	0.3	0.6	0.0	0.0
Tragopogon dubius Scop.	TRDU1	F	N		0.9	0.1	1.3	0.5	0.2	1.3	0.2	1.4	0.6	0.3
Verbascum blattaria L.	VEBL1	F	N		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Verbascum thapsus L.	VETH1	F	N		0.0	0.0	0.0	0.5	0.7	0.0	0.0	0.0	0.6	0.9
Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	F	Y		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Ambrosia psilostachya DC.	AMPS1	F	Y		0.3	0.1	0.1	0.3	0.1	0.3	0.1	0.1	0.3	0.2
Artemisia dracunculus L.	ARDR1	F	Y		0.1	0.3	0.7	0.7	0.8	0.1	0.3	0.7	0.8	1.2
Artemisia frigida Willd.	ARFR1	F	Y		0.2	0.3	0.3	0.1	0.0	0.3	0.3	0.3	0.1	0.0
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y		1.5	0.6	1.4	0.3	0.3	1.8	0.6	1.5	0.3	0.4
Aster falcatus Lindl.	ASFA1	F	Y		0.8	0.3	0.7	0.8	0.5	1.1	0.3	0.7	0.9	0.8
Astragalus flexuosus (Hook.) G. Don	ASFL1	F	Y		0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.1	0.1	0.0
Aster porteri Gray	ASPO1	F	Y		0.1	0.0	0.3	0.0	0.3	0.1	0.0	0.3	0.0	0.4
Chrysopsis villosa Pursh.	CHVI1	F	Y		0.5	0.2	0.1	0.0	0.2	0.8	0.2	0.1	0.0	0.3
Cirsium undulatum (Nutt.) Spreng.	CIUN1	F	Y		0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1
Comandra umbellata (L.) Nutt.	COUM1	F	Y		0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0
Dalea candida Michx. ex Willd. var. oligophylla (Torr.) Shinners.	DACA1	F	Y		0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.0
Dalea purpurea Vent	DAPU1	F	Y		0.1	0.2	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.1
Descurainia pinnata (Walt.) Britt.	DEPI1	F	Y		0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Descurainia richardsonii (Sweet) Schultz	DERI1	F	Y		0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0
Eriogonum alatum Torr.	ERAL1	F	Y		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Erysimum capitatum (Nutt.) DC.	ERCA2	F	Y		0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Erigeron divergens T. & G.	ERDI1	F	Y		0.1	0.1	0.0	0.1	0.1	0.2	0.1	0.0	0.1	0.1
Erigeron flagellaris A. Gray	ERFL1	F	Y		0.3	0.5	0.2	0.5	0.4	0.4	0.5	0.2	0.5	0.6
Euphorbia dentata Michx.	EUDE1	F	Y		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Evolvulus nuttallianus R. & S.	EVNU1	F	Y		0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0
Gaura coccinea Pursh.	GACO1	F	Y		0.0	0.2	0.1	0.0	0.0	0.0	0.2	0.1	0.0	0.0
Grindelia squarrosa (Pursh.) Dun.	GRSQ1	F	Y		0.1	0.2	1.0	0.2	0.0	0.2	0.2	1.0	0.2	0.0
Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	F	Y		0.1	0.3	0.5	0.8	0.3	0.1	0.3	0.5	0.9	0.4
Helianthus petiolaris Nutt.	HEPE1	F	Y		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Helianthus pumilus Nutt.	HEPU1	F	Y		0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1
Kuhnia chlorolepis Woot. & Standl.	KUCH1	F	Y		0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Kuhnia eupatorioides L.	KUEU1	F	Y		0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.2
Lesquerella montana (A. Gray) Wats.	LEMO1	F	Y		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Lithospermum incisum Lehm.	LIIN1	F	Y		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	LIPE1	F	Y		0.2	0.5	0.0	0.0	0.0	0.3	0.5	0.0	0.0	0.0
Liatris punctata Hook.	LIPU1	F	Y		0.1	0.1	0.6	0.0	0.1	0.2	0.1	0.6	0.0	0.1
Lomatium orientale Coult. & Rose	LOOR1	F	Y		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Mirabilis linearis (Pursh.) Heimerl	MILI1	F	Y		0.2	0.2	0.1	0.1	0.1	0.3	0.2	0.1	0.2	0.1
Onosmodium molle Michx. var. occidentale (Mack.) Johnst.	ONMO1	F	Y		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2
Phacelia heterophylla Pursh.	PHHE1	F	Y		0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Polygonum sawatchense Small	POSA1	F	Y		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Psoralea tenuiflora Pursh.	PSTE1	F	Y		2.5	2.2	4.8	2.9	1.5	3.3	2.4	4.9	3.3	2.2
Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	F	Y		0.4	0.1	0.5	0.4	0.1	0.6	0.1	0.5	0.5	0.1

Table 3-3. (cont.)

Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	Absolute Cover (%) 1993	1994	1995	1999	2000	Relative Cover (%) 1993	1994	1995	1999	2000
Solidago missouriensis Nutt.	SOMI1	F	Y		0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1
Sphaeralcea coccinea (Pursh.) Rydb.	SPCO1	F	Y		0.3	0.2	0.1	0.5	0.3	0.4	0.2	0.1	0.6	0.5
Vicia americana Muhl. ex Willd.	VIAM1	F	Y		0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Poaceae sp.	PO1	G			0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Agropyron intermedium (Host) Beauv.	AGIN1	G	N	C	0.8	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0
Bromus inermis Leyss. ssp. inermis	BRIN1	G	N	C	0.1	0.1	0.2	1.1	0.9	0.2	0.2	0.2	1.4	1.2
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	14.5	29.1	37.1	10.5	1.7	19.6	31.8	38.2	12.0	2.3
Bromus tectorum L.	BRTE1	G	N	C	0.3	3.9	3.7	4.7	2.2	0.3	4.2	3.8	5.2	2.9
Poa compressa L.	POCO1	G	N	C	1.4	0.9	1.2	1.8	0.9	1.8	1.0	1.2	2.0	1.3
Poa pratensis L.	POPR1	G	N	C	2.9	2.6	1.0	4.6	3.7	3.6	2.8	1.0	5.2	5.2
Schedonnardus paniculatus (Nutt.) Trel.	SCPA2	G	N	C	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.2	0.1
Agropyron smithii Rydb.	AGSM1	G	Y	C	21.7	18.1	20.2	12.1	9.5	29.7	20.1	20.8	14.8	13.4
Aristida purpurea Nutt. var. longiseta (Steud.) Vasey	ARFE1	G	Y	C	0.1	0.2	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	G	Y	C	1.1	0.5	0.8	0.6	1.1	1.4	0.6	0.8	0.7	1.6
Carex eleocharis Bailey	CAEL1	G	Y	C	2.9	0.1	0.2	0.1	0.3	3.9	0.1	0.2	0.2	0.5
Carex heliophila Mack.	CAHE1	G	Y	C	0.0	4.1	2.2	2.5	3.1	0.0	4.5	2.3	3.0	4.2
Carex oreocharis Holm.	CAOR1	G	Y	C	1.1	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0
Hordeum jubatum L.	HOJU1	G	Y	C	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	0.1	0.1	0.0	0.4	0.2	0.2	0.1	0.0	0.5	0.3
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.3
Stipa comata Trin. & Rupr.	STCO1	G	Y	C	3.9	3.1	1.2	2.1	3.5	4.7	3.3	1.3	2.4	4.6
Stipa viridula Trin.	STVI1	G	Y	C	0.7	1.7	1.5	1.9	1.4	0.8	1.9	1.6	2.2	1.9
Andropogon gerardii Vitman	ANGE1	G	Y	W	3.2	1.7	1.8	2.7	2.5	4.0	1.9	1.9	3.1	3.3
Andropogon scoparius Michx.	ANSC1	G	Y	W	0.1	0.2	0.0	0.2	0.1	0.2	0.2	0.0	0.2	0.1
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	1.6	2.4	0.9	7.1	8.5	2.2	2.7	1.0	8.8	11.9
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	4.4	6.5	2.1	14.4	17.1	6.2	7.3	2.1	17.6	25.1
Bouteloua hirsuta Lag	BOHI1	G	Y	W	0.4	0.9	0.1	0.1	0.0	0.6	1.0	0.1	0.1	0.0
Buchloe dactyloides (Nutt.) Engelm.	BUDA1	G	Y	W	0.1	0.5	0.1	1.8	2.7	0.2	0.6	0.1	2.1	4.0
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Muhlenbergia wrightii Vasey	MUWR1	G	Y	W	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.1
Sporobolus cryptandrus (Torr.) A. Gray	SPCR1	G	Y	W	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	G	Y	W	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0
Yucca glauca Nutt.	YUGL1	S	Y		0.4	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0
Total foliar cover					74.7	91.3	97.0	84.7	70.7	99.9	100.0	100.0	100.0	100.0
Total forb cover					12.7	13.9	22.6	15.6	10.9	16.9	15.2	23.3	18.1	15.6
Total native forb cover					8.1	7.2	12.3	8.1	5.7	10.9	7.9	12.6	9.3	8.2
Total non-native forb cover					4.6	6.7	10.3	7.5	5.3	6.0	7.3	10.7	8.8	7.4
Total graminoid cover					61.5	77.3	74.4	69.1	59.7	82.4	84.7	76.7	81.9	84.4
Total native cover					50.1	47.9	43.4	54.3	56.0	67.2	52.7	44.7	65.1	79.5
Total non-native cover					24.6	43.4	53.5	30.3	14.7	32.7	47.2	55.2	34.9	20.5
Total warm-season graminoid cover					10.0	12.5	5.0	26.4	31.0	13.6	13.9	5.2	32.1	44.6
Total cool-season graminoid cover					51.5	64.8	69.3	42.7	28.7	68.8	70.8	71.5	49.7	39.8

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (1500).
Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).
All cover values presented are means (n =15).
Native categories: Y = Native, N = Non-Native
Form categories: C = Cactus, F = Forb, G = Graminoid
Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 3-4. 1993-2000 Mesic Grassland Foliar Cover by Species at TR02

					Frequency					Absolute Cover					Relative Cover				
					TR02														
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N		20	40	60	80		0.8	1.6	2.0	2.0		1.2	1.8	2.1	2.6	
Centaurea diffusa Lam.	CEDI1	F	N		20	60	60	60	80	0.4	0.6	1.6	1.4	2.4	0.6	0.7	1.6	1.8	3.4
Convolvulus arvensis L.	COAR1	F	N				20	20				0.2	0.2				0.2	0.3	
Hypericum perforatum L.	HYPE1	F	N				20					0.2					0.2		
Lactuca serriola L.	LASE1	F	N				20					0.2					0.2		
Linaria dalmatica (L.) Mill.	LIDA1	F	N						20					0.2					0.3
Scorzonera laciniata L.	SCLA1	F	N			100	80	40	40		1.8	1.6	1.2	0.6		2.0	1.6	1.6	0.8
Sisymbrium altissimum L.	SIAL1	F	N			20					0.2					0.2			
Tragopogon dubius Scop.	TRDU1	F	N		60	20	80			1.2	0.4	3.0			1.8	0.5	3.1		
Ambrosia psilostachya DC.	AMPS1	F	Y				20					0.2					0.2		
Artemisia frigida Willd.	ARFR1	F	Y		40	60	40			0.4	0.8	0.6			0.6	0.9	0.6		
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y		20	20	40			0.4	0.4	0.4			0.6	0.5	0.4		
Aster ericoides L.	ASER1	F	Y		60	20	40			0.6	0.2	0.4			0.9	0.2	0.4		
Aster falcatus Lindl.	ASFA1	F	Y					20	40				0.2	0.4				0.3	0.6
Astragalus flexuosus (Hook.) G. Don	ASFL1	F	Y			20	20				0.4	0.2				0.5	0.2		
Aster porteri Gray	ASPO1	F	Y		20		40		20	0.2		0.6		0.2	0.3		0.6		0.3
Chrysopsis villosa Pursh.	CHVI1	F	Y		80	20	20		40	1.4	0.4	0.4		0.6	2.1	0.5	0.4		0.8
Cirsium undulatum (Nutt.) Spreng.	CIUN1	F	Y			20					0.2					0.2			
Dalea candida Michx. ex Willd. var. oligophylla (Torr.) Shinners.	DACA1	F	Y				20					0.2					0.2		
Dalea purpurea Vent	DAPU1	F	Y						20					0.2					0.3
Eriogonum alatum Torr.	ERAL1	F	Y				20					0.2					0.2		
Erysimum capitatum (Nutt.) DC.	ERAS1	F	Y			20					0.2					0.2			
Erigeron divergens T. & G.	ERDI1	F	Y		20				20	0.4				0.2	0.6				0.3
Erigeron flagellaris A. Gray	ERFL1	F	Y		20	40	20		40	0.4	0.4	0.4		0.8	0.6	0.5	0.4		1.1
Evolvulus nuttallianus R. & S.	EVNU1	F	Y		20					0.2					0.3				
Gaura coccinea Pursh.	GACO1	F	Y			20	20				0.2	0.2				0.2	0.2		
Grindelia squarrosa (Pursh.) Dun.	GRSQ1	F	Y		20	20	60			0.2	0.2	1.2			0.3	0.2	1.2		
Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	F	Y				60	20	20			0.6	0.2	0.2			0.6	0.3	0.3
Helianthus pumilus Nutt.	HEPU1	F	Y					20	20				0.2	0.2				0.3	0.3
Lesquerella montana (A. Gray) Wats.	LEMO1	F	Y				20					0.2					0.2		
Lithospermum incisum Lehm.	LIIN1	F	Y						20					0.2					0.3
Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	LIPE1	F	Y			40					1.2					1.4			
Liatris punctata Hook.	LIPU1	F	Y		20	20	40		20	0.2	0.2	1.8		0.2	0.3	0.2	1.9		0.3
Mirabilis linearis (Pursh.) Heimerl	MILI1	F	Y		20	40				0.2	0.4				0.3	0.5			
Onosmodium molle Michx. var. occidentale (Mack.) Johnst.	ONMO1	F	Y						20					0.4					0.6
Psoralea tenuiflora Pursh.	PSTE1	F	Y		80	60	100	80	80	2.4	2.2	7.6	1.4	1.4	3.5	2.5	7.8	1.8	2.0
Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	F	Y		80		80	20		1.2		1.2	0.2		1.8		1.2	0.3	
Sphaeralcea coccinea (Pursh.) Rydb.	SPCO1	F	Y		20	20	20	40	40	0.6	0.6	0.4	0.4	0.4	0.9	0.7	0.4	0.5	0.6
Poaceae sp.	PO1	G					20					0.2					0.2		
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	100	100	100	100	20	5.6	18.4	27.6	3.8	0.2	8.2	20.9	28.4	4.9	0.3
Bromus inermis Leyss. ssp. inermis	BRIN1	G	N	C	20	20	20	40	40	0.4	0.4	0.6	3.2	2.6	0.6	0.5	0.6	4.1	3.6
Poa compressa L.	POCO1	G	N	C	40	40	20	20	40	1.0	0.4	0.2	0.4	0.6	1.5	0.5	0.2	0.5	0.8
Poa pratensis L.	POPR1	G	N	C	20	20		20	40	0.2	0.2		0.2	0.4	0.3	0.2		0.3	0.6
Agropyron smithii Rydb.	AGSM1	G	Y	C	100	100	100	100	100	27.6	29.0	30.6	18.2	16.6	40.5	33.0	31.5	23.5	23.2
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	G	Y	C	60	20	40	40	80	1.2	0.6	0.4	0.6	1.2	1.8	0.7	0.4	0.8	1.7

Table 3-4. (cont.)

					Frequency					Absolute Cover					Relative Cover				
					TR02														
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
Carex eleocharis Bailey	CAEL1	G	Y	C	40		20			3.4		0.2			5.0		0.2		
Carex heliophila Mack.	CAHE1	G	Y	C		40	20	40	40		3.6	2.8	3.2	3.6		4.1	2.9	4.1	5.0
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C				40	20				0.4	0.2				0.5	0.3
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C					20					0.2					0.3
Stipa comata Trin. & Rupr.	STCO1	G	Y	C	40	40	20	20	20	1.8	1.0	0.6	0.2	0.8	2.6	1.1	0.6	0.3	1.1
Stipa viridula Trin.	STVI1	G	Y	C	20	40	40	80	20	0.2	0.6	1.0	1.0	0.6		0.7	1.0	1.3	0.8
Andropogon gerardii Vitman	ANGE1	G	Y	W	40	40	40	40	40	2.2	1.4	1.8	1.6	0.6	3.2	1.6	1.9	2.1	0.8
Andropogon scoparius Michx.	ANSC1	G	Y	W	40	20		20		0.4	0.2		0.4		0.6	0.2		0.5	
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	80	80	40	80	80	3.2	4.8	2.6	14.8	14.6	4.7	5.5	2.7	19.1	20.4
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	80	100	60	100	100	6.8	11.8	2.8	20.6	17.4	10.0	13.4	2.9	26.6	24.3
Bouteloua hirsuta Lag	BOHI1	G	Y	W	60	60				1.2	2.0				1.8	2.3			
Buchloe dactyloides (Nutt.) Engelm.	BUDA1	G	Y	W	40	60	20	80	100	0.4	1.0	0.2	1.4	3.4	0.6	1.1	0.2	1.8	4.7
Sporobolus cryptandrus (Torr.) A. Gray	SPCR1	G	Y	W	20					0.2					0.3				
Yucca glauca Nutt.	YUGL1	S	Y		20					1.2					1.8				
Total foliar cover										68.2	88.0	97.2	77.4	71.6	99.7	100.0	100.0	100.0	100.0
Total forb cover										11.2	12.6	25.6	7.4	8.6	16.4	14.3	26.3	9.6	12.0
Total native forb cover										8.8	8.0	16.8	2.6	5.4	12.9	9.1	17.3	3.4	7.5
Total non-native forb cover										2.4	4.6	8.8	4.8	3.2	3.5	5.2	9.1	6.2	4.5
Total graminoid cover										55.8	75.4	71.6	70.0	63.0	81.5	85.7	73.7	90.4	88.0
Total native cover										58.6	64.0	59.8	65.0	64.6	85.6	72.7	61.5	84.0	90.2
Total non-native cover										9.6	24.0	37.2	12.4	7.0	14.1	27.3	38.3	16.0	9.8
Total warm-season graminoid cover										14.4	21.2	7.4	38.8	36.0	21.1	24.1	7.6	50.1	50.3
Total cool-season graminoid cover										41.4	54.2	64.0	31.2	27.0	60.4	61.6	65.8	40.3	37.7

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (500).
Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).
All cover values presented are means (n = 5).
Native categories: Y = Native, N = Non-Native
Form categories: C = Cactus, F = Forb, G = Graminoid
Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 3-5. 1993-2000 Mesic Grassland Foliar Cover by Species at TR04

					Frequency					Absolute Cover					Relative Cover				
					TR04														
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
Opuntia macrorhiza Engelm.	OPHU1	C	Y			20					0.2					0.2			
Lepidium sp.	LEP1	F				20					0.2					0.2			
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N		40	40	40	60	80	0.8	1.8	1.4	2.6	2.2	1.1	2.0	1.4	3.0	3.4
Camelina microcarpa Andrz. ex DC.	CAMI1	F	N		20	60	60			0.2	1.2	1.2			0.3	1.3	1.2		
Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	F	N		60	40	40			1.4	0.4	2.0			2.0	0.4	2.0		
Hypericum perforatum L.	HYPE1	F	N						20					0.2					0.3
Lactuca serriola L.	LASE1	F	N				20					0.2					0.2		
Linaria dalmatica (L.) Mill.	LIDA1	F	N		20	80	60	40	40	0.6	0.8	1.4	0.6	0.4	0.8	0.9	1.4	0.7	0.6
Scorzonera laciniata L.	SCLA1	F	N		60	60	100	100	60	1.4	2.8	3.8	5.6	1.4	2.0	3.1	3.9	6.5	2.2
Sisymbrium altissimum L.	SIAL1	F	N			40	20				0.4	0.6				0.4	0.6		
Tragopogon dubius Scop.	TRDU1	F	N		40		60	60	60	0.6		0.8	1.4	0.6	0.8		0.8	1.6	0.9
Ambrosia psilostachya DC.	AMPS1	F	Y		20	20				0.4	0.2				0.6	0.2			
Artemisia dracunculus L.	ARDR1	F	Y		20	40	80	40	80	0.2	0.8	1.8	2.0	2.4	0.3	0.9	1.8	2.3	3.7
Artemisia frigida Willd.	ARFR1	F	Y		20			20		0.2			0.2		0.3			0.2	
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y		20		20		20	0.2		0.6		0.2	0.3		0.6		0.3
Aster ericoides L.	ASER1	F	Y		60	40	80			1.4	0.6	1.8			2.0	0.7	1.8		
Aster falcatus Lindl.	ASFA1	F	Y					80	80				1.8	1.2				2.1	1.9
Astragalus flexuosus (Hook.) G. Don	ASFL1	F	Y					20					0.2					0.2	
Chrysopsis villosa Pursh.	CHVI1	F	Y		20	20				0.2	0.2				0.3	0.2			
Descurainia pinnata (Walt.) Britt.	DEPI1	F	Y			20					0.2					0.2			
Erigeron divergens T. & G.	ERDI1	F	Y			20					0.2					0.2			
Erigeron flagellaris A. Gray	ERFL1	F	Y		20	20	20	20	20	0.2	0.6	0.2	1.0	0.2	0.3	0.7	0.2	1.2	0.3
Evolvulus nuttallianus R. & S.	EVNU1	F	Y					20					0.2					0.2	
Gaura coccinea Pursh.	GACO1	F	Y			40	20				0.4	0.2				0.4	0.2		
Grindelia squarrosa (Pursh.) Dun.	GRSQ1	F	Y		20	20	60	60		0.2	0.4	1.4	0.6		0.3	0.4	1.4	0.7	
Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	F	Y		20	40	40	60	60	0.2	0.6	0.6	1.2	0.6	0.3	0.7	0.6	1.4	0.9
Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	LIPE1	F	Y		20	20				0.6	0.2				0.8	0.2			
Mirabilis linearis (Pursh.) Heimerl	MILI1	F	Y		20	20	20	40	20	0.2	0.2	0.2	0.4	0.2	0.3	0.2	0.2	0.5	0.3
Polygonum sawatchense Small	POSA1	F	Y				20					0.2					0.2		
Psoralea tenuiflora Pursh.	PSTE1	F	Y		80	80	100	100	60	1.4	2.4	3.6	4.2	1.8	2.0	2.6	3.7	4.9	2.8
Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	F	Y			20	40	20			0.4	0.4	0.2			0.4	0.4	0.2	
Solidago missouriensis Nutt.	SOMI1	F	Y						20					0.2					0.3
Sphaeralcea coccinea (Pursh.) Rydb.	SPCO1	F	Y		20			60	60	0.2			1.2	0.6	0.3			1.4	0.9
Vicia americana Muhl. ex Willd.	VIAM1	F	Y			20					0.2					0.2			
Agropyron intermedium (Host) Beauv.	AGIN1	G	N	C	20					2.4					3.4				
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	100	100	100	100	80	26.8	44.6	46.6	10.2	1.4	37.6	48.7	47.3	11.9	2.2
Bromus tectorum L.	BRTE1	G	N	C		40	40	40	40		4.2	3.0	2.4	0.6		4.6	3.0	2.8	0.9
Poa compressa L.	POCO1	G	N	C	60	60	80	80	60	0.8	0.8	1.6	1.2	0.6	1.1	0.9	1.6	1.4	0.9
Poa pratensis L.	POPR1	G	N	C	60	80	40	80	80	2.0	1.6	1.2	6.8	5.2	2.8	1.7	1.2	7.9	8.1
Schedonnardus paniculatus (Nutt.) Trel.	SCPA2	G	N	C				20	20				0.6	0.2				0.7	0.3
Agropyron smithii Rydb.	AGSM1	G	Y	C	100	100	100	100	100	20.4	14.4	19.0	11.8	6.4	28.6	15.7	19.3	13.7	10.0
Aristida purpurea Nutt. var. longiseta (Steud.) Vasey	ARFE1	G	Y	C	20	20			.	0.2	0.2				0.3	0.2			
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	G	Y	C		20	20	20	60		0.2	0.4	0.2	0.8		0.2	0.4	0.2	1.2
Carex eleocharis Bailey	CAEL1	G	Y	C	40	20	20	20	20	1.8	0.4	0.4	0.4	0.2	2.5	0.4	0.4	0.5	0.3
Carex heliophila Mack.	CAHE1	G	Y	C				20	40				0.2	0.8				0.2	1.2

Table 3-5. (cont.)

					Frequency					Absolute Cover					Relative Cover				
					TR04														
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
Hordeum jubatum L.	HOJU1	G	Y	C					20					0.2					0.3
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	20	20				0.2	0.2				0.3	0.2			
Stipa comata Trin. & Rupr.	STCO1	G	Y	C		20		20			0.2		0.2			0.2		0.2	
Stipa viridula Trin.	STVI1	G	Y	C		40	40	40	20		0.6	0.8	0.4	0.2		0.7	0.8	0.5	0.3
Andropogon gerardii Vitman	ANGE1	G	Y	W				20					0.2					0.2	
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	40	40	20	40	40	0.4	1.6	0.2	4.0	4.6	0.6	1.7	0.2	4.7	7.2
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	80	80	80	100	100	5.4	6.2	2.6	20.4	26.6	7.6	6.8	2.6	23.7	41.4
Bouteloua hirsuta Lag	BOHI1	G	Y	W		20	20	20			0.4	0.2	0.2			0.4	0.2	0.2	
Buchloe dactyloides (Nutt.) Engelm.	BUDA1	G	Y	W		20		100	80		0.6		3.4	4.2		0.7		4.0	6.5
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W	20					0.2					0.3				
Muhlenbergia wrightii Vasey	MUWR1	G	Y	W			20					0.2					0.2		
Total foliar cover										71.2	91.6	98.6	86.0	64.2	100.0	100.0	100.0	100.0	100.0
Total forb cover										10.6	15.2	22.4	23.4	12.2	14.9	16.6	22.7	27.2	19.0
Total native forb cover										5.6	7.6	11.0	13.2	7.4	7.9	8.3	11.2	15.3	11.5
Total non-native forb cover										5.0	7.4	11.4	10.2	4.8	7.0	8.1	11.6	11.9	7.5
Total graminoid cover										60.6	76.2	76.2	62.6	52.0	85.1	83.2	77.3	72.8	81.0
Total native cover										34.2	32.8	34.8	54.6	51.4	48.0	35.8	35.3	63.5	80.1
Total non-native cover										37.0	58.6	63.8	31.4	12.8	52.0	64.0	64.7	36.5	19.9
Total warm-season graminoid cover										6.0	8.8	3.2	28.2	35.4	8.4	9.6	3.2	32.8	55.1
Total cool-season graminoid cover										54.6	67.4	73.0	34.4	16.6	76.7	73.6	74.0	40.0	25.9

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (500).
Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).
All cover values presented are means (n = 5).
Native categories: Y = Native, N = Non-Native
Form categories: C = Cactus, F = Forb, G = Graminoid
Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 3-6. 1993-2000 Mesic Grassland Foliar Cover by Species at TR11

					Frequency					Absolute Cover					Relative Cover				
					TR11														
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000	1993	1994	1995	1999	2000
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N		60	60	60	80	40	1.2	2.8	3.0	2.8	2.8	1.4	3.0	3.2	3.1	3.7
Camelina microcarpa Andrz. ex DC.	CAMI1	F	N		20	60	40	20		0.6	2.8	1.8	0.2		0.7	3.0	1.9	0.2	
Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	F	N		60		60	20	40	1.6		2.2	0.2	0.4	1.9		2.3	0.2	0.5
Centaurea diffusa Lam.	CEDI1	F	N					20	20				0.2	0.6				0.2	0.8
Cirsium arvense (L.) Scop.	CIAR1	F	N		20			20	20	0.2			0.8	0.4	0.2			0.9	0.5
Convolvulus arvensis L.	COAR1	F	N		20					0.2					0.2				
Lactuca serriola L.	LASE1	F	N		20		80	60		0.2		1.2	0.8		0.2		1.3	0.9	
Linaria dalmatica (L.) Mill.	LIDA1	F	N		40	40	60	60	60	0.8	2.2	1.2	0.6	1.2	0.9	2.3	1.3	0.7	1.6
Scorzonera laciniata L.	SCLA1	F	N					20	20				0.2	0.2				0.2	0.3
Sisymbrium altissimum L.	SIAL1	F	N		20	20	20			0.6	0.2	1.2			0.7	0.2	1.3		
Tragopogon dubius Scop.	TRDU1	F	N		60		20	20		1.0		0.2	0.2		1.2		0.2	0.2	
Verbascum blattaria L.	VEBL1	F	N						20					0.2					0.3
Verbascum thapsus L.	VETH1	F	N					40	40				1.6	2.0				1.8	2.6
Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	F	Y				20					0.2					0.2		
Ambrosia psilostachya DC.	AMPS1	F	Y		20	20	20	40	40	0.4	0.2	0.2	0.8	0.4	0.5	0.2	0.2	0.9	0.5
Artemisia dracunculus L.	ARDR1	F	Y				20					0.2					0.2		
Artemisia frigida Willd.	ARFR1	F	Y				20					0.2					0.2		
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y		100	60	100	60	60	3.8	1.4	3.2	0.8	0.6	4.5	1.5	3.4	0.9	0.8
Aster ericoides L.	ASER1	F	Y		40					0.4					0.5				
Aster falcatus Lindl.	ASFA1	F	Y					40					0.4					0.4	
Aster porteri Gray	ASPO1	F	Y				20		40			0.2		0.6			0.2		0.8
Cirsium undulatum (Nutt.) Spreng.	CIUN1	F	Y						20					0.2					0.3
Comandra umbellata (L.) Nutt.	COUM1	F	Y					20					0.2					0.2	
Dalea candida Michx. ex Willd. var. oligophylla (Torr.) Shinners.	DACA1	F	Y			20		20			0.2		0.4			0.2		0.4	
Dalea purpurea Vent	DAPU1	F	Y		20	40				0.2	0.6				0.2	0.6			
Descurainia richardsonii (Sweet) Schultz	DERI1	F	Y			40	20				0.4	0.2				0.4	0.2		
Erigeron divergens T. & G.	ERDI1	F	Y					20					0.2					0.2	
Erigeron flagellaris A. Gray	ERFL1	F	Y		40	20		40	20	0.4	0.4		0.4	0.2	0.5	0.4		0.4	0.3
Euphorbia dentata Michx.	EUDE1	F	Y						20					0.2					0.3
Grindelia squarrosa (Pursh.) Dun.	GRSQ1	F	Y				40					0.4					0.4		
Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	F	Y			20	20	20			0.2	0.2	1.0			0.2	0.2	1.1	
Helianthus petiolaris Nutt.	HEPE1	F	Y				20					0.2					0.2		
Kuhnia chlorolepis Woot. & Standl.	KUCH1	F	Y		20					0.2					0.2				
Kuhnia eupatorioides L.	KUEU1	F	Y			20	20	20	40		0.4	0.4	0.4	0.4		0.4	0.4	0.4	0.5
Liatris punctata Hook.	LIPU1	F	Y		20					0.2					0.2				
Lomatium orientale Coult. & Rose	LOOR1	F	Y				20					0.2					0.2		
Mirabilis linearis (Pursh.) Heimerl	MILI1	F	Y		20					0.2					0.2				
Phacelia heterophylla Pursh.	PHHE1	F	Y		20					0.4					0.5				
Psoralea tenuiflora Pursh.	PSTE1	F	Y		100	100	100	80	80	3.8	2.0	3.2	3.0	1.4	4.5	2.1	3.4	3.3	1.8
Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	F	Y					60	20				0.8	0.2				0.9	0.3
Solidago missouriensis Nutt.	SOMI1	F	Y			20					0.2					0.2			
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	100	100	100	100	100	11.0	24.4	37.2	17.4	3.4	13.0	25.8	39.1	19.2	4.5
Bromus tectorum L.	BRTE1	G	N	C	40	60	80	80	80	0.8	7.6	8.0	11.6	6.0	0.9	8.1	8.4	12.8	7.9
Poa compressa L.	POCO1	G	N	C	40	40	40	40	40	2.4	1.6	1.8	3.8	1.6	2.8	1.7	1.9	4.2	2.1
Poa pratensis L.	POPR1	G	N	C	60	80	80	60	60	6.6	6.0	1.8	6.8	5.4	7.8	6.4	1.9	7.5	7.1

Table 3-6. (cont.)

					Frequency					Absolute Cover					Relative Cover				
					TR11														
Scientific Name	**Speccode**	**Growth Form**	**Native**	**Cool/ Warm Season**	**1993**	**1994**	**1995**	**1999**	**2000**	**1993**	**1994**	**1995**	**1999**	**2000**	**1993**	**1994**	**1995**	**1999**	**2000**
Agropyron smithii Rydb.	AGSM1	G	Y	C	100	80	100	80	100	17.0	11.0	11.0	6.4	5.4	20.1	11.7	11.6	7.1	7.1
Aristida purpurea Nutt. var. longiseta (Steud.) Vasey	ARFE1	G	Y	C		40					0.4					0.4			
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	G	Y	C	40	40	60	40	60	2.0	0.8	1.6	1.0	1.4	2.4	0.8	1.7	1.1	1.8
Carex eleocharis Bailey	CAEL1	G	Y	C	40				20	3.6				0.8	4.3				1.0
Carex heliophila Mack.	CAHE1	G	Y	C		100	100	100	100		8.8	3.8	4.2	4.8		9.3	4.0	4.6	6.3
Carex oreocharis Holm.	CAOR1	G	Y	C	60					3.2					3.8				
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	20			40	40	0.2			0.8	0.4	0.2			0.9	0.5
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C					40					0.4					0.5
Stipa comata Trin. & Rupr.	STCO1	G	Y	C	100	60	80	60	100	9.8	8.2	3.0	6.0	9.6	11.6	8.7	3.2	6.6	12.6
Stipa viridula Trin.	STVI1	G	Y	C	20	60	60	40	40	2.0	4.0	2.8	4.4	3.4	2.4	4.2	2.9	4.9	4.5
Andropogon gerardii Vitman	ANGE1	G	Y	W	80	60	60	80	100	7.4	3.8	3.6	6.4	7.0	8.7	4.0	3.8	7.1	9.2
Andropogon scoparius Michx.	ANSC1	G	Y	W		40		20	20		0.4		0.2	0.2		0.4		0.2	0.3
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	40	40		80	80	1.2	0.8		2.4	6.2	1.4	0.8		2.6	8.1
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	40	100	60	100	100	1.0	1.6	0.8	2.2	7.4	1.2	1.7	0.8	2.4	9.7
Bouteloua hirsuta Lag	BOHI1	G	Y	W		20					0.2					0.2			
Buchloe dactyloides (Nutt.) Engelm.	BUDA1	G	Y	W				40	40				0.6	0.6				0.7	0.8
Muhlenbergia wrightii Vasey	MUWR1	G	Y	W		20			20		0.4			0.2		0.4			0.3
Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	G	Y	W		20		20			0.4		0.4			0.4		0.4	
Total foliar cover										84.6	94.4	95.2	90.6	76.2	100.0	100.0	100.0	100.0	100.0
Total forb cover										16.4	14.0	19.8	16.0	12.0	19.4	14.8	20.8	17.7	15.7
Total native forb cover										10.0	6.0	9.0	8.4	4.2	11.8	6.4	9.5	9.3	5.5
Total non-native forb cover										6.4	8.0	10.8	7.6	7.8	7.6	8.5	11.3	8.4	10.2
Total graminoid cover										68.2	80.4	75.4	74.6	64.2	80.6	85.2	79.2	82.3	84.3
Total native cover										57.4	46.8	35.6	43.4	52.0	67.8	49.6	37.4	47.9	68.2
Total non-native cover										27.2	47.6	59.6	47.2	24.2	32.2	50.4	62.6	52.1	31.8
Total warm-season graminoid cover										9.6	7.6	4.4	12.2	21.6	11.3	8.1	4.6	13.5	28.3
Total cool-season graminoid cover										58.6	72.8	71.0	62.4	42.6	69.3	77.1	74.6	68.9	55.9

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (500).
Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).
All cover values presented are means (n = 5).
Native categories: Y = Native, N = Non-Native
Form categories: C = Cactus, F = Forb, G = Graminoid
Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 3-7. 1999-2000 Mesic Grassland Species Frequency Summary

			TR02				TR04				TR11			
Family	Scientific Name	Speccode	Spring 1999	Summer 1999	Spring 2000	Summer 2000	Spring 1999	Summer 1999	Spring 2000	Summer 2000	Spring 1999	Summer 1999	Spring 2000	Summer 2000
		UNKN				4								
AGAVACEAE	Yucca glauca Nutt.	YUGL1				4								
APIACEAE	Lomatium orientale Coult. & Rose	LOOR1	56		52	4	44		36		72	4	68	20
APIACEAE	Musineon divaricatum (Pursh.) Nutt. var. hookeri T. & G.	MUDI1	12		12		12		12		4		4	
ASCLEPIADACEAE	Asclepias pumila (Gray) Vail	ASPU1		4		4								
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1									8	8	8	8
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	12	12	4	4	20	24	28	28	16	20	16	20
ASTERACEAE	Arnica fulgens Pursh.	ARFU1									4		4	
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	ARCA1	8				32							
ASTERACEAE	Artemisia dracunculus L.	ARDR1		4	4	4		40	44	40				
ASTERACEAE	Artemisia frigida Willd.	ARFR1	8	8	8	8	16	16	20	20	8	4	4	4
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	24	24	24	24	12	16	16	16	64	60	68	64
ASTERACEAE	Aster falcatus Lindl.	ASFA1	16	20	20	16	68	56	60	64	8	12	12	16
ASTERACEAE	Aster porteri Gray	ASPO1	16	12	8	8		4	4	4	12	20	20	16
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1					12	8	4		20	24	28	24
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	96	44	40	32							4	8
ASTERACEAE	Chrysopsis fulcrata Greene	CHFU1	4											
ASTERACEAE	Chrysopsis villosa Pursh.	CHVI1	16	12	12	12	4	8		4				
ASTERACEAE	Cirsium arvense (L.) Scop.	CIAR1					12	8	8	4	12	12	16	20
ASTERACEAE	Cirsium undulatum (Nutt.) Spreng.	CIUN1	12	8	4			4	4	4	8			
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	16		8	4	8	4	20	32	24		24	12
ASTERACEAE	Erigeron flagellaris A. Gray	ERFL1				4		8	8	4		20		16
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	12	4			32	40	40	36	16	8	16	12
ASTERACEAE	Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	24	20	8	4	20	24	20	16	8	8	4	
ASTERACEAE	Helianthus petiolaris Nutt.	HEPE1		4	4			4		4		4		
ASTERACEAE	Helianthus pumilus Nutt.	HEPU1	12	12	20	16								
ASTERACEAE	Kuhnia chlorolepis Woot. & Standl.	KUCH1				4						4		4
ASTERACEAE	Kuhnia eupatorioides L.	KUEU1		4		4		4		4			4	
ASTERACEAE	Lactuca serriola L.	LASE1	24	4	4		28	32	8	4	84	84	24	8
ASTERACEAE	Liatris punctata Hook.	LIPU1	4			4						4		4
ASTERACEAE	Microseris cuspidata (Pursh.) Sch. Bip.	MICU1									12		12	
ASTERACEAE	Picradeniopsis oppositifolia (Nutt.) Rydb.	PIOP1										4	4	4
ASTERACEAE	Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	60	44	12	4	28	16	8	12	28	16	12	8
ASTERACEAE	Scorzonera laciniata L.	SCLA1	84	56	28	20	92	92	64	44	32	12	8	8
ASTERACEAE	Senecio integerrimus Nutt.	SEIN1					4		4	4				
ASTERACEAE	Senecio plattensis Nutt.	SEPL1	12		8	4					32		40	24
ASTERACEAE	Solidago missouriensis Nutt.	SOMI1					4	4	4	8				
ASTERACEAE	Solidago rigida L.	SORI1	4		4	4								
ASTERACEAE	Taraxacum officinale Weber	TAOF1	4				28	20	24	4	12	8	12	4
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	20	4	12		76	76	88	56	44	64	32	32
BORAGINACEAE	Lappula redowskii (Hornem.) Greene	LARE1	4								16		8	4
BORAGINACEAE	Lithospermum incisum Lehm.	LIIN1		8	8	8		8	4	4	4	8	4	
BORAGINACEAE	Onosmodium molle Michx. var. occidentale (Mack.) Johnst.	ONMO1	8											
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	92	76	28	32	64	64	56	44	76	72	56	56
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	CAMI1					20	4	12		52	28	20	8
BRASSICACEAE	Descurainia pinnata (Walt.) Britt.	DEPI1	4		4		12				16		8	
BRASSICACEAE	Descurainia richardsonii (Sweet) Schultz	DERI1						4						
BRASSICACEAE	Draba reptans (Lam.) Fern.	DRRE1					4		4		4			
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	ERCA2	8				4	4						4
BRASSICACEAE	Erysimum repandum L.	ERRE1					16							
BRASSICACEAE	Lepidium campestre (L.) R. Br.	LECA1	24	8	16	12								
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	LEMO1	20	12	16	12					8	4	4	4
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	4		4		4	4			8			

Table 3-7. (cont.)

			TR02				TR04				TR11			
Family	Scientific Name	Speccode	Spring 1999	Summer 1999	Spring 2000	Summer 2000	Spring 1999	Summer 1999	Spring 2000	Summer 2000	Spring 1999	Summer 1999	Spring 2000	Summer 2000
CACTACEAE	Coryphantha missouriensis (Sweet) Britt. & Rose	COMI1	16	8	16	4	4		4	4				
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	4	4	4	4					12	16	16	12
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	36	40	36	24	24	24	28	28	24	16	20	24
CARYOPHYLLACEAE	Silene antirrhina L.	SIAN1					8						4	
CARYOPHYLLACEAE	Silene drummondii Hook.	SIDR1										4	4	4
CHENOPODIACEAE	Chenopodium leptophyllum Nutt. ex Moq.	CHLE2						4		4				
CLUSIACEAE	Hypericum perforatum L.	HYPE1	4									4	4	4
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	TROC1	8		12	4	24		32		16		12	
CONVOLVULACEAE	Convolvulus arvensis L.	COAR1	4	8	8	8								
CONVOLVULACEAE	Evolvulus nuttallianus R. & S.	EVNU1		8	8	4				4				4
CYPERACEAE	Carex eleocharis Bailey	CAEL1								4	4		4	4
CYPERACEAE	Carex heliophila Mack.	CAHE1	24	24	24	24					60	72	64	64
EUPHORBIACEAE	Euphorbia dentata Michx.	EUDE1										4		
EUPHORBIACEAE	Euphorbia robusta (Engelm.) Small	EURO1			4									
EUPHORBIACEAE	Euphorbia spathulata Lam.	EUSP1	16		24	12	16				24		16	8
FABACEAE	Astragalus agrestis Dougl. ex G. Don	ASAG1			4		8	8	8	4				
FABACEAE	Astragalus shortianus Nutt. ex T.&G.	ASSH1									4	4	4	4
FABACEAE	Dalea candida Michx. ex Willd. var. oligophylla (Torr.) Shinners.	DACA1	8	4	4	4					4	8	4	8
FABACEAE	Dalea purpurea Vent	DAPU1	4	4	4	4					4	4	8	8
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	64	56	64	56	20	48	52	40	32	52	56	40
FABACEAE	Vicia americana Muhl. ex Willd.	VIAM1	20				28		28		8		8	4
GERANIACEAE	Erodium cicutarium (L.) L'Her.	ERCI1	28	12	12	8	8							
HYDROPHYLLACEAE	Phacelia heterophylla Pursh.	PHHE1											4	4
LILIACEAE	Allium textile A. Nels. & Macbr.	ALTE1	4								4	4	4	4
LILIACEAE	Leucocrinum montanum Nutt.	LEMO2	16		16		8		16				4	
LINACEAE	Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	LIPE1	40	4	24	28	16		8	8				
LINACEAE	Linum pratense (Nort.) Small	LIPR1						12						
MALVACEAE	Sphaeralcea coccinea (Pursh.) Rydb.	SPCO1	40	32	48	48	40	40	44	52	8	4	8	8
NYCTAGINACEAE	Mirabilis linearis (Pursh.) Heimerl	MILI1			4	16		4		28		4		8
ONAGRACEAE	Gaura coccinea Pursh.	GACO1	12		16	4	32	16	28	12	20	8	12	16
ONAGRACEAE	Oenothera howardii (A. Nels.) W. L. Wagner	OEHO1					4	4	4	4				
OROBANCHACEAE	Orobanche fasciculata Nutt.	ORFA1						4	4	4	20		12	
PLANTAGINACE	Plantago patagonica Jacq.	PLPA1						4	4					
POACEAE	Agropyron smithii Rydb.	AGSM1	68	64	72	64	88	56	80	68	80	56	72	80
POACEAE	Andropogon gerardii Vitman	ANGE1	12	12	16	16					32	32	32	32
POACEAE	Andropogon scoparius Michx.	ANSC1		4		4								
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	20	24	28	24	4	8	8	8	8	20	16	20
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	52	48	48	52	4	4	4	4	24	32	44	36
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	92	80	84	92	72	76	76	76	36	52	64	72
POACEAE	Bouteloua hirsuta Lag	BOHI1		4	8					4	4		12	8
POACEAE	Bromus inermis Leyss. ssp. inermis	BRIN1	8	8	8	4								
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	68	72	32	36	68	84	72	64	96	92	76	76
POACEAE	Bromus tectorum L.	BRTE1					8	12	16	8	44	48	48	52
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	BUDA1	32	36	44	56	40	40	40	40	16	16	16	16
POACEAE	Hordeum brachyantherum Nevski	HOBR1			4									
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1		4	4	4	4	4	4	8	24	12	16	20
POACEAE	Muhlenbergia wrightii Vasey	MUWR1					4		4		4	4	4	4
POACEAE	Poa compressa L.	POCO1	8	8	8	8	12	20	16	16	12	12	20	16
POACEAE	Poa pratensis L.	POPR1					24	20	24	20	28	24	24	16
POACEAE	Schedonnardus paniculatus (Nutt.) Trel.	SCPA2						4		4				
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1		4	16	8						4	8	4
POACEAE	Sporobolus asper (Michx.) Kunth	SPAS1								4				
POACEAE	Sporobolus cryptandrus (Torr.) A. Gray	SPCR1						4	4					

Table 3-7. (cont.)

			TR02				TR04				TR11			
Family	Scientific Name	Speccode	Spring 1999	Summer 1999	Spring 2000	Summer 2000	Spring 1999	Summer 1999	Spring 2000	Summer 2000	Spring 1999	Summer 1999	Spring 2000	Summer 2000
POACEAE	Stipa comata Trin. & Rupr.	STCO1	8	12	12	12		4	4	4	36	40	44	44
POACEAE	Stipa viridula Trin.	STVI1	8		4	4	4	8	12	8	32	28	28	24
POLEMONIACEAE	Collomia linearis Nutt.	COLI1			4									
POLEMONIACEAE	Microsteris gracilis (Hook.) Greene	MIGR1					8							
POLYGONACEAE	Eriogonum alatum Torr.	ERAL1	8	4	8	8								
POLYGONACEAE	Polygonum ramosissimum Michx.	PORA1						4		4				
PRIMULACEAE	Androsace occidentalis Pursh.	ANOC1											4	
RANUNCULACEAE	Delphinium virescens Nutt. ssp. penardii (Huth) Ewan	DEVI1									4	4	4	
ROSACEAE	Rosa arkansana Porter	ROAR1	12	12	12	12	8	8	8	8	4	4	4	4
SANTALACEAE	Comandra umbellata (L.) Nutt.	COUM1								4	16	12	12	20
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1					28	24	32	24	52	48	64	48
SCROPHULARIACEAE	Penstemon virens Penn.	PEVI1									16	12	16	12
SCROPHULARIACEAE	Verbascum blattaria L.	VEBL1	4		4									
SCROPHULARIACEAE	Verbascum thapsus L.	VETH1									20	20	20	24
VIOLACEAE	Hybanthus verticillatus (Ort.) Baill.	HYVE1	12	16	4	4					4			
VIOLACEAE	Viola nuttallii Pursh.	VINU1	16		4						20		12	

Frequency percentages based on n=25.

Report 4

Diffuse Knapweed Control Study

4. Monitoring Summary for Diffuse Knapweed Control Study

4.1 Introduction

Diffuse knapweed (*Centaurea diffusa*) is a noxious weed that has become increasingly widespread across the Front Range of Colorado. Over the past several years, the spread of this species has become a serious threat with regard to managing the natural resources in the Buffer Zone at the Rocky Flats Environmental Technology Site (the Site). Under the Colorado Noxious Weed Act, diffuse knapweed is listed as a noxious weed that must be controlled by property owners, and it is listed as one of the top ten prioritized species for control in the state (CRS 1996).

Diffuse knapweed is a very aggressive competitor in dry conditions such as those found at the Site. Studies elsewhere have shown that it rapidly invades overgrazed range lands, disturbed sites, and even undisturbed plant communities, often becoming a dominant species and altering the species composition of the plant community (Powell 1990; FEIS 1996; Sheley et al. 1998). Studies have also shown that diffuse knapweed–infested lands exhibit increased soil erosion, degraded water quality, lower wildlife habitat value, reduced grazing capacity, and less aesthetic and recreational value (Sheley et al. 1997, 1998).

At the Site, one of the rare plant communities that is increasingly affected by the spread of diffuse knapweed is the relict xeric tallgrass prairie. The Site contains a substantial portion of what has been identified as the largest remaining stand of this plant community known to occur in Colorado, and potentially in all of North America (CNHP 1995). The herbicide Tordon 22K (trademark of DowElanco [picloram]) is one of the more effective chemicals for controlling diffuse knapweed infestations, because its multi-year residual effect can prevent the seeds from germinating for several years after application (Beck 1994). Because the xeric tallgrass prairie is an important plant community, it is important to evaluate what effect the herbicide might have on the native species. A study was begun on the Site in 1997 to evaluate the effectiveness of Tordon 22K in controlling diffuse knapweed on the Site and to identify any potential effects on desirable species in the xeric tallgrass prairie. This report summarizes the four years of data collected thus far.

The following general questions were proposed for investigation:

- How effective is Tordon 22K on controlling diffuse knapweed under Site conditions?
- How long is a single application of Tordon 22K effective in controlling diffuse knapweed?

- How does Tordon 22K affect species richness, cover, and individual species abundance on the xeric tallgrass prairie?

4.2 Study Site Location and Characteristics

The study site is located north of the T130 trailer complex, west of the Industrial Area (Figure 4-1). The xeric tallgrass prairie at the Site is located primarily on the pediment, which is underlain by Rocky Flats Alluvium (SCS 1980). The soils are classified as Flatirons very cobbly sandy loams (SCS 1980). The study site is essentially flat, with only a 1° slope to the northeast. The area was chosen because it was large enough for placement of both control and treatment plots (each 60 × 65 m), and an abundance of diffuse knapweed was present where the two plots would be located.

4.3 Methods

A control plot (no herbicide applied) and a treatment plot (herbicide applied) were established. Within both the control and treatment plots, five parallel, randomly located, 50-m transects were established from a baseline using X and Y coordinates generated by a computerized random number generator (Figure 4-2). Transects were permanently marked, assigned numbers, and labeled. Although it would have been preferable to collect a full year's worth of data prior to herbicide application in 1997, logistics and the required time frame allowed for only a single spring sampling prior to herbicide application.

The treatment plot was sprayed with Tordon 22K, applied at a rate of 1 pint/acre, on June 23–24, 1997, using a truck-mounted spray unit with a 16.75-m (55-ft) boom. The boom was held approximately 0.6–1.0 m (2–3 ft) above the vegetation. A uniform application rate was obtained across the area using a computerized spray system that regulated the application pressure rate according to the speed of the truck. Some diffuse knapweed plants had already bolted and were in the bud stage at the time the spraying occurred, but many rosettes were still present. Sampling during 1997 was conducted on June 16–19 and again on September 2–4. In 1998, sampling was conducted on June 17–19 and August 24–27. In 1999, sampling was conducted on June 14–18 and August 30–September 1. In 2000, sampling was conducted on June 12–16 and August 28–31.

Species richness was determined in a 2-m-wide belt centered along the length of each 50-m transect. Every plant species rooted within the 100-m^2 area was recorded. In addition, the numbers of woody plant stems and cactus stems were counted and recorded for the 100-m^2 area. Basal cover and foliar cover estimates were made using a point-intercept method along each of the 50-m transects. A 2-m-long rod, with a 6-mm diameter, was dropped vertically at 50-cm increments along the transect to record a total of 100 intercept points. Two categories of hits were recorded, basal and foliar. Basal cover hits indicated what material the rod contacted at the ground surface. Hits could be vegetation (live plants), litter (fallen dead material), rock (pebbles and cobbles that were

greater than the rod diameter), bare ground, or water, in that order of priority based on the protection from erosion that each type of cover provided. Basal vegetation hits were recorded by species only if the rod was touching the stem or crown of the plant where the plant entered the ground. Foliar vegetation hits (defined as a portion of a plant touching the rod) were recorded by species in three categories defined by height and growth form. The topmost hit of each growth form was recorded. The growth forms measured were herbaceous, woody <2 m in height, and woody >2 m in height.

Frequency information by species was gathered by randomly locating 25 1-m^2 quadrats (5 per transect) in each of the control and treatment plots and recording all species present in each plot. Stem density counts for diffuse knapweed also were made using these same quadrats. No distinctions were made during counts between seedlings, rosettes, or adult plants. More detailed summaries of these specific methods are found in the *Environmental Monitoring Department Operating Procedures Manual* (DOE 1995), the *High Value Vegetation Survey Plan for the Rocky Flats Environmental Technology Site* (K-H 1997), and the 2000 *Ecological Field Monitoring Plans for the Rocky Flats Environmental Technology Site* (K-H 2000a).

Species richness data were summarized by generating species lists for the control and treatment plots for each sampling period. In addition, other species diversity variables were calculated from the species lists. Basal cover data were reported as total percent cover of vegetation, litter, rock, and bare ground. Foliar cover data were reported as frequency, absolute cover, and relative cover for each species encountered. Frequency from the cover data was defined as the percent of point-intercept transects in which a species occurred, out of the total five possible sampled per plot. Absolute foliar cover was the percentage of the number of hits on a species out of the total number of hits possible at a plot (500). This value is the actual cover of a species. Relative foliar cover was the number of hits on a species relative to the total number of vegetative hits recorded per plot (i.e., the percent of total vegetative cover [100 percent] represented by the species).

Both absolute and relative foliar cover values are means averaged over the five transects. Frequency based on quadrats (n=25) was defined as the number of quadrats in which a species was recorded, divided by 25 (the total number of quadrats possible), multiplied by 100. Density count data were summarized as the mean number of stems per square meter based on the 25 quadrats sampled within each plot (n=25).

For most results, descriptive comparisons were made between the control and treatment plots from the four years of data to examine potential changes over time—pre-treatment to post-treatment. Species richness, cover, and frequency were summarized by combining data from the five control transects and five treatment transects for each sampling event, respectively. A Sorensen coefficient of similarity was used to assess the species composition similarity between the control and treatment data (Brower and Zar 1977). A Shannon-Weaver diversity index was used to calculate diversity and was conducted using the relative foliar cover data (Brower and Zar 1977). Statistical analysis of the results was conducted only when mean values were different enough to suggest a

meaningful interpretation. Where normality, variance, and dependence requirements were met, parametric tests were used to compare results; otherwise, non-parametric tests were used. Independent samples (i.e., the control and treatment plots) were compared using one-way analysis of variance (ANOVA), t-tests, or Mann-Whitney U tests (SigmaStat 1997; Fowler and Cohen 1990; Sheskin 1997), as appropriate. Dependent sample comparisons (i.e., within treatment over time) were done using paired t-tests, Wilcoxon's test for matched pairs, or Friedman's repeated measures ANOVA (SigmaStat 1997; Fowler and Cohen 1990; Sheskin 1997), as appropriate. Where applicable, a Tukey test was used for pairwise multiple comparison procedures to isolate groups that differed from one another (SigmaStat 1997). Frequency analyses were done using a McNemar test (Sheskin 1997).

4.4 Results

4.4.1 Species Richness

Overall species richness in the treatment plot initially declined by 12 species after the herbicide application in 1997 (from 74 to 62 species), but rebounded the following spring to 70 species. Over the past four years since treatment, species richness in the treatment plot has fluctuated between 68 and 73 species (Tables 4-1 and 4-2, Figure 4-3). Species richness in the control plot during the same time period remained stable from 1997 to early 1999, but then declined from summer 1999 through 2000 (Tables 4-1 and 4-3, Figure 4-3). Species richness has been 7 to 15 species lower in the control plot compared to the treatment plot over the past 1.5 years.

The treatment plot had fewer species per quadrat than the control plot initially and during all subsequent sampling events. Examination of the mean number of species per quadrat has shown parallel seasonal responses in both the control and treatment plots from 1997 through 1999 (Tables 4-1, 4-2, and 4-3, Figure 4-4). In 2000, however, the mean number of species per quadrat in the treatment plot did not parallel that of the control plot, but remained lower (Figure 4-4).

A Sorensen coefficient of similarity was used to compare initial 1997 species composition to that in 2000 for both the control and treatment plots. Comparing spring 1997 to spring 2000 resulted in a Sorensen index value of 0.82 for the control plot and 0.86 for the treatment plot, indicating slightly higher similarity in species composition in the treatment plot, four growing seasons after the herbicide application. The spring 1997 control-versus-treatment Sorensen index value was 0.80, and it was 0.77 in summer 2000. Thus, four growing seasons after the herbicide application, the similarity of species composition between the control and treatment plots is less than prior to the start of the study, largely due to the change in composition over time in the control plot.

4.4.2 Diffuse Knapweed Response

Diffuse knapweed densities declined significantly in the treatment plot after the herbicide application and continued to remain at low levels in 2000, four growing seasons after the herbicide application (Table 4-1, Figure 4-5; Friedman's repeated measures ANOVA by Ranks, $X^2 = 55.7$, df = 7, P <0.001). In the treatment plot, spring diffuse knapweed densities (a measure of seedling and rosette density) decreased significantly after herbicide treatment, from 23 plants/m^2 in 1997 to 1.8 plants/m^2 in 1999 (Table 1, Figure 5; Friedman's repeated measures ANOVA by Ranks, $X^2 = 55.7$, df = 7, P <0.001).

Large seasonal fluctuations were observed in diffuse knapweed densities in the control plot (Table 4-1, Figure 4-5). Spring diffuse knapweed density showed a statistically significant increase in the control plot, from 5.6 plants/m^2 in 1997 to 26.1 plants/m^2 in 1999 (Table 4-1, Figure 4-5; Friedman's repeated measures ANOVA by Ranks, $X^2 = 68.0$, df = 7, P <0.001). However, in spring 2000, no large increase in diffuse knapweed density was observed, as had occurred in 1998 and 1999 (Figure 4-5).

Diffuse knapweed frequency has remained fairly stable in the control plot from 1997 through 2000, with the exception of a sharp peak (increase) during spring 1999 (Table 4-1). In the treatment plot, during the same time period, diffuse knapweed frequency declined steadily, from 80 percent before herbicide treatment in 1997 to a low of 20 percent in summer 1998. During the summer of 1999, it increased to 44 percent, with an additional increase to 48 percent in 2000 (Table 4-1). Diffuse knapweed frequency in the treatment plot still remains below its initial starting point and below that of the control plot.

4.4.3 Cactus Density Response

Cactus densities in the control plot for twistspine prickly pear (*Opuntia macorhiza*) and hedgehog cacti (*Echinocereus viridiflorus*) remained generally stable from 1997 to 2000, showing only a slight increase in 1999 (Table 4-1; Figures 4-6 and 4-7). In the treatment plot, however, densities for these two species both declined after the herbicide treatment (Table 4-1; Figures 4-6 and 4-7). The twistspine prickly pear density decreased significantly, by 87 percent from 1997 to 1999 (Figure 4-6; Friedman's repeated measures ANOVA by Ranks, $X^2 = 10$, df = 2, P <0.001). It declined only slightly more in 2000, and remains far below that of pre-treatment levels or that found in the control plot. The frequency of the twistspine prickly pear also decreased significantly, by more than 50 percent (Table 4-1; McNemar test, $X^2 = 8.1$, df = 1, P <0.01). Hedgehog cactus density and frequency also decreased significantly in the treatment plot from spring 1997 to spring 2000 (Table 4-1, Figure 4-7; Friedman's repeated measures ANOVA by Ranks, $X^2 = 11.1$, df = 3, P <0.05; McNemar test, $X^2 = 6.1$, df = 1, P <0.05), with the density decreasing by over 50 percent. Continued monitoring will detect if and when the cacti begin to return to these areas.

4.4.4 Diversity Response

Shannon-Weaver diversity indices for the control and treatment plots are shown, by sampling event, in Table 4-1 and Figure 4-8. No significant changes were observed in the control plot from 1997 through 2000 (Figure 4-8). In the treatment plot, a statistically significant loss of diversity was observed from spring 1997 to summer 1998 as a result of the herbicide treatment (Figure 4-8; Friedman's repeated measures ANOVA by Ranks, $X^2 = 15.5$, df = 7, P = 0.03). In 1999, however, diversity began to increase to pre-treatment levels, and was no longer statistically different from the control plot (Figure 4-8; P >0.05). In 2000, however, the diversity in the treatment plot dropped during the summer and was again significantly different from that in the control plot (Figure -8; T-test, t = 3.54, df = 8, P = 0.008). Further numerical increases in diversity are needed at the treatment plot before a complete return to pre-treatment levels is reached.

4.4.5 Plant Frequency Response

Individual species frequencies measured during each sampling event are presented in Tables 4-4 and 4-5 for the control and treatment plots, respectively. Taking into account changes that occurred from spring 1997 to spring 2000 in the control plot (i.e., assumed to be natural variability in species frequency), those species in the treatment plot that showed the greatest change in frequency are shown in Table 4-6. Only those species that showed changes of 12 percent or more (negative or positive) are listed, because the presence of a species in a single quadrat represents 4 percent (n=25). Changes of 8 percent or less are as likely explained by chance as by any response to the herbicide application, given the natural variability of species on the prairie. The species showing the greatest decreases were twistspine prickly pear and diffuse knapweed, with decreases of 56 and 28 percent, respectively, in the treatment plot compared to the control plot. Of the other 12 species listed as having experienced declines in frequency, 10 were native species and 2 were non-native (Table 4-6). Several species also showed increases in frequency in the treatment plot versus control plot analysis (Table 4-6).

4.4.6 Vegetation Cover Response

Basal cover amounts for total basal vegetation, rock, bare ground, and litter cover did not change by any meaningful amounts in either the control or treatment plots from 1997 to 2000 (Table 4-1).

Foliar cover results, by species and species groupings, for the control and treatment plots for 1997 to 2000, by sampling session, are presented in Tables 4-7 and 4-8. Changes in species composition (relative cover) and actual cover (absolute cover) were evaluated by examining changes in the amounts of foliar cover provided by different species or groups of species. Examination of the cover data showed seasonal shifts in cover amounts for many of the species groupings (Tables 4-7 and 4-8). Total foliar cover, total native foliar cover, and total non-native foliar cover values for both the control and treatment plots showed essentially parallel responses from 1997 through 2000 (Tables 4-7 and 4-8;

Figure 4-9). The only fluctuation in total absolute foliar cover in the treatment plot compared to the control plot occurred in summer 1997, and most of this resulted from the loss of non-native foliar cover (Tables 4-7 and 4-8). Thus, the total absolute cover present on the grassland was not affected substantially by the herbicide treatment.

Species composition was affected, though. In the control plot, total relative forb cover varied slightly from 1997 through 2000, fluctuating only about 6 percent around an average of approximately 15 percent (Figure 4-10). Total relative forb cover in the treatment plot, however, dropped significantly—from more than 18 percent initially in 1997 to a low of less than 5 percent in summer 1998—in response to the herbicide (Figure 4-10; Friedman's repeated measures ANOVA by Ranks, $X^2 = 19.2$, df = 7, $P < 0.05$). In 1998, the treatment plot relative forb cover was significantly lower than the control plot (Figure 4-10; spring 1998, Mann-Whitney Rank Sum test, T = 40, $P < 0.05$; summer 1998, T-test, t = 3.211, df = 8, $P < 0.05$). During 1999 and 2000, relative forb cover recovered in the treatment plot and was no longer significantly different from the control plot ($P > 0.05$). However, in summer 2000, treatment-plot relative forb cover decreased again and was significantly different from that in the control plot (Figure 4-10; T-test, t = 3.102, df = 8, $P < 0.05$).

Non-native relative foliar cover was eliminated from the treatment plot throughout 1998, the second growing season after treatment, but began to return again in 1999 and remained stable at about 2 percent through the summer of 2000 (Figure 4-11). Non-native cover in the treatment plot was significantly below that in the control plot in the late summer of 2000. In the control plot, non-native cover also declined throughout 1998 and spring 1999, but returned to almost 8 percent by summer 2000. Diffuse knapweed accounted for the largest portion of non-native cover in both the control and treatment plots in summer 2000 (Tables 4-7 and 4-8). Native relative forb cover was equal in the control and treatment plots prior to the herbicide application (Figure 4-11). However, after the herbicide application, native relative forb cover dropped in the treatment plot and was significantly different from the control plot throughout 1998 (spring 1998, Mann-Whitney Rank Sum test, T = 40, $P < 0.05$; summer 1998, T-test, t = 2.409, df = 8, $P < 0.05$). By 1999, native relative forb cover was no longer significantly different from the control plot, and this condition prevailed through spring 2000, by which time it was essentially equal to that in the control plot ($P > 0.05$). In summer 2000, however, the native relative forb cover declined in the treatment plot and was significantly different from the control plot (Figure 4-11; T-test, t - 2.959, df = 8, $P < 0.05$).

Absolute (actual) graminoid cover in the treatment plot increased and surpassed that of the control plot after the herbicide application in 1997 (Figure 4-12). Since then, the absolute graminoid cover amounts in the control and treatment plots have paralleled each other in all but one sample session (Figure 4-12). Relative graminoid cover has not changed significantly in the control plot throughout the duration of the study (Figure 4-13; $P > 0.05$). In the treatment plot, however, relative graminoid cover increased significantly from 1997 to summer 1998 (Figure 4-13; Friedman's repeated measures ANOVA by Ranks, $X^2 = 17.89$, df = 5, P = 0.003). As a result of the herbicide application, relative graminoid cover was significantly higher in the treatment plot than in

the control plot throughout 1998 (Figure 4-13, spring 1998, Mann-Whitney Rank Sum test, T = 15, P <0.05; summer 1998, T-test, t = –3.211, df = 8, P <0.05). By 1999 and spring 2000, however, treatment plot relative graminoid cover was no longer statistically different from the control plot (Figure 4-13; P >0.05). In summer 2000, however, relative graminoid cover in the treatment plot increased again and was significantly different from the control plot (Figure 4-13; T-test, t = –3.102, df = 8, P <0.05). Split out by cool-season and warm-season graminoid species, the relative cover of both has increased in the treatment plot as a result of the herbicide application, with warm-season species increasing slightly more than the cool-season species (Figure 4-14).

The relative foliar cover provided by the dominant native species—big bluestem (*Andropogon gerardii*), little bluestem (*Andropogon scoparius*), mountain muhly (*Muhlenbergia montana*), and Porter's aster (*Aster porteri*)—at the control and treatment plots from 1997 to 2000 is shown in Figures 4-15 and 4-16, respectively. Both plots had just over 50 percent of the cover provided by these species prior to the herbicide application in spring 1997. The treatment plot showed an increase in cover of these species during summer 1997, but then returned to pre-treatment levels, with some slight fluctuation through spring 2000. Another peak occurred in summer 2000. Both peaks were due to increases in big bluestem and mountain muhly. Porter's aster, an endemic species along the Front Range of Colorado, has remained at stable levels from 1997 through summer 1999. Its drop in cover during 2000 was evident in both the control and treatment plots.

4.5 Discussion

The effect of the herbicide Tordon 22K on diffuse knapweed and other species in the xeric tallgrass prairie was examined to provide important information for weed control and resource management activities at the Site. In 1998, the second growing season after the initial herbicide application, a number of measured plant-community variables continued to show declines as a result of the herbicide application. In addition to diffuse knapweed, forbs in general were affected; overall forb cover decreased considerably, and species richness, cactus density, and species diversity all declined initially (K-H 1998, 1999). Data from the 1999 and 2000 field seasons, however, have shown the expected reversal of many of these initial responses (K-H 2000b).

Although overall species richness in the treatment plot declined by 12 species immediately after the herbicide application in 1997, by 1999, overall species richness had essentially returned to pretreatment levels (only one species less than the original number; Figure 4-3). Currently, species richness is higher in the treatment plot than in the control plot. The declines shown in both the control and treatment plots in 2000, relative to 1999, are best explained by the very dry winter and summer in 2000. A Sorensen coefficient of similarity index (an index used to evaluate species similarity between locations), was used to evaluate the species richness similarity within the control and treatment plots from spring 1997 to summer 2000. Index values of 0.82 for the control plot and 0.86 for the treatment plot suggest a very high similarity in species richness between pre- and post-treatment for both plots. Additional comparisons of

similarity between the control plot and the treatment plot, for spring 1997 and summer 2000, showed essentially no difference either, thus indicating that no long-term loss of species occurred as a result of the herbicide application. Examination of the species lists through time (from 1997 through 2000) for both the control and treatment plots (Tables 4-2 and 4-3), shows little difference in the overall species richness of either plot. The data show numerous species in both plots that appear and disappear during different years. For those few species, in either plot, that were present to begin with but disappeared during the course of the study, examination of the cover and frequency data showed that these species occurred in very small amounts to begin with. Thus, it is not really possible to attribute their disappearance to the herbicide or any other factor, but rather, it is most likely just part of the natural variation on the grassland.

Species diversity (Shannon-Weaver) declined immediately after the herbicide application in the treatment plot reaching its lowest level in summer 1998, when it was significantly different from the control plot (Figure 4-8). However in 1999, species diversity in the treatment plot was no longer significantly different from the control plot. Continued gains in spring 2000 were reversed in summer 2000. The loss of species diversity is largely attributable to the loss of forb cover; both measures showed parallel responses (Figure 4-10). It is interesting that the control plot showed no loss in either species diversity or forb cover in summer 2000 (Figures 4-8 and 4-10)—in fact, both measures increased. The loss shown in the treatment plot may be a response of the combined stresses from the drought and herbicide or a result of increased competition from the graminoids. Continued monitoring will reveal whether species diversity on the xeric tallgrass prairie at the Site returns to pre-treatment levels next year.

The effect on diffuse knapweed, the primary target species of the herbicide application, has been dramatic. The herbicide application reduced and continues to control the diffuse knapweed in the treatment plot, where diffuse knapweed densities remain far below their original values (Figure 4-5). Diffuse knapweed cover also remains at less than 2 percent of the total relative foliar cover (Table 4-8). In the control plot, however, diffuse knapweed densities have fluctuated widely on a seasonal and annual basis, and continue to increase from pre-treatment levels (Figure 4-5).

The effective control of diffuse knapweed observed in the treatment plot is critical, because the longer the control continues, the fewer adult plants there are to produce additional seeds and blow across the landscape spreading the seeds. Thus, the control of diffuse knapweed documented from 1997 through 2000 in the treatment plot has and continues to reduce diffuse knapweed seed production in the area, and has substantially reduced the chances for spread of the species from this area. Both of these criteria are important for controlling diffuse knapweed. Another important consideration, however, is that with time, diffuse knapweed density will begin to increase again in the treatment plot as a result of the seed bank that remains, and from immigration of new seed from offsite sources (e.g., grasslands and mining areas to the west). If no further control measures are taken, the densities will reach and could potentially exceed pre-treatment levels in a few years. In fact, although diffuse knapweed densities continue to be controlled to low levels, frequency data for diffuse knapweed in the treatment plot

showed that after bottoming out at 20 percent in 1998, diffuse knapweed frequency increased to 44 percent in 1999, and 48 percent in 2000 (Table 4-1). Clearly, diffuse knapweed is slowly returning to the area.

It is also important to recognize that these data are from a small area of the grassland. Therefore, monitoring should be done at various scales to better evaluate the overall effectiveness of the herbicide application. In the larger area surrounding the treatment plot, which received the same herbicide application, weed mapping results have begun to show an increase and return of diffuse knapweed to the larger area. Thus, although the herbicide application in the treatment plot continues to control the diffuse knapweed, long-term integrated weed control using multiple methods is necessary for sustainable control of this species. Additionally, spot control of missed areas or small locations where infestations have begun to return would help extend the length of effective control across the larger area. The use of spot control methods becomes especially important because of the potential long-term impacts that the native plants in the community could experience in response to repeated large-scale, long-term herbicide applications. Cooperative weed control in conjunction with surrounding landowners would help address the issue of seed being transported onto the Site. More details on the weed mapping that has been done at the Site during the same time frame as this study are available elsewhere in this and earlier versions of the Annual Vegetation Report for the Site (K-H 1998, 1999, 2000b).

The response of the non-target species on the xeric tallgrass prairie varied but fell within generally expected parameters. Total absolute (actual) cover on the xeric tallgrass prairie was not substantially affected by the herbicide treatment—changes in the treatment plot generally paralleled changes in the control plot (Figure 4-9). This is important because it illustrates that no large, barren, unvegetated areas were created on the prairie as a result of the herbicide application. Instead, other species (graminoids) expanded, moving in and filling in the canopy to replace the species that were reduced by the spraying.

The forb, or non-grass, component of the prairie, both non-native and native, was affected by the herbicide treatment. This was not unexpected, because the herbicide Tordon 22K, though considered a selective herbicide, affects a number of plant families. Two growing seasons after the herbicide application, however, total relative forb cover in the treatment plot was no longer significantly different from the control plot (Figure 4-10). The significant loss of forb cover observed in the treatment plot during the summer of 2000 is most likely either a result of the drought that occurred and/or increased competition from graminoids.

Although native relative forb cover was equal in the control and treatment plots prior to the herbicide application, after treatment, the native relative forb cover dropped significantly in the treatment plot (Figure 4-11). However, by 1999, native relative forb cover was no longer significantly different from the control plot, and it remained that way through spring 2000. Examination of the non-native relative forb cover showed that by spring 2000, the difference in total forb cover between the control and treatment plots was due to the higher non-native forb cover in the control plot. The non-native forb

cover in the treatment plot was still being controlled by the herbicide treatment and was significantly below that found in the control plot. The loss of native forb cover in the treatment plot during the late summer of 2000 is likely explained by the reasons mentioned above.

The information on the forbs is important because it is not desirable to re-treat the area with a broadleaf herbicide if the native forb component of the community has not returned to its former level of abundance. Repeated broadcast applications of herbicide without allowing appropriate time for the native forbs to rebound could potentially stress them to the point of elimination from the grassland—an undesirable result. In a situation where the native species have not completely returned to pre-treatment levels, a broadcast application of a more species-specific herbicide—such as Transline, which controls diffuse knapweed very effectively, with less impact to other species—might be useful as a follow-up. This would continue to give the native species a chance to return. Drawbacks to Transline, however, are its higher cost and its lack of a multi-year residual effect. Therefore, it would require more frequent retreatment to maintain effective control.

The loss of forb cover in the treatment plot did not cause a loss of overall foliar cover—as mentioned above, the total foliar cover in the treatment plot paralleled the response in the control plot. The loss of relative forb cover was offset by an increase in relative graminoid cover in response to reduced competition from forb species (Figure 4-13). The increase in relative graminoid cover in the treatment plot began after the herbicide application, and it continues four growing seasons after the herbicide treatment.

One of the most affected non-target species groups was cacti. The density of the twistspine cactus has been reduced by about 87 percent, and hedgehog cactus by over 50 percent, since the herbicide application in 1997 (Figures 4-6 and 4-7). Most of the cacti turned yellow after the herbicide application and later died. Continued monitoring will document whether the cacti begin to return to the treatment plot, but any return will be gradual because the cacti grow slowly.

Data from the Site are consistent with data from other studies that have shown an initial decline of species diversity, loss of forb and weed cover, and increase in graminoid vigor and cover after spraying with Tordon 22K. Rice and Toney (1996) reported decreases in forb cover due to herbicide treatments on native prairie in Montana. They reported that these responses were transitory, however, and that forb values returned to pre-treatment levels after about three years. Rice et al. (1997) found that species diversity also declined after spraying with Tordon 22K, but recovered after 2–3 years. Both of these studies also indicated that, as a result of lost weed and forb cover (i.e., reduced competition), the graminoid component of the community responded vigorously. In the Lolo National Forest in Montana, Henry (1998) reported that two years after spraying with Tordon 22K, a mountain grassland community had a 95 percent reduction in weed biomass and an 86 percent decrease in forb biomass. Associated with this was a 714 percent increase in grass biomass.

Continued monitoring will document the recovery of the xeric tallgrass prairie under the conditions present at the Site. This information will be useful for developing improved weed control strategies and provide for better long-term management of the Site's grassland communities.

4.6 Conclusions

Application of Tordon 22K on the xeric tallgrass prairie at the Site continues to provide good control of diffuse knapweed, the primary target species, four years after herbicide treatment. In the treatment plot, initial declines in species richness were transitory, and no changes in overall foliar cover were observed. Although species diversity, overall forb cover, native forb cover, and non-native forb cover declined initially in the treatment plot as a result of the herbicide application, these measures were reversed by 1999. Reduced competition from forbs has improved the vigor and cover of the graminoid species. The results at the Site are consistent with previous studies that examined the effect of Tordon 22K on grassland communities. Continued monitoring in 2001 will provide additional information for management of the grassland communities at the Site.

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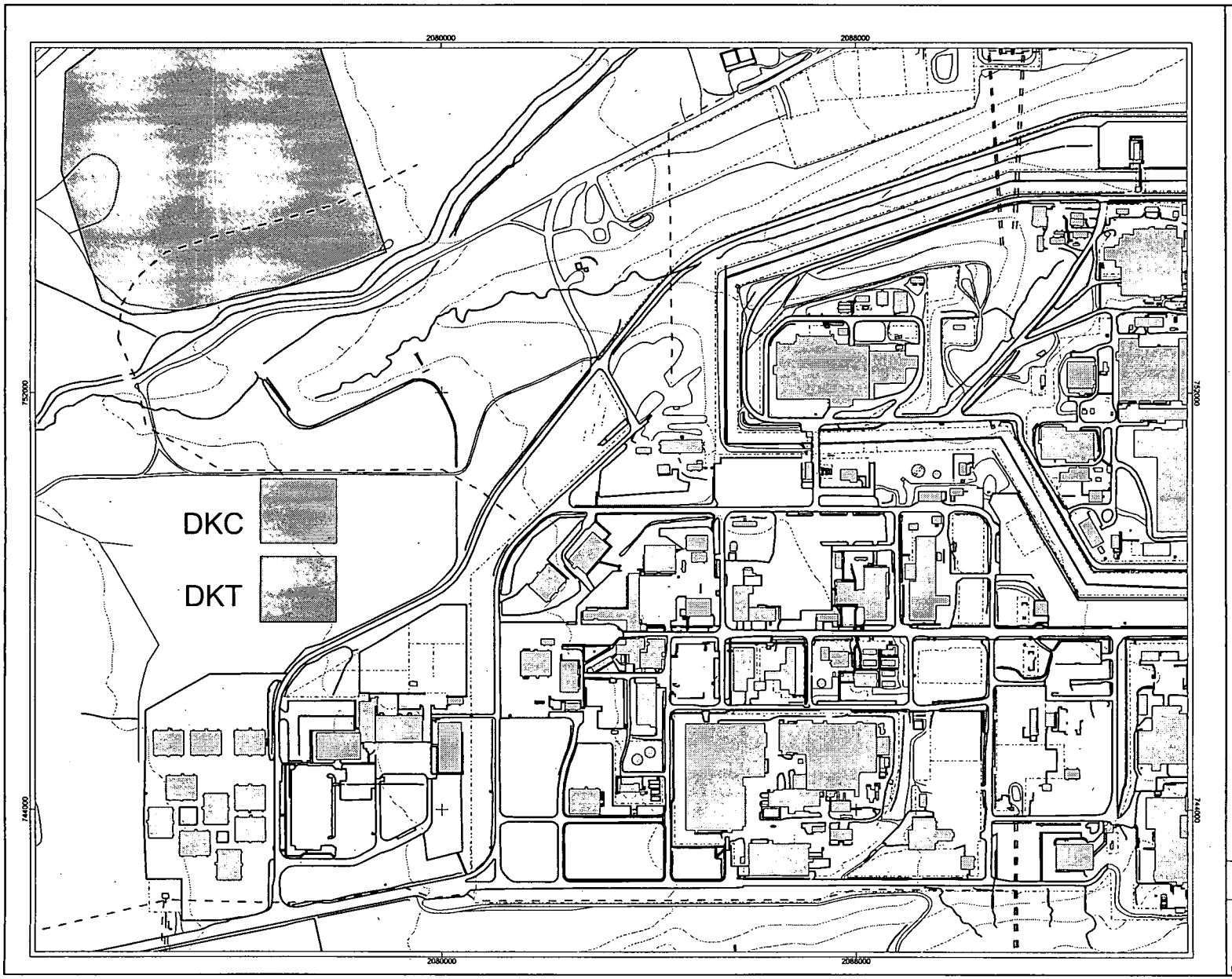

Diffuse Knapweed Herbicide Monitoring Plot Locations

Figure 4-1

LEGEND

- Control Plot
- Treatment Plot

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours.
The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution.
The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Location data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

N

1:5566

200 0 200 400 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2k-0038

May 3, 2001

\\Gisarv\GIS\ECO-projects\projects\2k-0038\veg monitoring locations 2001 apr\CEDI plots

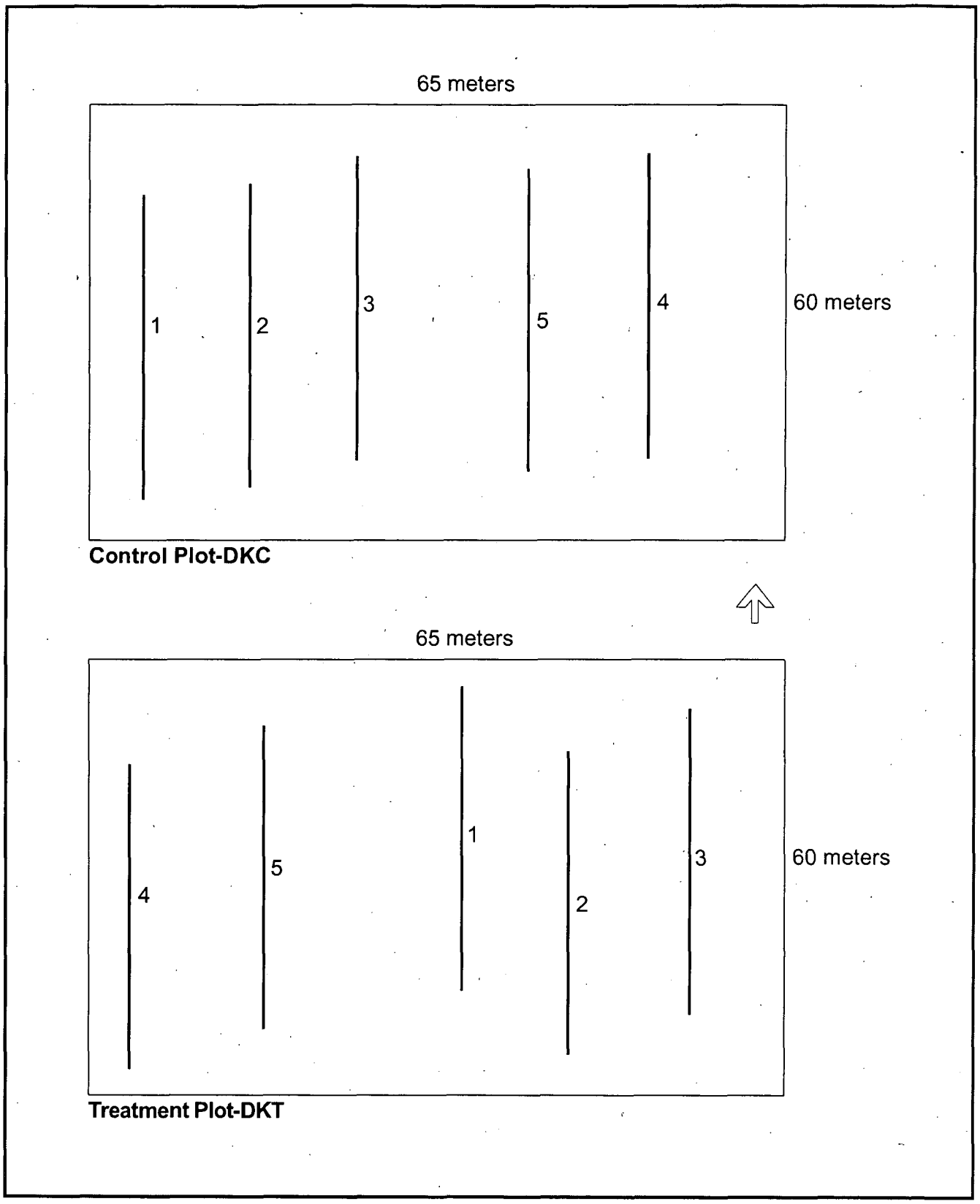

Figure 4-2. Diffuse knapweed monitoring plot and transect locations.

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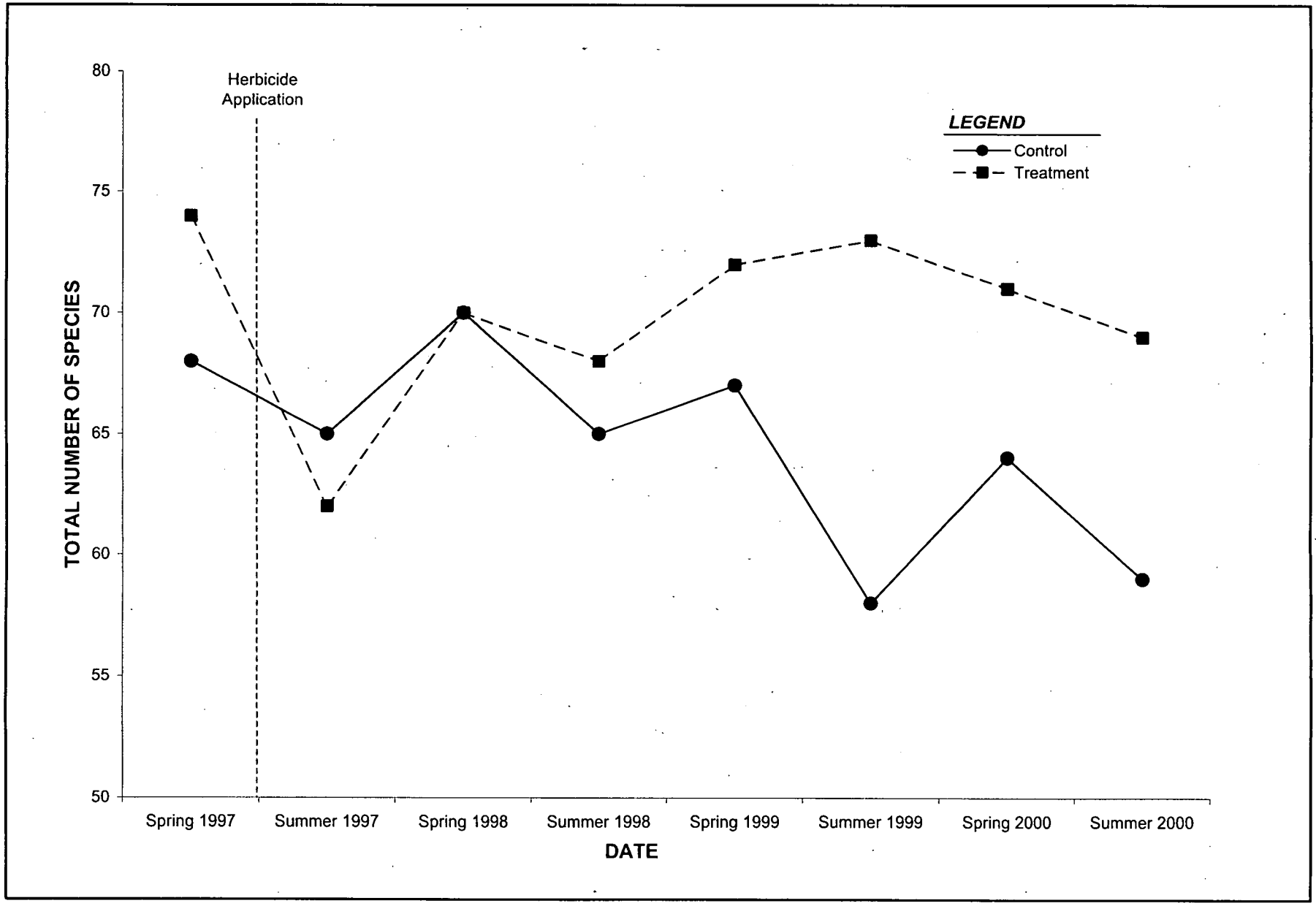

Figure 4-3. Diffuse knapweed herbicide monitoring study - species richness summary.

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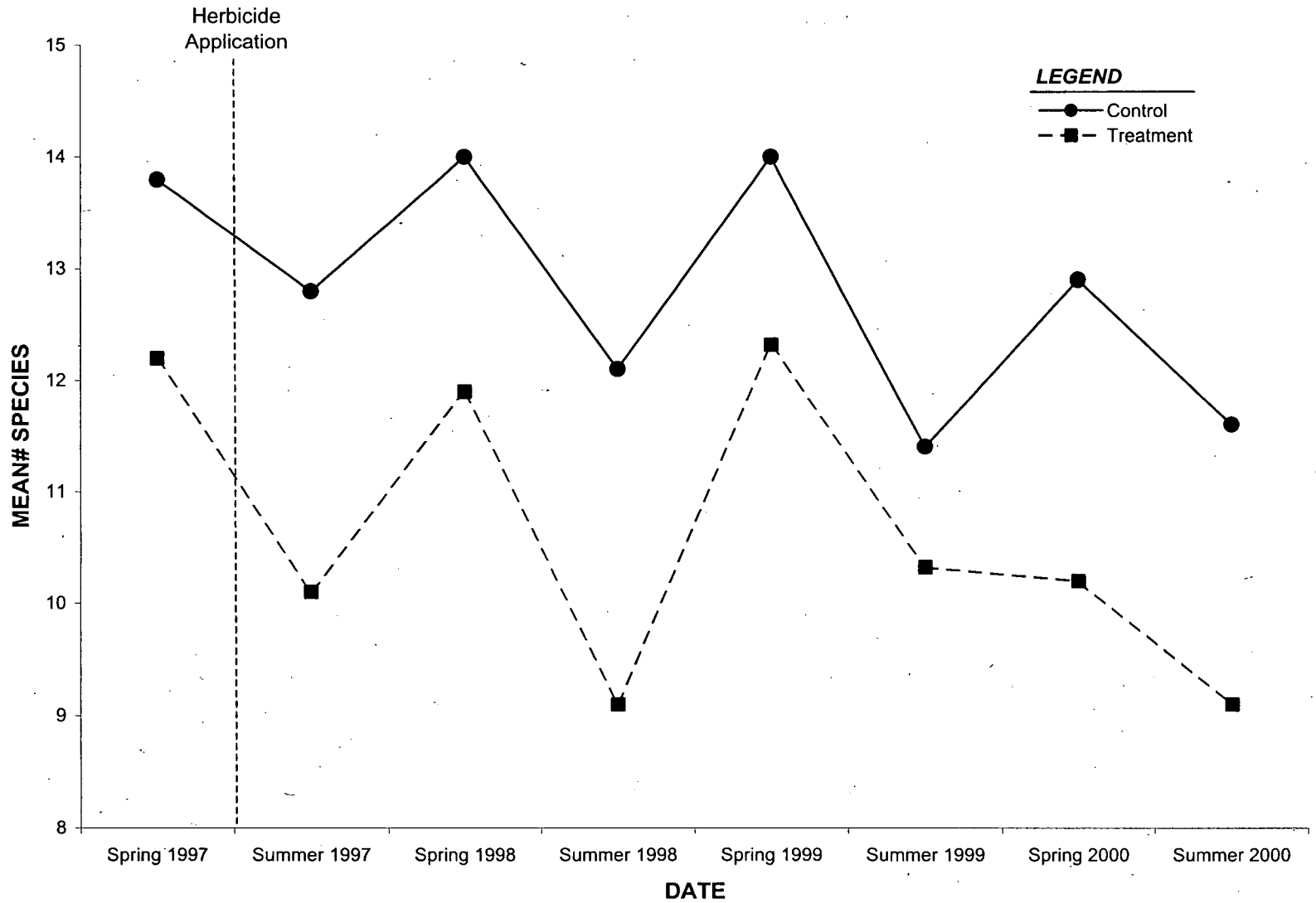

Figure 4-4. Diffuse knapweed herbicide monitoring study–#species/quadrat.

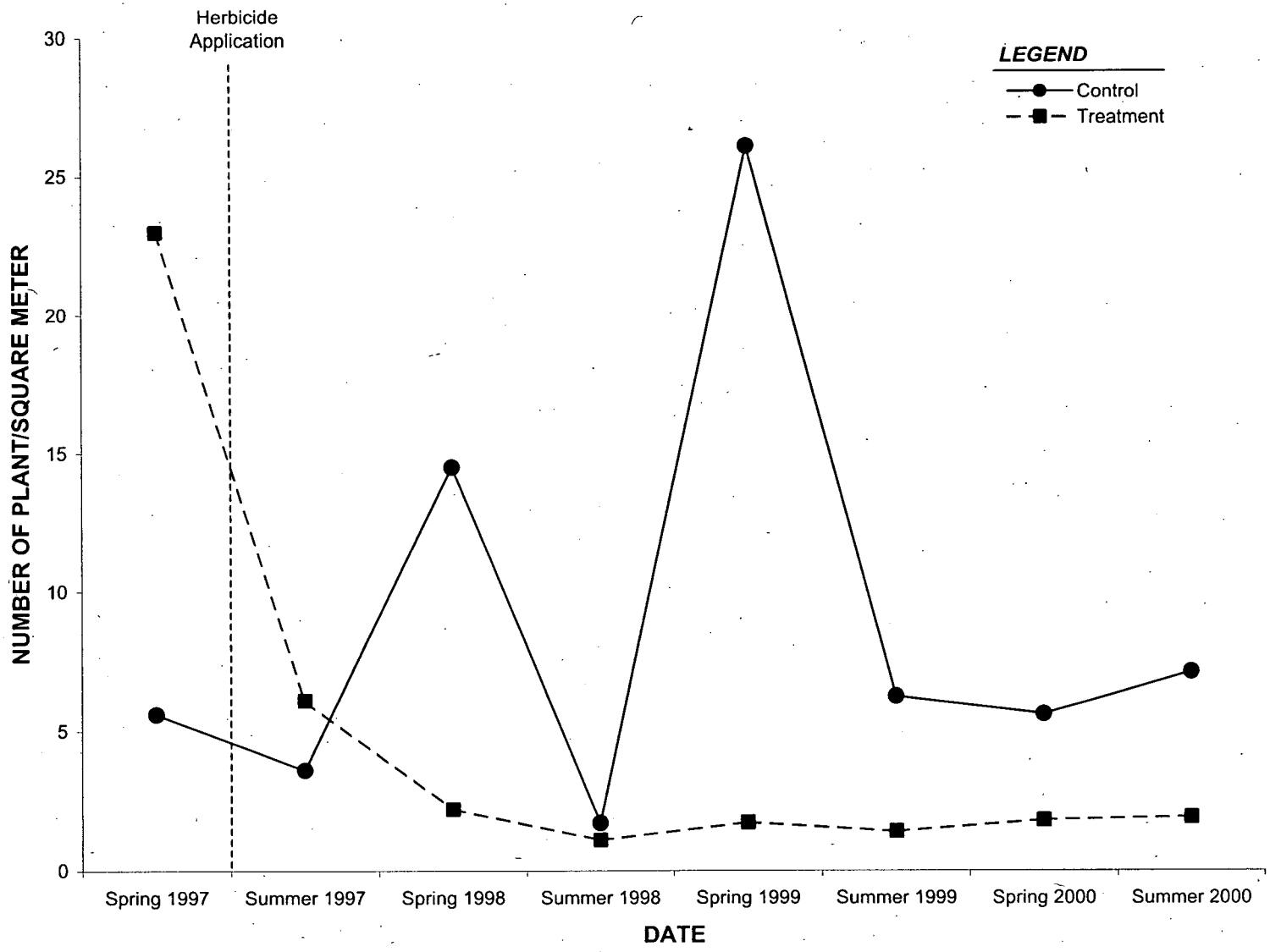

Figure 4-5. Diffuse knapweed herbicide monitoring study–Diffuse knapweed density.

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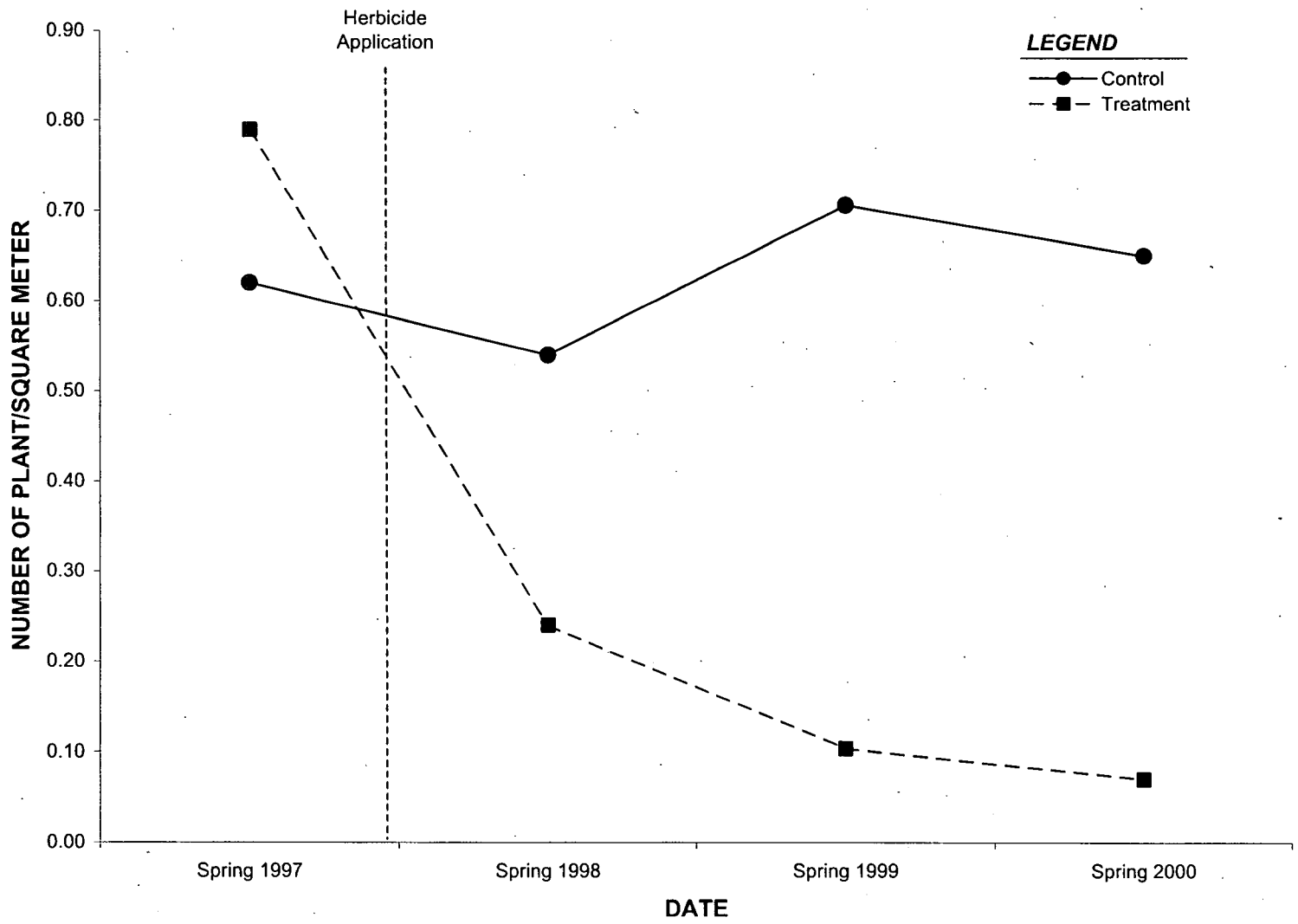

Figure 4-6. Diffuse knapweed herbicide monitoring study–Twistspine prickly pear cactus density.

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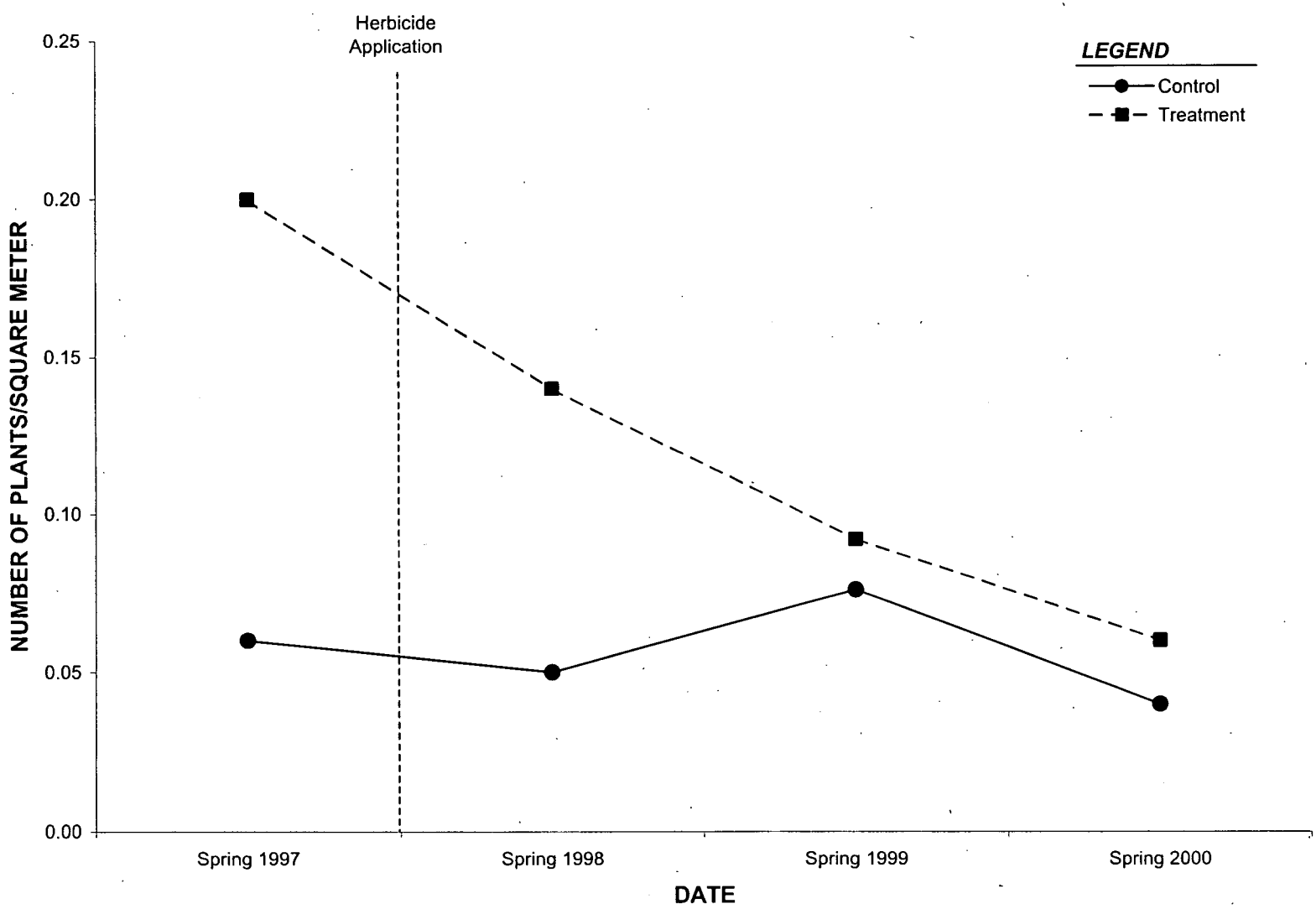

Figure 4-7. Diffuse knapweed herbicide monitoring study–Hedgehog cactus density.

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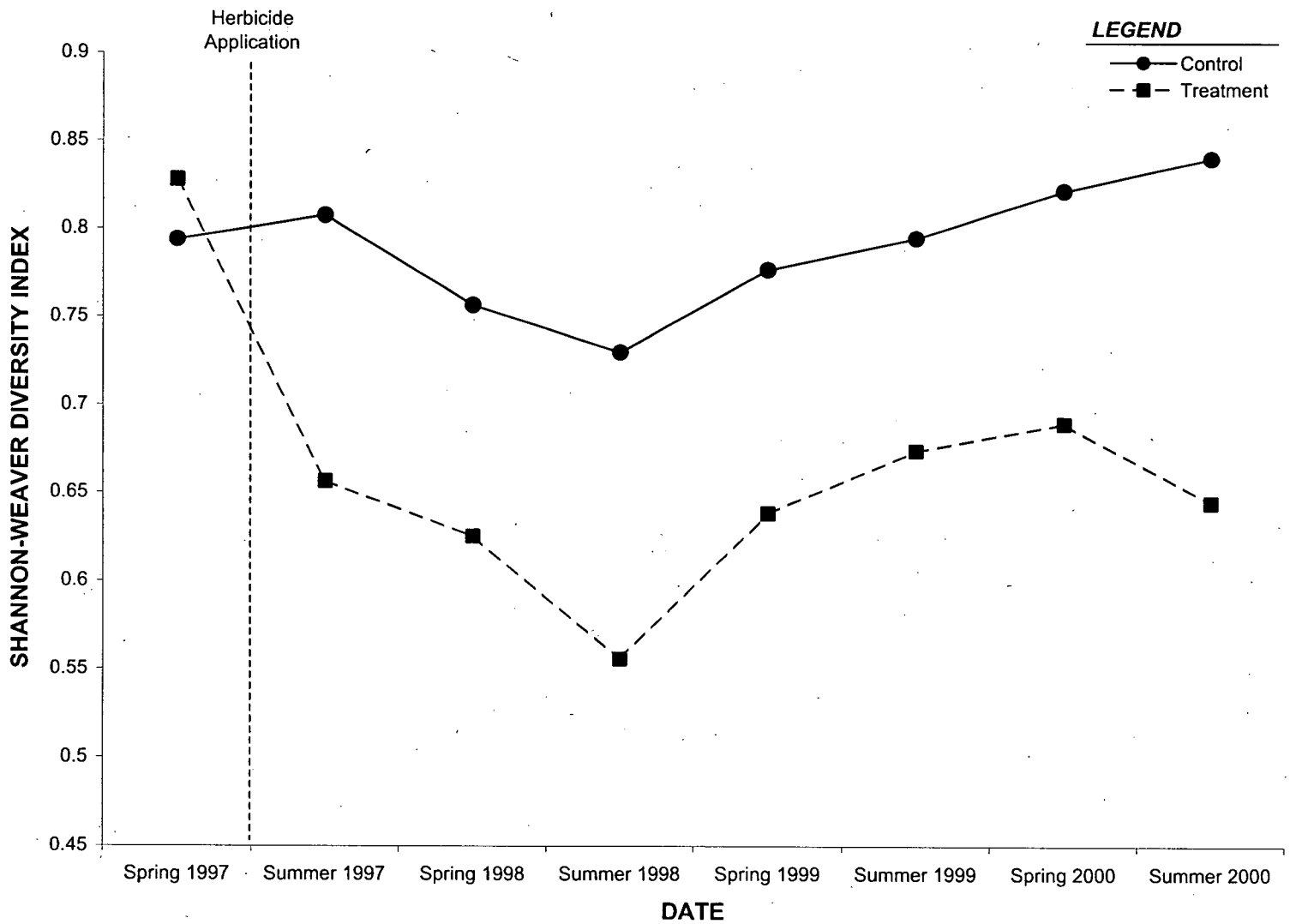

Figure 4-8. Diffuse knapweed herbicide monitoring study–Shannon-Weaver Diversity Index.

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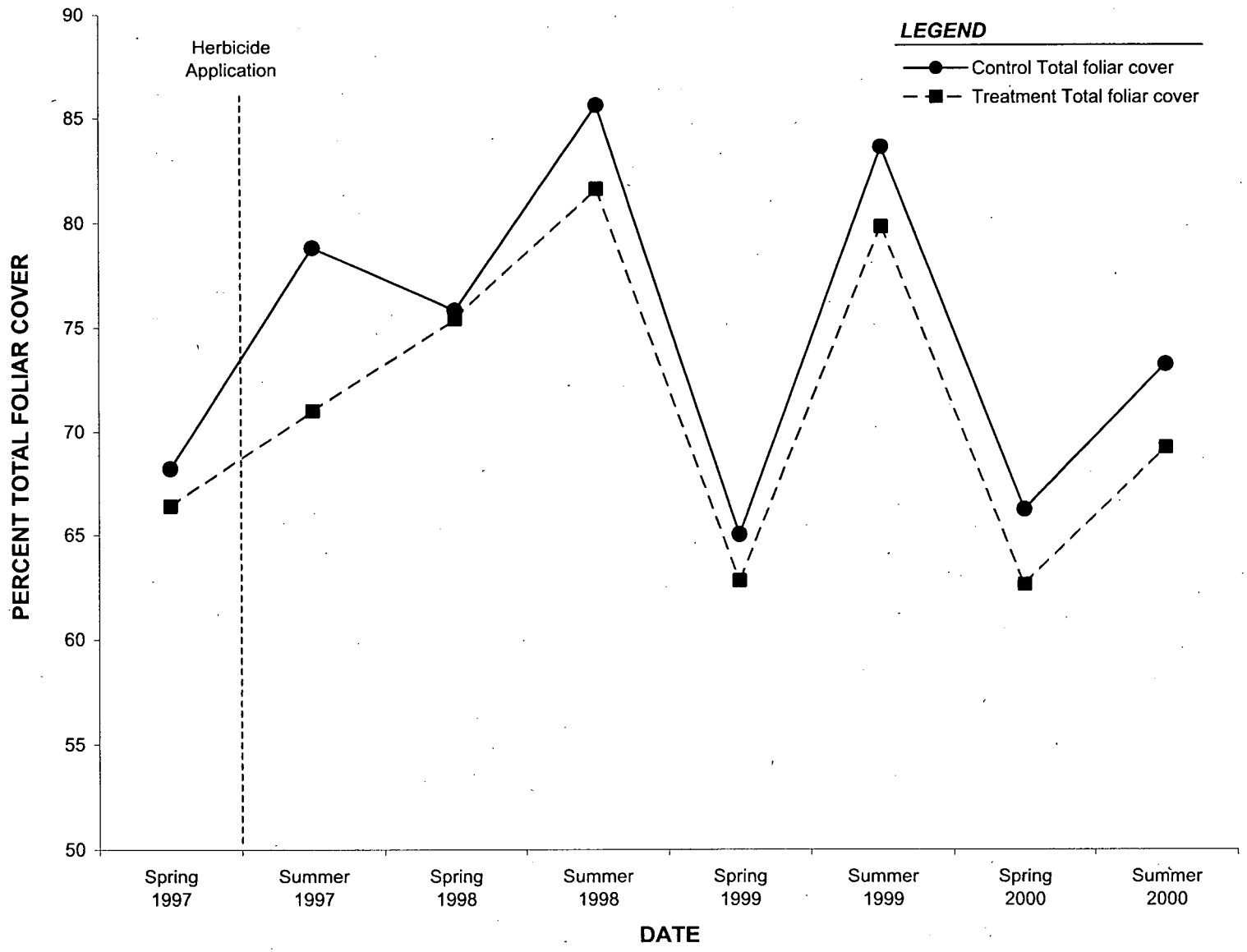

Figure 4-9. Diffuse knapweed herbicide monitoring study–Total foliar cover.

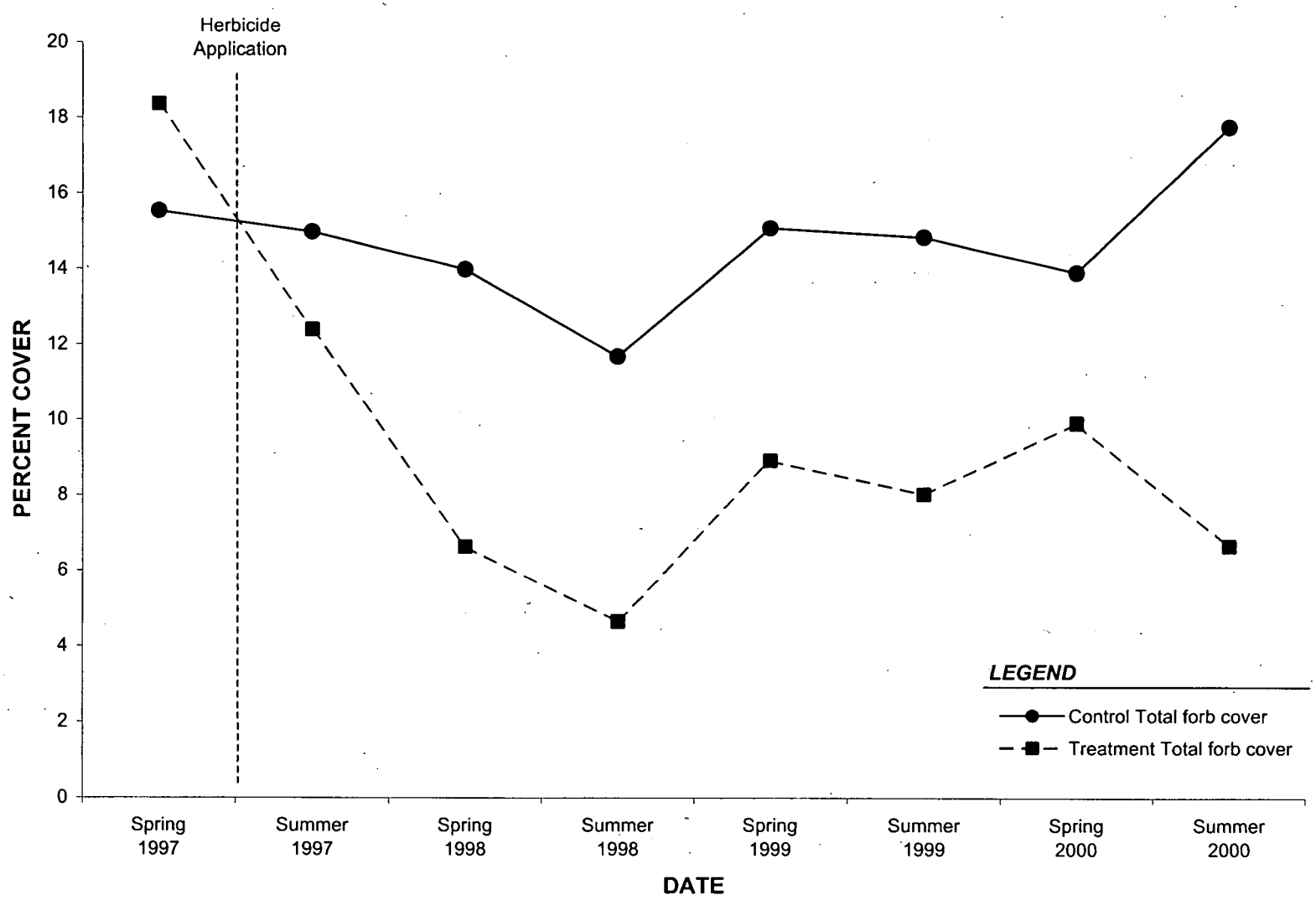

Figure 4-10. Diffuse knapweed herbicide monitoring study–Total relative forb cover.

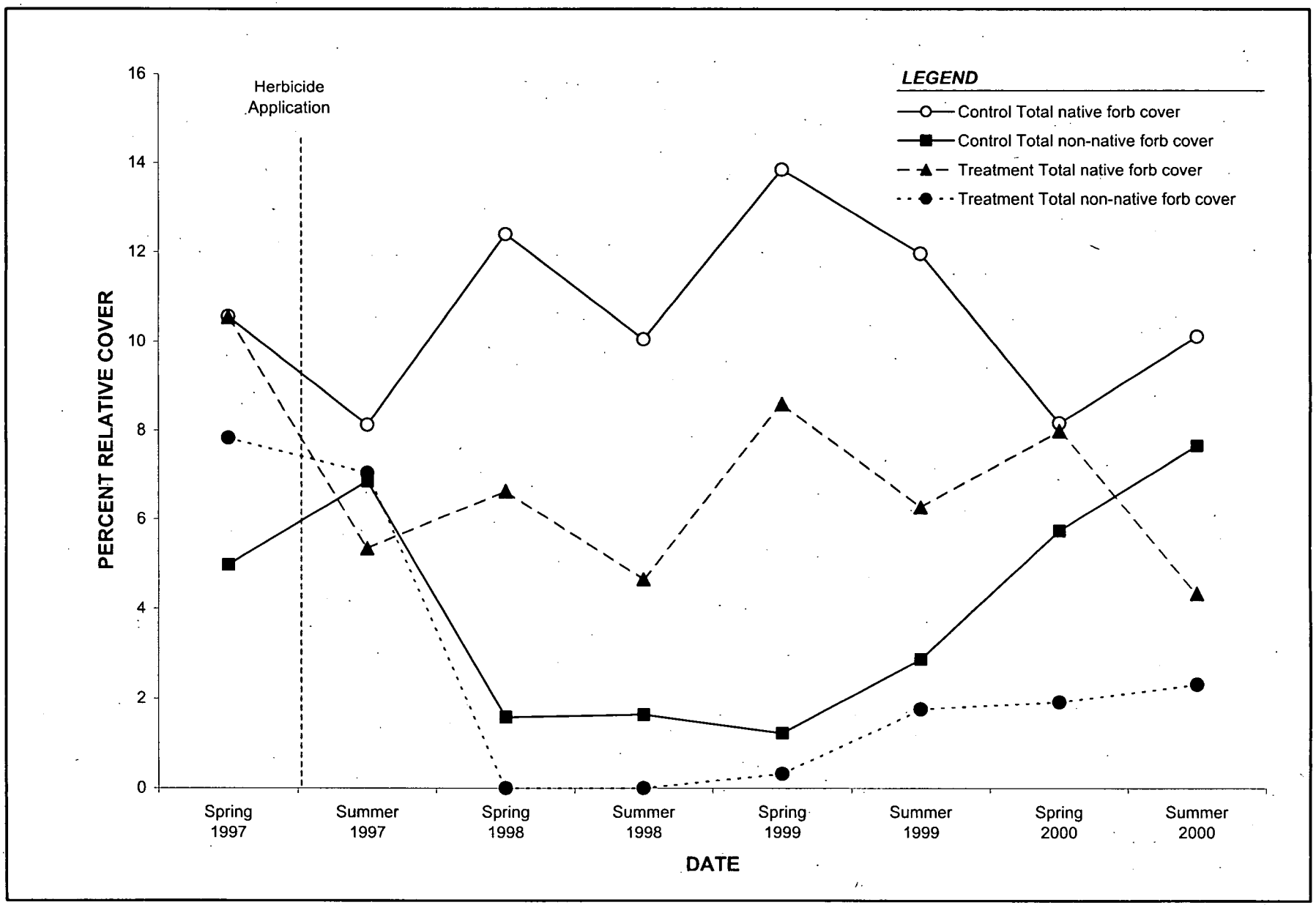

Figure 4-11. Diffuse knapweed herbicide monitoring study–Native vs. non-native forb cover.

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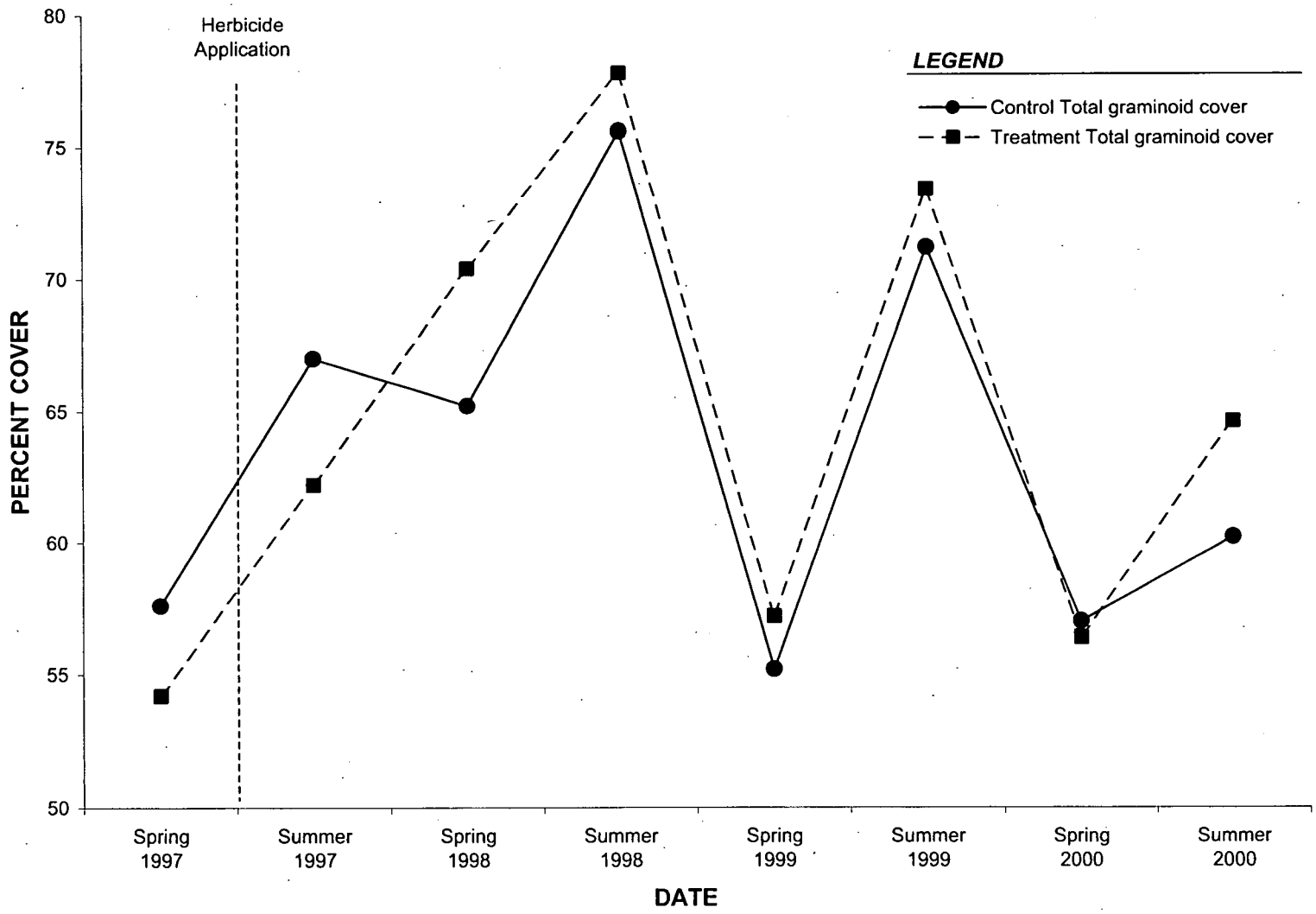

Figure 4-12. Diffuse knapweed herbicide monitoring study–Total absolute graminoid cover.

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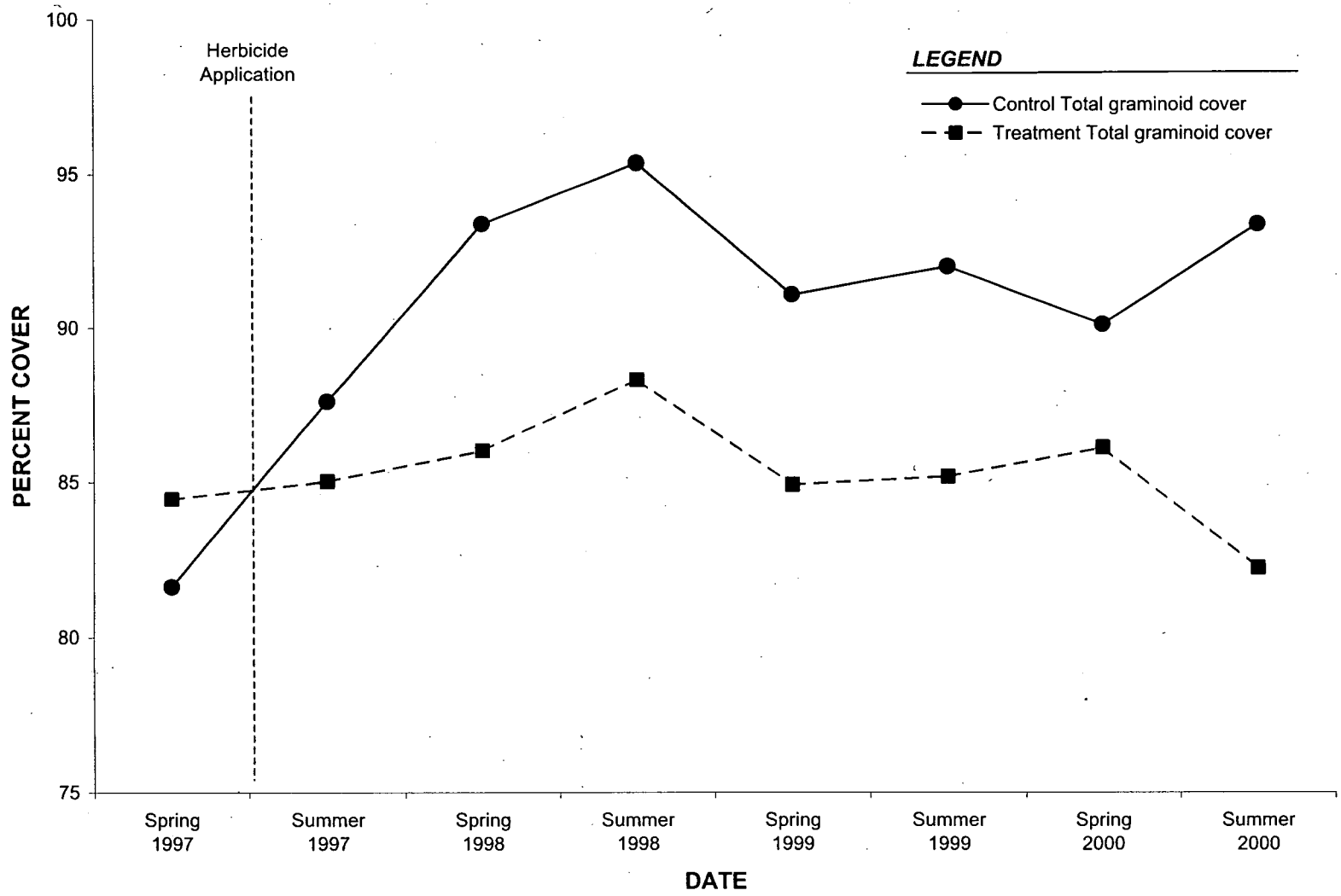

Figure 4-13. Diffuse knapweed herbicide monitoring study–Total relative graminoid cover.

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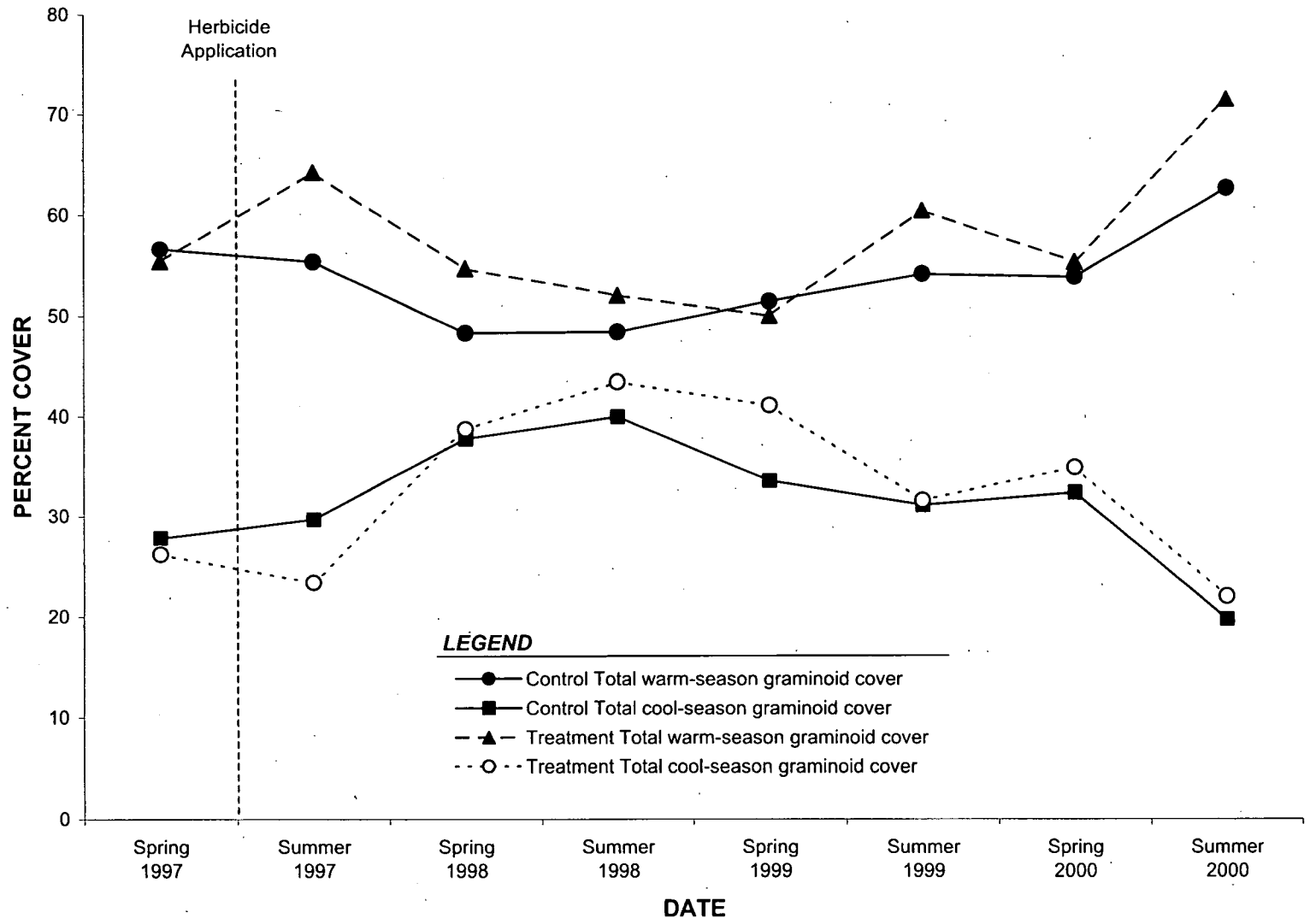

Figure 4-14. Diffuse knapweed herbicide monitoring study–Cool vs. warm season total relative graminoid cover.

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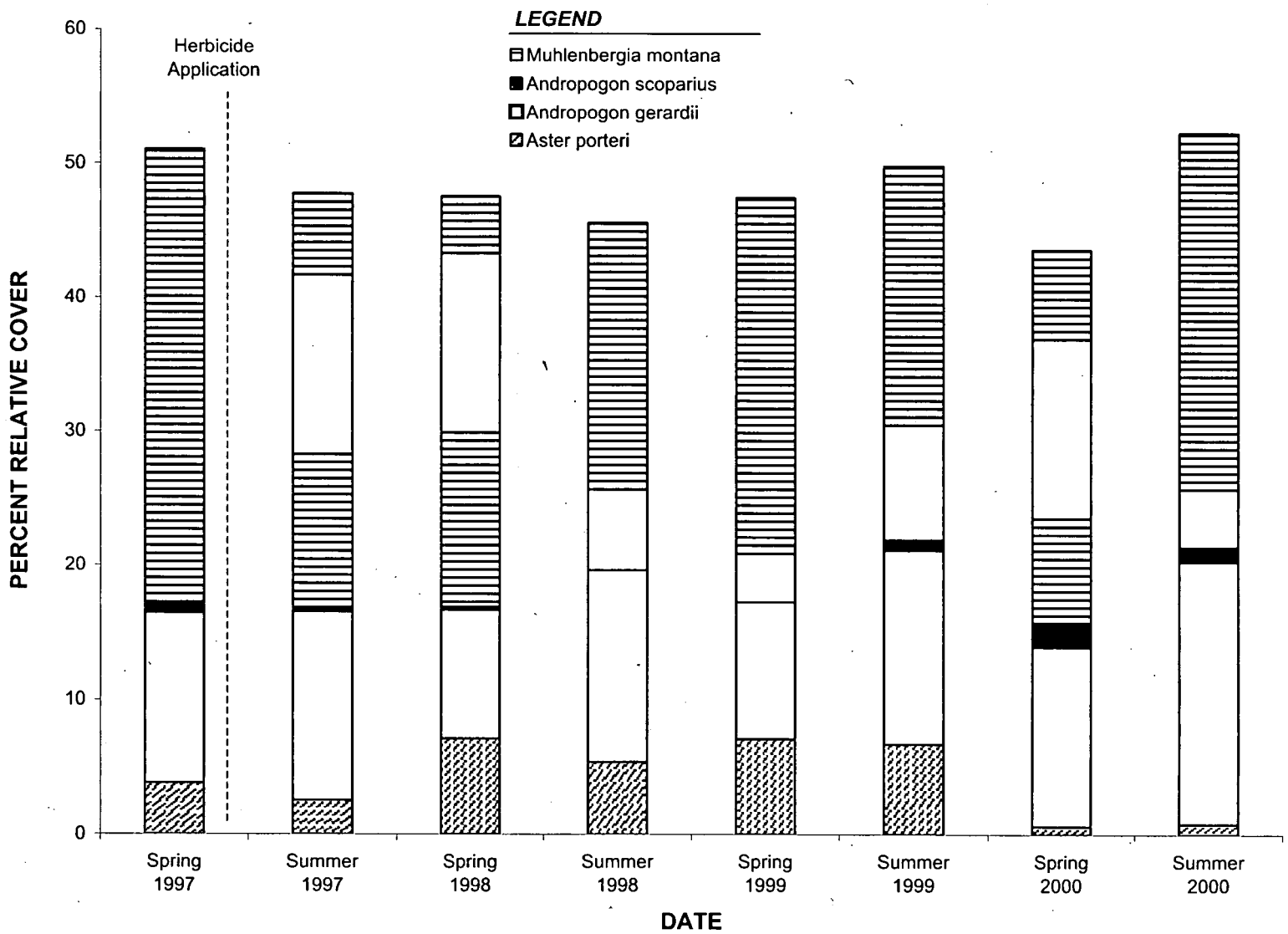

Figure 4-15. Diffuse knapweed herbicide monitoring study–Dominant species relative foliar cover 1997–2000, control plot.

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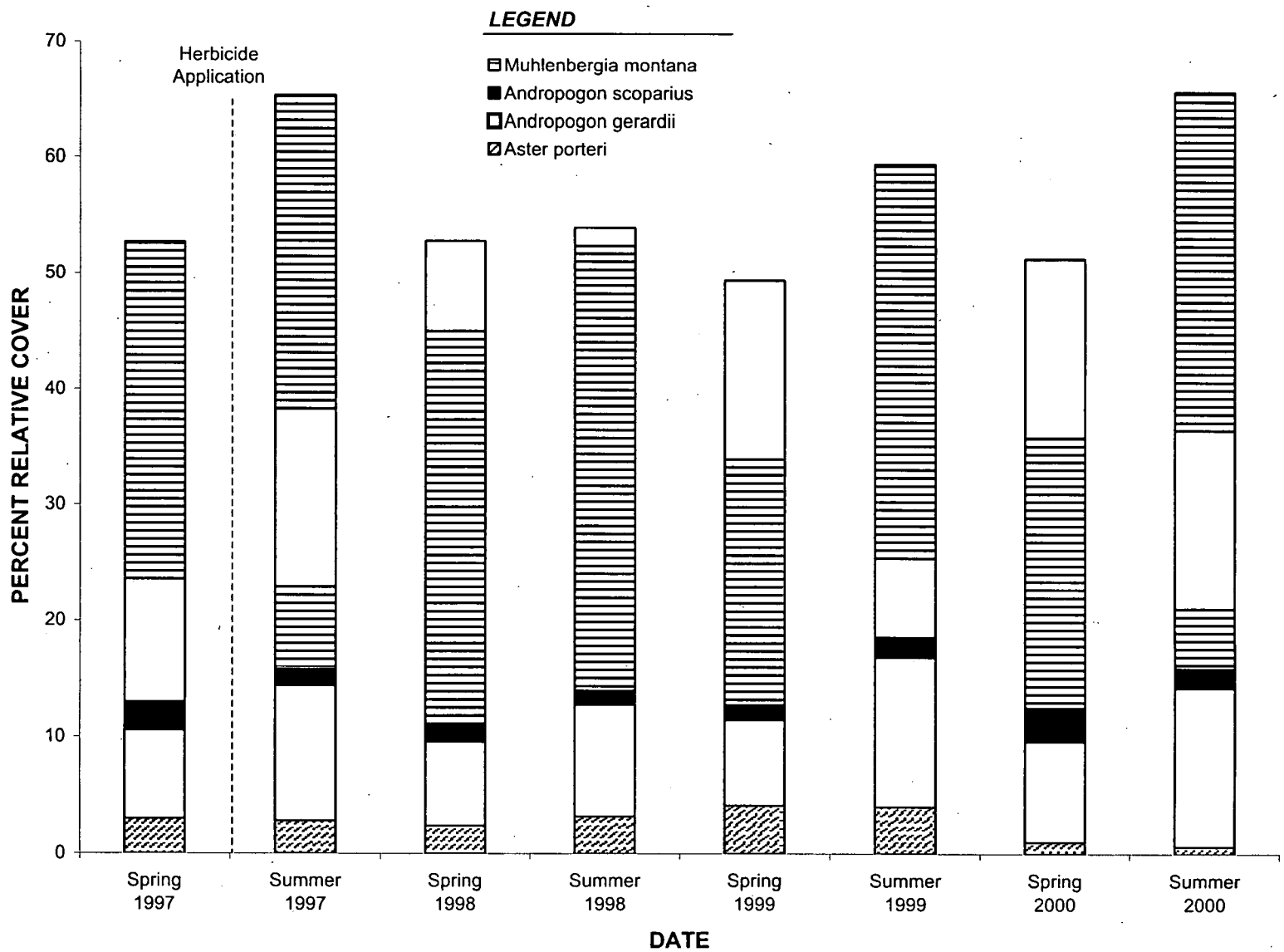

Figure 4-16. Diffuse knapweed herbicide monitoring study–Dominant species relative foliar cover 1997–2000, treatment plot.

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Table 4-1. 1997-2000 Diffuse Knapweed Herbicide Monitoring Data Summary

	Spring97	Summer97	Spring98	Summer98	Spring99	Summer99	Spring2k	Summer2k
Species Richness Variables								
# species								
DKC - Control	68	65	70	65	67	58	64	59
DKT - Treatment	74	62	70	68	72	73	71	69
% natives								
DKC - Control	75	74	74	77	76	76	78	81
DKT - Treatment	73	77	77	79	75	76	75	75
mean # species/quadrat								
DKC - Control	13.8	12.8	14	12.1	14	11.4	12.9	11.6
DKT - Treatment	12.2	10.1	11.9	9.1	12.3	10.3	10.2	9.1
Ground Cover (Average Percent)								
total basal vegetation cover								
DKC - Control	10.8	8	11.2	9.2	10.4	9.6	3.8	5.8
DKT - Treatment	10.8	10.2	10.2	8.8	8.8	9.4	4.8	6.6
rock cover								
DKC - Control	12.8	12	10.2	10.8	13.4	9	13.8	7.6
DKT - Treatment	19.8	17.4	18.2	17.2	17.6	19.2	18.2	15.2
bare ground cover								
DKC - Control	11.6	4	3	2.2	5.8	2.6	5.2	3.2
DKT - Treatment	9	5.4	2.6	3	4	3.2	5.2	1.8
litter cover								
DKC - Control	64.8	76	75.6	77.8	70.4	78.8	77.2	83.4
DKT - Treatment	60.4	67	69	71	69.6	68.2	71.8	76.4
Diffuse Knapweed Density (mean # stems/m2)								
DKC - Control	5.6	3.6	14.5	1.7	26.1	6.2	5.6	7.1
DKT - Treatment	23	6.1	2.2	1.1	1.7	1.4	1.8	1.9
Diffuse Knapweed Frequency (%)								
DKC - Control	76	76	76	60	96	64	68	64
DKT - Treatment	80	60	52	20	44	44	44	48
Cactus Densities (mean # stems/m2)								
Twistspine prickly pear cactus								
DKC - Control	0.62		0.54		0.71		0.65	
DKT - Treatment	0.79		0.24		0.1		0.07	
Hedgehog cactus								
DKC - Control	0.06		0.05		0.08		0.04	
DKT - Treatment	0.2		0.14		0.09		0.06	

Table 4-2. 1997-2000 Diffuse Knapweed Monitoring Study Species Richness Summary - Treatment Plot

Family	Scientific Name	Speccode	Native	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
		UNKN							X		
APIACEAE	Lomatium orientale Coult. & Rose	LOOR1	Y	X	X	X	X	X	X	X	X
ASCLEPIADACEAE	Asclepias stenophylla A. Gray	ASST1	Y	X			X	X	X	X	X
ASCLEPIADACEAE	Asclepias viridiflora Raf.	ASVI1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Antennaria parvifolia Nutt.	ANPA1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Arnica fulgens Pursh.	ARFU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	ARCA1	Y	X	X	X					
ASTERACEAE	Artemisia frigida Willd.	ARFR1	Y	X							
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Aster porteri Gray	ASPO1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	N	X					X	X	X
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	N	X	X	X	X	X	X	X	X
ASTERACEAE	Chrysopsis fulcrata Greene	CHFU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Chrysopsis villosa Pursh.	CHVI1	Y			X	X				
ASTERACEAE	Cirsium arvense (L.) Scop.	CIAR1	N	X		X		X			
ASTERACEAE	Conyza canadensis (L.) Cronq.	COCA1	Y						X		X
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	Y	X	X		X	X		X	X
ASTERACEAE	Erigeron flagellaris A. Gray	ERFL1	Y	X	X	X					X
ASTERACEAE	Gaillardia aristata Pursh.	GAAR1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Lactuca serriola L.	LASE1	N	X	X		X	X	X	X	X
ASTERACEAE	Liatris punctata Hook.	LIPU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Microseris cuspidata (Pursh.) Sch. Bip.	MICU1	Y	X		X		X		X	
ASTERACEAE	Scorzonera laciniata L.	SCLA1	N	X	X						X
ASTERACEAE	Senecio plattensis Nutt.	SEPL1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Senecio spartioides T. & G.	SESP1	Y		X		X	X	X	X	X
ASTERACEAE	Solidago mollis Bart.	SOMO1	Y	X	X	X	X		X	X	X
ASTERACEAE	Sonchus arvensis L. ssp. arvensis L.	SOAR1	N							X	X
ASTERACEAE	Taraxacum officinale Weber	TAOF1	N	X	X	X	X	X	X	X	X
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	N	X	X	X	X	X	X	X	X
BORAGINACEAE	Mertensia lanceolata (Pursh.) A. DC.	MELA1	Y	X							
BRASSICACEAE	Alyssum alyssoides (L.) L.	ALAL1	N	X							
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	N	X	X	X	X	X	X	X	X
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	Y	X	X			X	X	X	X
BRASSICACEAE	Barbarea vulgaris R. Br.	BAVU1	N	X	X	X		X	X	X	X
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	CAMI1	N	X		X	X	X	X	X	
BRASSICACEAE	Draba reptans (Lam.) Fern.	DRRE1	Y				X				
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	ERCA2	Y	X	X	X	X	X	X	X	X
BRASSICACEAE	Lepidium campestre (L.) R. Br.	LECA1	N	X	X	X	X	X	X	X	X
BRASSICACEAE	Lepidium densiflorum Schrad.	LEDE1	Y	X	X	X	X		X	X	

Table 4-2. (cont.)

Family	Scientific Name	Speccode	Native	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	LEMO1	Y	X	X	X	X	X	X	X	X
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	N			X		X	X		
CACTACEAE	Coryphantha missouriensis (Sweet) Britt. & Rose	COMI1	Y	X							
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	Y	X	X	X	X	X	X	X	X
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	Y	X	X	X	X	X	X	X	X
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	ARFE2	Y	X	X	X	X	X	X	X	X
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	PAJA1	Y	X	X	X	X	X	X	X	X
CARYOPHYLLACEAE	Silene antirrhina L.	SIAN1	Y	X	X	X	X	X	X	X	X
CLUSIACEAE	Hypericum perforatum L.	HYPE1	N	X	X	X	X	X	X	X	X
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	TROC1	Y	X		X	X	X	X	X	
CRASSULACEAE	Sedum lanceolatum Torr.	SELA1	Y	X	X	X	X	X	X	X	X
CYPERACEAE	Carex heliophila Mack.	CAHE1	Y	X	X	X	X	X	X	X	X
CYPERACEAE	Eleocharis compressa Sulliv.	ELCO1	Y	X	X	X	X	X	X	X	X
FABACEAE	Dalea purpurea Vent	DAPU1	Y	X	X	X	X	X	X	X	X
FABACEAE	Medicago lupulina L.	MELU1	N	X							
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	Y	X	X	X	X	X	X	X	X
HYDROPHYLLACEAE	Phacelia heterophylla Pursh.	PHHE1	Y		X	X	X	X	X	X	X
JUNCACEAE	Juncus interior Wieg.	JUIN1	Y			X	X	X	X		X
LAMIACEAE	Hedeoma hispidum Pursh.	HEHI1	Y			X				X	
LILIACEAE	Allium textile A. Nels. & Macbr.	ALTE1	Y	X	X	X	X	X	X	X	
ONAGRACEAE	Oenothera villosa Thunb. ssp. strigosa (Rydb.) Dietrich & Raven	OEVI1	Y					X	X	X	X
OROBANCHACEAE	Orobanche fasciculata Nutt.	ORFA1	Y		X	X	X	X		X	X
PLANTAGINACE	Plantago lanceolata L.	PLLA1	N	X	X	X	X	X	X	X	X
PLANTAGINACE	Plantago patagonica Jacq.	PLPA1	Y	X							
POACEAE	Agropyron smithii Rydb.	AGSM1	Y			X		X			
POACEAE	Andropogon gerardii Vitman	ANGE1	Y	X	X	X	X	X	X	X	X
POACEAE	Andropogon scoparius Michx.	ANSC1	Y	X	X	X	X	X	X	X	X
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	Y						X		X
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	Y	X	X	X	X	X	X	X	X
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	Y	X	X	X	X	X	X	X	X
POACEAE	Bouteloua hirsuta Lag	BOHI1	Y	X	X	X	X	X	X	X	X
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	N	X	X	X	X	X	X	X	X
POACEAE	Bromus tectorum L.	BRTE1	N	X	X	X	X	X	X	X	X
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	BUDA1	Y	X	X		X	X	X	X	X
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1	Y	X	X	X	X	X	X	X	X
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	Y	X	X	X	X	X	X	X	X
POACEAE	Muhlenbergia wrightii Vasey	MUWR1	Y			X	X	X		X	X
POACEAE	Panicum capillare L.	PACA1	Y						X		
POACEAE	Poa compressa L.	POCO1	N	X	X	X	X	X	X	X	X
POACEAE	Poa pratensis L.	POPR1	N	X	X	X	X	X	X	X	X
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	Y	X	X		X	X	X	X	X
POACEAE	Sorghastrum nutans (L.) Nash	SONU1	Y		X	X	X		X	X	X

Table 4-2. (cont.)

Family	Scientific Name	Speccode	Native	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	Y	X	X	X	X	X	X	X	X
POACEAE	Stipa comata Trin. & Rupr.	STCO1	Y			X					
POLEMONIACEAE	Collomia linearis Nutt.	COLI1	Y	X		X	X	X	X		
POLYGONACEAE	Eriogonum alatum Torr.	ERAL1	Y	X	X	X	X	X	X	X	X
POLYGONACEAE	Polygonum arenastrum Jord. ex Bor.	POAR1	N					X			
POLYGONACEAE	Polygonum ramosissimum Michx.	PORA1	Y			X	X	X	X		
POLYGONACEAE	Rumex crispus L.	RUCR1	N	X		X	X	X	X	X	
PORTULACACEAE	Talinum parviflorum Nutt.	TAPA1	Y	X				X	X	X	X
ROSACEAE	Potentilla gracilis Dougl. ex Hook. var. glabrata (Lehm.) C. L. Hitchc.	POGR1	Y	X							
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1	N							X	X
SCROPHULARIACEAE	Penstemon virens Penn.	PEVI1	Y	X	X	X	X	X	X	X	X
SCROPHULARIACEAE	Veronica peregrina L. var. xalapensis (H. B. K.) St. John & Warren	VEPE1	Y			X	X	X	X		
	Number of Species			74	62	70	68	72	73	71	69
	Percent Native Species			73	77	77	79	75	76	75	75

Table 4-3. 1997-2000 Diffuse Knapweed Monitoring Study Species Richness Summary - Control Plot

Family	Scientific Name	Speccode	Native	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
APIACEAE	Lomatium orientale Coult. & Rose	LOOR1	Y	X	X	X	X	X		X	X
ASCLEPIADACEAE	Asclepias stenophylla A. Gray	ASST1	Y	X	X	X	X	X	X	X	X
ASCLEPIADACEAE	Asclepias viridiflora Raf.	ASVI1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Antennaria parvifolia Nutt.	ANPA1	Y	X	X	X		X	X		
ASTERACEAE	Arnica fulgens Pursh.	ARFU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	ARCA1	Y	X	X		X			X	X
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Aster porteri Gray	ASPO1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	N	X	X	X	X				
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	N	X	X	X	X	X	X	X	X
ASTERACEAE	Chrysopsis fulcrata Greene	CHFU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Chrysopsis villosa Pursh.	CHVI1	Y			X	X			X	
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	Y				X	X		X	
ASTERACEAE	Erigeron flagellaris A. Gray	ERFL1	Y	X	X	X	X		X		X
ASTERACEAE	Gaillardia aristata Pursh.	GAAR1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Lactuca serriola L.	LASE1	N	X	X	X	X	X	X		
ASTERACEAE	Liatris punctata Hook.	LIPU1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Microseris cuspidata (Pursh.) Sch. Bip.	MICU1	Y	X		X		X			
ASTERACEAE	Scorzonera laciniata L.	SCLA1	N	X	X	X		X		X	
ASTERACEAE	Senecio plattensis Nutt.	SEPL1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Solidago mollis Bart.	SOMO1	Y	X	X	X	X	X	X	X	X
ASTERACEAE	Solidago rigida L.	SORI1	Y		X	X	X	X	X	X	X
ASTERACEAE	Taraxacum officinale Weber	TAOF1	N	X	X	X	X	X	X	X	X
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	N	X	X	X	X	X	X	X	X
BORAGINACEAE	Lithospermum incisum Lehm.	LIIN1	Y	X	X	X		X		X	X
BORAGINACEAE	Mertensia lanceolata (Pursh.) A. DC.	MELA1	Y			X		X			X
BRASSICACEAE	Alyssum alyssoides (L.) L.	ALAL1	N			X					
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	N	X	X	X	X	X	X	X	X
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	Y			X	X				
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	CAMI1	N	X	X	X	X	X	X		
BRASSICACEAE	Draba reptans (Lam.) Fern.	DRRE1	Y	X	X	X		X			
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	ERCA2	Y	X	X	X	X	X	X	X	X
BRASSICACEAE	Lepidium campestre (L.) R. Br.	LECA1	N	X	X	X	X	X	X	X	X
BRASSICACEAE	Lepidium densiflorum Schrad.	LEDE1	Y	X	X						
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	LEMO1	Y	X	X	X	X	X	X	X	X
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	N	X	X						
CACTACEAE	Coryphantha missouriensis (Sweet) Britt. & Rose	COMI1	Y	X				X			
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	Y	X	X	X	X	X	X	X	X
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	Y	X	X	X	X	X	X	X	X
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	ARFE2	Y	X	X	X	X	X	X	X	X

Table 4-3. (cont.)

Family	Scientific Name	Speccode	Native	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	PAJA1	Y	X			X			X	
CARYOPHYLLACEAE	Silene antirrhina L.	SIAN1	Y	X	X	X		X		X	
CLUSIACEAE	Hypericum perforatum L.	HYPE1	N	X	X	X	X	X	X	X	X
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	TROC1	Y	X							
CYPERACEAE	Carex heliophila Mack.	CAHE1	Y	X	X	X	X	X	X	X	X
CYPERACEAE	Eleocharis compressa Sulliv.	ELCO1	Y	X	X	X	X	X	X	X	X
FABACEAE	Dalea purpurea Vent	DAPU1	Y	X	X	X	X	X	X	X	X
FABACEAE	Oxytropis lambertii Pursh.	OXLA1	Y	X					X		
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	Y	X	X	X	X	X	X	X	X
JUNCACEAE	Juncus interior Wieg.	JUIN1	Y		X	X	X	X	X	X	X
LILIACEAE	Allium textile A. Nels. & Macbr.	ALTE1	Y	X	X	X	X	X	X	X	X
LILIACEAE	Leucocrinum montanum Nutt.	LEMO2	Y	X		X		X			
NYCTAGINACEAE	Mirabilis linearis (Pursh.) Heimerl	MILI1	Y								X
ONAGRACEAE	Oenothera villosa Thunb. ssp. strigosa (Rydb.) Dietrich & Raven	OEVI1	Y	X	X	X	X	X	X	X	X
OROBANCHACEAE	Orobanche fasciculata Nutt.	ORFA1	Y	X				X		X	
PLANTAGINACE	Plantago lanceolata L.	PLLA1	N	X	X	X	X	X	X	X	X
POACEAE	Agropyron smithii Rydb.	AGSM1	Y	X							X
POACEAE	Andropogon gerardii Vitman	ANGE1	Y	X	X	X	X	X	X	X	X
POACEAE	Andropogon scoparius Michx.	ANSC1	Y	X	X	X	X	X	X	X	X
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	Y		X				X	X	X
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	Y	X	X	X	X	X	X	X	X
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	Y	X	X	X	X	X	X	X	X
POACEAE	Bouteloua hirsuta Lag	BOHI1	Y	X	X	X	X	X	X	X	X
POACEAE	Bromus inermis Leyss. ssp. inermis	BRIN1	N	X	X	X	X	X	X	X	X
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	N	X	X	X	X	X	X	X	
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1	Y	X	X	X	X	X	X	X	X
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	Y	X	X	X	X	X	X	X	X
POACEAE	Muhlenbergia wrightii Vasey	MUWR1	Y							X	
POACEAE	Poa compressa L.	POCO1	N	X	X	X	X	X	X	X	X
POACEAE	Poa pratensis L.	POPR1	N	X	X	X	X	X	X	X	X
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	Y	X	X		X	X	X	X	X
POACEAE	Sorghastrum nutans (L.) Nash	SONU1	Y		X	X	X		X	X	X
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	Y	X	X	X	X	X	X	X	X
POACEAE	Stipa comata Trin. & Rupr.	STCO1	Y				X		X		
POLYGONACEAE	Eriogonum alatum Torr.	ERAL1	Y			X	X			X	X
POLYGONACEAE	Polygonum convolvulus L.	POCO2	N			X					
POLYGONACEAE	Polygonum ramosissimum Michx.	PORA1	Y			X	X				
PORTULACACEAE	Talinum parviflorum Nutt.	TAPA1	Y		X	X	X	X	X	X	X
ROSACEAE	Prunus virginiana L. var. melanocarpa (A. Nels.) Sarg.	PRVI1	Y	X	X	X	X	X	X	X	X
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1	N					X		X	
SCROPHULARIACEAE	Penstemon virens Penn.	PEVI1	Y	X	X	X	X	X	X	X	X
SCROPHULARIACEAE	Verbascum blattaria L.	VEBL1	N	X	X	X	X	X	X	X	X
SCROPHULARIACEAE	Veronica peregrina L. var. xalapensis (H. B. K.) St. John & Warren	VEPE1	Y			X	X	X			

Table 4-4. 1997-2000 Diffuse Knapweed Monitoring Study Species Frequency Summary - Control Plot

Family	Scientific Name	Native	Speccode	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
APIACEAE	Lomatium orientale Coult. & Rose	Y	LOOR1	92		92	48	100		96	4
ASCLEPIADACEAE	Asclepias stenophylla A. Gray	Y	ASST1	8	4			4	4		4
ASCLEPIADACEAE	Asclepias viridiflora Raf.	Y	ASVI1	8	12	8	8	12	12	8	8
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	Y	ACMI1	8	8	8	4	8	4	4	4
ASTERACEAE	Ambrosia psilostachya DC.	Y	AMPS1	72	68	64	68	64	60	60	64
ASTERACEAE	Arnica fulgens Pursh.	Y	ARFU1	36	16	40	28	40	12	32	8
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	Y	ARLU1	68	68	68	64	68	64	68	68
ASTERACEAE	Aster porteri Gray	Y	ASPO1	76	76	84	76	76	76	52	40
ASTERACEAE	Centaurea diffusa Lam.	N	CEDI1	76	76	76	60	96	64	68	64
ASTERACEAE	Chrysopsis fulcrata Greene	Y	CHFU1	8	8	8	4	4	4	4	8
ASTERACEAE	Erigeron divergens T. & G.	Y	ERDI1					4		4	
ASTERACEAE	Erigeron flagellaris A. Gray	Y	ERFL1	4	4	4	4		4		4
ASTERACEAE	Gaillardia aristata Pursh.	Y	GAAR1	12	4	8	4	12	8	4	8
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	Y	GRSQ1	56	48	68	40	40	32	32	20
ASTERACEAE	Lactuca serriola L.	N	LASE1	12	12	28	8	20	4		
ASTERACEAE	Liatris punctata Hook.	Y	LIPU1	16	20	20	28	24	24	16	24
ASTERACEAE	Microseris cuspidata (Pursh.) Sch. Bip.	Y	MICU1	4		8		4			
ASTERACEAE	Senecio plattensis Nutt.	Y	SEPL1	8	4	4		16	4	4	8
ASTERACEAE	Solidago mollis Bart.	Y	SOMO1	24	24	28	28	28	24	28	24
ASTERACEAE	Tragopogon dubius Scop.	N	TRDU1	8	16	44	32	32	20	24	32
BORAGINACEAE	Lithospermum incisum Lehm.	Y	LIIN1	4	4						4
BORAGINACEAE	Mertensia lanceolata (Pursh.) A. DC.	Y	MELA1			4					
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	N	ALMI1	28	20	12	16	20	8	4	4
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	N	CAMI1	8				8	4		
BRASSICACEAE	Draba reptans (Lam.) Fern.	Y	DRRE1	16	4	4		12			
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	Y	ERCA2	8	4	8		4			
BRASSICACEAE	Lepidium campestre (L.) R. Br.	N	LECA1		4	4	4	12	8	4	
BRASSICACEAE	Lepidium densiflorum Schrad.	Y	LEDE1	4	4						
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	Y	LEMO1	8	8	12	16	28	16	12	12
CACTACEAE	Echinocereus viridiflorus Engelm.	Y	ECVI1	16	16	20	8	8	4	4	12
CACTACEAE	Opuntia macrorhiza Engelm.	Y	OPMA1	40	40	40	40	36	32	48	44
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	Y	ARFE2	32	44	20	44	32	36	32	36
CARYOPHYLLACEAE	Silene antirrhina L.	Y	SIAN1	8	8	4		12		8	
CLUSIACEAE	Hypericum perforatum L.	N	HYPE1	52	64	44	16	24	16	20	28
CYPERACEAE	Carex heliophila Mack.	Y	CAHE1	64	72	72	68	56	60	68	76
FABACEAE	Dalea purpurea Vent	Y	DAPU1	8	4	8	8	8	8	8	8
FABACEAE	Psoralea tenuiflora Pursh.	Y	PSTE1	32	40	44	36	36	44	44	36
JUNCACEAE	Juncus interior Wieg.	Y	JUIN1		4		4		4		4
LILIACEAE	Allium textile A. Nels. & Macbr.	Y	ALTE1	20	4	8		8			
NYCTAGINACEAE	Mirabilis linearis (Pursh.) Heimerl	Y	MILI1								4
ONAGRACEAE	Oenothera villosa Thunb. ssp. strigosa (Rydb.) Dietrich & Raven	Y	OEVI1			4					
OROBANCHACEAE	Orobanche fasciculata Nutt.	Y	ORFA1					4		12	

Table 4-4. (cont.)

Family	Scientific Name	Native	Speccode	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
POACEAE	Andropogon gerardii Vitman	Y	ANGE1	88	88	88	84	88	92	84	84
POACEAE	Andropogon scoparius Michx.	Y	ANSC1	28	28	20	24	16	36	48	52
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	Y	ARLO1								4
POACEAE	Bouteloua curtipendula (Michx.) Torr.	Y	BOCU1	36	40	28	28	40	40	60	44
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	Y	BOGR1		16	8	8	8	20	28	24
POACEAE	Bouteloua hirsuta Lag	Y	BOHI1	16	16	16	28	16	20	24	28
POACEAE	Bromus japonicus Thunb. ex Murr.	N	BRJA1			4	4	4			
POACEAE	Koeleria pyramidata (Lam.) Beauv.	Y	KOPY1	40	32	28	20	28	24	40	24
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	Y	MUMO1	100	100	96	100	96	100	100	100
POACEAE	Poa compressa L.	N	POCO1	92	100	100	100	100	96	100	100
POACEAE	Poa pratensis L.	N	POPR1	8	8	8	8	4	4	8	8
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	Y	SIHY1	8	12			8	12		
POACEAE	Sorghastrum nutans (L.) Nash	Y	SONU1		4	4	4		4	4	4
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	Y	SPHE1	20	20	20	24	20	20	20	20
POACEAE	Stipa comata Trin. & Rupr.	Y	STCO1				4		4		
POLYGONACEAE	Polygonum ramosissimum Michx.	Y	PORA1				8				
PORTULACACEAE	Talinum parviflorum Nutt.	Y	TAPA1		4	4		8	4	4	
SCROPHULARIACEAE	Penstemon virens Penn.	Y	PEVI1	4		4	4	4	4	4	4
SCROPHULARIACEAE	Veronica peregrina L. var. xalapensis (H. B. K.) St. John & Warren	Y	VEPE1			4					

Numbers shown are percent frequency (n = 25).

Table 4-5. 1997-2000 Diffuse Knapweed Monitoring Study Species Frequency Summary - Treatment Plot

Family	Scientific Name	Native	Speccode	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
			UNKN						4		
APIACEAE	Lomatium orientale Coult. & Rose	Y	LOOR1	80	8	92	72	92	24	88	16
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	Y	ACMI1							4	
ASTERACEAE	Ambrosia psilostachya DC.	Y	AMPS1	32	32	12	16	16	12	28	28
ASTERACEAE	Arnica fulgens Pursh.	Y	ARFU1	16	12	16	12	20	8	20	8
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	Y	ARCA1	4	4	4					
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	Y	ARLU1	36	36	32	16	24	16	20	16
ASTERACEAE	Aster porteri Gray	Y	ASPO1	80	84	80	72	80	72	44	48
ASTERACEAE	Centaurea diffusa Lam.	N	CEDI1	80	60	52	20	44	44	44	48
ASTERACEAE	Chrysopsis fulcrata Greene	Y	CHFU1					4	4	4	
ASTERACEAE	Erigeron divergens T. & G.	Y	ERDI1	4						4	
ASTERACEAE	Erigeron flagellaris A. Gray	Y	ERFL1		4						4
ASTERACEAE	Gaillardia aristata Pursh.	Y	GAAR1	8	4		4	4	4	4	8
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	Y	GRSQ1	20	16	12		12	4	4	4
ASTERACEAE	Lactuca serriola L.	N	LASE1	20	8			28	16	4	
ASTERACEAE	Liatris punctata Hook.	Y	LIPU1	20	20	28	20	28	24	28	16
ASTERACEAE	Microseris cuspidata (Pursh.) Sch. Bip.	Y	MICU1	4		4		8			
ASTERACEAE	Scorzonera laciniata L.	N	SCLA1	4	4						
ASTERACEAE	Senecio plattensis Nutt.	Y	SEPL1	24	12	20	4	12	4	4	4
ASTERACEAE	Taraxacum officinale Weber	N	TAOF1	4							
ASTERACEAE	Tragopogon dubius Scop.	N	TRDU1	12	8		4	8	4	20	28
BORAGINACEAE	Mertensia lanceolata (Pursh.) A. DC.	Y	MELA1	4							
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	N	ALMI1	4	4	16	4	8	4	4	4
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	Y	ARHI1	4				4	4	4	4
BRASSICACEAE	Barbarea vulgaris R. Br.	N	BAVU1	4							
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	N	CAMI1					4			
BRASSICACEAE	Draba reptans (Lam.) Fern.	Y	DRRE1				4				
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	Y	ERCA2	4				8	8	12	4
BRASSICACEAE	Lepidium campestre (L.) R. Br.	N	LECA1	16	8	16	12	20	12	4	
BRASSICACEAE	Lepidium densiflorum Schrad.	Y	LEDE1	12	8						
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	Y	LEMO1	12	16	12	12	20	20	12	12
CACTACEAE	Echinocereus viridiflorus Engelm.	Y	ECVI1	40	36	28	32	28	24	20	20
CACTACEAE	Opuntia macrorhiza Engelm.	Y	OPMA1	64	76	20	32	24	28	16	20
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	Y	ARFE2	52	40	28	28	28	24	28	16
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	Y	PAJA1	12	12	4	4	4	4	4	4
CARYOPHYLLACEAE	Silene antirrhina L.	Y	SIAN1	4		28		24	8	12	4
CLUSIACEAE	Hypericum perforatum L.	N	HYPE1	16	8	72	12	36	24	20	36
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	Y	TROC1	4		4		4	4	4	
CYPERACEAE	Carex heliophila Mack.	Y	CAHE1	32	40	52	40	36	28	36	36
FABACEAE	Dalea purpurea Vent	Y	DAPU1	12	12	8	12	12	12	16	16
FABACEAE	Psoralea tenuiflora Pursh.	Y	PSTE1	20	8	16	16	12	16	20	20
JUNCACEAE	Juncus interior Wieg.	Y	JUIN1				4				

Table 4-5. (cont.)

Family	Scientific Name	Native	Speccode	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
LILIACEAE	Allium textile A. Nels. & Macbr.	Y	ALTE1	36	12	24	12	28	16		
ONAGRACEAE	Oenothera villosa Thunb. ssp. strigosa (Rydb.) Dietrich & Raven	Y	OEVI1					4	4	4	4
OROBANCHACEAE	Orobanche fasciculata Nutt.	Y	ORFA1		4	4	4	20		40	12
POACEAE	Andropogon gerardii Vitman	Y	ANGE1	68	64	64	64	64	68	64	60
POACEAE	Andropogon scoparius Michx.	Y	ANSC1	20	40	20	20	20	28	28	32
POACEAE	Bouteloua curtipendula (Michx.) Torr.	Y	BOCU1	8	32	28	12	24	32	20	36
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	Y	BOGR1	16	28	16	24	36	48	36	48
POACEAE	Bouteloua hirsuta Lag	Y	BOHI1	16			4	8	20	12	12
POACEAE	Bromus japonicus Thunb. ex Murr.	N	BRJA1	36	32	32	36	40	24	24	12
POACEAE	Bromus tectorum L.	N	BRTE1	8	4	12	8		12	12	8
POACEAE	Koeleria pyramidata (Lam.) Beauv.	Y	KOPY1	36	20	28	20	20	32	24	24
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	Y	MUMO1	96	96	92	92	96	100	96	96
POACEAE	Poa compressa L.	N	POCO1	96	96	100	100	100	100	100	100
POACEAE	Poa pratensis L.	N	POPR1			4	4	8	4		
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	Y	SIHY1						4	4	4
POACEAE	Sorghastrum nutans (L.) Nash	Y	SONU1				4		4		4
POLEMONIACEAE	Collomia linearis Nutt.	Y	COLI1	4		4	4	4	4		
POLYGONACEAE	Polygonum ramosissimum Michx.	Y	PORA1			4	8	8	4		
POLYGONACEAE	Rumex crispus L.	N	RUCR1	4							
PORTULACACEAE	Talinum parviflorum Nutt.	Y	TAPA1					12	28	4	20
SCROPHULARIACEAE	Penstemon virens Penn.	Y	PEVI1	16		28	12	28	24	20	16
SCROPHULARIACEAE	Veronica peregrina L. var. xalapensis (H. B. K.) St. John & Warren	Y	VEPE1			72	32	60	16		

Numbers shown are percent frequency (n = 25).

Table 4-6. 1997-2000 Diffuse Knapweed Monitoring Species Frequency Changes Summary

Scientific Name	Native	Speccode	Control Change	Treatment Change	Control vs. Treatment Change
Opuntia macrorhiza Engelm.	Y	OPMA1	8	-48	-56
Centaurea diffusa Lam.	N	CEDI1	-8	-36	-28
Arenaria fendleri A. Gray	Y	ARFE2	0	-24	-24
Artemisia ludoviciana Nutt. var. ludoviciana	Y	ARLU1	0	-16	-16
Senecio plattensis Nutt.	Y	SEPL1	-4	-20	-16
Lepidium campestre (L.) R. Br.	N	LECA1	4	-12	-16
Allium textile A. Nels. & Macbr.	Y	ALTE1	-20	-36	-16
Aster porteri Gray	Y	ASPO1	-24	-36	-12
Psoralea tenuiflora Pursh.	Y	PSTE1	12	0	-12
Andropogon scoparius Michx.	Y	ANSC1	20	8	-12
Bouteloua curtipendula (Michx.) Torr.	Y	BOCU1	24	12	-12
Bouteloua hirsuta Lag	Y	BOHI1	8	-4	-12
Bromus japonicus Thunb. ex Murr.	N	BRJA1	0	-12	-12
Koeleria pyramidata (Lam.) Beauv.	Y	KOPY1	0	-12	-12
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	Y	SIHY1	-8	4	12
Draba reptans (Lam.) Fern.	Y	DRRE1	-16	0	16
Erysimum capitatum (Nutt.) DC.	Y	ERCA2	-8	8	16
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	N	ALMI1	-24	0	24
Orobanche fasciculata Nutt.	Y	ORFA1	12	40	28
Hypericum perforatum L.	N	HYPE1	-32	4	36

Control and Treatment Change column values based on Spring 1997 and Spring 2000 differences. See Tables 4 and 5.

Line separates negative and postive changes. Only those changes (+ or -) than 12 percent are shown.

Table 4-7. 1997-2000 Diffuse Knapweed Monitoring Study Foliar Cover Summary - Control Plot

					Frequency (%)								Absolute Cover (%)								Relative Cover (%)							
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
Centaurea diffusa Lam.	CEDI1	F	N		100	100	40	80	40	60	100	100	2.6	4.8	0.4	1.0	0.6	2.0	3.2	4.8	3.8	6.1	0.5	1.2	0.9	2.4	4.8	6.6
Lepidium campestre (L.) R. Br.	LECA1	F	N		20	20	20	20		40			0.4	0.2	0.2	0.2		0.2			0.6	0.3	0.3	0.2		0.2		
Hypericum perforatum L.	HYPE1	F	N			20								0.2								0.3						
Camelina microcarpa Andrz. ex DC.	CAMI1	F	N					20								0.2								0.2				
Tragopogon dubius Scop.	TRDU1	F	N		40	20	60		40	20	60	40	0.4	0.2	0.6		0.2	0.2	0.8	0.8	0.6	0.3	0.8		0.3	0.2	0.9	1.1
Ambrosia psilostachya DC.	AMPS1	F	Y		60	60	100	80	80	60	40	100	1.2	0.6	1.2	1.4	1.8	1.4	1.0	2.4	1.8	0.8	1.6	1.6	2.8	1.7	1.5	3.3
Gaillardia aristata Pursh.	GAAR1	F	Y			20			20					0.2			0.2					0.3			0.3			
Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	F	Y								20								0.2								0.3	
Chrysopsis fulcrata Greene	CHFU1	F	Y								20	20							0.2	0.2							0.3	0.3
Aster porteri Gray	ASPO1	F	Y		100	100	100	100	100	100	20	40	2.6	2.0	5.4	4.6	4.6	5.6	0.4	0.6	3.8	2.5	7.1	5.4	7.1	6.7	0.6	0.8
Dalea purpurea Vent	DAPU1	F	Y			20	20		20	20				0.2	0.2		0.2	0.2				0.3	0.3		0.3	0.2		
Arenaria fendleri A. Gray	ARFE2	F	Y		40	20		40	20	40	40		0.4	0.2		0.4	0.6	0.4	0.6		0.6	0.3		0.5	0.9	0.5	0.9	
Arnica fulgens Pursh.	ARFU1	F	Y		20		20			20			0.2		0.2			0.2			0.3		0.3			0.2		
Grindelia squarrosa (Pursh.) Dun.	GRSQ1	F	Y		40	80		20			20		0.4	1.2		0.2			0.2		0.6	1.5		0.2			0.3	
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y		100	20	40	40	40	40	40	60	1.0	0.2	0.6	0.4	0.6	0.4	0.6	1.2	1.5	0.3	0.8	0.5	0.9	0.5	0.9	1.6
Asclepias stenophylla A. Gray	ASST1	F	Y		20	20				40	20		0.2	0.2				0.4	0.2		0.3	0.3				0.5	0.3	
Erigeron divergens T. & G.	ERDI1	F	Y						40								0.4								0.6			
Psoralea tenuiflora Pursh.	PSTE1	F	Y		40	80	40	80	20	100	80	100	0.8	1.4	0.8	1.6	0.2	1.4	1.4	2.6	1.2	1.8	1.1	1.9	0.3	1.7	2.1	3.6
Liatris punctata Hook.	LIPU1	F	Y		20							40	0.2							0.4	0.3							0.5
Lomatium orientale Coult. & Rose	LOOR1	F	Y				60		40		40				0.8		0.4		0.6				1.1		0.6		0.9	
Silene antirrhina L.	SIAN1	F	Y		20								0.2								0.3							
Erigeron flagellaris A. Gray	ERFL1	F	Y			20	20							0.2	0.2							0.3	0.3					
Poa pratensis L.	POPR1	G	N	C	20	40	40	20				40	0.4	0.6	0.8	0.2				0.4	0.6	0.8	1.1	0.2				0.5
Poa compressa L.	POCO1	G	N	C	100	100	100	100	100	100	100	100	17.2	20.8	25.4	31.8	19.2	24.2	19.6	11.8	25.2	26.4	33.5	37.1	29.5	28.9	29.6	16.1
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	40	20	20	20	40	40	20		0.4	0.2	0.2	0.2	0.4	0.4	0.2		0.6	0.3	0.3	0.2	0.6	0.5	0.3	
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C		20			20					0.2			0.2					0.3			0.3			
Eleocharis compressa Sulliv.	ELCO1	G	Y	C	20		20			20		20	0.4		0.2			0.2		0.2	0.6		0.3			0.2		0.3
Carex heliophila Mack.	CAHE1	G	Y	C	60	100	80	80	60	60	80	80	0.6	1.6	2.0	2.0	2.0	1.2	1.6	2.0	0.9	2.0	2.6	2.3	3.1	1.4	2.4	2.7
Andropogon gerardii Vitman	ANGE1	G	Y	W	100	100	100	100	100	100	100	100	8.6	11.0	7.2	12.2	6.6	12.0	8.8	14.2	12.6	14.0	9.5	14.3	10.2	14.4	13.3	19.4
Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	G	Y	W	100	100	100	100	100	100	100	100	5.6	6.2	4.8	6.0	5.6	6.4	5.0	6.4	8.2	7.9	6.3	7.0	8.6	7.7	7.6	8.7
Andropogon scoparius Michx.	ANSC1	G	Y	W	20	20	20			60	80	40	0.4	0.2	0.2			0.6	1.2	0.8	0.6	0.3	0.3			0.7	1.8	1.1
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	40	80	40	80	40	60	60	40	0.4	1.8	1.0	0.8	1.2	2.0	1.4	1.0	0.6	2.3	1.3	0.9	1.8	2.4	2.1	1.4
Bouteloua hirsuta Lag	BOHI1	G	Y	W			20		20	40	40				0.2		0.2	0.4	0.4				0.3		0.3	0.5	0.6	
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W	100	100	100	100	100	100	100	100	23.2	24.4	23.2	22.2	19.6	23.4	18.4	22.6	34.0	31.0	30.6	25.9	30.2	28.0	27.8	30.9
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	20			20	20	20	60	60	0.4			0.2	0.2	0.4	0.4	0.8	0.6			0.2	0.3	0.5	0.6	1.1
Total foliar cover													68.2	78.8	75.8	85.6	65.0	83.6	66.2	73.2	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total forb cover													10.6	11.8	10.6	10.0	9.8	12.4	9.2	13.0	15.5	15.0	14.0	11.7	15.1	14.8	13.9	17.8
Total native forb cover													7.2	6.4	9.4	8.6	9.0	10.0	5.4	7.4	10.6	8.1	12.4	10.0	13.8	12.0	8.2	10.1
Total non-native forb cover													3.4	5.4	1.2	1.4	0.8	2.4	3.8	5.6	5.0	6.9	1.6	1.6	1.2	2.9	5.7	7.7
Total graminoid cover													57.6	67.0	65.2	75.6	55.2	71.2	57.0	60.2	84.5	85.0	86.0	88.3	84.9	85.2	86.1	82.2
Total native cover													47.2	52.0	48.4	52.2	45.0	57.0	42.8	55.4	69.2	66.0	63.9	61.0	69.2	68.2	64.7	75.7
Total non-native cover													21.0	26.8	27.4	33.4	20.0	26.6	23.4	17.8	30.8	34.0	36.1	39.0	30.8	31.8	35.3	24.3
Total warm-season graminoid cover													38.6	43.6	36.6	41.4	33.4	45.2	35.6	45.8	56.6	55.3	48.3	48.4	51.4	54.1	53.8	62.6
Total cool-season graminoid cover													19.0	23.4	28.6	34.2	21.8	26.0	21.4	14.4	27.9	29.7	37.7	40.0	33.5	31.1	32.3	19.7

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (500).
Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).
All cover values presented are means (n = 5).
Native categories: Y = Native, N = Non-Native
Form categories: C = Cactus, F = Forb, G = Graminoid
Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 4-8. 1997-2000 Diffuse Knapweed Monitoring Study Foliar Cover Summary - Treatment Plot

					Frequency (%)								Absolute Cover (%)								Relative Cover (%)							
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000	Spring 1997	Summer 1997	Spring 1998	Summer 1998	Spring 1999	Summer 1999	Spring 2000	Summer 2000
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N						20	20	20						0.2	0.2	0.2						0.3	0.3	0.3	
Centaurea diffusa Lam.	CEDI1	F	N		100	100				20	40	60	4.4	4.8				0.6	0.4	1.2	6.6	6.8				0.8	0.6	1.7
Hypericum perforatum L.	HYPE1	F	N		20	20					20	20	0.2	0.2					0.2	0.2	0.3	0.3					0.3	0.3
Lactuca serriola L.	LASE1	F	N							20								0.2								0.3		
Lepidium campestre (L.) R. Br.	LECA1	F	N		20								0.2								0.3							
Plantago lanceolata L.	PLLA1	F	N		20								0.2								0.3							
Tragopogon dubius Scop.	TRDU1	F	N		20					40	40	20	0.2					0.4	0.4	0.2	0.3					0.5	0.6	0.3
Allium textile A. Nels. & Macbr.	ALTE1	F	Y		20	20	20						0.2	0.2	0.2						0.3	0.3	0.3					
Ambrosia psilostachya DC.	AMPS1	F	Y		80					20	40	60	1.6					0.2	0.6	1.0	2.4					0.3	1.0	1.4
Arenaria fendleri A. Gray	ARFE2	F	Y		20								0.4								0.6							
Arnica fulgens Pursh.	ARFU1	F	Y		60	20	20	40	40		20		0.6	0.2	0.4	0.4	0.8		0.6		0.9	0.3	0.5	0.5	1.3		1.0	
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y		20	60		60		60	40	20	0.4	1.0		0.6		0.6	0.6	0.2	0.6	1.4		0.7		0.8	1.0	0.3
Aster porteri Gray	ASPO1	F	Y		80	100	60	60	60	80	20	40	2.0	2.0	1.8	2.6	2.6	3.2	0.6	0.4	3.0	2.8	2.4	3.2	4.1	4.0	1.0	0.6
Asclepias stenophylla A. Gray	ASST1	F	Y		20			20					0.2			0.2					0.3			0.2				
Dalea purpurea Vent	DAPU1	F	Y			20	20				20			0.2	0.2				0.2			0.3	0.3				0.3	
Grindelia squarrosa (Pursh.) Dun.	GRSQ1	F	Y		60	20	20		20		20	20	0.6	0.2	0.2		0.2		0.4	0.2	0.9	0.3	0.3		0.3		0.6	0.3
Lesquerella montana (A. Gray) Wats.	LEMO1	F	Y							20	40							0.2	0.4							0.3	0.6	
Liatris punctata Hook.	LIPU1	F	Y		20		20			40	60	40	0.2		0.2			0.6	0.8	0.4	0.3		0.3			0.8	1.3	0.6
Lomatium orientale Coult. & Rose	LOOR1	F	Y		60		80		80		40		0.8		1.6		1.2		0.4		1.2		2.1		1.9		0.6	
Penstemon virens Penn.	PEVI1	F	Y				20					20			0.2					0.2			0.3					0.3
Senecio plattensis Nutt.	SEPL1	F	Y				20								0.2								0.3					
Senecio spartioides T. & G.	SESP1	F	Y							20	20	20						0.2	0.4	0.4						0.3	0.6	0.6
Talinum parviflorum Nutt.	TAPA1	F	Y									20								0.2								0.3
Tradescantia occidentalis (Britt.) Smyth	TROC1	F	Y						20								0.4								0.6			
Veronica peregrina L. var. xalapensis (H. B. K.) St. John & Warren	VEPE1	F	Y						20								0.2								0.3			
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	60	80	40	60	40	40	20		2.2	2.4	2.0	2.2	1.2	0.8	0.2		3.3	3.4	2.7	2.7	1.9	1.0	0.3	
Bromus tectorum L.	BRTE1	G	N	C	20		40	40		20			1.8		1.2	0.6		0.6			2.7		1.6	0.7		0.8		
Poa compressa L.	POCO1	G	N	C	100	100	100	100	100	100	100	100	12.2	12.4	25.0	31.6	23.8	22.8	20.4	13.0	18.4	17.5	33.2	38.7	37.9	28.6	32.6	18.8
Poa pratensis L.	POPR1	G	N	C	20	20	20					20	0.2	0.4	0.2					0.2	0.3	0.6	0.3					0.3
Carex heliophila Mack.	CAHE1	G	Y	C	60	40	60	40	40	40	20	60	0.8	1.2	0.8	0.8	0.6	0.8	1.0	2.0	1.2	1.7	1.1	1.0	1.0	1.0	1.6	2.9
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	40	20			20		20		0.2	0.2			0.2		0.2		0.3	0.3			0.3		0.3	
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C				20		20						0.2		0.2						0.2		0.3		
Andropogon gerardii Vitman	ANGE1	G	Y	W	80	100	80	100	100	100	100	100	5	8.2	5.4	7.8	4.6	10.2	5.4	9.4	7.5	11.5	7.2	9.6	7.3	12.8	8.6	13.6
Andropogon scoparius Michx.	ANSC1	G	Y	W	80	60	80	60	40	40	60	80	1.6	1	1	1	0.8	1.4	1.8	1.2	2.4	1.4	1.3	1.2	1.3	1.8	2.9	1.7
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	60	40	60	20	60	80	40	80	0.8	0.4	1.4	0.2	1.6	2	0.6	2.4	1.2	0.6	1.9	0.2	2.5	2.5	1.0	3.5
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	40	20	80			80	60	40	0.6	0.2	1.2			0.8	1	1.2	0.9	0.3	1.6			1.0	1.6	1.7
Bouteloua hirsuta Lag	BOHI1	G	Y	W	80			20	40		80	20	0.8			0.2	0.6		1	0.2	1.2			0.2	1.0		1.6	0.3
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W	100	100	100	100	100	100	100	100	26.4	35.2	31.6	32.6	23	32.6	24.2	34.4	39.8	49.6	41.9	40.0	36.6	40.9	38.7	49.7
Sorghastrum nutans (L.) Nash	SONU1	G	Y	W						20	20							0.2	0.2							0.3	0.3	
Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	G	Y	W	60	20	40	40	40	40	20	40	1.6	0.6	0.6	0.6	0.8	1	0.4	0.6	2.4	0.8	0.8	0.7	1.3	1.3	0.6	0.9
Total foliar cover													66.4	71.0	75.4	81.6	62.8	79.8	62.6	69.2	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total forb cover													12.2	8.8	5.0	3.8	5.6	6.4	6.2	4.6	18.4	12.4	6.6	4.7	8.9	8.0	9.9	6.6
Total native forb cover													7.0	3.8	5.0	3.8	5.4	5.0	5.0	3.0	10.5	5.4	6.6	4.7	8.6	6.3	8.0	4.3
Total non-native forb cover*													5.2	5.0	0.0	0.0	0.2	1.4	1.2	1.6	7.8	7.0	0.0	0.0	0.3	1.8	1.9	2.3
Total graminoid cover													54.2	62.2	70.4	77.8	57.2	73.4	56.4	64.6	81.6	87.6	93.4	95.3	91.1	92.0	90.1	93.4
Total native cover													44.8	50.8	47.0	47.2	37.6	54.2	40.8	54.4	67.5	71.5	62.3	57.8	59.9	67.9	65.2	78.6
Total non-native cover													21.6	20.2	28.4	34.4	25.2	25.6	21.8	14.8	32.5	28.5	37.7	42.2	40.1	32.1	34.8	21.4
Total warm-season graminoid cover													36.8	45.6	41.2	42.4	31.4	48.2	34.6	49.4	55.4	64.2	54.6	52.0	50.0	60.4	55.3	71.4
Total cool-season graminoid cover													17.4	16.6	29.2	35.4	25.8	25.2	21.8	15.2	26.2	23.4	38.7	43.4	41.1	31.6	34.8	22.0

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (500).
Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).
All cover values presented are means (n = 5).
Native categories: Y = Native, N = Non-Native
Form categories: C = Cactus, F = Forb, G = Graminoid
Cool/Warm Season categories: C = Cool season species, W = Warm season species

Report 5

Aerial Herbicide Application

5. Aerial Herbicide Application Diffuse Knapweed Monitoring

5.1 Introduction

During May 1999, the herbicide Tordon 22K was applied from a helicopter to control diffuse knapweed (*Centaurea diffusa*) and other noxious weeds on approximately 1,500 acres at the Rocky Flats Environmental Technology Site (the Site). To evaluate the effectiveness of the aerial herbicide application on diffuse knapweed, the primary target species, a monitoring effort was undertaken.

The following questions were proposed for investigation:

1. Is the aerial herbicide application effective at reducing the frequency and cover of diffuse knapweed?
2. How does the aerial herbicide application compare to previous ground applications for controlling diffuse knapweed at the same application rates?
3. Is there evidence of undesirable drift or other unintentional application outside the specified application areas? If so, what were the impacts?

This report presents and updates the results of the 2000 monitoring with respect to question 1 above. The answer to question 2 was reported in the 1999 Annual Vegetation Report for the Rocky Flats Environmental Technology Site (K-H 2000). To summarize the 1999 report in response to question 2, the ground and aerial applications seemed to work equally well. Either method provides effective control, and the aerial application is more cost effective over large areas, as well as more suitable for rough terrain where ground application would be impractical.

5.2 Methods

The study was conducted at three replicated circular plots (AS-1, AS-2, and AS-3) chosen subjectively for their high infestation of diffuse knapweed in the xeric tallgrass prairie at the Site (Figure 5-1). Each plot was 30 m in diameter, and the center of each plot was permanently staked with rebar. Using randomly generated X (distance from center stake) and Y (aspect) coordinates, a total of 20 quadrats (0.5×1 m; 10 control and 10 treatment) were located in each plot. No overlapping of quadrats was allowed. The southwest corner of each quadrat location was permanently staked, assigned a number, and tagged. Quadrats were aligned using a compass, with the 1-m side of the quadrat running east-west and the southwest corner of the quadrat touching the stake. Quadrats were sampled in mid-May 1999, on the day before and the morning of the aerial herbicide application, and again in August 1999, May 2000, and August 2000. At each

quadrat, diffuse knapweed cover was estimated using the cover class system shown in Table 5-1. Only live diffuse knapweed plants were used to estimate cover. It should be noted therefore that the spring (pre-treatment) cover data represent only seedling and rosette cover, while the summer (post-treatment) data represent the cover of seedling, rosette, and adult plants. At each plot, photographs were taken of five control and five treatment quadrats. Photographs were taken with a single-lens reflex (SLR) camera with a 35-mm lens. Photographs were taken looking straight down on the center of each quadrat from eye level (approximately 1.5 m), while standing facing south so that the permanent stake is in the upper right hand corner of the photograph.

After the initial monitoring of the quadrats, but prior to the 1999 aerial herbicide application, the 10 control quadrats at each plot were covered with black plastic that was weighted down to hold it in place during spraying. This was done to prevent the herbicide from reaching the plants and surface of the ground. The aerial herbicide application was conducted on May 12 and 13, 1999. The black plastic was removed within a few hours after the aerial herbicide application had taken place. A helicopter was used to apply the herbicide (Figure 5-2).

Diffuse knapweed cover was summarized for the control and treatment areas during each sampling session. Cover data were summarized and analyzed using the midpoint of each cover class (Table 5-1). All 30 quadrats for the control and treatment analyses, respectively, were summarized together for both cover and frequency comparisons. Statistical comparisons were made between and within the control and treatment areas for each sample session and across time (pre- and post-treatment) using non-parametric tests because the data failed normality tests. Independent samples (control versus treatment) were tested using a Mann-Whitney rank sum test, and dependent samples (control and treatment through time, respectively) were tested with a Friedman repeated measures ANOVA (SigmaStat 1997). Frequency analyses were conducted using a McNemar test (Sheskin 1997).

5.3 Results

Initial cover amounts for diffuse knapweed (seedlings and rosettes) at the control and treatment plots prior to aerial herbicide application were not statistically different, averaging approximately 7 and 9 percent, respectively (Figure 5-3; Mann-Whitney rank sum test, $P = 0.734$; median = 2.5 for control and treatment). However, approximately 3 months after the herbicide application, diffuse knapweed cover amounts (seedlings, rosettes, and adults) were statistically different between the late summer control and treatment plots, averaging 25 and less than 1 percent, respectively (Figure 5-3; Mann-Whitney rank sum test, $P < 0.001$; median: control = 15, treatment = 0). In 2000, diffuse knapweed cover in the treatment plots remained significantly lower than in the control plots in both the spring (Figure 5-3; Mann-Whitney rank sum test, $P < 0.001$; median: control = 15, treatment = 0) and summer (Figure 5-3; Mann-Whitney rank sum test, $P < 0.001$; median: control = 62.5, treatment = 0). Additionally, comparison of the pre-application versus post-application diffuse knapweed cover amounts for the control and treatment plots showed statistically significant changes. At the control plots, diffuse

knapweed cover has increased significantly, from a mean of 9 percent to over 43 percent from May 1999 to August 2000 (Figure 5-3; Friedman repeated measures ANOVA, $P < 0.001$). During the same time frame at the treatment plots, diffuse knapweed cover decreased significantly, from 7 percent to less than 1 percent cover (Figure 5-3; Friedman repeated measures ANOVA, $P < 0.001$). Diffuse knapweed frequency in the control plots decreased only slightly and was not significantly different (Figure 5-4). In the treatment plots, however, the frequency of diffuse knapweed dropped substantially, from 83 percent before treatment to 10 percent, where it remains 1.5 years after treatment (Figure 5-4; McNemar test, $X^2 = 10.3$, df = 1, $P < 0.01$). One of the control quadrats, photographed a year following the herbicide application, is shown in Figure 5-5. Figures 5-6 and 5-7 show the diffuse knapweed infestation in the area at the AS-2 plot before and after herbicide application.

Drift-card results from the 2000 aerial herbicide application showed that no substantial herbicide drift was observed in any sensitive habitats adjacent to the spray areas. At a few locations, some very slight drift was noticed on a few cards in the row outside the edge of the spray area, but observations throughout the growing season showed no impacts to the plants at these locations.

5.4 Discussion

The aerial herbicide application of Tordon 22K by helicopter has been shown to effectively control diffuse knapweed at the Site where it was sprayed in 1999. Diffuse knapweed cover dropped to less than 1 percent in the sprayed areas where monitoring was conducted. Additionally, diffuse knapweed frequency was reduced substantially in the sprayed areas. Qualitative observations elsewhere indicated similar success at most treatment areas on the xeric tallgrass prairie. At most of these locations, essentially no adult diffuse knapweed plants were observed in 1999, except where small spots were missed. As a result, the annual seed set in these areas was reduced to near zero, and little spread of diffuse knapweed occurred from these areas because no adult plants are available to blow across the landscape. In 2000, however, at some locations, diffuse knapweed has been returning, largely as a result of missed flight lines and disturbance by small mammals. Spot control is necessary to extend the longevity of the large-scale herbicide applications. For more information and discussion on weed control and mapping results at Rocky Flats during 2000, see the High-Value Vegetation Monitoring section in this annual report.

Although a small amount of undesirable drift was observed at some locations during 2000, observations of the plants in these areas throughout the growing season showed no impacts to the sensitive native species in these areas. However, because drift is not desired, drift will continue to be monitored using drift cards during future aerial herbicide applications.

5.5 Conclusions

In summary, the 1999 aerial herbicide application of Tordon 22K on the xeric tallgrass prairie at the Site has effectively controlled diffuse knapweed at the treatment study plots.

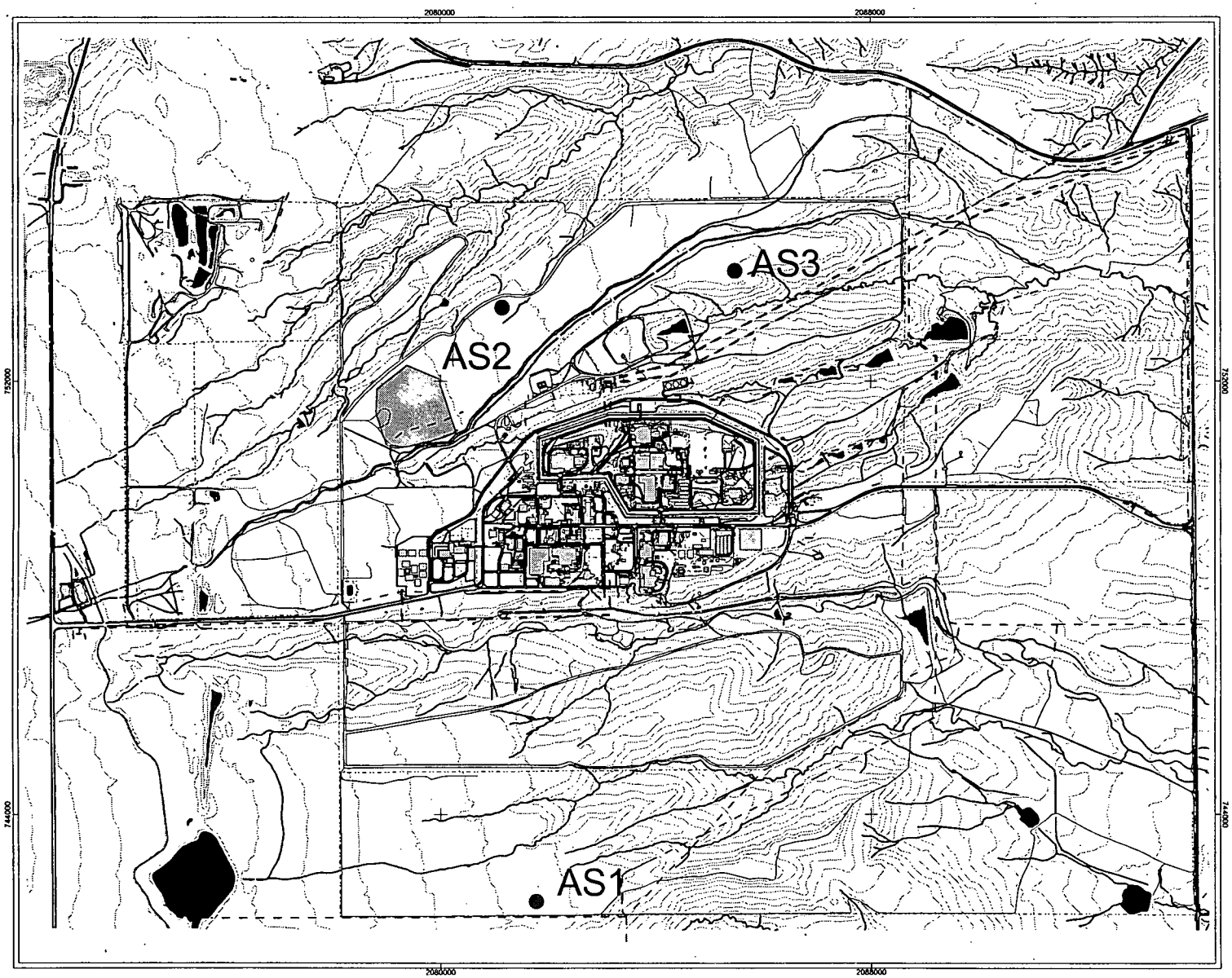
Qualitative and quantitative results show that diffuse knapweed continues to be controlled in 2000 across much of the area treated by helicopter in 1999. As a result, annual seed set at these locations has been reduced dramatically, and the chance of infestation spreading from these treated areas is greatly reduced, because fewer adult plants are available to tumble across the landscape. Where diffuse knapweed has begun to return, at locations that were missed during spraying or where small mammals have continued to disturb the soil, spot control is essential to extend the longevity of the large-scale helicopter treatments. Improvements will continue to be made in the management of diffuse knapweed at the Site, integrating chemical control with other methods, while proactively managing the Site's ecological resources.

5.6 References

K-H. 2000. 1999 Annual vegetation report for the Rocky Flats Environmental Technology Site. Kaiser-Hill Company, LLC, Rocky Flats Environmental Technology Site, Golden, CO.

Sheskin, D.J. 1997. Handbook of parametric and nonparametric statistical procedures. CRC Press, Boca Raton, FL.

SigmaStat. 1997. SigmaStat Statistical Software, Version 2.0. SPSS Inc./Marketing Department, Chicago, IL.



Aerial Herbicide Monitoring Plot Locations

Figure 5-1

LEGEND

- Control Plot

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Location data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

N

1:23552

1000 0 1000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2k-0038

May 3, 2001

\\Gisrv\GIS\ECO-projects\projects\2k-0038\vg monitoring locations 2001.apr\Aerial plots

Figure 5-2. Aerial herbicide application.

Approximately 1500 acres of grassland were treated by helicopter in 1999 at the Site. The use of the helicopter made the herbicide application much more efficient and cost effective, and allowed many areas that otherwise would have been difficult to reach with ground equipment to be sprayed.

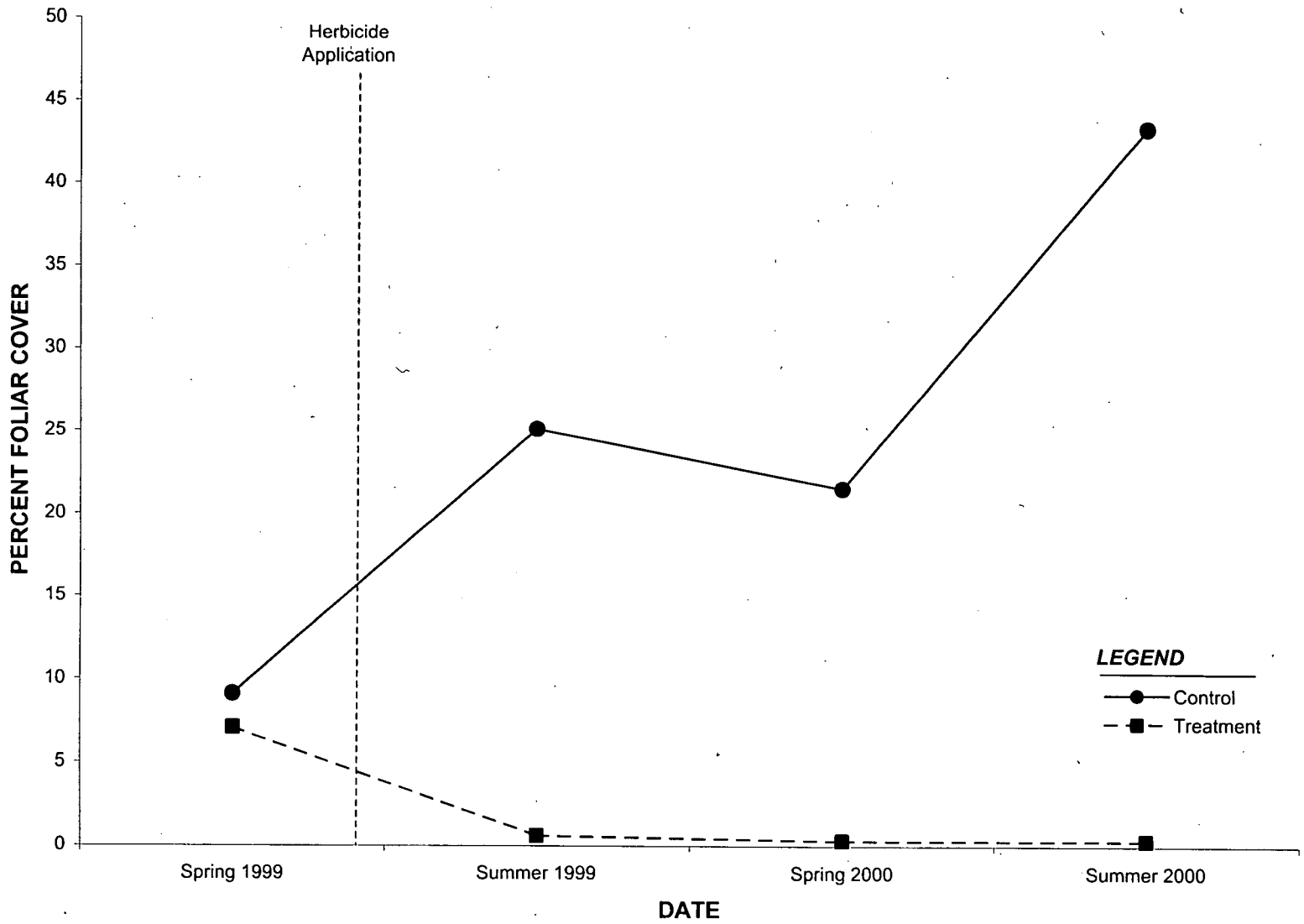


Figure 5-3. Diffuse knapweed foliar cover.

\\Boulder1\Groups\Graphics\1454\2001\aerial monitoring analyses.xls Figure 3 5/3/01 CO

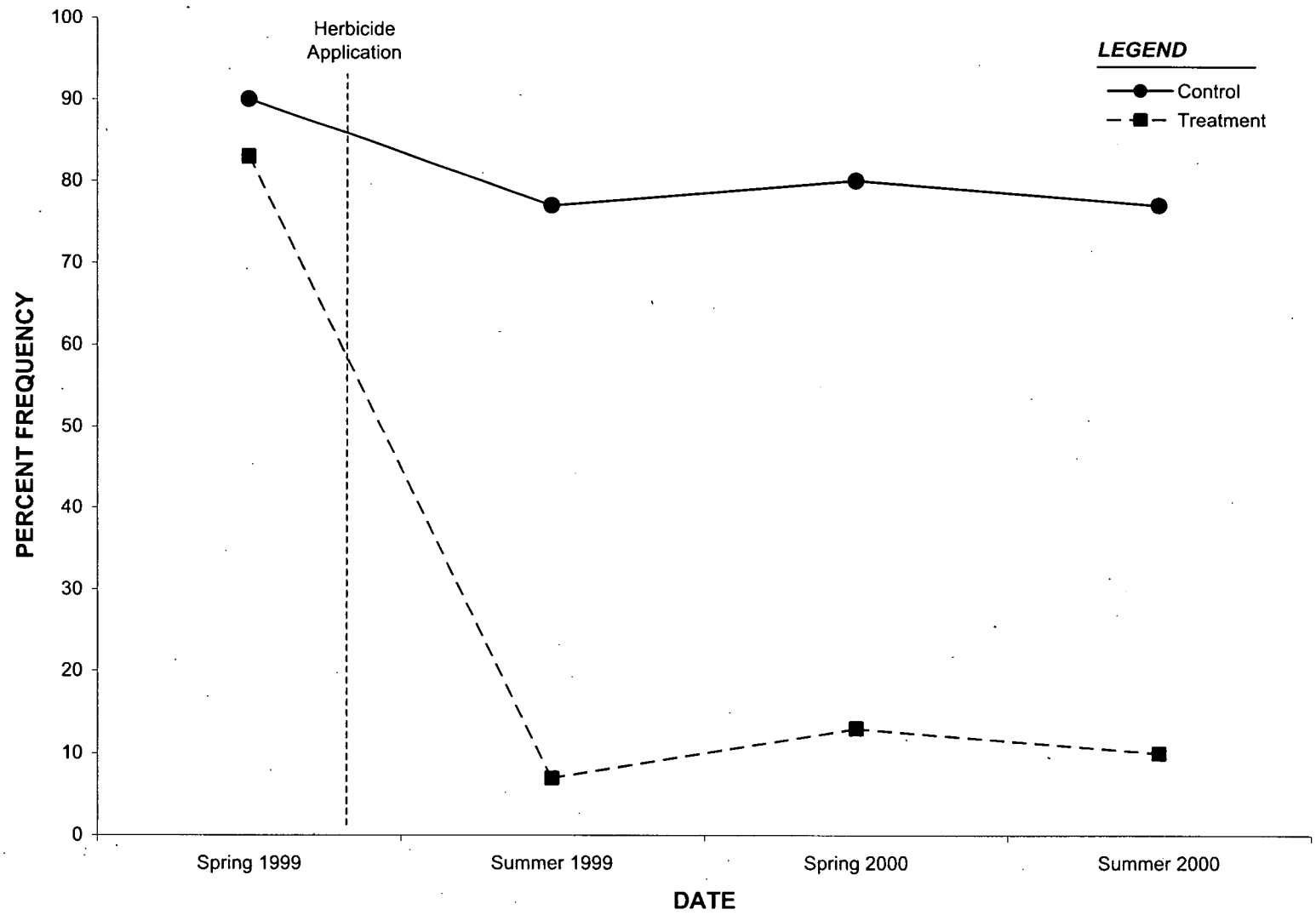


Figure 5-4. Diffuse knapweed frequency.

\\Boulder1\Groups\Graphics\1454\2001\aerial monitoring analyses.xls Figure 4 5/3/01 CO

Figure 5-5. In this untreated control plot, the diffuse knapweed has buried the quadrat. This is what the entire area would have looked like in 2000 had it not been sprayed. The grass response was similar to that after a fire, with increased flowering as seen here.

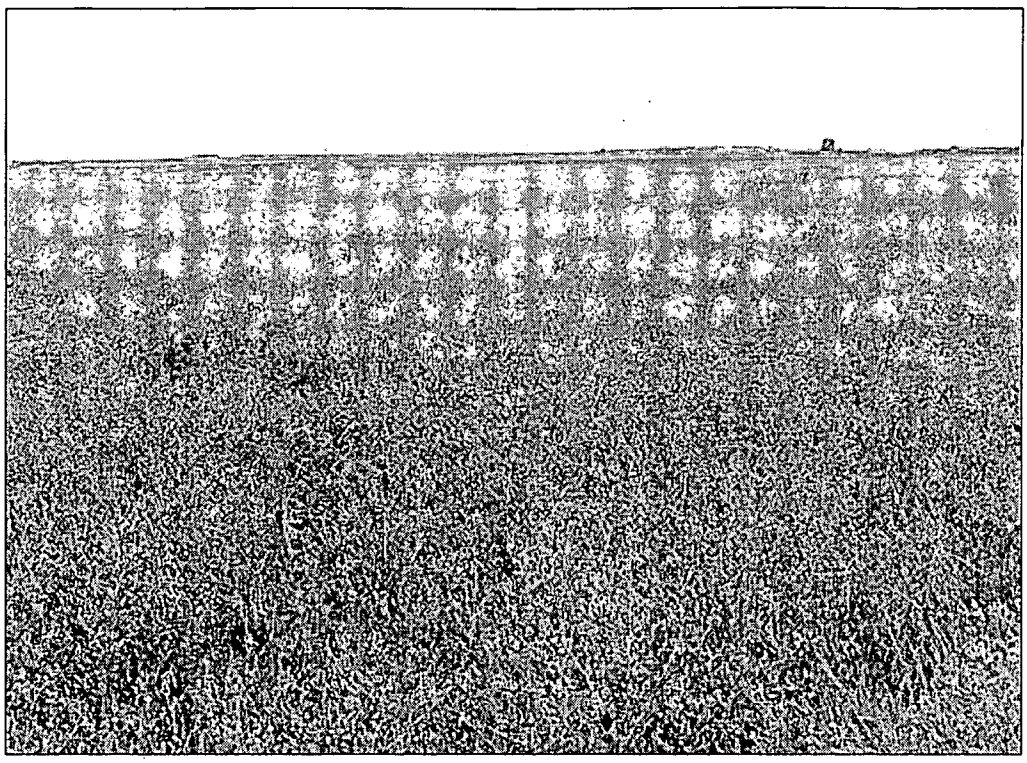


Figure 5-6. The xeric tallgrass prairie at this location was heavily infested with diffuse knapweed as seen here in 1997.

Figure 5-7. In 2000, 2 years after being treated by helicopter with Tordon 22K, the same location (note trees on horizon) has no diffuse knapweed and the prairie grasses have responded well.

Table 5-1. Cover Class System

Cover Class	Visually Estimated Cover Range	Midpoint
1	<5%	2.50%
2	5-25%	15.00%
3	26-50%	37.50%
4	51-75%	62.50%
5	>76%	87.50%

Report 6

Prescribed Burn

6. 2000 Buffer Zone Prescribed Burn: Pre- and Post-Burn Monitoring Summary

6.1 Purpose

Prescribed burning is an important tool for managing native grasslands. To maintain the health and vigor of the native plant species, reduce plant litter and the potential for wildfire, recycle nutrients, and help with weed control, the use of prescribed burns has been proposed to help manage the grassland communities at the Rocky Flats Environmental Technology Site (the Site). As with all land management actions, monitoring is an integral part of determining whether the objectives and goals for a particular management technique are being achieved. On April 6, 2000, a 48-acre prescribed burn was conducted by the U.S. Forest Service on the xeric tallgrass prairie in the south Buffer Zone at the Site. (Photographic documentation of the prescribed burn is available in Appendix C on the CD-ROM). To evaluate the effect of the prescribed burn on the plant community, a quantitative monitoring program was instituted in the summer of 1999 to provide pre-burn data. After the burn, monitoring was conducted throughout the summer of 2000 to gather post-burn data.

The following general questions were proposed for investigation:

1. How will a prescribed burn affect the species richness and species diversity of the xeric tallgrass prairie?
2. What impact will a prescribed burn have on the foliar cover of the xeric tallgrass prairie? Specifically, what impact is there to the following categories of foliar cover: overall cover, native cover, non-native cover, forb cover, overall graminoid cover, warm-season graminoid cover, and cool-season graminoid cover?
3. What impact will a prescribed burn have on the frequency of individual plant species on the xeric tallgrass prairie?
4. What impact will a prescribed burn have on specific weed species?
5. How much litter biomass will be removed by a prescribed burn?
6. How does the fire response of the xeric tallgrass prairie at the Site compare to other locations of the tallgrass prairie?
7. What recommendations can be made with regard to the use of prescribed burns for management of the xeric tallgrass prairie at the Site?

This report summarizes the pre-burn and post-burn conditions at the locations where monitoring was conducted during 1999 and 2000.

6.2 Methods

The xeric tallgrass prairie at the Site is located primarily on the pediment, which is underlain by Rocky Flats Alluvium (SCS 1980). The soils are classified as Flatirons very cobbly sandy loams (SCS 1980). Historically, the 48-acre burn area had not been grazed since the early 1950s, and the control plot locations had not been grazed since the early 1970s. Both the control and treatment areas have had little human influence or activity over the past 25 to 50 years. However, prior to the burn, in May 1999, the control and treatment locations were sprayed by helicopter with Tordon 22K to help control the noxious weed diffuse knapweed (*Centaurea diffusa*).

During 1999, a monitoring program was developed and initiated to provide quantitative pre-burn and post-burn information to help answer the questions listed above. A stratified, random sampling design was used. Initially, six plots—three control (no burn), and three treatment (burn)—were chosen for monitoring the response of the Site's xeric tallgrass prairie to the prescribed burn (Figure 6-1).

The control plots selected were BC1, BC2, and TR01. Plots BC1 and TR01 were pre-existing sites that had been used previously for other quantitative monitoring. BC2 was set out specifically for this study as a third replicate. The treatment plots were BT1, BT2, and BT3. Sites BT1 and BT2 were also pre-existing plots used for other monitoring, and BT3 was set out specifically for this study to provide a third replicate treatment site. At each plot, a total of five randomly located 50-m transects were sampled. Pre-burn sampling was conducted from September 9 through 24, 1999. The decision to conduct a controlled burn was made at a time that precluded collecting any spring pre-burn data. Thus, the study can evaluate only the late-summer effects on the prairie.

The study design was modified in spring 2000, because the actual prescribed burn was not conducted over the entire area that was originally scheduled to be burned. Treatment plots BT1 and BT2 were burned, but plot BT3 was not. Therefore, data were summarized by combining the data from two of the three control plots (BC1 and TR01) and two of the three treatment plots (BT1 and BT2), respectively. Control plot TR01 was chosen over plot BC2 because it was more similar to plots BC1, BT1, and BT2. In 2000, post-burn monitoring data were gathered throughout the summer using qualitative photographs and quantitative measurements from September 5 through 21, 2000.

Species richness, cover, and frequency were measured at each of the 50-m transects. Species richness was determined in a 2-m-wide belt centered along the length of each 50-m transect. Every plant species rooted within the 100-m^2 area was recorded. In addition, the number of woody plant stems and cactus stems were counted and recorded for the 100-m^2 area. Basal cover and foliar cover estimates were made using a point-intercept method along each of the 50-m transects. A 2-m-long rod, with a 6-mm diameter, was dropped vertically at 50-cm increments along the transect to record a total

of 100 intercept points. Two categories of hits were recorded, basal and foliar. Basal cover hits indicated what material the rod contacted at the ground surface. Hits could be vegetation (live plants), litter (fallen dead material), rock (pebbles and cobbles that were greater than the rod diameter), bare ground, or water, in that order of priority based on the protection from erosion provided by each type of cover. Basal vegetation hits were recorded by species only if the rod was touching the stem or crown of the plant where the plant entered the ground. Foliar vegetation hits (defined as a portion of a plant touching the rod) were recorded by species in three categories as defined by height and growth form. The topmost hit of each growth form was recorded. The growth forms measured were herbaceous, woody <2 m in height, and woody >2 m in height. Frequency information by species was gathered by randomly locating five 1-m^2 quadrats along each of the 50-m transects (total of 25 quadrats/site) and recording all species present in each plot. Density stem counts for diffuse knapweed were also made using these same quadrats. No distinctions were made during the counts to differentiate seedlings, rosettes, or adult plants.

Biomass sampling was conducted on different transects than those described above, to prevent disturbance. Sampling was conducted along a single transect in the burn area and another transect outside the burn area. Five randomly located 0.25-m^2 quadrats were located along the right-hand side of each transect. Vegetation was clipped and sorted as current-year live or litter and placed into separately labeled paper bags. The bags were dried in an oven at 65° C until no further weight loss was observed, and then the vegetation weight was recorded. More detailed summaries of these specific methods are found in the *Environmental Monitoring Department Operating Procedures Manual* (DOE 1995), the *High-Value Vegetation Survey Plan for the Rocky Flats Environmental Technology Site* (K-H 1997), and the *1999 Ecological Field Monitoring Plan for the Rocky Flats Environmental Technology Site* (K-H 1999a).

Photographs were taken before and after the burn to document the recovery of the vegetation on the prairie throughout the summer of 2000. A photograph was taken of each transect during the sampling session to visually document the condition of the transect. Photographs were taken from near the 0-m end of the transect, near the permanent marker, looking toward the 50-m endpoint. A placard was placed in the photograph against the 0-m endpoint to provide the site and transect number, and date. Photographs were taken with a digital camera with the lens set at approximately 50 mm.

Additional photographs were also taken looking straight down on the grassland along the transects in the area that burned. Each of these photographs was taken of a quadrat (1 m × 0.5 m), placed at the 50-m end of the transect and aligned north-south, with the 50-m stake at the southwest corner of the quadrat. The photographs were taken throughout the summer, with the digital camera centered over the middle of the quadrat at eye level (approximately 1.5 m). A total of 10 quadrats (one at each transect) were photographed during each photography session. The lens was set at 35 mm for these photographs. Photographs were taken from the north side facing south, so that the permanent stake was in the upper right-hand corner of the photograph. A placard was placed in the photograph to provide the site and transect number, and date. At the end of

the summer, after all the photographs had been taken, visual estimates of the percent total current-year vegetation cover were made by viewing the photographs on the computer screen. Estimates were classified into the following cover class categories: 1 = 1–10%, 2 = 11–20%, 3 = 21–30%, 4 = 31–40%, 5 = 41–50%, 6 = 51–60%, 7 = 61–70%, 8 = 71–80%, 9 = 81–90%, and 10 = 91–100%. Midpoints of each range (5, 15, 25, 35, etc.) were used for calculations.

Estimates were recorded on data sheets, entered into the database, and checked for quality prior to analysis. Additional landscape photographs were also taken from permanent locations within the burn area and around the perimeter of the burn. These photographs, with a map of the burn area and photo locations, can be viewed in Appendix C on the CD-ROM.

Species richness data were summarized by generating a species list for the control and treatment locations. In addition, other species richness variables were calculated from the species lists. A Sorensen coefficient of similarity was used to assess the species richness similarity between the control and treatment data (Brower and Zar 1977). Basal cover data were reported as total percent cover of vegetation, litter, rock, and bare ground. Foliar cover data were reported as frequency, absolute cover, and relative cover for each species encountered. Frequency from the cover data was defined as the percent of point-intercept transects in which a species occurred, out of the total 10 possible. Absolute foliar cover was the percentage of the number of hits on a species out of the total number of hits possible (1,000). This value is the actual cover of a species. Relative foliar cover was the number of hits on a species relative to the total number of vegetative hits recorded (i.e., the percent of total vegetative cover [100 percent] represented by the species). A Shannon-Weaver diversity index was used to calculate diversity based on the relative foliar cover data (Brower and Zar 1977). Frequency based on quadrats (n=50; 2 transects × 25 quadrats each) was defined as the number of quadrats in which a species was recorded, divided by 50 (the total number of quadrats possible), multiplied by 100. Density count data were summarized as the mean number of stems per square meter. Biomass data were summarized as the mean litter, current-year live, and total biomass (litter and current-year live combined).

Statistical analysis of the results was conducted only when mean values were different enough to suggest a meaningful interpretation. Where normality, variance, and dependence requirements were met, parametric tests were used to compare results. Nonparametric tests were used for all analyses where normality, variance, and independence requirements were not met. Independent samples (i.e., the control and treatment plots) were compared using t-tests or Mann-Whitney U tests (SigmaStat 1997; Fowler and Cohen 1990; Sheskin 1997). Dependent sample comparisons (i.e., within treatment over time) were done using paired t-tests or Wilcoxon's test for matched pairs (SigmaStat 1997; Fowler and Cohen 1990; Sheskin 1997). Frequency analyses were done using a McNemar test (Sheskin 1997).

6.3 Results

In 1999, the control plots had a total of 66 species, and the treatment plots had 73 species (Table 6-1). In 2000, both the control and treatment plots showed an increase of six species to 72 and 79 species, respectively (Table 6-1). A Sorensen coefficient of similarity index showed a high similarity in species richness within the control (0.90) and treatment plots (0.89) from 1999 to 2000. When the control plots were compared to the treatment plots, however, similarity decreased slightly from 1999 (0.76) to 2000 (0.72). The percentage of native species decreased more in the control plots (86 percent to 81 percent) than in the treatment areas (78 percent to 77 percent) during the same time period. The mean number of species per quadrat showed no substantial change from 1999 to 2000 (Table 6-1). Shannon-Weaver diversity indices were calculated using the relative cover data. In the control plots, diversity declined slightly from 1.068 in 1999 to 1.036 in 2000. In the treatment plots, diversity increased from 0.931 in 1999 to 0.963 in 2000.

Cactus densities were higher in the treatment areas than in the control areas (Table 6-2). Twistspine prickly pear (*Opuntia macorhiza*) density declined significantly in both the control and treatment areas from 1999 to 2000, by 61 percent and 62 percent, respectively (control: paired t-test, $t = 4.858$, 9 df, $P < 0.001$; treatment: $t = 7.252$, 9 df, ($P < 0.001$; Table 6-2). Changes in hedgehog cacti (*Echinocereous viridiflorus*) density were not statistically significant ($P > 0.05$; Table 6-2).

Total foliar vegetation cover was initially 79.2 percent in the control areas and 77.2 percent in the treatment areas in 1999 (Table 6-3 and 6-4). In 2000, both the control and treatment plots showed declines of approximately 2.5 percent (Tables 6-3 and 6-4). Tables 6-3 and 6-4 show the foliar cover for individual species and various groupings of species for both the control and treatment locations. Of the total vegetation cover, more than 94 percent was provided by graminoids at both the control and treatment locations (Tables 6-3 and 6-4). Three graminoid species—big bluestem (*Andropogon gerardii*), Canada bluegrass (*Poa compressa*), and mountain muhly (*Muhlenbergia montana*)—dominated the vegetative cover at both the control and treatment locations (Tables 6-3 and 6-4). Only the order of dominance of these three species differed between the control and treatment areas. At the control plots, cool-season graminoid cover and warm-season graminoid cover did not change significantly from 1999 to 2000 ($P > 0.05$; Figure 6-2). In the treatment plots, however, cool-season graminoid cover decreased significantly (by 7.4 percent; paired t-test, $t = 4.024$, 9 df, $P < 0.01$), and warm-season graminoid cover increased significantly from 1999 to 2000 (by 5.9 percent; $t = -3.276$, 9 df, $P = 0.01$; Figure 6-2). In the treatment plots, native cover increased significantly, by almost 10 percent (from 57.8 to 67.2; paired t-test, $t = -4.964$, 9 df, $P < 0.001$), but did not change significantly in the control plots ($P > 0.05$; Tables 6-3 and 6-4).

Ground cover was dominated by litter, which accounted for 75 percent at the control and 77 percent at the treatment locations in 1999 (Figure 6-3). In 2000, litter cover increased significantly (by 5.7 percent; paired t-test, $t = -2.578$, 9 df, $P < 0.05$) in the control plots while decreasing significantly in the treatment plots (by 7.2 percent; paired t-test, $t = 4.548$, 9 df, $P = 0.001$; Figure 6-3). Bare ground cover decreased significantly in the

control plot (by 2.7 percent, paired t-test, $t = 2.400$, 9 df, $P < 0.05$) while increasing significantly in the treatment plots from 1999 to 2000 (by 4.2 percent; paired t-test, $t = -4.996$, 9 df, $P < 0.001$; Figure 6-4). Rock cover increased significantly at the treatment locations (by 3.7 percent; paired t-test, $t = -2.645$, 9 df, $P < 0.05$) while remaining the same at the control plots ($P > 0.05$; Figure 6-4).

Overall biomass on the grassland (combined current-year live and litter) was reduced significantly, by approximately 77 percent, as a result of the prescribed burn (t-test, $t = 6.521$, 8 df, $P < 0.001$; Figure 6-5). Biomass values were decreased from approximately 465 g/m^2 (4,152 lbs/acre) to 108 g/ m^2 (963 lbs/acre). By winter 2001, however, overall biomass in the burn area had increased to 276 g/ m^2 (2460 lbs/acre), but was still significantly below the initial levels (t-test, $t = 2.914$, 8 df, $P < 0.05$; Figure 6-5).

The recovery of the vegetation cover throughout the growing season is shown in Figure 6-6. The pre-burn vegetation and litter combined cover value (as estimated from quadrat photographs) was approximately 95 percent. After the fire, live vegetation cover (no litter included) was reduced to approximately 5 percent. Throughout the summer, vegetation cover increased and had returned to approximately 75 percent by September 27, 2000. Figures 6-7 and 6-8 visually document the recovery of the grassland throughout the growing season at both the landscape and quadrat levels. Additional photographic documentation of the fire recovery is contained in Appendix C on the CD-ROM.

Individual species frequency results from the 1-m^2 quadrats are presented in Table 6-5. The most frequently encountered species in the control plots in 1999 were sun sedge (*Carex heliophila*), dotted gayfeather (*Liatris punctata*), blue grama (*Bouteloua gracilis*), mountain muhly, sideoats grama (*Bouteloua curtipendula*), and big bluestem (Table 6-5). In the treatment plots in 1999, the most frequently encountered species were sun sedge, Canada bluegrass, mountain muhly, big bluestem, blue grama, and twistspine prickly pear (Table 6-5). In 2000, some shifting of the order of each of these species was noted in both the control and treatment plots, but generally, these same species remained the most frequently encountered. A comparison of the amount of change exhibited by each species within the control and treatment plots, respectively, and then compared between the control and treatment plots, showed that blue grama, Porter's aster (*Aster porteri*), side-oats grama, winged eriogonum (*Eriogonum alatum*), blanket flower (*Gallardia aristata*), mountain muhly, and field alyssum (*Alyssum minus*) showed the greatest frequency response to the burn. Blue grama, Porter's aster, side-oats grama, and winged eriogonum, had the most positive frequency responses to the fire, compared to changes in the control. Blanket flower, mountain muhly, and field alyssum responded more negatively to the fire than they did in the control. Diffuse knapweed frequency increased slightly in both the control and treatment plots.

6.4 Discussion

Monitoring was conducted on the xeric tallgrass prairie at the Site during the summers of 1999 and 2000 to collect pre- and post-burn vegetation data at locations where a 48-acre

prescribed burn was conducted in April 2000. Data were collected from control (unburned) and treatment (burned) areas for comparison. All control and treatment monitoring areas were treated with the herbicide Tordon 22K, applied by helicopter, in May 1999.

Analysis of the data shows that species richness was not affected by the fire. Both control and treatment plots increased by six species from 1999 to 2000. Species diversity increased only slightly as a result of the burn. It would be interesting to know whether species diversity would have changed more if the areas had not been treated with herbicides the year before the burn, because the forb component would not have been quite so depressed. Cactus densities declined, but similar declines were observed in both the control and treatment areas; therefore, these declines are best explained as a response to the herbicide application, rather than the prescribed burn. Similar losses of cactus density have been observed at other monitoring locations for herbicide effects where no prescribed fire has been used (see other sections of this annual report or K-H 1999b, 2000).

One of the objectives of the prescribed burn was to reduce the amount of dead plant litter on the prairie, thereby reducing the potential for a wildfire and also recycling nutrients to the plants. Ground cover data showed that surface litter decreased significantly, by approximately 7 percent. Most of this decrease was offset by increases in rock and bare ground cover. Although a 7 percent reduction in litter cover at the ground surface doesn't seem like much, it must be remembered that this value was determined using a point-intercept cover methodology and thus records only what is found at the ground surface. It does not measure the actual amount or depth of the litter present. The biomass data, on the other hand, showed that overall biomass was reduced by 77 percent (from 4,152 lbs/acre to 963 lbs/acre) in the burned areas, so it is clear that the potential for a wildfire was lessened. By winter 2001, overall biomass was still significantly below initial levels, with most of the reduction still a result of reduced litter amounts (Figure 6-9). The fact that the cover of litter at the ground surface was not completely removed is beneficial, because it means there was still some cover protecting the ground surface from wind and/or water erosion. For these reasons, the fire accomplished what it was designed to do. The amount of biomass available as fuel on the grassland was reduced, but the ground surface itself remained protected from wind and water erosion as the vegetation returned throughout the summer. Additionally, the fire recycled nutrients that were tied up in the dead plant litter and stimulated the growth of the perennial grass species.

By the end of the growing season, total foliar cover on the grassland was essentially unchanged by the fire. Total foliar cover was approximately 2.5 percent less in 2000 than in 1999, in both the control and treatment plots. Forb cover increased only slightly in the treatment area, compared to the control. In general, however, forb cover was depressed in both the control and treatment plots by the herbicide application from the year before.

Overall graminoid cover also remained essentially unchanged as a result of the fire. However, the ratio of cool-season to warm-season graminoids was changed as a result of the burn. One of the goals of the prescribed burn was to increase the dominance of the

warm-season graminoid species, especially those that are the characteristic species of the xeric tallgrass prairie. This was done by timing the fire so that it would have the greatest detrimental effect on the cool-season species. In the unburned control plot, neither cool-season nor warm-season graminoid cover changed significantly from 1999 to 2000. In the treatment plot, however, cool-season cover was reduced significantly after the fire, and warm-season graminoid cover increased significantly. The prescribed burn shifted the species composition of the treatment plots from a cool-season-dominated community to a warm-season-dominated community. The warm-season species that showed increases in the treatment areas included big bluestem, little bluestem, blue grama, and side-oats grama. Big bluestem and little bluestem showed declines in cover at the unburned control locations. The cool-season graminoids that showed decreases in the treatment plot were Canada bluegrass, Kentucky bluegrass (*Poa pratensis*), and sun sedge. The data show that the prescribed burn helped push the species composition in the direction that Site ecologists wanted it to go. Continued prescribed burns in the same area every few years would help continue to promote the dominance of the warm-season species.

One dominant warm-season species that did not increase as a result of the fire was mountain muhly, a montane warm-season species. Why this is the case is unknown. It actually showed a slight increase in the control plots, but a slight decline in the treatment plots. Perhaps the timing of the fire was not appropriate for this species, or some other factor(s) affected its response. Studies from ponderosa pine forests in Arizona have shown that mountain muhly generally decreases in density after a fire, but fully recovers after approximately three years (FEIS 2001). It would be useful to gather further information on the response of mountain muhly to fire under the prairie conditions here at the Site, because this species forms a dominant and unique part of the xeric tallgrass prairie species composition on the Rocky Flats Alluvium—a species composition that is not found elsewhere along the Front Range (Buckner 2000).

In general, the warm-season graminoids responded to the burn as anticipated, although the dry spring and early summer caused the height and overall flowering response to be somewhat less than what had been hoped for. Had normal precipitation occurred, it is likely that a greater response of the warm-season graminoids would have been seen, because many species began to wither and go dormant in late July and August (Figures 6-6 and 6-8). The response of the dominant warm-season species frequency in the treatment area generally paralleled that of the cover data. Big bluestem frequency remained unchanged, while little bluestem, blue grama, hairy grama, and side-oats grama increased. Mountain muhly frequency decreased in the burn area, while increasing in the control area.

With respect to the noxious weed diffuse knapweed, both the control and treatment areas showed no significant changes. The slight increases in the cover and frequency of diffuse knapweed were not statistically significant in either the control or treatment plots, suggesting that the fire did not affect diffuse knapweed abundance. The significant loss of twistspine cactus density shown in both the control and treatment plots is best explained by the herbicide application at all the monitoring locations in spring 1999.

Results from studies elsewhere at the Site have shown a similar decline in response to the herbicide alone.

Direct comparisons to studies conducted elsewhere on the response of the tallgrass prairie to fire are difficult to make because of differences in location, soil types, precipitation amounts, community composition, variation in conditions before and after burning, fire frequency, and monitoring methodologies. No other comparable data were available on the response of a xeric tallgrass prairie to fire. However, an attempt was made to compare the Site data to responses of the mesic tallgrass prairie to fire that have been recorded elsewhere around the country (Collins and Wallace 1990).

With respect to species richness, Collins and Gibson (1990) state that there "appears to be no clear relationship between fire and species richness during the year in which the fire occurred." They report results from several studies, some showing increases in species richness and others showing decreases in response to fire. Data from the Site burn showed no difference in species richness in the burned area compared to the unburned locations.

Collins and Gibson (1990) also report that most studies show a loss of species diversity after a fire because of an increase in dominance by the matrix species (i.e., species occupying the greatest amount of space in a community). Data from the Site showed a slight increase in species diversity in response to the burn. This response may have been confounded, however, by the herbicide application in the year before the fire. It is also well documented that a spring fire enhances the productivity and vigor of warm-season graminoids, while reducing that of the cool-season species (Ewing and Engle 1988; Collins and Wallace 1990). The increase in warm-season graminoid cover and reduction in cool-season graminoid cover from the Site burn substantiate this occurrence on the xeric tallgrass prairie in Colorado as well. Qualitative observations also concurred with the literature that there appeared to be an increase in flowering of many of the warm-season species within the burned area compared to those outside the burn area (Svejcar 1990).

The results of the 2000 spring prescribed burn on the xeric tallgrass prairie demonstrate the utility of fire as a tool for effective management and restoration of the prairie ecosystems at the Site. Continued monitoring of these transects will provide a better understanding of the longer-term implications for fire on the xeric tallgrass prairie at the Site. With clearly stated objectives, the use of prescribed fire, integrated with other resource management techniques, can help maintain the viability and sustainability of the prairie ecosystems at the Site.

6.5 Conclusions

In April 2000, a prescribed burn was conducted on 48 acres of the xeric tallgrass prairie at the Site. Monitoring results have shown that the prescribed burn was successful not only because it demonstrated that it could be accomplished through the coordinated

efforts of many organizations both on and off Site, but because the objectives of the prescribed burn were achieved.

The prairie benefited from the prescribed burn in multiple ways. The fire removed and recycled much of the plant litter that had been burying and stressing the native species and reducing their ability to compete with noxious weeds. The reduction in plant litter reduced the risk of a wildfire. The fire stimulated the growth, health, and reproduction of the native perennial plant species, which was observed quantitatively in the increased cover and frequency of many of these species, and qualitatively in the increased flowering observed on the prairie at the burn location in 2000. The burn also caused a species composition shift from a cool-season-dominated community to a warm-season-dominated community, as intended. The use of prescribed burns is a valuable tool for prairie management and restoration and should be continued at the Site.

6.6 References

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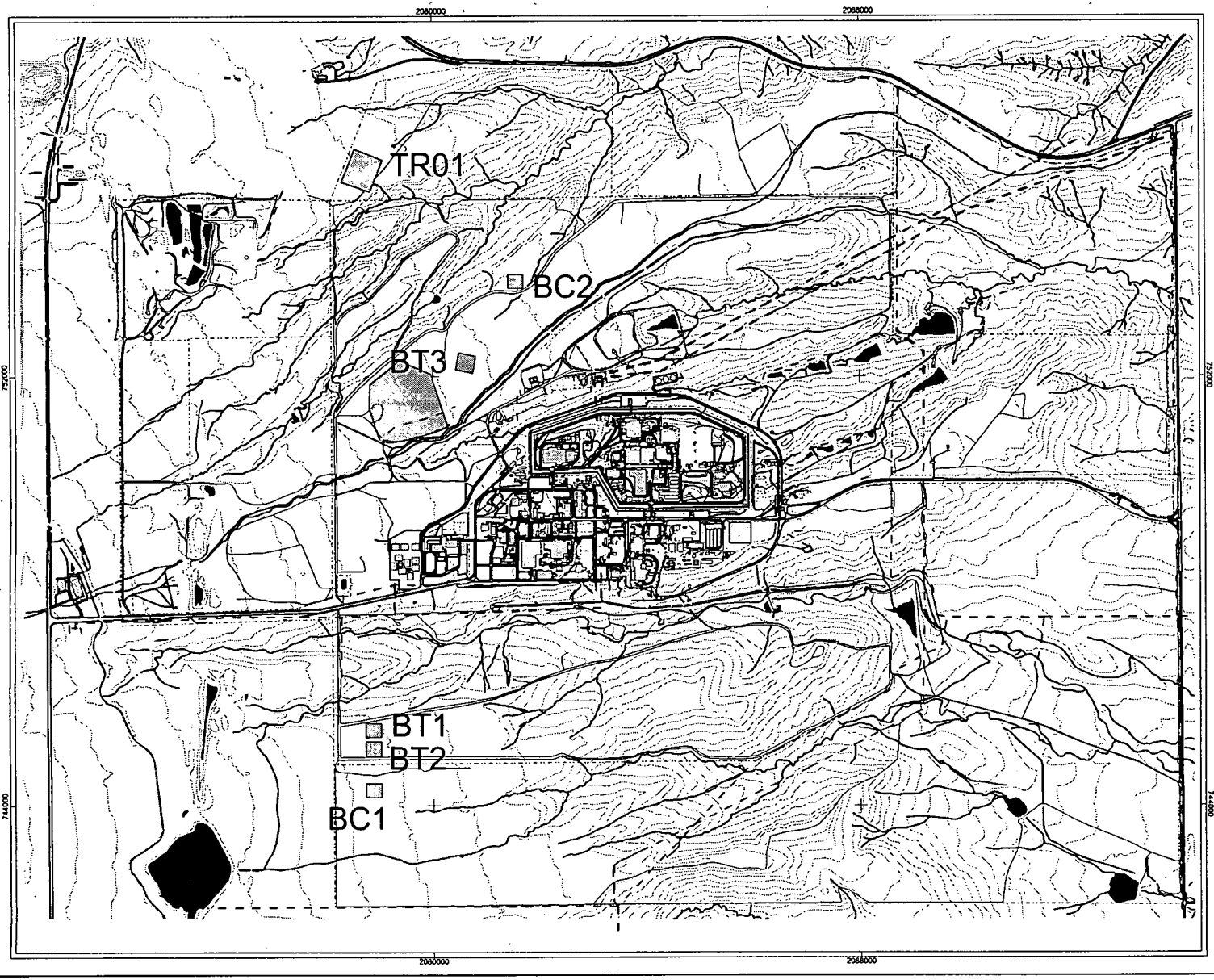

Prescribed Burn Monitoring Plot Locations

Figure 6-1

LEGEND

- Control Plots
- Treatment Plots

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours.
The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution.
The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Location data provided by Exponent.
K-H Ecology Group POC: Karan North 303-966-9876.

N

1:23552

1000 0 1000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2k-0038

May 3, 2001

\\Gaia\GIS\ECO\projects\2k-0038\veg monitoring locations 2001 aprBurn plots

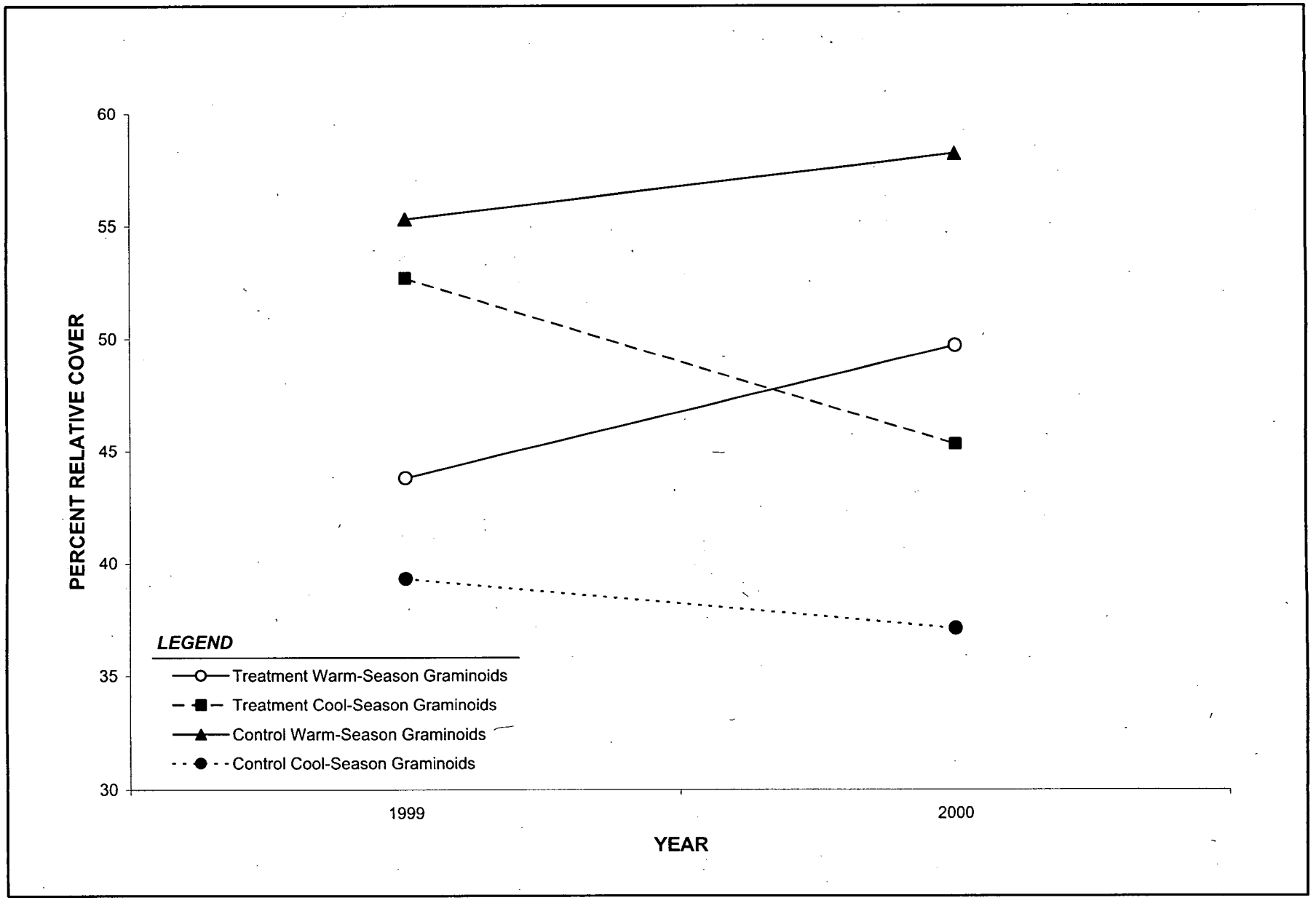

Figure 6-2. Pre- and post-burn cool-season vs. warm-season graminoid cover.

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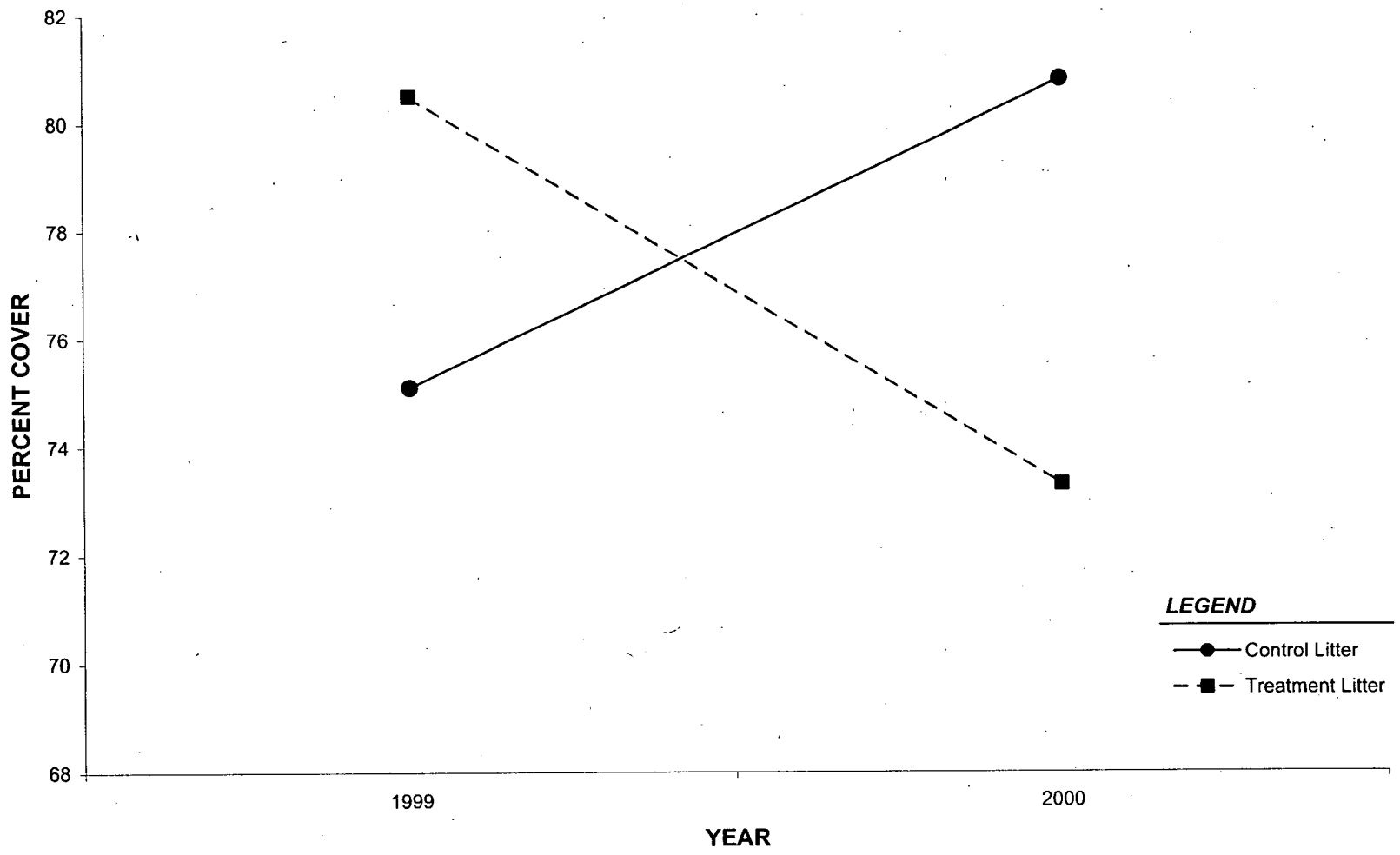

Figure 6-3. Pre- and post-burn litter cover.

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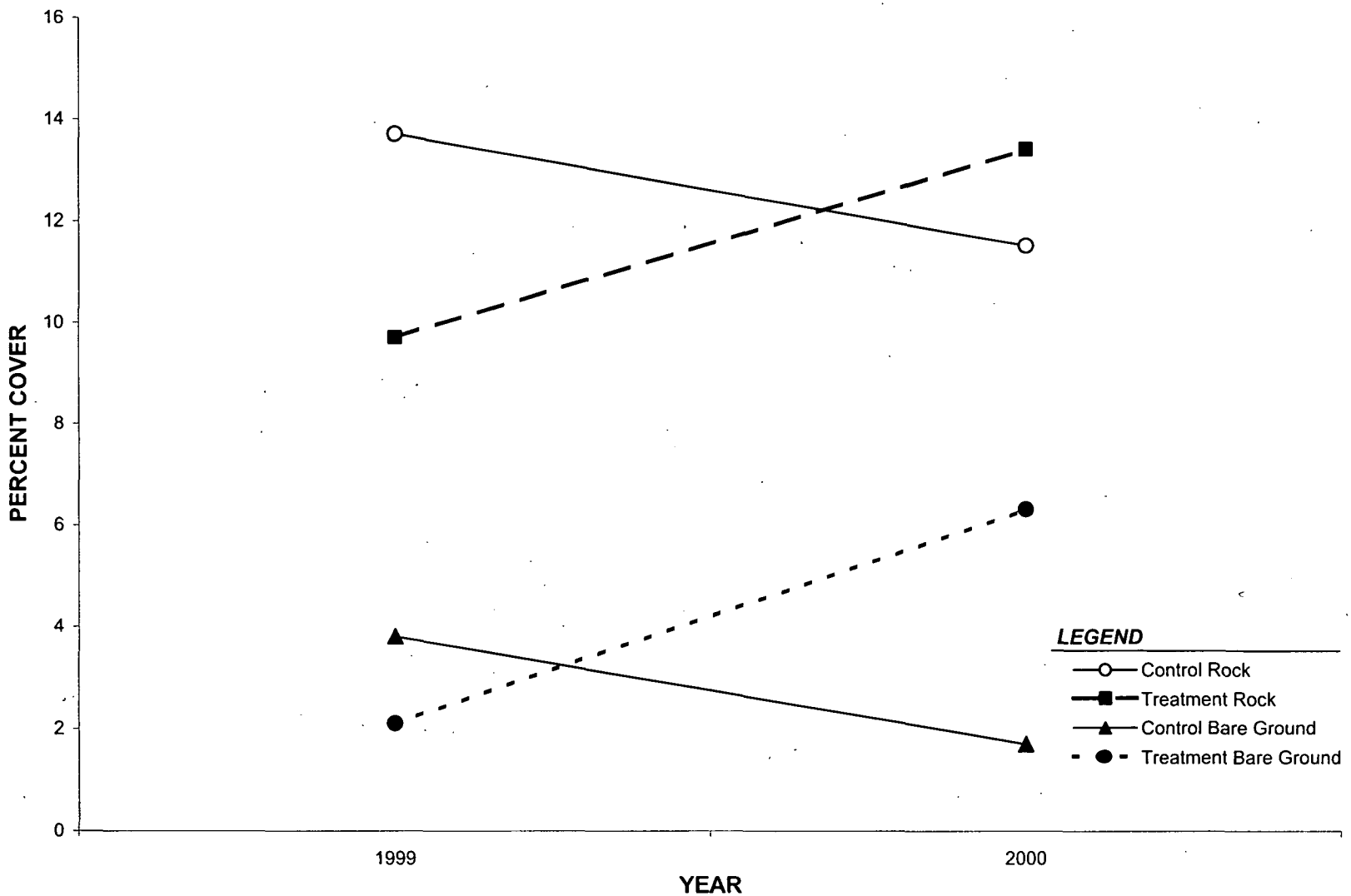

Figure 6-4. Pre- and post-burn rock and bare ground cover.

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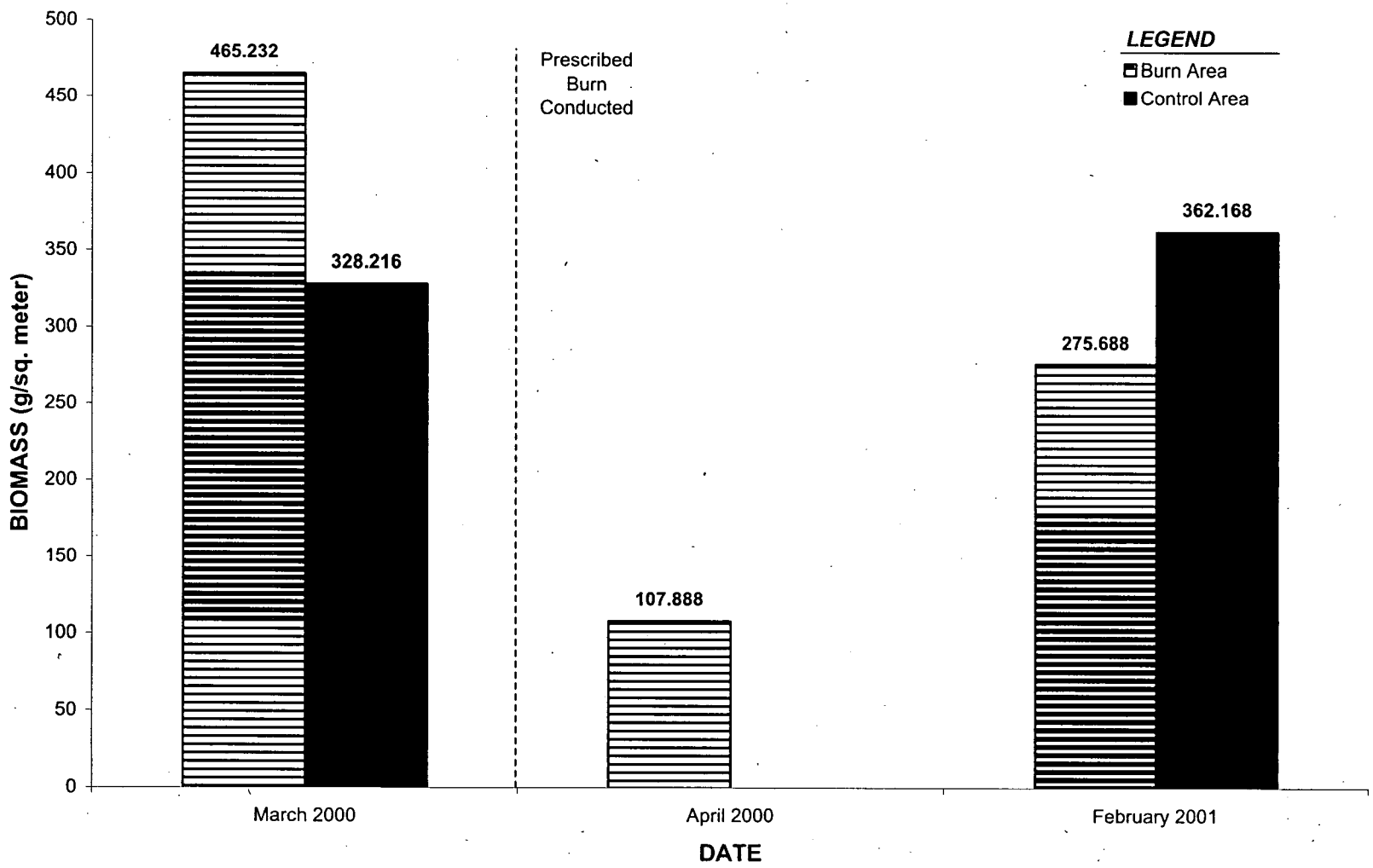

Figure 6-5. Prescribed burn biomass changes.

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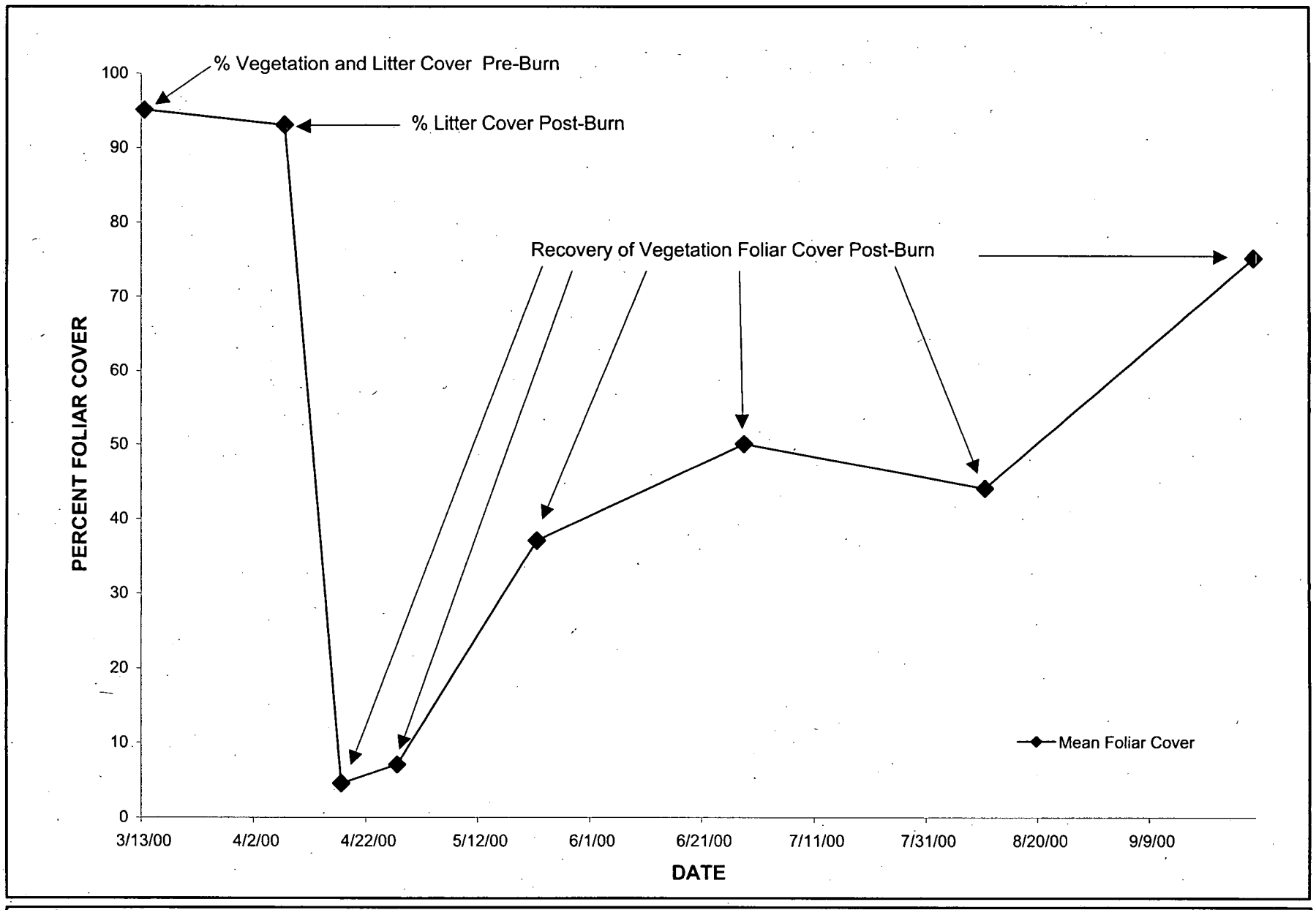

Figure 6-6. Recovery of post-burn vegetative cover based on photo quadrats.

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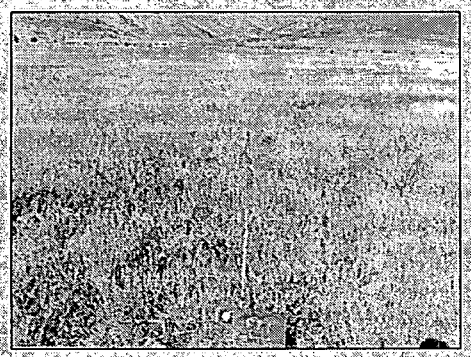
Figure 6-7. Time Series of 2000 Prescribed Burn Area at Rocky Flats Environmental Technology Site

Prescribed Burn Conducted on April 6, 2000



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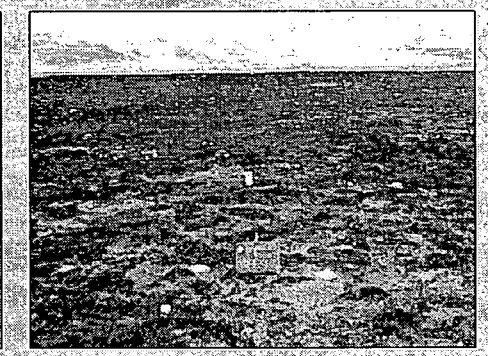

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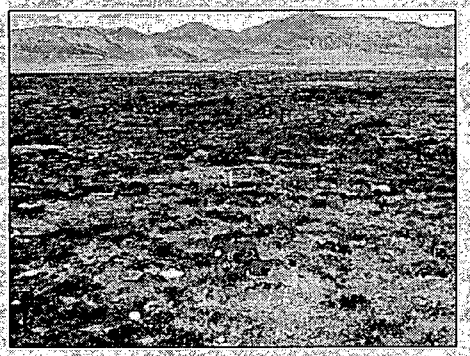

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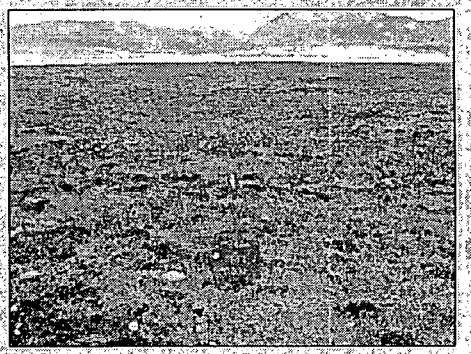

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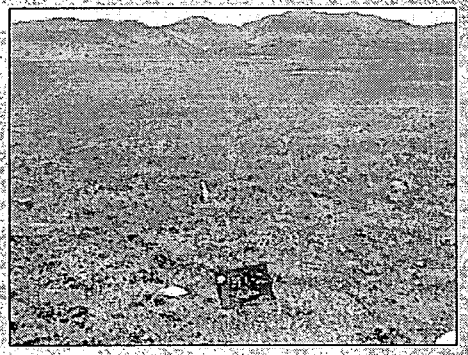

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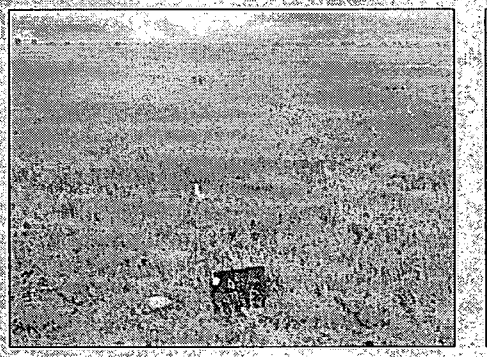

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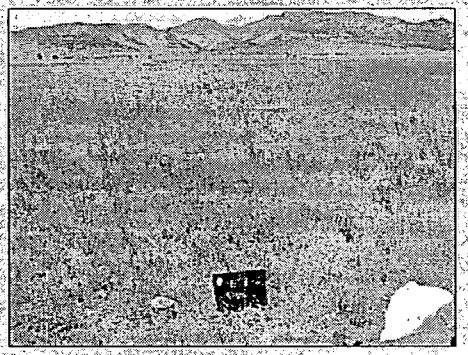

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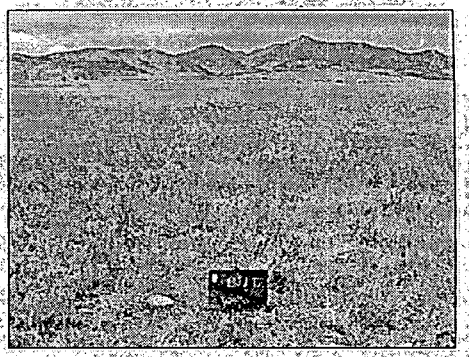

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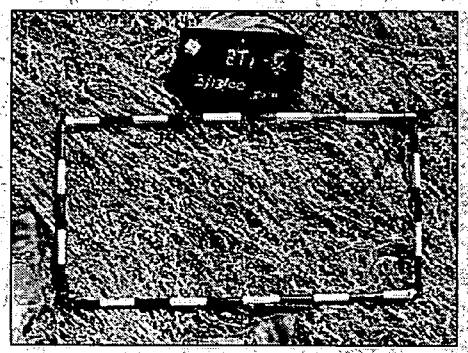
Figure 6-8. Time Series of Ground Surface in 2000 Prescribed Burn Area
at Rocky Flats Environmental Technology Site
Prescribed Burn Conducted on April 6, 2000



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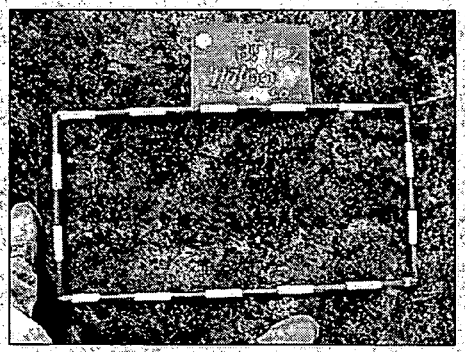

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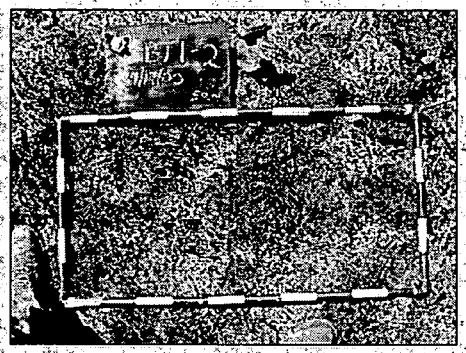

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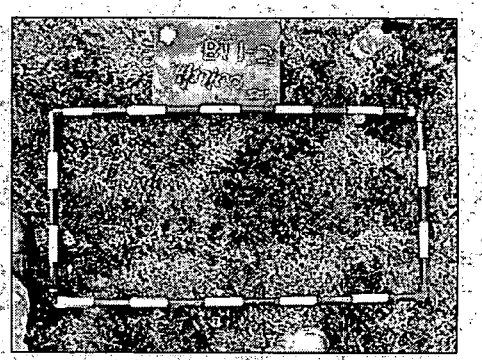

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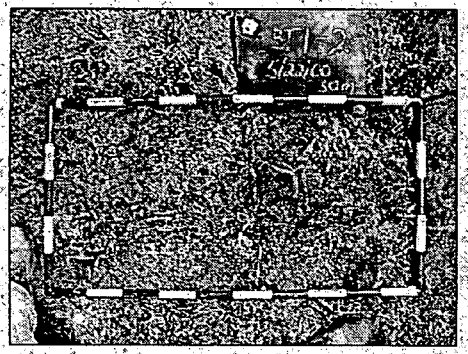

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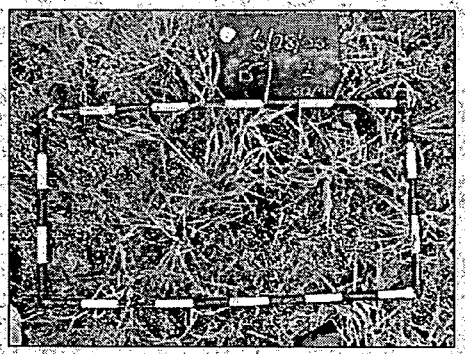
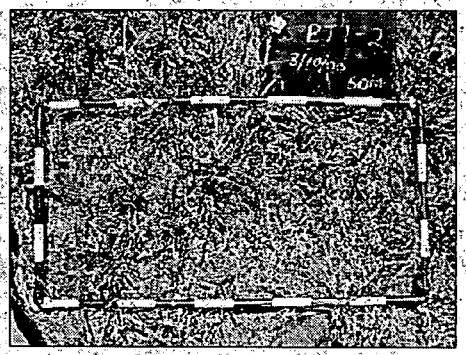
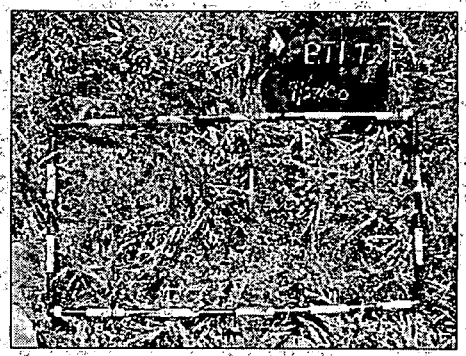


6/28/00



8/10/00



9/27/00

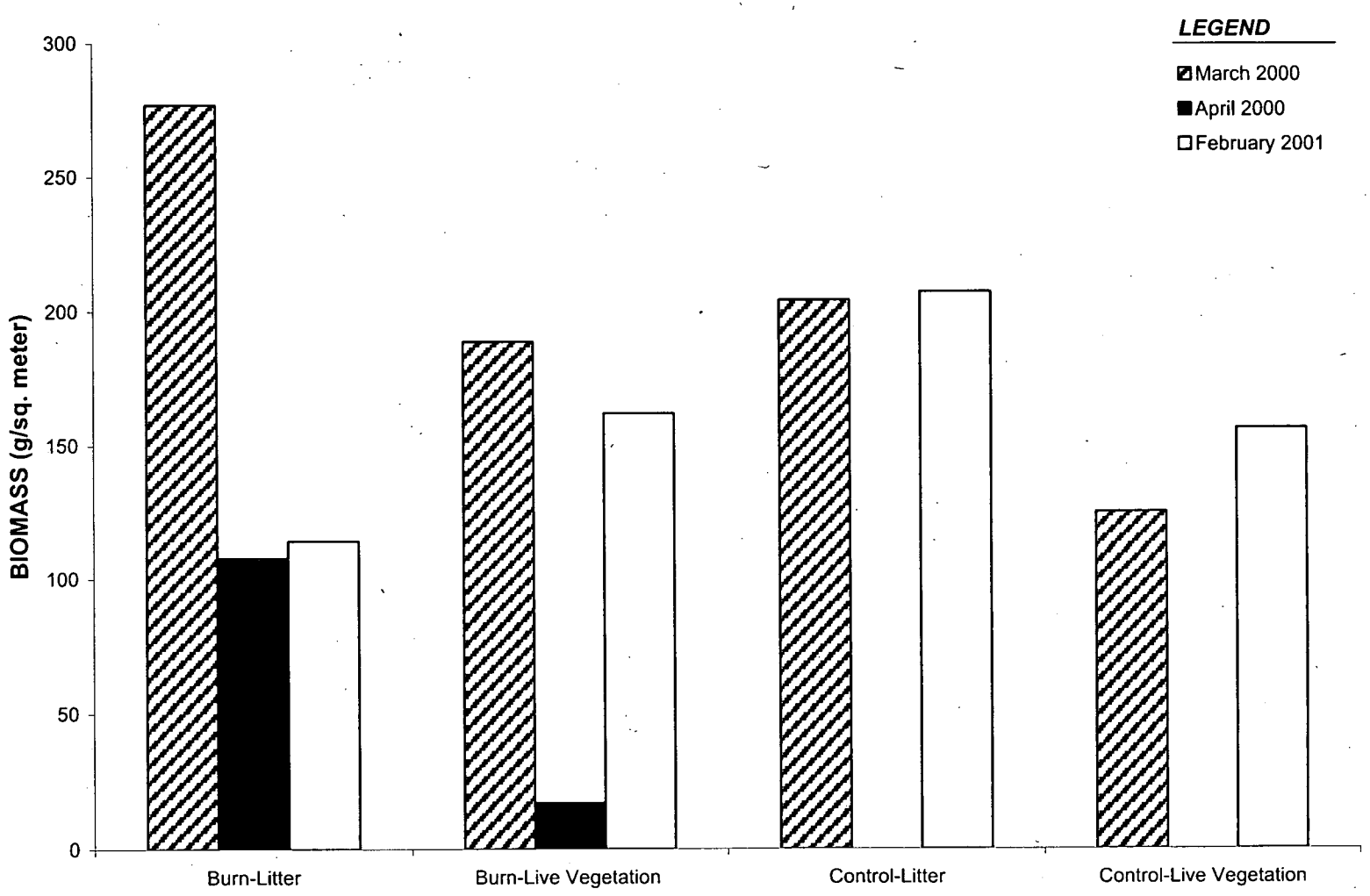


Figure 6-9. Prescribed burn biomass changes.

Boulder1\Data\Groups\Graphics\Projects\1454\2001\burn biomass values.xls 5/3/01 CO

Table 6-1. Prescribed Burn Pre- and Post-Burn Species Richness (1999-2000)

				Control		Treatment	
Family	**Scientific Name**	**Speccode**	**Native**	**1999**	**2000**	**1999**	**2000**
AGAVACEAE	Yucca glauca Nutt.	YUGL1	Y				
ANACARDIACEAE	Rhus aromatica Ait. var. trilobata (Nutt.) A. Gray	RHAR1	Y	X	X		
APIACEAE	Lomatium orientale Coult. & Rose	LOOR1	Y	X		X	
ASCLEPIADACEAE	Asclepias speciosa Torr.	ASSP1	Y			X	X
ASCLEPIADACEAE	Asclepias stenophylla A. Gray	ASST1	Y	X	X	X	X
ASCLEPIADACEAE	Asclepias viridiflora Raf.	ASVI1	Y	X	X	X	X
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	Y	X	X		
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	Y	X	X	X	X
ASTERACEAE	Antennaria parvifolia Nutt.	ANPA1	Y	X	X	X	X
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	ARCA1	Y			X	X
ASTERACEAE	Artemisia dracunculus L.	ARDR1	Y				
ASTERACEAE	Artemisia frigida Willd.	ARFR1	Y	X	X	X	X
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	Y	X	X	X	X
ASTERACEAE	Aster falcatus Lindl.	ASFA1	Y				
ASTERACEAE	Aster porteri Gray	ASPO1	Y	X	X	X	X
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	N				X
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	N	X	X	X	X
ASTERACEAE	Chrysanthemum leucanthemum L.	CHLE1	N				
ASTERACEAE	Chrysopsis fulcrata Greene	CHFU1	Y	X	X	X	X
ASTERACEAE	Chrysopsis villosa Pursh.	CHVI1	Y	X	X	X	X
ASTERACEAE	Cirsium arvense (L.) Scop.	CIAR1	N				
ASTERACEAE	Cirsium undulatum (Nutt.) Spreng.	CIUN1	Y			X	X
ASTERACEAE	Conyza canadensis (L.) Cronq.	COCA1	Y				X
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	Y	X		X	X
ASTERACEAE	Erigeron flagellaris A. Gray	ERFL1	Y				X
ASTERACEAE	Gaillardia aristata Pursh.	GAAR1	Y	X	X	X	X
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	Y		X	X	X
ASTERACEAE	Helianthus annuus L.	HEAN1	Y				X
ASTERACEAE	Helianthus pumilus Nutt.	HEPU1	Y	X	X		
ASTERACEAE	Helianthus rigidus (Cass.) Desf. ssp. subrhomboideus (Rydb.) Heiser	HERI1	Y	X	X		
ASTERACEAE	Kuhnia chlorolepis Woot. & Standl.	KUCH1	Y				
ASTERACEAE	Kuhnia eupatorioides L.	KUEU1	Y				
ASTERACEAE	Lactuca serriola L.	LASE1	N		X	X	X
ASTERACEAE	Liatris punctata Hook.	LIPU1	Y	X	X	X	X
ASTERACEAE	Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	Y				X
ASTERACEAE	Scorzonera laciniata L.	SCLA1	N				
ASTERACEAE	Senecio plattensis Nutt.	SEPL1	Y	X	X	X	X
ASTERACEAE	Senecio spartioides T. & G.	SESP1	Y			X	X
ASTERACEAE	Solidago mollis Bart.	SOMO1	Y	X	X	X	
ASTERACEAE	Taraxacum officinale Weber	TAOF1	N		X	X	X
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	N	X	X	X	X
BORAGINACEAE	Cryptantha virgata (Porter) Payson	CRVI1	Y			X	X
BORAGINACEAE	Lappula redowskii (Hornem.) Greene	LARE1	Y				
BORAGINACEAE	Lithospermum incisum Lehm.	LIIN1	Y			X	X
BRASSICACEAE	Alyssum alyssoides (L.) L.	ALAL1	N		X		
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	N	X	X	X	X
BRASSICACEAE	Arabis fendleri (S. Wats.) Greene var. fendleri	ARFE3	Y		X		
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	Y	X	X	X	X
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	CAMI1	N				
BRASSICACEAE	Draba reptans (Lam.) Fern.	DRRE1	Y		X		
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	ERCA2	Y	X	X	X	X
BRASSICACEAE	Lepidium campestre (L.) R. Br.	LECA1	N				
BRASSICACEAE	Lepidium densiflorum Schrad.	LEDE1	Y		X		X
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	LEMO1	Y	X	X	X	X
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	N				
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	Y	X	X	X	X
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	Y	X	X	X	X
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	ARFE2	Y	X	X	X	X
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	PAJA1	Y	X	X	X	X
CARYOPHYLLACEAE	Silene antirrhina L.	SIAN1	Y				X
CARYOPHYLLACEAE	Silene drummondii Hook.	SIDR1	Y	X	X		
CHENOPODIACEAE	Chenopodium leptophyllum Nutt. ex Moq.	CHLE2	Y				
CHENOPODIACEAE	Kochia scoparia (L.) Schrad.	KOSC1	N		X		
CHENOPODIACEAE	Salsola iberica Senn. & Pau.	SAIB1	N		X		

Table 6-1. (cont.)

				Control		Treatment	
Family	Scientific Name	Speccode	Native	1999	2000	1999	2000
CLUSIACEAE	Hypericum perforatum L.	HYPE1	N	X	X	X	X
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	TROC1	Y				
CONVOLVULACEAE	Convolvulus arvensis L.	COAR1	N				X
CRASSULACEAE	Sedum lanceolatum Torr.	SELA1	Y				
CYPERACEAE	Carex heliophila Mack.	CAHE1	Y	X	X	X	X
EUPHORBIACEAE	Euphorbia robusta (Engelm.) Small	EURO1	Y			X	X
FABACEAE	Astragalus agrestis Dougl. ex G. Don	ASAG1	Y		X	X	X
FABACEAE	Astragalus shortianus Nutt. ex T.&G.	ASSH1	Y				
FABACEAE	Dalea purpurea Vent	DAPU1	Y	X	X	X	X
FABACEAE	Melilotus officinalis (L.) Pall.	MEOF1	N				X
FABACEAE	Oxytropis lambertii Pursh.	OXLA1	Y				
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	Y	X	X	X	X
GERANIACEAE	Erodium cicutarium (L.) L'Her.	ERCI1	N			X	X
HYDROPHYLLACEAE	Phacelia heterophylla Pursh.	PHHE1	Y				
JUNCACEAE	Juncus interior Wieg.	JUIN1	Y	X	X	X	X
LILIACEAE	Allium textile A. Nels. & Macbr.	ALTE1	Y	X	X	X	
NYCTAGINACEAE	Mirabilis linearis (Pursh.) Heimerl	MILI1	Y	X	X	X	X
ONAGRACEAE	Calylophus serrulatus (Nutt.) Raven	CASE2	Y	X			
ONAGRACEAE	Gaura coccinea Pursh.	GACO1	Y				
OROBANCHACEAE	Orobanche fasciculata Nutt.	ORFA1	Y	X			
PLANTAGINACE	Plantago lanceolata L.	PLLA1	N			X	X
POACEAE	Aegilops cylindrica Host	AECY1	N			X	
POACEAE	Agropyron smithii Rydb.	AGSM1	Y			X	X
POACEAE	Andropogon gerardii Vitman	ANGE1	Y	X	X	X	X
POACEAE	Andropogon scoparius Michx.	ANSC1	Y	X	X	X	X
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	Y	X	X	X	X
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	Y	X	X	X	X
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	Y	X	X	X	X
POACEAE	Bouteloua hirsuta Lag	BOHI1	Y	X	X	X	X
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	N	X	X	X	X
POACEAE	Bromus tectorum L.	BRTE1	N	X	X	X	X
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	BUDA1	Y	X	X		X
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1	Y	X	X	X	X
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	Y	X	X	X	X
POACEAE	Muhlenbergia wrightii Vasey	MUWR1	Y	X	X		
POACEAE	Panicum capillare L.	PACA1	Y			X	X
POACEAE	Poa compressa L.	POCO1	N	X	X	X	X
POACEAE	Poa pratensis L.	POPR1	N	X	X	X	X
POACEAE	Setaria viridis (L.) Beauv.	SEVI1	N			X	X
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	Y	X	X	X	X
POACEAE	Sorghastrum nutans (L.) Nash	SONU1	Y	X	X	X	X
POACEAE	Sporobolus asper (Michx.) Kunth	SPAS1	Y			X	X
POACEAE	Sporobolus cryptandrus (Torr.) A. Gray	SPCR1	Y			X	X
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	Y	X	X	X	X
POACEAE	Stipa comata Trin. & Rupr.	STCO1	Y	X	X	X	X
POLEMONIACEAE	Ipomopsis spicata (Nutt.) V. Grant ssp. spicata	IPSP1	Y	X	X		
POLYGONACEAE	Eriogonum alatum Torr.	ERAL1	Y	X	X	X	X
POLYGONACEAE	Eriogonum umbellatum Torr.	ERUM1	Y				
PORTULACACEAE	Talinum parviflorum Nutt.	TAPA1	Y	X	X	X	X
ROSACEAE	Potentilla fissa Nutt.	POFI1	Y	X	X		
ROSACEAE	Potentilla hippiana Lehm.	POHI1	Y	X	X		
ROSACEAE	Rosa arkansana Porter	ROAR1	Y				
SANTALACEAE	Comandra umbellata (L.) Nutt.	COUM1	Y	X	X		
SCROPHULARIACEAE	Castilleja sessiliflora Pursh.	CASE3	Y	X	X	X	
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1	N	X	X	X	X
SCROPHULARIACEAE	Penstemon secundiflorus Benth.	PESE1	Y				
SCROPHULARIACEAE	Penstemon virens Penn.	PEVI1	Y	X	X	X	X
SCROPHULARIACEAE	Verbascum thapsus L.	VETH1	N			X	X
SELAGINELLACEAE	Selaginella densa Rydb.	SEDE1	Y				X
	Total Species Richness			66	72	73	79
	Percent Native Species			86	81	78	77
	Mean # Species/Quadrat			12.7	12	10.6	10.7

Table 6-2. Pre- and Post-Burn Cactus Densities

		Density (plants/m^2)		
Scientific Name	**Site**	**1999**	**2000**	**% Change**
Opuntia macorhiza	Control	25.4	10.0	-61
	Treatment	98.2	37.4	-62
Echinocereus viridiflorus	Control	43.8	31.0	-29
	Treatment	55.0	73.6	34

Sample size (n=10)

Table 6-3. Prescribed Burn Pre-Burn vs. Post-Burn Control Plot Foliar Cover Summary

					Frequency		Absolute Cover		Relative Cover	
Scientific Name	**Speccode**	**Form**	**Native**	**Cool/Warm Season**	**1999**	**2000**	**1999**	**2000**	**1999**	**2000**
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N			10		0.1		0.1
Linaria dalmatica (L.) Mill.	LIDA1	F	N		30	20	0.4	0.2	0.5	0.3
Arenaria fendleri A. Gray	ARFE2	F	Y		20	30	0.2	0.4	0.3	0.5
Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	F	Y		10		0.1		0.1	
Aster porteri Gray	ASPO1	F	Y		10		0.3		0.4	
Chrysopsis villosa Pursh.	CHVI1	F	Y		20		0.2		0.3	
Eriogonum alatum Torr.	ERAL1	F	Y		10		0.2		0.3	
Lesquerella montana (A. Gray) Wats.	LEMO1	F	Y			10		0.1		0.1
Liatris punctata Hook.	LIPU1	F	Y		80	90	2.2	2.3	2.8	3.0
Paronychia jamesii T. & G.	PAJA1	F	Y			10		0.1		0.1
Penstemon virens Penn.	PEVI1	F	Y		10		0.1		0.1	
Psoralea tenuiflora Pursh.	PSTE1	F	Y		40	30	0.5	0.4	0.6	0.5
Solidago mollis Bart.	SOMO1	F	Y		10		0.1		0.1	
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	30		0.4		0.5	
Bromus tectorum L.	BRTE1	G	N	C	20	20	0.5	0.5	0.6	0.7
Poa compressa L.	POCO1	G	N	C	90	100	10.2	7.5	12.9	9.8
Poa pratensis L.	POPR1	G	N	C	80	70	5.8	5.6	7.3	7.3
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	G	Y	C	60	20	0.9	0.3	1.1	0.4
Carex heliophila Mack.	CAHE1	G	Y	C	90	100	4.9	5.3	6.2	6.9
Juncus interior Wieg.	JUIN1	G	Y	C	10		0.1		0.1	
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	100	90	4	3.9	5.1	5.1
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C		30		0.4		0.5
Stipa comata Trin. & Rupr.	STCO1	G	Y	C	80	90	4.3	5	5.4	6.5
Andropogon gerardii Vitman	ANGE1	G	Y	W	100	100	14.3	13.4	18.1	17.4
Andropogon scoparius Michx.	ANSC1	G	Y	W	60	50	1.8	0.9	2.3	1.2
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	80	90	3	3.3	3.8	4.3
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	90	100	2.5	2.7	3.2	3.5
Bouteloua hirsuta Lag	BOHI1	G	Y	W	40	80	0.8	1.1	1.0	1.4
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W	90	90	18.5	20.3	23.4	26.4
Sorghastrum nutans (L.) Nash	SONU1	G	Y	W	80	70	2.3	2.3	2.9	3.0
Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	G	Y	W	30	30	0.6	0.7	0.8	0.9
Total foliar cover							79.2	76.8	100.0	100.0
Total forb cover							4.3	3.6	5.4	4.7
Total native forb cover							3.9	3.3	4.9	4.3
Total non-native forb cover							0.4	0.3	0.5	0.4

Table 6-3. (cont.)

Scientific Name	Speccode	Form	Native	Cool/Warm Season	Frequency		Absolute Cover		Relative Cover	
					1999	2000	1999	2000	1999	2000
Total graminoid cover							74.9	73.2	94.6	95.3
Total warm-season graminoid cover							43.8	44.7	55.3	58.2
Total cool-season graminoid cover							31.1	28.5	39.3	37.1
Total native cover							61.9	62.9	78.2	81.9
Total non-native cover							17.3	13.9	21.8	18.1

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (1500).

Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).

All cover values presented are means (n = 10).

Native categories: Y = Native, N = Non-Native

Form categories: C = Cactus, F = Forb, G = Graminoid

Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 6-4. Prescribed Burn Pre-Burn vs. Post-Burn Treatment Plot Foliar Cover Summary

					Frequency		Absolute Cover		Relative Cover	
Scientific Name	Speccode	Form	Native	Cool/Warm Season	1999	2000	1999	2000	1999	2000
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N		10		0.1		0.1	
Centaurea diffusa Lam.	CEDI1	F	N		10	30	0.1	0.3	0.1	0.4
Linaria dalmatica (L.) Mill.	LIDA1	F	N		10	10	0.1	0.1	0.1	0.1
Verbascum thapsus L.	VETH1	F	N			10		0.1		0.1
Arenaria fendleri A. Gray	ARFE2	F	Y		10		0.1		0.1	
Artemisia frigida Willd.	ARFR1	F	Y		10		0.1		0.1	
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y		10	30	0.1	0.4	0.1	0.5
Chrysopsis villosa Pursh.	CHVI1	F	Y		10		0.1		0.1	
Liatris punctata Hook.	LIPU1	F	Y		80	90	1.6	2.2	2.1	2.9
Penstemon virens Penn.	PEVI1	F	Y		10		0.1		0.1	
Psoralea tenuiflora Pursh.	PSTE1	F	Y		20	50	0.3	0.6	0.4	0.8
Aegilops cylindrica Host	AECY1	G	N	C	10		0.1		0.1	
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	40		0.9		1.2	
Bromus tectorum L.	BRTE1	G	N	C	10	20	0.3	0.5	0.4	0.7
Poa compressa L.	POCO1	G	N	C	100	100	23.3	17.6	30.2	23.6
Poa pratensis L.	POPR1	G	N	C	100	90	7.7	5.9	10.0	7.9
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	G	Y	C	20	30	0.2	0.3	0.3	0.4
Carex heliophila Mack.	CAHE1	G	Y	C	90	90	3.3	2.9	4.3	3.9
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	60	50	0.8	0.8	1.0	1.1
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C		20		0.2		0.3
Stipa comata Trin. & Rupr.	STCO1	G	Y	C	80	90	4.1	5.6	5.3	7.5
Andropogon gerardii Vitman	ANGE1	G	Y	W	100	100	14.4	17.4	18.7	23.3
Andropogon scoparius Michx.	ANSC1	G	Y	W	70	80	1.8	2	2.3	2.7
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	40	90	1	2.3	1.3	3.1
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	80	90	1.3	1.9	1.7	2.5
Bouteloua hirsuta Lag	BOHI1	G	Y	W	30	10	0.3	0.1	0.4	0.1
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W	100	100	13.2	11.8	17.1	15.8
Sorghastrum nutans (L.) Nash	SONU1	G	Y	W	50	50	1.6	1.5	2.1	2.0
Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	G	Y	W	10	10	0.2	0.1	0.3	0.1
Total foliar cover							77.2	74.6	100.0	100.0
Total forb cover							2.7	3.7	3.5	5.0
Total native forb cover							2.4	3.2	3.1	4.3
Total non-native forb cover							0.3	0.5	0.4	0.7
Total graminoid cover							74.5	70.9	96.5	95.0
Total warm-season graminoid cover							33.8	37.1	43.8	49.7
Total cool-season graminoid cover							40.7	33.8	52.7	45.3

Table 6-4. (cont.)

Scientific Name	Speccode	Form	Native	Cool/Warm Season	Frequency		Absolute Cover		Relative Cover	
					1999	2000	1999	2000	1999	2000
Total native cover							44.6	50.1	57.8	67.2
Total non-native cover							32.6	24.5	42.2	32.8

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (1500).

Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).

All cover values presented are means (n = 10).

Native categories: Y = Native, N = Non-Native

Form categories: C = Cactus, F = Forb, G = Graminoid

Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 6-5. Prescribed Burn Pre- and Post-Burn Species Frequency (1999-2000)

				Control		Treatment		Change		
Family	**Scientific Name**	**Native**	**Speccode**	**1999**	**2000**	**1999**	**2000**	**Control**	**Treatment**	**Difference**
APIACEAE	Lomatium orientale Coult. & Rose	Y	LOOR1	16		16		-16	-16	0
ASCLEPIADACEAE	Asclepias stenophylla A. Gray	Y	ASST1				2	0	2	2
ASCLEPIADACEAE	Asclepias viridiflora Raf.	Y	ASVI1	2	2			0	0	0
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	Y	ACMI1	6	4			-2	0	2
ASTERACEAE	Ambrosia psilostachya DC.	Y	AMPS1	2	2	8	10	0	2	2
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	Y	ARCA1			2		0	-2	2
ASTERACEAE	Artemisia frigida Willd.	Y	ARFR1	6	2	8	4	-4	-4	0
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	Y	ARLU1	4	8	26	24	4	-2	6
ASTERACEAE	Aster porteri Gray	Y	ASPO1	30	2	10	6	-28	-4	24
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	N	CANU1				2	0	2	2
ASTERACEAE	Centaurea diffusa Lam.	N	CEDI1		2	6	16	2	10	8
ASTERACEAE	Chrysopsis fulcrata Greene	Y	CHFU1	8	8	2	2	0	0	0
ASTERACEAE	Chrysopsis villosa Pursh.	Y	CHVI1	26	12	2		-14	-2	12
ASTERACEAE	Cirsium undulatum (Nutt.) Spreng.	Y	CIUN1			2	2	0	0	0
ASTERACEAE	Conyza canadensis (L.) Cronq.	Y	COCA1				2	0	2	2
ASTERACEAE	Erigeron divergens T. & G.	Y	ERDI1			4		0	-4	4
ASTERACEAE	Erigeron flagellaris A. Gray	Y	ERFL1				6	0	6	6
ASTERACEAE	Gaillardia aristata Pursh.	Y	GAAR1	8	18	12	8	10	-4	14
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	Y	GRSQ1			8	8	0	0	0
ASTERACEAE	Helianthus pumilus Nutt.	Y	HEPU1	2	2			0	0	0
ASTERACEAE	Lactuca serriola L.	N	LASE1				2	0	2	2
ASTERACEAE	Liatris punctata Hook.	Y	LIPU1	82	86	52	60	4	8	4
ASTERACEAE	Senecio plattensis Nutt.	Y	SEPL1	6	6	4	4	0	0	0
ASTERACEAE	Solidago mollis Bart.	Y	SOMO1	6	6			0	0	0
ASTERACEAE	Taraxacum officinale Weber	N	TAOF1			2	10	0	8	8
ASTERACEAE	Tragopogon dubius Scop.	N	TRDU1		2	2	10	2	8	6
BRASSICACEAE	Alyssum alyssoides (L.) L.	N	ALAL1		2			2	0	2
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	N	ALMI1	8	4	18		-4	-18	14
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	Y	ARHI1	8	4	8	2	-4	-6	2
BRASSICACEAE	Draba reptans (Lam.) Fern.	Y	DRRE1		2			2	0	2
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	Y	ERCA2	4	4	4	2	0	-2	2
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	Y	LEMO1	34	48	54	80	14	26	12
CACTACEAE	Echinocereus viridiflorus Engelm.	Y	ECVI1	46	34	48	46	-12	-2	10
CACTACEAE	Opuntia macrorhiza Engelm.	Y	OPMA1	28	12	58	36	-16	-22	6
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	Y	ARFE2	32	22	14	10	-10	-4	6
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	Y	PAJA1	22	20	4		-2	-4	2
CARYOPHYLLACEAE	Silene antirrhina L.	Y	SIAN1				2	0	2	2
CLUSIACEAE	Hypericum perforatum L.	N	HYPE1	4	6	2	2	2	0	2
CYPERACEAE	Carex heliophila Mack.	Y	CAHE1	94	96	84	82	2	-2	4
FABACEAE	Astragalus agrestis Dougl. ex G. Don	Y	ASAG1			4	4	0	0	0
FABACEAE	Dalea purpurea Vent	Y	DAPU1	10	10	4	6	0	2	2
FABACEAE	Psoralea tenuiflora Pursh.	Y	PSTE1	26	40	18	20	14	2	12
JUNCACEAE	Juncus interior Wieg.	Y	JUIN1	4	4	8	2	0	-6	6

Table 6-5. (cont.)

				Control		Treatment		Change		
Family	Scientific Name	Native	Speccode	1999	2000	1999	2000	Control	Treatment	Difference
LILIACEAE	Allium textile A. Nels. & Macbr.	Y	ALTE1	4				-4	0	4
POACEAE	Agropyron smithii Rydb.	Y	AGSM1			2	2	0	0	0
POACEAE	Andropogon gerardii Vitman	Y	ANGE1	64	64	76	76	0	0	0
POACEAE	Andropogon scoparius Michx.	Y	ANSC1	56	54	38	40	-2	2	4
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	Y	ARLO1	14	12	4	14	-2	10	12
POACEAE	Bouteloua curtipendula (Michx.) Torr.	Y	BOCU1	74	66	44	50	-8	6	14
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	Y	BOGR1	78	60	58	68	-18	10	28
POACEAE	Bouteloua hirsuta Lag	Y	BOHI1	52	60	18	30	8	12	4
POACEAE	Bromus japonicus Thunb. ex Murr.	N	BRJA1	4		14	2	-4	-12	8
POACEAE	Bromus tectorum L.	N	BRTE1	2	2	4	4	0	0	0
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	Y	BUDA1	2	2			0	0	0
POACEAE	Koeleria pyramidata (Lam.) Beauv.	Y	KOPY1	62	74	28	32	12	4	8
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	Y	MUMO1	76	78	76	64	2	-12	14
POACEAE	Poa compressa L.	N	POCO1	56	52	84	88	-4	4	8
POACEAE	Poa pratensis L.	N	POPR1	38	38	48	50	0	2	2
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	Y	SIHY1	18	22		6	4	6	2
POACEAE	Sorghastrum nutans (L.) Nash	Y	SONU1	24	22			-2	0	2
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	Y	SPHE1	8	8			0	0	0
POACEAE	Stipa comata Trin. & Rupr.	Y	STCO1	34	42	50	58	8	8	0
POLYGONACEAE	Eriogonum alatum Torr.	Y	ERAL1	38	22	12	10	-16	-2	14
PORTULACACEAE	Talinum parviflorum Nutt.	Y	TAPA1	4	10			6	0	6
ROSACEAE	Potentilla fissa Nutt.	Y	POFI1	2	2			0	0	0
ROSACEAE	Potentilla hippiana Lehm.	Y	POHI1	2	2			0	0	0
SANTALACEAE	Comandra umbellata (L.) Nutt.	Y	COUM1	6	16			10	0	10
SCROPHULARIACEAE	Castilleja sessiliflora Pursh.	Y	CASE3	2	2			0	0	0
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	N	LIDA1	14	14	2	2	0	0	0
SCROPHULARIACEAE	Penstemon virens Penn.	Y	PEVI1	8	2	2	4	-6	2	8
SCROPHULARIACEAE	Verbascum thapsus L.	N	VETH1			2		0	-2	2

Sample size (n=50)

Report 6

Prescribed Burn

6. 2000 Buffer Zone Prescribed Burn: Pre- and Post-Burn Monitoring Summary

6.1 Purpose

Prescribed burning is an important tool for managing native grasslands. To maintain the health and vigor of the native plant species, reduce plant litter and the potential for wildfire, recycle nutrients, and help with weed control, the use of prescribed burns has been proposed to help manage the grassland communities at the Rocky Flats Environmental Technology Site (the Site). As with all land management actions, monitoring is an integral part of determining whether the objectives and goals for a particular management technique are being achieved. On April 6, 2000, a 48-acre prescribed burn was conducted by the U.S. Forest Service on the xeric tallgrass prairie in the south Buffer Zone at the Site. (Photographic documentation of the prescribed burn is available in Appendix C on the CD-ROM). To evaluate the effect of the prescribed burn on the plant community, a quantitative monitoring program was instituted in the summer of 1999 to provide pre-burn data. After the burn, monitoring was conducted throughout the summer of 2000 to gather post-burn data.

The following general questions were proposed for investigation:

1. How will a prescribed burn affect the species richness and species diversity of the xeric tallgrass prairie?
2. What impact will a prescribed burn have on the foliar cover of the xeric tallgrass prairie? Specifically, what impact is there to the following categories of foliar cover: overall cover, native cover, non-native cover, forb cover, overall graminoid cover, warm-season graminoid cover, and cool-season graminoid cover?
3. What impact will a prescribed burn have on the frequency of individual plant species on the xeric tallgrass prairie?
4. What impact will a prescribed burn have on specific weed species?
5. How much litter biomass will be removed by a prescribed burn?
6. How does the fire response of the xeric tallgrass prairie at the Site compare to other locations of the tallgrass prairie?
7. What recommendations can be made with regard to the use of prescribed burns for management of the xeric tallgrass prairie at the Site?

This report summarizes the pre-burn and post-burn conditions at the locations where monitoring was conducted during 1999 and 2000.

6.2 Methods

The xeric tallgrass prairie at the Site is located primarily on the pediment, which is underlain by Rocky Flats Alluvium (SCS 1980). The soils are classified as Flatirons very cobbly sandy loams (SCS 1980). Historically, the 48-acre burn area had not been grazed since the early 1950s, and the control plot locations had not been grazed since the early 1970s. Both the control and treatment areas have had little human influence or activity over the past 25 to 50 years. However, prior to the burn, in May 1999, the control and treatment locations were sprayed by helicopter with Tordon 22K to help control the noxious weed diffuse knapweed (*Centaurea diffusa*).

During 1999, a monitoring program was developed and initiated to provide quantitative pre-burn and post-burn information to help answer the questions listed above. A stratified, random sampling design was used. Initially, six plots—three control (no burn), and three treatment (burn)—were chosen for monitoring the response of the Site's xeric tallgrass prairie to the prescribed burn (Figure 6-1).

The control plots selected were BC1, BC2, and TR01. Plots BC1 and TR01 were pre-existing sites that had been used previously for other quantitative monitoring. BC2 was set out specifically for this study as a third replicate. The treatment plots were BT1, BT2, and BT3. Sites BT1 and BT2 were also pre-existing plots used for other monitoring, and BT3 was set out specifically for this study to provide a third replicate treatment site. At each plot, a total of five randomly located 50-m transects were sampled. Pre-burn sampling was conducted from September 9 through 24, 1999. The decision to conduct a controlled burn was made at a time that precluded collecting any spring pre-burn data. Thus, the study can evaluate only the late-summer effects on the prairie.

The study design was modified in spring 2000, because the actual prescribed burn was not conducted over the entire area that was originally scheduled to be burned. Treatment plots BT1 and BT2 were burned, but plot BT3 was not. Therefore, data were summarized by combining the data from two of the three control plots (BC1 and TR01) and two of the three treatment plots (BT1 and BT2), respectively. Control plot TR01 was chosen over plot BC2 because it was more similar to plots BC1, BT1, and BT2. In 2000, post-burn monitoring data were gathered throughout the summer using qualitative photographs and quantitative measurements from September 5 through 21, 2000.

Species richness, cover, and frequency were measured at each of the 50-m transects. Species richness was determined in a 2-m-wide belt centered along the length of each 50-m transect. Every plant species rooted within the 100-m^2 area was recorded. In addition, the number of woody plant stems and cactus stems were counted and recorded for the 100-m^2 area. Basal cover and foliar cover estimates were made using a point-intercept method along each of the 50-m transects. A 2-m-long rod, with a 6-mm diameter, was dropped vertically at 50-cm increments along the transect to record a total

of 100 intercept points. Two categories of hits were recorded, basal and foliar. Basal cover hits indicated what material the rod contacted at the ground surface. Hits could be vegetation (live plants), litter (fallen dead material), rock (pebbles and cobbles that were greater than the rod diameter), bare ground, or water, in that order of priority based on the protection from erosion provided by each type of cover. Basal vegetation hits were recorded by species only if the rod was touching the stem or crown of the plant where the plant entered the ground. Foliar vegetation hits (defined as a portion of a plant touching the rod) were recorded by species in three categories as defined by height and growth form. The topmost hit of each growth form was recorded. The growth forms measured were herbaceous, woody <2 m in height, and woody >2 m in height. Frequency information by species was gathered by randomly locating five 1-m^2 quadrats along each of the 50-m transects (total of 25 quadrats/site) and recording all species present in each plot. Density stem counts for diffuse knapweed were also made using these same quadrats. No distinctions were made during the counts to differentiate seedlings, rosettes, or adult plants.

Biomass sampling was conducted on different transects than those described above, to prevent disturbance. Sampling was conducted along a single transect in the burn area and another transect outside the burn area. Five randomly located 0.25-m^2 quadrats were located along the right-hand side of each transect. Vegetation was clipped and sorted as current-year live or litter and placed into separately labeled paper bags. The bags were dried in an oven at 65° C until no further weight loss was observed, and then the vegetation weight was recorded. More detailed summaries of these specific methods are found in the *Environmental Monitoring Department Operating Procedures Manual* (DOE 1995), the *High-Value Vegetation Survey Plan for the Rocky Flats Environmental Technology Site* (K-H 1997), and the *1999 Ecological Field Monitoring Plan for the Rocky Flats Environmental Technology Site* (K-H 1999a).

Photographs were taken before and after the burn to document the recovery of the vegetation on the prairie throughout the summer of 2000. A photograph was taken of each transect during the sampling session to visually document the condition of the transect. Photographs were taken from near the 0-m end of the transect, near the permanent marker, looking toward the 50-m endpoint. A placard was placed in the photograph against the 0-m endpoint to provide the site and transect number, and date. Photographs were taken with a digital camera with the lens set at approximately 50 mm.

Additional photographs were also taken looking straight down on the grassland along the transects in the area that burned. Each of these photographs was taken of a quadrat (1 m × 0.5 m), placed at the 50-m end of the transect and aligned north-south, with the 50-m stake at the southwest corner of the quadrat. The photographs were taken throughout the summer, with the digital camera centered over the middle of the quadrat at eye level (approximately 1.5 m). A total of 10 quadrats (one at each transect) were photographed during each photography session. The lens was set at 35 mm for these photographs. Photographs were taken from the north side facing south, so that the permanent stake was in the upper right-hand corner of the photograph. A placard was placed in the photograph to provide the site and transect number, and date. At the end of

the summer, after all the photographs had been taken, visual estimates of the percent total current-year vegetation cover were made by viewing the photographs on the computer screen. Estimates were classified into the following cover class categories: 1 = 1–10%, 2 = 11–20%, 3 = 21–30%, 4 = 31–40%, 5 = 41–50%, 6 = 51–60%, 7 = 61–70%, 8 = 71–80%, 9 = 81–90%, and 10 = 91–100%. Midpoints of each range (5, 15, 25, 35, etc.) were used for calculations.

Estimates were recorded on data sheets, entered into the database, and checked for quality prior to analysis. Additional landscape photographs were also taken from permanent locations within the burn area and around the perimeter of the burn. These photographs, with a map of the burn area and photo locations, can be viewed in Appendix C on the CD-ROM.

Species richness data were summarized by generating a species list for the control and treatment locations. In addition, other species richness variables were calculated from the species lists. A Sorensen coefficient of similarity was used to assess the species richness similarity between the control and treatment data (Brower and Zar 1977). Basal cover data were reported as total percent cover of vegetation, litter, rock, and bare ground. Foliar cover data were reported as frequency, absolute cover, and relative cover for each species encountered. Frequency from the cover data was defined as the percent of point-intercept transects in which a species occurred, out of the total 10 possible. Absolute foliar cover was the percentage of the number of hits on a species out of the total number of hits possible (1,000). This value is the actual cover of a species. Relative foliar cover was the number of hits on a species relative to the total number of vegetative hits recorded (i.e., the percent of total vegetative cover [100 percent] represented by the species). A Shannon-Weaver diversity index was used to calculate diversity based on the relative foliar cover data (Brower and Zar 1977). Frequency based on quadrats (n=50; 2 transects × 25 quadrats each) was defined as the number of quadrats in which a species was recorded, divided by 50 (the total number of quadrats possible), multiplied by 100. Density count data were summarized as the mean number of stems per square meter. Biomass data were summarized as the mean litter, current-year live, and total biomass (litter and current-year live combined).

Statistical analysis of the results was conducted only when mean values were different enough to suggest a meaningful interpretation. Where normality, variance, and dependence requirements were met, parametric tests were used to compare results. Nonparametric tests were used for all analyses where normality, variance, and independence requirements were not met. Independent samples (i.e., the control and treatment plots) were compared using t-tests or Mann-Whitney U tests (SigmaStat 1997; Fowler and Cohen 1990; Sheskin 1997). Dependent sample comparisons (i.e., within treatment over time) were done using paired t-tests or Wilcoxon's test for matched pairs (SigmaStat 1997; Fowler and Cohen 1990; Sheskin 1997). Frequency analyses were done using a McNemar test (Sheskin 1997).

6.3 Results

In 1999, the control plots had a total of 66 species, and the treatment plots had 73 species (Table 6-1). In 2000, both the control and treatment plots showed an increase of six species to 72 and 79 species, respectively (Table 6-1). A Sorensen coefficient of similarity index showed a high similarity in species richness within the control (0.90) and treatment plots (0.89) from 1999 to 2000. When the control plots were compared to the treatment plots, however, similarity decreased slightly from 1999 (0.76) to 2000 (0.72). The percentage of native species decreased more in the control plots (86 percent to 81 percent) than in the treatment areas (78 percent to 77 percent) during the same time period. The mean number of species per quadrat showed no substantial change from 1999 to 2000 (Table 6-1). Shannon-Weaver diversity indices were calculated using the relative cover data. In the control plots, diversity declined slightly from 1.068 in 1999 to 1.036 in 2000. In the treatment plots, diversity increased from 0.931 in 1999 to 0.963 in 2000.

Cactus densities were higher in the treatment areas than in the control areas (Table 6-2). Twistspine prickly pear (*Opuntia macorhiza*) density declined significantly in both the control and treatment areas from 1999 to 2000, by 61 percent and 62 percent, respectively (control: paired t-test, $t = 4.858$, 9 df, $P < 0.001$; treatment: $t = 7.252$, 9 df, ($P < 0.001$; Table 6-2). Changes in hedgehog cacti (*Echinocereous viridiflorus*) density were not statistically significant ($P > 0.05$; Table 6-2).

Total foliar vegetation cover was initially 79.2 percent in the control areas and 77.2 percent in the treatment areas in 1999 (Table 6-3 and 6-4). In 2000, both the control and treatment plots showed declines of approximately 2.5 percent (Tables 6-3 and 6-4). Tables 6-3 and 6-4 show the foliar cover for individual species and various groupings of species for both the control and treatment locations. Of the total vegetation cover, more than 94 percent was provided by graminoids at both the control and treatment locations (Tables 6-3 and 6-4). Three graminoid species—big bluestem (*Andropogon gerardii*), Canada bluegrass (*Poa compressa*), and mountain muhly (*Muhlenbergia montana*)—dominated the vegetative cover at both the control and treatment locations (Tables 6-3 and 6-4). Only the order of dominance of these three species differed between the control and treatment areas. At the control plots, cool-season graminoid cover and warm-season graminoid cover did not change significantly from 1999 to 2000 ($P > 0.05$; Figure 6-2). In the treatment plots, however, cool-season graminoid cover decreased significantly (by 7.4 percent; paired t-test, $t = 4.024$, 9 df, $P < 0.01$), and warm-season graminoid cover increased significantly from 1999 to 2000 (by 5.9 percent; $t = -3.276$, 9 df, $P = 0.01$; Figure 6-2). In the treatment plots, native cover increased significantly, by almost 10 percent (from 57.8 to 67.2; paired t-test, $t = -4.964$, 9 df, $P < 0.001$), but did not change significantly in the control plots ($P > 0.05$; Tables 6-3 and 6-4).

Ground cover was dominated by litter, which accounted for 75 percent at the control and 77 percent at the treatment locations in 1999 (Figure 6-3). In 2000, litter cover increased significantly (by 5.7 percent; paired t-test, $t = -2.578$, 9 df, $P < 0.05$) in the control plots while decreasing significantly in the treatment plots (by 7.2 percent; paired t-test, $t = 4.548$, 9 df, $P = 0.001$; Figure 6-3). Bare ground cover decreased significantly in the

control plot (by 2.7 percent, paired t-test, $t = 2.400$, 9 df, $P < 0.05$) while increasing significantly in the treatment plots from 1999 to 2000 (by 4.2 percent; paired t-test, $t = -4.996$, 9 df, $P < 0.001$; Figure 6-4). Rock cover increased significantly at the treatment locations (by 3.7 percent; paired t-test, $t = -2.645$, 9 df, $P < 0.05$) while remaining the same at the control plots ($P > 0.05$; Figure 6-4).

Overall biomass on the grassland (combined current-year live and litter) was reduced significantly, by approximately 77 percent, as a result of the prescribed burn (t-test, $t = 6.521$, 8 df, $P < 0.001$; Figure 6-5). Biomass values were decreased from approximately 465 g/m^2 (4,152 lbs/acre) to 108 g/ m^2 (963 lbs/acre). By winter 2001, however, overall biomass in the burn area had increased to 276 g/ m^2 (2460 lbs/acre), but was still significantly below the initial levels (t-test, $t = 2.914$, 8 df, $P < 0.05$; Figure 6-5).

The recovery of the vegetation cover throughout the growing season is shown in Figure 6-6. The pre-burn vegetation and litter combined cover value (as estimated from quadrat photographs) was approximately 95 percent. After the fire, live vegetation cover (no litter included) was reduced to approximately 5 percent. Throughout the summer, vegetation cover increased and had returned to approximately 75 percent by September 27, 2000. Figures 6-7 and 6-8 visually document the recovery of the grassland throughout the growing season at both the landscape and quadrat levels. Additional photographic documentation of the fire recovery is contained in Appendix C on the CD-ROM.

Individual species frequency results from the 1-m^2 quadrats are presented in Table 6-5. The most frequently encountered species in the control plots in 1999 were sun sedge (*Carex heliophila*), dotted gayfeather (*Liatris punctata*), blue grama (*Bouteloua gracilis*), mountain muhly, sideoats grama (*Bouteloua curtipendula*), and big bluestem (Table 6-5). In the treatment plots in 1999, the most frequently encountered species were sun sedge, Canada bluegrass, mountain muhly, big bluestem, blue grama, and twistspine prickly pear (Table 6-5). In 2000, some shifting of the order of each of these species was noted in both the control and treatment plots, but generally, these same species remained the most frequently encountered. A comparison of the amount of change exhibited by each species within the control and treatment plots, respectively, and then compared between the control and treatment plots, showed that blue grama, Porter's aster (*Aster porteri*), side-oats grama, winged eriogonum (*Eriogonum alatum*), blanket flower (*Gallardia aristata*), mountain muhly, and field alyssum (*Alyssum minus*) showed the greatest frequency response to the burn. Blue grama, Porter's aster, side-oats grama, and winged eriogonum, had the most positive frequency responses to the fire, compared to changes in the control. Blanket flower, mountain muhly, and field alyssum responded more negatively to the fire than they did in the control. Diffuse knapweed frequency increased slightly in both the control and treatment plots.

6.4 Discussion

Monitoring was conducted on the xeric tallgrass prairie at the Site during the summers of 1999 and 2000 to collect pre- and post-burn vegetation data at locations where a 48-acre

prescribed burn was conducted in April 2000. Data were collected from control (unburned) and treatment (burned) areas for comparison. All control and treatment monitoring areas were treated with the herbicide Tordon 22K, applied by helicopter, in May 1999.

Analysis of the data shows that species richness was not affected by the fire. Both control and treatment plots increased by six species from 1999 to 2000. Species diversity increased only slightly as a result of the burn. It would be interesting to know whether species diversity would have changed more if the areas had not been treated with herbicides the year before the burn, because the forb component would not have been quite so depressed. Cactus densities declined, but similar declines were observed in both the control and treatment areas; therefore, these declines are best explained as a response to the herbicide application, rather than the prescribed burn. Similar losses of cactus density have been observed at other monitoring locations for herbicide effects where no prescribed fire has been used (see other sections of this annual report or K-H 1999b, 2000).

One of the objectives of the prescribed burn was to reduce the amount of dead plant litter on the prairie, thereby reducing the potential for a wildfire and also recycling nutrients to the plants. Ground cover data showed that surface litter decreased significantly, by approximately 7 percent. Most of this decrease was offset by increases in rock and bare ground cover. Although a 7 percent reduction in litter cover at the ground surface doesn't seem like much, it must be remembered that this value was determined using a point-intercept cover methodology and thus records only what is found at the ground surface. It does not measure the actual amount or depth of the litter present. The biomass data, on the other hand, showed that overall biomass was reduced by 77 percent (from 4,152 lbs/acre to 963 lbs/acre) in the burned areas, so it is clear that the potential for a wildfire was lessened. By winter 2001, overall biomass was still significantly below initial levels, with most of the reduction still a result of reduced litter amounts (Figure 6-9). The fact that the cover of litter at the ground surface was not completely removed is beneficial, because it means there was still some cover protecting the ground surface from wind and/or water erosion. For these reasons, the fire accomplished what it was designed to do. The amount of biomass available as fuel on the grassland was reduced, but the ground surface itself remained protected from wind and water erosion as the vegetation returned throughout the summer. Additionally, the fire recycled nutrients that were tied up in the dead plant litter and stimulated the growth of the perennial grass species.

By the end of the growing season, total foliar cover on the grassland was essentially unchanged by the fire. Total foliar cover was approximately 2.5 percent less in 2000 than in 1999, in both the control and treatment plots. Forb cover increased only slightly in the treatment area, compared to the control. In general, however, forb cover was depressed in both the control and treatment plots by the herbicide application from the year before.

Overall graminoid cover also remained essentially unchanged as a result of the fire. However, the ratio of cool-season to warm-season graminoids was changed as a result of the burn. One of the goals of the prescribed burn was to increase the dominance of the

warm-season graminoid species, especially those that are the characteristic species of the xeric tallgrass prairie. This was done by timing the fire so that it would have the greatest detrimental effect on the cool-season species. In the unburned control plot, neither cool-season nor warm-season graminoid cover changed significantly from 1999 to 2000. In the treatment plot, however, cool-season cover was reduced significantly after the fire, and warm-season graminoid cover increased significantly. The prescribed burn shifted the species composition of the treatment plots from a cool-season-dominated community to a warm-season-dominated community. The warm-season species that showed increases in the treatment areas included big bluestem, little bluestem, blue grama, and side-oats grama. Big bluestem and little bluestem showed declines in cover at the unburned control locations. The cool-season graminoids that showed decreases in the treatment plot were Canada bluegrass, Kentucky bluegrass (*Poa pratensis*), and sun sedge. The data show that the prescribed burn helped push the species composition in the direction that Site ecologists wanted it to go. Continued prescribed burns in the same area every few years would help continue to promote the dominance of the warm-season species.

One dominant warm-season species that did not increase as a result of the fire was mountain muhly, a montane warm-season species. Why this is the case is unknown. It actually showed a slight increase in the control plots, but a slight decline in the treatment plots. Perhaps the timing of the fire was not appropriate for this species, or some other factor(s) affected its response. Studies from ponderosa pine forests in Arizona have shown that mountain muhly generally decreases in density after a fire, but fully recovers after approximately three years (FEIS 2001). It would be useful to gather further information on the response of mountain muhly to fire under the prairie conditions here at the Site, because this species forms a dominant and unique part of the xeric tallgrass prairie species composition on the Rocky Flats Alluvium—a species composition that is not found elsewhere along the Front Range (Buckner 2000).

In general, the warm-season graminoids responded to the burn as anticipated, although the dry spring and early summer caused the height and overall flowering response to be somewhat less than what had been hoped for. Had normal precipitation occurred, it is likely that a greater response of the warm-season graminoids would have been seen, because many species began to wither and go dormant in late July and August (Figures 6-6 and 6-8). The response of the dominant warm-season species frequency in the treatment area generally paralleled that of the cover data. Big bluestem frequency remained unchanged, while little bluestem, blue grama, hairy grama, and side-oats grama increased. Mountain muhly frequency decreased in the burn area, while increasing in the control area.

With respect to the noxious weed diffuse knapweed, both the control and treatment areas showed no significant changes. The slight increases in the cover and frequency of diffuse knapweed were not statistically significant in either the control or treatment plots, suggesting that the fire did not affect diffuse knapweed abundance. The significant loss of twistspine cactus density shown in both the control and treatment plots is best explained by the herbicide application at all the monitoring locations in spring 1999.

Results from studies elsewhere at the Site have shown a similar decline in response to the herbicide alone.

Direct comparisons to studies conducted elsewhere on the response of the tallgrass prairie to fire are difficult to make because of differences in location, soil types, precipitation amounts, community composition, variation in conditions before and after burning, fire frequency, and monitoring methodologies. No other comparable data were available on the response of a xeric tallgrass prairie to fire. However, an attempt was made to compare the Site data to responses of the mesic tallgrass prairie to fire that have been recorded elsewhere around the country (Collins and Wallace 1990).

With respect to species richness, Collins and Gibson (1990) state that there "appears to be no clear relationship between fire and species richness during the year in which the fire occurred." They report results from several studies, some showing increases in species richness and others showing decreases in response to fire. Data from the Site burn showed no difference in species richness in the burned area compared to the unburned locations.

Collins and Gibson (1990) also report that most studies show a loss of species diversity after a fire because of an increase in dominance by the matrix species (i.e., species occupying the greatest amount of space in a community). Data from the Site showed a slight increase in species diversity in response to the burn. This response may have been confounded, however, by the herbicide application in the year before the fire. It is also well documented that a spring fire enhances the productivity and vigor of warm-season graminoids, while reducing that of the cool-season species (Ewing and Engle 1988; Collins and Wallace 1990). The increase in warm-season graminoid cover and reduction in cool-season graminoid cover from the Site burn substantiate this occurrence on the xeric tallgrass prairie in Colorado as well. Qualitative observations also concurred with the literature that there appeared to be an increase in flowering of many of the warm-season species within the burned area compared to those outside the burn area (Svejcar 1990).

The results of the 2000 spring prescribed burn on the xeric tallgrass prairie demonstrate the utility of fire as a tool for effective management and restoration of the prairie ecosystems at the Site. Continued monitoring of these transects will provide a better understanding of the longer-term implications for fire on the xeric tallgrass prairie at the Site. With clearly stated objectives, the use of prescribed fire, integrated with other resource management techniques, can help maintain the viability and sustainability of the prairie ecosystems at the Site.

6.5 Conclusions

In April 2000, a prescribed burn was conducted on 48 acres of the xeric tallgrass prairie at the Site. Monitoring results have shown that the prescribed burn was successful not only because it demonstrated that it could be accomplished through the coordinated

efforts of many organizations both on and off Site, but because the objectives of the prescribed burn were achieved.

The prairie benefited from the prescribed burn in multiple ways. The fire removed and recycled much of the plant litter that had been burying and stressing the native species and reducing their ability to compete with noxious weeds. The reduction in plant litter reduced the risk of a wildfire. The fire stimulated the growth, health, and reproduction of the native perennial plant species, which was observed quantitatively in the increased cover and frequency of many of these species, and qualitatively in the increased flowering observed on the prairie at the burn location in 2000. The burn also caused a species composition shift from a cool-season-dominated community to a warm-season-dominated community, as intended. The use of prescribed burns is a valuable tool for prairie management and restoration and should be continued at the Site.

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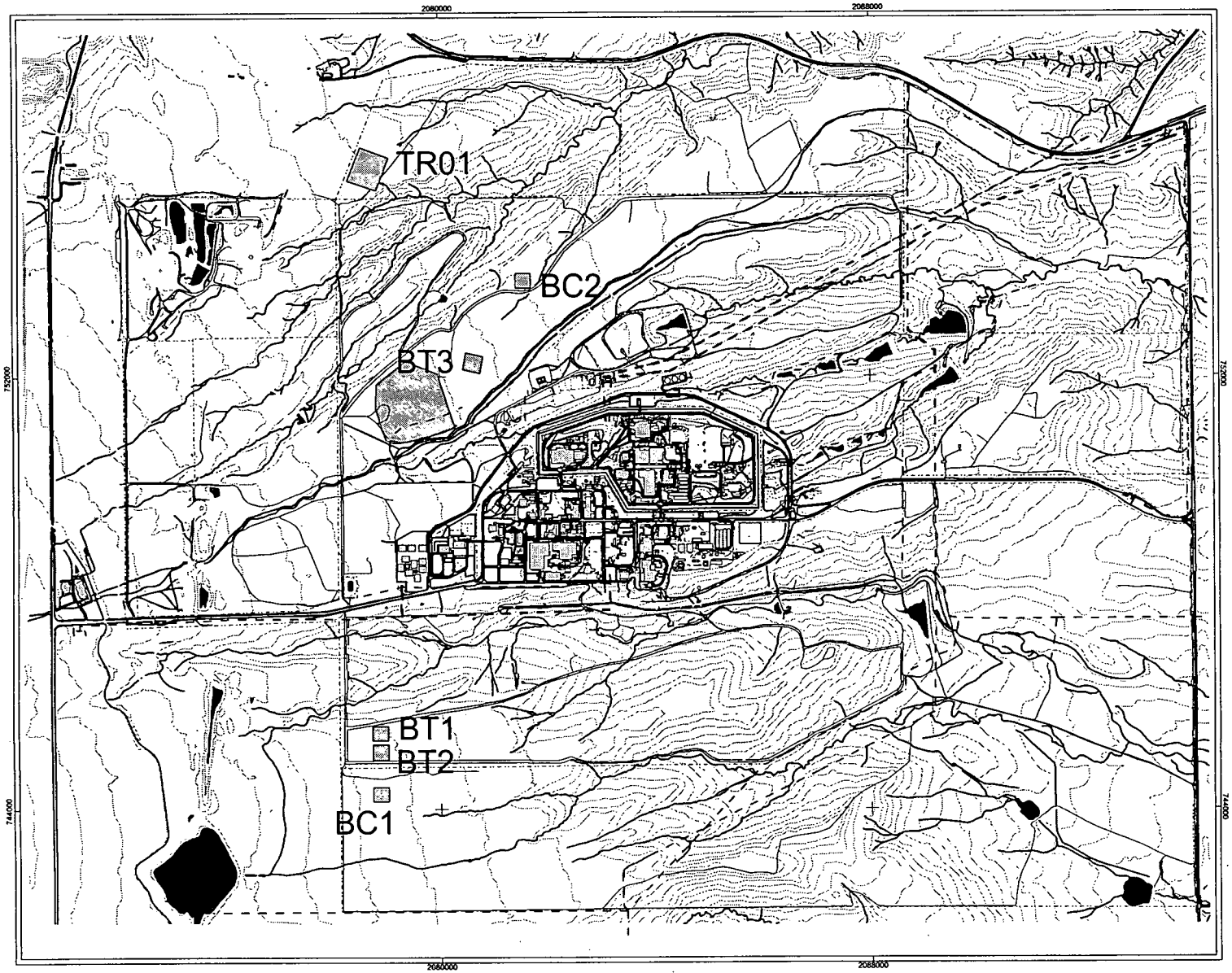

Prescribed Burn Monitoring Plot Locations

Figure 6-1

LEGEND

- Control Plots
- Treatment Plots

Standard Features

- Buildings
- Lakes & ponds
- New Landfill
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft)
- Power Lines

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs. 1/95
Hypsography derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. The DEM post-processing performed by MK, Winter 1997.

Data Source Ecology Features:
Location data provided by Exponent.
K-H Ecology Group POC; Karan North 303-966-9876.

N

1:23552

1000 0 1000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Exponent®

For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 2k-0038

May 3, 2001

\\Gasrv\GIS\ECO-projects\projects\2k-0038\veg monitoring locations 2001 aprBurn plots

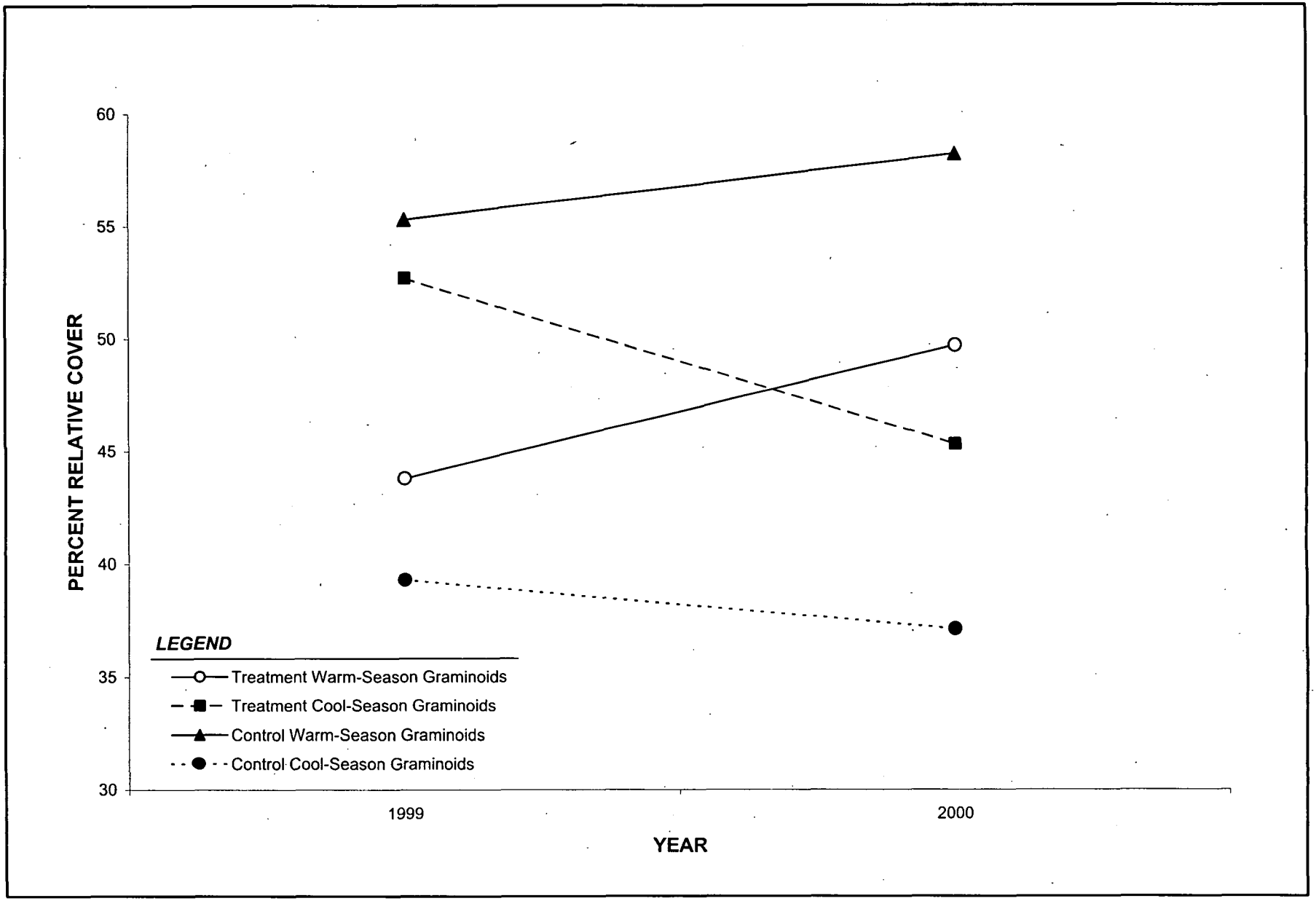

Figure 6-2. Pre- and post-burn cool-season vs. warm-season graminoid cover.

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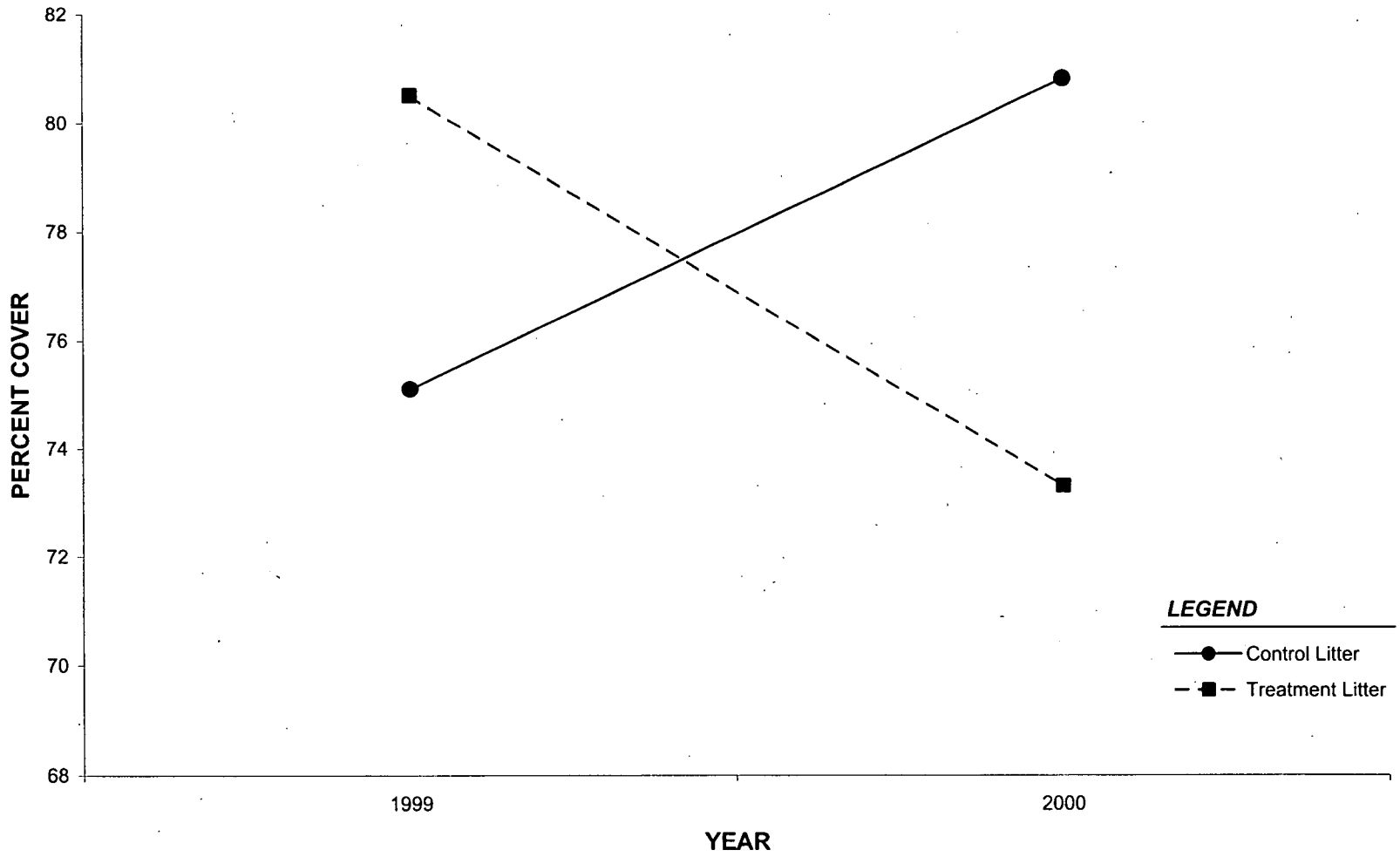

Figure 6-3. Pre- and post-burn litter cover.

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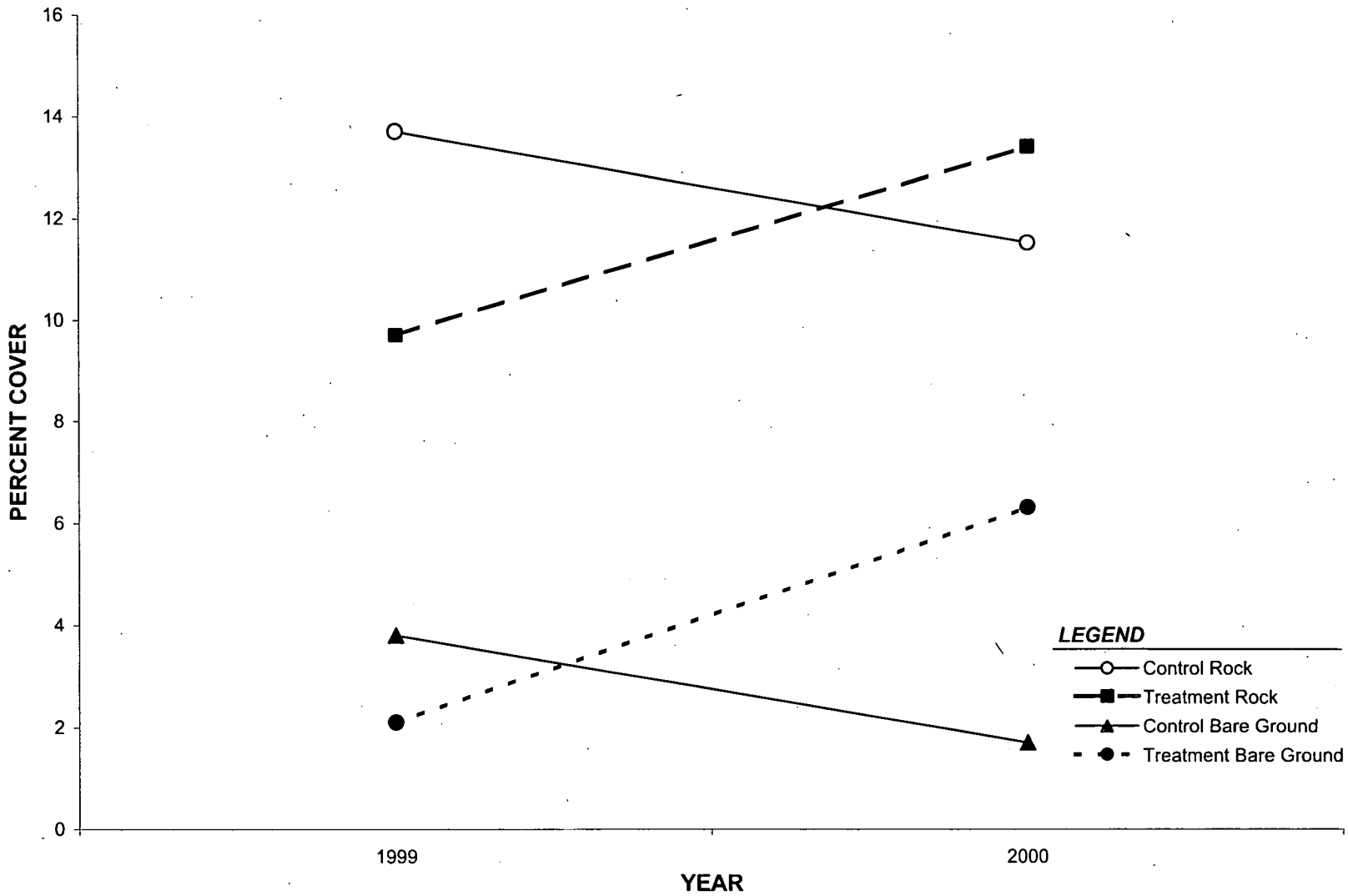

Figure 6-4. Pre- and post-burn rock and bare ground cover.

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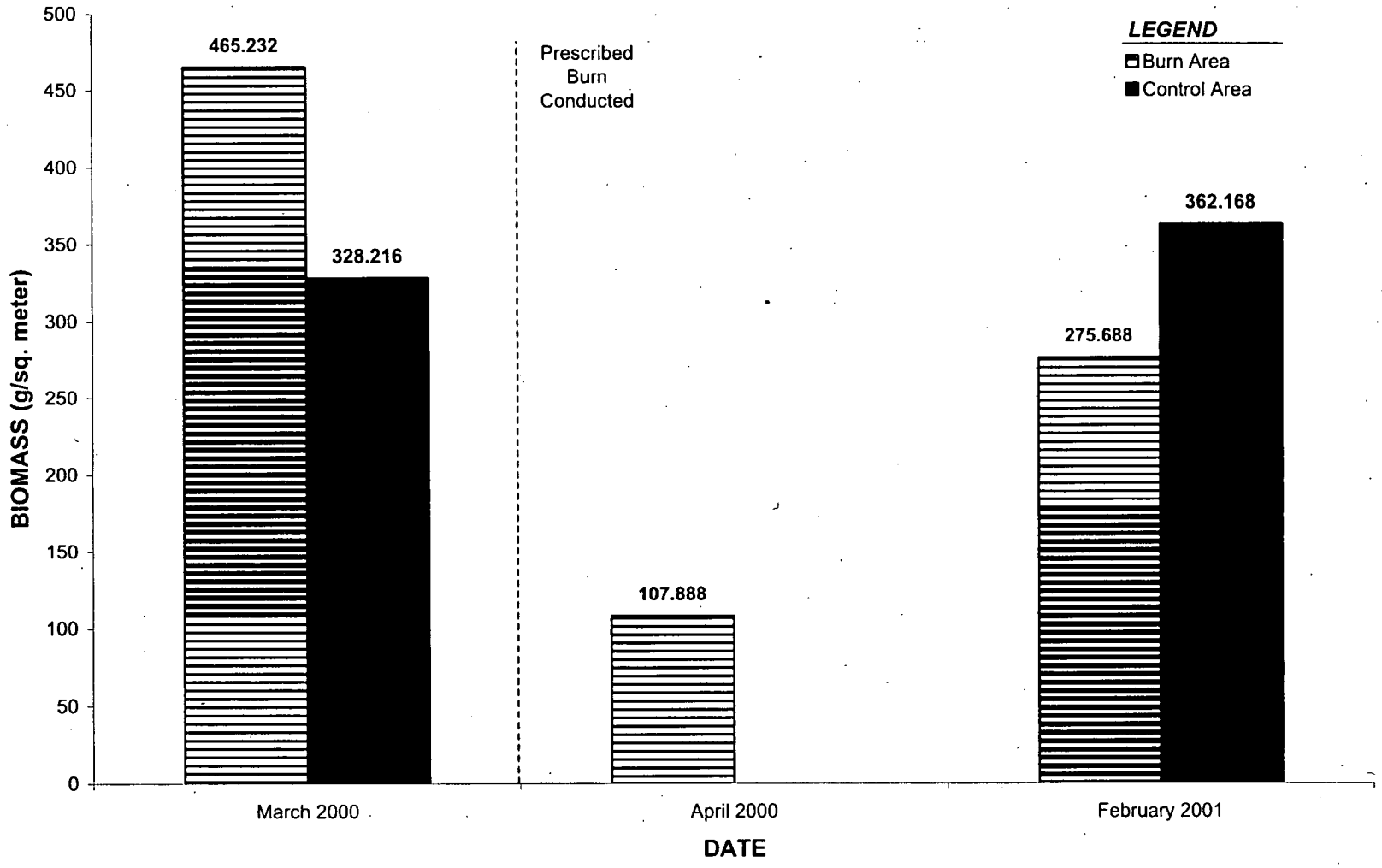

Figure 6-5. Prescribed burn biomass changes.

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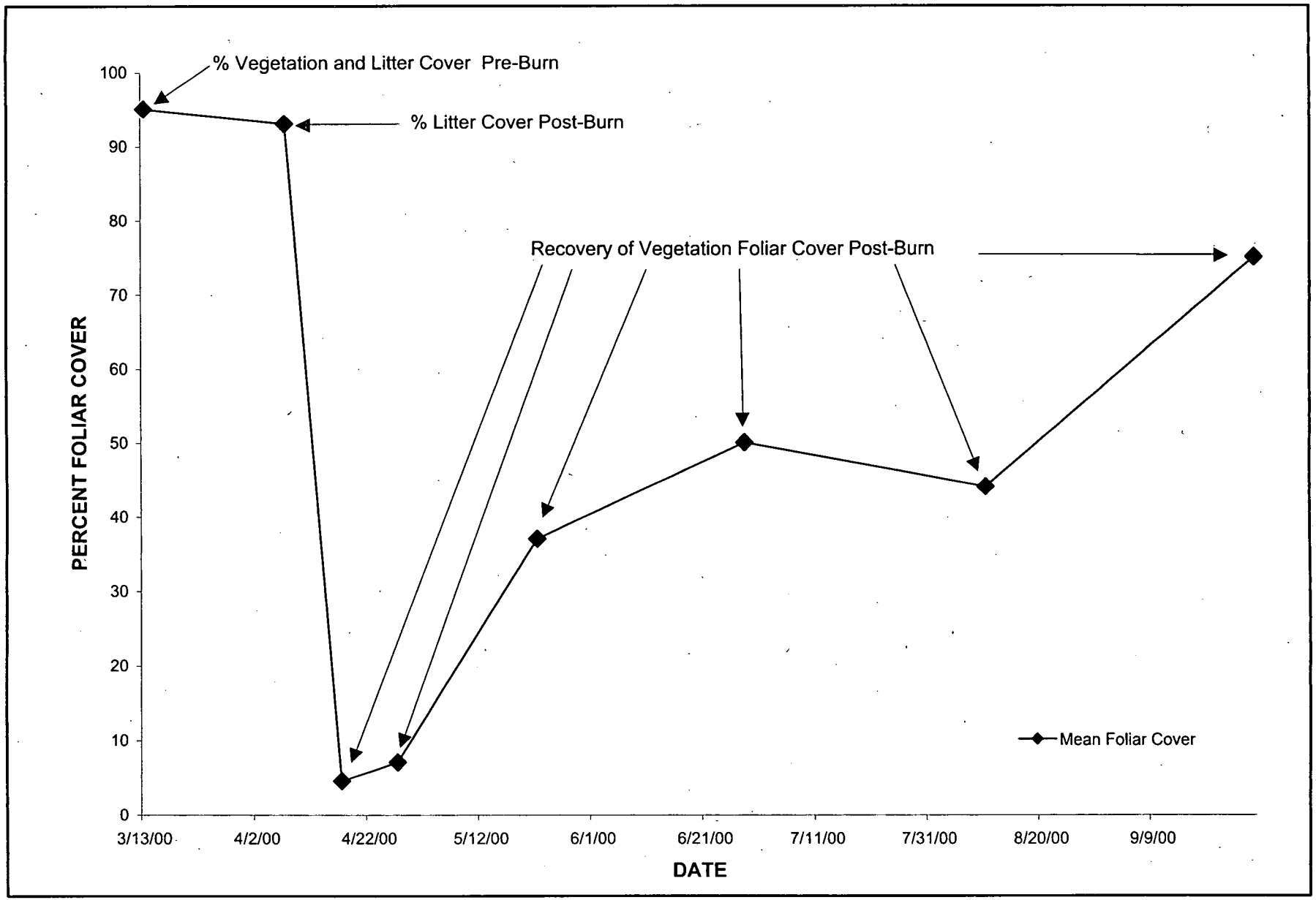

Figure 6-6. Recovery of post-burn vegetative cover based on photo quadrats.

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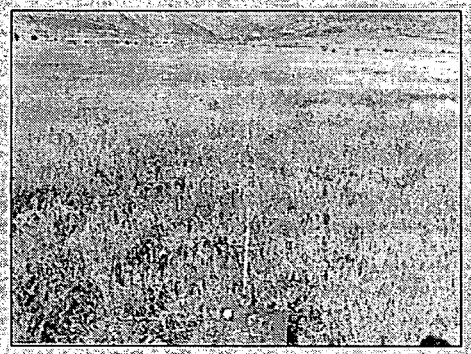
Figure 6-7. Time Series of 2000 Prescribed Burn Area at Rocky Flats Environmental Technology Site

Prescribed Burn Conducted on April 6, 2000



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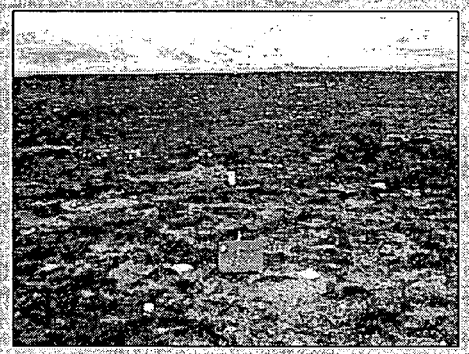

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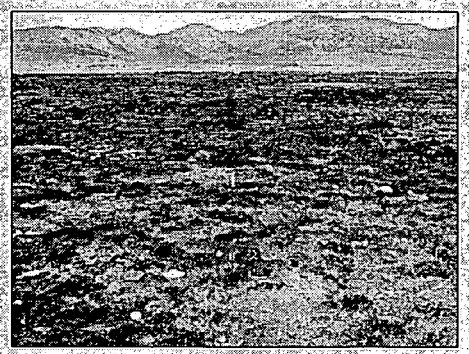

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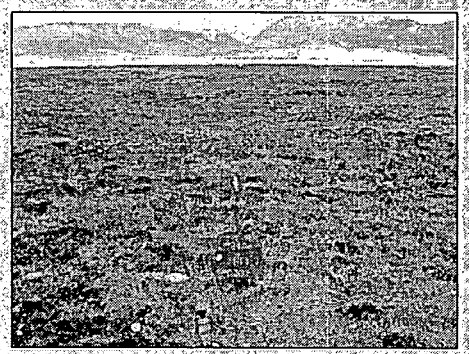

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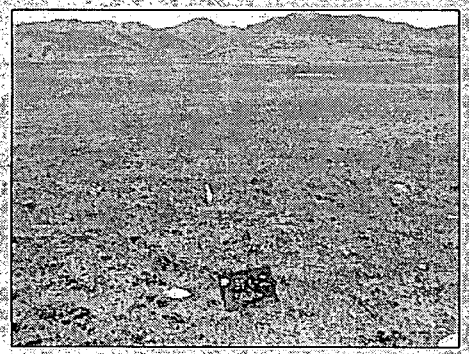

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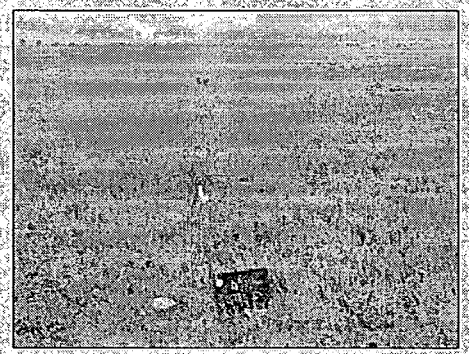

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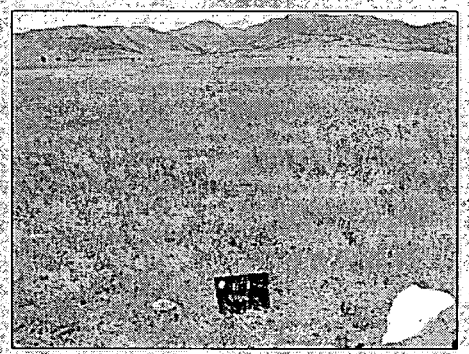

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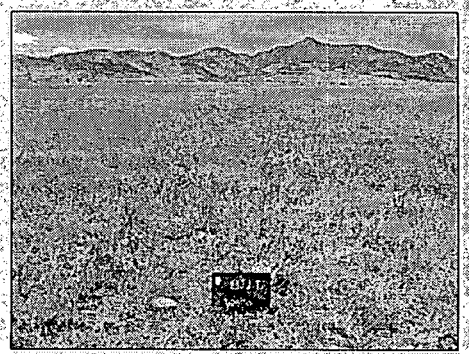

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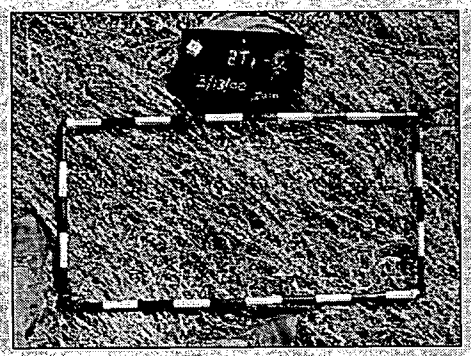
Figure 6-8. Time Series of Ground Surface in 2000 Prescribed Burn Area
at Rocky Flats Environmental Technology Site
Prescribed Burn Conducted on April 6, 2000



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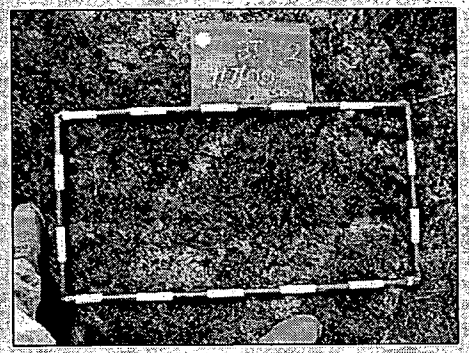

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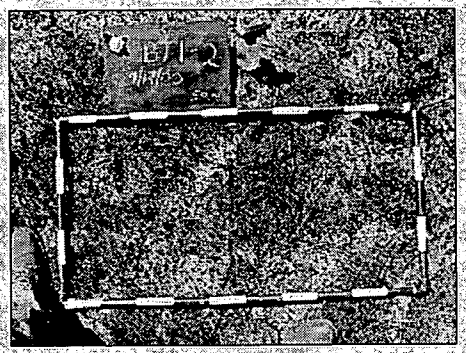

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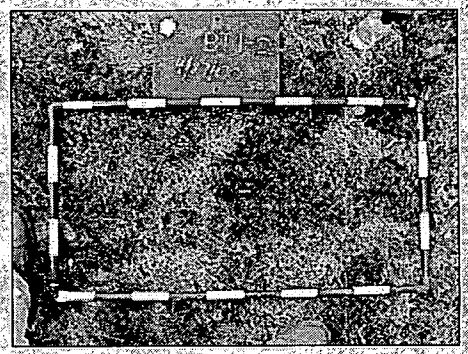

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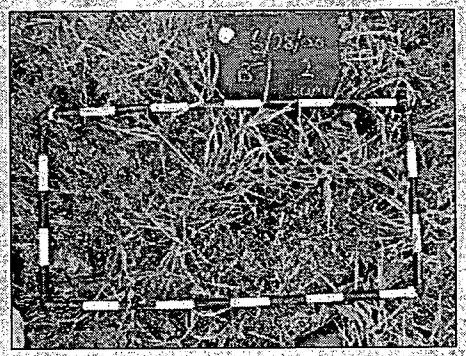

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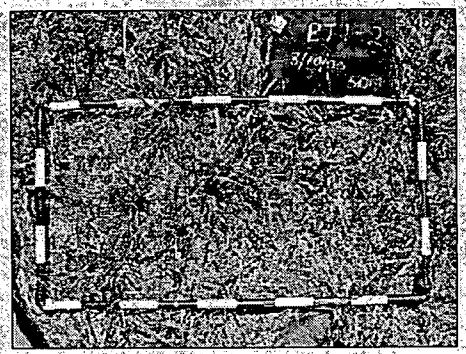

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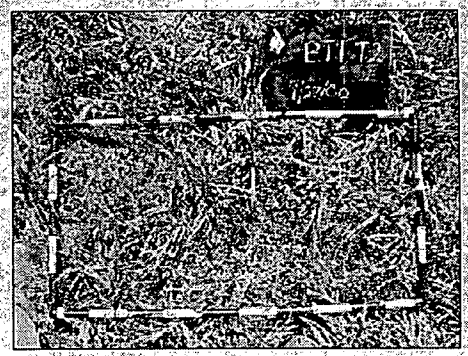

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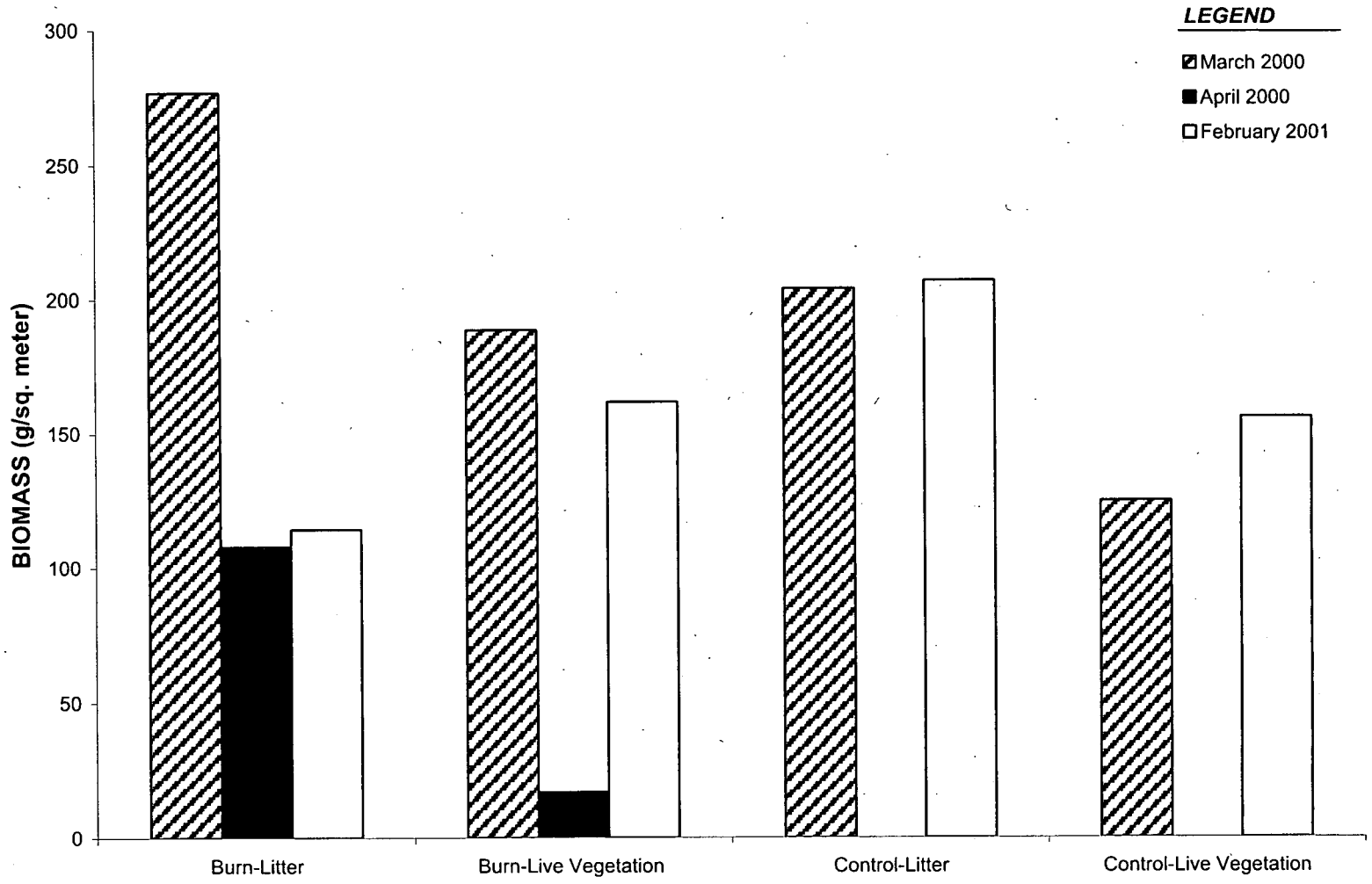

Figure 6-9. Prescribed burn biomass changes.

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Table 6-1. Prescribed Burn Pre- and Post-Burn Species Richness (1999-2000)

				Control		Treatment	
Family	**Scientific Name**	**Speccode**	**Native**	**1999**	**2000**	**1999**	**2000**
AGAVACEAE	Yucca glauca Nutt.	YUGL1	Y				
ANACARDIACEAE	Rhus aromatica Ait. var. trilobata (Nutt.) A. Gray	RHAR1	Y	X	X		
APIACEAE	Lomatium orientale Coult. & Rose	LOOR1	Y	X		X	
ASCLEPIADACEAE	Asclepias speciosa Torr.	ASSP1	Y			X	X
ASCLEPIADACEAE	Asclepias stenophylla A. Gray	ASST1	Y	X	X	X	X
ASCLEPIADACEAE	Asclepias viridiflora Raf.	ASVI1	Y	X	X	X	X
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	Y	X	X		
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	Y	X	X	X	X
ASTERACEAE	Antennaria parvifolia Nutt.	ANPA1	Y	X	X	X	X
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	ARCA1	Y			X	X
ASTERACEAE	Artemisia dracunculus L.	ARDR1	Y				
ASTERACEAE	Artemisia frigida Willd.	ARFR1	Y	X	X	X	X
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	Y	X	X	X	X
ASTERACEAE	Aster falcatus Lindl.	ASFA1	Y				
ASTERACEAE	Aster porteri Gray	ASPO1	Y	X	X	X	X
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	N				X
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	N	X	X	X	X
ASTERACEAE	Chrysanthemum leucanthemum L.	CHLE1	N				
ASTERACEAE	Chrysopsis fulcrata Greene	CHFU1	Y	X	X	X	X
ASTERACEAE	Chrysopsis villosa Pursh.	CHVI1	Y	X	X	X	X
ASTERACEAE	Cirsium arvense (L.) Scop.	CIAR1	N				
ASTERACEAE	Cirsium undulatum (Nutt.) Spreng.	CIUN1	Y			X	X
ASTERACEAE	Conyza canadensis (L.) Cronq.	COCA1	Y				X
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	Y	X		X	X
ASTERACEAE	Erigeron flagellaris A. Gray	ERFL1	Y				X
ASTERACEAE	Gaillardia aristata Pursh.	GAAR1	Y	X	X	X	X
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	Y		X	X	X
ASTERACEAE	Helianthus annuus L.	HEAN1	Y				X
ASTERACEAE	Helianthus pumilus Nutt.	HEPU1	Y	X	X		
ASTERACEAE	Helianthus rigidus (Cass.) Desf. ssp. subrhomboideus (Rydb.) Heiser	HERI1	Y	X	X		
ASTERACEAE	Kuhnia chlorolepis Woot. & Standl.	KUCH1	Y				
ASTERACEAE	Kuhnia eupatorioides L.	KUEU1	Y				
ASTERACEAE	Lactuca serriola L.	LASE1	N		X	X	X
ASTERACEAE	Liatris punctata Hook.	LIPU1	Y	X	X	X	X
ASTERACEAE	Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	Y				X
ASTERACEAE	Scorzonera laciniata L.	SCLA1	N				
ASTERACEAE	Senecio plattensis Nutt.	SEPL1	Y	X	X	X	X
ASTERACEAE	Senecio spartioides T. & G.	SESP1	Y			X	X
ASTERACEAE	Solidago mollis Bart.	SOMO1	Y	X	X	X	
ASTERACEAE	Taraxacum officinale Weber	TAOF1	N		X	X	X
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	N	X	X	X	X
BORAGINACEAE	Cryptantha virgata (Porter) Payson	CRVI1	Y			X	X
BORAGINACEAE	Lappula redowskii (Hornem.) Greene	LARE1	Y				
BORAGINACEAE	Lithospermum incisum Lehm.	LIIN1	Y			X	X
BRASSICACEAE	Alyssum alyssoides (L.) L.	ALAL1	N		X		
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	N	X	X	X	X
BRASSICACEAE	Arabis fendleri (S. Wats.) Greene var. fendleri	ARFE3	Y		X		
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	Y	X	X	X	X
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	CAMI1	N				
BRASSICACEAE	Draba reptans (Lam.) Fern.	DRRE1	Y		X		
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	ERCA2	Y	X	X	X	X
BRASSICACEAE	Lepidium campestre (L.) R. Br.	LECA1	N				
BRASSICACEAE	Lepidium densiflorum Schrad.	LEDE1	Y		X		X
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	LEMO1	Y	X	X	X	X
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	N				
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	Y	X	X	X	X
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	Y	X	X	X	X
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	ARFE2	Y	X	X	X	X
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	PAJA1	Y	X	X	X	X
CARYOPHYLLACEAE	Silene antirrhina L.	SIAN1	Y				X
CARYOPHYLLACEAE	Silene drummondii Hook.	SIDR1	Y	X	X		
CHENOPODIACEAE	Chenopodium leptophyllum Nutt. ex Moq.	CHLE2	Y				
CHENOPODIACEAE	Kochia scoparia (L.) Schrad.	KOSC1	N		X		
CHENOPODIACEAE	Salsola iberica Senn. & Pau.	SAIB1	N		X		

Table 6-1. (cont.)

				Control		Treatment	
Family	Scientific Name	Speccode	Native	1999	2000	1999	2000
CLUSIACEAE	Hypericum perforatum L.	HYPE1	N	X	X	X	X
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	TROC1	Y				
CONVOLVULACEAE	Convolvulus arvensis L.	COAR1	N				X
CRASSULACEAE	Sedum lanceolatum Torr.	SELA1	Y				
CYPERACEAE	Carex heliophila Mack.	CAHE1	Y	X	X	X	X
EUPHORBIACEAE	Euphorbia robusta (Engelm.) Small	EURO1	Y			X	X
FABACEAE	Astragalus agrestis Dougl. ex G. Don	ASAG1	Y		X	X	X
FABACEAE	Astragalus shortianus Nutt. ex T.&G.	ASSH1	Y				
FABACEAE	Dalea purpurea Vent	DAPU1	Y	X	X	X	X
FABACEAE	Melilotus officinalis (L.) Pall.	MEOF1	N				X
FABACEAE	Oxytropis lambertii Pursh.	OXLA1	Y				
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	Y	X	X	X	X
GERANIACEAE	Erodium cicutarium (L.) L'Her.	ERCI1	N			X	X
HYDROPHYLLACEAE	Phacelia heterophylla Pursh.	PHHE1	Y				
JUNCACEAE	Juncus interior Wieg.	JUIN1	Y	X	X	X	X
LILIACEAE	Allium textile A. Nels. & Macbr.	ALTE1	Y	X	X	X	
NYCTAGINACEAE	Mirabilis linearis (Pursh.) Heimerl	MILI1	Y	X	X	X	X
ONAGRACEAE	Calylophus serrulatus (Nutt.) Raven	CASE2	Y	X			
ONAGRACEAE	Gaura coccinea Pursh.	GACO1	Y				
OROBANCHACEAE	Orobanche fasciculata Nutt.	ORFA1	Y	X			
PLANTAGINACE	Plantago lanceolata L.	PLLA1	N			X	X
POACEAE	Aegilops cylindrica Host	AECY1	N			X	
POACEAE	Agropyron smithii Rydb.	AGSM1	Y			X	X
POACEAE	Andropogon gerardii Vitman	ANGE1	Y	X	X	X	X
POACEAE	Andropogon scoparius Michx.	ANSC1	Y	X	X	X	X
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	Y	X	X	X	X
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	Y	X	X	X	X
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	Y	X	X	X	X
POACEAE	Bouteloua hirsuta Lag	BOHI1	Y	X	X	X	X
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	N	X	X	X	X
POACEAE	Bromus tectorum L.	BRTE1	N	X	X	X	X
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	BUDA1	Y	X	X		X
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1	Y	X	X	X	X
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	Y	X	X	X	X
POACEAE	Muhlenbergia wrightii Vasey	MUWR1	Y	X	X		
POACEAE	Panicum capillare L.	PACA1	Y			X	X
POACEAE	Poa compressa L.	POCO1	N	X	X	X	X
POACEAE	Poa pratensis L.	POPR1	N	X	X	X	X
POACEAE	Setaria viridis (L.) Beauv.	SEVI1	N			X	X
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	Y	X	X	X	X
POACEAE	Sorghastrum nutans (L.) Nash	SONU1	Y	X	X	X	X
POACEAE	Sporobolus asper (Michx.) Kunth	SPAS1	Y			X	X
POACEAE	Sporobolus cryptandrus (Torr.) A. Gray	SPCR1	Y			X	X
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	Y	X	X	X	X
POACEAE	Stipa comata Trin. & Rupr.	STCO1	Y	X	X	X	X
POLEMONIACEAE	Ipomopsis spicata (Nutt.) V. Grant ssp. spicata	IPSP1	Y	X	X		
POLYGONACEAE	Eriogonum alatum Torr.	ERAL1	Y	X	X	X	X
POLYGONACEAE	Eriogonum umbellatum Torr.	ERUM1	Y				
PORTULACACEAE	Talinum parviflorum Nutt.	TAPA1	Y	X	X	X	X
ROSACEAE	Potentilla fissa Nutt.	POFI1	Y	X	X		
ROSACEAE	Potentilla hippiana Lehm.	POHI1	Y	X	X		
ROSACEAE	Rosa arkansana Porter	ROAR1	Y				
SANTALACEAE	Comandra umbellata (L.) Nutt.	COUM1	Y	X	X		
SCROPHULARIACEAE	Castilleja sessiliflora Pursh.	CASE3	Y	X	X	X	
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1	N	X	X	X	X
SCROPHULARIACEAE	Penstemon secundiflorus Benth.	PESE1	Y				
SCROPHULARIACEAE	Penstemon virens Penn.	PEVI1	Y	X	X	X	X
SCROPHULARIACEAE	Verbascum thapsus L.	VETH1	N			X	X
SELAGINELLACEAE	Selaginella densa Rydb.	SEDE1	Y				X
	Total Species Richness			66	72	73	79
	Percent Native Species			86	81	78	77
	Mean # Species/Quadrat			12.7	12	10.6	10.7

Table 6-2. Pre- and Post-Burn Cactus Densities

		Density (plants/m^2)		
Scientific Name	**Site**	**1999**	**2000**	**% Change**
Opuntia macorhiza	Control	25.4	10.0	-61
	Treatment	98.2	37.4	-62
Echinocereus viridiflorus	Control	43.8	31.0	-29
	Treatment	55.0	73.6	34

Sample size (n=10)

Table 6-3. Prescribed Burn Pre-Burn vs. Post-Burn Control Plot Foliar Cover Summary

					Frequency		Absolute Cover		Relative Cover	
Scientific Name	**Speccode**	**Form**	**Native**	**Cool/Warm Season**	**1999**	**2000**	**1999**	**2000**	**1999**	**2000**
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N			10		0.1		0.1
Linaria dalmatica (L.) Mill.	LIDA1	F	N		30	20	0.4	0.2	0.5	0.3
Arenaria fendleri A. Gray	ARFE2	F	Y		20	30	0.2	0.4	0.3	0.5
Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	F	Y		10		0.1		0.1	
Aster porteri Gray	ASPO1	F	Y		10		0.3		0.4	
Chrysopsis villosa Pursh.	CHVI1	F	Y		20		0.2		0.3	
Eriogonum alatum Torr.	ERAL1	F	Y		10		0.2		0.3	
Lesquerella montana (A. Gray) Wats.	LEMO1	F	Y			10		0.1		0.1
Liatris punctata Hook.	LIPU1	F	Y		80	90	2.2	2.3	2.8	3.0
Paronychia jamesii T. & G.	PAJA1	F	Y			10		0.1		0.1
Penstemon virens Penn.	PEVI1	F	Y		10		0.1		0.1	
Psoralea tenuiflora Pursh.	PSTE1	F	Y		40	30	0.5	0.4	0.6	0.5
Solidago mollis Bart.	SOMO1	F	Y		10		0.1		0.1	
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	30		0.4		0.5	
Bromus tectorum L.	BRTE1	G	N	C	20	20	0.5	0.5	0.6	0.7
Poa compressa L.	POCO1	G	N	C	90	100	10.2	7.5	12.9	9.8
Poa pratensis L.	POPR1	G	N	C	80	70	5.8	5.6	7.3	7.3
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	G	Y	C	60	20	0.9	0.3	1.1	0.4
Carex heliophila Mack.	CAHE1	G	Y	C	90	100	4.9	5.3	6.2	6.9
Juncus interior Wieg.	JUIN1	G	Y	C	10		0.1		0.1	
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	100	90	4	3.9	5.1	5.1
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C		30		0.4		0.5
Stipa comata Trin. & Rupr.	STCO1	G	Y	C	80	90	4.3	5	5.4	6.5
Andropogon gerardii Vitman	ANGE1	G	Y	W	100	100	14.3	13.4	18.1	17.4
Andropogon scoparius Michx.	ANSC1	G	Y	W	60	50	1.8	0.9	2.3	1.2
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	80	90	3	3.3	3.8	4.3
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	90	100	2.5	2.7	3.2	3.5
Bouteloua hirsuta Lag	BOHI1	G	Y	W	40	80	0.8	1.1	1.0	1.4
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W	90	90	18.5	20.3	23.4	26.4
Sorghastrum nutans (L.) Nash	SONU1	G	Y	W	80	70	2.3	2.3	2.9	3.0
Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	G	Y	W	30	30	0.6	0.7	0.8	0.9
Total foliar cover							79.2	76.8	100.0	100.0
Total forb cover							4.3	3.6	5.4	4.7
Total native forb cover							3.9	3.3	4.9	4.3
Total non-native forb cover							0.4	0.3	0.5	0.4

Table 6-3. (cont.)

					Frequency		Absolute Cover		Relative Cover	
Scientific Name	Speccode	Form	Native	Cool/Warm Season	1999	2000	1999	2000	1999	2000
Total graminoid cover							74.9	73.2	94.6	95.3
Total warm-season graminoid cover							43.8	44.7	55.3	58.2
Total cool-season graminoid cover							31.1	28.5	39.3	37.1
Total native cover							61.9	62.9	78.2	81.9
Total non-native cover							17.3	13.9	21.8	18.1

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (1500).

Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).

All cover values presented are means (n = 10).

Native categories: Y = Native, N = Non-Native

Form categories: C = Cactus, F = Forb, G = Graminoid

Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 6-4. Prescribed Burn Pre-Burn vs. Post-Burn Treatment Plot Foliar Cover Summary

					Frequency		Absolute Cover		Relative Cover	
Scientific Name	Speccode	Form	Native	Cool/Warm Season	1999	2000	1999	2000	1999	2000
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N		10		0.1		0.1	
Centaurea diffusa Lam.	CEDI1	F	N		10	30	0.1	0.3	0.1	0.4
Linaria dalmatica (L.) Mill.	LIDA1	F	N		10	10	0.1	0.1	0.1	0.1
Verbascum thapsus L.	VETH1	F	N			10		0.1		0.1
Arenaria fendleri A. Gray	ARFE2	F	Y		10		0.1		0.1	
Artemisia frigida Willd.	ARFR1	F	Y		10		0.1		0.1	
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y		10	30	0.1	0.4	0.1	0.5
Chrysopsis villosa Pursh.	CHVI1	F	Y		10		0.1		0.1	
Liatris punctata Hook.	LIPU1	F	Y		80	90	1.6	2.2	2.1	2.9
Penstemon virens Penn.	PEVI1	F	Y		10		0.1		0.1	
Psoralea tenuiflora Pursh.	PSTE1	F	Y		20	50	0.3	0.6	0.4	0.8
Aegilops cylindrica Host	AECY1	G	N	C	10		0.1		0.1	
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C	40		0.9		1.2	
Bromus tectorum L.	BRTE1	G	N	C	10	20	0.3	0.5	0.4	0.7
Poa compressa L.	POCO1	G	N	C	100	100	23.3	17.6	30.2	23.6
Poa pratensis L.	POPR1	G	N	C	100	90	7.7	5.9	10.0	7.9
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	G	Y	C	20	30	0.2	0.3	0.3	0.4
Carex heliophila Mack.	CAHE1	G	Y	C	90	90	3.3	2.9	4.3	3.9
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C	60	50	0.8	0.8	1.0	1.1
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C		20		0.2		0.3
Stipa comata Trin. & Rupr.	STCO1	G	Y	C	80	90	4.1	5.6	5.3	7.5
Andropogon gerardii Vitman	ANGE1	G	Y	W	100	100	14.4	17.4	18.7	23.3
Andropogon scoparius Michx.	ANSC1	G	Y	W	70	80	1.8	2	2.3	2.7
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W	40	90	1	2.3	1.3	3.1
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W	80	90	1.3	1.9	1.7	2.5
Bouteloua hirsuta Lag	BOHI1	G	Y	W	30	10	0.3	0.1	0.4	0.1
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W	100	100	13.2	11.8	17.1	15.8
Sorghastrum nutans (L.) Nash	SONU1	G	Y	W	50	50	1.6	1.5	2.1	2.0
Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	G	Y	W	10	10	0.2	0.1	0.3	0.1
Total foliar cover							77.2	74.6	100.0	100.0
Total forb cover							2.7	3.7	3.5	5.0
Total native forb cover							2.4	3.2	3.1	4.3
Total non-native forb cover							0.3	0.5	0.4	0.7
Total graminoid cover							74.5	70.9	96.5	95.0
Total warm-season graminoid cover							33.8	37.1	43.8	49.7
Total cool-season graminoid cover							40.7	33.8	52.7	45.3

Table 6-4. (cont.)

Scientific Name	Speccode	Form	Native	Cool/Warm Season	Frequency		Absolute Cover		Relative Cover	
					1999	2000	1999	2000	1999	2000
Total native cover							44.6	50.1	57.8	67.2
Total non-native cover							32.6	24.5	42.2	32.8

Absolute cover = Absolute foliar cover is the percentage of the number of hits on a species out of the total number of hits possible (1500).

Relative cover = Relative foliar cover was the number of hits a species had relative to the total number of all vegetative hits recorded per site (i.e., the percent of vegetative cover the species represented).

All cover values presented are means (n = 10).

Native categories: Y = Native, N = Non-Native

Form categories: C = Cactus, F = Forb, G = Graminoid

Cool/Warm Season categories: C = Cool season species, W = Warm season species

Table 6-5. Prescribed Burn Pre- and Post-Burn Species Frequency (1999-2000)

				Control		Treatment		Change		
Family	Scientific Name	Native	Speccode	1999	2000	1999	2000	Control	Treatment	Difference
APIACEAE	Lomatium orientale Coult. & Rose	Y	LOOR1	16		16		-16	-16	0
ASCLEPIADACEAE	Asclepias stenophylla A. Gray	Y	ASST1				2	0	2	2
ASCLEPIADACEAE	Asclepias viridiflora Raf.	Y	ASVI1	2	2			0	0	0
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	Y	ACMI1	6	4			-2	0	2
ASTERACEAE	Ambrosia psilostachya DC.	Y	AMPS1	2	2	8	10	0	2	2
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	Y	ARCA1			2		0	-2	2
ASTERACEAE	Artemisia frigida Willd.	Y	ARFR1	6	2	8	4	-4	-4	0
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	Y	ARLU1	4	8	26	24	4	-2	6
ASTERACEAE	Aster porteri Gray	Y	ASPO1	30	2	10	6	-28	-4	24
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	N	CANU1				2	0	2	2
ASTERACEAE	Centaurea diffusa Lam.	N	CEDI1		2	6	16	2	10	8
ASTERACEAE	Chrysopsis fulcrata Greene	Y	CHFU1	8	8	2	2	0	0	0
ASTERACEAE	Chrysopsis villosa Pursh.	Y	CHVI1	26	12	2		-14	-2	12
ASTERACEAE	Cirsium undulatum (Nutt.) Spreng.	Y	CIUN1			2	2	0	0	0
ASTERACEAE	Conyza canadensis (L.) Cronq.	Y	COCA1				2	0	2	2
ASTERACEAE	Erigeron divergens T. & G.	Y	ERDI1			4		0	-4	4
ASTERACEAE	Erigeron flagellaris A. Gray	Y	ERFL1				6	0	6	6
ASTERACEAE	Gaillardia aristata Pursh.	Y	GAAR1	8	18	12	8	10	-4	14
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	Y	GRSQ1			8	8	0	0	0
ASTERACEAE	Helianthus pumilus Nutt.	Y	HEPU1	2	2			0	0	0
ASTERACEAE	Lactuca serriola L.	N	LASE1				2	0	2	2
ASTERACEAE	Liatris punctata Hook.	Y	LIPU1	82	86	52	60	4	8	4
ASTERACEAE	Senecio plattensis Nutt.	Y	SEPL1	6	6	4	4	0	0	0
ASTERACEAE	Solidago mollis Bart.	Y	SOMO1	6	6			0	0	0
ASTERACEAE	Taraxacum officinale Weber	N	TAOF1			2	10	0	8	8
ASTERACEAE	Tragopogon dubius Scop.	N	TRDU1		2	2	10	2	8	6
BRASSICACEAE	Alyssum alyssoides (L.) L.	N	ALAL1		2			2	0	2
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	N	ALMI1	8	4	18		-4	-18	14
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	Y	ARHI1	8	4	8	2	-4	-6	2
BRASSICACEAE	Draba reptans (Lam.) Fern.	Y	DRRE1		2			2	0	2
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	Y	ERCA2	4	4	4	2	0	-2	2
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	Y	LEMO1	34	48	54	80	14	26	12
CACTACEAE	Echinocereus viridiflorus Engelm.	Y	ECVI1	46	34	48	46	-12	-2	10
CACTACEAE	Opuntia macrorhiza Engelm.	Y	OPMA1	28	12	58	36	-16	-22	6
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	Y	ARFE2	32	22	14	10	-10	-4	6
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	Y	PAJA1	22	20	4		-2	-4	2
CARYOPHYLLACEAE	Silene antirrhina L.	Y	SIAN1				2	0	2	2
CLUSIACEAE	Hypericum perforatum L.	N	HYPE1	4	6	2	2	2	0	2
CYPERACEAE	Carex heliophila Mack.	Y	CAHE1	94	96	84	82	2	-2	4
FABACEAE	Astragalus agrestis Dougl. ex G. Don	Y	ASAG1			4	4	0	0	0
FABACEAE	Dalea purpurea Vent	Y	DAPU1	10	10	4	6	0	2	2
FABACEAE	Psoralea tenuiflora Pursh.	Y	PSTE1	26	40	18	20	14	2	12
JUNCACEAE	Juncus interior Wieg.	Y	JUIN1	4	4	8	2	0	-6	6

Table 6-5. (cont.)

				Control		Treatment		Change		
Family	Scientific Name	Native	Speccode	1999	2000	1999	2000	Control	Treatment	Difference
LILIACEAE	Allium textile A. Nels. & Macbr.	Y	ALTE1	4				-4	0	4
POACEAE	Agropyron smithii Rydb.	Y	AGSM1			2	2	0	0	0
POACEAE	Andropogon gerardii Vitman	Y	ANGE1	64	64	76	76	0	0	0
POACEAE	Andropogon scoparius Michx.	Y	ANSC1	56	54	38	40	-2	2	4
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	Y	ARLO1	14	12	4	14	-2	10	12
POACEAE	Bouteloua curtipendula (Michx.) Torr.	Y	BOCU1	74	66	44	50	-8	6	14
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	Y	BOGR1	78	60	58	68	-18	10	28
POACEAE	Bouteloua hirsuta Lag	Y	BOHI1	52	60	18	30	8	12	4
POACEAE	Bromus japonicus Thunb. ex Murr.	N	BRJA1	4		14	2	-4	-12	8
POACEAE	Bromus tectorum L.	N	BRTE1	2	2	4	4	0	0	0
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	Y	BUDA1	2	2			0	0	0
POACEAE	Koeleria pyramidata (Lam.) Beauv.	Y	KOPY1	62	74	28	32	12	4	8
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	Y	MUMO1	76	78	76	64	2	-12	14
POACEAE	Poa compressa L.	N	POCO1	56	52	84	88	-4	4	8
POACEAE	Poa pratensis L.	N	POPR1	38	38	48	50	0	2	2
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	Y	SIHY1	18	22		6	4	6	2
POACEAE	Sorghastrum nutans (L.) Nash	Y	SONU1	24	22			-2	0	2
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	Y	SPHE1	8	8			0	0	0
POACEAE	Stipa comata Trin. & Rupr.	Y	STCO1	34	42	50	58	8	8	0
POLYGONACEAE	Eriogonum alatum Torr.	Y	ERAL1	38	22	12	10	-16	-2	14
PORTULACACEAE	Talinum parviflorum Nutt.	Y	TAPA1	4	10			6	0	6
ROSACEAE	Potentilla fissa Nutt.	Y	POFI1	2	2			0	0	0
ROSACEAE	Potentilla hippiana Lehm.	Y	POHI1	2	2			0	0	0
SANTALACEAE	Comandra umbellata (L.) Nutt.	Y	COUM1	6	16			10	0	10
SCROPHULARIACEAE	Castilleja sessiliflora Pursh.	Y	CASE3	2	2			0	0	0
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	N	LIDA1	14	14	2	2	0	0	0
SCROPHULARIACEAE	Penstemon virens Penn.	Y	PEVI1	8	2	2	4	-6	2	8
SCROPHULARIACEAE	Verbascum thapsus L.	N	VETH1			2		0	-2	2

Sample size (n=50)

Appendix C

Vascular Plants Species List for the Rocky Flats Environmental Technology Site

As of 2000, there are currently 592 species of vascular plants that have been documented as occurring at Rocky Flats. Voucher specimens are maintained in the Site's herbarium. Plant nomenclature follows that of GPFA (1986), Weber (1976), and Weber (1990), in that order of determination.

GPFA. 1986. Flora of the Great Plains, 2nd printing with 1991 supplement. Great Plains Flora Association. University Press of Kansas, Lawrence, KS. 1402 p.

Weber, W.A. 1976. Rocky Mountain flora. Colorado Associated University Press, Boulder, CO.

Weber, W.A. 1990. Colorado flora: Eastern Slope. University Press of Colorado, Niwot, CO.

Family	Scientific Name	Common Name	Species Code
ACERACEAE	Acer glabrum Torr.	Mountain Maple	ACGL1
ACERACEAE	Acer negundo L. var. interius (Britt.) Sarg.	Box-elder	ACNE1
AGAVACEAE	Yucca glauca Nutt.	Yucca	YUGL1
ALISMATACEAE	Alisma trivale Pursh	American Water Plantain	ALTR1
ALISMATACEAE	Sagittaria latifolia Willd.	Common Arrowhead	SALA1
AMARANTHACEAE	Amaranthus albus L.	Tumbleweed	AMAL2
AMARANTHACEAE	Amaranthus retroflexus L.	Rough Pigweed	AMRE1
ANACARDIACEAE	Rhus aromatica Ait. var. trilobata (Nutt.) A. Gray	Fragrant Sumac	RHAR1
ANACARDIACEAE	Toxicodendron rydbergii (Small) Greene	Poison Ivy	TORY1
APIACEAE	Berula erecta (Huds.) Cov. var. incisum	Water Parsnip	BEER1
APIACEAE	Cicuta maculata L. var. angustifolia Hook.	Water Hemlock	CIMA1
APIACEAE	Conium maculatum L.	Poison Hemlock	COMA1
APIACEAE	Daucus carota L.	Wild Carrot	DACA2
APIACEAE	Harbouria trachypleura (Gray) C. & R.	Whiskbroom Parsley	HATR1
APIACEAE	Heracleum sphondylium L. ssp. montanum (Schleich.) Briq.	Cow Parsnip	HESP1
APIACEAE	Ligusticum porteri C. & R.	Porter's Lovage	LIPO1
APIACEAE	Lomatium orientale Coult. & Rose	Wild Parsley	LOOR1
APIACEAE	Musineon divaricatum (Pursh.) Nutt. var. hookeri T. & G.	Musineon	MUDI1
APIACEAE	Osmorhiza chiliensis H. & A.	Sweet Cicely	OSCH1
APIACEAE	Osmorhiza longistylis (Torr.) DC var. longistylis	Anise Root	OSLO1
APOCYNACEAE	Apocynum androsaemifolium L.	Spreading Dogbane	APAN1
APOCYNACEAE	Apocynum cannabinum L.	Hemp Dogbane	APCA1

ASCLEPIADACEAE	Asclepias incarnata L.	Swamp Milkweed	ASIN1
ASCLEPIADACEAE	Asclepias pumila (Gray) Vail	Plains Milkweed	ASPU1
ASCLEPIADACEAE	Asclepias speciosa Torr.	Showy Milkweed	ASSP1
ASCLEPIADACEAE	Asclepias stenophylla A. Gray	Narrow-leaved Milkweed	ASST1
ASCLEPIADACEAE	Asclepias viridiflora Raf.	Green Milkweed	ASVI1
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	Yarrow	ACMI1
ASTERACEAE	Agoseris glauca (Pursh.) Dietr.	False Dandelion	AGGL1
ASTERACEAE	Ambrosia artemisiifolia L.	Common Ragweed	AMAR1
ASTERACEAE	Ambrosia psilostachya DC.	Western Ragweed	AMPS1
ASTERACEAE	Ambrosia trifida L.	Giant Ragweed	AMTR1
ASTERACEAE	Antennaria microphylla Rydb.	Pink Pussytoes	ANMI1
ASTERACEAE	Antennaria parvifolia Nutt.	Pussytoes	ANPA1
ASTERACEAE	Anthemis cotula L.	Dog Fennel	ANCO1
ASTERACEAE	Arctium minus Bernh.	Burdock	ARMI1
ASTERACEAE	Arnica fulgens Pursh.	Arnica	ARFU1
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	Western Sagewort	ARCA1
ASTERACEAE	Artemisia dracunculus L.	Silky Wormwood	ARDR1
ASTERACEAE	Artemisia frigida Willd.	Silver Sage	ARFR1
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	White Sage	ARLU1
ASTERACEAE	Aster falcatus Lindl.	Aster	ASFA1
ASTERACEAE	Aster fendleri A. Gray	Fendler's Aster	ASFE1
ASTERACEAE	Aster hesperius A. Gray var. hersperius	Panicled Aster	ASHE1
ASTERACEAE	Aster laevis L. var. geyeri A. Gray	Smooth Blue Aster	ASLA1
ASTERACEAE	Aster porteri Gray	Aster	ASPO1
ASTERACEAE	Bidens cernua L.	Nodding Beggarticks	BICE1
ASTERACEAE	Bidens frondosa L.	Beggar-ticks	BIFR1
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	Musk Thistle	CANU1
ASTERACEAE	Centaurea diffusa Lam.	Diffuse Knapweed	CEDI1
ASTERACEAE	Centaurea repens L.	Russian Knapweed	CERE1
ASTERACEAE	Chrysanthemum leucanthemum L.	Ox-eye Daisy	CHLE1
ASTERACEAE	Chrysopsis fulcrata Greene	Golden Aster	CHFU1
ASTERACEAE	Chrysopsis villosa Pursh.	Golden Aster	CHVI1
ASTERACEAE	Chrysothamnus nauseosus (Pall.) Britt. ssp. graveolens (Nutt.) Piper	Greenplume Rabbitbrush	CHNA1
ASTERACEAE	Chrysothamnus nauseosus (Pall.) Britt. ssp. nauseosus	Rubber Rabbitbrush	CHNA2
ASTERACEAE	Cichorium intybus L.	Common Chicory	CIIN1

ASTERACEAE	Cirsium arvense (L.) Scop.	Canada Thistle	CIAR1
ASTERACEAE	Cirsium flodmanni (Rydb.) Arthur	Flodman's Thistle	CIFL1
ASTERACEAE	Cirsium ochrocentrum A. Gray	Yellow Spine Thistle	CIOC1
ASTERACEAE	Cirsium undulatum (Nutt.) Spreng.	Wavyleaf Thistle	CIUN1
ASTERACEAE	Cirsium vulgare (Savi) Ten.	Bull Thistle	CIVU1
ASTERACEAE	Conyza canadensis (L.) Cronq.	Horseweed	COCA1
ASTERACEAE	Crepis occidentalis Nutt.	Hawksbeard	CROC1
ASTERACEAE	Crepis runcinata (James) T. & G.	Hawksbeard	CRRU1
ASTERACEAE	Dyssodia papposa (Vent) Hitchc.	Fetid Marigold	DYPA1
ASTERACEAE	Erigeron canus A. Gray	Fleabane	ERCA1
ASTERACEAE	Erigeron compositus Pursh var. dicoideus A. Gray		ERCO1
ASTERACEAE	Erigeron divergens T. & G.	Fleabane	ERDI1
ASTERACEAE	Erigeron flagellaris A. Gray	Fleabane	ERFL1
ASTERACEAE	Erigeron pumilus Nutt.	Fleabane	ERPU1
ASTERACEAE	Erigeron speciosa (Lindl.) DC. var. macranthus (Nutt.) Cronq.	Oregon Fleabane	ERSP1
ASTERACEAE	Erigeron strigosus Muhl. ex Willd.	Daisy Fleabane	ERST1
ASTERACEAE	Erigeron vetensis Rydb.	LaVeta Fleabane	ERVE1
ASTERACEAE	Gaillardia aristata Pursh.	Blanket Flower	GAAR1
ASTERACEAE	Gnapthalium chilense Spreng.	Cotton-batting	GNCH1
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	Curly-top Gumweed	GRSQ1
ASTERACEAE	Gutierrezia sarothrae (Pursh.) Britt. & Rusby	Snakeweed	GUSA1
ASTERACEAE	Happlopappus spinulosus (Pursh) DC.	Cutleaf Ironplant	HASP1
ASTERACEAE	Helianthus annuus L.	Common Sunflower	HEAN1
ASTERACEAE	Helianthus ciliaris DC.	Texas Blue Weed	HECI1
ASTERACEAE	Helianthus maximilianii Schrad.	Maximilian Sunflower	HEMA1
ASTERACEAE	Helianthus nuttallii T. & G.	Nuttall's Sunflower	HENU1
ASTERACEAE	Helianthus petiolaris Nutt.	Plains Sunflower	HEPE1
ASTERACEAE	Helianthus pumilus Nutt.	Sunflower	HEPU1
ASTERACEAE	Helianthus rigidus (Cass.) Desf. ssp. subrhomboideus (Rydb.) Heiser	Stiff Sunflower	HERI1
ASTERACEAE	Heliomeris multiflora Nuttall	Showy Goldeneye	HEMU1
ASTERACEAE	Hymenopappus filifolius Hook. var. cinereus (Rydb.) I. M. Johnst.	Hymenopappus	HYFI1
ASTERACEAE	Iva axillaris Pursh.	Poverty Weed	IVAX1
ASTERACEAE	Iva xanthifolia Nutt.	Marsh Elder	IVXA1
ASTERACEAE	Kuhnia chlorolepis Woot. & Standl.	False Boneset	KUCH1
ASTERACEAE	Kuhnia eupatorioides L.	False Boneset	KUEU1
ASTERACEAE	Lactuca oblongifolia Nutt.	Blue Lettuce	LAOB1

ASTERACEAE	Lactuca serriola L.	Prickly Lettuce	LASE1
ASTERACEAE	Leucelene ericoides (Torr.) Greene	White Aster	LEER1
ASTERACEAE	Liatris punctata Hook.	Blazing Star	LIPU1
ASTERACEAE	Lygodesmia juncea (Pursh.) Hook.	Skeleton-weed	LYJU1
ASTERACEAE	Machaeranthera bigelovii (Gray) Greene	Bigelovi's Tansy Aster	MABI1
ASTERACEAE	Machaeranthera canescens (Pursh) A. Gray	Hoary Aster	MACA1
ASTERACEAE	Microseris cuspidata (Pursh.) Sch. Bip.	False Dandelion	MICU1
ASTERACEAE	Onopordum acanthium L.	Scotch Thistle	ONAC1
ASTERACEAE	Picradeniopsis oppositifolia (Nutt.) Rydb.	Picradeniopsis	PIOP1
ASTERACEAE	Ratibida columnifera (Nutt.) Woot. & Standl.	Prairie Coneflower	RACO1
ASTERACEAE	Rudbeckia ampla Nelson	Goldenglow	RUAM1
ASTERACEAE	Scorzonera laciniata L.	False Salsify	SCLA1
ASTERACEAE	Senecio fendleri Gray	Groundsel	SEFE1
ASTERACEAE	Senecio integerrimus Nutt.	Groundsel	SEIN1
ASTERACEAE	Senecio plattensis Nutt.	Prairie Ragwort	SEPL1
ASTERACEAE	Senecio spartioides T. & G.	Groundsel	SESP1
ASTERACEAE	Senecio tridenticulatus Rydb.	Groundsel	SETR1
ASTERACEAE	Solidago canadensis L.	Canada Goldenrod	SOCA1
ASTERACEAE	Solidago gigantea Ait.	Late Goldenrod	SOGI1
ASTERACEAE	Solidago missouriensis Nutt.	Prairie Goldenrod	SOMI1
ASTERACEAE	Solidago mollis Bart.	Soft Goldenrod	SOMO1
ASTERACEAE	Solidago nana Nutt.	Low Goldenrod	SONA1
ASTERACEAE	Solidago rigida L.	Rigid Goldenrod	SORI1
ASTERACEAE	Sonchus arvensis L. ssp. uglinosus (Bieb.) Nyman	Field Sow Thistle	SOAR2
ASTERACEAE	Sonchus asper (L.) Hill	Prickly Sow Thistle	SOAS1
ASTERACEAE	Stephanomeria pauciflora (Torr.) A. Nels.	Wire Lettuce	STPA1
ASTERACEAE	Taraxacum laevigatum (Willd.) DC.	Red Seeded Dandelion	TALA1
ASTERACEAE	Taraxacum officinale Weber	Dandelion	TAOF1
ASTERACEAE	Thelesperma megapotanicum (Spreng.) O. Ktze.	Greenthread	THME1
ASTERACEAE	Townsendia grandiflora (Nutt.)	Easter Daisy	TOGR1
ASTERACEAE	Townsendia hookeri Beaman	Easter Daisy	TOHO1
ASTERACEAE	Tragopogon dubius Scop.	Goat's Beard	TRDU1
ASTERACEAE	Tragopogon porrifolius L.	Salsify	TRPO1
ASTERACEAE	Xanthium strumarium L.	Cocklebur	XAST1
BERBERIDACEAE	Berberis repens Lindl.	Oregon Grape	BERE1
BETULACEAE	Alnus incana (L.) Moench ssp. tenuifolia (Nuttall) Breitung	Alder	ALIN1
BETULACEAE	Betula occidentalis Hook.	Water Birch	BEOC1

BORAGINACEAE	Asperugo procumbens L.	Madwort	ASPR1
BORAGINACEAE	Cryptantha virgata (Porter) Payson	Miners Candle	CRVI1
BORAGINACEAE	Cynoglossum officinale L.	Hound's Tongue	CYOF1
BORAGINACEAE	Hackelia floribunda (Lehm.) I. M. Johnst.	Large-flowered Stickseed	HAFL1
BORAGINACEAE	Lappula redowskii (Hornem.) Greene	Stickseed	LARE1
BORAGINACEAE	Lithospermum incisum Lehm.	Puccoon	LIIN1
BORAGINACEAE	Lithospermum multiflorum Torr.		LIMU1
BORAGINACEAE	Mertensia lanceolata (Pursh.) A. DC.	Bluebells	MELA1
BORAGINACEAE	Onosmodium molle Michx. var. occidentale (Mack.) Johnst.	False Gromwell	ONMO1
BORAGINACEAE	Plagiobothrys scouleri (H. & A.) I. M. Johnst.	Popcorn Flower	PLSC1
BRASSICACEAE	Alyssum alyssoides (L.) L.	Pale Alyssum	ALAL1
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	Alyssum	ALMI1
BRASSICACEAE	Arabis fendleri (S. Wats.) Greene var. fendleri	Rock Cress	ARFE3
BRASSICACEAE	Arabis glabra (L.) Bernh.	Tower Mustard	ARGL1
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	Rock Cress	ARHI1
BRASSICACEAE	Barbarea vulgaris R. Br.	Yellowrocket Wintercress	BAVU1
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	Small-seeded False Flax	CAMI1
BRASSICACEAE	Capsella bursa-pastoris (L.) Medic.	Shepherd's Purse	CABU1
BRASSICACEAE	Cardaria chalepensis (L.) Hand-Mazz	Lens-padded Hoary Cress	CACH1
BRASSICACEAE	Cardaria draba (L.) Desv.	Hoary Cress	CADR1
BRASSICACEAE	Chorispora tenella (Pall.) DC.	Blue Mustard	CHTE1
BRASSICACEAE	Conringia orientalis (L.) Dum.	Hare's-ear Mustard	COOR1
BRASSICACEAE	Descurainia pinnata (Walt.) Britt.	Tansy Mustard	DEPI1
BRASSICACEAE	Descurainia richardsonii (Sweet) Schultz	Tansy Mustard	DERI1
BRASSICACEAE	Descurainia sophia (L.) Webb ex Prantl.	Flixweed	DESO1
BRASSICACEAE	Draba nemorosa L.	Yellow Whitlowort	DRNE1
BRASSICACEAE	Draba reptans (Lam.) Fern.	White Whitlowort	DRRE1
BRASSICACEAE	Erysimum capitatum (Nutt.) DC.	Western Wallflower	ERCA2
BRASSICACEAE	Erysimum repandum L.	Bushy Wallflower	ERRE1
BRASSICACEAE	Hesperis matronalis L.	Dame's Rocket	HEMA2
BRASSICACEAE	Lepidium campestre (L.) R. Br.	Field Peppergrass	LECA1
BRASSICACEAE	Lepidium densiflorum Schrad.	Peppergrass	LEDE1
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	Bladderpod	LEMO1
BRASSICACEAE	Nasturtium officinale R. Br.	Watercress	NAOF1
BRASSICACEAE	Physaria vitulifera Rydb.	Double Bladder-pod	PHVI1
	Rorippa palustris (L.) Bess. ssp. hispida (Desv.)		

BRASSICACEAE	Jonsell	Bog Yellow Cress	ROPA1
BRASSICACEAE	Sisymbrium altissimum L.	Tumbling Mustard	SIAL1
BRASSICACEAE	Thlaspi arvense L.	Field Penny Cress	THAR1
CACTACEAE	Coryphantha missouriensis (Sweet) Britt. & Rose	Nipple Cactus	COMI1
CACTACEAE	Echinocereus viridiflorus Engelm.	Hedgehog Cactus	ECVI1
CACTACEAE	Opuntia fragilis (Nutt.) Haw.	Little Prickly Pear	OPFR1
CACTACEAE	Opuntia macrorhiza Engelm.	Twistspine Prickly Pear	OPMA1
CACTACEAE	Opuntia polyacantha Haw.	Plains Prickly Pear	OPPO1
CACTACEAE	Pediocactus simpsonii (Engelm.) Britt. & Rose	Nipple Cactus	PESI1
CALLITRICHACEAE	Callitriche verna L.	Water Starwort	CAVE1
CAMPANULACEAE	Campanula rotundifolia L.	Harebell	CARO1
CAMPANULACEAE	Lobelia siphilitica L. var. ludoviciana A. DC.	Great Lobelia	LOSI1
CAMPANULACEAE	Triodanis leptocarpa (Nutt.) Nieuw.	Venus' Looking Glass	TRLE1
CANNABACEAE	Humulus lupulus L. var. lupuloides E. Small	Common Hops	HULU1
CAPPERACEAE	Polansia dodecandra (L.) DC. ssp. trachysperma (T. & G.) Iltis	Clammy-weed	PODO2
CAPRIFOLIACEAE	Symphoricarpos occidentalis Hook.	Western Snowberry	SYOC1
CAPRIFOLIACEAE	Symphoricarpos oreophilus Gray	Snowberry	SYOR1
CAPRIFOLIACEAE	Viburnum opulus L. var. americanum Ait	Highbush Cranberry	VIOP1
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	Fendler's Sandwort	ARFE2
CARYOPHYLLACEAE	Cerastium arvense L.	Prairie Chickweed	CEAR1
CARYOPHYLLACEAE	Cerastium brachypodum (Engelm. ex A. Gray) Robins.	Short-stalked Chickweed	CEBR1
CARYOPHYLLACEAE	Cerastium vulgatum L.	Common Mouse-Ear	CEVU1
CARYOPHYLLACEAE	Conosilene conica (L.) Fourreau ssp. conoidea (L.) Love & Kjellqvist	Community Campion	COCO1
CARYOPHYLLACEAE	Paronychia jamesii T. & G.	James' Nailwort	PAJA1
CARYOPHYLLACEAE	Saponaria officinalis L.	Bouncing Bet	SAOF1
CARYOPHYLLACEAE	Silene antirrhina L.	Sleepy Catchfly	SIAN1
CARYOPHYLLACEAE	Silene drummondii Hook.	Campion	SIDR1
CARYOPHYLLACEAE	Silene pratensis (Raf.)Godr. & Gren	White Campion	SIPR1
CARYOPHYLLACEAE	Spergularia rubra (L.) K. Presl.	Sand Spurry	SPRU1
CARYOPHYLLACEAE	Stellaria longifolia Muhl. ex Willd.	Long-leaved Stitchwort	STLO1
CARYOPHYLLACEAE	Vaccaria pyramidata Medic.	Cow Cockle	VAPY1
CERATOPHYLLACEAE	Ceratophyllum demersum L.	Coontail	CEDE1
CHENOPODIACEAE	Atriplex canescens (Pursh.) Nutt.	Four-winged Saltbush	ATCA1
CHENOPODIACEAE	Chenopodium album L.	Lamb's Quarters	CHAL1
CHENOPODIACEAE	Chenopodium atrovirens Nutt.	Dark Goosefoot	CHAT1
CHENOPODIACEAE	Chenopodium berlandieri Moq.	Pitseed Goosefoot	CHBE1

CHENOPODIACEAE	Chenopodium botrys L.	Jerusalem Oak	CHBO1
CHENOPODIACEAE	Chenopodium dessicatum A. Nels.	Desert goosefoot	CHDE1
CHENOPODIACEAE	Chenopodium fremontii S. Wats.	Fremont Goosefoot	CHFR1
CHENOPODIACEAE	Chenopodium leptophyllum Nutt. ex Moq.	Goosefoot	CHLE2
CHENOPODIACEAE	Chenopodium overi Aellen	Overi's Goosefoot	CHOV1
CHENOPODIACEAE	Kochia scoparia (L.) Schrad.	Kochia	KOSC1
CHENOPODIACEAE	Salsola iberica Senn. & Pau.	Russian-Thistle	SAIB1
CLUSIACEAE	Hypericum majus (A. Gray) Britt.	Greater St. John's-wort	HYMA1
CLUSIACEAE	Hypericum perforatum L.	Common St. John's-wort	HYPE1
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	Spiderwort	TROC1
CONVOLVULACEAE	Calystegia macouni (Greene) Brummitt	Hedge Bindweed	CAMA1
CONVOLVULACEAE	Calystegia sepium (L.) R. Br. ssp. angulata Brummitt	Hedge Bindweed	CASE1
CONVOLVULACEAE	Convolvulus arvensis L.	Field Bindweed	COAR1
CONVOLVULACEAE	Evolvulus nuttallianus R. & S.	Evolvulus	EVNU1
CRASSULACEAE	Sedum lanceolatum Torr.	Stonecrop	SELA1
CUPRESSACEAE	Juniperus communis L.	Common Juniper	JUCO1
CUPRESSACEAE	Juniperus scopulorum Sarg.	Rocky Mountain Juniper	JUSC1
CUSCUTACEAE	Cuscuta approximata Bab.	Dodder	CUAP1
CYPERACEAE	Carex athrostachya Olney	Sedge	CAAT1
CYPERACEAE	Carex aurea Nutt.	Sedge	CAAU1
CYPERACEAE	Carex bebbii (Bailey) Fern	Sedge	CABE1
CYPERACEAE	Carex brevior (Dew.) Mack. ex Lunell.	Sedge	CABR1
CYPERACEAE	Carex douglasii F. Boott.	Sedge	CADO1
CYPERACEAE	Carex eleocharis Bailey	Sedge	CAEL1
CYPERACEAE	Carex emoryi Dew.	Sedge	CAEM1
CYPERACEAE	Carex filifolia Nutt.	Sedge	CAFI1
CYPERACEAE	Carex heliophila Mack.	Sedge	CAHE1
CYPERACEAE	Carex hystericina Muhl. ex Willd.	Sedge	CAHY1
CYPERACEAE	Carex interior Bailey	Sedge	CAIN1
CYPERACEAE	Carex lanuginosa Michx.	Sedge	CALA1
CYPERACEAE	Carex nebrascensis Dew.	Sedge	CANE1
CYPERACEAE	Carex oreocharis Holm.	Sedge	CAOR1
CYPERACEAE	Carex praegracilis W. Boott.	Sedge	CAPR1
CYPERACEAE	Carex rostrata Stokes ex Willd.	Sedge	CARO2
CYPERACEAE	Carex scoparia Schkuhr. ex Willd.	Sedge	CASC1
CYPERACEAE	Carex simulata Mack.	Sedge	CASI1
CYPERACEAE	Carex stipata Muhl.	Sedge	CAST1

CYPERACEAE	Carex vulpinoidea Michx.	Fox Sedge	CAVU1
CYPERACEAE	Cyperus acuminatus Torr. & Hook.	Taperleaf Flatsedge	CYAC1
CYPERACEAE	Eleocharis acicularis (L.) R. & S.	Spikerush	ELAC1
CYPERACEAE	Eleocharis compressa Sulliv.	Spikerush	ELCO1
CYPERACEAE	Eleocharis macrostachya Britt.	Spikerush	ELMA1
CYPERACEAE	Eleocharis obtusa (Willd.) J.A. Schult.	Blunt Spikerush	ELOB1
CYPERACEAE	Eleocharis parvula Link ex Boff. & Fingerbr. var. anachaeta (Torr.) Svens.	Spikerush	ELPA1
CYPERACEAE	Scirpus acutus Muhl.	Bulrush	SCAC1
CYPERACEAE	Scirpus pallidus (Britt.) Fern	Bulrush	SCPA1
CYPERACEAE	Scirpus pungens Vahl	Pungent Bulrush	SCPU1
CYPERACEAE	Scirpus validus Vahl.	Bulrush	SCVA1
ELAEAGNACEAE	Elaeagnus angustifolia L.	Russian Olive	ELAN1
EQUISETACEAE	Equisetum arvense L.	Field Horsetail	EQAR1
EQUISETACEAE	Equisetum laevigatum A. Br.	Smooth Horsetail	EQLA1
EQUISETACEAE	Equisetum variegatum Schleich.	Variegated Scouring Rush	EQVA1
EUPHORBIACEAE	Euphorbia dentata Michx.	Toothed Spurge	EUDE1
EUPHORBIACEAE	Euphorbia fendleri T. & G.	Fendler's Euphorbia	EUFE1
EUPHORBIACEAE	Euphorbia marginata Pursh.	Snow-on-the-Mountain	EUMA1
EUPHORBIACEAE	Euphorbia robusta (Engelm.) Small	Spurge	EURO1
EUPHORBIACEAE	Euphorbia serpyllifolia Pers.	Thyme-leaved Spurge	EUSE1
EUPHORBIACEAE	Euphorbia spathulata Lam.	Spurge	EUSP1
EUPHORBIACEAE	Tragia ramosa Nutt.	Noseburn	TRRA1
FABACEAE	Amorpha fruticosa L.	False Indigo	AMFR1
FABACEAE	Amorpha nana Nutt.	Dwarf Wild Indigo	AMNA1
FABACEAE	Astragalus adsurgens Pall. var. robustior Hook.	Standing Milkvetch	ASAD1
FABACEAE	Astragalus agrestis Dougl. ex G. Don	Field Milkvetch	ASAG1
FABACEAE	Astragalus bisulcatus (Hook.) A. Gray	Two-grooved Vetch	ASBI1
FABACEAE	Astragalus canadensis L.	Canada Milk-vetch	ASCA1
FABACEAE	Astragalus crassicarpus Nutt.	Ground-plum	ASCR1
FABACEAE	Astragalus drummondii Dougl. ex Hook.	Drummond Milkvetch	ASDR1
FABACEAE	Astragalus flexuosus (Hook.) G. Don	Pliant Milkvetch	ASFL1
FABACEAE	Astragalus lotiflorus Hook.	Lotus Milk-Vetch	ASLO1
FABACEAE	Astragalus parryi Gray	Parry's Milkvetch	ASPA1
FABACEAE	Astragalus shortianus Nutt. ex T.&G.	Short's Milkvetch	ASSH1
FABACEAE	Astragalus spathulatus Sheld.	Draba Milk-Vetch	ASSP2
FABACEAE	Astragalus tridactylicus Gray	Foothill Milkvetch	ASTR1
FABACEAE	Coronilla varia L.	Crown Vetch	COVA1

FABACEAE	Dalea candida Michx. ex Willd. var. oligophylla (Torr.) Shinners.	White Prairie Clover	DACA1
FABACEAE	Dalea purpurea Vent	Purple Prairie Clover	DAPU1
FABACEAE	Glycyrrhiza lepidota Pursh.	Wild Licorice	GLLE1
FABACEAE	Lathyrus eucosmus Butters and St. John	Purple Peavine	LAEU1
FABACEAE	Lotus corniculatus L.	Birdfoot Trefoil	LOCO1
FABACEAE	Lupinus argenteus Pursh ssp. ingratus (Greene) Harmon		LUAR2
FABACEAE	Lupinus argenteus Pursh var. argenteus	Silvery Lupine	LUAR1
FABACEAE	Medicago lupulina L.	Black Medick	MELU1
FABACEAE	Medicago sativa L. ssp. sativa	Alfalfa	MESA1
FABACEAE	Melilotus alba Medic.	White Sweetclover	MEAL1
FABACEAE	Melilotus officinalis (L.) Pall.	Yellow Sweetclover	MEOF1
FABACEAE	Oxytropis lambertii Pursh.	Purple Locoweed	OXLA1
FABACEAE	Psoralea tenuiflora Pursh.	Wild Alfala	PSTE1
FABACEAE	Robinia pseudo-acacia L.	Black Locust	ROPS1
FABACEAE	Thermopsis rhombifolia var. divaricarpa (Nels.) Isely	Golden Banner	THRH1
FABACEAE	Trifolium hybridum L.	Alsike Clover	TRHY1
FABACEAE	Trifolium pratense L.	Red Clover	TRPR1
FABACEAE	Trifolium repens L.	White Clover	TRRE1
FABACEAE	Vicia americana Muhl. ex Willd.	American Vetch	VIAM1
FUMARIACEAE	Fumaria vaillentii Lois	Fumitory	FUVA1
GENTIANACEAE	Gentiana affinis Griseb.	Northern Gentian	GEAF1
GENTIANACEAE	Swertia radiata (Kell.) O. Ktze.	Green Gentian	SWRA1
GERANIACEAE	Erodium cicutarium (L.) L'Her.	Filaria	ERCI1
GERANIACEAE	Geranium caespitosum James ssp. caespitosum	Common Wild Geranium	GECA1
GROSSULARIACEAE	Ribes aureum Pursh	Golden Currant	RIAU1
GROSSULARIACEAE	Ribes cereum Dougl.	Western Red Currant	RICE1
GROSSULARIACEAE	Ribes inerme Rydb.	Common Gooseberry	RIIN1
HALORAGACEAE	Myriophyllum exalbescens Fern.	American Milfoil	MYEX1
HYDROPHYLLACEAE	Hydrophyllum fendleri (Gray) Heller	Waterleaf	HYFE1
HYDROPHYLLACEAE	Phacelia heterophylla Pursh.	Scorpionweed	PHHE1
IRIDACEAE	Iris missouriensis Nutt.	Western Blue Flag	IRMI1
IRIDACEAE	Sisyrinchium montanum Greene	Blue-eyed Grass	SIMO1
JUNCACEAE	Juncus articulatus L.	Articulate Rush	JUAR1
JUNCACEAE	Juncus balticus Willd.	Baltic Rush	JUBA1
JUNCACEAE	Juncus bufonius L.	Toad Rush	JUBU1
JUNCACEAE	Juncus dudleyi Wieg.	Dudley Rush	JUDU1

JUNCACEAE	Juncus ensifolius Wikst. var. montanus (Englm.) C. L. Hitchc.	Rush	JUEN1
JUNCACEAE	Juncus interior Wieg.	Inland Rush	JUIN1
JUNCACEAE	Juncus longistylis Torr.	Rush	JULO1
JUNCACEAE	Juncus nodosus L.	Knotted Rush	JUNO1
JUNCACEAE	Juncus torreyi Cov.	Torrey's Rush	JUTO1
JUNCACEAE	Juncus tracyi Rydb.	Tracy Rush	JUTR1
LAMIACEAE	Dracocephalum parviflorum Nutt.	Dragonhead	DRPA1
LAMIACEAE	Hedeoma hispidum Pursh.	Rough False Pennyroyal	HEHI1
LAMIACEAE	Lycopus americanus Muhl. ex Barton	American Bugleweed	LYAM1
LAMIACEAE	Lycopus asper Greene	Rough Bugleweed	LYAS1
LAMIACEAE	Marrubium vulgare L.	Common Horehound	MAVU1
LAMIACEAE	Mentha arvensis L.	Field Mint	MEAR1
LAMIACEAE	Monarda fistulosa L. var. menthifolia (Grah.) Fern.	Wild Bergamot	MOFI1
LAMIACEAE	Monarda pectinata Nutt.	Spotted Bee-Balm	MOPE1
LAMIACEAE	Nepeta cataria L.	Catnip	NECA1
LAMIACEAE	Prunella vulgaris L.	Selfheal	PRVU1
LAMIACEAE	Salvia reflexa Hornem.	Lance-leaved Sage	SARE1
LAMIACEAE	Scutellaria brittonii Porter	Britton's Skullcap	SCBR1
LAMIACEAE	Stachys palustris L. ssp. pilosa (Nutt.) Epling	Hedge Nettle	STPA2
LEMNACEAE	Lemna minor L.	Duckweed	LEMI1
LILIACEAE	Allium cernuum Roth	Wild Onion	ALCE1
LILIACEAE	Allium geyeri S. Wats.	Geyer's Onion	ALGE1
LILIACEAE	Allium textile A. Nels. & Macbr.	Wild White Onion	ALTE1
LILIACEAE	Asparagus officinalis L.	Asparagus	ASOF1
LILIACEAE	Calochortus gunnisonii S. Wats.	Sego Lily	CAGU1
LILIACEAE	Leucocrinum montanum Nutt.	Mountain Lily	LEMO2
LILIACEAE	Smilacina stellata (L.) Desf.	Spikenard	SMST1
LILIACEAE	Zigadenus venenosus Wats. var. gramineus (Rydb.) Walsh ex Peck	Death Camass	ZIVE1
LINACEAE	Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	Blue Flax	LIPE1
LINACEAE	Linum pratense (Nort.) Small	Norton's Flax	LIPR1
LYTHRACEAE	Ammania robusta Herr & Regel.	Robust Toothcup	AMRO1
LYTHRACEAE	Lythrum alatum Pursh.	Winged Loosestrife	LYAL1
MALVACEAE	Malva neglecta Wallr.	Common Mallow	MANE1
MALVACEAE	Sidalcea candida Gray	White Checkermallow	SICA1
MALVACEAE	Sidalcea neomexicana Gray	New Mexico Checkmallow	SINE1
MALVACEAE	Sphaeralcea coccinea (Pursh.) Rydb.	Red False Mallow	SPCO1

NYCTAGINACEAE	Mirabilis hirsuta (Pursh.) MacM.	Hairy Four-O'Clock	MIHI1
NYCTAGINACEAE	Mirabilis linearis (Pursh.) Heimerl	Narrowleaf Four O'Clock	MILI1
NYCTAGINACEAE	Mirabilis nyctaginea (Michx.) MacM.	Wild Four-O'Clock	MINY1
ONAGRACEAE	Calylophus serrulatus (Nutt.) Raven	Plains Yellow Primrose	CASE2
ONAGRACEAE	Epilobium ciliatum Raf. ssp. glandulosum (Lehm.) Hock & Raven	Willow Herb	EPCI1
ONAGRACEAE	Epilobium paniculatum Nutt.	Willow Herb	EPPA1
ONAGRACEAE	Gaura coccinea Pursh.	Scarlet Gaura	GACO1
ONAGRACEAE	Gaura parviflora Dougl.	Velvety Gaura	GAPA1
ONAGRACEAE	Oenothera flava (A. Nels.) Garrett	Evening Primrose	OEFL1
ONAGRACEAE	Oenothera howardii (A. Nels.) W. L. Wagner	Yellow Stemless Evening Pr	OEHO1
ONAGRACEAE	Oenothera villosa Thunb. ssp. strigosa (Rydb.) Dietrich & Raven	Common Evening Primrose	OEVI1
ORCHIDACEAE	Habenaria hyperborea (L.) R. Br.	Northern Green Orchid	HAHY1
OROBANCHACEAE	Orobanche fasciculata Nutt.	Broomrape	ORFA1
OXALIDACEAE	Oxalis dillenii Jacq.	Gray-Green Wood Sorrel	OXDI1
PAPAVERACEAE	Argemone polyanthemos (Fedde) G. Ownbey	Prickly Poppy	ARPO1
PINACEAE	Picea pungens Engelm.	Blue Spruce	PIPU1
PINACEAE	Pinus ponderosa Laws	Ponderosa Pine	PIPO1
PINACEAE	Pseudotsuga menziesii (Mirb.) Franco	Douglas-Fir	PSME1
PLANTAGINACE	Plantago lanceolata L.	English Plantain	PLLA1
PLANTAGINACE	Plantago major L.	Common Plantain	PLMA1
PLANTAGINACE	Plantago patagonica Jacq.	Patagonian Plantain	PLPA1
POACEAE	Aegilops cylindrica Host	Jointed Goatgrass	AECY1
POACEAE	Agropyron caninum (L.) Beauv. ssp. majus (Vasey) C. L. Hitchc.	Slender Wheatgrass	AGCA1
POACEAE	Agropyron cristatum (L.) Gaertn.	Crested Wheatgrass	AGCR1
POACEAE	Agropyron dasystachyum (Hook.) Scribn.		AGDA1
POACEAE	Agropyron desertorum (Fisch.) Schult.	Crested Wheatgrass	AGDE1
POACEAE	Agropyron elongatum (Host) Beauv.	Tall Wheatgrass	AGEL1
POACEAE	Agropyron griffithsii Scribn. & Smith		AGGR1
POACEAE	Agropyron intermedium (Host) Beauv.	Intermediate Wheatgrass	AGIN1
POACEAE	Agropyron repens (L.) Beauv.	Quackgrass	AGRE1
POACEAE	Agropyron smithii Rydb.	Western Wheatgrass	AGSM1
POACEAE	Agropyron spicatum (Pursh) Scribn. and Sm.	Bluebunch Wheatgrass	AGSP1
POACEAE	Agrostis scabra Willd.	Ticklegrass	AGSC1
POACEAE	Agrostis stolonifera L.	Redtop	AGST1
POACEAE	Alopecurus geniculatus L.	Marsh Foxtail	ALGE2

POACEAE	Andropogon gerardii Vitman	Big Bluestem	ANGE1
POACEAE	Andropogon scoparius Michx.	Little Bluestem	ANSC1
POACEAE	Apera interrupta (L.) Beauvois	Italian Windgrass	APIN1
POACEAE	Aristida basiramea Engelm. ex Vasey var. basiramea	Forktip Threeawn	ARBA1
POACEAE	Aristida purpurea Nutt. var. longiseta (Steud.) Vasey	Fendler Threeawn	ARFE1
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	Red Threeawn	ARLO1
POACEAE	Avena fatua var. sativa (L.) Hausskn.	Cultivated Oats	AVFA1
POACEAE	Bouteloua curtipendula (Michx.) Torr.	Side-oats Grama	BOCU1
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	Blue Grama	BOGR1
POACEAE	Bouteloua hirsuta Lag	Hairy Grama	BOHI1
POACEAE	Bromus briziformis F. & M.	Rattlesnake Grass	BRBR1
POACEAE	Bromus inermis Leyss. ssp. inermis	Smooth Brome	BRIN1
POACEAE	Bromus japonicus Thunb. ex Murr.	Japanese Brome	BRJA1
POACEAE	Bromus tectorum L.	Downy Brome	BRTE1
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	Buffalo-grass	BUDA1
POACEAE	Calamagrostis stricta (Timm.) Koel	Northern Reedgrass	CAST2
POACEAE	Cenchrus longispinus (Hack.) Fern	Field Sandbur	CELO1
POACEAE	Ceratochloa marginata (Nees ex Stued.) Jackson	Rescuegrass	CEMA1
POACEAE	Dactylis glomerata L.	Orchardgrass	DAGL1
POACEAE	Danthonia spicata (L.) Beauv. ex R. & S.	Poverty Oatgrass	DASP1
POACEAE	Dichanthelium linearifolium (Scribn.) Gould	Slimleaf Dichanthelium	DILI1
POACEAE	Dichanthelium oligosanthes (Schultz) Gould var. scribnerianum (Nash) G	Scribner Dichanthelium	DIOL1
POACEAE	Digitaria sanguinalis (L.) Scop.	Hairy Crabgrass	DISA1
POACEAE	Echinochloa crusgallii (L.) Beauv.	Barnyard Grass	ECCR1
POACEAE	Elymus canadensis L.	Canada Wild Rye	ELCA1
POACEAE	Elymus juncea Fisch.	Russian Wild Rye	ELJU1
POACEAE	Eragrostis cilianensis (All.) E. Mosher	Stinkgrass	ERCI2
POACEAE	Eragrostis curvula (Schrad.) Nees	Weeping Lovegrass	ERCU1
POACEAE	Eragrostis pilosa (L.) Beauv.	India Lovegrass	ERPI1
POACEAE	Festuca octoflora Walt.	Six-weeks Fescue	FEOC1
POACEAE	Festuca ovina L. var. rydbergii St. Yves	Sheep's Fescue	FEOV1
POACEAE	Festuca pratensis Huds.	Meadow Fescue	FEPR1
POACEAE	Glyceria grandis S. Wats. ex A. Gray	Tall Mannagrass	GLGR1
POACEAE	Glyceria striata (Lam.) Hitchc.	Fowl Mannagrass	GLST1
POACEAE	Hordeum brachyantherum Nevski	Meadow Barley	HOBR1

POACEAE	Hordeum jubatum L.	Foxtail Barley	HOJU1
POACEAE	Koeleria pyramidata (Lam.) Beauv.	Junegrass	KOPY1
POACEAE	Leersia oryzoides (L.) Sw.	Rice Cutgrass	LEOR1
POACEAE	Lolium perenne L. var. aristatum Willd.	Italian Ryegrass	LOPE1
POACEAE	Lolium perenne L. var. perenne	Perennial Ryegrass	LOPE2
POACEAE	Muhlenbergia asperifolia (Nees. & Mey.) Parodi	Scratchgrass	MUAS1
POACEAE	Muhlenbergia filiformis (Thurb.) Rydb.	Muhly	MUFI1
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	Mountain Muhly	MUMO1
POACEAE	Muhlenbergia racemosa (Michx.) B. S. P.	Marsh Muhly	MURA1
POACEAE	Muhlenbergia wrightii Vasey	Spike Muhly	MUWR1
POACEAE	Oryzopsis hymenoides (R. & S.) Ricker	Indian Ricegrass	ORHY1
POACEAE	Panicum capillare L.	Witchgrass	PACA1
POACEAE	Panicum dichotomiflorum Michx.	Fall Panicum	PADI1
POACEAE	Panicum virgatum L.	Switchgrass	PAVI1
POACEAE	Phalaris arundinacea L.	Reed Canarygrass	PHAR1
POACEAE	Phleum pratense L.	Timothy	PHPR1
POACEAE	Phragmites australis (Cav.) Trin. ex Steud.	Common Reed	PHAU1
POACEAE	Poa bulbosa L.	Bulbous Bluegrass	POBU1
POACEAE	Poa canbyi (Scribn.) Piper	Canby's Bluegrass	POCA1
POACEAE	Poa compressa L.	Canada Bluegrass	POCO1
POACEAE	Poa fendleriana (Steud.) Vasey	Muttongrass	POFE1
POACEAE	Poa juncifolia Scribn.	Alkali Bluegrass	POJU1
POACEAE	Poa palustris L.	Fowl Bluegrass	POPA1
POACEAE	Poa pratensis L.	Kentucky Bluegrass	POPR1
POACEAE	Polypogon monspeliensis (L.) Desf.	Rabbitfoot Grass	POMO1
POACEAE	Schedonnardus paniculatus (Nutt.) Trel.	Tumblegrass	SCPA2
POACEAE	Secale cereale L.	Rye	SECE1
POACEAE	Setaria viridis (L.) Beauv.	Green Foxtail	SEVI1
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	Squirreltail	SIHY1
POACEAE	Sorghastrum nutans (L.) Nash	Indian-grass	SONU1
POACEAE	Spartina pectinata Link	Prairie Cordgrass	SPPE1
POACEAE	Sphenopholis obtusata (Michx.) Scribn.	Prairie Wedgegrass	SPOB1
POACEAE	Sporobolus asper (Michx.) Kunth	Rough Dropseed	SPAS1
POACEAE	Sporobolus cryptandrus (Torr.) A. Gray	Sand Dropseed	SPCR1
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	Prairie Dropseed	SPHE1
POACEAE	Sporobolus neglectus Nash	Poverty Grass	SPNE1
POACEAE	Stipa comata Trin. & Rupr.	Needle-and-thread	STCO1

POACEAE	Stipa neomexicana (Thur.) Scribn.	New Mexico Feather Grass	STNE1
POACEAE	Stipa robusta (Vasey) Scribn.	Sleepy Grass	STRO1
POACEAE	Stipa spartea Trinius	Porcupine-grass	STSP1
POACEAE	Stipa viridula Trin.	Green Needlegrass	STVI1
POACEAE	Triticum aestivum L.	Wheat	TRAE1
POACEAE	X Agrohordeum macounii (Vasey) Lepage		AGMA1
POLEMONIACEAE	Collomia linearis Nutt.	Collomia	COLI1
POLEMONIACEAE	Gilia opthalmoides Brand. ssp. clokeyi (Mason) A. & V. Grant	Gilia	GIOP1
POLEMONIACEAE	Ipomopsis spicata (Nutt.) V. Grant ssp. spicata	Spike Gilia	IPSP1
POLEMONIACEAE	Microsteris gracilis (Hook.) Greene		MIGR1
POLEMONIACEAE	Navarretia minima Nutt.	Navarretia	NAMI1
POLYGONACEAE	Eriogonum alatum Torr.	Winged Eriogonum	ERAL1
POLYGONACEAE	Eriogonum effusum Nutt.	Spreading Wild Buckwheat	EREF1
POLYGONACEAE	Eriogonum jamesii Benth.	James' Wild Buckwheat	ERJA1
POLYGONACEAE	Eriogonum umbellatum Torr.	Sulphur Flower	ERUM1
POLYGONACEAE	Polygonum arenastrum Jord. ex Bor.	Knotweed	POAR1
POLYGONACEAE	Polygonum convolvulus L.	Wild Buckwheat	POCO2
POLYGONACEAE	Polygonum douglasii Greene	Knotweed	PODO1
POLYGONACEAE	Polygonum hydropiper L.	Water Pepper	POHY1
POLYGONACEAE	Polygonum lapathifolium L.	Pale Smartweed	POLA1
POLYGONACEAE	Polygonum pensylvanicum L.	Pennsylvania Smartweed	POPE1
POLYGONACEAE	Polygonum persicaria L.	Lady's Thumb	POPE2
POLYGONACEAE	Polygonum ramosissimum Michx.	Knotweed	PORA1
POLYGONACEAE	Polygonum sawatchense Small	Knotweed	POSA1
POLYGONACEAE	Rumex acetosella L.	Sheep Sorrel	RUAC1
POLYGONACEAE	Rumex crispus L.	Curly Dock	RUCR1
POLYGONACEAE	Rumex maritimus L.	Golden Dock	RUMA1
POLYGONACEAE	Rumex obtusifolius L.	Bitter Dock	RUOB1
POLYGONACEAE	Rumex salicifolius Weinm. ssp. triangulivalvis Danser	Willow Dock	RUSA1
POLYPODIACEAE	Cystopteris fragilis (L.) Bernh.	Fragile Fern	CYFR1
PORTULACACEAE	Claytonia rosea Rydb.	Spring Beauty	CLRO1
PORTULACACEAE	Portulaca oleracea L.	Common Purslane	POOL1
PORTULACACEAE	Talinum parviflorum Nutt.	Prairie Fameflower	TAPA1
POTAMOGETONACEAE	Potamogeton foliosus Raf.	Leafy Pondweed	POFO1
POTAMOGETONACEAE	Potamogeton natans L.	Floatingleaf Pondweed	PONA1
PRIMULACEAE	Androsace occidentalis Pursh.	Western Rock Jasmine	ANOC1

PRIMULACEAE	Dodecatheon pulchellum (Raf.) Merrill	Shooting Star	DOPU1
PRIMULACEAE	Lysimachia ciliata L.	Fringed Loostrife	LYCI1
RANUNCULACEAE	Anemone cylindrica A. Gray	Candle Anemone	ANCY1
RANUNCULACEAE	Anemone patens L.	Pasque-flower	ANPA2
RANUNCULACEAE	Clematis hirsutissima Pursh	Hairy Clematis	CLHI1
RANUNCULACEAE	Clematis ligusticifolia Nutt.	Western Clematis	CLLI1
RANUNCULACEAE	Delphinium nuttalianum Pritz. ex Walpers	Blue Larkspur	DENU1
RANUNCULACEAE	Delphinium virescens Nutt. ssp. penardii (Huth) Ewan	Prairie Larkspur	DEVI1
RANUNCULACEAE	Myosurus minimus L.	Mousetail	MYMI1
RANUNCULACEAE	Ranunculus macounii Britt.	Macoun's Buttercup	RAMA1
RANUNCULACEAE	Ranunculus scleratus L.	Cursed Crowfoot	RASC1
RANUNCULACEAE	Ranunculus trichophyllus Chaix	Hairy Leaf Buttercup	RATR1
RANUNCULACEAE	Thalictrum dasycarpum Fisch. & Ave-Lall	Purple Meadow Rue	THDA1
RHAMNACEAE	Ceanothus fendleri A. Gray	Buckbrush	CEFE1
RHAMNACEAE	Ceanothus herbaceus Raf. var. pubescens (T. & G.)	New Jersey Tea	CEHE1
ROSACEAE	Agrimonia striata Michx.	Striate Agrimony	AGST2
ROSACEAE	Amelanchier alnifolia Nutt.	Saskatoon Service-berry	AMAL1
ROSACEAE	Crataegus erythropoda Ashe	Hawthorne	CRER1
ROSACEAE	Crataegus succulenta Link var. occidentalis (Britton) E. J. Palm.	Hawthorn	CRSU1
ROSACEAE	Geum aleppicum Jacq.	Yellow Avens	GEAL1
ROSACEAE	Geum macrophyllum Willd.	Large-leaved Avens	GEMA1
ROSACEAE	Physocarpus monogynus (Torr.) Coult.	Mountain Ninebark	PHMO1
ROSACEAE	Physocarpus opulifolius (L.) Raf.	Ninebark	PHOP1
ROSACEAE	Potentilla arguta Pursh	Tall Cinquefoil	POAR2
ROSACEAE	Potentilla fissa Nutt.	Cinquefoil	POFI1
ROSACEAE	Potentilla gracilis Dougl. ex Hook. var. glabrata (Lehm.) C. L. Hitchc.	Cinquefoil	POGR1
ROSACEAE	Potentilla hippiana Lehm.	Wooly Cinquefoil	POHI1
ROSACEAE	Potentilla norvegica L.	Norwegian Cinquefoil	PONO1
ROSACEAE	Potentilla paradoxa Nutt.	Bushy Cinquefoil	POPA2
ROSACEAE	Potentilla pensylvanica L.	Cinquefoil	POPE4
ROSACEAE	Potentilla pulcherrima x hippiana	Hybrid Cinquefoil	POPU1
ROSACEAE	Potentilla rivalis Nutt.	Cinquefoil	PORI1
ROSACEAE	Prunus americana Marsh.	Wild Plum	PRAM1
ROSACEAE	Prunus pumila L. var. besseyi (Bailey) Gl.	Sand Cherry	PRPU1
ROSACEAE	Prunus virginiana L. var. melanocarpa (A. Nels.)	Chokecherry	PRVI1

	Sarg.		
ROSACEAE	Pyrus malus L.	Apple	PYMA1
ROSACEAE	Rosa acicularis Lindl.	Prickly Wild Rose	ROAC1
ROSACEAE	Rosa arkansana Porter	Prairie Wild Rose	ROAR1
ROSACEAE	Rosa woodsii Lindl.	Western Wild Rose	ROWO1
ROSACEAE	Rubus deliciosus Torr.	Boulder Raspberry	RUDE1
ROSACEAE	Rubus idaeus L. ssp. sachalinensis (Levl.) Focke var. sachalinensis	Raspberry	RUID1
ROSACEAE	Sanguisorba minor Scop.	Burnet	SAMI1
ROSACEAE	Sorbus scopulina Greene	Mountain Ash	SOSC1
RUBIACEAE	Galium aparine L.	Catchweed Bedstraw	GAAP1
RUBIACEAE	Galium septentrionale Roemer & Schultes	Northern Bedstraw	GASE1
SALICACEAE	Populus alba L.	Silver Poplar	POAL1
SALICACEAE	Populus angustifolia James	Narrow-leaved Cottonwood	POAN3
SALICACEAE	Populus deltoides Marsh. ssp. monilifera (Ait.) Eckenw.	Plains Cottonwood	PODE1
SALICACEAE	Populus x acuminata Rydb.	Lanceleaf Cottonwood	POAC1
SALICACEAE	Salix amygdaloides Anderss.	Peach-leaf Willow	SAAM1
SALICACEAE	Salix exigua Nutt. ssp. exigua	Coyote Willow	SAEX2
SALICACEAE	Salix exigua Nutt. ssp. interior (Rowlee) Cronq.	Sandbar Willow	SAEX1
SALICACEAE	Salix fragilis L.	Crack Willow	SAFR1
SALICACEAE	Salix irrorata Andersson		SAIR1
SALICACEAE	Salix lutea Nutt.	Yellow Willow	SALU1
SANTALACEAE	Comandra umbellata (L.) Nutt.	Bastard Toadflax	COUM1
SAXIFRAGACEAE	Heuchera parvifolia Nutt. ex T.& G.	Alumroot	HEPA1
SAXIFRAGACEAE	Saxifraga rhomoidea Greene	Diamondleaf Saxifrage	SARH1
SCROPHULARIACEAE	Castilleja integra A. Gray	Orange Paintbrush	CAIN2
SCROPHULARIACEAE	Castilleja sessiliflora Pursh.	Downy Paintbrush	CASE3
SCROPHULARIACEAE	Collinsia parviflora Doug. ex Lindl.	Blue Lips	COPA1
SCROPHULARIACEAE	Gratiola neglecta Torr.	Hedge Hyssop	GRNE1
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	Toadflax	LIDA1
SCROPHULARIACEAE	Limosella aquatica L.	Mudwort	LIAQ1
SCROPHULARIACEAE	Linaria vulgaris Hill	Butter-and-eggs	LIVU1
SCROPHULARIACEAE	Mimulus floribundus Dougl. ex Lindl.	Monkey Flower	MIFL1
SCROPHULARIACEAE	Mimulus glabratus H. B. K. var. fremontii (Benth.) A. L. Grant	Roundleaf Monkey-flower	MIGL1
SCROPHULARIACEAE	Penstemon albidus Nutt.	White Beardtongue	PEAL1
SCROPHULARIACEAE	Penstemon secundiflorus Benth.	Penstemon	PESE1
SCROPHULARIACEAE	Penstemon strictus Bentham in De Candolle	Rocky Mountain Penstemon	PEST1

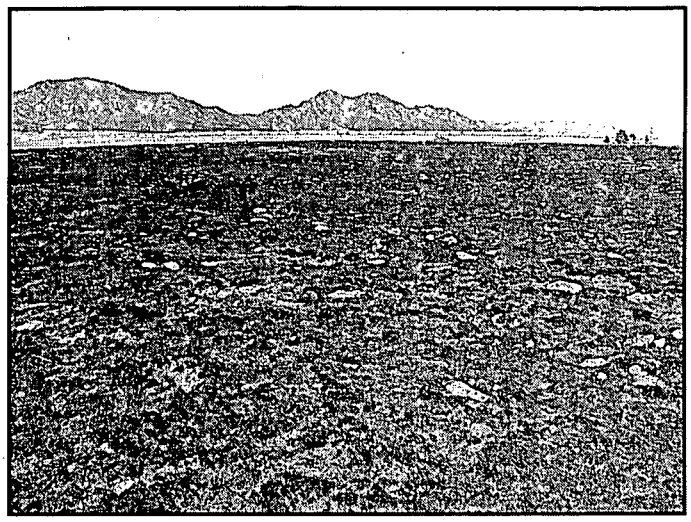
SCROPHULARIACEAE	Penstemon virens Penn.	Slender Penstemon	PEVI1
SCROPHULARIACEAE	Penstemon virgatus Gray ssp. asa-grayi Crosswhite	Penstemon	PEVI2
SCROPHULARIACEAE	Scrophularia lanceolata Pursh.	Figwort	SCLA2
SCROPHULARIACEAE	Verbascum blattaria L.	Moth Mullein	VEBL1
SCROPHULARIACEAE	Verbascum thapsus L.	Common Mullein	VETH1
SCROPHULARIACEAE	Veronica americana (Raf.) Schwein. ex Benth.	Brooklime Speedwell	VEAM1
SCROPHULARIACEAE	Veronica anagallis-aquatica L.	Water Speedwell	VEAN1
SCROPHULARIACEAE	Veronica catentata Penn.	Catenate Ironweed	VECA1
SCROPHULARIACEAE	Veronica peregrina L. var. xalapensis (H. B. K.) St. John & Warren	Purslane Speedwell	VEPE1
SELAGINELLACEAE	Selaginella densa Rydb.	Spikemoss	SEDE1
SMILACACEAE	Smilax herbacea L. var. lasioneura (Small) Rydb..	Carrion Flower	SMHE1
SOLANACEAE	Physalis heterophylla Nees	Clammy Ground cherry	PHHE2
SOLANACEAE	Physalis virginiana P. Mill.	Virginia Ground Cherry	PHVI2
SOLANACEAE	Quincula lobata (Torr.) Raf.	Purple Ground Cherry	QULO1
SOLANACEAE	Solanum rostratum Dun.	Buffalo Bur	SORO1
SOLANACEAE	Solanum triflorum Nutt.	Cut-leaved Nightshade	SOTR1
TAMARICACEAE	Tamarix ramosissima Ledeb.	Salt Cedar	TARA1
TYPHACEAE	Typha angustifolia L.	Narrow-leaved Cattail	TYAN1
TYPHACEAE	Typha latifolia L.	Common Cattail	TYLA1
ULMACEAE	Ulmus pumila L.	Siberian Elm	ULPU1
URTICACEAE	Parietaria pensylvanica Muhl. ex Willd.	Pennsylvania Pellitory	PAPE1
URTICACEAE	Urtica dioica L. ssp. gracilis (Ait.) Seland.	Stinging Nettle	URDI1
VERBENACEAE	Lippia cuneifolia (Torr.) Steud.	Fog-fruit	LICU1
VERBENACEAE	Verbena bracteata Lag. & Rodr.	Prostrate Vervain	VEBR1
VERBENACEAE	Verbena hastata L.	Blue Vervain	VEHA1
VIOLACEAE	Hybanthus verticillatus (Ort.) Baill.	Nodding Green Violet	HYVE1
VIOLACEAE	Viola nuttallii Pursh.	Yellow Prairie Violet	VINU1
VIOLACEAE	Viola rydbergii Greene	Rydberg's Violet	VIRY1
VIOLACEAE	Viola scopulorum (Gray) Greene	Colorado Violet	VISC1
VIOLACEAE	Viola sororia Willd.	Northern Bog Violet	VISO1
VITACEAE	Vitis riparia Michx.	River-bank Grape	VIRI1
ZYGOPHYLLACEAE	Tribulus terrestris L.	Puncture Vine	TRTE1

Appendix D

This appendix contains the vegetation photo monitoring results the prescribed burn conducted at the Rocky Flats Environmental Technology Site in April 2000. This appendix is part of the 2000 Annual Vegetation Report for the Rocky Flats Environmental Technology Site. To view these results simply click on the selection below.

2000 Prescribed Burn Photo Monitoring Results

April 6, 2000 Prescribed Burn at the Rocky Flats Environmental Technology Site



On April 6, 2000, a prescribed burn (test burn) was conducted on the xeric tallgrass prairie at the Rocky Flats Environmental Technology Site (Site) by the U.S. Forest Service. Photographic documentation was conducted of the prescribed burn itself and to document visually the recovery of the vegetation in the burn area. The photo monitoring results incorporate three types of views: landscape, transect, and quadrat. Landscape views were taken from various locations around the perimeter and in the center of the burn area. Transect views were taken at the vegetation monitoring transects to compliment quantitative vegetation data. Quadrat views were taken of the ground's surface and later used to estimate total vegetation cover. Additionally, photos from the day of the prescribed burn are also available for viewing. Click on one of the choices below to view the photographs in that category.

Prescribed Burn Photos

Landscape Time-Series Photos

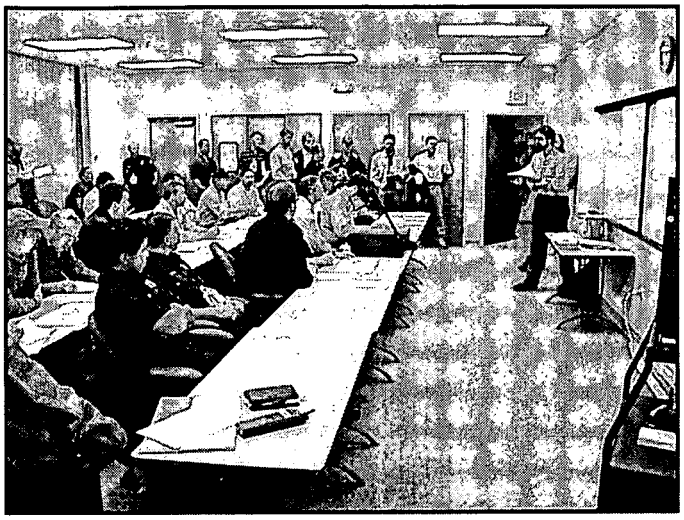
Transect Time-Series Photos

Quadrat Time-Series Photos

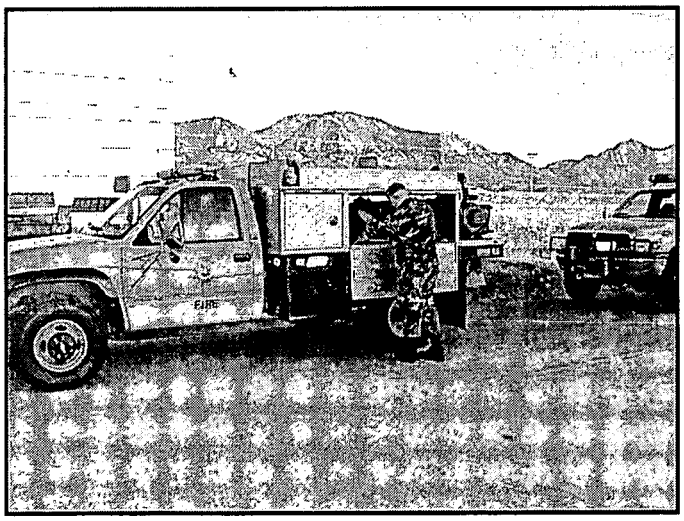
Return Home

Prescribed Burn For Xeric Tallgrass Prairie Resource Management at Rocky Flats Environmental Technology Site

On April 6, 2000, the U.S. Forest Service conducted a prescribed burn (test burn) on the xeric tallgrass prairie at the Rocky Flats Environmental Technology Site. The objectives of the fire were to reduce the high amounts of plant litter (a fuel source for potential wildfires) and restore the natural process and function of fire to the grassland ecosystem at the Site in order to enhance conditions for the native plants that are fire adapted. The photographs below document some of the pre-burn and actual burn activities during the day. Click on the photographs to view the pictures full-size.



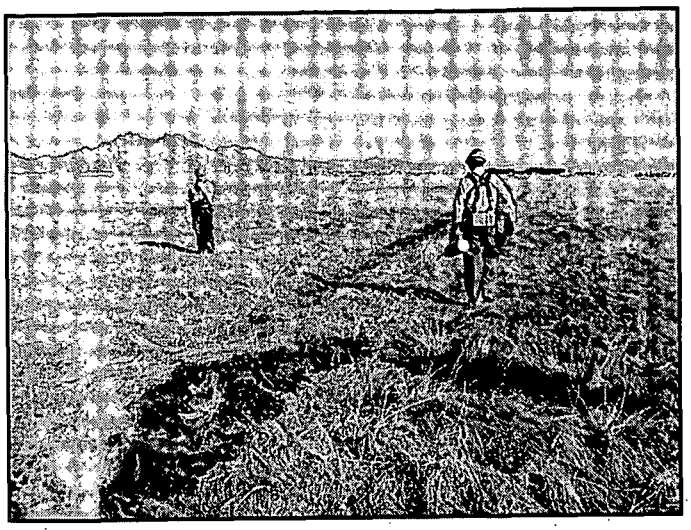
Forest service personnel discussed how the burn would be conducted at the pre-evolution meeting prior to going to the field to conduct the burn. Both on-Site and off-Site personnel were involved in the briefing.



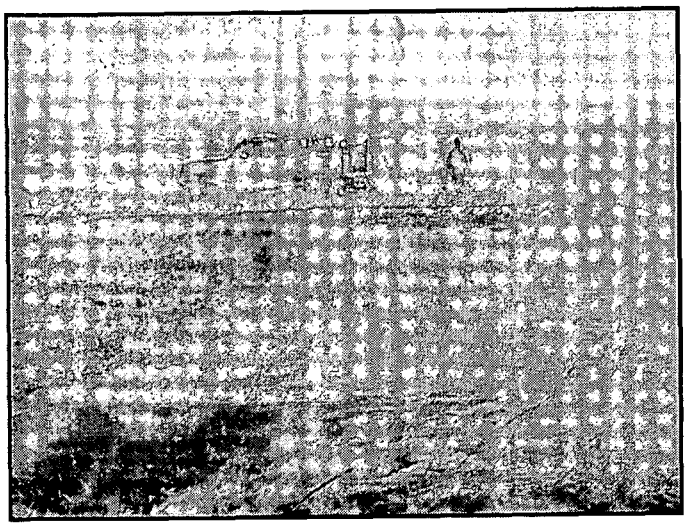
In keeping with Site security policies, each of the Forest Service vehicles had to be searched prior to being allowed on Site.

Once in the field final assignments were given to firefighters. John Rampe (in the white hard hat), DOE ecologist, listens to final preparations and then provided the final signature authorizing the Forest Service to begin the prescribed burn.

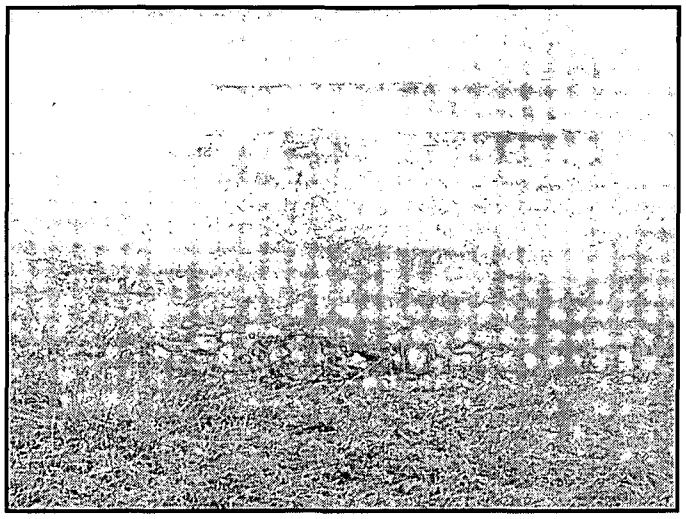
The initial step prior to setting the fire was to make sure the boundary of the fire was well defined and protected. Roads surrounded the burn area on the north, south, and west sides and served as good boundaries and firebreaks. To the east however, no roads were present. Firefighters put down a wetline and then a blackline to prevent the fire from escaping to the east. The firefighters here are putting down the wetline by spraying water along the entire eastern boundary.



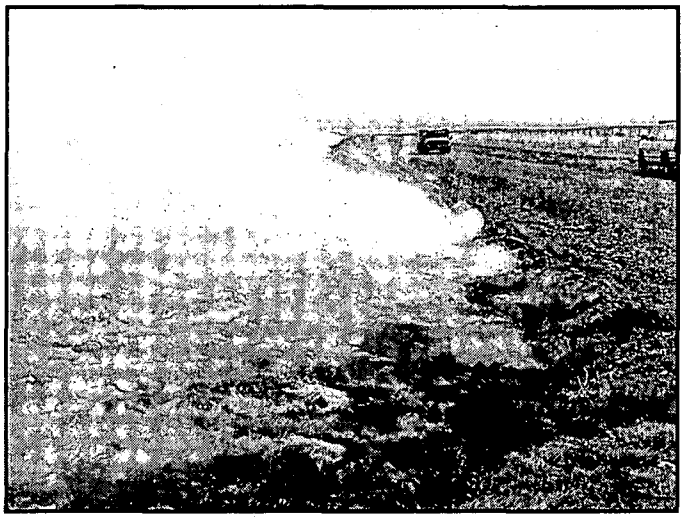
With the wetline in place, drip torches were used to create a blackline (an area of burned vegetation) along the entire eastern boundary of the burn area. The blackline then served as the firebreak along the eastern boundary of the burn area.



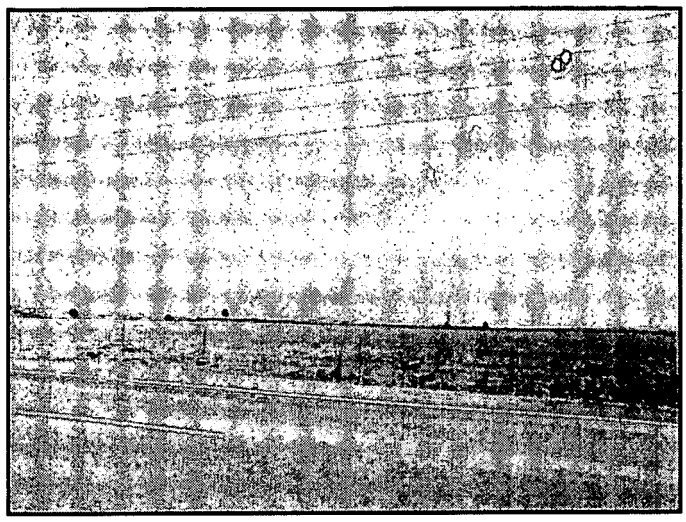
Firefighters continued to establish the eastern boundary along the blackline (in the background) while beginning to establish the southeastern boundary along the south road (seen in the foreground).



Once the blackline was established sufficiently along the eastern boundary of the burn area, the fire was allowed to begin burning across the prairie. As seen here, the fire crept across the prairie in fingers burning the dead plant litter and recylcing the nutrients for new plant growth. Flames lengths were never much more than 1 or 2 feet in height.

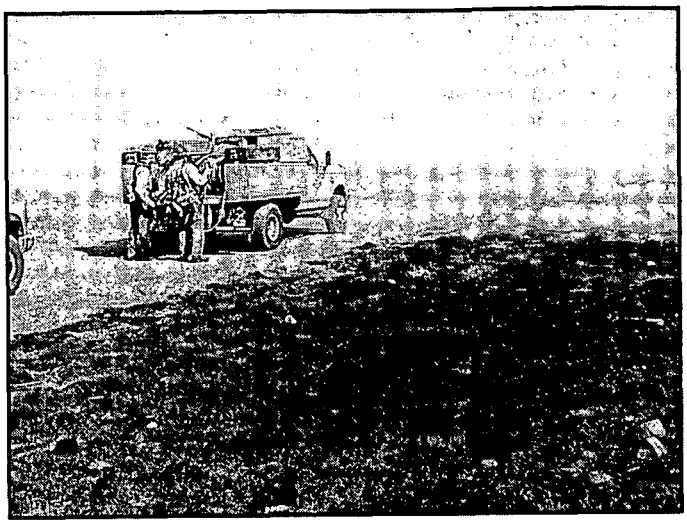


With the fire under control, the entire south boundary was set ablaze and the fire was allowed to burn across to the north boundary. Meanwhile Forest Service personnel patrolled the burn area boundaries to make sure no fire escaped beyond the burn area.



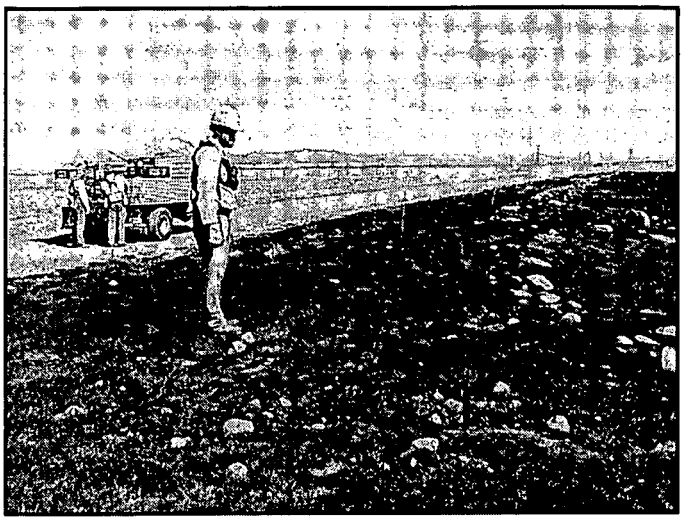
As seen from a distance off-Site, the smoke plume rose into the sky and spread to the northwest. This photograph was taken from Highway 93 looking to the northeast.

As the fire moved across the prairie to the north, firefighters walked into the blackened areas to evaluate the effectiveness of the fire.



As the fire reached the western boundary firefighters had their vehicles positioned with hoses ready to control any problems. When the fire stopped at the road as planned and they put packed up and put away their equipment.

As the smoke began to clear the success of the fire was apparent by the nearly solid blackened earth. In the distance the buildings in the Industrial Area slowly came into view.

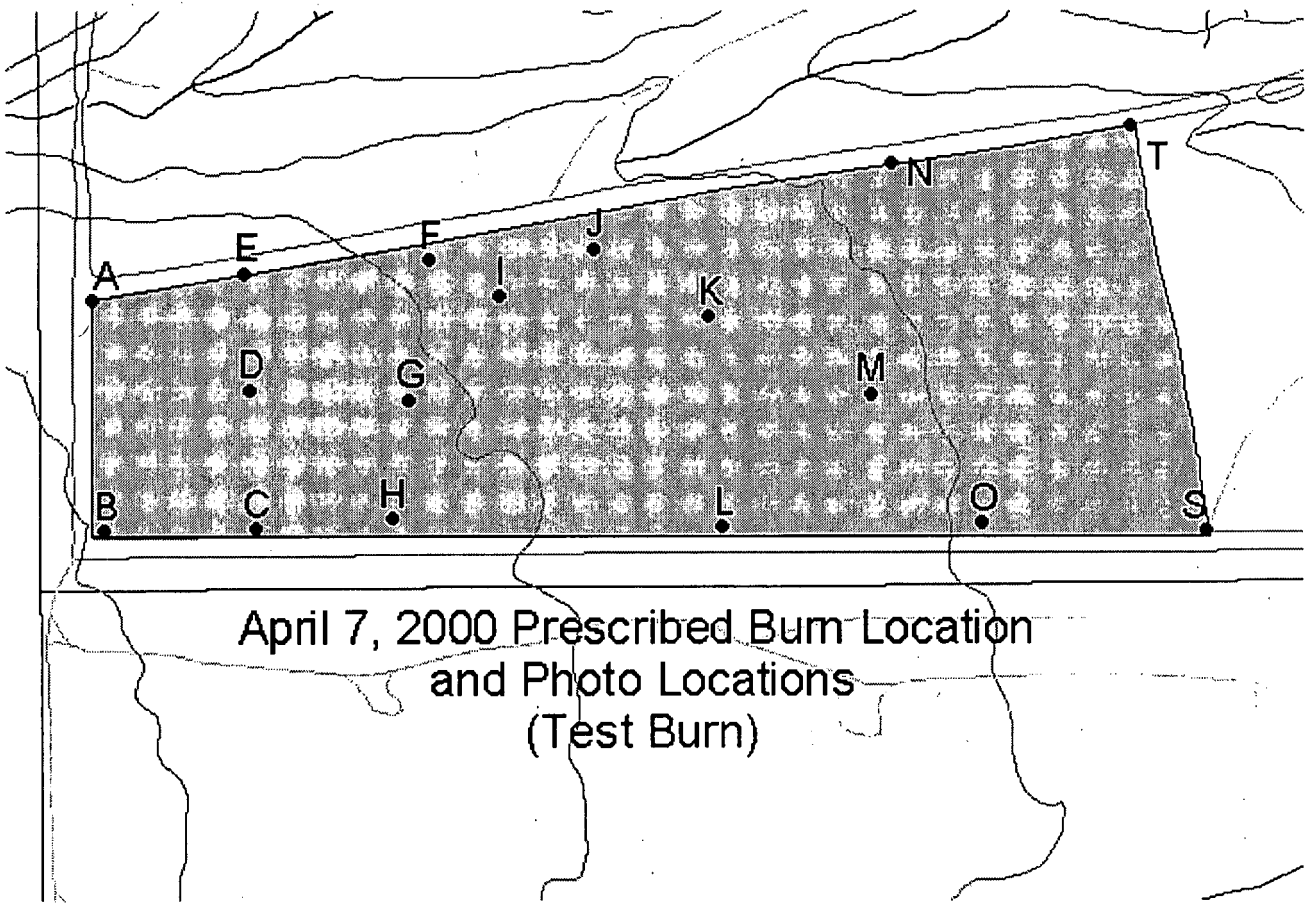


With the smoke cleared, firefighters evaluated their efforts and the prescribed burn was declared a success. Both pre- and post-burn monitoring of the vegetation in the burn area was conducted throughout 1999 and 2000 to determine if the prescribed burn objectives were met. Results of the monitoring efforts are available elsewhere in this annual report. Click here to view some of the photographic monitoring results.

Return Home

Prescribed Burn Landscape Photographic Monitoring Results

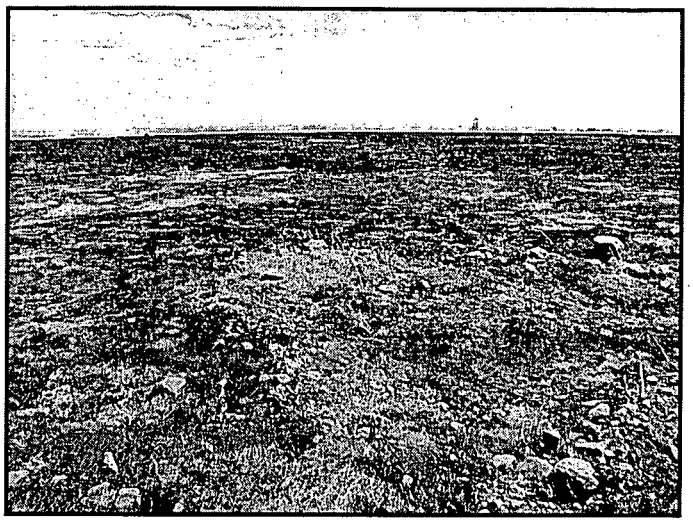
To view a time-series of photographs taken before and after the prescribed burn throughout the growing season during 2000 click on the photo points on the map below.



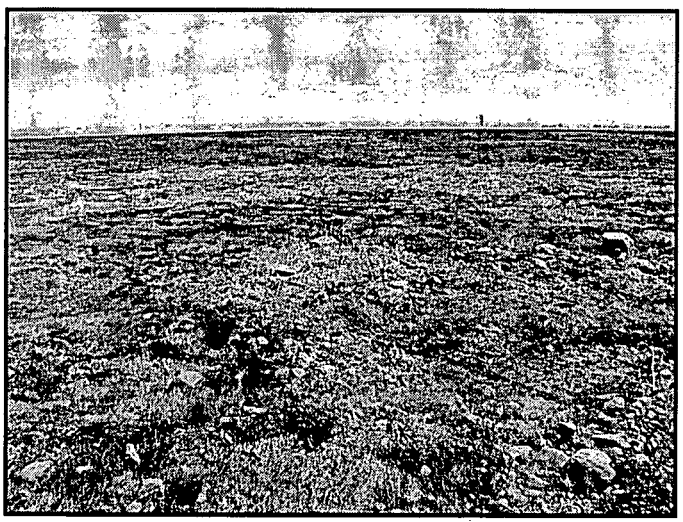
Prescribed Burn Photo Point A

Looking Southeast

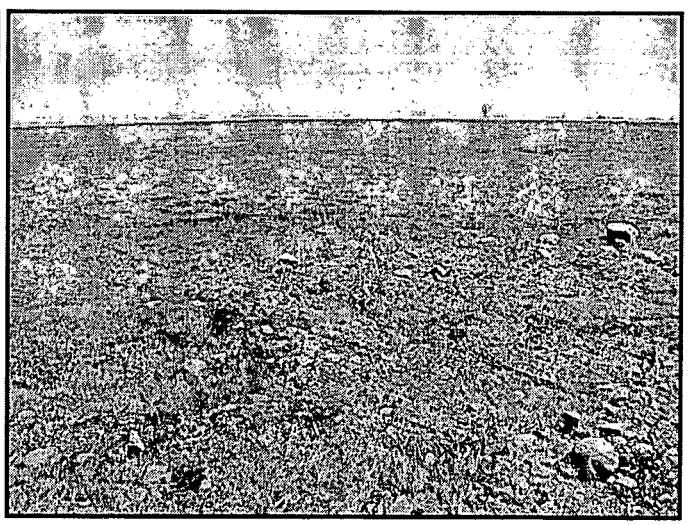
3/24/00



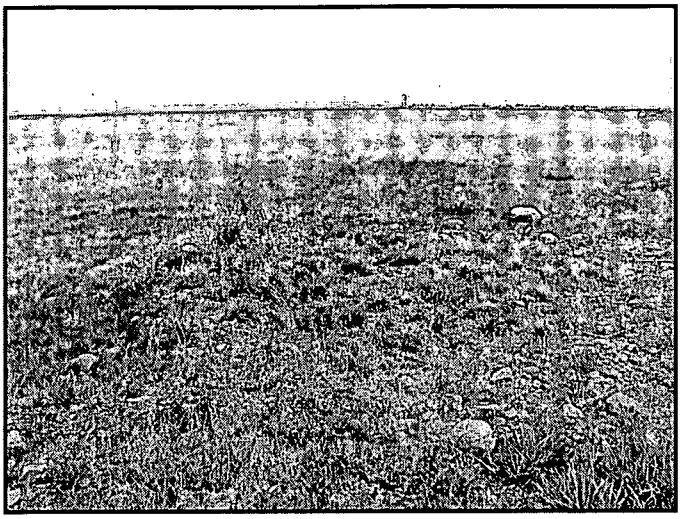
4/7/00



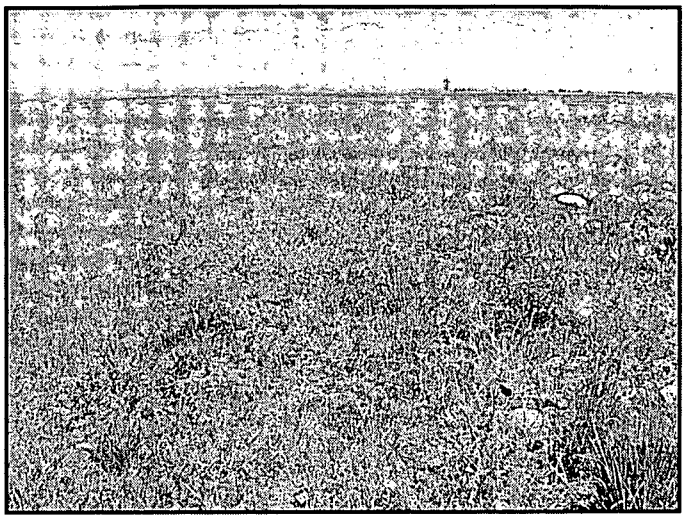
4/17/00



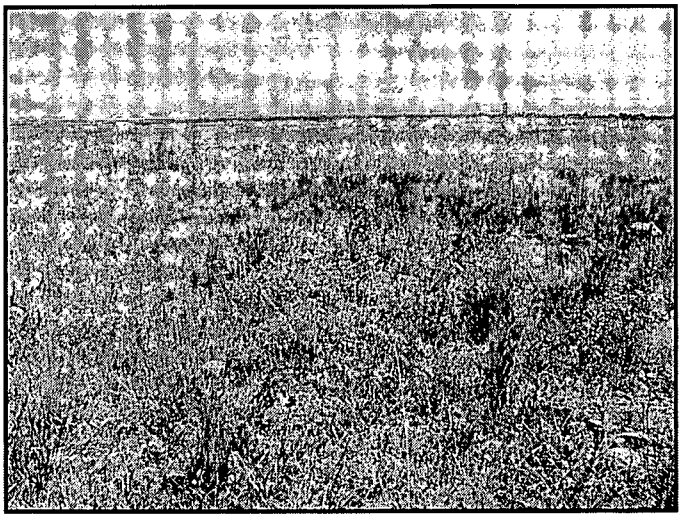
4/27/00



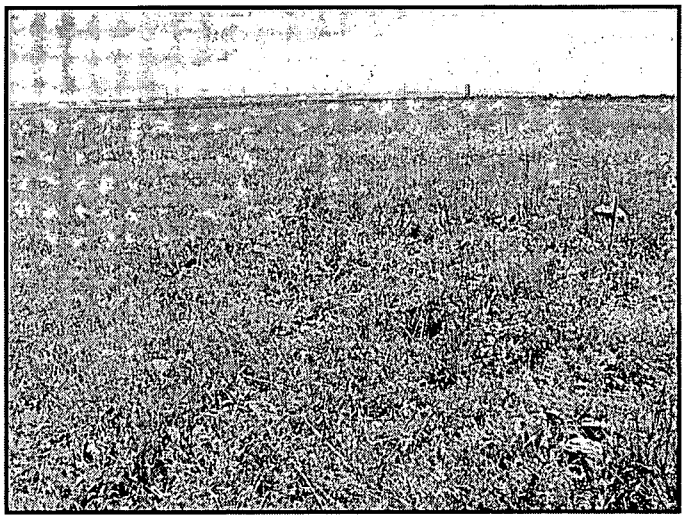
5/22/00



7/25/00



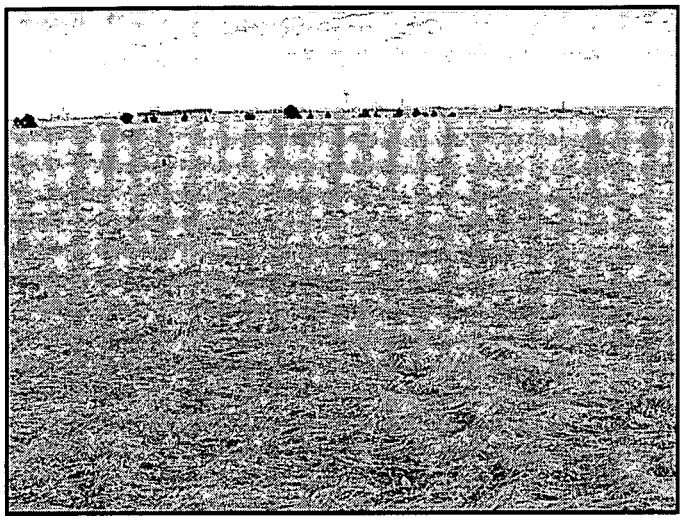
8/10/00



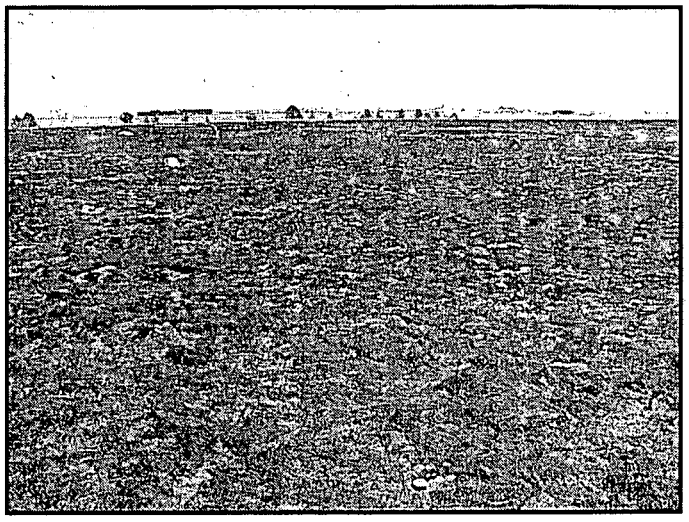
9/27/00

Prescribed Burn Photo Point B

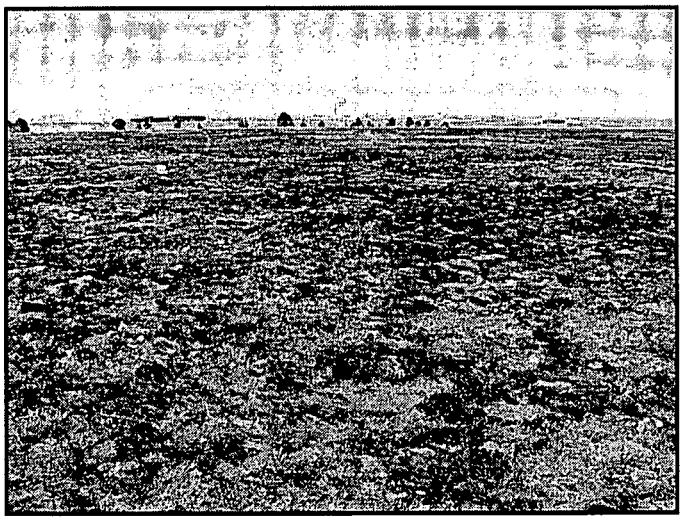
Looking Northeast



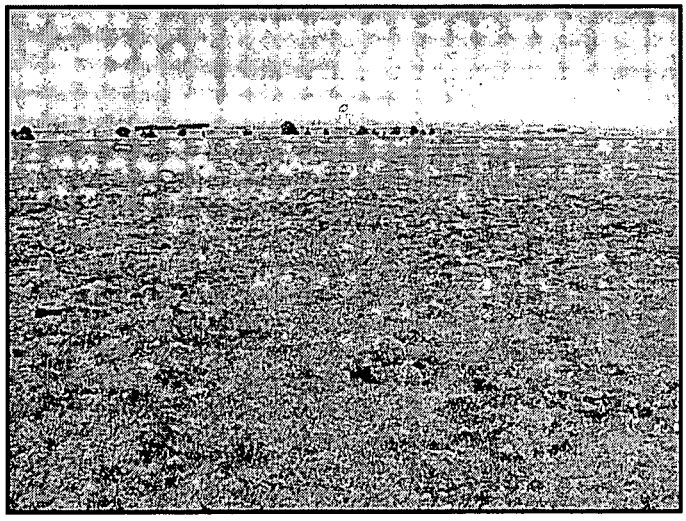
3/24/00



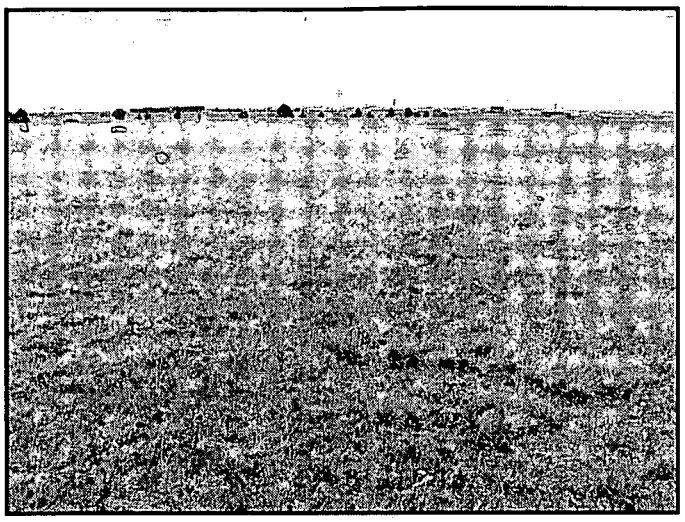
4/7/00



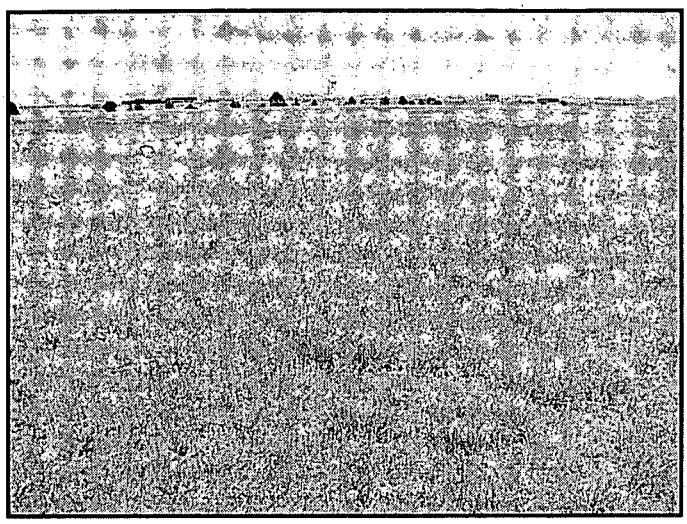
4/17/00



4/27/00

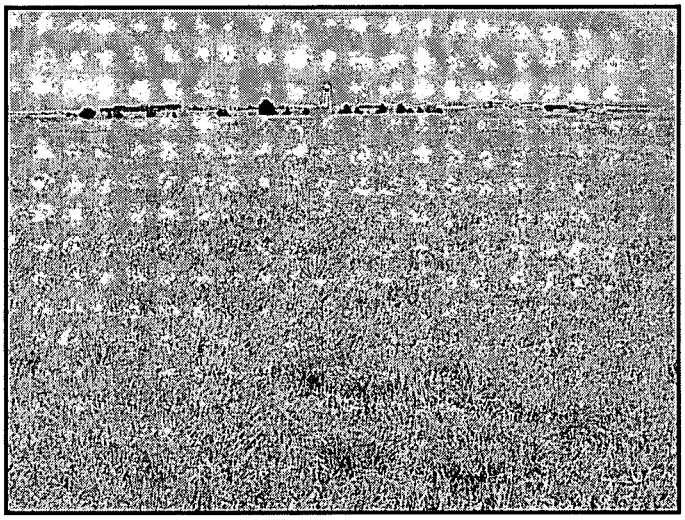


5/22/00



7/5/00

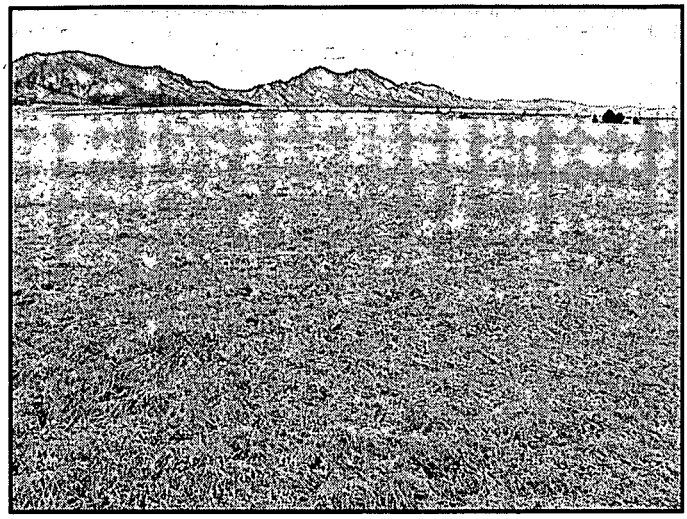
8/10/00



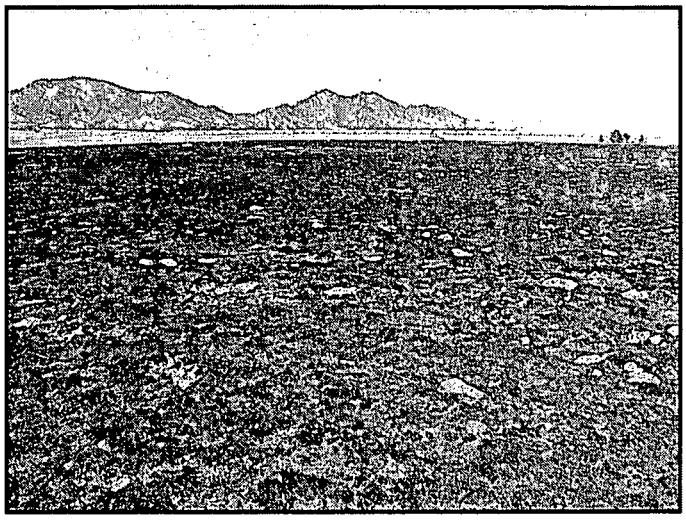
9/27/00

Prescribed Burn Photo Point C

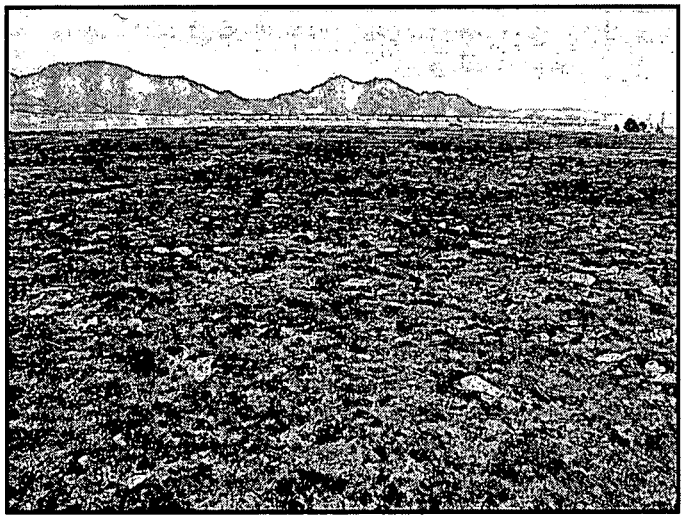
Looking Northwest



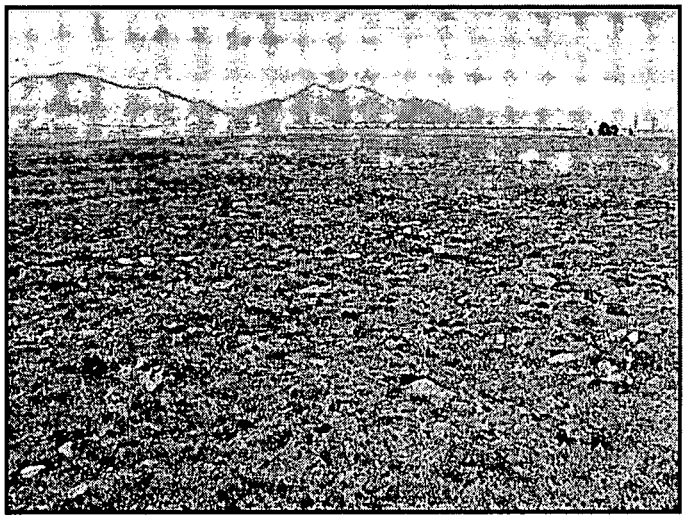
3/24/00



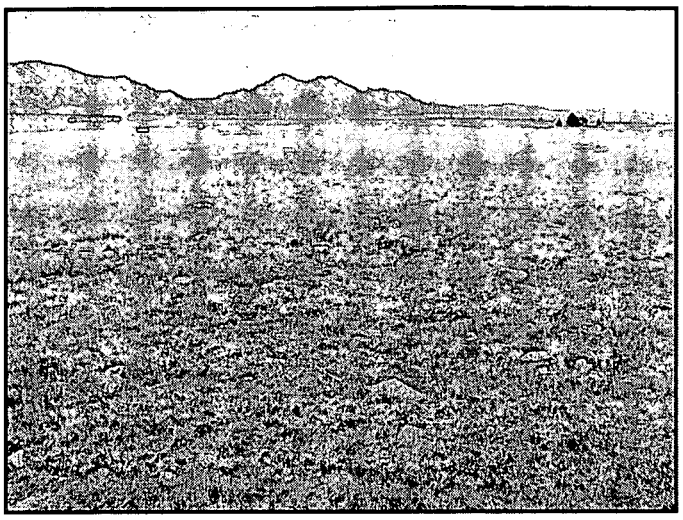
4/7/00



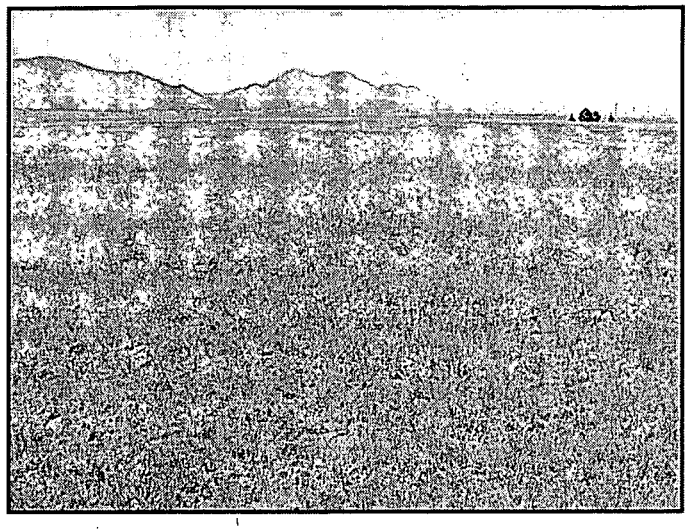
4/17/00



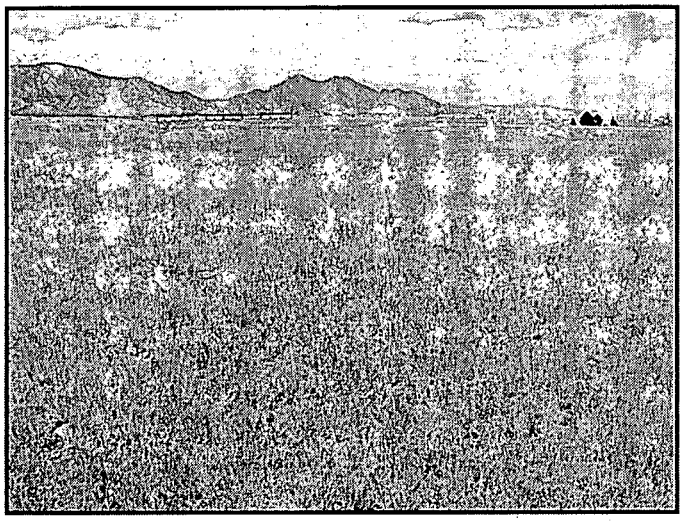
4/27/00



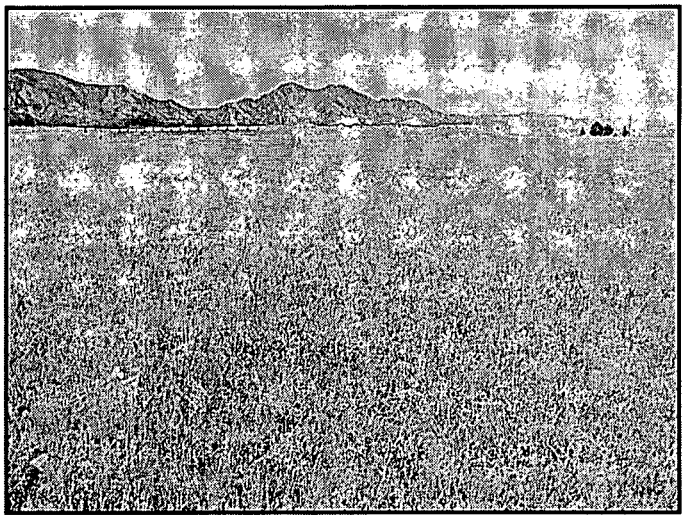
5/22/00



7/5/00



8/10/00

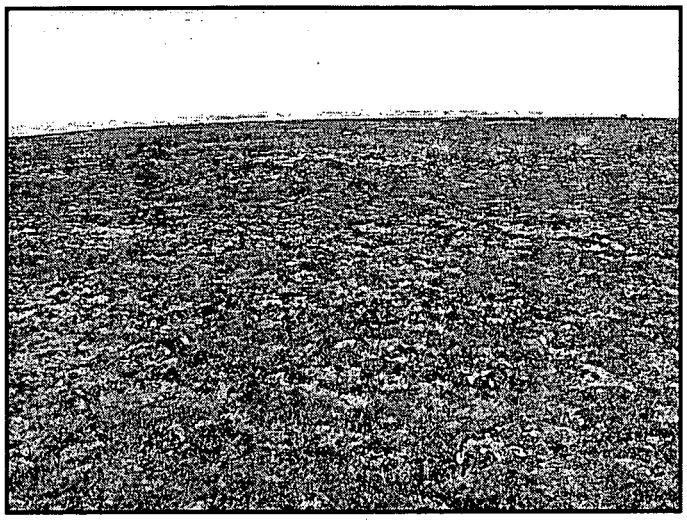


9/27/00

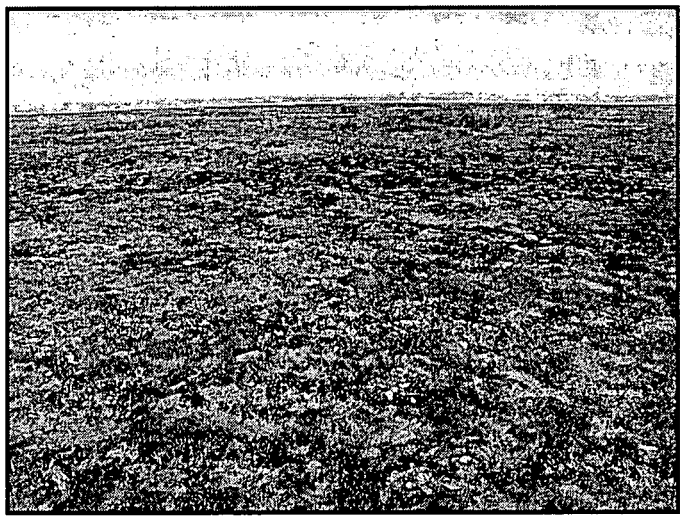
Prescribed Burn Photo Point D

Looking East

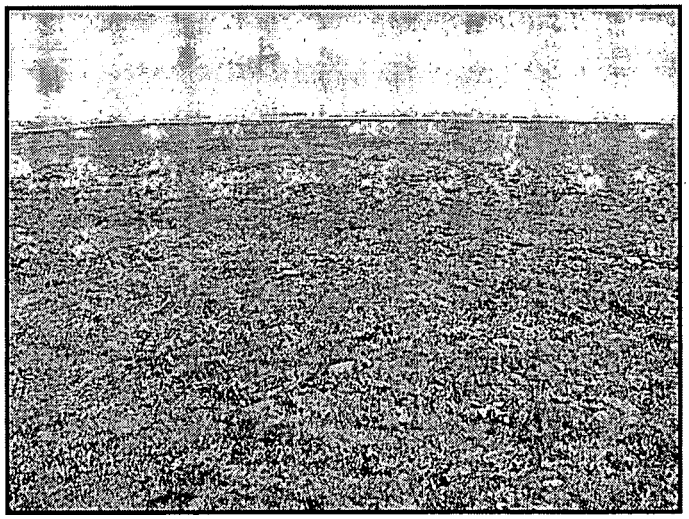
3/24/00



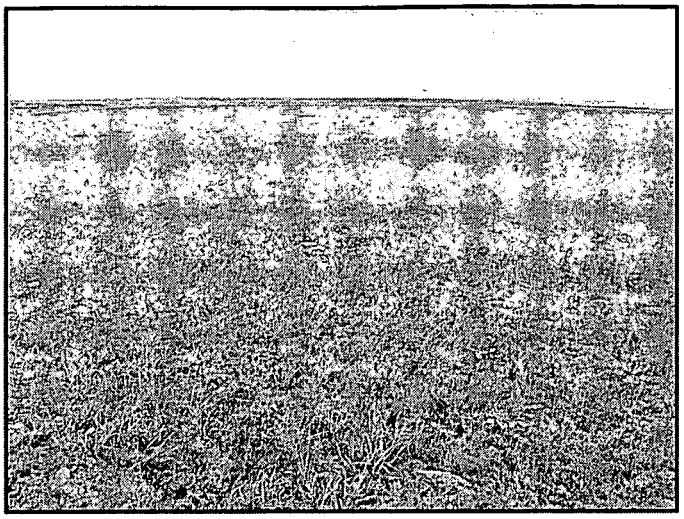
4/7/00



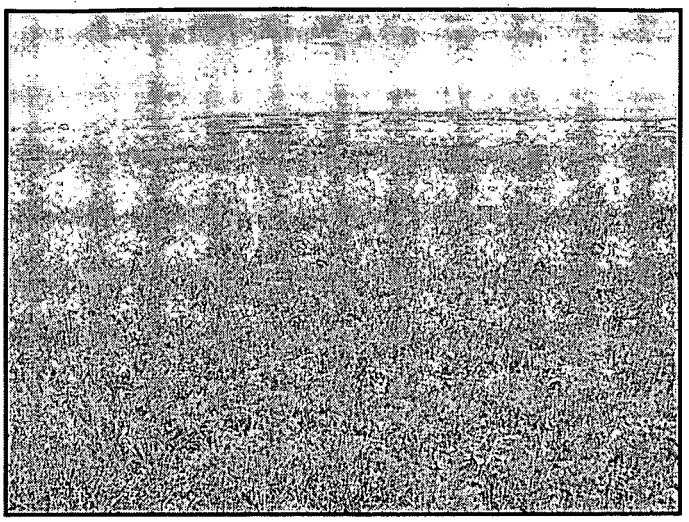
4/17/00



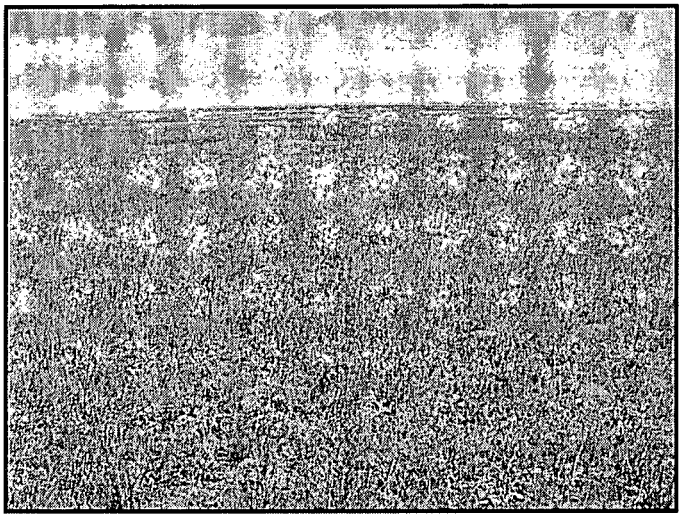
4/27/00



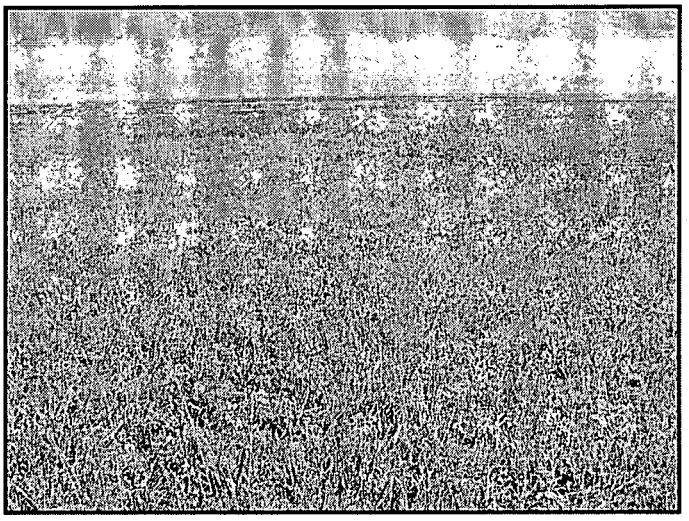
5/22/00



7/5/00



8/10/00

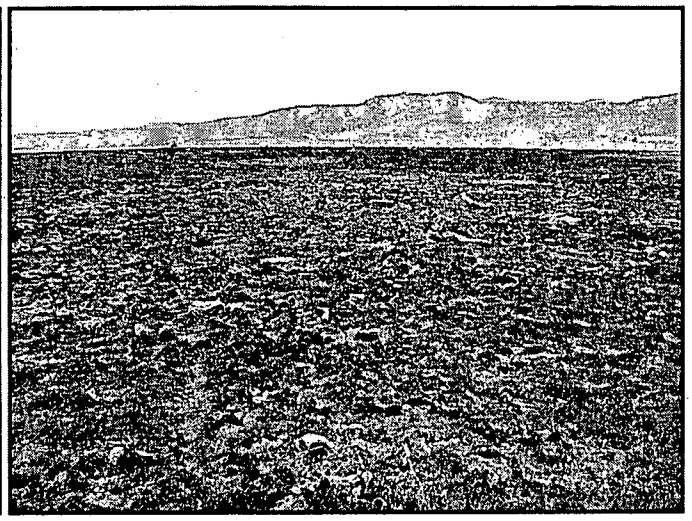


9/27/00

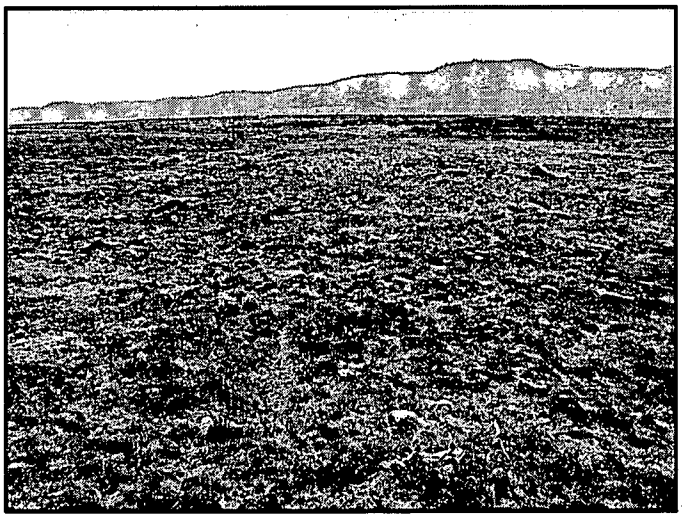
Prescribed Burn Photo Point E

Looking Southwest

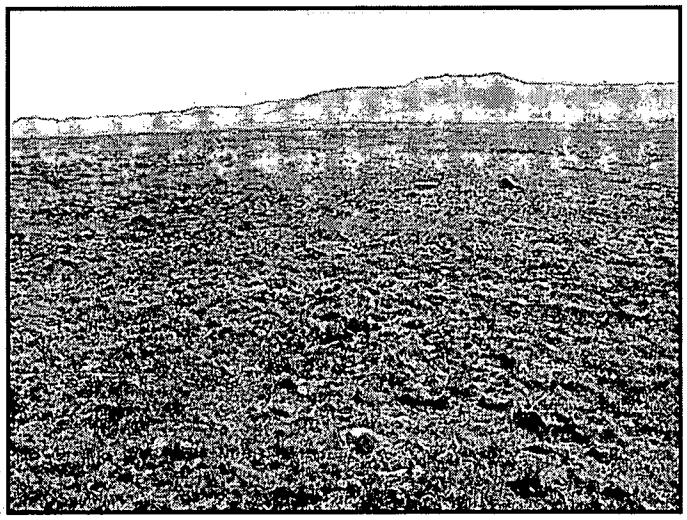
3/24/00



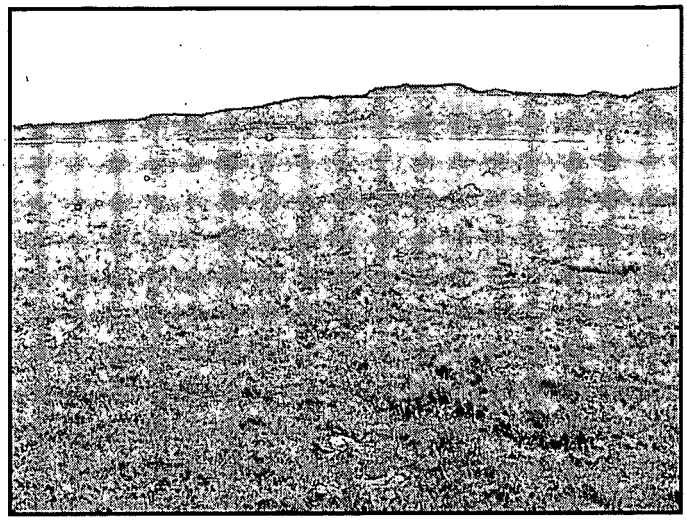
4/7/00



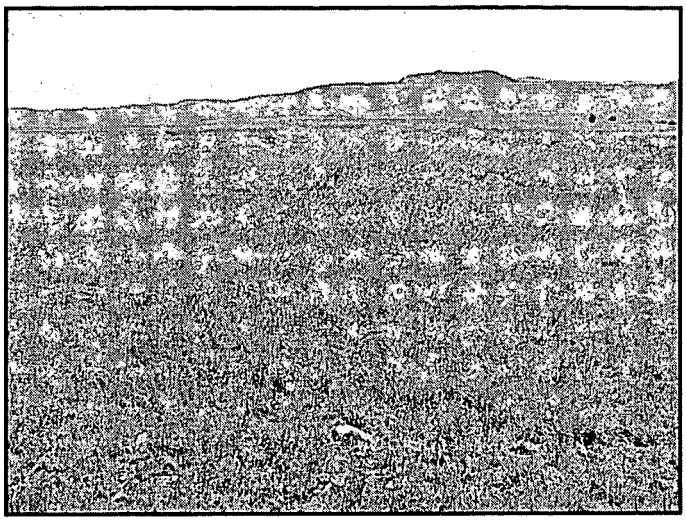
4/17/00



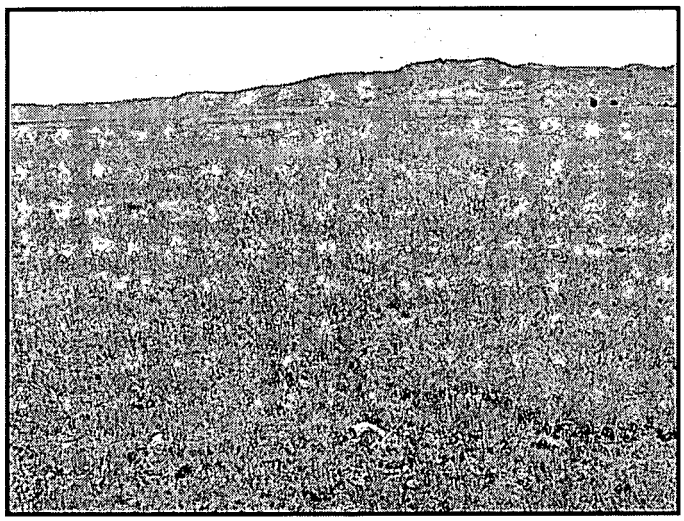
4/27/00



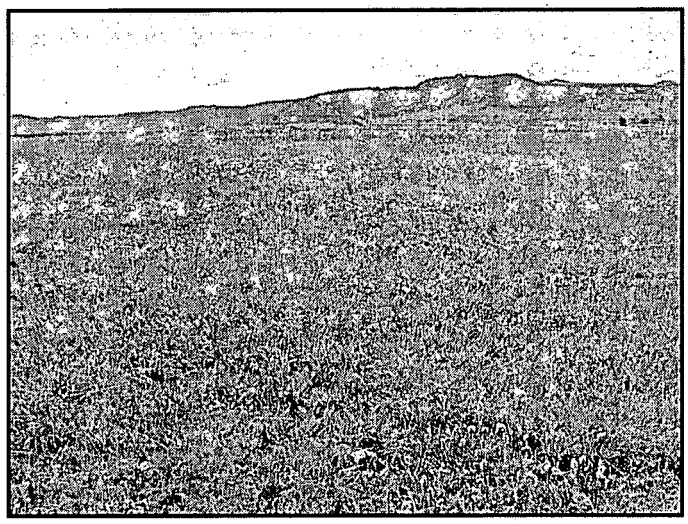
5/22/00



7/5/00



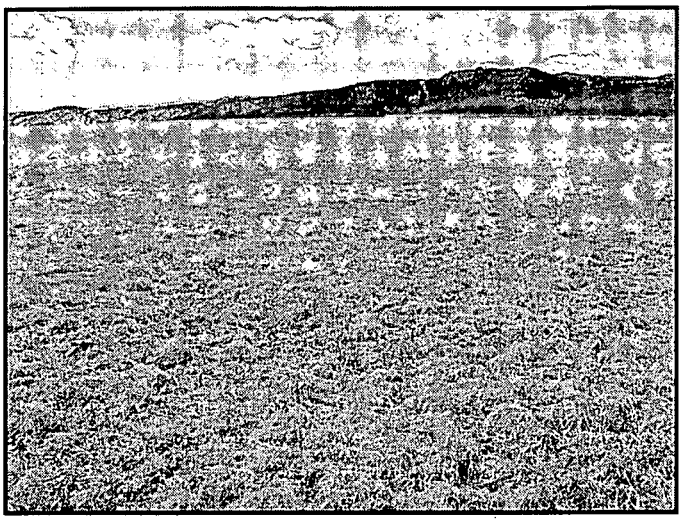
8/10/00



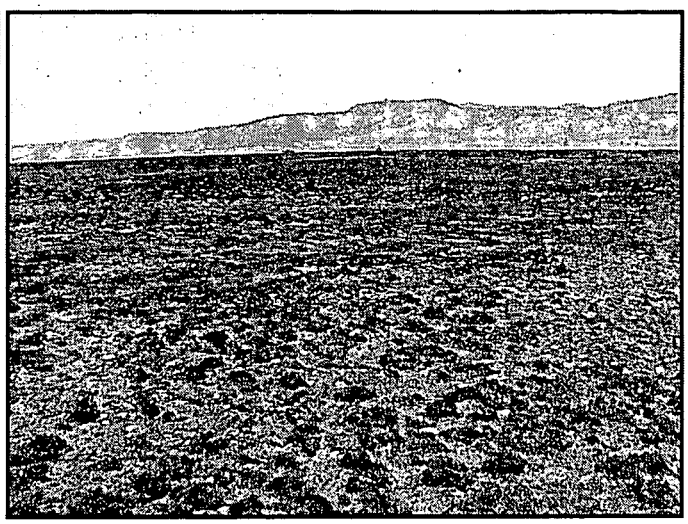
9/27/00

Prescribed Burn Photo Point F

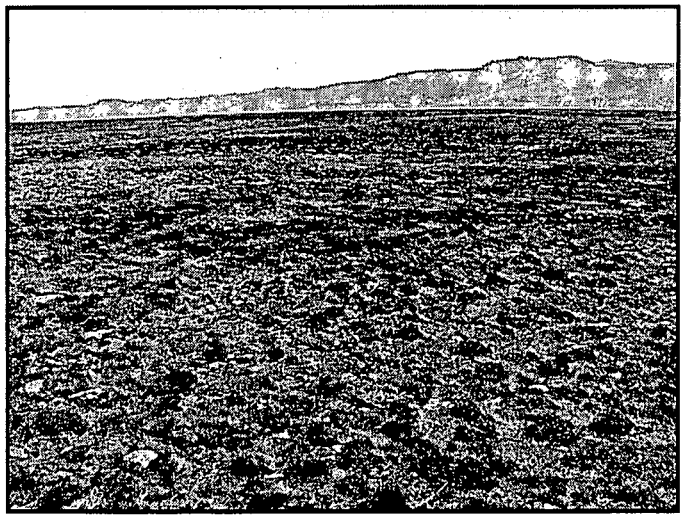
Looking Southwest



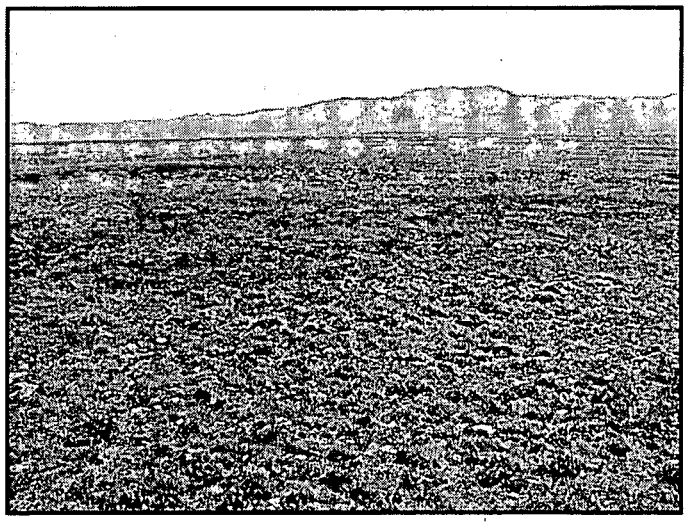
3/24/00



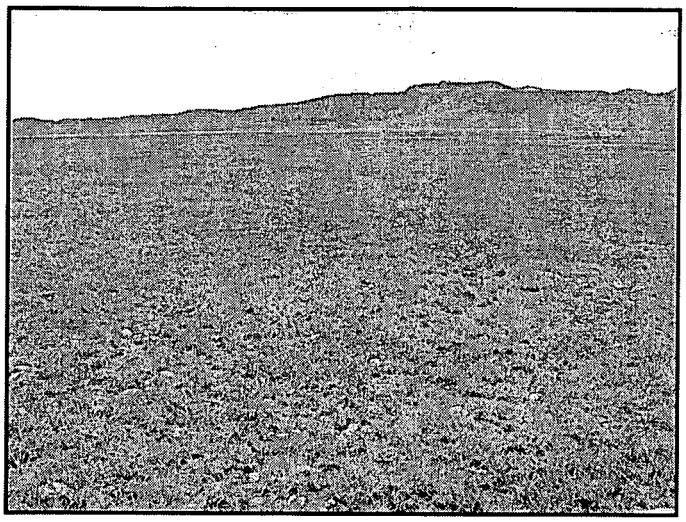
4/7/00



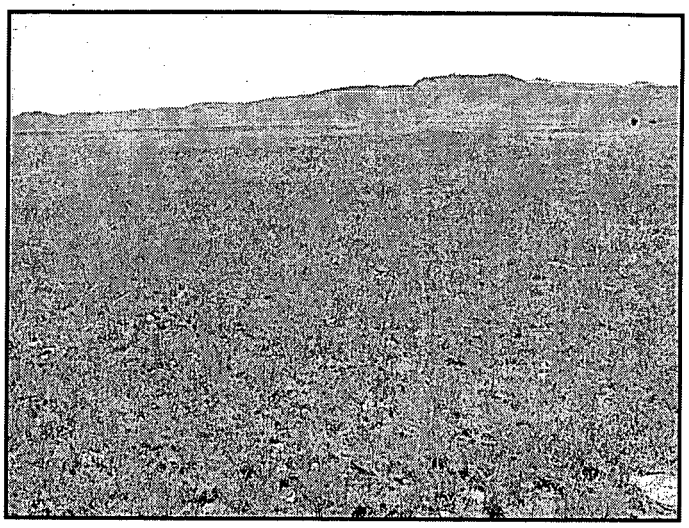
4/17/00



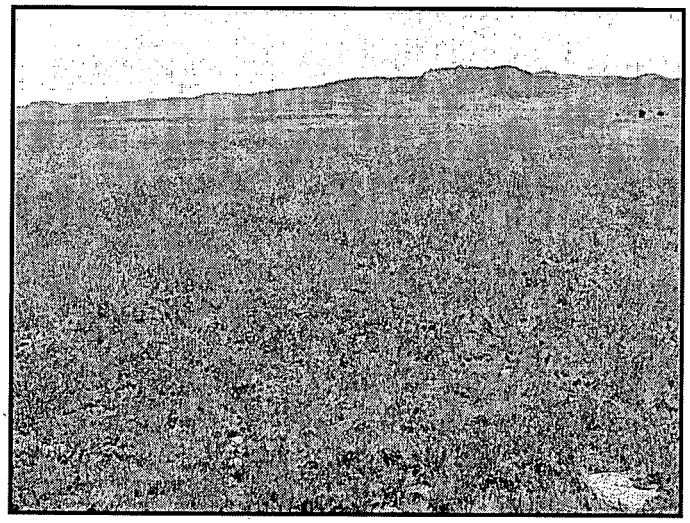
4/27/00



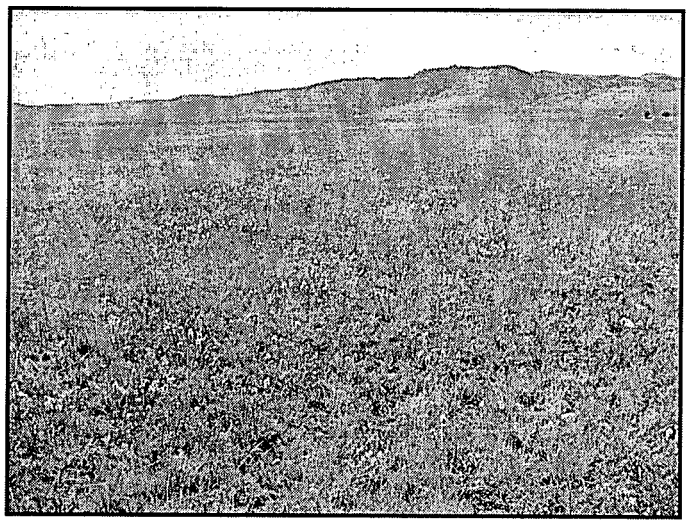
5/22/00



7/5/00



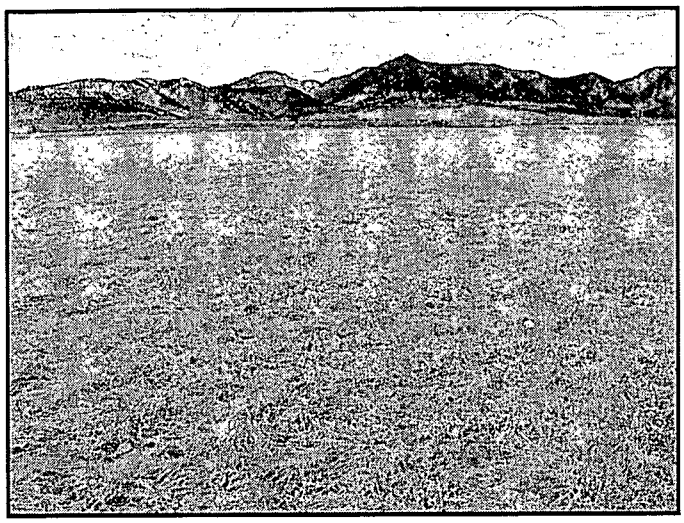
8/10/00



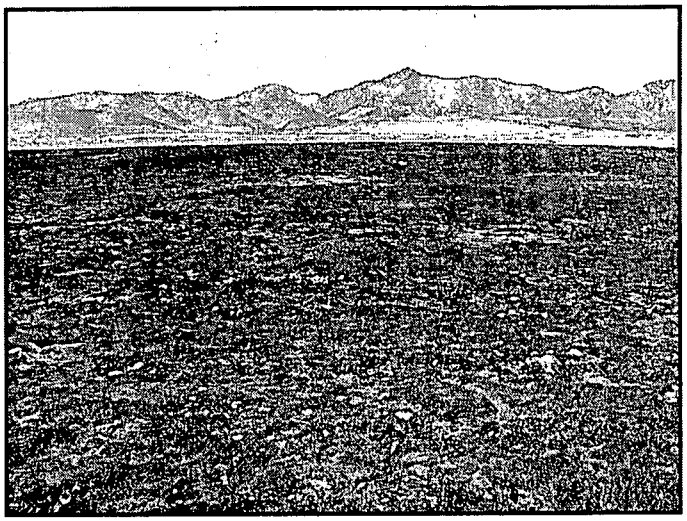
9/27/00

Prescribed Burn Photo Point G

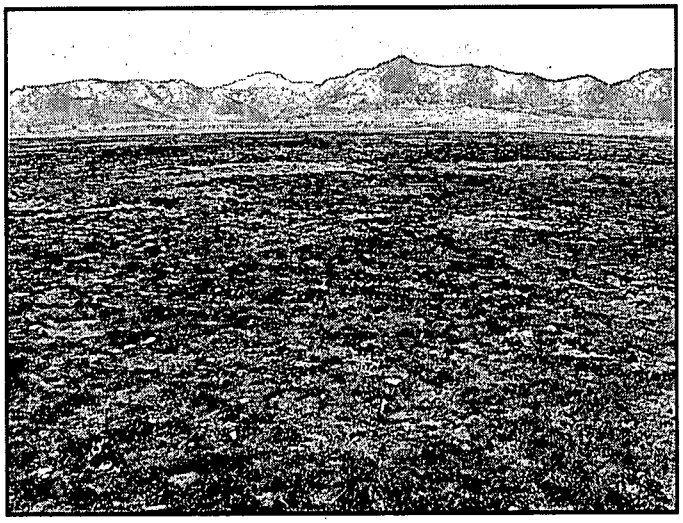
Looking West



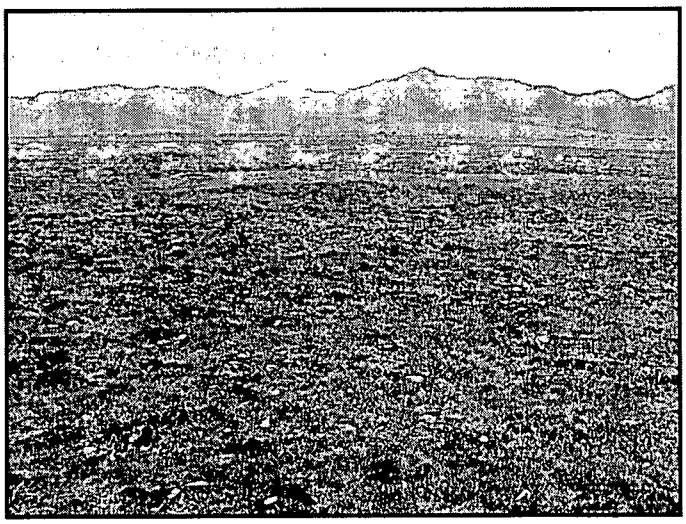
3/24/00



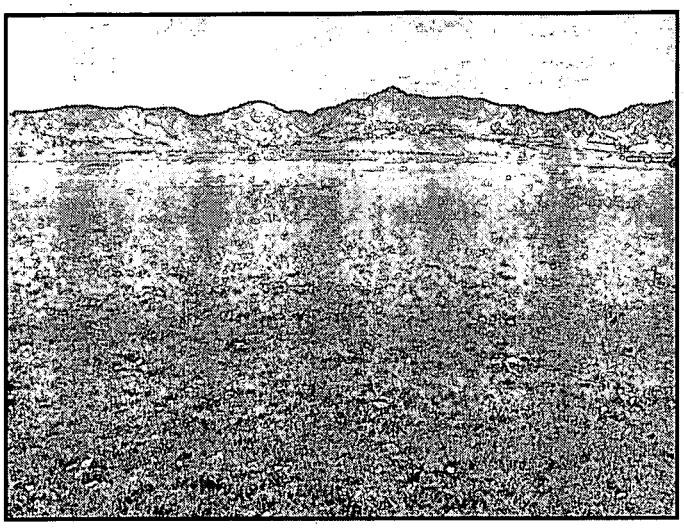
4/7/00



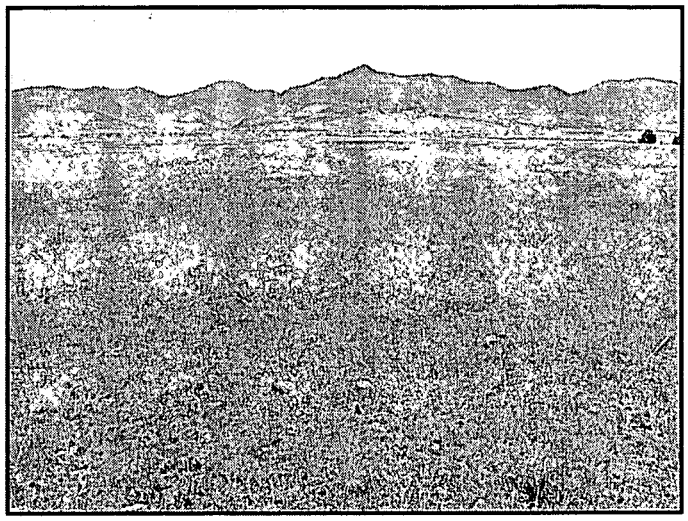
4/17/00



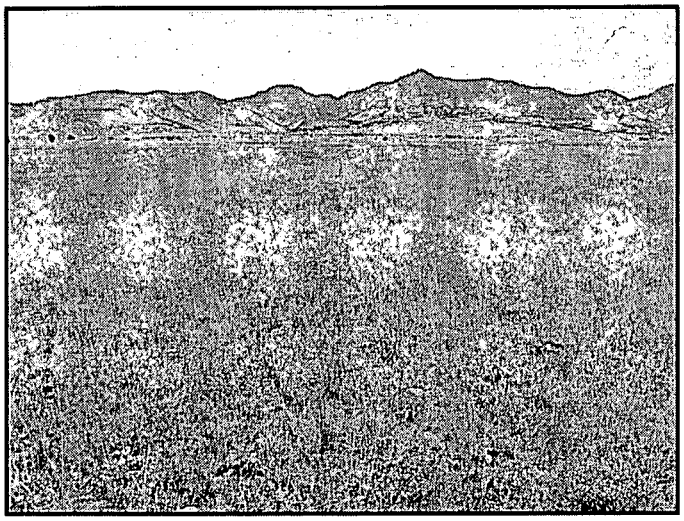
4/27/00



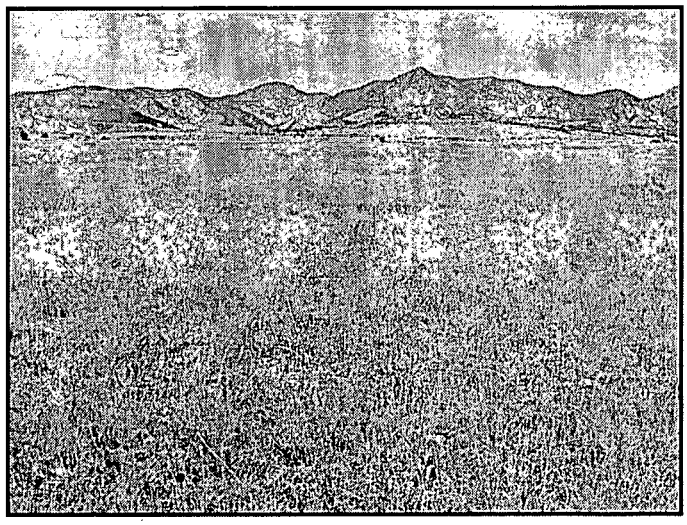
5/22/00



7/5/00



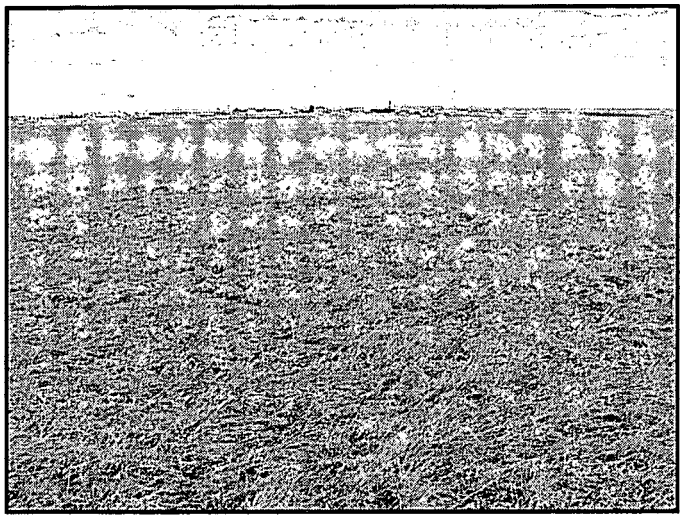
8/10/00



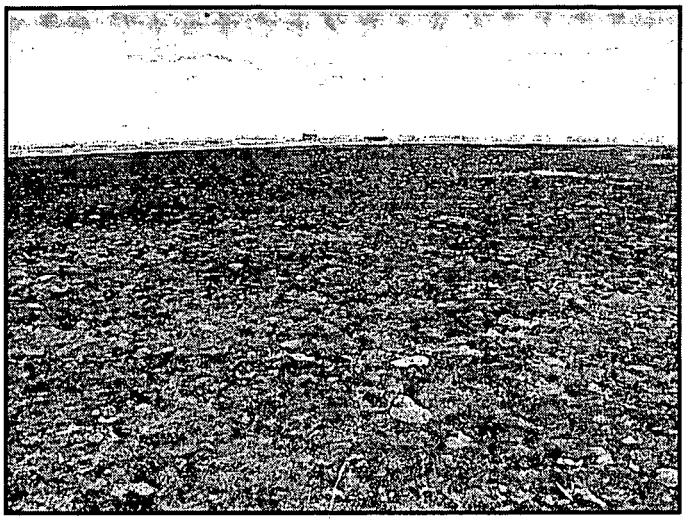
9/27/00

Prescribed Burn Photo Point H

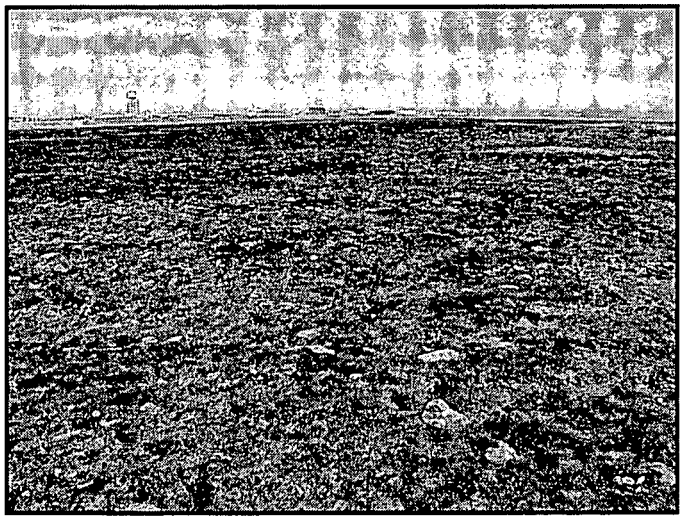
Looking Northeast



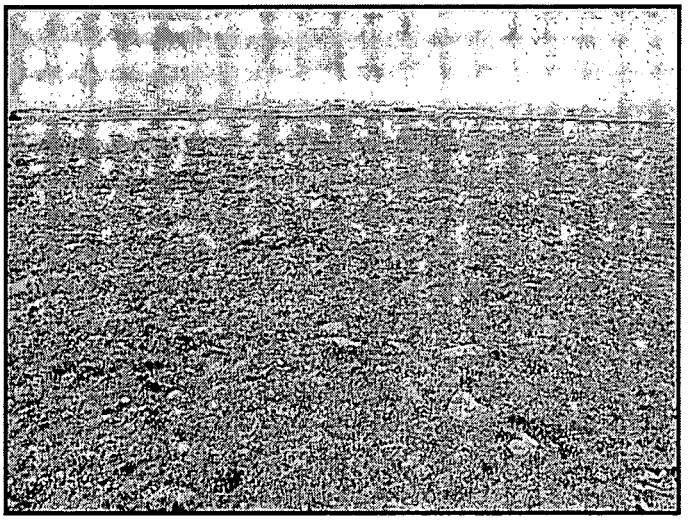
3/24/00



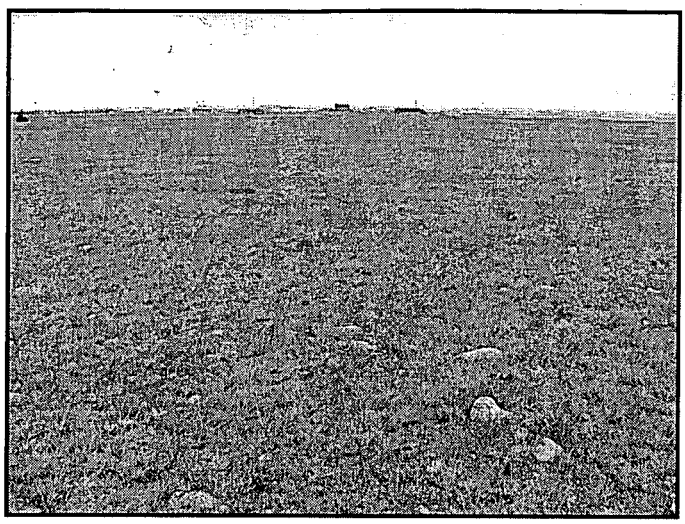
4/7/00



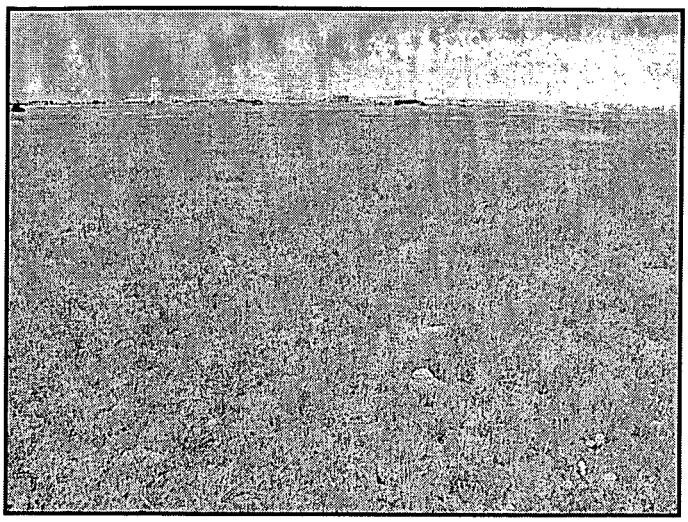
4/17/00



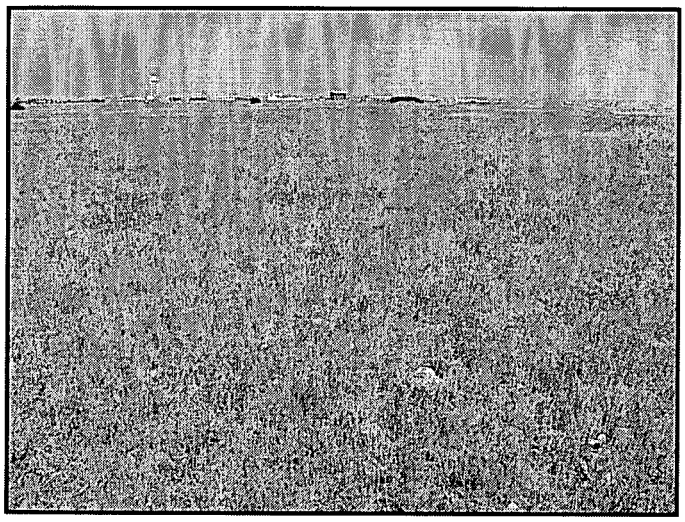
4/27/00



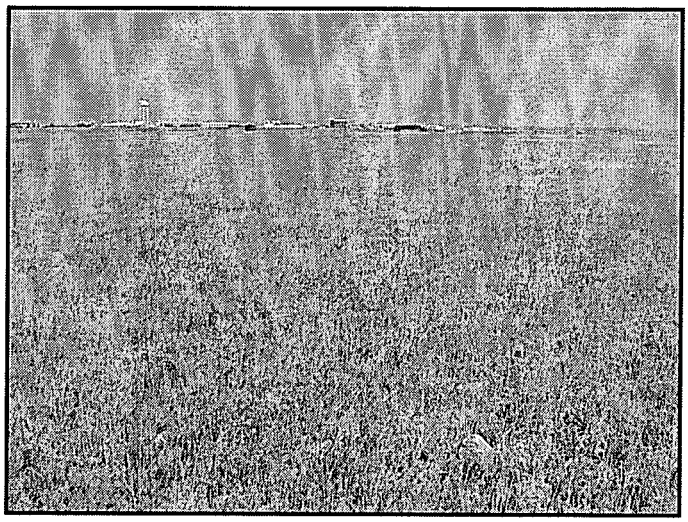
5/22/00



7/5/00



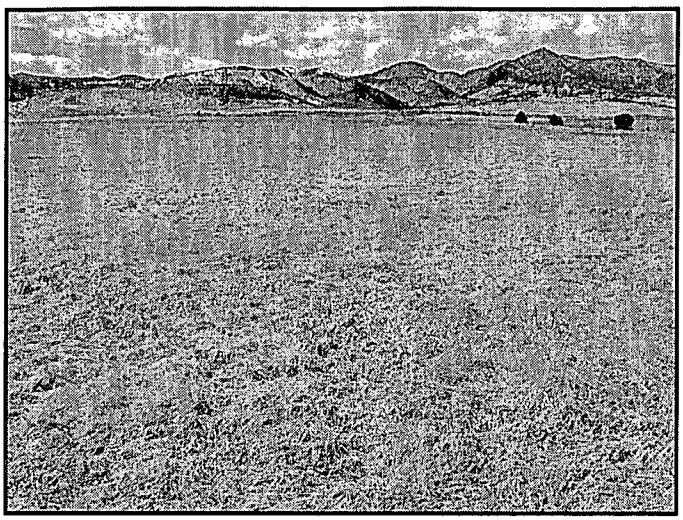
8/10/00



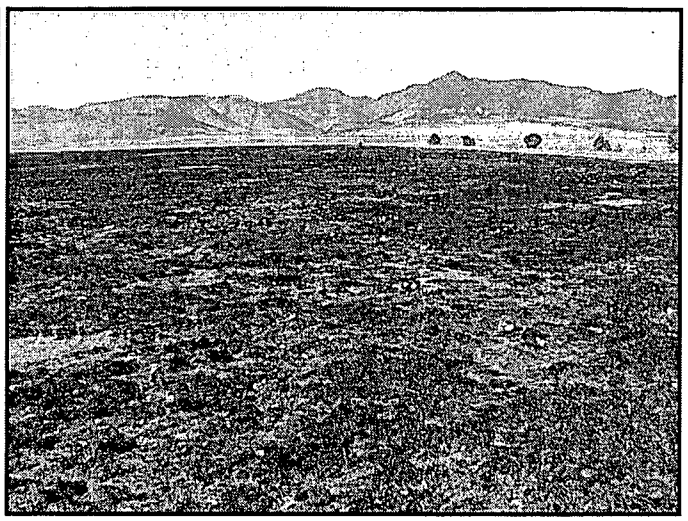
9/27/00

Prescribed Burn Photo Point I

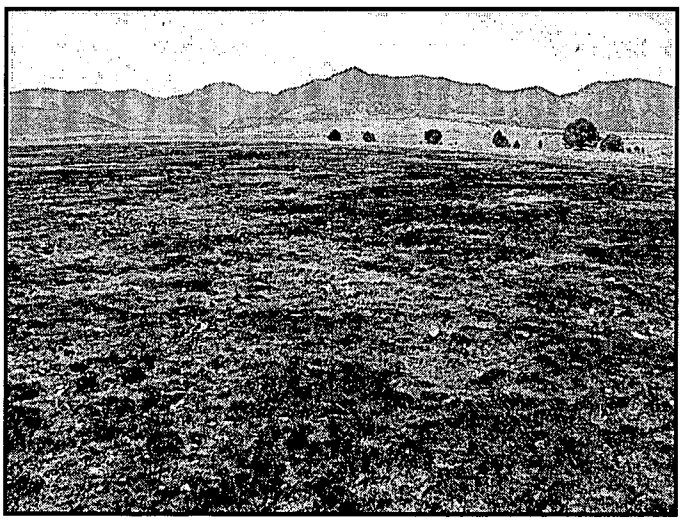
Looking West



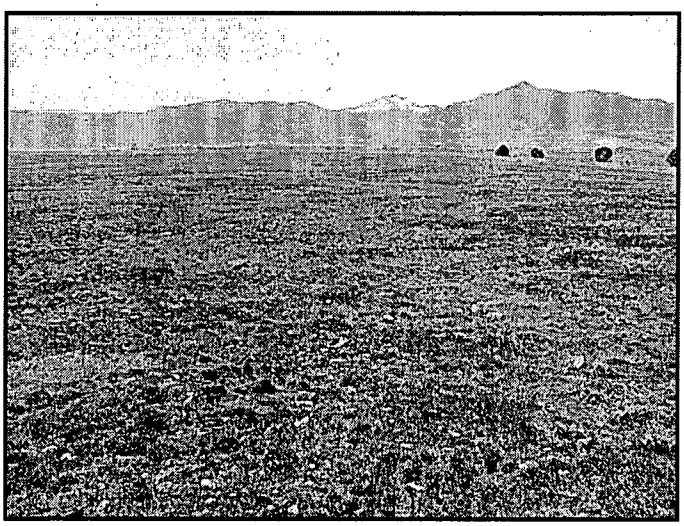
3/24/00



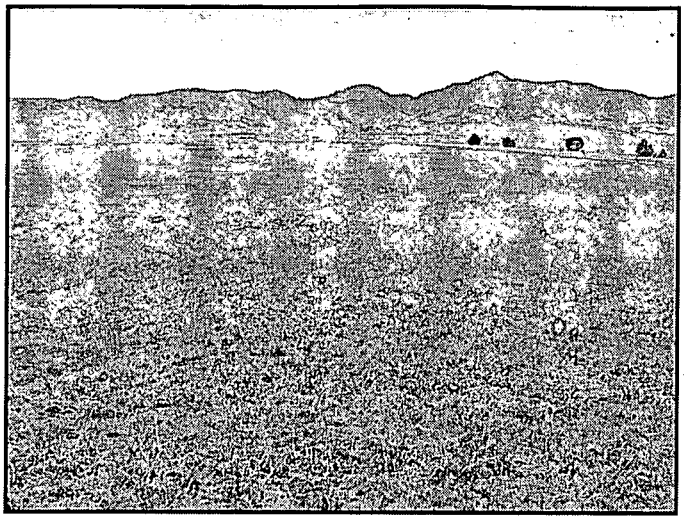
4/7/00



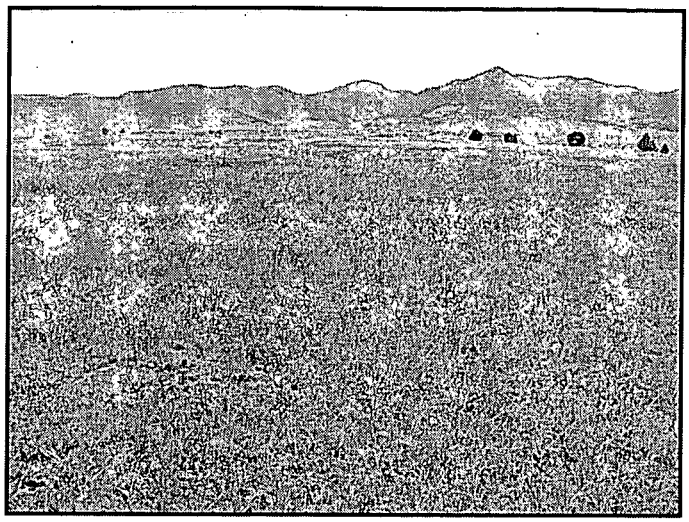
4/17/00



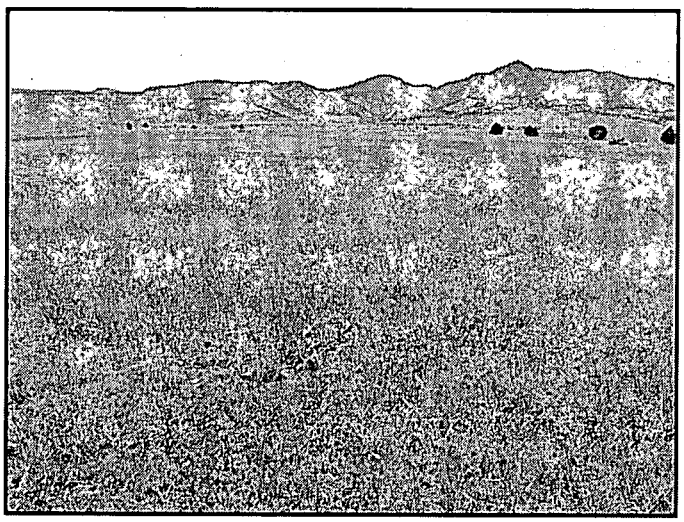
4/27/00



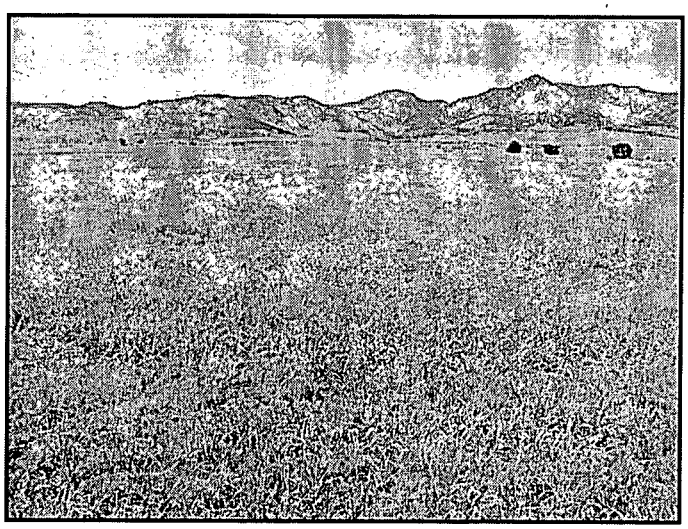
5/22/00



7/5/00



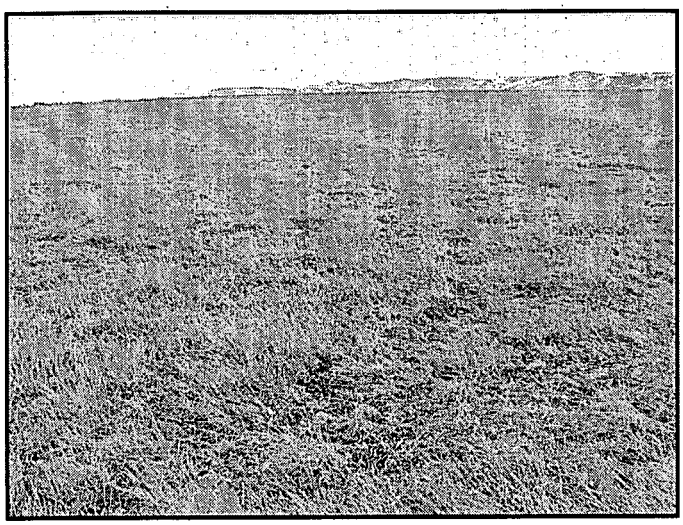
8/10/00



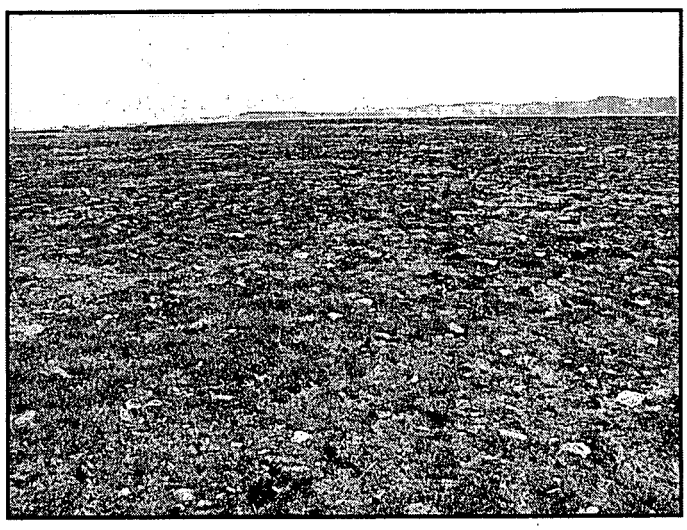
9/27/00

Prescribed Burn Photo Point J

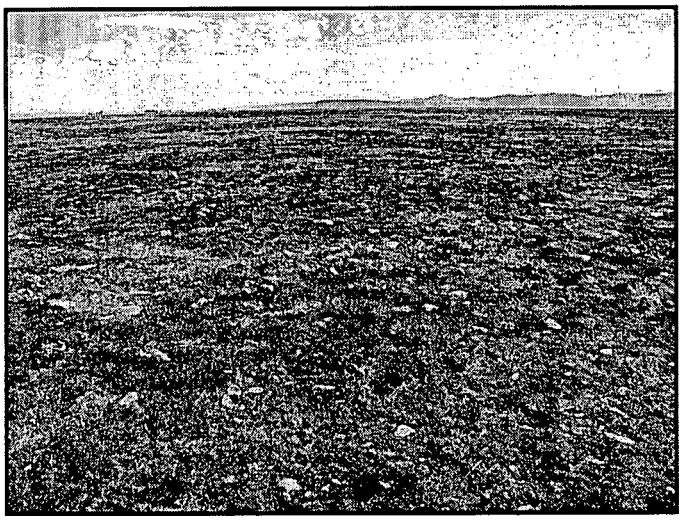
Looking South



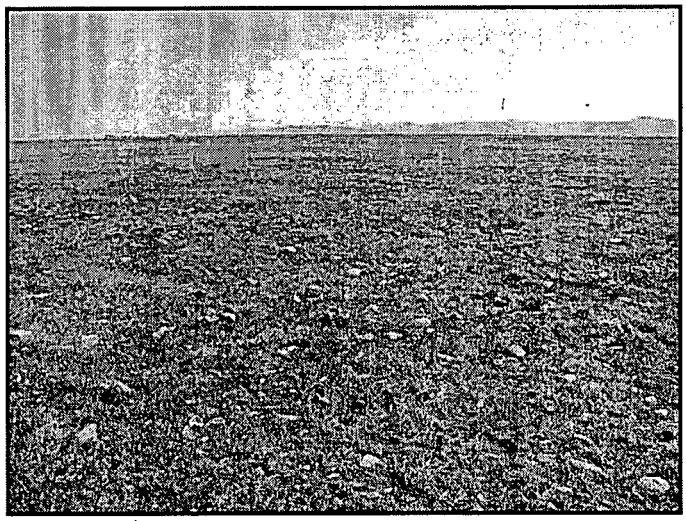
3/24/00



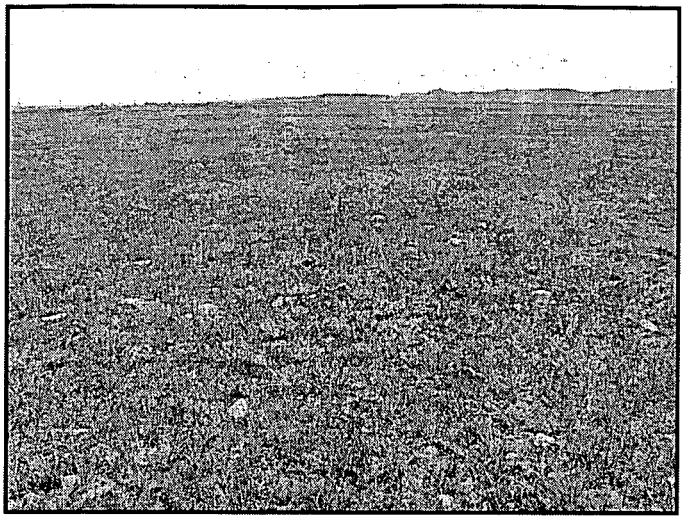
4/7/00



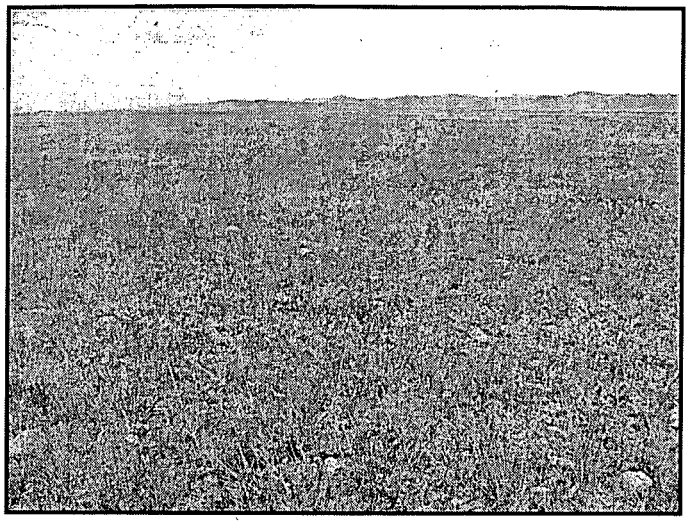
4/17/00



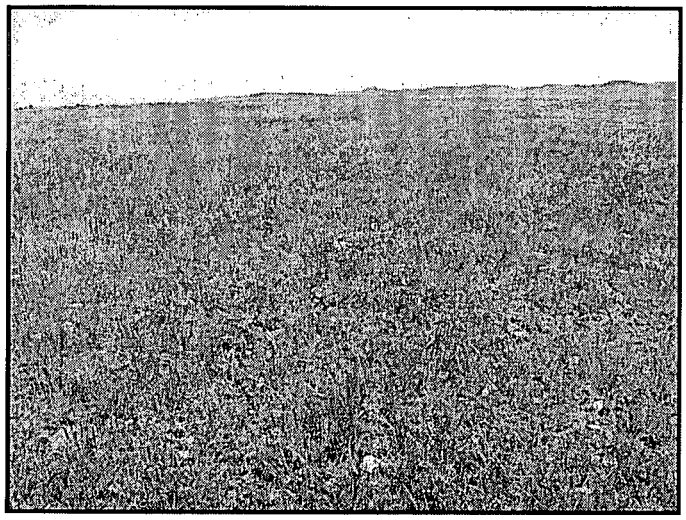
4/27/00



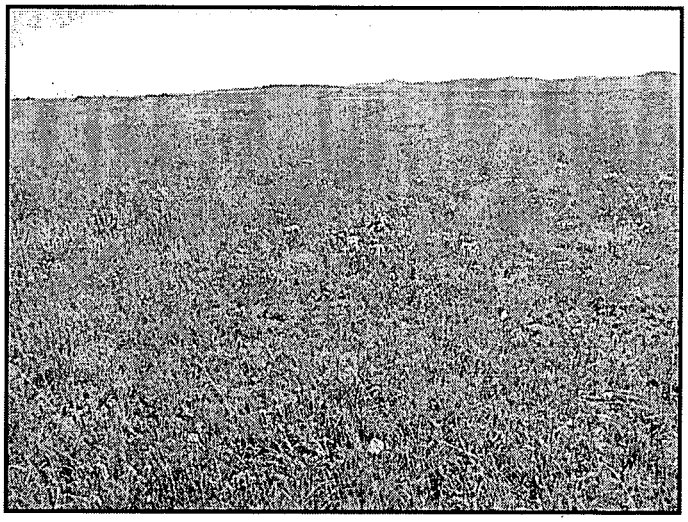
5/22/00



7/5/00



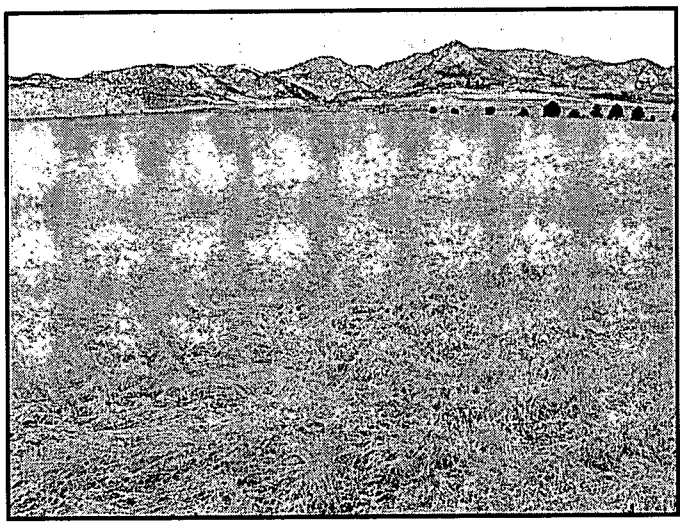
8/10/00



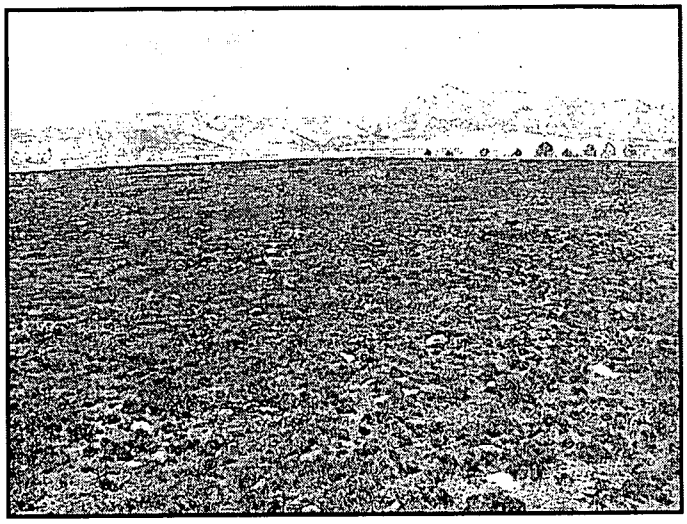
9/27/00

Prescribed Burn Photo Point K

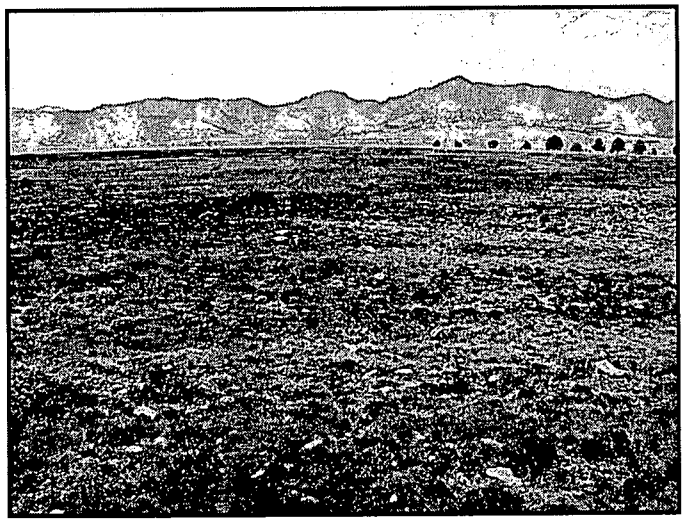
Looking South



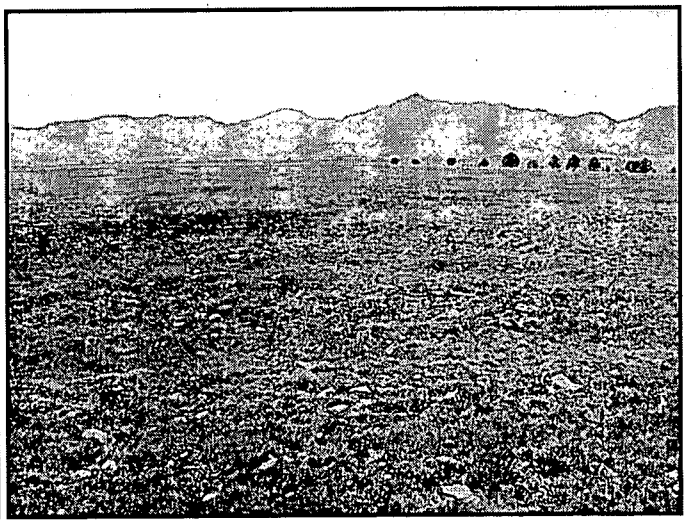
3/24/00



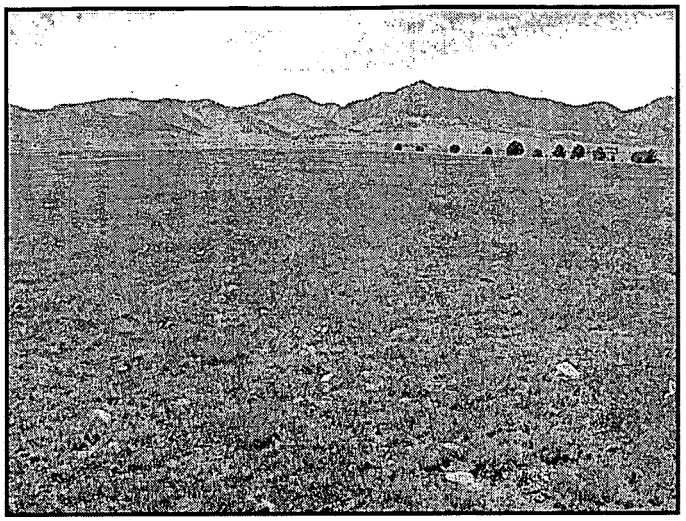
4/7/00



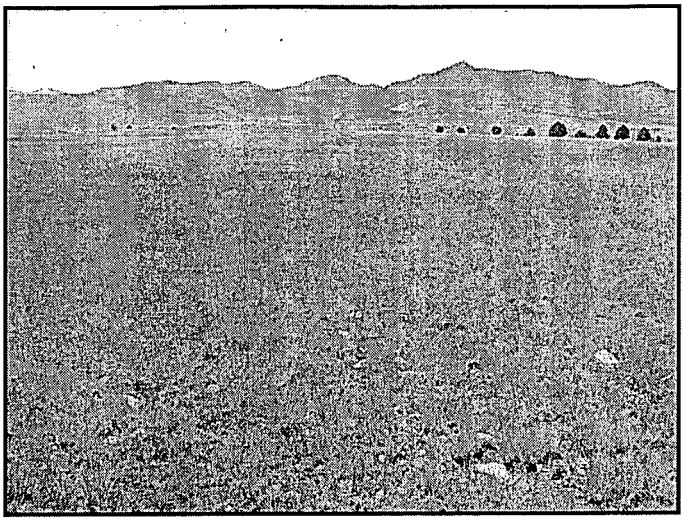
4/17/00



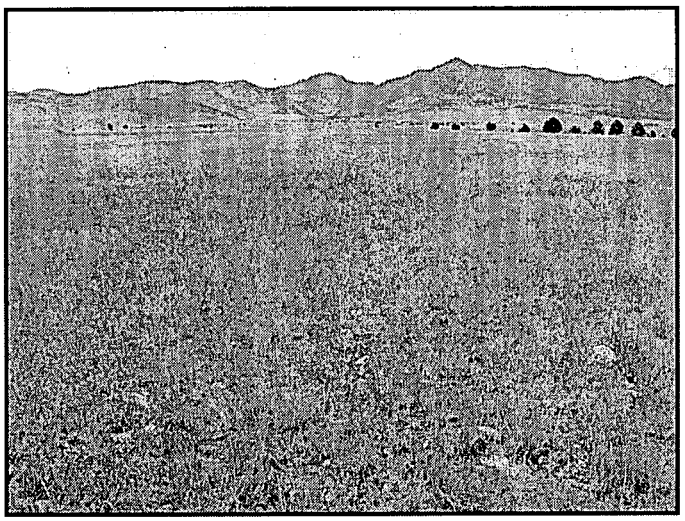
4/27/00



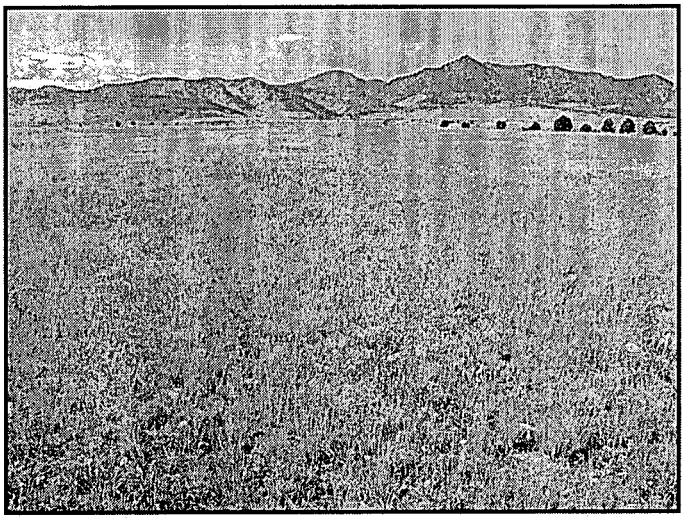
5/22/00



7/5/00



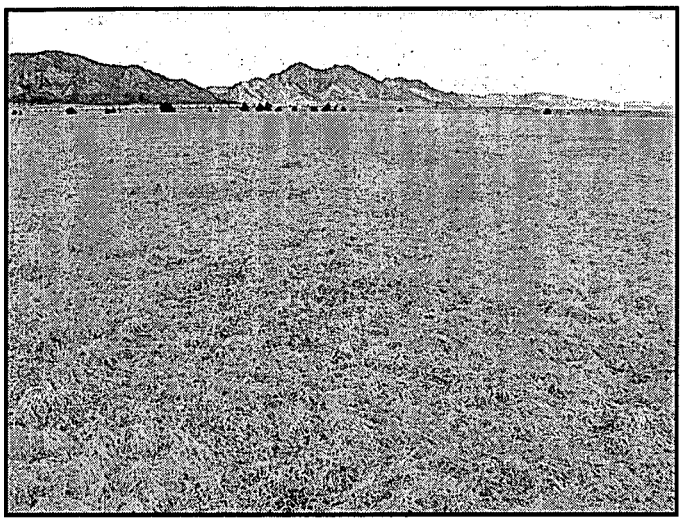
8/10/00



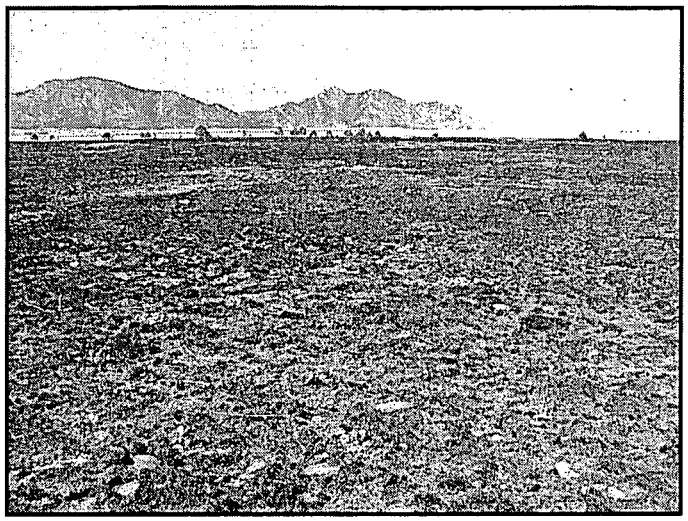
9/27/00

Prescribed Burn Photo Point L

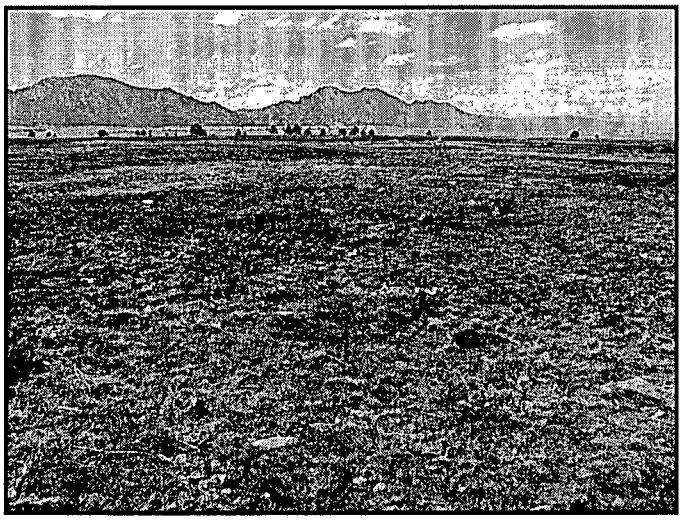
Looking Northwest



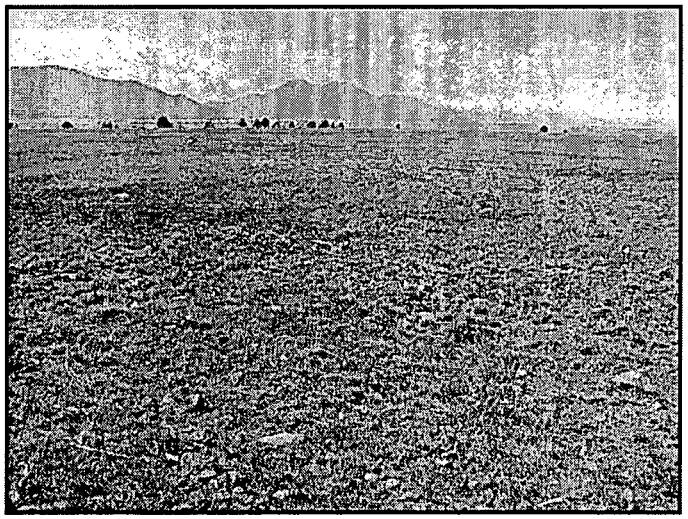
3/24/00



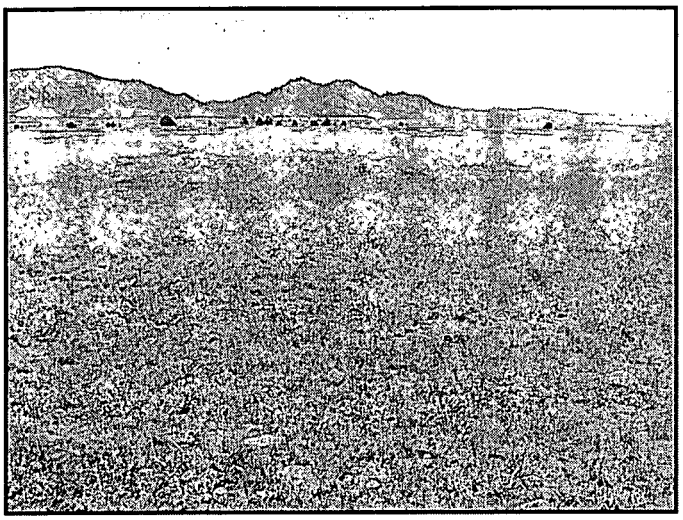
4/7/00



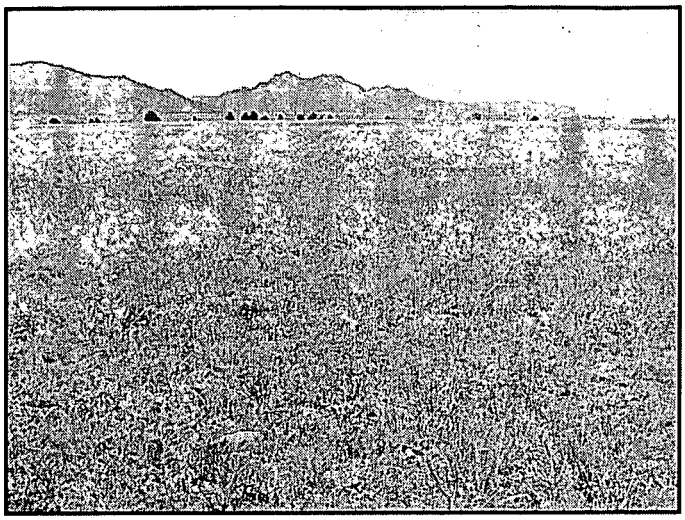
4/17/00



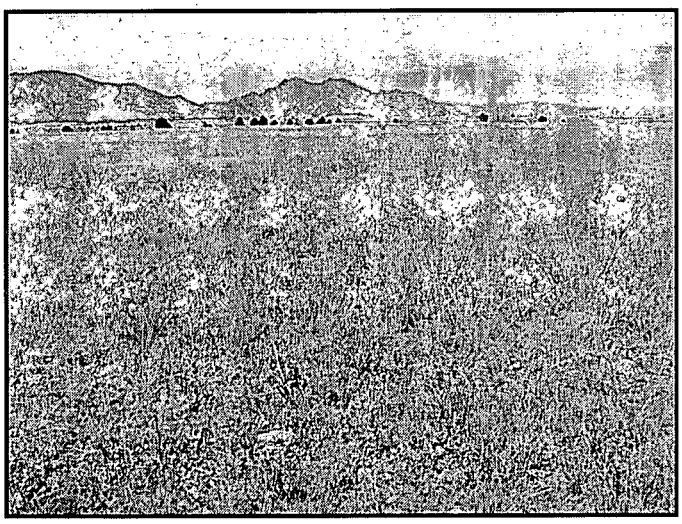
4/27/00



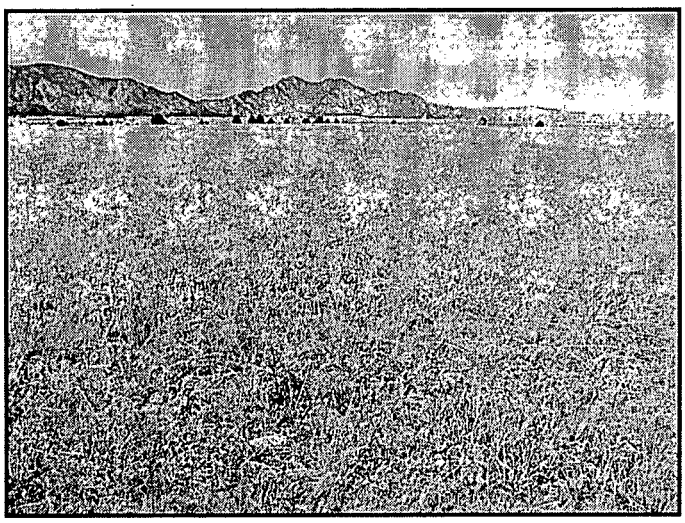
5/22/00



7/5/00



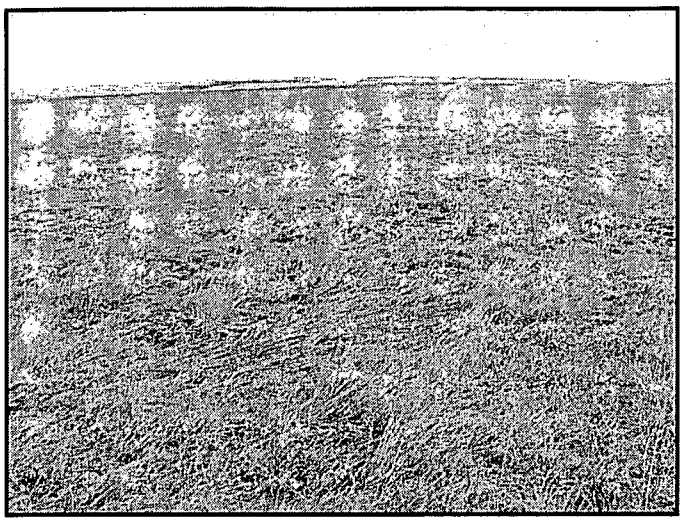
8/10/00



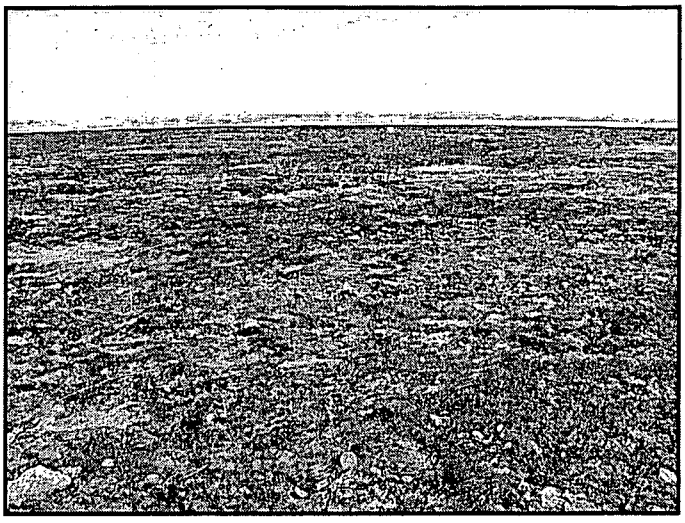
9/27/00

Prescribed Burn Photo Point M

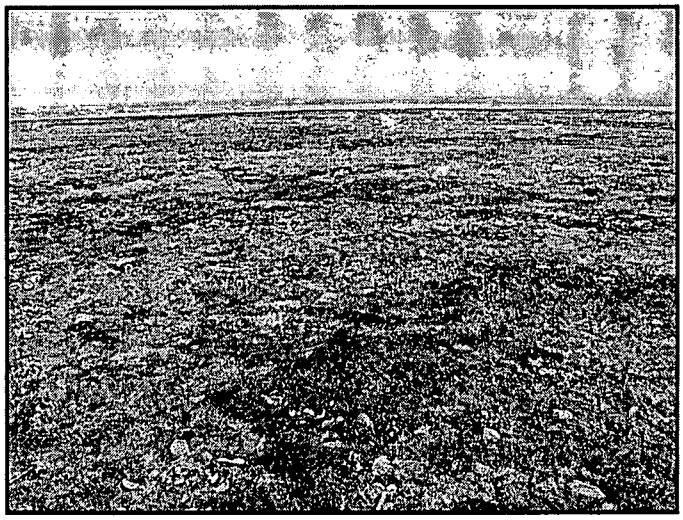
Looking East



3/24/00



4/7/00



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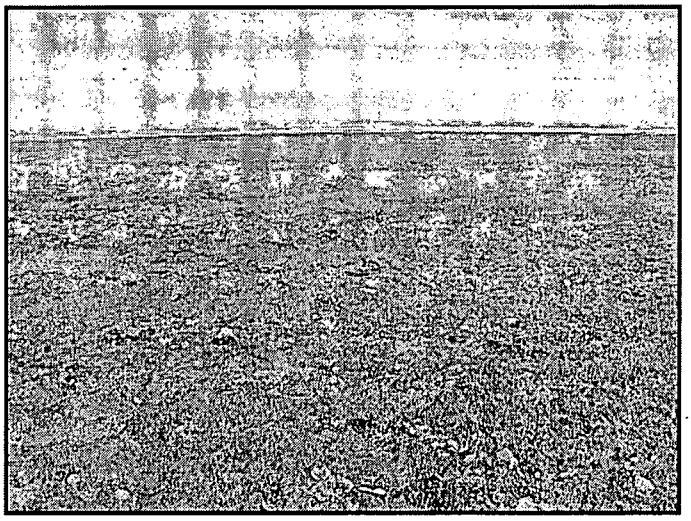

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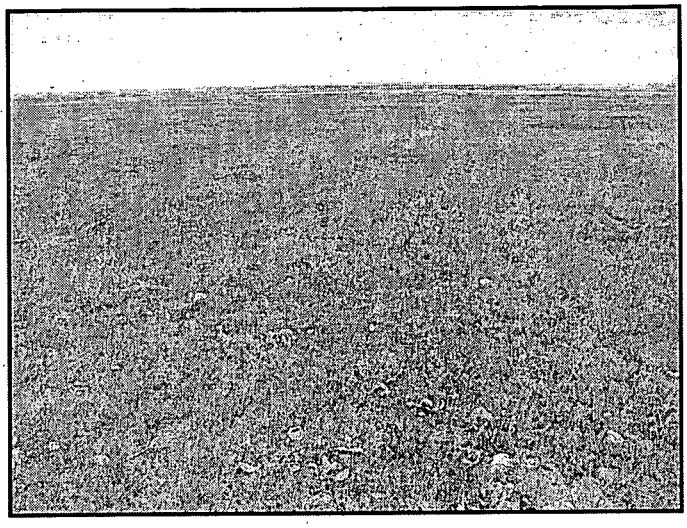

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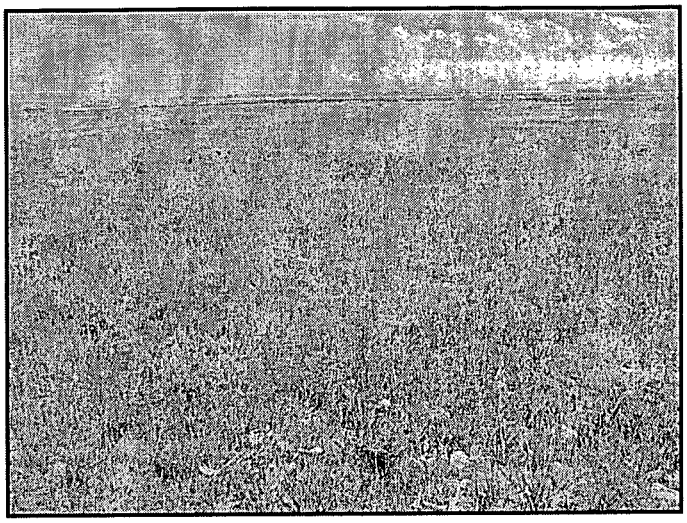

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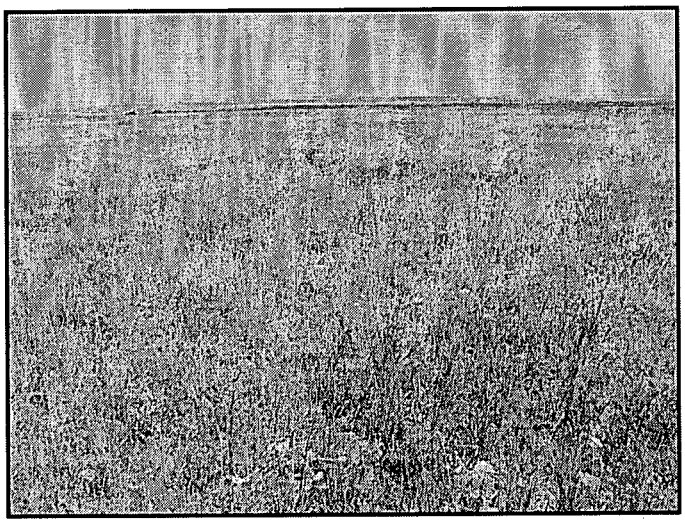

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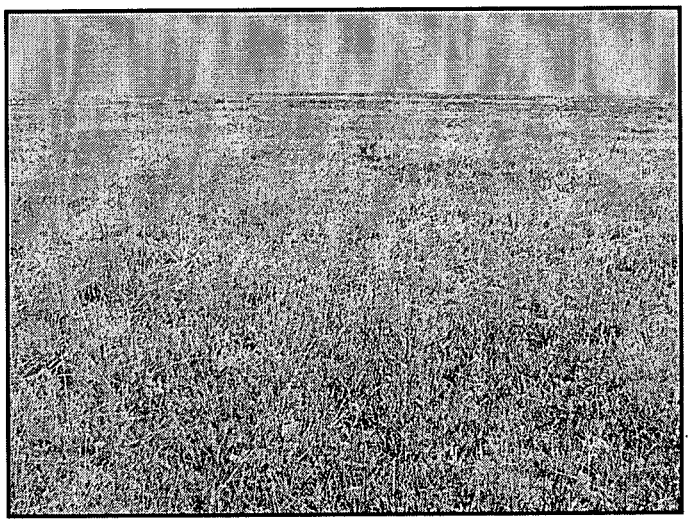
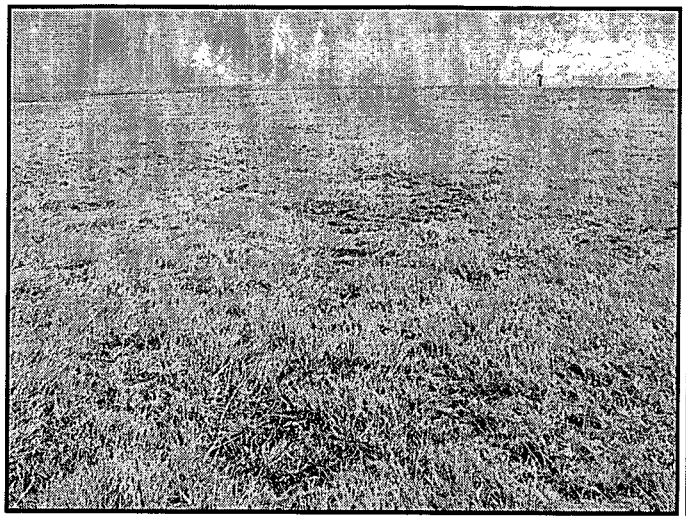


9/27/00

Prescribed Burn Photo Point N

Looking Southeast



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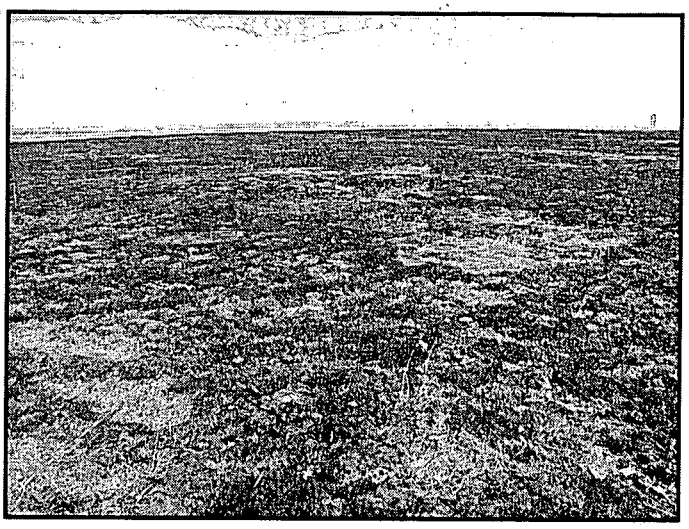
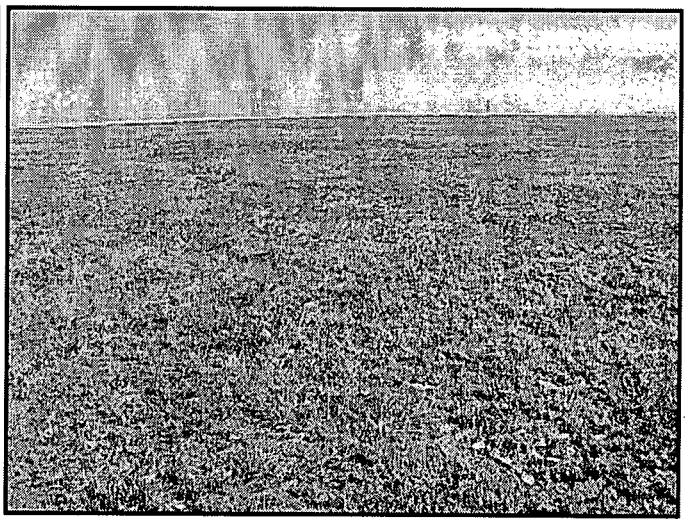


4/7/00

4/17/00



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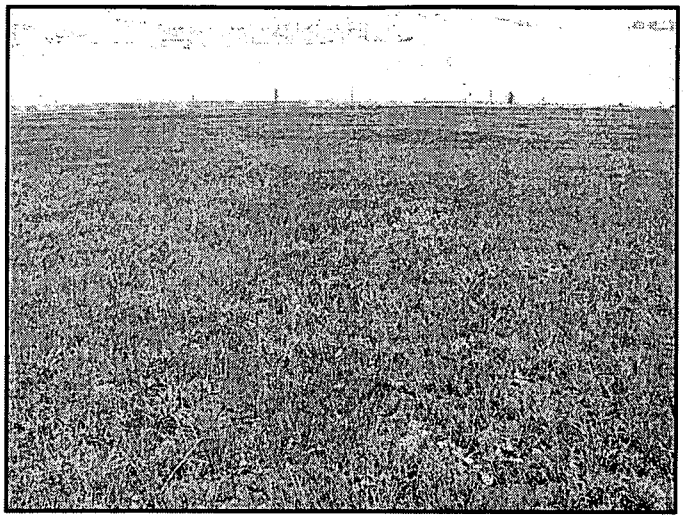

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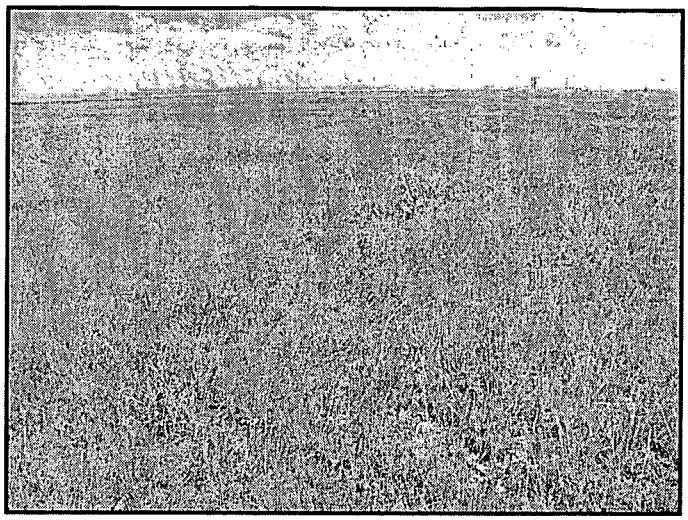

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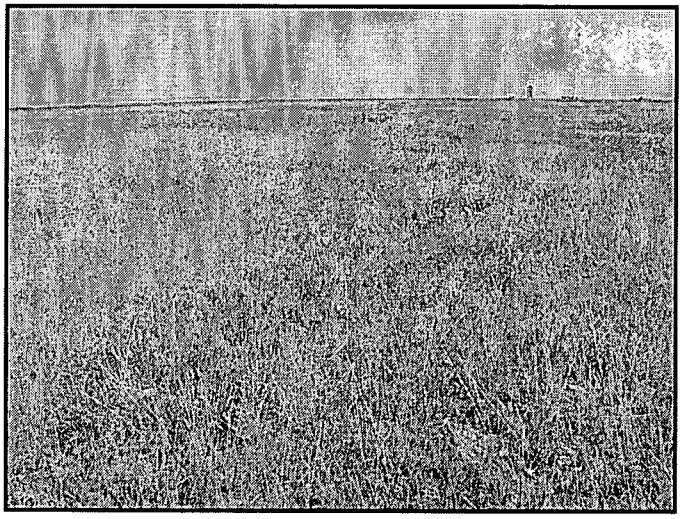

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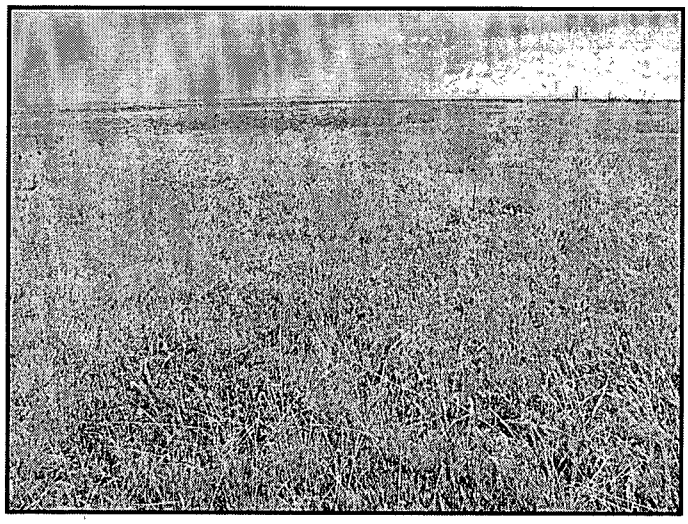
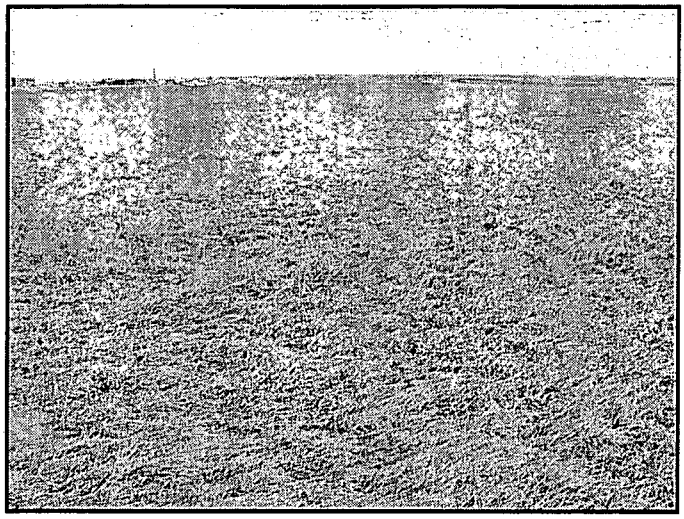


9/27/00

Prescribed Burn Photo Point O

Looking Northeast



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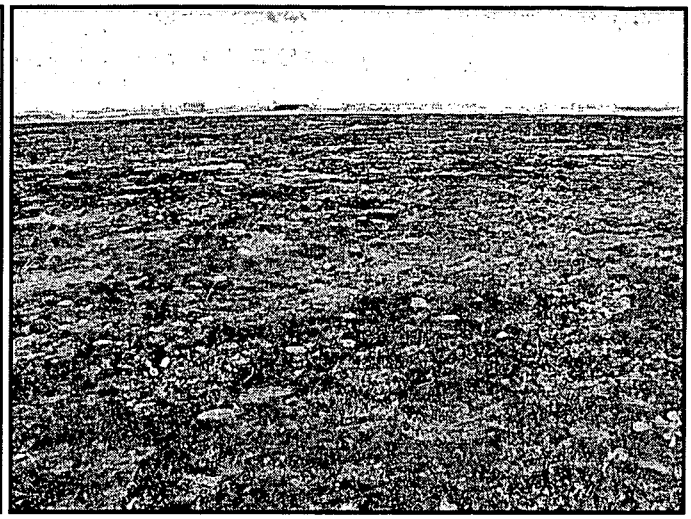

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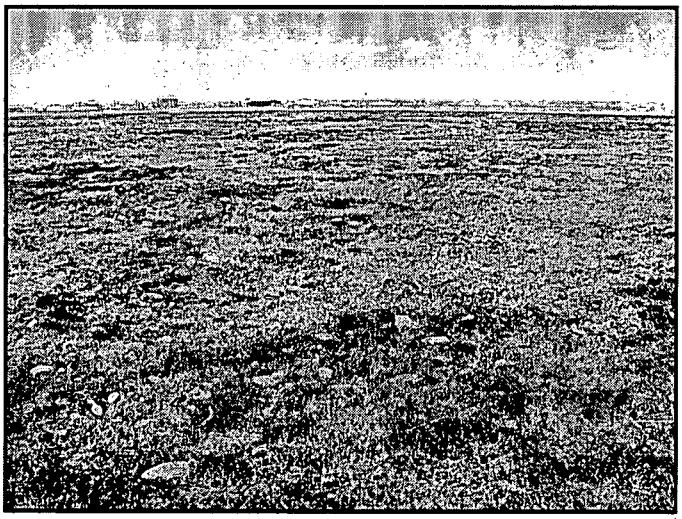

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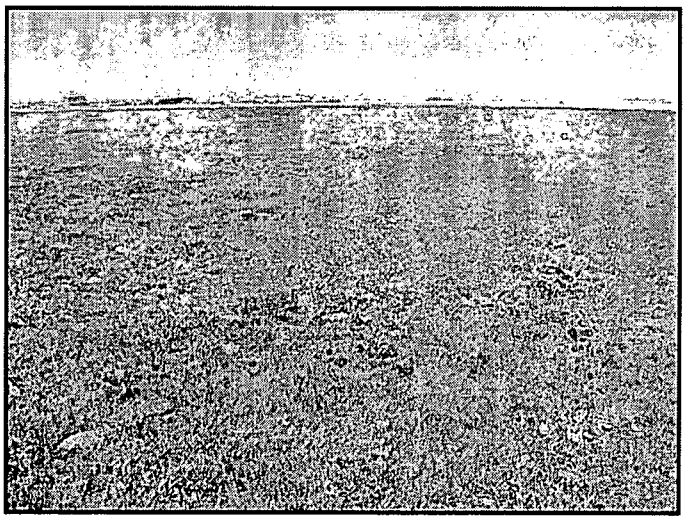

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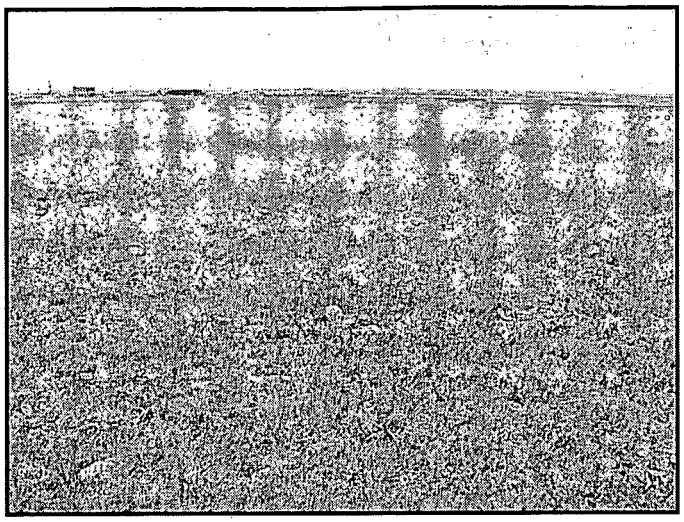

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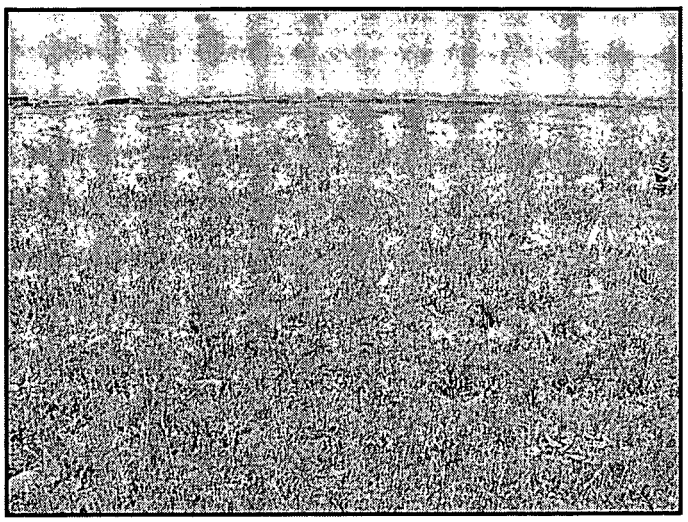

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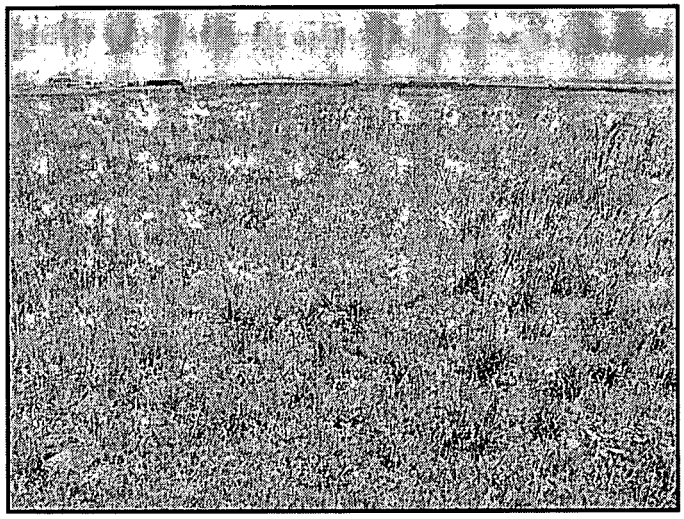

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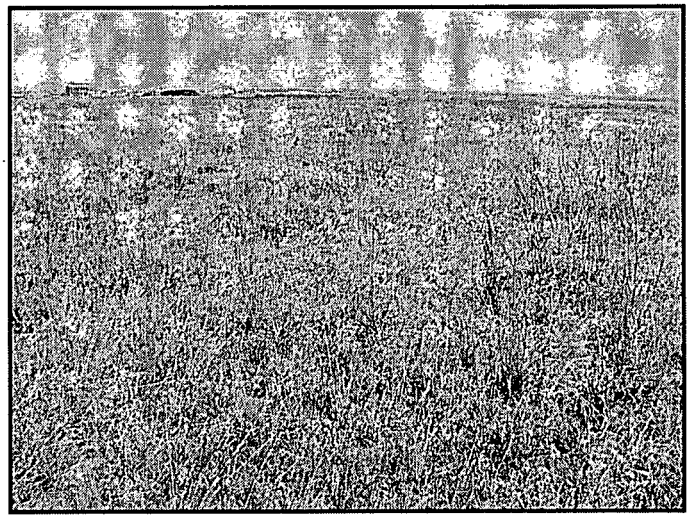
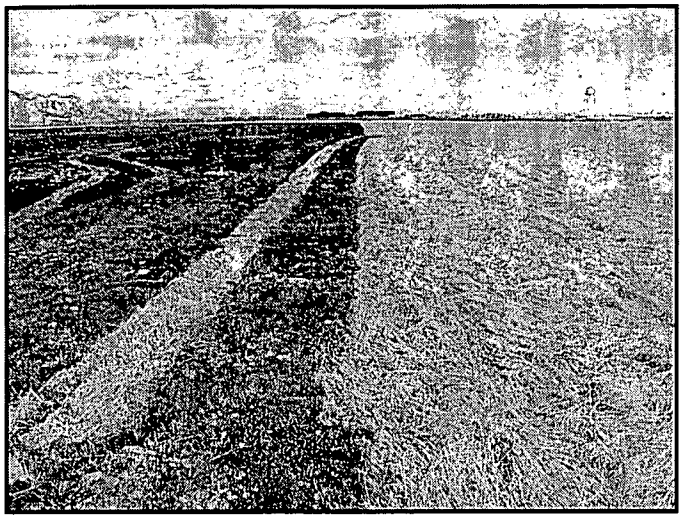


9/27/00

Prescribed Burn Photo Point S

Looking North



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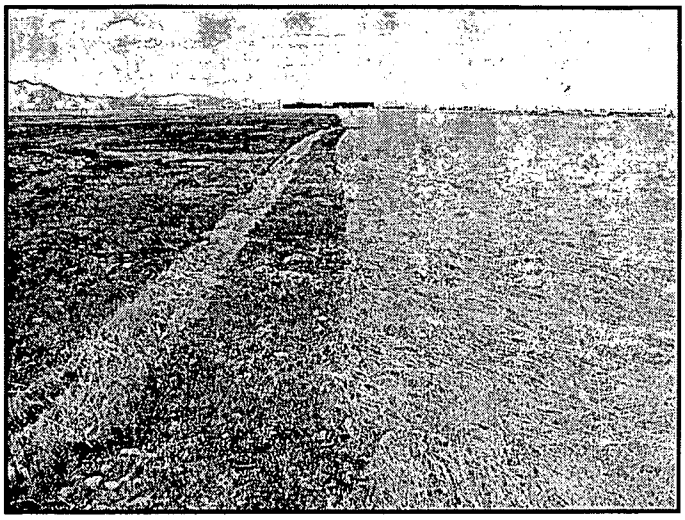
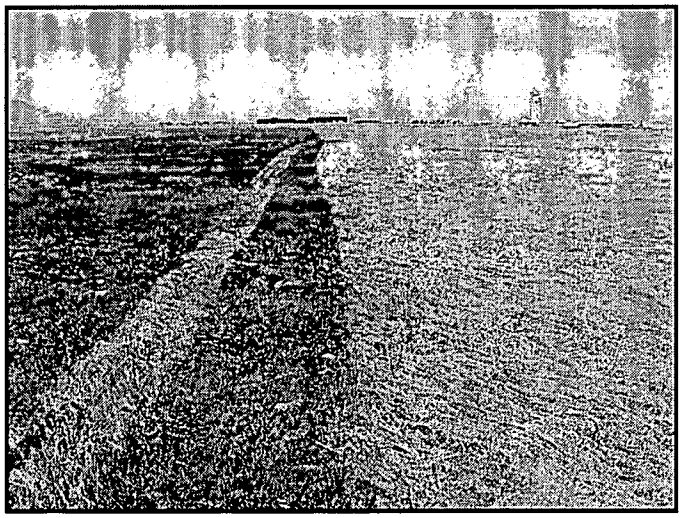


4/17/00



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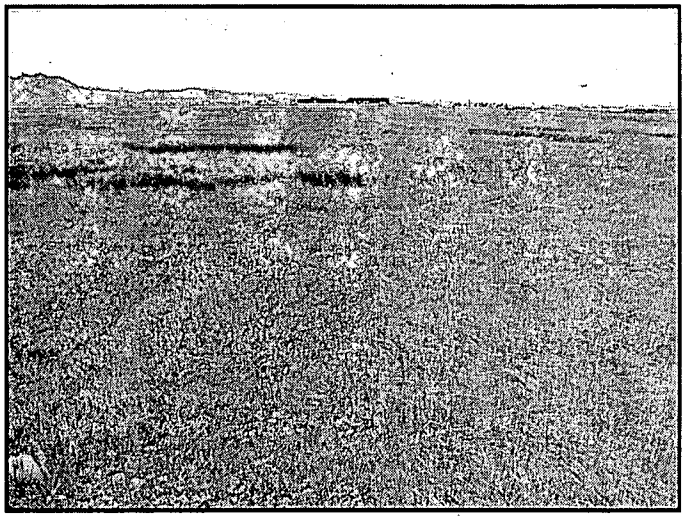

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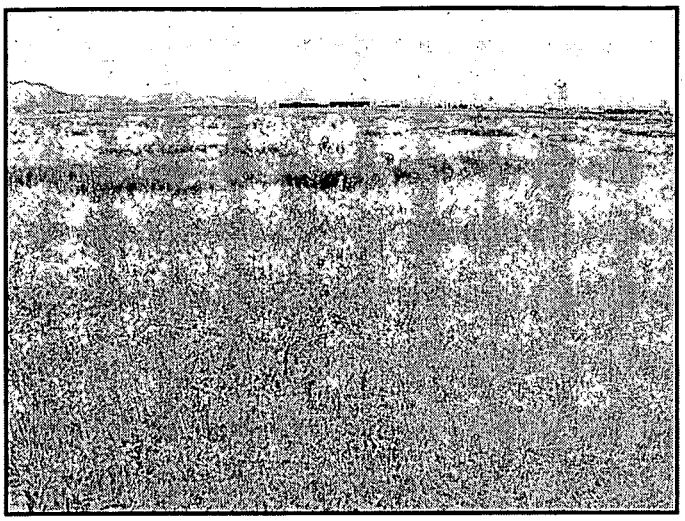

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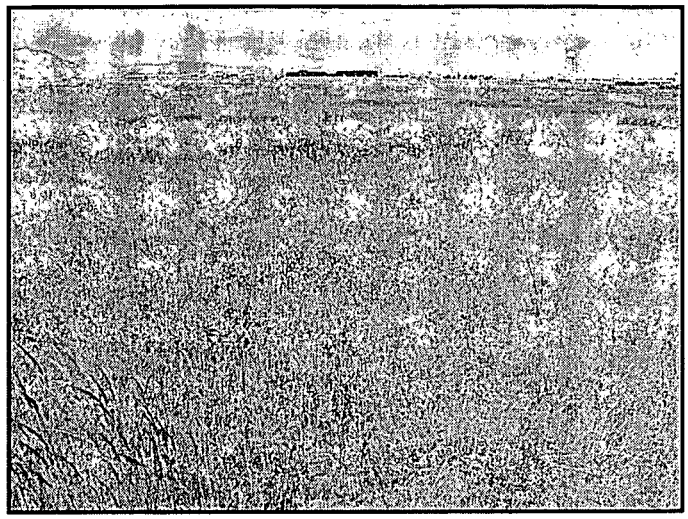

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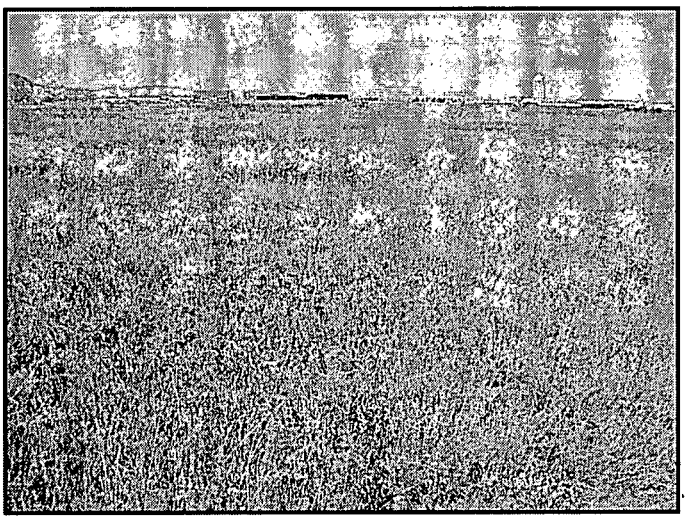
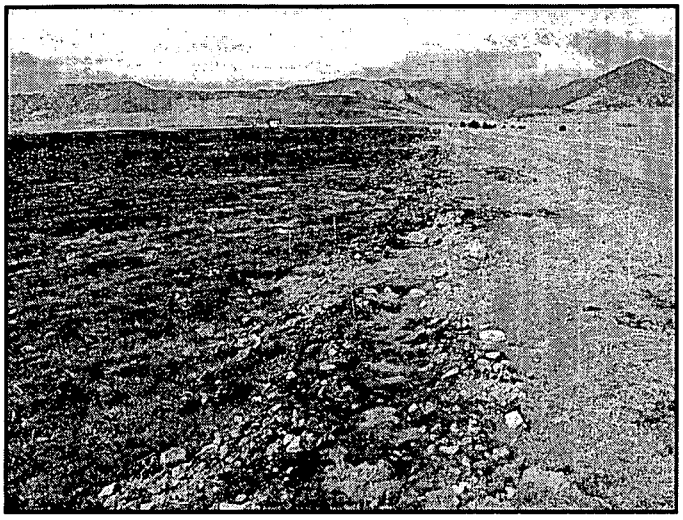


9/27/00

Prescribed Burn Photo Point T

Looking West



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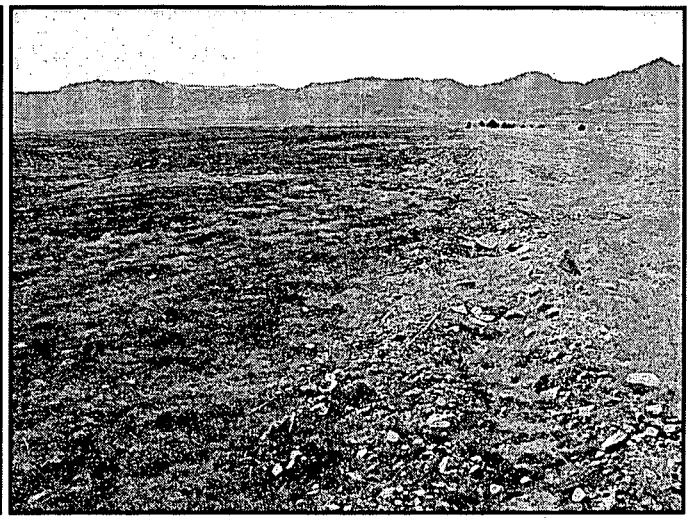

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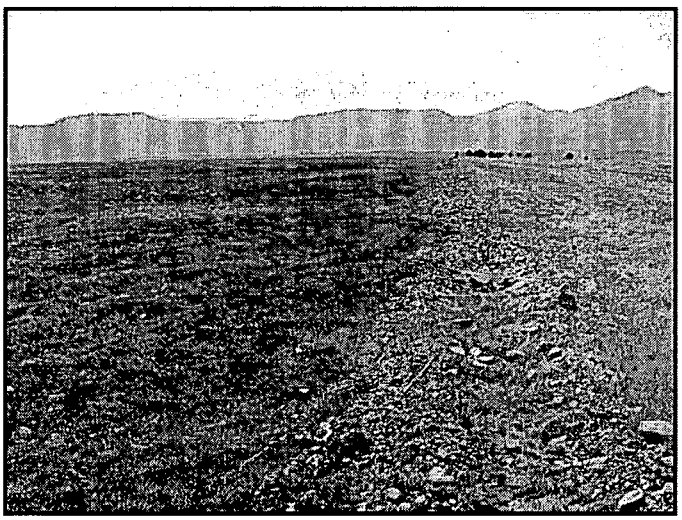
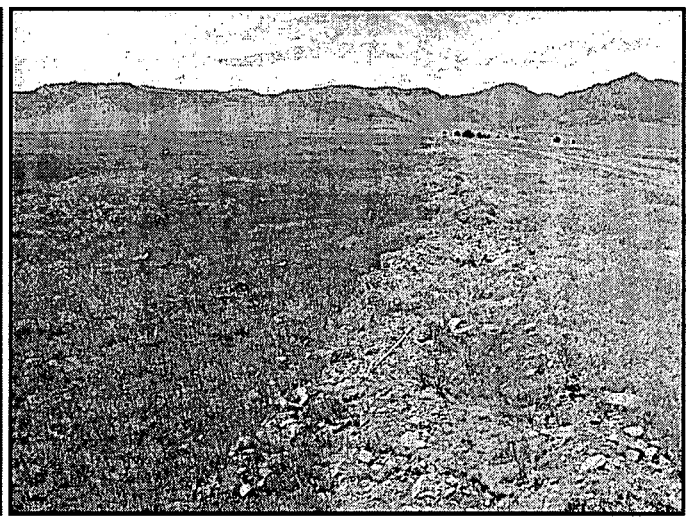
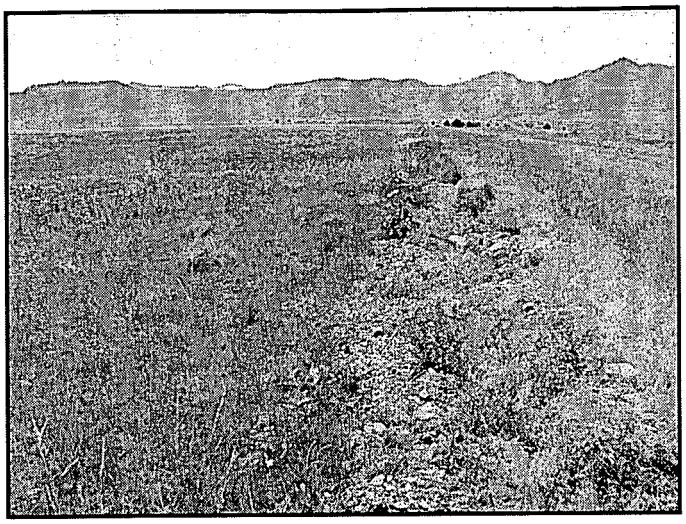


4/27/00



5/22/00



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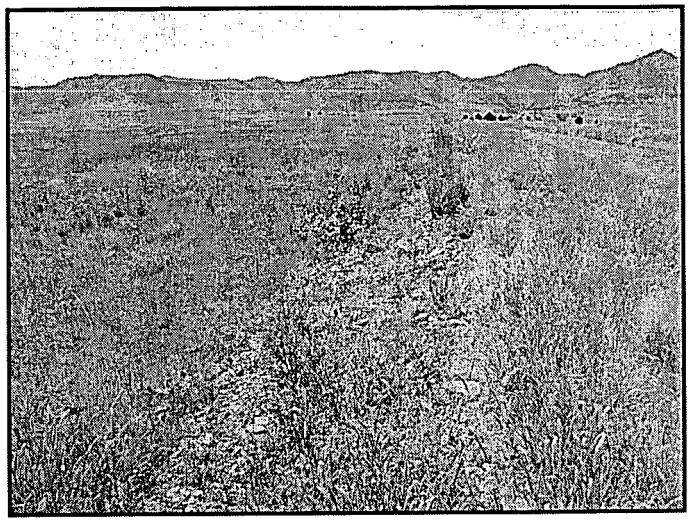

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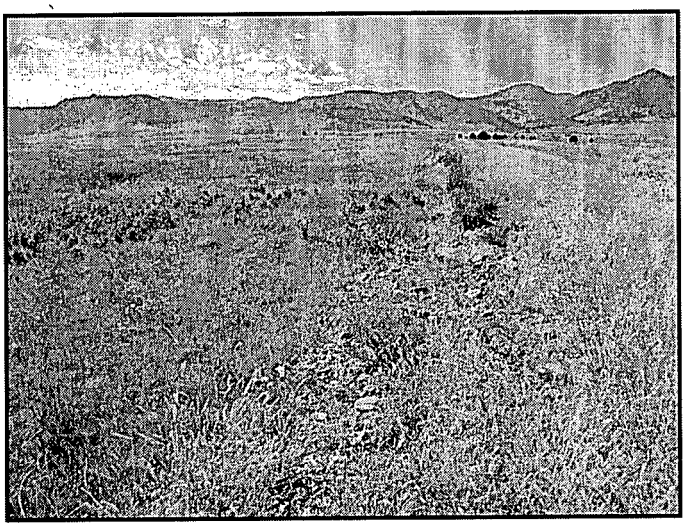
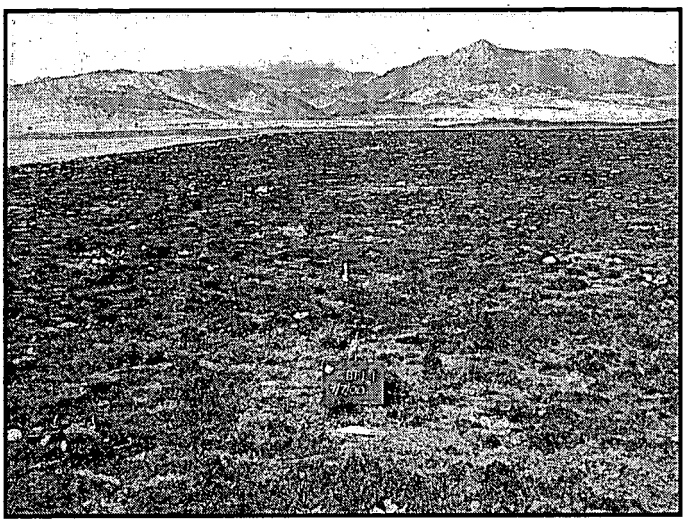


9/27/00

2000 Prescribed Burn Transect Monitoring Photographs

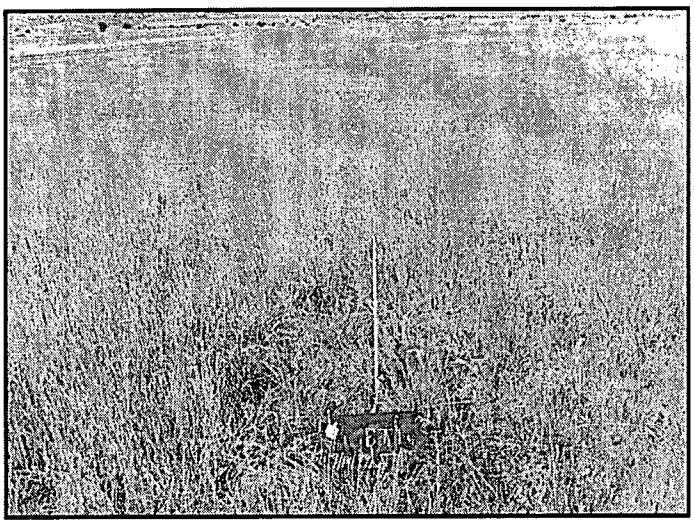
Select one of the transects below to view a time-series of the burn recovery.



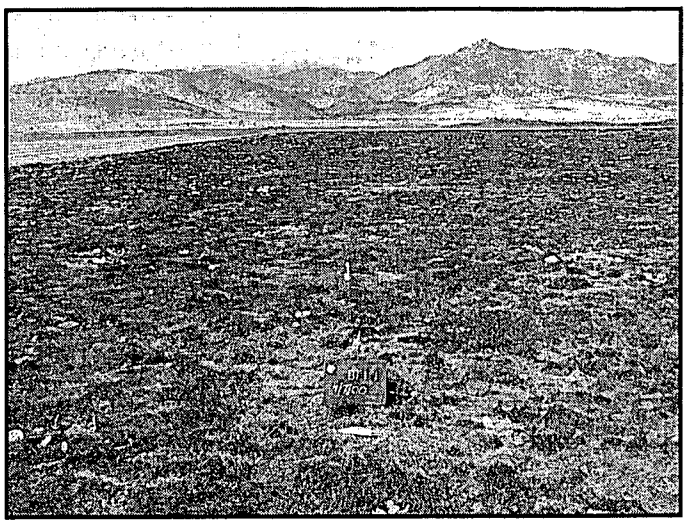
Transect BT1 T1	Transect BT2 T1
Transect BT1 T2	Transect BT2 T2
Transect BT1 T3	Transect BT2 T3
Transect BT1 T4	Transect BT2 T4
Transect BT1 T5	Transect BT2 T5

Prescribed Burn Transect BT1 T1

Looking West



9/14/99



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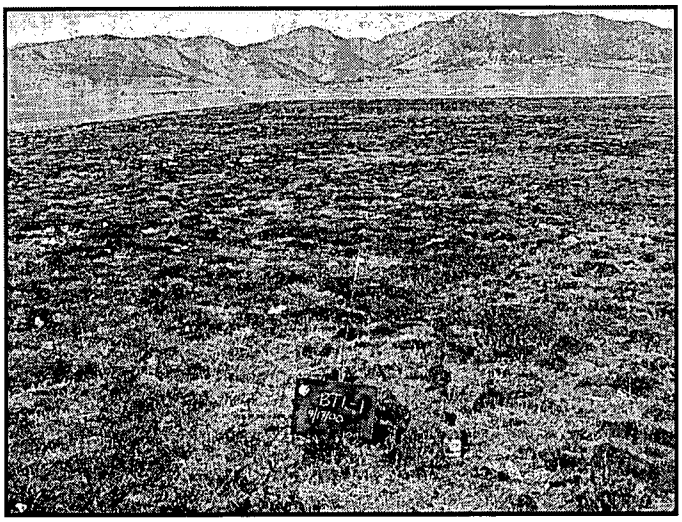

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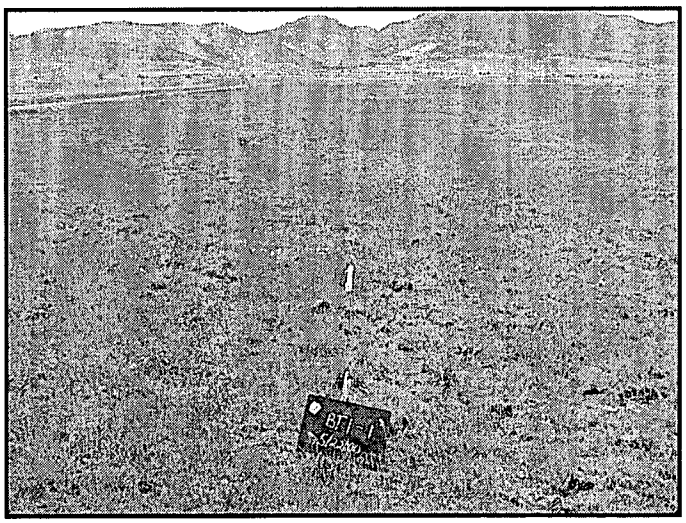

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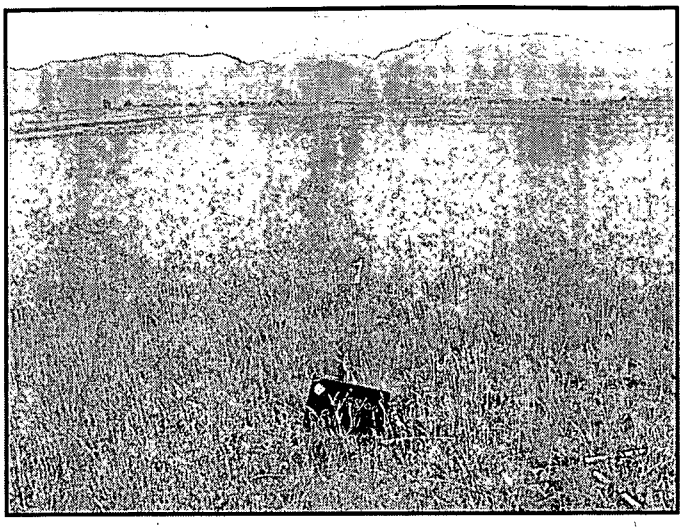
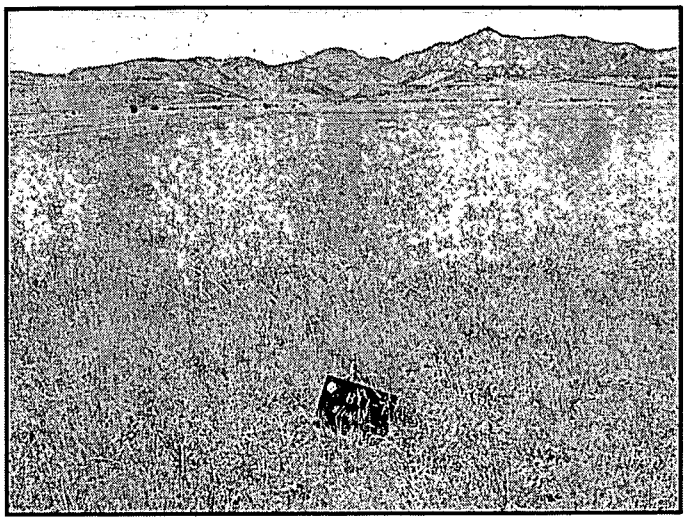


6/28/00



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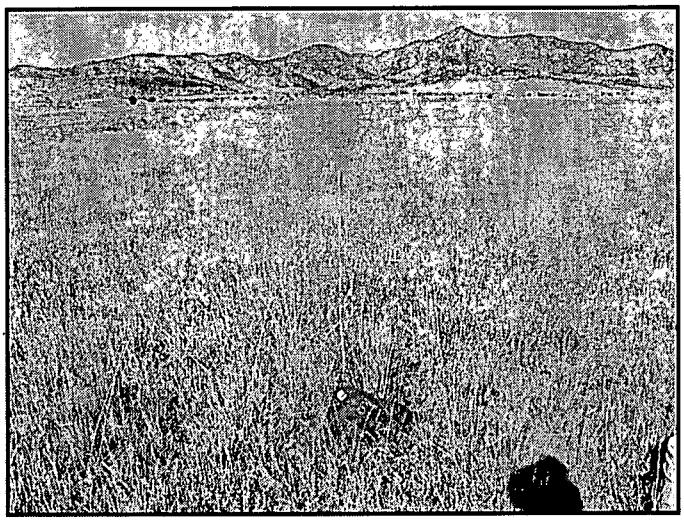
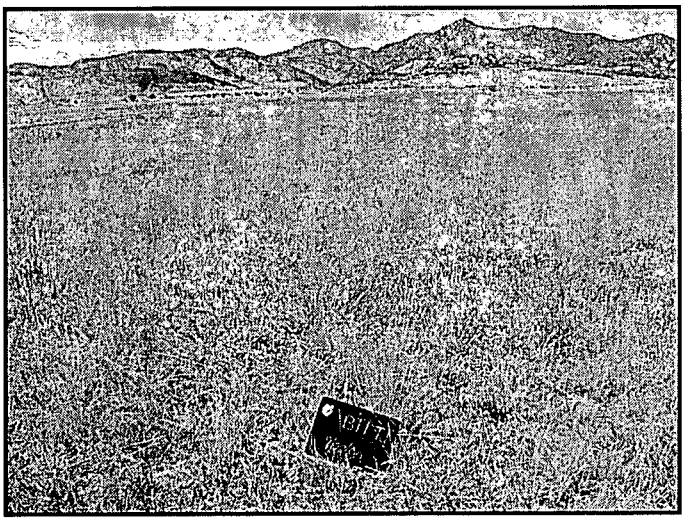


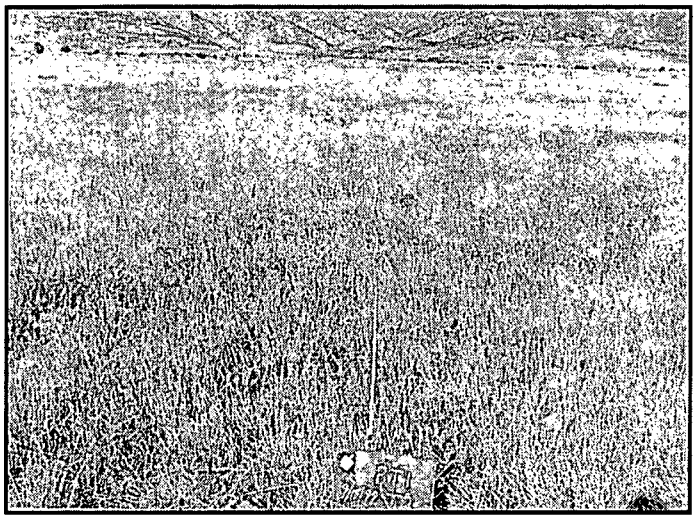
9/5/00



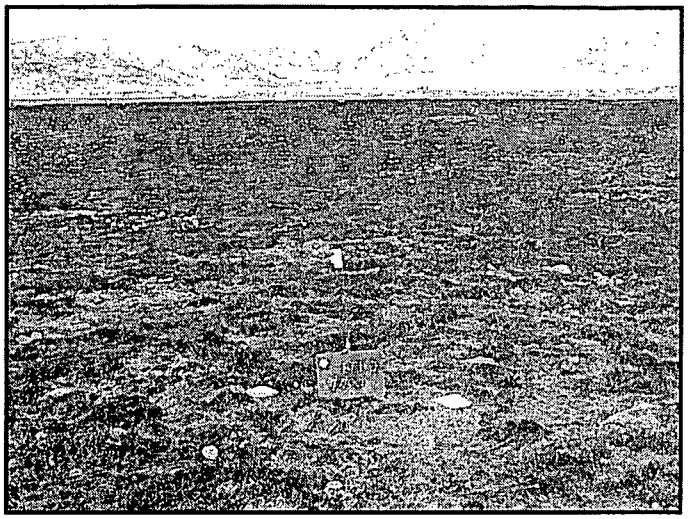
9/27/00

Prescribed Burn Transect BT1 T2

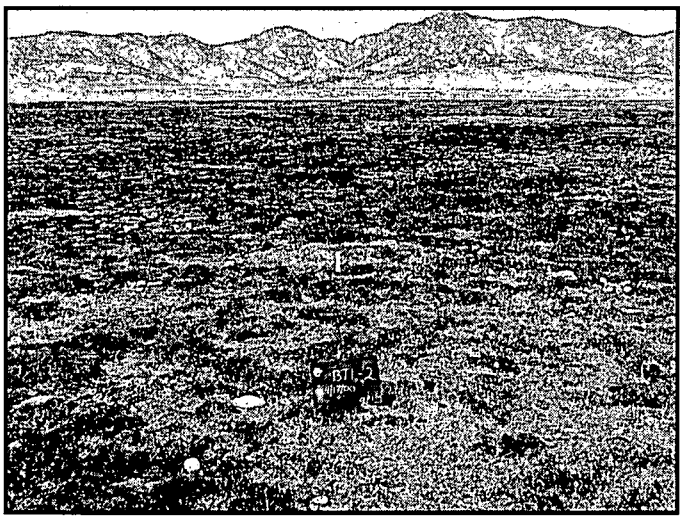
Looking West



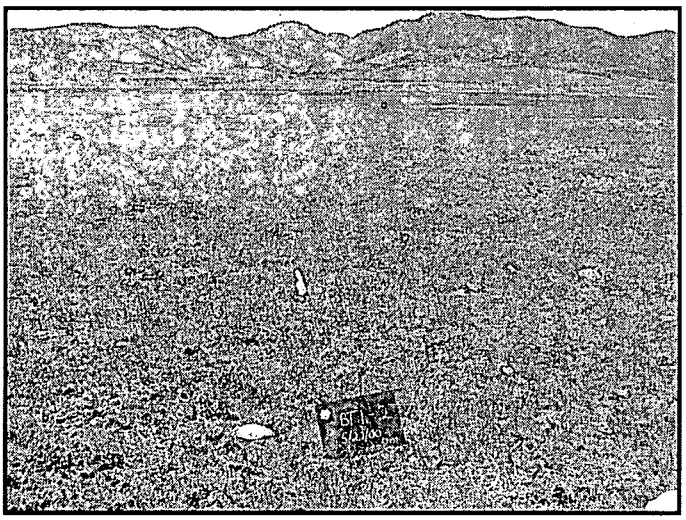
9/14/99



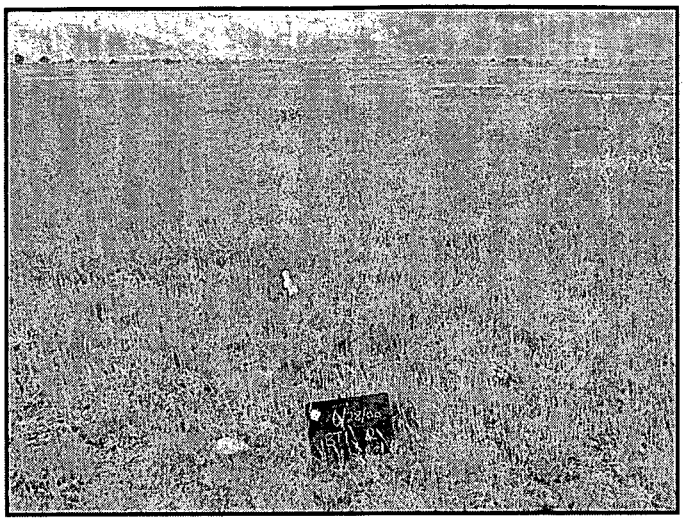
4/7/00



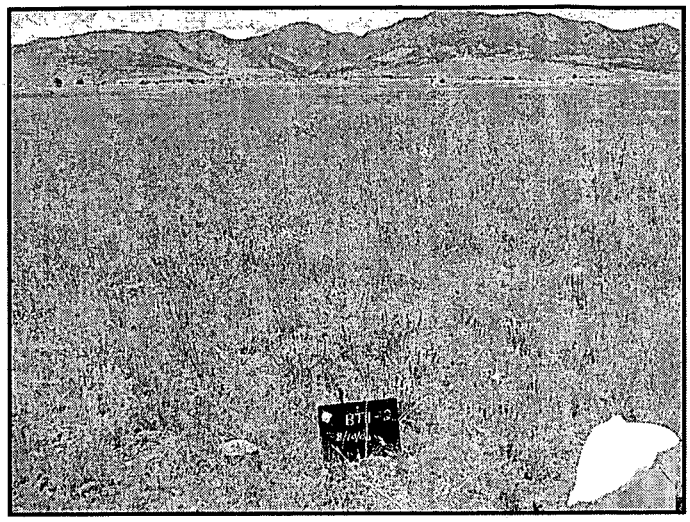
4/17/00



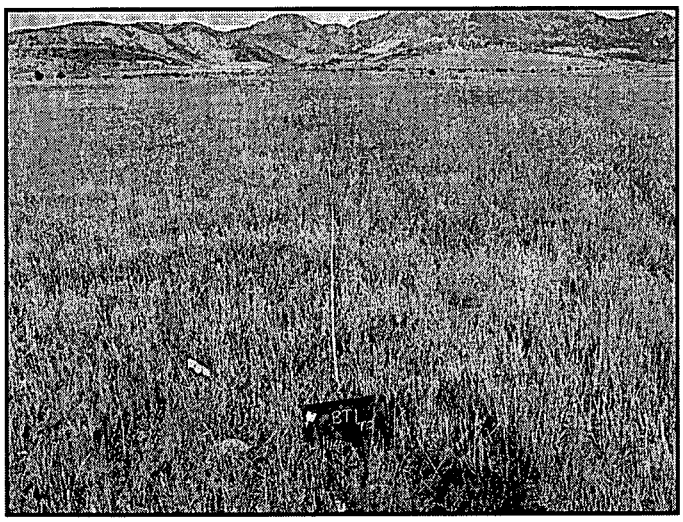
5/22/00



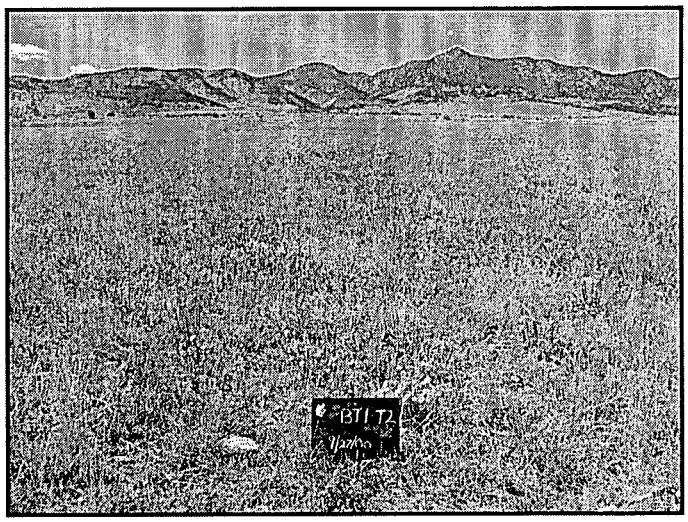
6/28/00



8/10/00



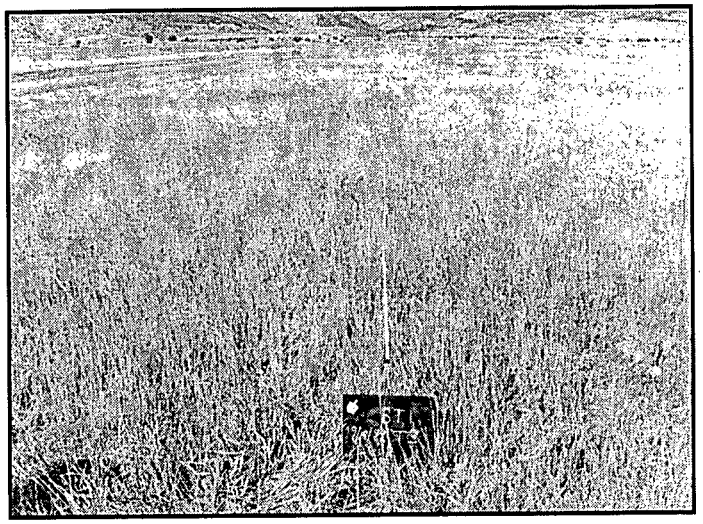
9/5/00



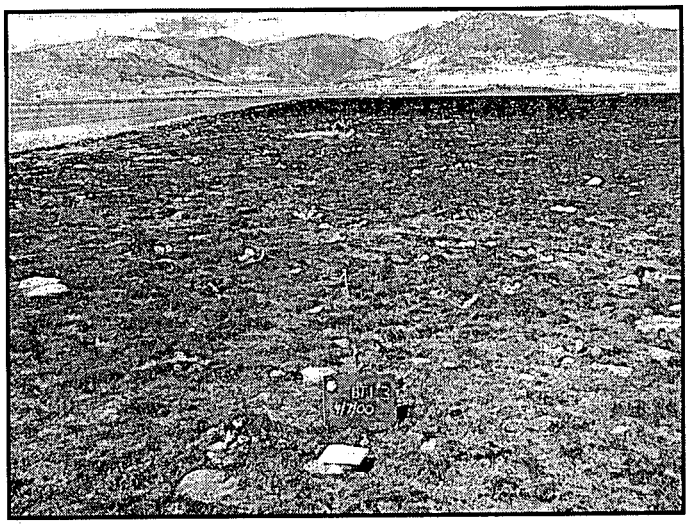
9/27/00

Prescribed Burn Transect BT1 T3

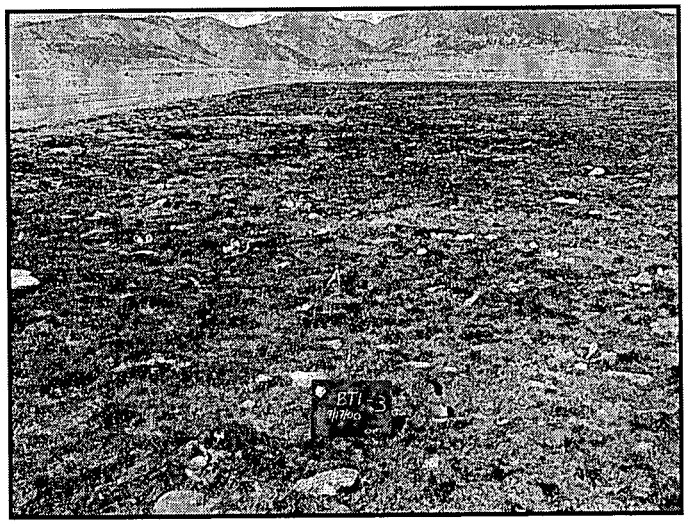
Looking West



9/14/99



4/7/00



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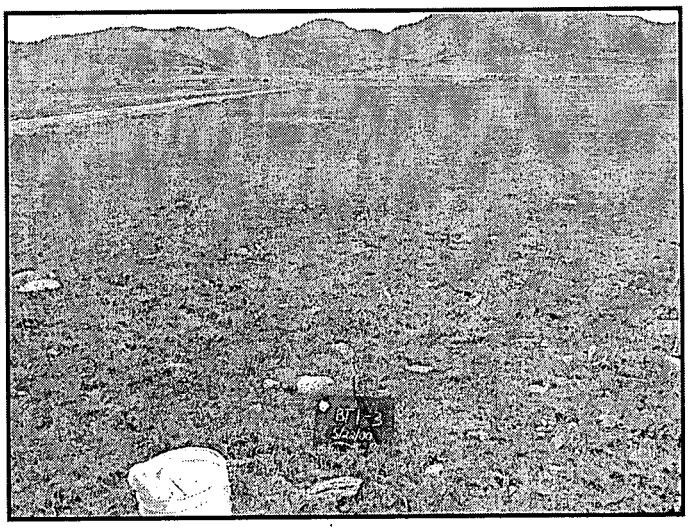
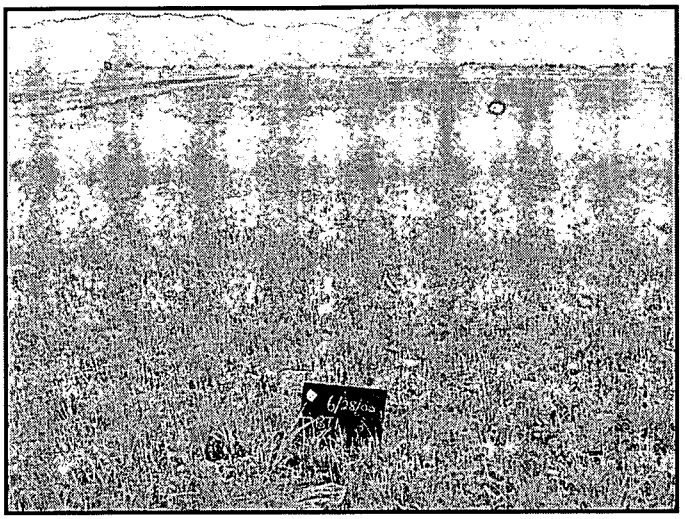
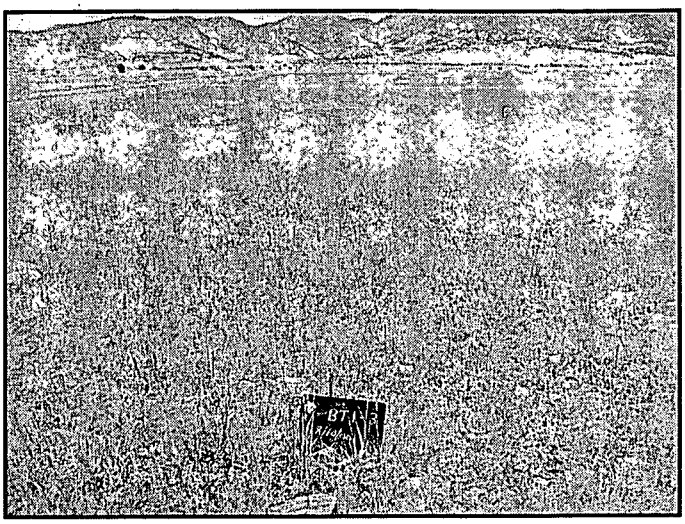


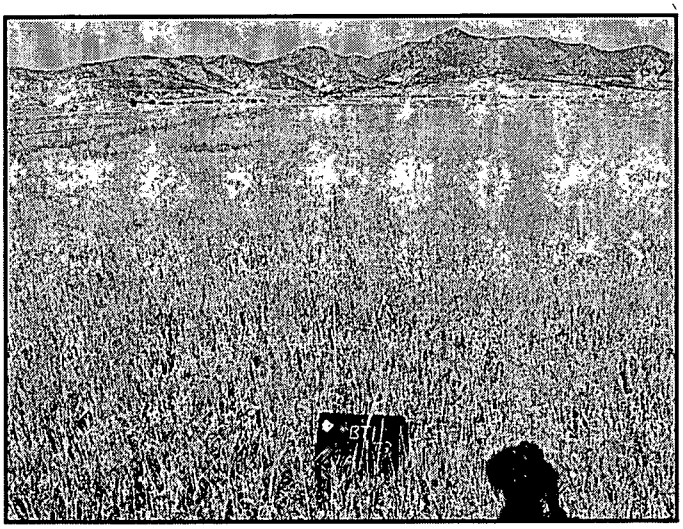
5/22/00



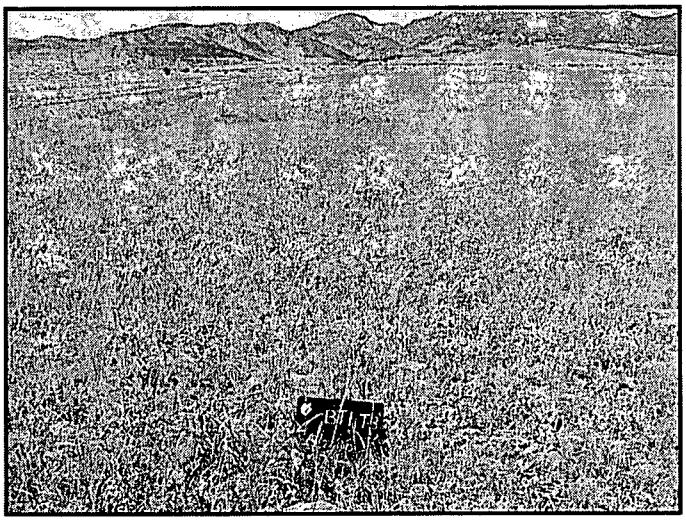
6/28/00



8/10/00



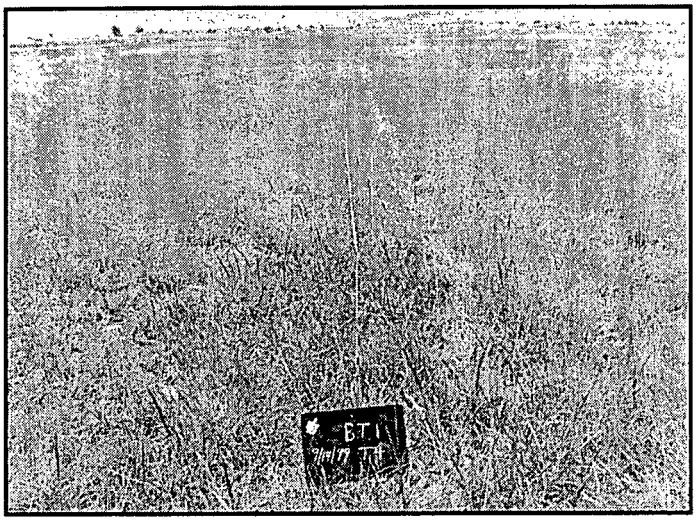
9/5/00



9/27/00

Prescribed Burn Transect BT1 T4

Looking West



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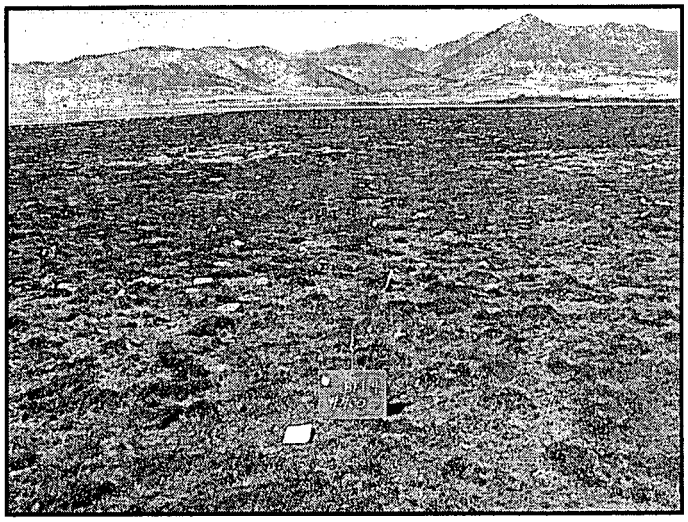

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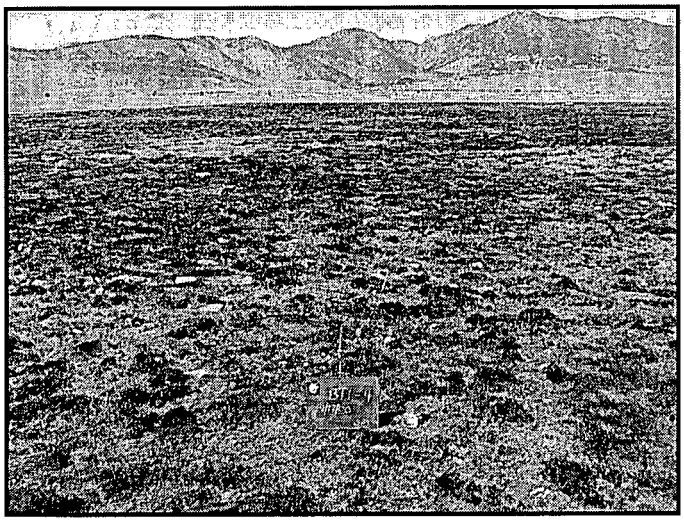

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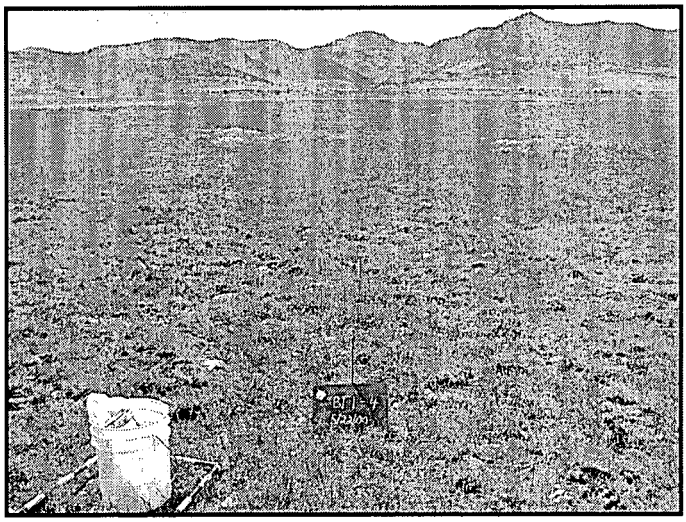

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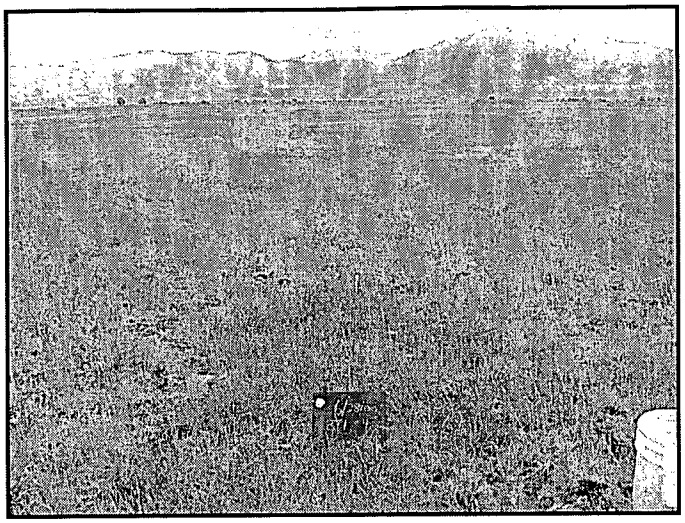

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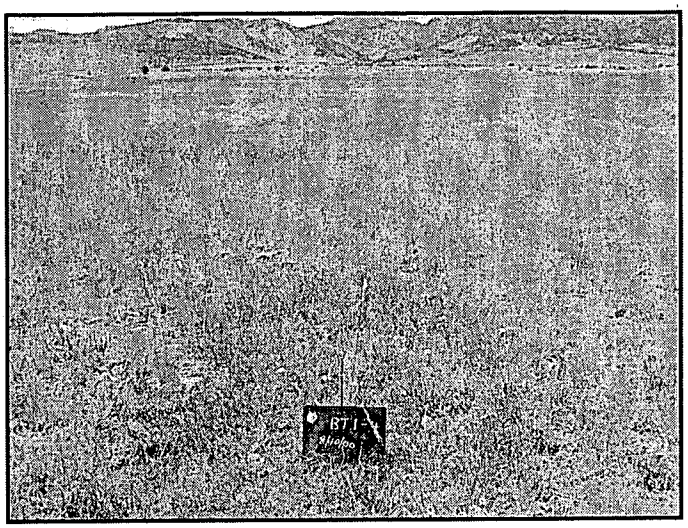

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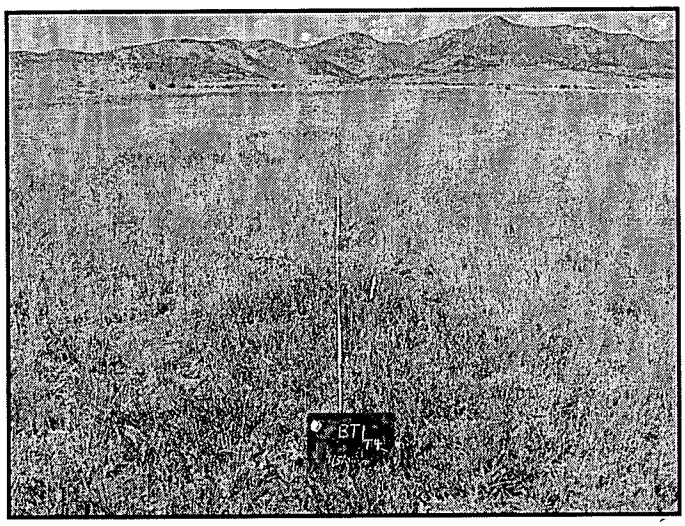

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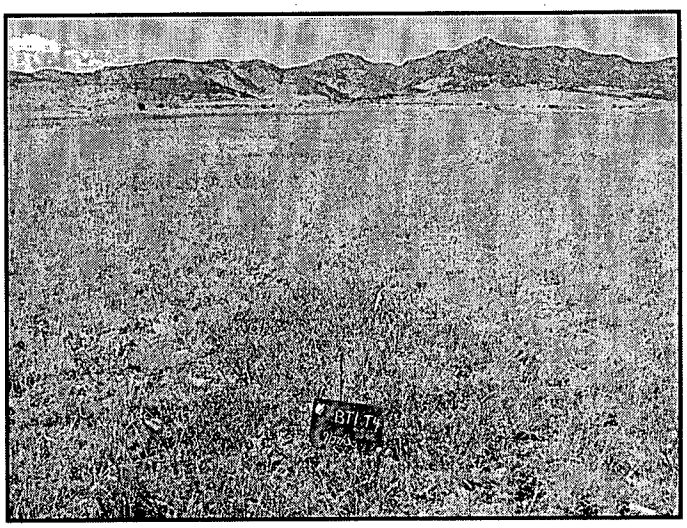
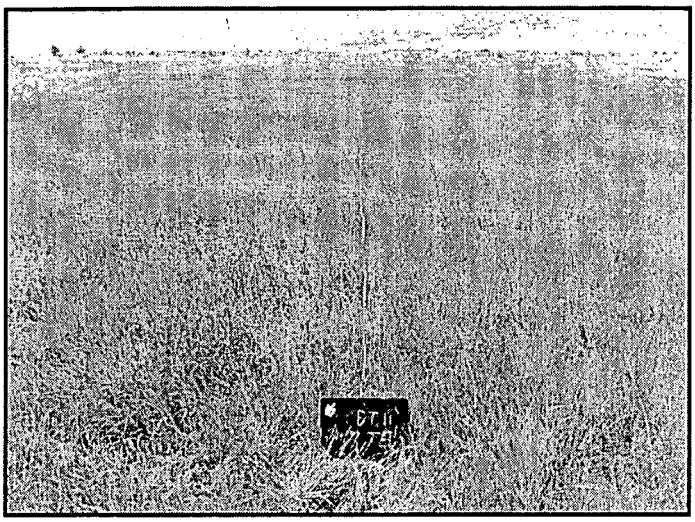


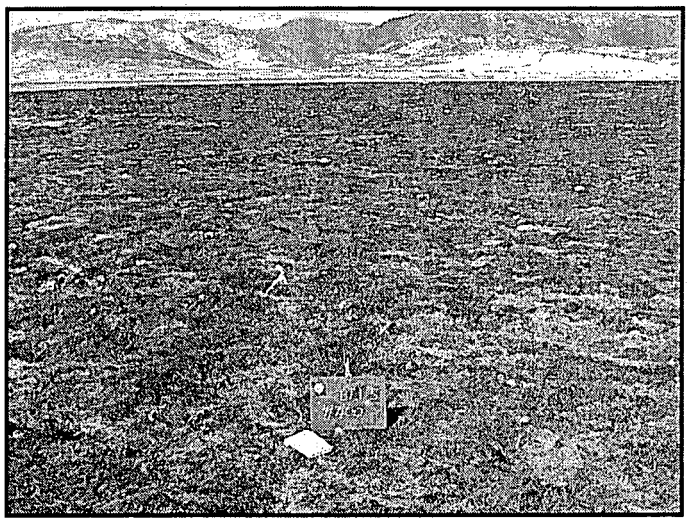
9/27/00

Prescribed Burn Transect BT1 T5

Looking West



9/14/99



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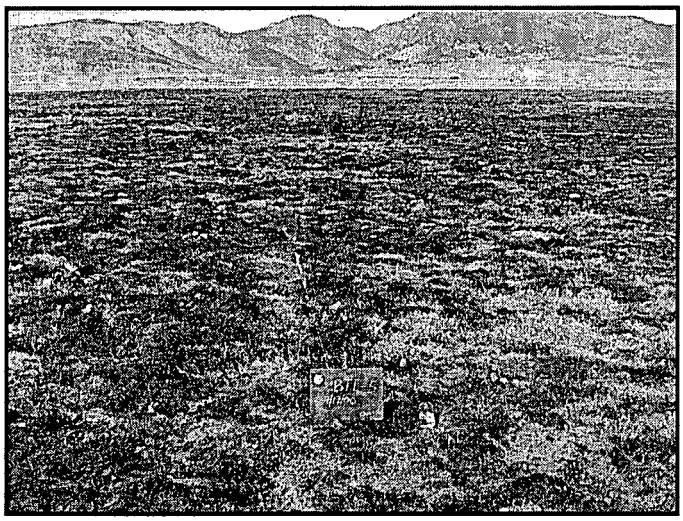

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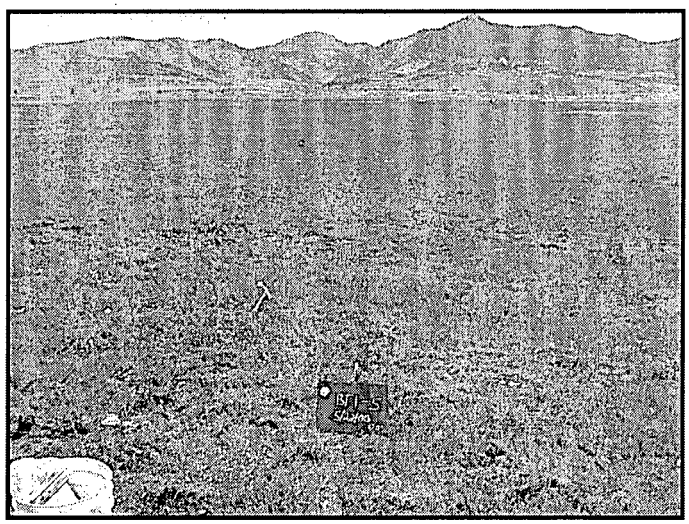

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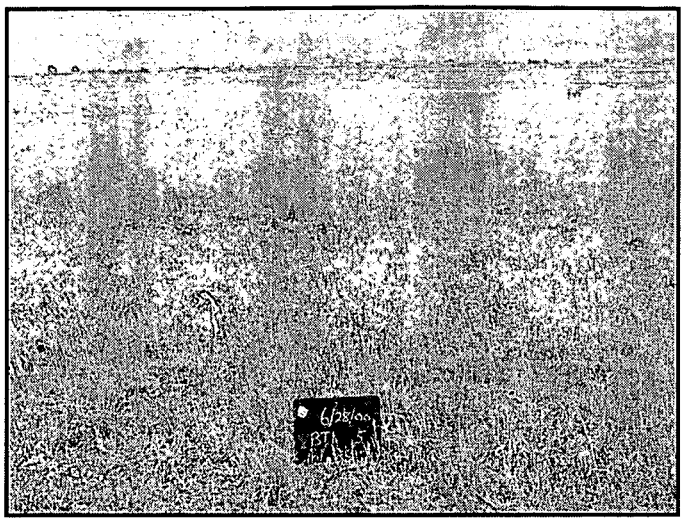

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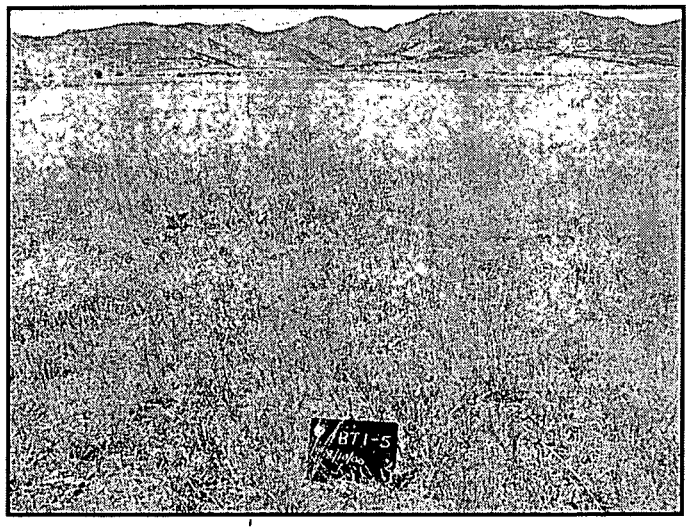
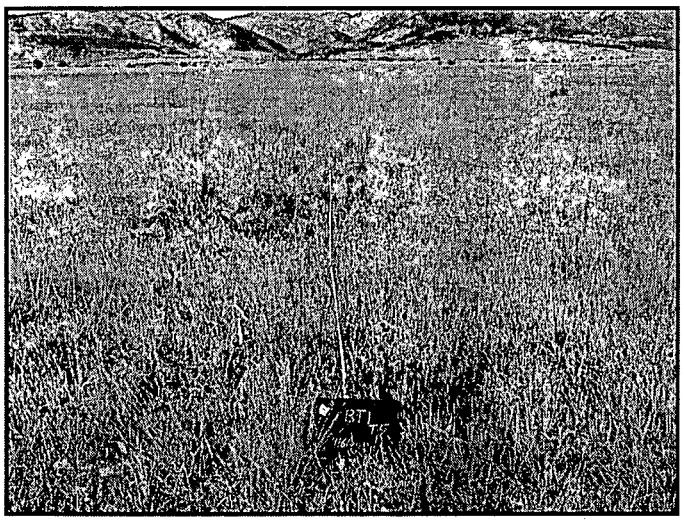


8/10/00



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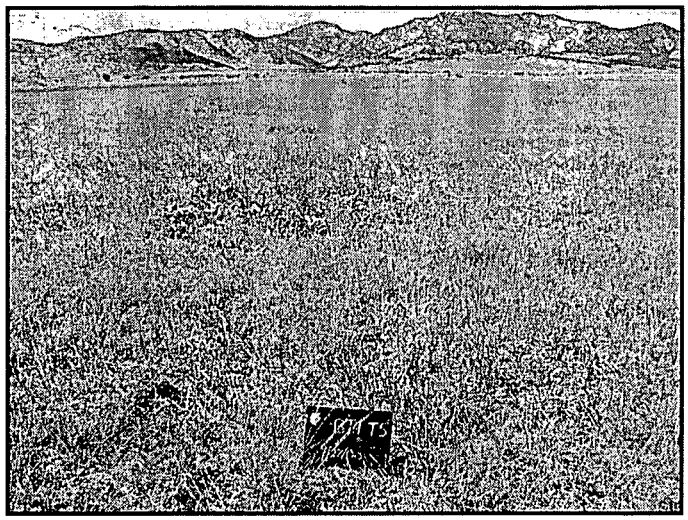
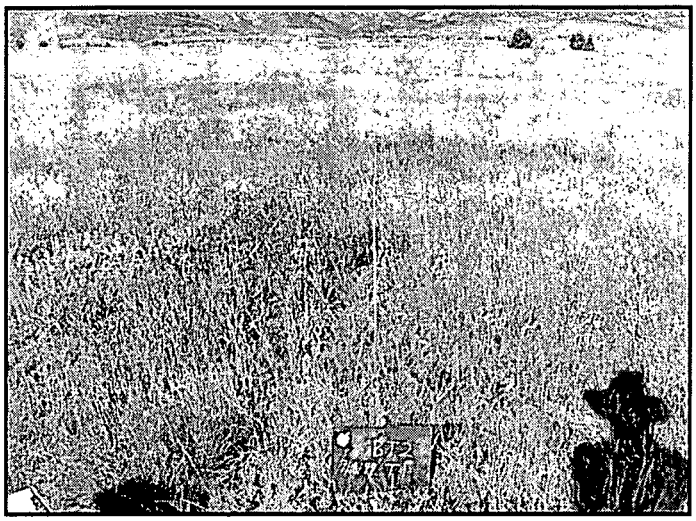


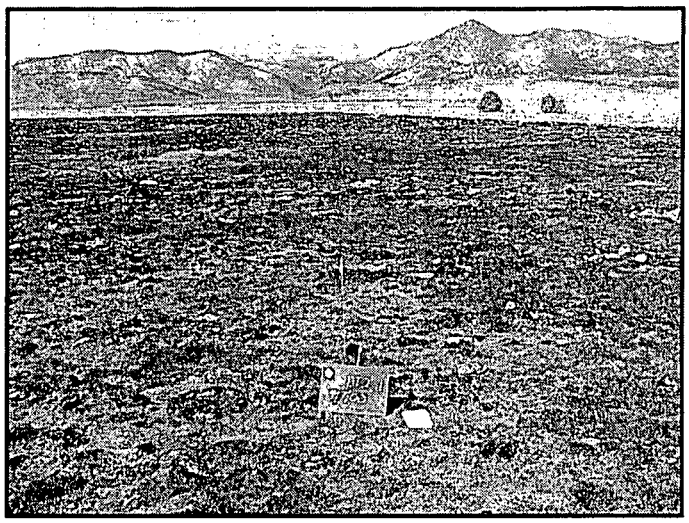
9/27/00

Prescribed Burn Transect BT2 T1

Looking West



9/16/99



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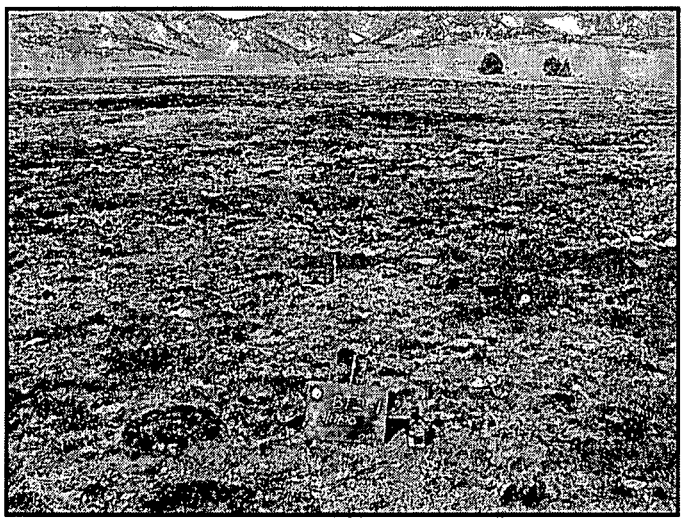

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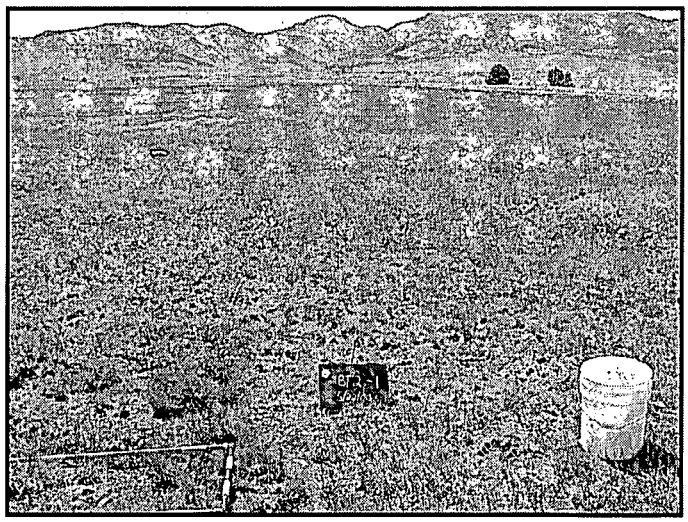

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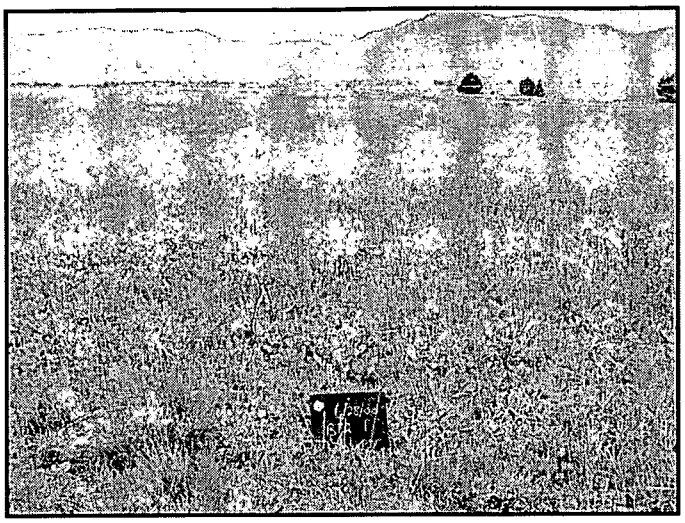

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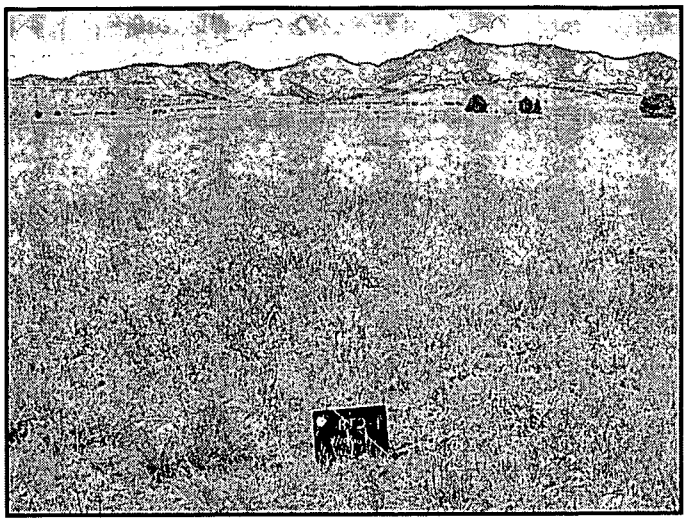
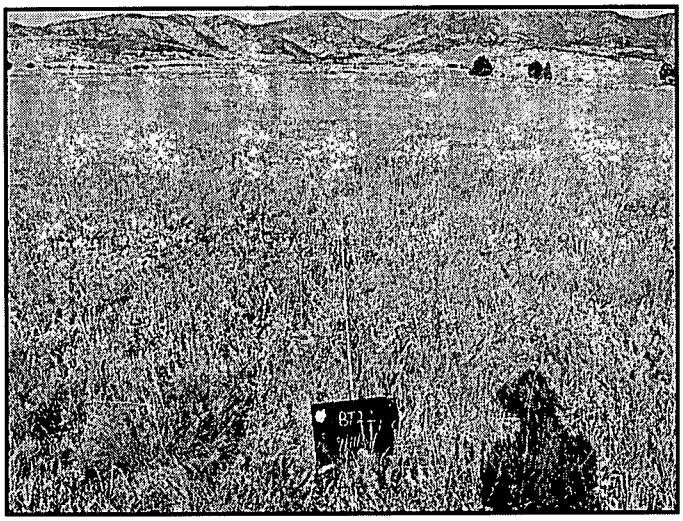
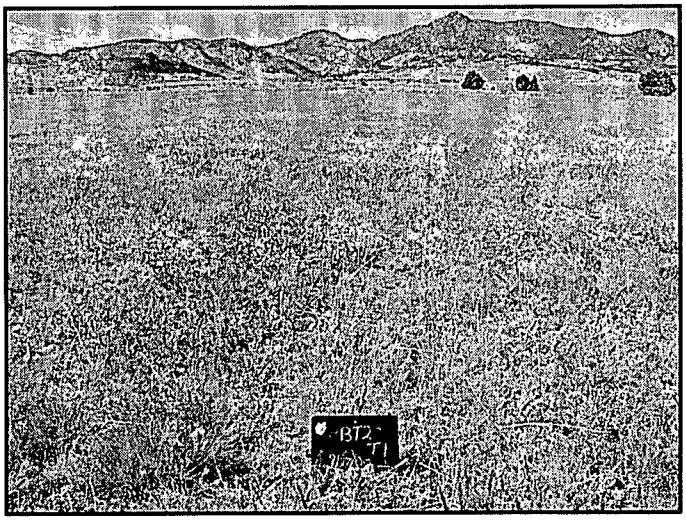


8/10/00



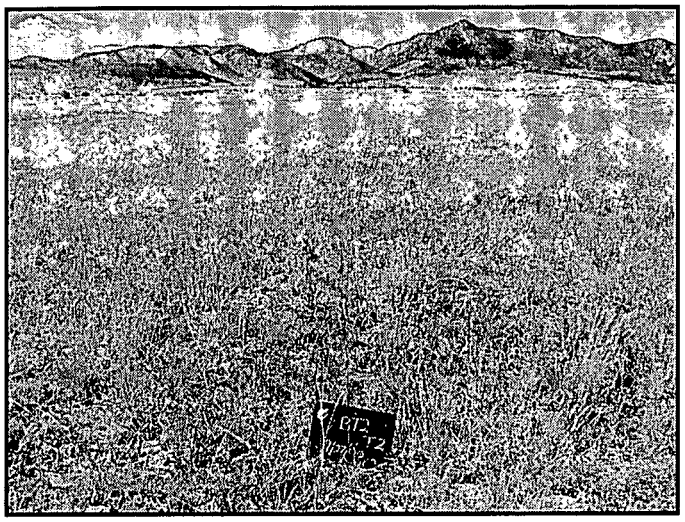
9/11/00



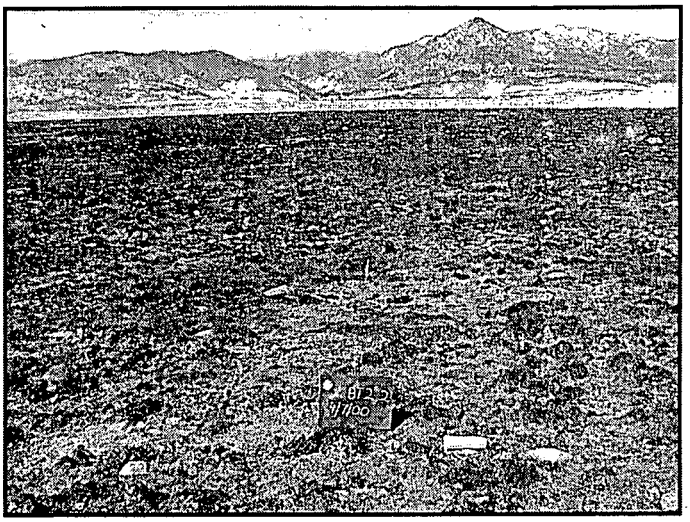
9/27/00

Prescribed Burn Transect BT2 T2

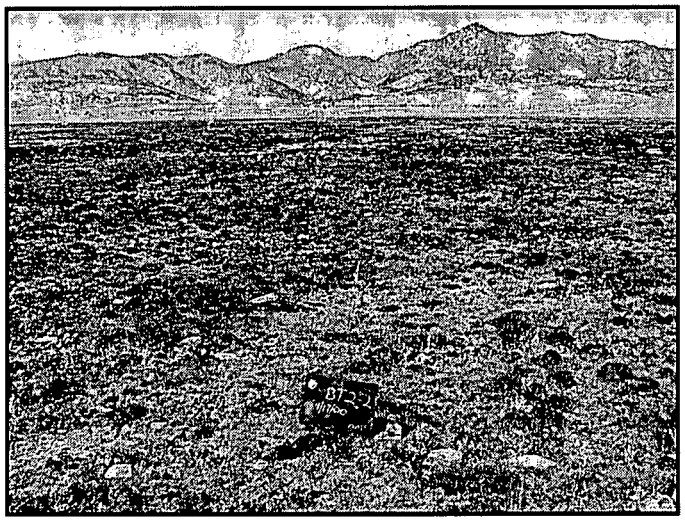
Looking West



9/16/99



4/7/00



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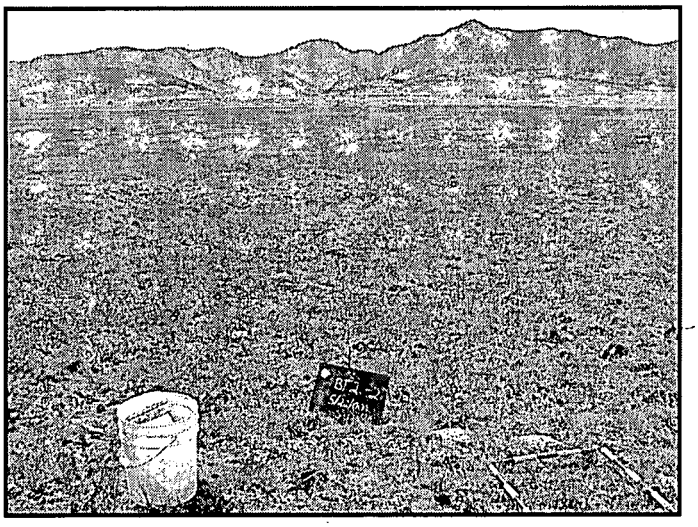
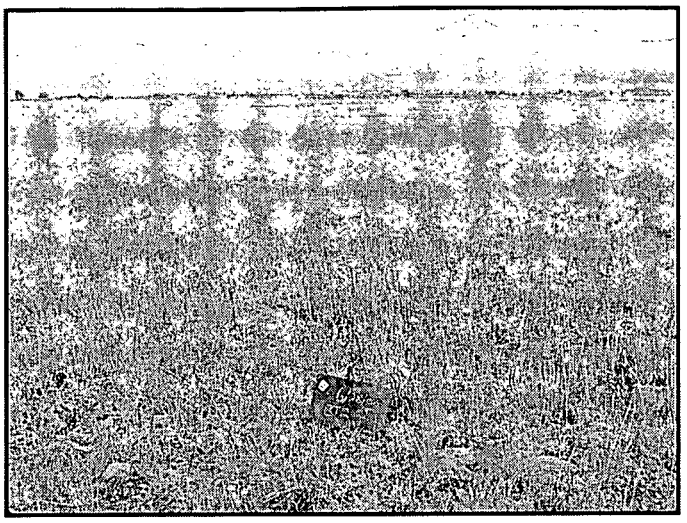
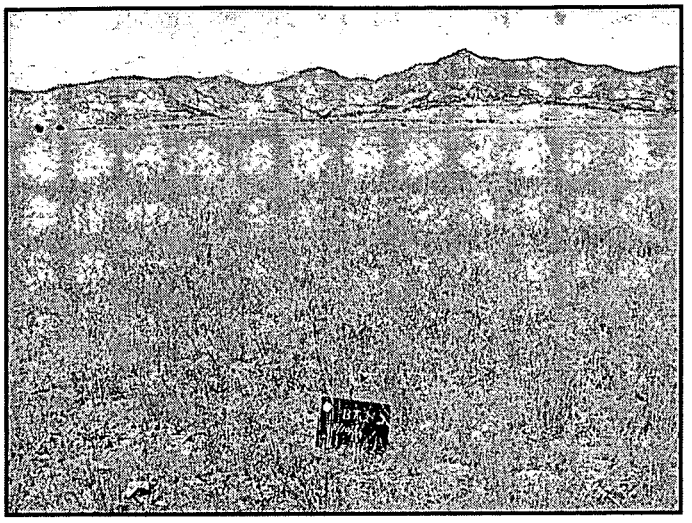


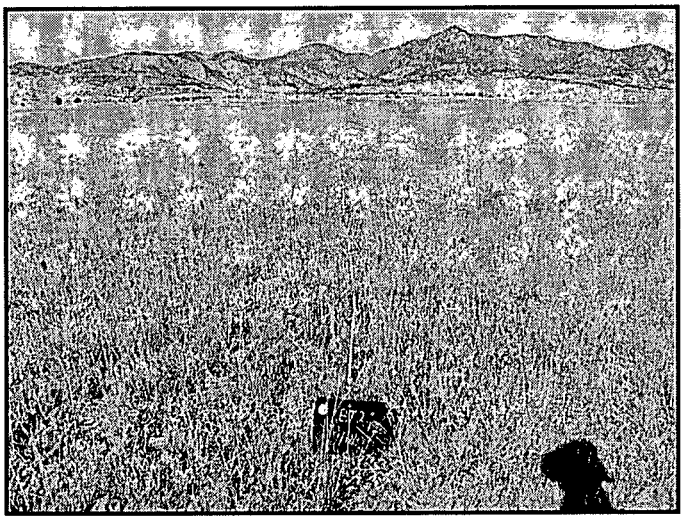
5/22/00



6/28/00



8/10/00



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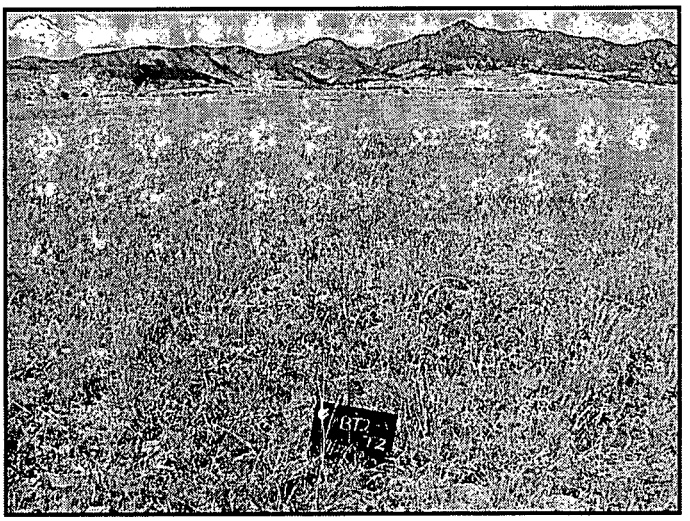
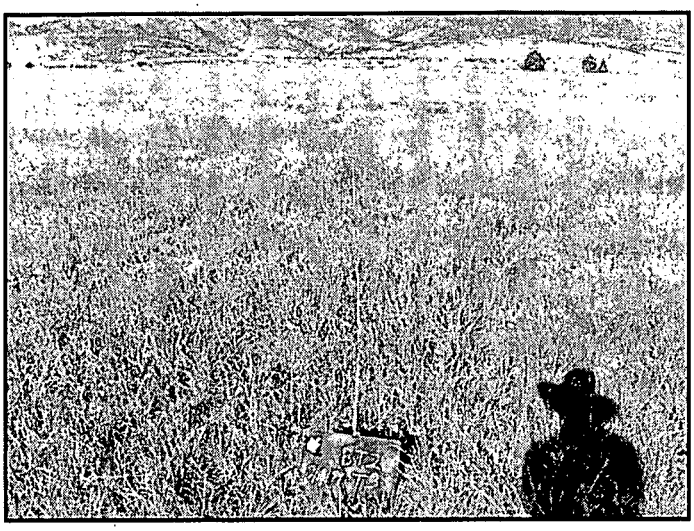


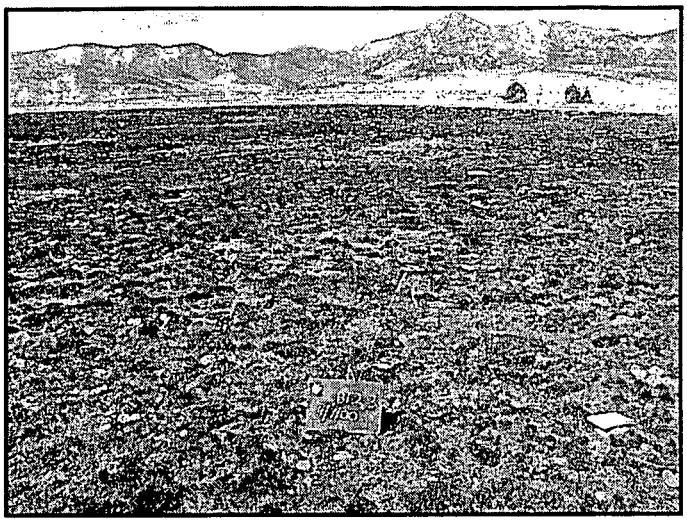
9/27/00

Prescribed Burn Transect BT2 T3

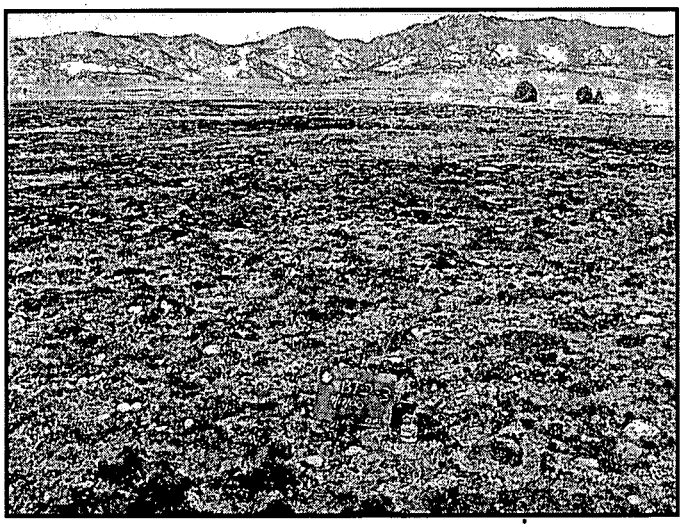
Looking West



9/16/99



4/7/00



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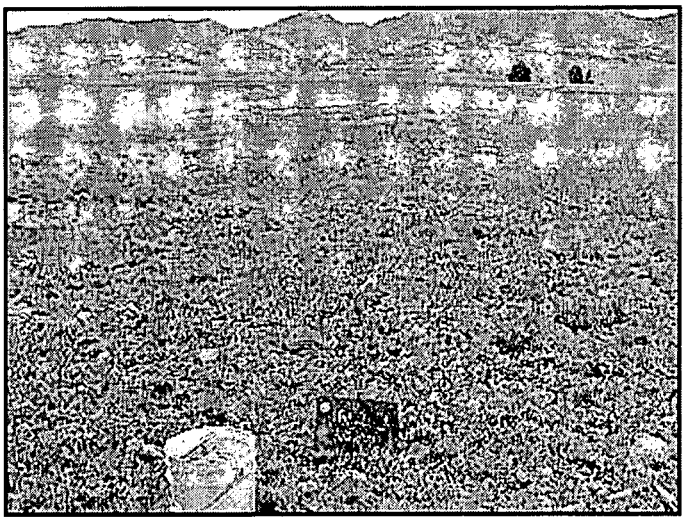

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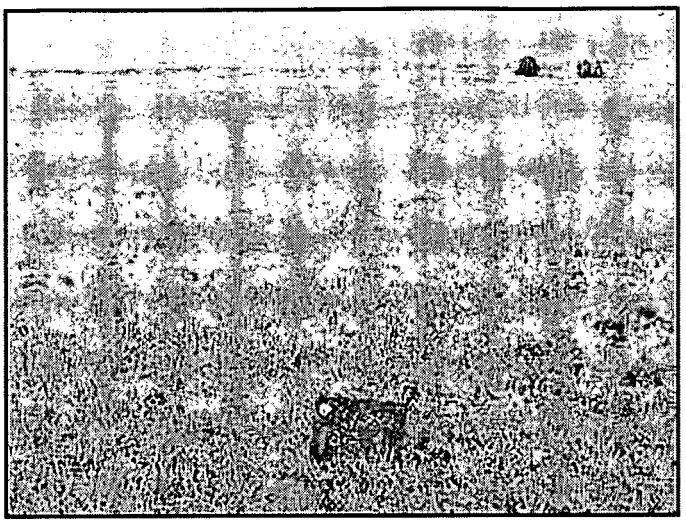

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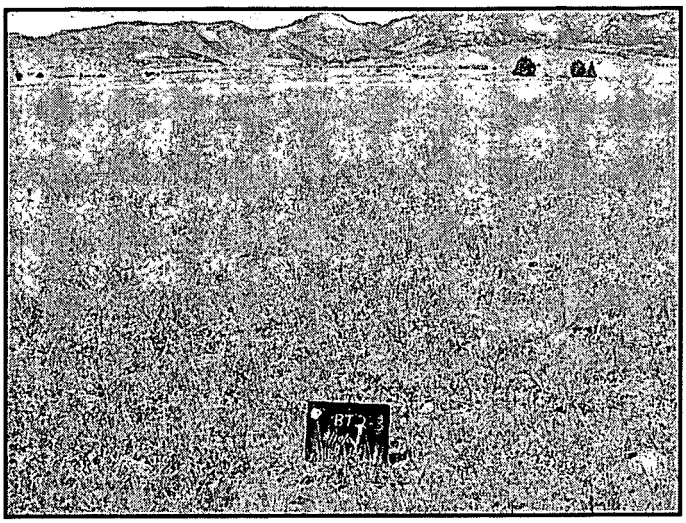

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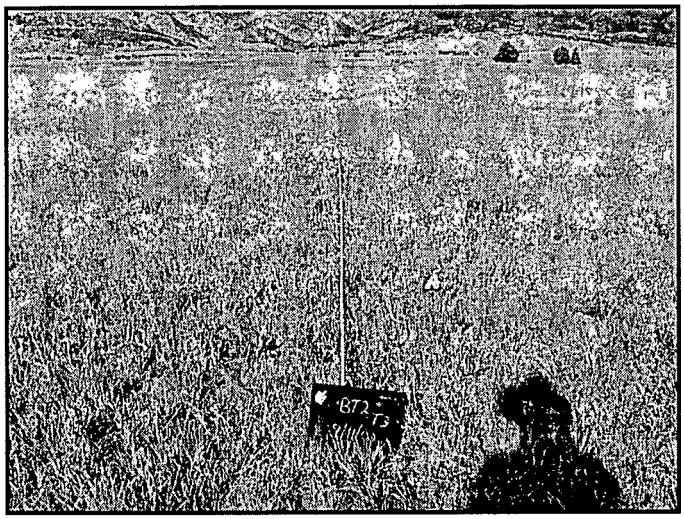

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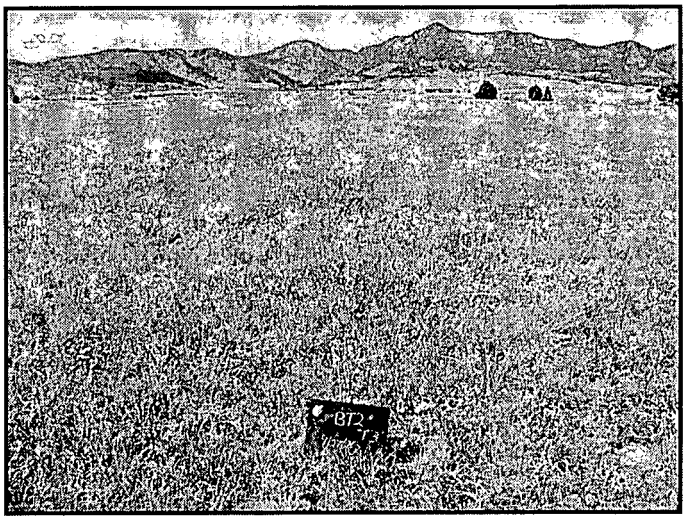
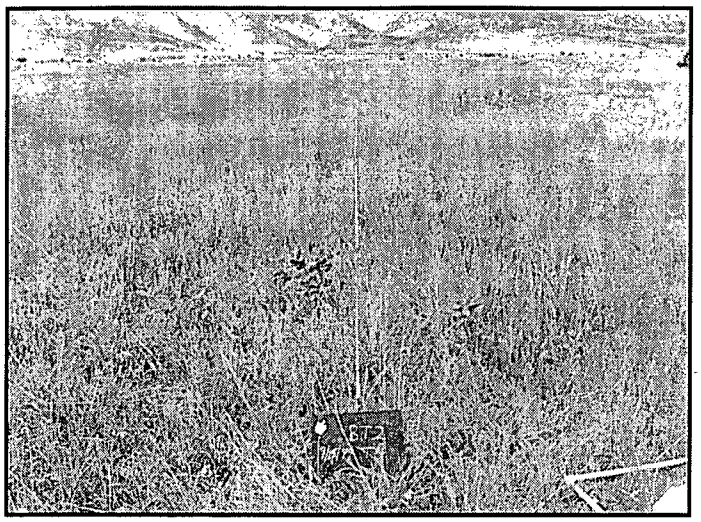


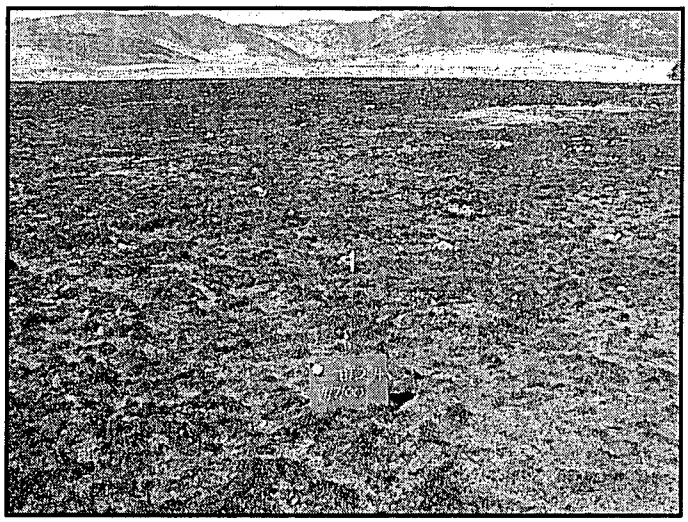
9/27/00

Prescribed Burn Transect BT2 T4

Looking West



9/16/99



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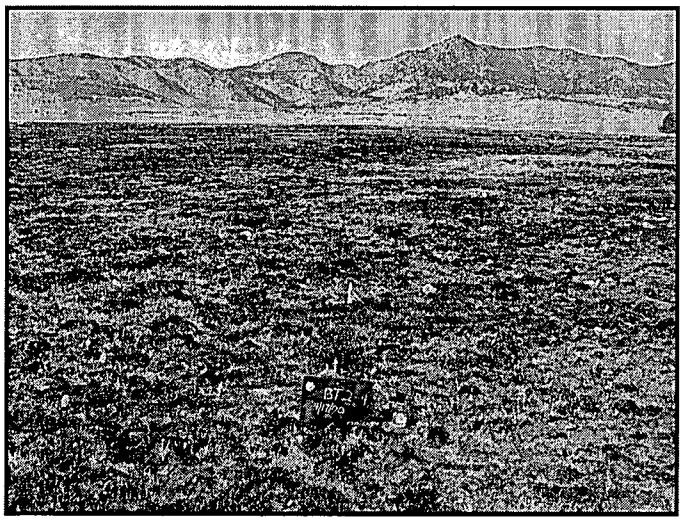

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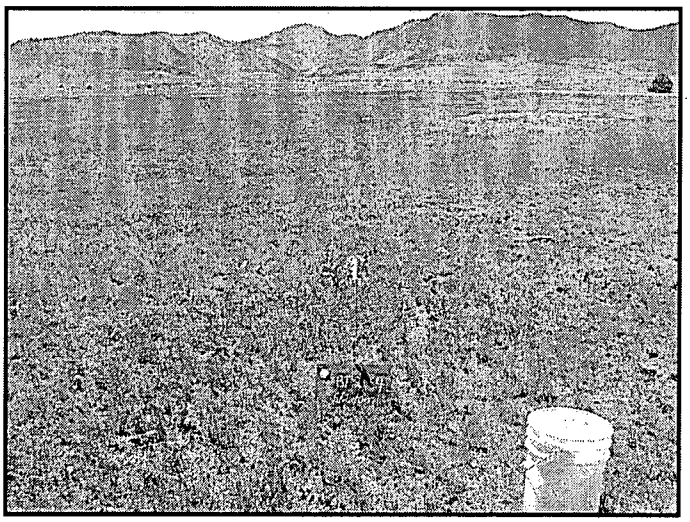

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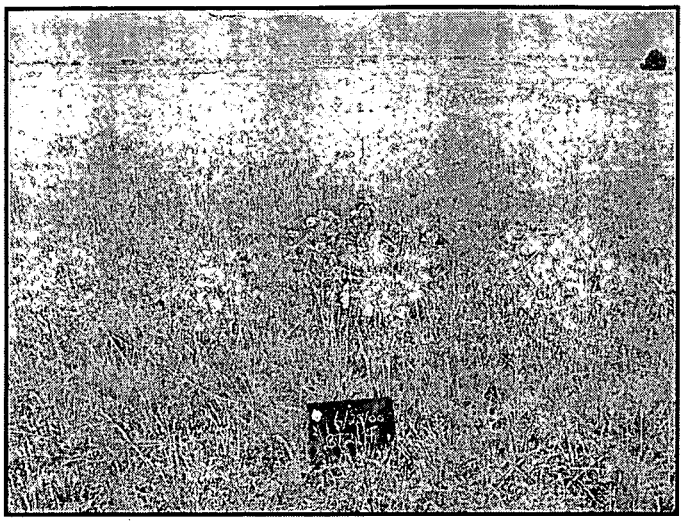
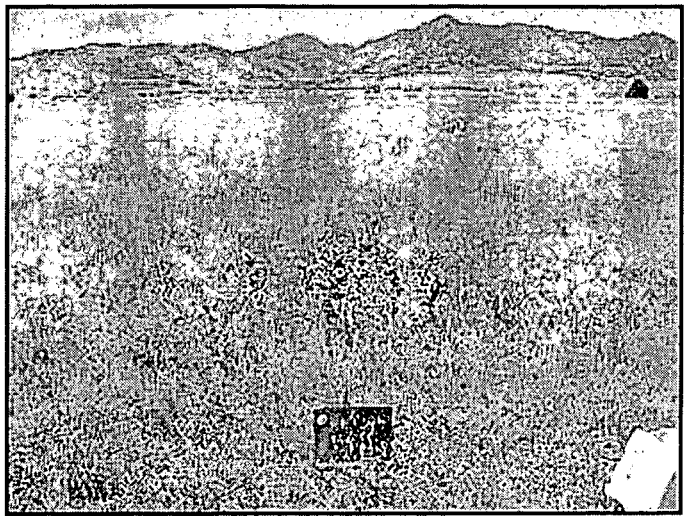


6/28/00



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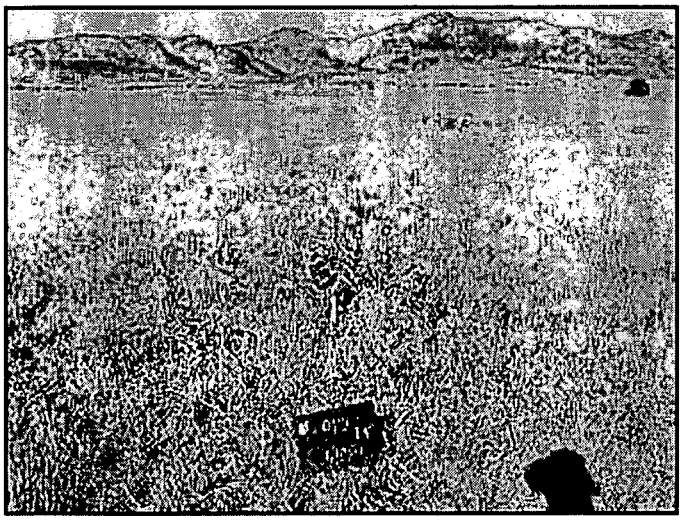

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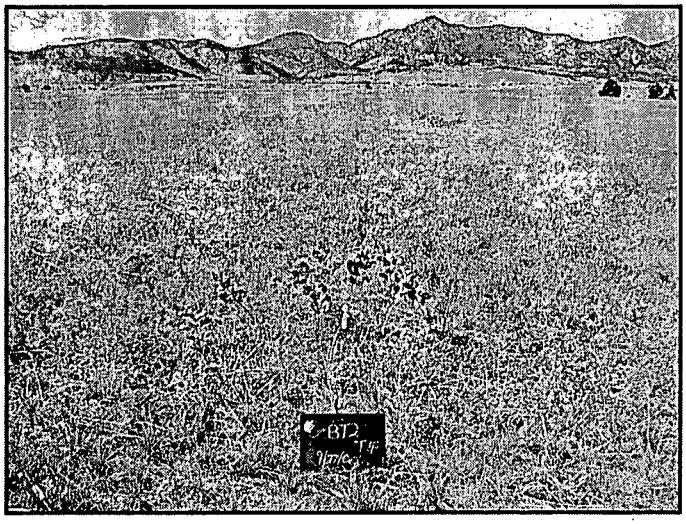
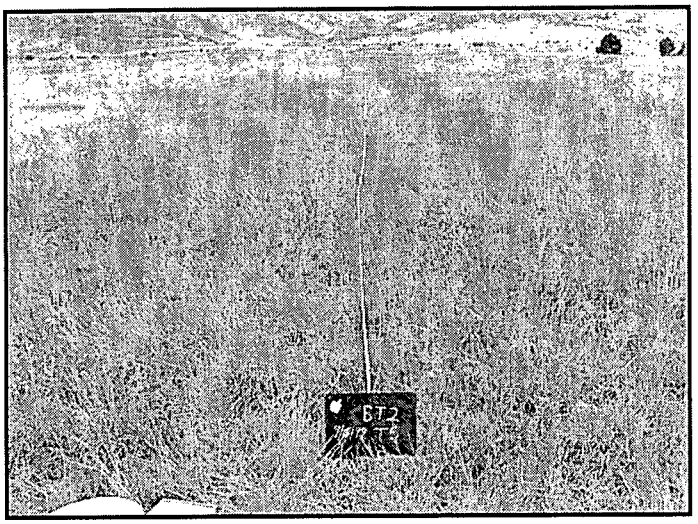


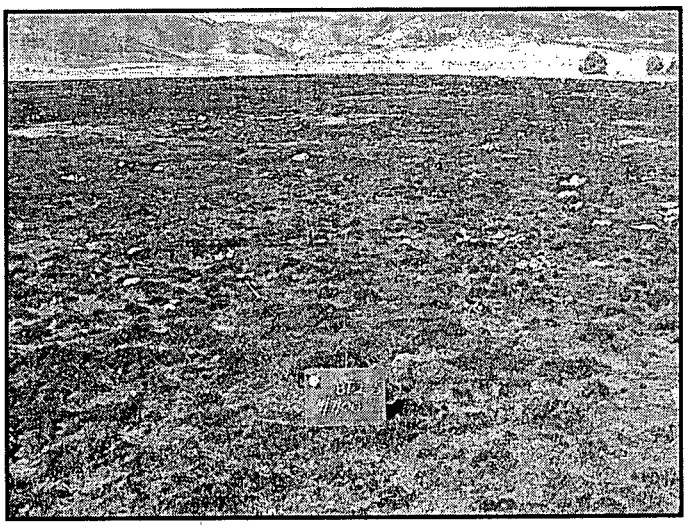
9/27/00

Prescribed Burn Transect BT2 T5

Looking West



9/16/99



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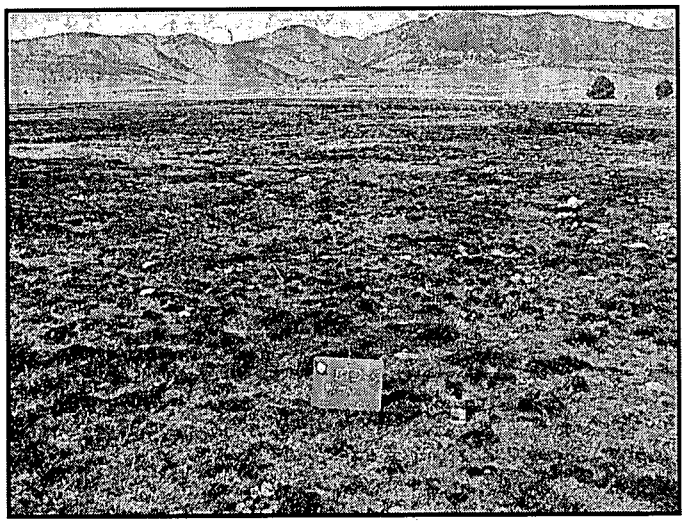
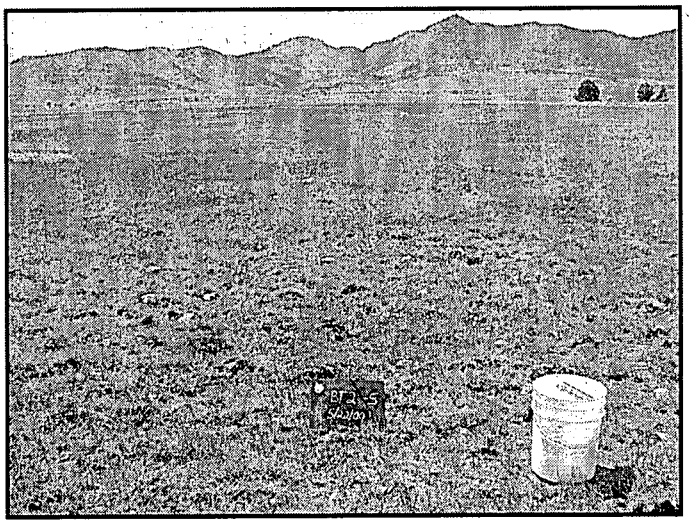


4/17/00



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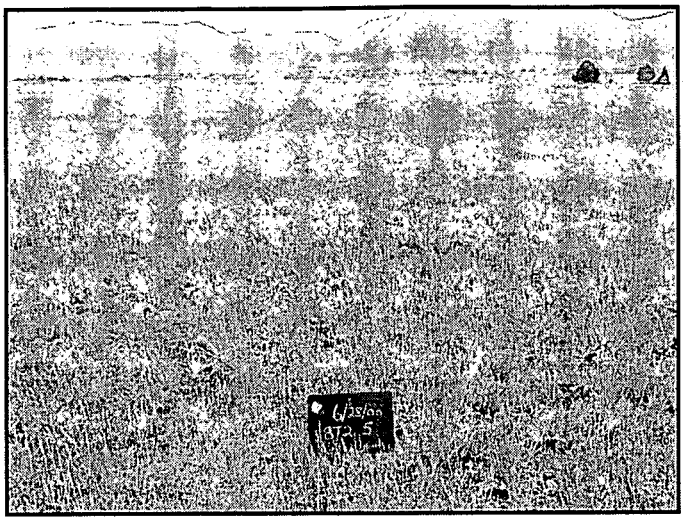
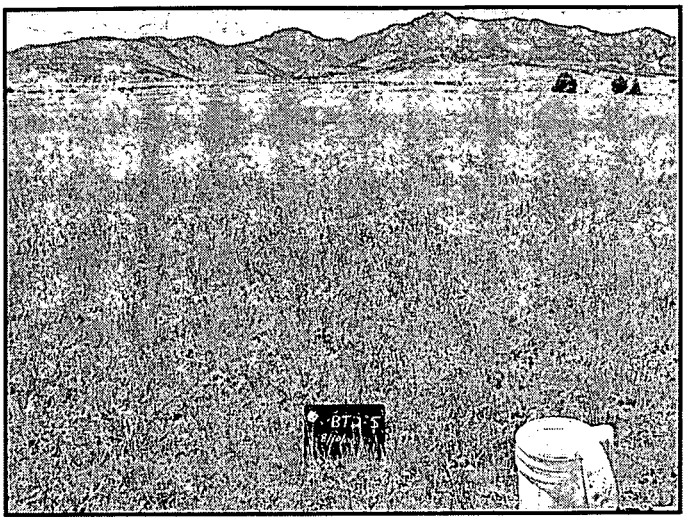
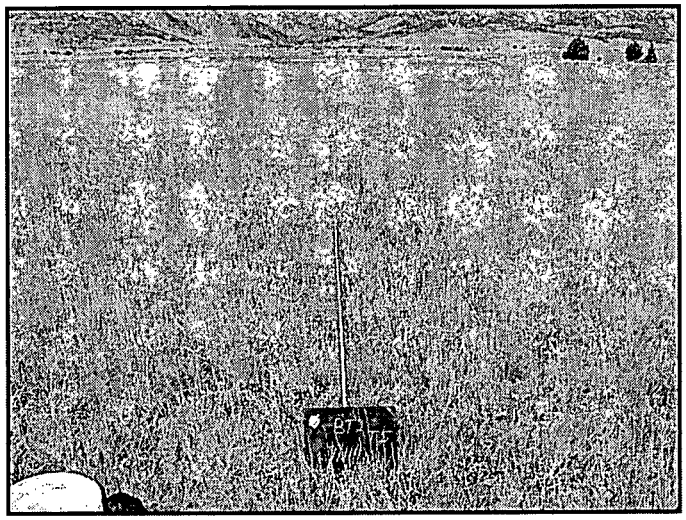


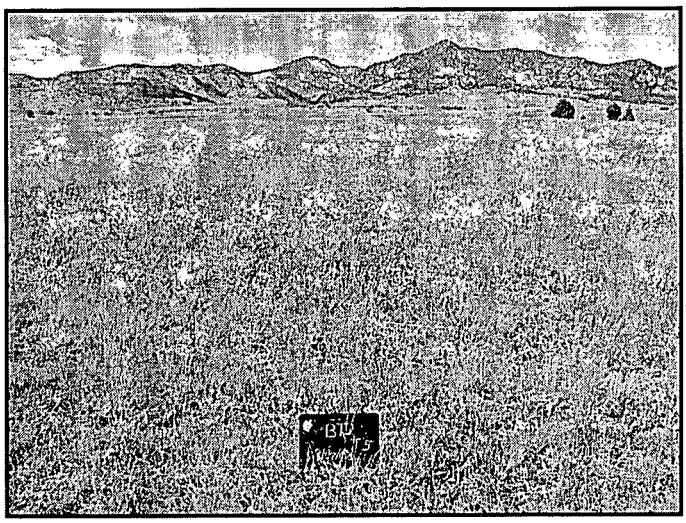
6/28/00



8/10/00

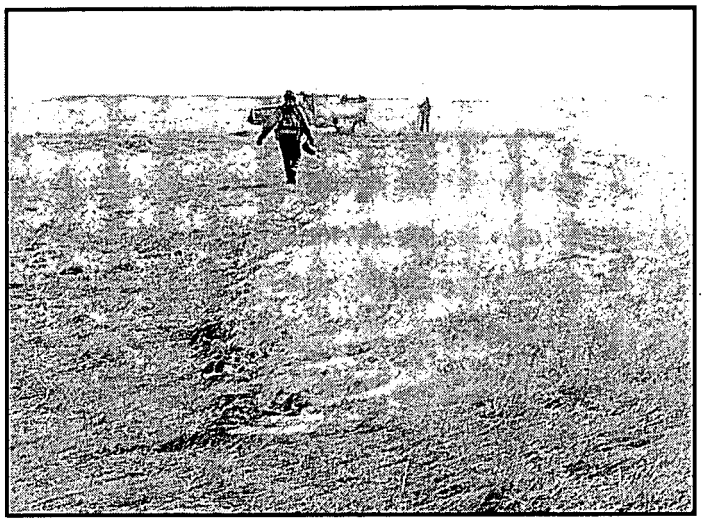


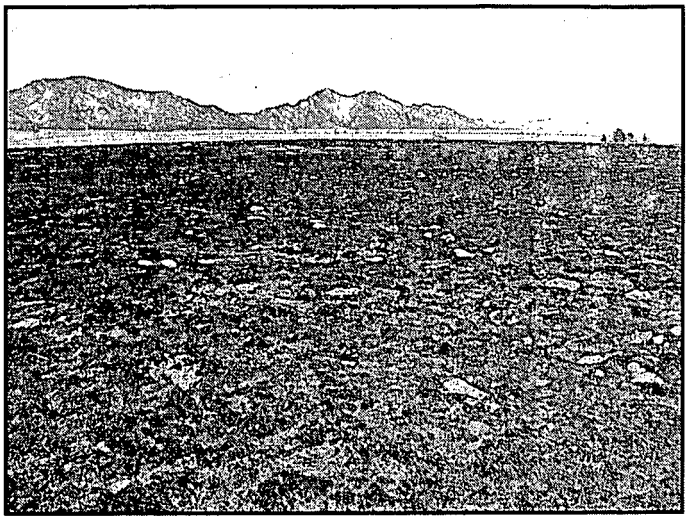
9/11/00



9/27/00

April 6, 2000 Prescribed Burn at the Rocky Flats Environmental Technology Site





On April 6, 2000, a prescribed burn (test burn) was conducted on the xeric tallgrass prairie at the Rocky Flats Environmental Technology Site (Site) by the U.S. Forest Service. Photographic documentation was conducted of the prescribed burn itself and to document visually the recovery of the vegetation in the burn area. The photo monitoring results incorporate three types of views: landscape, transect, and quadrat. Landscape views were taken from various locations around the perimeter and in the center of the burn area. Transect views were taken at the vegetation monitoring transects to compliment quantitative vegetation data. Quadrat views were taken of the ground's surface and later used to estimate total vegetation cover. Additionally, photos from the day of the prescribed burn are also available for viewing. Click on one of the choices below to view the photographs in that category.

Prescribed Burn Photos

Landscape Time-Series Photos

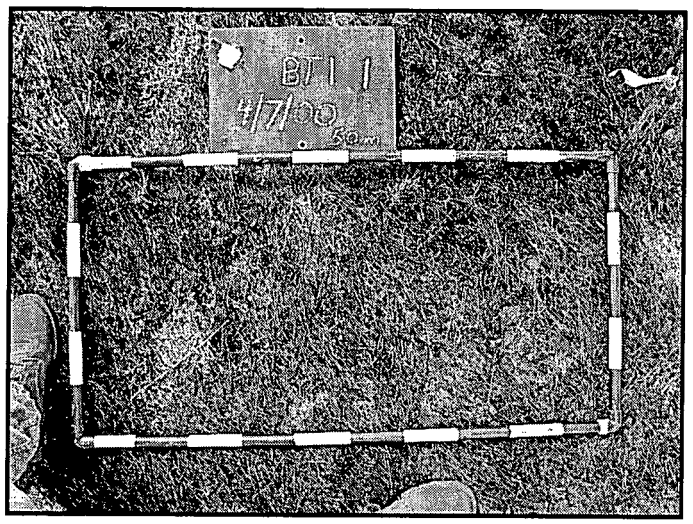
Transect Time-Series Photos

Quadrat Time-Series Photos

Return Home

2000 Prescribed Burn Quadrat Monitoring Photographs

Select one of the quadrats below to view a time-series of the burn recovery.



Quadrat BT1 T1

Quadrat BT1 T2

Quadrat BT1 T3

Quadrat BT1 T4

Quadrat BT1 T5

Quadrat BT2 T1

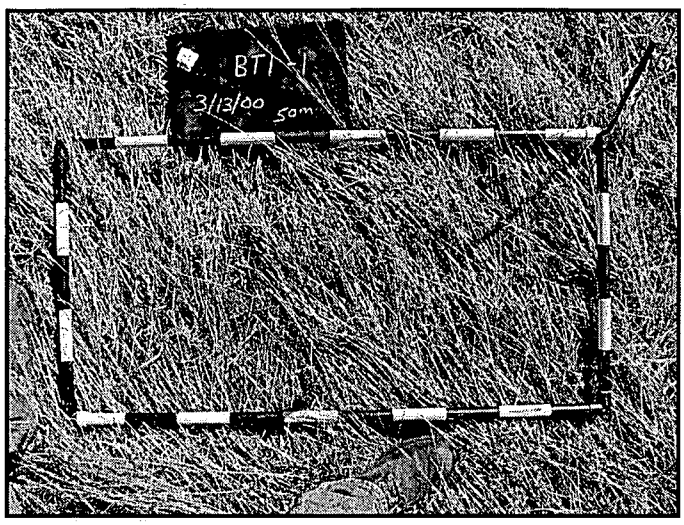
Quadrat BT2 T2

Quadrat BT2 T3

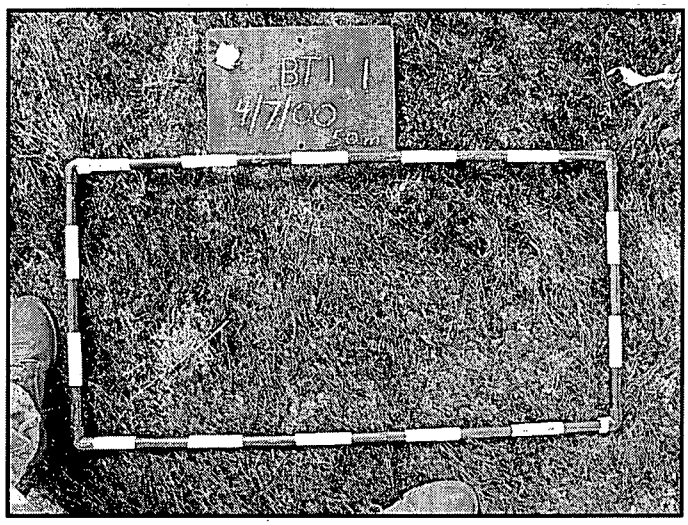
Quadrat BT2 T4

Quadrat BT2 T5

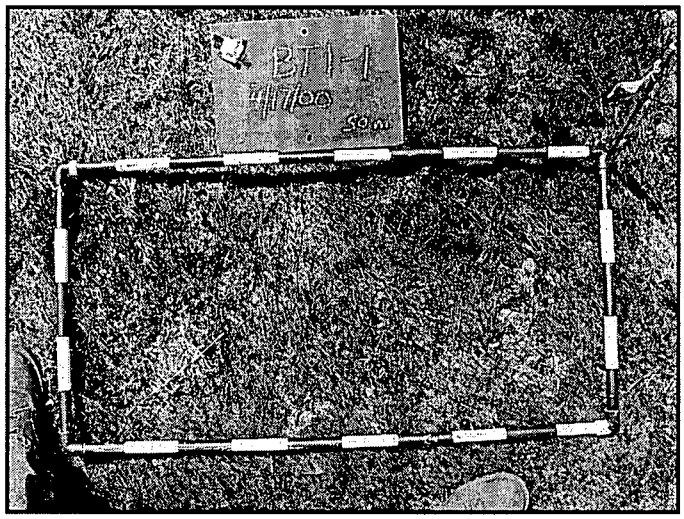
Prescribed Burn Quadrat BT1 T1



3/13/00



4/7/00



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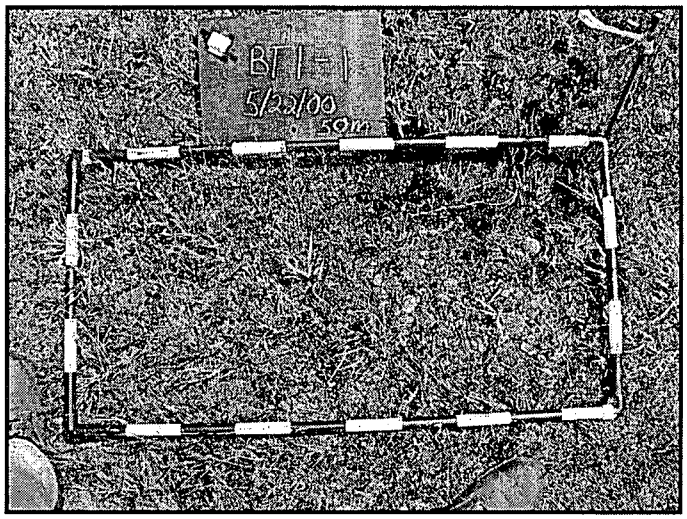

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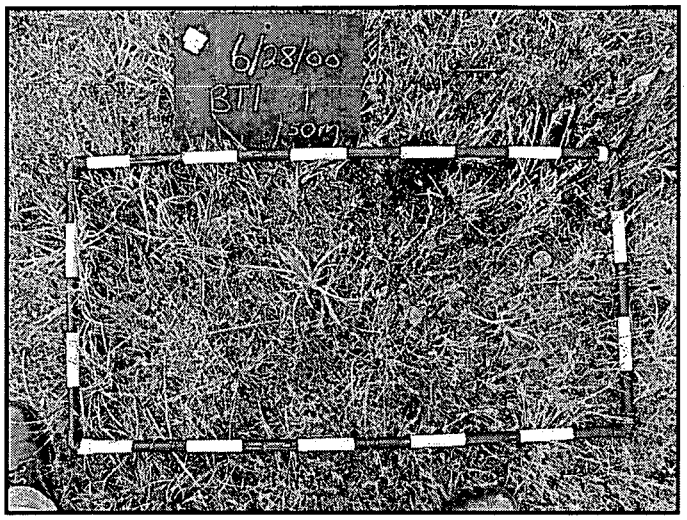
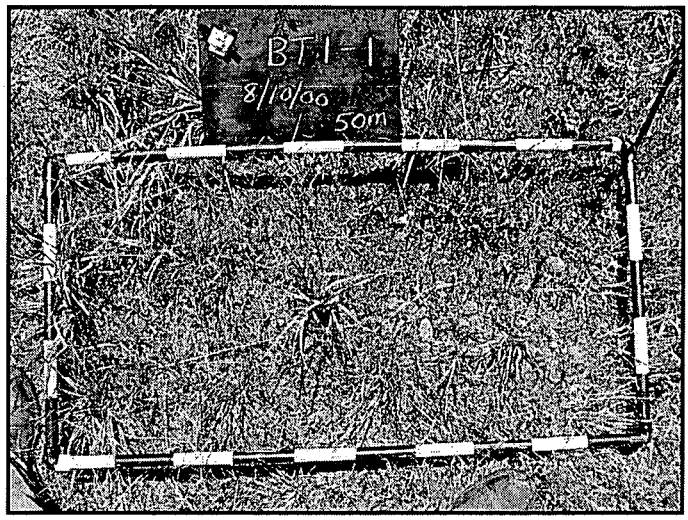
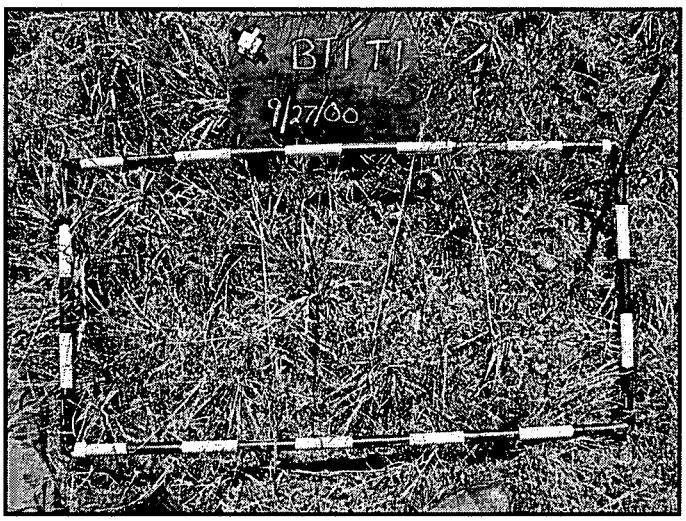


6/28/00

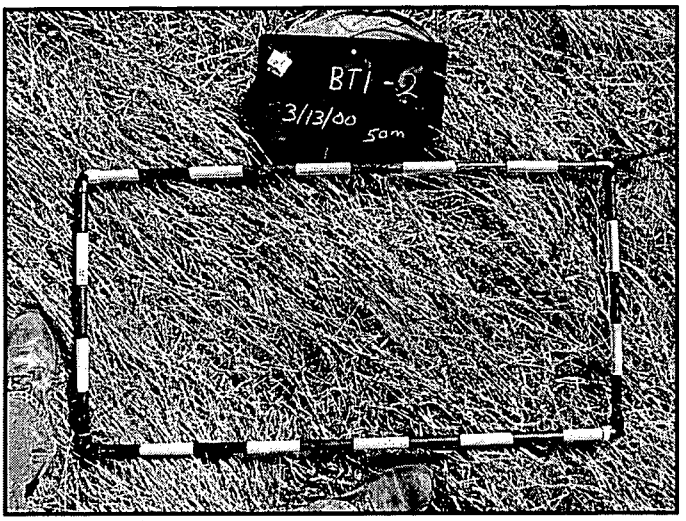


8/10/00



9/27/00

Prescribed Burn Quadrat BT1 T2



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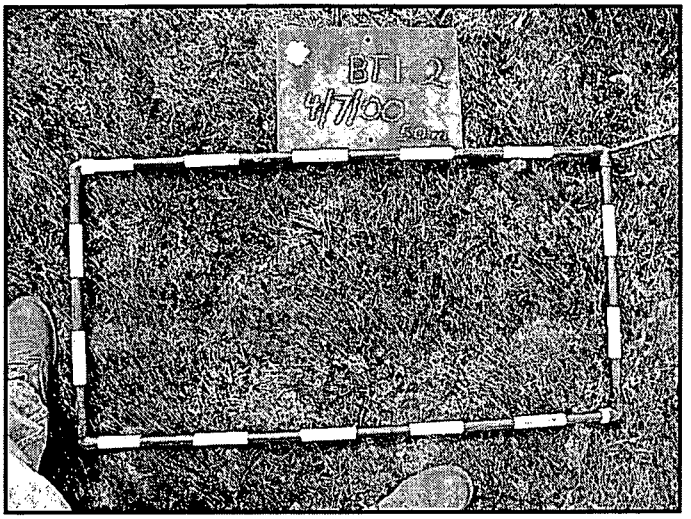

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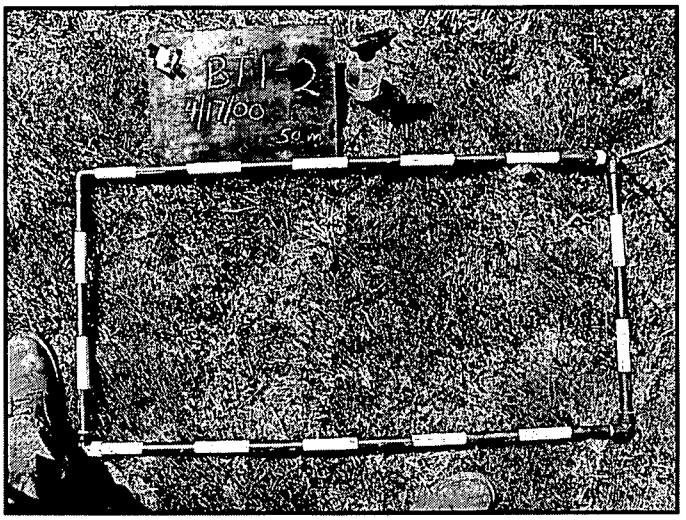

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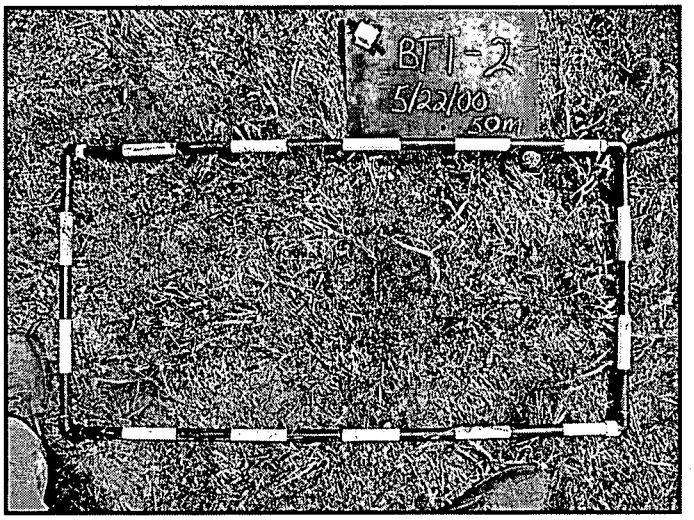

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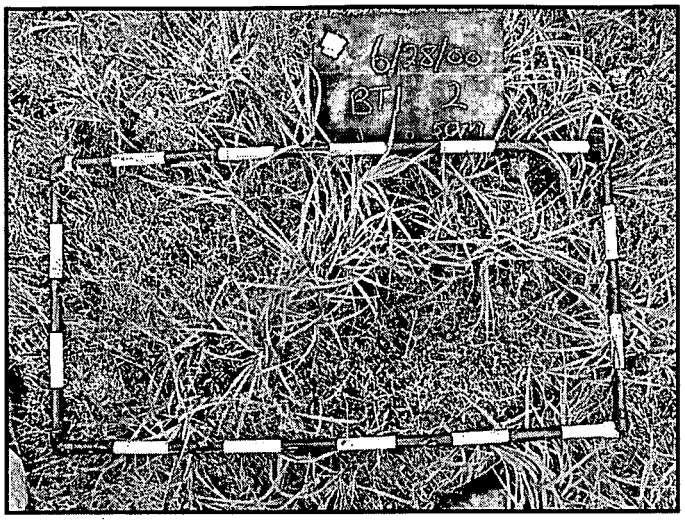

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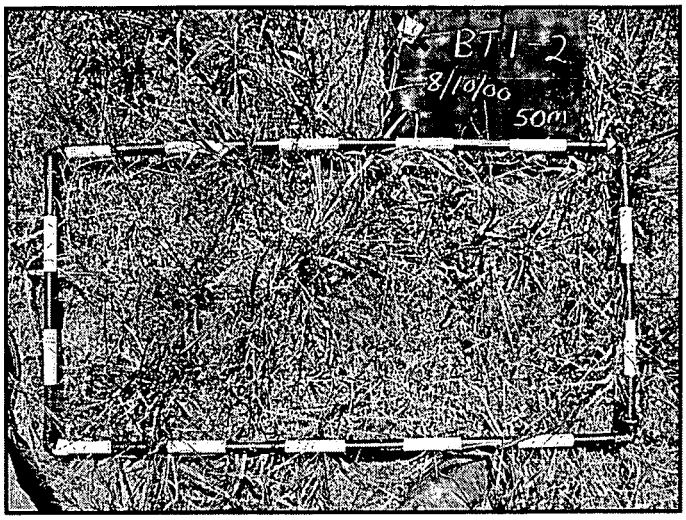
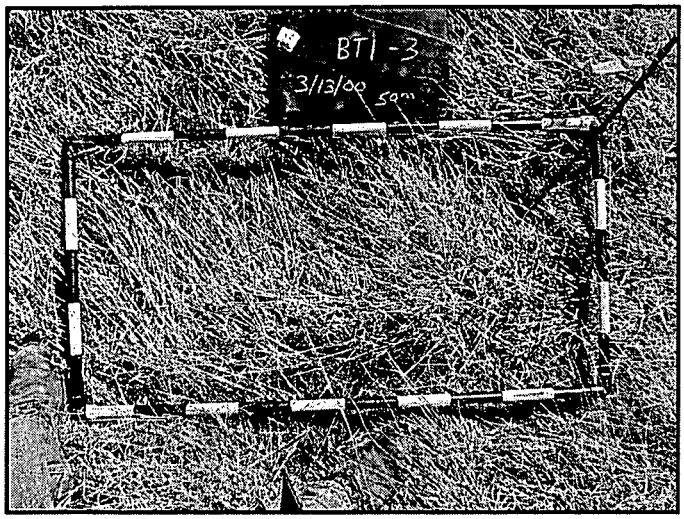


8/10/00

9/27/00

Prescribed Burn Quadrat BT1 T3



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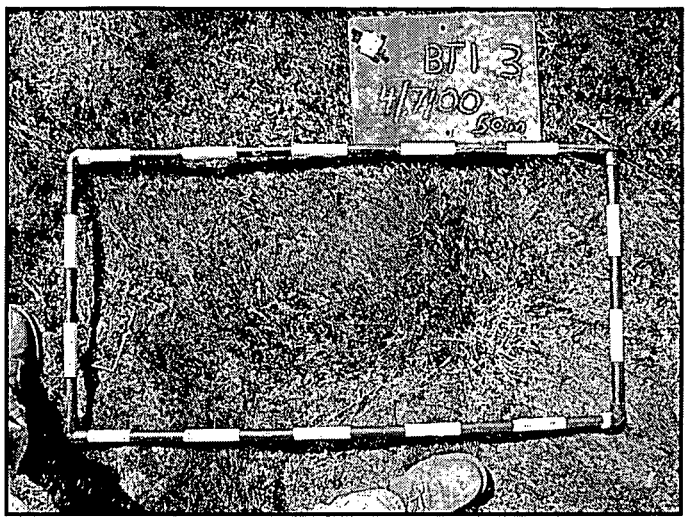

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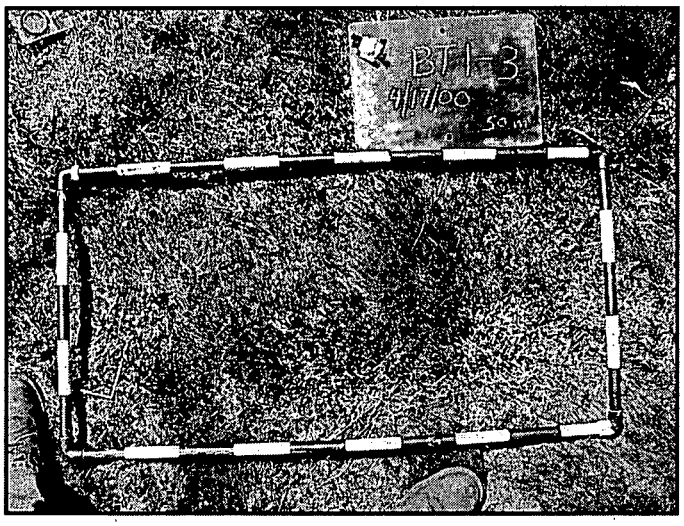

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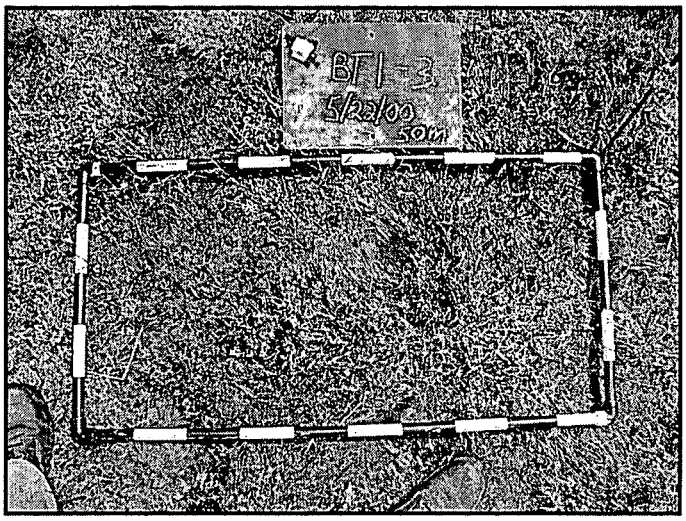
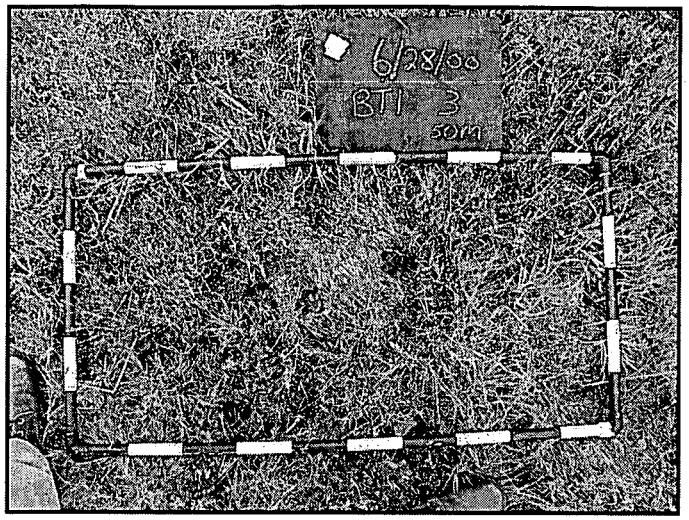


5/22/00



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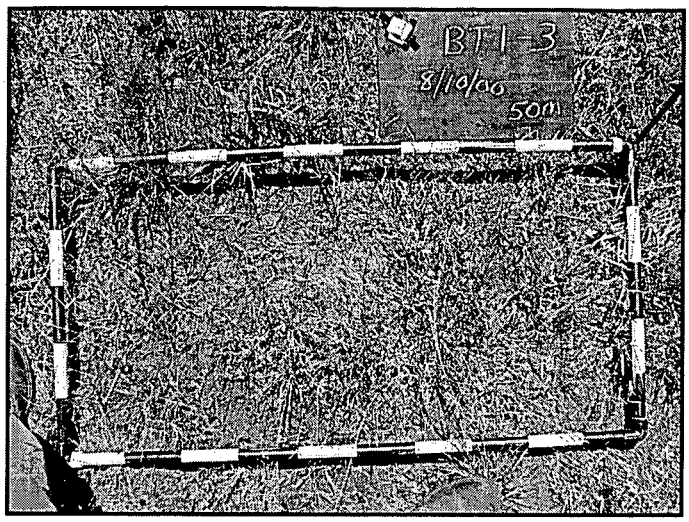

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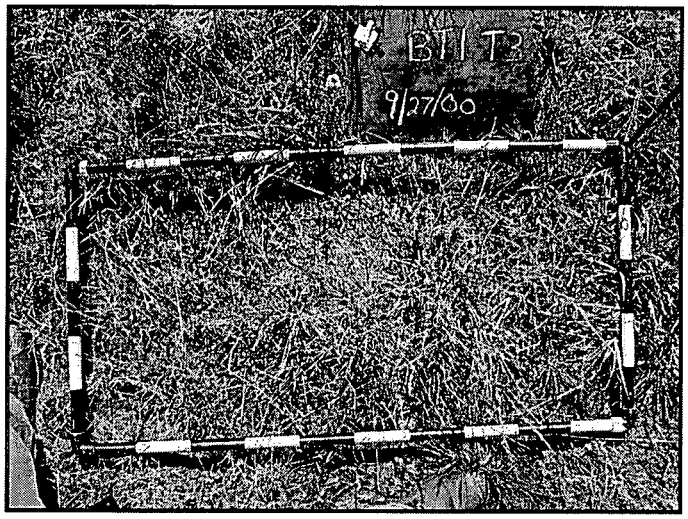
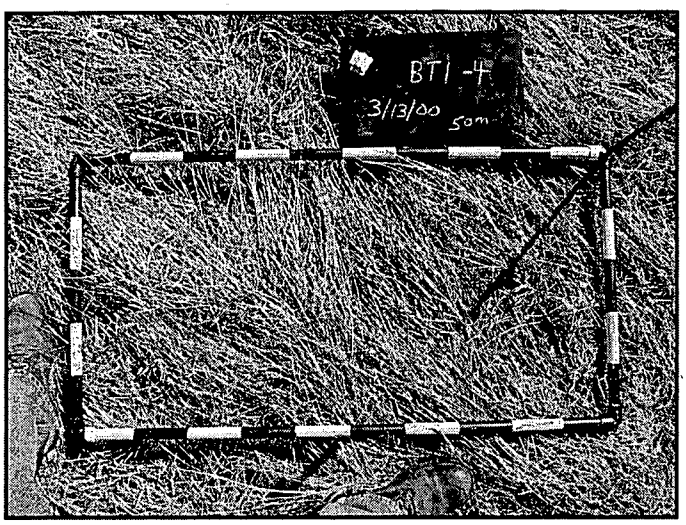


9/27/00

Prescribed Burn Quadrat BT1 T4



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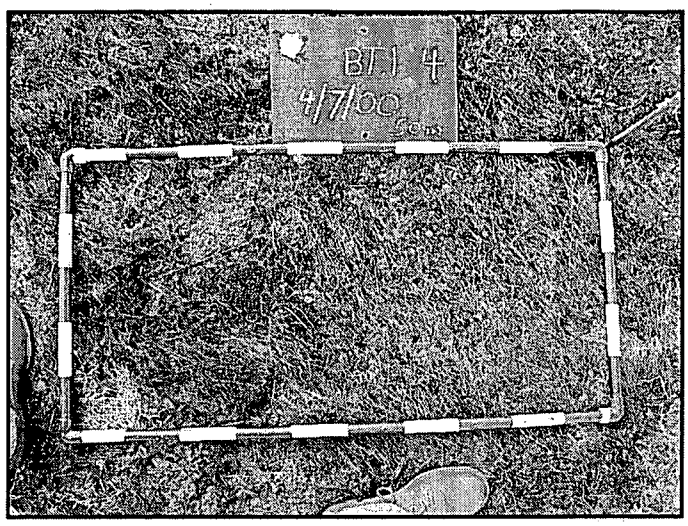

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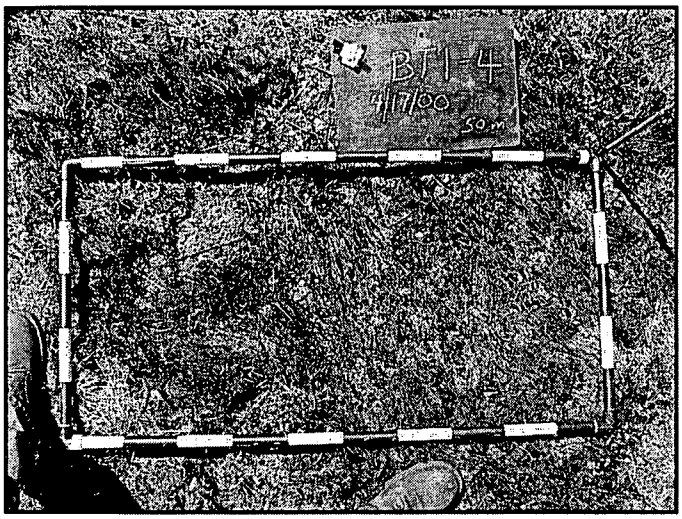

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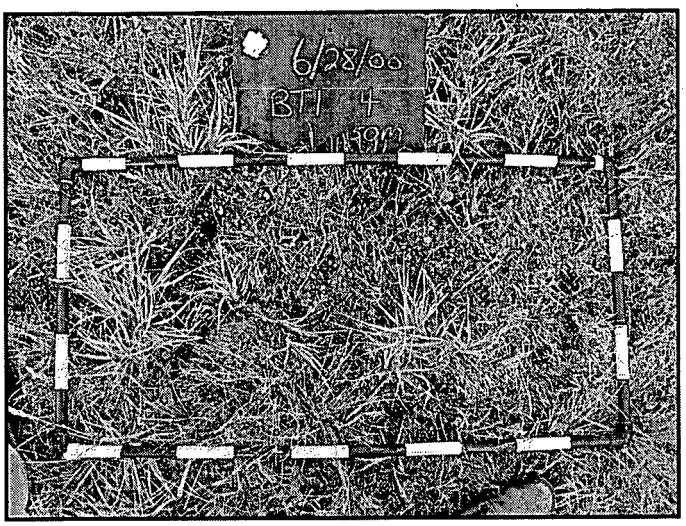
5/22/00



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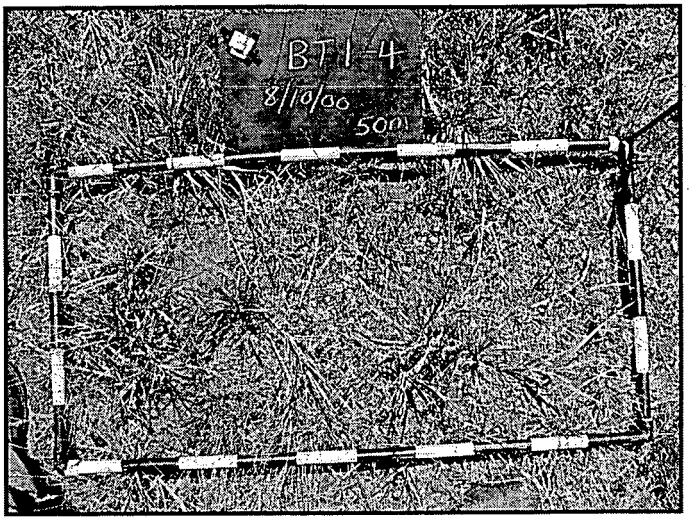

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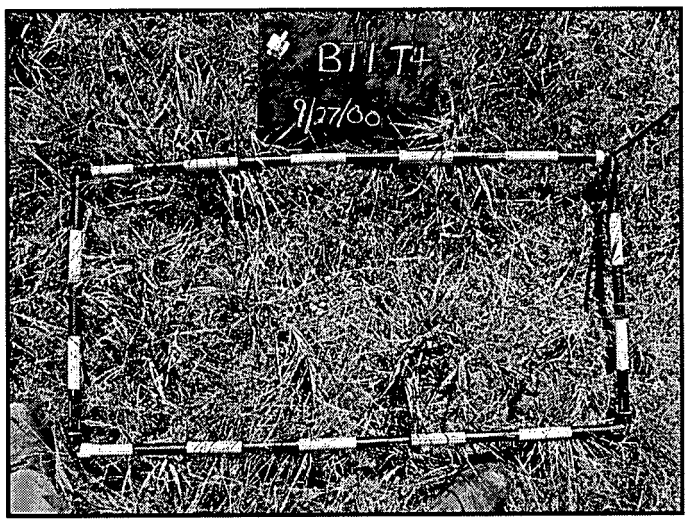
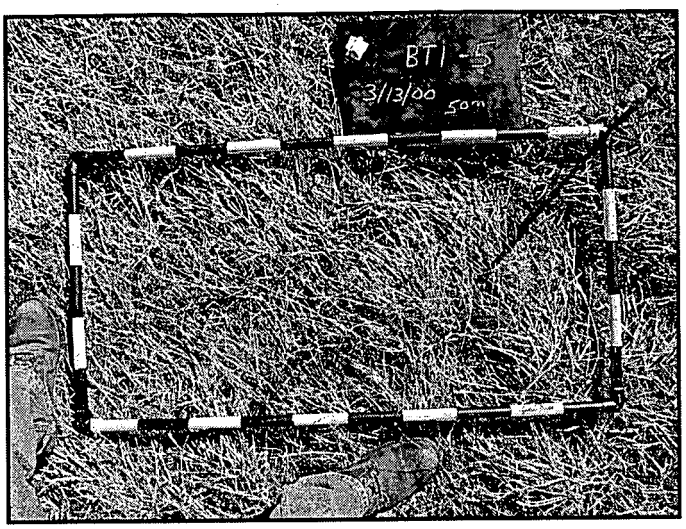


9/27/00

Prescribed Burn Quadrat BT1 T5



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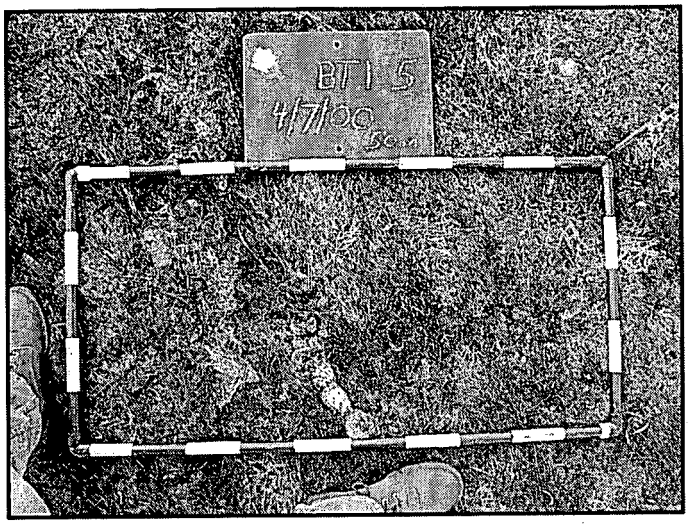

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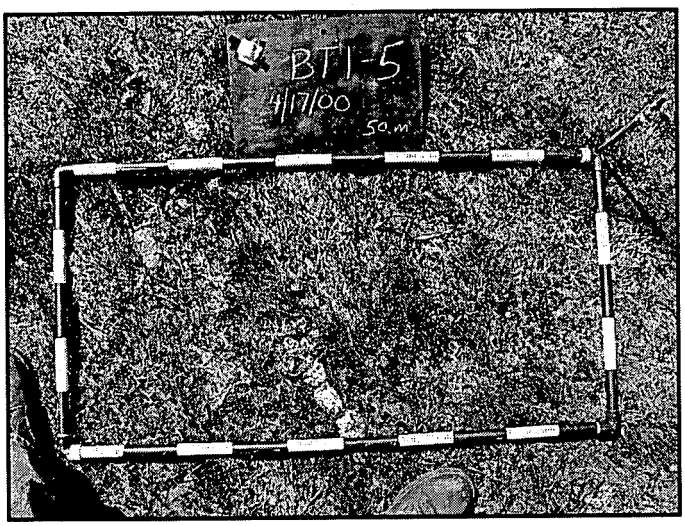

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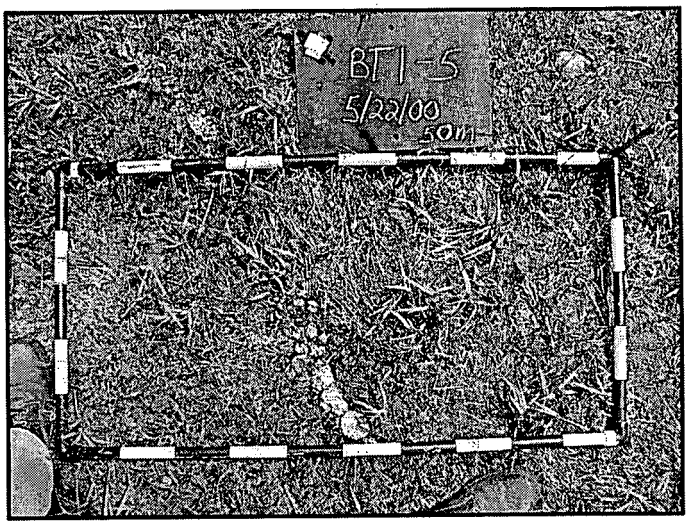

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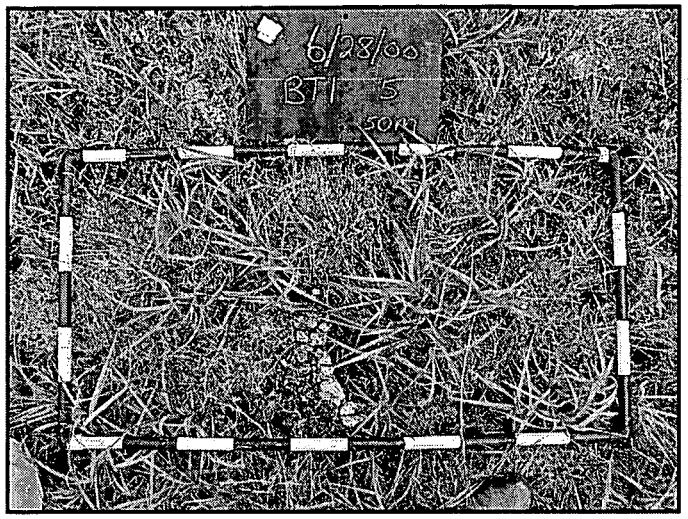

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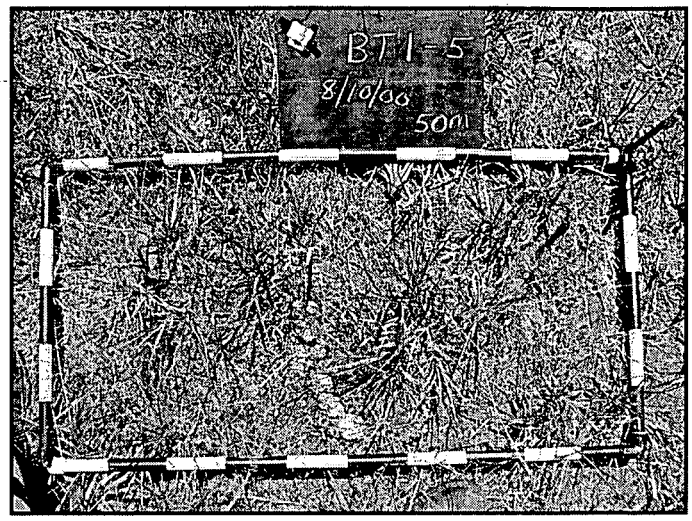
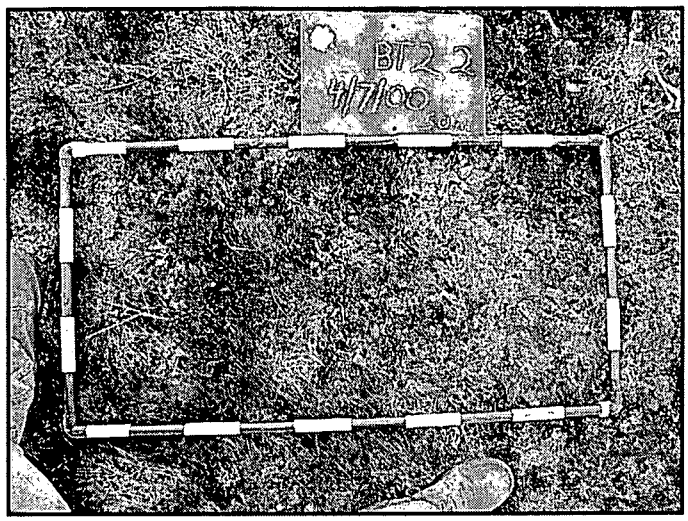


8/10/00

9/27/00

Prescribed Burn Quadrat BT2 T2

3/13/00



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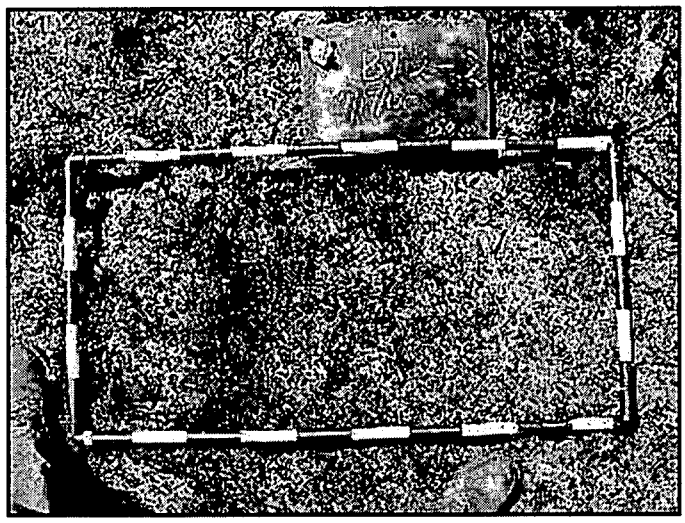

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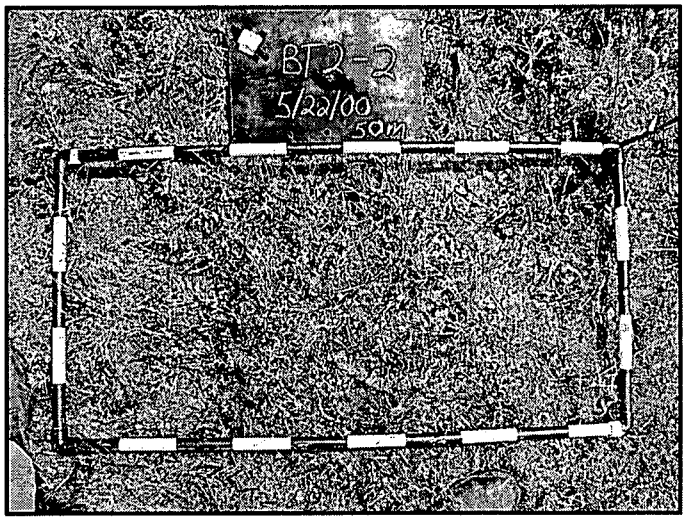

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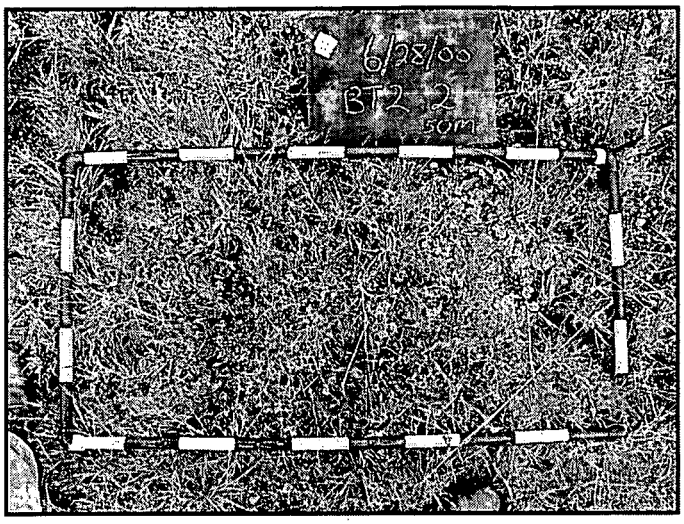

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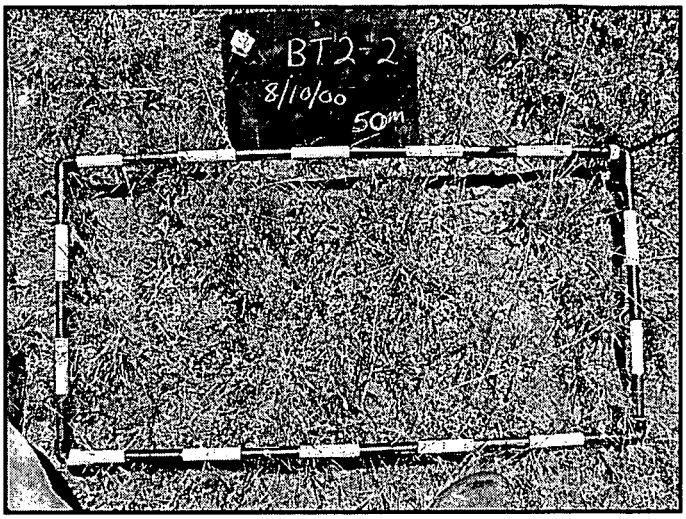
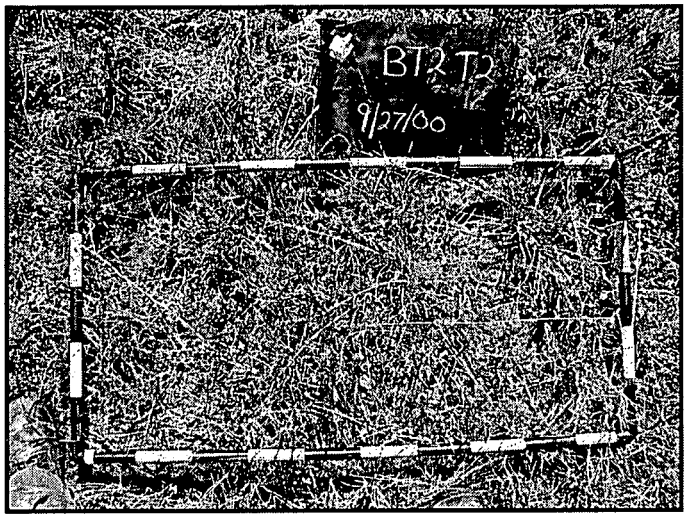
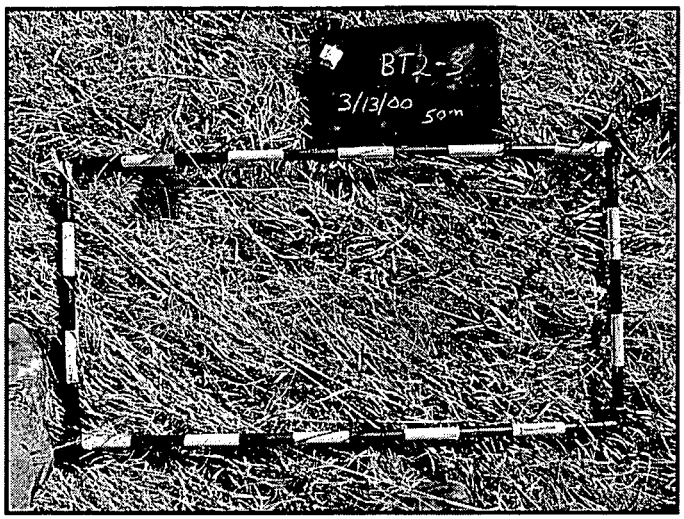


8/10/00

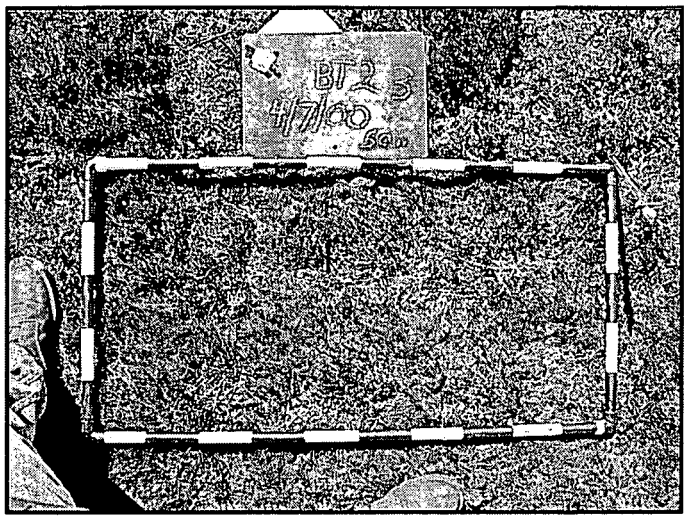


9/27/00

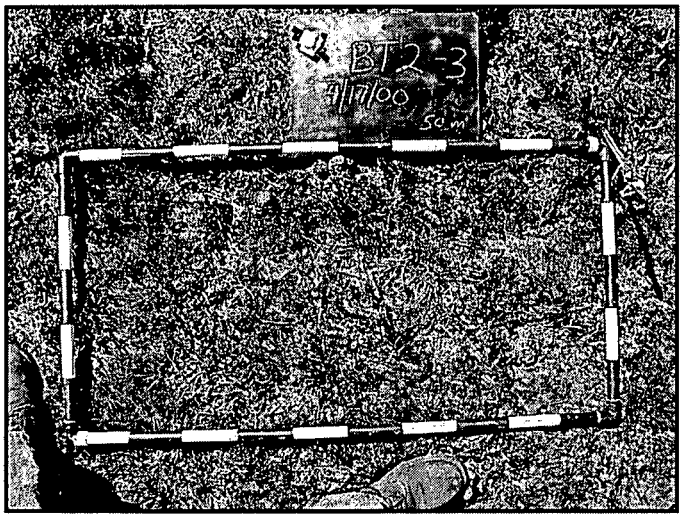
Prescribed Burn Quadrat BT2 T3



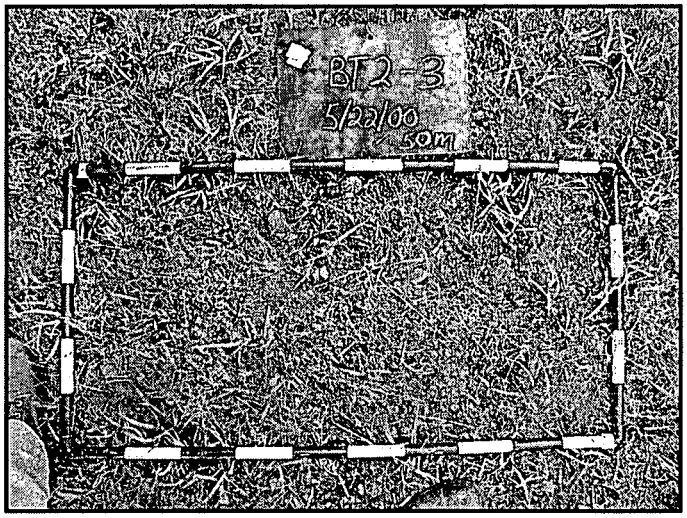
3/13/00



4/7/00

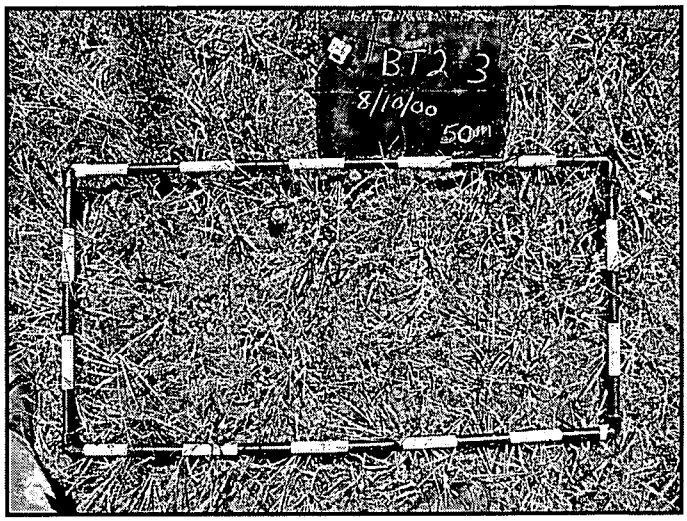


4/17/00



5/22/00

6/28/00



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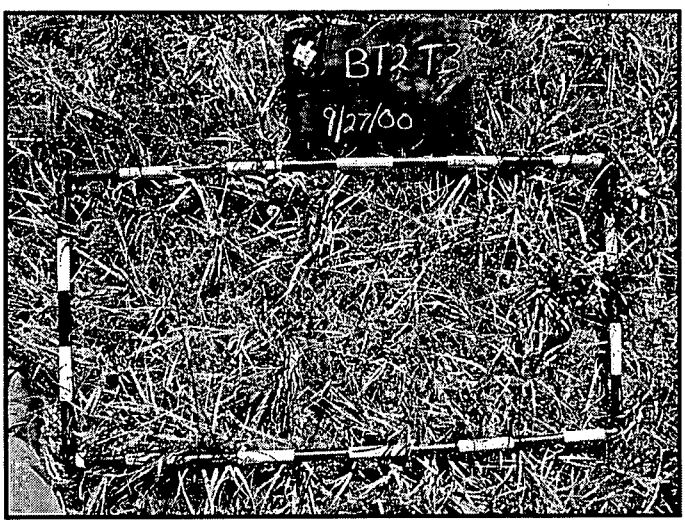
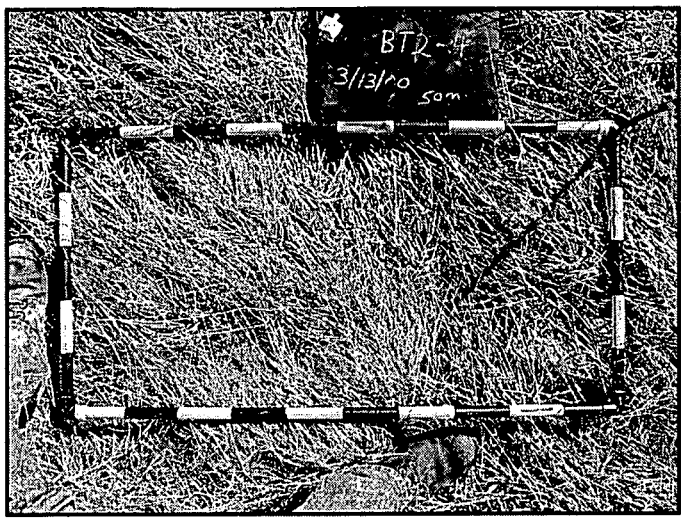


9/27/00

Prescribed Burn Quadrat BT2 T4



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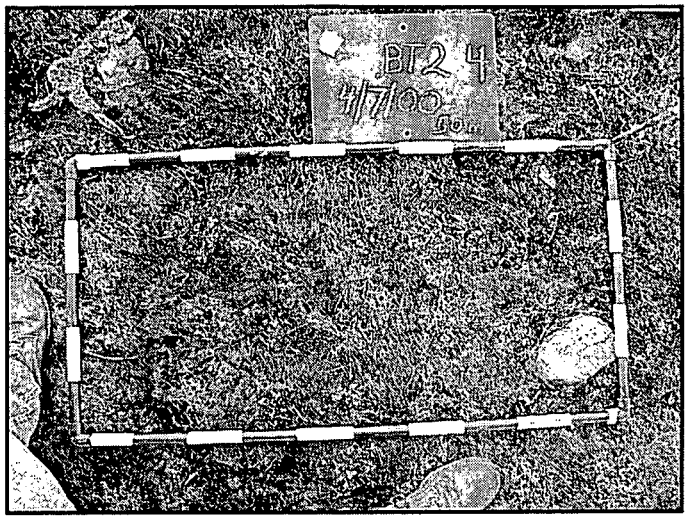

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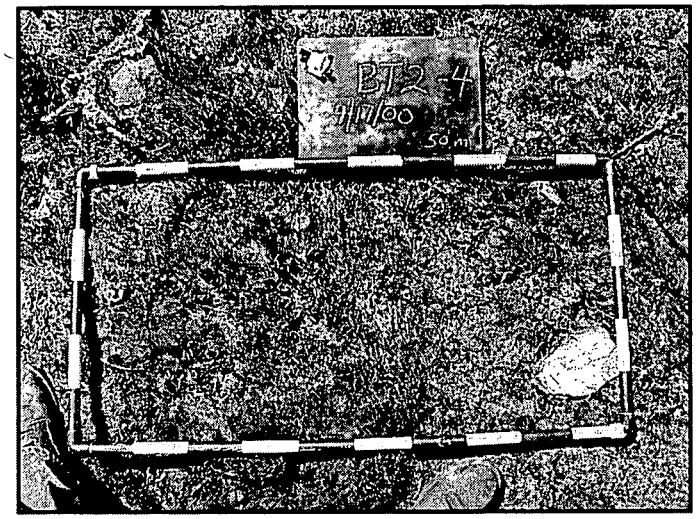
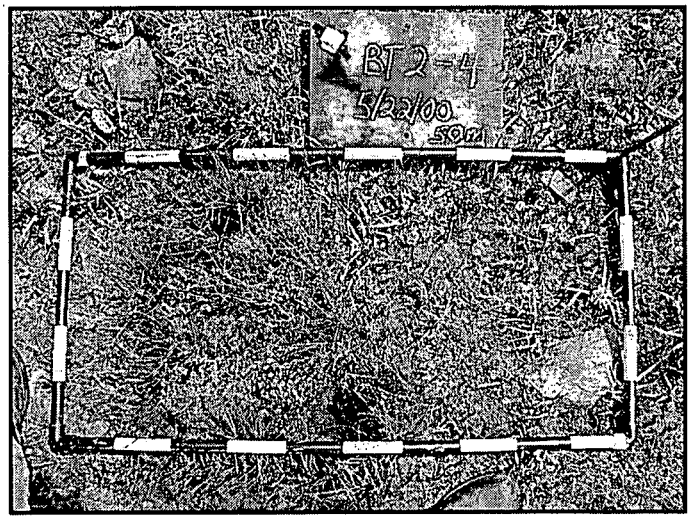
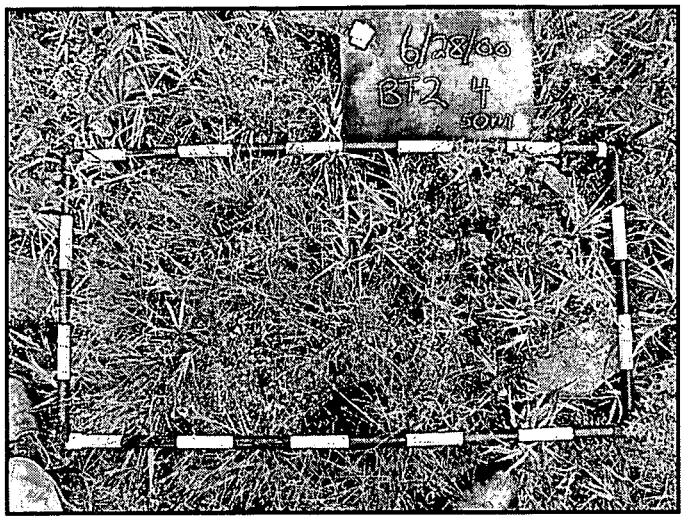


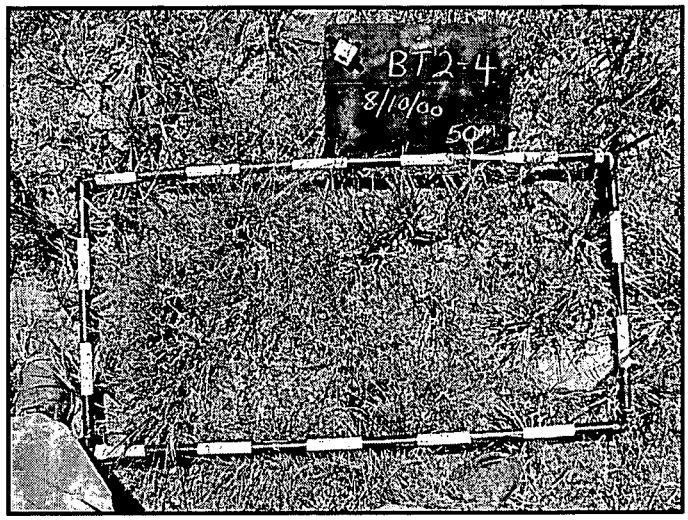
4/17/00



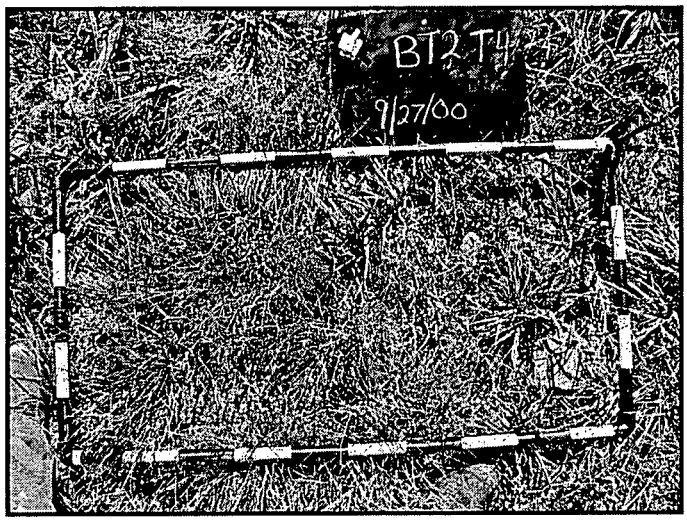
5/22/00



6/28/00

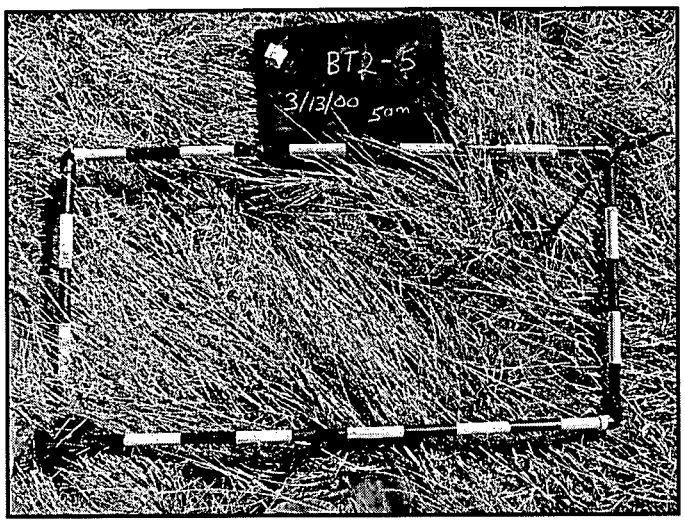


8/10/00

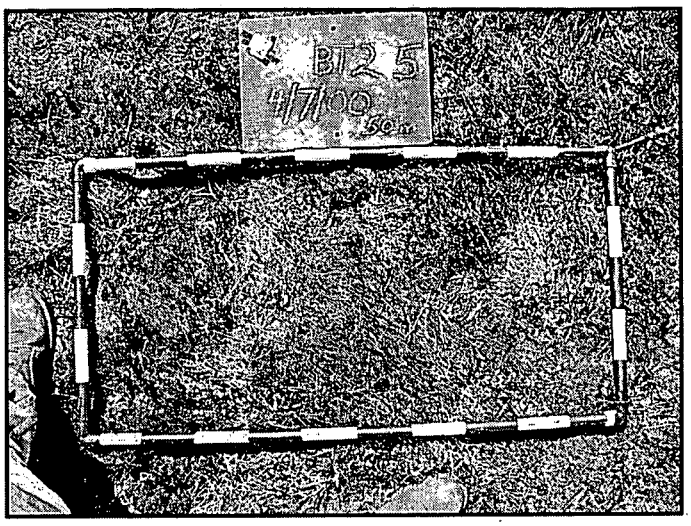


9/27/00

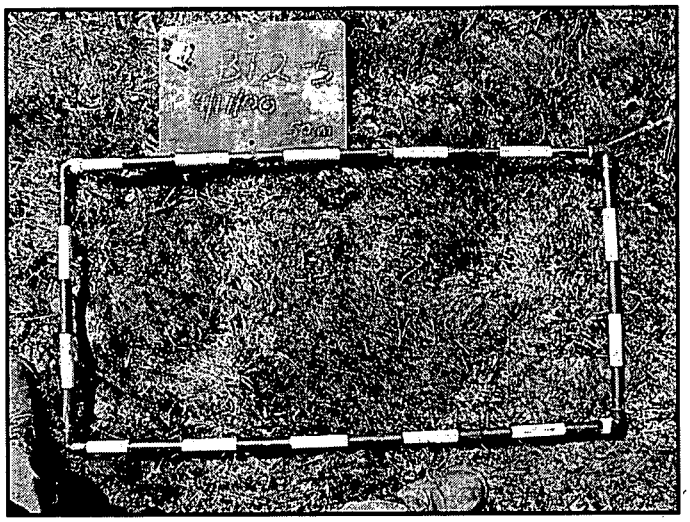
Prescribed Burn Quadrat BT2 T5



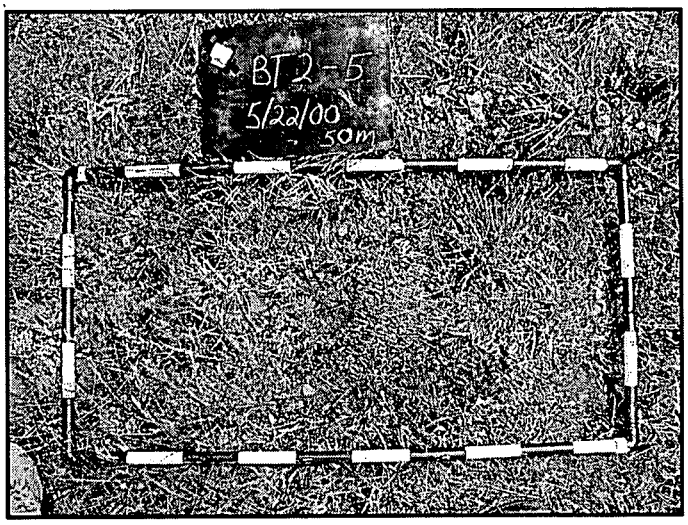
3/13/00



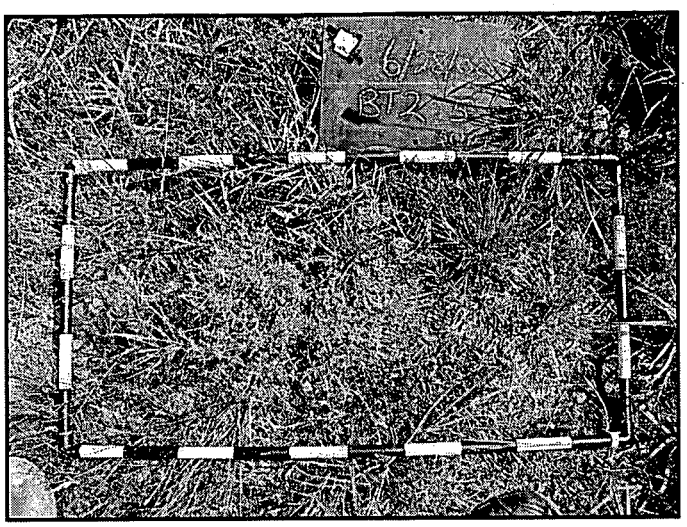
4/7/00



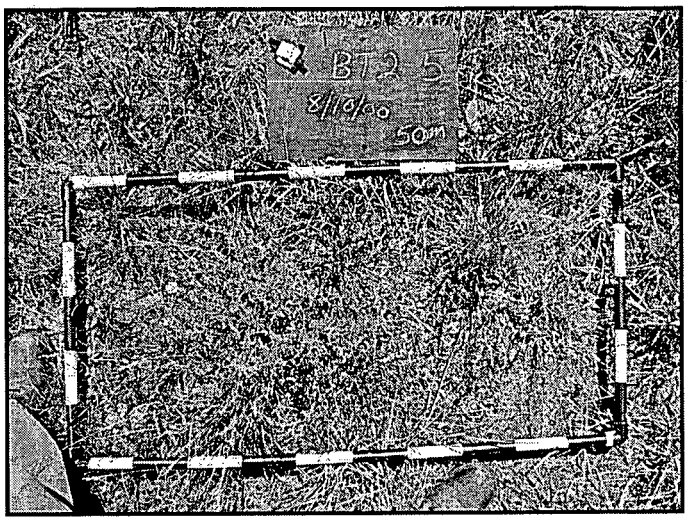
4/17/00



5/22/00



6/28/00



8/10/00

9/27/00

Appendix E

This appendix contains the vegetation photo monitoring results for the 2000 Annual Vegetation Report for the Rocky Flats Environmental Technology Site. To view these results simply click on the selections below.

High-Value Plant Community Permanent Photo Point Monitoring Results

2000 Photo Monitoring Results from Project Disturbances and Revegetation/Restoration Activities in the Buffer Zone at the Rocky Flats Environmental Technology Site

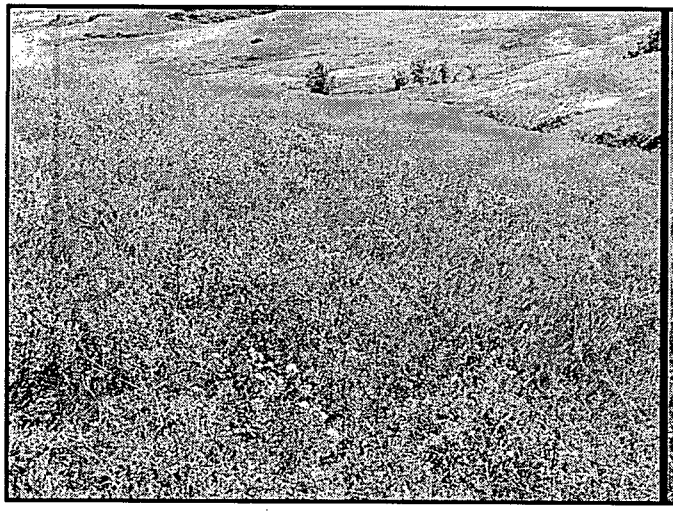
Rocky Flats Environmental Technology Site

Photographic Monitoring Results (1997-2000)

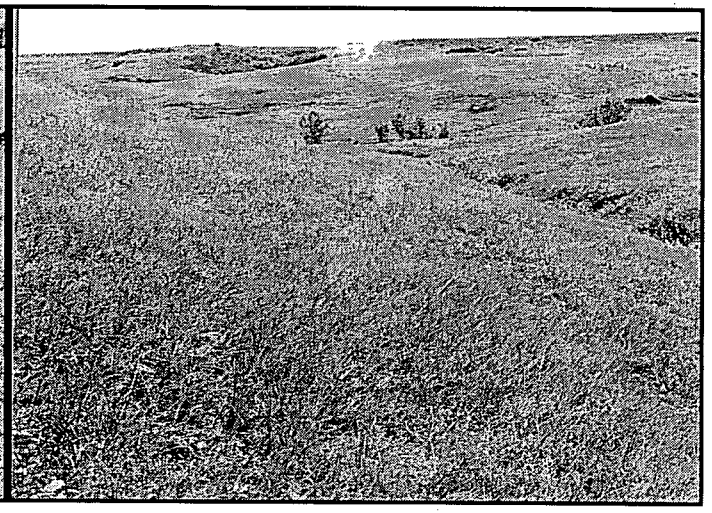
As part of the ongoing ecological monitoring at the Rocky Flats Environmental Technology Site (Site), permanent photo points were set in place in 1997 to provide a visual baseline of the current conditions of the various plant communities at the Site at that time. In 1999, photographs were retaken at these locations and examined to evaluate any changes in the plant communities. During 2000, additional photographs were taken at selected photo points. By clicking on one of the images below you can link to a map that shows the locations of the permanent photo points at the Site. To view side by side comparisons of one of the sets of photographs taken at that location in 1997, 1999, and 2000, click on that photo point.

Return Home

Photo Point 1



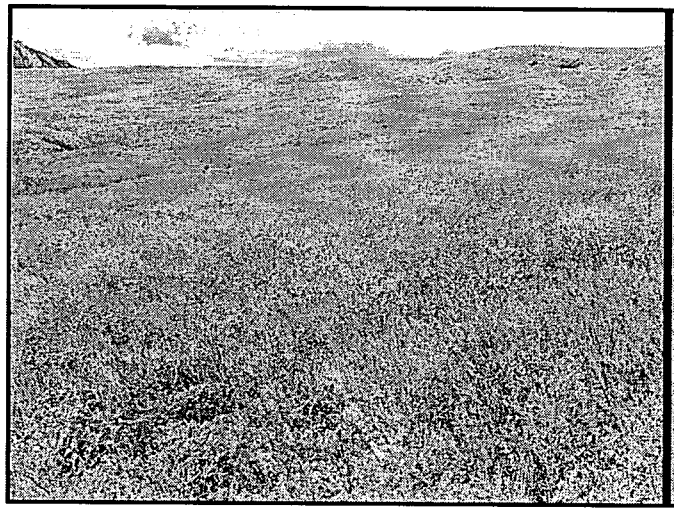
1997



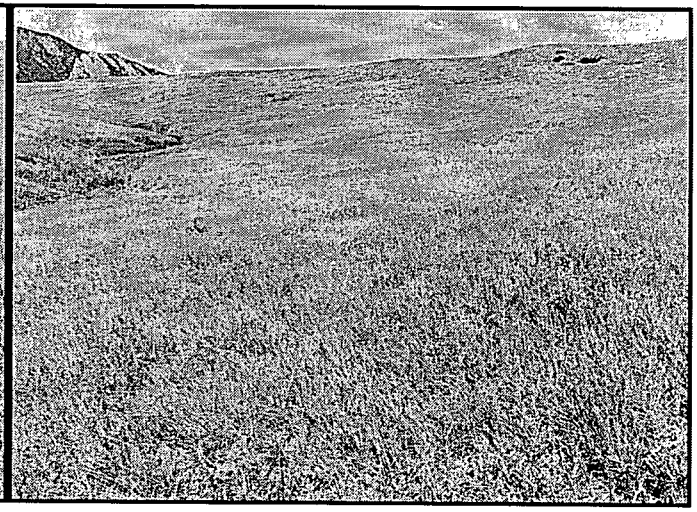
1999

The light brown color in the 1997 photograph is the noxious weed, diffuse knapweed, which literally covered much of the mesic mixed grassland on this hillside in Rock Creek. After being treated by helipcopter with herbicide Tordon 22K, the hillside has a much better stand of grass. The dark gray plants in the 1999 photograph are dead knapweed skeletons.

Photo Point 2

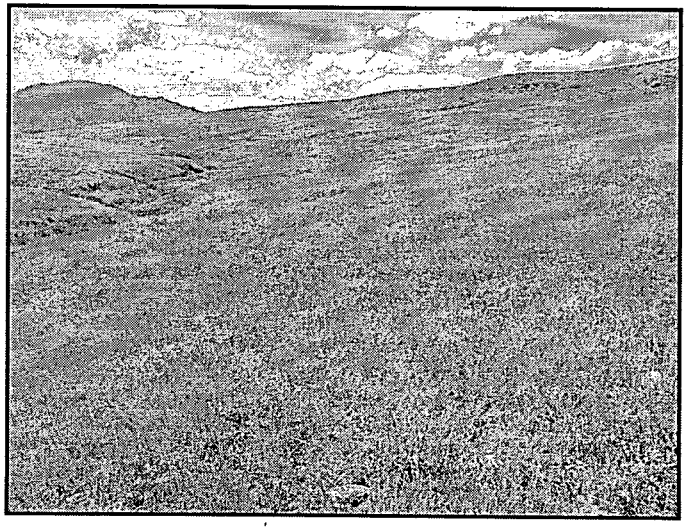


1997



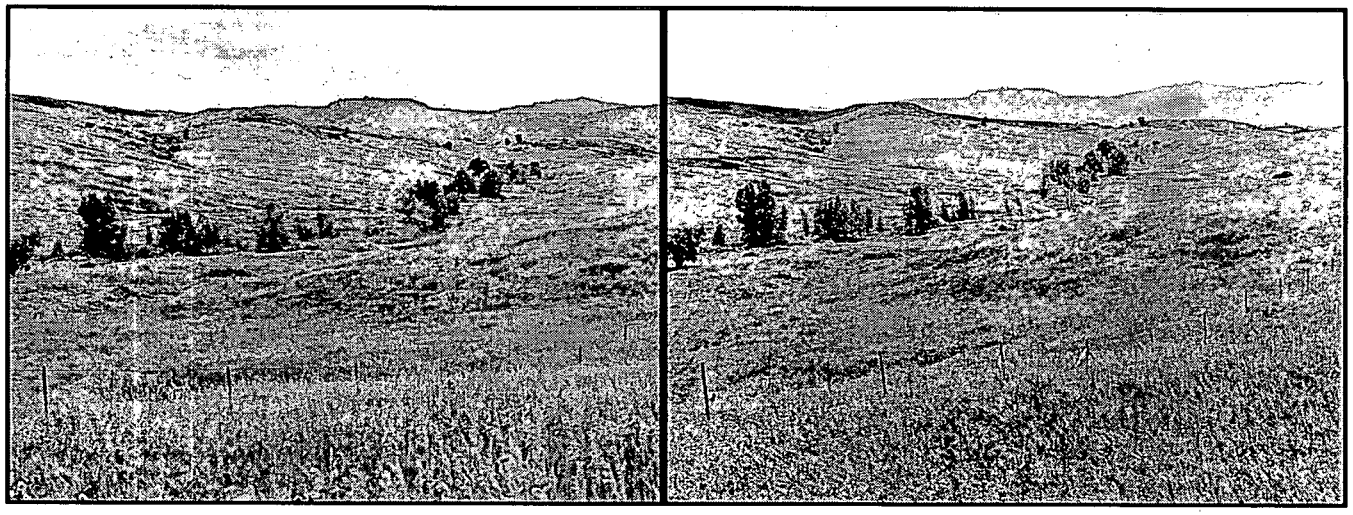
1999

This set of photographs shows a diffuse knapweed infested hillside in Rock Creek before and after the aerial herbicide treatment of Tordon 22K. The change is dramatic and shows how the native grasses responded well to the herbicide application. Parts of the hillside continued to be controlled in 2000, however, other areas on the hillside were heavily infested because of missed flightlines.



2000

Photo Point 3



1997 1999

This view looking southwest in the Rock Creek watershed appears little changed since 1997. The only noticeable difference is in the height of some of the younger trees along the stream.

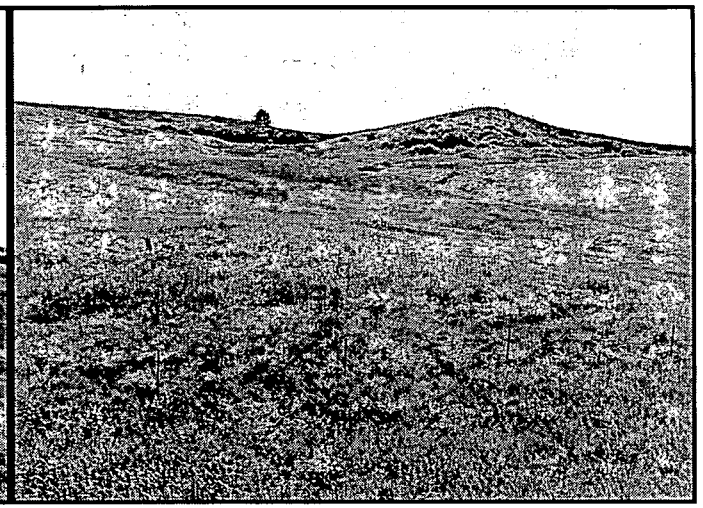
Photo Point 4

1997 1999

Little change is apparent in the mesic mixed grassland at this location in Rock Creek from 1997 to 1999.

Photo Point 5

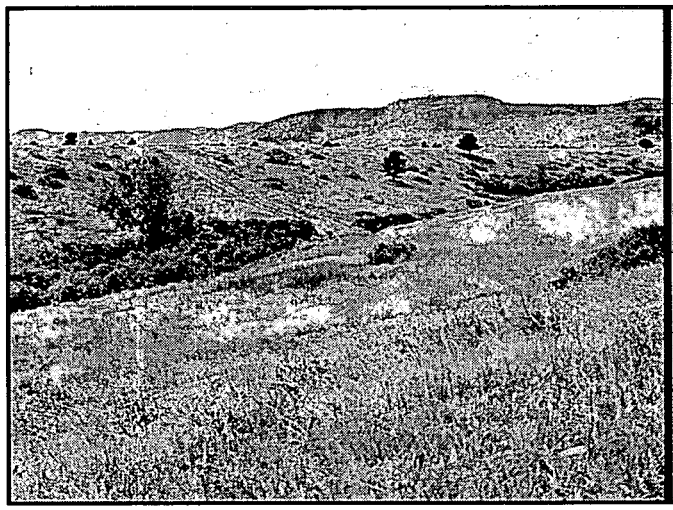
1997



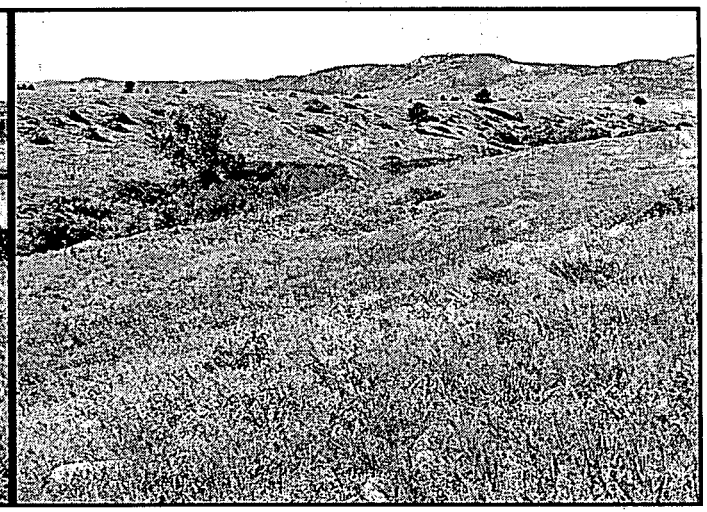
1999

Little change is seen in the tall upland shrubland (near ridgetop) or the mesic mixed grassland at this location in Rock Creek. The small area of smooth brome in the lower left of the 1997 photograph has expanded slightly in the 1999 photograph.

Photo Point 6



1997

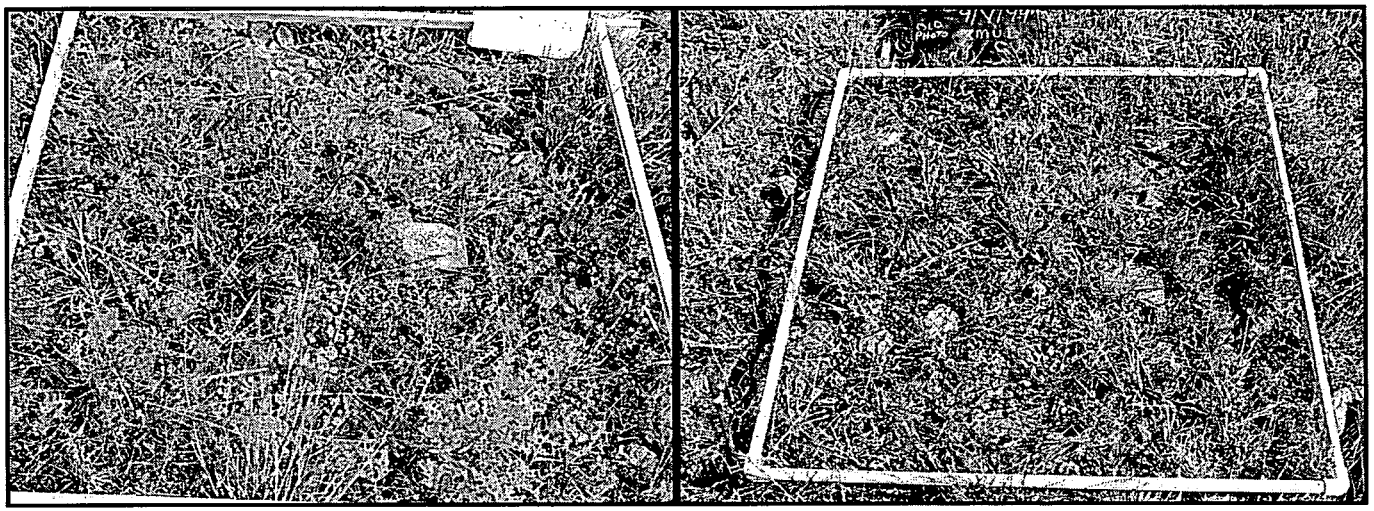


1999

The light brown color in the 1997 photograph is the noxious weed, diffuse knapweed, which literally covered much of the mesic mixed grassland on this hillside in Rock Creek. Diffuse knapweed was becoming a problem in the tall upland shrubland (the wooded areas in the photographs) because it would break off and blow into the shrubland areas, literally burying many of the shrubs. An patch of American plum is thought to have been killed, due to shading after being buried for several seasons under diffuse knapweed plants. After being treated by helicopter with herbicide Tordon 22K, the hillside has a much better stand of grass and less diffuse knapweed was blown into the shrubland.

2000

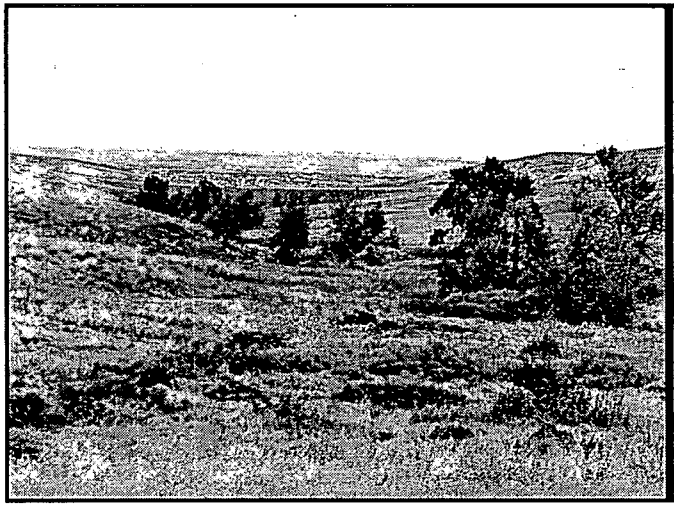
Photo Point 7



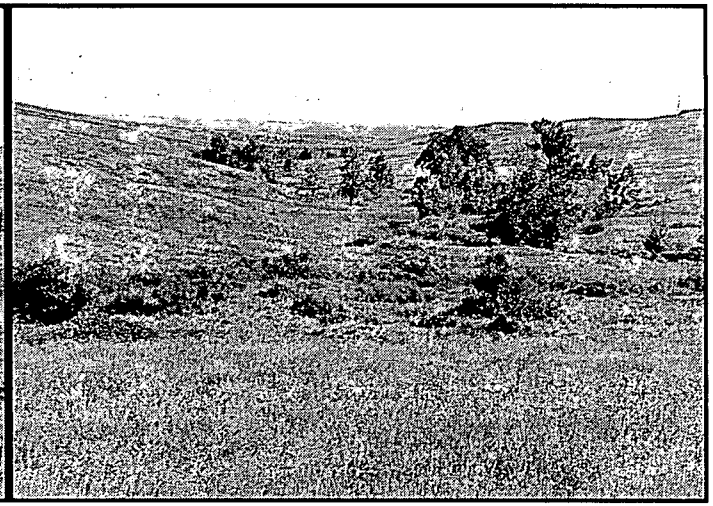
1997 1999

The cobbly appearance of the xeric tallgrass prairie is apparent from both of these photographs. Notice the lack of forbs (non-grass plants or wildflowers) in the 1999 photograph. This is largely a result of the aerial herbicide application that was conducted at this location to control diffuse knapweed. In a year or so, the missing forbs in 1999 will return. See photo point 27 to see how the forbs return.

Photo Point 8



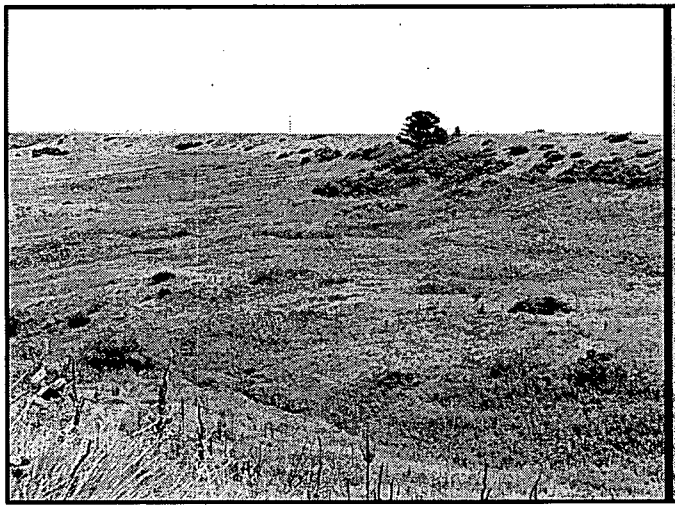
1997



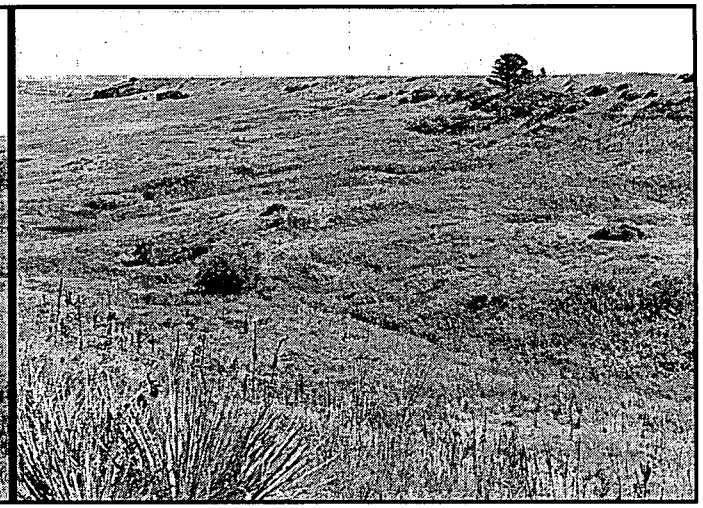
1999

The Great Plains riparian woodland in the Rock Creek drainage appears healthy and little changed from 1997 to 1999. The diffuse knapweed present on the hillside on the left of the 1997 photograph (brownish solid plant cover) is somewhat less in the 1999 photograph as a result of the aerial herbicide application conducted in May 1999.

Photo Point 9



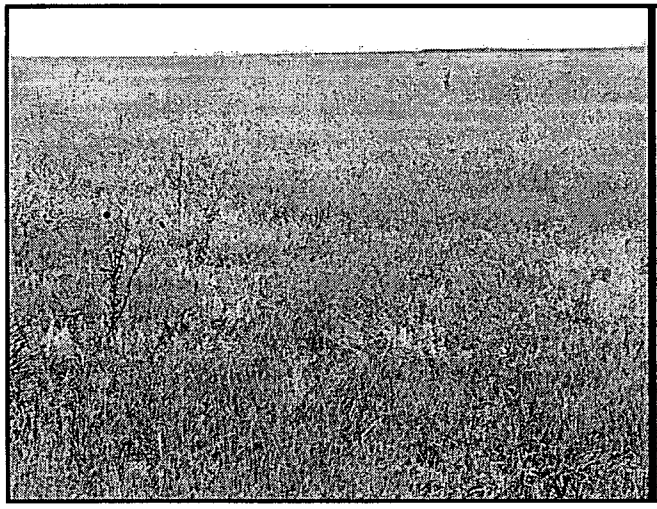
1997



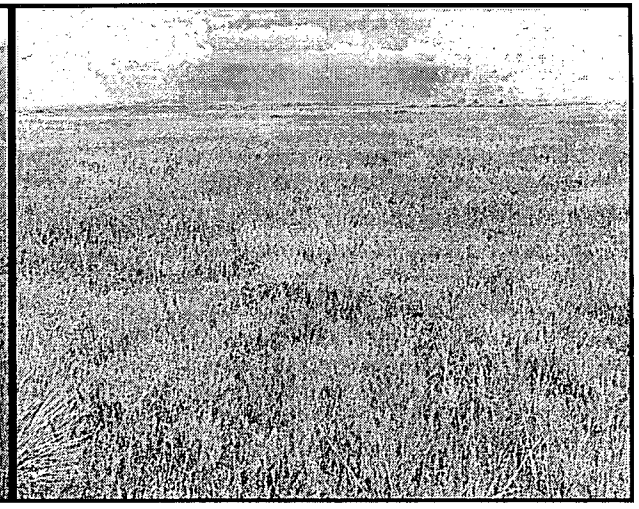
1999

The large hillside seep wetlands with the tall upland shrubland along their upper edges have changed little at this location in the Rock Creek drainage.

Photo Point 10



1997



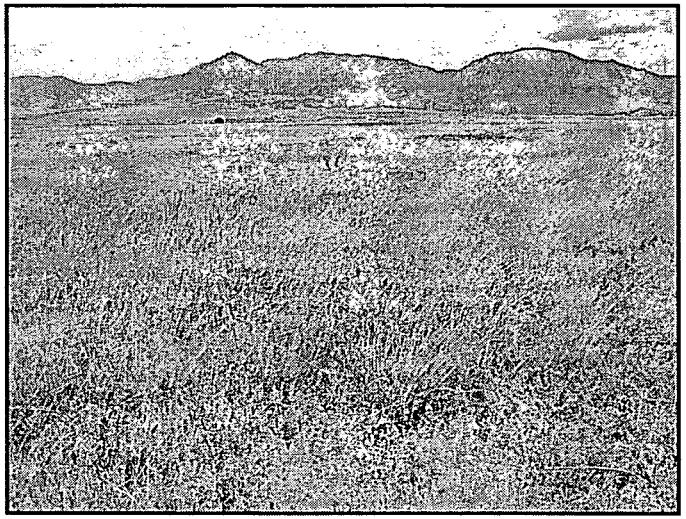
1999

The 1997 view of the xeric tallgrass prairie at this location shows a rather weed appearance. Musk thistle and curly-top gumweed (the two taller plants across much of the photograph) are common across the prairie here. In 1999, however, the area was treated with Tordon 22K as part of the aerial herbicide application to control diffuse knapweed which was coming in across much of the prairie. The herbicide also controlled these other weedy species as well and improved the stands of native grasses in the area. In 2000, the grassland looked very nice and the graminoid species flowered abundantly.

Photo Point 11

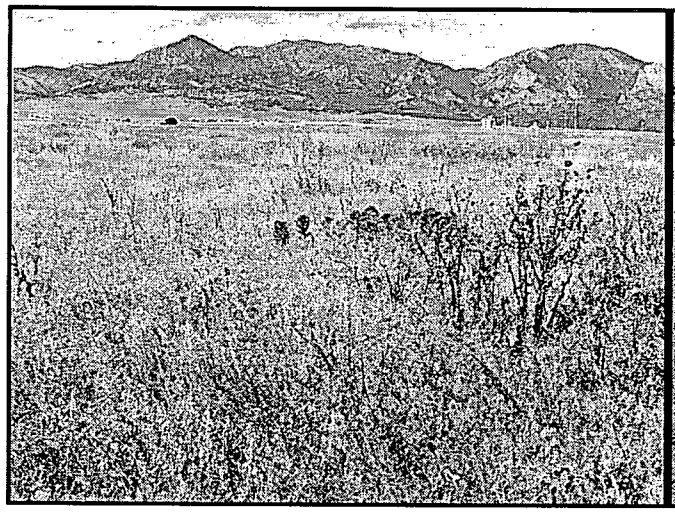
1997 1999

The xeric tallgrass prairie at this location was infested with musk thistle in 1997. In spring of 1999, the area was treated with the herbicide Tordon 22K, that got rid of it and several other weedy species, allowing the grasses to florish in the community.

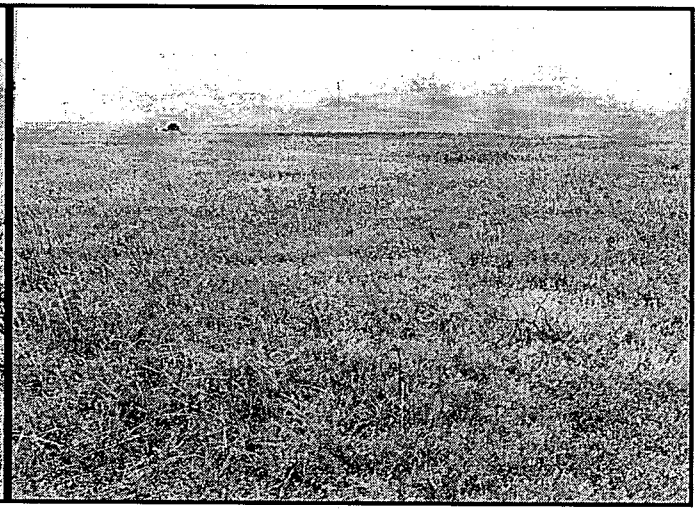


2000

Photo Point 11



1997



1999

The xeric tallgrass prairie at this location was infested with musk thistle in 1997. In spring of 1999, the area was treated with the herbicide Tordon 22K, that got rid of it and several other weedy species, allowing the grasses to florish in the community.

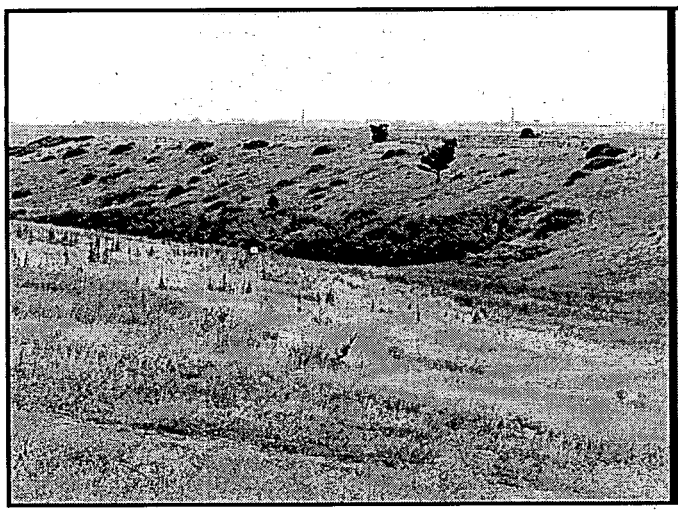
2000

Photo Point 12

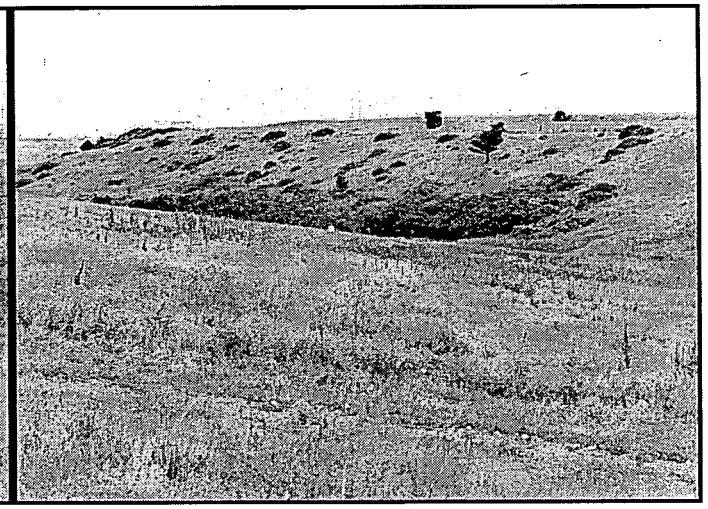
1997 1999

A concern on the mesic mixed grassland at this location in Walnut Creek is the appearance of Canada thistle in the 1999 photograph. It was not present in the 1997 photograph (the plants that look similar to it in the 1997 photograph are curly-top gumweed). Weed control should be conducted here to keep the infestation from growing.

Photo Point 13



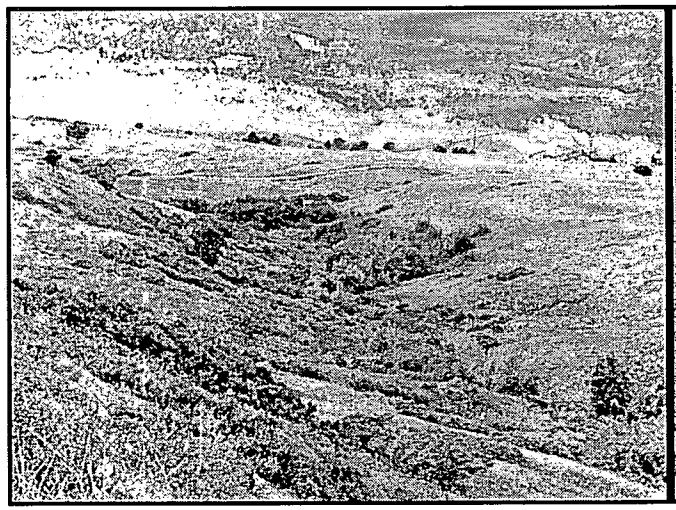
1997



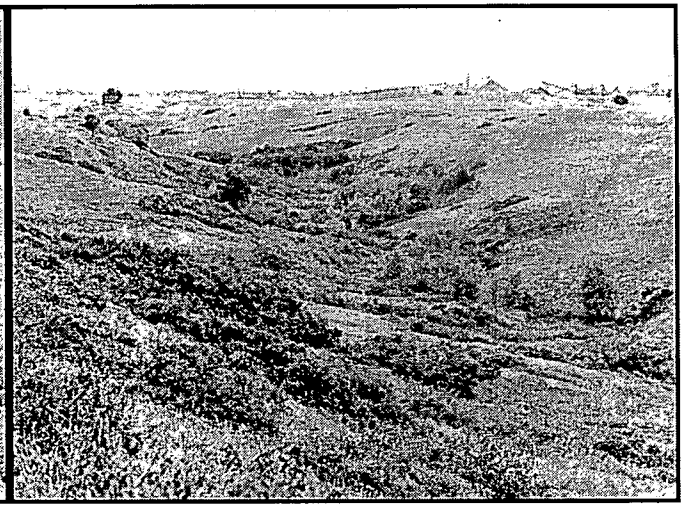
1999

The tall upland shrubland showed little change from 1997 to 1999. However, the noxious weed, common mullein (taller plants in front of the white sign near the center of the photograph) showed an increase in infestation size during this period.

Photo Point 14



1997



1999

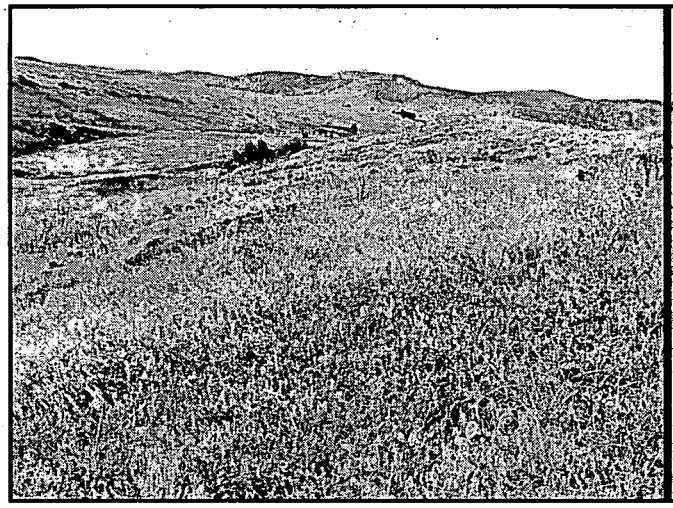
No change is apparent in the tall upland shrubland in Rock Creek at this location from 1997 to 1999. It appears healthy during both years.

Photo Point 15

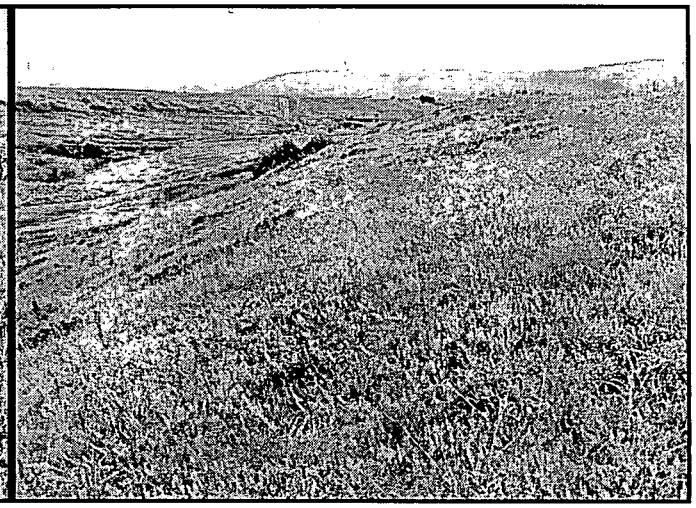
1997 1999

Quadrat photo comparisons can be used to look at differences in how the plant community responses to changes in climate and/or management actions. In this set of photographs the differences are in response to natural changes (i.e. precipitation, temperature, drought, etc.) and not due to human management actions, because no management actions had taken place at this location. The abundant white flowered plants (Porter's aster) in the 1997 photograph are actually present in the 1999 photograph, but they did not flower as abundantly in 1999 (at least not when the photograph was taken). Both photographs were taken the first week of September in their respective years. Different species will have boom and bust years depending on changes in the timing of precipitation or drought, and these are reflected in their annual abundance on the prairie. These types of annual changes and differences are not uncommon in plant communities.

Photo Point 16



1997



1999

The mesic mixed grassland appears essentially the same in both 1997 and 1999. The greener condition of the grassland in 1999 is due to the higher precipitation received in the summer of 1999. Another item to note is the similar size and locations of the St. John's-wort infestations in both photographs (the dark brownish-red patches on the hillside on the right of each photograph). The lack of change in the infestations would suggest that additional biocontrol insects are needed in this area. Additional insects were released on the plants in summer 2000 (below). Monitoring in 2001 will evaluate whether they established.

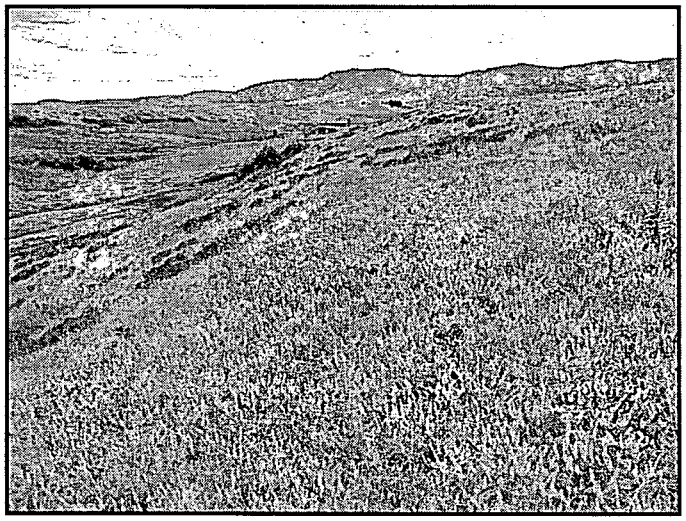
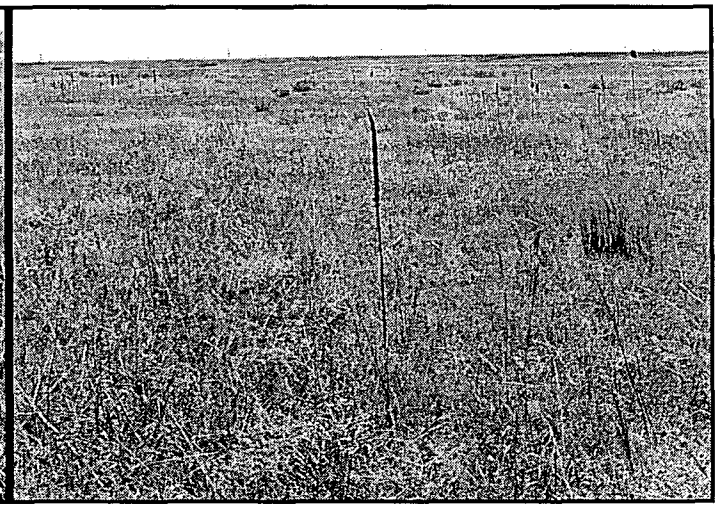


Photo Point 17

1997

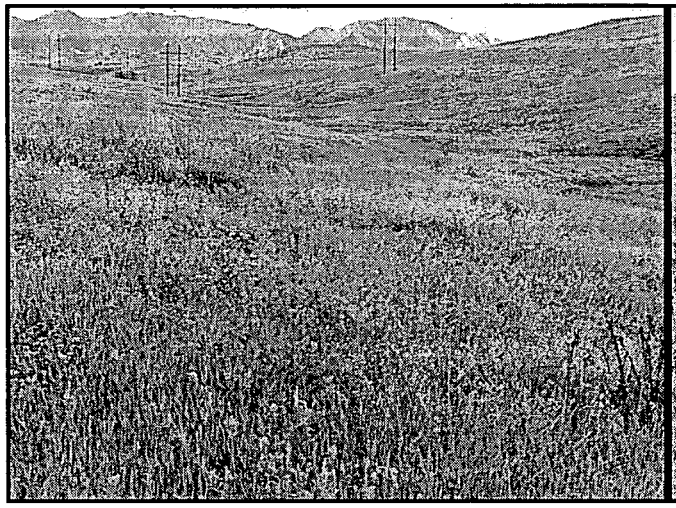


1999

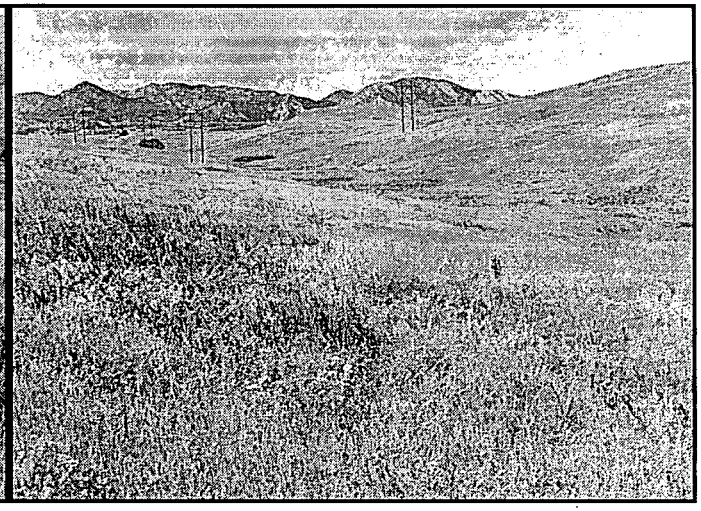
The 1997 view of the xeric tallgrass prairie at this location shows a large stand of musk thistle in the background (the tall brown plants). After treatment in 1999 with Tordon 22K, as part of the aerial herbicide application to control diffuse knapweed which was coming in across much of the prairie, the musk thistle was controlled as well. The tall dead stalks in the 1999 photograph are dead common mullein, another noxious weed, that was also controlled with the herbicide treatment. The dry summer of 2000 accounts for the brown condition of the lower photograph.

2000

Photo Point 18

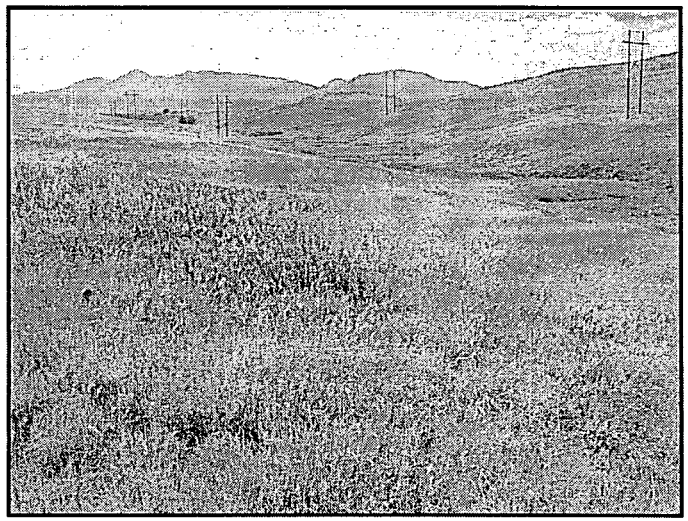


1997



1999

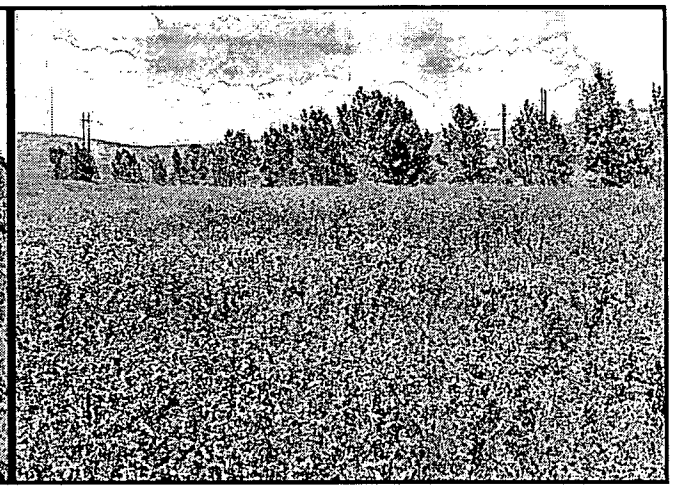
The mesic mixed grassland at this location in Walnut Creek looks essentially the same with the exception of the growing patch of smooth brome (dark green area on the left side of both photographs). Smooth brome is an exotic, aggressive grass species commonly used for revegetation of disturbances along highways and pipelines. In recent years however, it has become a serious threat to native plant communities because of its invasive, aggressive characteristics. Where it has gotten established it is not uncommon to find smooth brome circles like these in the photographs in otherwise undisturbed native prairie. Left unattended the circles will enlarge and eliminate most of the native plants leaving a solid stand of smooth brome.



2000

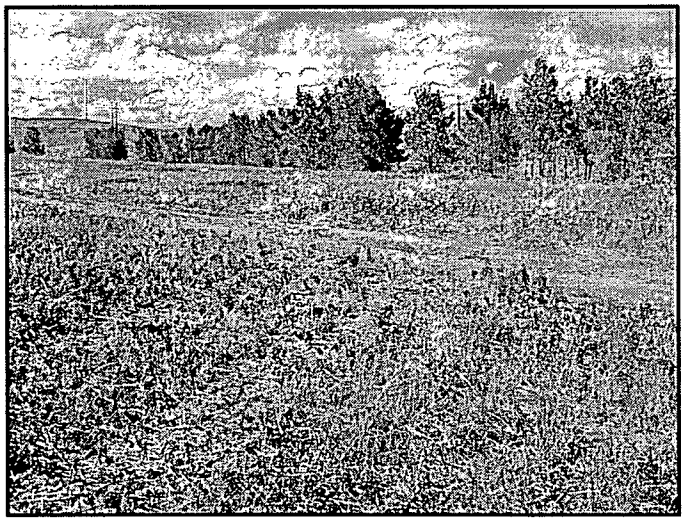
Photo Point 19

1997



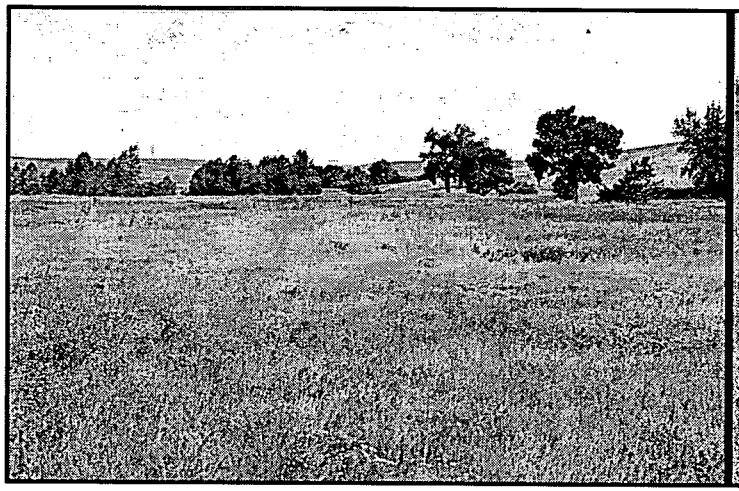
1999

At this location in Walnut Creek, notice the increase in Canada thistle in the foreground from 1997 to 1999. In 2000, as a result of the dry summer and road use the Canada thistle was much less abundant than in 1999.

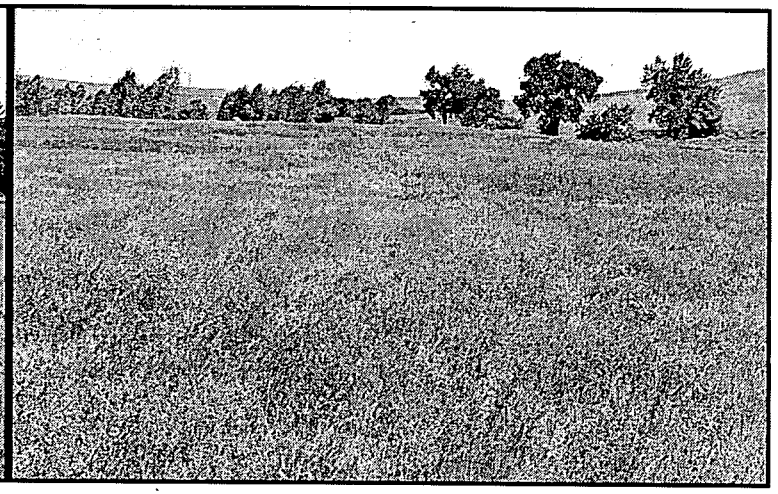


2000

Photo Point 20

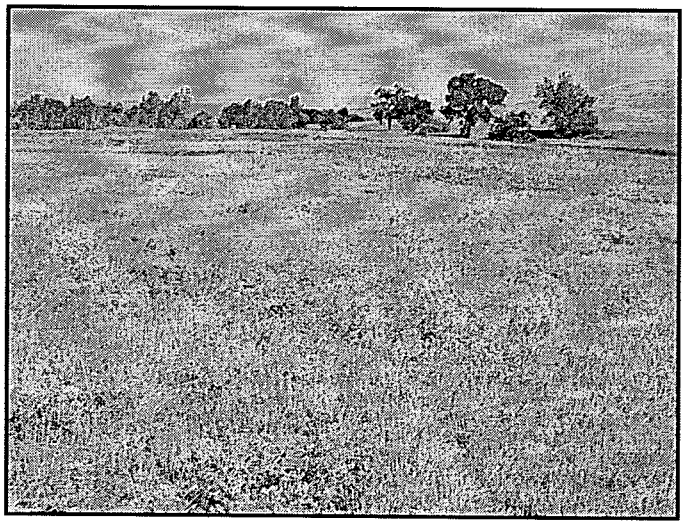


1997



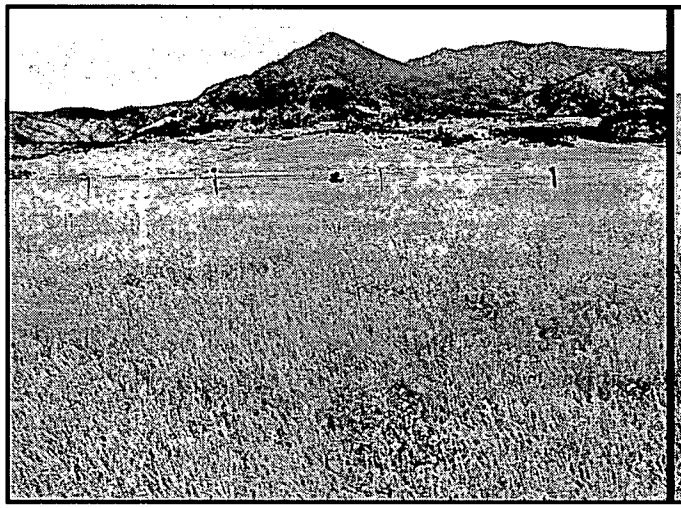
1999

At this location in Walnut Creek, notice the increase in Canada thistle in the background (near the trees). There has also been an increase in the diffuse knapweed in the foreground of the 1999 photograph that was not present in the same abundance in 1997.

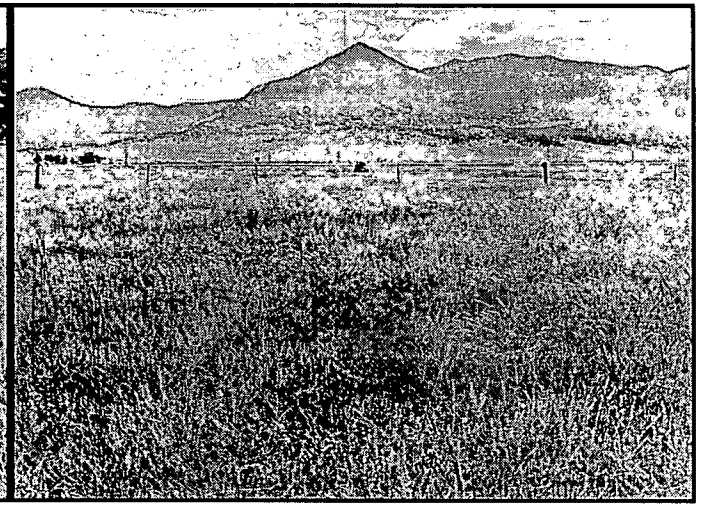


2000

Photo Point 21

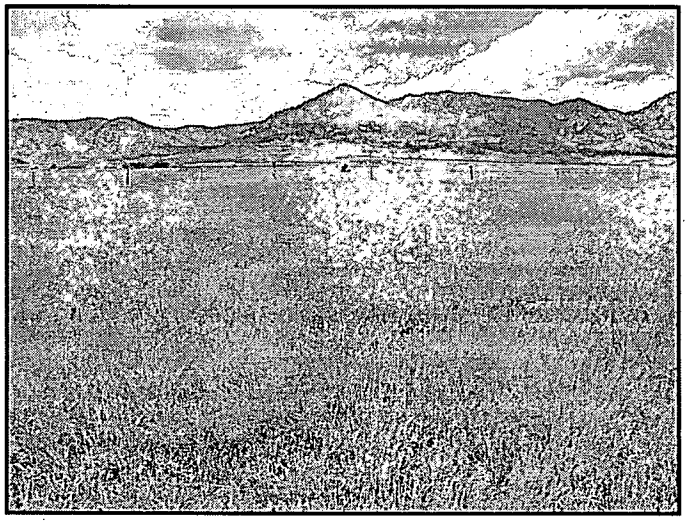


1997



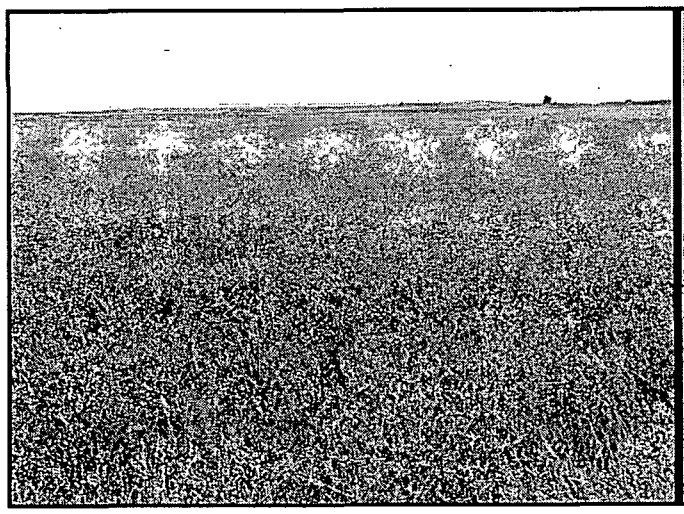
1999

The xeric tallgrass prairie on the site is considered a relict plant community. It remained isolated in a narrow band along the Front Range as the climate changed after the last Ice Age. At the Site it is dominated by big bluestem, mountain muhly, little bluestem, Canada bluegrass, and many other native plants. A few diffuse knapweed plants, a noxious weed, that can invade and dominate the prairie are visible in the photos if you look closely. The darker green appearance of the 1999 photograph is due to the high late summer precipitation received in that year compared to 1997. The brown conditions in 2000 were due to the low precipitation amounts received during the early part of the summer.

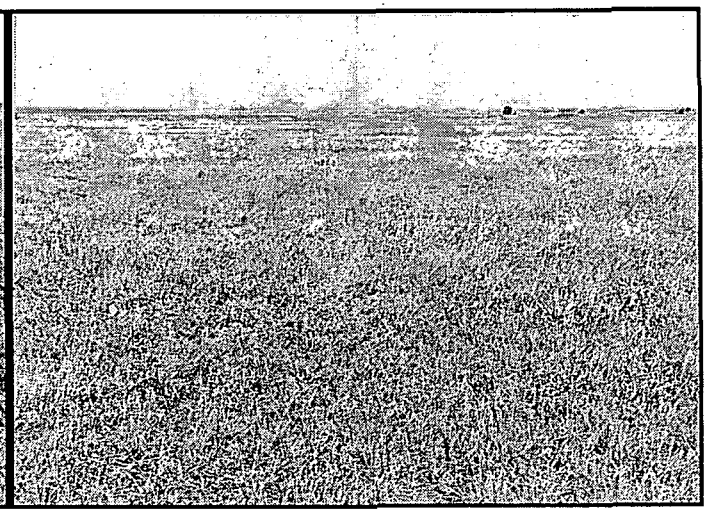


2000

Photo Point 22



1997

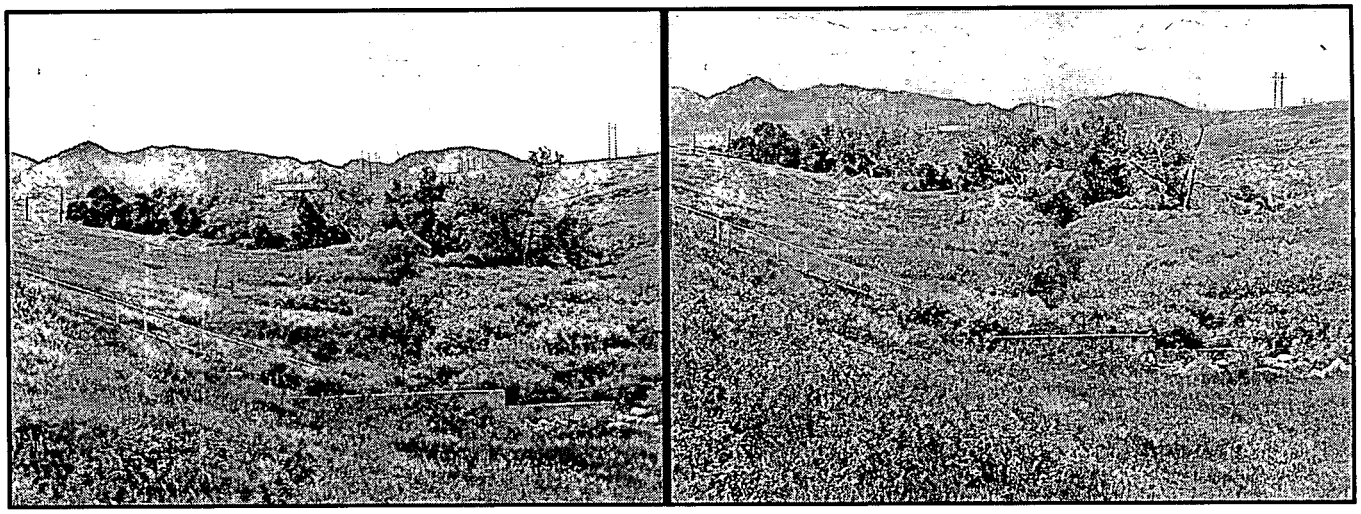


1999

The xeric tallgrass prairie at this location was dominated by the noxious weed, diffuse knapweed, in 1997. The 1999 photograph was taken three months after the aerial herbicide treatment in May 1999. Only dead stalks of previous years diffuse knapweed remain and the condition of the xeric tallgrass prairie is greatly improved. In 2000, the grassland looked even better and many of the graminoid species flowered abundantly.

2000

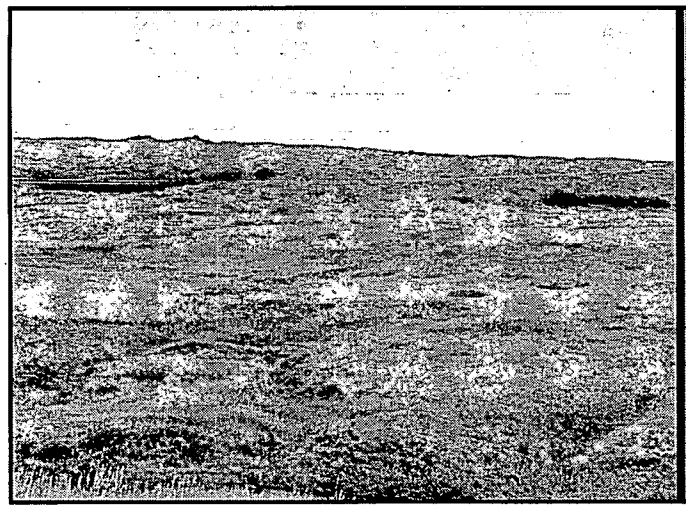
Photo Point 23



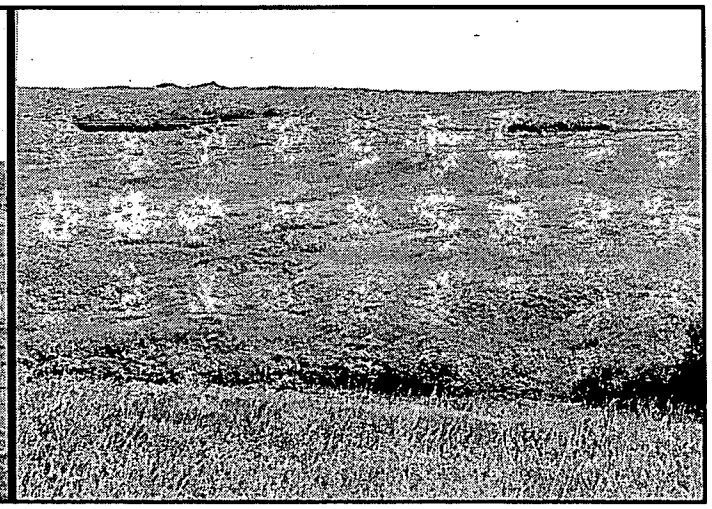
1997 1999

Looking west of the A-series ponds at the Great Plains riparian woodland the most noticeable changes are the filling in of the coyote willow patch (large shrubs on right hand side of photographs) and the death of a couple of large old cottonwood trees (just above the coyote willow patch). Most likely both are a result of changes in stream flow levels.

Photo Point 24



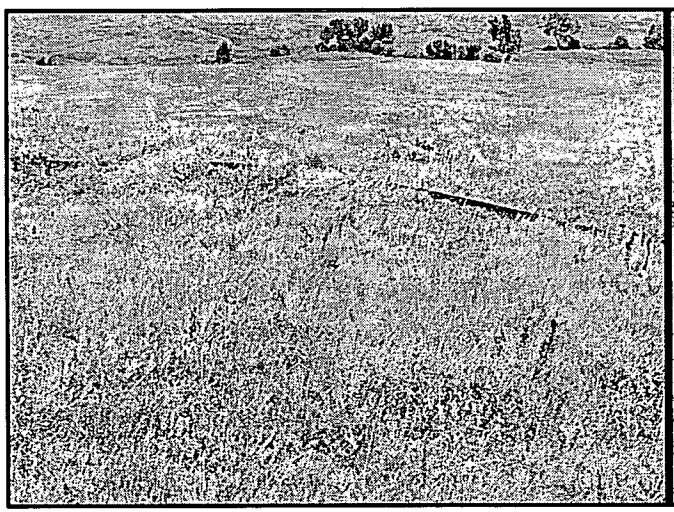
1997



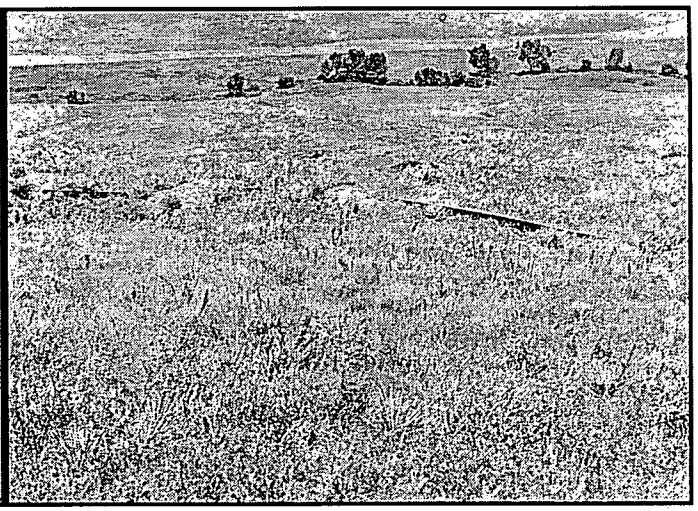
1999

No change is apparent in the tall upland shrubland (small patches near ridgetop) or in the wetland/wet meadow areas on the hillsides at this location in Walnut Creek.

Photo Point 25



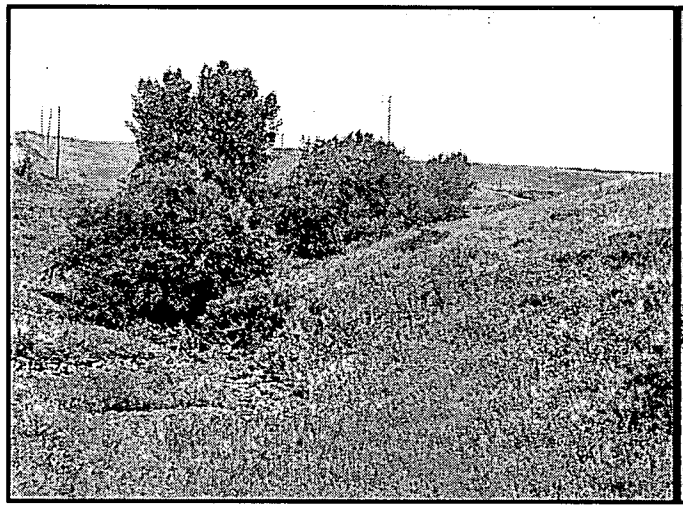
1997



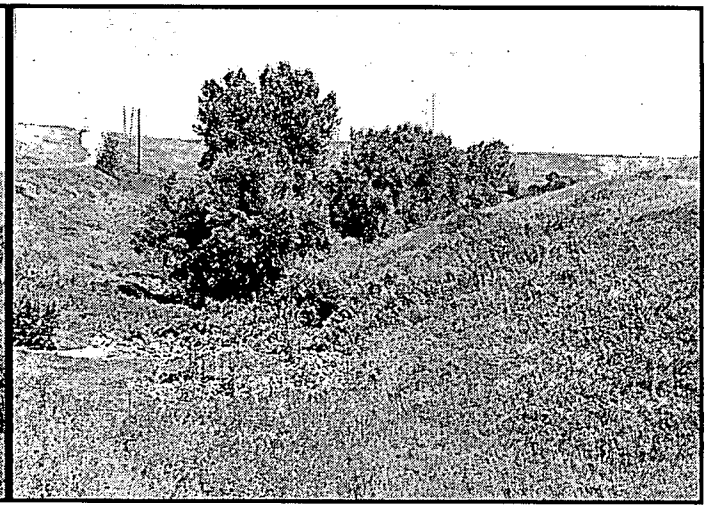
1999

The mesic mixed grassland (foreground hillside) and Great Plains riparian woodland (along stream) appear no different in the two time comparison photographs. The linear stripe along the top of the 1999 photograph was a disturbance in the native prairie where a water diversion pipeline was buried. The area was revegetated after the project was completed.

Photo Point 26



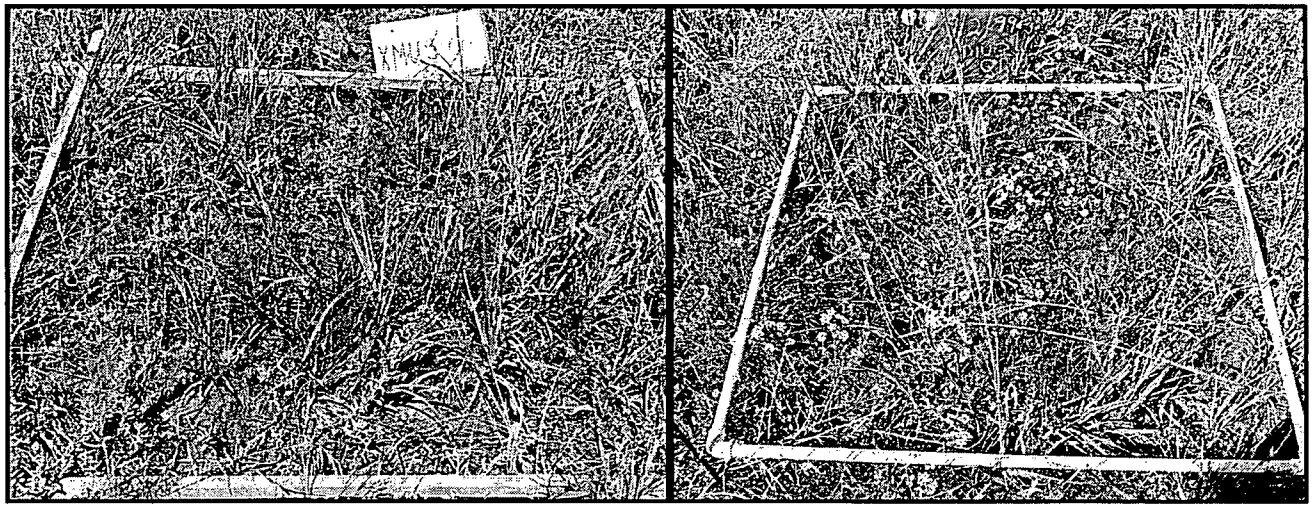
1997



1999

No major changes are noted in this view of the Great Plains riparian woodland below the B-4 dam area.

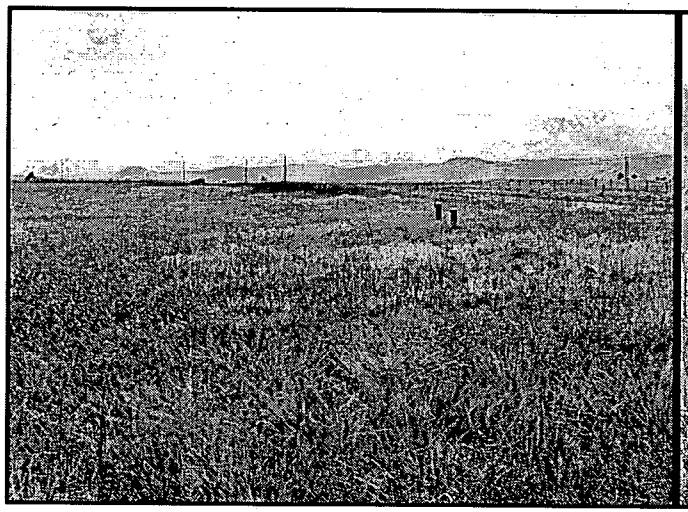
Photo Point 27



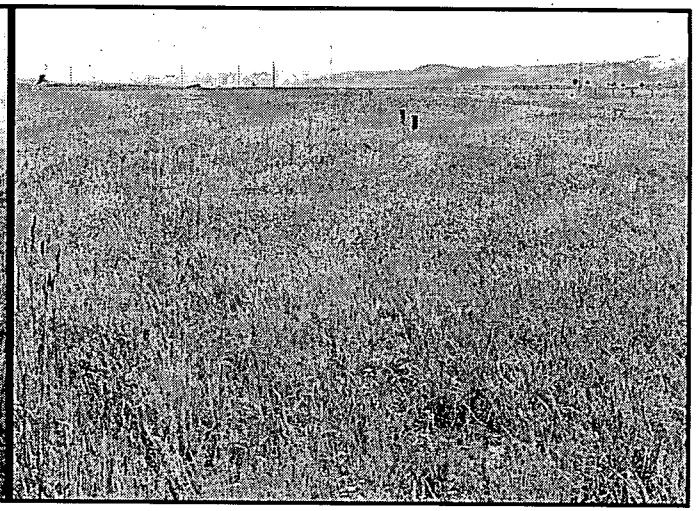
1997 1999

Quadrat photographs can reveal some of the changes that occur in the vegetation from year to year. The taller grasses in both photographs are big bluestem, one of the dominant grasses on the xeric tallgrass prairie at the Site. In the 1997 photograph the predominant forb was white sage, while in 1999 the white flowered plant, Porter's aster had become more common. The 1997 photograph was taken just after the area had been treated with Tordon 22K for control of diffuse knapweed. Notice how two years later the Porter's aster, a species sensitive to the herbicide, had returned.

Photo Point 28

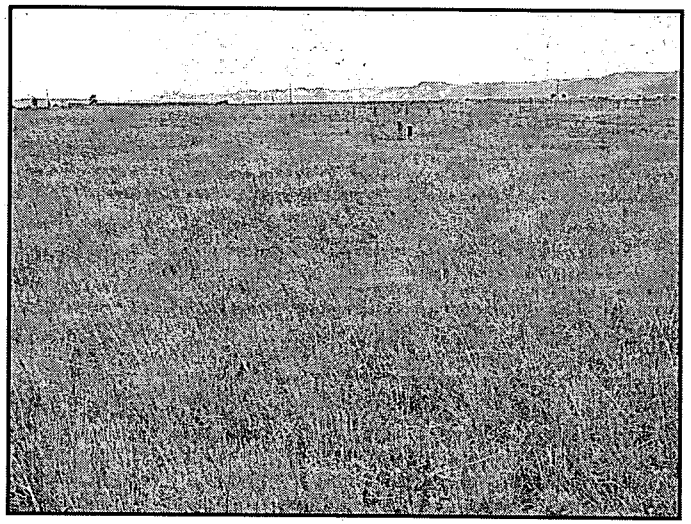


1997



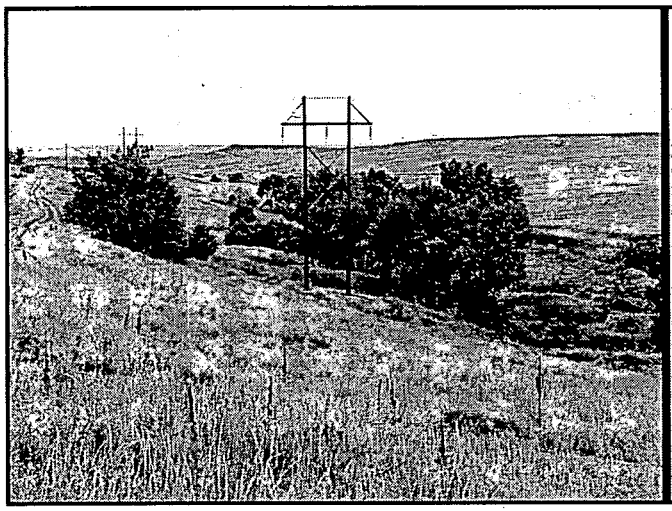
1999

Little difference is noted in these photographs at this location on the xeric tallgrass prairie at the Site. The tall grass flowering in both photographs is big bluestem, one of the dominant species in this rare plant community along the Front Range of Colorado.

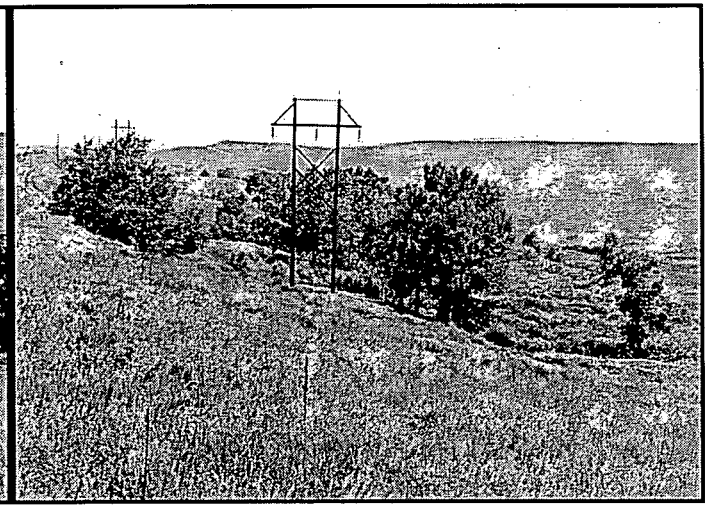


2000

Photo Point 29



1997

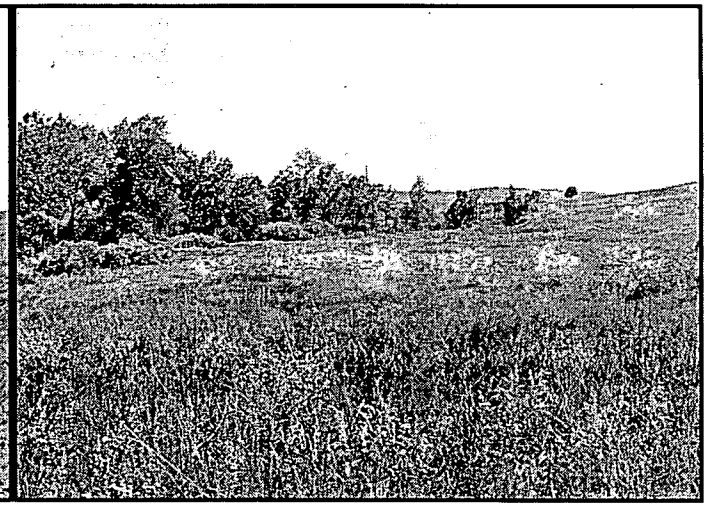


1999

No major changes in the Great Plains riparian woodland in Woman Creek are evident, however the diffuse knapweed present on the hillside in the foreground of the 1997 photograph is gone in the 1999 photograph. The hillside was treated with Tordon 22K in the fall of 1998.

Photo Point 30

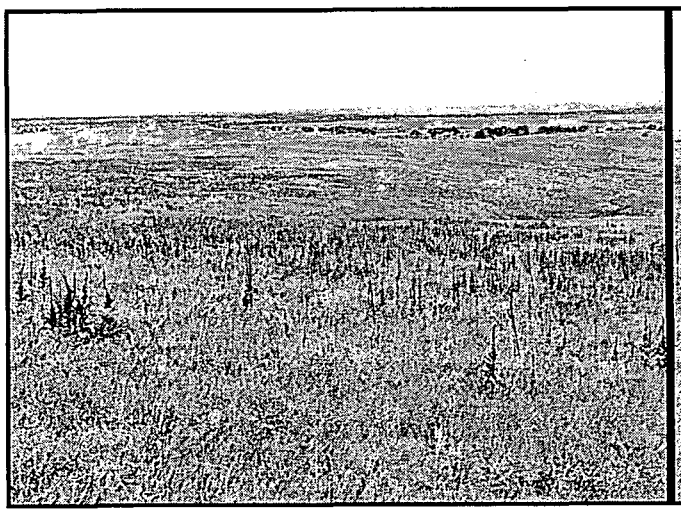
1997



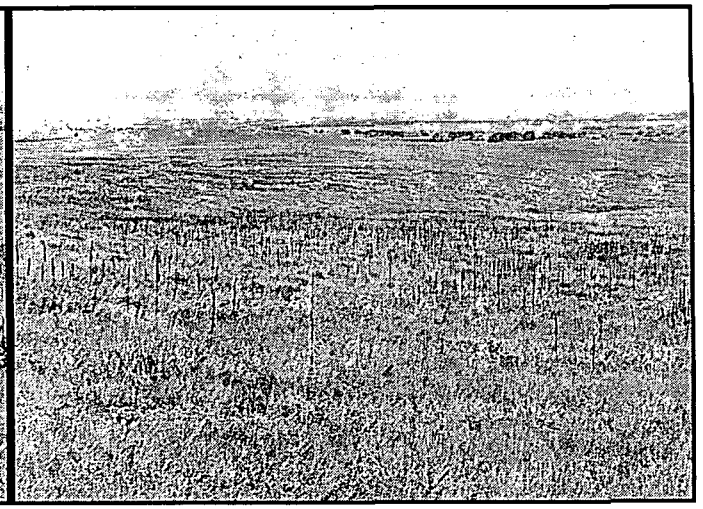
1999

No major changes were observed in the Great Plains riparian woodland in Woman Creek east of the C-1 pond.

Photo Point 31

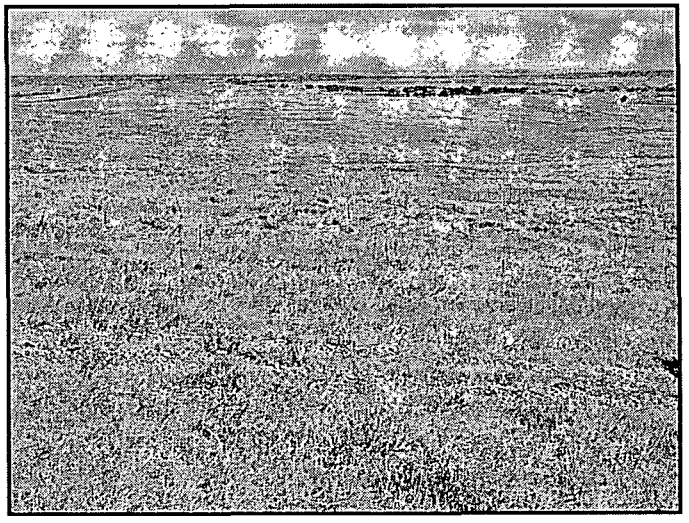


1997



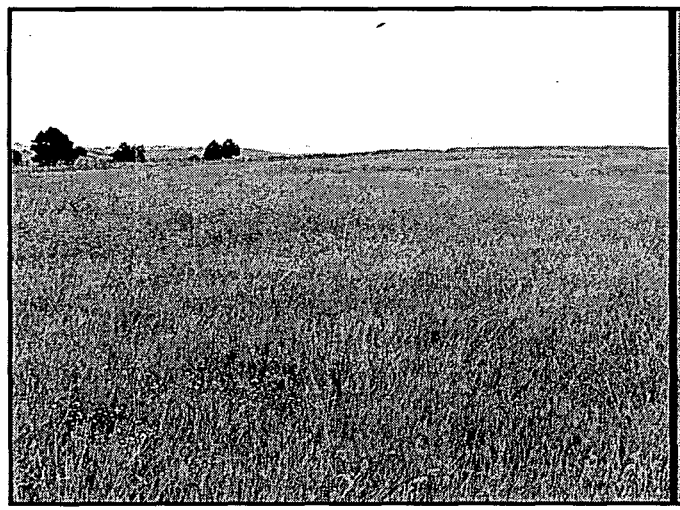
1999

The mesic mixed grassland looking across the southeastern portion of the Buffer Zone is dominated by several noxious weeds, including common mullein, musk thistle, and diffuse knapweed (all three are present in the darker areas in the photographs).



2000

Photo Point 32



1997

1999

Little change is observable in this pair of photographs of the xeric tallgrass prairie from 1997 to1999. In spring 2000, however, the grassland at this location was burned as part of the first prescribed burn at the Site for prairie management and restoration. The vegetation recovered well after the fire even though the summer was very dry.

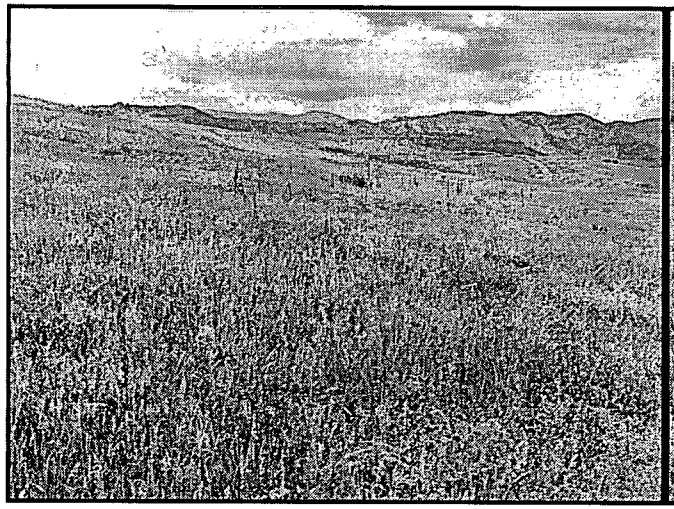
2000

Photo Point 33

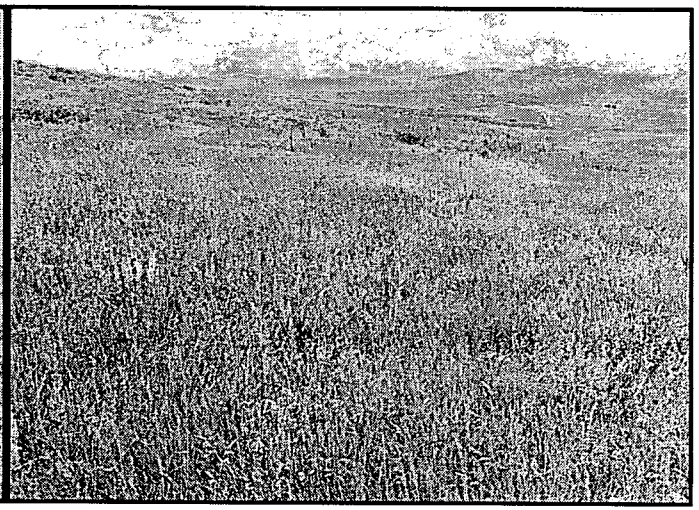
1997 1999

No change is apparent in the Antelope Springs wetland (top of hill towards rear of photograph). However, in the foreground of the 1999 photograph, Canada thistle has sprung up in the mesic mixed grassland and it in need of control before the infestation grows larger.

Photo Point 34



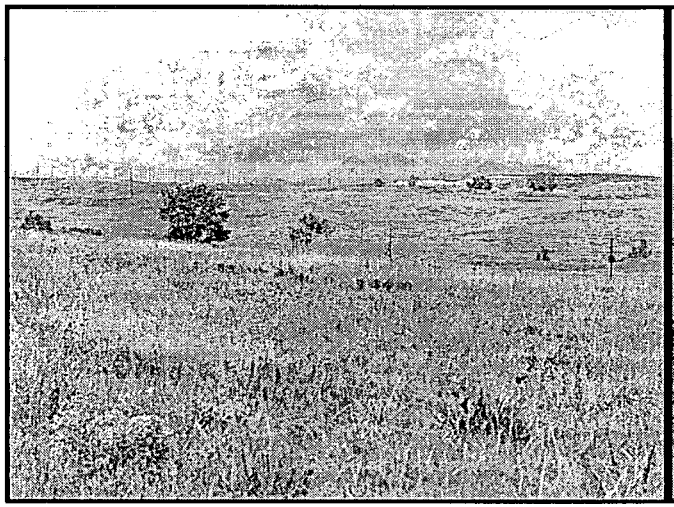
1997



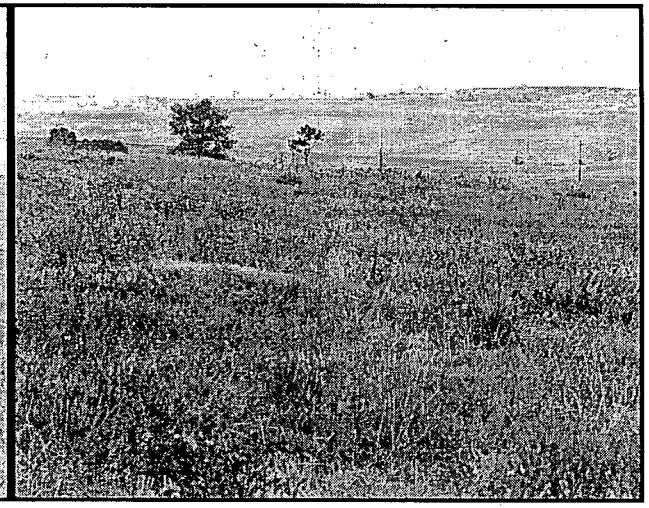
1999

No change is apparent in the mesic mixed grassland at this location in Woman Creek.

Photo Point 35



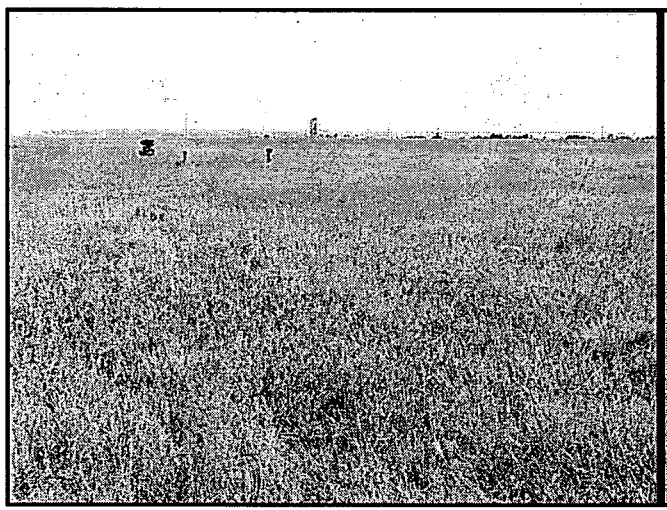
1997



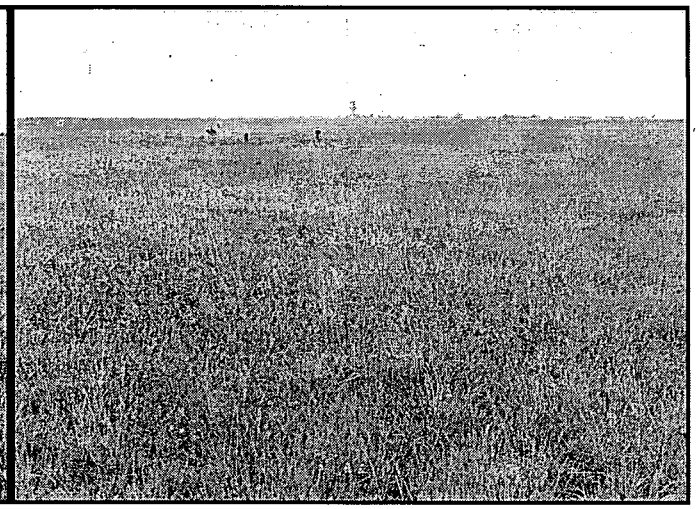
1999

The mesic mixed grassland appears essentially the same in both 1997 and 1999.

Photo Point 36

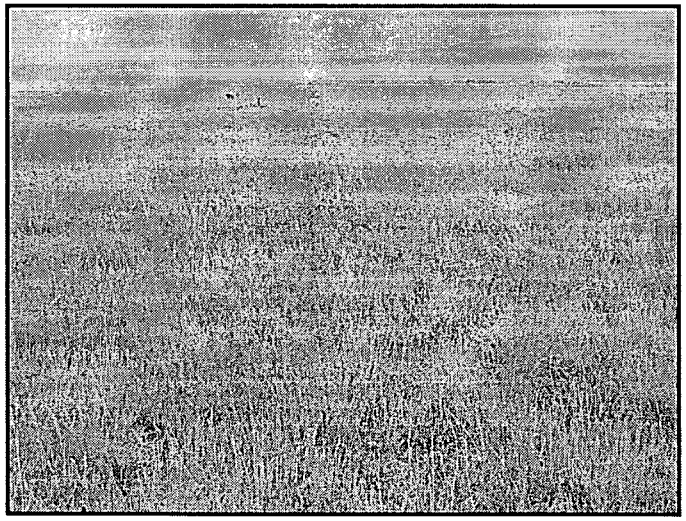


1997



1999

The xeric tallgrass prairie in the south Buffer Zone appears little different from 1997 to 2000.



2000

Photo Point 37

1997

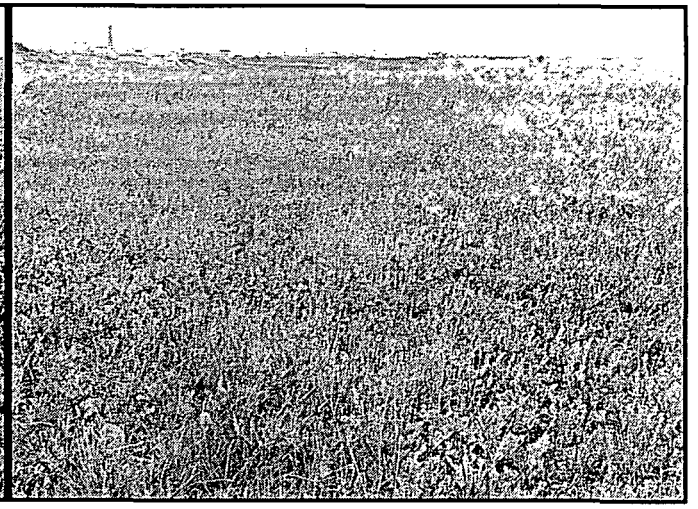
1999

These photos are of the xeric tallgrass prairie in the south Buffer Zone. Notice the lack of the taller plants that were present in 1997 and are missing in 1999. Most of these are non-native species that were controlled in 1999 as a result of the aerial herbicide application which was conducted in May 1999. The brown condition of the grassland in 2000 was due to the dry conditions during early and mid summer.

2000

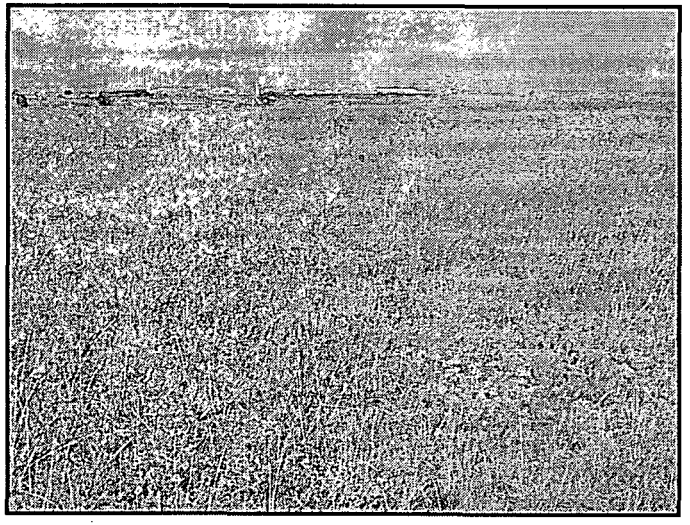
Photo Point 38

1997



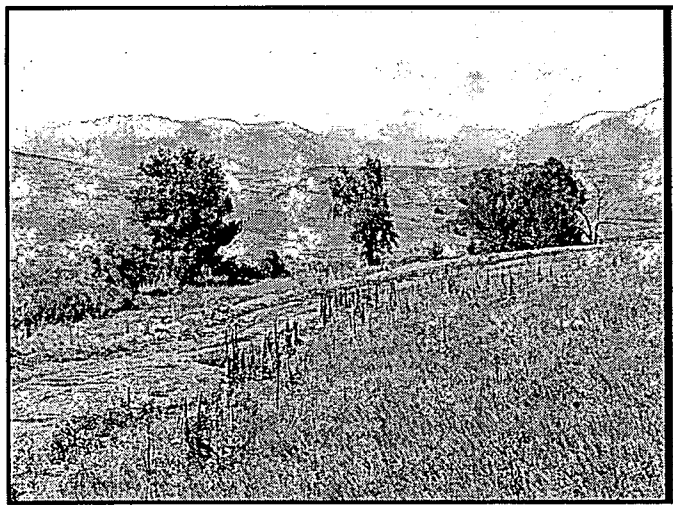
1999

The xeric tallgrass prairie in 1997 was white with Porter's aster. After being treated with the herbicide Tordon 22K, which was applied in spring 1999 to control diffuse knapweed which was becoming a problem, the dotted gayfeather (purple flowers) was abundant in the area. The Porter's aster which is sensitive to the herbicide will return after one or two years, based on observations elsewhere on the Site.



2000

Photo Point 39

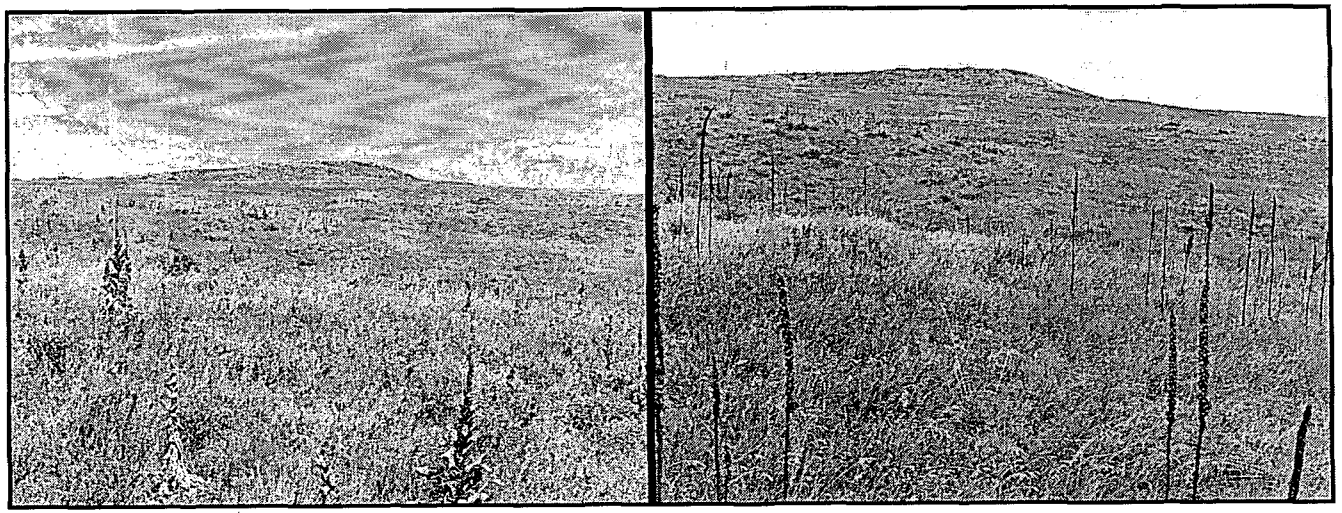


1997

1999

The Great Plains riparian woodland along the stream in Smart Ditch has changed little from 1997 to 1999. However, notice the firebreak road in the foreground is much less weedy in 1999 after being sprayed by helicopter with Tordon 22K and graded. The common mulleins present in 1997 only remain as dead stalks in 1999. No live plants remain of mullein.

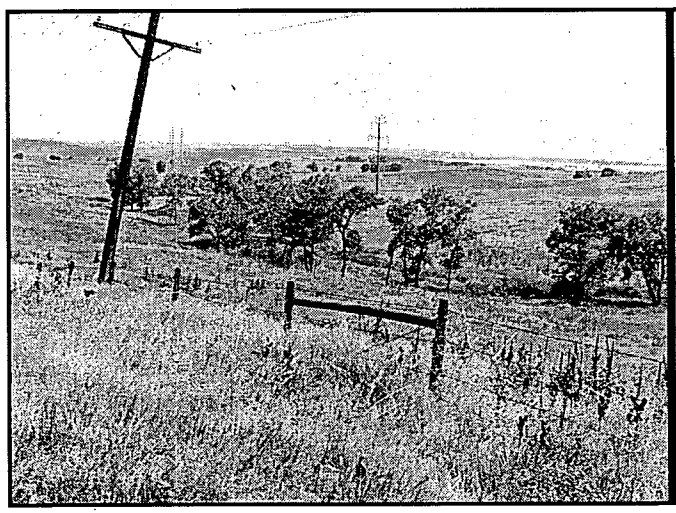
Photo Point 40



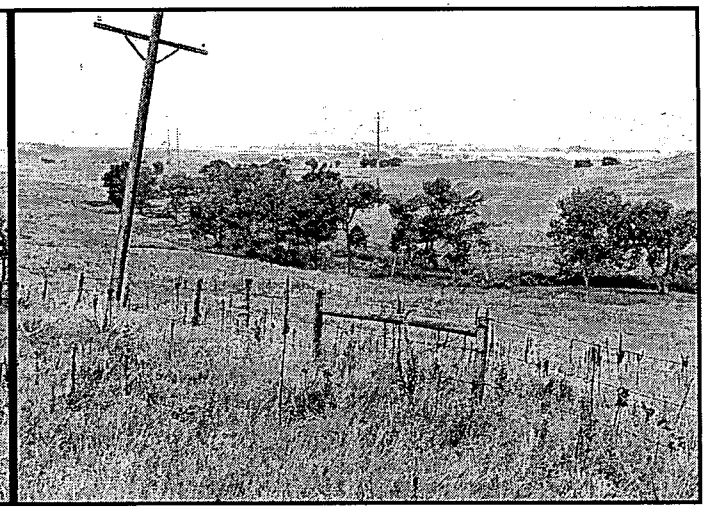
1997 1999

The mesic mixed grassland in 1997 had lots of mullein and musk thistle (the tall plants in the photograph) present at this location. In 1999, however, most of these plants had been controlled and were no longer present as a result of the aerial herbicide application that was conducted in May 1999. The tall stalks in the 1999 photograph are dead mullein stalks from previous years.

Photo Point 41



1997

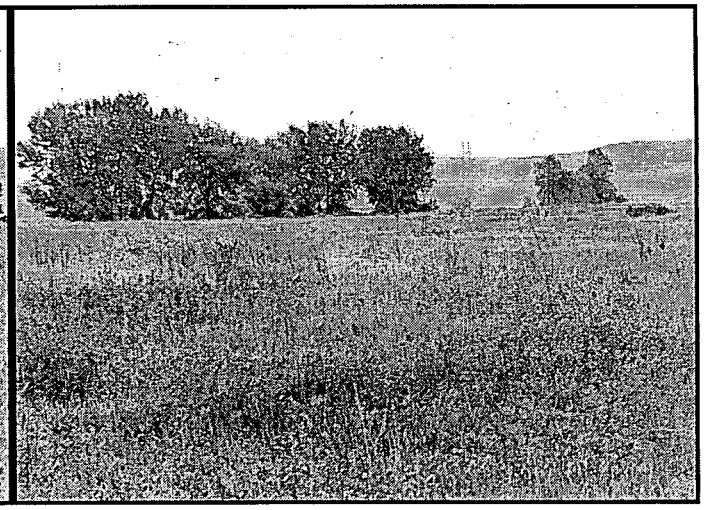


1999

Little change has been seen in the Great Plains riparian woodland at this location along Smart Ditch.

Photo Point 42

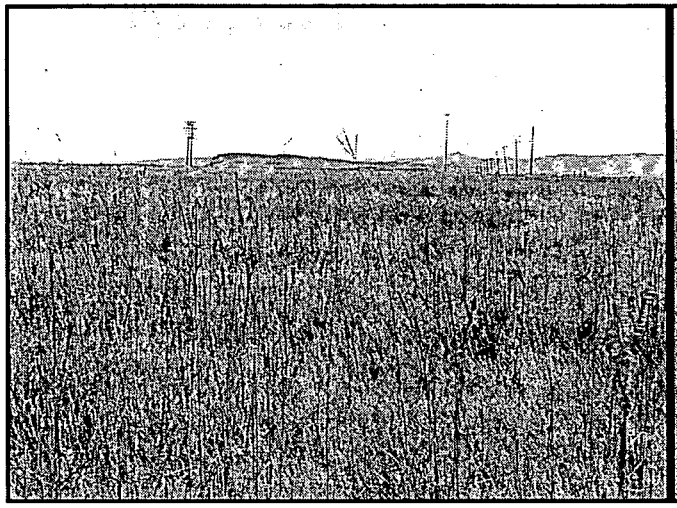
1997



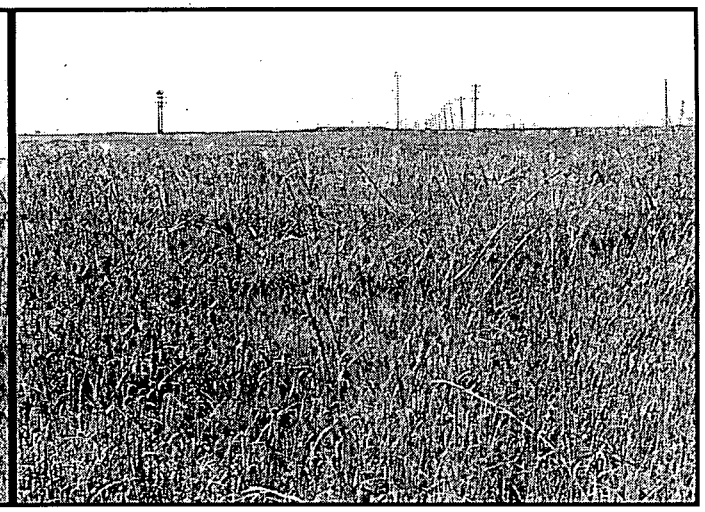
1999

Little change has been seen in the Great Plains riparian woodland at this location along lower Smart Ditch. The large cottonwood trees all appear healthy and continue to provide habitat for wildlife in the southeast Buffer Zone.

Photo Point 43



1997

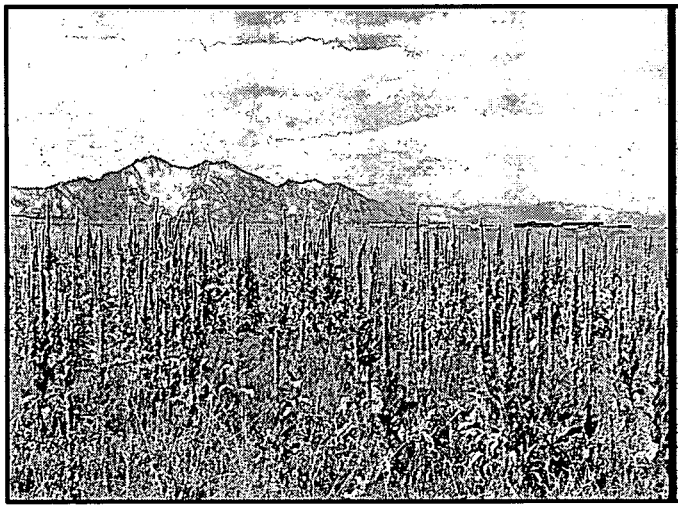


1999

The tall grass in the foreground these photographs is big bluestem, one of the dominant grasses on the xeric tallgrass prairie at the Site. Note the lush growth in the photograph on the right, resulting from the high precipitation received during the summer of 1999.

2000

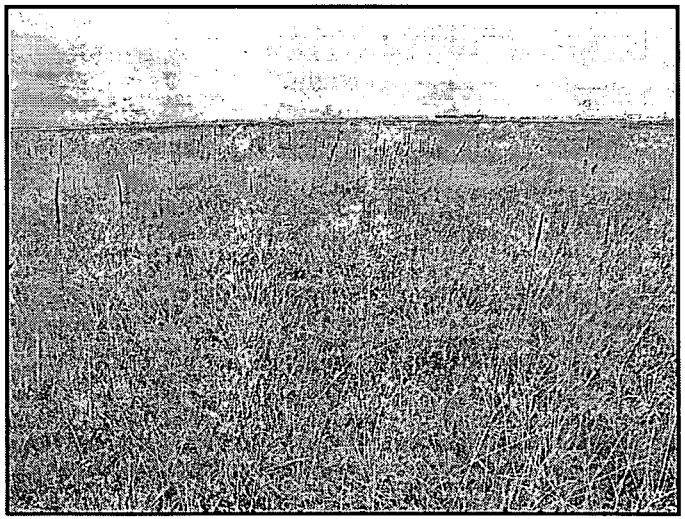
Photo Point 44



1997

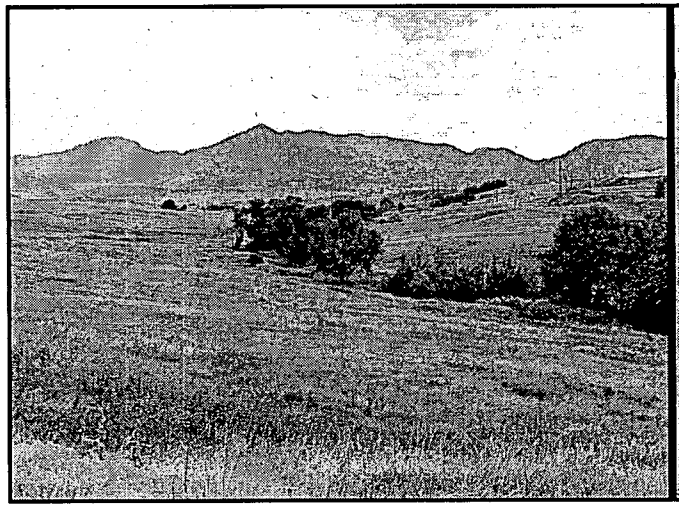
1999

The tall plants in the foreground in the 1997 photograph are the noxious weed, common mullein. Mullein "forests" occur at several locations across the Site, but at this one which was sprayed with Tordon 22K in spring 1999, the only remnants that remained by fall 1999 were the dead stalks from previous years. The mullein continued to be controlled during 2000.

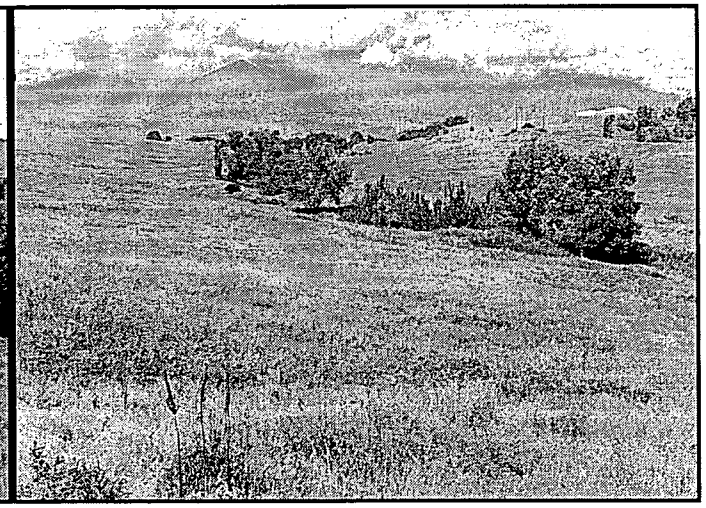


2000

Photo Point 45



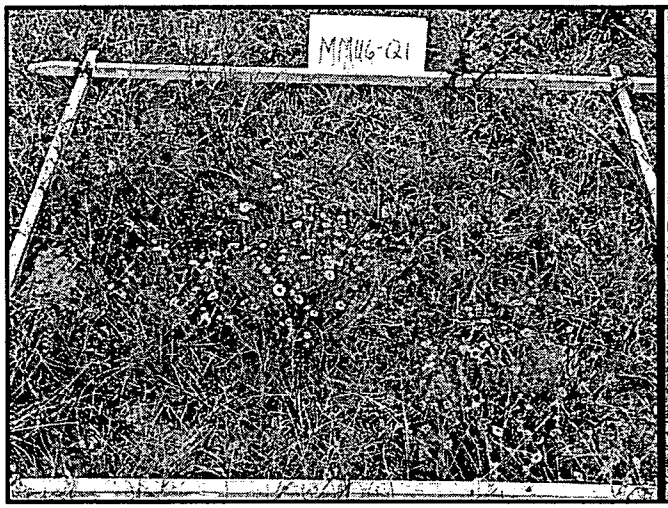
1997



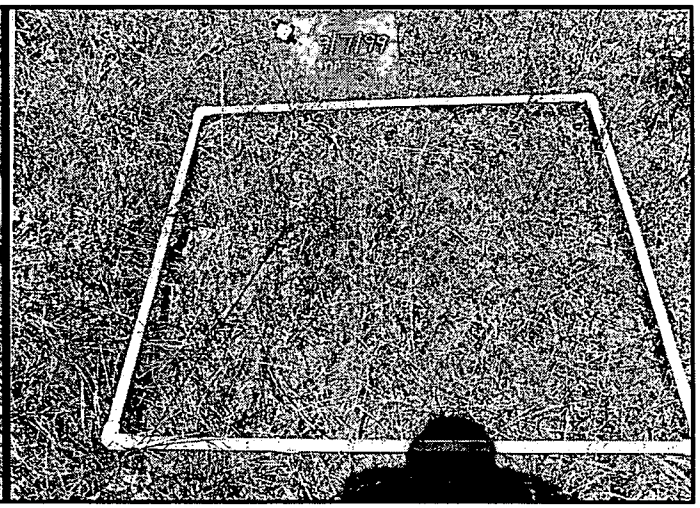
1999

The Great Plains riparian woodland at this location in Woman Creek shows little change in the vegetation along the stream. The cottonwood trees along the stream all appear to be doing well.

Photo Point 46



1997

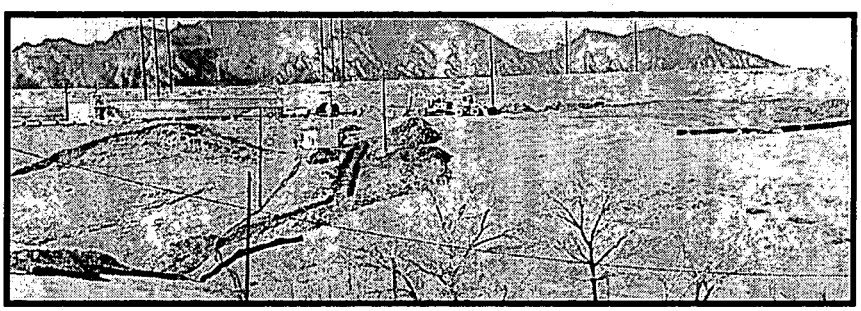


1999

This photo quadrat in the mesic grassland in Walnut Creek shows some of the changes observed on the grassland at this location over a 2 year period.

Photo Monitoring Results from Project Disturbances and Revegetation /Restoration Activities in the Buffer Zone at Rocky Flats Environmental Technology Site

In 1999, remediation projects disturbed several acres of native and previously reclaimed grassland at Rocky Flats. Revegetation was a required activity at the conclusion of each project. The links below will take you to maps and photographs showing the locations and extent of the restoration efforts undertaken to restore these areas with native plant species. Monitoring efforts continued to document the recovery during 2000. Photographs taken at photo points during 2000 have been added to the web pages to provide a time-series of the recover at these project locations. Click on the links below to view the various projects.



McKay Ditch Project

Solar Ponds and Tanks Pipeline Projects

T-1 Trench and East Trenches Projects

South Buffer Zone Road Revegetation Project

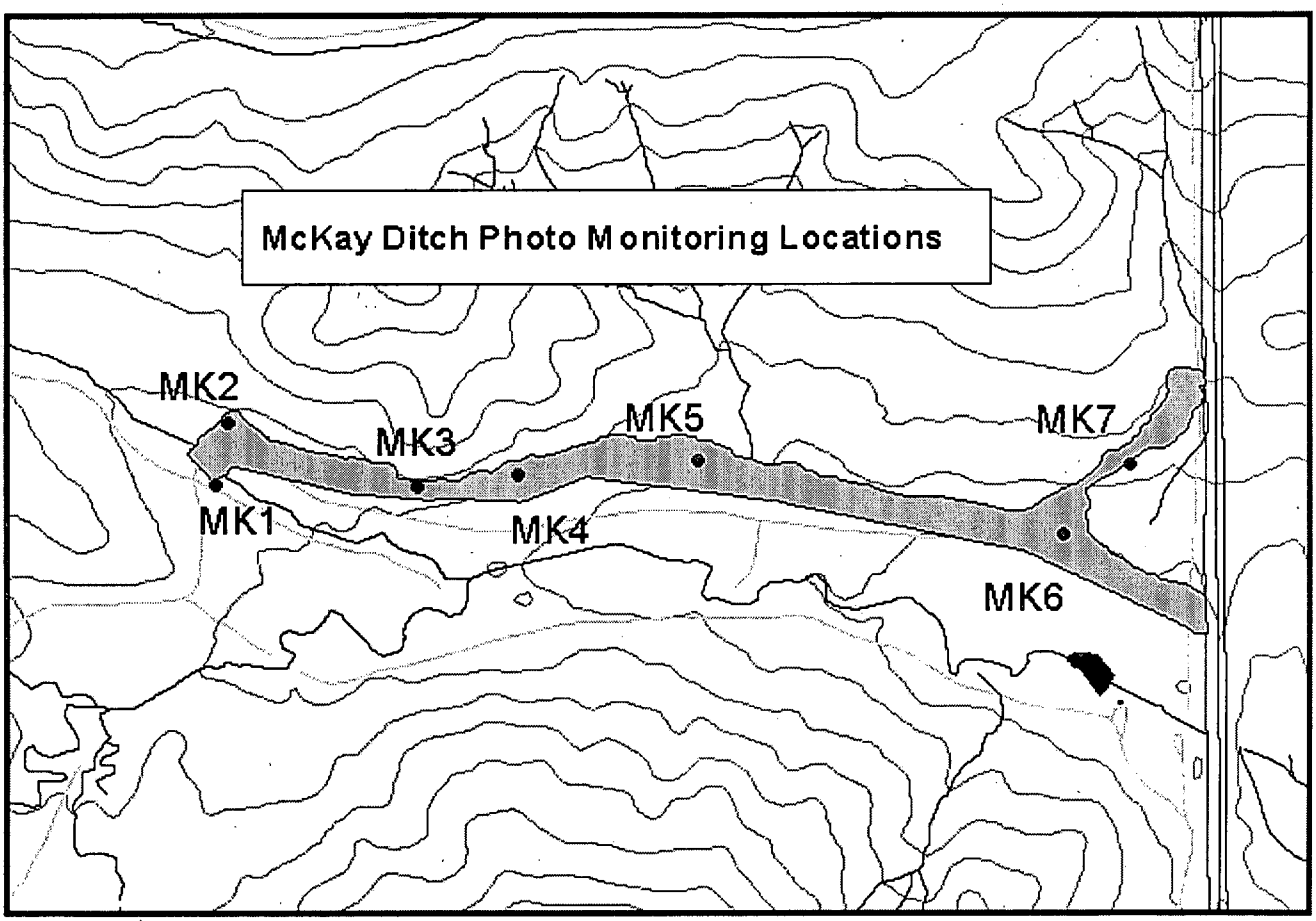
Large Map Showing All 1999 Projects (Linked to Projects)

Return Home

McKay Ditch Restoration/Revegetation Photo Monitoring Project

Rocky Flats Environmental Technology Site, Ecology Group

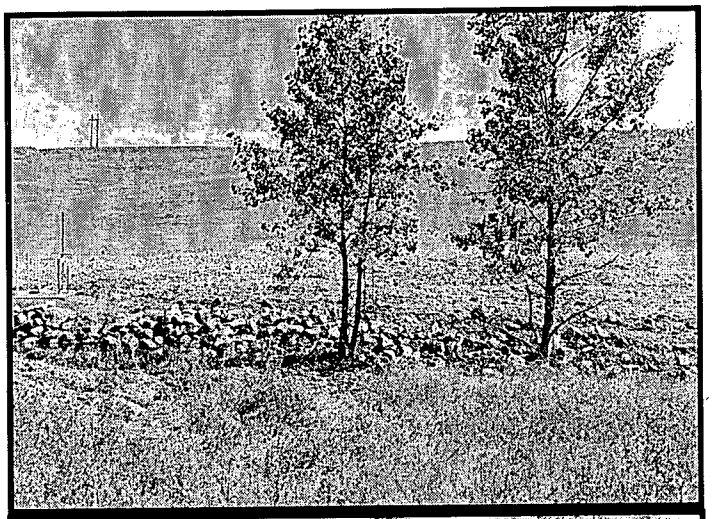
During 1999, a water diversion pipeline was buried across a portion of the northeast Buffer Zone at the Rocky Flats Environmental Technology Site (Site). It was decided that photo monitoring would be an appropriate design to visually document the progression of the restoration/revegetation effort for Site managers and ecologists. The monitoring plan used both photo point and photo quadrats to document changes of the landscape views and ground's surface. To see currently available photographs of the restoration effort click on the photo locations on the project map below. The seed mix used for the restoration is available by clicking here.



Return Home

McKay Ditch Photo Location

MK1



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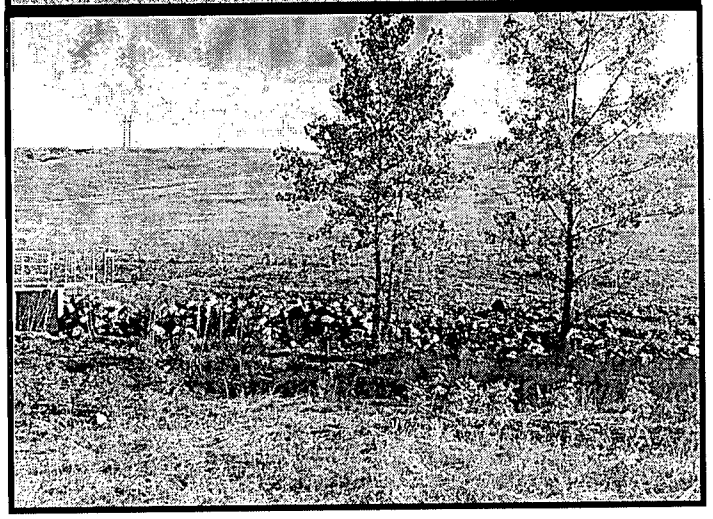

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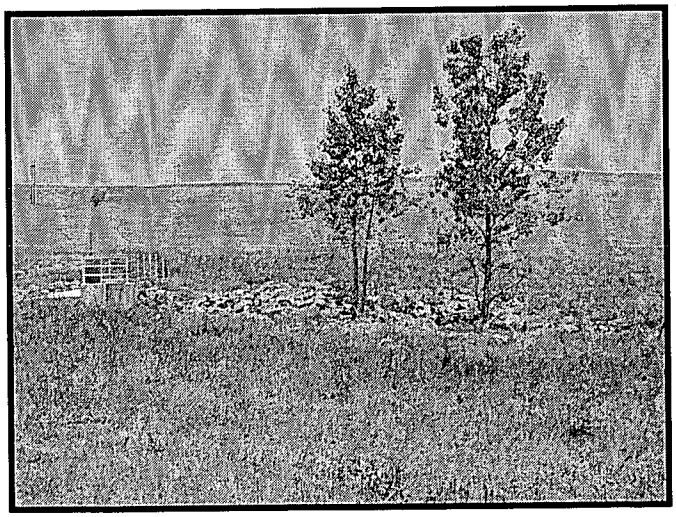

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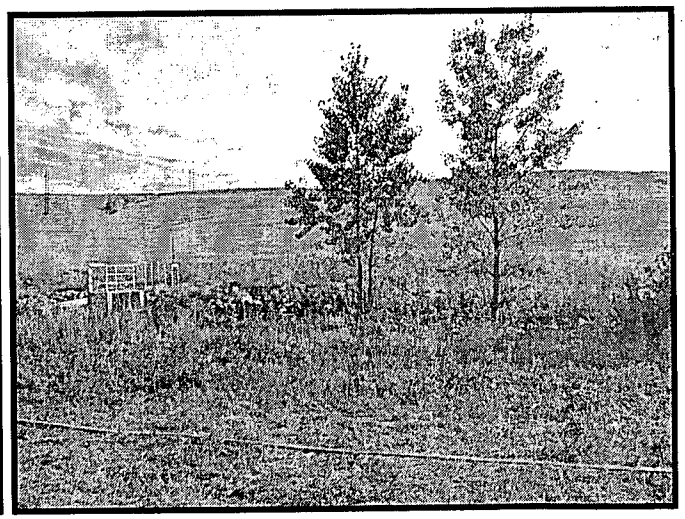

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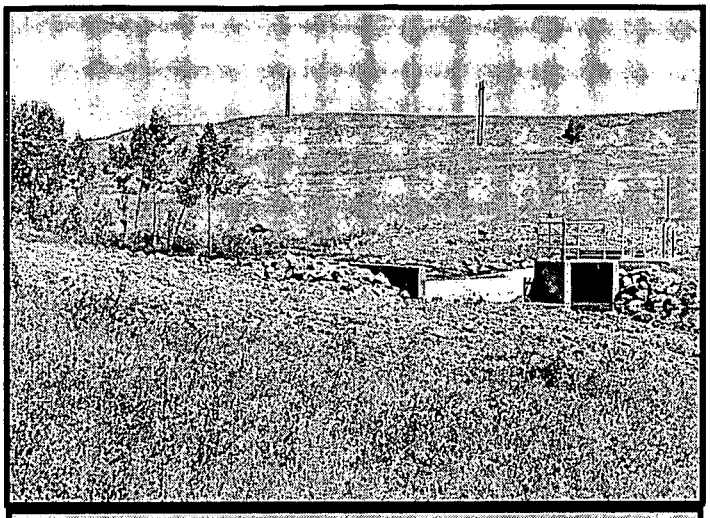

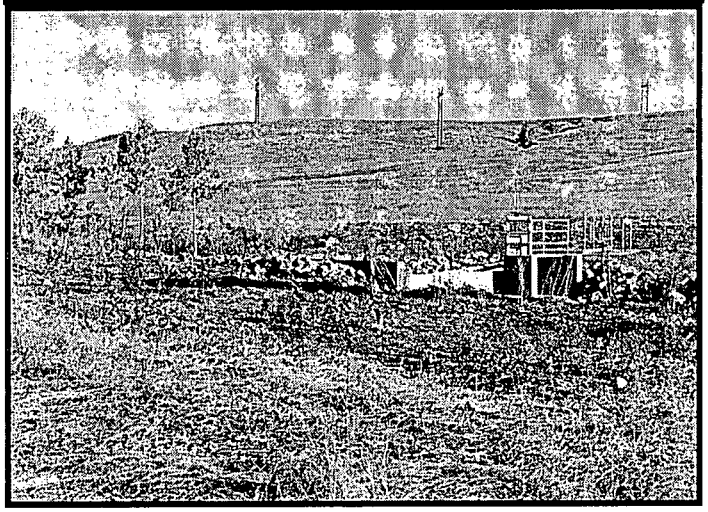

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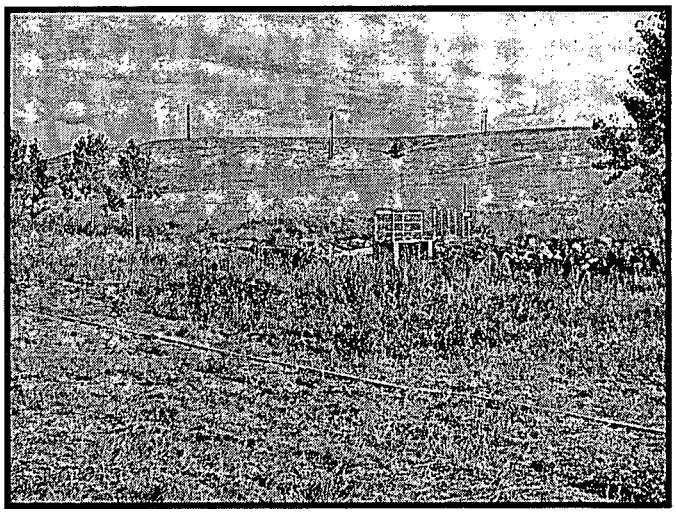

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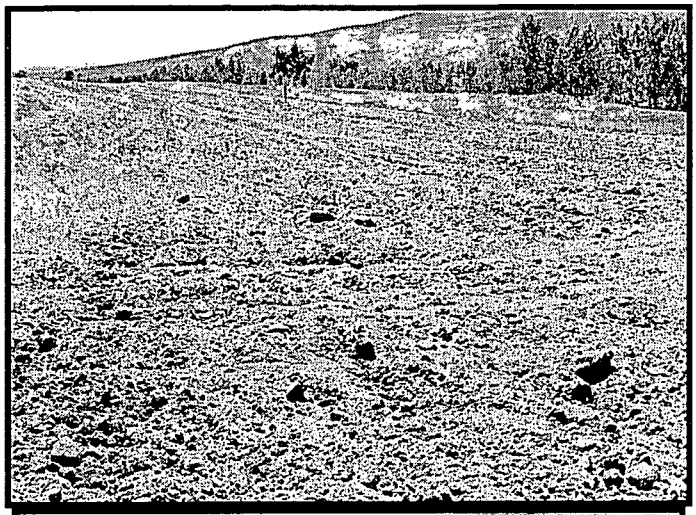
McKay Ditch Photo Location

MK2



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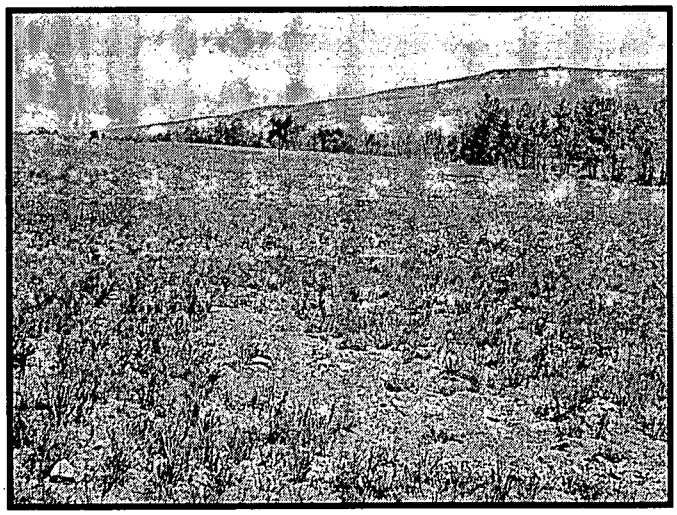

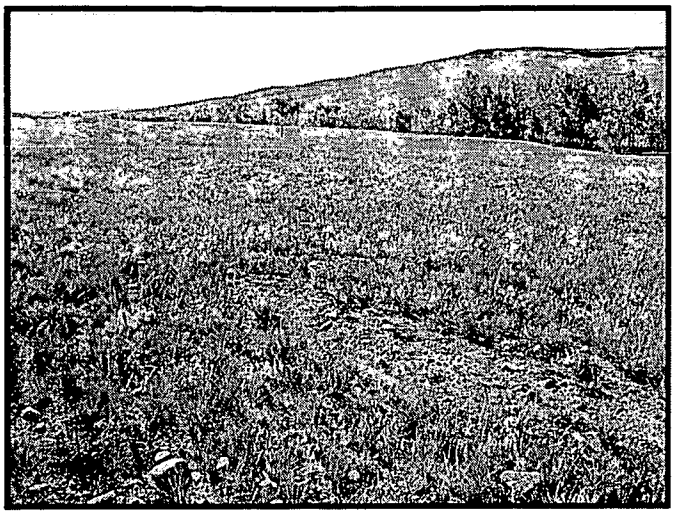

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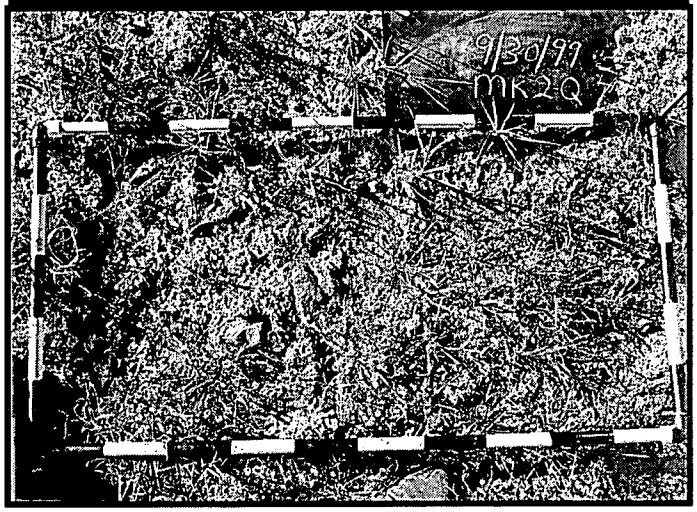

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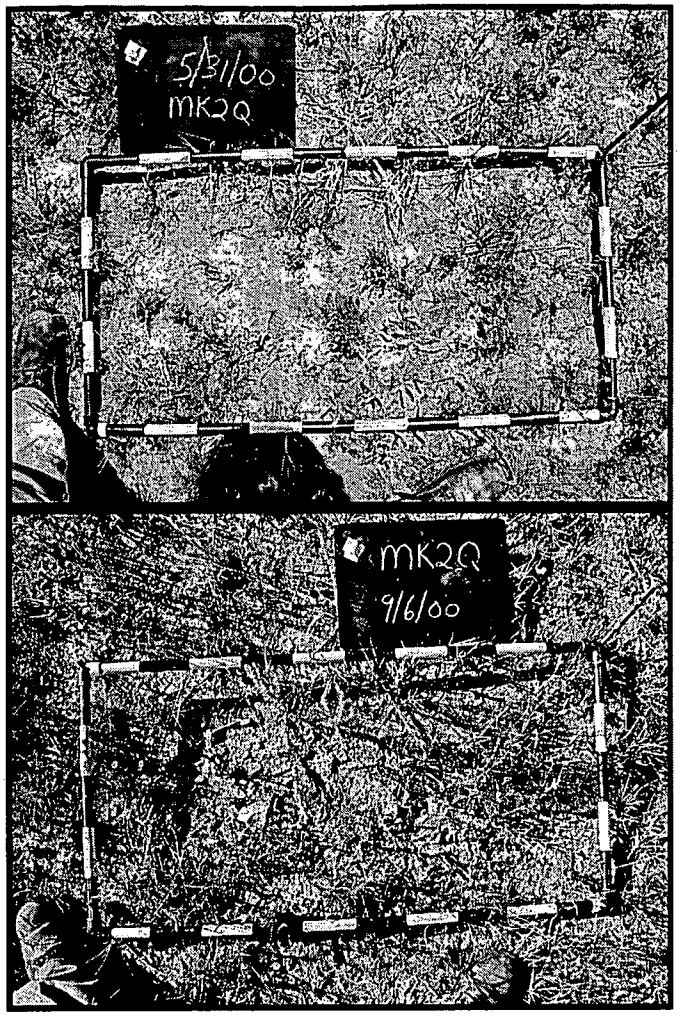

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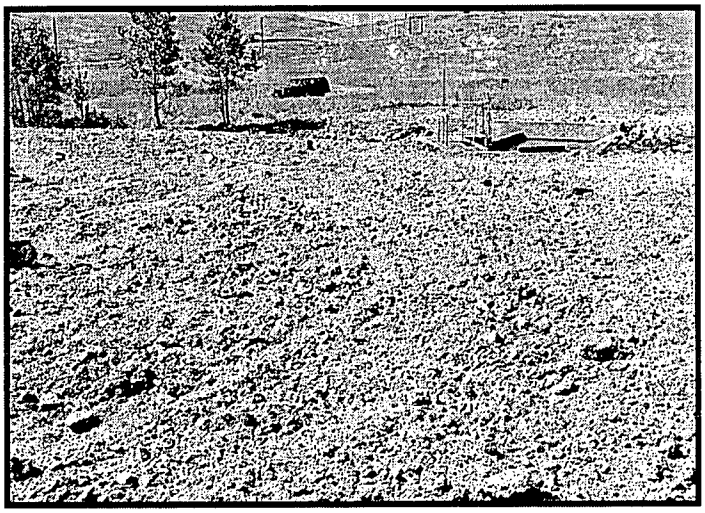

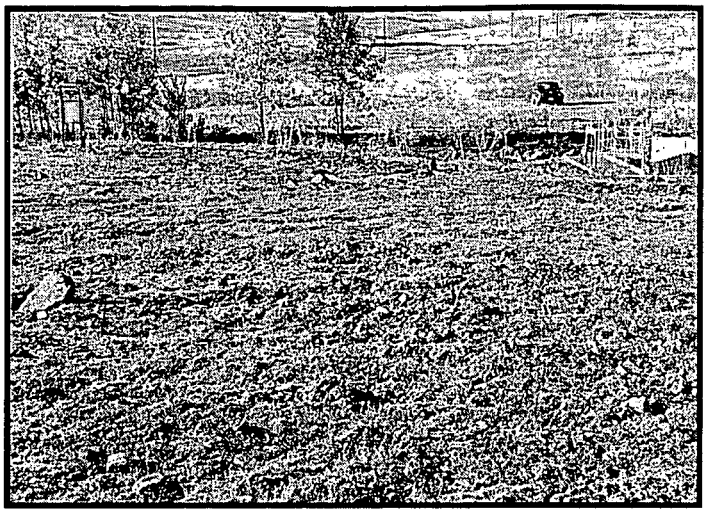

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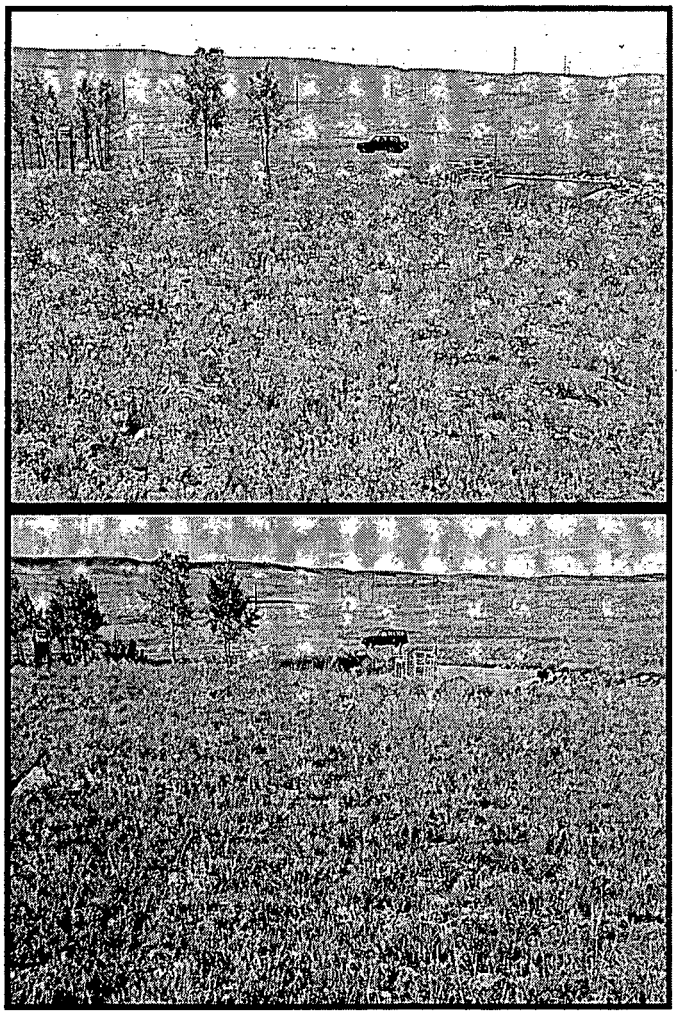

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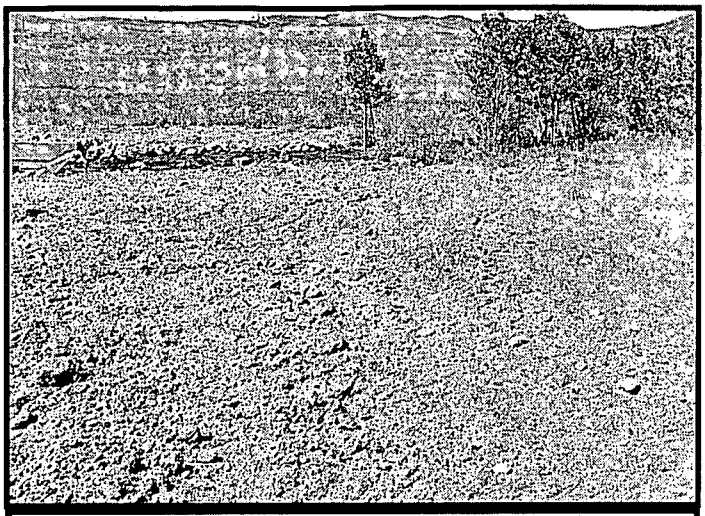

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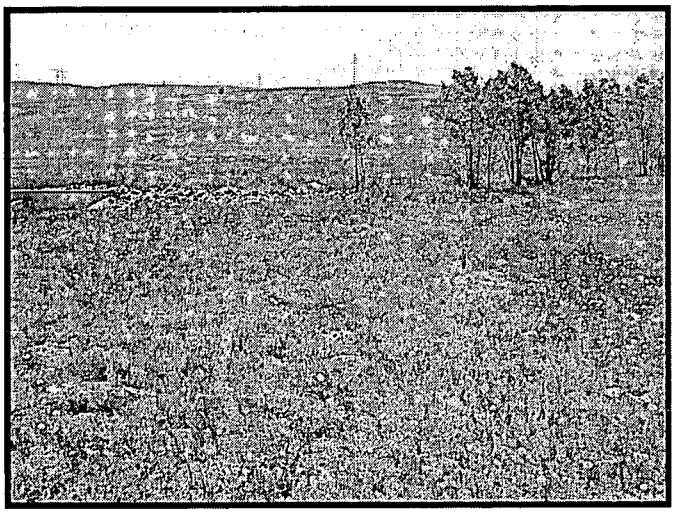

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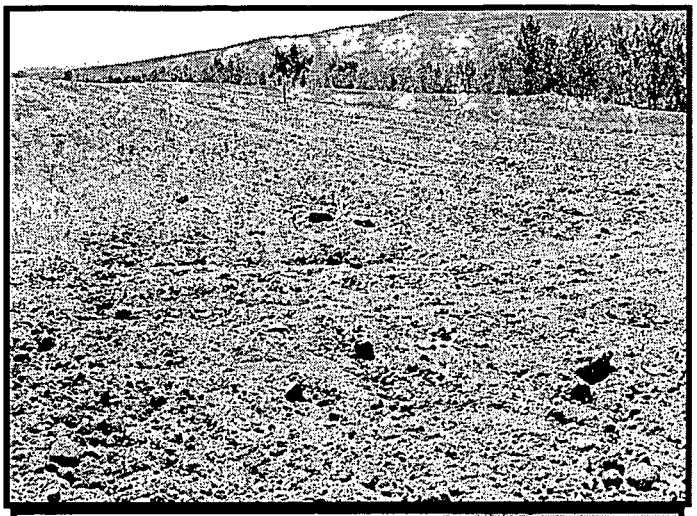
McKay Ditch Photo Location

MK2



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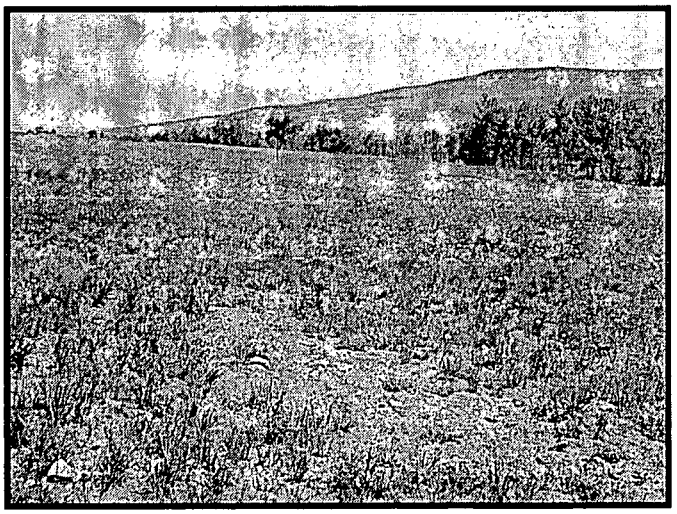

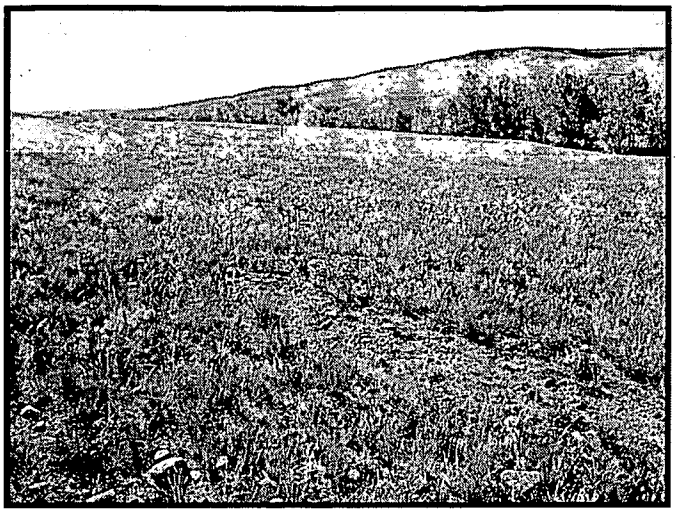

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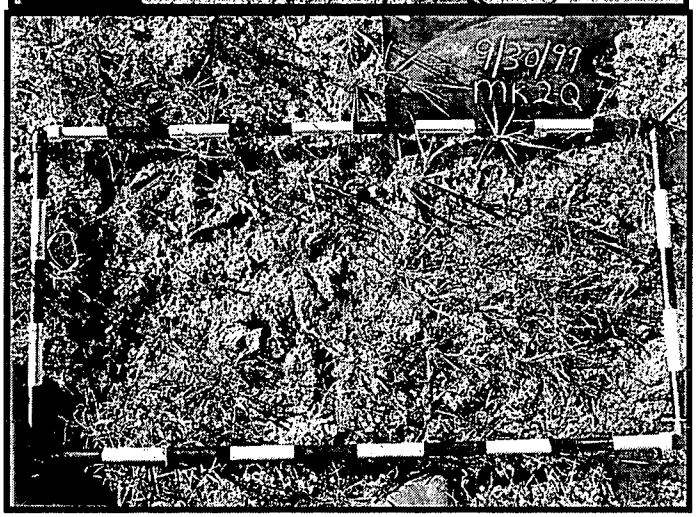

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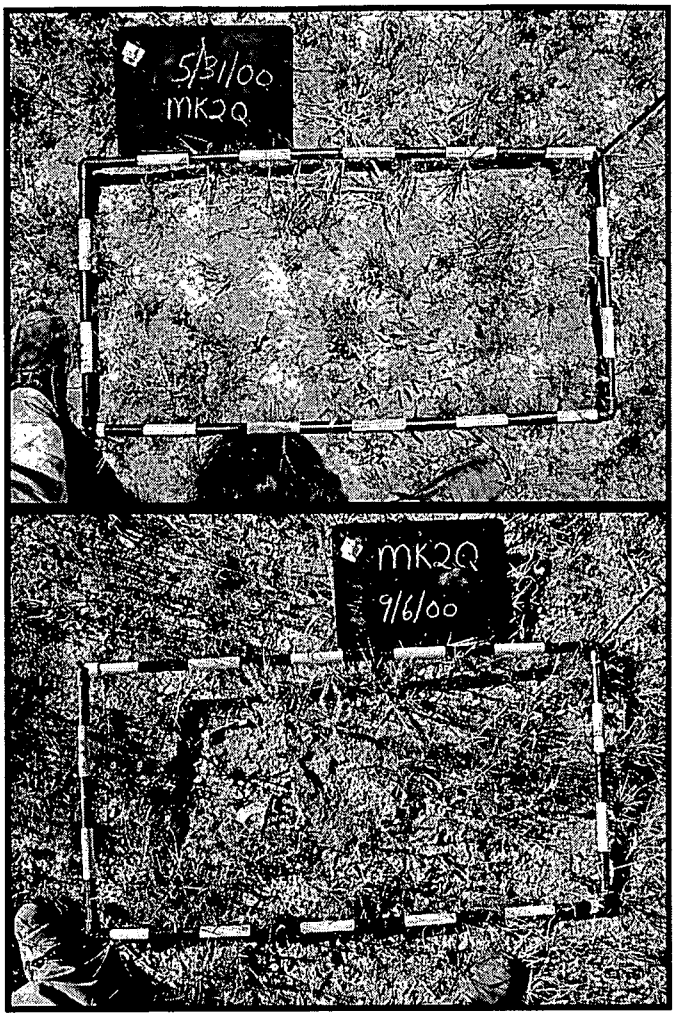

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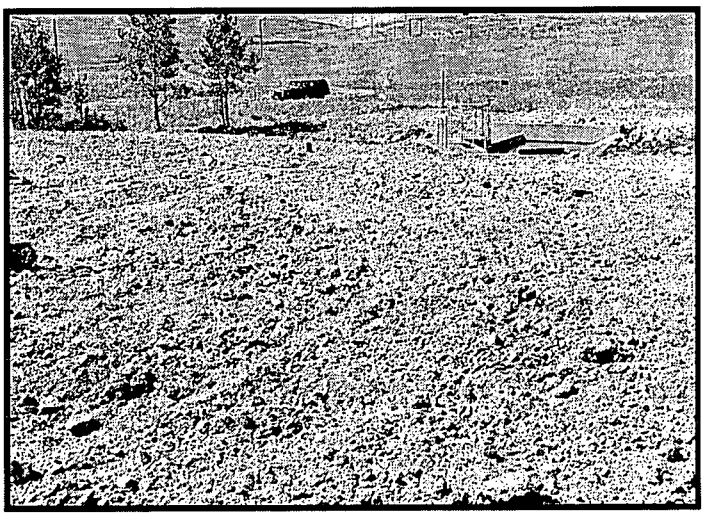

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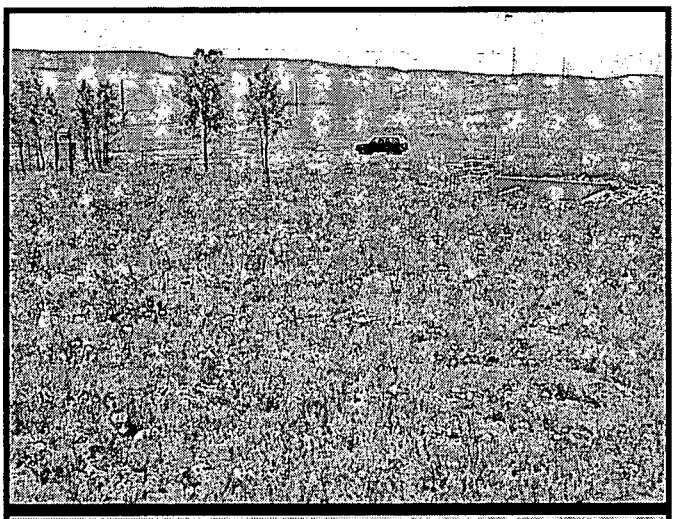

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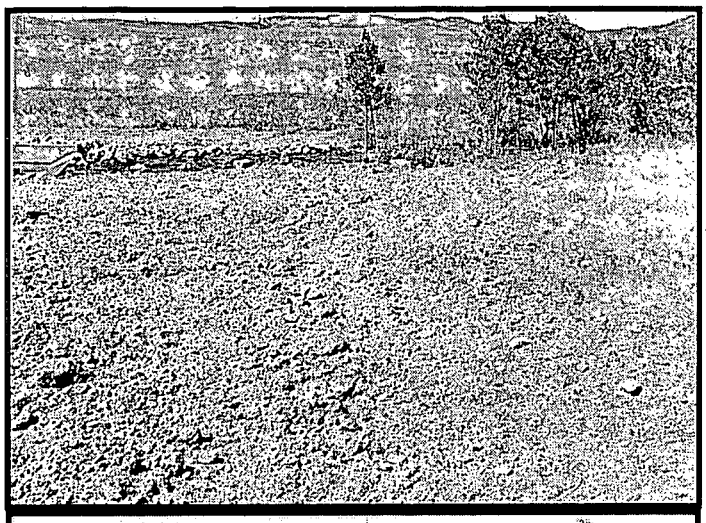

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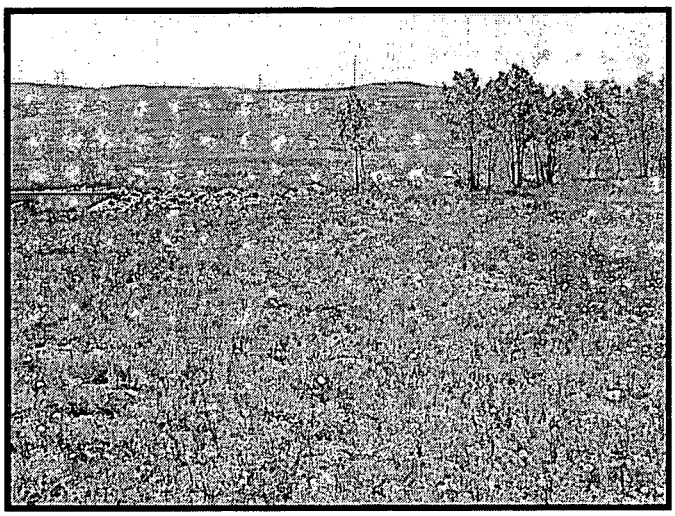

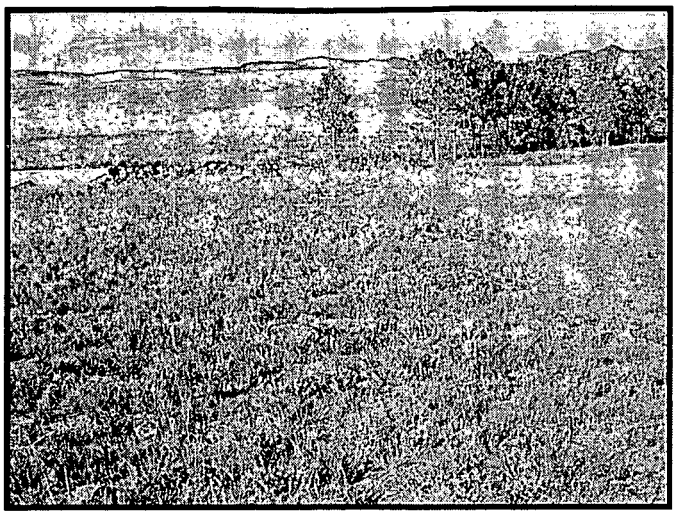

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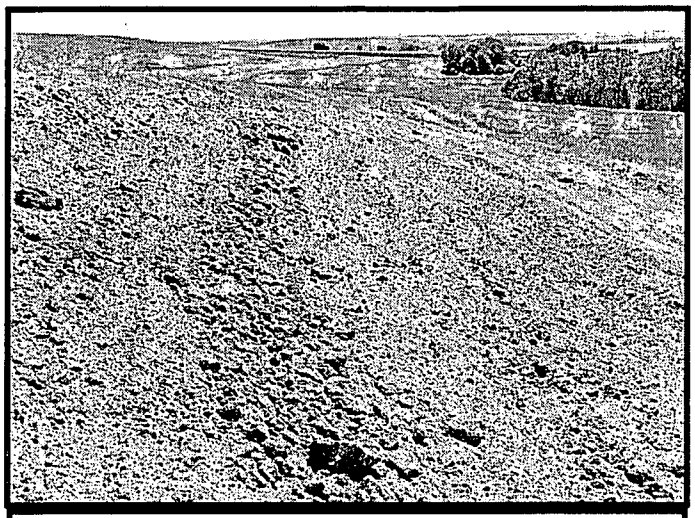
McKay Ditch Photo Location

MK3



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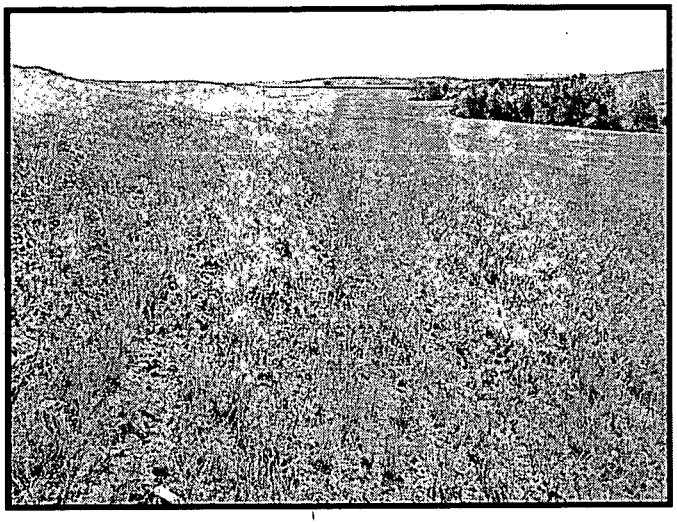
9/30/99



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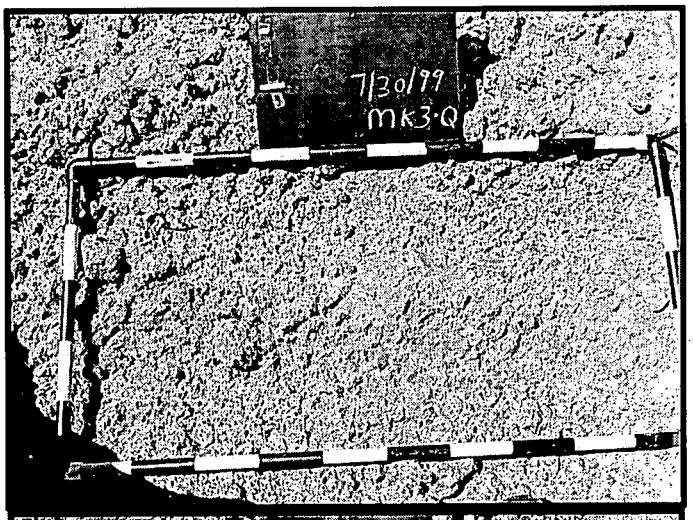

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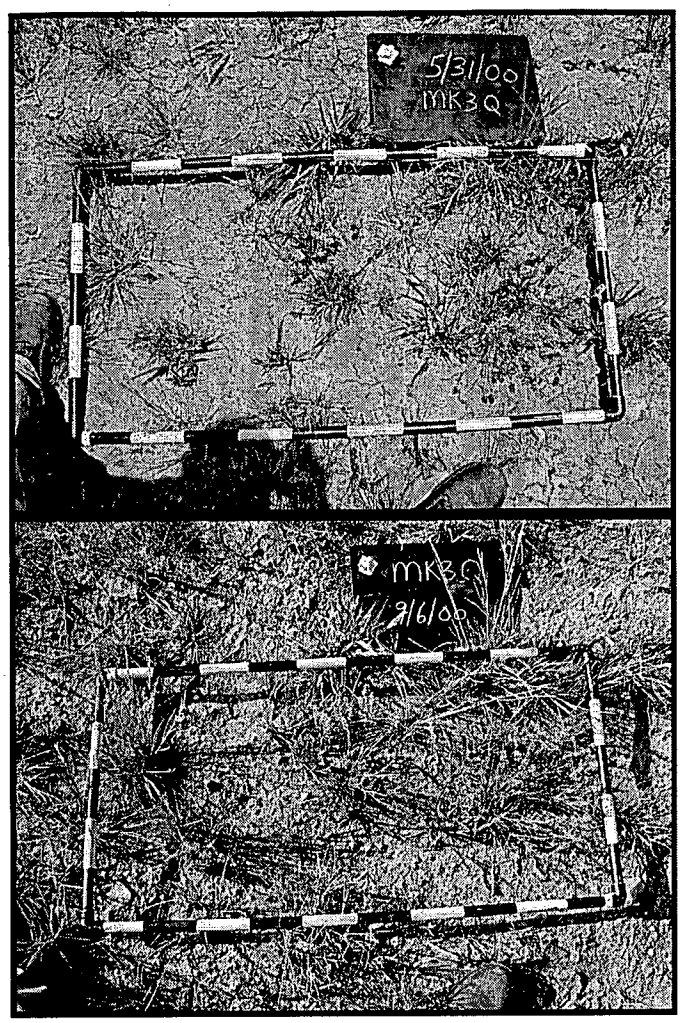

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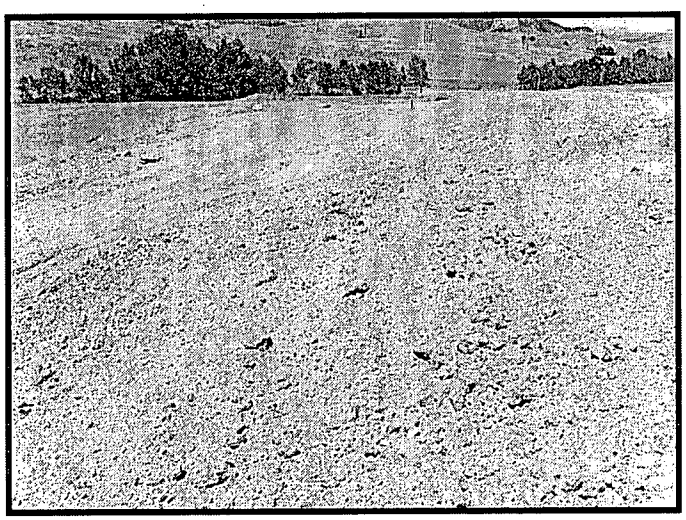

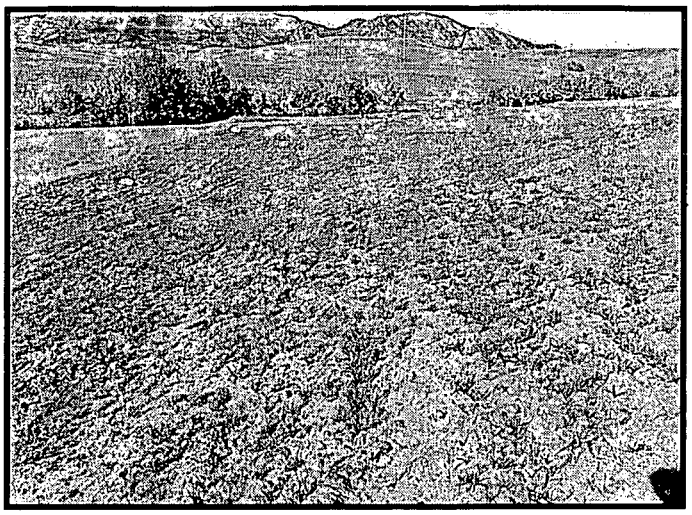

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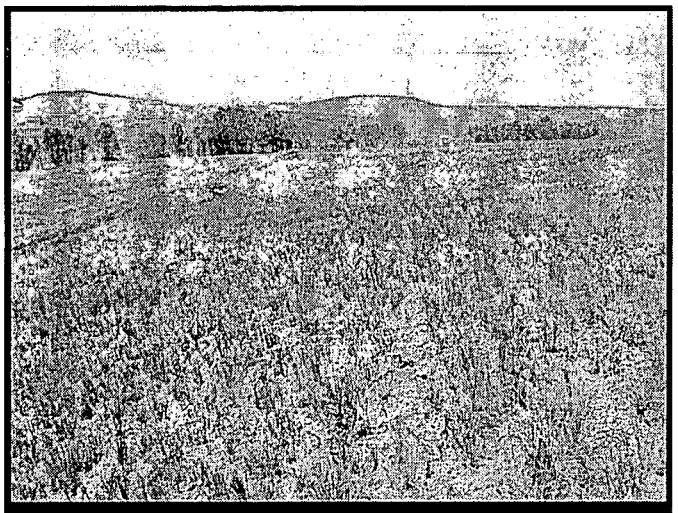

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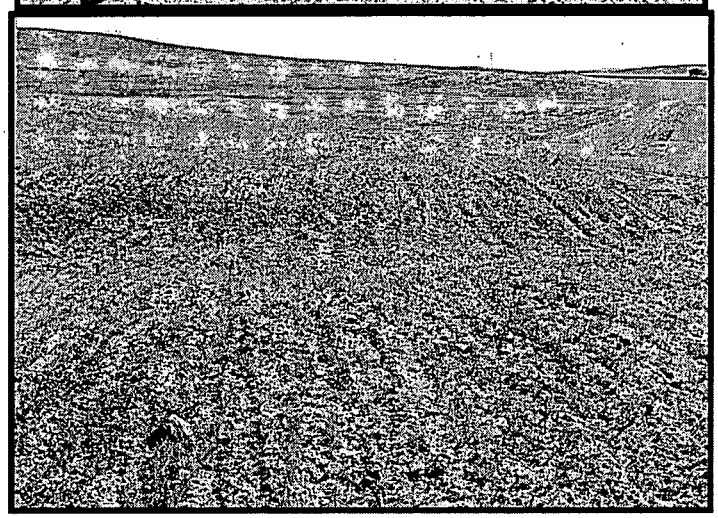
McKay Ditch Photo Location

MK4



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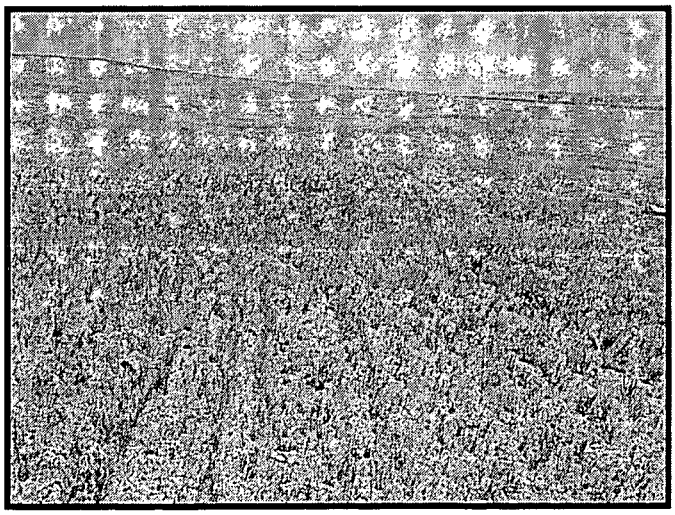

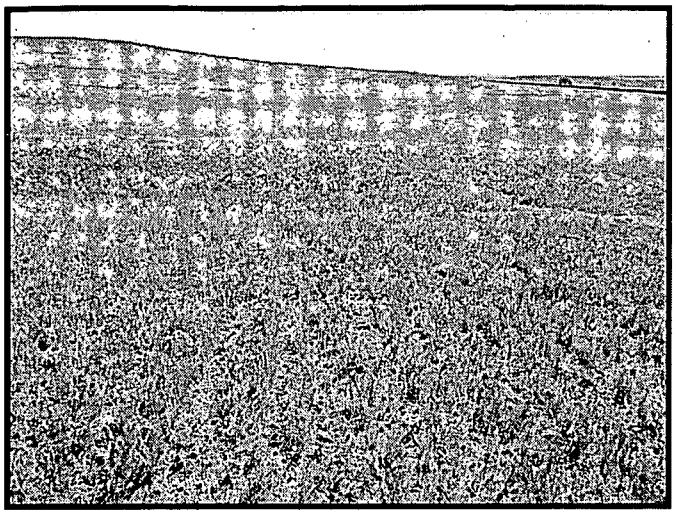

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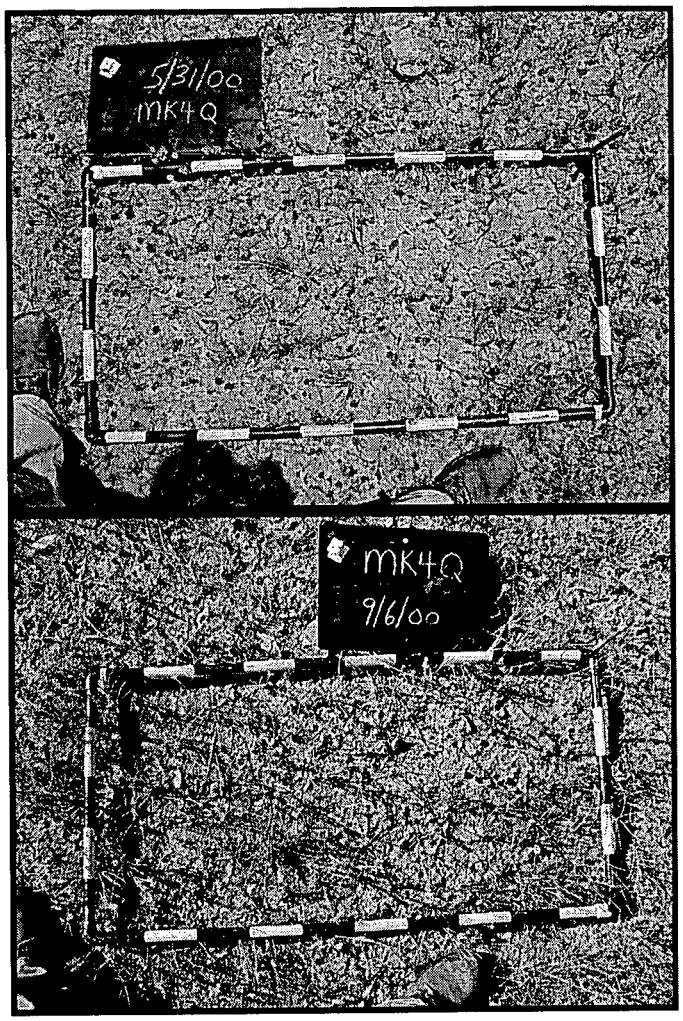

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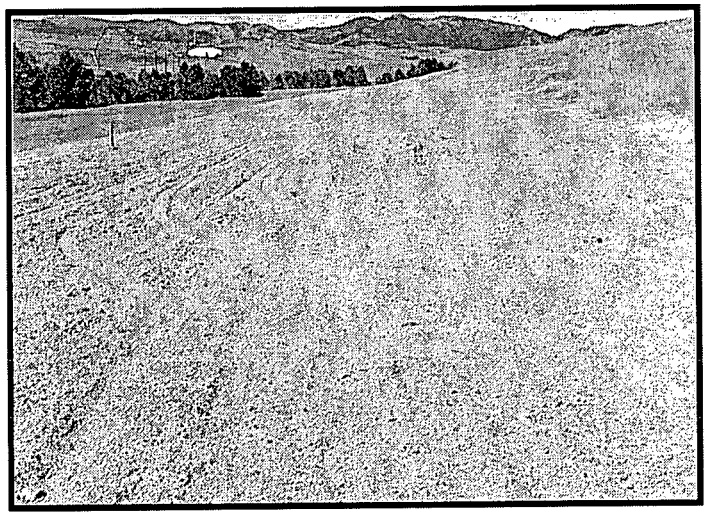

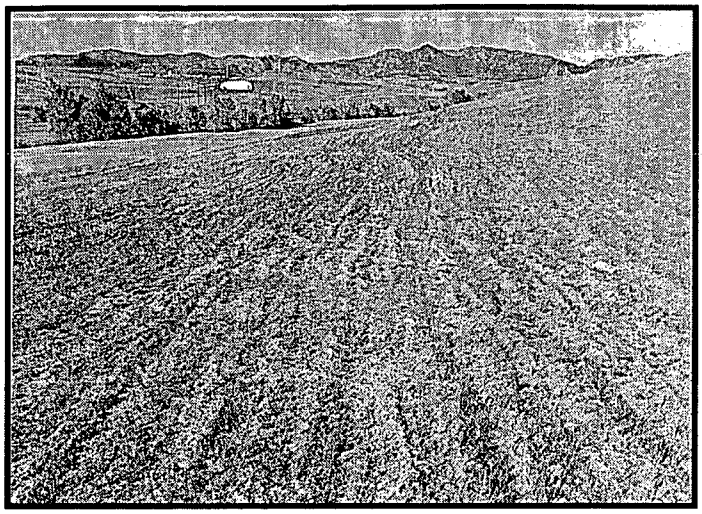

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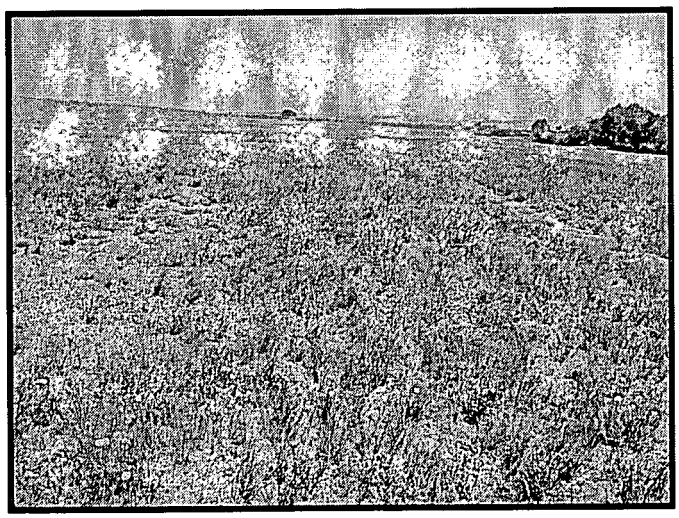
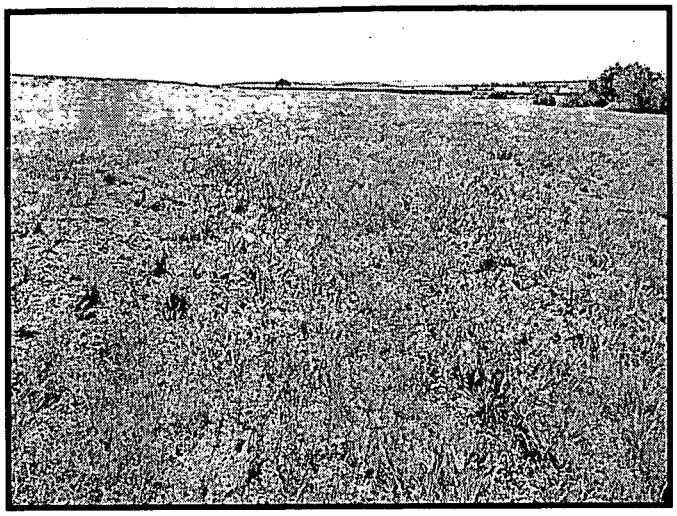
McKay Ditch Photo Location

MK5

7/30/99

9/30/99





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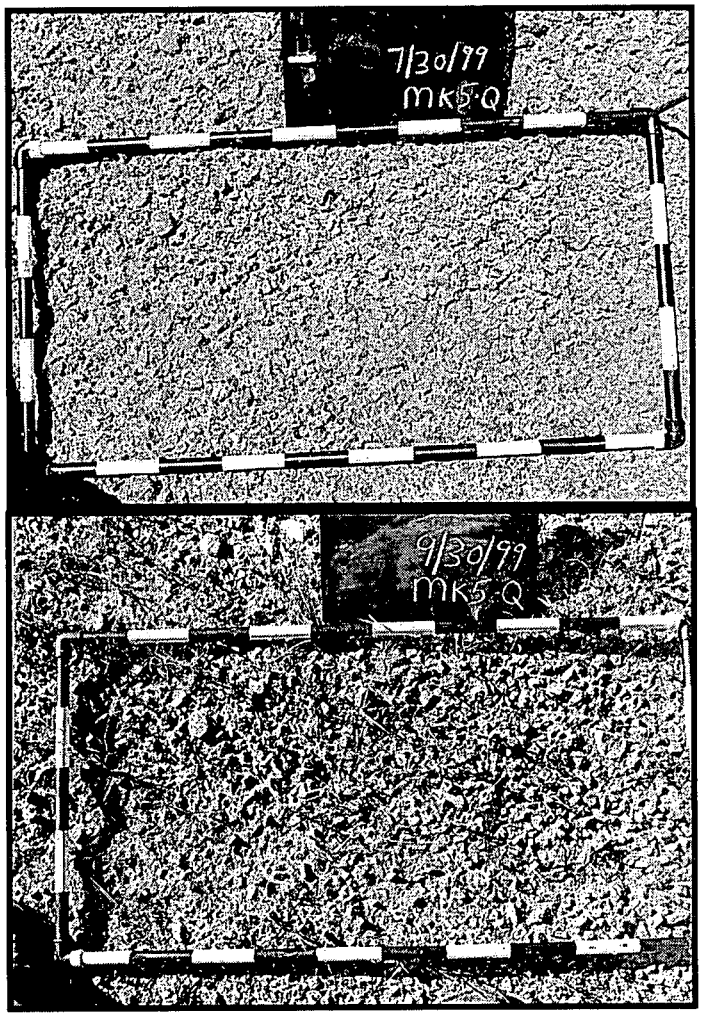

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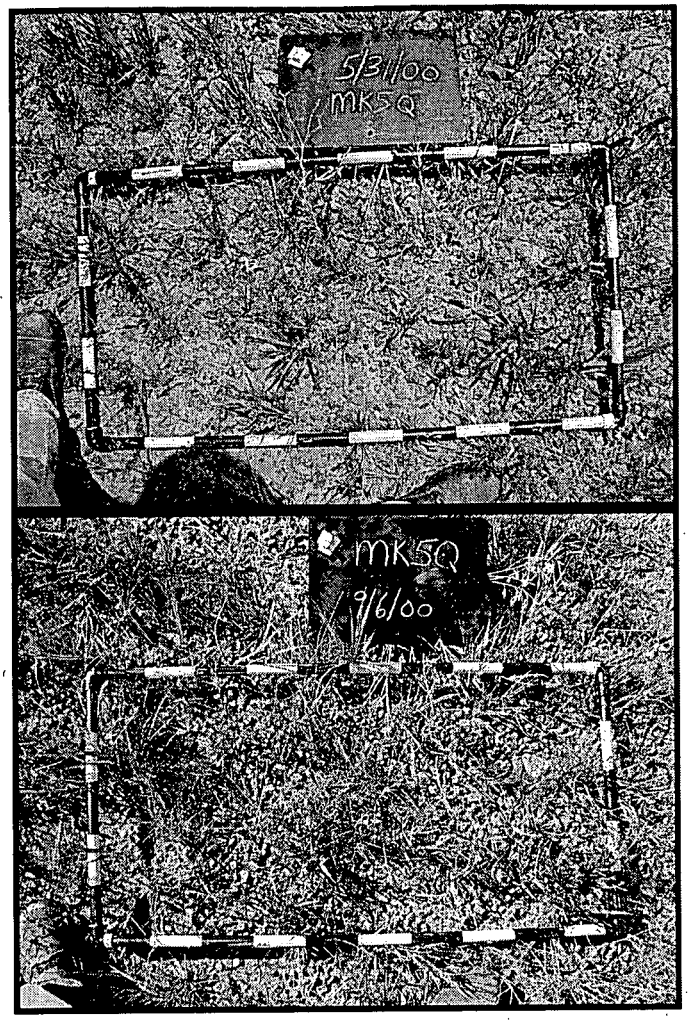

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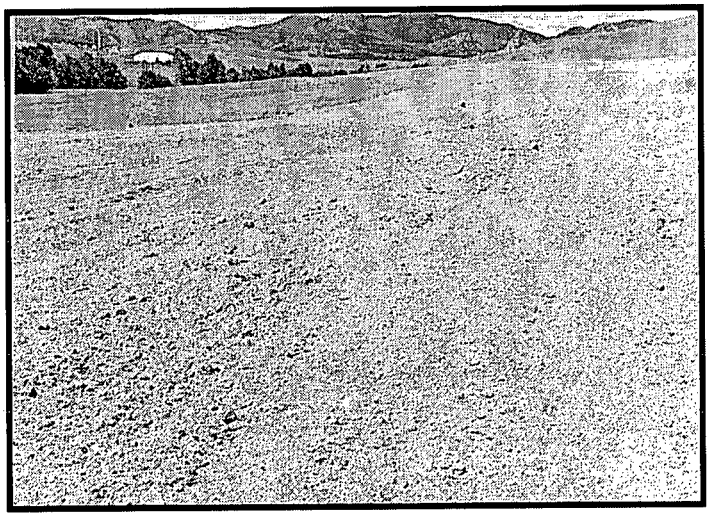

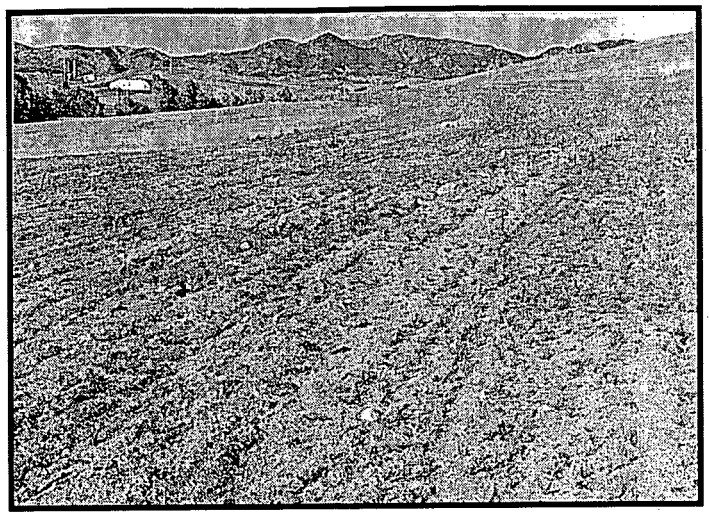

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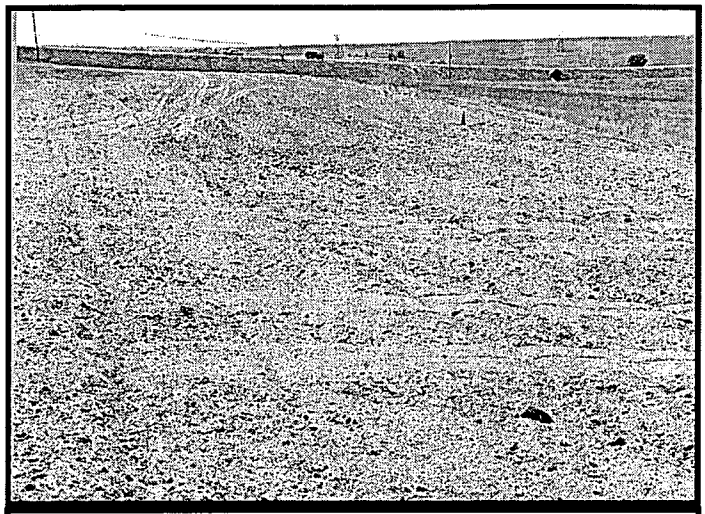
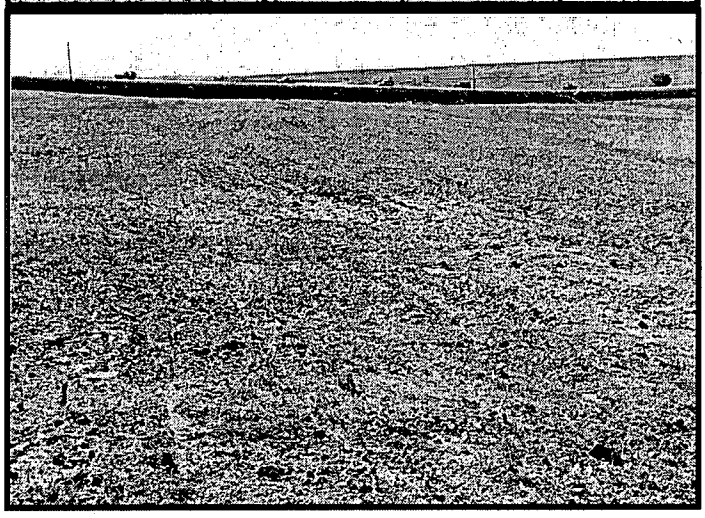
9/6/00

McKay Ditch Photo Location

MK6





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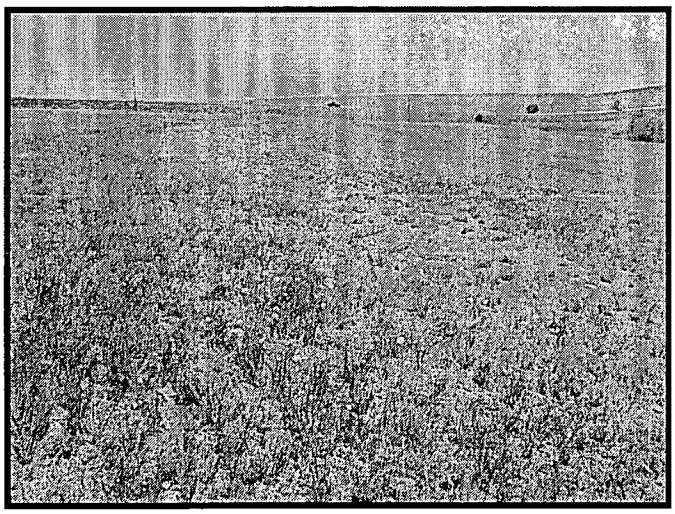
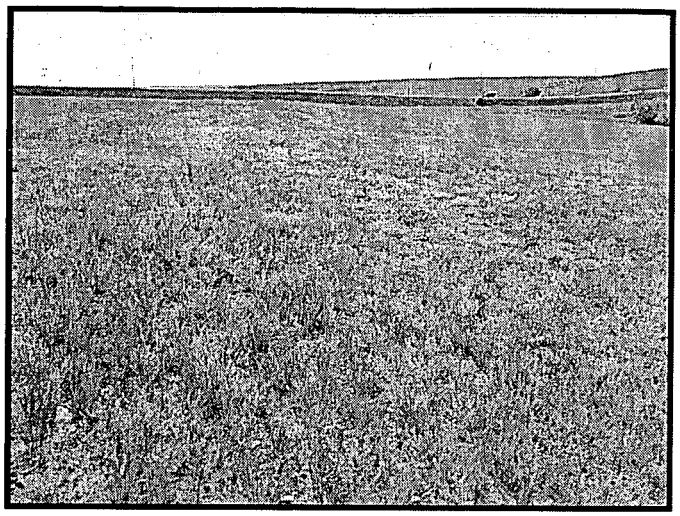
9/30/99





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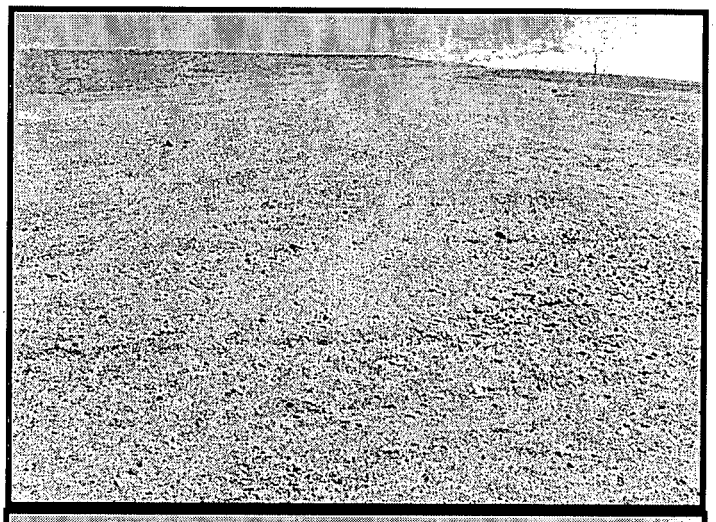

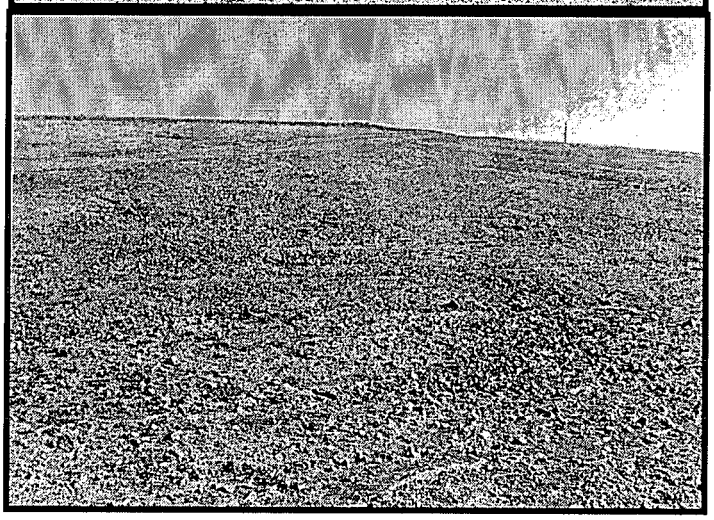

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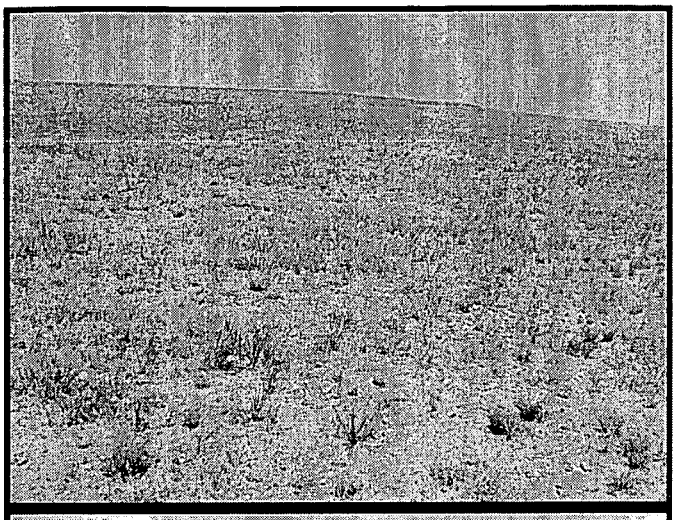

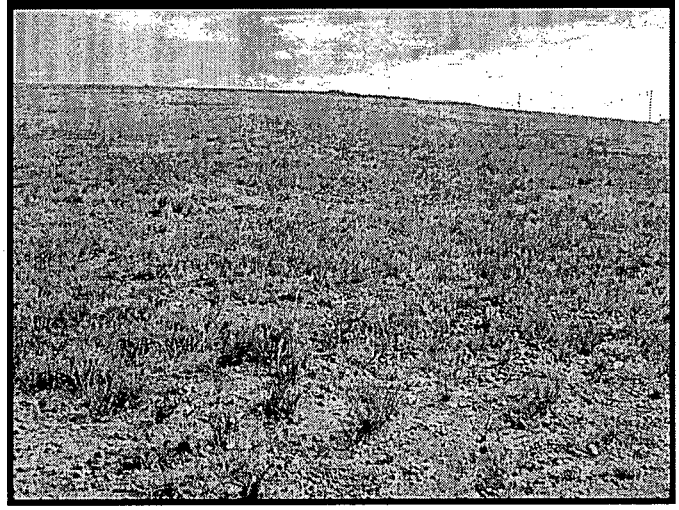

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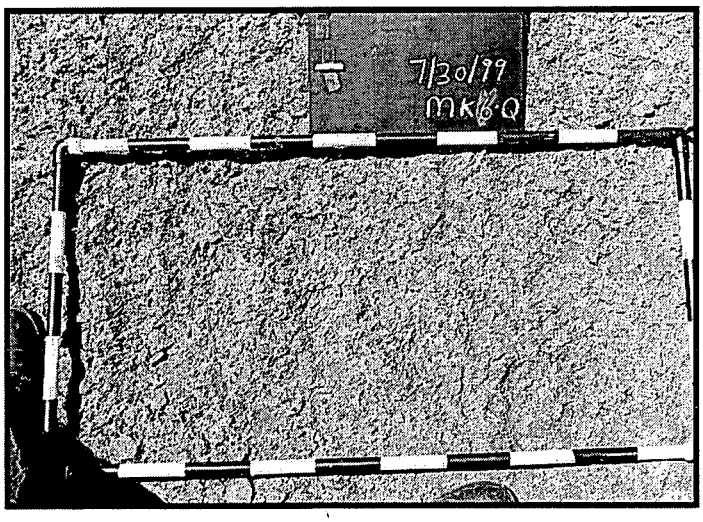
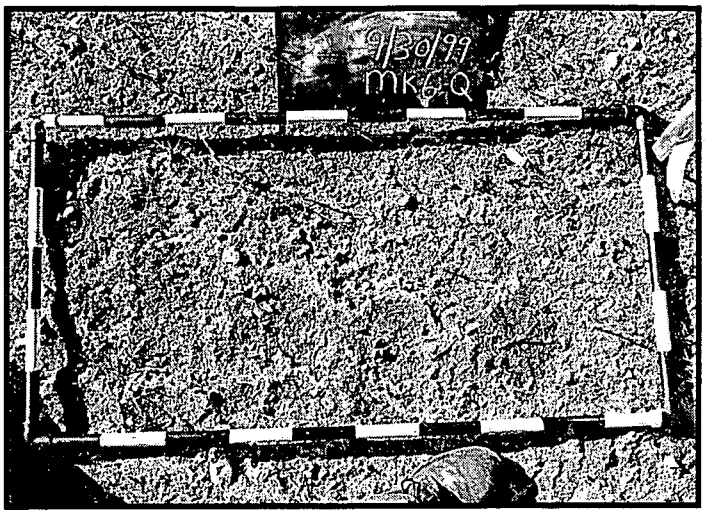
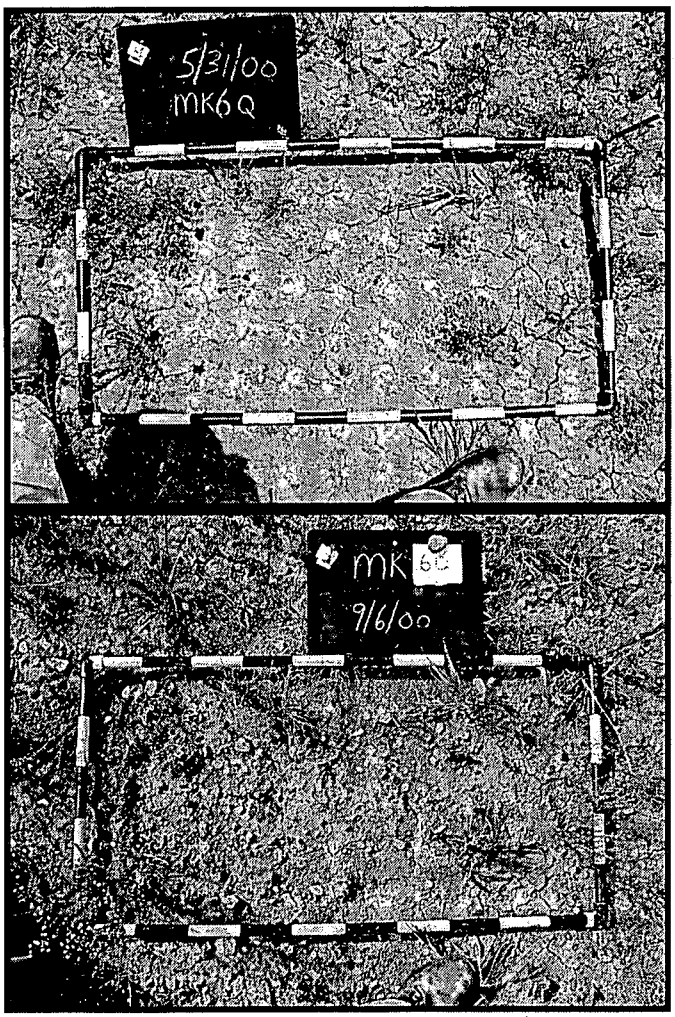
9/6/00





7/30/99 9/30/99



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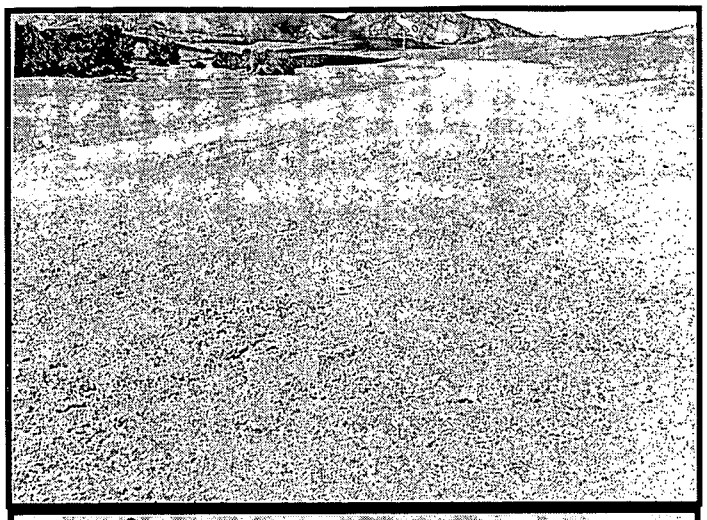
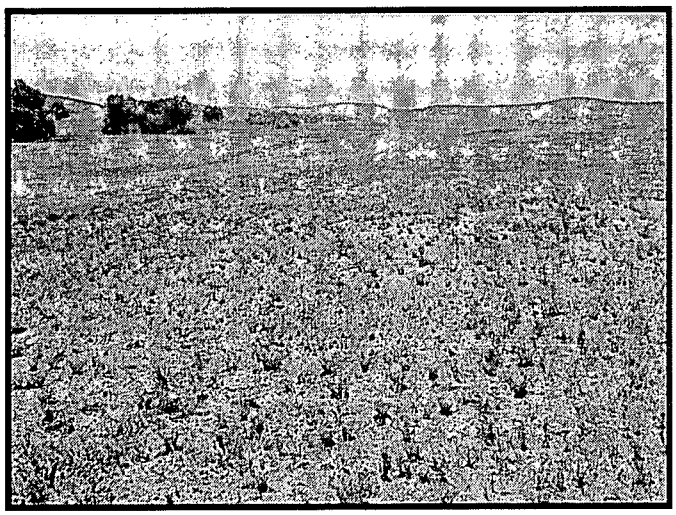


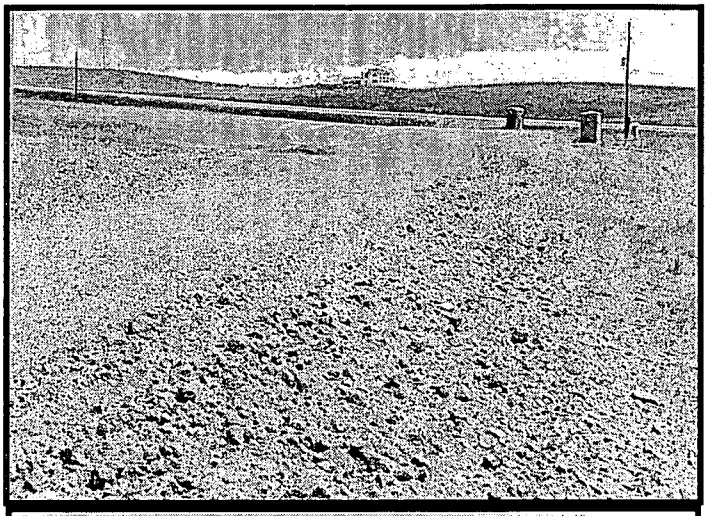
7/30/99 9/30/99



5/31/00 9/6/00

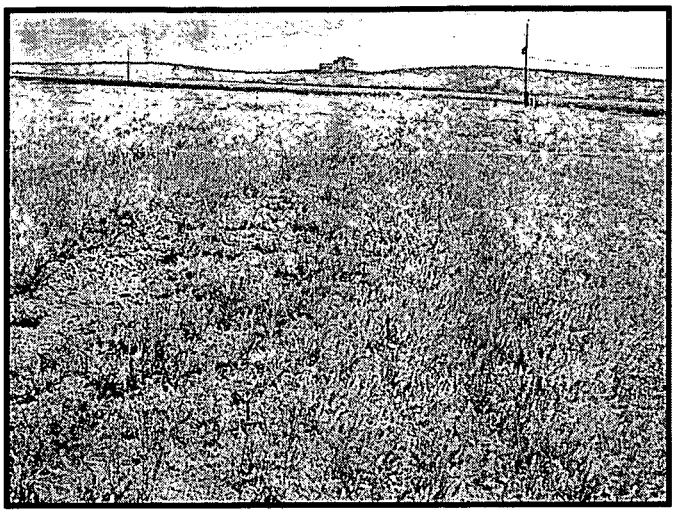
McKay Ditch Photo Location

MK7

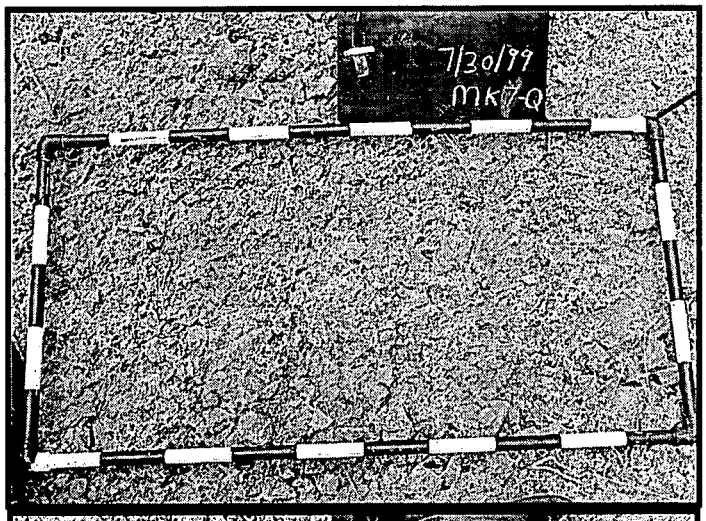


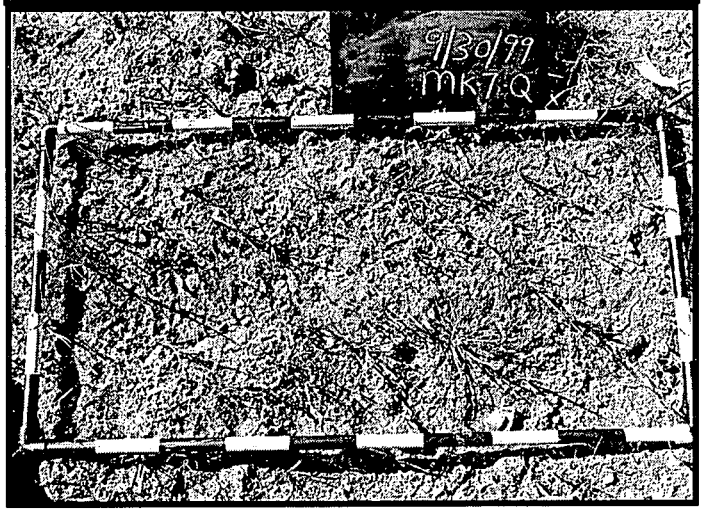
7/30/99

9/30/99

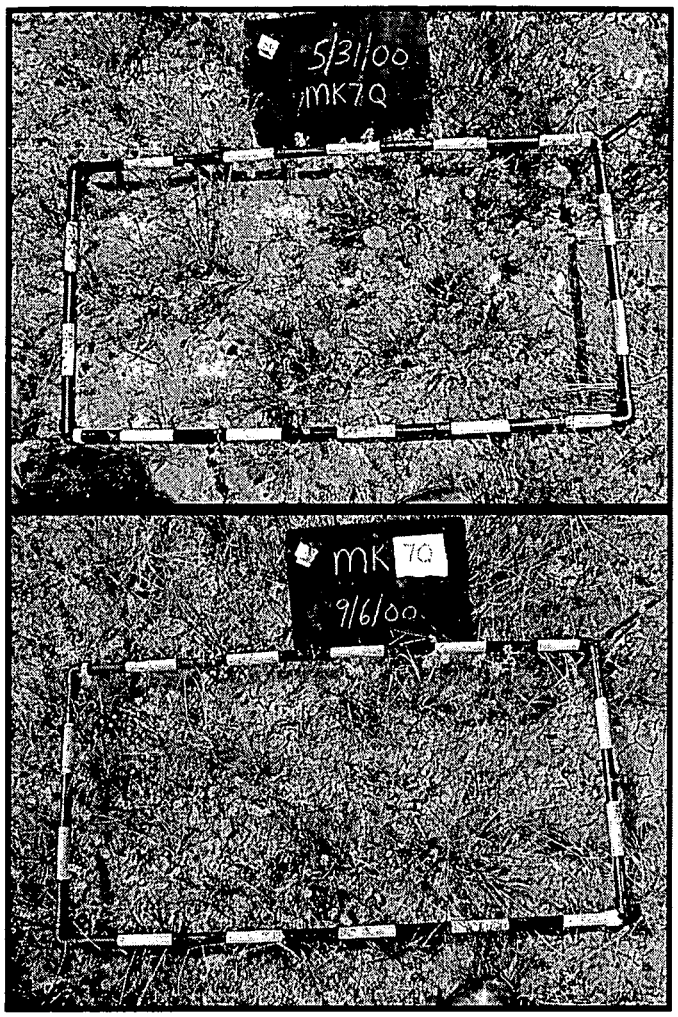


5/31/00 9/6/00

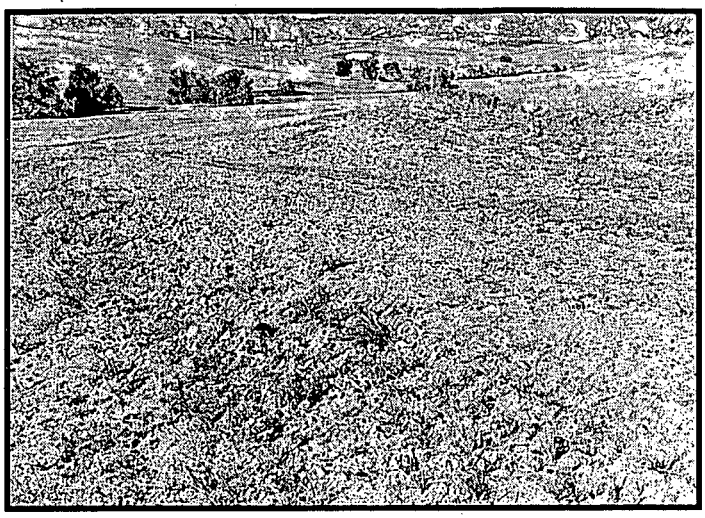




7/30/99 9/30/99



5/31/00 9/6/00

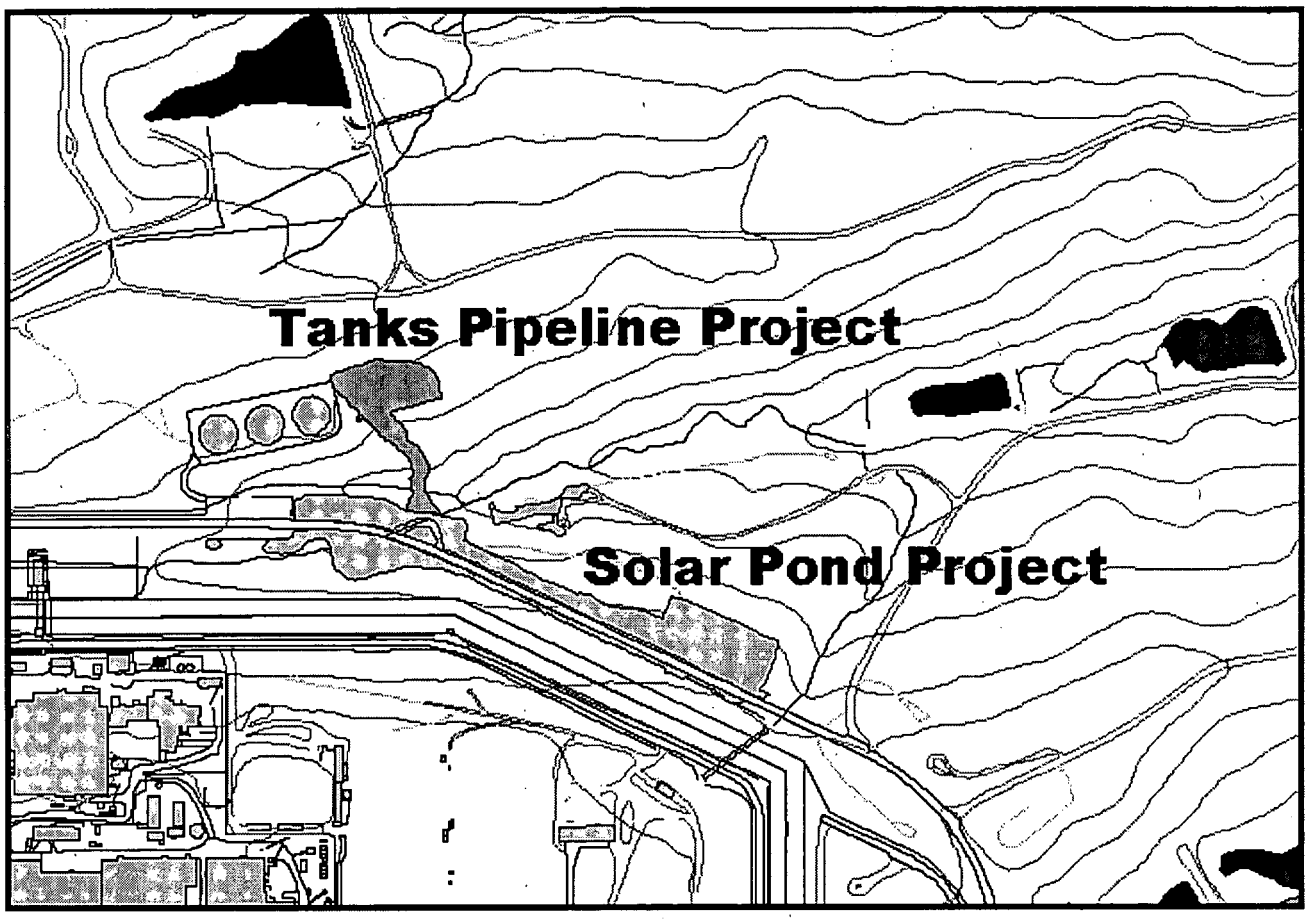


7/30/99 9/30/99

5/31/00 9/6/00

Tanks Pipeline and Solar Ponds Projects

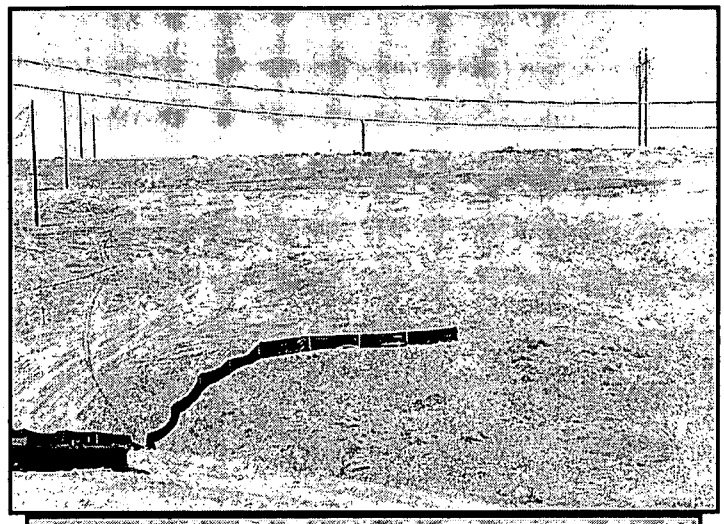
During 1999 two separate projects disturbed the vegetation on hillsides along the northern edge of the Industrial Area at Rocky Flats Environmental Technology Site. After completion of the projects both areas were revegetated with native seed mixes. Photographs of both areas during the project and after reseeding are available by clicking the respective project area on the image below. The seed mix used for Solar Ponds Project is available for viewing by clicking here.

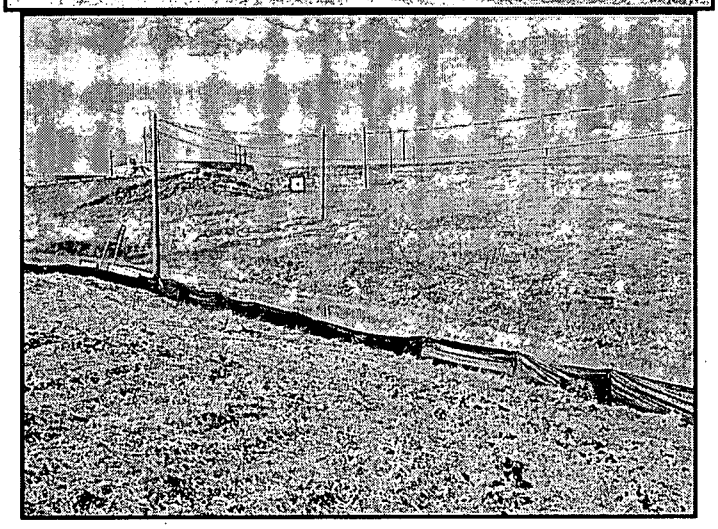


Solar Ponds Project Seed Mix

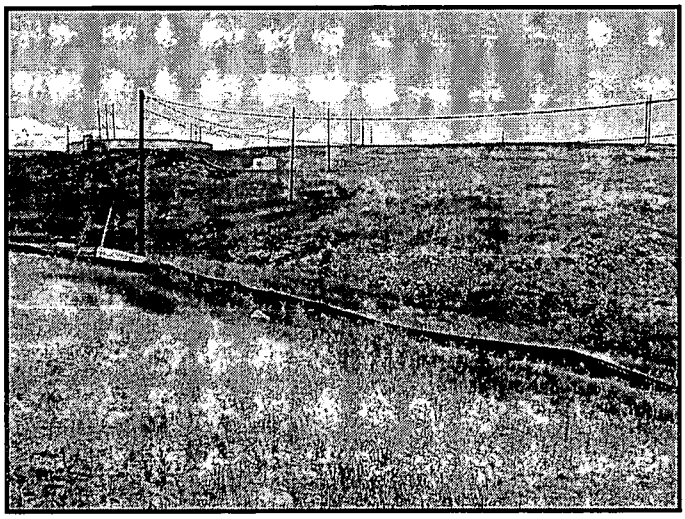
Species	Application Rate (Lbs/acre PLS)
Big Bluestem (*Andropogon gerardii*)	4.0
Little Bluestem (*Andropogon scoparius*)	4.0
Western Wheatgrass (*Agropyron smithii*)	6.0
Side-Oats Grama (*Bouteloua curtipendula*)	4.0
Blue Grama (*Bouteloua gracilis*)	4.0
Blue Flax (*Linum perenne*)	2.0
Buffalo Grass (*Buchloe dactyloides*)	4.0
Total Pounds PLS/Acre	28.0

Tanks Pipeline Project Revegetation Photographs



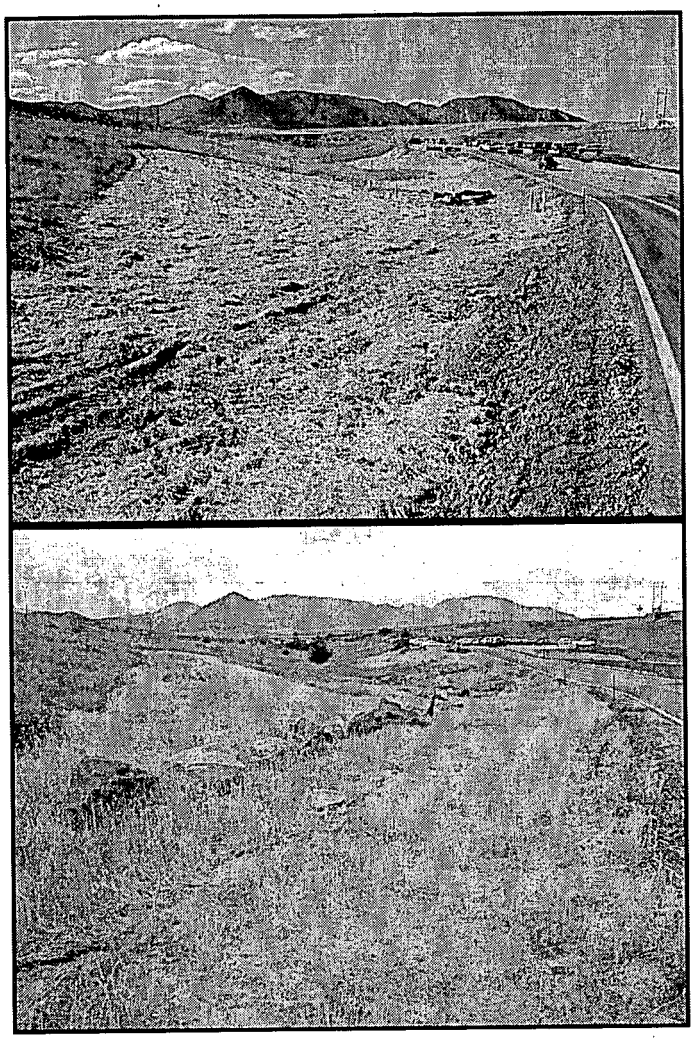


1999 1999

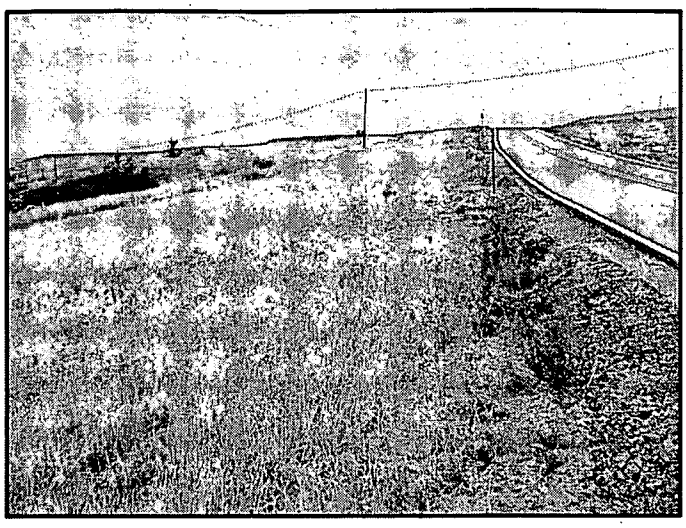


2000

Solar Ponds Project Revegetation Photographs



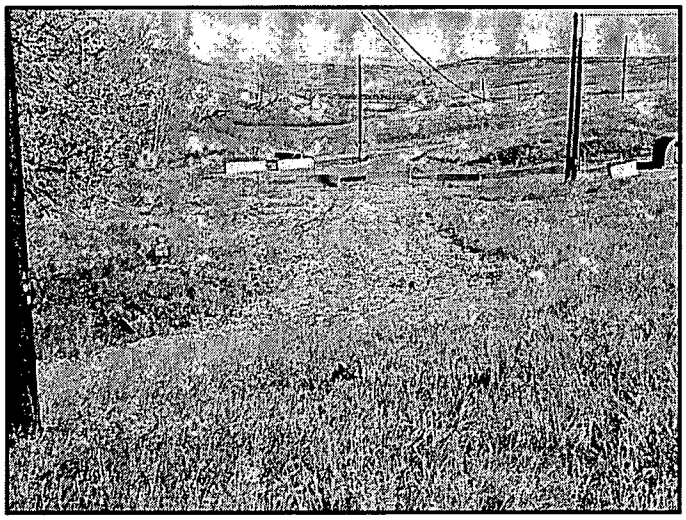
1999 2000

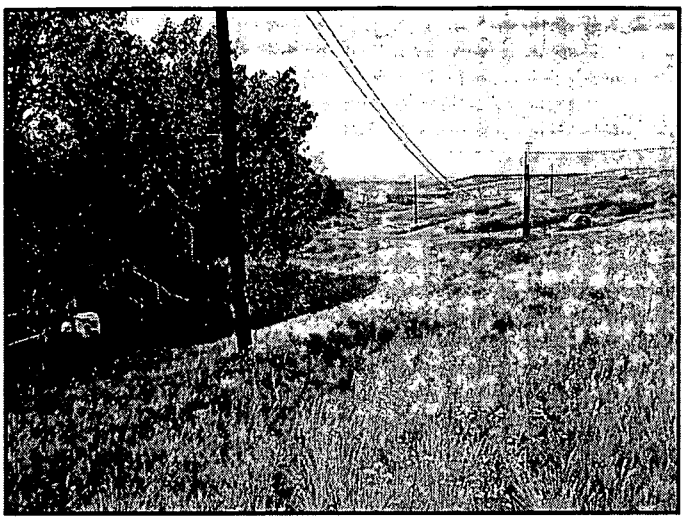


1999 2000

The grass (light color in photographs) that came up in 2000 turned out to be a wheat crop. The straw used for mulch contained viable seed heads. As a result the area grew a nice wheat crop, but unfortunately none of the seeded species germinated. The area was mowed during the summer of 2000 when the the wheat crop was in flower to prevent seed production. Monitoring in 2001 will determine whether any of the native species seeded begin to grow.

For a panoramic photograph of the project area click here.

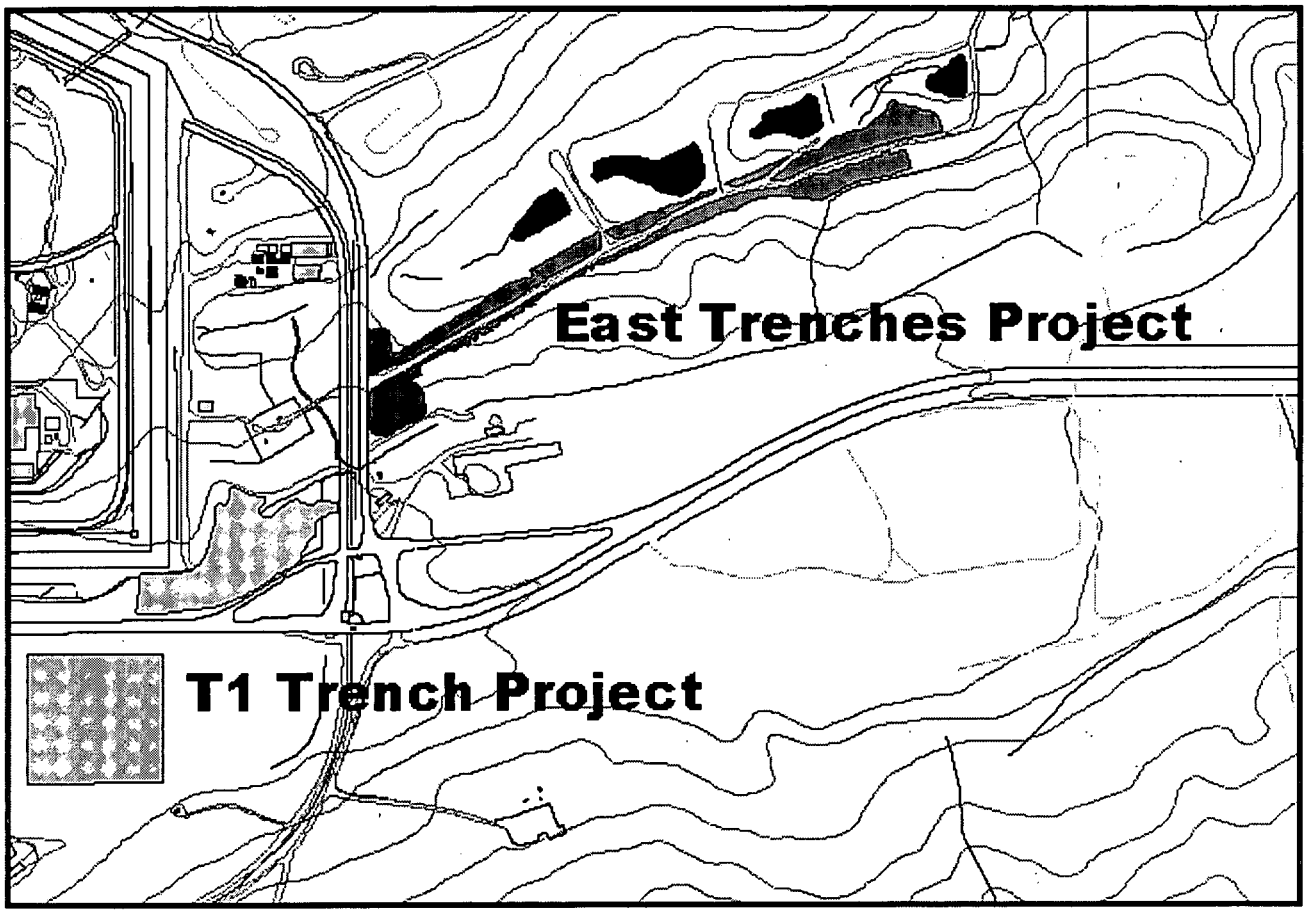




1999 2000

East Trenches and T-1 Trench Projects

Two separate projects that disturbed the vegetation along the eastern edge of the Industrial Area at Rocky Flats Environmental Technology Site were revegetated during 1999. Photographs of both areas are available by clicking the respective project area on the image below. Seed mixtures used for each of the projects are also available for viewing by clicking here.



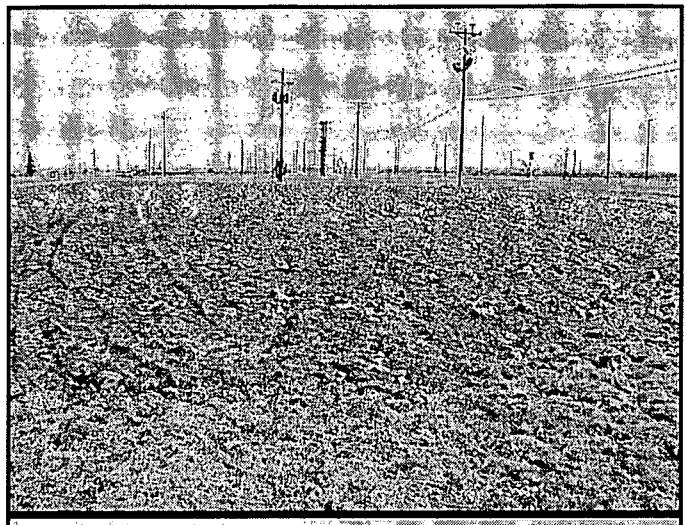
East Trenches Project Seed Mix

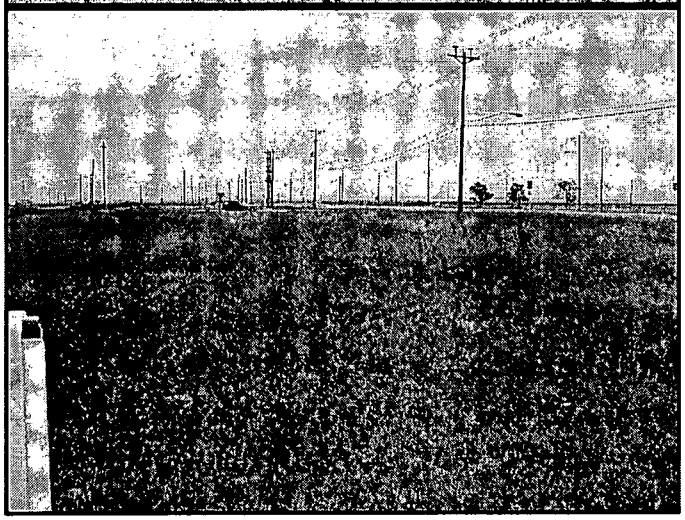
Species	Application Rate (Lbs/acre PLS)
Big Bluestem (*Andropogon gerardii*)	8.0
Side-Oats Grama (*Bouteloua curtipendula*)	8.0
Little Bluestem (*Andropogon scoparius*)	8.0
Blue Grama (*Bouteloua gracilis*)	8.0
Western Wheatgrass (*Agropyron smithii*)	12.0
Buffalo Grass (*Buchloe dactyloides*)	8.0
Blue Flax (*Linum perenne*)	4.0
Total Pounds PLS/Acre	56.0

T-1 Trench Project Seed Mix

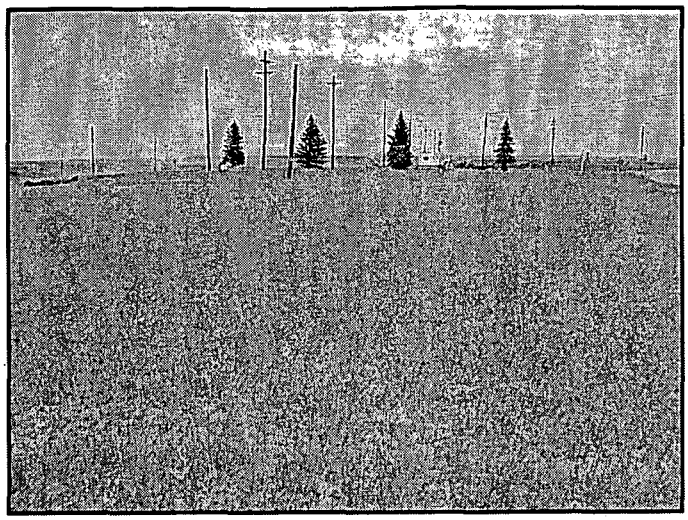
Species	Application Rate (Lbs/acre PLS)
Western Wheatgrass (*Agropyron smithii*)	NA
Blue Grama (*Bouteloua gracilis*)	NA
Buffalo Grass (*Buchloe dactyloides*)	NA
Side-Oats Grama (*Bouteloua curtipendula*)	NA
Big Bluestem (*Andropogon gerardii*)	NA
Little Bluestem (*Andropogon scoparius*)	NA
Blue Flax (*Linum perenne*)	NA
Blanket Flower (*Gallardia aristata*)	NA
Total Pounds PLS/Acre	NA

T-1 Trench Project Revegetation Photographs





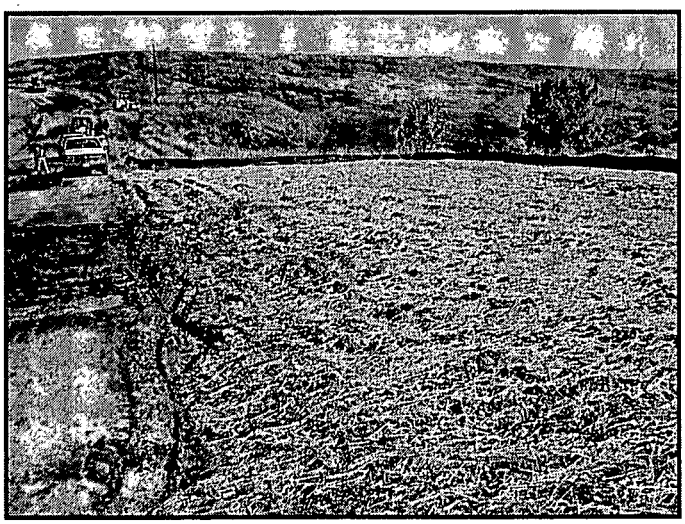
1999 2000

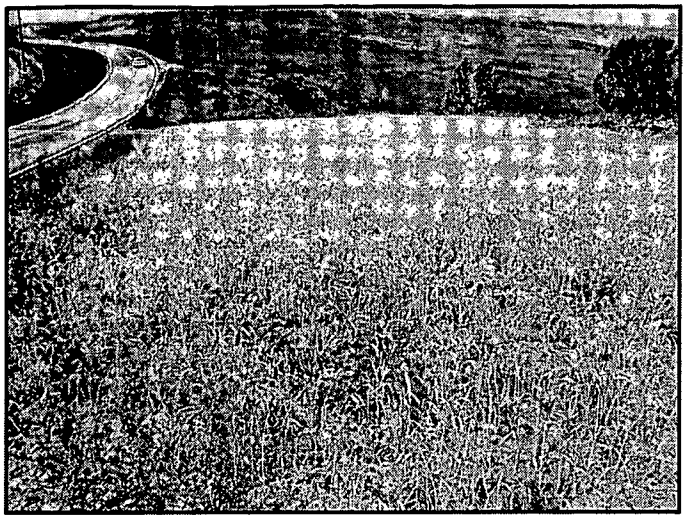


1999 2000

East Trenches Project Revegetation Photographs

1999 2000

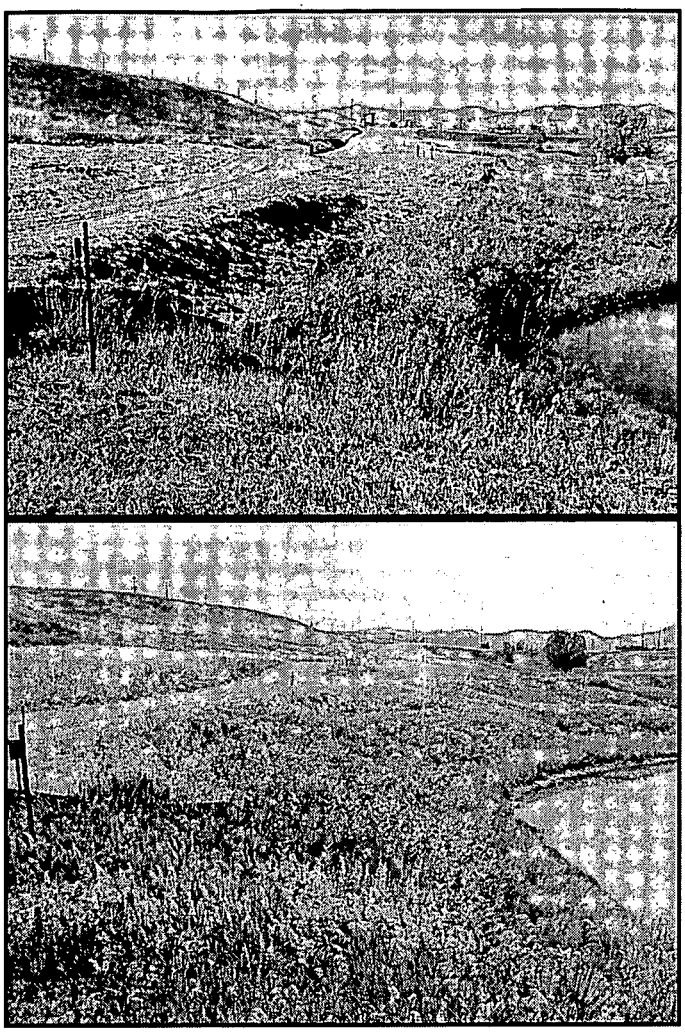




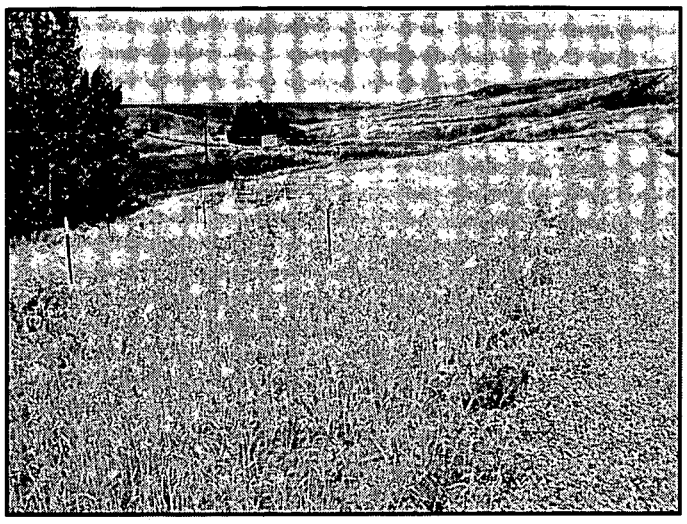
1999 2000

For a panoramic photograph of the project area click here.

One of the problems encountered as the vegetation began to grow in 2000, was the fact that what came up was a wheat crop. Although not specified in the seed mix, the straw mulch contained viable seed heads from the wheat. As a result, a solid stand of wheat grew, but virtually none of the species seeded in 1999 came up. Monitoring in 2001 will determine whether any of the native species seeded begin to grow or if the wheat monoculture perpetuates itself.



1999 2000



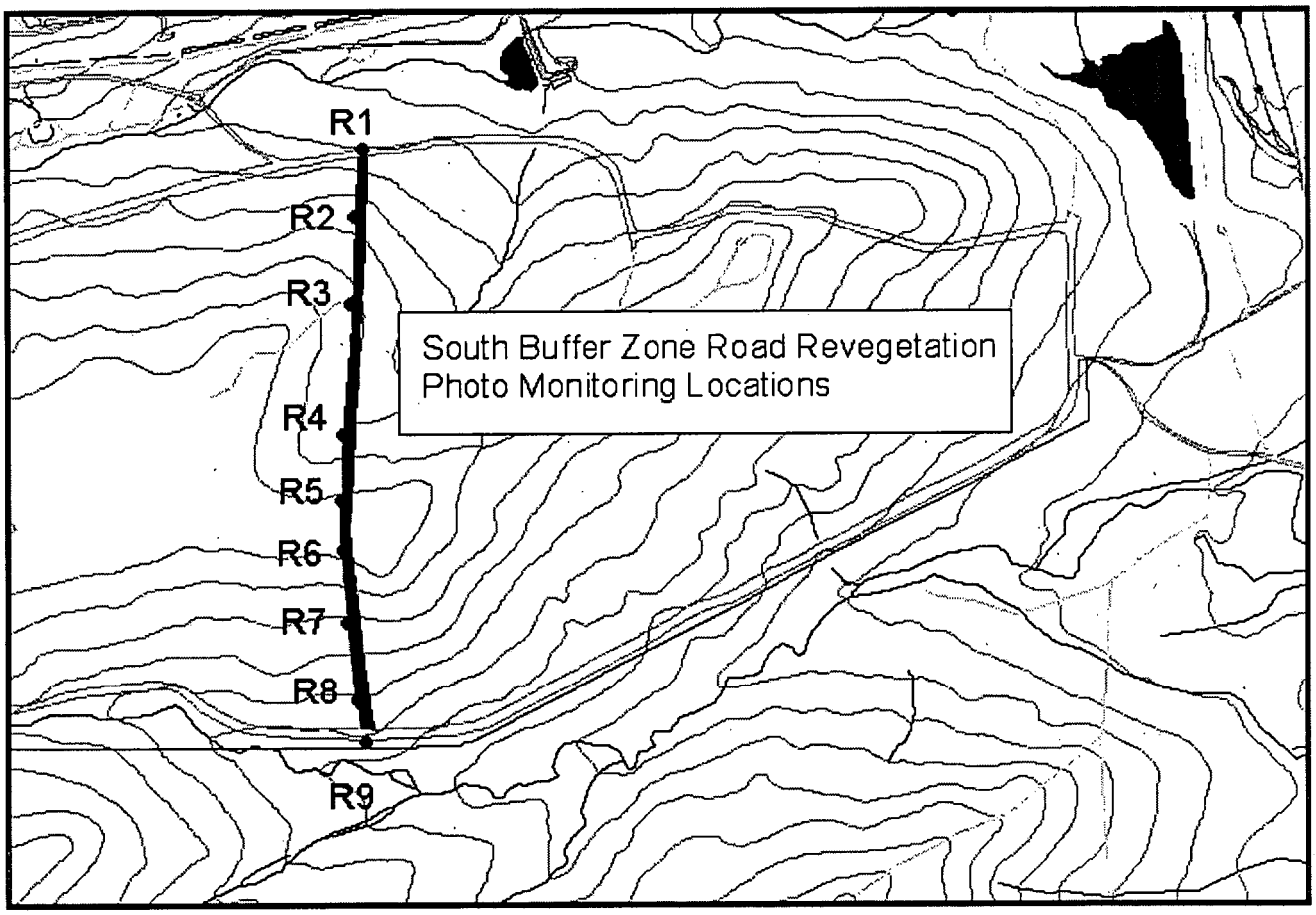
1999 2000

South Buffer Zone Road Restoration Photo Monitoring Project

Rocky Flats Environmental Technology Site

During the fall of 1999, an abandoned road in the south Buffer Zone at the Rocky Flats Environmental Technology Site was revegetated with native species. Seeding was done using a drill seed. A list of the plant species seeded may be viewed by clicking on the species list below. A photo monitoring project was utilized to document the effectiveness of the revegetation effort. The map below contains links to the photographs taken of the project during 1999 and 2000. By clicking on each of the photo point locations, photographs taken from that location may be viewed.

Seed Mix



Return Home

South Buffer Zone Road Revegetation Project Seed Mixes

Two separate seed mixes were used. Near the ridgetop a xeric native species mix was used to match the native species found there. On the lower hillside areas a mesic native species mix was planted.

Xeric Area Seed Mixture

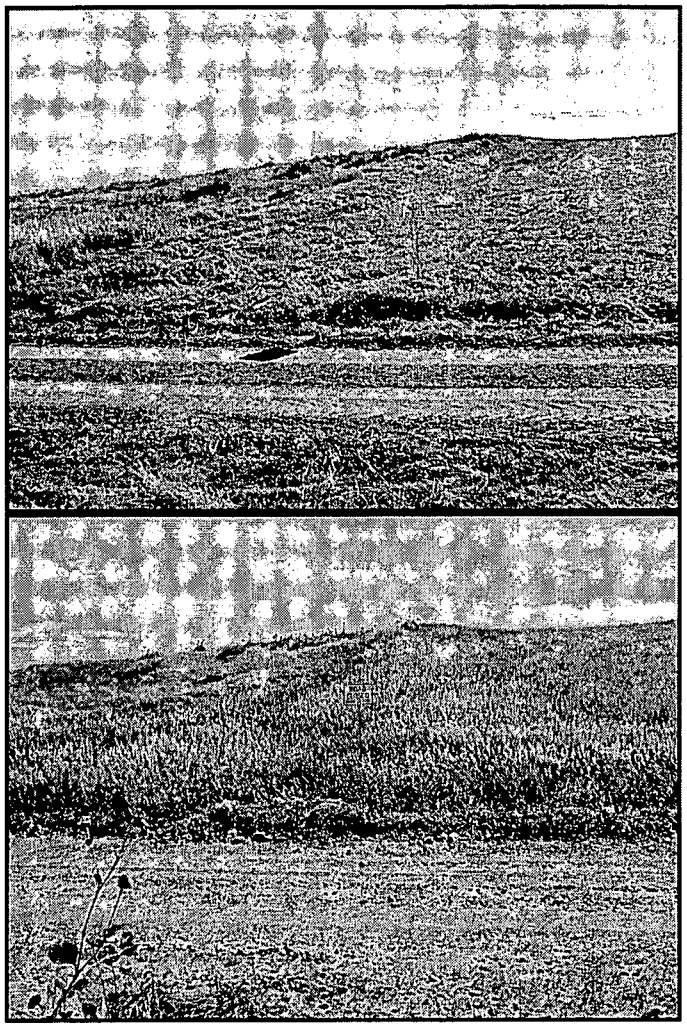
Species	Application Rate (Lbs/acre PLS)
Big Bluestem (*Andropogon gerardii*)	5.0
Side-Oats Grama (*Bouteloua curtipendula*)	3.0
Little Bluestem (*Andropogon scoparius*)	5.0
Blue Grama (*Bouteloua gracilis*)	5.0
Western Wheatgrass (*Agropyron smithii*)	4.0
Green Needle Grass (*Stipa viridula*)	3.0
Blanket Flower (*Gallardia aristata*)	0.5
Total Pounds PLS/Acre	25.5

Mesic Area Seed Mixture

Species	Application Rate (Lbs/acre PLS)
Western Wheatgrass (*Agropyron smithii*)	6.0
Blue Grama (*Bouteloua gracilis*)	6.0
Buffalo Grass (*Buchloe dactyloides*)	4.0
Side-Oats Grama (*Bouteloua curtipendula*)	4.0
Green Needle Grass (*Stipa viridula*)	4.0
Blue Flax (*Linum perenne*)	2.0
Total Pounds PLS/Acre	26.0

South Buffer Zone Road Revegetation Project

Photo Location - R1



1999 South 2000

South Buffer Zone Road Revegetation Project

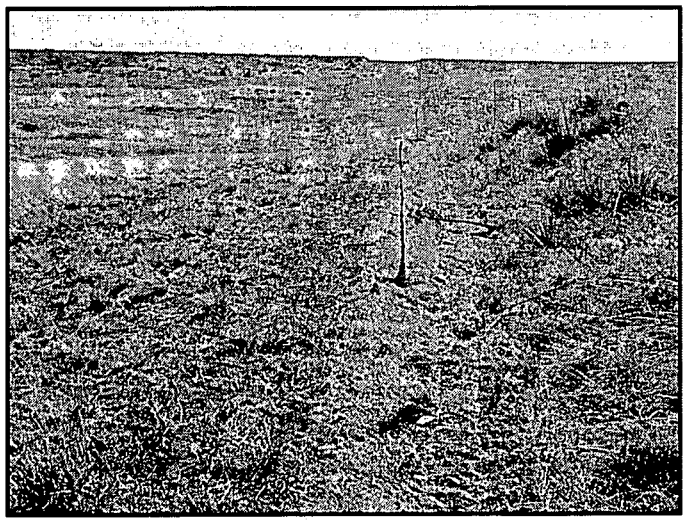
Photo Location - R2

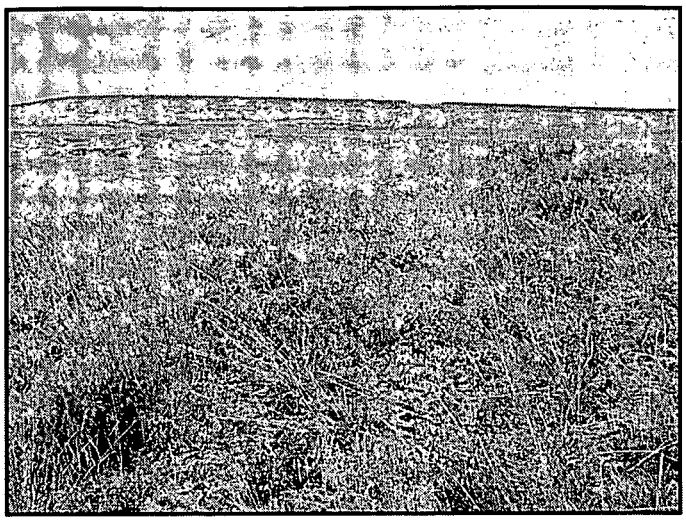
1999 Southeast 2000

South Buffer Zone Road Revegetation Project

Photo Location - R3

1999 Northeast 2000



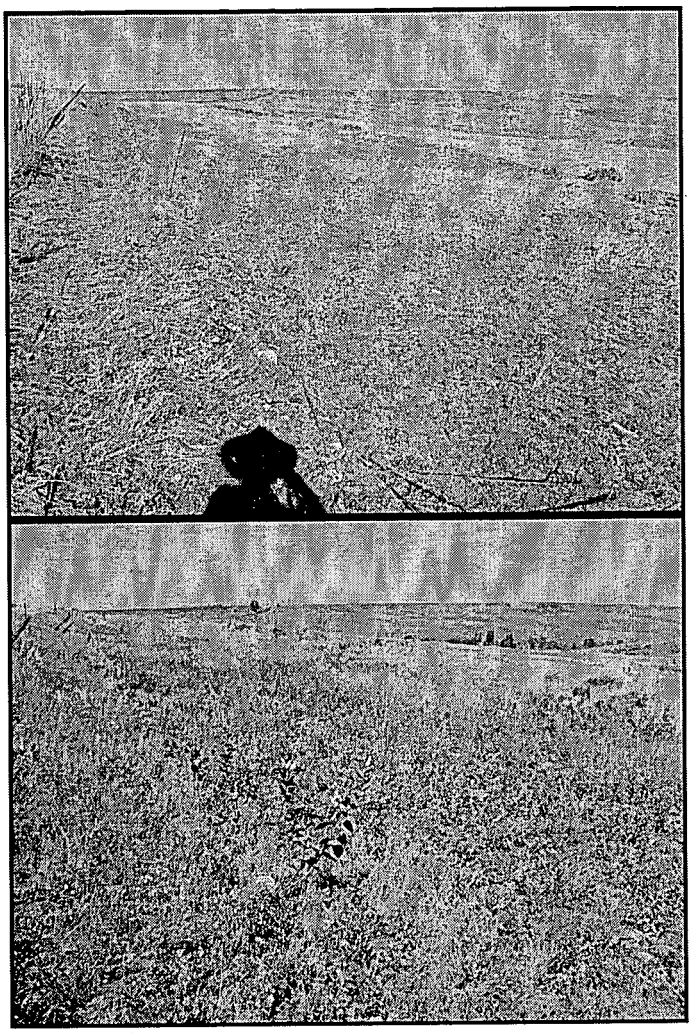


1999 South 2000

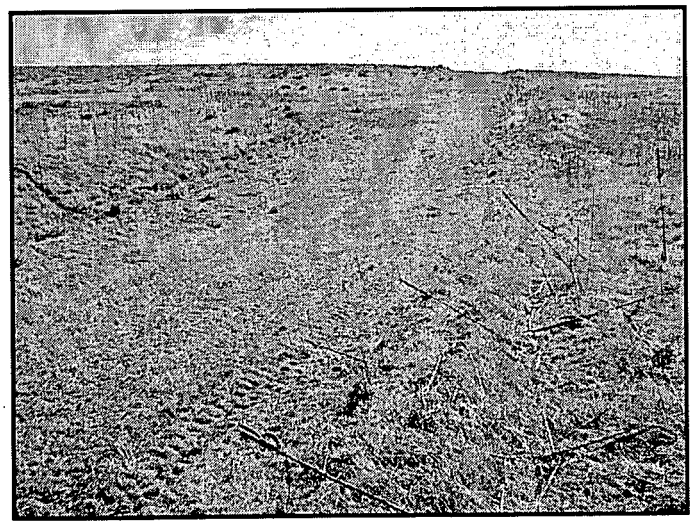
1999 Southeast 2000

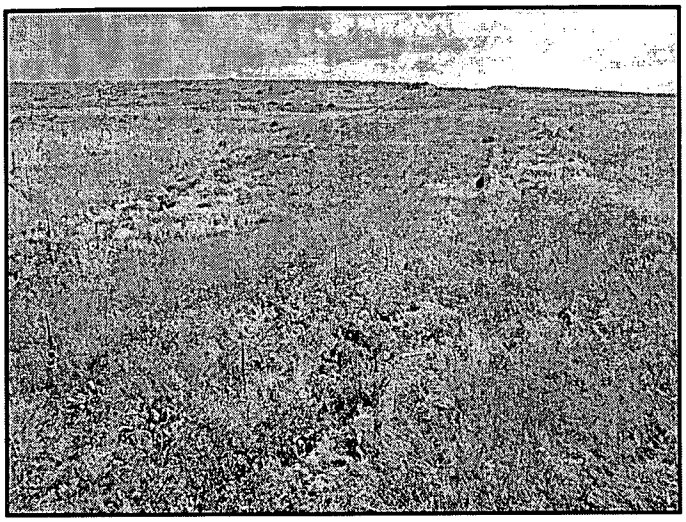
South Buffer Zone Road Revegetation Project

Photo Location - R4



1999 North 2000

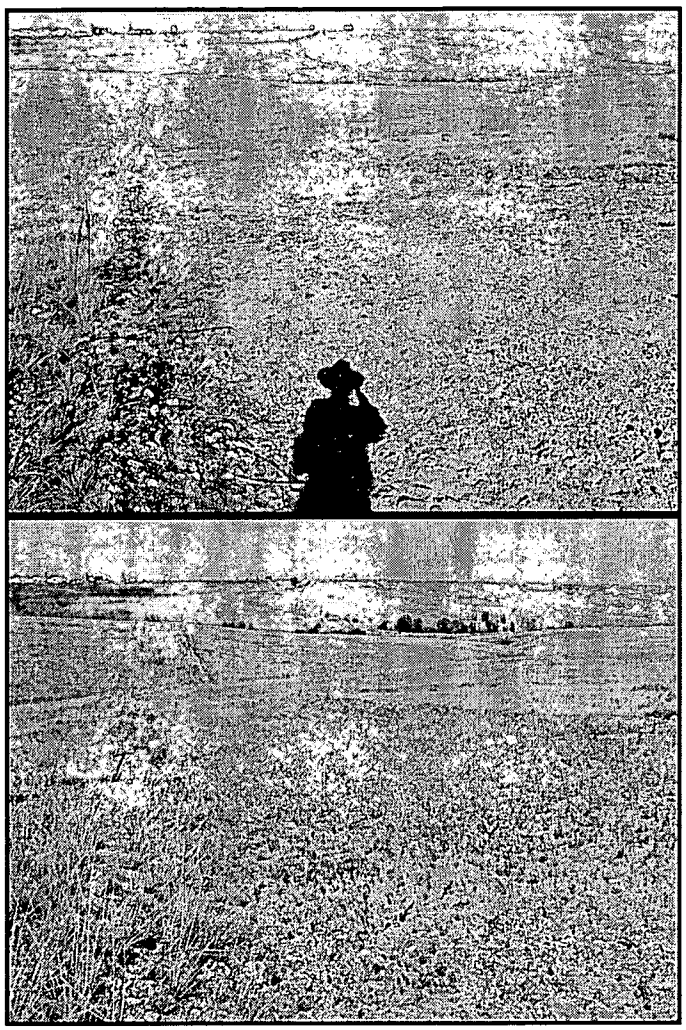




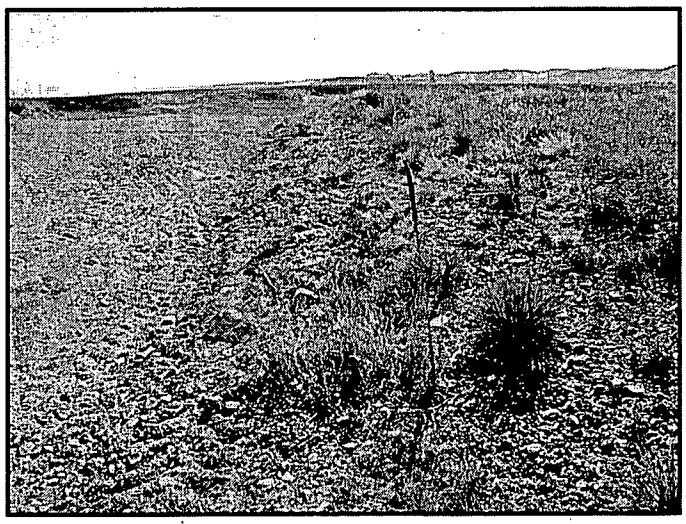
1999 South 2000

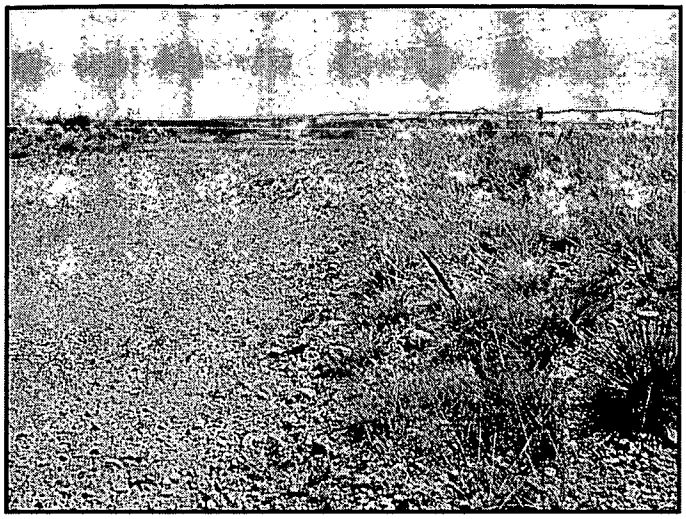
South Buffer Zone Road Revegetation Project

Photo Location - R5

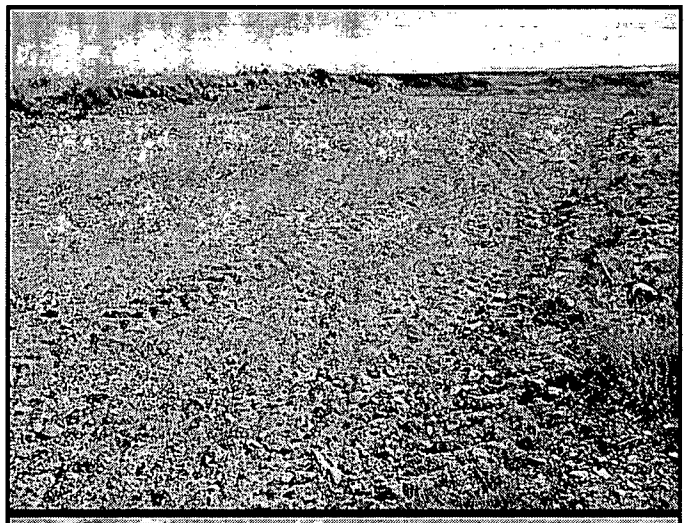


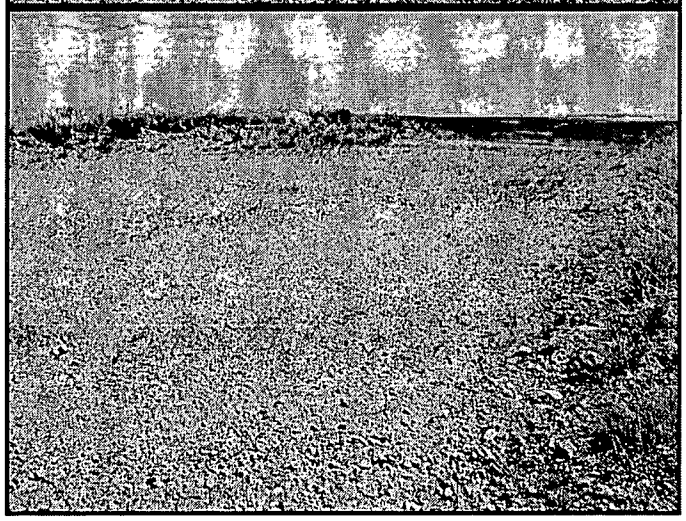
1999 North 2000





1999 South 2000



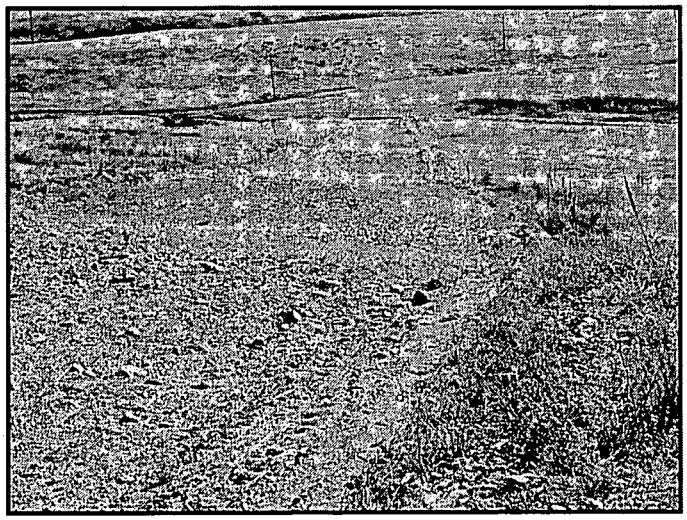


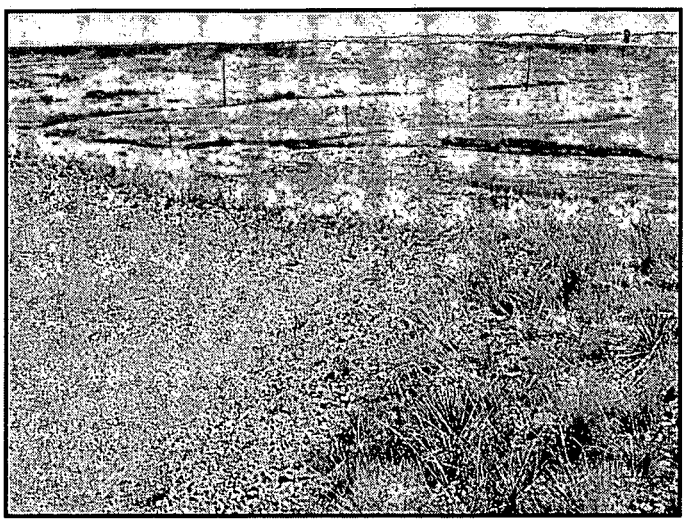
1999 Southeast 2000

South Buffer Zone Road Revegetation Project

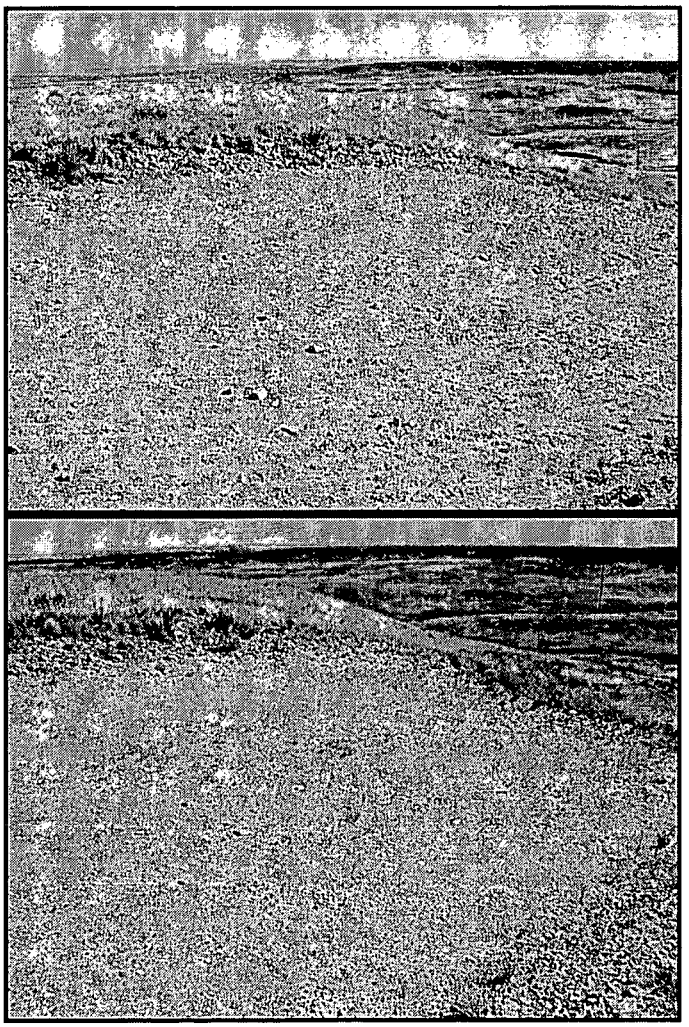
Photo Location - R6

1999 Northeast 2000





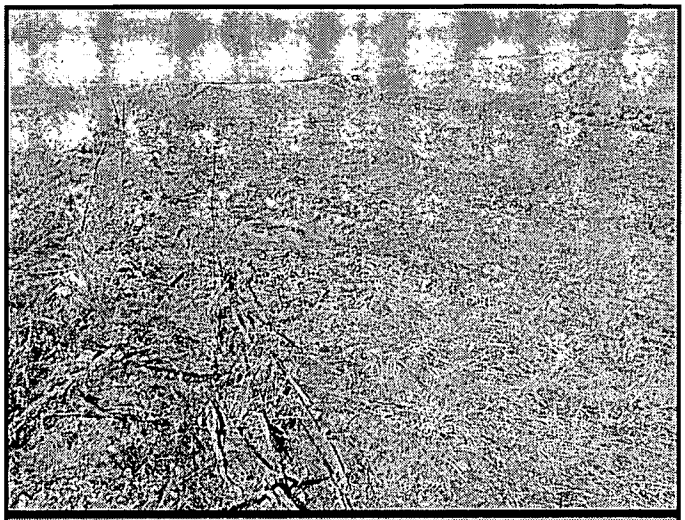
1999 South 2000



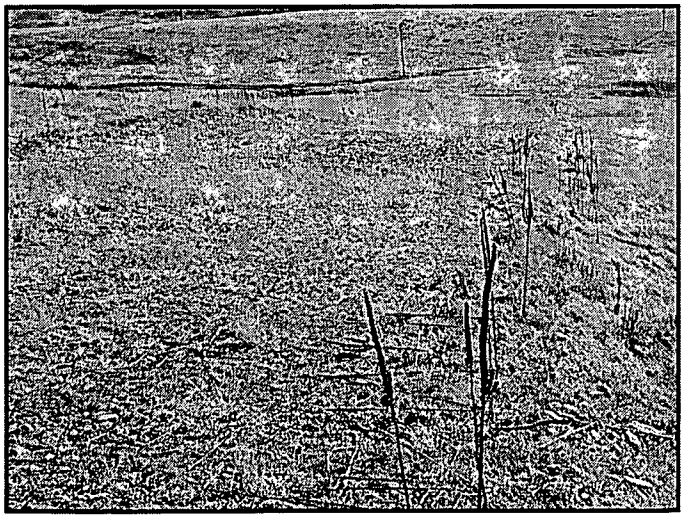
1999 Southeast 2000

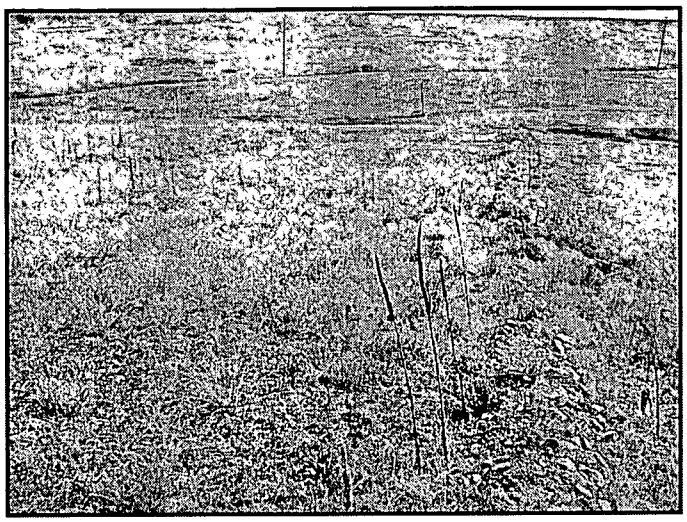
South Buffer Zone Road Revegetation Project

Photo Location - R7



1999 North 2000

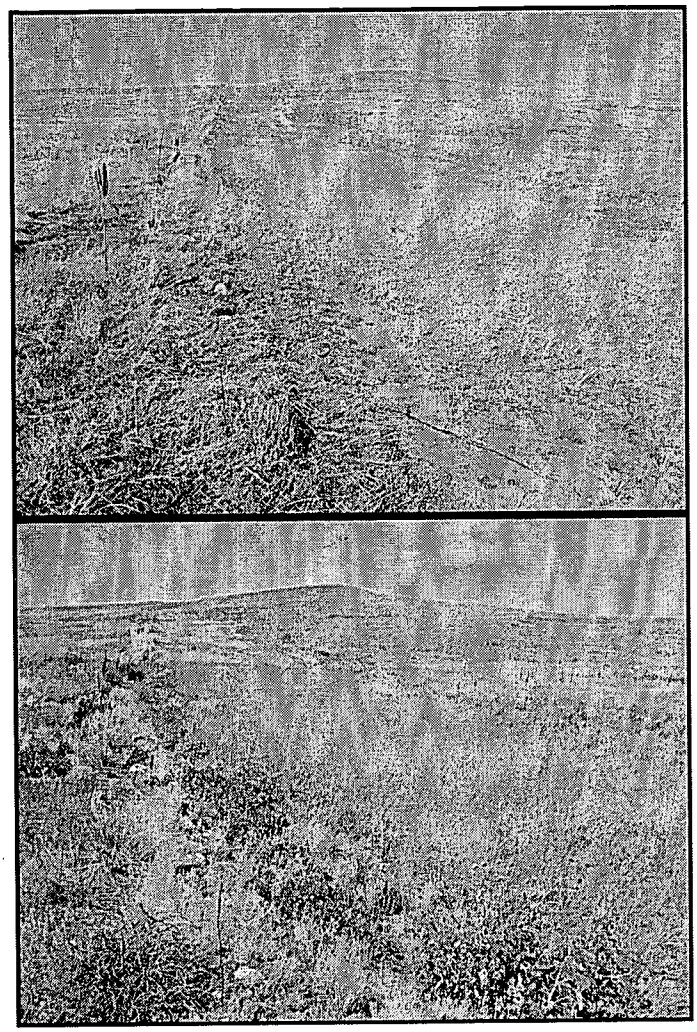




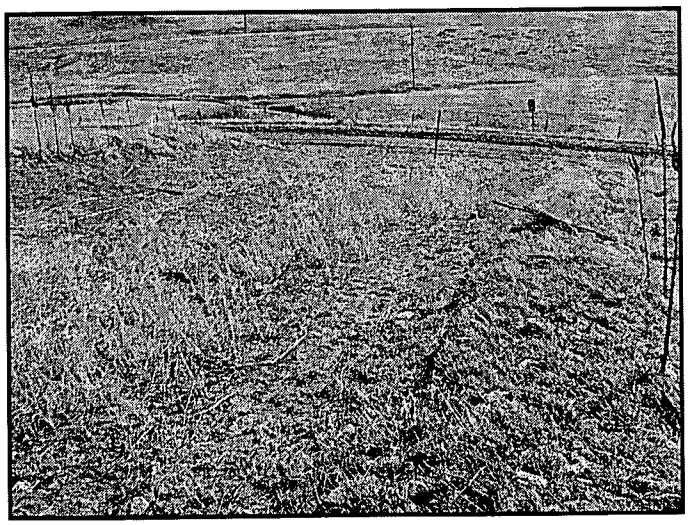
1999 South 2000

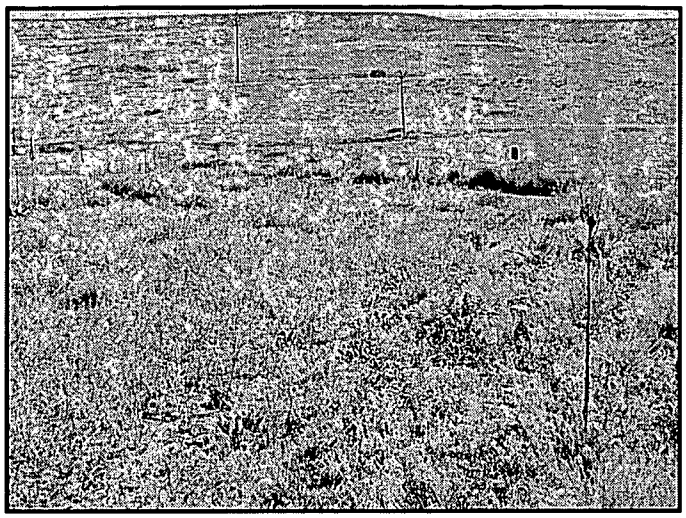
South Buffer Zone Road Revegetation Project

Photo Location - R8



1999 North 2000

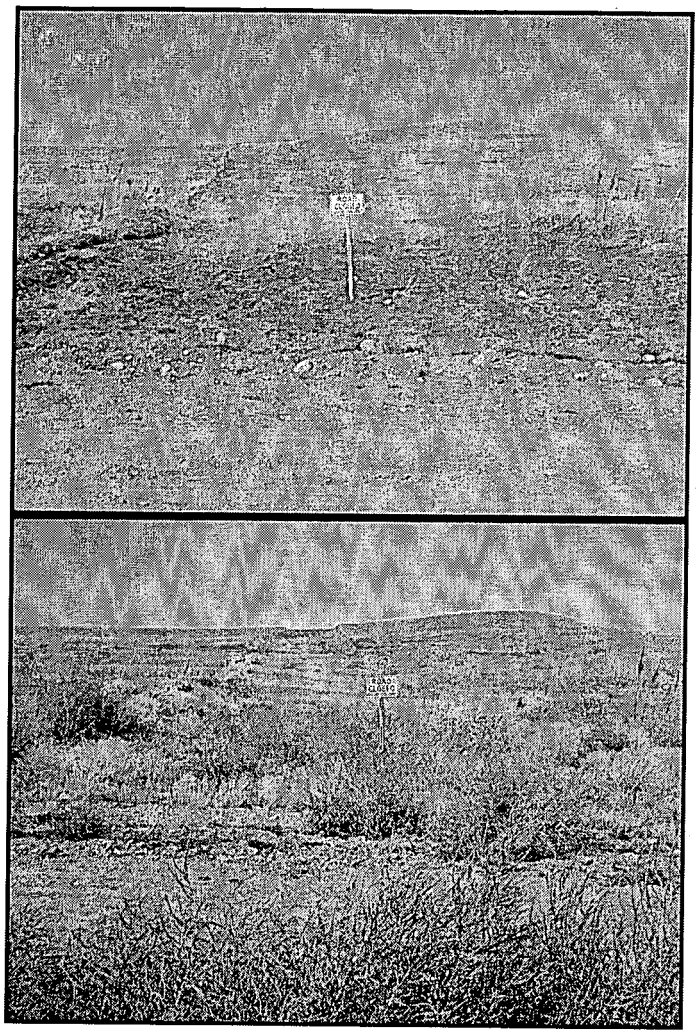




1999 South 2000

South Buffer Zone Road Revegetation Project

Photo Location - R9



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