

City of Carson City  
Agenda Report

Item # 7A

Date Submitted: March 2, 2007

Agenda Date Requested: March 15, 2007

Time Requested: 15 Minutes

To: Mayor and Supervisors

From: Parks and Recreation Department, Open Space Division

Subject Title: Discussion and presentation regarding the sheep and fuels reduction project along the Carson City west wild land interface area planned for Spring 2007.

Staff Summary: The Open Space program is the lead agency in the planning and coordination of the sheep and fuels reduction project for Spring 2007. Partners include the U.S. Forest Service, Nevada Division of Forestry, and Nevada Department of Agriculture.

Type of Action Requested: (check one)

Resolution

Ordinance

Formal Action/Motion

Other (Specify)

Does This Action Require A Business Impact Statement:  Yes  No

Recommended Board Action: No action, this item is for discussion only.

Explanation for Recommended Board Action: The 2006 sheep and fuels reduction project generated a positive response from agencies, officials, and the public. Following guidance from Resource Concepts, Inc., who led the project last year (see attached report), the Open Space Advisory Committee approved staff to continue with the project this year. The project start date is April 2007; however, this is subject to climatic conditions. The sheep will be based at the List Ranch in Washoe County. When proper conditions have been determined, the sheep will be trailered south to State Lands west of WNCC. The fuels reduction project will be implemented between State Lands and the C-Hill area.

Applicable Statute, Code, Policy, Rule or Regulation: The Waterfall Fire BAER Report

Fiscal Impact: None

Explanation of Impact: The operational costs for the planning of this project are absorbed by the Open Space Program. Transportation costs will be paid by Nevada Division of Forestry.

Funding Source: Not Applicable

Alternatives: 1) Instruct staff to place the item on the Board of Supervisors agenda for action.

Supporting Material:

- Staff report from the November 20, 2006, Open Space Advisory Committee meeting
- Minutes from the November 20, 2006, Open Space Advisory Committee meeting
- C-Hill and West Carson City Fuels Reduction Project, Treatment Implementation and Monitoring Report, dated August 11, 2006.
- 2007 Proposed Sheep / Fuels Reduction Project Area Map

Prepared By: *Ann Bollinger* Date: 3/14/07  
Ann Bollinger, Open Space Assistant

Reviewed By: *Roger Moellendorf* Date: 3/7/07  
Roger Moellendorf, Parks & Recreation Director

*Linda Ritter* Date: 3/6/07  
Linda Ritter, City Manager

*Melanie Bukotta* Date: 3/6/07  
District Attorney's Office

*Susan Johnson* Date: 3/6/07  
Finance Department

**Board Action Taken:**

Motion: \_\_\_\_\_ 1: \_\_\_\_\_ Aye/Nay  
2: \_\_\_\_\_  
\_\_\_\_\_  
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\_\_\_\_\_  
(Vote Recorded By)

**OPEN SPACE ADVISORY COMMITTEE  
STAFF REPORT**

**MEETING DATE:** November 20, 2006

**AGENDA ITEM NUMBER:** 3B

**STAFF:** Ann Bollinger, Open Space Assistant

**REQUEST:** Action to provide the Board of Supervisors with recommendations regarding the use of sheep for fuels reduction within the Carson Range foothills.

**GENERAL DISCUSSION:**

In the spring of 2006, a fuels reduction project using sheep was implemented on the west side of Carson City. The project was planned and managed by Resource Concepts, Inc. (RCI) with field monitoring conducted by RCI and staff.

The proposal suggested grazing treatment on 2,371 acres of private, city, state, and federal-owned lands. Treatment areas were divided and prioritized with the C-Hill area as first priority due to the higher density of cheatgrass and the area north of Kings Canyon as second priority. Season of use for the grazing permit was from April 10- June 30, 2006.

Due to late spring rains into early April, resulting in greater soil moisture and limited growth of cheatgrass, Borda Land and Sheep Company delayed arrival until conditions improved. The sheep arrived on April 18 and departed May 13, at which time the cheatgrass reached late bloom stage and was no longer palatable. The grazing treatment consisted of 1,274 acres only in the C-Hill area. In addition, an average estimate of 12% of the total growing season fuel load was reduced.

Recommendations and alternatives from RCI include: 1) Increase the number of head grazing in the project area, 2) Increase the length of the grazing season, 3) Use electric fence to create fuelbreaks, 4) Move bedding sites more frequently, 5) Locate bedding sites on cheatgrass dominant slopes, and 6) Graze sheep in a deferred rotation type system. Suggestions from Ted Borda include a "staging" site in Carson City.

Sheep grazing offers a cost-effective option for reduction of fine fuels such as cheatgrass. Staff recommends grazing treatment for spring 2007 and by beginning soon, there is sufficient time to plan and request necessary permits. Project costs may include transport for Borda Land and Sheep Company and assistance from RCI, with total costs not to exceed \$25,000. It must be noted that consultant costs can be kept to the minimum due to knowledge and expertise in field monitoring by the Open Space Assistant. However, present funding will result in unemployment of this position in April with re-hire status in July 2007.

**RECOMMENDED ACTION:** Action to provide the Board of Supervisors with recommendations regarding the use of sheep for fuels reduction within the Carson Range foothills.

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plan is developed, especially since no information was provided on the recommended \$1 to \$3 million set aside. He suggested the cost estimates are reasonable based upon some comprehensive shared cost plan to be determined and reviewed by this committee prior to budgeting funds. Member Scott suggested separating the operation and maintenance concepts from the fire suppression set aside. He noted that the committee, through Open Space Program staff, has provided a significant benefit in fire-related rehabilitation, analysis, and other work to properties already owned by the City. He acknowledged the concern over financial responsibility for future fire, and expressed the opinion that the Open Space Program has already proven reliability. He further acknowledged that additional management will be required with acquisition of additional land. He expressed a hesitancy to discuss a \$1 to \$3 million set aside "without a whole lot more information on which to base any ... decision." He expressed a willingness to consider a statement addressing operation and maintenance of lands which may be acquired, subject to individual or collective parcel plans, so that appropriate treatments can be administered in a logical manner. He advised of available funds for fire rehabilitation over the course of the next couple years, and suggested that work needs to continue in that area. He concurred with Member Riedl's comments, but suggested providing a recommendation to the Board of Supervisors in terms of management commitment. **Vice Chairperson Jacquet moved to recommend to the Board of Supervisors that Open Space funding is available for management of transferred federal lands that become part of the Open Space Program. Member Fischer seconded the motion.** Chairperson Hartman commented that the purpose of the federal lands bill is not to reallocate risk or liability. He expressed a willingness to manage lands in such a way as to avoid catastrophe in the next fire. He called for a vote on the pending motion; **motion carried 7-0.**

Mr. Guzman acknowledged that this committee would likely have a say in the future disposition of lands to which Open Space funding had been allocated for management and fire suppression. He advised that Public Works Director Andrew Burnham has expressed a willingness to allocate funding to cover the proportional share of utilities costs. Mr. Burnham concurs with Carson City retaining ownership of watershed lands. Chairperson Hartman expressed the opinion that the citizens understand the significance of the watershed lands to the community. He agreed that Public Works Department representatives also understand the significance and have expressed support for retaining watershed lands.

In response to a question, Chairperson Hartman advised that the Open Space Master Plan element provides for the opportunistic acquisition of property pursuant to the stated priorities of the master plan. He expressed the belief that a great deal of attention has been and continues to be devoted to River properties. He noted the significance of the view shed, as a stated priority of the master plan, and the priority of rehabilitating the west side in the aftermath of the Waterfall Fire. Member Scott expressed a reluctance to prioritize properties, and the opinion that, with management planning and financial prioritization, he "would want to take on everything." He reiterated a willingness to take on the responsibility of management with the assistance of "other beneficiaries." He expressed a preference for "all of the above." Mr. Guzman advised he would convey the committee's sense of priority. Vice Chairperson Jacquet recalled that the Open Space Master Plan element designates the Carson River, hillsides, and irrigated farmland as priorities but not in any particular order. Chairperson Hartman agreed based on the opportunistic provisions of the master plan.

\* **3-B. ACTION TO PROVIDE THE BOARD OF SUPERVISORS WITH RECOMMENDATIONS REGARDING THE USE OF SHEEP FOR FUELS REDUCTION WITHIN THE CARSON RANGE FOOTHILLS (7:55:04) - Ms. Bollinger reviewed the staff report. She responded to questions regarding last year's project, and recommendations for the upcoming year. She**

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advised of having met, earlier in the day, with Ted Borda and of having reviewed the federal lands bill maps. In response to a question, she advised that Mr. Borda has three bands of sheep available. In response to a question, Mr. Guzman advised that a proposal will be submitted to the committee, in January 2007, to recommend permanently funding Ms. Bollinger's position. Member Scott discussed the importance of prioritizing this process.

Mr. Guzman advised of Mr. Borda's interest in pursuing a five to ten year contract which would provide the opportunity to determine the best areas to encamp the sheep bands. He pointed out areas, on the displayed map, for which Mr. Borda has a grazing permit. Mr. Borda has a visual concept of how to cost effectively move sheep around the valley to create fuel breaks. Chairperson Hartman suggested a five to ten year contract is likely not possible, but requested Ms. Madden to look into the possibility of extended contracts. Ms. Bollinger advised that Mr. Borda had offered to pay this year's shipping costs. Chairperson Hartman entertained a motion, and Member Scott advised he would abstain from voting on the motion. **Member Lincoln moved to provide the Board of Supervisors with recommendations regarding the use of sheep for fuels reduction within the Carson Range foothills for the year 2007. Member Fischer seconded the motion.** Chairperson Hartman called for public comment and, when none was forthcoming, a vote on the pending motion. **Motion carried 6-0-1, Member Scott abstaining.**

#### 4. NON-ACTION ITEMS:

**STATUS REPORTS AND ANNOUNCEMENTS FROM STAFF (8:06:59)** - Mr. Guzman reviewed the "FYI" items included in the agenda materials. He reported that the Raffety wetlands project is progressing well. The Anderson / Jarrard appraisal will be done in the near future following a meeting with water utility staff regarding water rights. Attorney Chris MacKenzie and Mickey Anderson have been kept informed of the progress. *Mr. Guzman anticipates the appraisal reports will be submitted within 45 days.* He advised of continued work on the Horse Creek Ranch conservation easement. He anticipates that Nevada Division of State Lands staff will submit a revised draft funding agreement and deed restrictions in the near future. He advised of continued concerns, on the part of the Schulz family, regarding the proposed lodge. Mr. Guzman anticipates that the appraisal report for the Desormier property will be submitted in approximately 45 days. The appraisal for the Wilson property is anticipated to be done prior to the first snowfall. Mr. Guzman advised of two new proposals, a two-acre parcel near the River and the Steadley property, which will be presented to the committee in the near future. He reported on the progress of cabin demolition on the Swafford property. (8:12:08) Ms. Bollinger provided an overview of the Collaborative Watershed Management and Research in the Great Basin Conference, descriptive materials for which were included in the agenda materials. In response to a question, she advised of having discussed, with University of Nevada Cooperative Extension Director, JoAnne Skelly, the possibility of utilizing goats for a fuels reduction project in 2007.

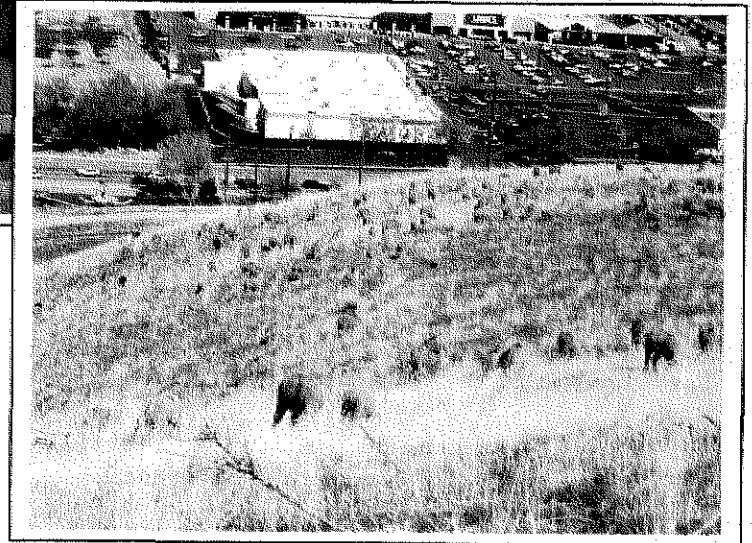
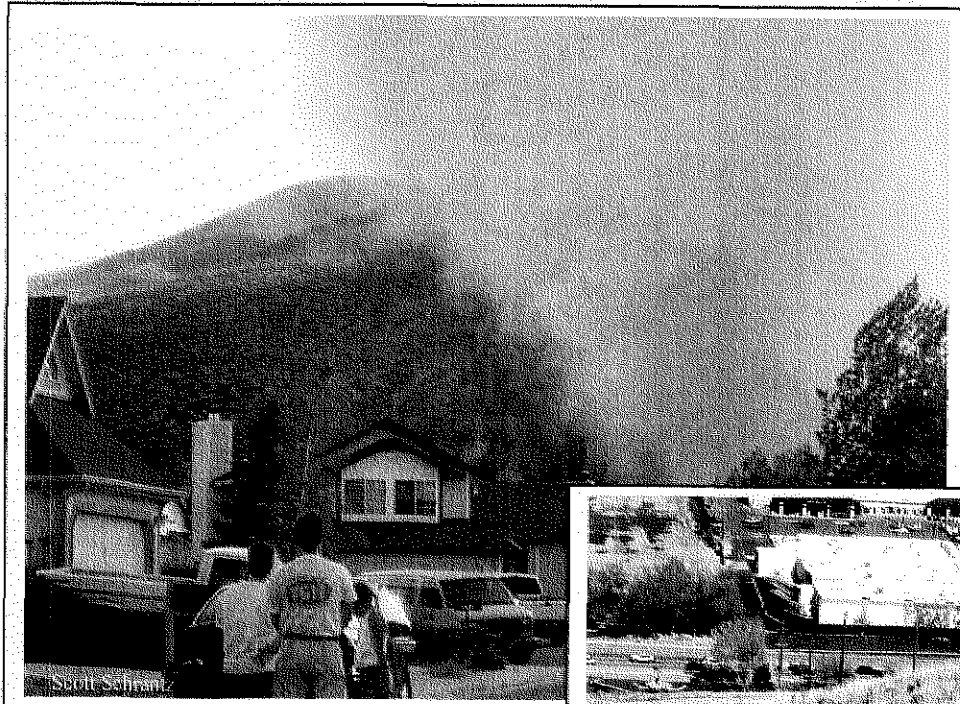
**MEMBERS' ANNOUNCEMENTS AND REQUESTS FOR INFORMATION (8:06:30)** - Member Scott expressed appreciation for Toiyabe Chapter of the Sierra Club Chair Tina Nappe's comments in the November 3, 2006 letter which was included in the agenda materials. (8:12:55) Member Scott expressed appreciation for the efforts of Mr. Guzman and Ms. Bollinger. He referred to the billing statement from RCI, which was included in the agenda materials, and suggested it represented sufficient

# *C-Hill and West Carson City*

## Fuels Reduction Project

### Treatment Implementation and Monitoring Report

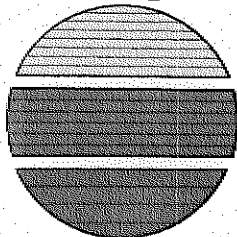
*August 11, 2006*



*Prepared For:*

**CARSON CITY PARKS AND  
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3303 Butti Way, Building Number 9  
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*Prepared By:*



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# *C-Hill and West Carson City*

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## **Fuels Reduction Project – Monitoring Report**

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*August 11, 2006*

*Prepared For:*

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**APPENDICES**

- Appendix A – List of Consenting Landowners*
- Appendix B – Photo Points from the Project Area*
- Appendix C – Use Pattern Maps*

*File Doc: 2006-08-11 rpt. Fuels Reduction 06114.1 Carson City TLB-sta LB-20 v3.doc  
(August 11, 2006)*

## 1.0 Introduction and Background

The C-Hill and West Carson Fuels Reduction Project was proposed by Carson City to address the urgent need for reduction of cheatgrass and other herbaceous fuels accumulating in the project area. Following the 2004 Waterfall Fire both aerial and drill seedings occurred under the direction of the U.S. Forest Service (USFS) and Nevada Division of Forestry (NDF). While much of the drill seeding was successful, there are areas where the aerial seeding did not successfully establish, likely because of the extensive cheatgrass population in those areas. One such area is above Curry Street extending west of the railroad museum. That area was dominated almost exclusively by cheatgrass and annual mustard in 2005 and early 2006. The C-Hill and West Carson City Fuels Management Plan was developed to encompass both annual fuels such as cheatgrass and perennial herbaceous material capable of carrying wildfire into the community. The fuels reduction project addressed the need to plan fuels reduction in areas deemed appropriate by the Carson City Fire Department, NDF, and USFS, and to meet a prescription outlined by the fire professionals. Carson City contracted Resource Concepts, Inc. (RCI) to develop project objectives with input from fire and resource professionals in various agencies, write the fuels reduction plan, coordinate treatment implementation, and monitor the results. This report describes the final treatment implementation, summarizes the monitoring results, and provides recommendations for future fuels management activities.

## 2.0 Fuels Reduction Project Objectives

The C-Hill and West Carson City Fuels Reduction Project purpose was to create a fuelbreak along the Wildland-Urban Interface (WUI) on the west side of Carson City within the area of the Waterfall Fire burn. **The principle objective is to manipulate vegetation characteristics to reduce fire hazards by removing biomass production or altering fuel structure.** Specific objectives included:

1. Utilizing sheep as a tool to remove up to 80% of the herbaceous vegetation biomass along the wildland-urban interface areas within the Waterfall Fire burn area (Figure 1).
2. Utilizing mechanical equipment on Carson City, Nevada State Lands, and private lands to reduce 80% of herbaceous vegetation biomass on relatively flat slopes within the proposed project area. Mechanical equipment will only be used in the event that the timing of sheep grazing, annual herbaceous biomass produced, or other factors limit the amount of the project area that can be treated through sheep grazing.

There were two portions of the total project area that were approved for grazing, one in the Wildland Urban Interface area of C-Hill and the other north of Kings Canyon. The C-Hill area was identified as the area of highest priority due to the greater density of cheatgrass in specific areas and the inaccessibility for mechanical equipment to conduct fuels reduction. The area north of Kings Canyon was a second priority for treatment. Within both main treatment areas, the grazing treatments were intended to be focused in the first 1,300 feet behind homes. Once fuels management objectives were met in the first 1,300 feet, then the grazing area was to be extended to the rest of the project area further from homes.

## 3.0 Project Planning and Coordination

### 3.1 Total Treatment Area - Land Ownership

The total area planned for treatment (2,371 acres) included lands owned or managed by the U.S. Forest Service, Nevada Division of State Lands, Carson City, and various private landowners. Because cheatgrass cured and became unpalatable before sheep could be moved and cheatgrass growth was lower than expected, the northern part of the project area was not grazed in 2006. Acreage and landownership values for the southern portion of the project are listed below.

Land Owner	Acreage
Carson City	115
NV State Lands	61
US Forest Service	556
Private Lands	542
<b>Total</b>	<b>1,274</b>

### 3.2 Project Contributors and Roles

Project cooperators and stakeholders include the City of Carson City, Resource Concepts, Inc. (RCI), US Forest Service (USFS), Nevada Division of Forestry (NDF), Nevada Department of Wildlife (NDOW), Nevada Department of Agriculture (NDA), Borda Land and Sheep Company, the University of Nevada-Cooperative Extension (UNCE), and private landowners. The primary roles of each of the project cooperators are listed below. These are the primary responsibilities of each group, and do not represent a total list of every task completed.

- |  |  |
|--|--|
| 1. <i>Agricultural Research Service</i>    | Completed a bioassay of soils in several parts of the project area and provided technical assistance to agencies   |
| 2. <i>Borda Land and Sheep Company</i>     | Donated their time and sheep band to be used as a fuels reduction tool for the project, contributed to the agency coordination effort, and addressed stakeholder concerns during project implementation  |
| 3. <i>Carson City</i>                      | Initiated the project, funded transportation of sheep to the project area, coordinated with all agencies, notified landowners, sought landowner permissions, led tours of the project area, assisted in utilization monitoring, and assisted in tour coordination and planning. Carson City Fire Department assisted in development of fuels management objectives |
| 4. <i>Nevada Department of Agriculture</i> | Contributed to project development and implementation, served as a liaison for Borda Land and Sheep Company, and providing expertise on project documentation, regulation, and implementation strategies   |

5. <i>Nevada Division of Forestry</i>	Assisted in development of fuels management objectives, provided labor for building utilization cages and exclosures, completed cultural resource inventories and documentation for each bedding and watering site, and provided equipment and labor to water sheep throughout the project
6. <i>Nevada Division of Wildlife</i>	Assisted in the identification of important wildlife habitat concerns within the fuels management area, and actively attended coordination meetings
7. <i>Resource Concepts, Inc.</i>	Retained to provide technical assistance to Carson City, developed fuels reduction plan, coordinated with agencies and producer, addressed stakeholder concerns, monitored grazing utilization, summarized monitoring results, and provided Carson City with a report summarizing monitoring results and providing recommendations
8. <i>University of Nevada Cooperative Extension</i>	Provided initial project recommendations, served as a liaison between private landowners and project stakeholders, provided project information to media representatives, and coordinated with all involved agencies
9. <i>USDA- Forest Service</i>	Coordinated with project stakeholders, performed NEPA analysis, completed necessary letter writing, reporting, and consultation to issue temporary livestock grazing permit, provided fencing materials for two grazing exclosures, and assisted in development of fuels management objectives
10. <i>USDI – Bureau of Land Management</i>	Coordinated with project stakeholders and conducted necessary consultation to issue a trailing permit for sheep to move from Carson City to BLM permits

### **3.3 Final Permitting, Clearance, Consent, and Outreach**

The cooperating landowners and managers within the project area were required to meet many different and specific requirements to allow for full and appropriate implementation of this project.

#### **3.3.1 U.S. Forest Service**

The Forest Service filed the required permits for use of livestock to reduce wildland fuels on Forest Service lands. Several permits must be granted to implement this project on these lands. The Livestock Use Permit (FSM 2209.13 Chapter 31.2) and Vegetation Management permit (FSM 2209.13 Chapter 31.25) were granted on April 10, 2006. These permits, listed and described below, are filed and kept by the Carson Ranger District. The Forest Service also approved trailing across lands outside the project area to allow sheep to exit the project.

### **3.3.2 City Land and Private Landowner Permissions**

Carson City lands were authorized for fuels reduction through Juan Guzman, Carson City Open Space Manager. Mr. Guzman contacted all private landowners with potential to be involved in the project by letter, phone call, or personal visit prior to project implementation. A list of private landowners who were asked to participate in the project and their responses are included in Appendix A.

### **3.3.3 Traffic Control and Law Enforcement Coordination**

A permit for Temporary Occupancy of Nevada Department of Transportation Right-of-Way was obtained from Nevada Department of Transportation. This permit required signatures from the local Nevada Highway Patrol and the Carson City Sheriffs Department. Both NHP and Carson City Sheriffs had patrol cars available for escort of the sheep across US Highway 395 and east up Clearview Road to BLM lands.

### **3.3.4 Public Coordination and Outreach Efforts**

Public outreach and notification of this project was performed as an interagency effort. Outreach included articles in both the local newspapers, an announcement of the proposed project on a local radio station, and project coverage on local television stations. The project was discussed and open to comment at both a Carson City Open Space Advisory Committee meeting and a Carson City Board of Supervisors meeting. Both of these meetings were advertised in the local newspaper, which specifically mentioned the project. UNCE provided information to the interested landowners regarding the project, and Carson City mailed letters regarding the project to 45 adjacent landowners.

## **4.0 Fuels Reduction Treatment Implementation**

Implementation of this project required coordination with the sheep operator, agencies and involved private landowners. All stakeholders operated efficiently with a cooperative attitude, allowing this project to move forward. A description of treatment implementation is included below.

### **4.1 Fuels Reduction Specifications**

#### **4.1.1 Season of use**

The season of use for the grazing permit was from April 10 - June 30, 2006; however the total length of the actual project was from April 18 - May 13, 2006. Soil wetness/firmness suitability delayed the start of the grazing season until April 18, when the sheep arrived at the project area. The wet spring and longer than expected duration until snowmelt limited the growth of cheatgrass and delayed the growth of perennial grasses by several weeks. The cheatgrass that did germinate was approximately 1-2 inches in height when the sheep arrived at the project area. Cheatgrass had generally reached late bloom stage throughout most of the project area (except a few north slopes) by May 10, 2006. By late bloom stage cheatgrass is typically no longer palatable for grazing. Perennial grass species were in the vegetative stage when sheep arrived at the project area. Sandberg bluegrass was in bloom, crested wheatgrass was in boot and early heading stages, and pubescent wheatgrass was in vegetative and early boot stages when the project ended on May 13, 2006.

#### **4.1.2 Utilization**

- Grazing utilization was limited to a maximum of 80% at the end of the growing season to achieve the fuels reduction objectives; however, several project cooperators voiced concerns that 80% use would be too high to maintain perennial grass species health and vigor.
- Utilization was also limited to a minimum 3-inch stubble height on June 1<sup>st</sup> (which could be less than 80% of the biomass) on native and seeded perennial grasses. The stubble height specification provided a minimum amount of vegetation cover for soil conservation purposes.
- Browsing of mature shrubs (where they occur) was limited to 25% utilization in non-bedding ground or watering sites.

#### **4.1.3 Stock Watering and Bedding Ground Sites**

Sheep bedding and watering sites were impacted more than the typical treatment area due to concentrated use.

- Bedding and watering sites may have occurred within the same general location as each other, or independently from one another. Watering sites were located appropriately for accessibility of water tenders to deliver water to troughs, or adjacent to municipal water sources to fill troughs.
- Bedding and watering sites were not established in areas recently seeded with Bitterbrush caches by NDOW following the Waterfall fire. Bedding and watering sites were placed near the toe slopes of the fuel reduction treatment areas where possible.
- Bedding sites were used consecutively for two to four days due to limitations on moving the trailer and amount of forage at certain locations.
- Bedding grounds were located more than 100 feet from Kings Canyon Creek.

#### **4.1.4 Mechanical Treatment Specifications (if necessary)**

- Mechanical treatments (mowing) have not been carried out to date. If mechanical treatments are carried out, herbaceous annuals and perennials should be mowed within a minimum 100-foot strip behind houses within the northern portion of the project area.

#### **4.1.5 Goat Grazing Treatment Specifications (if necessary)**

- Goats will be used to develop a 100-200 ft wide fuelbreak just east of houses in the Timberline Area. This treatment is being used as a demonstration project to determine whether or not goats will consume mature cheatgrass and other dried material at levels sufficient to create an effective fuelbreak. Grazing is scheduled to commence August 10, 2006 and last for a period of 5-10 days.

## **5.0 Treatment Results**

### **5.1 Degree of Fuels Reduction**

Borda Land and Sheep Company provided one band of approximately 900 ewes (approximately half with lambs) for the fuels reduction project. The sheep grazed the south portion of the project area for 26 days. The total estimated amount of dry weight fuel that was removed was 62 tons, or an average of approximately 175 lbs/acre. The fuels in the C-Hill portion of the project area can be primarily described as a fuel model 1, with fuel loads ranging between  $\frac{3}{4}$  - 1 ton/acre (Anderson 1982). An average estimate of 12% of the total growing season fuel load was reduced through one month of grazing at the beginning of the growing season. This is far less than the specification of an 80% reduction in fuel loads. Some trampling of litter from the 2005 growing season did occur, further reducing the standing fuel load from what was grazed in 2006. The grazing treatment appeared to

reduce the leaf biomass of the perennial grass species and only slightly reduce the height of the grass by the end of the growing season. This type of grazing treatment decreased the horizontal continuity of the fuel, but not the vertical continuity.

## 5.2 Utilization and Stubble Height Monitoring

Resource Concepts, Inc. and Carson City's resource specialists monitored grazing utilization two days a week during the length of the grazing season. The Landscape Appearance Method was used to determine percent utilization directly following grazing in various portions of the project area (Coulloudon et al. 1999). Use pattern mapping was also completed for the grazed areas. Transects were completed to provide documentation for the use pattern mapping and to calibrate the data gatherer's ability to visually assess the utilization of the area. Several monitoring checks did not involve the completion of transects, but at times resulted in recommendations to the shepherds to move the sheep to other locations. Repeat photos of several grazed areas are located in Appendix B and use pattern maps developed immediately following grazing and at the end of the growing season are included in Appendix C.

Using data collected from utilization transects during the grazing season and the use pattern mapping, it is estimated the average utilization for the grazed portion of the project area was 52%. Below is a list of the acreage estimated within each utilization class, right after the sheep grazing occurred.

**Table 1. Estimated Utilization by Acreage**

Utilization Class	Estimated Acreage
None or negligible 0-5%	484 ac.
Very light use 6-20%	91 ac.
Light use, rangeland topped, skimmed or grazed in patches 21-40%	111 ac.
Moderate use, rangeland entirely grazed as uniformly as features allow 41-60%	324 ac.
Heavy use, rangeland has appearance of complete search 61-80%	79 ac.
Severe use, mowed appearance, herbaceous completely utilized	111 ac.

**Table 2. Average Utilization and Stubble Heights Immediately Following Grazing**

Date	Transect Number	Average Utilization	Cheatgrass Height (in.)	Sandberg Bluegrass Height (in.)	Seeded Grasses Height (in.)
4-20-06	Transect 1	22%	1.3	--	5.1
4-20-06	Transect 2	50%	--	--	--
4-25-06	Transect 3	36%	2.0	2.1	5.0
4-25-06	Transect 4	70%	--	--	--
4-27-06	Transect 5	52%	2.0	2.9	5.0
4-27-06	Transect 6	9%	2.4	3.2	5.5

Date	Transect Number	Average Utilization	Cheatgrass Height (in.)	Sandberg Bluegrass Height (in.)	Seeded Grasses Height (in.)
4-27-06	Transect 7	2.5%	4.8	--	6.3
5-2-06	Transect 8	85.5%	2.5	1.7	3.4
5-4-06	Transect 9	71%	2.3	1.3	1.9
5-4-06	Transect 10	25%	4.0	--	4.0
5-4-06	Transect 11	19%	2.3	2.5	4.3
5-15-06	Transect 12	5%	--	--	18.0
5-15-06	Transect 13	2.5%	--	--	14.0
5-15-06	Transect 14	3.5%	--	--	20.0
5-15-06	Transect 15	15.5%	--	--	9.0
5-15-06	Transect 16	4%	--	--	13.0
5-15-06	Transect 17	2.5%	--	--	12.0

**Table 3. End of Growing Season Utilization and Stubble Heights**

Date	Transect Number	Average Utilization	Cheatgrass Height (in.)	Sandberg Bluegrass Height (in.)	Seeded Grasses Height (in.)
8-1-06	Transect 1	13%	4.3	10.3	34.7
8-1-06	Transect 2	18%	4.0	9.4	20.7
8-1-06	Transect 8	38%	3.8	6.5	29.0
8-1-06	Transect 9	37%	5.9	8.9	23.3
8-1-06	Transect 10	20%	3.5	--	10.1
8-1-06	Transect 11	13%	5.4	11.3	31.4
8-1-06	Transect 12	2.5%	--	8.4	37.3
8-1-06	Transect 15	2.5%	--	10.9	44.6
8-1-06	Transect 16	2.5%	--	13.7	30.7
8-1-06	Transect 17	2.5%	--	18.0	34.2

## 5.3 General Observations

### 5.3.1 Vegetation

Both during the grazing season and at the end of the growing season, all perennial grass species exhibited high vigor and high levels of productivity. The cool, wet spring provided optimal conditions for perennial cool-season grasses to thrive. Productivity appeared to be greater than in the 2005 growing season, in part due to weather conditions, and in part due to greater recovery following the 2004 fire. Regardless of the level of grazing pressure the grasses received, perennial grass species produced seed heads and had high reproductive capability. In some areas, heavy utilization (70-80%) appeared to cause tillering of the crested wheatgrass and the pubescent wheatgrass.

The opposite situation occurred for cheatgrass, especially in regards to productivity. The cool, wet, and cloudy spring conditions did not favor cheatgrass growth, with most plants not exceeding 4 inches by the time cheatgrass reached late bloom stage. However, cheatgrass density was still very high,



especially on south and east facing slopes near the south portion of the project area. The cheatgrass began to head out as early as April 27, and was generally unpalatable by May 10, 2006 throughout much of the project area.

No noxious weeds were identified during the monitoring process. Weedy patches of skeleton weed and tumble mustard are still common throughout the Waterfall Fire area. Grasshoppers were prevalent in many areas that were monitored at the end of the growing season.

### **5.3.2 Soils – Hydrology**

RCI specialists observed grazing impacts to soil resources while they were monitoring the grazing utilization. Trampling of vegetation by sheep increased the amount of litter on the ground directly following grazing. Soil compaction ranged from negligible to slight throughout the grazing area. The sheep grazing did not appear to have any impacts on soil erosion, and no rills or gullies were observed. The minimum requirement of the 3-inch stubble height for soil protection was met for the seeded species, and was met in most locations for Sandberg bluegrass as well. Any impacts to infiltration and runoff were very short term, as the grass regrowth quickly provided soil cover.

### **5.3.3 Sheep Grazing**

Borda Land and Sheep Company reported that the sheep were in good health prior to, during, and after the grazing project. Sheep had adequate forage available, even though grass growth was shorter than expected at the beginning of the project. The sheep had access to water in the canyons at the south end of the project area during the first week of the grazing season. Once the sheep moved to areas where water was no longer available, NDF provided the water. The watering locations and watering system worked well for Borda Land and Sheep Company. It is interesting to note that the lambs were observed grazing on the cheatgrass, while the ewes grazed more readily on the seeded perennials.

Some of the problems encountered with the sheep grazing included the difficulty in communications with the herders, as one only spoke Spanish and the other limited English and Spanish. It was difficult to convey the need for keeping the sheep as close to the interface as possible. The herders seemed to have difficulties keeping the sheep in close proximity to houses and other interface areas. Also, bedding sites could only be moved every four days or so because the herders didn't have a truck for moving their camp trailer. The campsites could only be moved when a representative from Borda Land and Sheep Company could come to Carson City and move the trailer.

## **6.0 Recommendations**

### **6.1 Fuels Reduction**

All of the project stakeholders and cooperating agencies coordinated effectively to successfully utilize sheep for fuels management in the Carson City wildland-urban interface. The sheep did reduce fuel loads and altered the structure of the fuel loads, but not to the degree of the 80% reduction called for in the specifications. Resource Concepts, Inc. has developed alternatives and recommendations that either separately or combined will aid Carson City in achieving the desired conditions within the wildland-urban interface in the future.

**Proposed Alternatives:**

<p><b>1. Increase the number of head grazing in the project area</b></p>	<p>Increasing the number of sheep to 2 or 3 bands would allow the entire project area (north and south) to be grazed early in the growing season. This would focus the grazing intensity on early season species such as cheatgrass, Sandberg bluegrass, and crested wheatgrass. Greater trampling of previous year's growth would occur.</p>
<p><b>2. Increase the length of the grazing season</b></p>	<p>Increasing the length of the grazing season would allow greater fuels reduction through greater grazing intensity on all grass species. Greater trampling of previous year's growth would occur.</p>
<p><b>3. Use electric fence to create fuelbreaks</b></p>	<p>Electric fence could be used to establish specific fuelbreaks in WUI priority areas where fuels should be reduced by approximately 80%. Wethers or dry ewes should be used in these areas if possible, and the ewes with lambs could be used in the project area outside the electric fence. This would increase uniformity of the fuels treatments and could decrease the chance of sheep moving into yards and parking lots.</p>
<p><b>4. Move bedding sites more frequently</b></p>	<p>Greater levels of fuel reduction occur near bedding sites. Moving bedding sites more frequently could increase the uniformity of the fuels reduction treatment, reduce the chance of causing soil compaction or soil erosion, and allow for more rapid recovery of the site.</p>
<p><b>5. Locate bedding sites on cheatgrass dominant slopes</b></p>	<p>Bedding sites could be located on cheatgrass-dominated sites to increase the level of utilization on cheatgrass.</p>
<p><b>6. Graze sheep in a deferred rotation type system</b></p>	<p>Sheep grazing could occur annually utilizing a deferred rotation type grazing system where sheep start at different ends of the project area during alternate years. For example, the system would allow late grazing during seed production in Year 1, and early grazing allowing for regrowth and seed set in Year 2.</p>
<p><b>7. Utilize mowing behind homes in the Ash Canyon and Timberline areas</b></p>	<p>Mowing could be utilized to reduce fuels and create fuelbreaks directly behind homes where topography is fairly flat and large rocks are not present.</p>

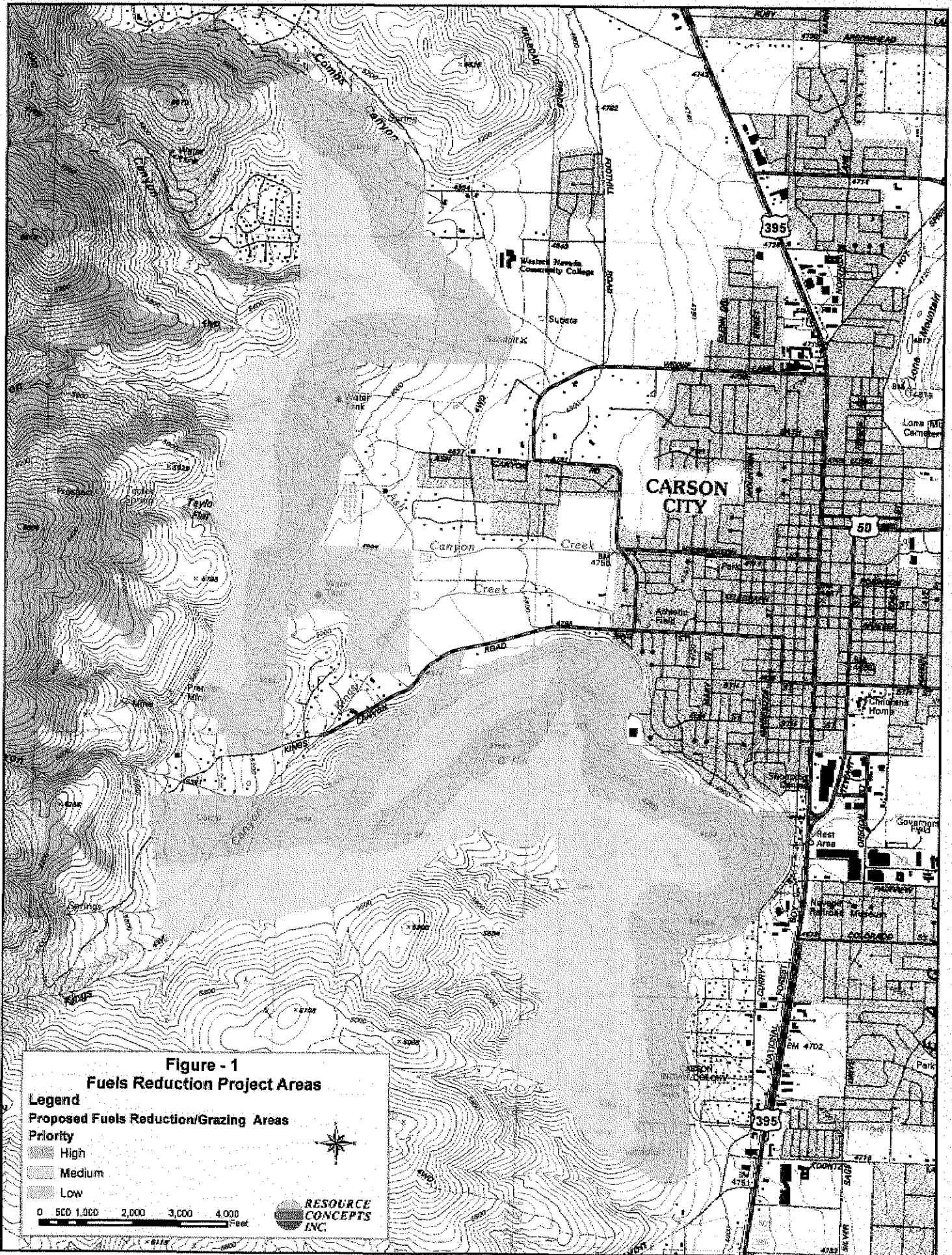
**6.2 Utilization Objectives**

RCI specialists believe that 80% utilization of annual and perennial grass species is not possible to achieve before cheatgrass sets seed and becomes unpalatable, especially with a single band of sheep.

It is also not annually appropriate to graze perennial grasses at an 80% utilization level. Rather, specific fuelbreak areas should be planned and managed appropriately in 200-500 foot wide areas to aid fire protection for the west side of Carson City. A 50% utilization objective for the lands west of the fuelbreaks is more appropriate for maintenance of perennial grass species and will provide a reduction in fuels and decrease fuel bed continuity. Cheatgrass-dominated sites can be grazed at utilization levels of 80%, but without fencing, this would be a difficult objective to achieve. RCI recommends reducing the utilization specification to 50% for all lands (except cheatgrass dominant slopes) outside the designated fuelbreaks.

## 7.0 References

- Anderson, H.A. 1982. Aids to determining fuel models for estimating fire behavior. Ogden, Utah, U.S. Forest Service, General Technical Report INT-122. 22p.
- Coulloudon, B., K. Eshelman, J. Gianola, N. Habich, L. Hughes, C. Johnson, M. Pellant, P. Podbourny, A. Rasmussen, B. Robles, P. Shaver, J. Spehar, and J. Willoughby. 1999. Utilization studies and residual measurements: Interagency Technical Reference. BLM/RS/ST-96/004+1730.



***Appendix A***  
***List of Consenting Landowners***

## Appendix A

00915102	102.8						
00915104	211.0	BUREAU OF INDIAN AFFAIRS	1677 HOT SPRINGS RD	CARSON CITY, NV	89706-0000		
00915102	102.8						
00915104	211.0						
00752103	43.3						
00752101	84.9	BOARD OF REGENTS - U.N.R.	2601 ENTERPRISE ROAD	RENO, NV	89512-0000		X
00752103	43.3						
00752102	31.5		2621 NORTHGATE LN STE 54	CARSON CITY, NV	89706-0000		
00752102	31.5						
00732232	35.8						
00732232	35.8	CARSON CITY					X
00732232	6.2		201 N CARSON ST	CARSON CITY, NV	89701-0000		
00732232	35.8						
00709128	80.5	CARSON LODGE #1	c/o P O BOX 771	CARSON CITY, NV	89702-0000		X
00709128	80.5						
00750102	3.1	EATON FAMILY PARTNERSHIP	2457 GRANDVILLE DR	CARSON CITY, NV	89701		
00750108	3.3	JONES, RONALD & THERESA	1112 W FOURTH ST	CARSON CITY, NV	89703		
00750103	3.3	CITYVIEW PROPERTIES LLC	c/o KENT W GABRIEL 1001 MOUNTAIN ST, STE 3M	CARSON CITY, NV	89703-0000		X
00750101	3.0	MILES, WILLIAM & ANGELA	4053 WEISE DR	CARSON CITY, NV	89703		X
00903102	29.0						
00903102	43.4						
00903107	5.0	COOMES, JOANNE MARIE GRAVES	395 SUNSET DRIVE	ENCINITAS, CA	92024-0000		X
00903102	29.0						
00903102	43.4						
00903115	38.2	DIVISION OF STATE LANDS	333 W NYE LN RM 118	CARSON CITY, NV	89706-0857		X
00903115	38.2						

00709129	40.7	GLENN, MADELINE & SKARAKIS, G	c/o GERALDINE C SKARAKIS 1260 GARY WY	CARMICHAEL, CA 95608-6108	X
00709129	40.7				
00708201	9.8	HAMILTON, WESLEY F	KINGS CANYON RD	CARSON CITY, NV 89703-0000	X
00706122	26.1				
00710151	71.0				
00710151	3.7	JOOST LAND & CATTLE CO, INC	P O BOX 25	CARSON CITY, NV 89702-0000	
00706113	45.7				
00706113	25.9				
00750101	3.4	MILES, WILLIAM D & ANGELA L	P O BOX 1760	DAYTON, NV 89403-0000	X
00710139	1.3				
00706172	9.9				
00706173	9.9	PARKS DEPT, CITY OF CARSON CITY	3303 BUTTI WAY #9	CARSON CITY, NV 89701-0000	X
00706174	9.9				
00706175	9.9				
00717211	3.6	PAWLUK, JAMES S & CHERYL J	4070 WEISE RD	CARSON CITY, NV 89703-0000	X
00901405	20.2	POTTER, PATRICIA R FAMILY TRUST	1555 W KING STREET	CARSON CITY, NV 89703-0000	X
00315125	1.9				
00902102	251.4				
00903101	146.7				
00902102	251.4	STANTON PARK DEVELOPMENT, INC	2989 HWY 50 E	CARSON CITY, NV 89701-0000	X
00903101	146.7				
00915101	73.3				
00902102	251.4				
00709180	69.8				
00709181	164.7	STATE OF NEVADA	c/o DIVISION OF STATE LANDS 333 W NYE LN #118	CARSON CITY, NV 89706-0000	X
00709180	69.8				
00709181	164.7				
00710109	38.1	STATE OF NEVADA	101 N CARSON ST	CARSON CITY, NV 89701-0000	X
00710109	38.1				
00306404	19.2	STATE OF NEVADA DIV OF ST LANDS	333 W NYE LN RM 118	CARSON CITY, NV 89706-0857	X
00330101	4.9				

00709116	77.9								
00709116	77.9								
00706118	74.1								
00901406	67.8								
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00706118	74.1								
00901406	67.8								
00706118	3.4								
00706120	397.6								
00901406	67.8								
00706120	397.6								
00706118	74.1								
00901406	67.8								
00706120	397.6								
00706119	202.6								
00706119	202.6								
00706126	598.7								
00706119	202.6								
00706126	598.7								
00706119	202.6								
00709125	1268.4								
00706111	403.0								
00710110	32.7								
00706111	403.0								
00713117	1.8								
00707110	10.2								
00706123	40.0								
00706123	40.0								
00709191	56.9								
00709191	56.9								
		U S FOREST SERVICE	1536 S CARSON ST	CARSON CITY, NV	89703-0000				X
		UTILITIES DEPT, CARSON CITY	3505 BUTTI WAY	CARSON CITY, NV	89701-0000				X
		COMBS CANYON LLC	11611 SAN VICENZTE BLVD SUITE 605	LOS ANGELES, CA	90049				X



***Appendix B***  
***Photo Points from the Project Area***

# Photo-Point Location Map

## Legend

○ Photo Point Locations

▭ Fuels Reduction Treatment Area

## Land Ownership

### Label

▭ Bureau of Indian Affairs

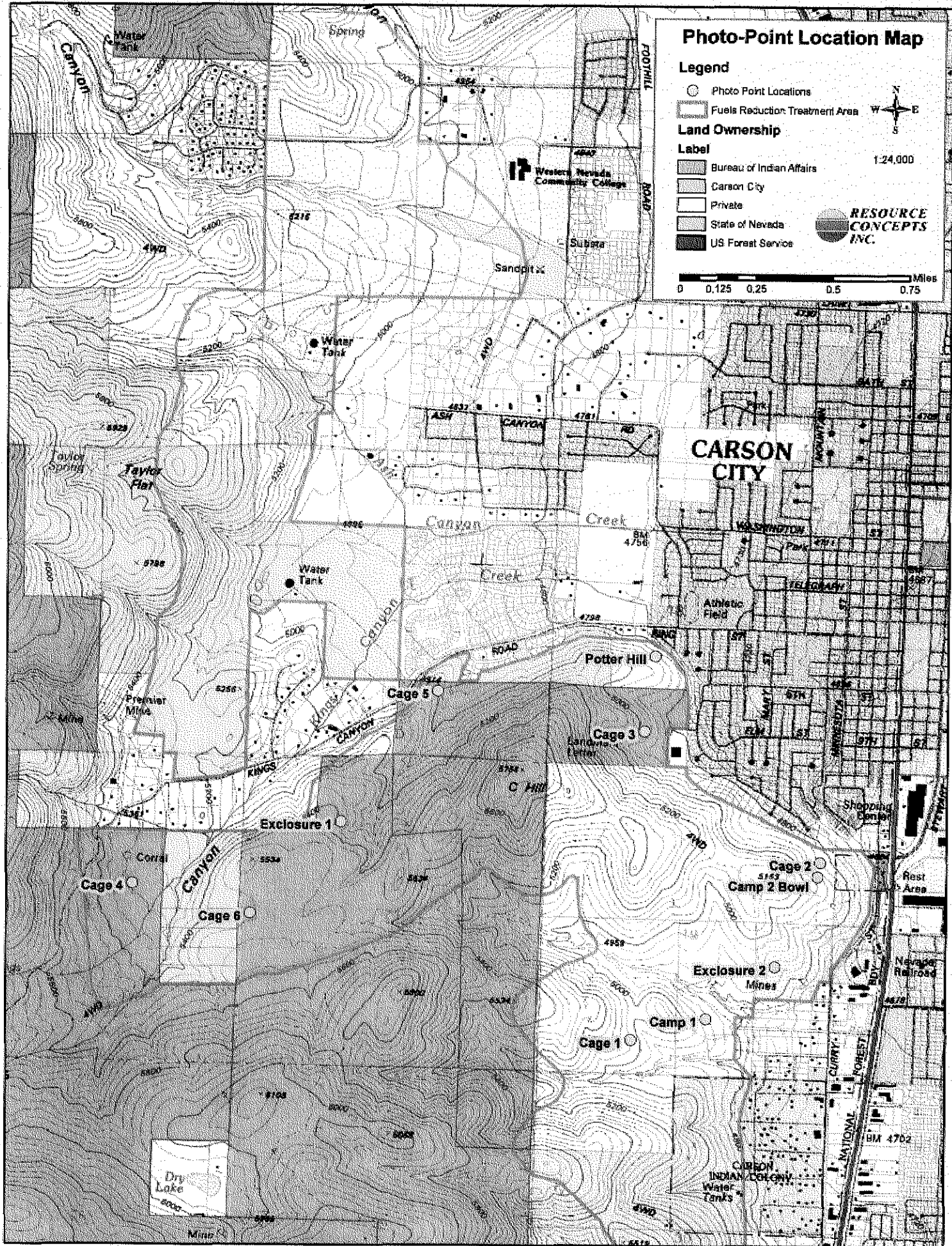
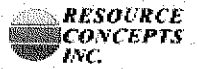
▭ Carson City

▭ Private

▭ State of Nevada

▭ US Forest Service

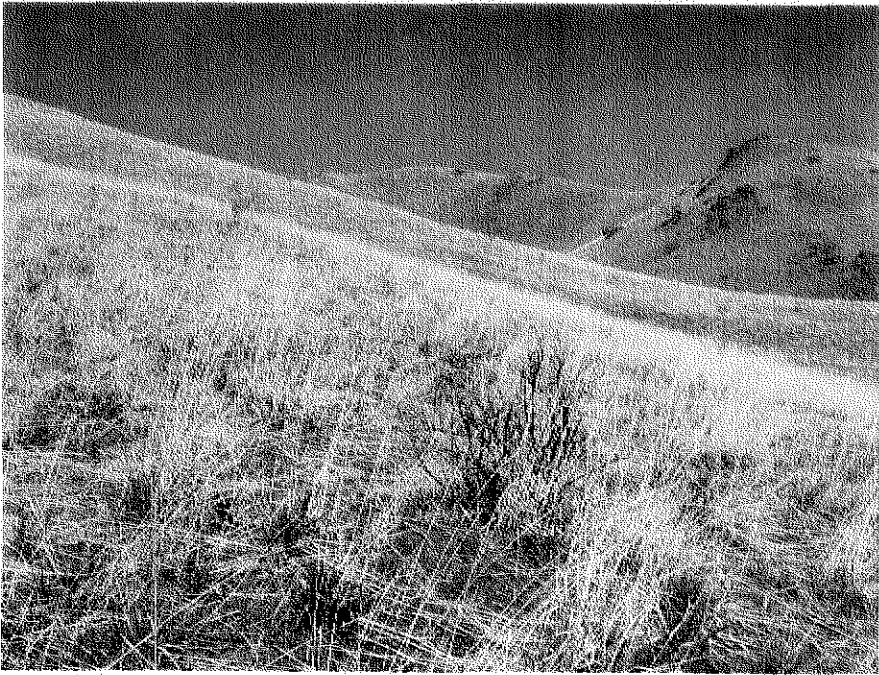
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**CAGE 1 – LOOKING NORTH**

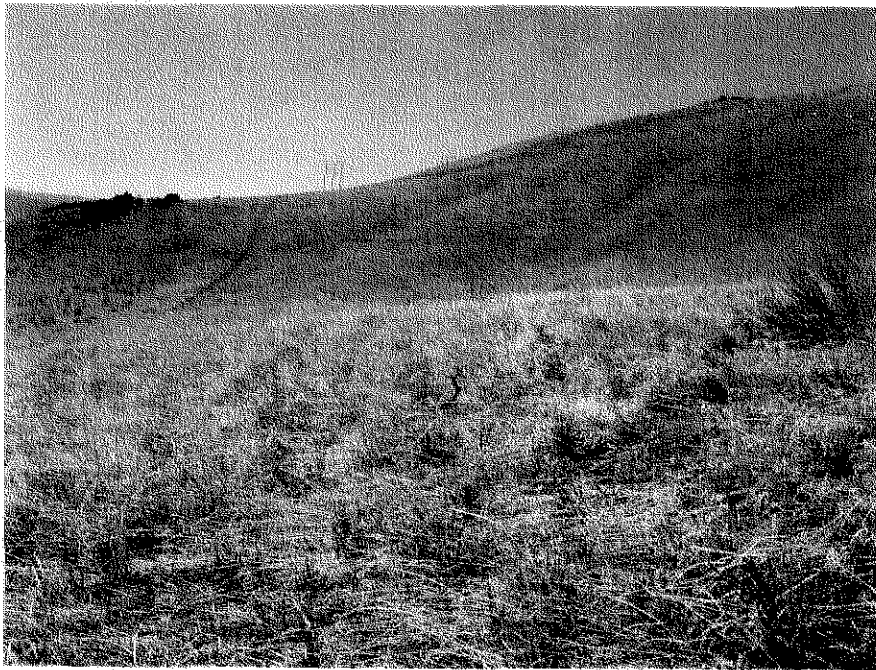
**Before Grazing (4/18/06)**



**Grazed (4/20/06)**



**End of Growing Season (8/1/06)**

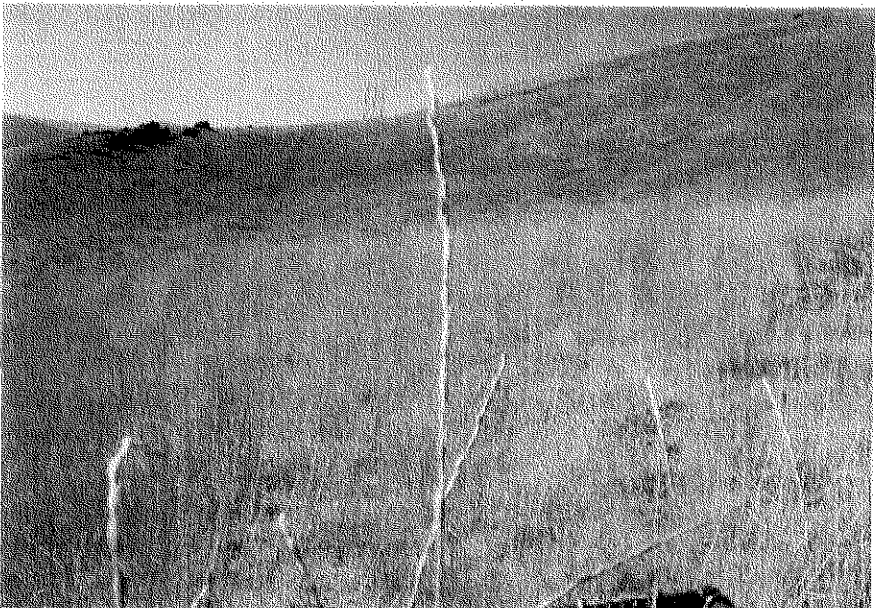


**CAGE 1 – LOOKING SOUTH**

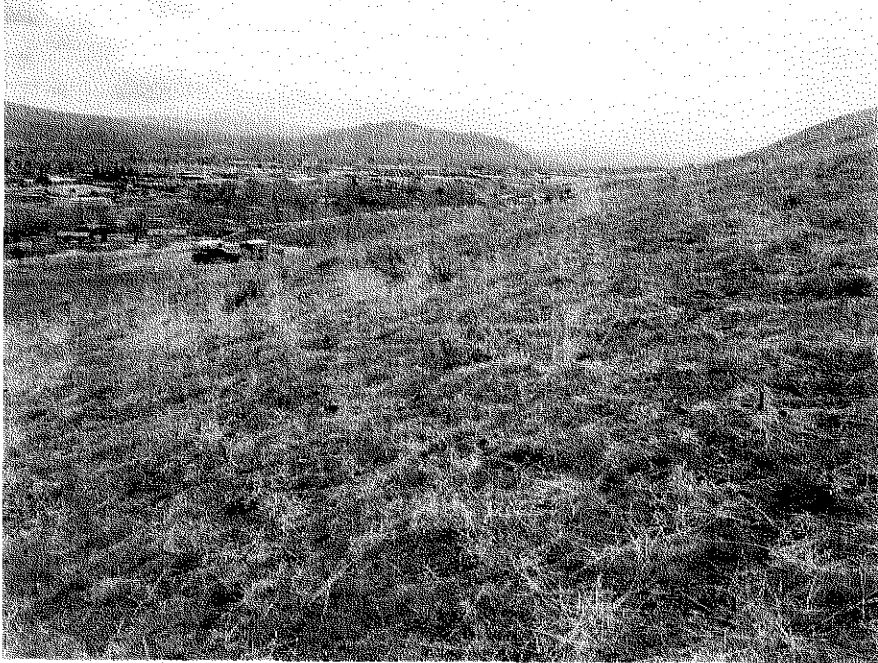
**Before Grazing (4/18/06)**



**Grazed (4/20/06)**



**End of Growing Season (8/1/06)**



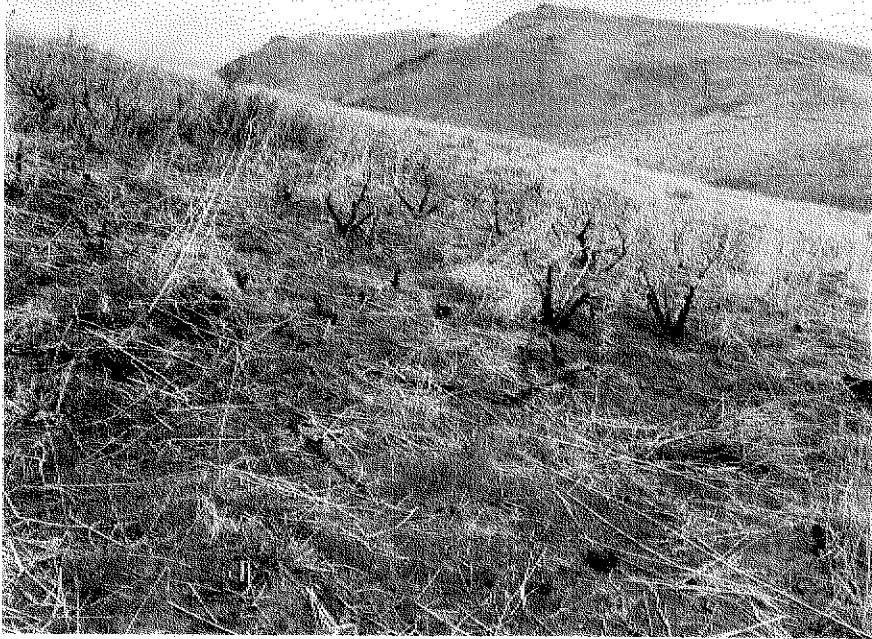
**CAMP 1 – LOOKING SOUTHEAST**

Grazed (4/25/06)



End of Growing Season (8/1/06)

**CAMP 1 – LOOKING NORTHWEST**



Grazed (4/25/06)



End of Growing Season (8/1/06)

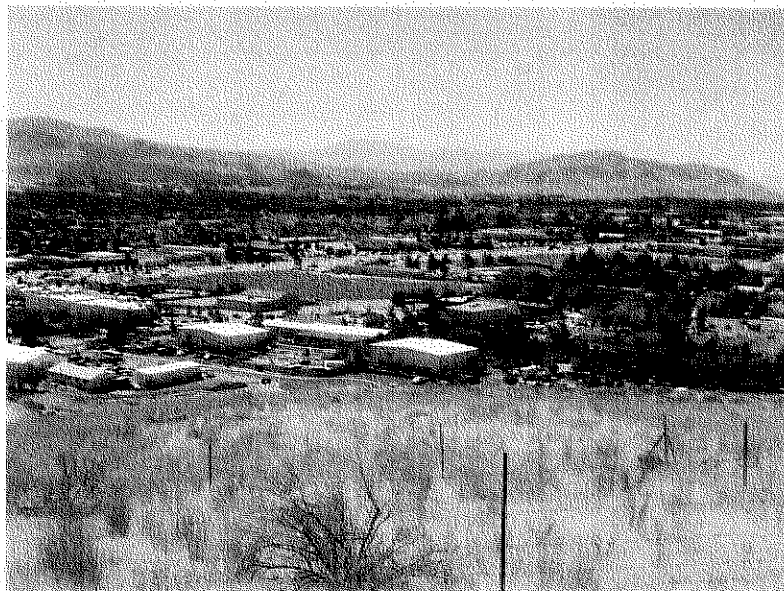


**EXCLOSURE 2 – LOOKING SOUTH**

No Grazing (4/25/06)

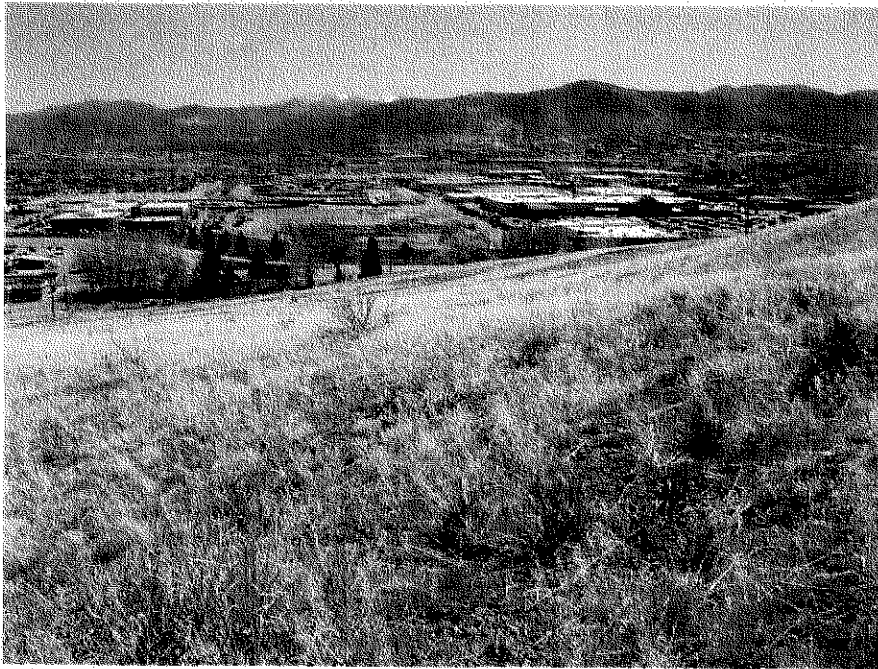


No Grazing (5/4/06)

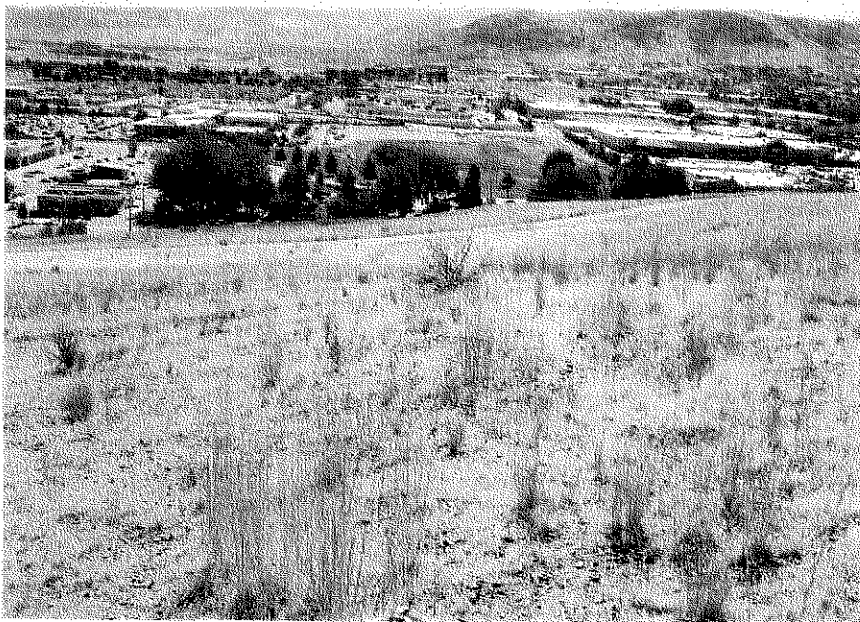


No Grazing (8/1/06)

**CAGE 2/CAMP 2 – LOOKING EAST**



**Before Grazing (4/18/06)**



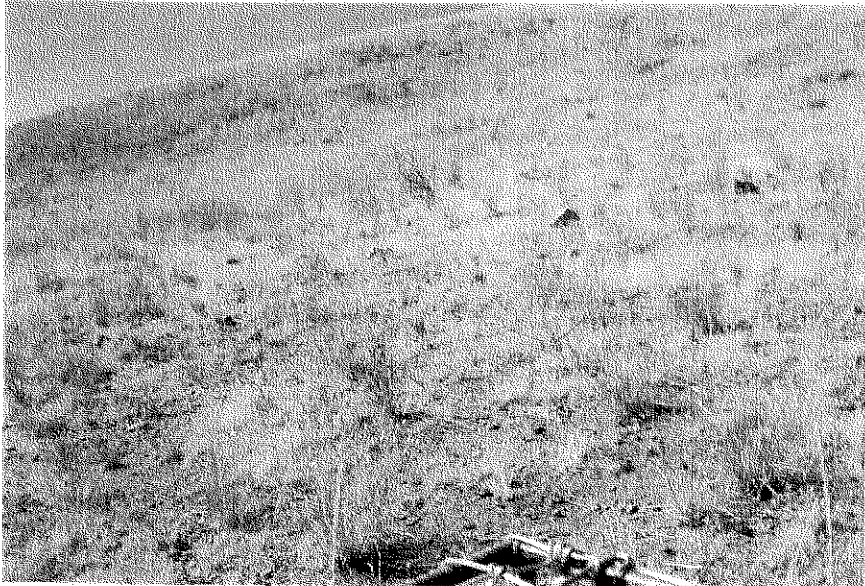
**End of Growing Season (8/1/06)**



**CAGE 2/CAMP 2 – LOOKING SOUTH**



**Before Grazing (4/18/06)**



**End of Growing Season (8/1/06)**

**CAMP 2 BOWL – LOOKING WEST**



Grazed (5/02/06)



End of Growing Season (8/1/06)

**CAGE 3 – LOOKING NORTH**

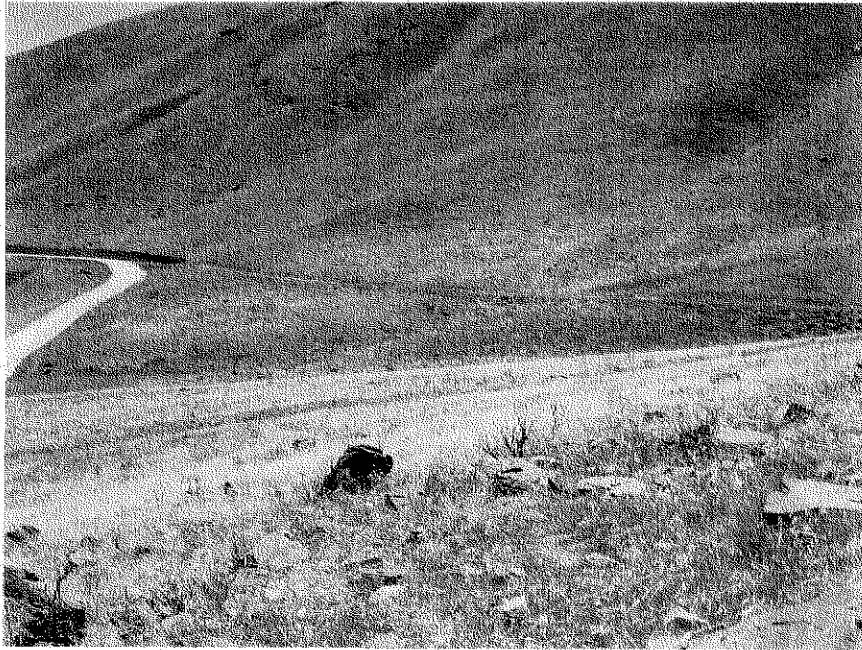


Before Grazing (4/18/06)

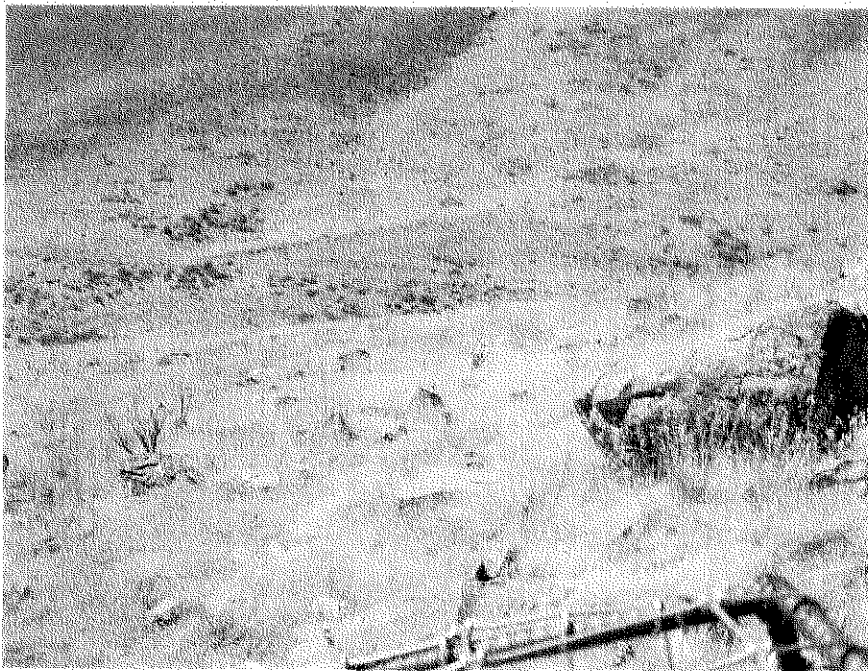


End of Growing Season (8/1/06)

**CAGE 3 – LOOKING SOUTH**



**Before Grazing (4/18/06)**



**End of Growing Season (8/1/06)**

## POTTER HILL – LOOKING NORTHWEST



Grazed (5/4/06)

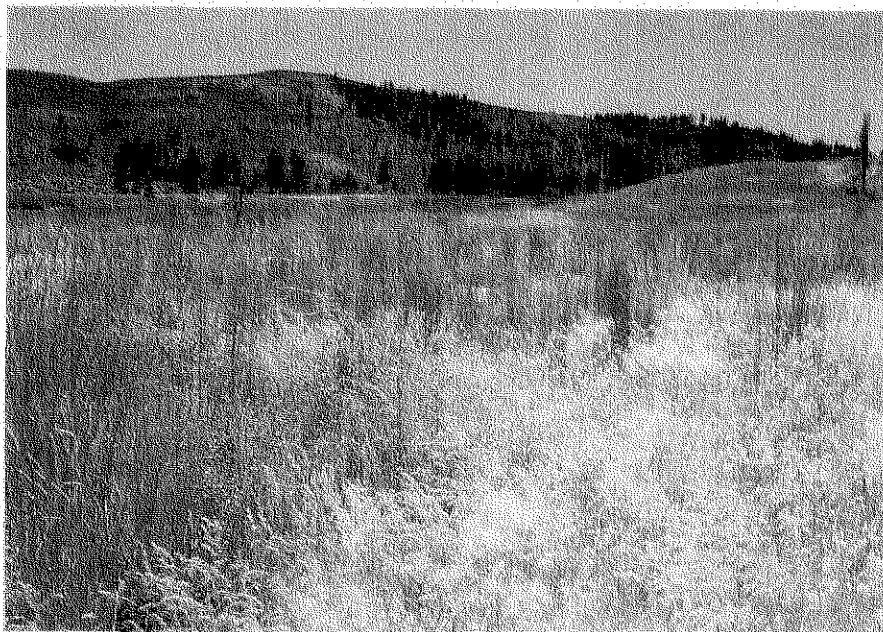


End of Growing Season (8/1/06)

**CAGE 4 – LOOKING SOUTH**

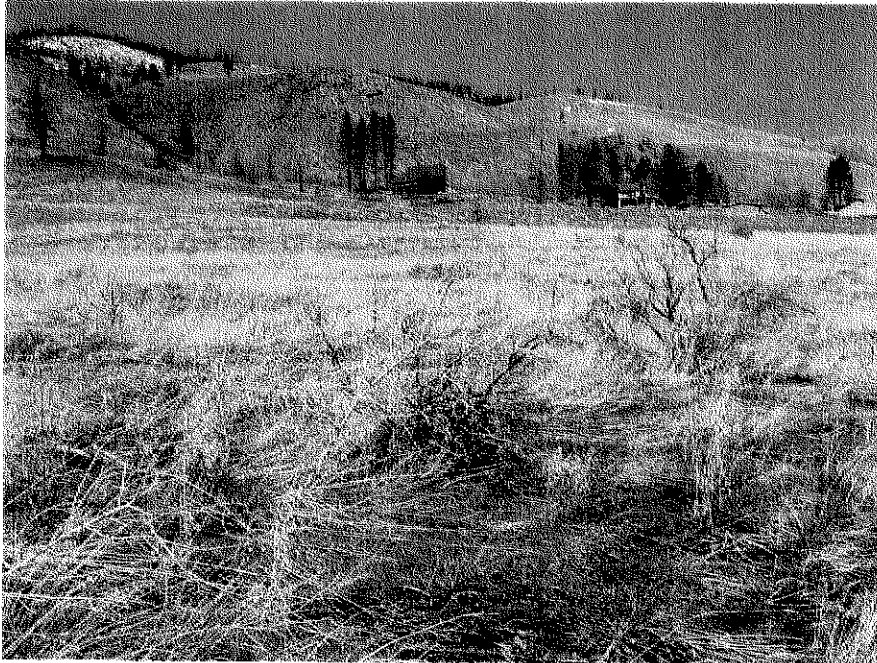


**Before Grazing (4/18/06)**

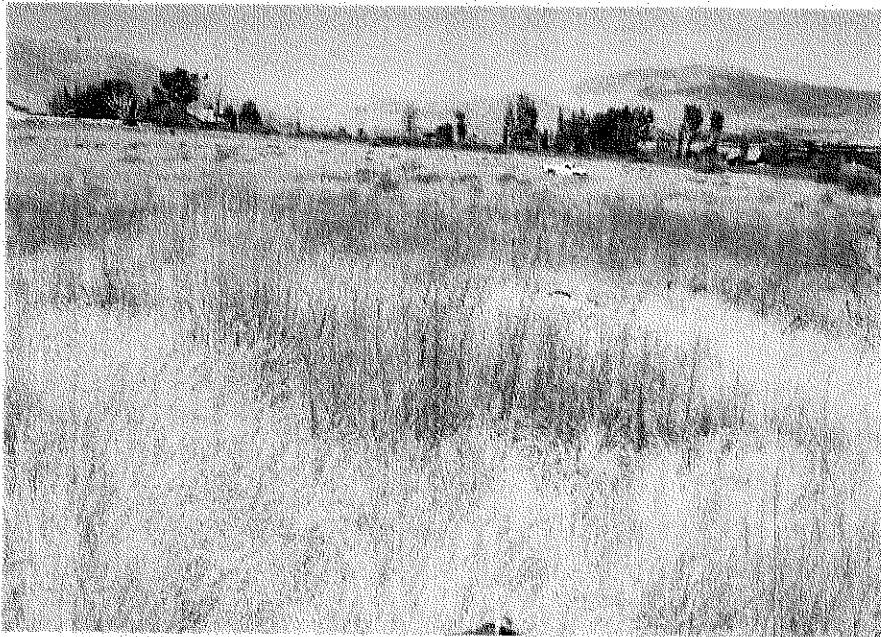


**End of Growing Season (8/1/06)**

**CAGE 4 – LOOKING NORTH**



**Before Grazing (4/18/06)**



**End of Growing Season (8/1/06)**

**CAGE 5 – LOOKING EAST**



**Before Grazing (4/18/06)**



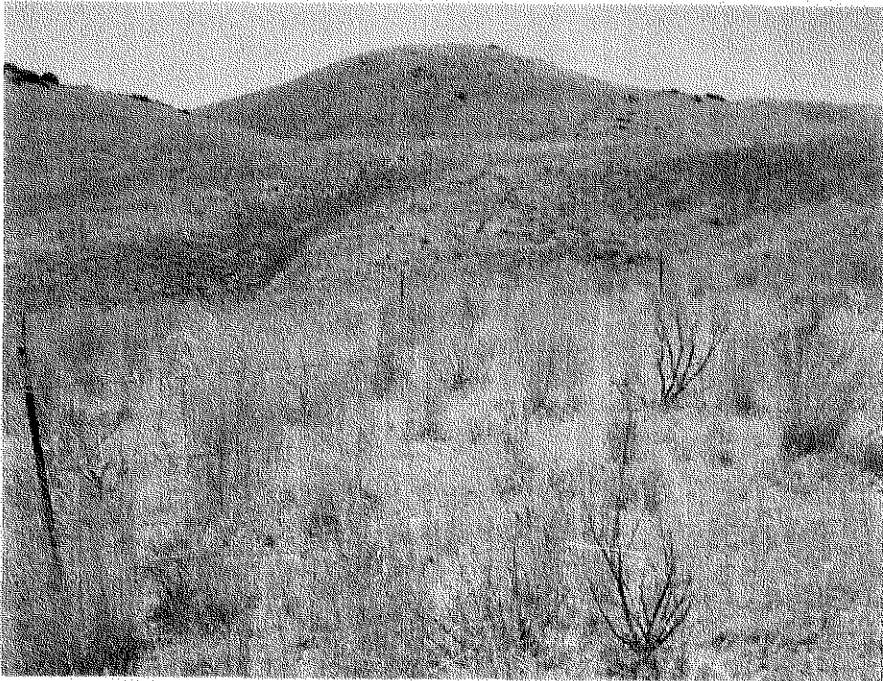
**End of Growing Season (8/1/06)**



**EXCLOSURE 1 – LOOKING SOUTH**



**No Grazing (3/24/06)**

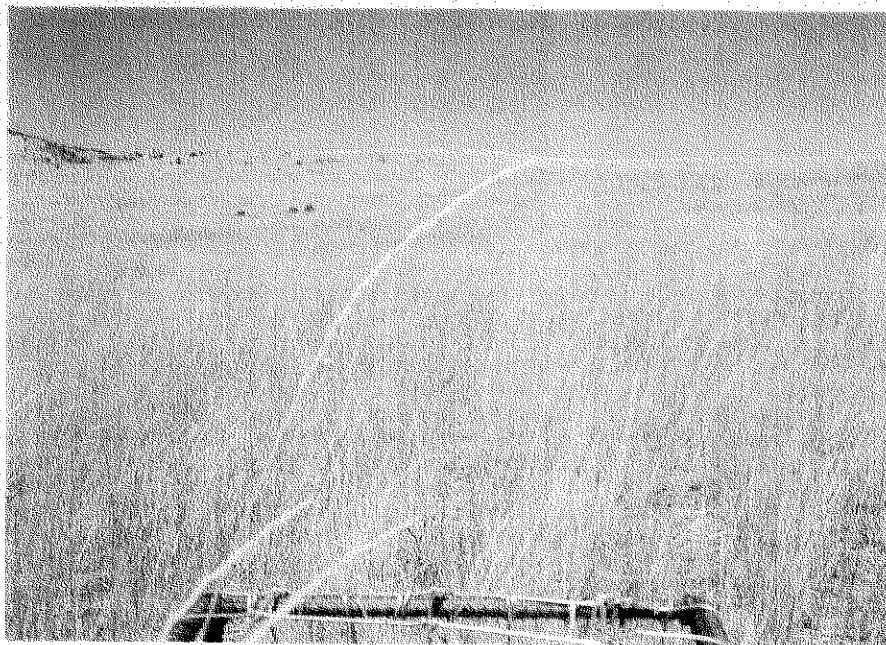


**No Grazing (8/1/06)**

**CAGE 6 – LOOKING NORTH**



*Before Grazing (4/18/06)*

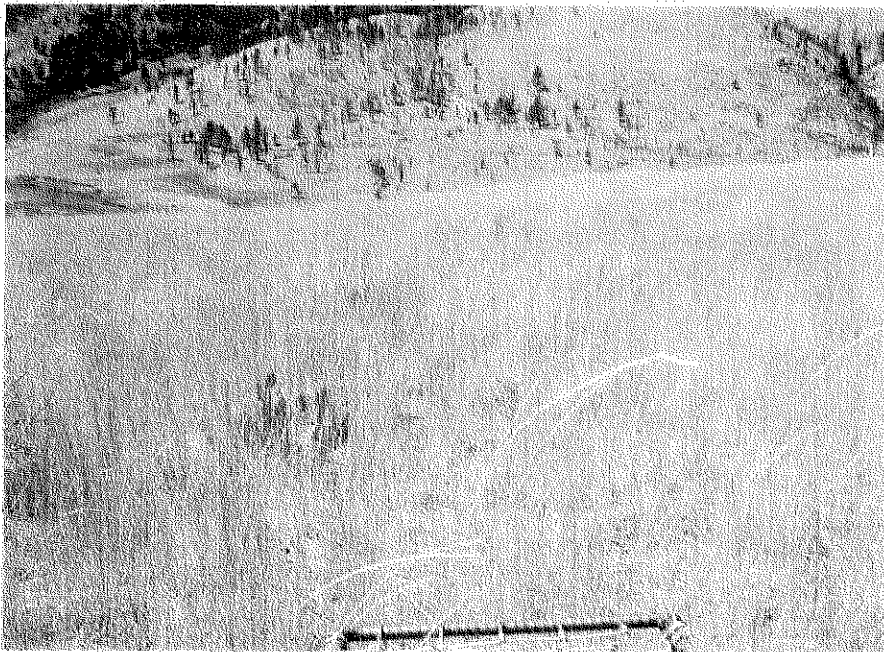


*End of Growing Season (8/1/06)*

**CAGE 6 – LOOKING WEST**



**Before Grazing (4/18/06)**






**End of Growing Season (8/1/06)**







***Appendix C***  
***Use Pattern Maps***

# C-1 End of Grazing Season Use

## Legend

-  Fuel Reduction Treatment Area
-  Utilization Cage Locations
-  Enclosure Locations

## End of Grazing Season Use

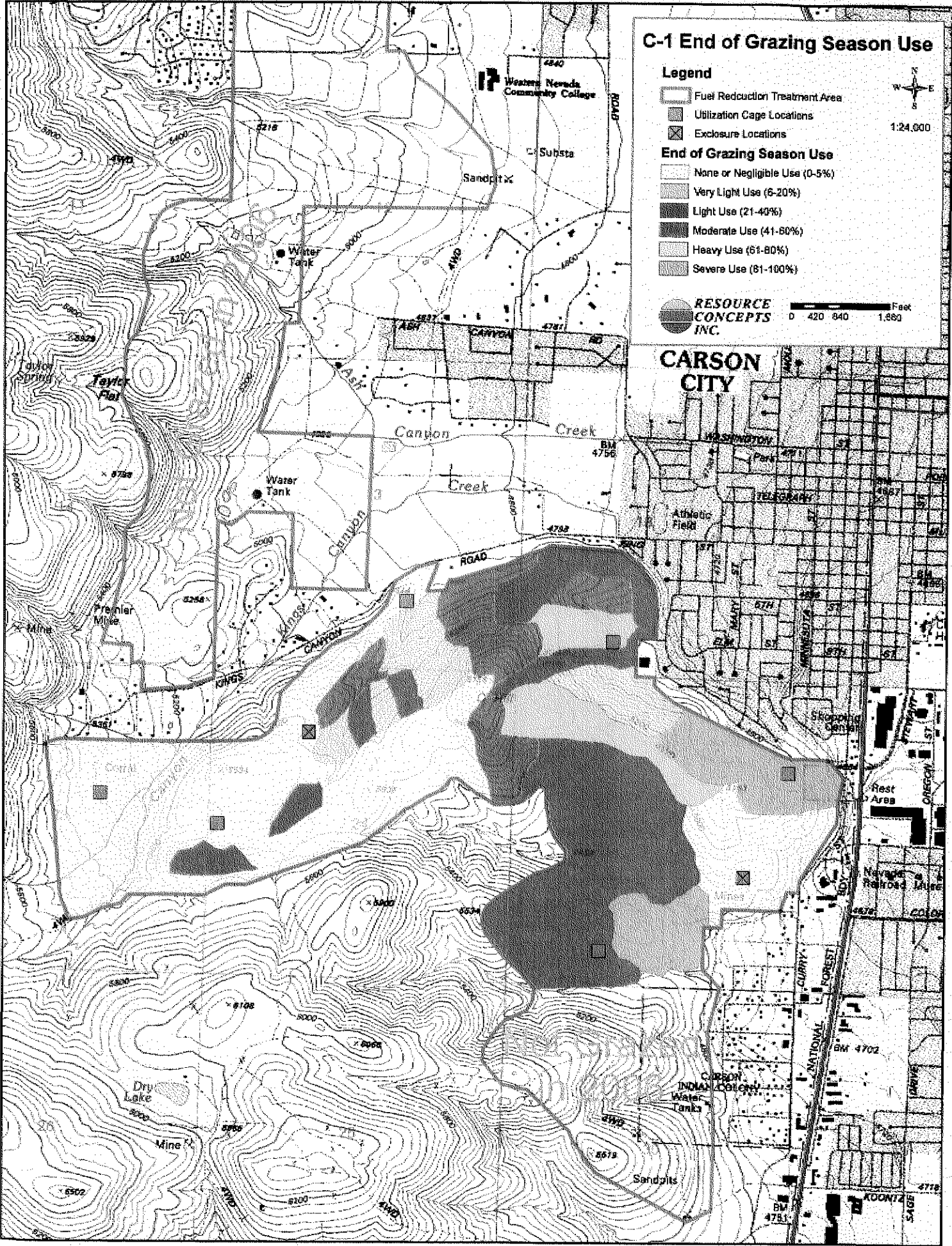
-  None or Negligible Use (0-5%)
-  Very Light Use (6-20%)
-  Light Use (21-40%)
-  Moderate Use (41-60%)
-  Heavy Use (61-80%)
-  Severe Use (81-100%)

**RESOURCE  
CONCEPTS  
INC.**

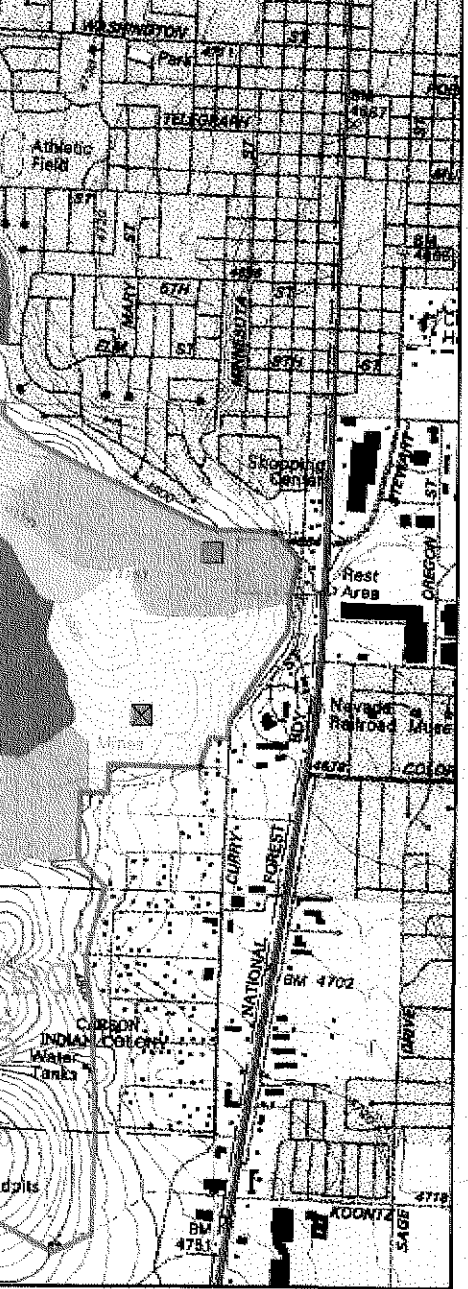
0 420 840 1,680 Feet



1:24,000









**CARSON  
CITY**



# C-2 End of Growing Season Use

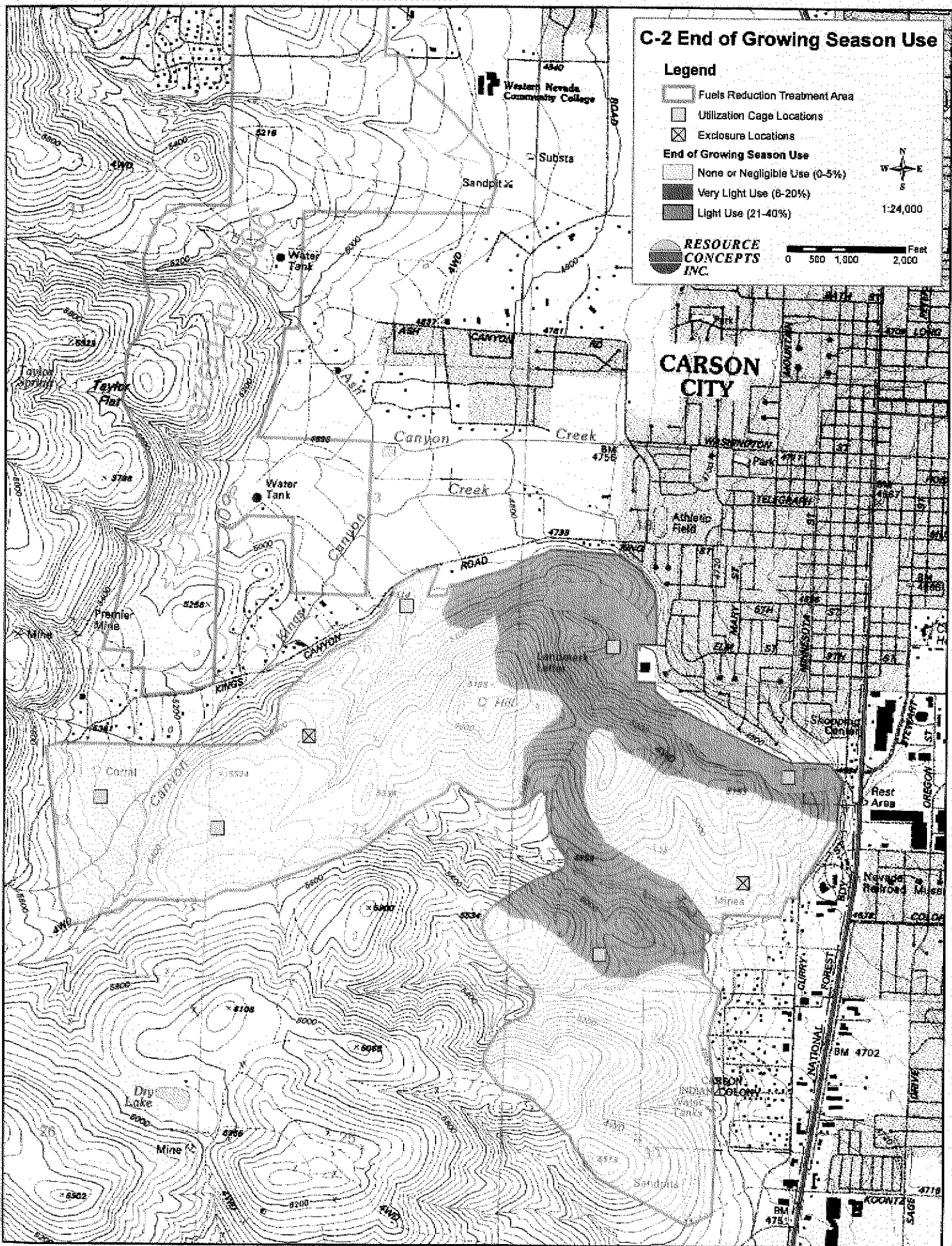
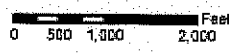
## Legend

-  Fuels Reduction Treatment Area
-  Utilization Cage Locations
-  Exclosure Locations
- End of Growing Season Use**
-  None or Negligible Use (0-5%)
-  Very Light Use (6-20%)
-  Light Use (21-40%)



1:24,000

**RESOURCE  
CONCEPTS  
INC.**



Due to unanticipated printing difficulties, not all of the required maps are available. Staff will provide the maps to the City Manager's Office as soon as they become available.