Boulder County

Parks and Open Space

5201 St. Vrain Road • Longmont, Colorado 80503

MEMORANDUM

TO: North Foothills Plan

FROM: Jesse Rounds

RE: Plan Organization

In an effort to consolidate files online, Boulder County Parks and Open Space has combined the many files regarding the North Foothills Management Plan into one document. The document attached to this cover note includes the following documents:

- North Foothills Open Space Management Plan Volume I
- North Foothills Open Space Management Plan Volume II

Also included are the documents relating Amendment I of the plan that had to do with access to Hall and Heil Valley Ranches from the Town of Lyons. The documents included are:

- Memorandum to BOCC Outlining Staff Recommendations
- Summary of the January 12, 2006 BOCC Hearing
- Hall to Lyons Map
- Heil Valley Ranch Closure Amendment
- Heil to Lyons Map

By clicking on the above links users can access specific parts of the document.

DRAFT

NORTH FOOTHILLS OPEN SPACE

MANAGEMENT PLAN

VOLUME I

RESOURCE EVALUATION

PREPARED BY:

BOULDER COUNTY PARKS AND OPEN SPACE

MARCH 1996

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NORTH FOOTHILLS OPEN SPACE MANAGEMENT PLAN
(Covering Hall Ranch, Heil Ranch, Trevarton Ranch and other adjacent public and protected private lands - 11,048 acres)

LANDSCAPE SETTING

1.0 INTRODUCTION

The lands west of Lyons between the North and South St. Vrain creeks, and west of Foothills Highway between Lefthand and St. Vrain creeks, have long been recognized as significant for their beauty, natural resources and cultural value. The initial Boulder County Comprehensive Plan, adopted in 1978, designated these lands as having high scenic value.

The undeveloped nature of these lands has been retained from prehistoric peoples to homesteaders, and continued with current day ranchers and farmers. Formal County actions to protect these lands for future generations began in 1990 with the acquisition of Trevarton Open Space and Conservation Easement. These actions have continued through 1996 with the acquisition of Heil Valley Ranch and Hall Ranch, as well as conservation easements being placed on portions of the Loukonen Ranch. Additionally, the County is under contract to acquire 162 acres of the Mack Property. Hopefully, protection will continue by securing adjacent State Lands and BLM parcels.

The result of the above described actions is the saving of 11,048 acres of land. Together, they are being called North Foothills Open Space (NFOS). They represent one of the most significant land saving ventures ever undertaken in the county. The natural and cultural values of these properties will be protected for current and future citizens to enjoy. They also represent important steps in protecting an ecosystem from the Continental Divide to the Great Plains.

We wish to express our gratitude to the Hall, Heil, Loukonen, Trevarton, Edwards and Mack families who decided to take the necessary land saving actions and protect their lands from development for the benefit of all citizens. We also wish to express our gratitude to all the citizens of Boulder County who have provided the means to acquire these ranches.

2.0 RESOURCE MANAGEMENT OBJECTIVES

Those goals in the Boulder County Comprehensive Plan of particular relevance to the North Foothills Open Space include:

B.1Unique or distinctive natural features and systems and cultural features and sites should be conserved and preserved in

recognition of the irreplaceable character of such resources and their importance to the quality of life in Boulder County. Other resources should be managed in a manner which is consistent with sound conservation practices, while enhancing compatibility between natural and man-made characteristics.

B.3 Critical wildlife habitats should be conserved and preserved in order to avoid the depletion of wildlife and to perpetuate and encourage a diversity of species in the County.

B.4 Significant natural communities (including significant riparian communities) and rare plant sites should be conserved and preserved to retain living examples of natural ecosystems, furnish a baseline of ecological processes and function, and enhance and maintain the biodiversity of the region.

B.5 Wetlands which are important to maintaining the overall balance of ecological systems should be conserved.

B.7 Productive agricultural land is a limited resource of both environmental and economic value and should be conserved and preserved.

C.1 Provision should be made for open space to meet human needs throughout the County in order to protect and enhance the quality of life and enjoyment of the environment.

C.3 Open Space should be promoted as an urban-shaping method and as a means of protecting from development those areas which have significant environmental, scenic or cultural value.

C.4 A County-wide trail system shall be promoted to serve transportation and recreation purposes.

B.8 Environmental conservation areas should be conserved and preserved in order to perpetuate those species, biological communities and ecological processes that function over large geographic areas and require a high degree of naturalness.

B.9 Riparian ecosystems, which are important plant communities, wildlife habitat and movement corridors, shall be protected.

K.1 Every effort shall be made to identify and protect prehistoric and historic sites which meet national, state, or local criteria for historic designation from destruction or harmful alteration.

Those policies in the Boulder County Comprehensive Plan of particular relevance to North Foothills Open Space include:

4.04 The County shall identify and work to assure the preservation of critical wildlife habitats, natural areas, historic and archaeological sites and significant agricultural land.

4.05 Existing critical or unique stands of vegetation such as short grass prairies, chaparral, willow carrs and old growth forests, should be conserved and preserved.

4.08 The County shall provide management plans and the means for the implementation of said plans for all open space areas that have been acquired by or dedicated to the County. The open space land owned or controlled by the County shall be managed in such a way as to provide protection to neighboring landowners or tenants, visiting public, and the resource itself. Boulder County shall contract for and provide payment services necessary for protection of County-controlled open space when said protection is not directly provided by the County.

4.09 The County, through its Parks and Open Space Department, shall continue to provide environmental education activities for the public, including but not limited to programs on the uniqueness, importance and appropriate uses of open space areas in the County.

4.15 Except as the County may establish regional park, recreation, trail or other similar facilities, the County will provide only a minimum level of maintenance or development on open space land (consistent with policy 4.08).

4.15.3 In evaluating potential uses and/or development of park and open space lands, preference shall be given to those activities which are consistent with the County's original intent of acquiring the land.

4.23 Trail locations shall be selected so as to minimize their impact upon the environment and the surrounding private properties. Adverse effects on the privacy and utility of private lands shall be minimized insofar as possible by trail placement, posting of rules and admonitions against trespassing, installation of containing fences where critical, and any other appropriate measures.

ER.1.0 Natural Landmarks and natural areas as identified in the Environmental Resources Element, and as may be identified from time to time or pursuant to 36-10-101, CRS, as amended, shall be protected from destruction or harmful alteration.

ER.1.5 The County shall identify and work to assure the preservation of critical wildlife habitats, natural areas, Natural Landmarks, environmental conservation areas and significant agricultural land.

ER.1.6 Areas that are considered as valuable scenic vistas, such as the foothills portion of Boulder County, shall be

preserved as much as possible in their natural state.

ER.1.7 The County shall use its open space program as one means of achieving its environmental resources and cultural preservation goals.

ER.4.2 The Boulder County Comprehensive Plan and attendant regulations shall be formulated to insure that proposed land uses, including structures, shall be compatible with the ecosystem of critical wildlife habitats and not pose immediate and potential detrimental impacts to such habitats

ER.4.3 Boulder County, under the auspices of the Parks and Open Space Department shall establish a critical wildlife habitat management program, in direct cooperation with land owners. The program shall deal with, but not be limited to, the following situations:

ER.4.3.1 The use of buffer zones to further insulate critical wildlife habitats from detrimental human uses in instances of potential land use encroachments;

ER.4.3.2 The retention of existing non-detrimental land uses and vegetative cover occurring within or adjacent to critical wildlife habitats; and

ER.4.3.3 Mitigation where detrimental land uses currently exist adjacent to critical wildlife habitats.

ER.4.8 The County will work towards protecting critical elk range and migration routes through reducing development potential and by working with landowners and management agencies to minimize human disturbance and provide seasonal habitat needs.

ER.8.1 Development within ECA's shall be located and designed to minimize impacts on the flora and fauna of the area.

ER.8.3 The County will encourage and participate with the various public and private owners in the development of coordinated management plans to conserve, protect or restore the values of ECA's.

ER.8.4 Management of ECA's shall encourage use or mimicry of natural processes, maintenance or reintroduction of native species, restoration of degraded plant communities, elimination of undesirable exotic species, minimizing human impacts, and development of long-term ecological monitoring programs.

ER.8.5 The County will work with appropriate management agencies and property owners to protect or restore riparian areas.

ER.8.6 The County shall work toward minimizing human impacts to riparian ecosystems from development, roads and trails.

ER.8.7The County will work with appropriate entities to ensure suitable minimum stream flows that maintain channel morphology, support hydrologically connected wetlands and perpetuate species, both plant and animal, dependent on riparian ecosystems.

ER.8.9Management of riparian areas shall encourage use or mimicry of natural processes, maintenance or reintroduction of native species, restoration of degraded plant communities, elimination of undesirable exotic species, minimizing human impacts, and development of long-term ecological monitoring programs.

ER.9.0It is the policy of Boulder County to encourage the preservation and utilization of those lands identified in the Environmental Resources Element as Agricultural Lands of National, Statewide or Local Importance and other agricultural lands for agricultural or non-urban use.

K1.02Significant archaeological and historic sites and structures acquired by the county both in unincorporated and incorporated areas, shall be documented, protected, preserved, and where appropriate, restored.

K1.02.1After acquisition, an inventory of cultural resources on the property shall be undertaken and the historic significance of each resource shall be determined.

K1.02.2Resources that meet the criteria for local landmark, or State or National Register status should be nominated for such status by the county.

K1.07.1Sites within the county associated with traditional cultural practices may fall within the purview of the county's historic preservation regulations, provided that the use of the site can be documented and meets the criteria for designation at the local, state or national level.

In accordance with these adopted goals and policies, the management objectives for the North Foothills Open Space include:

1. Protect the scenic quality and undeveloped nature of the properties.
2. Protect the ecosystem functions of the properties relative to their values within the North St. Vrain and South St. Vrain/Foothills Environmental Conservation Areas.
3. Protect and properly manage significant plant and animal communities, and rare plants and animals.
4. Preserve the cultural, historical, geological and archaeological integrity of the area.
5. Manage for ecosystem integrity by encouraging and planning for naturally occurring processes so they will remain vital

components of the ecosystem.
6. Manage vegetative communities by maintaining and encouraging desirable native species, restoring degraded areas, and controlling undesirable exotic species.
7. Protect wildlife habitat by maintaining natural food, cover, nesting sites, resting areas and habitat effectiveness.
8. Provide passive outdoor recreation opportunities which do not adversely impact sensitive resources.
9. Provide opportunities for environmental and cultural interpretation to the public.
10. Provide a good neighbor policy to adjacent landowners.

3.0 GENERAL DESCRIPTION OF PROPERTIES

3.1Acquisitions

North Foothills Open Space was conceptualized with the initial Boulder County Comprehensive Plan during the 1970s. Two "Scenic Areas" were designated on the Open Space Map as wishful suggestions for future open space acquisitions. The designations stemmed from the beauty, undeveloped nature, cultural and natural resource values of these lands. Their geographic and geologic position, at the junction of the Great Plains and Southern Rocky Mountains physiographic provinces, adds to their significance.

Boulder County Parks & Open Space Department made its first purchase of land in North Foothills Open Space in 1990 with the acquisition of Trevarton Ranch. For the 1,207 acre parcel, 491 acres were purchased outright while a conservation easement was acquired on the remaining 716 acres.

In 1992, two parcels of the Loukonen Ranch, totalling 310 acres, were encumbered by a conservation easement. These parcels, located north and south of Trevarton Ranch on the west side of North Foothills Highway, were sending areas for development rights as part of a non-contiguous non-urban planned unit development.

In 1993 and 1994, Boulder County began acquiring portions of two of the most significant properties in the county. The first is the Heil Valley Ranch (4,923 acres) located between Lefthand Canyon and the Town of Lyons and is west of Trevarton and Loukonen Ranches. The second is the Hall Ranch (3,205 acres) located just west of Lyons. The County also acquired the 40 acre Edwards parcel within the Heil Valley Ranch. In conjunction with these ranches, the County anticipates acquiring a 560 acre State Land Board parcel as well as 641 acres of Bureau of Land Management (BLM) property and is in the process of acquiring 162 acres of the Mack Property. For those lands acquired through purchase, the average price has been $1,688 per acre.

Two other organizations, The Trust for Public Land (TPL) and The

Nature Conservancy (TNC), need mention for their critical role in protecting portions of North Foothills Open Space. After the County had entered into contracts to acquire the Hall and Heil ranches, the County Open Space Sales tax was approved by voters. However, a lawsuit against the County meant the sales tax revenue could not be spent until the suit was resolved and jeopardized the acquisition of these two ranches. The Nature Conservancy came in and acquired the first parcel of the Heil Valley Ranch for the County while the Trust for Public Land did the same on the Hall Ranch. With resolution of the lawsuit in the County's favor, the interests of these two organizations have been acquired by the County. Without the actions of TNC and TPL, the Heil and Hall Ranches may not have been protected.

Part of the acquisition of parcel 2 of the Heil Valley Ranch was financed by a $200,000 Great Outdoors Colorado Grant. As part of the acceptance of the grant, a conservation easement on parcel 2 was granted by the County to Colorado Open Lands.

Table 1

North Foothills Open Space
Acquisitions and Protection of Lands

Property	Dates	Acres	Price/Acre	Total Price
Trevarton	1990-94			
Open Space		491	$1,275	$ 627,122
Easement		716	$ 800	$ 568,056
Heil Valley Ranch	1994-96	4,923	$1,700	$8,367,200
Hall Ranch	1994-95	3,205	$1,881	$6,028,735
Edwards Parcel	1994-95	40	$2,625	$ 105,000
Mack Property	1996	162	$2,517	$ 407,850
Loukonen Easements	1992	310		
State Land Board		560		
BLM		641		
Total		10,886	$1,688	$16,103,963

3.2 Physical Characteristics

3.2.1 Location

North Foothills Open Space lies in north-central Boulder County (Figure 1). It is located directly west and south of the Town of Lyons, 7 miles west of the City of Longmont, and 7 miles north of the City of Boulder. Generalized geographic boundaries are: east - North Foothills Highway and the Town of Lyons; west - Central Gulch, Coffintop Gulch and Buttonrock Preserve; north - North St. Vrain Creek; and south - Lefthand Creek. The Hall

Ranch, Mack Property and BLM Parcels are located west of the Town of Lyons between the North and South St. Vrain Creeks (Figure 2). Heil Valley Ranch, Trevarton Open Space and Conservation Easement, Loukonen Ranch easements, Edwards Parcel, and the State Land Board Property are located west of North Foothills Highway between Lyons and Lefthand Canyon.

3.2.2 Climate

Being at the junction of the Great Plains and the Southern Rocky Mountains, North Foothills Open Space has characteristics of both a high plains, continental climate and a mountain climate (Barry 1973). The general climate of the area is semi-arid with warm summers and mild to cold winters. Moving west and higher in elevation, precipitation increases, average annual temperature decreases and the average number of frost free days decreases.

While site specific weather data for the properties are not available, some estimates are possible from data for relative locations. Average annual precipitation ranges from 15" to 25" (38-63 cm) (Doesken et al. 1984). Normally there is a May precipitation maximum and a midwinter minimum. Average annual temperature ranges from 45 to 50 degrees F (5-10 C). January is the coldest month while July is the warmest (Owenby and Ezell 1992). Average number of frost free days ranges from 120 to 150. Relative humidity in the area averages from 30 to 35% in the summer and from 40 to 50% during the winter.

3.2.3 Topography

The area lies within the foothills of the eastern flank of the Rocky Mountain Front Range. The rise of the Rocky Mountains prominently starts on the west side of North Foothills Highway.

Elevation generally increases from east to west across the properties (Figure 3). Elevation also increases in both directions away from South St. Vrain Creek and from other minor streams and drainage. Elevations for the area begin at 5,390' (1643m). The lowest points are found at Lyons (Meadow Park and along South St. Vrain Creek) and along North Foothills Highway. The highest elevation on the Hall Ranch is 7,200' (2195m) on the east flank of Coffintop Mountain. The highest point on the Heil Valley Ranch is 8,080' (2463m) found at its furthest western point on a ridge overlooking Central Gulch.

Figure 1 - Location Map

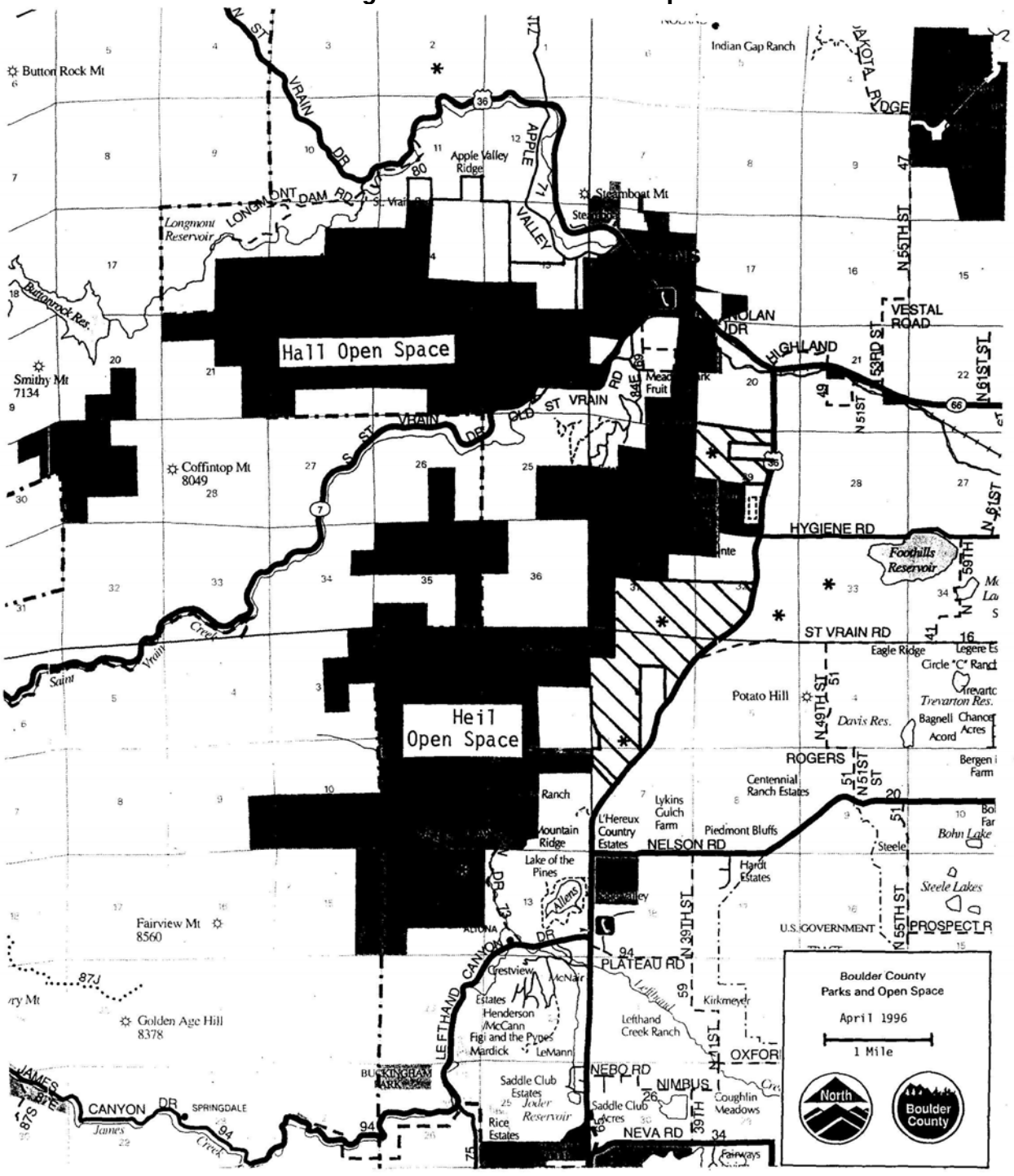


Figure 2 - Property Locations

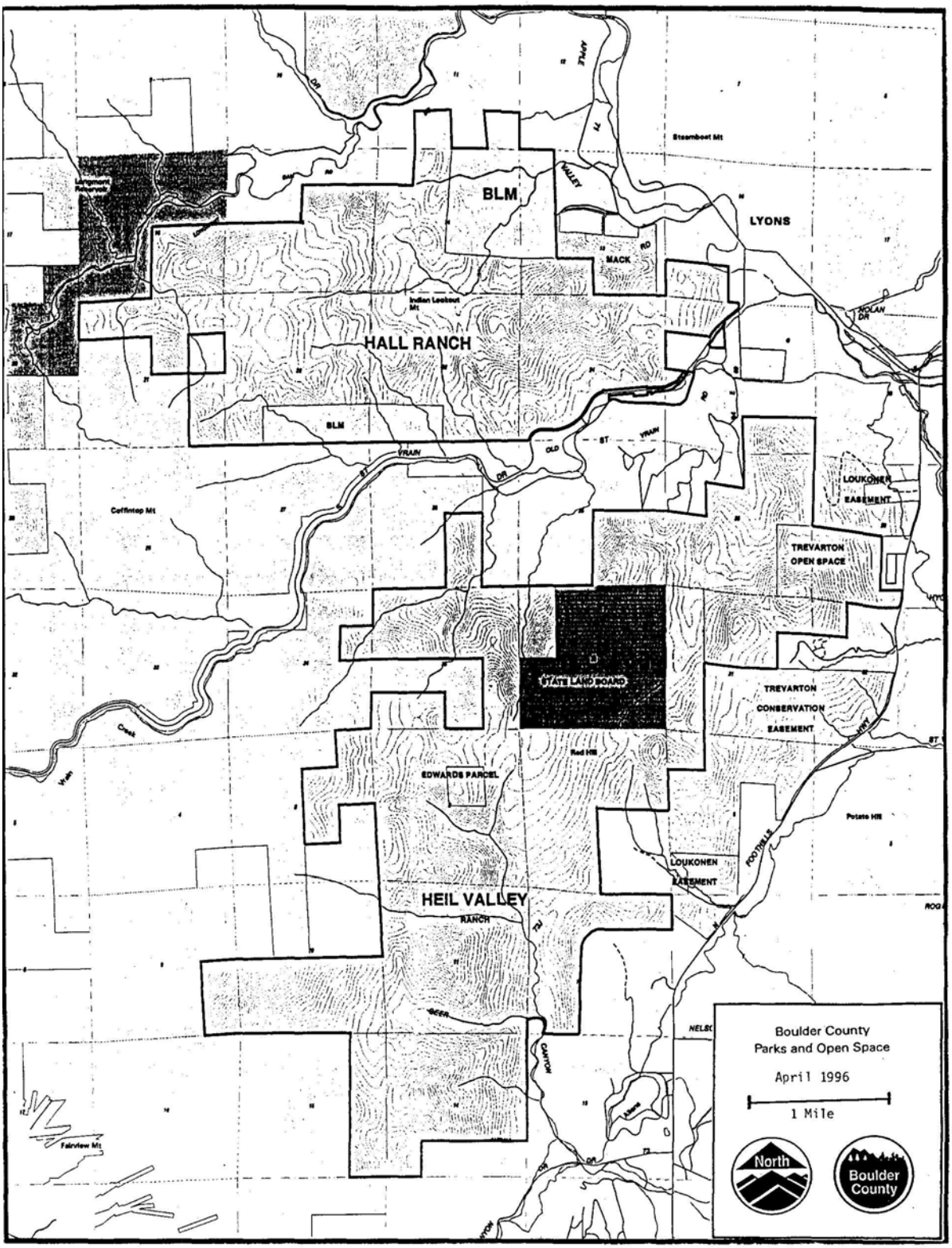
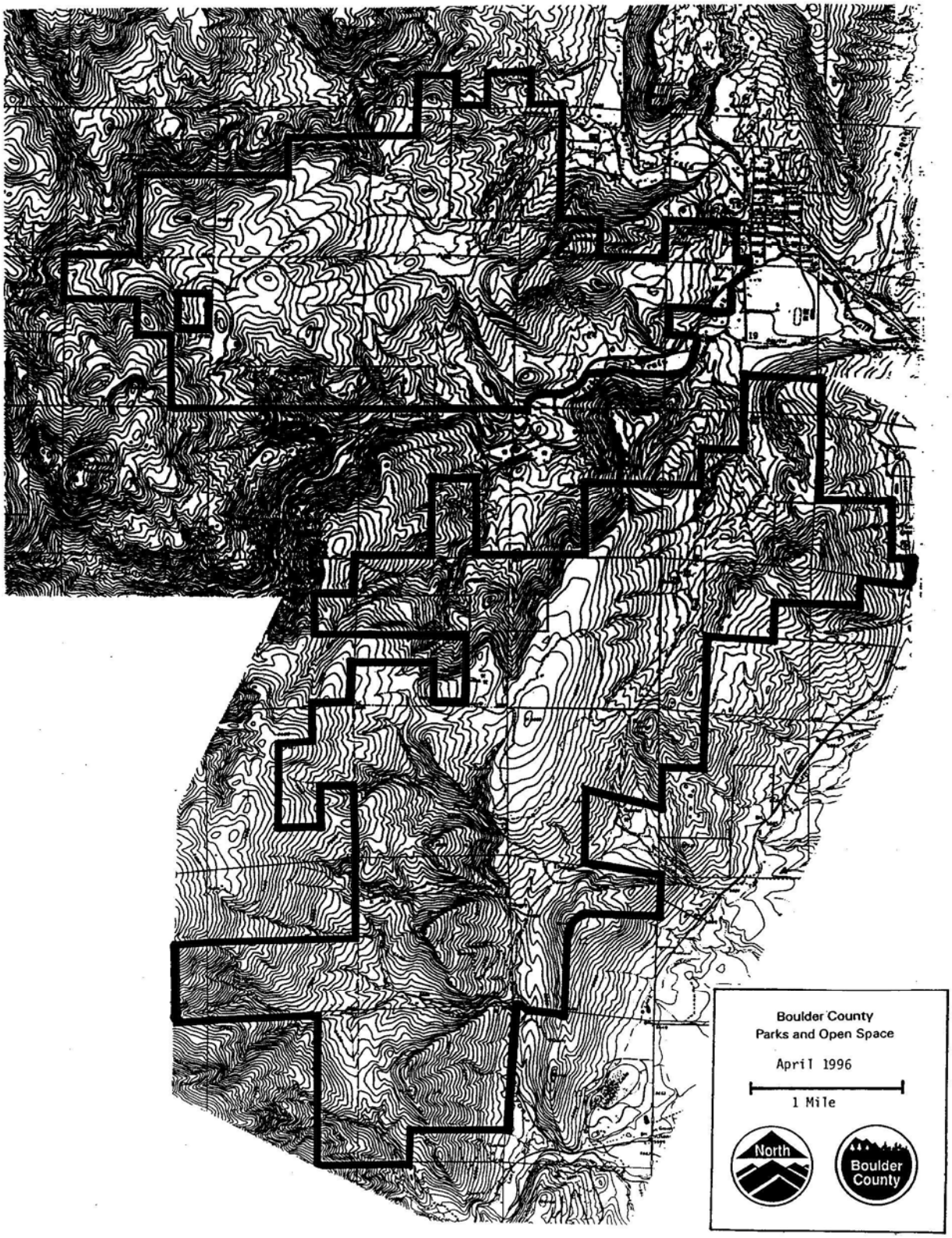


Figure 3 - Topography



The Hall Ranch is framed by the South and North St. Vrain creeks. The precambrian granites and metamorphic rocks have eroded into high rolling grasslands such as lower and upper Antelope Park. The park margins have eroded into deep narrow canyons such as Deadman Gulch.

On the Heil Ranch, drainage generally runs east-west and perpendicular to the trend of more resistant rock units such as the Fountain Formation, Lyons Sandstone and Dakota Ridge. Geer, Plumely and Marietta Canyons are steep-walled drainages that cut through the Fountain Formation whose cliffs are topped by highly resistant Lyons Sandstone. Weathering of the softer Lykins Formation has produced a broad north-south trending treeless valley between the Lyons Sandstone and Dakota Ridge.

3.2.4 Geology

The geology is dramatic and complex. As previously stated, North Foothills Open Space is at the junction where the Great Plains meets the Southern Rocky Mountains. The landforms generally run north-south as sedimentary rock layers are upturned against older, Precambrian rock units. Rock units from all three groups - igneous, sedimentary and metamorphic - are represented. The oldest rock units are approximately 1.7 billion years old, while the youngest are about 62 million years old. Additionally, there is evidence of more recent deposits in the form of talus piles, landslides, and floodplain and terrace gravels (Braddock et al. 1988).

The western half of the Hall Ranch is dominated by igneous rocks of Silver Plume Granite. The eastern half of the ranch is dominated by sedimentary layers of the Fountain Formation, Ingleside Formation and Lyons Sandstone.

The western portions of the Heil Valley Ranch are underlain by metamorphic and igneous rock units. The main portion of the ranch is underlain by sedimentary rock units - Fountain Formation, Lyons Sandstone and Lykins Formation. The eastern margins of Heil Valley Ranch and the main body of Trevarton Open Space are underlain by Morrison Formation and members of the Dakota Group.

The upturned sedimentary rock layers lying along the igneous and metamorphic core of the Rocky Mountains give this region its predominant north to northeast fabric. On the Heil Ranch, this fabric is enhanced by fault and fracture zones and by igneous intrusions that parallel the regional trend of the mountain front. On the Hall Ranch, an antithetic set of southeast-trending faults and linear structural features cut across the regional fabric (Harrold and Mieras 1995).

The sedimentary rock formations present geologic hazards due to danger from rockfalls, expansive soil, landslides and soil creep (Boulder County 1991). The Dakota, Morrison and Lykins Formations present the highest geologic risk due to landslide potential. These formations are found under most of Trevarton Open Space and Trevarton Conservation Easement. Evidence of an old landslide on Trevarton Conservation Easement is present. Lyons Sandstone and Fountain Formation, which dominate the subsurface geology of Heil Valley Ranch and the eastern portion of Hall Ranch, also present significant geologic problems due to rockfalls.

3.2.5 Soils

Topographic variety and geologic complexity create a large number of soil series (Figures 4a and 4b). Twelve soil series are found within the area, dominated by members of the Baller, Goldvale, Juget, Peyton, Pinata and Sixmile series, mixed with rock outcrops and colluvial soil (USDA Soil Conservation Service 1975). The soil texture is characterized by loams and sands, generally having gravelly and stony structure. Rock outcrops are often mixed with the soils.

Soil series influences vegetation. Grasses are dominant in the Colluvial and Peyton-Juget series. Coniferous forest, particularly ponderosa pine, is characteristic on the Pinata, Fern Cliff-Allens Park, Goldvale and Juget series. Shrubs, grasses and scattered pines dominate rock outcrops, Sixmile soils and the Baller series.
Table 2 provides some information about the rate of runoff, erosion potential and limits to trail development for each soil series. Generally, the soils have moderate to high erosion hazard, medium to rapid runoff, and moderate to severe limits for trail development. More information about each soil series can be found in Appendix 1.

Table 2

CHARACTERISTICS OF SOILS

	Runoff	Erosion Hazard	Limits for Trails
Baller stony sandy loam (BaF)	rapid	high	mod-severe
Ascalon sandy loam (AcC)	medium	mod-high	slight
Colluvial (Cu)	rapid	high	mod-severe
Fern Cliff-Allens Park-Rock outcrop complex (FcF)	med-rapid	high	mod-severe
Goldvale-Rock outcrop complex (GrF)	rapid	high	mod-severe
Juget-Rock outcrop complex (JrF)	rapid	high	mod-severe
Kutch clay loam (KuD)	rapid	high	moderate
Niwot soils (Nh)	slow	slight	mod-severe
Peyton-Juget very gravelly loamy sand (PgE)	slow-med	mod-high	moderate
Pinata Rock outcrop complex (PrF)	med-rapid	high	mod-severe

Figure 4a - Soils - Hall Ranch
(Refer to Appendix 1 for descriptions of soil types)

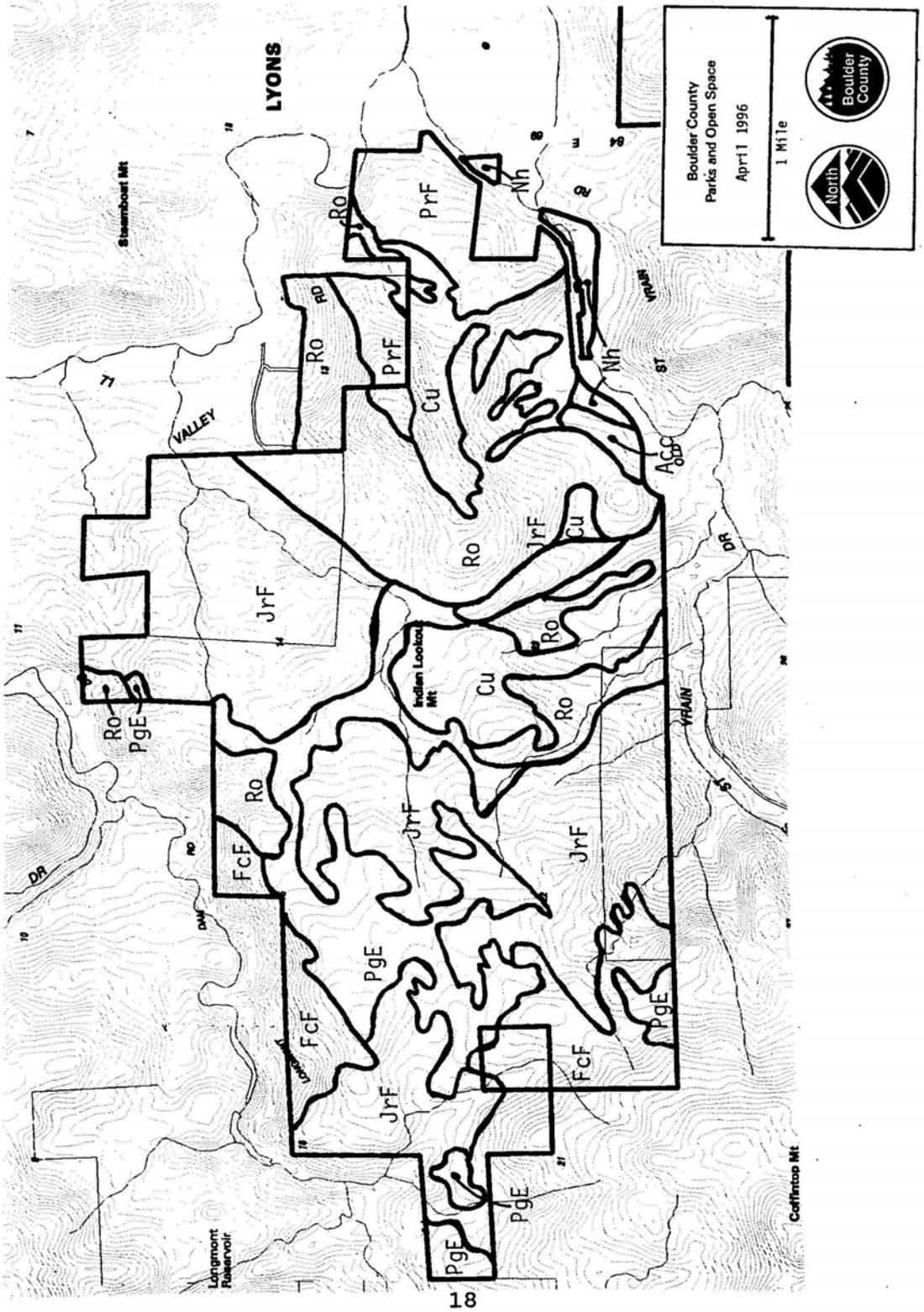


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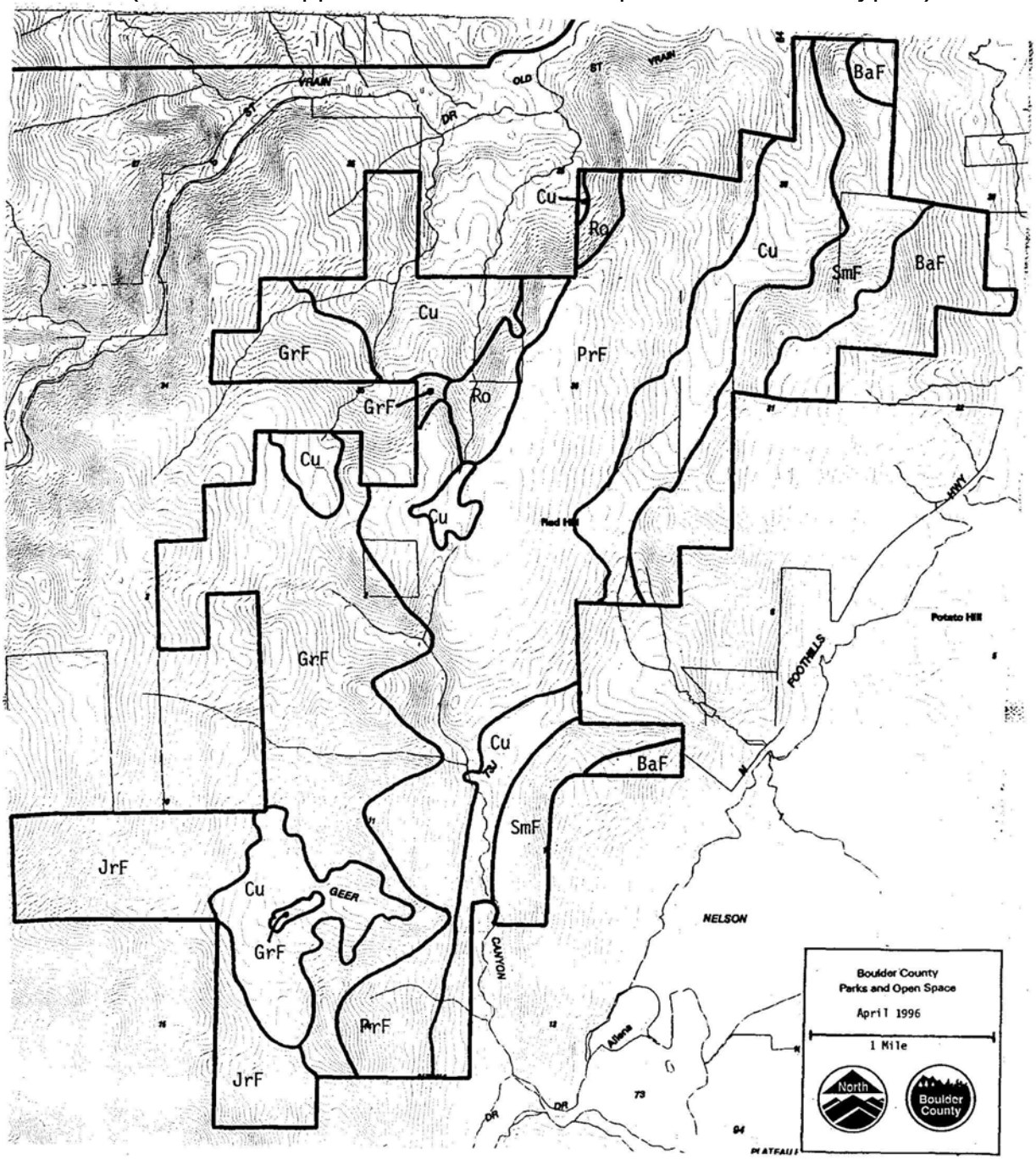
Figure 4b - Soils - Heil/Trevarton
(Refer to Appendix 1 for description of soil types)



3.2.6 Hydrology

All of North Foothills Open Space is within the St. Vrain Creek drainage basin. The northern portion of Hall Ranch drains into the North St. Vrain Creek, while the southern portion flows into the South St. Vrain Creek. The northern portion of Heil Valley Ranch, beginning at Red Hill, flows north into the South St. Vrain Creek, while the southern portion flows into Lefthand Creek. For the Trevarton and Loukonen properties, flow is generally east, then north to the St. Vrain Creek or south to Lefthand Creek.

The South St. Vrain Creek is the most prominent stream within North Foothills Open Space. Flows generally average near 200 cfs, reaching a peak during spring and low flows during the winter. Floods are usually caused by general rainstorms and cloudburst storms during the period May through September. Flood potential also exists from the rapid melting of heavy snow cover in the late spring. At the mouth of South St. Vrain Creek, the 10-year storm level is 1,400 cfs while the 100-year event is 5,430 cfs (Camp Dresser and Mckee Inc. 1978). A small portion of Hall Ranch Open Space north of SH 7 is within the 100-year floodplain while most of the land south of the stream would be flooded. Major floods, within the 50-year to 100-year level occurred in 1894, 1919 and 1941. The stream level of this past spring (1995), which caused minor flooding, was considered a 10 to 15-year event.

Numerous small streams and drainage exist within the area. The only other stream with normal year-round flow is in Geer Canyon on Heil Valley Ranch. All other streams are considered intermittent, generally flowing in spring or after rainstorms. Most of these streams have flash flooding potential (Boulder County 1991).

Two irrigation ditches exist on Hall Ranch. Both ditches take water from the South St. Vrain Creek. The Matthews Ditch irrigates the pasture lands on the south side of the creek. The County acquired 50% of the interest in the ditch. The Otto Ditch irrigates lands north of SH 7 with the County acquiring 40% of the seller's interests.

Subsurface hydrology is influenced by subsurface geology with certain formations considered better yielding aquifers than others. Groundwater availability is best in the Lyons and Dakota formations, as they contain moderate yield aquifers of permeable sandstone (Madole 1973). These formations are all steeply dipping and, therefore, are useful only along a narrow strip immediately east or downdip of their recharge zones. The Morrison, Lykins and Fountain formations are considered low-yield aquifers. The granites found in the western portion of the area are considered variable-yield fracture aquifers as permeability is entirely

dependent on the fractures present in the rock mass.

Surface water availability is limited to several ponds, rock quarry depressions and springs. Many of these are intermittent. Two seasonal ponds exist on the State Land Board parcel of the Heil Valley Ranch. The springs that exist on the Heil Ranch are in the northern half of the property, often associated with the Lyons Formation. Additionally, a small limestone cave contains a spring in Section 30 of the northern Heil Ranch. On the Hall Ranch, a developed stockpond exists just north of the ranch residence. Numerous springs have been developed into stockponds, most of these are located on the western part of the property and on the BLM parcel. On both Heil and Hall ranches, old rock quarry pits create intermittent ponds of water after precipitation events.

3.3 Land Use Considerations

3.3.1 Context of Properties

North Foothills Open Space is located at the junction of the Great Plains and the Southern Rocky Mountains (Benedict 1991). The area is on the eastern flank of the Rocky Mountain Front Range. Most of the area is within the foothills lifezone, sometimes referred to as the lower montane (Mutel 1976, Marr 1961). North Foothills Open Space is also part of an area in Boulder County and the Front Range that is relatively free from human development. This is especially true running west from NFOS toward the Continental Divide.

Two Environmental Conservation Areas (ECAs) are designated by the County in this area. ECAs are: "large and relatively undeveloped areas of the County that possess a high degree of naturalness, contain high quality or unique landscape features, and/or have significant restoration potential. Their size and quality make them important areas for wide-ranging animals, human-sensitive species, native plant communities, and ecological processes" (Boulder County 1994).

Hall Ranch is located within the North St. Vrain ECA, which is almost 35,000 acres in size and runs to the Highway 72. West of the Highway 72 is Rocky Mountain National Park. Except for development along the Peak-to-Peak, the North St. Vrain drainage is relatively undeveloped from the Continental Divide to the Town of Lyons and encompasses Hall Ranch. The eastern edge of Hall Ranch and the BLM lands are adjacent to a significant level of development in and around the Town of Lyons.

Heil and Trevarton ranches are part of the South St. Vrain/Foothills ECA, which is almost 22,000 acres in size. This ECA starts on the northwest flank of Table Mountain and continues

west to the Peak-to-Peak Highway where it joins the Indian Peaks ECA. This represents a Continental Divide to plains landscape that is relatively undeveloped and encompasses Heil and Trevarton Ranches. Lands east of Trevarton are undeveloped and considered part of the ECA, though North Foothills Highway bisects this area. The most significant development in this area is located east and southeast of the Heil Ranch. The South St. Vrain/Foothills ECA and North St. Vrain ECA abut in South St. Vrain Canyon.

The majority of land west of North Foothills Open Space is National Forest and managed by the Boulder District. These lands, particularly Coffintop Gulch west of Hall Ranch and Central Gulch west of Heil, are relatively wild areas for the foothills of Boulder County and are primarily free of trails, roads and a permanent human presence. The Forest Service Management Prescription for Coffintop Gulch is 3A which emphasizes nonmotorized recreation and wildlife habitat, while Central Gulch is 5B which emphasizes big game wildlife winter range.

As part of the current Forest Plan Update, a Management Prescription called Core Habitat (1.41) is being recommended for both of these areas. This prescription emphasizes natural ecological processes and maintaining existing habitat. The level of human use is not intended to disrupt ecosystem processes and will generally not be encouraged. These areas have few facilities, roads or trails.

3.3.2 Adjacent Land Use and Ownership

A mixture of natural (forests, meadows and shrublands), rural (pasture, agriculture, rock quarries and related residences) and residential land uses surround North Foothills Open Space.

Approximately 40% of the boundary of NFOS is with public land, most of this located on the west side. The Forest Service lands were discussed in the previous section. Buttonrock Preserve, owned and maintained by the City of Longmont, borders Hall Ranch on the west and northwest boundaries. Its uses are watershed and passive recreation including hiking, fishing and some rock climbing (horseback riding, mountain biking and motorized recreation are prohibited). The northeast corner of Hall Ranch is adjacent to the Town of Lyons' Meadow Park, which is used for a mixture of active and passive recreation including picnicking, baseball, camping and ice skating. The Town of Lyons also owns a parcel of open space that is adjacent to the northern boundary of the Heil Valley Ranch - it is located between the Heil Ranch and the Lyons Junior/Senior High School. Because of the steep terrain, it receives only casual use. Along the South St. Vrain Creek, the City of Longmont owns two small parcels of land that are adjacent to Hall Ranch. One parcel contains the takeout and pipeline for water that the City takes from the South St. Vrain

Creek.

The highest concentration of residential and commercial development near NFOS is in and around the Town of Lyons. The town's population is approximately 1,500 people. The Town of Lyons is adjacent to the eastern boundary of the Hall Ranch and the northern boundary of the Heil Valley Ranch. Other significant residential development in the Lyons' area are: Apple Valley Road/Antelope Drive region adjacent to the northeast boundary of Hall Ranch and the eastern boundary of the Bureau of Land Management property; and Lyons Park Estates/Meadow Park Farms region located between the Heil Valley Ranch and Hall Ranch.

The northern boundary of Hall Ranch and the Bureau of Land Management land are adjacent to private property. Most of the residential development in this area is along Longmont Dam Road or in several clusters such as St. Vrain Park Subdivision. Several subdivisions border Heil/Trevarton ranches on their eastern boundary including Whittington Estates, North Pointe, Foothills Ranch, Mountain Ridge, and Lake of the Pines. Additional development exists along Lefthand Canyon Drive south of Heil Valley Ranch. One private property and home exists on the west boundary of Heil Valley Ranch at the end of Plumely Canyon. Also located adjacent to Trevarton Ranch is Realia Ranch, a property permitted through County special use review for seminars.

Pasture and agricultural lands are found on the east side of Heil/Trevarton Ranches and east of Foothills Highway (State Highway 36). Lands between Heil Valley Ranch and Hall Ranch are utilized for pasture, including the remainder of the Hall Ranch retained by the Hall Family. Land north of the Bureau of Land Management parcel in sections 11 and 12 is also used for grazing.

3.3.3 20th Century Land Use of Properties

Most of North Foothills Open Space was homsteaded and removed from the public domain around the turn of the 20th century, except for the Bureau of Land Management and State Land Board properties. Ranching and grazing of livestock have been a consistent use of the area through time. The predominant livestock for the Heils and Halls have been cattle, though recently the Hall Ranch has also been used as winter pasture for horses. During the first half of the 20th century, crops were grown on portions of both the Heil and Hall ranches as evidenced by the remaining silos. Hay is still cut on portions of the Hall Ranch.

Other uses common throughout NFOS included sandstone quarries, moss rock collection, timber harvest and hunting. Much of the Lyons Sandstone used to construct the buildings for the University of Colorado in Boulder came from the Heil Valley Ranch. Timber harvest has been extensive on the Heil Valley Ranch and the State

parcel. The Hall Ranch has fewer timber resources, though recently some thinning and harvest was done on the western portion of the ranch. Hunting has occurred on the Hall Ranch and at times the property was leased to a local hunting organization. Hunting has and still occurs on the Heil Valley Ranch. The primary species hunted in the area have been deer, elk, mountain lion, black bear and occasionally wild turkey. The Hall Ranch has been known for its deer hunting while the Heil Valley Ranch is better known for elk as well as deer.

Over the years the Heil Valley Ranch has been used for other recreational pursuits including horseback riding, hayrides and cookouts, weddings, skeet shooting, and group activities such as tactical pursuit and international fantasy gaming.

3.3.4 Current Leases

Current leases affecting North Foothills Open Space are as follows:

Hall Ranch: The entire ranch is being leased to John and Karen Hall for the purposes of grazing livestock, harvesting hay and living at the residence in section 24. Grazing shall not exceed a maximum of 1,400 AUM's. The lease terminates September 15, 1996.

BLM Land: The St. Vrain Creek Allotment (#26009), covering 641 acres of BLM land, is leased to John Hall for grazing. A total of 144 AUMs is allowed during one year of the permit. The County is working with BLM to see that the timing of this permit coincides with the lease of the Hall Ranch.

Heil Valley Ranch: As part of the purchase agreement, the entire ranch is being leased to the Heil Family for the purpose of grazing livestock. The tenants shall not exceed the maximum of 150 mother cows per day on the property. The grazing lease expires in 1997. Also as part of the purchase agreement, the Heil family retained rights for the hunting of any lawful game during authorized hunting seasons. This right expires December 31, 1997.

State Lands: The 560 acre parcel of state land, situated in the center of Heil Valley Ranch, is being leased to the Heil Family for grazing purposes. The current lease expires July 1, 1996. The County will work with the State to see that the timing of any lease extension coincides with the lease of Heil Valley Ranch.

Trevarton Open Space: The property was being leased for grazing purposes to a third party for 26 AUMs. The lease expired on December 31, 1995. Renewal is under consideration.

National Forest Lands: Forest lands located adjacent to and west of Heil Valley Ranch have an active grazing allotment that resulted from historic grazing activities of Heil Valley Ranch. Don Heil is the permittee. Approximately 1,728 acres are in the allotment for which 22 cow/calf pair are allowed from June 1 to September 30. The permit expired December 31, 1995. The Forest Service is reworking the permit and is recommending the permit be reissued to Don Heil for 22 cow/calf pair with a season of use from May 15 through July 15. The permit would expire and the allotment closed in 1997 to coincide with the County's lease to the Heil Family on Heil Valley Ranch.

3.3.5 Easements, Right-of-ways, Decrees and Other Rights Affecting Properties

Hall Ranch:

Rights-of-way/Easements Providing Public Access:

1. State Highway 7 (South St. Vrain Canyon Rd);
2. Old St. Vrain Road and County Road 84;
3. Prospect St., Meily St., and alley on west edge of Crona Heights 1st Addition, all in Town of Lyons;
4. Antelope Drive (being acquired by the County);

Rights Affecting Property:

1. City of Longmont has right to use road from Apple Valley Road to its facilities on BLM land in Section 11 (The public status of this road is currently under dispute);
2. City of Longmont has right to cross Hall Ranch for emergency purposes to get to Buttonrock Preserve (affects Sections 14, 15, 22 and 21);
3. Poudre Valley REA has an easement for a power line across Hall Ranch (in sections 23, 24, 14 and 15) and the right to maintain the line;
4. City of Longmont aqueduct from Longmont Reservoir to the power plant near Apple Valley Road which traverses the Hall Ranch in Section 15 and the BLM lands in Sections 11 and 14;
5. City of Longmont pipeline near the South St. Vrain Creek which crosses a portion of Hall Ranch (Lot 15, Tumbelson's Subdivision);
6. Mathews Ditch which crosses the Hall Ranch in Section 24:
7. Easement for access to the Hall Family for ranching proposes across that portion of property lying between the west opening of the culvert under State Highway 7 located in SW1/4 SW1/4 Sec 24 to land retained by the Hall Family on north side of Highway - easement is 30' in width and runs approximately 250' in length.

Decrees:

1.Rocky Mountain Hydro-Electric (1908);
2.Columbine Reservoir and Columbine Pipeline (1926);
3.Coffintop Reservoir (1978) - City of Longmont and St. Vrain Left Hand Water Conservancy District (would inundate portions of Hall Ranch affecting sections 18, 24, 23 and 22);

Heil/Trevarton:
Rights-of-Way/Easements Providing Public Access:
1.State Highway 36 (North Foothills Highway) to Trevarton Open Space;
2.County Road 94 (Lefthand Canyon Drive) and County Road 73 (Geer Canyon Drive) into Heil Valley Ranch;
3.Five roads or outlots in Lyons Park Estates touch Heil Valley Ranch - an outlot near the northern entrance to Red Gulch Road, Jasper Drive, Pyrite Way, Quartz Way and Flint Rock Drive;
Rights Affecting Property:
1.Ochs Family has right to access their property using the dirt road from Geer Canyon Drive through Plumely Canyon to their property on the western side of Heil Valley Ranch;
2.Poudre Valley REA has a prescriptive easement for the power line that runs to the dwelling in Geer Canyon in Sections 11 and 14;
3.Heils have retained a right-of-way for livestock to access existing leased lands of Colorado Board of Land Commissioners and U.S. Forest Service until expiration of those leases.
Decrees:
1.Geer Canyon Reservoir (1978) - St. Vrain Left Hand Water Conservancy District (would inundate portions of Heil Valley Ranch affecting Sections 11, 12, and 14; Appropriation date is December 31, 1969; Reservoir would be 17,497 acre feet).

4.0 VEGETATIVE RESOURCES

4.1Historic Ecology

The pre-settlement vegetative landscape of North Foothills Open Space was probably different from today with respect to two primary aspects:
1.The forests and woodlands were more open, less continuous and smaller in extent due to frequent low-intensity ground fires; and
2.The vegetation was all native as adventives came into the area with Euro-American settlement.

4.1.1Changes in Forest Structure

Prior to Euro-American settlement of North America, groundfires were a common occurrence in ponderosa pine ecosystems (Kotok 1934, Biswell 1972). These fires had an effect on stand structure and composition through reduction of understory reproduction while enhancing regeneration within forest openings. This resulted in open, park-like forests that were generally uneven-aged overall with trees growing in even-aged groups (Wright 1978). It is probable that many of these fires were set by Native Americans (Barrett 1980). Also, lightning-caused fires have been relatively infrequent on the eastern slope of the Front Range. Information from Rocky Mountain National Park indicates that from 1915 to 1988, only 28 lightning-ignited fires were reported on the eastern slope of the park (Rocky Mountain National Park, unpublished data).

The effect on fire ecology of Euro-American settlement was an initial period of increased fire frequency (from 1859 until about 1916) followed by a period of fire suppression which continues today. Local research being conducted in Boulder County provides evidence to the changes in fire frequency. Mean fire return intervals calculated from fire scarred trees at several locations in the county were 8-22 years in the foothills and 21-28 years in the montane during pre-settlement times (pre-1859). During the Euro-American settlement period (1859-1916) mean fire return intervals were 5-7 years in the foothills and 7-9 years in the montane. During the fire suppression period (post-1916) so few fire scars were found that a mean interval could not be calculated (Veblen and Kitzberger 1994). More recent data taken from fire scarred trees on Heil Valley Ranch found evidence of numerous fires during the Native American and Euro-American settlement periods and no fires after 1916 (Veblen and Donnegan, Department of Geography, Univ. of Colo., unpublished data).

The alteration of fire frequency, first increasing and then decreasing from historic levels, has several implications. Today's forests are more dense, have invaded grasslands and meadows, and are more uniform in structure as many of them originated during the 1859-1916 period of increased fire (Veblen and Lorenz 1991). As a result of this structure, the forests are more susceptible to large-scale insect and disease infestations, and stand-replacing crown-fires.

4.1.2Adventive Plants

The movement of people and livestock west brought non-native plants into Boulder County (Weber 1995). Sometimes the transplanting was with purpose, often it was inadvertent as the seed was mixed with luggage or livestock.

Some non-native plants have become serious problems in the county. Some are very aggressive and can displace native vegetation. Disturbances to the ground, whether from over-grazing, home building or road construction, often are recolonized by aggressive non-native plants.

Ecosystem problems are associated with non-native plants. Some plants are not palatable to wildlife, such as diffuse knapweed (*Acosta diffusa*), Russian knapweed (*Acroptilon repens*), and Leafy Spurge (*Euphorbia esula*), resulting in "biological deserts" and displacing animals. Other plants, such as cheatgrass (*Bromus tectorum*), can cause severe fire danger and lengthen the fire season as the plant matures and cures earlier than most native grasses.

Many non-native plants and weeds are found throughout North Foothills Open Space. Cheatgrass is found throughout meadows and in the understory of shrublands, woodlands and forests. Several types of thistle and knapweed as well as dalmation toadflax (*Linaria dalmatica*) are present.

4.2Resource Inventories/Current Conditions

Several inventories concerning vegetation were conducted during 1995 on North Foothills Open Space. The Colorado Natural Heritage Program (CNHP) conducted a general inventory of plant communities and a more detailed survey of significant resources (Kettler et al. 1995). The Colorado State Forest Service (CSFS) conducted a forest inventory and wildfire hazard mapping. The Natural Resources Conservation Service (NRCS) performed a range analysis.

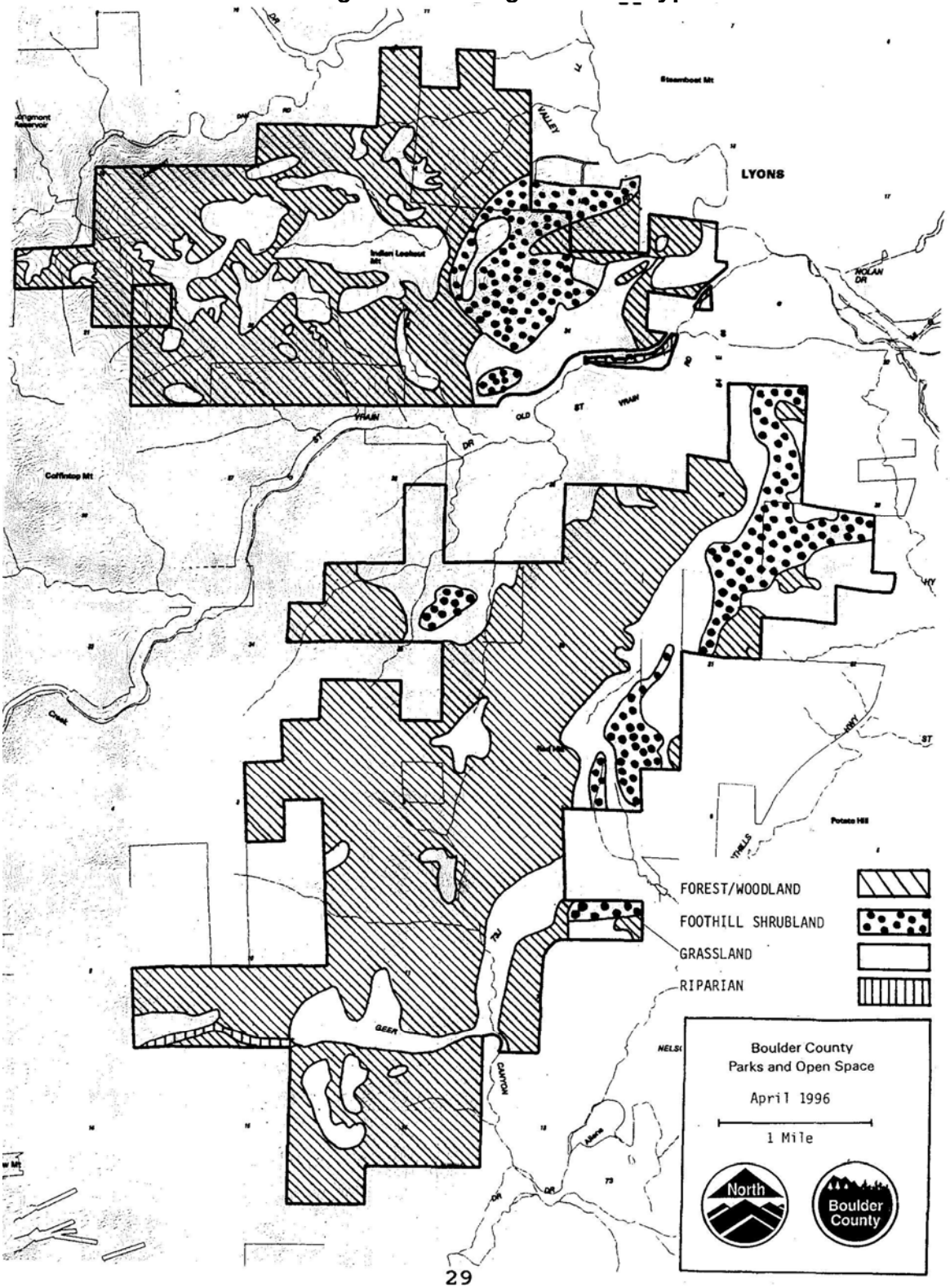
4.2.1Plant Communities

The major plant associations are those dominated by coniferous forests, deciduous shrublands and grasslands (Figure 5). Following are descriptions of the major series. A list of the plant associations can be found in Appendix 2.

Ponderosa Pine Series: Ponderosa pine (*Pinus ponderosa*) is the dominant coniferous tree. This series occupies about two-thirds of the Heil Valley Ranch/Trevarton Open Space and about half of Hall Ranch. Many of the plant associations in this series represent a disturbed situation. Ponderosa pine has increased due to fire suppression which has increased shading of the understory and has changed the ground cover composition. Where logging has occurred there has been an increase in shrubby and herbaceous vegetation. This series occurs on all slopes and aspects. Most occurrences of this series are on Lyons Sandstone, Fountain Formation, Silver Plume Granite as well as pegmatite and schist.

Douglas Fir Series: This series is limited in occurrence on NFOS due to the general low elevation of the area. Occurrences are limited mostly to north-facing slopes, sheltered west-facing slopes in narrow ravines, and west-facing slopes mixed with boulder fields which provide moister conditions. Douglas fir is usually mixed with ponderosa pine on lower slopes. Fire suppression has probably increased the extent of Douglas fir which is more shade tolerant than ponderosa pine (Veblen and Lorenz 1991).

Figure 5 - Vegetation Types



Rocky Mountain Juniper Series: Rocky Mountain juniper (*Juniperus scopulorum*) is found throughout the area. As a dominant, it is found in association with mountain mahogany (*Cercocarpus montanus*). This association occurs mostly on steep, north-facing slopes. Outcrops are common and soils are shallow and gravelly. The mapped association of this series is found on the Fountain Formation. Rocky Mountain juniper is also found as a co-dominant in the ponderosa pine series.

River Birch Series: The river birch series (*Betula occidentalis*) are deciduous shrublands limited to narrow strips along small streams. Mountain maple (*Acer glabrum*) co-dominates while alder (*Alnus incana ssp. tenufolia*) is infrequently found.

Mountain Mahogany Series: The major shrublands in the area are dominated by mountain mahogany. They reach their best development on Heil Ranch/Trevarton Open Space along the upper slopes of the Dakota Hogback as well as around Indian Lookout Mountain of Hall Ranch. Three-leaf sumac (*Rhus trilobata*) is sometimes present in minor amounts. These shrublands are generally associated with sedimentary rock formations including Morrison, Sundance, Jelm, Lykins, Lytle and the Plainview sandstone member of the South Platte Formation.

Big Bluestem Series: Big bluestem (*Andropogon gerardii*) is a native tallgrass of the plains that is found in the foothills of NFOS. On the Heil Ranch/Trevarton Open Space it is found as a dominant east and northeast of Red Hill and on the east aspect of Trevarton. On Hall Ranch it is found at Crona Hill, in the meadow between Indian Lookout Mountain and Hat Rock, and on the upper south-facing aspect between Indian Lookout Mountain and Deadman Gulch. Big bluestem is found in other associations of the ponderosa pine series and the mountain mohagany series. Morrison and Lykins formations dominate the subsurface geology for this series.

Western Wheatgrass Series: Western wheatgrass (*Pascopyrum smithii*) is a dominant species of many of the grassland valleys of the Heil Valley Ranch. The grasslands are often weedy. This series is found in Geer Canyon, lower Plumely Canyon and Red Hill Gulch. Subsurface geology of this series is dominated by Quaternary colluvium and alluvium.

Little Bluestem Series: Little bluestem (*Schizachyrium scoparium*) is another prairie grass that makes it into the foothills of Boulder County. It occurs on east and west-facing slopes but is much more frequent on west-facing aspects. It is found on Trevarton Open Space and on the east flank of Red Hill Gulch. On Hall, Heil and Trevarton it is often found in association with big bluestem. The major subsurface geology for this

series are the Morrison, Sundance and Jelm formations.

Needle-and-Threadgrass Series: The Needle-and-threadgrass (*Stipa comata*) series is a dominant part of the grasslands of Hall Ranch. It is found in the meadows of lower Antelope Park on to upper Antelope Park and continuing west toward Buttonrock Preserve. On Heil Valley Ranch, this series is found in upper Geer Canyon, near Red Hill and on the flat bench above the east flank of lower Red Hill Gulch. It is often found in association with blue grama (*Bouteloua gacilis*). Primary subsurface geology for this series are Quaternary colluvium and alluvium on the Hall Ranch and schist, Morrison Formation and Lykins Formation on Heil Valley Ranch.

New Mexico Feathergrass Series: This series is dominated by New Mexico feathergrass (*Stipa neomexicana*). The series is found on the Heil Valley Ranch in Geer Canyon, in a small meadow on the State Land Board parcel, and near Lyons Park Estates. It is also found on Trevarton Open Space near its east boundary. Primary subsurface geology are Quaternary colluvium and alluvium, Fountain Formation, Lyons Sandstone, and the South Platte Formation (middle shale member). New Mexico feathergrass is also found as a co-dominant in the mountain mahogany series on both the Hall and Heil Valley ranches.

Redtop Series: These are highly disturbed wetlands dominated by redtop (*Agrostis gigantea*), an introduced species. These sites are generally spring-fed wetlands that are badly trampled from concentrated grazing and watering. The subsurface geology of these sites is the contact zone between Quaternary colluvium and alluvium, and a sedimentary formation such as the Fountain Formation or Lykins Formation.

Spikerush Series: These are small, rocky, intermittent wetlands near the top of the Lyons Hogback. Spikerush (*Eleocharis sp.*) and water plantain (*Alisma triviale*) dominate.

Narrowleaf Cottonwood Series: This vegetation type, dominated by cottonwood willow (*Populus angustifolia*), occurs along South St. Vrain Creek and as small patches on streams throughout parts of the Hall Ranch. Associated species are peach-leaved willow (*Salix amygdaloides*) and sandbar willow (*Salix exigua*). The understory is dominated by exotic and weedy native species.

4.2.2Forests

Ponderosa pine is the major tree type with Douglas fir as a co-dominant to dominant at higher elevations or on north-facing aspects. The forest analysis conducted by the Colorado State Forest Service identified eleven forest types. Stand origin dates

were important criteria for evaluating types, as this determined the structure (even-aged to uneven-aged) of each stand.

Ponderosa pine tends to be episodic in its establishment (Peet 1981). When a good seed crop coincides with the right weather and surface conditions, then many ponderosa seedlings will become established. Much of the forest originated in 1890 and 1920. Pre-settlement trees exist and are generally found on rocky ridges, steep slopes, or are remnants left behind in logged areas.

Forest structure differs significantly throughout NFOS. On the Hall Ranch, dense forests are found only on the western portion near National Forest lands, and on the north facing aspect that drops toward the North St. Vrain Creek. On the remainder of the property, ponderosa pine is found as open woodlands or in small, discontinuous patches. Meadows, shrublands and open woodlands comprise much of the vegetative structure of the Hall Ranch.

The Heil Valley Ranch contains the most continuous stands of forest. Much of the land west of the Lykins Formation strike valley, which forms a north-south trending meadow through the property, is forested. These forests continue west onto National Forest lands and into Central Gulch. They are occasionally broken in continuity by rock cliffs (particularly on the west sides of the Lyons Formation hogbacks), and small meadows and streams. The east slope of the Dakota Hogback on Trevarton Open Space is a mix between open woodland and forest, and is patchy in distribution.

Following are descriptions of the forest types:

<u>Douglas Fir/Ponderosa Pine Association</u>

A.Even-aged Ponderosa Pine/Douglas Fir

The co-dominant trees comprise 80% or more of the 11"-21" diameter size classes. Basal area is between 40-70 square feet per acre. The type dates from about 1880. There are about 100 acres of this type.

B.Two-aged Douglas Fir

Douglas fir and ponderosa pine co-dominate the overstory (11"-21" size classes), which originated about 1880. Basal area of the overstory is between 70-100 square feet per acre. The understory (3"-11" size classes) is dominated by Douglas fir and originated about 1920. Basal area of the understory is between 10-40 square feet per acre. There are about 700 acres of this type.

<u>Ponderosa Pine</u>

A.Even-aged Ponderosa Pine

1.Ponderosa Pine Small Sawtimber

Ponderosa pine comprises at least 80% of the trees in the 11"-21"

diameter classes, which originated about 1890. Basal area is between 10 and 40 square feet per acre. These stands are gradually dying out due to a lack of regeneration and death of component trees. There are about 700 acres of this type.

2.Ponderosa Pine Poles

Ponderosa pine comprises at least 80% of the trees in the 3"-11" diameter classes, which originated about 1920. Basal area is between 10 and 40 square feet per acres. These stands are gradually dying out due to a lack of regeneration. There are about 300 acres of this type.

3.Ponderosa Pine Saplings

Ponderosa pine comprises at least 80% of the trees among trees up to 3" in diameter, which originated about 1980. Basal area is between 10 and 40 square feet per acre. There are about 100 acres of this type.

B.Two-Aged Ponderosa Pine

1.Ponderosa Pine Old-Growth

Ponderosa pine comprises at least 80% of the trees exceeding 21" in diameter, which originated from 1850 and before. Basal area of these older trees is between 70 to 100 square feet per acre. Ponderosa pine dominates the second age group (11"-21" diameter classes), which originated about 1880. Basal area of this second group is between 70-100 square feet per acre. There are about 100 acres of this type.

2.Ponderosa Pine Sawtimber/Sapling Stand

Ponderosa pine comprises at least 80% of trees in the 11"-21" diameter classes, which originated about 1910. Basal area of this larger group is between 10 to 40 square feet per acre. Ponderosa pine dominates the understory (up to 3" in diameter), which originated about 1980. Basal area of these saplings is between 10 to 40 square feet per acre. There are about 300 acres of this type.

3.Ponderosa Pine Pole/Sapling Stand

Ponderosa pine comprises at least 80% of trees in the overstory (3"-11" diameter classes), which originated about 1930. Basal area for the overstory is between 40-70 square feet per acre. Ponderosa pine dominated the understory (up to 3" in diameter), which originated about 1960. Basal area of the understory is between 70 and 100 square feet per acre. There are about 300 acres of this type.

4.Ponderosa Pine Sawtimber/Pole Stand

Ponderosa pine comprises at least 80% of the trees in the overstory (11"-21" diameter classes), which originated about 1860. Basal area for the overstory is between 70-100 square feet per acre. The understory (3"-11" diameter classes) is dominated by ponderosa pine and originated about 1920. Basal area for the understory is between 10-40 square feet per acre. There are about 500 acres of this type.

5.Ponderosa Pine Sawtimber/Pole Stand

Ponderosa pine comprises at least 80% of the trees in the overstory (11"-21" diameter classes), which originated about 1890. Basal area of the overstory is between 70 to 100 square feet per acre. The understory (3"-11" diameter classes) is dominated by ponderosa pine, which originated about 1920. Basal area of the understory is between 10 to 40 square feet per acre. There are about 1,200 acres of this type.

C.Uneven-Aged Ponderosa Pine

Ponderosa pine comprises at least 80% of trees exceeding 21" in diameter, which originated prior to 1850. Basal area of these older trees is between 10 to 40 square feet per acre. Ponderosa pine comprises at least 80% of the trees in the 11"-21" diameter classes, which originated between 1860-1900. Basal area of this second overstory is between 40 to 70 square feet per acre. Ponderosa pine dominates trees in the 3"-11" diameter classes, which originated after 1900. Basal area of this understory is between 40 to 70 square feet per acre. Finally, ponderosa pine dominates the sapling class (up to 3"diameter), which originated about 1920.

These uneven-aged stands were probably depleted by logging practices, particularly high-grading. The larger size and older age-classes consist only of remnants. There are about 1700 acres of this type.

Fire suppression combined with logging have created stand structures that have little resemblance to how these forests probably appeared prior to Euro-American settlement. Low intensity ground fires would have continued thinning many of the seedlings and saplings. The forests would be more open, the stands would be less continuous and more of a mosaic, and the trees would not be dominated by those that originated during the last 100 years. Additionally, more large-diameter trees would be present.

Insects and disease are not currently a problem for the forests. Some localized outbreaks of mountain pine beetle (*Dendroctonus ponderosae*) are evident as are endemic levels of dwarf mistletoe (*Arceuthobium vaginatum*). However, higher tree densities and greater forest coverage make these stands more susceptible to large-scale insect and disease events.

Logging has occurred throughout NFOS during the 1900s. On the Hall Ranch, forestry is evident on the western end of the property in sections 15, 16, 21 and 22. Thinning was also conducted on adjacent National Forest lands in section 21. Much of the Heil Valley Ranch has been logged at one time or another. Relatively recent forest management is evident in sections 1, 2, 3, 11, 14, 35 and 36.

Several recent fires have effected portions of the area. The Lefthand Canyon fire of September 1988 burned approximately 100 acres of the southwest corner of Heil Valley Ranch in section 15. This was a major stand-replacing fire that burned a total of 2,456 acres in the canyon. A fire-break was cut through the Heil Ranch in sections 14 and 15 to try and contain the fire. Additionally, a back-fire was burned on top of the Lyons Sandstone hogback in section 14. During 1995, two small fires occurred on portions of the Hall Ranch and BLM lands. Both fires began along State Highway 7 and burned up the south facing hillside. Both were ground fires as they burned through grasslands, woodlands and some shrub areas. The first fire occurred in August and was started by a car accident. It burned approximately 60 acres, 30 of which were on BLM land. The second fire happened in October and was probably started by a cigarette. It burned a total of 60 acres, 30 on the Hall Ranch, 20 on BLM land, and another 10 on private land.

4.2.3Range

All of North Foothills Open Space has been grazed by domestic livestock from settlement to the present. Grass production has always been a resource utilized on these properties. Current leases are for a maximum of 150 mother cows per day on the Heil Valley Ranch and a total of 1,400 AUM's annually on the Hall Ranch. Additionally, there are leases on adjacent BLM, State Land, and USFS lands. It is probable that grazing numbers were higher in past years.

The Natural Resources Conservation Service (NRCS) has conducted range inventories on portions of North Foothills Open Space. Inventories and evaluations were conducted on Heil Valley Ranch in 1995 and 1980, on Hall Ranch in 1993, 1986 and 1984, and on Trevarton Open Space on 1990 (Table 3, Figure 6)

The range inventories were conducted at various locations that are representative of the major range site types. An evaluation is made of the range condition and is based on comparing the species composition and the amount of vegetation present with the potential for the plant community. A number of other factors are evaluated in order to provide an indication of whether the range is improving or declining, including:

Reproduction:Are major species of the potential plant community showing signs of reproducing or not?

Utilization:Is any litter present or not, and is utilization moderate or severe?

Composition:Are dominant species maintaining their place in the stand or are they decreasing or absent while minor species not native to the community are increasing?

Plant Vigor:Are major species strong, healthy, productive and well rooted or are they showing die-off?

Soil Surface:Are signs of accelerated erosion evident or not, or is past erosion healing or not?

The result is an evaluation of the Range Condition Class (Excellent, Good, Fair, Poor) and the Range Trend (Improving Trend - rating between 11 and 20; Declining Trend - rating between 0 and 10). Table 3 provides information on the Range Condition Inventories that have been conducted on North Foothills Open Space since 1980.

NRCS conducted an additional range analysis of the Hall Ranch in July of 1993. This was a 1 day qualitative visual survey and site specific range condition inventories were not performed.

The overall range condition of NFOS is shown to be fair to poor (Table 3, Figure 6). There has been a species composition change towards exotic and weedy species. Large amounts of cheatgrass, Japanese brome (*Bromus japonicus*), Kentucky blue-grass (*Poa pratensis*) and Canada blue-grass (*Poa compressa*) are present throughout the area. The vigor and reproduction of major native species is marginal. Signs of soil erosion are present (gullies), though there is evidence of healing indicating reduced grazing intensities and/or better grazing management. Riparian areas show poor health as many stretches are absent of expected vegetation types and there is little regeneration of overstory trees.

Range trends are variable. Improvement is indicated in the northwest and northern portions of the Heil Valley Ranch,

Trevarton Open Space and portions of the Hall Ranch. The 1993 survey of the Hall Ranch also indicated that conditions are improving.

Conservative animal unit (AU's) estimates for the properties, assuming continuous year-round grazing, are: Heil Valley Ranch -

Figure 6- Range Condition Inventory Locations
(See Table 3 for Inventory Results)

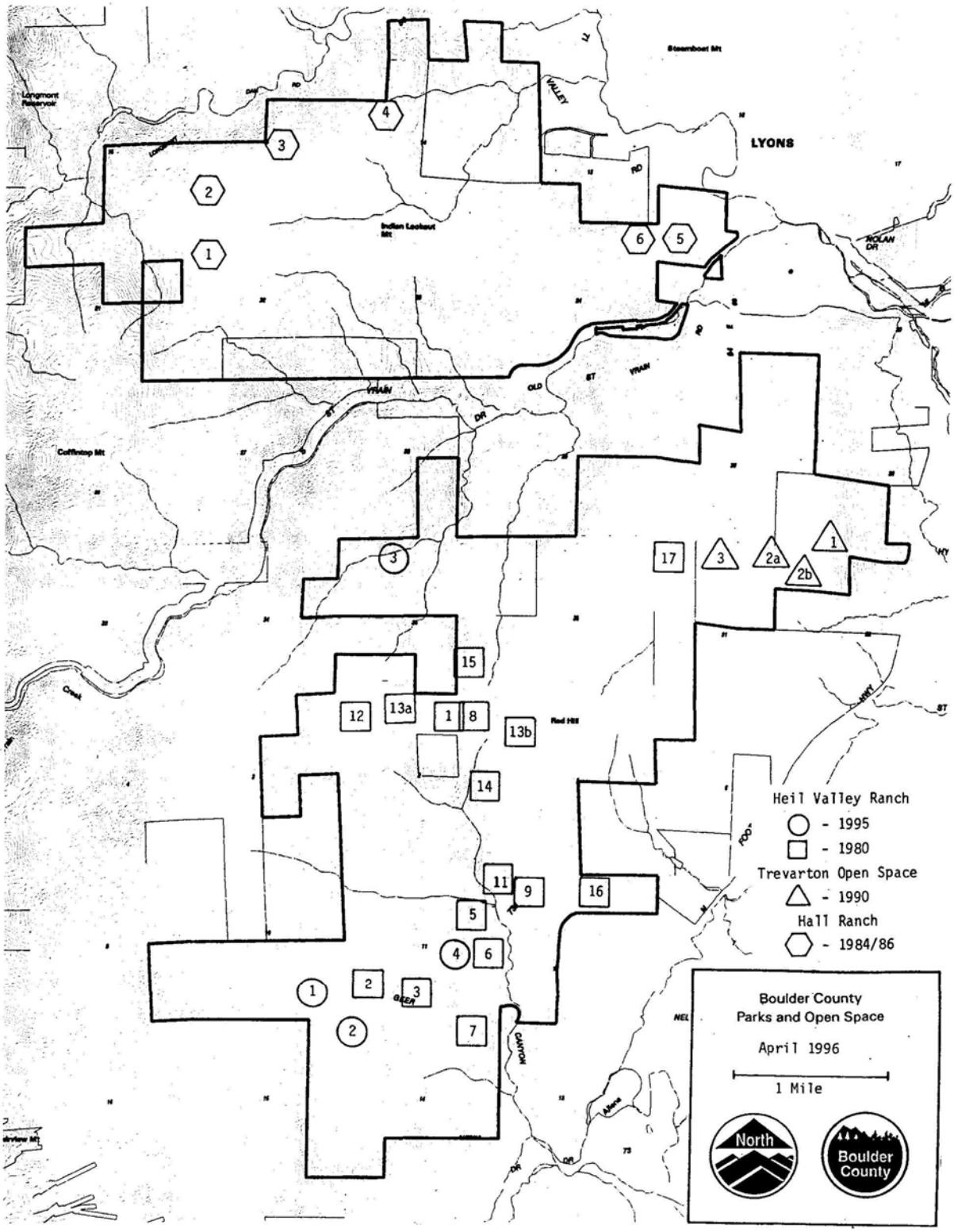


Table 3

NORTH FOOTHILLS OPEN SPACE RANGE CONDITION INVENTORIES

(See Figure 6 for Inventory Locations)

Property	Year	Map #	Site Description	Range Condition Class	Range Trend[a]	Location
Heil	1995	1	Loamy Foothill	Poor	6-7	SE SE 1/4 Sec 10
Heil	1995	2	Rocky Foothill	Poor	6-7	NW 1/4 Sec 14
Heil	1995	3	Pine Woodland	Poor	9-12	NE 1/4 Sec 3
Heil	1995	4	Loamy Foothill	Poor	5-6	NE SE 1/4 Sec 11
Heil	1980	1	Loamy Park	Poor	7-9	NE NE 1/4 Sec 2
Heil	1980	2	Loamy Park	Fair	9-10	SW 1/4 Sec 11
Heil	1980	3	Rocky Foothill	Poor	8-9	SW SE 1/4 Sec 11
Heil	1980	5	Pine Woodland	Poor	10-12	NE 1/4 Sec 11
Heil	1980	6	Loamy Foothill	Poor	10-11	NE SE 1/4 Sec 11
Heil	1980	7	Loamy Foothill	Poor	14-15	NE 1/4 Sec 14
Heil	1980	8	Loamy Park	Poor	11-13	NE NE 1/4 Sec 2
Heil	1980	9	Loamy Foothill	Fair	7-9	NW 1/4 Sec 12
Heil	1980	11	Ponderosa Pine	Poor	8-10	NW NW 1/4 Sec 12
Heil	1980	12	Ponderosa Pine	Fair	15-18	NW 1/4 Sec 2
Heil	1980	13a	Loamy Park	Fair	10-13	NW 1/4 Sec 2
Heil	1980	13b	Ponderosa Pine	Fair	11-12	NW 1/4 Sec 1
Heil	1980	14	Ponderosa Pine	Poor	9-12	SE 1/4 Sec 2
Heil	1980	15	Ponderosa Pine	Poor	11-12	SE 1/4 Sec 35
Heil	1980	16	Rocky Foothill	Poor	8-11	NE 1/4 Sec 12
Heil	1980	17	Loamy Foothill	Fair	13-15	NW 1/4 Sec 31
Trevarton	1990	1	Shallow Foothill	Fair	11	Sec Line between Sec 29 & 32
Trevarton	1990	2a	Shallow Foothills	Poor	6	NE 1/4 Sec 31
Trevarton	1990	2b	Shallow Foothill	Fair	15	SE NW 1/4 Sec 31
Trevarton	1990	3	Rocky Foothill	Poor	10	Between NE 1/4 NW 1/4 Sec 31
Hall	1984	1	Loamy Park	Fair	7-11	NW 1/4 Sec 22
Hall	1984	2	Loamy Park	Fair	7-11	SW 1/4 Sec 15
Hall	1984	3	Loamy Park	Fair	7-11	Center of Sec 15
Hall	1984	4	Loamy Park	Poor	7-11	NW 1/4 Sec 14
Hall	1986	5	Shallow Foothill	Fair	10-14	NW 1/4 Sec 19
Hall	1986	6	Loamy Foothill	Fair	5-9	NE 1/4 Sec 24

* Range Trends - 11-20 Improving Trends; 0-10 Declining Trends

97; Trevarton Open Space - 8; Hall Ranch - 67; or 172 for the entire area.

One of the County's goals in acquiring and managing open space lands is to maintain functioning ecosystems. Foothill grasslands and forests co-evolved with a certain amount of disturbance activity through fire and grazing. The intensity and duration of

historic grazing is unknown. Some of the native ungulate species are gone from the county. Some remain including mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*). Remaining native ungulates along with the possibility of controlled fire can provide much of the disturbance factor. The use of supplemental grazing by domestic livestock can also be used as a tool to help maintain ecosystem processes, improve the vigor and reproduction of native grasses and decrease the exotic plant component. Intensity, duration and timing will be key factors in maintaining a disturbance element in rangelands.

4.2.4Weeds

As previously mentioned, weeds and exotic plants are present throughout North Foothills Open Space. Cheatgrass, Kentucky blue-grass, Canada blue-grass, and Japanese brome are some of the Eurasian grasses that have invaded meadows and grasslands.

Other noxious weeds are present. Dalmatian toadflax is found throughout Hall Ranch. Smaller pockets are found on Heil Valley Ranch. Diffuse knapweed is found on both Hall and Heil ranches. Currently, it is primarily found adjacent to roads, including the fire-break that was cut in 1988 for the Lefthand Canyon fire. Small pockets of musk thistle (*Carduus nutons*) are found in meadows, along roads, in colonies of black-tailed prairie dogs (*Cynomys ludovicianus*), and in logged areas on Hall, Heil and Trevarton properties.

Boulder County Parks and Open Space staff conducted a detailed inventory of weeds on Hall Ranch in 1995. Weed control activities were also initiated. Weed mapping will be conducted on the Heil Ranch/Trevarton Open Space in 1996. Management activities will continue on all properties of NFOS. Weed maps are kept on file at the Parks and Open Space Department.

4.3Significant Resources

The Colorado Natural Heritage Program (CNHP) maintains information on the status and distribution of all elements of biodiversity on a global and state level. Information is gathered by CNHP on species, natural communities and ecosystems, each of which is considered an element of biodiversity. Each element is assigned a rank that indicates its relative rarity on a five-point scale (1 = extremely rare/imperilled; 5 = abundant/secure; for a further description of the CNHP ranking system, see Appendix 3).

The primary criterion for ranking elements is the number of occurrences, i.e. the number of known distinct localities or populations. Also of great importance is the number of

individuals at each locality or, for highly mobile organisms, the total number of individuals. Other considerations include the condition of the occurrences, the number of protected occurrences, population trends and threats. Overall, ranks are an index of known biological rarity. These ranks are assigned both in terms of the element's rarity within Colorado (its State or S-rank) and the element's rarity over its entire range (its Global or G-rank). Taken together, these two ranks give an instant picture of the rarity of the element.

Other systems for evaluating rarity are maintained at federal and state agencies and are also used to evaluate the importance of biodiversity elements. Additionally, there are local lists maintained by the Boulder County Nature Association and by Boulder County that evaluate the status and distribution of species in the county. All of these ranking systems are further described in Appendix 3.

4.3.1Rare Plants

One rare plant was located in the area. Several populations of Miner's lettuce (*Claytonia rubina*) were found on the State Land Board parcel (Harrold and Meiras 1995). It is a rare plant located near springs in protected canyons of the Front Range and known from only two collections in Colorado (Weber 1990). It is a common plant in the Pacific Northwest.

Other potential rare plants of North Foothills Open Space are found in Appendix 4.

4.3.2Natural Communities and Conservation Sites

The quality and rarity of plant associations were assessed by the Colorado Natural Heritage Program. Plant associations are groups of species that typically grow together because of their common affinity for a particular climatic condition, soil type, moisture regime, disturbance pattern, or combination of these.

Twelve plant associations of significance (those associations determined to be rare, threatened or endangered or of high quality) were located on North Foothills Open Space (Table 4). These were found at 23 sites (Figures 7a, 7b). Woodlands, shrublands and grasslands were the major vegetation types, with mountain mahogany being a component in half the association types.

As additional indication of vegetative quality, a search was made for rare butterflies in appropriate habitat during the flight season for that species. Butterflies can be very host specific, tied to one or a few plant species, and can be indicators of ecosystem health. Three significant butterfly species were found

at four different sites (Table 4, Figure 7b).

Each significant site (referred to as an "element" by CNHP) is then evaluated in terms of quality, condition, viability and defensibility, and to identify conservation planning boundaries for each site. In developing the boundaries, a number of factors were considered including: habitat for rare species or significant communities, protection of water quality, buffers from potentially detrimental land uses, and the maintenance of ecological processes necessary for the perpetuation of the significant elements in the area.

Table 4

NATURAL HERITAGE CONSERVATION SITES

Conservation Sites and Element Occurrences

1. Red Hill Conservation Site

Element	Global Rank*	State Rank	Map Number*
Ponderosa pine/mountain mahogany/ big bluestem - woodland	G2	S2?	12
Ponderosa pine/mountain mahogany/ big bluestem - woodland	G2	S2?	13
Mountain mahogany/needle and thread - foothills shrubland	G2	S2	17
Mountain mahogany/New Mexico feathergrass foothills shrubland	GU	SU	18
Mountain mahogany/New Mexico feathergrass foothills shrubland	GU	SU	16
Mountain mahogany/Scribner's needlegrass foothills shrubland	GU	SU	19
Big bluestem-little bluestem - xeric tallgrass prairie	G2	S2	22
Needle and thread - East - grassland	G2	S2	11
New Mexico feathergrass - grassland	G2	S2	20
Rare Butterfly	G3?	S2	3
Rare Butterfly	G4	S2	3

2. Plumely Canyon Conservation Site

Element	Global Rank	State Rank	Map Number
Big bluestem-little bluestem - xeric tallgrass prairie	G2	S2	10
Rare Butterfly	G4	S2	2
Rare Butterfly	G3G4	S3	1

3. Upper Geer Canyon Conservation Site

Element	Global Rank	State Rank	Map Number
Ponderosa pine/spike fescue - woodland	G2	S2	15
Water birch - shrubland	G3	SU	23

4. Indian Lookout Mountain Conservation Site

Element	Global Rank	State Rank	Map Number
Ponderosa pine/mountain mahogany/ big bluestem - woodland	G2	S2?	8
Mountain mahogany/needle and thread - foothills shrubland	G2	S2	7
Mountain mahogany/New Mexico feathergrass - foothills shrubland	GU	SU	5
Mountain mahogany/Scribner's needlegrass - foothills shrubland	GU	SU	6
Big bluestem-little bluestem xeric tallgrass prairie	G2	S2	9
Big bluestem-little bluestem xeric tallgrass prairie	G2	S2	4

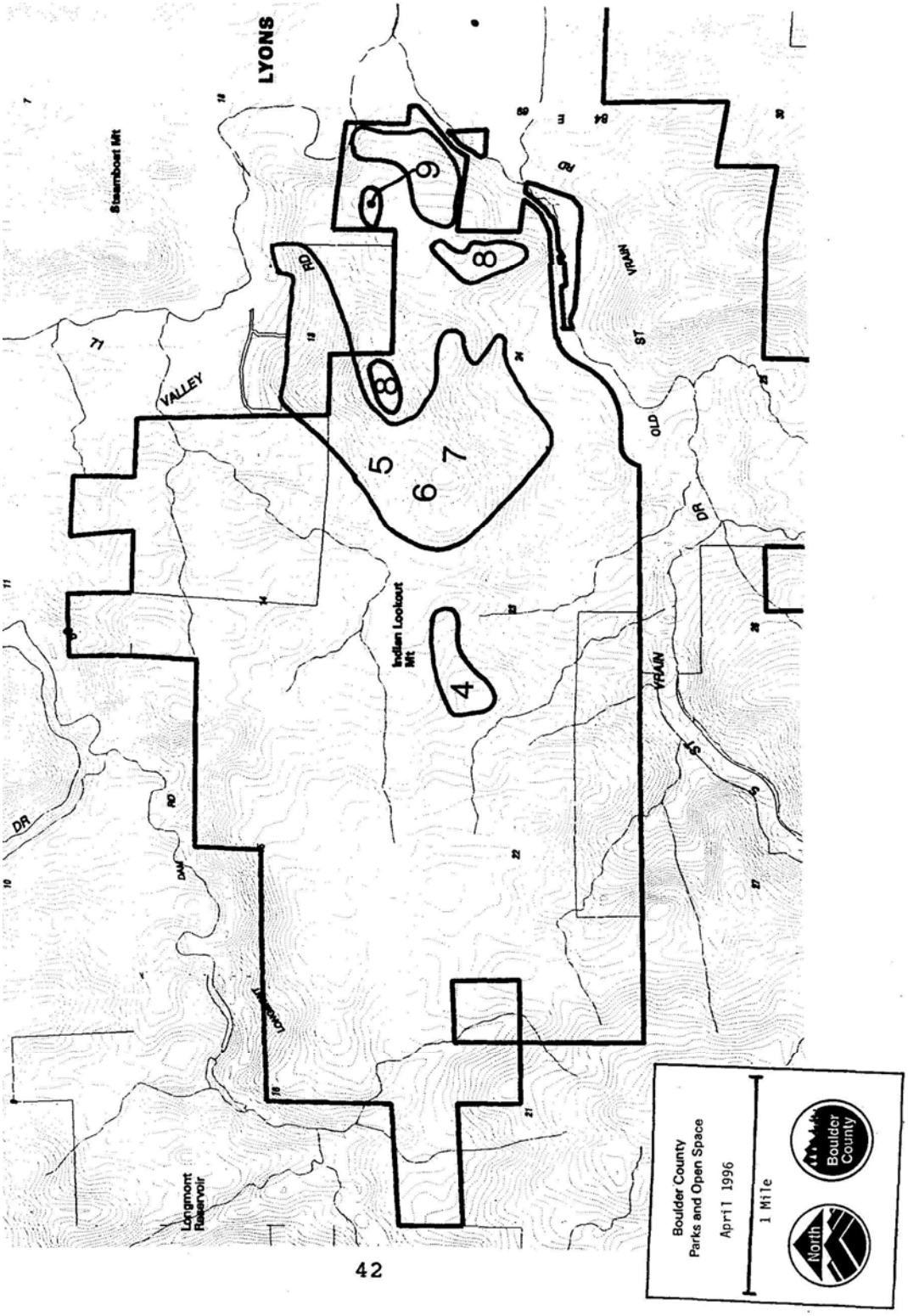
5. Other Significant Elements

Element	Global Rank	State Rank	Map Number
Rocky Mountain juniper/mountain mahogany - foothills woodland	G2	S2	14

* Rank descriptions can be found in Appendix 3.

* For Map Site Locations, refer to Figures 7a, 7b and 8.

Figure 7a - Significant Plant Associations and Butterfly Habitat
Hall Ranch



42

Figure 7b - Significant Plant Associations and Butterfly Habitat
Heil/ Trevarton

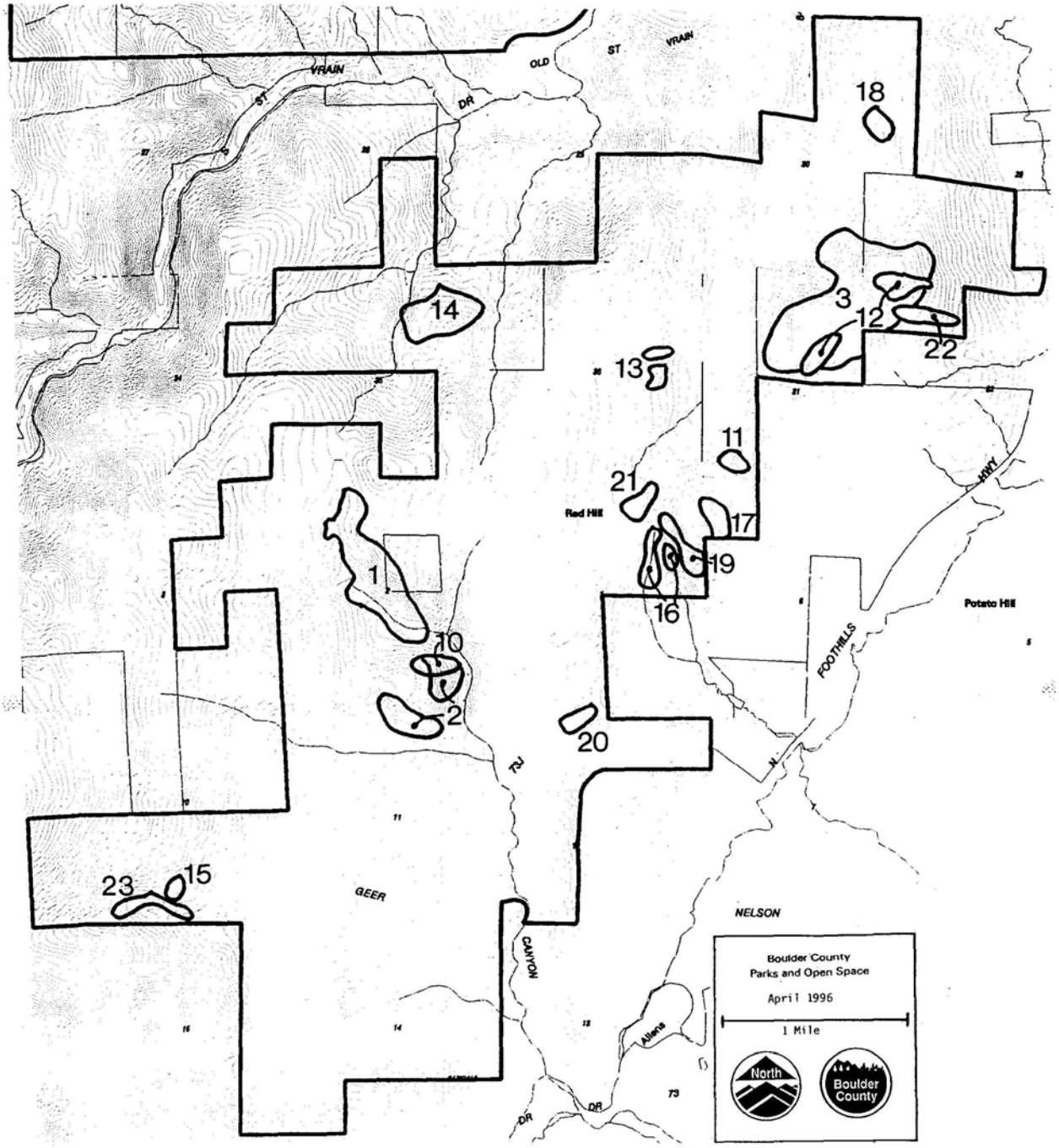
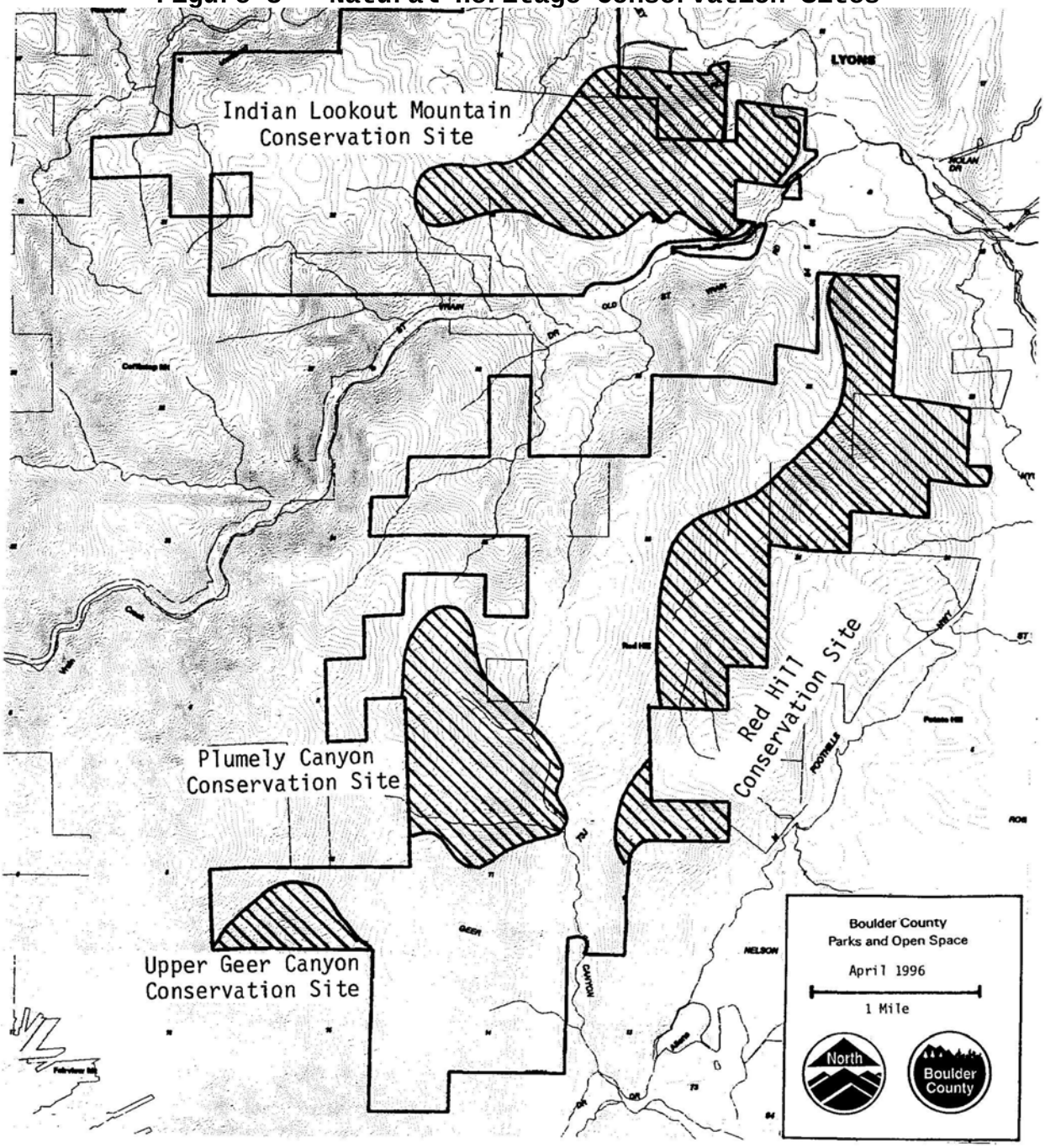


Figure 8 - Natural Heritage Conservation Sites



The proximity and clustering of significant elements led to the identification of 4 Conservation Sites (Table 4, Figure 8). Three of the Conservation Sites are on Heil Trevarton (Red Hill, Plumely Canyon and Upper Geer Canyon). One site is on Hall Ranch (Indian Lookout Mountain).

The Conservation Sites should be considered as core areas for the protection of the full range of biological diversity. Management activities should focus on maintaining and improving the sites integrity. Active monitoring and management of invasive alien plants is critical to the long term health of these areas. The use of fire needs to be carefully planned while the effects and impacts of grazing and herbiciding should also be considered.

General descriptions of the four Conservation Sites follow:

Red Hill: This 2800 acre site contains several occurrences of globally rare plant associations, one occurrence of a globally rare butterfly, and one occurrence of a state rare butterfly. The concentration of elements at this site would allow for protection of a significant portion of the imperiled natural heritage of the Front Range. The ponderosa pine/mountain mahogany/big bluestem and mountain mahogany/needle-and-thread plant associations are known only from Colorado. The mountain mahogany/New Mexico feathergrass plant association has only recently been documented and is known only from Colorado and Wyoming. The mountain mahogany/Scribner's needlegrass plant association has only recently been documented and is known only from the northern Front Range of Colorado. The big bluestem-little bluestem plant association is known from Colorado and Montana. It was thought to have once been much more common and expansive along the Front Range but is now reduced to a few, small patches. The needle-and-thread-East plant association is only known from Colorado and very few occurrences have been documented. The New Mexico feathergrass plant association is documented only in Colorado. The sites at Red Hill are in good condition with few exotic species. The two rare butterfly species are known to inhabit relatively intact tallgrass prairie remnants along the Front Range.

Many of the associations in the Red Hill Conservation Site have been degraded by exotic plants. This appears to be the major threat to this site. Aggressive management may be necessary to control exotics. The use of fire and grazing need to be carefully planned to help maintain patchiness and not increase exotics nor adversely affect butterflies (Swengel and Swengel 1995).

Plumely Canyon: This 620 acre site contains one globally rare

plant association and two state rare butterflies. It includes the big bluestem-little bluestem plant association which is documented from Colorado and Montana and has been reduced in coverage to a few small patches along the Front Range. One butterfly species inhabits relatively intact tallgrass prairie remnants while the other favors ponderosa pine woodlands.

Again, Exotic plants present a threat to the site. Early season grazing, burning or mowing may be effective management tools to control many of the cool season exotic plants and favor warm season dominant native plants. However, management actions need to be carefully planned in order to protect butterflies and not increase weeds.

Upper Geer Canyon: A 160 acre site that contains two globally rare plant associations. The ponderosa pine/spike fescue plant association is known only from Colorado. The water birch plant association is known from Idaho and Montana, and has only recently been documented in Colorado. In general, riparian areas on the Front Range have been heavily impacted from development, grazing, agriculture and recreational use. High quality remnants are considered significant.

Indian Lookout Mountain: This 1025 acre site contains several occurrences of globally rare plant associations. The ponderosa pine/mountain mahogany/big bluestem plant association is known only from Colorado. The mountain mahogany/needle-and-threadgrass plant association is also only known from Colorado. The mountain mahogany/New Mexico feathergrass plant association has only recently been documented and is known only from Colorado and Wyoming. The mountain mahogany/Scribner's needlegrass plant association has only recently been documented and is known only from the northern Front Range of Colorado. The big bluestem-little bluestem plant association is known from Colorado and Montana. Along the Front Range, it has been reduced to a few small patches.

Again, exotics present the greatest threat to this site. The use of herbicides, mowing, fire and/or grazing needs to be carefully planned.

5.0 WILDLIFE RESOURCES

5.1Historic Ecology

Since Euro-American settlement of Boulder County, several animal species, some of them major faunal components of the pre-

settlement landscape, have been lost. Others have been reduced in number. Still others have been introduced or have prospered from the increasing presence of humans.

Bison (*Bison bison*) were once very common on the plains and montane ecosystems of Colorado (Long 1988). By 1839 trappers' journals were already noting declines as market hunting entered the region (Roe 1970). The last native bison in eastern Colorado was killed near Springfield, Baca County, in 1889 (Armstrong 1972). It is probable that bison utilized NFOS. The ecological effects of removing such large numbers of migratory grazers is not clear.

Antelope (*Antilocapra americana*) were also present in presettlement times and were found in the foothills and montane lifezones, as well as the plains. Hunting of antelope occurred in the Estes Valley as settlement of the region began (Estes 1939). The naming of the Antelope Park area of the Hall Ranch is probably related to their presence. Antelope met the same fate as bison in Boulder County. One of the last major hunts by native peoples for antelope in the county occurred in the early 1860s (Kindig 1987). Again, the numbers and use patterns of NFOS are unknown.

Other ungulates were eliminated from the county or greatly reduced in number, but through reintroduction and/or the establishment of hunting restrictions, have repopulated. Elk (for scientific names of mammals still occurring in the area, see Appendix 5) were common on the plains and mountains of the county. They were virtually eliminated from the county and reintroduced from 1913-17 with animals brought in from the Yellowstone National Park region (Thomas and Toweill 1982). Their current numbers in Boulder County are probably between 2,000 and 3,000 (estimate from CDOW WRIS data). Habitat use is primarily in the mountains with very limited use of the plains. Bighorn sheep also appeared to be plentiful in presettlement times (Buchholtz 1983). They were eliminated from overhunting sometime in the early part of the 20th century. The last few sheep of the Mt. Audubon area were taken by "Stapp of Stapp's Lake" (Wheeler 1932). They were reintroduced and a small population currently exists in the county.

Many carnivores, particularly those that were perceived as threats or competed for resources with humans, were eliminated from the landscape. This included gray wolf (*Canis lupus*), grizzly bear (*Ursus arctos*), black-footed ferret (*Mustela nigripes*), and river otter (*Lutra canadensis*). Wolverine (*Gulo gulo*) and Lynx (*Felis canadensis*) have not been confirmed in the county for a long time and probably should be considered extirpated as well. The effects of the loss of these species is complex and tied to the numbers and distribution of primary prey species.

For other groups of animals, the effects of Euro-American

settlement can be seen in community shifts. Fish populations of the South St. Vrain Creek are now dominated by introduced species which have out-competed native fish. Avian populations have seen the loss of some plains species (which were probably marginal, at best, on NFOS). The introduction and/or expansion of such species as European starling and brown-headed cowbird have resulted in impacts to other avian species. It is probable that species such as mountain bluebird, western bluebird and Lewis' woodpecker are at lower than normal numbers due to increased forest density (all of these species favor open forests) and competition for nest holes from starlings and others. Rock doves are new nesters on cliffs. Peregrine falcons were eliminated from the county for almost 40 years, but are now making a comeback in the county. Mid-sized mammals, such as the introduced house cat, domestic dog and fox squirrel, and some natives such as raccoon, are increasing in number as they can take advantage of human landscapes and have the potential of causing significant adverse effects to many native animals.

5.2Resource Inventories/Current Conditions

Several sources of information were used in evaluating wildlife resources. A one season breeding bird inventory was conducted (Hallock 1995). Birds are good indicators of habitat quality as they cover all habitat types and are cost-effective to inventory. Searches were also conducted for bats and small mammals (Kettler et al. 1996). The Colorado Division of Wildlife provided information regarding large mammals, fish, other game animals, and raptors through historic data, maps and interviews (M. Babler, M. Cousins, J. George, R. Van Buren, R. Hoffman, J. Craig). Other individuals provided historic and current information about wildlife (L. Austin, A. Brown, D. Craig, M. Figgs, D. Fisher, J. Hall, D. Heil, B. Heil, J. Hiebert, M. Jarril, D. King, H. Kingery, R. Koopmann, N. Lederer, J. Orback, B. Prather, M. Sanders).

5.2.1Mammals

The foothills lifezone and its ecotone with the plains are considered rich habitats for mammals (Mutel 1976). The mix between grasslands, shrublands, woodlands, forests, cliffs and rock outcrops provides an abundance of food, cover and denning sites. The concentration of mammals in the foothills is heightened during the winter when snow and harsh weather move animals down from higher elevations.

Approximately 60 species of mammal could call North Foothills Open Space home (Appendix 5). This represents about 70% of all mammal species found in the county. The list is potentially longer as it is probable that some plains species wander up and some mountain species occasionally expand into lower elevations.

The most common mammal is probably the deer mouse, though it is seldom seen. Other common ground dwelling rodents include least chipmunk, Colorado chipmunk and golden-mantled ground squirrel. Coyotes are the most commonly seen carnivore and are habitat generalists. Abert's squirrels are characteristic of ponderosa pine forests while rock squirrels are restricted to cliffs and talus slopes.

Visually and numerically, mule deer is the most common ungulate. They are plentiful on both Hall and Heil ranches. They have historically been hunted on both properties. White-tailed deer are occasionally seen in the foothills.

Several species are of special interest. This group includes bighorn sheep, elk, mountain lion, black bear and prairie dog. They are considered of special interest due to habitat requirements, problems or impacts associated with human interaction, or unique ecosystem functions.

Bighorn Sheep: As previously stated, bighorn sheep were once plentiful in the county, but were eliminated by overhunting in the early 20th century. Nineteen bighorn sheep were reintroduced into the North St. Vrain Canyon in 1980 (Goodson and King 1995). The population as of 1994 is approximately 130. Their overall range is considered to include the western half of Hall Ranch (Figure 9). Field observations (sightings, tracks and droppings) indicate bighorn sheep use of the southwest portion of Hall Ranch with more concentrated use of the rock cliffs in South St. Vrain Canyon and the Coffintop Gulch/Coffintop Mountain area.

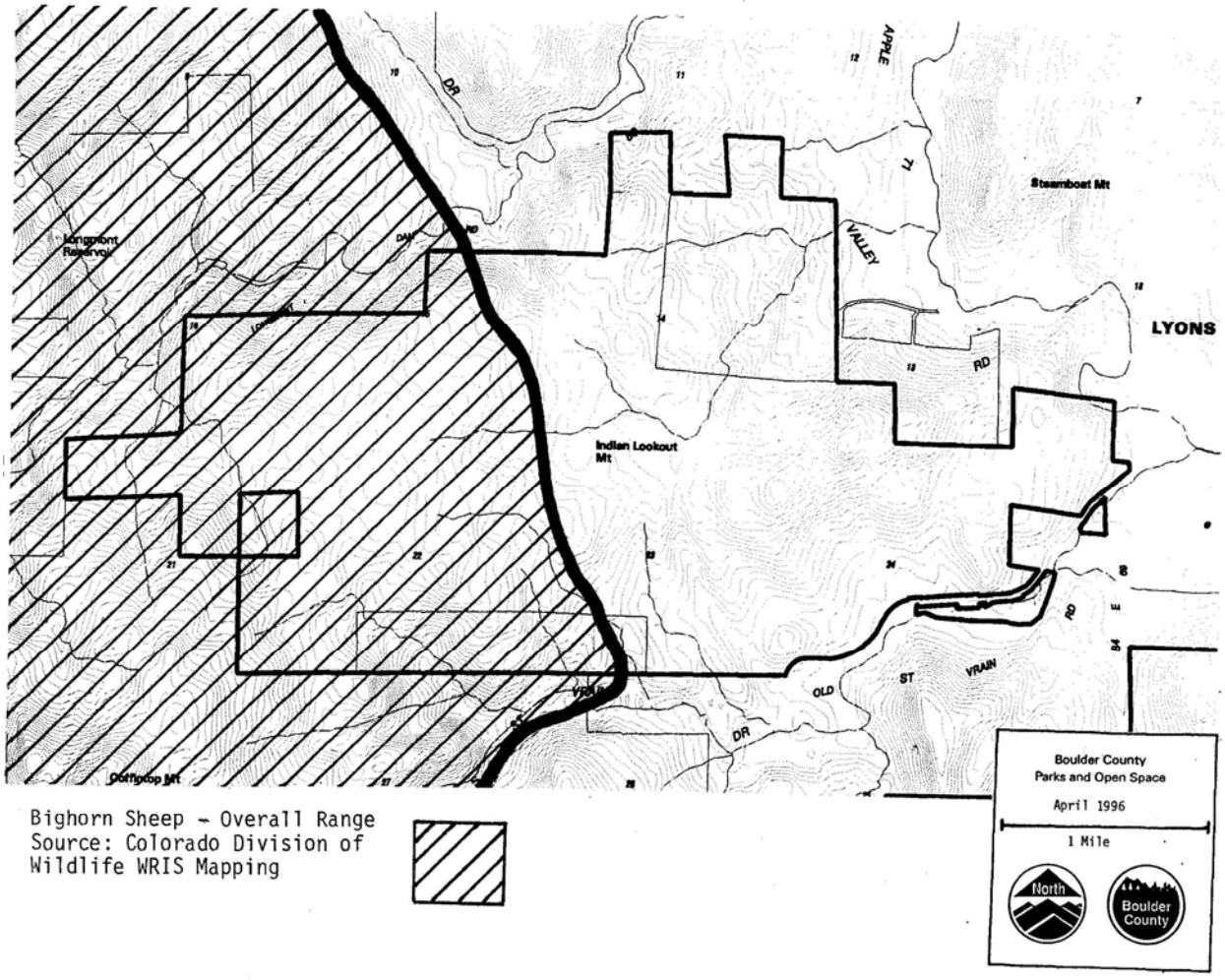
Bighorn sheep are considered vulnerable with respect to human interaction. Factors that seem important to time and spatial variability of bighorn sheep include: 1) past extinctions; 2) herds surpassing range carrying capacity; 3) low population size increasing the risk of herd extinction due to rare or unusual events; 4) inbreeding depression due to low population size; 5) herds not utilizing available range; 6) disease; and 7) degradation of habitat (Bailey 1990, Covich et al. 1994). The most significant mortality factors today are diseases, the spread of which apparently is facilitated by over-concentration of sheep on inadequate range. Persistent crowding of a herd by visitors and recreationists can cause unobservable stress in bighorns, which may predispose them to death from otherwise sublethal disease (Armstrong 1975).

Rocky Mountain Elk: As previously stated, elk were eliminated from the county around the turn of the 20th century. They were reintroduced between 1913 and 1917 and are now numerically

doing well. North Foothills Open Space is important winter range for elk. Virtually the entire NFOS is mapped as winter range, winter concentration area and severe winter range by the Colorado Division of Wildlife.

Elk that utilize Heil/Trevarton appear to be from a herd that summer in the Indian Peaks Wilderness. They come to the Heil Ranch for winter, probably moving across Central Gulch, and sometimes returning as early as September (which occurred in 1994). High count for the herd is approximately 150 animals. This group also utilizes land east of North Foothills Highway

Figure 9 - Bighorn Sheep Overall Range



between Lefthand Canyon and Lyons. In Boulder County, this is the only group of elk that make a Continental Divide to Plains movement. There is speculation from some people that some of the elk are resident to lower elevation areas.

Concentration areas on NFOS appear to be along the ridge of the Dakota Hogback and along the western and northwestern portions of Heil Valley Ranch. Elk have been historically hunted on Heil Valley Ranch with generally 6-8 animals taken per year. All of NFOS falls within Hunting Unit 20 which has a late elk season that generally runs through mid-January. The presence of elk on Hall Ranch is more casual. Small groups are seen during some winters. Primary wintering areas for elk in this part of the county appears to be north of the North St. Vrain Creek. Elk that were radio-collared near Longmont Reservoir in 1979, summered on alpine ridges in southeastern Rocky Mountain National Park (Bear 1989). Elk movements to Hall Ranch have been reported across the Coffintop Mountain area and across Buttonrock Reservoir (they have even been seen crossing along the dam top).

While elk can be adaptable animals, they can also be wary of humans. Behavior is often shaped by several factors including whether or not they are hunted on portions of their range (Thomas 1982). Their ability to recognize "safe" locations during specific times of the year is not clear though speculated by some individuals and researchers. One Boulder County herd that utilized the Indian Peaks Wilderness Area for summer range, generally stayed away from trails and areas of recreational use during the daytime. They utilized areas other than their daytime hiding cover around dawn and dusk, and at night (Hallock 1991). Maintaining habitat effectiveness for wintering elk on NFOS is a concern.

Mountain Lion: The foothills are preferred habitat for mountain lions. Mule deer, the lions primary food source, are also concentrated in the foothills. An adult lion is estimated to kill one deer every 7-10 days for an average of 50 a year.

Lions and their signs (tracks, food caches, scat) are regularly seen on North Foothills Open Space. They have also been hunted in the area. Hunting unit 20, which contains NFOS, is considered one of the top 8 for hunting lions in the state (Harvest Statistics, Colorado Division of Wildlife).

Lions are very adaptable animals. They are generally considered to be secretive and wary of humans, but have demonstrated an ability to live near people and take advantage of resources provided around human settlement. Human/lion encounters are increasing, primarily due to a greater human presence on the landscape and the adaptive nature of lions. Recreationists

have had encounters with lions. Persistent "problem" lions, those that take livestock and pets or appear to have a strong affinity for settled areas, are sometimes removed from the population.

Even with the growing interaction between lions and people, there is a recognition by wildlife managers and ecologists for the need to retain secluded areas for mountain lions and other species. There is speculation that Central Gulch and the Coffintop Mountain area are important habitat for lions due to their habitat quality and remoteness. On a landscape scale, it appears to be important to retain the character of these remote areas and not increase human/lion encounters (Soulè 1991, Noss and Cooperrider 1994).

Black Bear: Black bear are relatively secretive forest animals. They are usually intolerant of human activity, but will come around human settlement in search of food. Habitual problem animals are generally removed from the population.

Black bears are present on NFOS. They have historically been hunted on the properties. During the field research of 1995, there were five sightings of bear, all during daylight, and in all cases the bear ran off. Other signs of bear were present throughout the area including scat, tracks, large rocks turned over, and old tree stumps ripped apart (the latter two signs result from bears searching for insects).

The east slope of the Front Range is not considered prime bear habitat in Colorado due to poor food resources. McCutchen, working in Rocky Mountain National Park from 1986 through 1992, established that only 9 bears (including cubs) inhabited an area of 90,000 acres east of the Continental Divide within the park, a density of one bear per 9.7 square miles of suitable habitat. No adult males were found east of the Divide. Bears did not reproduce until they were about 7 years old and the litter size averaged 1.7 cubs. The survival rate of cubs to the age of one year was 43%. The reproductive success of black bears in the Park is among the lowest on record in North America. Problems for bears are caused by: 1) human occupation or use of bear habitat including prime areas such as riparian corridors; 2) the fact that no male bears on the east side of the park lived to adulthood, principally due to human predation; and 3) the historic policy of fire suppression has reduced the vegetative diversity of the park and reduced the carrying capacity for bears (McCutchen 1993).

Much like lions, bears appear to desire secluded areas. The need to maintain blocks of land with little human presence will be advantageous to maintaining black bears in Boulder County.

Increasing structural and habitat diversity of the land could also help sustain the bear population.

Black-tailed Prairie Dog: Prairie dogs are large, colonial, ground-dwelling squirrels which inhabit the short and mixed grass prairies of western North America (Fitzgerald, et al. 1994). The prairie dog is a keystone species that plays an important role in maintaining the biotic integrity of western grasslands. They greatly influence the landscape where they live by modifying soil characteristics, as well as the density and composition of vegetation around their colonies by clipping vegetation, feeding on roots, and burrowing. The burrow systems of prairie dog colonies provide breeding and refuge areas for a wide range of other species such as badger, prairie rattlesnake, burrowing owls, and rabbits. The colonies also function as areas of high prey density utilized by raptors and coyotes.

Prairie dog populations have declined as much as 98% throughout North America (Miller et al. 1994). Concern over population loss has led to a petition for U.S. Fish and Wildlife Service to consider classifying the black-tailed prairie dog as a Category 2 Candidate species under the Endangered Species Act. A recent plague outbreak greatly reduced prairie dog numbers in Boulder County.

Four prairie dog colonies exist on North Foothills Open Space, two on Hall Ranch and two on Heil Valley Ranch. On occasion, there has also been a small colony on the eastern edge of Trevarton Open Space. The colonies are located in meadows, generally associated with colluvial and alluvium soil. The colonies cover approximately 240 acres, which represents 2.2% of the area of NFOS.

These are the highest elevation prairie dog colonies known in Boulder County. The historic use of these areas is not clear. The colonies on the Hall Ranch appeared about 1972 (J. Hall, pers. comm.).

The colonies are a prey base for local raptors. The golden eagles that nest on NFOS conduct extensive hunting of the colonies. Other raptors prey on these colonies as well. The colonies on the Hall Ranch are topographically situated in an advantageous position for the Meadow Park eagles. The eagle's food sources are located higher than the nest site, which means they can catch prey and then drop down to the nest, which from an energy standpoint is highly efficient. It will be important to maintain habitat effectiveness (the ability of predators to use the area) for the prairie dog colonies.

5.2.2Birds

A total of 97 potential breeding species were observed during a one season survey (Appendix 6). Of this total, 47 were confirmed as nesters by finding a nest, seeing a nest being built, seeing adults feeding young, or finding fledged young. Another 27 species were considered to be probable breeders. Evidence of probability included seeing a pair, hearing a singing male twice in the same location a week apart (evidence of a territory), hearing multiple males (minimum of 7) of the same species singing in one day, and seeing the agitated behavior of a bird. Finally, there were 23 possible breeders which were those species seen in suitable breeding habitat.

In the Colorado Breeding Bird Atlas, where approximately 2,000 6,240 acre (2,525 ha) blocks of land were censused for breeding birds, only 1% contained more than 90 species (Hugh Kingery, pers. comm.). The probable reasons for the species richness of NFOS are the great variation in elevation and habitat, and the location of the area at the junction of the Great Plains and the Southern Rocky Mountain physiographic provinces.

Some of the more common species are generalists who can utilize the resources of several habitat types. These species include American robin, broad-tailed hummingbird, house wren, mourning dove and black-billed magpie.

The uplifted sedimentary rock formations and associated canyons running through the foothills of Boulder County support an unusually high concentration of nesting birds-of-prey (Jones 1989, Figgs and Lederer 1992). Two golden eagle nests, one on Heil Valley Ranch and one on Hall Ranch, were active in 1995. Judging from the number and size of stick nests, it appears that these nesting areas have a long history of activity. There was one active prairie falcon nest on Heil Valley Ranch and an active nest on the Hall Ranch. Cliffs and canyon walls also supported colonies of white-throated swifts, cliff swallows, violet-green swallows and rock doves. Canyon wren and rock wren are also characteristic of cliffs and talus slopes.

Foothills shrub habitat supports a unique assemblage of avian species. Characteristic species are rufous-sided and green-tailed towhees, lazuli bunting, yellow-breasted chat and blue-gray gnatchacher. Other unique or restricted species include scrub jay, bushtit, gray catbird, northern mockingbird and sage thrasher. Foothills shrublands are not common in Boulder County. Hall Ranch, Heil Valley Ranch and Trevarton Open Space contain a significant portion of what shrublands exist in the county.

Coniferous forests and woodlands were dominated by mountain chickadee, chipping sparrow, yellow-rumped and Virginia's

warblers, Steller's jay and grey-headed junco. Ponderosa pine woodlands were good habitat for mountain and western bluebirds , and Lewis' woodpecker. Forest dwelling accipiters were found. One nesting northern goshawk was found on Heil Valley Ranch. Single Cooper's hawk nests were found on both Hall and Heil ranches. Golden-crowned kinglet and pygmy nuthatch were associated with mature and old-growth coniferous forests.

Riparian areas are some of the richest avian habitats in Colorado. The best developed riparian habitat on NFOS is the segment of the South St. Vrain Creek that runs through the Hall Ranch. Characteristic species include yellow warbler, northern oriole, song sparrow, warbling vireo and black-capped chickadee. Rare or restricted species found along the creek were gray catbird and Lewis' woodpecker. During the winter, dippers congregate along this stretch of the South St. Vrain.

Meadows probably have the poorest species richness of breeding birds, but are utilized for food by many birds of adjacent forest or shrub habitat. Dominant breeders in meadows include vesper sparrow and lark sparrow. The abundant small mammal populations of meadows, including prairie dogs, were favorite hunting grounds for golden eagles and red-tailed hawks.

Wild turkey are present on both the Heil and Hall ranches. They appear to be better established on the Heil Valley Ranch, where up to 30 in one flock have been seen. All of NFOS is considered a winter concentration area (Colorado Division of Wildlife, WRIS Maps, Fort Collins). Turkey are forest dwellers who use small meadows or the edges of larger meadows as well. They may be less tolerant of human recreational use than many other wildlife species (Richard Hoffman, Colorado Division of Wildlife, pers. comm.). This may have already occurred on another County Open Space property - the Meyers Gulch trail of Walker Ranch - where turkey were often seen 10-15 years ago and now are rarely observed.

5.2.3Amphibians and Reptiles

A total of 14 potential amphibians and reptiles reside on North Foothills Open Space (Appendix 7). The most common snakes are prairie rattlesnake and bullsnake. The primary lizard seen around rock outcrops is the eastern fence lizard.

Striped chorus frogs are present in many intermittent ponds. They were found throughout NFOS during the wet spring and early summer of 1995.

Tiger salamanders were observed near ponds and springs on the north end of Heil Valley Ranch (Harrold and Mieras 1995). They are listed as a species of special interest by Region II of the

U.S. Forest Service. However, their populations appear stable on the Arapaho and Roosevelt National Forests (Parmenter 1996).

5.2.4Fish

In North Foothills Open Space, the South St. Vrain Creek provides the primary habitat for fish. Fish can serve as indicators of the quality of aquatic habitat because of their high sensitivity to increased turbidity and runoff contamination.

Four species numerically dominate the fish species found in the South St. Vrain Creek (Randy VanBuren, Colorado Division of Wildlife, pers. comm.). Brown Trout (*Salmo trutta*), an introduced species, make up about 70% of individual fish in this section of creek. Two native species, Longnose Sucker (*Catostomus catostomus*) and Longnose Dace (*Rhinichthys cataractae*) probably make up another 30%. Introduced Rainbow Trout (*Salmo gairdneri*) and Brook Trout (*Salvelinus fontinalis*), and native Western White Sucker (*Catostomus commersoni suckleyi*) may also be present. Rainbow Trout are listed as indicator species for stream and lake habitat by the U.S. Forest Service. Greenback Cutthroat Trout (*Salmo clark*) were once the dominant native fish but have been locally extirpated.

5.2.5Invertebrates

Most populations of invertebrates are not well studied on North Foothills Open Space. However, the Colorado Natural Heritage Program conducted an inventory for rare insects during the summer of 1995 (Kettler 1996).

Three insects of concern, all butterflies, were found on NFOS. Snow's Skipper (*Paratrytone snowi*) has a Colorado Natural Heritage Program State Ranking of S3, indicating it is rare (20-100 known populations). This is a medium-sized, dark brown insect with reddish wing surfaces that have a row of small yellow spots. It favors the upper end of ponderosa pine riparian habitat. Arogos Skipper (*Atrytone arogos*) has an S2 ranking indicating it is very rare (5-20 populations). It is very patchy in distribution. Ottoe Skipper (*Hesperia ottoe*) also has a state rank of S2. It favors undisturbed prairie and avoids weedy conditions.

Additional information on butterflies can be found in Section 4.3.2 - Natural Communities and Conservation Sites.

5.3Significant Resources

A number of significant wildlife resources were found on North Foothills Open Space. Animals, as opposed to plants, are moving parts of the landscape. Some have specific sites, such as a nest, that we have knowledge about. For others, we only know

that they are tied to a certain habitat type, which can also be identified and mapped. Still others have very large territories and may only be present at certain times. For many of the species, we do not know specific nest or den sites. Our knowledge of their use of NFOS and their movements to and from the property are more general.

Like plants, there are ranking systems that evaluate the rarity and vulnerability of species to significant population impacts. Lists are maintained by the Colorado Natural Heritage Program, Federal and State governments, U.S. Forest Service, Boulder County Nature Association and Boulder County. These systems are further described in Appendix 3.

5.3.1Mammals

Fifteen mammal species of special concern could find suitable habitat and reside on NFOS (Table 5). The highest ranking species in terms of level of concern is Townsend's Big-eared Bat which is under review for Federal listing. Bat inventories conducted by CNHP (Kettler 1996) did not presently find any.

A number of the species are listed by the county because they are restricted to one or a few habitats such as streams, rock outcrops or talus slopes, or mature ponderosa pine forest. Beaver, meadow vole, rock mouse, Abert's squirrel, Merriam's shrew, dwarf shrew,

Table 5

MAMMALS OF SPECIAL CONCERN

Species	Federal Status	State Status	Rarity Ranking Systems (1) CNHP	USFS	Armstrong
Dwarf Shrew (2)			G5S3	X	5
Merriam's Shrew			G5S3		4,5
Fringed Myotis				X	5
Townsend's Big-eared Bat	C2	U	G4S3	X	
White-tailed Jackrabbit					3,5
Rock Squirrel					4
Abert's Squirrel					4
Plains Pocket Mouse					4,5
Olive-backed Pocket Mouse					4,5
Beaver					4
Rock Mouse					4
Meadow Vole					4
Gray Fox					4
Ringtail					5
Bobcat					3

(1)For a description of the Species Rarity Ranking Systems, see Appendix 3.
(2)For Scientific Names of Species, see Appendix 5.

rock squirrel and gray fox are examples of restricted species. These species are not considered rare, but because of their limited use of habitat they are considered more vulnerable than species that can utilize many habitats. The key to maintaining these species is providing and maintaining suitable habitat.

Many of the larger mammals such as deer, elk and mountain lion, are fairly adaptable. It is probable that there will be some displacement of these animals. What impact this will have on individuals or the population is not clear.

Other large mammals such as black bear and bighorn sheep are less tolerant of humans. Bears are considered by some to be "at risk" along the Front Range. Except for trying to take food from rural residences (and occasionally urban areas), they generally avoid human contact. Bighorn sheep are very sensitive to stress and vulnerable to disease.

5.3.2Birds

Sixteen bird species of special concern were located on North Foothills Open Space (Table 6). These species are either rare, declining, restricted to one or a few habitat types, or had

significant concentrations at one location.

Table 6

SPECIES OF SPECIAL CONCERN
1995 Breeding Season Observations

Species	Federal* Status	State Status	CNHP	USFS Reg 2	BCNA
Sharp-shinned Hawk			G5S3		
Cooper's Hawk			G4S3		
Northern Goshawk	C2		G4S3	X	3
Golden Eagle			G4S3		4
Prairie Falcon			G5S3		4
Lewis' Woodpecker		U		X	3
Three-toed Woodpecker			G5S3	X	4
Olive-sided Flycatcher				X	
Scrub Jay					4
Bushtit					4
Pygmy Nuthatch				X	4
American Dipper					4W
Golden-crowned Kinglet				X	4
Gray Catbird			G5S3		4
Northern Mockingbird					2,4
Sage Thrasher					2

*Rank and status descriptions can be found in Appendix 3.

An assessment was made of habitat quality and uniqueness for avian species. Key components looked for were:

1. Structural Diversity - Increasing amounts of vertical structural diversity within a habitat has a positive correlation with species richness (Balda 1975, MacArthur and MacArthur 1961). High quality riparian areas, shrublands, woodlands with a shrub understory and old-growth forests are generally considered to have good structural diversity.
2. Old-Growth Characteristics - Large diameter trees, snags and deadfall are important forest components that late-successional avian species depend upon for finding food and nesting sites. General characteristics of old-growth ponderosa pine and mixed pine/Douglas fir forests include large-diameter overstory trees (generally at least 20" DBH), multi-layered canopy, high percentage of snags and/or live trees whose tops were killed by lightning, and the presence of large-diameter course woody debris in the understory (Mehl 1992).
3. Unique Landscape Features - Uncommon landscape features can

present nesting or feeding opportunities for restricted species. Examples are cliffs or prairie dog colonies that present a high concentration of food supplies for raptors.

There is a strong relationship between avian species of concern and areas of high or unique habitat quality. Additionally, many of the mammal species of concern utilize these same areas.

Avian Conservation Areas are mapped (Figure 10a - Hall Ranch; Figure 10b - Heil/Trevarton) and described below. They take into account species of concern and habitats of special interest. They are those areas rich in breeding avifauna, contain good structural diversity, exhibit old-growth characteristics, or support a complex of species of concern.

Foothills Shrubland - (Figure 10a - #8; Figure 10b - #'s13,14): Thickets dominated by mountain mahogany, skunkbrush and bitterbrush are rich breeding bird habitat and support a number of species of concern. Scrub jay, bushtit, gray catbird, northern mockingbird and sage thrasher are considered rare and/or restricted breeding species in the county and were found in the shrublands of NFOS. These areas are also potential habitat for dwarf shrew, Merriam's shrew, Townsend's big-eared bat, rock squirrel, rock mouse and ringtail. The shrublands are sometimes mixed with juniper and scattered ponderosa pine adding to the structural diversity.

Figure 10a - Avian Conservation Areas
Hall Ranch

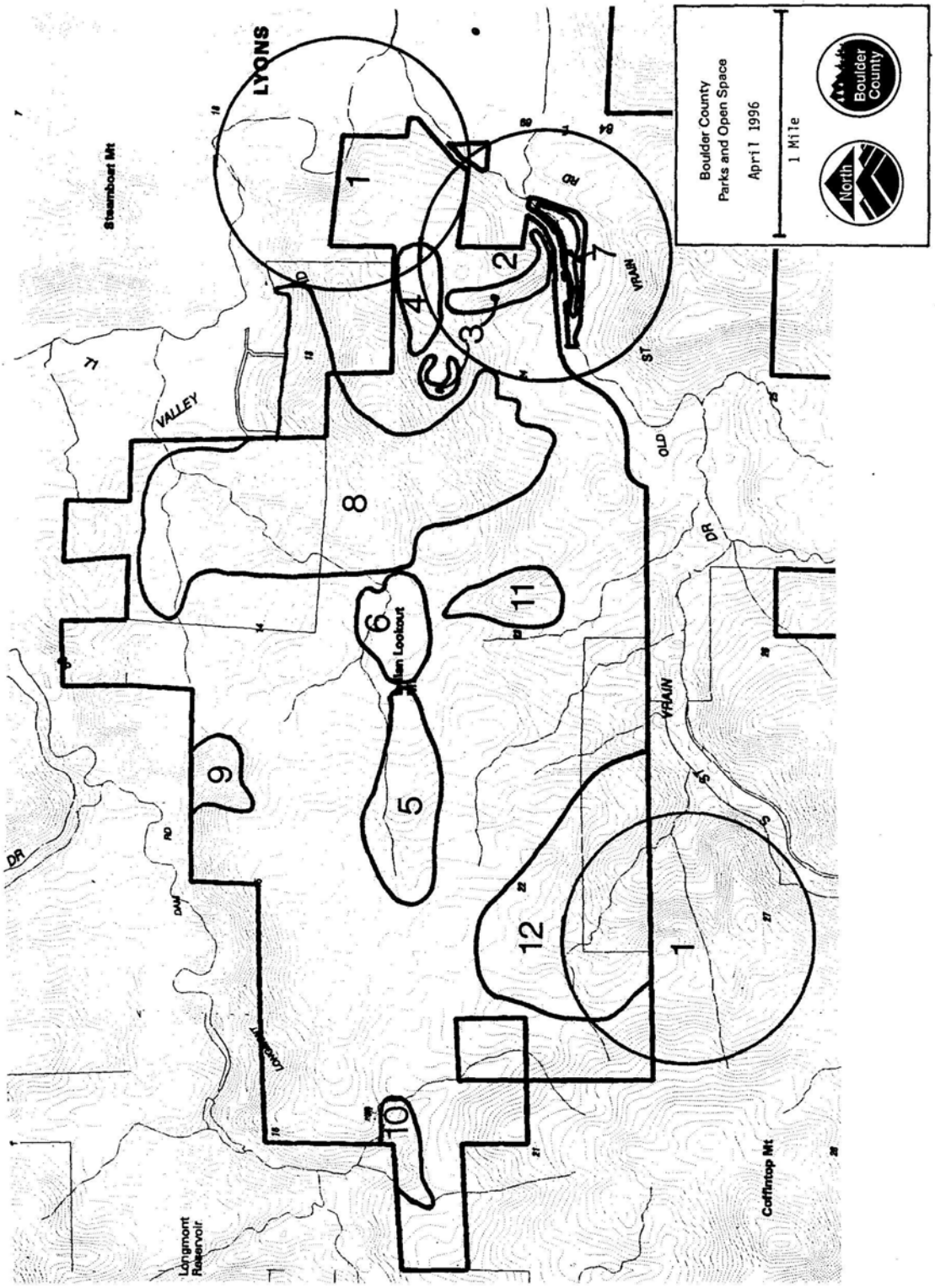
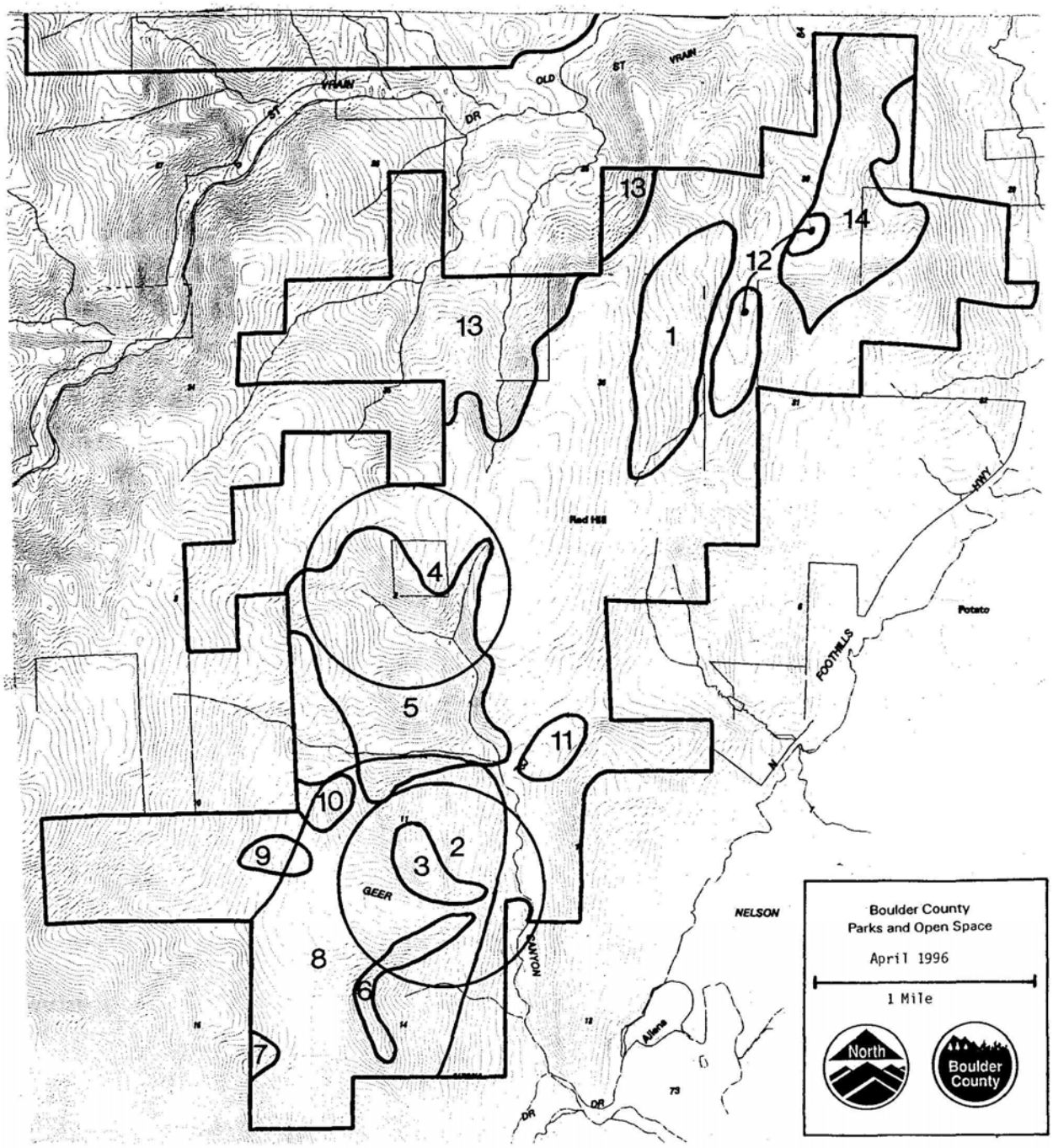


Figure 10b - Avian Conservation Areas
Heil/Trevarton



Shrublands are not common habitat in Boulder County and NFOS contains a significant portion of what exists. On the Hall Ranch, the north and south facing flanks of Indian Lookout Mountain contain extensive shrublands as do the BLM lands on the northern part of the area (Figure 10a-#8). On the Heil Valley Ranch and Trevarton Open Space, the west flank of Red Hill Gulch (Figure 10b-#14, and the area north and west of the State Land Board parcel (Figure 10b-#13).

Dense foothills shrublands act as closed canopy habitat for many species. Fragmentation by trail and roads should be minimized. Management activities (fire, grazing) should maintain a mosaic of shrub density, size and age.

Forests and Woodlands with Old-Growth Characteristics - (Figure 10a - #'s 9,10,11,12; Figure 10b - #'s 1,3,5,6,7,9,10,13): Old-growth, characterized by large-diameter trees, snags and deadfall, is important habitat. Only about 1% of ponderosa pine forests in Boulder County are considered old-growth (Lowry 1992). General characteristics of old-growth ponderosa pine and mixed ponderosa pine/Douglas fir forests include large-diameter overstory trees (generally at least 20" DBH), multi-layered canopy, high percentage of snags and/or live trees whose tops were killed by lightning, and the presence of large-diameter course woody debris in the understory.

Several species of special concern favor old-growth including northern goshawk, Lewis' woodpecker, three-toed woodpecker, pygmy nuthatch and golden-crowned kinglet. Other characteristic breeding birds include Hammond's flycatcher, red-breasted nuthatch and brown creeper. Western bluebirds favor woodlands with large-diameter trees and snags. Large-diameter course woody debris is an important feature for numerous species of wildlife including wild turkey and many small mammals. Large-diameter snags are important for all cavity-nesting birds.

Forests and woodlands with old-growth characteristics were found in the study area. On the Hall Ranch, old-growth was found in steep north-facing drainages (Figure 10a - #'s 9,10) as well as open south-facing woodlands (Figure 10a - #'s 11,12). On the Heil Valley Ranch, old-growth is associated with east and north-facing drainages as well as the steep north, south and west flanks of the hogbacks (Figure 10b - #'s 1,3,5,6,7,9,10,13). The canyons and north-facing slopes often contain a mix of ponderosa pine and Douglas fir.

Maintaining low elevation old-growth is a complex issue. Currently, many of the forest stands are overstocked due to the lack of periodic ground fires. Efforts should be made to

maintain large-diameter trees, snags and deadfall. Any efforts to thin these forests should focus on relatively flat sites and understory trees. The use of prescribed fire should be considered for woodlands and forests with an open understory that will allow ground fires. Fragmentation of old-growth habitats by trails or roads should be minimized .

Riparian Habitat - (Figure 10a - #'s 5,7,8,12; Figure 10b - #'s 1,5): Riparian areas are generally considered some of the richest habitat for breeding birds. They are also one of the most impacted habitat types in the United States (Taylor and Littlefield 1986). Riparian areas are characterized by cottonwood forests with a dense shrub understory or, along small drainages, adjacent vegetation is dominated by river birch.

Several species of concern are found in riparian habitat including Lewis' woodpecker, American dipper and gray catbird. Other characteristic species are warbling vireo, yellow warbler and song sparrow. Riparian areas are potential habitat for beaver and meadow vole. The riparian area in Marietta Canyon (Figure 10b- #5) was heavily used by black bear during the fall of 1994 and 1995.

The most significant stream system and riparian habitat of NFOS is found on the Hall Ranch along the South St. Vrain Creek. (Figure 10a - #7). This stretch of creek functions as a winter concentration area for American Dipper. Smaller significant riparian systems are found throughout NFOS (Figure 10a - #'s 5,8,12; Figure 10b - #'s 1,5).

Riparian systems within the study area could use considerable restoration. Grazing should be reduced to a level that allows for the establishment of willow, shrubs and cottonwoods. Along the South St. Vrain Creek, the western 2/3rds of this segment of creek should be considered for restoration to allow for cottonwood regeneration and the development of a shrub understory.

Cliffs and Canyons - (Figure 10a - #'s 1,2,3; Figure 10b - #'s 2,3,4,5): Cliffs and canyon walls formed by the uplifting and erosion of sedimentary rock formations provide unique nesting habitat for several species. Most of Boulder County's breeding population of golden eagles and prairie falcons nest on cliff formations in the lower foothills.

Two golden eagle nests exist on NFOS. It is generally recommended that a 1/2 mile radius buffer be maintained around eagle nest sites (CDOW 1995, Call 1979). This is sometimes modified by terrain and by what has historically occurred in the area. Some eagles are more tolerant of human activity in their

nesting area, others are not. They are less tolerant of activity above the nest site, though activity below can also have impacts (Knight and Gutzwiller 1995). In Boulder County, since the early 1980s, there has been one known abandonment of an eagle nesting area due to human activity nearby (Nan Lederer, Boulder County Nature Association, pers. comm.).

The current pair on Hall Ranch are very tolerant of human use occurring in Meadow Park. A management concern is to limit climbing on the cliff during the nesting period (Feb. 1 - July 15), as well as human activity above the nest. The Heil Ranch eagles utilize the canyon from January through September - this includes courtship, nesting and feeding of fledglings. The eagles casually use the area from October through December. Closure of this area seems appropriate.

A third golden eagle nest area occurs in the South St. Vrain Canyon. Several alternate nest sites are present. The closest site to Hall Ranch is near Deadman Gulch.

Two prairie falcon nesting areas are present on NFOS. Human disturbance should be minimized for a 1/2 mile radius around the nest sites (CDOW 1995). Again, terrain and historical occurrence of activities will modify perceived threats from nesting falcons. Disturbances below nesting cliffs by recreationists cause responses by falcons, however activities above the nest causes even greater reaction from nesting birds (Herbert and Herbert 1965).

Colonies of white-throated swifts, cliff swallows, violet-green swallows and rock doves were found on exposed cliffs at several sites. While these four species are not species of concern, sites that support their colonies should be considered significant due to the high concentration of breeding birds at each location. Important cliff and canyon nesting sites were found at several locations (Figure 10a - #'s 1,2,3; Figure 10b - #'s 2,3,4,5). Seasonal closures should be considered for activities that could go through these colonies.

Raptor Feeding Areas - (Figure 10a - #'s 4,6; Figure 10b - #'s 11,12): Prairie dogs are an important prey base for many raptors in Boulder County. Four colonies were found on NFOS. Raptors, particularly golden eagles and red-tailed hawks, were observed hunting and feeding on a regular basis in all four colonies. It is probable that these feeding grounds greatly contribute to the viability of the nesting golden eagles. Conservation of the prairie dog colonies and ability to maintain them as effective hunting grounds would be advantageous. Trails should be placed to minimize a visual

presence in or around the colonies.

Wild Turkey Production Areas - (Figure 10b -#8): Wild turkeys are present on both Hall and Heil ranches, though they seem better established on the Heil Valley Ranch. Use patterns on both ranches by turkey are not clear. CDOW Wildlife Resource Information System (WRIS) mapping indicates that both properties are part of a winter concentration area. Additionally a production area exists on the Heil Valley Ranch in the Geer Canyon area (Figure 10b - #8). The current validity of this mapped area is not clear.

5.4Maintaining Habitat Effectiveness

Opening North Foothills Open Space to recreation will present a level of human presence on the property that is higher than historic use. While different forms of recreation have occurred in the past, including horseback riding, wagon rides, hunting, and various group activities, historic use has generally been limited and controlled. Future use levels, which may number several hundred people on weekends and holidays, will probably be higher and cover more of the property at one time than in the past.

How different wildlife species react to recreationists is a complex issue. As summarized in *Wildlife and Recreationists: Coexistence Through Management and Research* (Knight and Gutzwiller 1995) and *Wildland Recreation: Ecology and Management* (Hammitt and Cole 1987), some of the main variables include:

Type of Recreation Activity: Slower moving activities may elicit a milder response from wildlife than those that move faster, however stopping generally elicits a response;

Predictability: If the recreational action is expected and nonthreatening, animals may show little response. People on established trails are considered more predictable, while off-trail use may be perceived as less predictable;

Timing: Disturbance during the breeding season can affect an individuals productivity, while disturbance outside the breeding season can affect the individuals energy balance and, therefore its survival;

Location: The relative locations of wildlife and disturbance can influence animals responses. Wildlife often show a more pronounced response to activities from above. In certain situations, wildlife feel more secure when they have greater open distance between themselves and potential threats;

Type of Animal: Species with specialized food and shelter

requirements are more vulnerable to disturbance than habitat generalists. Larger species generally flush at greater distances than smaller species;

Group Size: Animals feeding in groups respond to approaching threats at greater distances and are less vulnerable to attack than solitary individuals;

Learned Responses of Animals: The reactions of animals are often related to the number and outcome of interactions with people. A major distinction is often made between hunted vs. nonhunted individuals and herds. Hunted animals generally stay a greater distance from people than do non-hunted animals. A compounding variable is whether an animal has part of its range where hunting is allowed and another part where it is not.

Given the number of species present on NFOS, the numerous types of disturbance, and the variables related to each potential disturbance, it is difficult to predict how each animal and herd will react to increased recreation on NFOS. However, some information can be gleaned from other studies. Boyle and Samson (1985) reviewed 166 articles that contained original data on the effects of nonconsumptive outdoor recreation on wildlife. In 81% of the studies, the effects were considered negative. There are studies indicating some of the same wildlife species found on NFOS may underutilize areas near trails, roads and/or human settlement. Such species include elk (Ward 1973, Cassirer et al. 1992), bighorn sheep (Hicks and Elder 1979, MacArthur et al. 1982), black bear (Brown 1980, Goodrich and Berger 1994), mountain lion (Van Dyke et al. 1986), mule deer (Freddy et al. 1986) and raptors (Holmes et al. 1993, Holmes 1994). Recreation impacts have also been observed on turkey (Rick Hoffman, Colorado Division of Wildlife. pers. comm.).

In the recently released Forest Plan and Draft Environmental Impact Statement for the Arapaho and Roosevelt National Forests and Pawnee National Grasslands (U.S.D.A. Forest Service. 1996. Fort Collins, CO), the Forest Service made an assessment of habitat effectiveness. The assessment estimated effective habitat based on distances from travelways (moderate to high use trails and roads) that are open to public use. Their method of estimation is based on known disturbance distances for large mammals. For the foothills and montane lifezones of Boulder County, effective habitat remains for only 41% of the public and private lands within the National Forest Boundary. Almost 60% of this area is relatively disturbed due to human influence. Road and trail densities of 2.0 miles per square mile of land or less are generally recommended as acceptable for certain wildlife species, especially elk, and densities approaching 3.0 or more are generally not recommended.

A strategy for maintaining habitat effectiveness should include: providing blocks of land with no formal trails to provide effective habitat during periods of high recreational use; and encouraging recreationists to stay on trails so activities and movements through the landscape are predictable for wildlife.

6.0 CULTURAL RESOURCES

North Foothills Open Space appears to have been utilized by humans for thousands of years although the prehistoric period is currently not as evident on the landscape as historic times. Following is a general description of the cultural history and prominent cultural features.

6.1Cultural History

Prehistoric habitation and use of northeastern Colorado covers approximately 12,000 years from the late Pleistocene epoch through historic contact. Evidence of occupation is nearly continuous throughout this 12,000 year span, though most of the reliably dated archaeological sites in the region represent the past 5,000 years (Butler 1986).

6.1.1 Prehistoric Context

Paleo-Indian Stage (12,000 - 7,500 years before present): This stage is characterized by a nomadic lifestyle and a hunting and gathering economy based upon the exploitation of large game animals that are now extinct, including mammoth, Pleistocene bison, bear and sloth, and undetermined species of flora. This stage is divided into four periods: Pre-Clovis, Clovis, Folsom and Plano. Changes in technology, reflected by tool shape and size, coincided with shifts in hunting exploitation from mammoth to bison.

Archaic Stage (7,500 - 2,000 years before present): This stage can be divided into Early, Middle and Late periods. The Early Period was characterized by a continental warming trend which resulted in ecological changes. The way of life that developed during this period included increased dependence on small mammals and wild plants, and increased utilization of foothills and montane environments. Material remains include more varied tools, specifically more groundstone implements than those of the Paleo-Indian Stage.

The general hunting and gathering life way that evolved during the Early Archaic Period persisted with only minor alterations throughout the Middle and Late Archaic periods. Cultural

variation during these periods is indicated by changes in projectile point morphology and by increased exploitation and settlement of plains regions during the milder climatic episodes that followed the Early Period.

Ceramic Stage (2,000 - 275 years before present): The termination of the Archaic Stage in eastern Colorado is indicated by the occurrence of three roughly contemporaneous events in the archaeological record: the introduction of ceramic technology, the replacement of the spear thrower with the bow, and the advent of horticulture. However, evidence of plant domestication in northeastern Colorado is scant, and the overall subsistence strategy in this area appears to have remained generally similar to that of the Archaic Stage.

Ceramic Stage cultural remains are frequent in the mountains and foothills areas. Discovered sites include open camps, rock shelters, lithic scatters, tepee ring sites, quarries and rock art. Small side-notched projectile points are characteristic of this stage.

Protohistoric/Contact Stage (275 - 150 years before present): This stage encompasses the period between the earliest contacts of Native Americans with items of European origin and the beginning of direct and frequent contact between Native Americans and people of European descent. The Plains Apache were the earliest known occupants of eastern Colorado during this stage. Many other tribes are known to have utilized the area during this period of accelerated mobility and conflict that followed the acquisition of fire arms and horses. These include, but are not limited to: Palome and Cuartelejo Apache, Comanche, Shoshone, and Wichiti.

Although Native American groups continued to practice the hunting and gathering strategies of the Archaic Stage, extensive modifications in lifestyle were necessary due to the pressure and influence of Euro-American settlement of the region. Evidence of this influence can be seen in the increase of Euro-American cultural materials found at Native American sites and in the gradual increase in restricted movement until the various tribes were assigned to reservations.

6.1.2 Historic Context

Exploration and the Fur Trade (1700-1845): Spain, the original claimant of all of Colorado, held tenuous control throughout the sixteenth, seventeenth and eighteenth centuries by virtue of Coronado's wanderings of 1540-41. The first documented Spaniards to reach the area of modern Denver and beyond came in 1719-20 (Long 1943).

The Adams-Onis Treaty led to Spanish recognition of the United States claims to the area. The claims dated to 1803 when the Louisiana Purchase gave the new American government control of the central and northern Great Plains as far west as the Continental Divide. This led to several government sponsored explorations of the area, including those of Zebulon Pike in 1806 and Major Stephen Long in 1820 (Goetzmann 1959).

Between 1820 and 1845 fur traders and trappers frequented the South Platte Valley. A number of fur forts appeared in the area. During this time a number of trappers, including Ceran St. Vrain, who lent his name to the areas main watercourse, entered the mountains along the route of modern U.S. 36 west from Lyons. Fur trade declined as silk became the preferred material for hats coincidental to exhaustion of the beaver supply from over-trapping.

The Gold Rush and Subsequent Mining: In 1858, Charles Green Russell and a small party of prospectors announced they had discovered gold in the area that became modern Denver. This and subsequent discoveries led to the Rush of 1859 and the beginnings of permanent settlement along the Front Range.

Mining in Boulder began in 1859 as S. James Aikens discovered the first free vein of gold approximately 12 miles west of present-day Boulder. Boulder City grew into a small supply town for the mining camps which included Magnolia, Eaglerock, Sugarloaf, Wall Street, Crisman, Salina, Sunshine and Gold Hill.

There was isolated mining activity along the St. Vrain River. However, this area developed primarily out of agricultural interest. In 1899, gold was confirmed near the south fork of the St. Vrain River and several exploratory mines were operational (*Denver Times*, January 6, 1899). Brief periods of gold and later copper mining activity occurred, but little ore was found.

Nineteenth Century Agriculture: By 1860, the roots of permanent settlement north and east of the fledgling town of Boulder began to appear as farmers and stock raisers, who had turned to being prospectors, returned to farming, establishing farms and running cattle herds along the South Platte and St. Vrain. The markets for these farms were the growing urban centers along the Front Range. Liberal federal land disposal laws encouraged settlement in Colorado and throughout the west (Athearn 1976).

The north-central portion of Boulder County participated in this agricultural boom of the late nineteenth century with the

majority of the land within it passing from federal to private ownership between 1878 and 1900. For North Foothills Open Space, from the 1860s to the early 1880s, a number of claims were entered on lands but all were either revoked or canceled by the General Land Office. For this area, most land activity was in the 1890-1900 period. This is approximately 10 years later than lands to the east at Dowe Flats and Rabbit Mountain and may reflect the poorer quality and ruggedness of the terrain. The fact that some of these lands remained in the public domain (now BLM) also attests to their ruggedness.

An example of one local farmer was Edward S. Lyon. He and his wife Adeline came to Colorado from Connecticut in 1880. They traveled with a group of seven families, most of whom took advantage of opportunities near NFOS. Lyon platted a townsite named Lyons in 1882, although incorporation did not occur until 1891. By 1885 Lyon patented his farm/ranch operation in NFOS. He later formed the Evans Townsite and Quarry Company with Giff Evans and Hiram Sawyer (Lyons Historical Society 1977).

Irrigation ditches were important in order to provide water to many farms. It has been estimated that over 40 ditches and subsequent water rights were determined during the 1860s from the St. Vrain Creeks and Lefthand Creek. The South Ledge Ditch, which takes water from the South St. Vrain Creek on NFOS, is an example of such a ditch. Originally appropriated in 1865, water rights were adjudicated in 1882 and 1907.

This first farming boom ended around the turn of the 20th century due to drought and a national depression that devastated Colorado's silver mines.

Twentieth Century Agriculture: A second wave of settlement of NFOS occurred in the years after World War I. Table 6 shows the land patent activity and the increase that occurred after the war. The activity reflects improved farming/ranching techniques and the introduction of sugar beets into north-eastern Colorado. Mr Leonard Laukenen reports that his family developed a farming business in 1912 (Laukenen 1993). George H. and Ella Winters began farming in what became known as the Hall Ranch in 1921. They continued through 1943.

Electricity was another improvement that surfaced in this period. The Longmont Hydro-Electric Plant was built near Apple Valley Road in 1912. Longmont Reservoir is connected to the power plant via the Longmont Aqueduct. The aqueduct flows through portions of the BLM parcels on the north side of Hall Ranch.

Table 7

LAND OWNERSHIP/PATENTING ACTIVITY

Hall Ranch

3 North, 70 West:

8/13/1881	C. Bradford
1/30/1885	E. Lyon
1/30/1885	B. Lewis

3 North, 71 West:

5/05/1883	J. Tumbleson
1/18/1890	R. Clark
8/04/1891	E. Kraig
3/17/1892	A. Smith
1/13/1893	R. Weese
7/31/1903	S. Crona
8/17/1903	W. Davis
9/24/1903	A. Fisher
5/23/1906	J. Lee
1/28/1908	J. Jenks
6/11/1908	D. Jenks
12/27/1909	H. Laycook
4/27/1911	S. Blair
4/09/1915	J. Jenks
4/15/1915	H. Hardy
7/31/1918	E. Fitting
6/17/1919	L. Weir
6/24/1919	L. Weir
6/28/1919	R. Epley

Heil Ranch

2 North, 70 West:

6/11/1912	J. Jones
1/03/1917	S. Pace
11/16/1921	C. Boinay
1/13/1923	C. Boinay

3 North, 70 West:

6/26/1883	N. Foster
1/15/1890	A. Sanford
7/02/1890	J. Dewey
1/29/1891	J. Deiney
10/27/1891	J. Rebstock
5/11/1892	O. Botts

Heil Ranch (continued)

8/24/1896	M. Smead
10/11/1919	R. Kiley
1/29/1920	G. Roland

2 North, 71 West:

9/13/1881	J. Chambers
9/16/1887	G. Larison
3/31/1888	S. Geer
1/18/1890	W. Kimber
6/02/1890	W. Tiffin
12/15/1890	L. Chapman
3/06/1891	C. Ingersol
3/17/1892	A. Nelson
4/09/1892	P. Haldi, Sr.
8/01/1892	W. Tiffin
7/24/1893	J. Plumlee
2/20/1894	S. Crona
6/28/1896	G. Hinton
10/28/1897	C. Ingersol
8/18/1898	W. Edwards
9/28/1904	H. Harison
6/12/1907	M. Allen
5/04/1917	C. Pace

Quarrying and Urban Growth: Denver and north-central Colorado experienced rapid growth between 1870 and 1890. During this time, building materials changed from wood and brick to stone. Near Lyons, land changed hands from agriculture to quarrying for building stone. Stone from the Lyons area quarries found its way into many Denver buildings and was shipped throughout the United States.

In 1880, Edward Lyon settled 160 acres in the area later named for him. In 1885, he patented acreage on what was to become the Hall Ranch. Recognizing the market for stone building material, he began quarrying and hauling to Longmont for shipment to Denver. The distinctive pink Lyons sandstone was a popular building material. Lyon, Griffith Evans and H.F. Sawyer established the first sandstone quarry in the region.

Buildings at the University of Colorado made extensive use of Lyons sandstone, beginning around the turn of the century. Newspaper articles from the 1940s to 1960s state that the University operated quarries at the Ingersoll quarry and elsewhere on the Heil Ranch. In the mid-1950s, the Ingersoll (located on the Heil Ranch) and Hall (located southwest of Lyons) quarries are listed in the Colorado School of Mines publication as operated by the University of Colorado.

By the early 1900s, cement, which was strong and reasonably inexpensive, began replacing stone as a major building material.

The Great Depression and World War II Era: Land ownership changed in the area in the post-World War II period. In 1945 A.A. and Dora C. Johnson, owners of what became Heil Valley Ranch, sold out to Orville C. and Mable Pickett who farmed for two years.

In 1949, the Heils' came from Sugar City to take over the farm that was to bear their name. Bertha Heil and her brothers recalled the decision to move from Sugar City (a sugar beet processing town in south-eastern Colorado) as partially based upon their father's ill-health which was adversely affected by the pollution of the sugar refineries. When the Pickett's farm came for sale, the decision was made that they would move (Heil Family Interview 1995).

Similarly, George H. and Ella Winters sold what became part of the Hall Ranch after over 20 years of ownership in 1943. Lennora Otto purchased the land and held it for 10 years. Leonard H. Hein owned the land in 1953.

In the mid-1940s Hallyn and June Hall began ranching on what became known as the Hall Ranch. Throughout the 1940s the

Halls expanded their holdings. In 1954 they purchased property from Hein.

After World War II the trend in Colorado was toward consolidation of the area's farms and ranches. The Hall and Heil ranches are examples of this trend. The lands of NFOS have been predominantly agricultural since the 1950s. Both families explored other activities on their lands including quarrying, hunting, timber and tourist-related services, but ranching remained the predominant lifeway.

6.2Cultural Sites and Structures

A Class III cultural resource inventory was conducted over most of North Foothills Open Space during the summer of 1995 (Grant et al. 1995). The following summarizes their findings.

6.2.1 Prehistoric Sites

Fourteen prehistoric sites were located on North Foothills Open Space. They mainly consisted of small scatters of flaked stone artifacts. Some sites also contain ground stone artifacts, and one consists exclusively of ground stone. The flaked stone is the by-product of stone tool manufacturing. It indicates that the final stages of lithic reduction into stone tools, and tool resharpening, and refurbishing, occurred at the sites and probably in conjunction with faunal resource procurement and processing. The ground stone consists of hand stones (manos) and fragments of grinding slabs (metates). Their presence indicates floral resource processing. The manufacture of manos and metates from the locally available Lyons sandstone undoubtedly occurred, and ground stone fragments on the sites could in some cases be the result of artifact manufacture and not resource processing.

Several sites contained diagnostic projectile points. Functionally diagnostic tools such as scrapers, choppers, knives or hammers were not found at the sites. The absence of tools at the sites is likely due, at least in part, to collection by Euro-Americans over the last 130 years. Collections of artifacts from North Foothills Open Space are present at the University of Colorado Museum, as well as collections with only generalized locational data such as "South St. Vrain," "Near Lyons," etc. Unfortunately, the artifact collections have virtually no information with them, but they do indicate that sites have been impacted from casual collection. The low overall number of sites may also be due, in part, to the historic use of the properties, suggesting some sites were destroyed by ranching and quarrying activities.

Thirty-five prehistoric isolated finds were documented. Based on the 20 mano or metate fragment occurrences, the majority of the

isolated finds were ground stone. Edge-ground cobbles comprise two of the ground stone isolated finds, with one containing two cobbles. Similar edge-ground cobbles are not common, but are occasionally reported from the plains. Some consider them "hide processing tools," but no definitive evidence has been presented.

The eight diagnostic projectile points recorded provide sparse but direct evidence that North Foothills Open Space was utilized during nearly all prehistoric time periods, including the Early, Middle and Late Archaic periods, and the Ceramic or Late Prehistoric period. The Paleo-Indian period is the only prehistoric era not represented. Projectile points found include: Mount Albion corner-notched point (Early Archaic); stemmed, indented-base point (Middle Archaic); large corner-notched point (Late Archaic); hog back corner-notched point (Ceramic Period); and Plains side-notched point (Protohistoric).

The most common projectile points present were those from the Ceramic Period. Four examples were recorded during the survey, and numerous other specimens from NFOS and the Lyons area are curated at the University of Colorado Museum. This is also the most common projectile point type from the plains-foothills transition zone. It is worth noting four of the Ceramic Period points, and the Middle Archaic Period point, are made of Kremmling Chert, a tool stone available in Middle Park. The other Ceramic Period point is constructed of jasper, which may also be from a mountain source. The Mount Albion point is made of locally available quartz. The Late Archaic point is made of tan chert from an unknown source. No definite plains sources of lithic material are represented.

6.2.2 Historic Sites and Structures

Following is a summary of prominent cultural features and sites.

1. Sandstone Quarry: This site is located on the east side of Hall Ranch near the Town of Lyons. It consists of 52 small sandstone quarry pits. It is located with a 177 acre homestead claim filed by Edward Lyon on January 20, 1885. No remains of site use dating to this period were found.

2. Hall Ranch Complex: This site is located in a valley bottom just north of State Highway 7. It consists of several buildings, structures and features associated with a historic ranching operation. The oldest building, now part of the white stucco building, was apparently built around 1890. A shed located at the rear of the house may also have been built around the turn of the 20th century. This site was originally the homestead of J.W. Tumbleson, patented in 1883.

3. Nelson Ranch Complex: This is a historic ranch consisting of a standing house and partly collapsed root cellar, a cement stave silo, a partial corral and associated features. It is located in Antelope Park. The house is a vernacular wood from single story building, apparently dating to the early 1920s. This is the location of the Richard Clark homestead, dating to 1890. However, no evidence remains of 19th century buildings. This site was occupied by the Nelson family from the early 1920s.

4. Archy Ranch - Weir Homestead: This historic ranch consists of several buildings and associated features and is located on the north part of Hall Ranch. Much of the site is on two terraces cut into a hillside. This ranch was occupied by Mr. and Mrs. James Archy from the 1920s until purchased by the Halls and incorporated into the Hall Ranch. Historic records indicate this is the location of the Levi Weir homestead patented in 1919. It is possible that some of the log buildings are the original habitation dating to the end of the 19th century, with the house built around the time of the patent, or in the early 1920s.

5. Plumlee Homestead/Ranch Site: This site consists of 5 structural remains or foundations, including a 2,400 square foot house ruin, and associated stone fences, depressions, roads, and a platform. This site is located within a 160 acre homestead claim filed by Joel Plumlee (for whom Plumlee Canyon is named) on July 24, 1893 on what is now the Heil Valley Ranch. Exact construction dates and locations within the homestead are unknown.

6. Pace Homestead Ranching and Quarrying Complex: This site consists of sandstone quarries and remains of structures and buildings and is located in the middle of Heil Valley Ranch. This site is part of an extensive ranching and quarrying operation homesteaded by Edward Pace between 1919-1921. Exact construction dates and locations within the homestead are unknown. The Pace properties were originally used for ranching but as Pace saw increased economic opportunities in stone quarrying, he began investigating and exploiting potential quarry sites throughout his property.

7. Geer Ranch Complex: This site consists of associated farm yard features and structures located in Geer Canyon on Heil Valley Ranch. The larger white house was probably constructed around 1920. The log house may have been the original Geer homestead and was built between 1890 and 1910. This site has homesteaded by Solomon Geer (for whom Geer Canyon is named).

8. Whitestone and Vickery Quarry Complex: This site is located in the northern part of Heil Valley Ranch. It consists of a

large tabular and block sandstone quarry, associated waste rock dumps, platforms, foundations, and ranching features. The ranching features are probably related to the maintenance of draft animals to work the quarry. The northern part of the site consists primarily of habitation features, while the southern half consists of the main quarry. This site is the remains of the Whitestone and Vickery Quarry which was operational from the 1890s-1960s. It was one of the more important quarry operations in the Lyons area. The quarry is referenced in historic publications on quarrying and building materials. It was noted for flagstone and veneer strips. This was operated intermittently by the University of Colorado at Boulder to provide sandstone for campus buildings.

9. Ingersoll Quarry: This site consists of a large sandstone quarry and a complex of related structures, roads and features. The site is part of a large homestead patent filed by Charles Ingersoll in 1893. Quarrying activities continued on this property into the 1970s. A lack of domestic and structural artifacts on site agrees with historical accounts which relate that quarry workers commuted to work from surrounding farms and ranches. The quarry is referenced in historic publications on quarrying and building materials. It was noted for fine-grained, light colored sandstone. The quarry provided sandstone for buildings on the University of Colorado, Boulder campus.

7.0 VISITOR SERVICES

7.1Recreation Potential

North Foothills Open Space possesses the size, terrain, scenery, views and resources which can make it a place that people will enjoy visiting. Non-urban recreational opportunities may include hiking, picnicking, mountain biking, horseback riding, fishing, wildlife viewing, rock climbing and environmental education can be accommodated. Opportunities may also exist for citizens with special needs.

Recent visitor surveys on other Boulder County Open Space properties indicate that hikers (33%) and picnickers (25%) are the predominant users followed by anglers (16%), mountain bikers (14%), wildlife viewers (8%), dog walkers (8%) and equestrians (3%) (Fried 1995).

Additional pertinent information can be gleaned from the survey. Mountain biking is a growing form of recreation as bicyclists made

up only 2% of open space visitors in 1985. At Walker Ranch Open Space 35% of visitors are bicyclists. Approximately 80% of park visitors live in Boulder County and the majority have lived here less than 5 years. Sixty-six percent of equestrians and mountain bicyclists desire trails over 5 miles in length. Hikers prefer trails 2 to 5 miles long. Half the anglers want easy access to fishing holes. They would prefer less than 1/2 mile hike.

Within Boulder County, the formal nonmotorized trail systems occurring on Boulder County Open Space, City of Boulder Mountain Parks, City of Boulder Open Space, Eldorado Canyon State Park and U.S. Forest Service result in 340 miles of trail (Boulder County Parks & Open Space, Trail Database). Of this, 319 miles are open to equestrians and 161 miles are open to mountain bikes. These figures do not include "social" trails that have been created by public land visitors, livestock and wildlife. Additionally, there are approximately 130 miles of multiple use roads that are used by motorized recreationists and are also being used by nonmotorized visitors. These include roads in the following areas: West Magnolia Road, Caribou, Switzerland Trail, Coney Road/Peaceful Valley, Winiger Ridge, Bunce School Road, Rock Creek, Gordon Gulch, Peewink Mountain, Pennsylvania Gulch, Walker Mountain/James Creek/Spring Gulch, Johnny Park Road, House Rock and Miller Rock.

Use of the property must be compatible with the protection of the resources and other visitors. Some direct and indirect impacts from recreation include displacement of wildlife (Knight and Gutzwiller 1995), spread of exotic plants (Benninger-Truax et al. 1992, Tyser and Worley 1992), soil compaction, erosion and the loss of vegetation (Hammitt and Cole 1987), and vandalism. Every effort needs to be made to lessen human impact on the resources, direct visitors to less sensitive areas, and to design for human use that minimizes resource damage and reduces conflict.

7.1.1Significant Resources

The geology, topography, vegetative diversity and cultural features make for an interesting and pleasing landscape for visitors. It allows for trails to pass through a variety of landscape features. Trails that make transitions and provide changes in experiences, such as from meadow to forest or from hilltop to valley, are more pleasing to visitors. Following are some of the significant resource types of North Foothills Open Space.

Views: Throughout NFOS are significant views of the Continental Divide, plains, and the initial rise of the foothills. For example, Antelope Park on Hall Ranch has good views looking west of the Continental Divide including Meeker and Long's Peaks, while at the top of Red Hill Gulch on Heil Valley

Ranch are views of the plains and foothills looking north toward Boulder.

Places of Interest: The mixture of forests and meadows along with the varied topography creates a "sense of place" to many locations including Antelope Park, Red Hill Gulch and Upper Geer Canyon, along with many forest openings.

Geology: The dramatic hogbacks, exposed sandstone, granite domes, cliffs and canyons enhance the interest of the landscape. The Dakota Hogback is evident throughout Heil Valley Ranch, particularly on the east side of Red Hill Gulch. The upper part of Lykins Formation provides the red in Red Hill. The sandstone outcrops near Hat Rock on Hall Ranch are Fountain Formation capped by Ingleside Formation. Tilted slabs of Lyons Sandstone are present throughout the central part of Heil Valley Ranch and eastern Hall Ranch (Crona Hill) and provided a source of building stone that was quarried on both properties.

Cultural Resources: The old homesteads and remains of quarries and buildings add to the diversity of experiences that a visitor may encounter. The Nelson Homestead, on the edge of Antelope Park of Hall Ranch, provides visual interest. The quarry complexes, particularly those on Heil Valley Ranch, provide interest and a sense of place.

7.1.2Trail System Considerations

Trail opportunities on Hall Ranch include: connecting Hall Ranch with Buttonrock Preserve; good loop potential around Antelope Park and Lower Antelope Park; connecting Lyons with Hall Ranch; continuing the South St. Vrain Trail west from its current terminus to Hall Ranch. Topography provides some constraint as elevation steeply increases from the perimeter toward the center of the property.

Access to Hall Ranch can be achieved at several locations. State Highway 7 provides good access, though existing roads from SH 7 toward Antelope Park are steep. Access from SH 7 can also occur to Crona Hill portion of Hall Ranch. Access can also be provided from Buttonrock Reservoir toward Antelope Park, though only hiking is allowed through Buttonrock while horses and mountain bikes are not allowed. Antelope Drive off of Apple Valley Drive has been an historic access to Hall Ranch. The county is in the process of buying Antelope Drive.

Trail opportunities on Heil Valley Ranch include: a trail connection through Heil Valley Ranch north to Lyons; good loop potential within the property as well as spurs to vistas and special places.

Access to Heil Valley Ranch can be achieved from Geer Canyon Drive off of Lefthand Canyon Drive. Additional access needs to occur from the north. Current northern access points within Lyons Park Estates do not lend themselves to being major points of access due to topography and conflicts with homes. The potential of additional access points along the northern boundary of Heil Valley Ranch needs exploring. Access from the east, along North Foothills Highway, also needs additional consideration. The only current legal access along North Foothills Highway is through Trevarton Open Space, however topography, lack of parking space and critical environmental resources preclude serious consideration through this property.

7.1.3Other Recreation Resources

Other recreation opportunities exist on North Foothills Open Space. The major fishing resource is the South St. Vrain Creek on the southern portion of Hall Ranch. The county has acquired about a one mile segment of the creek. Access can be provided off of Old St. Vrain Road as well as from the north side of State Highway 7 through a stock underpass.

Opportunities for picnic areas exist. The Geer Canyon Drive entrance to Heil Valley Ranch has proper topography and vegetation to allow for the development of a picnic area. A group shelter would also be possible in this area. At Hall Ranch, topography along State Highway 7 is suitable for a picnic ground, however vegetation is relatively open except for near the Hall Ranch residence and along the South St. Vrain Creek.

Climbing resources exist on both properties, though more opportunity appears to exist on Heil Valley Ranch. Climbing opportunity appears to exist within cliffs in the Precambrian rock units, Fountain Formation, Lyons Sandstone, and lower Dakota Group. Some of the cliffs also contain significant environmental resources in the way of cliff-nesting raptors and colonial swifts and swallows. Care needs to be taken to protect these resources.

The Geer Canyon area of Heil Valley Ranch is topographically isolated from the rest of the ranch. The isolation lends itself to consideration of uses that would be enhanced by a seperation from other trail and picnic ground users. The significant resources of the area (raptor nest, old-growth forests, wild turkey nesting area) indicate that the uses, and the timing of use of this area need to be carefully planned.

7.2Existing Fencing

Fencing can be used to demarcate property boundaries. It is used to funnel access to appropriate locations and reduce trespass

between private and public lands. Fencing is also used to control livestock. Sometimes topographic features, such as a steep cliff, acts as a fence.

Before establishing a fence line or replacing existing fence, a survey is generally conducted to assure that the fence is on the legal property line.

Some fencing exists on North Foothills Open Space (Figures 11a and 11b). On Heil Valley Ranch, most of the existing fencing is along the east property line along with portions of the north and south property lines. Some of the fencing is in poor condition and in a few locations cliffs are used with rock walls and fencing. Very little fencing exists on the west, except that which was put up by one adjacent owner around their property. There is no internal fencing on Heil Valley Ranch. Trevarton Open Space has a perimeter fence.

Hall Ranch has fencing on its east boundary adjacent to the Town of Lyons as well as its southern boundary along State Highway 7. The two parcels south of South St. Vrain Creek have perimeter fencing. The Bureau of Land Management parcels contain some perimeter fencing. There is much internal fencing on Hall Ranch. It is probable that much of this dates from the different homesteads and ranches that were eventually assembled by the Halls. Some of the fencing is in poor condition. Cliffs are used as fencing in some locations.

Figure 11a - Hall Ranch - Existing Fence

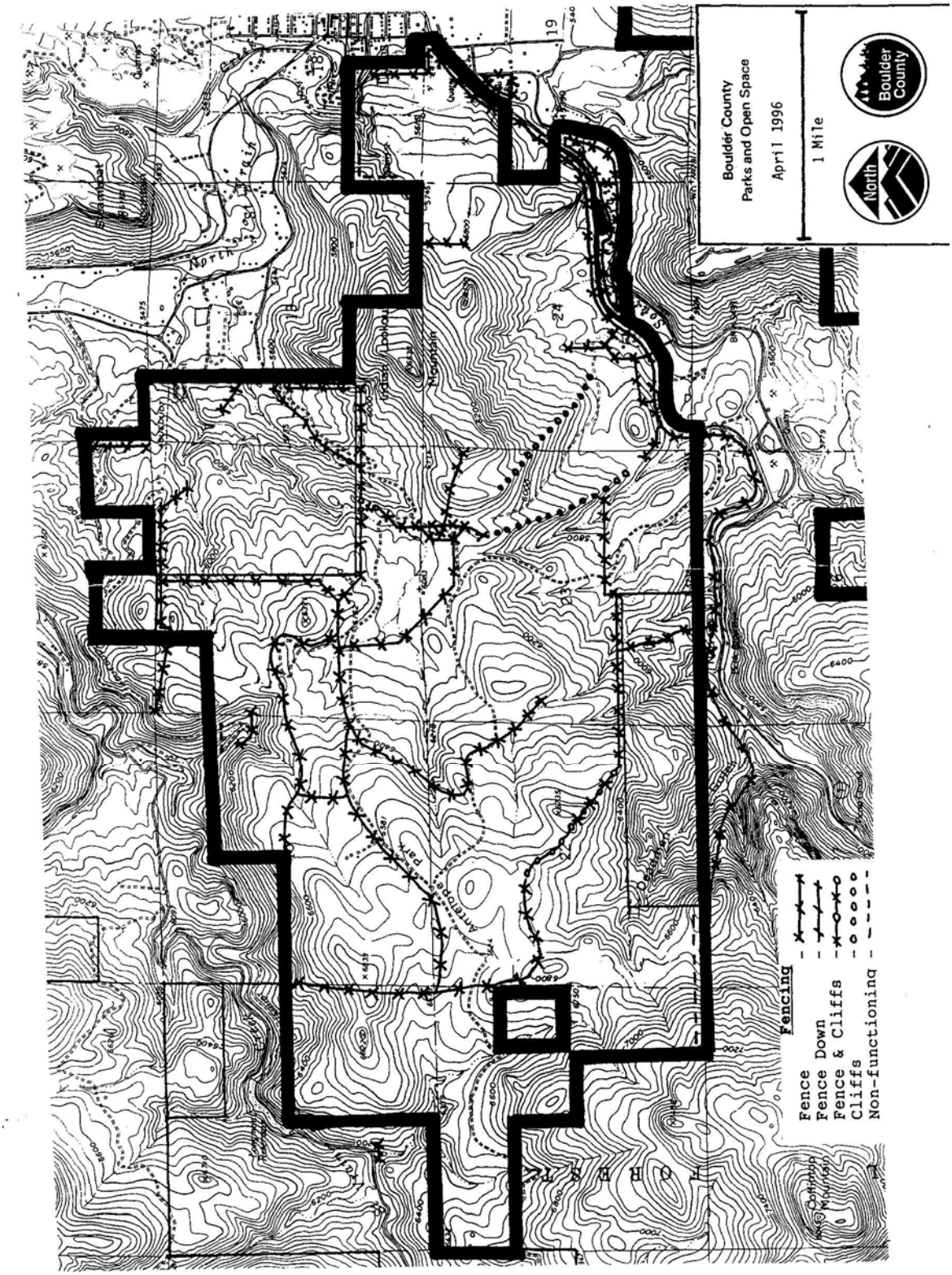
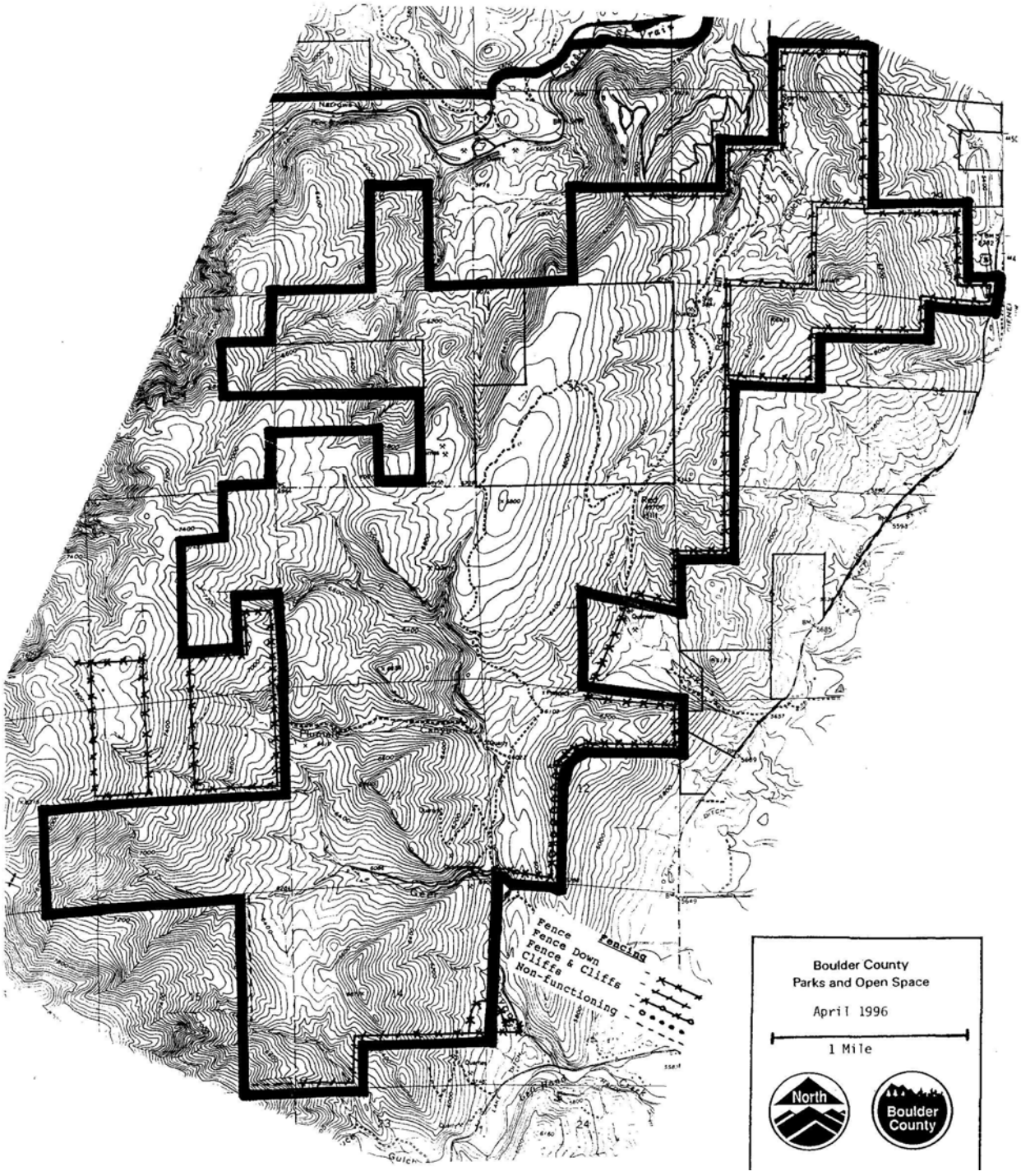


Figure 11b - Heil/Trevarton - Existing Fence



7.3Safety Considerations

Hazards exist throughout North Foothills Open Space that need to either be actively managed or made aware to visitors. These include:

Old Homesteads: The Nelson and Archy Homesteads are decaying. Depending on what is decided regarding the cultural resources of the site, action needs to be taken on both buildings to make them safe for any visiting public.

Loose Rock: The exposed rock formations, some of which are unstable, and quarries may present hazards to visitors.

Flooding: Flashflood danger is possible in some of the intermittent drainage. Additionally, South St. Vrain Creek can present a major spring flood hazard. Trails should be located to minimize damage that could occur from flooding.

Wildlife: Encounters with prairie rattlesnakes, ticks, black bears and mountain lions may all present hazards to visitors.

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APPENDIX 1
SOILS INFORMATION

The following information is a summary of each soil series found on North Foothills Open Space. For more detailed information, consult "Soil Survey of Boulder County Area, Colorado" produced in 1975 by USDA Soil Conservation Service.

Ascalon sandy loam (AcC)
This soil is deep and well drained. It is formed on terraces and uplands in loamy mixed alluvium and wind-laid materials. The vegetation on this soil series is dominated by grasses. A small amount of this soil is found on the Hall Ranch around the ranch buildings just above the S. St. Vrain Creek.

*deep, well-drained
*slopes - 3-5%
*runoff - medium
*erosion hazard - moderate to high
*slight limits for trails

Baller stony sandy loam (BaF)
Forms on east slopes of ridges. Large amounts of stone occur on the surface and throughout the soil. There are small areas of rock outcrop present near ridgetops. The dominant vegetation on this soil series are grasses and scattered ponderosa pine. This soil is found on the east slope of the Dakota Hogback on Trevarton, Loukonen and Heil parcels.

*shallow and well drained
*slopes - 9-35%
*runoff - rapid
*erosion hazard - high
*moderate to severe limits for trails (slope)

Colluvial Land (Cu)
This soil series is in long narrow valleys. The surface layers are dominated by sandy loam that contains stones and cobbles. Most of this soil is covered by grass and portions were once sultivated. This soil forms a broad north-south valley through the Heil Ranch between the Dakota Hogback and the Lyons Formation. It is also present on the Hall Ranch.

*erosion hazard - high
*runoff - rapid
*moderate to severe limits for trails (cobbles, runoff)

Fern Cliff - Allens Park - Rock outcrop complex (FcF)
This soil series is composed of deep, sell-drained soils formed in loamy mixed alluvium on short fans and valley side slopes in the mountain area. The vegetation is dominated by coniferous forest. This soil is found in the western portion of the Hall and Heil ranches.

*deep, well drained
*slopes - 15-60%
*runoff - medium to rapid
*erosion hazard - high
*moderate to severe limits for trails (slope)

Goldvale - Rock outcrop complex (GrF)
Deep, well drained soils that formed on mountainsides in loamy alluvium make up this series. This soil is formed in residuum weathered from granite and sandstone. The vegetation is dominated by coniferous forest. It is found in the western portion of the Heil Ranch.

*deep, well drained
*slopes - 9-55%
*runoff - rapid
*erosion hazard - high
*moderate to severe limits for trails (rock outcrop)

Juget - Rock outcrop complex (JrF)
This soil series is shallow, somewhat excessively drained, and formed on mountain slopes and ridges in sandy residuum weathered from granite. The vegetation is dominated by coniferous forest. It is found in the western portions of the Hall and Heil ranches.

*shallow, excessively drained
*slopes - 9-55%
*runoff - rapid
*erosion hazard - high
*moderate to severe limits for trails (slope)

Kutch clay loam (KuD)
This soil series is formed on uplands and valley sides in clayey residuum. It is moderately deep and well drained. It supports native shortgrass and mid-grass vegetation. There is a small amount found on the Loukonen parcel.

*deep, well drained
*slopes - 3-9%
*runoff - rapid
*erosion hazard - high
*moderate limits for trails (slope)

Niwot soils (Nh)
This soil series is found on stream terraces and bottoms. It is made up of deep, poorly drained soils that are shallow over gravelly sand. It is found on the Hall Ranch in the floodplain of the South St. Vrain River. It supports grassland and riparian vegetation.

*poorly drained
*slopes - 0-1%
*runoff - slow
*erosion hazard - slight
*high water table
*moderate to severe limits for trails (poorly drained)

Peyton - Juget very gravelly loamy sand (PgE)
This is a deep, well drained soil formed on upland hills and valley side slopes in weathered loamy and sandy material that has been locally transported. Vegetation is dominated by grasses and scattered pines. Most of lower and upper Antelope Parks on the Hall Ranch is this soil series.

*deep, well drained
*slopes - 5-20%
*runoff - slow to medium
*erosion hazard - moderate to high
*moderate limits for trails (very gravelly)

Pinata - Rock outcrop comples (PrF)
This is comprised of moderately deep, well drained soils that formed on upland ridges and side slopes. They developed in stony sandy to clayey residuum and colluvium weathered from sandstone. The vegetation on this soil series in dominated by ponderosa pine and grass. It is found on the east flanks of the Lyons Sandstone hogback on both the Hall and Heil ranches.

*deep, well drained
*slopes - 5-55%
*runoff - medium to rapid
*erosion hazard - high
*moderate to severe limits for trails (rock outcrops)

Rock outcrop (Ro)
Consists of steep slopes and cliffs. These areas are exposed bedrock, sometimes intermixed with shrub and grassland communities. Included are areas of shallow soil that have less slope and are in areas of mixed colluvium near the bottom of slopes. This landform type is found extensively around Indian Lookout Mountain on the Hall Ranch and on the western flank of the Lyons Formation uplift on the Heil Ranch.

*runoff - rapid
*erosion hazard - moderate to severe
*severe limts for trails (exposed bedrock)

Sixmile stony loam (SmF)
This soil series is formed on upland ridges and sideslopes in calcareous loamy residuum weathered from shale. Associated with this soil are are narrow bands of rock outcrop and rock excarpments. Also associated near the base of the slopes are small areas of colluvial land. The vegetation is dominated by grasses, shrubs and scattered ponderosa pine. This soil is found on the west side of the Dakota Hogback on Heil, Trvarton and Loukonen parcels.

*moderately deep and well drained
*slopes - 10-50%
*runoff - rapid
*erosion hazard - high
*moderate to severe limits for trails (slopes)

APPENDIX 2
PLANT ASSOCIATIONS

Ponderosa Pine Series

Ponderosa pine/kinnikinnik
Pinus ponderosa/Arctostaphylos uva-ursi

Ponderosa pine/sun sedge
Pinus ponderosa/Carex heliophila

Ponderosa pine/mountain mahogany
Pinus ponderosa/Cercocarpus montanus

Ponderosa pine/mountain mahogany/big bluestem
Pinus ponderosa/Cercocarpus montanus/Andropogon gerardii

Ponderosa pine/mountain mahogany/New Mexico feathergrass
Pinus ponderosa/Cercocarpus montanus/Stipa neomexicana

Ponderosa pine/Rocky Mountain juniper
Pinus ponderosa/Juniperus scopulorum

Ponderosa pine/Rocky Mountain juniper/mountain mahogany
Pinus ponderosa/Juniperus scopulorum/Cercocarpus montanus

Ponderosa pine/spike fescue
Pinus ponderosa/Leucopoa kingii

Ponderosa pine/three-leaf sumac/big bluestem
Pinus ponderosa/Rhus trilobata/Andropogon gerardii

Ponderosa pine/bitterbrush
Pinus ponderosa/Purshia tridentata

Ponderosa pine - Douglas fir/mountain muhly
Pinus ponderosa - Pseudotsuga menziesii/Muhlenbergia montana

Douglas Fir Series

Douglas fir/waxflower
Pseudotsuga menziesii/Jamesia americana

Douglas fir/ninebark
Pseudotsuga menziesii/Physocarpus monogynus

Rocky Mountain Juniper Series

Rocky Mountain juniper/mountain mahogany
Juniperus scopulorum/Cercocarpus montanus

River Birch Series

River birch
Betula occidentalis

Mountain Mahogany Series

Mountain mahogany/grass
Cercocarpus montanus/Elytrigia dasystachya

Mountain mahogany - three-leaf sumac/big bluestem
Cercocarpus - Rhus trilobata/Andropogon gerardii

Mountain mahogany/Scribner needlegrass
Cercocarpus montanus/Stipa scribneri

Mountain mahogany/needle-and-thread grass
Cercocarpus montanus/Stipa comata

Mountain mahogany/New Mexico feathergrass

Cercocarpus montanus/Stipa neomexicana

Big Bluestem Series

Big bluestem - little bluestem

Andropogon gerardii - Schizachyrium scoparium

Western Wheatgrass Series

Western wheatgrass/blue grama

Pascopyrum smithii/Bouteloua gracilis

Little Bluestem Series

Little bluestem

Schizachyrium scoparium

Needle-and-Threadgrass Series

Needle-and-threadgrass/blue grama

Stipa comata/Bouteloua gracilis

New Mexico Feathergrass Series

New Mexico feathergrass

Stipa neomexicana

Redtop Series

Redtop

Agrostis gigantea

Spikerush Series

Spikerush species

Eleocharis sp.

Narrowleaf Cottonwood Series

Narrowleaf Cottonwood - Peach-leaved willow/sandbar willow

Populos angustifolia - Salix amygdaloides/Salix exigua

APPENDIX 3
SPECIES RARITY RANKING SYSTEMS

1.U.S. Fish and Wildlife Service, Division of Endangered Species and Hibitat Conservation - Endangered and Threatened Wildlife and Plants.

Categories:

LE - Listed Endangered
LT - Listed Threatened
PE - Proposed Endangered
PT - Proposed Threatened
C1 - Candidate for Listing
C2 - Under Review

2.U.S. Forest Service Region 2 - Threatened, Endangered and Sensitive Plants and Animals.

FS - Sensitive Species

3.State of Colorado - Department of Natural Resources, Division of Wildlife - Colorado Threatened or Endangerd Species and Colorado Species of Special Concern/Species of Undetermined Status.

Categories:

E - Endangered
T - Threatened
SC - Special Concern
U - Undertermined Status

4.Colorado Natural Heritage Program (CNHP) - Species and Natural Communities of Special Concern. (S = State rank; G = Global rank).

Catergories:

1 -Extremely rare (5 or fewer populations)
2 -Very rare (5 to 20 populations)
3 -Rare to uncommon (20 to 100 populations)
4 -Common (Generally greater than 100 populations, but may be restricted)
5 - Very common, secure under present conditions
A -Accidental
H -Historically known, but not verified for 15+ years
B -Breeding status
N - Non-breeding status
U -Status uncertain, often because of low search effort or cryptic nature of the element
? -The rank is somewhat questionable, often due to lack of information
X -Extirpated

5.Boulder County Nature Association (BCNA) - Boulder County Avian Species of Special Concern (Generally focuses on breeding species).

Categories:

1 - Extirpated
2 - Rare
3 - Declining
4 - Isolated/Restricted
5 - Undetermined Status
W - Rare or Restricted in Winter

6.Dr. David Armstrong, Center for Interdisciplinary Studies, University of Colorado - Mammalian Fauna of Boulder County and Species of Special Concern.

Categories:

1 - Extirpated
2 - Threatened & Endangered
3 - Declining
4 - Isolated/Restricted
5 - Undetermined Status

APPENDIX 4

POTENTIAL RARE PLANT SPECIES OF NORTH FOOTHILLS OPEN SPACE

(See Appendix 3 for Descriptions of Rarity and Status Rankings)

Species	CNHP Rank	Federal Status	State Status	USFS
Plants				
Aletes humilis				
Larimer Aletes	G2G3 S2S3	C2		FS
Aristada basiramea				
Forktip Three-awn	G5 S1			
Carex leptalea				
Bristle-stalk Sedge	G5 S1			
Cypripedium pubescens				
Yellow Lady's-slipper	G5 S2			
Heuchera richardsonii				
Richardson's Alum-root	G5 S1			
Hypoxis hirsuta				
Yellow Stargrass	G5 S1			
Isoetes echinospara				
Quillwort	G5?S2			
Juncus brachycephalus				
Small-headed Rush	G5 S1			
Lilium philadelphicum				
Wood Lily	G5 S3			
Listera convallariodes				
Broad-leaved Twayblade	G5 S2			
Physaria bellii				
Bell's Twinpod	G2 S2	C2		
Potentilla effusa var rupincola				
Rocky Mountain Cinquefoil	G? S2	C2		FS
Pyrola picta				
Pictureleaf Wintergreen	G4G5 S2			
Spiranthes diluvialis				
Ute Ladies' Tresses	G2 S2	LT		
Viola pedatifida				
Prairie Violet	G5 S2			

APPENDIX 5
POTENTIAL MAMMALS OF NORTH FOOTHILLS OPEN SPACE

Information for this list is taken from "Mammalian Fauna of Boulder County", Boulder County Comprehensive Plan: Environmental Resources Element (1984).

Habitat Codes: C - Coniferous Woodland/Forest; D - Deciduous Woodland (Riparian); G - Grasslands and Meadows; R - Rock and Talus; S - Shrublands; W - Wetlands

Species	Habitat
INSECTIVORES	
Masked Shrew (*Sorex cinereus*)	C,D,G,R,W
Montane Shrew (*Sorex monticolus*)	C,D,G,R,W
Dwarf Shrew (*Sorex nanus*)	C,D,G,R,S,W
Merriam's Shrew (*Sorex merriami*)	C,G,S
BATS	
Little Brown Bat (*Myotis lucifugus*)	C,D,G,S,W
Long-eared Myotis (*Myotis evotis*)	C,G,W
Fringed Myotis (*Myotis thysanodes*)	C,G
Long-legged Myotis (*Myotis volans*)	C,D,G,W
Western Small-footed Myotis (*Myotis leibii*)	D,G,S,W
Silver-haired Bat (*Lasionycteris noctivagans*)	C,D,G,W
Big Brown Bat (*Eptesicus fuscus*)	C,D,G,S,W
Hoary Bat (*Lasiurus cinereus*)	C,D,G
Townsend's Big-eared Bat (*Plecotus townsendii*)	C,G,S
RABBITS AND ALLIES	
Nuttall's Cottontail (*Sylvilagus nuttallii*)	C,D,G,S
White-tailed Jackrabbit (*Lepus townsendii*)	C,G
Black-tailed Jackrabbit (*Lepus californicus*)	C,G,S
RODENTS	
Least Chipmunk (*Eutamias minimus*)	C,D,R,S
Colorado Chipmunk (*Eutamias quadrivittatus*)	C,R,S
Yellow-bellied Marmot (*Marmota flaviventris*)	C,G,R,S
Wyoming Ground Squirrel (*Spermophilus elegans*)	C,G
Rock Squirrel (Spermophilus variegatus)	C,D,G,S
Golden-mantled Ground Squirrel (*Spermophilus lateralis*)	C,G,R,S
Black-tailed Prairie Dog (*Cynomys ludovicianus*	D
Fox Squirrel (*Sciurus niger*)	D
Aberts Squirrel (*Sciurus aberti*)	C
Chickaree (*Tamiasciurus hudsonicus*)	C
Northern Pocket Gopher (*Thomomys talpoides*)	C,G,R,S
Plains Pocket Mouse (*Geomys bursarius*)	C,G
Olive-backed Pocket Mouse (*Perognathus fasciatus*)	G,C

Species	Habitat
Beaver (*Castor canadensis*)	D,W
Deer Mouse (*Peromuscus maniculatus*)	C,D,G,R,S,W
Rock Mouse (*Peromyscus difficilis*)	C,G,S
Mexican Wood Rat (*Neotoma mexicana*)	C,G,R,S
Bushy-tailed Wood Rat (*Neotoma cinerea*)	C,G,R,S
Meadow Vole (*Microtus pennsylvanicus*)	D,G,W
Montane Vole (*Microtus montanus*)	C,G,D,W
Long-tailed Vole (*Microtus longicaudus*)	C,D,G
Prairie Vole (*Microtus ochrogaster*)	C,D,G
Muskrat (*Ondatra zibethicus*)	D,W
Porcupine (*Erethizon dorsatum*)	C,D,S
CARNIVORES	
Coyote (*Canis latrans*)	C,D,G,R,S
Red Fox (*Vulpes vulpes*)	C,D,G,R,S,W
Gray Fox (*Urocyon cinereoargenteus*)	C,R,S
Black Bear (*Ursus americanus*)	C,D,S
Raccoon (*Procyon lotor*)	C,D,W
Ringtail (*Bassariscus astutus*)	S
Short-tailed Weasel (*Mustela erminea*)	C,D,G,R
Long-tailed Weasel (*Mustela frenata*)	C,D,G,R,S
Mink (*Mustela vison*)	D,W
Badger (*Taxidea taxus*)	C,G,R,S
Western Spotted Skunk (*Spilogale gracilis*)	C,R,S
Striped Skunk (*Mephitis mephitis*)	C,D,G,R,S,W
Mountain Lion (*Felis concolor*)	C,G,R,S
Bobcat (*Felis rufus*)	C,D,S
EVEN-TOED UNGULATES	
Elk (*Cervus elaphus*)	C,G
Mule Deer (*Odocoileus hemionus*)	C,D,G,R,S
White-tailed Deer (*Odocoileus verginianus*)	D,W
Bighorn Sheep (*Ovis canadensis*)	C,G,R

APPENDIX 6
BREEDING BIRD SPECIES OF NORTH FOOTHILLS OPEN SPACE
1995 Breeding Season Observations

Habitat Codes: C - Coniferous Woodland/Forest; S - Shrubland; M - Meadow; R - Riparian Woodland; T - Talus, Cliffs, Rock Outcrops; P - Ponds, Stream

Abundance Codes: 1: 1 Breeding Pair; 2: 2-10 Breeding Pairs; 3: 11-100 Breeding Pairs; 4: 101-1,000 Breeding Pairs; 5: More than 1,000 Breeding Pairs

Breeding Status Codes: Po - Possible Breeder; Pr - Probable Breeder; Cf - Confirmed Breeder

Location Codes: Ha - Hall Ranch; He - Heil Ranch and Trevarton Open Space

Bold - Bird Species of Special Concern in Boulder County

Species	Location	Habitat	Abun.	Status	Behavior
Common Merganser	Ha	P	1	Po	Pair
Mallard	Ha,He	P	2	Cf	Fledged young
Turkey Vulture	Ha,He	T	2	Po	Seen
Sharp-shinned Hawk	Ha,He	C	2	Po	Seen
Cooper's Hawk	Ha,He	C	2	Cf	On nest
Northern Goshawk	Ha,He	C	2	Cf	Nest with young
Red-tailed Hawk	Ha,He	C	2	Cf	On nest
Golden Eagle	Ha,He	T	2	Cf	Fledged young
American Kestrel	Ha	R,M	1	Po	Seen
Prairie Falcon	Ha,He	T	1	Cf	Visiting nest
Peregrine Falcon	Ha	T	1	Po	Seen
Blue Grouse	Ha,He	C	2	Cf	Fledged young
Wild Turkey	Ha,He	C	3	Cf	Fledged young
Killdeer	Ha,He	P,M	2	Cf	Fledged young
Rock Dove	Ha,He	T	3	Cf	Visiting nest
Mourning Dove	Ha,He	C,R,S	3	Cf	Nest with eggs
Great Horned Owl	Ha,He	R,C	2	Cf	Fledged young
Northern Pygmy-Owl	He	C	2	Po	Seen
Northern Saw-whet Owl	Ha	C	2	Po	Seen
Common Nighthawk	Ha,He	C	2	Cf	Nest with eggs
Common Poorwill	Ha,He	C	2	Pr	Territory
White-throated Swift	Ha,Hd	T	3	Cf	Visiting nest
Broad-tailed Hummingbird	Ha,He	C,R,S	4	Cf	On nest
Lewis' Woodpecker	Ha,He	C,R	2	Cf	Nest with young
Williamson's Sapsucker	Ha,He	C	2	Pr	Territory
Downy Woodpecker	Ha,He	R	2	Pr	Territory
Hairy Woodpecker	Ha,He	C	3	Cf	Nest with young
Three-toed Woodpecker	He	C	2	Po	Seen

Species	Location	Habitat	Abun.	Status	Behavior
Northern Flicker	Ha,He	C,R	3	Cf	Nest with young
Olive-sided Flycatcher	Ha,He	C	2	Pr	Territory
Western Wood-pewee	Ha,He	C,R	3	Pr	Multiple males
Hammond's Flycatcher	Ha,He	C	3	Pr	Territory
Dusky Flycatcher	Ha,He	S,R	2	Po	Seen
Cordilleran Flycatcher	Ha,He	C,T	3	Pr	Multiple males
Western Kingbird	Ha	R,M	1	Po	Seen
Eastern Kingbird	Ha	R,M	1	Po	Seen
Violet-green Swallow	Ha,He	T	3	Cf	Visiting nest
No. Rough-winged Swallow	Ha	R	1	Po	Seen
Cliff Swallow	Ha	T	3	Cf	On nest
Barn Swallow	Ha,He	M,R	2	Cf	On nest
Steller's Jay	Ha,He	C	3	Pr	Territory
Blue Jay	Ha	R	2	Po	Seen
Scrub Jay	Ha,He	S	2	Cf	Fledged young
Black-billed Magpie	Ha,He	C,R,S	2	Cf	Used nest
American Crow	Ha,He	C	2	Cf	Fledged young
Common Raven	Ha,He	T	2	Pr	Pair
Black-capped Chickadee	Ha,He	R	2	Cf	Nest with young
Mountain Chickadee	Ha,He	C	4	Cf	Nest with young
Bushtit	Ha,He	S	2	Po	Seen
Red-breasted Nuthatch	Ha,He	C	3	Po	Seen
White-breasted Nuthatch	Ha,He	C	3	Cf	Fledged young
Pygmy Nuthatch	Ha,He	C	4	Cf	Nest with young
Brown Creeper	Ha,He	C	3	Po	Seen
Rock Wren	Ha,He	T	2	Po	Seen
Canyon Wren	Ha,He	T	2	Pr	Territory
House Wren	Ha,He	C,R,S	3	Cf	Nest with young
Ruby-crowned Kinglet	Ha,He	C	2	Pr	Multiple males
American Dipper	Ha	P	2	Po	Seen
Golden-crowned Kinglet	Ha,He	C	2	Pr	Territory
Blue-gray Gnatcatcher	Ha,He	S	3	Cf	Feeding young
Western Bluebird	Ha,He	C,S	2	Cf	Nest with young
Mountain Bluebird	Ha,He	C	2	Cf	Fledged young
Townsend's Solitaire	Ha,He	C	3	Pr	Territory
Hermit Thrush	Ha,He	C	2	Pr	Territory
American Robin	Ha,He	C,M,R,S	4	Cf	Fledged young
Gray Catbird	Ha,He	S,R	2	Pr	Territory
Northern Mockingbird	He	S	2	Pr	Territory
Sage Thrasher	Ha,He	S	2	Pr	Territory
Starling	Ha,He	R	2	Cf	Nest with young
Solitary Vireo	Ha,He	C	3	Pr	Multiple males
Warbling Vireo	Ha,He	R	2	Cf	Visiting nest
Virginia's Warbler	Ha,He	C,S	3	Pr	Multiple males
Yellow Warbler	Ha,He	R	2	Cf	Visiting nest
Yellow-rumped Warbler	Ha,He	C	3	Pr	Multiple males
MacGillivray's Warbler	Ha,He	S,R	2	Pr	Territory
Yellow-breasted Chat	Ha,He	S	3	Pr	Territory

Species	Location	Habitat	Abun.	Status	Behavior
Western Tanager	Ha,He	C	3	Po	Seen
Black-headed Grosbeak	Ha,He	C,R	3	Pr	Territory
Lazuli Bunting	Ha,He	S,R	3	Cf	Feeding young
Green-Tailed Towhee	Ha,He	S	3	Cf	Feeding young
Rufous-sided Towhee	Ha,He	S	4	Cf	Fledged young
Chipping Sparrow	Ha,He	C	4	Cf	Fledged young
Vesper Sparrow	Ha,He	M	4	Cf	Fledged young
Lark Sparrow	Ha,He	M,S	4	Cf	Nest with eggs
Song Sparrow	Ha,He	R	2	Pr	Territory
Gray-headed Junco	Ha,He	C	3	Cf	Fledged young
Western Meadowlark	Ha,He	M	3	Cf	Fledged young
Brewer's Blackbird	Ha,He	M,R	2	Pr	Pair
Common Grackle	Ha,He	M,R	2	Po	Seen
Brown-headed Cowbird	Ha,He	C,R,S	3	Pr	Pair
Northern Oriole	Ha	R	2	Pr	Territory
Cassin's Finch	Ha,He	C	2	Cf	Fledged young
House Finch	Ha,He	R	2	Po	Seen
Red Crossbill	Ha,He	C	3	Po	Seen
Pine Siskin	Ha,He	C	3	Pr	Multiple males
Lesser Goldfinch	Ha,He	C,R,S	3	Cf	Fledged young
American Goldfinch	Ha,He	R,S	3	Cf	Fledged young

Total Species Seen - 97
Confirmed Breeders - 47
Probable Breeders - 27
Possible Breeders - 23

APPENDIX 7
POTENTIAL AMPHIBIANS AND REPTILES OF NORTH FOOTHILLS OPEN SPACE

Species	Habitat Preference
MOLE SALAMANDERS	
Barred Tiger Salamander *Ambystoma tigrinum*	Small ponds and lakes in most habitats up to 12,000'.
TRUE TOADS	
Woodhouse's Toad *Bufo woodhousii*	Deep floodplain soils below 7,000'.
TREEFROGS	
Striped Chorus Frog *Pseudacris triseriata*	Wet meadow and marxhy ponds to 12,000'.
TRUE FROGS	
Northern Leopard Frog *Rana pipiens*	Banks, shallow permanent water up to 10,000'.
IGUANIDS	
Eastern Fence Lizard *Sceloporus undulatus*	Rocky terrain in foothills and mountains up to 9,000'.
COLUBRIDS	
Racer *Coluber constrictor*	Grasslands and foothills below 6,000'.
Milk Snake *Lampropeitis triangulum*	Eastern plains and foothills below 8,000'.
Smooth Green Snake *Opheodrys vernalis*	Riparian vegetation between 5,500'-9,000'.
Bullsnake *Pituophis melanoleucus*	Most habitats below 8,500'.
Plains Blackhead Snake *Tantilla nigriceps*	Grasslands and rocky canyons to 7,000'.
W. Terrestrial Garter Snake *Thamnophis elegans*	Most habitats below 11,000' except plains.
Plains Garter Snake *Thamnophis radix*	Most habitats below 7,000'.
Common Garter Snake *Thamnophis sirtalis*	Riparian habitat below 6,000'.
VIPERS	
Prairie Rattlesnake *Crotalus viridis*	All habitats up to about 8,000'.

DRAFT

NORTH FOOTHILLS OPEN SPACE

MANAGEMENT PLAN

VOLUME II

MANAGEMENT DIRECTION

AND

VISITOR USE PLAN

PREPARED BY:

BOULDER COUNTY PARKS AND OPEN SPACE

APRIL 1996

EXECUTIVE SUMMARY

North Foothills Open Space is 11,000 acres of land located near the Town of Lyons. The protection of these lands provide for the conservation of scenic quality, natural and cultural resources, wildlife habitat, native plant communities, and natural ecosystem processes. The area can also provide outdoor recreational opportunities primarily through passive, nonmotorized trail use, picnicking, fishing, wildlife viewing and environmental education. Finding a balance between resource protection, land management, and human enjoyment will be the key to the well-being of the area.

Volume II of the Management Plan presents the general management direction and a conceptual visitor use plan. More detailed studies will be required for accomplishing management direction including: Forest Management Plan, Grazing Plan, Controlled Burn Plan, Emergency Response and Fire Protection Plan, and specific designs for trails and facilities. The Management Plan is dynamic and flexible, and can change as our knowledge of the property increases, or as management situations change.

The Plan tries to balance resource protection and passive recreational use. Those areas less suitable for visitors include locations of significant plant communities and animals, buffers to Central and Coffintop gulches, and large blocks of land that can provide hiding cover and habitat for larger mammals.

The backbone of recreational use is a 22.5 mile trail system, which allows for hiking, equestrian and mountain biking opportunities. The major trailheads and parking areas will also provide a number of recreational amenities including picnic areas, group picnic shelters, access to fishing, a handicapped trail and fishing access, and an interpretive center. The Geer Canyon area of Heil Ranch is being planned for an Outdoor Retreat Center geared toward environmental education and other group activities.

The Management Plan also provides policy direction for wildlife protection and management, the restoration and management of vegetation, and the protection and interpretation of cultural resources. Weeds will be aggressively fought. Grazing will be maintained as a management tool to reduce weeds, increase native plants and reduce fire danger. Forest management and controlled burns will be used to improve wildlife habitat and reduce the probability of catastrophic wildfire. Hunting will be retained as a management tool and used if deer and elk populations increase to a point of potentially causing damage to other resources. The County will cooperate with local fire protection districts, search and rescue organizations, and other applicable volunteer and public safety organizations in controlling fires and handling public safety situations.

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SUMMARY OF VOLUME I - RESOURCE EVALUATION

1.0INTRODUCTION

North Foothills Open Space (NFOS) was conceptualized during the development of the initial Boulder County Comprehensive Plan in the 1970s. Much of the area was designated as a "Scenic Area" on the Open Space Map. The designations stemmed from the beauty, undeveloped nature, cultural value and natural resources of these lands.

Several major acquisitions and land saving actions have occurred (Figure 1). Boulder County Parks & Open Space Department made their first purchase of land in North Foothills Open Space in 1990 with the acquisition of Trevarton Ranch. For the 1,207 acre parcel, 491 acres were purchased outright while a conservation easement was acquired on the remaining 716 acres.

Beginning in 1993, Boulder County began acquiring portions of two of the most significant properties in the county. The Heil Valley Ranch totals 4,923 acres. The Hall Ranch covers 3,205 acres. Those purchases are now complete.

Other land saving actions include a conservation easement on portions of the Loukonen Ranch that occurred as part of a subdivision process, and the purchase of the 40 acre Edwards parcel within the Heil Valley Ranch. The county also hopes to lease and acquire lands currently owned by the Bureau of Land Management and the State of Colorado.

Protected land in North Foothills Open Space totals approximately 11,000 acres. We wish to express our gratitude to the families of the Hall, Heil, Loukonen and Trevarton ranches and the Edwards parcel who decided to take the necessary land saving actions and protect their lands from development. We also wish to express our gratitude to all the citizens of Boulder County and the State of Colorado who have provided the means to acquire much of this land. Finally, the help of The Nature Conservancy, The Trust for Public Land, GO-Colorado, and Colorado Open Lands is greatly appreciated.

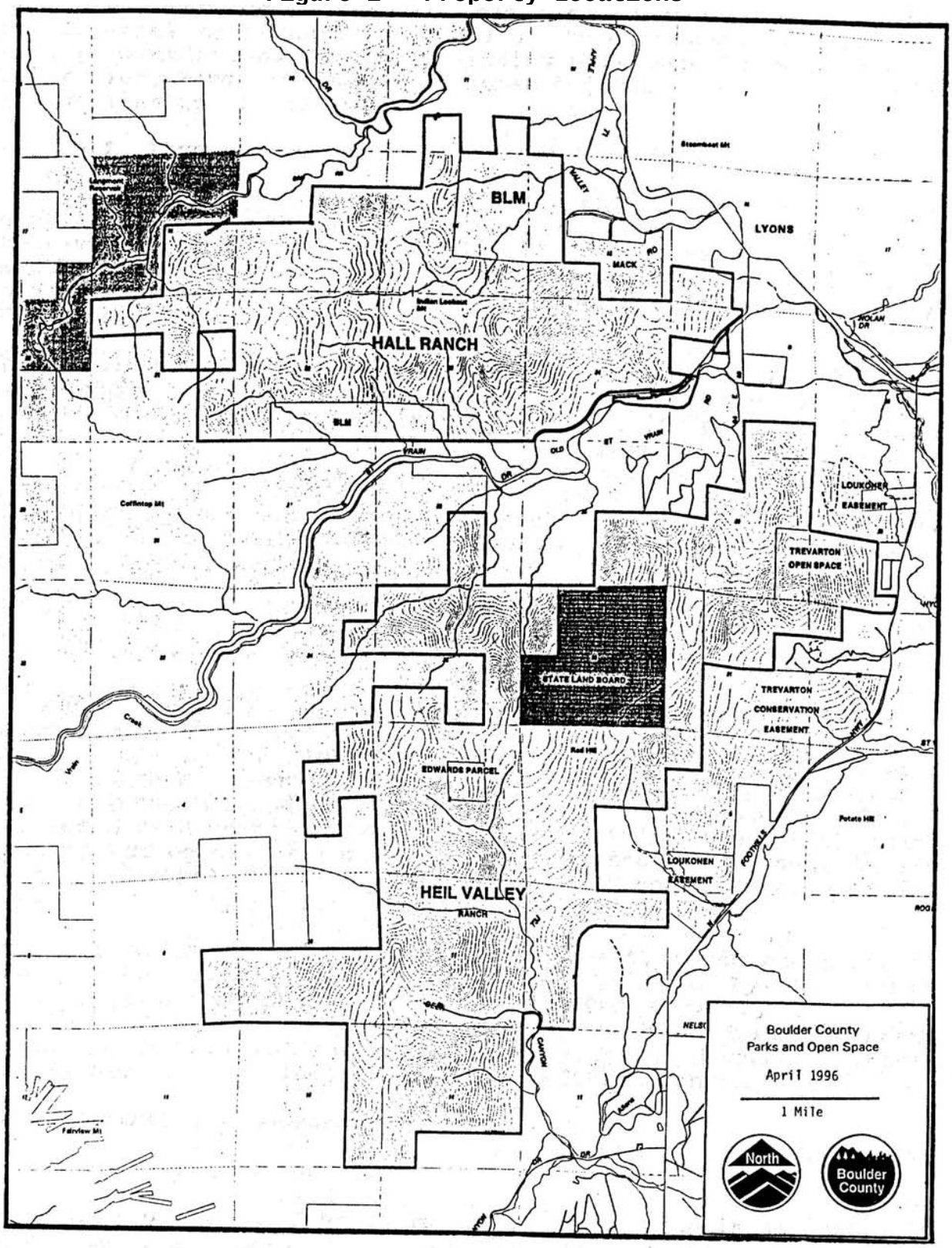
1.1Management Objectives

Within the context of the Boulder County Comprehensive Plan, Open Space are those lands intentionally left free from future development. They can serve many functions, including: preservation of critical ecosystems, natural areas, scenic vistas and areas, fish and wildlife habitats, natural landmarks, cultural, historical and archaeological areas, outdoor recreation areas, and linkages and trails; conservation of natural resources including forest lands, range lands, agricultural lands, aquifer recharge areas and surface water; and the creation of urban shaping buffers between or around municipalities.

For North Foothills Open Space, a high priority is the protection

and/or conservation of scenic quality, natural and cultural

Figure 1 - Property Locations



resources, wildlife habitat, native plant communities, and natural ecosystem processes. The area can also provide passive outdoor recreational opportunities primarily through nonmotorized trail use, picnicking and fishing. Finding a balance between resource protection, land management and human enjoyment will be the key to the well-being of the area.

1.2Physical Characteristics and Landscape Setting

North Foothills Open Space lies within the foothills of the eastern flank of the Rocky Mountain Front Range. It also lies on the western edge of the junction of the Great Plains and the Southern Rocky Mountains. The rise of the Rocky Mountains prominently begins on the west side of North Foothills Highway. Elevation ranges from 5,390' to 8,080'.

The geology of NFOS is dramatic and complex. The upturned sedimentary rock layers lying along the igneous and metamorphic core of the Rocky Mountains give this region its predominant north to northeast fabric. On Heil Ranch and Trevarton Open Space, the first hogback is formed by the Dakota Group, followed by a broad valley (Red Hill Gulch) of the more erodible Lykins Formation, and then a second hogback of Lyons Sandstone. The eastern half of the Hall Ranch is dominated by sedimentary layers of the Fountain Formation (the reddish rock visible from State Highway 7), Ingleside Formation and Lyons Sandstone. The western portion of NFOS is generally igneous and metamorphic rock. A major feature splitting the ranches is the South St. Vrain Creek.

NFOS is part of an area in Boulder County that is relatively free from human development. Hall Ranch is part of a large block of undeveloped land that includes the North St. Vrain Canyon and runs to the Peak-to-Peak Highway. Adjacent to Hall Ranch on the west are Buttonrock Preserve, owned and managed by the City of Longmont, and Coffintop Gulch which is under consideration by the U.S. Forest Service for Research Natural Area designation due to its high quality ecological features. The Heil Ranch is adjacent on the west to Central Gulch, a relatively wild and natural foothill canyon.

Existing development is generally found east, north and south of NFOS. The largest settlement is the Town of Lyons. Other significant development is found at Lyons Park Estates, along Apple Valley Road, along the Longmont Dam Road, on the west side of North Foothills Highway south of Lykins Gulch (Foothills Ranch, Mountain Ridge, Lake of the Pines), and along Lefthand Canyon Drive.

2.0VEGETATIVE RESOURCES

2.1General Description

The vegetation of North Foothills Open Space is dominated by

woodlands and forests of ponderosa pine, sometimes mixed with Douglas fir (Figure 2). Foothill shrublands, dominated by mountain mahogany, are found along the Dakota Hogback of Heil Ranch/Trevarton Open Space and around Indian Lookout Mountain on Hall Ranch. Grasslands, meadows and the understory of forests, woodlands and shrublands are a mixture of native and introduced species. Dominant native grasses include big bluestem, little bluestem, western wheatgrass, needle-and-threadgrass and New Mexico feathergrass. Meadows are present in areas of alluvial soil. Riparian habitat is dominated by river birch along small streams and narrowleaf cottonwood along the South St. Vrain Creek.

Cheatgrass, blue-grass and Japanese brome are dominant exotic grasses. Other weeds, including knapweed, dalmatian toadflax and thistle are found throughout.

Fire suppression combined with logging have created forest stands that have little resemblance to how these stands appeared prior to Euro-American settlement. The stands are denser as a result of fire suppression and contain fewer large-diameter trees due to high-grade timber cutting.

2.2Significant Resources

The Colorado Natural Heritage Program (CNHP) inventoried the area for rare plants and significant plant associations. They maintain a worldwide data base that ranks the biological rarity of species and associations on global and regional (state) levels. Their work resulted in the recommendation of several conservation sites (Figures 2, 3a, 3b and Table 1).

Red Hill - This area, located on Heil Valley Ranch and Trevarton Open Space, runs north and south along the Dakota Hogback and is centered on Red Hill. It contains several occurrences of globally rare plant associations, one occurrence of a globally rare butterfly, and one occurrence of a state rare butterfly. The associations are dominated by different mixtures of ponderosa pine woodlands, mountain mahogany shrubs, and several native grasses including big bluestem, little bluestem, needle-and-threadgrass, New Mexico feathergrass and Scribner's needlegrass.

Plumely Canyon - This area is located in the west-central portion of Heil Valley Ranch. It contains one globally rare plant association and two state rare butterflies. It includes the big bluestem-little bluestem plant association. The butterfly species are associated with relatively intact tallgrass prairie.

Upper Geer Canyon - This area is located in the southwest part of Heil Valley Ranch. It contains two globally rare plant associations: ponderosa pine/spike fescue; and water birch.

Indian Lookout Mountain - This site, located in the eastern part

of Hall Ranch, contains several occurrences of globally rare plant associations. They contain are different mixtures of ponderosa pine, mountain mahogany and native grasses.

Figure 2 - Natural Heritage Conservation Sites

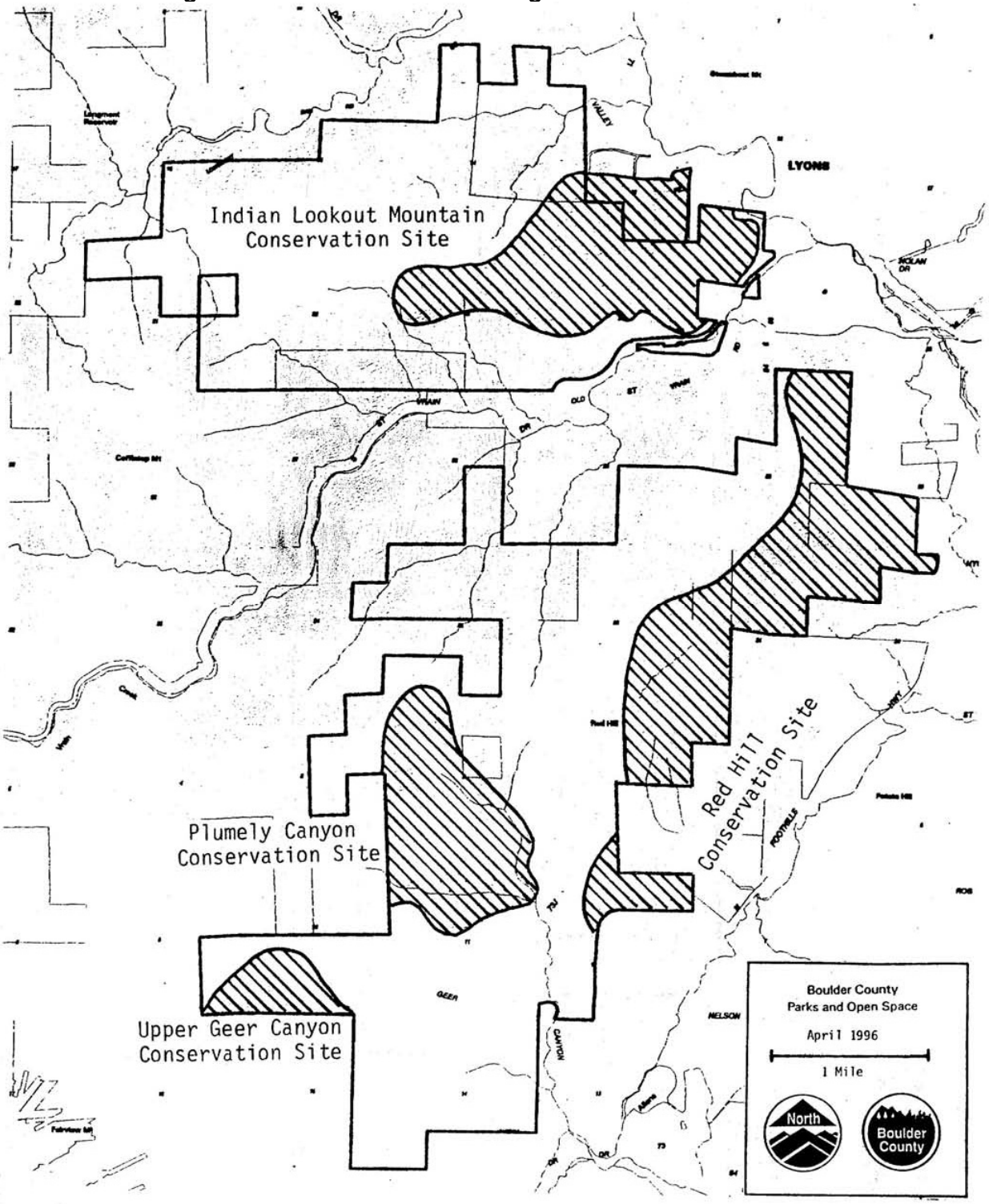


Figure 3a - Significant Plant Associations and Butterfly Habitat - Hall Ranch

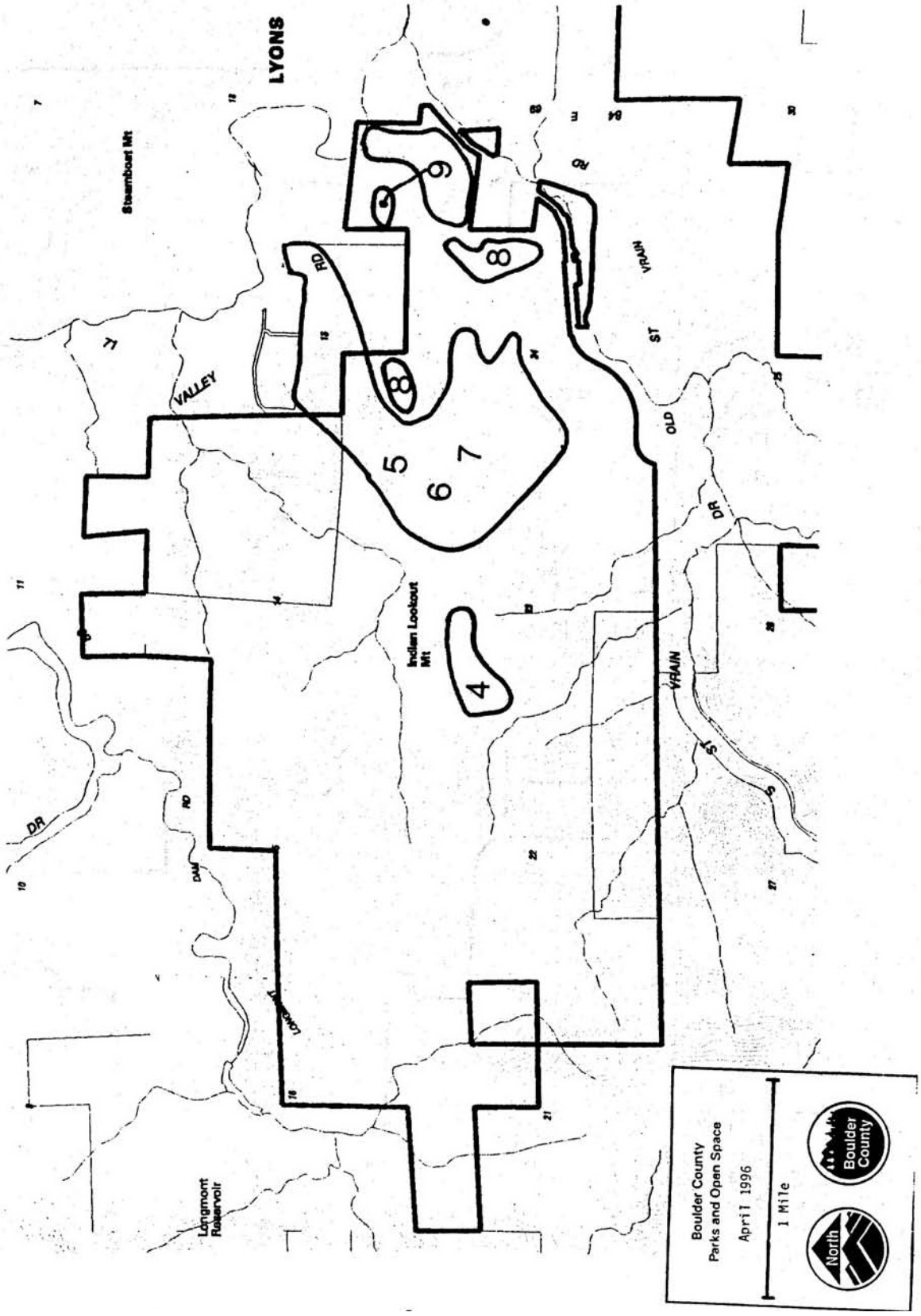


Figure 3b - Significant Plant Associations and Butterfly Habitat - Heil/Trevarton

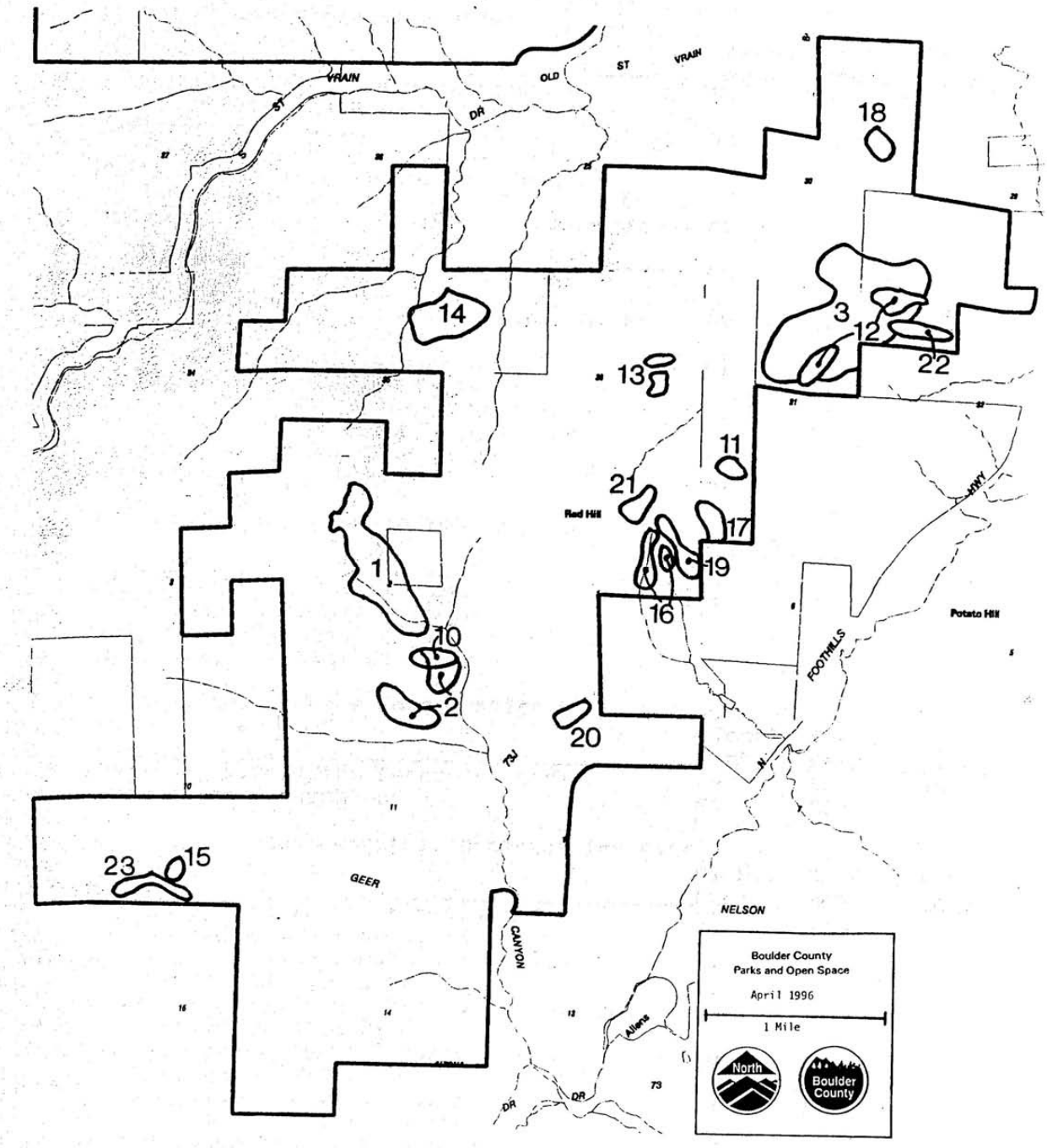


Table 1 - Natural Heritage Conservation Site Information

Conservation Sites and Element Occurrences

1. Red Hill Conservation Site

Element	Global Rank	State Rank	Map Number
Ponderosa pine/mountain mahogany/ big bluestem - woodland	G2	S2?	12
Ponderosa pine/mountain mahogany/ big bluestem - woodland	G2	S2?	13
Mountain mahogany/needle and thread - foothills shrubland	G2	S2	17
Mountain mahogany/New Mexico feathergrass foothills shrubland	GU	SU	18
Mountain mahogany/New Mexico feathergrass foothills shrubland	GU	SU	16
Mountain mahogany/Scribner's needlegrass foothills shrubland	GU	SU	19
Big bluestem-little bluestem - xeric tallgrass prairie	G2	S2	22
Needle and thread - East - grassland	G2	S2	11
New Mexico feathergrass - grassland	G2	S2	20
Rare Butterfly Habitat	G3?	S2	3
Rare Butterfly Habitat	G4	S2	3

2. Plumely Canyon Conservation Site

Element	Global Rank	State Rank	Map Number
Big bluestem-little bluestem - xeric tallgrass prairie	G2	S2	10
Rare Butterfly Habitat	G4	S2	2
Rare Butterfly Habitat	G3G4	S3	1

3. Upper Geer Canyon Conservation Site

Element	Global Rank	State Rank	Map Number
Ponderosa pine/spike fescue - woodland	G2	S2	15
Water birch - shrubland	G3	SU	23

4. Indian Lookout Mountain Conservation Site

Element	Global Rank	State Rank	Map Number
Ponderosa pine/mountain mahogany/ big bluestem - woodland	G2	S2?	8
Mountain mahogany/needle and thread - foothills shrubland	G2	S2	7
Mountain mahogany/New Mexico feathergrass - foothills shrubland	GU	SU	5
Mountain mahogany/Scribner's needlegrass - foothills shrubland	GU	SU	6
Big bluestem-little bluestem xeric tallgrass prairie	G2	S2	9
Big bluestem-little bluestem	G2	S2	4

xeric tallgrass prairie

5. Other Significant Elements

Element	Global Rank	State Rank	Map Number
Rocky Mountain juniper/mountain mahogany - foothills woodland	G2	S2	14

Modifiers for Global (G) and State (S) Ranks:

2Imperilled or very rare; usually between 5 and 20 occurrences; or with many individuals in fewer occurrences; often susceptible to becoming endangered.

3Rare; usually between 20 and 100 occurrences; may have fewer occurrences, but with a large number of individuals in some places; may be susceptible to large-scale disturbances.

4Common; usually less than 100 occurrences, but may be fewer with many large populations; may be restricted to only a portion of the state; usually not susceptible to immediate threats.

UStatus uncertain, often because of low search effort or cryptic nature of the element.

?The rank is somewhat questionable, often because of lack of information.

3.0WILDLIFE RESOURCES

3.1General Description

The foothills lifezone is considered rich wildlife habitat. The mixture of grassland, shrubland, woodland, forest and cliffs provide exceptional habitat diversity. Additionally, this lifezone provides important winter range for a number of animals that spend summer at higher elevations.

Approximately 60 species of mammals could call NFOS home. This represents about 70% of all mammal species found in the county. The area is winter range for elk and year-round habitat for deer, black bear, mountain lion and numerous other mammals. Bighorn sheep are present in the North St. Vrain Canyon and are occasionally seen on the southwest portion of Hall Ranch. Four prairie dog towns exist, two on Heil Valley Ranch and two on Hall Ranch.

A total of 97 breeding bird species were observed during a one season survey. For the size of NFOS, this is considered high species richness. Mountain chickadee, chipping sparrow and yellow-rumped warbler dominate ponderosa pine forests, rufous-sided and green-tailed towhees frequent foothill shrublands, while vesper and lark sparrows dominate meadows. Several raptor nests, including red-tailed hawk, golden eagle, prairie falcon, northern goshawk and Cooper's hawk were found. Wild turkey are present throughout the forested areas of NFOS and appear to be well established on Heil Valley Ranch.

Other forms of animals are present. The South St. Vrain Creek provides important habitat for fish. Brown trout is the most common species in this section of the creek. Amphibians and reptiles are present. Prairie rattlesnake and bullsnake are common. Striped chorus frogs are present in many intermittent ponds.

3.2Significant Resources

A number of significant resources warrant special attention on NFOS. Some animals have a specific site, such as a nest, that we have knowledge about. For others, we only know that they are tied to a certain habitat type. Still others have very large territories and may only be present at certain times. Proposed Avian Conservation Areas are presented in Figures 4a and 4b with descriptions of each site in Table 2.

Habitat Effectiveness - NFOS is used by several species of large mammals. The property is winter range for elk. Bighorn sheep utilize the western portion of Hall Ranch. Many of the large mammals, such as deer and elk are fairly adaptable. However, the increased presence of people recreating could result in some displacement. Mountain lions are also viewed

as adaptable animals, however increasing human/lion encounters

Figure 4a - Avian Conservation Areas - Hall Ranch

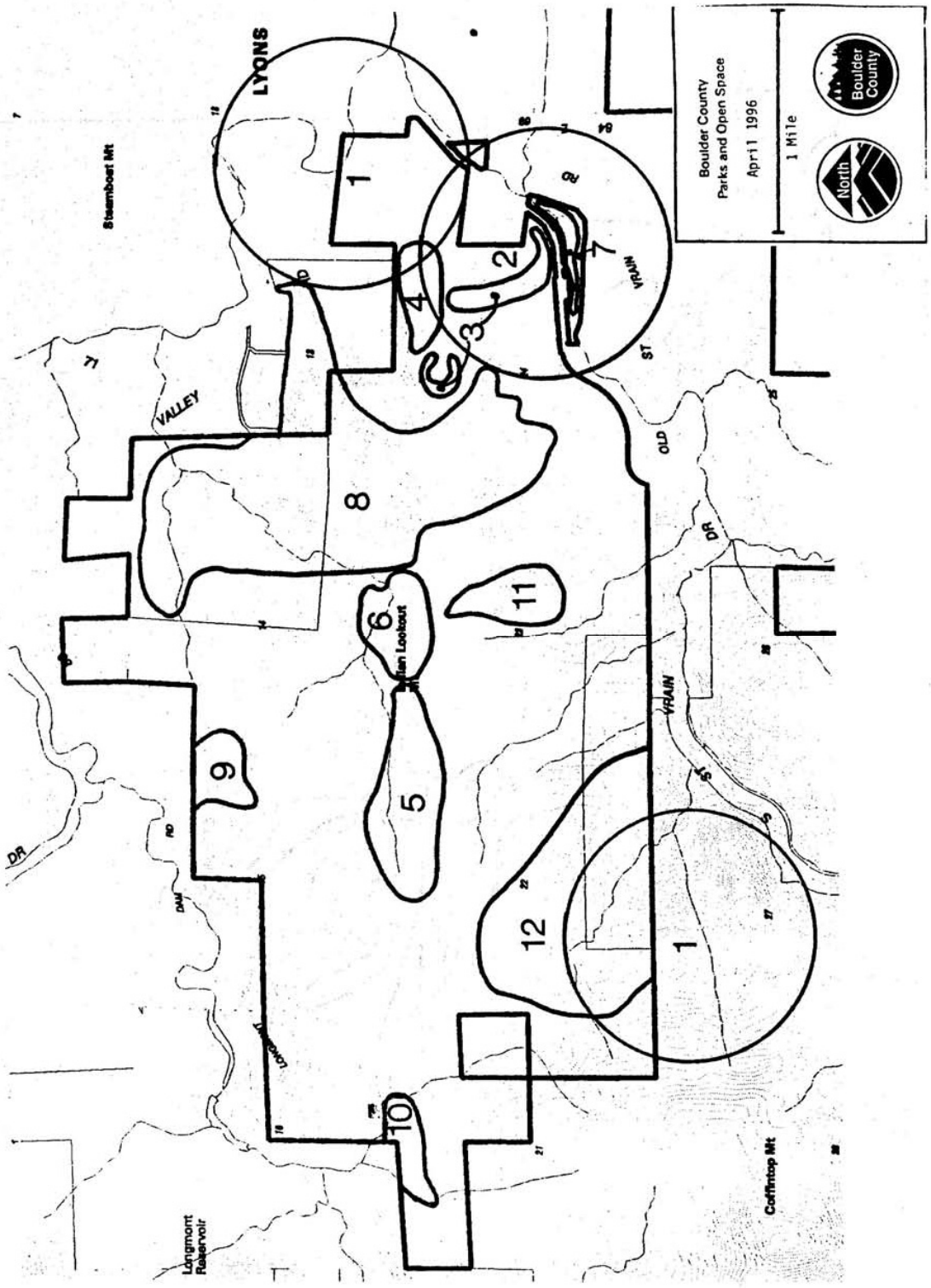


Figure 4b - Avian Conservation Areas - Heil/Trevarton

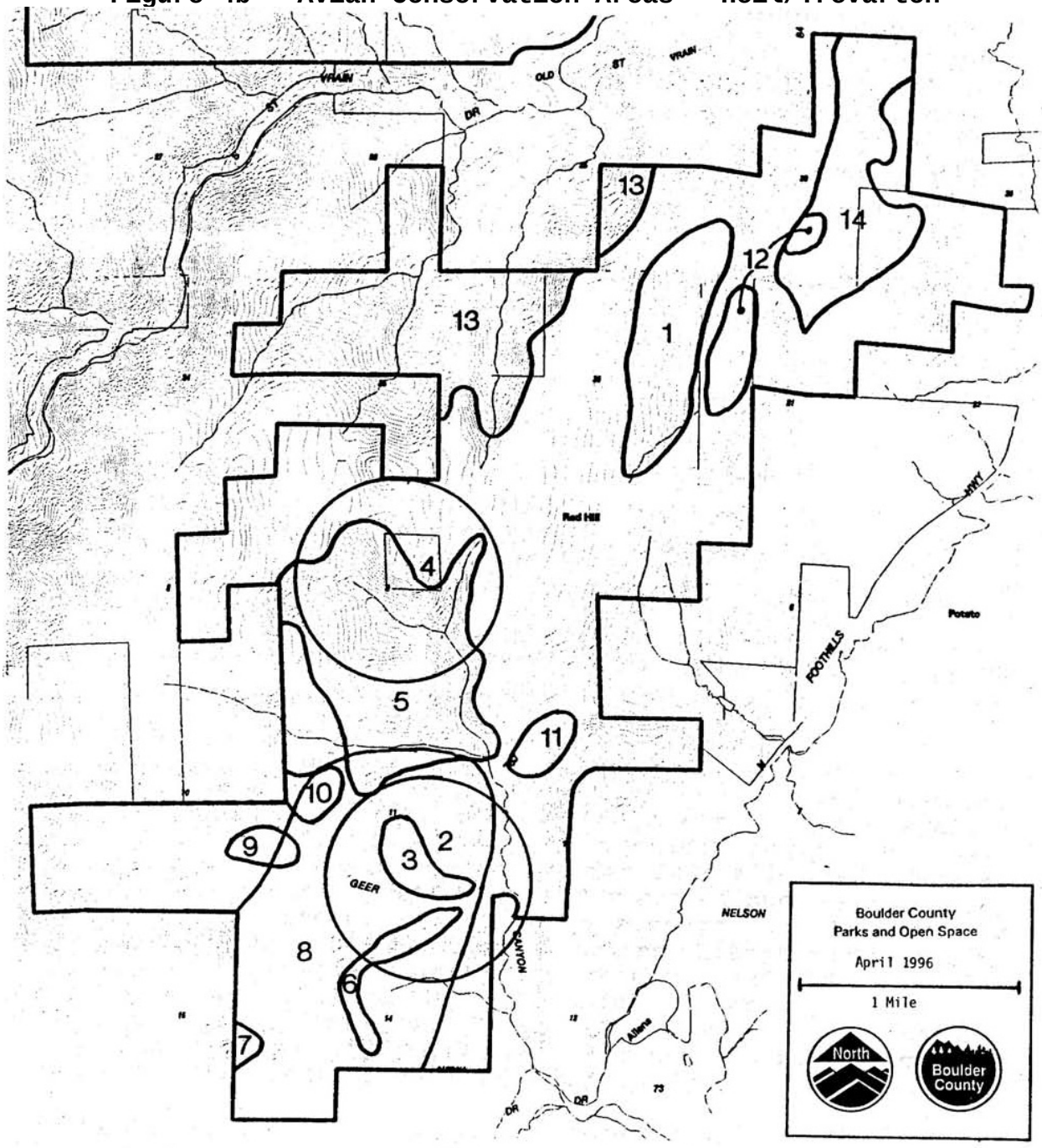


Table 2

Avian Conservation Areas

Hall Ranch (Figure 5a)
1.Raptor Nest
2.Raptor Nest
3.Cliff Nesting Birds
4.Raptor Feeding Area - Prairie Dog Colony
5.Riparian, Foothill Shrub, and Ponderosa Pine Woodland
6.Raptor Feeding Area - Prairie Dog Colony
7.Riparian and Wetland Habitat
8.Riparian, Foothill Shrub, Ponderosa Pine Woodland, and Canyons
9.Old-growth Characteristics
10.Old-growth Characteristics
11.Ponderosa Pine Woodland with Old-growth Characteristics
12.Old-growth Characteristics

Heil/Trevarton (Figure 5b)
1.Raptor Nest and Post-fledging Family Area, Old-growth Characteristics, Riparian Habitat
2.Raptor Nest
3.Cliff Nesting Birds, Old-growth Characteristics
4.Raptor Nest
5.Cliff Nesting Birds, Raptor Post-fledging Area, Riparian Habitat, Old-growth Characteristics
6.Old-growth Characteristics and Burn Area
7.Old-growth Characteristics
8.Turkey Production
9.Old-growth Characteristics
10.Old-growth Characteristics
11.Raptor Feeding Area - Prairie Dog Colony
12.Raptor Feeding Area - Prairie Dog Colony
13.Old-growth Characteristics, Ponderosa Pine Woodland, Foothill Shrub
14.Foothill Shrub

is probably not a good thing. Black bears generally avoid human contact and could also see some displacement. Bighorn sheep are sensitive to stress and vulnerable to disease. Wild turkey are very sensitive to human presence. Keys to maintaining good use of the area by these species will be to minimize habitat fragmentation by trails, provide sizeable blocks of land that have little human presence, buffer key habitat areas such as Central Gulch and Coffintop Gulch, and provide seasonal closures where appropriate.

Cliffs and Canyons - Cliff and canyon walls provide important habitat for a number of species of concern - species which are rare, declining, and/or restricted to one or a few habitat types or specific locations. Two golden eagle nests were located on NFOS as were two prairie falcon nests. General guidelines suggest a 1/2 mile buffer around such

sites during the nesting season. These areas also provide habitat for several colonial nesting birds, such as white-throated swift, cliff swallow and violet-green swallow, and are potential habitat for peregrine falcons, which appear to be making a comeback along the Front Range. These areas are potential habitat for several mammal species of concern including dwarf shrew, rock squirrel and rock mouse.

Foothills Shrubland - Thickets dominated by mountain mahogany are rich breeding bird habitat and support a number of species of concern. Scrub jay, gray catbird, northern mockingbird and sage thrasher are considered rare and/or restricted breeding species in the county and were found in foothill shrublands. These areas are also potential habitat for several mammal species of concern including dwarf shrew, Merriam's shrew, Townsend's big-eared bat, rock squirrel, rock mouse and ringtail, all mammals of concern in the county. These shrublands are found in the vicinity of Red Hill on Heil Valley Ranch and Indian Lookout Mountain on Hall Ranch.

Forests and Woodlands with Old-Growth Characteristics - Old-growth is characterized by large-diameter trees, snags and deadfall. Several areas with old-growth characteristics were found on NFOS, particularly in drainages and on steep slopes. Several bird species of concern favor old-growth and were found on NFOS including Lewis' woodpecker, three-toed woodpecker, pygmy nuthatch and golden-crowned kinglet. One northern goshawk nest was found. These areas are potential habitat for several mammal species of concern including fringed myotis, Abert's squirrel and Merriam's shew.

Raptor Feeding Areas - Prairie dogs are an important prey base for many raptors. Four colonies were found on NFOS. Raptors, particularly golden eagles and red-tailed hawks, were observed hunting and feeding on a regular basis in all four colonies. It is probable that these feeding grounds greatly contribute to the viability of the nesting golden eagles present on NFOS.

Riparian Areas - Riparian areas are considered rich wildlife habitat. Several species of concern are found in riparian habitat including Lewis' woodpecker, American dipper and gray catbird. The most significant stream system and riparian habitat of NFOS is found on the Hall Ranch along the South St. Vrain Creek. Additional riparian habitat is found along some of the intermittent streams of both Hall and Heil Valley Ranch.

4.0CULTURAL RESOURCES

4.1General Description

North Foothills Open Space has been utilized by humans for thousands of years. Prehistoric habitation and use of

northeastern Colorado covers approximately 12,000 years from the late Pleistocene epoch through historic contact. Evidence of occupation is nearly continuous throughout this 12,000 year span, though most of the reliably dated archaeological sites in the region represent the past 5,000 years. The Paleo-Indian Stage (12,000-7,500 years before present) is characterized by a nomadic lifestyle and a hunting and gathering economy based upon the exploitation of large game animals that are mostly now extinct. The Archaic Stage (7,500-2,000 years before present) was characterized by a continental warming trend, an increased dependence on smaller mammals and wild plants, and the increased use of foothills and montane environments. The Ceramic Stage (2,000-275 years before present) is characterized by the introduction of ceramic technology, the replacement of the spear with the bow, and the advent of horticulture, though evidence of plant domestication in northeastern Colorado is scant. The Protohistoric/Contact Stage (275-150 years before present) was the beginning of direct and frequent contacts between Native Americans and people of European descent, and is characterized by accelerated mobility and conflict that followed the acquisition of horses and fire arms.

Accelerated permanent settlement of Boulder County by Euro-Americans began in 1859 with the discovery of gold. Settlement and the patenting of land within North Foothills Open Space began in the 1880s, primarily for ranching and homesteading. Edward Lyon patented land, a portion of which is now the Hall Ranch. Solomon Geer patented a portion of what is today the Heil Valley Ranch in 1888, as did Joel Plumlee (1893) and Charles Ingersoll (1893). During this period building material, needed for the growing towns along the front range, changed from wood to brick and stone. Near Lyons, land changed use from agriculture to quarrying for building stone. Edward Lyon joined with Griffith Evans and H.F. Sawyer in establishing the first major sandstone quarry on the eastern part of the Hall Ranch. On the Heil Valley Ranch, extensive quarry operations were found at the Ingersoll Quarry, the Whitestone and Vickery Quarry, and the Pace Quarry. The stone from NFOS was used throughout the Front Range and was utilized for many of the buildings at the University of Colorado. After World War II, during the 1940s, Hallyn and June Hall began acquiring what became the Hall Ranch while the Heil family acquired their ranch from Orville Pickett in 1949.

4.2Significant Resources

A Class III cultural resource inventory was conducted over most of North Foothills Open Space during the summer and fall of 1995. Following are some of the significant findings.

Prehistoric Sites - Fourteen prehistoric sites and thirty-five isolated finds were documented from NFOS. They consisted mainly of small scatters of flaked stone artifacts and ground stone artifacts. Diagnostic projectile points recorded from the inventory provide direct evidence that North Foothills

Open Space was utilized during nearly all prehistoric time periods. The most common points were from the Ceramic Period.

Historic Ranch Complexes - Several ranch complexes are present, some still functioning and others only as partial remains. These include: the Hall Ranch Complex (along State Highway 7, site patented by J. Tumbleson, oldest building from around 1890); Nelson Ranch Complex (in Antelope Park on Hall Ranch, located on R. Clark homestead, built around 1920s); Archy Ranch-Weir Homestead (located on Hall Ranch, located on L. Weir patent of 1919 and occupied by Mr. and Mrs. James Archy beginning in the 1920s, homes built probably around time of patent); Geer Ranch Complex (located on Heil Valley Ranch, site homesteaded by Solomon Geer, buildings date from possibly 1890 to 1920).

Historic Quarry Complexes - Several significant quarry sites are present. These include: Lyon Sandstone Quarry (patented by Edward Lyon in 1885, site consists of 52 small sandstone quarry pits); Pace Homestead Ranching and Quarry Complex (located on Heil Valley Ranch, site consists of quarries and remains of structures and buildings on site that was homesteaded between 1919-1921); Whitestone and Vickery Quarry Complex (located on Heil Valley Ranch, site consists of quarries, foundations and remains of buildings); Ingersoll Quarry (located on Heil Valley Ranch, site consists of sandstone quarries and related structures).

5.0VISITOR SERVICES

5.1General Description

North Foothills Open Space possesses the size, terrain, scenery, views and resources which should make this an area people will enjoy visiting. Non-urban recreational opportunities which can be accommodated in a manner that minimizes resource damage may include hiking, picnicking, mountain biking, horseback riding, fishing, wildlife viewing, rock climbing and environmental education. Opportunities may also exist for citizens with special needs.

Recent visitor surveys (1995) on other Boulder County Open Space properties indicate that hikers (33%) and picnickers (25%) are the predominant users followed by anglers (16%), mountain bikers (14%), wildlife viewers (8%), dog walkers (8%) and equestrians (3%). Eighty percent of the users come from Boulder County.

Use of the property must be compatible with the protection of the resources and other visitors. Some direct and indirect impacts from human use include displacement of wildlife (loss of habitat effectiveness), spread of exotic plants, soil compaction, soil erosion, the loss of vegetation through trail widening and the creation of additional trails, and vandalism. Every effort needs

to be made to lessen human impact on the resources, direct visitors to less sensitive areas, and to design for human use that minimizes resource damage and reduces conflict.

5.2Significant Resources

The geology, topography, vegetative diversity and cultural features make for an interesting and pleasing landscape for visitors. Following are some of the significant resource types of North Foothills Open Space.

Views - There are significant views of the Continental Divide, plains, and the initial rise of the front range.

Mixture of Landscape Types - The mixture of forests and meadows along with the varied topography create a "sense of place" to many locations including Antelope Park, Red Hill Gulch and Upper Geer Canyon.

Geology - The dramatic hogbacks, exposed sandstone, granite domes, cliffs and canyons enhance the interest of the landscape.

Cultural Resources - The old homesteads, and remains of quarries and buildings add to the diversity of experiences that a visitor may encounter.

MANAGEMENT DIRECTION

6.0VEGETATIVE MANAGEMENT

General management goals for vegetative resources of North Foothills Open Space include:

- Protect and properly manage Conservation Areas, Significant Plant Communities, and rare plants;
- Manage vegetative communities by maintaining and encouraging desirable native species, restoring degraded areas, and eliminating or controlling undesirable exotic species;
- Manage for ecosystem integrity by encouraging and planning for naturally occurring processes, or the simulation of those processes, so they will remain vital components of the ecosystem.

The management direction is towards protecting critical resources, encouraging native species over exotic, and maintaining natural processes. Where feasible, a passive approach of letting nature take its course will be utilized. However, active tools such as forest thinning, herbicides, seeding, grazing, rest from grazing, exclusion from grazing, biological weed controls and prescribed fire will also be utilized.

6.1Protection of Significant Resources

The Colorado Natural Heritage Program identified significant plant communities and conservation sites. Recommendations for their protection include:

- Properly manage significant elements of natural diversity. Any activities in or near significant resources should only be carried out with knowledge of the most current information and best management practices. The effects and impacts of fire, grazing and herbiciding are potential tools but need to be utilized in a manner that protects the resource. Appropriate organizations, such as the Colorado Natural Heritage Program, Colorado Natural Areas Program, The Nature Conservancy, and academic institutions, should be consulted in conjunction with any proposed activity, development of specific management plans, and long-term monitoring.

- Promote cooperation with adjacent boundary neighbors to insure the maintenance of selected sites and ecosystem integrity. The County should promote cooperation with private individuals, the State Land Board, and the U.S. Forest Service.

- Where possible, avoid fragmentation by roads and trails of conservation sites, and actively manage roads and trails through and to these sites to control invasive alien plants.

- Increase public awareness of the benefits of protecting areas determined to be significant to the nation's natural diversity. Increasing the public's knowledge of the remaining significant areas will build support for the initiatives necessary to protect them. Such activities could be done through interpretive facilities, direct public involvement in management, information pamphlets, and public service announcements.

- Continue to identify significant natural resources through inventories and other tools.

6.2Forest and Grassland Management

Active management may be necessary in order to restore natural communities and mimic natural processes. Some of the main objectives are:

- Increase native plants, increase diversity, cover and vigor, control soil erosion, and retain more moisture on site.

- Reduce the density of some forest stands to bring these stands back to a more natural density and to decrease the probability of major wildfire, and large-scale insect and disease infestations.

•Restore natural meadow systems by reducing invasion of conifers;

•Retain and perpetuate old-growth forests and woodlands. Retain large-diameter trees (generally those over 20" DBH), snags (standing dead) and course woody debris in the understory. Retain a minimum of 3 snags per acre of 10" DBH for wildlife.

•Maintain a mosaic of stand density, size and age for vegetation types, particularly coniferous forests and woodlands, and foothill shrublands.

•Protect and restore riparian habitat. Reduce grazing to a level that allows for the regeneration and establishment of willows, shrubs and cottonwoods in riparian zones.

•Manage undesirable vegetation, including noxious weeds, using an integrated pest management approach. Unwanted vegetation may be managed using manual removal, prescribed fire, mechanical, biological, or herbicidal methods. All methods of control will be evaluated to reduce potential adverse effects to human health and the environment.

The primary tools for active management include: thinning and pruning of forests and woodlands; use of controlled burns; grazing; and weed management. Following are objectives and potential applications of each management tool for NFOS.

Thinning and Pruning of Forests and Woodlands: This management tool is utilized in order to decrease stand density in ponderosa pine forests and maintain open meadows, shrublands and woodlands. It also allows fire to be a more effective and less dangerous agent by reducing stand density, maintaining less hazardous fuel types, and eliminating ladder fuels. Thinning will focus on removing understory trees, as well as many seedlings and saplings which would have been killed by historically occurring low-intensity ground fires. Most active forest management will focus on maintaining meadows, shrublands and woodlands (Figure 5, areas 1, 3-5, 7-9). Thinning can be used to reduce fuel loads, bring ponderosa pine stands back to more natural densities, and feather the sharp edges created by thinning operations of the past (Figure 5, areas 2 & 6).

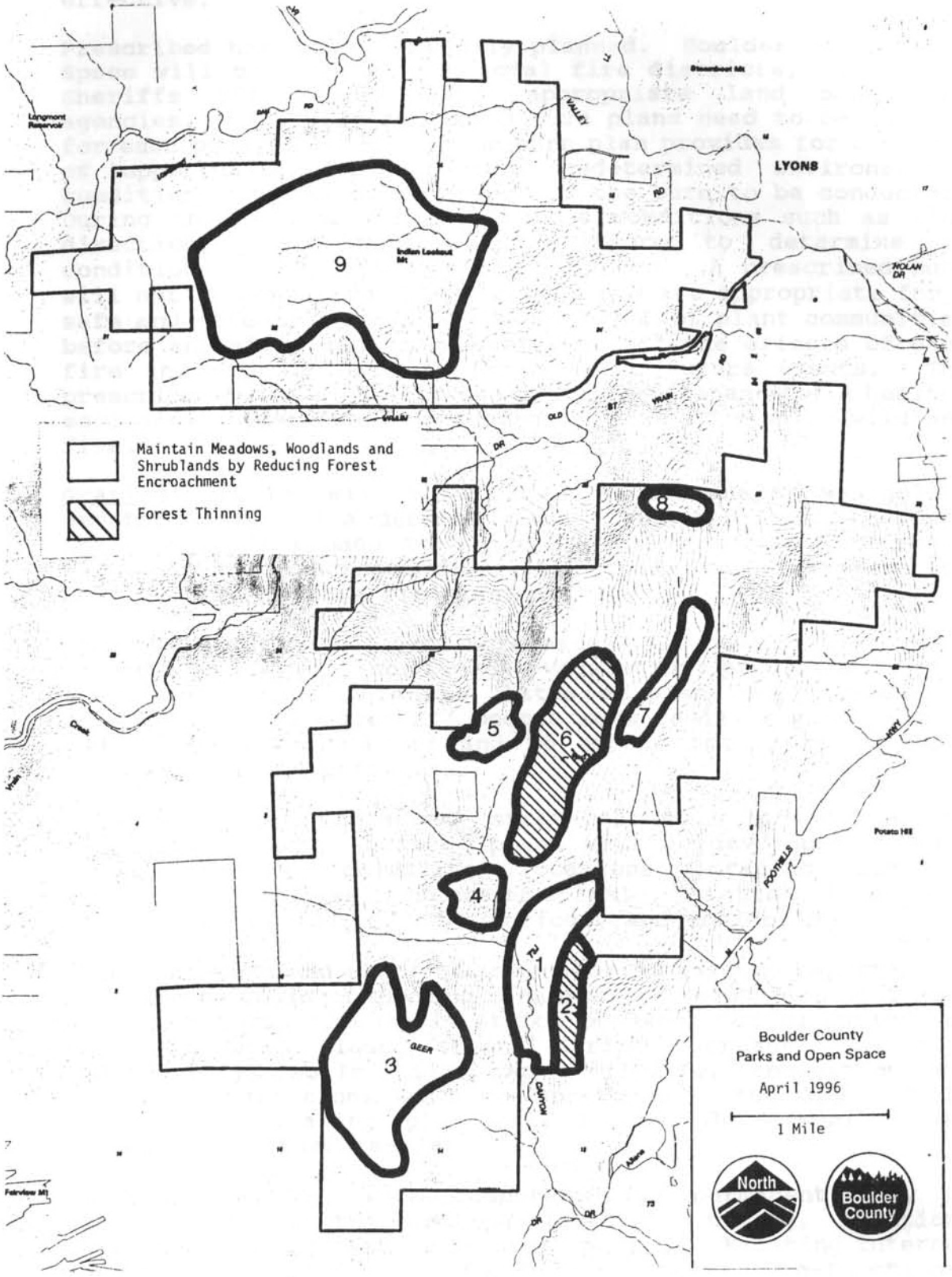
Spatially, management activities on Heil Valley Ranch focus on maintaining a north-south corridor of reduced fuels. Much of the priority areas for management activity help maintain the grasslands of lower Geer Canyon (Figure 5, area 1) and Red Hill Gulch (Figure 5, area 7) which form a natural north-south fuel break.

Use of Prescribed Burns: Fire is an important part of grassland,

woodland, shrubland and forest ecosystems of Boulder County. Recent research suggests that fires in the foothills burned at an interval of 10-20 years prior to suppression efforts. Many plants and plant communities are influenced by fire or are dependent upon it for germination and growth. Fire burns in a mosaic that creates a diversity of species and densities within a vegetative community. Fire helps return nutrients to the soil. Fire should be used in conjunction with grazing, mowing, thinning and pruning to maintain periodic disturbances in vegetative communities.

Prescribed burns can reduce exotic plants, restore ecological diversity, and reduce fuel loads which may help reduce the risk or severity of wildland fire. Low to moderate intensity prescribed burns can be utilized in grasslands, ponderosa pine woodlands, shrublands and some forests of NFOS (Figure 5, areas 1,3-7,9). Each burn will generally only cover a portion of each area. Some areas may receive an initial thinning and

Figure 5 - Vegetative Management Priority Areas



pruning of trees in order to allow the fire to be more effective.

Prescribed burns are carefully planned. Boulder County Open Space will coordinate with local fire districts, the County Sheriffs Office and other appropriate land management agencies. Carefully developed burn plans need to be written for each prescribed fire. The burn plan provides for a window of opportunity during which predetermined environmental conditions must exist in order for the burn to be conducted. During this window, officials test conditions such as wind direction, temperature, and moisture to determine if conditions are appropriate for the burn. A prescribed burn will not be conducted unless conditions are appropriate for a safe and effective burn. The monitoring of plant communities before and after each burn are important the effects of each fire and provide data to better plan future events. The prescribed burns allow for the better maintenance of a healthy ecological system while reducing the risk of a major wildland fire.

Grazing: Grazing will be utilized as a means to manipulate vegetation toward a desired goal. On North Foothills Open Space we will manage to: increase native plants; decrease exotic plants; increase diversity, cover and vigor; control erosion; and improve riparian habitat.

No grazing during the growing season will occur for two years in order to: benefit most of the vegetation; provide more time to further investigate the status of plant communities and strategies for management; become more familiar with fencing and watering facilities; and to become more familiar with recreational use patterns.

When vegetation management strategies call for the use of grazing as a tool, grazing plans will be developed. These plans will include objectives, locations of grazing, season of use, livestock class, numbers of animals, duration, intensity, plant recovery and regrowth periods, and monitoring.

Both long-term and short-term monitoring will be important to achieve the goals of grazing management. Vegetation will need to be monitored frequently (twice per week during periods of rapid growth, less often during dormant seasons). Additionally, soils, hydrology, wildlife, recreation and overall interactions will be monitored. The approach to achieving a grazing plan will be to plan, monitor and evaluate, and then re-plan.

Internal fencing, both temporary and permanent, may be required to control grazing location, timing, duration, intensity, and vegetation recovery periods. Existing internal fencing will be evaluated for effectiveness. Non-functional and poor

quality fencing will be removed to provide less conflict with recreation and wildlife movement. Temporary fencing will be used as much as possible to achieve new fencing needs.

Some of the likely vegetation management objectives that can be achieved through grazing include:

•Weed Control - this is primarily for the control of cheatgrass. Early spring grazing or after fall germination can be effective.

•Manipulation of Plant Communities - There are site specific instances where plant communities may be manipulated, using grazing, to increase overall plant health and vigor, and increase native grasses, while reducing cool season grasses such as smooth brome and Kentucky bluegrass.

Weed Management: Weeds and non-native plants are present throughout NFOS. Cheatgrass, Kentucky blue-grass, Canada blue-grass and Japanese brome are some of the Eurasian grasses that have invaded meadow and grasslands. Noxious weeds include dalmatian toadflax (found throughout Hall Ranch and in smaller pockets on Heil Ranch), diffuse knapweed (found throughout NFOS, generally adjacent to roads), and musk thistle (found throughout NFOS in meadows, along roads, in prairie dog colonies and in logged areas).

A detailed inventory of weeds on Hall Ranch was conducted in 1995. Detailed mapping will be conducted on Heil/Trevarton in 1996. Weed mapping will be updated every 5 years.

The County utilizes an integrated pest management approach that uses manual removal, prescribed fire, mechanical, biological and herbicidal methods. Weed control activities were initiated on Hall Ranch in 1995. Biological, manual and herbicidal control were initiated against dalmatian toadflax. Herbicidal applications were also conducted on diffuse knapweed along roadways. Weed control will continue on Hall Ranch and be initiated on Heil Valley Ranch in 1996, and continue throughout NFOS as required. Emphasis will be placed on controlling knapweed, while it is still primarily contained along roads, dalmatian toadflax and thistle.

Herbicides are used only under strict guidelines. Those herbicides that are persistent in soil and move easily in water are used as spot applications away from trees, sensitive vegetation and streams. Herbicides with low toxicity, low movement in water and active on few plant families can have a wider application.

7.0WILDLIFE MANAGEMENT

General management goals for wildlife resources of North

Foothills Open Space include:

- Protect the ecosystem functions of the properties relative to their values within the North St. Vrain and South St. Vrain/Foothills Environmental Conservation Areas, and particularly Coffintop and Central gulches;

- Protect and properly manage conservation areas and critical resources;

- Protect wildlife habitat by maintaining natural food, cover, nesting sites, resting areas and habitat effectiveness.

The management direction focuses on three different scales: 1) the context of the property in the landscape of northwestern Boulder County; 2) the ability of the property to function as effective wildlife habitat; and 3) the protection of known significant resources.

7.1Protection of Landscape Values

Northwestern Boulder County is a relatively undeveloped portion of the county as evidenced by the presence of bighorn sheep, elk that migrate from the Continental Divide to the Great Plains, and a high concentration of raptor nests. Hall Ranch is within the North St. Vrain Environmental Conservation Area and adjacent to Coffintop Gulch, an area which the U.S. Forest Service wishes to designate as core habitat due to its relative pristine nature. Heil Valley Ranch is adjacent to Central Gulch, which is also being considered for a core habitat designation. It is probable that Central and Coffintop gulches provide effective habitat for human sensitive species such as black bear and mountain lion.

- Visitor use of NFOS should be directed away from the western portion of Heil Valley Ranch and the southwestern portion of Hall Ranch to effectively buffer the high quality habitat found in Central and Coffintop gulches.

7.2Maintaining Habitat Effectiveness

Visitor use of NFOS will probably be higher in number and cover more of the property at one time than in the past. Maintaining effective habitat for species to utilize and remain on the property, such as black bear, mountain lion, bighorn sheep, elk, deer, wild turkey, and raptors is an important factor in finding a balance between resource protection and visitor use.

- Minimize habitat fragmentation by trails and recreational use, and maximize habitat effectiveness by providing sizeable blocks of land where wildlife can find hiding cover and food;

- Encourage visitors to stay on trails so their activities and

movements through the property are predictable to wildlife;

- Forest management should provide a mix of forest stages. Meadow and woodlands should be retained and enhanced through halting conifer encroachment. Large diameter trees, snags and deadfall should be retained and perpetuated throughout the forest and woodland landscape, particularly in old-growth areas, to help those wildlife specialists that depend on these features;

- Grazing should be reduced to a level that provides greater grass/forb cover as well as increased shrub and riparian habitat;

- Important raptor feeding areas, particularly prairie dog colonies, should be maintained and perpetuated. Expansion should be monitored and containment considered, however it is possible these colonies will be geographically contained by soil type, geology and topography. In order to maintain raptor prey base, re-introduction should be considered when plague eliminates colonies. Visitor use should be directed away from prairie dog colonies to maintain their effectiveness as a prey base.

- Hunting should be maintained as an optional management tool for deer and elk populations. Hunting should be considered if deer and elk numbers approach carrying capacity level and could potentially cause damage to other resources. The county should establish methods to monitor populations and coordinate such efforts with the Colorado Division of Wildlife. If it is deemed necessary to control the population, the method and timing of hunting will be coordinated with the Colorado Division of Wildlife.

7.3Protection of Significant Resources

A number of avian conservation areas were identified. Recommendations for their protection include:

- Minimize visitor impacts to conservation areas through trail location and design to influence where people go and encouraging visitors to stay on trails. Where possible, avoid fragmentation of conservation areas by trails and roads;

- Use seasonal and permanent closures where and when appropriate:

- Use seasonal closure from February 1 to July 15 for visitors within 1/2 mile of golden eagle nest sites (distance can be modified by historically occurring intrusions and topography);

•Use seasonal closure from March 15 to July 31 for visitors within 1/2 mile of prairie falcon nest sites (distance can be modified by historically occurring intrusions and topography);

•Use permanent closure for the canyon north of Plumely Canyon on Heil Valley Ranch due to critical wildlife resource values and wildlife use that occurs most of the year;

•Consider seasonal closures for critical wild turkey habitat - roosting areas, winter concentration areas and breeding areas - as these sites are found through research.

8.0CULTURAL RESOURCE MANAGEMENT

General management goals for cultural resources of North Foothills Open Space include:

•Preserve the cultural, historical and archaeological integrity of the area;

•Provide opportunities for cultural interpretation to the public.

The management direction is towards cultural resource protection, use for interpretation and visitor safety.

A number of prehistoric sites and isolated finds were documented from NFOS. Native American use of NFOS should be a strong interpretive theme. However, due to the sensitivity of these archaeological resources, specific sites will not be used for interpretation and visitor use will be directed away from them. Parks and Open Space regulations prohibit the removal of any artifacts by visitors. The sensitivity of these sites should be respected by all visitors.

The most prominent cultural resources on NFOS are historic sites related to homesteading, ranching and quarrying. Following is general management direction for the most significant sites;

Hall Ranch Complex (Hall Ranch): The complex should be developed into a ranger quarters, maintenance workstation and possible interpretive center. These buildings are currently being used as a residence and ranch related functions. The current residence will be replaced to house a property caretaker. The barn will function as a workstation and storage location for maintenance activities. The vernacular cut stone, two-story white building could be developed into a self-guided interpretive center, with access from the main parking lot located to the east.

Nelson Ranch Complex (Hall Ranch): The complex should be utilized for interpretation. The house should be stabilized from further decay. Doors and windows should be boarded or barred to prohibit visitors from entering for safety considerations.

Weir Homestead/Archy Ranch (Hall Ranch): The site should be made safe. Due to the poor condition of the main house, it should be allowed to decay. The remaining stone walls, log buildings and foundations will still lend themselves to interpretation. Doors and windows may be boarded or barred to prohibit visitors from entering for safety considerations.

Geer Ranch Complex (Heil Valley Ranch): This site should be used as on-site housing for a ranger and/or seasonal help. The main house is currently being used as a residence. The smaller log building, which may have been the original Geer homestead, should be stabilized from further decay.

Whitesone and Vickery Quarry Complex; Ingersoll Quarry; Pace Homestead and Quarry Complex (Heil Valley Ranch): All three areas contain stone structures and quarry pits which could be used for interpretation. All three sites should also be considered for National Register of Historic Places designation as an addition to the Lyons Sandstone Historic District. These site significantly contribute to the local and regional history based around the sandstone quarry industry of the Lyons area. The sites should be inspected for loose walls and stone and made safe. Signage will be needed requesting people not to climb on or enter the structures for safety and cultural resource protection.

Other historic cultural resources exist. The sites should be inspected for safety and cleanup potential. Otherwise, no additional work should be conducted and these sites should be allowed to naturally decay.

9.0VISITOR SERVICES

9.1Visitor Use Objectives

General management goals for visitor services of North Foothills Open Space include:

- Provide passive outdoor recreation opportunities which do not adversely impact sensitive resources;

- Provide opportunities for environmental and cultural interpretation to the public;

- Provide a good neighbor policy to adjacent landowners.

The Open Space Sales Tax Resolution (Resolution No. 93-174) approved by the voters of Boulder County, and whose funds were used to acquire Hall Ranch and Heil Valley Ranch, provides further

direction regarding appropriate recreational use of these lands. The resolution cites six functions that open space may serve including urban shaping buffers, preservation of critical natural and historic resources, trail linkages and public access, areas of environmental preservation, conservation of natural resources, and:

"preservation of land for outdoor recreation areas limited to passive recreational use, including but not limited to hiking, photography or nature studies, and, if specifically designated, bicycling, horseback riding, or fishing."

The management direction focuses on passive recreational use. Uses such as shooting ranges and active recreational fields (baseball, football, golf) are prohibited from these properties. They are not consistent with the intent of the Open Space Sales Tax Resolution.

9.2Management Areas

In trying to balance resource protection with visitor use of North Foothills Open Space, Management Areas that describe the emphasis of use of the land have been developed (Figure 6). It distinguishes between those areas more suitable for resource protection and those areas more suitable for visitor use. While Management Areas should direct the management practices of a specific area, attempts should be made to manage for other resource components, when possible. The use areas are:

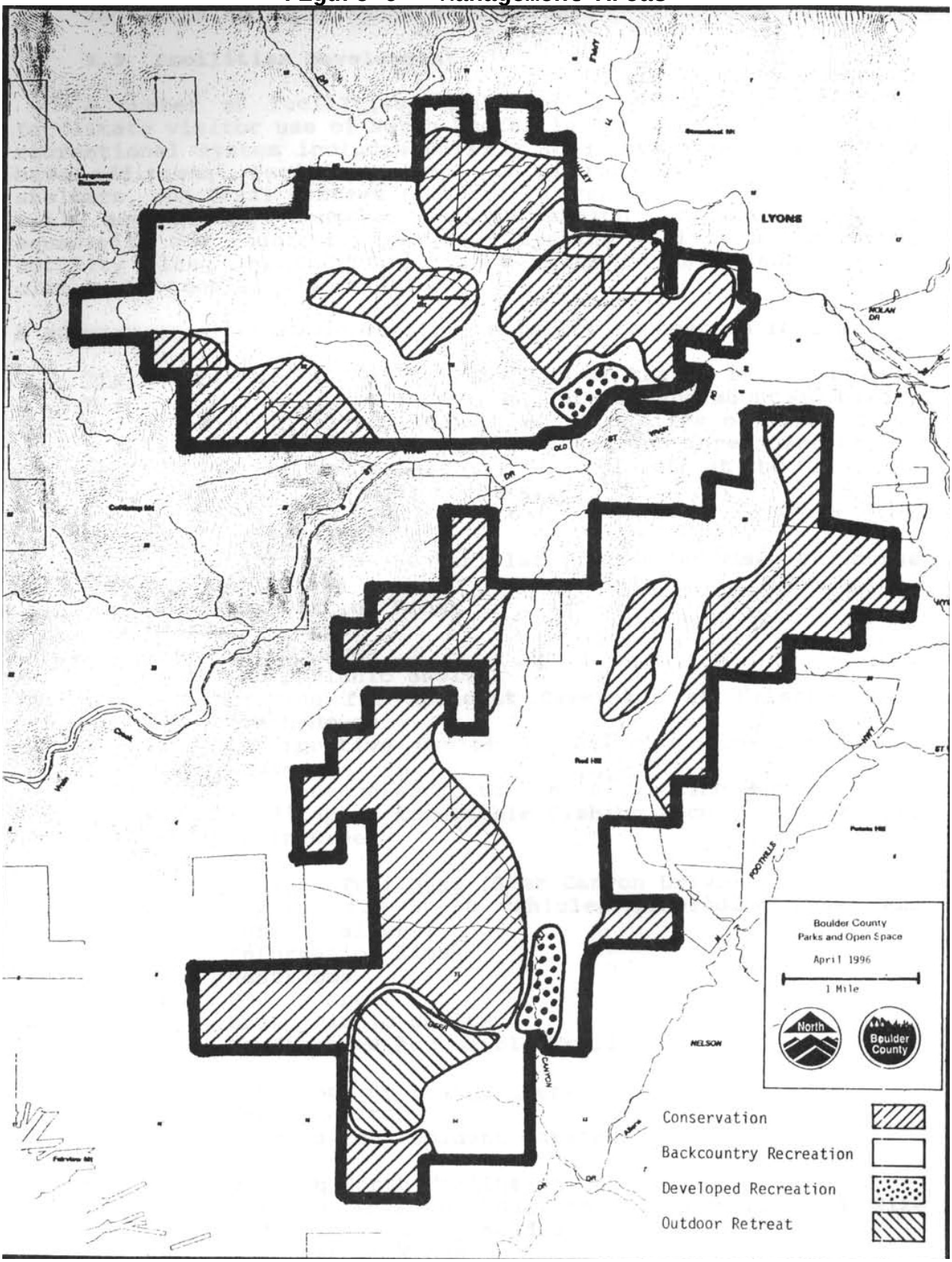
Conservation Area: These are areas with a concentration of significant plant communities and avian conservation areas. They also provide habitat effectiveness for human sensitive wildlife species. Additionally, the western portion of Heil Valley Ranch functions as a buffer to the Central Gulch Habitat Core Area while the southwestern portion of Hall Ranch buffers the Coffintop Gulch Habitat Core Area. Visitor use is discouraged from these areas by focusing trail use to other parts of the property. Seasonal closures are used for raptor nest sites and other appropriate sensitive areas. A permanent closure is used in the canyon north of Plumely Canyon due to sensitive resources that are present for most of the year.

Backcountry Recreation Area: These are areas for passive recreation in a natural appearing landscape. Trails are the primary routes for recreational travel and visitors are encouraged to stay on them. Smaller sites of significant natural and cultural resources, not included in Conservation Areas, are used to influence trail locations.

Developed Recreation Areas: These are areas of primary visitor services, including any and all of the following: parking lots, trailheads, restrooms, picnic areas, group picnic shelters, caretaker housing and interpretive facilities.

Outdoor Retreat Area: This area in Geer Canyon is appropriate for a retreat center due to its isolation. The center would be open on a reservation basis and seasonal closures would be used to protect sensitive resources. Priority will be given to environmental education activities, but it will be open to other groups where activities are compatible with the site,

Figure 6 - Management Areas



and Parks and Open Space Regulations.

9.3Facilities Development

A number of facilities will need development in order to facilitate visitor use of North Foothills Open Space. The primary recreational system includes parking areas/trailheads, which may have additional facilities such as picnic areas, group picnic shelters, and trail systems (Figures 7a and 7b). The trail system will accommodate nonmotorized recreation including hiking, equestrian and mountain bike use. Fishing will be a recreation activity along the South St. Vrain Creek on Hall Ranch. Rock climbing potential also exists.

A summary of site development projects for recreation follows:

Trails: Twenty-two and a half miles of trails including 15.5 miles of multiple use (hiker, equestrian and mountain bike), 5.5 miles of hiker/equestrian, and 1.5 miles of hiker only. A goal is to provide opportunities for the three user groups while providing some separation of uses, both at the trailhead and internally on the properties.

Hall Ranch Trailhead:
•Parking for 50 vehicles (including buses and horse trailers)
•Information Kiosk
•Restrooms
•Picnic Area
•Group Picnic Shelter
•Housing for Resident Caretaker at Existing Hall Ranch House
•Interpretive Center in Existing Two-Story White House
•Maintenance Work Station in Existing Barn
•Handicapped Accessible Fishing Access to South St. Vrain Creek

Heil Valley Ranch Trailhead (Geer Canyon Drive):
•Parking for 50-60 vehicles (including buses and horse trailers)
•Information Kiosk
•Restrooms
•Picnic Area
•Group Picnic Shelter
•Handicapped Accessible Trail

Geer Canyon Outdoor Retreat Center:
•Group Shelter
•Housing for Resident Caretaker

Heil Valley Ranch North Trailhead:
•Parking Area of Undetermined Location and Size (additional study needed)
•Information Kiosk

Figure 7a - Trailhead and Trail Plan - Hall Ranch

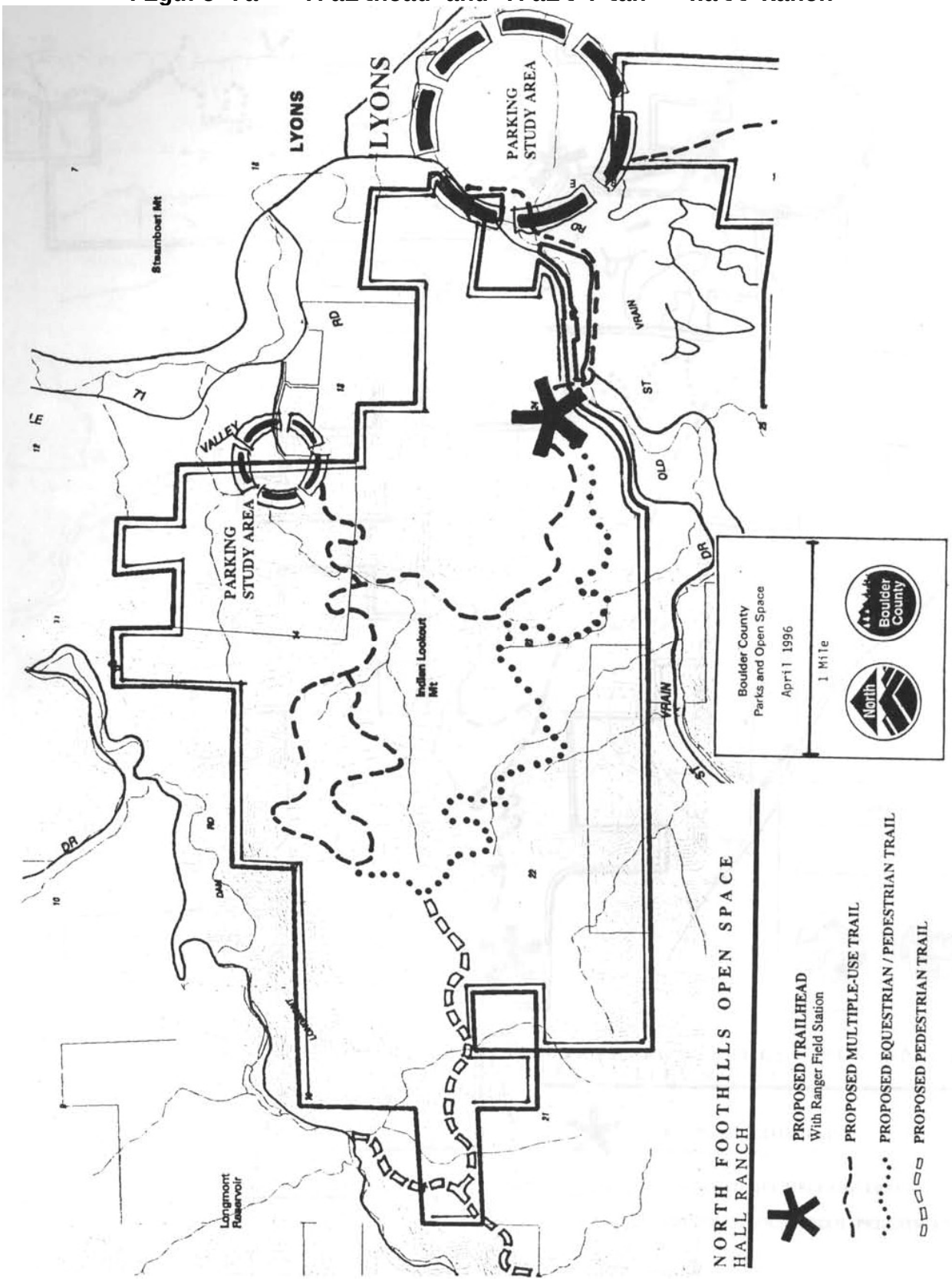
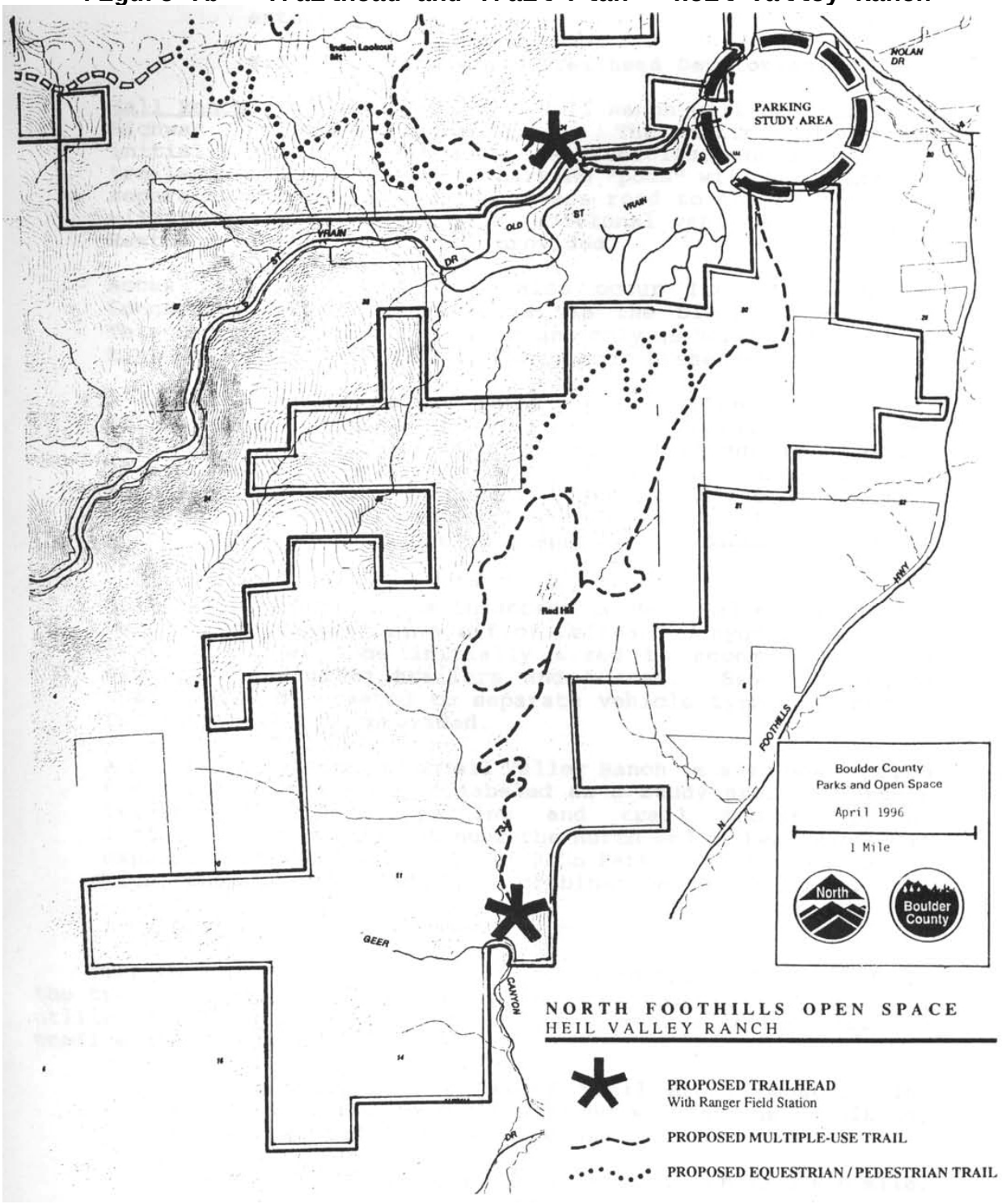


Figure 7b - Trailhead and Trail Plan - Heil Valley Ranch



Buttonrock Preserve Access to Hall Ranch:

•Information Signs (located where Sleepy Lion Trail enters Hall Ranch)

9.3.1Access and Trailhead Development

Hall Ranch: The main access to Hall Ranch will be from State Highway 7 (South St. Vrain Drive). The parking lot will be initially sized to accommodate 50 vehicles, including horse trailers and buses. Several parking "pods" will be created to separate vehicle types. The access road to the parking area will be sized to accommodate additional vehicles if needed. Restroom facilities will be provided.

Access to Hall Ranch will also occur from the City of Longmont's Buttonrock Preserve via the Sleepy Lion Trail. This access will be for pedestrians only as horse and mountain bike use are not allowed in Buttonrock Preserve.

A third potential access point is at the end of Antelope Drive. This access point has been a long-standing access to Hall Ranch. Local roads that go through residential areas are used to get to this access point. This site is considered to be a local trail and emergency access. Additional study is needed to determine whether a small parking lot (10 spaces) should be built or if the area should be managed to prohibit any parking.

Heil Valley Ranch: The main access to Heil Valley Ranch will be via Geer Canyon Drive off of Lefthand Canyon Drive. The parking lot will be initially sized to accommodate 50-60 vehicles, including trailers and busses. Several parking "pods" will be created to separate vehicle types. Restroom facilities will be provided.

A parking area/access to Heil Valley Ranch is also needed from the north. This area is labeled as a study area to further investigate several parking and trail access options including: a separate lot near the north end of Heil Ranch, an expansion of the Town of Lyons' Bohn Park, use of Lyons' Jr/Sr High School parking lot, or a combination of the above.

9.3.2Trail System

The backbone of visitor use of North Foothills Open Space is the trail system. A significant portion of the trail system will utilize the existing road system. Management direction for the trail system includes:

•Approximately 22.5 miles of trail are proposed. The majority of trails (70%) will be multiple use - hiking, equestrian and mountain bike use.

The main trail system on Heil Valley Ranch is a 6.0 mile, north-

south trail from Geer Canyon Drive to Lyons. This trail goes by the stone buildings of the Pace Quarry Complex and the Whitestone/Vickery Quarry Complex. It also has outstanding views south toward Boulder and north to Lyons from a saddle below Red Hill. The trail system includes several internal loops, each 2.0 miles in length. The central loop will be for multiple use. The northern loop is for pedestrian/equestrian use only due to several isolated critical resources (small wetlands, rare plants, and a nesting accipiter) as well as wild turkey winter range. Decreasing use of this northern loop is advantageous and a winter closure may be needed to protect the turkey. Total trail mileage on Heil Valley Ranch is approximately 10 miles, with 8.0 being multiple use, and 2.0 being pedestrian/equestrian.

On Hall Ranch, the trail system rises from the South St. Vrain Creek floodplain toward Antelope Park. A trail connecting the Town of Lyons' South St. Vrain Trail could run west along the South St. Vrain Creek and near Old St. Vrain Road. This trail would go under State Highway 7 at a stock underpass and into the main parking area. This trail needs additional study and will require coordination with the City of Longmont and the State Highway Department, who own intervening lands.

The trails from the main parking area toward Antelope Park possess many outstanding views in all directions. Several loops are planned. The Nelson Homestead will be an important focal point for these trails.

The western portion of Hall Ranch will be for hikers only, and occurs at a topographic break that descends toward Buttonrock Preserve, where equestrian and horseback riding are prohibited. The western portion of Hall Ranch is also within bighorn sheep range, and decreasing the level of use of this area would be advantageous. The other trail that will be for hiker/equestrian use begins near the main trailhead and allows for a separation of use toward Antelope Park. Total trail mileage on Hall Ranch is approximately 12.5 miles, with 7.7 miles being multiple use, 3.5 miles for hiker/equestrian, and 1.5 miles for hiker only.

•Where existing roads/trails meet locational, design and resource protection objectives, they should be utilized as part of the trail system. Where existing roads/trails meet locational objectives but have design problems, these sections should be redesigned and reconstructed (this can be phased over several years). Existing roads and trails that could have impacts to critical resources, and are not deemed appropriate for recreational, maintenance or emergency use, should be closed and reclaimed.

- Educating visitors to stay on trails is important to achieving resource protection goals. Wildlife can better adapt to known, repeated and consistent human movement along the same locations (trails) than they can to casual/unpredictable occurrences of human use. The Parks and Open Space Department will work to educate visitors to the ecosystem benefits of staying on trails. Closure and reclamation of those existing roads/trails not desirable for recreational use is a high priority.

- From main parking areas, it will be advantageous to separate hiker/equestrian use from mountain bike use for the first segments of trail to decrease user conflicts in the highest use areas.

- Main entry areas should be evaluated for the potential development of trails (approximately 1 mile in length) for families and those wishing a short walk to separate their use from the main trail system.

9.3.3Picnic Areas and Group Shelters

Picnicking is a popular activity on County Open Space lands. Picnic sites will be developed on Hall Ranch near the east edge of the trees at the Hall Ranch building complex. At Heil Valley Ranch, picnic sites can be provided in the vicinity of the main entrance off of Geer Canyon Drive. Tables, grills and trash cans will be provided.

Group picnic shelters will also be developed near the main entrances to Hall and Heil Valley ranches. These sites can be reserved for group activities, such as picnics or weddings

9.3.4Geer Canyon Outdoor Retreat Center

There is a need in Boulder County to provide an outdoor retreat site for in-service, training and workshops away from other park visitor activities. The Geer Canyon Outdoor Retreat Center will provide a secluded setting for groups to conduct these types of programs. Priority will be given to environmental education sessions.

Due to the sensitive habitat of Geer Canyon, the site will be open to groups no larger than 50 people. Also, the site will be available by reservation only. Seasonal closures, as well as how many user-days are available for a specific year, will be other tools to help the site co-exist with the sensitive resources of the area.

Development of the site will include: a shelter, bench seating which faces a speaker's table, electricity for visual aids, and a restroom.

9.3.5Special Recreation Use

From time-to-time there will be requests by special interest groups/commercial operators to allow specific outdoor recreational pursuits on North Foothills Open Space. Each request should be evaluated on its own merits keeping in mind the long-term stewardship responsibilities. The overriding objective in management of the property is to prevent the loss of natural and cultural resources while yet allowing education and passive recreational activity which is compatible with protection of the resources and other visitors.

9.3.6Special Populations

Opportunities exist to provide facilities that meet the needs of handicapped individuals. The parking lots, restrooms, picnic areas and group shelters will all provide handicapped access to portions of the facilities. Fishing opportunities along the South St. Vrain Creek of Hall Ranch should also be made handicapped accessible. A handicapped accessible trail should be developed near the Geer Canyon entrance to Heil Valley Ranch.

9.4Interpretation

North Foothills Open Space provides many interpretive opportunities. Aspects of both natural history and cultural history are present. Interpretive potential for programs and publications include:

Cultural History Interpretive Themes:
- Native Americans
- Homesteading
- Ranching
- Sandstone Quarrying

Natural History Interpretive Themes:
- Geology (particularly sedimentary formations and hogbacks)
- Flora (including significant plant communities)
- Fauna (including large mammals and avian species of concern)
- General Ecology of Foothills Lifezone

Interpretive sites will include those described under Cultural Resource Management (Section 8.0). Major cultural resources which can be interpreted on-site include the Nelson Homestead (Hall Ranch), the Weir Homestead/Archy Ranch (Hall Ranch) and the sandstone quarry complexes of the Heil Valley Ranch.

A self-guided walk-through interpretive center should be developed on the Hall Ranch in the two-story white building near the main trailhead. This site can be used to display to visitors the continuum of human use of North Foothills Open Space from Native Peoples, to the Hall and Heil families.

9.5Fencing

Fencing is an important feature in order to demarcate property boundaries, focus access onto open space land toward public trailheads, reduce casual access points from private land, control trespass on private land, and control grazing animals. Over the next 3 years, most of the perimeter boundaries of North Foothills Open Space will be surveyed.

Currently, much of the eastern and northern boundaries of Heil Valley Ranch are fenced. All of the perimeter of Trevarton Open Space is fenced. On Hall Ranch, the areas adjacent to State Highway 7, Old St. Vrain Road, and the Town of Lyons are fenced. Additionally, Hall Ranch contains a significant amount of internal fencing.

Management direction for perimeter fencing is to maintain and repair current fencing, or establish new fence where appropriate. All existing perimeter fencing will be retained. Additional fencing will be established where: it would help demarcate property lines between open space and private residential development, topography makes trespass to private land or unwanted access to open space probable, and where it would assist grazing practices on open space or control unwanted grazing from adjacent private land. Some of the fencing needs will be determined through the monitoring of use patterns of people and livestock. Property boundary fences will be posted with boundary signs identifying the property as open space. Property boundaries that are not fenced will be posted with boundary signs. This will be particularly important on boundaries with National Forest lands and Buttonrock Preserve where management regulations differ.

The need for existing internal fencing will be determined with the development of a detailed grazing management plan. Fencing that is not determined to be necessary will be removed.

9.6General Park Regulations

The following regulations, which apply to all County Open Space, will be applicable to North Foothills Open Space:

- Parks are open from sunrise to sunset. Overnight camping is prohibited;
- Collecting, removing, destroying, or defacing any natural or manmade objects within parks and open space is not permitted;
- Feeding, disturbing, trapping, hunting, or killing wildlife is not permitted (except as allowed by the Board of County Commissioners to carry out a wildlife management program);
- Groundfires are not permitted. Fires may only be built in established grills and fireplaces in picnic areas. Fires

may be prohibited entirely by order of the Board of County Commissioners, the Boulder County Sheriff or the Director of Parks and Open Space by the posting of special notices or notification through the press;

- Pets must be on a leash and under physical control of a person at all times;

- Mountain bicycling is permitted on designated trails only;

- A valid Colorado fishing license is required whenever fishing in ponds, lakes and creeks;

- Discharging or carrying firearms, crossbows, fireworks, or projectile weapons of any kind is not permitted (except law enforcement officials and as allowed by the Board of County Commissioners to carry out a wildlife management program);

- Motorized vehicles are not permitted unless the area is specifically designated and posted to permit the operation of such vehicles in the area (County and emergency vehicles on official business are excepted; exceptions may also be granted to persons with disabilities, by written permission from the Parks and Open Space Department, for the use of single-rider, motorized vehicles adapted for recreational use by people with disabilities);

- The use of rock bolts as an aid to rock climbing is prohibited;

- The Parks and Open Space Department may temporarily close areas to public use for repairs or due to wildlife, vegetation and/or public safety concerns. It shall be unlawful for the public to enter such areas;

- The disposal of trash, garbage, rubbish, litter or debris is not permitted except is designated trash receptacles;

- State law prohibits the possession or consumption of any beverage having an alcohol content greater than 3.2% in any public place;

- Activities which unduly interfere with the health, safety and welfare of the users or the neighbors in the area, or which creates a nuisance or hazard to the use and safety of persons using or neighboring such areas are prohibited. Disorderly conduct (including amplified sound) shall be prohibited;

9.7Parks and Open Space Field Staff

The field staff of Boulder County Parks and Open Space conduct and/or coordinate construction, maintenance, patrol and

resource management activities on open space lands. Currently, this staff is comprised of 22 full-time and at least as many seasonal employees. The field staff are split into the following divisions:

Trails and Construction: Construct and maintain trails; construct trailhead facilities, picnic areas, group shelters, interpretive facilities and aids; produce and repair signs.

General Maintenance: Maintain facilities, buildings, roads, fencing; mow where necessary; pick-up trash.

Resource Management: Conduct resource inventories (wildlife, plants, forests, cultural) and resource management projects; provide patrol and law enforcement; plan interpretive facilities and programs; coordinate volunteer activities.

Agricultural Resources: Manage agricultural and grazing leases and activities.

Weed District: Plan and conduct weed management activities.

At both Hall and Heil ranches, existing or replacement residences should be turned into housing for resident caretakers. These staff people, one at each ranch, will function as the daily "eyes and ears" and provide a constant presence for day-to-day activities. The caretakers will also coordinate the activities of other field staff on the ranches.

9.8Patrol

Several staff activities will provide patrol of the property. Primary law enforcement responsibility will be provided by full-time Park Deputies, who cover all the major open space properties. The deputies are fully commissioned law-enforcement officers. The Boulder County Sheriff's office also has the duty and authority to enforce regulations adopted for County park and open space areas.

Other Parks and Open Space staff, particularly Resource Managers and the resident caretakers, will provide patrol and a presence. These staff people are authorized to enforce regulations under the Animal Control Ordinance, and can initiate other enforcement activities needed in response to violations or park rules and regulations.

9.9Emergency Services

Emergency response is provided by a host of agencies, organizations and fire protection districts. These activities are initially coordinated through a call to the Boulder County Sheriff's Dispatch Division. From here, depending on the nature of the emergency, appropriate response agencies are called.

Three fire districts help provide fire fighting and emergency response (first aid, evacuation, search and rescue) services to North Foothills Open Space. Most of Heil Valley Ranch is covered within the Lefthand Fire Protection District. Some of the eastern portions of Heil and Trevarton Open Space are within the Hygiene Fire Protection District. Hall Open Space is within the Lyons Fire Protection District.

The fire protection districts generally provide initial response and coordination for fighting fires. This is supplemented with help from the Boulder County Sheriff's Emergency Response Team, the Boulder County Wildland Firefighters, the Colorado State Forest Service, and possibly Federal crews and other fire fighting crews that may have been brought into the area during high fire seasons. The current mode of operation is to aggressively control all fires and extinguish them at the earliest time possible.

A detailed Emergency Response and Fire Fighting Response Plan needs to be developed in coordination with the fire districts, the Sheriff's Department, Parks and Open Space, the State Forest Service, the Forest Service, and local search and rescue operations. Preplans for fire fighting response need to be developed that address: suppression strategies and intensity of fire fighting for different parts of North Foothills Open Space; recognition of primary access travel routes needed for vehicular access for emergencies; coordination between responding staffs and the assistance of Parks and Open Space staff in helping to effectively respond to any emergency while minimizing resource damage.

10.0OTHER CONSIDERATIONS

10.1Research Programs

Research studies have occurred on County Open Space. Some studies have been conducted for Boulder County, while others have been conducted as part of an organization or school project. Research projects have included herbarium collection, mammal population studies, geological mapping, archaeological studies, rare plant inventories, and bird censuses. The department must approve all research projects, and a written proposal is requested before approval. Department staff will monitor on-site research and require a copy of findings after project completion.

10.2Volunteer Opportunities

For interested citizens and organizations, many volunteer opportunities exist through Boulder County Parks and Open Space to help maintain the land and provide services to visitors. Moat of these programs are organized through the Boulder County Parks and Open Space Volunteer Coordinator, unless otherwise noted. Volunteer opportunities include:

Adopt a Park/Trail: This program gives families, schools,

community groups, and businesses an opportunity to be part of the County's park maintenance system. Generally, there is an adopted site, such as a parking area or trail. Work can include trash pick-up, trail construction/maintenance, weed control, wildlife habitat construction, and other park improvements. Training is provided by Parks and Open Space staff.

Park Hosts: Park Hosts work at specific open space properties orienting visitors to the recreational opportunities, resources, and places to enjoy. Park rules may also be discussed with visitors. Training is provided by Parks and Open Space staff.

Volunteer Naturalists: Volunteer Naturalists are trained to provide environmental education programs to the public, school groups, and organizations. Each year, one or two classes of 20-25 people are chosen from applicants for the training program. Currently, there are over 120 active volunteer naturalists in the program. There are three other programs associated with the Volunteer Naturalists: the Herberium Team works on developing a complete inventory of all plant species found on open space; the Wildlife Study Team conducts field research such as bat inventories, mammal tracking, deer census, and fish creels; and the Cultural History Team pulls together information and materials on the history associated with open space properties, and is involved with living history presentations.

Adopt a Weed-Patch: This program allows groups and individuals the chance to help the County control noxious weeds by hand-pulling and cutting. To volunteer, contact the Boulder County Weed District.

The Boulder County Youth Corps is an opportunity for younger people to get involved in community activities, some of which will be conducted on open space. Youths from the ages of 14-17 can apply. The program is designed to provide youths lifetime skills by involvement in specific projects. Participants are paid minimum wage and have a 32 hour work week during the summer. The program is coordinated by the Administrative Services Division of Boulder County.

10.3Bureau of Land Management and State Land Board Properties

Boulder County has applied to the Bureau of Land Management, under the Recreation and Public Purposes Act, to transfer 641 acres of land adjacent to the Hall Ranch to County ownership. If these lands are put to a recreation purpose, or if they are lands which contribute to a park, the Bureau of Land Management can transfer these lands to a public entity for the cost of the application fee. Generally, these lands are first leased and eventually patented.

The Bureau of Land Management lands located at the very northern end of Hall Ranch are subject to several existing authorizations and rights. The most significant is the City of Longmont's water supply pipeline and associated facilities. The Town of Lyons also has a water take-out on these lands. A cooperative management agreement between Boulder County, the City of Longmont and the Town of Lyons should be developed that would allow for the proper maintenance of these facilities while retaining the open space and resource values of these lands.

The 560 acres of State Land Board property located in the center of Heil Valley Ranch will need to be leased for recreational purposes from the State. The long range goal for this land should be acquisition either through purchase or trade.

11.0RESOURCE MONITORING

Resource monitoring is done to determine how well management objectives are being met. Monitoring provides a feedback mechanism for decision making that keeps the plan dynamic and responsive. Monitoring provides information on what changes are occurring on the property. Some resources may be adversely affected resulting in a change in management. Other resources may improve as a result of management activities. The monitoring will be used to evaluate when hunting should be initiated. Visitor use patterns, user conflicts, and monitoring the creation of social trails can influence recreation management.

The monitoring of specific resources is performed on a periodic basis. Some inventories are ongoing and occur through standard patrol activities. Others are scheduled several times a year (trail inspections) annually (raptor nest monitoring), or every 5 years (detailed weed mapping). Still other monitoring projects are triggered by other events, such as the vegetative monitoring needed before and after a controlled burn.

Annually, a general monitoring report will be prepared. Every 5 years, a major evaluation of management direction will be undertaken.

North Foothills Open Space Resource Monitoring

WHAT	FREQUENCY	WHO
Photopoints		
Vegetation	4X/Year	BCPOS
Review Veg by Ecologist	Every 5 years	BCPOS
Trails	2X/Year	BCPOS
Cultural Resources	Every 5 years	BCPOS
Range Analysis	Every 5 years	BCPOS/ NRCS
Weed Mapping	Every 5 years	BCPOS

Social Trail Inventory	Annual for 1st 5 yrs, every 2 yrs after	BCPOS
Raptor Nest Monitoring	Annual	Vol.
Deer & Elk Population Monitoring Pellet count, capture/recapture	Annual	BCPOS/ Vol./ CDOW

North Foothills Open Space Resource Monitoring (Continued)

What	Frequency	Who
Raptor Utilization of Prairie Dog Colonies	4X/Year	Vol.
Trail Inspection	12X/Year	BCPOS
Parking Lot, Fencing, Building Inspection	2X/Year	BCPOS
Prairie Dog Inventory	Annual	BCPOS
Habitat Effectiveness Transect (includes winter mammal tracking)	Annual	Vol.
Butterfly Transects	Annual	Vol.

GENERAL DEPARTMENT PROJECT

Visitor Use Levels	Annual	BCPOS
Visitor Questionnaire	Every 3 years	BCPOS/ Vol.
Records of Violation	Annual	BCPOS
Records of Request for Use	Annual	BCPOS
Records of Reported Conflicts	Annual	BCPOS
Records of Emergency Response	Annual	BCPOS/ FPD/ Sheriff

SPECIAL

Prescribed Fire Pre-fire Veg Inventory During Fire Intensity Post Fire: Veg annual for 1st 5 yrs, every 5 years after	As planned	BCPOS/ Univ.

Exclosures	Initial Set Up	BCPOS
Deer & Elk Traps	Initial Set Up	BCPOS/ CDOW

Abbreviations:
BCPOS -Boulder County Parks and Open Space
NRCS -Natural Resource Conservation Service
Vol. -Volunteers (through Volunteer Naturalist Program and others)
CDOW -Colorado Division of Wildlife
FPD -Fire Protection Districts
Univ. -Universities

Appendix I

Boulder County Parks and Open Space
North Foothills Open Space Project Management Team

Dave Hallock, Resource Planner and Project Coordinator
Dan Wolford, Park Operations Manager
Michael Sanders, Senior Research Specialist (Wildlife)
Cindy Owsley, Weed Coordinator
Rob Alexander, Agricultural Resource Specialist
Barry Shook, Foreman - Trails and Construction
Brian Hannegan, Landscape Architect
Rich Koopmann, Resource Planner
Randy Coombs, Resource Specialist (Forestry)
Pascale Fried, Interpretive Specialist
Libby Henits, Resource Specialist (Law Enforcement)
Bob Buxton, Foreman - Maintenance
Jeff Moline, GIS Mapping

TO: Board of County Commissioners (BOCC)

DATE AND LOCATION: Thursday, January 12, 2006, 5:00 p.m. Commissioners Hearing Room, 3rd floor Boulder County Courthouse, 1325 Pearl Street, Boulder

AGENDA ITEM TITLE: Recommendations for Lyons-Hall-Heil Trail Connections (Amendment to North Foothills Open Space Management Plan)

PRESENTER: Patrick Malone, Natural Resource Planner, BCPOS

ACTION REQUESTED: Adoption of the recommendations and plan amendment

Executive Summary

BCPOS recommends an amendment to the North Foothills Open Space (NFOS) Management Plan in order to show the proposed alignment of new trails that will connect the Hall Ranch and Heil Valley Ranch properties to the town of Lyons. A new loop trail within the Heil property, along with a new parking lot to serve the Heil property from the north, are also proposed.

Two modifications to existing closure areas within the Heil property are also recommended: one is a minor reduction of acreage in order to accommodate new trails, and the other is an addition of acreage that will serve to protect significant resources that were discovered during the planning process.

The Department's recommendations seek to achieve an appropriate balance between recreational access and environmental preservation. Staff is requesting that the BOCC adopt the recommendations outlined as an amendment to the NFOS plan.

Background

The NFOS Management Plan, adopted in 1996, outlined the goal of establishing trail connections from Hall Ranch and Heil Valley Ranch to the town of Lyons. The management plan included some conceptual trail corridors intended to achieve this goal.

Since that time, as part of the requirements of the 1993 countywide open space sales tax, the County has annually queried all county communities about their open space and trail priorities. The Town of Lyons has consistently stated that access and connections to the Hall Ranch and Heil Valley Ranch properties are their #1 and #2 priorities. Many users and user groups have also made it known that these trail connections are a high priority. Accordingly, BCPOS has included the Lyons-Hall-Heil trail connections in the Capital Improvement Projects (CIP) budget for a number of years.

BCPOS staff initiated this project at the beginning of 2005 and has conducted eight public meetings to date (three open houses, four meetings with the respective advisory boards, and one meeting with the Town of Lyons Board of Trustees). The goal of these meetings was to identify issues, gather public input, and help shape the Department's final recommendations. In addition to these public meetings, staff also met several times with affected landowners in the project area,

including our most recent meeting with the Old S St Vrain Rd. landowners held on Dec. 15, 2005.

Analysis of Alternatives

Staff considered a variety of information sources in developing the recommendations, including adopted management plans; independent natural resource and engineering studies; consultation with the Colorado Division of Wildlife; and input from the public, landowners, recreation interest groups, advisory boards, and County staff. Criteria used to evaluate the alternatives included, but was not limited to, environmental impact, visitor experience, public safety, impact to landowners, cost efficiency, and overall feasibility.

For the Hall Ranch connection, nine different alternatives were considered (several variations on two basic routes, SH7 and Old South St. Vrain Road, plus Corona Hill). At the request of some Lyons area residents, staff shared information about previous analysis done on Corona Hill when it was removed from further consideration by the North Foothills Open Space Advisory Committee in 1998. Staff also led a field trip to Corona Hill for interested people. Please refer to the attachments for a map of the Routes Considered and detailed information and comments on the various alignments.

For the Heil Valley Ranch connection, several alternatives were considered. Within the Heil property, several trail alignments that depart the existing trail system were considered. These routes then tie into a conceptual alignment that heads north to the property boundary. From this point, several routes run across private lands in order to connect to the town of Lyons. Please refer to the attachments for a map of the Routes Considered and detailed information and comments on the various alignments.

Summary of Recommended Routes

Staff is recommending an approach that contains recommended and alternate routes. This approach provides flexibility by allowing for short-term recommendations while accommodating other compatible long-term solutions. Please refer to the attachments for maps of the Recommended Routes and detailed information and comments on the preferred alignments.

LYONS TO HALL RANCH

Recommended Routes

Modified Option A: A hybrid approach is recommended -- one that provides for new access to Hall Ranch, but has the least amount of environmental impact and disruption to nearby homeowners and landowners. The recommendation includes the installation of a new bridge over the St. Vrain Creek and utilizes the existing SH7 underpass located on the County's Hall Ranch Meadows property. The existing, informal recreational use that occurs on Old South St. Vrain Road would be maintained -- no new recreational improvements along Old South Road would be initiated. Preliminary cost estimates for implementation of this approach range between $160,000-180,000. This figure includes design costs, a bridge, approach trails, gates and safety signage. Permits will be required from the U.S. Fish & Wildlife Service (USFWS) and the Army Corps of Engineers (ACOE) for the project.

Since the Old South St. Vrain Road corridor is being used as a de-facto informal trail connection, the Department should monitor recreational usage and safety issues in the area. Incorporating the new connector trails, including the Old South Road corridor, into user surveys and providing appropriate staff presence in the area will be important.

SH 7 Shoulder Widening:
Widened shoulders along SH7 from town to Hall Ranch would provide a safer experience for cyclists and other users. This project has been a long-standing desire, but has not been a priority for CDOT or the County Transportation Department. Shoulder widening typically costs about $220,000 per mile. This alternative should be pursued regardless of the location of the main connector trail.

Alternate Routes
Option E (N side of Highway 7): A grade-separated trail along SH7 provides for safe and direct access from Lyons to Hall Ranch and minimizes impacts to private lands, but it has limitations for users seeking a more serene connection from Heil Valley Ranch to Hall Ranch. This alternative requires significant financial resources. Preliminary costs estimates range between $1.2-2.3 million. BCPOS does not have the necessary funding to implement this alternative and would be dependant on outside funding assistance. Therefore, BCPOS has collaborated with the County Transportation Department to submit the SH7 separated trail project as a grant request to the DRCOG Transportation Improvement Program (TIP).

No Action: While BCPOS believes that there is value in pursuing and establishing a connector trail, doing nothing is an option that the Department accepts. Two existing roads currently provide access to Hall Ranch from Lyons for the majority of users. There are still safety concerns and limitations for some users, but the cost of remedying the situation far exceeds the expected benefits. This approach incurs no cost to BCPOS. Furthermore, it has become more evident that the Town's and public's priority is access to Heil Valley Ranch.

Other
In response to public interest about access to Corona Hill in Hall Ranch, the Department is committed to leading periodic guided hikes into this permanently closed conservation area. Such hikes should be conducted outside of the recommended seasonal closure for the nesting golden eagle.

HEIL VALLEY RANCH TO LYONS
Recommended Routes
Connector Trail: Staff has identified an "Area of Consideration" that can accommodate the footprint of both the connector and loop trails. The preferred route utilizes this conceptual zone to depart the proposed loop area and the existing trail system. The route then travels the edge of Red Hill Gulch, passing the Whitestone/Vickery quarry site. The trail then passes adjacent to the seasonal closure that is in place for the nesting golden eagle. In this area, all trail users will be required to stay on trail from Feb. 1 to July 31. The trail continues north to reach the northern property boundary. From there, several routes run across private lands in order to connect into the Town's existing trail system. A new bridge will be required to reach the proposed trailhead parking area located off of Highway 36/66. Total mileage of the recommended connector trail is approximately 5.75 miles (4 miles to the northern boundary of Heil Ranch and 1.75 miles to the proposed parking lot at Hwy. 66). Preliminary cost estimates for the project range from about $380,000-430,000, which includes a bridge ($150-200K), parking area ($100K), and about 6 miles of natural surface trail ($130K). The cost of land acquisition for trail corridors across private land has not been included and would come from available acquisition funds.

Based on recent discussions with affected landowners, it appears that an alternate trailhead parking area located on a parcel adjacent to the high school's practice fields may be more viable. This site was included in the original analysis and is identified on the map of Routes Considered as a potential parking lot site. Utilizing this location would have less impact on the Lyons Valley

Park development (and other private property owners), would reduce project costs by eliminating a bridge over the St. Vrain Creek, and would site the trailhead next to an existing public facility. However, it is not immediately accessible from the highway like the currently proposed site. Staff feels that this alternate site is in keeping with the overall project goal of establishing a trail connection to Heil Valley Ranch and offering a northern parking area.

Since this site was not identified as the preferred/recommended site throughout the process, the Department is committed to bringing this issue back to POSAC and the BOCC for additional review and providing an opportunity for public comment should it become the preferred site.

Loop Trail: Although this planning process was originally envisioned to address the connector trail, there has been significant public interest in an additional loop trail on Heil Valley Ranch. In response to this public input, staff identified an area suitable for an additional loop. Based on a recommendation from the County Parks & Open Space Advisory Committee (POSAC), the Department recommends a loop trail that maximizes trail length within the identified "Area of Consideration".

The loop trail will depart from the existing Ponderosa Loop in the vicinity of the overlook and connect back into the Ponderosa Loop. The southern connection point has yet to be determined. Staff will identify some viable alternatives for the loop trail within the Area of Consideration, where impacts have been deemed acceptable, and work with interested parties to plan and create features that will improve the visitor experience for trail users while minimizing impacts where feasible. Trail corridors are still conceptual at this stage, and, therefore, this approach provides staff the flexibility to deal with difficult topography while providing for improved visitor experiences. The new loop trail will be close to two miles long, depending on topographic constraints.

Alternate Routes

Spur to Red Gulch Road: This route provides an alternate connection to Hall Ranch that does not require acquisition of private property by utilizing a County-owned easement that connects into Red Gulch Road. It is not the preferred route because it is steep, it passes between two private residential parcels, and construction would be difficult. Staff, however, believes the route should be retained and pursued in the event that property issues prohibit implementation of the preferred route. A new culvert or bridge would be required to cross the gulch (approx. 20-30 feet).

Closure Area Modifications

As part of the Department's recommendations for trails in the Heil Valley Ranch property, staff has proposed modifications to two permanent closure areas: the "Goshawk" closure area and the east "Foothills" closure area. The boundaries of the recommended modifications are conceptual. The actual boundary amendment will be field verified by staff, GPSd, and then added to the Department's relevant maps and records.

"Goshawk" Closure Area

This closure area was put into effect when the North Foothills Open Space management plan was adopted in 1996. It was intended to protect an area that contained old-growth forest, foothills shrub habitat, and riparian habitat associated with intermittent streams/drainages. This area was home to a northern goshawk nest and post-fledging family area and, more recently, a Cooper's hawk nest. Observations of the Lewis' woodpecker, three-toed woodpecker, pygmy nuthatch, and golden-crowned kinglet were also documented in similar habitat in both the Hall and Heil properties. The area that actually contains these old-growth characteristics is located in the central portion of the closure area.

An "Area of Consideration" that infringes upon the extreme southern portion of the closure area has been identified to accommodate a corridor for the connector trail. This area was developed based on topographical constraints and the location of known environmental resources. The location of the proposed area of modification is well away from the core habitat. Furthermore, the goshawk nest that was identified in the 1995 breeding season, which was a driving force for identifying the boundaries of the original closure area, is no longer present. The nest tree was destroyed in a storm in 1999 and, to the best of our knowledge, goshawks have not nested on the property since that time. However, suitable habitat is still present and our records show that goshawks are using the property, just not for nesting. Therefore, we intend to preserve the core area for possible future goshawk nesting and for other avian and wildlife use. BCPOS wildlife staff feels that the proposed modification to the closure area will not have a significant impact on this resource.

The southern boundary of the closure area will be modified to accommodate the alignment of the connector trail. Depending on the route that is selected for the final trail alignment, the net reduction in acreage of the closure area will be between 5-34 acres. Everything north of the trail will remain closed to public use and everything south of the trail will be open.

East "Foothills" Closure Area

This closure area was also put into effect in 1996 as part of the original management plan. It was intended to protect an area that contained different mixtures of Ponderosa pine woodlands, mountain mahogany shrubs, and several native grasses including big bluestem, little bluestem, needle-and-thread grass, New Mexico feathergrass, and Scribner's needlegrass. This area was inventoried by the Colorado Natural Heritage Program (CNHP) and was recommended for protection. Known as the the Red Hill Conservation Site, the area contains several occurrences of globally rare plant associations, one occurrence of a globally rare butterfly, and one occurrence of a state rare butterfly. The foothills shrub component is rich breeding bird habitat and supports a number of species of concern. The closure area also contains a prairie dog colony that serves as an important raptor feeding area, especially for the nearby nesting golden eagle.

The site of the proposed acreage addition is that of the Red Hill saddle. In addition to containing many of the characteristics described above for the Red Hill Conservation Site, this area serves as a critical movement corridor for large mammals, including deer and elk. Preserving movement corridors is key to maintaining habitat effectiveness. The area also contains several springs that act as important water sources for wildlife. The Red Hill saddle is actually part of the original conservation site that CNHP recommended for protection, but it was excluded from the closure area in the original management plan. New evidence and staff observations now confirm the significance of this area. Amending the closure boundary to include this area will help maintain this important connection.

Staff is recommending that the western boundary of the eastern "foothills" closure area be amended to include the Red Hill saddle. As a result, approximately 156 acres (0.24 square miles) will be added to this permanently closed and protected area.

Implementation Plan

Once the trail plan is approved, an implementation plan will be developed as part of the Department's CIP budget. Exact timing of various implementation efforts will be contingent on acquiring private land for trail corridors and securing outside funding. Based on public input, the Department recommends completing the new trails (loop and connector) at Heil Valley Ranch first and then working on connections to Hall Ranch.

Summary of Most Recent Public Meetings

Lyons Pathways Commission -- Nov. 3, 2005

Staff presented the Department's recommendations, including a discussion of the public comments heard at the final open house on October 25, 2005. The Commission agreed with the Department's recommendations and encouraged staff to reconsider the idea of having a segment of off-road trail that parallels Old South Road through the Hall Ranch Meadows property. The Commission also encouraged staff to maximize the length of the potential new loop trail within the Heil property.

POSAC -- Nov. 17, 2005

Along with other project recommendations, staff presented several options for the new loop trail inside the Heil property: no trail vs. smaller loop vs. larger loop. A smaller loop offers the best chance to minimize the cumulative effects of recreational impacts, but obviously limits recreation experiences for mountain bikers, equestrians, and long-distance hikers and runners. A larger loop maximizes the potential to create a stacked loop system that offers significant new trail distance, but cumulative impacts from new trails and human presence will likely be more significant. POSAC recommended the larger loop by a vote of 6-4.

POSAC also recommended that the BOCC accept the staff recommendations on the three other major project elements: the Heil-Lyons connector trail, modification of the Heil closure areas, and the Lyons-Hall connector trail. With regards to the Lyons-Hall connector trail, POSAC also recommended that the Department add a new segment of trail to the Modified Option A alternative that was proposed by staff. This would result in 0.4 miles of new, off-road trail inside the Hall Ranch Meadows property. This segment of off-road trail was evaluated by staff as part of Options B & C on the *Routes Considered* map, but was not included as part of the Department's final recommendations.

Lyons Board of Trustees- Dec. 5, 2005

Staff presented the project recommendations to the Town Board, and reported on the new trail segment inside the Hall Ranch Meadows property that POSAC recommended on Nov. 17. The Board had significant concerns about any new trails in the Old South Road corridor. A number of homeowners that live in the area also spoke in opposition to new trails. In general, the Board seemed to support a trail along the north side of SH7 and expressed some desire to have access to Hall Ranch via Corona Hill. If any new trails are created within the Hall Ranch Meadows property, it was suggested that fencing be used to keep visitors off of the balance of the parcel and away from the riparian corridor.

Staff Request

Staff requests that the BOCC adopt the recommendations outlined as an amendment to the NFOS management plan.

LIST OF ATTACHMENTS

Lyons to Hall Ranch

Analysis of Alternatives: Factors Considered
Map of Routes Considered
Description of Preferred Alternatives: Determining Factors
Map of Recommended Routes

Heil Valley Ranch to Lyons

Analysis of Alternatives: Factors Considered
Map of Routes Considered
Description of Preferred Alternatives: Determining Factors
Map of Recommended Routes
Map of Proposed Amendment to Closure Areas

Map of Wildlife Resources on Hall-Heil
BOA petition on Heil loop trail with 265 signatures (only one original copy submitted)

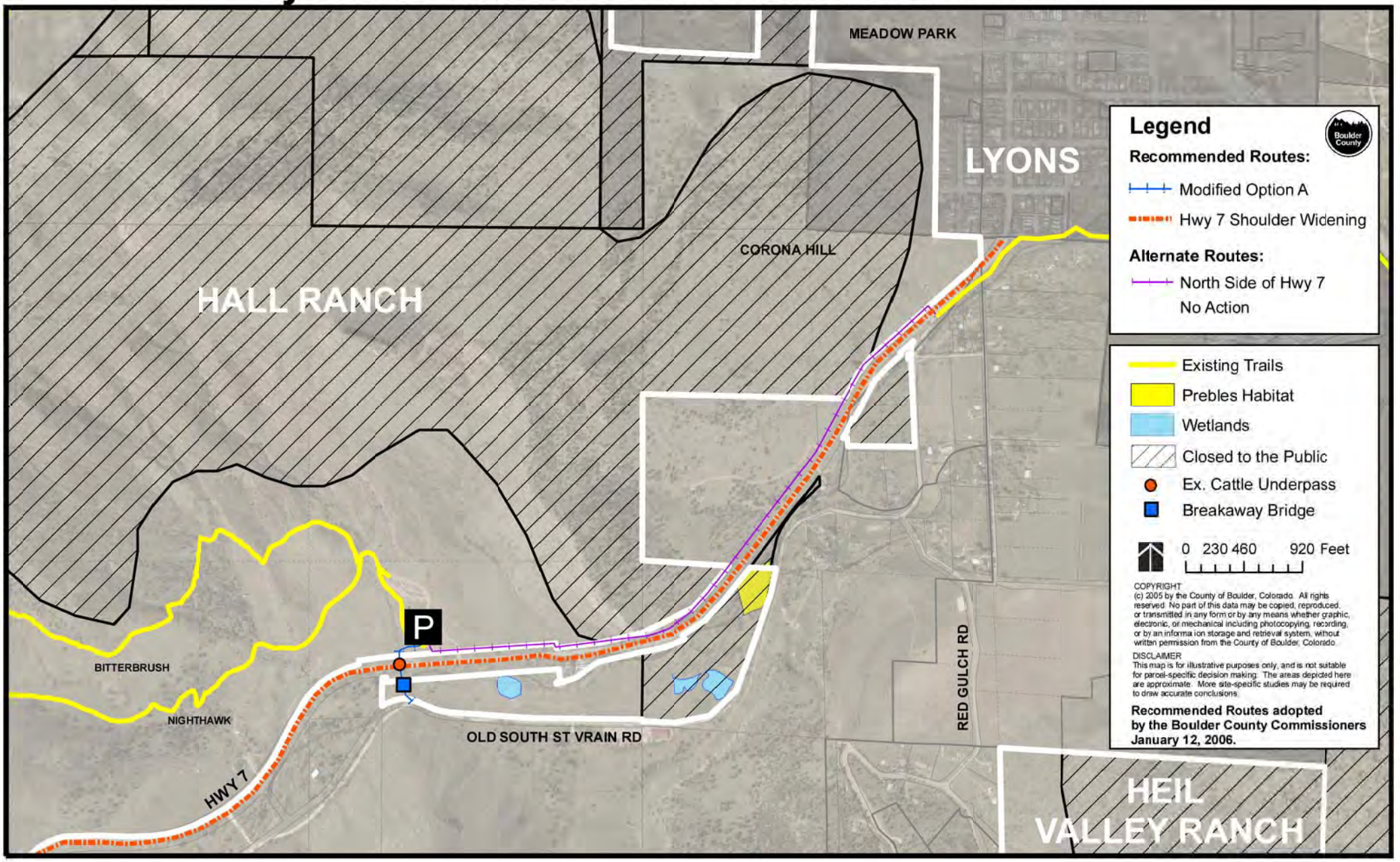
Summary of BOCC Public Hearing held on Jan. 12, 2006

Lyons to Hall Ranch connection
Motion: To adopt the staff-recommended Modified Option A with the caveat that the following issues can be satisfactorily addressed before implementation: parking, breakaway bridge design, public safety on Old S. Road, and wildlife impacts. Should the grant request for the SH 7 separated trail be approved by DRCOG, then Comm. Toor reserves the right to reconsider this issue and his vote.
Motion passed 2-1 with Comm. Pearlman in opposition.

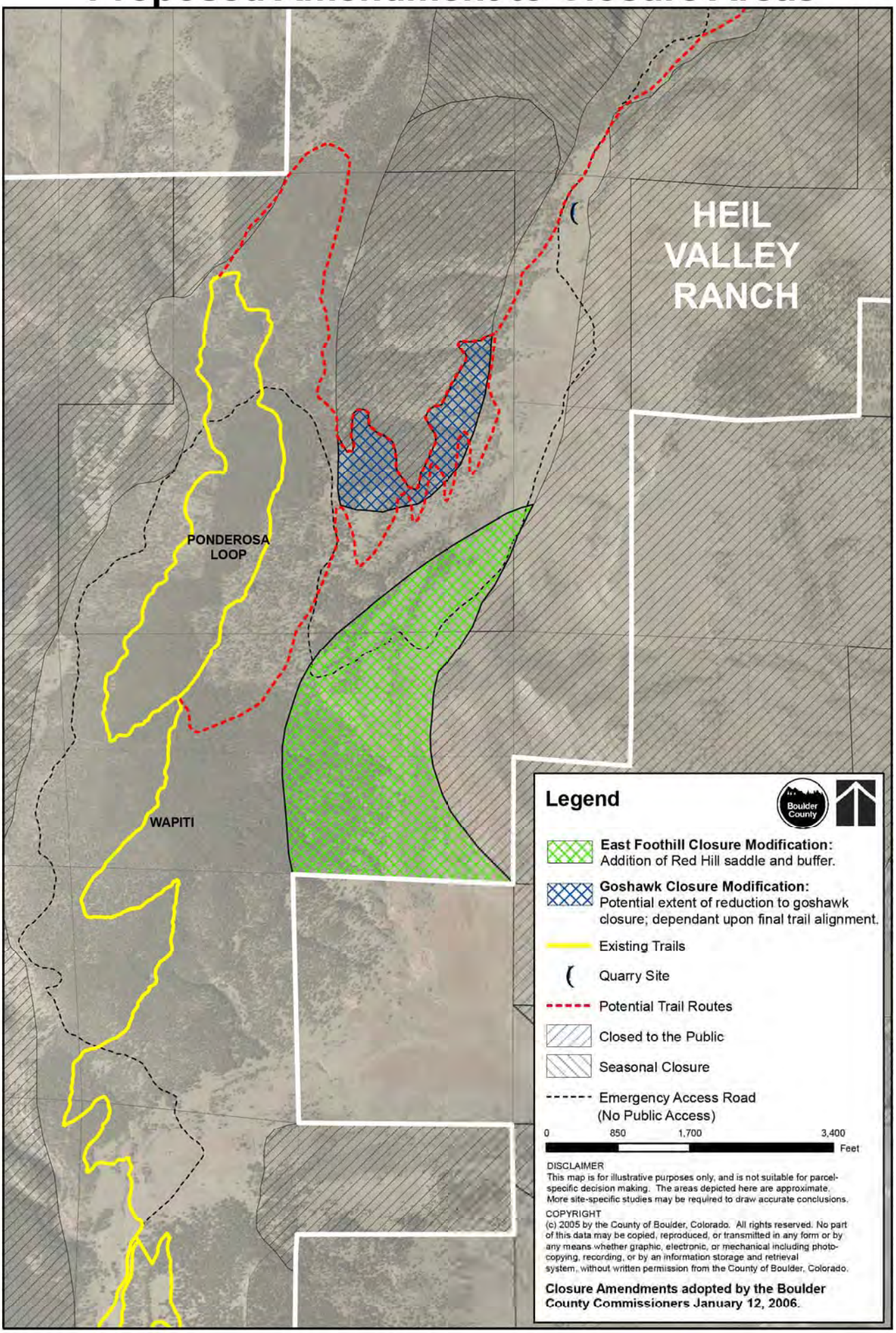
Heil Valley Ranch to Lyons connection
Motion: To adopt the suite of staff recommendations including the loop trail, connector trail, and closure area.
Motion passed 3-0.
The BOCC also commented that they are supportive of allowing flexibility in trail layout/design and are open to the idea of minor intrusions into closure areas in order to develop sustainable trails, so long as it is not a significant deviation from the original proposal and the initial spirit and intent.

Reminder: Should the location of the northern trailhead parking area change from the proposed location off of Hwy. 36/66, then the Department shall host another open house in Lyons to hear citizen concerns/suggestions and bring the issue to POSAC and the BOCC for review and approval.

Lyons to Hall Ranch: Recommended Routes



Heil Valley Ranch:
Proposed Amendment to Closure Areas



Heil Valley Ranch to Lyons - Recommended Routes