

# Condition, Compatibility & Trends

An Analysis of Visitor Experience and Infrastructure  
and their Compatibility with Resource Conservation



City of Boulder  
Open Space and Mountain Parks Department  
Visitor Master Plan

*The Open Space and Mountain Parks Department preserves and protects  
the natural environment and land resources that characterize Boulder.  
We foster appreciation and use that sustain the natural values of the land for  
current and future generations.*

-- Open Space and Mountain Parks Department Mission Statement --

## Introduction

The purpose of the Visitor Master Plan is to outline policies and actions for OSMP to provide a high quality visitor experience consistent with the long-term sustainability of natural, agricultural and cultural resources. This goal echoes Boulder's Charter provisions which establish a multiple use mandate for Open Space and Mountain Parks lands. The Visitor Master Plan describes **environmentally sound** strategies for meeting the need for quality visitor experiences (Connection Ecology 2003). Managing for multiple, often conflicting uses can be complex and requires a carefully thought out and strategic approach.

The approach used here was adapted from the Conservation Project Management approach developed by The Nature Conservancy (TNC 2000, 2003a). The approach begins with the translation of the Visitor Master Plan goals into specific **planning targets**. The next step is documenting the **condition** of the targets and **trends** that affect them during the Visitor Master Plan ten year planning horizon. The condition and trends analysis prepares Open Space and Mountain Parks for the next step—strategy development. **Strategies** are developed to address restoration needs, ensure that critical on-going management activities continue, and guide changes in management to avoid or correct management issues. Finally, a **monitoring program** will be developed to measure the effectiveness of the strategies in improving or maintaining the condition of the planning targets.

## Identifying Planning Targets

Translating the Visitor Master Plan goals to on-the-ground strategies requires several intermediate steps. Developing effective strategies requires an understanding of the specific planning targets that must be managed to achieve the Plan's goals. Based upon a summary of public comment, the results of the Visitor Plan Advisory Committees, review of many other visitor use and recreational plans and planning protocols, Open Space and Mountain Parks staff developed the following list of planning targets for the Visitor Plan:

1. The Visitor Experience
2. The Visitor Infrastructure
3. Ecological Systems
4. Agricultural Operations
5. Cultural Resources

The **visitor experience** is the focus of the Visitor Plan. It describes the Open Space and Mountain Parks program's closest and most critical link to the people we serve--the citizens of the City of Boulder and visitors to the area.

The **visitor infrastructure** is closely related to the visitor experience. The infrastructure includes the trails, trailheads, parking lots and other facilities that are provided to help provide a high quality visitor experience and protect other resources. The visitor experience and the visitor infrastructure are related, but they are also distinct and sometimes vary independently of each other. In other words, visitors can report a high quality experience in an area where trail conditions are not sustainable. Separating the infrastructure from the experience allows for thorough consideration of each.

The Visitor Plan will be the primary document describing how the visitor experience and visitor infrastructure will be managed on Open Space and Mountain Parks lands; and this document attempts to describe in detail the current conditions and trends relevant to these targets. In addition, the Visitor Master Plan must also address compatibility of visitor use with other OSMP resources. These other resources have been summarized as ecological systems, agricultural operations and cultural resources. The Visitor Master Plan offers guidance to reduce significant adverse impacts of visitor use upon these resources.

**Ecological systems** include a wide variety of species and communities. Ecological systems include dominant cover types such as prairie grasslands and foothills forests, as well as smaller patches of shrublands, wetlands, aquatic systems and linear riparian areas. Nested within each of these ecological systems are smaller patches, habitat types and species. Prairie grasslands for example, include wet and dry tallgrass prairie communities, as well as black-tailed prairie dog colonies. The forested foothills are a mosaic of montane meadows and shrublands, cliff faces, talus slopes, and spring fed hollows rich with rare plants in a matrix of ponderosa pine and Douglas fir forests.

**Agriculture operations** in the Boulder Valley are dominated by cattle grazing (including rangeland, pasture and hayfield management) as well as some farming (mostly small grains). The Open Space and Mountain Parks department was established in part to preserve agricultural operations in the Boulder Valley. The water rights and delivery infrastructure has a tight relationship with agricultural use and is nested within this planning target as are the practices and people needed to achieve sustainable agricultural operations.

**Cultural resources** includes sites, structures, districts, landscapes, objects, and documents associated with or representative of people, cultures, and human activities and events in the past.

## Evaluating the Current Status of the Planning Targets

### Identifying Key Attributes<sup>1</sup>

Among the goals of the Visitor Master Plan are to provide a high quality visitor experience and a sustainable visitor infrastructure. But what is "high quality"? What makes a system of trails and other facilities "sustainable"? In preparing answers to these questions, OSMP staff relied upon information gathered from community groups and interested members of the public, conversations with the Open Space Board of Trustees, the first Visitor Plan Advisory Committee and review of published reports and plans to identify a set of key attributes for each of the planning targets.

***The key attributes for a planning target are those factors that most clearly define or characterize the target, or describe a range of conditions over which that target may vary.***

These factors are "key", because when any are eliminated or significantly altered, the planning target either ceases to exist or changes into something else, typically something less desirable. Key factors for the five planning targets of the Visitor Plan are listed in the table below. Each of these key attributes is described below.

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<sup>1</sup> The "key attribute" concept described here was described by The Nature Conservancy (2003a)

**Key Attributes for Planning Targets: Open Space and Mountain Parks Visitor Plan**

Quality of the Visitor Experience	Sustainability of the Visitor Infrastructure	Integrity of Ecological Systems	Sustainability of Agricultural Operations	Integrity of Cultural Resources
<ul style="list-style-type: none"> <li>• Connection with the land</li> <li>• Access to destinations</li> <li>• Aesthetics</li> <li>• Conflict</li> <li>• Safety</li> <li>• Remoteness</li> <li>• Variety of activities</li> </ul>	<ul style="list-style-type: none"> <li>• Physical sustainability</li> <li>• Maintenance condition</li> <li>• Engendering stewardship</li> </ul>	<ul style="list-style-type: none"> <li>• Size/Abundance</li> <li>• Composition</li> <li>• Landscape Context</li> </ul>	<ul style="list-style-type: none"> <li>• Agricultural productivity</li> <li>• Agricultural efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Abundance of Material &amp; Context</li> <li>• Condition</li> </ul>

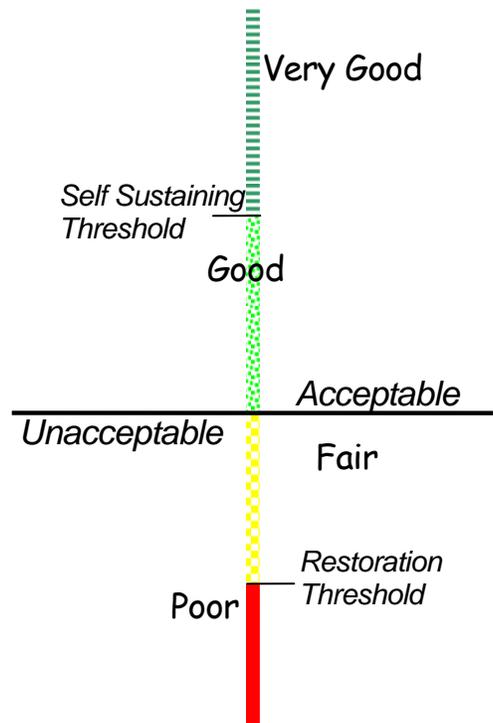
**Assessing Condition Using the Key Attributes**

The quality, integrity or sustainability of the planning targets is a function of the key attributes. The factors were rated as “Very Good”, “Good”, “Fair” or “Poor.” “Very good” and “good” are given when the status of the key attribute is acceptable. That is, maintaining the conservation target at this level for this attribute would allow for the continued healthy existence of the target at least until the end of the planning period.

“Fair” and “Poor” are used to indicate unacceptable status for a key attribute. Key factors rated “very good” are those that have reached a near-optimal condition. On the other hand, key attributes that are rated “poor” lie below the restoration threshold. The restoration threshold indicates a level of performance or condition that cannot practically be restored to an acceptable condition. “Fair” is a ranking used to describe an unacceptable state that could be restored to either “Good” or “Very Good”. The figure on the right shows the relationship of the integrity ratings to thresholds of acceptability, sustainability and restorability (TNC 2003a).

There are currently no established standards for the quality of the visitor experience and sustainability of the visitor infrastructure. Consequently, there are no accepted benchmarks against which we can compare data collected in the field.

Determining the condition of planning targets in the absence of standards requires reliance upon formal surveys, scientific literature, and feedback gained during public meetings and technical expertise within and outside the Department to substantiate our ratings. Every effort was made to find and use the best available information, and supplement sparse data with conceptual models and professional judgment.



**Relationship of Thresholds & Integrity Ratings (after TNC 2003a)**

In the pages that follow, we present an assessment of the current condition of the planning targets. We provide ratings for each of the key attributes and an explanation of how the ratings were determined.

The OSMP land system is diverse, and the ratings given here are meant to reflect the condition of key attributes across the entire system. In some cases, this results in an overall rating that could be lower than would be given to a particular area of the land system. For example, there are some places where aesthetics are not significantly compromised and other places where they are. An overall rating of “good” would result in the analysis ignoring the areas where the condition of the aesthetics was unacceptable. A rating of “fair” however indicates that there is an issue that needs to be addressed. In some cases, where critical information would be lost by blending very different states of a key attribute, two ratings are given with an explanation.

### Linking Conditions and Trends with Strategies

The conditions and trends analysis is not meant as an academic exercise, but rather a way to identify management needs. Key attributes that are rated as acceptable (“Good” and “Very Good”) usually indicate that successful management techniques are in place. In those cases, the level of quality is maintained by continuing or enhancing the existing management activities. For example, the quality of the visitor experience is due in part to the connections that visitors can build with the natural setting of OSMP. We have rated this key factor (“Connections with the Land”) as “Very Good”. This rating is based upon the availability of resources, information and programs designed specifically to foster a sense of connection with the natural world. Therefore, an objective of the Visitor Master Plan is to continue or enhance programs that support this key attribute, thereby contributing to the quality of the visitor experience.

On the other hand, the key factor “safety” was rated as “Fair”, indicating an unacceptable condition. One of the chief reasons for the unacceptable rating is the number of potentially dangerous road crossings that visitors to OSMP might encounter. Consequently an objective of the Visitor Master Plan is to identify management actions (e.g. build underpasses or install traffic signals) to address this issue.

In some cases, new initiatives will be needed to address existing unacceptable conditions or head off changes in the future which could adversely affect the planning targets.

## PART I: CONDITION

### The Visitor Experience

Everything that visitors do, think, sense and feel on OSMP makes up their experience. Land managers have the responsibility to provide legal and appropriate use of OSMP. We cannot fully describe how various people enjoy Open Space and Mountain Parks—a satisfactory experience comes in infinite sizes and shapes.

This visitor experience is complex, subjective and therefore, difficult to assess. The “big picture” suggests the overall level of satisfaction with the visitor experience is high and the land system is a popular destination. In 1999, 93% of Boulder citizens surveyed expressed satisfaction with the visitor experience on Open Space lands (PIC 1999), rating their experience as either “excellent” (58%) or “good” (35%). Estimates of annual visitation have increased from approximately 250,000 in 1980 to 3.5 million in 2002.

These numbers are unsurprising and perhaps not especially informative. To paraphrase a popular bumper sticker, “A bad day on OSMP is better than a good day at the office.” Boulder’s trends are part of a nation-wide pattern. Natural areas near cities are among the most popular destinations for outdoor recreation (Cordell 1999).

OSMP managers know that these lands are popular destinations where people generally have a fun and enjoyable time. But managers also need to know if the quality of the experience is steady, improving or declining over time; and be able to determine the most critical actions to maintain, enhance or if necessary restore a high quality experience. Levels of visitation and general satisfaction don’t provide enough sensitivity to monitor change before it is too late, or to set management priorities.

In an attempt to better understand the visitor experience, the Open Space and Mountain Parks programs worked with the community to identify the attributes most useful for determining and measuring the quality of the visitor experience on Boulder’s public lands.

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#### Sources of Public Comment used to Select Key Attributes

- Open houses and forums for the Mountain Parks Resource Protection and Visitor Use Plan
  - Forums and workshops for the Open Space Visitor Use Plan
  - Public workshop for the Open Space and Mountain Parks (OSMP) Visitor Use Plan
  - E-mail, hotline, letter, and reply form comments from citizens
  - Notes from meetings with community groups
  - Information submitted by various user groups
  - Informal contacts with citizens by Open Space and Mountain Parks staff
  - 2000 and 2003 Visitor Plan Advisory Committee processes
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In addition to information derived from local sources, the National Park Service (Anderson et al. 1998, NPS 1997), Parks Canada (Environment Canada 1985), and the U.S. Forest Service (Stankey et al. 1985, McCool and Cole 1997) have addressed the quality of the visitor experience in management plans and procedural guidance. Open Space and Mountain Parks staff used these external sources to develop the key attributes for the visitor experience (below).

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#### Key Attributes for the Visitor Experience

- |                                   |                                |
|-----------------------------------|--------------------------------|
| ■ <b>Connection to the land</b>   | ■ <b>Safety</b>                |
| ■ <b>Access to destinations</b>   | ■ <b>Remoteness</b>            |
| ■ <b>Aesthetic attractiveness</b> | ■ <b>Variety of activities</b> |
| ■ <b>Conflict</b>                 |                                |
-

**Key Attribute: Connection with the Land****Rating: Good**

Boulder has a long tradition of public support for local initiatives to preserve the natural environment. The Open Space and Mountain Parks system is the result of that support. It is also a key reason for the sustained public advocacy for natural systems conservation here. OSMP lands offer huge opportunities for community members to build connections with the natural world and to appreciate the importance of resource stewardship. Such connections have long improved the quality of life for Boulder residents. OSMP has many programs to encourage these relationships. This important community service is reflected in the Department's mission statement, ". . . to foster appreciation and use that sustain the natural values of the land for current and future generations."

**Interpretation**

While some visitors may be primarily interested in directions to destinations, trail mileage, elevation gain and the applicable rules and regulations--interpretation goes far beyond providing simple information. OSMP uses interpretation not only to convey facts but also to build connections between the personal interests of the visitors and the many meanings of the OSMP system, answering questions like:

- Why was this area set aside from development and made available for the public?
- What are the essential stories about this place (geological, ecological, cultural, and historical)?
- What experiences are available for the public to enjoy?

OSMP currently provides several interpretive programs and outreach initiatives.

- The administrative services staff at the "front desk" answers thousands of questions each month on a wide variety of topics
- "Natural Selections" is an ongoing series of educational programs on topics including ecology, wildlife, local history, astronomy, children's programs, etc. All programs are widely advertised, free and open to the public.
- Open Space and Mountain Parks staff and volunteers provide hikes and presentations for schools and community groups. Hikes and slide show presentations are available on over 30 wide-ranging topics.
- Open Space and Mountain Park's staff and volunteers offer informative displays, brochures, maps and answers to questions most summer weekends at public events such as the Farmer's Market, year round at select community events, and on duty at the Summit Center on Flagstaff Mountain and OSMP's cottage adjacent Chautauqua meadow.
- Rangers education staff and volunteers provide assistance, offer information and raise awareness about "current events" in the natural world at trailheads and on the trail.

The OSMP website provides up-to-date access to OSMP activities, management practices, and OSBT meetings as well as on-line access to a great deal of information about the land system, its history and management.

**Rangers**

Rangers provide emergency response, law enforcement, scheduled or impromptu interpretation and other services to assist visitors. OSMP rangers are skilled interpreters and resource conservation professionals. In addition to being certified law enforcement officers, rangers encourage positive interactions among people, wildlife and agricultural operations, using appropriate approaches to ensure the safety of visitors and the protection of resources.

### **Signs**

Signs and information boards are used to inform visitors about their surroundings help them navigate to their destinations and encourage stewardship by highlighting features sensitive to disturbance.

### **Volunteer Program**

Volunteer programs on OSMP enhance the connection of community members with the natural world through several offerings. Some of the many volunteer programs are highlighted here.

- Volunteers monitor the progress of cliff nesting raptors. These raptor monitoring volunteers become spokespeople for the community benefit from and importance of seasonal wildlife protection.
- Much of what OSMP knows about the occurrence and distribution of plants is a result of a dedicated group of volunteers who have been collecting and preparing plant specimens for over 15 years.
- Naturalist volunteers are not only deepening their own connection with OSMP, but introducing others to some of the stories the land has to tell. Their work includes presenting programs, and hosting and providing information at the farmer's Market, Flagstaff Nature Center, Chautauqua Cottage and many public and community events.
- The volunteer Stewardship Program offers families, individuals, businesses and organizations a chance to connect with OSMP and help maintain or monitor areas. They two-year commitment ranges from annual clean-up/maintenance/education projects to weekly service.
- The volunteer members of the Open Space Board of Trustees are appointed by City Council to five year terms. The OSBT typically meets twice monthly and provides opportunities for public comment on all items to be considered for a vote. In addition, the Board welcomes public participation for items not on the agenda for a particular meeting. The Board makes recommendations to City Council and staff on the acquisition and management of Open Space.



### **Junior Rangers**

“Junior Rangers” is a youth employment program which incorporates the building of a responsible work ethic, environmental awareness, stewardship values, and personal growth within the setting of service learning. Since 1965, Open Space and Mountain Parks has been providing a means for students to engage in meaningful work that makes a difference to our open lands, parks, and community.

Not only do Junior Rangers gain in-depth experiences with Boulder’s natural land system, they also learn what it takes to ensure a high quality visitor experience by maintaining the trail system. The Department has relied upon the Junior Rangers to accomplish a significant portion of the trail maintenance on the system. Much of the work is physically demanding. Job duties include general maintenance tasks, noxious weed removal, and other clean-up and upkeep projects.

The junior rangers program also includes environmental education and team building activities that round out the work experience. Participants are encouraged and supported in exploring the land around them—defining their connections and opinions about the land on which they work and live.

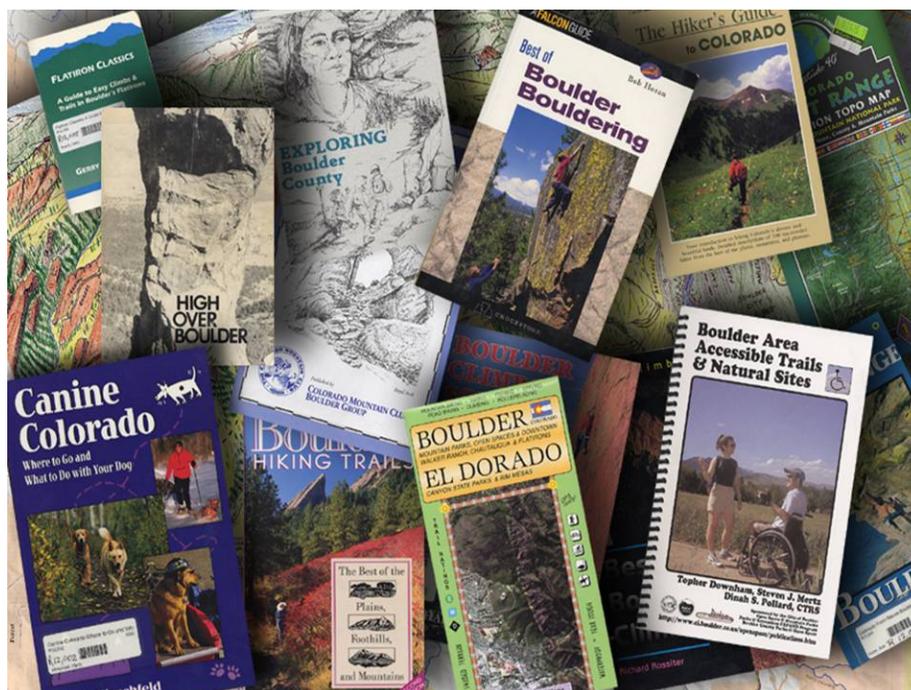
#### **Justification for the rating (Good)**

The current situation is acceptable. OSMP provides a high level of service in the provision of services related to education and outreach, enforcement, volunteer opportunities, and junior rangers. A considerable amount of public support exists for these programs. OSMP has the opportunity to develop a system to measure the effectiveness of these programs in building the type of connections with the land that motivate changes consistent with good land stewardship.

**Key Attribute: Access to destinations**

**Rating: Good (Fair for cyclists)**

There are currently 130 miles of designated trails, approximately 1,000 named rock climbing routes, hundreds of bouldering “problems,” 38 trailheads and 75 other designated access points. The system of trails is well distributed over the Open Space and Mountain Parks land system. The location of Open Space and Mountain Parks properties is shown on a high quality map produced and distributed by the Open Space and Mountain Parks Department. The map is also available on the Open Space and Mountain Parks web site and at many retail locations. In addition there are many guidebooks directing people to the Open Space and Mountain Parks land system.



A sample of the guidebooks which identify OSMP lands as a recreational destination

Many non-motorized activities are allowed on Open Space and Mountain Parks lands without qualification. The most significant restriction affecting all users is the seasonal area closures to protect raptors and bats. These closures affect all activities, on trail and off. Although the Open Space and Mountain Parks Department encourages visitors to stay on trails, individuals and small groups are allowed to travel almost anywhere on city-owned Open Space and Mountain Parks lands.

Undesignated trails are an important aspect when considering access to destinations on OSMP. There are many undesignated access points and over 300 miles of undesignated trails on Open Space and Mountain Parks lands. The management of these undesignated trails is one of the core issues facing OSMP land managers.

The positive side to undesignated trails is they provide access to destinations. However, undesignated trails usually come to be without design and persist without management. The result is considerable impact to the land and potentially huge restoration costs for the OSMP program.

Undesignated trails emerge for several reasons:

- Access to designated trails from neighboring properties  
Open Space and Mountain Parks has a diffuse boundary with hundreds, perhaps thousands of neighboring properties. Many adjacent homeowners and businesses have created trails from their fence across otherwise untrailed areas of OSMP to connect with the system of designated trails. Existing policies to minimize access from adjacent properties have not been effective.
- Access to destinations  
The proliferation of undesigned trails on OSMP is a good indicator that the designated trail system doesn't provide access to some of the places visitors want to go. For example, most of the staging areas for rock climbing on OSMP are served only by undesigned trails.
- Ease of establishment and persistence  
Even low levels of off-trail activity lead to the establishment of undesigned trails. This is consistent with the conclusions of recreational researchers (Hammit and Cole 1987:62-3, Marion and Sober 1987). Once established, undesigned trails tend to persist for a long time because of slow rates of vegetation recovery in our arid climate.
- Curiosity  
Some undesigned trails attract visitors, curious about where they lead. This stimulates use which even if sporadic, can perpetuate a trail.

Resolving the dilemma of undesigned trails requires that OSMP recognize both the contribution these trails make to the visitor experience by providing access to destinations **and** a consideration of the associated expense and ecological impact of these trails.

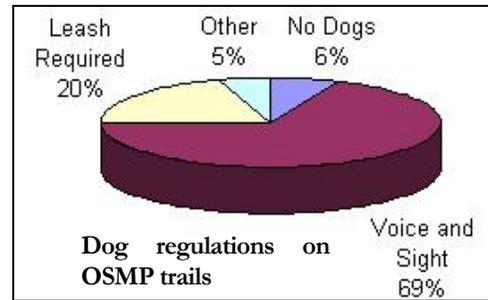
**Activity Specific Access**

**Pedestrians**

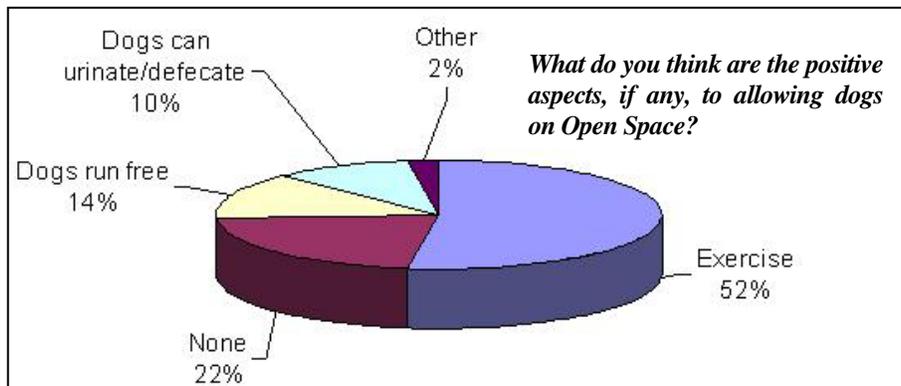
Pedestrians have considerable access to destinations on OSMP. Hiking, jogging, running and other pedestrian trail activities are allowed throughout the trail system. Although keeping to trails is encouraged through the LNT principles, visitors are not *required* to remain on the trail in most places.

Walking of dogs

The City of Boulder is the only municipal land management agency in the Denver metropolitan area which allows dogs to be unleashed if they are kept in sight and under voice control. The majority of trails outside of city limits are open to dogs under "voice and sight" regulations. Consequently, Boulder's OSMP offers much opportunity for dogs to accompany their guardians on a hike or run. Dog walking is currently managed under the provisions of Boulder's dog management program (City of Boulder 1996). The figure to the right gives a breakdown of dog access on OSMP trails. As with other pedestrian use, dog owners are encouraged to stay on the trail. However, in the majority of the OSMP system, dogs are allowed to accompany their guardians off trails.



A public opinion survey was conducted in 1993 involving 1221 Boulder residents. Respondents indicated that exercise, a place to run free, and a place for dogs to relieve themselves were the most important aspects of allowing dogs on Open Space (see figure).



### **Climbing/Bouldering**

Boulder is a popular destination for bouldering. Long a popular training component for climbers, bouldering has grown into a popular sport in its own right due in part to the growth of climbing gyms, marketing by magazines and recreational equipment companies, and the fact that it is a relatively inexpensive sport. Most of the many climbing routes and bouldering problems on Open Space and Mountain Parks are not served by designated trails. However, access to these areas is allowed. With the exception of seasonal wildlife closures, and some area closures, climbers and boulderers have currently unrestricted access to a wide range of destinations.

New trails are being formed as visitors find and popularize climbing routes and bouldering areas. The establishment and maintenance of a designated trail system serving climbing destinations would be a significant improvement to the visitor experience for climbers and boulderers.

### **Equestrian Use**

The City Charter states that OSMP should provide specifically designated areas for horseback riding. As a matter of practice, very nearly all OSMP trails are open to equestrian use<sup>2</sup>. As with pedestrian uses, equestrians are encouraged to stay on trails. However, equestrians are not prohibited from off trail travel. Properties that are open to visitor use, but lack adequate horse trailer parking or pedestrian gates are functionally unavailable to equestrian use.

### **Bicycling**

Bicycling is an exception to the rule of open access. Unlike most other activities, bikes are only permitted on trails and only on those trails that are designated for their use. About one third of the trail system (41 miles) is open to bicycles. There is very little steep or mountainous terrain or single track trails available to bicyclists. This diminishes the quality of the visitor experience for cyclists. A large system of bicycle trails is available at destinations to the west of OSMP (Boulder County's Walker Ranch and U.S. Forest Service lands). The quality of the visitor experience would be significantly improved if trail linkages were built from Boulder to the west.

### **Hang/Paragliding**

Like climbing, these activities are reliant upon steep terrain. Hang gliders require access to ridgelines, cliffs or hills as launch sites. Hang gliders also have indicated a lack of opportunity for their activities. A temporary administrative ban on hang gliding is currently in effect with only one area open for use. Designating hang-gliding launch sites to offer a range of challenge levels would improve the visitor experience for this group.

### **Fishing**

Fishing, like cycling and equestrian use, is allowed where specifically designated. Fishing is currently allowed in creeks and selected ponds and lakes. Fishing is enjoyed in Boulder and South Boulder Creeks as well as Sawhill Ponds, Wonderland, Teller and KOA lakes, and scattered other ponds. OSMP cooperates with the Colorado Division of Wildlife to manage local fisheries. This includes improving access to selected fishing areas while using some ponds as natural "hatcheries" for declining native fish species.

### **Connectivity**

Another issue for those seeking access to destinations is the lack of internal connectivity at some places in the existing system of designated trails. As described above under bicycling, gaps in the trail system fragment the continuity of the visitor experience. Some other "missing links" are listed in the table below.

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<sup>2</sup> The single exception, a section of the South Boulder Creek trail at the Bobolink trailhead is closed to equestrian use. A separate, equestrian only trail has been established to provide access to destinations in this area.

Open Space and Mountain Parks Internal Trail Connections\*

from the *Boulder Valley Comprehensive Plan* (City of Boulder 2001)

<b>Name</b>	<b>Start</b>	<b>End</b>
East Boulder Trail	Baseline Reservoir Area	Teller Farm
Coalton Connector	Greenbelt Plateau Trailhead	Coalton Trail
Greenbelt Plateau/Flatirons Vista	Greenbelt Plateau Trailhead	Flatirons Vista Trailhead
Marshall-Superior Connector	Marshall Mesa	Town of Superior
Valmont-Gunbarrel Connector	Valmont and South Boulder Creek	63 <sup>rd</sup> St. and Andrus Road

\* A comprehensive trails assessment (City of Boulder 2003) has been prepared showing the approximate locations of the trail alignments listed here.

For pedestrians, the Open Space and Mountain Parks trail system is moderately well-linked with other trail systems. Boulder Reservoir and Coot Lake, Eldorado Canyon State Park and Boulder County's Walker Ranch are directly connected via the trail system. Several of the City of Boulder Tributary Greenways trails run through Open Space and Mountain Parks providing connection with the extensive system of Boulder's Greenways. However, there are opportunities for more linkages with other trail systems. The Boulder Valley Comprehensive Plan trails map identifies proposed alignments that link the Open Space and Mountain Parks land with external trail systems.

Proposed Trail Alignments Adjacent to Open Space and Mountain Parks\*

from the *Boulder Valley Comprehensive Plan* (City of Boulder 2001)

- U.S. 36 (Bear Creek to Superior)
- 51<sup>st</sup> St. (Jay Road to Eagle Trailhead)
- Coal Creek Drive (Marshall to Superior)
- Eldorado Springs Drive (Mesa Trail South Trailhead to Eldorado Canyon State Park)
- Gunbarrel Ditches/Canals (Boulder Creek @ Jay to IBM)
- Boulder Feeder Canal (Boulder Reservoir to Lyons)
- Union Pacific Railroad (Boulder Creek eastward)
- Burlington Northern Railroad (IBM to Louisville)
- Eldorado Canyon to Walker Ranch (multi-use)
- Highway 93/Jefferson County

\* A comprehensive trails assessment (City of Boulder 2003) has been prepared showing the approximate locations of the trail alignments listed here.

In addition to the *Boulder Valley Comprehensive Plan* alignments presented here, Open Space and Mountain Parks has received suggestions for other new trails. A map and table describing these is available in the *Trail Assessment and Prioritization Report* (City of Boulder 2003).

**Parking**

As levels of use on OSMP have increased, it has become increasingly common for trailhead parking lots to fill up, especially during the cool and sunny weekends of early fall and late spring. In some areas, such as the south trailhead of the Mesa Trail, visitors are routinely turned away from the parking lots. Many visitors choose to park along roadsides creating potentially dangerous situations and conflicts with OSMP neighbors.

### **Disabled Access**

Most of the Open Space and Mountain Parks Department's efforts towards access for the disabled have been focused upon those with physical, mostly mobility impairments. Some examples of ways in which access for the disabled has been addressed are parking spaces at all Open Space and Mountain Parks parking lots, trails at an appropriate grade for use by those in wheelchairs, a wheelchair accessible fishing dock, the production and distribution of the *Boulder Area Accessible Trails and Natural Sites Guide* (Downham et al. 2000) and accessibility information on the department-produced trails map. In addition, OSMP leases the equestrian facility at Cherryvale Ranch to Rocky Mountain Riding Therapy, a private, non-profit organization that provides services to people with a variety of disabilities.



Although OSMP is continually vigilant about providing passive recreational opportunities for all, no formal assessment has been conducted of how Open Space and Mountain Parks could better meet the needs of those with disabilities.

### **Transit**

Boulder citizens have expressed an interest in reaching Open Space and Mountain Parks trails via public transit. Unfortunately, travel to trailhead by bus is difficult. Of the 38 trailheads, 18 are served by public transportation (see table below). Several of those are served by buses that are infrequent and scheduled to serve weekday commuters. Buses run most frequently from 7am until 7pm Monday through Friday. Peak Open Space and Mountain Parks use is on the weekend and weekday evenings. Current demand for transit to OSMP trailheads is too low for the Regional Transportation District (RTD) to modify service levels.

#### **Justification for the rating (Good–Fair for cyclists and hang gliders)**

The current situation is acceptable to visitors, with the exception of bicyclists. OSMP currently provides an extensive system of designated trails that provide a high level of access. OSMP also provides a great deal of freedom to visitors to travel off trail to destinations, which has had the unintended result of an extensive network of undesignated trails. This key attribute could be improved by providing more convenient or safer access to destinations in some locations, providing trails that diversify opportunities for bicycling, hang gliders and experiences for disabled populations and upgrading transit service to trailheads.

**Key Attribute: Aesthetic Attractiveness      Rating: Very Good (coarse scale) Fair (fine scale)**

Many visitors to OSMP come to experience the sights, sounds, smells and environments that only exist in wild places. The potential to see a hunting fox from a forest trail is intriguing and inviting. These lands offer myriad vistas and intricacies to captivate the eye, mind and heart.

### **Overall Setting**

The dominant aesthetic element on OSMP is the expansive and open vistas. Whether viewed from the eastern plains westward to the foothills and the Front Range, or from the hogbacks eastward, OSMP lands afford panoramic views and a sense of expansiveness and openness.

### **Trail Setting**

Trails should be woven into an area to provide close contact with nature rather than merely passing through an area. A great deal of visitors' enjoyment is dependent upon the quality of their travel along a trail. Satisfying trail experiences emerge from siting and design aimed at providing a consistently pleasing experience. This includes considerations of trail surface, alignment, length and difficulty. Well designed trails include variety, build suspense and cultivate a sense of curiosity and exploration. Many Open Space and Mountain Parks trails meet these conditions.

Some trails are located in settings with low aesthetic appeal. These include trails built adjacent to a busy roadway, under power lines, near backyards of residential lots or in narrow (<100' wide), fenced corridors. A recent review (Jones and Armstead 2002) of Open Space and Mountain Parks trails shows that approximately

eight percent (8%) of the trail system met one or more of these criteria. In some cases, trail placement in unattractive areas was unavoidable to address resource concerns.

### **Animal Excrement**

The failure of some dog guardians to remove dog waste is an aesthetic issue on OSMP. Many visitors do not clean up after their pets. In a recent study (Mertz 2002), observers recorded the number of defecating dogs along several OSMP trails. The observer recorded whether or not the excrement was picked up and deposited in a trash can. Forty-one percent of those observed with defecating dogs failed to pick up after their dogs. The intensity of this situation has been documented in a local study that reported over 1,400 piles of dog excrement over a distance of approximately one mile on the Sanitas Valley trail (Murphy 2003). In a 1993 citizen survey, the failure of dog owners to remove dog feces was identified by 31% of respondents as a negative aspect of allowing dogs on open space (City of Boulder 1993). The aesthetic impact of dog excrement most degrades the visitor experience along several of the most popular trails.

In addition to the concern over dog excrement, a few visitors have expressed concerns about the aesthetic impact of cow and horse manure on trails. On narrow trails, manure piles can be difficult to step around while keeping to the trail. For some, the presence of horse manure degrades the condition of their experience.

### **Erosion/Gullying**

The visual impact of erosion and gullying detracts from the aesthetic attractiveness of the visitor experience. Trampling and soil compaction caused by visitors and livestock have resulted in bare and eroded ground in heavily used areas. The effect is most dramatic where high levels of use, cattle grazing, poorly constructed trails, highly erodible soils and steep terrain coincide.

### **Litter**

Litter is an isolated problem, confined mostly to trailhead parking lots and pull-offs along Flagstaff road where beer and liquor bottles are left behind and at picnic areas where visitors sometimes fail to clean up after themselves. Littering is typically not a problem along trails.

### **Other**

Vandalism and noise (amplified music, barking dogs) can degrade the aesthetic qualities of natural areas. However, these are uncommon and isolated occurrences.

### **Justification for the rating: Very Good (coarse scale); Fair (fine scale)**

OSMP lands offer world class scenery and vistas. Much of the attractiveness of the land system as a recreational destination stems from the beauty of the surroundings. However, at a finer scale, the current situation for aesthetic attractiveness requires improvement. Dog excrement degrades the visitor experience in localized areas, especially near trailheads. Trail improvements are also needed to eliminate trail erosion / gullying in key areas.

### **Key Attribute: Conflict**

**Rating: Fair**

Conflict results when behaviors of one or more visitors interfere with others visitors' ability to achieve desired experiences. Conflict degrades the quality of the visitor experience. In a recent survey, only 13% of those interviewed responded that they considered that conflicts among recreational activities were minimal (PIC 1999). Twelve percent of those interviewed either did not use open space or chose not to answer this question (PIC 1999). More striking is the fact that 75% of respondents indicated there were notable conflicts between recreational activities.

The effects of this conflict have not been well described. The same 1999 survey asked if people were using particular areas less often or if people had stopped using areas because of conflict. The majority (80%) of respondents indicated that they had not changed their use patterns. Those who did either reduce (9%) or stop (10%) using areas gave the reasons listed below for their change in behavior.

Reasons for Change in Use  
from PIC 1999

Reason	Percent of those who altered use	Percent of all respondents
Getting too crowded	36	6.84
Dog issues	19	3.61
Miscellaneous	10	1.90
Conflicting activities	7	1.33

These results suggest that crowding and conflict account for the majority of change in use patterns. The numbers of visitors changing their patterns of use are low is not insignificant. Assuming that the survey uniformly reflects the population of users, 478,000 visits to OSMP were affected by one or more of these factors. While some natural redistribution among visitors is expected, these numbers represent an unacceptably high number of disruptions in use patterns.

Several studies of multiple-use trails have investigated the question of user conflict. A survey of 83 managers of rail-to-trail projects reported “no” or “few if any” conflicts. The most common type of conflicts reported was between hikers and bikers, followed by conflicts between equestrians and bikers. Conflicts involving in-line skaters, cross-country skiers, and dogs were also reported (Moore et al. 1992, cited in Moore 1994). The same study also interviewed trail users and included the question “What things did you like least about the trail?” Of 2,128 comments, 316 (about 15%) related to the behaviors of others. The most common comment (239) was about bicyclists being inconsiderate, riding two-abreast, passing with no warning, going too fast, and other unspecified concerns about cyclists. In 1999 (PIC 1999), citizens of Boulder were asked an open ended question to identify specific activities in conflict on Open Space lands. The results are given below.

Survey response

Question: *What specific recreational activities would you say are in conflict with other specific activities?*

Reported cause of conflict	Respondents indicating conflict	Percent of Open Space and Mountain Parks visitors engaged in activity
Mountain Bikers	27%	11%
Dogs/Dog guardians	26%	20%
Horses/Equestrians	6%	1%

Conflicts with bikers were most associated with passing without warning, failing to yield, failing to staying on trail, and traveling at high speed. Dog-related conflicts were typically attributed to guardians not complying with the City of Boulder’s dog control ordinances<sup>3</sup>. Conflicts with horses focused upon the large size of horses, their perceived unpredictability, and the presence of horse manure on the trails.

**Mountain Biking**

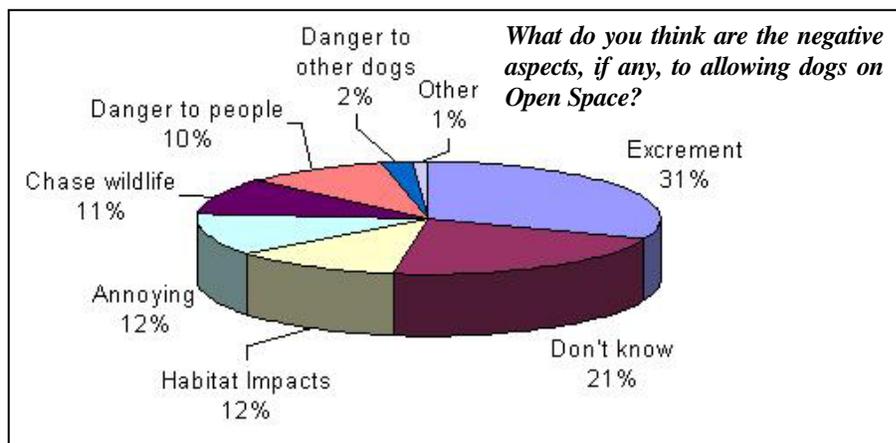
Cycling on OSMP is restricted to approximately one third of the OSMP trail system. Trails are open to cyclists where the opportunity for conflict with other uses was considered to be lowest. As with other visitor groups, most cyclists follow the “rules of the road.” However, fast cyclists and those who do not provide warning of their approach can create unsafe conditions. OSMP rangers report occasional collisions between hikers and cyclists. There are three areas where safety issues are most pronounced: 1) Marshall Mesa trailhead, 2) Foothills Trail near the railroad grade and 3) Foothills Trail as the trail approaches Wonderland Lake from the north. Each of these locations is at the bottom of a hill where bikes tend to be moving fastest.

<sup>3</sup> Although the survey identified “dogs” as the focus, the concern was actually over the behavior of dog guardians. Specific concerns were failing to keep dogs from approaching or jumping on other users or dogs, allowing dogs to chase/harass wildlife and failing to pick up dog excrement.

### Behavior of Some Dog Guardians

Like all users, dog guardians seek to avoid conflict with others. Many OSMP visitors enjoy interacting with dogs or having their dogs interact with other dogs. However, when not properly controlled by their guardians, dogs can disturb, jump upon, knock over, frighten, and injure visitors or their companion animals.

A public opinion survey was conducted 1993 involving 1,221 Boulder residents. The respondents most frequently indicated that excrement, and conflicts with visitors and other dogs (annoying, danger to people, danger to other dogs) were negative aspects of allowing dogs on Open Space (see figure below). The impacts of non-compliance with excrement removal regulations is discussed under the key attribute "aesthetics".



In an observational study (Mertz 2002) at seven trailheads, investigators found that 5% of dogs observed charged, chased, or showed aggression towards people or other dogs.

The City's dog management plan, adopted in 1996, called for long-term monitoring to measure the success of the program and

provide information for future decisions. Unfortunately, a monitoring system was not developed that could assess the effectiveness of the dog management program's goals. City staff did develop a method for tracking summonses, warnings, public comment and incident reports<sup>4</sup>. Unfortunately this database cannot be used to reliably estimate the rate of conflict with dogs. .

However, the database does provide documentation that the behavior of some dogs and some dog guardians results in conflict. These types of conflict occur and OSMP considers them to be significant issues, even if they may not be the dominant experience.

### Dog/Human Conflicts

- Dog/human conflicts range from a temporary scare to the inconvenience and expense of an emergency room visit.
- Some dogs approach, paw, lick, run into and jump upon people, who do not wish them to. These are special problems for the young, elderly and infirm. Conflict of this sort has several different outcomes including frightening visitors, soiling or damaging their clothing, injuring them, and some visitors require medical attention after being knocked over by a dog.
- Some dogs bite people. Some dog bites do not break the skin, but result in bruising or tearing of clothing. In other instances visitors require medical attention. Dog bites carry with them the danger of rabies and the uncertainty of the rabies danger if the dog can not found or identified. Serious injuries can result in loss of time at work and leisure activities.

### Dog/Dog Conflicts

- Some dogs attack other dogs and other companion animals. Sometimes the attacks spook or frighten the owners or their companion animals. Sometimes the attack results in an injury. Sometimes the attack results in injuries necessitating veterinary care with the associated costs and inconveniences.

<sup>4</sup> "Incident" is a term used by rangers to describe an event requiring their attention or a response that is either of complexity or scale to require formal documentation. Incident reports are typically used to document the response and actions of the rangers, Department, and other agencies (e.g. ambulance, sheriff, fire departments).

### **Other Dog-related Conflicts**

- Some visitors' experience is degraded by the unsettling nature of dogs harassing or attacking other visitors, other dogs, farm animals and wildlife.
- Some incidents with dogs can result in altercations between people. Sometimes this is merely an unpleasant verbal exchange, however it can also result in individuals hitting dogs or assaulting each other.

### **Horses**

Equestrians also seek to reduce the likelihood of safety issues. However, visitors are intimidated by the bulk and perceived unpredictability of horses. Visitors have occasionally been injured, sometimes seriously by horses. Equestrian use of the OSMP system is relatively low, estimated at approximately 6%.

#### **Justification for the rating: Fair**

The current situation needs improvement. While most visitors do not feel that conflict with other users detracts from the quality of their experience in OSMP, survey results show that over 400,000 visits each year may be degraded to the point visitors change their behavior. The major improvements needed include reducing the number of adverse visitor contacts with dogs, reducing cyclists' speed and increasing the frequency of warnings to other visitors.

### **Key Attribute: Safety**

**Rating: Fair**

OSMP promptly addresses localized and avoidable safety issues which come to the attention of the department. The Department in general, but the rangers and trails maintenance staff act upon public safety concerns as the number-one priority.

Risks are inherent in agricultural and wildland settings. Poisonous snakes, lightning, disease-bearing animals, mountain lions, black bear, and hypothermia can seriously injure or kill people. Barbed wire, poison ivy and stinging insects also pose significant but somewhat less serious risks. Whenever and wherever possible, the OSMP Department seeks to reduce the likelihood that visitors will encounter hazardous situations. The Department staff provide, among other services, placement and maintenance of warning signs and law enforcement and emergency response on OSMP lands. From January 2000 through July 2003, OSMP rangers responded to 168 law enforcement incidents, 103 medical emergencies, participated in 32 search operations and responded to 30 reports of fire. OSMP staff also contributes to public safety by teaching and providing written material about how visitors can avoid dangerous situations.

Conflict and safety overlap. Some safety concerns associated with particular uses are presented in the discussion of the key attribute "conflict."

### **Criminal Activity**

Criminal activity is very rare and tends to be localized on Open Space and Mountain Parks. There are approximately 20 to 30 vehicle break-ins in parking lots each year (S. Armstead pers. comm.). Thefts resulting in property damage (smashed vehicle windows) or loss significantly degrade a visitor's experience. Permanent signs are posted at many trailhead parking lots, advising people about how to reduce the likelihood of break-ins. In addition, OSMP, in cooperation with the Boulder County sheriff's office, provides this same information in periodic press releases. There are approximately 10 to 20 reports of indecent exposure on OSMP lands each year in recent years. OSMP rangers respond to these reports because of concerns for visitor safety.

**Historic Mining**

There are no known unsecured mine openings on OSMP lands. Historic mining activities in the Marshall area created conditions where ground subsidence is possible. Conversations with staff at the Colorado Department of Natural Resources, Division of Mining and Geology (DMG) suggest that there are no easily queried databases that would provide information to assess hazards associated with mining activity. DMG staff further suggested that subsidence dangers in the Marshall area are possible, but it would be difficult to predict where and when subsidence may occur.

**Trail Crossings**

There are several places where designated trails cross roadways at grade (e.g. East Boulder Trail at Valmont Road, Foothills Trail at Lee Hill Road, Community Ditch Trail at Colorado State Highway 93, and multiple crossings of Flagstaff Road and on the Flagstaff Trail). There are additional locations where no crossing is recommended, but visitors often choose to cross a roadway to use another section of the OSMP trail system. These crossings require navigating busy roads or highways. The table below lists the road crossings for existing trails and the current status of improvements to address visitor safety (e.g. striped intersection, warning signs along roadway). Addressing these problems will require notification of and action by the governmental entities that own and manage the roads and rights of way (e.g. Boulder County, the State of Colorado).

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Crossings\*

Trail	Road Crossing	Existing Crossing Improvements
Sanitas/Centennial Trailheads	Sunshine Canyon Drive	Stripes
Cottontail Trail	Mineral Road (Hwy. 52)	None
Cottonwood Trail	Independence Road	None
East Boulder Trail	Valmont Road	Stripes/signs on roadway
Foothills Trail	Lee Hill Road	Stripes/signs on roadway
Fourmile Canyon Creek Trail	Diagonal Highway	Informal use of Fourmile Canyon Creek underpass
Fourmile Canyon Creek Trail	Burlington Northern RR	None
Flagstaff Trail	Flagstaff Rd	Stripes/signs on roadway
South Boulder Creek Trail	Highway 93	None
Flagstaff parking areas	Flagstaff Road	None
South Mesa Trailhead /Doudy Draw Trail	Eldorado Springs Drive	None
Greenbelt Plateau Trail	Highways 121/93	None
Community Ditch Trail	Highway 93	None

\* A comprehensive trails assessment (City of Boulder 2003) has been prepared showing the approximate locations of the road crossings listed here.

**Roadside Parking**

Visitors commonly park along roadsides to access Open Space and Mountain Parks properties. Many informal roadside parking areas have become heavily used. Because of poor sight lines and high traffic volume and speed, some of these areas are of concern (Flagstaff Road, Baseline Road near the Bobolink and Dry Creek trailheads, Eldorado Canyon, Hwy 93 near Community Ditch, and Marshall Road near the Marshall Mesa trailhead). As with crossings, resolution of this concern will require notification of, consultation with and action by the entities which own and manage the roads and rights-of-way.

**Livestock**

Livestock can injure OSMP visitors. However, most livestock tend to shy away from human activity. The greatest potential for safety issues arises where grazing areas are not segregated from trails by fences. The unpredictability of livestock is higher during calving season when cows are more likely to interpret human activity as a threat to their young.

Visitors have occasionally reported concerns about aggressive livestock since the start of the Open Space program. In some cases, people have been concerned about bulls or cattle with long horns in fields adjacent to trails. Other people have reported concerns about how closely cattle have approached them. However, until recently, there were no reports of livestock coming into unwanted contact with trail users or other OSMP visitors.

In 2003 there were two such reports. One visitor alleged that she was injured when a cow knocked her down. Another visitor reported that he had been butted by two cows. Both of these incidents involved nursing cows in fields where the trails are not separated from grazing areas by fences.

**Justification for the rating (Fair)**

The current situation needs improvement. While most visitors may not perceive significant threats to their safety, significant improvements can be made in providing safe trail crossings across busy roads and better management where parking overflows from OSMP lots onto busy roads.

**Key Attribute: Remoteness**

**Rating: Very Good**

This factor is related in part to crowding but especially addresses the visitors' desire to leave their fast-paced lives behind. At the western edge of the City land slopes upward dramatically and grows wilder. Exchanging a road for a trail at the edge of town can lead to opportunities to see a black bear or hear the call of a falcon hailing its mate. Elsewhere on OSMP, visitors can lose themselves in extensive grasslands out of sight of roads or human settlement where hawks hunt prairie dogs and coyotes lope through the mosaic of grasslands. This proximity to truly wild life, carrying on wild lives, is unusual. It is an accomplishment based on the foresight of citizens who started protecting this land. Many visitors revel in the remote experience and consider the protection of these nearby lands with pride.

While the Open Space and Mountain Parks land system may not be wilderness, it does provide an uncommonly good opportunity near an urban area for visitors to get far from built up areas and other people. An hour long walk into the foothills can still provide a visitor with a near-wilderness experience. In some places even shorter hikes lead to quiet refuges dominated by natural sights, sounds and smells.

The large number of surrounding cities and neighborhoods limits the degree to which OSMP can be truly remote. With each year of increasing use, the likelihood of not seeing others on a hike decreases, leading some visitors further away from trailheads.

**Justification for the rating (Very Good)**

The current situation is acceptable or better for most visitors. Given the proximity of OSMP natural and agricultural lands to urban and suburban development, OSMP lands offer considerable opportunities for getting away from city life, experiencing nature, and recreating in uncrowded situations. These opportunities are possible because of the physical remoteness of mountain terrain, large open stretches of land, and management that has preserved remnant patches of nature.

**Key Attribute: Variety of activities**

**Rating: Very Good**

Boulder's Charter states that Open Space lands are intended for certain purposes. Among them is "passive recreation use". Hiking, photography and nature studies are given as examples of passive recreation. Bicycling, horseback riding, and fishing are also listed in the Charter as examples of passive recreation "if specially designated". The first Visitor Plan Advisory Committee deliberated on the concept on "passive recreation" and provided the following definition for passive recreation (City of Boulder 2000b):

Non-motorized activities that:

- Offer constructive, restorative, and pleasurable human benefits that foster appreciation and understanding of Open Space and its purposes
- Are compatible with other passive recreational uses

- Do not have significant adverse impacts to natural, cultural, scientific, or agricultural values
- Occur in an Open Space setting, which is an integral part of the experience
- Require only minimal visitor facilities and services directly related to safety and minimizing passive recreational impacts

The first Visitor Plan Advisory Committee also developed a methodology for reviewing activities not mentioned in the Charter to determine if they should be considered passive recreation. A wide range of passive recreation activities are allowed on Open Space and Mountain Parks lands (see tables below).

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**Recreational Activities on OSMP Lands August 2003**

These activities are subject to seasonal, or site specific restrictions

<b>Activities currently allowed on OSMP lands</b>	<b>Activities currently allowed where specially designated</b>	<b>Activities currently prohibited on OSMP lands</b>
<ul style="list-style-type: none"> <li>■ Hiking</li> <li>■ Running</li> <li>■ Nature study</li> <li>■ Photography</li> <li>■ Picnicking</li> <li>■ Cross-country skiing and snowshoeing</li> <li>■ Rock climbing</li> <li>■ Bouldering</li> <li>■ Dog walking</li> </ul>	<ul style="list-style-type: none"> <li>■ Fishing</li> <li>■ Sledding</li> <li>■ Boating*</li> <li>■ Horseback riding**</li> <li>■ Bolted climbing</li> <li>■ Hang/paragliding</li> <li>■ Wading (in streams only)</li> <li>■ Wheeled Vehicles                             <ul style="list-style-type: none"> <li>• Bicycles</li> <li>• Horse-drawn wagons or sleds</li> <li>• Dog sleds (wheeled)</li> <li>• Strollers / joggers</li> <li>• In-line skates</li> <li>• Skateboards</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>■ Motorized vehicles (including motorized boats)</li> <li>■ Hunting</li> <li>■ Competitive events</li> <li>■ Organized sports</li> <li>■ Use of firearms, including bows and paintball guns</li> <li>■ Collection of natural features</li> <li>■ Swimming</li> <li>■ Wading (in ponds, lakes and reservoirs)</li> <li>■ Hot air ballooning</li> <li>■ Camping (except at 4th-of-July campground)</li> <li>■ Golfing</li> </ul>

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*\*Currently allowed unless an area is posted as closed to boating. Boats must not exceed 17 feet in length.*

*\*\*Under the provisions of the City Charter, horseback riding is allowed where designated. Horseback riding is currently allowed throughout Open Space and Mountain Parks lands*

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**Participation in Selected Activities on OSMP (2001 Estimates)**

<b>Activity</b>	<b>Open Space Percent*</b>	<b>Mountain Parks Percent*</b>	<b>Overall Percentage of Visits*</b>
Hiking	29%	71%	47%
Jogging/Running	39%	7%	26%
Exercising pets	21%	19%	20%
Bicycling	17%	3%	11%
Wildlife viewing	2%	19%	9%
Scenic driving/viewing	0%	13%	6%
Photography	<1%	9%	4%
Contemplation/meditation	<1%	8%	3%
Climbing	<1%	7%	3%
Nature study/appreciation	0%	6%	2%
Picnicking	0%	3%	1%
Horseback riding	2%	<1%	1%
Fishing	1%	0%	1%

Activity	Open Space Percent*	Mountain Parks Percent*	Overall Percentage of Visits*
Social gathering	0%	1%	1%
Hang gliding, paragliding	<1%	0%	<1%
Radio controlled gliders	<1%	0%	<1%
Other	4%	2%	3%

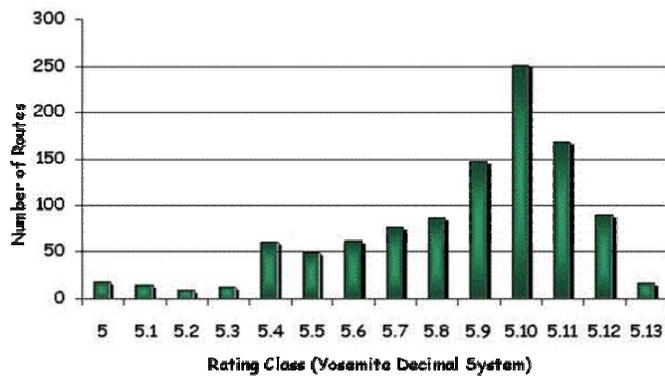
\*Columns do not add to 100% because respondents could select more than one activity

**Challenge Levels**

In addition to providing a variety of activities, the diverse terrain of Open Space and Mountain Parks offers most visitors a range of challenge levels.

Runners, hikers, joggers and dog walkers can choose the level terrain of the plains, steep trails in the foothills or a mixture of both. Equestrians enjoy a wide variety of experiences on OSMP lands.

Climbing routes on Open Space and Mountain Parks offer a wide distribution of difficulties (see figure). A similarly wide range of bouldering problems are offered on OSMP lands. Recently a pilot program has been established to increase sport climbing opportunities in the Dinosaur Mountain area.



Climbers choose from routes that cross the spectrum of difficulty on Open Space and Mountain Parks (higher numbers are more difficult routes).

The diversity of plants and animals can provide a lifetime of challenge and interest for naturalists. Changing season and weather overlay the wide variety of natural and agricultural settings and a sprinkling of historic sites to offer an endless variety for photographers, painters and other artists inspired by OSMP. OSMP continues a long term relationship with the Colorado Division of Wildlife to develop a variety of ecologically compatible sport fishing opportunities in OSMP lakes and creeks.

As described under the key attribute: **access to destinations**, the extent and variety of cycling and hang gliding opportunities are limited. The Department is working with to identify sites or access to areas managed by others that will provide a range of challenge levels without creating significant resource impacts.

**Justification for the rating (Good) (Fair for cycling and hang gliding)**

The current situation is acceptable or better for most visitors. In its diverse natural and agricultural terrain, OSMP offers wide variety in the type and challenge level of recreational and educational opportunities. There is a demand for expanding the extent and challenge level of some activities, such as bicycling and hang/paragliding.

**The Visitor Experience: Future Trends**

The Visitor Master Plan has a ten year planning horizon. Therefore it is necessary to consider the relevant trends as well as the current condition. Important trends affecting the visitor experience all point toward increasing recreational use of OSMP.

Local and regional population has been growing rapidly over the past decades. For example, from 1980-2000, the population of Boulder County increased by 53% (State of Colorado 2003). Population changes for the City of Boulder and nearby municipalities from 1970-2000 and 1990-2000 are provided in the table below (note the values are *percentages*.)

**Percent Change in Populations (DRCOG 2003a)**

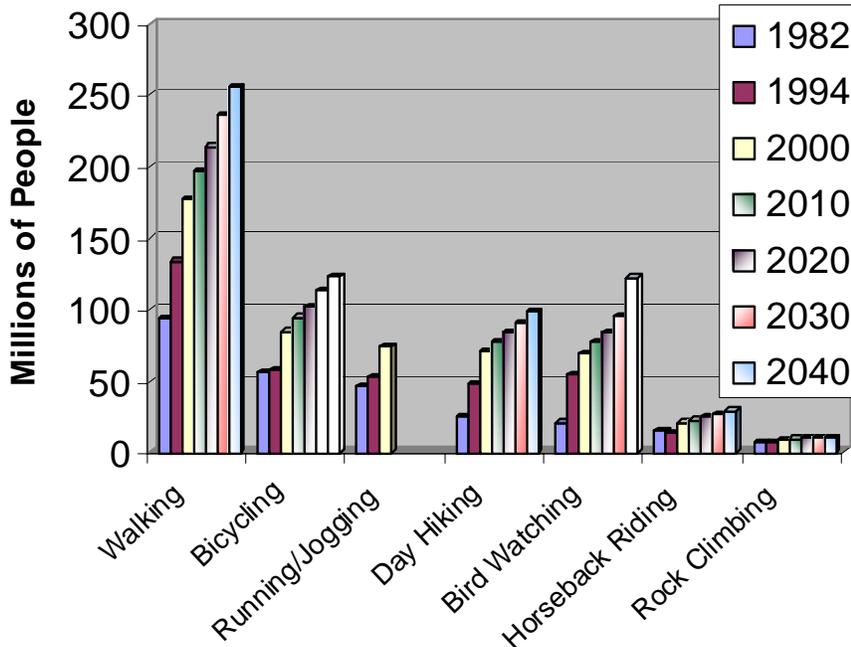
<b>City</b>	<b>1970-2000</b>	<b>1990-2000</b>	<b>City</b>	<b>1970-2000</b>	<b>1990-2000</b>
Boulder	42	14	Louisville	686	53
Arvada	105	14	Broomfield	427	55
Golden	75	31	Lafayette	563	59
Westminster	417	35	Erie	477	400
Longmont	206	38	Superior	5,170	3,434

Despite the recent softening of the economy, continued growth is predicted for the Front Range and the Denver metropolitan area (DRCOG 2003b). Population forecasts for the regional statistical areas around Boulder are provided in the table below. The state demographer has estimated a 16% increase in the population of Boulder County between 2000 and 2010 (State of Colorado 2002)

**Regional Population Forecast, by Regional Statistical Area (DRCOG 2003b)**

<b>Area</b>	<b>2000 Population</b>	<b>Population Forecast 2020</b>	<b>Change</b>	<b>Forecast Annual Growth Rate</b>
Arvada	72,003	82,417	10,414	0.72%
Boulder - Mountains	16,959	20,127	3,168	0.93%
Boulder - TriCities	74,929	108,731	33,802	2.26%
Boulder City - North	40,172	43,098	2,926	0.36%
Boulder City - Periphery	26,977	33,107	6,130	1.14%
Boulder City - South	51,880	57,857	5,977	0.58%
Golden	27,562	47,094	19,532	3.54%
JeffCo - Northwest	5,282	8,997	3,715	3.52%
Longmont	75,940	92,992	17,052	1.12%
Standley Lake	84,152	100,124	15,972	0.95%

National trends in recreational activities indicate that higher percentages of the population are recreating now than in the past (Cordell 1999, 2002a 2002b). This is due in part to the health benefits associated with an active lifestyle, marketing and promotion by the outdoor equipment industry, and the increasing availability of access information through traditional publications and the internet. This trend is expected to continue. (Cordell 1999, 2002a, 2002b). The figure below summarizes some information about the growth and growth trends of selected recreational activities.



**Historical and projected trends in outdoor recreation.**  
from Cordell 1999, 2002a, 2002b

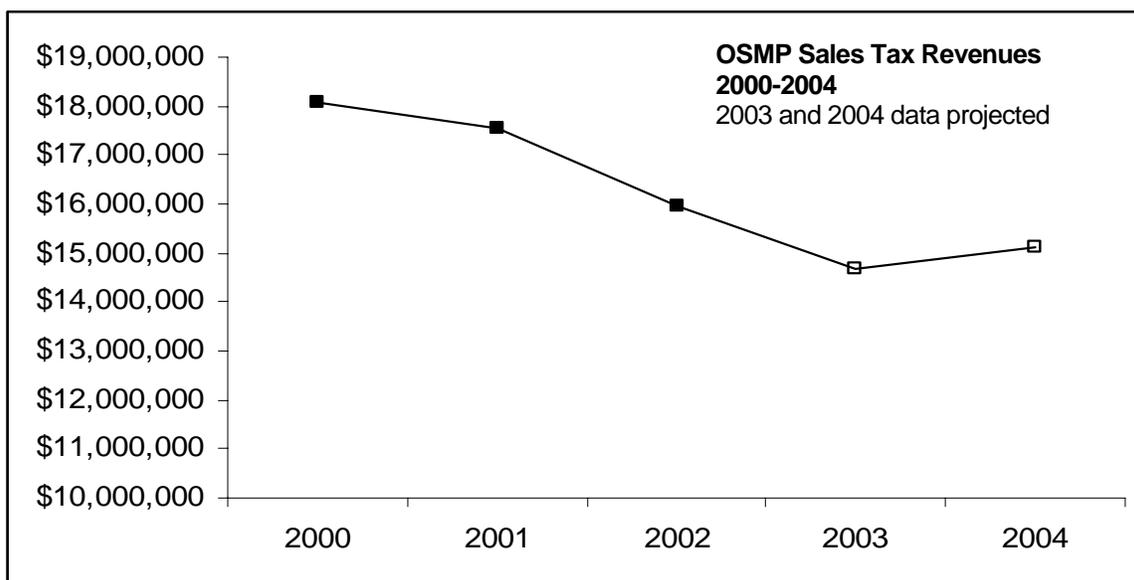
Increasing population and interest in outdoor recreation are part of the demand side of the equation. A third trend is apparent when examining the supply side. Regionally, the open space land base has been growing much more slowly than demand for passive recreation. Undeveloped lands are disappearing as residential and commercial land uses are developed in communities surrounding Boulder. The recent explosive residential growth of Superior and commercial development in Broomfield are two obvious examples of this trend. Land values continue to increase. Most communities, even those with open space programs, find themselves unable to make purchases to adequately satisfy the recreational needs of their own residents. The result is that Boulder and other communities with well-developed open space programs become regional providers of outdoor recreation for other communities.

Increasing use will generate new demands on OSMP programs. Education staff will face the need to not only increase offerings but develop new techniques to reach different and larger audiences. It is likely that law enforcement and emergency response will increase at least in proportion to visitation. New law enforcement issues may also emerge with increasing numbers of visitors. Maintaining acceptable aesthetic conditions through education and enforcement will be more difficult with more visitors and more dogs. It may become a greater challenge to provide opportunities for solitude as visitors compete for remote settings. Conflicts among users are also likely to increase.

An indication of the need for management strategies to address future conflicts has been described in *The Daily Camera* (Reid and Butler 2003). The newspaper article described a trend referred to as “recreational rage.” The authors describe this phenomenon as visitors acting aggressively toward each other. Some of the causes

suggested are, high levels of stress, little ability among the general population to manage stress, and increasing numbers of interactions among people on the trail system. When there is a perceived failure in trail etiquette, people can respond angrily. Records of aggressive behaviors by visitors on OSMP lands are uncommon. However it is unclear how often incidents or rage occur or what percentage of them is reported to authorities. The authors cite anecdotal evidence that “rec rage” may be increasing.

Economic trends in Boulder have reduced the capacity of OSMP to provide visitor services. The OSMP Department is almost fully funded from sales tax revenues. Over the past three years, the department’s sales tax revenues have declined nearly 19%. A large portion of this revenue is used for non-discretionary payments for prior real estate purchases, leaving flexibility only in matters of new land acquisition and management. A very slight recovery is projected for 2004, but such increases will not restore revenues to year 2000 levels.



**Summary: The Visitor Experience**

The visitor experience can be described in terms of seven key factors: connection with the land, access to destinations, aesthetics, remoteness, conflict, variety of recreational activities, and safety. Currently, the quality of the visitor experience is quite high. OSMP is a popular destination for citizens of Boulder and surrounding communities. The system receives millions of visits--more than Rocky Mountain National Park. Citizen surveys consistently conclude that the quality of the visitor experience is very high.

This analysis identifies programs and policies that are currently supporting the quality visitor experience as well as new initiatives needed to address unacceptable conditions or head off trends which may adversely affect the visitor experience.

**Maintaining the “Good” and “Very Good” Ratings**

The OSMP provides a number of facilities and services to maintain the quality of the visitor experience. A key element in supporting all of the key factors is the systems of trails and trailheads. This infrastructure provides safe access to a variety of environments and recreational destinations *while* facilitating connections between people and the land. OSMP also offers programming focused upon sharing information about the OSMP lands and deepening the connections between people and the landscape through interpretive events, volunteerism, a youth work program, community outreach and ranger activities.

OSMP policies also support the quality of the visitor experience. Visitors highly value the current policy of open access to the land system, and the opportunity to have their dogs accompany them off leash.

### Improving the “Fair” Ratings

The most significant issues affecting the quality of the visitor experience are

- gaps in the trail system,
- safety issues related to road crossings,
- lack of variety in the experiences available to cyclists and hang gliders,
- impacts of dog excrement upon aesthetic attractiveness, and
- conflicts among visitors, especially conflicts involving cyclists who do not follow proper trail etiquette and non-compliance with dog voice and sight regulations

### Anticipating the Future

Given trends for increasing demands for outdoor recreation and no increases in regional supply, OSMP will face increasing numbers of visitors. If OSMP's role as a regional recreation destination increases, we face the opportunity to build environmental connections with a larger and more diverse audience. We also expect to see an increase in the severity of those issues that are closely related to use levels. For example, the rates of conflict and aesthetic impacts are likely to increase with higher levels of visitation. Increasing number of OSMP visitors will put new pressures on existing programs and may require that we reexamine the ways in which we offer education and enforce regulations.

## Visitor Infrastructure: OSMP Trails

Open Space and Mountain Parks uses a system of trails, trailheads and other facilities to enhance the visitor experience and help ensure that recreational use does not have a significant adverse effect upon other resources. The ways in which trails are designed, constructed and maintained have implications for both the quality of the visitor experience, and the compatibility of that experience with resource conservation. Properly designed, constructed and maintained trails encourage visitors to stay on them because they provide the easiest and safest routes to their destinations (Byers et al. 2000)

There are currently, 130 miles of designated trails, 1,000 named climbing routes, 38 trailheads as well as two nature centers, fishing piers, several interpretive trails, picnic areas, restrooms, trashcans, and other miscellaneous facilities. Public opinion surveys and summaries of public comment have not revealed significant concerns about the availability of most facilities. The most consistent comment has been a desire for restrooms at more trailheads.

The greatest concerns about OSMP infrastructure concern the sustainability of trails. Public comment and staff concern are squarely focused upon this as a critical component for the Visitor Master Plan. Clearly, trails and the visitor infrastructure are related. Consider the key attribute descriptions for the visitor experience. "Access to destinations," "aesthetics," "safety" and "variety" are closely linked to the OSMP trail system. Despite their close association, it appears that visitors can express a high level of satisfaction in the experience provided by a trail system that is in poor condition. Trails were separated out as a separate planning target because the condition of the visitor experience and the condition of the trail system can vary independently of each other.

Our goal is for a sustainable trail system. Trail sustainability can be characterized by three key attributes, **physical sustainability, maintenance condition and engendering stewardship.**

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### Key Attributes for the Visitor Infrastructure

- **Physical Sustainability**
  - **Maintenance Condition**
  - **Engendering stewardship**
- 

#### **Key Attribute: Physical Sustainability**

**Rating: Fair**

A trail or other facility is physically sustainable when it is able to continually accommodate all physical forces acting upon it, both natural and human-caused, with regular maintenance and without damage to the surrounding area (Parker in prep.).

The composition of the trail tread, slope and aspect are environmental variables which control the physical sustainability of a trail. Compaction, displacement and erosion are important processes that can lead to the degradation of trails. The relationships among these factors can be used to anticipate and resolve trail sustainability problems.

On the Open Space and Mountain Parks system this relationship is played out in the contrast between some trails on the plains and those in the foothills. On the flat terrain of the prairie grasslands, trails are often converted farm roads on generally level terrain. Although subject to compaction, these trails are not as erosion prone as the steeply pitched trails built upon the highly erodable gravelly soils of the mountain backdrop. However, trails on level terrain are susceptible to "cupping" or deepening and may need special design to prevent incremental widening. Many trails lack the structures and tread design needed to accommodate the types and level of use that they receive. This creates an unsustainable situation, as trail tread deepens it becomes an attractive course for water to drain after rain or during snowmelt, further entrenching the trail. As the trail gets deeper it becomes a more efficient water course increasing rates of erosion and deposition.

Boulder's land managers have known for several years that many of the trails, particularly those in the mountain backdrop, are not physically sustainable (City of Boulder 1983, Brown, et al. 1992). In 2003, OSMP re-

assessed the physical sustainability of the trails system. A staff team involved in this project identified over 16 trail miles spread over 31 trails that are not physically sustainable. All are in need of reconstruction or relocation. Almost all are located in the mountain backdrop (City of Boulder 2003).

In addition to designated trail mileage that is not physically sustainable, there are many unsustainable **undesigned** trails as well. Some of these trails are the only access to popular destinations, but were never properly designed or constructed. Staff has identified 38 areas with concentrations of undesigned trails, many of which are unsustainable. Each of these areas poses complex management decisions about whether and how to provide access, stabilize disturbed areas and reclaim closed areas. In recognition of the difficulty of improving the situation in these places, they have been referred to as “management challenge areas” (City of Boulder 2003).

Trailheads, access points and picnic areas have been also been evaluated for physical sustainability. The evaluation found that degradation is widespread. As with trails, the least physically sustainable facilities are located in the mountain backdrop.

More information about the physical sustainability assessment for trails and other facilities as well as maps showing their locations can be found in the *Trail Assessment and Prioritization Report* (City of Boulder, 2003)

**Justification for the rating: Fair**

The current situation needs significant improvement quickly. Extensive portions of the trail system and other facilities are significantly degraded. The degradation is so severe and widespread that OSMP considers this key factor to be close to “Poor”. While restoration is possible, it will continue far beyond the ten-year horizon being contemplated in the Visitor Master Plan.

**Key Attribute: Maintenance Condition Rating: Fair**

Lack of maintenance alone does not imply that a trail is physically unsustainable. However, a trail or portion of a trail might be in unacceptable condition because it has not been regularly maintained. “Maintenance condition” is a key attribute that refers to the degree to which a trail receives adequate repairs to ensure its long term sustainability. Maintenance includes minor repairs and preventative measures designed to avoid more serious problems later. Typical maintenance activities include cleaning and repairing drainage features, maintaining side slopes to minimize erosion, filling low areas where water pools, defining the trail edge, clearing the trail of debris, etc. (City of Boulder 2003).

An inventory of maintenance condition is undertaken each spring to identify and prioritize maintenance needs. At this time no consolidated inventory reports are available. However, information on annual expenditures of time and money has been summarized (City of Boulder 2003). About 29,000 hours and \$350,000 are required annually to maintain the existing system of OSMP **designated** trails. The majority (approximately 80%) of these resources are needed to maintain mountain trails.

In addition to trail maintenance, OSMP maintains trailheads and parking areas. Trailhead maintenance includes a wide variety of time consuming tasks (see below).

**Trailhead Maintenance Tasks**

- |  |  |
|--|--|
| ■ Mowing   | ■ Trash cans (regular trash haul, replacement of cans) |
| ■ Outhouses (cleaning, painting, repair)                     | ■ Dog excrement bag dispensers                         |
| ■ Fencing (replacing/repair corral fencing, repairing gates) | ■ Graffiti removal                                     |
| ■ Potholes   | ■ Benches (sand and repaint)                           |
| ■ Education/Information board repair                         | ■ General repairs from wear and tear/vandalism         |

Trailheads and parking areas have been a maintenance priority for OSMP because of their role in greeting visitors. Since the merger of the Open Space and Mountain Parks Programs there have been staff and funding reductions making it necessary to divert funding from a variety of OSMP projects to cover the expenses and staff time needed to maintain trailheads.

Beginning with the merger of the Open Space and Mountain Parks Programs and continuing because of more recent budget restrictions staffing levels for trail construction and maintenance have dropped precipitously. Wear and tear from increasing use and decreasing capacity for maintenance and reconstruction has resulted in deferred maintenance over much of the trail system for several years.

Maintenance work has historically been undertaken by seasonal adult trail crews and seasonal junior ranger crews. The seasonal workforce dedicated to trail maintenance and construction has been reduced significantly since the merger of the Open Space and Mountain Parks programs. Capacity for trail maintenance was further diminished by the reallocation of adult trail crew coordinators to other projects, primarily trailhead maintenance.

As trail maintenance staffing levels have fallen, the relative amount of time spent addressing unavoidable emergencies increases, further reducing trail maintenance capacity.

**Justification for the rating: Fair**

The current situation needs significant improvement. Open Space and Mountain Parks lacks the staffing and financial capacity to adequately maintain the existing system of trails at current levels of use.

**Key Attribute: Engendering Stewardship**

**Rating: Fair**

Facilities that engender stewardship provide a satisfying experience for the visitor while simultaneously serving to encourage care for the resources around them. Trails that engender stewardship also seek to modify our attitudes towards trails and natural resources. (Parker in prep.). A trail or other facility that does not provide satisfaction, encourage care, or modify attitudes about the relationship of trails and natural systems does not engender stewardship. For example a trail that winds through a riparian area may be extremely pleasing, but does not seek to minimize environmental impacts. Engendering stewardship overlaps somewhat with “aesthetics” and “connection” that were considered key attributes for the visitor experience.

In order for trails to engender stewardship they should be enjoyable for their intended purposes. This can be done by providing frequent, small-scale experiences to notice nature and to react to subtle changes along the trail. Ensuring that there *are* changes in elevation, slope, direction, vegetation and shape provides dynamic contact with nature and can heighten awareness (Parker in prep.)

Holding interest requires careful design. Most of the current trail system on OSMP was not designed using modern standards. Much of the system evolved from the conversion of historic roads and by formalizing footpaths that had been in use for decades. Farm and mining roads were typically built without consideration of aesthetics, looking for the quickest way to a destination. Informal trails arising from patterns of wear also followed the quickest routes, lacked engineered solutions, avoided obstacles and typically ignored ecological impacts or erosion problems.

Open Space and Mountain Parks has not directly measured the degree to which the designated trail system engenders stewardship. However, our experience from new trail construction projects and trail re-routes suggest that trail design and siting *can* be used effectively to keep people on the trail and engender stewardship. For example, the Towhee Trail was historically located in the bottom of the lower Shadow Canyon drainage along a small seasonal creek. In an attempt reduce the impact to the montane riparian and wetland system; much of the trail was removed from the drainage. The result was improved ecological conditions and a pleasing alternative alignment which held the visitors’ interest because of its setting, including the excellent view of the drainage. Similar projects in Long Canyon and at the approach to Mallory cave have improved the quality of the visitor experience through design and siting. Newly constructed trails such as the Lefthand trail have been designed to provide access and connections while avoiding rare plant habitat, wetlands and other significant resources.

**Justification for the rating: Fair**

The current situation for engendering stewardship needs improvement. Some trails in the OSMP system are unlikely to encourage use because they lack the design features that will attract and retain interest. Some of these “design-less” trails are also physically and ecologically unsustainable. The aesthetics of the visitor experience, physical condition of the trails, especially the occurrence of “management challenge areas” and degree of resource impact (see compatibility discussion of ecological systems and agricultural operations) suggest that the trail system could be designed to better engender stewardship.

**Visitor Infrastructure: Future Trends**

The trends leading to an increase in use levels have direct consequences for the visitor infrastructure. The primary effect of increasing rates of visitation will be more physical wear and tear on trails and other facilities. For some facilities, standards for construction or replacement intervals may need be adjusted to address increased use levels. Trail and facility maintenance will probably require more time unless facilities are hardened or otherwise redesigned to withstand increased levels of use.

Using the trails to engender stewardship may become increasingly difficult if visitation becomes dominated by people who are unaware of the multi-use purposes of OSMP and perceive only the recreational value of these lands.

Trail maintenance and construction, especially in the steep and inaccessible mountain backdrop requires considerable manual labor. It is therefore time consuming and expensive. The existing level of resources dedicated to these activities is insufficient to create acceptable conditions. In fact, there is a general consensus among OSMP staff that conditions grow worse each year as maintenance is deferred. Forecasts suggest that local short-term economic recovery is unlikely.

**Climate and Patterns of Use**

Rates of trail use appear to be directly correlated with weather. Cool sunny days and evenings appear to attract the largest numbers of visitors. When it is very hot, snowing or raining, visitation tends to decrease.

Winter is the time when most of our precipitation falls and when trails are most vulnerable to impact because of rain and melting snow. Trail users active during wet and muddy conditions have far more impact on trails than they do at other times.

Skiing is one of the most popular outdoor recreation activities for active people in the Front Range. However, Denver metropolitan residents appear to be less willing to drive to Summit County because of the congestion on Interstate 70. Some people are doing their skiing during the week. The numbers of people looking for local outdoor activities on the weekends is probably increasing.

In recent years, Boulder seems to be experiencing increasingly mild winters—perhaps an effect of climate change. Mild weather on OSMP and congestion on I-70 could lead (or already be leading to) increases in visitor use during the times when trails are most sensitive to impact.

**Summary: The Visitor Infrastructure**

The visitor experience can be described in terms of three key factors: physical sustainability, engendering stewardship and maintenance condition. The condition of the visitor infrastructure is variable, but there are significant areas, mostly in the mountain backdrop that are not physically sustainable, that do not engender stewardship and that have not been consistently maintained. Already below capacity, the trails program faces significant challenges in maintaining the infrastructure as use levels are forecast to increase and sales tax revenue will be slowly increasing at best.

**Improving the “Fair” Ratings**

Investments of significant capital will be needed to improve the physical sustainability of the trail system. These reconstruction projects will also increase the degree to which these trails engender stewardship. It is likely that projects which increase the physical sustainability of trails will take priority over redesign to engender stewardship on trails that are already physically sustainable. A location and extent report of trail maintenance

needs would complement the existing inventory and would be useful in helping to set priorities and assess the capacity needs for an effective on-going trail maintenance program.

Existing capacity (staffing and funding levels) is not sufficient to improve the ratings of these key attributes over the planning horizon. Significant resources will be needed to provide this service and alternative funding and labor sources may need to be developed to improve conditions.

## Part II: Compatibility

### Ecological Systems

The preceding analysis focused upon the **visitors** (experience and infrastructure); this section deals with the **residents**. We know for example that natural systems, plants and animals provide much of the basis for a visitor experience that is “Open Space-dependent.” The enjoyment of natural systems, plants and animals builds support for the conservation and protection of these areas. In addition, the Visitor Master Plan calls upon OSMP to ensure that the visitor experience and the visitor infrastructure do not have significant adverse impacts upon other resources.

Ecological systems are complex and we do not fully understand the impacts of recreational use upon them. Like many multiple use management agencies, OSMP is guided by the precautionary principle. This principle dictates that the management agency has a duty on behalf of the community to anticipate harm to resources held in the public trust and take action to prevent such harm. In addition, the precautionary principle places the burden of proof that an activity has no significant impact upon the proponent of the activity, rather than necessarily requiring that the management agency demonstrate an activity causes significant impacts.

Boulder’s Open Space and Mountain Parks are home to an unusual diversity of living things. One quarter (over 800 species) of the vascular plants found in Colorado occur on Open Space and Mountain Parks (A. Armstrong pers comm.). Wildlife biologists estimate approximately 500 vertebrate species use Open Space and Mountain Parks lands for some portion of their lives. This represents a little less than half the number of vertebrates in Colorado. The Colorado Breeding Bird Atlas project found that Boulder contained the greatest number of species of breeding birds (101) and habitat types (15) of 1,745 places across the state. Included in this diversity are 48 species considered rare or imperiled by the Colorado Natural Heritage Program and nine other species of concern to OSMP ecologists.

### Species and Communities of Concern for Open Space and Mountain Parks Lands

#### Animals (28)

##### Vertebrates (19)

American peregrine falcon \* LE  
 American white pelican\*  
 Bald eagle\* ST  
 Black-necked stilt\*  
 Black-tailed prairie dog\* CT  
 Bobolink\*  
 Burrowing owl\* ST  
 Ferruginous hawk\*  
 Fringed myotis\*  
 Green-back cutthroat trout\* LT ST  
 Lewis’s woodpecker\*  
 Northern leopard frog\*  
 Northern redbelly dace\*  
 Northern goshawk\*  
 Ovenbird\*  
 Plains sharp-tailed grouse\* SE  
 Preble’s meadow jumping mouse\*  
 LT  
 Smooth green snake\*  
 Western (Townsend’s) big-eared bat  
 \*  
 Wilson’s phalarope\*

#### Plants (39)

Alaskan orchid  
 American groundnut\*  
 Bell’s twinpod\*  
 Black spleenwort\*  
 Blue toadflax  
 Broad-leaved twayblade\*  
*Carex oreocharis*\*  
 Carrionflower\*  
 Chaffweed\*  
 Common moonwort\*  
 Dwarf wild indigo\*  
 Forktip three-awn\*  
 Frostweed\*  
 Golden showers  
 Grass-fern\*  
 Mingan moonwort\*  
 Mountainspray  
 Narrow-leaved milkweed\*  
 Paper birch\*  
 Pictureleaf wintergreen\*  
 Prairie dropseed  
 Prairie violet \*  
 Rattlesnake fern  
 Reflected moonwort \*

#### Plant Communities (11)

Foothills riparian shrubland\*  
 Foothills shrublands\*  
 Great Plains mixed grass prairies\*  
 Mixed foothills shrublands\*  
 Montane riparian forests\*  
 Parry’s oatgrass montane grassland \*  
 Ponderosa pine/king fescue savannas  
 Ponderosa pine/mountain mahogany  
 scrub woodlands\*  
 Salt meadows\*  
 Wet prairies\*  
 Xeric tall grass prairie\*

Species and Communities of Concern for Open Space and Mountain Parks Lands

<b>Animals (28)</b>	<b>Plants (39)</b>	<b>Plant Communities (11)</b>
<u>Invertebrates (8)</u>	Rock polypody	
Arogos skipper *	Rocky mountain sedge*	
Cross-line skipper *	Showy prairie gentian	
Hops feeding azure (butterfly) *	Small-headed rush*	
Moss's elfin (butterfly) *	Sprengle's sedge*	
Mottled dusky wing (butterfly) *	Toothcup*	
Regal fritillary (butterfly) *	Torrey sedge*	
Snow's skipper *	Ute ladies'-tresses orchid LT *	
Two-spotted skipper*	Waterthread pondweed*	
	Wavy-leaf stickleaf*	
	Weatherby's spike-moss	
	White adder's mouth*	
	Wood lily*	
	Wright's cliff-brake*	
	Yellow hawthorn*	

\* = tracked by Colorado Natural Heritage Program,  
 LE = Listed Endangered (federal status),  
 LT = Listed Threatened (federal status)  
 CT = Candidate for Threatened (federal status)  
 SE = Listed Endangered (state status)  
 ST = Listed Threatened (state status)

Rather than assessing condition, this analysis examines compatibility, focusing upon those key attributes most likely to be affected by passive recreation. This analysis considers how, where and under what conditions recreational activities have an impact upon the ecological systems of Open Space and Mountain Parks.

Key Attributes for Assessing Recreational Use Impacts upon Ecological Systems

- **Size/Abundance**
- **Composition**
- **Landscape Context**

**Key Attribute: Size** **Rating: Fair**

The examples below refer to ways in which recreational use affects the natural communities and species. For communities this factor refers to patch size or geographic coverage. For animal and plant species, size takes into account the size of a population or the number of individuals

**Communities**

Forested foothills and prairie grasslands are extensive on the landscape and visitor use has not resulted in significant reductions in these dominant landscape scale communities. However, some habitats occur only as smaller patch types and are much less common on OSMP lands. Some examples of common patch types are wetlands, riparian areas, and shrublands. These each account for between two and three percent of the OSMP system. Tallgrass prairie and shale barrens are less common patch types that together cover less than one percent of the land system. Because of their relative rarity, these patches are vulnerable to the impacts of visitor use.

Riparian areas are extremely popular destinations for visitors. The shade, moisture and diversity of plant and animal life attract people to these areas. Most creeks and draws on Open Space and Mountain Parks have

associated trails. In these areas, especially the steep intermittent drainages, the band of riparian vegetation is narrow and trampling can locally destroy herbaceous vegetation, shrubs and tree seedlings. The cumulative effect of this impact is significant. In addition to being imperiled communities themselves, riparian areas provide habitat for more species than **any other** habitat type in the state. In the Boulder Valley, they are critical for the survival of two species protected under the provisions of the U.S. Endangered Species Act (Ute ladies'-tresses orchid and Preble's meadow jumping mouse). Many of the rare plants listed on page 30 occur in riparian areas.

Trails also cross tallgrass prairie. Trail widening and the establishment of undesignated trails have reduced the extent of tallgrass prairie on Open Space and Mountain Parks.

Rock and cliff faces are another patch type. The removal of some vegetation on rock and cliff faces is unavoidable by the very act of climbing. In addition, some climbers purposely remove vegetation and soil to improve conditions for climbing. A local climbing website explains a classification system for "modified climbing routes." Although the authors acknowledge that such activity may be illegal and encourages climbers to limit their impact, the classification characterizes cleaning lichens off the rock and cleaning grass from cracks as "okay."

Little is known about the distribution and composition of rock and cliff face communities on Open Space and Mountain Parks lands. Two ferns, both uncommon, grow in crevices of boulders and rock faces. The Open Space and Mountain Parks staff is concerned about the impact of climbing upon these plants and has general concerns about the extent of climbing and its potential impact upon plant communities on cliff faces and at the base of cliffs. Although no studies have been performed locally, researchers at Joshua Tree National Park found greater species richness on rock faces and at the base of rock faces where there was no evidence of climbing activity (Camp and Knight 1998). There level of impacts of climbers needs more study.

Despite the limited regional value of the Open Space and Mountain Parks land system by itself, the lands are part of a larger complex of protected and undeveloped areas that is considered one of the best opportunities to conserve many ecological features within the Southern Rocky Mountain ecoregion (Neely et al. 2001). These include species of plants and animals, plant communities and ecological systems.

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**Black-tailed prairie dogs** have been designated by the U.S. Fish and Wildlife Service as a candidate for listing as threatened under the provisions of the Endangered Species Act. They are also an example of a species affected by the behavior of dogs.

Some visitors to Open Space and Mountain Parks consider it acceptable to allow their companion dogs to chase prairie dogs (an illegal activity) because they perceive the likelihood of their dog capturing a prairie dog to be quite low.

Prairie dogs are effective at evading dogs, but disturbance by dogs alters prairie dog behavior and may still pose a real threat to the survival of individual prairie dogs, family groups and even colony persistence. A recent study documented changes in prairie dog behavior at an Open Space and Mountain Parks property where prairie dogs and domestic dogs interact regularly. The researchers found that prairie dogs significantly reduce the time they spend foraging while avoiding dogs (Bekoff and Ickes 1999). This can affect their ability to overwinter and reproduce.

As a species, prairie dogs face the threats of habitat destruction, poisoning and exotic diseases. Prairie dog Habitat Conservation Areas have been established on Open Space and Mountain Parks lands to conserve populations locally and to inform the community about their ecological role and threatened status.

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### **Species**

At the species scale, trampling can affect populations of rare plants. Plants within a few meters of the trails edge are most vulnerable to trampling effects. Rare plants such as Bell's twinpod and some montane orchids grow near OSMP trails in several areas. Brittle woody plants like shrubs and tree seedlings are especially sensitive to trampling impacts.

Recreational use can also result in animal mortality. As visitors move through a landscape animals respond in a number of ways. Many flee. Young animals in nests and dens abandoned, even temporarily by their parents can die from exposure. Even slightly older animals that have recently left their nest or den may be especially vulnerable to human activity because as they run, they expose themselves to predators. Repeated

disturbances increase the likelihood that these animals will be found by predators. The role of human disturbance in increasing juvenile susceptibility to predation has been documented in a number of studies (none on Open Space and Mountain Parks) (Sime 1999, Joslin and Youmans 1999).

Studies on OSMP have documented a number of relationships suggesting that recreational trails are correlated with higher levels of mortality.

- Avian nest predators attacked more nests near trails than away from trails. (Miller and Hobbs 2000)
- Higher rates of nest parasitism by brown-headed cowbirds occur near canopy gaps formed by trails (Chace and Cruz 1999, Chace et al. 2000)
- In grasslands, nests are less likely to occur near trails versus away from trails (Miller et al 1998)
- In grasslands and forests, nest survival increased with increasing distance from trail (Miller et al 1998)

Dogs are allowed to be off leash on most OSMP lands as long as they are in sight and under voice control. However, there is a wide range of interpretation among dog guardians about what voice and sight control means. Even with a shared community understanding and clear standards, there are those owners who may not be able to or choose not to obey regulations. The result is that some dogs chase and kill wildlife. Occasionally OSMP staff members observe dogs killing wildlife or these incidences are brought to the attention of a ranger by a concerned citizen.

Other direct impacts of visitors and their pets are the increased mortality associated with free-roaming dogs. . Dogs chase and harass indigenous wildlife (Office of Technology Assessment 1993) and disturb ground-nesting birds by attacking adult birds, and consuming eggs and hatchlings (U.S. Forest Service 1999, Miller and Leopold 1992). Free-ranging dogs prey upon the threatened gopher tortoise and destroy gopher tortoise burrows (U.S. Fish and Wildlife Service 1990 and Causey and Cude 1978). Dog-related deaths are the second most frequent cause of human induced mortality for the endangered Key deer (U.S. Fish and Wildlife Service 1999).

There are 141 records in the OSMP data bases documenting dogs chasing or attacking wildlife. Dogs most commonly chase prairie dogs, deer, waterfowl and coyotes. Although no studies have been conducted on the frequency or effects of dogs as predators on Open Space and Mountain Parks lands, studies elsewhere have concluded that dogs played a significant role in increasing mortality of native ungulate (moose, deer and elk) populations (collected in Sime 1999). Many of the existing studies focus upon the effects of dogs running without their owners. Both dogs off leash and out of control and dogs at large (away from their owners) have been known to chase wildlife on OSMP.

The impact of dogs on ground nesting birds may be especially severe because of the likelihood that nests will be found and the contents (eggs and chicks) destroyed by dogs “mousing” along the ground. Dog predation on waterfowl nests and disturbances caused by trampling (by dogs and people) in wetlands and shorelines is of special concern because of the relative rarity of waterfowl and shorebird nesting habitat in the Boulder Valley.

Studies show that even when dogs are unsuccessful in catching an animal, the potential prey has had to expend significant energy during the pursuit. In many cases, especially during late winter, animals do not have large reserves of fat. The effort of a chase can be significant and may weaken the animal increasing the likelihood of starvation or vulnerability to other predators. Pregnant wildlife and juveniles are also especially susceptible. (review by Sime 1999)

**Justification for the rating: Fair**

Recreational use has had a widespread effect upon the abundance of riparian vegetation. Impacts of visitation upon ground nesting birds have not been studied comprehensively on OSMP lands, but the cumulative effect may be significant. Until a clearer picture emerges, the precautionary principle suggests that OSMP manage conservatively, providing undisturbed habitat and other protections for potentially sensitive species, communities and ecological systems most at risk.

**Key Attribute: Composition****Rating: Fair**

Composition refers to the number and type of species found in a natural community, or the number and type of communities found in an ecological system.

The invasion of native ecosystems by non-native species is now widely regarded as a top threat to biological diversity worldwide. Weeds typically have the advantage of establishing themselves quickly in disturbed areas. Once established, weeds alter the composition of natural systems by out competing native species for space, water, light or soil nutrients.

Trail sides and other areas of focused recreational use (such as hang/paragliding launch and landing sites, and climbing and bouldering staging areas) provide disturbed areas that serve as germination sites for weeds. A recent study conducted on Open Space and Mountain Parks demonstrated that not only are trail sides weedy, but that the number of weed species is higher on older trails (Potito 2000). Open Space and Mountain Parks managers are concerned that trails coupled with trail users, dogs and horses may act as conduits and vectors, delivering weed seeds into otherwise weed-free areas.

Species displacement caused by visitor use can also alter the composition of animal communities. A common trend is the exchange of habitat specialists for habitat generalists. In a study partially on OSMP lands, researchers found that robins were most abundant near trails; and magpies and house finches were only found along trails (Miller et al. 1998). These three species are habitat generalists--capable of living in a variety of natural and human dominated habitats. On the other hand, three grassland specialists, (birds that require grassland habitat) were far more abundant away from trails. A similar pattern was repeated in the forest where five forest specialists were found to be much more abundant away from trails (Miller et al. 1998). Breeding bird studies show that ground-nesting songbirds have virtually disappeared from heavy use areas such as Chautauqua meadow.

Roosting bats, such as the Western (Townsend's) big-eared bat are extremely sensitive to human presence, and have been known to abandon roost sites following limited disturbance (Graham 1966). Human disturbances to cliff nesting raptors can lead to missed feedings of young, predation on eggs or chicks, overheating, chilling or drying of eggs or young (Porter et al. 1973, Postovit and Postovit 1987 and see Richardson and Miller 1997 for a review of human disturbance on raptors).

Studies on the effects of recreational use on OSMP lands have demonstrated that recreational use can displace predators from an area. In one study mammalian predators were found to avoid trails (Miller and Hobbs 2000). Researchers have shown that some effects of trails extend outward from the trail (or visitor moving off trail) creating a zone of influence of as much as 250 feet. (Miller et al. 1998).

**Justification for the rating: Fair**

Given the abundance and distribution of undesignated trails, the effect of trails on altering the composition of ecological systems is quite widespread on Open Space and Mountain Parks. The cumulative impacts may be severe, especially locally where trails are concentrated and heavily used. Until a clearer picture emerges, the precautionary principle suggests that OSMP manage conservatively, providing undisturbed habitat for potentially sensitive species, communities and ecological systems.

**Key Attribute: Landscape Context****Rating: Fair**

Fire, wind and drought are the ecological process most important in structuring the forested ecosystems of the Open Space and Mountain Parks system. Fire suppression relates to providing a visitor experience relatively safe from wildfire. However even in the absence of trail users and other visitors, vigorous control of forest fires would continue. In general, visitor use has little impact upon disturbance regimes or controlling processes. Visitor use of the Open Space and Mountain Parks system has limited direct effect upon climate patterns responsible for high wind events or drought.

Some animals prefer to inhabit the central portions of large, relatively continuous blocks of habitat. These so-called interior species may be sensitive to the conditions found at the edges of habitat blocks or require extensive areas for foraging or other of purposes. Some examples of these interior species are large mammalian predators like lynx, but other smaller-bodied species may also have these sorts of habitat requirements. For example, grasshopper sparrows are considered a grassland-interior species and ovenbirds (a ground nesting warbler) a forest-interior species. There is little information about the effects of trails on interior species. The largest habitat blocks on Open Space and Mountain Parks lands that are not divided by trails are between 700 and 1400 acres.

Isolation increases with increasing distance between a patch and its next nearest neighbor. Isolation may control bird populations, such as some woodpecker species. In some woodpeckers, the ability of young birds to disperse and establish new territories is reduced when patches are isolated from each other. It is unlikely that hiking trails or other visitor use facilities present obstacles to the dispersal of vertebrate species such as woodpeckers. High levels of use associated with these trails may create barriers. Some research indicates that trails can fragment habitat for smaller animals (Collinge and Formann 1998).

**Justification for the rating: Fair**

There are relatively few large blocks of habitat unbroken by trails or roads on OSMP. The cumulative effect of trails on the landscape context of ecological systems may be widespread and severe. Until a clearer picture emerges, the precautionary principle suggests that OSMP manage conservatively, protecting the remaining blocks of undisturbed habitat.

**Future Trends: Natural Systems**

Direct effects of visitation such as trampling and increased predation will increase with increasing levels of use. It is likely that increasing numbers of people will create more undesignated trails in areas that currently serve as refuges for interior species and habitat specialists. These trails may disrupt environmental conditions, creating opportunities for parasites, predators and competing species, reducing the extent of effective habitat.

Decreasing revenues suggest that any inventory and monitoring projects proposed be inexpensive. This could restrict the range of information that can practically be gathered and increase reliance upon students and volunteers. The Department needs efficient and effective tools to communicate to an ever growing audience the critical role OSMP lands play as habitat for rare species and in the conservation of plant communities and representative pieces of even larger scale ecological systems.

**Summary: Natural Systems**

Natural systems and visitation are not wholly compatible. Although species, communities and ecological systems can respond to natural disturbances and fluctuations, they did not evolve with recreational pressures. Natural systems can withstand some level of direct trampling and predation but frequent and repeated impacts by visitors or dogs can overwhelm natural rates of reproduction and regrowth. Portions of OSMP lands offer a refuge for certain species that best succeed with low levels of human disturbance. Unrestricted access by people and dogs could reduce the extent and function of these areas as refuges by affecting patterns of predation and reproduction. Ecologists know too little to describe the vulnerabilities of all species, or define appropriate visitor use levels to conserve communities. In the absence of specific direction about how best to conserve natural systems, a conservative approach is needed. This approach should offer protection for large habitat blocks, representative areas of all ecological systems (common and rare), and the habitats of rare plants and animals. This approach should be coupled with a policy of actively promoting research to answer questions about vulnerability of species and systems to recreational use.

## Agricultural Operations

For some visitors, agricultural operations provide the vistas, scenery and experiences that contribute to their satisfaction with the OSMP program. Agriculture uses include small grain production (mostly barley) and cow-calf operations (hay, pasture, range). Agriculture is a historic land use in the Boulder Valley and is identified specifically in the City Charter as a purpose of OSMP. OSMP and the Boulder County Parks Open Space Department own the majority of the agricultural land in the Boulder Valley. In the increasingly developed landscape the opportunity to see a farm or ranch in operations has become an “open space dependent” activity. The enjoyment of agricultural landscapes builds support for the conservation and protection of these areas as open space.

However, agricultural operations are not merely amenities for visitors. They are businesses. The 16,000 acres of Open Space and Mountain Parks leased to local farmers and ranchers are managed under the provisions of leases with the City of Boulder. Agricultural operations generate revenues in the form of lease payments. Lease revenues average approximately \$150,000 annually.

Where visitor use and agricultural operations co-occur there is the potential for conflict. The Open Space and Mountain Parks Department has found that coexistence of agriculture and passive recreation is possible. However, it is important to recognize the ways in which the visitor experience and agricultural land uses affect each other. This analysis provides consideration of the effects of passive recreation upon the sustainability of agricultural operations.

The effects of agricultural operations upon visitors are discussed on pages 13 and 17.

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### Key Attributes for Agricultural Operations

- **Productivity**
  - **Efficiency**
- 

## **Key Attribute: Productivity Conflicts**

**Rating: Good**

Agricultural productivity is “the bottom line” for farmers and ranchers. Visitors to OSMP affect agricultural productivity in two ways. Some visitors walk or ride through crops and hayfields during the growing season reducing the farmer’s yield. Some dogs harass livestock even when accompanied by guardians.

Visitors affect agricultural productivity when they use hayfields, pastures and grain fields in a manner that damages or destroys the crop. The most common complaint heard from agricultural lessees is that equestrians will use vulnerable fields during the growing season to exercise their horses, developing trails that destroy a portion of the crop. Visitors leave internal gates open allowing livestock to wander into pastures or hayfields, reducing or destroying the yield of the affected pasture.

The potential risk for dogs harassing livestock is higher where the dogs are off leash. Livestock are especially vulnerable when cows have calves in the spring.

Trail construction has direct impacts on the operation and sustainability of agricultural operations. Some trail designs include a trail separated from the surrounding landscape by a fence. This serves to isolate a portion of the range or pasture from agricultural use. This always reduces the available forage and may require modifications to the lease or payments. More significantly is the impact on the ecological condition of the isolated area. These areas, removed from the lessee’s responsibility receive little attention. Removing grazing from an area with historic grazing pressure can (and has) resulted in the explosive growth of weed species which can spread into adjacent lease areas. This compromises the ecological and agricultural integrity of the surrounding landscape.

An informal survey conducted in 2003 of the four lessees who manage OSMP with significant visitor use showed they have had minimal direct financial losses over relatively long periods (15 to 25+ years). Losses included two calves and several chickens killed by dogs as well as several calves injured by dogs. Although losses have been relatively low, lessees uniformly identified dogs chasing cattle as their chief concern.

**Justification for the rating: Good**

Impacts to productivity have not had a significant adverse effect on the economics of agricultural operations. It will be important to develop “early detection” tools and anticipate changes in the state of this key attribute as visitation increases and becomes even more comprised of people unfamiliar with agricultural practices. The situation could be improved by responding to localized dog/livestock conflicts.

**Key Attribute: Efficiency Conflicts**

**Rating: Good**

**Explanation of Rating**

Approximately one quarter (30 miles) of the OSMP trail system crosses lands with active agricultural management. These trails traverse many fields and pastures requiring visitors to open and shut gates as they move from one field to another. When gates are left open, livestock can move freely off of Open Space and Mountain Parks lands, onto private property and roadway creating hazards for themselves and the public. Users sometimes cut perimeter fences to reach or gain more ready access to preferred destinations. This behavior has the additional consequence of requiring the lessee to locate and repair the damage to the fence.

Responding to dogs harassing livestock, gates left open, livestock in the road or in neighbor’s yards, and fences intentionally cut by visitors takes a farmer away from the central business of agricultural production. To some degree this extra effort is expected and accepted by lessees willing to run their operations in the Boulder area. These sorts of conflict are likely to increase with increasing levels of use and may eventually reach a threshold at which point it will be difficult to find farmers or ranchers interested in leasing Open Space and Mountain Parks lands.

The survey of lessees revealed that most spent between 10 and 40 hours a year responding to problems they considered caused by visitors. The lessees mentioned dogs chasing livestock and gates being left open as the biggest problems.

**Justification for the rating: Good**

Visitors use may create extra work for ranchers and farmers. Because agricultural operations have traditionally dealt with many uncertainties, lessees tend to accommodate occasional inconveniences. While less than ideal, the status of this key attribute is acceptable. This attribute could be improved by localized and seasonal dog management efforts and improving signage or design to ensure proper gate closure.

**Future Trends: Agricultural Operations**

The trends leading to an increase in use levels have consequences for the agricultural operations. Absent preventative measures, increased visitation will probably result in more wear and tear on trails and other facilities. For some facilities, standards for construction or replacement intervals may need be adjusted to address increased use levels. Trail and facility maintenance will probably require more loss of livestock to dogs, and more time spent dealing with visitor related problems. Over time it is likely that a greater percentage of visitors will be unfamiliar with agricultural practices, increasing the likelihood that they will inadvertently create problems for lessees.

**Summary: Agricultural Operations**

Visitor activities are generally compatible with agricultural operations on OSMP lands. OSMP and lessees have made changes in management practices to reduce the likelihood for conflict in several areas. Despite a variety

of management techniques to improve the situation, dog harassment of livestock continues to be a problem at Boulder Valley Ranch (BVR). Management focused at BVR would resolve much of the current conflict.

Annual lease reviews could include annual monitoring of the effects of visitor use to provide early warning of conflicts so they can be addressed before they become significant issues.

## Cultural Resources

Uninhabited cabins, hidden foundations, abandoned quarries, coal mines, old farmhouses and barns dot the OSMP landscape suggesting different customs and different times. These features contribute to the visitor experience by providing a starting point for the imagination about the people who once lived and made a living here. In some places the story is clarified by interpretive signs that provide detail about the nature and extent of human activity.

In addition to their interest for visitors, cultural sites and artifacts are important from cultural, religious and scientific perspectives. Although not included as a purpose of Open Space in the charter, the OSBT adopted cultural resource protection as part of the Long Range Management Policies in 1995 (City of Boulder 1995). All OSMP projects with the potential to affect cultural resources are required to check existing inventories for potential impacts or provide a site specific survey by a qualified archaeologist describing the cultural resources in the area.

The integrity of cultural resources is related to the degree to which the form, substance and quantity of a resource can be used to explain behaviors and ideas. Cultural resources have integrity when they retain material attributes associated with their social values. Integrity includes the following attributes:

- Abundance, sufficient quantities of material need to be available to draw conclusions or contribute to a large scale understanding about a culture
- Condition Includes: the material aspect of a resource , the ways in which materials were put together and the relationship between different parts of a resource and the aesthetic qualities that resulted
- Context, the exact geographic location of a resource and the nature of its setting

For the purposes of this analysis context and abundance are combined. The most significant impact for both of these key attributes is the removal of artifacts.

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### Key Attributes for Cultural Resources

- **Abundance of Material & Context**
  - **Condition**
- 

### **Key Attribute: Abundance of Material and Context**

**Rating: Good**

One of the values of cultural resources to the community is the information they can impart about past cultures. A certain amount of cultural material is required to paint a picture of the customs, land use practices and way of life of historic or prehistoric people.

Enough local historical information and cultural material have been recovered or described to recommend the establishment of historic districts on Open Space and Mountain Parks lands. Similarly archaeologists and historians have recommended historic contexts and themes for Open Space and Mountain Parks lands based largely on locally recovered or recorded cultural resources. Historic contexts and themes are delineated by time periods and geographic areas. They serve as frameworks for understanding important historical events, trends or cultural patterns. These themes and contexts also provide a useful setting within which individual resources can be evaluated.

The known prehistoric material from Open Space and Mountain Parks, taken by itself, does not provide enough information to draw many conclusions about the local prehistoric inhabitants or cultures of the Boulder Valley. However, Open Space and Mountain Parks cultural materials have contributed to an understanding of some regional prehistoric contexts.

It is reasonable to assume that visitors collect some portion of the cultural materials they encounter while using Boulder's Open Space and Mountain Parks. Artifacts such as projectile points (arrowheads), or small bottles are especially attractive and small enough to be placed in a pocket or pack. Some places, especially where artifacts were more abundant or concentrated, may have attracted illegal collection. It is not uncommon to hear about the collections of cultural resources in the possession of private individuals, especially families of early settlers in the Boulder Valley.

Over the past century of use on former Mountain Parks, the incremental impact of focused and casual collecting could be quite high. On lands purchased as Open Space the story is probably different. Because this program did not start until the late 1960's, the majority of collecting had probably occurred before the City's purchase.

OSMP has no formal agreement with a museum or university to curate small, theft prone artifacts. When such items are brought to the attention of OSMP staff, it is common practice for the items to be collected, tagged with the date, location and collector and stored in a secure location.

An analysis of cultural resources conducted for the Visitor Master Plan (City of Boulder 2002) identified 162 sites that lie within 100 feet of trails, trailheads or other focal points of recreational activity on OSMP lands. A review of cultural history reports identified 340 cultural sites in proximity to trails, trailheads and other focal points of visitor activity. The majority of sites and artifacts are Euroamerican not prehistoric. Many of the sites have been significantly disturbed or are roads, trails and ditches in good condition, and not particularly susceptible to impacts from visitors.

**Justification for the rating: See next key attribute.**

**Key Attribute: Condition**

**Rating: Good**

The City of Boulder Open Space and Mountain Parks department has contracted with professional archaeologists to conduct cultural resource surveys over 75 percent of the land system (> 30,000 acres). Most of these surveys have identified cultural resources that have been evaluated according to the standards of the Colorado Historical Society's Office of Archaeology and Historic Preservation. One part of that evaluation is determining the *condition* of a site. Only a quarter of the sites on record with the OAHP are in good or excellent condition.

Most of the degradation or destruction of sites is unassociated with visitor use. Deliberate destruction or disturbance (vandalism) of cultural sites is uncommon on Open Space and Mountain Parks lands. Structures (e.g. cabins, barns and outbuildings) are vulnerable to vandalism because they are so obvious. These structures provide a canvas for graffiti "artists" and hiding places for people to engage in illegal activities (underage drinking, drug use, etc.). Structures in sight of a trail or other high use areas are also more likely to be vandalized. Twenty-six standing or partially standing structures on Open Space and Mountain Parks were identified as vulnerable to impacts from visitor use. The attribute information provided from site forms and compiled by the OAHP notes vandalism as a factor affecting 12 of the 146 sites. The bulk of the vandalized sites are buildings.

**Justification for the rating:**

**Abundance of Material & Context: Good**

**Condition: Good**

Over the past century, there has almost certainly been a significant reduction in the number of cultural resources on OSMP lands. Visitors are more likely to encounter large historic buildings, rather than pocketable prehistoric artifacts. Recent analysis of cultural resource data indicates the potential for further loss or degradation of cultural resources. However, until the risks are better defined, the precautionary principle suggests that OSMP manage conservatively. These attributes could be improved by increasing the protection of structures, periodic monitoring of sites or artifacts "at risk" by volunteer archaeologists, and grant-funded interpretive, protection and monitoring in collaboration with local and state officials

### **Future Trends: Cultural Resources**

Cultural resources could be affected by increasing use levels and reduced management capacity. With more people using the trails, there is a greater likelihood of illegal collection or vandalism. OSMP will continue to conduct cultural resource surveys as necessary in association trail construction and management projects.

### **Summary: Cultural Resources**

Little is known about the compatibility of visitor activities and cultural resources. Recent analysis has reviewed monitoring and management issues that could reduce the potential impact of visitor use on potentially vulnerable sites and artifacts. OSMP currently lacks on-staff expertise, or funding capacity to develop or undertake a monitoring or protection program. In the short term, the most vulnerable sites should be identified for protection and monitoring.

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