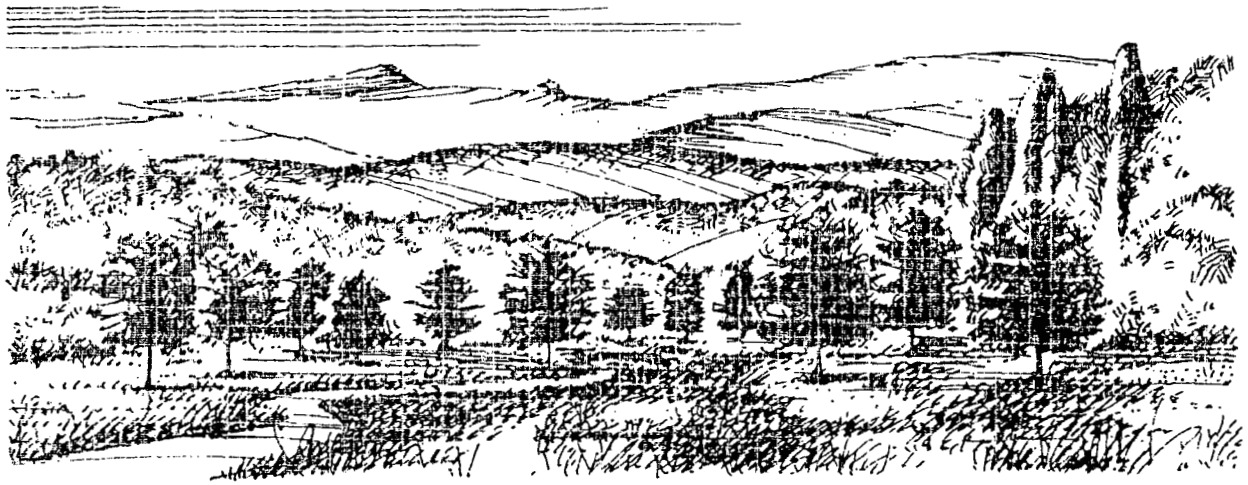
ERO Resources

Environmental Analysis of Proposed Developments to the South Mesa Trailhead and Adjoining Open Space Lands



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City of Boulder
Real Estate / Open Space Department

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March 1992

ENVIRONMENTAL ANALYSIS OF PROPOSED DEVELOPMENTS TO THE SOUTH MESA TRAILHEAD AND ADJOINING OPEN SPACE LANDS

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ANALYSIS OF PROPOSED DEVELOPMENTS TO THE SOUTH MESA TRAILHEAD AND ADJOINING OPEN SPACE LANDS

INTRODUCTION

The City of Boulder Open Space Department (OSD) has requested an environmental analysis of proposed improvements to the Mesa Trail south trailhead and adjoining open space lands. The OSD needs the following information relative to the natural resources of the area:

- Effects of current recreation use on the environmental resources of the area;
- Identification of natural resources in the area that are potentially sensitive to visitor use;
- Determination of the likely effects of increased visitor use on these resources;
- Recommendations on monitoring impacts;
- Recommendations for mitigating current or potential future impacts.

OBJECTIVES

This analysis is based on the goal of maintaining the environmental integrity of the site by maintaining, restoring, and improving the site's natural resources and mitigating adverse impacts to those resources due to existing as well as future facility siting, past and future visitor use or other past disturbances. We recognize that the purposes and goals of the OSD are many and varied, and that competing goals and uses can conflict. This report should is not an attempt to balance competing or conflicting goals and uses but focuses upon the conservation and management of natural areas on open space lands. This report addresses:

- sensitive plant communities and/or wildlife habitat;
- flora and/or fauna of special concern;
- water resources;
- general aesthetics.

The overall goal of this analysis is to provide the OSD with natural resource information and recommendations that will assist them in responding to their short-term needs and long-term management plans. To meet this overall goal we identified the following objectives:

- Create a baseline map of the site that shows: 1) vegetation/habitat types; 2) soil erosion hazard areas; and 3) existing facilities.
- Collect and present information that builds on existing OSD programs and capabilities.
- Identify areas that are sensitive to visitor use.
- Identify adverse impacts to the site by historical and current use.
- Determine potential adverse impacts to natural resources from projected improvements and use.
- Develop recommendations for management, monitoring and mitigation measures.
- Develop a process for future analysis, monitoring, and management.

The most immediate need is to evaluate the proposed conceptual facilities improvements plan (South Mesa Trail Open Space Mapping and Site Improvements, J.J. Zarka, 1991) and to provide alternative recommendations (if needed) from a perspective of maintaining the integrity of the environmental resources of the trailhead and surrounding open space area.

SITE DESCRIPTION

The study area includes the south trailhead of the Mesa Trail and an approximate 370 acre area north of the trailhead designated as City of Boulder Open Space (Figure 1). The study area lies approximately 0.5 miles northeast of Eldorado Springs and approximately 1.5 miles south of the City of Boulder, and is bordered by South Boulder

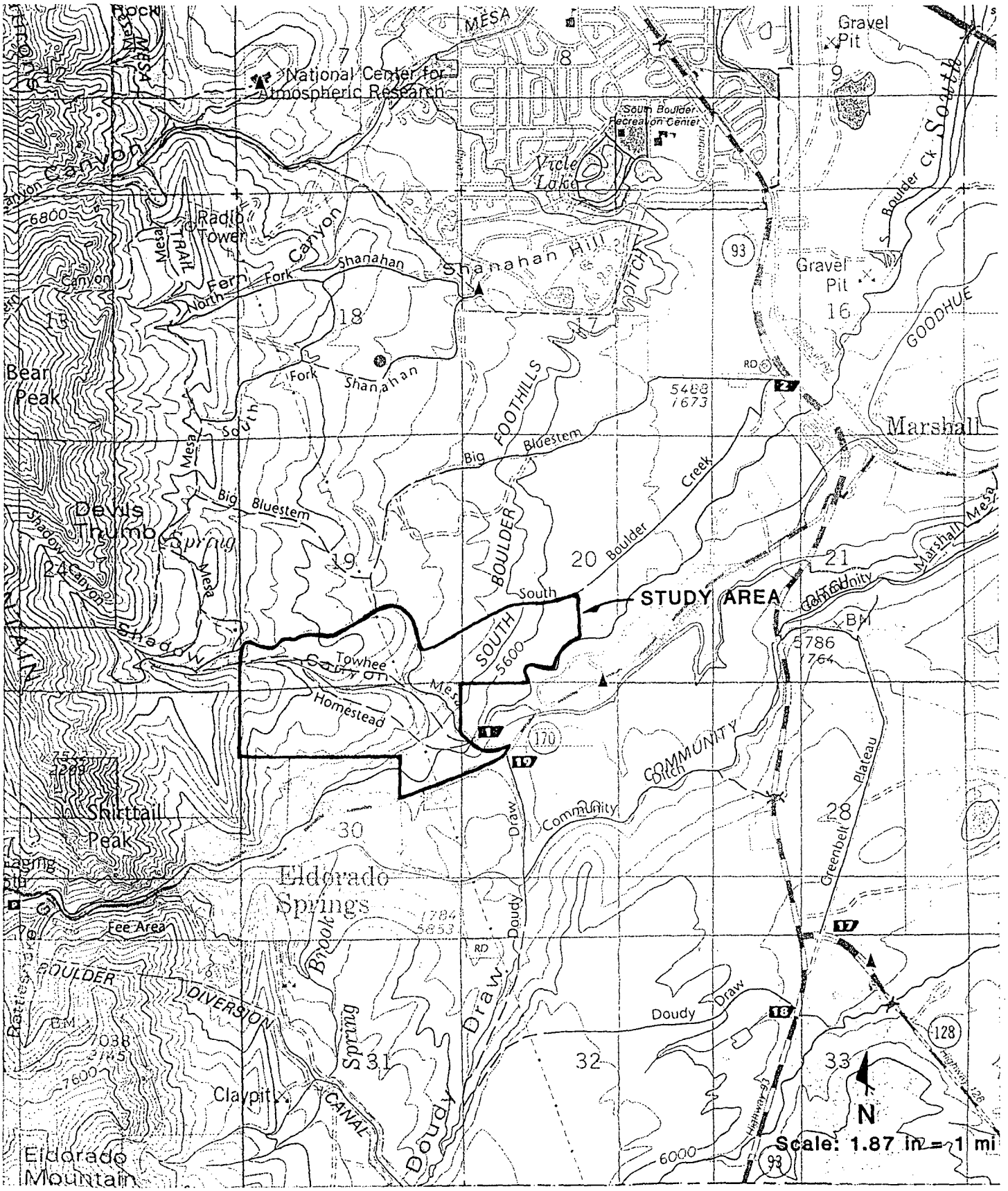

FIGURE 1 South Mesa Study Area

Creek and Colorado Highway 170 on the south. The regional significance of Eldorado Canyon as well as scenic driving on Colorado 170 intensify the value of the scenic resource at the trailhead.

The study area is dominated by four major landscape features:

1. South Boulder Creek floodplain and its riparian forest that forms the south and southeast border of the study area.

2. The broad and rolling mixed grass prairie that dominates the northern portions of the study area.

3. Ponderosa pine savannas that occur on two mesas in the center of the study area.

4. Towhee Draw that divides the two mesas forming a long shrub-lined riparian corridor that is flanked by dry shrub slopes and forms the mouth of Shadow Canyon that lies to the northwest.

The South Mesa trailhead receives substantial use; it is a critical link and access point for the southwestern open space properties, and allows access to the western open space properties via the Mesa Trail. The trailhead area has the following facilities:

- Parking lot, which presently accommodates approximately 70 cars (72 legally parked cars were counted on February 1, 1992)
- Restrooms
- Four picnic tables
- Six trails
- A variety of historic features (Doudy-Debacker-Dunn House, extensive rock walls, old apple orchard, and old irrigation facilities)

According to Boulder Open Space ownership and land use records, the easternmost part of the study area (Section 20) is fenced and currently utilized for livestock grazing. This is the only portion of the study area that is currently grazed.

PROPOSED DEVELOPMENTS

The following developments have been conceptually proposed for the South Mesa trailhead area (South Mesa Trail Open Space Mapping and Site Improvements, J.J. Zarka, July 1991):

- Reconfiguration of the existing parking lot to accommodate 11 additional cars.
- Wheelchair access trail, approximately 350 feet in length, that would run along an existing maintenance road west of the parking lot.
- Three picnic table locations along the proposed wheelchair access trail.
- An at-grade observation and resting area at the terminus of the wheelchair access trail that would allow access to South Boulder Creek.
- An overlook/deck located across South Boulder Creek from the terminus of the proposed wheelchair access trail.
- Extension of the Homestead Trail to the proposed overlook.
- Nine scattered shelter areas.

These proposed developments can affect natural resources directly (e.g., displacement of a natural resource) or indirectly (e.g., increased visitation and use that results in vegetation trampling or wildlife disturbance). Virtually all of the natural resource impacts observed in the study area are directly or indirectly the result of recreation use. Increased or decreased impacts will most likely be influenced by changes in recreation use (e.g., facilities, activities, levels of use and locations of use).

METHODS

Information on existing vegetation and wildlife and the effects of recreation use on the site's natural resources were generated primarily from site visits in January 1992 and the professional experience and expertise of the principal investigators. Information on soil

erosion hazards and species of special concern were primarily based on existing references and previous studies.

Vegetation

Vegetation types were mapped on 1" = 400' blueline copies of PSCO's 1984 aerial photography. Vegetation types were based upon the habitat type classification (map unit names and abbreviations) used in the recently developed Boulder Wildlife Habitat Database (City of Boulder, draft document, September 1990). These vegetation types were used in this study with limited modification to provide continuity with an ongoing Boulder program.

Information on plant species of special concern was based on descriptive and map data provided by the Colorado Natural Areas Program (CNAP). Additionally, personal communications with Janet Coles (CNAP) and Mark Gershman (OSD) were used to identify the potential for occurrences of plant species of special concern in the study area.

Wildlife

The evaluation of wildlife habitats was based on two site visits that were conducted in January 1992. Wildlife species that are of likely occurrence throughout the year were inferred from existing literature as well as the principal investigator's records of wildlife distributions in the major habitats within Boulder County.

Soils

The soils evaluation was performed using existing information supplied primarily from the Soil Conservation Service (SCS). This includes the Boulder County soil survey and

soil interpretation records for each soil type occurring in the study area. A brief field visit was conducted on January 25, 1992 to observe site characteristics.

Recreation and Visual Resources

The existing and potential recreation environments (physical improvements, user characteristics) were addressed relative to environmental impacts, most typically vegetation, wildlife, soils and visual impacts. The assessment was accomplished by preparing an inventory and map of the existing study area and trailhead area (area of highest use). Based on field work and photography, resource impacts resulting from recreation use were identified. The proposed improvements for the site were also considered in determining potential impacts.

In evaluating the South Mesa open space study area, as well as any open space for environmental impacts, primary recreation-related impacts are assessed. The following primary recreation-related impacts were used as a checklist to survey environmental impacts:

- noise (trailheads or access points)
- noise ("backcountry")
- dust
- visual intrusion or congruity
- trash
- storm drainage (dirty water) off unvegetated surfaces
- vegetative disturbance (wood gathering) near picnic and campsites where fires are permitted
- vegetative trampling, denuding and soil erosion in any pedestrian high traffic areas within or adjacent to recreation use areas, especially if no paving, groundcover or edge control is provided
- vegetative trampling resulting from informal vehicle parking
- vegetative trampling and bank erosion along creeks and ditches where access and the water amenity attract concentrated and/or continual use
- success or problems associated with introduced plant materials (native or non-native)

- routine or anticipated "wear and tear" on designated trails
- pedestrian and equestrian trail-drainage crossings
- increased use on designated trails
- increased use on social or informal trails
- establishment of new social or informal trails
- user adherence to temporary or permanent trail closures or areas closed for revegetation
- existing or potential human intrusion into areas of sensitive plant or wildlife species
- adequacy of signs to protect environmental resources

MAPPING

Two project base maps were prepared for the South Mesa Open Space study area. The base map for the overall study area is a 1 inch = 400 feet photographic enlargement of a standard U.S.G.S. 7.5 minute quad. Study area features and resources were mapped as overlays to this 400 scale map. Base features, including existing recreation facilities, have been mapped on one overlay. This will facilitate AutoCAD/LandCadd data entry if desired at a future date. Vegetation types and soil erosion hazards have been mapped on separate overlays. An enlargement of the trailhead area was also prepared at approximately 1 inch = 40 feet. Facilities and resources were field-mapped as overlays to this 1:480 scale map.

EXISTING NATURAL RESOURCES

The overall quality of the natural resources within the study area is high compared to other undeveloped lands in the near Boulder vicinity. Wildlife habitats are diverse, the majority of the vegetation is dominated by native species and highly disturbed weedy areas are limited. The foothills environment, juxtaposed with South Boulder Creek, provides appealing visual diversity.

Vegetation

The vegetation within the study area is diverse. Nineteen different vegetation types were mapped (Appendix A and Vegetation Map under separate cover) within the study area. The trailhead area is situated in and adjacent to the riparian forest of South Boulder Creek. The majority of the study area is mapped as either Mixed Grass Prairie or Ponderosa Pine Savanna.

The majority of the study area supports vegetation types that are dominated by native species and appear to be healthy vigorous systems (i.e., lack substantial weedy cover and have desirable native species that are reproducing and colonizing historically disturbed sites). Weedy areas are encountered particularly around the Doudy house, areas west of the parking lot and along the Highway 170 corridor. However, even these weedy areas are being colonized by desirable native grass species (western wheatgrass, blue grama, and big bluestem). Riparian areas are healthy and, while some areas have been trampled by social trails, reproduction and recruitment of woody riparian species (particularly cottonwood) is good. The study area, with proper management, could develop in the future into an even better example of native foothills plant communities.

Wildlife

The overall wildlife value of the study area is high compared to other undeveloped lands in the near vicinity of Boulder. This site would be given a rating of 8 or 9 for overall habitat quality according to the criteria used in the recently developed Boulder Wildlife Habitat Database (City of Boulder, draft document dated September, 1990). The wildlife habitat evaluations performed for this data base showing the overall habitat quality ratings for 125 sites in the Boulder area are summarized in Figure 2 . Only 12 percent of these sites have ratings above 8.

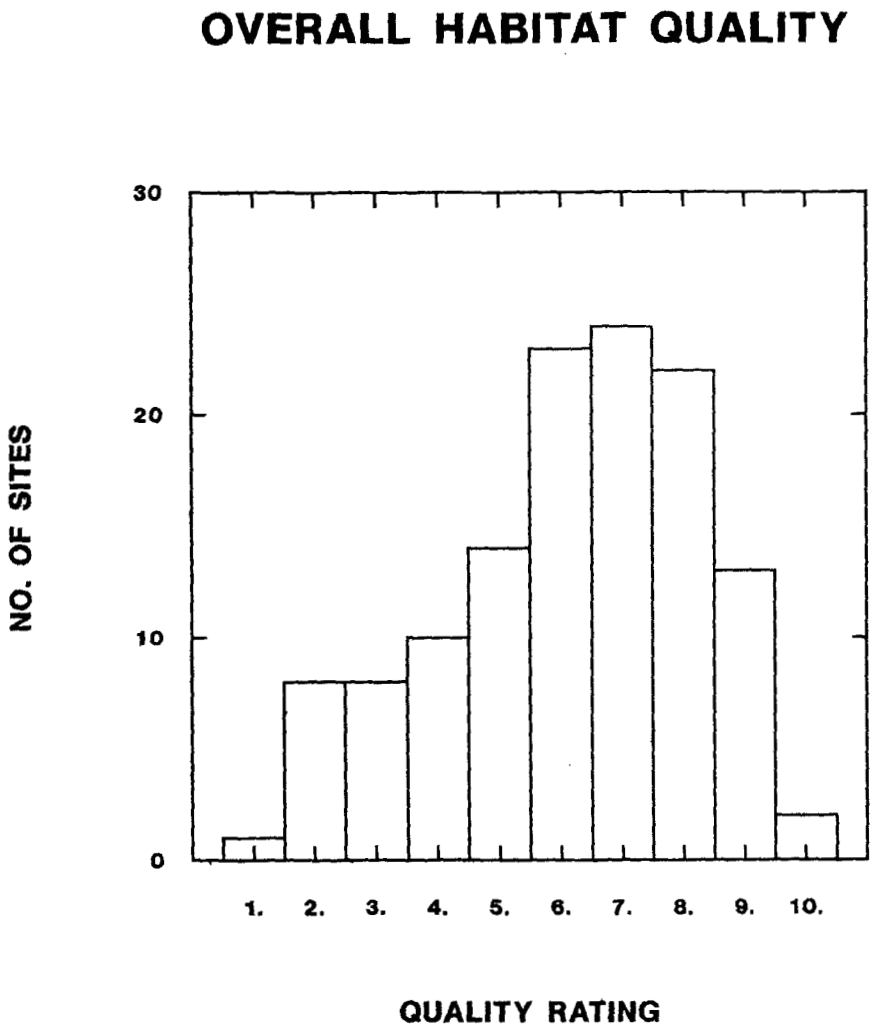

Figure 2. Distribution of overall habitat quality ratings for 125 sites in the Boulder area. 1 = low, 10 = high. (Boulder Wildlife Habitat Database, 1990).

The reason for the high wildlife value of the study area is due primarily to two important habitat conditions:

1. The study area is located at the intersection of two important large scale wildlife movement corridors, and

2. The study area occurs in the mountain-plains transitional zone.

The study area occurs along the extensive north-south movement corridor defined by the abrupt topography of the foothills and hogbacks of the Front Range. Many migrating birds travel this north-south corridor and use the protected valleys for food and shelter. This corridor is intersected by the cottonwood riparian forest along South Boulder Creek that forms an east-west movement corridor. The intersection of these two wildlife movement corridors occurs within the mountains-plains transitional zone that has considerable heterogeneity of major plant communities and an intermingling of the distributions of many wildlife populations. These varied landscapes create a juxtaposition of ponderosa pine savanna, mountain and plains shrublands, foothills grassland, plains mixed grass prairie and cottonwood riparian forests resulting in a diversity of habitat conditions that concentrates a variety of wildlife in the South Mesa open space area.

Wildlife Likely to be Encountered near the South Mesa Trail Site. Lists of wildlife species likely to be encountered in the South Mesa area are presented in Appendix B. The lists were compiled from the principal investigator's personal database of wildlife for Boulder County. The species of birds listed are those that were classified as common or abundant within habitat types that are present in the South Mesa open space area. The lists for mammals, and for amphibians and reptiles, pertain to species that have been identified but are not necessarily common in habitats in the South Mesa area. These lists might be considered for inclusion in a pamphlet for visitors to the South Mesa Trail area.

Table B-4 (Appendix B) provides a listing of species of potential occurrence in the study area that are considered as species of special status and concern.

Most of the remaining habitats at the South Mesa Trail site are somewhat less vulnerable to physical or human use disturbances; however, all support desirable wildlife populations and together create a visually pleasing landscape. The surrounding grasslands and ponderosa pine savanna are of course extensive habitats in the region. These types largely characterize the Mesa Trail and together provide abundant habitat for many wildlife species including feeding habitat for black bear and hunting habitat for mountain lion and raptors. Nearby cliffs provide potential nesting habitat for cliff nesting raptors.

Soils

The study area is composed of five soil map units (Soils and Erosion Hazard Map under separate cover). Three of the map units are soil consociations, while the other two map units are miscellaneous land types. These soil map units are delineated on the Soils and Erosion Hazard Map (separate cover) for the study area. The SCS soil map was adjusted after the field visit to more accurately tie the soil map units to landforms. The majority of the existing trail system transects the Terrace Escarpment (Te) and Nederland soil (NdD) map units.

Baller soils (BaF) are shallow, stony soils under ponderosa pine on steep slopes in the western-most portion of the study area. They have rapid runoff, low available water capacity, and a high risk of erosion. Nederland soils (NdD) are deep, cobbly soils that occur on mesa tops and alluvial fans. They have slow to medium runoff, moderate available water capacity, and slight risk of erosion. Niwot soils (Nh) are deep, sandy, and somewhat stony soils that occur on low terraces and floodplains along South Boulder Creek. They have slow runoff, low to moderate available water capacity, and slight risk

of erosion. Some of the areas where Niwot soils occur are subject to flooding or prolonged periods of wetness due to their proximity to the creek. As a result, this soil series has been identified by the SCS as a hydric soil. Soils in the Colluvial Land map unit (Cu) are variable in depth and texture. This unit occurs on sloping land below mesas and hogbacks. The map unit was rated as having rapid runoff and high erosion hazard. The Terrace Escarpment (Te) map unit occurs along and below mesa edges and is composed mainly of shallow, stony soils. These soils have rapid runoff, low available water capacity, and severe erosion hazard.

Recreation and Visual Resources

South Mesa Trailhead is very visible from Eldorado Springs Drive (Colorado 170), especially to westbound traffic. In contrast to the drier upland montane landscape to the north of the trailhead, the riparian vegetation associated with South Boulder Creek and Davidson Ditch provides an area of scenic attraction. In part, this visual quality is responsible for the recreation use that concentrates around the trailhead area.

The Mesa Trail, linking Boulder with the South Mesa Trailhead, is a regionally significant and very popular Boulder trail. A considerable amount of trail use within the South Mesa Study Area, especially in the spring and fall months, originates in Boulder. It is recognized that South Mesa impacts due to recreational use result from visitors accessing the area from both the South Mesa Trailhead, as well as the Mesa Trail from Boulder.

Sensitive Site Features

Sensitive vegetation types. The riparian forest and riparian shrublands are potentially the most prone vegetation types to visitor use impacts. Prolonged trampling of woody seedlings and sampling can significantly affect the long term viability of riparian systems. Trampling can also lead to reduced herbaceous cover that can cause streambank erosion

leading to the rapid decline of riparian systems. The mesic tall grassland that occurs west of the wetland area is also sensitive to prolonged trampling. Sensitive vegetation types within the South Mesa study area include:

- **Riparian forest** - trails and facilities should be located outside the riparian forest whenever possible. Some trampling from informal trails occurs along South Boulder Creek, particularly in the vicinity of the parking lot.

- **Riparian shrubland** - the shrub thickets that border South Boulder Creek and Towhee Draw should be avoided for trail and facilities placement.

- **Sedge-rush meadows** - the sedge and rush meadow located west of the parking lot should be avoided for activities that would concentrate visitor traffic in this area.

- **Small shrubland stands** - several small and somewhat isolated stands of shrubs occur northwest of the parking area along the Mesa, Towhee, and Homestead Trails. When possible trails should avoid fragmenting these stands.

Plant species of special concern. A population of bird's-foot violets (*Viola pedatifida*) occurs within the study area. The violet is considered a species of special concern by CNAP and is included on State List 3, which includes plant species that appear to be rare but for which conclusive information is lacking.

Favorable habitat may also exist on or near the site for another species of special concern, carrion-flower (*Smilax lasioneuron*). The carrion-flower is included on State List 2, which includes plant species that are rare in Colorado but relatively common elsewhere within their range. This species is found in alluvial thickets, meadows, and low woods as well as moist deciduous to coniferous-deciduous woods and thickets. One population is known to occur in nearby Shadow Canyon. Two other populations near the site are found at the mouth of Boulder Canyon and at the beginning of Gregory Canyon Trail. Neither of these species were observed during the January 1992 field visits.

Sensitive wildlife habitat features. Sensitive wildlife habitat features of the South Mesa study area include:

- **Riparian forest** - all the large cottonwood trees, including the large dead trees, should be preserved if at all possible;
- **Riparian shrub** - the thickets that closely border South Boulder Creek, Davidson ditch and Towhee Draw should not be fragmented by trails.
- **South Boulder Creek** - its shoreline and the integrity of the bottom substrate should not be degraded.

One micro-habitat with historic as well as wildlife value is the array of stone fences near the old Doudy homesite. These stone piles provide many den sites for small mammals and reptiles. From a wildlife point of view, they warrant preservation.

Soils and erosion hazard. Presented in Table 1 are soil and land properties and interpretations germane to the intended use of the soils. The ratings are based on restrictive soil features such as wetness, slope and surface soil texture. Flooding is not considered in the ratings; however, areas subject to flooding are limited for use depending on duration, intensity, and seasonality of flood events. Onsite assessments of these features is, therefore, essential for planning.

Risk of erosion considers both the erodibility of the soil by water, and landscape features. The K factor indicates the susceptibility of unprotected soil to sheet and rill erosion by water. Estimates are based primarily on soil texture. The higher the value, the more susceptible the soil is to erosion by water. The erosion hazard for each map unit reflects the combination of surface texture, slope, and runoff. As shown on Soil and Erosion Hazard Map (under separate cover), map units BaF, Cu, and Te are particularly susceptible to erosion if disturbed. Under natural conditions, the rock and vegetative cover has provided adequate protection from heavy rainfall events and snowmelt.

Table 1. Soil properties and interpretations for recreation development.

Map Unit	Risk of Erosion		Limitations for:		Hydric Soils	
	K Factor[1]	Hazard	Trails	Picnic Areas	% of Unit	Landscape Position
BaF	.10/.05	high	severe	severe	3	swales
Cu	NR	high	moderate	moderate	- -	- -
NdD	.05/.05	slight	slight	moderate	- -	- -
Nh	.24/.10	slight	moderate	moderate	80	floodplains, low terraces
Te	NR	high	severe	severe	- -	- -

[1]Surface value/subsurface value; NR = not rated.

Limitations for trails and picnic areas refer to the suitability of soil factors that affect this use. A slight limitation indicates that soil properties are generally favorable. Conversely, a severe limitation means that special design, intense maintenance or costly soil reclamation, or a combination of these, is usually required. Such facilities are areas of heavy foot traffic and should require little or no cutting or filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface. Portions of the Towhee and Homestead trails were observed to be severely eroded, exposing large rocks and creating areas of water accumulation.

The map units BaF and Te were rated as severe for trail and picnic area usage because of steep slopes, large rocks, and the high risk of erosion if disturbed. Placement of trails through these map units will require erosion control protection. The map unit Cu was rated moderate because of large stones, moderate slopes, and the erosion hazard. As

above, care should be taken to minimize erosion in these areas if used for facility development. Niwot soils (Nh) were rated moderate for both uses due to seasonal flooding and wetness. In the context of natural resource conservation, however, these soils should be avoided to prevent disturbance to the riparian area. Nederland soils (NdD) are best suited for trail and picnic area development because of favorable slopes and low risk of erosion. The presence of stones and boulders will impact facility placement.

Hydric soils were highlighted in Table 1 to indicate potential wetland areas. As previously stated, these areas should be avoided for development due to both their importance as unique ecosystems and because of the limitations for development posed by wetness and flood hazard. In the South Mesa Trail area, these areas are limited to soil map unit Nh (along South Boulder Creek) and inclusions of swales and drainageways in the BaF map unit. The drainage at the mouth of Shadow Canyon (in map unit Te) should also be avoided.

IMPACTS TO NATURAL RESOURCES

Existing Impacts

The most significant natural resource impacts attributable to recreation use are the result of informal access, the meandering of curious visitors, and hiking within and along the riparian areas of Davidson Ditch (with two heavily used forks) and South Boulder Creek. This is particularly true of the areas adjacent to the ditch near the existing parking lot. The social or informal trail to the south of Davidson Ditch also provides multiple access points with riparian vegetation. In addition to the South Mesa, Towhee and Homestead Trails, three significant social (informal) trails are in use. These are located on the Existing Recreation Resources Maps (under separate cover).

More significant impacts to vegetation and/or bank stability were noted at the following locations:

- the existing picnic area;
- the area around the bridge crossing at the ditch adjacent to the existing parking lot (particularly the equestrian stream crossing on the east side of the bridge);
- the area adjacent to the headgate of Davidson Ditch at South Boulder Creek;
- the banks of South Boulder Creek in the vicinity of the bridge crossing, especially just upstream (west) of the bridge;
- the area immediately around the Doudy-Debacker-Dunn House;
- the area upstream of the Doudy-Debacker-Dunn House.

Potential Conflicts of Proposed Improvements and Natural Resources

It is important to recognize that the proposed improvements to the trailhead area shifts the focus of the South Mesa trailhead area from primarily an open space trailhead and natural area to more of a destination recreational site (picnicking, short trail use, handicap trails). The proposed improvements will increase use of the trailhead area as well as affect the type of use and visitor diversity.

The majority of resource impacts (vegetative disturbance, soil erosion and wildlife disturbance) within the South Mesa study area are the result of concentrated and dispersed recreation use. Any increase in use will likely worsen these impacts unless design changes and remedies are provided. The most significant potential impacts will be increased disturbance in the current informal use areas (social trails, informal use areas around developed facilities, access points along Davidson Ditch and South Boulder Creek) that will result from increased recreation use afforded by increased parking capacity and additional facilities.

It is interesting to note that most of the impacts to the riparian areas adjacent to and between the two forks of the diversion and South Boulder Creek seem to be out of character with what would be expected to be found at a typical trailhead facility. These impacts and site observations suggest that there is significant use of the trailhead area that is not related to preparing to embark or complete a hike of the Mesa, Homestead or Towhee Trails and other activities associated with trail touring. The trailhead appears to be a destination in itself, a site that attracts numerous visitors for recreation values apart from the trails. These destination recreational uses seem to include such things as eating food; consuming beverages (including alcoholic); exercising of dogs; jogging; wading in and splashing about in the water including building modest rock dams to further facilitate water play; light, short duration aerobic exercise (short walks around the area); sunbathing; and contemplating historic architecture (the Stone House) and engineering (the rock walls and various irrigation structures). These activities, although not necessarily inappropriate to a trailhead facility, appear to compete for limited space, resource, and maintenance attention quite successfully with the primary activity of hiking.

It seems risky to address impacts caused by these destination uses in the same way that more typical trailhead impacts are addressed. In a more urban setting, where these destination activities and impacts are more typically encountered and addressed, the mitigation methods are indeed urban (e.g., paving, irrigation, fencing, and intense management) and would probably be out of character and unappreciated by hikers at South Mesa Trailhead.

ANALYSIS OF PROPOSED ALTERNATIVES AND RECOMMENDATIONS

1. **Picnic Facilities.** It has been indicated by Open Space that the current location of the picnic ground is unacceptable. From both a resource protection and a recreation planning point of view, it is more desirable to concentrate this use area and to link it closely with the parking lot and areas of higher foot traffic. This

approach will limit the total area of foot traffic disturbance and make it easier to manage a suitable groundcover. A recommended alternative would be to redesign the parking area to be linear, not "pod-like," and the picnicking facilities should be adjacent to the parking area along its length, not more than 20 feet or so from the edge of the parking area. This design recognizes the fact that visitors who come here to picnic do not need or want to go too far from their cars and parking lot edges are already typically highly impacted areas. Control of undesirable behavior is best attenuated by park visitors who do not behave undesirably, and parking areas are a good location to obtain the interaction and supervision needed to discourage undesirable visitor behavior.

The proposed alternative to locate picnic sites between the proposed handicap trail and Davidson Ditch would likely result in the adverse cumulative effect of significant disturbance to a substantial amount of riparian vegetation.

2. **Handicap trail.** The proposed plan element of providing a creekside handicap trail along South Boulder Creek can be a relatively low environmentally damaging feature if care is exercised to minimize vegetative and soil/drainage disturbance.

3. **Parking lot expansions.** The proposed parking lot expansion could accommodate more horse trailer parking. Horses are hard on trails, especially when the trails are soft (e.g., at drainage crossings). At "use-intensive" trailheads like South Mesa, horse impacts need to be monitored. Regardless of the trailer parking capacity, equestrian use will increase over time due to increased population and visitor use. Perhaps the best way to handle equestrian parking is across the road at Dowdy Draw.

   Develop erosion/sedimentation barrier (berm or landscape timber barrier) along the north boundary of the parking lot where it borders Davidson Ditch. Presently there is nothing to prevent materials from the parking lot from being easily transported into the ditch.

4. **Equestrian crossing.** The ditch crossing at the fire gate should be redesigned so that equestrians cross the ditch using the bridge rather than the ditch itself.

   Equestrian use should be confined to designated trails only (i.e., no riding on social trails or cross-country). Although crossings or segments of trails (e.g., the ditch crossing by the fire gate at the parking lot, some steep segments of Towhee Trail) are showing degradation due to horse traffic, for the most part the damage is minimal and confined to the developed trails.

5. **Social trails.** The existing network of many social trails between the Stone House and the parking area could easily be consolidated into a more logical, systematic trail layout if the trails were improved by widening, surfacing (5 feet wide with a compactable, gravel-like material) and modest realignment. Through a combination of widening, surfacing and realignment, many of these social trails could be made handicap accessible at the same time. This would have an overall impact-reducing benefit via reducing the overall length of social trials, focusing use to areas more suited to absorbing impacts and accommodate visitors' natural tendencies to see the various sights via the most direct routes. This approach would also have the benefit of not having to relegate handicapped visitors to some special, segregated facility.

General Recommendations

1. Minimize placement of facilities in riparian and shrub vegetation types.

2. Avoid placement of facilities in wetland areas and drainageways.

3. Minimize disturbances such as cut and fill on slopes greater than 12%.

4. Include erosion control measures on both trails and cut banks in areas with slopes over 12 percent.

5. Avoid widening of designated trails due to conflicts of use between hikers and equestrians, e.g., where hikers and equestrians pass on a trail. If widening or trail degradation occurs, implement specific remedies (e.g., trail definition or edging, intentional widening at certain spots, or creation of steps).

6. Use native plant materials for all revegetation and landscaping efforts.

7. Develop and post more signs.

8. Wild plum and skunkbush sumac thickets - the isolated clumps of shrubs that occur at some distance from the stream, on the flood plain or on the mesa slopes, should not be disturbed.

9. Sedge and rush meadows - these wetlands should be maintained in their natural state

10. South Boulder Creek - the shoreline and the integrity of the bottom substrate of South Boulder Creek should not be degraded.

LONG RANGE MANAGEMENT AND MONITORING RECOMMENDATIONS

OSD's long range management plans or goals are unknown; the monitoring of site conditions and trends needs to be designed and evaluated relative to OSD management plans and goals. The following recommendations are based upon the objective of conservation and management of the study area's natural resources and does not attempt to balance competing and/or conflicting goals.

1. **Recommended monitoring sites.** Sites recommended for monitoring impacts associated with visitor use have been identified on the Existing Recreation Resources Maps. These sites should be inspected in early spring and fall. Color photos and notes that specifically describe and quantify problems where possible (e.g., the width of the trail or dimensions of the disturbed area) should be taken. Each time the monitoring site is inspected, all quantifications will be measured and new photos taken.

   Based upon monitoring results, specific actions can be taken if a site becomes degraded (e.g., design improvements and modifications, temporary or permanent closure for vegetation restoration).

2. **Riparian vegetation.** Riparian vegetation monitoring should occur as a component of the recommendations listed above. Riparian vegetation monitoring should focus on continued reproduction of woody riparian species (particularly cottonwoods) and maintenance of total woody riparian area (i.e., track losses due to informal trails, facilities placement, and natural causes).

   A series of permanent belt transects can be established by permanently locating 2 stakes 30 meters apart and recording all cottonwood seedlings and saplings within 2 meters of either side of the line defined by the stakes. The belt transects can be rapidly sampled annually and compared over time for trends. If reproduction rapidly declines and younger trees are not recruited into the riparian population, the riparian forest will eventually decline to a decadent riparian cottonwood forest.

   Trends in total area can be reviewed by periodic aerial photography or well placed on-the-ground photography.

3. **Livestock grazing.** The eastern portion of the study area (southwestern quarter of Section 20) should be monitored for impacts due to livestock grazing. It is obvious that this portion of the study area has a reduced cover by tall grasses and an increase in weedy species (e.g., cheatgrass). Monitoring of this area is best accomplished by sampling permanently established plots in the grazed area and comparison with similar plots in the ungrazed area. Observation of the slope in the grazed area, which receives less grazing pressure, also gives some perspective on the effects of livestock grazing in this area.

   The current livestock grazing on the eastern portion of the study area could eventually produce a vegetation management problem. It is first important to note that the grasslands of the foothills most likely developed under a disturbance regime of periodic fire and ungulate grazing, and that periodic disturbance is most likely beneficial in favoring native grasses and discouraging woody vegetation and less desirable native species (e.g., Spanish bayonet and prickly pear).

   Prolonged intensive grazing of the foothills tall grasslands results in a decline in tall grasses and an increase in short and mid grasses as well as less desirable species (e.g., Spanish bayonet, prickly pear, and downy brome). It was difficult to accurately determine the extent of the effects livestock grazing has had in Section 20, as the vegetation was dormant during January, but the following preliminary observations were made:

   - There appears to be less of a tall grass species component in the currently grazed grasslands of Section 20.
   - At the time of field review, there was a distinct tall grass "browse line" where the slope became too steep for cattle.
   - There appeared to be a greater component of undesirable species in the currently grazed portions of Section 20 relative to the ungrazed tall grasslands to the west.

   The Section 20 area should be reviewed again this summer to verify these observations during the growing season. A possible management plan for Section 20 would be to only allow moderate grazing during the dormant season. Tall warm season grasses need to develop substantial shoot systems during the growing season. If the shoots are continually grazed, these grasses will deplete their root reserves and will eventually be replaced by short grasses and weeds.

4. **Maintenance of vegetation type distributions.** Grasslands are frequently associated with disturbance regimes (e.g., grazing and fire). Colonization of the mixed prairie grasslands by woody species is possible; however, it does not appear at this time that there is a threat of losing the mixed grass prairie areas to invasion by woody species. Loss of grasslands to woody species can best be monitored by periodic (5 year interval) of gross vegetation mapping similar to the mapping effort for this analysis. Bunin (1985) determined that local site conditions, especially drainage and soil texture, are primary influences on the suitability of the grasslands for coniferous trees. In some areas, an open ponderosa pine canopy with a xeric tall grassland understory is apparently a stable association. Also, xeric tall grasslands are distributed throughout the east slope of the Colorado Front Range. However, the disturbance history as well as recent disturbance affect the likelihood of tree invasion into neighboring grasslands.

5. **Visitation.** Continue to monitor visitor use with a trail counter.

6. **Dogs.** Dogs should be kept on a leash at all times while on the South Mesa Open Space Property.

7. **Weeds.** Noxious weed and undesirable species were not observed to be a substantial problem within the study area. However, the January field review was not the most favorable time for determining weedy distributions. The South Mesa study area is at risk for establishment of noxious weeds primarily due to a history of locally disturbed areas, continued disturbance along trails, continued grazing in the eastern portion of the study area, and frequent equestrian use (horses are notorious for introducing weed seeds through feces). The following species have the greatest potential of becoming localized problems at the South Mesa study area:

WEED	DESCRIPTION
Diffuse knapweed (*Centaurea diffusa*)	A biennial that could become established along trails and the parking area.

WEED	DESCRIPTION
Russian knapweed (*Centaurea repens*)	A perennial noxious weed that is very difficult to control or eradicate once established. Trails, the field of annual weeds north of the Dunn House, areas bordering the parking lot and road entering the south Mesa Trailhead should be monitored for this species. Control measures (physical removal and/or herbicides) should be used to eradicate this species or it will become a management problem.
Field bindweed (*Convolvulus arvensis*)	A creeping perennial weed that could become established in the field north of the Dunn House.
Prickly lettuce (*Lactuca serriola*)	An annual weed that has become well established in the field northwest of the Dunn House. As long as it does not spread beyond this field, the infestation problem will be temporary as native species are beginning to colonize the site.
Canada thistle (*Cirsium arvense*)	A perennial noxious weed that could become established in riparian areas and the wetland west of the parking area. In the Boulder area, Canada thistle frequently invades wetlands and pastures that have been removed from irrigation or grazing. Existing populations should be monitored and controlled.

WEED	DESCRIPTION
Downy brome (*Bromus tectorum*)	An annual grass that is a common component of the grasslands in the study area. Although common, it does not appear in dense pure stands and does not at this time appear to be out competing desirable native species. Downy brome has the greatest potential to create problems in the weed field northwest of the Dunn House and on the easter portion of the study area that is still grazed.
Kochia (*Kochia scoparia*)	An annual weed that will most likely be a persistent problem along trail margins, the parking area, and the field northwest of the Dunn House.
Leafy Spurge (*Euphorbia esula*)	This noxious perennial was not observed within the study area, but its potential presence should be monitored. Its likely first occurrence would be in the riparian areas of South Boulder Creek and Davidson Ditch. This weed is difficult to control and eradication efforts must be undertaken early.
Russian olive (*Elaeagus angustifolia*)	This introduced and adventive tree was not observed in the study area, but could invade the riparian woodland of South Boulder Creek. Russian olive can out compete cottonwoods that cavity nesters depend upon and if observed, should be eradicated from the study area.

WEED	DESCRIPTION
Crack willow (*Salix fragilis*)	An introduced tree that appears to out compete the native peach-leaved willow (*Salix amydaloides*). Repercussions of this competition are unknown except the decline of a once dominant native species. Where possible, crack willow should probably be discouraged and peach-leaved willow encouraged.

If OSD has not already adopted a weed control policy, it should. Weeds will be continual problems along trails and other areas of continual disturbance. The following approach could be considered by OSD. The following weeds should not be tolerated and should be eradicated by whatever means (physical or chemical) OSD determines to meet its long-term management goals. These are noxious difficult to control perennial weeds that spread by rhizomes:

- Russian knapweed
- Canada thistle
- Leafy spurge

REFERENCES

Bunin, J.E. 1985. Vegetation of the City of Boulder, Colorado Open Space Lands.

City of Boulder. 1990. Boulder Wildlife Habitat Database (Draft).

USDA Soil Conservation Service. 1975. Soil survey of Boulder County area, Colorado. Government printing office, Washington, D.C.

_____. 1986-1991. Soil interpretation records. SCS state office, Lakewood, Colorado.

_____. 1990. Hydric soils list, Boulder County, Colorado. SCS field office, Longmont, Colorado.

_____. 1990. Highly erodible lands, Boulder County, Colorado. SCS field office, Longmont, Colorado.

Zarka, J.J. 1991. South Mesa Trail Open Space Mapping and Site Improvements (Conceptual planning map).

APPENDIX A: VEGETATION TYPE DESCRIPTIONS

VEGETATION TYPE DESCRIPTIONS

The classification of vegetation types (existing plant community types) follows the habitat type classification system developed for the Boulder Wildlife Habitat Database (City of Boulder, draft, 1990) with some changes. The map abbreviation follows the vegetation type name in parentheses.

Ponderosa Pine Forest (PPF) - The Ponderosa Pine Forest vegetation type occurs to a limited degree at the highest elevations (ca. 6,200 feet) found within the northwestern portion of the study area. The forest is characterized by a closed canopy of ponderosa pine (*Pinus ponderosa*) with little herbaceous or woody understory.

Ponderosa Pine Savanna (PPS) - The Ponderosa Pine Savanna type occurs on two elevated (ca. 5,800 to 6,000 feet) mesas divided by the Towhee Draw drainage. This type is characterized by widely spaced ponderosa pines with an understory dominated by grasses. The grass understory varies from a dominance of tall grasses, primarily big bluestem (*Andropogen geradii*) to dominance by short grasses, primarily blue grama (*Bouteloua gracilis*). Common understory vegetation includes: mountain muhly (*Muhlenbergia montana*), Western wheatgrass (*Agropyron smithii*), little bluestem (*Schizachyrium scoparius*), Scribner's needlegrass (*Stipa scribnerii*), sideoats grama (*Bouteloua curtipendula*), cheatgrass (*Bromus tectorum*), sun sedge (*Carex heliophila*), Oregon grape (*Mahonia repens*), wild tarragon (*Artemesia dracunculus*), winged eriogonum (*Eriogonum altatum*), Spanish bayonet (*Yucca glauca*), snakeweed (*Xanthocephalum sarothrae*), and prickly pear (*Opuntia* spp.).

Skunkbush Sumac Shrubland (SSS) - The Skunkbush Sumac Shrubland occurs primarily along the north-facing slope above Towhee Draw. Small isolated areas of this type also occur south of Towhee Draw. Skunkbush sumac (*Rhus trilobata*) contributes at least 25% canopy cover to areas mapped as this type. Common understory species are the same as those listed for the Ponderosa Pine Savanna type.

Open Shrubland/Mixed Grass Prairie (OSG) - This type is similar to the Skunkbush Sumac Shrubland type but much more open. This type occurs on the drier south-facing slopes and mesa tops that border the Ponderosa Pine Savanna type.

Sumac Shrubland (SUS) - This type is restricted to a small area between the Mesa Trail and the Towhee Draw drainage. It is very similar to the Skunkbush Sumac Shrubland previously described; however, the dominant shrub is smooth sumac (*Rhus glabra*).

Mixed Plains Shrubland (MPS) - This type occurs to a limited extent along the Mesa Trail near Towhee Draw and in the upper Towhee Draw area. This type is similar to the Skunkbush Sumac Shrubland previously described, but has a mix of shrubs including chokecherry (*Prunus virginiana*), wild plum (*Prunus americana*), ninebark (*Physocarpus monogynus*), and skunkbush sumac.

Foothills Tallgrass Prairie (TGP) - This type covers the majority of the study area. The majority of the area mapped as Foothills Tallgrass Prairie fits Bunin's (1985) description of xeric tall grassland. This type is dominated by big bluestem, blue grama, sideoats grama, and little bluestem. Other species commonly occurring in this type are the same as the understory species described for the Ponderosa Pine Savannas. Some of the areas mapped as TGP along Colorado Highway 398 have been grossly disturbed and have large components of introduced species such as smooth brome (*Bromus inermis*). However, these areas are being colonized by native tall and midgrass species.

An area of mesic tallgrass prairie occurs at the west end of the wetland area west of the parking lot. The mesic tall grassland area is dominated by big bluestem, switchgrass (*Panicum virgatum*), and Indian grass (*Sorghastrum nutans*). It appears as if this area may be in the early phases of developing into to a mesic tall grassland.

Mixed Grass Prairie (MGP) - The Mixed Grass Prairie type is also referred to as mid-height grassland (Bunin, 1985). It is dominated by western wheatgrass and blue grama and occurs on the broad, dry, south-facing slope above Towhee Draw.

Shortgrass Prairie (SGP) - The shortgrass prairie vegetation type occurs west of the parking lot and between the parking lot and the Doudy house. These areas are dominated by blue grama and in some areas buffalo grass (*Buchloe dactyloides*). These areas appear to have a history of disturbance and also support weedy species such as cheatgrass and golden aster (*Heterotheca villosa*).

Mountain Meadow (MTM) - Areas that are mapped as mountain meadows are limited to moist sites that are dominated by bluegrass (*Poa pratensis*). Historically the sites were most likely dominated by western wheatgrass. The largest of the mountain meadow areas occurs in a saddle of the mesa north of Towhee Draw.

Riparian Forest (RPF) - The Riparian Forest type occurs along South Boulder Creek and is dominated by cottonwoods (*Populus deltoides* and *P. augustifolia*) and willows (*Salix fragilis* and *S. exigua*). Other commonly occurring woody species include: chokecherry, wildplum, box elder (*Acer negundo*), thinleaf alder (*Alnus tenuifolia*), river birch (*Betula fontinalis*), currants (*Ribes* spp.) and poison ivy (*Toxicodendron rydbergii*). The herbaceous understory is somewhat limited but includes bluegrass, smooth brome, orchard grass (*Dactylis glomerata*) and field horsetail (*Equisetum arvense*).

Riparian Shrubland (RPS) - Similar to the riparian forest is the riparian shrubland vegetation type that occurs along Towhee Draw where a narrow band of mixed shrubs border the drainage. Shrubs commonly found in this type include: chokecherry, wild plum, willow, and currant. A herbaceous understory of bluegrass, sedges, and rushes is common.

Willow Shrubland (WLS) - The willow shrubland occurs in small isolated areas within the South Boulder Creek floodplain. The thickets are typically dominated by coyote willow (*Salix exigua*) and scattered individuals of peachleaf willow (*Salix amygdaloides*).

Rush and Sedge Meadows (RSM/SDM) - Although these vegetation types are distinct, for the purposes of this study the two types are considered an associated type for the wetland area west of the parking lot. This wetland is dominated by baltic rush and sedges. Another small area mapped as RSM occurs between the parking lot and the Doudy house.

Cattail Marshes (CTM) - The cattail marsh type is very limited within the study area. The only mapped cattail marsh occurs on the upper reaches of Towhee Draw. Another small (unmapped) cattail marsh occurs near the center of the wetland west of the parking lot mapped as RSM/SDM.

Annual Weed Communities (AWC) - One area north of the Doudy house was mapped as an annual weed community. This area appears to have had a long history of disturbances and is presently dominated by prickly lettuce (*Lactuca serriola*). However, this area is also being colonized by blue grama and, over time, should eventually revert to mixed native grasses.

Miscellaneous Types (IRD and TPL) - Irrigation ditches are mapped as IRD and the abandoned apple orchard near the Doudy house is mapped as TPL (tree plantings).

Table B-1. Common birds of the South Mesa Trail area.

Common name	Scientific name
Red-tailed hawk	*Buteo jamaicensis*
Swainson's hawk	*Buteo swainsoni*
Rough-legged hawk	*Buteo lagopus*
American kestrel	*Falco sparverius*
Mourning dove	*Zenaida macroura*
Common nighthawk	*Chordeiles minor*
Broad-tailed hummingbird	*Selasphorus platycercus*
Belted kingfisher	*Ceryle alcyon*
Common flicker	*Colaptes auratus*
Hairy woodpecker	*Picoides villosus*
Downy woodpecker	*Picoides pubescens*
Western wood-pewee	*Contopus sordidulus*
Horned lark	*Eremophila alpestris*
Violet-green swallow	*Tachycineta thalassina*
Barn swallow	*Hirundo rustica*
Blue jay	*Cyanocitta cristata*
Steller's jay	*Cyanocitta stelleri*
Black-billed magpie	*Pica pica*
Common raven	*Corvus corax*
American crow	*Corvus brachyrhynchos*
Black-capped chickadee	*Parus atricapillus*
Mountain chickadee	*Parus gambeli*
Pygmy nuthatch	*Sitta pygmaea*
American dipper	*Cinclus mexicanus*
House wren	*Troglodytes aedon*
Canyon wren	*Catherpes mexicanus*
American robin	*Turdus migratorius*
Hermit thrush	*Catharus guttas*
Swainson's thrush	*Catharus ustulatus*
Mountain bluebird	*Sialia currucoides*
Townsend's solitaire	*Myadestes townsendi*
Golden-crowned kinglet	*Regulus satrapa*
Ruby-crowned kinglet	*Regulus calendula*
European starling	*Sturnus vulgaris*
Orange-crowned warbler	*Vermivora celata*
Yellow warbler	*Dendroica petechia*
Yellow-rumped warbler	*Dendroica coronata*
Common yellowthroat	*Geothlypis tricas*

Common name	Scientific name
Wilson's warbler	*Wilsonia pusilla*
House sparrow	*Passer domesticus*
Western meadowlark	*Sturnella neglecta*
Red-winged blackbird	*Agelaius phoeniceus*
Northern oriole	*Icterus galbula*
Brewer's blackbird	*Euphagus cyanocephalus*
Common grackle	*Quiscalus quiscula*
Western tanager	*Piranga ludoviciana*
Black-headed grosbeak	*Pheucticus melanocephalus*
House finch	*Carpodacus mexicanus*
Pine siskin	*Carduelis pinus*
American goldfinch	*Carduelis tristis*
Lesser goldfinch	*Carduelis psaltria*
Green-tailed towhee	*Pipilo chlorurus*
Rufous-sided towhee	*Pipilo erythrophthalmus*
Vesper sparrow	*Pooecetes gramineus*
Lark sparrow	*Chondestes grammacus*
Dark-eyed junco	*Junco hyemalis*
American tree sparrow	*Spizella arborea*
Chipping sparrow	*Spizella passerina*
White-crowned sparrow	*Zonotrichia leucophrys*
Lincoln's sparrow	*Melospiza lincolnii*
Song sparrow	*Melospiza melodia*

Table B-2. Mammals of probable occurrence near the South Mesa Trail.

Common name	Scientific name
Wandering shrew	*Sorex vagrans*
Eastern cottontail	*Sylvilagus floridanus*
Mountain cottontail	*Sylvilagus nuttallii*
Golden-mantled ground squirrel	*Spermophilus lateralis*
Abert's squirrel	*Sciurus aberti*
Fox squirrel	*Sciurus niger*
Red squirrel	*Tamiasciurus hudsonicus*
Northern pocket gopher	*Thomomys talpoides*
Western harvest mouse	*Reithrodontomys megalotis*
Deer mouse	*Peromyscus maniculatus*
Rock mouse	*Peromyscus difficilis*
Northern grasshopper mouse	*Onychomys leucogaster*
Mexican woodrat	*Neotoma mexicana*
Red-backed vole	*Clethrionomys gapperi*
Montane vole	*Microtus montanus*
Long-tailed vole	*Microtus longicaudus*
Prairie vole	*Microtus ochrogaster*
Porcupine	*Erithizon dorsatum*
Coyote	*Canis latrans*
Red fox	*Vulpes vulpes*
Gray fox	*Urocyon cinereoargenteus*
Raccoon	*Procyon lotor*
Black bear	*Ursus americanus*
Striped skunk	*Mephitis mephitis*
Mountain lion	*Felis concolor*
Bobcat	*Lynx rufus*
Mule deer	*Odocoileus hemionus*

Table B-3. Amphibians and reptiles of probable occurrence near the South Mesa Trail.

Common name	Scientific name
Woodhouse's toad	*Bufo woodhousei*
Boreal chorus frog	*Pseudacris triseriata*
Western leopard frog	*Rana pipiens*
Ornate box turtle	*Terrapene ornate*
Northern prairie lizard	*Sceloporus undulatus*
Lesser earless lizard	*Holbrookia maculata*
Six-lined racerunner	*Cnemidophorus sexlineatus*
Many-lined skink	*Eumeces multivirgatus*
Wandering garter snake	*Thamnophis elegans*
Western plains garter snake	*Thamnophis radix*
Red-sided garter snake	*Thamnophis sirtalis*
Northern lined snake	*Tropidoclonion lineatus*
Plains hognose snake	*Heterodon nasicus*
Eastern yellow-bellied racer	*Coluber constrictor*
Western smooth green snake	*Opheodrys vernalis*
Bullsnake	*Pituophis melanoleucus*
Western milk snake	*Lampropeltis triangulum*
Plains black-headed snake	*Tantilla nigriceps*
Prairie rattlesnake	*Crotalus viridis*

Table B-4. Species of Special Concern.[1]

Common name	Scientific name	Classification[2]
BIRDS		
Peregrine falcon	*Falco peregrinus*	II A,B
Northern harrier	*Circus cyaneus*	III, IV
Swainson's hawk	*Buteo swainsoni*	III, IV
Red-tailed hawk	*Buteo jamaicensis*	III
Scrub jay	*Aphelocoma coerulescens*	III, IV
Horned lark	*Eremophila alpestris*	III
Pygmy nuthatch	*Sitta pygmaea*	IV
Mountain bluebird	*Sialia currucoides*	III
Yellow warbler	*Dendroica petechia*	III
MAMMALS		
Rock squirrel	*Spermophilus variegatus*	IV
Eastern cottontail	*Sylvilagus floridanus*	V
Abert's squirrel	*Sciurus aberti*	IV
Western harvest mouse	*Reithrodontomys megalotus*	V
Rock mouse	*Peromyscus difficilus*	IV
Northern grasshopper mouse	*Onychomys leucogaster*	V
Gray fox	*Urocyon cinereoargenteus*	IV
Bobcat	*Lynx rufus*	III
AMPHIBIANS and REPTILES		
Woodhouse's toad	*Bufo woodhousei*	SC
Boreal chorus frog	*Pseudacris triseriata*	SC
Western leopard frog	*Rana pipiens*	SC
Ornate box turtle	*Terrapene ornate*	SC
Northern prairie lizard	*Sceloporus undulatus*	SC
Lesser earless lizard	*Holbrookia maculata*	SC
Six-lined racerunner	*Cnemidophorus sexlineatus*	SC
Many-lined skink	*Eumeces multivirgatus*	SC
Wandering garter snake	*Thamnophis elegans*	SC
Western plains garter snake	*Thamnophis radix*	SC
Red-sided garter snake	*Thamnophis sirtalis*	SC
Northern lined snake	*Tropidoclonion lineatus*	SC
Plains hognose snake	*Heterodon nasicus*	SC
Eastern yellow-bellied racer	*Coluber constrictor*	SC
Western smooth green snake	*Opheodrys vernalis*	SC
Bullsnake	*Pituophis melanoleucus*	SC

Western milk snake	*Lampropeltis triangulum*	SC
Plains black-headed snake	*Tantilla nigriceps*	SC
Prairie rattlesnake	*Crotalus viridis*	SC

[1] Species listed above that are not represented in Tables 1, 2 or 3 are not "common" or "probable" species for the area.

[2] Classifications: I=extirpated species; II=endangered or threatened species (A=federal, B=state); III=species undergoing long term, noncyclical population declines; IV=species with habitat restrictions; V=Colorado Heritage Inventory species of special concern; SC=Boulder County species of special concern.