

**Marshall Mesa/Southern
Grasslands
Trail Study Area (TSA)
Inventory Report**

2005

Background Information for the Marshall Mesa-Southern Grasslands Trail Study Area (TSA) Planning Inventory Report

8/16/05

Table of Contents

Page #

1	Existing Trails and Trailheads
4	Vistas, Destinations, and Connections
5	Agricultural Resources
5	Cultural, Paleontological, and Geological Resources
6	Upland Vegetation Resources
11	Wetland and Riparian Resources
16	Wildlife Resources

Inventory Maps for Marshall Mesa-Southern Grasslands Trail Study Area

- Map 1. Subareas Map
- Map 2. Composite Map of Key Natural and Cultural Resources
- Map 3. Planned and Requested Trail Improvements
- Map 4. Cultural Resource Areas
- Map 5. Rare Plant Species and Vegetation Communities
- Map 6. Detailed Vegetation Map
- Map 7. Riparian and Wetland Resources
- Map 8. Wildlife Resources

Tables

- Table 1. Rare and Imperiled Plant Species Listed by the Colorado Natural Heritage Program and Occurring in the Marshall Mesa – Southern Grasslands Trail Study Area, OSMP
- Table 2. Rare and Imperiled Plant Species Listed by the Colorado Natural Heritage Program and Expected in the Marshall Mesa – Southern Grasslands Trail Study Area, OSMP
- Table 3. Rare and Imperiled (Upland) Plant Communities Listed by the Colorado Natural Heritage Program and Occurring in the Marshall Mesa – Southern Grasslands Trail Study Area, OSMP
- Table 4. Non-Native Plant Species of Concern Occurring in the Marshall Mesa – Southern Grasslands Trail Study Area, OSMP
- Table 5. Wildlife Species of Special Concern by Management Area

This document compiles various information collected and analyzed for the Marshall Mesa-Southern Grasslands Trail Study Area (TSA). A companion document, *Summary of Major Findings for the Marshall Mesa-Southern Grasslands Trail Study Area Planning Inventory Report*, integrates the various information and offers preliminary findings that will help define and evaluate alternatives for the Trail Study Area, including new trails and trail improvements, resource protection measures, and activity-specific management measures.

The Marshall Mesa-Southern Grasslands Trail Study Area (TSA) is comprised of three Visitor Plan Management Areas and a part of a fourth one. Map 1. Subareas Map shows management areas designations, subareas used for inventory analysis, water features, and other public lands adjacent to the TSA. The management areas include:

- West Marshall Mesa Passive Recreation Area (PRA)
- East Marshall Mesa Natural Area (NA)
- Southern Grasslands Habitat Conservation Area (HCA)
- Doudy Draw Natural Area (the part east of State Highway 93)

Trails and Trailheads

Map 3. Planned and Requested Trail Improvements shows existing designated trails and trailheads and proposed trails—both Boulder Valley Comprehensive Plan-approved trails and citizen-requested trails that were identified in a public questionnaire. The map also shows undesignated trails used for informal visitor use in the past.

Passive Recreational Facilities

Passive recreational facilities in the Marshall Mesa-Southern Grasslands TSA include designated access areas such as trailheads, structures, and designated multi-use trails that are signed and maintained. There are approximately seven miles of designated trails in the TSA, which all but 0.7 of a mile are multi-use. Undesignated access points and undesignated trails are areas where informal visitor use patterns have created unsustainable (in most cases) physical disturbances on the landscape. There are approximately 24 miles of undesignated trails in the TSA. The Open Space and Mountain Parks Department discourages use of undesignated access points and undesignated trails to reduce negative impacts to the natural resource.

Trailheads

Marshall Mesa Trailhead: Located on the south side of Marshall Road just east of Cherryvale Road. Parking for approximately 13 vehicles currently exists and is heavily used. Two bear proof trash cans, dog station, information board, and trailhead sign are provided. No restroom facilities are currently provided.

Assessment:

- Minimal size, expansion opportunities are limited.
- Requires visitors to back-up into traffic on Marshall Road with limited sight lines.
- Adjacent to and above an existing wetland.
- Boulder County is planning on adding a bike lane to Marshall Road in the fall of 2006, making visitor access more difficult and dangerous.
- Difficult to plow snow and maintain after winter storms.
- Could be effectively replaced by new trailhead at recently purchased City Limits property.
- Work with county on reclaiming area after road is widened to add bike lane.

Greenbelt Plateau Trailhead: Located on the north side of State Highway 128 just east of State Highway 93. Parking for approximately 25 vehicles currently exist with limited horse trailer parking; receives minimal use on weekdays with heavier use occurring on the weekends. One bike rack, bear proof trash can, information board, and trailhead sign are provided. No restroom facilities are provided.

Assessment:

- The trailhead itself is in generally good condition.
- Entrance on to State Highway 128 could be improved by extending existing asphalt apron.
- Currently requires U-turn several hundred feet east of trailhead entrance if coming from State Highway 93.
- Current use patterns can be expected to increase considerably when the Greenbelt Plateau to Coalton Road trail connection is completed in 2006.
- Trail connection to Flatirons Vista Trailhead was constructed in 2004 with an at-grade crossing at State Highway 93 controlled by visitor-activated light.

Coalton Trail Access at State Highway 128: Informal parking area located off highway in Colorado Department of Transportation (CDOT) right-of-way; currently no amenities are provided.

Assessment:

- Currently few problems exist at this location.
- Parking appears to be very minimal at this time.
- Dumping of personal trash happens occasionally.
- When the Greenbelt Plateau to Coalton trail connection is built, this site should be reviewed for potential upgrades.

Greenbelt Plateau Trail: This trail starts at the trailhead and continues to the north where it forks to the east and the west; the eastern section intersects with Community Ditch Trail and the western section ends at Highway 93. The entire trail is open to hikers, bicyclists, and equestrians; all dogs must be in voice-and-sight control. The trail is vehicle accessible and maintained as a ten-foot wide gravel surface.

Assessment:

- Most of the trail is in good condition; however, the section connecting with Community Ditch is braided in several sections because of poor drainage. This section may need to be re-located or re-routed.
- Visitor use of this area could increase significantly with the proposed connection to Coalton Road.
- Several undesignated trails lead off the main trail and traverse the Southern Grasslands Habitat Conservation Area (HCA) to the east.

Marshall Mesa Trail: This trail starts at the trailhead and continues to the west until it connects with the Community Ditch Trail. It currently is the only section of trail in the TSA that is not open to bike use.

Assessment:

- This trail receives moderate to high use and is braided in several sections because of flat terrain on the upper section and poor drainage. Sections of this trail may need to be surfaced or relocated to provide better drainage.
- Self guided interpretive signs are provided giving a brief history of past coal mining activities in the area.
- Many visitors use this trail to form a loop with the Community Ditch Trail.
- Future trail connections to 66th Street and possibly to City Limits will see a significant increase in use levels in the future.

Community Ditch Trail: This trail starts at the bridge crossing Davidson Ditch and heads in an easterly direction and starts a steep climbing turn to the west where it continues until it reaches State Highway 93. Negotiations are currently underway to provide for a safe crossing using an existing box culvert under State Highway 93.

Assessment:

- The upper section of this trail is an eight-foot wide gravel surfaced trail maintained by the ditch company for access.
- The lower section is a three to five-foot wide natural surface trail that is starting to braid in several areas. A minor re-route at the apex of the climbing turn is anticipated when the connection to 66th Street is completed in the fall of 2005.
- This section of trail is also maintained once a year by a local volunteer group, Boulder Off Road Alliance (BOA).
- Significant increase in visitor use can be expected when the 66th Street trail connection is completed.

Trail Connection to South Highway 66th Street: This trail connection was approved by the Open Space Board in 2004 and is scheduled to be built in September of 2005 by a large community volunteer group in collaboration with the International Mountain Biking Association (IMBA).

Assessment:

- This trail connection provides a significant link to 66th Street and the town of Superior to the east.
- This trail could also potentially provide a connection to the Tall Grass Prairie East TSA.
- Currently the trail is to end at 66th Street and trail users will be expected to use the road and Coal Creek Drive to access the Single Tree Trail near Superior.
- An alternative option along the old railroad grade continuing east through the Damyanovich property and then through Boulder County Open Space connecting to the Single Tree trail should also be considered. This route is significantly more visitor friendly, aesthetically more pleasing, and provides additional loop options on the east side of the TSA.

- The upcoming lease for Marshall Lake and recreational opportunities associated with it should be considered.

Greenbelt Plateau to Coalton Road Trail Connection: Currently CDOT will not allow any trail connection to be made using any part of their right-of-way. Almost all trail users agree and would prefer a trail located further away from State Highway 128. Concerns also exist with running the trail inside the fence line since it could invite off-trail use into the HCA, especially since there are visible two-track ranch roads to the north.

Additional fencing could discourage off-trail use; however, the existing topography is bisected by several drainages that would require a longer contouring design to gain and lose elevation. This option would require a corridor further from the highway into the HCA, requiring more fencing. Building the trail along the fence line would create a non-sustainable trail with many grades exceeding 25%.

Vistas, Destinations, and Connections

The area has good to excellent vistas of mixed grass prairie and the Front Range. On parts of the Coalton Trail, you can see from Pikes Peak to Arthur's (Horsetooth) Rock near Fort Collins, a span of over 120 miles.

Points of Interest, Major Destinations

There are a number of interesting historic sites. An interpretive sign on Marshall Mesa Trail promotes off-designated trail travel to the edge of the escarpment. Some people want a trail along Coal Creek and Marshall Lake. Various ponds attract people. A pedestrian gate on Marshall Road near S. 66th has promoted undesignated trails.

Critical Trail Connections

There are four Boulder Valley Comprehensive Plan (BVCP) proposed connections in the area (see Map 3. Planned and Requested Trail Improvements). To the east, Coal Creek Trail coming from Louisville, Lafayette and ultimately Erie connects to the Singletree Trail, which connects to Coal Creek Drive, which will connect to the Community Ditch Trail near Marshall Trailhead via south 66th Street.

To the south, there is a conceptual trail alignment connecting the southern terminus of the Coal Creek Trail to Greenbelt Plateau. Boulder County has the connection from the Singletree Trail to Coalton Trail on its 2005 – 2010 Transportation Improvement Plan (TIP). Also in that TIP, Marshall Road is to be widened to include bikes lanes, likely in 2006 or 2007. When completed the combined trails will be a large loop, roughly following the old “Morgal Bismarck” road bike route, of State Highway 93, State Highway 128, McCaslin Boulevard, Coal Creek Drive, South 66th, and Marshall Road.

Further south, a BVCP conceptual trail alignment connects to Jefferson County on the east side of State Highway 93. Any connection to the Rocky Flats Wildlife Refuge would be made via this trail. Traveling north, the Front Range Trail follows the combination of the Jefferson County connection, Greenbelt Plateau Trail, Community Ditch Trail, Marshall Road, and Broadway in Boulder.

To the west, the Greenbelt Plateau and Flatirons Vista trailheads and the Dougy Draw Trail were connected last year. A State Highway 93 underpass is planned for the Community Ditch Trail.

Agricultural Resources

Livestock grazing is the primary agricultural use in the TSA. The grazing rotation changes each year based on Resource Conservation and Agricultural staff input. Here is some general information based on historical use.

Season of Use: There has been livestock somewhere in the area from May - December of each year. The livestock do not stay in one field the whole time because they are moved from one field to the next throughout this time period. The Marshall Mesa area (East Rudd, Greenbelt Plateau) is generally used in the spring or winter because of the heavy recreational activity. The Waneka / Kelsall / Superior Associates area is grazed during the summer and a bit in the fall. Tracy-Collins has been grazed in the spring and fall, sometimes a bit in the late summer.

Class of Livestock: Up to 250 yearlings or up to 150 cow/calf/bulls have been grazed in the area. The yearlings are generally grazed from 15 May - 1 September. The cows/calves/bulls have been grazed from 1 June - 1 December.

Livestock water will be a major factor in determining any future fence alignments should we decide to build more fence. Large areas without a water source are a concern for agricultural management. Visitor access points in the Highway right-of-way would also cause some concerns because of the pedestrian gates. More access points mean more of an opportunity for a gate to be left open and livestock escape onto the highway.

See [Appendix A](#) for detailed information on the grazing plan for properties in the TSA.

Cultural and Paleontological Resources

Cultural Resources

Inventories of the study area have identified 45 cultural and historic sites. Map 4. Cultural Resource Areas combines much of this information and identifies general locations or areas for these cultural resources (the information is generalized to protect the security of these sites). Several of these sites have been identified as having potential for listing on the National Register of Historic Places. Evidence of Native American tribes is relatively abundant in the study area. At least 17 aboriginal or prehistoric sites have been identified. These sites include isolated flakes or rock fragments, lithic scatters, stone piles, and evidence of habitation.

The Marshall Mesa Historic Mining District was proposed in 1995 to recognize the contribution of coal mining to the history of Boulder County and the Marshall area. A concentration of historic coal mines comprised the proposed mining district. Some of the principal historic mines include the Gorham Mine-Old Crackerjack Mine complex, the Marshall No. 6 Mine, the Big Tom Mine, the Black Diamond No. 1 Mine, the Marshall No. 7 Mine, and the Pinecliff Shaft site along with several other mine adits, structure remnants, and tailings piles. Although a mining district was never officially designated, the identified mines contribute to an eligible district.

Evidence of the farming and ranching history of the area include several historic irrigation ditches--the McKenzie Ditch and the Eggleston Reservoir Filler Ditches--and foundations or remnants of farmhouses, outbuildings, and a variety of farm machinery and equipment.

Geological and Paleontological Resources

The geological bedrock formations that are exposed in the study area are the Fox Hills Sandstone, the Laramie formation, and the Pierre Shale, each of which date to the Cretaceous Period. Marshall Mesa consists of outcroppings of the Fox Hills Sandstone--a massive cross-bedded and ripple-marked sandstone evidencing beach sand and shallow marine environments--and the Laramie formation--consisting of cobbly gravels and sands evidencing stream floodplain and stream terrace depositional environments--overlying the Fox Hills formation. The Laramie formation contains the coal beds for which the Marshall area is famous. These ancient marine and stream deposits contain numerous marine and fresh-water fossils, although no significant fossil finds are reported from the Marshall Mesa area.

The cobbly sandy and clayey loam soils found in the study area support mixed grass and shortgrass prairies. These native grasslands have been grazed by native ungulates (bison and antelope, primarily) prior to European settlement and by domestic livestock since European settlement. An eastern outlier of the ponderosa pine savanna woodland more typical of foothills forests to the west occurs on Marshall Mesa.

Marshall Mesa is identified as a “unique geological feature” in Boulder County in the Boulder Valley Comprehensive Plan.

Upland Vegetation Resources

Overview of the TSA Vegetation

This overview section addresses the significance of the rare types and non-native species and a brief landscape-level description. Relevant maps include Map 5. Rare Plant Species and Vegetation Communities (some of the information is generalized to protect sensitive sites) and Map 6. Detailed Vegetation Map. Map 6 will not be made available on the OSMP website, only in large format hard copy, because the detail is such that it is unreadable in a smaller-scale map format.

West Marshall Mesa Planning Recreation Area (PRA) and East Marshall Mesa Natural Area (NA)

This area contains the farthest extension of the foothills forest into the prairie margin of any area in the Open Space and Mountain Parks system. Because of increased elevation, geology, and slightly higher moisture conditions, the area includes patches of ponderosa pine forest, a rich diversity of foothills and prairie shrubs, tallgrass and mixed grass communities, and wet meadows. Riparian areas are present in the Cowdrey drainage and along the major ditches. Wetlands exist in low-lying areas and on hill slopes where rock layers are near the surface or exposed and form seeps and springs.

While this management area was severely disturbed by mining activity in the 19th and 20th centuries, native plant communities have recovered in some areas. The management area includes xeric tallgrass communities (Table 3) (mostly on upper, rocky portions of slopes and on mesa tops), which are important for rare butterflies (such as arogos skipper, two-spotted skipper, and cross-line skipper). Another rare plant community, green needle grass mixed grass prairie, occurs on the north-facing slopes in the eastern and central parts of the mesa (Table 3). Birdsfoot violet (*Viola pedatifida*), wavy-leaf stickleaf (*Nuttallia sinuata*), and dwarf leadplant (*Amorpha nana*), rare plants listed by the Colorado Natural Heritage Program, are present (Table 1). The xeric tallgrass communities, birdsfoot violet, and dwarf leadplant occur in a few places along the Front Range foothills at the far western edge of their distribution. These rarities are also found in the northern and northeastern Great Plains.

Shrublands on the north-facing slopes are some of the largest and most species-rich shrubland communities east of the foothills in the OSMP system. Montane species like serviceberry (*Amelanchier alnifolia*), wax currant (*Ribes cereum*), and Oregon grape (*Mahonia repens*) mix with species more common in the prairie, including yucca (*Yucca glauca*), three-leaved sumac (*Rhus aromatica* subsp. *trilobata*), and dwarf rabbitbrush (*Chrysothamnus nauseosus* subsp. *nauseosus*). Jersey tea (*Ceanothus herbaceus*), also a common shrub on Marshall Mesa, is associated with tallgrass prairie communities in the eastern Great Plains.

Forest stands are approximately 100 years old and contain high cover of small diameter trees with sparse understory vegetation. One more-open stand (woodland density) includes tallgrass prairie patches and rare plant locations.

Two utility corridors and some lower elevation meadows were seeded with non-native grasses when they were reclaimed or converted for agricultural use during the last century. One utility corridor (Louisville water line) follows the old railroad bed.

Several non-native plant species of concern (state A- and B-listed) occur in the management area (see Table 4). Species posing the greatest threat to native vegetation include: diffuse knapweed (*Acosta diffusa*), sulphur cinquefoil (*Potentilla recta*), dalmation toadflax (*Linaria genistifolia* subsp. *dalmatica*), myrtle spurge (*Tithymalus myrsinites*), and Canada thistle (*Breca arvensis*).

Livestock grazing has been the main agricultural activity in the area for over a century. Currently, a large portion of the area is leased for cattle grazing by Albert and Leo Hogan. Moderate levels of spring or fall grazing are typical with occasional summer grazing. Additional fencing may be needed to reduce the potential for livestock and visitor interactions, and may provide an opportunity for improved cattle grazing management.

These management areas are contiguous with several thousand acres of OSMP and Boulder County Parks and Open Space (BCPOS) lands to the south and nearly contiguous (separated by State Highway 170) with large areas of OSMP land to the north and northeast. Moderate densities of residential development are to the southwest. The Passive Recreation Area designation for western Marshall Mesa recognizes high levels of visitation.

Southern Grasslands Habitat Conservation Area (HCA) and (Greenbelt Plateau) Dowdy Draw Natural Area (NA)

This management area is the largest relatively intact block of grassland habitat in the Open Space and Mountain Parks system (a mosaic of plains riparian, mixed grass, and tallgrass habitats). It is a mixed complex of several different kinds of prairie grassland communities that form a transition from foothills to eastern plains community types. The dominant shortgrass species include buffalograss (*Buchloe dactyloides*) and blue grama (*Chondrosum gracile*). Some of the important tallgrass and mixed grass species include big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), switchgrass (*Panicum virgatum*), prairie dropseed (*Sporobolus heterolepis*), needle and thread grass (*Hesperostipa comata*), side-oats grama (*Bouteloua curtipendula*), western wheatgrass (*Pascopyrum smit hii*), junegrass (*Koeleria macrantha*), and purple three-awn (*Aristida purpurea*). Dwarf leadplant (*Amorpha nana*), birdsfoot violet (*Viola pedatifida*), carrion flower (*Smilax lasioneuron*), and chaffweed (*Anagallis minima*) are species documented in the HCA and listed as rare and sensitive by the Colorado Natural Heritage Program (Table 1). Narrow-leaved milkweed (*Asclepias stenophylla*), a CNHP tracked species found on the outwash mesas in the Boulder area, has been observed, but not formally documented in the management area. Fork-tip threeawn grass (*Aristida basiramea*) and the upland sedge, *Carex oreocharis*, are additional rare species occurring in adjacent grasslands and expected to occur in the Southern Grasslands (Table 2). The Coal Creek corridor contains potential habitat for Ute ladies'-tresses orchid (*Spiranthes diluvialis*), a federally-listed species.

Xeric tallgrass communities (Table 3, Map 5) occurring on the Rocky Flats Mesa and on slightly younger outwash mesa surfaces in the Boulder area (including the Marshall Mesa-Southern Grassland Trail Study Area) are thought to be the largest remnants of this tallgrass type in North America. Tallgrass prairie communities are among the rarest community types in the world, making the Colorado Front Range tallgrass communities exceptional in their conservation significance and value.

Contiguous grassland areas within the HCA are large enough and intact enough to serve as a site for threatened and endangered prairie species reintroduction (e.g., sharp-tailed grouse). Much of the management area includes important prairie dog habitat, distant from urban development and other human presence. The largest black-tailed prairie dog Conservation Area designated on

Open Space and Mountain Parks falls within the management area. The relatively large blocks of uninterrupted xeric tallgrass and needle and thread grass communities on the mesa tops, mixed grass within the southern block of the management area, and the riparian woodlands associated with Coal Creek provide diversity of habitat that supports a high number of bird species, several rare butterfly species, and many small and large mammal species (see Wildlife section).

Large areas of short grass and mixed grass prairie in the central part of the area south of Coal Creek are in variable condition, and have good restoration potential. Active restoration of a historic sand and gravel mine includes riparian and upland grassland habitat.

Several non-native plant species of concern (state A- and B-listed) occur in the management area (Table 4). Species posing the greatest threat to native vegetation include: diffuse knapweed (*Acosta diffusa*), sulphur cinquefoil (*Potentilla recta*), dalmation toadflax (*Linaria genistifolia* subsp. *dalmatica*), cutleaf teasel (*Dipsacus laciniatus*), Scotch thistle (*Onopordum acanthium*), and Canada thistle (*Breca arvensis*).

Livestock grazing is a current and historic agricultural use for parts of the area. Presently, a large portion of the area is leased for cattle grazing by Albert and Leo Hogan. Moderate levels of spring, summer and fall grazing are typical. Several large fenced areas with water sources allow for a rotational grazing regime.

In addition to being the largest grassland habitat block in the OSMP system, the Southern Grasslands are bounded on the east by a large block of Boulder County Parks and Open Space land, on the south by the Rocky Flats National Wildlife Refuge and the National Renewable Energy Laboratory, and on the west and north by OSMP land. State highways 93 and 128 are the only developments separating the management area from these adjacent, publicly owned lands. This landscape context creates a significant buffer for the Southern Grasslands from the urban interface.

Vegetation Maps

The vegetation maps display vegetation types at the “Alliance” level of the National Vegetation Classification. Plant communities of special concern and plant species of concern are identified and located.

Sensitive Species and Communities

The following tables identify rare and imperiled plant species (Tables 1 and 2) and rare and imperiled upland plant communities (Table 3) located in the Marshall Mesa-Southern Grassland Trail Study Area, which are listed by the Colorado Natural Heritage Program (CNHP). These tables include their ranking of rarity for each rare plant species.

Table 1
Rare and Imperiled Plant Species Listed by the Colorado Natural Heritage Program and Occurring in the Marshall Mesa – Southern Grasslands Trail Study Area, OSMP

Common Name	Scientific Name	Global Rank	State Rank	Subarea
Dwarf wild indigo (leadplant)	<i>Amorpha nana</i>	Secure (G5)	Imperiled to vulnerable (S2S3)	WMM, EMM, SG/DD
Chaffweed	<i>Anagallis minima</i>	Secure (G5)	Critically imperiled (S1)	SG
Narrow-leaved milkweed	<i>Asclepias stenophylla</i>	Apparently secure (G4G5)	Imperiled (S2)	SG
Wavy-leaf stickleaf	<i>Nutallia sinuata</i>	Vulnerable to extirpation (G3)	Imperiled (S2)	WMM
Carrion-flower	<i>Smilax lasioneuron</i>	Secure (G5)	Vulnerable to secure (S3S4)	SG
Birdsfoot violet, prairie violet	<i>Viola pedatifida</i>	Secure (G5)	Imperiled (S2)	WMM, SG/DD

Table 2
Rare and Imperiled Plant Species Listed by the Colorado Natural Heritage Program and Expected in the Marshall Mesa – Southern Grasslands Trail Study Area, OSMP

Common Name	Scientific Name	Global Rank	State Rank	Fed Status
Fork-tip three-awn	<i>Aristida basiramea</i>	Secure (G5)	Critically imperiled (S1)	
Upland sedge	<i>Carex oreocharis</i>	Vulnerable to extirpation (G3)	Critically imperiled (S1)	
Ute ladies'-tresses orchid	<i>Spiranthes diluvialis</i>	Imperiled (G2)	Imperiled (S2)	Threatened (LT)

Table 3
Rare and Imperiled (Upland) Plant Communities Listed by the Colorado Natural Heritage Program and Occurring in the Marshall Mesa – Southern Grasslands Trail Study Area, OSMP

Common Name	Scientific Name	Global Rank	State Rank
Xeric Tallgrass Prairie	<i>Andropogon gerardii</i> / <i>Schizachyrium scoparium</i>	Imperiled (G2)	Imperiled (S2)
Xeric Tallgrass Prairie	<i>Andropogon gerardii</i> / <i>Sporobolus heterolepis</i>	Imperiled (G2)	Critically imperiled to imperiled (S1S2)
Shortgrass Prairie	<i>Chondrosum (Bouteloua) gracile</i> – <i>Buchloe dactyloides</i>	Apparently secure (G4)	Imperiled (S2?)
Needle and Thread Grass – East (Colorado): Great Plains Mixed Grass Prairie	<i>Hespirostipa comata</i> --East	Imperiled (G2)	Imperiled (S2)
New Mexico Feathergrass: Great Plains Mixed Grass Prairie	<i>Hesperostipa neomexicana</i>	Imperiled (G2)	Imperiled (S2)
Green Needle Grass: Great Plains Mixed Grass Prairie	<i>Nasella viridula</i>	Unranked: need for additional information (GU)	State rank not yet assessed (SNR)

Non-Native Plant Species of Concern

The following table (Table 4) identifies non-native plant species that, to varying degrees, are threats to the native flora and fauna in the Trail Study Area.

Table 4
Non-Native Plant Species of Concern Occurring in the Marshall Mesa – Southern Grasslands Trail Study Area, OSMP

State rankings for noxious weed species: List A = Eradication mandated, List B = Management recommended, List C = Management not required at this time (not displayed in table)

Common Name	Scientific Name	State Rank	Primary Habitat
Myrtle spurge	<i>Tithymalus myrsinites</i>	List A	Upland
Bouncingbet	<i>Saponaria officinalis</i>	List B	Riparian
Canada thistle	<i>Breea arvensis</i>	List B	Wetland, riparian
Common teasel	<i>Dipsacus fullonum</i>	List B	Wetland, riparian
Cutleaf teasel	<i>Dipsacus laciniatus</i>	List B	Wetland, riparian
Dalmation toadflax	<i>Linaria genistifolia</i> subsp. <i>dalmatica</i>	List B	Upland
Diffuse knapweed	<i>Acosta diffusa</i>	List B	Upland
Houndstongue	<i>Cynoglossum officinale</i>	List B	Upland, riparian, forest
Musk thistle	<i>Carduus nutans</i>	List B	Upland
Oxeye daisy	<i>Leucanthemum vulgare</i>	List B	Wet meadow, riparian
Scotch thistle	<i>Onopordum acanthium</i>	List B	Upland, riparian
Sulphur cinquefoil	<i>Potentilla recta</i>	List B	Upland, riparian

Plant Species List

OSMP is compiling a plant species list for the TSA, including upland, wetland and riparian vegetation. When completed, this list will be available to the public.

Wetland and Riparian Resources

Map 7. Riparian and Wetland Resources shows the location of relevant information for this portion of the inventory.

Introduction

Riparian areas are extremely important landscapes in Colorado because they support disproportionately high levels of biological diversity. Although they comprise less than two

percent of the land cover, riparian areas supply habitat for approximately 80 percent of birds, mammals, reptiles, amphibians and fish native to Colorado (citation). Many are obligate riparian species and depend almost entirely on these streamside and aquatic habitats for their survival. Because of their relative scarcity, each riparian area is a valuable resource important for the conservation of Colorado's biological diversity.

Riparian areas are as endangered as they are important. The availability of water, gravel, and abundant vegetation has attracted a host of human uses to riparian areas. Since the 1800's gravel mining, flood control projects, urban development, unsustainable agricultural practices, and hydrologic modifications in riparian areas have decreased their extent and ecological integrity. Along the Colorado Front Range, none remain unaffected by human disturbances.

Background

Since 1981, the City of Boulder has acquired over 90 percent of the undeveloped riparian lands along Coal Creek in Boulder and Jefferson Counties creating a nearly contiguous seven-mile riparian corridor from the town of Superior to the mouth of Coal Creek Canyon at State Highway 72.

Coal Creek is the most remote riparian system in the City of Boulder Open Space and Mountain Parks system and the only riparian area without an associated recreational trail. Through much of its length, the creek has not been mined for gravel and has not been channelized. There are no main-stem reservoirs on Coal Creek. Although several ditches at the mouth of Coal Creek Canyon divert much of the creek's water, there is considerable spring and summer flow from thunderstorms and snowmelt from higher in the watershed. These annual high flows have maintained a complex floodplain. Where it flows through Open Space, Coal Creek's multiple channels are dynamic. Each year they cut into their banks and redeposit the eroded material as point bars further downstream. Consequently, the Coal Creek floodplain has a rich variety of wetland, riparian, and upland plant communities.

Coal Creek Riparian Vegetation Sampling

In 1999, a vegetation monitoring project was initiated on Coal Creek to collect baseline vegetation data within the fenced riparian corridor. Sixteen permanent transects were established along the creek from the Flatirons Vista property to the eastern most portion of the Superior Associates property. Transects were spaced 400 meters apart from a randomly chosen starting point and placed perpendicular to the flow of the creek. Distinct plant assemblages were subjectively demarcated, and along each transect permanent one-square meter plots were randomly placed within them. (In riparian areas, plant species changes are primarily due to elevation changes in the terrain relative to the channel and consequently the ground water.) A total of 96 permanent plots were placed along 16 transects. A nine-square meter plot was centered over each of the 96 one-meter plots, and cover of the overstory component was also measured (shrubs and trees). Permanent photo points were set up at the endpoints of each transect. All plots and transects were documented with a Global Positioning System. Vegetation data at all transects were collected in 1999, 2001 and 2004 and entered into a Microsoft Access database.

Despite gravel mining and changes in the natural hydrologic regime since the 1800's, the vegetation of the Coal Creek riparian area is still diverse and dominated by an overstory of native species. Because Coal Creek winds its way down from higher elevations on the Front Range and out to the high plains, it intersects a variety of diverse upland habitats that occur as a result of steep environmental gradients. As a result of these gradients, biological diversity is high in this section of the Front Range known as the foothills.

Riparian and Wetland Plant Associations in the Study Area

The overstory species *Populus angustifolia* (narrowleaf cottonwood) is prolific along the higher reaches of Coal Creek and slowly intermixes with *Populus deltoides* (plains cottonwood). Many of the hybrid cottonwoods *Populus x acuminata* are common in this transition zone with more *Populus deltoides* and fewer *Populus angustifolia* becoming apparent on the lower reaches as the creek meanders further out of the foothills and onto the plains.

Several Colorado Natural Heritage Program (CNHP) tracked plains cottonwood riparian woodland associations occur along Coal Creek. These range from the common human created and grazing induced *Populus deltoides/ Bromus inermis* (plains cottonwood/smooth brome) woodland to the very rare *Populus deltoides /Prunus virginiana* (plains cottonwood/chokecherry) woodland.

The *Populus deltoides (Salix amygdaloides)/ Salix exigua* (plains cottonwood/ peach-leaf willow/ coyote willow association described as rare to uncommon in Colorado (S3) is found along the Coal Creek riparian area and also in Cowdrey Draw. This association is typically an early seral stage community with small plains cottonwood trees intermixed with a coyote willow understory although older cottonwood trees can be numerous. Peachleaf willow is common in this association along the Front Range.

Two rare to very rare riparian plant communities along Coal Creek have been identified by OSMP staff and described by CNHP. The *Populus angustifloia/ Salix irrorata* (narrowleaf cottonwood/ bluestem willow) plant association has been found to occur only along the foothill streams of the Colorado Front Range and in the Rio Grande Valley of New Mexico. It often occupies the transition zone where plains cottonwood and narrowleaf cottonwood co-occur and hybridize to form cross type *Populus x acuminata*.

The extremely rare (S1) *Populus angustifolia/ Prunus virginiana* (narrowleaf cottonwood/ chokecherry) association is found in small areas along Coal Creek and may have been more extensive prior to the last century's changes in hydrologic and grazing regimes. Chokecherry is found in scattered patches along the riparian corridor, but many were heavily browsed in the past. With recent changes in management, such as fencing to exclude cattle and restoration of the gravel mined channel to raise ground water levels streamside, these species could potentially recover and increase enough to warrant additional occurrences.

The Salix amygdaloides (peachleaf willow) woodland (S1) is uncommon in Colorado and is found in Cowdrey Draw. It occurs in small clumps adjacent to the narrow floodplain channel in the drainage. Understory species may include coyote willow and western snowberry.

The *Crataegus macracantha* var. *occidentalis* (hawthorn) plant association was described in a 1998 report by CNHP on the South Platte River Basin as being known from Colorado only along Coal Creek. Other rare plant associations described by CNHP may be discovered after more extensive vegetation sampling and analysis is performed.

Several plant species growing along Coal Creek are listed as dominants within CNHP's record of Colorado's riparian plant associations and have as yet not been formally documented. The extremely rare to very rare (S1S2) *Populus deltoides*/*Sporobolus cryptandrus* (plains cottonwood/sand dropseed) association may also occur along Coal Creek because both species are found in the riparian corridor. The potential exists for the discovery of new occurrences of several associations already described by CNHP.

In upper Cowdrey draw, *Schoenoplectus pungens* (common three-square) forms an uncommon (S3) herbaceous vegetation association in low lying swales where soil remains saturated for much of the growing season. The species is salt tolerant and occurs most frequently in near pure stands in alkaline soils. Disturbance from grazing can lead to an increase in *Juncus balticus* and *Hordeum jubatum*.

Symphoricarpos occidentalis (western snowberry) shrubland (S3) is also an uncommon plant association that occurs in the Coal Creek riparian area, in Cowdrey Draw and in isolated small drainages in the TSA. This association is typically found in the drier riparian sites and appears to be transitional between riverine and upland communities.

Carex nebrascensis (Nebraska sedge) herbaceous vegetation association (S3) is found in the flood irrigated meadows of lower Coal Creek. Under heavy grazing Nebraska sedge increases in abundance and can crowd out other species.

Riparian Restoration and Protection Project

In 1999, the City of Boulder Open Space and Mountain Parks Department began a project to protect and restore the riparian habitat of Coal Creek in southern Boulder County. The main goal of this multi-disciplinary project is to conserve and improve the native riparian plant, animal, and fish communities of Coal Creek and the ecological processes that sustain them. The project is multi-faceted involving fencing the riparian corridor, restoring channelized sections of the creek, recreating historic riparian wetlands, constructing fish passage structures, and monitoring the success of the project.

Many public agencies and private organizations participated in the project design, funding, construction, and monitoring. Public agencies include Boulder County Parks and Open Space, Colorado Division of Wildlife, and U.S. Fish and Wildlife Service. Participating private and non-profit organizations include The Terra Foundation, National Audubon Society, Colorado Audubon Council, Boulder County Audubon Society, Boulder County Nature Association, and Boulder Flycasters (local Trout Unlimited chapter).

Project Descriptions

Fencing

The fencing component of the project involved fencing the seven-mile Coal Creek riparian corridor from State Highway 72 to the town of Superior to improve vegetation cover and diversity. The width of the “exclosure” varies from one-eighth to one-half mile depending on several factors including the width of riparian vegetation, terrain, and soil type. Several small irrigation reservoirs as well as non-tributary springs exist in upland areas and serve as livestock water sources. The riparian exclosure was constructed with gates so that livestock grazing could be used prescriptively to address weed control or other vegetation management issues.

Stream Channel Restoration

Historically, gravel mining has affected several areas along Coal Creek. In one area, gravel was mined around and through the creek channel. In a nearby area the stream was diverted into a bypass ditch to divert flow from areas that were mined. As a result, the original stream channel was cut off. The ditch increased the stream gradient and caused channel downcutting, streambank erosion, and a lowering of the local water table. We restored flow to the original channel by filling in the ditch and directing flow into the historic channel. Planting and seeding with native riparian trees, shrubs, and herbaceous vegetation took place after final grading.

Wetland Restoration

Wetlands typically occur in riparian areas as freshwater marshes and willow shrublands in abandoned channel meanders (“oxbows”) or other depressions where the water table is at or near the ground surface. Water diversions and gravel mining along Coal Creek are thought to have reduced the extent and possibly destroyed some of these wetlands. As part of this project, off-channel wetlands were recreated in areas where gravel mining occurred. This involved monitoring the depth to ground water in shallow monitoring wells and excavating areas to expose the water table. The size, shape and location of these wetlands are similar to natural, historic conditions. Native plants were also reintroduced into these areas.

Fish Passage Structures

The water flow in Coal Creek is seasonal most years. However, many shallow pools remain in the channel due to the high alluvial groundwater table and natural springs adjacent to the stream. These pools allow for fish to survive during low-flow or no-flow periods. In 2000, an unprecedented drought caused Coal Creek to completely dry out, including the isolated pools. As a result, all fish were extirpated from the project area. Re-colonization of fishes from upstream and downstream fish populations has been slowly occurring since then.

Three low-head diversion dams existed in the project area blocking upstream movement of fish. OSMP constructed two rock-ramp fishways on the functioning diversion dams to allow fish to move freely past the dams. An abandoned diversion dam was also removed and the channel regraded to match the existing channel. Rock-ramp fishways consist of gently sloping (eight to

ten percent slope) concrete and natural rock ramps that slow water velocities and direct water during low flows into the low flow channel. Small boulders are imbedded into the ramp to provide holding pools and resting areas for small fish as they navigate up the ramp. The rock ramps blend naturally with the stream channel and function much like a natural riffle. Extensive revegetation took place at each diversion dam where native riparian trees, shrubs and grasses were planted and seeded.

Fish Sampling

The city of Boulder Open Space and Mountain Parks Department and the Colorado Division of Wildlife performed fish sampling in August 1999 and 2000. Sample sites were located on the Superior Associates property (upstream of the town of Superior), Tracy-Collins property (between State Highways 128 and 93) and the Jewell Mountain property (in Jefferson County). The highest native species diversity was found on the Superior Associates property and included the following species: Longnose dace, fathead minnow, creek chub, central stoneroller, Johnny darter, and white sucker. Rainbow trout and creek chub were collected on the Tracy-Collins property. The Jewell Mountain property contained rainbow trout and longnose dace. Rainbow trout was the only non-native species collected on Coal Creek

Fish have been observed above and below the modified and removed diversion dams. Although quantitative data that compare pre- and post-project species diversity have not yet been collected, fish population monitoring will take place in 2005 and beyond.

As with all restoration projects, monitoring is critical to assess change and determine if the goals of the project have been met. Documentation is important to explain the value and benefits of ecosystem restoration. Measuring the ecological conditions in riparian areas and aquatic ecosystems can also provide land managers with a better idea of environmental conditions that might characterize a more sustainable or “natural” system. As additional information from this project is gathered, analyzed and reported, it will be shared with other land management agencies and researchers to contribute further to our understanding of riparian ecosystem restoration.

Wildlife Resources

Map 8. Wildlife Resources shows the location of relevant information for this portion of the inventory (some of the information is generalized to protect sensitive sites).

Marshall Mesa

Overall importance for Wildlife

Marshall Mesa supports several habitat types including shrubland, ponderosa pine forest, grassland, and wetland areas. The areas of shrubland are high quality wildlife habitat that is unfragmented and embedded in a matrix of grassland habitat. These shrublands provide habitat for songbirds and a variety of other taxa. Extensive data is not available on the wildlife community in this particular shrubland. However, shrublands in general and north-facing

shrublands in particular are rare across the Front Range and support a diverse wildlife community.

Marshall Mesa also supports ponderosa pine forest unique in its easterly location. These forests support a community of bird species typical of ponderosa pine forests to the west, but absent from other habitats this far east. These include species such as Western Wood-pewee and White-breasted Nuthatch. These forests also provide shelter for large mammals such as Mule Deer and coyotes.

Grassland habitats on Marshall Mesa support grassland nesting birds and rare species of butterflies (see below for details). In addition, the prairie dog colony provides hunting opportunities for both wintering and breeding raptors.

Two small ponds provide habitat for waterfowl seasonally and watering bats have been documented. Northern Leopard Frogs have also been documented.

Butterflies

Three species of locally imperiled and globally rare butterflies have been documented on Marshall Mesa. These are the Ottoe Skipper, a prairie specialist that prefers undisturbed grasslands, the Arogos Skipper, and the Mottled Duskywing.

Birds

Documented occurrences of rare imperiled birds include Bald Eagle, Golden Eagle, Ferruginous Hawk, Bobolink, Yellow-headed Blackbird, and Long-eared Owl. A complete list can be found in Table 5. Wildlife Species of Special Concern.

Prairie Dogs

Marshall Mesa supports a single prairie dog colony that covers approximately 36 acres (identified on Map 8. Wildlife Resources). This colony provides important hunting areas for raptors and mammalian predators as well as providing habitat for species commensal with prairie dogs.

Greenbelt Plateau

Greenbelt Plateau consists mainly of grassland habitat with smaller areas of ponderosa pine forest and wetlands that support species associated with grasslands including raptors, grassland nesting birds, reptiles and amphibians, large and small mammals, and insects. The ponderosa pine forests on Greenbelt Plateau support the species discussed above for Marshall Mesa ponderosa forests.

Species of Special Concern

Species documented in the Greenbelt Plateau area include Bald Eagles, Lark Bunting, Grasshopper Sparrow, and Northern Leopard Frogs.

Bird Diversity

Hastings et al. 2005 found that the Greenbelt Plateau had the highest density of Grasshopper Sparrows and Vesper Sparrows and the second highest density of Western Meadowlarks of seven grassland sites studied on OSMP. In addition, Greenbelt Plateau had the highest nest density of all 18 study sites for all species. Only Greenbelt Plateau and Superior Associates (included in Southern Grasslands discussion) supported the full suite of five primary grassland nesting species: Western Meadowlark, Vesper Sparrow, Grasshopper Sparrow, Horned Lark, and Lark Sparrow.

This data shows that Greenbelt Plateau is an important area for grassland nesting birds and supports high species richness, high abundance of a species of special concern (Grasshopper Sparrow), and overall grassland bird nesting density.

Southern Grasslands

HCA Importance for Wildlife

The Southern Grasslands HCA includes the largest intact block of grassland habitat on OSMP properties. The size of this habitat is important for wildlife for a variety of reasons. First, the ecosystem processes that are necessary for natural wildlife communities are more likely to occur in an undisturbed state in large habitat blocks. Factors affecting communities and individual species such as predator-prey dynamics, free movement of animals, both individuals and populations, and complete biological communities are more likely to be intact in an area of habitat that is large. As a result, the size of this unfragmented habitat block presents the best grassland habitat area on OSMP lands to preserve and restore this biological functioning and the wildlife populations that accompany it.

The Southern Grasslands HCA is also unique in its distance from the urban areas of Boulder. Other large grasslands on the OSMP system occur in much closer proximity to urban development, increasing the chances that impacts from development will affect the wildlife communities and biological functioning of these habitat areas. In addition, the location of the Southern Grasslands presents the opportunity to preserve this habitat in a landscape context that contains extensive Boulder County Open Space properties as well as Federal Lands (i.e., Rocky Flats) that create an even more extensive grassland habitat area remote from urban development. This is particularly critical for wide-ranging species or species particularly susceptible to human disturbance such as non-habituated wintering elk, hunting Golden Eagles and Ferruginous Hawks, and extirpated species such as Plains Sharp-tailed Grouse and Pronghorns.

The unique nature of this habitat in the OSMP land system also presents the opportunity for research examining the impacts of fragmentation, urbanization, and other disturbances in a setting less impacted than many other OSMP grassland areas. This also presents the opportunity for researchers to utilize this area as a control site to be compared to other areas that are either smaller habitat patches or exist in closer proximity to the urban edge. Additionally, researchers can examine community dynamics that are less well preserved on smaller or more impacted areas.

Overall, the Southern Grasslands present the best opportunity on the OSMP system to preserve and restore grassland ecosystem dynamics and wildlife communities and populations in a setting allowing natural and unimpeded functioning.

Raptors

The Southern Grasslands area supports both breeding and wintering raptor species. In census efforts across this area, five species of special concern (Bald Eagle, Golden Eagle, Ferruginous Hawk, Northern Harrier, and Prairie Falcon) were seen hunting during the winter. In addition to these species, Swainson's Hawks were observed during the breeding season. Other species not appearing on the Species of Special Concern list included Rough-legged Hawk, Red-tailed Hawk, and American Kestrel. The Mesa Sand and Gravel site had the highest number of Golden Eagle sightings at prairie dog towns of any OSMP property surveyed.

The heavy raptor usage of this area suggests that the large habitat block present along with ample prey such as prairie dogs and other small mammals offer these species valuable habitat during both the nesting and wintering seasons. This area represents one of the few sites on OSMP where raptor predator-prey relationships (particularly with prairie dogs) are intact and functioning normally.

Burrowing Owl

The Southern Grasslands supported a breeding pair of Burrowing Owls in 2005, which successfully fledged three young. This was the only known breeding location in 2005 for this species in the county. Burrowing Owls are listed as threatened by the State of Colorado and are dependent on prairie dog colonies for nesting sites. Burrowing Owls are considered to be sensitive to disturbance in breeding areas. This is supported by the fact that this pair nested in one of the most remote prairie dog areas on the OSMP system.

Bald Eagle

In 2003, Bald Eagles began nesting in the Southern Grasslands/Coal Creek area. A more detailed account of nesting is provided under section on Coal Creek. However, the habitat in the Southern Grasslands provides important hunting grounds for these breeding bald eagles. In addition, other non-breeding, wintering bald eagles hunt in this area.

Prairie Dogs

The Southern Grasslands area is identified in the 1996 Open Space Black-Tailed Prairie Dog Habitat Conservation Plan as a conservation area for the species. The reasons for this designation include the large, unfragmented nature of this grassland area and the remoteness from conflicting land uses and urbanization. This was one area that was identified as important for providing a natural setting for prairie dog existence with freedom of movement and expansion of the colonies, as well as an intact predator community including not only raptors, but also mammalian predators.

The Southern Grasslands contain 16 distinct prairie dog town organized loosely into three complexes. The total acreage occupied in 2004 was approximately 373 acres. Prairie dog towns in this area are shown on the Map 8. Wildlife Resources.

Prairie dog towns provide habitat for a variety of species in addition to prairie dogs including Burrowing Owls (one of these towns had a breeding pair in 2005), several species of amphibians and reptiles and other small mammals such as rabbits, mice, and voles. They also provide hunting and feeding opportunities for a variety of predators including Ferruginous Hawks, Golden Eagles, and Coyotes.

In the Black-Tailed Prairie Dog Conservation Plan, OSMP has identified grassland biodiversity preservation as the top priority in this area.

Wildlife Preservation Area

As delineated on various maps, an area surrounding Eggleston Reservoir No. 4 has been designated a Wildlife Preservation Area. As part of the agreement with the previous owner of this land, the area was closed to all public access. The purpose of the Wildlife Preservation Area as stated in the Eggleston Reservoir No. 4 Wildlife Preservation Area agreement dated May 26, 1992 is “to create a buffer zone for the protection and enhancement of appropriate vegetation, wildlife habitat and the ecological condition of the Wildlife Preservation Area, as determined by the city... In addition, the WPA provides a controlled area that allows for environmental, vegetation, and wildlife education and research.”

Plains Sharp-tailed Grouse

Plains Sharp-tailed Grouse are listed as endangered in the state of Colorado. Despite a previous relocation effort, none are known to inhabit Boulder County. However, the Division of Wildlife and the Fish and Wildlife Service have both expressed interest in future relocation efforts of this endangered grouse. The complex of open grassland consisting of OSMP lands, Boulder County Open Space lands, and Rocky Flats represents a substantially large area of habitat to support the grouse. In addition, the habitat in this area is suitable, with appropriate management, for the needs of the grouse throughout their lifecycle including areas for wintering and breeding. This area represents the only suitable habitat for the grouse found in Boulder County. Although current fragmentation of the area exists in the form of major roads (State Highways 93 and 128),

future fragmentation of the area could lead to a significant decline in the suitability of this area for Plains Sharp-tailed Grouse.

Pronghorn

Like the Plains Sharp-tailed Grouse, Pronghorn have been extirpated from grasslands of Boulder County. Biologists from the Colorado Division of Wildlife and the US Fish and Wildlife Service believe that the Southern Grasslands along with adjoining lands represent the best possibility for future reintroduction of this species for many of the same reasons as discussed for the Plains Sharp-tailed Grouse.

Coal Creek

Overall Importance for Wildlife

Coal Creek is an important plains riparian area providing habitat for a variety of species including Bald Eagles, shrubland and riparian birds, small mammals, Prebles Meadow Jumping Mice, amphibians, fish and larger mammals such as coyotes, raccoons, and occasionally bears. In addition, with the restoration of the riparian habitat, this represents an important east-west corridor to allow the movement of large animals such as elk to and from wintering areas as well as being a stopover habitat for migrating songbirds. Riparian corridors and the associated riparian forest and shrubland are rare habitats in the grasslands of Boulder County with many being heavily disturbed by mining, water diversion, and urbanization. Despite its history of mining and other disturbances, the remote nature of Coal Creek makes it an important and unique restoration site that provides important wildlife habitat that will only increase in value as restoration is completed and vegetation recovers and matures.

Birds

Boulder County Audubon Society volunteers have been surveying birds in the Coal Creek drainage since 1998. Overall in that time period, they have documented 142 species of birds, 35 of which appear on lists of species of special concern. In addition, six of those appear on federal or state lists of special concern or regulatory protection. Bird species have responded positively to the re-growth of vegetation associated with the restoration project in the area and shrub-nesting and cavity-nesting birds have increased.

Overall, this riparian corridor contains habitat that supports high avian species diversity and is increasing in its importance as bird habitat as vegetation recovers.

Bald Eagle

Beginning in 2003, a pair of Bald Eagles nested in the Coal Creek riparian area. This nest was one of only two known nests in Boulder County in 2003 and 2004. The pair nested in 2003 and 2004 but did not return in 2005. However, individuals have been seen in the area throughout the breeding season, suggesting they may return in future years.

Prebles Meadow Jumping Mouse

Prebles Meadow Jumping Mice have been trapped along Coal Creek in this area. As a result, the entire stretch of Coal Creek is either confirmed or potential Prebles' habitat. As a federally threatened species, the habitat of Preble's Meadow Jumping Mice is protected under the Endangered Species Act and subject to regulations dictated by the Act.

Fish

Fish in Coal Creek are discussed in the wetlands portion of the inventory report.

Small Mammals

The restoration of the Coal Creek drainage is expected to increase habitat available for small mammals, although at this time, recent data is not available. In trapping efforts from 1999-2001, 9 species of small mammal were located. These included the Prebles Meadow Jumping Mouse (*Zapus hudsonius preblei*) (Federally threatened species), Deer Mouse (*Peromyscus maniculatus*), Hispid Pocket Mouse (*Chaetodipus hispidus*), House Mouse (*Mus musculus*), Western Harvest Mouse (*Reithrodontomys megalotis*), Meadow Vole (*Microtus pennsylvanicus*), Prairie Vole (*Microtus ochregaster*), Mexican Woodrat (*Neotoma mexicanus*), and Masked Shrew (*Sorex cineros*).

Amphibians

Northern Leopard Frogs use the habitats in and adjacent to the Coal Creek drainage including ephemeral wetlands along the creek corridor. Northern Leopard Frogs are a species of special concern. In addition, Woodhouse Toads and Painted Turtles have been found in th

Table 5
Wildlife Species of Special Concern by Management Area

Marshall Mesa

Species	Listing/ Designation*	Other information
American White Pelican	State- Special Concern CNHP- Globally rare, locally vulnerable	
Arogos Skipper	CNHP- globally vulnerable, locally imperiled	
Bald Eagle	Federal- Threatened State- Threatened CNHP- locally critically imperiled breeding, vulnerable non-breeding	Federal regulation under Endangered Species Act and Eagle Protection Act
Black-crowned Night-heron	BCNA	
Black-tailed Prairie Dog	State- Special Concern CNHP- locally vulnerable	

Species	Listing/ Designation*	Other information
Bobolink	CNHP- locally vulnerable Audubon	
Cedar Waxwing	BCNA	
Cooper's Hawk	OSMP	
Ferruginous Hawk	State- Special Concern	
Golden Eagle	BCNA	Federal regulation under Eagle Protection Act
Great Blue Heron	BCNA	
Lark Bunting	BCNA- rare and declining PIF	
Long-eared Owl	BCNA- rare and declining	
Mottled Duskywing	CNHP- globally vulnerable, locally imperiled	
Northern Leopard Frog	Federal- Sensitive State- Special Concern CNHP- locally vulnerable	
Osprey	State- sensitive BCNA- rare	
Ottoo Skipper	CNHP- Globally vulnerable, Locally imperiled	
Rock Squirrel	OSMP	
Sharp-shinned Hawk	OSMP	
Turkey Vulture	OSMP	
Yellow-headed Blackbird	BCNA	

Greenbelt Plateau

Species	Listing/ Designation*	Other information
Bald Eagle	Federal- Threatened State- Threatened CNHP- locally critically imperiled breeding, vulnerable non-breeding	Federal regulation under Endangered Species Act and Eagle Protection Act
Grasshopper Sparrow	BCNA	
Lark Bunting	BCNA- rare and declining PIF	
Northern Leopard Frog	Federal- Sensitive State- Special Concern CNHP- locally vulnerable	

Southern Grasslands/ Coal Creek

Species	Listing/ Designation*	Other information
American Peregrine Falcon	State- Special concern CHNP- State imperiled breeding BCNA	
Bald Eagle	Federal- Threatened State- Threatened CNHP- locally critically imperiled breeding, vulnerable non-breeding	Federal regulation under Endangered Species Act and Eagle Protection Act
Black-crowned Night-heron	BCNA	
Black-tailed Prairie Dog	State- Special Concern CNHP- locally vulnerable	
Brewer's Sparrow	Audubon	
Brown Thrasher	BCNA- rare and declining	
Burrowing Owl	State- Threatened PIF BCNA- Rare and declining	State regulation under Endangered Species Act
Cedar Waxwing	BCNA	
Cooper's Hawk	OSMP	
Double-crested Cormorant	BCNA	
Ferruginous Hawk	Federal- Sensitive State- Special Concern BCNA	
Golden Eagle	BCNA	Federal regulation under Eagle Protection Act
Grasshopper Sparrow	BCNA	
Gray Catbird	BCNA	
Great Blue Heron	BCNA	
Green-winged Teal	OSMP	
Indigo Bunting	OSMP	
Lark Bunting	PIF BCNA	
Loggerhead Shrike	USFS PIF BCNA- rare and declining	
Long-eared Owl	BCNA- rare and declining	
MacGillivrays Warbler	PIF	
Merlin	OSMP	
Northern Bobwhite	BCNA- rare and declining	
Northern Harrier	PIF BCNA- Rare and declining	
Northern Leopard Frog	Federal- Sensitive State- Special Concern	

Species	Listing/ Designation*	Other information
	CNHP- locally vulnerable	
Northern Mockingbird	BCNA- rare	
Northern Pocket Gopher, macroctis subsp.	State- Special concern CNHP- locally critically imperiled	
Osprey	State- sensitive BCNA- rare	
Plains Sharp-tailed Grouse	State-Endangered CNHP- critically imperiled PIF BCNA	State regulation under Endangered Species Act No individuals remain from earlier reintroduction efforts
Prairie Falcon	BCNA	
Prebles Meadow Jumping Mouse	Federal- Threatened State- Threatened	Federal and State regulation under Endangered Species Act
Red-eyed Vireo	OSMP	
Rock Squirrel	OSMP	
Rose-breasted Grosbeak	OSMP	
Ring-necked Duck	BCNA	
Rose-breasted Grosbeak	OSMP	
Sage Thrasher	BCNA-rare	
Savannah Sparrow	BCNA	
Sharp-shinned Hawk	OSMP	
Short-eared Owl	CNHP- locally imperiled breeding PIF BCNA- rare Audubon	
Swainson's Hawk	PIF BCNA	
Turkey Vulture	OSMP	
Utah Milksnake	OSMP	
Virginias Warbler	Audubon	
Western Scrub Jay	BCNA	
Western Tanager	PIF	
Wood Duck	BCNA	
Yellow-headed Blackbird	BCNA	

*** Lists referenced:**

Federal- US Fish and Wildlife Service-Federal Endangered Species List

State- Colorado Division of Wildlife-State Endangered Species List

USFS- US Forest Service-Threatened, Endangered and Sensitive Plants and Animals

CNHP- Colorado Natural Heritage Program- Tracked Species and Communities

PIF- Partners in Flight Conservation Targets

BCNA- Boulder County Nature Association Avian Species of Special Concern

Audubon- Audubon Society Watchlist

OSMP- Open Space and Mountain Parks Species of Special Concern (includes all species featured on lists identified above as well as species uniquely identified as OSMP listed)

Appendix A

Grazing Plan Information for Properties in the Marshall Mesa-Southern Grasslands TSA

8/12/05

Property	Lessee	End Date of Lease	Condition	Category of Grassland	2005 Grazing Plan	Long Term Grazing Plan	Comments
Damyanovich East of S. 66 th . St.	Hogan Brothers	12/31/06 Long term lease	Fair	Disturbed native / seeded grassland	Winter grazing	Winter grazing	Disturbance is from historic railroad and mining activities. This pasture is used to keep bulls separate from visitors and cows during the winter and calving season.
Damyanovich West of S. 66 th . St.	Hogan Brothers	12/31/06 Long term lease	Good	Native grassland	Spring grazing	No summer grazing	This property has a pond with associated wetlands. Summer grazing might lead to undesirable impacts to these communities. This property also has a xeric tallgrass community on the top of the mesa. Annual brome grasses and Canada thistle would be prescriptive grazing targets.
East Rudd	Hogan Brothers	12/31/06 Long term lease	Good	Native grassland / shrubland	Spring / early summer grazing	Minimize summer grazing	This parcel has significant shrublands and riparian communities on the north end. Spring or fall grazing minimizes the impact to these communities while allowing for some level of non-native cool season species control (Canada thistle, non-native bluegrasses, annual brome)
Greenbelt Plateau	Hogan Brothers	12/31/06 Long term lease	Good	Native grassland	Early summer and winter grazing	Minimize summer grazing	Significant xeric tallgrass as well as mesic tallgrass communities are found in this area. The communities found on this property are some of our better examples of these community types. Grazing targets have included diffuse knapweed and non-native perennial grasses including smooth brome and orchard grass.
Varra / Salstrand	Hogan Brothers	12/31/06 Long term lease	Fair	Native grassland / introduced grassland	Summer grazing	Seasonal use	This area has a significant black-tailed prairie dog population. Recent grazing has tried to account for this by controlling overall levels of use and season of grazing. Livestock water availability limits the number of livestock that can be grazed (around 40 animals). Grazing targets have included diffuse knapweed and Canada thistle.

Property	Lessee	End Date of Lease	Condition	Category of Grassland	2005 Grazing Plan	Long Term Grazing Plan	Comments
Waneka	Hogan Brothers	12/31/06 Long term lease	Fair	Native grassland	Summer grazing	Rest rotation grazing	This area has a significant black-tailed prairie dog population. Recent grazing has tried to account for this by controlling overall levels of use and season of grazing. The Waneka / Kelsall / South Superior Associates area are evaluated each year to determine the timing of livestock grazing for each parcel. Maintenance of grassland conditions has been the primary grazing management objective. Vegetation transects have been installed in this pasture to monitor the vegetation trends on and off prairie dog colonies. Diffuse knapweed has been a grazing management target.
Kelsall	Hogan Brothers	12/31/06 Long term lease	Good	Native grassland	Summer grazing	Rest rotation grazing	The Waneka / Kelsall / South Superior Associates area are evaluated each year to determine the timing of livestock grazing for each parcel. Diffuse knapweed has been a grazing management target.
Superior Associates south of Coal Creek	Hogan Brothers	12/31/06 Long term lease	Fair	Native grassland	Fall grazing	Rest rotation grazing	This area has a significant black-tailed prairie dog population. Recent grazing has tried to account for this by controlling overall levels of use and season of grazing. The Waneka / Kelsall / South Superior Associates area are evaluated each year to determine the timing of livestock grazing for each parcel. Vegetation transects have been installed on the mesa near the Coalton trail. Diffuse knapweed has been a grazing management target.
Mesa Sand and Gravel / Superior Associates	Hogan Brothers	12/31/06 Long term lease	Fair	Native grassland	Spring grazing	Seasonal grazing use	This area has a significant black-tailed prairie dog population. Recent grazing has tried to account for this by controlling overall levels of use and season of grazing.
Tracy-Collins	Hogan Brothers	12/31/06 Long term lease	Good	Native grassland / shrubland	Summer grazing	Spring or fall grazing	This parcel has significant shrub communities on the north and west facing slopes. A significant xeric tallgrass community is found on the mesa top. Grazing targets have included non-native cool season grasses.

DRAFT

Summary of Major Findings for the Marshall Mesa-Southern Grasslands Trail Study Area (TSA) Planning Inventory Report

8/12/05

Synthesis Information

Map 1 (Marshall Mesa-Southern Grasslands Trail Study Area Subareas Map) delineates the Trail Study Area and shows the relevant Visitor Master Plan Management Area designations.

“Big-Picture” Opportunities for Expansion of Public Access and Trail Improvements

- Construction of the “missing trail links” in this TSA, which will provide a long-distance, loop trail system in the Trail Study Area offering multiple-use opportunities and scenic vistas and important interconnections with trails west of S.H. 93 on OSMP lands, and east to Boulder County open space lands and to the Coal Creek Trail in Superior, Lafayette, and beyond.
- Possible new education / interpretation facilities for area history, geology, ranching, and grassland ecosystems.
- Possible regional trail connections to Boulder County Open Space, Jefferson County Open Space, and Rocky Flats National Wildlife Refuge.
- Safe trail crossing at an underpass under S.H. 93 from Marshall Mesa Trail to the Community Ditch Trail.
- Improved and safer trailheads (i.e., construction of the new City Limits Trailhead and improvement of Greenbelt Plateau Trailhead).
- Potential for new trailheads—determine the status of the Marshall Mesa Trailhead and options for new trailheads in the vicinity of S. 66th Street south of S.H. 170 and at the existing western terminus of the Coalton Trail and S.H. 128.

“Big-Picture” Opportunities for Resource Protection

- Preservation of the large size and ecological function of the core wildlife habitat block and the Coal Creek riparian area in the Southern Grasslands Habitat Conservation Area (HCA), which provide diverse habitats remote from development and connected with other undeveloped natural areas managed by Boulder County, Jefferson County, and the Rocky Flats National Wildlife Refuge.
- Protection of rare, imperiled, and highly-vulnerable resources listed by the Colorado Natural Heritage Program (CNHP).
- Ecological restoration of the Coal Creek riparian / aquatic ecosystem and the tallgrass, mixed-grass, and short-grass prairie complex in the Southern Grasslands.

Factors that Suggest Favorable Opportunities for Public Access and Trail Improvements (“Green Lights”)

- Availability of the Community Ditch culvert under S.H. 93 as a possible trail under-crossing.
- Availability of the City Limits Trailhead site to address the crowding and unsafe conditions at the Marshall Mesa Trailhead.

DRAFT

- Availability of suitable alignments for the Marshall Mesa to S. 66th trail connection and the new trail from the City Limits Trailhead to the Community Ditch Trail.

Factors that Suggest Caution When Considering Public Access Alternatives (“Caution Signs” or “Yellow Flags”)

- Large patches of big bluestem plant communities.
- Rare butterfly habitat associated with the xeric tallgrass prairies.
- Prairie dog colonies that have room to move across the prairie landscape.
- Occupied habitat for a rare subspecies of the Northern Pocket Gopher.
- High-quality habitat for, and high-density of, ground-nesting grassland birds.
- Important hunting areas for wintering and nesting raptors.
- Prairie escarpment and north-facing shrubland habitats.
- Wetland / stream crossing of Coal Creek and other wetland areas.
- Doudy Draw-Greenbelt Plateau concentration of high avian diversity.
- Large size of the un-fragmented habitat block in the Southern Grasslands.
- Potential reintroduction areas for Plains sharp-tailed grouse and pronghorn antelope.
- Local infestations of State-listed priority A and B weeds.
- Safety concerns associated with the Marshall Mesa Trailhead.
- Safety concerns associated with visitors crossing S.H. 93 to continue travel on the Community Ditch Trail.
- Unknowns about the ground stability of the City Limits Trailhead site.

Factors that Suggest Looking Elsewhere for Public Access Opportunities (“Warning Signs” or “Red Flags”)

- Preble’s meadow jumping mouse habitat.
- Bald eagle nesting closure area.
- Burrowing owl nesting area.
- Local occurrences of Colorado Natural Heritage Program-listed rare and sensitive species.
- Contaminated areas closed to public access due to historical use of Marshall Landfill and other industrial use impacts.
- Varra active mining and mine reclamation closure area (smaller than the combination of areas identified on the OSMP Trails Map because reclamation has been completed).
- Eggleston Reservoir # 4 Wildlife Preservation Area closure.
- Coal Creek restoration area.
- Privately-owned conservation easement properties and privately-owned Marshall Lake properties that do not allow public access.

Composite Map of Key Natural and Cultural Resources

Map 2 (Composite Map of Key Natural and Cultural Resources) shows a composite of key natural and cultural resources. Documentation of how Geographic Information Analysis (GIS) was used to develop this map is located in Attachment A. This composite map is a spatial overlay of several key resources that affect the suitability of visitor access and trails. The map only includes resources that can be located with specific locations on the map; it does not include

DRAFT

other resources that are non-specific in location because of their wide-ranging or transient nature. The purpose of the map is to show where the highest concentration of important mappable resources is located. The color categories on the map show how many different mapped resources are present in any given area. No weighting of these resources is factored into the numerical ratings, just the presence or absence of the resource.

The results show that the highest concentration of resources is located in the following areas:

- A limited portion of the Marshall Mesa area, which includes important cultural resources, rare plant and wildlife species identified by the Colorado Natural Heritage Program, prairie dog colonies, and riparian or wetland vegetation.
- The northern part of the Southern Grasslands HCA, which includes CNHP-listed big bluestem tallgrass plant communities and other rarities, prairie dog colonies, nesting burrowing owls, and riparian or wetland vegetation.
- The Coal Creek restoration area, and the Rocky Flats area south of S.H. 128., which include co-occurrence of many of key resources: Bald eagle nest sites, many CNHP-listed communities or species, prairie dogs colonies, Preble's meadow jumping mouse habitat, Coal Creek riparian restoration area, wetlands, and important cultural resources.

Two other areas do not show up with a high concentration of multiple mapped resources, but they are very valuable because they are the largest tallgrass and mixed grass prairie habitat blocks that support high quality native grassland ecosystems. The first of these areas, the Greenbelt Plateau area, contains a big bluestem habitat block that is particularly valuable because of the excellent nesting grassland bird habitat it offers. In the portion of the Southern Grasslands HCA south of Coal Creek, this habitat block supports several large complexes of prairie dog colonies with abundant predator populations that require large patches of interior habitat, and also several types of CNHP-listed species.

Some of the high resource concentration areas include important late prehistoric, Pre-European and European settlement features.

On this map, certain areas are identified as closed to public access and therefore are not open to consideration for trails. These areas include: the Egelston Reservoir # 4 Wildlife Preservation Area around Egelston reservoir # 4, the still active Varra clay mining pit, and the chemical contamination area on the eastern portion of the Damyanovich property (east of S. 66th Street).

DRAFT

Inventory Information Summarized by Visitor Master Plan Management Areas and Subareas

Map 1 shows the boundaries of the Visitor Master Plan Management Areas and the subareas used in this inventory.

West Marshall Mesa Passive Recreation Area

Existing Visitor Use

- This management area is a very heavy visitation area. Marshall Mesa Trail and Community Ditch Trail are popular with pedestrians, dog walkers, mountain bikers, and horseback riders. An extensive network of undesignated trails has developed here.
- The Marshall Mesa Historic Mining Area is a popular destination, with interpretive signs provided by OSMP.
- Dog management is on-leash or voice-and-sight control.
- The Marshall Mesa Trailhead is frequently congested, and parking backs up onto S.H. 170, which can be dangerous at times.
- The at-grade road crossing of S.H. 93 by visitors traveling on the Community Ditch Trail is a significant safety hazard.

Natural Resources

- This management area includes patches of ponderosa pine forest (farthest extension of foothills forest into the prairie of any area in the Open Space and Mountain Parks system), a rich diversity of shrubs, and relatively wet meadows and savannas. Riparian areas are present in the Cowdrey drainage and along the ditches, and wetlands exist in low-lying areas.
- While this management area was severely disturbed by mining activity in the 19th and 20th centuries, native plant communities have recovered in some areas. The management area includes some rare plants and butterflies listed by the Colorado Natural Heritage Program.
- Marshall Mesa geology includes sandstone outcrops, plant fossils, and a coal seam. Evidence from historic Marshall Mesa coal mining activities is present, and interpretive signs provide highlights to visitors.

Planned Major Access Opportunities

- Further evaluation of the status of the Marshall Mesa Trailhead and its associated crowding and unsafe conditions.
- A new City Limits Trailhead that would be connected to the Community Ditch Trail.
- Potential for potable water and restrooms at the City Limits Trailhead.

Major Trail Requests Identified in the Public Questionnaire (See Map 3. Marshall Mesa-Southern Grasslands Trail Study Area Planned and Requested Trail Improvements)

- New City Limits Trailhead with visitor services such as potable water and public toilets.
- Connection of the City Limits Trailhead with Community Ditch Trail
- Designation of some of the undesignated trails to historical or geological features.

DRAFT

Major Access Constraints

City Limits Trailhead

- Possible need for an engineering solution to ground subsidence and / or contamination at the City Limits Trailhead.

Marshall Mesa Trailhead

- Planned S.H. 170 road widening and new bike lanes will reduce the width of the current parking area and may affect the existing parking at the trailhead.

East Marshall Mesa Natural Area

Existing Visitor Use

- No designated trails currently exist.
- Considerable visitor use occurs on undesignated trails heading toward Marshall Lake and Superior.
- Dog management is on-leash or voice-and-sight control.

Natural Resources

- This management area includes drier upland grasslands (mostly Western wheat-mixed grass prairie), but also some wetter big bluestem tallgrass patches, and patches of green needle grass (a rare Front Range endemic species) and shrublands. Diverse riparian areas are present in the Cowdrey drainage and along the ditches, and wetlands exist in low-lying areas.
- While this management area was severely disturbed by mining activity in the 19th and 20th centuries, many native plant communities have recovered to varying degrees.

Planned Major Access Opportunities

- Extension of the Marshall Mesa Trail East to South 66th Street and then connection to Coal Creek Drive, providing new multiple-use recreational opportunities (including bicycling) and completing the northern part of the trail loop in the TSA. These trail improvements are identified in the Boulder Valley Comprehensive Plan.

Major Trail Requests Identified in the Public Questionnaire (See Map 3)

- Extension of the Marshall Mesa Trail east to S. 66th Street and then farther east and south to Boulder County Open Space properties.
- New connecting trail from the Marshall Mesa Trail eastern extension north (across S.H. 170) to the Davidson Mesa area.

Major Access Constraints

South 66th Trail Connection

- Cowdrey drainage wetlands and riparian areas.
- Some rare plant communities (e.g., green needle grass) and plant species (dwarf leadplant), a small prairie dog colony (not yet mapped), and pockets of shrub bird habitat.

DRAFT

- Contaminated area on the east side of S. 66th Street: need for stabilization of contaminated soils, fencing, and continuation of an area closure to provide safe public trail access through the Damyanovich property to S. 66th.

Southern Grasslands Habitat Conservation Area (HCA) / Doudy Draw Natural Area

The Southern Grasslands HCA contains the largest relatively intact block of grassland habitat in the Open Space and Mountain Parks system (a mosaic of plains riparian, tallgrass, mixed grass, and short grass habitats). It is a diverse complex of many different kinds of prairie grassland communities. Natural processes and functions occur in this grassland to a greater extent than elsewhere because of the large size of this un-trailed habitat block, its remoteness from development, and proximity to other large expanses of natural prairie lands owned by other public entities. This large block of prairie habitat supports a very diverse suite of wildlife species that depend on little human disturbance and various natural processes that can only occur in large habitat blocks.

Coal Creek Subarea

Existing Visitor Use

- The Coal Creek riparian restoration area is currently fenced and closed to public access. Historically, the Coal Creek corridor has received a low level of off-trail travel by visitors.
- Some current off-trail visitation occurs on the Varra access road and other undesignated trails outside the restoration area.

Natural Resources

The Coal Creek riparian restoration area contains a multitude of highly valuable and vulnerable resources that are unique and sensitive, and are in the process of being restored. Some of the reasons that this riparian area is so important ecologically is the un-trailed seven-mile stretch of the creek (Coal Creek is one of the only un-trail plains streams in the Front Range), the abrupt transition from foothills to plains riparian ecosystems, the contiguity of the riparian area with adjacent large patches of high-quality grassland, which supports diverse habitats for different life-cycle stages and foraging needs of reptiles, amphibians, birds, and large and small mammals. Specific important resources present in this subarea include:

- Rare un-trailed plains riparian ecosystem with a high level of biodiversity due to: the steep-gradient stream transition from foothills to plains; hybridization of upper- and lower-elevation cottonwood riparian species (which increases habitat diversity); and a rich variety of wetland, riparian, and upland plant communities that support a high diversity of insects and riparian and shrubland birds.
- Refuge for rare and imperiled plant communities and species listed by the Colorado Natural Heritage Program.
- Occupied and potential habitat for the federally-listed threatened Preble's meadow jumping mouse.
- Many natural hydrologic processes are in place with dynamic Coal Creek's stream channels and flood plain complex.

DRAFT

- Undisturbed raptor nesting, perching, and hunting area and site for nesting of federally-listed bald eagles.
- Undisturbed habitat for amphibians, including Northern Leopard Frogs that are a species of concern.
- Riparian forest and shrubland that is an important shelter for small mammals and birds.
- Important wildlife movement corridor from the foothills to the plains.
- Major restoration focus for stream channel and flows, wetlands, fish passage, and riparian and other native plant communities.

Planned Major Access Opportunities

- None.

Major Trail Requests Identified in the Public Questionnaire (See Map 3)

- Trails in the Coal Creek restoration area or parallel to it.
- Trails crossing through the restoration area.

Major Access Constraints

- The high ecological value of this rare stretch of un-trailed prairie riparian corridor, along with the major commitment of funds for its ecological restoration, make trails in the area or trail crossings of the riparian corridor have a higher resource impact potential.

Greenbelt Plateau Subarea

Existing Visitor Use

- The Greenbelt Plateau subarea currently has only one trail in it: the Greenbelt Plateau Trail that forms the boundary between the Doudy Draw Natural Area and the Southern Grasslands Habitat Conservation Area. This trail receives a moderate amount of visitor use.
- Some off-trail visitation occurs on various undesignated trails. A separate user-created undesignated trail runs parallel to the Greenbelt Plateau Trail is used mainly by bicyclists who want a “single-track” trail. Concerns have been raised that these parallel trails foster the spread of weeds and expand the “trail effect” that fragments and reduces the value of habitat.
- A recently installed stoplight at the intersection of State Highways 128 and 93 now provides a safe road crossing and connection from the Greenbelt Plateau Trail to the Doudy Draw Trail .
- Dog management in this subarea is a combination of dogs on-leash or under voice-and-sight control in the Doudy Draw Natural Area portion of this subarea and on the Greenbelt Plateau Trail and dogs on-trail and on-leash in the Southern Grasslands HCA portion of the subarea.

Natural Resources

- The Greenbelt Plateau subarea contains large patches of native xeric tallgrass dominated by various big bluestem plant communities—some of the best occurrences in the OSMP system.

DRAFT

- This subarea provides a refuge for rare and imperiled plant communities and species listed by the Colorado Natural Heritage Program, as well as occurrences of rare CNHP-listed butterflies.
- The Greenbelt Plateau subarea is a very important area for grassland nesting birds. The area supports both high avian species richness (i.e., many different kinds of species including those of special concern) and high overall bird nesting density; the area is only one of two known places on OSMP lands that supports the full suite of the five primary grassland bird species.
- In the northern part of the Southern Grasslands HCA, a large complex of prairie dog colonies is located south of Marshall Lake.

Planned Major Access Opportunities

- None.

Major Trail Requests Identified in the Public Questionnaire (See Map 3)

- New trail that would allow visitors to travel from the Greenbelt Plateau Trail to an under-crossing of S.H. 93 and then connect with the Doudy Draw Trail. This under-crossing would go through the existing culvert that allows livestock to cross under S.H. 93.
- New trail from Marshall Mesa to the area south of Marshall Lake that would form a “stacked trail loop” system with the Marshall Mesa Trail.
- New flat and easy loop trail accessible to people with disabilities from the Greenbelt Plateau Trailhead and offering scenic vistas.
- Modification of the flat, wide, straight Greenbelt Plateau Trail (an old roadbed) by narrowing the trail and building in some higher-interest serpentine curves. These modifications would be designed to slow down bicyclists, reduce conflict between bikes and pedestrians and horses, and encourage visitors to stay on trail.
- A northern or interior alignment of the trail connection between Greenbelt Plateau Trailhead to a mid section of the Coalton Trail. This alignment would basically run east-west from the trailhead and would connect with other requested north-south trails in the eastern part of the Trail Study Area. This alignment would run south of the Coal Creek subarea and would cut through the interior of the Southern Grasslands HCA.

Major Access Constraints

- This subarea’s high-quality big bluestem xeric tallgrass prairie provides very important relatively undisturbed habitat for grassland nesting birds.
- Public access is not allowed in the Hayes conservation easement / Eggelston Reservoir # 4 Wildlife Preservation Area, the Varra active mining and mine reclamation closure area, and the Rothman conservation easement.
- Currently, private entities lease Marshall Lake for private recreational use. In addition, the large complex of prairie dog colonies south of Marshall Lake is a significant constraint to increased public access to the lake.

DRAFT

Southern Grasslands Core Area

Existing Visitor Use

- This subarea currently has no designated trails in it, except for the Coalton Trail that forms the eastern boundary of the Southern Grasslands HCA and receives a low level of visitation.
- Undesignated trails are minimal, and the amount of off-trail use is low.
- A launch site for beginning-level hang gliders has historically been located on the north side of State Highway 128 on the Waneka property. The area of landing activity is relatively small.
- Dog management in this subarea is dogs on-trail and on-leash.

Natural Resources

- This subarea is a large block of high-quality unfragmented grassland habitat, which is remote from development and adjacent to other large stretches of similar protected habitat (i.e., other OSMP lands to the north and west, Boulder County Open Space to the east and south, and Rocky Flats National Wildlife Refuge to the south). This subarea is drier than Greenbelt Plateau, and the prairie grasses are dominated by Western wheatgrass and blue grama. The value of this large un-trailed grassland habitat block (the largest single block of intact grassland in OSMP) lies in being able to support a very diverse suite of wildlife species that depend on little human disturbance and various natural processes that can only occur in large habitat blocks.
- This grassland includes several rare and imperiled plant communities listed by the Colorado Natural Heritage Program. Rare plant communities includes those on mesa tops (such as several big bluestem types, New Mexico feathergrass) and in other locations (such as blue grama-buffalo grass). The grassland supports CNHP-listed rare and imperiled butterflies that depend on large expanses of native prairie.
- This subarea includes several large important undisturbed prairie dog colonies and is the largest designated Prairie Dog Habitat Conservation Area in Open Space and Mountain Parks. The extensive prairie dog colonies, because of the large habitat block, can expand, contract, and migrate over the landscape naturally over time, and natural predator-prey relationships and behaviors can be maintained.
- The grassland is large enough and intact enough to be a site for threatened and endangered species reintroductions (e.g., Plains sharp-tailed grouse and pronghorn antelope).
- Prescriptive grazing is used as a management tool in the dominant mixed-grass community to suppress weedy species and stimulate the growth of native species.

Planned Major Access Opportunities

- Trail connection from the Coalton Trail to Greenbelt Plateau Trail completing the southern part of the loop trail at the periphery of the TSA. This trail connection is identified in the Boulder Valley Comprehensive Plan.

DRAFT

Major Trail Requests Identified in the Public Questionnaire (See Map 3)

- Trail connection from the Coalton Trail to the Greenbelt Plateau Trailhead.
- Several trails in the interior of this habitat block connecting to the Coalton Trail and the planned Coalton-Greenbelt Plateau trail link.
- Improvement of Greenbelt Plateau Trailhead with better ingress to the site, extension of paving, and accommodation of horse trailer parking.
- Improvement of the Coalton Trail parking area off S.H. 128.

Major Access Constraints

- Ecological value of this core habitat block that derives from its remoteness and current undisturbed condition.
- The high-quality grassland nesting bird habitat and prairie dog habitat.
- The potential for Plains sharp-tailed grouse reintroduction.
- A significant threat of weed dispersal into the three rare plant community types present in the current hang gliding landing site along S.H. 128, with the possibility of weeds being carried in from other local launch and landing sites, e.g., jointed goat grass to the Southern Grasslands area.

Possible Expansion of the Greenbelt Plateau Trailhead

- The trailhead is adjacent to tallgrass communities on the north, west, and east.

Coalton to Greenbelt Plateau Trail Connection

- CDOT has ruled that an OSMP trail cannot be placed in the S.H. 128 R.O.W.
- Several natural resources will need to be protected or mitigated: rare plant communities, prairie dogs, wetlands, riparian areas, and grassland bird habitat.
- Large continuous habitat block.

Rocky Flats Subarea

Existing Visitor Use

- No designated trails in this subarea. Overall visitor use levels are low.
- Some off-trail visitor activities have historically occurred in this subarea, including hiking and occasional model airplane use and dog training activities.
- Dog management in this subarea is dogs on-trail and on-leash.

Natural Resources

- This subarea is a high quality block of unfragmented grassland habitat (including extensive big bluestem communities), which are adjacent to similarly protected lands owned by the federal government to the south and east (i.e., National Wind Technology Center and Rocky Flats National Wildlife Refuge).
- This subarea includes several rare and imperiled plant communities listed by the Colorado Natural Heritage Program, as well as high-quality habitat for the Preble's meadow jumping mouse and a rare pocket gopher subspecies.

DRAFT

- The subarea contains extensive wetlands and riparian areas, which are fed by springs, seeps, and Coal Creek. The Coal Creek riparian restoration area extends south into this subarea.
- In addition to important nesting grassland bird habitat, this subarea includes important shrubland habitat on prairie escarpments and north-facing slopes. These shrubland areas are valuable habitat for many birds and small mammals.

Planned Major Access Opportunities

- None.

Major Trail Requests Identified in the Public Questionnaire (See Map 3)

- New trail along the east side of S.H. 93 and a spur trail connecting to the culvert under S.H. 128.

Major Access Constraints

- Major concentration of wetlands, seeps, and springs.
- Coal Creek riparian restoration corridor.
- Federally-listed Preble's meadow jumping mouse habitat.
- Potential site for Plains sharp-tailed grouse reintroduction.
- Cultural resource locations.

DRAFT

Attachment A

Explanation of Grid-Based Spatial Overlay Analysis Used in Developing the Composite Map of Key Natural and Cultural Resources

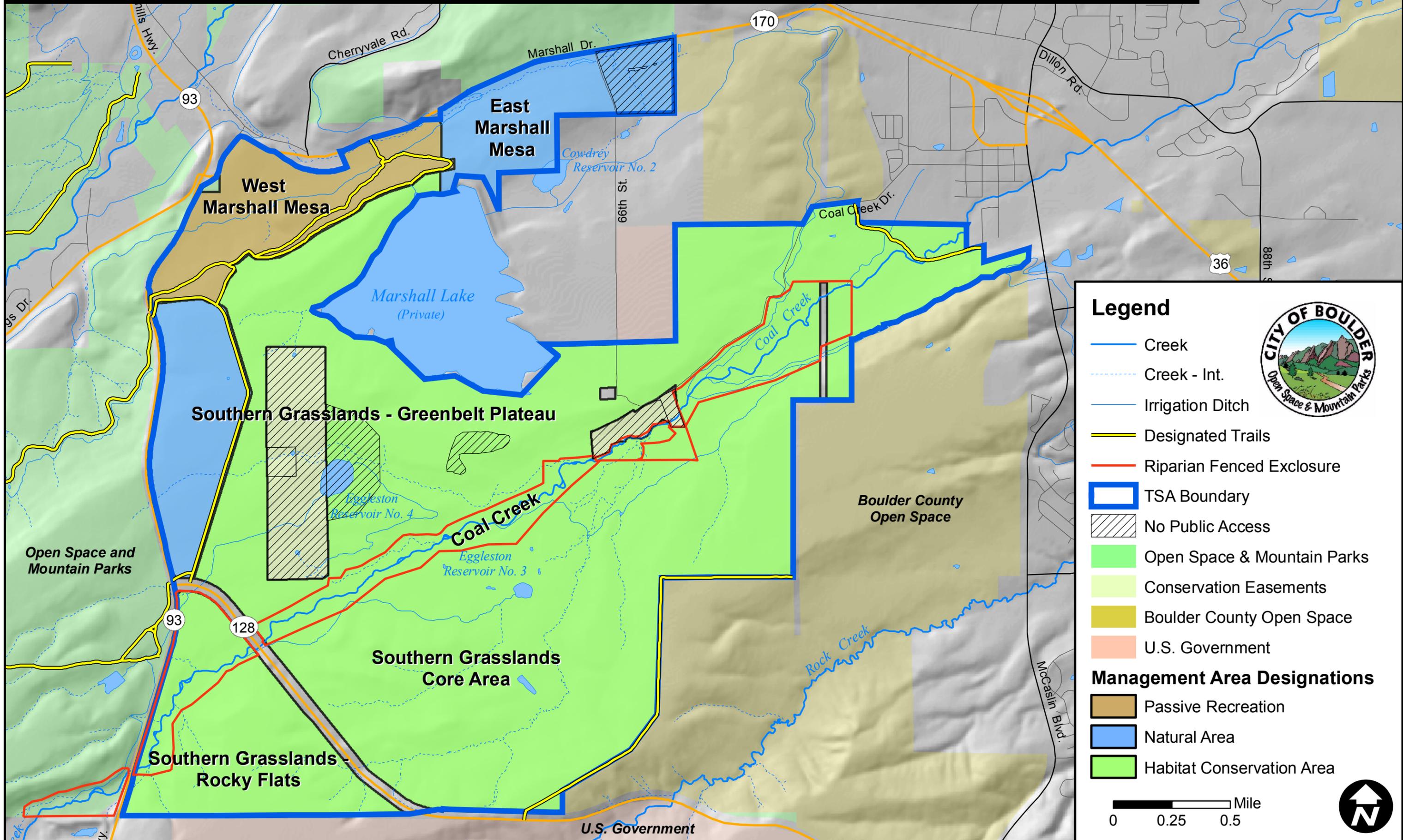
In order to determine the suitability of proposed trail alignments, it is necessary to create a suitability model that examines the coincidence of natural resource spatial datasets for the area. This is made possible by completing an unweighted grid-based analysis using GIS to compile all pertinent data in order to display the suitability model in a single data layer. For this particular analysis we used the following 12 datasets:

- ½-Mile Bald Eagle Nest Site Buffer Zone
- Burrowing Owl Breeding Area
- Coal Creek Riparian Restoration Area (fenced enclosure)
- Colorado Natural Heritage Program's (CNHP) Rare Plants Occurrences
- CNHP Plant Communities of Special Concern
- CNHP Rare Animal Occurrences
- Cultural / Historical Occurrences (Colorado Historical Society)
- Eggleston Reservoir #4 Wildlife Preservation Area
- Preble's Meadow Jumping Mouse Conservation Zones
- Riparian Vegetation
- Wetland Vegetation
- 2004 Prairie Dog Colonies

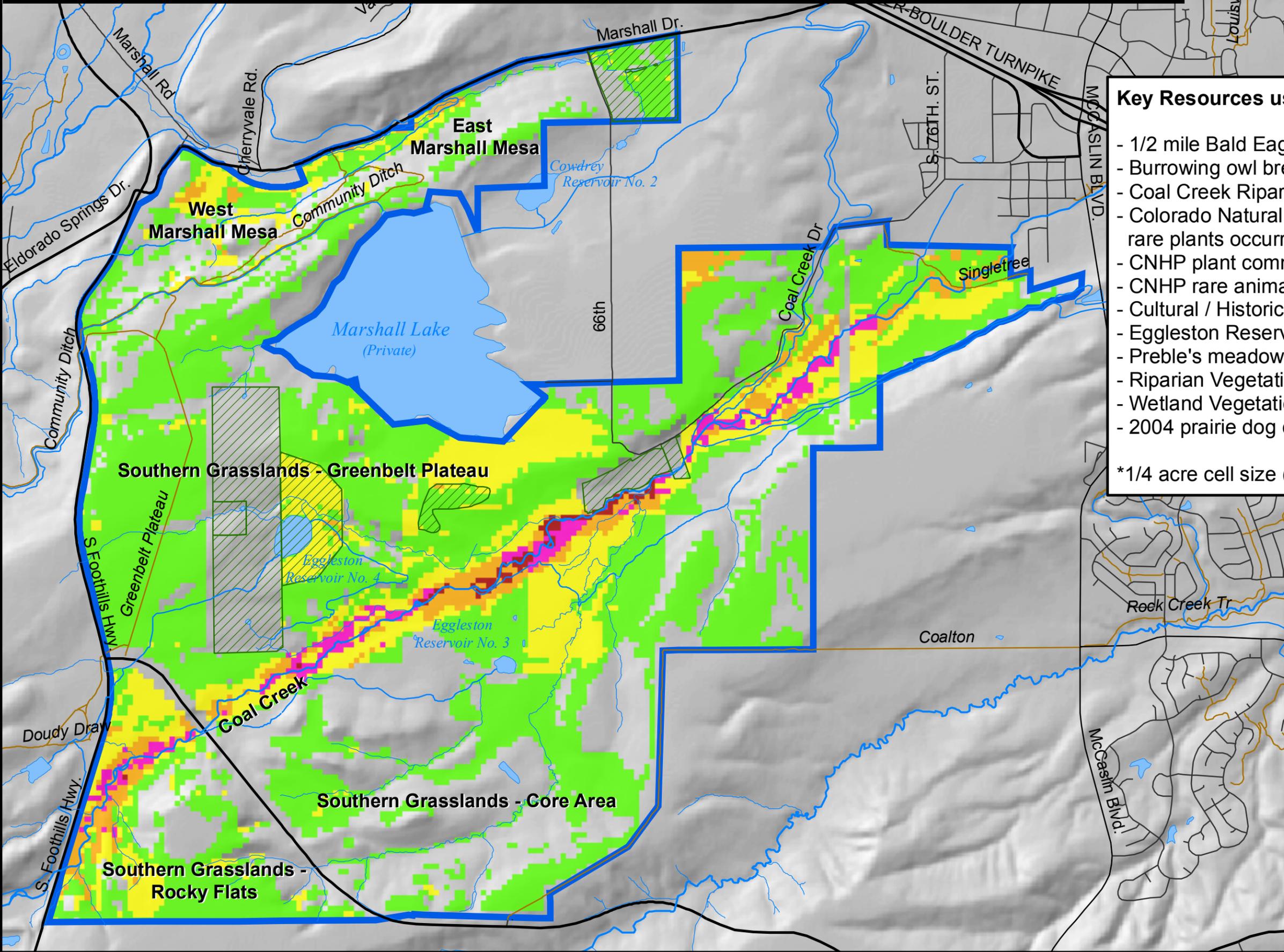
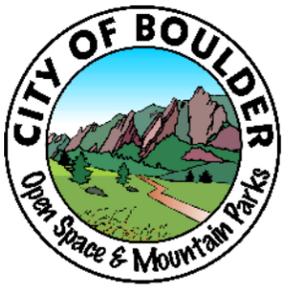
Each dataset was converted separately to raster, or grid format, with a cell size of 0.25 acre (each side of the cell is 104.36 ft). Where the resource was present, the grid cells were assigned a value of 1, and when the particular resource was not present, the grid cell received a value of 0. This step was completed for each of the 12 datasets; and then all resulting grids were added together to determine the number of resources present within each grid cell. For example, a grid cell receiving a score of four could be the result of containing the following four resources: Bald eagle nest, Coal Creek Riparian Restoration Area, a CNHP tracked vegetation community, and the Preble's meadow jumping mouse Conservation Zone.

The results of this analysis show the relative differences in the number of Key Cultural and Natural Resources within the Trail Study Area.

Map 1. Marshall Mesa-Southern Grasslands Trail Study Area (TSA) Subareas Map



Map 2. Marshall Mesa - Southern Grasslands Trail Study Area (TSA) Composite Map of Key Natural and Cultural Resources



- Key Resources used in this analysis* -**
- 1/2 mile Bald Eagle Nest buffer zone
 - Burrowing owl breeding area
 - Coal Creek Riparian Restoration Area
 - Colorado Natural Heritage Program's (CNHP) rare plants occurrences
 - CNHP plant communities of special concern
 - CNHP rare animal occurrences
 - Cultural / Historical localities
 - Eggleston Reservoir #4 Wildlife Preservation Area
 - Preble's meadow jumping mouse Conservation Zones
 - Riparian Vegetation
 - Wetland Vegetation
 - 2004 prairie dog colonies
- *1/4 acre cell size (104.36 ft on each side)

Legend

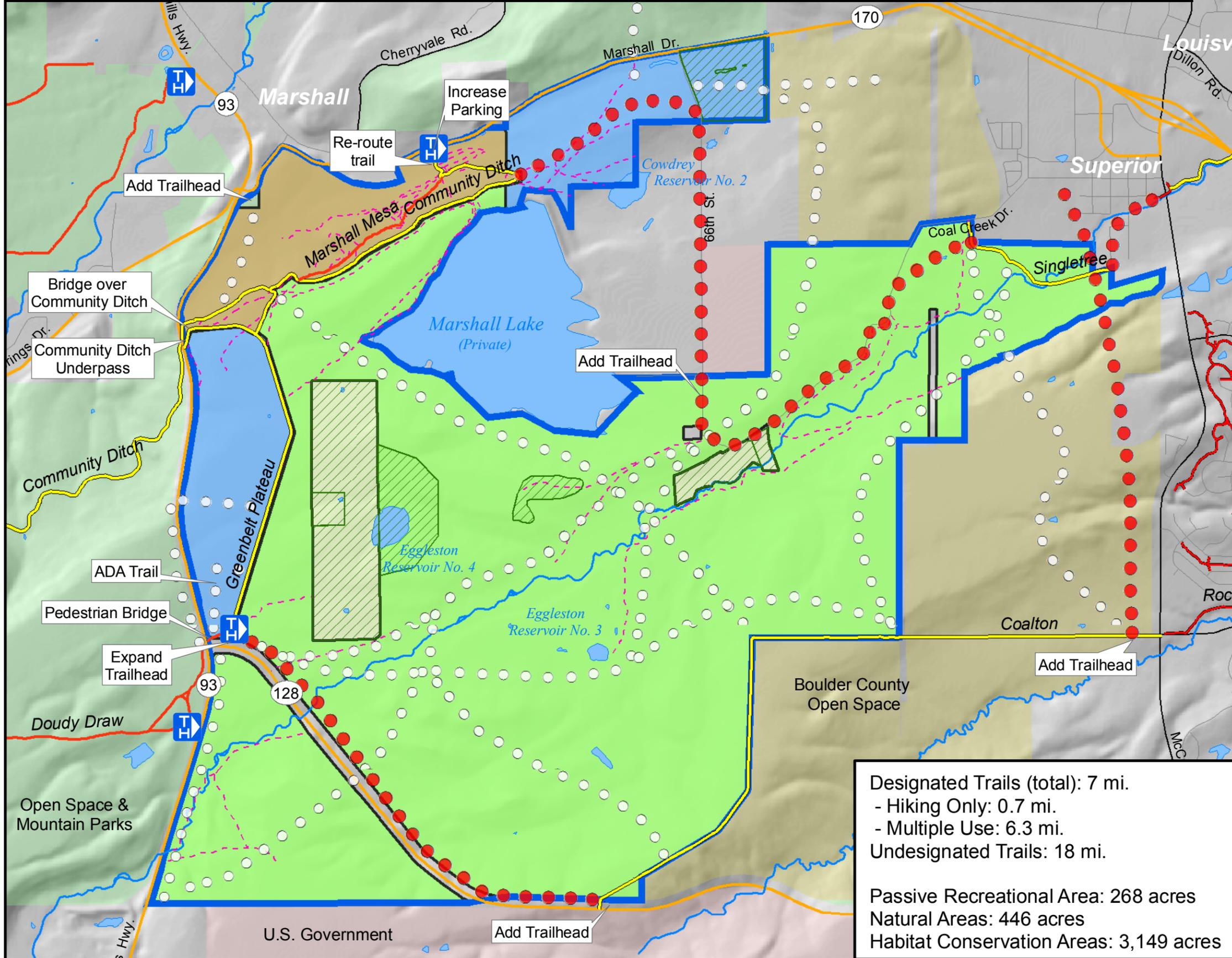
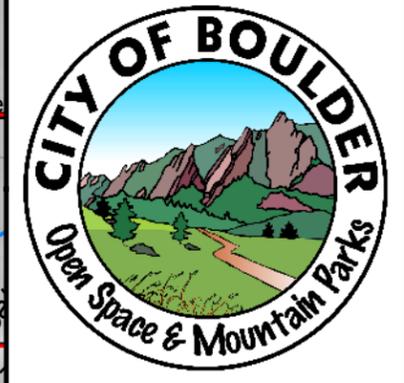
Number of overlapping resources

Grey	1
Light Green	2
Yellow	3
Orange	4
Pink	5
Red	6

No Public Access
 TSA Boundary

Mile
 0 0.25 0.5

Map 3. Marshall Mesa-Southern Grasslands Trail Study Area (TSA) Planned and Requested Trail Improvements



Legend

All Proposed Trails

- Comprehensive Plan Approved
- Citizen Requested Trails
- TH Existing Trailheads

Designated Trails

- Hiking Trail
- Multi-Use Trail
- Paved Path

Undesignated Trails

- - - Undesignated Trails

Management Area Designations

- Open Space Mountain Parks
- Boulder County Open Space
- U.S. Government
- No Public Access
- Conservation Easements
- TSA Boundary
- Passive Recreation
- Natural Area
- Habitat Conservation Area

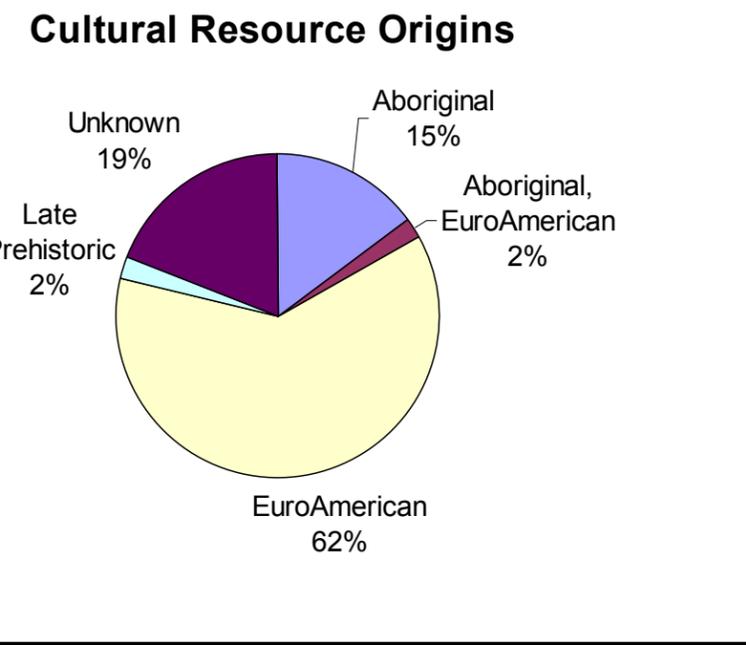
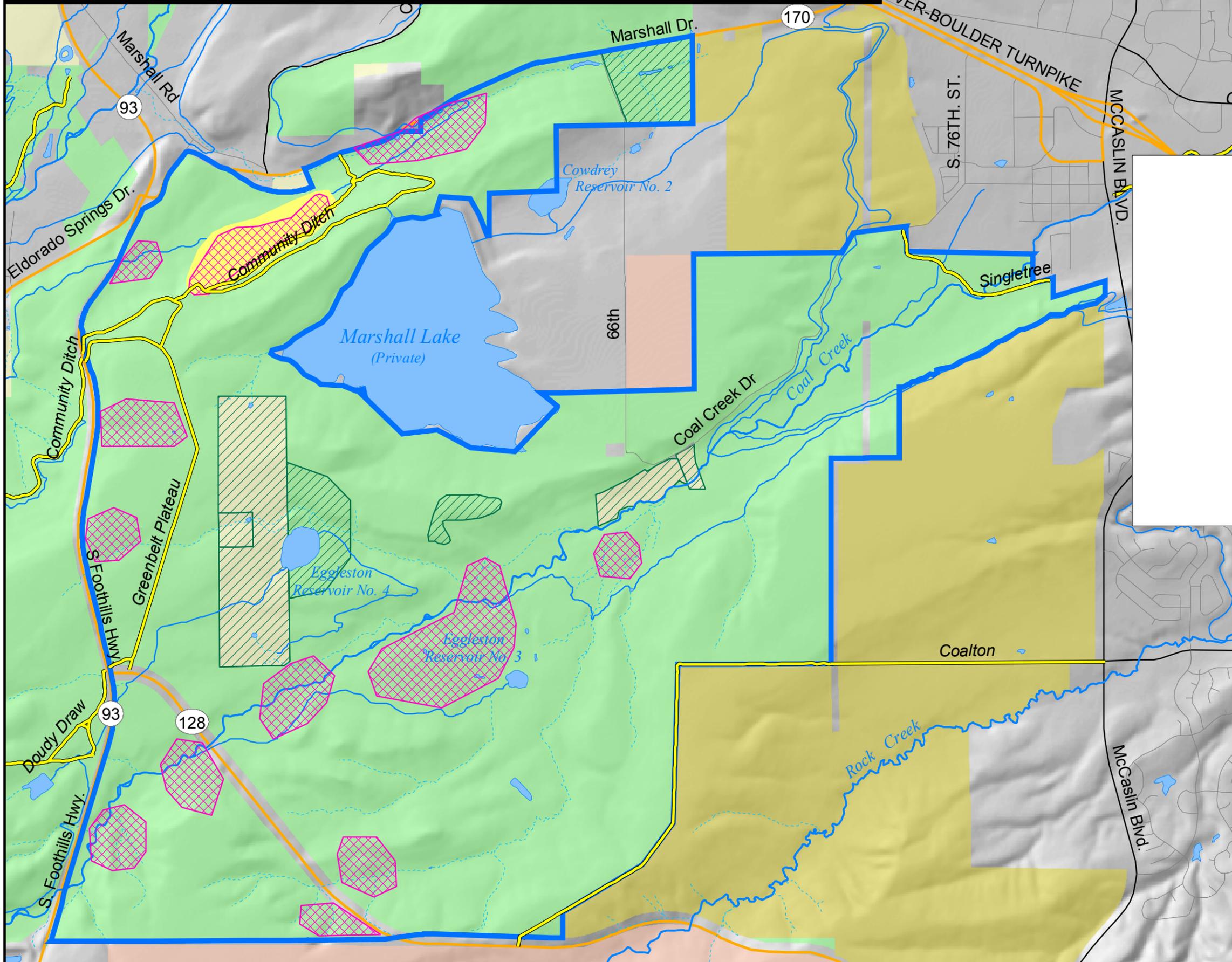
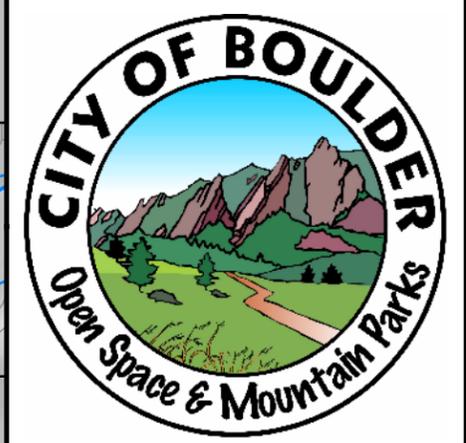
Scale: 0 0.25 0.5 Mile

North Arrow

Designated Trails (total): 7 mi.
 - Hiking Only: 0.7 mi.
 - Multiple Use: 6.3 mi.
 Undesignated Trails: 18 mi.

Passive Recreational Area: 268 acres
 Natural Areas: 446 acres
 Habitat Conservation Areas: 3,149 acres

Map 4. Marshall Mesa-Southern Grasslands Trail Study Area (TSA) Cultural Resource Areas

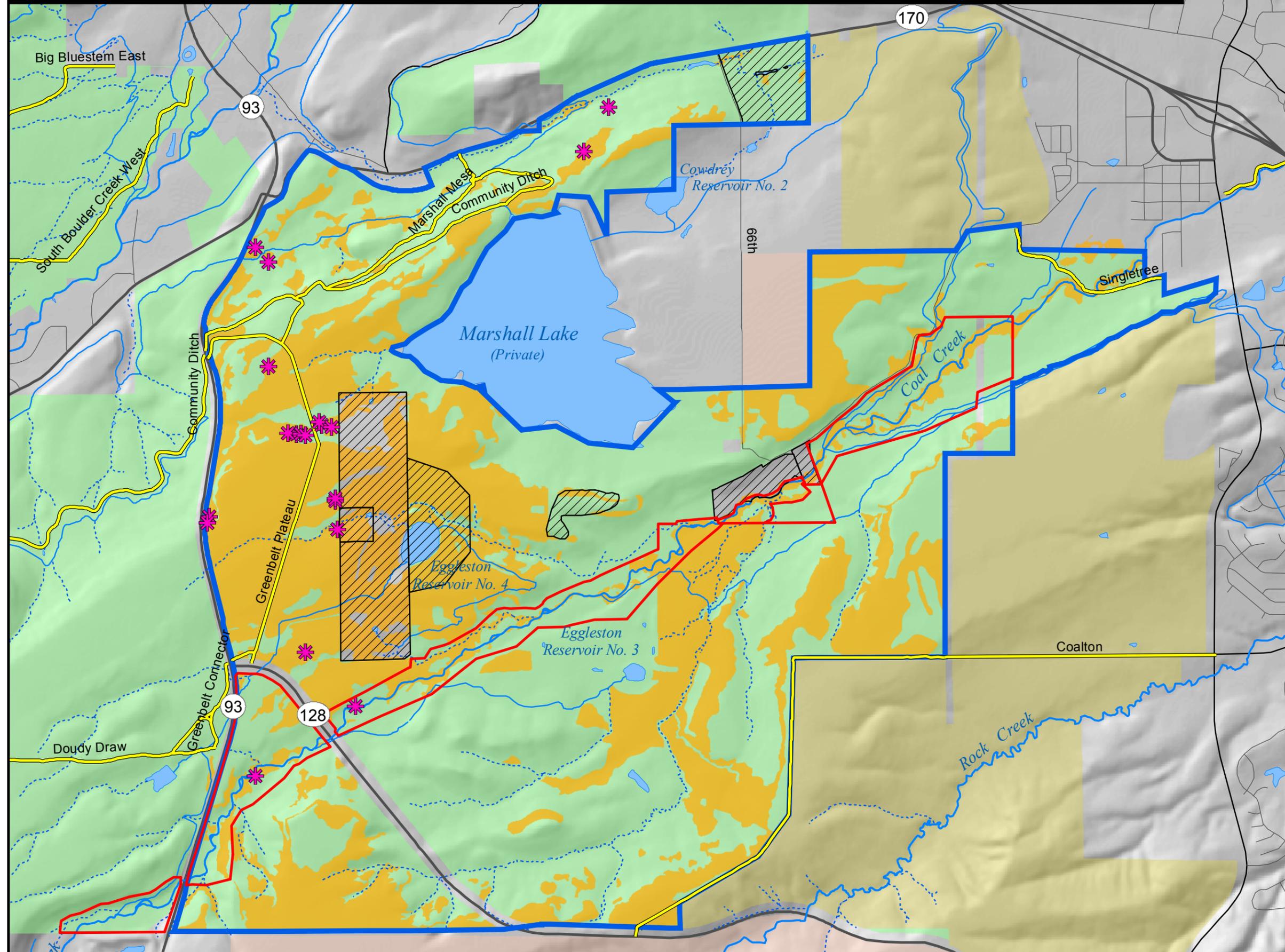
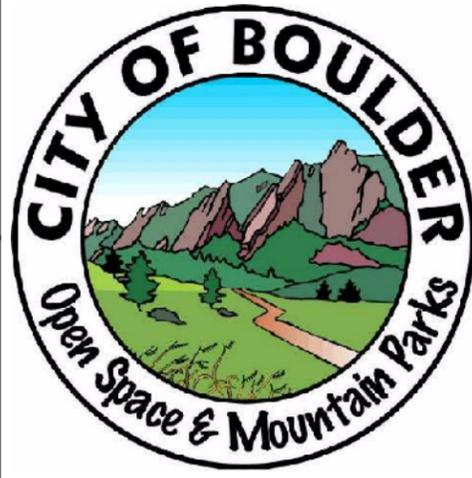


Legend

- Cultural Resources Areas
- Historic Mining District
- Trails
- Open Space and Mountain Parks
- Conservation Easement
- Boulder County Open Space
- U.S. Government
- No Public Access
- TSA Boundary

0 0.25 0.5 Mile

Map 5. Marshall Mesa - Southern Grasslands Trail Study Area (TSA) Rare Plant Species and Vegetation Communities

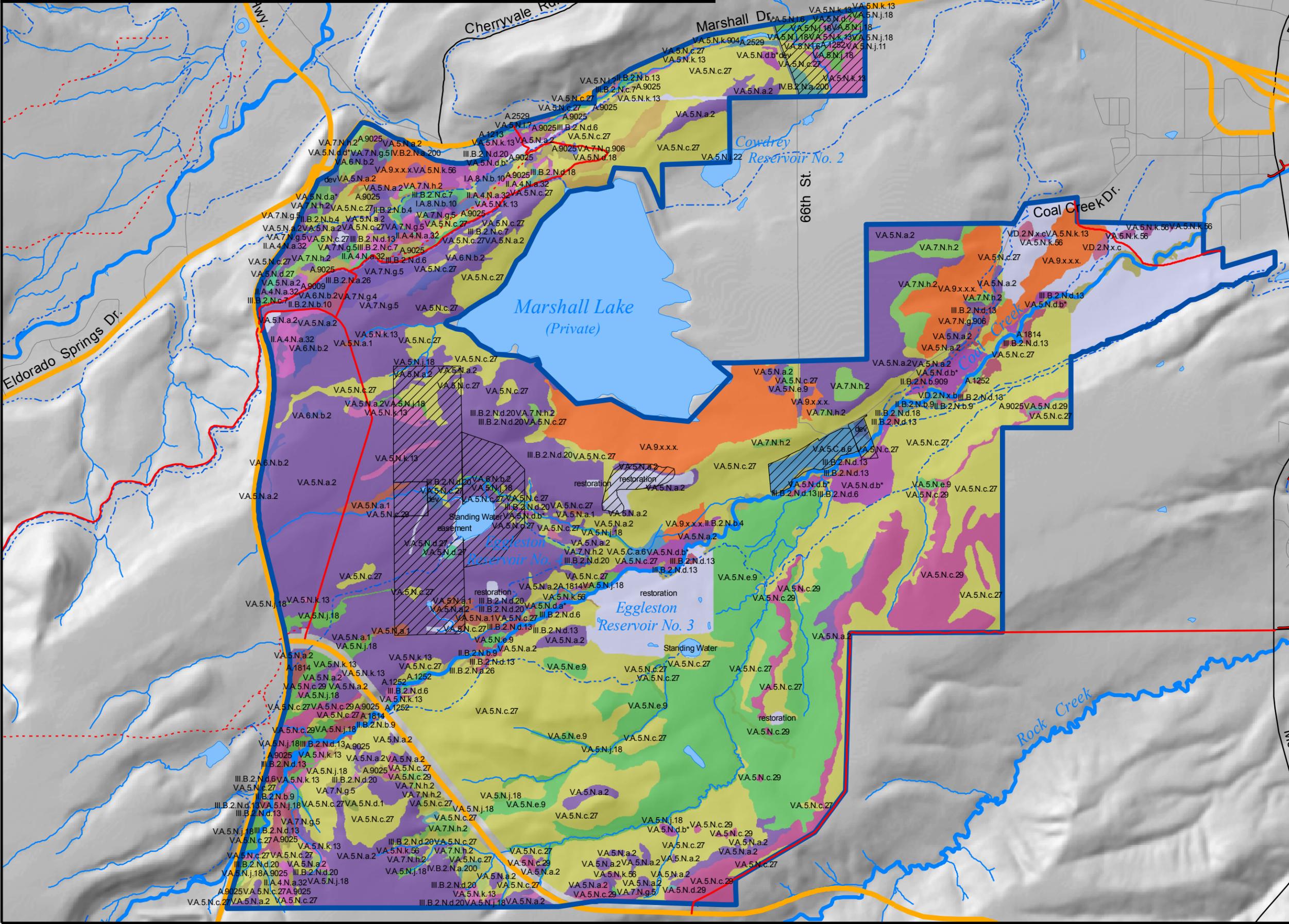


Legend

- Rare Plant Occurrences
- Riparian Fenced Enclosure
- Creeks
- Creek - Int.
- Irrigation Ditch
- Rare Vegetation Communities
- No Public Access
- Fee Property
- Boulder County Open Space
- U.S. Government
- TSA Boundary
- Designated Trails

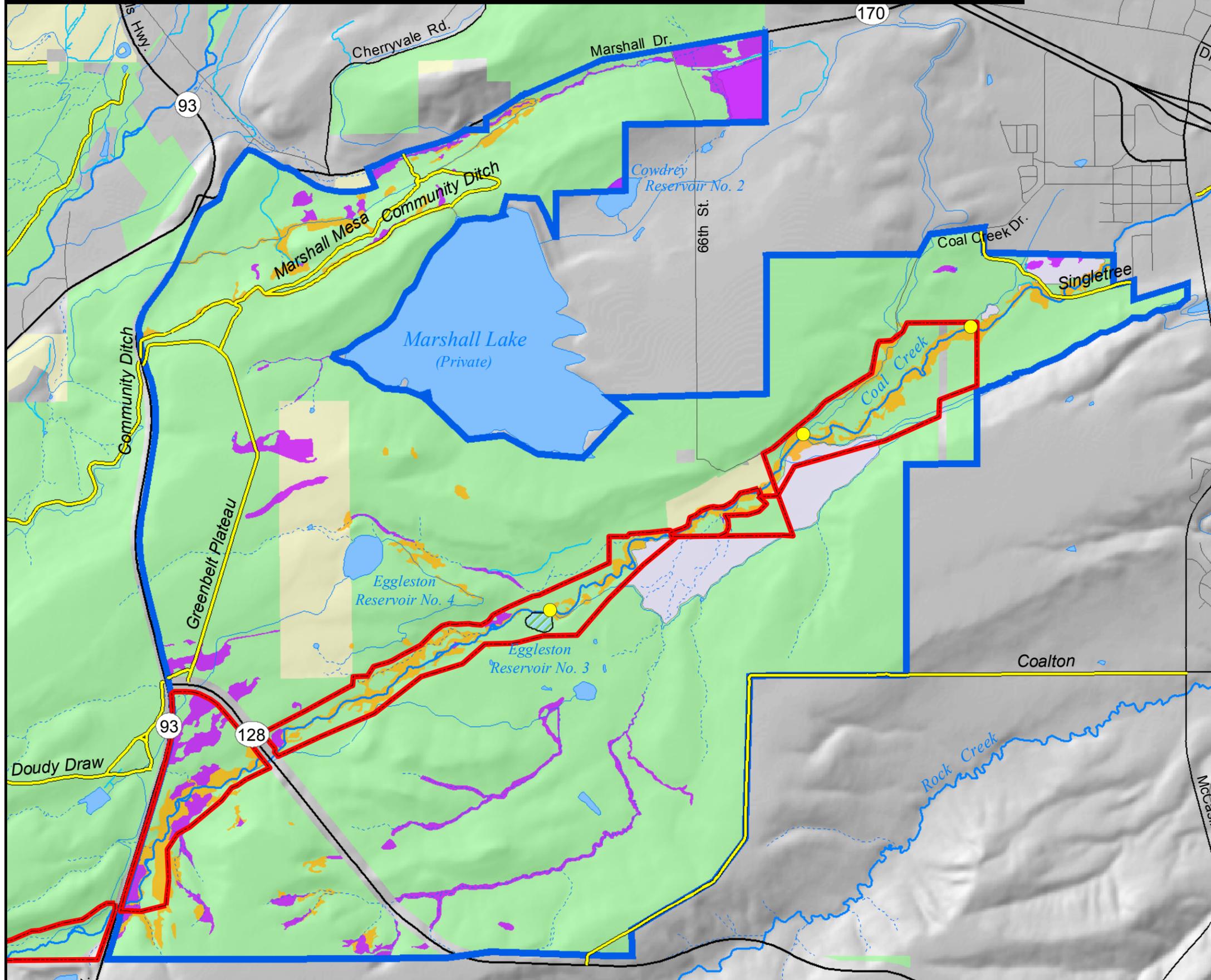
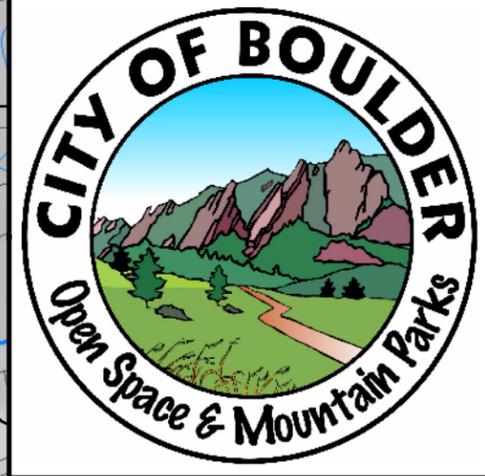


Map 6. Marshall Mesa-Southern Grasslands Trail Study Area (TSA) Detailed Vegetation Map



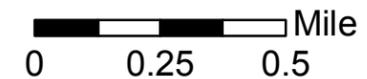
- ### Legend
- #### Vegetation Alliances
- Other
 - (Black Hawthorn, Fleshy Hawthorn) Temporarily Flooded Shrubland Alliance
 - (Tall Fescue, Meadow Fescue) Herbaceous Alliance
 - Alkali Sacaton Herbaceous Alliance
 - Annual-dominated Floodplain Disturbance Community
 - Baltic Rush Seasonally Flooded Herbaceous Alliance
 - Big Bluestem - (Bluejoint, Switchgrass) Herbaceous Alliance
 - Big Bluestem - (Yellow Indiangrass) Herbaceous Alliance
 - Black Tailed Prairie Dog Grassland Complex
 - Blue Grama Herbaceous Alliance
 - Bluestem Willow Temporarily Flooded Shrubland Alliance
 - Box-elder Temporarily Flooded Woodland Alliance
 - Canada Bluegrass Semi-Natural Herbaceous Alliance
 - Cattail Bulrush Sempipermanently Flooded Herbaceous Alliance
 - Cattail Herbaceous Alliance
 - Cheatgrass Annual Grassland
 - Choke Cherry Shrubland Alliance
 - Coyote Willow, Sandbar (Willow) Temporarily Flooded Shrubland Alliance
 - Crested Wheatgrass Semi-Natural Herbaceous Alliance
 - Disturbed Cultivated Agricultural Pasture
 - Eastern Cottonwood Temporarily Flooded Woodland
 - Emory Sedge Seasonally Flooded Herbaceous Alliance
 - Foxtail Barley Temporarily Flooded Herbaceous Alliance
 - Green Needlegrass Herbaceous Alliance
 - II-scented Sumac Intermittently Flooded Shrubland Alliance
 - Intermediate Wheatgrass Semi-natural Herbaceous Alliance
 - Marsh Spikerush Herbaceous Alliance
 - Mountain Ninebark Shrubland
 - Mountain-mahogany Shrubland Alliance
 - Moving Water
 - Narrowleaf Cottonwood Temporarily Flooded Woodland
 - Nebraska Sedge Herbaceous Alliance
 - Needle and Thread - Blue Grama Herbaceous Alliance
 - Needle-and-Thread Bunch Herbaceous Alliance
 - Netleaf Hackberry Woodland
 - New Mexico Needlegrass Herbaceous Alliance
 - Non-Native Dominated Temp. Flooded Woodland
 - Peachleaf Willow Temporarily Flooded Woodland
 - Ponderosa Pine Forest
 - Ponderosa Pine Tallgrass Savannah Herbaceous Alliance
 - Ponderosa Pine Woodland
 - Prairie Cordgrass Temporarily Flooded Herbaceous Alliance
 - Redtop (introduced) Seasonally Flooded Herbaceous Alliance
 - Russian Olive Semi-Natural Woodland Alliance
 - Sand Dropseed Herbaceous Alliance
 - Sideoats Grama Herbaceous Alliance
 - Smooth Brome Semi-Natural Herbaceous Alliance
 - Smooth Sumac Shrub Savannah Herbaceous Alliance
 - Smooth Sumac Shrubland Alliance
 - Snakeweed Dwarf-shrubland Alliance
 - Soapweed Yucca Evergreen Shrubland
 - Soapweed Yucca Shrub Savannah Herbaceous Alliance
 - Standing Water
 - Three-leaved Sumac Shrub Savannah Herbaceous Alliance
 - Three-leaved Sumac Upland Shrubland
 - Threesquare Herbaceous Alliance
 - Upland Disturbance Community
 - Western Snowberry Temporarily Flooded Shrubland Alliance
 - Western Wheatgrass Herbaceous Alliance
 - Western Wheatgrass Temporarily Flooded Herbaceous Alliance
 - Wood's Rose Shrub Herbaceous Alliance
 - Wood's Rose Temporarily Flooded Shrubland Alliance
 - Developed

Map 7. Marshall Mesa - Southern Grasslands Trail Study Area (TSA) Riparian & Wetland Resources

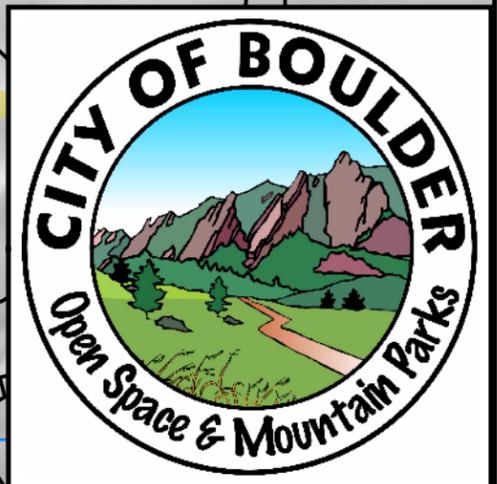
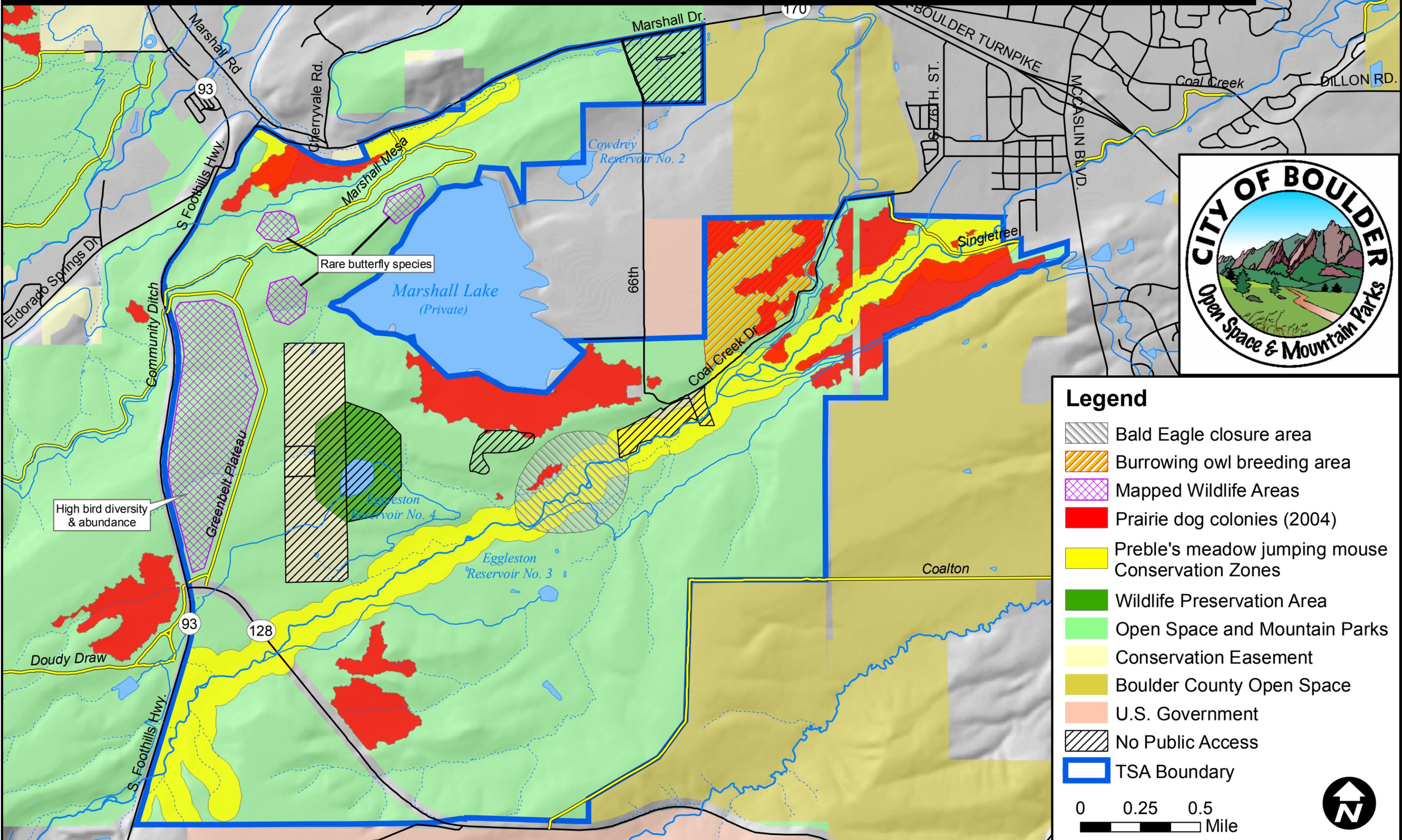


Legend

- Fish Passage Sites
- Riparian Restoration Area
- Creeks & Ditches**
- Creek
- Lateral
- Irrigation Ditch
- - - Creek - Intermittent
- Wetland Riparian Restoration Projects
- Riparian vegetation
- Wetland vegetation
- Irrigated fields
- Lakes
- Open Space & Mountain Parks
- Conservation Easement
- TSA Boundary



Map 8. Marshall Mesa-Southern Grasslands Trail Study Area (TSA) Wildlife Resources



Legend

- Bald Eagle closure area
- Burrowing owl breeding area
- Mapped Wildlife Areas
- Prairie dog colonies (2004)
- Preble's meadow jumping mouse Conservation Zones
- Wildlife Preservation Area
- Open Space and Mountain Parks
- Conservation Easement
- Boulder County Open Space
- U.S. Government
- No Public Access
- TSA Boundary

0 0.25 0.5
 Mile

High bird diversity & abundance

Rare butterfly species

Marshall Lake
(Private)

Eggleston Reservoir No. 4

Eggleston Reservoir No. 3

Cowdrey Reservoir No. 2

Greenbelt Plateau

66th

Singletree

Coalton

Doudy Draw

93

128

170

Marshall Rd

Cherryvale Rd.

Marshall Dr.

BOULDER TURNPIKE

176TH ST.

MCCASLIN BLVD.

Coal Creek

DILLON RD.

S Foothills Hwy.

Coal Creek Dr.

Eldorado Springs Dr

S. Foothills Hwy.