

Eldorado Canyon – Walker Ranch Trail Feasibility Study Findings Report



Boulder County Parks and Open Space
City of Boulder Open Space and Mountain Parks
Colorado Parks and Wildlife

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Introduction

Purpose of the Study

This study analyzes the benefits, drawbacks, and overall feasibility of a multi-use, natural surface trail between Eldorado Canyon State Park and Walker Ranch. The primary objectives of the Eldorado-Walker connection are:

- Improve access to the Walker Ranch Loop trail.
- Expand the range of trail-based recreation opportunities.
- Reasonably accommodate bicycles while maintaining the currently allowed activities of hiking, running, and horseback riding.

This report summarizes the findings of the feasibility analysis.

Background

Located in south-central Boulder County, Eldorado Canyon State Park and Walker Ranch Open Space are part of a broad landscape of publicly-owned, protected lands in the South Boulder Creek watershed. This landscape is characterized by dramatic rock outcrops, steep canyons, and rugged terrain, and is valued for its scenery, natural communities, and wildlife habitat.

For decades, recreationists and land management agencies have envisioned an east-west trail connection between Eldorado Canyon and Walker Ranch to improve access to the Walker Ranch Loop Trail, and to expand the range of trail-based recreation opportunities. An existing hiking trail currently makes this connection, but it is too steep and eroded to be safely and reasonably opened to bike access. This connection has been documented in several plans and studies, and was most recently considered in the Walker Ranch Management Plan (BCPOS 2013):



Eldorado Canyon from Rattlesnake Gulch Trail

“For many years, there has been a desire to create a multi-use link that could accommodate bicycles. Efforts were made to include that decision in this management plan. However, through discussions between the property owners involved, it is clear that more research is required. The three agencies have agreed to hire a consultant to explore different trail options and provide an analysis of the impacts of these various options. While such a connection to Walker Ranch is appropriate and is permitted

through this plan, the decision with respect to location and extent of the trail will occur outside of this plan and be approved by the County Commissioners.”

In early 2014, three partner agencies – Colorado Parks and Wildlife (CPW), City of Boulder Open Space and Mountain Parks (OSMP), and Boulder County Parks and Open Space (BCPOS), initiated this feasibility study to evaluate various options to complete a natural surface, multi-use trail between Walker Ranch Open Space and Eldorado Canyon State Park. This report presents the process and findings of this study, and includes information on proposed trail corridors, existing environmental and visitor conditions, feasibility and screening criteria, and trail implementation recommendations.

Existing Plans and Studies

Multi-use trail connections through this study area have been considered in several previous plans and studies. These are summarized below.

State of Colorado – Colorado the Beautiful Initiative (2016)

Under the Colorado the Beautiful Initiative in 2016, Governor John Hickenlooper designated the Eldorado Canyon to Walker Ranch trail connection as one of the “16 in 2016.” The intent of the initiative was to elevate critical trail gaps, missing segments, and undeveloped trails and to generate a more focused and coordinated discussion to support trails and recreation in Colorado.

Walker Ranch Management Plan – Boulder County Parks and Open Space (2013)

The 2013 Walker Ranch Management Plan provides management direction for historic preservation, habitat protection, and trail-based recreation. Key elements pertaining to this trail study include the designation of the BLM South Conservation Area, and the direction to explore and analyze options for a trail connection to Eldorado Canyon State Park.

The BLM South Conservation Area is a 1,000-acre area of contiguous undisturbed land with high habitat value. The approved management direction is to close this area to public access in support of preservation of natural resources. However, in considering the closure as part of the adoption of the 2013 plan, the Boulder County Commissioners also approved a plan amendment in support of an investigation of additional trail alignment possibilities to complete a trail connection to Eldorado Canyon State Park. The intent of this amendment was to consider potential alignment options along the edge of the BLM South area as part of a feasibility study.

West Trail Study Area – City of Boulder Open Space and Mountain Parks (2011)

The West Trail Study Area (TSA) Plan directs OSMP to “use best efforts to work with Eldorado Canyon State Park, BCPOS, and community groups to examine the feasibility of a multiple-use trail connection from Eldorado Springs to Walker Ranch. This includes the potential use of a portion of the Eldorado Canyon Trail on OSMP land.” The plan further notes that this connection would connect public lands and provide access from OSMP lands to significant mountain biking opportunities on BCPOS lands.

Eldorado Mountain/Doudy Draw Trail Study Area - City of Boulder Open Space and Mountain Parks (2006)

The Eldorado Mountain/Doudy Draw TSA plan map indicates a connection to Walker Ranch from ECSP. It does not indicate a specific route for the connection.

OSMP Visitor Master Plan (2005)

This plan includes a management strategy to “work with community groups to examine the feasibility of possible mountain biking/multiple use trails that would: 1) connect the east side of Mountain Parks to Walker Ranch or U.S. Forest Service land, and/or 2) provide more mountain biking opportunities west of State Highway 93” and a management action to “Consider a possible mountain bike (multi-use) trail corridor from the frontside to the backside of Mountain Parks (i.e., from Eldorado Springs to Walker Ranch).”

Eldorado Canyon State Park Management Plan – Colorado State Parks (2000)

This management plan states that “Colorado State Parks may explore the appropriateness and feasibility of constructing one or both of the following two regional trails”: 1) a connection from Golden Gate Canyon State Park to Eldorado Canyon State Park, and 2) a south rim trail that would link the Crescent Meadows and Inner Canyon portions of Eldorado Canyon State Park. The plan acknowledges some of the challenges associated with private property, lands managed by other agencies, potential environmental impacts, rugged terrain, and funding.

Both of the regional connections identified in the management plan would involve portions of the southern corridor considered in this study.

Boulder Valley Comprehensive Plan – Trails Map (2001, 2005, 2010, 2015)The Boulder Valley Comprehensive Plan Trails Map identifies a conceptual alignment that makes this connection. A conceptual alignment generally links specific destinations, but no location has been determined for the trail.

Boulder County Comprehensive Plan – County Trails Map (1999)

The Boulder County Comprehensive Plan County Trails Map identified a conceptual trail corridor that makes this connection. A Conceptual Trail Corridor is a general course that usually links specific destinations, but no landscape feature or specific location has been determined for the trail itself.

Overview of the Study Area

Located in south-central Boulder County, Eldorado Canyon State Park and Walker Ranch Open Space are part of a broad landscape of publicly-owned, protected lands in the South Boulder Creek watershed. The landscape is characterized by dramatic rock outcrops, steep canyons, and rugged terrain, and is valued for its scenery, natural communities, and wildlife habitat.

This area also has a long history of human development use. In the early 1900’s the construction of the railroad introduced a means of transportation and access to the canyon. Use and development of water facilities along South Boulder Creek followed. Today the canyon bottom adjacent to South Boulder Creek is developed along Kneale Road with multiple residences, a regional natural gas pipeline, and Denver

Water distribution facilities. The southern portion of the study area is dominated by the historic and scenic Union Pacific Railroad (UPRR) corridor, which passes through 15 tunnels as it climbs into the mountains. Away from these existing corridors, there is little development aside from old access roads or abandoned trails.

Land Ownership and Management

Eldorado Canyon State Park

Eldorado Canyon State Park (ECSP) consists of three parcels, totaling 1,442 acres: the Inner Canyon parcel, Jefferson County parcel, and Crescent Meadows. The main, Inner Canyon area is a world-class rock climbing destination, and is also used for hiking and picnicking. Crescent Meadows includes a portion of the Walker Ranch Loop Trail and a trailhead, with no other visitor facilities. In addition to serving as an access point for Walker Ranch, hunting also is allowed in the Crescent Meadows portion of Eldorado Canyon State Park the Tuesday after Labor Day through the Friday prior to Memorial Day. The portion of ECSP within Jefferson County includes the upper portions of South Draw and the Union Pacific Railroad corridor, and has no designated trails or facilities.

Walker Ranch Open Space

Walker Ranch includes a large area of foothills landscape (3,616 acres) primarily owned and managed by BCPOS. In addition to the original Walker Ranch parcel, the area also includes the Meyers Gulch area to the northwest, and the BLM South parcels to the south. The Walker Ranch Loop Trail is a 7.8 - mile multi-use trail that is a regional destination for mountain bikers, hikers, runners, and other trail users. This trail is accessed from the Walker Ranch Loop Trailhead off of Flagstaff Road, the Ethel Harold Trailhead off of Bison Road, and the Crescent Meadows parking lot off of CO 72/Gross Dam Road (within ECSP). The BLM South area is a rugged area that currently does not offer any public access and is designated as a Wildlife Conservation Area recognizing its valuable natural resources and wildlife habitat.

Boulder Open Space and Mountain Parks

The northeast portion of the study area is open space land owned and managed by the City of Boulder OSMP. This area includes most of the existing Eldorado Canyon Trail. It is designated as a Habitat Conservation Area (HCA), which is managed to maintain naturally functioning ecosystems with lower levels of visitor use. Another OSMP-owned parcel in the study area is located along the southeast edge, between South Draw and the Union Pacific Railroad corridor. This area is part of the Eldorado Mountain HCA.

Private and other Restricted Lands

Private lands within the study area are primarily found within the South Boulder Creek canyon above ECSP. Several residential properties are located in this area, which are accessed from Kneale Road. Kneale Road is a private road with gated access beyond the park boundary. The Denver Water Department also owns land associated with a diversion dam along South Boulder Creek and underground pipeline connecting to the South Boulder Diversion Canal.

Along the southern edge of the study area, the Union Pacific Railroad (UPRR) tracks climb through the canyons as they cross through a series of tunnels. This historic railroad line is the main connection

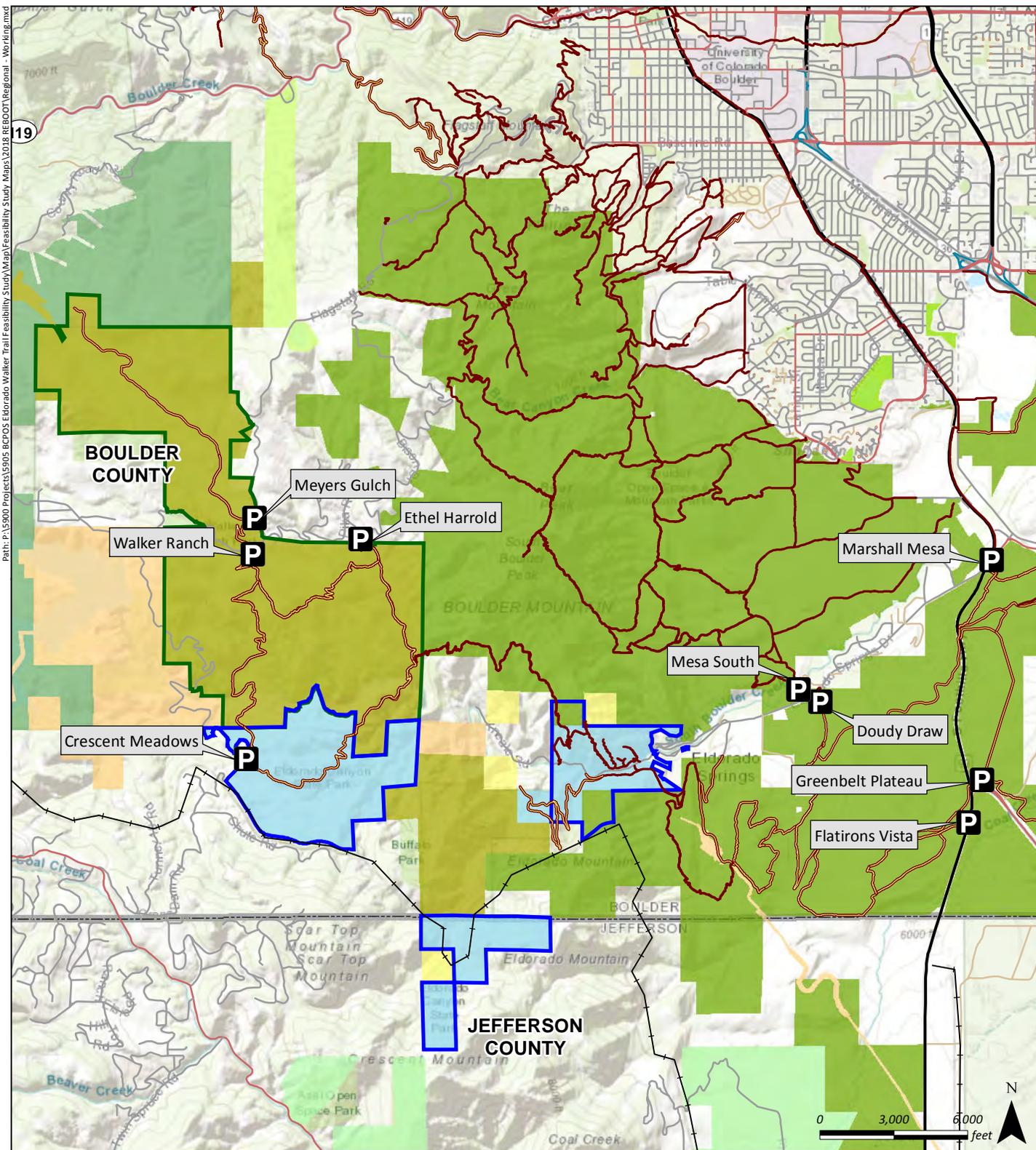
between Denver and the Moffat Tunnel, and is the primary east-west rail route through Colorado. The UPRR right-of-way ownership is about 100 feet wide in most areas, and supersedes the underlying land ownership.

In the far southwest corner of the study area, a small parcel of private land is located between the UPRR and the BCPOS-owned BLM South area. This parcel is owned, in association with several adjacent parcels to the south in Jefferson County, by an aggregate mining company.

Existing Planning and Management Designations

Most of the study area is included in various protective planning and management designations by Boulder County, the Colorado Natural Heritage Program CNHP, and open space agencies. These existing designations are described in Appendix A.

Figure 1. Regional Context



Eldorado Canyon – Walker Ranch Trail Feasibility Study

- | | | |
|------------------------------|---|------------------------------|
| Hiking Trail | Boulder County Parks & Open Space | Denver Water Board |
| Multi-Use Trail | City of Boulder Open Space & Mountain Parks | Jefferson County Open Space |
| Eldorado State Park Boundary | City of Boulder Parks & Recreation | US Bureau of Land Management |
| Walker Ranch Boundary | City of Boulder Public Works | USDA Forest Service |
| Parking | Colorado State Parks | |

Trail Design Standards

An objective of this study is to consider trail options that would accommodate mountain biking. The partner agencies agreed to use the OSMP adopted Class 3 trail standards for bicyclists.

Table 1. Summary of OSMP Class 3 Trail Standards - Bicycle

Type	Design Tread Width (Inches)	Target Grade	Short Pitch Max Grade	Protrusions	Turn Radius (Feet)
Native tread; intermittently rough sections	18 to 36	0 to 10%	15%; for up to 200'	Less than 6 inches; common, not continuous	4 to 8

Routes Considered and Dismissed

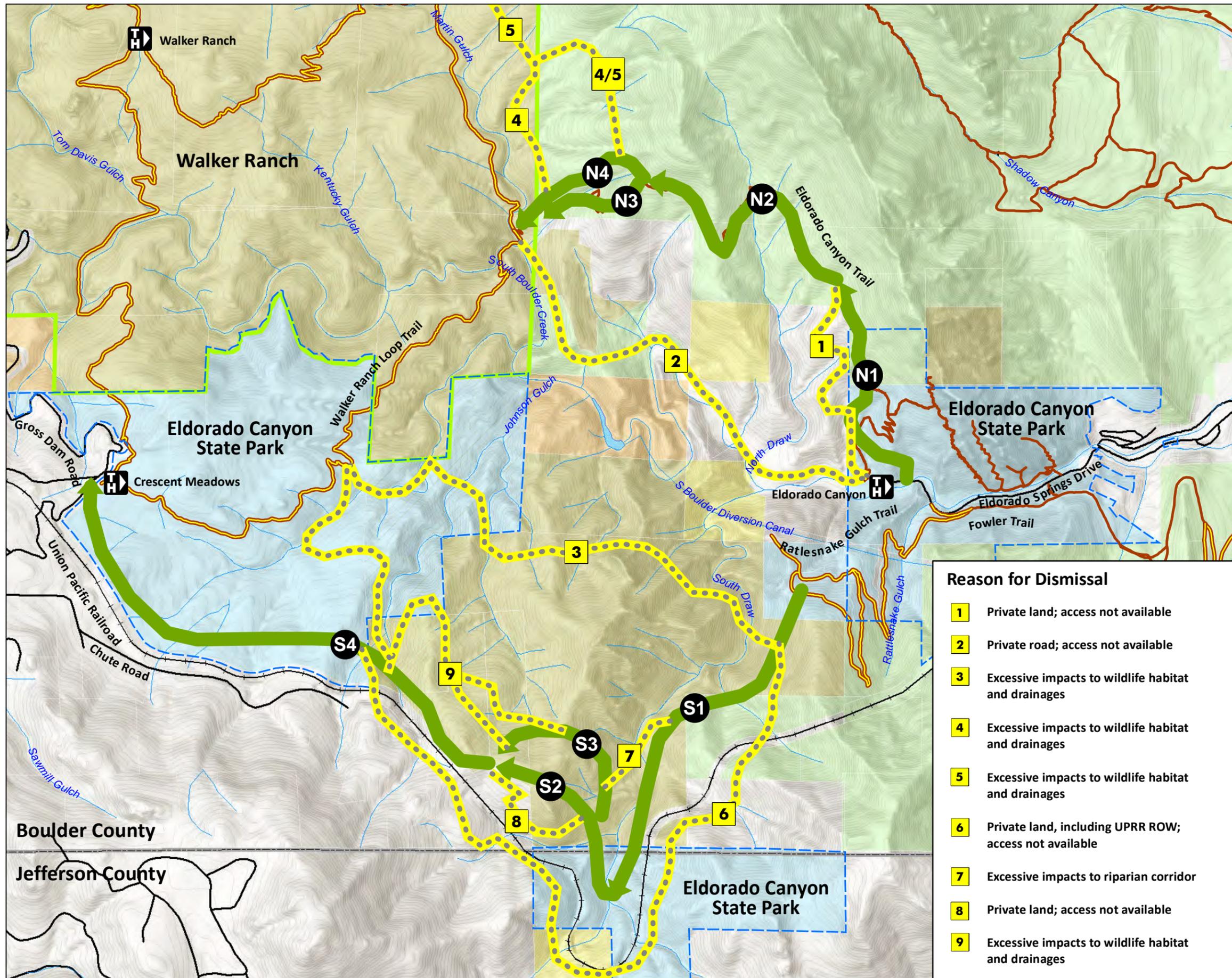
The feasibility study identified over a dozen trail alignments for initial consideration. Through field visits and meetings with adjacent property owners, there were several routes dismissed. These are shown on Figure 2, and are briefly explained below.

Rationale for Routes Dismissed

(See Figure 2)

1. This route is on private land. The landowner has indicated it is not available for public access.
2. This route is on Kneale Road, a private subdivision road that is not open to public access. The owners of this road indicated it is not available for public trail access.
3. This route is a direct, high contour south of the greater Eldorado Canyon area. It was removed due to concerns about habitat fragmentation and impacts to undisturbed land and drainages.
4. This route extends north from the Eldorado Canyon Trail and connects back to it farther to the west. It was removed due to concerns about impacts to wildlife and riparian habitat/drainages.
5. This route extends north from the Eldorado Canyon Trail to connect into the Ethel Harold Trailhead. It was removed due to concerns about impacts to wildlife and riparian habitat/drainages.
6. This route is on a high contour crossing the Union Pacific Railroad tracks and Right of Way. The railroad has indicated it is not available for a public access.
7. This route is a shorter, direct crossing of South Draw. It was removed due to concerns about riparian habitat impacts and fragmentation.
8. This route is on private land. The landowner has indicated it is not available for public access.
9. This route follows a longer contour around a ridge. It was removed due to concerns about habitat fragmentation and impacts to riparian habitat/drainages.

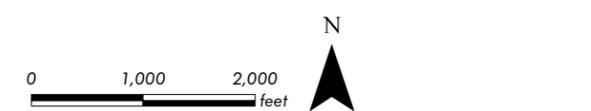
Figure 2. Routes Considered and Dismissed



- Eldorado Canyon – Walker Ranch Trail Feasibility Study
- 1 Routes Previously Dismissed from Analysis
 - Routes under consideration
 - H Trailhead
 - Existing Hiking Trail
 - Existing Multi-Use Trail
 - Railroad
 - Neighborhood Road
 - Stream/River
 - 20-Foot Contour

- Land Manager**
- Eldorado Canyon State Park Boundary
 - Walker Ranch Boundary
 - Boulder County
 - City of Boulder
 - Boulder County – City of Boulder
 - State of Colorado – Boulder County
 - State of Colorado
 - Denver Water
 - Bureau of Land Management

- Reason for Dismissal**
- 1 Private land; access not available
 - 2 Private road; access not available
 - 3 Excessive impacts to wildlife habitat and drainages
 - 4 Excessive impacts to wildlife habitat and drainages
 - 5 Excessive impacts to wildlife habitat and drainages
 - 6 Private land, including UPRR ROW; access not available
 - 7 Excessive impacts to riparian corridor
 - 8 Private land; access not available
 - 9 Excessive impacts to wildlife habitat and drainages



Summary of Route Options

Two trail corridors – North Route and South Route – were retained for further analysis. Additionally, a No Action option is also under consideration. These three options are described below.

No Action Option and Existing Conditions

The **No Action** option would not complete a multi-use connection that accommodates biking activities. With no new trail connection, the No Action option would not achieve the desired objectives of the project. It would maintain the status quo conditions. This means that the No Action option also would not address current issues or achieve desired improvements that have been codified in public planning and policy documents guided by public engagement and input. The No Action alternative would perpetuate existing conditions, described below.

Trails

The **Eldorado Canyon Trail**, on the north side of the canyon, allows hiking and horseback riding, but not bicycle use. The trail climbs about 500 feet over 0.8 miles before leaving the park. Multiple switchbacks have been prone to shortcutting which exacerbates erosion and resource impacts. Installation of wood steps and crib-walls has been an ongoing, labor-intensive task to maintain a safe visitor experience.

The **Rattlesnake Gulch Trail**, on the south side of the canyon, is 2.1 miles and currently the only multi-use trail in Eldorado Canyon State Park that allows bicycle use. The steep canyon and limited space provide a moderate to challenging ride for experienced mountain bikers.

The **Walker Ranch Loop Trail** on Boulder County Parks and Open Space property is a 7.5-mile multi-use trail that allows bicycles.

Transportation, Parking, and Access and Impact to Eldorado Springs

The Eldorado Springs area has experienced transportation, parking and access issues for decades. There is only one road extending several miles from Highway 93. The road serves entrances for trailheads for city public lands, the state park, Eldorado Springs, Artesian Springs pool, and residences to the west of the state park.

Eldorado Canyon State Park's parking spots are filled during peak times, particularly on weekends and holidays during the summer months. On many days, visitors cannot enter the park due to capacity issues. Illegal parking on the road's shoulder in the community of Eldorado Springs and along the road back to Highway 93 is a common challenge for the public land managers and the community.

The three partner agencies are committed to working with the community towards long-term solutions to these issues. Choosing a North or South route will strengthen the capacity and momentum for the community and partner agencies to collaborate on providing accessing, connecting visitors to enjoyable experiences, and addressing transportation issues. Therefore, the focus of the feasibility study is on analyzing and comparing the north and south route alternative options.

North Route Options

The North Route generally follows the existing Eldorado Canyon Trail corridor, with several variations and reroutes, reaching the Walker Ranch Loop Trail near South Boulder Creek. The existing and conceptual alignments detailed below are on public lands owned and managed by CPW and OSMP.

- **Alignment N1** would be a realignment of the existing Eldorado Canyon Trail, where the trail currently climbs through steep terrain in a series of steep switchbacks and steps within Eldorado Canyon State Park. A new trail would utilize terrain undulations to climb at a shallower grade, with turns and features that are suitable for multi-use travel. The existing trail would remain for climbing access or a short loop hike from the visitor center.
- **Alignment N2** would follow the existing Eldorado Canyon Trail, with several short reroutes and enhancements to improve sustainability and suitability for multi-use travel.

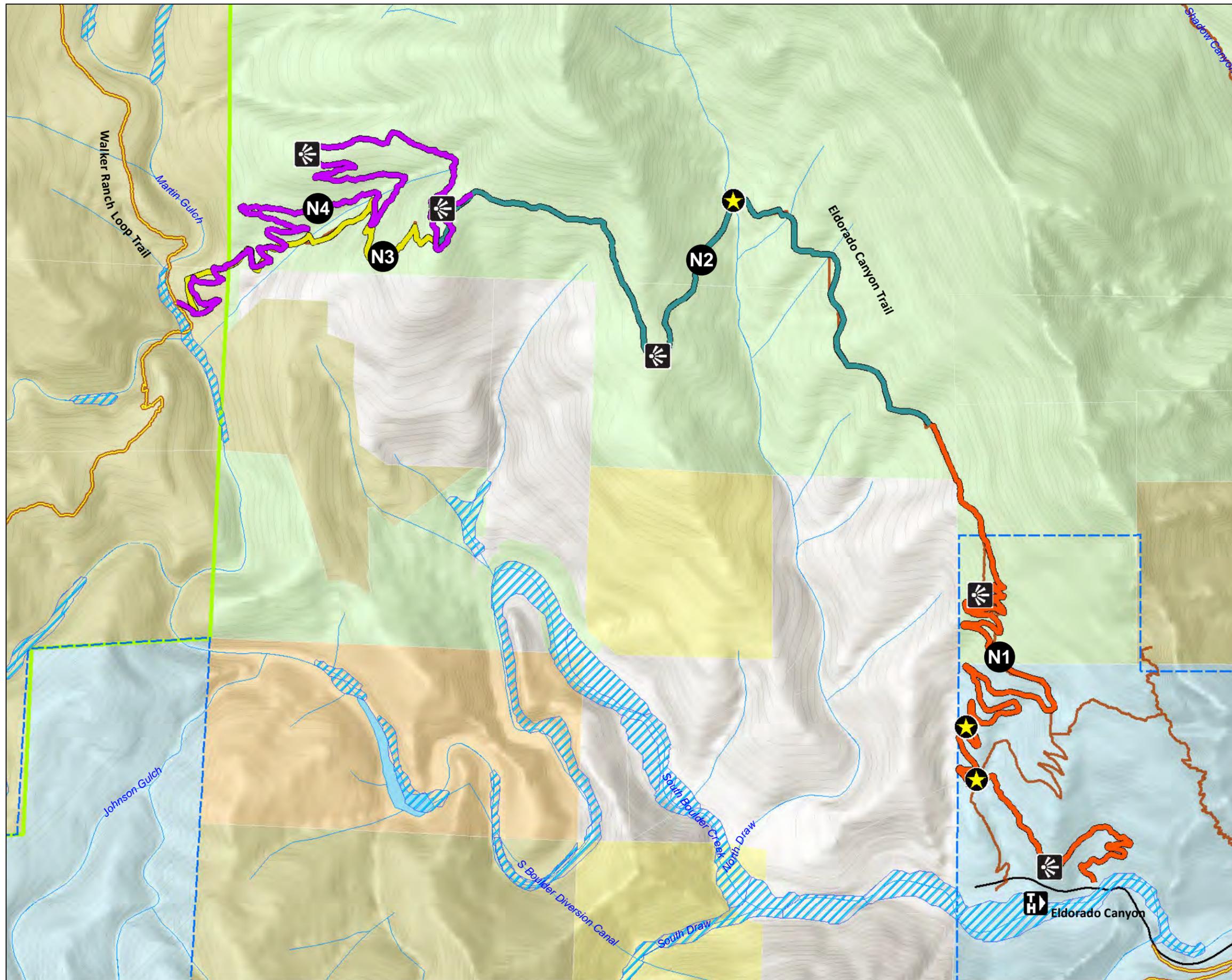
Sub-Alternative Options:

- **Alignment N3** would follow the existing Eldorado Canyon Trail where it drops to the west through a series of tight, steep switchbacks. Multiple short reroutes and trail enhancements would improve trail sustainability and suitability for multi-use travel.
- **Alignment N4** would realign the western portion of the Eldorado Canyon Trail, using variations in terrain over a larger area to achieve shallower grades and a more sustainable trail that is also better suited for multi-use travel. While some short sections of the existing trail may be re-used, most of it would be reclaimed and abandoned.

North Route approximate length: 3.9 or 4.8 miles total, new or refurbished trail

**Figure 3.
North Route Alignments**

Eldorado Canyon – Walker Ranch Trail Feasibility Study

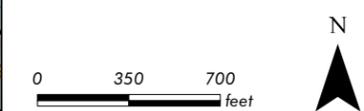


Alternative Sub-Routes

- N1
- N2
- N3
- N4
- Riparian Areas and Wetlands
- ★ Point of Interest
- Primary Viewpoint
- H Trailhead
- Existing Hiking Trail
- Existing Multi-Use Trail
- Neighborhood Road
- Stream/River
- 20-Foot Contour

Land Manager

- Eldorado Canyon State Park Boundary
- Walker Ranch Boundary
- Boulder County
- City of Boulder
- State of Colorado – Boulder County
- State of Colorado
- Denver Water
- Bureau of Land Management



South Route Options

The South Route requires use of the existing Rattlesnake Gulch Trail and the construction of a new trail that follows a high contour from the existing Rattlesnake Gulch Trail around South Draw, before extending to the west past Johnson Gulch and Crescent Meadows, reaching the Walker Ranch Loop at the Crescent Meadows Trailhead. The conceptual alignments detailed below are on public lands owned and managed by BCPOS, City of Boulder OSMP, and ECSP.

While the Rattlesnake Gulch Trail is a part of the South Route in the sense one must travel on it as part of the overall south route, a comprehensive assessment of it is not included in the study. This is because it currently allows biking, was considered the access to the south route, and it is not proposed to be improved. Therefore, while the Rattlesnake Gulch Trail is not comprehensively analyzed in the same way as the other south segments, in many cases including it completed the picture of the South Route, particularly as it relates to management concerns within Eldorado Canyon State Park, and therefore it is included and analyzed where relevant.

- **Alignment S1** would branch off from the west loop of Rattlesnake Gulch trail about 600 feet south of the Continental Divide Overlook spur. It would follow a high contour above South Draw, crossing the stream near the southern edge of the study area. The trail is envisioned to run parallel and below the railroad corridor.

Sub-Alternative Options:

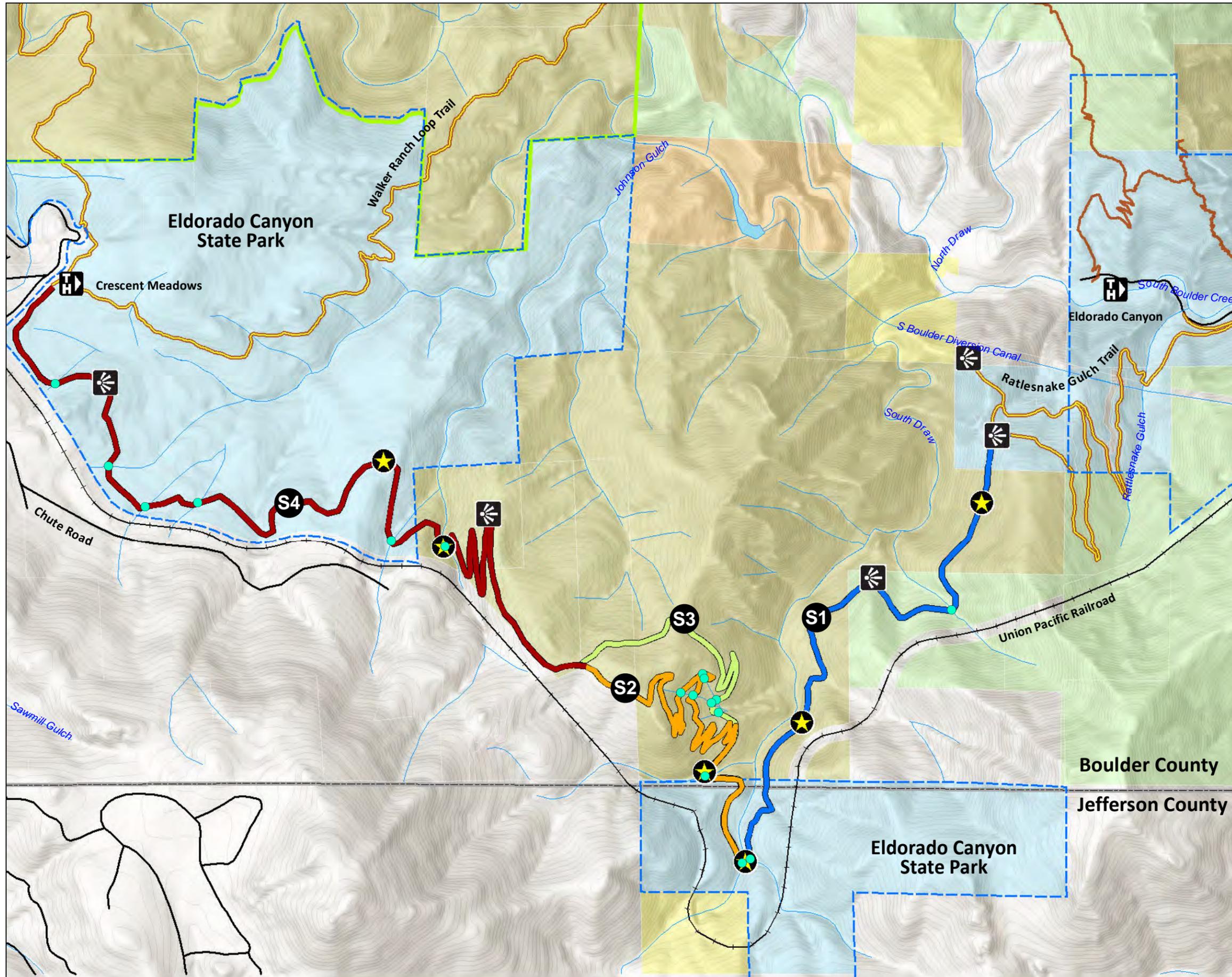
- **Alignment S2** would follow contours to the north before climbing through a series of switchbacks in open and rocky terrain to reach a high saddle. From the saddle, the alignment would follow on or near an existing two-track road that would require enhancements to improve sustainability and suitability for multi-use travel.
- **Alignment S3** is a variation of S2, but would follow contours slightly north of S2, climbing to a lower saddle where it would turn to the west and follow on or near an old mining road that would require enhancements to improve sustainability and suitability for multi-use travel. It would reach the same saddle as S2.
- **Alignment S4** would descend towards a crossing of Johnson Gulch before climbing a series of switchbacks to Crescent Meadows. Within Crescent Meadows, this route follows on or near an existing two-track road, with several variations for sustainability and suitability for multi-use travel to reach the Crescent Meadows Trailhead.

South Route approximate length: 6.5 or 7.1 miles of new trail; 7.2 or 7.8 miles total.

Total length includes the existing Rattlesnake Gulch Trail, which is not part of this study.

**Figure 4.
South Route Alignments**

Eldorado Canyon – Walker Ranch Trail Feasibility Study



Alternative Sub-Routes

- S1
- S2
- S3
- S4

- Stream Crossing
- ★ Point of Interest
- ☼ Primary Viewpoint
- H Trailhead

- Existing Hiking Trail
- Existing Multi-Use Trail
- +— Railroad
- Neighborhood Road
- Stream/River
- 20-Foot Contour

Land Manager

- Eldorado Canyon State Park Boundary
- Walker Ranch Boundary
- Boulder County
- City of Boulder
- Boulder County – City of Boulder
- State of Colorado – Boulder County
- State of Colorado
- Denver Water
- Bureau of Land Management



Summary of Analysis Findings

The feasibility study evaluated the alternatives using the following analysis topics:

Environmental and Cultural Resources

- Wetland and riparian areas
- Significant natural communities
- Wildlife habitat impacts
- Undisturbed habitat impacts
- Cultural Resources

Trail Construction Costs

Trail Management and Maintenance

- Trail sustainability and maintenance
- Emergency response
- Interagency management

Visitor Experience

- Regional trail connectivity
- Trail aesthetic and character
- Access and parking
- Trail access opportunities
- Seasonality
- Visitor density
- Visitor conflict management

Eldorado Canyon State Park Interface

- Park capacity and visitation
- Access and parking
- Revenue and fee collection
- Trail and facility sustainability
- Visitor conflict and enjoyment
- Emergency access and response

Below are summary tables and brief descriptions of the findings. In addition to reporting out on the analysis topics, there is also an “overall” findings table and description, which “rolls up” the findings of the analysis topics and reports out on the analysis categories (listed in bold above).

The alternatives were assigned an impact score for each of the analysis topics and categories ranging from a Major Benefit to a Major Impact.

				
Major Benefit	Minor Benefit	Insignificant	Minor Impact	Major Impact

The impact scores are informed by best available and comparable data and were determined by reaching consensus among subject areas experts from all partner agencies. The intent of the impact scores are to provide a foundation and tool to develop a recommendation. They are not intended to be used in a strict formulaic way. In other words, the recommendation will not be derived by simply adding up the impact scores.

Summary of Overall Findings

Analysis Category	North Route	South Route
Environmental and Cultural Resources	○	●
Visitor Experience	◐	◐
Trail Construction Costs	\$360K to \$660K	\$410K to \$810K
Trail Management and Maintenance	◐	○
Eldorado Canyon State Park Interface	●	●

Environmental and Cultural Resources

- **North** has minimal new environmental impacts since most of the route follows an existing trail corridor with existing impacts.
- **South** has major impacts to environmental resources including major impacts to riparian, wildlife and undisturbed habitat.
- The impacts to the North Route would be insignificant, while the South Route would have major impacts.

Visitor Experience

- **Both** would provide an enjoyable and quality visitor experience. Some similarities and differences between the routes are highlighted below.
- **Both:**
 - meet desired bike trail design standards, with the exception of the Rattlesnake Gulch Trail which would be the access trail for the south route in ECSP.
 - offer expansive views and go through a similar diversity of landscape types.
 - may result in increased visitor conflict, due to increased trail visitation and the introduction of a new visitor type into the trail system.
- **North:**
 - is shorter (3.9 – 4.8 miles) with an elevation gain/loss of +1,010/-610 (E to W).
 - will accommodate more year-round use due to the combination of aspect and shade cover.
 - no temporal or seasonal use restrictions are anticipated.
- **South:**
 - is longer 6.5 – 7.1 (7.8 including Rattlesnake Gulch Trail) with an elevation gain/loss of +930/-480 (+1,860 including Rattlesnake).

- provides a new trail experience in an area that is currently inaccessible.
- may result in temporal and seasonal use restrictions.

Trail Construction: Estimate of Probable Cost

- **Both** have comparatively similar construction cost estimates

Trail Management and Maintenance

- **Both** are sustainable and can be constructed to achieve desired bike trail design standards with the exception of the Rattlesnake Gulch Trail which would be the access trail for the south route in ECSP.
- **North** improves trail sustainability and emergency access along a trail that is currently unsustainable in sections.

Eldorado Canyon State Park Interface

- **Both:**
 - adversely impact the park, which is already beyond capacity during busy periods.
 - increase traffic and congestion.
 - increase visitor density and potential conflict along existing trails.
 - increase visitation, estimated up to 60 more daily visitors.
- **North** improves trail sustainability and emergency response along the existing Eldorado Canyon Trail.

More information on the benefits and impacts can be found in the following analysis topic summaries below and in the corresponding sections of the report.

Summary of Environmental and Cultural Resource Findings

Analysis Topic	North Route	South Route
Wetland and Riparian Habitat	○	●
Significant Natural Communities	○	◐
Wildlife Habitat Impacts	○	●
Undisturbed Habitat Impacts	○	●
Cultural Resources	○	◐
Overall Impact	○	●

Wetland and Riparian Habitat:

- **North**
 - The N3 alternative has insignificant new impacts to wetland and riparian habitat since most of the route follows an existing trail corridor.
 - The N4 alternative has minor impacts to wetland and riparian habitat. N4 would result in two or more new stream crossings in a designated Habitat Conservation Area.
 - The overall impact would be insignificant.
- **South** has major impacts. It would cross 7 riparian corridors including South Draw and Johnson Gulch, unaltered riparian corridors that provide excellent effective habitat for wildlife.

Significant Natural Communities:

- **North** has insignificant new impacts. The north alternatives will largely stay on the existing trail corridor through the areas with significant natural communities.
- **South** has minor impacts resulting from crossing through several mapped significant communities.

Wildlife Habitat Impacts:

- **North** has insignificant new wildlife habitat impacts. The north alternatives will largely stay on the existing trail corridor through important wildlife habitat.
- **South** has major impacts.
 - It would intersect potential habitat for Preble’s meadow jumping mouse a federally listed threatened species. This will require consultation with US Fish and Wildlife Service (USFWS).

- It would impact the Boulder County designated South Draw Critical Wildlife Habitat Area and area currently closed to public access. Approximately 106 acres of this designated area or 12 percent of the total would be impacted.
- It would intersect winter range for mule deer and elk, and severe winter range habitat for elk, which will require management strategies that may include temporal or seasonal restrictions for trail users.

Undisturbed Habitat Impacts:

- **North** The amount of new habitat disturbance would be insignificant. The north route would result in a reduction of up to 24 acres, a 1.5% reduction of undisturbed habitat in a designated Habitat Conservation Area.
- **South** The amount of new habitat disturbance would be major. The south route would result in a reduction of up to 324 acres or 26% of undisturbed habitat.

Cultural Resources:

- **North** has insignificant new impacts. The north alternatives will largely stay on the existing trail corridor through the areas with known cultural resources. These resources would need to be taken into consideration during a subsequent design phase.
- **South** has multiple cultural resources that would need to be taken into consideration during a subsequent design phase.

More information on the impacts can be found in the respective sections within the Environmental and Cultural analysis section of the report.

Summary of Visitor Experience Findings

Analysis Topic	North Route	South Route
Regional Trail Connectivity		
Trail Aesthetic and Character		
Access and Parking		
Trail Access Opportunities		
Seasonality		
Visitor Density		
Visitor Conflict Management		
Overall Impact Score		

Regional Trail Connectivity

- **Both** provide a major benefit by completing the desired regional connection.

Trail Aesthetic and Character

- **Both** provide a major benefit by offering an enjoyable and quality visitor experience.
 - Both also offer expansive views and go through a diversity of landscape types.
- **North**
 - is shorter (3.9 -4.8 miles) with an elevation gain/loss of +1,010/-610 (E to W). Elevation profiles are located in the Trail Aesthetic and Character section of the analysis.
 - Would achieve the desired bike trail standards using the N4 alternative. Portions of N3 likely cannot achieve the standards.
- **South**
 - is longer 6.5 – 7.1 (7.8 including Rattlesnake Gulch Trail) with an elevation gain/loss of +930/-480 (+1,860 including Rattlesnake)
 - would achieve the desired bike trail standards with the exception of the Rattlesnake Gulch Trail which would be the access trail to the south route.

Access and Parking

- **Both** have major impacts to current visitor parking, which are often at capacity. More information and a description of parking and capacity constraints are further analyzed in the Eldorado Canyon State Park Interface summary.
- **North** route trail users would likely use the ECSP Rincon Parking Area as the primary access point as it is the closest.
- **South** route trail users would likely use the ECSP Fowler Trail Parking Area as the primary access point as it is the closest.

Trail Access Opportunities

- **Both** would result in a minor benefit due to increased and improved trail access opportunities for multiple visitor types.
- **North** would provide a new experience in an existing or familiar trail corridor.
- **South**
 - would provide a new trail experience in an area that is currently inaccessible.
 - would provide a new, 13-mile loop, opportunity for hikers and trail runners.

Seasonality

- **North:**
 - would accommodate more year-round use due to the combination of aspect and shade cover.
 - would likely not have temporal or seasonal use restrictions.
- **South:**
 - would accommodate less year-round use due to the combination of aspect and shade cover.
 - may likely result in temporal and seasonal use restrictions due to hunting and impacts to Severe Winter Range for mule deer and elk.

Visitor Density

- **Both** would have a minor impact on trail density with an estimated additional average of 60 daily trail users during the busy summer months (June-August).
- **North** During the busy summer months this would increase trail density by up to 33% (compared to the existing use of the Eldorado Canyon Trail)
- **South** During the busy summer months this would increase trail density by up to 25% (compared to the existing use of the Rattlesnake Gulch Trail)

Visitor Conflict Management

- **Both** would have a potential minor impact on visitor conflict due to increased trail density and the introduction of a new visitor type into the trail system.
- **North**
 - The reconfiguration of the existing Eldorado Canyon Trail and continued management of

the existing trail to create a shorter loop for hikers and climbers may reduce potential conflicts by dispersing visitors and maintaining a bike-free option in the most congested section of the trail.

- May result in conflict resulting from adding a visitor type to an existing trail.
- **South**
 - The anticipated increase in the numbers of mountain bikers on the existing Rattlesnake Gulch Trail, which is steep, would likely contribute to increased visitor conflict along that trail.
 - would not contribute to conflict resulting from a change of use designations.
 - would retain a hiking only connection (the existing Eldorado Canyon Trail).

More information on the benefits and impacts can be found in the respective sections within the Visitor Experience analysis section of the report.

Summary of Trail Construction Cost Findings

Analysis Topic	North Route	South Route
<i>Estimated Cost Range</i>	\$360K to \$660K	\$410K to \$810K

Both

- Overall, costs to complete a multi-use connection along either the north or south are expected to be comparably similar.
- Estimated construction costs are conceptual and are likely to change as the design is refined.

North

- Re-building the north route would entail more technical construction.

South

- The south route construction is longer in total distance in more remote areas.

Summary of Trail Management and Maintenance Findings

Analysis Topic	North Route	South Route
Trail Sustainability and Maintenance		
Emergency Response		
Interagency Management		
Overall Impact Score		

Trail Sustainability and Maintenance

- **North**
 - would achieve the desired bike trail standards using the N4 alternative. Portions of N3 likely cannot achieve the standards.
 - improves the existing Eldorado Canyon Trail, which is in moderate to poor condition in some sections.
- **South** would achieve the desired bike trail standards with the exception of the Rattlesnake Gulch Trail will not meet desired bike trail standards which is the access to the south route and is not proposed to be improved.

Emergency Response

- **North** the improved Eldorado Canyon Trail would improve emergency access and response by implementing a more stable, less steep and sustainable route to facilitate emergency response. due to the improved trail sustainability and reduce grades.
- **South** - Due to the longer trail distance, emergency response times would be more complicated and longer.

Interagency Management

- **Both**
 - The partner agencies would formalize management responsibilities and procedures for law enforcement, emergency response and trail maintenance activities as part of the implementation process.
 - The partner agencies will work together on strategies to ensure visitors have enjoyable experiences, address capacity constraints including parking and traffic issues, and to protect existing resources.
- **South** would require coordination with Jefferson County to formalize an agreement for management, and emergency response and enforcement.

Summary of Eldorado Canyon State Park Interface Findings

Analysis Topic	North Route	South Route
Park Capacity and Visitation	●	●
Access and Parking	●	●
Revenue and Fee Collection	○	○
Trail and Facility Sustainability	◐	◑
Visitor Conflict and Enjoyment	●	●
Emergency Access and Response	◐	●
Overall Impact Score	●	●

Park Capacity and Visitation

- **Both:**
 - adversely impact ECSP, which is already beyond capacity during busy periods and currently experiencing significant increases in visitation.
 - result in an increase in visitation of approximately 60 more daily visitors exacerbating existing issues with park capacity.

Access and Parking

- **Both** negatively impact park access and parking availability, which is already beyond capacity during busy periods. No public parking is available in the town of Eldorado Springs or along Highway 170. Illegal parking in the town is a recurrent problem.

Revenue and Fee Collection

- **Both** would increase fee entry fee revenue accordingly. Fee collection is the only mechanism to generate revenue to fund operations. The park currently charges a daily vehicle entry fee and a walk-in/bike-in fee.

Trail and Facility Sustainability

- **North** – Re-designing the Eldorado Canyon Trail would improve trail sustainability.
- **South** – The anticipated increase in the numbers of mountain bikers on the existing Rattlesnake

Gulch Trail, which is steep, would likely contribute to additional maintenance needs.

Visitor Conflict and Enjoyment

- **Both** increase visitor density and conflict along existing trails.
- **South** The anticipated increase in the numbers of mountain bikers on the existing Rattlesnake Gulch Trail, which is steep, would likely contribute to increased visitor conflict along that trail.

Emergency Access and Response

- **North** would improve emergency access and response by implementing a more stable and sustainable route to facilitate emergency response.
- **South** would likely increase incidents affecting ECSP due to added visitors and new trail miles within the park, resulting in a major impact.

Trail Feasibility Analysis

Environmental and Cultural Resources

The proposed trail route options were evaluated for their potential impacts on environmental and cultural resources in the study area. Resources evaluated include:

- Wetland and Riparian Habitat
- Significant Natural Communities
- Wildlife Habitat Impacts
- Undisturbed Habitat Impacts
- Cultural Resources

Note that this analysis was completed to evaluate the impacts and feasibility of potential trail options. Any trail option that moves forward would require additional trail design and more detailed consideration of resource impacts, which may be different from those presented here.

Results of the analysis were then assigned an impact score using the criteria in Table 2.

Table 2. Environmental Impact Scoring Criteria

Symbol					
Text	Major Benefit	Minor Benefit	Insignificant	Minor Impact	Major Impact
Definition	Changes are strongly evident, resulting in the significant improvement to resources	Changes are detectable, but are small and localized and would result in long-term improvement of resources	Changes, where they occur, are slight, local, and are not readily detectable	Changes are detectable, but are small and localized and would not result in long-term degradation of resources	Changes are strongly evident, resulting in the significant alteration or loss of resources

Table 3. Summary of Environmental and Cultural Resource Findings

Resource	North Route	South Route
Wetland and Riparian Habitat	○	●
Significant Natural Communities	○	◐
Wildlife Habitat Impacts	○	●
Undisturbed Habitat Impacts	○	●
Cultural Resources	○	◐
Overall Impact	○	●

Wetland and Riparian Habitat

Riparian woodlands and shrublands are known hotspots of biodiversity and support a broad mix of native plants including many rare species and provide important travel corridors for a wide variety of wildlife. This analysis assesses impacts to riparian habitat and stream crossings.

Riparian habitat impacts were evaluated based on the number of times the trail routes cross mapped riparian habitat areas. For each crossing, impacts would occur within up to about 10-meters of the trail centerline. These impacts may typically include the trail tread itself, vegetation clearing, trampling, adjacent drainage and sedimentation, and habitat changes.¹

Stream crossing impacts were evaluated based on the number of crossings of USGS-mapped drainages. Many of these small stream crossings are ephemeral and do not contain consistent surface water, wetland vegetation, or riparian habitat, while some contain small streams and wetland areas. Impacts are expressed as the number of crossings per trail route.

North Route

Proposed North Routes would not result in new impacts to mapped riparian habitat. There is an existing trail crossing of North Draw and other small drainages, which would remain. New trail segment N4 would result in two or more new stream crossings. Impacts to stream crossings and riparian habitat

¹ This 10-meter (20 meters total) buffer is a conservative estimate that extends well beyond the direct disturbance associated with a 3-foot wide natural surface trail. This assumption is supported by studies including Potito and Beatty 2005, Rowe et al. 2018, and Cole 1978.

areas along the North Route are provided in Table 4 and shown in Figure 5. Overall impacts would be insignificant.

Table 4. North Route Wetland and Riparian Habitat Impact Analysis Results

Resource	Alternative Sub-Options			
	N1	N2	N3	N4
New riparian corridor crossings	○	○	○	○
New small drainage / swale crossings	○	○	○	◐
Overall Impact Score per Segment	○	○	○	◐
Overall Impact Score	○			

South Route

The South Route would cross and impact seven (7) riparian habitat corridors, primarily associated with South Draw, Johnson Gulch, and Crescent Meadows (see Figure 6). The South Route would also cross up to 15 small streams or ephemeral drainages. Impacts to stream crossings and riparian habitat areas by South Route segments are provided in Table 5. Overall, the South Route is considered to have major impacts.

Table 5. South Routes Wetland and Riparian Habitat Impact Analysis Results

Resource	Alternative Sub-Options			
	S1	S2	S3	S4
Riparian corridor crossings	◐	◐	◐	◐
Small drainage / swale crossings	◐	●	●	●
Overall Impact Score per Segment	◐	●	●	●
Overall Impact Score	●			

Direct impacts to riparian habitat in South Draw would be largely avoided except for a perpendicular crossing of the stream and associated riparian corridor at the end of S1 and beginning of S2, though

some buffer impacts may occur. (Impacts to this riparian corridor are shared by S1 and S2, since it is the breaking point between segments). In addition to South Draw, both Segments S2 and S3 would also cross a side drainage with associated riparian impacts. Minor impacts to the Johnson Gulch riparian corridor from S4 would occur at the upper end of the drainage (about 120 meters north of where it is cut off by the railroad embankment).

For Segments S2, S3, and S4, the crossing of several small ephemeral drainages/swales would result in major impacts to those areas. Some of the S4 impacts to smaller drainages in the Crescent Meadows area would occur along existing two-track roads with existing culverts, which could reduce or eliminate adverse impacts to these drainages in areas where the existing road corridor is used.



*Existing Eldorado Canyon
Trail crossing of North Draw
- North Route*



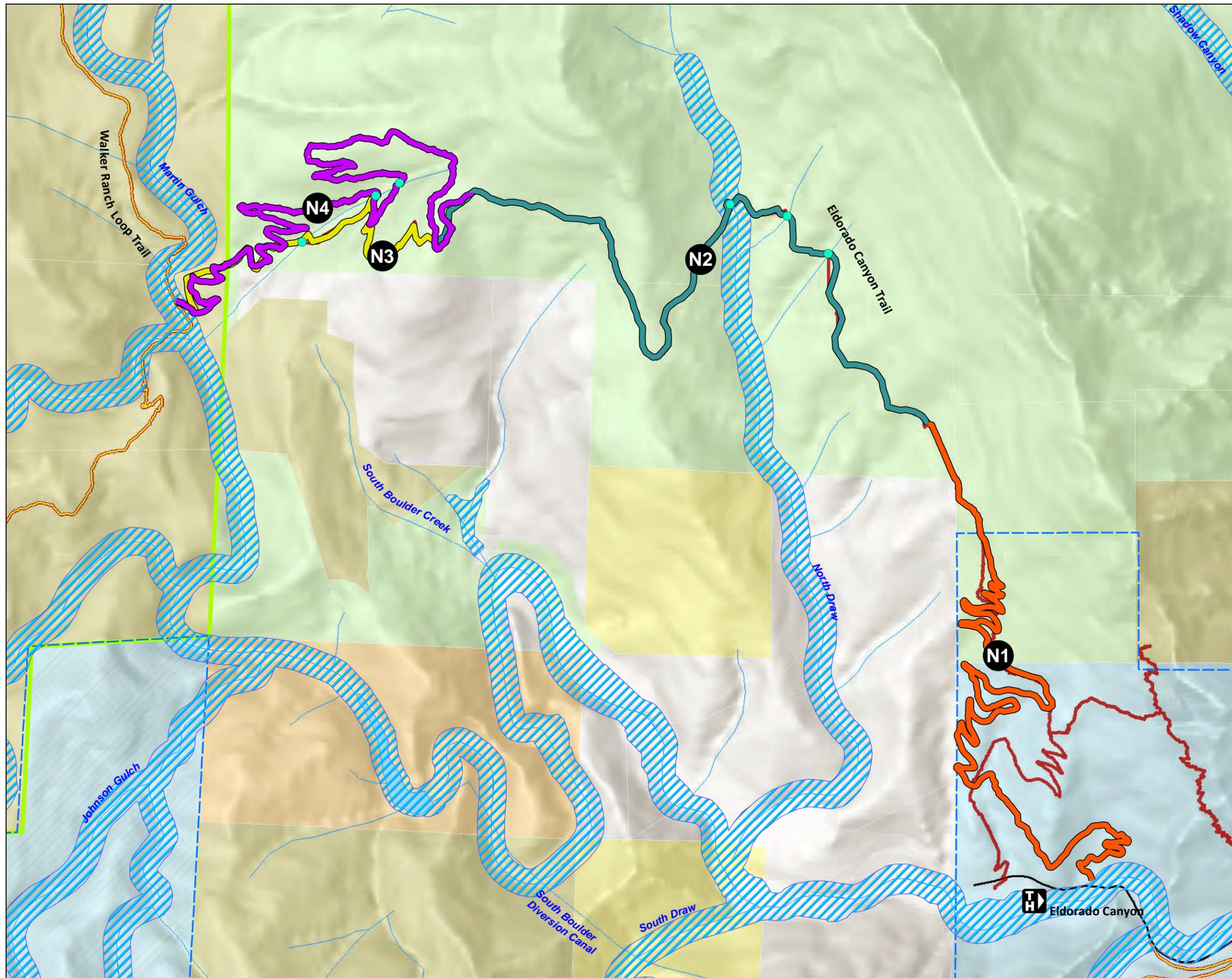
*South Draw near potential
trail crossing (scouring from
2013 flood is evident) - South
Route*



*Narrow riparian corridor
along Johnson Gulch - South
Route*

Figure 5. North Routes Riparian and Wetlands

Eldorado Canyon – Walker Ranch Trail Feasibility Study



Alternative Sub-Routes

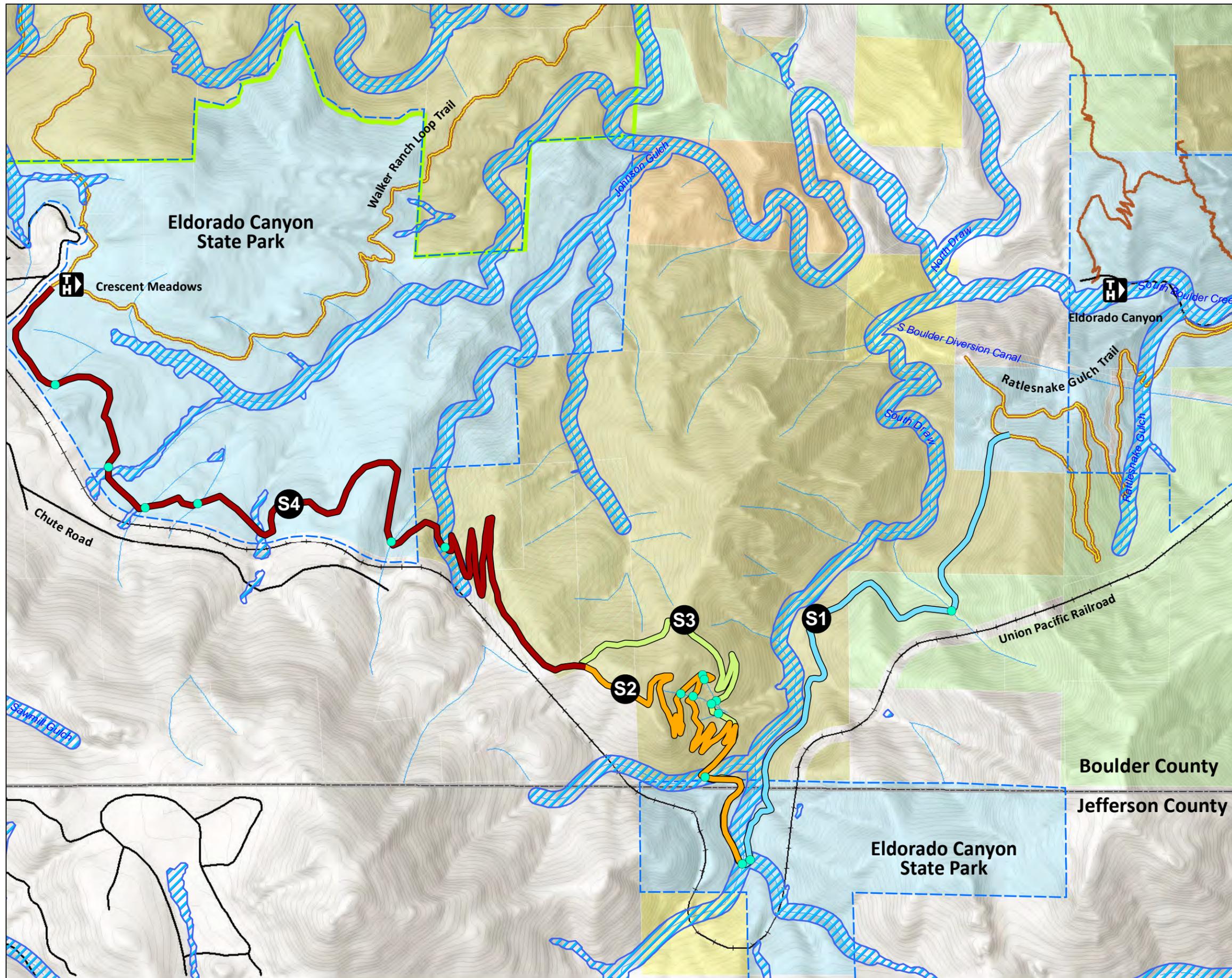
- N1
- N2
- N3
- N4
- Stream Crossing
- Riparian Area
- H Trailhead
- Existing Hiking Trail
- Existing Multi-Use Trail
- Neighborhood Road
- Stream/River

Land Manager

- Eldorado Canyon State Park Boundary
- Walker Ranch Boundary
- Boulder County
- City of Boulder
- State of Colorado – Boulder County
- State of Colorado
- Denver Water
- Bureau of Land Management

Figure 6. South Routes Riparian and Wetlands

Eldorado Canyon – Walker Ranch Trail Feasibility Study



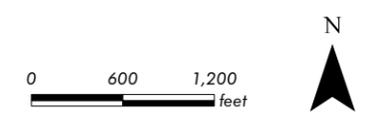
Alternative Sub-Routes

- S1
- S2
- S3
- S4
- Stream Crossing

- Riparian Area
- H Trailhead
- Existing Hiking Trail
- Existing Multi-Use Trail
- + + Railroad
- Neighborhood Road
- Stream/River
- 20-Foot Contour

Land Manager

- Eldorado Canyon State Park Boundary
- Walker Ranch Boundary
- Boulder County
- City of Boulder
- Boulder County – City of Boulder
- State of Colorado – Boulder County
- State of Colorado
- Denver Water
- Bureau of Land Management



Significant Natural Communities

Significant natural communities are plant communities or alliances that have been identified and tracked by OSMP, BCPOS, and CPW for their rare or sensitive status and their importance to biodiversity. Mapped communities from these agencies are included in this analysis.² Impacts to significant natural communities were evaluated by assessing trail route impacts on mapped vegetation communities (see Figure 7). Trail routes were buffered by 10 meters to account for the trail tread, vegetation clearing, trampling, adjacent drainage and sedimentation, erosion, and invasive species.

North Route

Along the North Route, segments N1, N2, and N3 would not result in new impacts to any significant natural communities, unless reroutes were to be located in these areas. Segment N4 would potentially impact up to 0.2 acres of significant natural communities. Segment N4 impacts could potentially be reduced or avoided with additional trail route refinements during trail design. The overall impact would be insignificant.

More detailed analysis during the design phase could increase, decrease, or eliminate potential impacts associated with the N4 route.

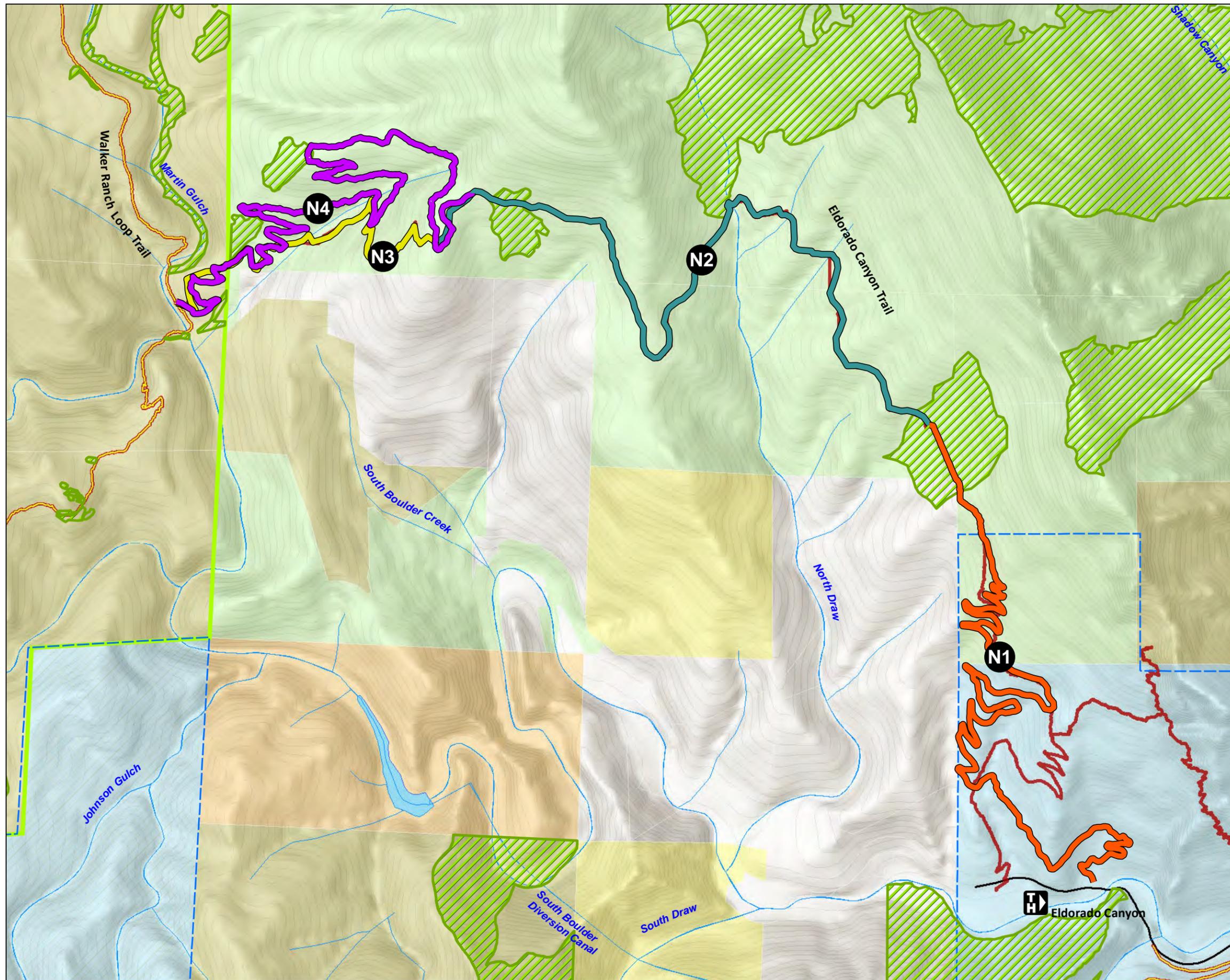
Table 6. North Route Significant Natural Communities Impact Analysis Results

Resource	Alternative Sub-Options			
	N1	N2	N3	N4
New impacts to Significant Natural Communities	○	○	○	○
Overall Impact Score	○			

² Includes Significant Community Alliances from Boulder County Parks and Open Space and Significant Vegetation Communities from the City of Boulder Open Space and Mountain Parks and select vegetation community mapping from CPW.

**Figure 7. North Routes
Significant Natural Communities**

Eldorado Canyon – Walker Ranch Trail Feasibility Study



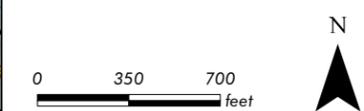
Alternative Sub-Routes

- N1
- N2
- N3
- N4

- Significant Natural Communities
- Trailhead
- Existing Hiking Trail
- Existing Multi-Use Trail
- Neighborhood Road
- Stream/River
- 20-Foot Contour

Land Manager

- Eldorado Canyon State Park Boundary
- Walker Ranch Boundary
- Boulder County
- City of Boulder
- State of Colorado – Boulder County
- State of Colorado
- Denver Water
- Bureau of Land Management



South Route

Along the South Route, segment S1 would result in minor impacts near South Draw. Segments S2 or S3 (which share an alignment for much of their length) would result in impacts along the central ridge to the west of South Draw, with S2 having greater impacts to mapped communities than S3.

Segment S4 would pass through several mapped communities in the Crescent Meadows area. Portions of the route would follow an existing two-track road with existing impacts, which would reduce new impacts in those locations (the extent of existing road that would be determined as part of the design process).

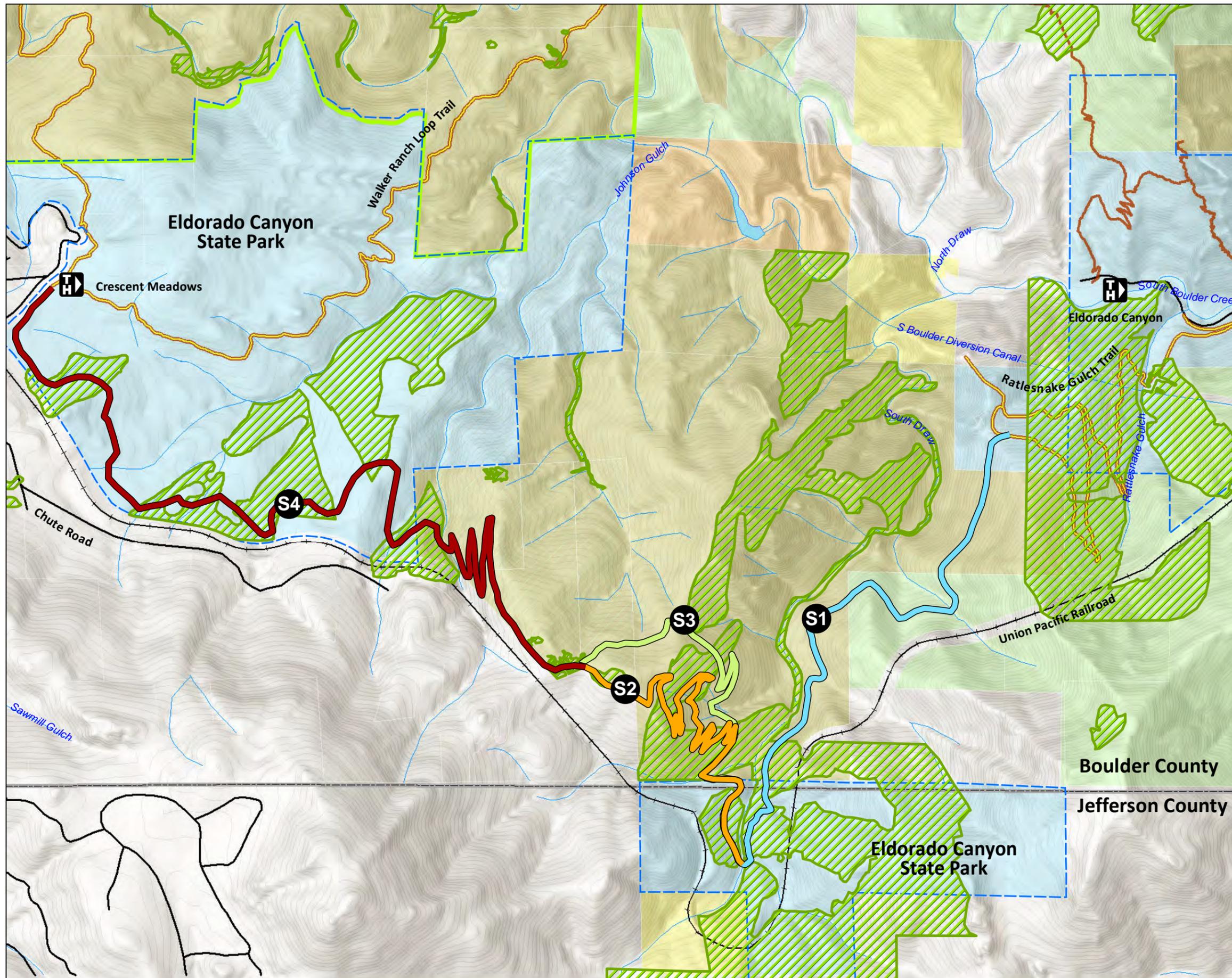
The overall impact of the South Route would be minor.

Table 7. South Routes Significant Natural Communities Impact Analysis Results

		<i>Alternative Sub-Options</i>		
Resource	S1	S2	S3	S4
Significant Natural Communities	●	●	○	●
Overall Impact Score	●			

Figure 8. South Routes Significant Natural Communities

Eldorado Canyon – Walker Ranch Trail Feasibility Study



Alternative Sub-Routes

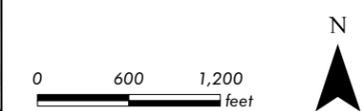
- S1
- S2
- S3
- S4

Significant Natural Communities

- H Trailhead
- Existing Hiking Trail
- Existing Multi-Use Trail
- + + Railroad
- Neighborhood Road
- Stream/River
- 20-Foot Contour

Land Manager

- Eldorado Canyon State Park Boundary
- Walker Ranch Boundary
- Boulder County
- City of Boulder
- Boulder County – City of Boulder
- State of Colorado – Boulder County
- State of Colorado
- Denver Water
- Bureau of Land Management



Wildlife Habitat Impacts

Impacts to sensitive wildlife resources were evaluated by assessing trail route impacts on the following:

- Sensitive Wildlife Habitat (concentrations of habitat for sensitive species) – based on known locations of sensitive species with recommended buffer
- Golden eagle ½-mile nest buffers – active nest sites with the recommended buffer
- Preble’s meadow jumping mouse (PMJM) known and potential habitat – based on Boulder County and CPW mapping of potential habitat for federally-listed species (any new trail development in PMJM habitat. I will require consultation with US Fish and Wildlife Service.
- Boulder County Comprehensive Plan Critical Wildlife Habitat areas – based on Boulder County Comprehensive Plan Environmental Resources Element designation
- CPW Species Area Mapping – based on documented habitat, movement corridors, and sensitive ranges for CPW-managed game species in the study area (mule deer, elk, black bear, and wild turkey)

The analysis categories and data vary by route, based on the availability of wildlife data within different managing agencies. Trail segments were buffered by 100 meters to account for direct and indirect impacts to sensitive wildlife species and habitat.³ These findings are summarized below and were used to inform staff determination of impacts.

Regional management concerns for CPW-managed game species, as well as regional wildlife habitat connectivity, were evaluated based on CPW Species Area Mapping (SAM) data for wide-ranging species including elk, mule deer, black bear, and wild turkey (see Figures 11-14). This mapping indicates potential impacts to sensitive ranges for these species, as well as general impacts resulting from disturbance and habitat fragmentation. Impact analysis considered direct impacts to mapped ranges as well as herd/population management considerations expressed by CPW.

North Route

Segment N2 intersects a sensitive wildlife habitat area and a golden eagle nest buffer along the existing Eldorado Canyon Trail. Implementation of the North Route is unlikely to result in new impacts to the wildlife in that area, because the existing trail corridor would be used.

Potential habitat for Preble’s meadow jumping mouse (PMJM) exists along South Boulder Creek and Martin Gulch. While impact buffers indicate a potential impact to these areas on the far east and west sides of the proposed trail route (up to 11 acres along N1 and 6 acres along N4), the actual impact at these locations, which is heavily disturbed by existing roads, trails, and the ECSP visitor center and picnic areas, is likely negligible.

³ While the distance in which human disturbance affects wildlife varies widely by species, location, and context, a standard impact buffer of 100 meters is used for this analysis. This is based on consideration of numerous studies on the topic, including Taylor and Knight 2003, Miller et al. 1998, Sisk 1989, Miller et al. 2001, Malone and Emerick 2003, and Cassirer et al. 1992.

The North Route (Segments N1 and N2) does not intersect the Boulder Mountain Parks and Eldorado Mountain Critical Wildlife Habitat (as defined in the Boulder County Comprehensive Plan Environmental Resources Element).

The trail routes are within mule deer winter concentration and winter range, and elk severe winter range, which could result in impacts from trail use during the winter. While some new impacts would occur along the Segment N4 reroute, the overall impact is considered insignificant, because of the existing presence of visitor use along the existing trail corridor.

The overall impact of the North Route on sensitive wildlife habitat would be insignificant.

Table 8. North Route Wildlife Habitat Impact Results

Resource	Alternative Sub-Options			
	N1	N2	N3	N4
Golden Eagle Nest 0.5-mile Buffer	○	○	○	○
Sensitive Wildlife Habitat	○	○	○	○
PMJM Potential Habitat	○	○	○	○
Boulder County Critical Wildlife Habitat	○	○	○	○
CPW-Tracked Species Habitat	○	○	○	○
Overall Impact Score per Segment	○	○	○	○
Overall Impact Score	○			

South Route

None of the south segments would impact buffers for nesting golden eagles.

Segments S1 and S4 would result in potentially major impacts to PMJM habitat (see Table 9). S1 would impact approximately 21.6 acres of habitat along South Draw, and S4 would impact approximately 44.1 acres along Johnson Gulch and in Crescent Meadows. Segments S2 and S3 (which share an alignment for a portion of their length) would each impact about 4.4 acres of PMJM habitat (minor impact). Some of the S4 alignment follows an existing two-track road through Crescent Meadows, but the extent of road that would be used would need to be determined at the design phase. Due to the large extent of potential PMJM habitat in the area, and uncertainty as to whether the road would be used, the impact determination (major) assumes a greater magnitude of new impacts. Direct impacts to PMJM habitat

would be subject to site-level habitat assessments, surveys, and consultation with the U.S. Fish and Wildlife Service.

All south segments would impact the South Draw Critical Wildlife Habitat. The culmination of routes would impact up to 105.5 acres of this designation, or 12 percent of the total.

Most of the South Route is located in winter range for mule deer and elk, and severe winter range for elk. Potential winter use of this trail could adversely affect these species. If the South Route is constructed, CPW may consider strategies to mitigate impacts to wildlife, including seasonal closures on State Park land to protect winter range for elk and deer. The overall potential for impacts would be major, because of the impacts of a new trail.

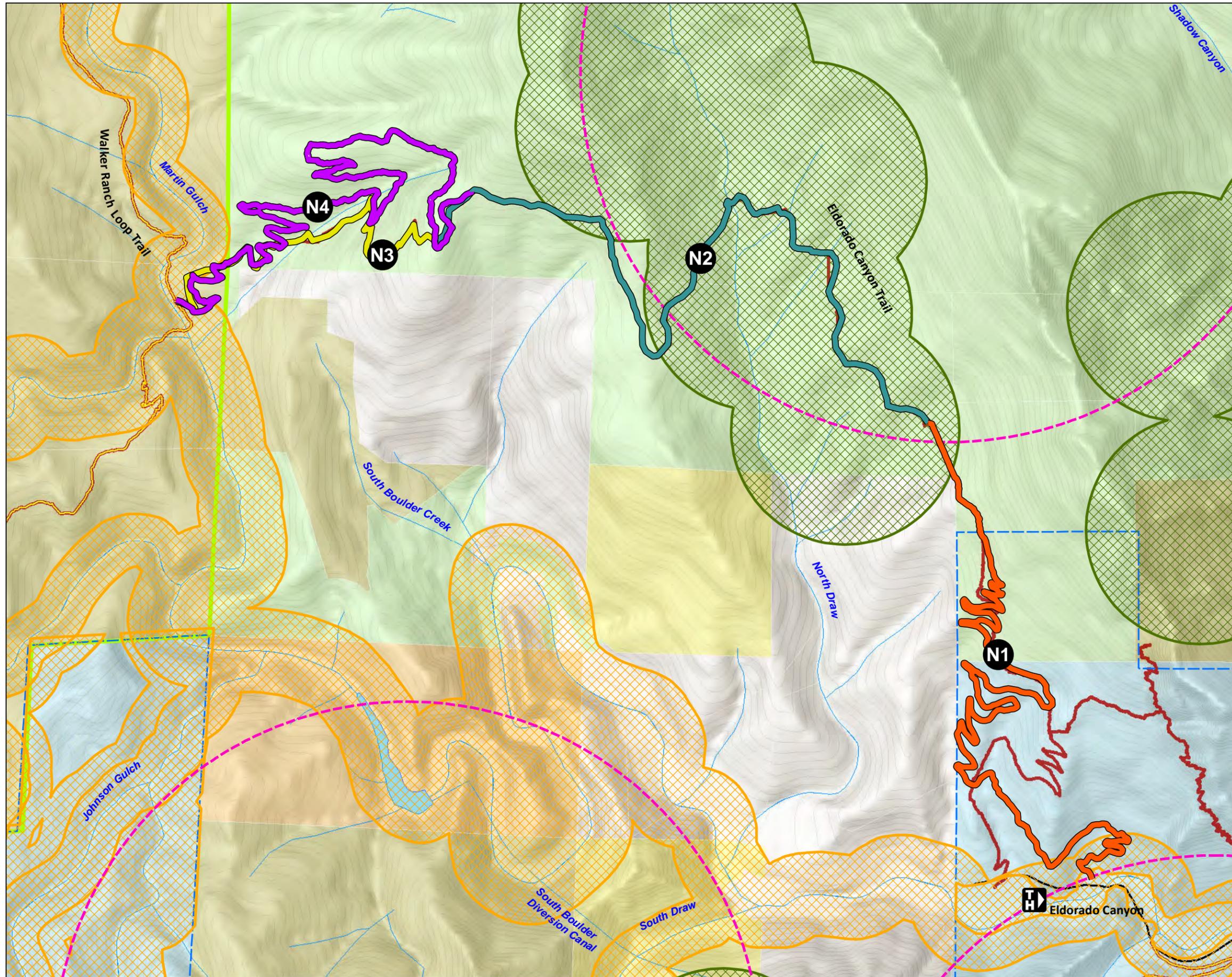
Based on the designated Critical Wildlife Habitat and potential PMJM habitat, the South Routes would result in a major impact to sensitive wildlife habitat.

Table 9. South Route Wildlife Habitat Impact Results

Resource	<i>Alternative Sub-Options</i>			
	S1	S2	S3	S4
Golden Eagle Nest 0.5-mile Buffer	○	○	○	○
PMJM Habitat	●	◐	◐	●
Boulder County Critical Wildlife Habitat	●	●	●	●
CPW-Tracked Species Habitat	●	●	●	●
Overall Impact Score per Segment	●	◐	◐	●
Overall Impact	●			

Figure 9. North Routes Sensitive Wildlife Habitat

Eldorado Canyon – Walker Ranch Trail Feasibility Study



Alternative Sub-Routes

- N1
- N2
- N3
- N4

- Trailhead
- Golden Eagle ½-Mile Nest Buffer
- Sensitive Wildlife Habitat
- Preble's Meadow Jumping Mouse Habitat
- Existing Hiking Trail
- Existing Multi-Use Trail
- Neighborhood Road
- Stream/River
- 20-Foot Contour

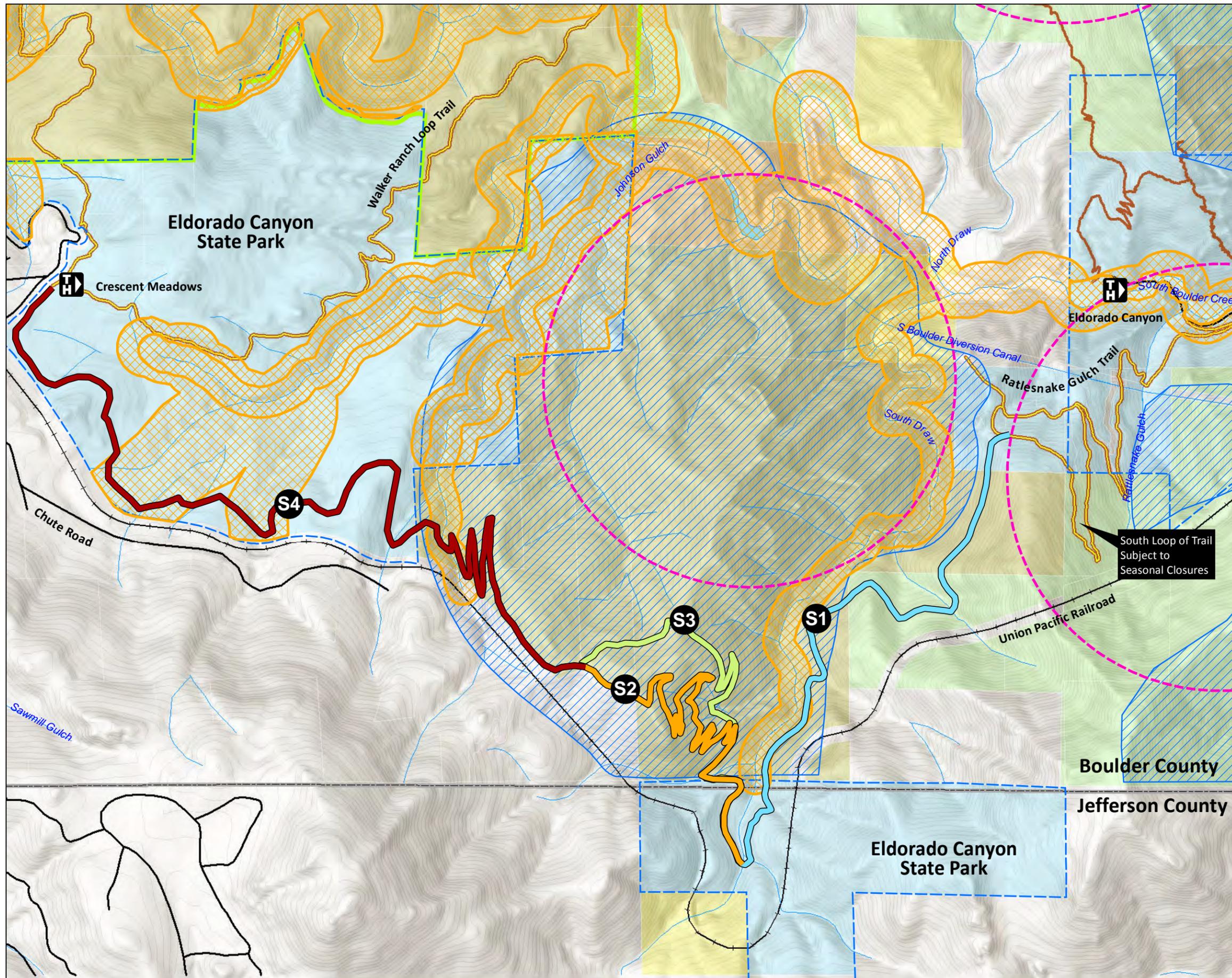
Land Manager

- Eldorado Canyon State Park Boundary
- Walker Ranch Boundary
- Boulder County
- City of Boulder
- State of Colorado – Boulder County
- State of Colorado
- Denver Water
- Bureau of Land Management



Figure 10. South Routes Sensitive Wildlife Habitat

Eldorado Canyon – Walker Ranch Trail Feasibility Study



Alternative Sub-Routes

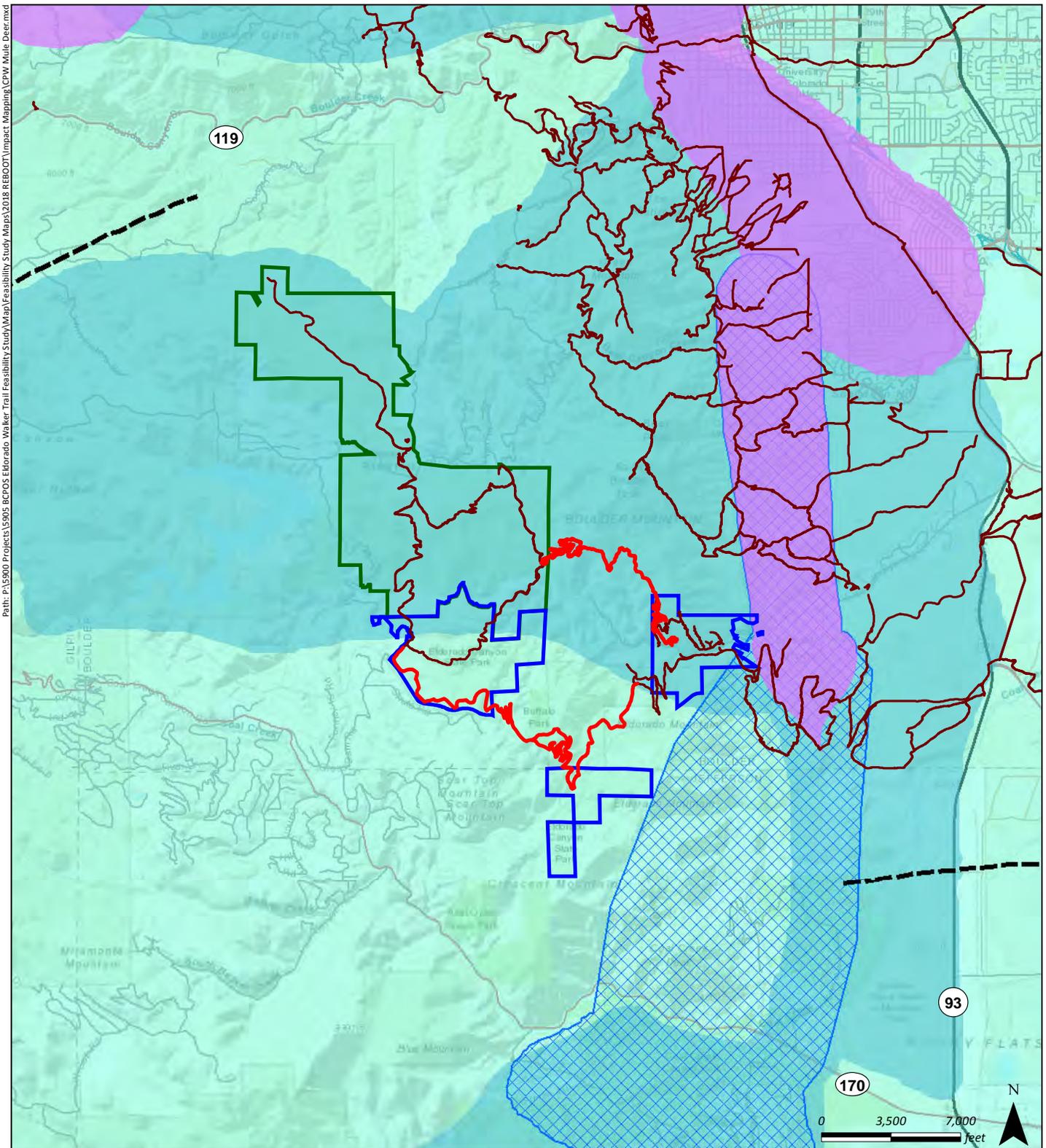
- S1
- S2
- S3
- S4
- Trailhead
- Golden Eagle 1/2-Mile Nest Buffer
- Preble's Meadow Jumping Mouse Habitat
- Critical Wildlife Habitat
- Existing Hiking Trail
- Existing Multi-Use Trail
- Railroad
- Neighborhood Road
- Stream/River
- 20-Foot Contour

Land Manager

- Eldorado Canyon State Park Boundary
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- State of Colorado
- Denver Water
- Bureau of Land Management



Figure 11. CPW Mule Deer Habitat

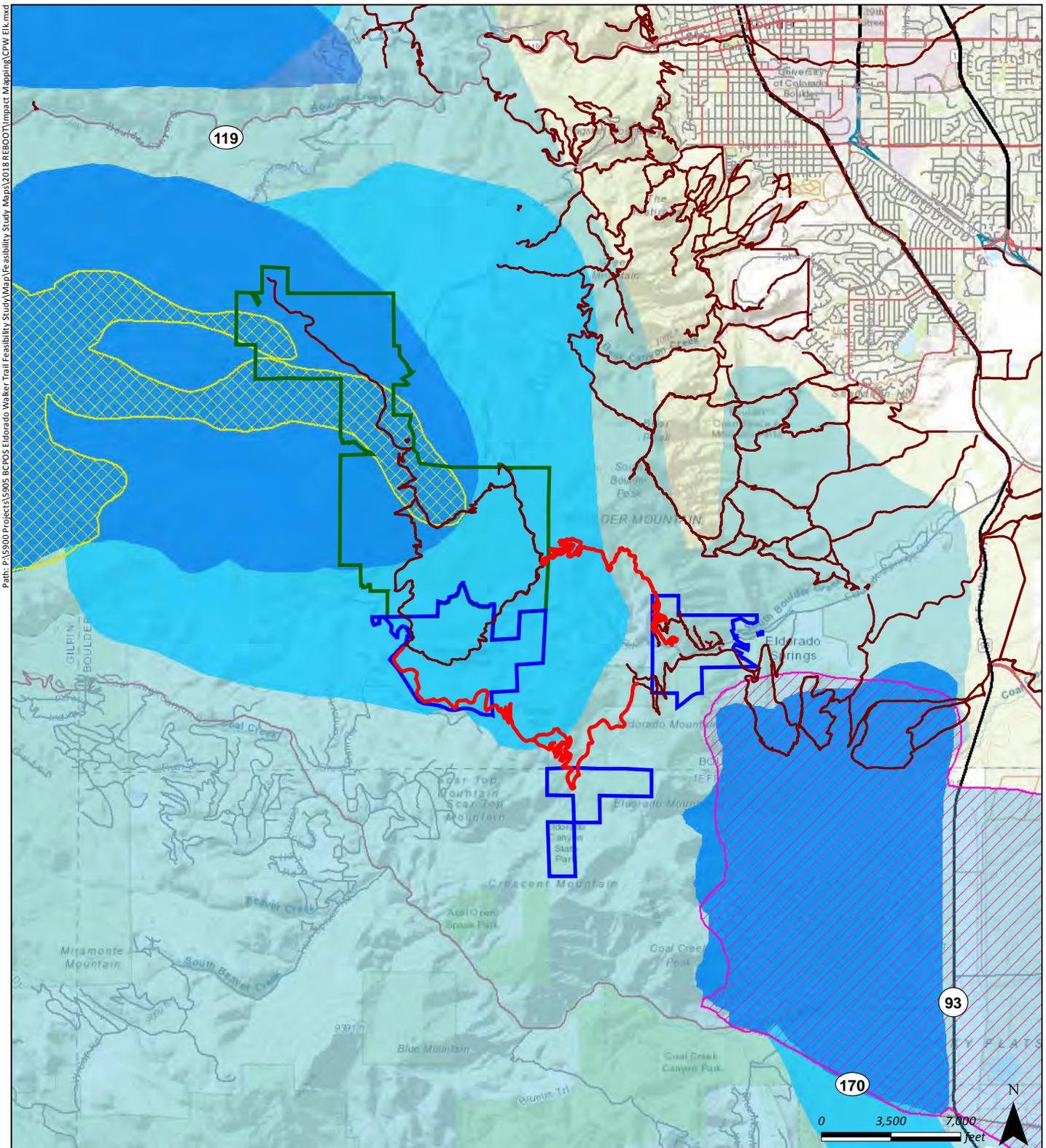


Eldorado Canyon – Walker Ranch Trail Feasibility Study

Potential Trail Route Option	Concentration Area
Existing Trail	Migration Patterns
Eldorado State Park Boundary	Severe Winter Range
Walker Ranch Boundary	Winter Concentration Area
	Winter Range

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Figure 12. CPW Elk Habitat

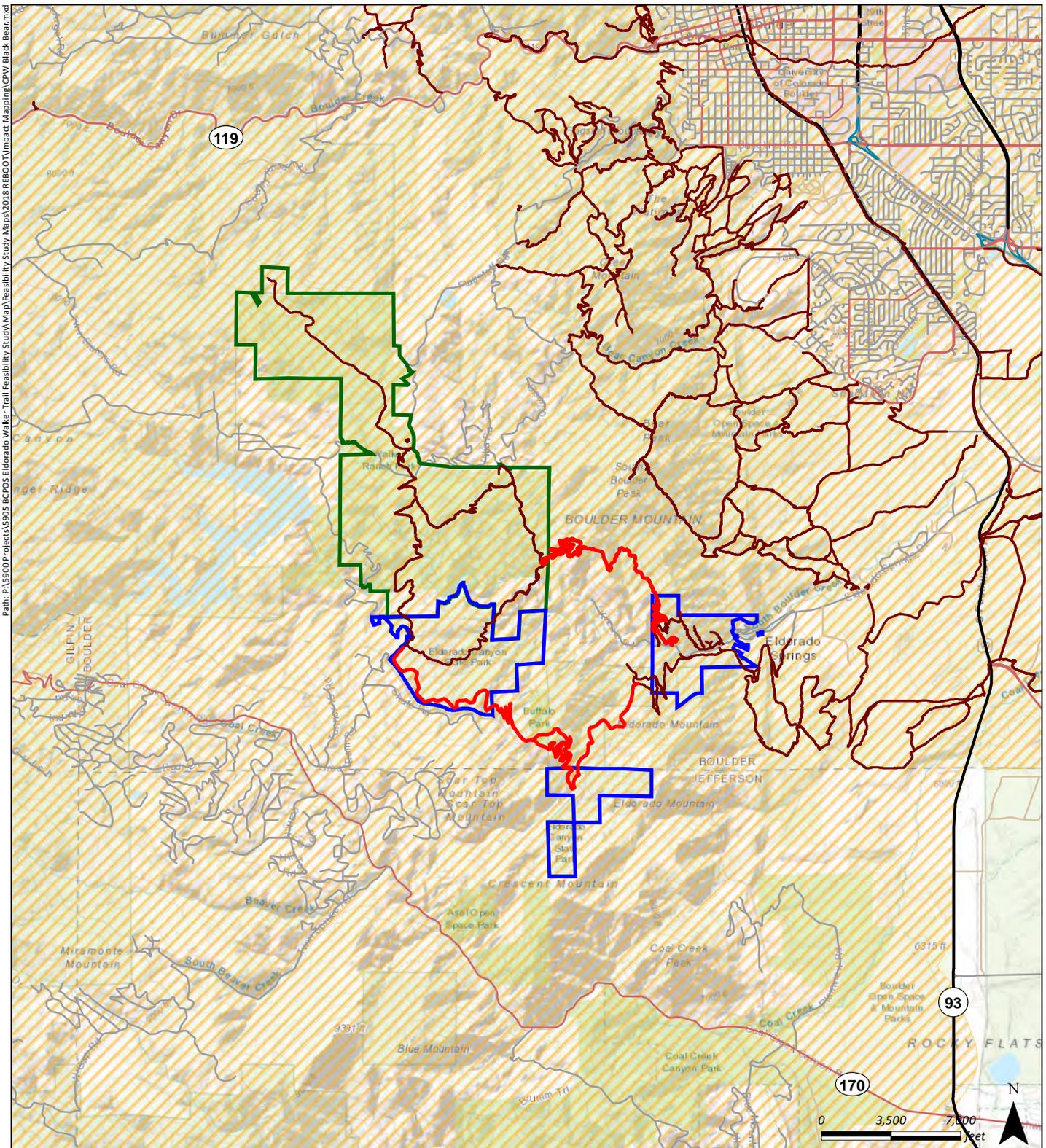


Eldorado Canyon – Walker Ranch Trail Feasibility Study

Potential Trail Route Option	Migration Corridor
Existing Trail	Production Area
Eldorado State Park Boundary	Winter Concentration Area
Walker Ranch Boundary	Severe Winter Range
	Winter Range

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Figure 13. CPW Black Bear Habitat



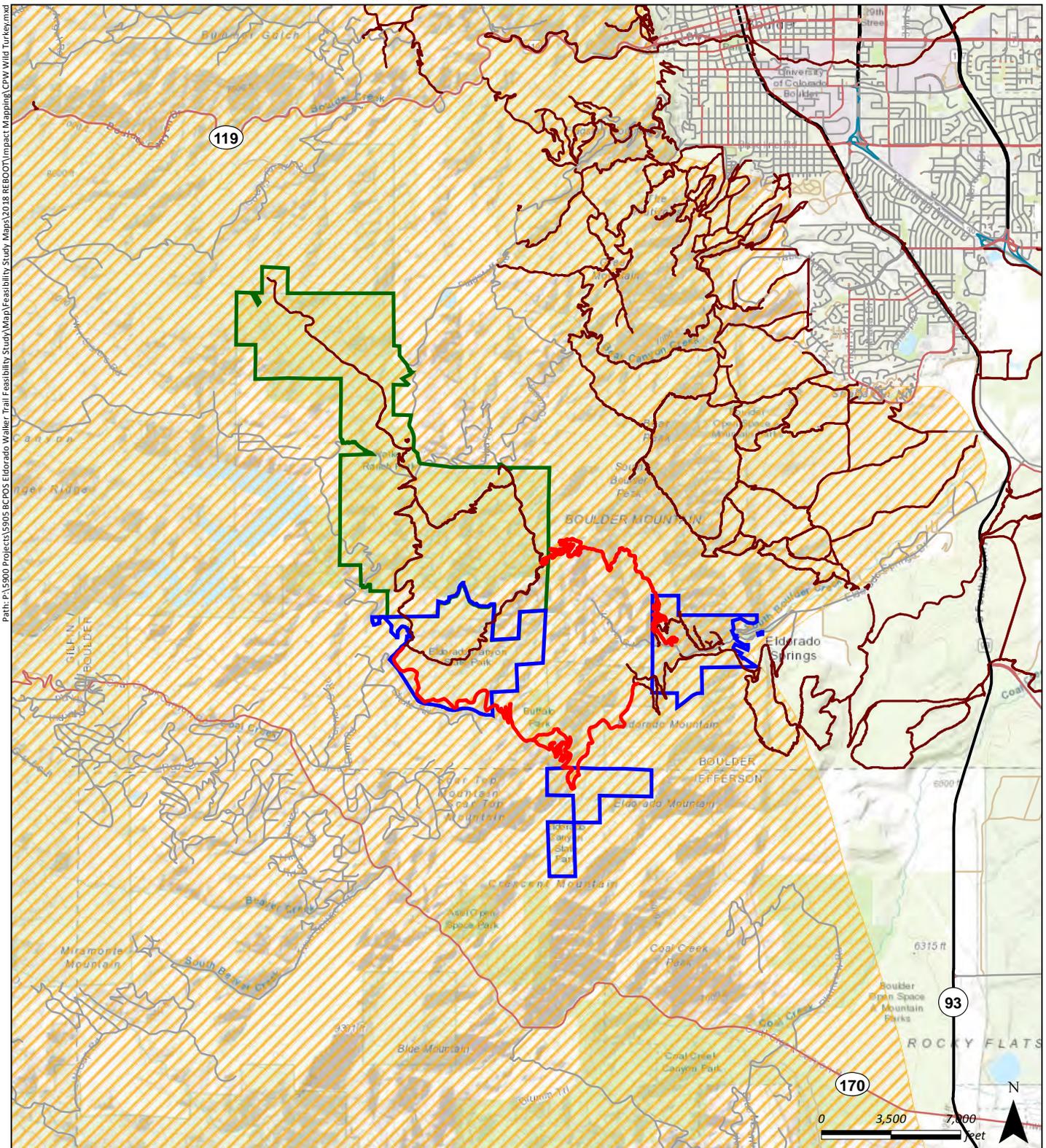
Eldorado Canyon – Walker Ranch Trail Feasibility Study

- Potential Trail Route Option
- Existing Trail
- Eldorado State Park Boundary
- Walker Ranch Boundary
- Overall Range

Figure 1

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Figure 14. CPW Wild Turkey Habitat



Eldorado Canyon – Walker Ranch Trail Feasibility Study

- Potential Trail Route Option
- Existing Trail
- Eldorado State Park Boundary
- Walker Ranch Boundary
- Overall Range

Undisturbed Habitat Impacts

Habitat impacts were evaluated by assessing the overall change to large tracts of undisturbed habitat. To determine existing conditions, all existing trails, as well as existing roads and railroads, were buffered by 100 meters to account for all potential human impacts to wildlife habitat.⁴ The change in the amount of undisturbed habitat due to the proposed trail routes was compared to the existing undisturbed habitat (defined as contiguous, undisturbed public land). The results of this analysis are presented in acres and the percent change in undisturbed habitat for both the north and south trail routes.

North Route

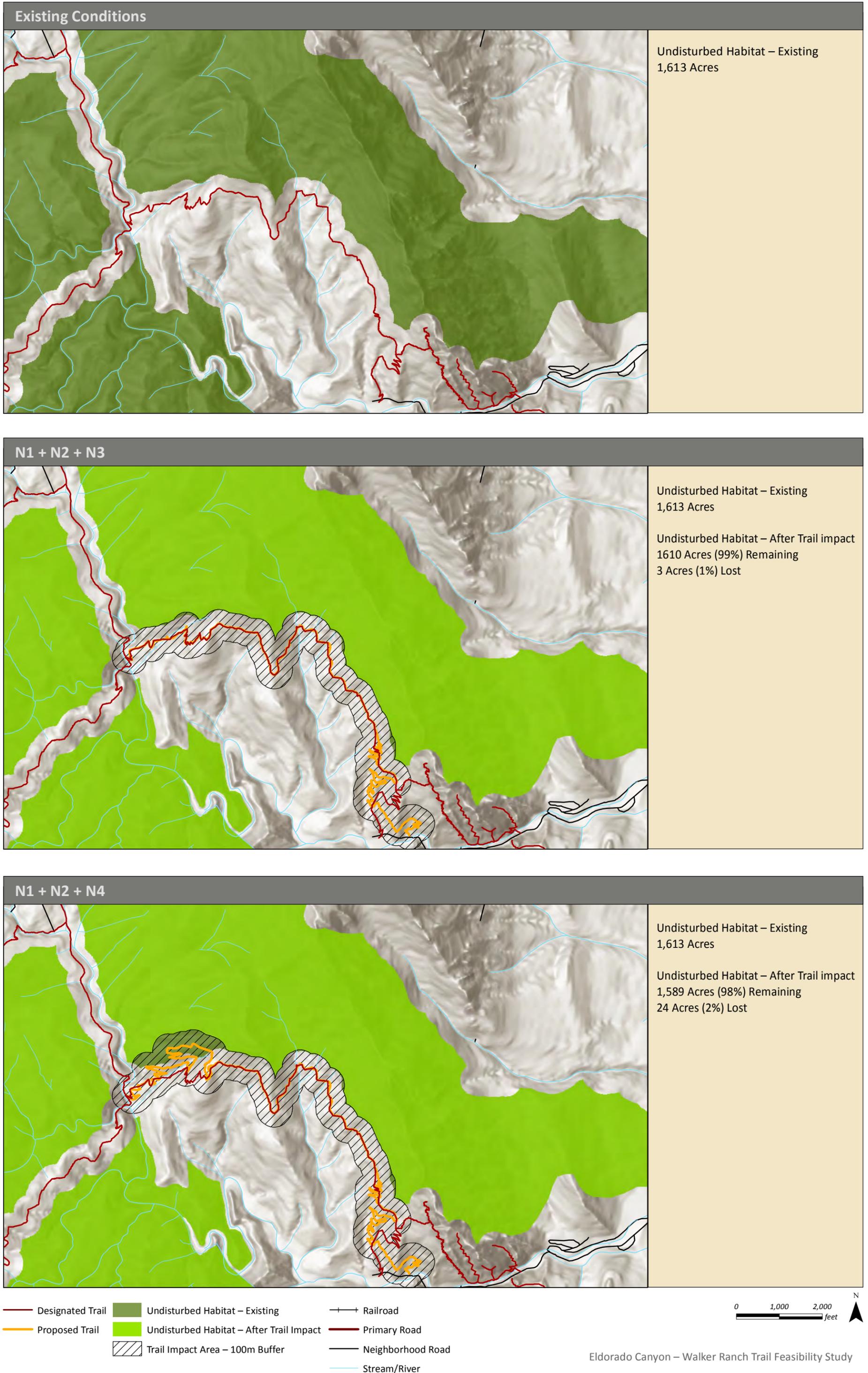
The North Route would result in some new disturbance beyond the existing Eldorado Canyon Trail (see Table 10 and Figure 15). Construction of a new North Route using segments N1, N2 and N3 would result in new loss of 2.9 acres of undisturbed habitat (0.2 percent reduction). Construction of a new North Route using segments N1, N2, and N4 would result in new fragmentation of 23.9 acres of undisturbed habitat (1.5 percent reduction). Overall, because of the existing Eldorado Canyon Trail, the amount of new habitat disturbance would be insignificant if a North Route was constructed.

Table 10. North Route Undisturbed Habitat Impact Results

Resource	N1-N2-N3	N1-N2-N4
Undisturbed Habitat	○	○
Overall Impact Score	○	

⁴ A standard impact buffer of 100 meters is used for this analysis (Taylor and Knight 2003, Miller et al. 1998, Sisk 1989, Miller et al. 2001, Malone and Emerick 2003, and Cassirer et al. 1992).

Figure 15. North Routes Undisturbed Habitat Impacts



South Route

The South Route segments would result in new habitat disturbances through the BLM South area of Walker Ranch (see Figure 16). Implementation of a South Route trail, using segments S1, S2, and S4 would result in new impacts to 296 acres of habitat (24 percent reduction). Segments S1, S3, and S4 would result in new impacts to 324 acres of habitat (26 percent reduction).

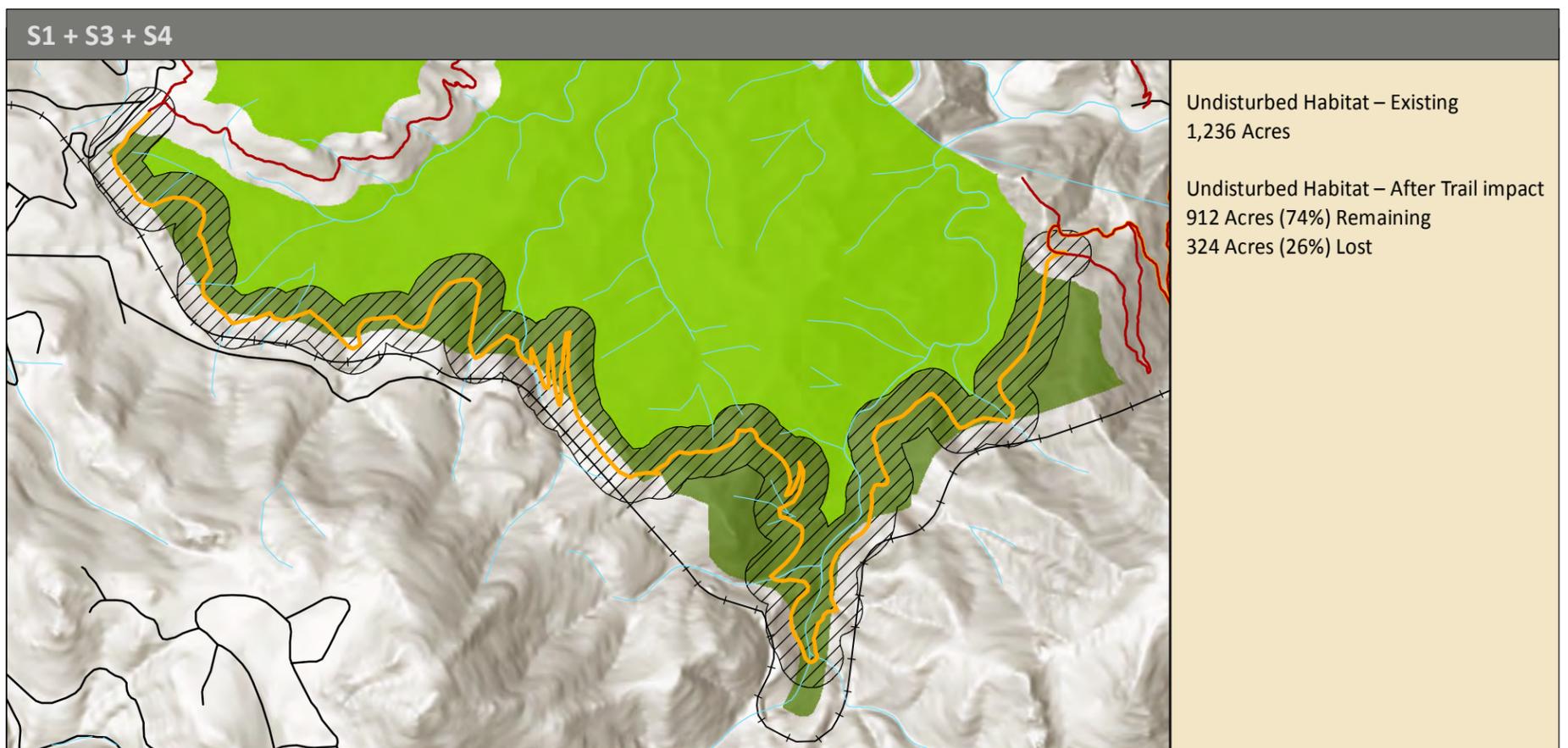
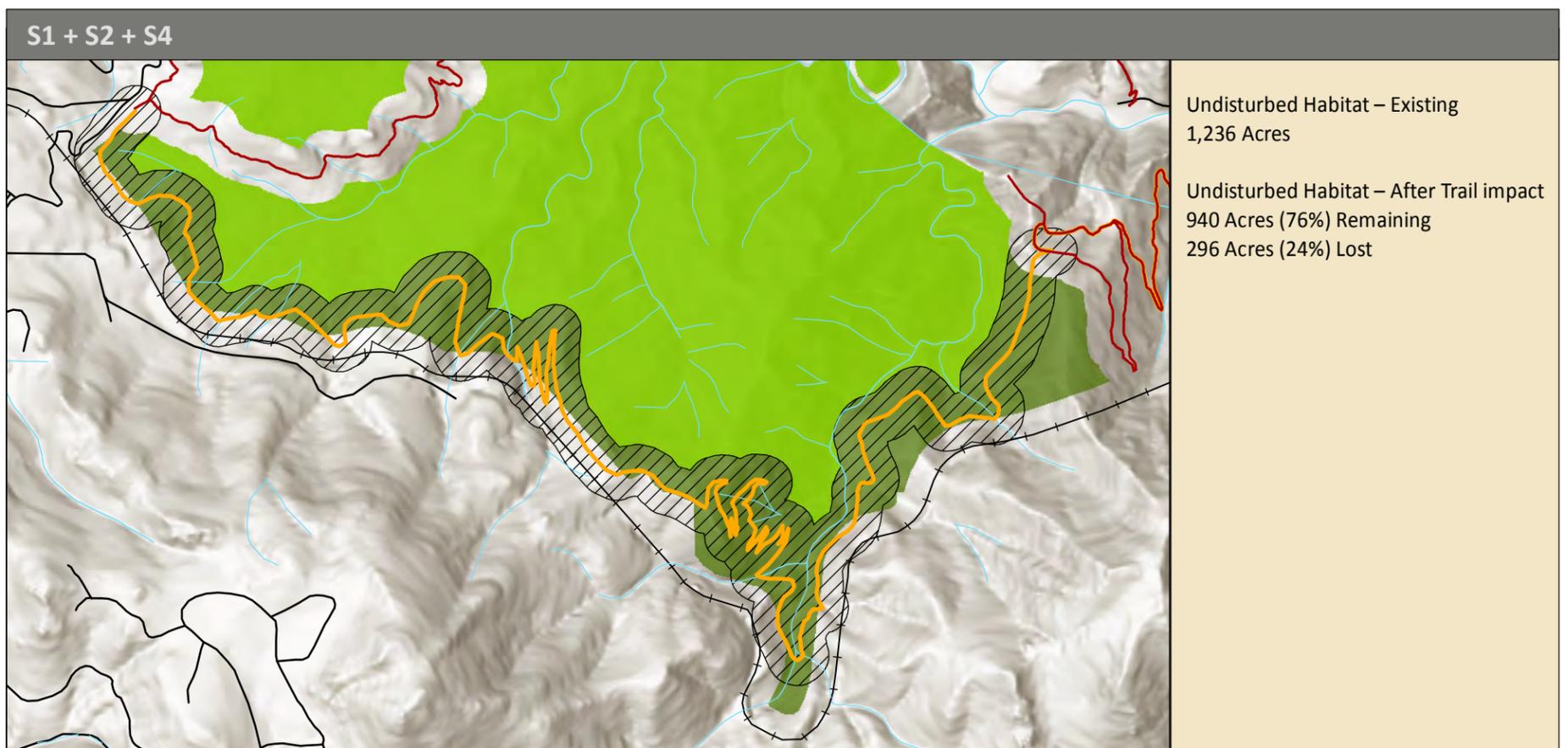
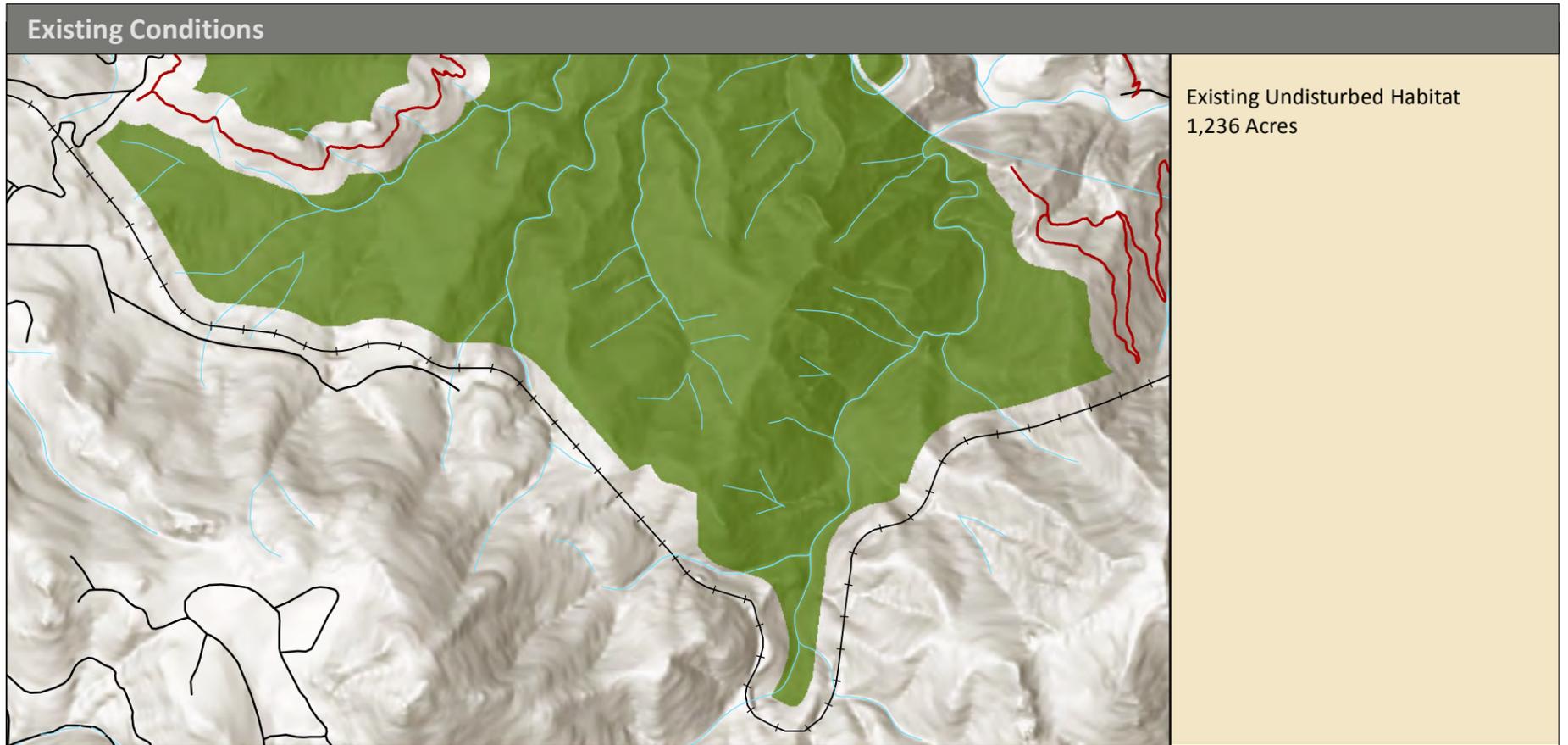
This new disturbance of between 24 and 26 percent of the undisturbed habitat is the greatest impact to wildlife habitat in the project area. This impact does not relate to any particular wildlife species or activity, but instead reduces available habitat for all wildlife in the area. The severity of this impact on individual species (or individual animals) would vary, depending on the location, the species affected, and their sensitivity to new human disturbance.

Overall, the south routes would result in major impacts to undisturbed habitat.

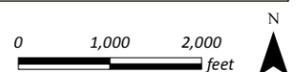
Table 11. South Route Undisturbed Habitat Impact Results

Resource	S1-S2-S4	S1-S3-S4
Undisturbed Habitat	●	●
<i>Overall Impact Score</i>	●	

Figure 16. South Routes Undisturbed Habitat Impacts



- Designated Trail
- Proposed Trail
- Undisturbed Habitat – Existing
- Undisturbed Habitat – After Trail impact
- ▨ Trail Impact Area – 100m Buffer
- Railroad
- Primary Road
- Neighborhood Road
- Stream/River



Cultural Resources

This analysis completed a desktop review of mapped cultural resources within 500 feet of both the north and south alignments for the cultural resource evaluation. The review utilized a geospatial dataset, obtained from the Colorado Office of Archaeology and Historic Preservation (OAHP), of mapped resource locations on and within the immediate vicinity of the proposed routes. Impacts were evaluated based on the number of cultural resources within 500 feet or intersected by the proposed routes. The Impacts are based on several factors including resource type, eligibility for listing in the National Register of Historic Places (NRHP), intersections with mapped cultural resources, and the types of anticipated impacts.

North Route

Overall, the proposed North Route is anticipated to result in no change; no new impacts to cultural resources would occur. One cultural resource (same resource as current conditions) is within 500 feet of the proposed North Route.

Segments N3 and N4 are proposed to intersect the mapped shape of an NRHP listed district. Impacts from segments N3 and N4 may be discovered within the district boundary during a comprehensive field survey prior to construction, resulting in a minor impact.

Table 12. North Route Cultural Resource Impacts

Resource	Alternative Sub-Options			
	N1	N2	N3	N4
Cultural Resources within 500 feet	○	○	○	○
Cultural Resources Intersected	○	○	◐	◐
Overall Impact Score per Segment	○	○	◐	◐
Overall Impact Score	○			

South Route

Overall, the proposed South Route is anticipated to result in minor impacts to cultural resources. A total of 21 cultural resources are within 500 feet of the proposed South Route, and six cultural resources are intersected by multiple segments of the proposed alignment.

The proposed South Route would result in only minor impacts to these cultural resources, consisting mainly of an increased probability of looting at some sites resulting from an increase in public access to the area.

Segment S1 intersects the mapped locations of two cultural resources. It is anticipated to result in only minor impacts to one cultural resource, and no impacts to a second. The minor impacts to the resource consists of a low probability of discovering previously undocumented features during trail construction and an increased probability of looting within the resource boundary if those new features are evident from the new trail alignment after construction.

Segments S2 and S3 intersect the mapped location of one cultural resource. Developing either route is anticipated to result in minor impacts to an historic structure; however, it is assumed that trail construction will not take place in the area of the standing structure. Thus, anticipated impacts would likely be limited to an increased probability of looting or vandalism at the structure.

Segment S4 intersects three cultural resources. Based on the information currently available, two of the affected sites have moderate to good potential for buried intact cultural material which could be disturbed by trail construction. The third cultural resource was determined not eligible for inclusion in the NRHP and is of limited informational value. Trail construction is only anticipated to have a minor impact related to potential vandalism of this resource.

Table 13. South Route Cultural Resource Impacts

Resource	Alternative Sub-Options			
	S1	S2	S3	S4
Cultural Resources within 500 feet	⊖	⊖	⊖	⊖
Cultural Resources Intersected	⊖	⊖	⊖	⊖
Overall Impact Score per Segment	⊖	⊖	⊖	⊖
Overall Impact Score	⊖			

This review of cultural resource information is based on data for cultural resources the immediate vicinity of the proposed routes, and within the vicinity of conceptual study corridor alignments. Because of the limited scope and timeliness of the data, a formal Class I cultural resources survey (which is a literature review and an official OAHF file search) and an intensive Class III cultural resources survey (which is a comprehensive field survey and report) are recommended and should be conducted prior to the design phase of this project. The Class I survey should be included as a part of the final Class III report. Both surveys and the report must adhere to the requirements established in the [Colorado Cultural Resources Survey Manual](#) in order to comply with Colorado Office of Archaeology and Historic Preservation standards for cultural resource projects.

Visitor Experience

Visitor experience is assessed by looking at the following aspects:

- Regional Trail Connectivity
- Trail Aesthetic and Character
- Access and Parking
- Trail Access Opportunities
- Seasonality
- Visitor Density
- Visitor Conflict Management

Results of the analysis were then assigned an impact score using the criteria in Table 16.

Table 14. Scoring Criteria Definitions for Visitor Experience

				
Significantly improves recreational opportunities for multiple visitor types.	Slightly improves recreational opportunities for some visitors.	No impact; maintains existing trail options.	Slightly degrades recreational opportunities for some visitors.	Significantly degrades recreational opportunities for multiple visitor types.

Overall impacts and changes are summarized in Table 17, and are described in greater detail below.

Table 15. Summary Impacts and Changes to Visitor Experience

Resource	North Route	South Route
Regional Trail Connectivity		
Trail Aesthetic and Character		
Access and Parking		
Trail Access Opportunities		
Seasonality		

Visitor Density		
Visitor Conflict Management		
Overall Impact Score		

Regional Trail Connectivity

The primary objective of this analysis process is to consider opportunities for a multi-use trail between Eldorado Canyon State Park and Walker Ranch Open Space. The existing Eldorado Canyon Trail accommodates pedestrians but is not suitable in its current condition and alignment to accommodate bicycle use. (Equestrian use is permitted but is extremely rare due to steep and rocky conditions). This connectivity for bicycles has been envisioned for decades and is documented in several adopted master plans and guidance documents.

Both the North and South Routes achieve this purpose by creating a multi-use trail connection with Walker Ranch Open Space.

Consistency with Plans and Guidance Documents

Multi-use trail connectivity through this corridor has been envisioned and documented in several master plans and guidance documents adopted by several governmental entities. In summary, these include the following:

- State of Colorado – Colorado the Beautiful (16 in 2016) Initiative (2016)
- Boulder County Parks and Open Space – Walker Ranch Management Plan (2013)
- OSMP West Trail Study Area (TSA) Plan (2011)
- OSMP Eldorado Mountain/Doudy Draw TSA Plan (2006)
- OSMP Visitor Management Plan (2005)
- Eldorado Canyon State Park Management Plan (2000)
- Boulder Valley Comprehensive Plan – Trails Map (2001, 2005, 2010, 2015)
- Boulder County Comprehensive Plan – County Trails Map (1998)

These are described in greater detail in the Introduction. Both the North and South routes achieve the intended connectivity of the plans listed above.

Resource	North Route	South Route
Regional Trail Connectivity		

North Route

The North Route achieves the regional trail connectivity goal; significantly improving the recreational opportunities for multiple visitor types. The north route is mentioned as an option in the OSMP plans (Visitor Management Plans and TSA plans).

South Route

The South Route achieves the regional trail connectivity goal; significantly improving the recreational opportunities for multiple visitor types. Connecting to the State Parks lands is mentioned or illustrated in the ECSP Management Plan.

Trail Aesthetic and Character

Trail aesthetic and character—which create much of the visitor experience—encompass the qualities of the trail itself and its interplay with the setting through which it passes. Some of these qualities are objective, measurable, and applicable to this conceptual/feasibility phase of a trail project, others are subjective and/or are related to the design phase of a trail. This study focuses on the objective components of aesthetic and character applicable for a conceptual/feasibility phase, including: trail distances, trail profiles, landscape types, views, and trail design standards. More subjective elements, such as anticipated trail texture/ruggedness, trail difficulty, efficiency (direct vs meandering), sense of exploration, rhythm, and fun, would be considered during a subsequent more detailed design phase once a preferred alignment is identified.⁵ Both routes have many opportunities to create experiences rich with exploration, rhythm, fun, and sense of place.

This category is not rated for potential impacts or benefits; instead, this section is intended to be illustrative - describing the trail aesthetic and character for each route.

Resource	North Route	South Route
Trail Aesthetic and Character	●	●

⁵ The following references can provide additional information on these topics: MDNR 2007, USFS 2008, IMBA 2004, IMBA 2007 T. Scott Parker 2004, BCPOS 2003, BLM/IMBA 2017

North Route – Trail Aesthetic and Character

Summary Statistics

- Total Distance: 3.9 to 4.8 miles
- Total Elevation gain/loss (east to west):
+1,010 feet/-610 feet
Subject to change pending final design and construction

Landscape/Vegetation Types

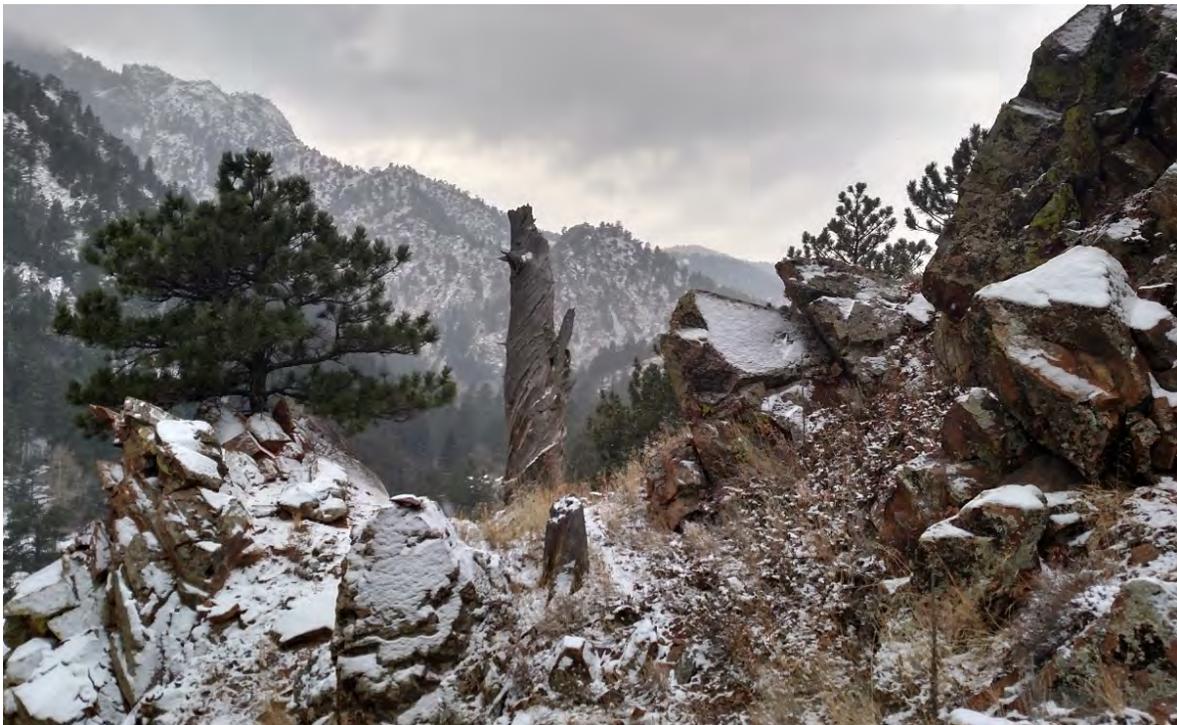
- N1 – Open shrubland, mixed forest, and talus
- N2 – Mixed forest and open shrubland
- N3 – Mixed forest
- N4 – Open shrubland and mixed forest

Interesting Features

- Four prominent viewpoints with expansive views to the west, including Walker Ranch, Winiger Ridge, and the Continental Divide
- Multiple views to the east and south, including Rincon Wall and Eldorado Canyon, distant views to downtown Denver to the east, Eldorado Mountain, Union Pacific railroad grade, and Rattlesnake Gulch Trail to the south
- Two large talus fields
- North Draw drainage

Meets Class 3 Trail Bike Design Standards

- It is feasible to reconstruct N1, N2, N4 to meet these bike design standards
- It is not feasible for N3 to be re-constructed to meet these bike design standards
- More information on trail sustainability and trail design standards can be found below



Viewpoint along potential N1 reroute



View east from Eldorado Canyon Trail



Existing talus crossing, Eldorado Canyon Trail



Eldorado Canyon Trail corridor, looking east



View of North Draw drainage, looking northwest

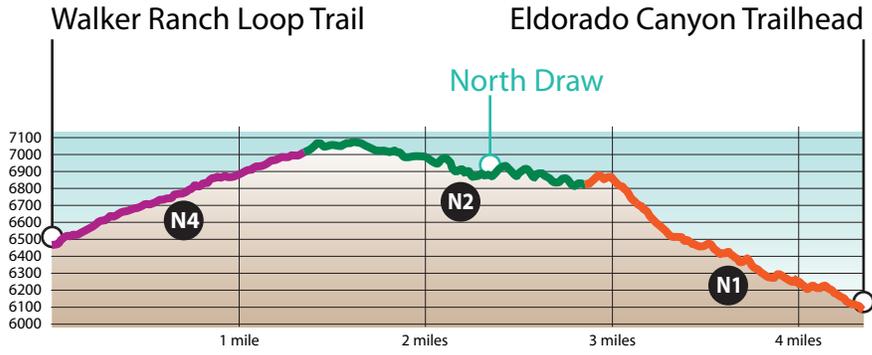


View from the Eldorado Canyon Trail to the northwest, near the top of N3/N4

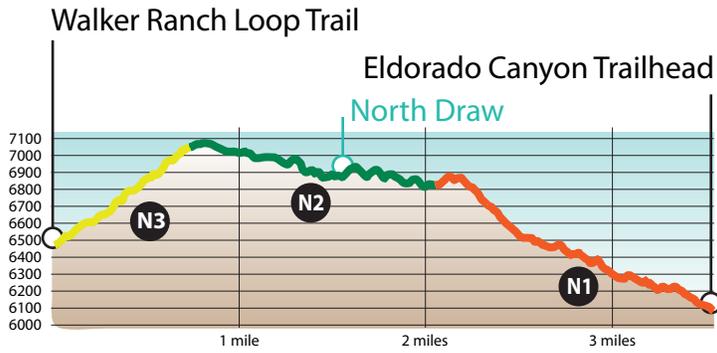


View from the N4 reroute, looking south

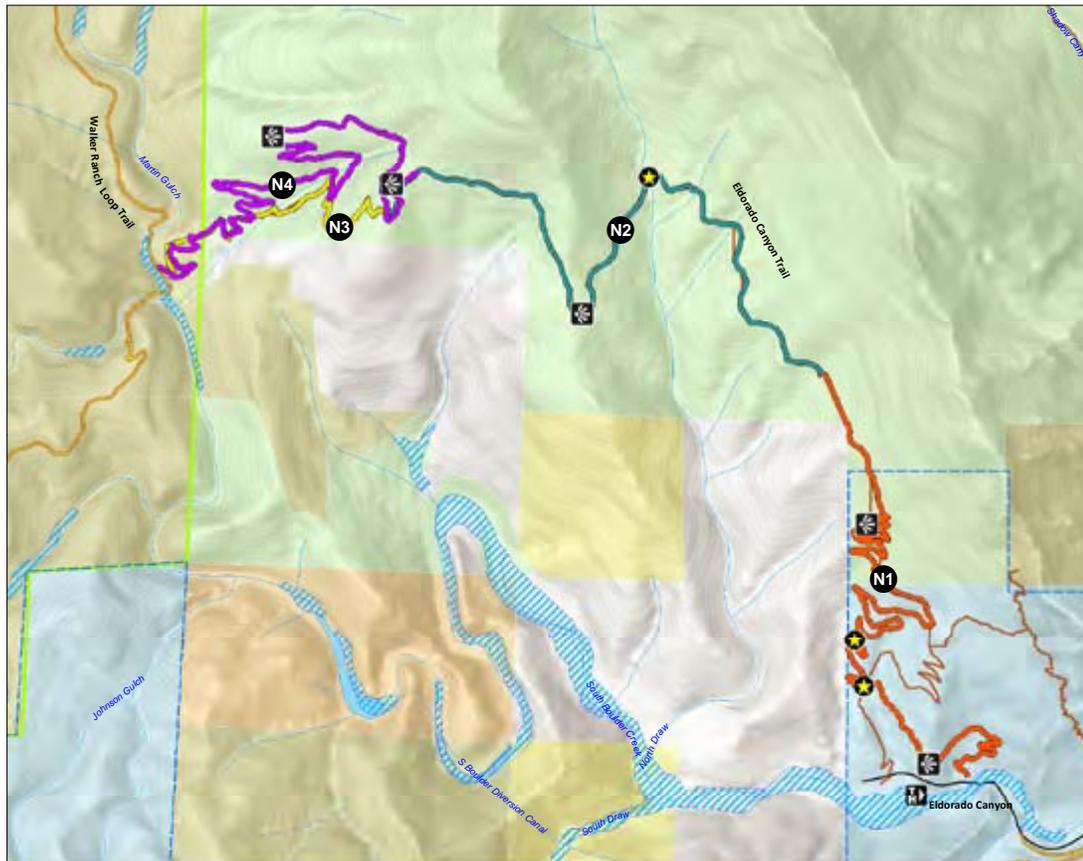
Proposed North Routes



Total Distance = 4.8 miles



Total Distance = 3.9 miles



North Routes Considered

Eldorado Canyon – Walker Ranch Trail Feasibility Study

Alternative Sub-Routes

- N1
- N2
- N3
- N4
- Riparian Areas and Wetlands
- Point of Interest
- Primary Viewpoint
- Trailhead
- Existing Hiking Trail
- Existing Multi-Use Trail
- Neighborhood Road
- Stream/River
- 20-Foot Contour

Land Manager

- Eldorado Canyon State Park Boundary
- Walker Ranch Boundary
- Boulder County
- City of Boulder
- State of Colorado – Boulder County
- State of Colorado
- Denver Water
- Bureau of Land Management



South Route – Trail Aesthetic and Character

Summary Statistics

- Total Distance: 7.2 or 7.8 miles
- New Trail Distance: 6.5 or 7.1 miles
- Total Elevation gain/loss (east to west): +930 feet/-480 feet (+1,860 feet/-480 feet including Rattlesnake Gulch trail)
Subject to change pending final design and construction

Landscape/Vegetation Types:

- S1 – mixed forest, talus
- S2 – mixed forest, open shrubland
- S3 – mixed forest, open shrubland
- S4 – mixed forest, open meadow

Interesting Features

- Three prominent viewpoints with expansive views to the west, including Walker Ranch, Winiger Ridge, and the Continental Divide
- Multiple overlooks with proximate views of the landscape, including overlooks of South Draw, Johnson Gulch, and Crescent Meadows
- Views and proximity to the historic and iconic Union Pacific Railroad corridor and tunnels
- Crossings of one large talus field, and one small talus field
- Crossings of South Draw, Johnson Gulch, and several smaller streams

Meets Class 3 Bike Trail Design Standards

- The south route can be constructed to meet bike trail design standards.
- More information on trail sustainability and trail design standards can be found below.



View north from top of existing Rattlesnake Gulch Trail



Historic trail across talus field along S1 in South Draw



Large talus field crossing along S1 in South Draw



South draw stream corridor near trail crossing location



View of Union Pacific Railroad grade across South Draw



View north along South Draw, from S2/S3 alignment



View south from top of S2 alignment

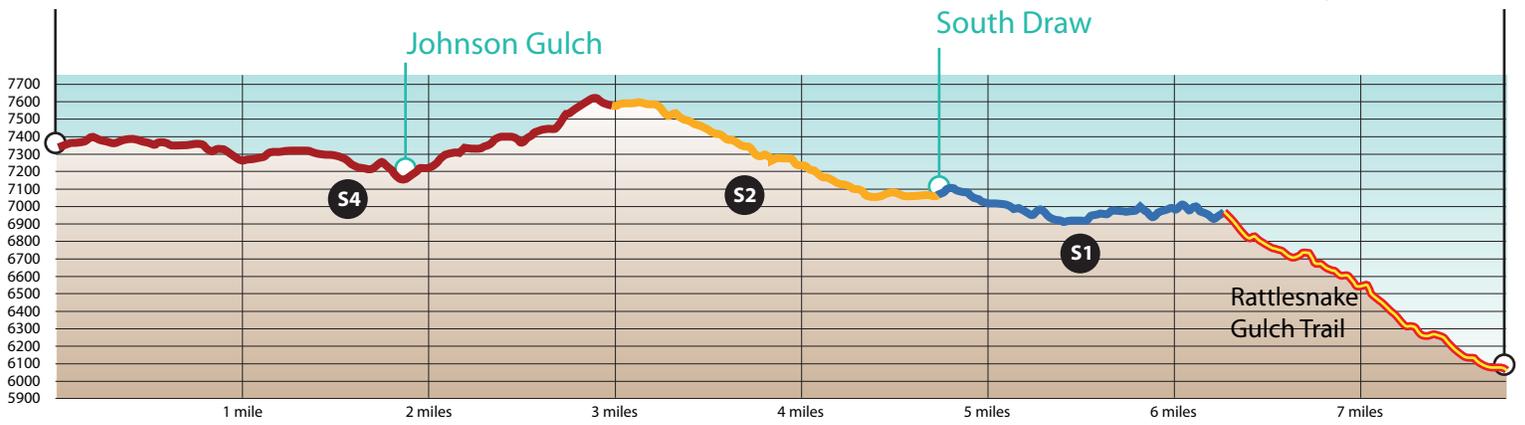


View east of Crescent Meadows from S4 alignment

Proposed South Routes

Crescent Meadows Trailhead

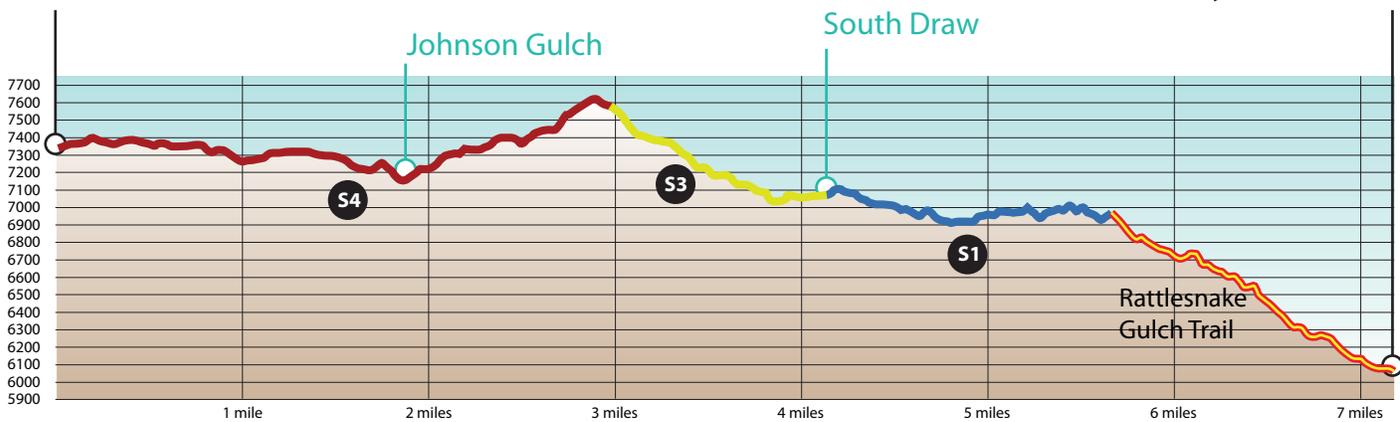
Eldorado Canyon Trailhead



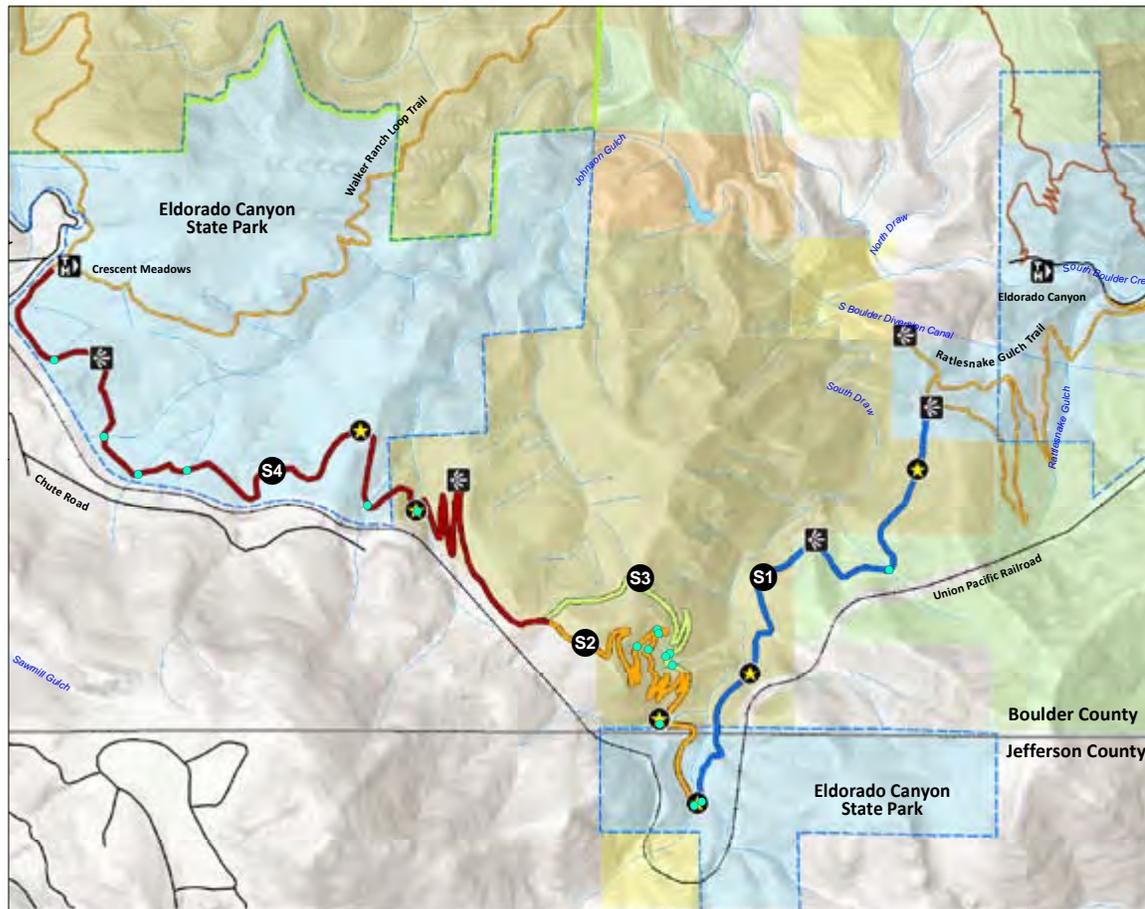
Total Distance = 7.8 miles Proposed Trail Segments = 7.1 miles

Crescent Meadows Trailhead

Eldorado Canyon Trailhead



Total Distance = 7.2 miles Proposed Trail Segments = 6.5 miles



South Routes Considered

Eldorado Canyon – Walker Ranch Trail Feasibility Study

Alternative Sub-Routes

- S1
- S2
- S3
- S4
- Stream Crossing
- ★ Point of Interest
- ⊙ Primary Viewpoint
- ⊙ Trailhead
- Existing Hiking Trail
- Existing Multi-Use Trail
- Railroad
- Neighborhood Road
- Stream/River
- 20-Foot Contour

Land Manager

- Eldorado Canyon State Park Boundary
- Walker Ranch Boundary
- Boulder County
- City of Boulder
- Boulder County – City of Boulder
- State of Colorado – Boulder County
- State of Colorado
- Denver Water
- Bureau of Land Management



Access and Parking

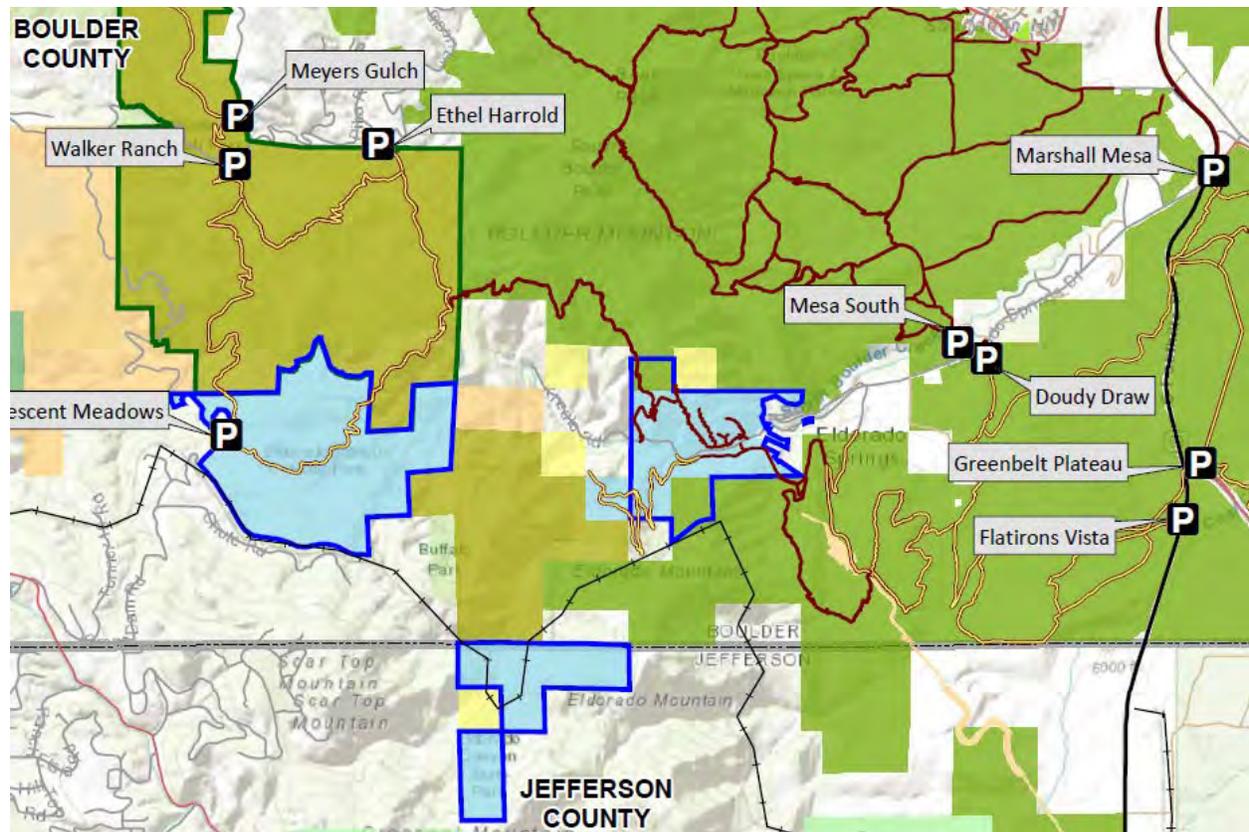
Visitor parking and trail access would be similar for both the North and South Routes. This trail feasibility study does not consider the construction of any new trailheads or parking. The existing trailheads and access points are described below.

Access and parking are currently a major problem at ECSP. On high visitation days, park visitors walk along the main road, which increases congestion. Parking within the Park are discussed further in the ECSP Interface section.

Table 16. Existing Trailheads and Parking Locations

Trailhead	Description
ECSP Visitor Center	The current ECSP Visitor Center/ Eldorado Canyon Trail Trailhead serves as the primary access point for visitors using the existing Eldorado Canyon Trail. Includes about 90 parking spaces.
Rincon Trailhead	Located east of the ECSP Visitor Center, Rincon Trailhead is a secondary access point for the existing Eldorado Canyon Trail. Includes about 12 parking spaces.
Rattlesnake Gulch/ Fowler Trailhead	Primary access for the Rattlesnake Gulch and Fowler Trails and includes about 10 parking spaces.
ECSP Lower Trailhead	Several parking areas in the eastern portion of the ECSP canyon; access points for rock climbing access routes and the Streamside Trail. Collectively, these lots contain about 90 parking spaces.
Crescent Meadows Trailhead	Parking area along Gross Dam Road that provides access to the Walker Ranch Loop Trail. About 25 parking spaces.
Ethel Harrold Trailhead (BCPOS)	Existing BCPOS trailhead on the north side of Walker Ranch. Includes about 18 parking spaces.
Doudy Draw and Mesa Trailheads (OSMP)	Existing OSMP lots located about 1.5 miles from the ECSP entrance and 2.2 miles from the North and South Routes. Bike access would require riding along Highway 170 to ECSP then along the park road (no direct trail access). These lots fill quickly and are at capacity during busy periods.
Flat Irons Vista and Marshall Mesa Trailheads (OSMP)	Existing OSMP lots located about along Hwy 93. Bike access would require riding on Highway 170 to ECSP then along the park road (no direct trail access west of Doudy Draw Trailhead).

Resource	North Route	South Route
Access and Parking	●	●



Existing trailheads near the study area

North Route

The ECSP Rincon Parking Area would be the primary access point for the rerouted Eldorado Canyon Trail, which would start at a new location to the east of the existing trailhead. It is anticipated that the other parking areas in the vicinity within ECSP would serve as secondary parking locations; those closest to the trailhead would fill up more quickly. As demand for parking increases during busy periods, regional trail users may use other parking areas as well.

South Route

The ECSP Fowler Trail Parking Area would be the primary access point for the South Route. It is anticipated that the other parking areas in the vicinity within ECSP would serve as secondary parking locations; those closest to the trailhead would fill up more quickly. As demand for parking increases during busy periods, regional trail users may use other parking areas as well.

Either route will increase demand at ECSP Lower Trailhead. Note that parking lots often fill to capacity in the mornings on days with good weather, and especially Saturdays and Sundays Memorial Day through Labor Day.

Trail Access Opportunities

This section includes a description of trail based recreational activities available to each visitor type, and an analysis of the potential changes under each route option. Based on recent visitor studies conducted by OSMP and BCPOS, the most common activity on system trails is hiking, followed by mountain biking (in areas where biking is allowed). Primary motivations for all users include enjoyment of nature and scenery, exercise, and a fun experience (combined from OSMP 2018 and BCPOS 2015).

This analysis considers the changes in access and trail-based recreation opportunities by general visitor type, and route options. Desired recreation opportunities by visitor type⁶ are generally summarized as follows:

- **Casual Hiker** - seek easy to moderate difficulty trails, with short trip lengths and interesting features (viewpoint, lake, waterfall, historic site, etc.). This visitor type includes most picnickers, families, etc. Trip length 2 to 4 miles.
- **Day Hiker** - seek longer, moderate to difficult trails with destinations and diverse terrain and character. Trip length 5 to 10 miles.
- **Casual Mountain Biker** - seek easy to moderately difficult trails with interesting features, short sections of technical challenge. Trip length 6 to 12 miles.
- **Advanced Mountain Biker** - seek moderate to advanced difficulty trails, with challenging and interesting terrain and features. Trip length of 10 to 25 miles or more.
- **Casual Trail Runner** - seek easy to moderately difficult trails on primarily flat or rolling terrain with even and predictable trail tread. Trip length 4 to 6 miles.
- **Advanced Trail Runner** - seek moderate to high difficulty trails, with challenging, interesting and varying terrain. Trip length 6 to 12 miles or more.
- **Rock Climber** - seek direct and efficient access to rock climbing routes. Trails can be moderate to high difficulty. Trip length 1 to 3 miles.
- **Equestrians** - seek easy to moderately difficult trails, with access to water and limited exposure. Trip length 5 to 25 miles.
- **Hunters** – seek access to hunting areas with few, if any other visitors present.

Of course, not all visitors fit these profiles, but they are useful in evaluating changes to recreation opportunities.

Changes in trail access opportunities are expressed using this scale:

⁶ These descriptions are based on professional judgment and observation, and are consistent with several references including PDNR 2002, USFS 2007, BLM/IMBA 2017, and ATRA 2018.

				
Significantly improves recreational opportunities	Slightly improves recreational opportunities	Maintains existing trail options	Slightly degrades recreational opportunities	Significantly degrades recreational opportunities

Changes to trail access opportunities for various visitor types are summarized in the following table.

Table 17. Summary of Changes to Trail Access Opportunities, by Visitor Type

Visitor Type	North Route	South Route
Casual Hiker		
Day Hiker		
Casual Mountain Biker		
Advanced Mountain Biker		
Casual Trail Runner		
Advanced Trail Runner		
Rock Climber		
Equestrian		
Hunter		
Overall Change		

North Route

The north route would be a minor or major improvement to the access and trail opportunities for various visitor types. The improved trail opportunities are along an existing corridor that is familiar to some users.

South Route

The south route would be a minor or major improvement to the access and trail opportunities for various visitor types. The improved trail opportunities are on a new trail corridor that explores new areas that are unfamiliar to visitors (currently not accessible/open to the public).

Seasonality

Seasonality is an assessment of the year round use potential of the trail by recreationalists. The analysis includes an assessment of trail conditions due to seasonal weather conditions and management strategies that may impact access.

A shade and aspect analysis was used to assess trail conditions due to seasonal weather. The shade analysis was derived from LiDar data where the trail has canopy coverage with trees over 15 feet.

The North Route shade and aspect is as follows:

- N1 – aspect: 80% S. 18% W., 1%N. 1% E, 18%W, 55% shade cover
- N2 – aspect: 63% S., 22% W., 7% N, 7% E, 42% shade cover
- N3 – aspect: 37% S., 42% W., 22% N., 0% E. 60 % shade cover
- N4 – aspect: 72% S, 13% W, 15% N, 1% E 43 percent shade cover

The South Route shade and aspect is as follows:

- S1 – aspect: 8% S, 36% W, 53% N, 1% E, 76 % shade cover
- S2 – aspect: 48% S, 1%W, 16% N, 35% E, 47% shade cover
- S3 –aspect: 25% S, 1%W, 44% N, 30% E, 61% shade cover
- S4 – aspect: 27% S, 62% W, 16% N, and 4% E 59% shade cover

Activities or conditions that may prompt seasonal or temporal user restrictions within the study area include hunting and severe winter range for mule deer and elk. More information on the habitat and connectivity impacts to winter range for wildlife is included in the environmental and cultural section of the analysis. Hunting is allowed in the Crescent Meadows portion of Eldorado Canyon State Park the Tuesday after Labor Day through the Friday prior to Memorial Day. Hunters are highly regulated through limited numbers of hunting licenses and specific methods of take allowed. Per Colorado Revised Statutes 33-10-101, hunting is the primary management method for game species of wildlife on division of parks and wildlife lands.

Resource	North Route	South Route
Seasonality		

North Route

The proposed reroute and realignments will likely not be subject to seasonal wildlife closures. The North Route will accommodate more year-round use (than the South Route) due to the combination of aspect and shade cover.⁷ The average shade cover for N1, N2, and N3 is 52%. The average shade cover for N1, N2, and N4 is 47%. The north route is approximately 10-20% more sunny than the south route. The average aspect for N1, N2, and N3 is 60% S., 27% W., 10% N, 3% E. The average aspect for N1, N2, and N4 is 72% S., 18% W, 8% N, 3% E.

South Route

CPW may consider strategies to mitigate impacts to wildlife, including seasonal closures on State Park land to protect winter range for elk and deer. CPW may consider regulations to protect hunting recreational opportunity and wildlife management in Crescent Meadows during the hunting seasons. A range of strategies would need additional study and may range from trail closures during hunting season to managing uses by days of the week. The average aspect for S1, S2, and S4 is 28% S, 33% W, 28% N, 13% E. The average aspect for S1, S3, and S4 is 20 %S., 33% W., 38% N., 12% E.

The South Route will accommodate less year-round use (than the north route) due to the combination of aspect and shade cover.⁸ The average shade cover for S1, S2, and S4 is 60%. The average shade cover for S1, S3, and S4 is 65%. The south route is approximately 10-20% less sunny than the north route.

Visitor Density

Visitor density is the concentration of visitors on a section of trail at a particular time, and the frequency that visitors encounter or pass each other in an outing. Frequent encounters with others can be impactful to trail users, who generally seek solitude during their recreational experience. Using current park visitation data and visitor counts from other nearby trails (see Appendix B), this study estimates that new visitors could increase by up to about 33 percent during the busy summer months, which would be up to about 60 additional visitors using trails per day (on average). This equates to one additional person on the trail every 12 minutes over the course of a 12-hour summer day.

Encounters include trail users of different speeds overtaking/passing each other, or users coming in different directions. Infrequent encounters are part of an expected trail experience, while frequent encounters can degrade that experience. Excessive encounters with other trail users can result in a sense of crowding and frustration, and can contribute to conflict. In general, fewer encounters results in a positive experience, while more encounters results in a negative experience.

Resource	North Route	South Route
Visitor Density	⊖	⊖

⁷ Shade cover is derived from LiDar data where the trail has canopy coverage with trees over 15 feet.

⁸ Shade cover is derived from LiDar data where the trail has canopy coverage with trees over 15 feet.

North Route

The North Route would introduce a new user group, mountain bikers, and thus more visitors to the existing Eldorado Canyon Trail. This change of use would result in an approximate 27 to 33 percent increase in total trail visits during busy months (compared to existing use of the Eldorado Canyon Trail). However, the N1 segment of the route may experience less conflict because the existing trail would remain open to create a hiking loop in ECSP. This would likely disperse visitors and reduce impacts to visitor density. Overall, the North Route would result in a minor negative impact to trail density for all visitors.

South Route

The South Route would introduce a new trail corridor, user group, and experience for all visitors, and would increase bike traffic and overall visitors to the existing Rattlesnake Gulch Trail.

Development of the South Route would result in an approximately 22 to 25 percent increase in total trail visits during the busiest months (compared to existing use of the Rattlesnake Gulch Trail). This could have a significant adverse effect on trail density and encounters along the existing Rattlesnake Gulch Trail. However, beyond the existing trail, increased trail traffic would be spread out over a longer distance than the proposed North Route and would not substantially change trail density on other existing trails. Hikers and runners seeking a connection without encountering cyclists could continue to use the existing Eldorado Canyon Trail. The overall net effect on trail density would be minor. (Impacts specific to Rattlesnake Gulch Trail are discussed in the Eldorado Canyon State Park Interface section, below).

Total pedestrian traffic on the Eldorado Canyon Trail could either increase or decrease slightly. A new trail may reduce use and density on the existing Eldorado Canyon Trail by providing an additional option for many visitors, meanwhile the attraction of a new 13-mile loop may attract some new users.

Visitor Conflict Management

Visitor conflict on trails is defined as negative interactions between visitors on the trail. Conflicts may arise when different recreationists with differing goals and values occur at the same time and place. Factors influencing conflict include environmental concerns, safety concerns, differences in social values, and past experiences. Distinctions between perceived and actual conflict is also an important consideration. Conflict can be the result of a combination of the above factors (environmental, safety, social values, and past experience), whereby users experience conflict based on the presence of a particular type of recreationist, whether or not negative interactions occur (Cessford 2003, Jellum 2007, Bradsher 2003, OSMP 2010).

On-trail conflict directly relates to congestion and visitor density, discussed above. In general, areas with higher visitor density are more prone to visitor conflict. Visitor conflict can be addressed through design, education, and enforcement.

Recent visitor surveys by OSMP and BCPOS found up to about 5 percent of visitors reported having a conflict. Individual results of these surveys are summarized as follows:

BCPOS Visitor Study (2015):	OSMP Visitor Survey Report (2016-2017):	OSMP Springbrook Loop Monitoring (2011):
Of the 5% of visitors who reported conflict - <ul style="list-style-type: none"> • 16% - Biker speed • 9% - Inconvenience or discourtesy while sharing trail • 8% - Biker not yielding • 7% - Crowded • 7% - Dogs off leash <i>(Top sources of conflict listed)</i>	Of the 5% of visitors who reported conflict - <ul style="list-style-type: none"> • 53% - Conflict with dogs • 33% - Conflict with bikes • 25% - Conflict with runners 	Visitors reporting conflicts, by type- <ul style="list-style-type: none"> • 12% of hikers • 6% of cyclists • 1% of runners Source of reported conflict – <ul style="list-style-type: none"> • 43% - Cyclists • 19% - Dogs or dog guardian • 14% - Equestrians • 12% - Hikers • 10% - Runners

Of the 5 percent of visitors who reported conflict, about 24 to 33 percent of the reported conflicts were related to bikes (OSMP 2018 and BCPOS 2015). Based on these studies, up to about 2 percent of all visitors reported a conflict with bikes.

Trail management tools that can mitigate on-trail conflict include design measures to increase visibility and reduce bike speeds, education and signage, loop trails to disperse all visitors, user-specific or directional trails in congested areas, and enforcement.

Resource	North Route	South Route
Visitor Conflict Management	●	●

North Route

The North Route would require reconfiguration of the existing Eldorado Canyon Trail to accommodate multi-use travel and would include the continued management of the existing trail located within ECSP to create shorter loop opportunities for picnickers and casual hikers. The North Route would have the following considerations related to visitor conflict:

- The continued management of the existing trail (adjacent to N1) to create shorter loops for hikers and maintain climbing access would reduce potential conflicts by dispersing visitors and maintaining a bike-free option for pedestrians in the most congested section of the trail.
- The reconfiguration of the remainder of the existing Eldorado Canyon Trail from hiker-only to multi-use could contribute to conflict among long-standing visitors who are accustomed to a trail with no bike use.
- The regional connection would add visitors of all types to this corridor, which could increase the potential for conflict; however, based on recent studies, the actual incidence of reported conflicts with bikes is about 2 percent of visitors (OSMP 2018 and BCPOS 2015).

Overall, the North Route would contribute to potential conflict due to increased total traffic on the trail, and the introduction of mountain bikers to an existing hiker-only route. However, approximately one third of the existing trail, nearest the ECSP Visitor Center, would remain available as a bike-free option for hikers. Initial impacts associated with a change of management would likely level over time, as visitors become accustomed to new use patterns. This is the section of trail that has the highest use among casual hikers and picnickers. This impact is expected to be minor.

South Route

The South Route would include construction of a new trail corridor extending from the existing Rattlesnake Gulch Trail to Crescent Meadows. Considerations related to visitor conflict include the following:

- The anticipated increase in the number of mountain bikers on the existing Rattlesnake Gulch Trail, which is wide and steep, would likely contribute to increased visitor conflict on that trail.
- The South Route would not contribute to conflict resulting from a change of use designation, along the S1 and S2 portions of the route because it would be a new opportunity for all visitors and would not affect access opportunities on existing trails. It would contribute to the potential for conflict in the Crescent Meadows portion because of the impact on existing hunting activities.

Overall, the South Route would likely increase visitor conflict on the Rattlesnake Gulch Trail due to the steep grades. Otherwise, trail conflict on the South Route is expected to be minor because an alternate option without bikes (Eldorado Canyon Trail) would remain available.

Trail Construction: Estimate of Probable Cost

Estimated requirements and costs for construction are described below. These estimates are based on currently-identified planning corridors, and a reconnaissance-level assessment of the terrain, length, construction difficulty, and anticipated structures within each sub-segment of trail. Lengths are based on GIS analysis plus a percentage (10-20%) based on the differential that is typically seen between planning estimates and as-built measured length.

Construction difficulty summarizes the general physical conditions/work for each segment:

- **Refurbish** – maintenance of existing good quality tread, desloughing/deberming, corridor pruning, minor improvements to treat small problem areas or to meet intended use, class-3 specification, or minor drainage improvements (knicks, rolling grade drips, etc.)
- **Easy** – construction of excavated full-bench tread in reasonable soils on moderate cross-slope; maintenance of existing tread requiring significant drainage improvements or removing obstacles
- **Moderate** – construction of excavated tread where soils are rocky, cross-slope is steep or vegetation/duff is dense; construction where duff layer must be removed then filled with mineral soil
- **Hard** – construction of tread where soil is very rocky or deep duff, slope very steep, or may require large rock removal/shaping and/or intermittent retaining walls; retrofitting existing tread with significant drainage structures or obstacle removal
- **Special Treatment** – Special tread treatments such as steps, tread hardening/armoring steep sections, causeway/turnpike, extended retaining walls on new or refurbished tread, extensive removal/shaping of bedrock.
- **Trail Closure and Reclamation** – Decommission and fully reclaim old routes including: scarification, swales where grade dictate, application of commercially available custom native seed mix, application of native duff or suitable mulch, slashing with native woody debris and rock spoils from trail construction.

Construction difficulty and structures per segment was determined via concurrent on-site recon by the partner agencies and trails consultant. Observations found in Reconnaissance Summary Worksheets in Appendix C.

Cost estimates for construction/reclamation are based on current market conditions (e.g., recent bids, consultation with subject matter experts, and grant awards) for contracted trail construction in Colorado, and are broadly defined in Table 20.

Other costs associated with implementation may include: trail design/engineering, creating construction specs/documents, contractor selection, environmental surveys/permitting, mitigation measures, additional construction requirements/constraints, structure engineering (bridges), boundary surveys, mobilization, and construction management. Cost estimates do assume basic best management practices, described below.

Table 18. Estimated Trail Construction Costs

	Trail Item	Unit	Estimated Cost Range	
Trail Tread				
	Trail Tread -- Refurbish	lf	\$1.00	\$3.00
	Trail Tread – Easy Difficulty	lf	\$3.00	\$6.00
	Trail Tread – Medium Difficulty	lf	\$6.00	\$12.00
	Trail Tread – High Difficulty	lf	\$12.00	\$20.00
	Trail Tread – Special Treatments	lf	\$20.00	\$40.00
Route Reclamation				
	Trail Closure + Reclamation	lf	\$1.00	\$3.00
Trail Structures				
	Climbing turn @ grade (billed as lf tread)	n/a	n/a	n/a
	Switchback / Structured climbing turn	ea	\$3,000	\$7,000
	Bridges (major/engineered)	l/f	\$1,000	\$1,500
	Boardwalk/Bridges (minor)	l/f	\$200	\$300
	Culvert	ea	\$1,500	\$3,000
Mobilization				
	Per season, assume 2 seasons	ea	\$5,000	\$10,000

The above cost estimates provide an apples-to-apples comparison of construction cost between North and South Routes with the following assumptions and notes:

1. Construction costs should be considered preliminary, planning-level Estimates of Probable Cost for comparative analysis of alternatives. Such estimates should not be used for construction bidding/budgeting. Estimates should be refined/updated during planning and final design phases and after mitigation measures are directed. Modifying routes to accommodate additional concerns, selection of tread alignment and/or additional construction requirements may affect costs.
2. Contracted Construction Cost: Line item estimates represent current market conditions in Colorado based on actual project bids by private trail contractors for work in Colorado between 2016 and 2018 (see Appendix C). To account for the complexity of issues, process, and multi-agency coordination inherent to this project, and to honor input from agency staff, cost items used here are higher than referenced comparables. Trail construction is very busy industry in Colorado, delays in implementation can expect cost increases exceeding inflation. In-house

construction costs vary by agency and are not readily available for analysis. Line items are assumed to be let as a portion of total project, not stand-alone tasks.

3. Best Management Practices (BMP): Costs assume basic BMPs to reduce impacts such as washing equipment prior to entry and control of materials/soils directly adjacent to riparian area or waterways. Segments of trail in sensitive habitats, such as riparian areas, are included in the estimate based on increased construction difficulty. Requiring additional/special BMPs, such as “full clean” in sensitive habitats may increase costs.
4. Method: This evaluation assumes a mechanized construction method. In some cases, limitations may be placed on mechanized equipment. Restricting allowed construction methods may increase costs.
5. Draw Crossings: cost estimates include bridges/boardwalks at all discernable draws for ephemeral drainages or seasonally moist areas where water is anticipated to collect. Substituting armored at-grade crossings in typically dry locations may decrease cost.
6. Temporal restrictions: Seasonal wildlife closures often extend to construction activities; Seasonal closures are not anticipated for the north route, and are likely for the south route. These closures are not factored into current cost estimates. In popular recreation areas, trail construction activities may be restricted to off peak hours. For the south route this is not anticipated since it is a new trail; for the north route it is unknown and subject to agency discretion. Restricting allowed construction seasons/times may increase costs.
7. Access and Staging: Trail contractors are typically provided sites close to the worksite(s) for harvesting, storing and staging materials, personnel and equipment; site access is typically allowed along existing routes via vehicle, utv/motorcycle, and foot travel. For this project such routes exist on the ground. Additional restrictions may increase costs.
8. Weed prevention: Trail contractors are often required to clean all equipment before entering the site and to mulch significant deposits of excess soil with native duff/leaf litter. Application of commercially available native seed mixes and/or mulch/erosion control materials, or post-construction weed management can further reduce weed propagation and add to final costs.
9. Imported Materials: Imported materials (screened fill / road base / rocks for retaining walls) may reduce construction costs near vehicle access and, in some cases reduce impacts from harvesting. Such materials are occasionally prohibited where sources are likely to introduce noxious weeds or when control of staged materials poses a threat to waterways. Such restrictions/requirements may influence costs.
10. Mitigation Measures: Additional measures to further mitigate impacts (such as substituting a typical trail bridge with a long span bridge to vertically separate the trail from a riparian area) may be available and typically increase costs.
11. Inherent Variability: Natural surface trails must contend with highly variable materials in a highly variable setting where some site conditions (i.e. sub-surface bedrock) may not be discovered until during construction and require field-fitting or site-modifications. The exact length of as-

build trail often varies ~10% from GIS-based metrics. Such variability can lead to discrepancies between engineering-level cost estimates and final construction.

North Route

Estimated trail construction costs for the North Route are summarized in Table 21. The total Estimate of Probable Construction Cost range for the North Route is: \$360K to \$660K.

Table 19a. Estimated North Route Construction Units

	Segment N1	Segment N2	Segment N3	Segment N4
Length (miles)	1.4	1.5	1.1	1.9
% refurbish	-	80%	-	-
% easy	5%	-	17.5%	20%
% med	30%	10%	17.5%	30%
% hard	45%	-	45%	40%
% special	20%	10%	20%	10%
Restoration/closure (mile)	.04	0.2	0.8	0.6
Anticipated Structures	Switchbacks: 15-19 Boardwalk: 1@50'	Bridges: 1@20'	Switchbacks: 14-18 Bridges: 1@20'	Switchbacks: 8-10 Bridges: 2 @ 30'

Table 21b. Estimated North Route Granular Construction Costs

	Segment N1	Segment N2	Segment N3	Segment N4
Tread Construction/ Refurb	\$94k - \$157k	\$42k - \$70k	\$68k - \$114k	\$95k - \$158k
Restoration/closure	\$4k - \$6k	\$1k - \$3k	\$8k - \$13k	\$6k - \$11k
Structures	\$73k - \$122k	\$4k - \$6k	\$64k - \$106k	\$71k - \$119k
Segment Total	\$170k - \$285k	\$45k - \$80k	\$140k - \$235k	\$175k - \$290k

Table 21c. Estimated North Route Aggregate Construction Costs

	Probable Total Cost Range	Estimated Total Trail Distance (miles)	Estimated cost/mile range
N1+N2+N3	\$360k - \$600k	4.0	\$90k - \$150k
N1+N2+N4	\$390k - \$650k	4.8	\$80k - \$140k

South Route

Estimated trail construction costs for the South Route are summarized in Table 22. The total Estimate of Probable Construction Cost range for the South Route is: \$410K to \$810K.

Table 20a. Estimated South Route Construction Units

	Segment S1	Segment S2	Segment S3	Segment S4 east	Segment S4 west
Length (miles)	1.7	2.0	1.4	1.9	1.5
% refurbish	-	-	-	-	-
% easy	10%	10%	10%	10%	75%
% medium	30%	45%	50%	35%	25%
% hard	50%	40%	35%	45%	-
% special	10%	5%	5%	10%	-
Restoration/closure (mile)	-	-	-	-	-
Anticipated Structures	Bridges: 1@35' 1@20'	Switchbacks: 11-15 Bridges: 1@30'	Switchbacks: ~2 Bridges: 1@30'	Switchbacks: 4-8 Bridges: 1@35'	Culvert: 1 replace existing @ road

Table 22b. Estimated South Route Granular Construction Costs

	Segment S1	Segment S2	Segment S3	Segment S4 east	Segment S4 west
Tread Construction/Refurbish	\$101k - \$169k	\$102k - \$171k	\$70k - \$116k	\$105k - \$175k	\$35k - \$59k
Restoration/closure	-	-	-	-	-
Structures	\$10k - \$17k	\$77k - \$128k	\$36k - \$59k	\$55k - \$92k	\$1k - \$3k
Segment Total	\$110k - \$185k	\$180k - \$300k	\$105k - \$175k	\$160k - \$265k	\$35k - \$60k

Table 22c. Estimated South Route Aggregate Construction Costs

	Probable Total Cost Range	Estimated Total Trail Distance (miles)	Estimated cost/mile range
S1+S2+S4	\$490k - \$810k	7.1	\$70k - \$110k
S1+S3+S4	\$410k - \$690k	6.6	\$65k - \$105k

Trail Management and Maintenance

This section analyzes the changes in trail management and maintenance by assessing the following factors for each trail route:

- Sustainability and Maintenance
- Emergency Response
- Interagency Management

Results of the analysis were then assigned an impact score using the criteria in Table 23.

Table 21. Criteria for Management and Maintenance Analysis

				
Considerably improves management conditions and/or maintenance requirements	Minor improvement to management conditions or maintenance requirements	Minimal impact; similar to existing conditions	Minor impact to management conditions or maintenance requirements	Considerably impacts management conditions and/or maintenance requirements

The impacts and changes to trail management and maintenance conditions are summarized in Table 24, and are described in detail below.

Table 22. Summary Impacts and Changes to Trail Management and Maintenance

Resource	North Route	South Route
Trail Sustainability and Maintenance		
Emergency Response		
Interagency Management		
Overall Impact Score		

Trail Sustainability and Maintenance

Measuring Trail Sustainability

Trail Sustainability may be assessed through four lenses: ecological sustainability, physical sustainability, social sustainability, and managerial sustainability (MDNR 2007, USFS 2008, IMBA 2004, BLM/IMBA

2017). This section focuses on the *physical sustainability* of a trail since other portions of this feasibility study look through the remaining three lenses.

Physical sustainability is essentially asking if a trail will remain stable in its intended condition over time, supporting anticipated visitation, and within limits of available maintenance resources. Primarily, will the trail tread resist the forces of visitors, water and wind or will soil erode from the trail bed? Secondly—and this overlaps with social sustainability—will visitors stay on the tread as intended, or deviate to avoid obstacles and cause undesired braiding?

Several tools have been created to encourage development of sustainable trails. These include Trail Classifications, Standards, and Design Guidelines.

Design Objective

The design objectives of both the north and south routes is a natural-surface, singletrack trail meeting OSMP Class 3 trail standards for bicycles. These are summarized in Table 25.

Table 23. Summary of OSMP Class 3 Trail Standards - Bicycle

Type	Design Tread Width (Inches)	Target Grade	Short Pitch Max Grade	Protrusions	Turn Radius (Feet)
Native tread; intermittently rough sections	18 to 36	0 to 10 percent	15 percent	Less than 6 inches; common, not continuous	4 to 8

One objective of the project is to achieve this standard on all segments of the trail. Exceptions are the Rattlesnake Gulch Trail, where no improvements are proposed; and portions of N3, which cannot be constructed to the Class 3 Standard.

In addition to the trail standards in Table 25, additional design and construction techniques would be used to ensure long-term sustainability of the trail. These include, but are not limited to, grade reversals, rock-armoring, retaining walls, structured turns, and the careful siting of turns and other features to promote water drainage and minimize tread erosion.

Maintenance Needs

Maintenance is an ongoing expectation for any trail, even if it is properly built to be sustainable. If constructed properly, trails in gentle terrain, with few structures, that meet design standards require minimal long-term maintenance; while trails in flat terrain (poor drainage), in unstable soils, with more trail structures, and/or do not meet design standards typically require more frequent maintenance. For any given section of trail, routine maintenance is necessary every 2 to 3 years. Routine maintenance includes cleaning and shaping grade reversals and drains, removing loose rocks, clearing vegetation, and light repairs to armored sections or other trail structures. Maintenance needs also include monitoring for early erosion events and adjusting after new construction, monitoring and controlling weeds coming in after construction. More intensive maintenance includes repairing or rebuilding trail structures, new

rock armoring areas, or minor retrofits to problem areas. Major maintenance should be expected every 4 to 6 years.

Significant structures, such as those described above, are both more expensive to implement initially and also generally require more ongoing maintenance. Drainage structures—rather than grade reversals—need to be cleaned, switchbacks tend to see erosion and shortcutting developed, stone armoring and steps require frequent inspection to catch small problems before they become large. Therefore, a higher concentration of structures generally correlates to a higher maintenance load.

Maintenance access, including personnel and equipment, is an important consideration for any trail design.

Resource	North Route	South Route
Trail Sustainability and Maintenance	●	●

North Route

The North Route would require a retrofit and rebuild of much of the trail (segments N1, N4, most of N3, and portions of N2) to improve sustainability and to be useable by bicyclists. Several areas would also require additional structures and treatments (rock armoring, etc.) to maintain sustainability. It is expected that the North Route would require construction of up to about 40 structures (switchbacks, bridges, and a boardwalk) and several extended sections of rock armoring. Construction would also include restoration of existing trail when alignments change. These rebuilds and retrofits would satisfy Class 3 standards for the entirety of the trail, and would result in a major improvement to trail sustainability. However, existing maintenance loads would remain for the eastern portion of the Eldorado Canyon Trail in ECSP if retained as a hiker-only-option.

Maintenance access would primarily be from ECSP, while vehicle access to the west side would be available through Walker Ranch.

South Route

The South Route would be originally designed and built to meet Class 3 standards. Similar to the North Route, additional structures and treatments would be needed in steeper or challenging terrain but would be designed and built to maintain sustainability. It is expected that the South Route would require construction of up to about 25 structures (switchbacks and bridges). Overall, this would result in a major benefit to trail sustainability. However, there will be miles of new trail to maintain.

While the existing Rattlesnake Gulch Trail was not evaluated as part of this study, it is the access to the South Route. This trail, a former road, is steep, wide, and erosive and may never meet Class 3 trail standards.

Vehicular access for maintenance along the South Route could be accommodated from the west along the Gross Dam Road and Chute Road. This would allow equipment and personnel to access the western

two-thirds of the trail. An access agreement to Chute Road (private road, with existing county right of access) would need to be negotiated. Otherwise, maintenance access would be from the east via the Rattlesnake Gulch Trail.

Emergency Response

Accidents, injuries, sickness, and lost visitors (reported “incidents”) are inherent in all trail systems, and among all visitor types. (Many injuries are not reported as injured visitors self-evacuate). Medical/trauma patient survivability increases as response time decreases.

In general, accidents and injuries involving falls or crashes are more typical among rock climbers and mountain bikers, while lost visitors, ankle sprains, and sickness are typical among hikers and trail runners. In any case, they are infrequent. Recent reported incidences at Walker Ranch and ECSP are summarized as follows:

- Walker Ranch Incidents – Since 2015, BCPOS has had 7 medial calls and 12 search and rescue calls at (average about 5 per year)
- ECSP Incidents – Since 2016, CPW has had 19 medical calls, about half of which are climbing related, and half were hiking related (average about 6 per year)

The prominence of ECSP as a popular destination for rock climbers occasionally results in major climbing accidents requiring emergency response and rescue. Major rescue operations necessitate the closing of the park entirely. The poor condition of the existing Eldorado Canyon Trail can complicate rescue and visitor extraction on the west side of the Inner Canyon (i.e., Rincon Wall).

Emergency response factors related to the various trail route configurations are described below.

Resource	North Route	South Route
Emergency Response		

North Route

The North Route would have the following considerations related to emergency response:

- Introduction of a new user type and additional visitors would likely increase the potential for accidents
- Compared to existing conditions, the reconstruction of steep and eroded trail sections (N1 and N4) would reduce the potential for accidents
- Emergency response would likely originate from ECSP and the Rocky Mountain Fire District Station 6 (about 2.5 miles east)
- Improved trail conditions and access (section N1) would improve emergency access and response for climbing accidents

The North Route would likely result in a small increase in incidents and medical calls on the trail, but would also improve access for climbing incidents. The overall impact to emergency response would be a minor improvement.

South Route

The South Route would have the following considerations related to emergency response:

- Introduction of a new trail route and additional visitors would likely increase the potential for accidents
- Emergency response to Rattlesnake Gulch and the eastern section of trail would originate from the ECSP and Rocky Mountain Fire District Station 6 (about 2.5 miles east). Emergency response to Crescent Meadows and the central portions of the route (Segments S2 or S3) would likely originate from the Coal Creek Canyon Fire District (about 3 miles to the trailhead, 4.5 miles to the end of Chute Road)
- A short section of this route (about ½ mile) is located within Jefferson County. As such, agreements would need to be formalized to ensure consistent medical response and law enforcement capability
- Due to the longer trail distance, emergency response times would be longer than along the north route

The impact of the South route on emergency response would be minor increase.

Interagency Management

Both routes, north and south, would cross publicly owned lands, managed by the three partner agencies: Colorado Parks and Wildlife, City of Boulder Open Space and Mountain Parks, and Boulder County Parks and Open Space.

Primary ownership and management designations would be as follows:

- North Route – CPW and OSMP
- South Route – CPW and BCPOS

Coordination between these partner agencies with regards to visitor management, law enforcement and trail maintenance will be important and necessary. These are described in this section.

Visitor Management

Issues regarding consistency of visitor management regulations relate to dogs, nighttime trail use, e-bike use, and hunting. These are described below.

Dog Regulations

Both CPW and BCPOS require dogs to be on-leash at all times. OSMP allows voice and sight control (off leash) in some areas, though the Eldorado Canyon Trail is currently a leash-required trail. Therefore, dog access regulations are consistent across the three agencies.

Nighttime Use Regulations

Nighttime trail access regulations for the three agencies are as follows:

- ECSP – The park, including trails, is open dawn until dusk year-round
- OSMP – Trailheads and parking lots are closed to vehicles from 11pm to 5am, but trails currently remain open.
- BCPOS – Parks and trails are open from sunrise to sunset

Based on these regulations, both the North and South routes would be open from sunrise to sunset.

E-Bike Use

CPW allows e-bike use on trails that allow bicyclists, while OSMP and BCPOS do not. BCPOS is considering a one-year pilot to allow e-bikes on plains trails but not on mountain trails. The Walker Ranch loop and this proposed regional connection are mountain trails and would continue to prohibit e-bikes.

Hunting

CPW allows hunting in Crescent Meadows, although hunting use is relatively low. Open space land managed by BCPOS and OSMP in this area are not open to hunting.

Law Enforcement and Emergency Response

Law enforcement and emergency response responsibilities would primarily be consistent with the ownership and management of the trail. CPW would have primary responsibility for the Eldorado Canyon Trail and Rattlesnake Gulch Trail within the ECSP. OSMP would have primary responsibility for the remainder of the North Route. CPW and BCPOS would share responsibility for the South Route, which begins and ends in portions of ECSP. As part of the implementation process, the partner agencies would formalize management responsibilities and procedures, including law enforcement responsibilities.

Trail Maintenance

Trail maintenance responsibilities would likely be consistent with the corresponding land ownership. CPW would have primary responsibility for trail maintenance along the Eldorado Canyon Trail and Rattlesnake Gulch Trail within the ECSP. OSMP would have primary responsibility for the remainder of the North Route outside the ECSP. CPW and BCPOS would share responsibility for the South Route, similar to the existing Walker Ranch loop. As part of the project implementation process, the agencies would formalize management and maintenance responsibilities and procedures.

Resource	North Route	South Route
Interagency Management	●	●

North Route

The North route would be under the jurisdiction of OSMP and ECSP, same as existing conditions.

Visitor management – To be consistent with current regulations, the North Route would not be open at night. While a portion of the Eldorado Canyon Trail on OSMP land could technically be open at night, that section is bounded on both sides by CPW and BCPOS land which are not open at night. Based on existing e-bike regulations, the North Route would prohibit e-bike use on portions of the trails on OSMP lands. This potential inconsistency would need to be resolved by the managing agencies or could result in confusion or lack of compliance among e-bike users.

Law enforcement – The increase in trail users may require additional patrol. As part of the implementation process, the partner agencies would formalize management responsibilities and procedures, including law enforcement responsibilities.

Trail maintenance – Maintenance would likely be consistent with the corresponding land owners. CPW would have primary responsibility for trail maintenance along ECT. OSMP would have primary responsibility for the remainder of the ECT. As part of the implementation process, the partner agencies would formalize maintenance responsibilities and procedures.

Overall impact to interagency coordination for the North Route would be minor.

South Route

Visitor management – To be consistent with current regulations, the south route would not be open at night. Based on existing e-bike regulations, the South Route would prohibit e-bike use on portions of the trails on BCPOS lands. This potential inconsistency would need to be resolved by the managing agencies or could result in confusion or lack of compliance among e-bike users. Outreach and education will likely need to be increased to inform visitors of potential management associated with hunting regulations in the Crescent Meadows segment of the trail.

Law enforcement – The increase in trail users may require additional patrol. Due to the miles of new trail, the increase for patrol and enforcement would likely be significant. As part of the implementation process, the partner agencies would formalize management responsibilities and procedures, including law enforcement responsibilities. A section of the South Route (about ½ mile) within ECSP is located within Jefferson County. As such, agreements would need to be formalized to ensure consistent medical response and law enforcement capability. (BCPOS is currently working to address a similar issue with the portion of the Toll Trail that is in Gilpin County). In any case, the agencies are committed to ongoing cooperation to manage resources and address issues across jurisdictional boundaries.

Trail maintenance – Maintenance would likely be consistent with the corresponding land owners. CPW and BCPOS would share responsibility of the south route similar to the existing Walker Ranch Loop. As part of the implementation process, the partner agencies would formalize maintenance responsibilities and procedures.

Overall impact to interagency coordination for the South Route would be minor.

Eldorado Canyon State Park Interface

This section analyzes and describes the potential impacts and benefits of the proposed multi-use trail to ECSP. Many of the factors described below are also analyzed under other topics and are restated here to provide a focused analysis on the park itself.

Existing conditions in the park pose several challenges for CPW managers. These challenges are important in considering the impacts (both negative and positive) of additional trails, and trail users associated with this trail project. Both the North Route and South Route would originate from ECSP. Since the two access points – Rincon Parking Area for the North Route and the Rattlesnake Gulch Trailhead for the South Route – are in close proximity (0.15 miles), most of the overall effects to park management and resources would be common to both routes.

The topics for analysis of impacts to the park and park operations include:

- Park Capacity and Visitation
- Access and Parking
- Revenue and Fee Collection
- Trail and Facility Sustainability
- Visitor Conflict and Enjoyment
- Emergency Access and Response

Each of these topics is discussed in greater detail below.

Summary of Impacts to Eldorado Canyon State Park

Potential impacts to ECSP resulting from the regional trail connection options are summarized below.

Table 24. Summary Impacts and Changes to ECSP

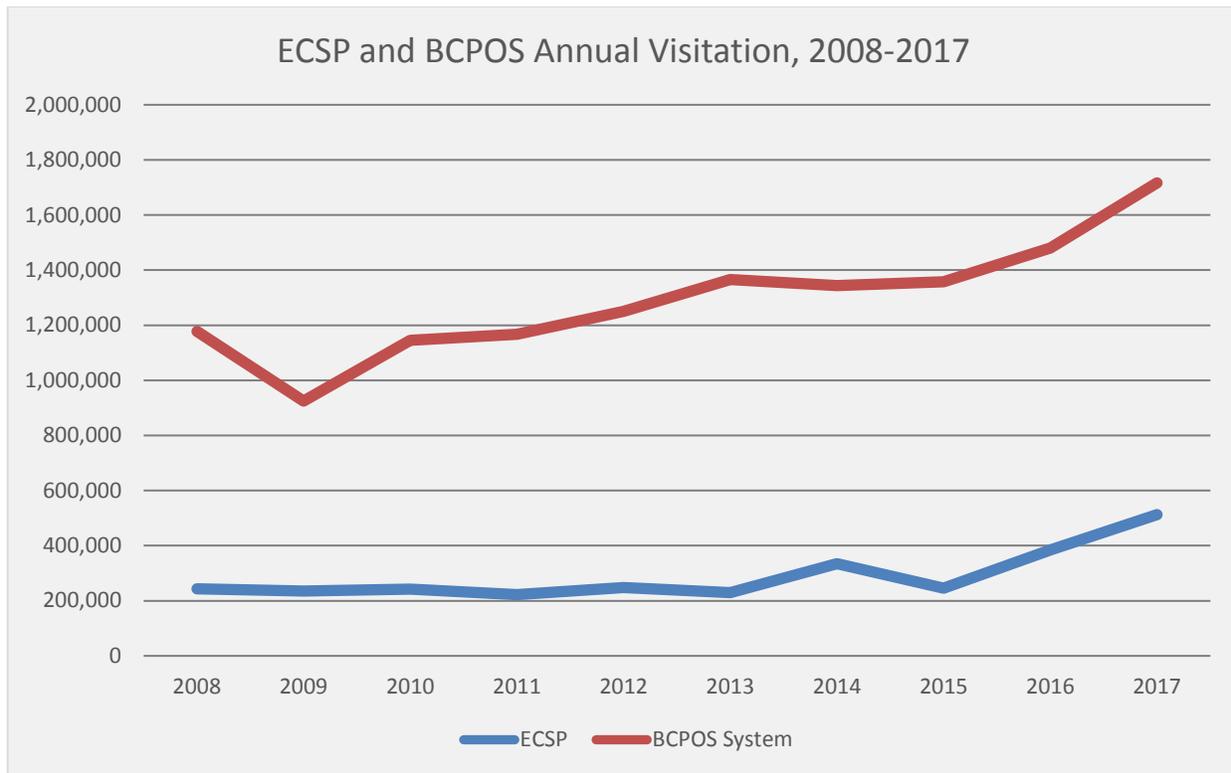
Resource	North Route	South Route
Park Capacity and Visitation	●	●
Access and Parking	●	●
Revenue and Fee Collection	○	○
Trail and Facility Sustainability	◐	◑
Visitor Conflict and Enjoyment	●	●

Emergency Access and Response	●	●
Overall Impact Score	●	●

Park Capacity and Visitation

Over the past decade, park visitation has steadily increased, with a significant increase in the past two years (Fiscal Year (FY) 2016-2017 through FY 2017-2018) (see Figure 17). In FY 2017-2018, 512,619 visitors were recorded in the park, which is 48 percent higher than two years prior. This increase is similar to increased visitation throughout Boulder County, as shown in Figure 17. (OSMP saw a mean annual growth in visitation of 2.4 percent between 2004 and 2017, from 4.26 million to 6.26 million visits).

Figure 17. ECSP and BCPOS Annual Visitation, 2008-2017

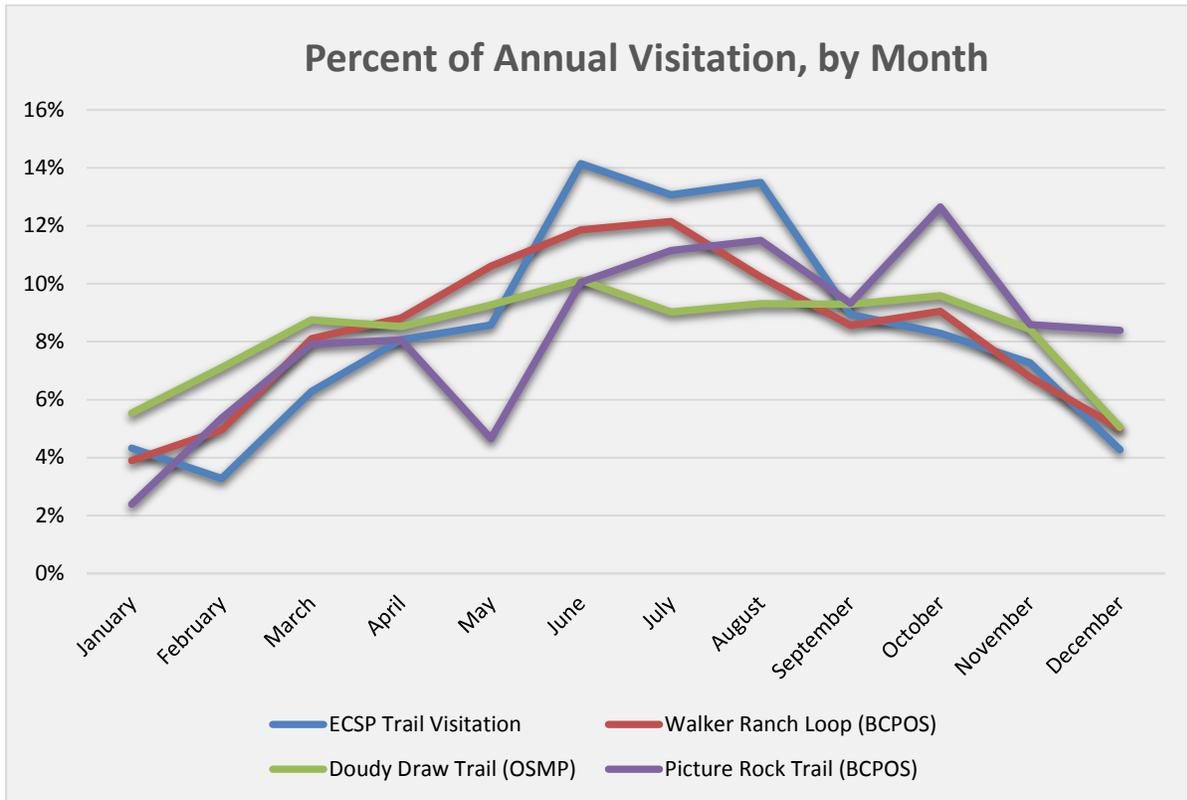


During most of the summer and nearly all summer weekends, the ECSP exceeds its capacity to provide parking, picnic sites, and an overall desirable visitor experience. In addition, illegal overflow parking within the Town of Eldorado Springs has created trespass and congestion problems.

Trail Visitation

Visitation to existing park trails is similar to the park as a whole, with the highest numbers in June, July, and August, and lowest trail use in February. Estimated monthly use of park trails is provided in Figure 18, along with similar data for other nearby trail systems.

Figure 18. Percent of Annual Visitation, ECSP and Nearby Trails, by Month



Notes: ECSP data is for FY 2017-2018, other data is from 2016. Picture Rock and Doudy Draw Trails are periodically closed due to muddy trail conditions.

As detailed in Figure 18, peak visitation in ECSP and most other nearby trails is during the summer months of June, July, and August. The average number of visitors per day during the busy summer months are provided in Table 27. While it is understood that weekend days are much busier than most week days, this metric provides a quantitative basis for estimating changes in trail visitation. This analysis, including data and assumptions, is presented in greater detail in Appendix B.

Table 25. Average Daily Trail Visitation in ECSP and Reference Trails, June-August

Month	ECSP Trail Visitation			Other Reference Trail Visitation		
	ECSP Total Trails	Eldorado Canyon Trail	Rattlesnake Gulch Trail	Walker Ranch Loop (BCPOS)	Doudy Draw Trail (OSMP)	Picture Rock Trail (BCPOS)
June	833	216	262	170	80	116
July	745	211	247	169	69	125
August	770	175	259	142	71	129

Sources: ECSP trail use data provided by CPW; 2017 BCPOS Park Visitation data; OSMP 2016-2017 Visitation Estimate Report (Leslie 2018)

Impacts Common to North and South Routes

Both the North and South Routes could result in a significant increase in mountain bikers, since there is currently very limited mountain bike use in the park. Hikers and trail runners may increase slightly, as the new trails would be attractive to a broader spectrum of these users, compared to existing conditions. ECSP staff expects the impact on park capacity would be major.

Based on an analysis of existing visitation and projected expansion of use resulting from new trail opportunities, an increase in visitation of between about 7 and 33 percent (up to about 60 additional trail visitors per day, on average) may be expected. More specifically, the following changes would be anticipated during the June-August summer season:

- Increase in total park trail visitors of about 7 percent
- Increase in use along the Eldorado Canyon Trail (North Route) of between 27 and 33 percent
- Increase in use along the Rattlesnake Gulch Trail (South Route) of between 22 and 25 percent

These estimates are based on methods described in Appendix B.

As shown in Figures 19-21, this change in daily trail visitation is significant because the park is already at or beyond capacity for parking, access, and facilities during the busy summer months.

Figure 19. Average Estimated Increase in Daily ECSP Trail Visitors, June - August

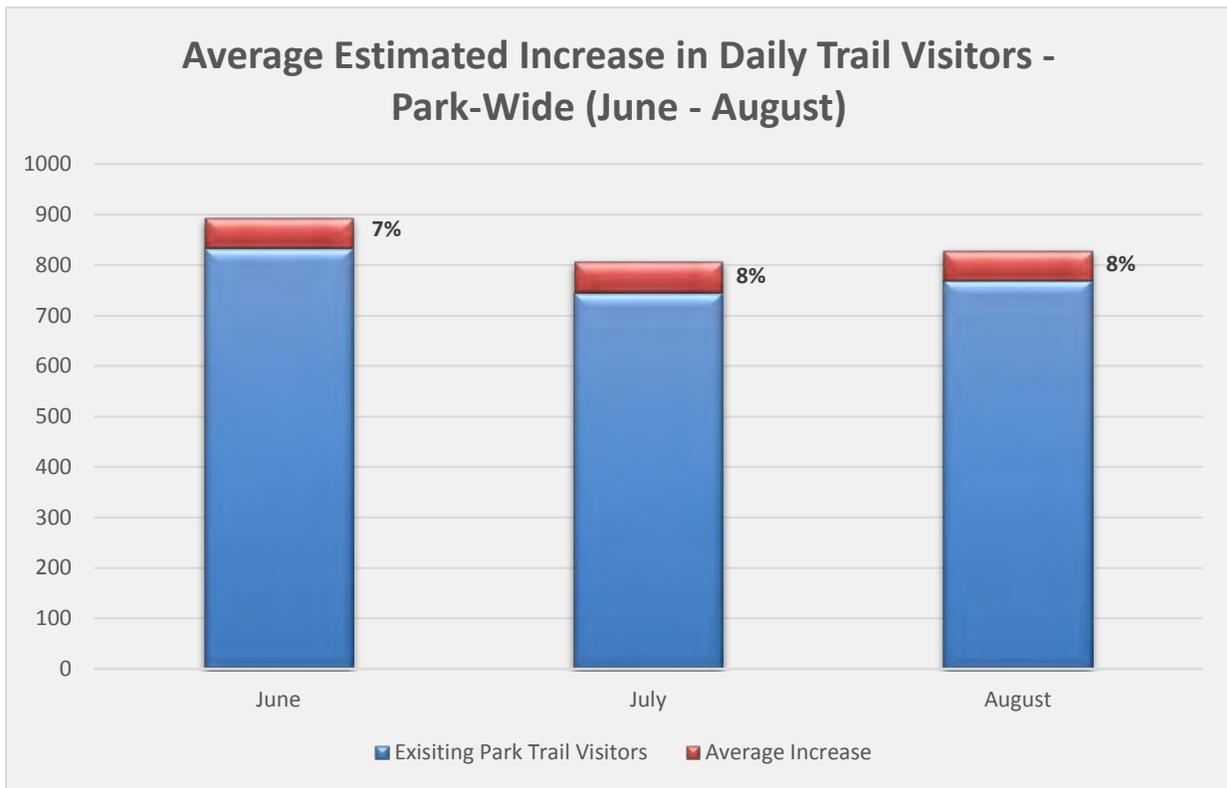


Figure 20. Average Estimated Increase in Daily Eldorado Canyon Trail Visitors, June - August

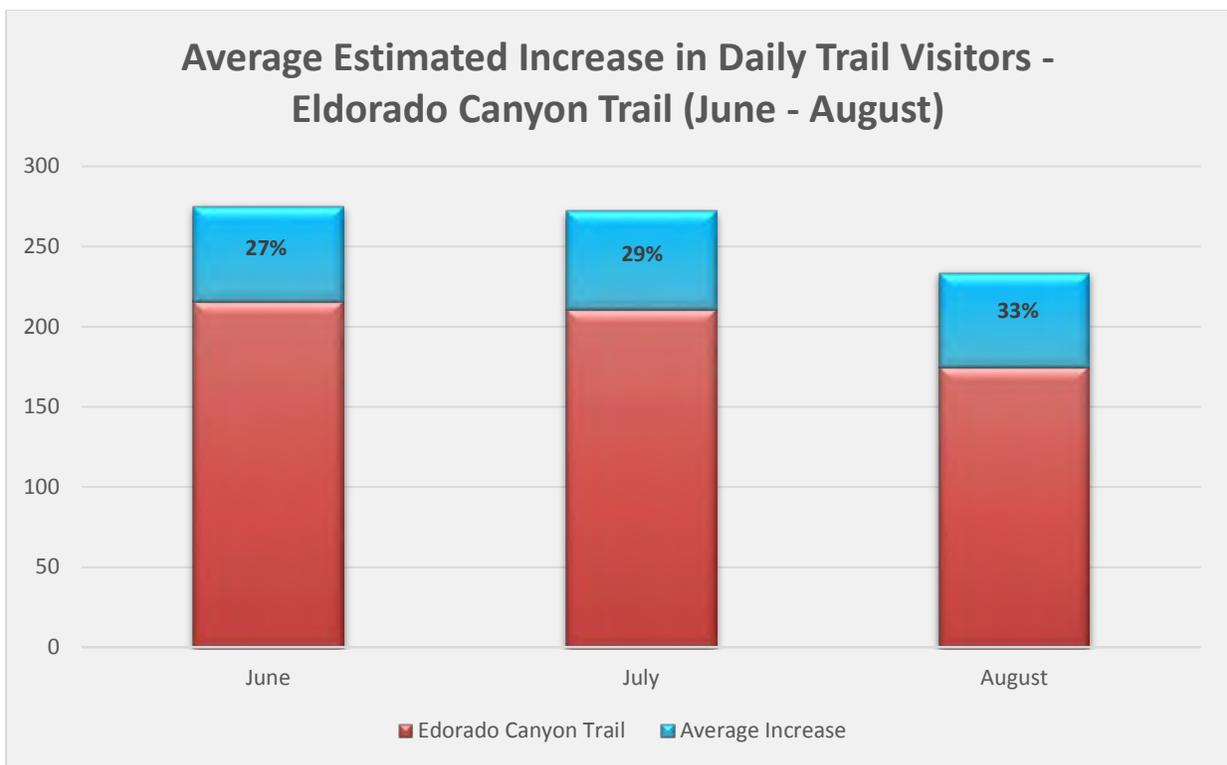
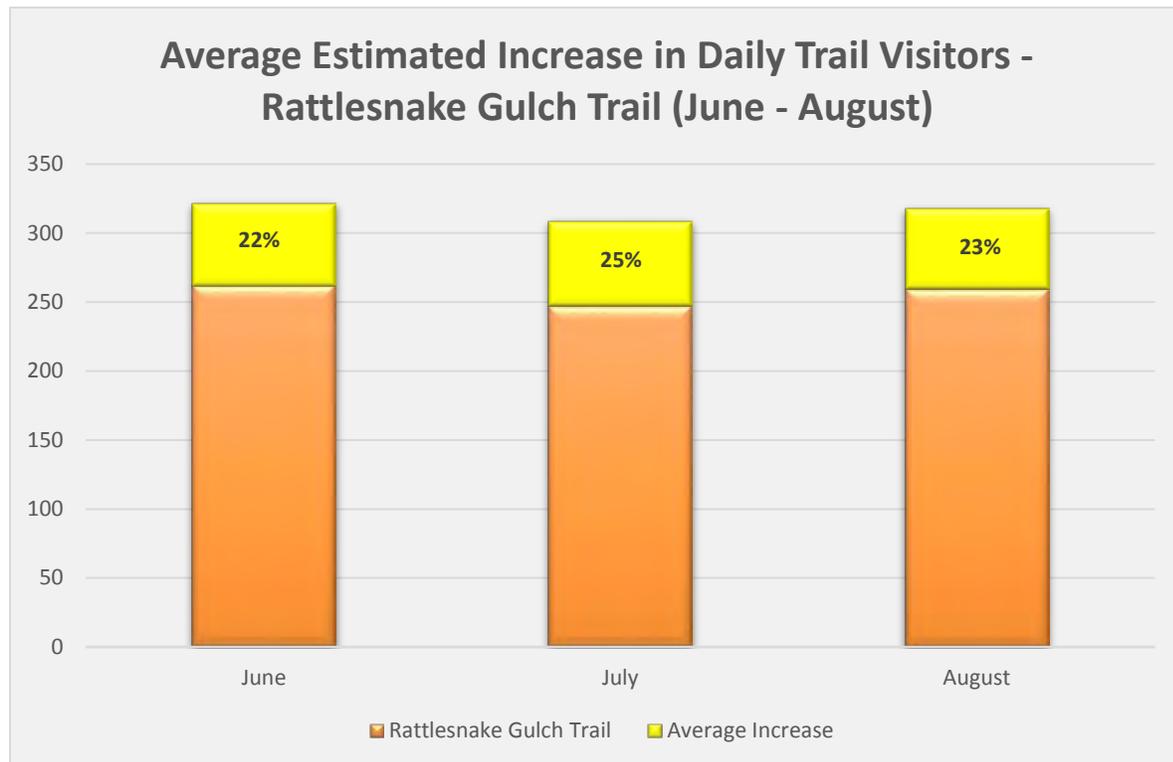


Figure 21. Average Estimated Increase in Daily Rattlesnake Gulch Trail Visitors, June - August



For either route, an unusually high number of visitors would be expected in the first year after construction completion, as trail users are curious and eager to see the new or reconfigured trail. This new trail “spike” in visitors would likely dissipate over the long term.

Access and Parking

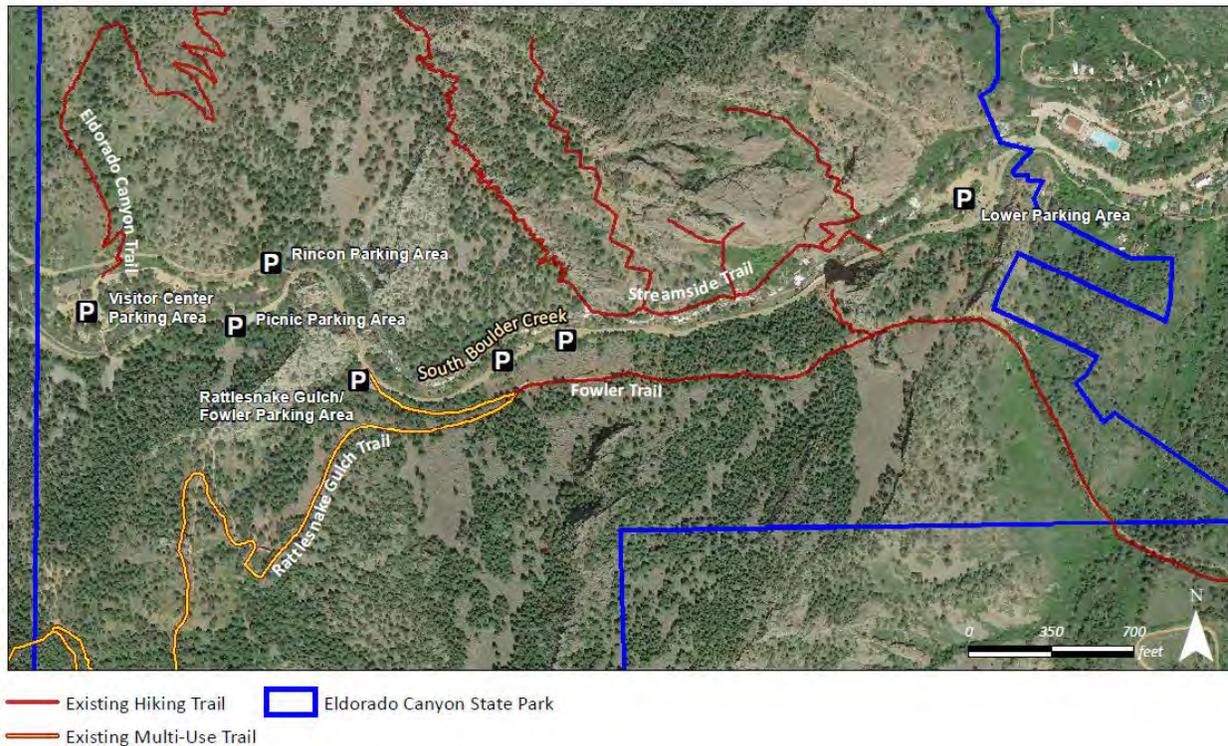
Trail access and parking would vary by the type of visitor. Based on informal surveys conducted by the park (26 visitor groups over four days in August 2017 and 2018), the following observations were made:

- Hikers – Average visit 2.2 hours, typical parking evenly distributed
- Climbers – Average visit 4.3 hours, typically park at lower (Main and Streamside lots)
- Picnickers – Average visit 5.1 hours, all at upper picnic lots

The anticipated use patterns by different types of visitors are summarized below. While mountain bikes are allowed to use Rattlesnake Gulch Trail, current bike use is very low. During many weekends and busy periods, the park currently fills to capacity. No public parking is available in the town of Eldorado Springs or along Highway 170, and no new trailheads or parking areas are proposed as part of this study. Illegal parking in the town is a recurrent problem.

Rock climbers and picnickers are key visitor types that are served by the park, as it is a unique destination for both activities. For these uses, desired access and parking would be similar to existing conditions. However, additional congestion and loss of parking in the park would adversely affect the availability of parking for climbing and picnics, potentially displacing these uses during busy periods.

Figure 22. Existing Parking Areas in the Inner Canyon of ECSP



For hikers and trail runners, access and parking would likely be similar to existing conditions.

- For the North Route, the preferred parking location would be the Rincon Lot, followed by the Visitor Center/Picnic Area and Rattlesnake Gulch lots.
- For the South Route, the preferred parking location would be the Rattlesnake Gulch Lot, followed by the Rincon and Visitor Center lots.
- In either case, the lot closest to the selected route would be the first to fill up during busy periods.
- Additional parking in the Visitor Center area could reduce parking availability for picnic use.

For mountain bikers, access and parking would vary depending on their desired experience and familiarity with the park.

- Casual mountain bikers or those unfamiliar with the park and trails would prefer to park in the upper lots (Rincon, Rattlesnake, and Visitor Center) for either the North or South route.
- Advanced mountain bikers seeking longer distances, less driving, and a warm-up (or those who are more familiar with the park and parking options) would likely prefer to park at the OSMP lots east of the park and ride about 2 miles (along Highway 170 and the park road) to reach the trail. (These lots, however, also fill to capacity during busy periods).

- Some mountain bikers may also prefer to originate from areas further east, such as Flatirons Vista or Marshall Mesa trailheads, or communities such as Boulder, Superior, or Louisville.

For equestrians, access would be limited to the Streamside or Rincon lots which have limited room for a horse trailer and a wide turning radius. (Equestrian trailer parking typically cannot be accommodated on weekends and holidays). No existing parking areas within the park are designed to accommodate horse trailers, and no new parking is proposed as part of this study.

Impacts Common to North and South Routes

Both the North and South Routes could result in an increase in trail visitation between about 7 (park trail visitors) and 33 percent (Eldorado Canyon Trail visitors) during busy summer months. While some mountain bikers would prefer to access the trail connections from outside of the park, new demands on parking within the park would occur. This could negatively impact parking availability for climbers and picnickers, particularly in the Visitor Center lots that are close to the trailheads for both north and south.

Implementation of either route is not anticipated to noticeably impact use levels at the Crescent Meadows Trailhead. While this trailhead is currently used by mountain bikers riding the existing Walker Ranch Loop Trail, most mountain bikers would not want to access the Inner Canyon area from the west.

The overall impact to parking and access, for both routes, is expected to be major.

Revenue and Fee Collection

Fee collection is the only mechanism to generate revenue to fund operations in the State Park system. The park currently charges a daily vehicle entry fee and a walk-in/bike-in fee. The primary purpose of the walk-in/bike-in fee is to discourage illegal parking within the Town of Eldorado Springs. Currently, walk-in visitors who access the park from external trails (e.g., hikers or runners coming from Fowler Trail or Eldorado Canyon Trail) are expected to purchase a day pass at the Visitor Center and carry the receipt as they pass through the park. There is currently no fee collection at Crescent Meadows Trailhead.

Fee collection serves as a tool to both generate revenue and manage park capacity. Any efforts to improve pass and fee compliance are primarily in the interest of visitor management and instilling a sense of stewardship. CPW is considering alternative fee collection approaches, including an annual walk-in pass or remote fee stations, but no new approaches are in place.

Impacts Common to North and South Routes

New visitation associated with a regional trail connection would increase entry fee revenue accordingly. It is not certain how many would be drive-in vs. bike-in visitors. Statistics from other nearby systems were useful to estimate the potential percentage of users that mountain bikers may comprise along the trail. Mountain bikers currently comprise 29 and 59 percent of visitors at Walker Ranch and Heil Valley Ranch, respectively. As discussed previously, it is expected that mountain bikers would both drive in to the park to start their ride, or ride in from trailheads to the east of the park.

The park could also expect an increase in pass-through mountain bikers and runners, originating from the west, who do not pay a park fee (or their fee compliance is not known). While the number of such pass-through visits is uncertain and is anticipated to be small, it could have a compounding effect on park capacity and resources.

Overall, implementation of either route would result in a minor increase in gate fees, along with a small increase in pass-through visitors who do not pay a fee, resulting in an overall insignificant effect to the park.

Trail and Facility Sustainability

The existing Eldorado Canyon Trail climbs about 500 feet over 0.8 miles before leaving the park. The trail is steep (exceeding 20 percent in multiple places), rocky, and has substantial erosion. In addition, the multiple switchbacks have been prone to shortcutting which exacerbates erosion and resource impacts. Installation of wood steps and crib-walls has been an ongoing, labor-intensive task to maintain a safe and reasonably sustainable route. The park is committed to maintaining this trail as needed to provide a safe visitor experience, but also recognizes that it will be increasingly difficult to maintain a sustainable trail condition over the long term. The park is currently in the early stages of planning for a full reroute of this trail, which would emphasize lower grades and more durable and sustainable construction.

The Rattlesnake Gulch Trail climbs over 900 feet over 1.5 miles. It is also steep, exceeding 20 percent grades in places. This trail was originally constructed as a road and is in moderate to poor condition. The park currently has no plans to improve this trail.

North Route

Implementation of the North Route would include significant reroutes and upgrades to the Eldorado Canyon Trail, resulting in minor long-term benefits to the park. Portions of the existing trail would continue to be maintained for hiking and climbing access, which would continue the current maintenance requirements.

South Route

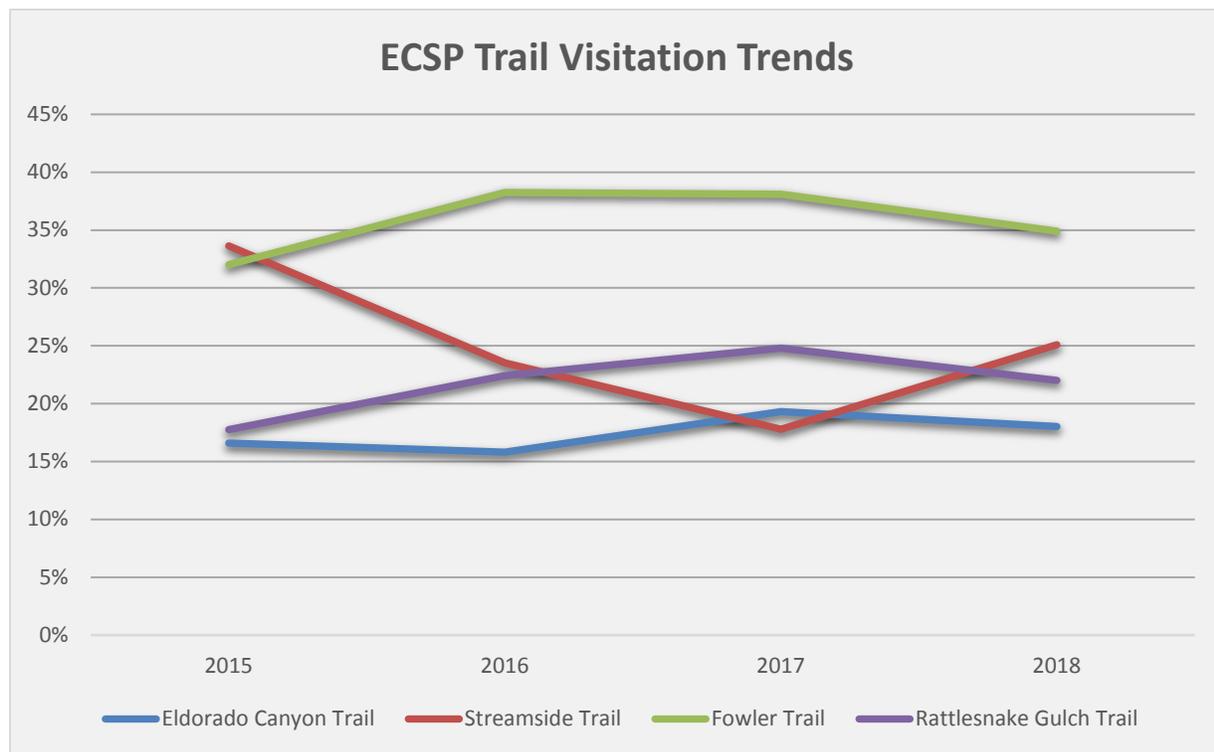
Implementation of the South Route would include a new trail corridor. While the South Route in itself would be built to meet Class 3 trail standards and overall sustainability goals, it may increase maintenance requirements within the park on the Rattlesnake Gulch Trail and would not address existing problems with the Eldorado Canyon Trail.

Visitor Conflict and Enjoyment

While hiking is one of the primary visitor activities, the park lacks some of the options and connections for better internal trail circulation. The Fowler Trail is the most popular, followed by the Streamside and Rattlesnake Gulch Trails. The Eldorado Canyon Trail has been the least popular trail in the park in recent years. The park is currently planning to extend the Streamside Trail to the west towards the Visitor Center, which would improve circulation, dispersion, and connectivity for visitors.

Levels of use of existing park trails over the past four years are shown in the following chart.

Figure 23. Visitation Trends on ECSP Trails



This analysis focuses on visitor conflict and enjoyment within the park itself. For either the North or South Route, the completion of regional multi-use trail access would provide park enjoyment to a new group of visitors (bicyclists). However, the use of existing park trails increase by about 60 visitors per day (up to 33 percent increase for Eldorado Canyon Trail and up to 25 percent increase for Rattlesnake Gulch Trail). This increase, in addition of new users (primarily bikes) to the narrow park road and existing trails could increase conflict. As described previously in the Visitor Experience section, recent surveys by BCPOS and OSMP found up to about 2 percent of visitors reporting a conflict related to bikes on the trail.

North Route

The North Route would provide access and enjoyment to additional visitors but would also contribute to potential conflict due to increased total traffic on the trail and the introduction of mountain bikers to an existing hiker-only route. The continued management of the existing trail as a hiking loop within the park would reduce visitor conflict by dispersing users and providing alternative options for hikers. It is expected that casual hikers, comprised of families and picnickers would use the trail as a loop. Considering these factors, the impact to visitor conflict and enjoyment is expected to be major.

South Route

South Route would maintain existing access and enjoyment opportunities (as bikes are currently allowed on Rattlesnake Gulch Trail) but likely increase visitor conflict on the Rattlesnake Gulch Trail due to the steep grades; and increased bike traffic on the western end of Fowler Trail, which is a popular corridor

for hikers. Within the park, this could result in major impacts during busy periods, considering the magnitude of increased visitation.

Emergency Access and Response

As a renowned rock-climbing destination, climbing accidents are relatively common. High-angle rescues require teams from Rocky Mountain Rescue Group, specialized equipment and multiple vehicles – ambulance, fire, police, and the personal vehicles of volunteer rescue teams. Because of this, incidences requiring rescue typically result in a full closure of the park to all visitors.

From early-2016 through mid-2018, there were 19 reported injury incidences within the park. Of those, 9 were climbers and 10 were hikers. The most common were ankle injuries (9), while the most serious were head injuries (3).

Emergency access to climbing areas on the west side of the Inner Canyon, including Rincon Wall, Quartzite Ridge, and West Ridge, often occurs on the terrain east of the existing Eldorado Canyon Trail. The steep and loose terrain on this trail makes it difficult for crews to use the trail for emergency egress and litter transport.

North Route

The North Route would improve access for responding to climbing incidents and could likely result in a small increase in incidents on the trail (due to more visitors) or decrease (less rugged trail). The overall impact to emergency response within the park would be a minor benefit.

South Route

The South Route would likely result in an increase in incidents affecting ECSP due to adding new visitors to the park and new trail miles accessed from the park. The overall impact on emergency response within the park would be a major impact.

Existing Plans to Address Issues and Concerns

Independent of this project, several management actions have been considered and could be implemented to alleviate existing issues within the park. These include the following:

- **ECSP Entry Station Upgrade** – CPW has funded planning and design to upgrade and improve the entry station, which would allow for a more efficient processing of visitors as they enter the park and would also provide a vehicle turn-around for times when the park is full or closed.
- **Streamside Trail Extension** – The park is in the early planning stages to extend the Streamside Trail along the north bank of South Boulder Creek to reach the Rincon parking area near the Visitor Center. This trail, once designed and completed, would provide better trail connectivity and circulation through the Inner Canyon for all visitors, and would reduce pedestrian traffic on the road. This planning is anticipated to commence in late 2018.
- **Eldorado Canyon Trail Improvements** – The park is investigating options to re-route and re-build the existing Eldorado Canyon Trail within the park to be more sustainable and useable for a wider range of visitors. (This concept is represented in this feasibility study as segment N1).

Potential Strategies to Address Issues and Mitigate Impacts

In addition to the existing plans that have been considered to address management issues in the park (above), the following management strategies could be considered with additional planning, coordination, and public input:

- **Shuttle Service** – Shuttle service within the park, or between the park and nearby trailheads and parking areas could alleviate parking congestion. Boulder County has successfully implemented a similar model to alleviate congestion at the Hessie Trailhead west of Nederland. (Would not address on-trail congestion).
- **Expansion of Parking Outside of the Park** – Expanded parking at existing or new parking areas outside of the park address existing parking congestion, support additional visitor use, and/or shuttle services. (Would not address on-trail congestion).
- **Expansion of Parking Within the Park (Rincon Lot)** – Expansion of the informal parking at Rincon to support additional visitor use. Limited space is available to expand this lot.
- **Increased Parking Restrictions and Enforcement in Eldorado Springs** – Increase traffic control and enforcement measure within the town to reduce conflicts associated with illegal parking and trespass.
- **New Fee Structure or Passes** – Implementation of new fee programs, including annual walk-in/bike-in passes or remote fee stations to improve compliance.
- **Park Fee Outreach** – Signs and outreach encouraging visitors to comply with park fee requirements.
- **Conflict Mitigation on Rattlesnake Gulch Trail** – Implementation of design measures, including fencing or rock chicanes, improved sinuosity, and short reroutes to reduce potential bike speeds and conflict on the Rattlesnake Gulch Trail.

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Appendices

- A. Existing Planning and Management Designations
- B. Estimating Visitation Changes
- C. Construction Cost Estimates

Appendix A - Existing Planning and Management Designations

Appendix A

Existing Planning and Management Designations

Most of the study area is included in various protective planning and management designations by Boulder County, the CNHP, and open space agencies. These existing designations are described below.

Protective and Planning Designations

Boulder County Comprehensive Plan

Boulder County Comprehensive Plan designations that apply to the study area include the following:

Environmental Conservation Area

Definition: Areas of the County that possess a relatively low amount of fragmentation, contain high quality natural resources or habitats, are designated at a sufficient size to provide ecological benefit, and/or have significant potential for restoration.

The Hawkin Gulch/Walker Ranch/Upper Eldorado Canyon ECA includes the entire study area. This ECA is intended to conserve critical resources in the south-central part of the County, contains a multitude of significant plants, plant communities, and wildlife and provides an important mountain to prairie link.

High Biodiversity Area

Definition: An area that on a global scale is nearly irreplaceable and significance on a national scale. An area has a concentration of several biodiversity elements that are globally rare (G3) and/or species that are common globally (G4 or G5) but rare within Colorado.

The northern half of the study area – north of South Boulder Creek – is included in the Boulder Foothills High Biodiversity Area.

Critical Wildlife Habitat

Definition: An area of unique habitat which has a crucial role in sustaining populations of native wildlife and in perpetuating and encouraging a diversity of native species in the county. The area may be significantly productive habitat or particularly vital to the life requirements of species that are critically imperiled or vulnerable to extirpation.

Most of the BLM South areas from the she South Draw drainage to the Johnson Gulch drainage is designated as Critical Wildlife Habitat (area 76). This designation is based on its status as a relatively unfragmented and wilderness-like region which is highly productive for wildlife and closely situated to human settlement. Ruggedness and complexity of the area supports the unique habitat requirements for Northern goshawk nesting, as well as rare flammulated owl and mottled duskywing butterfly habitats.

Natural Area

Definition: An area especially unique and important to the natural heritage of the county that typifies native vegetation and associated biological and geological features and provides habitat for rare or

endangered animal or plant species; or includes geologic or other natural features of scientific or educational value.

Two Natural Areas are designated within the study area: South Draw (#12) in the southern area, and Boulder Mountain Park (#1) encompassing most of the northern portion.

Significant Natural Communities

Definition: An area where a combination of plant species (a plant association) that is critically imperiled or vulnerable to extirpation is present.

Significant natural communities have been identified along the west slopes of South Draw, and in several locations north of Eldorado Canyon.

Rare Plant Areas

Definition: An area known to have or have a high likelihood of having occurrences of Plant Species of Special Concern.

Several areas west of South Draw and most of the land area north of Eldorado Canyon have been designated as Rare Plant Areas.

PMJM Foothills Perennial Stream Habitat

Definition: Areas of suitable Preble's meadow jumping mouse (PMJM) habitat along foothills perennial streams up to 7,600 ft. in elevation not covered under one of the other designations. PMJM are known to occupy riparian habitat up to this elevation.

Several drainages within the study area, including South Boulder Creek, South Draw, and Johnson Gulch have been defined as PMJM habitat.

Agency Management Designations

Both BCPOS and OSMP have established protective management designations on open space lands located within the study area.

- **BCPOS** – Within the Walker Ranch Management Plan, BCPOS designated the BLM South area as being closed to public access. (BCPOS has indicated that this designation would be amended if a trail corridor through the BLM South area was determined to be suitable as a result of this study).
- **OSMP** – All of the OSMP land within the study area is designated as Habitat Conservation Areas (HCA). These areas do not preclude trails or public access, but are managed to maintain naturally functioning ecosystems with lower levels of visitor use.

Colorado Natural Heritage Program

Boulder Foothills Potential Conservation Area

Most of the study area north of South Boulder Creek has been designated by the Colorado Natural Heritage Program as a Potential Conservation Area, with a Biodiversity Significance Rank of B2: Very

High Biodiversity Significance. The rationale for this ranking is that the site contains good (B-ranked) occurrences of a globally imperiled (G2G3/S2) invertebrate species, hops feeding azure (*Celastrina humulus*), as well as two occurrences of the federally listed threatened Preble's meadow jumping mouse. Multiple birds, mammals, invertebrates, plants and plant communities are also within the site.

Appendix B - Estimating Visitation Changes

Appendix B. Estimating Changes in Trail Visitation

This appendix provides a summary of methods and findings related to estimated changes in trail visitation within Eldorado Canyon State Park if either the North or South Route were implemented.

Elements of this approach include:

1. Existing visitation data
2. Methods and assumptions
3. Findings

Existing Visitation Data

Existing park and trail visitation data were provided by CPW, BCPOS, and OSMP. Data sources include:

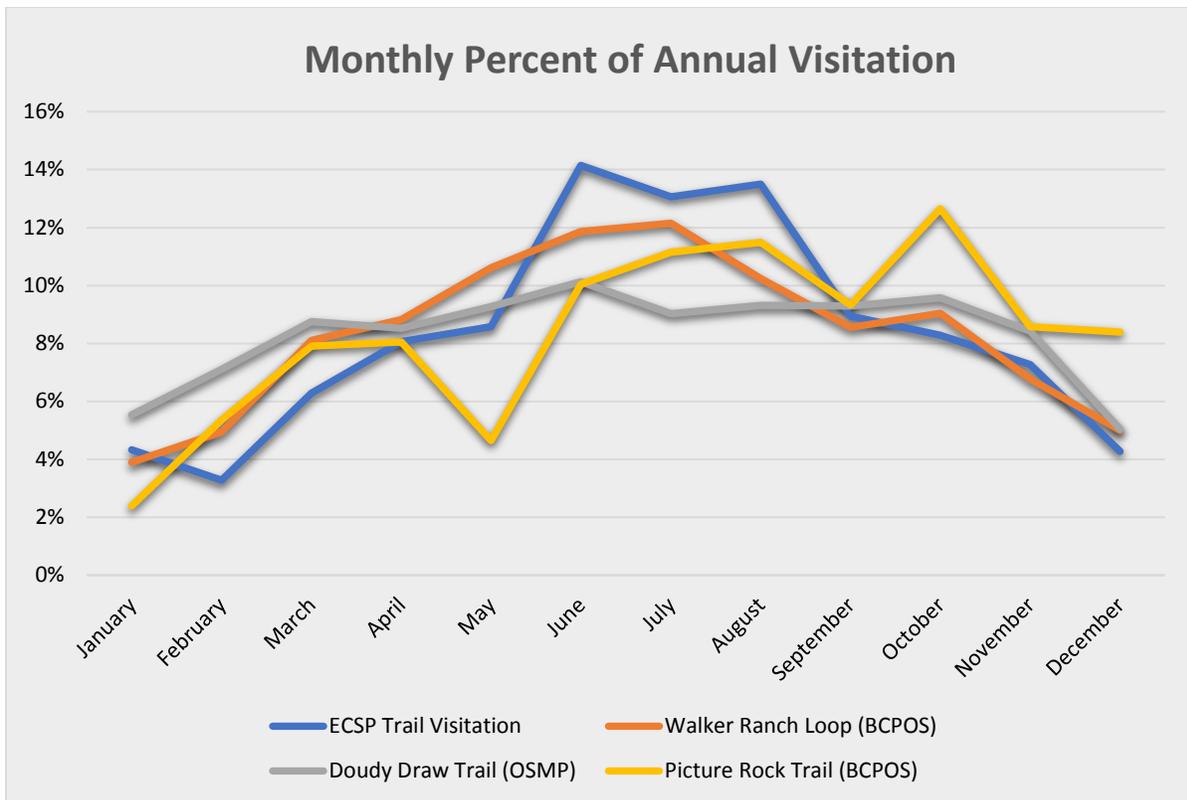
- Existing park and trail visitation in ECSP, including total trail use, and use of each existing trail. Data provided by CPW.
- Estimated use on OSMP trails at specific locations. Leslie, C. (2018). 2016-2017 Visitation Estimate Report. The City of Boulder, Open Space and Mountain Parks Department. Boulder, Colorado.
- Visitation data for Walker Ranch and Picture Rock Trail (2017). Report provided by BCPOS.

Data from other nearby parks in Jefferson County, which could have contributed to this analysis, were not available because Jefferson County Open Space does not routinely collect visitation numbers except for unique circumstances.

Existing visitation data from these sources is summarized as follows:

	ECSP Total Trail Visitation	Eldorado Canyon Trail	Rattlesnake Gulch Trail	Walker Ranch Loop (BCPOS)	Doudy Draw Trail (OSMP)	Picture Rock Trail (BCPOS)
January	7,640	1,494	1467	1,675	1,308	830
February	5,792	2,597	2,330	2,127	1,680	1,860
March	11,095	3,151	4,174	3,483	2,069	2,748
April	14,258	3,270	4,158	3,791	2,013	2,798
May	15,159	4,236	5,050	4,562	2,190	1,615
June	25,002	6,474	7,868	5,100	2,393	3,488
July	23,088	6,535	7,666	5,223	2,133	3,871
August	23,860	5,423	8,039	4,399	2,200	3,992
September	15,799	3,797	5,262	3,680	2,195	3,239
October	14,645	3,113	5,307	3,888	2,264	4,394
November	12,850	3,448	4,793	2,913	1,990	2,981
December	7,545	1,616	2,135	2,150	1,191	2,913
Annual Total	176,733	45,354	58,249	42,991	23,628	34,729

Based on this information, the highest levels of visitation are in the summer months of June, July, and August. This is particularly true for ECSP trails, as shown in the following chart.



Methods and Assumptions

Implementation of a multi-use trail connection between ECSP and Walker Ranch would increase visitation through the park. Most of the increased visitation is assumed to be mountain bike traffic, since the existing Eldorado Canyon Trail currently provides this connection for pedestrian use, but no such connection exists for mountain bikes. If the North Route were selected, additional trail traffic (primarily mountain bikes) would be expected on the Eldorado Canyon Trail. If the South Route were selected, additional trail traffic (mountain bikers and other users) would be expected on the existing Rattlesnake Gulch Trail and the new trail route that would be constructed.

This analysis estimates the additional trail traffic (mountain bikers and additional pedestrians) through this corridor as a result of a new trail connection. A constant metric of average visitors per day is used. (Note that actual visitation skews heavily toward weekend days, as about 48 percent of visitation on ECSP trails occurs on weekends).

Two separate methods were used to estimate additional visitation:

- Method 1:** Based on existing BCPOS data, this method assumes that *all* of the mountain bikers that currently use the Walker Ranch Loop Trail would choose to access the trail through ECSP. (BCPOS data found that 29 percent of visitors to Walker Ranch were mountain bikers.) This approach is based on a known population of mountain bikers who may desire and elect to use this trail connection.

- Method 2:** Based on existing BCPOS data, this method assumes that the number of mountain bikers that would use this trail connection would be similar to the number who use the Picture Rock Trail, a similar inter-park trail connection in northern Boulder County. This approach uses a similar population of visitors who may desire and elect to use this trail connection.

The results of these three analysis approaches, by average daily visitation, are presented below:

	Existing Park Trail Visitors	Eldorado Canyon Trail	Rattlesnake Gulch Trail		Method 1	Method 2	Average Increase
January	246	50	49		15.7	15.8	16
February	207	93	83		22.0	39.2	31
March	358	102	135		32.6	52.3	42
April	475	109	139		36.6	55.0	46
May	489	137	163		42.7	30.7	37
June	833	216	262		49.3	68.6	59
July	745	211	247		48.9	73.7	61
August	770	175	259		41.2	76.0	59
September	527	127	175		35.6	63.7	50
October	472	107	171		36.4	83.6	60
November	428	115	160		28.2	58.6	43
December	243	52	69		20.1	55.4	38

The percent change in visitation, based on the average increase across the three methods, are presented below:

	Existing Park Trail Visitors	Eldorado Canyon Trail	Rattlesnake Gulch Trail		Percent Change to Park	Percent Change to ECT	Percent Change to RGT
January	246	50	49		6%	32%	32%
February	207	93	83		15%	33%	37%
March	358	102	135		12%	42%	32%
April	475	109	139		10%	42%	33%
May	489	137	163		8%	27%	23%
June	833	216	262		7%	27%	22%
July	745	211	247		8%	29%	25%
August	770	175	259		8%	33%	23%
September	527	127	175		9%	39%	28%
October	472	107	171		13%	56%	35%
November	428	115	160		10%	38%	26%
December	243	52	69		16%	72%	55%

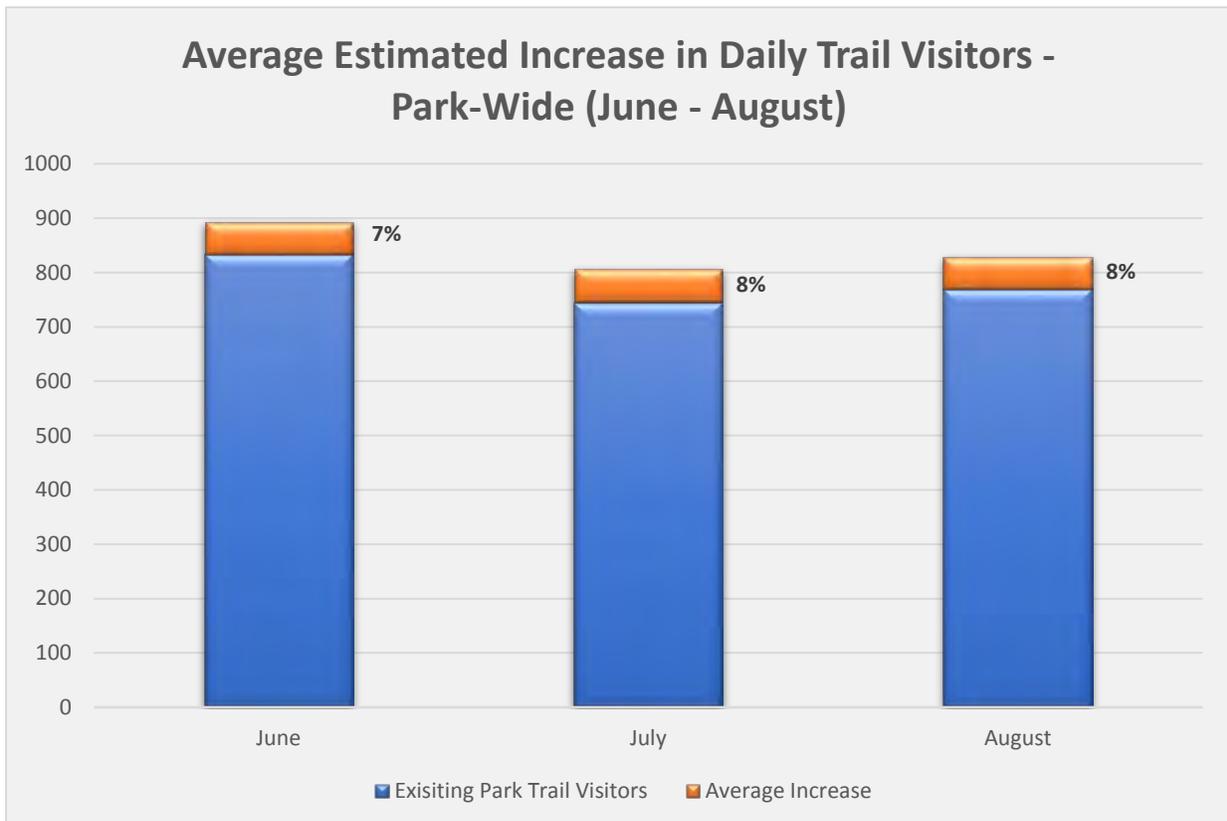
Findings

Recognizing that visitation and congestion concerns are greatest in the summer months, the estimated change in visitation is presented below. For discussion purposes, a range of 22-32 percent is used for trails in the report.

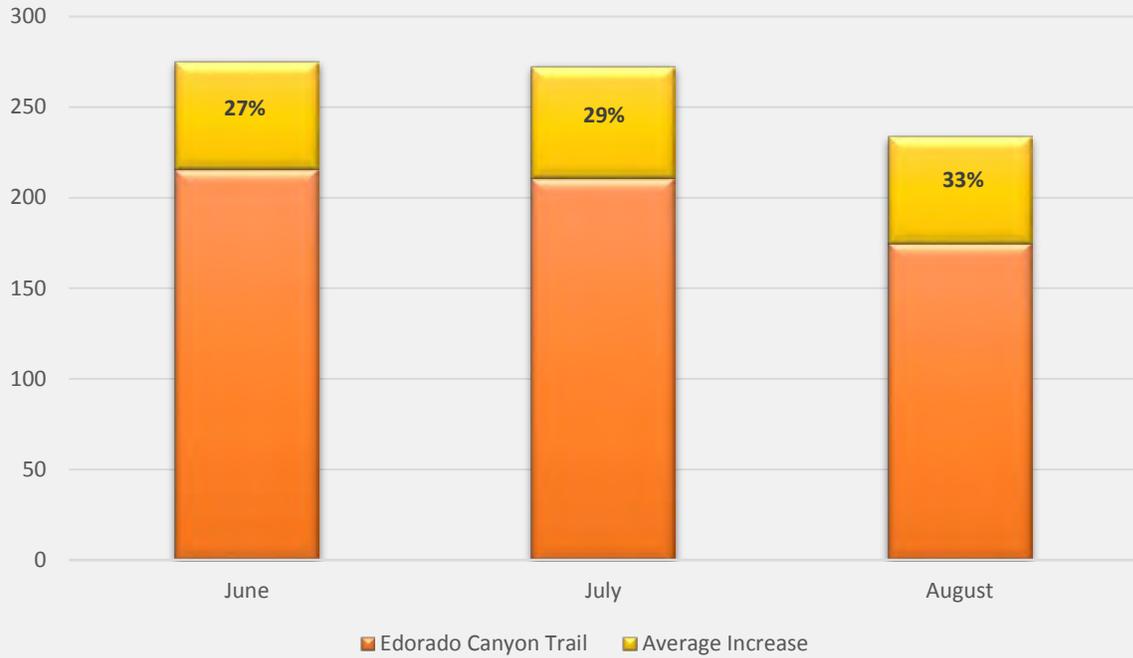
	Existing Park Trail Visitors	Eldorado Canyon Trail	Rattlesnake Gulch Trail	Average Increase	Percent Change to Park	Percent Change to ECT	Percent Change to RGT
June	833	216	262	59	7%	27%	22%
July	745	211	247	61	8%	29%	25%
August	770	175	259	59	8%	33%	23%

Based on this estimate, an average of 60 additional visitors would use the trails (either route) during the busy summer months. To put this in perspective, this equates to an additional person passing by on a trail every 12 minutes over the course of a 12-hour summer day.

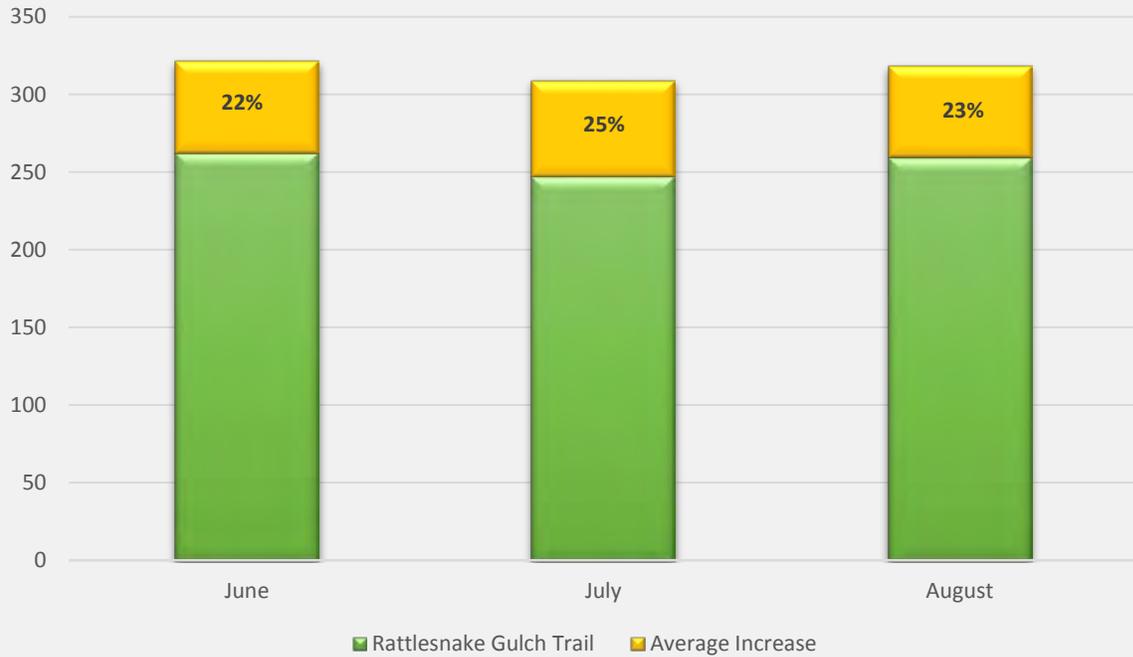
Increased summer trail visitation on a park-wide scale, and for the Eldorado Canyon and Rattlesnake Gulch Trails, is shown in the following charts.



Average Estimated Increase in Daily Trail Visitors - Eldorado Canyon Trail (June - August)



Average Estimated Increase in Daily Trail Visitors - Rattlesnake Gulch Trail (June - August)



Appendix C - Construction Cost Estimates

**Eldorado-to-Walker Connector Trail:
Planning-Level Cost Worksheet**

Cost Basis Midpoints									
Refurbish	\$ 2.00		Turn/Switchbac	\$ 5,000.00					
Easy	\$ 4.50		Boardwalk	\$ 250.00					
Med	\$ 9.00		Bridge	\$ 1,250.00					
Hard	\$ 16.00		Culvert	\$ 2,500.00					
Special	\$ 30.00								
Resto	\$ 2.50		Mobilization	\$ 15,000.00					
North Route					South Route				
	N1	N2	N3	N4	S1	S2	S3	S4-east	S4-west
Segment Cost Calculations									
Segment Length									
Est Length (lf)	7,475	7,950	5,525	9,875	9,175	10,600	7,325	9,950	7,900
Est Length (miles)	1.4	1.5	1	1.9	1.7	2	1.4	1.9	1.5
Trail Construction									
Mobilization									
Mobilization (distributed)	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 2,500.00	\$ 2,500.00
Tread construction (per site difficulty)									
% refurb	0%	80%	0%	0%	0%	0%	0%	0%	0%
refurb \$/ft	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00
\$ refurb	\$ -	\$ 12,725	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
% easy	5%	0%	18%	20%	10%	10%	10%	10%	75%
easy \$/ft	\$ 4.50	\$ 4.50	\$ 4.50	\$ 4.50	\$ 4.50	\$ 4.50	\$ 4.50	\$ 4.50	\$ 4.50
\$ easy	\$ 1,675	\$ -	\$ 4,350	\$ 8,900	\$ 4,125	\$ 4,775	\$ 3,300	\$ 4,475	\$ 26,675
% medium	30%	10%	18%	40%	30%	45%	50%	35%	25%
medium \$/ft	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00
\$ medium	\$ 20,175	\$ 14,300	\$ 8,700	\$ 35,550	\$ 24,775	\$ 42,925	\$ 32,975	\$ 31,350	\$ 17,775
% difficult	45%	0%	45%	30%	50%	40%	35%	45%	0%
difficult \$/ft	\$ 16.00	\$ 16.00	\$ 16.00	\$ 16.00	\$ 16.00	\$ 16.00	\$ 16.00	\$ 16.00	\$ 16.00
\$ difficult	\$ 53,825	\$ -	\$ 39,775	\$ 47,400	\$ 73,400	\$ 67,850	\$ 41,025	\$ 71,650	\$ -
% special treatment	20%	10%	20%	10%	10%	5%	5%	10%	0%
Tx \$/ft	\$ 30.00	\$ 30.00	\$ 30.00	\$ 30.00	\$ 30.00	\$ 30.00	\$ 30.00	\$ 30.00	\$ 30.00
\$ Tx	\$ 44,850	\$ 23,850	\$ 33,150	\$ 29,625	\$ 27,525	\$ 15,900	\$ 11,000	\$ 29,850	\$ -
SubTotal: Tread+Mobilization	\$ 125,525	\$ 55,875	\$ 90,975	\$ 126,475	\$ 134,825	\$ 136,450	\$ 93,300	\$ 139,825	\$ 46,950
lo	\$ 94,150	\$ 41,900	\$ 68,225	\$ 94,850	\$ 101,125	\$ 102,350	\$ 69,975	\$ 104,875	\$ 35,225
hi	\$ 156,900	\$ 69,850	\$ 113,725	\$ 158,100	\$ 168,525	\$ 170,575	\$ 116,625	\$ 174,775	\$ 58,700
Trail structures									
# switchbacks/turns	17	0	16	10	0	13	2	6	0
\$ per SB/turn	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00
SB/turn total	\$ 85,000	\$ -	\$ 80,000	\$ 50,000	\$ -	\$ 65,000	\$ 10,000	\$ 30,000	\$ -
Bridges-minor (lf)	50	20	20	30	55				0
\$/ft	\$ 250.00	\$ 250.00	\$ 250.00	\$ 250.00	\$ 250.00	\$ 250.00	\$ 250.00	\$ 250.00	\$ 250.00
Minor Bridge SubTotal	\$ 12,500.00	\$ 5,000.00	\$ 5,000.00	\$ 7,500.00	\$ 13,750.00	\$ -	\$ -	\$ -	\$ -
Bridges - major (lf)	0	0	0	30		30	30	35	0
\$/lf	\$ 1,250.00	\$ 1,250.00	\$ 1,250.00	\$ 1,250.00	\$ 1,250.00	\$ 1,250.00	\$ 1,250.00	\$ 1,250.00	\$ 1,250.00
Bridge - major SubTotal	\$ -	\$ -	\$ -	\$ 37,500	\$ -	\$ 37,500	\$ 37,500	\$ 43,750	\$ -
Culvert	0	0	0						1
\$/ea	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00
Bridge - major SubTotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,500
SubTotal: Structures	\$ 97,500	\$ 5,000	\$ 85,000	\$ 95,000	\$ 13,750	\$ 102,500	\$ 47,500	\$ 73,750	\$ 2,500
lo	\$ 73,125	\$ 3,750	\$ 63,750	\$ 71,250	\$ 10,313	\$ 76,875	\$ 35,625	\$ 55,313	\$ 1,875
hi	\$ 121,875	\$ 6,250	\$ 106,250	\$ 118,750	\$ 17,188	\$ 128,125	\$ 59,375	\$ 92,188	\$ 3,125
Reclamation									
feet to reclaim	1900	800	4150	3400	0	0	0	0	0
\$ / lf	\$ 2.50	\$ 2.50	\$ 2.50	\$ 2.50	\$ 2.50	\$ 2.50	\$ 2.50	\$ 2.50	\$ 2.50
SubTotal: Reclamation	\$ 4,750	\$ 2,000	\$ 10,375	\$ 8,500	\$ -	\$ -	\$ -	\$ -	\$ -
lo	\$ 3,575	\$ 1,500	\$ 7,775	\$ 6,375	\$ -	\$ -	\$ -	\$ -	\$ -
hi	\$ 5,950	\$ 2,500	\$ 12,975	\$ 10,625	\$ -	\$ -	\$ -	\$ -	\$ -
Construction Sub-Total	\$ 227,775	\$ 62,875	\$ 186,350	\$ 229,975	\$ 148,575	\$ 238,950	\$ 140,800	\$ 213,575	\$ 49,450
Construction Low	\$ 170,825	\$ 47,150	\$ 139,775	\$ 172,475	\$ 111,425	\$ 179,225	\$ 105,600	\$ 160,175	\$ 37,100
Construction Hi	\$ 284,725	\$ 78,600	\$ 232,950	\$ 287,475	\$ 185,725	\$ 298,700	\$ 176,000	\$ 266,975	\$ 61,825
Ave \$ per foot	\$ 30.47	\$ 7.91	\$ 33.73	\$ 23.29	\$ 16.19	\$ 22.54	\$ 19.22	\$ 21.46	\$ 6.26
Full-Length Route Composites									
Route Length									
Miles per Full Route			4.0	4.8		7.1	6.5		
Full Route Cost									
midpoint	n/a	n/a	\$ 477,000	\$ 521,000	n/a	\$ 651,000	\$ 552,000	n/a	n/a
lo			\$ 358,000	\$ 391,000		\$ 488,000	\$ 414,000		
hi			\$ 596,000	\$ 651,000		\$ 814,000	\$ 690,000		
\$ / Mile			\$ 120,218	\$ 108,730		\$ 91,356	\$ 84,849		
midpoint			\$ 90,226	\$ 81,600		\$ 68,482	\$ 63,637		
lo			\$ 150,209	\$ 135,861		\$ 114,230	\$ 106,061		
hi									
\$ / Foot			\$ 23	\$ 21		\$ 17	\$ 16		
midpoint			\$ 17	\$ 15		\$ 13	\$ 12		
lo			\$ 28	\$ 26		\$ 22	\$ 20		
hi									

Additional Notes and Assumptions on Cost Estimates

- **N1 Trail Reclamation:** About ~1800' portion of the existing ECT in N1 above the ECSP proposed corridor would join, would still need to be rerouted, but would be proximally adjacent and not be suitable for retaining as a hiker-only option. It would need reclamation work. Additionally, there is at least 100' of braiding that need be solved then reclaimed. The estimated closure length is ~1900'.
- **N2 Reroutes and Reclamation:** N2 is based on a GIS line of the existing trail. Trails specialists agreed that roughly 10% of N2 would be rerouted, usually because of very steep and/or fall-line grades. Therefore, the replacement tread would likely need to be approximately twice as long to achieve a workable trail grade; the cost estimate formula reflects this.
- **Cost Rounding:** All route lengths are rounded to nearest 25'. For consistency, all granular \$ figures are rounded to nearest \$25. Full-length route totals have been rounded to nearest \$1000. Rounding has been applied consistently across all segments. Some minor discrepancies may appear due to either compounded rounding and/or calculations based on pre-rounded numbers, then rounded.
- **Quantity of Switchbacks:** a range is given for the number of switchbacks (vs a singular number) to reflect the recon-based level of design. The exact number of switchbacks is TBD on final design.

Trail Construction Cost Comps for Eldorado-to-Walker, September 2018

Completed Trail Construction - Contracted. With oversight by ContourLogic / ERO

North Elk Trail - Pike National Forest 2018

<u>Vendor</u>	Singletrack Trails Inc		
<u>Description</u>	2.75 mile backcountry class 2-3 multi-use		
<u>Source</u>	awarded bid, project complete		
<u>Difficulty</u>	mixed: easy, moderate, difficult. Quite a bit of rock.		
<u>Rates</u>			
	Mobilization	\$	1,500.00
	tread construction / lf	\$	5.30
	Refurbish existing tread / lf	\$	3.59
	punchon/ bog bridge (25')	\$	1,500.00
	boulder causeway (20')	\$	1,000.00
	Structured Climbing Turn	\$	250.00

Summit Sky Ranch Trail - Silverthorne 2018

<u>Vendor</u>	Gumpton Trail works		
<u>Description</u>	4-miles, front country class 3-4, multi-use		
<u>Source</u>	awarded bid. Phase 1 complete. Phase 2 construction underway.		
<u>Difficulty</u>	gentle terrain, but lots of wetland setback and flat terrain requiring special techniques		
<u>Rates</u>			
	Mobilization	\$	500.00
	tread construction / lf	\$	5.00
	causeway / lf @ 4'w	\$	40.00
	tread armoring / sqft	\$	25.00
	crowned tread / lf @ 4-5'	\$	10.00
	rock wall / face ft	\$	20.00
	structured climbing turn	\$	3,000.00

Elk Falls Trails - Staunton State Park 2016/17

<u>Vendor</u>	Singletrack Trails inc		
<u>Description</u>	middle country class 3, multi-use		
<u>Source</u>	awarded bid, project complete		
<u>Difficulty</u>	moderate to difficult, very rocky		
<u>Rates</u>			
	Mobilization	\$	500.00
	tread construction / lf		4.50-7.00
	rock tread thru scree / lf	\$	30.00
	rock "Patio" landings / sqft	\$	25.00
	switchback	\$	1,000.00
	rock wall @ 42" tall / lf	\$	178.00
	rock steps / 5' flight	\$	2,400.00

Completed Trail Construction - Contracted. Oversight by others.

Floyd Hill - Clear Creek County 2017

<u>Vendor</u>	Tony Boone Trails		
<u>Description</u>	layout and rough-in of 30-36" tread in fairly easy terrain with good access		
<u>Source</u>	awarded bid, project complete		
<u>Difficulty</u>	easy, 3000'		
<u>Rates</u>			
	Mobilization	\$	2,000.00
	tread construction / lf	\$	3.10
	layout/ lf	\$	0.25
	Average cost / foot	\$	4.02

<u>Vendor</u>	Singletrack Trails Inc		
<u>Description</u>	layout and rough-in of 30-36" tread in fairly easy terrain with good access		
<u>Source</u>	second bidder, not awarded		
<u>Difficulty</u>	easy, 3000'		
<u>Rates</u>			
	tread construction + layout	\$	3.93

Trail Construction Cost Comps for Eldorado-to-Walker, September 2018

CPW Trail Construction Grants: Application Budgets

Paradox Trail ReRoute - BLM

<u>Vendor</u>	n/a		
<u>Description</u>			
<u>Source</u>	CPW: Trail grant revised budget, 2017		
<u>Difficulty</u>	?		
<u>Rates</u>			
	layout/mile	\$	500.00
	tread construction / mile	\$	6,500.00
	tread construction / mile	\$	9,500.00
	kiosk	\$	2,200.00
	ave \$ / ft	\$	1.52

BLM - San Miguel County

<u>Vendor</u>	n/a		
<u>Description</u>			
<u>Source</u>	CPW: Trail grant budget		
<u>Difficulty</u>	?		
<u>Rates</u>			
	trail construction (aggregate	\$	2.38
	carsonite signs / ea		\$35

Buffalo Pass Trail - Routt County

<u>Vendor</u>	Routt County Riders + Rocky Mountain Youth Corps		
<u>Description</u>	13 mile trail system		
<u>Source</u>	CPW: Trail grant budget, corrected		
<u>Difficulty</u>	?		
<u>Rates</u>			
	project mgt + grant admin	\$	15,700.00
	trail contractor	\$	273,800.00
	youth corps	\$	26,800.00
	ave \$ / ft	\$	4.38

South Canyon Trail System - Garfield County

<u>Vendor</u>	?		
<u>Description</u>			
<u>Source</u>	CPW: Trail grant budget, final		
<u>Difficulty</u>	?		
<u>Rates</u>			
	Tramway Trail / lf	\$	4.74
	Lightening Bug Trail / lf	\$	6.00
	Coal Camp Trail / lf	\$	5.35
	Bridge (ea)	\$	7,500.00
	Project/Construction Admin	\$	11,400.00
	Signage and Kiosks	\$	12,000.00
	ave \$ / ft, inclusive	\$	6.19

Eldo-to-Walker: Trail Specialist Recon Worksheet - North Route

	N1	N2	N3	N4
	Aggregate	Aggregate	Aggregate	Aggregate
Construction				
% Refurbish	0%	80%	0%	0%
% Easy	5%	0%	17.5%	20%
% Med	30%	10%	17.5%	40%
% Hard	45%	0%	45%	30%
% Extreme	20%	10%	20%	10%
Structures	Switchbacks: 17 Boardwalk: 1@50'	Bridge simple: 1@20'	Switchbacks: 16 Bridge simple: 1@20'	Switchbacks: 10 Bridge simple / fords: 2 @ 30'
Notes	Lots of talus/scree/rock	80% maint/ refurb 10% reroute 10% special Tx (rock work)		
Sustainability				
% Good	50%	80%	32%	70%
% Fair	40%	15%	37%	20%
% Poor	10%	5%	31%	10%
Notes				
Class-3 compliant %	85%	88%	73%	92%
Visitor Experience				
Difficulty Rating	Medium +	Medium	Difficult	Medium +
Visitors accommodated				
Hiker	well	well	yes	well
Runner	well	well	yes	well
Cyclist	yes, hike-a-bike	well	poorly	well
Equestrian	poorly	well	poorly	poorly
% MTB-able				
Character: Setting				
Stars rating	4	4.5	3.75	4.5
notes				
Character: Tread				
Stars rating	3.25	4.5	3	4
notes				

Eldo-to-Walker: Trail Specialist Recon Worksheet - South Route

	S1	S2	S3	S4-east	S4-west
	Aggregate	Aggregate	Aggregate	Aggregate	Aggregate
Construction					
% Refurbish		0%	0%	0%	0%
% Easy		10%	10%	10%	75%
% Med		30%	45%	50%	25%
% Hard		50%	40%	35%	45%
% Extreme		10%	5%	5%	10%
Structures	Bridges: 1x35' 1x20'	Switchbacks: 13 Bridge: 1x30'	Switchbacks: 2 Bridges: 1x30'	Switchbacks: 6 Bridge: 1x35'	Culvert: 1- replace existing @ road
Notes					
Sustainability					
% Good		55%	45%	65%	45%
% Fair		20%	30%	30%	45%
% Poor		25%	25%	5%	10%
Notes					
Class-3 compliant %		99%	88%	95%	90%
Visitor Experience					
Difficulty Rating	Medium	Medium+	Medium	Medium+	Easy+
Visitors accommodated					
Hiker	well	well	well	well	well
Runner	well	well	well	well	well
Cyclist	well	yes	well	yes	well
Equestrian	maybe	maybe	yes	maybe	well
% MTB-able					
Character: Setting					
Stars rating		4.25	3.75	4.25	4.5
notes					
Character: Tread					
Stars rating		3.25	3.25	3.5	4.25
notes					4

Eldo-to-Walker: Trail Specialist Recon Worksheet - North Route

	N1				
	ECSP	CPW Trails	OSMP	BCPOS	Consultant
Construction					
% Refurbish					
% Easy	15%	5%	0%	10%	0%
% Med	25%	40%	40%	20%	20%
% Hard	30%	50%	50%	50%	50%
% Extreme	30%	5%	10%	20%	30%
Structures	1 Bridge, 12 switchbacks	Switchbacks	17+ Turns	1 Bridge, 17 switchbacks	17 Switchbacks, Boardwalk: 1 @ 50'
Notes	Extreme rock			Lots of Talus	Lots of scree?
Sustainability					
% Good	40%	50%	50%	50%	50%
% Fair	50%	45%	40%	40%	30%
% Poor	10%	5%	10%	10%	20%
Notes	Will take work and tweaking		Rocks and switchbacks	Talus will be slow work	Shortcut potential (close to trailhead), lots of loose rock
Class-3 compliant %	85%		90%		80%
Visitor Experience					
Difficulty Rating	Beg / Int	Medium +	Medium +	Medium +	Difficult
Visitors accommodated					Lots of stray rocks
Hiker	X	X	X	X	X
Runner	x		x	x	x
Cyclist	X	X	X	advanced	advanced
Equestrian	X			expert	maybe
% MTB-able	85%				70%
Character: Setting					
Stars rating	4		4	5	3
notes		Partial Trees, some views	Talus, Vistas		Direct Route
Character: Tread					
Stars rating	3		4	4	2
notes	Lots of turns	Steep climb	Turns		Steep with lots of rocks on upper half, squeezing in SBs

Eldo-to-Walker: Tr

		N2				
		ECSP	CPW Trails	OSMP	BCPOS	Consultant
Construction						
% Refurbish						
% Easy		90%	80%	80%	80%	80%
% Med		0%	20%	0%	10%	10%
% Hard		10%	0%	0%	5%	0%
% Extreme		0%	0%	20%	5%	10%
Structures			Several potential reroutes, bridge removed	Stone Pitch	1 bridge	No Switchbacks, 1 Bridge single
Notes		3-4 areas to rebuild. Hike-a-bike.			7 hard spots	Set back, 7 areas need attention
Sustainability						
% Good						
% Fair		80%	80%	80%	75%	80%
% Poor		10%	20%	20%	15%	10%
% Poor		10%	0%	0%	10%	10%
Notes						
Class-3 compliant %		95%			85%	85%
Visitor Experience						
Difficulty Rating			Easy +	Medium +	Medium	Medium +
Visitors accommodate						
Hiker		X		X	X	X
Runner		x		x	x	X
Cyclist		X		X	X	X
Equestrian		X		X	X	X
% MTB-able		95%				90%
Character: Setting						
Stars rating		5		5	4	4
notes			Lots of views	Vistas, Forest, Meadows		
Character: Tread						
Stars rating		5		5	4	4
notes			Easy rolling contours with some steep sections	Contour, Short, Steep		A nice rest from steep on either end

Eldo-to-Walker: Tr

		N3				
		ECSP	CPW Trails	OSMP	BCPOS	Consultant
Construction						
% Refurbish						
% Easy		50%	20%	10%	5%	5%
% Med		10%	30%	30%	10%	10%
% Hard		20%	40%	40%	75%	40%
% Extreme		20%	10%	20%	10%	45%
Structures		1 Bridge, lots of Switchbacks		Turns, Armor	16	16 Switchbacks, 1-20' simple bridge
Notes		Rebuild old _____. Hard to access.			Too much work Fixing for reward?	Lots of armoring/step s. Big shortcut potential.
Sustainability						
% Good		30%	40%	40%	20%	30%
% Fair		40%	40%	40%	30%	35%
% Poor		30%	20%	20%	50%	35%
Notes		Hard to save old trail.		Soil Structure		Shortcut potential, steep grades
Class-3 compliant %		80%			90%	50%
Visitor Experience						
Difficulty Rating		Difficult	Difficult	Medium +	Difficult	Difficult++
Visitors accommodate			Advanced +			
Hiker		X		X	x	X
Runner		x		x	x	x
Cyclist		X		X	only strong	poor
Equestrian						poor
% MTB-able		60%				30%
Character: Setting						
Stars rating		4			4	3
notes		Nice	Forested	Forest, Meadow		Some shade, Few Views, little variety
Character: Tread						
Stars rating		3			4	3
notes		Fine	Steep	Turns, Climb		Extended upper range steep trail grade. Fitness challenge?

Eldo-to-Walker: Tr

		N4				
		ECSP	CPW Trails	OSMP	BCPOS	Consultant
Construction						
% Refurbish						
% Easy		40%	15%	10%	30%	10%
% Med		25%	50%	40%	60%	30%
% Hard		25%	25%	40%	7%	50%
% Extreme		10%	10%	10%	3%	10%
Structures		2 small bridges, plenty of switchbacks	2 Bridges	10+ Turns, 3 bridges@ grade	10 Switchbacks, 2 bridges	10 Switchbacks Bridges/fords: 30', 30'
Notes				Bedrock	? Bedrock	Lots of uncertainty about how much sub-surface bedrock
Sustainability						
% Good		60%	70%	60%	80%	70%
% Fair		30%	25%	20%	15%	20%
% Poor		10%	5%	20%	5%	10%
Notes				Soil Structure		Opportunity for shortening switchbacks. Several structures.
Class-3 compliant %		90%			95%	90%
Visitor Experience						
Difficulty Rating		Medium	Medium +	Medium +	Medium	Medium+
Visitors accommodate			Advanced Users			
Hiker		X		X	x	X
Runner		x			x	x
Cyclist		X		X	X	X
Equestrian		ok				maybe
% MTB-able		90%				95%
Character: Setting						
Stars rating		5			4	5
notes		Beauty spots	Views SE, turn out open terrain	Vistas, Forest, Meadows	Views	Open, sunny with views south.
Character: Tread						
Stars rating		4			4	5
notes		Fine		?? and turns		Sun exposure on climb, rocky, some loose soil.

Eldo-to-Walker: Trail Specialist Recon Worksheet - South Route

	S1				
	ECSP	CPW Trails	OSMP	BCPOS	Consultant
Construction					
% Refurbish					
% Easy	10%	5%	10%		20%
% Med	20%	40%	30%		30%
% Hard	60%	40%	50%		45%
% Extreme	10%	15%	10%		5%
Structures	Bridges, Retaining Walls				2 Bridges - 35' and 20'
Notes		talus crossings will be difficult because of the size of material, some concerns about rock fall in talus section, good views with a back country feel	steep cross slope... rocks, ledges, unconsolidated soil, talus field..., drainage crossings, close to tracks		Talus slope like Staunton SP \$30/ft
Sustainability					
% Good	25%	-	-	-	80%
% Fair	25%	-	-	-	20%
% Poor	50%	-	-	-	0%
Notes	I don't think talus will hold without structures				May have some sloughing soils
Class-3 compliant %		100%	100%	95%	100%
Visitor Experience					
Difficulty Rating	Medium	Medium+	Medium+		Medium
Visitors accommodated	Should be all wide!				
Hiker	X		X		X
Runner	X		X		X
Cyclist	X		X		X
Equestrian	X		Maybe		X
% MTB-able					100%
Character: Setting					
Stars rating		3	5	4	5
notes	Nice	good views with a back country feel	open meadows, divide views, forested		Variety, upland, arid, riparian proximity
Character: Tread					
Stars rating		2	5	1	5
notes	Cool	Given the length and difficulty I think only the more advanced riders will complete the entire 'loop' from Eldorado.			Gentle Contour

Eldo-to-Walker: Trail

	S2				
	ECSP	CPW Trails	OSMP	BCPOS	Consultant
Construction					
% Refurbish	0%	0%	0%	0%	0%
% Easy	10%	10%	10%	15%	5%
% Med	30%	50%	50%	60%	30%
% Hard	50%	35%	30%	25%	60%
% Extreme	10%	5%	10%	0%	5%
Structures	Bridges, switchbacks!	many turns/switchbacks, bridges?	15+ switchbacks... ledge... 2 drainage crossings (bridge/ at grade)?	Bridge(2)	13-S/B 1x30' Bridge
Notes	similar to Benjamin Trail	steep cross slopes in areas with poor soils, concerned about sustainability, multiple drain crossings, good views with a back country feel, forested	steep cross slope		lots of steep with loose rock
Sustainability					
% Good	25%	-	-	50%	60%
% Fair	25%	-	-	40%	30%
% Poor	50%	-	-	10%	10%
Notes	Soil Coarse				Some shortcut, sloughing backslope, down in the gullies
Class-3 compliant %		100%	80%	90%	80%
Visitor Experience					
Difficulty Rating	Medium+	Medium+	Medium+	Medium+	Medium+
Visitors accommodated				challenging	
Hiker			X		x
Runner			X		x
Cyclist			X		x
Equestrian			Maybe		maybe (SBs)
% MTB-able					90%
Character: Setting					
Stars rating		3	3	4	5
notes	Downing??	good views with a back country feel, forested	open meadows, divide views, forested	High	rugged, mix veg, veiw from high point
Character: Tread					
Stars rating		3	3	4	3
notes	Challenging build, for limited views	Given the length and difficulty I think only the more advanced riders will complete the entire 'loop' from Eldorado.		High	rocky, adventuresome, focus/energy

Eldo-to-Walker: Trail

	S3				
	ECSP	CPW Trails	OSMP	BCPOS	Consultant
Construction					
% Refurbish	0%	0%	0%	0%	0%
% Easy		10%	10%	5%	5%
% Med		50%	50%	65%	40%
% Hard		35%	30%	25%	50%
% Extreme		5%	10%	5%	5%
Structures		many turns/switchbacks, bridges?	15+ switchbacks 2 drainage crossings (bridge/ at grade)?	turns, 1 creek crossing	2 S/B 1-30' bridge
Notes		steep cross slopes in areas with poor soils, concerned about sustainability, multiple drain crossings, good views with a back country feel, forested	steep cross slope		Mostly contours but crosses some tricky terrain. Good S/B locations. Consider hybrid of S3 below saddle and S2 above saddle ???
Sustainability					
% Good	-	-	-	50%	80%
% Fair	-	-	-	40%	20%
% Poor	-	-	-	10%	0%
Notes					Little shortcut potential
Class-3 compliant %		100%	90%	95%	95%
Visitor Experience					
Difficulty Rating		Medium+	Medium+	Medium	Medium
Visitors accommodated				Challenging	
Hiker			X		x
Runner			X		x
Cyclist			X		x
Equestrian			Maybe		x
% MTB-able					99%
Character: Setting					
Stars rating		4	3	5	5
notes		good views with a back country feel, forested	open meadows, divide views, forested	High	Rugged, Some trees, lesser view from saddle
Character: Tread					
Stars rating		3	3	4	4
notes		Given the length and difficulty I think only the more advanced riders will complete the entire 'loop' from Eldorado.		High	Rocky, adventuresome, perceived exposure

Eldo-to-Walker: Trail

	S4-east				
	ECSP	CPW Trails	OSMP	BCPOS	Consultant
Construction					
% Refurbish	0%	0%	0%	0%	0%
% Easy	25%	5%	10%	5%	10%
% Med	30%	60%	40%	15%	30%
% Hard	25%	30%	40%	75%	50%
% Extreme	20%	5%	10%	5%	10%
Structures	Bridge?, Switchbacks	switchbacks and climbing turns, multiple crossings with bridge options	walls... switchbacks/climbing turns on open slope	Bridge	5-7 S/B, 1-16' bridge/ford, 1-35'bridge
Notes		multiple options for different views, some steep slopes in rocky terrain,	road segments... ledges		Reasses layout during design phase
Sustainability					
% Good	40%	-	-	30%	70%
% Fair	50%	-	-	60%	20%
% Poor	10%	-	-	10%	10%
Notes					shortcutting @ switchbacks
Class-3 compliant %		80%	95%	90%	95%
Visitor Experience					
Difficulty Rating	Medium +	Medium+	Medium+	Medium	Medium +
Visitors accommodated	Some fitness needed			Challenging	
Hiker			X		X
Runner			X		
Cyclist			X		X
Equestrian			Maybe		?
% MTB-able					95%
Character: Setting					
Stars rating		5	4	4	5
notes	Down in Da Hole	multiple options for different views, some steep slopes in rocky terrain	open meadows, divide views, forested	High	High - Rugged
Character: Tread					
Stars rating		4	4	4	5
notes	Cool trail without cool views	Given the length and difficulty I think only the more advanced riders will complete the entire 'loop' from Eldorado.		High	High - Rugged, exploratory, engaging

Eldo-to-Walker: Trail

	S4-west				
	ECSP	CPW Trails	OSMP	BCPOS	Consultant
Construction					
% Refurbish	0%	0%	0%	0%	0%
% Easy	75%	75%	60%	90%	80%
% Med	25%	25%	30%	10%	20%
% Hard	0%	0%	10%	0%	0%
% Extreme	0%	0%	0%	0%	0%
Structures	Boardwalk?	x% hard for drain crossing structure (* reallocated b/c structures tallied separately)	multiple crossings (at grade?)	2 Ditch Crossings	Replace Culvert @ old road, 2 armored fords
Notes	Rock Armor, replace culvert, keep vehicle access	partial open meadow, overall easy building with few structures; should be noted that this area is hunted by a few folks each season	mellow cross slopes...road bed segments...open sightlines		Access is easy
Sustainability					
% Good	-	-	-	90%	95%
% Fair	-	-	-	10%	5%
% Poor	-	-	-	0%	0%
Notes					
Class-3 compliant %			100%	80%	100%
Visitor Experience					
Difficulty Rating		Medium	easy-medium	Easy	easy-moderate
Visitors accommodated					
Hiker			X		X
Runner			X		
Cyclist			X		X
Equestrian			Maybe		X
% MTB-able					100%
Character: Setting					
Stars rating		5	4	4	5
notes		should be noted that this area is hunted by a few folks each season	open meadows, divide views, forested		Open terrain, rolling vistas, intimate sections
Character: Tread					
Stars rating		4	4	3	5
notes		Given the length and difficulty I think only the more advanced riders will complete the entire 'loop' from Eldorado.			Smooth, lazy rhythm