



HEADWATERS TRAILS ALLIANCE STRATEGIC TRAILS PLAN

April, 2019



CONTACT INFORMATION:

Prepared For:
Headwaters Trails Alliance
Meara McQuain, Executive Director

Phone: 970.726.1013
Email: mmcquain@co.grand.co.us
Web: www.headwaterstrails.org

Prepared By:
Kay-Linn Enterprises
Scott Linnenburger, Principal

303.241.3301
scott@kay-linn.com
www.kay-linn.com

TABLE OF CONTENTS

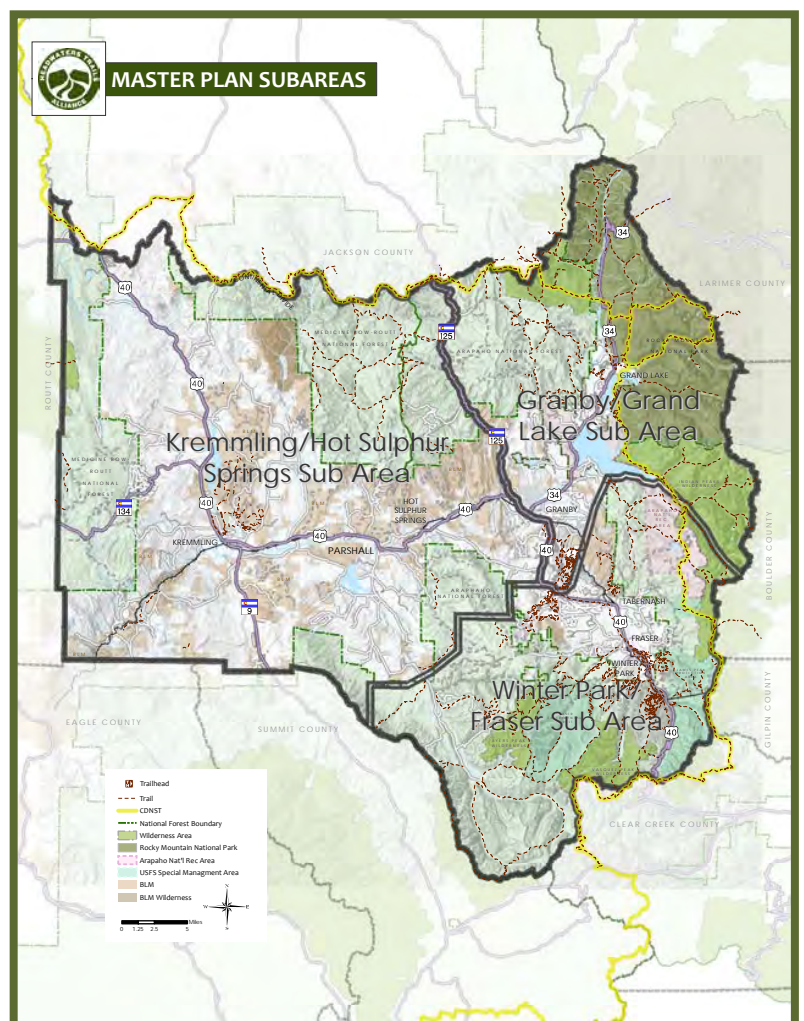
OVERVIEW.....	1
EXISTING PLANS AND DATA.....	5
HTA MISSION AND GOALS.....	14
OPPORTUNITIES & CONSTRAINTS.....	16
 SUBAREA INFORMATION	
WINTER PARK-FRASER.....	20
OVERVIEW.....	21
EXISTING TRAIL CONDITIONS.....	23
STAKEHOLDER OUTREACH SUMMARY.....	23
OPPORTUNITIES & CONSTRAINTS.....	24
GRANBY-GRAND LAKE	28
OVERVIEW.....	29
EXISTING TRAIL CONDITIONS.....	30
STAKEHOLDER OUTREACH SUMMARY.....	31
OPPORTUNITIES & CONSTRAINTS.....	32
KREMMLING-HOT SULPHUR SPRINGS.....	38
OVERVIEW.....	39
EXISTING TRAIL CONDITIONS.....	40
STAKEHOLDER OUTREACH SUMMARY.....	41
OPPORTUNITIES & CONSTRAINTS.....	42
STRATEGIC TRAILS PLAN ELEMENTS.....	46
GOAL 1.....	47
GOAL 2.....	51
GOAL 3.....	54
GOAL 4.....	59
APPENDICES	
APPENDIX A: EXISTING TRAILS & FACILITIES	
APPENDIX B: FUNDING & ACCESS INFORMATION	
APPENDIX C: TRAIL DEVELOPMENT INFORMATION	
APPENDIX D: SIGNAGE INFORMATION	
APPENDIX E: PROBABLE FUNDING NEEDS	

EXECUTIVE SUMMARY

Headwaters Trails Alliance (HTA) is a 501(c)3 not-for-profit organization registered in Grand County, Colorado. The organization was formed in 1996 following the development of the Headwaters Master Trails Plan, with the charge of administering that Plan. The Plan was updated in 2014, and during the public outreach process to support the update, HTA felt strongly that with 1) the large geographic area of Grand County and 2) regional differences throughout the county regarding trail priorities, it would be beneficial to supplement the overall Plan with more specific, local direction that would best serve the specific needs of the various communities.

HTA moved forward with a geographic regional approach to defining specific priorities and goals, splitting the county into the Winter Park-Fraser, Granby-Grand Lake, and Kremmling-Hot Sulphur Springs Sub-Areas. HTA believes that this sub-area approach provides the organization with the ability to best address local challenges and desires related to land management regimes, municipal interfaces, and stakeholder groups. The organization implemented the planning and outreach process in the Winter Park-Fraser Sub-Area in 2015/16, initiated the Granby-Grand Lake Sub-Area process in late 2017 and Kremmling-Hot Sulphur Springs Sub-Area in mid-2018.

The first portion of this plan presents a county-wide overview of trails and related facilities, other plans, opportunities/constraints, and demographics that have bearing on the overall plan, the mission, goals, and objectives of Headwaters Trails Alliance.



EXECUTIVE SUMMARY

The second portion of this plan is the Strategic Trails Plan for the three aforementioned sub-areas. Through significant stakeholder outreach and internal deliberation, HTA's Trail Planning Subcommittee distilled four overarching goals for improving the trail system, including:

- **Goal 1: Improve the interconnectivity between federal lands and municipal/residential centers throughout Grand County.**
- **Goal 2: Provide enhanced outreach/education to trail users, residents, and visitors.**
- **Goal 3: Redevelop the area trails into a diverse, four-season system that provides high-quality experiences while minimizing conflicts.**
- **Goal 4: Enhance the community focus of the trail system to provide quality of life and potential economic activity improvements throughout the area.**



Under each broad goal are a number of more specific and component objectives that better define the intended activities of HTA to meet the broad goals. Under each objective, a number of benchmarks are defined that help to direct the process of meeting the objectives. These benchmarks are prioritized for the 2018 to 2028 period as short-term (1-3 years), mid-term (4-6 years), and long-term (7-10 years), and were developed based on a combination of expressed stakeholder desires and HTA's potential capacity to move through the strategic implementation process.

To more fully explain these objectives/benchmarks, a list of potential projects, all of which were defined through the stakeholder outreach process, is included after each objective. These potential projects are presented only for the purposes of explanation of the strategic elements of the overall plan. Each project will have to be vetted through various processes and plans developed for implementation and ongoing management.

EXECUTIVE SUMMARY

HTA has set a bold course with this Strategic Trails Plan, committing to stepping into an enhanced leadership role in the community. Realizing the strategic elements of the plan depend upon a dramatic increase in the organization's capacity (i.e. staff, funding, and volunteer inputs) between 2018 and 2028. This is the preeminent challenge for HTA and all of its stakeholders (recreation groups, state and federal agencies, municipalities, and private entities) in realizing the goals of the Strategic Trails Plan. Simply stated, none of the stakeholders individually has the capacity to realize major, positive changes to the trail system. Negotiating challenges presented by multiple agency land management regimes, coalescing stakeholder desires, and creating the necessary capital to implement successful projects will be at the crux of successful Plan implementation in each Sub-Area.



HTA believes that the future sustainability and economic well-being of Grand County is incumbent upon highlighting and improving the quality of our outdoor recreation assets in a manner that directly benefits residents and visitors. Enhancing our sense of place through trails, via broader community connectivity, increased durability, consistent way finding, and new opportunities, will set Grand County apart and demonstrate that community-driven conservation and recreation are the economic and quality of life drivers that help Grand County to thrive in the future. As such, a significant investment in this vital infrastructure is just that- a strategic investment in our sustainable future.

OVERVIEW

BACKGROUND

In 1988, Grand County hired a team to produce the first county-wide trails map, create the Headwaters Trails logo, and post signs featuring this logo to mark all trail systems identified in the map. The Headwaters Trails Committee, created this same year pursuant to C.R.S. 33-11-106, developed a purpose for the future development of trails within Grand County. Along with this Purpose, a number of goals and objectives were produced to guide future trails decisions.

Grand County began work on the Headwaters Trails Master Plan in 1994. This plan was developed through the purpose, goals, and objectives set forth by the Headwaters Trails Committee. A portion of the impetus for the plan was local concern about the closing of trails due to development.

The Grand County Planning and Zoning Department began meeting with town governments, local chambers of commerce, municipal recreation districts, the United States Forest Service (USFS), the Bureau of Land Management (BLM), Rocky Mountain National Park (RMNP), and local trail groups to receive input on the project. These meetings transformed the plan considerably. An open meeting was announced and held with the Grand County Board of Commissioners on October 25, 1994 to present the modified draft to the public. The final draft of the Headwaters Trails Master Plan was presented to the Grand County Planning Commission on January 11, 1995. The Headwaters Trails Committee was chosen to play the role of administrator of the Headwaters Trails Master Plan.

In recognition of the need for a county-wide trails organization, Headwaters Trails Alliance was established as a 501 (c) (3) non-profit corporation in 1996. The organization was formed through the efforts of Fraser Valley Partnership for Trails and Grand Lake Partners for Trails with the support of the Grand County Board of Commissioners, the Grand County Planning Commission, and the individuals and groups who served on the Headwaters Trails Committee. Once formed, Headwaters Trails Alliance (HTA) assumed the role of administrator of the Master Trails Plan.



OVERVIEW

The stated Mission of the plan was:

“to create a Headwaters Trail System to provide multi-use recreational trails”

with Goals of:

- **Improving area trails**
- **Protecting trail connectivity in response to private development**
- **Guiding trail system expansion**

The original plan had a heavy focus on paved and aggregate-surfaced trails that connected Grand County’s municipalities and created similar connections to Jackson and Summit Counties. Changing economic factors, goals, and trail design, construction, and management techniques require a renewed focus on natural surface trails in this plan revision, but the essential Mission and Goals remain the same- a standard-bearing, multi-use

trail system that helps improve the quality of life in Grand County by providing high quality recreation, protecting natural resources, and creating the infrastructure for local economic development that is based on trail-related tourism and development.

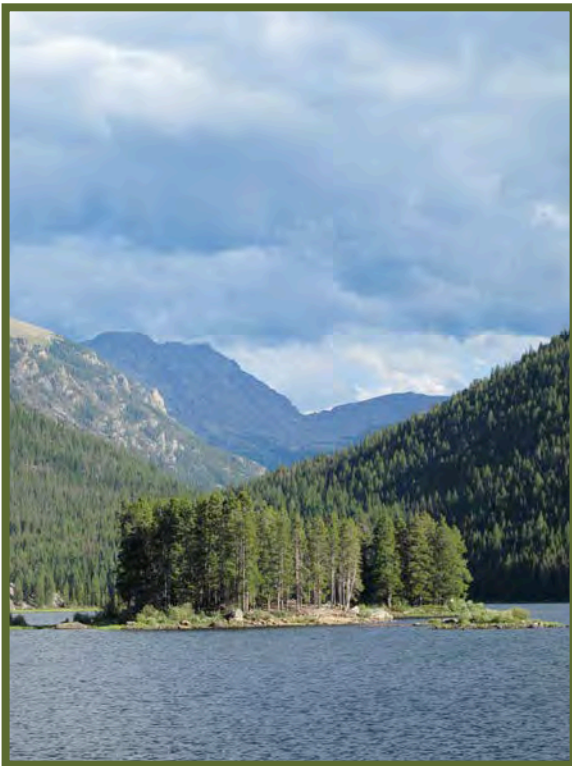


This revision of the Grand Count Master Trail Plan seeks to conform with and support existing county and municipal planning documentation. Recently, Grand County has published a County Master Plan, and municipalities have developed planning documents, including a Town of Fraser Downtown Revitalization and Comprehensive Plan, and a Town of Winter Park /Fraser Community Trails Plan. The Kremmling Office of the BLM finalized its Resource Management Plan in July, 2015, which provides guidance for the management of public lands it administers. The Forest Service has finished travel planning for motorized recreation and roads, resulting in a published Motor Vehicle Use Map (MVUM) and is currently working under the guidance of a Land & Resource Management Plan (LRMP) approved in 1997.

OVERVIEW

AREA DESCRIPTION

Grand County, Colorado is located in the north-central portion of the state. The county's land is largely in public ownership (nearly 75%). The largest manager of lands is the United States Forest Service (Arapaho-Roosevelt National Forest, Sulphur Ranger District, with some areas in cooperative management with the Routt and Medicine Bow National Forest) and secondarily by the US Department of Interior Bureau of Land Management (BLM, Kremmling Field Office) and National Park Service (Rocky Mountain National Park). State-owned land is managed by the Colorado State Board of Land Commissioners and Colorado Parks and Wildlife. Incorporated municipalities within the county are located in the central valleys of the Fraser and Colorado Rivers, and include Kremmling, Hot Sulphur Springs, Grand Lake, Granby, Fraser, and Winter Park. Notable unincorporated areas include Tabernash, Parshall, and Radium. The Grand County population is currently near 15,000 residents.



The topography of the county is dominated by mountain ranges, including the Front Range, Gore Range, Indian Peaks, Rabbit Ears Range, Never Summer Mountains, Vasquez Mountains, and Williams Fork Mountains. Much of the backcountry in these areas is designated for Wilderness Protection, and includes the Indian Peaks Wilderness, Byers Peak Wilderness, Vasquez Peak Wilderness, Never Summer Wilderness, Rocky Mountain National Park Wilderness, and Sarvis Creek Wilderness. Closer to populated areas, a number of special management areas exist, including the James Peak Protection and Special Interest Areas, Bowen Gulch Protection Area, Arapaho National Recreation Area, and Fraser Experimental Forest. Along with the headwaters and tributaries of the iconic Colorado River and Colorado's largest natural lake, Grand Lake, the county has an impressive number of large reservoirs, including Wolford Mountain Reservoir, Lake Granby and Shadow Mountain Lake (Arapaho National Recreation Area), Williams Fork Reservoir, Green Mountain Reservoir, Willow Creek Reservoir, and Windy Gap Reservoir.

OVERVIEW

A number of large, privately-managed, recreation-focused parcels exist in Grand County. Winter Park Resort (on USFS land), Ski Granby Ranch, Devil’s Thumb Ranch Resort and Spa, and the YMCA’s Snow Mountain Ranch all provide year-round, trail-based recreation opportunities on a total of more than 15,000 acres of land. Other relatively large-acreage private ranches also depend on tourism and trail-related activities for their financial livelihood.

Among the more than 1,030 miles of trails, a number of nationally notable scenic routes are located in Grand County, including the Continental Divide National Scenic Trail, Trail Ridge Road and Colorado River Headwaters Scenic Byways. Locally, the Fraser River and Fraser to Granby Trails provide non-motorized connectivity between Winter Park, Fraser and Granby. The Arapaho National Forest’s Sulphur Ranger District manages more than 500 miles of designated trails (including the trails lying within the management jurisdiction of the Medicine Bow/Routt National Forest) within Grand County. The BLM manages more than 50 miles of trails within the county, and the National Park Service manages approximately 100 miles of trails within the Grand County borders.



EXISTING PLANS & DATA

The Mission of Headwaters Trails Alliance is:

to identify, maintain, and expand an accessible, interconnecting trail system in Grand County for appropriate multi-user groups.

Overarching Goals and Objectives:

Physical Leadership [County, Towns and Land Management Agency, and Funding Partnerships]

- Provide technical direction, expertise, and support to municipalities, agencies, and private property owners in the design, development, and maintenance of trails.
- Coordinate monetary, informational, and personnel resources within and outside Grand County to further the planning, development and maintenance of trails in Grand County for the benefit of the public.
- Collaborate with the U.S. Forest Service, Bureau of Land Management, National Park Service, local communities and trail organizations to identify, build and maintain sustainable regional trail connections.

Social Leadership [County, Towns, Recreation Districts & Chamber Partnerships]-

- Lead the development of trail-based recreational signage, mapping, marketing, events, and outreach support to better promote Grand County as a trails destination.
- Promote the appreciation, preservation, and enjoyment of trails through education.
- Promote cooperation and respect among various user groups to further enhance the quality of existing and future trails in Grand County.

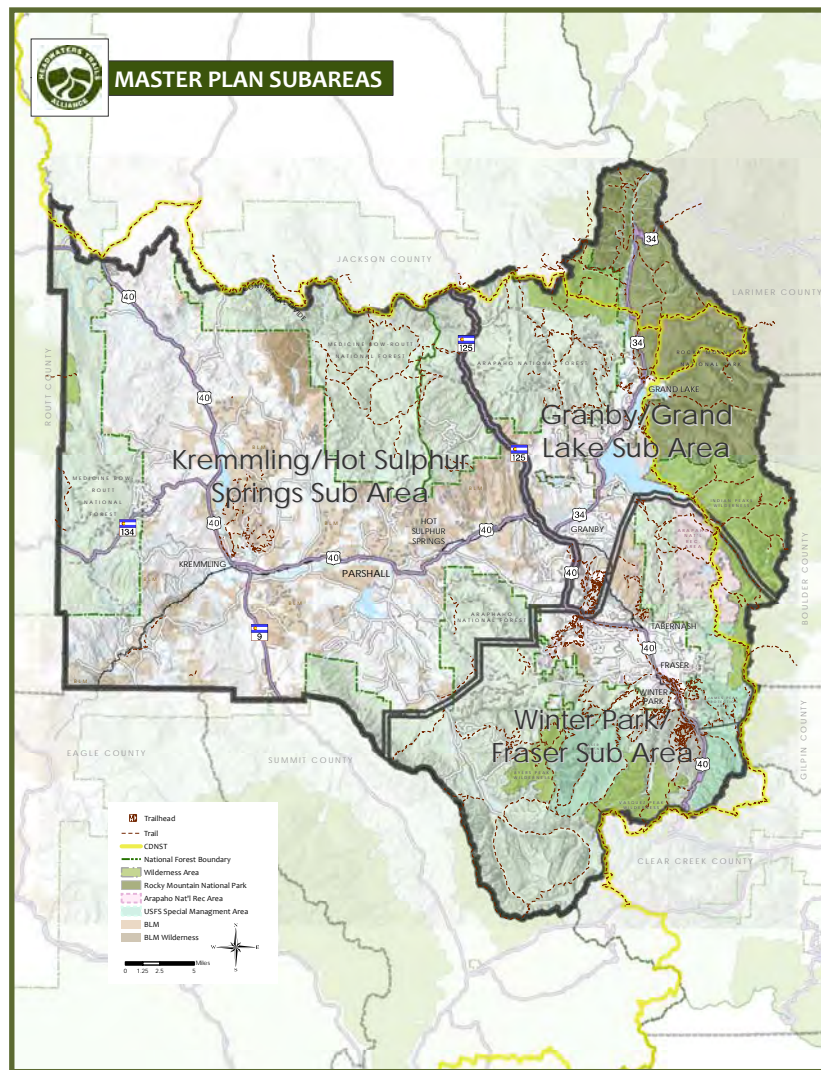
Managerial Leadership [Land Management Agency Partnerships]-

- Manage volunteer development and coordination, Challenge Cost Share and similar programs to assist agencies meeting their ongoing trail maintenance needs.
- Link and protect significant resources along trails through the support of volunteers and public and private partnerships.
- Review, recommend and assist in the implementation of grants and grant proposals.

EXISTING PLANS & DATA

STRATEGIC TRAILS PLAN AND SUB-AREAS

With such a vast geographic area, numerous agencies, unique municipal entities, and regional land uses, HTA feels that the most appropriate level of trail planning, local effectiveness and self-determination, and utility of a Strategic Trails Plan will be achieved by dividing Grand County into its three distinctive regions: the Winter Park-Fraser, Granby-Grand Lake, and Kremmling-Hot Sulphur Springs Sub-Areas. HTA, with the focused assistance of local stakeholders, municipal, state, and federal agencies, and private entities, developed stand-alone Strategic Trails Plans for each sub-area to assure the highest level of local benefit and better develop mutually beneficial partnerships. These sub-area plans are the official and supporting portions of the overall Strategic Trails Plan.



EXISTING PLANS & DATA

GRAND COUNTY MASTER PLAN

The updated Grand County Master Plan incorporated extensive public outreach regarding residents' values and assessment of the quality provided regarding differing "services", from government/tax payer-provided to government/tax payer-enhanced, and naturally-provided entities. The plan further categorizes these service values by sub-area within the county (north, west, and east) to develop a planning framework that provides maximum benefit to each sub-area. The support for the planning framework most universally centered on:

- **An Identity/Gateway Framework-** a signage and identity system that ensures continuity between county/cities/recreation and orients visitors (heaviest emphasis, 86%, from North).
- **A Legacy Framework-** a promotional and educational program designed to market Grand County's heritage to visitors and locals (heaviest emphasis from North and West, 79% and 77%, respectively).
- **A Scenic Connector Concept-** a designation system of scenic highways and corridors (heaviest emphasis from West, 81%).
- **A Natural Resource Framework-** a system for directing growth away from lands containing the most sensitive natural resources (heaviest emphasis from North and West, 86% and 88%, respectively).
- **A Trail and Recreation Framework-** a system of on- and off-road trails and recreation facilities and areas (heaviest emphasis from East and North, 81% and 85%, respectively).



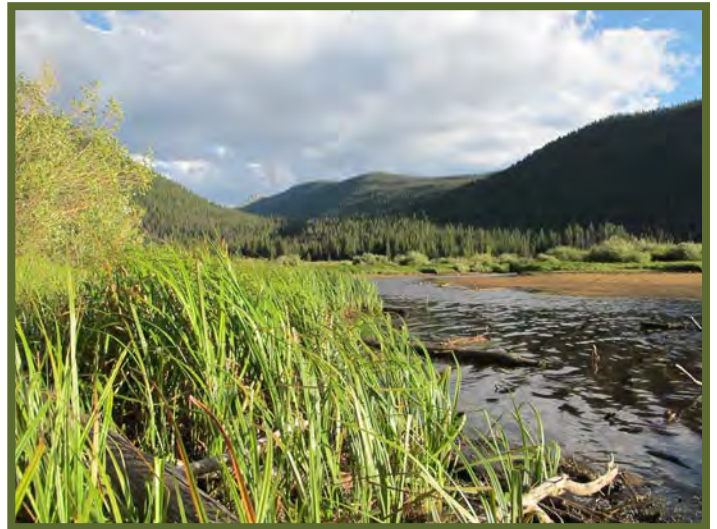
Grand County used these frameworks to develop potential implementation tools for realizing goals and gauging public support of each tool. Related to trails:

- 64% would support paying to protect additional open space.
- 67% support Grand County developing more parks and trail facilities countywide.

EXISTING PLANS & DATA

Translating this information to proposed policies, Grand County recommends to:

- Encourage the development of pedestrian-friendly crossings, sidewalks, and trail systems throughout the county (*Transportation, Policies Section 5.1.1*).
- Expand the economic and tax base of the county through economic development opportunities by supporting the growth of existing and new business and appropriate industry, and accommodate the development of business and industries that create sustainable, meaningful jobs for local residents. (*Economic Base, Policies 6.1.1*).
- Encourage and support high quality year-round recreation and tourist activities, facilities, and services and make efforts to retain Grand County's unique rural, western, and scenic character that is so appealing to tourists (*Recreation and Tourism-Based Industry, Policies 6.2.1*).
- Advance year-round, multi-faceted tourism opportunities to broaden the tourism economy and benefit county residents (*Recreation and Tourism-Based Industry, Policies 6.2.1*).
- Preserve public access to public lands (*Recreation and Tourism-Based Industry, Policies 6.2.1*).
- Delineate areas throughout the county dedicated to summer and winter recreation and tourism uses and activities, and the commercial facilities supporting such uses (*Recreation and Tourism-Based Industry, Policies 6.2.1*).
- Encourage local economic and tourism groups to market Grand County and develop a Grand County Legacy Program, a promotional and educational program based on the county's natural, cultural, and historic heritage and geared toward recruiting tourism and preserving the County's western, rural and scenic character (*Recreation and Tourism-Based Industry, Policies 6.2.1*).



EXISTING PLANS & DATA

GRAND COUNTY DEMOGRAPHICS

According to the Grand County Master Plan and the Grand Profile, Grand County's permanent population grew most quickly during the 1970's, at an average rate of more than 8% per year, more than 3 times the Colorado growth rate at that time. Population growth slowed in the 1980's before another rapid influx from the 1990's through 2010, when the county population reached 14,843 according to the 2016 state demographic estimate. The most recent projections estimate slow growth continuing through 2025, resulting in a population of approximately 20,000. The unincorporated area of Grand County holds almost 50% of the population. 2015 Populations of towns within the county, from highest to lowest, include: Granby (1,864), Kremmling (1,444), Fraser (1,224), Winter Park (999), Hot Sulphur Springs (663), Grand Lake (471), and unincorporated Tabernash (417).

The county's population is currently shifting toward an older demographic, similar to many parts of the nation, that will double in size and encompass 20.3% of the population by 2030. By 2020, the median age of the population is expected to be 42.0 years old, with 54.6% (almost 11,000 residents) of the population within the typically employed demographics of 25-64 years of age. In 2012, the median household income in Grand County was \$64,416 with 64% of households being families and 36% non-families.

Of equal significance is second home development. With an estimated 16,724 housing units in the county, the Department of Local Affairs estimates that 61% are not permanently occupied, a trend consistent with other regional mountain communities. Vacancy rates vary widely, though, with less than 8% in Kremmling and 18% in Granby to almost 75% and 80% in Grand Lake and Winter Park, respectively. 80% of second home units are occupied more than two weeks but less than three months per year.

While second home owners (and renters of those units) are not present for a majority of the year, their spending made up 78.7% (almost \$475,000,000) of the estimated basic sales in the county. This spending, and indeed the construction and visitor services markets, provided consistent employment opportunities with more than 70% of the county's estimated 10,000 jobs being in these sectors. Front Range transplants or second home buyers represent 59% of the 2013 home purchases with approximately 61% recovery in the real estate market after the recent recession.

According to the Grand Profile, total taxable sales throughout Grand County is quite low relative to other nearby areas; barely half of Routt County and 20-30% of Pitkin, Eagle, Summit Counties. Towns experience small seasonal variations in taxable sales in general, with the tourism-heavy economies of Winter Park and Grand Lake showing significant seasonal variation in taxable sales. Winter Park averages more than

EXISTING PLANS & DATA

\$32,000,000 in taxable sales in the first quarter of the year, almost equivalent to the remainder of Grand County during that time period. Those taxable sales drop to an average of \$8,000,000 during the second quarter, with the remainder of the county holding steady at approximately \$35,000,000. Grand Lake's taxable sales nearly triple during the third quarter to an average of more than \$10,000,000. Countywide, the seasonal split in taxable sales is slightly higher in the winter months.

Wages throughout Grand County are highly dependent on the leisure and hospitality sector, which is approximately double the size of any other sector, providing employment for a large number of the county's approximately 8,500 employed. Only 20% of county residents characterize themselves as fully employed. 55% consider themselves partially or fully retired with 21% being characterized as students.



Grand County residents score their satisfaction with parks, trails, and open space and recreational facilities higher than any other public facility or service. The safety of Grand County is the highest rated factor in decisions to locate or remain in the area, followed closely by recreation access, close proximity to trails and open space, and the character/quality of restaurants and neighborhood amenities. The lowest ranking factors were the county transportation system and lack of general retail options.

According to the Grand Profile (2015), visitors to Grand County in the summer months list their main reasons for visiting as 1) enjoyment of the scenic beauty, 71%, 2) rest and relaxation, 49%, 3) mountain getaway, 48%, 4) general sightseeing/touring, 47%, 5) national park visitation, 46%, 6) non-competitive recreational activity, 39%, 7) previous experience/annual vacation, 35%, and 8) climate/weather, 34%. Of these visitors, approximately 30% are single/couples without children and 35% each are families with children at home and families with children no longer at home.

EXISTING PLANS & DATA

EXISTING CONDITIONS: TRAILS AND FACILITIES

USFS Trails

The Sulphur Ranger District (SRD) manages a total of 459 miles of National Forest System Trails (referred to from here forward as System Trails). These trails exist in a variety of management regimes summarized in the Table below.

Table 1. USFS System Trails By Management Regime

Management Regime	Trail Miles	% of Total Trail Mileage
General, Non-Motorized Trails	231 Miles	50%
Motorized Trails	77 Miles	17%
Wilderness Trails	151 Miles	33%
Total Trails	459 Miles	

General, non-motorized trails are located outside the four designated Wilderness Areas (Vasquez Peak Wilderness, Byers Peak Wilderness, Indian Peaks Wilderness, and Never Summer Wilderness) in the Sulphur Ranger District’s management area. Most of these trails are managed for shared-use, including equestrian, mountain bike uses, and pedestrian use. A notable exception in terms of shared-use are the non-motorized trails in the Trestle Bike Park trail system on Winter Park Resort, which are managed under a Special Use Permit predominantly for downhill-direction mountain bike use only in the summer months. The resort has one designated hiking-only trail, as well.

Motorized trails are specifically designated on Sulphur Ranger District’s Motor Vehicle Use Map (MVUM). Trails are restricted to vehicles less than 50-inches wide and some allow only motorcycle use. Wilderness trails are managed for hiking, and in most cases, equestrian uses.

During the winter season, skiing and snowshoeing are allowed on all system trails. Snowmobile use is allowed on many trails, with details found on the SRD’s Snowmobile Use Map. Additional snowmobile trails are maintained by outfitters and guides under Special Use Permit.

EXISTING PLANS & DATA

USFS Trailheads

The Sulphur Ranger District maintains more than 40 trailheads. Generally the trailheads include a parking area and map/information/regulation kiosk. Sanitary facilities are located at a few locations.

Six trailheads provide access to the 77 miles of USFS motorized trails. The Idleglen Staging Area is, by far, the largest and provides parking for approximately 75 vehicles (or potentially 30+ vehicles with trailers) and has sanitary facilities. The vast majority of forest roads that are also managed for OHV recreation allow for dispersed camping within 300-feet of the road centerline. At this time, those dispersed camping areas likely provide for more vehicle parking than do the formal trailhead facilities.

Ten trailheads provide access to the four Wilderness Areas and the associated 151 miles of Wilderness system trails. Some of these trailheads, such as Monarch Lake, are relatively large (40 vehicle capacity) and have moderate facility development, with sanitary facilities and a check-in station. Others, like the nearby Roaring Fork trailhead, have limited parking and no facilities.

Twenty three trailheads provide Grand County access to the non-motorized trails or areas where non-motorized and motorized trails are co-located or in close proximity. Three additional trailheads provide access to non-motorized trails primarily from Summit and Jackson Counties. While these trails and trailheads are located within Grand County and are connected to Grand County roads, the access is quite far from most residents and visitors. These twenty six trailheads provide access to the Sulphur Ranger District's 231 miles of non-motorized system trails. The vast majority of these trailheads are relatively informal, with informational kiosks and small parking areas that handle five to ten vehicles. Very few are in close proximity to the county's municipalities, with only the Twin Bridges (Winter Park), Lower Creekside and Elk Meadows (Fraser), Jim Creek (Winter Park Resort), and East Shore (Grand Lake) Trailheads a short hiking distance from a trail or sidewalk.



EXISTING PLANS & DATA

USFS Campgrounds

In total, the Sulphur Ranger District maintains 430 designated campsites for individual campers. Three group camp areas, Cutthroat Bay (2, 50-person maximum), Midland (1, 36-person maximum), and Willow Creek (1, 20-person maximum) have a maximum total occupancy of 156.

315 of the 430 sites (73%) are based on water-related recreation (fishing, wildlife viewing, motorized and non-motorized boating) and are located within the Arapaho National Recreation Area. South Fork Campground, with 21 sites (5% of total sites), caters to equestrian use. 50 sites (12% of total sites) within the Sulphur Ranger District (Sugarloaf-11 sites, St. Louis Creek-17 sites, and Denver Creek- 22 sites) cater most directly to trail-based recreation. Campground facilities near streams, where fishing may take place, account for the remainder of the camping opportunities in Grand County, with Horseshoe (7 sites), Idlewild (26 sites), and Robbers Roost (11 sites) comprising 44 total sites or 10% of the camping total.



Dispersed camping is allowed on many of the forest roads within the county. Specific roads are identified on the Motor Vehicle Use Map. In some areas, especially near Fraser, Winter Park and the Stillwater OHV area, dispersed camping has become a difficult issue to manage, as seen from dozens of attempts at camp site restoration or closure, significant erosion near water/wetland resources, and increased litter.

EXISTING PLANS & DATA

Bureau of Land Management Trails

The Kremmling Field Office (KFO) of the Bureau of Land Management (BLM) manages motorized and non-motorized trails in Grand County. In the Wolford Mountain area, just north of Kremmling, more than 75 miles of routes were designated in 2005, the vast majority located on the east side of Wolford Reservoir. A number of popular, informally developed trails exist on BLM lands north of Tabernash and east of the Fraser River. These trails are slated for redevelopment, as prescribed in the approved BLM Resource Management Plan-Strawberry Special Recreation Management Area (Strawberry SRMA).

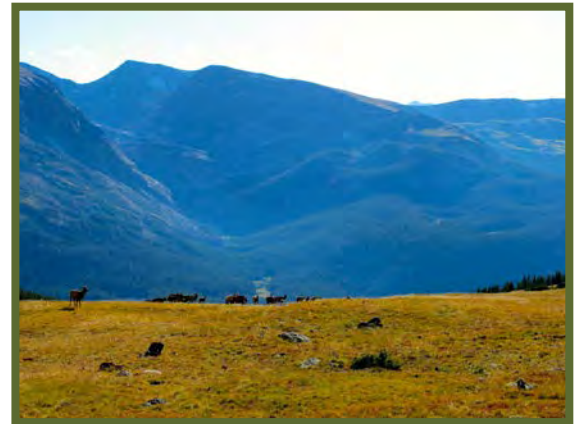
BLM Trail Facilities

The Kremmling Field Office maintains four map/information/regulatory kiosks at major access points on the Wolford Mountain trail system, at the most logical north and south entrances to the area. A handful of small, informal parking areas exist around the trail system.

The BLM also has management authority over recreation in the Colorado River in the area, including a number of put-ins and riverside camping sites with limited facilities as well as some trails.

National Park Service Trails

The southwestern corner of Rocky Mountain National Park is located within Grand County. National Park Service trails are managed for hiking use, with most trails also allowing equestrian use. Trails in this portion of the Park include Coyote Valley, East Shore, East Inlet, Grand Ditch, Green Mountain, Hitchen's Gulch, Colorado River, North Inlet, Onahu Creek, Red Mountain, Shadow Mountain Lookout, Skeleton Gulch, Thunder Pass, Timber Lake, and Tonahutu Trails. In total, Rocky Mountain National Park provides approximately 100 miles of hiking and equestrian trail opportunities within Grand County.



NPS Trail Facilities

The Grand Lake entrance station is located a few miles north of Grand Lake on US 34 along with the Kawuneeche Visitor Center. Approximately six miles north of the entrance gate, Timber Lake Campground (98 sites, no direct trail access) provides the only formal camping on the west side of the Park. A number of other facilities along US 34 include the Holzwarth Historic Site, Beaver Ponds and Harbison Meadows picnic areas. The trailheads on National Park Service-managed lands tend to be larger than those found on USFS-managed land. They typically have a higher level of formality, with defined and surfaced parking areas, permanent sanitary facilities, and colorful interpretive displays at kiosks. The large East Inlet Trailhead on the east side of Grand Lake also has a boat launch.

EXISTING PLANS & DATA

Multi-Jurisdictional Trails

The Continental Divide National Scenic Trail (CDT) is part of the National Scenic and Historic Trail system. The Continental Divide Trail Coalition (CDTC) assists land management agencies in the development, maintenance, and management of the trail. The CDT runs through Grand County from north at Willow Creek Pass at CO 125, continuing through the Never Summer Wilderness. The CDT passes directly through downtown historic Grand Lake, continues on the East Shore and Knight Ridge Trails, into Indian Peaks Wilderness, along the High Lonesome Trail, and up Devils Thumb Pass to the Continental Divide. This section of the trail continues along the Divide to Berthoud Pass at US 40, on to Jones Pass.

The paved, six-mile Fraser River Trail begins just north of Winter Park Resort in Old Town Winter Park, continues through the National Forest, and parallels US 40 through Winter Park and into Fraser. An aggregate surfaced section of the trail adjacent to the Fraser River forms a loop by utilizing a wide, paved trail on the west side of US 40 between the two towns.

The seventeen-mile Fraser to Granby Trail begins at the Fraser Valley Sports Complex on County Road 5. It runs north, roughly paralleling US 40, past Tabernash to the box culvert at the entrance of Snow Mountain Ranch/YMCA of the Rockies. A recent easement granted by Granby Ranch has facilitated the connection through the private property. Recent construction has connected the trail, parallel to US 40, to Kaibab Park in Granby.

The 80-mile Colorado Headwaters Scenic Byway runs south on US 34 from Grand Lake, turning west on US 40 paralleling the Colorado River through Hot Sulphur Springs to Kremmling and continuing on a gravel route to the south end of Gore Canyon and to State Bridge.

Other Trails

A number of short trails exist under the management of different entities or within the municipalities and municipal recreation districts. 17 miles of trails are managed by the municipalities of Winter Park and Fraser. The Windy Gap Interpretive site maintains an interpretive, wildlife viewing trail around the north end of the wetland. Pioneer Park in Hot Sulphur Springs has a short hiking trail running along the Colorado River. Kaibab Park in Granby has a short trail running adjacent to the River. Grand Lake Recreation District manages 15 miles of hiking and biking trails and 35 km of nordic skiing trails

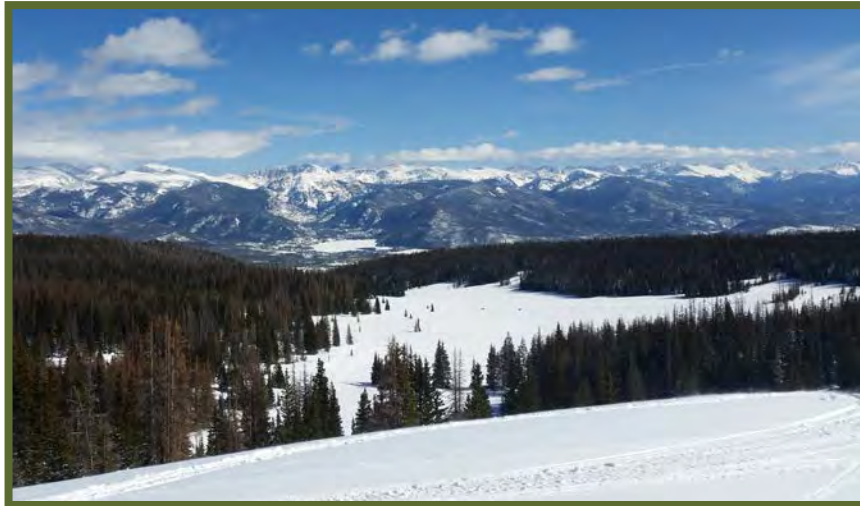
A large amount of trails also exist on private lands around Grand County. Most notable in terms of mileage and volume of use are the nordic ski trails at Devil's Thumb Ranch Resort and Spa and YMCA of the Rockies' Snow Mountain Ranch. These trail systems are also used to a lesser extent during summer months. Trail development is in various states of development on private residential subdivision lands around the county as well, primarily in the Fraser/Winter Park area, at Granby Ranch, and on the new Granby Trails parcel.

OPPORTUNITIES/CONSTRAINTS

OPPORTUNITIES

A Recreation-Based Tourism Economy

Grand County is dominated by federal land ownership. Without an abundance of mineral resources on these lands, the potential for economic benefit to the county is limited to more sustainable forms of natural resource use. For a limited period of time, following the recent beetle kill of the predominantly lodgepole pine forest, salvage, chipping, and related operations have provided some economic and forest health benefits. Following this period, timber extraction will not be a reasonable proposition for a lengthy period of time, far longer than the expected lifespan of this particular plan. However, the forest cover that has been so devastated by the beetle infestation is already showing signs of recovery, especially where mitigation actions have been initiated.



Grand County's economy is dominated by the tourism industry, and this tourism is primarily recreation-focused. The recreation opportunities, primarily on federal lands, are a major contributing factor to second home development, sales tax generation, commercial occupancy, and local jobs. Grand County's population is quite small relative to the county size and that is not expected to appreciably change. It is not likely that medium or large industry, commercial development, or public sector job development will be realized in Grand County due to its relative isolation from the Front Range, a lack of developable land for these purposes, and the relatively small and widely dispersed potential work force. The tourism and visitor services industries, however, can still grow in size and job sustainability that is in proportion to the county population, land base, and visitation. That growth promotes additional jobs in the professional and service industries through the creation of a sustainable economic base.

OPPORTUNITIES/CONSTRAINTS

For the reasonably projectable future, Grand County will continue to be dependent on public land-based and other outdoor recreation-focused tourism for its economic well-being. When directed, this has proven to be a community enhancing proposition; One that thrives, even depends on the preservation of local landscapes, natural resource functions and values, social traditions, community cohesion, and overall character. This is especially possible in large geographic areas with small populations and a diverse landscape of publicly managed land.

The landscape has very high potential recreation value. Trail users, hunters/anglers, wildlife watchers, and scenic byway users do not typically differentiate between thick stands of early successional forest and thick stands of secondary successional forest, nor do they make recreation site choices on those characteristics. They make recreational choices based on a desired experience, and in this case, that universal experience is being outside in a naturally functioning environment. Furthermore, those potential visitors make decisions based on the quality, diversity, and accessibility of recreation opportunities and facilities present at any particular destination.

Trails For All

There are literally trails for all passions, abilities, and seasons throughout the entire county. There are incredible opportunities to view wildlife, hike above tree line, or ride horses at a ranch in a uniquely Colorado setting. World class fishing, skiing, and mountain biking are found throughout Grand County. There are more than 100 miles of off-highway vehicle routes in the western portion of the county and some of the most iconic mountain bike settings are found in the southeastern portion of the county. Families can tour the Fraser Valley on a paved trail and walk through historic Grand Lake on the Continental Divide National Scenic Trail. A heritage of nordic skiing pervades Grand County and scenic driving opportunities are constant along the Colorado River and surrounded by the high mountains.



OPPORTUNITIES/CONSTRAINTS

CONSTRAINTS

HTA/Agency Funding and Capacity

With the demonstrated breadth and depth of needs to truly realize being a trail- and recreation-focused community, HTA needs to create feasible annual action plans to drive staff/board investments, internal benchmarking, progress reporting, and ultimately organizational capacity. The broad mission of providing physical, social, and managerial leadership further increases the need to be very specific regarding annual planning, goals, and capacity allotment to maintain organizational focus and goal realization.

This Strategic Trails Plan is aimed at guiding an organization toward a much greater community presence, capacity, and role than is currently being realized. This growth will not be realized under the current status of funding, staffing, and support. The organization will have to quadruple in size, both in staff and budget, over the next seven to ten years in order to develop the capacity needed to advocate, develop, and manage the area's trail systems. As such, annual organizational planning will have to focus, for the next five years, on projects that position HTA to achieve and sustainably handle the growth necessary to realize the plan's goals.



Additionally, annual planning will have to be fluid and strategic, taking advantage of available opportunities and making hard decisions on previously envisioned items that will not be possible with existing staff/board capacity. More important than any individual trail project taken on by HTA, organizational capacity growth must be the common driver for every decision made and the overwhelming focus of board member time and efforts. If this growth is facilitated by the board and supported by the communities, only then will the hard annual decisions of what the organization cannot accomplish be mitigated.

OPPORTUNITIES/CONSTRAINTS

Agency Planning/Management Regimes

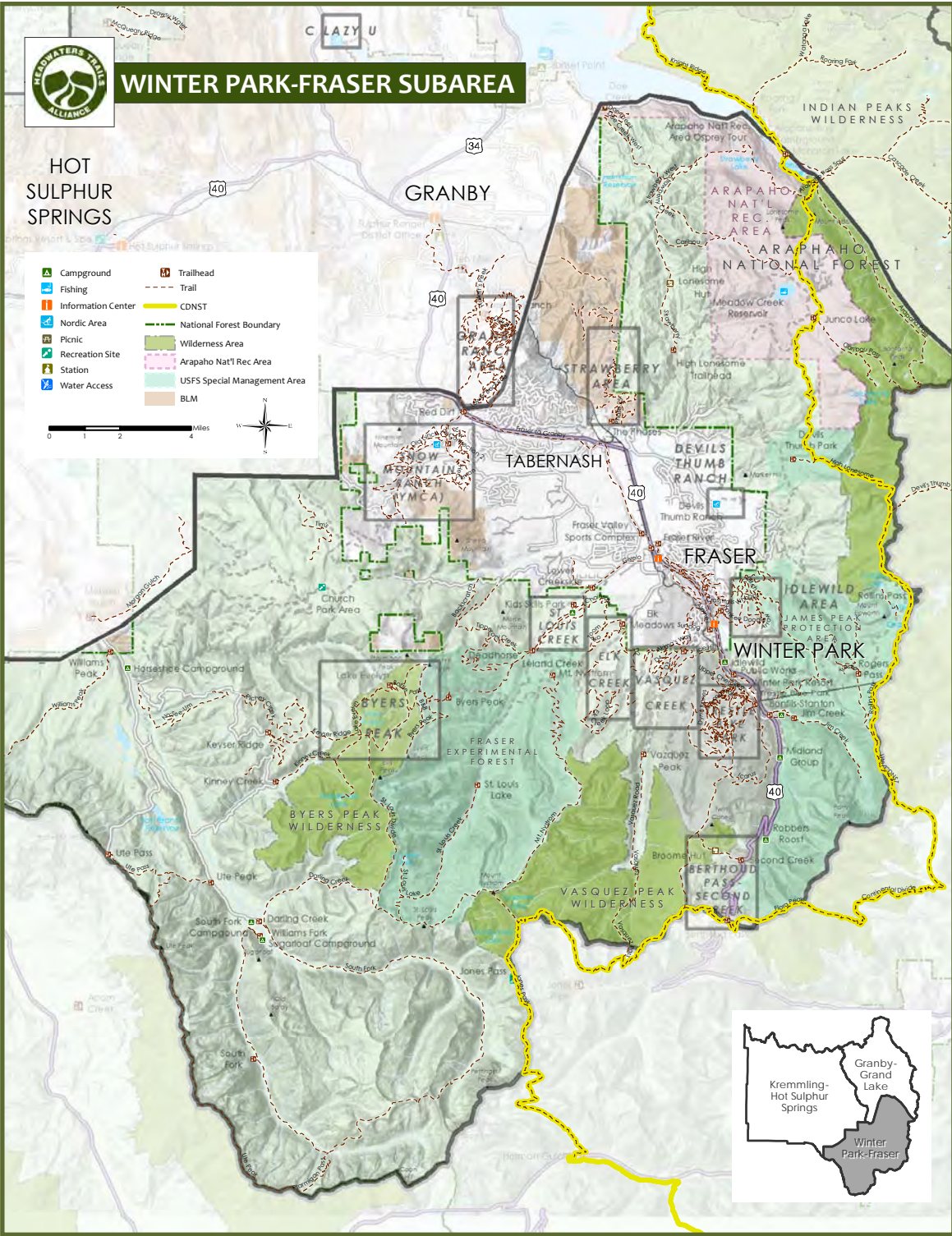
With the vast majority of acreage in Grand County being held by federal entities, the planning and management regimes of those agencies weighs quite heavily on HTA's ability to improve trails. The Arapaho-Roosevelt National Forest's Sulphur Ranger District's Land and Resource Management Plan (LRMP) focuses on the maintenance, restoration and connectivity of large acreages of land without roads or trails for the purposes of improving effective wildlife habitat (Note: portions of the Routt/Medicine Bow National Forest are also located within Grand County). The Kremmling Field Office of BLM has approved a new Resource Management Plan (RMP) that has more defined guidance on authorized travel ways and multiple use management of its lands. Rocky Mountain National Park has an internal Trail Plan and recently completed an Environmental Assessment with a Finding Of No Significant Impact for improvements to the East Shore Trail and inclusion of mountain biking as an allowed use in the trail's management. Colorado Parks and Wildlife initiated a public outreach process to help in formulating its next department-wide plan, which overlays management objectives on top of other land ownership in the case of wildlife and habitat management.

In addition to the agencies' overarching management mandates, new trail projects must work through the National Environmental Policy Act (NEPA) process for approval of having minimal resource impacts before construction implementation. If HTA can efficiently navigate these processes to move trail improvements from conceptualization through implementation, the county's residents and visitors will be able to see the benefits of the organization in affecting positive change on ideas that are already broadly supported.

Ongoing Forest Management

Following the beetle kill of much of the lodgepole pine forest, mitigation of dead timber was completed in some limited areas, mostly within municipal wildfire interface areas. The vast majority of beetle killed forest in Grand County has not undergone this mitigation work, leading to sometimes hazardous conditions in and around trails, an incredible increase in annual trail clearing and bucking, as well as hazardous tree removal during new trail construction, and an increased fire potential. Agency staff/funding does not currently cover the needs for mitigation of these hazards on or near recreational trail corridors, leaving volunteers and HTA to shoulder this much larger than average burden for trail clearing. This scenario significantly reduces the number of miles effectively cleared each year. It also dramatically increases the costs of new trail construction, as nearly every tree within 75 feet of a new trail must be removed as a hazard. As a trail supporting organization with a limited budget and relatively small potential population of volunteers, this forest management challenge has the potential to severely impact the quality of recreational experiences and HTA's ability to keep trails open to use.

WINTER PARK-FRASER



WINTER PARK-FRASER

OVERVIEW

Geographic Area

This sub-area, containing 535 miles of trails, encompasses the southernmost areas of Grand County, including the municipal boundaries of Winter Park, Fraser, and unincorporated Tabernash, and is roughly bound by the adjacent lands up to Berthoud Pass in the south, to Ute Pass in the west, the Continental Divide to the east, and Red Dirt Hill to the north. The primary land owner in the area is the United States Forest Service (USFS), managed by the Sulphur Ranger District (SRD). Bureau of Land Management's (BLM) Kremmling Field Office (KFO) has small land ownership in the northern portion of the subarea, commonly referred to as Strawberry and in the western portion of the subarea around Sheep Mountain. Numerous large, privately owned and managed parcels exist in this sub-area, including the recreation-focused YMCA Snow Mountain Ranch and Devils Thumb Ranch Resort and Spa, as well as residential developments that manage trails for public use, such as Rendezvous.

Federal Land Management

USFS lands in this area have a number of different management mandates that relate to recreation and trails. General guidance from the 1997 Land and Resource Management Plan focuses on management for wildlife habitat effectiveness that encourages large swaths of land without roads or trails and habitat corridor connectivity between these tracts. Development of new trails are analyzed using a forest habitat effectiveness GIS model that takes into account distance to travelways, terrain (% slope), vegetation type, and structural stage. As such, new trails are depicted to "split" habitat and render the area with a decreased percentage level of habitat effectiveness unless roads, administrative routes, or other trails are likewise decommissioned in the same geographic area.

USFS-managed Indian Peaks, Vasquez, and Byers Peak Wilderness areas are managed to retain wilderness character, which prohibits mechanized travel, limits new formal trail development and the types of maintenance that can be undertaken. The James Peak Protection Area (and James Peak Special Interest Area within the Protection Area) allow mechanized (commonly understood as bicycle use) travel and maintenance, but only to a defined maximum mileage of trails that was established by Congressional action and cannot practically be revisited. The Fraser Experimental Forest is managed for watershed and other scientific inquiry and allows hiking and nordic skiing but not mechanized or motorized recreation on its trails. The Sulphur Ranger District also manages a number of large permits in the area, including Winter Park Resort/Trestle Bike Park and Grand Adventures snowmobile tours. These permits function as overlays on the general forest plan and provide permission to undertake specialized, revenue-focused activities that are not generally permitted in the forest.

WINTER PARK-FRASER

BLM lands in the area are managed for multiple uses, including recreation and wildlife habitat protection. The Strawberry area is managed as a Special Recreation Management Area. A site-specific plan for trails and facilities is slated to be developed.

Local Land Management

The municipalities manage a number of parks and trails, including the Fraser River Trail, and in the collaboration with HTA, the Fraser-Granby Trail. The Fraser Valley Metropolitan Recreation District manages a large park north of the Town of Fraser and an indoor recreation center between the Towns of Fraser and Winter Park. Residential developments such as Rendezvous and Grand Park also host a number of publicly accessible trails.

EXISTING TRAIL CONDITIONS

The majority of trails at elevations below the Wilderness boundaries are comprised of relict industrial routes (i.e. old timber roads, skid tracks, railroad/mine tracks, etc.) that were adopted as a recreational trail system, most likely due to the presence of an open corridor that made travel convenient. These routes were not originally intended for recreational use and were generally devised to get from one place to another in the most expedient manner allowed by the topography. These routes often do not meet the USFS Trail Design Parameters and are often either 1) steeper than the maximum sustainable trail gradient and suffer soil erosion and deposition issues or 2) are wider than suggested corridors (greater than 6' and often up to 20' wide), which makes typical trail maintenance difficult and time consuming. When and if maintenance is completed, the product more closely resembles a wide, resource management road than a trail.

Many portions of trails travel through very flat, wet terrain.

Significant amounts of past maintenance have turnpiked, puncheoned, or bridged these areas in an attempt to provide a drier trail experience and reduce off-trail travel. Generally this maintenance work was somewhat successful, but is reaching the point where significant repair is necessary. Most low-lying wet areas offer opportunities for trail relocation to a higher, drier sidehill location that, with a rolling contour design and proper construction, will require far less maintenance over time and cause less cumulative resource damage, assuming old routes are closed and revegetated.



WINTER PARK-FRASER

In many cases, existing trails have been overlaid with Special Use Permit trails. In the case of Trestle Bike Park, the permit allows for only downhill mountain bike use and, as a consequence has restricted the opportunities for more general mountain bike use. In the case of Grand Adventures' snowmobile permit, co-location of wide corridors for winter grooming has reduced the opportunity for managing non-motorized, summer recreation within typical USFS Trail Design Parameters. Conversely, this permit vastly increases the opportunity for managing multiple use winter recreation.

STAKEHOLDER OUTREACH SUMMARY

The process of revising this Master Plan depended on a variety of collaborators, including:

- The Headwaters Trails Alliance Board of Directors and Staff
- The Arapaho-Roosevelt National Forest, Sulphur Ranger District
- The Bureau of Land Management, Kremmling Field Office
- Colorado Parks and Wildlife
- Fraser Valley Metropolitan Recreation District
- Municipal planners from around the County
- Local Businesses and Stakeholders

This process began in 2013 with directed outreach to area recreation groups regarding their desires for trail system improvements. This was conducted to help guide a Master Trails Plan (1995) revision. Results of this outreach were quite robust, quite often specific to small areas or particular trails, and led to Headwaters Trails Alliance to rethink its strategies in assisting these stakeholding parties, moving from a county-wide focus to a more specific regional sub-area focus.

With this new tact, HTA again reached out to regional stakeholding groups from February through April of 2015. Headwaters Trails Alliance initiated outreach activities to federal and municipal land managers, trail-related groups, and leaders from the area trails



WINTER PARK-FRASER

community to gauge their priorities and capacity to assist HTA in implementing trail improvement ideas throughout the Winter Park/Fraser area. On April 21 and July 21, HTA hosted open house presentations to request feedback from the greater public on the ideas and goals identified by the HTA Board. The public outreach process and meeting schedule was highlighted on an almost-weekly basis through the local newspaper in February and March.

General feedback that spanned multiple groups focused on the need for 1) more resource (funding and volunteer labor) capacity to implement quality work on trails, and 2) more collaboration between different groups and agencies. Most recreation interest groups and individual responders expressed a desire for more and better trails and improved access/connectivity to the municipal areas. Agencies felt there was limited capacity to manage the existing trail systems and that additional trails could negatively impact natural resources. Many groups did not have a complete understanding of agency trail management regimes and/or boundaries.



OPPORTUNITIES

Connectivity

In the last few years, trail projects in the Leland Creek and Rendezvous areas have improved connectivity between the Fraser Valley's municipalities and the Forest Service trails. The success of these projects can be a template for future trail and trailhead development closer to the town centers. Changing the location of the main trailhead access from primarily USFS-based to municipality-based locations has multiple potential benefits. Improved connectivity in this manner will reduce pressure on the relatively small USFS trailheads in the area, allow trail users to refrain from driving to trailheads, and bring visitors back in close proximity to services before and after their recreation experience. Town-based trailheads also provide for more efficient communication of key messages and volunteer/event opportunities, increased bike and pedestrian use in the towns, and an enhanced "look and feel" of a trail-based recreation area to visitors.

Improved connectivity is also possible between existing trails. Improving diversity in trail route choices or experiences provided, developing longer distance or multi-day opportunities, and linking trails to other sub-

WINTER PARK-FRASER

areas to the north and west would all be possible with strategic connecting routes. Development of new routes will be a compatibility challenge with the USFS and CPW wildlife concerns, but HTA and the communities have a vested interest in both improving the quality and diversity of the area’s trail systems and supporting wildlife habitat function. If all parties come to the table focused on a successful outcome, all parties desires can likely be fulfilled.

Collaboration

The communities of Winter Park and Fraser have begun to collaborate on multiple levels for the improvement of trails and recreation. From developing common signage standards to teaming on trail planning (i.e. “Trail Smart Sizing” project), this trend is one that should continue as it provides improved clarity and efficiency. HTA has a unique position within the community groups interested in trails in that the organization does not have a special interest other than improved trails and recreation. This may allow the organization to take a leadership role in bringing together multiple disparate voices of various groups, help to facilitate improved collaboration between the recreation and land management communities, and better demonstrate the size of the “voice for trails”.



The potential for collaboration in the management of area trail systems, better supporting the multiple land managing agencies with specialized staff, skills, or project delivery is aligned directly with recent national guidance from the Government Accounting Office (GAO) regarding the nationwide backlog in trail maintenance (summary found in Appendix D). HTA is in the position to train and provide more volunteer support, assistance through cost-share agreements, fundraising, and project management for a variety of projects that bring together multiple

stakeholders. This role of HTA leadership in collaboration could have significant positive long-term consequences for the quality and diversity of trails and relationships between all the stakeholders.

WINTER PARK-FRASER

Creativity

With the challenges presented by working through agency management regimes and resource concerns, private properties, and a major highway and railroad running parallel through the Fraser Valley, HTA has the opportunity to be the creative, solutions-oriented entity that drives positive projects that improve community quality of life. HTA can 1) undertake trail inventory/assessments that focus on improving trail experiences while reducing natural resource impacts 2) assist municipalities to better focus on their recreation and natural assets, and 3) help to develop enhanced opportunities for winter season fat/nordic cycling and hand cycling with the assistance of established local entities that promote cycling, Winter Park/Fraser Chamber of Commerce and National Sports Center For The Disabled, respectively.



CONSTRAINTS

Competing Uses

There is currently a perception by many in the Winter Park/Fraser area that there is antagonism between different stakeholding parties. While groups work against each other in an attempt to divide and aggregate recreation opportunities that best serve their individual desires, the whole of recreation in the area suffers. It is very easy for decision makers to not make decisions when it seems that any decision will result in vocal rebuttals or worse. Additionally, the “us vs. them” attitude that has driven some of these interactions only serves to further erode the potential for future collaboration. While there will always be differing opinions, HTA’s effectiveness could be undermined by feuding stakeholders.

Bringing parties together to work toward efficiencies in efforts, common goals, a greater understanding of individual group desires, and joint opportunities within agency management regimes could help to dissipate the current levels of frustration.

WINTER PARK-FRASER

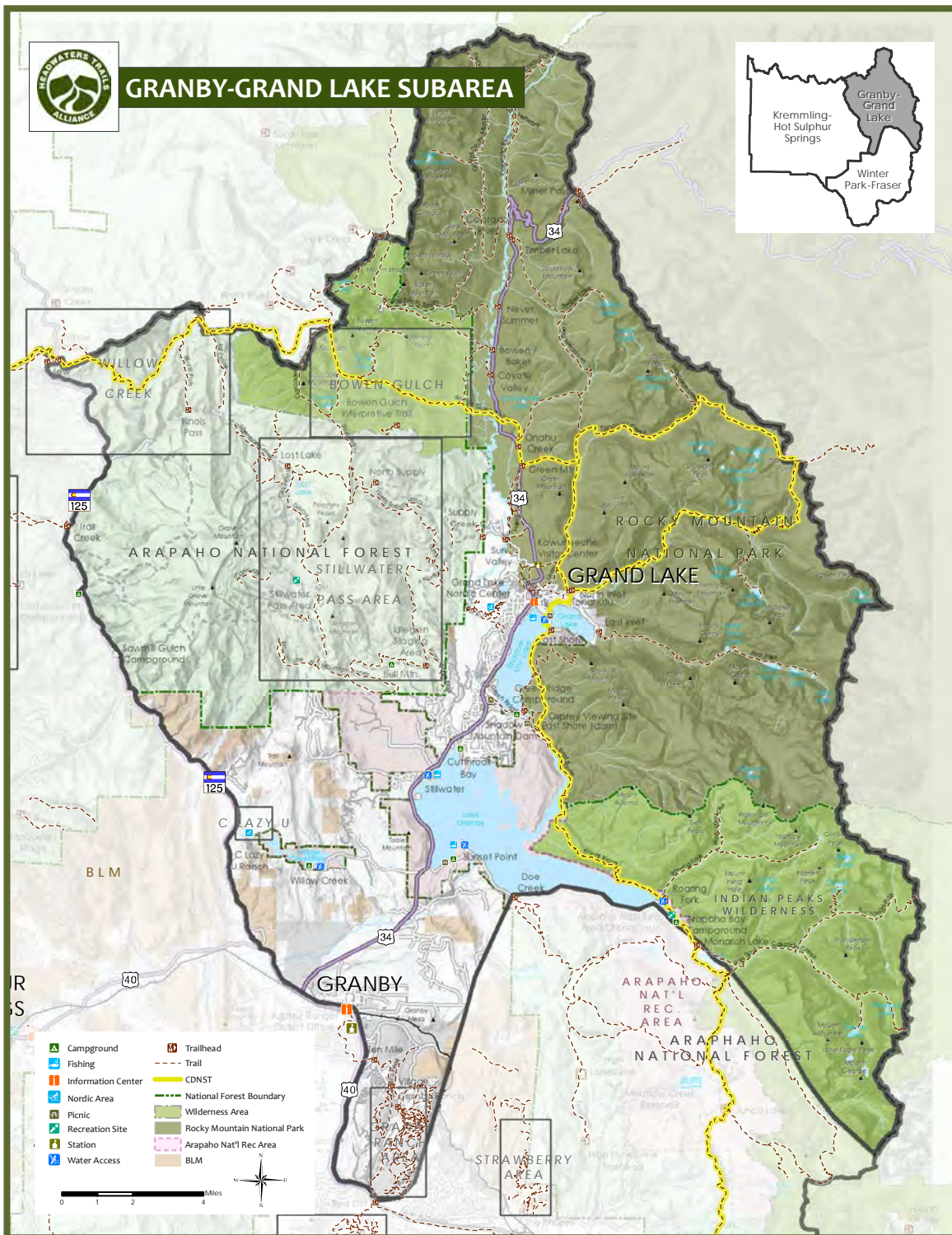
Multi-Party Collaboration

Connectivity improvements in the Winter Park-Fraser area are dependent upon on private and municipal lands. Without recreation or open space departments in the area, there is not a defined development or management entity for trails on municipal or private lands with allowed public trail use. This is a challenging situation as these multiple parties have management responsibility on facilities that cross multiple ownership boundaries. Changes in trail management policies, maintenance levels, and other factors could have serious consequences to trail connectivity, quality, and even access.

Currently, HTA's small size and capacity do not allow the organization to take the lead on trail planning and design, securing easement, constructing, or maintaining these recreational facilities. While it can organize volunteer events to assist in this process, there is simply more work than can be accomplished at this time and future dedication will be even more challenging. A dedicated funding source beyond the current municipal inputs would help HTA build the capacity to take on a larger, proactive role with these trails, potentially to a point where the organization could take the lead on the long-term management of trails on its own through cooperative agreements and/or contracts.



GRANBY-GRAND LAKE



GRANBY-GRAND LAKE

OVERVIEW

Geographic Area

This sub area, with approximately 324 miles of trail, encompasses the northeast area of Grand County, including the municipal boundaries of Granby and Grand Lake. It is bound in the north and east by the Continental Divide, by Highway 125 in the west, and US 40 in the south. The major federal landowners in the area are the United States Forest Service Arapaho National Forest (USFS), managed by the Sulphur Ranger District (SRD), and National Park Service’s Rocky Mountain National Park (RMNP). Numerous large, privately owned and managed lands exist in this subarea, including the recreation-focused YMCA Snow Mountain Ranch, C Lazy U and Winding River Ranches, as well as residential developments that manage trails for public use, such as Granby Ranch and Sun Community.

Existing Planning Documentation

This subarea plan has been informed by a number of previously developed plans, including the Granby to Grand Lake Trail Feasibility Study (2003), Grand Lake Trails: The Northwest Passage Study (2003), Granby Parks & Recreation Master Plan (2010), the Sun Communities/Granby Trail Plan (2017), and East Shore Trail Feasibility Study (2008).

Federal Land Management

USFS Sulphur Ranger District (SRD) lands in this area have a number of different management mandates that relate to recreation and trails. General guidance from the 1997 Land and Resource Management Plan focuses on management for wildlife habitat effectiveness that encourages large swaths of land without roads or trails and habitat corridor connectivity between these tracts. Development of new trails are analyzed using a forest habitat effectiveness GIS model that takes into account distance to travel ways, terrain (% slope), vegetation and structural stage. Per this model, new trails are depicted to “split” habitat and render the area with a decreased percentage level of habitat effectiveness, unless roads, administrative routes, or other trails in the same geographic area are likewise decommissioned.

The SRD also manages the Arapaho National Recreation Area (ARNA) and Stillwater Off-Highway Vehicle trail system. The Sulphur Ranger District (SRD) also manages a number recreation-related special use permits in the area, including Grand Lake Snowmobile Partners tours. These permits function as overlays on the general forest plan and provide permission to undertake specialized, revenue-focused activities that are not generally permitted in the forest.

National Park Service (NPS) managed Rocky Mountain National Park (RMNP) and USFS-managed Bowen Gulch and Indian Peaks Wilderness Areas are managed to retain wilderness character, which prohibits mechanized travel, limits new formal trail development and the types of maintenance that can be undertaken.

GRANBY-GRAND LAKE

Local Land Management

The municipalities manage a number of parks and trails. The northern portion the Fraser-Granby Trail, managed by HTA, and the developing Granby trails are managed by the Town Of Granby. The Grand Lake Touring Center Trails are managed by the Grand Lake Metropolitan Recreation District, and the Town of Grand Lake manages Point Park (USFS) and East Inlet (Bureau Of Reclamation) lands.

EXISTING TRAIL CONDITIONS

The Rocky Mountain National Park (RMNP) trails, accessed from Grand Lake, are generally steeper than would normally be considered sustainable. However, the RMNP professional trail crews provide considerable heavy maintenance to keep the trails in an acceptable condition.

The majority USFS-managed trails in this area, the Stillwater/Idle Glen OHV trails, are relict industrial routes (i.e. old timber roads, skid tracks, railroad/mine tracks, etc.) that were adopted as a recreational trail system, most likely due to the presence of an open corridor that made travel convenient. These road/trails provide ideal corridors for higher speed, four season use by off-highway vehicles and snowmobiles. Heavy maintenance of these trails is funded mostly through State of Colorado Off-Highway Vehicle Grant Program funds and implemented by USFS crews. Seasonal clearing and winter grooming are primarily handled by special use permittees. USFS lands also host a number of minimally constructed routes, most in Wilderness/Special Protection Areas and the ARNA. Maintenance is challenging on these routes due to their remote locations, unsustainable alignments and eroded conditions. The majority of the maintenance of these non-motorized trails are completed by volunteers through HTA's Adopt-A-Trail program. In the southern portion of SRD lands, significant illicit trail development issues have long been a challenge.



GRANBY-GRAND LAKE

More recently developed trails on municipal lands (Granby Trails and Grand Lake Trails) suffer to some extent from informal design and/or construction, but relatively low use levels have not created difficult maintenance challenges. Trails at Granby Ranch provide shared-use trails open to the public and downhill mountain bike trails with fee-based use. Some of these trails have been constructed with long-term sustainability tenets of sidehill location and rolling contour alignment, while others were informally developed and are developing maintenance challenges.

The Fraser-Granby Trail in this portion of the county provides a number of different trail surfaces and experiences, from wider aggregate-surfaced through the meadows west of the Val Moritz development, on roads throughout the development, to singletrack through Granby Ranch paved, and paved roadside greenway on the newly developed segment from Village Road to Kaibab Park in Granby.

In numerous locations, existing roads or trails are groomed for winter use for snowmobiling, nordic skiing, and/or fat biking, including the Fraser-Granby Trail, Granby Trails, Grand Lake Trails and Golf Course, and the Stillwater/Idleglen OHV Area.

In general, the trails throughout the sub area are lacking in sufficient navigation and maintenance, and the trail subsystems lack interconnectivity. This maintenance deficit is generally a function of a lack of capacity (i.e. knowledge, funding, and manpower), and will be a significant challenge to creating a more interconnected system that can be feasibly stewarded over time.

STAKEHOLDER OUTREACH SUMMARY

The process of developing this subarea plan depended on a variety of collaborators, including:

- The Headwaters Trails Alliance board of directors and staff
- Rocky Mountain National Park
- The Arapaho-Roosevelt National Forest, Sulphur Ranger District
- Colorado Parks and Wildlife
- Town of Grand Lake and Grand Lake Metropolitan Recreation District
- Town of Granby and Granby Metropolitan Recreation District
- Municipal planners from around Grand County
- Local Businesses and Stakeholders

Headwaters Trails Alliance reached out to regional stakeholder groups from October 2017 through March 2018. HTA initiated outreach activities to federal and municipal land managers, trail-related groups, and leaders from the area trails community to gauge their priorities and capacity to assist HTA in implementing trail improvement ideas throughout the Granby/Grand Lake area. On October 17, 2017 and April 19, 2018

GRANBY-GRAND LAKE

HTA hosted open house presentations to request feedback from the greater public on the community ideas and goals identified by the HTA board and staff.

Most recreation interest groups and individual responders expressed a desire for improved access/connectivity to the municipal areas and signage/wayfinding improvements to better direct visitors to the area opportunities. Agencies expressed that challenges exist in managing the area's trail systems, and the need for improved trail stewardship collaboration with the recreating communities.



OPPORTUNITIES

MUNICIPALITY-CONNECTED TRAIL SYSTEMS AND WAYFINDING SIGNAGE

High quality trail opportunities exist close to both Granby and Grand Lake. However, access to these trails requires vehicle travel, except in the case of Rocky Mountain National Park-accessed trails from downtown Grand Lake. Even in the latter case, access for locals is challenging as trailheads are often crowded, or even overflowing, with out-of-town visitors. Currently, safe and/or enjoyable routes through the town are not present. A similar access challenge exists with the development of the Granby Trails. These are not insurmountable challenges, and the short distances that require infrastructure improvements not only can provide more direct trail access, but also result in safer streets. This formalized connectivity helps encourage residents and visitors to base their recreational experiences from inside the towns, rather than leaving their homes or the municipal centers by car to access a recreational experience.



GRANBY-GRAND LAKE

Larger, nearby trail systems are potentially accessible by trails from Granby and Grand Lake, including ARNA, the Stillwater OHV Area, and Grand Lake trails. Access to these trail systems would ideally be trail-based, as expensive roadway and/or sidewalk improvements are less likely to occur. Land ownership barriers exist in making these connections, most notably with the Northwest Passage area out of Grand Lake, with the Grand Lake Trails and private and water district land between Granby and ARNA. However, concerted community collaboration could bridge these gaps with creativity and, if accomplished, would provide direct trail-based connectivity from Granby to Grand Lake to these municipal and USFS trail systems.

Planning for the longer term possibility of connecting Granby to Grand Lake (2003 Study and current East Shore Trail redevelopment), along with current routing and navigation needs within the town centers to near-town trails, the opportunity exists to collaborate on common wayfinding and signage elements. Examples of partnerships affecting this change include 1) Grand Lake's recent Gateway Community designation by the Continental Divide Trail Coalition that will better direct visitors to the CDT and 2) HTA's signage and trail connectivity in the southern portion of the county. These efforts build the marketing brand of Grand County as a natural and recreation destination and begin to provide a common navigation/wayfinding understanding for residents and visitors.

PRIVATE PARTNERSHIPS

Public-private partnerships are already very successful in the recreation landscape of Granby and Grand Lake. From special use permits that facilitate impressive levels of snowmobile, nordic ski/fat bike grooming, and horseback riding throughout the area to private developments that have allowed deeded trail access through their lands, a collaborative foundation has been laid that could multiply benefits over time. Much like Park City, Utah, where more than 200 miles of publicly-accessible trails are located on private lands (not controlled by ski areas), the large ownership parcels in the Granby-Grand Lake sub-area hold the opportunity for greatly enhanced trail connectivity that benefits residents and visitors alike. While these types of access and maintenance agreements require time and diligence to develop, co-leadership by HTA, the municipalities, and other interests hold the potential to utilize Grand County's new sales tax provision to make these opportunities into reality without the development and maintenance burden having to be carried by the private entity making the connection possible.



GRANBY-GRAND LAKE

CONTINENTAL DIVIDE NATIONAL SCENIC TRAIL, COLORADO RIVER & LAKES

The recreational assets of the Continental Divide, Colorado River headwaters, the Fraser River, and large lakes (Granby, Shadow Mountain, and Grand Lake) in the Granby-Grand Lake sub-area may offer one the most complete four-season recreational draws in all of Colorado. That these iconic geographic features all complement each other on the landscape only heightens their potential impact. Very few Colorado communities offer this mix of community-adjacent lake-river-alpine recreational opportunity. Further enhancing these destination-worthy geographic assets is the presence of the Continental Divide National Scenic Trail. Running through Grand Lake (one of only five towns that physically host this iconic route), the Continental Divide Trail Coalition designated the town as an official CDT Gateway Community in July, 2018.

CONSTRAINTS

PARKING/ACCESS/CONNECTIVITY



The challenge of enhancing visitation while improving the quality of the residential and business experience in Granby-Grand Lake is a stress to the existing municipal infrastructure. Especially in geographically small communities like Granby and Grand Lake, parking, recreation access, and connectivity can be rapidly overwhelmed without diligent planning. Confounding this challenge, the relatively small capital reserves and budgets in small communities often make investments in road, parking, and bike-pedestrian infrastructure seem like very high expenditures in the face of other pressing community needs. As is typically the case for communities of this type, a community decision-making process has to prioritize whether the town infrastructure will a) be driven by visitation pressures in a reactive manner or b) plan how to maximize the benefits of that visitation while maintaining and improving the quality of the life and business. The goals of welcoming more visitation and maintaining community values are not mutually exclusive. However, without diligent planning and community engagement, a tragedy of the commons is always possible, benefitting a few at the expense of the many.

GRANBY-GRAND LAKE

Three significant and difficult to resolve outdoor access and connectivity issues have long been present in the Granby-Grand Lake area, including the:

- Northwest Passage in Grand Lake, prohibiting Grand Lake access to the Arapaho National Forest, has been a significant winter connectivity constraint for snowmobile-based recreation;
- Railroad crossings (legal and/or safety), south of HWY 40 in Granby, on the northeast side of Granby Ranch, and south of the Arapaho National Recreation Area (ANRA), are a significant connectivity constraint; and
- Mountain bike connectivity from Grand Lake to the ANRA and southward to the Fraser Valley, including the Knight Ridge Trail/Wilderness Area expansion (Feasibility Study, 2008).

Overcoming these challenges will literally open up the Granby and Grand Lake communities. Given the length of time these challenging connectivity issues have persisted, it is clear the level of collaboration, creativity, and compromise on the part of all parties will have to increase to clear these hurdles.



GRANBY-GRAND LAKE

STEWARDSHIP CAPACITY

The presence of professional trail crews at Rocky Mountain National Park (RMNP), as well as winter grooming operations in the Stillwater OHV Area, Grand Lake Trails/Golf Course, and the Fraser-Granby Trail, have provided great benefits to the quality of the recreation in the Granby-Grand Lake area. However, these benefits have resulted in an unintended cost; the area does not have a high-capacity volunteer stewardship force. This lack of stewardship capacity becomes a constraint to the development of new trail and recreation improvements that could be undertaken by HTA, agencies, and local partners. Again, a small population spread over a large area provides additional challenges, as volunteers typically want to contribute to projects that provide close-to-home benefits.



Fortunately, the Granby and Grand Lake Metropolitan Recreation District trail systems are positioned to provide training grounds and local draws to develop trail skills, crew leaders, and interested volunteers within their neighboring communities. HTA, working in conjunction with Continental Divide Trail Coalition and their Gateway Communities program, can utilize these local trail systems to develop awareness in trail stewardship and build the local capacity to undertake more complex projects. Concurrently, the improved facilities at these local trail systems would provide community benefits.



GRANBY-GRAND LAKE

WILDLIFE HABITAT

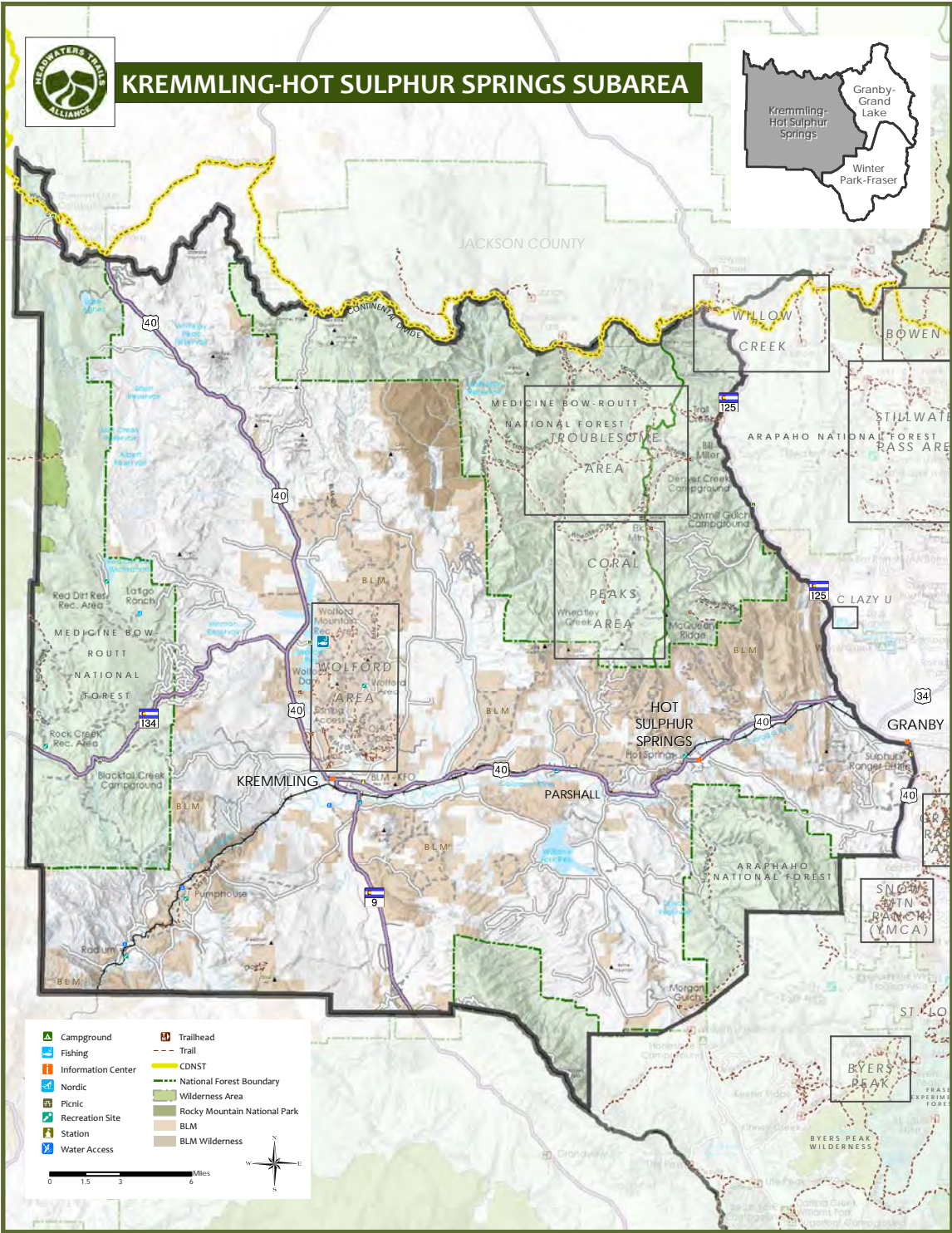
The balance between conservation and recreation is very challenging in the Granby-Grand Lake area. The significance of the regional geography including multiple Wildernesses, large reservoirs, lower elevation winter large game habitat, and wide riparian corridors of the Fraser and Colorado Rivers make this region equally compelling as a four-season destination for wildlife and recreationists. Trail development and management will require collaboration and open communication between numerous partners, hinging on partners' willingness to work together toward mutually agreeable ends.



During the initial public outreach for this sub area there was a demonstrated lack of trust and/or understanding regarding areas of conflict between trail use and wildlife/hunting and, for some, a determination to stake partisan sides. It is not likely that most individuals throughout the community believe in a zero sum game of wildlife or recreation. More likely, the majority see these community facets as mutually beneficial. However, it will be difficult to develop high quality and well-managed recreation facilities or fish and wildlife populations without a much higher level of community dialogue and understanding.

Facilitating a continued dialogue is a natural facet of HTA's mission and operations. That stated, state and federal agencies and community leaders must be the leaders in bringing diverse parties together to determine local priorities and direction. There are many potential models for improving both recreation and wildlife protection, but optimizing conservation and recreation functions and values will require more commitment than currently demonstrated.

KREMMLING-HOT SULPHUR SPRINGS



KREMMLING-HOT SULPHUR SPRINGS

OVERVIEW

Geographic Area

This sub area, containing approximately 172 miles of trails, encompasses the western portion of Grand County, including the municipal boundaries of Kremmling and Hot Sulphur Springs, as well as the unincorporated community of Parshall. It is bound in the north by the county line and Continental Divide, by the county line in the west, by Highway 125 in the east, and the county line and USFS boundary in the south. The major federal landowners in the area are the United States Forest Service Arapaho-Roosevelt and Medicine Bow-Routt National National Forests (USFS), managed by the Sulphur Ranger District (SRD), and the Bureau of Land Management Kremmling Office (KFO).

Existing Planning Information

This sub area plan has been informed by a number of previously developed plans, including USFS Land and Resource Management Plans for the Arapaho National Forest (1997) and Routt National Forest (1998), KFO Resource Management Plan (2016), the Town of Hot Sulphur Springs' Parks, Recreation, and Open Space Mater Plan (2015), Kremmling OHV Ordinance (2017), and Hahn-Bears Peak Mountain Bike Plan (2018).

Federal Land Management

The KFO manages the BLM-owned portions of land in this area. Within the recently completed Resource Management Plan (2016), the agency manages a number recreation-related Special Resource Management Areas (SRMAs) in the area, including the Wolford SRMA (25,657 acres). Near Kremmling, the Wolford SRMA is managed to provide off-highway vehicle (OHV) recreation.

USFS' Sulphur Ranger District (SRD)-managed lands in this area have a number of different management mandates that relate to recreation and trails. General guidance from the 1997 Land and Resource Management Plan focuses on management for wildlife habitat effectiveness that encourages large swaths of land without roads or trails and habitat corridor connectivity between these tracts. Development of new trails are analyzed using a forest habitat effectiveness GIS model that takes into account distance to travel ways, terrain (% slope), vegetation and structural stage. Per this model, new trails are depicted to "split" habitat and render the area with a decreased percentage level of habitat effectiveness, unless roads, administrative routes, or other trails in the same geographic area are likewise decommissioned.

USFS' Routt National Forest in this portion of the county include lands managed by the Parks Ranger District in the Corral Peaks area north of Hot Sulphur Springs and Yampa Ranger District west of Kremmling from Muddy Pass in the north to just beyond HWY 134 in the south. These lands, while technically under the management and LRMP direction of the Medicine Bow-Routt National Forest, a co-management agreement

KREMMLING-HOT SULPHUR SPRINGS

exists with the SRD to provide day-to-day operations and maintenance of these “sister” USFS lands as the staff for the portions of these ranger districts are quite a distance away to the north.

Local Land Management

The Town of Hot Sulphur Springs manages two parks. Pioneer Park, co-managed with Colorado Parks and Wildlife (CPW) is more than a mile in length along the north bank of the Colorado River and provides trail opportunities for hiking and cross country skiing/snowshoeing along with fishing, camping, disc golf opportunities. Town Park, near the south bank of the Colorado River on the north side of the town, is a developed recreation park with ball fields, a community garden, and event space.

Kremmling has a town park as well as a co-managed staging area for the Wolford-area OHV trails. With a recent ordinance, licensed off-highway vehicles can utilize Kremmling roads to access the surrounding BLM land and trail system.

EXISTING TRAIL CONDITIONS

The majority of designated system trails in the western portion of Grand County are congregated in the 1) Corral Creek/Troublesome area of the Medicine Bow-Routt National Forest and 2) north of Kremmling in the BLM’s Wolford Special Resource Management Area. The Corral Creek area trails are mostly four wheel drive roads that are groomed in the winter for snowmobile use. Further north in the Troublesome area, shared-use non-motorized trails provide backcountry experiences for equestrians, mountain bikers, and hikers. The Wolford Reservoir-area trails are managed primarily for motorized recreation, but also see relatively modest non-motorized use, especially during shoulder season months when this area is snow-free longer than many higher elevation areas of the county.

The USFS-based non-motorized trails are primarily adopted from old roads or resource extraction corridors. Running along creeks or in steep alignments, these historic corridors tend to have significant sustainability and maintenance challenges. With little federal land management capacity for dedicated backcountry trail maintenance and a small regional population of potential trail stewards, the attention given to the trails is mostly from hunting outfitters brushing and clearing dead or downed trees to keep routes open. Most trails have high quality vistas, are not crowded, and the backcountry nature of the area provides a high value in terms of surroundings and serenity.



KREMMLING-HOT SULPHUR SPRINGS

Wolford SRMA trails and OHV Staging/Play Area are primarily located in sage-covered low gradient slopes without many trees. These are also trails of convenience, adopted from historic ranch two-track, grazing tracks, or ridden in with motorcycles and atvs. The assemblage of trails has decreased from historic levels with many unsustainable routes being signed as closed through the BLM's travel management assessment process. To some extent that process improved the navigability of the area, but the system is still far from being easy to navigate. Navigability is challenged by insufficient signage, a number of different seasonal wildlife closures, and private inholdings within the Wolford SRMA.

High quality trails, especially singletrack, as well as meaningful loop experiences are hard to create in the Wolford SRMA due to the adopted route infrastructure and further classification into motorized and non-motorized routes. This management condition has resulted in further development of user-created routes and/or a lack of successful closure to routes that were posted closed to motorized use during the travel management inventory process of 2005.

The location of state-owned land parcels between Kremmling and KFO lands (depicted on map below) that do not allow motorized use make connectivity to the Town of Kremmling a challenge. A lack of formal management on this road has led to a significant trash issue. Summer season flood irrigation significantly affects the quality of recreational experiences near Kremmling, as mosquito populations make trail use challenging, especially for non-motorized activities.

STAKEHOLDER OUTREACH SUMMARY

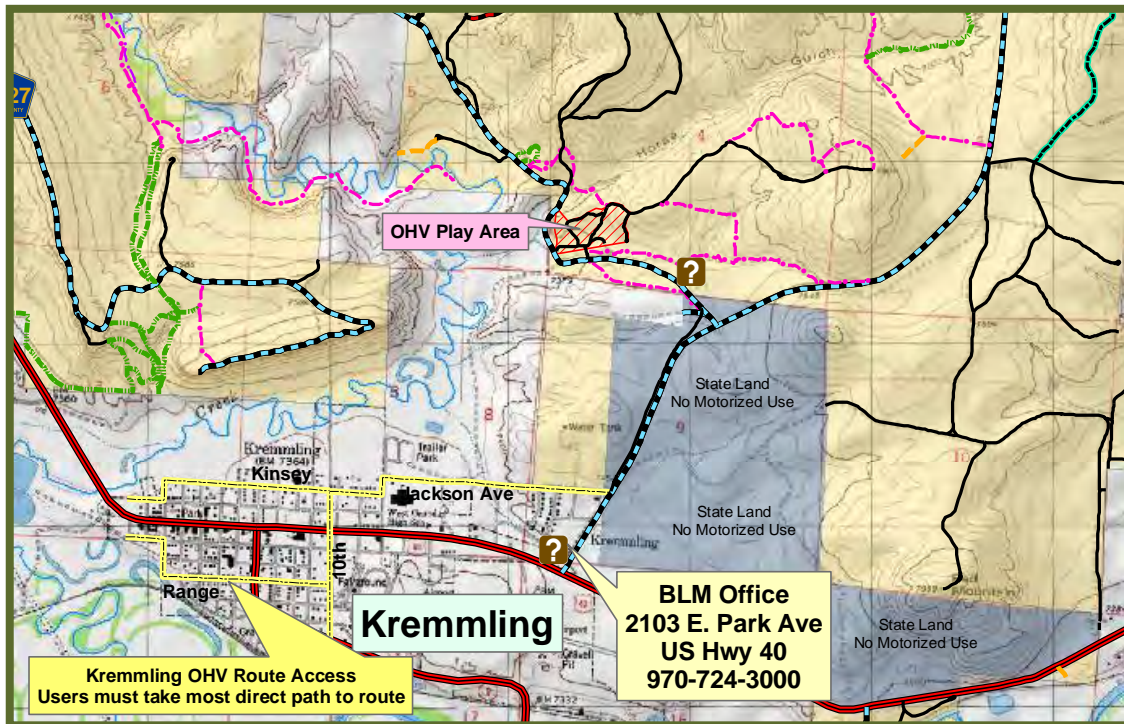
The process of developing this subarea plan depended on a variety of collaborators, including:

- The Headwaters Trails Alliance board of directors and staff
- Colorado BLM- Kremmling Field Office
- Colorado Parks and Wildlife
- Town of Hot Sulphur Springs
- Town of Kremmling OHV Committee
- Municipal planners from around Grand County
- Local Businesses and Stakeholders



KREMMLING-HOT SULPHUR SPRINGS

Headwaters Trails Alliance reached out to regional stakeholder groups from March through mid-July in 2018. HTA initiated outreach activities to federal and municipal land managers, trail-related groups, and leaders from the area trails community to gauge their priorities and capacity to assist HTA in implementing trail improvement ideas throughout the Kremmling/Hot Sulphur Springs area. At a date to be determined, HTA will



conduct an open house presentation to request feedback from the greater public on the community ideas and goals identified by the HTA board/staff and stakeholders.

Most recreation interest groups and individual responders expressed a desire for improved access/connectivity to the municipal areas and signage/wayfinding needs to direct visitors to the area opportunities. Agencies expressed that challenges exist in managing the area's trail systems, and the need for improved trail stewardship collaboration with the recreating communities.

OPPORTUNITIES

LONG DISTANCE TOURING

Long distance, town-to-town opportunities have untapped potential in the western portion of Grand County. The paved shoulder of the Colorado River Headwaters Scenic Byway, running from Grand Lake to State

KREMMLING-HOT SULPHUR SPRINGS

Bridge, forms a central “spine” for exploring the area. There are some major challenges with this route, such as the narrow exposed shoulder in Byers Canyon and the high speeds of vehicle travel between Parshall and Kremmling, but this corridor has high recreational value.

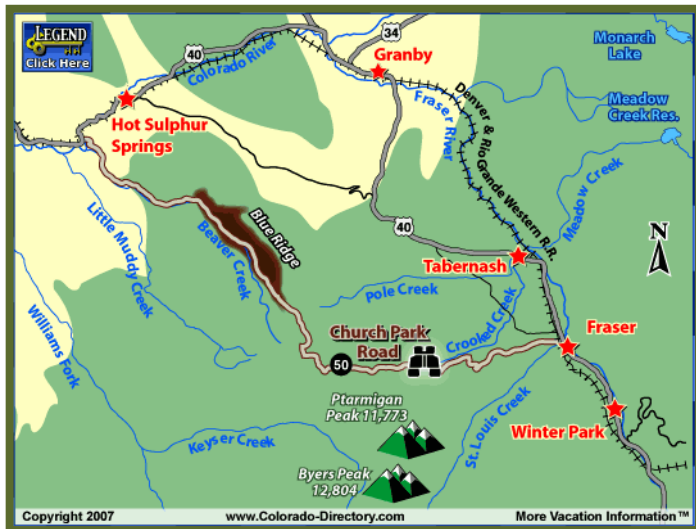
Many recreationists are looking for opportunities for long distance motorcycle, snowmobile, atv, or bicycle touring, and the combination of gravel and four wheel drive roads throughout this area are missing just a few important connections that greatly enhance backcountry travel and recreation-based tourism into the area communities. Increased collaboration between trail enthusiasts, working together with USFS, BLM, and CPW, would help to push the concept forward and assure that final decisions are optimized for all concerns.

WILDLIFE-FOCUSED RECREATION

The Colorado River and abundance of lower elevation lands provide a very high quality wildlife corridor. Winter range habitat for large ungulates is utilized in other seasons by large sage grouse populations. The Gold Medal fishery of the Upper Colorado is an incredible draw. Williams Fork and Wolford Mountain Reservoirs, State Wildlife Management Areas, and target shooting ranges provide local activities and draw visitors interested in wildlife-related pursuits. However, these opportunities are not currently marketed, access is somewhat challenging, and visitor facilities are lacking.

HIGH QUALITY OHV RECREATION

The Wolford area has the potential to be a very high quality trail system, adjacent to a town with a long history of off-highway vehicle (OHV) recreation. There are very few municipally connected ohv trail systems in the country. Where they have been developed with in-town ohv use on city streets, signage/navigation, services, and amenities, those trail systems have had significant positive economic impacts.

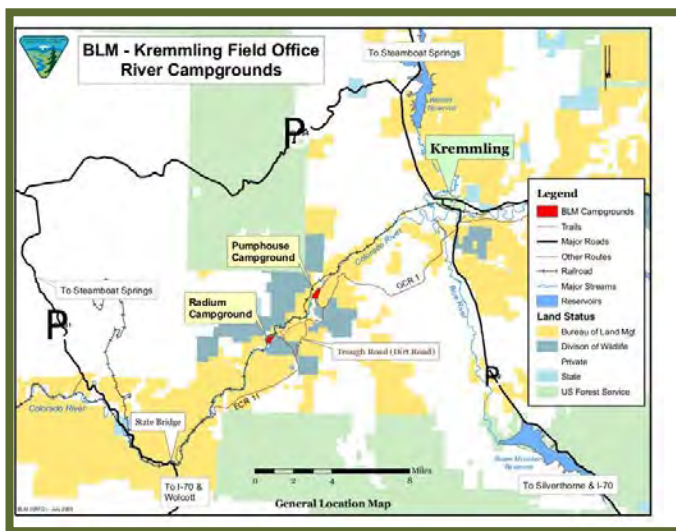


KREMMLING-HOT SULPHUR SPRINGS

With the reservoir and eponymous mountain as a backdrop, the Woflord area trail system could be redeveloped into a high quality recreational experience. This effort will require a significant amount of big picture planning and detailed trail system design, which is noted in the SRMA language for the area, to realize this goal while providing more natural resource protection. This will require significant increases in funding, stewardship, and collaborative management to achieve the potential.

CO RIVER BOATING/BACKCOUNTRY

The backcountry paddling experience on the Colorado River on the west side of the county is significantly



overlooked and under-marketed relative to many of Colorado boating opportunities. Along with the touring and wildlife-related recreation along the river, the promotion of paddling, backcountry hiking, and serenity are opportunities that blend into a broader narrative of Grand County as a full-service recreation destination.

CONSTRAINTS

CAPACITY FOR CHANGE

The western portion of Grand County is relatively isolated. There is a very small population, much of the outside visitation is “pass through” in nature by



KREMMLING-HOT SULPHUR SPRINGS

travelers with destinations in Routt or Summit Counties or the eastern side of Grand County, and the current recreation destinations are some distance from the towns on the Colorado River. This situation has created a “pioneer personae” for the area that has arguably served its residents well enough but has limited the development of recreation-related facilities that provide quality of life benefits, increased economic activity, and healthy, active communities. Collaboration in the development of recreational trail systems is difficult in any case, but coupled with the small populations that are widely spread through a large geographic area, it will be a constant challenge to create the inertia for change. Further challenging, these communities do not currently have a municipal funding supply or staff to implement recreation-related projects. Finally, federal agency capacity is not sufficient to bridge these gaps.



However, with Grand County government headquartered in Hot Sulphur Springs, improvements to recreation quality and access around the town could have cascading positive results around the rest of the county by providing the “proof of concept”. The recently completed Hot Sulphur Spring Parks, Recreation, and Open Space Plan broadly speaks to creating a more positive sense of place through park facility improvements, utilizing of rights of way for trails, connecting to the surrounding federal lands, and collaborating with private property owners to improve bike/pedestrian access. Innervating this



STRATEGIC PLAN ELEMENTS

GOALS, OBJECTIVES, BENCHMARKS, AND POTENTIAL PROJECTS

Through 1) internal board, Trails Planning Committee, and staff discussion, 2) facilitated discussion with an external consultant, and 3) extensive stakeholder outreach effort over the last few years, HTA developed the following strategies to improve trails and recreation throughout Grand County. The organization has set the course for realizing the following goals in the next ten years. This clear and purposeful direction will help clarify collaborative opportunities for entities in this area to improve the quality, quantity, and diversity of trail experiences while conserving the landscape functions and values that make being outdoors in the Grand County so rewarding.

The county-wide goals that HTA has set forth include:

- **Goal 1: Improve the interconnectivity between federal lands and municipal centers.**
- **Goal 2: Increase engagement with, and provide educational opportunities for trail users, residents, and visitors.**
- **Goal 3: Develop strategic trail projects that enhance the diverse, four-season system and provide high-quality experiences while minimizing conflicts.**
- **Goal 4: Enhance the community focus of the trail system to provide quality of life and potential economic activity improvements throughout the area.**

Under each of these broad goals, a number of more specific objectives break out the areas where HTA believes it can make fundamental, positive impacts. For organizational planning and reporting purposes, collaborating with the public and stakeholders, and clearly communicating how HTA plans to succeed, a number of benchmarks are aligned with the objectives that delineate project types and timelines.

Finally, specific potential projects identified by sub area are described under each objective. These projects have been put forth by stakeholders throughout the outreach process and serve to show the potential for HTA to collaborate with all interest groups. They represent current ideas for potential improvements, but for the most part have not been approved or funded. Nor is the list exhaustive or exclusive, and quite likely the potential projects that satisfy the objectives will change as new opportunities are presented. The feasibility of many of these projects depends on further, detailed assessment (i.e. on-the-ground trail planning, NEPA, etc.). Until formal planning, approval, and funding have been satisfied, these potential projects will be considered as explanatory only, rather than a road map. HTA fully anticipates that the list will change due to opportunities presented in the future.

STRATEGIC PLAN ELEMENTS

Goal 1: Improve the interconnectivity between federal lands and municipal centers.

Objective 1.1: Institute an effective and uniform navigation signage program that is identifiable, branded by HTA and towns, and integrated into federal lands signage systems and municipal/HTA maps.

Benchmark	Description	Timeline
1.1.1	Vet the developed signage standard, expanding on existing municipal wayfinding and signage plans, to determine ongoing needs for signage and map placement.	Short-Term
1.1.2	Develop complementary signage protocols (type and placement) in collaboration with federal land agencies and lead the replacement of trailhead, intersection, and return route, significant feature, and confidence marker signage.	Mid-Term
1.1.3	Update map database as improvements are realized.	Short- and Mid-Term
1.1.4	Develop trail names/nomenclature that is consistent throughout publications and efficiently consolidates trails by logical segment/loop.	Short- and Mid-Term



STRATEGIC PLAN ELEMENTS

Objective 1.2: Develop/enhance main trailhead locations and roadside signage within municipal boundaries to improve navigation to trails, increase safety, and allow easy access to municipal services.

Benchmark	Description	Timeline
1.2.1	Develop central Fraser trailhead at HTA office with roadside signage, high-profile trailhead kiosk, and bike/boot wash and repair stand.	Short-Term
1.2.2	Collaborate with the Towns and Metropolitan Recreation Districts to develop secondary primary and secondary trailheads.	Mid-Term
1.2.5	Lead efforts with Grand County to develop trailheads that provides direct four season recreation access.	Long-term

Potential Projects:

Winter Park/Fraser

- Fraser secondary trailhead development at the Fraser Valley Sports Complex and Grand Park Community Recreation Center.
- Winter Park permanent trailhead site with restroom facilities, trash receptacles, and kiosk. The current location at the gondola site will serve for the near term until a gondola is constructed on the property.
- Winter Park secondary trailhead development at the Headwaters Community Environmental Center.
- Develop overall map and trailhead information at Hideaway Park.

Granby/Grand Lake

- Work with Grand Lake to develop in-town Trail Hub that provides parking, information, and direct access to nearby federal lands and local amenities.
- Work with Grand Lake and the Continental Divide Trail Coalition to sign and promote the CDT through town.
- Work with Granby to develop public trailheads west of town (Granby Trails) and south of town (Fraser-Granby Trail and Granby Ranch).
- Work with all partners to provide direct, safe, four-season Northwest Passage access from Grand Lake to to USFS lands.

Kremmling/Hot Sulphur Springs

- Work with Kremmling to improve access to Wolford trails through 1) access/manageability of State-owned lands on the north side of town and 2) legal access to the west of of town.
- Improve signage in/around Hot Sulphur Springs for access to federal lands’ trails and recreation sites.

STRATEGIC PLAN ELEMENTS

Objective 1.3: Lead efforts to develop new trails and maintain existing trails along road/utility corridors and on public/private lands connecting highway corridors and surrounding federal lands.

Benchmark	Description	Timeline
1.3.1	Collaborate with municipalities to develop standard recreation easement, maintenance, and grooming agreement language.	Short-Term
1.3.2	Develop a revenue stream to fund ongoing seasonal trail maintenance and grooming.	Mid-Term
1.3.3	Lead efforts for sustainability improvements, new trail development, and municipal trail system connectivity through private properties.	Short- to Long-Term
1.3.4	Lead efforts for sustainability improvements, new trail development, and improved connectivity along road/utility corridors.	Short- to Long-Term

Potential Projects:

Winter Park/Fraser

- Improvements to access for Rendezvous trails, including improving access to the trail systems with a trailhead at Arrowhead Park and additional parking opportunities at other access locations.
- Denver Water Board trail expansion/implementation plan. The Town of Winter Park should work to secure a long-term lease of the Leland Creek parcel (200 acres, west of Winter Park). With a lease secured, a plan should be created to maximize the trail development potential of this area.
- Other Denver Water properties that would benefit trail connectivity via trail easements include a connection between Burnout and the Moffat Trail and a connection between Yankee Doodle and the intersection of FSR128 and Corona Pass Road (FSR 149).
- Beavers property trail expansion/implementation plan. The property has a number of non-motorized trails that are used by the public although public trail easements do not exist. The trails provide a



STRATEGIC PLAN ELEMENTS

critical link to existing trails in Rendezvous (Arrow). The property is currently located in unincorporated Grand County. The Town of Winter Park should work with HTA during the annexation process to determine if additional trail corridors should be established on the property.

- Grand Park trail expansion/implementation plan. Per the recommendations of the Town of Fraser, HTA should advise in seeking funding for trail construction, secure easements in agreed-upon locations for trails as property development continues, and work with USFS to identify connections to Grand Park and surrounding neighborhoods.
- Byers Peak Ranch trail development plan. Per the Town of Fraser, HTA should work to ensure trail easements are created if and when this parcel is developed.
- Parallel singletrack development in the St. Louis Creek, Elk Creek, and Vasquez Creek trail systems (i.e. connecting existing trails such as Flume-Broken Spade-Zoom or Blue Sky-Chickadee).
- Host or be the receiving organization for two annual, major fundraisers to facilitate project implementation.
- Create a business membership, outreach, or fundraising program that assists major fundraising events in providing capital for project implementation.



Granby/Grand Lake

- Create partnerships or easements with Northern Water and private landowners to facilitate trail connection between Granby and Grand Lake.
- Multi-use trail adjacent to West Portal Road in public-private collaboration.
- Assist Granby with the planning and implementation of the Granby/Sun Communities trail system.
- Granby Trails to Willow Creek Reservoir connection.



Kremmling/Hot Sulphur Springs

- Assist Hot Sulphur Springs with exploring opportunities for public trail access along Heimbaugh Creek.
- Assist Hot Sulphur Springs with signage, wayfinding and recreation marketing (i.e. Pioneer Park, scenic byway, etc) within town.
- Improve management and quality of Kremmling-Wolford connectivity through State Land Board parcel.

STRATEGIC PLAN ELEMENTS

Goal 2: Increase engagement with, and provide educational opportunities for trail users, residents, and visitors.

Benchmark	Description	Timeline
2.1.1	Collaborate with Municipalities/Chamber to improve consistency in trail mapping resources.	Short-Term
2.1.2	Develop high quality educational messaging regarding trail improvements, etiquette, trail sharing, resource protection, and natural interpretation for inclusion at trailhead kiosks, HTA website, and local businesses.	Short-Term
2.1.3	Improve website functionality, content, and social media integration, focusing on content that highlights partnerships created and work completed by HTA.	Short-Term

Objective 2.1: Improve the quality of the HTA brand through mapping, messaging, and placement throughout the Granby/Grand Lake area.

Potential Projects:

- Guided outings by ski, foot, bike, OHV, and snowmobile.
- Social events/gatherings to bring trail supporters and HTA together for informal networking and community building.
- Monthly “Trail Talks” integrated into volunteer events and municipal programming.
- County-wide “Trail Conditions” mobile application development and inclusion on the HTA website.
- HTA website links to Agency Proposed Actions and synopses of the information.
- Crowd-funded project of the season.
- Secure funding to have a professional cartographer create a regional trail map.



STRATEGIC PLAN ELEMENTS

Objective 2.2: Take an active leadership role in bringing together the many smaller recreation/conservation interest groups active in Grand County communities.

Benchmark	Description	Timeline
2.2.1	Change “Trail Night” model to become a mid-Summer and mid-Winter Trail Festivals and large fundraisers for the organization.	Short-Term
2.2.2	Hold quarterly meetings, organized by HTA, and involving all groups to increase collaboration/information sharing and decrease outreach “load” for agencies/municipalities.	Mid-Term
2.2.3	Create annual project plans that include project spearheaded by all groups and set project schedule late Fall/Spring prior to the season of work. Projects can be completed under existing HTA volunteer agreement with USFS and a similarly developed agreement with NPS, Municipalities, and private entities.	Mid-Term



STRATEGIC PLAN ELEMENTS

Objective 2.3: Increase the quality, quantity, and exposure of trail-related volunteerism and HTA-led trail construction/maintenance throughout Grand County.

Benchmark	Description	Timeline
2.3.1	Create a Volunteer Crew Leader training program or implement a strategy to train more Crew Leaders through Volunteers for Outdoor Colorado.	Short-Term
2.3.2	Develop a system to collaboratively plan, schedule, implement, and report (written and photographic) on at least 12 significant volunteer trail work projects each year.	Short-Term
2.3.3	Carry out a capital campaign to fund ongoing HTA-led projects, volunteer activities, and two 4-person summer trail crews.	Mid-Term
2.3.4	Institute a volunteer-based trail monitoring program to track annual maintenance needs and actions, identify ongoing problems, and plan for future trail work events.	Mid-Term
2.3.5	Increase the number and capacity of Adopt-A-Trail programs through work with municipalities and BLM.	Mid-Term



STRATEGIC PLAN ELEMENTS

Goal 3: Develop strategic trail projects that enhance the sustainable, diverse four-season trail system and provide high quality recreational experiences while minimizing conflicts.

Objective 3.1: Decrease the environmental footprint of the area trail system by converting historic extraction routes to singletrack trails and improving trail alignments to minimize erosion and potential resource impacts.

Benchmark	Description	Timeline
3.1.1	Conduct major trail system inventory/assessment projects to identify necessary actions for improved trail conditions, experiences, and streamlined management.	Short- to Long-Term
3.1.2	Major road-to-trail conversions, greater than one mile of physical improvements, to reduce resource impacts and trail footprint, better manage water, and improve trail user experiences.	Short- to Long-Term
3.1.3	Conduct simultaneous trail and habitat restoration/wildfire protection projects that reduce impacts to nearby natural resources and improve habitat effectiveness.	Short- to Long-Term

Potential Projects:

Winter Park/Fraser

- Idlewild trail system inventory and redevelopment plan; trail system is governed by the James Peak Protection Area mileage limitations and therefore, a public planning process should be undertaken to evaluate trail redundancy, consolidation, sustainability improvements, and additions.
- Strawberry/Phases trail system redevelopment plan; this trail system spans both USFS- and BLM-managed lands and is formally to be managed as the Strawberry Special Recreation Management Area on BLM property. USFS does not recognize any routes on their property as system trails, but have demonstrated the willingness to consider a trail connecting BLM Strawberry and the USFS Strawberry Bench/High Lonesome area trails. As such, a professionally developed plan should be created from a public planning process that evaluates trail redundancy, consolidation, connectivity, and overall trail improvements.
- Potential road-to-trail conversions include Burnout Loop reroute, Southfork Loop, Homestead, Rogers Pass, Buck Creek, Blue Sky, Cherokee, Upper Cherokee, Chickadee, D4, D2, Ice Hill (remove from gas line), Sunken Bridges, upper portion of Little Vasquez, and Tipperary Creek.

STRATEGIC PLAN ELEMENTS

- Consider decommissioning Backscratch Trail as it is an underutilized trail/road that is redundant with the more popular Tipperary Creek trail and realize gains in habitat effectiveness.
- Close Zoom to all summer use to improve habitat effectiveness, adopt adjacent Broken Spade trail as the summer alternative route, and maintain Zoom as a winter route.

Granby/Grand Lake

- Engage railroad in discussions to provide trail access between Tabernash/Granby and downtown Granby/Kaibab Park.
- Partner with Grand Lake to redevelop the existing trails into a Gateway Trail Centers (at GLMRD and Thomasson properties) that provides local opportunities for recreation, stewardship, and education.
- Continue to lead Knight Ridge Trail redevelopment initiative and work toward a Lake Granby trail circumnavigation.
- Assist Town of Granby with development of and year-round access (i.e winter grooming) to Granby Trails.
- Assist Town of Granby with paved trail development adjacent to HWY 40.

Kremmling/Hot Sulphur Springs

- Create a working group to assess the feasibility of non-paved connectivity between the two western municipalities, as well as Granby and Winter Park/Fraser.
- Assist BLM with Wolford OHV trail system redevelopment planning and fundraising.
- Work with Hot Sulphur Springs to determine the feasibility of a multi-loop trail system in and around the town.



STRATEGIC PLAN ELEMENTS

Objective 3.2: Develop additional trails that improve trail experiences and reduce potential use conflicts.

Benchmark	Description	Timeline
3.2.1	Develop shared-use singletrack connector trails adjacent to unpaved roads to reduce potential conflicts with motorized traffic.	Short- to Long-Term
3.2.2	Create new hiking/equestrian trail areas outside designated Wilderness Areas.	Mid-Term
3.2.3	Improve summer use motorized and mountain singletrack connectivity to provide long distance experiences	Mid-Term
3.2.4	Realign and improve existing system or approved trails to create viable high elevation mountain bike opportunities.	Mid-Term
3.2.5	Add technical features adjacent to high mountain bike use trails during new construction or maintenance projects.	Mid-Term

Potential Projects

Winter Park/Fraser

East of US Hwy. 40

- Feasibility study of Rollins Pass to Rogers Pass as mountain bike route as identified in the James Peak Wilderness Act.
- Create new trail from top of Yankee Doodle to the Fraser River Trail through Denver Water, Rendezvous, USFS and Beavers.
- Redevelop historic Boulder Wagon Route in a sustainable location.
- Improve trail connection between Rogers Pass and Broken Thumb (Ute Trail).
- Extension of Riflesight Trail to Rogers Pass.
- Work with Indian Peaks Traverse group in developing a connecting route to Boulder County.

West of US Hwy. 40

- Feasibility study of using Icarus to Mt. Nystrom connecting to Little Vasquez Road (around the top of the Cirque) as a high attitude mountain bike route (outside of wilderness area).
- Identify and develop a route from Berthoud Pass to Winter Park Resort (i.e. aquaduct to 2nd Creek and across Hwy. 40 to old 7-Mile Trail to the Fraser River Trail or 7-Mile Trail from Berthoud Pass to the Fraser River Trail in WP).

STRATEGIC PLAN ELEMENTS

- Parallel singletrack route along the Winter Park to Fraser Trail. The trail should include small adjacent features (i.e. jumps) for kids to hone their mountain bike skills.
- Create a connector trail from Elk Meadow trailhead to WTB/Vasquez Trail system (singletrack mechanized/motorized).
- Upper Chickadee adoption and trail improvements.
- Parallel singletrack routes in the St. Louis Creek, Elk Creek, and Vasquez Creek trail systems (i.e. connecting existing trails together).
- Reroute Twin Bridges to improve trail sustainability and realign with top of Sunset Pink on Vasquez
- Adopt Pinball as a system trail—connecting FSR157 to Elk Creek Loop.
- Develop access to Sheep Mountain (BLM) for hiking/equestrian uses only.

Strawberry Area

- Develop mechanized use and hiking/equestrian trails in the Strawberry area.
- Improve access/parking to climbing area in Tabernash off Hurd Creek Rd.
- Identify a connector singletrack mountain bike route from BLM/Strawberry to Arapaho National Recreation Area trails.

Granby/Grand Lake Area

- Develop East Shore Trail
- Develop Knight Ridge Trail
- Work with Grand Lake to improve the Grand Lake Lodge Trail.
- Collaborate with Town of Granby to develop Granby Trails into a Gateway Trail Center that provides local opportunities for recreation, stewardship, and education.
- Partner with Grand Lake Metropolitan Recreation District, local private landowners, and USFS to extend the Grand Lake Trails onto USFS land in the Stillwater area.

Kremmling/Hot Sulphur Springs

- Develop a sustainable, non-motorized system of trails to the south of Hot Sulphur Springs in the vicinity of CR 559 and west of Hot Sulphur Springs Resort on CR 20.
- Improve the integration of single track trail (motorized and non-motorized) experiences in Wolford SRMA, while reducing potential conflict and navigation issues.
- Assist in improvements to the Raptor Gulch, Waterfall and Argentine Trails.
- Assist BLM and Town of Kremmling in realizing improved connectivity and loops between the town and Wolford Mountain SRMA (i.e. Saddle Trail-Wolford Man.-Cowpath Loop- West Wolford ATV Trails).
- Work with BLM and Town of Kremmling to address UTV access/regulatory (i.e. width) issues.

STRATEGIC PLAN ELEMENTS

Objective 3.3: Achieve an increased role in the day-to-day management and decision making of the Grand County trail system.

Benchmark	Description	Timeline
3.2.1	Utilize volunteer agreement and challenge cost-share program to bring annual inputs of at least \$250,000 to federal trail projects.	Mid-Term
3.2.2	Develop event, grant, or foundation funding of at least \$150,000 annually to support area trail projects.	Mid-Term
3.2.3	Develop a robust business sponsorship program (i.e. membership, “sales for trails”, etc.) that seeds funding for projects.	Mid-Term
3.2.4	Develop collaborative management agreements to formally manage the non-Wilderness, non-motorized trails throughout Grand County.	Mid-Term



STRATEGIC PLAN ELEMENTS

Goal 4: Enhance the community focus of the trail system to provide quality of life and potential economic activity improvements throughout the area.

Objective 4.1: Provide advocacy support to municipalities in the development of multi-modal trails, sidewalks, and traffic control measures to improve walk- and bike-ability of Grand County.

Benchmark	Description	Timeline
4.1.1	Create education/outreach materials, letters of support, and public testimony in favor of hard-surfaced trail, sidewalk, and traffic control measures.	Short-Term
4.1.2	Collaborate with the Continental Divide Trail through CDT Gateway Community program.	Mid-Term
4.1.3	Provide advocacy support for increased safe access from municipalities across railroad rights of way.	Long-Term
4.1.4	Collaborate with Grand Huts to provide access and promote developing backcountry hut system.	Mid- to Long-Term

Potential Projects:

Winter Park/Fraser

- Extend Fraser River Trail and protect access to neighborhoods

Granby/Grand Lake

- CDTC Gateway Community support projects
- Support the Grand Lake Walkability Initiative
- Grand Lake Lodge trail redevelopment
- Assist in the planning, design, and development of Granby Trails

Kremmling/Hot Sulphur Springs

- Support the development of an interconnected trail, greenway, and sidewalk system in Hot Sulphur Springs
- Explore feasibility of a non-paved trail adjacent to the scenic byway
- Assist Hot Sulphur Springs in enhancing routes in and around the town.



STRATEGIC PLAN ELEMENTS

Objective 4.2: Improve community-focused trail assets within the municipalities of Grand County.

Benchmark	Description	Timeline
4.2.1	Formalize role as planner, developer, and maintenance “adopter” for natural surface trails throughout Grand County.	Short-Term
4.2.2	Collaborate with municipalities to transform town-controlled lands into trail- and healthy lifestyle-focused hub for community.	Mid-Term
4.2.3	Evaluate opportunities to “turn” community focus away from roads and to the lakes and rivers of the area.	Mid-Term
4.2.4	Develop a long-term, sustainable funding mechanism that will facilitate HTA capacity to undertake a progressively larger scope of assistance and leadership in the management of Grand County trail systems.	Long-Term

Potential Projects:

Winter Park/Fraser

- Conduct a bicycle friendly community assessment and create public discourse regarding the benefits of improvements of a walkable, bikeable community.
- Invest in the professional redevelopment of the bike park facility at the Fraser Valley Sports Complex or move the facility to a more accessible location in the Lions Pond area.
- Develop family-focused trails on town-controlled and private lands, as well as around USFS campgrounds.

Granby/Grand Lake

- Winter grooming of Trail Ridge Road for non-motorized use.
- Reinvigoration of Vagabond Huts.
- Facilitating winter grooming connectivity between Snow Mountain Ranch and Granby Ranch.

Kremmling/Hot Sulphur Springs

- Work with communities to facilitate trail development on adjacent private, County, or State lands.
- Explore winter grooming partnerships with Kremmling and Hot Sulphur Springs.
- Support improved Wolford SRMA connectivity, single track loop development, and the potential for a motorized trials course and loading ramps at the staging area.

APPENDIX A

APPENDIX A EXISTING TRAILS AND FACILITIES

USFS Trails

*in James Peak, **trail not yet built, GFA=General Forest Area, James=James Peak Protection Area, ANRA=Arapaho National Recreation Area

Trail #	Trail Name	Miles	motorized	wilderness	ANRA	James	GFA
1	Cascade Creek	9.1		8.1	1.0		0.0
1.1	Crater Lake	1.1		1.1			0.0
2	Buchanan Pass	5.5		5.5			0.0
2.1	Gourd Lake	2.1		2.1			0.0
3	Roaring Fork	6.3		6.3			0.0
3.1	Watanga Lake	1.6		1.6			0.0
4	Fraser River	0.9					0.9
5	Rollins Pass	4.5				4.5	0.0
6	Arapaho Pass	10.4		9	1.4		0.0
6.1	Arapaho Pass Spur	0.8		0.8			0.0
7	High Lonesome	17.7		6.0	6.0	5.7	0.0
7.1	Devils Thumb Park	0.7					0.7
7.2	Hi Lo Spur	0.3			0.3		0.0
8	Corona Lake	1.1				1.1	0.0
9	Strawberry Bench	3.9		0.3	3.6		0.0
9.1	Strawberry Creek	8.3			4.3		4.0
9.2	Strawberry West	2.5					2.5
9.3	Doe Creek	3.4			0.7		2.7
9.5	Caribou	3.1			0.4		2.7
10	Radial Bypass	1.0					1.0
11	Caribou Pass	4.3		4.2			0.1
11.1	Columbine Lake	1.3		1.3			0.0
12	Byer's Peak	2.5		1.1			1.4
13	Mount Nystrom	11.4		11.4			0.0
14	St. Louis Lake	3.0					3.0
14.1	St. Louis Pass	1.1					1.1
15	Lake Evelyn	2.6		2.6			0.0
16	Bottle Pass	3.0		2.8			0.2
16.1	Bottle Peak	2.0		2.0			0.0
17	St. Louis Divide	12.2		7.2			5.0
17.1	B And B	0.9					0.9
18	Darling Creek	5.6					5.6
19	Keyser Ridge	3.4		0.8			2.6
20	Blue Ridge	3.0		0.2			2.8
21	South Fork	23.6					23.6
22	Kinney Creek	3.2		2.0			1.2
23	Horseshoe Lake	1.7		1.7			0.0
24	Ute Peak	12.9					12.9
25	Illinois Pass	3.7	3.7				0.0

Trail #	Trail Name	Miles	motorized	wilderness	ANRA	James	GFA
26	Williams Peak	6.4					6.4
27	Elk Mountain	5.2					5.2
28	Bill Creek	2.7					2.7
29	Baker Gulch	5.8		3.2			2.6
29.1	Baker Pass	3.7		3.7			0.0
29.2	Parika Lake	1.1		1.1			0.0
30	Wolverine Bypass	2.5					2.5
30.1	Lost Lake	0.6					0.6
30.2	Lost Lake Access	0.3					0.3
31	Ute Pass	2.6					2.6
32	Blue Ridge Mtn. Bike	1.4					1.4
33	Cascade Chute	1.6					1.6
35	Ptarmigan Pass	1.7					1.7
36	Little Gravel Bypass	1.0	1.0				0.0
50	Sherman Creek	4.5	4.5				0.0
51	Buffalo Creek	2.4					2.4
53	Bill Miller	1.8					1.8
60	Broken Thumb*	3.5	3.5				0.0
61	Creekside	2.8					2.8
61.1	Creekside Loop	1.1					1.1
62	Boardwalk	0.6					0.6
63	Backscratch	1.7					1.7
64	Elk Meadow	0.9	0.9				0.0
65	East Elk Creek	2.0					2.0
66	WTB	1.3	1.2				0.1
67	Elk Creek Loop	2.2	2.2				0.0
67.1	Elk Creek Loop	0.7	0.7				0.0
68	Tipperary Creek	5.7					5.7
69	Arrow	0.4				0.4	0.0
70	Twisted Ankle**	0.8					0.8
71	Moffat	2.2				2.2	0.0
72	D2	1.7	1.7				0.0
73	D3	1.0					1.0
74	D4	1.6					1.6
75	Forest Spur	0.2				0.2	0.0
76	Riflesight	1.7				1.7	0.0
77	Trestle	0.6				0.6	0.0
78	Ranch Creek**						0.0
79	Mount Flora	2.3				1.3	1.0

Trail #	Trail Name	Miles	motorized	wilderness	ANRA	James	GFA
80	Upper Elk Loop	2.2	2.2				0.0
81	Chainsaw	2.1					2.1
82	Flume	2.2					2.2
83	Zoom	1.5					1.5
84	Sunken Bridges	0.6	0.1				0.5
85	Lower Cherokee	0.7					0.7
86	Blue Sky	1.6					1.6
87	Ice Hill	1.1					1.1
89	Chickadee	0.5					0.5
90	Twin Bridges	0.5					0.5
91	Serenity	1.1					1.1
92	Upper Cherokee	0.9					0.9
93	Rogers pass	2.5				2.5	0.0
94	Jim Creek	4.0				4.0	0.0
96	Jones Pass	1.8		1.0			0.8
97	South Fork Loop	2.7				2.7	0.0
99	Burnout Loop	1.6				1.4	0.2
100	Whoops	0.3				0.3	0.0
101	Vasquez Pass	4.4		3.5			0.9
102	Knight Ridge	6.0		4.0	2.0		0.0
103	East Shore	0.8			0.8		0.0
104	Ditch	1.5				1.5	0.0
105	Winterwoods	0.7				0.7	0.0
106	Idlewild	0.4				0.4	0.0
107	Crosstrails	0.7				0.6	0.1
108	Serendipity	0.3				0.3	0.0
109	Homestead	0.4				0.4	0.0
110	Willow Creek Pass	4.8	4.3				0.5
111	Meadow	0.2				0.1	0.1
112	Green Ridge	1.0			1.0		0.0
113	Camway	0.8	0.8				0.0
114	Trail Creek Loop	0.8	0.8				0.0
115	Lower Gilsonite	1.5	1.5				0.0
116	Beaver Line	2.3	2.3				0.0
117	Bull Mountain	4.3	3.8				0.5
118.1	Gilsonite III	0.6					0.6
118.2	Gilsonite II	3.5	3.5				0.0
118.3	Gilsonite I	0.8					0.8
119	Bowen Gulch	7.4		7.4			0.0

Trail #	Trail Name	Miles	motorized	wilderness	ANRA	James	GFA
119.1	Bowen Gulch Spur	0.4		0.3			0.1
120	Soda Pass	2.0	2.0				0.0
121	Blizzard Pass	2.0	2.0				0.0
122	Burn	1.1	1.1				0.0
123	Middle Supply	2.2	2.2				0.0
124	North Supply Loop	3.1	3.1				0.0
125	Spruce Em Up Jack	3.4	3.4				0.0
126	North/South	0.5	0.5				0.0
127	After Burn	0.8					0.8
128	Lower Soda Pass	1.3					1.3
129	Wolverine	2.4					2.4
130	Bowen Lake	1.7		1.7			0.0
131	Cascade Mountain	3.4		3.4			0.0
132	Blue Lake	3.2		3.2			0.0
	Bowen Gulch						
133	Interp.	1.1		1.1			0.0
134	Horseshoe	3.5					3.5
135	Morgan Gulch	4.0					4.0
136	Eagle Perch	0.7	0.7				0.0
137	Second Creek	1.0					1.0
138	John Kirkpatrick	0.3			0.3		0.0
139	Colorado River	0.9			0.9		0.0
140	Keyser Ridge Loop	1.8	1.8				0.0
141	Elk Wallow	1.0	1				0.0
142	K And K Connection	0.4	0.4				0.0
143	Viewpoint	0.8					0.8
144	Tim's	3.7	3.7				0.0
145	Richey Creek	6.7	6.7				0.0
146	No-See-Um	5.3	5.3				0.0
199	Trail Creek	2.8					2.8
199.1	South Trail Creek	1.1					1.1
200	Parkview	1.8					1.8
803	Ute	1.0				0.9	0.1
Total		402.5	72.6	111.7	22.7	33.5	162.0
%			18.0%	27.8%	5.6%	8.3%	40.2%

Note: Motor Vehicle Use Map is available for all USFS motor vehicle travel routes.

USFS SNOWMOBILE TRAILS

<u>Trail Name</u>	<u>Managing agent</u>	<u>Difficulty</u>	<u>Loc.</u>	<u>Mileage</u>	<u>Groomed</u>
Blue Ridge	Sulphur USFS	Dif	M-4	2.5	0
Blue Sky	Sulphur USFS		N-12	1.1	0
Burnside	Sulphur USFS	Dif		3	3
By-Pass	Sulphur USFS	Dif		3.7	0
Chainsaw	Sulphur USFS	Mod	M-11	1.3	1.3
Christmas Tree Lane	Sulphur USFS	Mod		2.7	2.7
Church Park	Sulphur USFS	Mod	M-12	5.5	0
Creekside	Sulphur USFS	Mod	M-11	2.1	2.1
Crystal Climb	Sulphur USFS	Mod	K-11	1.5	0
D2	Sulphur USFS	Mod	M-11	2.7	2.7
D4	Sulphur USFS	Mod	N-12	1.3	1.3
Doe Creek	Sulphur USFS	Mod	M-7	3.2	0
Fool Creek	Sulphur USFS	Mod		4.7	0
Goldrun	Sulphur USFS	Mod	K-7	16.4	16.4
Gravel Mountain	Sulphur USFS	Dif	K-5	3.1	2.5
Illinois Pass	Sulphur USFS	Mod	J-3	3.2	0
Kawuneeche	Sulphur USFS	Easy		9.9	9.9
Keyser Ridge	Sulphur USFS		K-12	2.5	
Kinney Creek	Sulphur USFS		I-8	3.5	
Little Gravel Mountain	Sulphur USFS	Dif	K-5	5.1	3.1
North Supply	Sulphur USFS	Mod	M-4	2.8	2.8
North West Passage			M-11	1.3	
Pony Park	Sulphur USFS	Dif		3.1	3.1
Rocky Point	Sulphur USFS		K-11	2.8	
Scenic Route	Sulphur USFS	Dif		1.2	0

South Supply	Sulphur USFS	Mod		1.7	1.7
St Louis Creek	Sulphur USFS	Mod	N-14	9.5	0
Stillwater Pass	Sulphur USFS	Mod	K-4	21.1	17.1
Trail Ridge(U.S. 34)	Rocky Mountain		N-4		
West Portal	Grand Lake	Easy	O-5	1.8	0

2012-2013

GRAND COUNTY SNOWMOBILE ROUTES

Note: Routes are revised annually by the GC Board of Commissioners.

Check for updates at: <http://co.grand.co.us/R&B/Snow%20Mobile%20Routes.htm>

C.R. # MILEAGE COUNTY ROAD NAME DESCRIPTION

10	2.87	Spring Creek Road	From Hwy 9 southwest to County Boundary
14	2.60	Mooney Road	From U.S. Hwy 40 west to the intersection of CR14M
14M	6.10	??unknown??	From intersection of CR14 west to Forest Service Bndry
2	5.88	Troublesome Creek Rd	From intersection of CR23 northwest to CR26
22	7.74	Back Troublesome Creek Road	From Kremmling city limits north to CR23
23	2.44	Troublesome Gulch Rd	From intersection of CR22 north to CR2
25	7.52	Antelope Pass Road	From U.S. Hwy 40 east to CR22
20	5.30	Parshall Divide Road	From Hot Sulphur Springs city limits west to Hwy 40
21	19.73	Corral - Cabin Creek Rd	From intersection of CR214 northeast to Hwy 125
4	2.27	Still Water Pass Road	From Hwy 34 west to the Forest Service Boundary
41	5.73	Trail Creek Road	From Hwy 34 west to the Forest Service Boundary
424	0.43	??unknown??	From Hwy 34 north to CR4
46	0.62	Hughes Road	From Hwy 34 north to intersection of CR464
47	0.78	Lakeridge Drive	From Hwy 34 north to CR4739
4739	0.03	Horseshoe Drive	From Intersection of CR47 south to power line
471	0.36	Colorado Drive	From CR48 south to CR47
479	700 ft	Mary Drive	From city limits west to end of County Road maintenance
48	1.42	Golf Course Road	From Hwy 34 west to end (entire road)
49	1.42	Western Road	From National Park bndry west to Winding River Ranch property bndry
491	0.94	Lake Road	From National Park Boundary north to CR492
492	0.72	Taberash Drive	From CR491 west to Forest Service Boundary
55	3.81	Cottonwood Pass Road	From Hot Sulphur Springs city limits east to Cottonwood Pass
6	9.61	Monarch Lake Road	From Hwy 34 east to the end (entire road)
66	1.39	Green Ridge	From Hwy 34 southeast to intersection of CR661
661	0.09	aka: Shadow Mtn Dam Road	From intersection of CR66 north to Shadow Mtn. Lake
667	0.55	Tonahutu Drive	From Grand Lake city limits to the end (entire road)

672	0.35	Pine Beach Campground	From Hwy 34 east to the end (entire road)
5	5.89	4 Bar 4	From U.S. Hwy 40 west to U.S. Hwy 40 (entire road)
522	2.52	FVPKWY	From CR5 northwest to the end
50	5.33	Church Park Road	From CR 5 southwest to Forest Service Boundary
50S	1.05	??unknown??	From CR 50 east to CR73 (entire road)
73	2.24	St. Louis Creek Road	From Fraser City Limits west to Forest Service Bndry
522	0.19	FVPKWY	From CR5221 east to CR522E (connector)
522E	0.24	Ute Street	From CR522E northeast to 523
523	0.09	4th Street	From CR523 north to Highway 40
524	0.43	3rd St.	From U.S. Hwy 40 south to the end (entire road)
526	0.29	South 5th Street	From U.S. Hwy 40 south to the end (entire road)
822	0.21	Main St.	From U.S. Hwy 40 northwest to CR825
823	0.30	Circle St.	From C.R. 822 north then east to end
825	0.08	3rd St.	From U.S. Hwy 40 north to C.R. 822
72	2.77	Tubing Hill Road	From CR721 & railroad tracks south to Forest Service Boundary
8	5.36	Ranch Creek Road	From US Hwy 40 east to CR81 (Water Board Road)
83	0.19	Devils Thumb Road	From U.S. Hwy 40 east to CR84
84	1.35	Meadow Creek Road	From CR83 north to Forest Service Boundary

It is illegal to use any other county road not within forest service or BLM land as a snowmobile route

USFS TRAILHEADS

Name	Trail Sub-Area	Primary Management Regime
Shadow Mountain Dam	Grand Lake/Granby	Non-Motorized
Doe Creek	Grand Lake/Granby	Non-Motorized/Motorized
Monarch Lake	Grand Lake/Granby	Wilderness
Roaring Fork/Knight Ridge	Grand Lake/Granby	Wilderness*
Supply Creek	Grand Lake/Granby	Motorized
Idleglen/Stillwater	Grand Lake/Granby	Motorized
Bill Miller	Grand Lake/Granby	Non-Motorized
Trail Creek	Grand Lake/Granby	Non-Motorized
Elk Mountain	Grand Lake/Granby	Non-Motorized
Willow Creek Pass	Grand Lake/Granby	Non-Motorized
Illinois Pass	Grand Lake/Granby	Non-Motorized/Motorized
North Supply	Grand Lake/Granby	Non-Motorized/Motorized
Bowen Gulch Loop	Grand Lake/Granby	Wilderness/Accessible
Gore Pass	Kremmling/Hot Sulphur Springs	Motorized
Dumont Lake	Routt County	Non-Motorized
Ute Peak	Summit County	Non-Motorized
Ute Pass	Summit County	Non-Motorized
Williams Fork	Summit County	Non-Motorized
South Fork	Summit County	Non-Motorized
Williams Peak	Summit County	Non-Motorized
Darling Creek	Summit County	Non-Motorized/Wilderness
Rogers Pass	Winter Park/Fraser	Non-Motorized
Strawberry	Winter Park/Fraser	Non-Motorized/Motorized
Devils Thumb	Winter Park/Fraser	Non-Motorized/Wilderness
Junco Lake	Winter Park/Fraser	Non-Motorized/Wilderness
High Lonesome	Winter Park/Fraser	Non-Motorized/Wilderness
Rollins Pass	Winter Park/Fraser	Wilderness/Non-Motorized
Keyser Ridge	Winter Park/Fraser	Motorized
Jim Creek	Winter Park/Fraser	Non-Motorized
Twin Bridges	Winter Park/Fraser	Non-Motorized

Name	Trail Sub-Area	Primary Management Regime
Lower Creekside	Winter Park/Fraser	Non-Motorized
St. Louis Creek	Winter Park/Fraser	Non-Motorized
Leland Creek/Deadhorse	Winter Park/Fraser	Non-Motorized
Elk Creek	Winter Park/Fraser	Non-Motorized/Motorized
Fraser Experimental Forest	Winter Park/Fraser	Non-Motorized/Motorized
Vasquez Wilderness	Winter Park/Fraser	Wilderness
Mt. Nystrom	Winter Park/Fraser	Wilderness
Byers Peak	Winter Park/Fraser	Wilderness
St. Louis Lake/Pass/Peak	Winter Park/Fraser	Wilderness
Lake Evelyn	Winter Park/Fraser	Wilderness
Kinney Creek	Winter Park/Fraser	Wilderness

USFS CAMPGROUNDS

Campground	Sites	Trail Sub-Area	Trail Mgt. Regime	Trail Connection
Arapaho Bay	84	Grand Lake/Granby	Water	No
Byers Creek	6	Winter Park/Fraser	Non-Motorized	Yes, St. Louis Lake
Cutthroat Bay (Group)	2 (50 max)	Grand Lake/Granby	Water	No
Denver Creek	22	Routt County	Non-Motorized	Yes, Troublesome Access
Green Ridge	77	Grand Lake/Granby	Water	Yes, Green Ridge, CO River, J. Kirkpatrick
Horseshoe	7	Summit County	Non-Motorized	No
Idlewild	26	Winter Park/Fraser	Non-Motorized	No
Midland (Group)	1 (36 max)	Winter Park/Fraser	Non-Motorized	No
Robbers Roost	11	Winter Park/Fraser	Non-Motorized	No
Sawmill Gulch	5	Grand Lake/Granby	Non-Motorized	No
South Fork	21	Summit County	Equestrian	Yes, South Fork
St. Louis Creek	17	Winter Park/Fraser	Non-Motorized	Yes, Creekside
Stillwater	129	Grand Lake/Granby	Water	No
Sugarloaf	11	Summit County	Non-Motorized	Yes, South Fork
Sunset Point	25	Grand Lake/Granby	Water	No

NATIONAL PARK SERVICE TRAIL FACILITIES

TRAILS

Name	Trail Sub-Area	Primary Management Regime
Coyote Valley	Grand Lake/Granby	Wilderness
East Shore	Grand Lake/Granby	Non-Motorized
East Inlet	Grand Lake/Granby	Wilderness
Grand Ditch	Grand Lake/Granby	Wilderness
Green Mountain	Grand Lake/Granby	Wilderness
Hitchen's Gulch	Grand Lake/Granby	Wilderness
Colorado River	Grand Lake/Granby	Wilderness
North Inlet	Grand Lake/Granby	Wilderness
Onahu Creek	Grand Lake/Granby	Wilderness
Red Mountain	Grand Lake/Granby	Wilderness
Shadow Mountain Lookout	Grand Lake/Granby	Wilderness
Skeleton Gulch	Grand Lake/Granby	Wilderness
Thunder Pass	Grand Lake/Granby	Wilderness
Timber Lake	Grand Lake/Granby	Wilderness
Tonahutu	Grand Lake/Granby	Wilderness

TRAILHEADS

Name	Trail Sub-Area	Primary Management Regime
East Shore	Grand Lake/Granby	Wilderness
East Inlet	Grand Lake/Granby	Wilderness
Tonahutu/North Inlet	Grand Lake/Granby	Wilderness
Onahu	Grand Lake/Granby	Wilderness
Timber Lake	Grand Lake/Granby	Wilderness
Coyote Valley	Grand Lake/Granby	Wilderness/Accessible
Green Mountain	Grand Lake/Granby	Wilderness
Colorado River	Grand Lake/Granby	Wilderness

Marked RMNP Cross-Country Ski Trails

Note: Location refers to HTA trails map grid. Difficulty level is determined by agency; please consider your ability level when deciding difficulty level.

<u>Trail Name</u>	<u>Managing Agent</u>	<u>Difficulty</u>	<u>Loc.</u>	<u>Mileage</u>
Colorado River	Rocky Mountain	Easy/Dif	N-3	3.8
East Inlet	Rocky Mountain	Mod/Dif	O-5	2.0
Green Mountain	Rocky Mountain	Mod/Dif	N-3	1.6
North Inlet	Rocky Mountain	Easy/Dif	O-5	3.6
Onahu Creek	Rocky Mountain	Easy/Dif	N-4	4.2
Timber Lake	Rocky Mountain	Dif	N-3	4.8
Tonahutu Creek	Rocky Mountain	Easy/Mod	O-5	4.4
Valley Loop	Rocky Mountain	Easy		2.5

Fraser to Granby Trail/Fraser River Trail is available for cross-country skiing; grooming is done

Marked RMNP Cross-Country Ski Trails

Note: Location refers to HTA trails map grid. Difficulty level is determined by agency; please consider your ability level when deciding difficulty level.

<u>Trail Name</u>	<u>Managing Agent</u>	<u>Difficulty</u>	<u>Loc.</u>	<u>Mileage</u>
Colorado River	Rocky Mountain	Easy/Dif	N-3	3.8
East Inlet	Rocky Mountain	Mod/Dif	O-5	2.0
Green Mountain	Rocky Mountain	Mod/Dif	N-3	1.6
North Inlet	Rocky Mountain	Easy/Dif	O-5	3.6
Onahu Creek	Rocky Mountain	Easy/Dif	N-4	4.2
Timber Lake	Rocky Mountain	Dif	N-3	4.8
Tonahutu Creek	Rocky Mountain	Easy/Mod	O-5	4.4
Valley Loop	Rocky Mountain	Easy		2.5

Fraser to Granby Trail/Fraser River Trail is available for cross-country skiing; grooming is done

BUREAU OF LAND MANAGEMENT TRAIL FACILITIES

Name	Trail Sub-Area	Managed Use	Mileage
Wolford Mountain	Kremmling/Hot Sulphur Springs	Motorcycle/Non-Motorized	2.3
Cow Gulch	Kremmling/Hot Sulphur Springs	Motorcycle	1.5
Sandtrap Loop	Kremmling/Hot Sulphur Springs	OHV	2.25
Mulberry	Kremmling/Hot Sulphur Springs	OHV	1.35
Old Highway	Kremmling/Hot Sulphur Springs	OHV	2.1
Cow Path	Kremmling/Hot Sulphur Springs	OHV	1.0
Dam	Kremmling/Hot Sulphur Springs	OHV	2.0
Sidewinder	Kremmling/Hot Sulphur Springs	4WD	0.8
Water Tank	Kremmling/Hot Sulphur Springs	MTB	4
Kremmling Cliffs	Kremmling/Hot Sulphur Springs	MTB	7
Fox Loop	Kremmling/Hot Sulphur Springs	MTB	7
Grouse Mountain	Kremmling/Hot Sulphur Springs	MTB	9
Little Wolford	Kremmling/Hot Sulphur Springs	MTB	7
Horse Gulch	Kremmling/Hot Sulphur Springs	MTB	13
Wolford Res. Overlook	Kremmling/Hot Sulphur Springs	MTB	16
Gore Canyon	Kremmling/Hot Sulphur Springs	Pedestrian	1.5
Yarmony	Kremmling/Hot Sulphur Springs	Pedestrian/Equestrian	1.2
Fraser River Access	Kremmling/Hot Sulphur Springs	Pedestrian	0.55
ACEC	Kremmling/Hot Sulphur Springs	Pedestrian	0.3
Muddy Creek	Kremmling/Hot Sulphur Springs	Pedestrian	0.5

*Outside the ACEC Cretaceous Ammonite Site, equestrian use is allowed on all BLM lands.

APPENDIX B

APPENDIX B
FUNDING AND ACCESS
INFORMATION

FUNDING

HTA is funded by: Grand County, Town of Winter Park, Fraser Valley Metropolitan Recreation District, Town of Fraser and Town of Grand Lake. Collectively, funding from these entities is referred to as HTA's Partner Commitments.

Currently, the following granting agencies fund Headwaters Trails Alliance projects: Grand Foundation, Forte' Foundation, Colorado State Recreational Trails Grant Program, Grand County Colorado Tourism Board, National Forest Foundation/Ski Conservation Fund and Arapaho Roosevelt Pawnee Foundation. Colorado State Trails Grants Program.

Funding Sources

- The Colorado State Recreational Trails Grants Program funds small and large, maintenance or construction recreational trail grants, planning grants and trail support grants. The grant program is a partnership among Colorado State Parks, Great Outdoors Colorado, the Colorado Lottery, the Federal Highways Administration Recreational Trails Program, and the Land and Water Conservation Fund.
- National Forest Foundation/Ski Conservation Fund. A signature partnership between the National Forest Foundation and the ski industry, the Ski Conservation Fund gives visitors and guests the opportunity to contribute small donations at participating businesses. The National Forest Foundation matches every \$10 contributed with an additional \$5, then invests the funds in projects on the neighboring National Forest. There are currently Ski Conservation Fund programs on 11 National Forests across the U.S., where projects have helped keep trails open, reduce invasive species, and rehabilitate overused recreation area, all while engaging more than 7,000 volunteers in hands-on projects.

Other potential grant sources:

- Surface Transportation Program -- Transportation Enhancement Activities – Federal Highways Administration www.fhwa.dot.gov/environment/transportation_enhancements/ and (www.enhancements.org) Transportation Enhancement (TE) activities offer funding opportunities to help expand transportation choices and enhance the transportation experience through 12 eligible TE activities related to surface transportation, including pedestrian and bicycle infrastructure and safety programs, scenic and historic highway programs, landscaping and scenic beautification, historic preservation, and environmental mitigation.
- National Scenic Byways Program- Federal Highways Administration (www.bywaysonline.org)
- Colorado Off-Highway Vehicle Recreation Fund: State of Colorado Available for: Trails for motorized vehicles <http://www.parks.state.co.us/OHVsandSnowmobiles/OHVProgram/Grants/Pages/Grants.aspx>
- Fishing is Fun Program: Colorado Division of Wildlife Available for: Enhancement of fishing resources
- State Historical Fund: State Gaming Commission Available for: Restoration or protection of historical resources
- Conservation Trust Fund: Colorado Dept. of Local Affairs
The Colorado Constitution (Article XXVII, Section 3), as amended in 1992, directs 40% of the net proceeds of the Colorado Lottery to the Conservation Trust Fund for distribution to municipalities and counties and other eligible entities for parks, recreation, and open space purposes. Funds are distributed through the Grand County Board of Commissioners.

In-kind service sources:

- Challenge-Cost Share Program: United States Forest Service, and the Bureau of Land Management
Available for: Trail building and maintenance
Service: USFS and BLM donate skilled staff time and equipment
- Volunteers for Outdoor Colorado
Available for: Trail Construction
Service: Donate time and materials for construction of trails
- Rivers and Trails Conservation Assistance Program: National Park Service: River and trail planning assistance

Other Notes:

In conjunction with USFS, BLM and NPS, HTA helps organize and fund National Public Lands Day (NPLD) each year. It has grown to be one of the largest NPLD events in the country. 2012 marked the 18th NPLD in Grand County, whereby countless hours of volunteer work provide much needed improvements and maintenance to our public lands through trail building, maintenance, re-routing, bridge building, tree planting and other activities.

Other Possible Funding Sources:

Impact fees are another source widely used among other growing communities. These fees are meant to compensate for the impact of growth on the community. Growth has impacted trails considerably in Grand County. By guiding portions of these fees into the funding and maintenance of trails the county would be minimizing environmental damage due to overuse of existing trails. Another option for funding the trails would be a special trails tax for the entire county or on just a particularly benefiting recreation district. A tourism tax is another potential source of funding for trails. A tourism tax would be a small sales tax on items defined as tourist/trail oriented. This tax would be generally directed at the users and would only minimally affect county residents who would not use the system.

Another option for funding the trails would be a special trails tax for the entire county or on just a particularly benefiting recreation district. A tourism tax is another potential source of funding for trails. A tourism tax would be a small sales tax on items defined as tourist/trail oriented. This tax would be generally directed at the users and would only minimally affect county residents who would not use the system.

Infrastructure improvement programs often can serve as an impetus and a way to save money in the construction of trails. Trail alignments and construction can be developed along with the improvement of utility corridors, flood control, and roadways.

LAND ACCESS

The ability to acquire land along a trail route should be one of the first major qualifiers for a trail alignment. Acquisition of rights-of-way and easements for the construction of trails is often a sensitive and time consuming process. The county and towns requirement of trail easements during the subdivision process plays a crucial role in trails development. However, these requirements can only produce portions of the routes needed. Other options must be pursued to acquire land through un-subdivided and previously subdivided properties.

Early in the trail route planning process, consideration should be given to the costs and feasibility of land acquisition along certain routes. Public perception of the value of a trail system is a prime influence in the cost and feasibility of a trail system. Identifying land owners and areas which are supportive of trails and directing routes near those areas not only lowers acquisition costs, but also directs routes towards probable users. Pre-existing rights-of-way and easements are always preferred, and Grand County currently has a number of pre-existing gas, power, fiber optic, railroad and other easements. Utility easements have often been used in the development of other trail systems throughout Colorado. Though these are already acquired rights-of-way, the redefinition of an easement to include trails as an acceptable use often takes time and energy.

Grand County currently can require 20% to 60% of all land in subdivisions to be dedicated for open space. State statutes would also permit the county or a town to require the developer to build a trail along the dedicated corridor, much as they can require the building of a road. This process can save a considerable amount of money in building trails. However, as discussed previously, this only creates segments of trail.

The Special Use Permit is often the cheapest and easiest way to acquire land for a trail route. In the land acquisition for the Fraser River Trail much of the trail land was acquired through special use permit through the state highway department along U.S. 40. Special Use Permits may be required to cross many public lands. The Special Use Permit process may be long and may be accompanied by a fee.

Leasing a trail easement is another option. This option may be preferable to the property owner because he/she still maintains ownership of that property. Leasing is also inexpensive and can allow for the cost of land acquisition to be spread out over time. Liability arrangements need to be included in the lease to clarify who retains liability for occurrences on that portion of trail. Also included in the lease should be a renewal provision to prevent future problems. A lease provides the least amount of direct control by the trail agent, the use of the land is often very limited and may cause future problems.

An easement can be exacted from developers or be purchased from private landowners. An easement is defined as an acquired right to use property owned by others. Easements are often the most inexpensive way to acquire trail access rights from private landowners. Easements also allow the property to remain under private ownership, therefore remaining on the tax roll. Again the aspect of liability may be unclear, and must be defined in the easement agreement.

Other Notes:

In conjunction with USFS, BLM and NPS, HTA helps organize and fund National Public Lands Day (NPLD) each year. It has grown to be one of the largest NPLD events in the country. 2014 marked the 20th NPLD in Grand County, whereby countless hours of volunteer work provide much needed improvements and maintenance to our public lands through trail building, maintenance, re-routing, bridge building, tree planting and other activities.

Other Possible Funding Sources:

Impact fees are another source widely used among other growing communities. These fees are meant to compensate for the impact of growth on the community. Growth has impacted trails considerably in Grand

County. By guiding portions of these fees into the funding and maintenance of trails the county would be minimizing environmental damage due to overuse of existing trails. Another option for funding the trails would be a special trails tax for the entire county or on just a particularly benefiting recreation district. A tourism tax is another potential source of funding for trails. A tourism tax would be a small sales tax on items defined as tourist/trail oriented. This tax would be generally directed at the users and would only minimally affect county residents who would not use the system.

Another option for funding the trails would be a special trails tax for the entire county or on just a particularly benefiting recreation district. A tourism tax is another potential source of funding for trails. A tourism tax would be a small sales tax on items defined as tourist/trail oriented. This tax would be generally directed at the users and would only minimally affect county residents who would not use the system.

Infrastructure improvement programs often can serve as an impetus and a way to save money in the construction of trails. Trail alignments and construction can be developed along with the improvement of utility corridors, flood control, and roadways.

APPENDIX C

APPENDIX C TRAIL DEVELOPMENT INFORMATION

TRAIL SPECIFICATIONS

Trail Type Name: Frontcountry- Barrier Free (FCBF)

Difficulty Rating: Easy

Difficulty Symbol: Green Circle

Typical Tread Width: 36"-72" (Sufficient clearance for mobility devices 36" wide)

Typical Corridor Width: 60"-96"

Tread Rugosity: Smooth and even

Average Gradient: <5%

Maximum Sustained Grade: 7%

Maximum Grade: 8%

Typical Tread Materials: Cut and fill at grade compacted crushed stone (6" lift of 1/2"-) with sub-base, as needed.

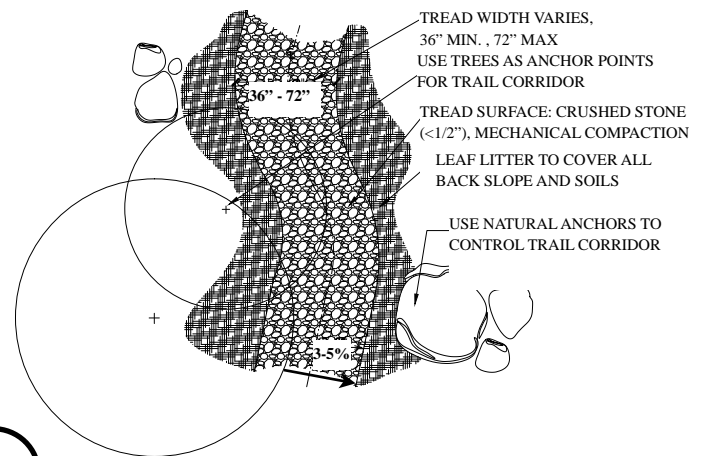
Sideslope Steepness: Flat to 50%, may need retaining walls on backslope if slope is greater

Turn Radius: Wide and open

Trail/Structure Formality: Formal, 90" minimum width

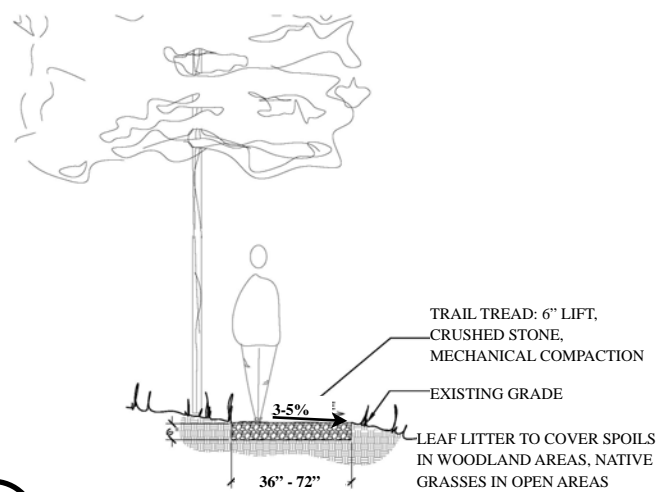
Wet Area Crossing Formality: Formal bridges for minor/major crossings

Duty of Care: High



1.1

PLAN DETAIL: GREENWAY TRAIL TYP.



1.2

SECTION DETAIL: GREENWAY TRAIL TYP.



TRAIL SPECIFICATIONS

Trail Type Name: Frontcountry- Natural Surface (FCNS)

Difficulty Rating: Moderate

Difficulty Symbol: Blue Square

Typical Tread Width: 36"-50"

Typical Corridor Width: 48"-60"

Tread Rugosity: Relatively smooth, some roots or rocks, protrusions <3" above trail tread

Average Gradient: <10%

Maximum Sustained Grade: 15%

Maximum Grade: 20% with surface treatment

Typical Tread Materials: Natural surface with surfacing amendments where necessary

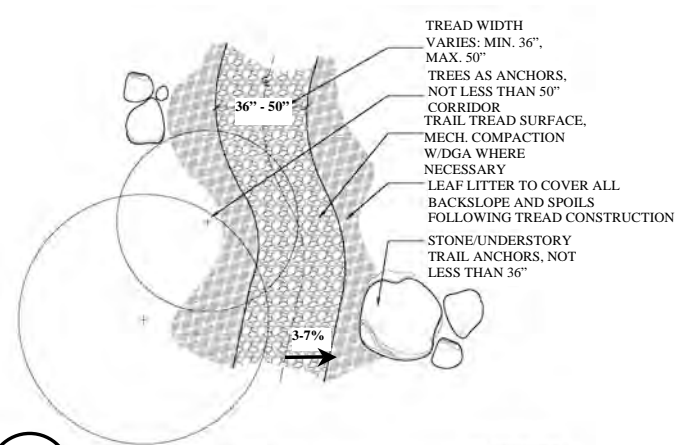
Sideslope Steepness: Flat to 75%

Turn Radius: Wide and open

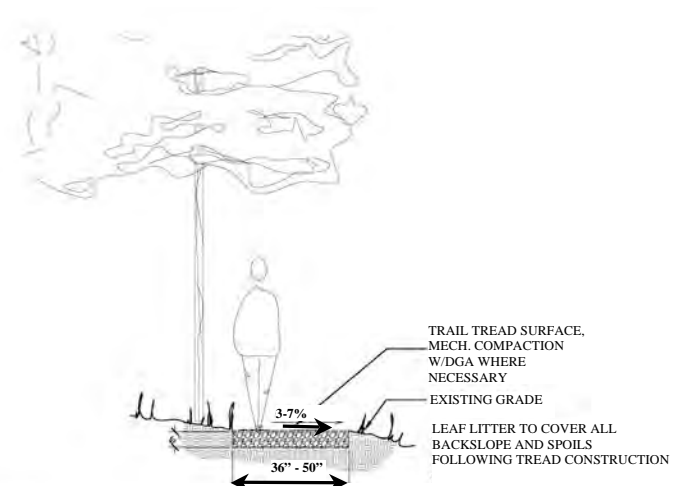
Trail/Structure Formality: Formal, 48" width

Wet Area Crossing Formality: Formal bridges for minor/major crossings, 60" minimum width

Duty of Care: Moderate



2.1 PLAN DETAIL: FRONTCOUNTRY TRAIL- TYP. N.T.S.



2.2 SECTION DETAIL: FRONTCOUNTRY TRAIL- TYP. N.T.S.



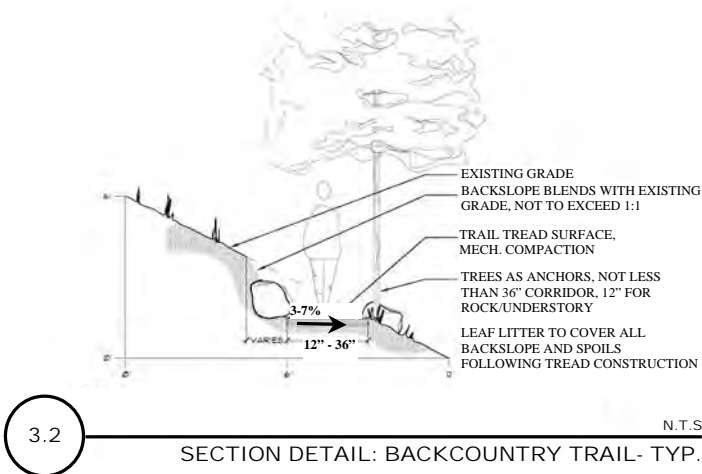
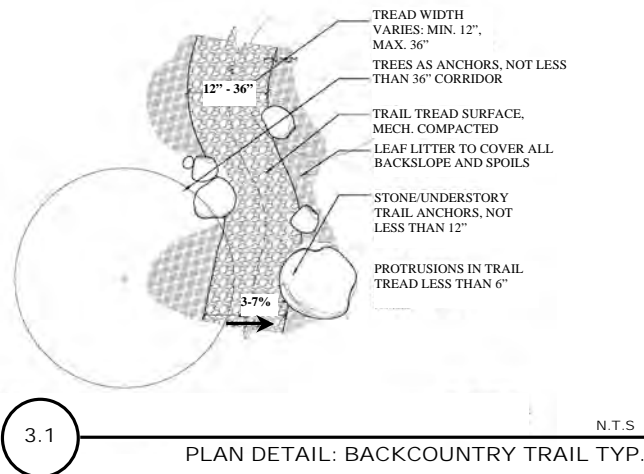
TRAIL SPECIFICATIONS

Trail Type Name: Backcountry (BCM or BCD)
Difficulty Rating: Moderate /Difficult
Difficulty Symbol: Blue Square/Black Diamond

Typical Tread Width: 12" - 36"
Typical Corridor Width: 36"-48"
Tread Rugosity: Uneven, with regular rock and root protrusions above trail tread

Average Gradient: < 10%
Maximum Sustained Grade: 15%
Maximum Grade: 30%, with armored tread and/or steps
Typical Tread Materials: Mostly natural surface (native soils) with some rock armoring
Sideslope Steepness: Flat to 75%

Turn Radius: Tight turns with possible switchbacks
Trail/Structure Formality: Low formality, 36 minimum width
Wet Area Crossing Formality: Armored crossings at grade where possible, bridges less formal with low level engineering
Duty of Care: Low



**FSH 2309.18 – TRAILS MANAGEMENT HANDBOOK
 CHAPTER 20 – TRAIL DEVELOPMENT**

23.11 - Exhibit 01

HIKER/PEDESTRIAN DESIGN PARAMETERS

Design Parameters are technical guidelines for the survey, design, construction, maintenance, and assessment of National Forest System trails, based on their Designed Use and Trail Class and consistent with their management intent¹. Local deviations from any Design Parameter may be established based on trail-specific conditions, topography, or other factors, provided that the deviations are consistent with the general intent of the applicable Trail Class.

Designed Use HIKER/PEDESTRIAN		Trail Class 1	Trail Class 2	Trail Class 3 ²	Trail Class 4 ²	Trail Class 5 ²
Design Tread Width	Wilderness (Single Lane)	0" – 12"	6" – 18"	12" – 24" Exception: may be 36" – 48" at steep side slopes	18" – 24" Exception: may be 36" – 48" at steep side slopes	Not applicable
	Non-Wilderness (Single Lane)	0" – 12"	6" – 18"	18" – 36"	24" – 60"	36" – 72"
	Non-Wilderness (Double Lane)	36"	36"	36" – 60"	48" – 72"	72" – 120"
	Structures (Minimum Width)	18"	18"	18"	36"	36"
Design Surface³	Type	Native, ungraded May be continuously rough	Native, limited grading May be continuously rough	Native, with some on-site borrow or imported material where needed for stabilization and occasional grading Intermittently rough	Native with improved sections of borrow or imported material, and routine grading Minor roughness	Likely imported material, and routine grading Uniform, firm, and stable
	Protrusions	≤ 24" Likely common and continuous	≤ 6" May be common and continuous	≤ 3" May be common, not continuous	≤ 3" Uncommon, not continuous	No protrusions
	Obstacles (Maximum Height)	24"	14"	10"	8"	No obstacles

**FSH 2309.18 – TRAILS MANAGEMENT HANDBOOK
 CHAPTER 20 – TRAIL DEVELOPMENT**

23.11 – Exhibit 01--Continued

Designed Use HIKER/PEDESTRIAN		Trail Class 1	Trail Class 2	Trail Class 3 ²	Trail Class 4 ²	Trail Class 5 ²
Design Grade³	Target Grade	5% – 25%	5% – 18%	3% – 12%	2% – 10%	2% – 5%
	Short Pitch Maximum	40%	35%	25%	15%	5% FSTAG: 5% – 12% ²
	Maximum Pitch Density	20% – 40% of trail	20% – 30% of trail	10% – 20% of trail	5% – 20% of trail	0% – 5% of trail
Design Cross Slope	Target Cross Slope	Natural side slope	5% – 20%	5% – 10%	3% – 7%	2% – 3% (or crowned)
	Maximum Cross Slope	Natural side slope	25%	15%	10%	3%
Design Clearing	Height	6'	6' – 7'	7' – 8'	8' – 10'	8' – 10'
	Width	≥ 24" Some vegetation may encroach into clearing area	24" – 48" Some light vegetation may encroach into clearing area	36" – 60"	48" – 72"	60" – 72"
	Shoulder Clearance	3" – 6"	6" – 12"	12" – 18"	12" – 18"	12" – 24"
Design Turn	Radius	No minimum	2' – 3'	3' – 6'	4' – 8'	6' – 8'

¹ For definitions of Design Parameter attributes (e.g., Design Tread Width and Short Pitch Maximum), see FSH 2309.18, section 05.

² Trail Classes 3, 4, and 5, in particular, have the potential to be accessible. If assessing or designing trails for accessibility, refer to the Forest Service Trail Accessibility Guidelines (FSTAG) for more specific technical provisions and tolerances (FSM 2350).

³ The determination of the trail-specific Design Grade, Design Surface, and other Design Parameters should be based upon soils, hydrological conditions, use levels, erosion potential, and other factors contributing to surface stability and overall sustainability of the trail.

**FSH 2309.18 – TRAILS MANAGEMENT HANDBOOK
 CHAPTER 20 – TRAIL DEVELOPMENT**

23.12 - Exhibit 01

PACK AND SADDLE DESIGN PARAMETERS

Design Parameters are technical guidelines for the survey, design, construction, maintenance, and assessment of National Forest System trails, based on their Designed Use and Trail Class and consistent with their management intent¹. Local deviations from any Design Parameter may be established based on trail-specific conditions, topography, or other factors, provided that the deviations are consistent with the general intent of the applicable Trail Class.

Designed Use PACK AND SADDLE		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
Design Tread Width	Wilderness (Single Lane)	Typically not designed or actively managed for equestrians, although use may be allowed	12" – 18" May be up to 48" along steep side slopes 48" – 60" or greater along precipices	18" – 24" May be up to 48" along steep side slopes 48" – 60" or greater along precipices	24" May be up to 48" along steep side slopes 48" – 60" or greater along precipices	Typically not designed or actively managed for equestrians, although use may be allowed
	Non-Wilderness (Single Lane)		12" – 24" May be up to 48" along steep side slopes 48" – 60" or greater along precipices	18" – 48" 48" – 60" or greater along precipices	24" – 96" 48" – 60" or greater along precipices	
	Non-Wilderness (Double Lane) Structures (Minimum Width)		60" Other than bridges: 36" Bridges without handrails: 60" Bridges with handrails: 84" clear width	60" – 84" Other than bridges: 36" Bridges without handrails: 60" Bridges with handrails: 84" clear width	84" – 120" Other than bridges: 36" Bridges without handrails: 60" Bridges with handrails: 84" clear width	
Design Surface ²	Type		Native, with limited grading May be frequently rough	Native, with some on-site borrow or imported material where needed for stabilization and occasional grading Intermittently rough	Native, with improved sections of borrow or imported material and routine grading Minor roughness	

**FSH 2309.18 – TRAILS MANAGEMENT HANDBOOK
 CHAPTER 20 – TRAIL DEVELOPMENT**

23.12 – Exhibit 01--Continued

Designed Use PACK AND SADDLE		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
Design Surface (continued)	Protrusions		≤ 6" May be common and continuous	≤ 3" May be common, not continuous	≤ 3" Uncommon, not continuous	
	Obstacles (Maximum Height)		12"	6"	3"	
Design Grade ²	Target Grade		5% – 20%	3% – 12%	2% – 10%	
	Short Pitch Maximum		30%	20%	15%	
	Maximum Pitch Density		15% – 20% of trail	5% – 15% of trail	5% – 10% of trail	
Design Cross Slope	Target Cross Slope		5% – 10%	3% – 5%	0% – 5%	
	Maximum Cross Slope		10%	8%	5%	
Design Clearing	Height		8' – 10'	10'	10' – 12'	
	Width		72" Some light vegetation may encroach into clearing area	72" – 96"	96"	
	Shoulder Clearance		6" – 12" Pack clearance: 36" x 36"	12" – 18" Pack clearance: 36" x 36"	12" – 18" Pack clearance: 36" x 36"	
Design Turn	Radius		4' – 5'	5' – 8'	6' – 10'	

¹ For definitions of Design Parameter attributes (e.g., Design Tread Width and Short Pitch Maximum), see FSH 2309.18, section 05.

² The determination of the trail-specific Design Grade, Design Surface, and other Design Parameters should be based upon soils, hydrological conditions, sea levels, erosion potential, and other factors contributing to surface stability and overall sustainability of the trail.

**FSH 2309.18 – TRAILS MANAGEMENT HANDBOOK
 CHAPTER 20 – TRAIL DEVELOPMENT**

23.13 – Exhibit 01

BICYCLE DESIGN PARAMETERS

Design Parameters are technical guidelines for the survey, design, construction, maintenance, and assessment of National Forest System trails, based on their Designed Use and Trail Class and consistent with their management intent¹. Local deviations from any Design Parameter may be established based on trail-specific conditions, topography, or other factors, provided that the deviations are consistent with the general intent of the applicable Trail Class.

Designed Use BICYCLE		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
Design Tread Width	Single Lane	6" – 12"	12" – 24"	18" – 36"	24" – 48"	36" – 60"
	Double Lane	36" – 48"	36" – 48"	36" – 48"	48" – 84"	72" – 120"
	Structures (Minimum Width)	18"	18"	36"	48"	60"
Design Surface ²	Type	Native, ungraded May be continuously rough Sections of soft or unstable tread on grades < 5% may be common and continuous	Native, with limited grading May be continuously rough Sections of soft or unstable tread on grades < 5% may be common	Native, with some on-site borrow or imported material where needed for stabilization and occasional grading Intermittently rough Sections of soft or unstable tread on grades < 5% may be present, but not common	Native, with improved sections of borrow or imported materials and routine grading Stable, with minor roughness	Likely imported material and routine grading Uniform, firm, and stable
	Protrusions	≤ 24" Likely common and continuous	≤ 6" May be common and continuous	≤ 3" May be common, but not continuous	≤ 3" Uncommon and not continuous	No protrusions
	Obstacles (Maximum Height)	24"	12"	10"	8"	No obstacles

**FSH 2309.18 – TRAILS MANAGEMENT HANDBOOK
 CHAPTER 20 – TRAIL DEVELOPMENT**

23.13 – Exhibit 01--Continued

Designed Use BICYCLE		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
Design Grade ²	Target Grade	5% – 20%	5% – 12%	3% – 10%	2% – 8%	2% – 5%
	Short Pitch Maximum	30% 50% on downhill segments only	25% 35% on downhill segments only	15%	10%	8%
	Maximum Pitch Density	20% – 30% of trail	10% – 30% of trail	10% – 20% of trail	5% – 10% of trail	0% – 5% of trail
Design Cross Slope	Target Cross Slope	5% – 10%	5% – 8%	3% – 8%	3% – 5%	2% – 3%
	Maximum Cross Slope	10%	10%	8%	5%	5%
Design Clearing	Height	6'	6' – 8'	8'	8' - 9'	8' - 9'
	Width	24" – 36" Some vegetation may encroach into clearing area	36" – 48" Some light vegetation may encroach into clearing area	60" – 72"	72" – 96"	72" – 96"
	Shoulder Clearance	0' – 12"	6" – 12"	6" – 12"	6" – 18"	12" – 18"
Design Turn	Radius	2' – 3'	3' – 6'	4' – 8'	8' – 10'	8' - 12'

¹ For definitions of Design Parameter attributes (e.g., Design Tread Width and Short Pitch Maximum), see FSH 2309.18, section 05.

² The determination of the trail-specific Design grade, Design Surface, and other Design Parameters should be based upon soils, hydrological conditions, use levels, erosion potential, and other factors contributing to surface stability and overall sustainability of the trail.

**FSH 2309.18 – TRAILS MANAGEMENT HANDBOOK
 CHAPTER 20 – TRAIL DEVELOPMENT**

23.21 – Exhibit 01

MOTORCYCLE DESIGN PARAMETERS

Design Parameters are technical guidelines for the survey, design, construction, maintenance, and assessment of National Forest System trails, based on their Designed Use and Trail Class and consistent with their management intent¹. Local deviations from any Design Parameter may be established based on trail-specific conditions, topography, or other factors, provided that the deviations are consistent with the general intent of the applicable Trail Class.

Designed Use MOTORCYCLE		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
Design Tread Width	Single Lane	Typically not designed or actively managed for motorcycles, although use may be allowed	8" – 24"	18" – 36"	24" – 48"	Typically not designed or actively managed for motorcycles, although use may be allowed
	Double Lane		48"	48" – 60"	60" – 72"	
	Structures (Minimum Width)		36"	48"	48"	
Design Surface ²	Type		Native, with limited grading May be continuously rough Sections of soft or unstable tread on grades < 5% may be common and continuous	Native, with some on-site borrow or imported material where needed for stabilization and occasional grading Intermittently rough Sections of soft or unstable tread on grades < 5% may be present	Native, with imported materials for tread stabilization likely and routine grading Minor roughness Sections of soft tread not common	
	Protrusions		≤ 6" May be common and continuous	≤ 3" May be common, but not continuous	≤ 3" Uncommon and not continuous	
	Obstacles (Maximum Height)		18" May be common or placed for increased challenge	12" Common and left for increased challenge	3" Uncommon	

**FSH 2309.18 – TRAILS MANAGEMENT HANDBOOK
 CHAPTER 20 – TRAIL DEVELOPMENT**

23.21 – Exhibit 01--Continued

Designed Use MOTORCYCLE		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
Design Grade ²	Target Grade		10% – 25%	5% – 20%	3% – 10%	
	Short Pitch Maximum		40%	25%	15%	
	Maximum Pitch Density		20% – 40% of trail	15% – 30% of trail	10% – 20% of trail	
Design Cross Slope	Target Cross Slope		5% – 10%	5% – 8%	3% – 5%	
	Maximum Cross Slope		15%	10%	10%	
Design Clearing	Height		6' – 7'	6' – 8'	8' – 10'	
	Width (On steep side hills, increase clearing on uphill side by 6" – 12")		36" – 48" Some light vegetation may encroach into clearing area	48" – 60"	60" – 72"	
	Shoulder Clearance		6" – 12"	12" – 18"	12" – 24"	
Design Turn	Radius		3' – 4'	4' – 6'	5' – 8'	

¹ For definitions of Design Parameter attributes (e.g., Design Tread Width and Short Pitch Maximum), see FSH 2309.18, section 05.

² The determination of the trail-specific Design Grades, Design Surface, and other Design Parameters should be based upon soils, hydrological conditions, use levels, erosion potential, and other factors contributing to surface stability and overall trail sustainability.

**FSH 2309.18 – TRAILS MANAGEMENT HANDBOOK
 CHAPTER 20 – TRAIL DEVELOPMENT**

23.22 – Exhibit 01

ALL-TERRAIN VEHICLE DESIGN PARAMETERS

Design Parameters are technical guidelines for the survey, design, construction, maintenance, and assessment of National Forest System trails, based on their Designed Use and Trail Class and consistent with their management intent¹. Local deviations from any Design Parameter may be established based on trail-specific conditions, topography, or other factors, provided that the deviations are consistent with the general intent of the applicable Trail Class.

Designed Use ALL-TERRAIN VEHICLE		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
Design Tread Width	Single Lane	Typically not designed or actively managed for ATVs, although use may be allowed	48" – 60"	60"	60" – 72"	Typically not designed or actively managed for ATVs, although use may be allowed
	Double Lane		96"	96" – 108"	96" – 120"	
Structures (Minimum Width)	60"		60"	60"		
Design Surface ²	Type		Native, with limited grading May be continuously rough Sections of soft or unstable tread on grades < 5% may be common and continuous	Native, with some on-site borrow or imported material where needed for stabilization and occasional grading Intermittently rough Sections of soft or unstable tread on grades < 5% may be present	Native, with imported materials for tread stabilization likely and routine grading Minor roughness Sections of soft tread uncommon	
	Protrusions		≤ 6" May be common and continuous	≤ 3" May be common, but not continuous	≤ 3" Uncommon and not continuous	
Obstacles (Maximum Height)		12" May be common or placed for increased challenge	6" May be common and left for increased challenge	3" Uncommon		

**FSH 2309.18 – TRAILS MANAGEMENT HANDBOOK
 CHAPTER 20 – TRAIL DEVELOPMENT**

23.22 – Exhibit 01--Continued

Designed Use ALL-TERRAIN VEHICLE		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
Design Grade ²	Target Grade		10% – 25%	5% – 15%	3% – 10%	
	Short Pitch Maximum		35%	25%	15%	
	Maximum Pitch Density		20% – 40% of trail	15% – 30% of trail	10% – 20% of trail	
Design Cross Slope	Target Cross Slope		5% – 10%	3% – 8%	3% – 5%	
	Maximum Cross Slope		15%	10%	8%	
Design Clearing	Height		6' – 7'	6' – 8'	8' – 10'	
	Width (On steep side hills, increase clearing on uphill side by 6" – 12")	60"	60" – 72"	72" – 96"		
	Shoulder Clearance	0" – 6"	6" – 12"	12" – 18"		
Design Turn	Radius	6' – 8'	8' – 10'	8' – 12'		

¹ For definitions of Design Parameter attributes (e.g., Design Tread Width and Short Pitch Maximum), see FSH 2309.18, section 05.

² The determination of the trail-specific Design Grade, Design Surface, and other Design Parameters should be based upon soils, hydrological conditions, use levels, erosion potential, and other factors contributing to surface stability and overall sustainability of the trail.

**FSH 2309.18 – TRAILS MANAGEMENT HANDBOOK
 CHAPTER 20 – TRAIL DEVELOPMENT**

23.31 – Exhibit 01

CROSS-COUNTRY SKI DESIGN PARAMETERS

Design Parameters are technical guidelines for the survey, design, construction, maintenance, and assessment of National Forest System trails, based on their Designed Use and Trail Class and consistent with their management intent¹. Local deviations from any Design Parameter may be established based on trail-specific conditions, topography, or other factors, provided that the deviations are consistent with the general intent of the applicable Trail Class.

Designed Use CROSS-COUNTRY SKI		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
Design Groomed Width	Single Lane	Typically not designed or actively managed for cross-country skiing, allow use may be allowed	2' – 4'	6' – 8'	8' – 10"	Typically not designed or actively managed for cross-country skiing, although use may be allowed
	Double Lane		Typically not groomed	Or width of grooming equipment	Or width of grooming equipment	
	Structures (Minimum Width)		6' – 8'	8' – 12'	12' – 16'	
Design Grooming and Surface ²	Type		36"	36"	36"	
	Protrusions		Generally no machine grooming	May receive occasional machine grooming for snow compaction and track setting	Regular machine grooming for snow compaction and track setting	
	Obstacles (Maximum Height)		No protrusions	No protrusions	No protrusions	
			12"	8"	No obstacles	
			Uncommon	Uncommon (no obstacles if machine groomed)		

**FSH 2309.18 – TRAILS MANAGEMENT HANDBOOK
 CHAPTER 20 – TRAIL DEVELOPMENT**

23.31 – Exhibit 01--Continued

Designed Use CROSS-COUNTRY SKI		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
Design Grade ²	Target Grade		5% – 15%	2% – 10%	0% – 8%	
	Short Pitch Maximum		25%	20%	12%	
	Maximum Pitch Density		10% – 20% of trail	5% – 15% of trail	0% – 10% of trail	
Design Cross Slope	Target Cross Slope		0% – 10%	0% – 5%	0% – 5%	
	Maximum Cross Slope (For up to 50')		20%	15%	10%	
Design Clearing	Height (Above normal maximum snow level)		6' – 8'	8'	8' – 10'	
	Width		24" – 60"	72" – 20"	96" – 168"	
	Shoulder Clearance		Light vegetation may encroach into clearing area	Light vegetation may encroach into clearing area	Widen clearing at turns or if increased sight distance needed	
			0" – 6"	0" – 12"	0" – 24"	
Design Turn	Radius		8' – 10'	15' – 20'	≥ 25'	
				Or to accommodate grooming equipment		

¹ For definitions of Design Parameter attributes (e.g., Design Tread Width and Short Pitch Maximum), see FSH 2309.18, section 05.

² The determination of the trail-specific Design Grade, Design Surface, and other Design Parameters should be based upon soils, hydrological conditions, use levels, erosion potential and other factors contributing to surface stability and overall sustainability of the trail

**FSH 2309.18 – TRAILS MANAGEMENT HANDBOOK
 CHAPTER 20 – TRAIL DEVELOPMENT**

23.33 – Exhibit 01

SNOWMOBILE DESIGN PARAMETERS

Design Parameters are technical guidelines for the survey, design, construction, maintenance, and assessment of National Forest System trails, based on their Designed Use and Trail Class and consistent with their management intent¹. Local deviations from any Design Parameter may be established based on trail-specific conditions, topography, or other factors, provided that the deviations are consistent with the general intent of the applicable Trail Class.

Designed Use SNOWMOBILE		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
Design Tread Width	Single Lane	Typically not designed or actively managed for snowmobiles, although use may be allowed	4' – 6' Typically not groomed	6' – 8' Or width of grooming equipment On turns with tight radius, increase groomed width to ≥ 10'	8' – 10' Or width of grooming equipment On turns with tight radius, increase groomed width to ≥ 12'	Typically not designed or actively managed for snowmobiles, although use may be allowed
	Double Lane		10' Typically not groomed	10' – 12'	12' – 20'	
	Structures (Minimum Width)		6'	12'	18'	
Design Surface ¹	Type		Generally no machine grooming Commonly rough and bumpy	May receive occasional machine grooming for snow compaction and conditioning Frequently rough and bumpy	Regular machine grooming for snow compaction and conditioning Commonly smooth	
	Protrusions		No protrusions	No protrusions	No protrusions	
	Obstacles (Maximum Height)		12" Uncommon	6" Uncommon (no obstacles if machine groomed)	No obstacles	

**FSH 2309.18 – TRAILS MANAGEMENT HANDBOOK
 CHAPTER 20 – TRAIL DEVELOPMENT**

23.33 – Exhibit 01--Continued

Designed Use SNOWMOBILE		Trail Class 1	Trail Class 2	Trail Class 3	Trail Class 4	Trail Class 5
Design Grade ²	Target Grade		0% – 12%	0% – 10%	0% – 8%	
	Short Pitch Maximum		35%	25%	20%	
	Maximum Pitch Density		15% – 30% of trail	10% – 20% of trail	5% – 10% of trail	
Design Cross Slope	Target Cross Slope		0% – 10%	0% – 5%	0%	
	Maximum Cross Slope		15%	10%	5%	
Design Clearing	Height (Above normal maximum snow level)		6'	6' – 8' Provide sufficient clearance for grooming equipment	8' – 12' Provide sufficient clearance for grooming equipment	
	Width	6' – 12' Some light vegetation may encroach into clearing area	8' – 14' Light vegetation may encroach into clearing area	10' – 22' Widen clearing at turns or if increased sight distance needed		
	Shoulder Clearance	6" – 12"	12" – 18"	12" – 24"		
Design Turn	Radius	8' – 10'	15' – 20' Or to accommodate grooming equipment	25' – 50'		

¹ For definitions of Design Parameter attributes (e.g., Design Tread Width and Short Pitch Maximum), see FSH 2309.18.

² The determination of the trail-specific Design Grade, Design Surface, and other Design Parameters should be based upon soils, hydrological conditions, use levels, erosion potential, and other factors contributing to surface stability and overall sustainability of the trail.

TRAIL STANDARDS

A variety of trail designs are proposed for the Towns trail system. These standards are intended to vary according to the anticipated amount of use; type of user, and type of area the trail is located in. In some instances, variations on these standards may be necessary due to topography or financial constraints. Five types of trails have been identified – Sidewalks, Bike Lanes, Major Trails, Neighborhood Trails, Singletrack Trails

- Sidewalks (within the Town of Winter Park) – along major roads
 - Width – Refer to the Standards and Specifications for Design and Construction, 2012 Edition
 - Surface – Refer to the Standards and Specifications for Design and Construction, 2012 Edition
 - Grade - Refer to the Standards and Specifications for Design and Construction, 2012 Edition
- Major Trails (i.e. Fraser River Trail)
 - Width – 8 foot – 10 foot
 - Surface – Gravel / Asphalt
 - Grade – 8% Maximum, 5% over sustained distance
- Neighborhood Trails (i.e. Leland Creek Trail / Alpine Trail)
 - Width – 5 foot
 - Surface – Gravel
 - Grade – 15% maximum, 10% over sustained distance
- Singletrack Trails (i.e. Akima's Way)
 - Refer to the International Mountain Biking Association Standards
- Town of Fraser Pedestrian Facilities
 - Refer to the Town of Fraser Design Criteria and Construction Standards

The Grand County Trails Master Plan, developed by Headwaters Trails Alliance has additional trail standards to use as a reference.



June 2013

FOREST SERVICE TRAILS

Long- and Short-Term
Improvements Could
Reduce Maintenance
Backlog and Enhance
System Sustainability

GAO Highlights

Highlights of [GAO-13-618](#), a report to congressional requesters

Why GAO Did This Study

The Forest Service manages more than 158,000 miles of recreational trails offering hikers, horseback riders, cyclists, off-highway-vehicle drivers, and others access to national forests. To remain safe and usable, these trails need regular maintenance, such as removal of downed trees or bridge repairs. GAO was asked to review the agency's trail maintenance activities. This report examines (1) the extent to which the Forest Service is meeting trail maintenance needs, and effects associated with any maintenance not done; (2) resources, including funding and labor, that the agency employs to maintain its trails; (3) factors, if any, complicating agency efforts to maintain its trails; and (4) options, if any, that could improve the agency's trail maintenance efforts. GAO reviewed laws and agency documents; analyzed Forest Service budget data for fiscal years 2006-2012 and trails data for fiscal years 2008-2012; and interviewed agency officials and representatives of 16 stakeholder groups selected to represent trail users, conservation, and industry. Their views are not generalizable.

What GAO Recommends

GAO recommends, among other actions, that the Forest Service (1) analyze trails program needs and available resources and develop options for narrowing the gap between them and take steps to assess and improve the sustainability of its trails and (2) take steps to enhance training on collaborating with and managing volunteers who help maintain trails. In commenting on a draft of this report, the Forest Service generally agreed with GAO's findings and recommendations.

View [GAO-13-618](#). For more information, contact Anne-Marie Fennell at (202) 512-3841 or fennella@gao.gov.

June 2013

FOREST SERVICE TRAILS

Long- and Short-Term Improvements Could Reduce Maintenance Backlog and Enhance System Sustainability

What GAO Found

The Forest Service has more miles of trail than it has been able to maintain, resulting in a persistent maintenance backlog with a range of negative effects. In fiscal year 2012, the agency reported that it accomplished at least some maintenance on about 37 percent of its 158,000 trail miles and that about one-quarter of its trail miles met the agency's standards. The Forest Service estimated the value of its trail maintenance backlog to be \$314 million in fiscal year 2012, with an additional \$210 million for annual maintenance, capital improvement, and operations. Trails not maintained to quality standards have a range of negative effects, such as inhibiting trail use and harming natural resources, and deferring maintenance can add to maintenance costs.

The Forest Service relies on a combination of internal and external resources to help maintain its trail system. Internal resources include about \$80 million allocated annually for trail maintenance activities plus funding for other agency programs that involve trails. External resources include volunteer labor, which the Forest Service valued at \$26 million in fiscal year 2012, and funding from federal programs, states, and other sources.

Collectively, agency officials and stakeholders GAO spoke with identified a number of factors complicating the Forest Service's trail maintenance efforts, including (1) factors associated with the origin and location of trails, (2) some agency policies and procedures, and (3) factors associated with the management of volunteers and other external resources. For example, many trails were created for purposes other than recreation, such as access for timber harvesting or firefighting, and some were built on steep slopes, leaving unsustainable, erosion-prone trails that require continual maintenance. In addition, certain agency policies and procedures complicate trail maintenance efforts, such as the agency's lack of standardized training in trails field skills, which limits agency expertise. Further, while volunteers are important to the agency's trail maintenance efforts, managing volunteers can decrease the time officials can spend performing on-the-ground maintenance.

Agency officials and stakeholders GAO interviewed collectively identified numerous options to improve Forest Service trail maintenance, including (1) assessing the sustainability of the trail system, (2) improving agency policies and procedures, and (3) improving management of volunteers and other external resources. In a 2010 document titled *A Framework for Sustainable Recreation*, the Forest Service noted the importance of analyzing recreation program needs and available resources as assessing potential ways to narrow the gap between them, which the agency has not yet done for its trails. Many officials and stakeholders suggested that the agency systematically assess its trail system to identify ways to reduce the gap and improve trail system sustainability. They also identified other options for improving management of volunteers. For example, while the agency's goal in the *Forest Service Manual* is to use volunteers, the agency has not established collaboration with and management of volunteers who help maintain trails as clear expectations for trails staff responsible for working with volunteers, and training in this area is limited. Some agency officials and stakeholders stated that training on how to collaborate with and manage volunteers would enhance the agency's ability to capitalize on this resource.

**FSH 2309.18 - TRAILS MANAGEMENT HANDBOOK
 CHAPTER 10 - TRAIL PLANNING**

18 – Exhibit 01

TRAIL OPERATION AND MAINTENANCE CONSIDERATIONS

Trail Operation and Maintenance Considerations are general guidelines for developing trail prescriptions and managing, operating, and maintaining National Forest System trails. The Considerations are a starting point and likely will need to be adapted to reflect local financial capability and other circumstances. Exceptions to the Trail Operation and Maintenance Considerations may occur at the trail-specific, district, forest or grassland, or regional level.

Trail Attributes	Trail Class 1 Minimally Developed	Trail Class 2 Moderately Developed	Trail Class 3 Developed	Trail Class 4 Highly Developed	Trail Class 5 Fully Developed
Trail Management	Typically managed to accommodate: <ul style="list-style-type: none"> • Low use levels • Highly skilled users who are comfortable off-trail • Users with high degree of orienteering skill • Some travel modes and ability levels may be impractical or impossible and may not be encouraged • Water Trails: users with high level of navigation/orientation and paddling skills 	Typically managed to accommodate: <ul style="list-style-type: none"> • Low-to-moderate use levels • Moderately to highly skilled users, capable negotiating obstacles • Users with moderate orienteering skill • Many types of uses, but challenging and requires advanced skills • Water Trails: users with moderate to high level of navigation/orientation and paddling skills 	Typically managed to accommodate: <ul style="list-style-type: none"> • Moderate to heavy use • Users with intermediate skill level and experience • Users with minimal orienteering skills • Moderately easy travel by Managed Uses • Water Trails: basic to moderate navigating and paddling skills required Random potential for accessible use	Typically managed to accommodate: <ul style="list-style-type: none"> • Very heavy use • Users with minimal skills and experience • Users with minimal or no orienteering skills • Easy travel by Managed Uses • Water Trails: basic navigating and paddling skills required May be or has potential to be made accessible	Typically managed to accommodate: <ul style="list-style-type: none"> • Intensive use • Users with limited skills and experience Typically meets agency requirements for accessibility
Maintenance Indicators	<ul style="list-style-type: none"> • Resource protection • Safety commensurate with targeted recreation experience 	<ul style="list-style-type: none"> • Resource protection • Safety commensurate with targeted recreational experience 	<ul style="list-style-type: none"> • Resource protection • User convenience • Safety commensurate with targeted recreation experience 	<ul style="list-style-type: none"> • User comfort and ease • Resource protection • Safety commensurate with targeted recreation experience 	<ul style="list-style-type: none"> • User comfort and ease • High level of accessibility for Managed Uses • Safety commensurate with targeted recreation experience
Routine Maintenance Frequency and Intensity¹	<ul style="list-style-type: none"> • Infrequent or no scheduled maintenance • Typically, maintenance conducted every 5 or more years or in response to reports of unusual resource problems requiring repair 	<ul style="list-style-type: none"> • Maintenance scheduled to preserve the trail and its location • Typically, maintenance conducted every 3-5 years or in response to reports of unusual resource problems requiring repair 	<ul style="list-style-type: none"> • Trail cleared for availability early in its season of use and for preservation of its integrity • Typically, maintenance conducted every 1-3 years or in response to reports of trail or resource damage or significant obstacles to Managed Use and experience level 	<ul style="list-style-type: none"> • Trail cleared at earliest opportunity to make it available for season of use • Typically, maintenance conducted at least annually 	<ul style="list-style-type: none"> • Typically, maintenance conducted at least annually, or as needed to meet posted conditions • Typically, major damage or safety concerns corrected or posted within 24 hours of discovery

¹ Maintenance in this category does not include routine trail condition assessment surveys.

GAO

Report to the Subcommittee on
National Parks, Forests and Public
Lands, Committee on Natural
Resources, House of Representatives

June 2009

FEDERAL LANDS

Enhanced Planning Could Assist Agencies in Managing Increased Use of Off-Highway Vehicles





Highlights of [GAO-09-509](#), a report to the Subcommittee on National Parks, Forests and Public Lands, Committee on Natural Resources, House of Representatives

Why GAO Did This Study

Off-highway vehicle (OHV) use on lands managed by the Department of Agriculture's Forest Service and the Department of the Interior's Bureau of Land Management (BLM) and National Park Service (Park Service) has become popular over the past few decades. Some critics have asserted that OHV use causes adverse environmental, social, and safety impacts, while proponents have voiced concerns about retaining access to federal lands. GAO examined the (1) trends in and status of OHV use on federal lands, as well as reported environmental, social, and safety impacts; (2) agencies' strategic planning for managing OHV use; (3) actions taken by agency field units to manage OHV use; and (4) current OHV management challenges.

GAO collected and analyzed related executive orders and agency OHV plans, regulations, and guidance; interviewed agency and interest group officials; and conducted a Web-based survey of all three agencies' field unit officials.

What GAO Recommends

GAO recommends that the Forest Service and BLM improve their strategic planning and take other actions to help provide quality OHV opportunities while protecting federal lands and resources. The agencies generally concurred with GAO's findings and recommendations.

View [GAO-09-509](#) or key components. To view survey results, click on [GAO-09-547SP](#). For more information, contact Robin M. Nazzaro at (202) 512-3841 or nazzaror@gao.gov.

FEDERAL LANDS

Enhanced Planning Could Assist Agencies in Managing Increased Use of Off-Highway Vehicles

What GAO Found

OHV use on federal lands—both authorized and unauthorized—increased from fiscal year 2004 through fiscal year 2008, with varying environmental, social, and safety impacts, according to officials from all three agencies. All three agencies reported that OHVs are predominantly used on their lands for OHV recreation, such as trail and open-area riding. Most Park Service officials said that OHV use constitutes less than 10 percent of the recreation on their lands. Most officials from all three agencies also said that OHV-related environmental impacts occur on less than 20 percent of their lands, although a few said that such impacts occur on 80 percent or more of their lands. Most officials said that social and safety impacts, such as conflicts with nonmotorized users, occasionally or rarely occurred.

Forest Service and BLM plans for OHV management are missing key elements of strategic planning, such as results-oriented goals, strategies to achieve the goals, time frames for implementing strategies, or performance measures to monitor incremental progress. For example, the Forest Service's strategic plan has no strategies to address key aspects of OHV management, such as communicating with the public or enforcing OHV regulations. Similarly, while BLM's recreation plan contains strategies addressing key aspects of OHV management, the agency has not identified time frames for implementing these strategies or performance measures for monitoring progress. The Park Service has no extensive planning for managing OHV use, but this absence seems reasonable given that its regulations limit OHV use to only a few units and OHV use is not a predominant recreational activity on its lands.

While agencies' field units have taken many actions to manage OHV use, additional efforts could improve communication and enforcement. In particular, units have taken actions such as supplementing federal funds with outside resources like state grants, communicating with the public by posting signs and maps, and enforcing OHV regulations by occasionally patrolling OHV areas and writing citations for OHV violations. Few officials, however, indicated that their unit had signs and maps for nearly all of their OHV areas. Additionally, while most field unit officials said that they conduct enforcement activities, such as writing citations, about half indicated that fines are insufficient to deter illegal or unsafe OHV use. In addition, a majority of officials reported they cannot sustainably manage their existing OHV use areas; sustainable management would include having the necessary human and financial resources to ensure compliance with regulations, educate users, maintain OHV use areas, and evaluate the OHV program.

Officials identified numerous challenges in managing OHV use, of which the most widely identified were insufficient financial resources, as well as staff for OHV management and enforcement. In addition, most officials cited enforcement of OHV regulations as a great challenge. Other challenges were maintaining signs, managing the public's varied expectations about how federal lands should be used, and changing long-established OHV use patterns.

TRAIL DEVELOPMENT BEST PRACTICES RESOURCES

Conflicts on Multiple-Use Trails. Roger Moore. U.S. Federal Highway Administration, 1994.

www.fs.fed.us/cdt/carrying_capacity/conflicts_trails_synthesis_1994.pdf

This resource offers a comprehensive review of the research literature related to recreation conflict, and has served as an invaluable resource for trail managers, volunteers, and advocates for more than a decade. The information summarized in Section 2.5 is built upon the foundation of knowledge presented in this free publication.

Lightly on the Land: The Student Conservation Association Trail-Building and Maintenance Manual. Robert Birkby, SCA, 2005 (www.imba.com)

Lightly on the Land focuses on crew leadership and the nuts and bolts of trail construction and maintenance. It contains detailed instructions on many technical skills such as building with rock, felling and buckling, building with timber, bridge construction, transplanting, and environmental restoration. It gets down and dirty with tools, tool repair, knots, and rigging. Instead of photos, it uses hundreds of fine illustrations to depict specialized techniques such as surveying, rigging, stonework, chainsaw skills, timber joinery, and bridge building.

Managing Mountain Biking: IMBA's Guide to Providing Great Riding. IMBA, 2007 (www.imba.com)

Managing Mountain Biking offers a collection of best practices for planning, designing, and managing successful trail networks and bike parks. More than 50 experts—including land managers, recreation ecologists, professional trailbuilders, and experienced advocates—contributed to Managing Mountain Biking, creating a complete reference. Managing Mountain Biking details overcoming user conflict, minimizing environmental impact, managing risk, and providing technically challenging riding. While Trail Solutions covers trail construction, Managing Mountain Biking focuses on solving mountain biking issues through innovative trail design, effective partnerships, and visitor management strategies.

Natural Surface Trails by Design: Physical and Human Design Essentials of Sustainable, Enjoyable Trails.

Troy Scott Parker, 2007 (www.imba.com)

This groundbreaking book explores trail design from a theoretical perspective, covering the physical and human forces and relationships that govern trails—how we perceive nature, how trails make us feel, how trail use changes trails, and how soils, trail materials, water, drainage, and erosion behave.

Recreational Trail Study for British Columbia: Phase 1 – Background Report. Ministry of Tourism, Sports and the Arts, Ministry of Environment, and Province of British Columbia, 2007 www.tsa.gov.bc.ca/sites/trails/docs/Provincial_Trails_Strategy/Trail_Strategy_Appendix1_May23.pdf

The first phase of this multi-phased project is the creation of this background report. This document is a great reference for information on Canadian laws and rules related to trails, best trail management practices from across North America, and discussion on the overall benefits of trails. It also includes a comprehensive survey, and the results, to help create a vision for the provincial trail planning, potential funding sources, and a province-wide trail inventory.

Region 5 Mountain Bike Management Strategy: Situational Assessment and Implementation Toolbox. Garrett Villanueva. U.S. Forest Service, 2007.

<http://www.fs.fed.us/r5/mountainbikes/>

This management strategy and situational assessment characterizes existing mountain bike trail conditions and provides methods for management. This document is written specifically for Region 5 in California, but its format, as a toolbox provides trail management advice that can be applied in any trail system. It is also a good example of a system-wide master plan.

Sea to Sky Corridor Recreation Trail Strategy. British Columbia, Ministry of Tourism, Sport and the Arts, 2007 (http://www.tsa.gov.bc.ca/sites/trails/Initiatives/SeatoSky-Strategy/sea_to_sky_strategy.htm)

The Ministry of Tourism, Culture and the Arts (MTCA) developed this comprehensive strategy to provide guidance on the management of this regional trail system. The strategy provides a framework for legal authorization and establishment of the vast majority of previously unauthorized trails on Crown land, recommends a process and organizational structure for ensuring a Corridor-wide coordinated approach to management of the extensive trail network, identifies opportunities and actions required to ensure a sustainable and economically beneficial network, and outlines and recommends trail construction, maintenance and sign standards and guidelines. This document is a useful example of a regional trail masterplan.

Trail Construction and Maintenance Notebook. Woody Hesselbarth, Brian Vachowski, and Mary Ann Davies. U.S. Forest Service, 2007 (www.fhwa.dot.gov/environment/rectrails/trailpub.htm)

This pocket-sized notebook is oriented to the needs of a trailworker. It pulls together basic trail construction and maintenance information in an easy-to-understand format. It includes a lot of the information detailed in *Trail Solutions*, plus a few additional strategies for trails in wet areas. It is concise with lots of illustrations – a perfect book to keep in a backpack out on the trail.

Trail Planning, Design, and Development Guidelines. Minnesota Department of Natural Resources, Trails and Waterways Division, 2007 (www.comm.media.state.mn.us/bookstore)

This comprehensive guide to shared-use paved trails, natural surface trails, winter use trails and bikeways is an excellent reference, well organized with tabs and an easy to follow lay-out. The book features dozens of useful reference illustrations and pictures for each specific topic (i.e. 6 pictures of different types of water caused erosion). Some information is Minnesota specific, but most is relevant to all climates and situations.

Trail Solutions: IMBA's Guide to Building Sweet Singletrack. IMBA, 2004 (www.imba.com)

This comprehensive trailbuilding resource combines cutting-edge trailbuilding techniques with proven fundamentals in an easy-to-read format. The book is divided into eight sections that follow the trailbuilding process from beginning to end. Readers will be guided through the essential steps of trail planning, design, tool selection, construction, and maintenance. Additionally, *Trail Solutions* provides detailed advice on banked turns, rock armouring, mechanized tools, freeriding, downhill, risk management, and other pioneering techniques. *Trail Solutions* is an essential tool for land managers and volunteer trailbuilders aspiring to raise their shared-use trail systems to the next level.

Wetland Trail Design and Construction. U.S. Forest Service, 2007. www.fhwa.dot.gov/environment/fspubs.

This manual describes common techniques for building a wetland trail. Starting with identifying the type of wetlands, this manual outlines how to build a dozen different types of wetland crossing structures (with and without foundations), what tools and materials to use, and instruction on maintaining drainage to minimize environmental impacts. This book is written for wetland trails, the techniques described can also be used for correcting other poorly drained low areas in existing trails.

TRAIL IMPACTS - LIT REVIEW

Introduction

Much research has been conducted to analyze recreational impacts to public lands; some of this research has focused on understanding impacts of different types of recreational use on trails, trail systems and the natural settings in which trails exist.

Trails are generally regarded as essential facilities in parks and forests. They provide access to remote areas, accommodate a diverse array of recreational activities, and protect resources by concentrating visitor trampling on narrow and resistant tread surfaces. Formal or designated trails are generally designed and constructed, which involves vegetation removal and soil excavation. These changes may be considered "unavoidable," in contrast to "avoidable" post-construction degradation from their subsequent use (e.g., trail widening, erosion, muddiness), or from the development and degradation of informal visitor-created trails.

Common environmental impacts associated with recreational use of trails include:

- Vegetation loss and compositional changes
- Soil compaction
- Erosion
- Muddiness
- Degraded water quality
- Disruption of wildlife

This review is organized into four broad categories: impacts to vegetation, soil, water, and wildlife.

Impacts to Vegetation: General Research

On formal trails, most vegetation is typically removed by construction, maintenance, and visitor use. This impact is necessary and "unavoidable" in order to provide a clear route for trail users. One goal of trail construction and maintenance is to provide a trail only wide enough to accommodate the intended use. Trails made wider than this through visitor use or erosion represent a form of "avoidable" impact. For example, a doubling of trail width represents a doubling of the area of intensive trampling disturbance. Wider trails also expose substantially greater amounts of soil to erosion by wind or water.

The creation and maintenance of trail corridors also removes shrubs and trees, allowing greater sunlight exposure that favors a different set of groundcover plants within trail corridors. Occasional trailside trampling within trail corridors also favors the replacement of fragile plants with those more resistant to trampling traffic. For example, shade-tolerant but fragile broadleaved herbs are frequently replaced by grasses and sedges that are trampling-resistant and require more sunlight to survive. Trail construction, use, and maintenance can also be harmful when trails divide sensitive or rare plant communities.

TRAIL IMPACTS - LIT REVIEW

Trampling - the action of crushing or treading upon vegetation, either by foot, hoof, or tire - contributes to a wide range of vegetation impacts, including damage to plant leaves, stems, and roots, reduction in vegetation height, change in the composition of species, and loss of plants and vegetative cover (Leung & Marion, 1996; Thurston & Reader, 2001). Trampling associated with "avoidable" off-trail traffic can quickly break down vegetation cover and create a visible route that attracts additional use. Complete loss of vegetation cover occurs quickly in shady forested areas, less quickly in open areas with resistant grassy vegetation. Regardless, studies have consistently revealed that most impact occurs with initial or low use, with a diminishing increase in impact associated with increasing levels of traffic (Hammit & Cole, 1998; Leung & Marion, 1996). Furthermore, once trampling occurs, vegetative recovery is a very slow process.

Compositional changes in the vegetation along trail corridors* can have both beneficial and adverse effects. Trampling-resistant plants provide a durable groundcover that reduces soil loss by wind and water runoff, and root systems that stabilize soils against displacement by heavy traffic. The ecological impacts of such compositional changes are not fully known, except when non-native vegetation is introduced to and spreads along trail corridors. Many of these species are disturbance-associated and are naturally limited to areas where the vegetation is routinely trampled or cut back. However, a few non-native species, once introduced to trail corridors, are able to out-compete native plants and spread away from the trail corridor in undisturbed habitats. Some of these species form dense cover that crowd out or displace native plants. These "invasive" species are particularly undesirable and land managers actively seek to prevent their introduction and spread. Unfortunately their removal is difficult and expensive.

*See Wells and Lauenroth 2007 for a case study examining horse and pack stock as dispersal mechanism for plants along recreational trails.

Impacts to Vegetation: Management Implications

Trail managers can either avoid or minimize impacts to vegetation through careful trail design, construction, maintenance, and management of visitor use. Here are some recommendations to reduce vegetation impacts: Design trails that provide the experience that trail users seek to reduce their desire to venture off-trail. Locate trails away from rare plants and animals and from sensitive or critical habitats of other species. Involve resource professionals in designing and approving new trail alignments. Keep trails narrow to reduce the total area of intensive tread disturbance, slow trail users, and minimize vegetation and soil impacts. Limit vegetation disturbance outside the corridor when constructing trails. Hand construction is least disruptive; mechanized construction with small equipment is less disruptive than full-sized equipment; skilled operators do less damage than those with limited experience. Locate trails on side-hills where possible. Constructing a side-hill trail requires greater initial vegetation and soil disturbance but sloping topography above and below the trail bench will clearly define the tread and

TRAIL IMPACTS - LIT REVIEW

concentrate traffic on it. Trails in flatter terrain or along the fall line may involve less initial disturbance but allow excessive future tread widening and off-tread trampling, which favor non-native plants. Construct and formalize meet-up and “tie-up” areas in a fashion that contains and concentrates visitor use to durable surfaces
Use construction techniques that save and redistribute topsoil and excavated plants.

There are also important considerations for maintaining and managing trails to avoid unnecessary ongoing impacts to vegetation:

While it is necessary to keep the trail corridor free of obstructing vegetation, such work should seek to avoid "day-lighting" the trail corridor when possible. Excessive opening of the overstory allows greater sunlight penetration that permits greater vegetation compositional change and colonization by non-native plants. An active maintenance program that removes tree falls and maintains a stable and predictable tread also encourages visitors to remain on the intended narrow tread. A variety of maintenance actions can discourage trail widening, such as only cutting a narrow section out of trees that fall across the trail, limiting the width of vegetation trimming, and defining trail borders with logs, rocks, or other objects that won't impede drainage. Use education to discourage off-trail travel, which can quickly lead to the establishment of informal visitor-created trails that unnecessarily remove vegetation cover and spread non-native plants. Such routes often degrade rapidly and are abandoned in favor of adjacent new routes, which unnecessarily magnify the extent and severity of trampling damage.

Educate visitors to be aware of their ability to carry non-native plant seeds on their bikes or clothing, and encourage them to remove seeds by washing mud from bikes, tires, shoes, and clothing. Preventing the introduction of non-natives is key, as their subsequent removal is difficult and costly.

Educate visitors about low impact riding practices, such as those contained in the IMBA-approved Leave No Trace Skills & Ethics: Mountain Biking booklet (www.LNT.org).

For further reading see: Pickering et al 2010, Cessford 1995; Grutz and Hollingshead 1995; Thurston and Reader 2001.

Impacts to Soils: General Research

The creation and use of trails also results in soil disturbance. Some loss of soil may be considered an acceptable and unavoidable form of impact on trails. As with vegetation loss, much soil disturbance occurs in the initial construction and use of the trail. During trail construction, surface organic materials (e.g., twigs, leaves, and needles) and organic soils are removed from treads; trails built on sidehill locations require even more extensive excavation. In addition, the underlying mineral soils are compacted during construction and initial use to form a durable tread substrate that supports trail traffic.

TRAIL IMPACTS - LIT REVIEW

In contrast, post-construction soil displacement, erosion, and muddiness represent core forms of avoidable trail impact that require sustained management attention to avoid long-lasting resource degradation. This degradation can reduce the utility of trails as recreation facilities and diminish the quality of visitor experiences. For example, soil erosion exposes rocks and plant roots, creating a rutted and uneven tread surface. Erosion can also be self-perpetuating when treads erode below the surrounding soil level, hindering efforts to divert water from the trail and causing accelerated erosion and muddiness. Similarly, excessive muddiness renders trails less usable and aggravates tread widening and associated vegetation loss as visitors seek to circumvent mud holes and wet soils (Marion, 2006).

Research has shown that visitors notice obvious forms of trail impact, such as excessive muddiness and eroded ruts and tree roots, and that such impacts can degrade the quality of visitor experiences (Roggenbuck and others., 1993; Vaske and others., 1993). Such conditions also increase the difficulty of travel and may threaten visitor safety. Remedying these soil impacts can also require substantial rehabilitation costs. Clearly, one primary trail management objective should be the prevention of excessive soil impacts.

The Four Common Forms of Soil Degradation on Trails:

- Compaction
- Muddiness
- Displacement
- Erosion

Compaction

Soil compaction is caused by the weight of trail users and their equipment, which passes through feet, hooves, or tires to the tread surface. Compacted soils are denser and less permeable to water, which increases water runoff. However, compacted soils also resist erosion and soil displacement and provide durable treads that support traffic. From this perspective, soil compaction is considered beneficial, and it is an unavoidable form of trail impact. Furthermore, a primary resource protection goal is to limit trailside impacts by concentrating traffic on a narrow tread. Success in achieving this objective will necessarily result in higher levels of soil compaction.

The process of compacting the soil can present a difficult challenge, especially on new trails. Unless soils are mechanically compacted during tread construction, initial use compacts the portions of the tread that receive the greatest traffic, generally the center. The associated lowering of the tread surface creates a cupped cross-section that intercepts and collects surface water. In flat terrain this water can pool or form muddy sections; in sloping terrain the water is channeled down the trail, gaining in volume, speed, and erosive potential.

Displacement

Trail users can also push soil laterally, causing displacement and development of ruts, berms, or cupped treads. Soil displacement is particularly evident when soils are damp or loose and when users are moving at

TRAIL IMPACTS - LIT REVIEW

higher rates of speed, turning, braking, or other movements that create more lateral force. Soil can also be caught in hooves, footwear, or tire treads, flicked to the side or carried some distance and dropped. Regardless of the mechanism, soil is generally displaced from the tread center to the sides, elevating inslopes or berms, and compounding drainage problems.

Muddiness

When trails are located in areas of poor drainage or across highly organic soils that hold moisture, tread muddiness can become a persistent problem. Muddiness is most commonly associated with locations where water flows across or becomes trapped within flat or low-lying areas. Soil compaction, displacement, and erosion can exacerbate or create problems with muddiness by causing cupped treads that collect water during rainfall or snowmelt. Thus, muddiness can occur even along trails where there is sufficient natural drainage. Subsequent traffic skirts these problem spots, compacting soils along the edges, widening mud holes and tread width, and sometimes creating braided trails that circumvent muddy sections.

Erosion

Soil erosion is an indirect and largely avoidable impact of trails and trail use. Soil can be eroded by wind, but generally, erosion is caused by flowing water. To avoid erosion, sustainable trails are generally constructed with a slightly crowned (flat terrain) or outsloped (sloping terrain) tread. However, subsequent use compacts and/or displaces soils over time to create a cupped or insloped tread surface that intercepts and carries water. The concentrated run-off picks up and carries soil particles downhill, eroding the tread surface.

Loose, uncompacted soil particles are most prone to soil erosion, so trail uses that loosen or detach soils contribute to higher erosion rates. Erosion potential is closely related to trail grade because water becomes substantially more erosive with increasing slope. The size of the watershed draining to a section of trail is also influential - larger volumes of water are substantially more erosive.

Water and the sediment it carries will continue down the trail until a natural or constructed feature diverts it off the tread. Such features include a natural or constructed reversal in grade, an outsloped tread, rocks or tree roots, or a constructed drainage dip or water bar. Once the water slows, it drops its sediment load, filling in tread drainage features and causing them to fail if not periodically maintained. Sediment can also be carried directly into watercourses, creating secondary impacts to aquatic systems. Properly designed drainage features are designed to divert water from the trail at a speed sufficient to carry the sediment load well below the tread, where vegetation and organic litter can filter out sediments. A well-designed trail should have little to no cumulative soil loss, for example, less than an average of one-quarter inch (6.3 mm) per year.

Impacts to Soils

Many studies have evaluated the soil impacts of different types of recreational uses. The general consensus of this research has shown that motorized and equestrian use are significantly more impacting to soils than human powered recreation (hiking, trail running, cycling). The trail system at Cave Run Lake is showing

TRAIL IMPACTS - LIT REVIEW

significant signs of degraded soils as a result of heavy use, poor design and a general lack of appropriate maintenance.

Several key studies comparing the impacts to soils by user-type are reviewed below:

Wilson and Seney (1994) evaluated tread erosion from horses, hikers, mountain bikes, and motorcycles on two trails in the Gallatin National Forest, Montana. They applied one hundred passes of each use-type on four sets of 12 trail segments, followed by simulated rainfalls and collection of water runoff to assess sediment yield at the base of each segment. Control sites that received no passes were also assessed for comparison. Results indicated that horses made significantly more sediment available for erosion than the other uses, which did not significantly vary from the control sites. Traffic on pre-wetted soils generated significantly greater amounts of soil runoff than on dry soils for all uses.

Marion (2006) studied 78 miles (125 km) of trail (47 segments) in the Big South Fork National River and Recreation Area, Tennessee and Kentucky, measuring soil loss along transects across the trail to evaluate the influence of use-related, environmental, and management factors.

Sidehill-aligned trails were significantly less eroded than trails in valley bottom positions, in part due to the influence of periodic floods. Trail grade and trail alignment angle were also significant predictors of tread erosion. Erosion rates on trails with 0-6 percent and 7-15 percent grades were similar, while erosion on trails with grades greater than 16 percent were significantly higher. And there was significantly greater erosion on fall line trails (alignment angles of 0-22 degrees) than those with alignments closer to the contour.

This study also provided an opportunity to examine the relative contribution of different use types, including horse, hiking, mountain biking, and ATV. Trails predominantly used for mountain biking had the least erosion of the use types investigated. Trails receiving equestrian use had significantly less erosion when rock content was high and grades were minimized.

Cessford (1995) provides a comprehensive, though dated, summary of trail impacts with a focus on mountain biking. Of particular interest is his summary of the two types of forces exerted by bike tires on soil surfaces: The downward compaction force from the weight of the rider and bike, and the rotational shearing force from the turning rear wheel. Mountain bikers generate the greatest torque, with potential tread abrasion due to slippage, during uphill travel. However, the torque possible from muscle power is far less than that from a motorcycle, so wheel slippage and abrasion occur only on wet or loose surfaces. Tread impact associated with downhill travel is generally minimal due to the lack of torque and lower ground pressures. Exceptions include when riders brake hard enough to cause skidding, which displaces soil downslope, or bank at higher speeds around turns, which displaces soil to the outside of the turn. Impacts in flatter terrain are also generally minimal, except when soils are wet or uncompacted and rutting occurs.

TRAIL IMPACTS - LIT REVIEW

Impacts to Soils: Management Implications

Soil loss is among the most enduring forms of trail impact, and minimizing erosion and muddiness are the most important objectives for achieving a sustainable trail. Soil cannot easily be replaced on trails, and where soil disappears, it leaves ruts that make travel and water drainage more difficult, prompting further impacts, such as trail widening.

Existing studies indicate that motorized and equestrian use have far greater impacts to soils than human powered recreation. Other factors, particularly trail grade, trail/slope alignment angle, soil type/wetness, and trail maintenance, are more influential determinants of tread erosion or wetness.

There are a number of tactics for avoiding the worst soil-related impacts to trails:

- Discourage or prohibit off-trail travel. Informal trails created by off-trail travel frequently have steep grades and fall-line alignments that quickly erode, particularly in the absence of tread maintenance. Exceptions include areas of solid rock or non-vegetated cobble.
- Design trails with sustainable grades and avoid fall-line alignments. Where equestrian or motorized use is allowed, minimize trail grades and import rock material to form a durable substrate should the native soils not have substantial rock content.
- When possible, build trails in dry, cohesive soils that easily compact and contain a larger percentage of coarse material or rocks. These soils better resist erosion by wind and water or displacement by feet, hooves and tires.
- Minimize tread muddiness by avoiding flat terrain, wet soils, and drainage-bottom locations.
- Use grade reversals to remove water from trail treads. Grade reversals are permanent and sustainable - when designed into a trail's alignment they remain 100 percent effective and rarely require maintenance.

Other strategies are more temporary in nature and will require periodic maintenance to keep them effective:

- While the use of a substantial outslope (e.g., 5 percent) helps remove water from treads, it is rarely a long-term solution. Tread cupping and berm development will generally occur within a few years after tread construction. If it is not possible to install additional grade reversals, reshape the tread to reestablish an outsloped tread surface periodically, and install wheel-friendly drainage dips or other drainage structures to help water flow off the trail.
 - If it is not possible to install proper drainage on a trail, consider rerouting trail sections that are most problematic, or possibly hardening the tread with the addition of local or imported material (rocks).
 - In flatter areas, elevate and crown treads to prevent muddiness, or add a gravel/soil mixture in low spots.
 - Finally, it is important to realize that visitor use of any type on trails when soils are wet contributes substantially greater soil impact than the same activities when soils are dry. Thus, discouraging or
-

TRAIL IMPACTS - LIT REVIEW

prohibiting the use of trails that are prone to muddiness during rainy seasons or snowmelt is another effective measure. Generally such use can be redirected to trails that have design or environmental attributes that allow them to better sustain wet season uses.

For further reading see: Pickering et al 2010, Cessford 1995, Thurston and Reader 2001, Newsome et al 2004.

Impacts to Water Resources: General Research

Trails and their use can also affect water quality. Trail-related impacts to water resources can include the introduction of soils, nutrients, and pathogenic organisms (e.g., *Giardia*), and alter the patterns of surface water drainage. However, in practice, these impacts are avoidable, and properly designed and maintained trails should not degrade water quality. Unfortunately there is very little research to draw from on these topics, and none that is specific to different modes of trail use.

Poorly sited and/or maintained trails can be eroded by water, with tread sediments carried off by runoff. Generally, if water control features such as grade reversals and outsloped treads are used to divert runoff from trails, the water drops its sediment close to trails, where it is trapped and held by organic litter and vegetation. Soils eroded from trails rarely enter water bodies, unless trails cross streams or run close to stream or lake shorelines and lack adequate tread drainage features. Since many recreational activities, such as fishing, swimming, boating, and viewing scenery (e.g., waterfalls) draw visitors and trails to the vicinity of water resources, it is often necessary to route trails to water resources or visitors will simply create their own informal trails.

Trails that are close to water resources require special consideration in their design and management to prevent the introduction of suspended sediments into bodies of water. Eroded soil that enters water bodies increase water turbidity and cause sedimentation that can affect aquatic organisms (Fritz and others 1993). Trout and other fish lay their eggs in gravels on the bottom of streams and lakes, and sediments can smother those eggs, reducing reproductive success. Sedimentation can also hurt invertebrate organisms, which serve as food for fish and other creatures. In addition, some sediment may contain nutrients that can contribute to algal blooms that deplete the dissolved oxygen in water bodies when they die off.

Poorly designed trails can also alter hydrologic functions - for instance, trails can intercept and divert water from seeps or springs, which serve important ecological functions. In those situations, water can flow along the tread, leading to muddiness or erosion and, in the case of cupped and eroded treads, the water may flow some distance before it is diverted off the trail, changing the ecology of small wetland or riparian areas.

Trail users may also pollute water with pathogenic organisms, particularly those related to improperly disposed human waste. Potential pathogenic organisms found through surveys of backcountry water sources include *Cryptosporidium* spp., *Giardia* spp., and *Campylobacter jejuni* (LeChevallier and others, 1999; Suk and others, 1987; Taylor and others, 1983). This is rarely a significant concern where trail use is

TRAIL IMPACTS - LIT REVIEW

predominantly day-oriented, and waste issues can be avoided by installing toilet facilities or following Leave No Trace practices (i.e., digging cat-holes for waste away from water resources).

Impacts to Water Resources: Management Implications

The same trail design, construction, and maintenance measures that help minimize vegetation and soil impacts also apply to water. But there are also some additional efforts needed to protect water resources:

- Trails should avoid close proximity to water resources. For example, it is better to build a trail on a sidehill along a lower valley wall than to align it through flat terrain along a stream edge, where trail runoff will drain directly into the stream.
- It is best to minimize the number of stream crossings. Where crossings are necessary, scout the stream carefully to select the most resistant location for the crossing. Look for rocky banks and soils that provide durable surfaces.
- Design water crossings so the trail descends into and climbs out of the stream crossing, preventing stream water from flowing down the trail.
- Armor trails at stream crossings with rock, gravel or concrete to prevent erosion.
- Include grade reversals, regularly maintained outsloped treads, and/or drainage features to divert water off the trail near stream crossings. This prevents water and sediment from flowing down the trail into the stream, and allows trailside organic litter, vegetation, and soils to slow and filter water.
- On some heavily used trails, a bridge may be needed to provide a sustainable crossing.
- Where permanent or intermittent stream channels cross trails, use armoring, open rock culverts or properly sized buried drainage culverts to allow water to cross properly, without flowing down the trail.

Impacts to Wildlife: General Research

Trails and trail users can also affect wildlife. Trails may degrade or fragment wildlife habitat, and can also alter the activities of nearby animals, causing avoidance behavior in some and food-related attraction behavior in others (Hellmund, 1998; Knight & Cole, 1991). While most forms of trail impact are limited to a narrow trail corridor, disturbance of wildlife can extend considerably further into natural landscapes (Kasworm & Monley, 1990; Tyser & Worley, 1992). Even very localized disturbance can harm rare or endangered species.

Different animals respond differently to the presence of trail users. Most wildlife species readily adapt or become "habituated" to consistent and non-threatening recreational activities. For example, animals may notice but not move away from humans on a frequently used trail. This is fortunate, as it can allow high quality wildlife viewing experiences for visitors and cause little or no impact to wildlife.

TRAIL IMPACTS - LIT REVIEW

Other forms of habituation, however, are less desirable. Visitors who feed wildlife, intentionally or from dropped food, can contribute to the development of food-related attraction behavior that can turn wild animals and birds into beggars. In places where visitors stop to eat snacks or lunches, wildlife quickly learn to associate people with food, losing their innate fear of humans and returning frequently to beg, search for food scraps, or even raid unprotected packs containing food. Feeding wild creatures also endangers their health and well-being. For instance, after food-attracted deer in Grand Canyon National Park became sickly and dangerously aggressive, researchers found up to six pounds of plastic and foil wrappers obstructing intestinal passages of some individuals.

The opposite conduct in wildlife - avoidance behavior - can be equally problematic. Avoidance behavior is generally an innate response that is magnified by visitor behaviors perceived as threatening, such as loud sounds, off-trail travel, travel in the direction of wildlife, and sudden movements. When animals flee from disturbance by trail users, they often expend precious energy, which is particularly dangerous for them in winter months when food is scarce. When animals move away from a disturbance, they leave preferred or prime habitat and move, either permanently or temporarily, to secondary habitat that may not meet their needs for food, water, or cover. Visitors and land managers, however, are often unaware of such impacts, because animals often flee before humans are aware of the presence of wildlife.

Two studies of possible interest are summarized below:

A study of the Boise River in Idaho examined flushing distances of bald eagles when exposed to actual and simulated walkers, joggers, fishermen, bicyclists, and vehicles (Spahr 1990). The highest frequency of eagle flushing was associated with walkers (46 percent), followed by fishermen (34 percent), bicyclists (15 percent), joggers (13 percent), and vehicles (6 percent). However, bicyclists caused eagles to flush at the greatest distances (mean = 148 meters), followed by vehicles (107m), walkers (87m), fishermen (64m), and joggers (50m). Eagles were most likely to flush when recreationists approached slowly or stopped to observe them, and were less alarmed when bicyclists or vehicles passed quickly at constant speeds. Similar findings have been reported by other authors, who attribute the difference in flushing frequency between walkers and bikers/vehicles either to the shorter time of disturbance and/or the additional time an eagle has to "decide" to fly (Van der Zande and others. 1984).

Impacts to Wildlife: Management Implications

Many potential impacts to wildlife can be avoided by ensuring that trails avoid the most sensitive or critical wildlife habitats, including those of rare and non-rare species. There are a number of tactics for doing this: Route trails to avoid riparian or wetland areas, particularly in environments where they are uncommon.

Consult with fish and wildlife specialists early in the trail planning phase.

For existing trails, consider discouraging or restricting access during sensitive times/seasons (e.g., mating or birthing seasons) to protect wildlife from undue stress.

TRAIL IMPACTS - LIT REVIEW

The education of trail users is also an important and potentially highly effective management option for protecting wildlife. Organizations should encourage Leave No Trace practices and teach appropriate behaviors in areas where wildlife are found:

- Store food safely and leave no crumbs behind - fed animals too often become dead animals.
- It's OK for wildlife to notice you but you are "too close" or "too loud" if an animal stops what it's doing and/or moves away from you.
- It's best to view wildlife through binoculars, spotting scopes, and telephoto lenses.
- All wildlife can be dangerous - be aware of the possible presence of animals and keep your distance to ensure your safety and theirs.

Conclusion

Scientific studies have examined the impacts of recreational use on trails and public lands. These studies provide an objective lens to view and understand how to better manage recreational use while minimizing impacts to natural resources and other users. The body of research has shown that motorized and equestrian use have significantly greater impacts to the natural resources than human powered trail uses. Studies present data that suggest ways to minimize impacts associated with trails, through proper design and construction (shallower grades, frequent grade reversals or water control features, more durable substrates with higher rock content).

APPENDICES

Knight, R. L. and D. N. Cole (1991). Effects of recreational activity on wildlife in wildlands. Transactions of the North American Wildlife and Natural Resource Conference.

LeChevallier, M. W., M. Abbaszadegan, et al. (1999). Committee report: Emerging pathogens - viruses, protozoa, and algal toxins. Journal American Water Works Association 91(9): 110-121.

Leung, Y. F. and J. L. Marion (1996). Trail degradation as influenced by environmental factors: A state-of-the-knowledge review. Journal of Soil and Water Conservation 51(2): 130-136.

Marion, J. L. (2006). Assessing and Understanding Trail Degradation: Results from Big South Fork National River and Recreational Area. USDI, National Park Service.

Newsome, D. Cole, D. N. and J. L. Marion. (2004). Environmental Impacts Associated with Recreational Horse-riding. Environmental Impacts of Ecotourism. ch. 5 61- 83.

Papouchis, C. M., F. J. Singer, et al. (2001). Responses of desert bighorn sheep to increased human recreation. Journal of Wildlife Management 65 3: 573-582.

Pickering, C. M. et al. (2010). Comparing hiking, mountain biking and horse riding impacts on vegetation and soils in Australia and the United States of America. Journal of Environmental Management 91: 551-562.

Roggenbuck, J. W., D. R. Williams, et al. (1993). Defining Acceptable Conditions in Wilderness. Environmental Management 17 2: 187-197.

Schuett, M. A. (1997). State park directors' perceptions of mountain biking. Environmental Management 21(2): 239-246.

Spahr, Robin. (1990) Factors Affecting The Distribution Of Bald Eagles And Effects Of Human Activity On Bald Eagles Wintering Along The Boise River, 1990. Boise State University, Thesis.

Suk, T. J., S. K. Sorenson, et al. (1987). The relation between human presence and occurrence of Giardia Cysts in streams in the Sierra-Nevada, California. Journal of Freshwater Ecology 4(1): 71-75.

Taylor, A. R. and R. L. Knight (2003). Wildlife Responses to Recreation and Associated Visitor Perceptions. Ecological Applications 13 4: 12.

Taylor, D. N., K. T. Mcdermott, et al. (1983). Campylobacter Enteritis from untreated water in the Rocky Mountains. Annals of Internal Medicine 99 1: 38-40.

APPENDICES

Sources

- Bjorkman, A. W. (1996). Off-road Bicycle and Hiking Trail User Interactions: A Report to the Wisconsin Natural Resources Board. Wisconsin, Wisconsin Natural Resources Bureau of Research.
- Cessford, G. R. (1995). Off-road impacts of mountain bikes: a review and discussion Off-Road Impacts of Mountain Bikes: A Review and Discussion Science & Research Series No 92. Wellington, NZ, Department of Conservation. pp: 42-70.
- Chavez, D., P. Winter, et al. (1993). Recreational mountain biking: A management perspective. *Journal of Park and Recreation Administration* 11 1: 7.
- Edger, C. O. (1997). Mountain biking and Marin Municipal Water District watershed. *Trends* 34 3: 5.
- Fritz, S. C., J. C. Kingston, et al. (1993). Quantitative trophic reconstruction from sedimentary diatom assemblages - A cautionary tale. *Freshwater Biology* 30(1): 1-23.
- Gander, H. and P. Ingold (1997). Reactions of Male Alpine Chamois *Rupicapra r. rupicapra* to Hikers, Joggers and Mountainbikers. *Biological Conservation* 79: 3.
- Goeft, U. and J. Alder (2001). Sustainable mountain biking: A case study from the Southwest of Western Australia. *Journal of Sustainable Tourism* 9 3: 19.
- Gruttz, J. and D. Hollingshead (1995). "Managing the Biophysical Impacts of Off-Road Bicycling" or "Shred Lightly." *Environmental Ethics & Practices in Backcountry Recreation Conference*, University of Calgary, Alberta.
- Hammit, W. E. and D. N. Cole (1998). *Wildland Recreation: Ecology and Management*. New York, John Wiley and Sons, Inc.
- Hellmund, P. C. (1998). *Planning Trails with Wildlife in Mind: A Handbook for Trail Planners*. Denver, Colorado State Parks.
- Hendricks, W. W. (1997). Mountain bike management and research: An introduction. *Trends*, 34(3), 2-4.
- Herrero, Jake, and Stephen Herrero (2000) *Management Options for the Moraine Lake Highline Trail: Grizzly Bears and Cyclists*. Unpublished Report for Parks Canada.
- Kasworm, W. F. and T. L. Monley (1990). Road and trail influences on grizzly bears and black bears in northwest Montana. *Bears: Their Biology and Management: Proceedings of the 8th International Conference*, Victoria, B.C., International Association for Bear Research and Management.
-

APPENDICES

Thurston, E. and R. J. Reader (2001). Impacts of experimentally applied mountain biking and hiking on vegetation and soil of a deciduous forest. *Environmental Management* 27(3): 397-409.

Torn, A. et al. (2008) Comparing the impacts of hiking, skiing and horse riding on trail and vegetation in different types of forest. *Journal of Environmental Management* 89: 1-8.

Tyser, R. W. and C. A. Worley (1992). Alien flora in grasslands adjacent to road and trail corridors in Glacier National Park, Montana (USA). *Conservation Biology* 6(2): 253-262.

Van der Zande, A. N., J. C. Berkhuizen, H. C. van Latesteijn, W. J. ter Keurs, and A. J. Poppelaars (1984) Impact of outdoor recreation on the density of a number of breeding bird species in woods adjacent to urban residential areas. *Biological Conservation* 30: 1-39.

Vaske, J. J., M. P. Donnelly, et al. (1993). Establishing management standards - Selected examples of the normative approach. *Environmental Management* 17(5): 629-643.

Wells, F. H. and Lauenroth, W.K. (2007) The Potential for Horses to Disperse Alien Plants Along Recreational Trails. *Rangeland Ecology and Management* 60: 574-577.

Whinam, J. and Comfort, M. (1996). The Impact of Commercial Horse Riding on Sub-Alpine Environments at Cradle Mountain, Tasmania, Australia. *Journal of Environmental Management* 47: 61-70.

White, D. D., M. T. Waskey, et al. (2006). A comparative study of impacts to mountain bike trails in five common ecological regions of the Southwestern U.S. *Journal of Park and Recreation Administration* 24(2): 20.

Wilson, J. P. and J. P. Seney (1994). Erosional impact of hikers, horses, motorcycles, and off-road bicycles on mountain trails in Montana. *Mountain Research and Development* 14(1): 77-88.

Wöhrstein, T. (1998). Mountainbike und Umwelt - Ökologische Auswirkungen und Nutzungskonflikte (Mountainbike and Environment - Ecological Impacts and Use Conflict). Saarbrücken-Dudweiler. Incomplete Reference, Pirrot Verlag & Druck.

APPENDIX D

APPENDIX D SIGNAGE INFORMATION

Trail signage is an integral part of a successful trail system. The Towns of Winter Park and Fraser, in cooperation with Headwaters Trails Alliance, have developed a sign plan for both Towns. The signage will consist of trailhead kiosks, trailhead signs, and directional signage. The combination of these signs will guide pedestrians and mountain bikers to the trails located in both Towns and in the National Forest. The sign template can be found in the Grand County Trails Master Plan.

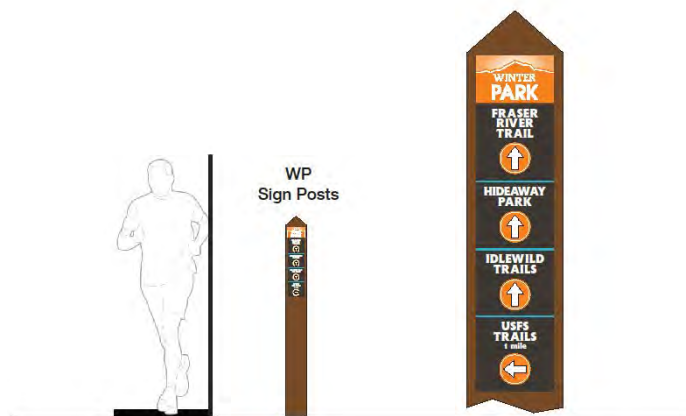


Trail Sign Plan

HTA developed a sign plan (including Way-finding Signs with “you are here” maps, Mile Markers, and Trailhead Signs) for the Fraser River Trail, Fraser to Granby Trail, and the Givelo-Northwest Passage Trails which are scheduled to be installed in 2014.



The Town of Winter Park also developed an in-town trail sign program that will be implemented in 2014.



HTA and Town of Winter Park have also collaborated on trailhead development for two trailheads along the Fraser River Trail: Public Works and Sitzmark parking areas. These will be installed in 2014. HTA should continue to implement trailhead development for locations identified in the image on page 3.

Interpretive Signage Best Practices

The foundation of interpretation, as defined by the National Park Service, is that “interpretation is driven by a philosophy that charges interpreters to help audiences care about park resources so they might support the care for park resources. Interpretation establishes the value of preserving park resources by helping audiences discover the meanings and significance associated with those resources.”

The National Park Service (NPS) and their Interpretive Development Program (IDP) have created core competencies that represent the NPS national standards for interpretation in ten benchmark areas of interpretive work. While these competencies are used to evaluate individual interpreters and their body of work, the benchmarks and their corresponding educational curriculum will provide the framework from which the entity will build their signage planning and implementation project. Specifically the NPS IDP addresses the following relevant topics:

- Interpretive Writing that is “both successful in creating opportunities for the readers to form their own intellectual and emotional connections with the resource and appropriate for the audience, providing a clear focus for their connection with the resources(s) by demonstrating the cohesive development of a relevant idea or ideas, rather than relying primarily on chronological narrative or a series of related facts.”
- Media Concept Development including Project Design and Planning, Meaningful and Appropriate Media selection, and incorporating Principles of Media Design.

Best Practices of Artistic Design

Experts in interpretive settings have incorporated cognitive theory into their work for decades (Ham, 1983; Hammitt, 1984; Bitgood, 2000). By using what is known about cognitive processing and memory, interpreters can aim to maximize visitor learning. In one widely used guide on exhibit labels, Serrell (1996, page 9) writes “for long term learning to occur, there must be short term learning; in order to have short term learning, there must be attention, and attention takes time.” In short, interpretive signage must first attract visitor attention before any further processing and subsequent learning may occur. It must also take into consideration the concept of limited capacity (Miller, 1956), and communicate messages while demanding minimal effort from the visitor.

One of the main challenges of encouraging mindful attention to interpretive labels in national parks and forests and other leisure settings is that the visitors are in a “non- formal” learning environment (Rounds, 2004). Non-formal learning (also referred to as “free-choice learning” and “learning in leisure settings”) describes educational opportunities that are outside of a formal learning setting such as a classroom. There may be no external motivations (money, privileges, or recognition of achievement) for learning in these situations, so the visitor must be highly internally motivated to learn on their own (Screven, 1992; Rounds, 2004). Artistic design elements are used as tools to clearly and effectively communicate messages to visitors without words. Young and Witter (1994) found in their experiment on environmental education brochures, that information presentation and design (collectively, the artistic component) were the most important factors influencing visitor learning. In this study, they found that subjects learned more when exposed to a brochure that included color photographs, color-coded headings when compared to another less visually appealing brochure that had more carefully worded text. Research in museum settings widely supports the idea that labels must be distinct in order to attract attention (Alt & Shaw, 1984; Nelson & Klutas, 2000). Through early research efforts, Alt & Shaw (1984) found that vivid exhibits that displayed short messages attracted more visitors in the British Museum of Natural History. Bitgood (2000), an interpretation expert who has written about the role of attention in exhibit labels, suggested that the most important factor is that the display must be novel and distinct. In a recent study, this idea of vividness and

distinction was supported when Nelson and Klutas (2000) found that people tend to direct their attention to those aspects of a perceptual scene that stand out rather than those that blend in to the background or setting.

Particular design elements that may increase vividness or distinctiveness are size of label (the larger, the more attention is given to it), contrast with the background (labels that don't blend in gain more attention) and presence of multi-sensory characteristics (smell, sound or touch) (Bitgood, 2000). Signs with novel attributes attract more attention and arouse more curiosity than less distinct and unique signs. Color is an important component to legibility, understandability and subsequent learning (Farley & Grant, 1976; Screven, 1992; Wolf & Smith, 1993; Young & Witter, 1994; Cota & Loomis, 1997). Farley and Grant (1976) found that subjects exposed to a color slide presentation learned more than their counterparts, who were shown the same presentation in black and white. Wolf and Smith (1993) demonstrated that color contrast has a significant effect on legibility. In their study, they found that black letters on white background provides the best contrast, making it easier for people to read. Cota and Loomis (1997) supported Wolf and Smith and demonstrated that color contrast additionally has a significant effect on memory recall. Research in interpretive publications has determined that use of color-coded headlines increased learning (Young & Witter, 1994). Young & Witter (1994) compared several different versions of a brochure. They found the most effective brochures had many "headings," that were set apart from the rest of the text by using color and different typefaces.

Typography is another aspect of design that influences how legible a sign is and therefore affects overall understandability of the message. In addition, typography plays an integral role in the overall aesthetics and mood of an interpretive exhibit (Serrell, 1996). Legibility becomes of utmost concern with body text because messages must be communicated very quickly and be easily understood. Typefaces may be either serif or sans serif styles. Serif typefaces have ornamentation at the ends of the main strokes (Times New Roman, for example). Sans serif typefaces do not have ornamentations (Ariel, for example). Sans serif typefaces allow for faster reading, and so are preferable in interpretive signage (Trapp, Gross & Zimmerman, 1999).

A considerable amount has been written on conceptual (text) components of exhibits that encourage central processing (Ham, 1983; Hammitt, 1984). Far less has been written on artistic aspects of exhibit design that encourage central processing (Moscardo, 1999; Bitgood, 2000). One that has received a fair amount of attention, however, is the use of hands-on and multi-sensory components (Bitgood, 2000; Arndt, Screven, Benusa and Bishop, 1993; Moscardo, 1999). Arndt et al. (1993) found that visitors interacting with flip-labels in a zoo exhibit exhibited more knowledge gain than others who were exposed to the same exhibit but without the flip-panels. This knowledge gain is commonly attributed to the curiosity aroused by the flip-labels and by engaging kinesthetic senses (Carlson, 1995; Moscardo, 1999; Bitgood, 2000).

Another component of the artistic design that may lead to conscious processing of information is the use of vivid pictures versus illustrations (Standing, 1973). Another concept that must be considered in the artistic design of interpretive signage is to prevent information overload. Studies done on exhibit labels in museum settings show visitors are far more likely to pay mindful attention to bulleted lists, outlines, and chunked paragraphs than one continuous paragraph (Screven, 1992; Bitgood, 1994; Cota & Loomis, 1997; Moscardo, 1999). Chunking, which in this context refers to breaking up one large

paragraph into smaller bits of information, makes it easier for visitors to remember information because entire messages are broken down into more manageable pieces (Miller, 1956; Ham, 1983; Cota & Loomis, 1997). Another reason to use chunking is that interpretive signage is non-linear, that is, the conceptual components are written so that they can be read in any order or quantity and still make sense to the viewer (Serrell, 1996). Chunking has been shown to increase average viewing time of an exhibit label (Bitgood, 2000).

Exhibit effectiveness is commonly evaluated in museum settings (Borhegyi, 1965; Falk, 1982; Peart, 1984; Donald, 1991; Cota & Loomis, 1997; Diamond, 1999; Fernandez & Benlloch, 2000; Sandifer, 2003). Exhibit effectiveness is far less commonly evaluated in national parks, forests, or other interpretive settings (Arndt, Screven, Benusa & Bishop, 1993; Bitgood, 2000; Hughes & Morrison-Saunders, 2002). The amount of time a visitor spends viewing an exhibit, knowledge gain, and an exhibit's ability to increase visitors' thinking and problem solving are general realms that are studied in exhibit evaluations (Donald, 1991). Specific measures that are commonly used are attracting power, holding time/power, and short-term knowledge gain (memory recall) (Falk, 1982; Peart, 1984; Cota & Loomis, 1997). Peart (1984, page 221) described attracting power as "the number of subjects from the target population who stop and look at an exhibit, expressed in percentages." Attracting power is an indicator of selective attention. Holding time and holding power are useful in estimating the amount of information that could possibly be absorbed by the audience. These two measures are based on the assumption that time and learning are positively correlated. Holding time is simply the number of seconds a visitor spends actively looking at the display. Holding power is a ratio of the holding time divided by the minimum amount of time it would take to process that sign (Peart, 1984). The minimum amount of time it takes a person to view the content of the sign is figured by averaging the time it takes a sample population to process the entire sign.

SIGNAGE, WAYFINDING, AND MAPPING RECOMMENDATIONS

A well-developed signage system is vital management tool in the 21st century land management context. Especially with large, diverse trail systems, a human management presence such as park rangers and law enforcement officers will be dispersed. Consistent, clear, well-placed signs often must take the place of humans in providing 1) information and directional assistance, 2) regulations and hazard warnings, and 3) educational and interpretive information.



Informational And Directional Signs

Roadside Signs

A positive experience on a trail begins by easily finding the desired location, be it a developed trailhead, boat launch, or brick and mortar facility. This gross level navigation requires roadside signage prior to the developed facility. With a broad and diverse suite of trail facilities, a universal symbol should be combined with short verbiage and mileage to provide information that can be recognized and comprehended at driving speeds. These clear, roadside signs help encourage trail use and dissuade visitors from creating unauthorized access routes.



Trailhead Signs

Upon entering a developed trailhead facility, large signs with a complete map and description of all the nearby trails and facilities, local regulations, emergency contact information, and educational messages should be located to funnel visitors to the developed facilities such as rest rooms, trails, launch, etc. This main trailhead kiosk is an ideal place to describe trail length and relative difficulty, allowing visitors to make informed decisions about their recreational experience. Trailhead kiosks can incorporate interpretive, programming, volunteer, and printed information such as maps. The total amount of information provided should mesh with the level of facility development. Major trailheads with significant parking should creatively incorporate most information, while striving not to reach “information overload”, while smaller trailheads may only require a map board (with location), emergency contact, and basic regulations.





Trailside Signs

Signs at trail intersections should provide clear, concise directions for how to stay on the trail or return to a trailhead. This navigation assistance is best provided on wooden or fiberglass posts at heights easily read by trail users, typically 60 – 84 inches from ground level, with standard iconography for allowed uses and difficulty level. Intersection signs can post location identification information to aid in emergencies. Outside of trail intersections, little signage is required on trails. Longer trails may necessitate waymarking, “confidence” signage, also placed on posts with location information.



Regulatory And Warning Signs

Human management of delineated rules is difficult except in spot locations. While it is simple to list dozens of prohibited activities, the success of regulatory signage is usually dictated by its practicality, ease of comprehension, and attitude. Fewer, more practical rules and explanations about why regulations are present almost always achieve higher compliance rates. Images and short phrases are much easier for a broader segment of the public to take note and understand. Positive phrasing of rules engenders a spirit of cooperative management with the public.



Warning Signs

Signs play a vital role in managing risk. These signs alert the public to known hazards and the potential hazards of changing environmental conditions. When appropriate, warning signs should be used to mark known hazards. Position them well in advance of the hazard or risk so that visitors have enough time to read the sign and react. Also consider adding signs before unexpected challenging technical trail features, like drop-offs, narrow bridges, or other elements of increased risk. Where human-vehicle interactions will occur, traditional yield signs, painted crosswalks, stop signs and traffic signals are necessary. Along the trail approaching a road crossing, both “slow” and “stop” signs should be considered. Additionally, consider placing information signs, such as trail name and allowed uses, on either side of a road crossing, as these are trail-system access points.

Emergency Signs

No matter how well-signed and maintained, there are likely to be incidents that require immediate maintenance or emergency response. With the duty to warn the public of potential hazards upheld, the ability of signs to help direct a timely incident response helps to demonstrate an ability to minimize the severity of incidents. To facilitate emergency services access, each trailhead or access point could be assigned a physical address by an appropriate local agency and mapped by GPS. This physical address and GPS coordinates should be included on trailhead and intersection signs along with emergency contact information. Emergency management and park maintenance personnel should have complete map sets and sufficient training to mobilize to any site on the Greenway in the most efficient manner practical.

Educational Signs

Effective outreach signage that provides educational and interpretive messaging is vital to effect a positive trail experience, regulatory compliance, and visitor safety, perhaps more than any other management technique. These types of messages are essentially the auto-rangers of modern, extensive trail systems. Educational signs provide guidelines for responsible recreation and trail etiquette. Interpretive signs describe natural or cultural resources and agency or volunteer-led programming.

Responsible Use

It is always necessary in urban interface trail systems to provide guidance on trail etiquette, preparedness, and good stewardship of resources. Again, stated with positive phrasing and reinforced through targeted agency-led or peer-to-peer programming (such as citizen/park ambassador patrols or trailhead presence) attains the highest levels of compliance.





Interpretive Signs

Interpretive signs provide information about points of interest along the trail, helping to make an experience interactive for visitors. Often keying on natural, cultural, or historical facets, these signs help frame a larger context for a recreational experience. Recently, interpretive signs have expanded in scope to include skill development contexts that promote safer use or are integrated into self-paced park programming such as play areas, scavenger hunts, seasonal changes, or art-based activities. The keys for types of signs and their density in placement revolve around matching the development level of nearby facilities with the signage. Additionally, in areas where higher speed differentials are expected such as paved trails, interpretive signs and associated activities should be removed from the immediate trail corridor and proper ingress/egress planned.

APPENDIX E

APPENDIX E
PROBABLE FUNDING NEEDS

FUNDING NEEDS

Probable Funding Needs

Based on similar projects undertaken in the last five years in mountainous Colorado, the following estimations have been produced to facilitate HTA annual project planning discussions, fundraising strategies, and necessary increases in organizational capacity. The estimates are conservative in nature, as items can vary widely in cost due to project specifics, environmental conditions. Individual funding needs should be closely assessed in the annual planning process and vetted to a somewhat lesser degree in longer term capacity building assessment.

Item	Unit	Unit Cost (2018 \$)	Typical Volunteer Match	Annual Fundraising Need	10-Year Fundraising Need
Volunteer Crew Leader/ Trail Skills Training/ Tools & Supplies	Ind.	\$250	Ind. time	\$10,000	\$100,000 (training @ 2-yr. intervals)
Staff Professional Development	Ind./Year	\$750 (PD) \$2,500 (ED)	Staff time	\$3,000 \$2,500	\$30,000 \$25,000
Natural Surface Trail Planning/Design	Mile	\$2,000	NA	\$20,000	\$200,000
Natural Surface Trail Construction	Mile	\$31,680	10%	\$316,800	\$3,168,000
Road-To-Trail Conversion	Mile	\$23,7600	10%	\$47,520	\$475,200
Bridge Development	Foot	\$175	10%	\$43,750	\$437,500
Aggregate Surface Trail Planning/Design	Mile	\$15,000	NA	\$15,000	\$150,000
Aggregate Surface Trail Construction	Mile	\$150,000+	NA	\$150,000	\$1,500,000
				\$608,570	\$6,085,700