Trail features that provide for Challenge
Illustrations are a key element of this process and are used to define and describe trail user objectives and illustrate how the following two charcteristics are translated into trail features that provide a challenge for the rider.

RAISED TREAD

AN EXCAVATED, TRAIL-WIDTH TRENCH FILLED WITH STONE AND CAPPED WITH NATIVE SOIL OR AGGREGATE. ENSURES PROPER DRAINAGE AND DURABLE TREAD. THE SIZE, SHAPE, AND TEXTURE OF THE FILL ROCK CAN BE USED TO ADD CHALLENGE.

Escape

Many features affect the feeling of escape on a ride. In general, features will be less developed when the sensation of escape is greatest so as not to distract from the natural environment. Rollers will be smaller and less regularly spaced; built features will use rustic materials such as rough-cut timbers or natural stone.

Forest: Minimally defined tread through dense forest with no landscape modification.

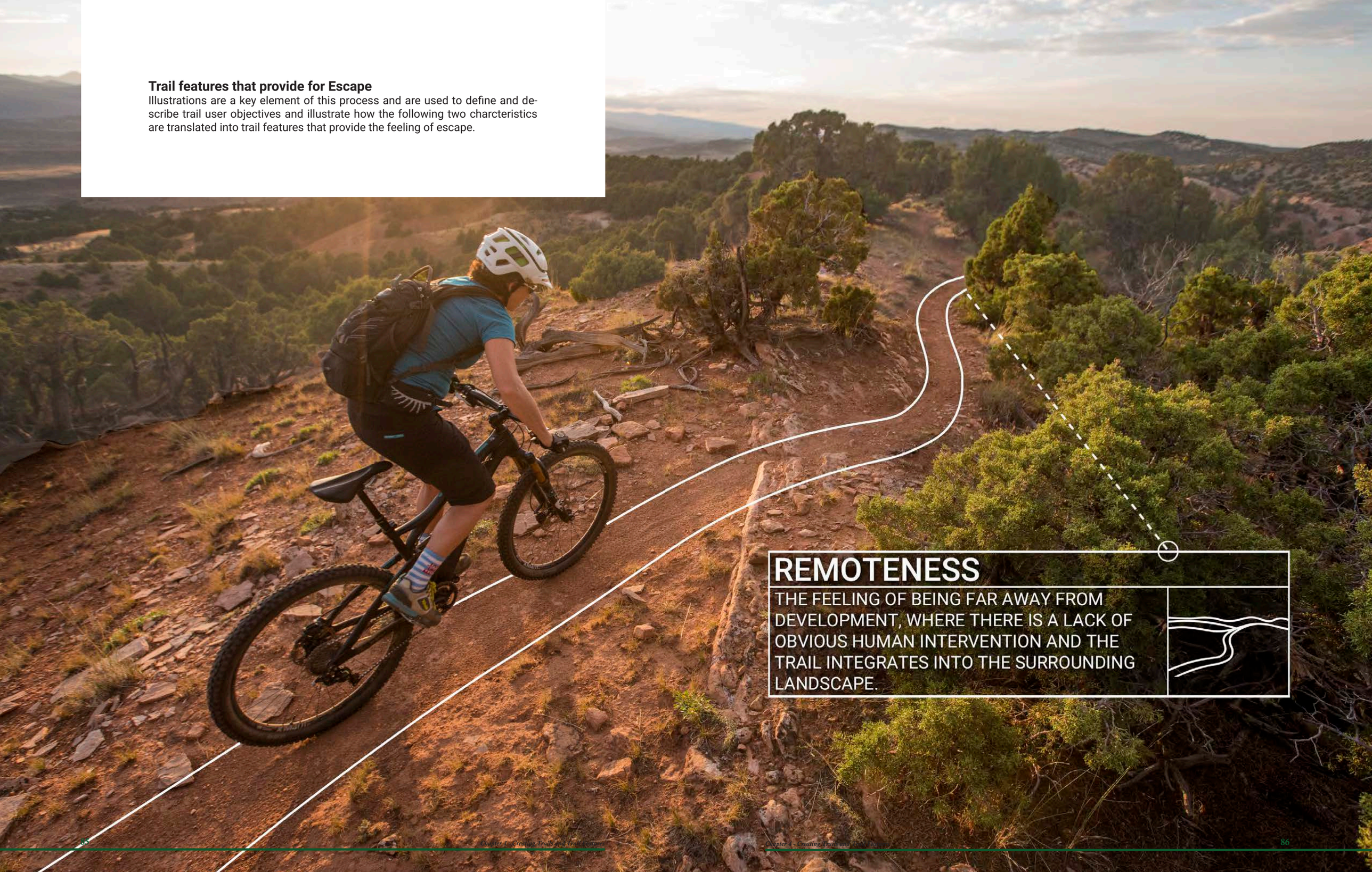
Forest: Enhanced tread through natural cliff band with tight forest. Makes use of natural features to provide a deep forest experience.

Desert: Narrow singletrack across the top of a small ridge surrounded by open sage desert and large cliffs. Perceived exposure higher than actual exposure.

Desert: Moderate technical challenges from natural features. Climbing and descending over unpredictable soils and sloping slickrock.

Trail features that provide for Escape

Illustrations are a key element of this process and are used to define and describe trail user objectives and illustrate how the following two charcteristics are translated into trail features that provide the feeling of escape.



TREAD CLEARANCE

THE AREA THAT IS MAINTAINED CLEAR OF OBSTACLES AND DEBRIS TO ALLOW USERS TO TRAVEL FREELY. DIMENSIONS VARY BASED ON THE ANTICIPATED USER OR DESIRED EXPERIENCE. MINIMAL HEIGHT AND WIDTH CAN CREATE THE EXPERIENCE OF ESCAPE.

Chapter 4 - Creating Trails and Trail Features

Risk

Used sparingly in most cases, features that increase risk provide a sensation of accomplishment when successfully navigated, but can also create a profoundly negative trail experience when it exceeds expectations. Even changes to just the surface of a feature can be varied to increase risk; for example, a loose trail tread creates more uncertainty than a stable one.

Forest: Variable conditions in landing zone, including wet roots oriented in various directions, increase the uncertainly of the jump.

Desert: The adrenaline rush from successfully navigating a blind drop is enhanced by the severity of the consequences given the rock surface and exposure.

Forest: Blind drop located several miles from the trailhead increases the risk associated with unsuccessfully completing the feature and thus increases the thrill of properly riding it.

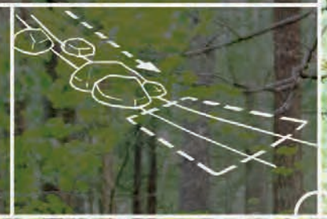
Desert: Technical challenge created by rocky, loose conditions is enhanced by risk of falling.

Trail features that provide for Risk

Illustrations are a key element of this process and are used to define and describe trail user objectives and illustrate how the following two characteristics are translated into trail features that provide a sense of risk.

FALL ZONE

AREA BELOW AND/OR ADJACENT TO THE TRAIL CLEARED OF OBSTACLES TO REDUCE CONSEQUENCES OF FALLING IN HIGHLY TECHNICAL, OFTEN ELEVATED FEATURES.



A description of the primary experiences and their associated trail features is detailed in Appendix 4.2. This information should be referenced extensively during the trail design process. It will form the core of the conversation between land managers and trail enthusiasts so that there is consensus on what the trail will look and ride like when it is finished. The details also find their way into trail construction and maintenance documentation to ensure that features are built and preserved as originally conceived by those involved in the planning process.

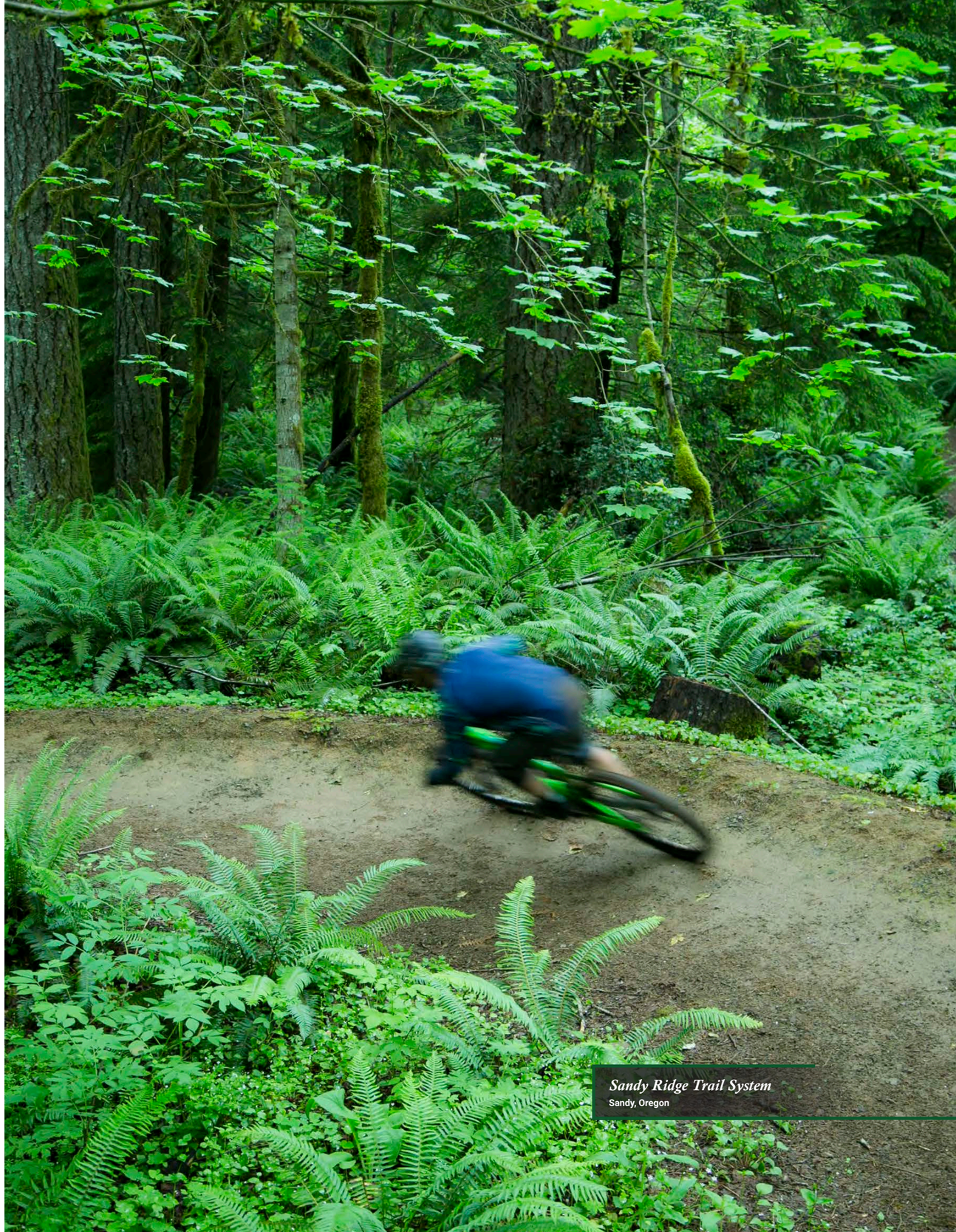
Trail Difficulty Rating

A critical aspect of a trail experience is whether the trail is too easy, too difficult, or just right. Similar to slopes in ski areas, mountain bike trails can be rated for difficulty to ensure that riders are able to find the experience they seek and, as importantly, avoid a trail they find either too boring or too formidable. The most common mountain bike trail difficulty rating system was developed by IMBA and utilizes the well-known ski area symbols: green circle, blue square, black diamond, etc.

The dimensions and characteristics of a feature are modified by the desired difficulty rating. It is only the first step to declare that achieving the desired degree of play requires a trail with berms. The next set of questions to answer are: How big (or small) are the berms? How frequent? What shape? The answers to these questions depend on the skill level of the targeted ridership.

All the features for a trail should be developed and maintained to the dimensions established for the targeted difficulty rating. This will avoid two common situations that result in socially unsustainable trails: where the difficulty level is increased on a trail, thus removing it as an option for less-skilled riders, or when features are “dumbed down” so that they no longer challenge or stimulate the target audience.

IMBA has established guidelines (https://www.imba.com/resources/maps/trail-difficulty-ratings) for trail difficulty rating based on dimensions for four typical trail characteristics: trail width, tread surface, grade, and technical trail features (TTF). This document enhances that information with more detailed specifications for the features associated with each experience characteristic as described in Appendix 2.



Sandy Ridge Trail System
Sandy, Oregon

The establishment of an accurate trail difficulty rating system can:

- Help trail users make informed decisions
- Encourage visitors to use trails that match their skill level
- Manage risk and minimize injuries
- Improve the outdoor experience for a variety of visitors
- Aid in the planning of trails and trail systems.

Many trail networks use this type of system. The system best applies to mountain bikers, but is also applicable to other visitors such as hikers and equestrians. These criteria should be combined with professional judgment and trail user input to reach the final rating.

Trail Rating Guidelines

1. Rate Technical Challenge Only
The system focuses on rating the technical challenge of trails, not the physical exertion. It is not practical to rate both types of difficulty with one system. Consider, for example, a smooth, wide trail that is 20 miles long. The technical challenge of this trail is easy, yet the distance would make the physical exertion difficult. The solution is to independently rate technical challenge, and indicate physical exertion by posting trail length, and possibly even elevation change.

2. Collect Trail Measurements
Use the accompanying table and collect trail measurements for each criteria. There is no prescribed method for tallying a "score" for each trail. Evaluate the trail against the table and combine with judgment to reach the final rating. It is unlikely that any particular trail will measure at the same difficulty level for every criteria. For example, a certain trail may rate as a green circle in three criteria, but a blue square in two different criteria.

3. Include Difficulty and Trail Length on Signs and Maps
Trail length is not a criterion of the system. Instead, trail length should be posted on signs in addition to the difficulty symbol. A sign displaying both length and difficulty provides a lot of information, yet it is simple to create and easy to understand.

Likewise, elevation change is not a criterion. The amount of climbing on a trail is more an indicator of physical exertion than technical difficulty. Mountainous regions may consider including the amount of climbing on trail signs.

4. Evaluate Difficulty Relative to Local Trails
Trails should be rated relative to other trails in the region. Don't evaluate each trail in isolation. Consider all the trails in a region and how they compare to one another. This will help you rank the relative difficulty of each trail and will help trail users select an appropriate route. Trails will rate differently from region to region. A black diamond trail in one region may rate as a blue square in another region, but the ratings should be consistent locally.

5. Use Good Judgment
Rating a trail is not 100 percent objective. It's best to combine tangible data with subjective judgment to reach the final rating. For example, a trail may have a wide range of tread surfaces — most of the trail is easy, but some sections are more difficult. How would other trail professionals and riders rate it? Use professional and stakeholder feedback to consider all elements and select a rating that best matches the style of trail.

6. Consider Other Trail Qualities
Don't forget to consider trail qualities beyond the objective criteria. A wide variety of features could contribute to a trail's difficulty. For example, exposure — the feeling of empty space next to and below the trail tread — provides an added psychological challenge beyond the steepness or roughness of the trail. A 3-inch rock seems like a boulder when a 50-foot drop looms on your side. Other qualities to think about are corridor clearance and turn radius.

7. Use Common Sense and Seek Input
No rating system can be totally objective or valid for every situation. This system is a tool to be combined with common sense. Look at trails with a discerning eye, and seek input from trail users before selecting the rating. Remember, a diverse trail network with a variety of trail styles is a great way to ensure happy visitors. Provide both easy and difficult trails to spread visitors and meet a range of needs. By indicating the length and difficulty of trails with a clear signage system, visitors will be able to locate their preferred type of trail.

IMBA Trail Difficulty Rating System

	Easiest White Circle	**Easy** Green Circle	**More Difficult** Blue Circle	**Very Difficult** Black Diamond	**Extremely Difficult** Dbl Black Diamond
Trail Width	72" or more	36" or more	24" or more	12" or more	6" or more
Trail Surface	Hardened or surfaced	Firm and stable	Mostly stable with some variability	Widely variable	Widely variable and unpredictable
Average Trail Grade	Less than 5%	5% or less	10% or less	15% or less	20% or more
Maximum Trail Grade	Max 10%	Max 15%	Max 15% or greater	Max 15% or greater	Max 15% or greater
Natural Obstacles and Technical Trail Features (TTF)	None	Unavoidable obstacles 2" tall or less Avoidable obstacles may be present Unavoidable bridges 36" or wider	Unavoidable obstacles 15" tall or less Avoidable obstacles may be present Unavoidable bridges 24" or wider TTF 2' high or less, width of deck is less than 1/2 the height Short sections may exceed criteria	Unavoidable obstacles 15" tall or less Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" or wider TTF 4' high or less, width of deck is less than 1/2 the height Short sections may exceed criteria	Unavoidable obstacles 15" tall or less Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" or narrower TTF 4' high or less, width of deck is unpredictable Many sections may exceed criteria

Criteria to Consider

Tread Width
The average width of the active tread or beaten path of the trail.

Tread Surface
The material and stability of the tread surface is a determining factor in the difficulty of travel on the trail. Some descriptive terms include: hardened (paved or surfaced), firm, stable, variable, widely variable, loose and unpredictable.

Trail Grade (maximum and average)
Maximum grade is defined as the steepest section of trail that is more than approximately 10 feet in length and measured in percent with a clinometer. Average grade is the steepness of the trail over its entire length. Average grade can be calculated by taking the total elevation gain of the trail, divided by the total distance, multiplied by 100 to equal a percent grade.

Natural Obstacles and Technical Trail Features
Objects that add challenge by impeding travel. Examples include: rocks, roots, logs, holes, ledges, drop-offs, etc. The height of each obstacle is measured from the tread surface to the top of the obstacle. If the obstacle is uneven in height, measure to the point over which it is most easily ridden.

Technical Trail Features are objects that have been introduced to the trail to add technical challenge. Examples include: rocks, logs, elevated bridges, teeter-totters, jumps, drop-offs, etc. Both the height and the width of the technical trail feature are measured.

Technical Trail Features (TTF) are objects, frequently man-made, that have been introduced to the trail to add play and challenge to the riding experience. The magnitude, spacing, and frequency by which TTF are integrated into the trail tread will directly impact the trail difficulty rating. Examples include: berms, drops, jumps, rollers, etc.

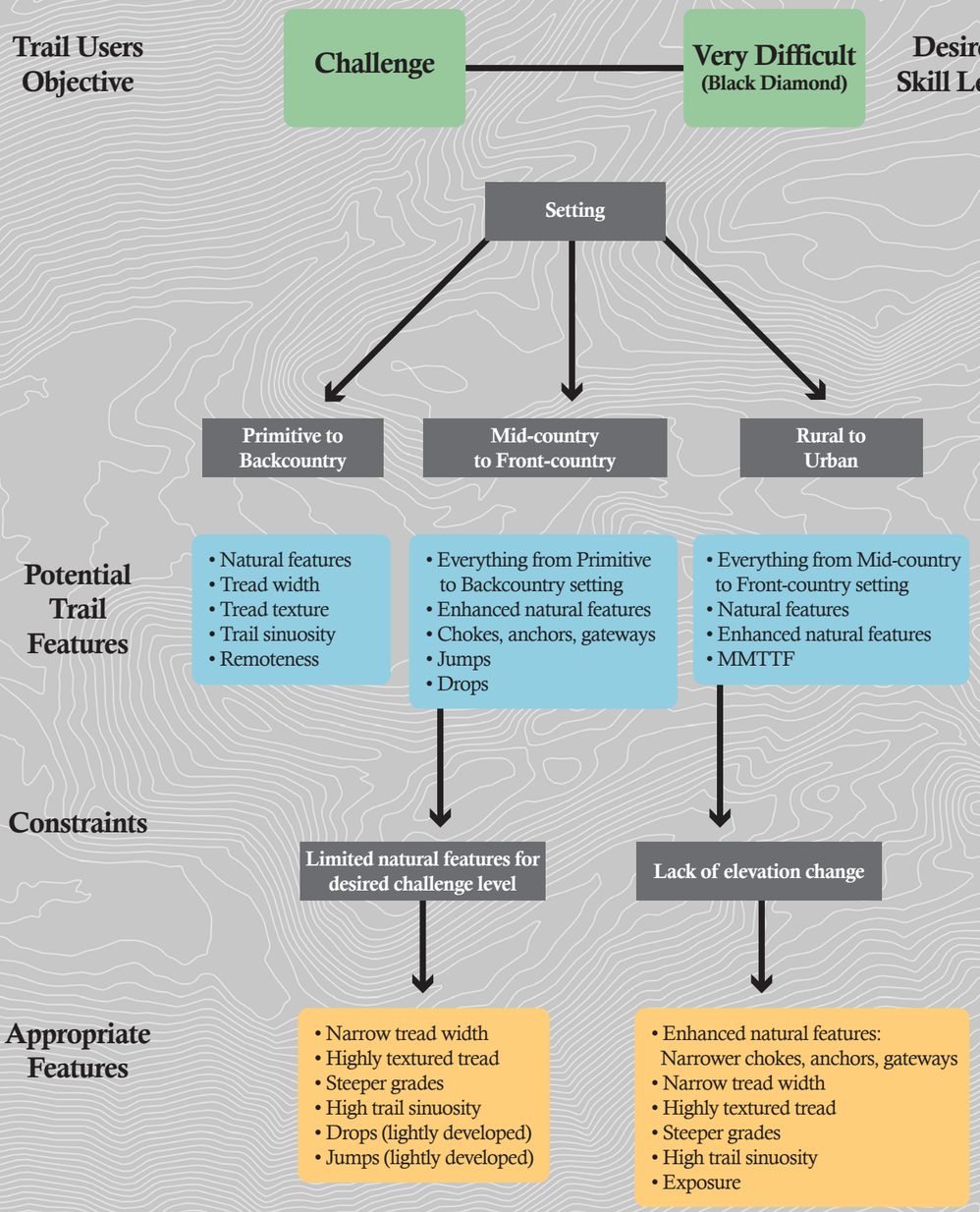
Integration with the Landscape

Not all trails and features are appropriate for all landscapes because not all landscapes are the same. Moab, Utah, with its arid climate and abundance of rock, is quite different than the lush forests and loamy soils of the Pacific Northwest. Factors like terrain, soil, and climate will greatly influence the achievable trail experience. For example, building a trail that features technically challenging jumps is complex and expensive on steep sideslopes with no mineral soil. While the experience may be highly sought, building such a trail would be a fruitless pursuit of the desired experience; resources would be better directed to developing a trail more appropriate to the terrain and soils.

The detailed information about size and shape of a given feature for a specific skill level can therefore be used earlier in the planning process to identify likely or reasonable scenarios. If the intention is to create a trail experience that is friendly to beginners, then extremely rocky terrain will need to be tamed. While many construction solutions exist for this problem, they may be cost prohibitive. Conversely, if the desire is to provide challenge through steep, rocky features and the terrain is flat and sandy, the desired experience may not be appropriate for the landscape.

In these cases, it is important to remember that the inability to provide the desired experience does not negate the desire. Instead, land managers and stakeholders should focus resources on creating engaging experiences that are supported by the landscape, search for different opportunities, or acknowledge any difficulties, such as funding, that will need to be overcome for successful implementation.

Meadow Wood
Lorton, VA



Examples

Primitive to Backcountry

Whistlepunk Trail: Imported and placed rock to add greater challenge; exposed roots; drops

Mid-country to Front-country

Red Ridge Trail: Narrow singletrack on naturally occurring exposed ledge; medium trail texture

Rural to Urban

Pipe Dream Trail: Extensive manipulation of native rock to create enhanced natural challenge features

Trail Users Objectives

Play Challenge — **Very Difficult (Black Diamond)** — **Desired Skill Level**

Setting

- **Primitive to Backcountry**
- **Mid-country to Front-country**
- **Rural to Urban**

Potential Trail Features

Primitive to Backcountry	Mid-country to Front-country	Rural to Urban
• Optional lines • Natural features • Tread texture • Trail sinuosity • Grade reversals • Natural features • Trail grade	• Everything from Primitive to Backcountry setting • Jumps (medium) • Berms (medium) • Drops (medium) • Optional lines • Enhanced natural features	• Everything from Mid-country to Front-country setting • MMTTF

Constraints

- Primitive to Backcountry: **Unstable soils; limited vegetation cover**
- Rural to Urban: **Limited natural features for desired challenge level; urban environment**

Appropriate Features

Unstable soils; limited vegetation cover	Limited natural features for desired challenge level; urban environment
• Natural features - rock features • Enhanced natrual features - placed rock to create obstacles, drops, jumps • Lots of different optional lines • Tread texture - high roughness to add challenge • Trail sinuosity	• MMTTF - wooden constructed features: wall rides, elevated structures, rollers, drops • Soil-based rollers, jumps, berms • Optional lines • Trail sinuosity

Examples

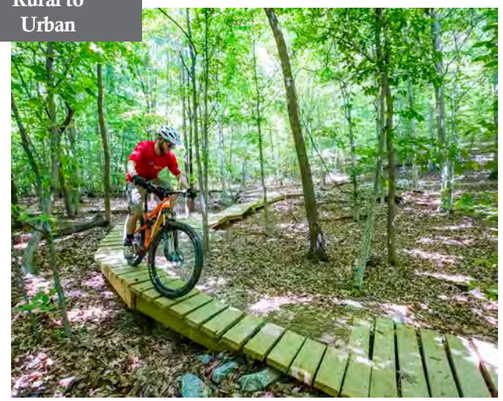
Primitive to Backcountry

Free Lunch: Constructed features not appropriate in the setting; however, natural rock allows creation of a variety of challenge and play features, and numerous optional lines

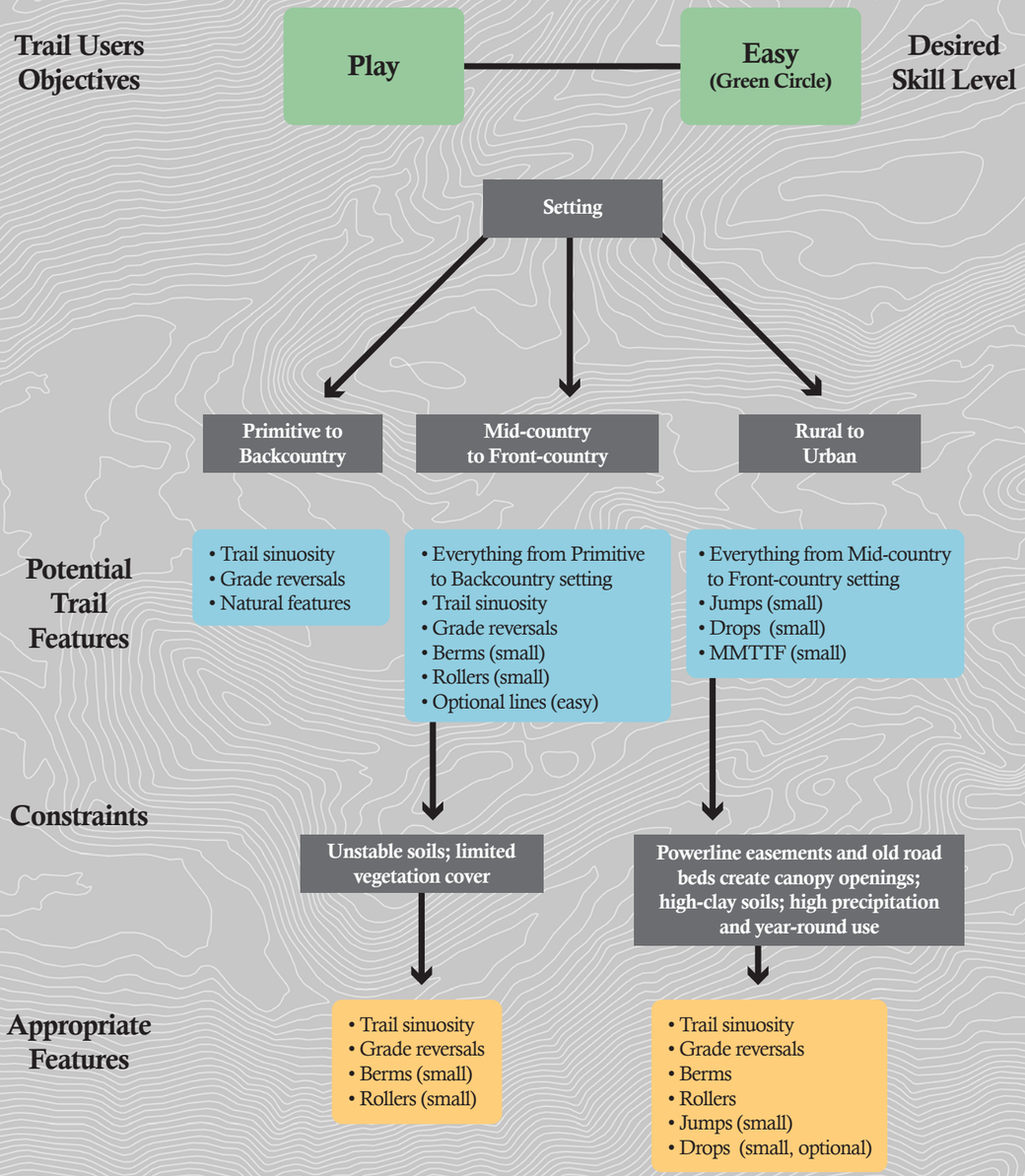
Mid-country to Front-country

Punchline: Natural rock features with multiple options lines; high texture on tread to allow for playful lines

Rural to Urban



Boss Trail: Wooden MMTTF, soil-based features for play and challenge



Examples

Primitive to Backcountry

Black Canyon Trail: Route that maximizes natural landscape features, including grade reversals and sinuous alignment

Mid-country to Front-country

Lower Hide & Seek Trail: Extensive tread shaping, tread amendments to create a flow trail with continuous small to large rollers and berms, soil amendments, pavers for durability & to reduce soil impacts during wet trail conditions

Rural to Urban

PBR Trail: Small/gentle rollers and berms, shape supported with rock materials, lots of undulations and meanders, flow adjusted to reduce speeds (to reduce breaking, sliding), soil amendments for tread shaping

Trail Building Workshop
Central Oregon

Chapter 5

Take Action

Using GQTE to Provide Bike-Optimized Trails

Who?

Trail design and construction techniques have evolved significantly over the past decade to address the advancement in mountain bike technology and the evolution of rider expectations, yet existing trail planning guidance fails to account for the range of experiences that riders seek. To address this, the BLM worked with the trail communities we serve and our national partners to establish sustainable mountain biking guidelines that help achieve the desired recreation setting characteristics and meet the recreation objectives of the area.

The GQTE was designed to be used by a broader trail-based community—land managers, users, advocates, and stakeholders—to better inform all decisions throughout the trail planning and design process. The GQTE is meant to serve as a tool that establishes a common language under which the trail community can communicate more effectively to better plan, design, construct, and maintain mountain bike trails.

To achieve the goals and vision for providing quality mountain biking trails on BLM-administered land, it is critical that those involved in the planning and design process understand their respective roles and the contributions they are uniquely positioned to make. This includes internal BLM staff at the field, district, and state office levels, as well as specialists from other agencies, partner organizations, or contractors. Also included is the broader trail-based community—advocates, local trail users, partner organizations, and bike industry professionals who have a vested stake in the outcomes of the planning and design process.

Resource Staff

Within the BLM and other land management agencies, specialists could include recreation planners, engineers, landscape architects, archeologists, hydrologists, ecologists or botanists, wildlife biologists, geologists, and more. Each may make significant contributions to a particular project. The recreation planner can provide critical information regarding visitor use, patterns of recreation activities, and desired settings necessary to achieve recreation objectives. For instance, consultation with the hydrologist could help to identify hydrologic issues affecting placement of trails, buffers from sensitive streams,

or similar aquatic habitat protection issues. Similarly, consultation with the landscape architect and/or visual resource management specialist can be essential in helping to describe the landscape character components that help shape trail layout and design.

It is imperative that BLM staff collaborate early and often in the planning and design stage. The earlier collaboration occurs, the more successful the communication of ideas and possibilities for appropriate design and layout solutions can be achieved. Collaboration must also consider useful and creative solutions for providing accessibility for all users that is integrated into the planning, conceptual design, and design development stages, rather than being addressed as an afterthought.

Depending on the scale of a particular project, collaboration may occur informally or may need to be formalized through a project and/or interdisciplinary team. In most cases, keepers of the specific natural resource data necessary in the site planning process are the aforementioned various resource specialists. Hence, it may be essential that these specialists be part of the project team(s)—both interdisciplinary teams for environmental analysis as well as trail-specific design teams.

In any case, the importance of early, often, and continual collaboration amongst resource specialists cannot be overemphasized. Becoming familiar with the planning and design process will help ensure specialists can provide substantive input throughout and ensure attention to issues of sustainability, safety, health, and well-being, while also meeting BLM's larger mission goals and resource-specific objectives.

External

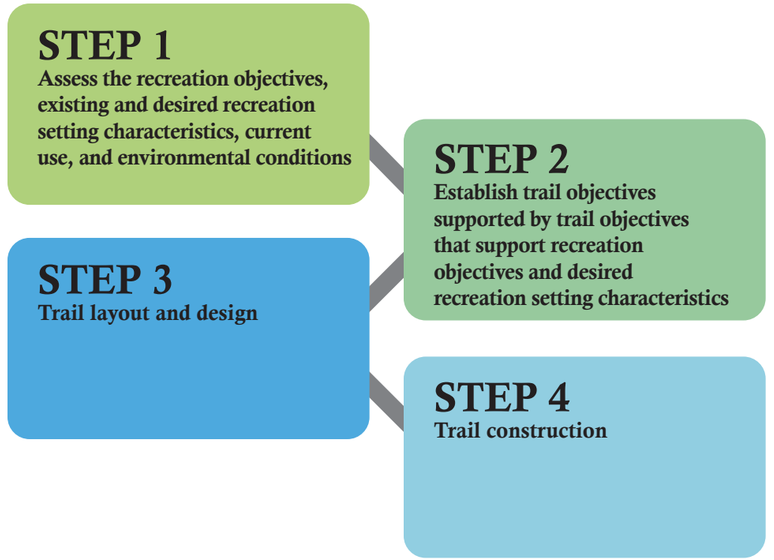
While navigating the planning and design process, it is important to involve the public and project stakeholders in order to learn their point of view, hear about desires, respond to any concerns, and incorporate design components that the internal team may not have analyzed. As with involving internal specialists early and often, bringing in external stakeholders will make sure that numerous voices will be heard and permit all involved to take ownership of the final outcome. Consider reaching out and including adjacent property owners, target user groups, users looking for access, and other governmental agencies.

A planning and design process can benefit from establishing a steering committee that includes internal staff and external stakeholders. Regularly scheduled meetings with the steering committee throughout the entire process keep everyone involved and informed. Including public outreach meetings at strategic milestones (draft concept plan, final plan for comments, pre-construction info) allows the steering committee to convey the planning concepts to the general public with the intent of receiving comments and vetting all concerns within the community.

Johnny Behind the Rocks Trail System
Lander, Wyoming

What?

The planning and design process is a systematic sequence of steps that, when followed, will produce a quality mountain biking–optimized riding experience. Each step in the process flows smoothly into the next and ensures informed decisions are made in a sequential order. This chapter provides guidance for planning and designing a bike-optimized experience at the trail system and individual trail level for both new opportunities and retrofitting existing opportunities. Several examples are provided to further illustrate this process.



The planning and design process involves steps that begin at the larger land use planning scale and continue through to the more detailed trail construction stage. Before the arduous process of designing a bike-optimized trail begins, well in advance of any ground-disturbing activities, decisions at the land use planning level will be made that can set the stage for the successful development of a mountain bike–optimized trail experience.

How?

The principels outlined in the GQTE are intended to be used during implementation-level planning after an area has been identified and subsequently designated as a Recreation Management Area that identifies mountain biking as one of the targeted recreation activities, as outlined by BLM recreation policy.

5.1 GENERAL RECREATION PLANNING

LAND USE PLANNING

This "big picture" level of planning serves as a basis for future decisions. To ensure the best balance of uses and resource protections for America's public lands, the BLM undertakes extensive land use planning through a collaborative approach with local, state, and tribal governments, the public, and stakeholder groups. The result is a set of land use plans—called Resource Management Plans—that provide the framework to guide decisions for every action and approved use on the BLM-managed Public Lands. The BLM currently manages over 245 million acres of surface land and 700 million acres of subsurface mineral estate.

Recreation resources and uses are allocated through the land use planning process, during which an interdisciplinary team considers various management scenarios for all resources that are present within a geographic area to achieve management goals and objectives. Some form of recreation use and associated recreation resources are typically present in a specific area's lands and waters, and are consequently allocated through the land use planning process.

To assist in the planning and management of recreation and visitor services on public lands and adjacent waters, the BLM relies on its existing guidance contained in Manual 8320 and Handbook H-8320-1 (Planning for Recreation and Visitor Services). Released in March 2011, Manual 8320 provides general policy, direction, and guidance for planning recreation and visitor services on the public lands and associated waters under the administration of the BLM. The purpose of Handbook H-8320-1 is to assist in providing guidance at the land use planning and implementation level. This handbook also supports the policies in BLM Manual 8320, and related program guidance in BLM Handbook H-1601-1, "Land Use Planning."

The BLM's Recreation Planning process is an outcome-focused management approach that stresses the management of recreation settings to provide opportunities that allow visitors and local communities to achieve a desired set of individual, social, economic, and environmental benefits. Planning for recreation resources focuses on fulfilling the BLM's mission to sustain the health, diversity, and productivity of public lands for the use and enjoyment of present and future generations.

Appendix 3 includes several examples of Recreation Management Area (RMA) frameworks that have been completed at the land use planning level where mountain bike trails were identified as one of the primary visitor activities, and the recreation values and outcome objectives were developed to manage this activity and setting.

IMPLEMENTATION PLANNING

Implementation planning can take many forms but generally includes applying the broad guidance of the "big picture" to a specific place or issue. This often involves completing a plan with a narrower focus (e.g., a specific recreation area) and generally requires additional National Environmental Policy Act (NEPA) analysis. Implementation actions may also be proposed and approved through recreation-specific implementation plans, including recreation area management plans and project plans at the trail system and individual trail level.

IMPLEMENTATION BY DESIGN, NOT DEFAULT

Indicators that will be used to define a quality recreation visit for a Recreation Management Area or Recreation Management Zone are based on the recreation activities and outcomes included in the Recreation Management Area objective. The recreation objectives then become the focus of all implementation actions. Implementation actions that focus on achieving the objectives limit unanticipated and unacceptable changes to Recreation Setting Characteristics or negative affects to recreation opportunities. Implementation actions that do not have a functional purpose should not be undertaken. The need, appropriateness, or relevance of each implementation action must be evaluated by its ability to:

- ***Support the RMA objective***
- ***Maintain or enhance desired physical, social, or operational Recreation Setting Characteristcs***
- ***Comply with allowable uses and management action decisions identified in the LUP***
- ***Support LUP decisions where SRPs will be issued, and/or mitigate visitor health and safety issues, recreation impacts on natural and cultural resources, and use or user conflicts***

RECREATION AREA MANAGEMENT PLANNING

Recreation Management Areas with complex implementation issues not resolved during the land use planning process may require a subsequent implementation plan—called a Recreation Area Management Plan (RAMP). The RAMP typically sets goals and objectives, works to resolve management issues such as capacity and environmental impacts, and provides specific direction for on-the-ground implementation of the land use plan. The four implementation categories addressed in the RAMP are management, administration, information and education, and monitoring. When RAMPs are completed for these areas, funding sources for future developments should be identified, including funds not only for construction, but also planning, design, and maintenance.

RMAs with complex implementation issues may require a subsequent RAMP to: (1) address implementation issues not addressed in an LUP, or (2) provide specific direction for on-the-ground implementation of the LUP over a discrete management unit. RAMPs should address actions, roles, and responsibilities for the BLM and, perhaps, other collaborating community recreation-tourism providers who affect RSCs or the kinds of recreation opportunities being produced. They also may include other actions necessary to achieve interdisciplinary LUP objectives. RAMPs may be developed for an RMA, multiple RMAs, or areas with connected recreation actions. RAMPs may precede project plans.

Appendix 4 includes several examples of Recreation Area Management Plans that have been completed for mountain bike trails and trail systems.

5.2 TRAIL SYSTEM PLANNING

When a new area or existing trail system has been identified for more in-depth trail planning, mountain bike project planning can be developed on a case-by-case basis to establish the trail design requirements for construction, tiered to the Land Use Plan or Recreation Area Management Plan. It is during this phase that initial planning for the proposed project occurs; the process identifies the targeted level of difficulty, desired trail objectives, and general trail construction guidelines that would provide and deliver the targeted mountain bike trail experiences. At this level, data collection includes review of pertinent BLM documents, manuals, Land Use Plans, Activity Level Plans, baseline trail experience evaluations (if trails exist), etc.
The Guidelines for a Quality Trail Experience theories discussed in Chapter 3: Trail Settings, Characteristics and Experiences, and Chapter 4: Creating Trail and Trail Features establish the foundation for creating a high-quality trail system plan that:

- Is setting appropriate
  (based on the desired Recreation Setting Characteristics)
- Supports the recreation objectives
  (based on targeted activities, experiences, and benefits)
- Provides the desired level of difficulty
  (based on the trail difficulty rating classes)
- Identifies the mountain bike trail features that when placed on the landscape will achieve the overall trail system goals

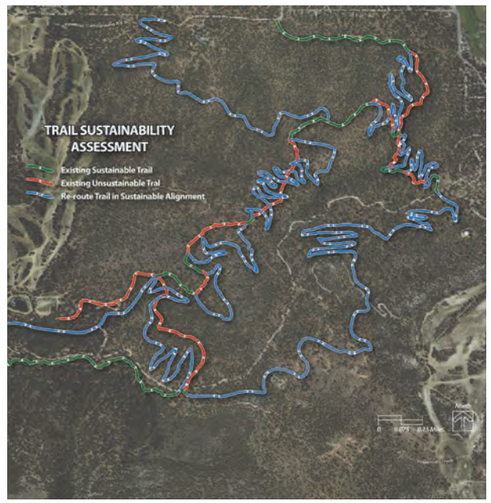
The following trail system planning steps should be followed when the goal is to design a trail system that provides a high-quality mountain bike trail experience:

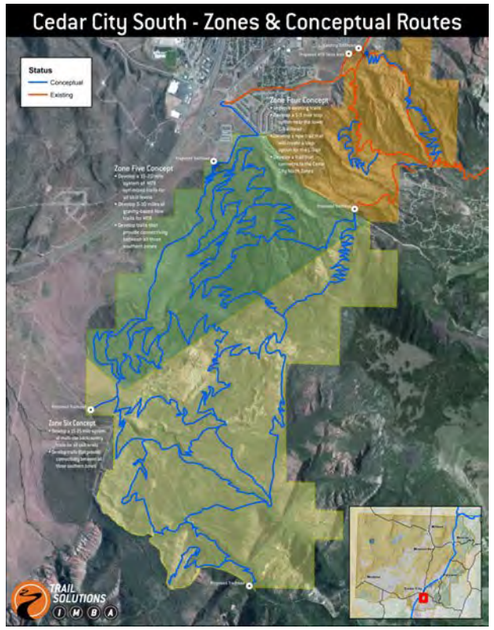
STEP 1: Identify recreation objectives and desired setting characteristics, current use, and environmental conditions

- Review recreation objectives and desired RSC for the entire project area or a portion of the project area (such as a recreation management zone)
- Use geographic information system data to map the physical characteristics (such as remoteness and naturalness) that are based on existing roads, access

STEP 2: Describe Trail User Objectives

- Using the trail objectives described in Chapter 3, establish goals and narratives for reach route within the system
- Trail objectives and trail narratives should describe the desired outcomes in a way that all stakeholders can understand
- These objectives and narratives will guide the trail design, construction, and management





STEP 3: Trail Layout and Design

Trail system design and layout should support the area's objectives and consider any environmental constraints.

- ***Site Planning –*** Build a base map for the planning area and start conceptualizing where trails can go and what kinds of features can be created to produce the experiences desired.
- ***Conceptual Design –*** What is possible on the site? Consider opportunities and constraints. Create a rough conceptual system by identifying generally where trails and experiences fit.
- Trail Design: Preliminary alignments from the conceptual plan are refined based on field visits and corridor flagging. The design is influenced by and evaluated with respect to the GQTE, including desired trail objectives specific to the trail or system and IMBA's alignment guidelines for environmental sustainability. The appropriate types of construction and procurement procedures are determined once field flagging, cost estimating, project phasing, and inventory of man-made technical trail features (MMTTF) is completed. Once the trail corridor is defined, any required environmental review and/or additional public input can occur prior to construction.
  - The flagged alignment represents a corridor through which the trail will go, but not its precise location. Providing a corridor rather than a tight alignment at this step allows for flexibility in the field to adjust the tread within the corridor to highlight various desired experiences and minimize environmental impacts.

STEP 4: Trail Construction

Trail construction should be influenced by the targeted user objectives identified in the previous steps. Construction techniques should follow best management practices, using features to create experiences within the environmental constraints, as guided by the Trail Characteristics tools in Chapter 4 and Appendix 5.2.

Mountain of the Rogue
Rogue River, Oregon

EXAMPLE: Mountain of the Rogue Conceptual Trail System Planning

Using the GQTE approach to develop a system in Southern Oregon from the ground up

The Mountain of the Rogue Trail (MOTR) project provided guidance and suggestions for the creation of a new shared-use trail system in a small study area near Rogue River, Oregon. The trail system addressed the growing demand in this region for mountain bike–optimized trails while also serving the needs of recreation users who prefer hiking or trail running by providing a core route that is multi-use. The BLM wanted to create a trail network that would appeal to the surrounding communities yet also provide a high quality mountain biking destination. To that end, the BLM engaged local mountain bike advocacy organizations to ensure that users' needs are met and that they are able to contribute to construction and maintenance. The study area is approximately five miles south of the town of Rogue River, Oregon, five minutes from Interstate 5, and sees thousands of potential users passing north and south between the larger regional cities of Seattle, Portland, Sacramento, Oakland, and San Francisco. It is also within an hour's drive of growing, outdoors-oriented populations in Medford and Ashland.

This project was crafted with the idea of developing an improved network of trails comprising both traditional singletrack and purpose-built singletrack trails. Clusters or stacked loops of trails were crafted to feature sustainable design and construction as well as meet conservation, education, and recreation objectives. These loops were designed to create a progression of experiences and challenges as trail users explore them in more depth with each visit. Individual segments would provide targeted experiences that meet user expectations. The design of this system is similar to that of a well-designed ski trail system, with a collection of easier (green circle), more difficult (blue square), very difficult (black diamond), and extremely difficult (double black diamond) areas. This network was designed to provide efficient way-finding signage and a variety of trail types. These managerial characteristics were targeted to appeal to a broad cross-section of mountain bikers, from family-oriented entry-level riders to highly skilled enthusiasts.

While all trails within the MOTR trail system are open to multiple uses, they vary in their designed (i.e., bike-optimized) and preferred use, and for some trails, in the preferred direction of travel. Trail "style," as identified in the Conceptual Plan index and maps, uses two designations to describe conceptual routes: Multi-use and Flow-MTB. Routes labeled "Multi-use" were designed with traditional shared-use trail characteristics and it is intended that traditional yield rules apply. Routes labeled "Flow-MTB" are bike-optimized trails and may include berms, jumps, drops, and other natural and man-made technical trail features.

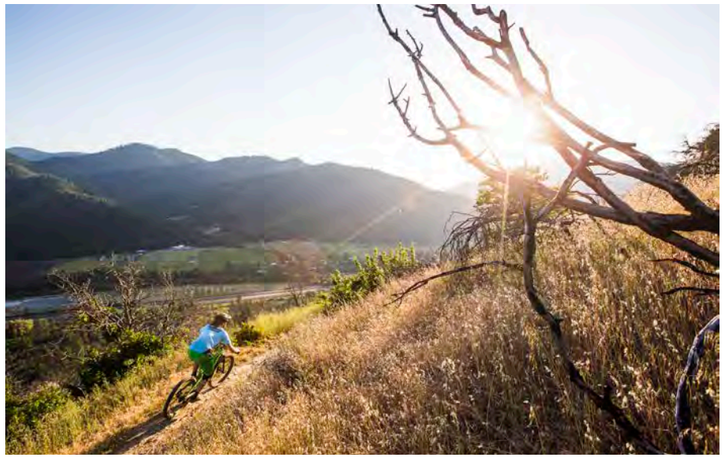
Additionally, some of the Flow-MTB trails are designed to optimize the experience specifically for descending mountain bikers. To provide the best experience for users, these trails are intended to be managed for mountain bikes as the preferred use and one-way (descending) as the preferred direction of travel. For these trails, yield rules are altered for user experience and risk management—it may not be possible for a rider to safely yield on these descending trails, so other users must yield to riders in the descending direction (including mountain bikers traveling uphill). It is expected that other users will seek multi-use trails, as they may find the Flow-MTB trail features less optimal for achieving their desired experiences. Trailhead information and intersection signs are critical in relaying information to users about targeted trail experiences and appropriate trail etiquette based upon trail descriptions and designations.

The following pages highlight the steps taken by the BLM and the IMBA Trail Solutions team to move through the trail development process.

STEP 1: Identify Recreation Setting Characteristics

Recreation Setting Characteristics are typically inventoried and described during the land use planning process and are ideally based on recreation data from visitors and communities, stating which settings they feel support the attainment of their desired outcomes. If there is no current land use planning for an area it may be necessary to work with the local community to inventory, describe, and establish recreation setting characteristics that meet local needs and desires.

Based on the visibility of and proximity to the urban environment, as well as existing and planned management controls for the site, the Mountain of the Rogue system falls within the Rural RSC Class.



STEP 2: Establish Trail User Objectives Supported By Trail Narratives and Trail Descriptors

To effectively accomplish the experience-based characteristics that were identified for the individual routes within the Mountain of the Rogue trail system, the following route-experience goals and trail narratives were developed to focus the design, construction, and management within the project area.

Trail Index

Route ID	Status	Difficulty	Style	Phase
Paydirt	Conceptual	Green	MTB-FLow	1

Trail Objective	Trail Narrative
An easy route, purpose built for MTB users. A descending trail with excellent flow and small rollers and berms. Returns riders to the parking lot in a safe, controlled manner.	This trail will be slightly wider (30") as it descends towards the trailhead through relatively dense vegetation. This trail will be the perfect opportunity for less advanced riders to experience dynamic features that allow them to lean through curves and swoop over rollers.The smooth surface will allow riders to focus on bike and body separation.

Trail Index

Route ID	Status	Difficulty	Style	Phase
Breakdown	Conceptual	Blue	MTB-Flow	1

Trail Objective	Trail Narrative
A moderately difficult route, purpose-built trail for MTB users. A descending trail with superior flow and modestly sized rollers, jumps, and berm turns.	This trail will be slightly wider (30") as it descends towards Breakdown trail through increasingly dense vegetation. This trail will have tighter flowing feel which rewards riders for maintaining momentum by pumping trail features and linking turns. Modestly sized features will challenge riders' upper body strength as they compress and extend through series of rollers and jumps.

Trail Index

Route ID	Status	Difficulty	Style	Phase
Ratpack	Conceptual	Blue	Multi-use	2

Trail Objective	Trail Narrative
A moderately difficult but technically challenging route for all users. Primarily a climb for most MTB users. Provides access to higher trails and forms part of a loop.	This trail will be narrow (24") in width as it ascends and winds along a rockier ridge and traverses a steeper slope. The grade will be moderate to steep and will be a challenging climb with modest technical challenges. The trail surface will be rough and will feature occasional low, natural obstacles in the trail tread; riders will focus on maintaing balance and traction.

Trail Index

Route ID	Status	Difficulty	Style	Phase
Armbar	Conceptual	Black	MTB-Flow	2

Trail Objective	Trail Narrative
A very difficult route that was a purpose-built trail for MTB users. A descending trail with open flow and nearly constant technical rock challenges.	This trail will be slightly wider (30") as it descends towards Breakdown trail through open terrain. This trail will have an open flowing feel that rewards riders for maintaining momentum which they will need to carry them over the rough, rocky surface. Modest ledges, jumps and rock gardens will challenge riders to maintain speed while negotiating obstacles.

Trail Index

Route ID	Status	Difficulty	Style	Phase
Darkside	Conceptual	Red	Multi-use	3

Trail Objective	Trail Narrative
A very difficult and technically challenging route for all users. Primarily a climb for most MTB users. Provides access to the descent (#015) of the peak and forms part of a loop.	This trail will be very narrow (18") in width as it ascends and traverses a steep slope to access the peak. The grade will be moderate to steep and will be a challenging climb with expert technical challenges. The trail surface will be rough, natural, and narrow, providing riders with a chance to test their tolerance for exposure as they enjoy the scenic vista.

STEP 3: Trail Layout and Design

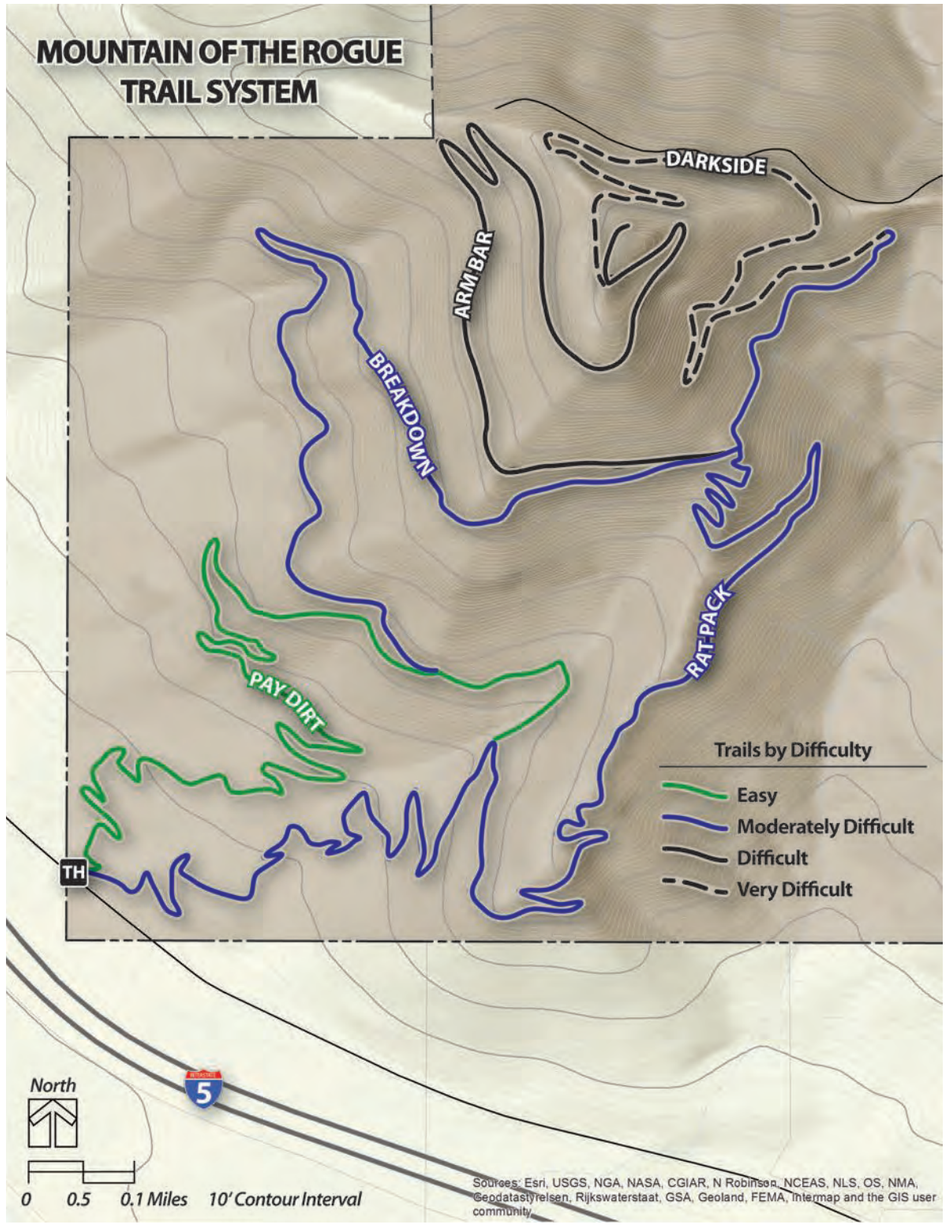
Site Planning: Initial layout and design for Mountain of the Rogue began with base maps showing existing structures (roads, gates, utilities, etc.) and environmental attributes (slope, vegetation cover, soil conditions, etc.).

Conceptual Design: Site visits contributed to the understanding of project site opportunities and constraints to guide the conceptual design. Targeted trail objectives guided the conceptual system design and each trail layout.

Trail Design: Field flagging followed the conceptual design, using a wide corridor to allow for flexibility in the field to adjust the tread within the corridor to highlight various desired experiences and minimize environmental impacts. The design was influenced by and evaluated with respect to the GQTE including targeted trail user objectives specific to each trail. Site-specific construction techniques and project phasing was determined. Four phases were planned for the construction, starting with beginner- and intermediate-level flow trails, and multi-use trail loops planned to serve the widest range of users with the initial construction.

For several trails at Mountain of the Rogue, play and flow were considered particularly important. Site conditions are composed of dry, sandy soils, which limited some of the features that could be constructed using native materials. While jumps and berms are common features used to create play and flow trail user objectives, in this instance different kinds of features were needed, e.g., rollers instead of jumps, and importing materials to create a more durable tread for berm surfaces.

Mountain of the Rogue Trail System: Conceptual Plan



STEP 4: Trail Construction

Mountain of the Rogue: Trail Outcomes Realized

Through a regional assistance agreement with IMBA, the BLM developed eight miles of new trails within the Mountain of the Rogue Trail System project area in the summer of 2015. As highlighted in the following images, by following the GQTE principles in applying targeted user objectives and using trail planning narratives to guide trail construction, trail users were provided distinctly different experiences throughout the trail system.

Trail Name: Armbar

Trail User Objectives:
Challenge, Texture, Exposure, Play

Trail Narrative: The most difficult purpose-built trail for mountain bike users including a descending trail with traditional build style and optimized yet variable flow, near-constant technical rock challenges and a rougher tread characteristic.

Trail Name: Breakdown

Difficulty: More difficult/Intermediate

Trail User Objectives:
Flow, Challenge, Play

Trail Narrative: This trail is slightly wider (30") as it descends through increasingly dense vegetation. It has a tighter flow feel that rewards riders for maintaining momentum by pumping trail features and linking turns. Modestly sized features challenge riders' upper body strength as they compress and extend through a series of rollers and jumps.

Trail Name: Pay Dirt

Difficulty: Easy/Beginner

Trail User Objectives:
Flow, Play, Risk

Trail Narrative: An easy route, purpose-built for mountain bike users, a descending trail with excellent flow and small rollers and berms. Trail returns riders to the parking lot in a safe and controlled manner. This trail is slightly wider (30") as it descends toward the trailhead through relatively dense vegetation. This trail is the perfect opportunity for less-advanced riders to experience dynamic features that allow them to lean through curves and swoop over rollers. The smooth surface allows riders to focus on bike and body separation.

Alsea Falls Trail System
Alsea, Oregon

5.3 TRAIL-SPECIFIC PLANNING

Incorporating the GQTE principles at the ground level will provide the trail planner/designer with the opportunity to develop a level of fine detail, which reinforces the planning and design as it transitions into the construction phase. As the project progresses, opportunities arise to seek additional guidance through trail construction guidelines and specifications, as well as photos, to provide refined specifications for the volunteers, agency staff, or trail contractor to effectively place a trail on the landscape that meets the rider's expectations. Trail-specific planning should generally follow a logical seven-step process:

STEP 1: Establish Primary Trail User Objectives
STEP 2: Conceptual Trail Design
STEP 3: Master Plan/Field Design
STEP 4: Establish Trail Construction Guidelines
STEP 5: Establish Trail Construction Specifications
STEP 6: Procurement/Construction
STEP 7: Experience Evaluation and Monitoring

EXAMPLE: Whistle Punk Trail
The existing trail system at the BLM-administered Alsea Falls site in Western Oregon provides several flow-style trails for beginner and intermediate riders, with sculpted berms, rollers, and jumps. Additionally, a few short user-created trails that have been improved and adopted into the system have a traditional shared-use feel, with some bike-optimized features such as open, slightly insloped turns. The plan for the system included several additional miles of trails to offer a variety of experiences and showcase the setting. Local users voiced their desire to create opportunities to provide a more technically challenging riding option for advanced users within the system.

Planning and design for the Whistle Punk Trail began as an effort to effectively provide the desired trail objectives and level of difficulty. The combination of the recreation setting characteristics (middle country) and specifically the physical characteristic of remoteness provided the opportunity to establish a trail with a different character than what was available within the existing system. During the public outreach, stakeholders communicated with the BLM that they wanted a trail experience with a more rugged, less predictable feel, one that blended with the setting and provided an immersive experience with the forest. Ideally, Whistle Punk would feel like a signature trail, one that would embody the setting and form the backbone for the system.

STEP 1: Establish Primary Trail User Objectives

A key component of this step is providing detailed information that further defines the targeted trail user objectives and include any available photos to better communicate the primary trail characteristics to agency staff and public stakeholders. Appendix 5 includes a library of trail characteristics across a range of difficulty levels.

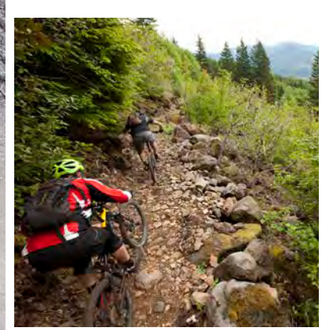
Trail User Objectives: *Technical Challenge, Nature*

Trail Objectives	Range
Setting	Relatively primitive
Technical Challenge	**High intermediate**
Trail Flow	Bike-optimized, but less predictable
Nature	**Immersed in nature**
Playfulness	Moderate
Exposure	Relatively low exposure

Flow: Trail should include optimized turns for bikes, but it shouldn't feel "pumpy"; it's not a "flow trail." It should have as much texture as possible, and should be narrow in finished width, with a lot of hidden, natural features. It should look and feel more like what people consider traditional or classic singletrack, a bit more unpredictable with a less manicured or engineered feel to keep riders on their toes.

Roughness: Where possible, tread should have a lot of small- to medium-sized (2"–8") obstacles to create challenge and a more natural trail feel. In general, this means leaving obstacles (roots and rocks), recognizing that many small obstacles will become "proud" as the trail bed wears in with use. Where large roots are exposed, especially if highly off-camber, use chokes (logs, rocks, existing tree trunks) on the downhill side to keep users from widening the tread. Placement of larger obstacles for challenge, including optional lines/avoidable obstacles (e.g., drops), is encouraged. The area near the top is a bit flatter with good road access for importing material as needed.

Trail Characteristic Photos:
Trail Roughness: Moderate (left and center) to high (right)



Optional lines and more advanced features

STEP 2: Conceptual Trail Design

The design team utilizes detailed mapping, GIS data, site inventories, site analysis, and geotechnical reports to determine what is possible on the site. Conceptual design places the trail onto the landscape to generate a trail layout needed to accomplish design and user objectives, and offers quick design solutions to generate comments and responses. Design concepts are evaluated with respect to GQTE principles, preliminary cost estimate, and the budget. Once a conceptual trail design option is approved, the determination is made as to whether the project will be constructed by trail advocates, volunteers, BLM personnel, or contractors, which dictates the level of plans and oversight needed.

For Whistle Punk Trail, the landscape helped to define the conceptual trail design. The remoteness to the rest of the trail system combined with the old-growth characteristics of the forest complemented the targeted user objectives. Based on an understanding of the site, integrated with GIS data for environmental factors (slope, vegetation cover, boundaries, soil type, etc.), a conceptual alignment was designed to further reflect desired objectives within the environmental and regulatory constraints.

STEP 3: Master Plan/Field Design

Further development of the conceptual design occurs in this phase. The Whistle Punk conceptual design was refined in the field and the corridor flagged for review. The flagged alignment represented a corridor through which the trail would go, but not its precise location. Providing a corridor rather than a tight alignment at this step allowed for flexibility in the field to adjust the tread within the corridor to highlight various desired experiences and minimize environmental impacts. For example, winding the trail between trees provided a more intimate nature experience while also adding challenge.

STEP 4: Establish Trail Construction Guidelines

Trail construction guidelines should be general in nature and should support the attainment of the primary trail objectives identified in Step 1.

Whistle Punk Trail Construction Guidelines:

1. ~1.7 miles flagged corridor (can be reduced to ~1.4 by eliminating upper trail segment)
2. 3% to 6% average trail grade (400' elevation loss), 15% maximum for short sections (<50ft)
3. Downhill directional from near high point of system, connects upper access road and Sexy Tree trail/lower access road
4. Difficulty rating: High Intermediate
5. Bike-optimized, but not a “flow trail”
6. Moderate to high surface roughness
7. Tread shaping should blend with environment
8. Corridor will be cleared by youth crew with volunteer assistance
9. Portions of route will have a marbled murrelet construction restriction

STEP 5: Establish Trail Construction Specifications

Construction drawings, details, and technical specifications are completed during this phase. Construction documents describe the quantity, quality, configuration, and size of trail features to be included in the design, and ensure the project is consistent with the design, program, budget, and schedule. If appropriate, agency agreements are finalized and a final cost estimate is produced. Trail guidelines are developed from the GQTE matrix and include the magnitude and frequency of trail features, trail difficulty, etc.

Alsea Falls-Whistle Punk Trail Specifications Matrix

The specifications are particular to the skill rating and user objectives for the trail—High Intermediate skill rating with a focus in nature and technical challenge.

Category	Trail Characteristic	Trail User Objectives	Intermediate	Int-Adv	Description
Tread					
	Grade	Challenge, Exercise			
	Average grade, soil	Challenge, Exercise	0-10%	0-12%	
	Maximum grade, soil	Challenge, Exercise	15%	20%	Maximum grade along a trail or trail segment for soil tread (unarmored), for distance >50lf. Can exceed max grade when part of a gravity dip.
	Maximum grade, rock or armored, climbing	Challenge, Exercise, Exposure	20%	25%	<~10lf
	Maximum grade, rock or armored, descending	Challenge, Exercise, Exposure	30%	40%	<50lf
	Grade reversal, frequency	Play, Nature	50-200'	50-200'	Varies with terrain, look for natural features and topography to guide grade reversal placement.
	Tread width	Exposure/Risk, Challenge, Nature	18-36"	12-36"	The average width of the active tread or beaten path of the trail. Mostly narrow and twisty, except where high exposure and/or at technical trail features and optional lines.
	Clearance width	Exposure/Risk, Challenge	12-96"	12-96"	The area that is maintained clear of obstacles and debris to allow users to travel freely. Dimensions vary based on the anticipated user. The width includes the tread, outslope, backslope, and any additional clearance requirements. The height dimension is measured from the ground surface to the edges of the clearance width to create the full corridor.
	Outslope	Exposure/Risk, Challenge	0-10%	0-15%	For regular tread, outslope should not exceed 10%. Up to 15% at drain apex. Excludes berms.
	Inslope	Play, Fun	0–10%	0–15%	Along elevated tread and for gutters above turns, inslope should not exceed 10%, up to 15% at drain apex to basins or for microtopography-forced drainage. Excludes berms.
	Roughness	Challenge, Play	Moderate	Moderate to high	Surface roughness–amplitude and frequency of tread obstacles. High surface roughness is desirable for this trail.
MMTTF	Natural obstacles, unavoidable	Nature, Challenge, Play	</=8"	</=10"	Choke tread to keep users from going around obstacles. Larger avoidable obstacles may also be present. Add optional larger features to tread where fits with trail flow.
Turns					
	Berm	Play			
	Radius		8–10'	7–10'	Tread is insloped or banked throughout the turn. Berm face should be convex. Usually constructed at grade. Bermed turns should blend with the landscape at Whistle Punk, generally smaller, tighter than flow trail berms.
	Grade		3–7%	5–10%	Change in elevation from upper to lower leg (e.g., the grade through the turn).
	Switchberm	Play, Efficiency			Hybrid bermed switchback used on steeper slopes or tighter trails. Uses a constructed platform, but the turn is super elevated/bermed to provide better user experience and reduce lateral soil displacement.
	Radius		5–7'	4–7'	
	Grade		3–7%	5–10%	
	Climbing Turn				
	Radius		8–15'	8–15'	
	Grade		5–10%	7–12%	Max grade varies by soil type.

STEP 6: Procurement/Construction

Once the construction specifications are completed the trail construction method is determined. If a contractor is going to be used then the required procurement process is followed: bid documents are produced, the package is prepared, and advertised for a formal public bidding process. Once awarded, the project then proceeds according to the construction drawings and specifications.

The best trails are those that appear to be placed into the landscape, not on top of it. These trails celebrate the unyielding variations present in the natural environment and avoid the stifling sensation of uniformity, allowing the builder to display creativity and flexibility to develop the best experience possible.

While this makes for memorable trails it tends to confound the typical procurement process mandated for most government agencies. Fixed-price installation, measured against established construction standards, allows for the best quality at the lowest price when installing roads or plumbing fixtures, but when used to bid trails it typically leaves the contractor, the agency, and the trail users unsatisfied.

For the Whistle Punk Trail, the BLM hired a contractor experienced with the construction of bike-optimized trails and bike parks, and used the construction specifications and the conceptual plan (from Steps 1 to 5) to relay the desired trail objectives to the builder. This was a critical step, because while the contractor was skilled in building highly sculpted bike features and trails, they were less experienced in building in a manner that highlighted the natural environment, with the objectives of nature and ruggedness as the highest priorities. Additionally, IMBA and the BLM checked in with the contractor regularly throughout construction to assure that the trail was being built to specifications. Developing build specifications, additional meetings with the contractor, and follow-up field visits incurred greater project costs but were critical in yielding desired outcomes for the stakeholders.

Meeting the Objectives

Some options are available to increase the likelihood of creating the trail experience that everyone in the process envisions.

• Mandated minimum experience requirements for bidders, such as 3–5 years in the industry working on similar projects, can keep unqualified contractors at bay. References from satisfied previous customers will help verify the purported expertise.

• Trail builders, especially those who create high-end mountain bike trails, can and should be considered "specialty contractors." The ability to provide a fun, risk-managed adventure via sustainable singletrack requires unique skills, artistry, and the ability to translate targeted user objectives into a physical manifestation of dirt and rock. The typical contractor will struggle with even the most basic trail project.

• Design-build contracts are ultimately the most cost-effective way to get a good trail. Most procurement processes do not allow this option but Cooperative Agreements and Assistance Agreements may provide the needed mechanism.

• Performance specifications, combined with trail-specific construction specifications, allow the contracting agency to ensure that what is built is not just a "trail-shaped object" but a piece of infrastructure that delivers the intended outcomes.

Whistle Punk construction specifications reflect the conceptual plan and design guidelines to produce the desired experiences. In this case, rock was imported and placed to provide more technical challenge than native materials could provide.

STEP 7: Experience Evaluation and Monitoring

The trail is made ready for public use and the project is completed. If constructed by a contractor, the project is turned over to BLM after final acceptance. BLM continues routine maintenance, plus experience and condition assessments throughout the life of the trail.

Whistle Punk: Outcomes Realized
Targeted Trail User Objectives: *Nature and Technical Challenge. Emphasis on ruggedness, use of natural features to provide challenge at intermediate to advanced skill level.*

Trail design and construction took advantage of many trees and large stumps to wind the trail over roots and through tight tree gaps, adding challenge. To add technical challenge, rock material was imported and placed into the tread to create a more rugged yet sustainable trail.

Free Lunch Trail
Grand Junction, Colorado

5.4 ASSESSING EXISTING TRAILS

In most cases, planning areas aren't presented as a clean slate, but rather have an existing network of trails and roads available for recreational use. These systems often have a variety of designated uses and likely have some form of trail rating established. A system may have dozens of routes open to mountain biking, but it's possible that few of them provide the desired outcomes that riders are seeking. For instance, former extraction routes provide access to landscapes, but they typically provide a poor user experience as they were constructed for transportation needs rather than to provide a fun mountain bike ride. Even trails that were designed for recreation don't always provide high-quality experiences, with mountain biking often added as a trail designation to existing trails built for hiking and/or equestrian use. More recently, built trails, even if designed with mountain bike use in mind, frequently fail to account for varied trail experiences among users. That's not to say that some of these trails don't provide excellent experiences for mountain bikers, but there is insufficient information to distinguish high quality from lesser experiences.

Experience Evaluations

An experience evaluation is a tool that has been developed to better understand the range of experiences currently available within a given trail system or on a single trail, and can be used to identify the various types of rider experiences that are available within a given geographic area, trail system, or on a specific trail. This information can be used to inform future planning for a different trail experience, different level of difficulty, or to develop trail ratings for existing routes.

When conducting an experience evaluation, basic information on trail length, width, grade, and maximum obstacle size should be included. While these data points are objective and easier to collect and disperse, the experience that the trail provides is subjective, making collecting information on trail experiences and describing those experiences more challenging. However, experience-based evaluations can be used to established meaningful trail experience descriptions and skill ratings through a systematic approach of focusing on a set of well-defined experience criteria and utilizing a range of users to assess existing trails.

BLM and IMBA Trail Solutions staff traveled to several iconic trail networks that the BLM manages in Colorado, Utah, and Idaho to conduct experience evaluations on existing trails. The team utilized the following steps that outline the process for evaluating and documenting existing trail experiences.

Evaluating Existing Trails

STEP 1:

Understand trail user objectives. Get a feeling for each factor using the descriptions, graphics, and photos found in Chapters 3 and 4, and Appendix 6.

STEP 2:

Make a plan. Using online tools and other available resources, identify the trail system and the individual trails you will be evaluating, determine the amount of time it will take to assess the identified trails, and prepare for the assessment.

STEP 3:

Ride and Report. Ride the individual trail segments you will be evaluating to get a sense of the primary trail features and types of outcomes that are present. After you've completed each trail or distinct trail section, fill out the evaluation form using the instructions provided. Remember, it should be about your experience and what you felt on the ride—not what you think it should be or what you think someone else might experience. When assessing existing trails, document and report on the following trail assessment components:

Trail Assessment Components	Description
Trail Identification and Length	Unique identifier (typically a trail name or number) and mileage
Trail Status	Open, closed, or limited by activity type or season of use
Level of Difficulty	Easiest/Easy/More Difficult/Very Difficult/Extremely Difficult
Trail Style	Multi-use, multi-use nonmotorized, flow mountain bike, traditional mountain bike, etc.
Management Controls	Use Status: Directional, 2-way, users yield to downhill riders, timing restrictions, etc.
Trail User Objectives	Select a primary objective for the trail (e.g., play, escape, challenge) and a secondary objective if needed.
Trail Narrative	Describe trail tread width, trail grade, and provide a brief narrative of how the trail is interpreted by the rider and how the individual trail characteristics impact a rider's experience.

STEP 4:

Submit the evaluation. Ideally, evaluations can be compiled from a range of rider skill and interest (crowdsourcing) to assess the trails. This will give the best overview of the experiences provided.

Grand Junction, CO

The Lunch Loops Trail System consists primarily of trails rated more difficult to very difficult. Two trails within the system, Free Lunch and Pucker Up, are designated as mountain bike only and open only to downhill travel. The trail system offers challenging terrain and spectacular views as it sits adjacent to the Colorado National Monument and Bangs Canyon. With challenging technical terrain, this trail system tests advanced riders.

Lunch Loops Trail System						
Route ID	**Status**	**Length**	**Difficulty**	**Style**	**Preferred Direction**	**Management Controls**
Holy Cross	Existing	2.7 Miles	Difficult	Technical Singletrack	Downhill Only	Bike Only

Trail Objectives	
Primary Objectives	**Description:** After climbing for some time, the overall downhill of Holy Cross is an enjoyable and challenging trail for the advanced rider. Challenge comes in the form of technical rock features including drops, tech lines with choke points, and steep punchy climbs. As a result of these challenge features, the rider's fitness level is tested. A slight feeling of risk is experienced due to the challenge features along technical lines rather than to exposure.
Challenge	

Trail Narrative

5% average grade with sections of 15% maximum grades. Typical 24" wide tread with 12" choke points, some widening around technical features. Consistent, relatively smooth texture connecting the countless sections of rough, rocky texture. Ridden more than Free Lunch with the preferred line more obvious to rider. Flows quite well without confusing decision points. Numerous unexpected punchy climbs due to limited sight lines.

Lunch Loops Trail System

Route ID	Status	Length	Difficulty	Style	Preferred Direction	Management Controls
Free Lunch	Existing	1.1 Miles	Extremely Difficult	Technical Downhill	Downhill Only	Bike Only

Trail Objectives

Primary Objectives	
Challenge	**Description:** Challenge expectations are set high with trail entry signage and crowdsourced online descriptions. This downhill directional trail has an onslaught of technical rocky features including various-sized drops, technical downhill lines with many options, and steep climbs. At times the signage can be confusing and fatiguing. Risk comes from high consequence drops and can be a result of misinterpreting the signage. The rider gets a strong sense of discovery and mental work-out as you wonder what is around the next turn. Due to the difficult climbs and descents the rider also gets a physical workout.

Trail Narrative

6% average grade with maximum slope of 13%. Trail tread with ranges from 24" — 36" with some 12" choke points. A few "play areas" up to 30' wide allow riders to explore numerous lines of different difficulty and risk levels. The trail is signed as black diamond with double black diamond options. Texture varies from smooth to very rough; surprisingly enough the smooth texture comes along more difficult rock slab areas associated with challenge features. Trail builders use the landscape efficiently to connect challenge features and play areas. Play areas didn't look like they were being thoroughly used; prime line was often beyond black diamond. At times signage seemed to be too late, therefore causing confusion and taking wrong line if rider is not familiar with the trail.

Fruita, CO

Situated outside the town of Fruita, Colorado, the 18 Road Trails provide options for riders to experience some of the most playful mountain bike trails in the state. The North Fruita Desert Special Recreation Management Area includes over 250 miles of designated recreation routes. Much of the area is desert valley floor with washes and sharp ridges. The 18 Road Trail System is characterized by flow, providing mountain bike—optimized features including rollers, berms, and tabletop jumps.

18 Road Trail System

Route ID	Status	Length	Difficulty	Style	Preferred Direction	Management Controls
PBR (Pumps, Bumps, and Rollers)	Existing	2.0 Miles	Easy/ Intermediate	Bike Optimized DH Flow	Downhill	Downhill traffic only, nonmotorized

Trail Objectives

Primary Objectives	
Play	**Description:** This is an entry into playful trails for beginner and intermediate riders. The trail rides as a continuous grade which starts to wear out the rider; the downhill could be broken up with rest sections of flat or climbs. Slight sense of escape since riders do not see any other development.

Trail Narrative

5% average grade with max slope of 8%. 24" wide, very smooth trail tread. In order to clear jumps and doubles, riders have to work hard to keep speed up; speed is controlled by flow, 5% grades, and grade dips.

18 Road Trail System

Route ID	Status	Length	Difficulty	Style	Preferred Direction	Management Controls
Joe's Ridge	Existing	1.9 Miles	Intermediate/ Difficult	Bike Optimized Singletrack	Downhill	Nonmotorized

Trail Objectives

Primary Objectives	
Risk	**Description:** Access to the top of Joe's Ridge and along saddles between ridges can be a workout for the intermediate rider. The smooth and flowy line gives the rider a roller coaster sensation. The trail follows the ridge line with some sense of exposure since the slopes fall away in all directions.

Trail Narrative

24" wide tread at a 5% average grade and 17% max grade. Smooth texture with rocky edges and a handful of technical rock features. Brake bumps coming into corners and along steep descents.

18 Road Trail System

Route ID	Status	Length	Difficulty	Style	Preferred Direction	Management Controls
MoJoe	Existing	1.1 Miles	Intermediate/ Difficult	Bike Optimized DH Flow	Downhill	Nonmotorized

Trail Objectives

Primary Objectives	
Play	**Description:** This is an entry into playful trails for beginner and intermediate riders. The trail rides as a continuous grade which starts to wear out the rider; the downhill could be broken up with rest sections of flat or climbs. Slight sense of escape since riders do not see any other development.

Trail Narrative

5% average grade with max slope of 8%. 24" wide, very smooth trail tread. In order to clear jumps and doubles, riders have to work hard to keep speed up; speed is controlled by flow, 5% grades, and grade dips.

Hailey, ID

The Croy Creek Trail System is a skills development area jointly managed by BLM and Blaine County located in south-central Idaho, west of Hailey. The trails were designed and constructed primarily for motorcycle riders and mountain bikers, but hikers and equestrians also frequent the system. The trails receive approximately 15,000—20,000 visits per season. The Croy Creek Trail System offers mountain bikers a long riding season because of the system's low elevation. The ride experience at Croy Creek includes traditional singletrack and modernized mountain bike trail features including rollers, berms, and tabletop jumps.

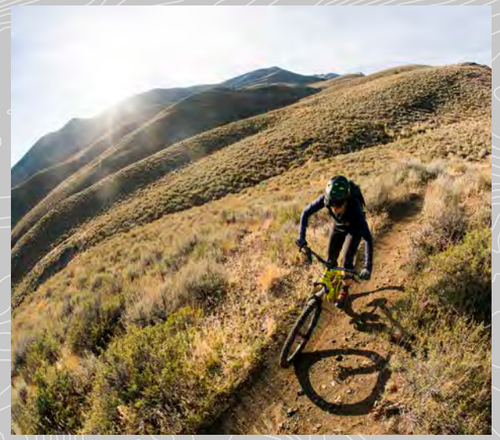
Croy Creek Trail System						
Route ID	**Status**	**Length**	**Difficulty**	**Style**	**Preferred Direction**	**Management Controls**
Hidden Valley Loop	Existing	5.8 Miles	Intermediate	Multi-use, existing, designated	Bi-directional 2-way travel, suggested direction of travel is counter clockwise	Open to nonmotorized (hike, bike, equestrian) and motorized users (motorcycles)

Trail Objectives

Primary Objectives	
Exercise	**Description:** The Hidden Valley Loop provides riders visiting the Croy Creek system with opportunities for a backcountry riding experience. The terrain and design of the trail provides riders the ability to feel a sense of escape from the sights and sounds present within other zones of this trail system. It provides fit riders who seek to challenge themselves physically with a high-quality experience. When riding this trail counterclockwise, the backside descent provides all levels of riders with quality opportunities to carve turns through a series of stacked berms that allow for speed control and environmental sustainability.

Trail Narrative

This trail is narrow in width (24" to 30") and climbs/descends at a moderate grade of approximately 7%. It has moderately challenging climb and steep sideslopes that provide the rider with some moderately challenging switchbacks to climb and descend. There are medium-sized bike-optimized features (series of bermed turns and rollers) present on the backside of this trail, when riding counterclockwise, that are built to enhance the riding experience for all skill levels.



Croy Creek Trail System

Route ID	Status	Length	Difficulty	Style	Preferred Direction	Management Controls
Two Dog	Existing	6.7 Miles	Intermediate	Multi-use, open, designated	Bi-directional 2 way travel; evaluation performed by climbing from trailhead	Open to nonmotorized (hike, bike, equestrian) users

Trail Objectives

Primary Objective	
Connectivity	**Description:** The Two Dog Trail provides another critical link from the secondary trailhead at the Croy Creek trailhead. It allows riders an efficient climb to access some of the bike-optimized flow trails within the trail network. There are bike-optimized trail features present within the trail tread that allow riders to maintain their speed as they make their way from the trailhead to connect to the other existing trails within the system. The climbing grade is moderate (6%), allowing a wide range of riders the ability to experience an efficient connection to the other trails within the system.

Trail Narrative

This trail is narrow in width (24" to 30") and climbs/descends at a moderate grade of approximately 6%. It has moderately challenging climbs and steep sideslopes that provide the rider with some moderately challenging switchbacks. There are medium-sized bike-optimized features (bermed turns) present within the trail tread allowing riders of all skill levels the ability to maintain speed while climbing, traversing, and descending along this route.

Croy Creek Trail System

Route ID	Status	Length	Difficulty	Style	Preferred Direction	Management Controls
Punchline	Existing, Open, Designated	1.2 Miles	Advanced, Intermediate/ Expert	Flow Trail and technical rock sections	One way, downhill only, S to N	Open to nonmotorized bike only

Trail Objectives

Primary Objectives	
Play	**Description:** Built for advanced and expert riders looking for a flow and techy experience with numerous, tight-spaced berms/rollers/doubles, and technical rock sections.

Trail Narrative

Moderate climb leads to technical and flow section. 36"—40" wide trail with choke points. Technical rock sections act as entrance to flow section of trail. Bigger features, steeper sections that turn up the speed, large grade reversals lead to step-ups, high fequency of berms and rollers down a pronounced ridgeline. Trail finished with a climb back to Two Dog.

Trail Assessment

Observation of the physical characteristics of existing trails can indicate experience problems. A trail sustainability assessment, when combined with experience evaluations and stakeholder feedback, can give a more complete picture of the experiences provided by an existing trail system and the potential for improvements. Trail sustainability assessments are common components of a monitoring and maintenance protocol, assuring that environmental impacts fall within designated parameters and user experiences are maintained. Sustainability assessment protocols and examples are discussed in Chapter 6. Presented here are assessment characteristics related specifically to the trail experience; common environmental impacts associated with user experience are highlighted.

STEP 1: Assess trails for environmental sustainability

- 3-tiered rating system: Sustainable, Maintainable, Unsustainable/Unmaintainable
- Define limits of acceptable change
- What level/type of trail change triggers management actions?

STEP 2: Evaluate the range of opportunities (from Experience Evaluations)

What's there, what's missing, what's needed?

- Define what existing experiences are provided and where they are within the current system
- Identify where gaps can be filled, whether with new routes or retrofitting existing trails
- Think about experience zones and/or specific trails to provide targeted experiences

STEP 3: Retrofit system

- Spatial arrangement should follow skills and experiences desired
- Create loops and connections, eliminate redundancy
- Prioritize areas for maintenance, reroutes, and reclamation based upon sustainability and user experience goals

Trail Building Workshop
Central Oregon

Chapter 6

Sustainable Experiences

Over the past several decades, the concept of sustainable trails has gathered support from land managers and trail users alike. The reasons for this are both valid and obvious: poorly built and maintained trails are expensive to manage, can result in environmental damage, and are wildly inconsistent in the experience they provide for users.

There has also been an understandable backlash against the concept of sustainable trails by mountain biking enthusiasts who think minimizing the environmental impact of a trail means "dumbing it down" by removing any challenging elements. While this is not an inherent condition of a sustainable trail, it is true that a historically narrow understanding of sustainability has led to a homogenization of trail standards.

Fortunately, progressive land managers and mountain bike trail builders understand that the principles of an environmentally sustainable trail, such as erosion control and minimization of potential resource impacts, do not intrinsically mandate a flat, smooth trail. They also appreciate that a sustainable trail engenders a full range of sustainability tenets, not just resource protection. Indeed, if a trail minimizes erosion but does not meet the desires of the users, it cannot be deemed a truly sustainable trail.

One significant goal of this book is to help the trails community better understand the factors that comprise sustainable trails. By establishing a common language for communicating a variety of needs that encompass trail user objectives, experiences, and benefits as outlined in this guide, the three primary components of sustainability—environmental, social, and economic—can be considered and balanced to achieve a broader definition of durable, engaging trails that last for generations.

The Three Components of Trail Sustainability

Environmental Sustainability

When considering what will or will not define a trail as sustainable, a primary question to be answered is, "Will the trail provide resource protection?" The mountain bike trails community has become well versed in the tenets of environmentally sustainable trail development, and implicitly understands that recreation access is threatened when trails cause erosion, harm sensitive plant and animal species, or promote the spread of invasive species.

When proposing new or modified trails, the National Environmental Policy Act (NEPA) process identifies potential impacts that are weighed against the benefits that the trail will otherwise provide. As described in Chapter 5, an iterative approach is used, beginning with geographic information system (GIS) data for identifying physiographic regions and site topography for high-level zone planning that aligns with trail user objectives and desired difficulty levels. Extensive natural resource GIS data, which includes information such as soil type, elevation, slope, ground cover, and hydrology, is then applied to conceptual planning. Spatial data informs on-the-ground flagging for routes and features, site-specific soil testing, construction-level markings, and, finally, any construction issues that hinge on environmental conditions at the micro level including individual trees, rocks, water crossings, and other terrain features.

IMBA has published several books on the topic of environmentally sustainable trails, including *Trail Solutions: IMBA's Guide to Building Sweet Singletrack* and *Managing Mountain Biking: IMBA's Guide to Providing Great Riding*. These resources and others provide a wealth of applicable knowledge and should be consulted regularly throughout the planning process to ensure that the proposed trail creates the least amount of environmental resource impact possible.

Social Sustainability

The most overlooked aspect of the trail development process is social sustainability, and a primary goal of the GQTE is to elevate awareness and consideration of this component. Each trail user seeks a specific experience, and while this seems simple enough to achieve, the complicated reality is that various types of users may be seeking dramatically different experiences on the same trail on the same day, and some users may have varying expectations of the trail itself depending upon their unique recreational objectives on any given day. Failure to consider or provide for a wide range of desired user outcomes (experiences and associated benefits) is easily evidenced by overcrowded trails, trails with little use, trail users who feel "pushed out" by other users, and the creation of unauthorized routes.

Even if a trail is properly designed to provide a desired user outcome by minimizing resource protection, it can still fail to be socially sustainable. If the location of the trail is unsupportable from a political or social standpoint, the long-term sustainability can be called into question as a case of "right trail, wrong place."

For example, a trail could be developed that has negligible resource impact and focuses on the identified objective of exercise. But if the trail was developed deep in the backcountry where it's only accessible by a limited number of people, it will have missed the mark for social sustainability. As most people live in urban areas, it would have been better to develop the trail closer to a population center.

The converse is also true, with many people desiring to escape the hustle and bustle of urban life with a close-to-home trail outing. While this may be an identified desire, it is difficult to achieve the objectives of escape or solitude when you can hear traffic, see buildings, or encounter other trail users every few minutes. The desired outcomes need to be moderated based on the characteristics of the site and those who will be using it.

Like other groups, mountain bikers are not monolithic in their desires, and the sport continues to evolve and stratify. Different bike cultures, influenced by topography, weather, the bike industry, and innumerable other factors, populate different parts of the U.S. In some areas, racing is a critical component of the local scene; in others, pushing the boundaries of technical riding drives the community. Using the network of trail stakeholders to identify the dominant culture of a specific area will foster the development of proper trail user objectives, ultimately leading to establishing the right trail in the right place.

Finally, the preservation of cultural and archeological artifacts is also a component of social sustainability. The determination of whether evidence of previous human presence has value is purely a social construct; it has no inherent value other than that which we assign to it, yet consideration of cultural impact is paramount. The NEPA process outlines steps for assessment and protection of cultural resources during the trail planning and development process, and is typically guided by the input of a resource specialist as outlined in Chapter 5.

Economic Sustainability
Applying financial resources to a problem can be a short-term solution for many situations, and trails are no different. A trail that provides a valuable user experience but causes damage to the natural resources can likely be mitigated through increased maintenance, but at what cost?

It can be difficult to evaluate whether a trail deserves extraordinary investment to create or maintain it. In some cases, the lack of available land or the desire to provide a unique experience may warrant any additional costs that are incurred. Typically, though, budget constraints dictate that resources be spread evenly across the available infrastructure.

Economic consideration must include the potential for users to create their own opportunities and incur unmitigated impacts if their recreational desires or expectations are not being met. For instance, a trail will always form to a viewpoint, even if it is steep and prone to erosion, so it would be beneficial to consider this factor and invest in creating an accommodating, sustainable route at the outset.

Another example is the unauthorized creation of technically challenging mountain bike trails. If a trail system lacks the desired range of riding opportunities, the user community will create an unsustainable management situation, causing resources to be diverted to closing trails even while new, unauthorized trails emerge in different locations. Such a scenario can be avoided by assessing the existing trail network at the outset using the GQTE process, and engaging the riding community to determine experience gaps. Solutions can then be presented and implemented that meet all three components of sustainability.

Moving Forward

Across the country, each trail has a unique combination of soil, topography, vegetation, and climate. The need for updated trail design, planning, construction, and management tools is also driven by the regional diversity that exists among rider culture, visitor use levels, landownership, and agency policies.

The principles outlined in this guide will help the land manager, the trail builder, and the trail advocate understand the desired outcomes that a rider would like to see accommodated, and establish a process for effectively delivering those outcomes while also maintaining environmental integrity.

The information provided in this guide is intended to provide advice and direction for those involved in trail development, and can help facilitate conversation among BLM staff as well as with contractors, volunteers, and the public at large. These guidelines will exist as both a physical book and an online document that can be referenced during all phases of trail planning, design, construction, and maintenance.

Moab Trail System
Moab, Utah

Appendix

Additional planning resources are available via an electronic appendix at the following link.

http://gqte.imba.com