Guidelines for a Quality Trail Experience

INTERNATIONAL MOUNTAIN BICYCLING ASSOCIATION

mountain bike trail guidelines

January 2017


I M B A
INTERNATIONAL MOUNTAIN BICYCLING ASSOCIATION


U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

About

BLM

The Bureau of Land Management (BLM) may best be described as a small agency with a big mission: to sustain the health, diversity, and productivity of America's public lands for the use and enjoyment of present and future generations. It administers more public land – over 245 million surface acres – than any other federal agency in the United States. Most of this land is located in the 12 Western states, including Alaska. The BLM also manages 700 million acres of subsurface mineral estate throughout the nation.

The BLM's multiple-use mission, set forth in the Federal Land Policy and Management Act of 1976, mandates that we manage public land resources for a variety of uses, such as energy development, livestock grazing, recreation, and timber harvesting, while protecting a wide array of natural, cultural, and historical resources, many of which are found in the BLM's 27 million-acre National Landscape Conservation System. The conservation system includes 221 wilderness areas totaling 8.7 million acres, as well as 16 national monuments comprising 4.8 million acres.

IMBA

IMBA was founded in 1988 by a group of California mountain bike clubs concerned about the closure of trails to cyclists. These clubs believed that mountain biker education programs and innovative trail management solutions should be developed and promoted. While this first wave of threatened trail access was concentrated in California, IMBA's pioneers saw that crowded trails and trail user conflict were fast becoming worldwide recreation issues. This is why they chose "International Mountain Bicycling Association" as the organization's name.

IMBA's nonprofit mission is to protect, create, and enhance great mountain bike experiences. Core activities include promoting responsible mountain biking, engaging in volunteer trailwork, and offering assistance to land managers. A vibrant network of IMBA chapters and other affiliated groups are the heart, mind, and soul of the organization. Today, IMBA counts more than 700,000 hours of volunteer service annually.

Mountain biking offers amazing opportunities to experience the great outdoors, explore new terrain, and connect with the land and with friends. Believe me, I am not the only one who feels this way! Every year more than 3.5 million mountain bikers ride the trails that are available on public lands managed by the Bureau of Land Management (BLM). And there are more riders every year.

The BLM is responding to this increasing demand by providing new and improved mountain bike trails so more Americans can experience their public lands on two wheels. But we are not doing this alone. We work closely with communities across the country and with national partners so we can be thoughtful, strategic, and sustainable in our approach.

Recently we collaborated with the International Mountain Bicycling Association and other partners to develop these "Guidelines for a Quality Trail Experience." The guidelines will help improve the design, construction, and management of mountain bike trails all across the country.

We depend on citizens like you to help us maintain the mountain bike trails we all enjoy on public lands. You can help out by viewing and sharing the guidelines, which are available in this publication or online. You can also practice and promote responsible mountain biking, volunteer at local trail events, and stay engaged with recreation planners at your local BLM office.

I have been incredibly fortunate to ride on public lands around the country, including places like Moab and Mt. Hood. I look forward to seeing you on the trails, and I am grateful for the passion you bring to this important use of our nation's public lands.

Ride on!

Neil Kornze

Director-Bureau of Land Management

BLM Director Neil Kornze (center)
Bar M Trails, Moab Utah—Outerbike 2015 Event

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Klondike Bluffs Trail System
Moab, Utah

Introduction

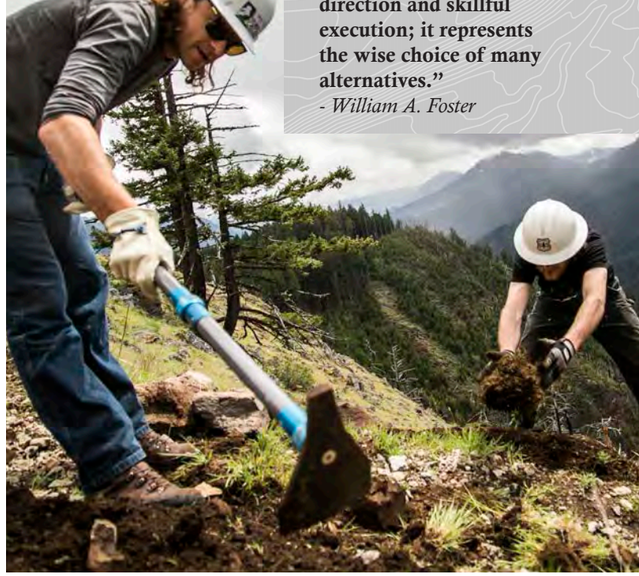
Quality

Quality is difficult to define but easy to recognize. For the purposes of the Bureau of Land Management's Guidelines for a Quality Trail Experience, herein referred to as GQTE, quality is defined as excellence. In the context of mountain bike trails, excellence is realized when a trail design merges the desired outcomes and difficulty that a rider seeks with the setting in which the outcomes are realized. These variables ultimately equate to an overall level of sustainability that protects resources while simultaneously providing a rider with the outcomes they seek.

Quality implies a sincere commitment to attaining the highest practical standard. With regard to a quality mountain bike trail experience, several attributes must apply. A quality mountain bike trail on BLM-administered land is one that is:

- ***Appropriate to a particular place and setting***
- ***Environmentally and socially sustainable***
- ***Economically responsible, taking into account long-term costs associated with maintenance and administration***
- ***Outcomes-focused, able to provide the targeted experience and benefits for the identified rider skill level***

"Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skillful execution; it represents the wise choice of many alternatives."
- William A. Foster



The overarching vision for the GQTE is to establish key characteristics that will define a range of trail-based experiences. When applied properly, the trail features will form the foundation for an experience that meets the targeted trail objectives and outcomes. The GQTE documents the BLM's evolution as a land management agency, provides internal staff and the public at large a resource to better communicate what constitutes a quality riding experience, and sets forth a process for ensuring that targeted experiences and beneficial outcomes are realized. As a mountain biker's quest for an extraordinary riding experience has evolved, so must the evolution of how trails are communicated, planned, designed, constructed, and managed.

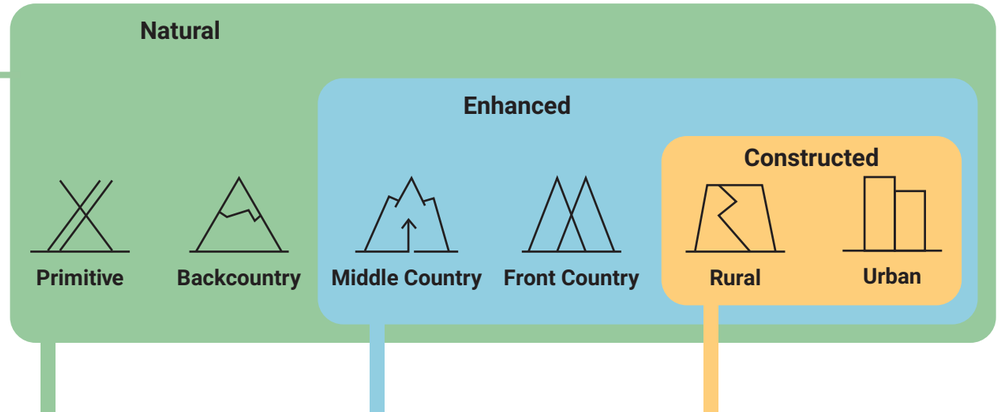
Illustrations are a key element of the GQTE, helping to define and describe trail objectives and how these can be translated into physical trail features. This example illustration for "Choke" shows how the rider interacts with the feature and how the feature functions as a management element. The effect on rider behavior is clearly evident from the rendering – chokes can be used to add challenge and to slow user speed.

The GQTE describes trails using objectives that generate a common language for user outcomes and trail features. To that end, a trail project has the ability to establish a wide range of objectives, each along a spectrum. Trail objectives are used to specify a targeted user experience and convey it to trail professionals, land managers, and stakeholders. For instance, the characteristic "play" has trail objectives that span all characteristics, from Primitive to Urban, but the features that are used to create a playful trail in the backcountry may look very different than those in an urban setting.

Play

Engaging in the activity purely for the enjoyment, bringing a childlike wonder to the pursuit or no destination. On a trail, this often means utilizing features to alter the experience, rather than simply riding from point to point. Playfulness is an important characteristic in mountain bike trails and distinguishes trail experiences from many other trail user goals (hikers, equestrians).

Recreation Setting Characteristics



Trail Feature Spectrum

Natural Features

Except in primitive settings, these may be enhanced with placed natural materials such as rock or soil to guide riders to these play features. In primitive and backcountry settings, access to the natural play features will have minimal tread modifications.

Enhanced Natural Features

Tread is shaped using natural materials (rocks or soil) to provide a play feature that blends with its landscape.

Constructed Trail Features

Tread is highly sculpted using natural or imported materials to provide a play feature. These features are typically placed in bike-specific trails and facilities.

Trail Building Workshop
Central Oregon

Sustainability

An integral part of mountain biking is balancing sustainability with challenge. Mountain bikers are constantly testing the limits of their skills and equipment. Challenging trails can provide a rider with numerous outcomes that can be realized in a variety of settings: a sense of excitement or exhilaration, progression, or an opportunity to test and develop their skills. For mountain bikers who are new to the sport, trails on the easier end of the spectrum provide an opportunity to develop their skills in a safe and predictable environment. For more advanced riders, challenging trails provide the opportunity to push their personal limits as well as those of their gear. Regardless of where a rider falls within this spectrum, when a trail is designed, planned, and managed to provide desired and challenging trail objectives, the rider's opportunity to realize these targeted outcomes will be increased.

The question is, though, how do you accommodate a range of mountain bikers who define challenge the same way yet seek dramatically different trail features to achieve a similar experience? As land managers and riders, we often hear both ends of the conversation: "We want sustainable trails but don't dumb down what we already have" or "Those trails are insane, crazy, and impossible to ride." In an era that has been defined by trail-building principles like the Half Rule, 10 percent average grade, and contour trails, it can be easy to miss the mark when designing and building bike trails for the appropriate level of rider skill and challenge.

One of the core principles of the GQTE is to balance the four components of trail sustainability in every project that is undertaken. If achieved, this balance will provide the type of quality trail outcomes that riders seek, ultimately resulting in a truly sustainable riding opportunity.

Three components of trail sustainability:

1. **Environmental Sustainability** — Will the trail provide for resource protection? This is the definition that is commonly used when referring to what does or does not provide for a sustainable trail.

2. **Social Sustainability** — This is frequently overlooked in the trail development process. Evidence of the failure to meet desired user outcomes (experiences and associated benefits) are everywhere: overcrowded trails, trails with little use, trail users who feel "pushed out" by other users, and unauthorized routes.

3. **Economic Sustainability** — Can the land manager and the community bear the long-term costs of maintaining a trail? If it provides a valuable experience, it is likely worth the investment, but it must be weighed against shrinking maintenance budgets.

Who, What, How

Who developed the GQTE?

Developing the GQTE has provided an opportunity to reconsider the role that the BLM plays as a recreation service provider and to solidify the agency's commitment to connecting with communities through the design, development, construction, and management of bike trails.

This document is the direct result of input from many BLM stakeholders. Over a series of workshops and land manager training sessions, these stakeholders helped to define the foundation of the document, test it in the field, and review it as it evolved.

Beginning in the fall of 2014, the BLM and IMBA, through a generous grant from the Shimano Corporation, conducted GQTE-based land manager outreach workshops throughout the United States. These workshops reached over 300 participants and were held in the following locations:

- *Steamboat Springs, Colorado - August 2014*
- *Lorane, Oregon - October 2014*
- *Prineville, Oregon - May 2015*
- *Salida, Colorado - November 2015*
- *Atlanta, Georgia - December 2015*
- *Missoula, Montana - June 2016*
- *Phoenix, Arizona - September 2016*

Land Manager Training
Salida, CO
photo credit: IMBA

Those in attendance at the workshops represented a variety of disciplines and hailed from a wide range of geographic areas, possessed a broad range of trail design and development experience, represented riders of various skill levels, and had varying levels of experience in managing mountain bike use.

A core planning team comprising BLM recreation program and IMBA Trail Solutions program staff were brought together under a National Assistance Agreement to develop this document. The collaboration between trail professionals from diverse disciplines and geographies enables the document to provide meaningful guidance to a wide range of settings throughout the BLM.

Who should use the GQTE?

The GQTE provides guidance to everyone involved in trail development and can help facilitate conversation amongst internal staff as well as with contractors, volunteers, and the public at large. It provides direction to everyone involved in the development of a new trail system or the modernization of an existing trail to facilitate better communication and the attainment of targeted outcomes between land managers and mountain bikers. It should be referenced during all phases of trail planning, design, construction, and maintenance. The guidelines should be used to focus all stakeholders on ensuring that bike-optimized trails on BLM lands are of high quality and reflect the primary trail features that ultimately provide the targeted outcomes riders seek.

Sandy Ridge Trail System
Sandy, Oregon

How should the GQTE be used?

The GQTE is formatted as a flip reference. The chapters are color-coded along the edge to allow for quick location of the appropriate chapter. The GQTE should be referenced during all phases of project design and development as well as during construction and maintenance. The GQTE is accessible at www.blm.gov/mountainbike and includes additional interactive tools that aren't available in hard copy versions of the guidelines. The appendices include real work examples of BLM planning projects that have incorporated the GQTE process as well as a library of resources to assist with all phases of bike trail planning, design, construction, and management.

View the Website

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GQTE Acknowledgments

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To provide feedback on this publication please visit www.imba.org/blm_gqte_feedback or contact us directly at the emails provided on this page.

Provide Feedback

Mountain of the Rogue
Rogue River, Oregon

Contributors

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Shea Ferrell Graphic Artist	FlowRide Concepts, LLC sheaferrell80@gmail.com	Shea is the founding partner and president of FlowRide Concepts, a bike park and trail design/build firm based in Denver. His design background allows him to visualize trails across the terrain, bring them to life through dynamic graphic renderings, and ultimately sculpt those designs into reality as head of the build crew of numerous top-tier riding destinations.
Leslie Kehmeier Photographer/ Cartographer	The Wide Eyed World bluebirdleslie@gmail.com	On her quest to document every mountain bike trail on the planet, globe-trotting photographer Leslie Kehmeier focuses on the interplay of outdoor landscapes and recreation, working to inspire future generations of outdoor enthusiasts and conservationists. She started her work on the GQTE while leading IMBA's mapping initiative.
Dylan VanWeelden Editor, Designer	VanWeelden Creative, LLC dylanvanweelden@gmail.com	Dylan has been dedicated to powerful design and photography focused in the outdoor space. He works with brands to create concepts and move them through to execution, elevating them to a new level.
Jill Van Winkle Author	City of Portland Parks and Recreation jill.vanwinkle@portlandoregon.gov	Jill has worked as a trail planner for over a decade, designing and constructing trails, and educating land managers and trail stewards. She has a background in natural resources, as well as a master's in environmental science and management.. She helped develop the GQTE concepts in her previous position as project manager for IMBA's Trail Solutions program.

Sandy Ridge Trail System
Sandy, Oregon

Pipe Dream Trail
Moab, Utah

Chapter 1

Vision & Goals

The Bureau of Land Management (BLM), under a national partnership with the International Mountain Bicycling Association (IMBA), has developed trail guidelines as a comprehensive approach to trail planning, design, construction, and management specific to mountain bike trails. The long-term vision of the BLM is that mountain biking will be the first of several trail-based activities covered under a set of specific national guidelines.

National Trail Guidelines (Guidelines for a Quality Trail Experience), hereafter referred to as GQTE, provides guidance and establishes best management practices for BLM field office managers and staff, interest groups, and individuals. It utilizes existing approaches to protecting natural resources while developing new guidance to design, plan, and manage high-quality mountain biking trails. The GQTE will be adapted as implementation of these principles occurs, as new technology is developed, and as public needs evolve. Refinement of the GQTE will be iterative and science based as new information becomes available, and will require the ongoing cooperation and participation of the public. As a guiding document, the GQTE will continue to be refined and further implemented as opportunities arise and funds allow.

The guidelines outline a general approach to trail development that can be applied to any trail project regardless of scope, scale, or location. This approach allows for the flexibility to develop an appropriate trail design solution within a variety of settings, and will result in planning and design solutions that are responsive to the unique physical, social, and environmental circumstances presented by a particular area.

There are a number of reasons why the BLM has developed the mountain biking GQTE:

- ***To recognize the changing demographics, increasing populations, emerging technologies, and issues unique to mountain biking.***
- ***To provide consistent planning, design, construction, and management approaches among BLM state and field offices.***
- ***To provide best management practices (BMP) related to mountain bike–specific planning, design, construction, maintenance, and management techniques to provide socially and environmentally sustainable trails, quality visitor outcomes, and adequate risk management.***
- ***To establish BLM trail definitions specific to mountain bike trail objectives.***
- ***To capture tools and techniques that may be applicable for other private, local, state, or federal land managers looking to sustainably manage mountain bike use.***

To accomplish these objectives, this guidebook:

- ***Integrates guidance from related programs, directives, and best management practices including Recreation and Visitor Services.***
- ***Establishes easy-to-use design guidelines for a variety of different mountain bike trail types and difficulty levels.***
- ***Addresses a diversity of settings that are representative of BLM public lands.***
- ***Presents a suggested process for planning, design, and construction of mountain bike–specific trails on BLM-administered lands.***

Sandy Ridge Trail System
Sandy, Oregon

Scope

The GQTE is designed to accomplish the following:

- ***In specific recreation management areas where mountain biking has been identified as the targeted activity, the GQTE can be used to achieve the overall recreation objectives of the area.***
- ***Create a consistent mountain bike trail language that can be used internally and externally to communicate with BLM staff and our partners.***
- ***Provide practical management guidance to the BLM's field office managers and staff, interest groups, and individuals regarding mountain bike–related activities on BLM-administered public lands.***
- ***Provide technical guidance to the BLM recreation staff to improve BLM's capability to more effectively plan, design, construct, and manage mountain biking on BLM-administered public lands.***

Sideboards

The GQTE is:

- ***An effort to enhance the management and protection of public lands managed by the BLM.***
- ***A general guidance document for BLM field offices, interest groups, and individuals on ways to address mountain biking on BLM-administered lands.***
- ***A set of guidelines that may be used by BLM land managers for local trail planning.***
- ***A means of sharing best management practices (BMP) with other local, state, or national land managers.***

The GQTE is not:

- ***A new regulation.***
- ***A means to close, limit, or open trails and roads to mountain bike use.***
- ***A forum for changing any proclamations or legislation relating to national monuments, National Conservation Areas, designated Wilderness and Wilderness Study Areas, National Scenic and Historic Trails, or National Wild and Scenic Rivers.***
- ***A decision document—land use plans are, and will continue to be, the principal decision documents guiding BLM lands. There will continue to be activity-level plans to address local issues. The GQTE is intended to provide BLM staff the necessary tools to plan and design high-quality mountain biking opportunities during implementation-level planning.***

The GQTE can:

- ***Provide a toolbox for BLM field staff to more effectively communicate with the public about mountain biking management.***

- ***Assist with proper trail planning and design guidance specific to mountain biking that will protect soil, water, wildlife habitat, threatened or endangered plant and animal species, native vegetation, heritage resources, and other resources while providing for high-quality mountain biking opportunities.***

- ***Establish definitions for trail types and difficulty levels based on regional trail characteristics.***

The GQTE cannot:

- ***Formulate regulations (this can occur only in the formal rulemaking process, with full public participation).***

- ***Change any legislation, proclamation, or executive order.***

- ***Provide the additional funds and/or staffing needed for effective mountain biking management.***

Trail Building with Trans-Cascadia
Central Oregon

Hurricane Cliffs Trail System
St. George, Utah

Chapter 2

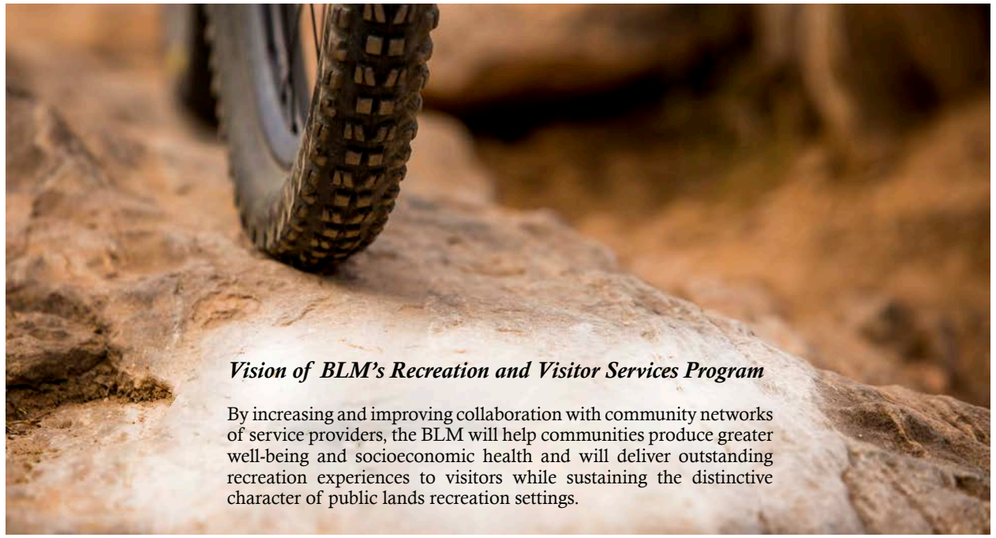
Background & History

Over the course of its history, BLM staff, trail contractors, and volunteers have developed thousands of miles of motorized and nonmotorized trails on public lands. Several BLM-administered and internationally recognized trail projects incorporate innovative mountain bike–specific design practices resulting in some of the most unique and highly sought after mountain biking experiences found on public lands. However, these ideal mountain bicycling opportunities are currently the exception rather than the norm.

Bureau of Land Management Mission Statement

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

Understandably, not all BLM-administered trails are viewed as models of excellence simply as a result of the manner in which many existing trails in the BLM's network have been developed over time. Trails on BLM lands are often a by-product of other resource management objectives, or have been developed by users rather than professionally planned and designed to provide a specific user experience.



Vision of BLM's Recreation and Visitor Services Program

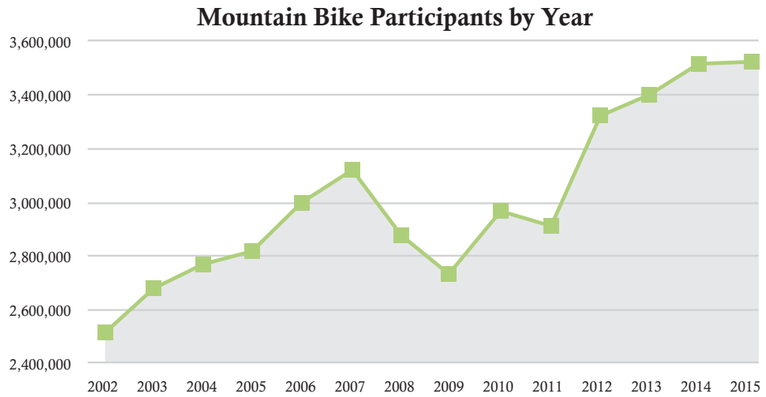
By increasing and improving collaboration with community networks of service providers, the BLM will help communities produce greater well-being and socioeconomic health and will deliver outstanding recreation experiences to visitors while sustaining the distinctive character of public lands recreation settings.

Mountain Bike Participation Rates and Trends

National: In 2015, 8.3 million Americans participated in mountain biking. This represents a 2.8 percent increase in the past three years and an 8.1 percent increase since 2006. This makes it one of the more popular active recreation pursuits in the U.S.

Bureau of Land Management: The number of mountain bikers using BLM-managed public lands has increased dramatically since the last strategic action plan was completed by the Bureau in 2002. An estimated 3.5 million mountain bikers visited public lands to participate in this activity in 2015, this represents a 40 percent increase in mountain bike participation since the BLM completed the last mountain bike action plan in 2002*.

What was once a low-use activity that was relatively easy to manage has become more complex as use has increased and riders' expectations have evolved. Land managers are now challenged with millions of mountain bikers and advanced technologies that enable riders to more easily reach remote areas. At the same time, land managers must deal with environmental impacts and visitor conflicts, as well as the need to provide high-quality experiences, information, and education.

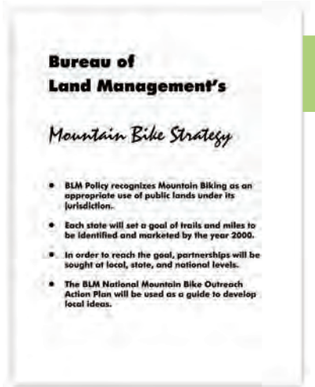


** Mountain bike participation data extracted from the BLM's Recreation Management Information System, Report 27: Visitor Days and Participants by Activity, National Office Summary.*

Previous National Mountain Bike Strategies

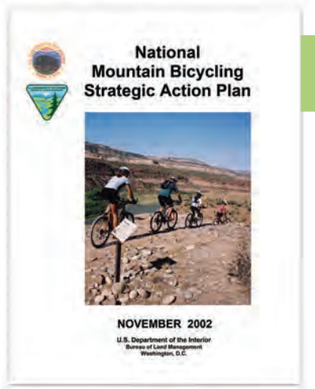
The BLM has completed several strategic planning efforts at the national level to address mountain bike management. Mountain bike–specific action plans were previously completed in 1992 and 2002. Trail design and construction techniques have evolved significantly over the past decade, resulting in the need to update the national strategy, so the BLM is currently updating the 2002 plan, working in conjunction with its national partners. Additionally, evolving mountain bike component and suspension technology has motivated the BLM's desire to provide a high-quality trail experience while managing potential resource impacts.

BLM trail management has traditionally relied on existing US Forest Service guidance, which fails to include experience-based trail design guidelines for mountain biking. To keep pace with the demands of mountain bikers, the BLM and national partners have collaborated since 1992 to develop tools that help create and better manage sustainable mountain biking opportunities.



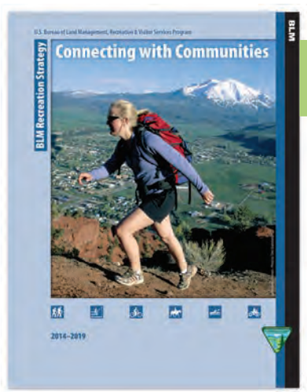
BLM National Mountain Bike Strategy (1992)

The BLM has a long-standing history of progressively developing and managing mountain bike use on public lands, completing the first national mountain bike strategy in 1992. The goal of the initial mountain bike strategy was to identify and implement diverse mountain biking opportunities into the multi-use system of trails and roads by the year 2000. The plan recognized mountain biking as an appropriate use of public lands under its jurisdiction, and established some key trail ethics for users based on IMBA's "Rules of the Trail" as well as identified key strategies to assist with mountain biking–specific outreach to be used during project-level planning.



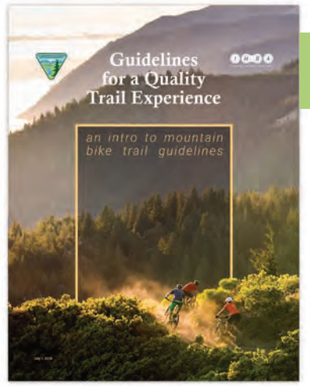
National Mountain Bicycling Strategic Action Plan (2002)

The BLM completed a National Mountain Bicycling Strategic Action Plan in 2002. This plan provided guidance to BLM field offices, interest groups, and individuals on techniques to address mountain biking and other nonmotorized/mechanical trail management issues. The action plan focused on several mountain bike–specific issues, identified subsequent management goals, and established action items to address emerging issues.



National Recreation and Visitor Services Strategy (2014)

In March 2014, the BLM released an updated Recreation Strategy – Connecting with Communities. This strategy further developed BLM's successful recreation and visitor services program, which provides effective tools in cultivating partnerships and establishing closer ties with communities.

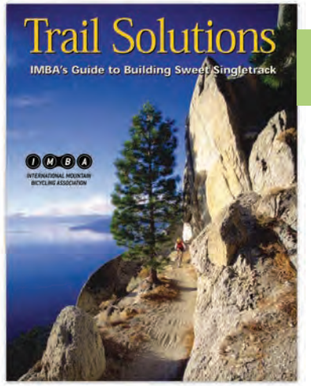


National Mountain Bicycling Action Plan (2016)

Changing public demands, evolving trail planning, new design and construction techniques, and the repositioning of the national BLM recreation strategy to more effectively work with its partners and the communities they serve have led to the need to develop an updated National Mountain Bicycling Action Plan. A strategic, community-driven approach will increase the capacity of the BLM and provide sustainable, high-quality trail experiences to the public. A long-standing national partnership with IMBA has positioned the BLM, its partners, and the communities they serve to effectively establish a strategic action plan to identify and manage mountain bicycling use across BLM-administered lands.

King Range Trail System
Lost Coast, California

Existing Mountain Bike Guidance: The BLM currently relies on guidance developed by several national partners to assist with mountain bike planning and management needs.



Trail Solutions: IMBA's Guide to Building Sweet Singletrack (2004)

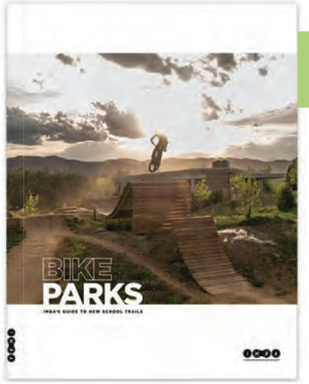
This resource has emerged as the leading source of sustainable trail-building information. The broad-based guidelines have been adopted as official policy by numerous land management agencies and recreation service providers.

Planning and Managing Environmentally Friendly Mountain Bike Trails (2006)

This study, developed through a partnership between the Arizona office of the BLM, Shimano Corporation, and Arizona State University was designed to achieve three goals: (1) to evaluate the physical impacts of mountain biking on recreation trails in multiple physical environments in the U.S. Southwest; (2) to document relationships between impacts, use-related factors, and environmental factors; and (3) to develop guidelines to contribute to best management practices for trail resource management. The study was intended to address gaps in the scientific understanding of recreation impacts, inform natural resource managers in the development of sustainable recreation environments, provide practical advice for sustaining riding, and offer clear advice for policymakers.

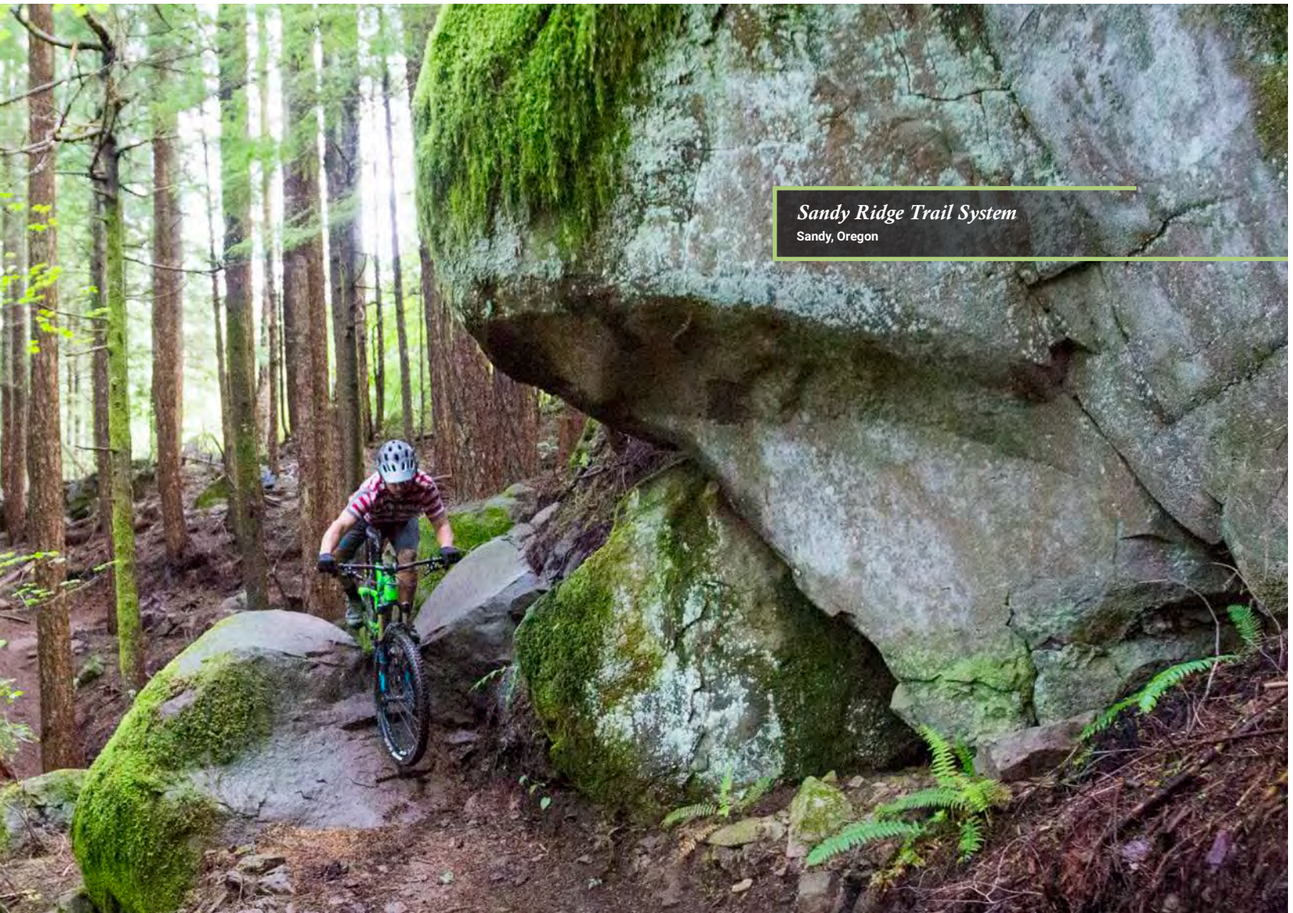
Managing Mountain Biking: IMBA's Guide to Providing Great Riding (2007)

This resource provides guidance on managing trail-based user conflict, minimizing environmental impact, managing risk, and providing technically challenging riding.



Bike Parks — IMBA's Guide to New School Trails (2015)

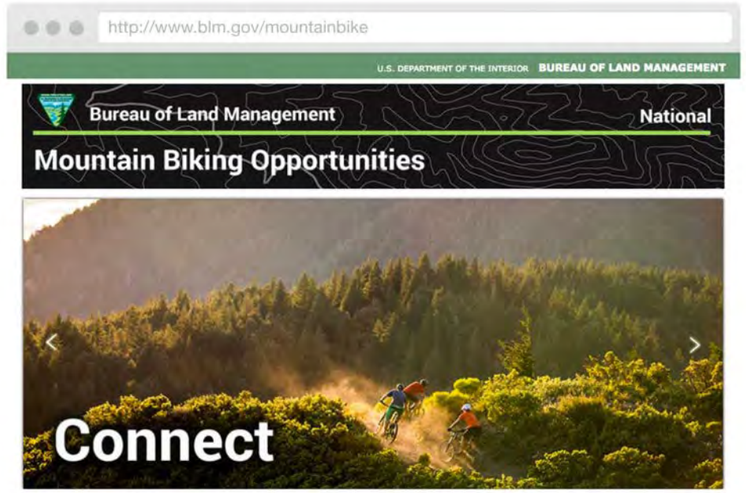
An essential resource for anyone planning a bike park project. Bike parks are being designed to appeal to every skill level, with enough variety to keep riders coming back, and municipalities are funding them at the same level as other types of recreational facilities. This book examines all phases of planning, designing, building, and operating these facilities, with real-world success stories and multiple essays provided by leaders in the field.



Sandy Ridge Trail System
Sandy, Oregon

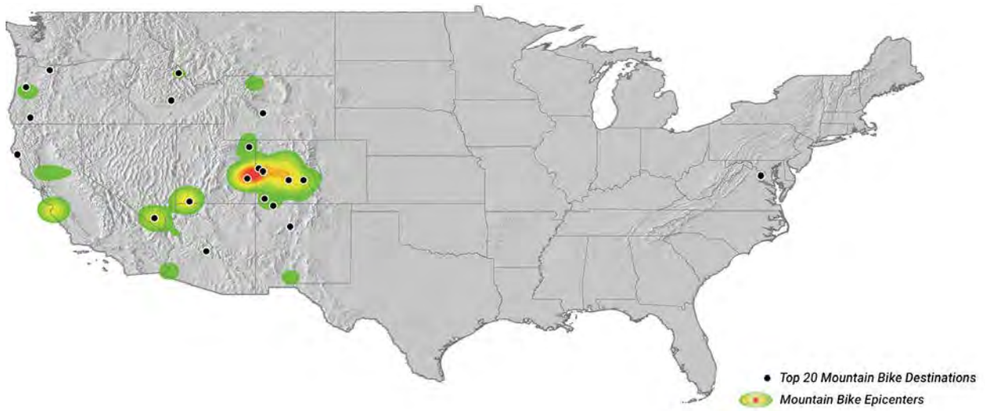
Existing High-Quality Experiences on BLM-administered Lands:

Through a national partnership with IMBA and MTB Project, the BLM developed an interactive map of the top 20 mountain biking trail opportunities that exist on BLM-administered lands across the United States. The BLM's new suite of online maps provides helpful information and eye-catching visual images of mountain bike recreation sites and trails. BLM Director Neil Kornze released this interactive website to the public on October 5, 2015, in Moab, Utah. The interactive top 20 mountain bike trail opportunities site can be accessed at www.blm.gov/mountainbike.



BLM Mountain Bike Destinations and Epicenters

The map below depicts concentrations of trails with the top 20 mountain biking trail opportunities that exist on BLM-administered lands across the United States. While opportunities exist all over the country, particularly in the West, areas displayed in the range from green to red represent a higher density of trails used by mountain bikers. More details can be accessed at www.blm.gov/mountainbike.



Mountain Biking — The Next 10 Years

The steady growth in mountain biking's popularity in the U.S. is more than just the sport retaining a static slice of the growing general population. The initial novelty that prompted mountain biking's rapid growth in the 1980s has matured into the second most popular human-powered trail activity in the country.

Good planning rewards foresight and trail development is no exception. It is therefore important to consider what factors will influence the growth of mountain biking over the next 10 years.

Bike Technology
Mountain bikes will become increasingly capable of handling the rigors of trail riding. Lighter, stronger, and more efficient bikes will allow riders to push the limits of what is possible. Technological increases for high-end products will trickle down to mid- and low-cost bikes, making increased performance, and enjoyment, available to a broader range of enthusiasts.

Communication Technology
Mountain bikers have proven to be enthusiastic adopters of websites, apps, and other social media tools. From highlighting quality experiences to navigating new trails, riders are sharing and using information to get out more often.

Climate Change
In many parts of the U.S. the rideable season is increasing, with an earlier spring and later autumn. Inclement weather is a major factor in deterring many outdoor sports, including mountain biking, and decreasing snowfall will increase riding opportunities.

Trail Development
Exponential growth in the number of professional and volunteer mountain bike trail builders has influenced the creation of fun, sustainable singletrack. Bringing bike-optimized designs and features to trails is forecast to continue as innovative builders to "dig deep."

Outdoor Recreation Culture
For a new generation of recreationists there has never not been mountain biking. It is part of the range of activities that are expected and anticipated to be a component of one's outdoor adventure, whereas participation in more traditional experiences, such as hunting or camping, is shrinking.

Access
Thanks to the efforts of individuals and organizations such as IMBA, mountain bikers will see an overall trend of increased access to local, state, and federal lands. Easier access to more and better trails will allow more people to become enthusiasts.

While these and other factors may change, there is one aspect that will remain a constant in the growth of the sport: it is a fun, challenging way for millions of Americans to enjoy the outdoors.

Wildcat Trail System
Sandy, Oregon

Mountain of the Rogue
Rogue River, Oregon

Chapter 3

Trail Settings, Characteristics and Experiences

Who?

The way in which the Bureau of Land Management and other land managers design and construct trails has a significant impact on a rider's experience. By making the necessary trail planning and design tools available to all BLM staff, contractors, volunteers, and partners, the quality of trails can be improved and a consistent level of excellence can be achieved when targeting specific trail objectives, targeted outcomes, and rider difficulty levels.

The purpose of this chapter is to provide an introduction to and overview of the following key concepts that will be applied in Chapter 5: Take Action.

- ***Types of trail users and trails are described, identifying the trail outcome goals that are common among different users as well as those that are different.*** *The distinctions between shared use trails and those designed specifically for mountain biking access are explored. Several considerations are established for planning and designing trails intended to provide access for a range of activities and users.*

- ***Recreation Setting Characteristics (RSC)*** *are introduced to form a solid foundation for the development of landscape-appropriate trails. An understanding of the setting in which trails are located will ensure the BLM develops trails that are sustainable, and provide targeted mountain biking objectives and difficulty given the physical, social, and operational recreation settings that define an area.*

- ***Types of Trails*** *and many trail objectives are shared, but others differ markedly depending on whether or not a trail is designated for shared use or designed specifically for bikes. Several considerations are established for planning and designing trails intended to provide experiences for a range of activities and users.*

- ***Trail Objectives*** *are defined in order to create a common and clear "trail language," with photos and renderings provided to illustrate the appropriate interaction between targeted trail objectives, settings, and mountain bike trail features.*

- ***Mountain Biking Trail Features*** *are documented to illustrate how a rider's experience can be affected by the construction and placement of trail features specific to mountain biking. Experiences are translated into trail features that look and feel different depending on where the development is located within the landscape, as well as the desired experience and intended level of difficulty.*

What?

Trails for All

A trail is a facility that allows the public to access and interpret landscapes while concentrating impacts to a defined corridor. A trail is considered to be sustainable when it allows users to enjoy an area with minimal impact to natural and cultural resources and requires only modest maintenance. When a trail fails to provide desired outcomes, the resulting impacts can be crowding, conflict, and the creation of unauthorized trails, so a truly sustainable trail must also align with desired user experiences.

Traditional trail guidelines offer best management practices in design and construction from an engineering standpoint that focuses on environmental sustainability (e.g., Half Rule, trail-slope alignment, full-bench construction, etc.). These guidelines also broadly define trail difficulty (easier, more difficult, most difficult, etc.), but not what the experience of that trail is intended to offer for the user. While factors such as length, grade, and obstacle size are important considerations for trail managers and users, they reveal very little about how the trail will actually feel for the user. How does the level of trail exposure affect a rider's experience? Is the trail playful? Is it challenging because it has rocks or because it has jumps?

Trail Experiences > Social Sustainability

- Reduce user conflict
- Reduce informal and unauthorized trails
- Fulfill management objectives
- Engage stakeholders in balanced and positive trail management

For trail managers, the GQTE seeks to develop the tools to describe the trail experience and plan accordingly as they seek to protect resources, address risk, and achieve their objectives. This framework recognizes that trails are truly successful only when they provide the experience a user is seeking.

For users, the GQTE helps with the critical step of establishing expectations. The more efficiently trails can be described, the more informed a user will be in deciding where and what to ride.

For advocates, the GQTE provides a means to describe the user experience in direct, shared, and consistent terms, allowing for a more constructive dialogue as trails are managed, maintained, and constructed in a collaborative way.

Trail Users

The trail-based activities and allowable-use decisions made for a recreation area will have a dramatic impact on what tools are used to control trail access and manage settings. Understanding these areas of goal interference is critical to creating trail systems that minimize user conflict while also accommodating user expectations for both shared-use and mountain bike—only access.

The recreation objectives for a specific recreation management area identify the specific outcomes (experiences and benefits) to be produced or realized and recreation activities to be emphasized. For areas where mountain biking is the targeted activity, more specific trail objectives and trail outcomes can be defined, in support of the recreation area objectives.

Input from the users of specific areas and residents of adjacent communities during the planning process will help determine if these generalizations apply to your area.

Singletrack Trail Users

- ***Hikers*** – more focused on setting and destination, most mobile users, capable of cross-country travel

- ***Equestrians*** – less affected by tread condition, prefer loops, greatly prefer water access, require longer distances than hikers for a valued experience

- ***Trail Runners*** – most similar in movement to mountain bikers (speed, distance, preferred trail conditions) where the trail itself is an important factor along with exercise

- ***Mountain Bikers*** – wide range of desired experiences, but the trail itself is generally the primary factor, rather than destination or setting

- ***Motorcyclists*** – less commonly share trails with other users (outside of designated OHV areas), can be similar to mountain bikes but present unique challenges in trail design and flow due to throttle power

- ***Electric-Powered Mountain Bikers*** – similar in desired experiences to human-powered mountain bikers but able to cover more distance for a given fitness level

Factors important to all trail users
- Setting/Nature
- Singletrack
- Exercise
- Loops, connectivity
- Variety

Factors more specific to mountain bikes
- Play
- Technical challenge
- Skills progression
- Trail rhythm

Sandy Ridge Trail System
Sandy, Oregon

Trail Designations

Shared Use versus Bike Only

Trail designations greatly influence the user experience. Deciding whether a trail should accommodate all users or be designated for limited uses such as hiking or biking only is not always a simple endeavor. Historically, single use trails have only applied to hikers. Trails that might be for a purpose other than hiking had not been considered. Given varied trail objectives and the interaction of wheeled modes of recreation with trail surfaces, it's clear that a trail built specifically to support mountain bike use might look quite different from one designed for shared use. Naturally, there are pros and cons for any trail designation, as outlined below.

Shared Use

Shared-use trails allow two or more distinct user groups to access a trail, and have a number of advantages that have made them popular among trail manager and users:

- Shared-use trails best accommodate the needs of the broadest array of users, whereas single- or restricted-use trails tend to concentrate users, sometimes creating negative social impacts due to crowding.

- Sharing helps build a trail community. Visitors are encouraged to cooperate in order to preserve and protect a common resource, and encountering other types of users on a trail helps to establish mutual respect and inspire courtesy.

- Shared-use trails take better advantage of available space and trail mileage. Quite simply, they provide more trail for everyone to enjoy.

- Systems with shared-use trails require fewer miles than would be necessary to accommodate trails for individual user groups, and therefore have less impact on the surrounding ecosystem.

- Shared-use trails support the most visitors. Trails that lead to specific major destinations, such as waterfalls and scenic vistas, should be considered for shared use, since most visitors will be drawn to the point of interest regardless of the mode they'll use to get there. Likewise, trails that serve as major travel corridors can be more efficient when shared.

Single Use

Since use and terrain conditions can vary greatly, there are cases where single-use trails may be the best solution:

- **Trails:** Popular recreation areas with crowded trail systems can benefit by providing access to both shared- and single-use routes, helping to ensure that visitors can avoid traffic jams if they simply want to hit the trails seeking relaxation and a connection with nature.

- **Trailheads:** Trail systems can avoid crowding at trailheads by providing separate access points to accommodate specific users. For instance, one entrance can be designated for equestrians and include horse-trailer parking, while another parking area can be designated for hikers and mountain bikers.

- **Targeted Experiences:** For mountain biking diehards, the experience of riding a narrow roller-coaster trail with a rocking rhythm of twists and turns unfolding under their wheels is a highly valued prize. These are the trails that envelope riders in a zone of exhilaration and successfully provide that desired result when they are specifically designated for mountain bikers.

- **High-Speed Trails:** Trails designated for speed can allow advanced runners and riders to race train at higher speeds without affecting other visitors. They are designed to separate visitors by skill level and the experience sought.

- **Skills Areas:** Skills facilities at trailheads or within developed parks can incorporate a practice area with a wide variety of challenging obstacles, from easy to progressively difficult. Skills clinics could also be conducted in these specialized areas.

Black Canyon Trail
Black Canyon City, Arizona

Preferred Use

While preferred-use trails allow two or more user types to access a trail, they are designed to primarily accommodate the experience of only one of the users. Used as a management tool, preferred-use trails can combine the benefits of both multi-use and single-use trails, but due to user preference of the design elements they may become de facto single-use trails.

Bike-Optimized Features

Bike-optimized features are those that are developed specifically to enhance the mountain biking experience. They can be located on shared-use, single-use, or preferred-use trails.

White Ridge Trail System
Rio Rancho, New Mexico

Appropriate for Shared/Preferred Use: Bike-optimized features can be appropriate for shared or preferred-use trails depending on their amplitude and frequency. A small feature placed strategically within the trail corridor would be enjoyed by riders but could go unnoticed by other trail users.


Rollers


Small Berms


Rock Gardens


Slow-speed Technical Features


Clear Sightlines on Faster Trail Sections

Bike-Optimized Features Not Appropriate for Shared/Preferred Use:


High-speed Features


Jumps


Large Drops


Elevated Structures


Gravity Trails


Any feature where a rider cannot safely yield


Any feature where rider experience is primary and trail use would be significantly diminished by other uses (including riders traveling in opposite direction)

How?

Outcomes-Focused Recreation Management
Advances in recreation management knowledge and practices have been responsible for the evolution of activity-based management to experience-based management and, more recently, benefits-based management. Outcomes-focused management is defined as an approach to recreation management that centers on the positive outcomes gained from engaging in recreational experiences. Positive recreation outcomes consist of experiences and benefits, defined by the BLM with distinct criteria.

Experiences—Immediate states of mind resulting from participation in recreation activities that result in benefits.

Experiences that may often be associated with mountain bikers include:

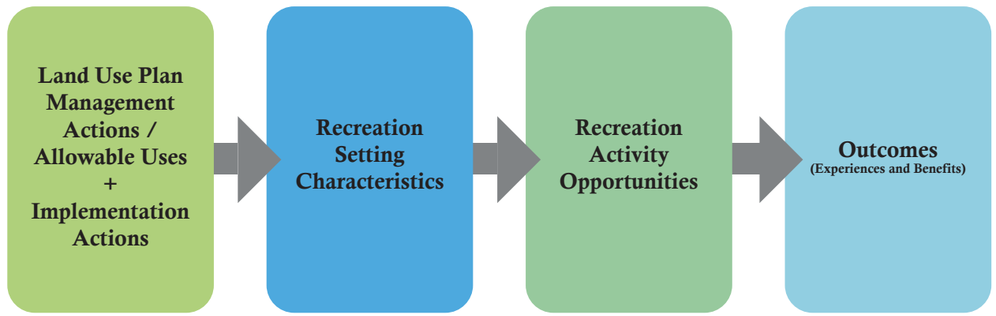
- Developing skills and abilities
- Testing endurance
- Enjoying risk-taking adventure
- Enjoying nature
- Enjoying strenuous physical exercise
- Getting away from family for a while
- Enjoying solitude, isolation, and independence
- Releasing or reducing stress
- Enjoying the closeness of friends and family
- Enjoying meeting new people with similar interests
- Having others nearby who can help if needed

Benefits—The result of a satisfying recreation experience that improves or maintains a desired condition. Benefits accrue from recreation participation, are both short- and long-term, are realized on-site and off-site, and can be identified in one of four categories: Personal/Individual, Social and Community, Economic, and Environmental.

Benefits that may be realized from mountain biking include:

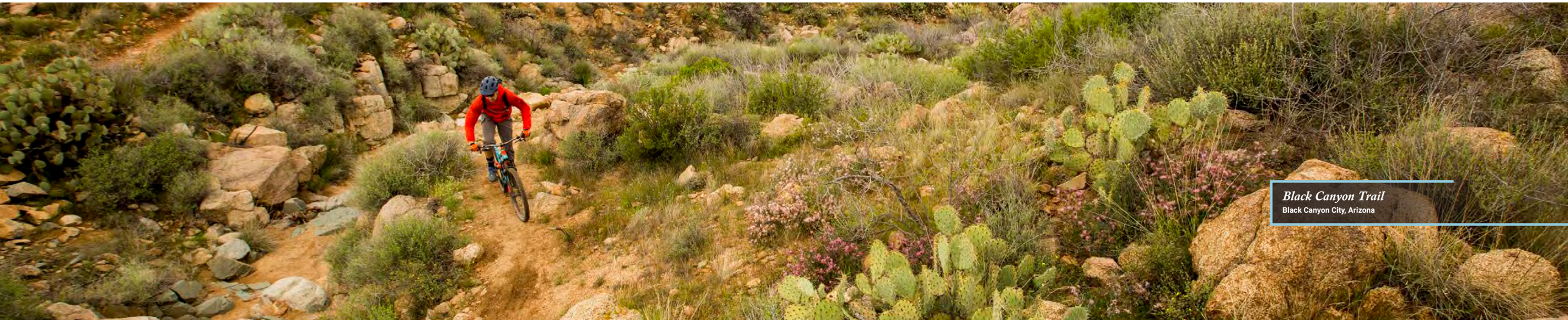
- A more holistic sense of health maintenance
- Restored mind from relieving stress
- Improved outdoor recreation skills
- Greater sense of adventure
- Greater freedom from urban living
- Improved physical fitness and health maintenance
- Greater opportunity for people with different skills to exercise in the same place

Outcomes-Focused Management Framework
An individual's ability to obtain specific recreational outcomes is highly dependent on the presence of the physical, social, and operational setting characteristics that support those outcomes. In order to incorporate outcomes-focused management into mountain bike trail planning, it is critical to understand the relationship between outcomes, recreation activities, recreation settings, land use planning decisions, and implementation actions. Understanding this framework as a production process provides a useful structure for mountain bike trail planning. The following figure illustrates the framework by showing that land use planning decisions and implementation actions interact with physical, social, and operational recreation settings to provide recreational activity opportunities, and ultimately facilitate the attainment of targeted outcomes.



These experiences can be influenced by the type of existing and prescribed Recreation Setting Characteristics to be managed (incorporated trail features, trail location, facilities associated with a trail system, etc.) as well as the physical components (remoteness, naturalness, visitor facilities) and operational component (public access, visitor services, management controls).

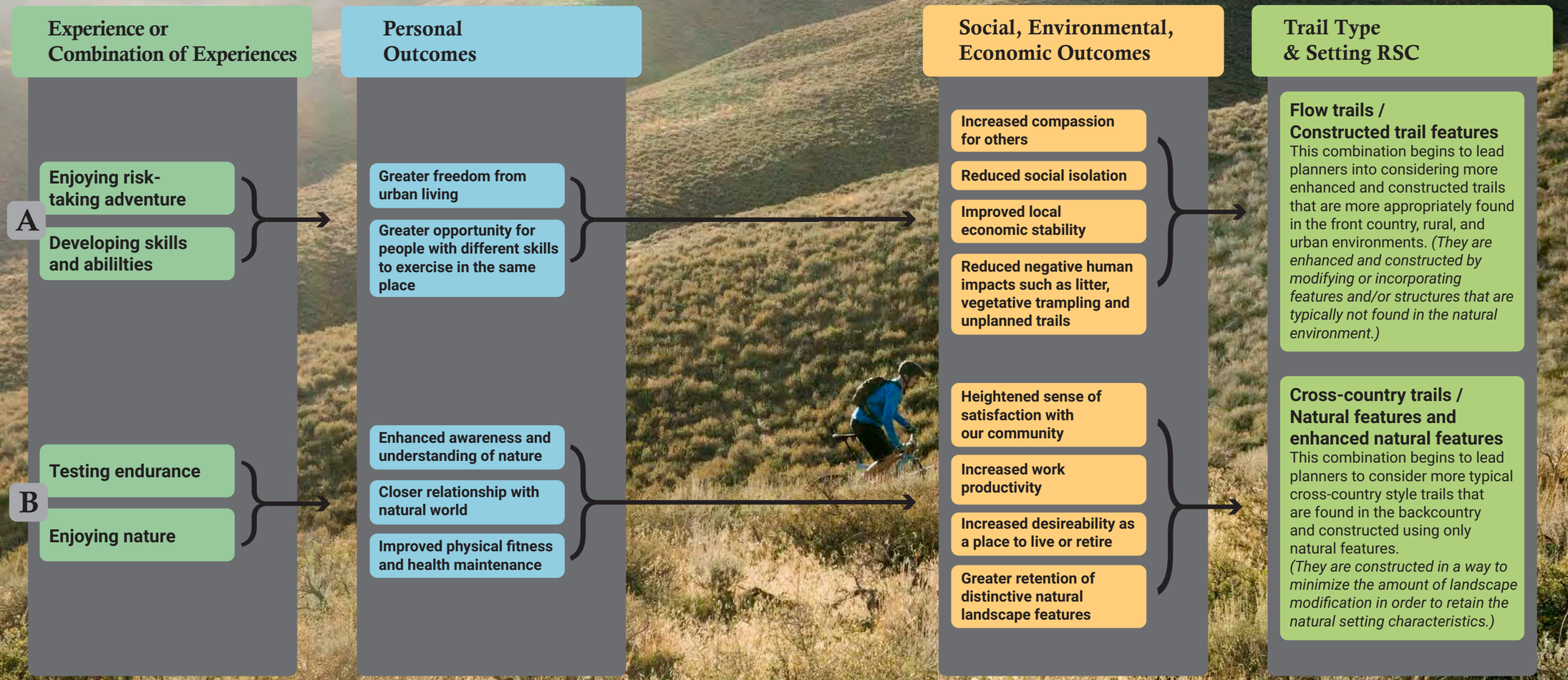
For additional information and to assist in the planning and management of recreation and visitor services on BLM-administered public lands, refer to BLM Manual 8320 and BLM Handbook H-8320-1 Planning for Recreation and Visitor Services.



Black Canyon Trail
Black Canyon City, Arizona

Incorporating OFM into Trail Design, Construction and Management

For the best results (user satisfaction and minimizing impacts to cultural and natural resources) it is important to gather OFM data prior to planning and designing new trails or modifying existing trails. OFM data is helpful in guiding the types of trails that are desired and the locations in which these trails should be placed. It is important to look at each trail-planning area as a unique unit and not to generalize the OFM data collection process or conclusions.



Trail User Objectives

Creating trails in terms of user objectives means establishing a common language in describing these factors. Trail users, land managers, and trail builders don't always use the same terms to describe trail features, and terms that mountain bikers use to describe desired trail user objectives can be confusing to noncyclists—terms like "flowy" and "rowdy" not only mean different things to different riders, but they may be completely misinterpreted by land managers and trail builders. This document seeks to break down trail user objectives into a set of defined terms to better describe a trail experience. Each term can be imagined as on a spectrum, low to high, poor to excellent, none to total.

Trail User Objectives	Description
Nature	Connection to nature. This can be anything from being among a few trees in the middle of the city to remote backcountry. Nature is an important factor for many riders.
Escape	Something that takes you away from your daily grind, allows you to get lost in the experience of riding. Often means getting away from the urban environment, but a bike park, even indoors, can provide this as well.
Solitude	Getting away from the urban environment and people; being active, alone, and quiet in the outdoors.
Challenge	Seeking to improve technical abilities, to solve a difficult problem, "clean" a trail feature or segment; sense of accomplishment.
Risk	Exposure to danger, harm, or loss; intentional interaction with uncertainty. The perception of risk creates a thrill for many trail users. It can be a positive or negative part of the trail experience, depending on user expectations and risk tolerance.
Fun	Amusing or enjoyable experience. When you are trying to build fitness and/or skill, you may do many rides without "fun" being a primary objective. Ideally, one doesn't have to sacrifice fun for challenge or exercise.
Play/Playfulness	Engaging in the activity purely for the enjoyment, bringing a childlike wonder to the pursuit, no destination. On a trail, this often means seeking features to enhance, alter the experience, rather than simply riding from point to point. Playfulness is a hugely important characteristic in mountain bike trails, and distinguishes trail experiences from many other trail user goals (hikers, equestrians).
Exercise	Health and fitness are part of the sport. For some this is a primary goal, for others a bonus, for some an obstacle. Defining the physical fitness needed for a particular ride is important in setting user expectations appropriately. Recognition that some riders have high skill and low fitness (and vice versa) plays a role in trail planning.
Variety	Multiple trail options, diversity of experience within a trail or trail system. Variety should be in several forms, where possible: skill, features, surface, setting, grade, etc. While all the trails within a system may have a particular feel based on its environmental factors, it can still have variety within those constraints. Also possible at the regional level to provide variety of experiences if limited opportunities exist within a particular system.
Connectivity	Series of loops and/or trail segments linked by other trails or transportation routes. Allows for a customized experience, change of plans, adding on to a ride. Also allows for riders of different fitness or skill level to begin rides together.
Socializing	Provides a shared experience and enhances safety for riders. Mountain biking is often a social activity.
Safety/Security	This could range from trailhead security for parking to personal safety unrelated to recreational use.
Efficiency	Getting to a destination or accomplishing a task with the least amount of time or effort expended. Road climbs are very efficient, as are trails that ascend directly to a destination. Efficiency sometimes means compromising sustainability and fun/play. Hiking trails tend to be much more efficient than biking trails.

Primary Experience Factors

Bike-optimized trails, designed and constructed to maximize the fun and efficiency of riding a bike, enhance trail experiences specifically for mountain bikers that might differ from traditional trails in several ways: enhanced tread shaping, directional or one-way travel, and the use of man-made technical trail features (MMTTF).

Mountain bikes move differently along a trail than other modes; the movement of the wheels, the use of gravity and friction, and the transfer of energy from the rider to the drive train all offer both opportunities and constraints for trails and trail features not sought after by other users. For instance, berms take advantage of the motion and momentum of the bike, keeping rider forces perpendicular to the tread surface, changing direction in a manner most efficient and least likely to cause soil displacement. Most important for the rider experience is that the feeling of riding a berm is exhilarating and playful.

A hiker or equestrian cannot take advantage of a berm; indeed, these users may find them difficult to negotiate without slipping and more obtrusive in the landscape than a switchback or at-grade turn. For hikers, equestrians, and other trail users, MMTTF designed for mountain bikers can seem unnecessary at the very least and could create safety concerns. Identifying appropriate locations for these features on shared-use or preferred-use trails should consider all users.

Whether a bike-optimized trail is shared, preferred, or single use depends on several factors: recreation activity opportunities, ability to yield, speed, and level of use. As in the example of user experience in a bermed turn, a shared-use, bike-optimized trail would need to provide a flat area through the turn for other users—a hybrid-style turn often referred to as a "switchberm" to accommodate multiple user modes.

Free Lunch Trail
Grand Junction, Colorado

Recreation Setting Characteristics

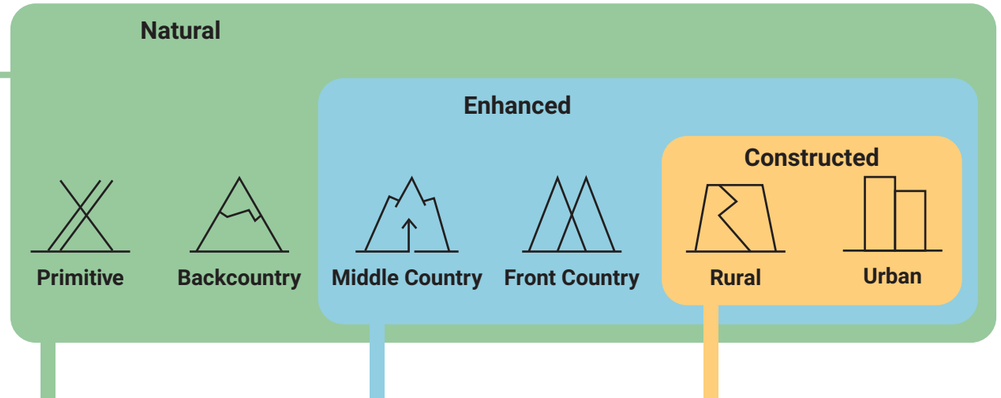
There are a variety of trail experiences that mountain bikers are interested in and for each of these there is a spectrum along which individual users will place their preferences. Recreation Setting Characteristics (RSC) are classified along a spectrum from urban to primitive using the RSC matrix as described in the Introduction. While these characteristics don't provide specific details of the trail objective for the user, they do help to define appropriate uses and use levels within a setting. They address factors like "remoteness" based on number of users encountered (e.g., solitude), and the naturalness of the broad setting that may influence user experience. In contrast, the trail experiences that riders seek are realized by the development, or lack thereof, of specific mountain biking features.

The following pages illustrate how trail user objectives are filtered through the recreation setting to determine what mountain bike trail features are most appropriate.

Play

Engaging in the activity purely for the enjoyment, bringing a childlike wonder to the pursuit or no destination. On a trail, this often means utilizing features to enhance or alter the experience, rather than simply riding from point to point. Playfulness is an important characteristic in mountain bike trails and distinguishes trail experiences from many other trail user goals (hikers, equestrians).

Recreation Setting Characteristics



Trail Feature Spectrum

Natural Features

Except in primitive settings, these may be modified with placed natural materials such as rock or soil to guide riders to these play features. In primitive and backcountry settings, access to the natural play features will have minimal tread modifications.

Enhanced Natural Features

Tread is shaped using natural materials (rocks or soil) to provide a play feature that blends with the landscape.

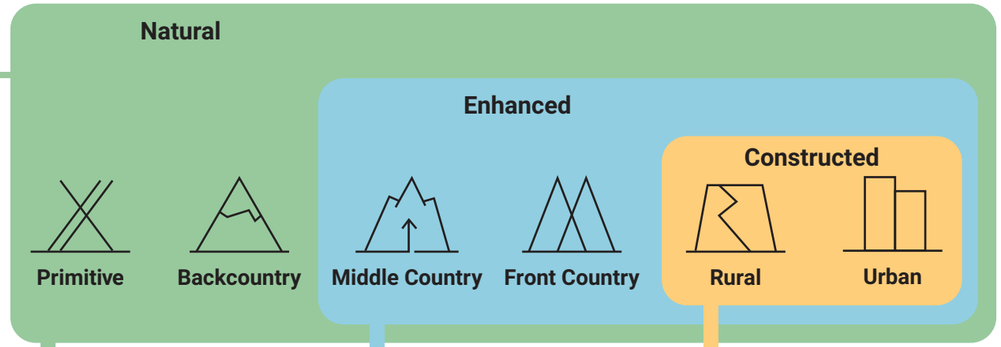
Constructed Trail Features

Tread is highly sculpted using natural or imported materials to provide a play feature. These features are typically placed in bike-specific trails and facilities.

Challenge

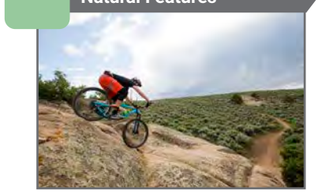
Seeking to improve technical and/or physical abilities, to solve a difficult problem, "clean" a trail feature or segment; sense of accomplishment.

Recreation Setting Characteristics



Trail Feature Spectrum

Natural Features



Except in primitive settings, these may be modified with placed natural materials such as rock or soil to guide riders to these challenge features. In primitive and backcountry settings, access to the natural challenge features will have minimal tread modifications.

Enhanced Natural Features

Tread is shaped using natural materials (rocks or soil) to provide a challenge feature that blends with the landscape.

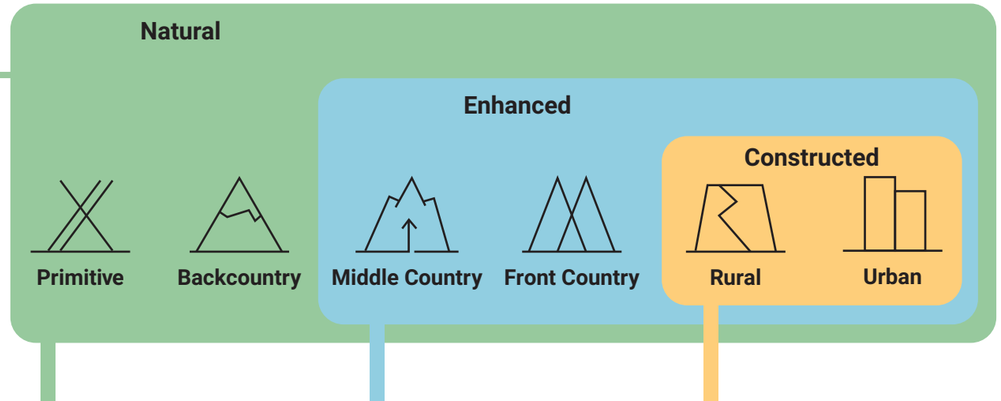
Constructed Trail Features

Tread is highly sculpted using natural or imported materials to provide a challenge feature. These features are typically placed in bike-specific trails and facilities.

Escape

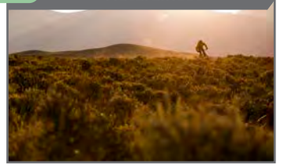
Something that takes you away from your daily grind, allows you to get lost in the experience of riding. Often means getting away from the urban environment, but a bike park, even indoors, can provide this as well.

Recreation Setting Characteristics



Trail Feature Spectrum

Maximize remoteness and Naturalness



Trail tread is minimally improved, if at all. Trail modifications in harmony with surroundings, not visually striking or immediately evident. All trail use is muscle-powered (human or animal).

Maintain remoteness and Naturalness

Trail tread and modifications become more evident and further contrast with the character of the landscape. Motorized trail users may be present on the trail.

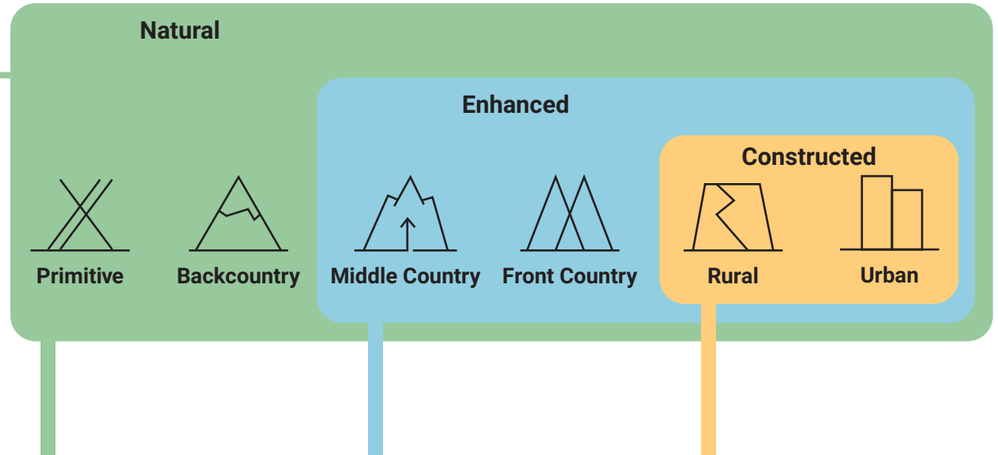
Minimize Remoteness and Naturalness

The character of the landscape and the trail is considerably modified as mountain bike–specific features are integrated. Sights and sounds of ordinary vehicle traffic in addition to motorized and nonmotorized trail users are present.

Risk

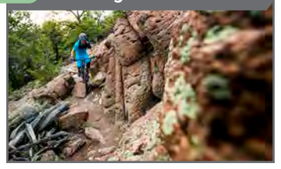
Exposure to danger, harm, or loss; intentional interaction with uncertainty.
The perception of risk creates a thrill for many trail users. It can be a positive or negative part of the trail experience, depending on user expectations and risk tolerance. Risk can appear to be closely related to Challenge but operates independently. The technical challenge of a feature is static but the consequences of falling, and thus the risk, can be minimal or severe.

Recreation Setting Characteristics



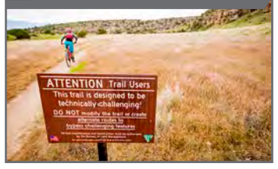
Trail Feature Spectrum

Minimal Visitor Services and Management Controls



No maps and limited way-finding information on trail including rock cairns, etc. Mountain bikers are responsible for route finding and navigation. Staff rarely present to provide assistance, emergency services sparse, few use restrictions, and little visitor information on-site.

Moderate Visitor Services and Management Controls



Trail brochures, maps, and staff occasionally present. Some regulatory information and signage available. Moderate use restrictions. Emergency services are more readily available.

Maximum Visitor Services and Management Controls

Way-finding information, maps, cellular phone service is available on-site. Regulations are strict, use may be limited by permit, reservation, etc. Trail signage including level of difficulty and primary trail experience is present. Emergency services are readily accessible.

Free Lunch Trail
Grand Junction, Colorado

Chapter 4

Creating Trails and Trail Features

Translating Trail Objectives into Trail Features

The mountain biking experience is enhanced when bike-specific features are incorporated into a trail. As trail planning is completed and the process moves to trail design, the type, scale, magnitude, and frequency at which trail features are provided has a direct impact on the rider's ability to realize a targeted set of outcomes.

Each of the trail user objectives noted in the previous chapter has primary features that can be used to guide trail development. When properly modified for the intended skill level and placed in an appropriate landscape, the combination of features provides the desired user outcomes.

Sustainable Trail Development

Throughout the process of design and construction of any trail, the guidelines for sustainable trail development must be followed, and in no way does the creation of bike-specific trail features contradict this mandate. In fact, the proper implementation of features enhances the sustainability of a trail by countering user forces (berms), hardening the tread against erosion (armoring), and aggressively draining water from the trail (rollers).

The methods for sustainable trail design, construction, and maintenance are well documented in other resources, particularly the trail-building books published by IMBA. Detailed knowledge of these concepts is key to successful implementation of the desired trail features.

Features

After having identified the primary trail user objectives it is necessary to select the appropriate bike-optimized trail features that provide the desired experience. This is where the "knobbies hit the dirt," so to speak, and where communication using shared terms is key. This can be illustrated with the four Primary Trail Characteristic examples from the previous chapter: Play, Challenge, Escape, and Risk.

To successfully create a high-quality trail experience, attention to detail needs to be at the forefront of the design and planning process. This is evident in the way that trails and trail features are placed on the landscape. Illustrations are a key element of this process and are used to define and describe trail user objectives and illustrate how these can be translated into physical trail features. The following renderings show how a rider interacts with the feature to elicit a specific experience as well as how the feature functions as a management element. The effect on rider behavior is clearly evident from the renderings in that each directly influences the way a rider experiences the elements of challenge, playfulness, escape, and risk.

Alsea Falls Trail System
Monroe, Oregon

Management Controls

In addition to influencing rider experience, trail features can be integrated into the trail planning and design process to function as a tool to accomplish a range of management objectives, including resource protection. For example, constructing a backslope that is blended with the prevailing slope allows soil to stabilize and vegetation to grow. This reduces erosion and creates a more natural trail feel. It also allows the rider to be more in the center of the trail where the tread is most durable, rather than pushed to the edge. The following illustrations depict trail features that serve the dual purpose of providing for a distinct rider experience while simultaneously achieving important management objectives.

BACKSLOPE

PREVAILING SLOPE TO BACKSLOPE RATIO, FOR SLOPES >20%. VARIES BASED ON SOIL AND VEGETATION, SHOULD APPROXIMATE A NATURAL ANGLE OF REPOSE.

CORRAL/ANCHOR

OBJECTS USED TO DEFINE THE SIDES OF THE TRAIL TO REDUCE TRAIL WIDENING, CONTROL SPEED, PREVENT SHORTCUTTING, AND/OR EMPHASIZE UPCOMING TRAIL FEATURES.

FILTER

A HIGH-SKILL, LOW-CONSEQUENCE OBSTACLE THAT DEMONSTRATES THE DIFFICULTY OF THE UPCOMING TRAIL OR FEATURE (AKA QUALIFIER OBSTACLE).

STONE PITCHING

AN ARMORING TECHNIQUE WHERE ROCKS ARE SET ON END OR "PITCHED" UP ON THEIR SIDE, PLACED TIGHTLY TOGETHER, AND PACKED WITH SOIL AND AGGREGATE TO TIGHTEN. ENSURES DURABLE TREAD AND CAN BE USED TO ADD CHALLENGE.

Play

Play is typically valued by mountain bikers more than by other nonmotorized users. Defined as engaging in activity for enjoyment as well as bringing a child-like wonder to the pursuit, on the trail this often means seeking features that enhance the unique characteristics of riding a bike rather than simply moving from point to point.

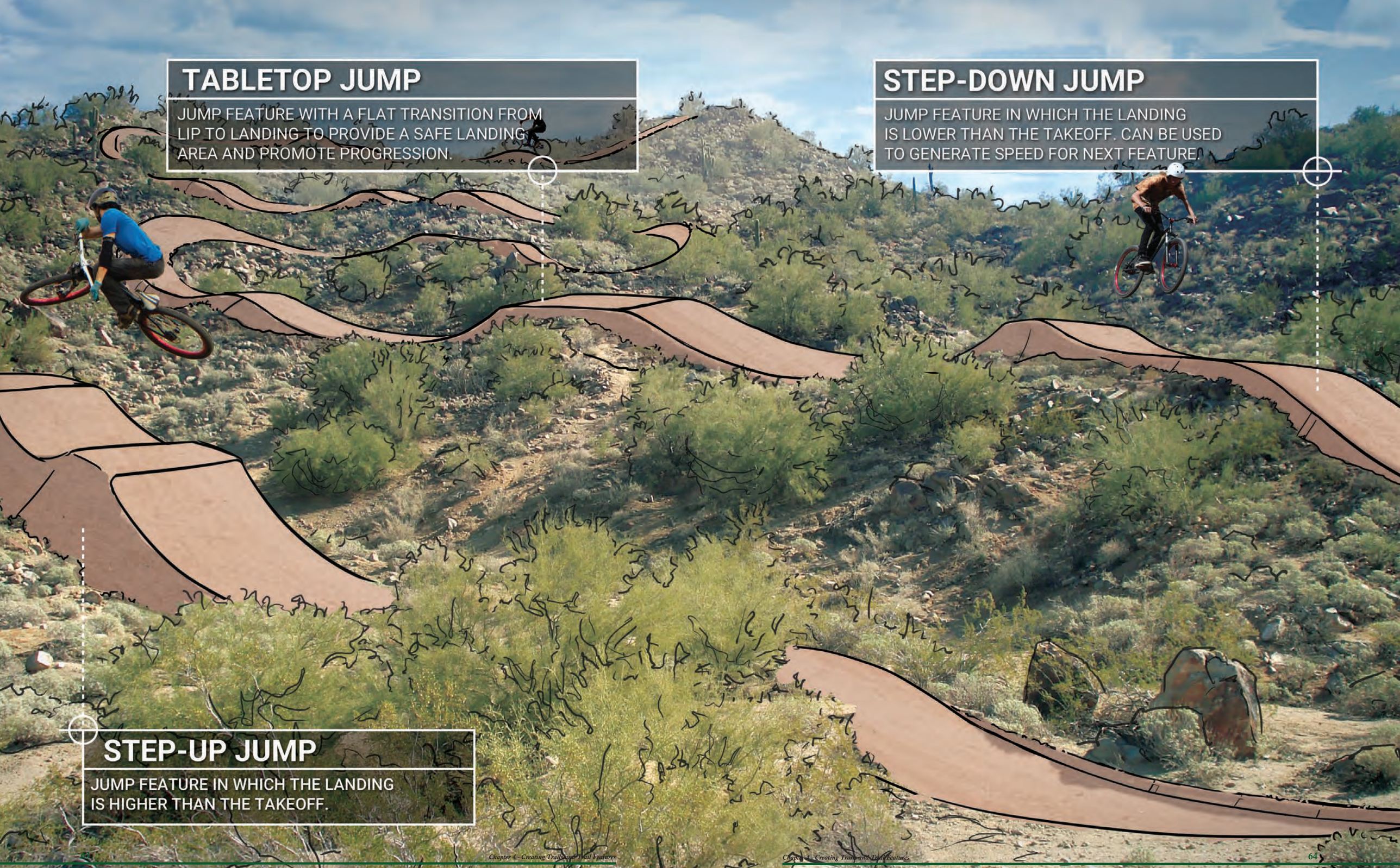
Forest: Constructed dirt jumps in a tight forest corridor. Jumps can be rolled (beginner to intermediate users) or launched (intermediate to advanced users).

Desert: Tilted rock slab used as a natural technical trail feature to create an optional line as a mini-berm.

Forest: An abrupt change in the natural landscape that can be used as a drop to create a moment of airtime.

Desert: Small rollers that can push more advanced riders in the air. Less advanced riders will roll through.

Trail features that provide for Play
Illustrations are a key element of this process and are used to define and describe experience charcteristics and illustrate how the following two charcteristics are translated into trail features that provide for a sense of play.



TABLETOP JUMP

JUMP FEATURE WITH A FLAT TRANSITION FROM LIP TO LANDING TO PROVIDE A SAFE LANDING AREA AND PROMOTE PROGRESSION.

STEP-DOWN JUMP

JUMP FEATURE IN WHICH THE LANDING IS LOWER THAN THE TAKEOFF. CAN BE USED TO GENERATE SPEED FOR NEXT FEATURE.

STEP-UP JUMP

JUMP FEATURE IN WHICH THE LANDING IS HIGHER THAN THE TAKEOFF.

Challenge

Referring to technical, not physical, challenge, this is one of the defining features of mountain biking and separates it from other outdoor pursuits such as road cycling or running. Many riders seek progressively challenging trails and there is a wide range of features for this characteristic including roots, gravity dips, chunky rocks, and jumps/drops.

Desert: Moderately challenging natural obstacles embedded in the tread as well as the tread clearance width and height that requires good line choices.

Forest: Constructed rock garden with medium to large rocks that challenge a rider to pick an optimal line and maintain a sufficient speed to ride the section without putting a foot down.

Desert: Naturally occuring slot between rock slabs limiting tread clearance width. This feature increases both the perceived and real challenge of the trail in this landscape.

Forest: A combination of natural technical trail features (drop and overhang) that require advanced skills and comfort with exposure.