

An aerial photograph of a mountain trail winding through dense green vegetation. Several cyclists are visible on the trail. A large, semi-transparent circular graphic with a blue and green gradient is overlaid on the image, framing the text.

Outdoor Sports Institute – Online Trail Build School

Building Great Trail Experiences



INTERNATIONAL MOUNTAIN BICYCLING ASSOCIATION

IN PARTNERSHIP WITH



OSI

OUTDOOR SPORT
INSTITUTE



INTERNATIONAL MOUNTAIN BICYCLING ASSOCIATION

IMBA UNIVERSITY

- Tuesday 10/6 – Intros, first take home (Trails Planning)
- Tuesday 10/13 – First webinar, second take home (Trails Design)
- Tuesday 10/20 – Second webinar, third take home (Trails Construction)
- Tuesday 10/27 – Last webinar



TOC

- Recap - High Quality Trail Experiences and Sustainable Trails
- Trails Planning Background (vision, visitor types, engagement)
- Trails Conceptual Planning (trail types, difficulty, user amenities, infrastructure, access, POIs)



WHAT IS A "HIGH QUALITY TRAIL EXPERIENCE"?

A high quality trail experience is difficult to define but easy to recognize.

In the context of recreational trails, especially mountain bike trails, this 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 trail user with the outcomes they seek.

BUILDING HIGH-QUALITY TRAILS

OUR CONCEPT WAS DON'T BUILD A LOT OF TRAILS, JUST BUILD REALLY COOL TRAILS

- AARON ROGERS, OWNER ROCKSOLID TRAILS CONTRACTING

NATURAL SURFACE TRAILS ARE AN AMENITY, THEY ARE A FACILITY, AND THEY BELONG IN OUR PARK SYSTEMS.

- RYAN SCHUTZ, IMBA

BUILDING HIGH-QUALITY TRAILS

SO THAT WE CAN SEE THE VISION BEFORE WE GET IN
OVER OUR HEADS MAKING THE WRONG MOVE.

- JEREMY HYATT, EASTERN BAND OF CHEROKEE INDIANS

SANDY RIDGE COLDWATER IMBA TRAIL CARE CREW

2012 PEARL IZUMI DIG

WHAT IS A SUSTAINABLE TRAIL?

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.

WHY A SUSTAINABLE TRAIL?

A sustainable trail allows visitors to enjoy a natural area with minimal impact to the ecosystem and continues to meet the management objectives.

- Protects resources.
- Allows visitors to achieve their recreation goals.
- Minimizes maintenance requirements.
- Minimizes conflict between visitors.
- Increases the capacity of the land for enjoyment with minimal negative impacts



CONSEQUENCES OF POOR PLANNING

- Increased conflicts
- Increased maintenance costs
- Poor visitor experiences
- Increased liability
- Resource damage



Traditional activity-based outdoor recreation management evolved to **outcomes-focused management:**

“...an approach to recreation management that centers on the positive outcomes gained from engaging in recreational experiences.”



Positive Trail Experiences > Social Sustainability

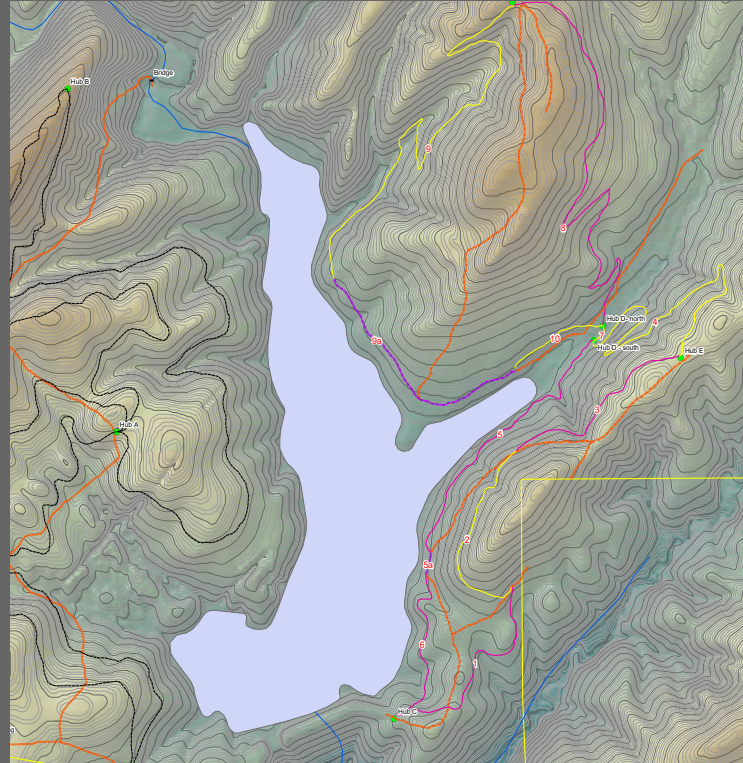
- Reduce user conflict
- Reduce informal and unauthorized trails
- Fulfill management objectives
- Engage stakeholders in balanced and positive trail management



TRAILS PLANNING

BACKGROUND / PRE-FIELDWORK

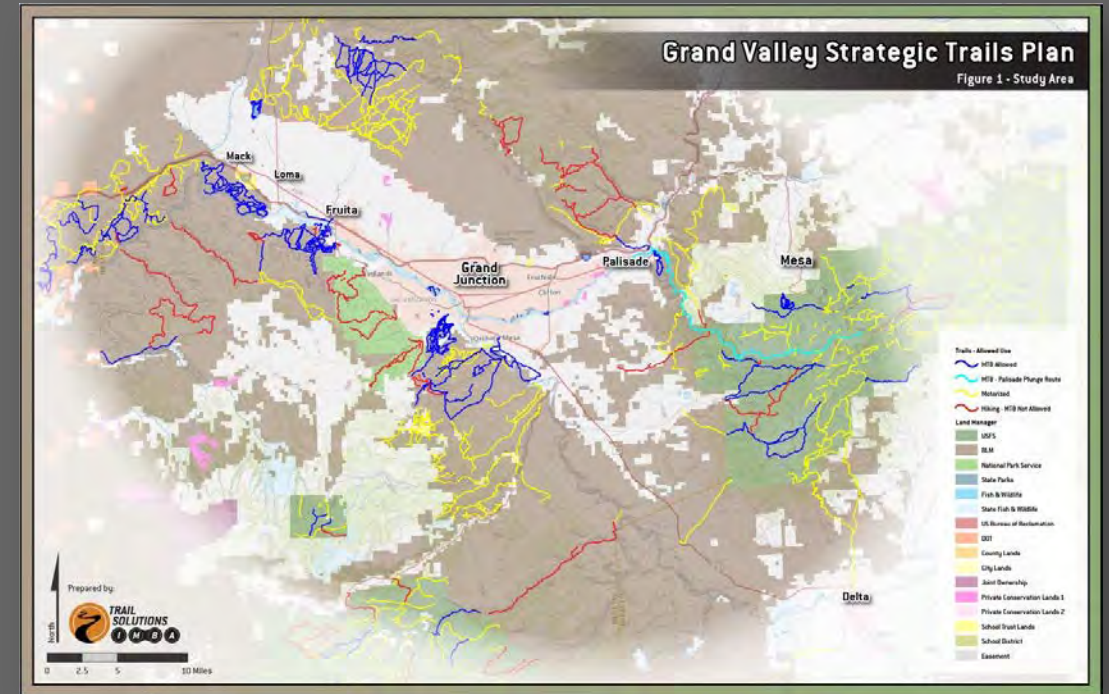
- Determine goals and objectives
- Identify stakeholders
- Identify likely constraints and challenges
- Locate past plans and existing spatial data



DEVELOP THE VISION

What are your big picture objectives?

- Are you working to create a destination/Ride Center or better the quality of life for residents, or both?
- Who will benefit? What benefits do you hope they achieve?
- What social outcomes do you want? Health, recruitment/retainment, economic, conservation, property values, community building...



ENGAGE THE COMMUNITY

- The only way to know what the community wants, is to ask!
- Ask the entire community (even non-trail users) what they want and what they need.
- Determine large social objectives and goals, not just detailed trail input.

POTENTIAL STAKEHOLDERS

Communications experts/Spokesperson

Local government/community leader

Fundraising specialist

Land Management Agency Representatives

Legal advisor

Planning/design experts

Local riders/hikers/equestrians/clubs

Local University Partners

Tourism Professional/convention and visitors
bureau



LAND MANAGERS OBJECTIVES



Drinking water supply



Recreation



Wildlife/habitat protection



Scenic value



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LAND MANAGERS OBJECTIVES

- Timber management
- Fire management
- Endangered/threatened species protection
- Cultural/historical site protection
- Revenue
- Community economic benefits (tourism)
- Relevancy to tax payers/visitors
- Provide a similar resource for future generations

KNOW YOUR LAND MANAGER

- Do they have a mandate for recreation?
- They likely already have plans/objectives, find and read them!
- Management, transportation, recreation, 5-, 10-year, master, resource, plans are all types you might find.
- Ask lots of questions, be prepared to compromise, and remember they have the final say.



LAND MANAGER PLANNING GUIDE

- [Statewide Comprehensive Outdoor Recreation Plan](#)
- [Forest Service Planning](#)
- [Bureau of Land Management Planning](#)

Find ways to help your land managers meet their goals/objectives through trails.



TIPS FOR FOR A SUCCESSFUL PROJECT

Develop a “dream team”

- Find movers, shakers, decision makers, and those who hold purse strings
- Often times not trail enthusiasts, but interested in community development.
- Collaboration and partnership
- A diversity or skills, knowledge, and networks will improve chances of success.

Present a Compelling Vision

- Whatever works!
- Compelling narrative, simple quality graphics
- Strong case, ROI, who benefits and how?
- How will you meet the needs?
- How will you measure/prove the needs are met?



WHO ARE THE TRAIL VISITORS?



WHO ARE THE TRAIL VISITORS?

- Who are your trail users?
- What experience do they seek?
- What trail distance will draw them?
- What level of fitness and skill ability do they have?
- How often are they using your trail?
- How many trail visitors (daily, weekly, annually) do you expect?

SHARED-USE VISITORS



Runners



Equestrians



Hikers



Mountain bikers



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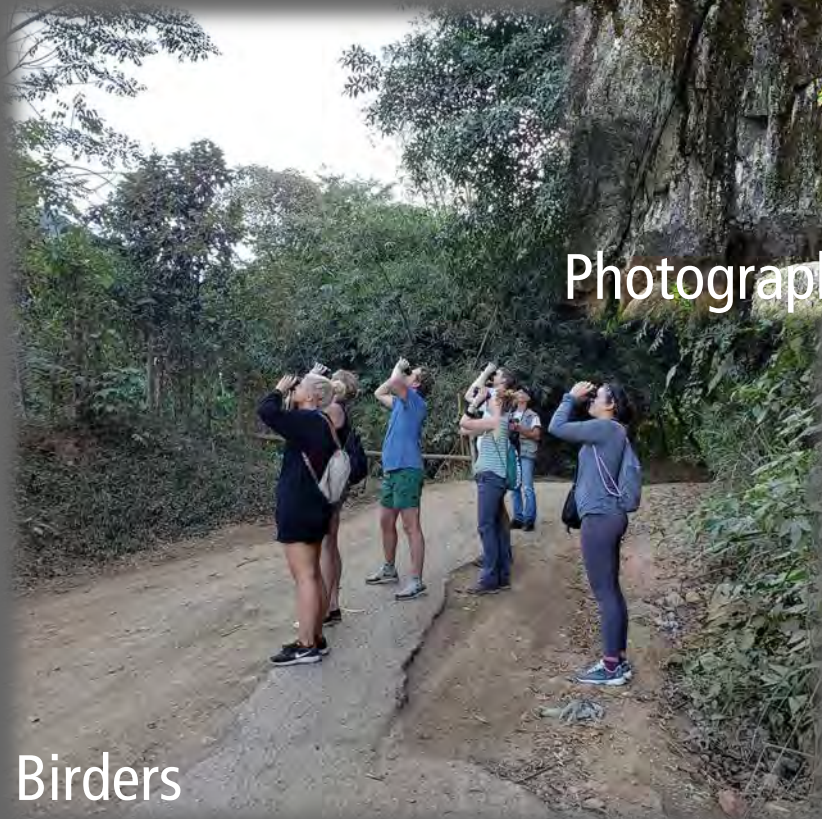
SHARED-USE VISITORS



Photographers



Climbers



Birders

BY FOOT



- Day hikers
- Backpackers
- Dog walkers
- Hunters
- Climbers
- Paddlers (put-in)
- Fisherman
- Runners
- Commuters

BY FOOT

- Can range from very new to trails/outdoors to very experienced
- Generally desire shorter experiences than other visitors
- Generally destination focused (boat put-in, climbing spot, peak, scenic view, waterfall, fishing spot, etc.)
- Tread texture and grade can be some of the most extreme of users (we can walk on just about anything)



BY FOOT

- Walkers are usually interested in getting a little exercise. For the most part, they prefer short trails that provide a direct path from one natural feature to another. Dog ownership is on the rise and many people walk they're dogs daily on trails.
- Hikers tend to be familiar with the outdoors and enjoy a more strenuous and adventurous experience than walkers. They can handle difficult terrain and steep grades. They will generally stay on trails that are direct yet interesting. Hikers are often destination oriented.
- Backpackers yearn for a backcountry experience and will travel many miles to reach it. Even though they have an intended destination, they are less apt to shortcut because they carry heavy loads that hinder maneuverability. Gentle trail grades linking natural features help keep long-distance foot travel interesting. Water sources should be regularly spaced and near suitable camping sites.
- Trail Runners enjoy connecting trail loops to add variety in their workouts. Most runners want several miles of rolling trail with occasional challenging sections. Runners come closest to the speed of mountain bikers, their enjoyment of "the trail itself" is also akin to riders versus other pedestrians.
- Rock Climbers use trails to reach climbing areas. Contour trails may be too indirect for them. They prefer short, direct access to the rocks. Many times trails to climbing areas cross scree or talus slopes, ideal for stairs. Climbers may also need built out areas such as landings, belay stations, or spectator/rest areas.
- Endurance Athletes, including trail runners, mountain bikers, and equestrians, like to push their limits. These people seek trail networks that are as much as a hundred miles long. A large network is more appealing to these users than multiple laps of a short loop.

BY HOOF

- Heaviest, widest and tallest non-motorized users
- Trails require a wide corridor and a high ceiling
- Contour trails with a durable tread are the most sustainable
- Water crossings, fords preferred to bridges
- Dislike large smooth surfaces (low traction for metal shoes)
- Most negatively impacted by startling and poor sightlines
- Requires specific trailhead facilities
- Can climb very steep trails when traction is available
- Rider is somewhat separated from trail condition, but very aware of corridor conditions



DISABLED VISITORS

The Americans with Disabilities Act is a 1990 federal law that helps disabled people gain equal access to public facilities. ADA compliant trails are designed to accommodate traditional wheelchairs and must meet a set of measurable specifications. It is extremely challenging to meet ADA specification with a soil surface trail due to weather related variability of soil conditions.

Mobility challenge comes in spectrum and offering less challenging trails that do not meet ADA specifications can be an effective way to improve access while maintaining a natural surface trail experience that has wider appeal to other visitors.

Due to improved skill, endurance, and equipment such as off-road wheelchairs, more trail opportunities are being sought by disabled athletes. The grade and trail texture suitable for mobility challenge visitors will vary depending upon the visitor's skill and goals. The largest barrier to access is a lack of information about the trail condition and obstacles. Providing effective information and offering a full spectrum of trail difficulty in a system is one of the best ways to facilitate mobility challenge access.

ADAPTIVE RIDERS

Adaptive Cycle are a specific off road wheelchairs using mtb technology.

aMTBs come in variety of configurations that result in differing capabilities and design constraints

In general, aMTBs

- Prefer wider radius turns and wider treads.
- Have a less ground clearance than traditional mtbs
- Do not allow the rider to transfer weight effectively
- Can be much more challenged getting back on the trail tread
- Riders don't get off the bike when stopped, so intersections or gathering spaces need to be larger.

From a planning perspective consider adding aMTB as an objective for a trail system so effective specifications are included in the design process.

Multiple trail difficulties and styles from gateway trails to gravity trails can easily accommodate aMTBs while not impacting the experience for other visitors.



MOUNTAIN BIKERS

Mountain bikers are some of the most diverse visitors, seeking a wide range of objectives and goals from trails. Riders can resemble walkers and hikers, getting out for regular exercise and with destinations in mind. They can also behave similar to runners, riding a similar loop or trails regularly. Due to the many types of riders, many types of trails can be appropriate for riders. One key to mountain biking trails are skill levels. Mountain bikers approach trails from multiple angles; trail grade, width, tread texture, exposure, length, roughness, forced air time, height of features, turn radii, and much more can effect the skill level of a trail.

TYPES OF MOUNTAIN BIKERS



TYPES OF MOUNTAIN BIKERS

- Cross-country riders generally enjoy the journey and are similar to runners and hikers in many ways. These riders may be beginners seeking gentle grades and easier trails or backcountry enthusiasts looking demanding pedal adventures
- Enduro/Trail tend to ride for the descents, technical challenges, and unique bike features. These riders will often look for ways to play on the bike, from chunky downhills to drops and booters, they like to have fun on the bike but also pedal and work for their smiles.
- Downhill/Freeride often utilize uplifts (shuttle, ski lifts, etc.) to access pure gravity fed riding. These riders often look for challenge from steep, technically demanding trails.

BY SNOW



- Nordic (cross-country) skiers
- Backcountry skiers
- Snowshoers
- Fatbikers
- Snowmobiles
- Timbersleds



BY SNOW

- High quality snow trail experiences usually require grooming
- Winter trails often use corridors unusable in the summer (wet areas)
- Nordic skiers generally prefer wider trails, similar to doubletrack or roads
- Nordic skiers often set tracks or trails are groomed, mixing users can disrupt tracks/experience
- Fatbikers and snowshoers can share trails, sometimes they can use summer trails too
- Corridor width and height are important (snow trails are higher off the ground and grooming needs vary), especially when grooming

BY MOTOR

- All-terrain vehicles (ATVs) require a 4- to 5-foot-wide tread that is open and flowing. Their horsepower and wide tires allow travel on sandy or rocky trails. Since the year 2000, this has been the fastest growing group of trail users. Fitted with racks, ATVs are popular with hunters, anglers, and others who take loads into and out of the backcountry. Land managers and trail crews find ATVs useful in many work situations.
- Off-Road Motorcycles require more operator skill than ATVs and can be used on narrower trails. Riders prefer trails that are open and flowing, and they can cover more than a hundred miles a day. Sensitive trails can be armored to withstand the weight and impact of these users.

BY MOTOR

- Generally separated from non-motorized
- In some areas (Idaho) dirt bikes and non motorized share trails well
- In some areas (Maine) ATVs and non-motorized share key multiuse connections
- Motorized users require more stable tread and sometimes wider corridors
- Due to speeds, sightlines are very important

TRAIL USER OBJECTIVES



- Nature
- Solitude
- Challenge

- Risk
- Play

- Exercise
- Variety
- Socializing
- Efficiency



WHAT DO PEDESTRIANS WANT?



WHAT DO RIDERS WANT?



TRAIL USER OBJECTIVES

- Hikers; efficiency, nature, escape, destination, education
- Runners; exercise, loops, challenge, solitude
- Equestrians; loops, solitude, escape
- Climbers; efficiency, destination
- Cross-country mountain bikers; exercise, loops, challenge, solitude
- Enduro riders; challenge, playfulness, risk
- ATVs; loops, connectivity to town/businesses
- Backcountry skiers; efficiency, risk, destination



SUCCESSFUL SHARED-USE SYSTEMS

Designed Use vs Managed Use

- Trails can have only one designed use
- Trails can have multiple managed uses
- Designed use sets the parameters by which the trail is designed and built, the limiting factor
- Managed uses are visitor types appropriate or desired on that particular trail that might impact some design/build choices

Single Use vs Multi Use

- Single use is just that, one visitor type, therefore the design and managed use are the same
- Multi use trails have multiple users, which means one designed use and multiple managed



SUCCESSFUL SHARED-USE SYSTEMS

- Shared use systems with pockets of single use are very effective for managing multiple visitor experiences
- Single use zones are ideal for creating gravity/descending experiences for mountain bikers (when speeds are highest)
- Shared use systems with multiple designed use trails will naturally separate visitors
- Optimized trailheads (horse tie ups, MTB descent end, bike wash, trailer parking, etc.) will help visitors pick the right point of entry
- Sharing key corridors for connectivity helps create larger loops for everyone
- The best way to manage speed through grade, mellower trails have less potential to create kinetic energy

SUCCESSFUL SHARED-USE SYSTEMS

- Use directionality to reduce conflict, visitors pass each other less when all traveling in the same direction
- Different visitors, different directions; for instance if walkers know riders are always approaching them and never coming from behind it can help reduce conflicts
- Sightlines are vital on shared use trails, especially with high speed differentials (walker vs descending rider)
- Dispersion is one of the best tactics for reducing crowding
- Dispersion can include more trail mileage, or different management (single use, directionality)

SUCCESSFUL SHARED-USE SYSTEMS

Almost all visitor conflict is due to failures in planning, design, and construction. You can mitigate a bad situation though encouraging good behavior, but it will still be conflict hot spot.

Strive to manage visitor actions through design, not signage.



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HOW DO VISITOR, COMMUNITY, AND LAND MANAGER OBJECTIVES OVERLAP?

4 MT. HELENA RIDGE TRHP

4 PARK CITY TRHD

A successful trail plan will meet multiple objectives and achieve a variety of social and land management goals.

Look for complementary solutions and take a holistic planning approach to ensure a successful design phase and implementation.



WANTS VS. NEEDS



INTO THE FIELD



FINDING DATA



- SCIENCE
Topics, centers, missions
- PRODUCTS
Maps, data, publications
- NEWS
Releases, Tm a reporter
- CONNECT
Contact, chat, social media
- ABOUT
Organization, jobs, budget

National Geospatial Program



TNM Corps is a crowd sourcing mapping project with volunteers

[Learn More!](#)

IPaC Information for Planning and Consultation

HOME

COMPONENTS OF NGP

The National Map

The National Map

As one of the cornerstones of the U.S. Geological Survey, the National Map is a collaborative effort among the USGS and other Federal agencies to provide information for the Nation. It has many uses ranging from

1 Find location

Search or zoom to find the project location

Or skip this step and:

- UPLOAD SHAPE FILE
- SELECT BY STATE OR COUNTY

2 Define area



- Home
- About Soils
- Help
- Contact Us

You are here: Web Soil Survey Home

Search

Go

All NRCS Sites

Browse by Subject

- Soils Home
- National Cooperative Soil Survey (NCSS)
- Archived Soil Surveys
- Status Maps
- Official Soil Series Descriptions (OSD)

The simple yet powerful way to access and use soil data.



Welcome to Web Soil Survey (WSS)



Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. WSS is the only soil survey

I Want To...

- Start Web Soil Survey (WSS)
- Know Web Soil Survey Requirements
- Know Web Soil Survey operation hours
- Find what areas of the U.S. have soil data
- Find information by topic
- Know how to hyperlink from other documents to Web Soil Survey
- Know the SSURGO data structure
- Use Web Soil Survey on a mobile device

Announcements/Events

- Web Soil Survey 3.3.2 has been released! View new features and fixes.
- Web Soil Survey Release History
- Sign up for a mail



FINDING DATA

- Many states, counties, and municipalities have GIS departments with a lot of data
- [The National Map](#) (all kinds of data, including elevation)
- [National Wetland Inventory](#)
- [USFWS IPaC](#) (endangered/threatened species)
- [Web Soil Survey](#)



WHAT IS THE SETTING?

URBAN

RURAL

FRONT
COUNTRY

MIDDLE
COUNTRY

BACKCOUNTRY

PRIMITIVE



The settings above are tied to US BLM terms, they represent a general continuum of recreation setting.

Are you in a city park?

Wilderness area? Somewhere between?



WHAT DOES THE LANDSCAPE PROVIDE?

How big an area?

How close to where people live? (access via existing roads and trails)

How much available elevation?

What is the terrain style? (geology, slopes, vegetation, hydrology)

What else happens on that landscape? (conservation, recreation, timber, resource extraction, power generation)

- Ultimately your plan can only be based upon reality.
- Whatever the specific landscape you are addressing is, it can only provide so much opportunity.
- You can't have a 5-mile descent with only 100-feet of elevation difference, you can't have a scenic waterfall without a stream, you can't fit 100 miles in 10 acres, etc.

COLLECTING DATA

- Using GPS collectors during fieldwork will allow you to capture real data with real spatial location
- Popular systems include; Avenza Maps (smart phone app), Gaia (smart phone app), Garmin (GPS device), ??
- You don't need to catalog everything little thing in the woods!
- Focus on the important control points, lines, and polygons
- For planning purposes, major control points are the most valuable and useful, these are very important data points that will have large effects on trails and need to be accounted for during planning
- Some control points can be identified before the field on maps, but should always be verified



MAJOR CONTROL POINTS

CONTROL POINTS

- Control points are specific locations that will end up controlling, or limiting, the trail plan/design.
- Positive control points can act as a “connect the dots exercise” to a reasonable extent.
- Negative control points are avoided
- Control points can be lines or polygons, you may want to steer clear of railroad tracks since they are loud and obtrusive to the experience or you may have to avoid a large wetland on your parcel
- Control points may be universal between users (trailhead, rare habitat, etc.) or they may be unique to visitor type (cliff face for climbers, fishing spot for fisherman, waterfall for hikers, etc.)
- Different points may be positive or negative depending on situation; a historical site may be used as interpretive education or avoided to protect it



CONTROL POINTS

OPPORTUNITIES

- + APPROPRIATE TERRAIN
- + UNIQUE LANDSCAPES
- + EXISTING INFRASTRUCTURE
- + ACCESS (CONSTRUCTION AND USE)

CONSTRAINTS

- SENSITIVE HABITATS
- T&E SPECIES
- STREAMS & WETLANDS
- NARROW CORRIDORS
- ADJACENT PRIVATE PROPERTY
- DEVELOPMENT
- UNSTABLE SLOPES
- PAST HUMAN ACTIVITY



CONTROL POINTS

POSITIVE

- + TRAILHEAD/ACCESS
- + SCENIC VIEWS
- + WATER FEATURES
- + RARE HABITAT
- + HISTORICAL SITE

NEGATIVE

- OTHER TRAILS
- UNAPPEALING VIEWS
- NEGATIVE SOUNDS
- RARE HABITAT
- HISTORICAL SITE

CONTROL POINTS

POSITIVE

- + FISHING SPOT
- + SWIMMING HOLE
- + BURNED AREA
- + ROCKY AREA

NEGATIVE

- UTILITY CORRIDORS
- FIRE MANAGED AREA
- RECENT TIMBER HARVEST
- ROCKY AREA

POSITIVE CONTROL POINT



POSITIVE CONTROL POINTS



POSITIVE CONTROL POINTS



NEGATIVE CONTROL POINTS



NEGATIVE CONTROL POINTS



POSITIVE OR NEGATIVE?

High water mark

Property boundary



POSITIVE OR NEGATIVE?

Scenic view

Cascade



POSITIVE OR NEGATIVE?

Old quarry wall

Wetland

Incised stream

