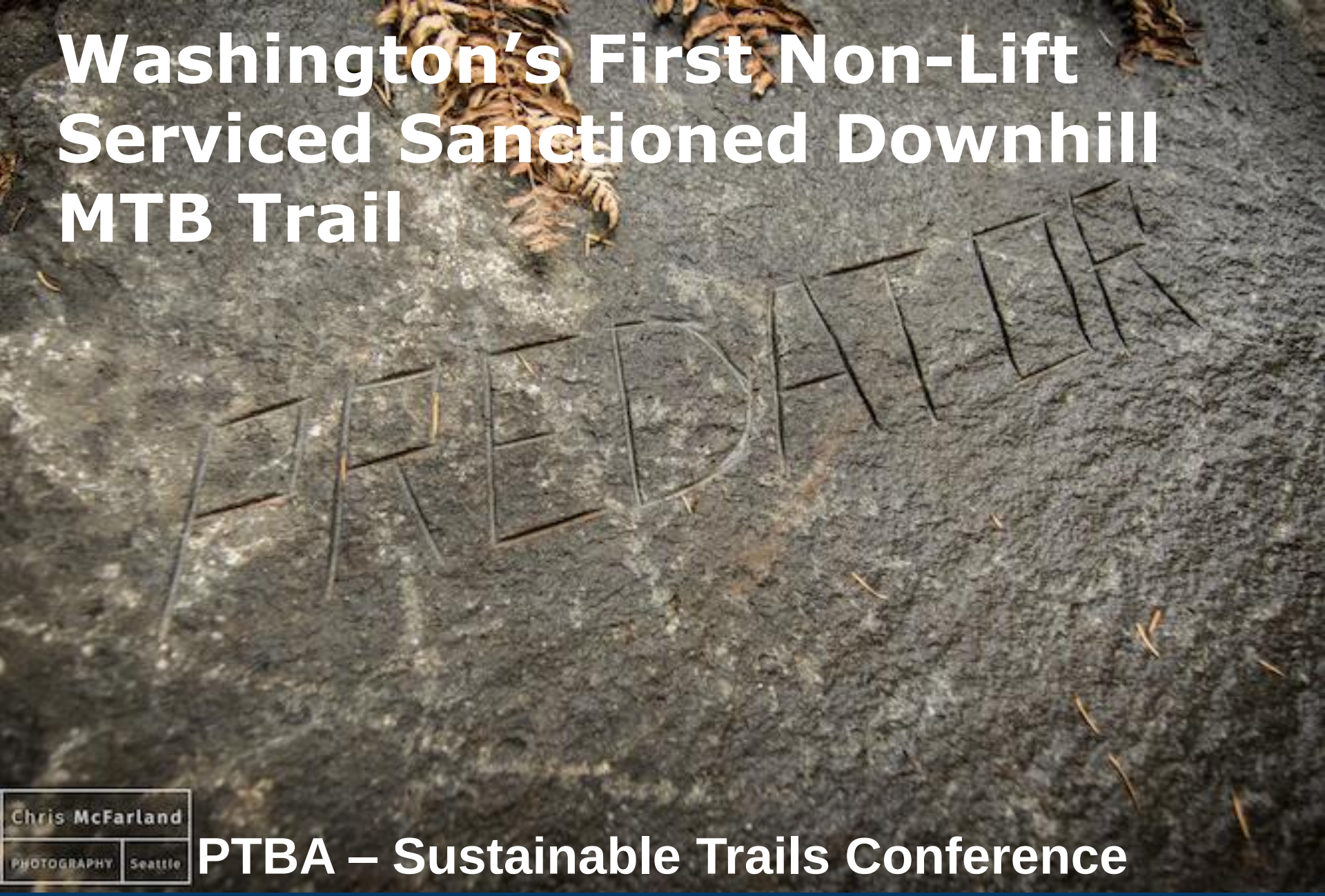
PTBA – Sustainable Trails Conference
Bend, OR

Washington's First Non-Lift Serviced Sanctioned Downhill MTB Trail



PTBA – Sustainable Trails Conference

Introductions

- **Sam Jarrett,** Snoqualmie Recreation & Natural Areas District Manager & Statewide Trails Specialist.
  WA Department of Natural Resources

- **Bryan Connolly**, Project Manager & Lead Builder
  Evergreen Mountain Bike Alliance

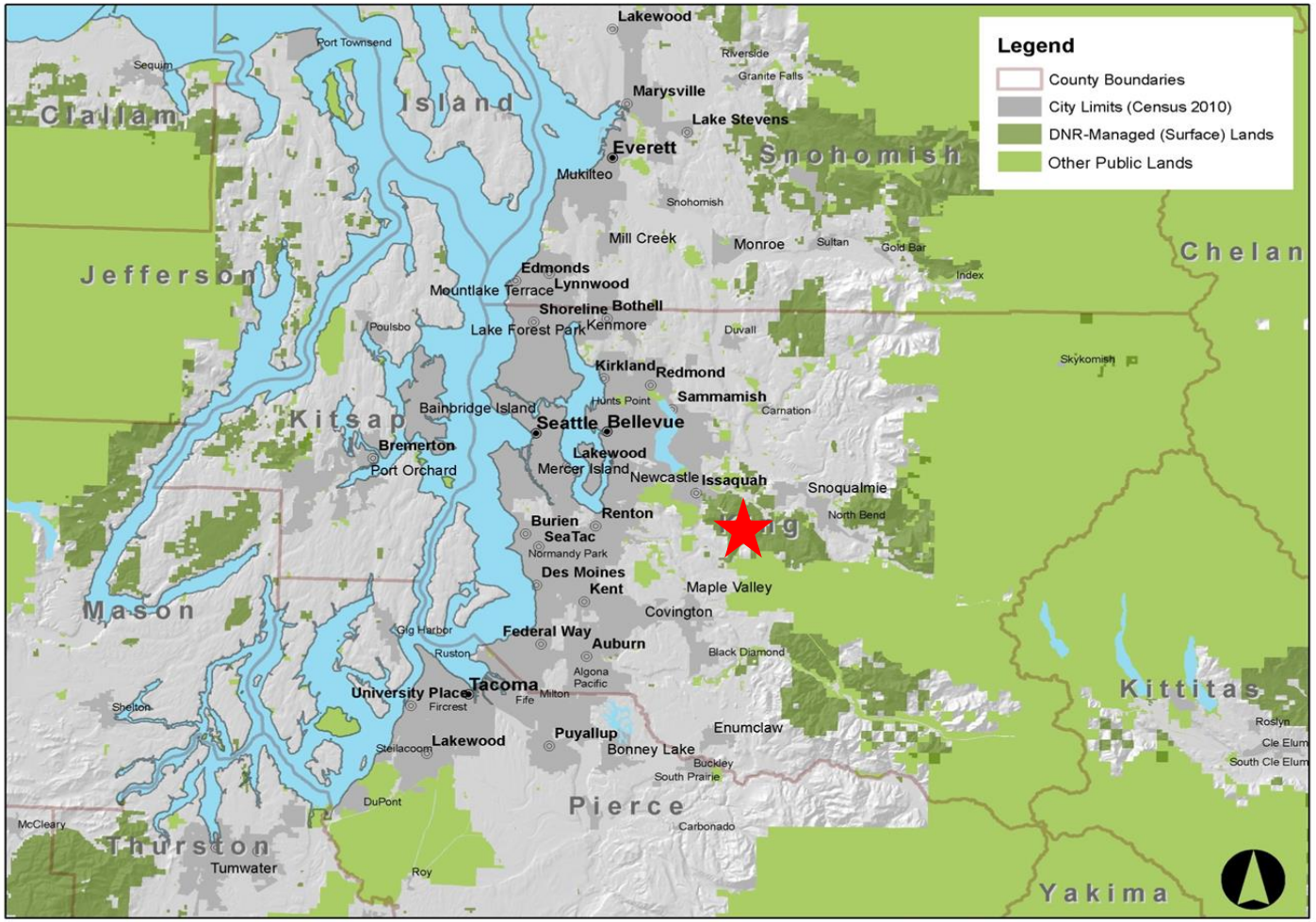
Evergreen Mountain Bike Alliance

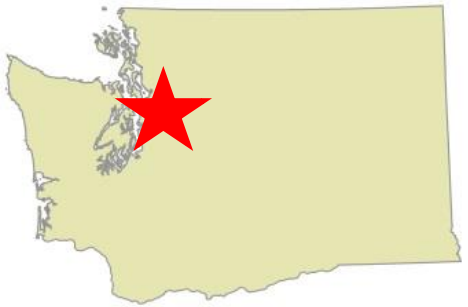
- The Nation's largest state-wide member-based mountain bike organization
- More than 3,200 members and over 20,000 social media followers
- Focus on trail building, education, advocacy & volunteerism
- Committed to creating and protecting sustainable mountain biking opportunities in Washington State
- *7 Regional Chapters*

WA State Dept. of Natural Resources

- Manages recreation on 2.2 million acres of state trust lands
- Generates Revenue: Local Community Services, public school construction, & universities
- 160 recreation sites & 1,100 trail miles

Tiger Mountain State Forest (east)

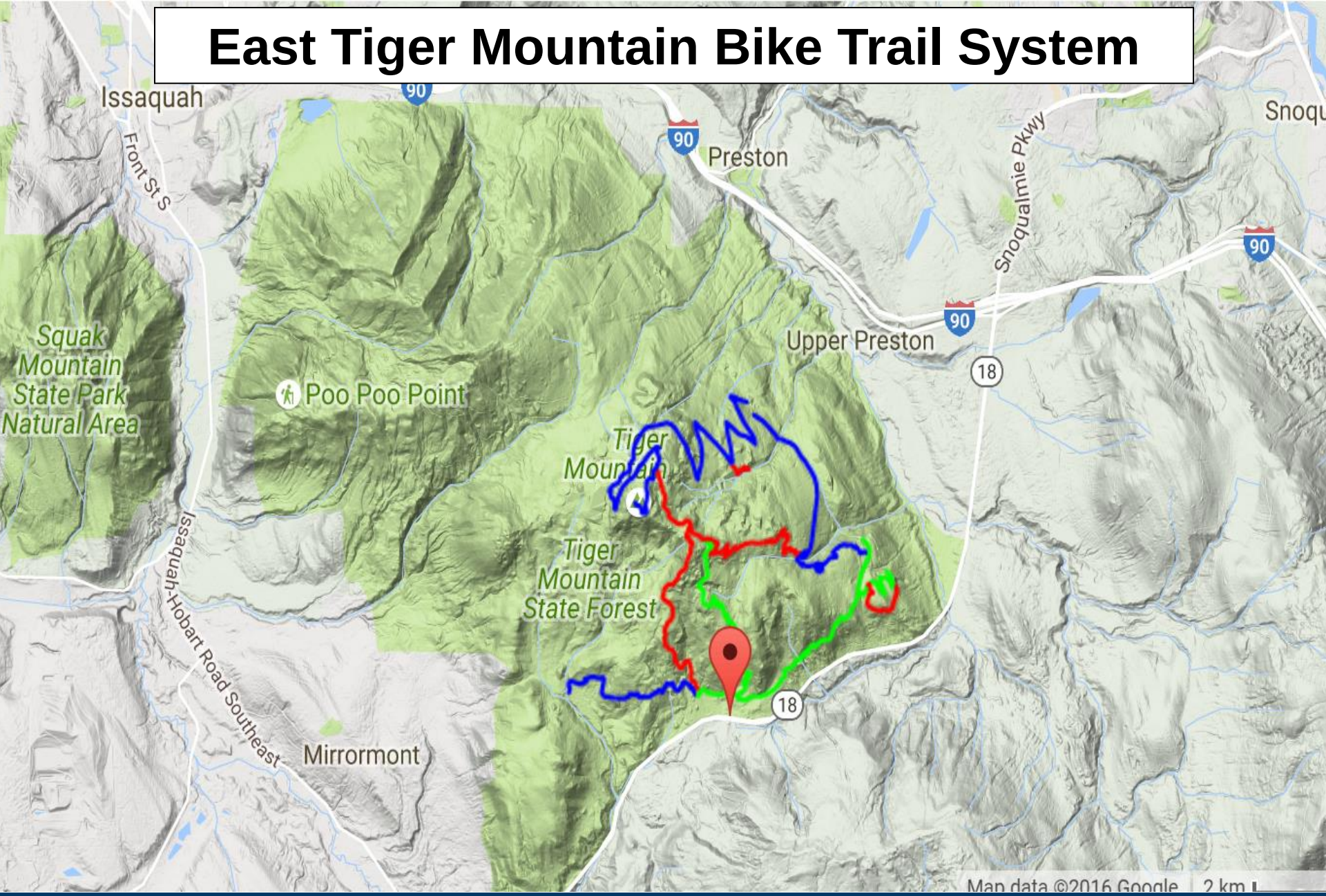




Regional Location Map

0 5 10 20 30 Miles

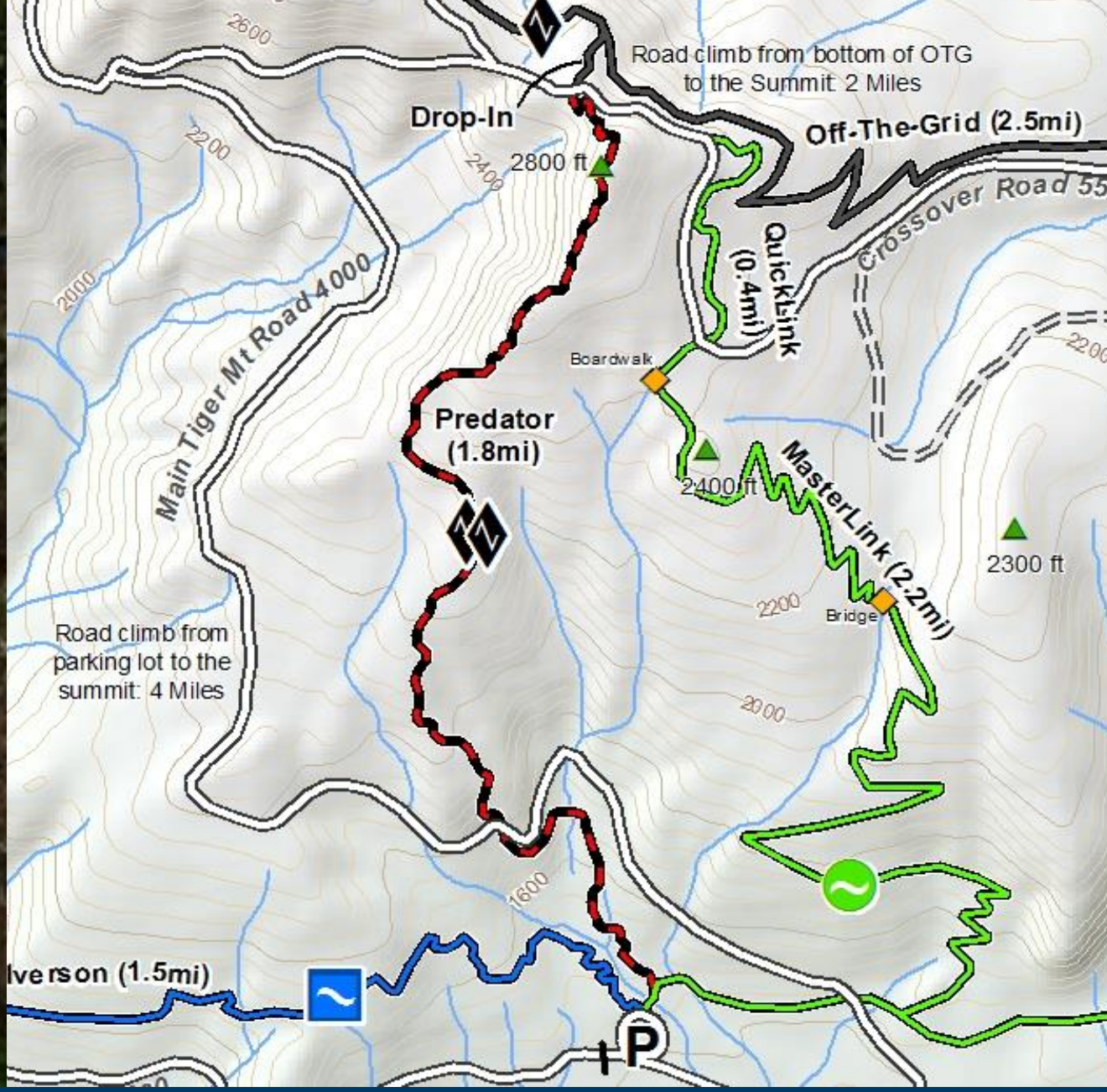
East Tiger Mountain Bike Trail System



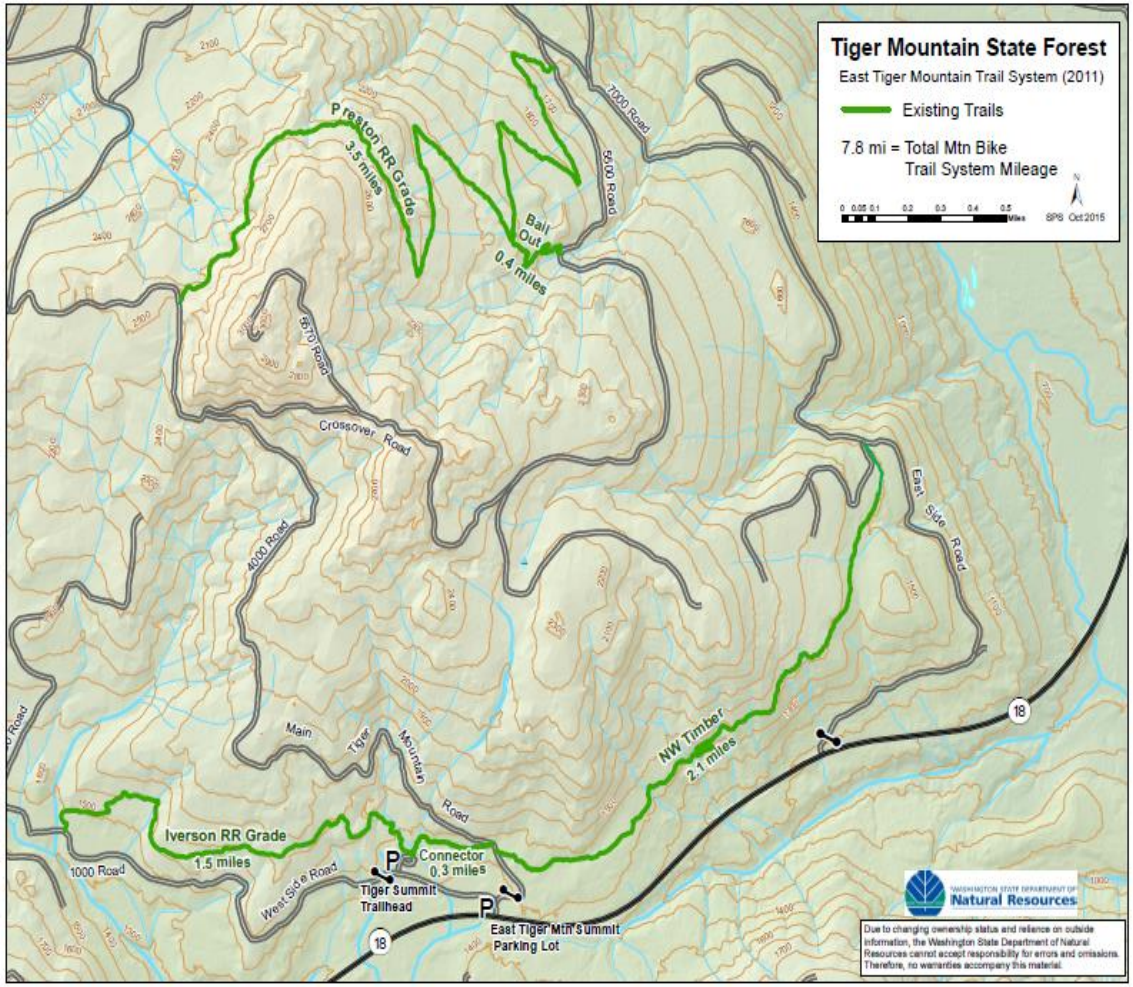
E. Tiger Mountain State Forest
Trails Open to Mountain Bikes

Preston (3.5mi)
Bail Out
E Tiger Summit (1.5mi)
3060 ft
Road climb from the end of Preston to the top of Fully Rigid: <1.5 Miles
Silent Swamp (1.3mi)
East Side Road 7000
Raging River
Road climb from bottom of OTG to the Summit: 2 Miles
Drop-In
2800 ft
Off-The-Grid (2.5mi)
Crossover Road 5500
Fully Rigid (0.5mi)
Joyride (1mi)
7200 RD
Future extensions and connection to the Raging River
Quicklink (0.4mi)
Boardwalk
Main Tiger Mt Road 4000
Predator (1.8mi)
2400 ft
MasterLink (2.2mi)
Bridge
2300 ft
Easy Tiger
The Legend
Road climb from parking lot to the summit: 4 Miles
East Side Road 7000
NW Timber (2mi)
East Side Rd Gate
18
Deep Creek
Iverson (1.5mi)
West Side Road 1000
Tiger Summit TH (1400 ft)
East Tiger Mt Summit Parking Lot
0 0.25 0.5 Miles
1:20,000

Predator Trail



A look back…

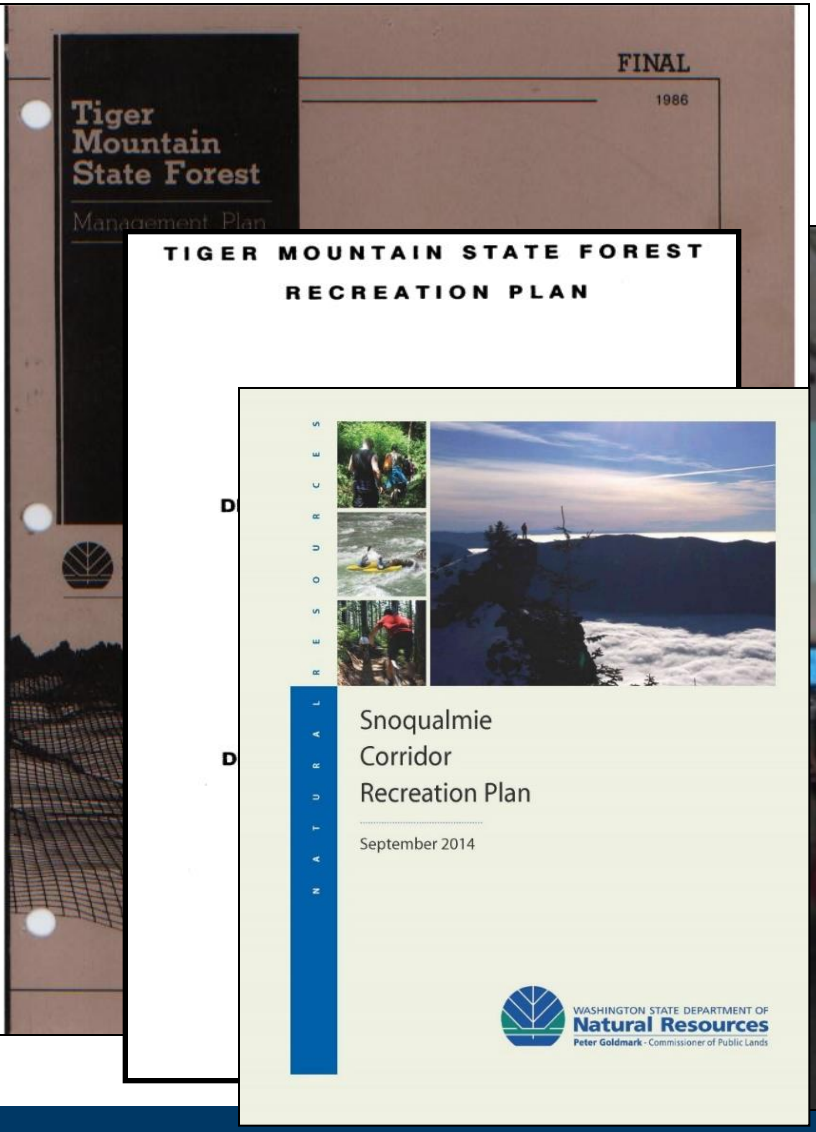


….2011:

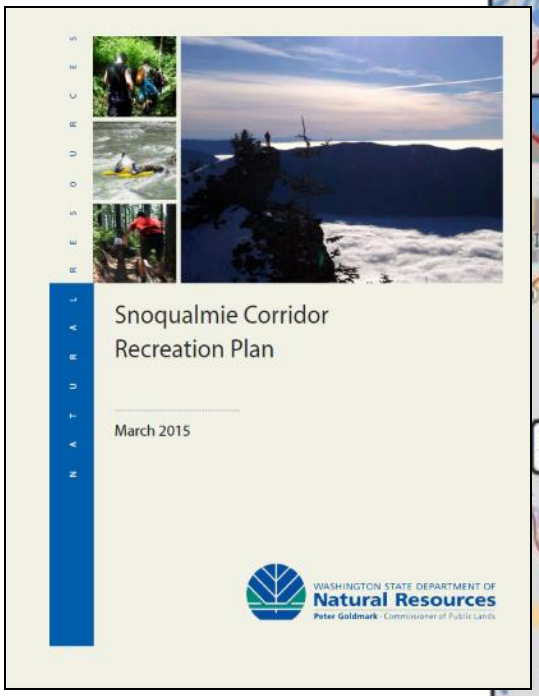
TRAIL SYSTEM STATS:

- 7.8 Total Trail Miles
- No new trails for mountain bikes for over 20 years!

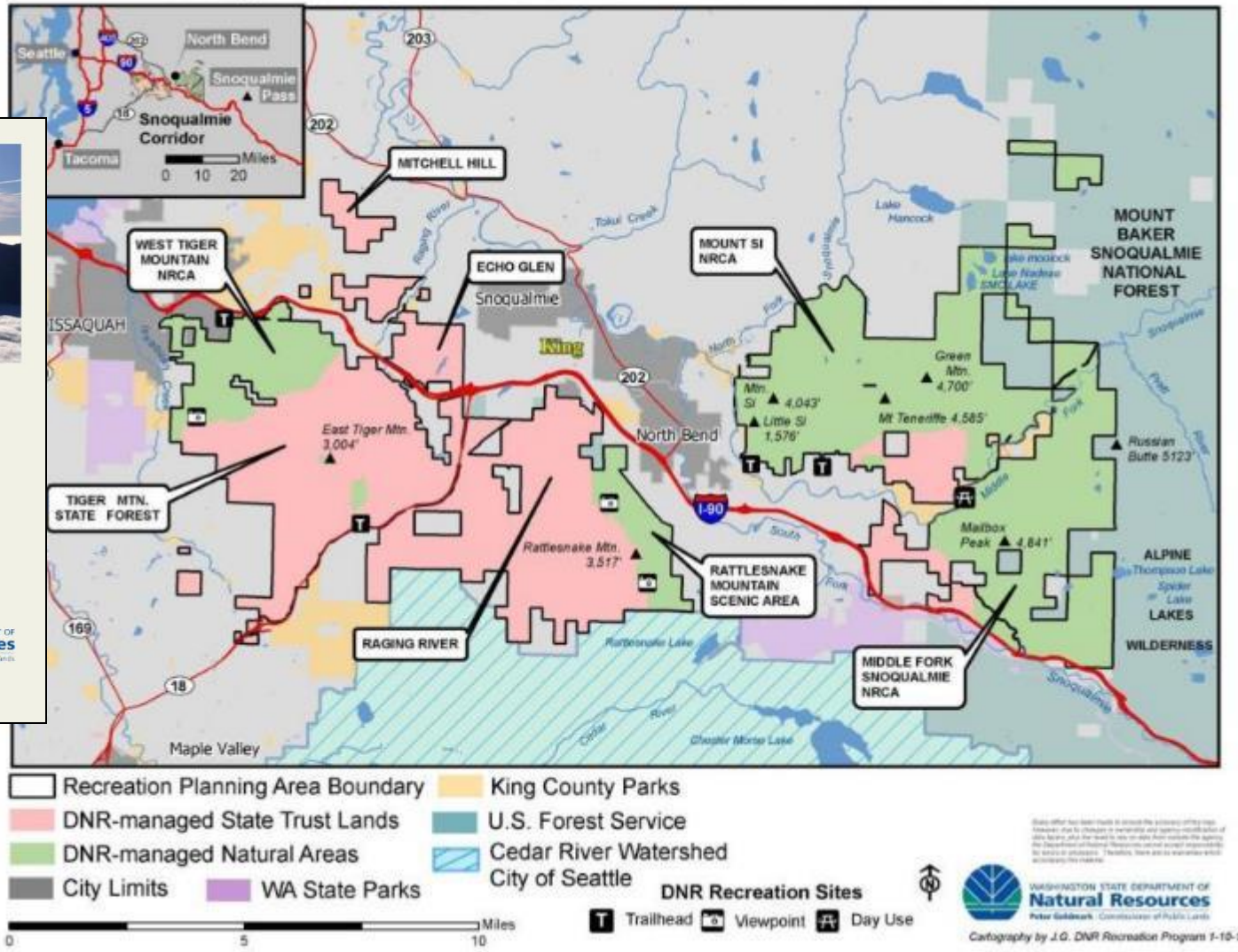
History of Planning with Public Input



- Snoqualmie Unit Advisory Committee
- Snoqualmie Corridor Recreation Planning Committee
- Snoqualmie Corridor Planning Survey

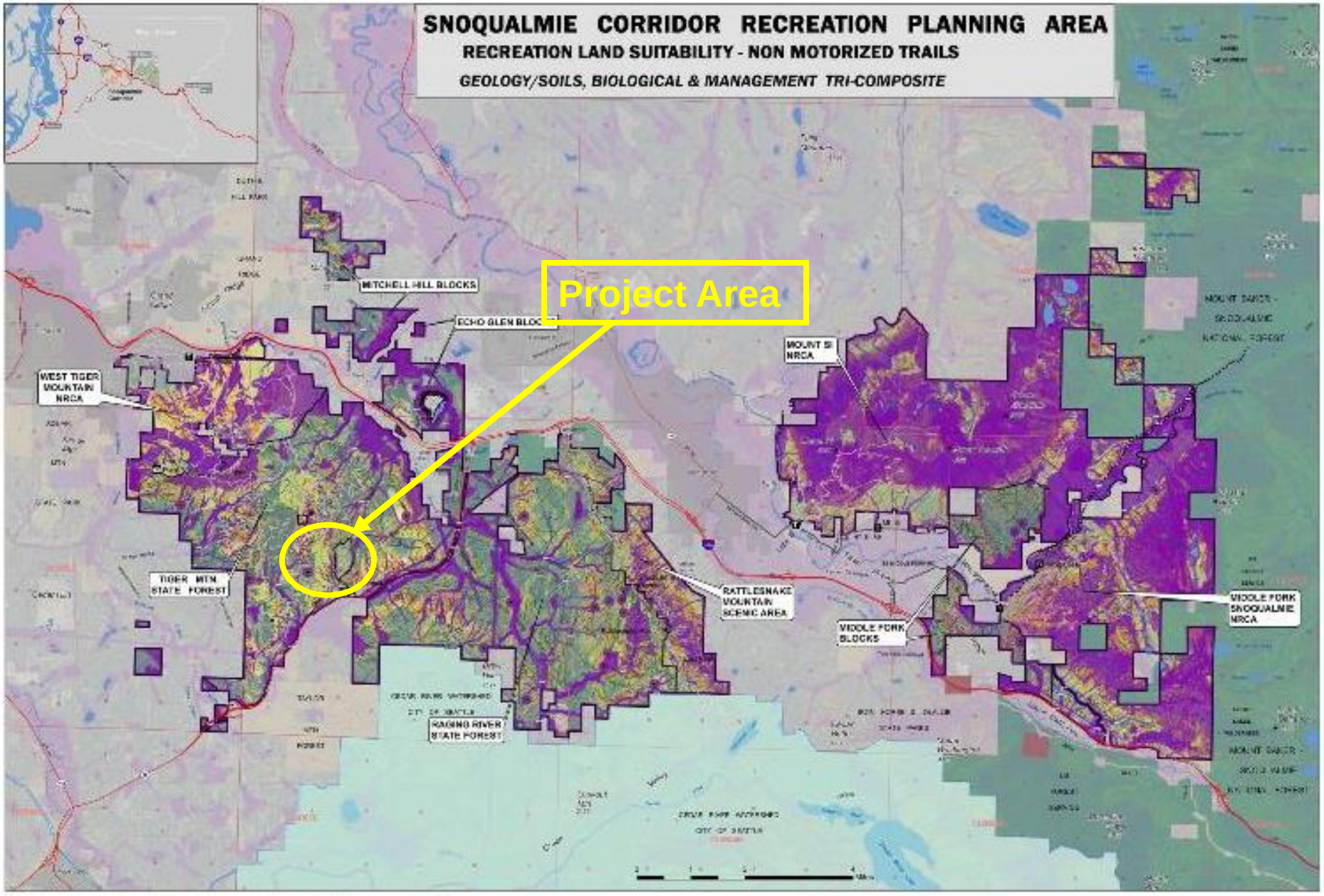


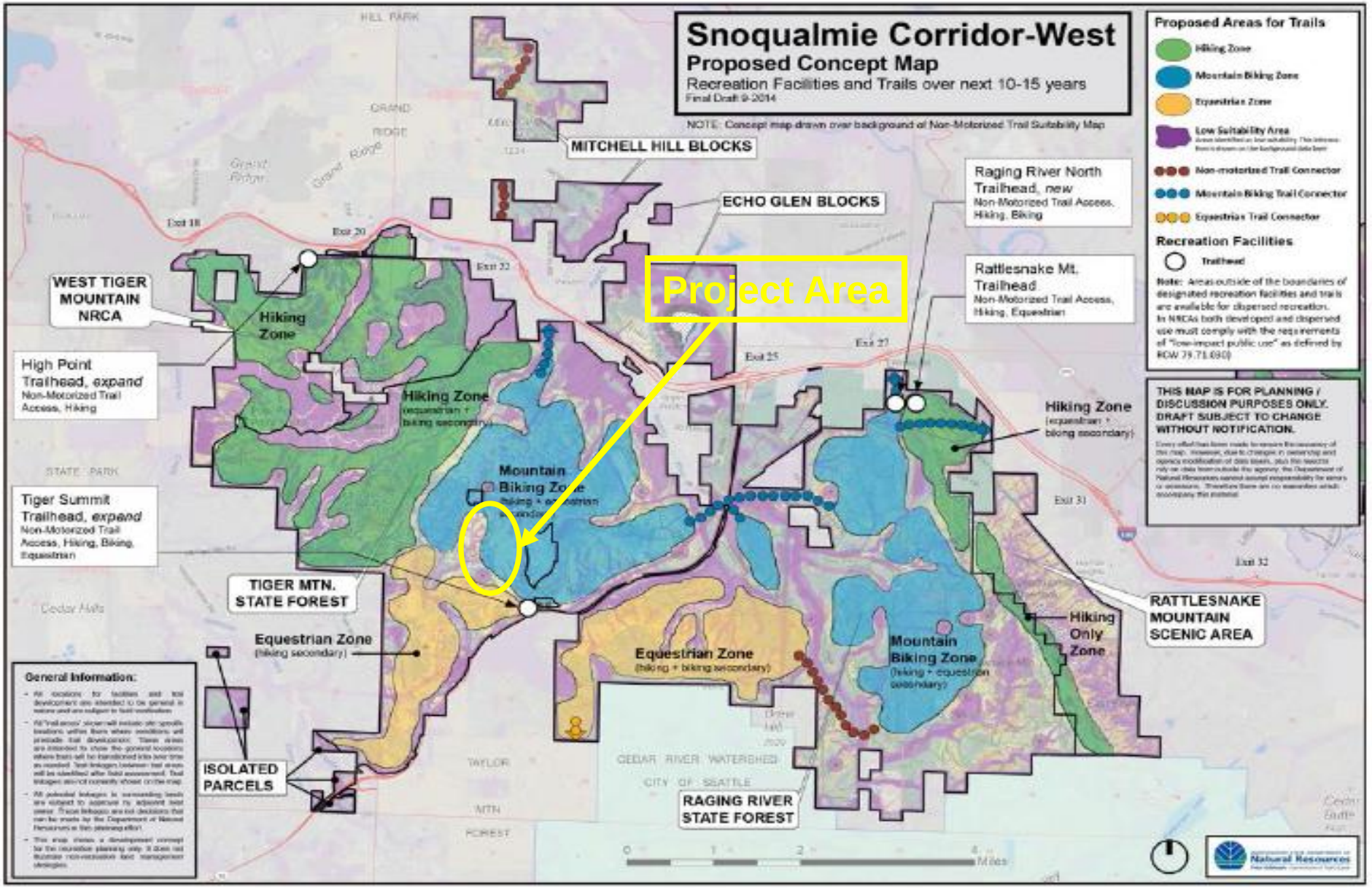
SNOQUALMIE CORRIDOR RECREATION PLANNING AREA



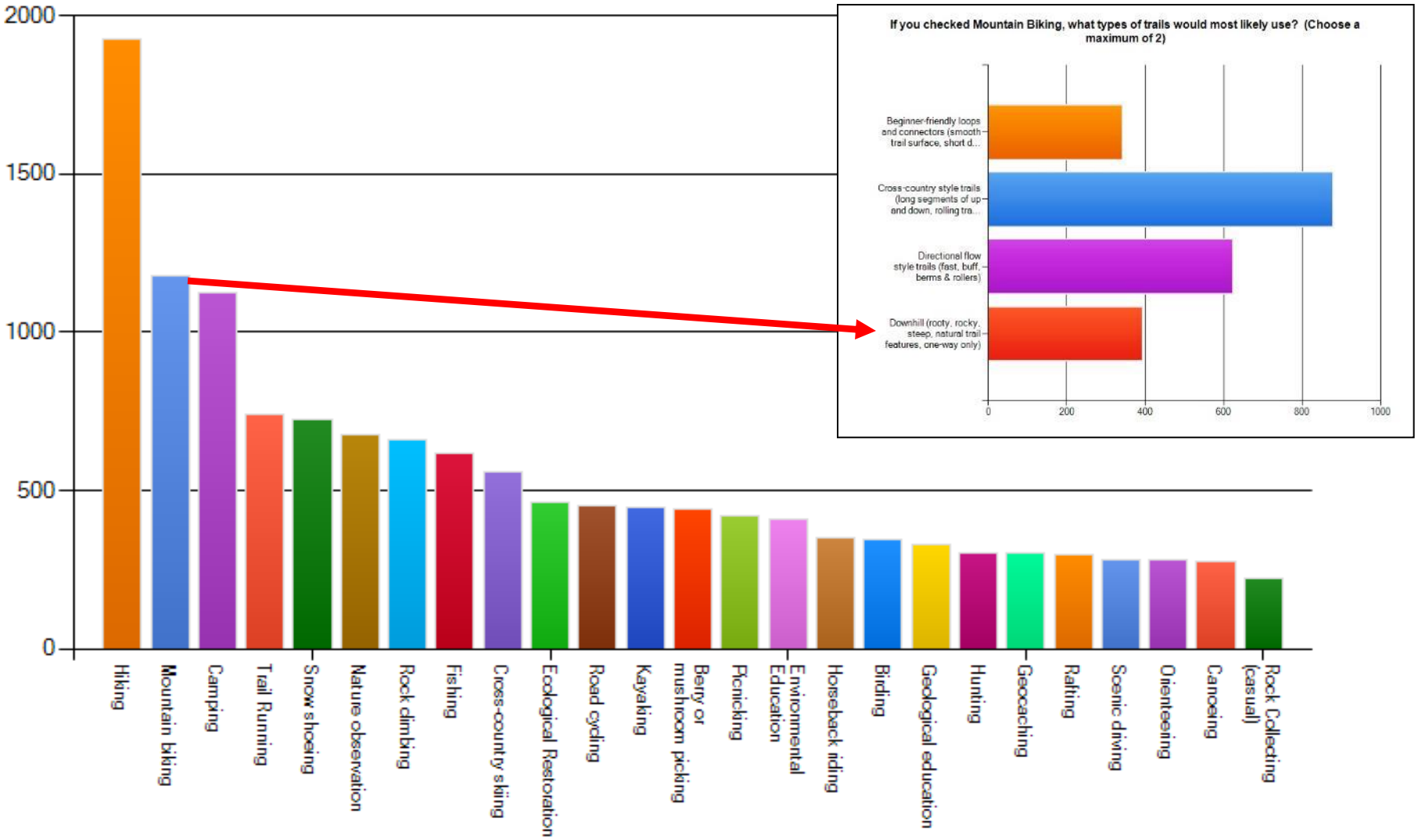
Snoqualmie Corridor Recreation Plan
Recreation Land Suitability Assessment Criteria

Biological Criteria	Geologic / Soils Criteria	Management Criteria
Wetlands and wetland buffers	Soils with high erosion potential	Communication sites
Fish habitat	Poorly drained soils	Rock sources
Riparian areas and riparian buffers	Deep-seated landslides	Utility easements
Talus, cliffs, caves, and balds	Areas with higher potential for landslides	Lands adjacent to other property
Suitable Marbled Murrelet habitat	Slope steepness	Proximity to correctional facilities
Northern Spotted Owl nest patches	Areas with higher potential for soil slumping	Water sources and watersheds
Elk, Columbian Black-tailed Deer (shown for reference only)	Alluvial fans & flats	Cultural/archaeological resources
Mountain Goat habitat	High elevation soils > 3400 feet	
High quality and rare plant communities	100 year flood plains	
Sensitive, threatened, or endangered species		

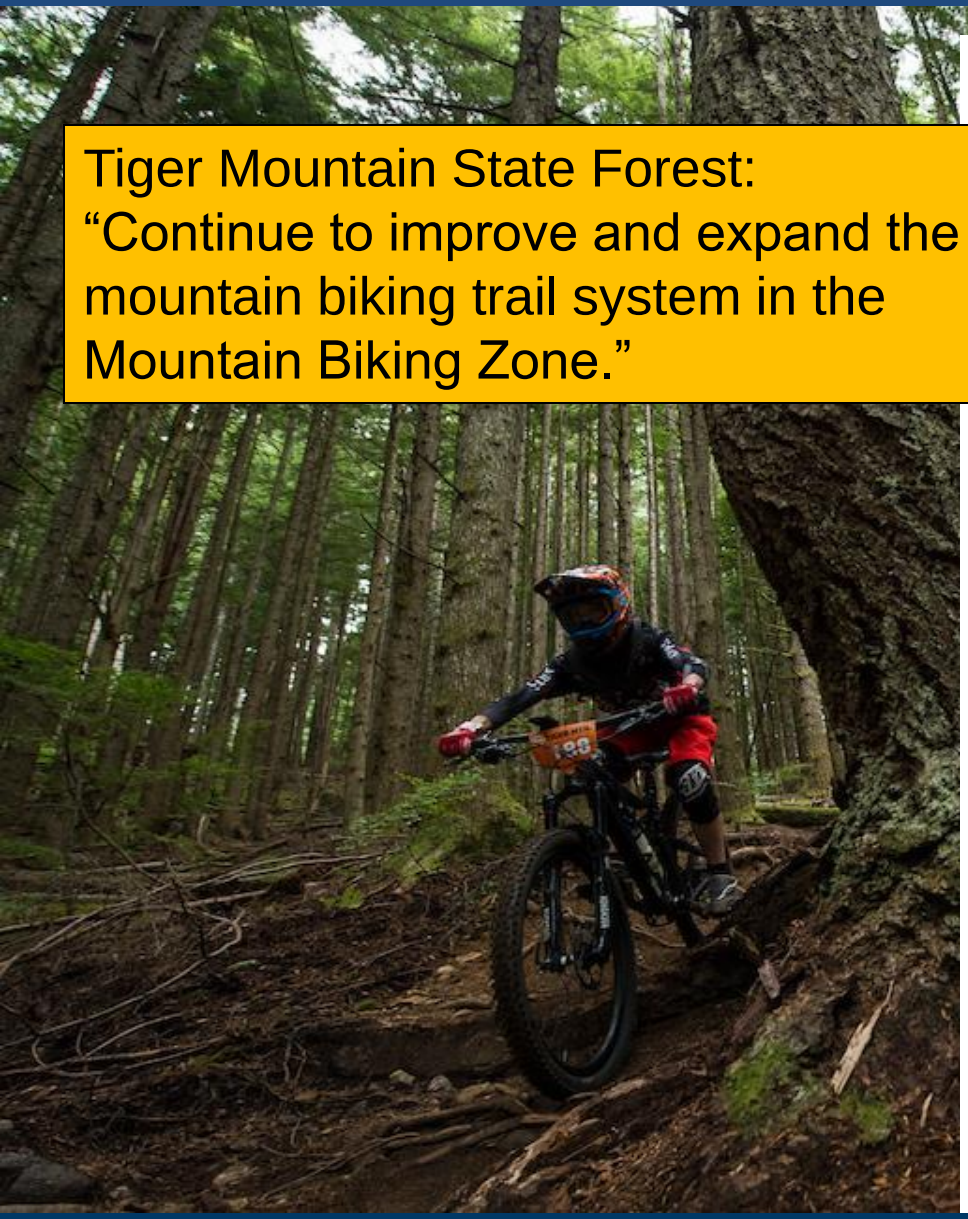

SNOQUALMIE CORRIDOR RECREATION PLANNING AREA
RECREATION LAND SUITABILITY - NON MOTORIZED TRAILS
GEOLOGY/SOILS, BIOLOGICAL & MANAGEMENT TRI-COMPOSITE
Project Area
MITCHELL HILL BLOCKS
ECHO GLEN BLOCK
WEST TIGER MOUNTAIN NRCA
TIGER MTN STATE FOREST
RAGING RIVER STATE FOREST
RATTLESNAKE MOUNTAIN SCENIC AREA
MOUNT SI NRCA
MIDDLE FORK BLOCKS
MIDDLE FORK SNOQUALMIE NRCA


Snoqualmie Corridor-West
Proposed Concept Map
Recreation Facilities and Trails over next 10-15 years
Final Draft 9-2014
NOTE: Concept map drawn over background of Non-Motorized Trail Suitability Map
Proposed Areas for Trails
Hiking Zone
Mountain Biking Zone
Equestrian Zone
Low Suitability Area
Non-motorized Trail Connector
Mountain Biking Trail Connector
Equestrian Trail Connector
Recreation Facilities
Trailhead
Note: Areas outside of the boundaries of designated recreation facilities and trails are available for dispersed recreation. In NRCAs both developed and dispersed use must comply with the requirements of "low-impact public use" as defined by RCW 79.70.030
THIS MAP IS FOR PLANNING / DISCUSSION PURPOSES ONLY. DRAFT SUBJECT TO CHANGE WITHOUT NOTIFICATION.
MITCHELL HILL BLOCKS
ECHO GLEN BLOCKS
Raging River North Trailhead, new
Non-Motorized Trail Access, Hiking, Biking
Rattlesnake Mt. Trailhead
Non-Motorized Trail Access, Hiking, Equestrian
Project Area
WEST TIGER MOUNTAIN NRCA
Hiking Zone
High Point Trailhead, expand
Non-Motorized Trail Access, Hiking
Hiking Zone (equestrian + biking secondary)
Mountain Biking Zone
Tiger Summit Trailhead, expand
Non-Motorized Trail Access, Hiking, Biking, Equestrian
TIGER MTN. STATE FOREST
Equestrian Zone (hiking secondary)
Equestrian Zone (hiking + biking secondary)
Mountain Biking Zone (hiking + equestrian secondary)
Hiking Only Zone
RATTLESNAKE MOUNTAIN SCENIC AREA
ISOLATED PARCELS
RAGING RIVER STATE FOREST
CEDAR RIVER WATERSHED
CITY OF SEATTLE
General Information:
Exit 18
Exit 20
Exit 22
Exit 25
Exit 27
Exit 31
Exit 32
Miles

Which recreational opportunities would you like to see provided on DNR-managed lands in the Snoqualmie Corridor? Please indicate your top five choices:



Recreation Plan - Phase 1 Implementation Priority



Tiger Mountain State Forest:
"Continue to improve and expand the mountain biking trail system in the Mountain Biking Zone."

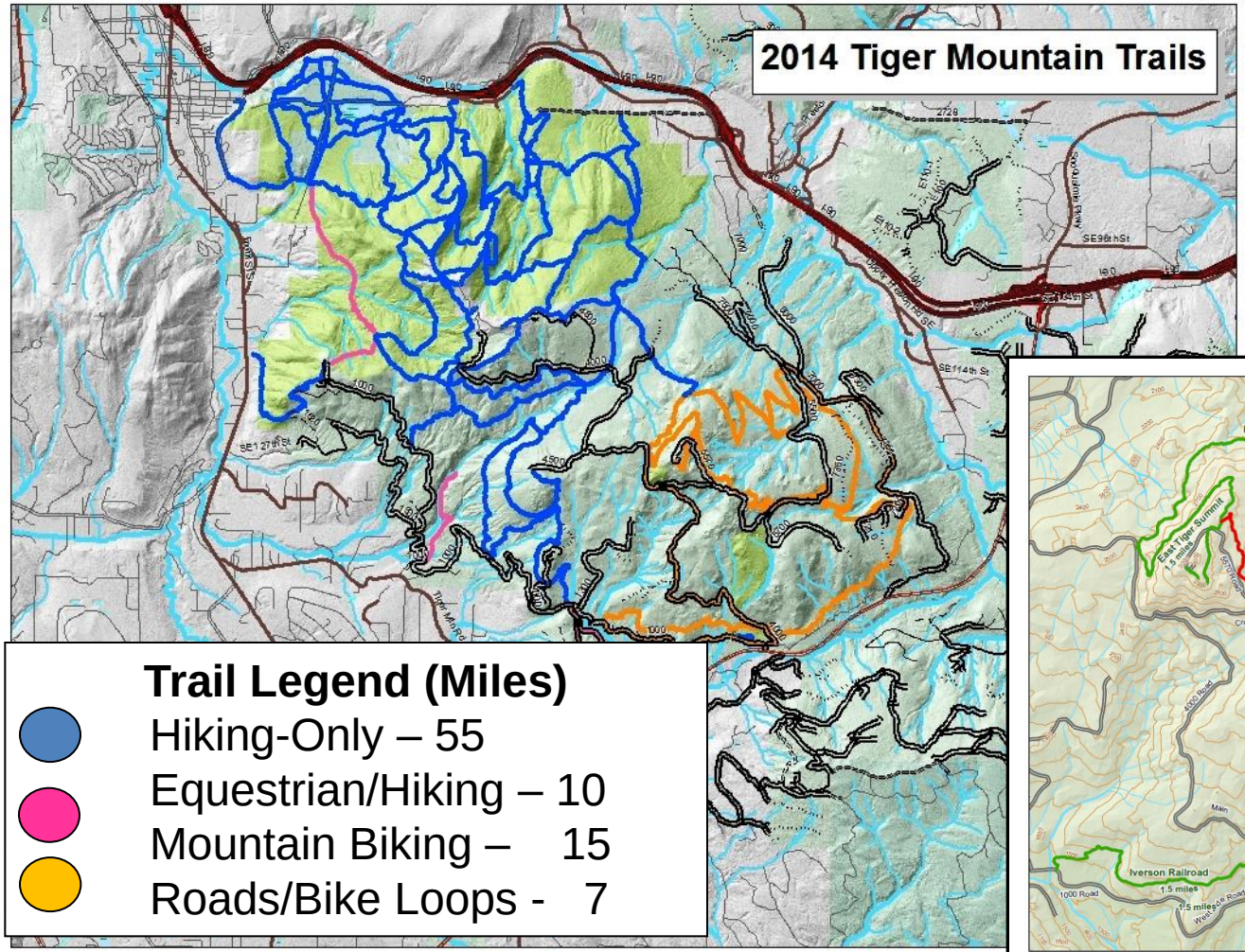
Implementation

Implementation priorities and phasing were established based on input from the Recreation Planning Committee, agency resource protection priorities, and logical sequencing of related projects. Development and construction of the implementation priorities and phases is dependent on the availability and security of funding for site-specific planning and design, construction, and maintenance and operations. All trail projects will include an evaluation of existing trails. Unsustainable trail segments will be removed and/or relocated to new locations

Table 4. Implementation Priorities and Phases

PHASE	PLANNING UNIT	PROJECT
Phase I	Tiger Mountain State Forest	MOUNTAIN BIKE TRAILS — Continue to improve and expand the mountain biking trail system in the Mountain Biking Zone. TRAIL LINKS — Improve trail connections from Tiger Summit Trailhead to hiking, biking and horseback riding opportunities.
	Raging River State Forest	RAGING RIVER NORTH TRAILHEAD — Develop a new trailhead serving the Mountain Biking Zone in the north end of the forest. MOUNTAIN BIKE TRAILS — Develop new mountain biking trails in the Mountain Biking Zone.
	Middle Fork Snoqualmie River	MIDDLE FORK RIVER SITES — Evaluate, design, and develop river access and day-use opportunities; pursue partnerships to develop a consistent management strategy in the valley.
	Mount Si NRCA	MOUNT TENERIFFE HIKING TRAIL — Develop a new hiking trail up to summit area using existing roadbed where practical.
	Middle Fork Snoqualmie NRCA	GRANITE CREEK TRAILHEAD AND CONNECTOR TRAIL — Work with King County to develop a new trailhead and construct a new hiking trail connection to the Granite Creek Trail. GRANITE CREEK HIKING TRAIL — Evaluate the Granite Creek Trail for improvements, required bridges, and further development where appropriate.

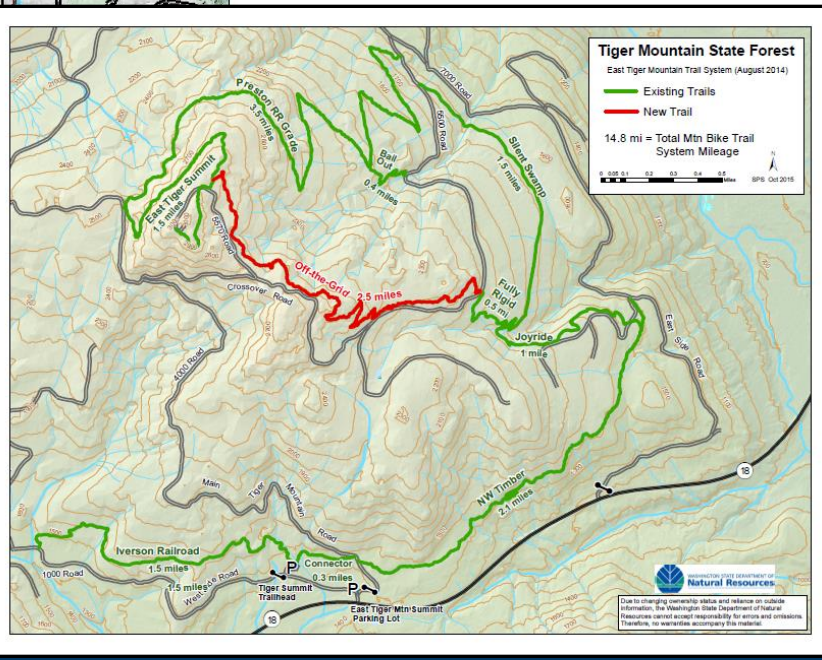
Trail System Status - Summer of 2014



Trail Legend (Miles)

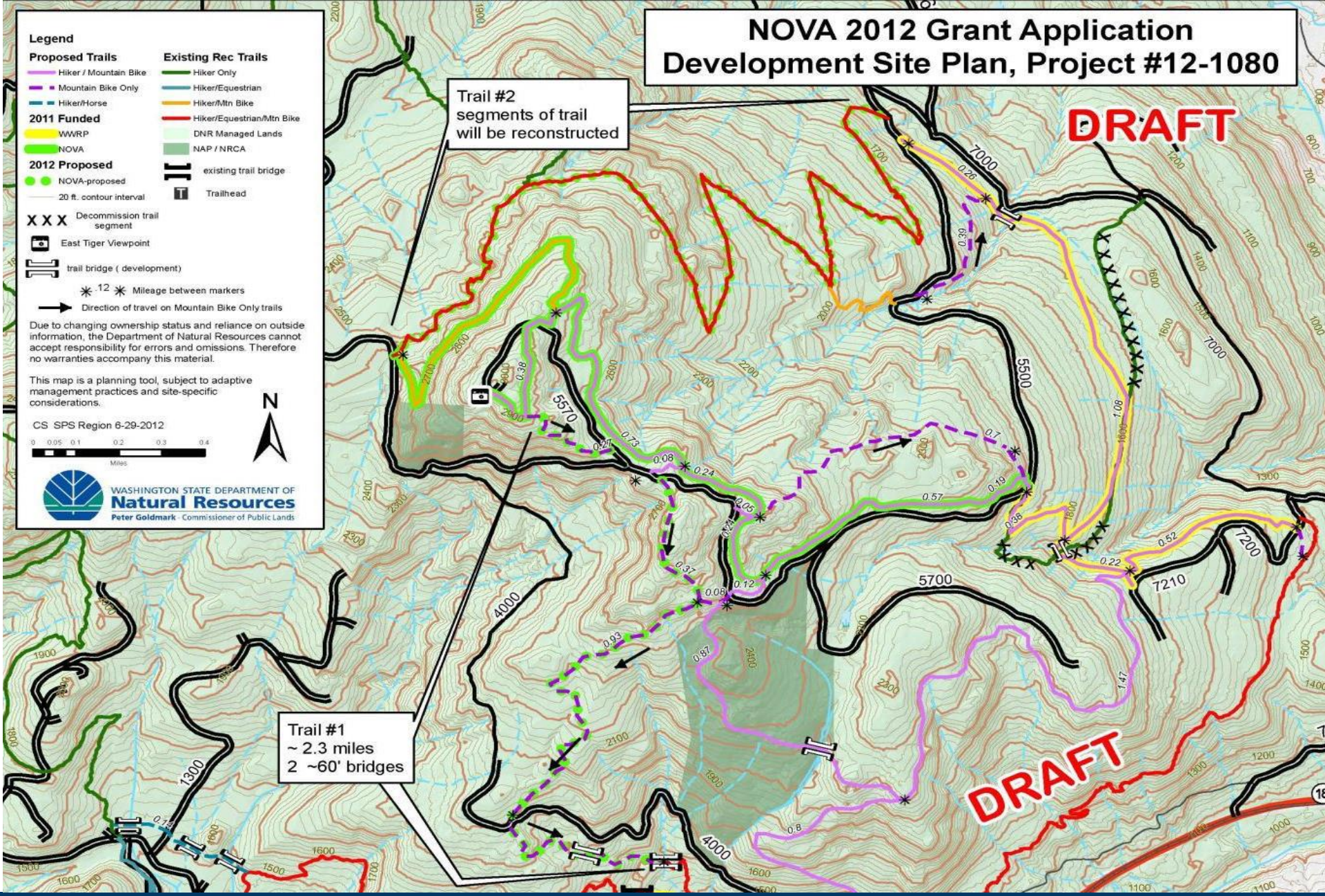
- Hiking-Only – 55
- Equestrian/Hiking – 10
- Mountain Biking – 15
- Roads/Bike Loops - 7

- Three Grant Awards - $665K
- Volunteer Labor - $197K



Downhill Trail Vision & Need

- Lack of Regional DH trails
- User group pressure to agencies & Evergreen
- Technology changes demand trail design changes
- Agency needs & keys to making DH trail a reality


NOVA 2012 Grant Application
Development Site Plan, Project #12-1080
DRAFT
Trail #2
segments of trail
will be reconstructed
Trail #1
~ 2.3 miles
2 ~60' bridges
DRAFT
Legend
Proposed Trails
Hiker / Mountain Bike
Mountain Bike Only
Hiker/Horse
2011 Funded
WWRP
NOVA
2012 Proposed
NOVA-proposed
20 ft. contour interval
Existing Rec Trails
Hiker Only
Hiker/Equestrian
Hiker/Mtn Bike
Hiker/Equestrian/Mtn Bike
DNR Managed Lands
NAP / NRCA
existing trail bridge
Trailhead
Decommission trail segment
East Tiger Viewpoint
trail bridge (development)
Mileage between markers
Direction of travel on Mountain Bike Only trails
Due to changing ownership status and reliance on outside information, the Department of Natural Resources cannot accept responsibility for errors and omissions. Therefore no warranties accompany this material.
This map is a planning tool, subject to adaptive management practices and site-specific considerations.
CS SPS Region 6-29-2012
Miles
WASHINGTON STATE DEPARTMENT OF
Natural Resources
Peter Goldmark · Commissioner of Public Lands
N
7000
5500
5570
5700
7210
7200
4000

Trail Concept & Design

- COTA standards
- DNR and USFS trail standards
- Trail ratings and signage
- Pro/semi-pro rider feedback on route
- Control Points..

Trail Concept & Landscape

. . . Rough trail alignment 20

& 100ft contours stream

layer construction access

Slope Analysis

0-5% Keep Out

5-10% Avoid

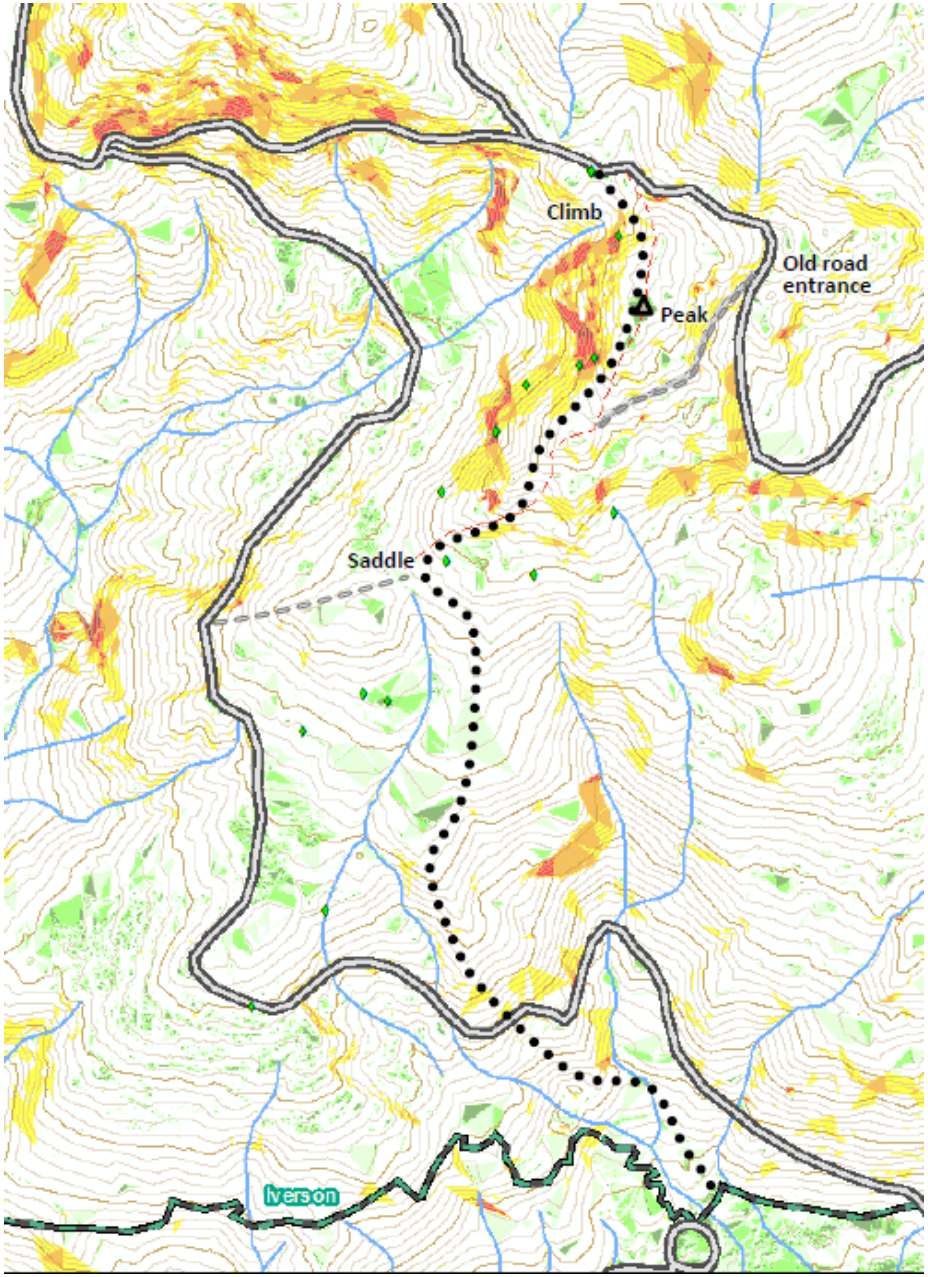
Look for 10-60%
Ideal: 30-50%

60-80% OK

80-100% Avoid

>100% Keep Out

Difficult for machine build

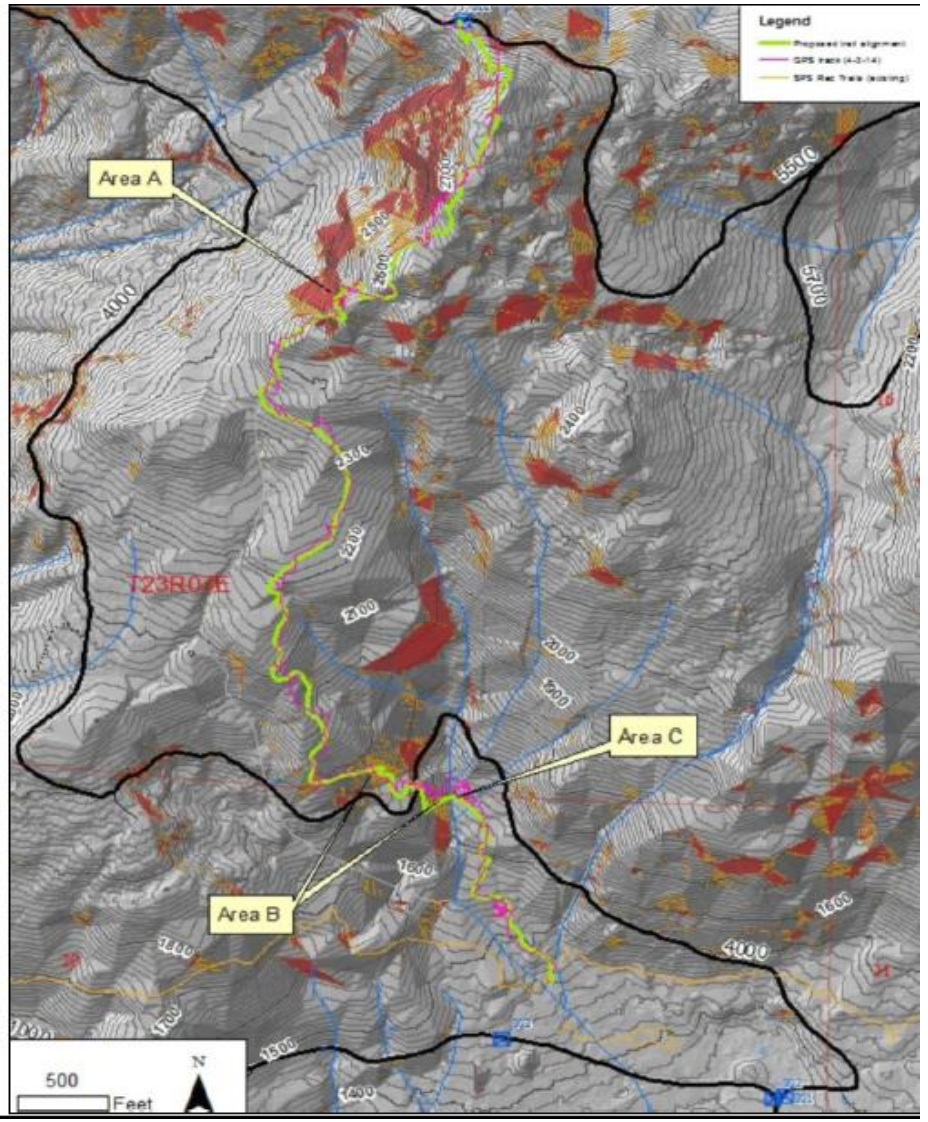


Trail Design - Control Points

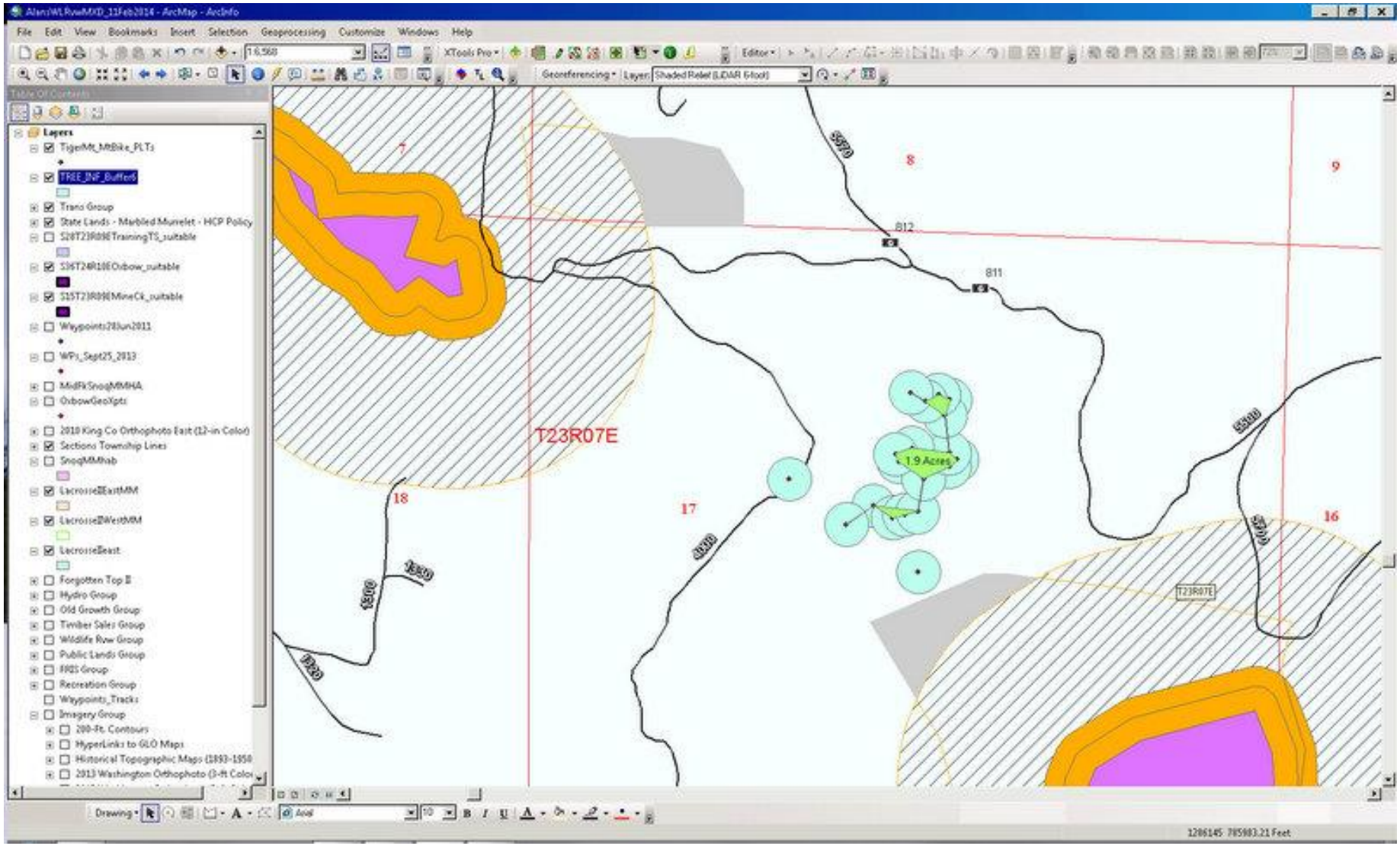
Memo from DNR Geologist, Ana Shafer

Key findings summarized below and complete memorandum attached.

"I identified no potentially unstable slopes or landforms along the proposed trail alignment, with one exception (Figure 2, Area C). Area C is just above (east of) an unnamed type-3 stream, at the outer edge of a bend in the channel, showing evidence of past debris sliding. It is a relatively small area, on the order of about 10 feet wide and no more than about 10 to 12 feet high. Area C itself is steep (steeper than about 70 and convergent) and is situated at the toe of relatively planar slopes (less than about 40 percent slope gradient). Area C and the slopes around it are well vegetated with no exposed soils or other evidence of ongoing or recent landsliding. We discussed avoiding this feature and instead constructing a full-bench trail upslope of this feature. It is my understanding that attempts will be made to avoid placing fill on or immediately upslope of the identified feature at Area C."



Habitat Delineation & Protection

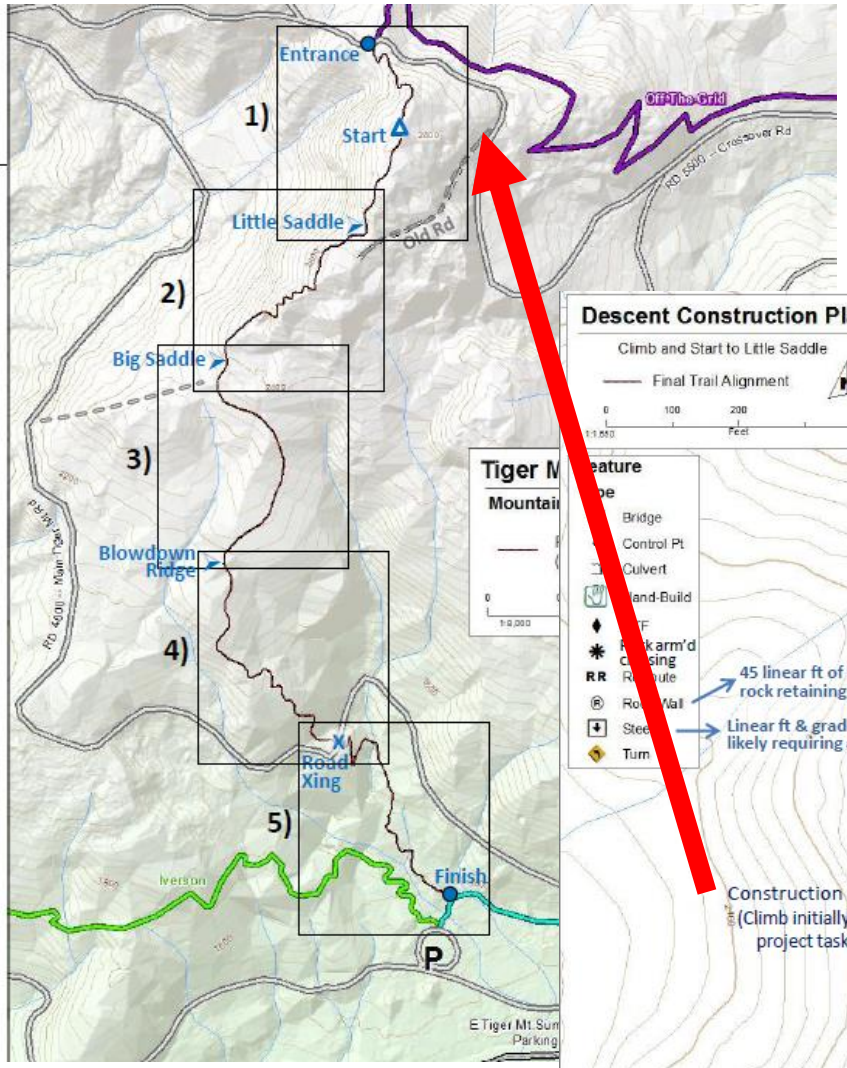


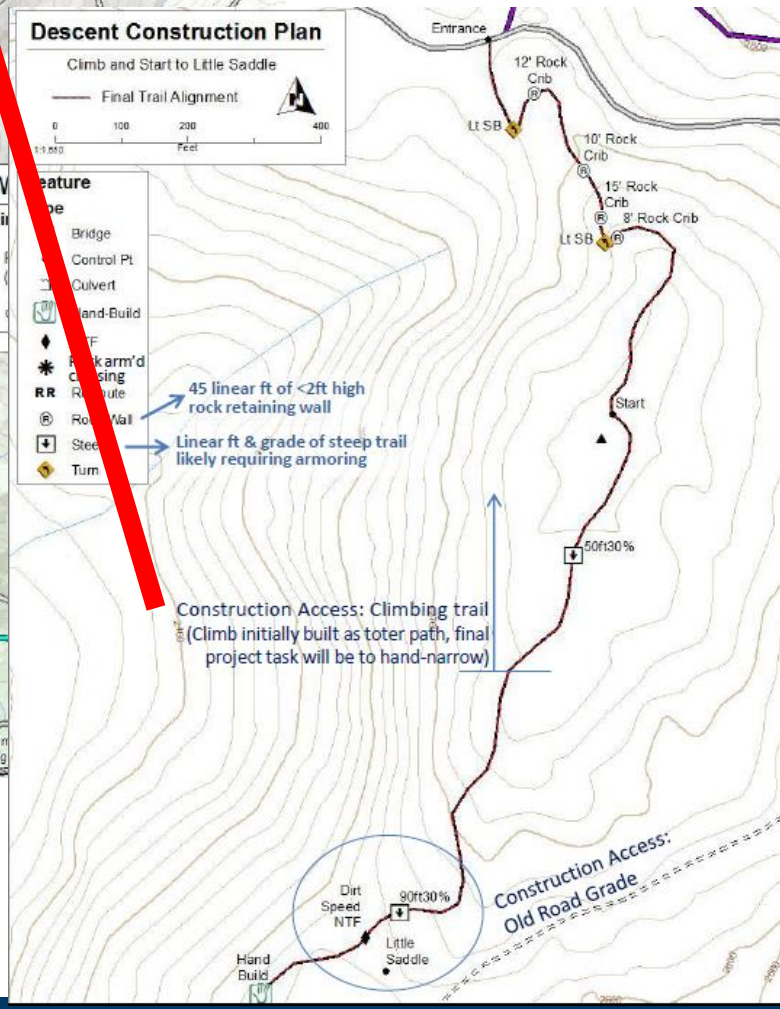
Construction and Feature Waypoints

5 Detailed Maps:

1) Entrance to Little Saddle
   - 2100 ft long, 2800'-2640' elev
2) Little Saddle to Big Saddle
   - 1600 ft long, 2640'-2400' elev
3) Big Saddle to Blowdown Ridge
   - 2200 ft long, 2400'-2100' elev
4) Blowdown Ridge to Road Crossing
   - 1400 ft long, 2100'-1900' elev
5) Road Crossing to Finish
   - 2200 ft long, 1900'-1460' elev

Construction access





Agency Trails Policy & Trail Standards

- USFS Trail Class
- Managed Use – MTB Only
- Designed Use – Target MTB ‘Most Difficult’
- USFS ‘Technical Trail’ Designation
- Rock Armoring Specs
- Natural Terrain Feature (NTF) Process
- Drops, NTF Width/Height Ratio
- Target Trail Grade Avg.
- Short Pitch Max 30% - < 30’,

COTA

se Difficulty Ratings from Easy to Most

The following matrix describes levels of trail technical difficulty as they apply to Mountain Bicycle Trails, starting with Easy and moving up to Expert Unlimited. These are applied to any trail in the Mountain Bicycle Trail Class Matrix. Included are general and detailed descriptions of trails, Native Trail Features (NTFs) which are native earth, log and rock formed trail features, Technical Trail Features (TTFs) which are generally fastened wooden construction and include use of non-native materials and metal fasteners. This Matrix quantifies the technical trail difficulty for Mountain Bicycles.

Design Parameters are technical guidelines for the survey, design, construction, maintenance, and assessment of National Forest System trails based on their Designed Use and Trail Difficulty Rating and consistent with their management intent.

Designed Use Trail Difficulty Rating Mountain Bicycle		(Easy) Green Circle	(More Difficult) Blue square	(Most difficult) Black Diamond	(Expert Unlimited) Double Black Diamond *1
General Description	Most Likely Mountain Bicycle Trail Class	*Associated with any Mountain Bicycle Trail Class	*Associated with any Mountain Bicycle Trail Class	*Associated with Mountain Bicycle Trail Classes 1 - 4	*Associated with Mountain Bicycle Trail Classes 3 and 4
	Rider Skill Level	*Minimum rider skill required.	*Intermediate rider skills required.	* Advanced rider skills required.	* Exceptional rider skill & balance essential.
	Trail Experience	*Gentle climbs and easily avoidable obstacles such as rocks, roots and potholes.	*Challenging riding with moderate slopes and or obstacles, possibly on a narrow trail with mixed traction.	*May include a mixture of steep climbs & descents, loose trail surfaces, numerous difficult obstacles to avoid or jump over, drop-offs and sharp corners. Some sections may be easier to walk.	*Exceeding Most Difficult
	Constructed Feature Placement	*NTF/TTF shall be alternate to the main tread except Technical Trail Designation *No NTF/TTF on Classic Trail Designation (see *2)	*NTF/TTF shall be alternate to the main tread except Technical Trail Designation *No NTF/TTF on Classic Trail Designation (see *2)	*NTF/TTF shall be alternate to the main tread except Technical Trail Designation *No NTF/TTF on Classic Trail Designation (see *2)	*NTF/TTF can be used in the main tread *No NTF/TTF on Classic Trail Designation (see *2)

Design - Approach

- Inspired by DH race and technical descending end user
- Target users engaged in design: pro, amateur, and recreational riders
- Develop creative solutions to CA specs: **terrain is the attraction**!

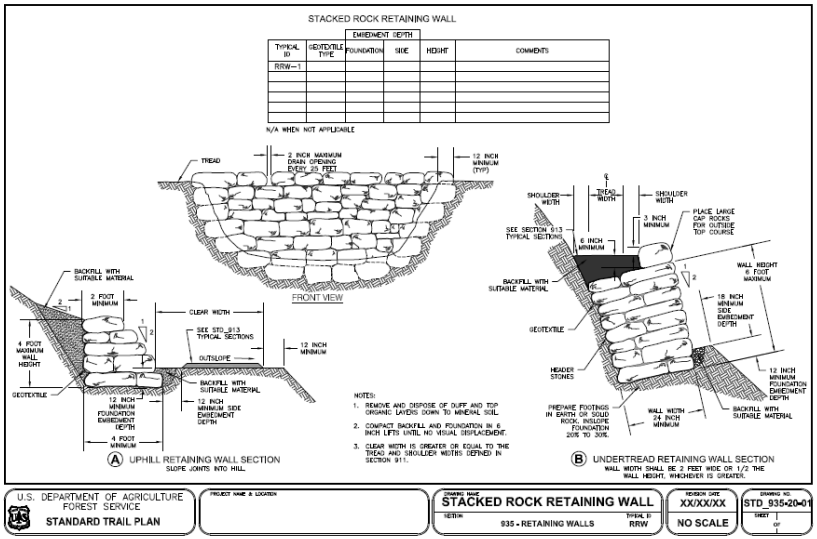
Design - Approach

- Steep slope, high traffic, diverse skill levels
- Result: tread armoring
- Close collaboration with Evergreen MTB Alliance on as-built considerations and issues
- Developed vested core volunteer base: ownership & experience

Build Detail - Implementation

Building sustainable trail on steep slope:

1. 18% average grade
2. Retain natural root structures
   - Removing organic layer & cleaning
   - Rock & mineral tread surface



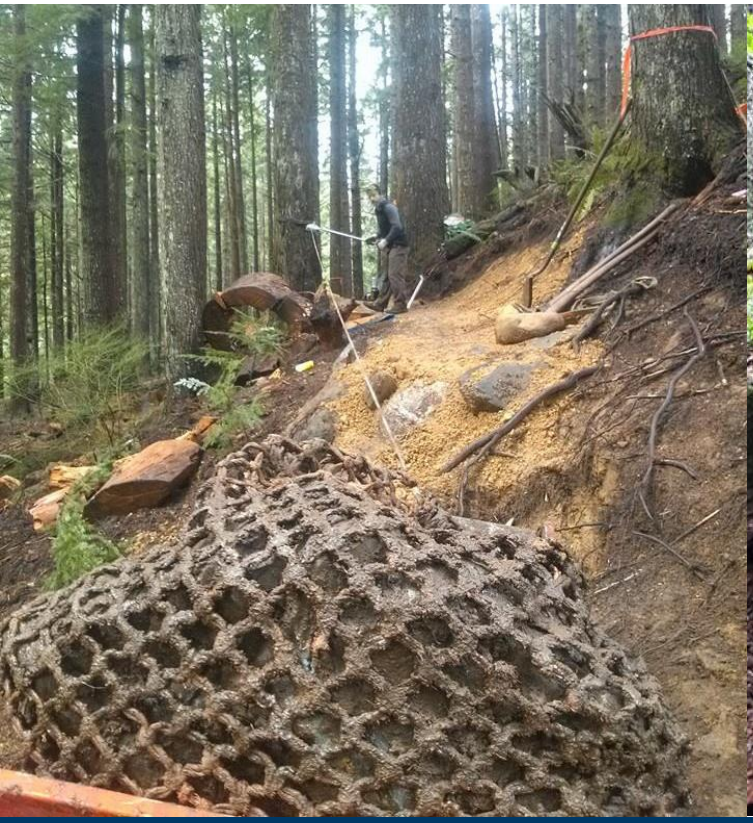
Rock Armoring Time Lapse Video

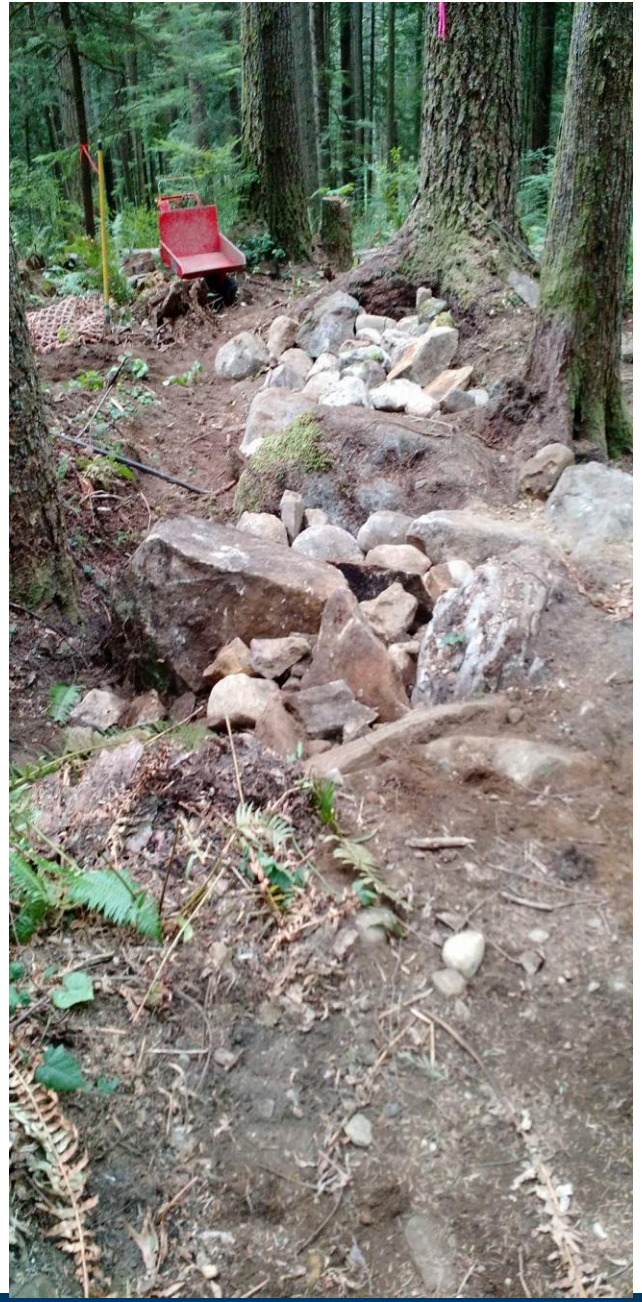
Building sustainable trail on steep slope:

3. Rock armoring
   – “Random natural feel”

Building sustainable trail on steep slopes

3. Rock armoring
   – Terracing to break up steep grades





Building sustainable trail on steep slopes:

4. Minimizing Damage & Erosion
   - Drainage
   - Catering to varying rider styles and abilities
   - Design and build for rider creativity

Build for Rider Diversity & Creativity

Signage & Surveys

Trail Entry Signage, Determining Appropriate Individual Trail Messaging

Required Messaging:
- Mountain Bike Trail
- Easier terrain
- Some unavoidable obstacles and technical features
- Ride at your own risk

Alternate routes (choose one):
- No alternate routes provided
- Some [choose one: intermediate/ advanced/extreme] optional routes available

Travel Direction & Yielding (choose one):
- Downhill Travel Only
- Climbing Travel Only
- Two-way – Downhill travel yield to climbing travel

Required Messaging:
- Mountain Bike Trail
- Intermediate terrain
- Some unavoidable obstacles and technical features
- Ride at your own risk

Alternate routes (choose one):
- No alternate routes provided
- Some [choose one: easier/advanced/extreme] optional routes available

Travel Direction & Yielding (choose one):
- Downhill Travel Only
- Climbing Travel Only
- Two-way – Downhill travel yield to climbing travel

Required Messaging:
- Mountain Bike Trail
- Advanced terrain
- Unavoidable advanced obstacles and technical

Required Messaging:
- Mountain Bike Trail
- Extreme terrain
- Unavoidable extreme obstacles and technical

Predator Project Summary

Trail Length:	1.8 miles	Project Match (other)	$4,000 (communications) $10,000 (cash donation)
Partners:	WA Dept. of Natural Resources Evergreen Mtn. Bike Alliance	Required Vol. Match Extra Vol. Match	3,200 ($48,000) 3,097 ($46,455) 6,297 ($94,455)
Cost:	-Total: $233,470.27 -$161,970.27 (Value of Agreements) -$45,000 (Bridges + Install) -$18,500 (Permits/signs/admin) -$8,000 (crew, bridge/bdwalk)	**Total Match Value**	**$58,990 (includes tax)**
Cost/Mile	$129,705/24.56 (per/lf)		
Annual Use:	1,000-1,500 riders /month		

Trail Dedication & Celebration

Unique Considerations & Lessons Learned

- Defining Trail Sustainability
- Adapting Trail Standards
- Project Compliance
- Bridge Structures
- Budget Considerations
- Road Crossing & Signage
- Underserved User Group

TIGER MTN
100
Eric
Ashley
PHOTOGRAPHY

Q & A

Thank You