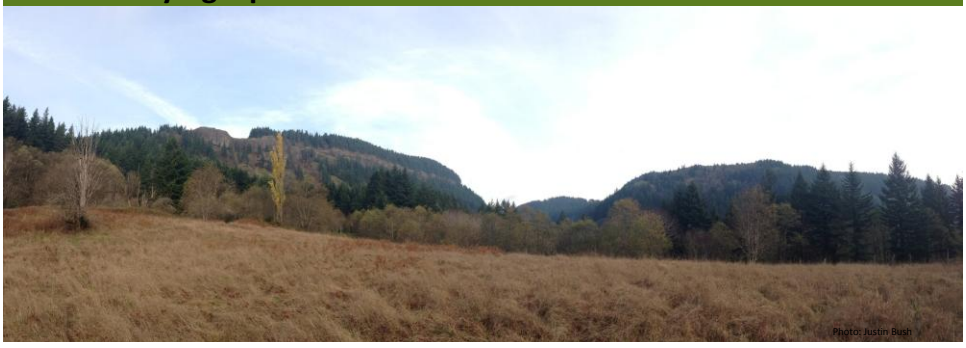
Digital Terrain Analysis of Archer Mountain

Identifying a potential new recreational trail



GEOG 593 - Duh
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Project Overview

- Background
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- Questions
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- Sources Consulted

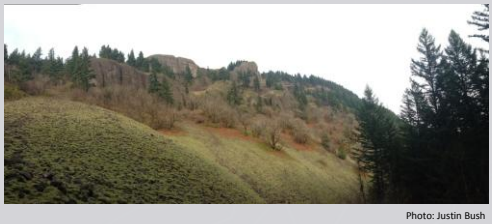
Photo: Justin Bush

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Background

Recreational use within the Columbia River Gorge National Scenic Area is an important draw to the communities in the Columbia River Gorge. Through public meetings and comment, the need to design and develop a new trail for the public on Archer Mountain has been identified.

As a preliminary analysis of trail feasibility and needs for land purchase or easement agreements, this team will take a GIS based approach and develop outputs to assist with future trail planning and decision making.

http://farm3.static.flickr.com/2021/2256199545_4f7d5ba41a.jpg

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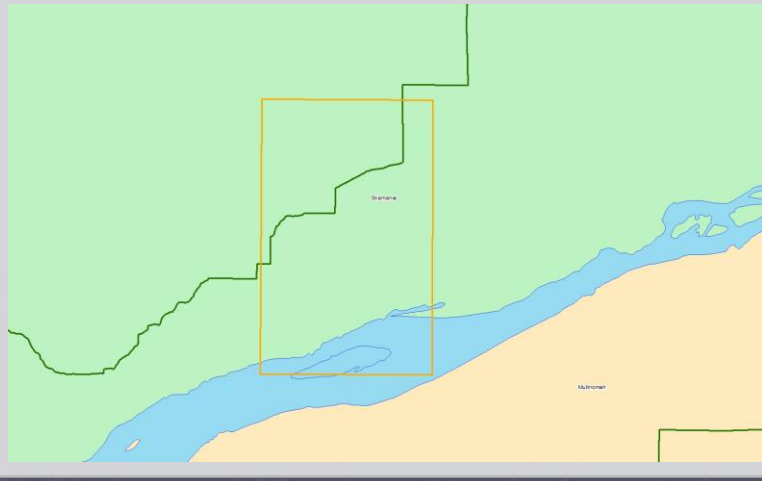
Project Area Overview



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Questions

1 . Where would a suitable moderate to intermediate level developed trail be best placed on Archer Mountain within the Columbia River Gorge?

2. In analyzing this potential trail, what locations are currently located on public lands and what areas will an easement agreement need to be negotiated or what parcels will need purchasing?

http://www.yellowleaf.org/scramble/g/enl/2006-05-12-199-viewpoint-from-trail.html

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Data Sources

Parcel Data (2012) (Skamania County)

Road Data (2012) (Skamania County)

Yacolt State Forest LiDAR Data (2005) (Washington State Department of Natural Resources)

Skamania County NAIP Orthophoto (2011) (US Army Corps of Engineers)

http://www.flickr.com/photos/redfredintheshed/2447615375/sizes/z/in/photostream/

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Assumptions

- "Key Viewpoints" (KVPs) were chosen through public comment process, they were agreed to upon by all partners.
- Private land ownership are less desireable than public ownership. Although easements may be negotiated.
- Private timber companies may grant easement with negotiation.
- Public lands are agreeable to trail, excluding state highways and national wildlife refuges.
- Department of Natural Resources does not have protected Natural Area Reserves within area of interest.

http://www.flickr.com/photos/redfredintheshed/2448421208/sizes/l/in/photostream

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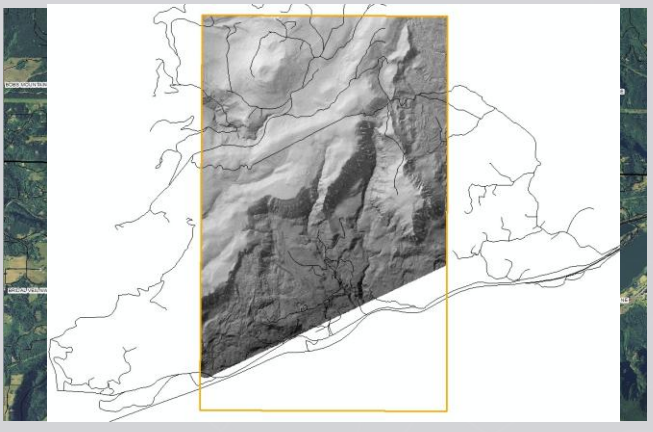
Methodology (DEM Creation (2ft resolution))

- Ascii data from DNR LiDAR
- Broken into 4 parts for AOI
- Converted to coverages
- Merged
- Clipped to Area of Interest
- DEM creation
- Hillshade creation



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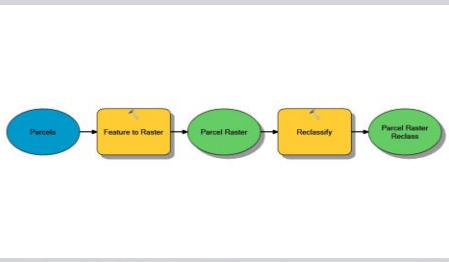
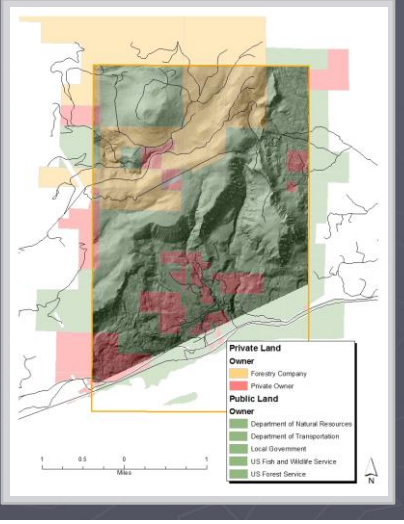
Parcel Methodology

1. Classify parcel data into public and private ownership
2. Reclassify parcels to weight versus public and private ownership.





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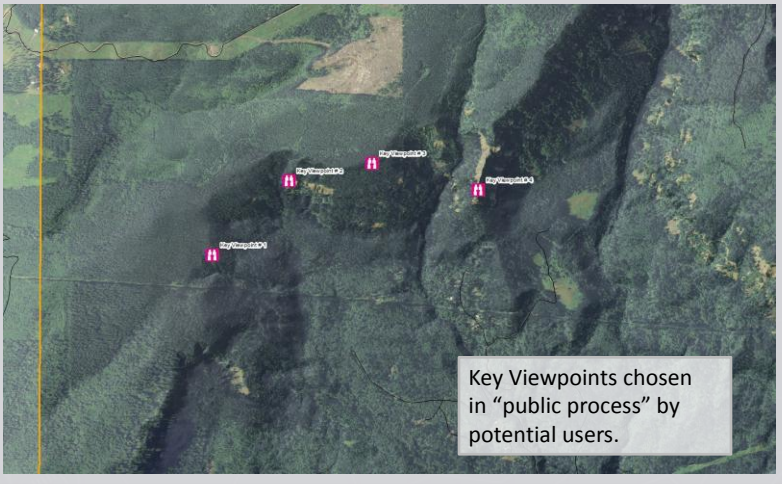
Methodology
Setting Key Viewpoints (KVPs)



Key Viewpoints chosen in “public process” by potential users.

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Methodology
Setting Trailhead Alternatives

Trailhead Alternative 3 (photo: Justin Bush)

Potential trailheads chosen by identifying dead-end roads on public land.

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Methodology
Trail Components (Trailheads and Key Viewpoints)

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Trail Methodology

1. Create DEM from LiDAR dataset
2. Create slope, hill shade, aspect from DEM
3. Reclassify slope to find acceptable, marginal, not acceptable areas
4. Create weighted cost overlay of slope and ownership.
5. Create least cost path between trailhead to viewpoint
6. Create least cost path between viewpoints, returning to trailhead
7. Repeat for alternatives

http://www.singletracks.com/blog/wp-content/uploads/2008/07/vast-trail-building2.jpg

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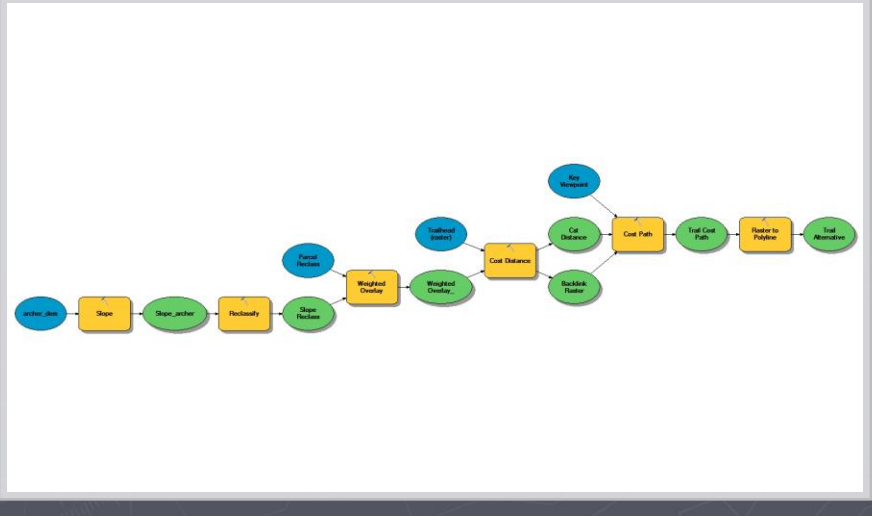
Trail Methodology



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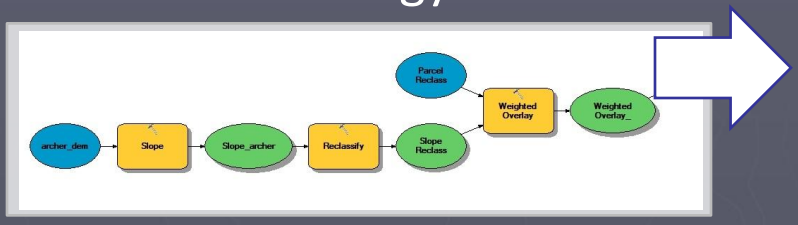
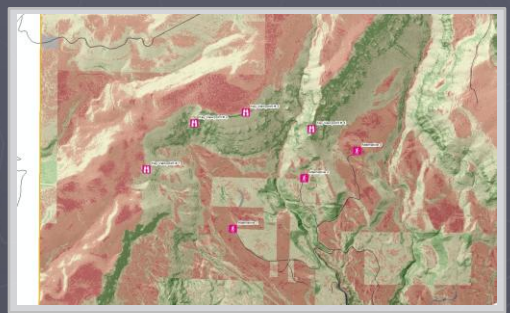
Trail Methodology





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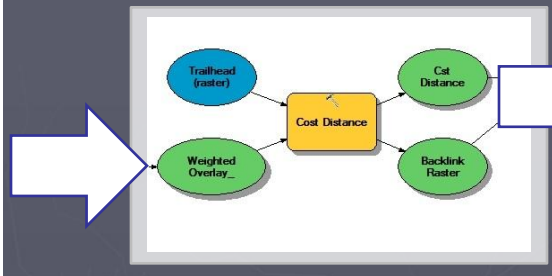
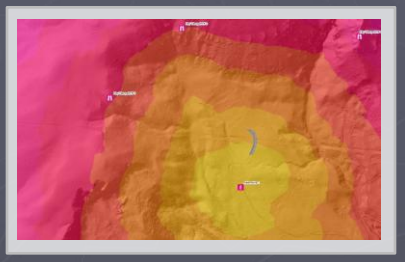
Trail Methodology





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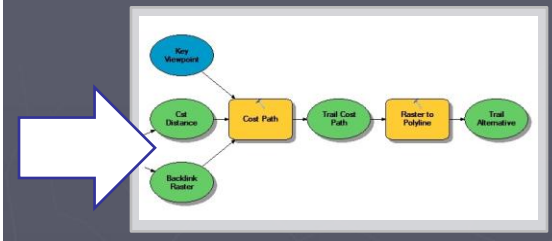
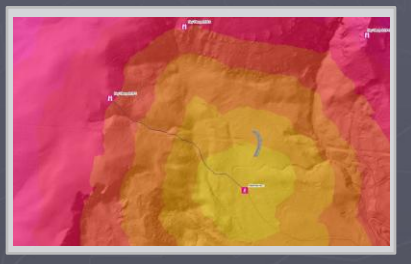
Trail Methodology (Least Cost Path)





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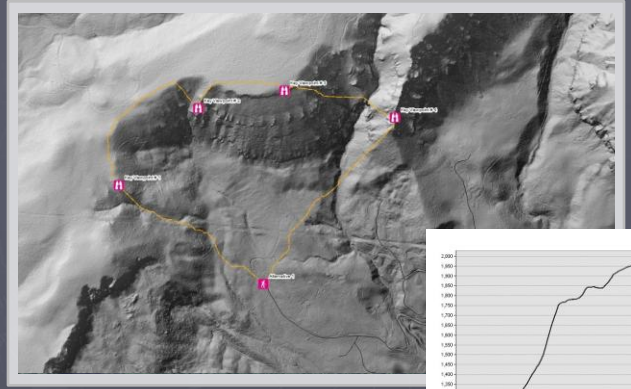
Outputs (Alternative # 1)



Length:
12618.82 feet
2.39 miles
Average slope:
15.00%

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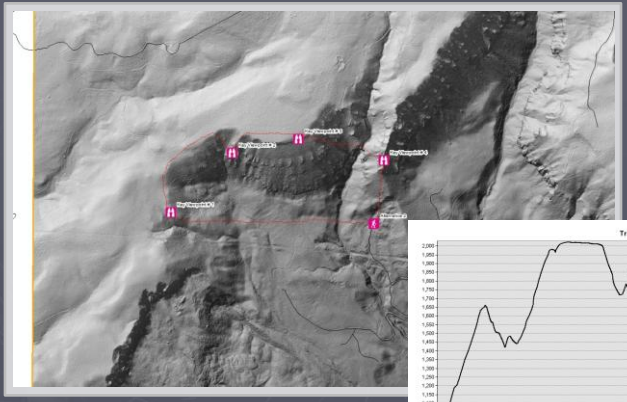
Outputs (Alternative # 2)



Length:
11846.27 feet
2.24 miles
Average slope:
16.88%

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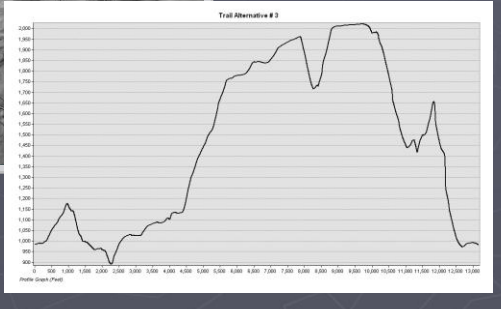
Outputs (Alternative # 3)

Length:
13514.32 feet
2.56 miles
Average slope:
14.70%



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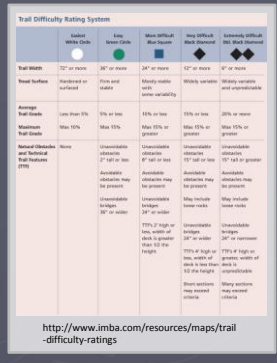
Evaluating Trail Alternatives



http://www.imba.com/resources/maps/trail-difficulty-ratings

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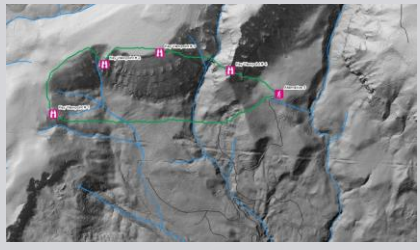
Discussion

How to improve the model:
Incorporate environmental analysis data:

- Incorporate wetland (NWI) data and streams; find least impact and crossings
- TESP surveys; find least impact to documented plants
- wildlife data; reroute around sensitive bird, pika habitat, etc.
- Investigate first return LiDAR to route path near interesting tree stands.
- Investigate further slope path reduction with analysis and development of switchbacks.

Known project issues:

- WA DNR Natural Area Preserve within AOI; closed to public
- Lacking data for right-of-ways; parcel data gaps
- Hoped to create viewshed, but creating path for three alternative trails increased project scope immensely.



Columbia Falls Natural Area Preserve:
Located in the scenic Columbia Gorge area, this preserve protects two state threatened species, four sensitive plant species, and the Larch Mountain salamander–a state threatened animal species. For visitors, the basalt cliffs and steep loose rock slopes (talus) make this site nearly inaccessible, and the rare species habitats are very sensitive to disturbance. The site contains undisturbed natural forest communities, and nine plant species which occur only in the Columbia River Gorge.

http://washingtondnr.wordpress.com/2011/03/29/6675/

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Sources Consulted

Chiou, C. R., Tsai, W. L., & Leung, Y. F. (September 30, 2010). A GIS-dynamic segmentation approach to planning travel routes on forest trail networks in Central Taiwan. *Landscape and Urban Planning, 97,* 4, 221-228.

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Natasha A. Lynn, Robert D. Brown, Effects of recreational use impacts on hiking experiences in natural areas, Landscape and Urban Planning, Volume 64, Issues 1–2, 15 June 2003, Pages 77-87, ISSN 0169-2046, 10.1016/S0169-2046(02)00202-5.

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