



Implementation of Stabilization Measures in the Novel Settings of Mount Rainier National Park

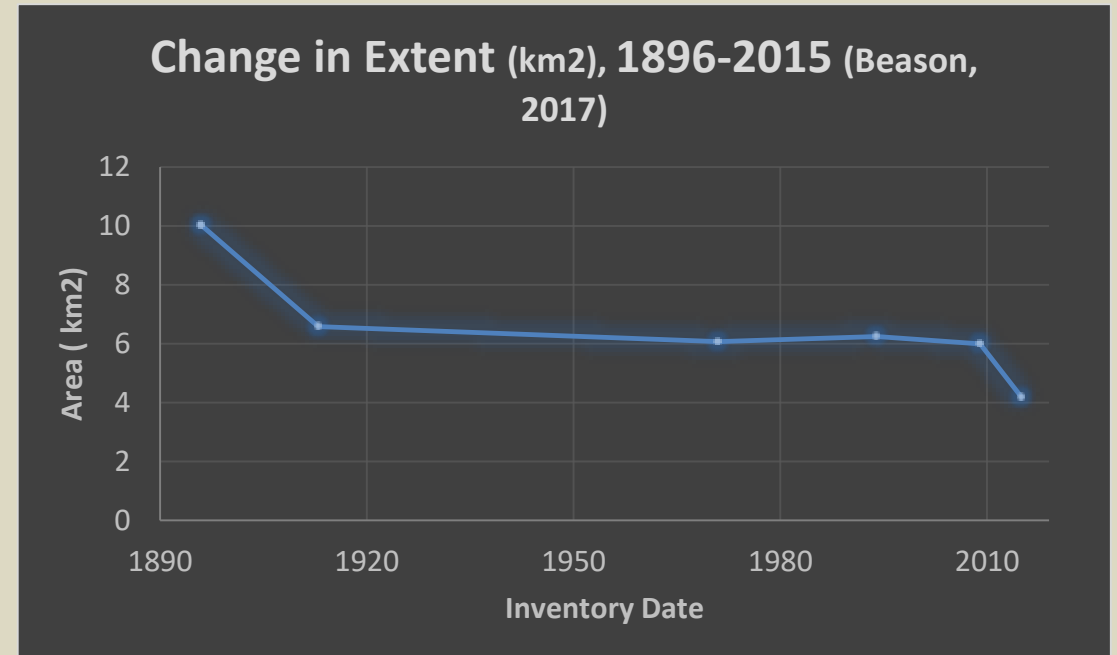
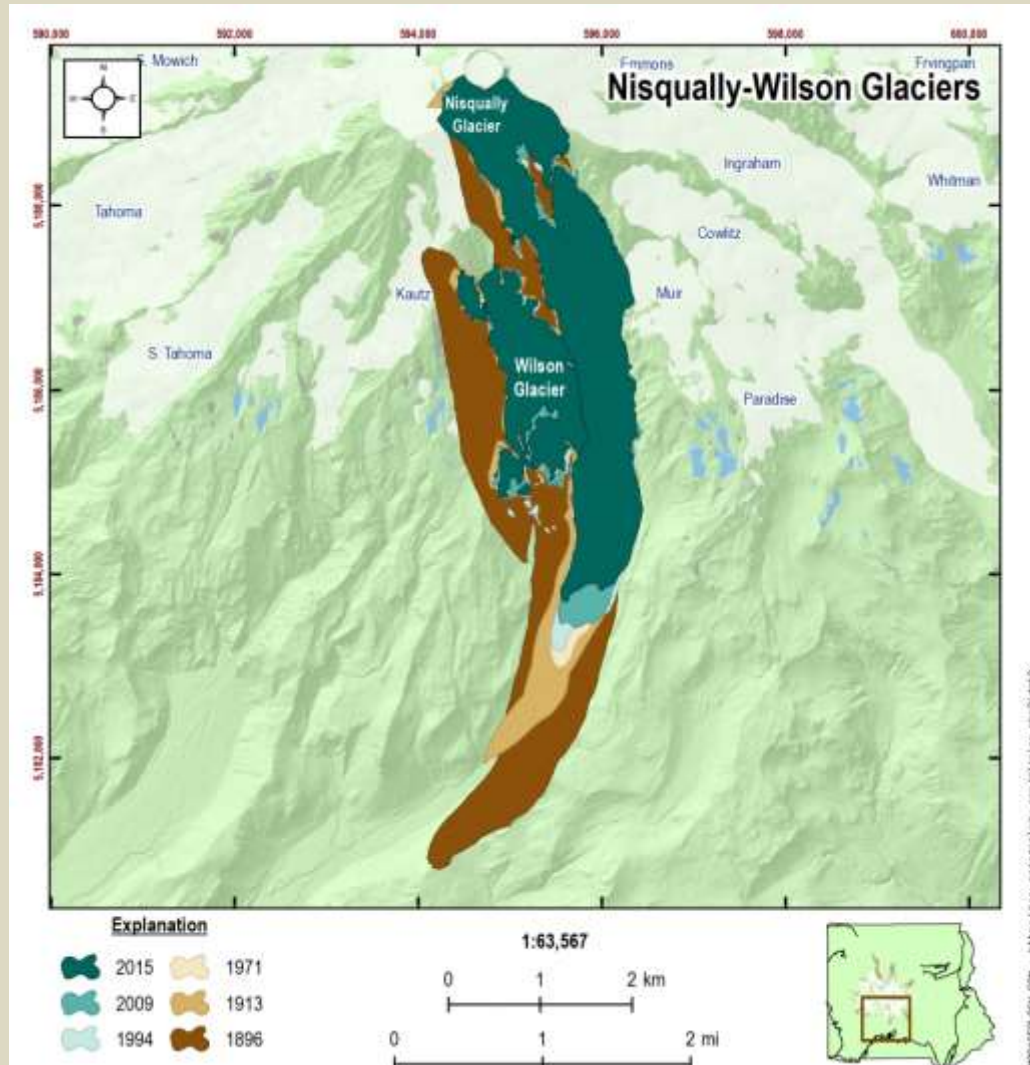
Taylor Kenyon, Robert Jost, Scott Beason





Mount Rainier National Park

The First Problem: Glacial Recession



- Over 50% of glacial area has been lost since 1896
- Recessional rates are rapidly increasing at present

1. Context

2. WSR

3. Barbs

4. Soil Bio-E.

5. Future

Mount Rainier National Park



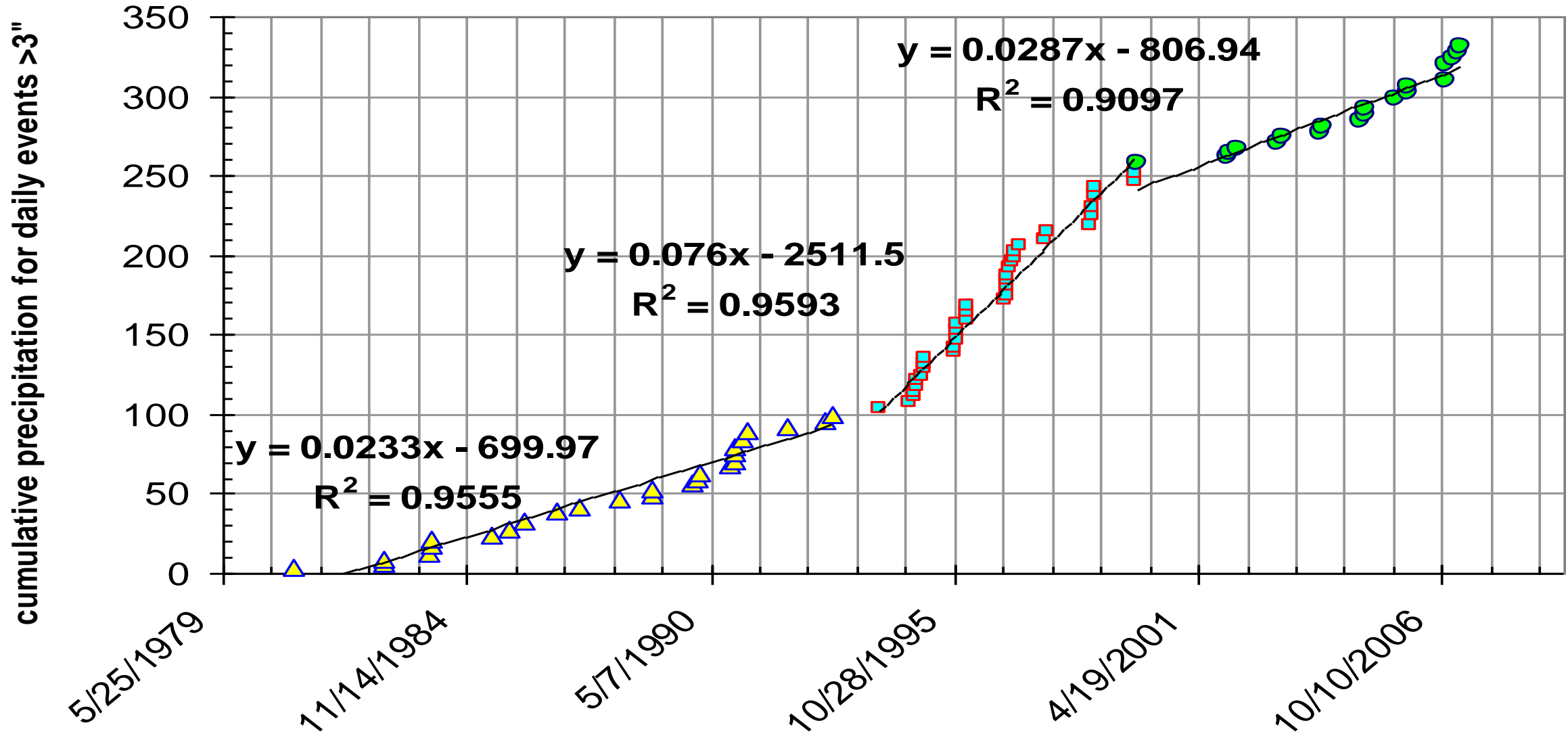
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Steady loss of Park infrastructure

Carbon River Road closed since 2006.

Carbon River Wonderland Out

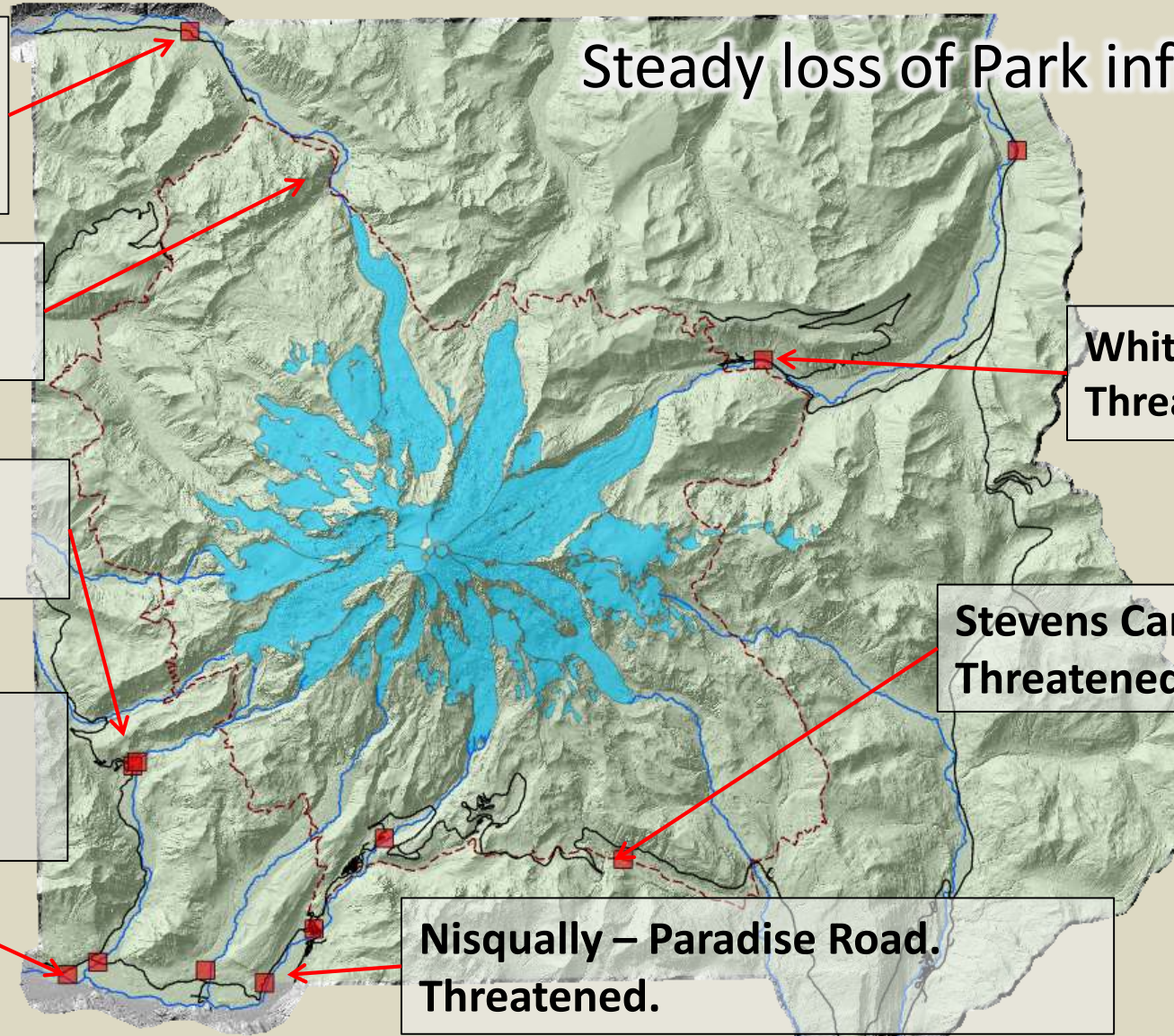
White River Road Threatened.

Westside Road closed since 1980.

Stevens Canyon Wonderland Threatened

Sunshine Point CG closed since 2006.

Nisqually – Paradise Road. Threatened.





These Challenges Add Up

Physical

- Rising precipitation intensities and glacier recession due to climate change.
- Greater occurrence of debris flows and catastrophic flooding.
- Mass aggradation of park rivers and destructive new avulsion behaviors.

Logistical

- Budget constraints felt by all NPS.
- Compliance has not been adjusted for these challenges.
- Traditional responses are not designed for this trend.



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The Westside Road Flood Revetments



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June, 2016

Mount Rainier National Park

Cross – Valley Gradient

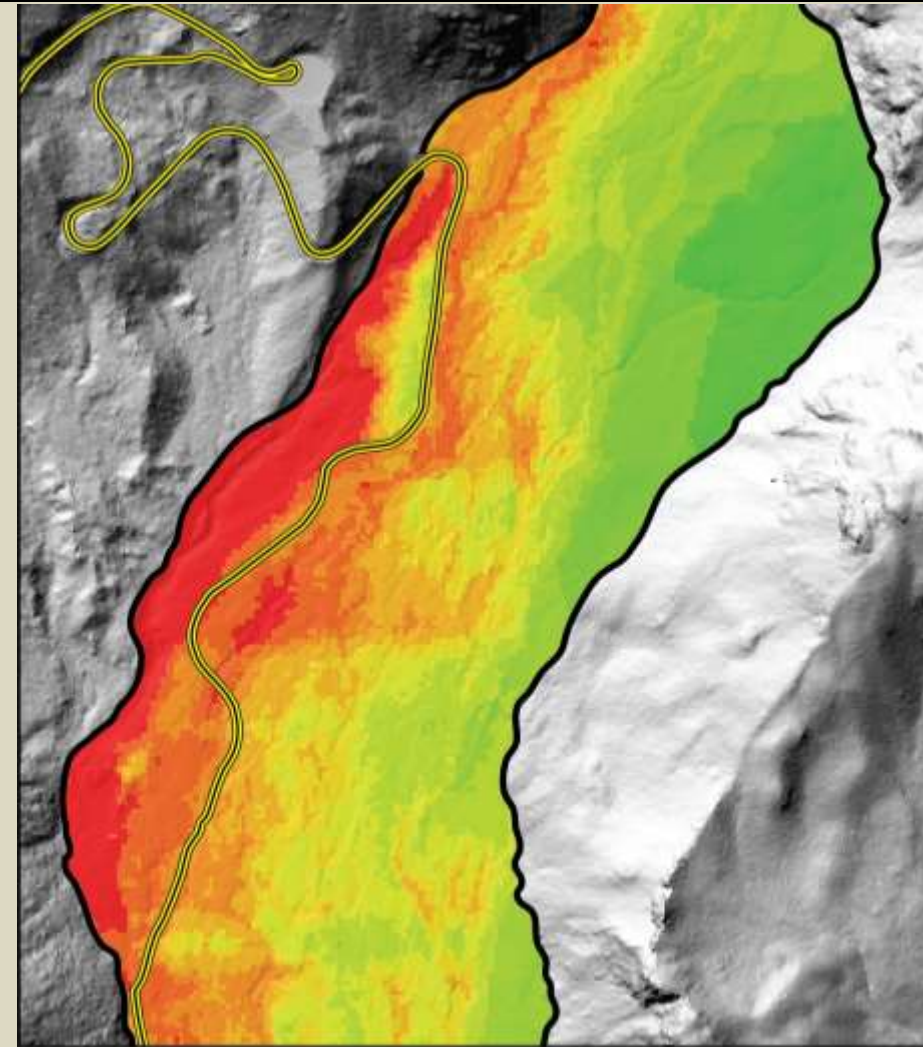
- 90% of the local cross-valley gradients are towards the road.

Height Above Water Surface

- The road is about two meters above the bottom of nearby channels.

2D Flood Modeling (HEC – RAS)

- Sections of the road will be inundated annually.



HAEFC [m]

-16.5 to -1.5

-1.5 to +1.5

+1.5 to +3.5

+3.5 to +6.0

+6.0 to +7.5

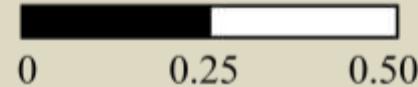
+7.5 to +9.0

+9.0 to +12.0

+12.0 to +25.0

+25.0 to +47.0

+47.0 to +83.0



Kilometers



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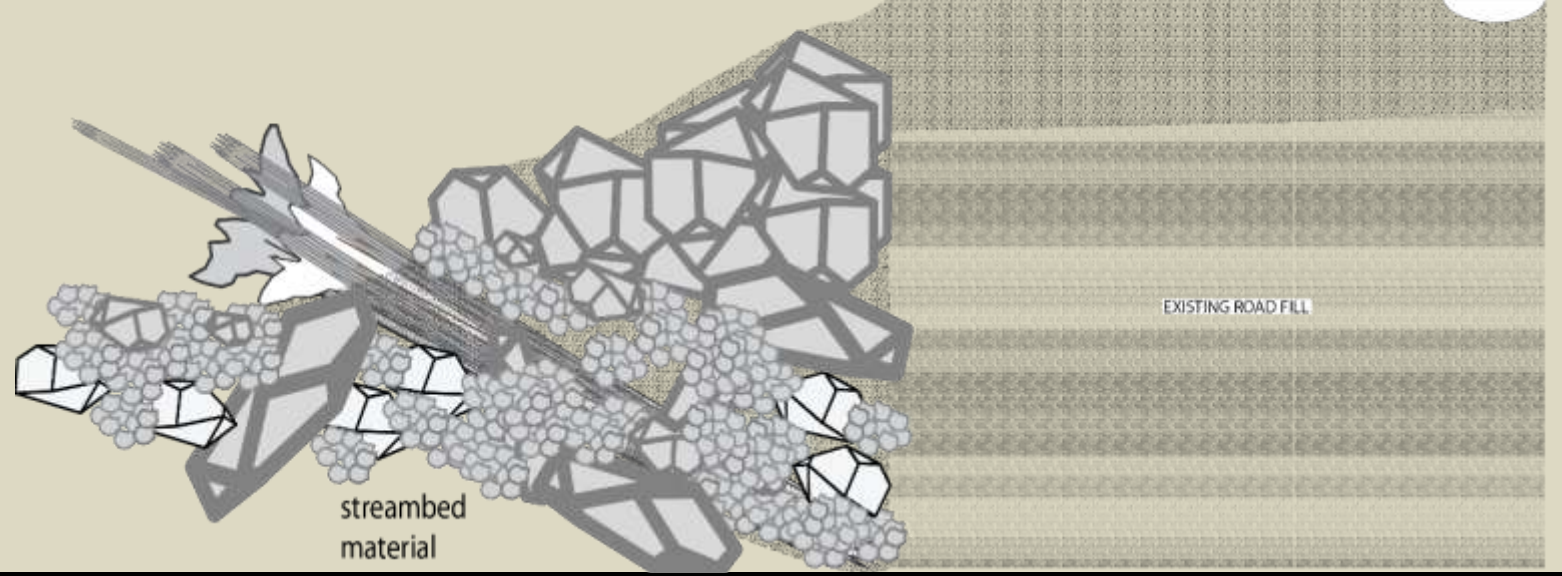
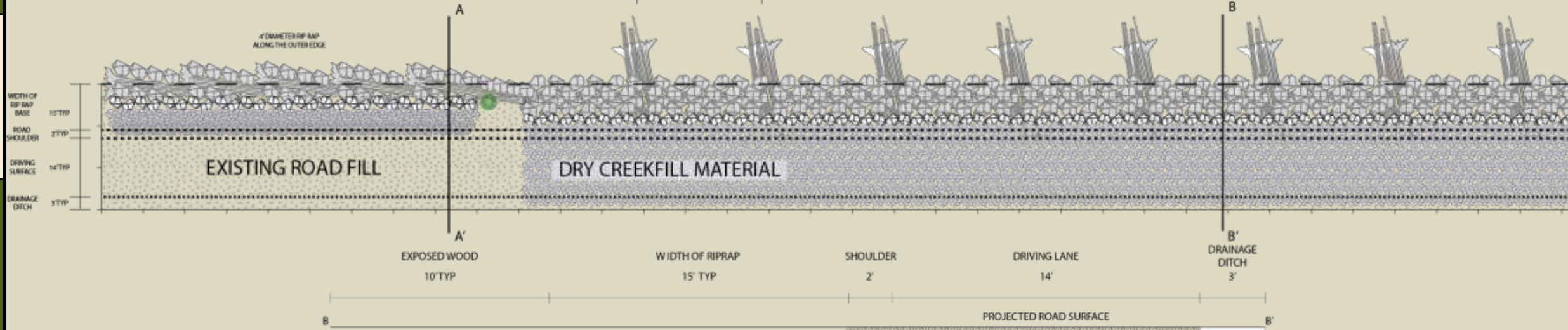
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En Echelon Logs

BUNDLE SPACING
(MEASURED FROM CENTER)
30'



Mount Rainier National Park



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September, 2019



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White River Campground Rock Barbs



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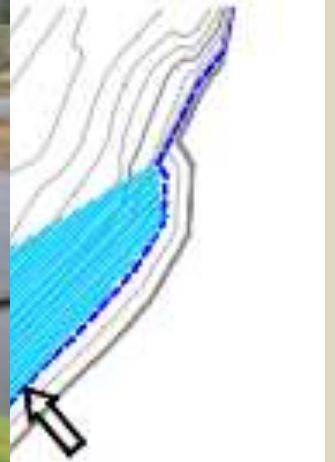
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BARB 1



Bankfull Elevation



Critical
Soil Effect

Photos courtesy of NRCS Oregon

Mount Rainier National Park



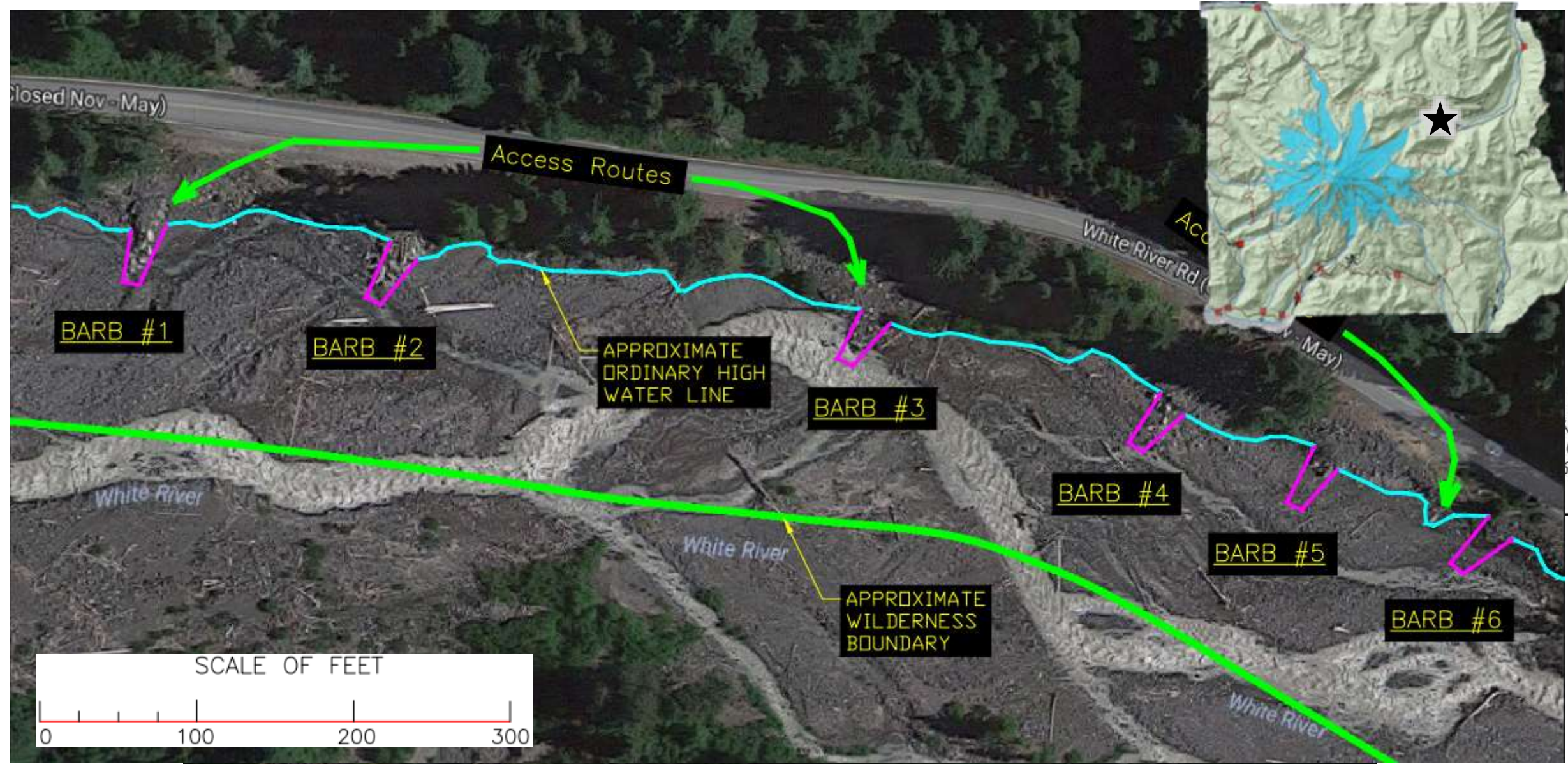
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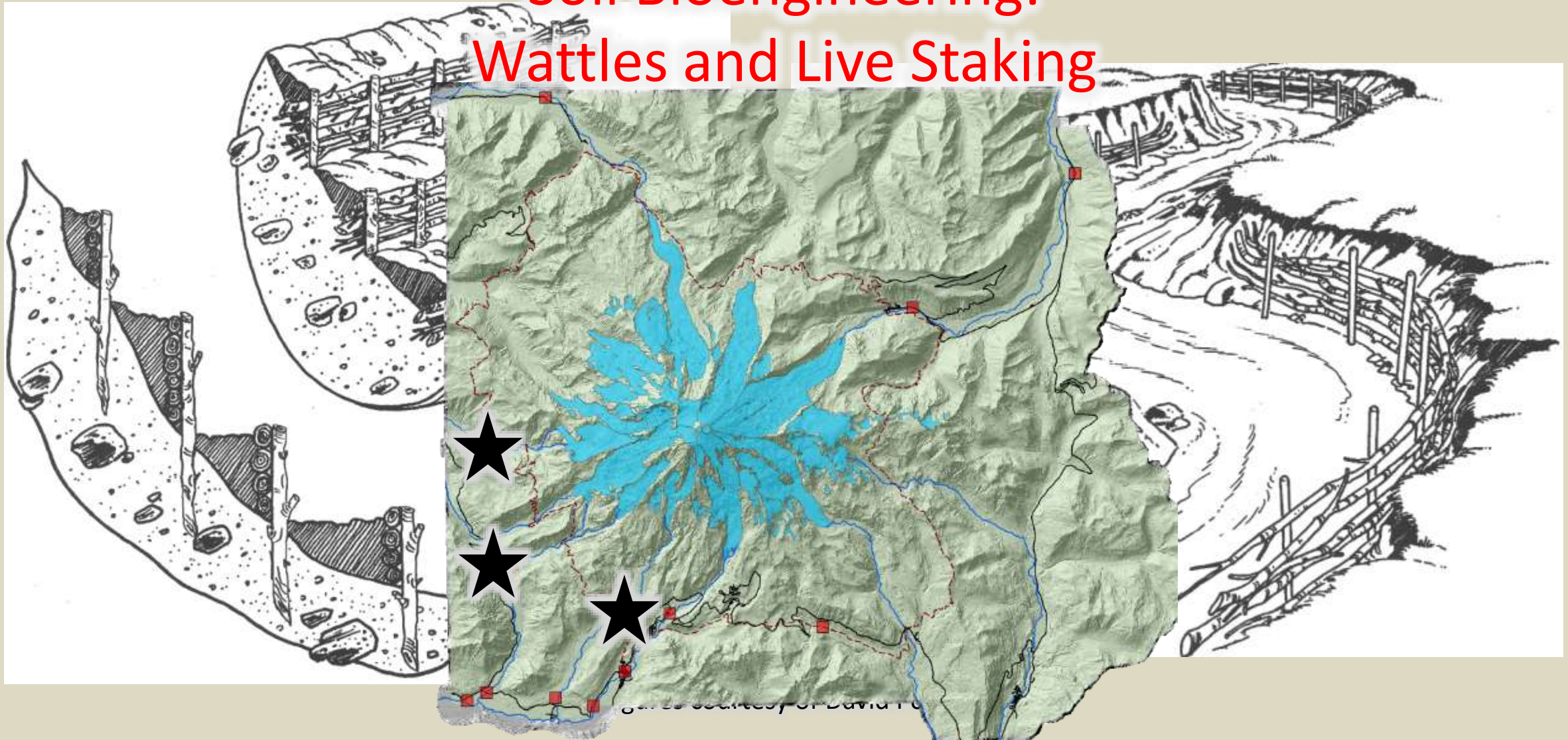
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Soil Bioengineering: Wattles and Live Staking



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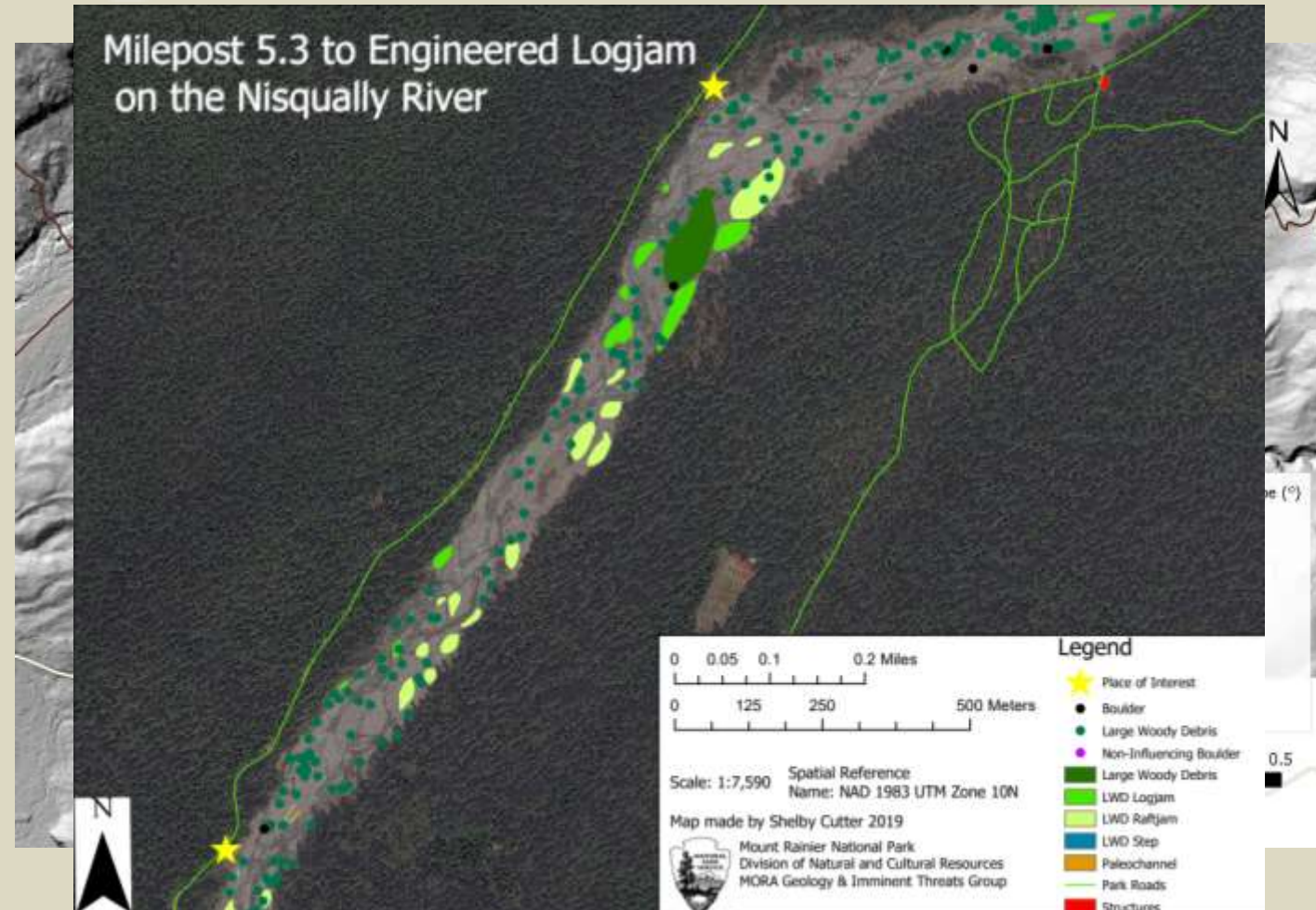
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Moving Forward

- Development of design manuals based on projects performed in MORA.
- Watershed-scale geomorphic assessments. (Wheaton et al., 2015)
- Shift toward preemptive actions within MORA.



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