LiDAR as a tool for assessing unstable slopes on State-managed forestlands

or

I ♥ LiDAR

Site-Scale Applications of LiDAR on
Forest Lands in Washington
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Goal of this presentation

- Provide a overview of how I use LiDAR in my daily work

DNR State lands geologist

- Unstable slopes specialist for DNR foresters and engineers
- Typically requested to visit timber sales during the layout process
- Before field visit perform an *office review* (aka: remote assessment, hands-off review, pre-field reconnaissance, GIS-analysis, ultramundane surveillance, etc.)

Office reconnaissance consists of…

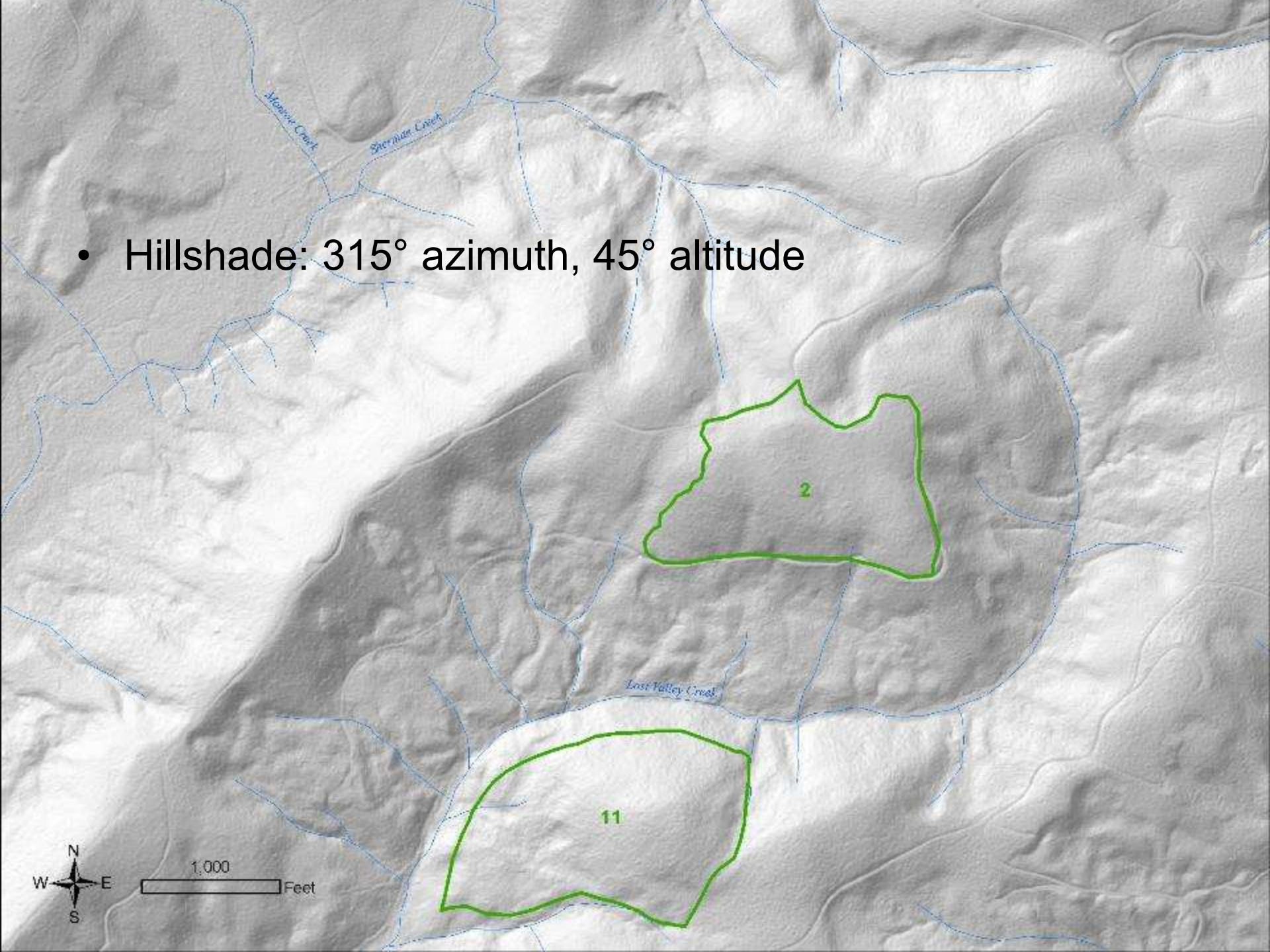
- the tools
  - mapping in GIS: geology, slope, hillshade, contours, orthophotographs…
  - various flight years of aerial photographs (if available)
  - LiDAR! (if available)
- to identify
  - any past slope failure(s)
  - any signs of potential instability
  - Forest Practices rule-identified unstable landforms

Forest Practices rule-identified landforms

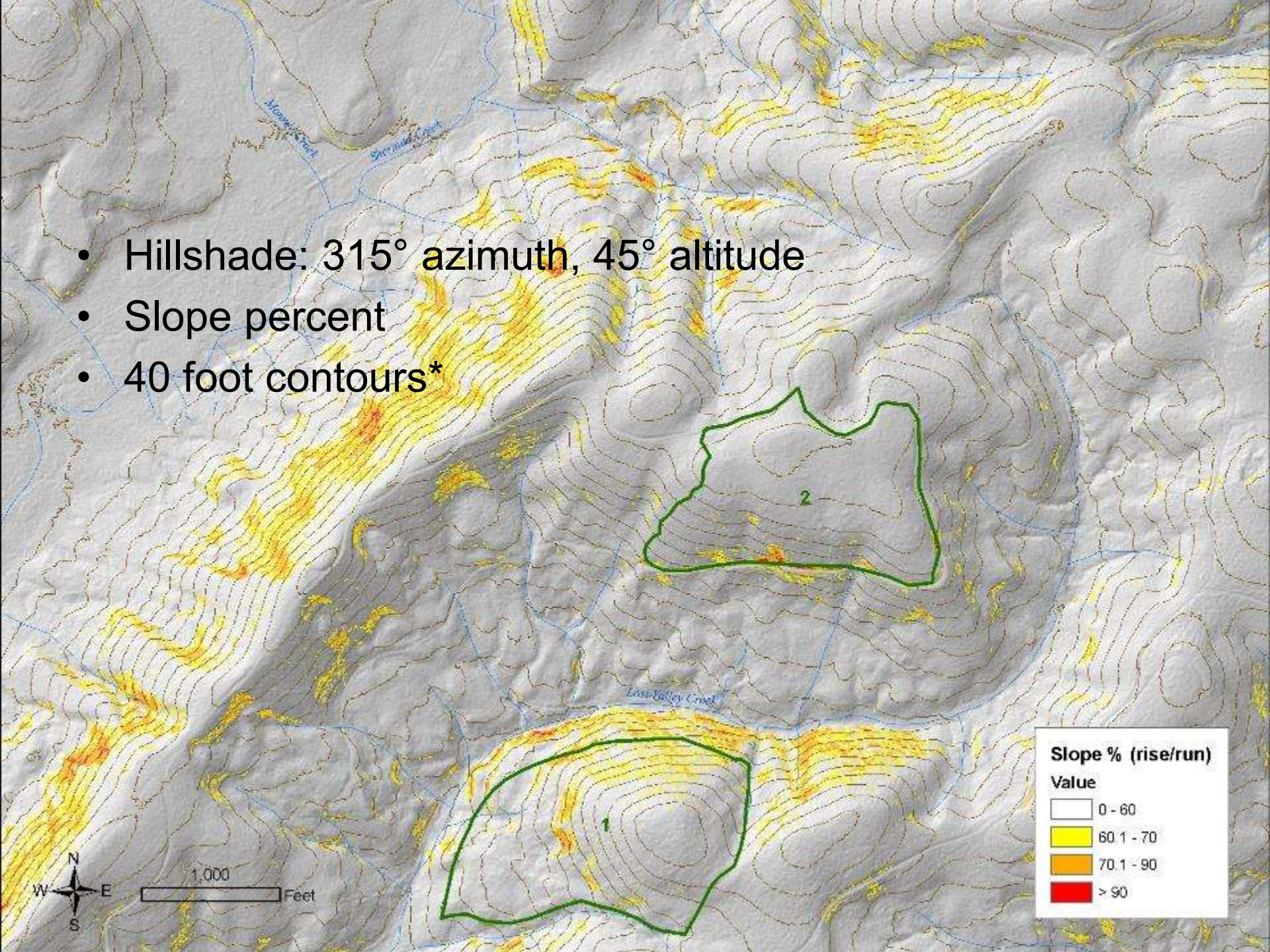
- Areas of similar mass-wasting potential
- Based on (in general):
  - Slope gradient
  - Slope form (convergent)
  - Potential for sediment delivery to a public resource
  - and a few other things…
- The flavors
  - Inner gorge
  - Bedrock hollow
  - Convergent headwall
  - Toe of deep-seated landslide
  - Recharge area of deep-seated landslides
  - Outside edges of meander bends
  - Other

Dark Horse Timber Sale

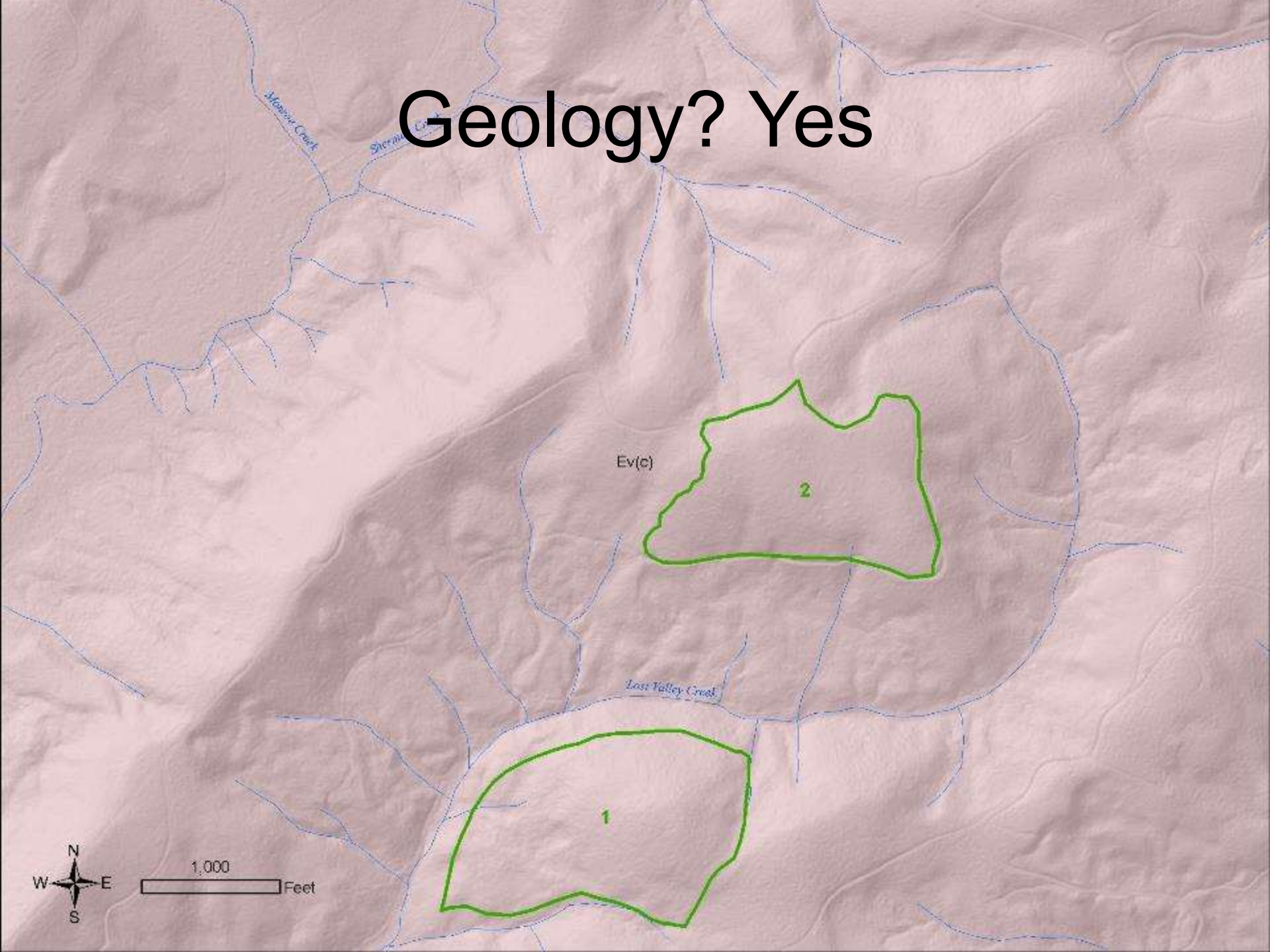
- In Capitol Forest, Thurston County, WA
- Two units
- Asked to look at potential bedrock-hollow and to just poke around

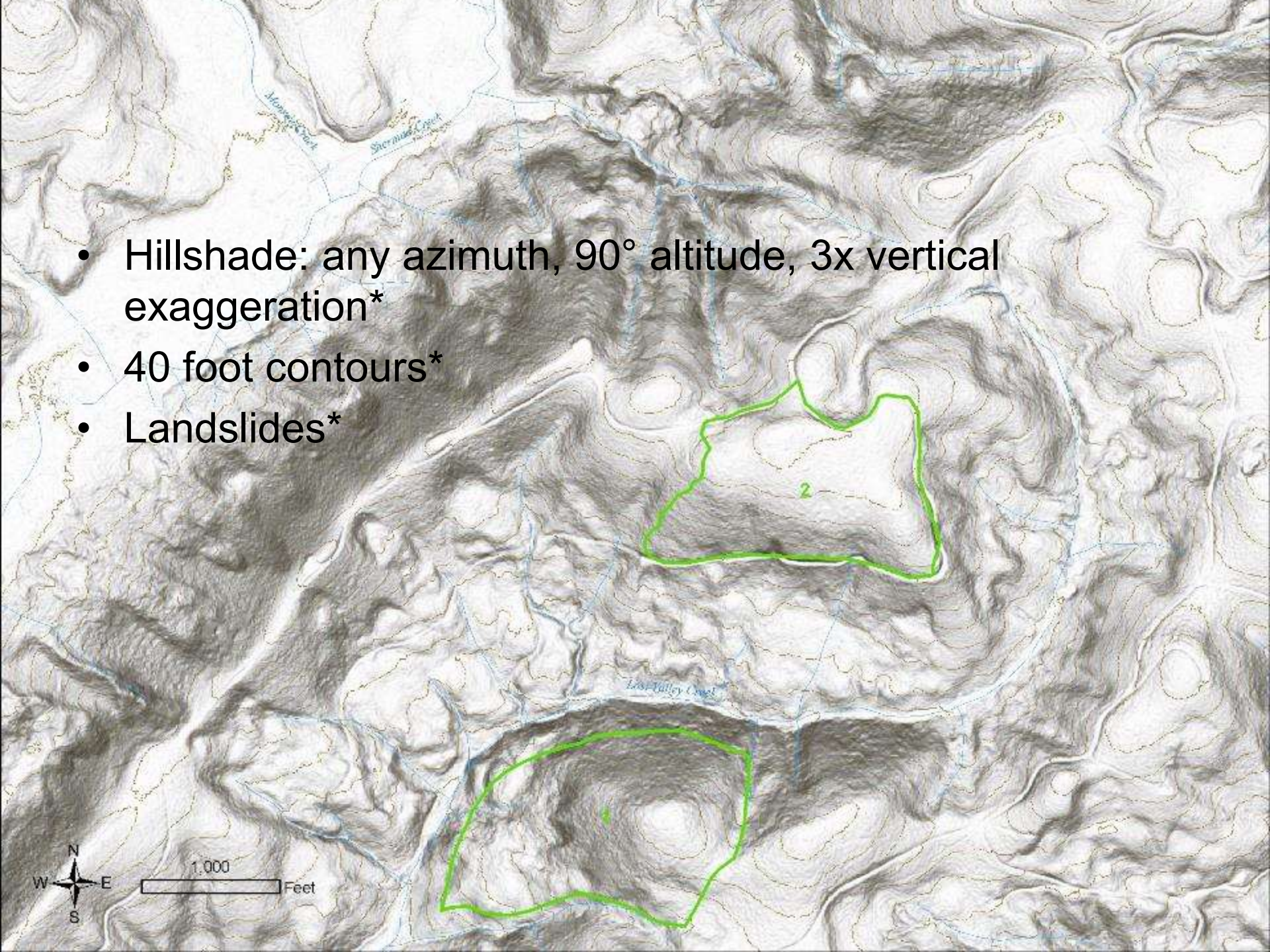


- Hillshade: 315° azimuth, 45° altitude

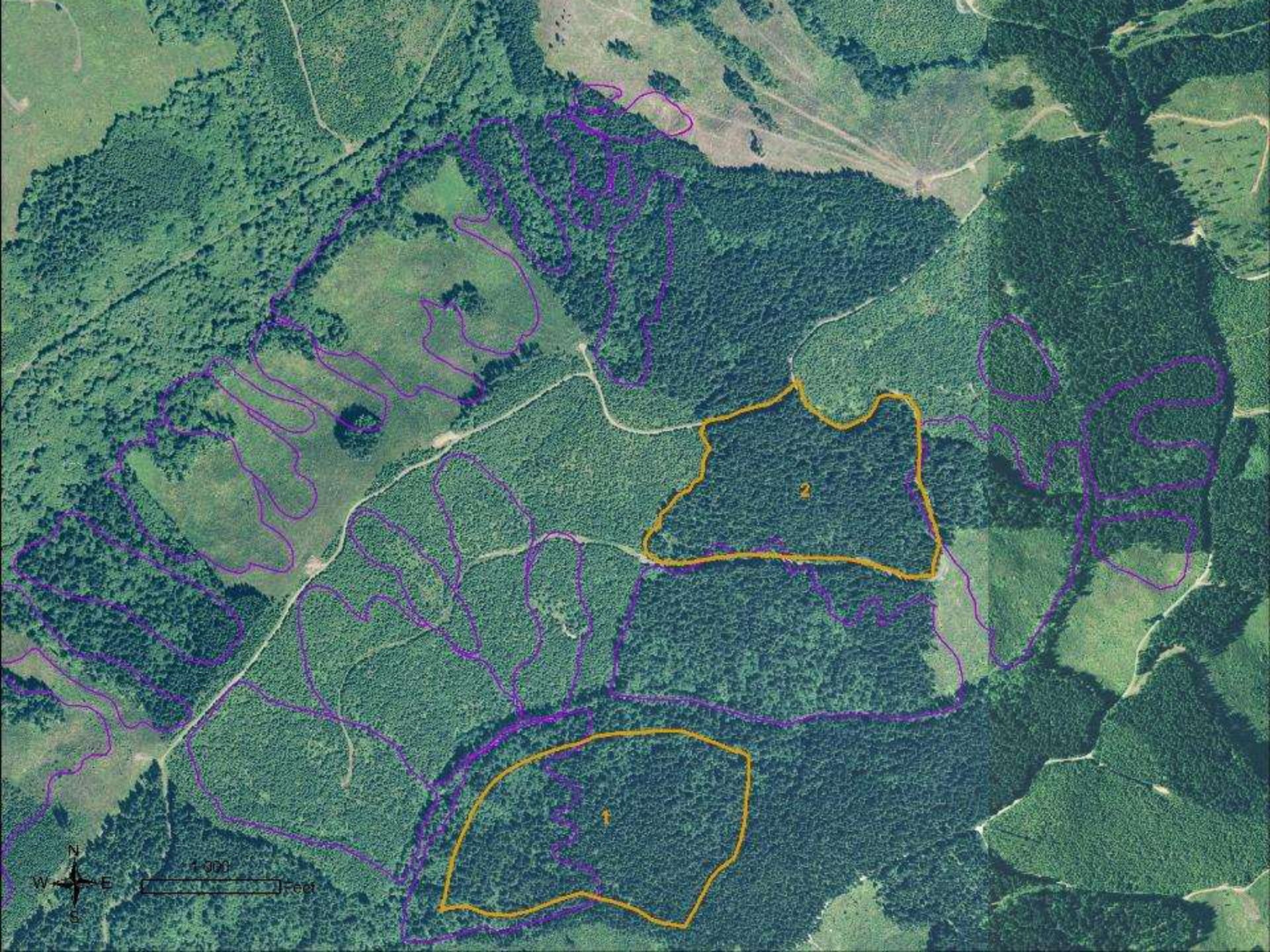

Hillshade: 315° azimuth, 45° altitude
Slope percent
40 foot contours*
2
1
Slope % (rise/run)
Value
0 - 60
60.1 - 70
70.1 - 90
> 90
N
W
E
S
1,000
Feet

Geology? Yes





- Hillshade: any azimuth, 90° altitude, 3x vertical exaggeration*
- 40 foot contours*
- Landslides*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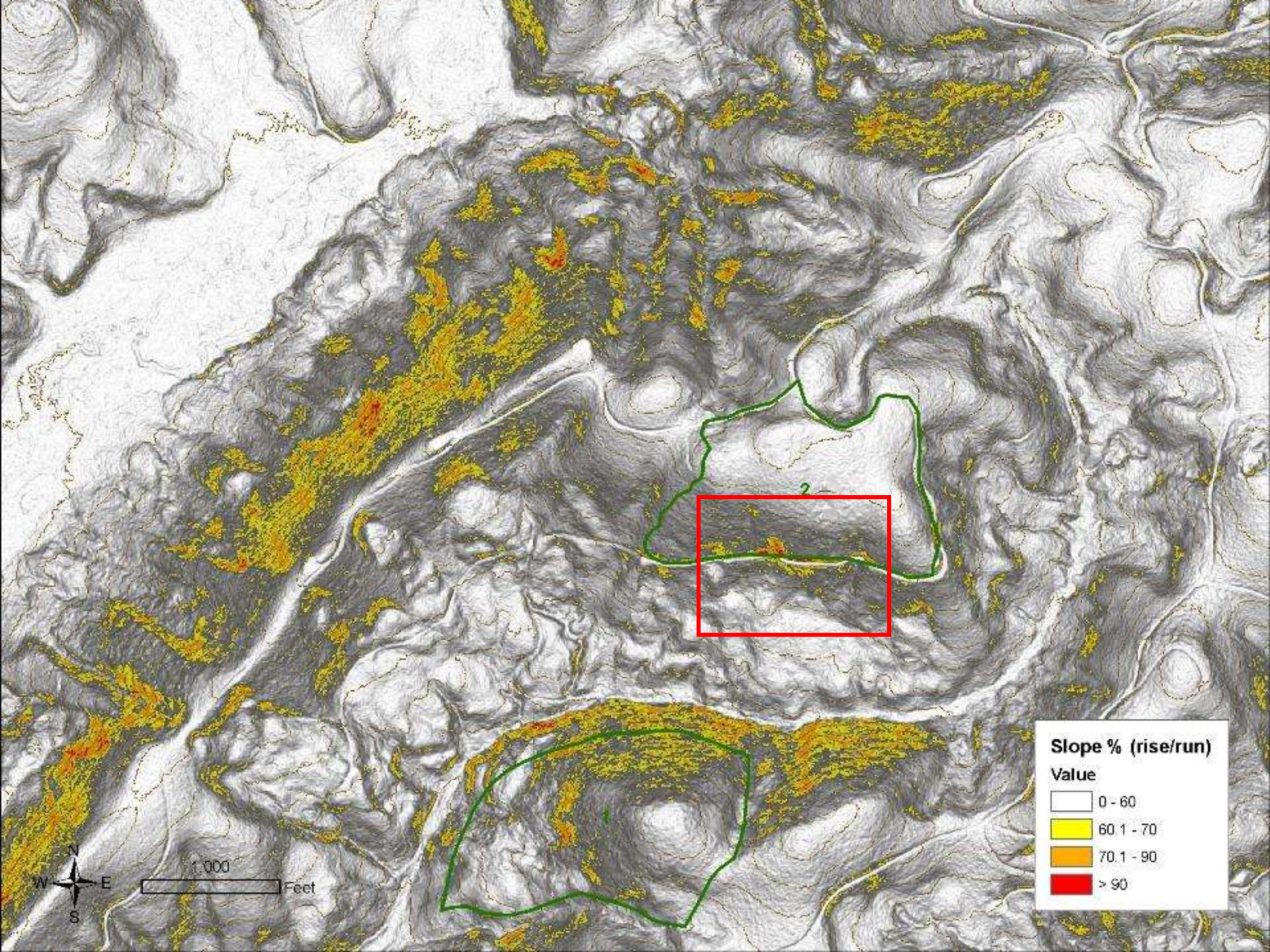
Slope % (rise/run)
Value
0 - 60
60.1 - 70
70.1 - 90
> 90
N
W
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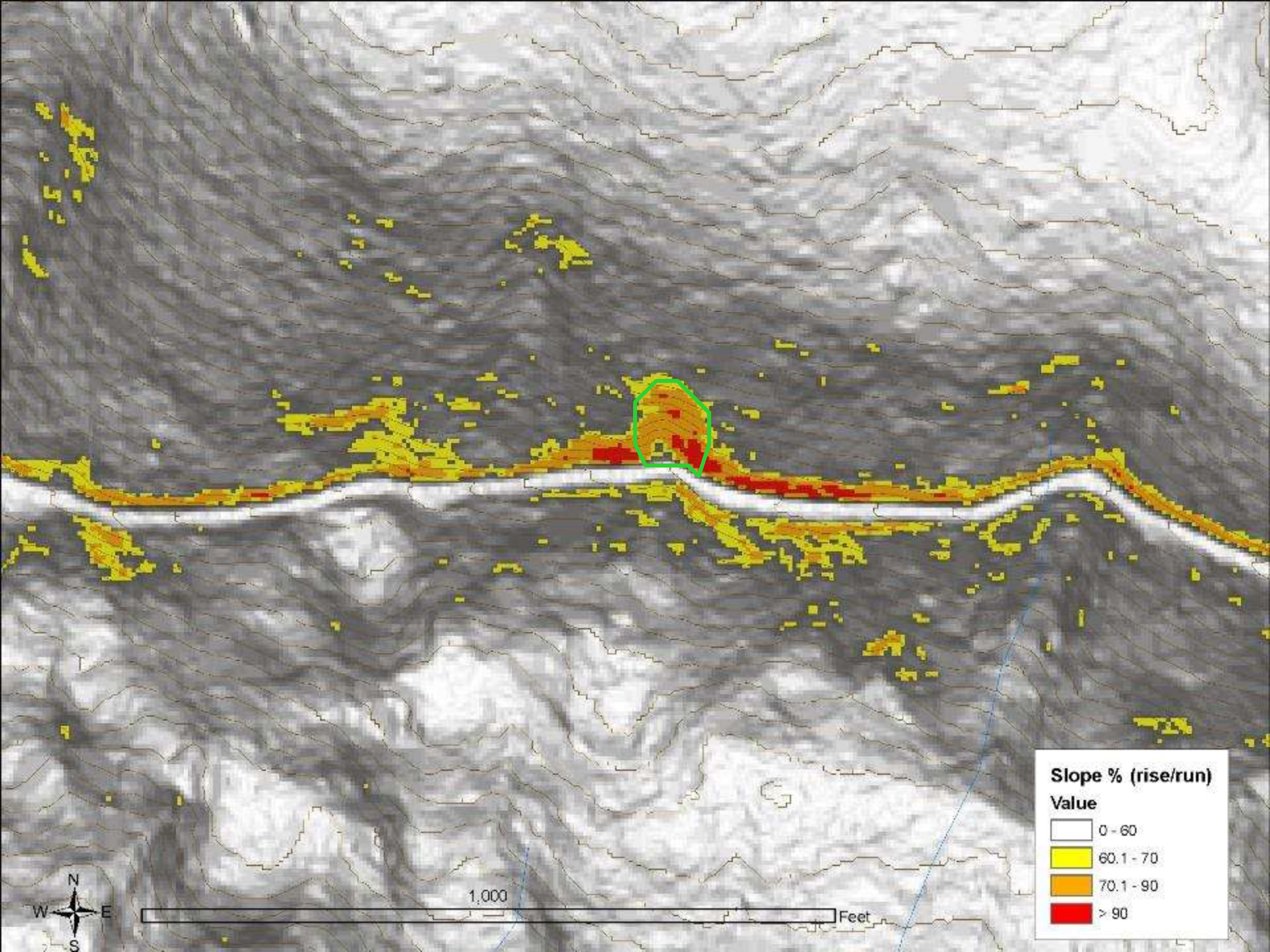
1,000
Feet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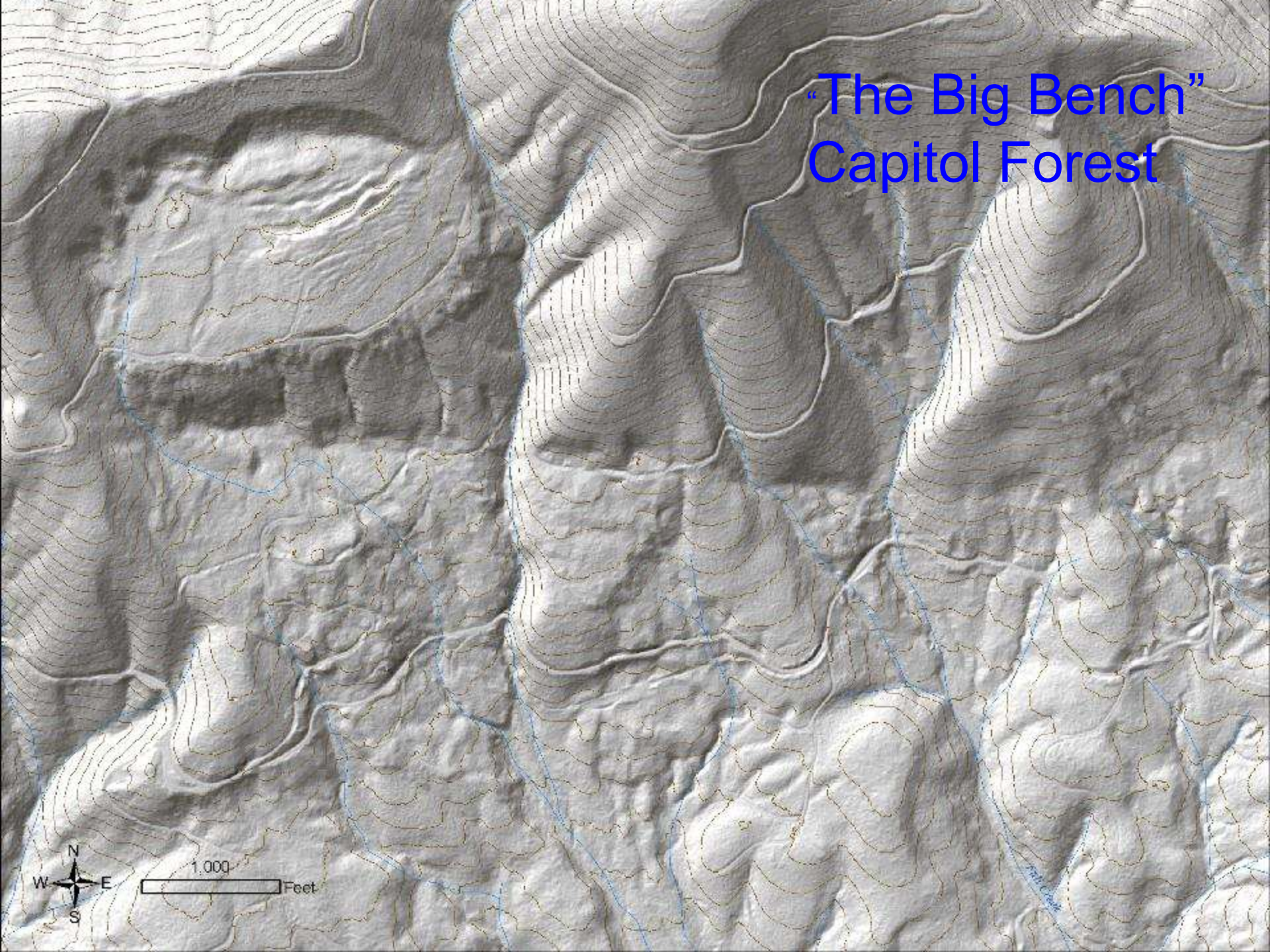
"The Big Bench"
Capitol Forest
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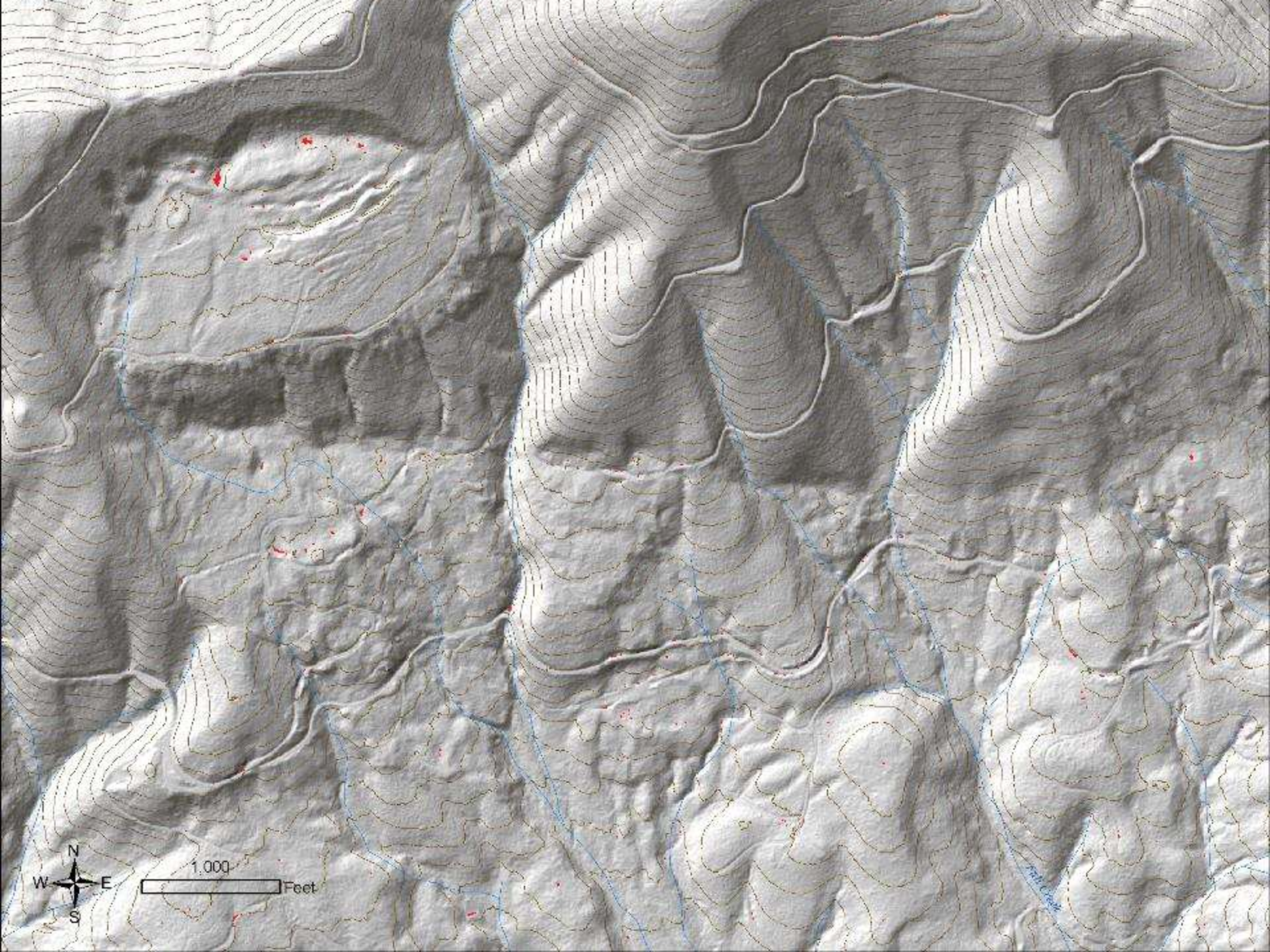
Feet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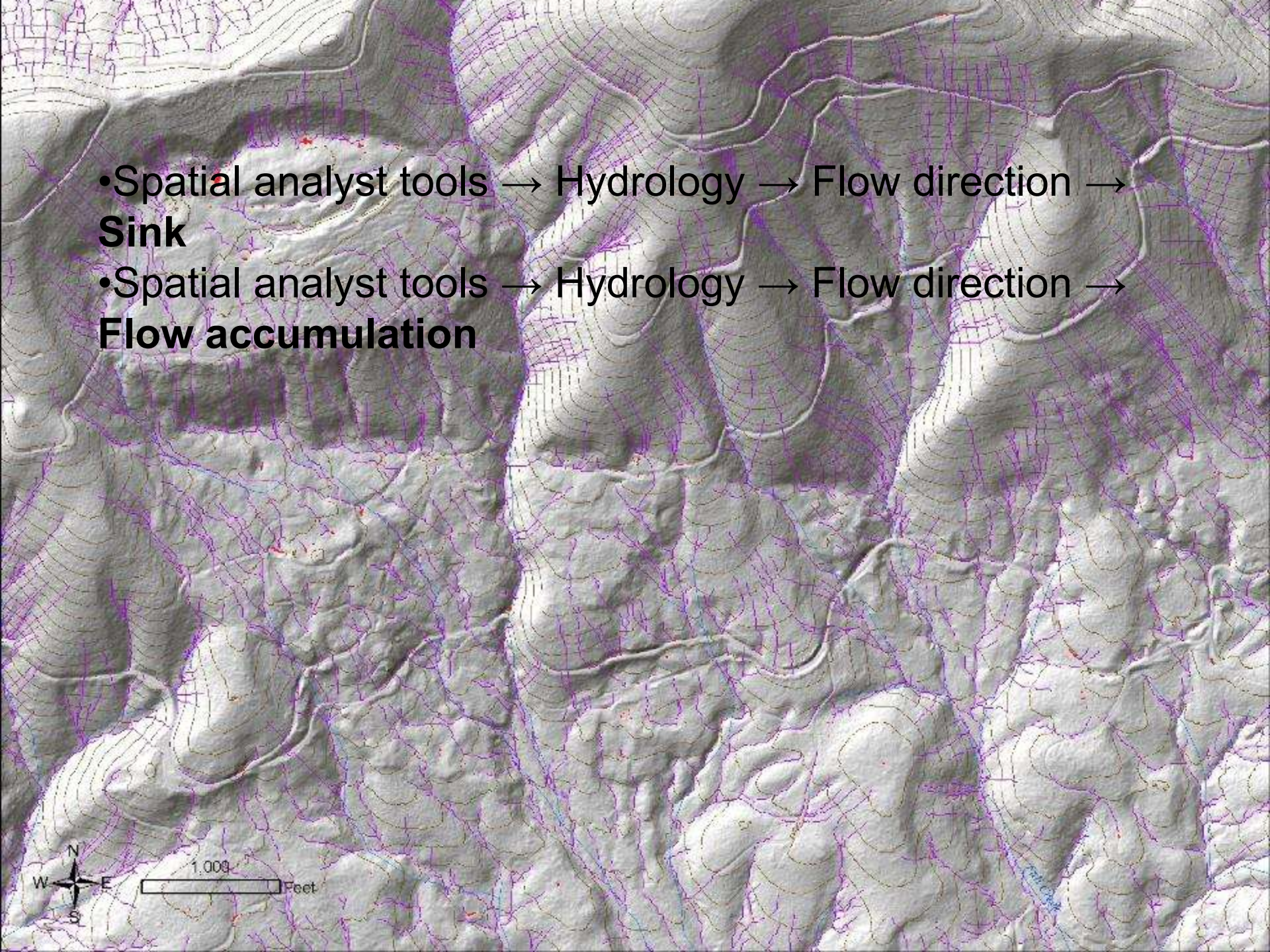

- Spatial analyst tools → Hydrology → Flow direction → **Sink**
- Spatial analyst tools → Hydrology → Flow direction → **Flow accumulation**

Questions?
Thank you