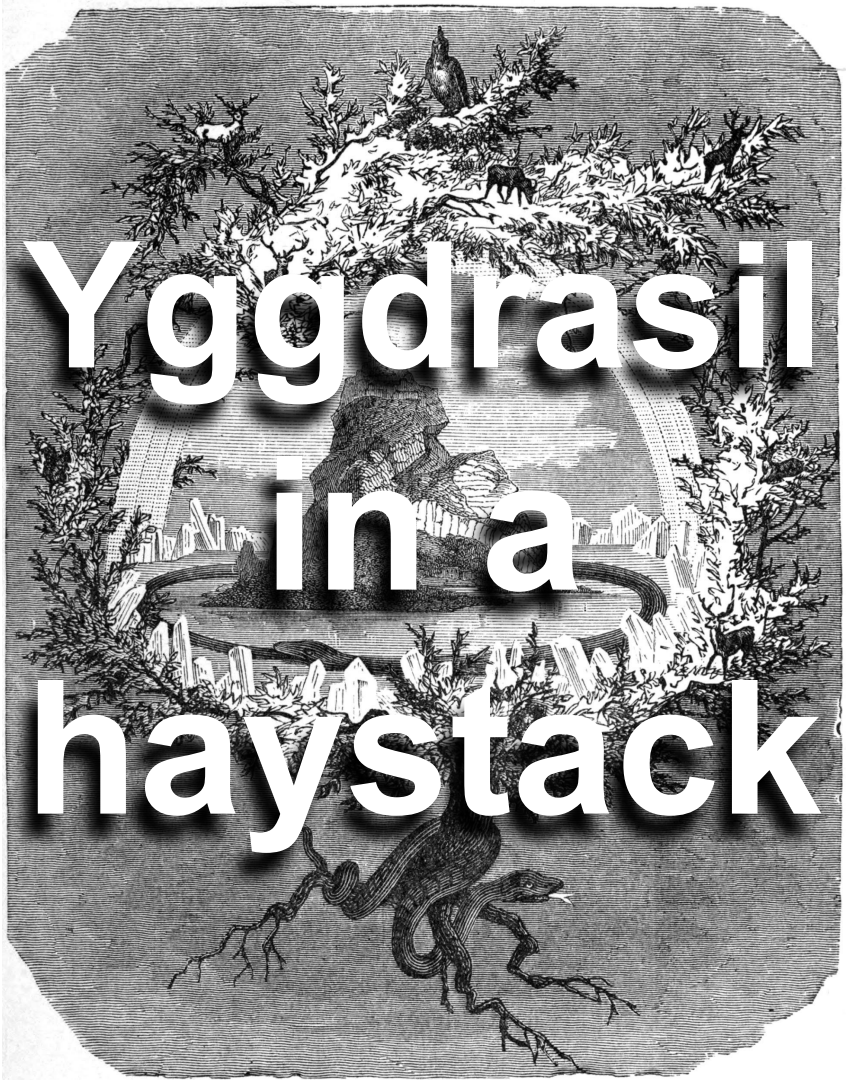


Yggdrasil, a great tree in Nordic mythology, provides a habitat for the universe and a meeting place for the gods. I like looking for big, tall, old trees and refer to them as yggdrasils. In the Northwest there are still old giants peppered through our forests and many of their locations have been kept to word-of-mouth even in the digital era. I wondered “can I find a particular tree based on a general location and description (8’+ DBH, 200’+ height, selectively logged area, riparian zone etc) and by using public GIS data?” To narrow my search I delineated a watershed from a sub-basin, created a vegetation density raster, narrowed CHM results, delineated canopies into polygons, extracted point clouds for individual trees and possibly found a simple workflow for identifying broken-top candidates. Old growth late succession firs can lose their crowns to weather and strong winds, these *broken-tops* create significant habitat for animals protected by the Endangered Species Act and can indicate a likely old giant. After narrowing candidates down by height and location I found that running a slope analysis on canopies may have been the strongest approach to locating my particular yggdrasil in a haystack. I identified three neighboring trees as the likeliest candidates in the sub-basin, but I have yet to ground truth my results. Names will be changed and the location will be obscured in this presentation.



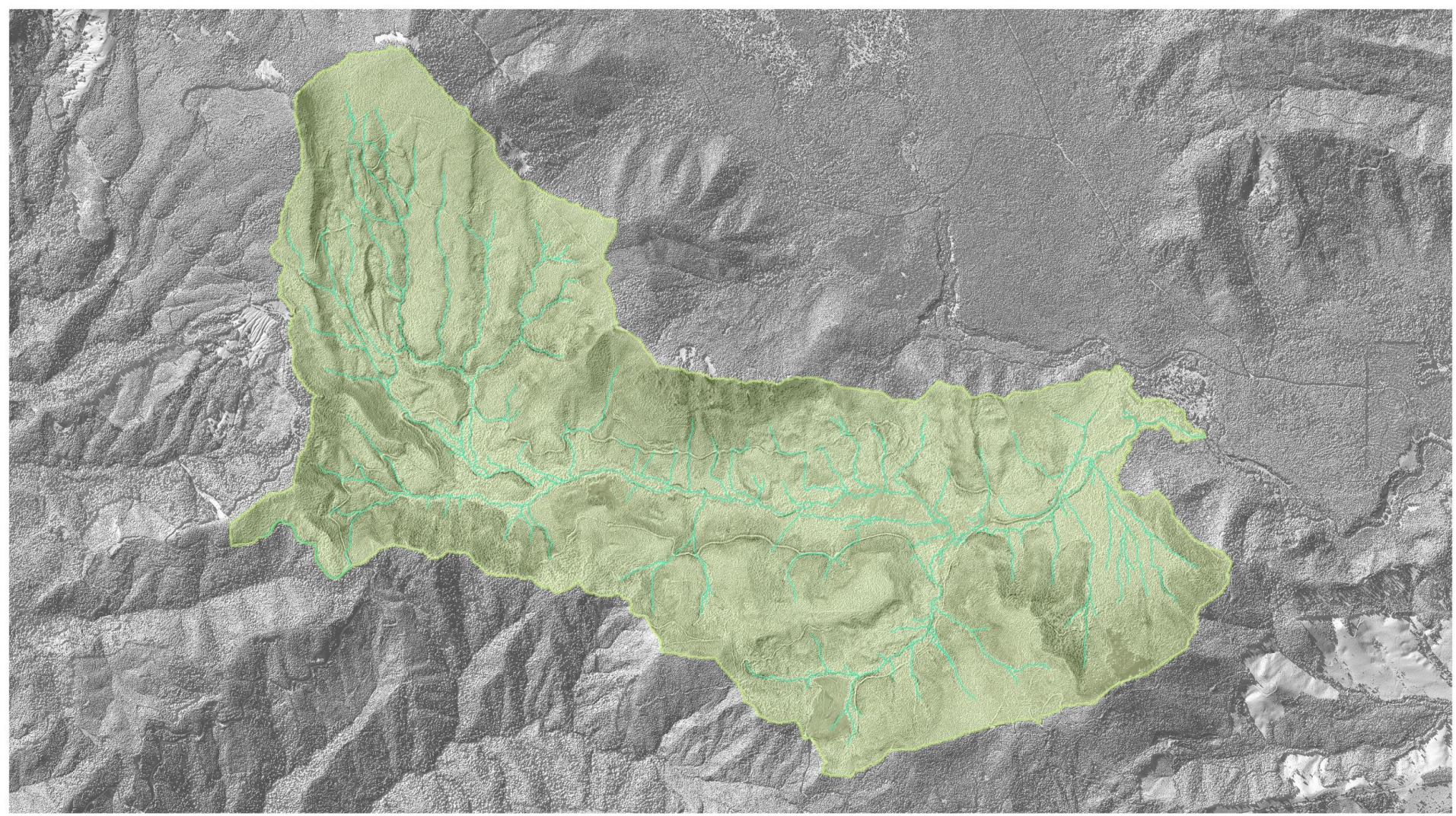
Yggdrasil in a haystack

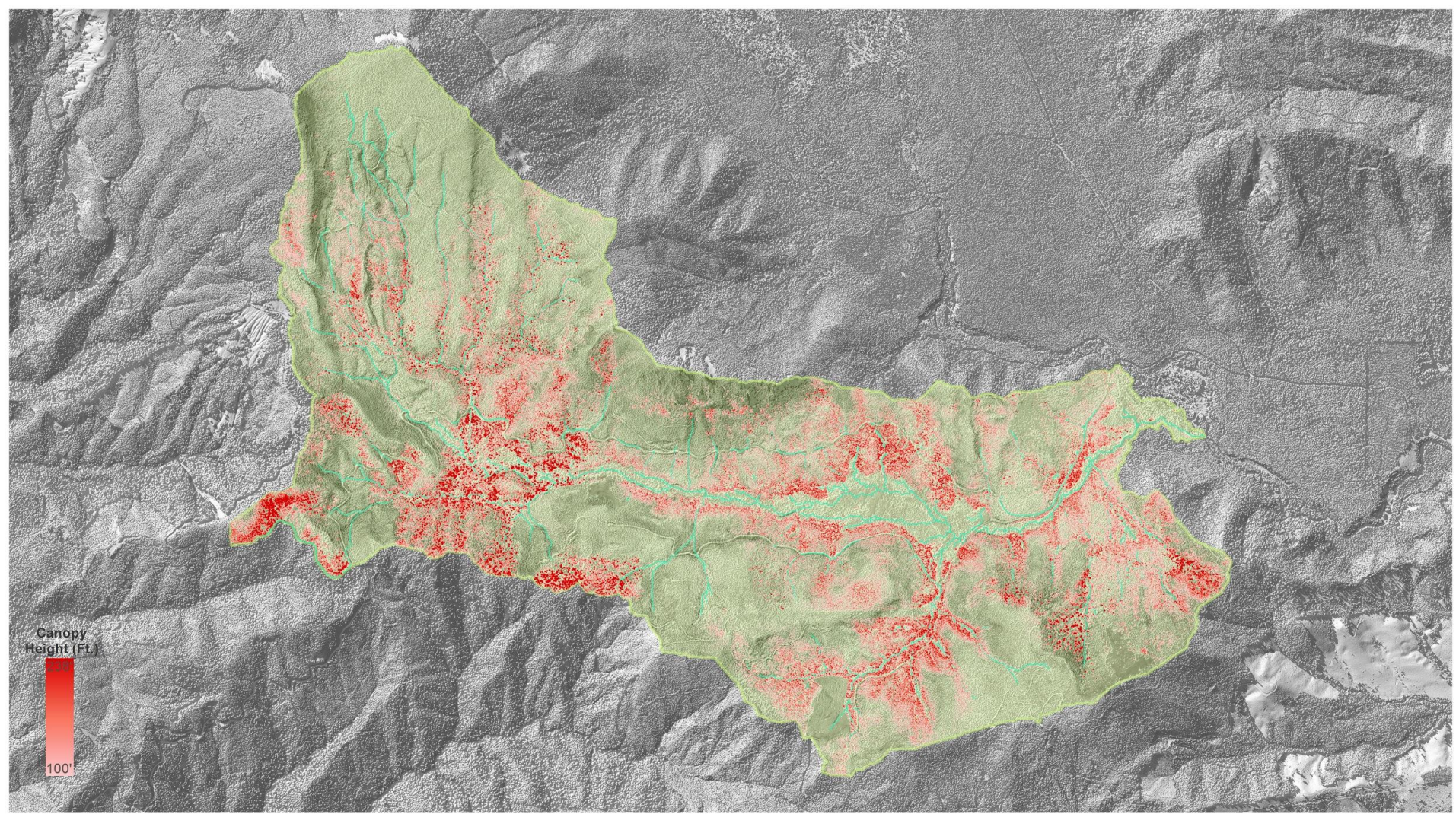
JJ Bjordahl

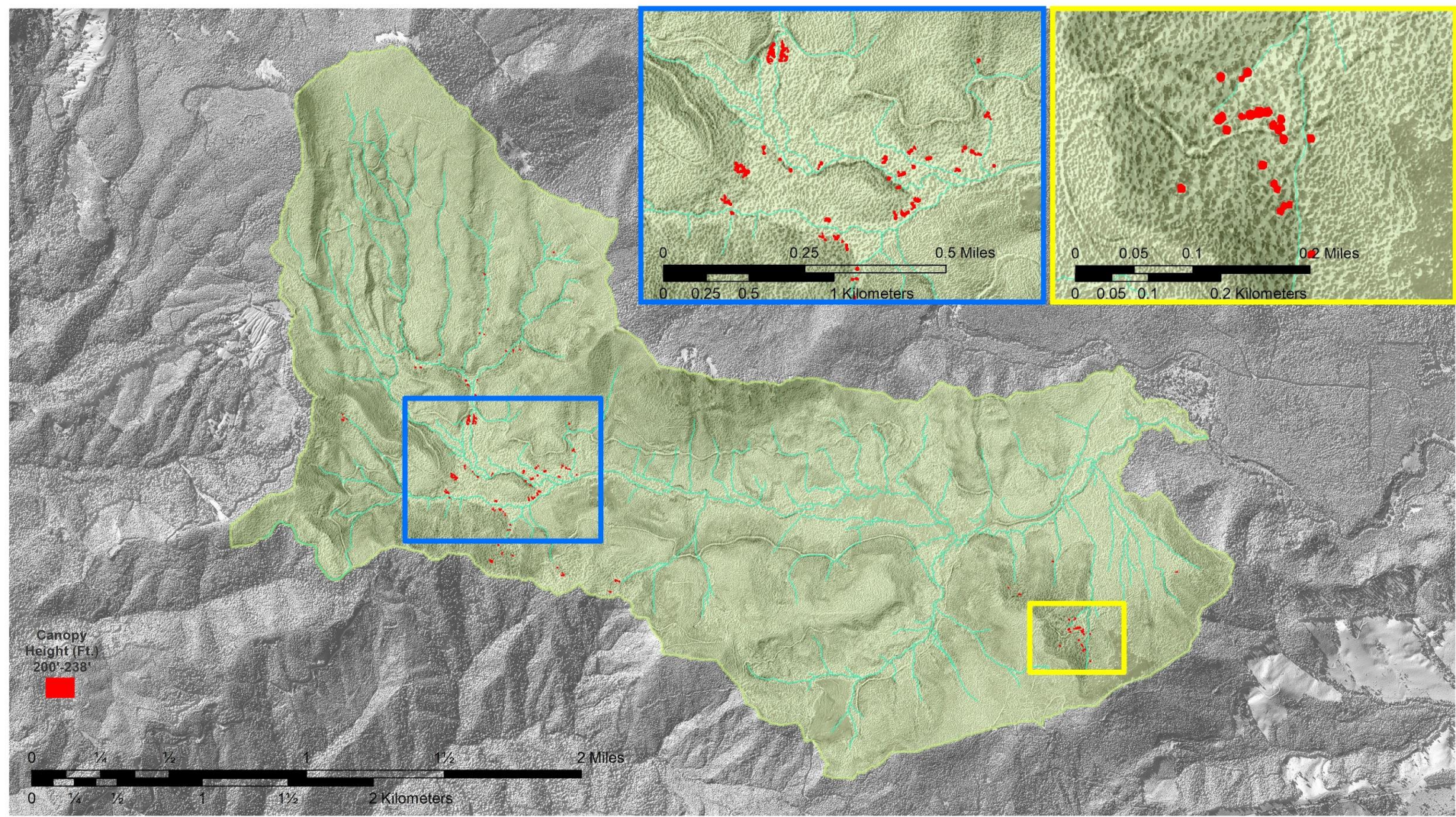
jbb5@pdx.edu

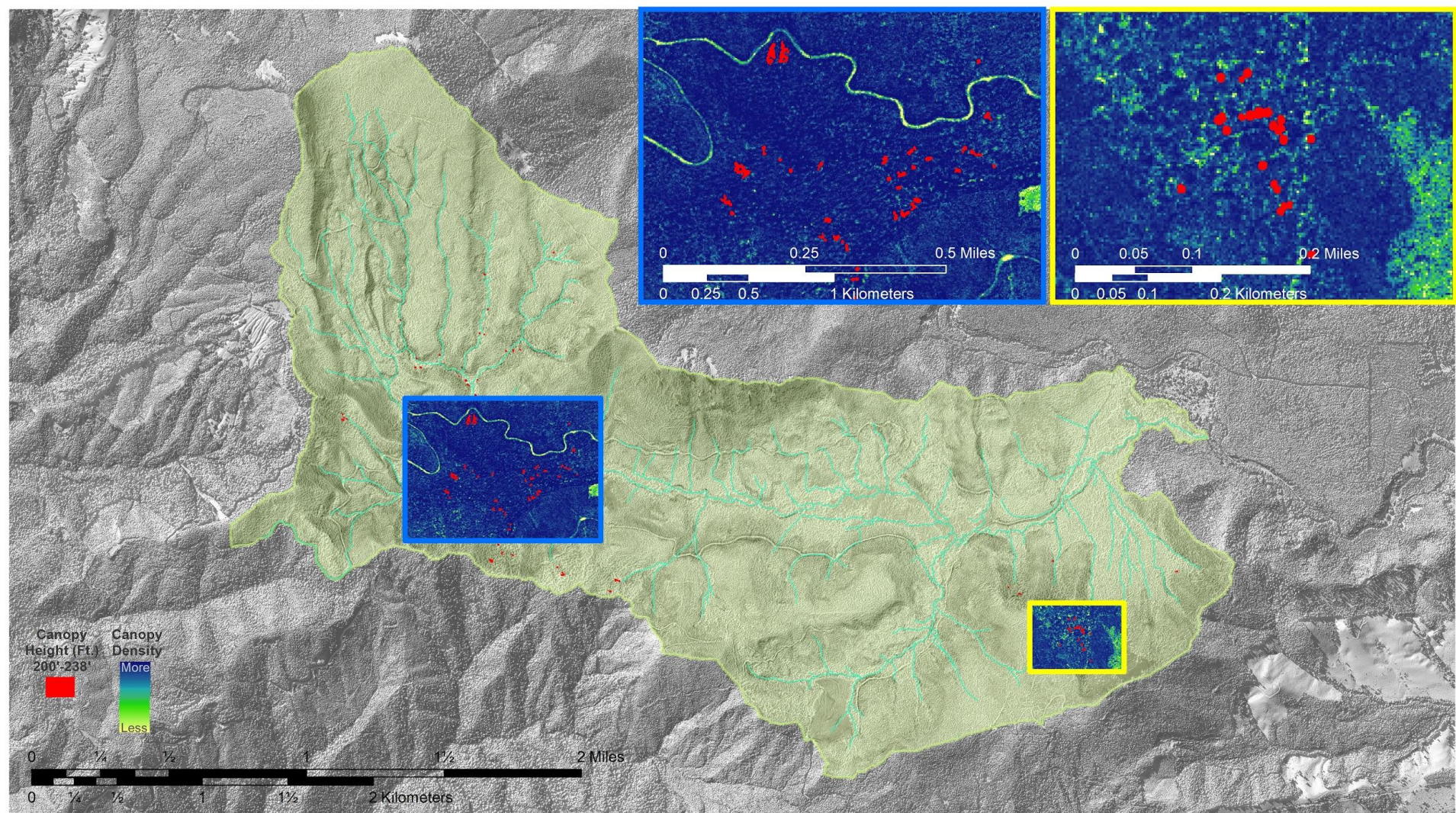
GEOG 493: Digital Terrain Analysis

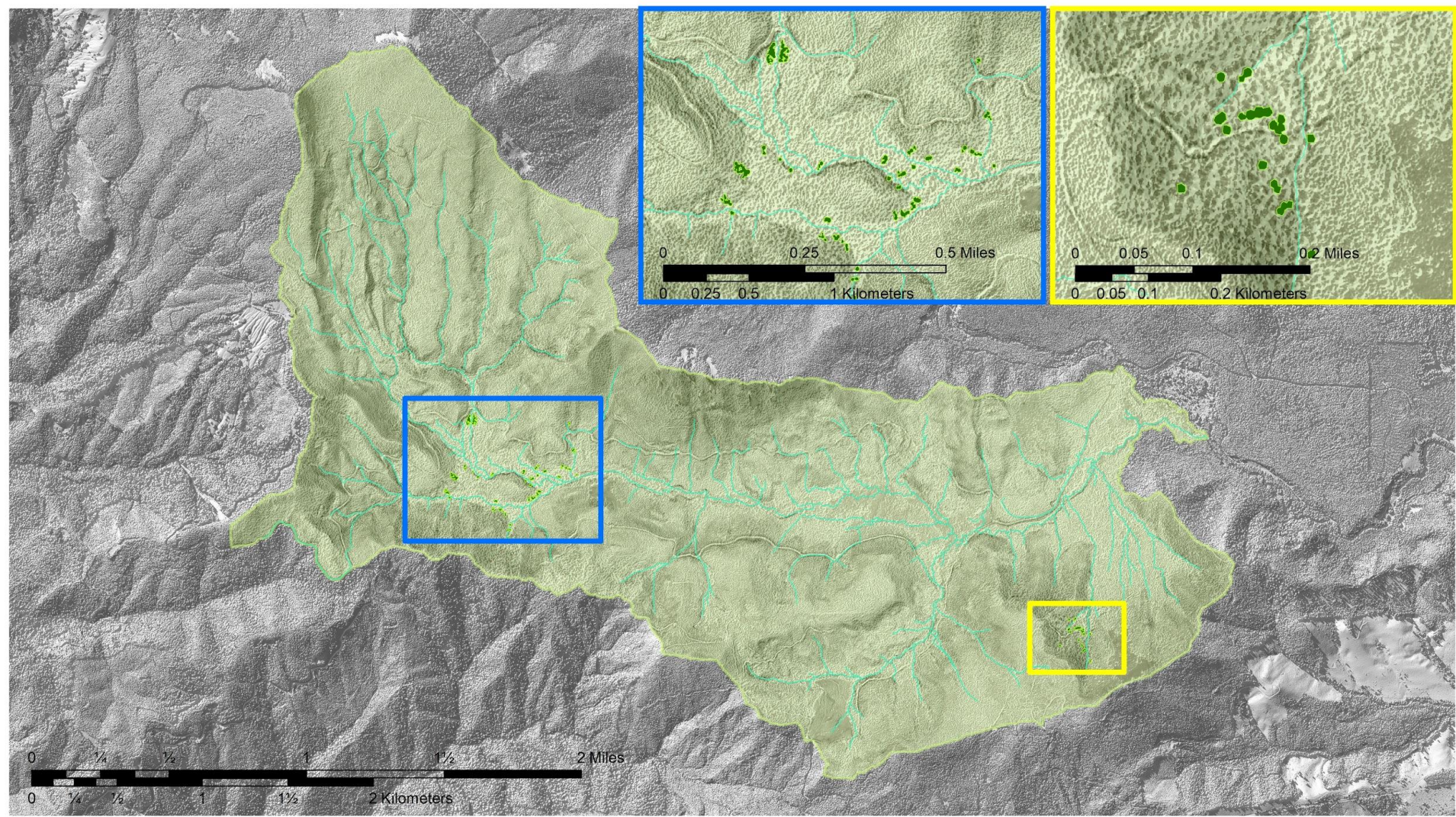
Fall 2020

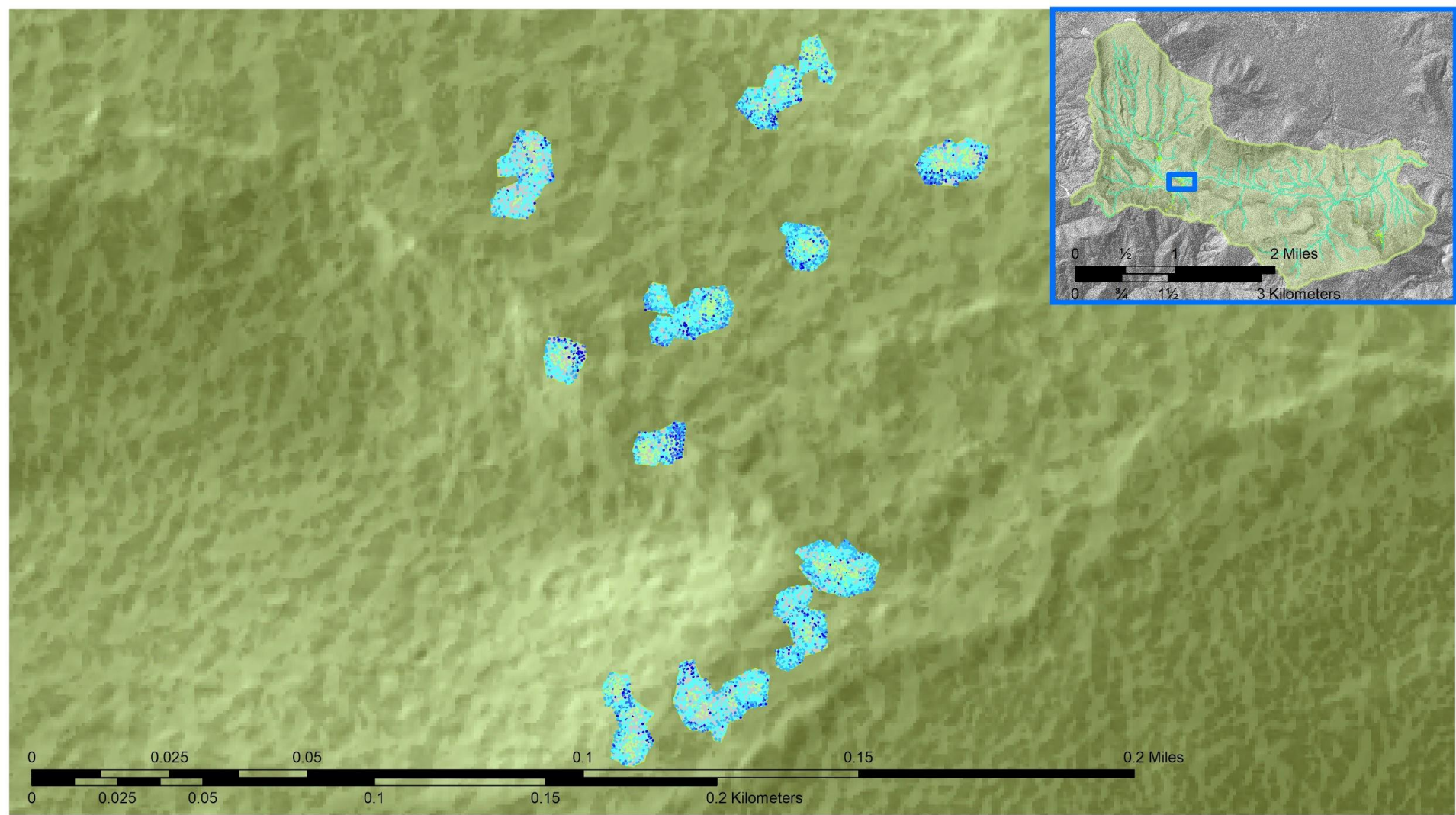


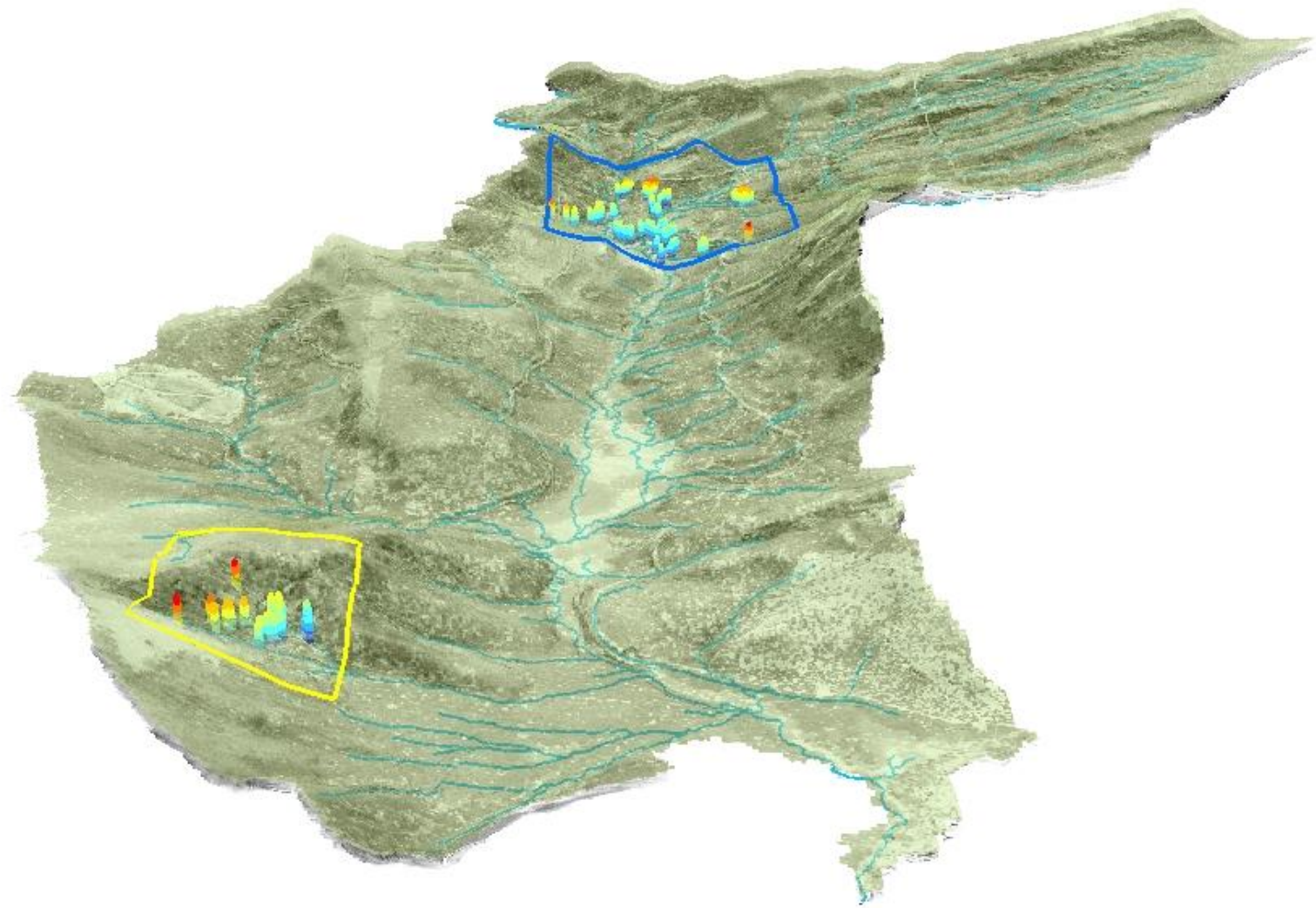


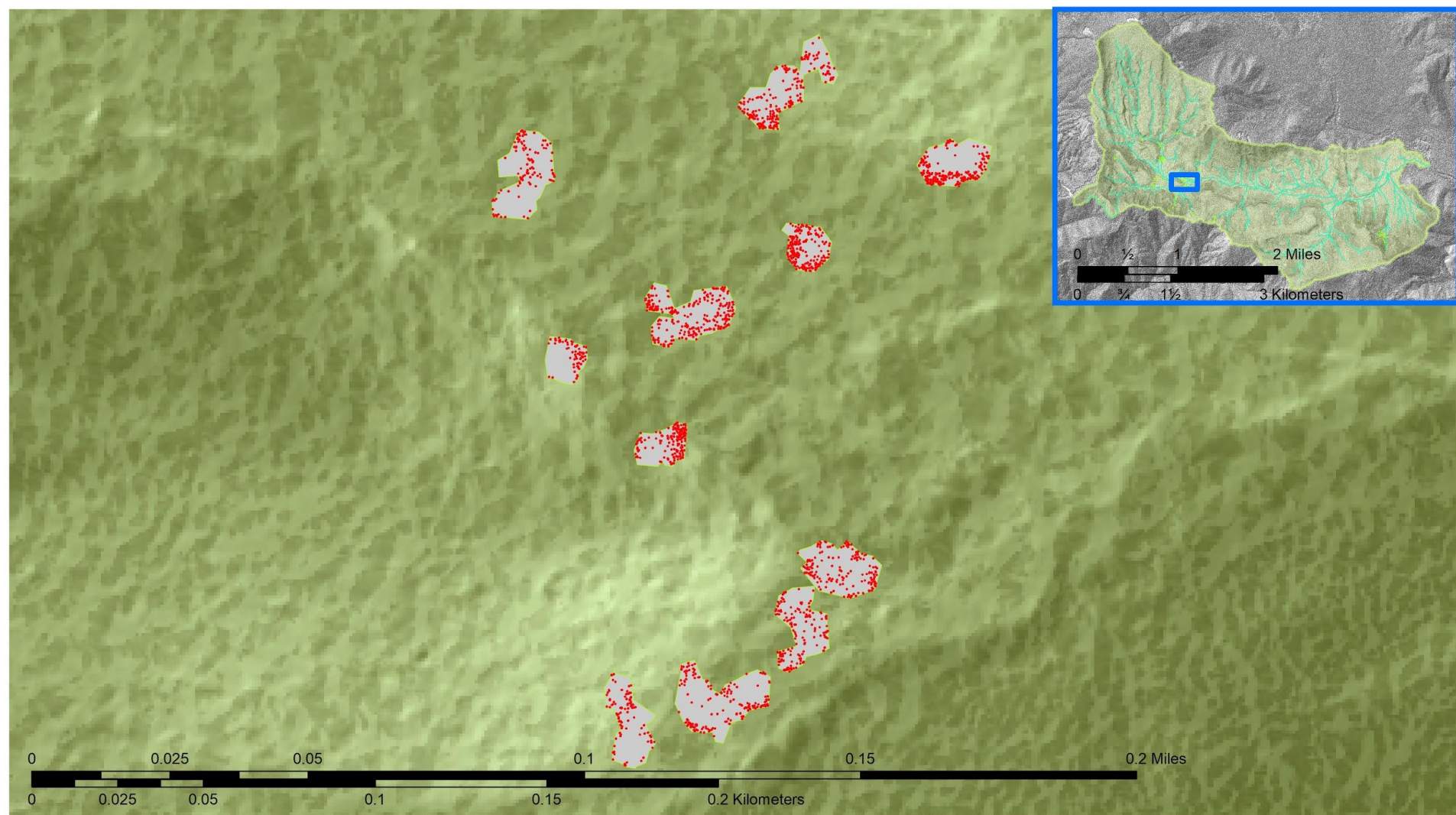


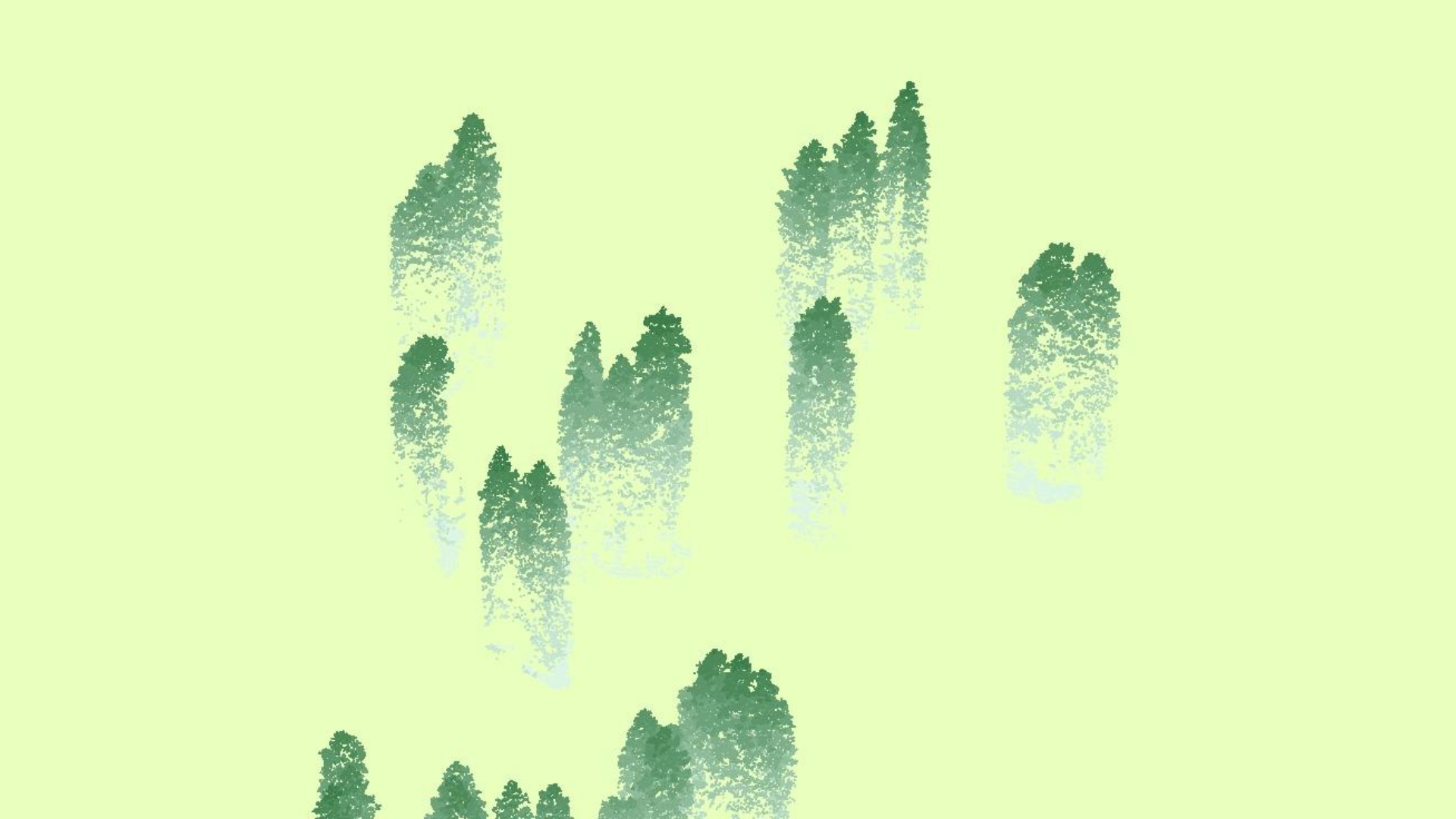


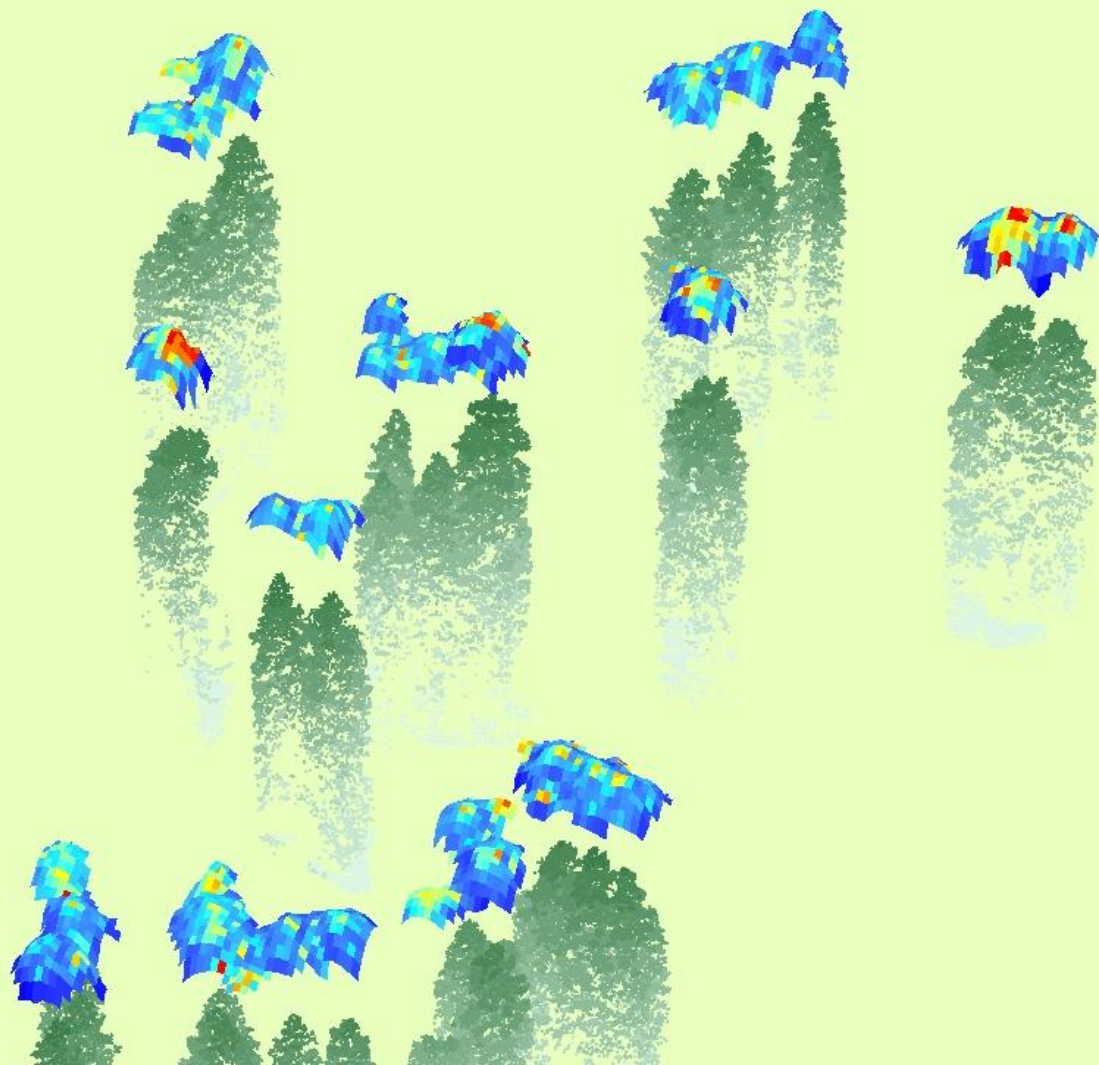


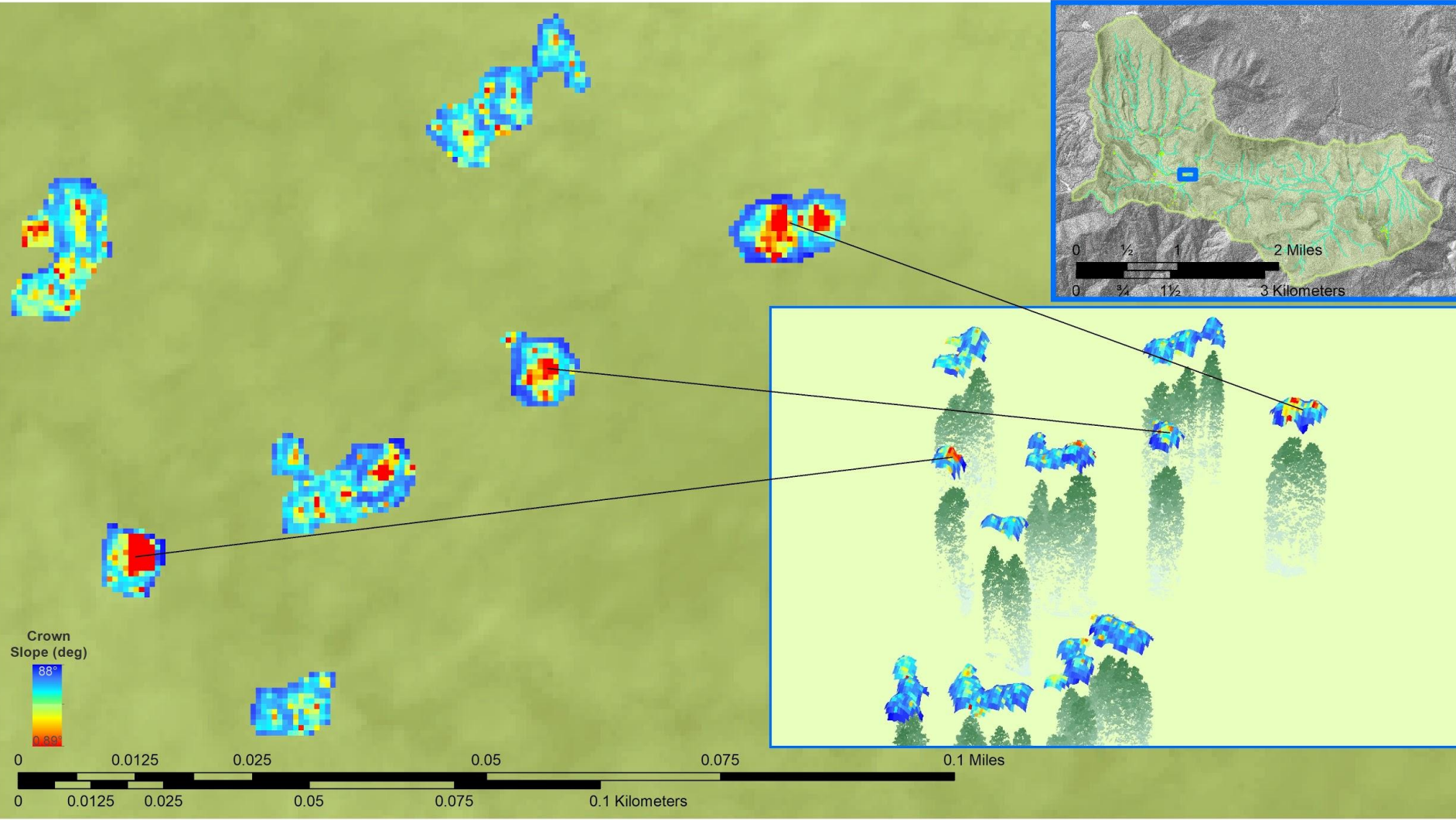












Data Sources:

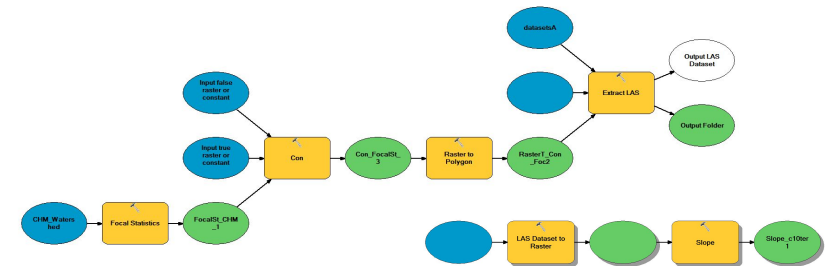
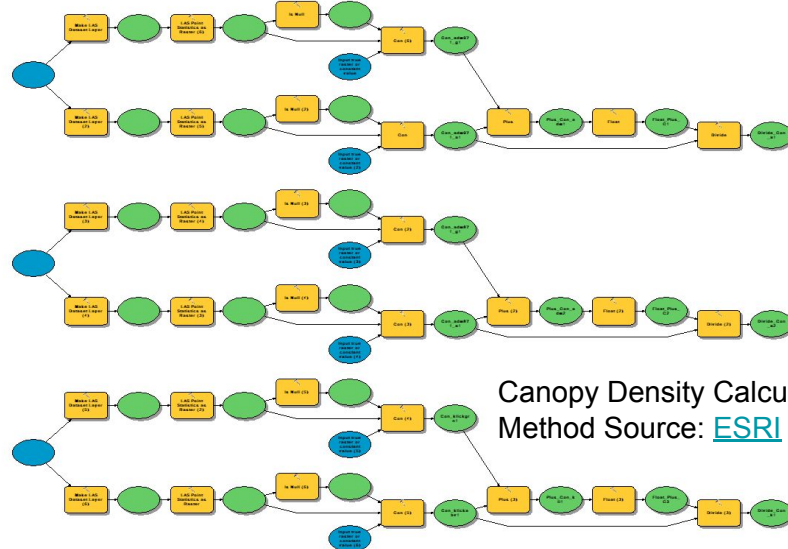
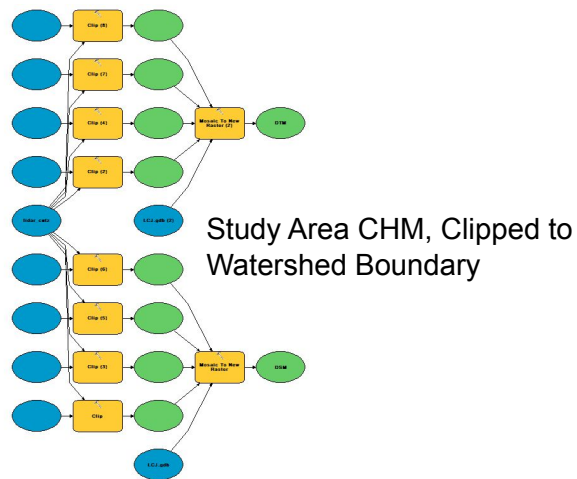
Washington State Department of Natural Resources Lidar Portal for all .LAZ point clouds, DTMs and DSMs
Yggdrasil artwork by Friedrich Wilhelm Heine and sourced from Wikipedia

GISystems used:

ESRI's ArcMap 10.x and ArcGIS Pro 2.x

GIS Tools used:

<i>Canopy Delineation (Crude)</i> • Focal Statistics • Con • Raster to Polygon • Extract LAS	<i>Canopy Density Measure</i> • Make LAS Dataset Layer • LAS Point Statistics as Raster • Is Null • Con • Plus • Float • Divide	<i>Treetop Slope Analysis</i> • Make LAS Dataset Layer • Slope • Con • Raster to Polygon
<i>Watershed Delineation</i> • Fill • Flow Direction • Flow Accumulation • Watershed	<i>DTM Hillshade</i> Terrain Tools version 1.1 Cluster Hillshade	<i>Failed Routes:</i> • DBH with Lidar Reason: data not high enough in resolution. • LASTools (RapidLasso). Reason: Unknown, maybe Map and Pro have moved beyond compatibility. • Forest Tools R package (CRAN). Reason: Likely user errors, not enough R experience.



Canopy Delineation / Individual Tree Point Clouds and Slope Measurement

Workflow and Idea Sources:

- [RapidLasso's LAsTools](#)
- [University of N. BC](#)
- [The Nature Conservancy](#)
- [Comprehensive R Archive Network: Forest Tools](#)
- [International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences](#)

