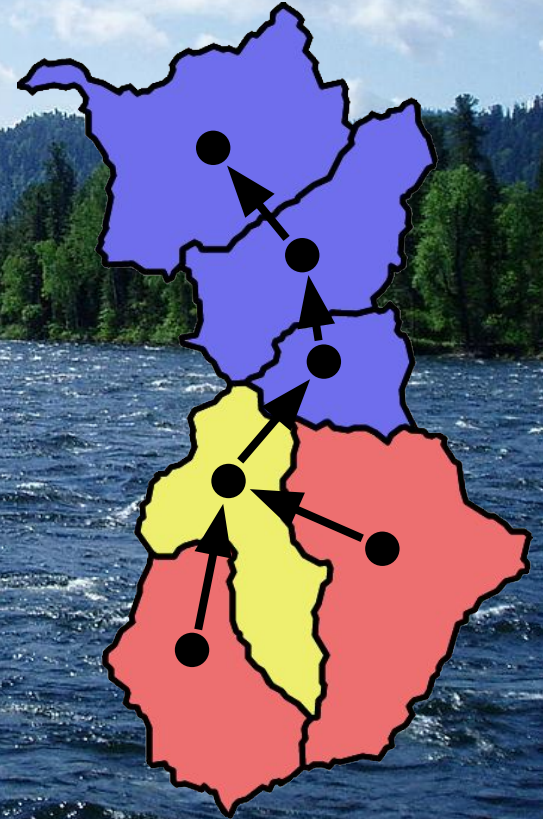
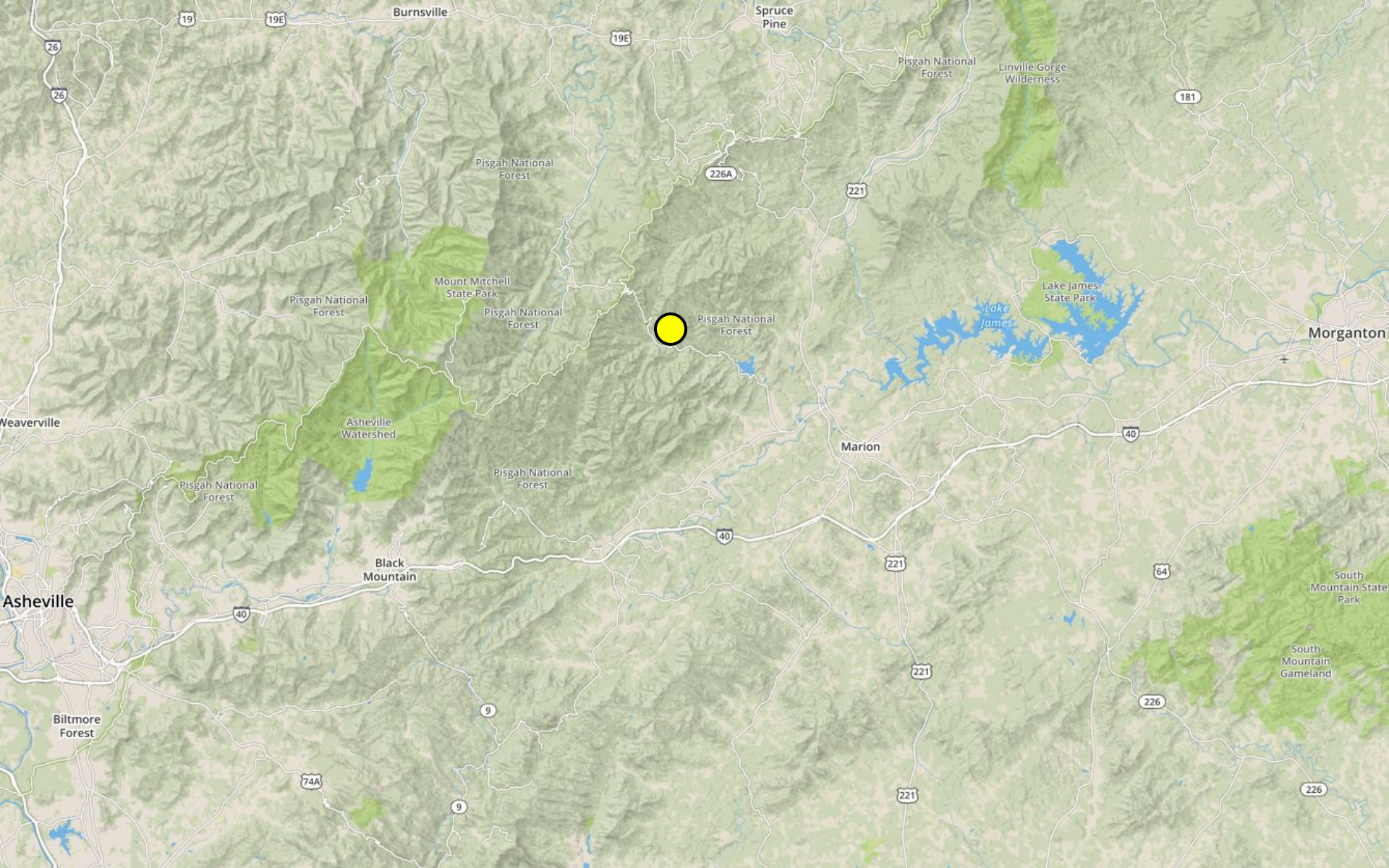
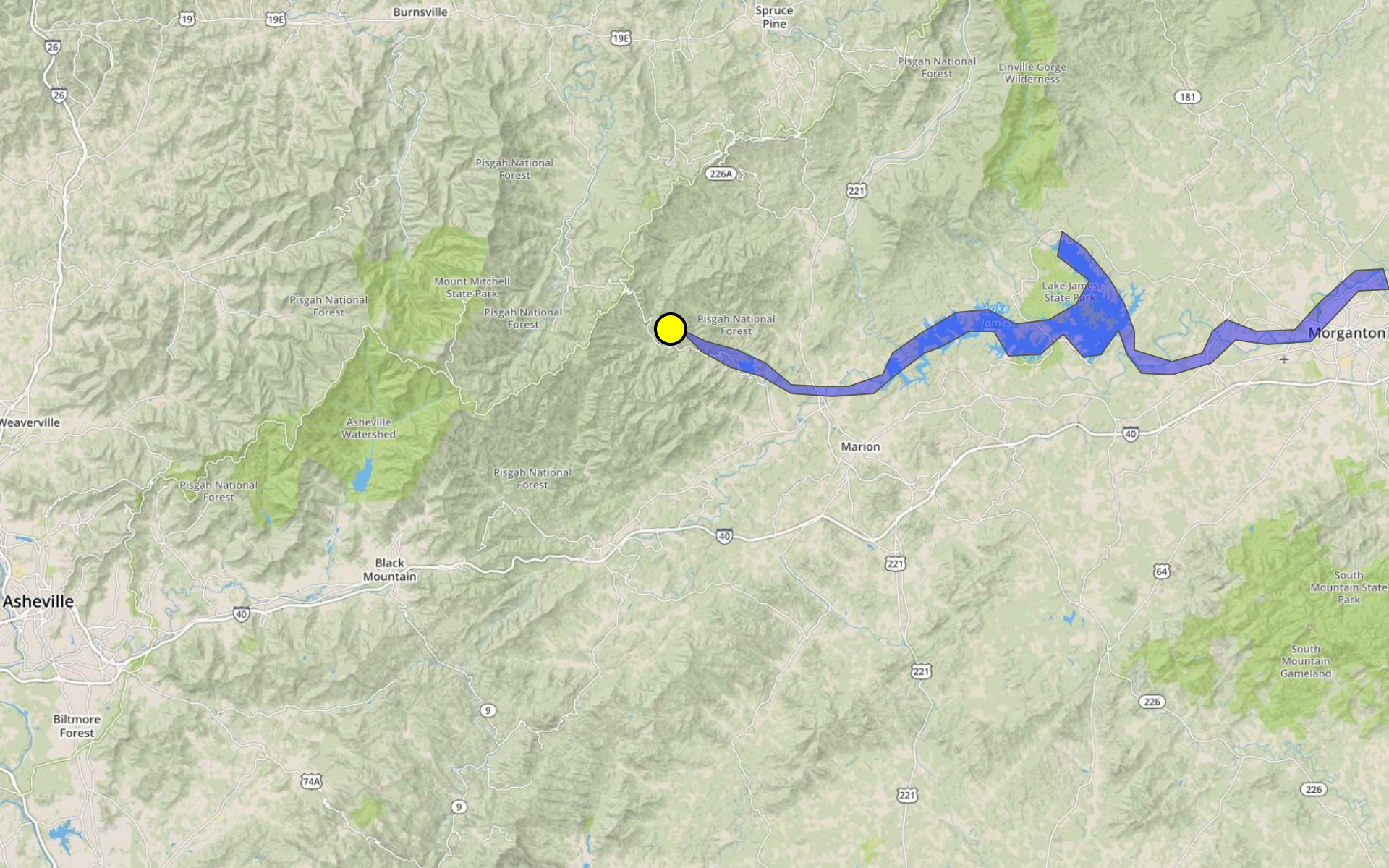


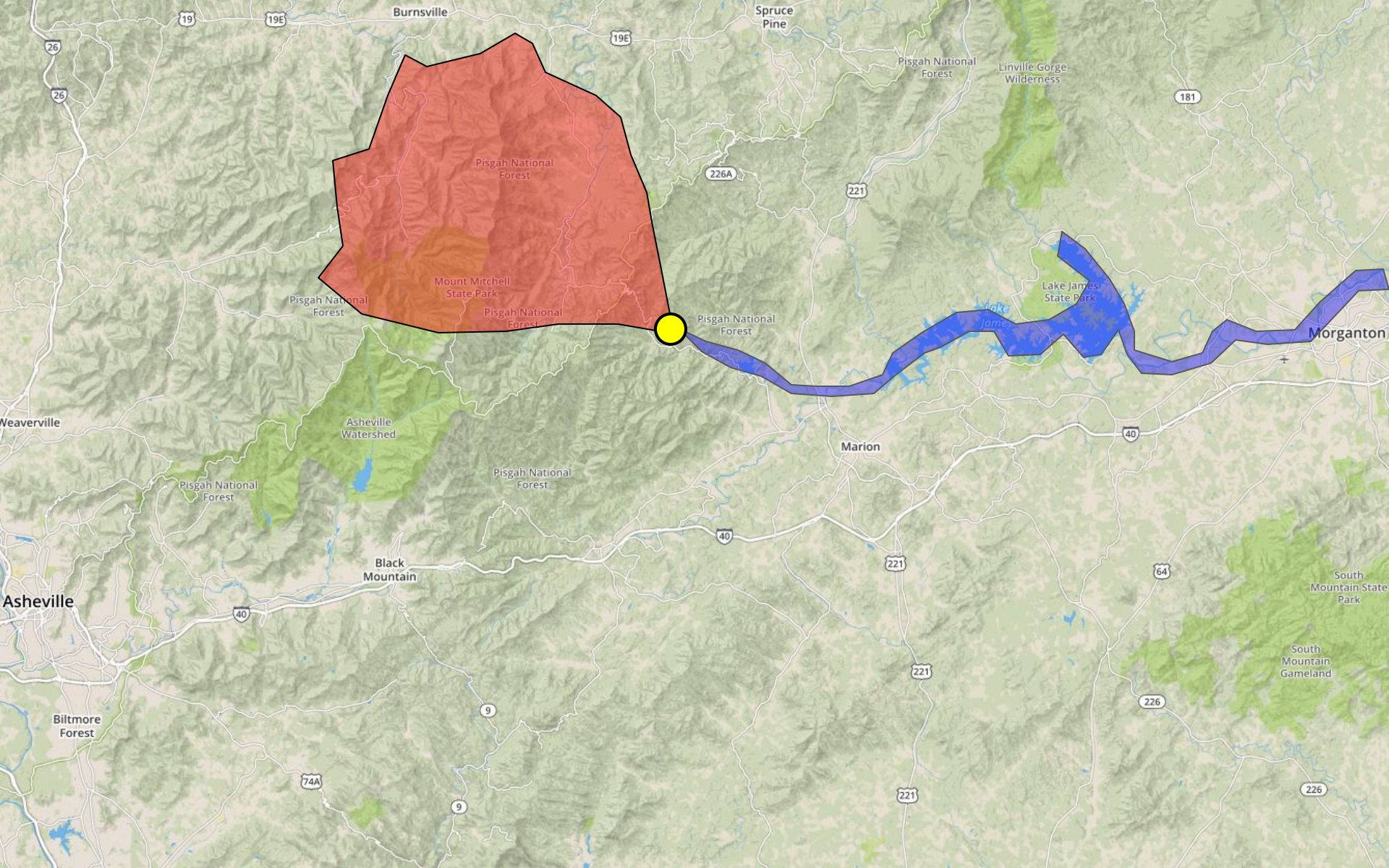
Upstream/Downstream: Discovering and Displaying Watershed Topology

Mark Phillips











Hydrography

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What is the WBD?



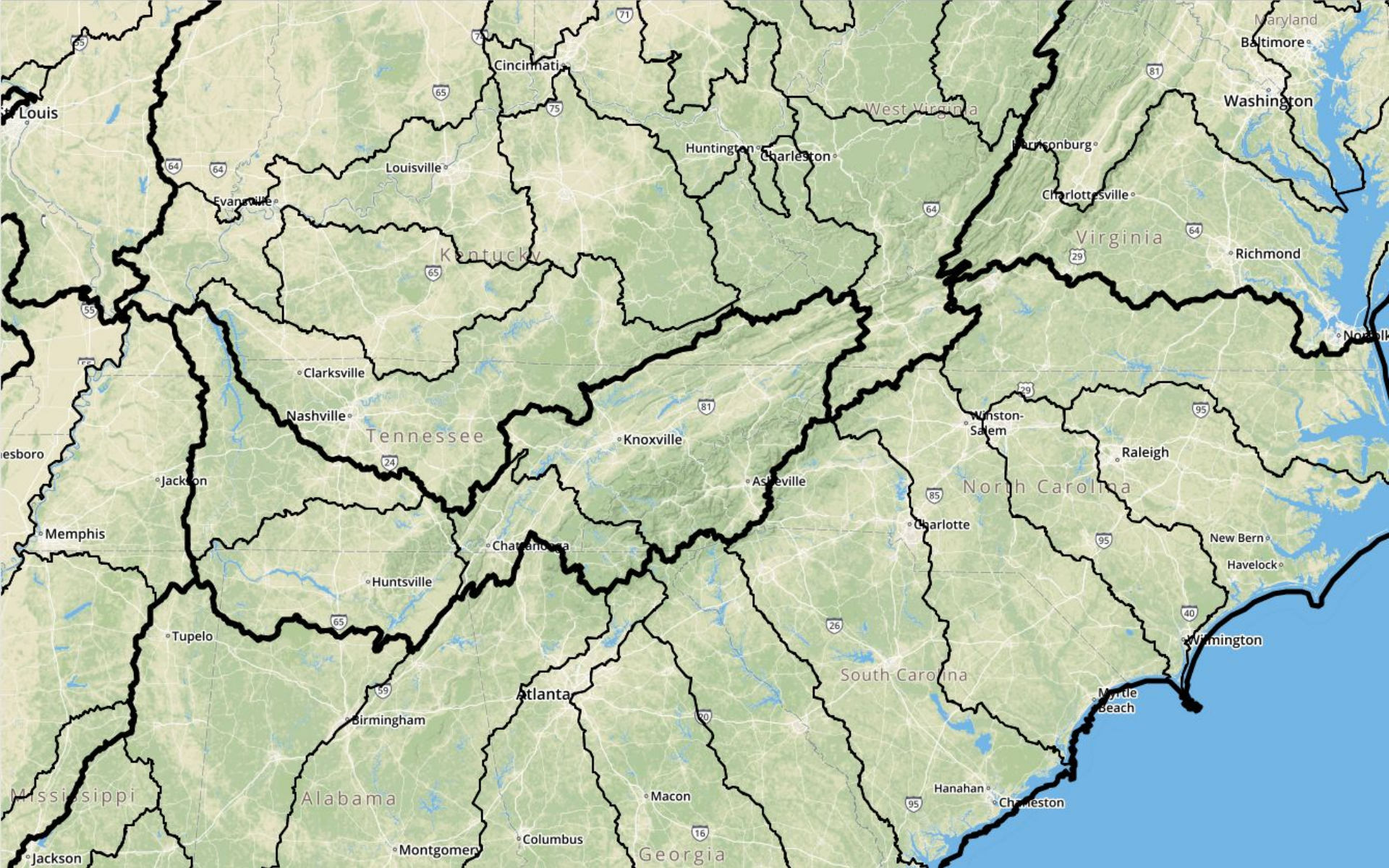
The Watershed Boundary Dataset (WBD) defines the areal extent of surface water drainage to a point, accounting for all land and surface areas. Watershed Boundaries are determined solely upon science-based hydrologic principles, not favoring any administrative boundaries or special projects, nor particular program or agency. The intent of defining Hydrologic Units (HU) for the Watershed Boundary Dataset is to establish a base-line drainage boundary framework, accounting for all land and surface areas. At a minimum, the WBD is being delineated and

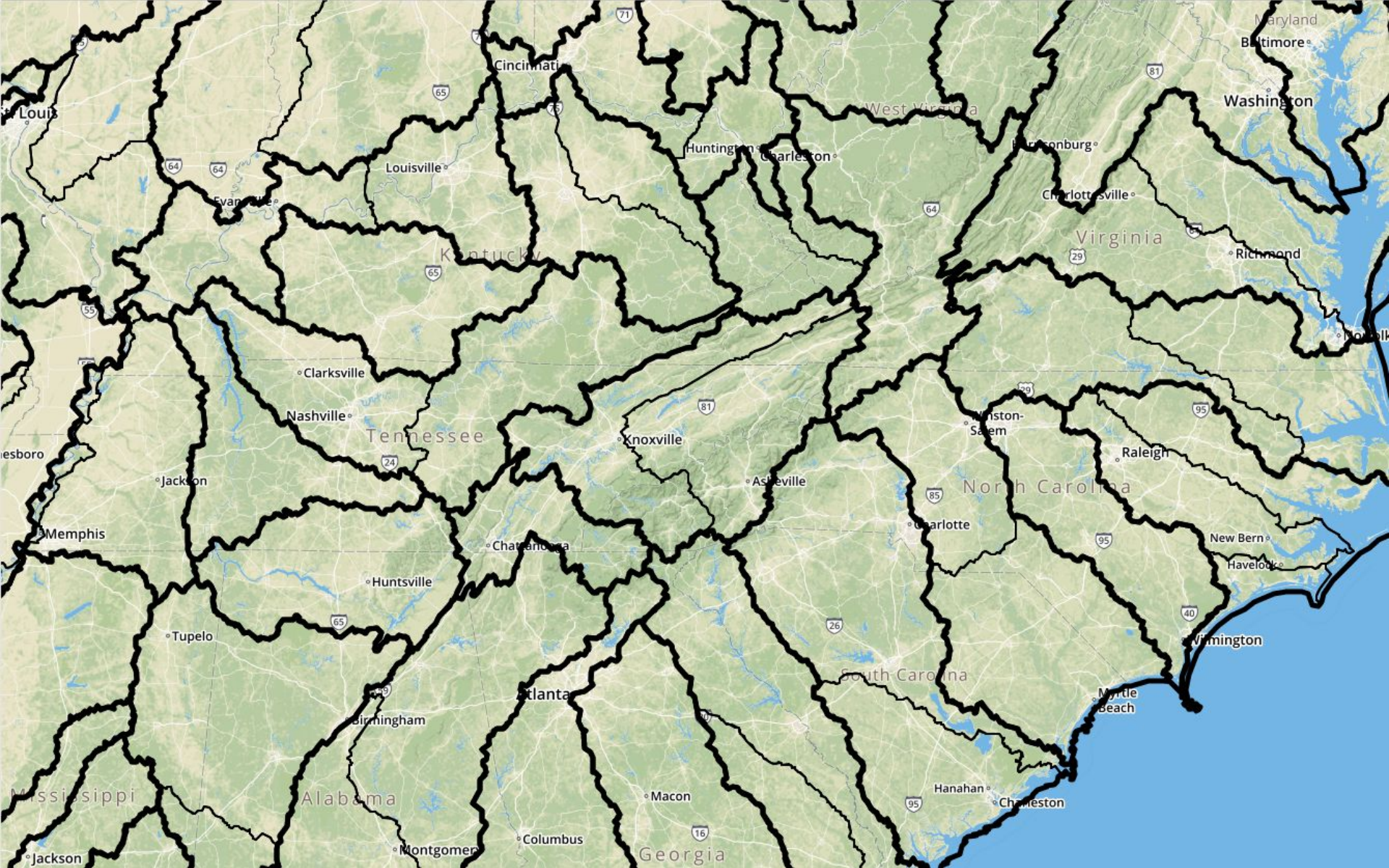
georeferenced to the USGS 1:24,000 scale topographic base map meeting National Map Accuracy Standards (NMAS). Hydrologic units are given a Hydrologic Unit Code (HUC). For example, a hydrologic region has a 2-digit HUC. A HUC describes where the unit is in the country and the level of the unit.

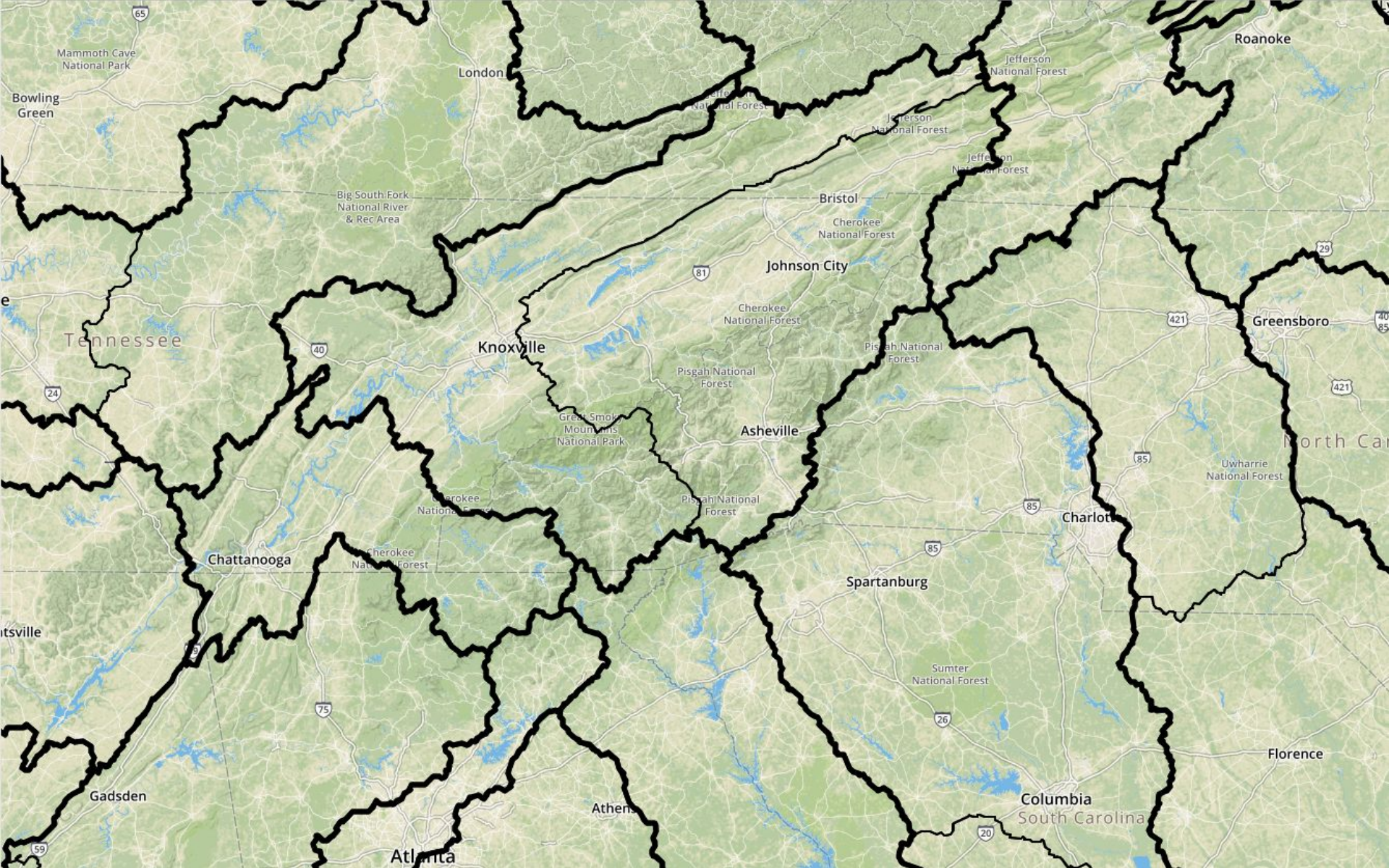


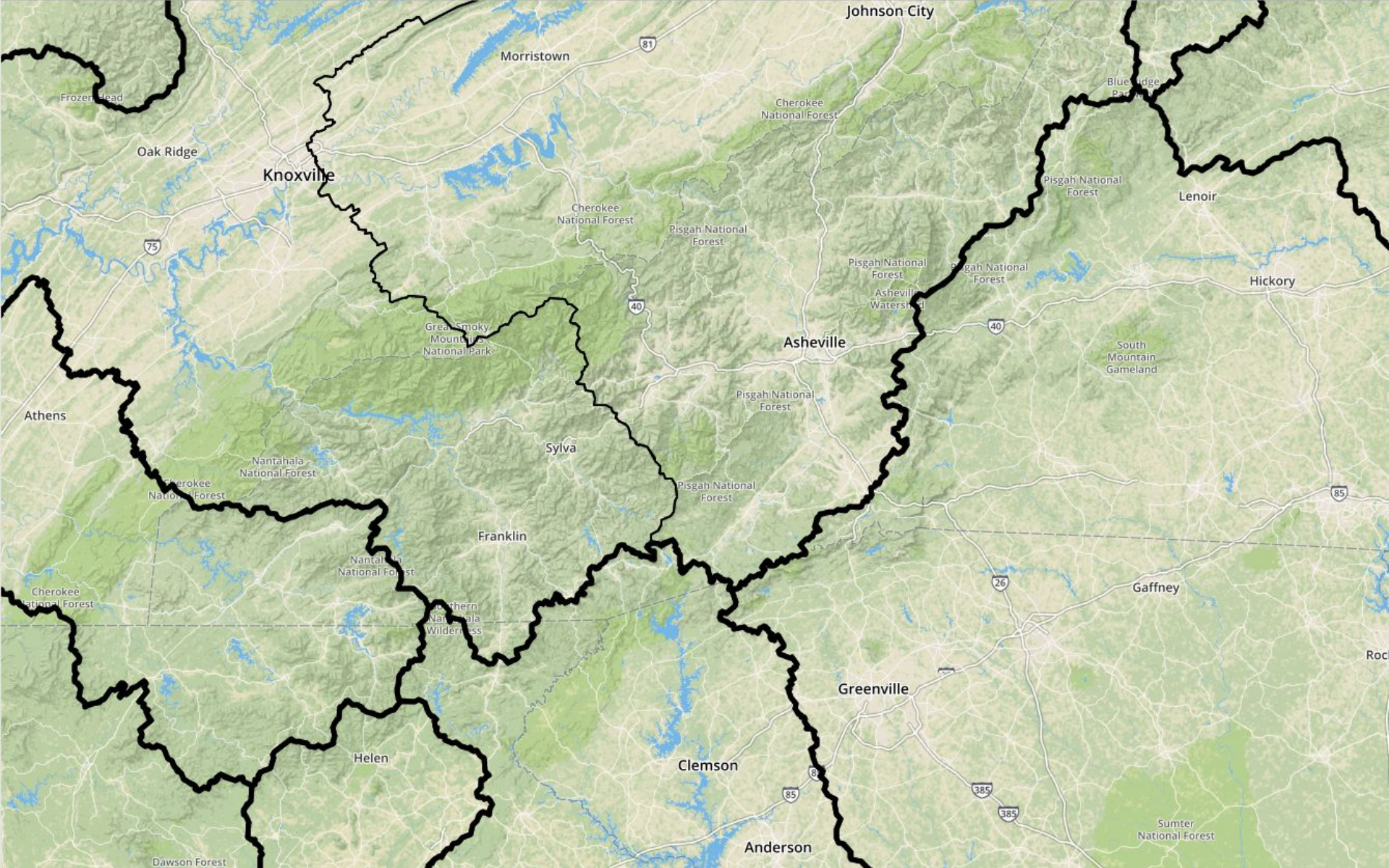


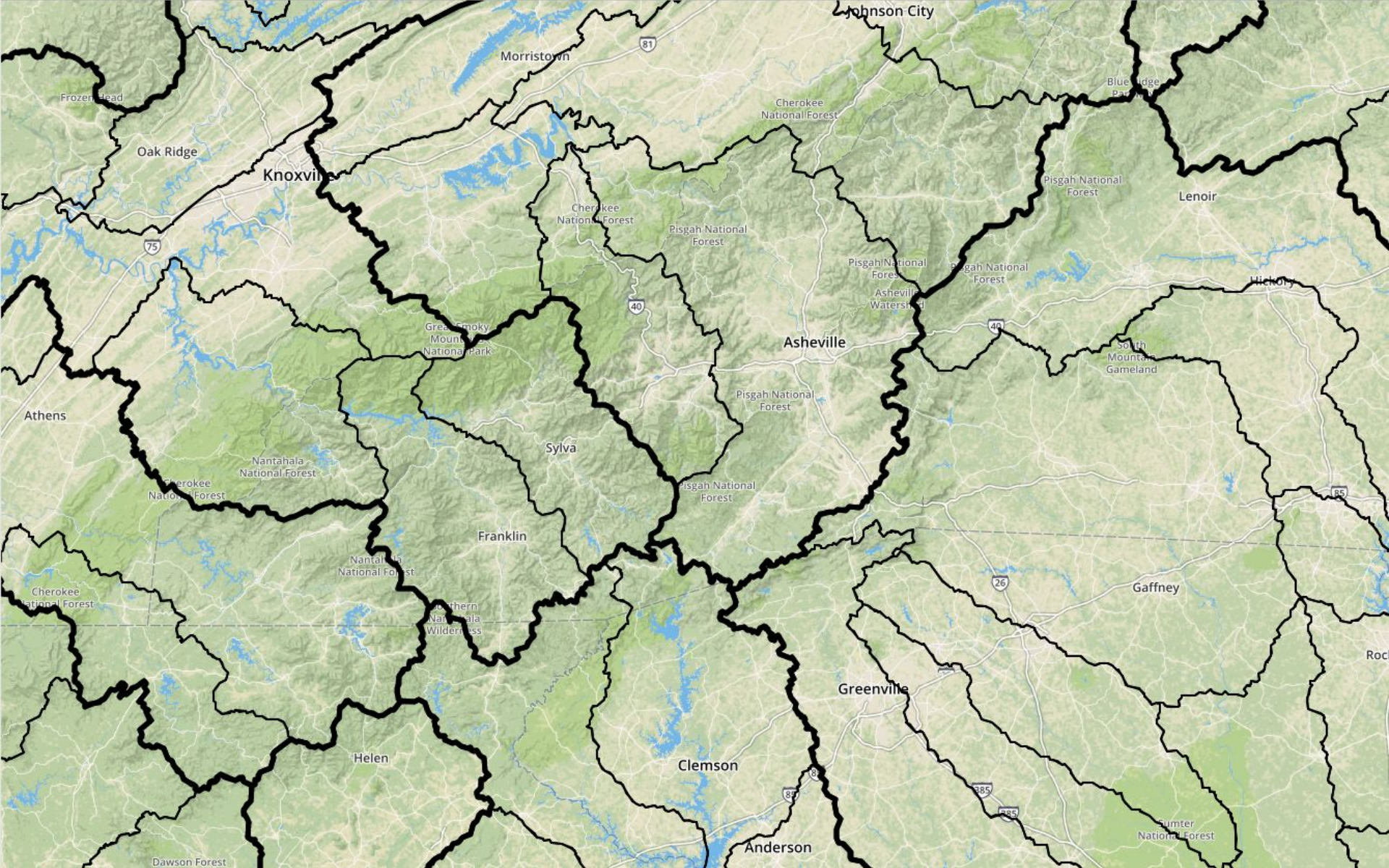


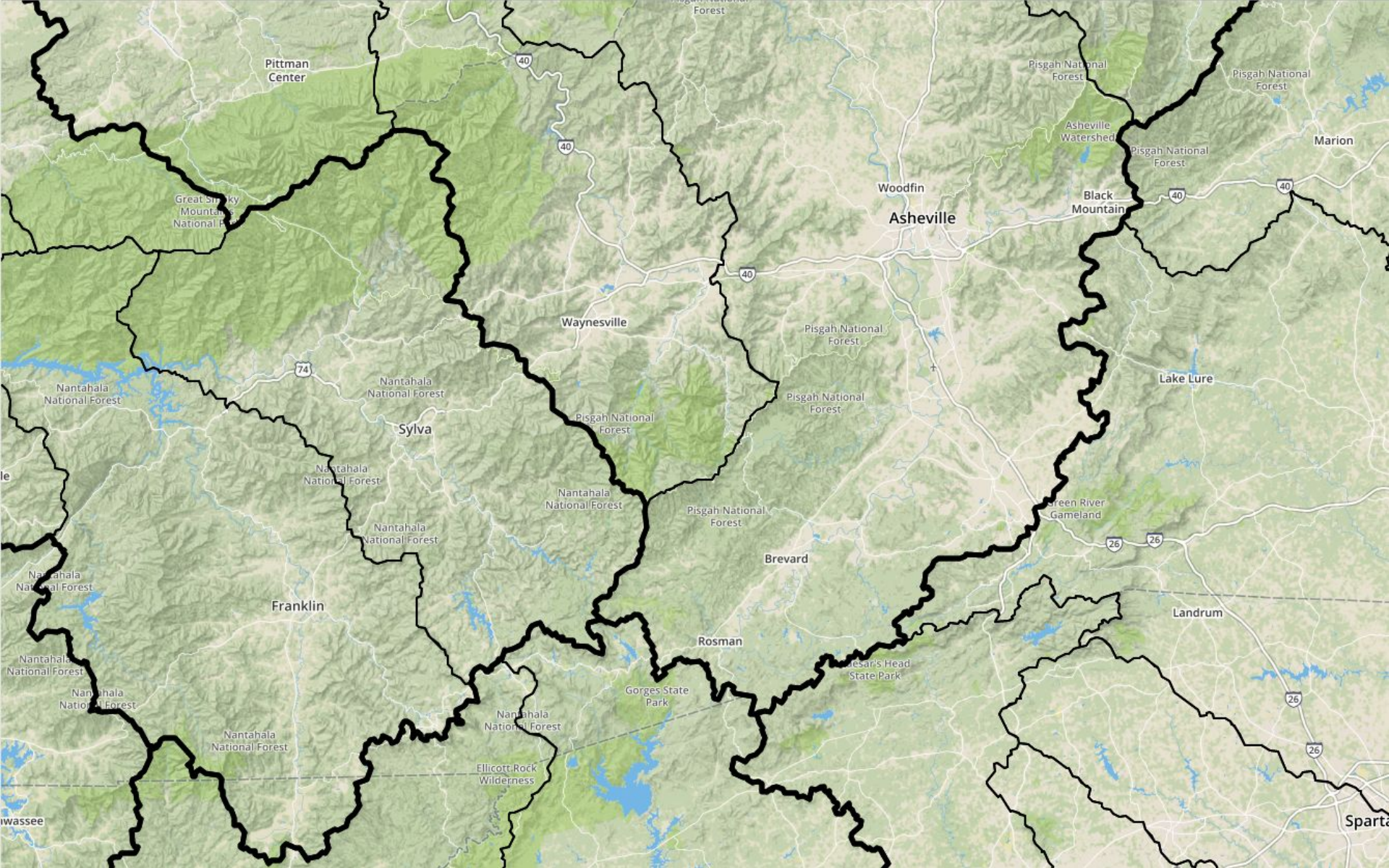


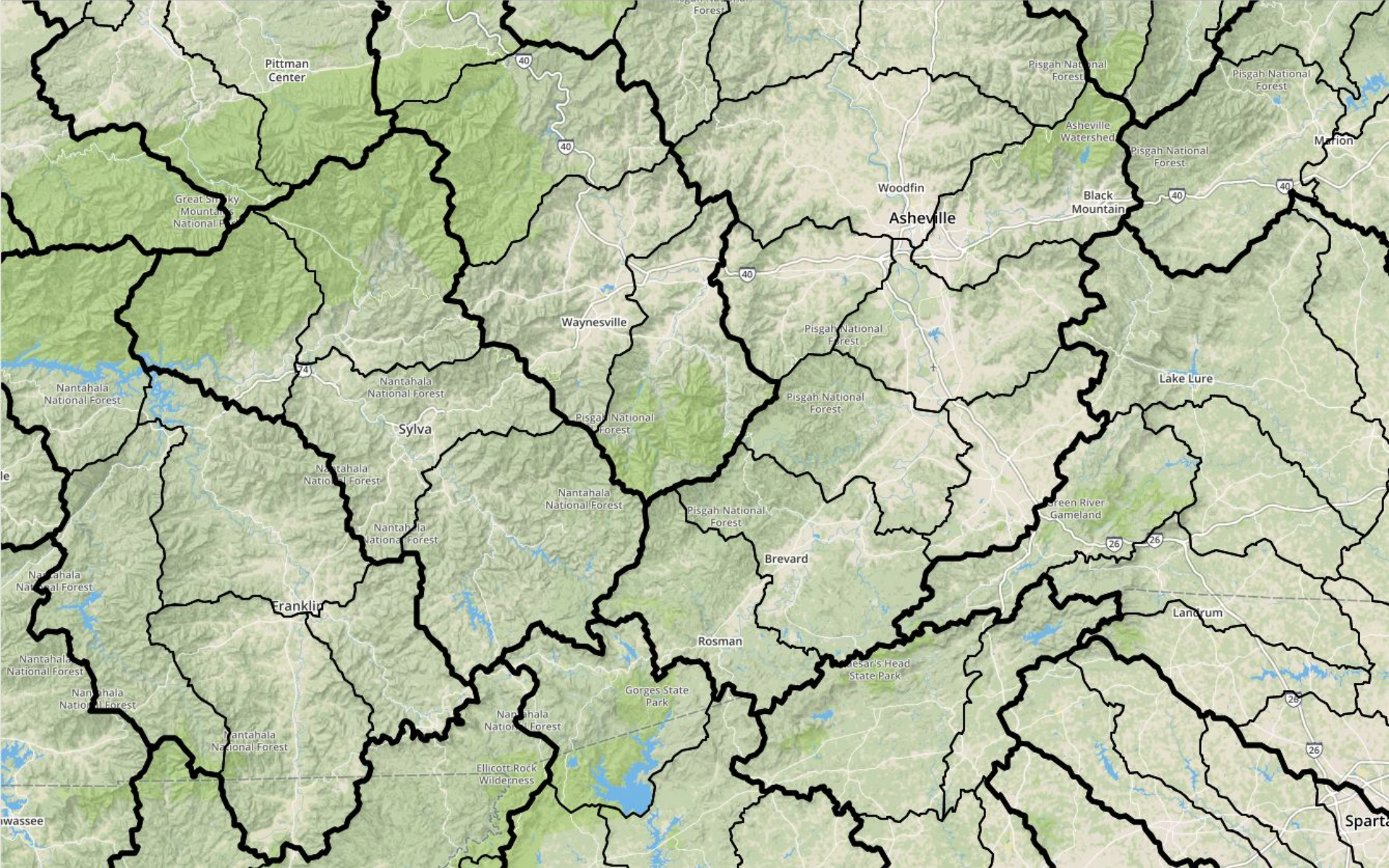


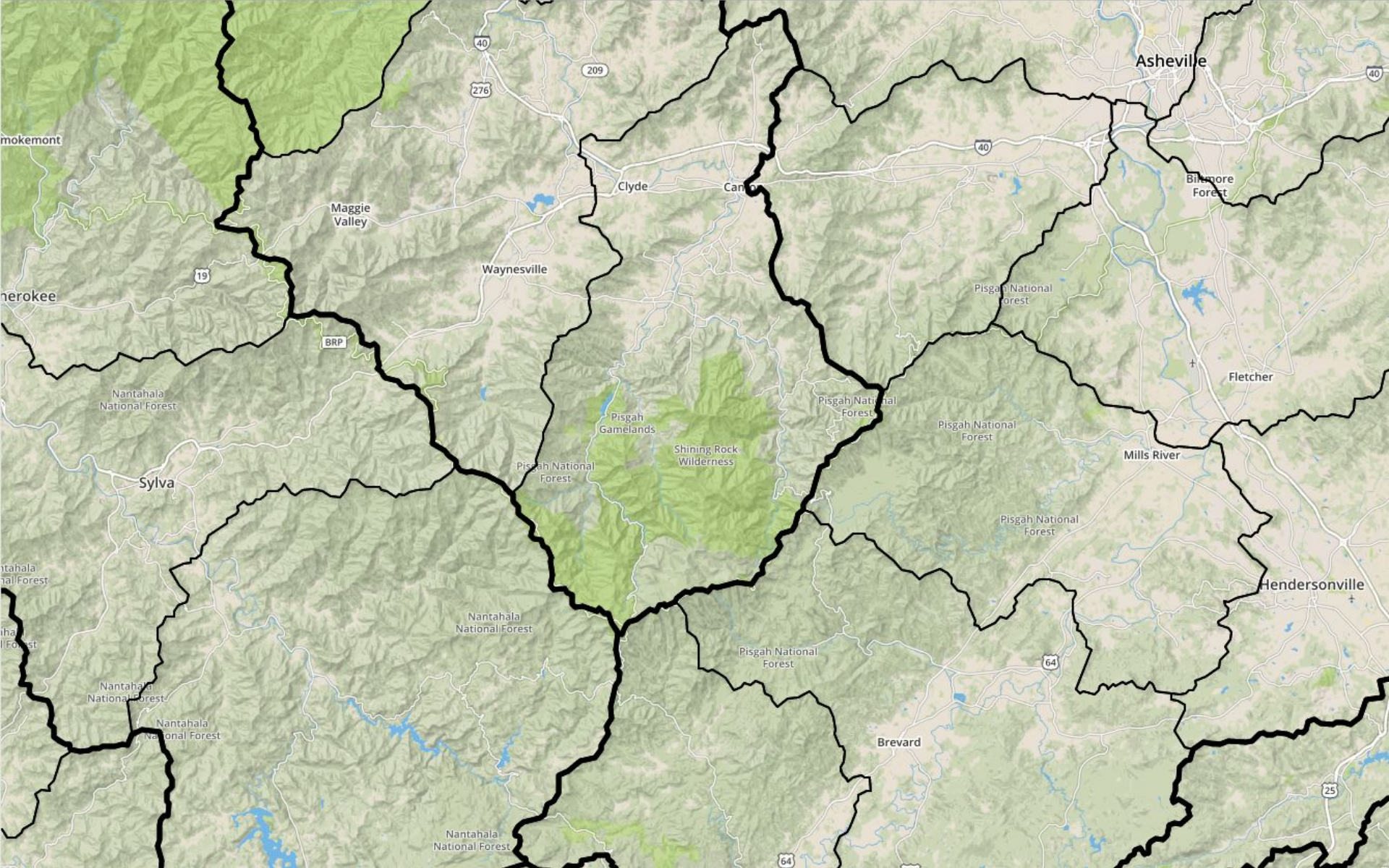


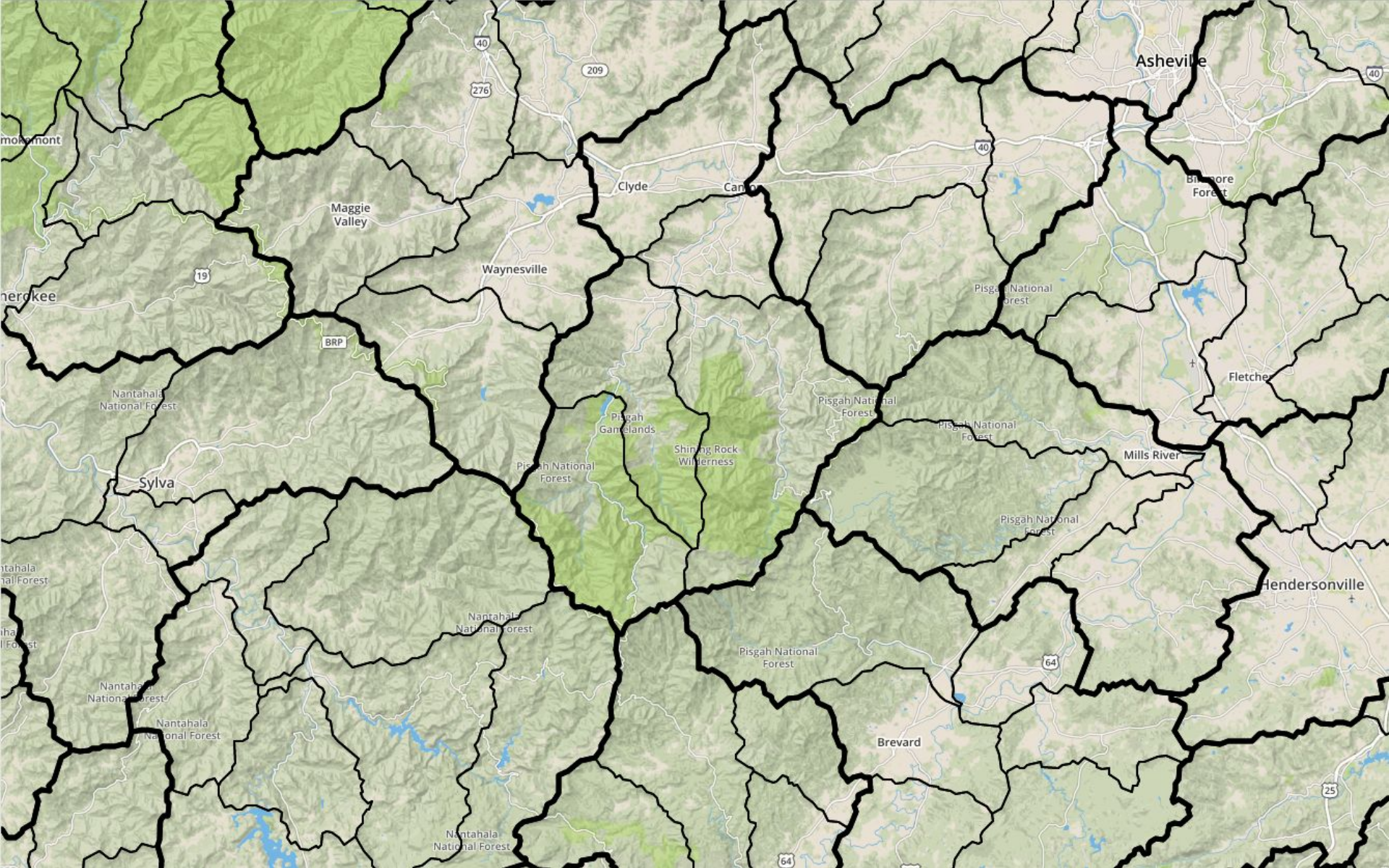


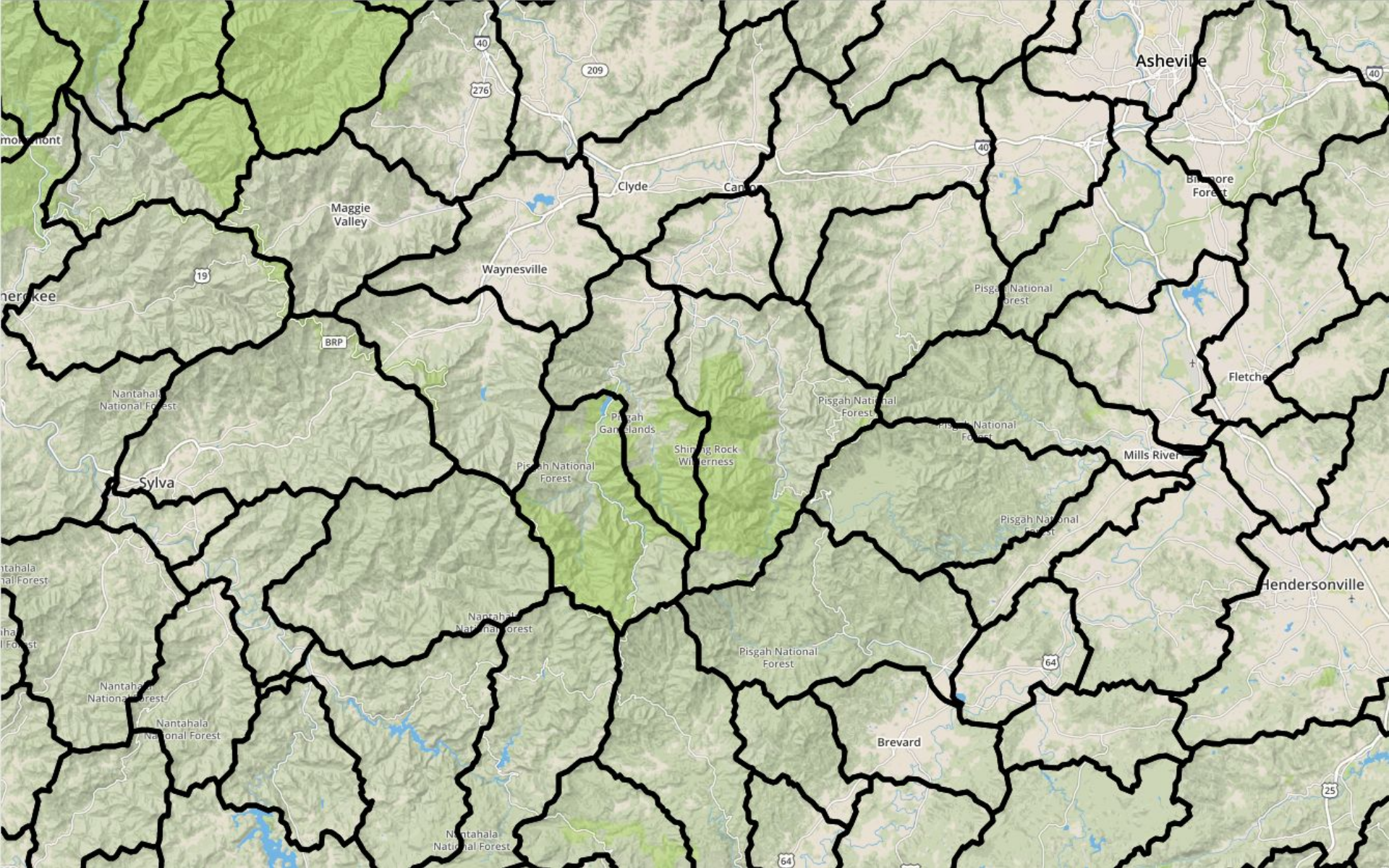


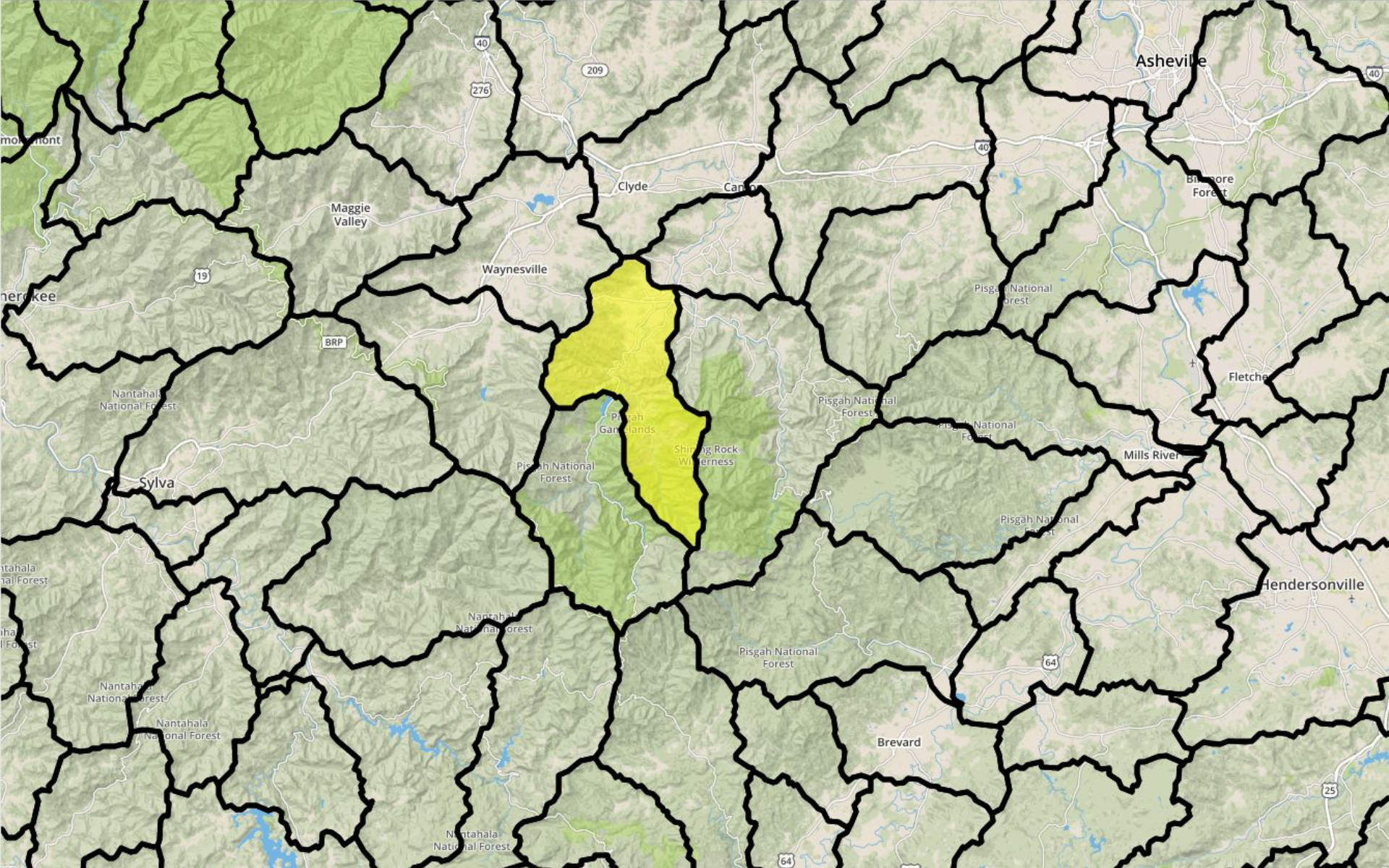


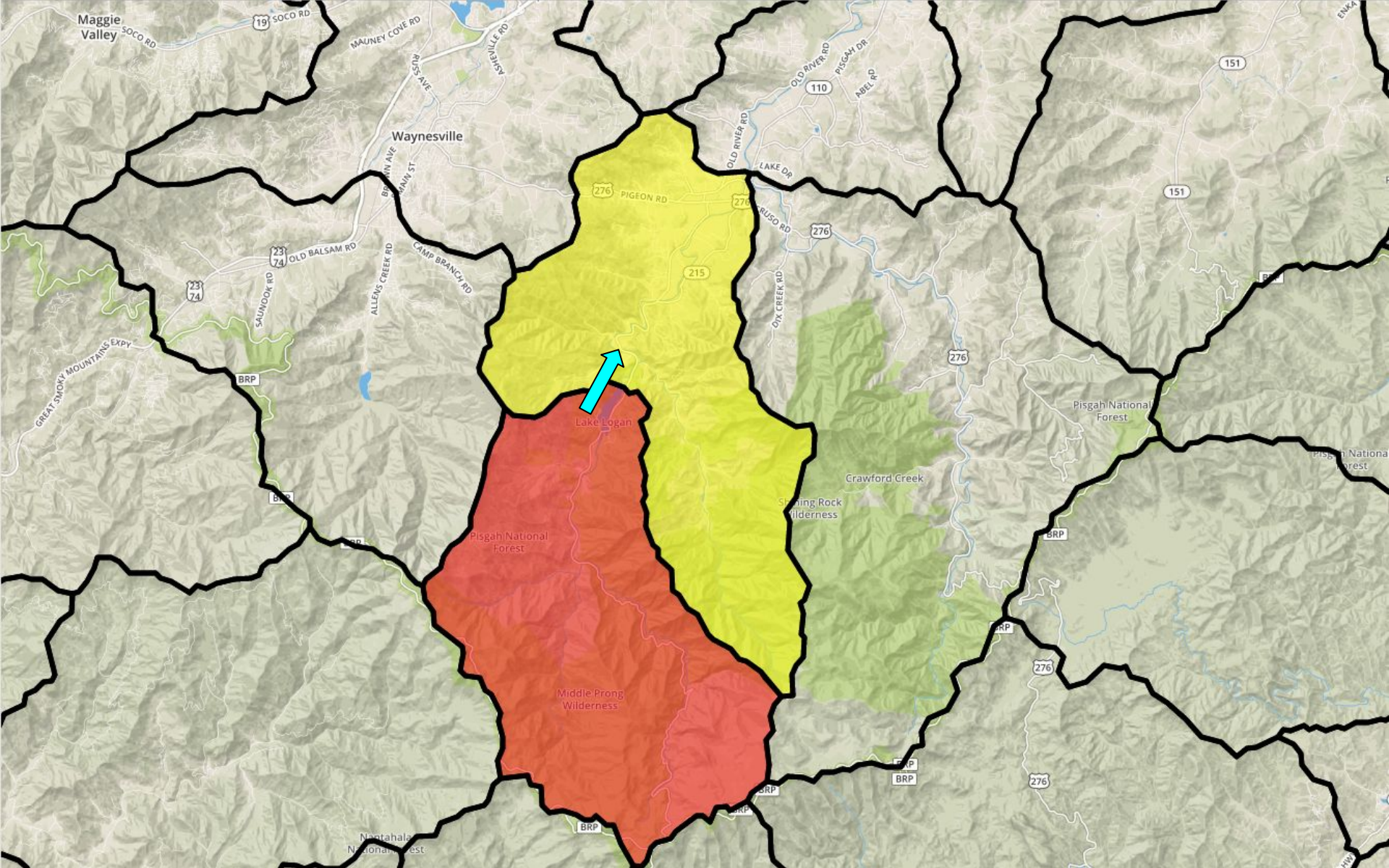


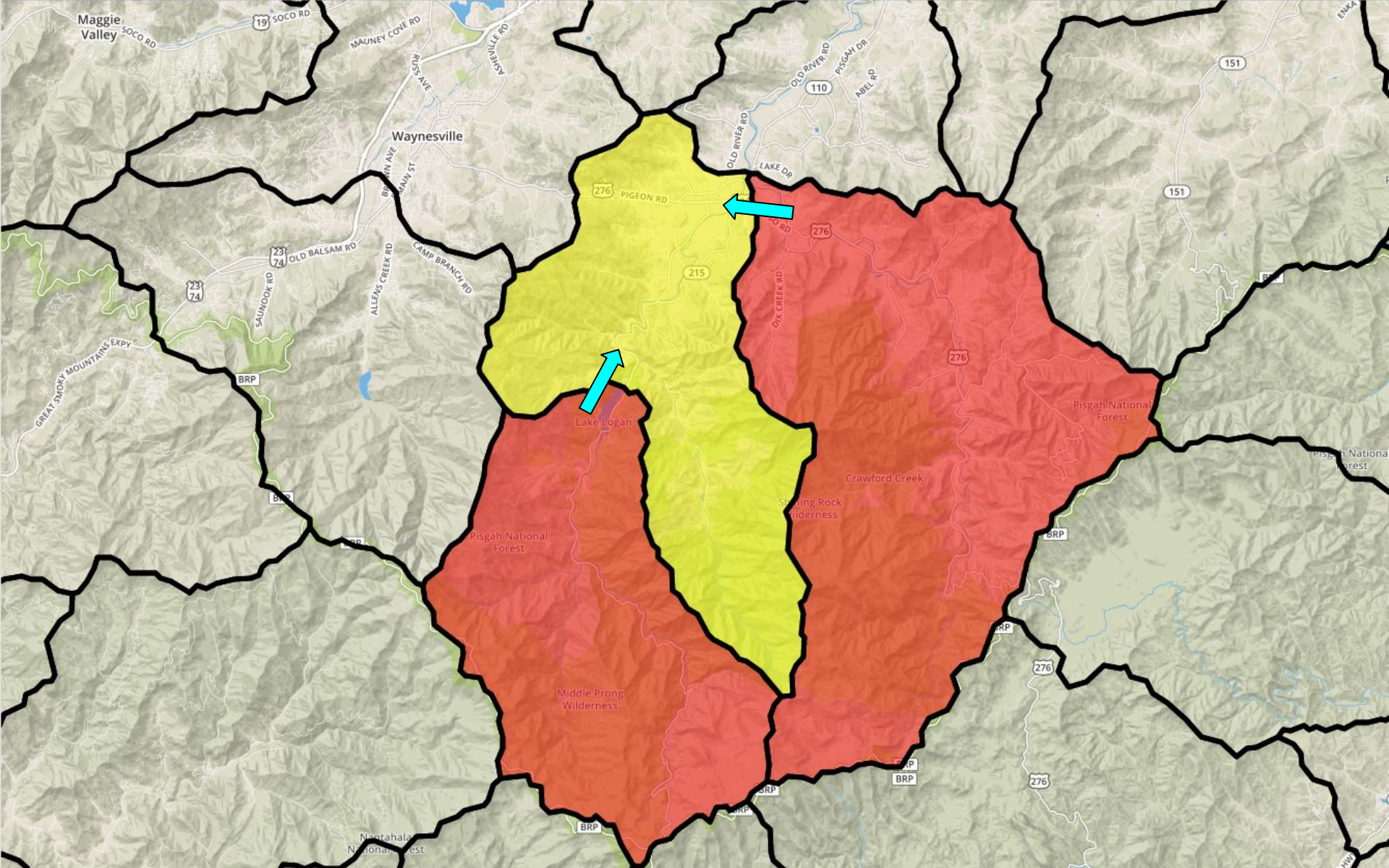


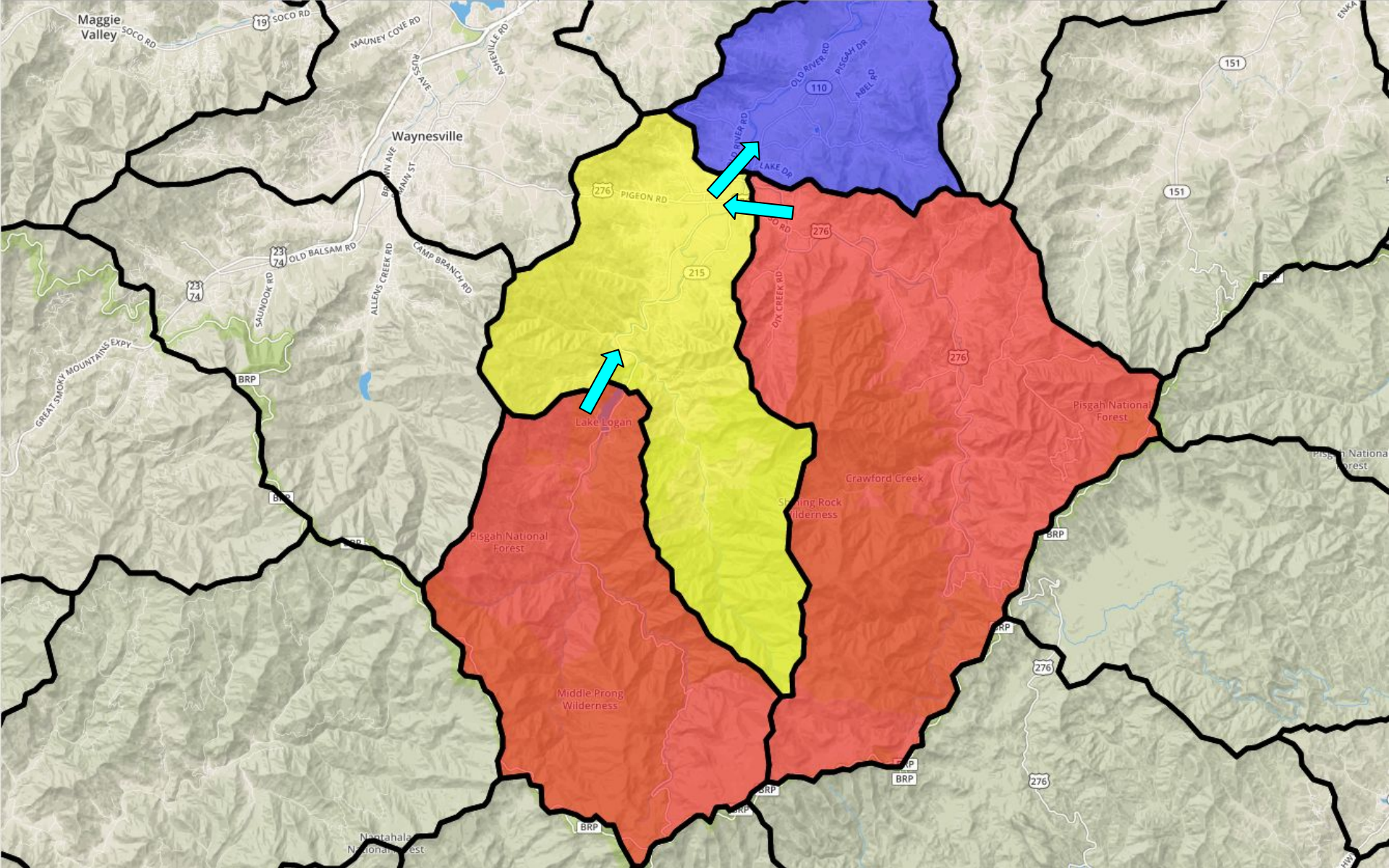


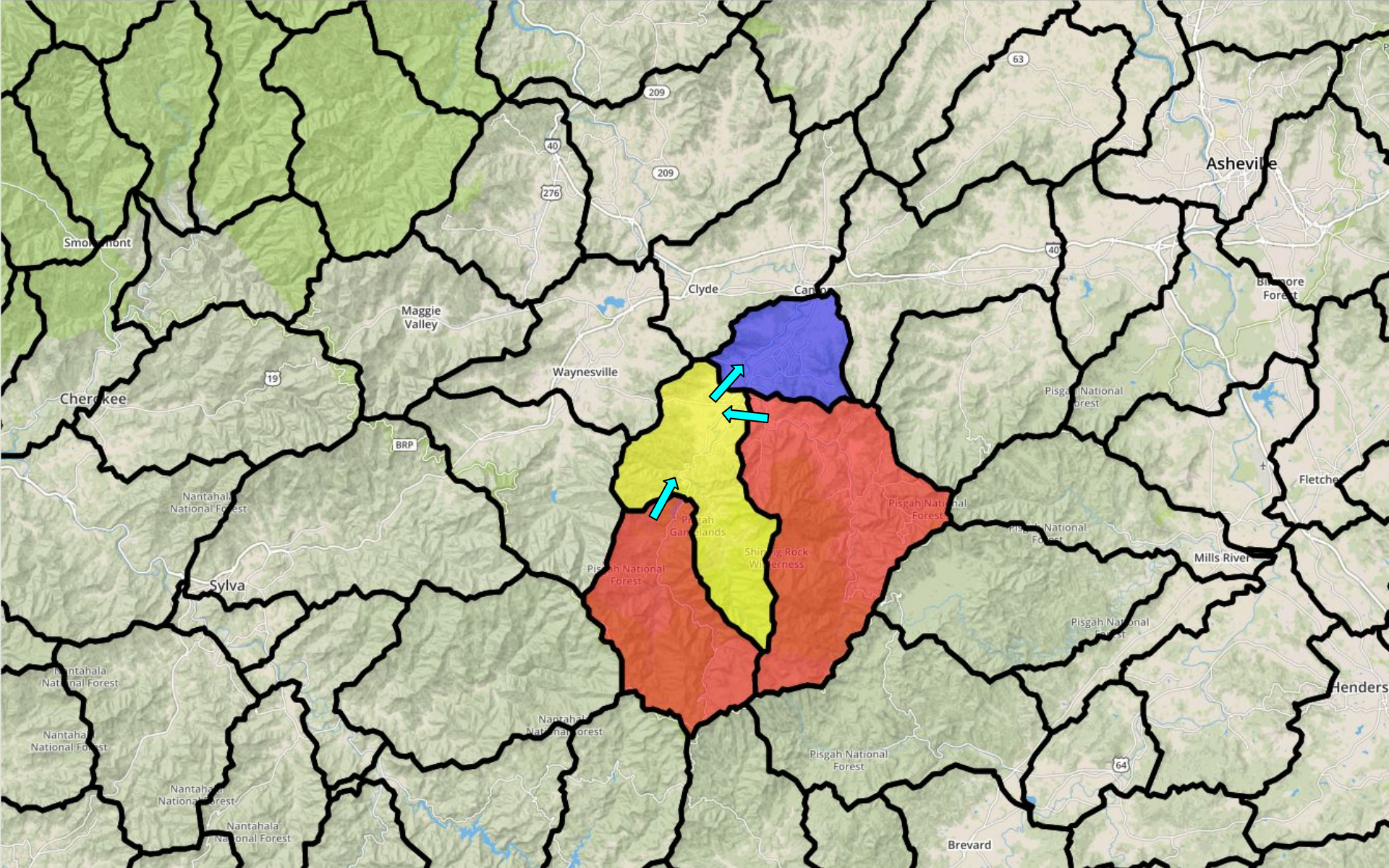


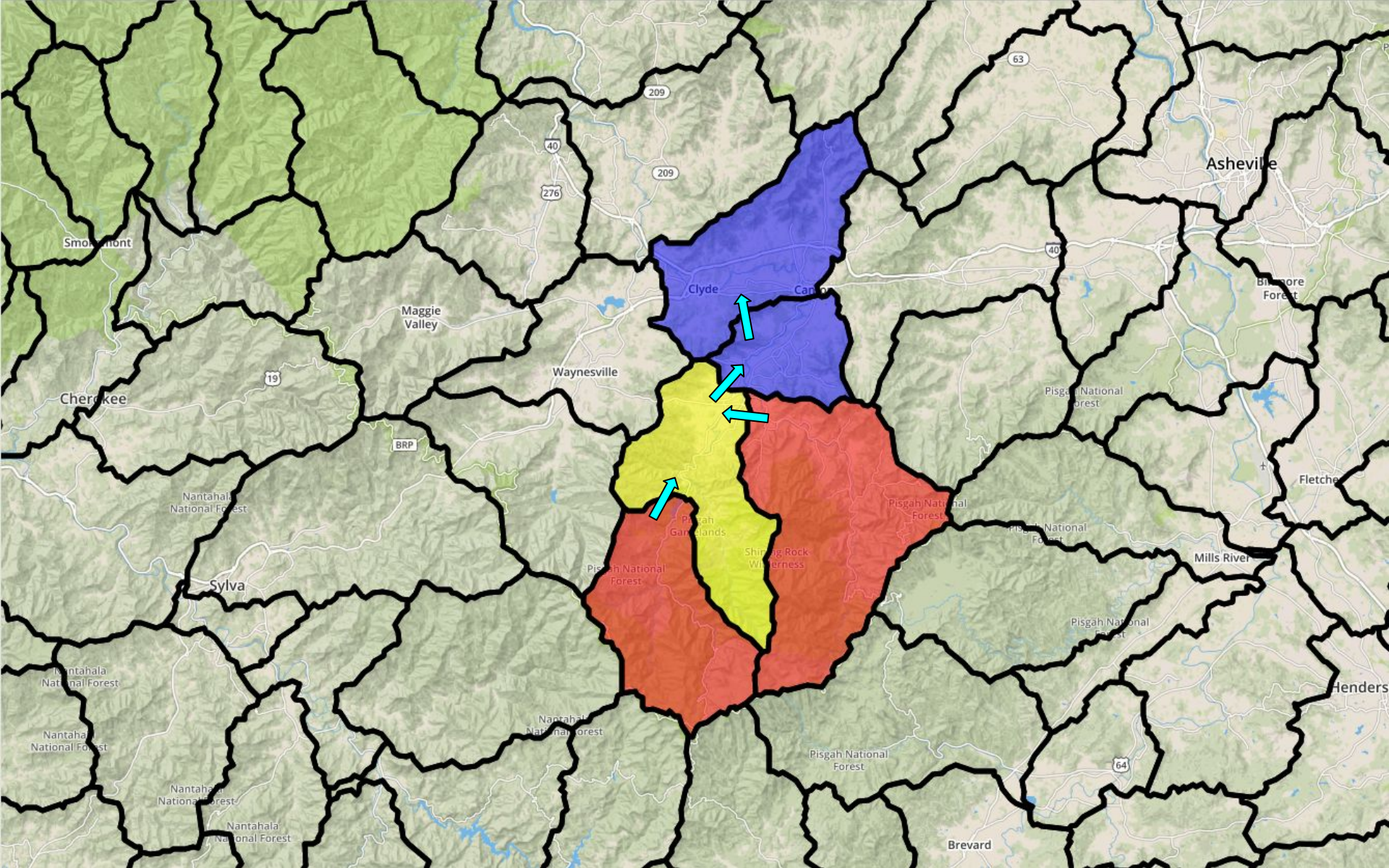


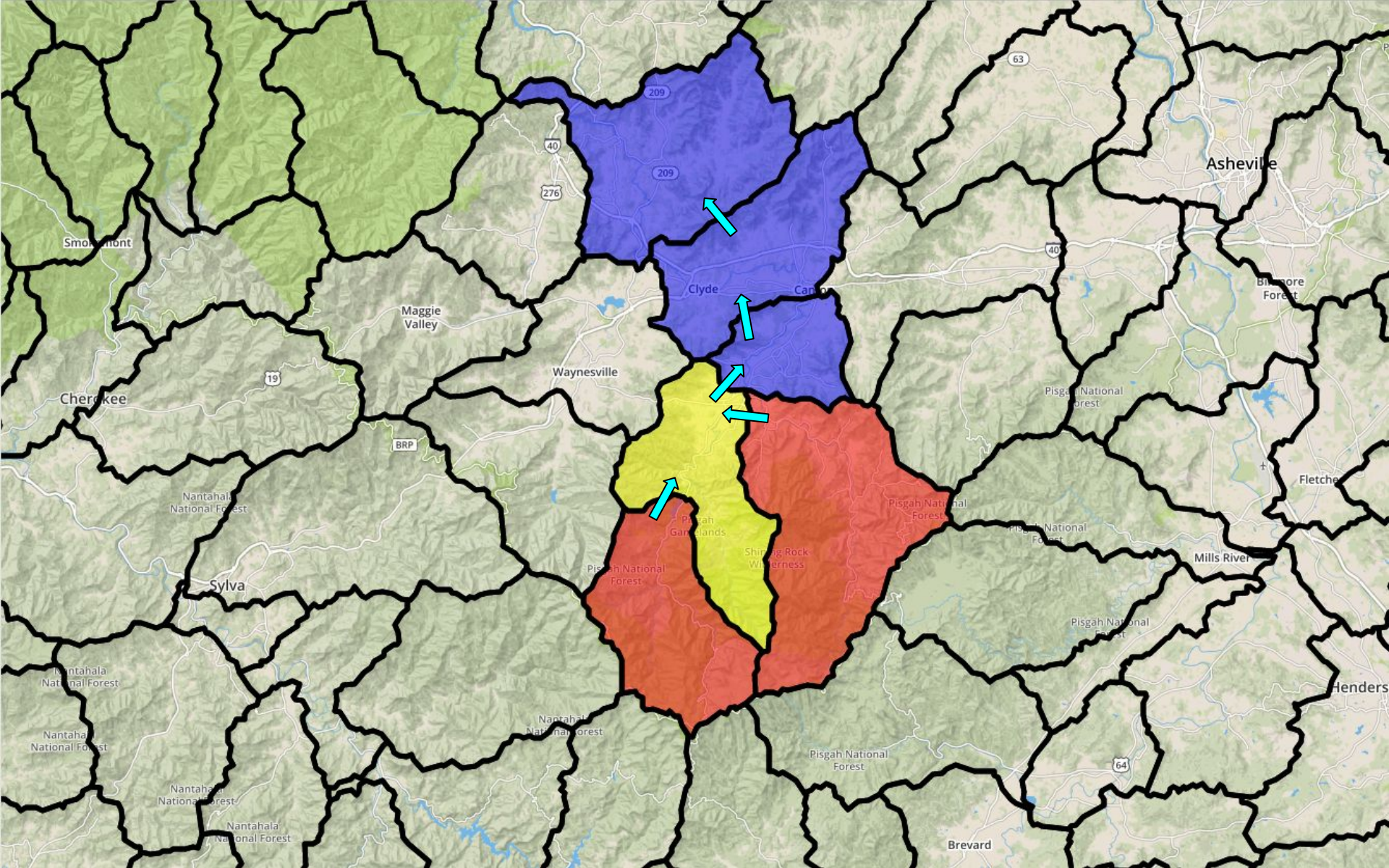


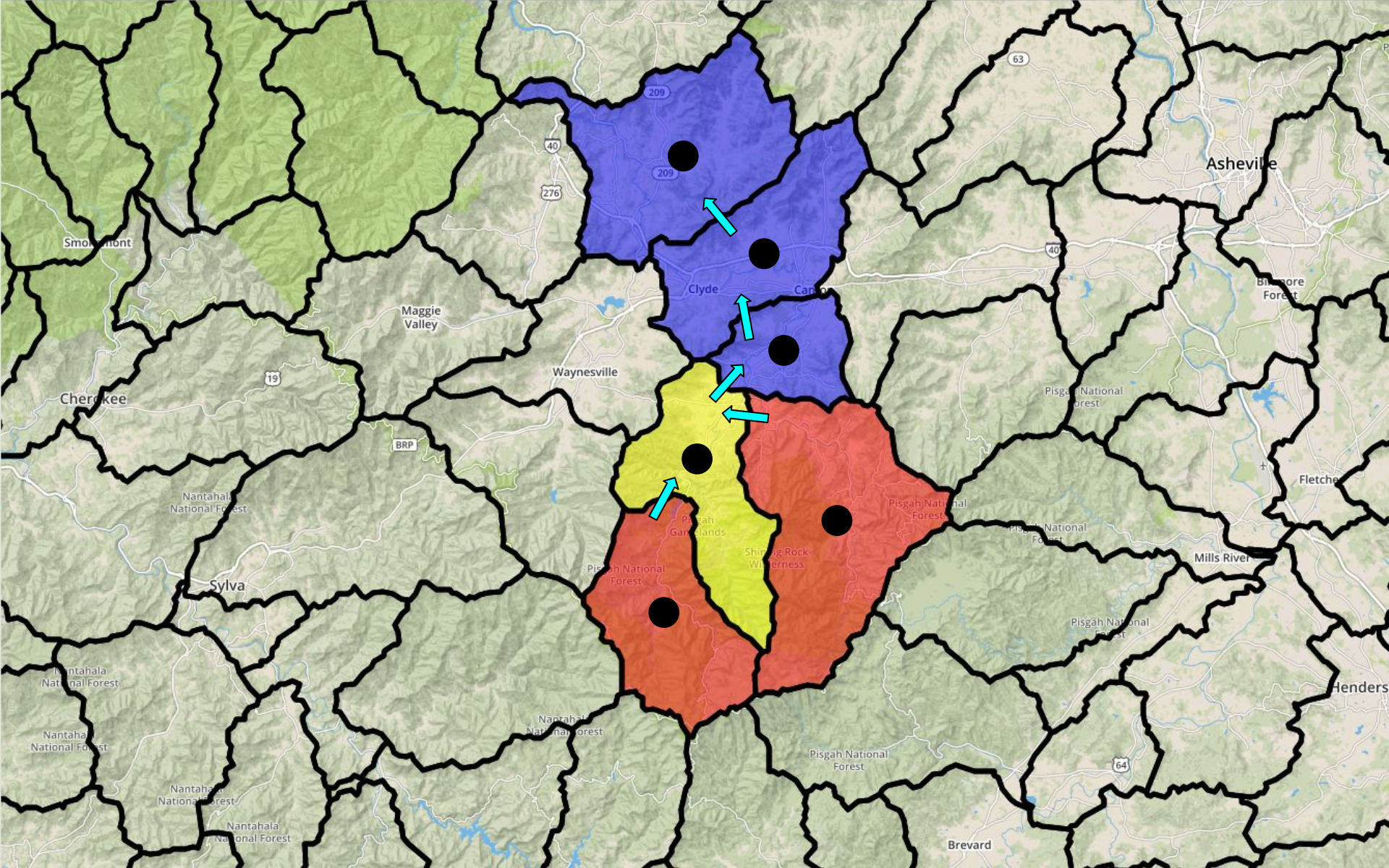


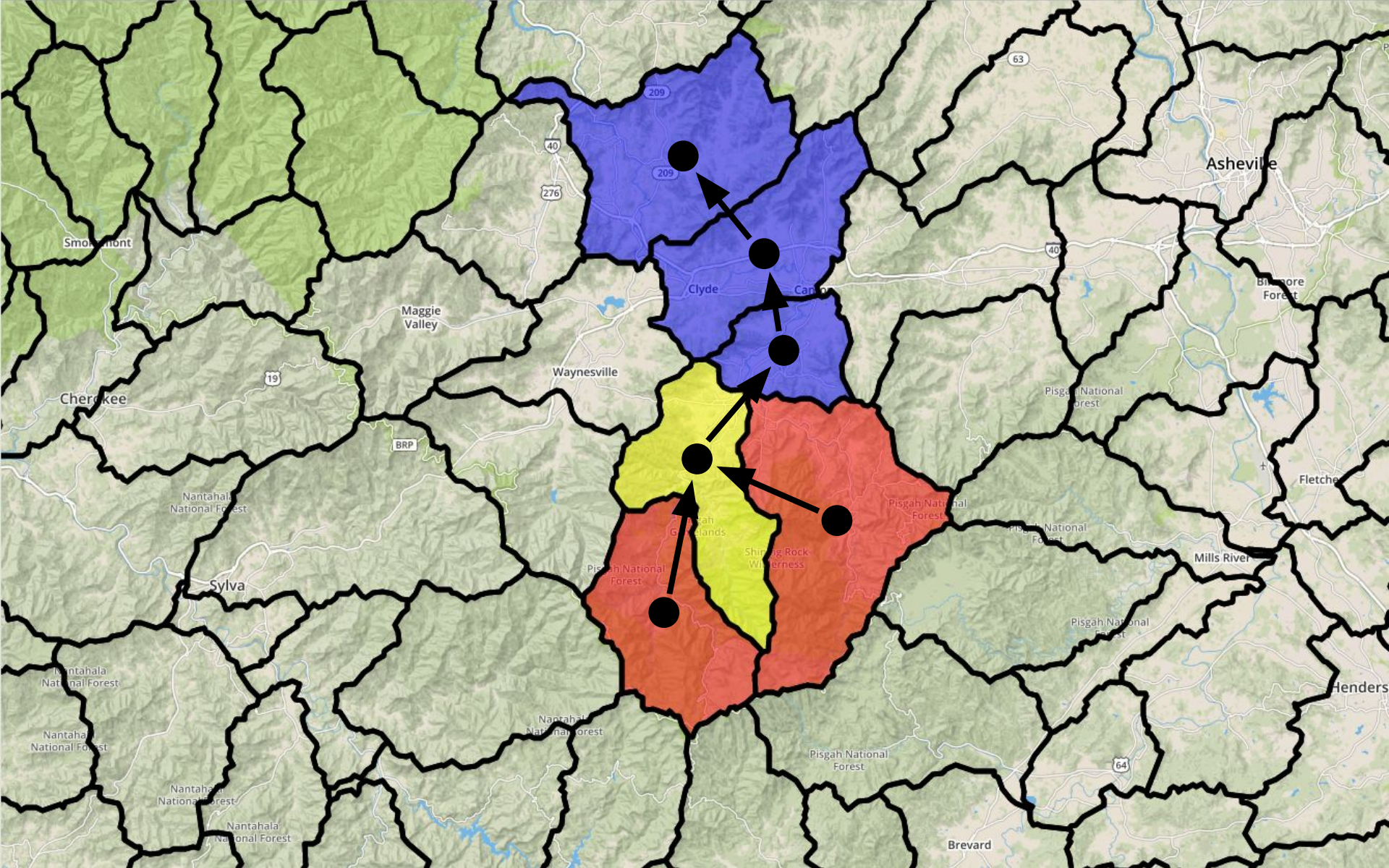


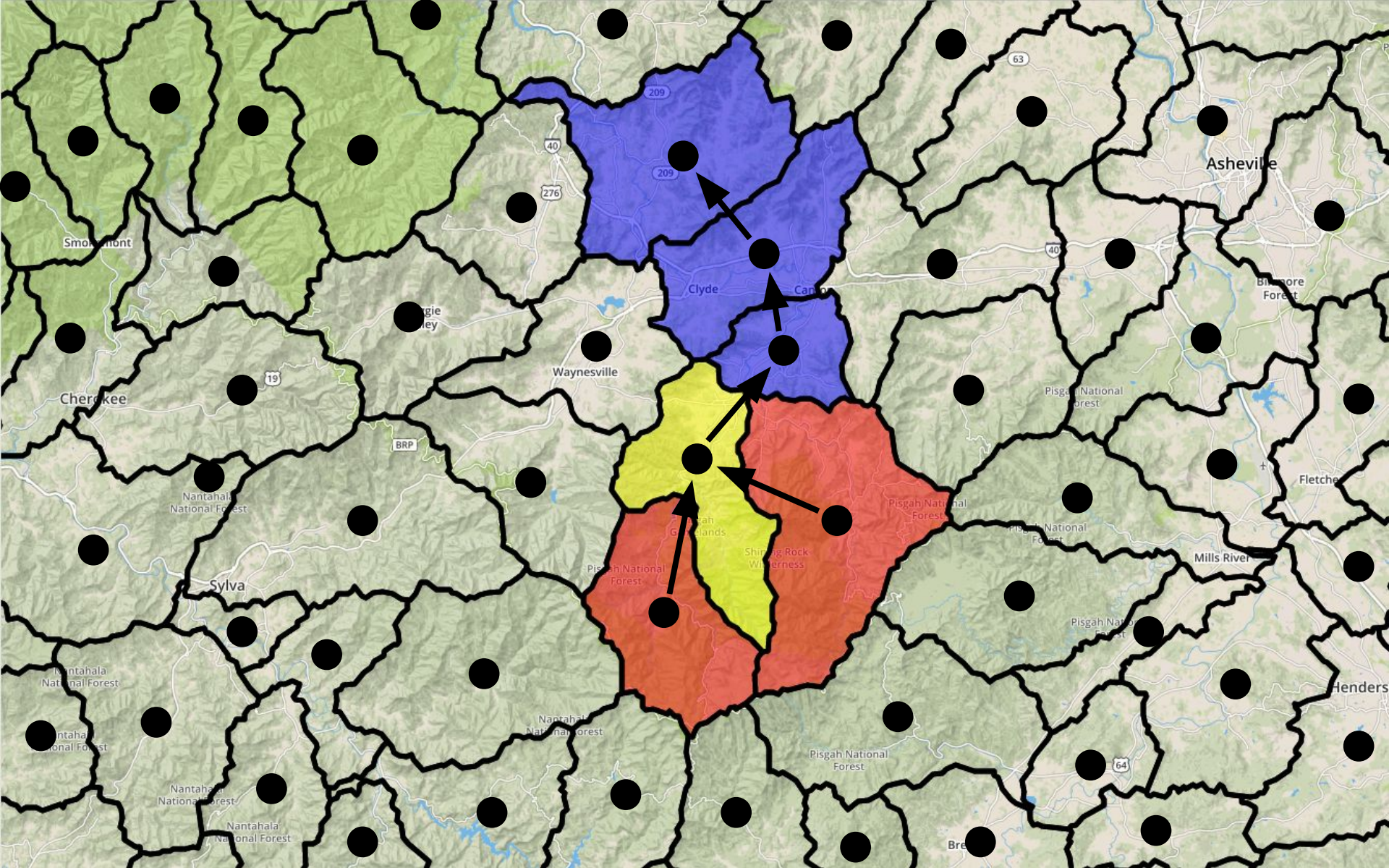


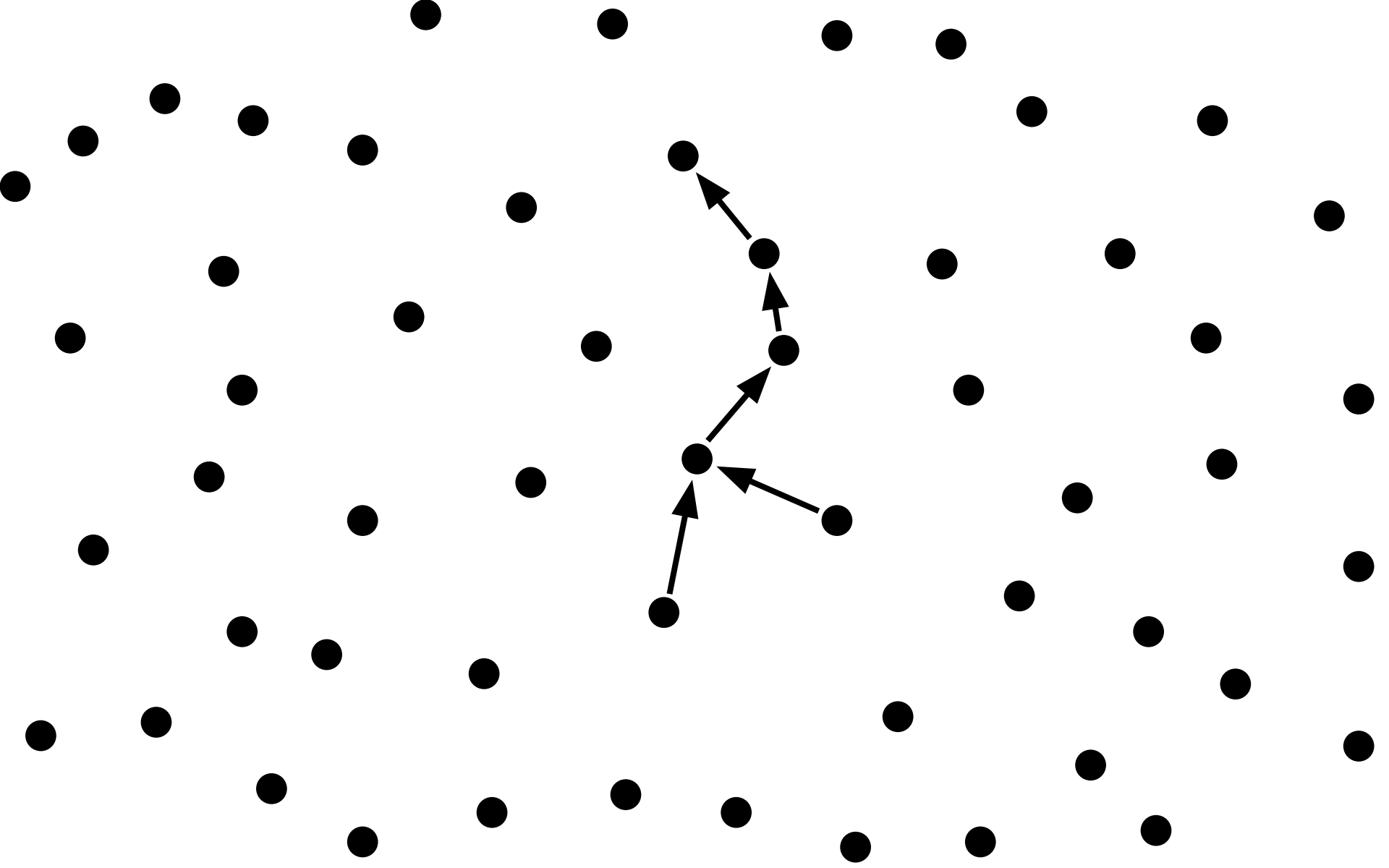


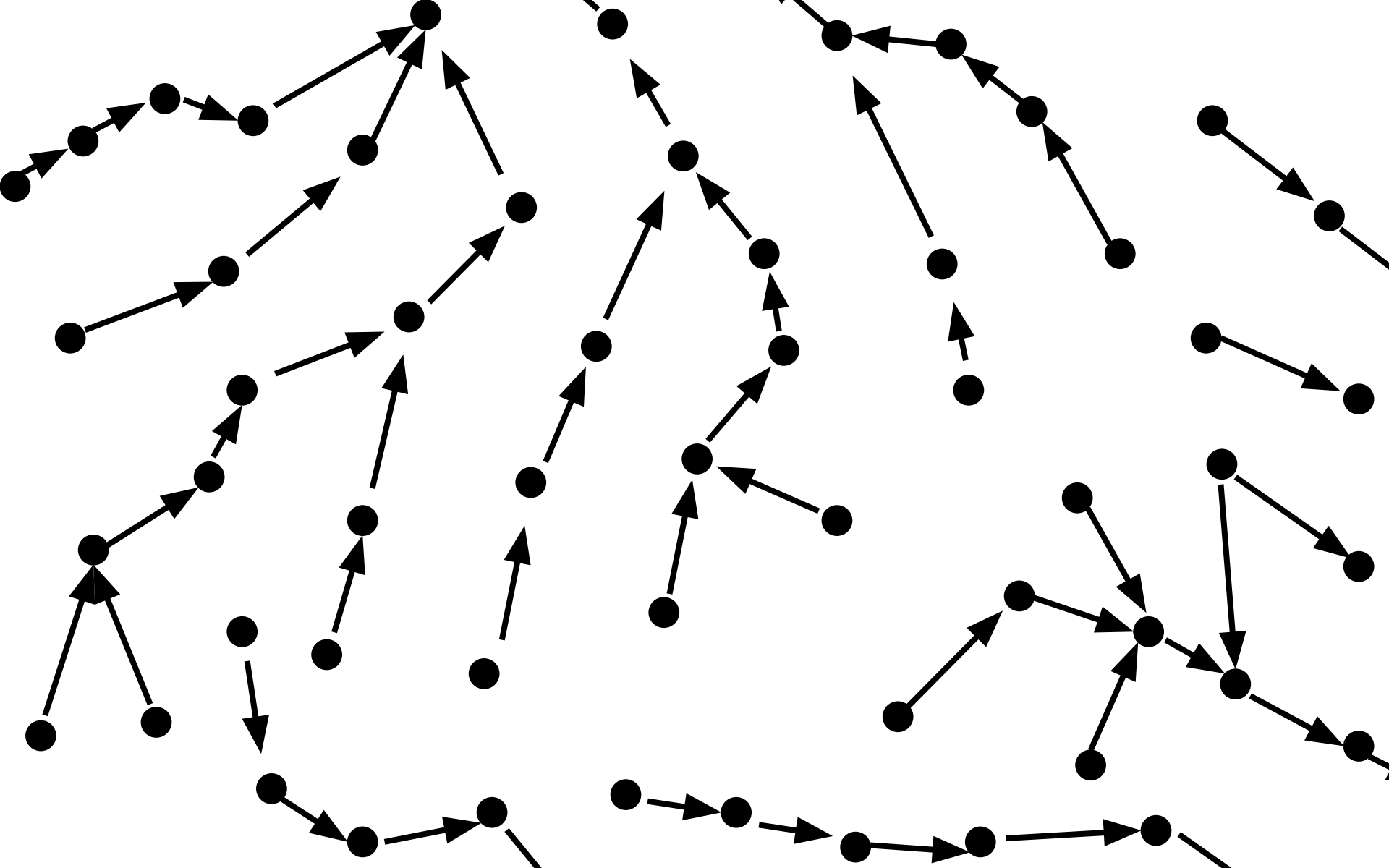


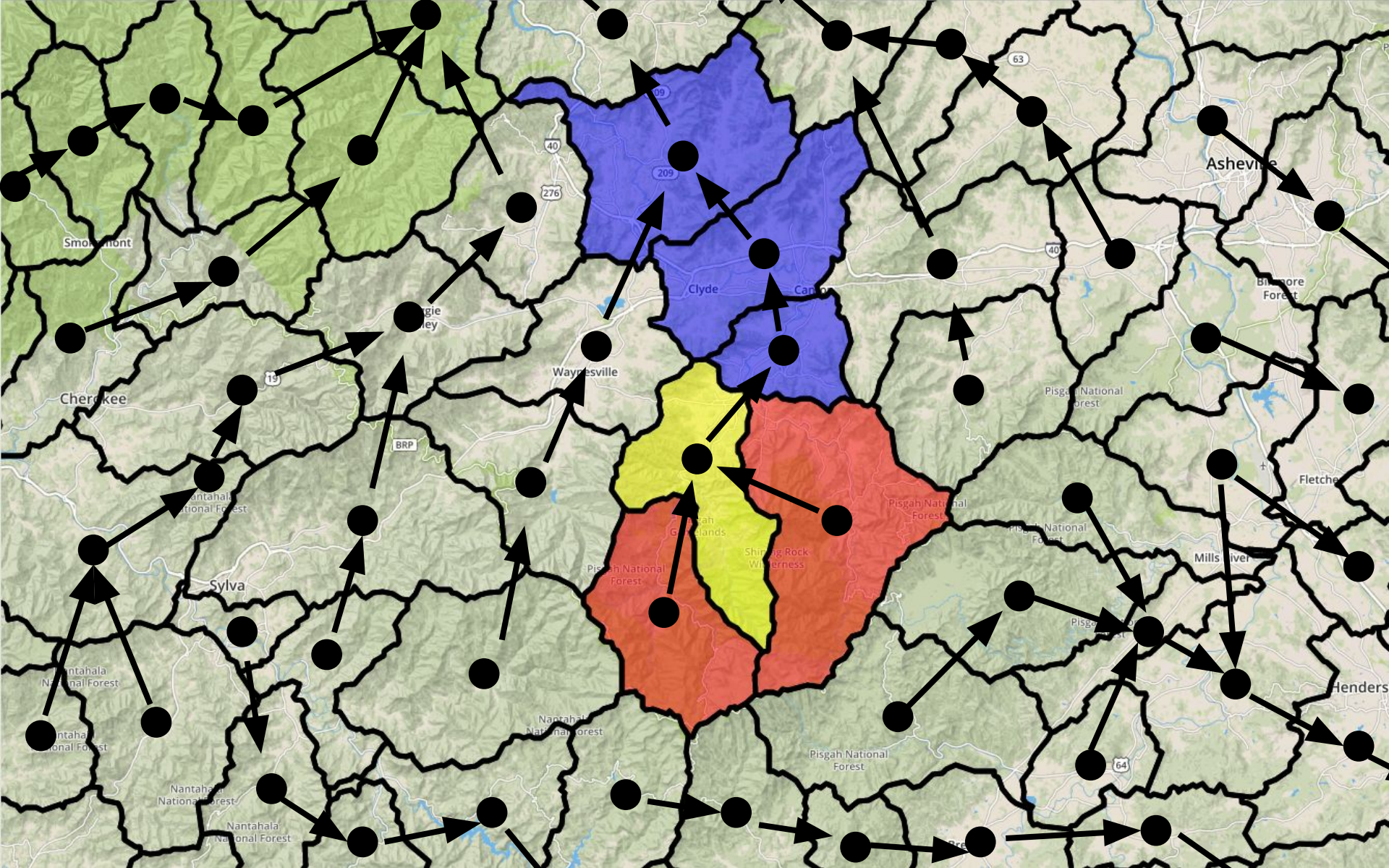


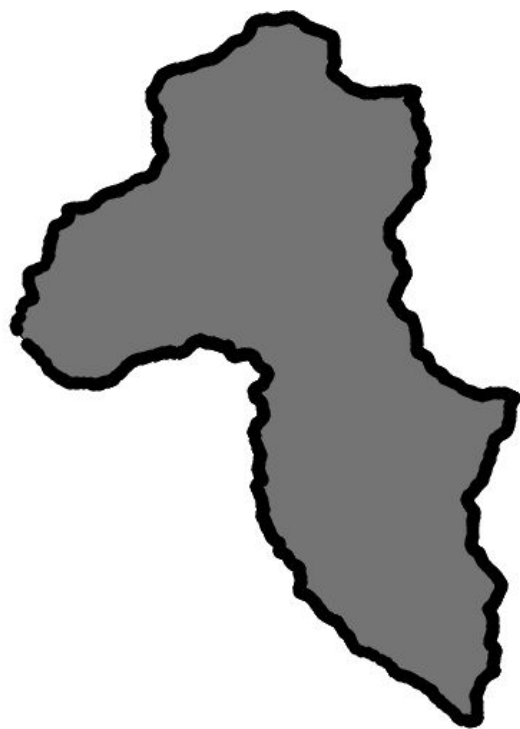




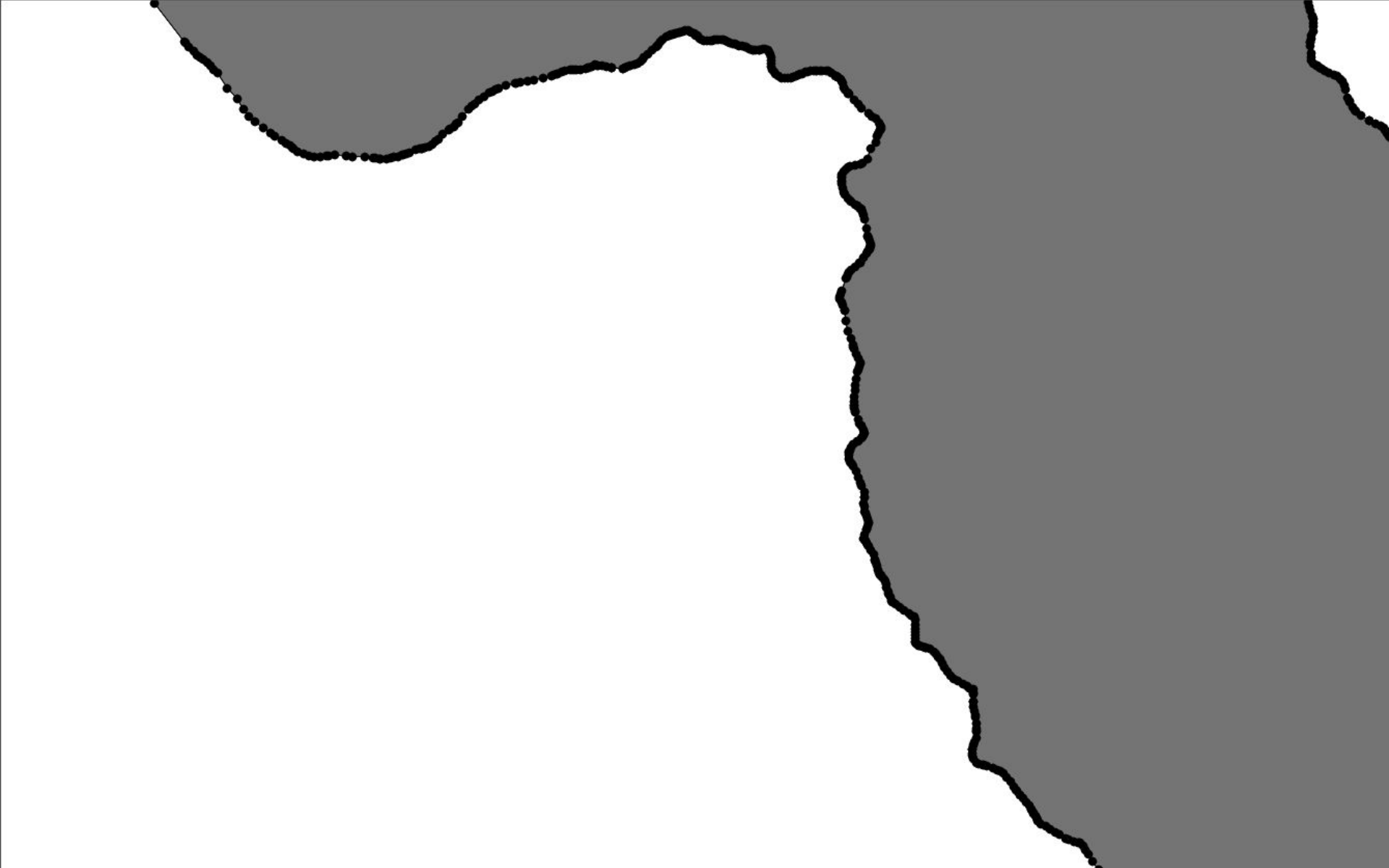




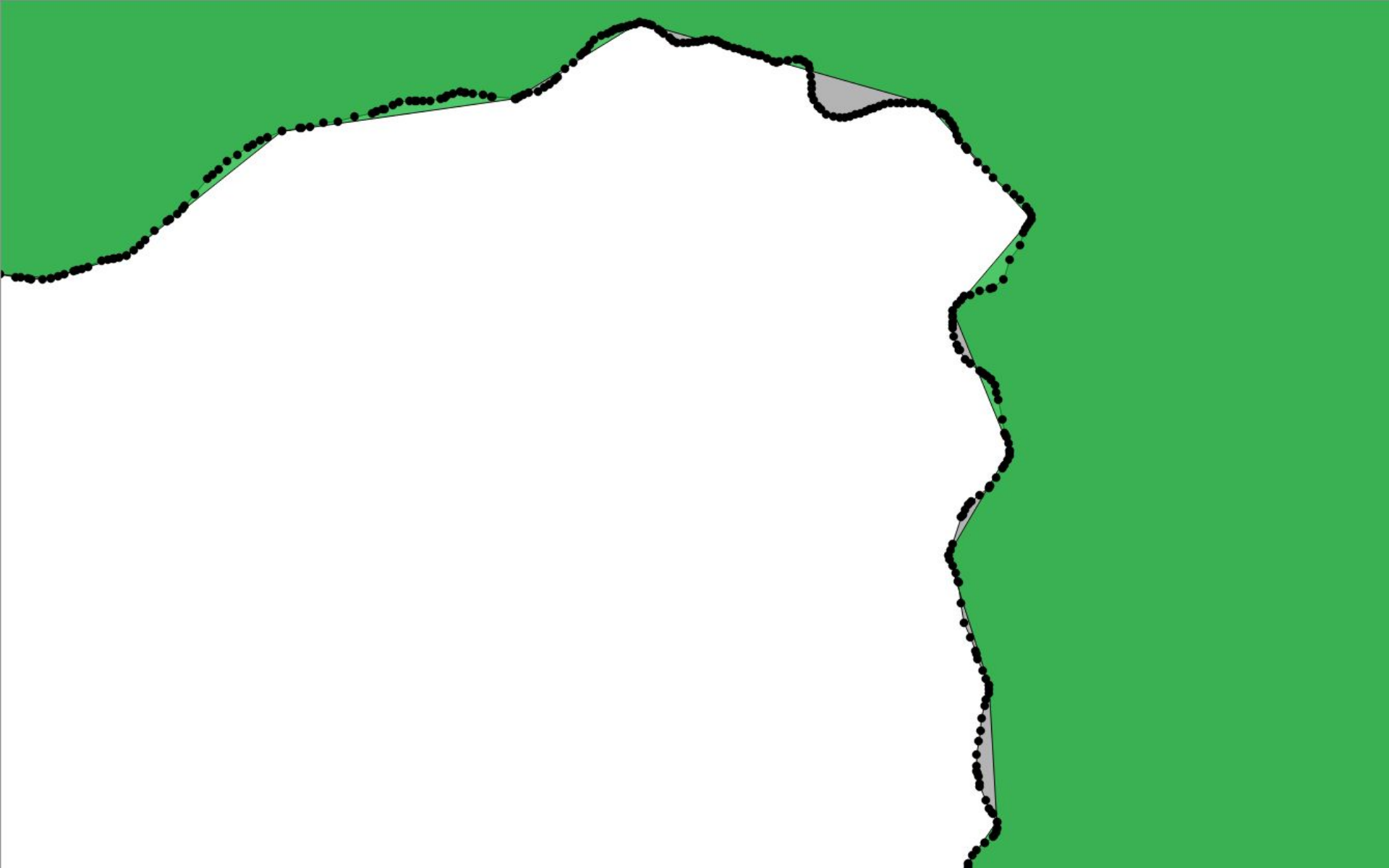


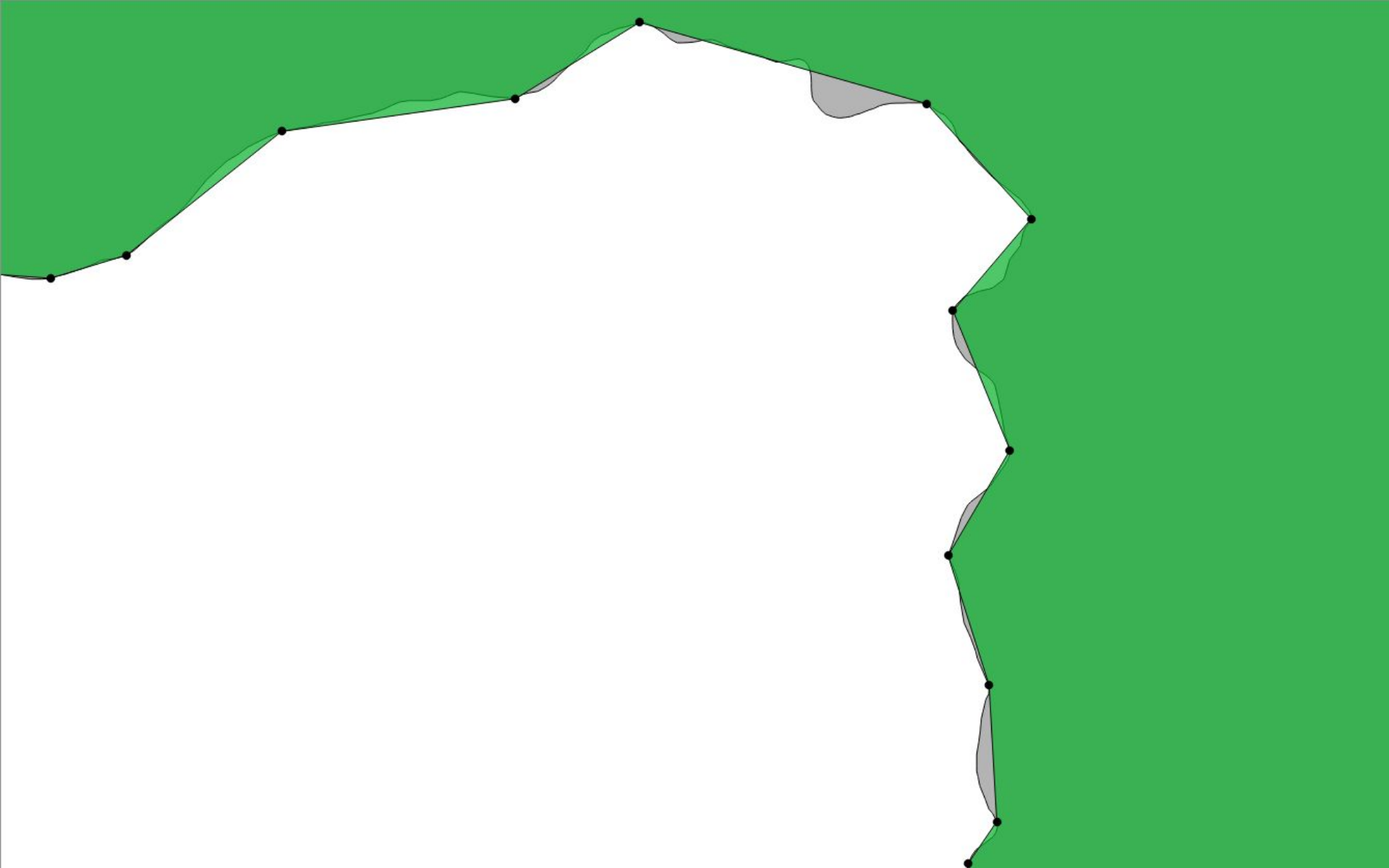






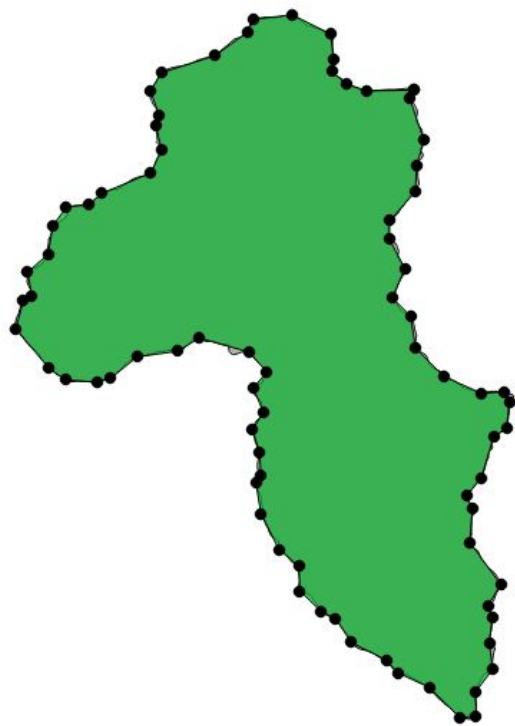


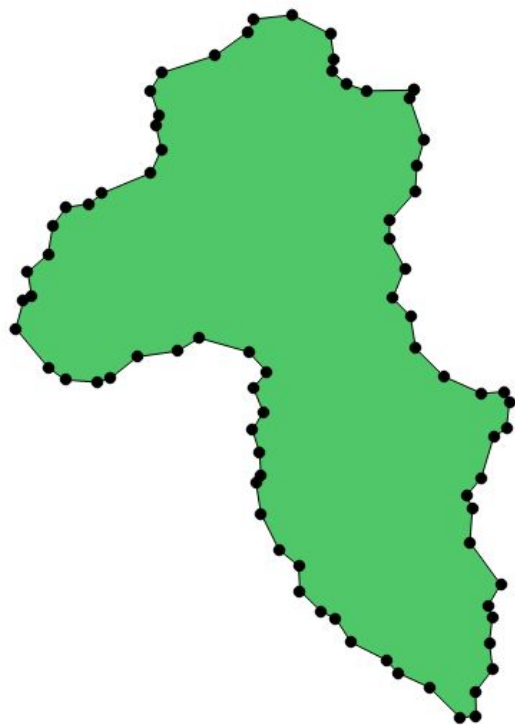


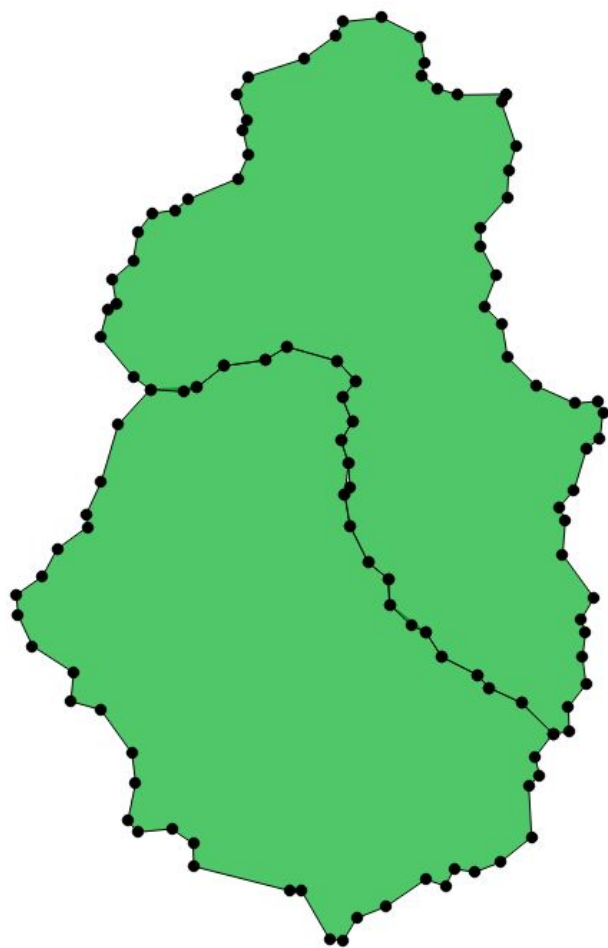


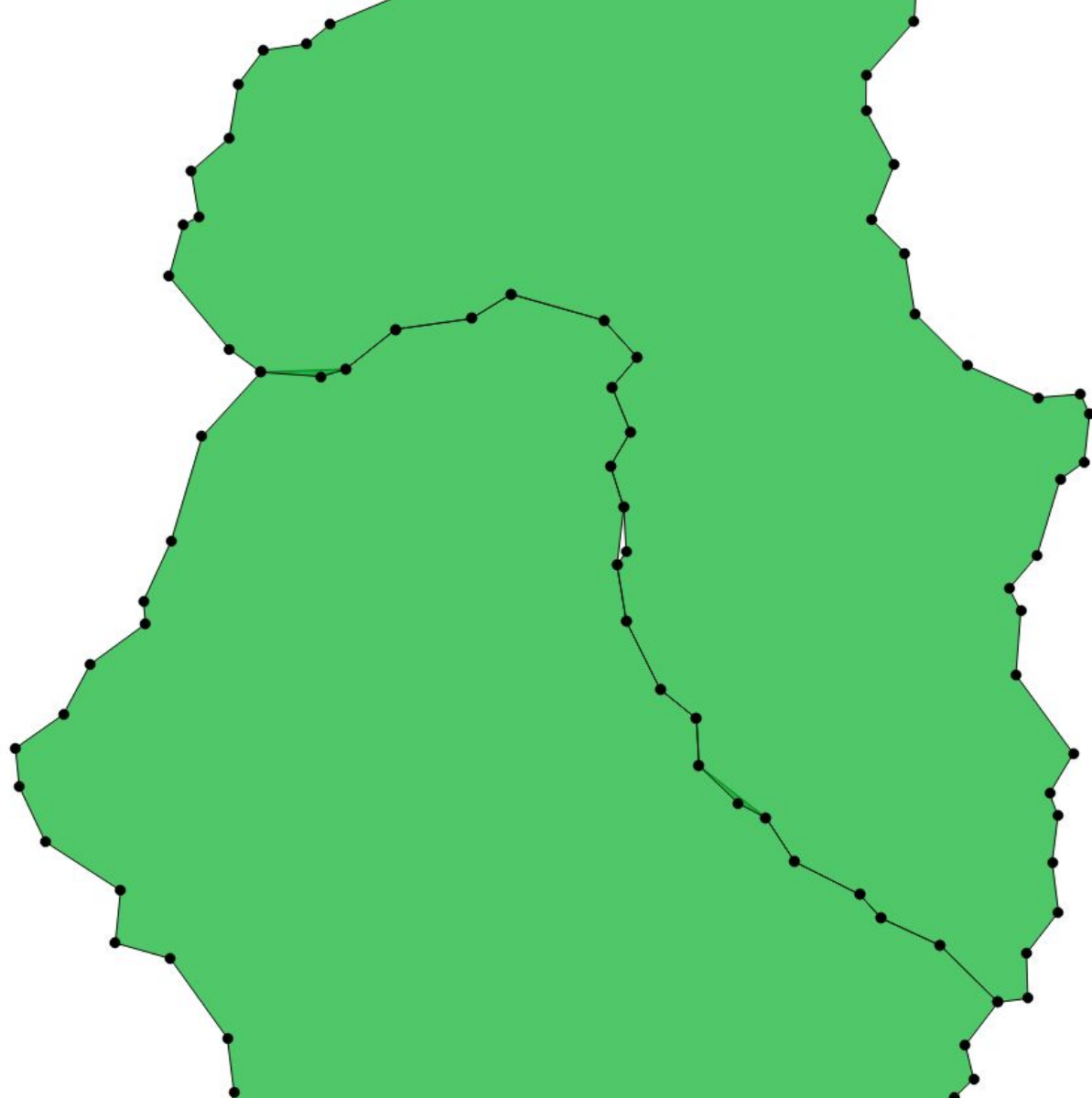


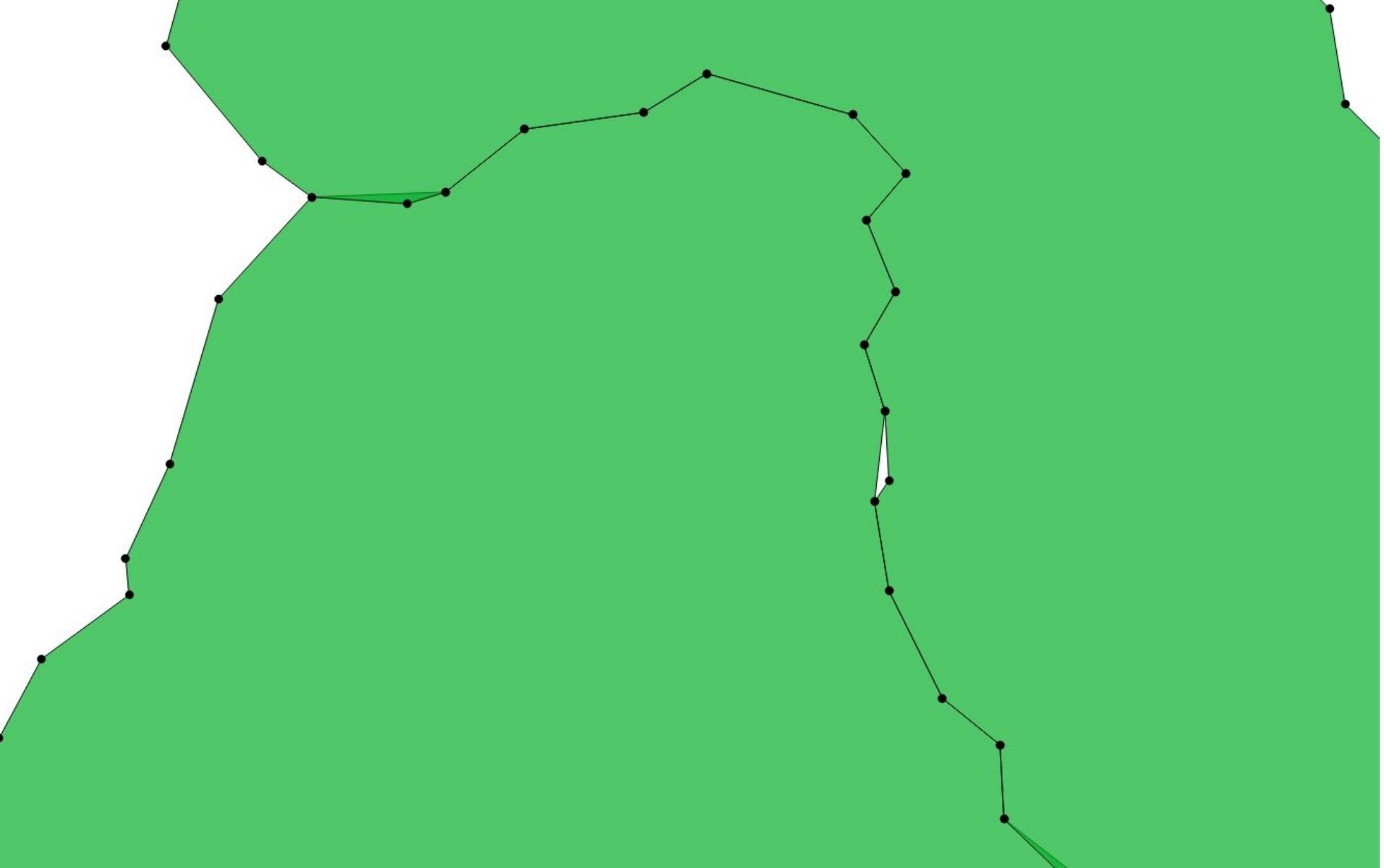




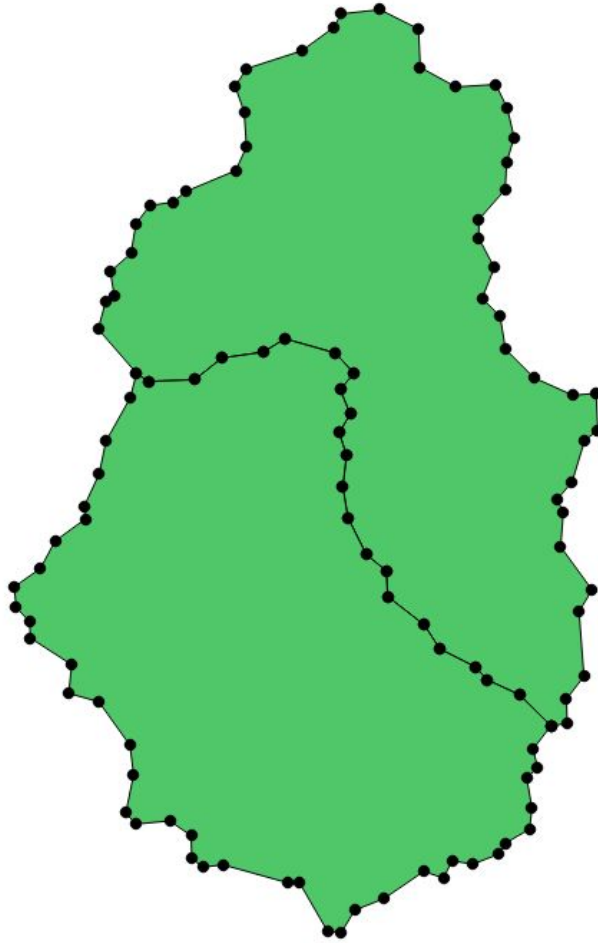








TopoJSON







DOM Manipulation: slow!

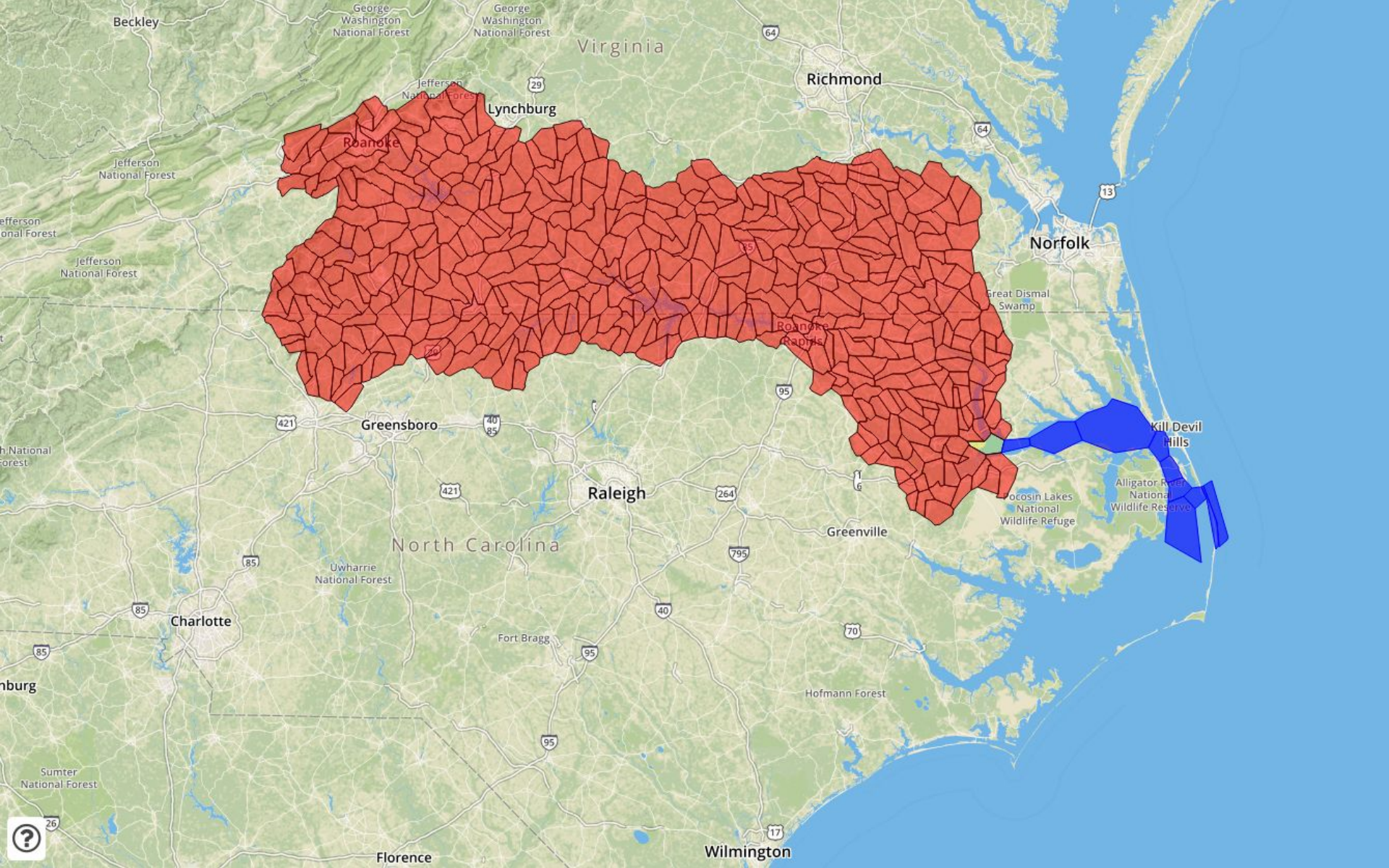
A map of North America, including parts of Canada, the United States, and northern Mexico. A large, dark brown, textured overlay covers the central and eastern parts of the continent, resembling a dense forest or a large-scale data visualization. The overlay is shaped like a map of the landmasses. Various cities and states are labeled on the map.

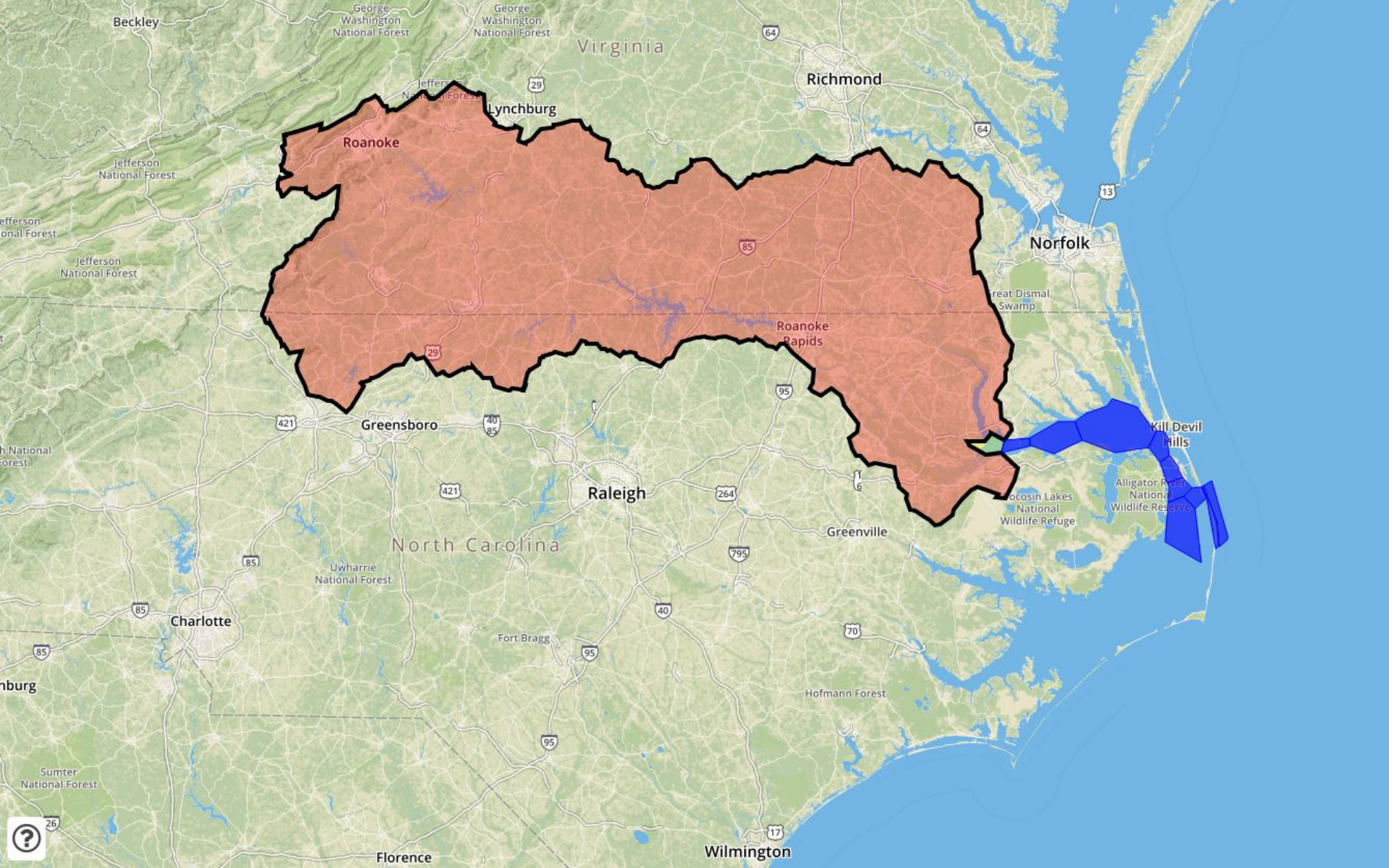
Leaflet  JS

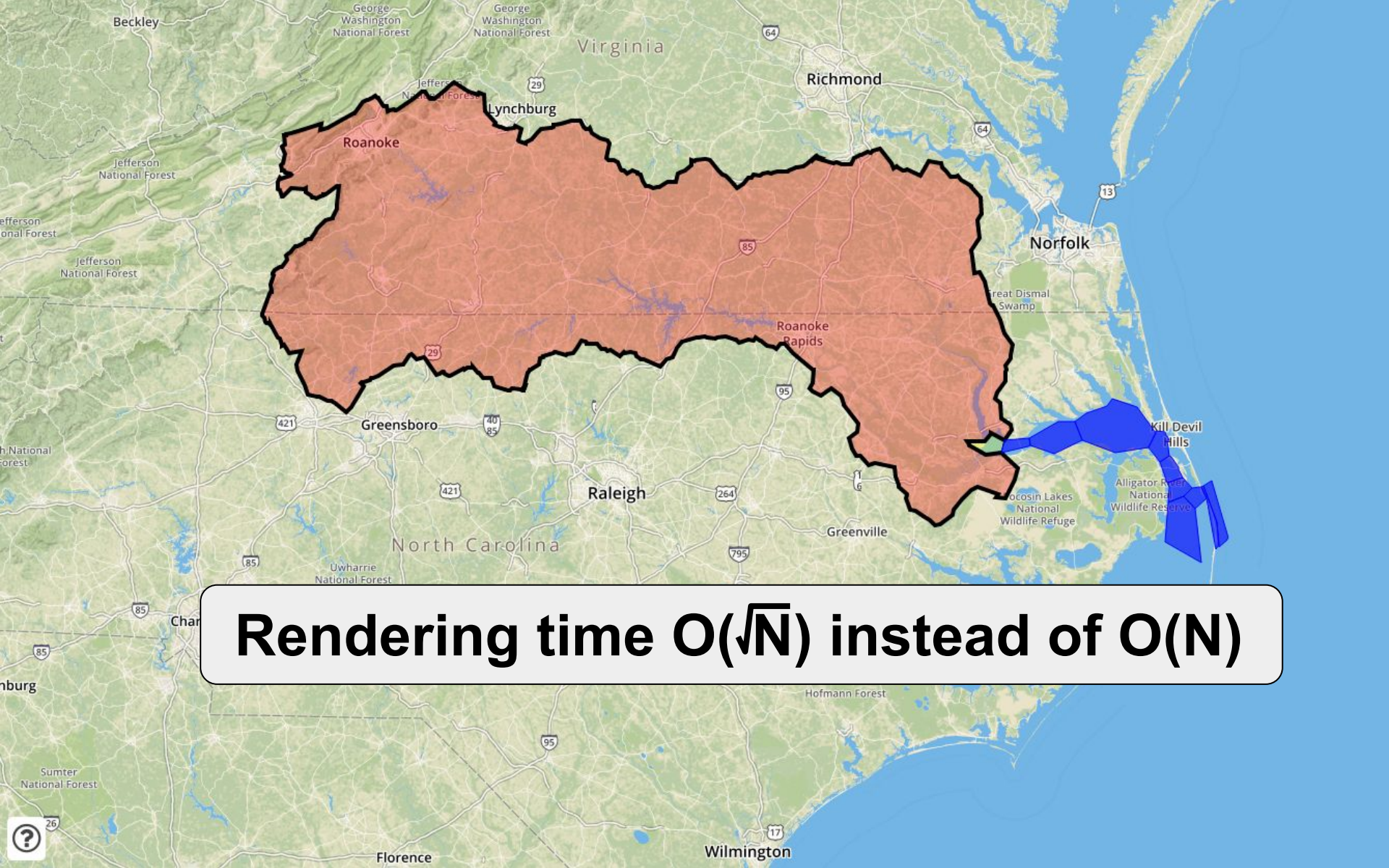
HTML5 Canvas



fast!

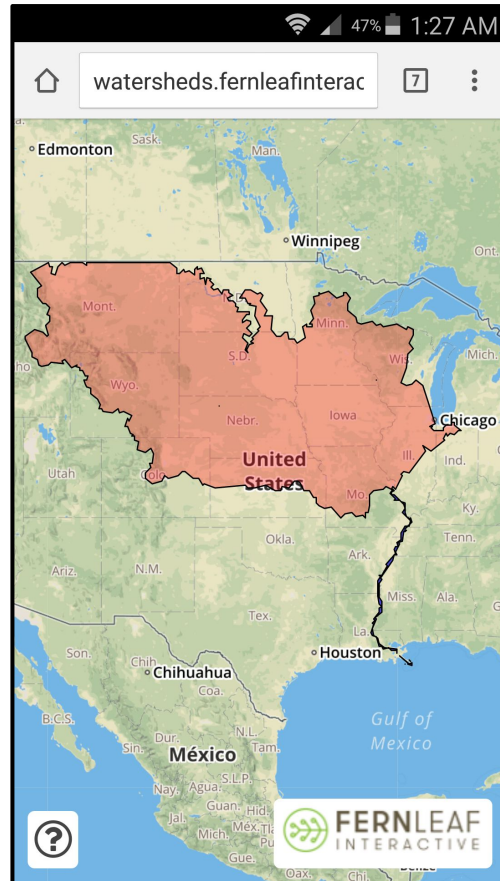






Rendering time $O(\sqrt{N})$ instead of $O(N)$

watersheds.FernLeafInteractive.com





Thanks!

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@embeepea

watersheds.fernleafinteractive.com

github.com/embeepea/watersheds

