Objective 1 Update

March 6, 2019 : LUWG

Rachel Soobitsky

- Completed Deliverables (through February 2019):
  - Created hot spot polygons for UVM to update LC
  - Completed initial outreach and presentations
  - QAPP
- Upcoming Deliverable (March 2019):
  - Finalization of classification scheme with additional classes under consideration:
    - Deciduous vs evergreen trees; timber harvests/silviculture; vegetation height; cover crops; crop vs. pasture; center-pivot irrigation; vineyards, nurseries, greenhouses, and orchards; solar fields; animal operations; non-tidal/forested wetlands; aquaculture operations; grass filter strips; submerged aquatic vegetation
- Future Deliverables (June 2019)
  - Hot Spot Land Cover Updates

Outreach

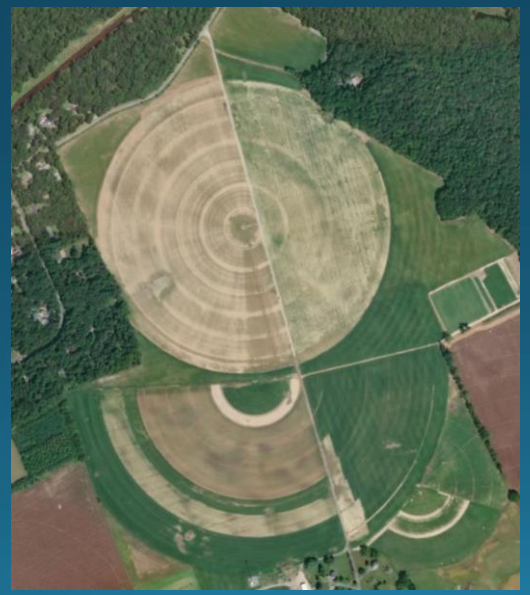
- Emailed counties/municipalities in Chesapeake Bay watershed (as of 3/1/19):
  - MD - 24/24 counties responded
  - DC – datasets online
  - DE – 3/3 counties responded
  - WV – 9/14 counties responded
  - VA – 55/98 counties/municipalities
  - PA – 26/43 counties responded
  - NY – 13/20 counties responded

Use Cases

- Cumberland County, PA: “The Chesapeake Bay Land Cover dataset is a great product. We are currently publishing it in a web map, http://gis.ccpa.net/planningreview/ (fourth tab on the left), to assist in our planning process.”- Justin Smith, Cumberland County GIS
- West Virginia Dept of Natural Resources Forestry Division: “ I have used this data from your predecessors for some priority area establishment work for our agency. The CB high resolution landcover has been very useful for a few of Core Programs.”- Steve Harouff, GIS Manager
- Pennsylvania Dept of Conservation and Natural Resources, Bureau of Forestry: Already been making use of the current high-resolution data- Joe Petroski Chief Forest Information an Spatial Analysis Section
- Delaware Dept of Agriculture: “…I’m happy about this data update. You probably don’t know, but I processed the 13/14 land cover version to create tree canopy percentages for every town, park, and HOA community in Delaware (about 3,000 entities). The results are published in a searchable web app here. https://de.gov/treecanopy” Jimmy Kroon, Planner IV, GIS Coordinator

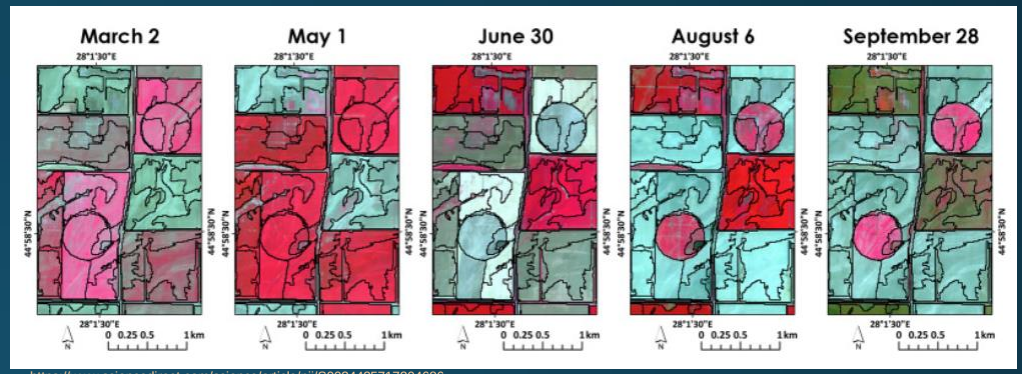
Research into Secondary Classes

- UVM:
  - Using Ecognition software:
    - Deciduous vs. Evergreen
    - Center-pivot irrigation
    - Vineyards, nurseries, orchards
    - Solar fields
    - Animal Operations: Chicken and/or Cattle
  - Vegetation height: taken from NDSM derivative
  - Silviculture/Timber Harvests
- MSFT AI for Earth Team



Research into Secondary Classes

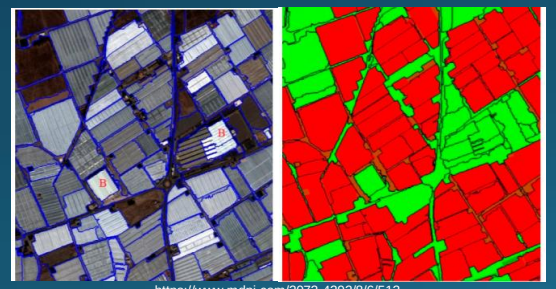
- Crop vs. Pasture and/or Cover Crop
  - Using 4 band Sentinel-2 imagery, can perform Object-Based Time-Weighted Dynamic Time Warping (TWDTW) analysis. Using reflectance, spectral indices (such as Normalized Difference Vegetation Index NDVI), and DEM-based ancillary info (such as slope or altitude). Will need to use R package.
- Aquaculture operations
  - DNR has data. Hard to ID oyster farms and SAV because of being underwater.
  - NOAA has identified current distribution, structure, and quality of oyster habitat.
- Submerged Aquatic Vegetation
  - Virginia Institute of Marine Science (VIMS) dataset.



https://www.sciencedirect.com/science/article/pii/S0034425717304686

Research into Secondary Classes

- Tidal vs. Non-tidal/Forested Wetlands:
  - Using 4 band leaf-off imagery combined with lidar-derived products (DEM, DSM, Compound Topographic Index, intensity), and vegetation indices in an Object-Based Imagery Analysis will seek to improve on accuracies found in the current baseline NWI data
- Greenhouses:
  - Using Landsat 8 with Moment Distance Index (MDI) metric, in an Object-Based Imagery Analysis could prove fruitful. May need higher-resolution data as well



https://www.mdpi.com/2072-4292/8/6/513

- Grass-Filter Strips: CBP OBJ 3 is identifying as part of BMP mapping

https://www.researchgate.net/publication/295571014_Wetland_Mapping_in_the_Upper_Midwest_United_States_An_Object-Based_Approach_Integrating_Lidar_and_Imagery_Data

Objective 2 Update

March 6, 2019 : LUWG

David Saavedra

- Completed Deliverables (through February 2019):
  - QAPP and other administrative tasks
  - Advisory Committee
    - Comprised primarily of USGS & EPA personnel with interests in geomorphology, hydrography
  - Method refinement
    - Tweaks to valley networking, channel extraction, channel connectivity
  - Decide on first pilot HUC
    - 02050306 – Lower Susquehanna
- Upcoming Deliverables (March-June 2019)
  - Method for distinguishing man-made features (e.g. ditches)
  - Apply methods to pilot HUC

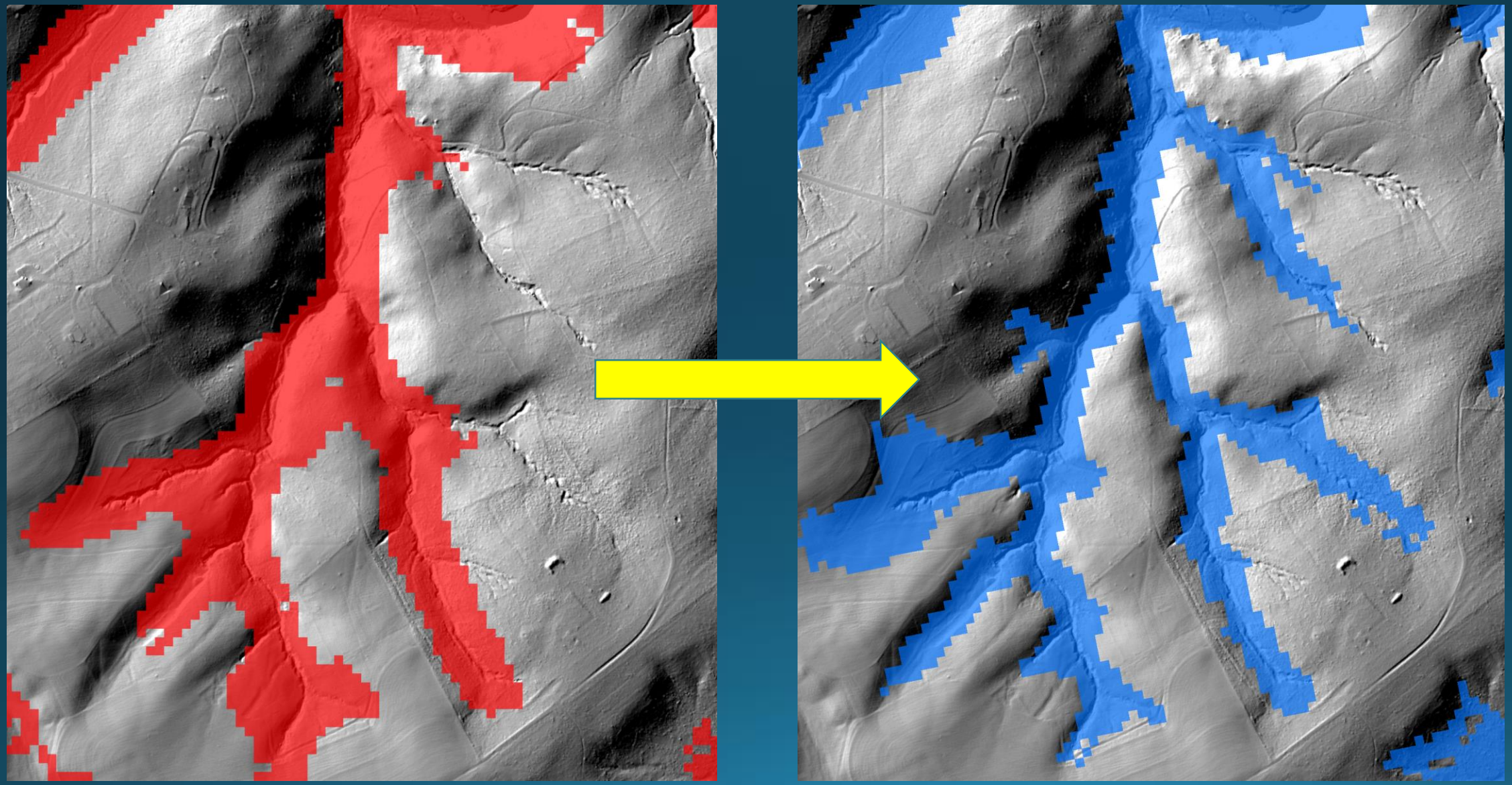
Valley networking

- Previously used 10-m NED to delineate valleys contiguous with NHD+ V2 (med. res.) streams

- Now will use lidar-derived DEM coarsened to 10-m to delineate valleys, assess contiguity with NHD+ HR (high res.)
  - Coarsened lidar DEM will still allow fast processing but location of valleys is more congruent with channels delineated from high-resolution lidar DEM.
  - NHD+HR should provide better inclusion of headwater valleys

RED – NED valley network

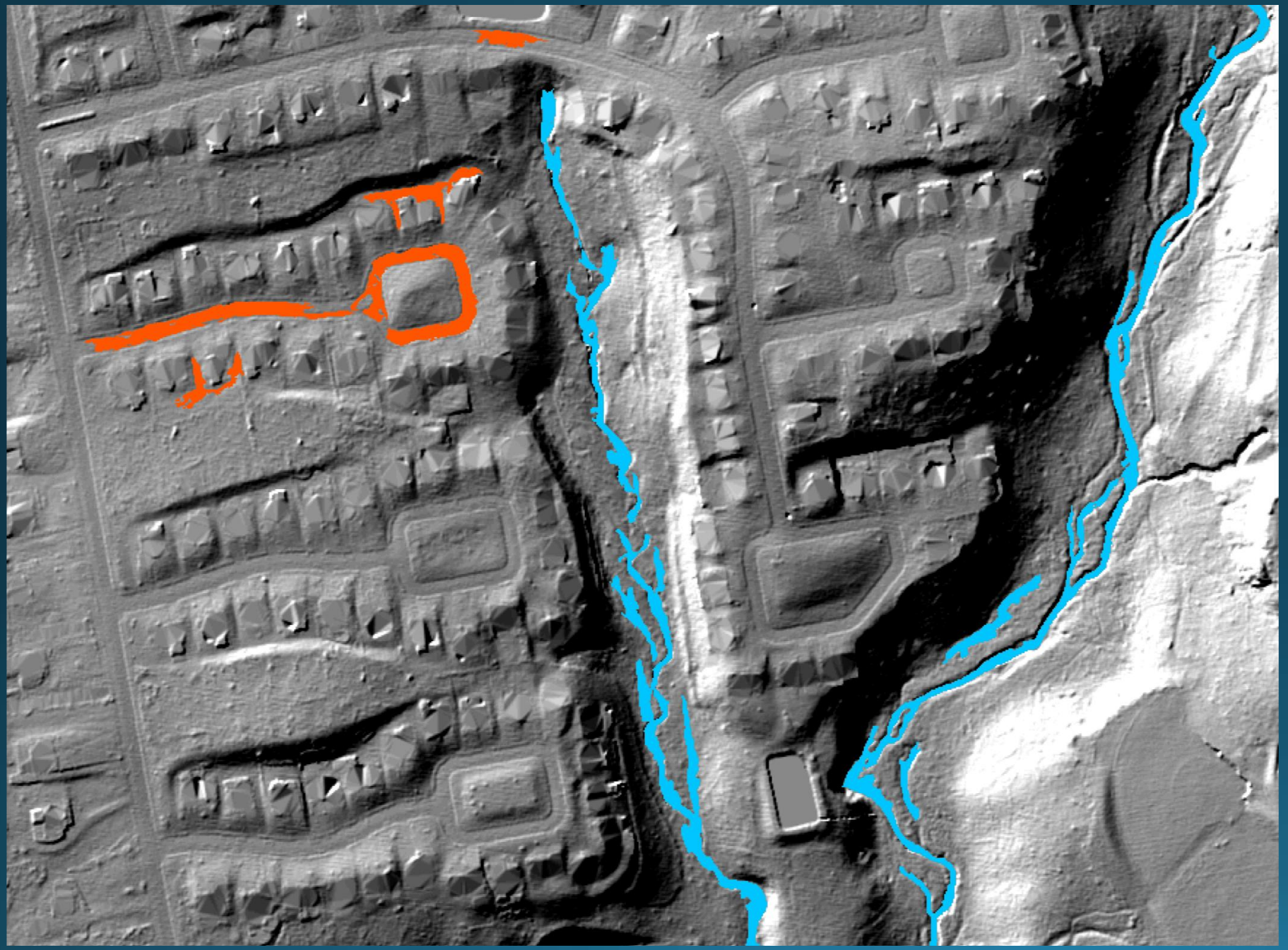
BLUE – lidar valley network



Channel extraction and connectivity

- Channel extraction – incorporating land cover data to exclude impervious surfaces from extracted channel skeleton
  - Helps alleviate issues where narrow roads with steep embankments get classified as channels
  - Aids in roadside ditch mapping effort

- Channel connectivity – implement *r.stream.extract* module
  - Similar functionality to least-cost-path method developed previously, more efficient
  - Additional output attributes available

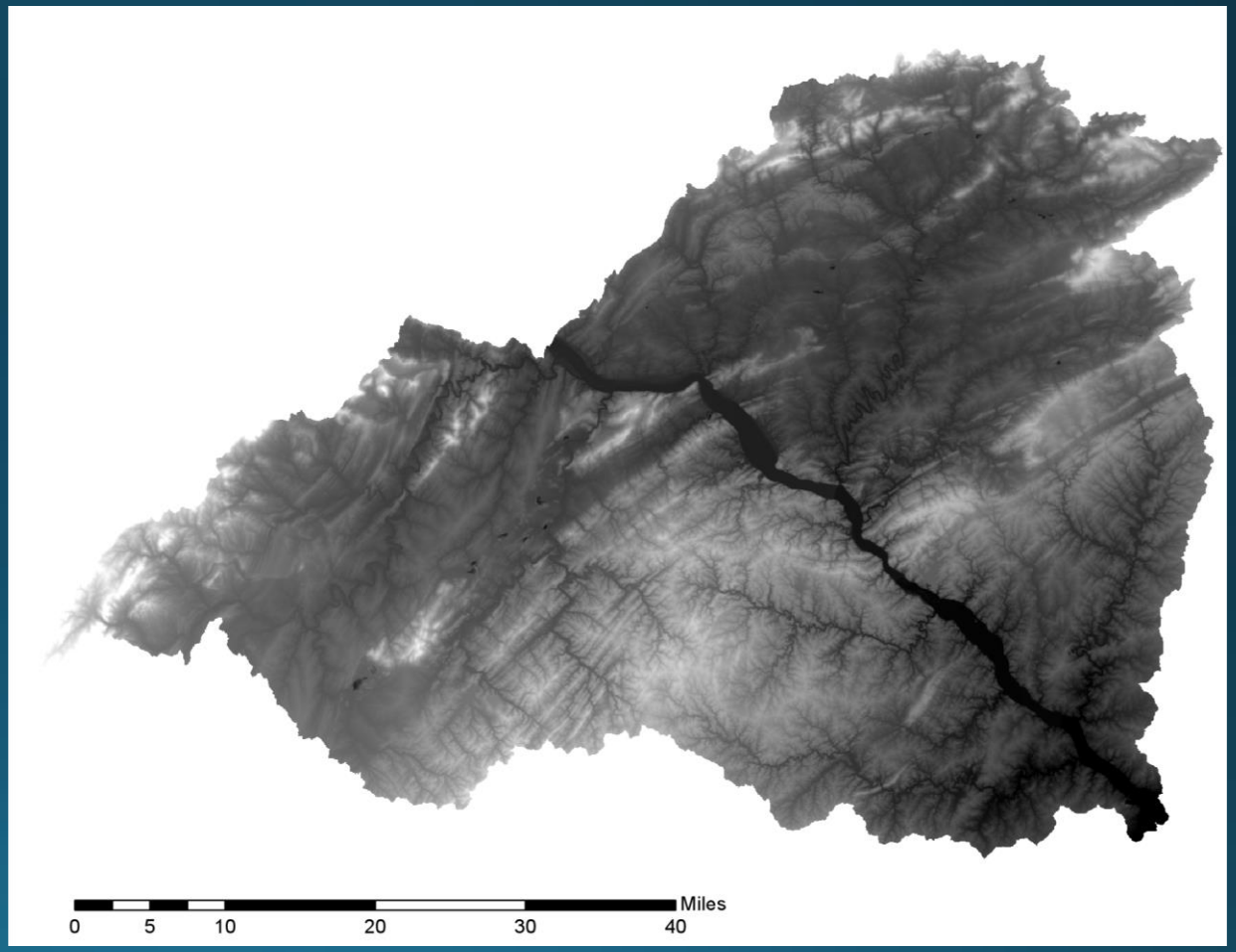


ORANGE – Streets classified as channels in previous channel extraction

BLUE – channel classification after valley and LC adjustments

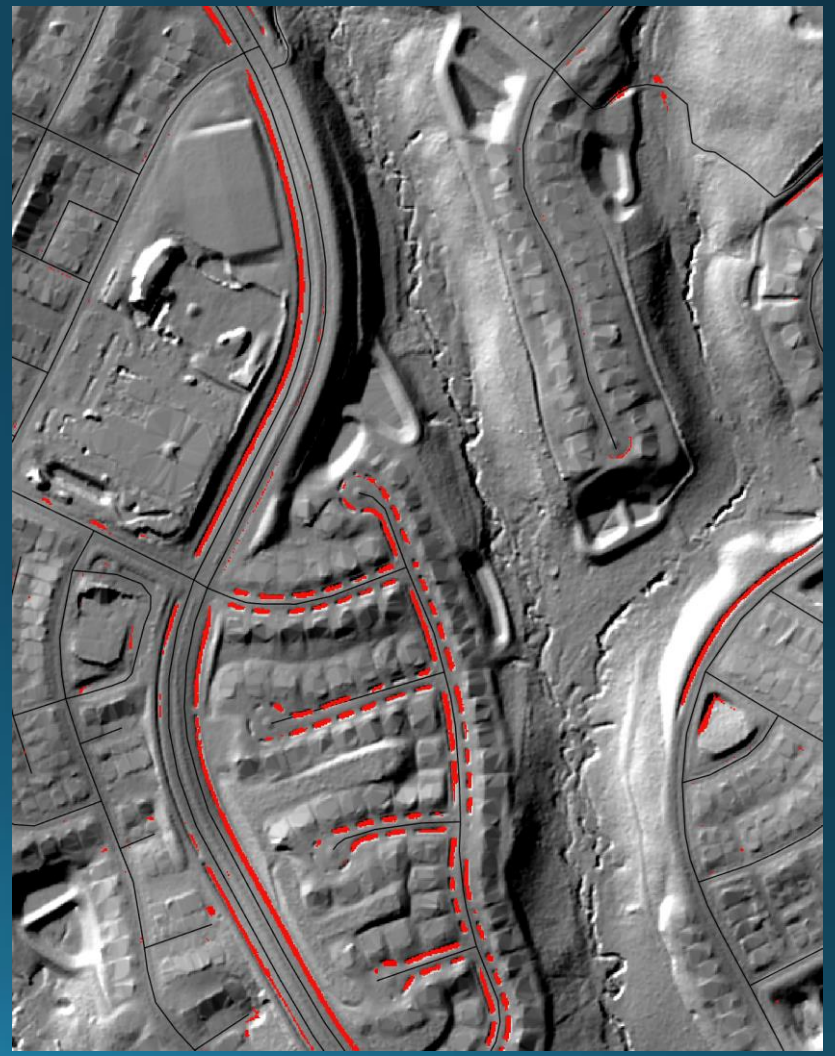
Pilot HUC

- Lower Susquehanna (02050306) selected with input from Advisory Committee, Conservancy staff and partners, and others
  - Existing local efforts/interest in high-res stream mapping
  - Variable land use and physiography (including karst topography)
  - Variable quality lidar will put methods to test
  - Proximate to Annapolis/Baltimore for field visits if needed
- Others considered:
  - Patapsco, Middle Potomac/Catoctin, Patuxent, Severn



Roadside ditch mapping

- Actively researching
- General criteria:
  - Proximate to roads (NAVTEQ)
  - Narrow, elongated shape (not necessarily long or linear)
  - Not included in natural channel dataset



Questions?

- rsoobitsky@chesapeakeconservancy.org
- dsaavedra@chesapeakeconservancy.org