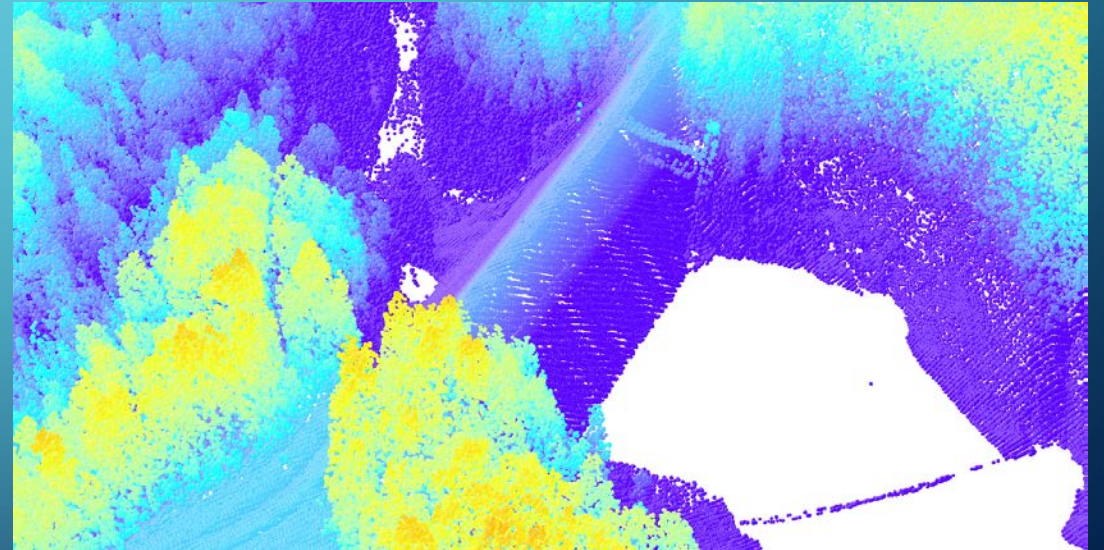# BRIEF EXAMPLES OF PRACTICAL USES OF LIDAR

PURDUE ROAD SCHOOL - 3/9/2016
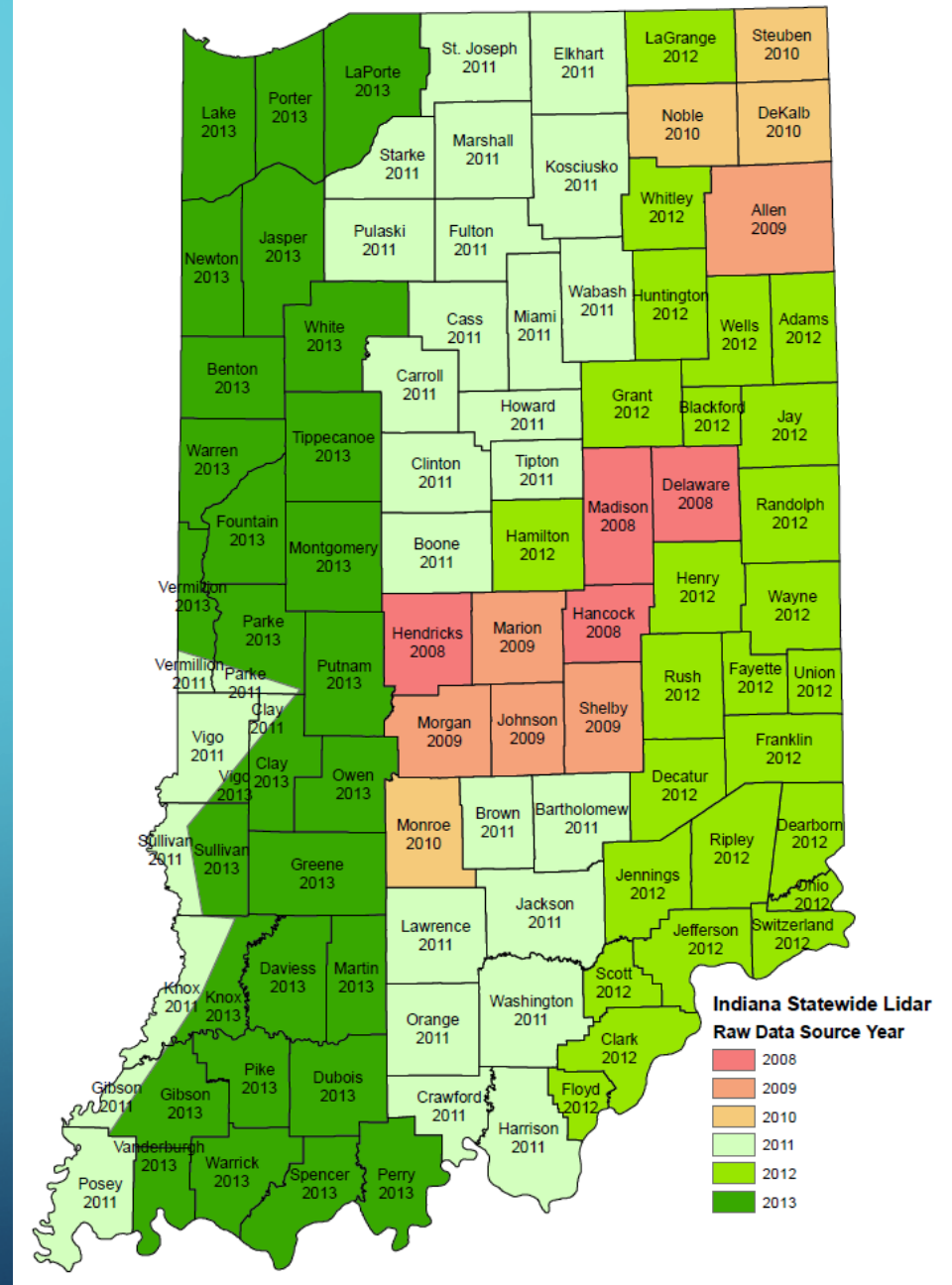
CHRIS MORSE

USDA-NRCS, STATE GIS COORDINATOR

LIDAR/DEM SOURCE DATES

- LiDAR and its derivatives (DEMs) have a collection date for data represented in the files.

- Data from before 2011 was re-processed into technical specs and formats to match the new 2011-2013 data collections

TECHNICAL SPECS FOR INDIANA DEM DATA

- Horizontal: NAD 1983 Indiana State Plane US Foot (East/West)

- Vertical: NAVD 1988

- Pixel Resolution: 5 feet

- Hydro Flattened Features

  - Waterbodies over 2 ac. in size (set to one elevation for the body)

  - Streams over 100 ft. wide (set to series of elevations as moving downstream)

- Additional elevation enforcement

 - Removal of road bridges over 100 ft. long (excludes footbridges)

OPEN TOPOGRAPHY

- www.opentopography.org

- Stores all of Indiana's LiDAR and related DEM files for free download

- Download via drawn AOI or Bulk Download options

- OT Processing will merge multiple source files into one download for each selected product

  - Note: TauDEM generated files will be split into new strips by the processing
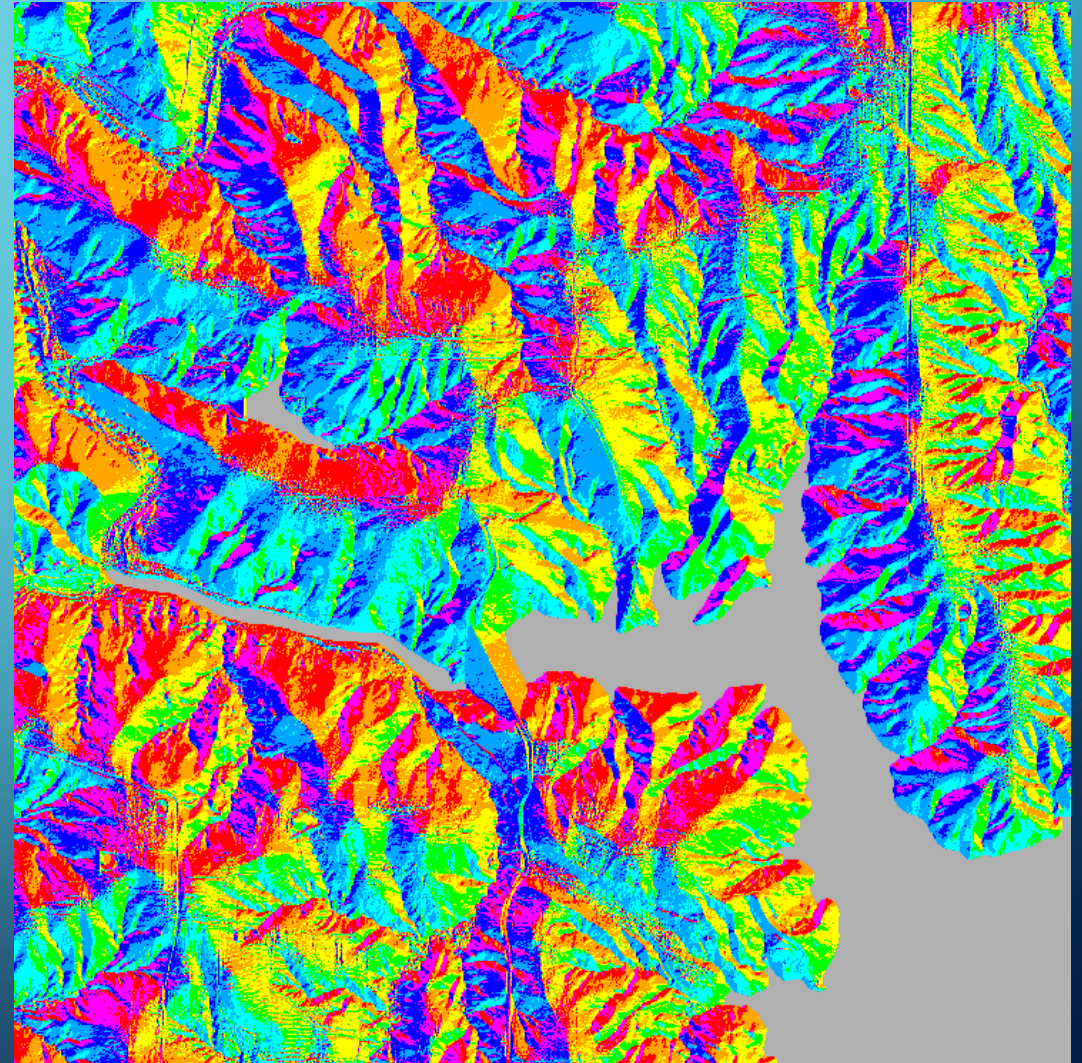
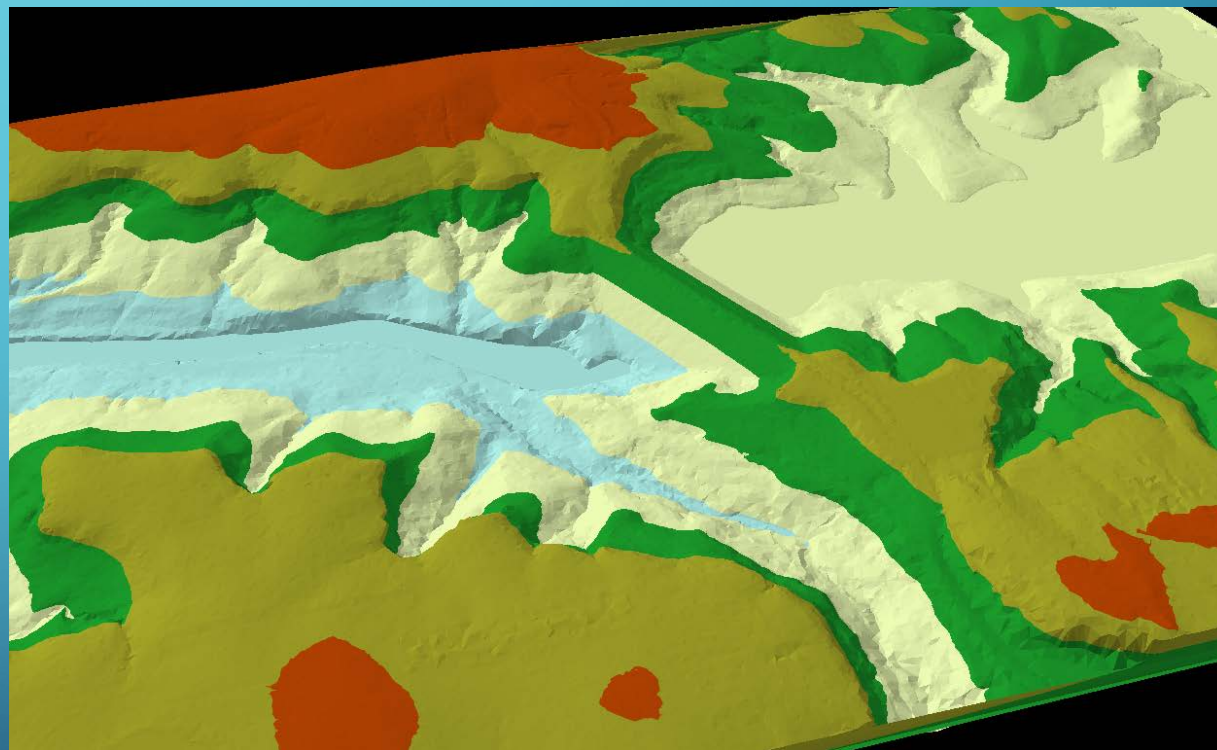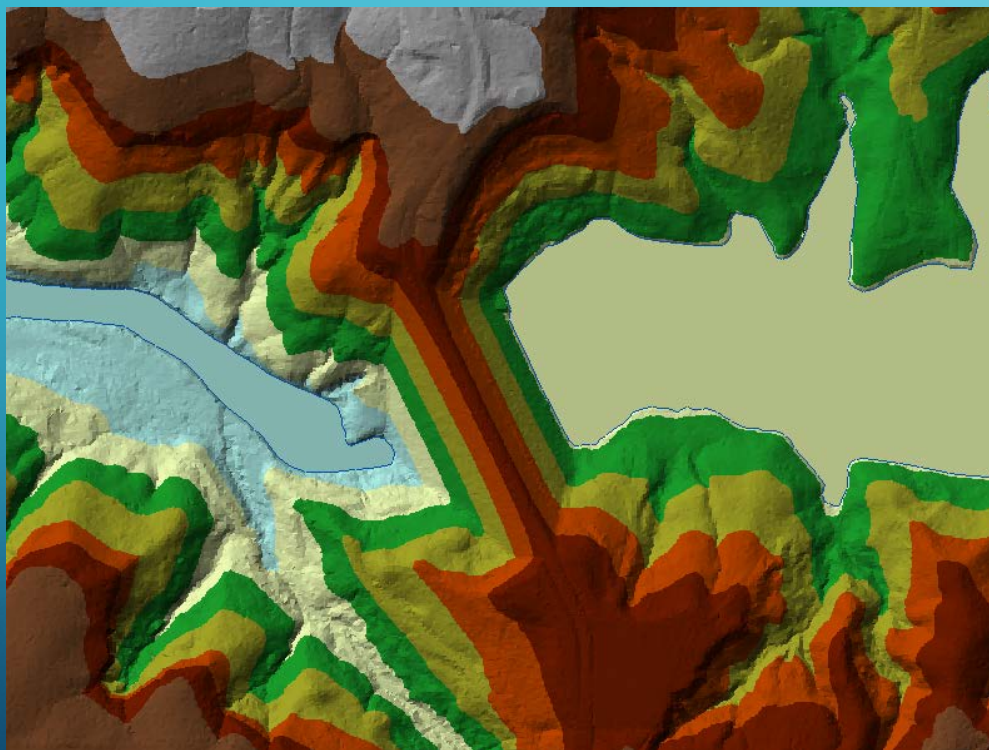# CREATE DEM AND DSM DATA
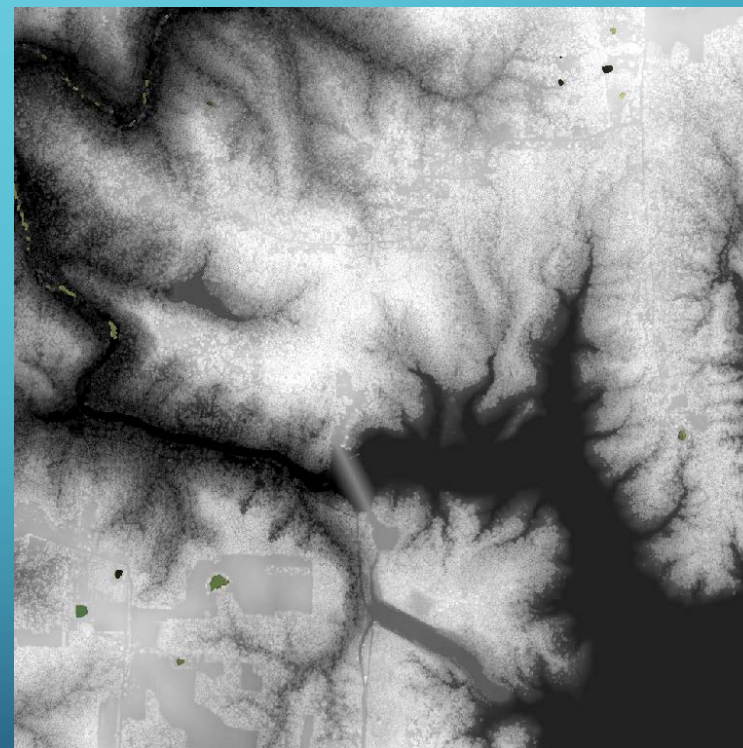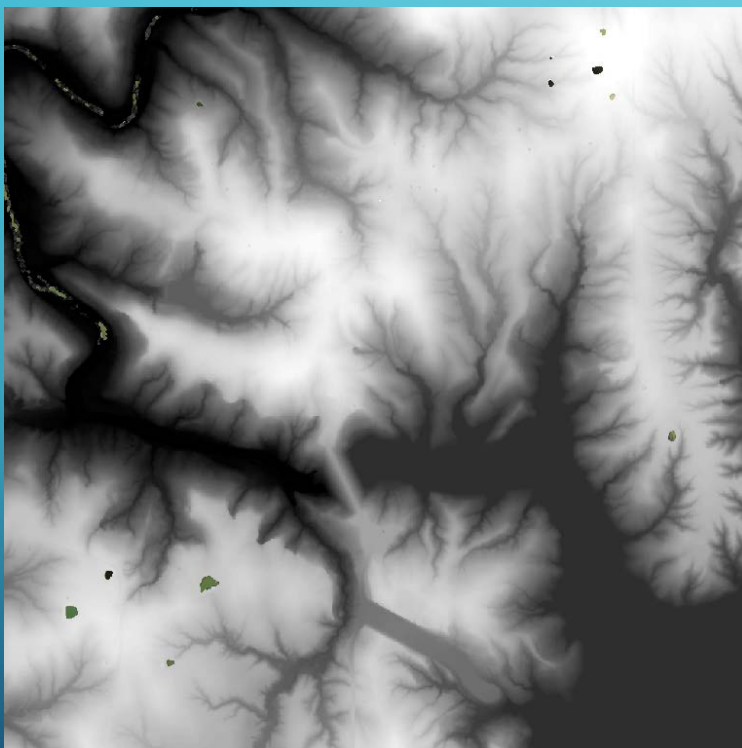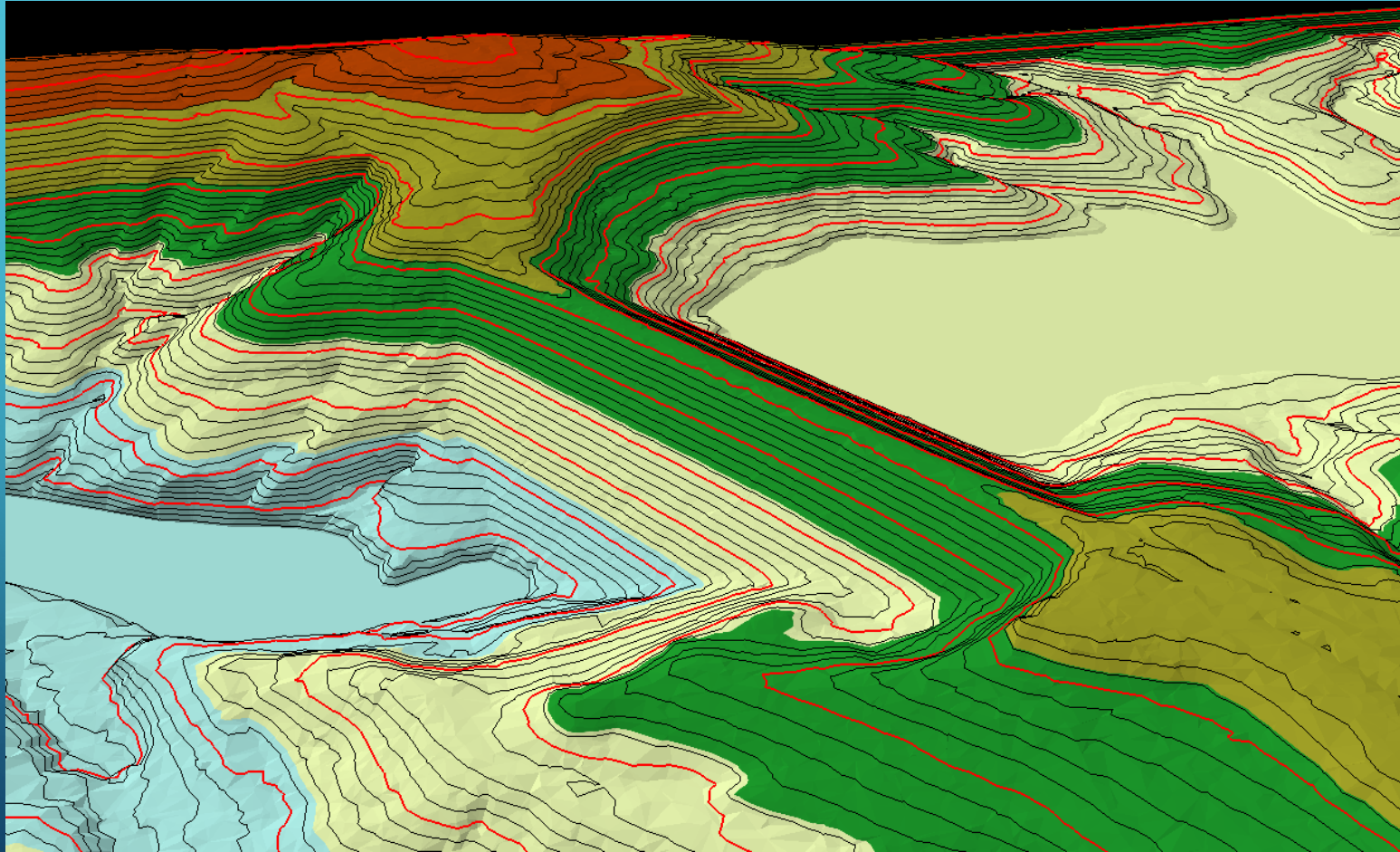
HILLSHADE AND SLOPE
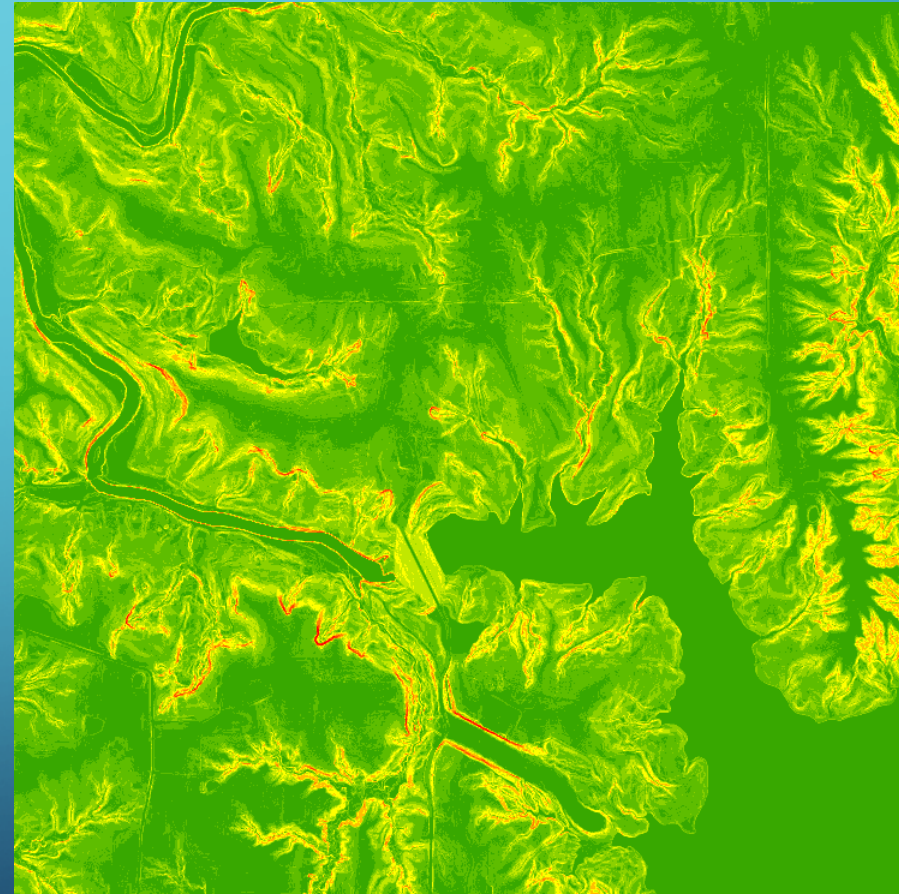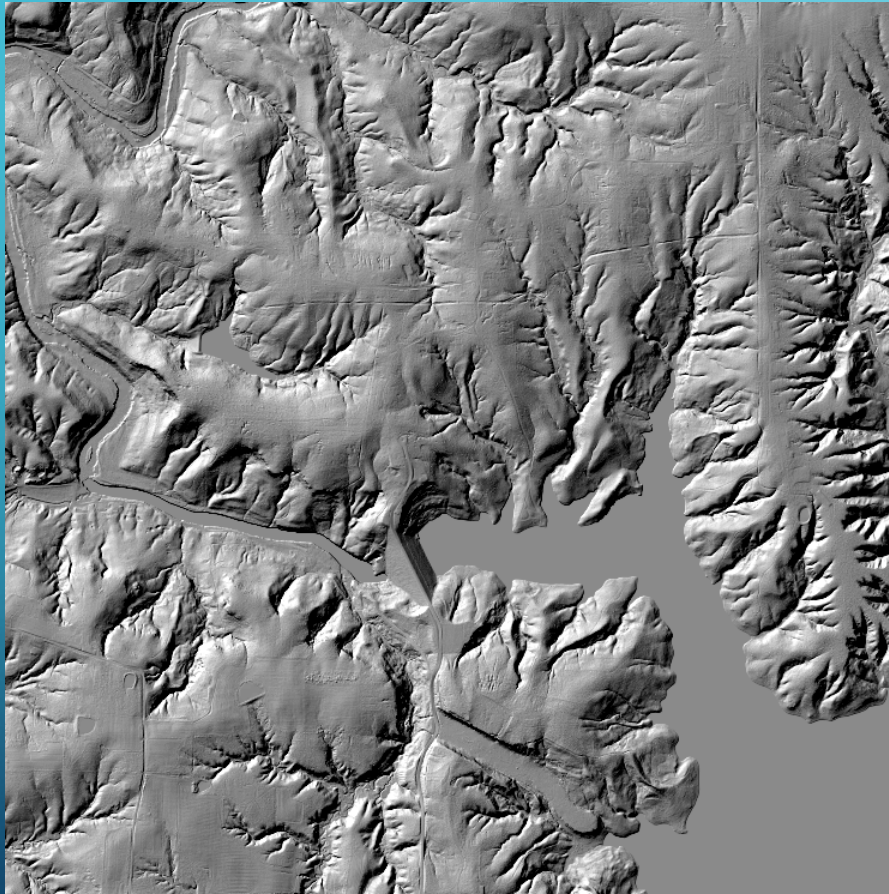
ASPECT

- Spatial Analyst tool to run Aspect

- Notes on Slope and Aspect, and similar derivatives like curvature – Lidar data is so detailed, you may want to resample source DEM files to "smooth" the data into traditionally recognized landforms
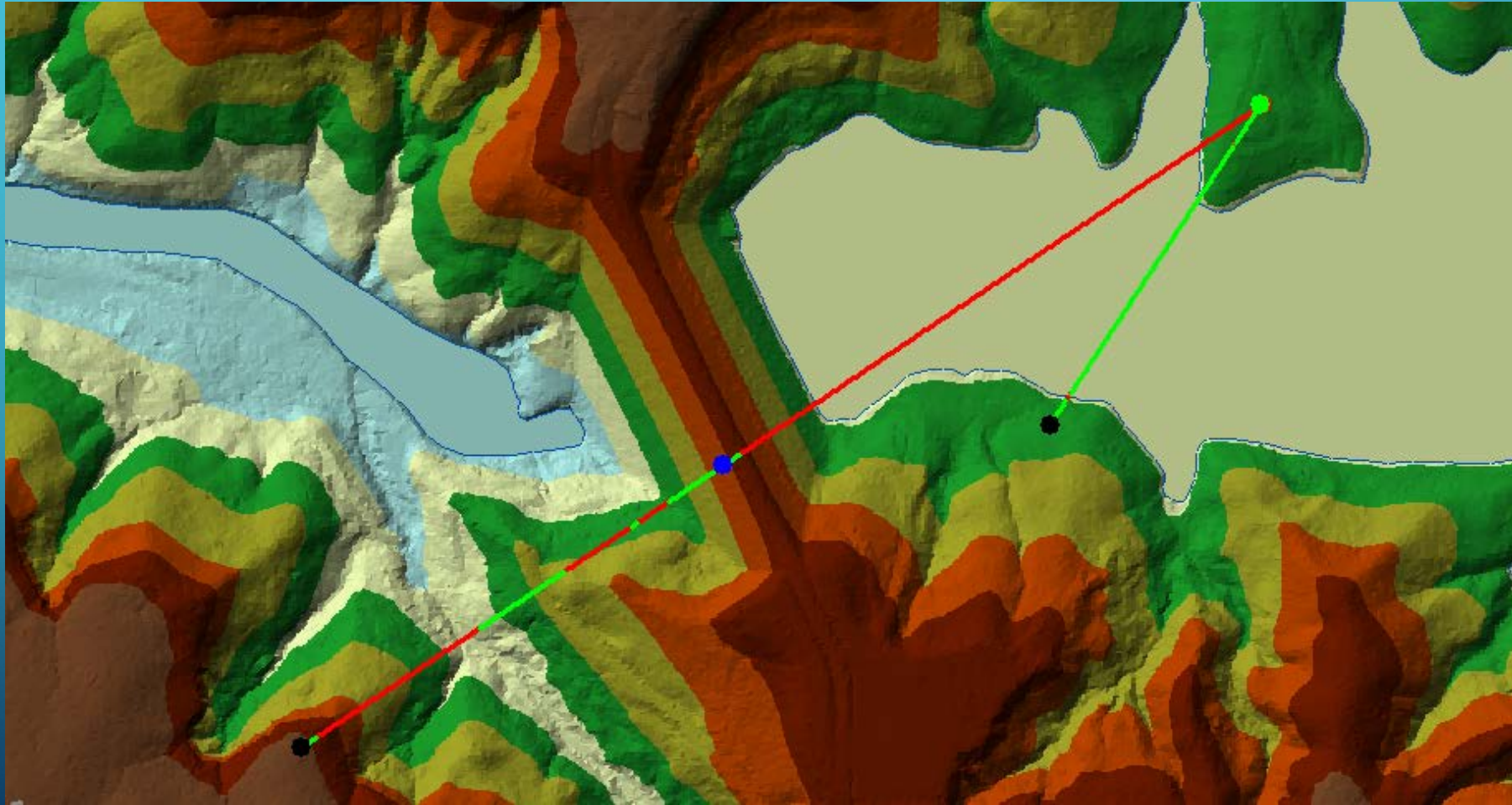
CREATE TIN OR TERRAIN VIEWS

CREATE BASIC CONTOURS (NO EXTRA BREAKLINES)

LINE OF SIGHT ANALYSIS
& VIEWSHEDS (NOT SHOWN)

CREATE INTENSITY IMAGES

- Intensity, in essence, is a measure for each point of the return strength of the laser pulse that generated that point.

- Factors include reflectivity and atmospheric distortion

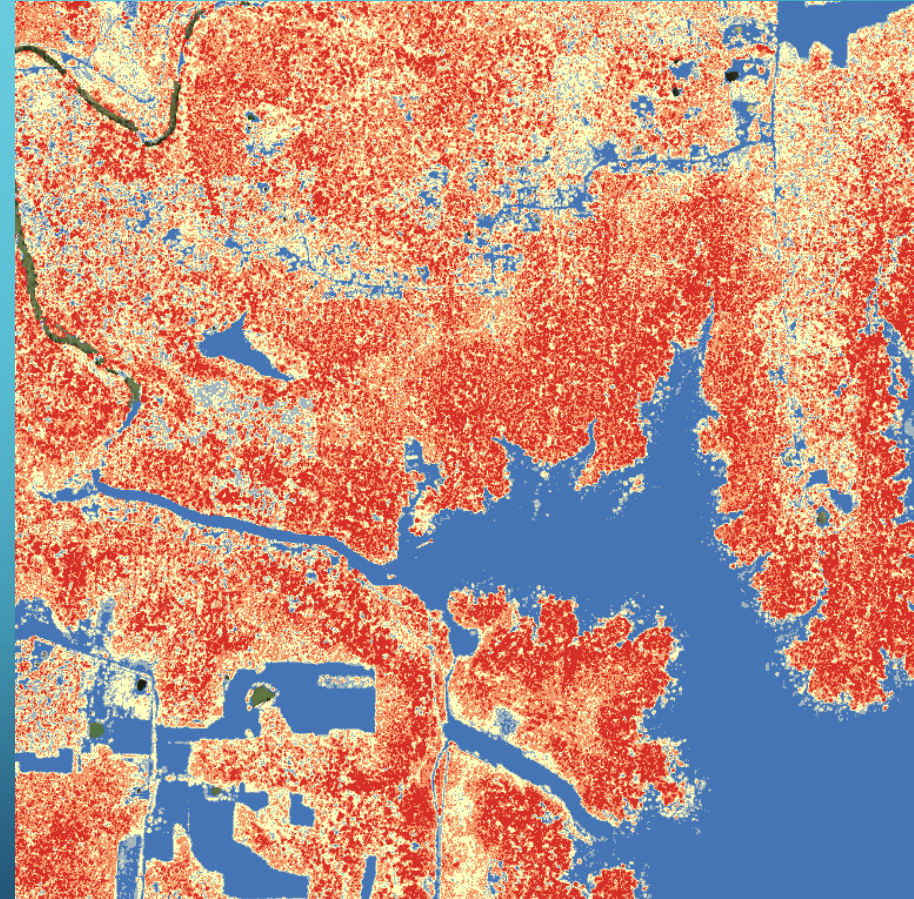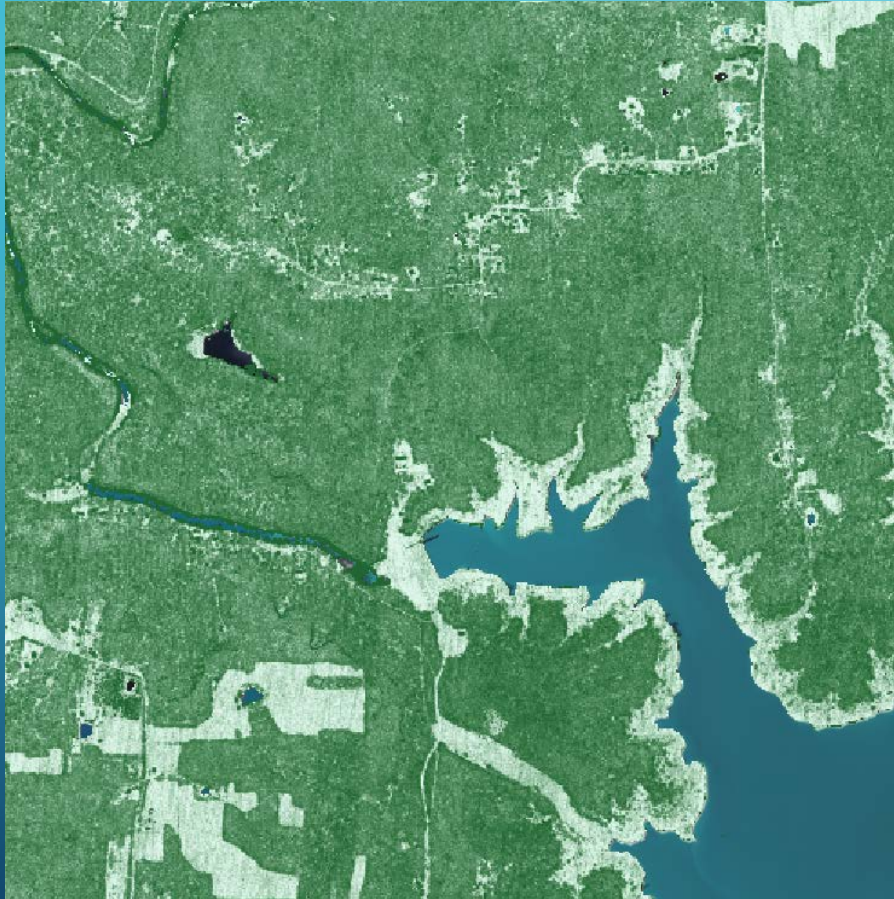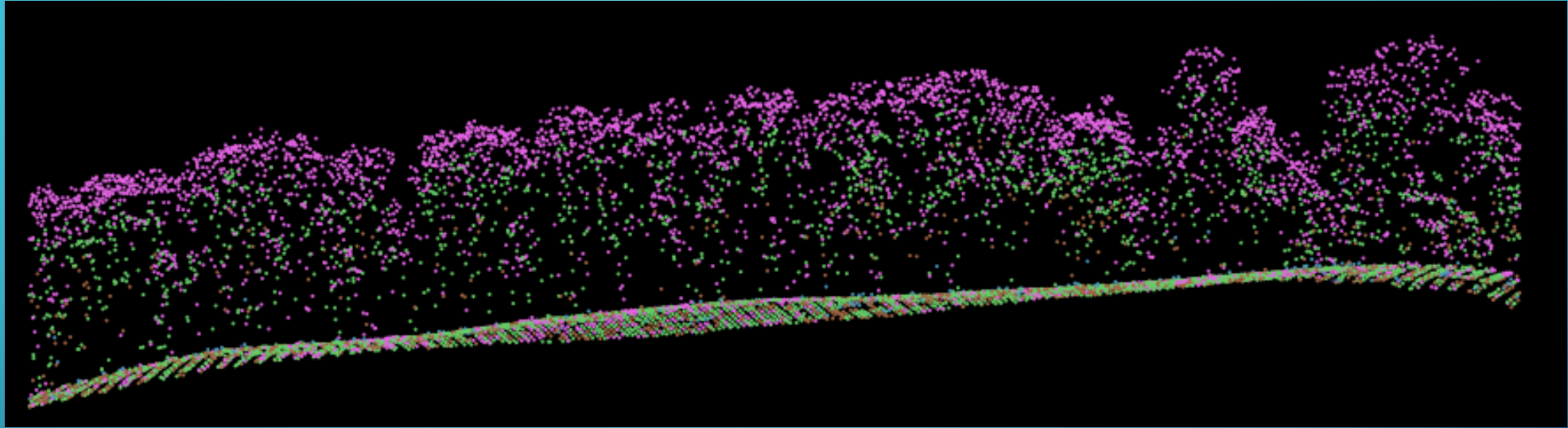- Can emulate an image if no image available

VIEW LAS POINT DATA

- Identify tool using a LAS Dataset in ArcMap

- ESRI Multipoint data blobs the points so you can't see the detailed attributes until you further format the data in ESRI tools
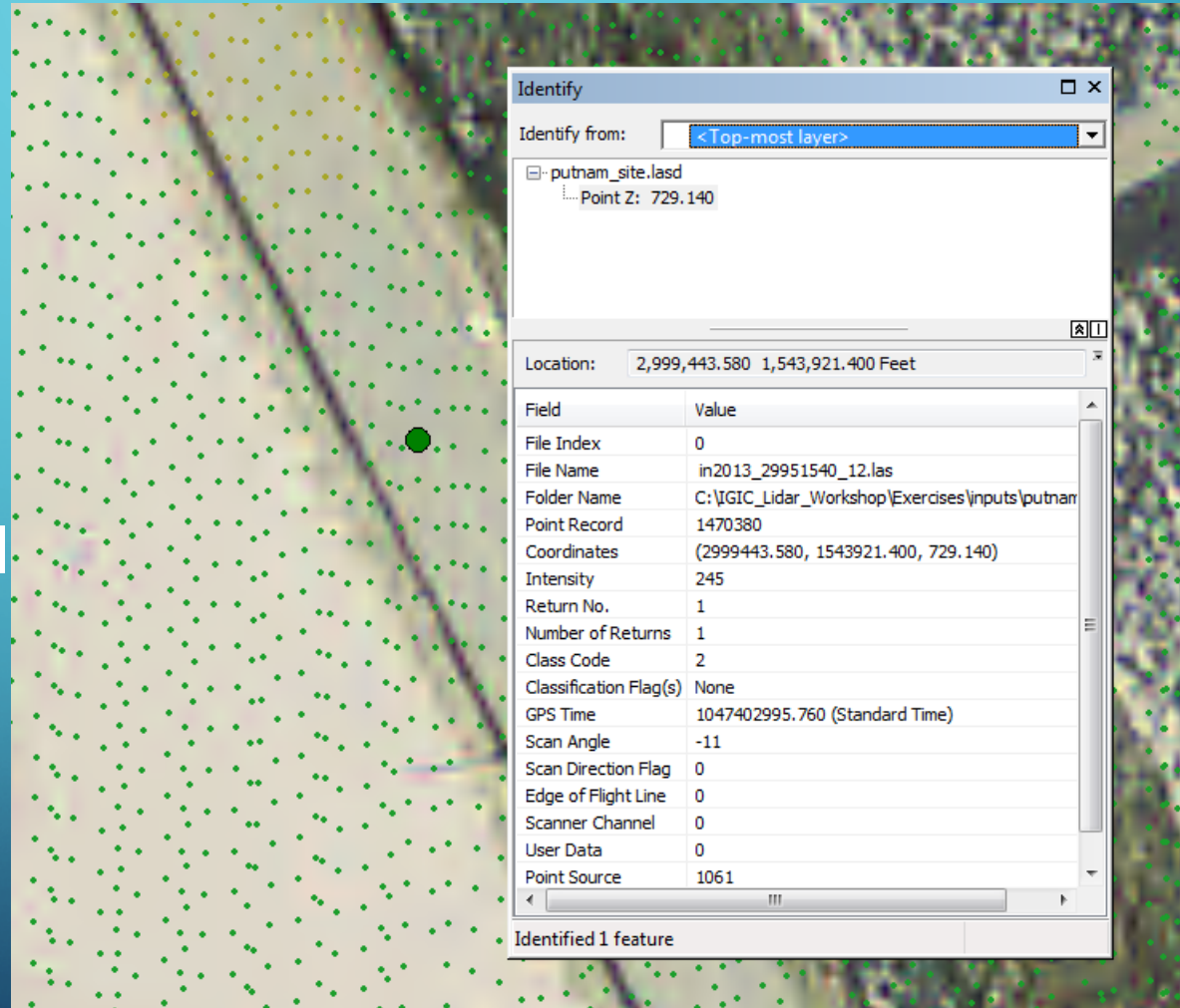
FORESTRY APPLICATIONS - DENSITY AND HEIGHT
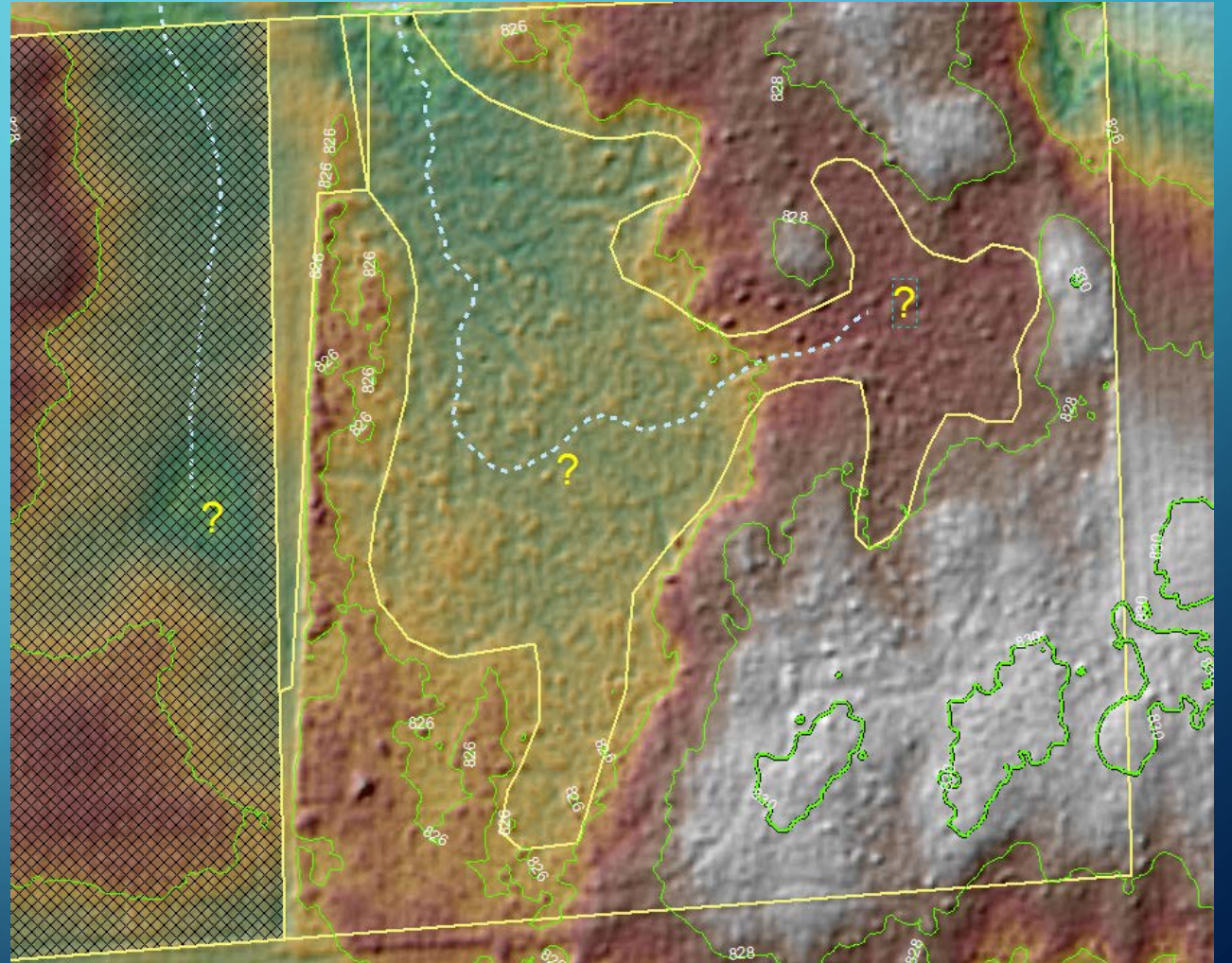
3D CROSS SECTIONS (VEGETATION)
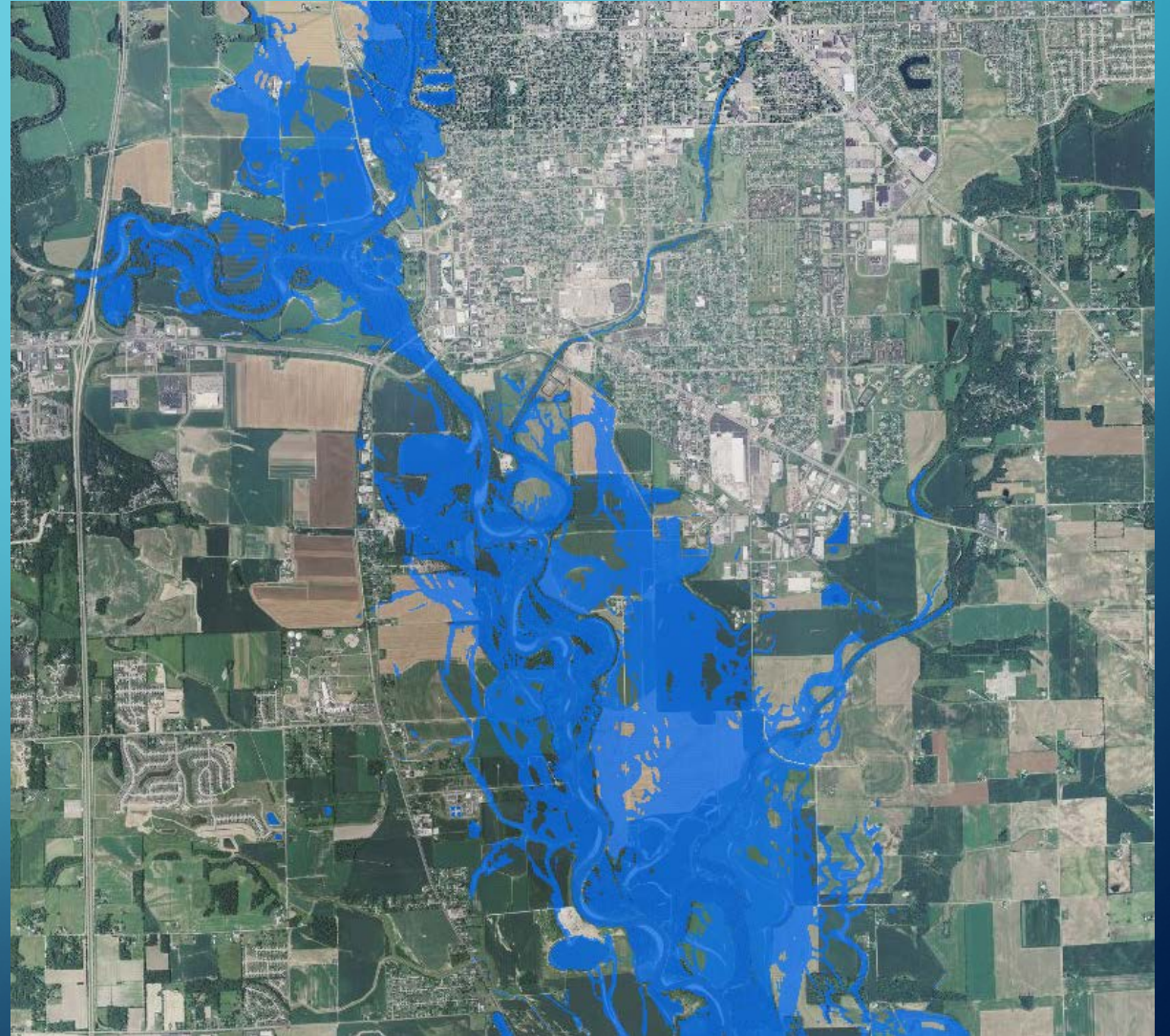
SOIL MAPPING UPDATES

WETLAND DETECTION

- Composite overlays

- Low lying areas

- Vegetated areas (sometimes)

- Wet soil types

- Lidar Intensity Image

- CIR photo signatures

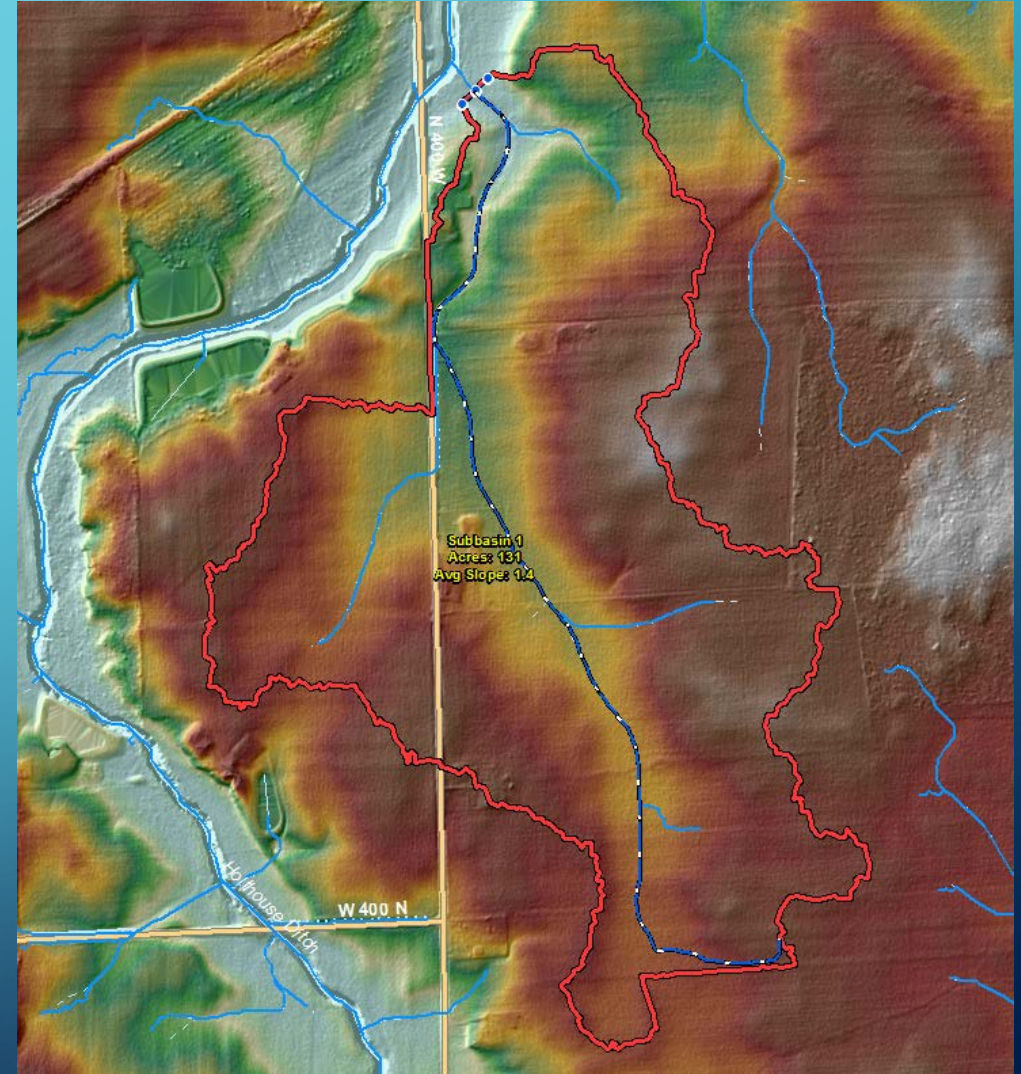# FLOOD AND INUNDATION MODELING

- Define cross sections from stream gauge data

- Fill to cross section heights

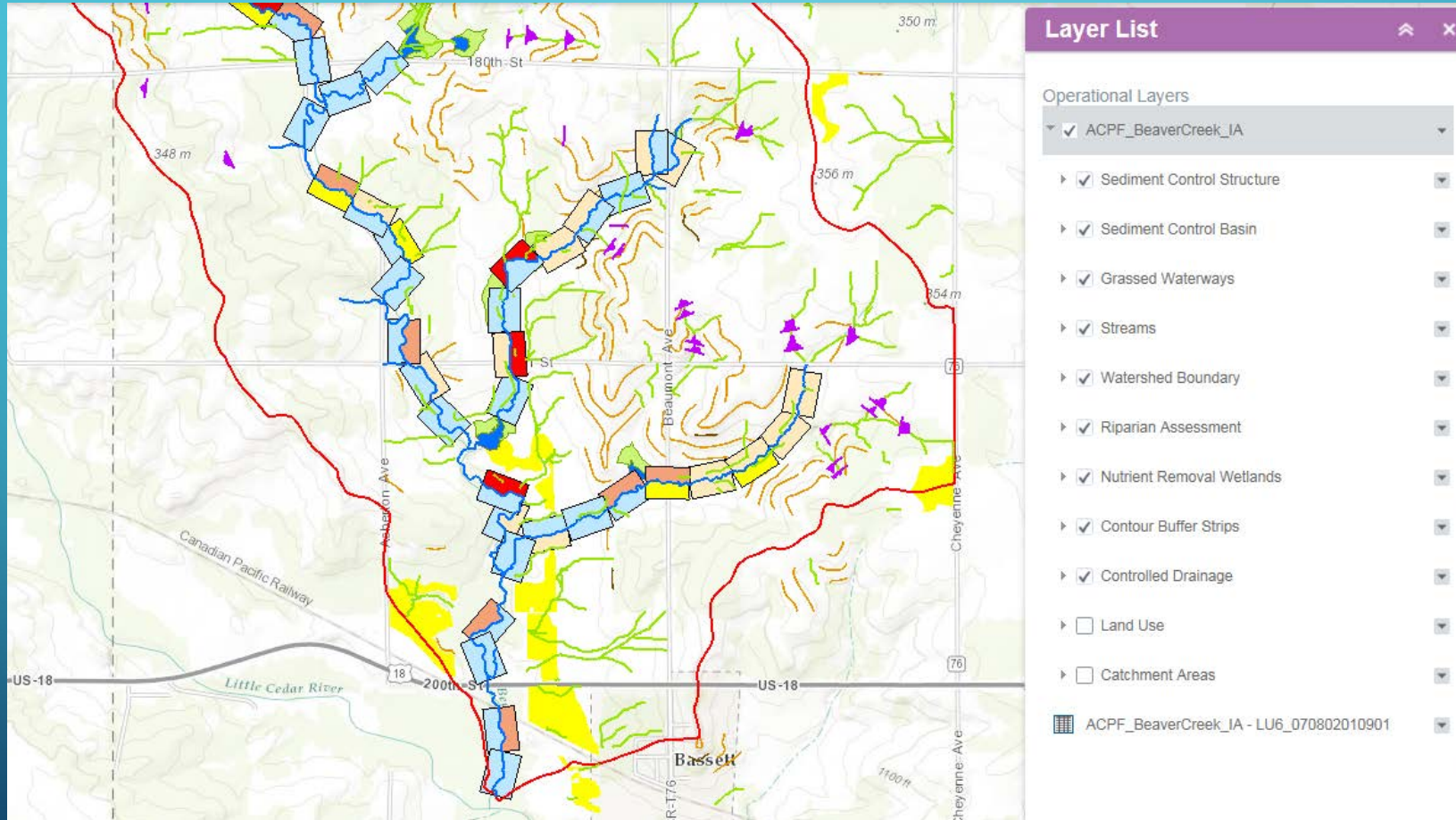- Subtract differences in surface models from flood heights

WATERSHED MODELING

- Start with DEM

- Interactive cuts to define flow

- Generate Flow Accumulation and Direction & stream link network

- Define pour point(s)

- Generate watershed

WATERSHED CONSERVATION PLAN DEVELOPMENT

ADD VALUE TO THE BASE LAS DATA

- Create Terrains using additional break lines created at the county

- Additional break lines can improve elevation derivatives from the Terrain

- Be attentive to dates of input datasets and LAS (lidar) files

- Treat discrepancies seriously, possibly due to temporal issue or a data flaw

FUTURE LIDAR DATA REFRESH CONSIDERATIONS

- To enable more uses or more detailed data products -
    - Higher Point Density to support additional accuracy and applications
    - Additional LAS Point Classification (low, med, high vegetation, buildings, etc…)
    - Additional break line types

ADDITIONAL NOTE ON INDIANA IMAGERY

- Imagery includes CIR band in the 4th band

- Most GIS systems can readily display the difference

- Useful for detecting water boundaries and wetness, as well as vegetative presence and vigor

NATURAL COLOR VS COLOR INFRARED VIEW
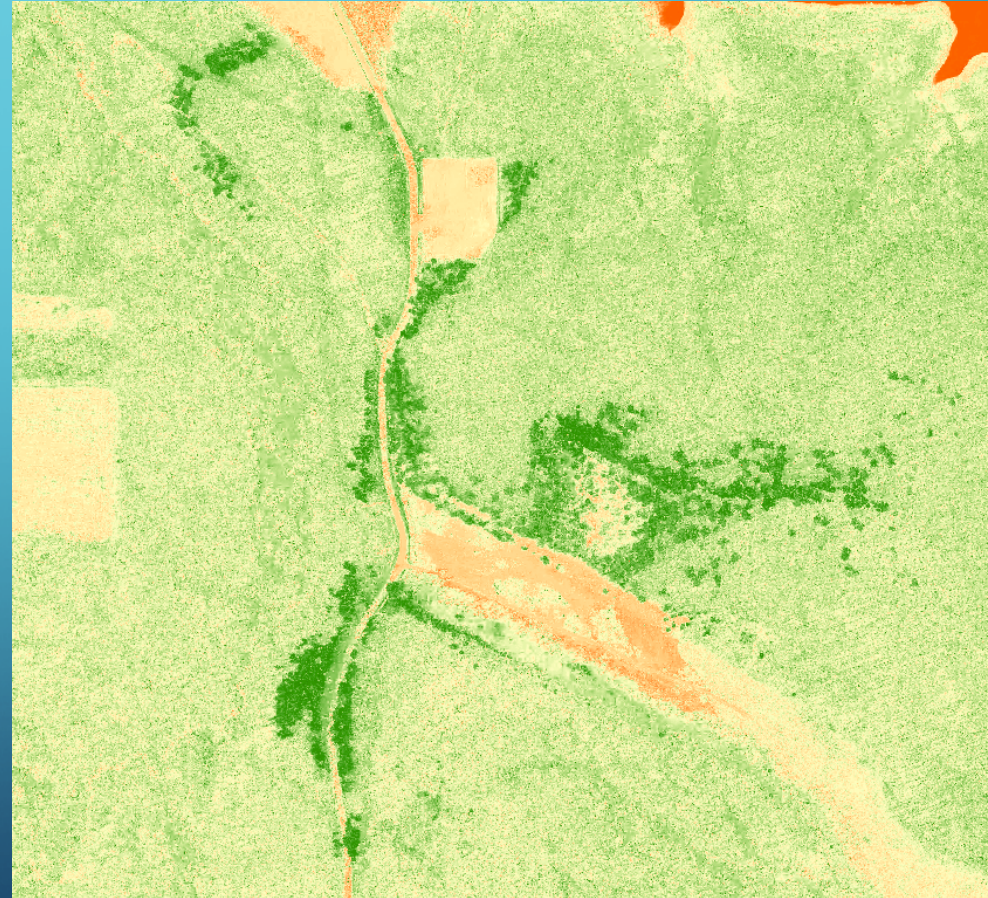## (1, 2, 3)   (4, 1, 2)

CIR BAND ENABLES NORMALIZED DIFFERENCE VEGETATION INDEX (NDVI)

- Difference between red and near infrared

- NDVI = (NIR – RED)/ (NIR+RED)

- Note: Imagery is spring. Green will be conifers & other early growth.

QUESTIONS?

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