

An aerial LIDAR map showing a region with a river and an airport. The map uses a color gradient to represent elevation, with red and orange indicating higher elevations and green and blue indicating lower elevations. A river flows from the top right towards the bottom right. An airport is visible on the left side of the map. The text is overlaid on the map in a bright cyan color.

LIDAR Status 2018

Jim Giglierano
Wisconsin DOA - WLIP - GIO

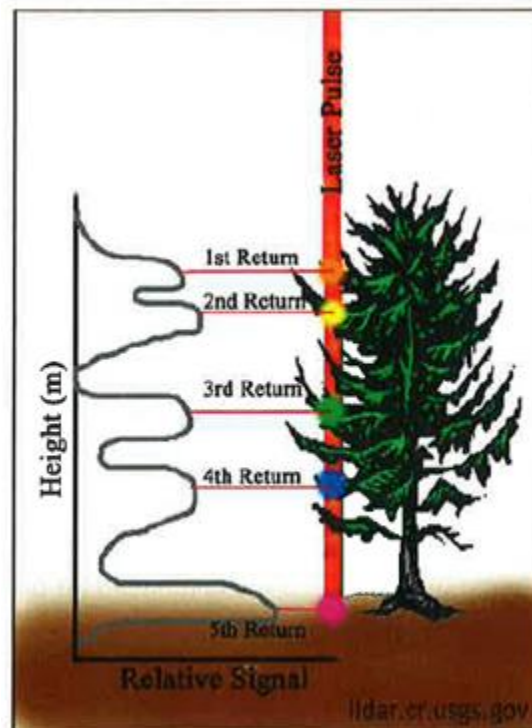
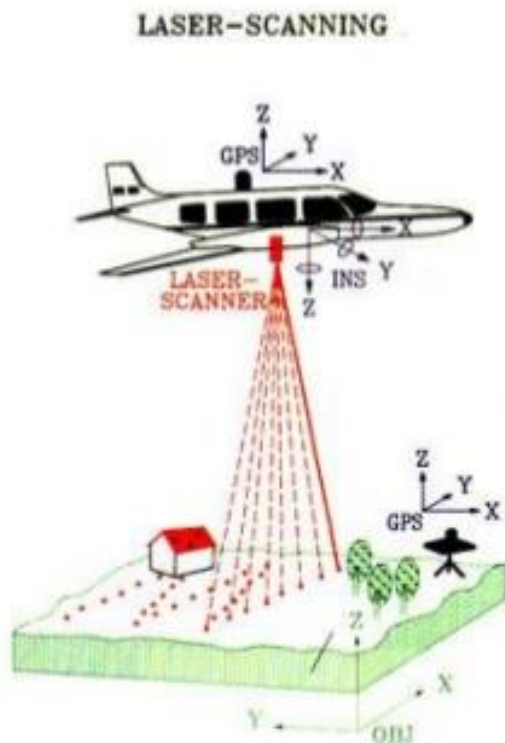
AWRA Conference
March 8, 2018

What I hope to give you today:

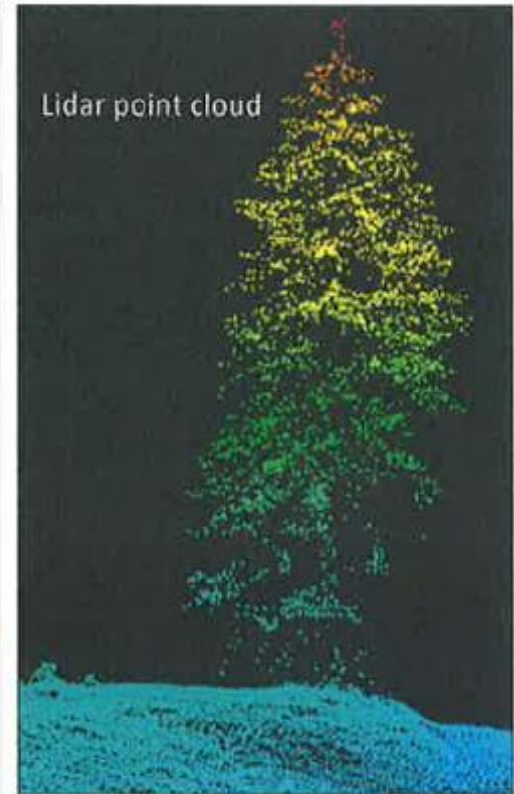
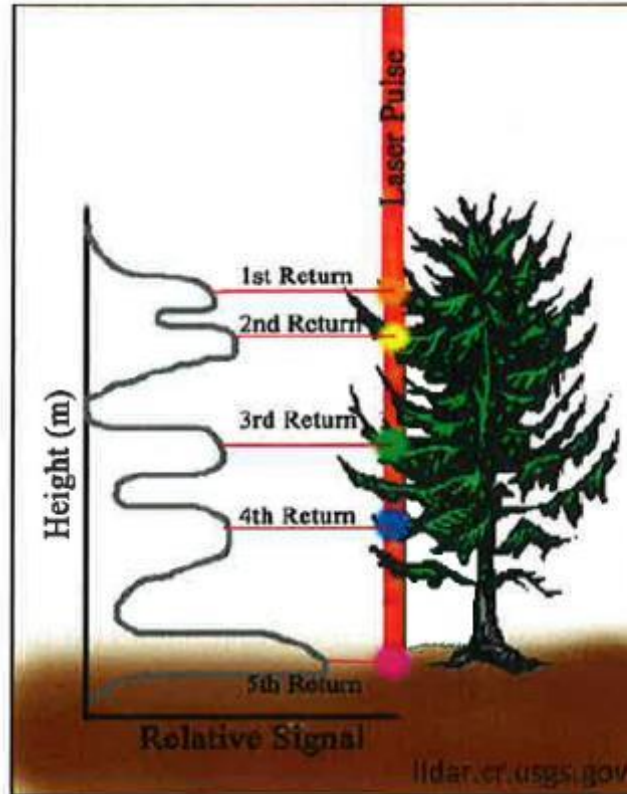
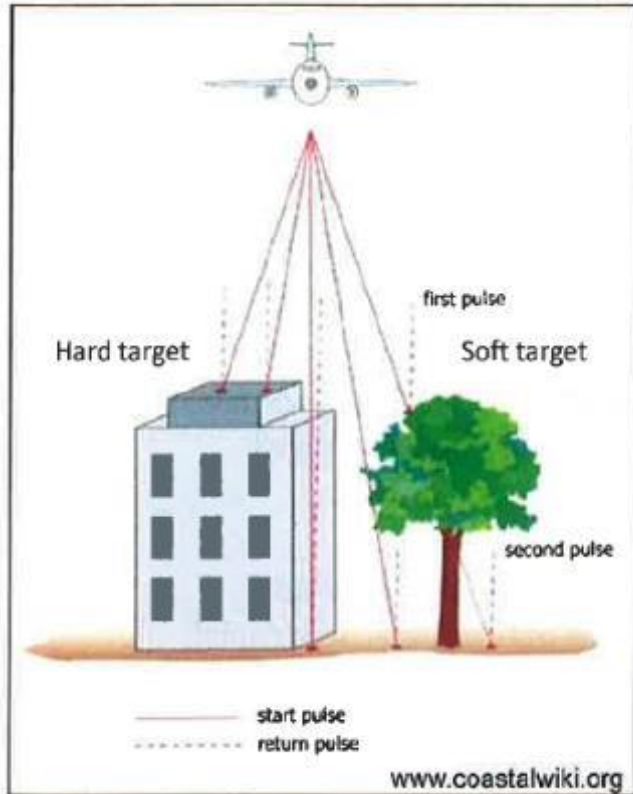
- A quick “what is lidar” overview
- What does lidar “see”, that is useful for mapping wetlands?
- The status of lidar coverage of the state
- The status of lidar accessibility to users
- How users can become more knowledgeable about lidar
- How users can influence what happens next in the lidar world

What is LIDAR?

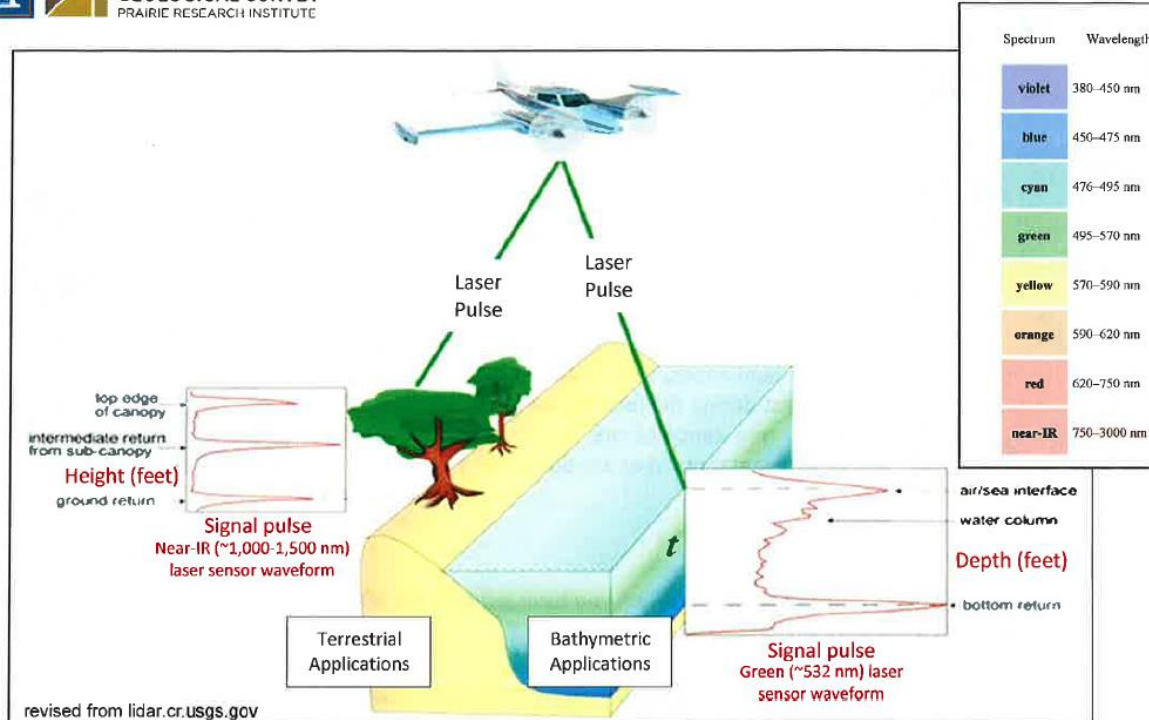
Light Detection And Ranging



Different Targets = Different Returns

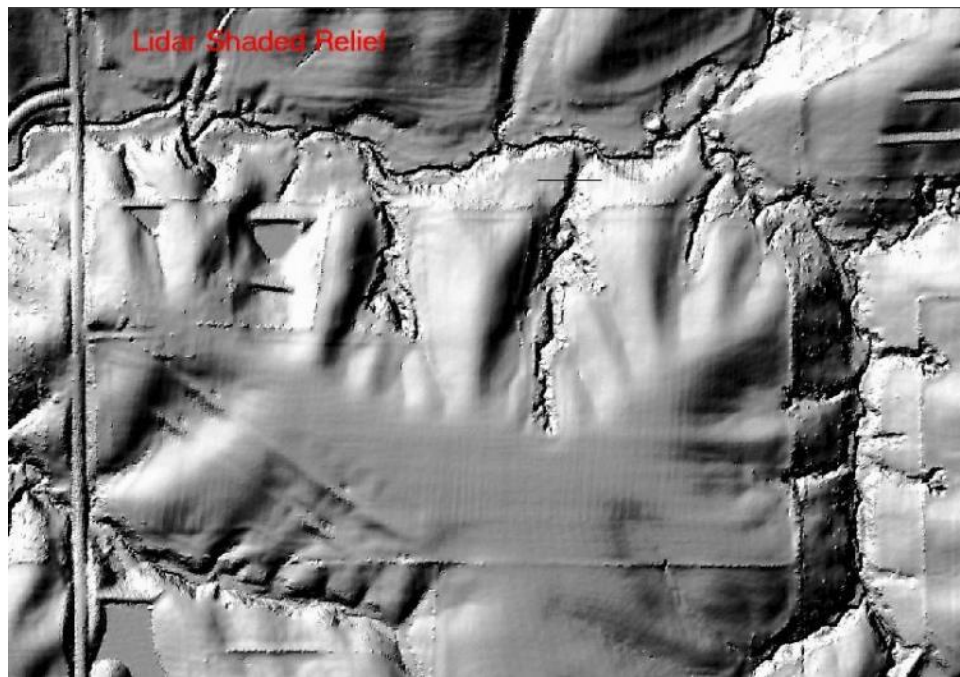
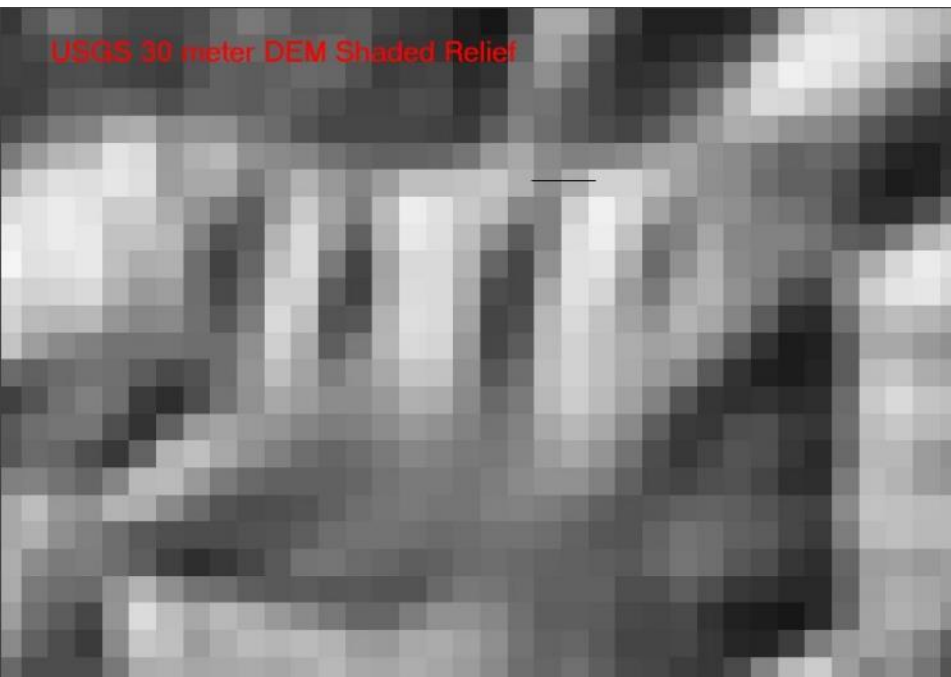


Different types of lidar - terrestrial vs. bathymetric



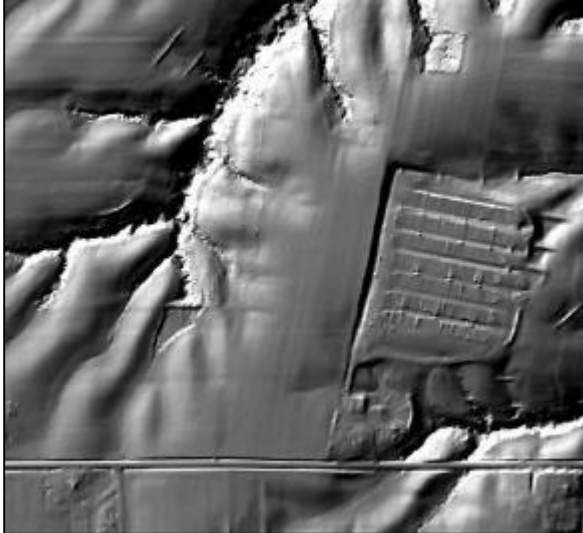
Lidar Products

This is your brain on NED.....
(old USGS topo product)

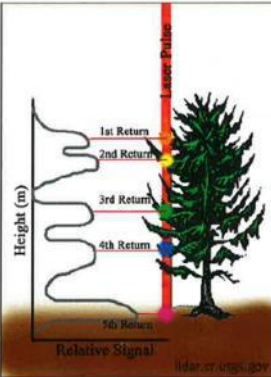
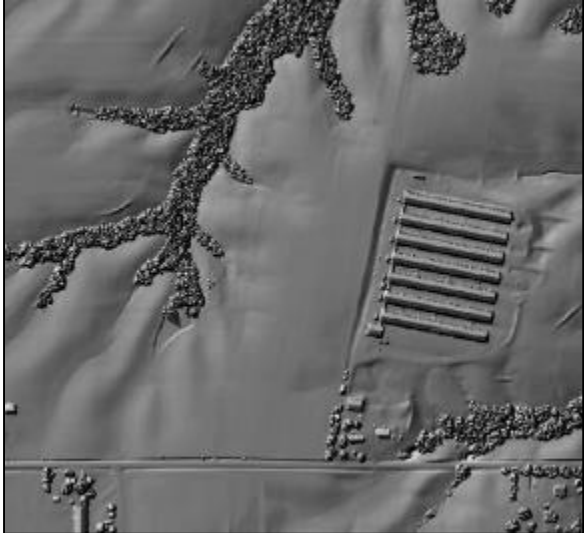


This is your brain on Lidar....!

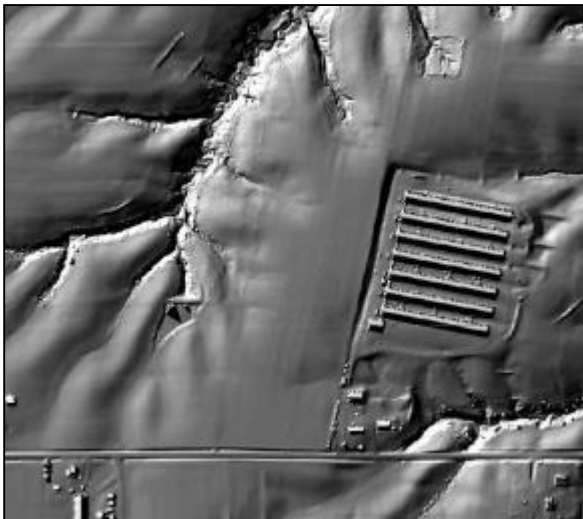
Bare Earth



First Return



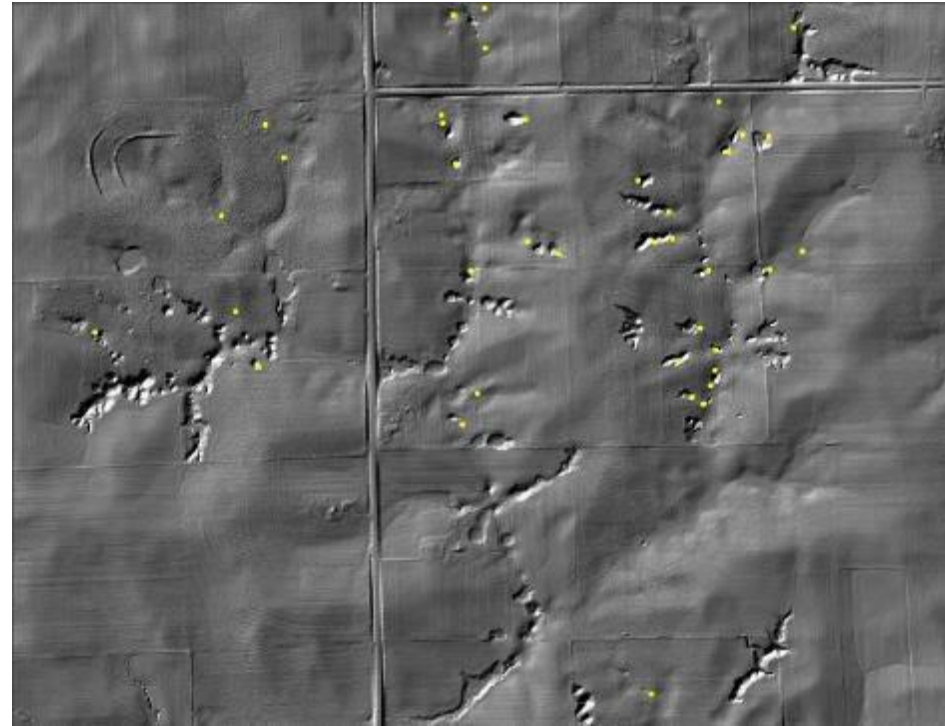
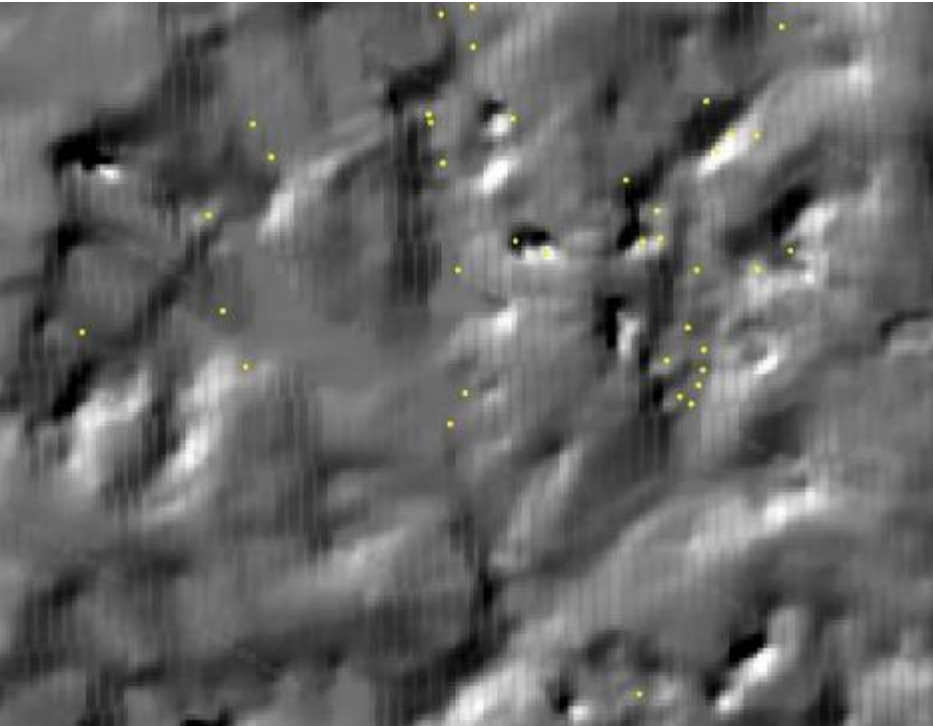
Last Return



Intensity

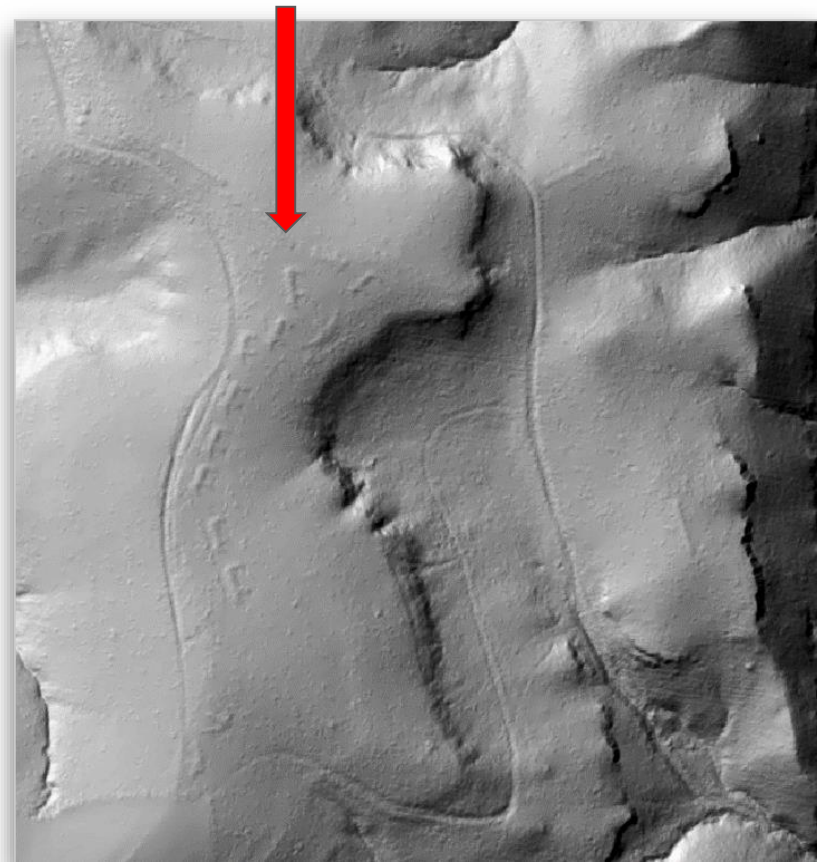
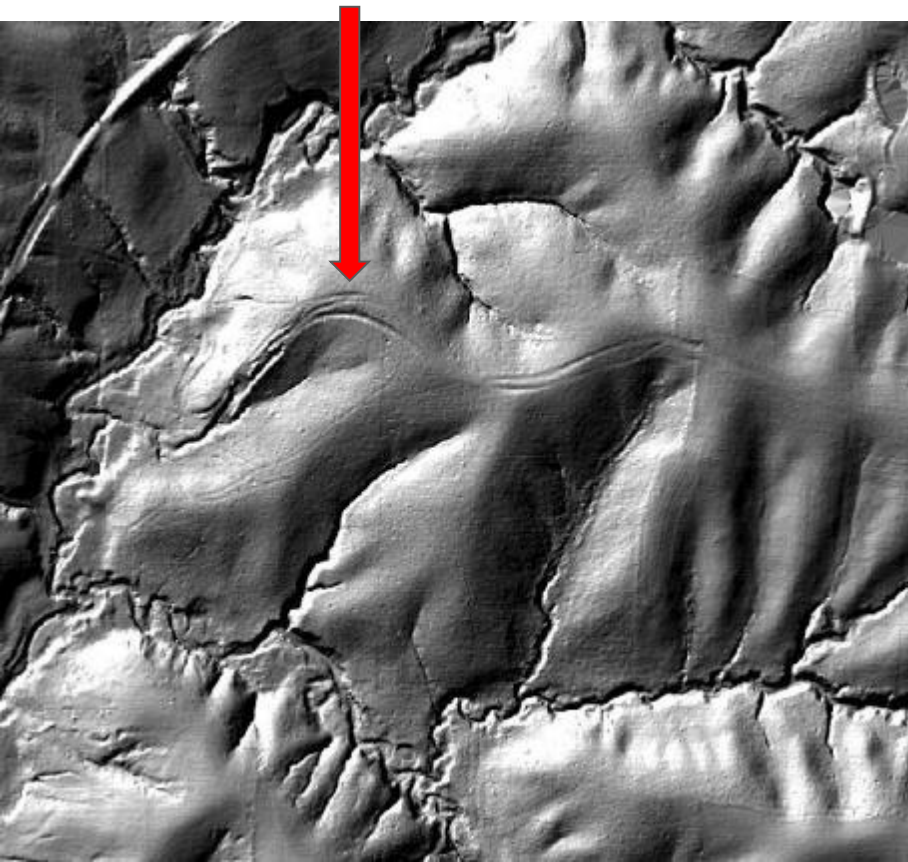


Sinkhole Mapping with Lidar

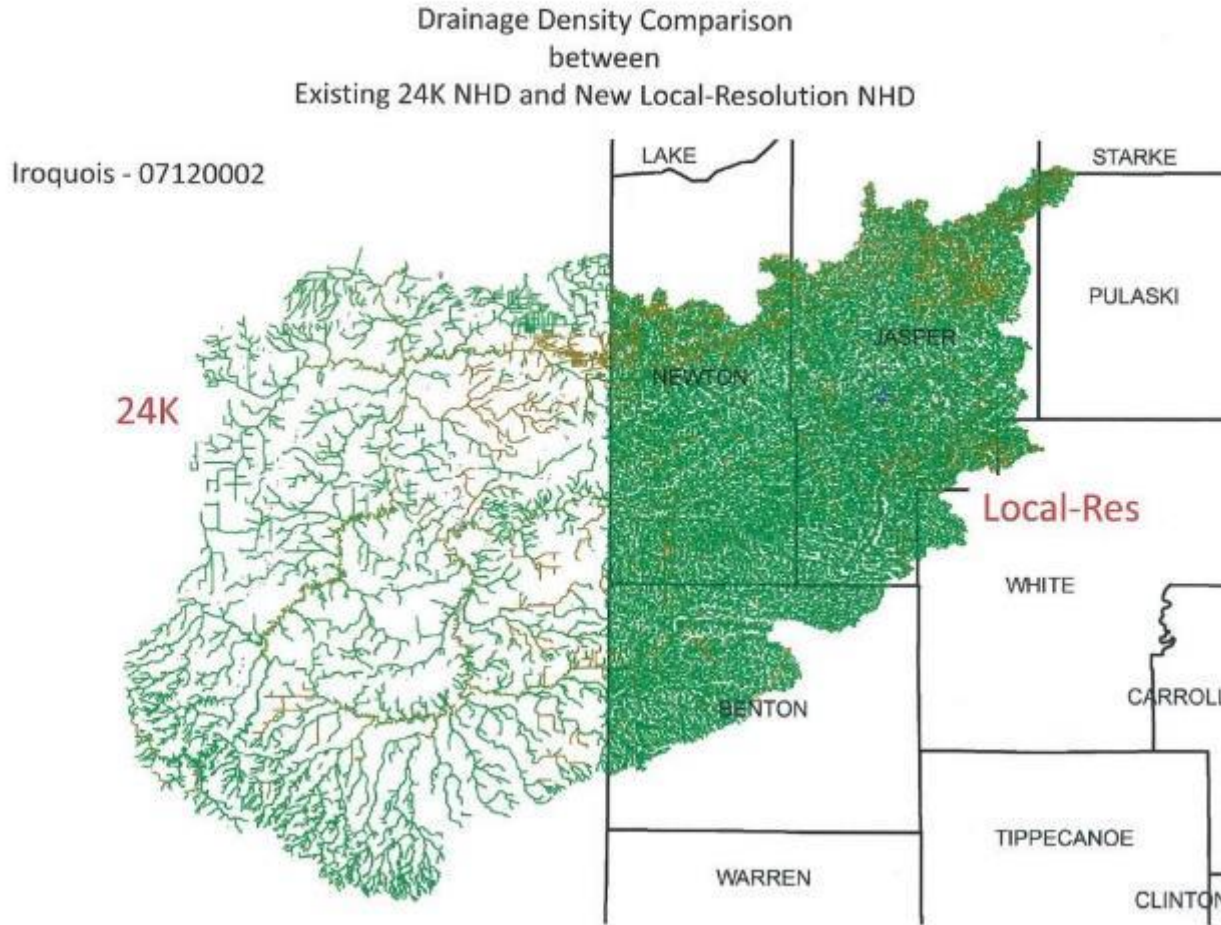


Yellow dots are depression features from soil survey point data

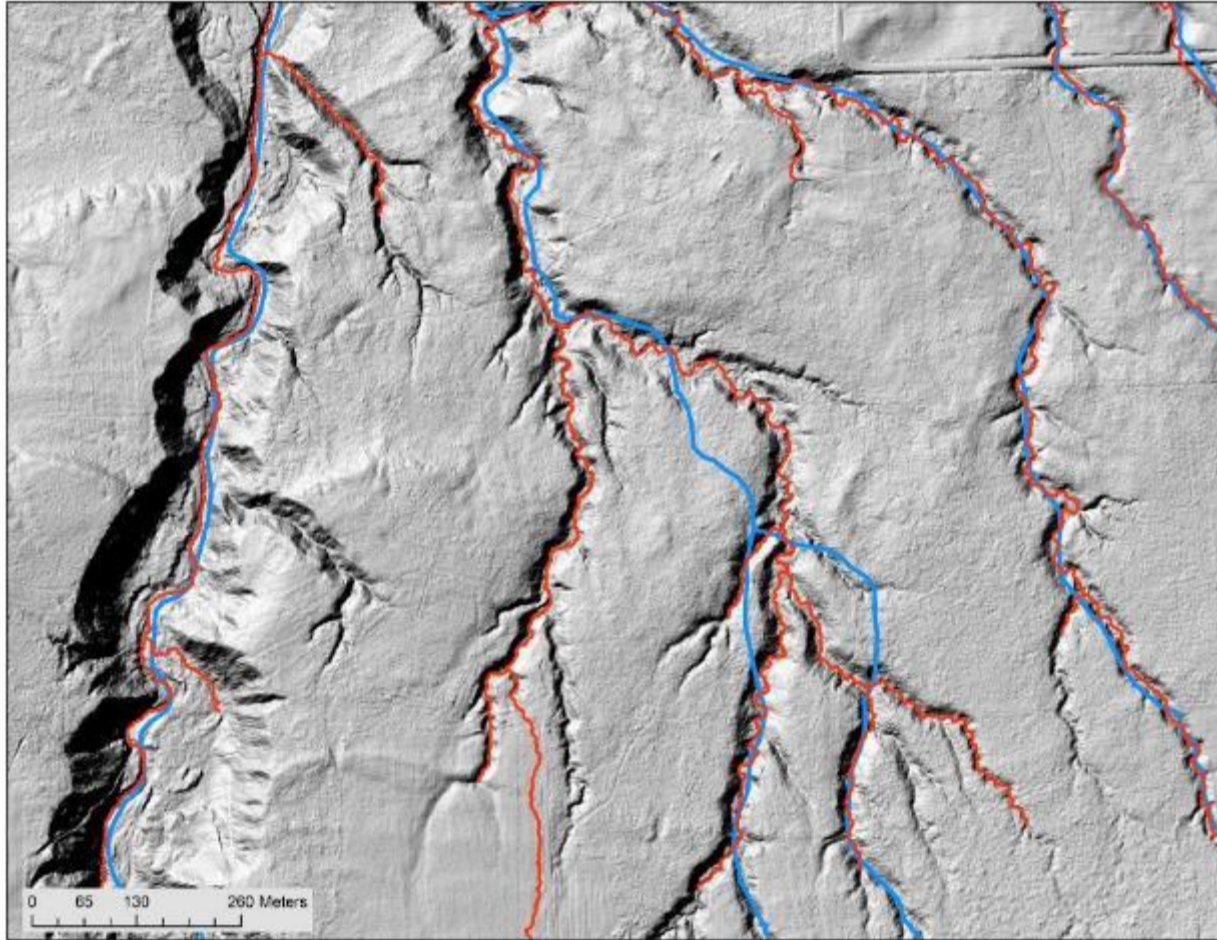
Archaeological Sites - Mormon Trail remnants and Effigy Mounds



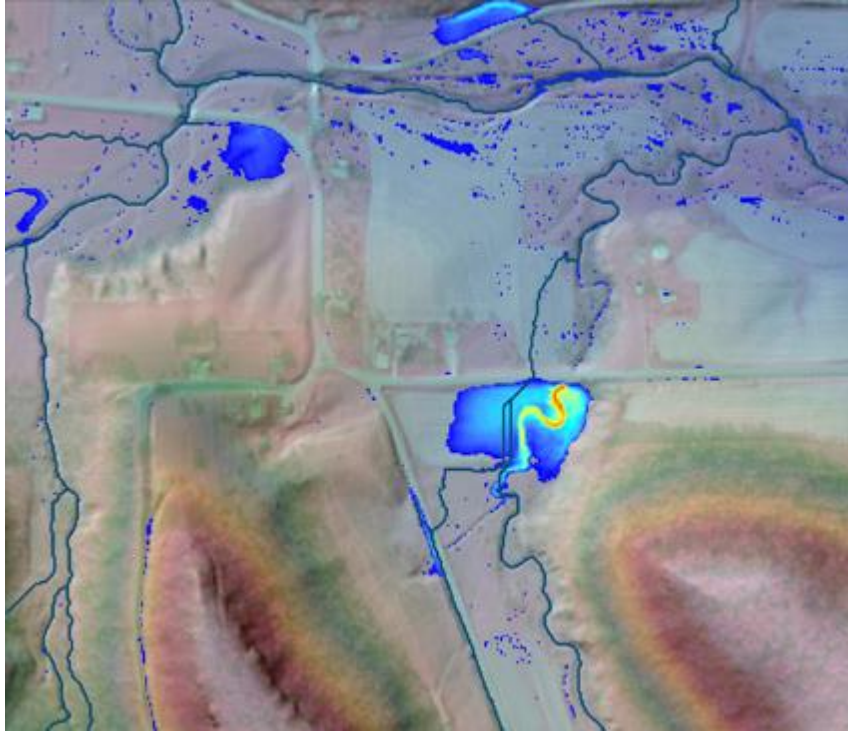
Local resolution hydrology derived from Lidar



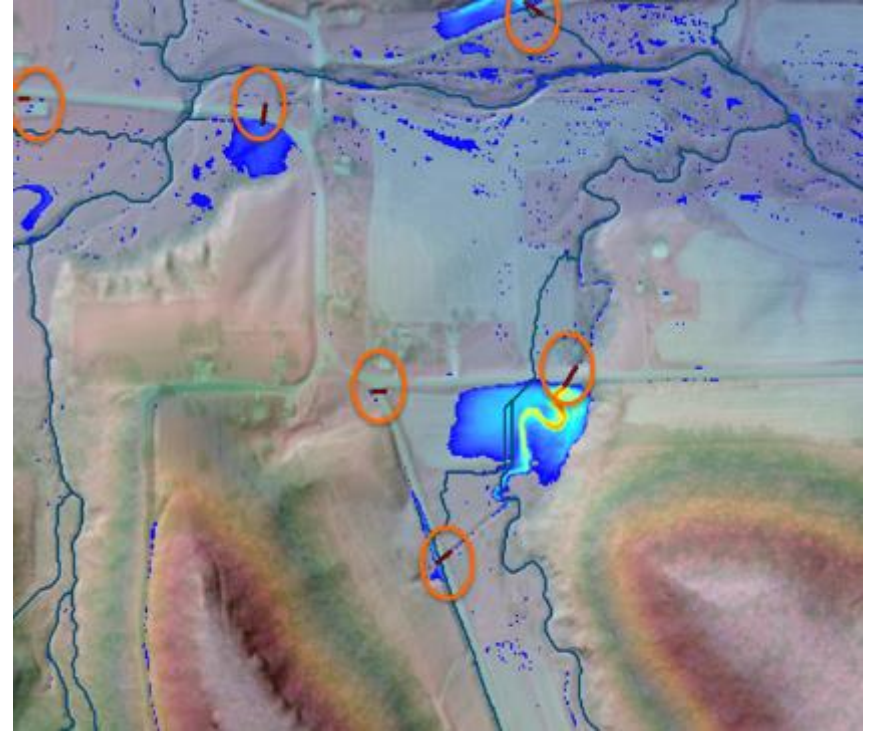
Ashland Co Lidar **BLUE = WDNR 24k hydro** **RED = LiDAR-derived lines**



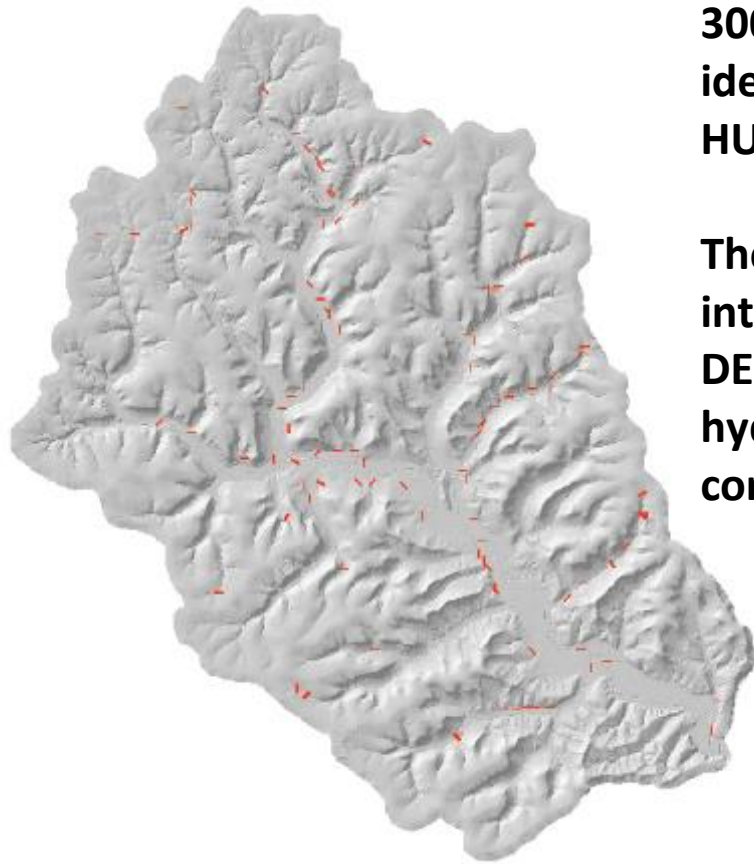
Creating basic hydro layers from lidar



Using ACPF tools to identify sinks and depressions - initial flow lines delineated

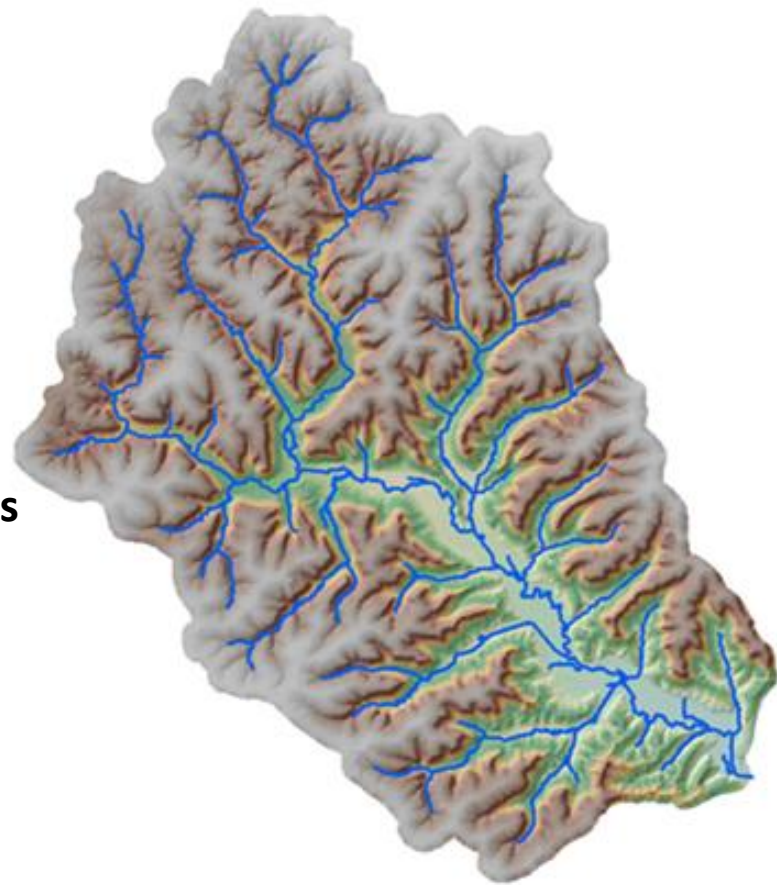


Creating “cut-lines” to enforce drainage through artificial impediments - culverts



**300+ cutlines
identified in one
HUC12 watershed**

**These are “burned”
into the original
DEM to create
hydrologically
connected flow lines**

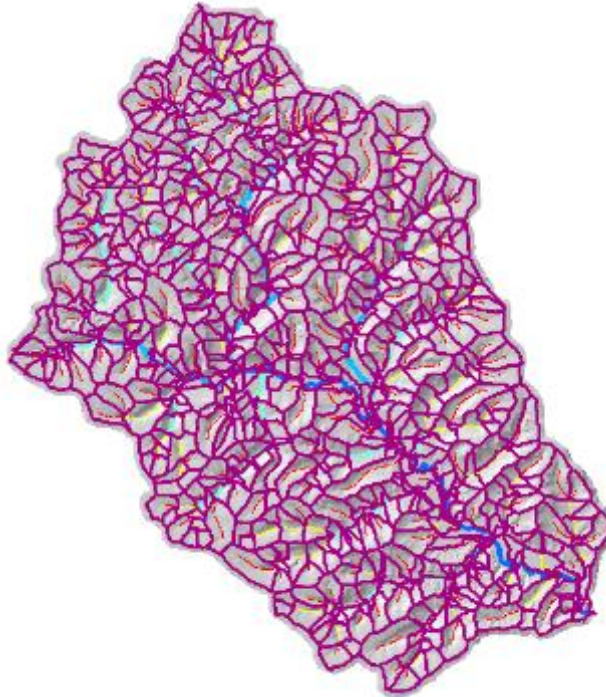


ACPF derivative products:

Stream order and hydro-
enforced DEM



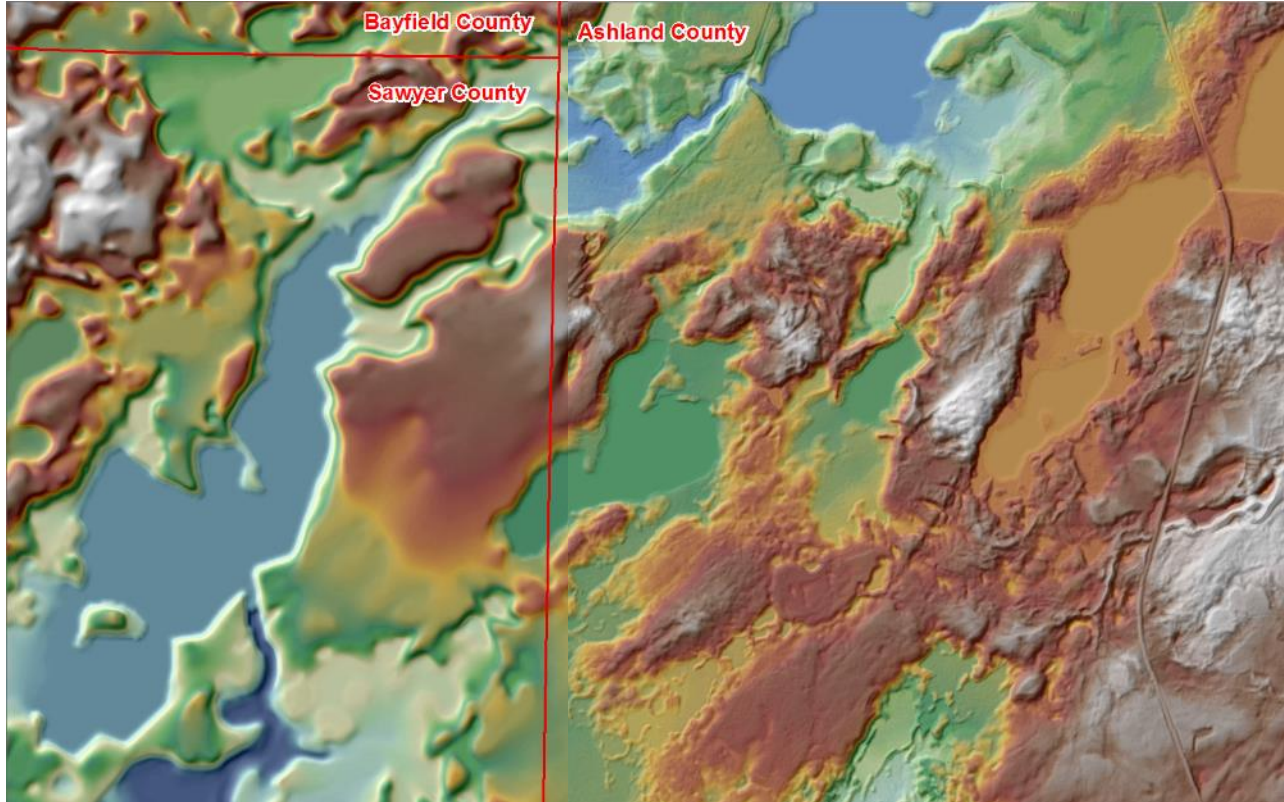
Sub-catchments



New HUC12 outline, stream
centerlines and basins



10 meter NED DEM vs. 3 meter Lidar DEM



Mapping Farmed Wetlands

- 1) Locate depressions by subtracting the original DEM from a “filled” DEM
- 2) Create outlines of depressions >10cm
- 3) Center points of depressions
- 4) Create flowpath network
- 5) Create connection network
- 6) Create “basin order”
- 7) Create basin catchments



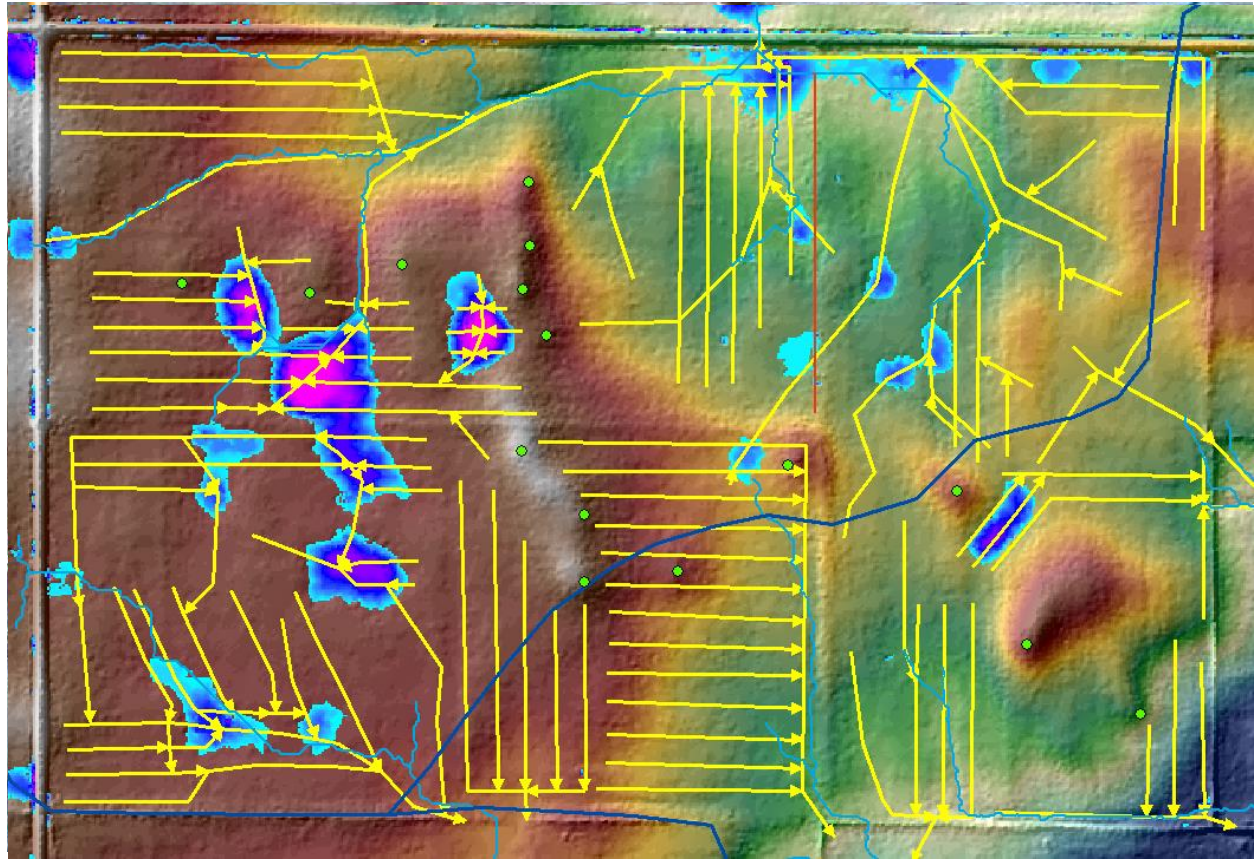
Tile Mapping of Farmed Wetlands

- Central Iowa - The Des Moines Lobe - Wright County
- Airphotos from April 2007 and May 2013
- Drainage District 160 - dark blue outline
- District Tile Mains - yellow lines
- Private tiles visible 2 days after 4-7" total rainfall in a 10 day period
- Soil profile above tiles drain first, producing lighter tone

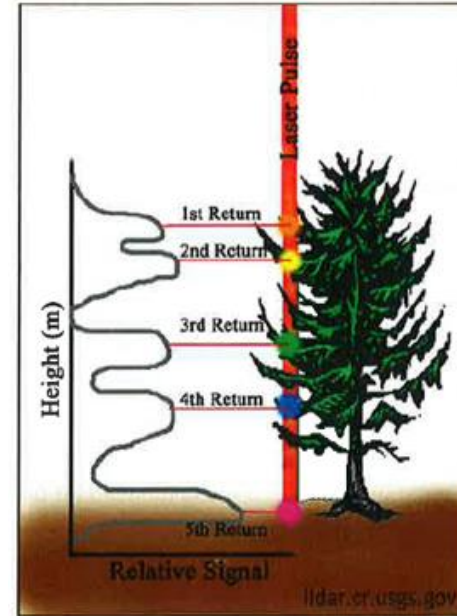
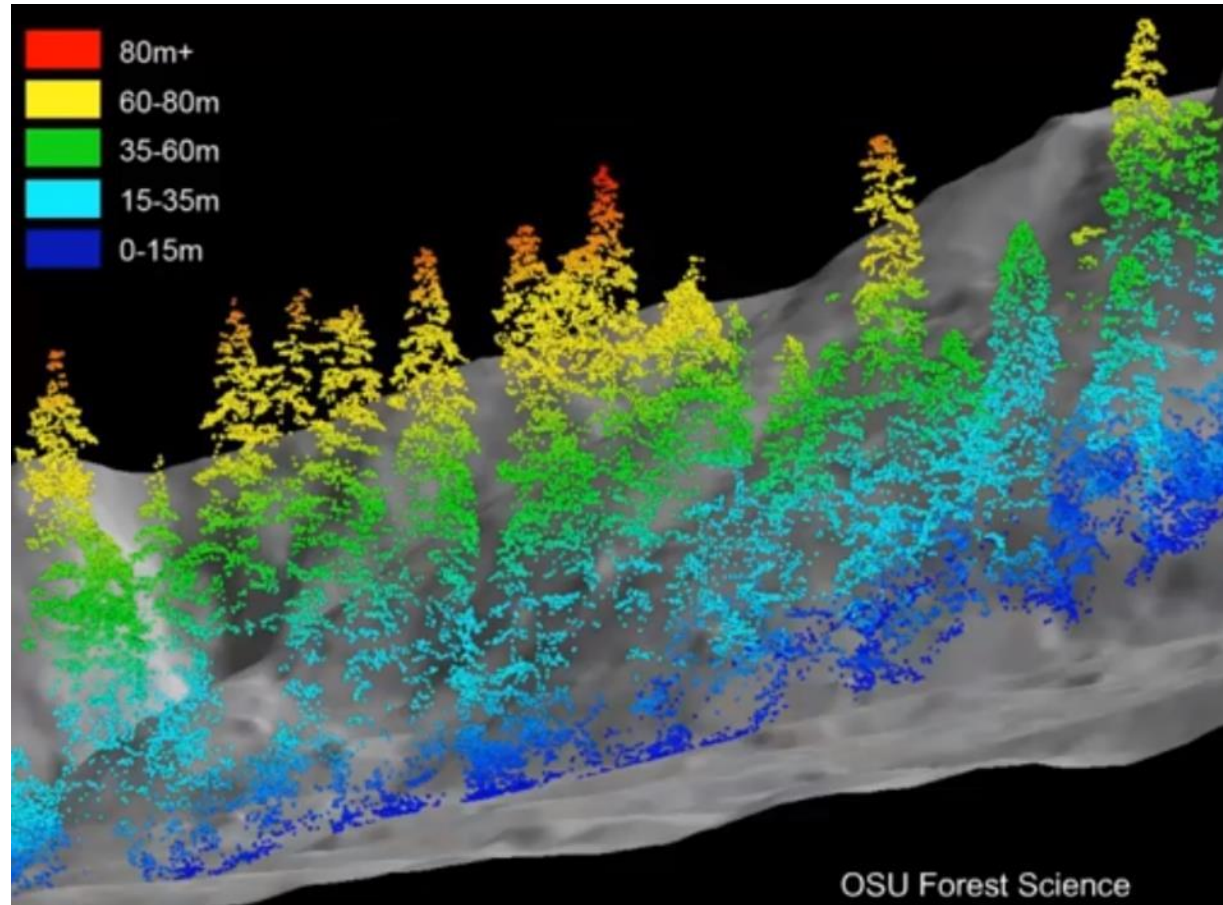


Tile Mapping of Farmed Wetlands

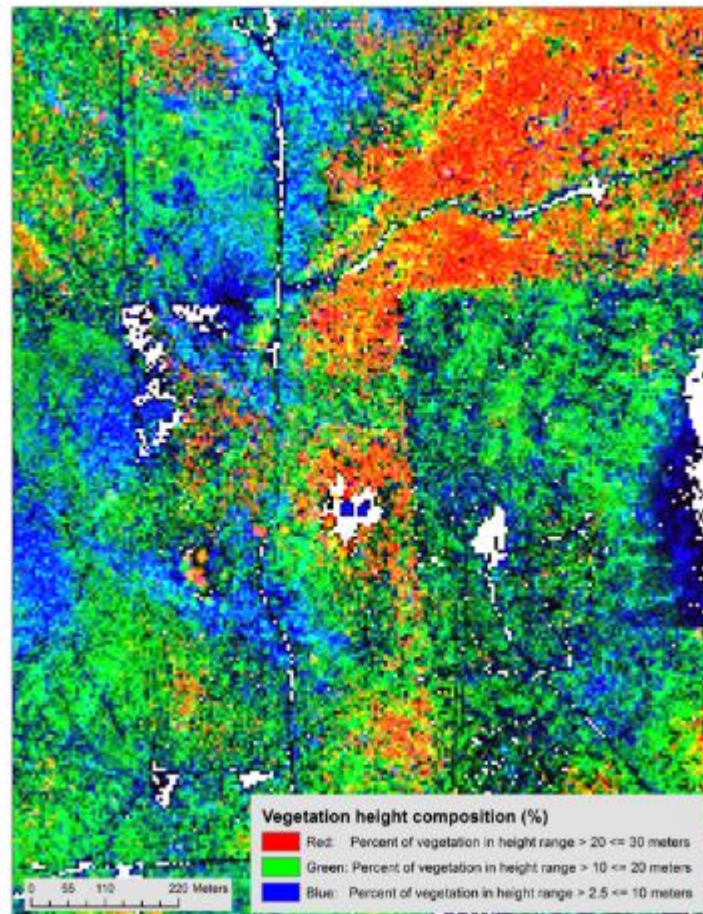
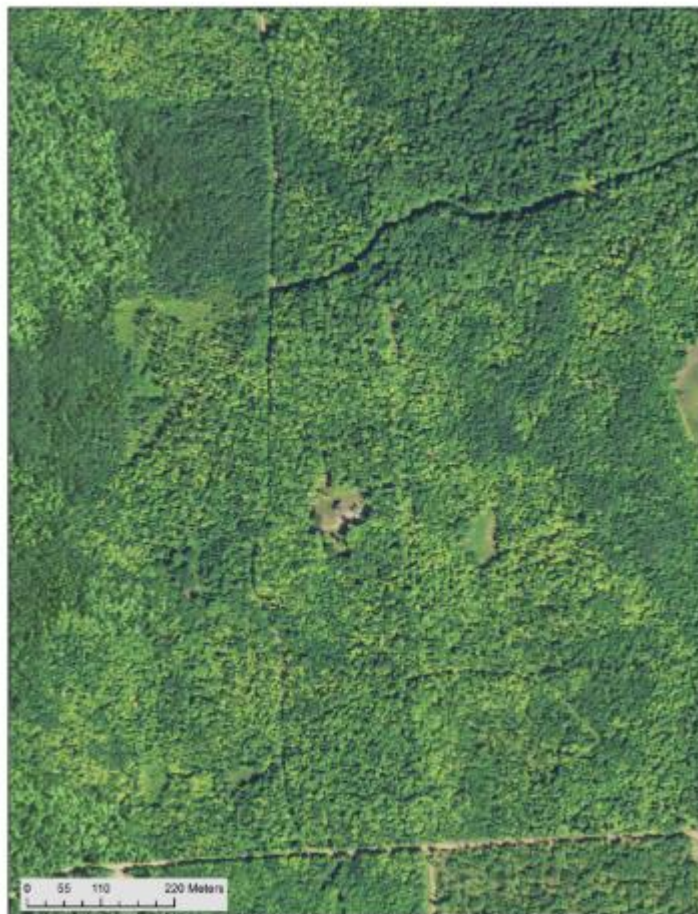
- Close up of section from previous slide
- Drainage District boundary - dark blue
- Concentrated flow lines - light blue from ACPF
- Topographic high points - green dots (not related to tiles)
- Filled depressions from ACPF
- Mapped tiles - yellow arrows - photointerpreted



Lidar and Vegetation Mapping



Vegetation height composition (# points in ht range/ total veg returns)



Height strata: 0-1m, 1-2.5m, 10-20m, 20-30m, >30m

Wisconsin Lidar General Priorities

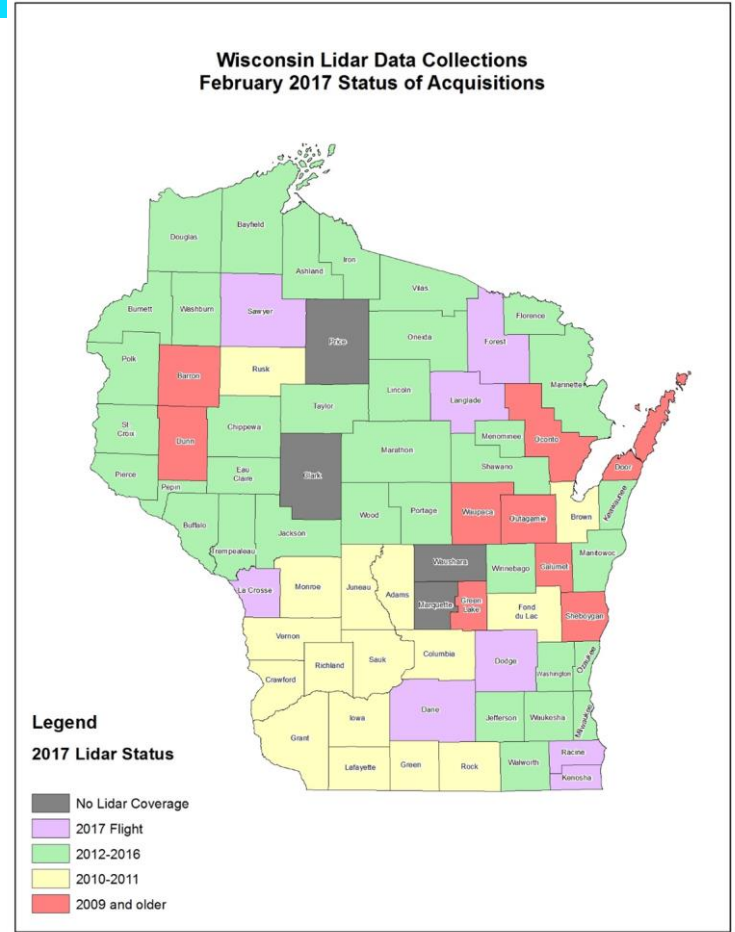
- Complete coverage of state using all available funding options
- Update older and incomplete data sets
- Increase public access to data
- Increase usability of lidar products
- Increase user knowledge
- Plan for the future



Completing Lidar Coverage Statewide And Updating Older Datasets

Status in 2017

1. GRAY - No data: Price, Clark, Marquette, Waushara, **HIGH PRIORITY**
2. RED - Older data 2002-2009 (11 counties) are currently eligible for 3DEP funds **HIGH PRIORITY**
3. YELLOW - 2010-2011 data (16 counties) will be eligible for FY18+ 3DEP funds, includes 2008 CDBG counties
4. GREEN - 2012-2016 Recent WROC, FEMA and 3DEP projects - mix of QL2 and QL3
5. PURPLE - 2017 3DEP Projects in progress - QL1 and QL2

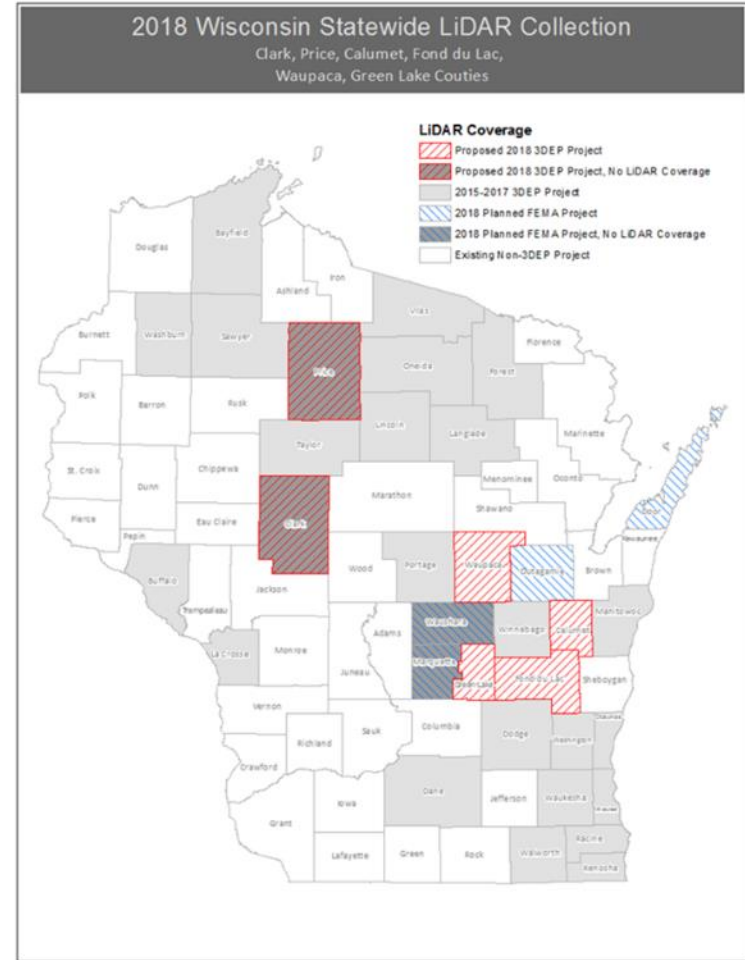


2018 Wisconsin

Cooperative Mapping Agreement

3DEP Actual Proposal

- Three counties with no lidar - Waushara Co was flown by FEMA Region 5 in the fall of 2017
- FEMA HQ will acquire Door, Outagamie and Marquette Counties
- USGS awarded Wisconsin 3DEP funding for six counties to be acquired Spring 2018
- Ayres/Quantum contractor team will fly Waupaca, Calumet, Fond Du Lac, Green Lake, Clark and Price Counties



2018 Lidar Status

2017-2018 18 counties

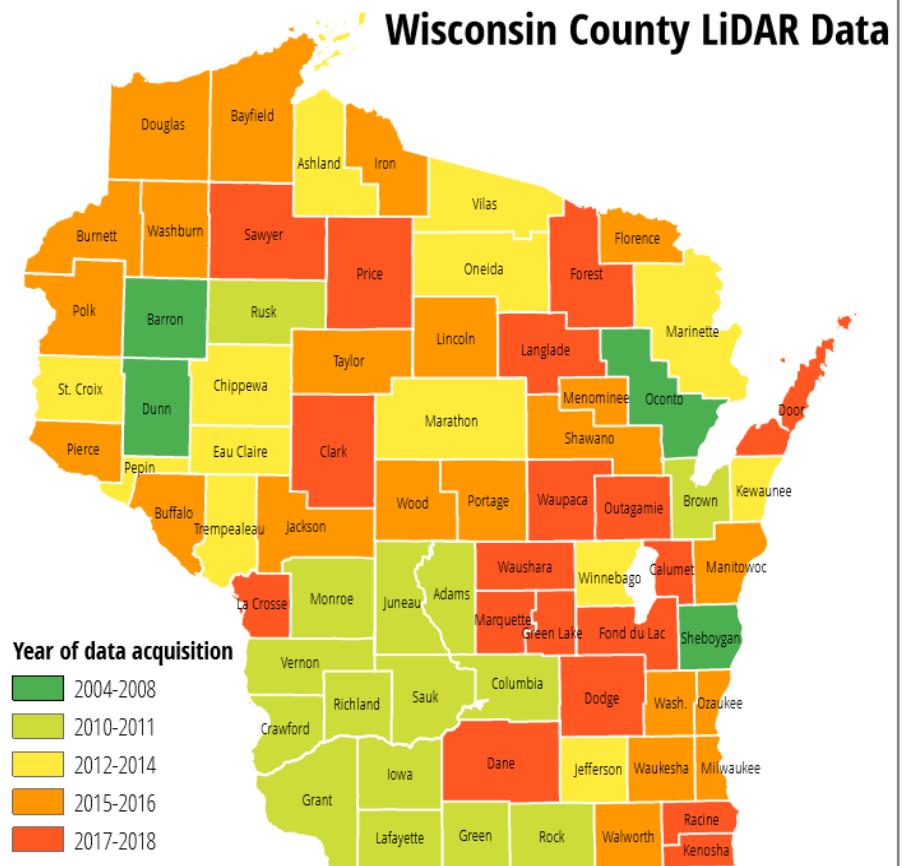
2015-2016 22 counties

2012-2014 13 counties

***** 53 counties 6 years old or younger - 74%**

2010-2011 15 counties

2004-2008 4 counties



This map depicts the year of acquisition for the most recent county-wide LiDAR dataset. Funding sources for acquisition include: county and regional planning commission funds; Wisconsin Land Information Program; Wisconsin Department of Commerce Community Development Block Grant Emergency Assistance Program; US Geological Survey 3DEP Program; and Federal Emergency Management Agency. The Geographic Information Office at the Wisconsin Department of Administration has been coordinating submissions to the 3DEP Program for several years.

Map produced by the Wisconsin State Cartographer's Office based on data supplied by the Wisconsin Geographic Information Office.

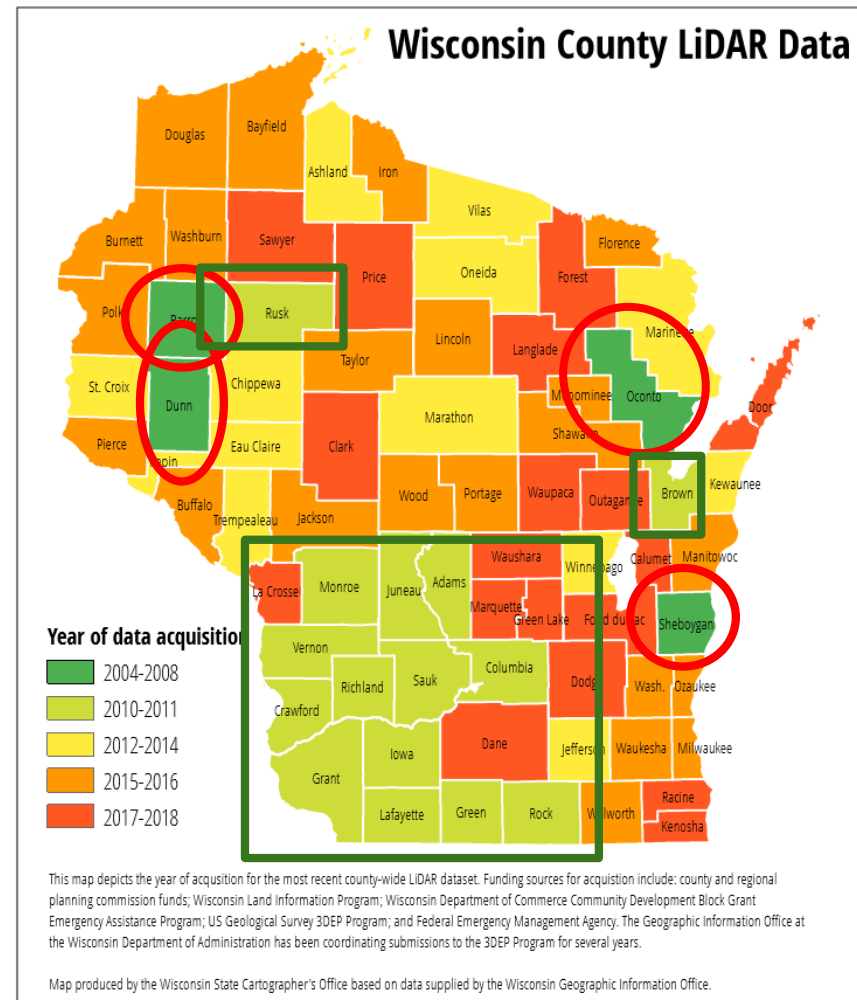
What next for 3DEP in Wisconsin?

After 2018 project, a few options options:

- Four counties with very old data, refly 2019 or 2020
- Fifteen CDBG* counties flown 2010/2011, maybe refly 2021 or so.

Continue with the county by county approach or do regions or watersheds? A different approach will require other stakeholders to help fund the local match.

**Community Development Block Grant 2008 Flood counties*



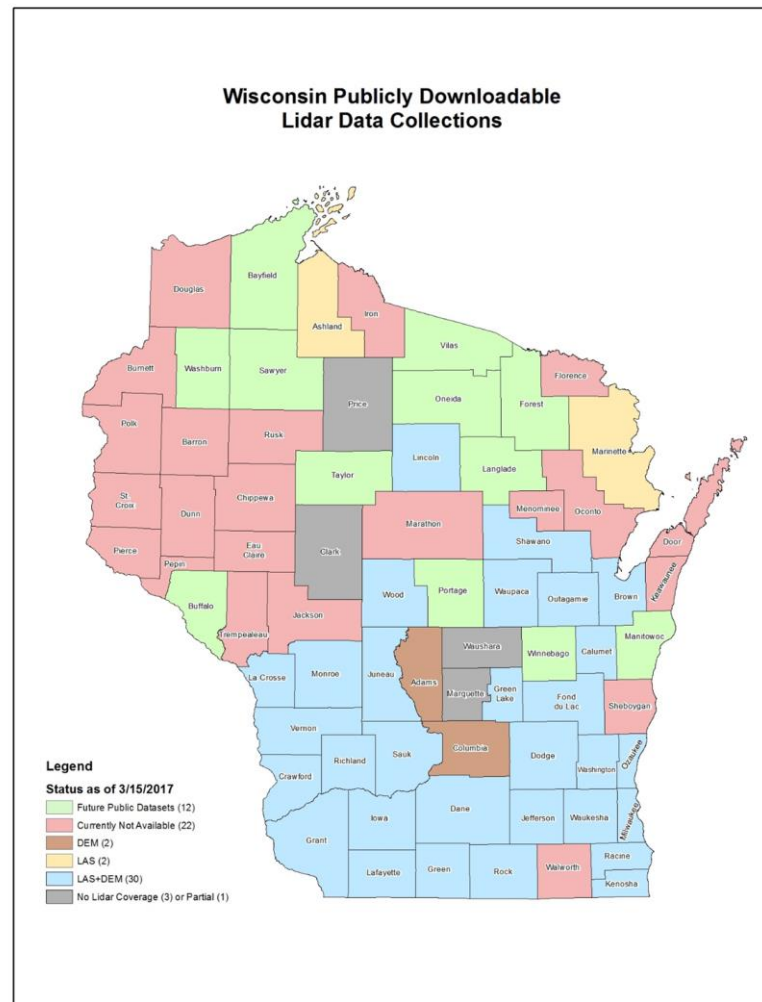
Increase Lidar Accessibility

Lidar DEMs, LAS and other files available from county GIS websites, USGS National Map, NOAA Digital Coast and WisconsinView

- Thirty-three counties available (some WV in progress)
 - FEMA
 - Full LAS not available yet
- Twenty-three counties exist but not available online
- Twelve counties in progress with 3DEP (public)
- Four counties with no data all

This is the old map – by this time next year we should have all the green areas available too

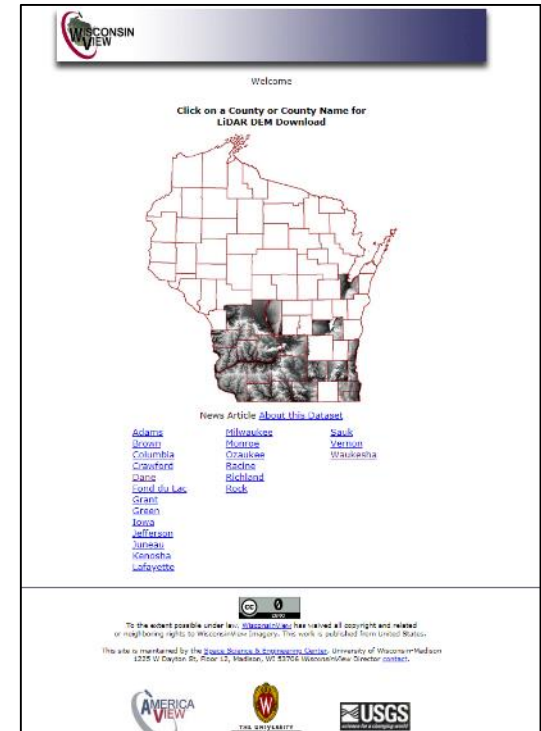
Visit the SCO Elevation webpage for more current info



Increase Lidar Accessibility

Upgrade WisconsinView Remote Sensing Data Archive (Summer 2018)

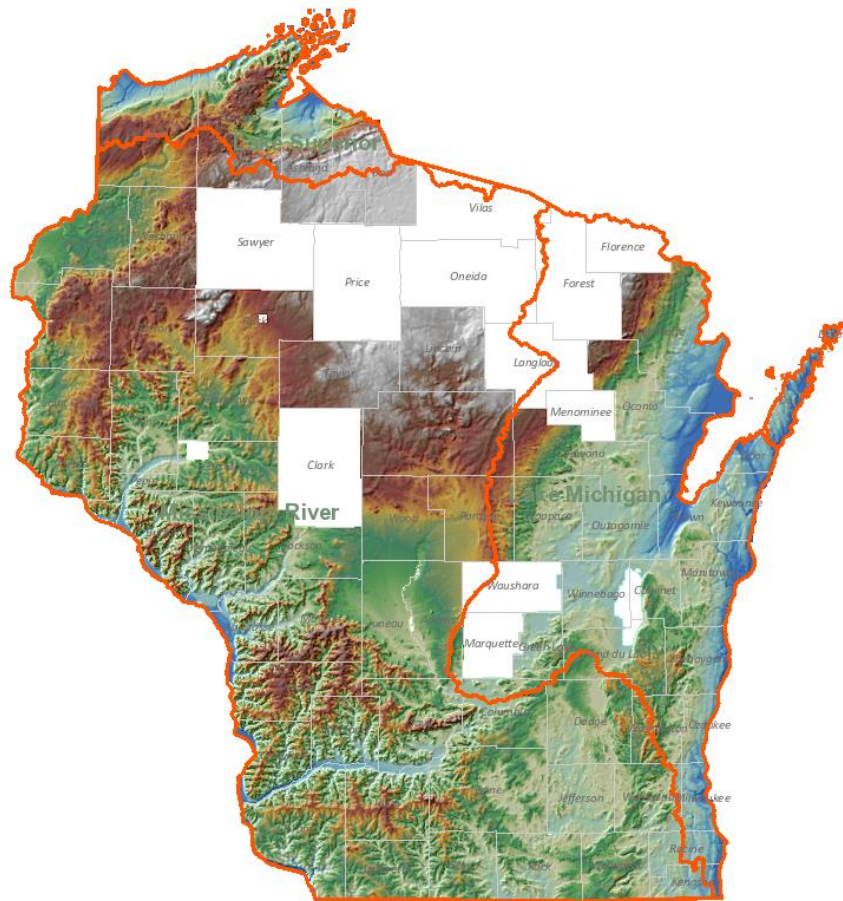
- Obtained funding from Wisconsin Coastal Management Program
- Increase download space to 80TB - compress LAS files to LAZ
- New download interface
- Tiled web services planned
- Develop commonly needed derived products - WTM DEMs, DSMs, height grids, etc.
- SCO Elevation Webpage



Increase Usability of Lidar Datasets - REST Services

Collaboration between DNR, UW, DOA, and NRCS

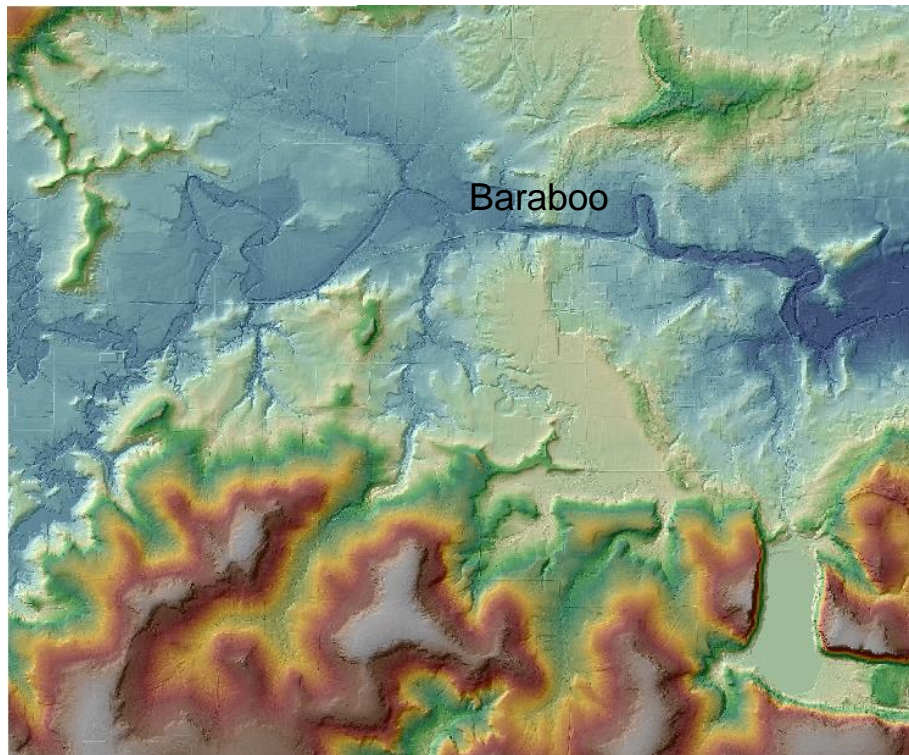
- Collecting public domain lidar DEMs, LAS and other files, organize and store on WisconsinView
- Creating a “statewide” mosaic of 2-3 meter DEMs and shaded relief
- ESRI Image Server for lidar web services hosted by DNR BTS
- In progress, 61 out of 72 counties
- http://dnrmaps.wi.gov/arcgis_image/rest/services/DW_Image

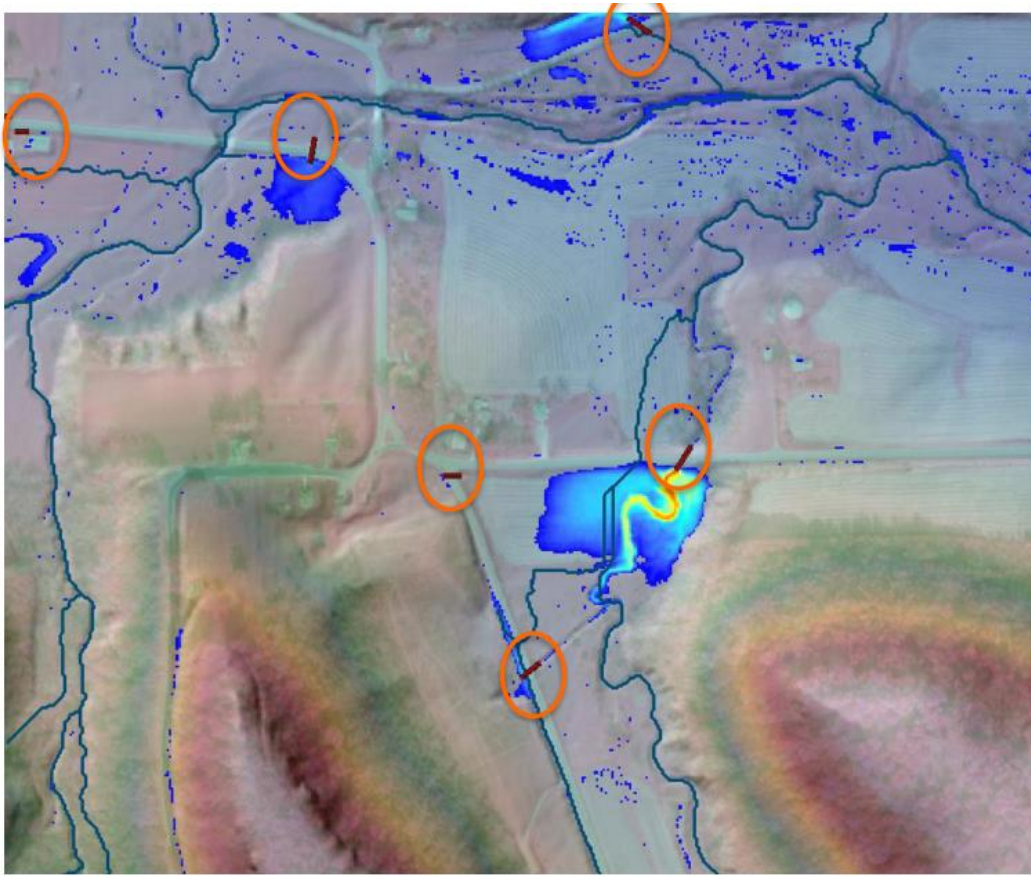


Increase User Knowledge of Lidar - Workshops

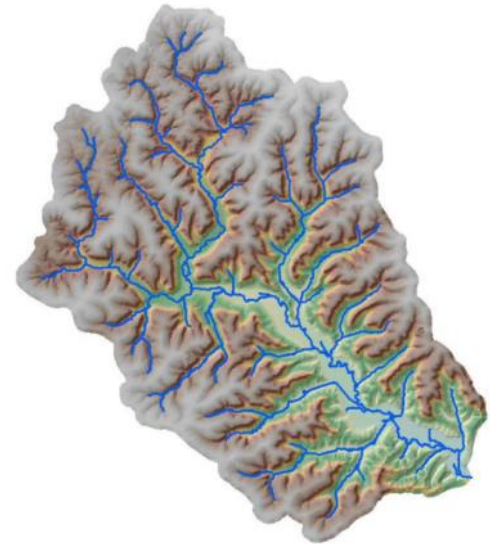
Collaboration between UW SCO, University of Minnesota, and DOA

- 2-day workshop, introduction to lidar and basic lidar processing (LAS and DEM files)
- About 85 persons trained so far in 4 workshops
- Expert help from University of Minnesota - Water Resources Center - Joel Nelson
- 2018: January (Eau Claire), March 21-22 (Milwaukee) and June (TBD)





SCO Lidar Workshop -
includes using ACPF* tool
to delineate stream
networks, small catchments
and create hydro-enforced
DEMs



*Agricultural Conservation Practice Framework

Increase User Knowledge Through Collaboration

Coastal Hazards Community of Practice – culvert mapping demo

- Great Lakes Mapping Summit in Chicago, IL
- Lake Superior Coastal Mapping Mini-summit in Ashland, WI
- Who is doing what, where
- Current and future needs
- Identify obstacles
 - Better communication
 - Organizational silos limit collaboration
 - Lack of central data repository
 - Proliferation of data portals
 - Lack of funding
- Identify opportunities for collaboration
 - Culvert inventories for hydro-enforced DEMs
 - Refly lidar - Bad River Watershed flood erosion
 - Increase collection of lake bathymetry
 - Traditional training and learn as you go
 - Community efforts vs traditional silos



What can users do?

- Take the **SCO lidar training** - \$250 per person (funds go to making data accessible on WisconsinView) – next class March 21-22 UW-Milwaukee
- Participate in new **Elevation Requirements and Benefits Study** this summer
- Tell your **county LIO to participate in 3DEP** joint applications with other counties if current lidar data is too old or low resolution for your needs
- Join the **coastal hazards community of practice** and map culverts

Many Thanks

- Ayres and Associates
- Quantum Geospatial
- Pictometry and Woolpert
- USGS Mapping Liaisons
- 3DEP Program Office
- NRCS Wisconsin State Office
- US Forest Service
- US Park Service
- FEMA Region 5
- NOAA Digital Coast
- BLM and tribal partners
- Many counties and local partners
- UW State Cartographers Office
- UW WisconsinView
- UW Robinson Map Library
- University of Minnesota Water Resources Center
- WDNR BTS and Lake Grant Program
- Wisconsin Land Information Program
- Wisconsin Coastal Management Program

Questions?

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608-267-6902