LIDAR Status 2018

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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.....!
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

ACPF – Agricultural Conservation Planning Framework
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
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
What next for 3DEP in Wisconsin?

After 2018 project, a few 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
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](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 Clare), 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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