Using High Resolution, High Accuracy Topography Data to Improve Water Management on the High Plains Aquifer

Doug Hallum
Survey Hydrogeologist
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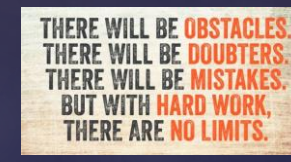
NGWA Groundwater SUMMIT 2017

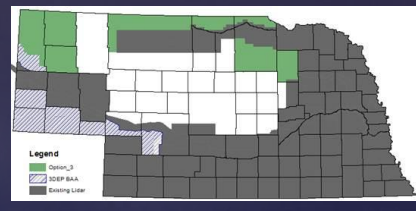
CONSERVATION AND SURVEY DIVISION
School of Natural Resources

A current, high-quality, state-wide elevation dataset suitable for the majority of needs, available and accessible to all

Goal:



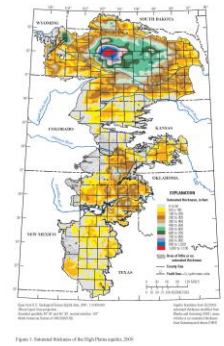
It took a decade…



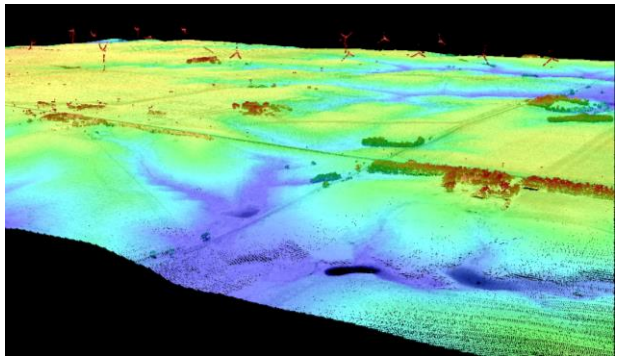
Our goal is in view!

Can LiDAR improve Water Management?

{ On the High Plains Aquifer?

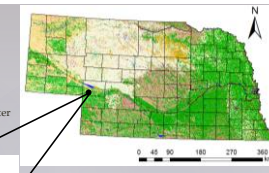


https://catalog.data.gov/dataset/saturated-thickness-high-plains-aquifer-2009



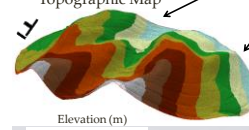
The GIS Toolbox

Variable Rate Irrigation



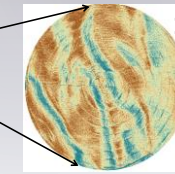
University of Nebraska-Lincoln
West Central Research and Extension Center
Brule Water Laboratory near Brule, NE

Topographic Map



Elevation (m)

Soft Edge
1073 - 1075
1070 - 1073
1067 - 1070
1064 - 1067
1061 - 1064
1058 - 1061
1055 - 1058
1052 - 1055
1050 - 1052



Slope (%)

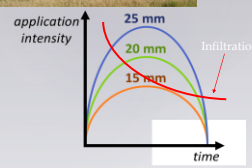
0 - 2
2 - 4
4 - 6
6 - 8
8 - 10
10 - 12

Basic Irrigation Design and Management
- Prevent runoff and deep percolation losses

Deep Percolation
- Soil type and retention properties
- Crop root zone

Runoff
- Soil type, surface cover, tillage, and slope
- Antecedent water events
- Crop type, population density, and row spacing

Baseline Irrigation Prescription
- Irrigation = f min(runoff, deep percolation)
  - Estimate maximum irrigation depth to prevent runoff and deep percolation for each zone
  - Select minimum of the two



Sub-Parcel Scale Watersheds

LiDAR: Small Watersheds

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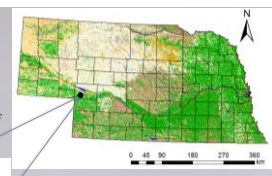
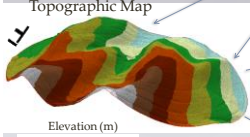
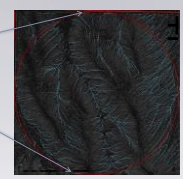
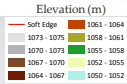


Topographic Map

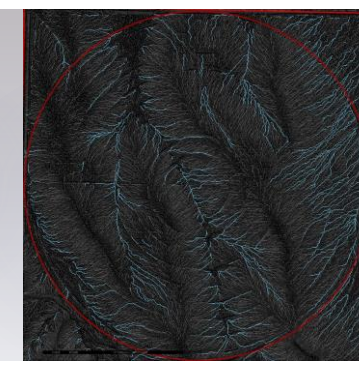


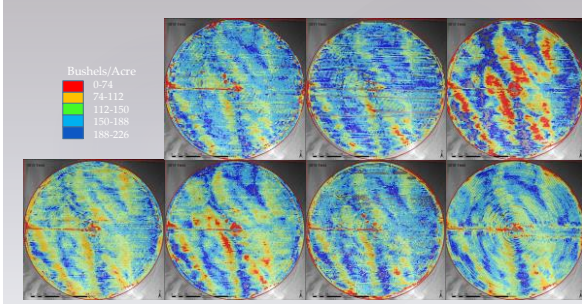


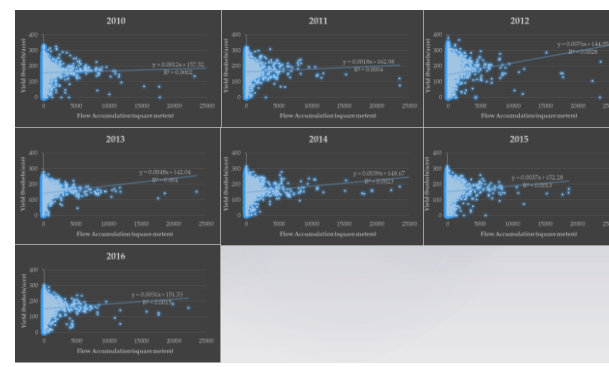
Elevation (m)



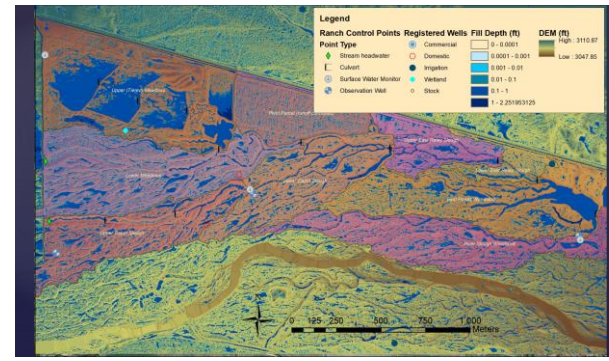
Flow Accumulation







Integrated Water Management



Douglas R. Hallum, P.G.
Survey Hydrogeologist - Conservation and Survey Division
University of Nebraska - Lincoln

West Central Research and Education Center
402 West State Farm Road
North Platte, NE 69101-7751

308-696-6743
dhallum2@unl.edu
http://snr.unl.edu/csd/

Thank You!

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