

Hydrologic Connection Analyses in the Lower Platte

Lower Platte River Basin Coalition Management Committee
July 23, 2019

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Outline

- Cycle Well Analysis Preliminary Results
- Lower Elkhorn NRD Pilot Scale Area (LENRD-PSA Model) Overview
- LENRD-PSA Results
- Future Analyses with LENRD-PSA
- LPNNRD AEM Survey Project

LPMT Cycle Well Setup

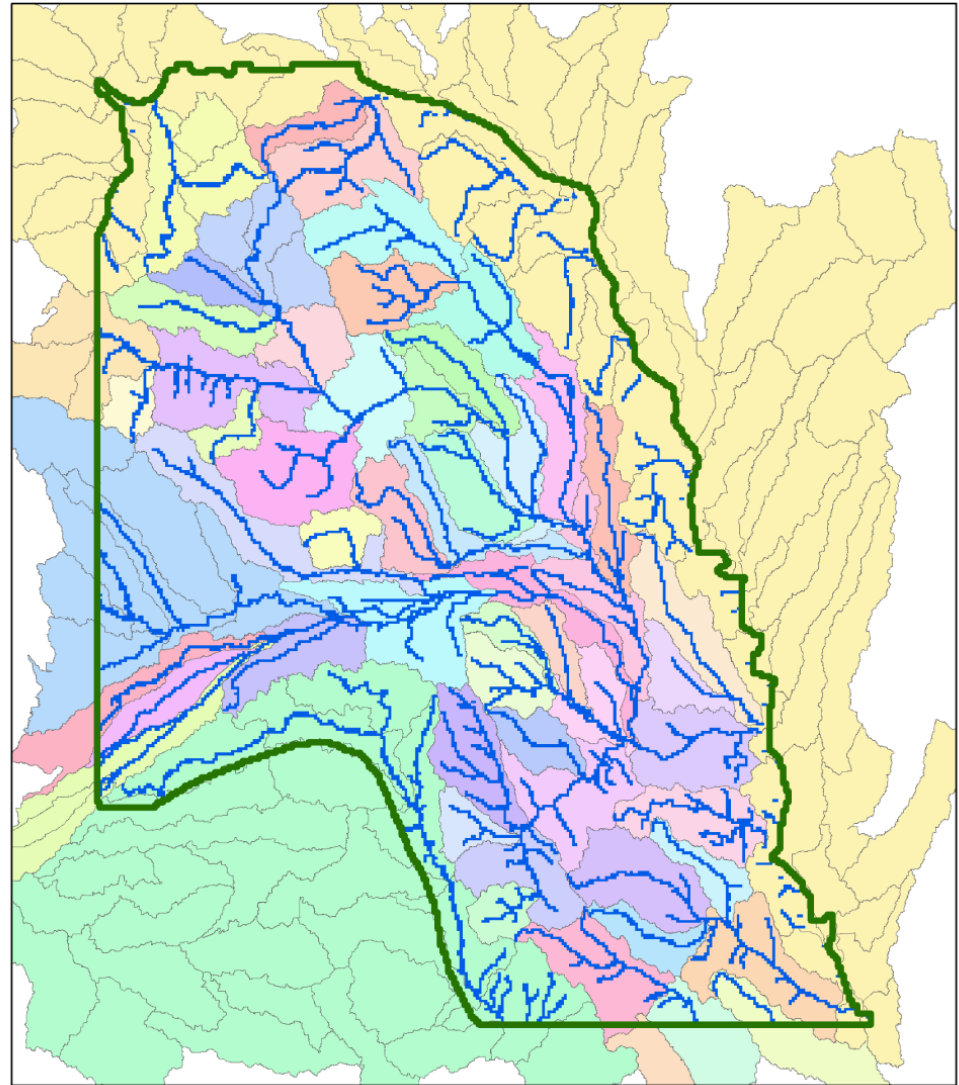
- Hydrologic connectivity determined by running a 50 year simulation called cycle well analysis
- LPMT cycle well analysis consists of original models 336 transient monthly stress periods plus the last 127 repeated twice
 - Original 336 transient periods – Jan 1986 to Dec 2013
 - Repeated last 127 periods twice - Jan 2002 to Dec 2013
 - Total of 600 stress period representing fifty years
- All model packages were modified to represent the stress period changes

LPMT Cycle Well Zones

- Zones were created to aid in the analysis of hydrologically connected areas
- The zones are based off of HUC 10 Watershed boundaries and are the same for both layers
- Missouri, Blue, Loup, and Platte Tributaries were grouped
- Bazille and Elkhorn watersheds without stream cells were grouped
- Total of fifty nine zones

LPMT Cycle Well Zones

Zone 25 Plum Creek Stream Depletion Factors





Created by Philip Paitz
March 1, 2019

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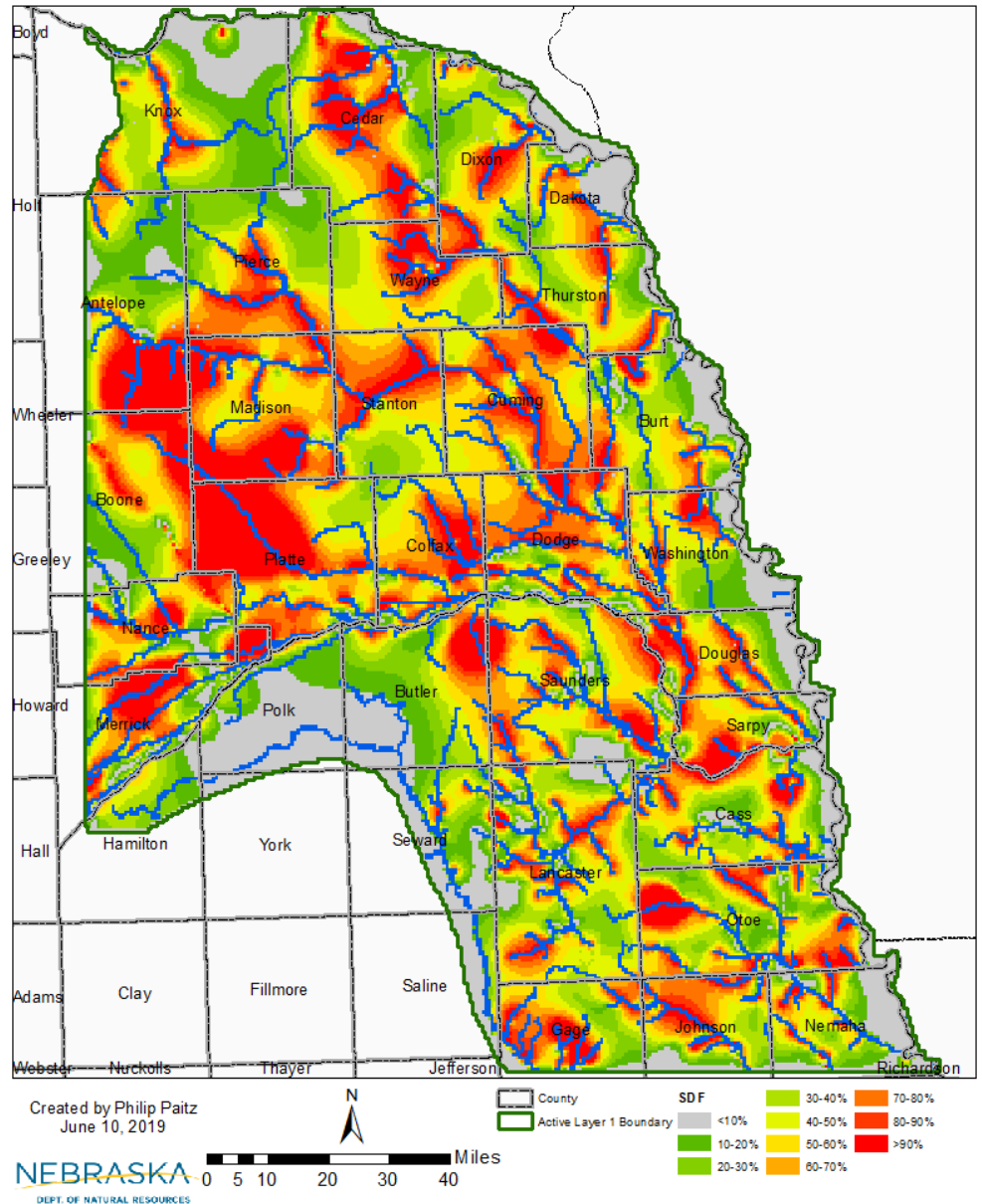


0 5 10 20 30 40 Miles

 Active Layer 1 Boundary
 Stream Cells

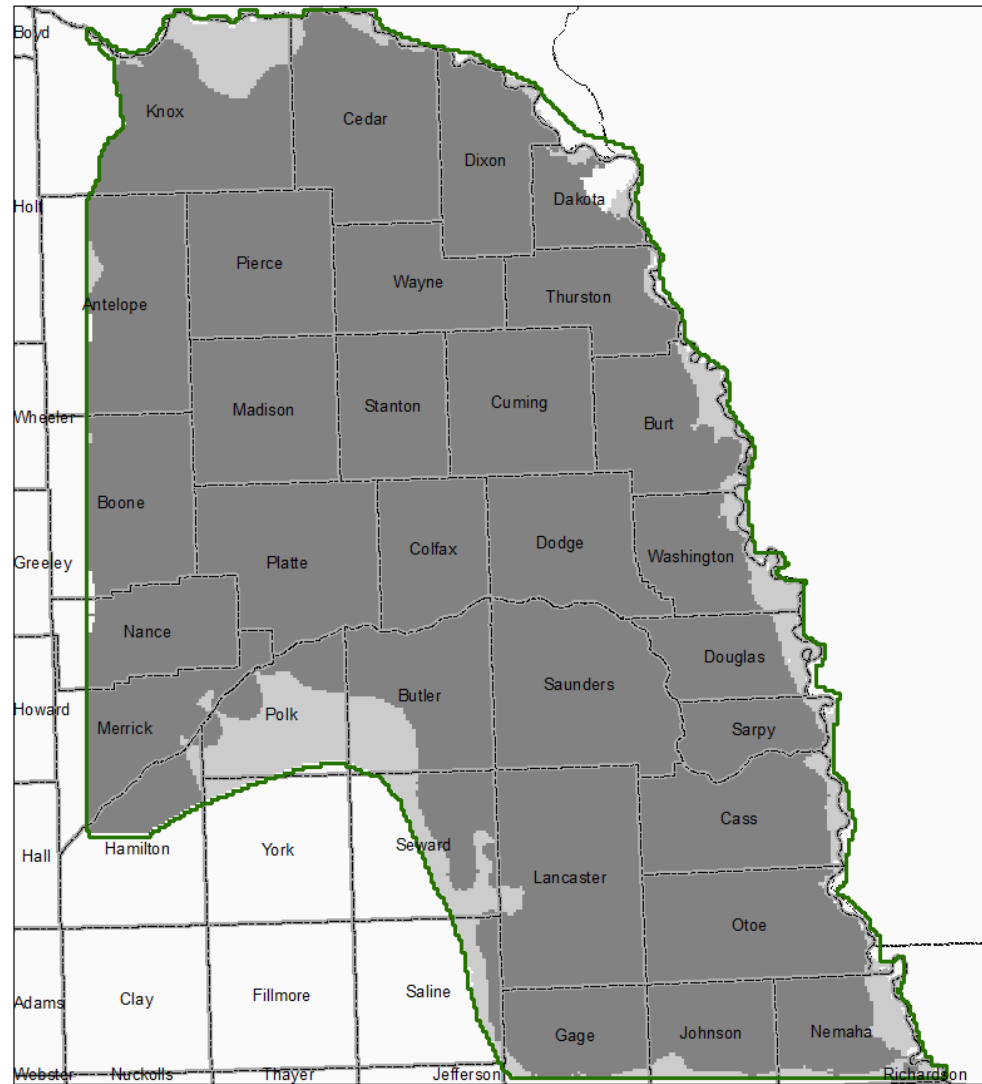
LPMT Cycle Well Results

Lower Platte Missouri Tributary Stream Depletion Factors



LPMT Cycle Well Results

Lower Platte Missouri Tributary Stream Depletion Factors



Created by Philip Paitz
June 10, 2019

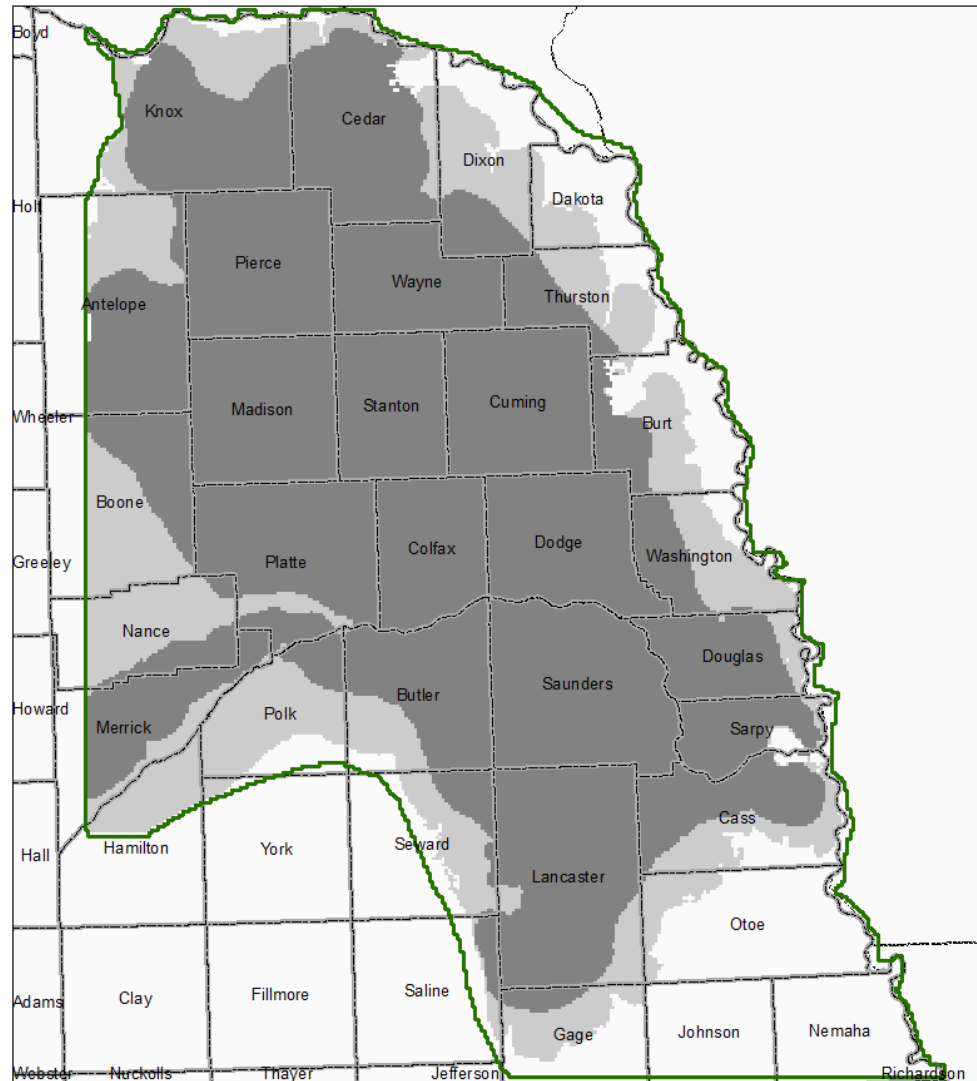
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0 5 10 20 30 40 Miles

County
Active Layer 1 Boundary
All Zone HC Area
<10%
>10%

LPMT Cycle Well Results – Platte River Tributaries only

Lower Platte Missouri Tributary Stream Depletion Factors



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0 5 10 20 30 40 Miles

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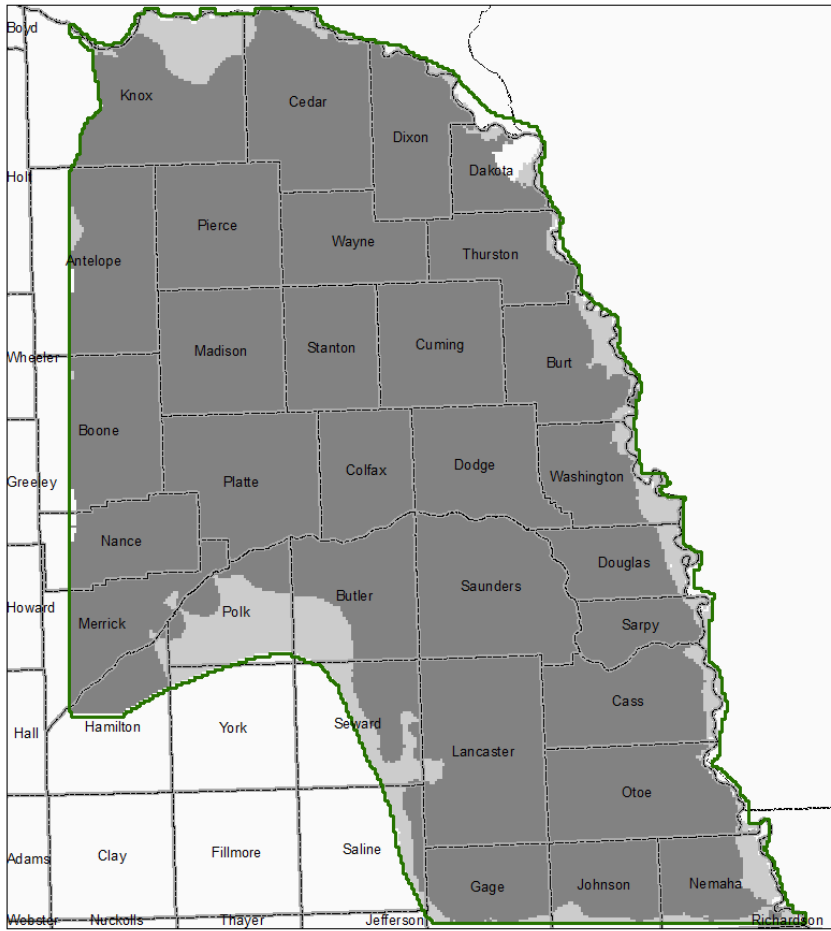
County
Active Layer 1 Boundary

Platte River Tribs Only

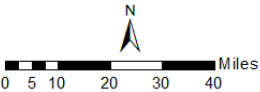
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Hydrologic Connection With Zones

Lower Platte Missouri Tributary Stream Depletion Factors



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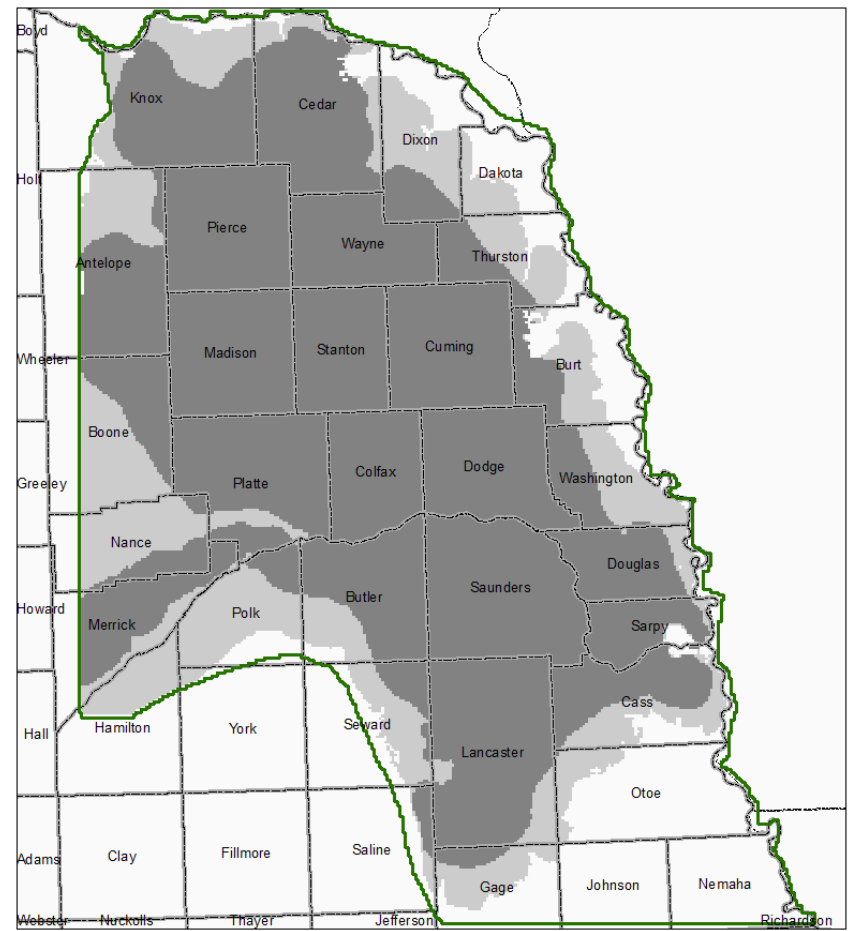


County
Active Layer 1 Boundary

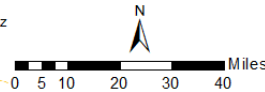
All Zone HC Area
 <10%
 >10%

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Lower Platte Missouri Tributary Stream Depletion Factors



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County
Active Layer 1 Boundary

Platte River Tribs Only
 <10%
 >10%

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What's Left to Do?

- QAQC the process, post-processing, and results
- Finalize documentation and write metadata for shapefiles
- Present final results to the Lower Platte River Basin Coalition Technical Committee

LENRD-Pilot Scale Area Model

➤ Purpose

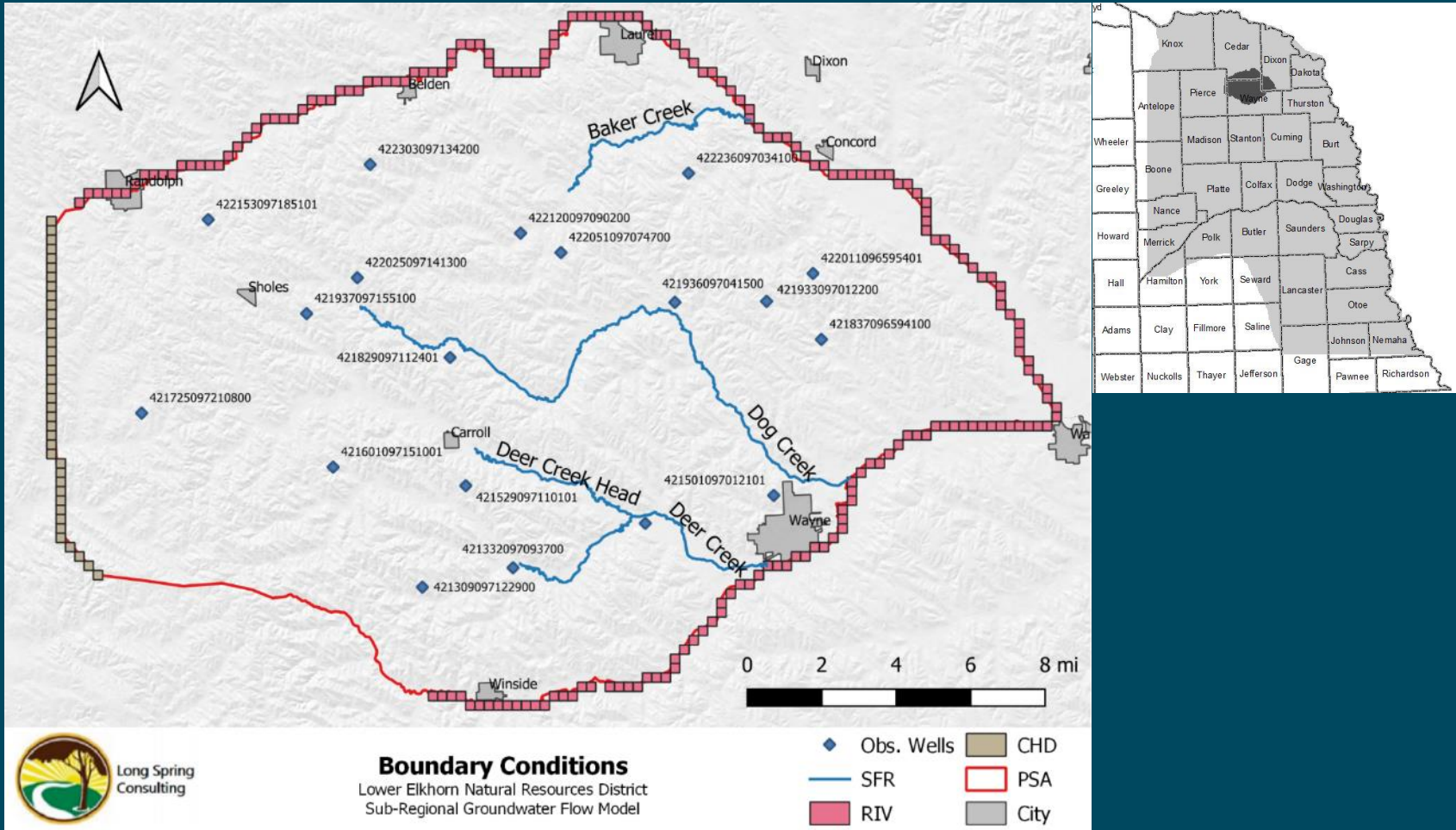
- Incorporate AEM flight data into the existing LPMT regional model to determine if improved modeling results can be achieved through finer remotely sensed geologic data

➤ AEM

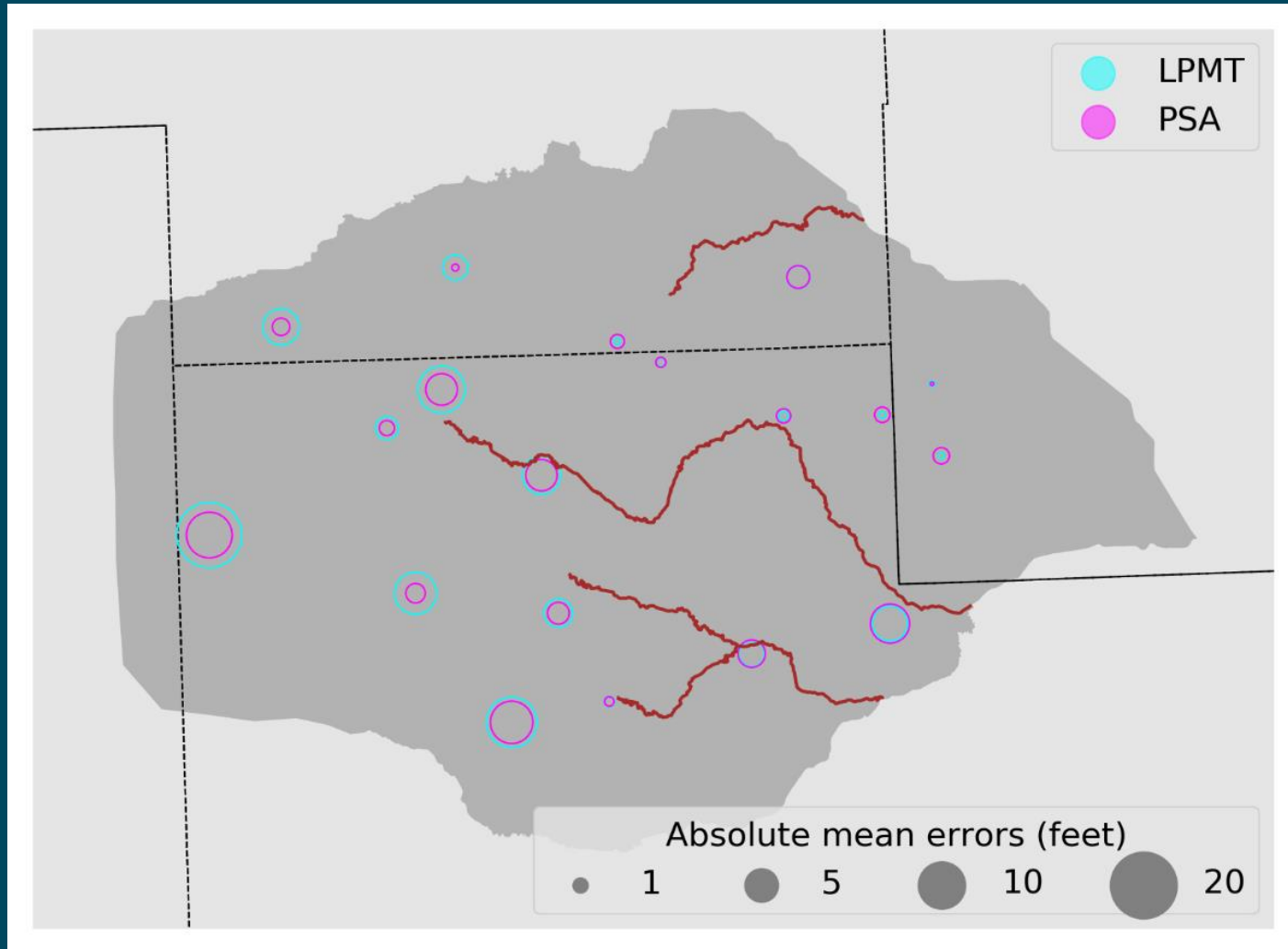
➤ Contracted and Built

- LENRD and NeDNR: Model sponsors
- JEO Consulting: Main contracting and consulting work
- Long Spring Consulting: Construction of the Numerical Model
- WSP USA: AEM interpretation

LENRD-Pilot Scale Area Model



PSA Residuals



Residual - Difference between and observed and modeled value

LENRD-PSA Future Analysis

➤ Cycle Well Analysis

- Compare results from LPMT
- Test MODFLOW-USG
- See how a refined model (layers, grid, pumping) responds

➤ Additional Scenarios

- See how model reacts due to pumping from different layers

LPNNRD AEM Surveys

➤ Purpose

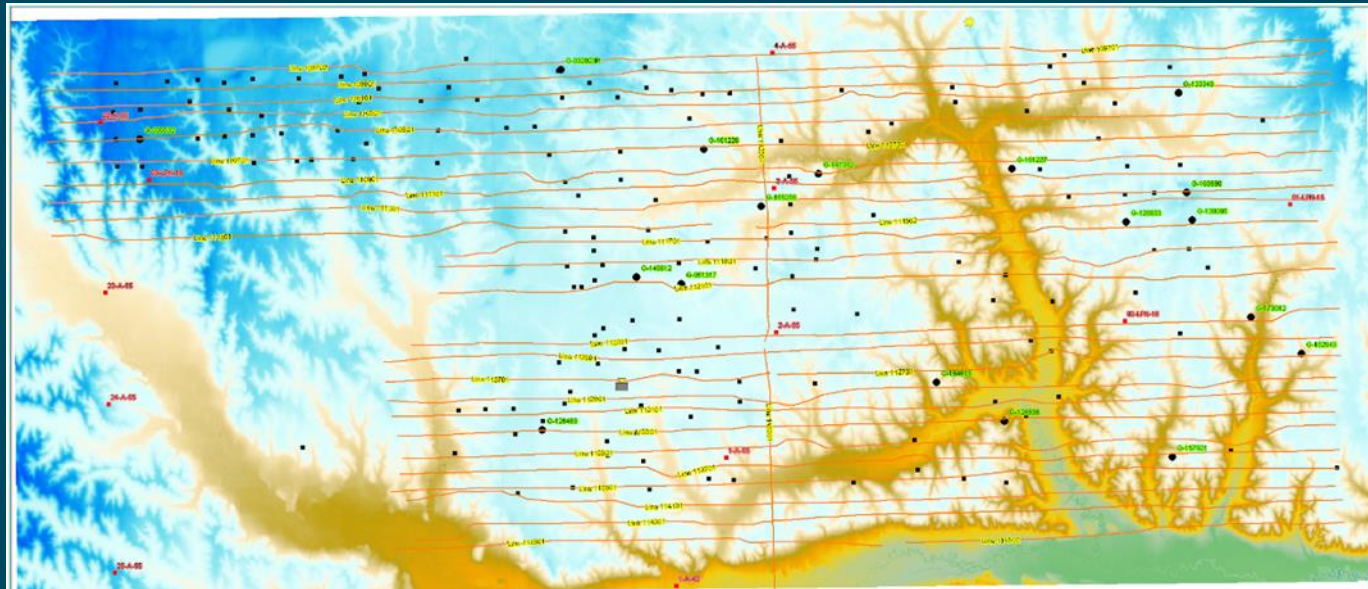
- Working with UNL-CSD to develop a hydrogeologic framework based on test hole, transducer, and AEM data for the Lower Platte North NRD

➤ Utilizing GeoScene3D for analysis

➤ Partnering with

- Jesse Korus and Jackie Polanshek (graduate student)
- Lower Platte North NRD

LPNNRD AEM Surveys



Summary

- Cycle well analysis was conducted using the LPMT Model expanded to fifty years
- Zones allow for hydrologic connectivity to be analyzed at watershed level
- Cycle Well QAQC is currently underway
- LENRD-PSA model incorporated AEM data
- LENRD-PSA cycle well analysis will begin soon
- Continue to work with our partners (LENRD, LPNNRD, and CSD) to integrate AEM data into the LPMT model

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Good Life. Great Water.

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THANK YOU

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