Hydrologic Connection Analyses in the Lower Platte

Lower Platte River Basin Coalition Management Committee

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NEBRASKA

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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

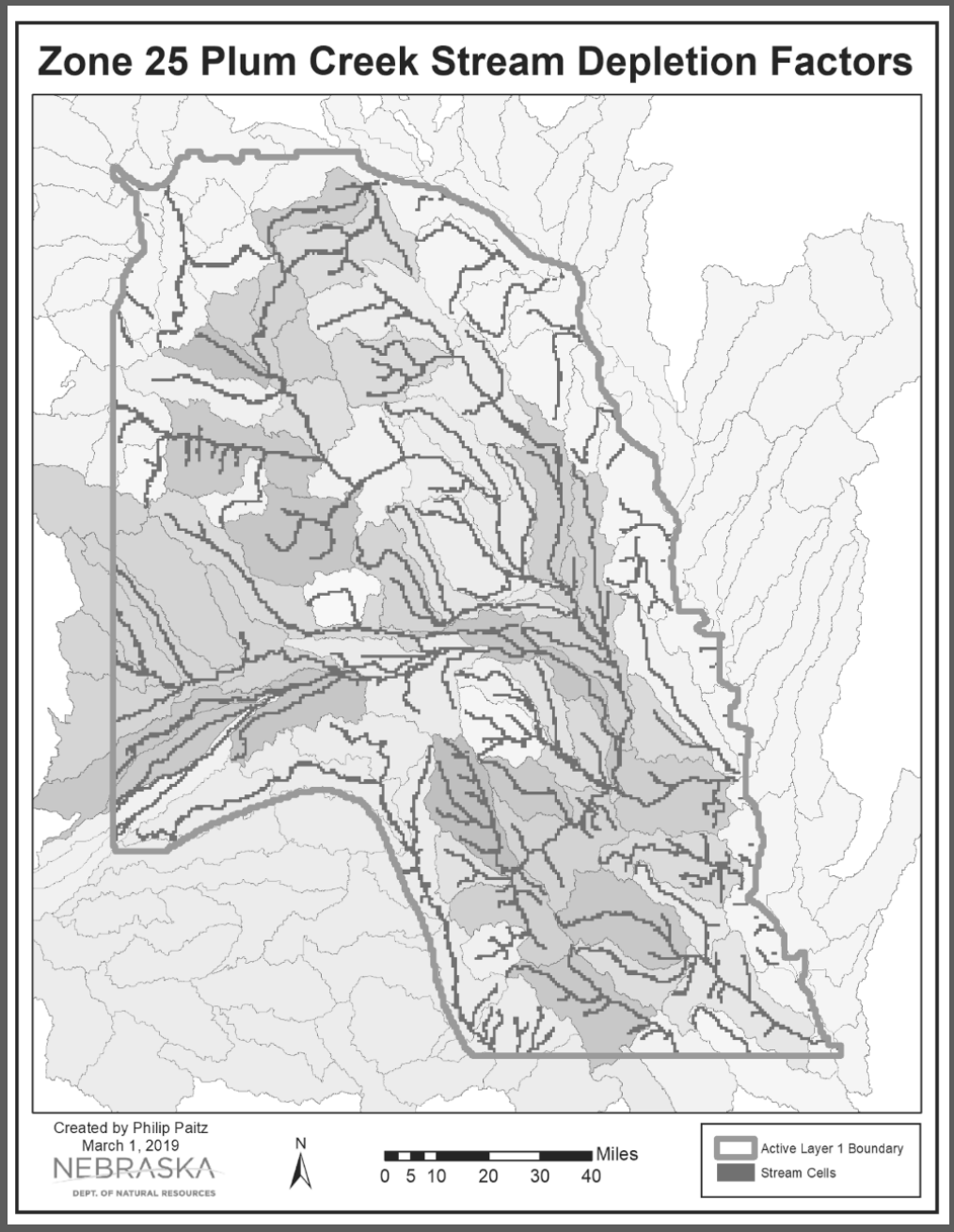
LPMT Cycle Well Setup

- 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

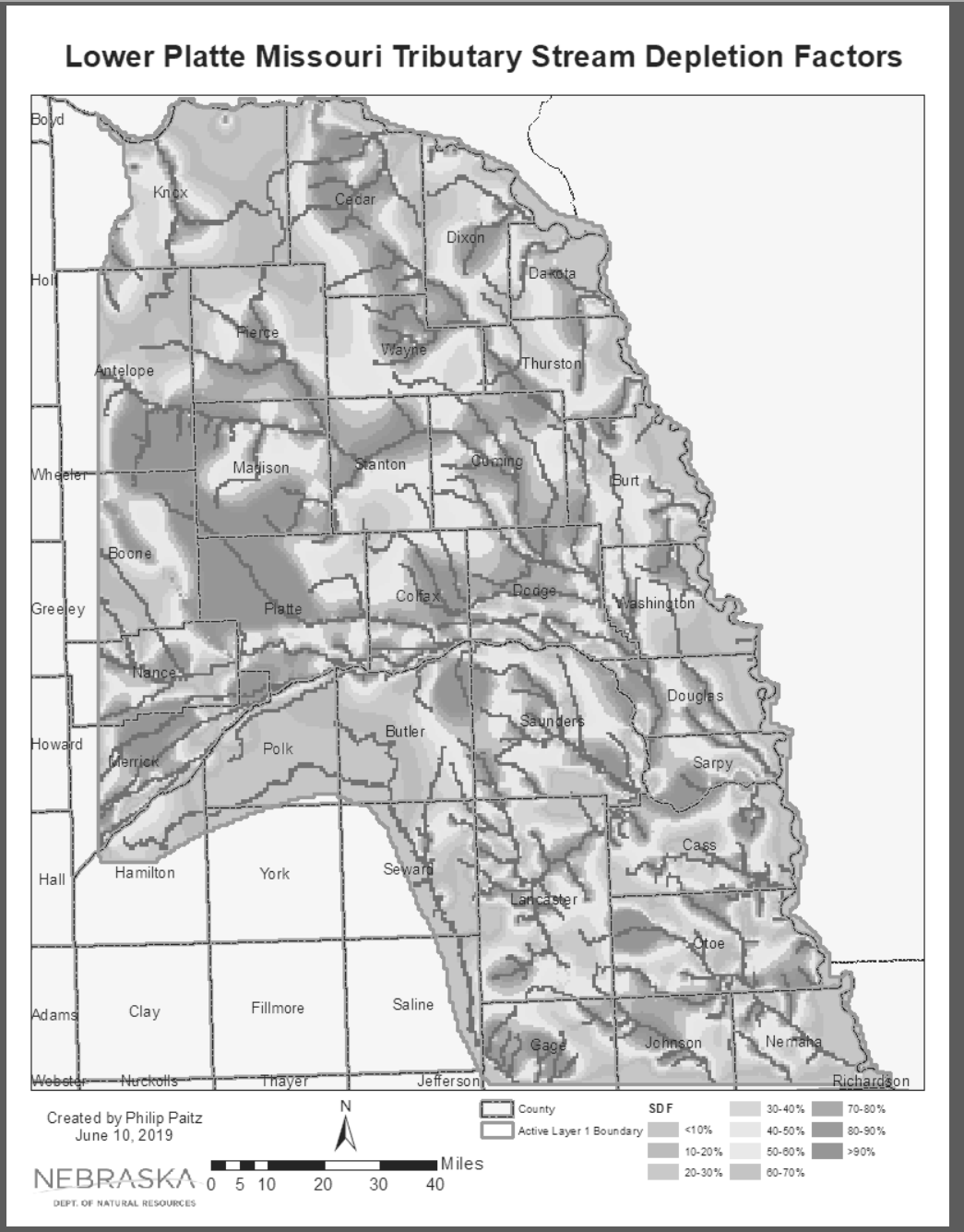
LPMT Cycle Well Zones

- 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

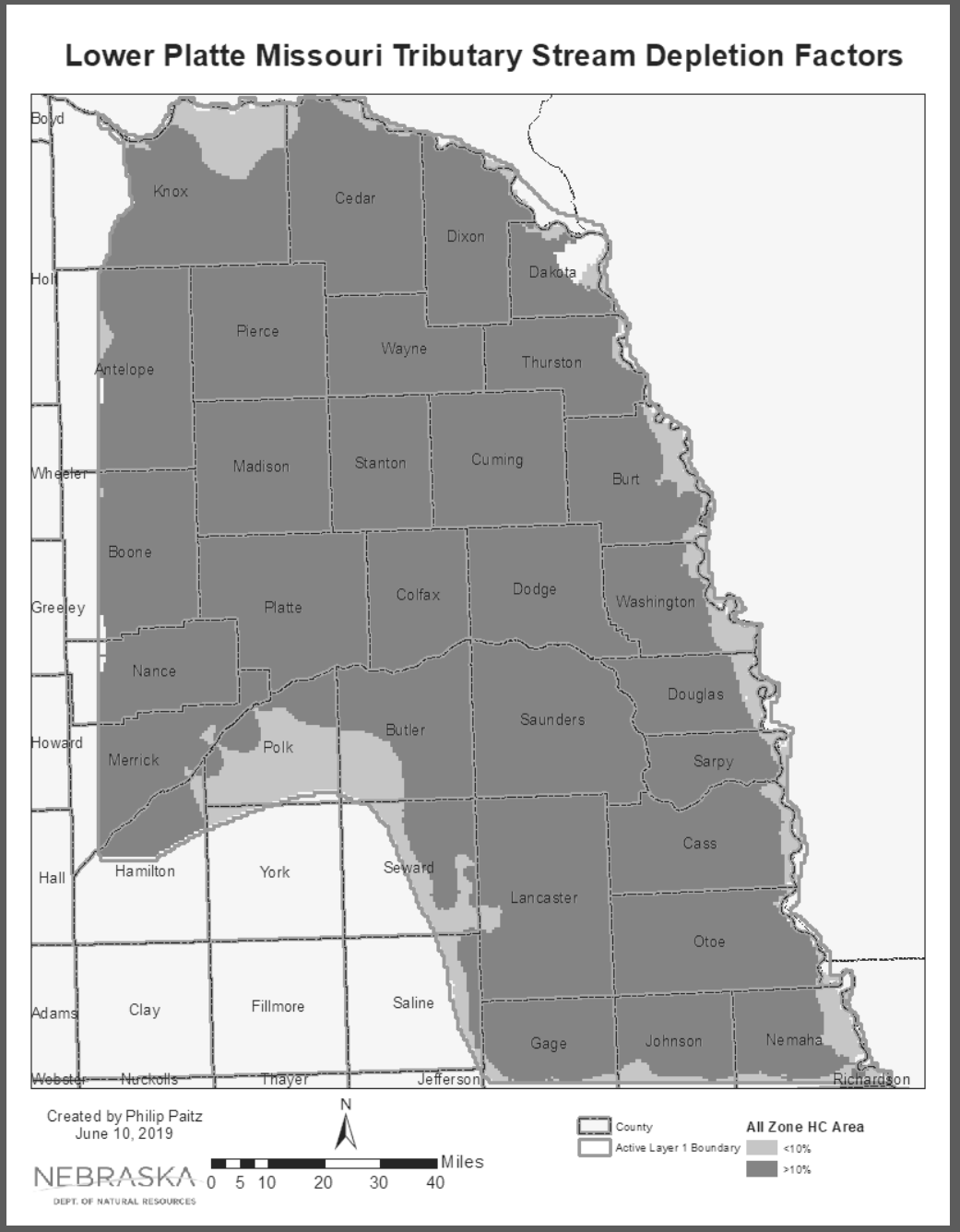
LPMT Cycle Well Zones



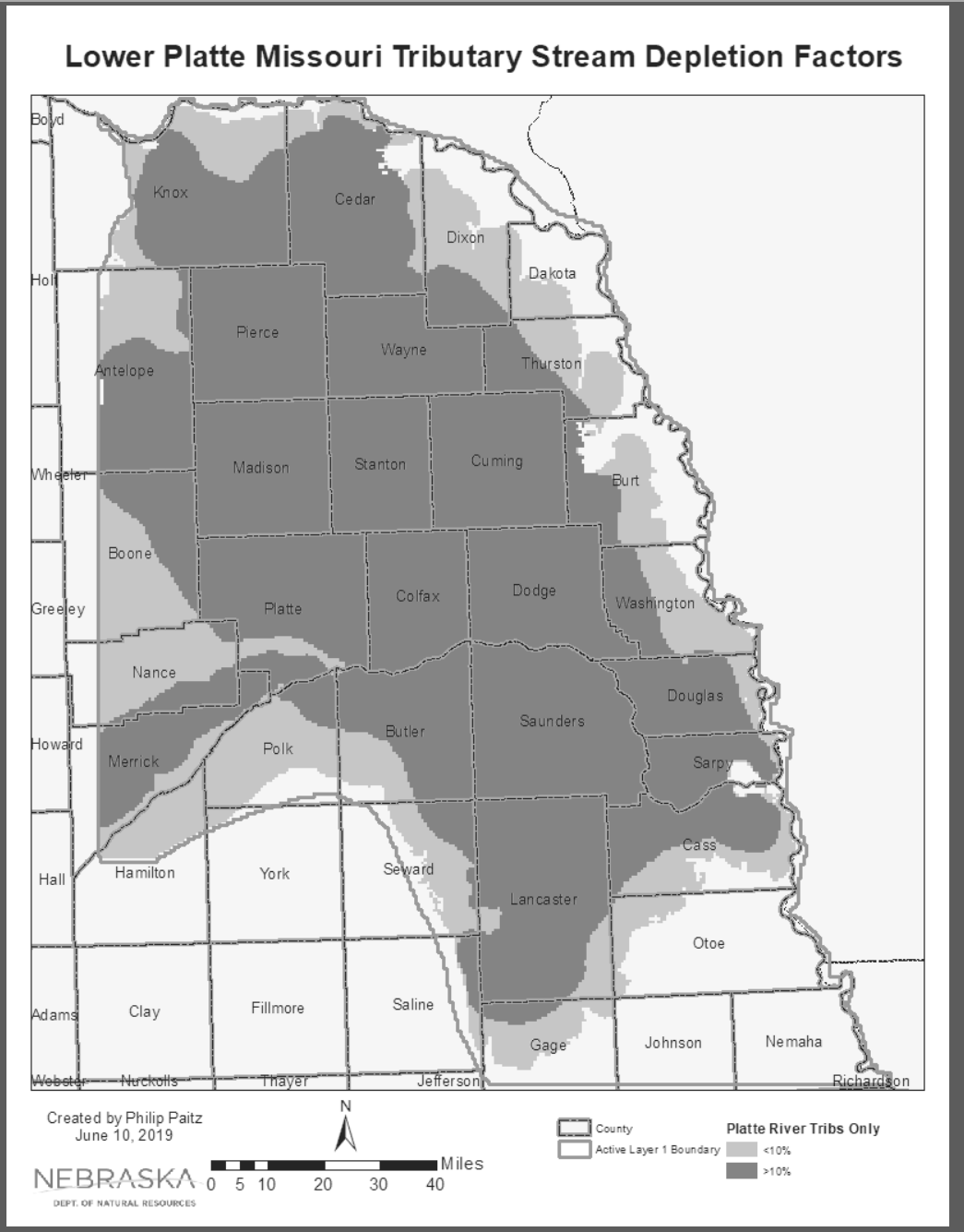
LPMT Cycle Well Results



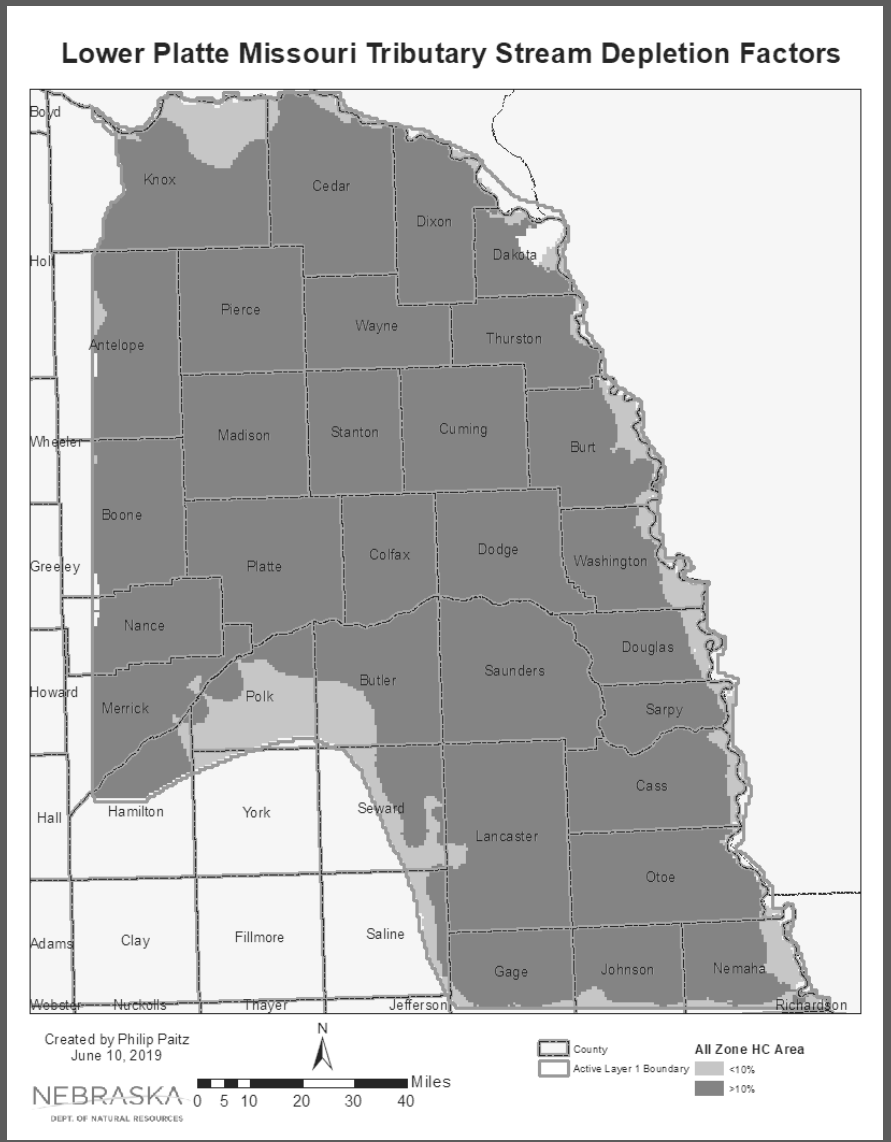
LPMT Cycle Well Results

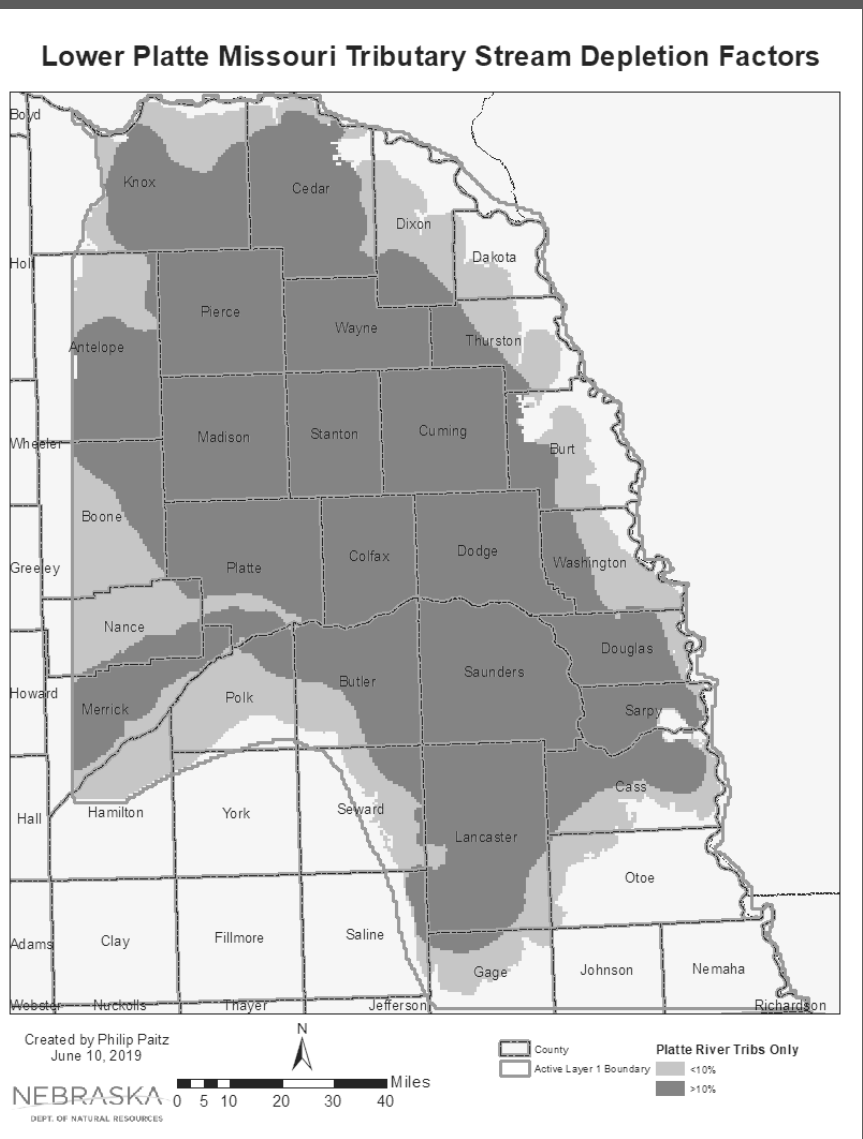


LPMT Cycle Well Results – Platte River Tributaries only



Hydrologic Connection With Zones





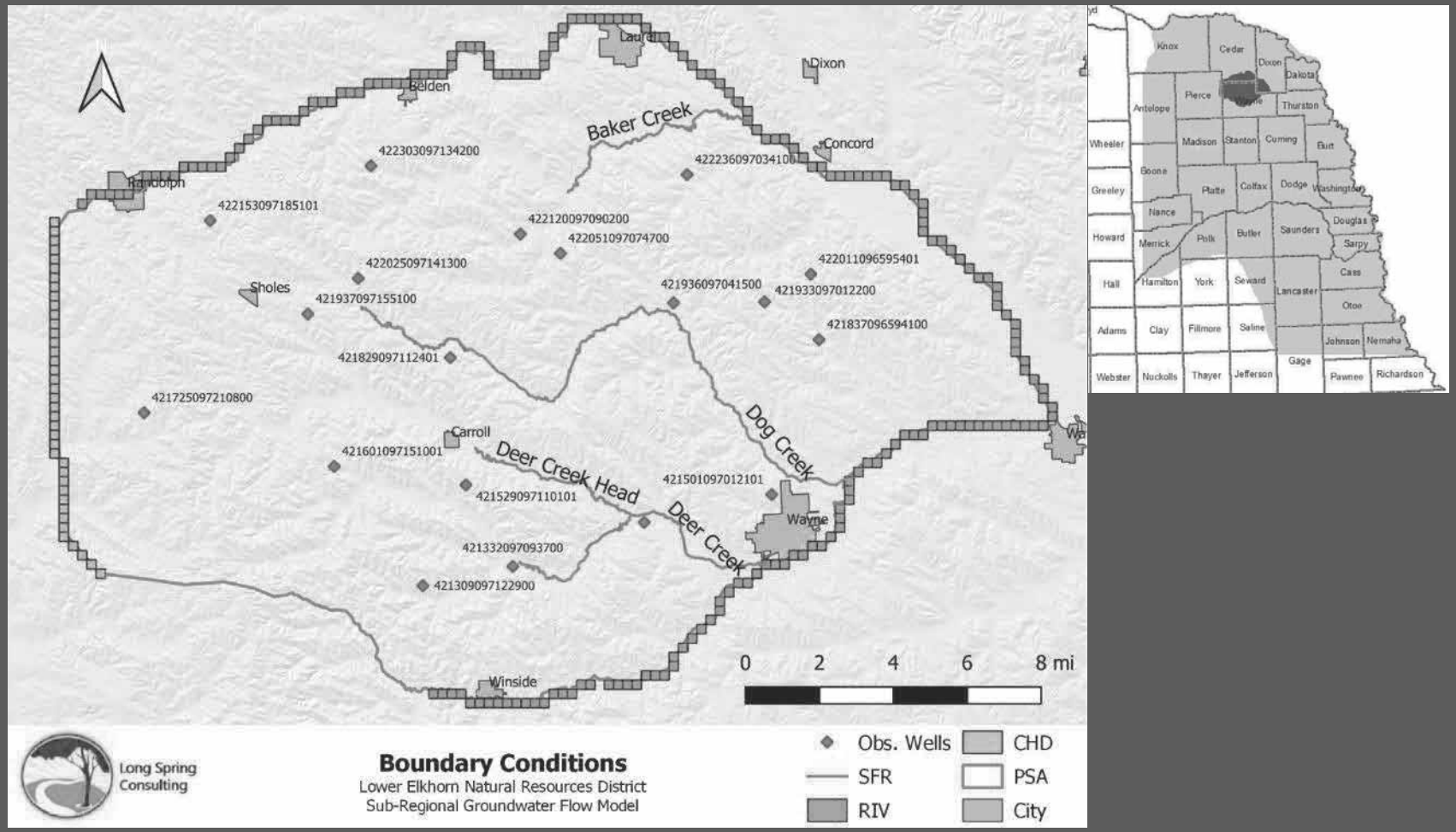
What's Left to Do?

- 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

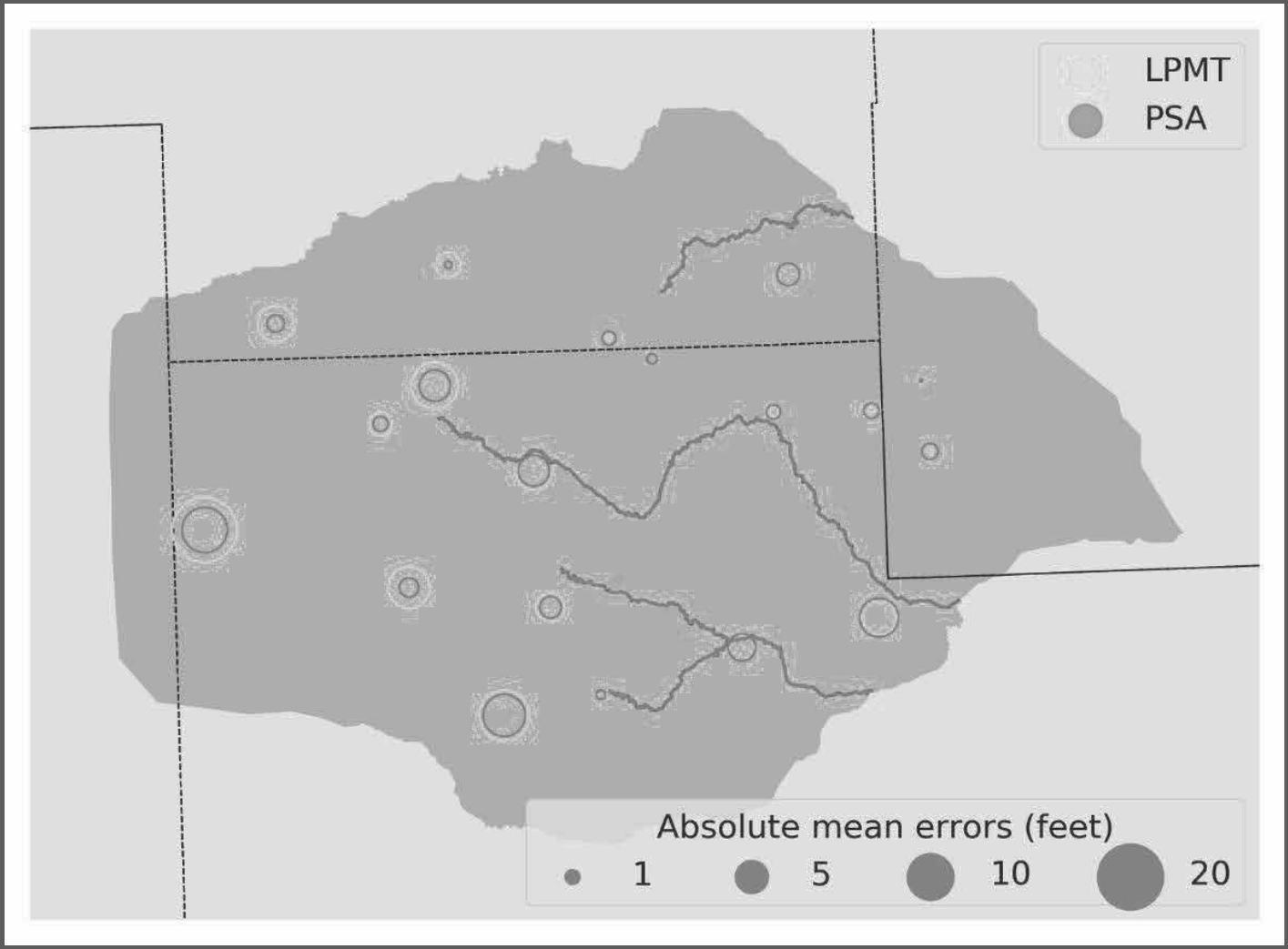
LENRD-Pilot Scale Area Model

- 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

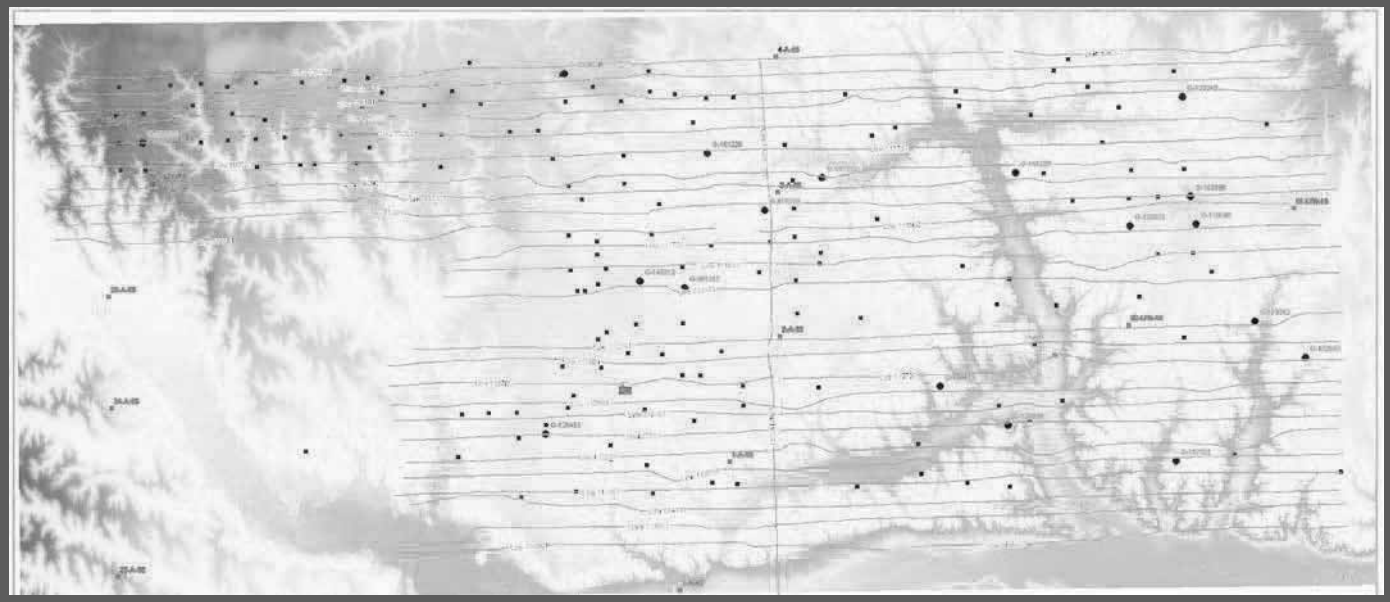
LENRD-PSA Future Analysis

- 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 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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THANK YOU

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