

# NDEP Groundwater Nitrate Assessment Tool

Bureau of Water Pollution Control  
Farr West Engineering

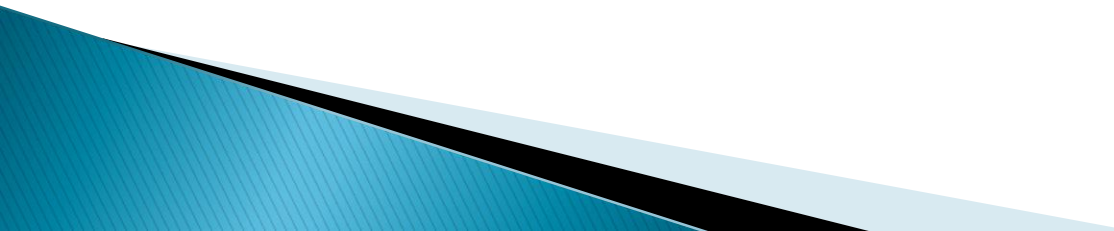
# Acknowledgement

- ▶ Department of Energy Grant

# Purpose of the project

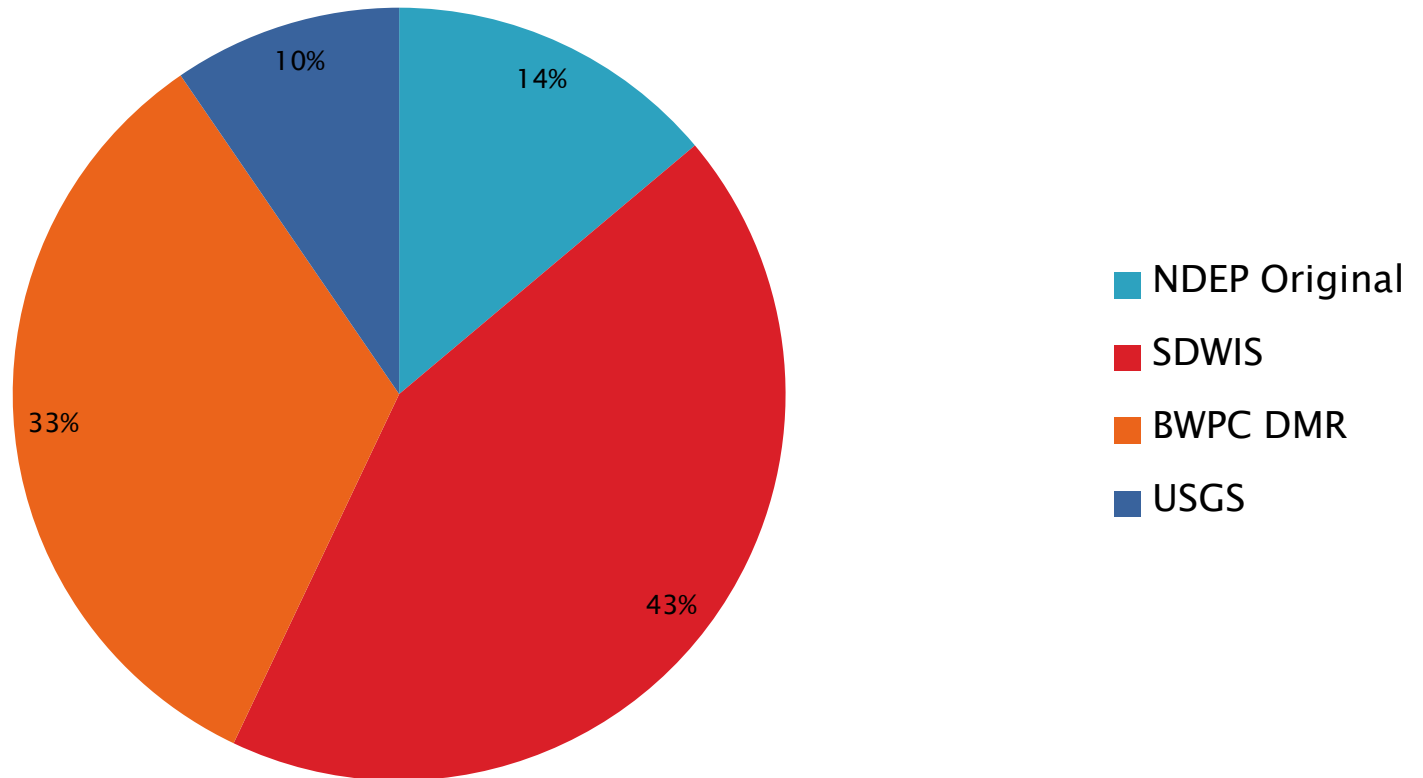
- ▶ To assist the BWPC in writing Discharge to Groundwater Permits and reviewing Monitoring Reports
  - To compile all available nitrate data into one source database
  - To visually represent the data
  - To show changes and trends in nitrate concentrations throughout the state
  - To identify areas of concern
  - Usability

# Permitting

- ▶ The BWPC has 300 active groundwater permits
  - ▶ 115 of the permits require groundwater Nitrate sampling
  - ▶ Sampling frequency is specified in the permit
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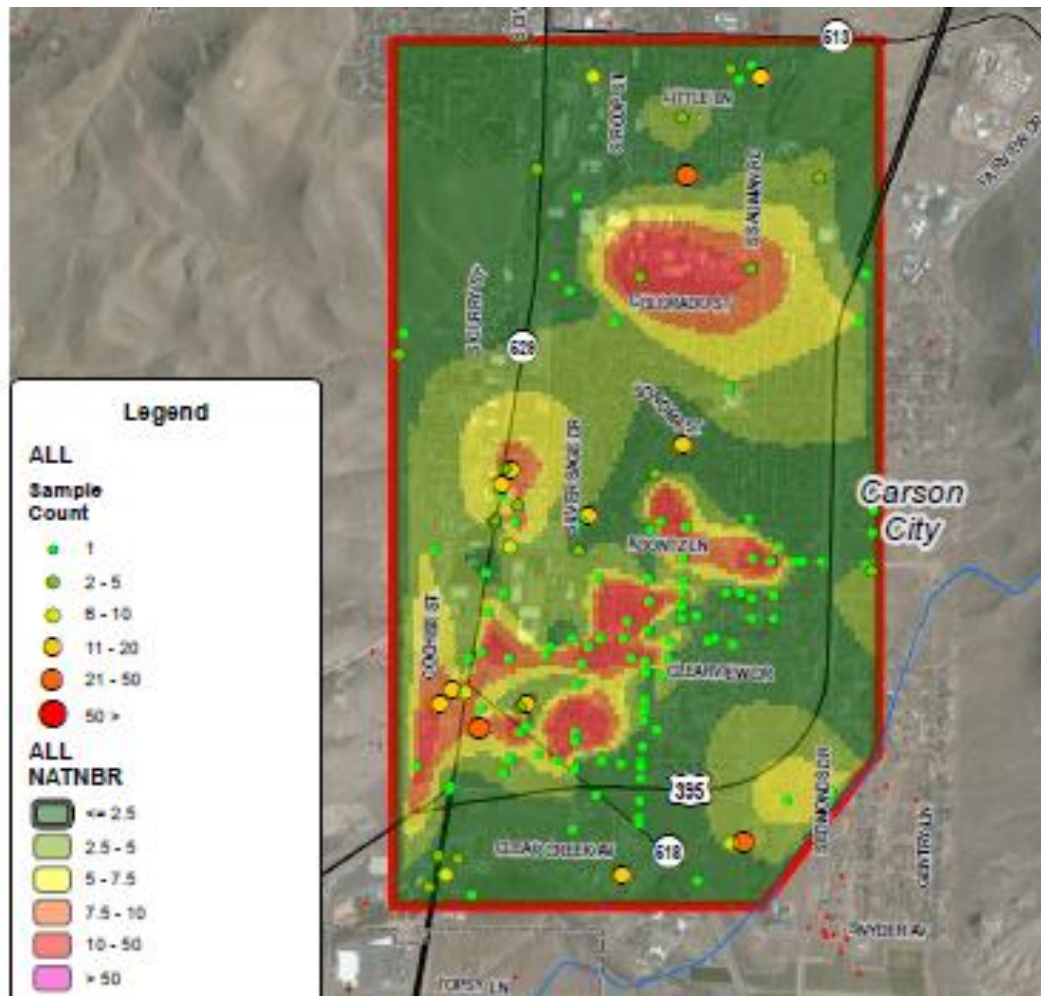
# Data Sources

Distribution of Nitrate Concentration Data from Source



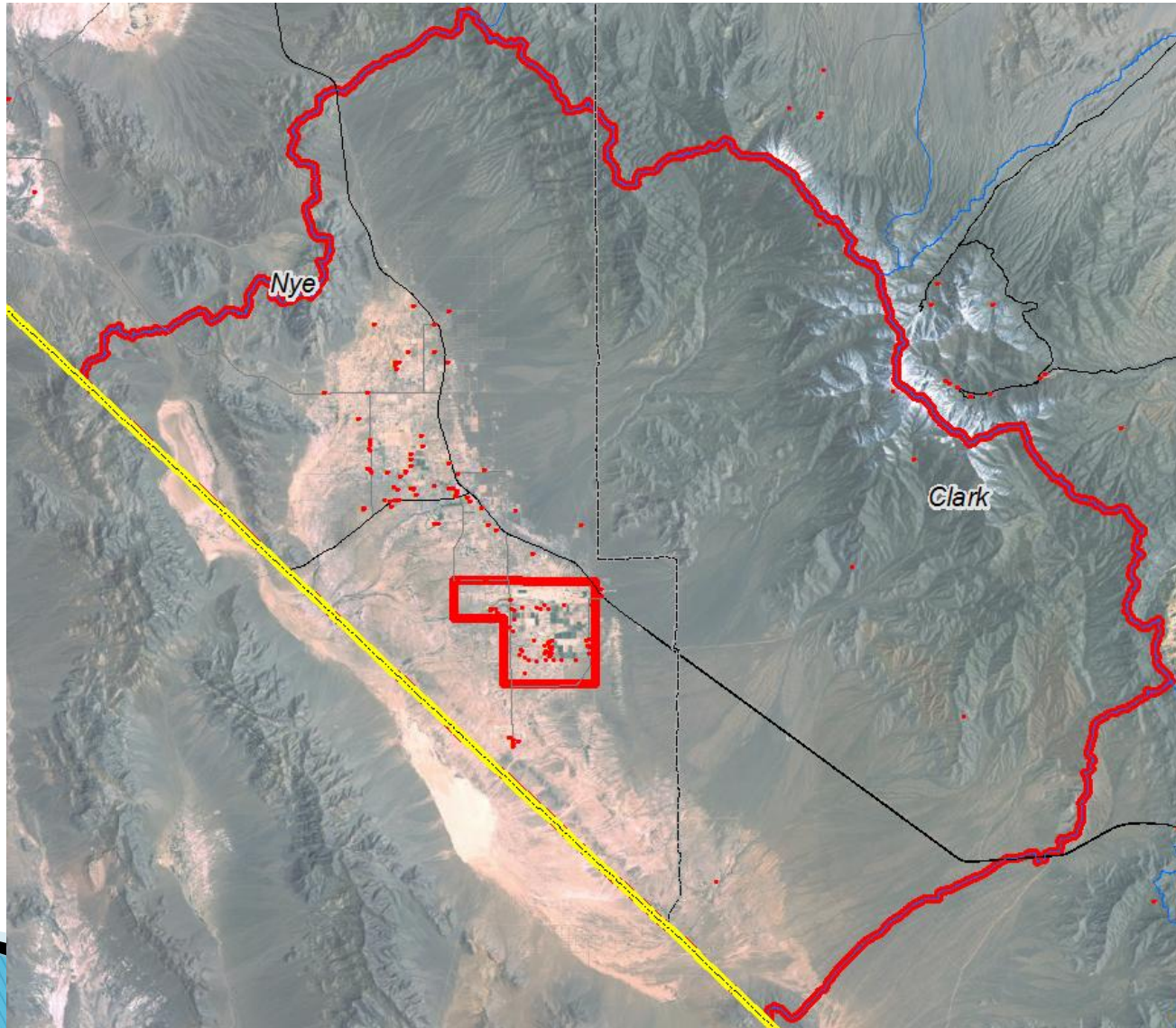
# What Is The Tool?

- ▶ A graphical interpolation of groundwater nitrate concentration data





# Tool Study Area



# Tool Selection Options

◆ Output Grid Name

◆ GRID Interpolation Method

◆ Selection Type

Data Source (optional)  
ALL

Start Date (optional)

End Date (optional)

Lower Bounding Amount (optional)

Upper Bounding Amount (optional)

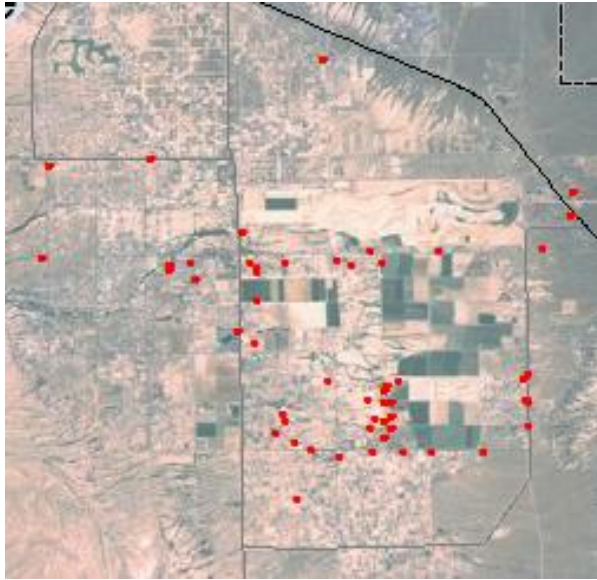
GRID Cell Size (optional)

Return Statistics (optional)

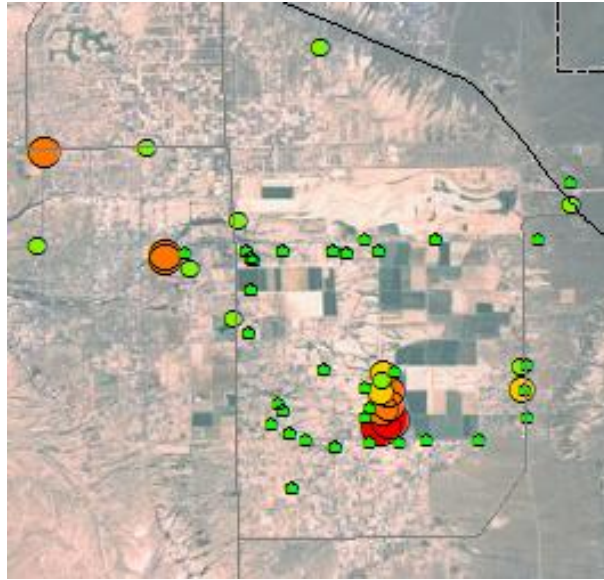


# Statistical Analysis

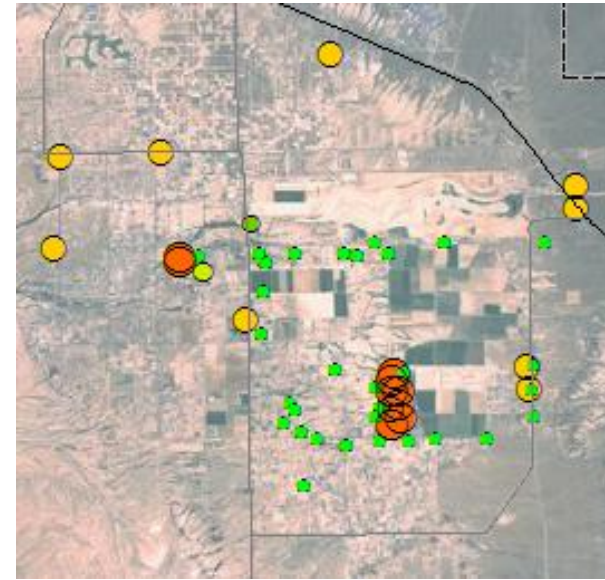
Sampled Wells



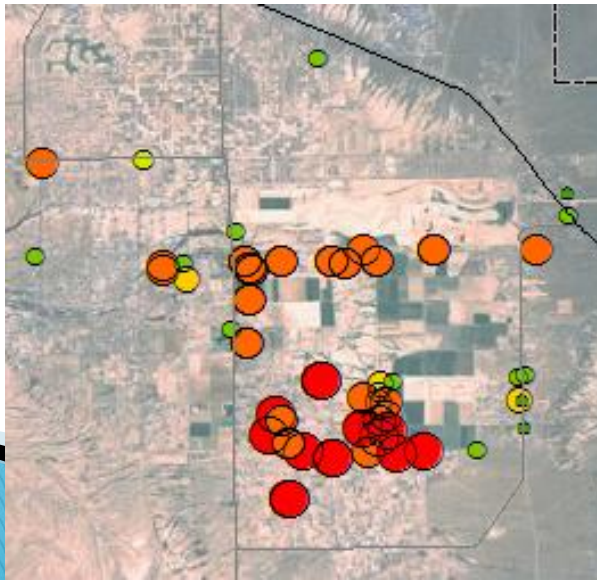
Difference



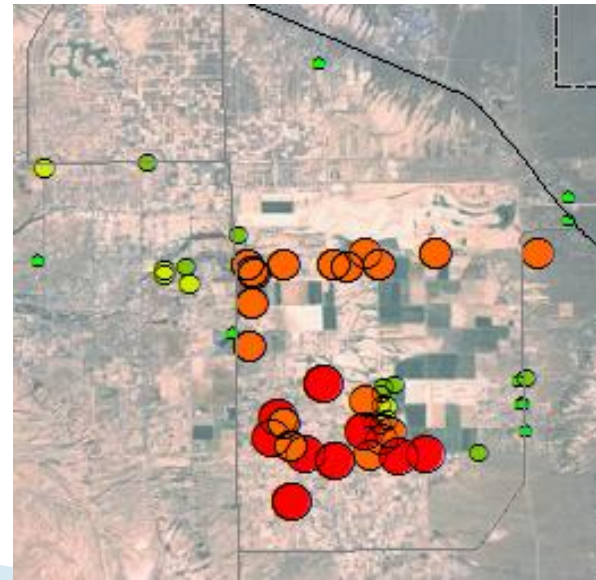
Sample Count



Max Concentration



Mean Concentration



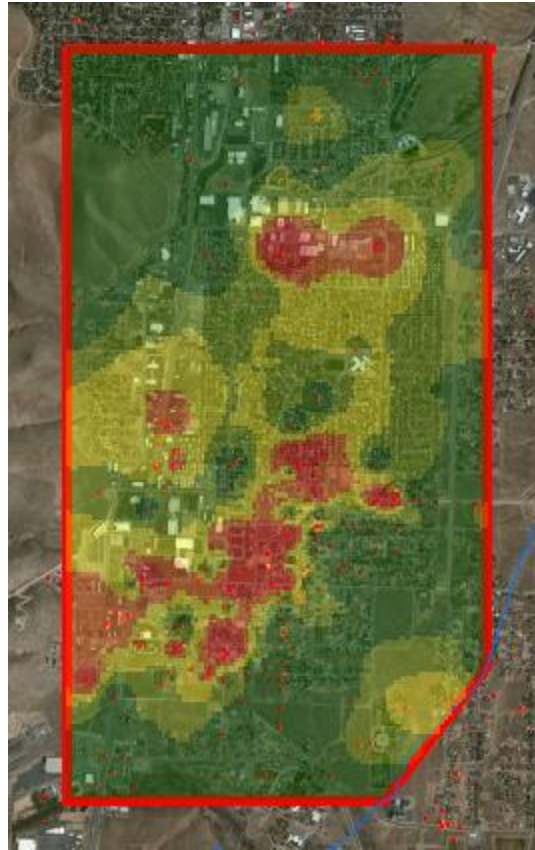


# Interpolation Methods: All Nitrate Data Averaged

Kriging



Inverse Distance Weighted



Natural Neighbor

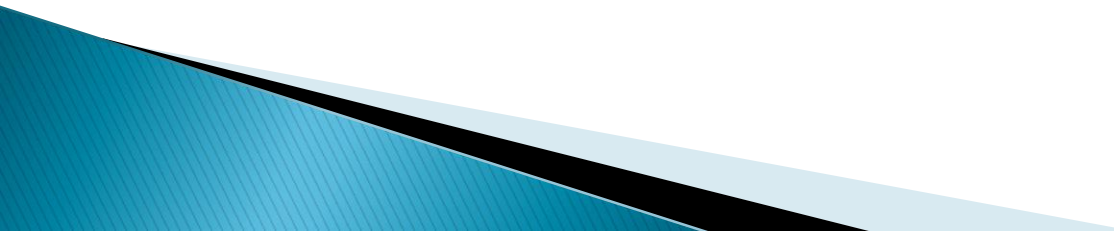


# Interpretation

- ▶ Combine this tool with other data
  - Well logs
  - Potentiometric maps
  - Geologic maps
  - Septic density maps
  - Areas of concern
    - Historical knowledge of the area
  - Reports

# Groundwater Tool Limitations

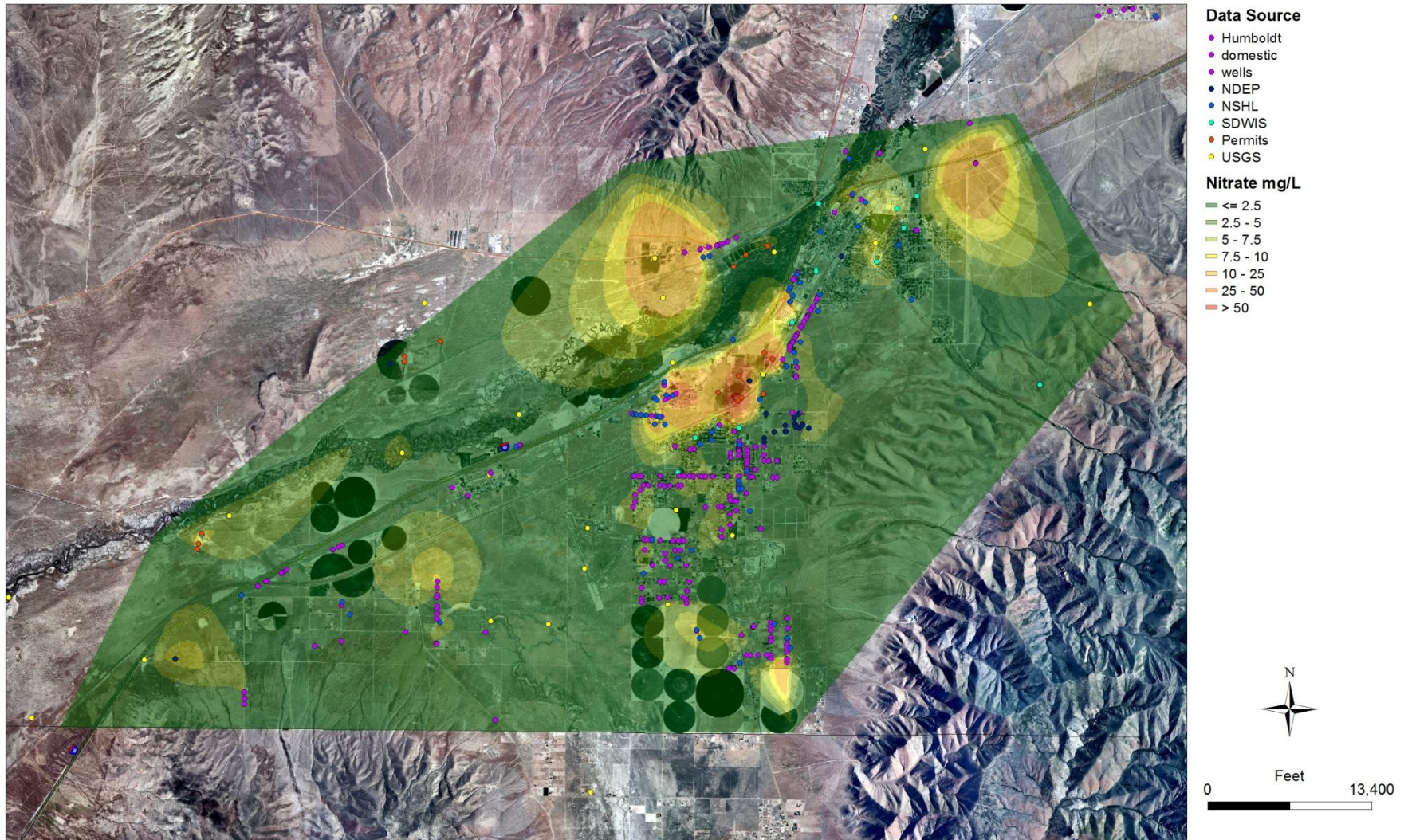
## ▶ Interpolations

- May cross hydrogeologic boundaries
  - Does not include groundwater flow directions
  - Does not include a depth component
  - Does not include lithologic/geologic materials
  - Not a groundwater modeling tool
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# BWPC USE EXAMPLE

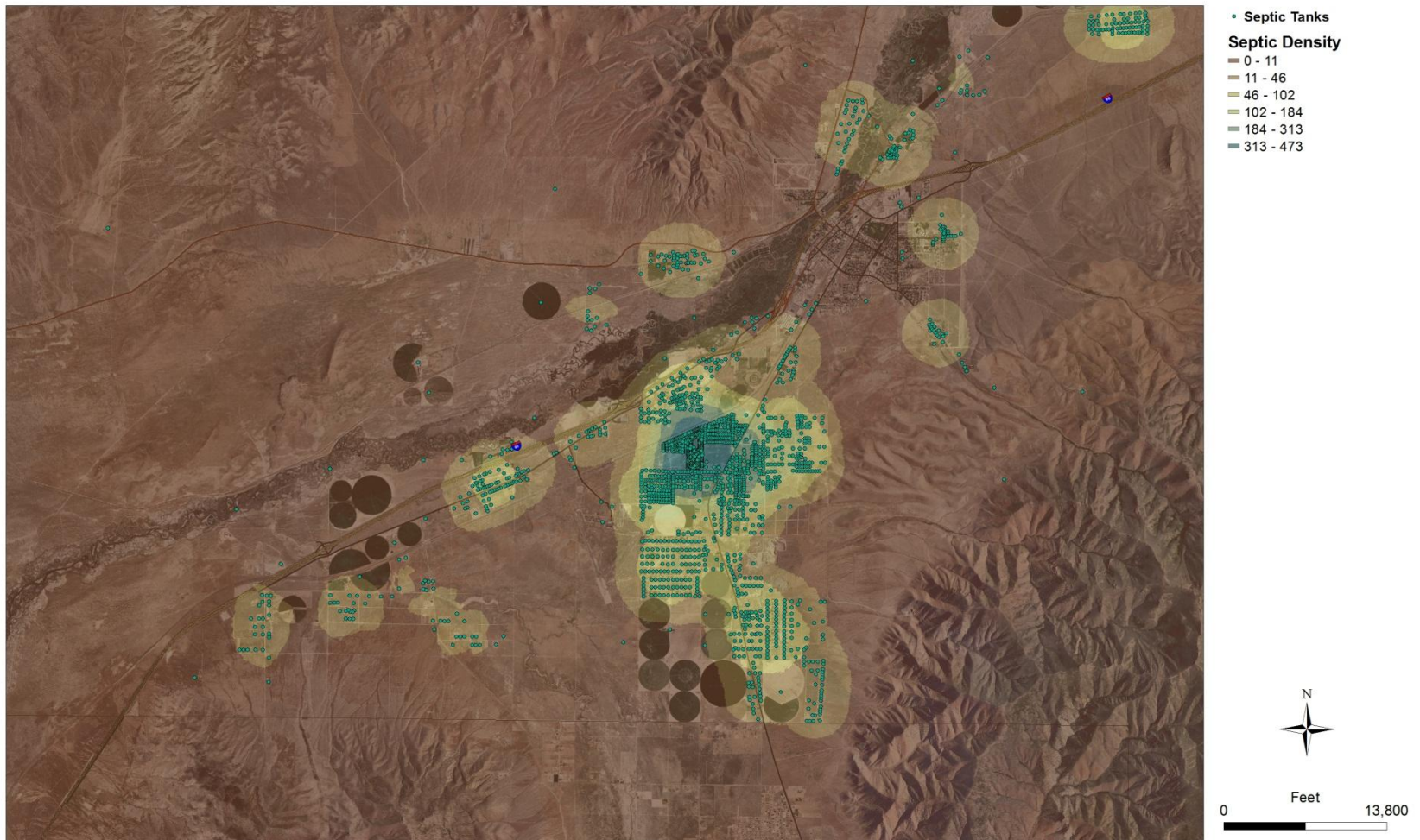
## Winnemucca Nitrate Concentration





# BWPC USE EXAMPLE

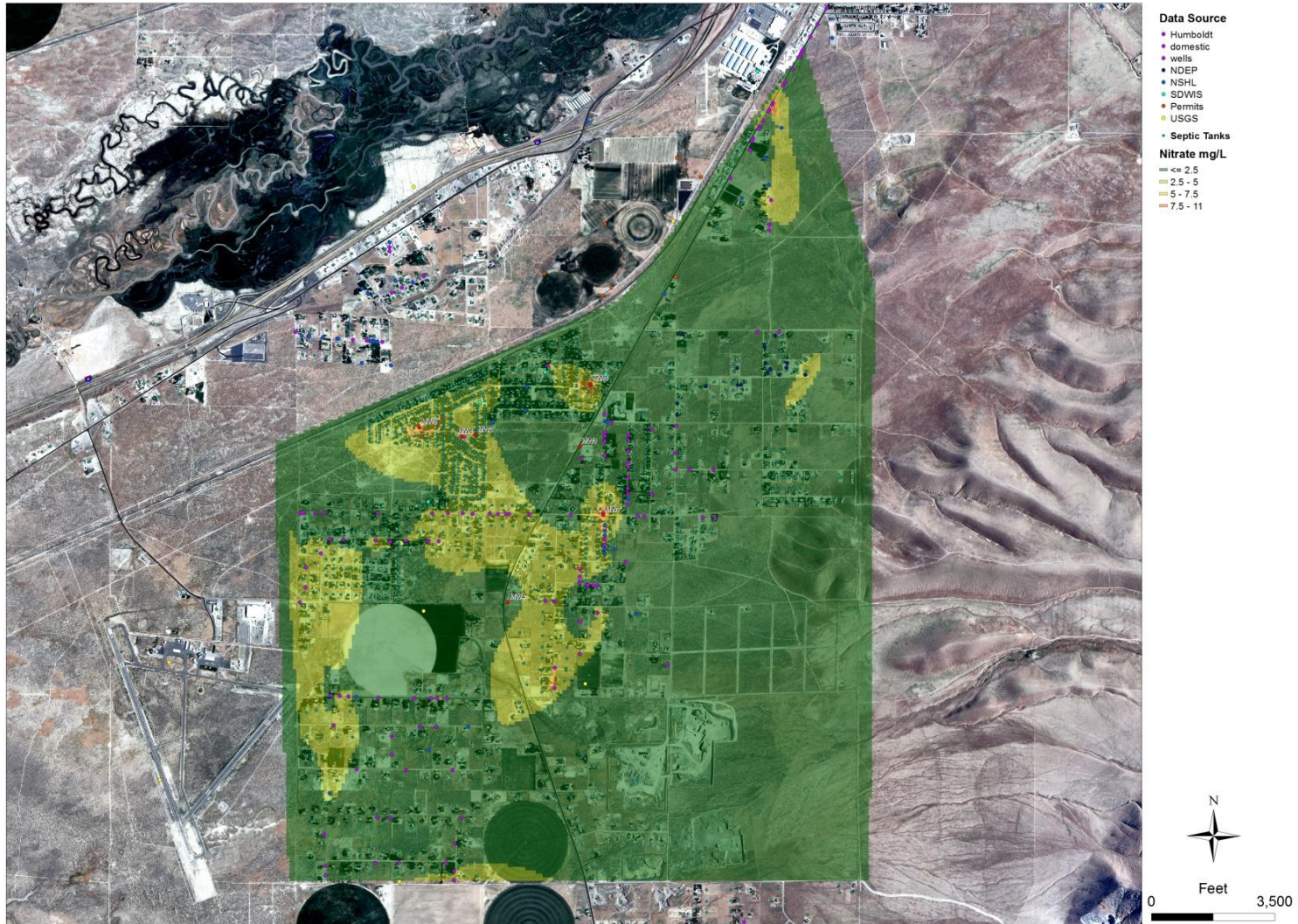
## Winnemucca Septic Density





# BWPC USE EXAMPLE

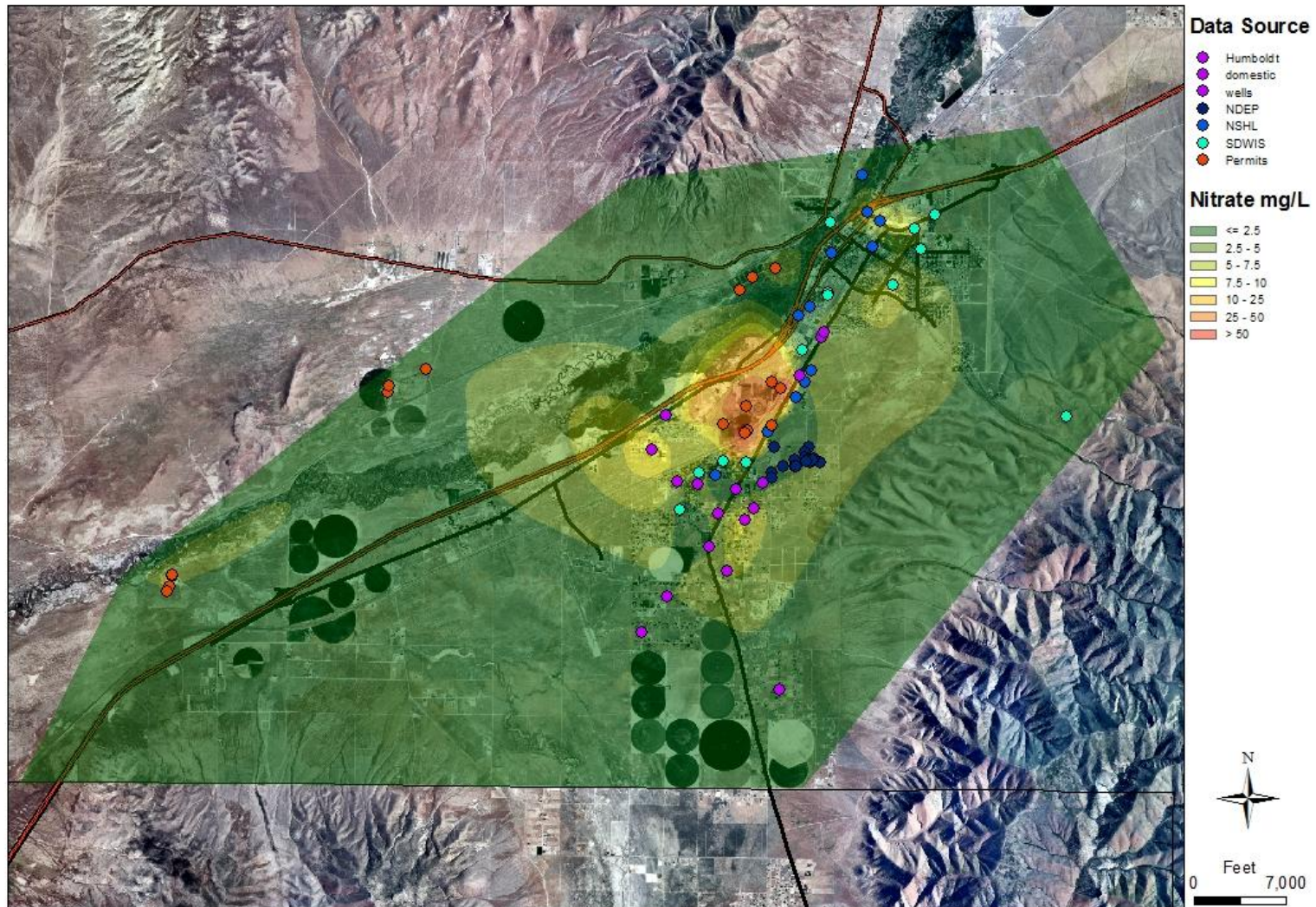
Grass Valley Nitrate Concentration





# BWPC USE EXAMPLE

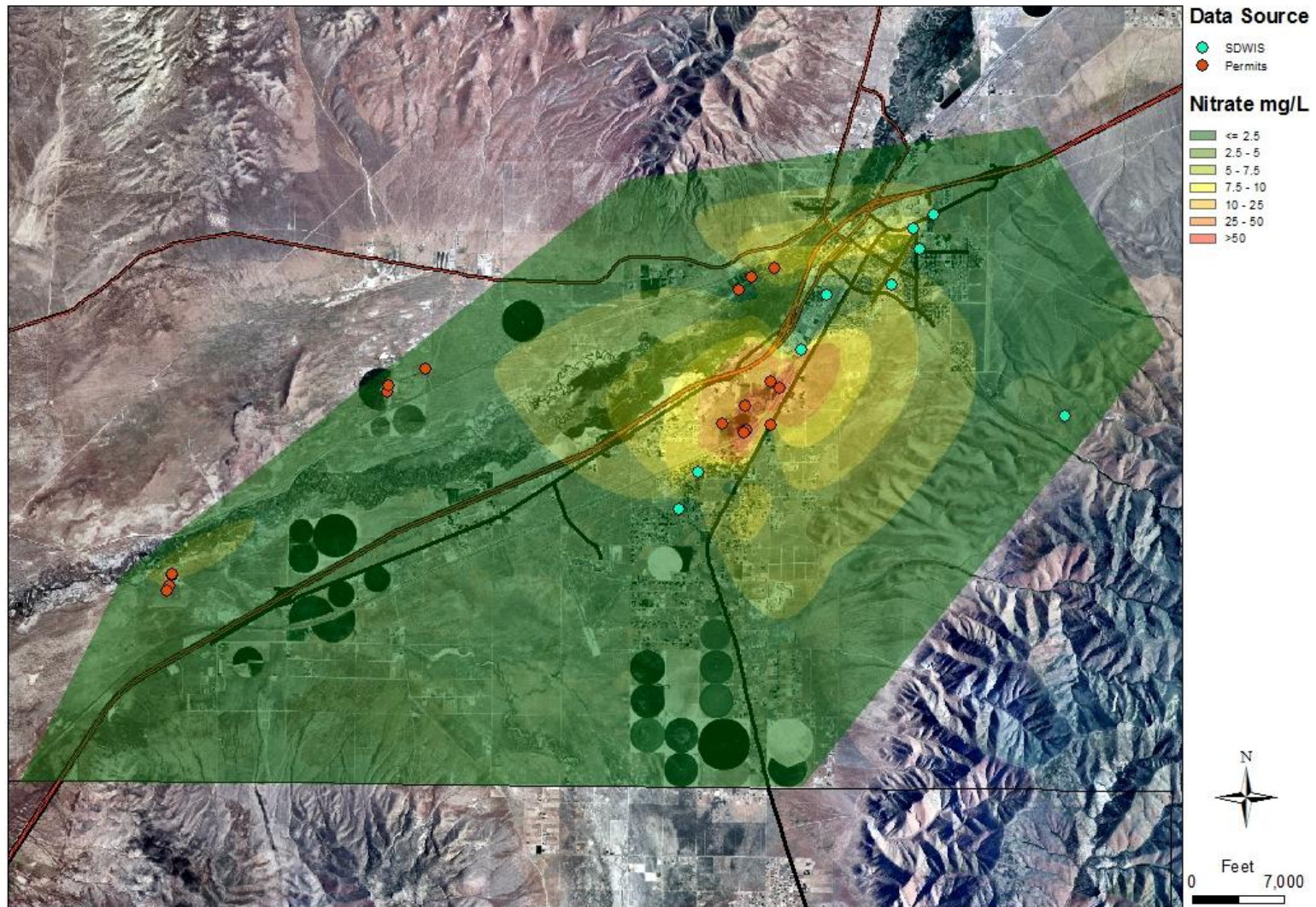
Nitrate Concentration, Data 2000 - present



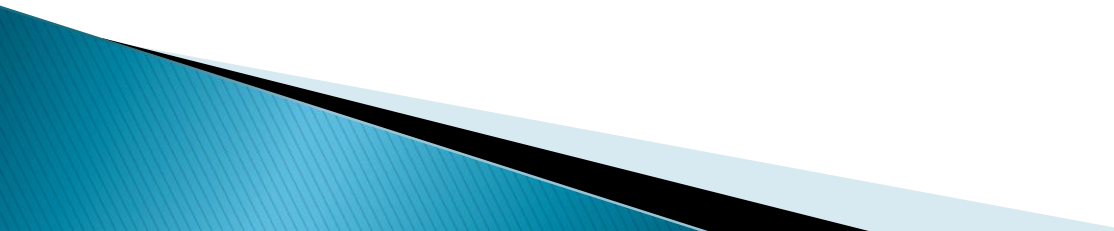


# BWPC USE EXAMPLE

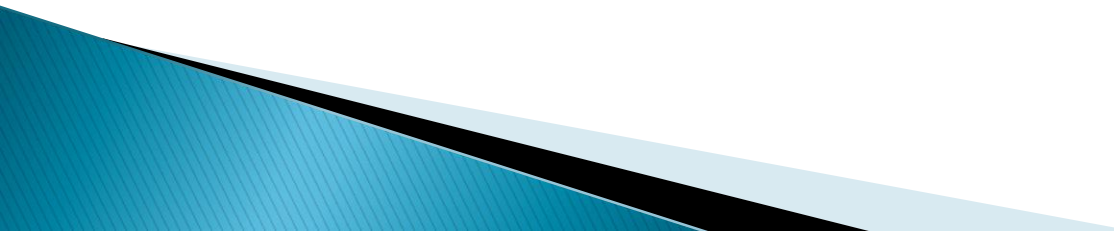
Nitrate Concentration, Last 5 Years of Data



# Continued Project Work

- ▶ Identify areas of concern and data gaps
    - Lack of recent (temporal) sampling
    - Sparse spatial sampling
  - ▶ Collect water quality samples to fill data gaps
  - ▶ Import recent data from sources
    - Automate or create an SOP for the process of future imports
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# Future Project Work

- ▶ Incorporate depth data
    - Screened depth from well logs
    - Well surface elevation
    - Arc 3-D Analyst
  - ▶ Parcel Data
    - Septic density
  - ▶ Web interface
    - Public use
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# Questions

