

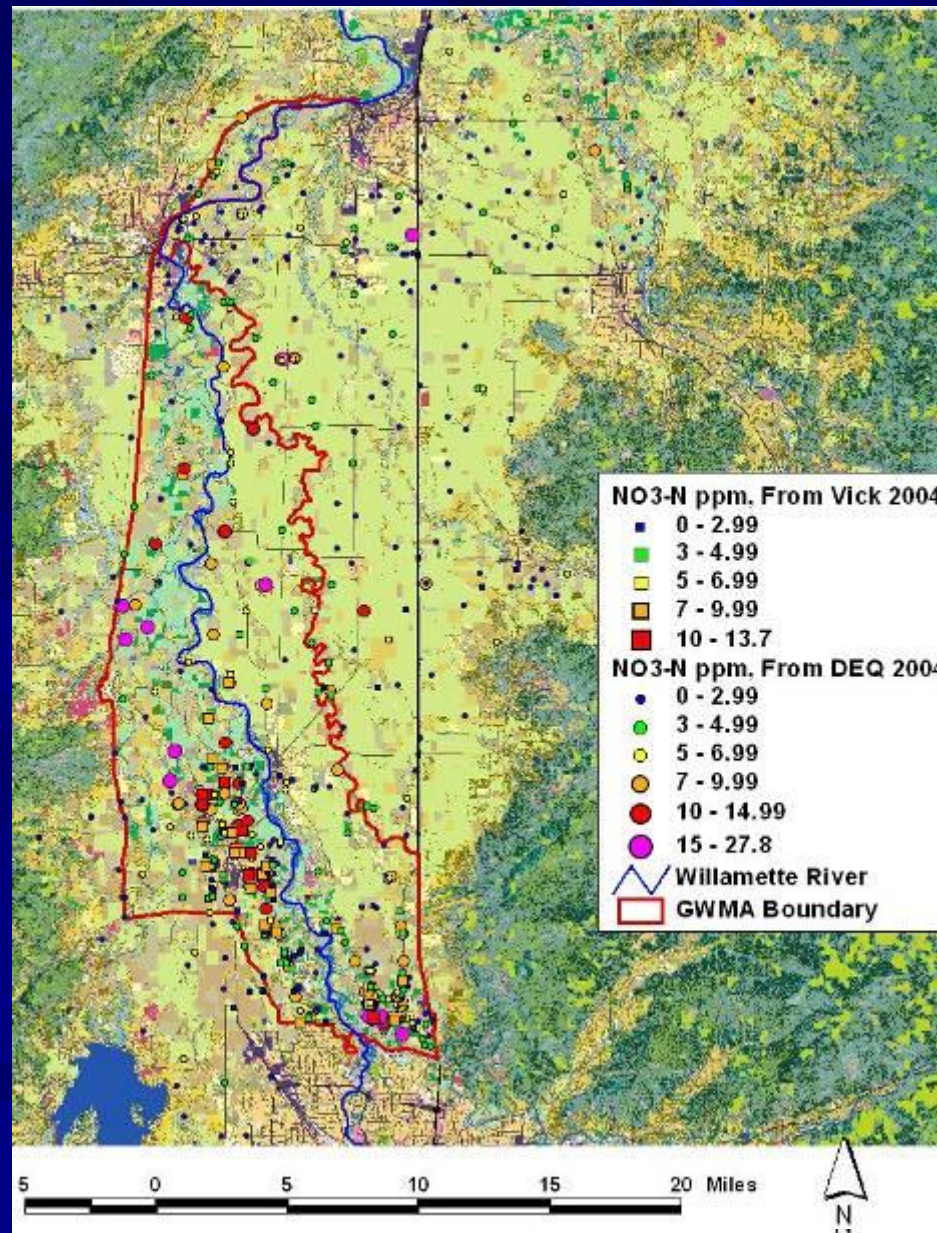
Temporal and Spatial Variability of Groundwater Nitrate in the Southern Willamette Valley, Oregon

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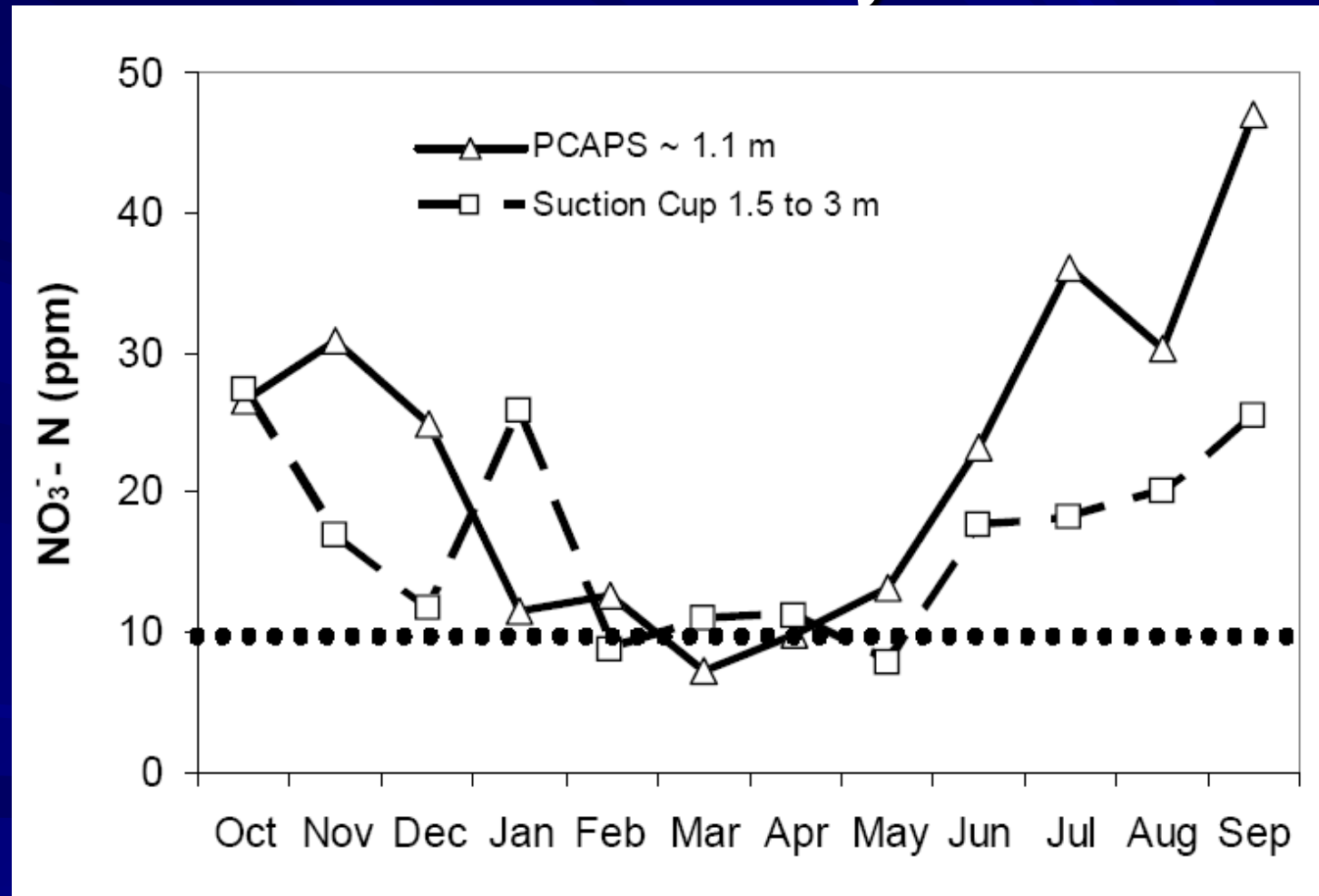
Introduction

- Refresher on the distribution of nitrate and the potential causes
- Issues of temporal variability and monitoring
- Modeling nitrate loading

Spatial Distribution of Nitrate from Previous Studies



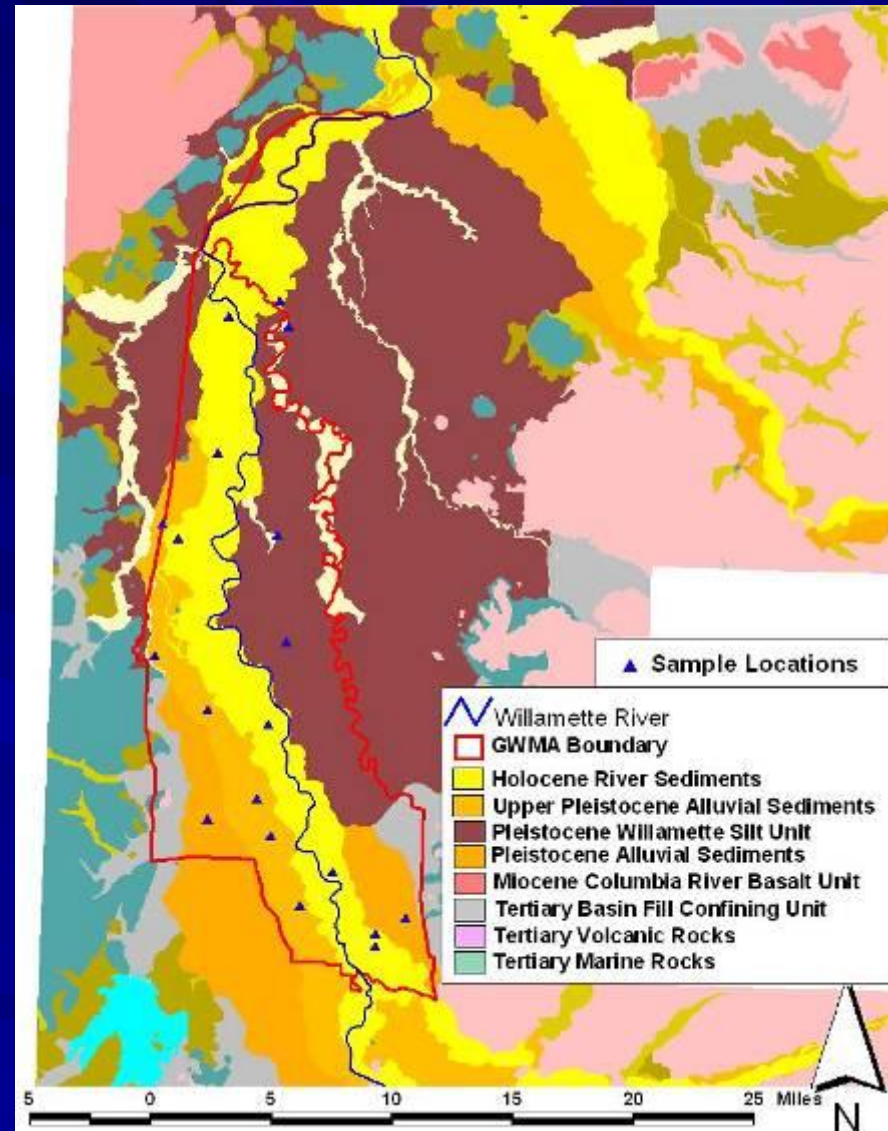
Prior Documentation of Temporal Variability



(From Faega et al., 2004)

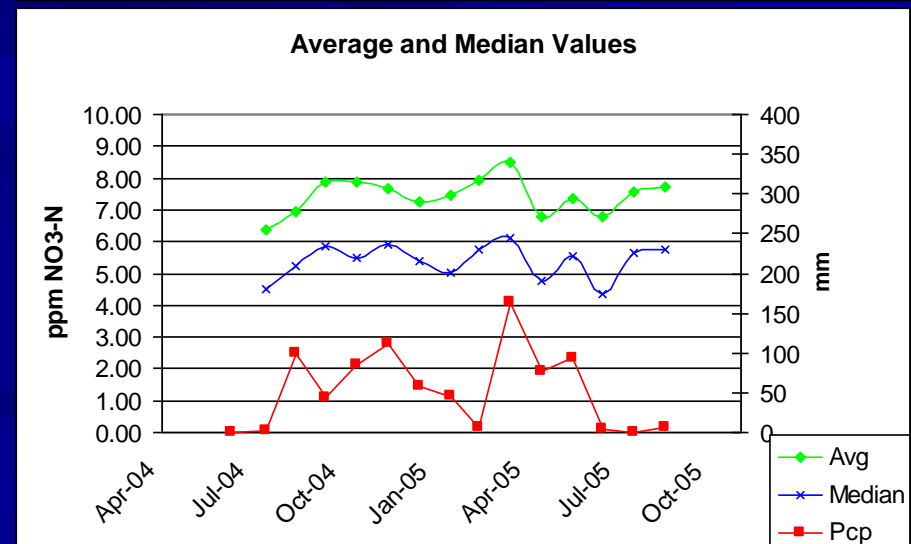
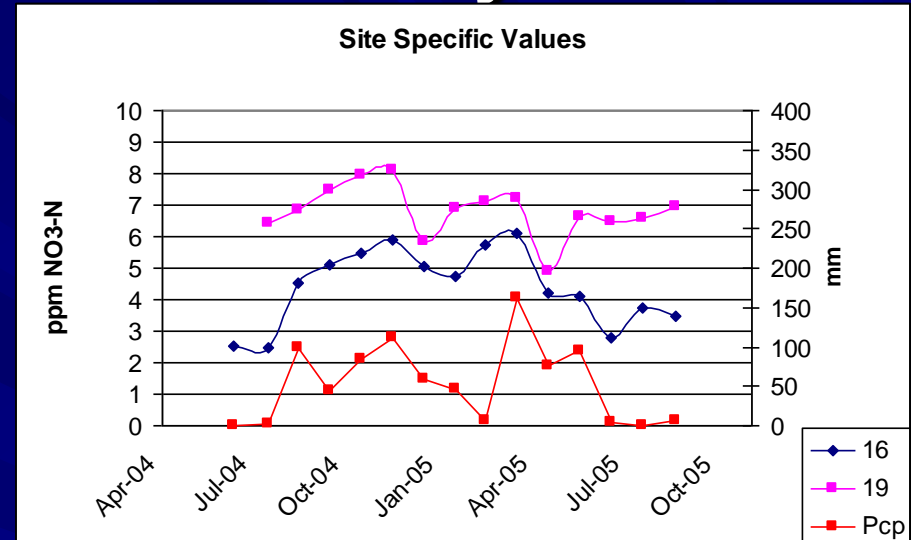
Monitoring Network

- 19 wells sampled monthly for 15 months
 - 15 residential wells
 - 4 monitoring wells

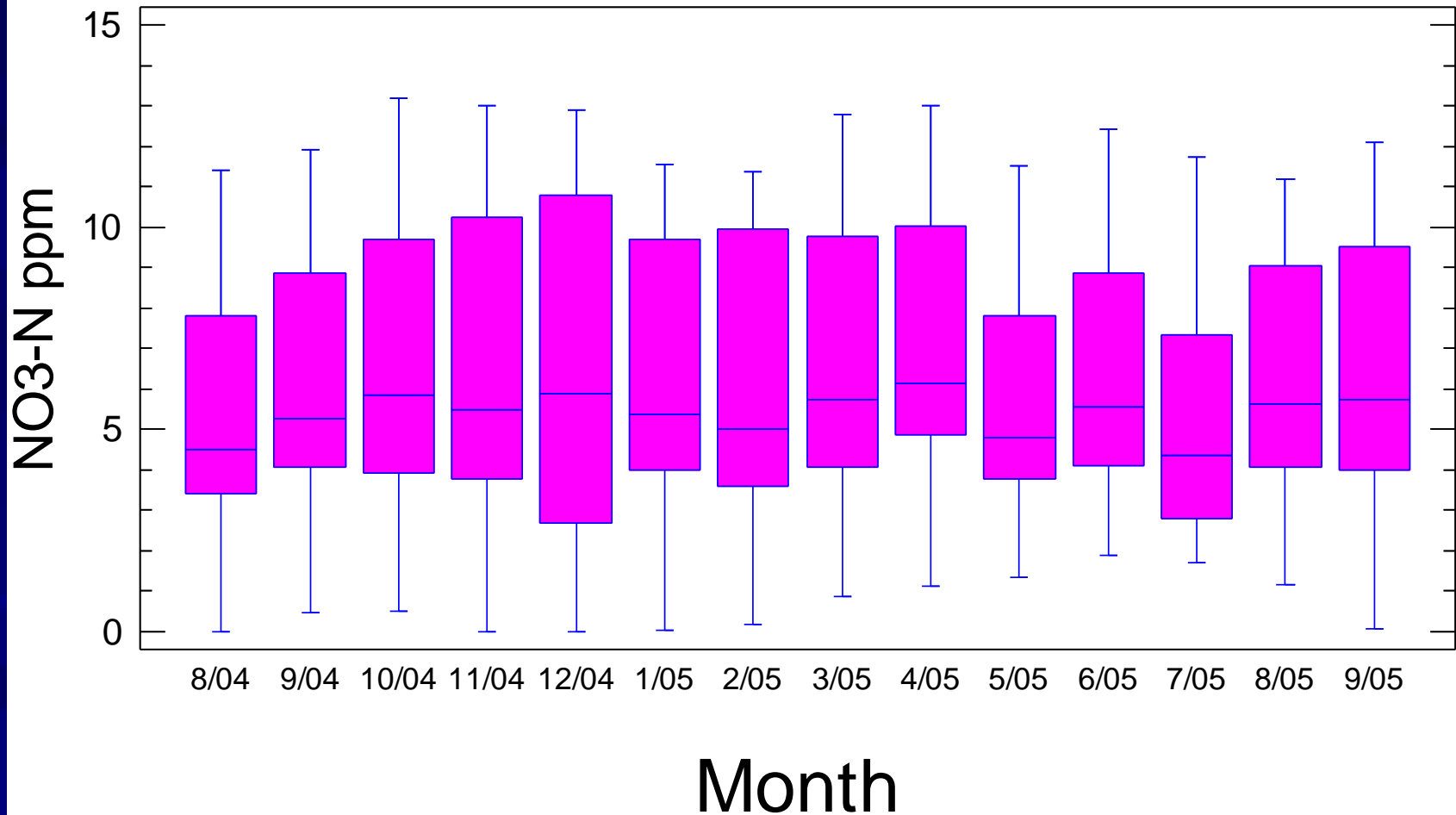


Was there Variability?

- Annual Variability could make it difficult to determine actual change in groundwater nitrate

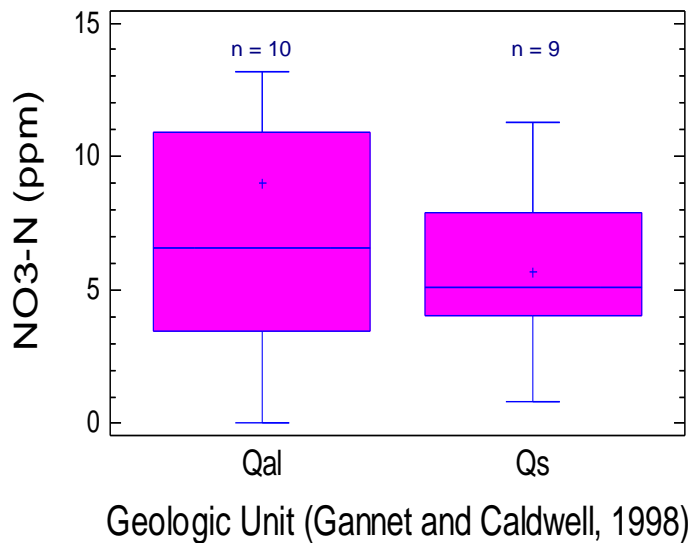


So what should sampling objectives be?

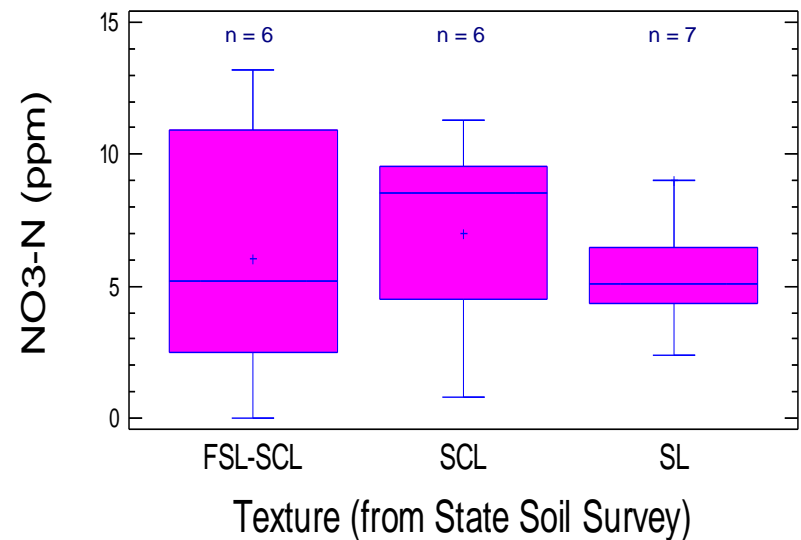


Sample Distributions Based on Geology and Soil

NO₃-N vs. Generalized Geologic Unit

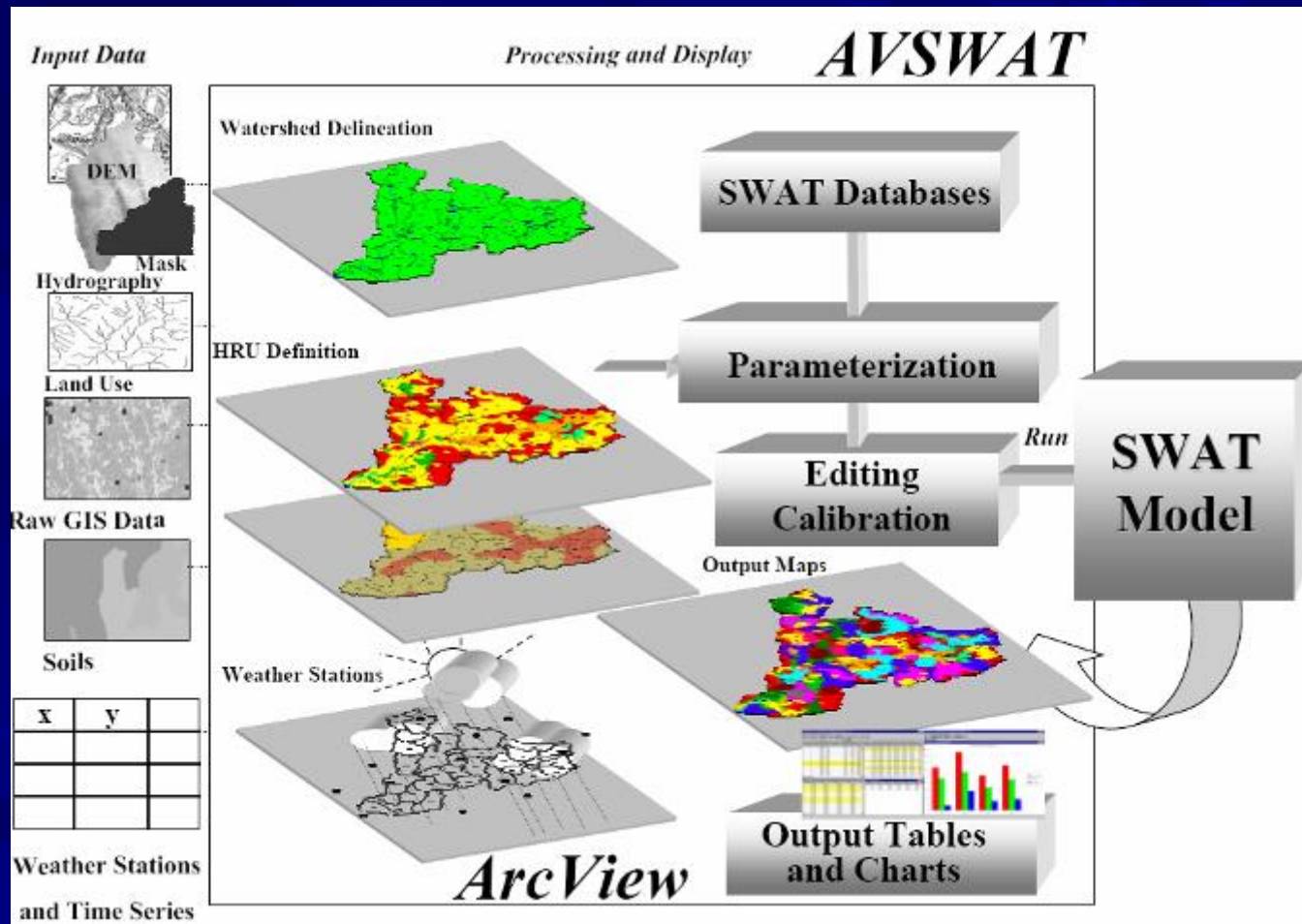


NO₃-N vs. General Soil Texture

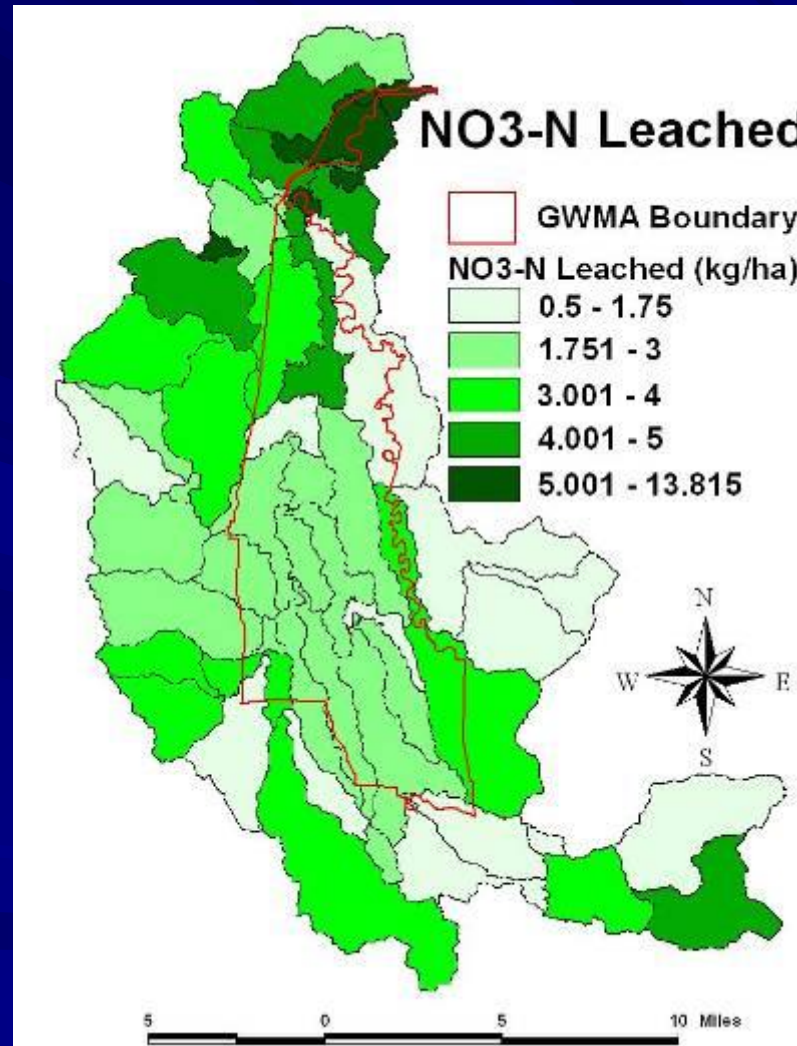


- Qal = Holocene Floodplain and Alluvial Deposits
- Qs = Pleistocene Alluvium and Flood Deposits
- FSL= Fine Sandy Loam
- SCL= Silty Clay Loam
- SL= Silt Loam

Can these Variabilities be Modeled?



Modeled Area & Pre-Calibration Results



Conclusions

- Nitrate concentrations in the Southern Willamette Valley are dynamically linked to precipitation during heavy rain months
- The recharge month with the highest annual precipitation is likely to have the highest annual groundwater NO_3^- concentration (but also the highest variability!!)
- Wells drilled in different geologic formations or soil classes are likely to exhibit different seasonal variabilities



■ *How does your study fit with the mission of the GWMA:*

- Information is imperative for creating a well-designing monitoring network

■ *What future study could help address the mission of the GWMA*

- Get a better understanding of septic tank contributions
 - Previous nitrate sourcing study was inconclusive
 - Population density (lot size and number of houses) seems higher in the “problem areas” (Junction City-River Road and Coburg)
 - Get local septic loading values vs. ag loading values
- More Benton County samples?