Earthworm Density and Soil Property Relationships in the Pacific Northwest Region

Valerie Espinoza
Dr. Johnson-Maynard
Chelsea Walsh

REACCH Regional Approaches to Climate Change – Pacific Northwest Agriculture

University of Idaho

Research Problem

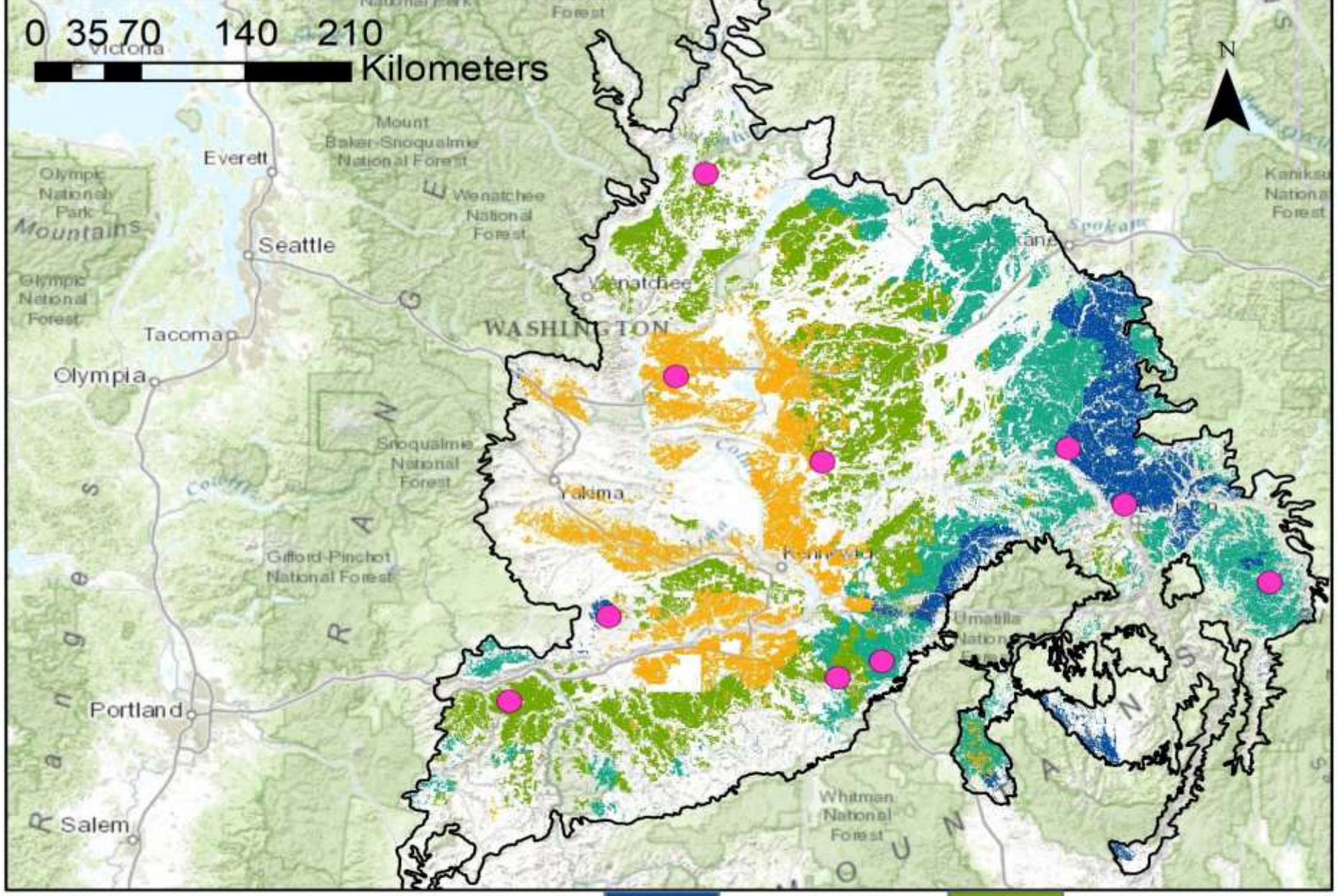
- Examine the relationship between earthworm density and soil properties.
- Understand how climate change can impact earthworm distribution.

Why?

- Earthworms are important for:
  - Soil aeration
  - Soil nutrient cycling
  - Building soil structure
  - Contributing to microbial activity
- Earthworm population and activity can be indicative of soil characteristics and climate change

Pertinent Research

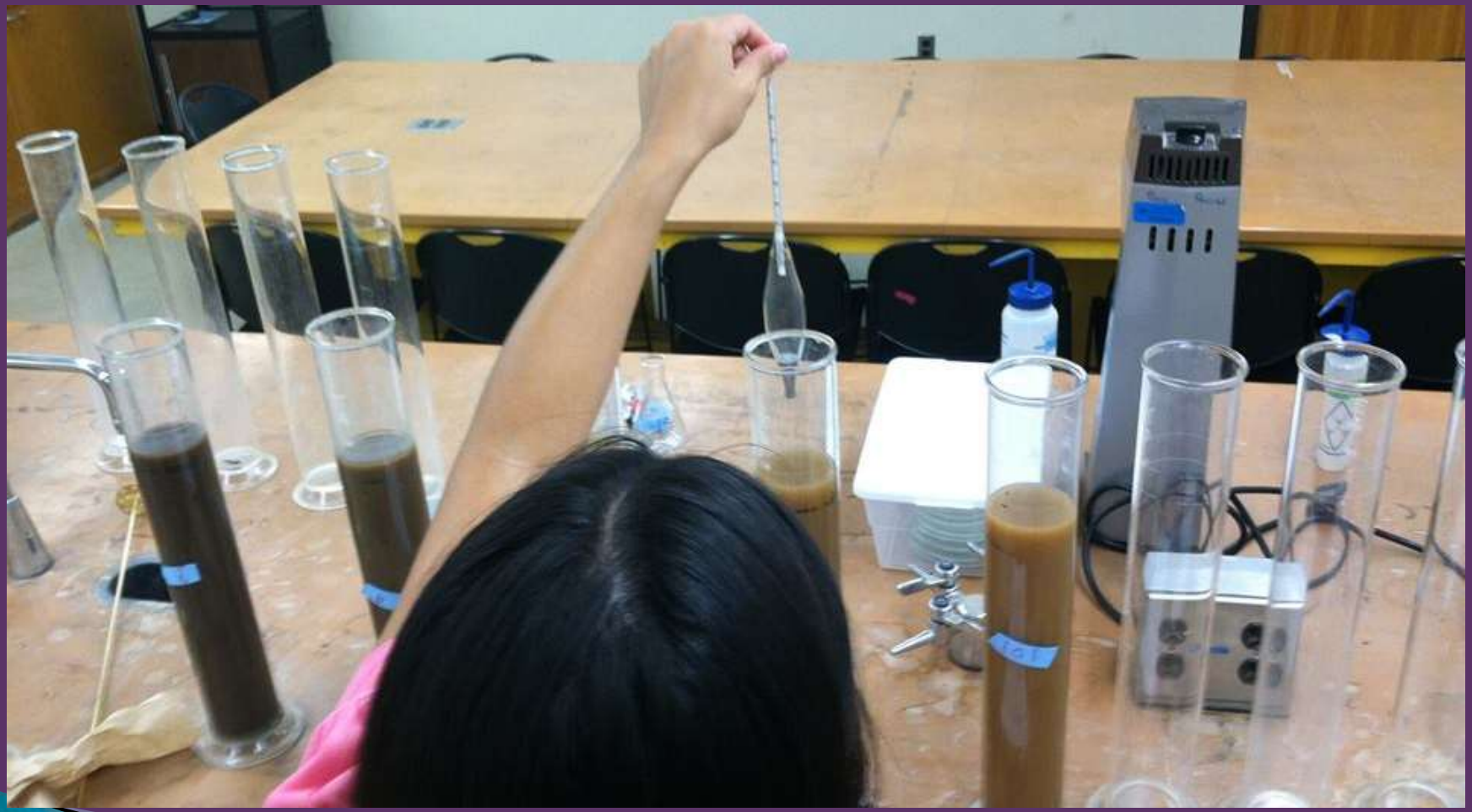
- Silt soils are more ideal than sandy soils for earthworms
- Neutral pH is ideal
  - Earthworms can tolerate soil pH 5-8
- Reduced tillage generally favors higher earthworm populations
  - Lower disturbances
  - Reduces physical injury
  - Lowers susceptibility to predation


0 35 70 140 210
Kilometers
N
Everett
Seattle
Tacoma
Olympia
Portland
Salem
Victoria
Mount Baker-Snoqualmie National Forest
Wenatchee National Forest
Olympic National Park
Olympic National Forest
Mountains
WASHINGTON
Wenatchee
Yakima
Kennewick
Snoqualmie National Forest
Gifford-Pinchot National Forest
Whitman National Forest
Spokane
Sample Sites
Annual
Crop-Fallow
Wheat Production Area
Transition
Irrigated

Methods

- Lab methods:
  - Soil texture determination (Hydrometer method)
  - Soil pH (1:1)
- Statistical Methods:
  - Spearman Rank-Order Correlation

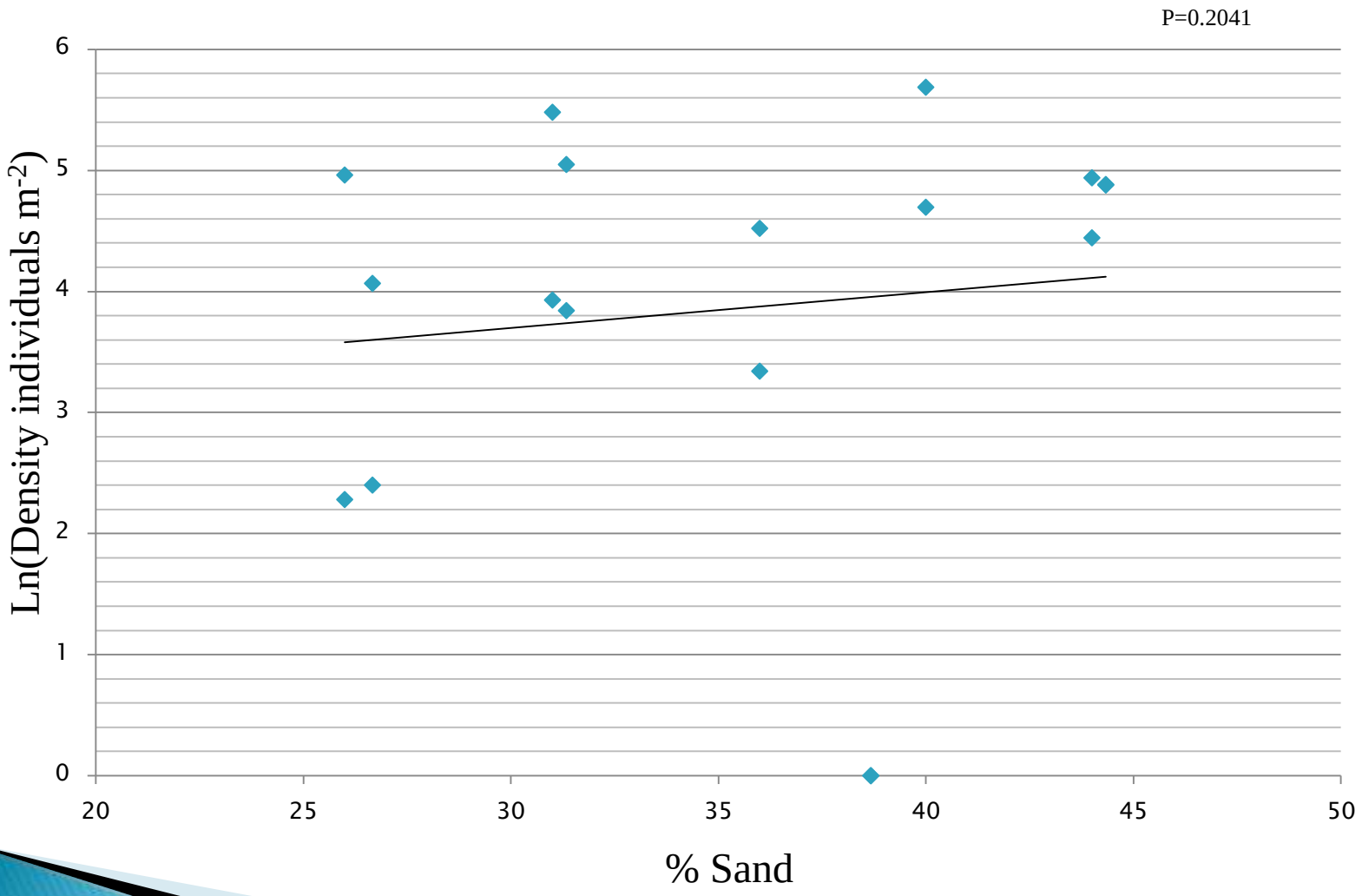
Particle Size Analysis (PSA)



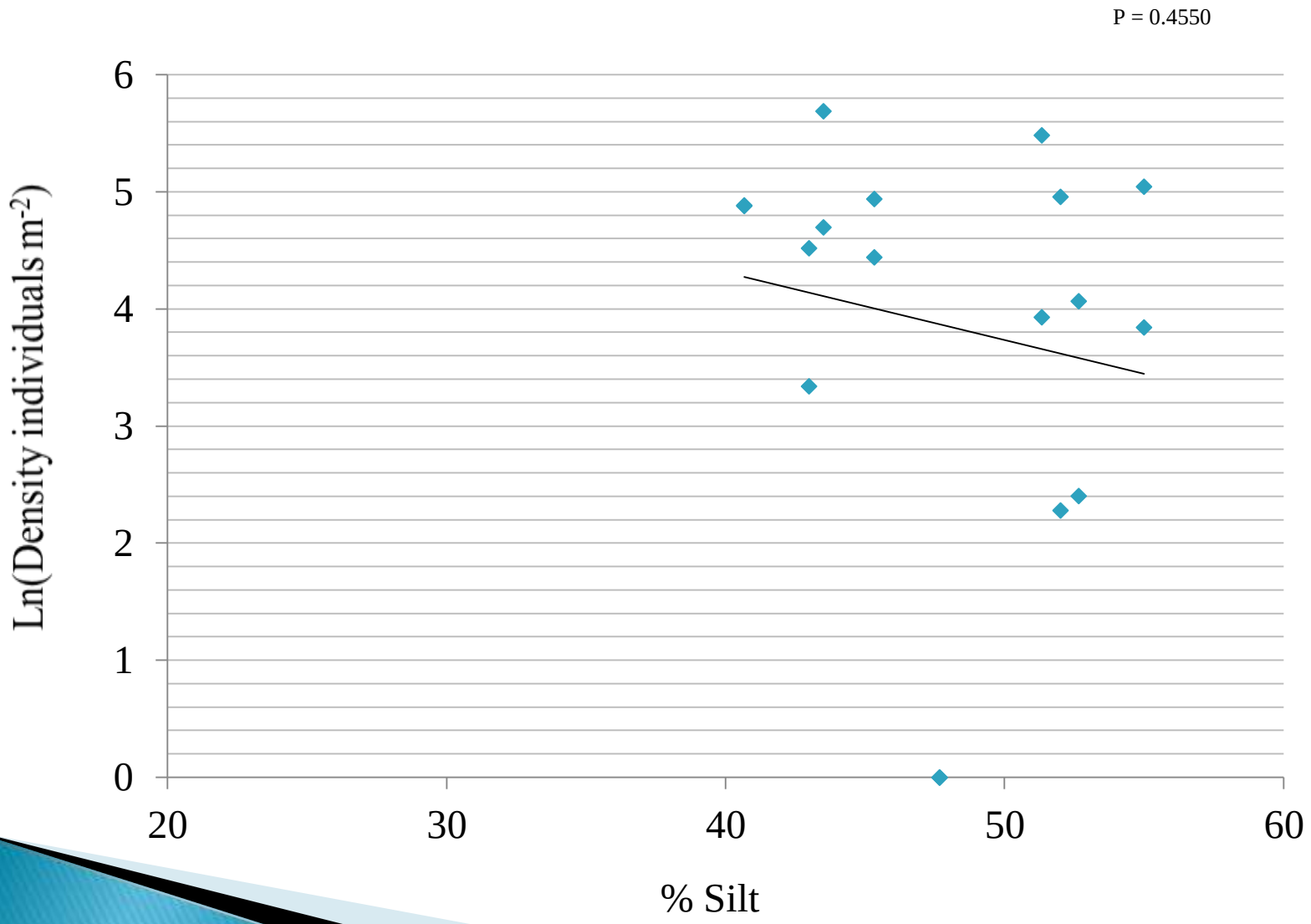
Research Questions

- How does soil texture and pH relate to earthworm density across agro-ecological zones?
- What are the differences in agro-ecological zone earthworm density, and soil properties?

Earthworm Density vs. % Sand



Earthworm Density vs. %Silt



Earthworm Density vs. %Clay

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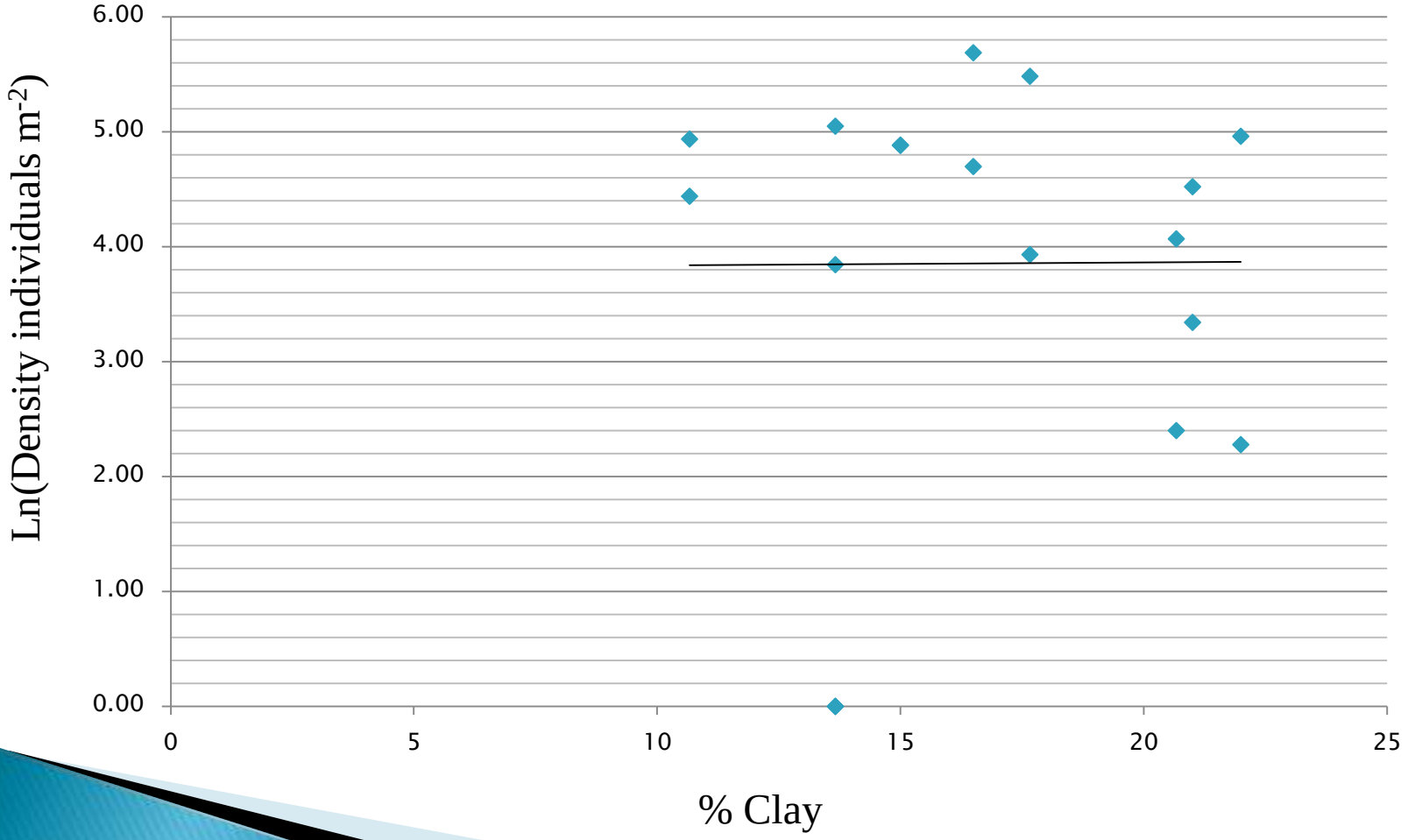
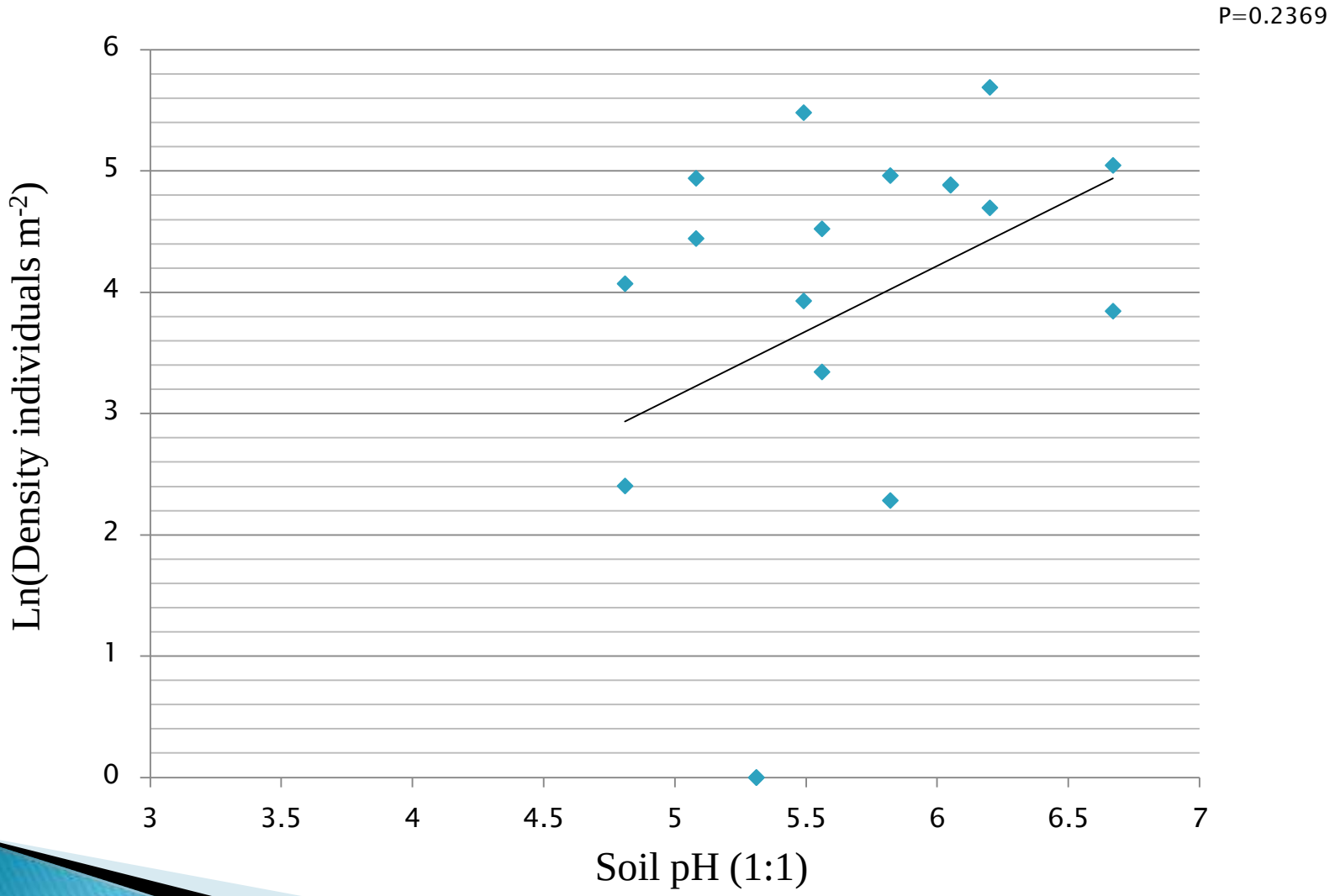
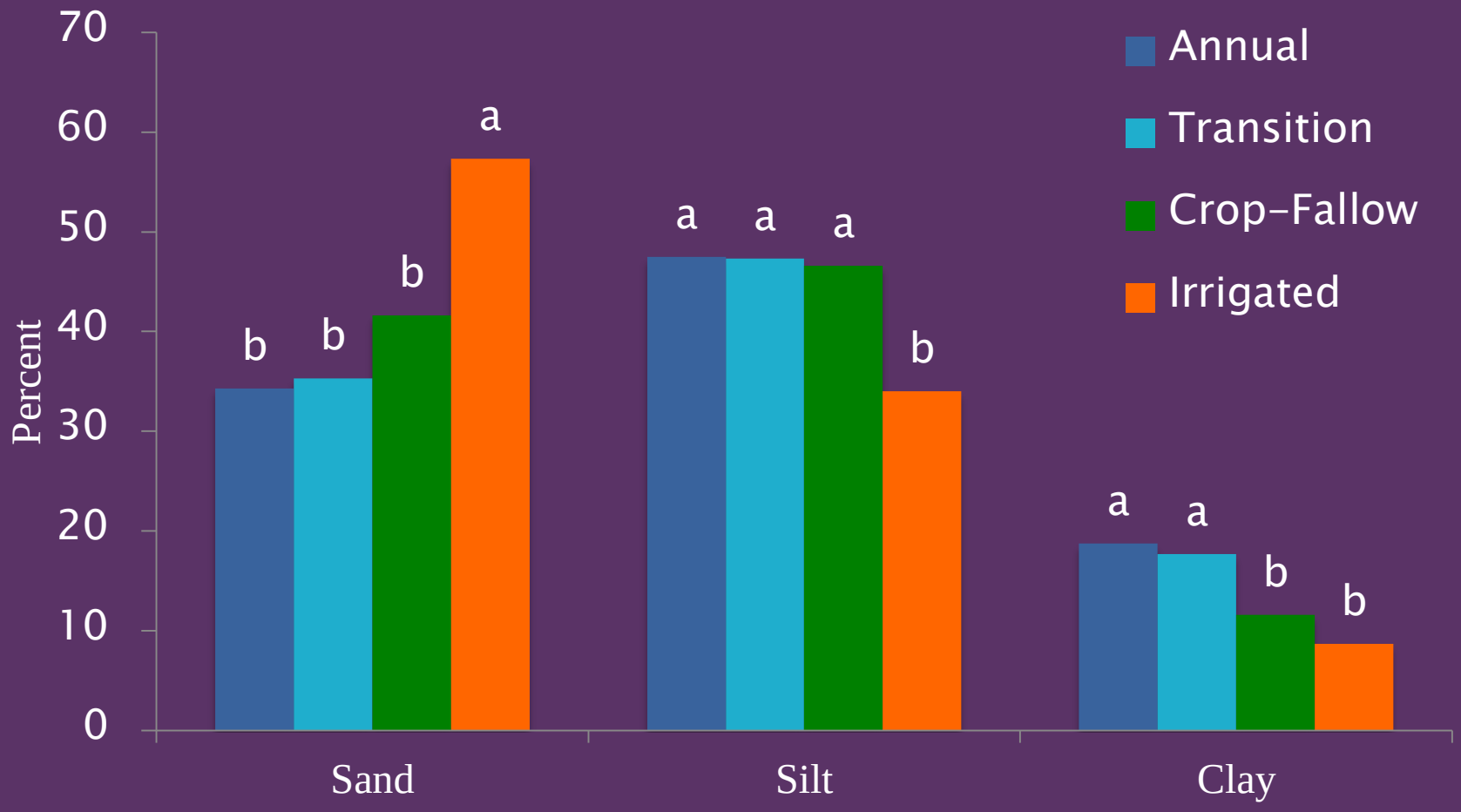


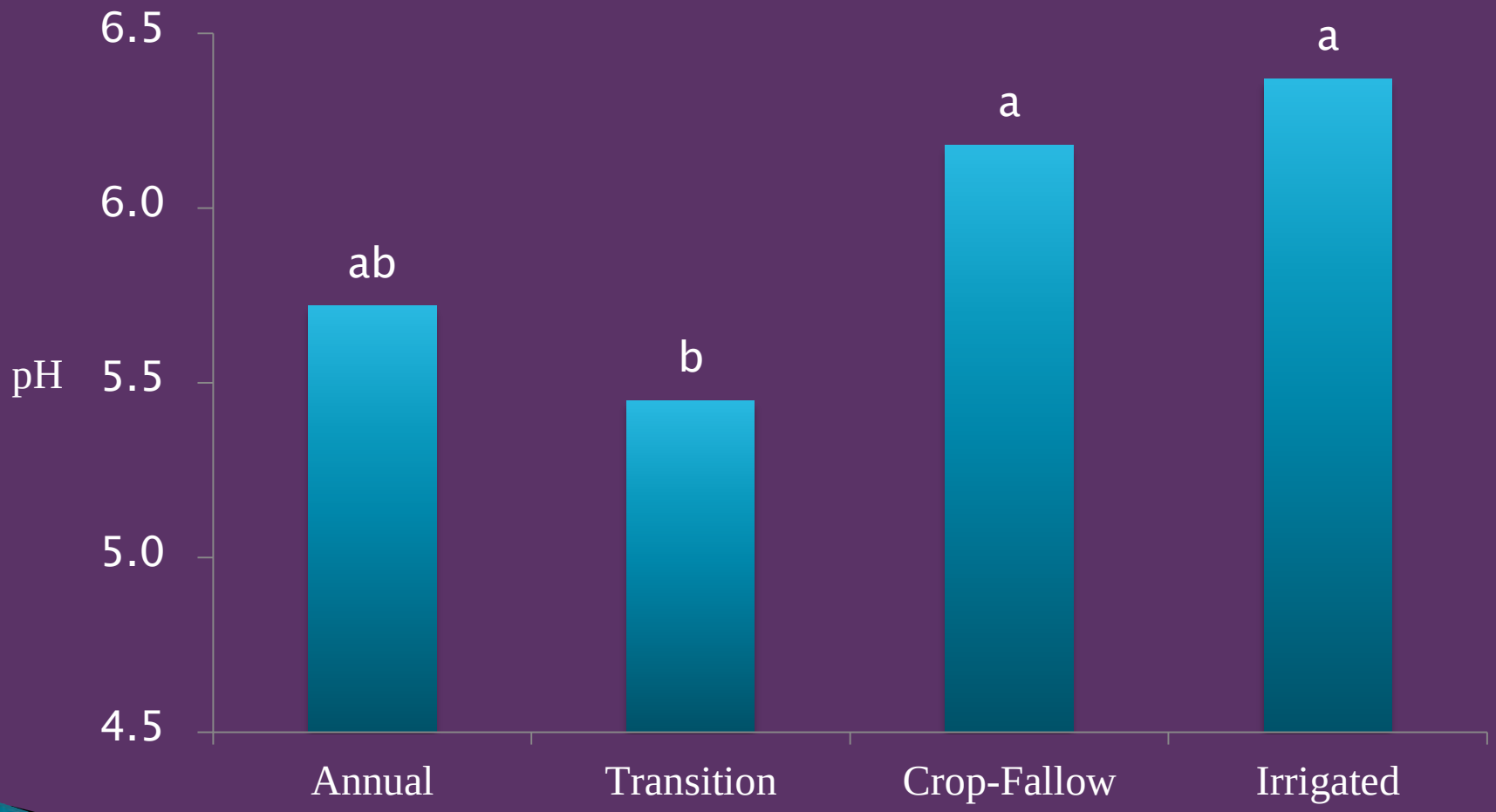
Earthworm Density vs. pH



Soil Texture by Zone



pH by Zone


6.5
6.0
5.5
5.0
4.5
pH
ab
b
a
a
Annual
Transition
Crop-Fallow
Irrigated

Conclusion

- Significant differences between zones for soil texture and pH.
- No correlation between earthworm density with soil properties.
- Other factors such as tillage, cropping systems, and climate can have greater impacts on earthworm density than soil texture and pH.

Ethical Considerations

- Sampling earthworm populations causes some ethical considerations
  - Taking earthworms from environment and euthanizing for species identification.

Acknowledgements

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USDA | NIFA

Questions?