



Refining Abiotic-Biotic Relationships in Wet Meadows

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What are Wet Meadows?

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- Exist along a gradient between lowland prairies and shallow marshes



What are Wet Meadows?

Key features:

- High water tables
- Poor drainages
- Nutrient-rich soils
- Carex dominated vegetation communities
- Fed by flow through subterranean gravel deposits

Ecosystem Services of Wet Meadows

- Nutrient removal
- Nutrient transformation
- Flood mitigation
- Groundwater discharge or recharge
- Foraging habitat
- Stopover habitat



The background image shows a vast wet meadow. In the foreground, there is a dense field of tall, green grass with some yellowish-brown seed heads. Beyond this, a body of water reflects the sky, which is filled with soft, white and grey clouds. The horizon is visible in the distance with some trees and a fence line.

Whooping Cranes- macroinvertebrate food source

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- Belowground macroinvertebrates only comprise $\sim 5\text{-}10\%$ their diets.



History of the CPRV

- Anthropogenic influence on the Platte River: Dams, diversions, chemical inputs, etc...
 - 70% decrease in annual flow and peak flow
- River has shifted from a wide, braided river channel with few trees to a narrow, multi-channel river dominated by trees
- Wet Meadows- declined by 75-80% over the last century in the area

A photograph of a grassy field with a fence. A person in a blue shirt is standing in the background. The field is filled with tall grass and some purple flowers. A fence line runs across the middle of the image. There are some black bags or equipment lying on the ground in the foreground.

Historic Restoration Efforts

- Restoration efforts have been conducted in the area for >40 years
 - Federal, state, private

A photograph of a grassy field with a fence line. A person in a blue shirt is visible in the background. The image is used as a background for the slide.

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- Recontouring land to mimic sloughs

A photograph of a field with tall green grass and a fence line. A person in a blue shirt is visible in the background. An orange rectangular graphic is in the top left corner.

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- Current management includes haying and grazing
 - Burns conducted on surrounding prairie

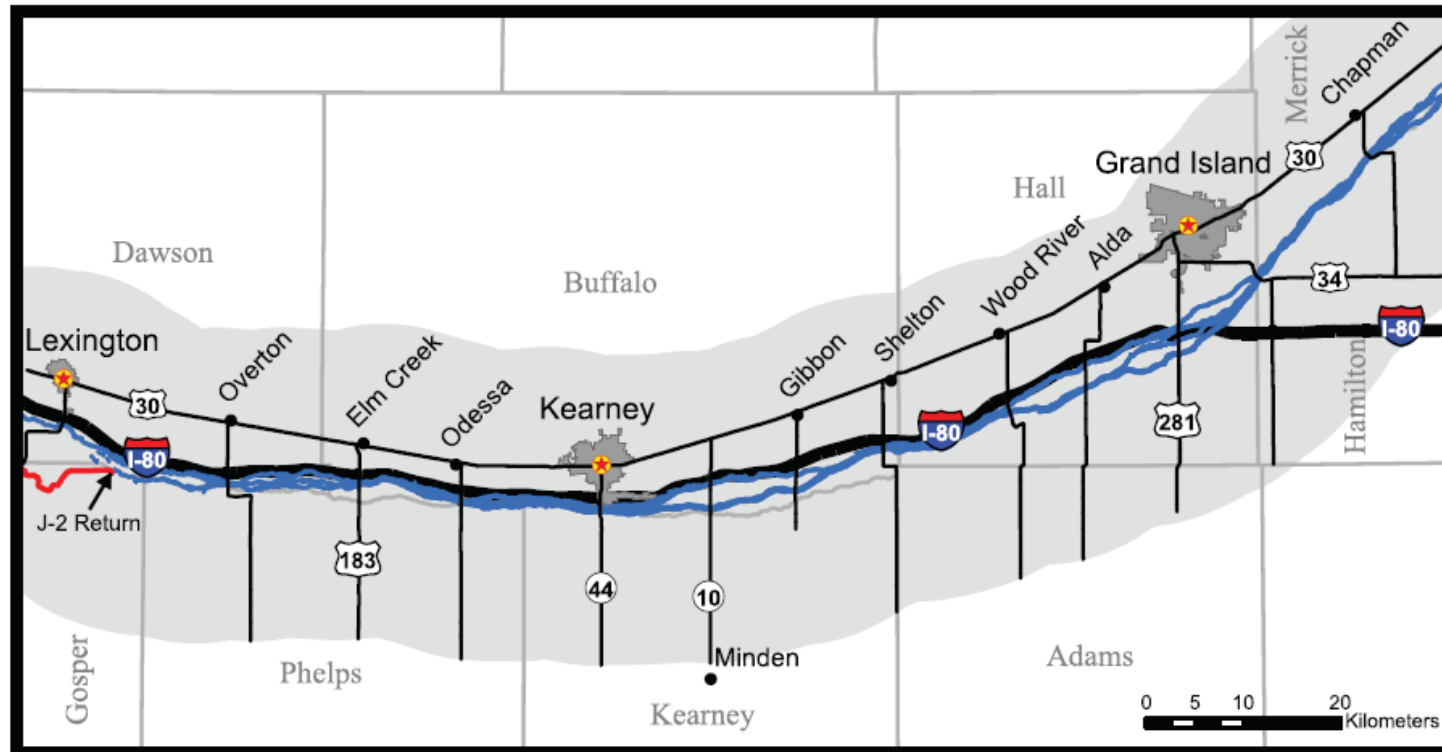
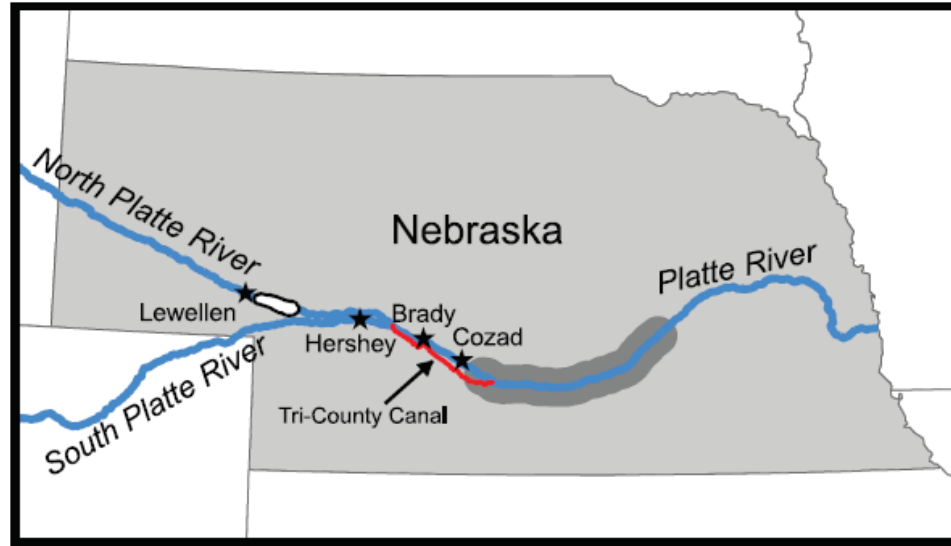
Objectives

- Refine relationships between belowground macroinvertebrates and abiotic ecosystem factors
- Relate belowground macroinvertebrate communities to wet meadow condition and functionality
- Update our knowledge of invertebrates in relict and restored wet meadow systems



Why Macroinvertebrates?

- Commonly used as bioindicators
- Critical in the movement and processing of nutrients





Methods



Data Collected at each site

- Coordinates
- Belowground macroinvertebrate samples
- Soil Moisture
- Bulk density
- Root density
- Depth to water



Data Collected at each site

- Soil Organic Matter- Field testing
- Soil samples sent to Soil testing lab for: Organic matter, Total nutrients, NH_4 , Texture
- Vegetative community data
 - FQI
 - WIS




Results

A man wearing a blue t-shirt, light-colored pants, and a baseball cap stands in a field of tall, golden-brown grass. In the background, there is a dense line of green trees under a clear blue sky. A semi-transparent white box is overlaid on the lower half of the image, containing text.

Invertebrate Community Summary

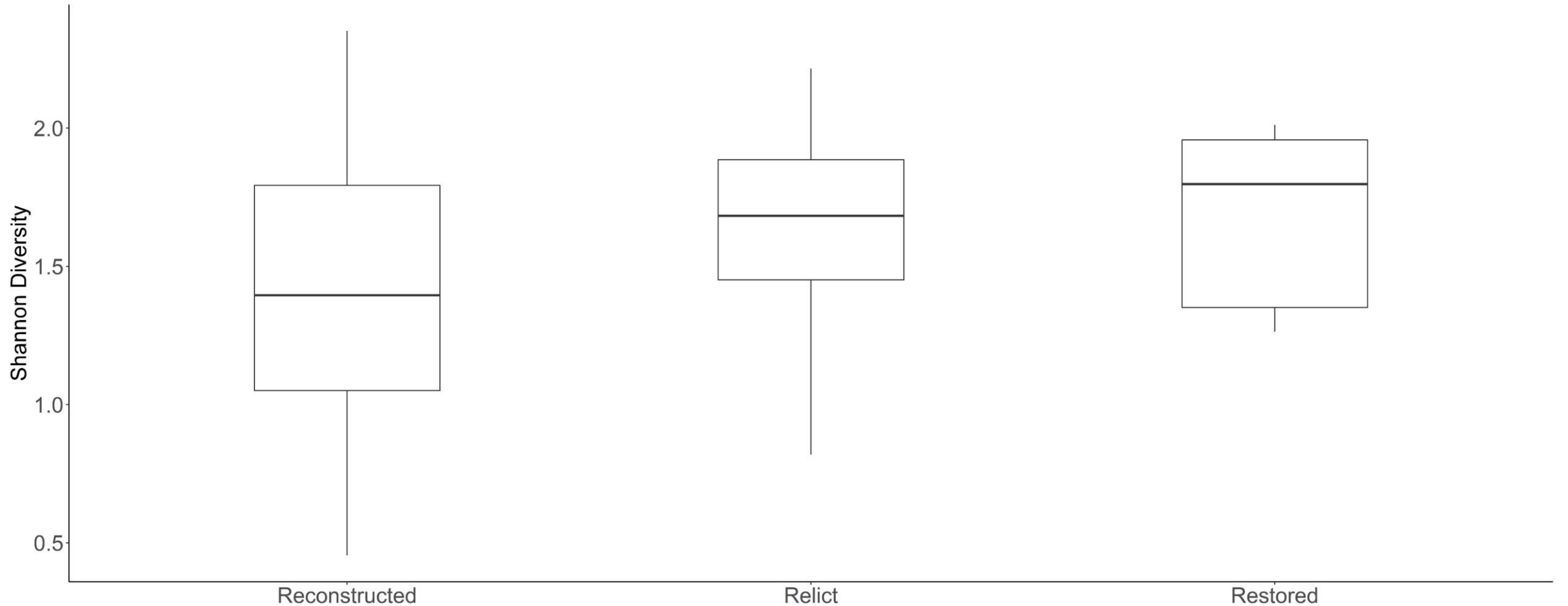
- 58 unique invertebrate taxa so far
 - ID at least to Family
- 3 most common taxa: Aporectodea, Diplocardia, Armadillidiidae

A photograph of a grassy field under a cloudy sky. A person is standing in the middle ground, holding a long pole. A white pickup truck is parked in the background. A yellow measuring tape is stretched across the foreground grass.

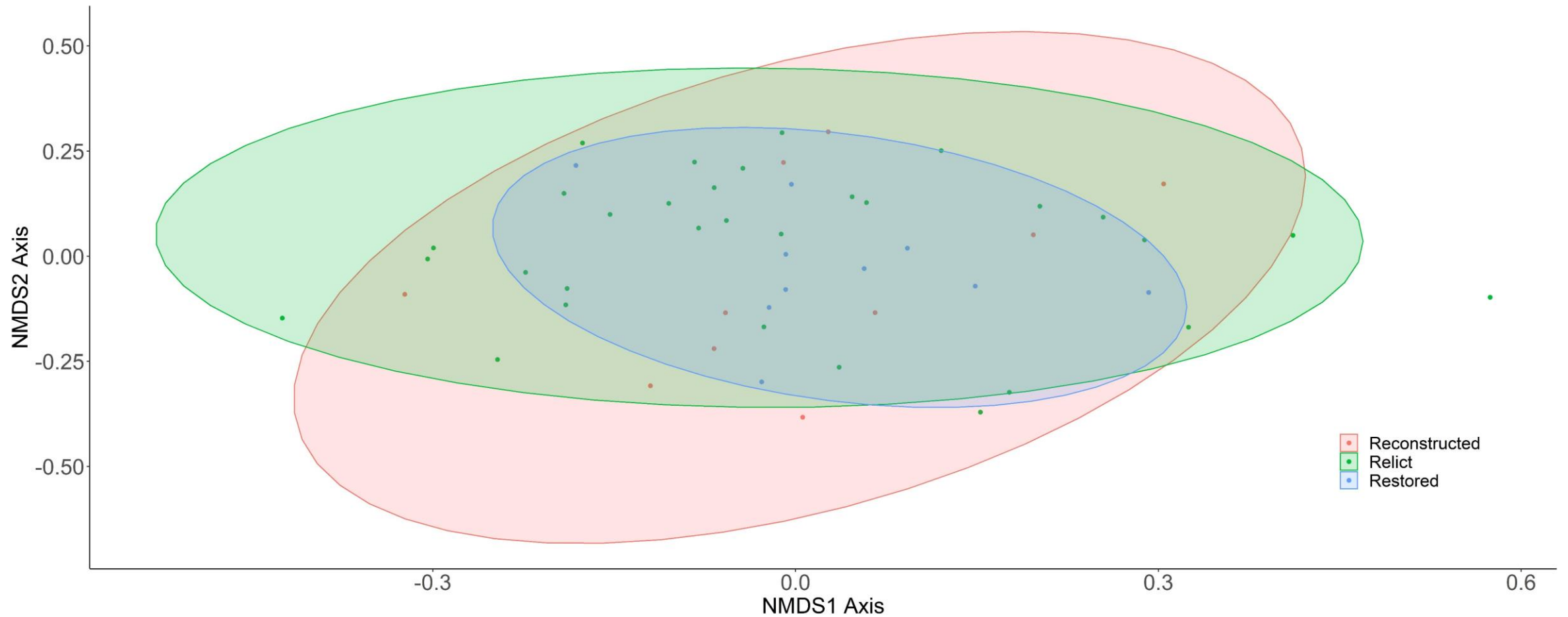
Invertebrate Community

- How does the entire belowground macroinvertebrate community look across treatments?

Belowground Macroinvertebrate Community Diversity



Belowground Macroinvertebrate Community Similarity

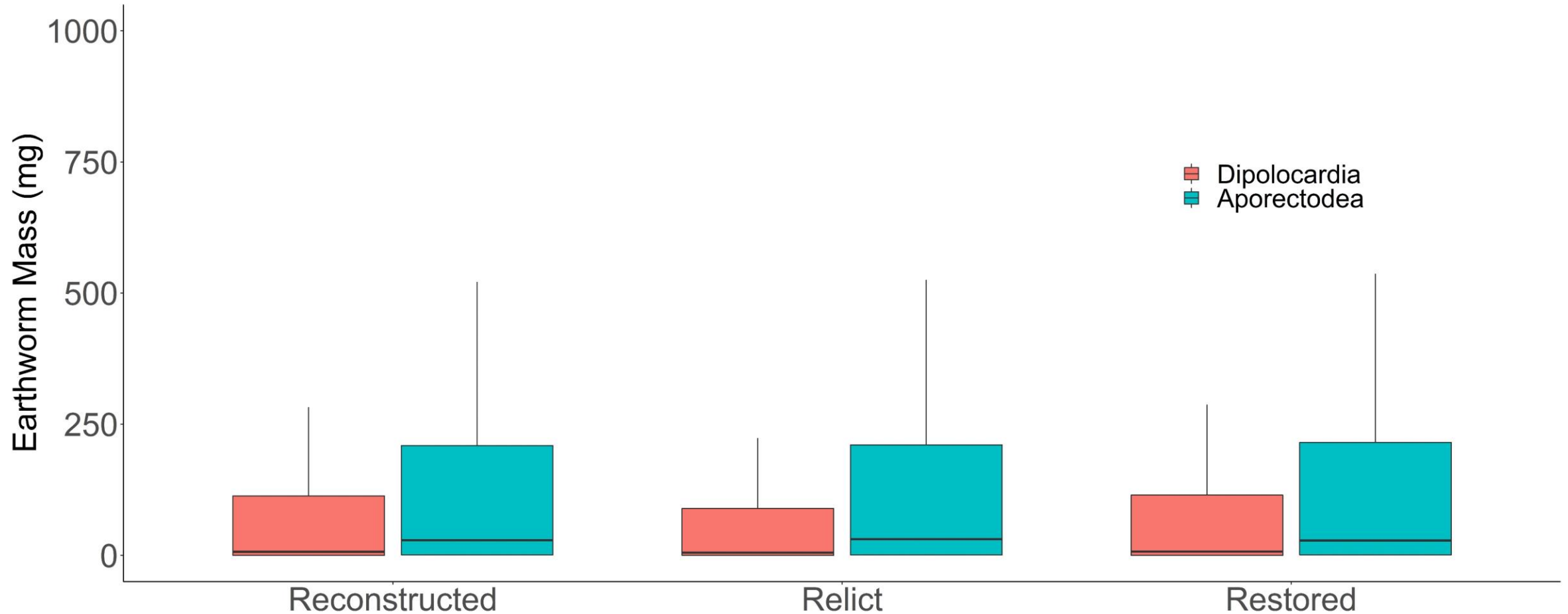


A photograph of a grassy field with a fence. A person wearing a blue shirt and a hat is standing in the field. In the foreground, there is a black bag and a shovel. The sky is cloudy.

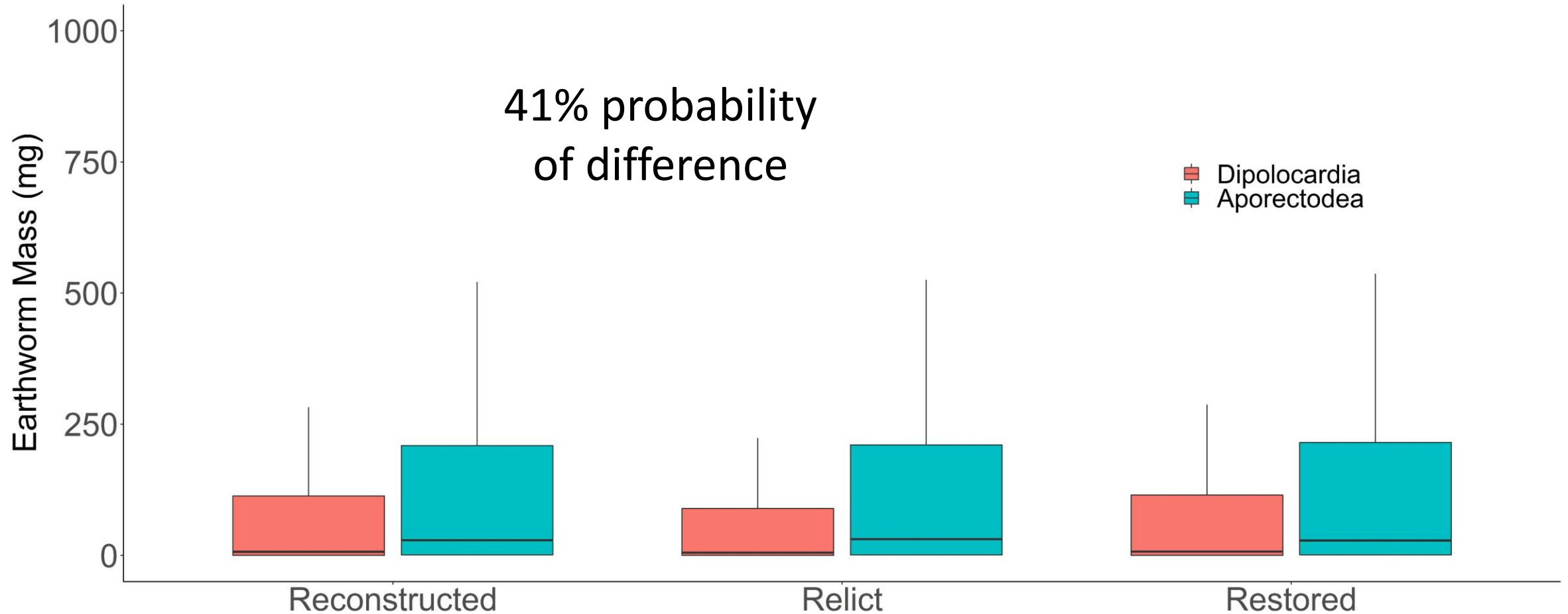
Invertebrate Community Summary- Earthworms

- Apporectodea: 558
- Diplocardia: 452
- Juveniles: 346

Earthworm Community Analysis



Earthworm Community Analysis

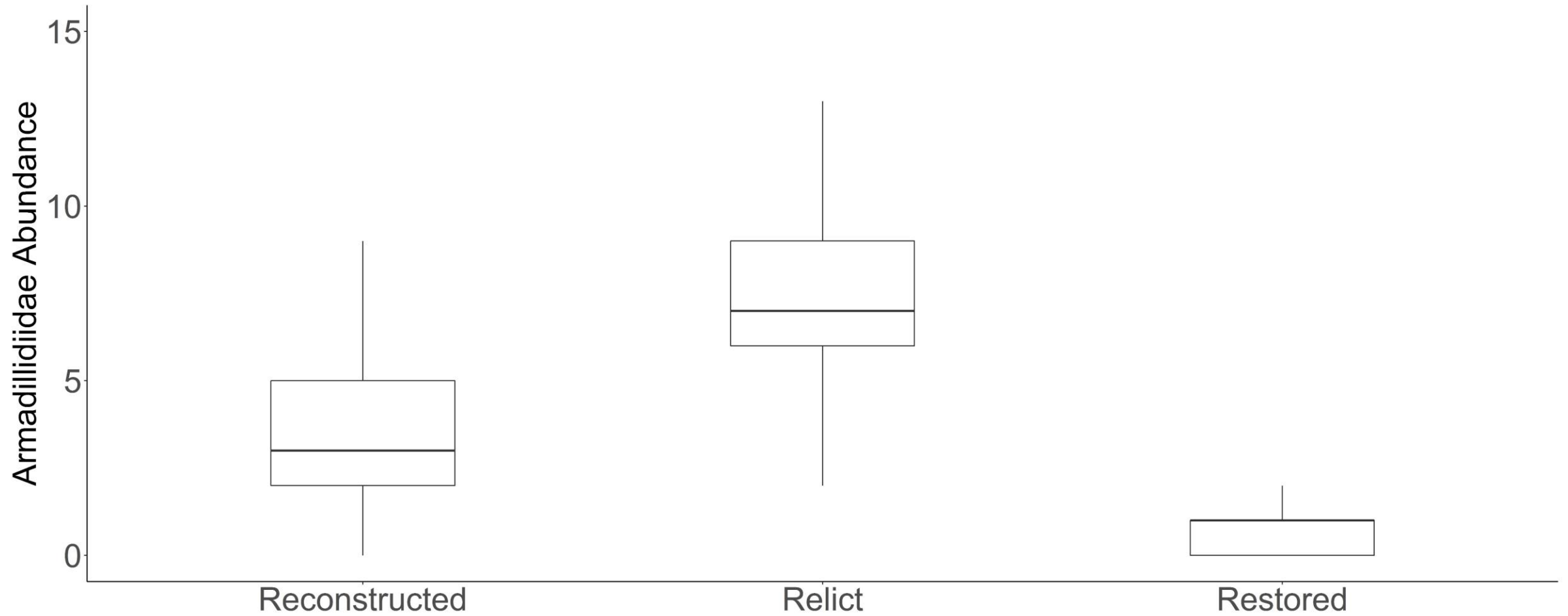




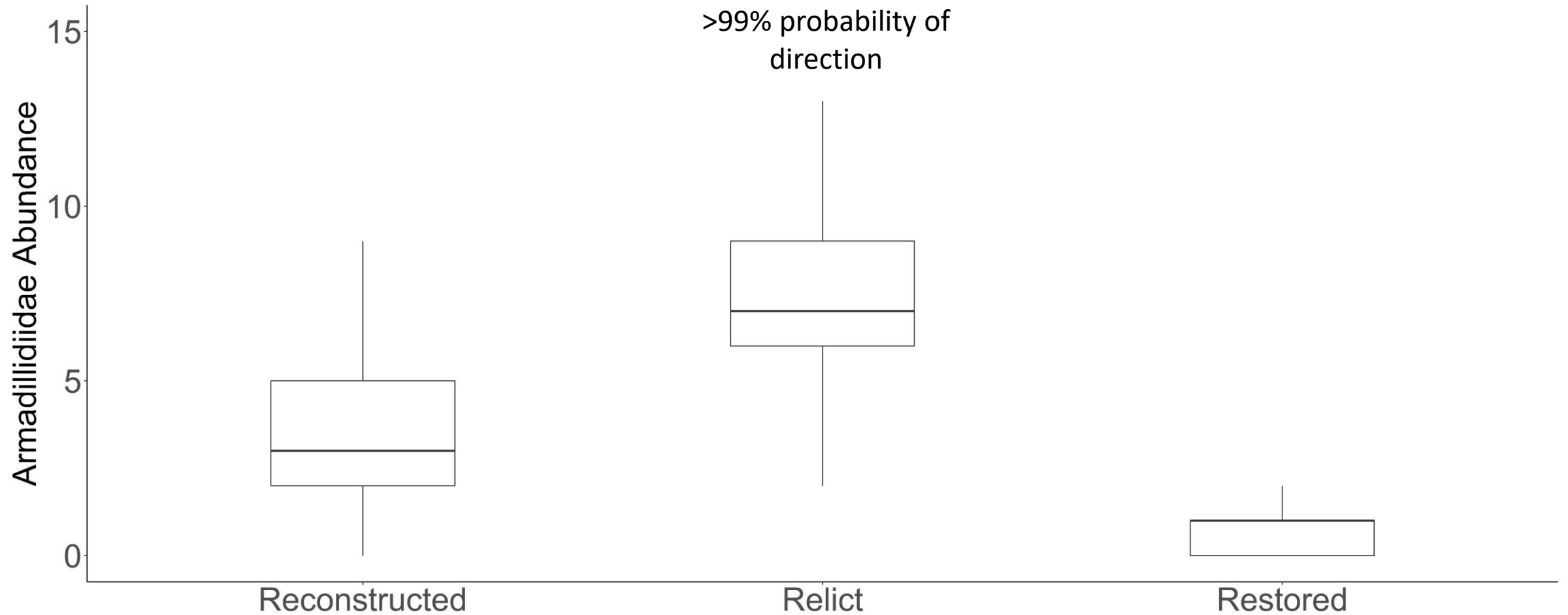
Invertebrate Community Summary

- Armadillidiidae: 284
- Scarabaeidae: 254
- Tipulidae: 182

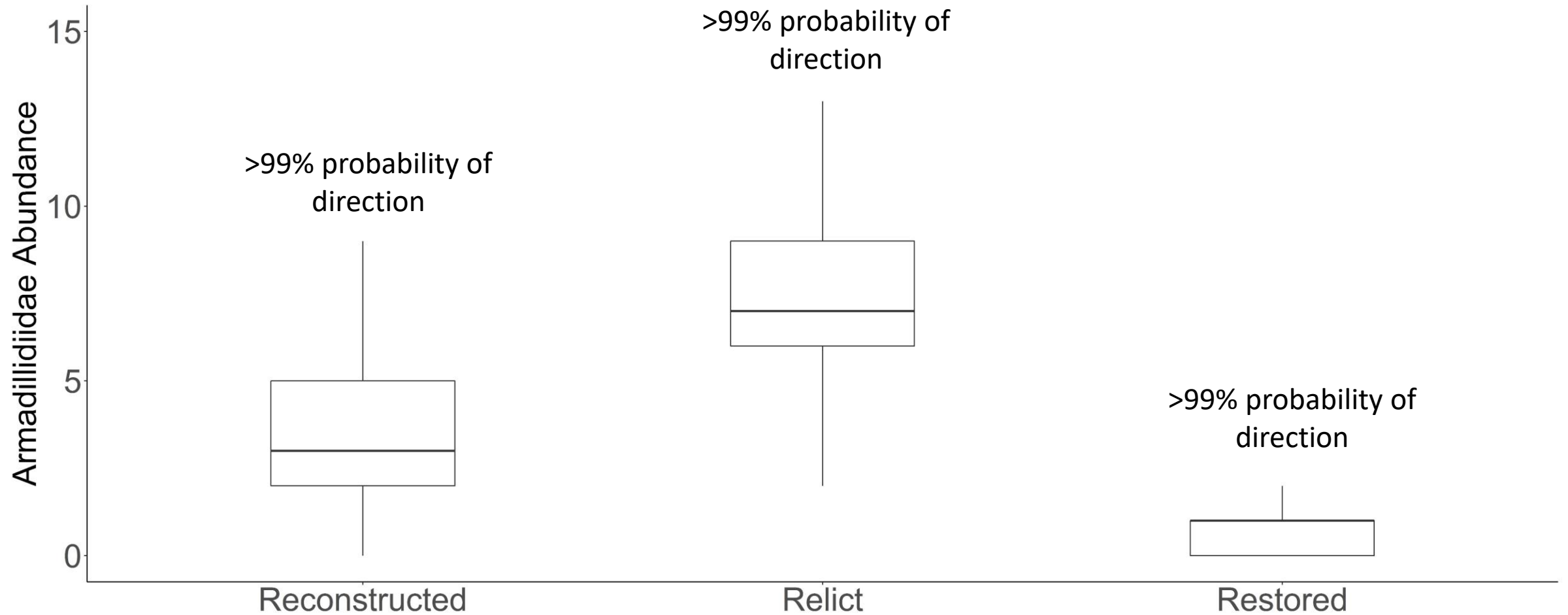
Treatment vs Armadillidiidae Abundance

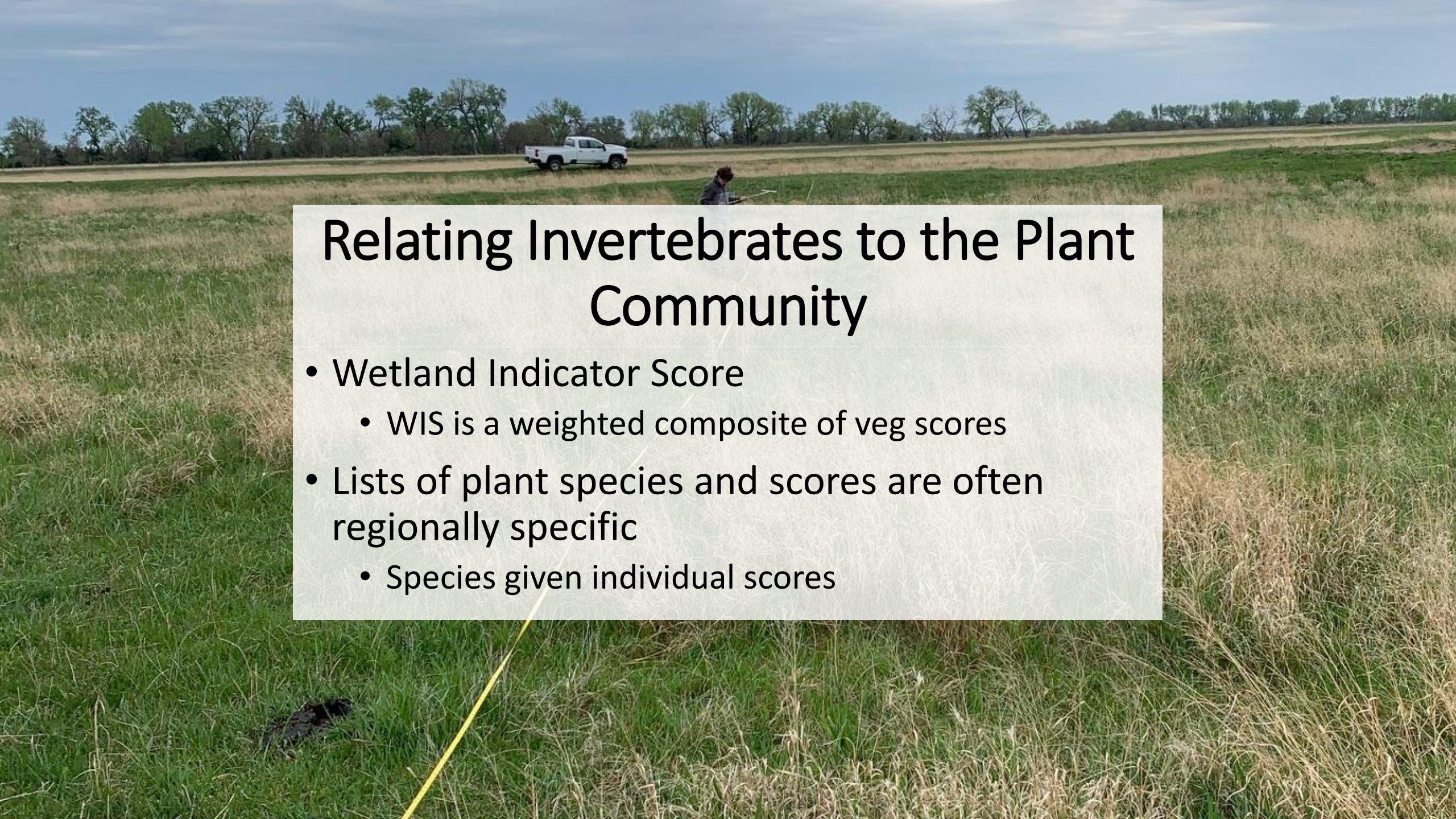


Treatment vs Armadillidiidae Abundance



Treatment vs Armadillidiidae Abundance



A photograph of a grassy field under a cloudy sky. In the background, a white pickup truck is parked on a slight rise. A person is standing in the middle ground, looking down at something in their hands. The foreground is filled with tall, green and yellow grass. A yellow line, possibly a measuring tape, is visible in the lower-left foreground.

Relating Invertebrates to the Plant Community

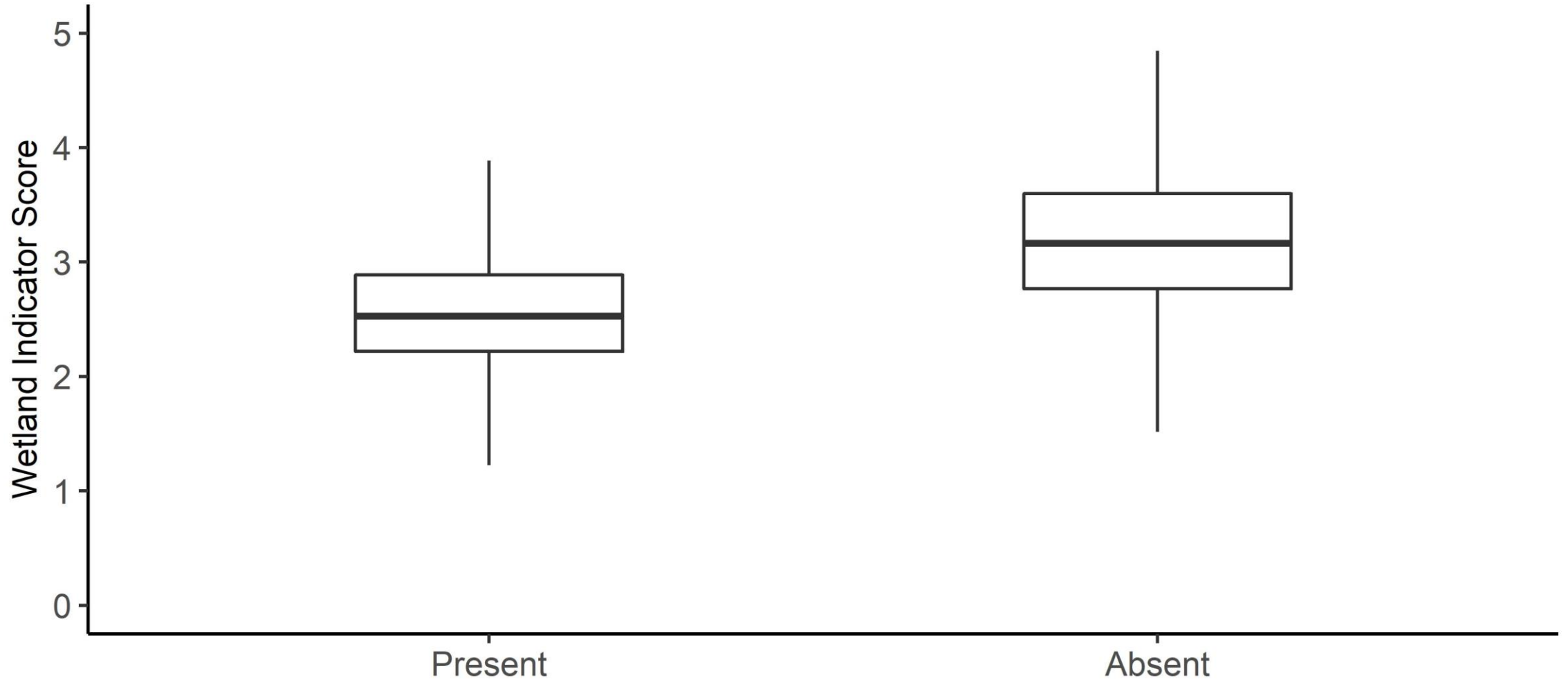
- Wetland Indicator Score
 - WIS is a weighted composite of veg scores
- Lists of plant species and scores are often regionally specific
 - Species given individual scores

A photograph of a wetland field with a white pickup truck and a person in the background. The field is covered in tall grass, some green and some yellowed. In the distance, there is a line of trees under a cloudy sky. A semi-transparent white box is overlaid on the right side of the image, containing text about Wetland Indicator Score (WIS).

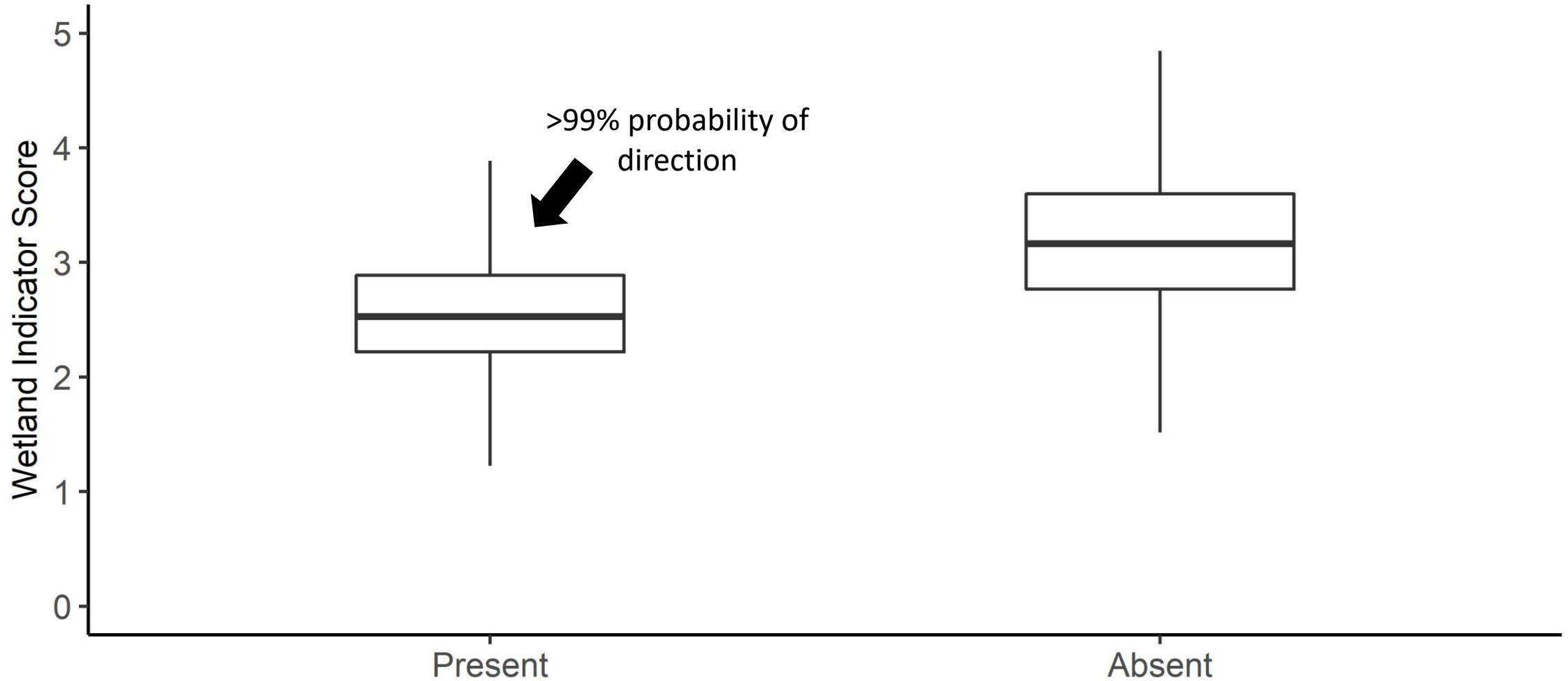
Wetland Indicator Score (WIS)

- WIS = weighted composite of veg scores
 - $WIS < 3 \approx$ Wetland
 - $WIS 3.0-3.2 \approx$ Transitional
 - $WIS > 3.2 \approx$ Upland

Predicting WIS using Tipulidae



Predicting WIS using Tipulidae





Summary

- Restored and reconstructed sites have communities similar to relict sites
- Invasive earthworms found throughout these sites at a similar distribution to native earthworms
- Specific invertebrate taxa can aid in prediction of wet meadow biotic and abiotic factors
- Preliminary results



Questions?

