



How does pasture soil health measure up?

A survey of biological soil health on Wisconsin pastures

CIAS CAC Meeting

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grassLAND 2.0



WISCONSIN
UNIVERSITY OF WISCONSIN-MADISON

Pastures check all of the boxes of soil health

- ✓ Soil armor
- ✓ Minimizing soil disturbance
- ✓ Plant diversity
- ✓ Continual living plants & roots
- ✓ Livestock integration



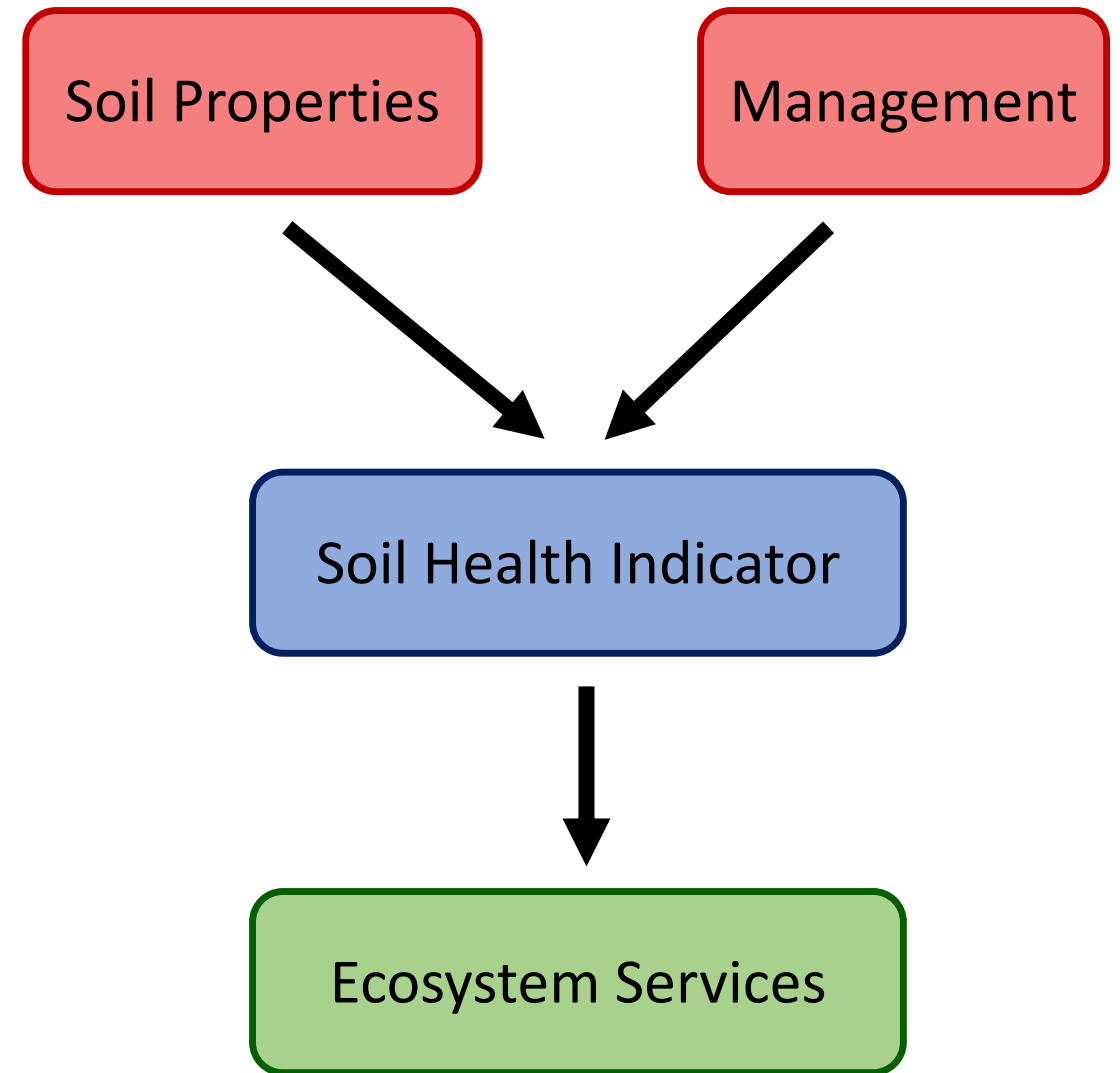
Within pasture systems, is there room to improve?

Research Objectives

- 1) Benchmark soil health indicators for pasture systems and compare to other cropping systems
- 2) Evaluate the influence of inherent soil properties & pasture management on soil health indicators

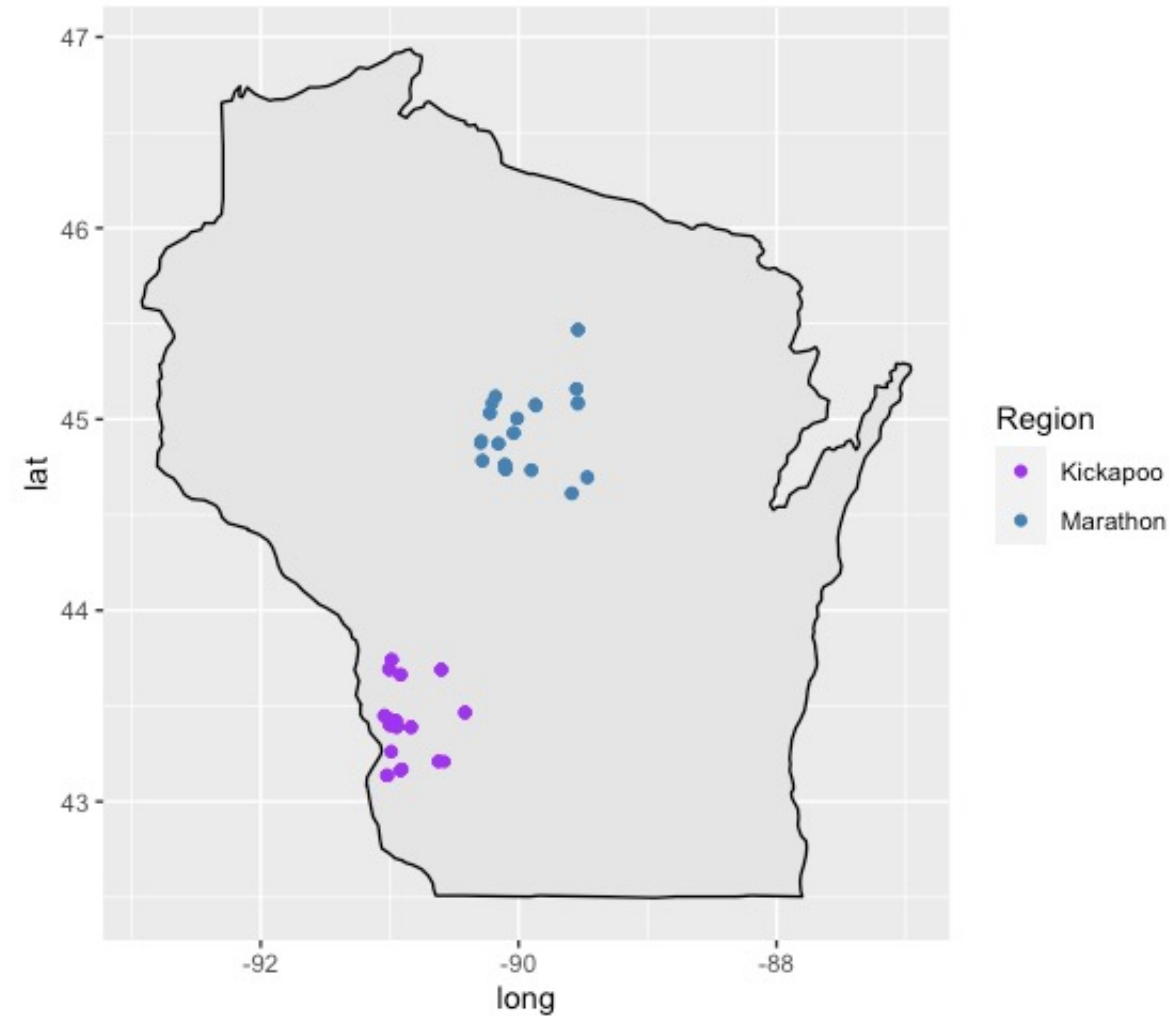
Future research:

- 3) Assess the relationship between biological soil health and ecosystem services



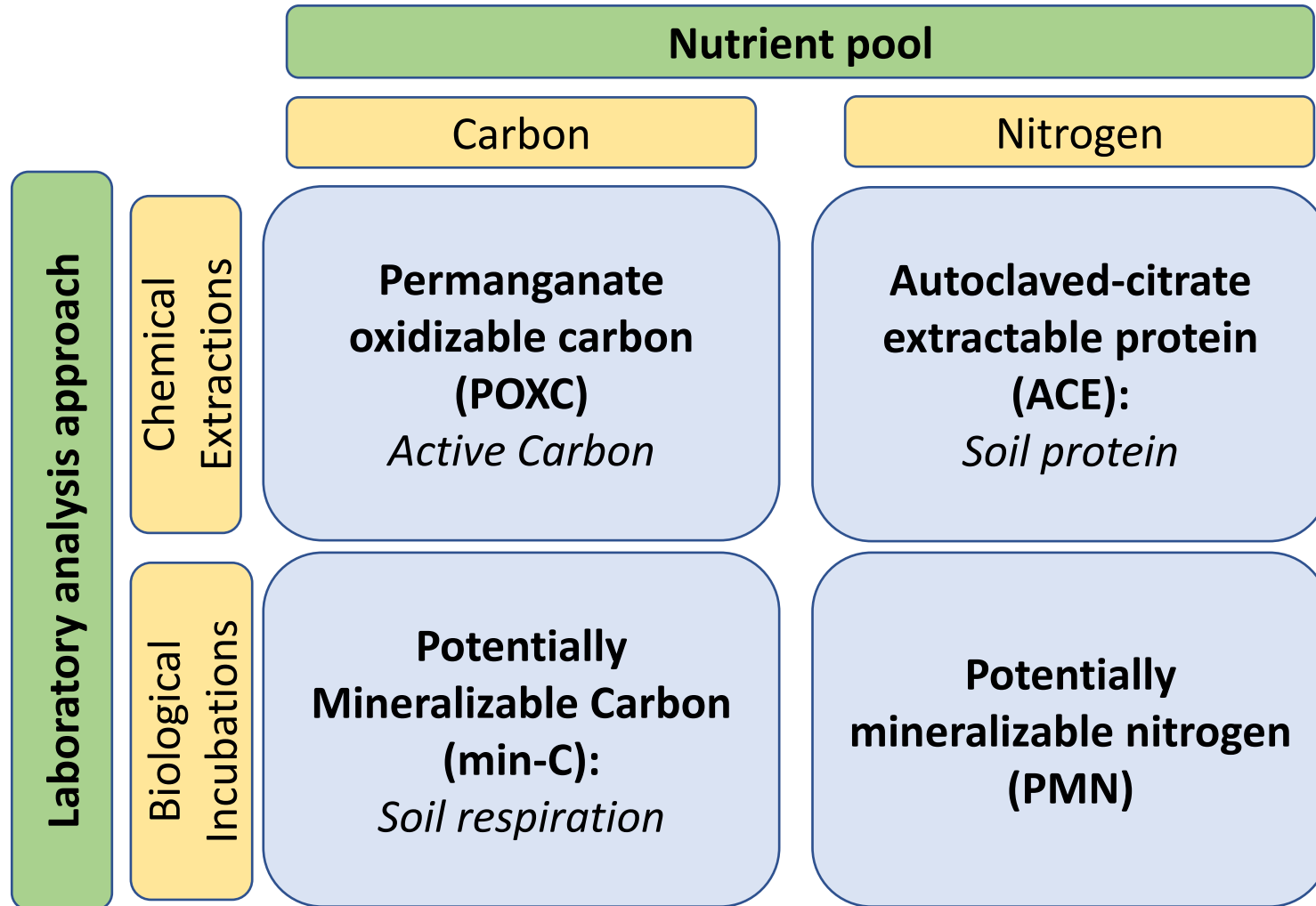
Survey work provides data from pastures representative of WI

- Collaborated with 33 farms
- 96 pastures sampled in June and September 2021
 - Varied in rotation, land history, pasture composition, stocking, inputs



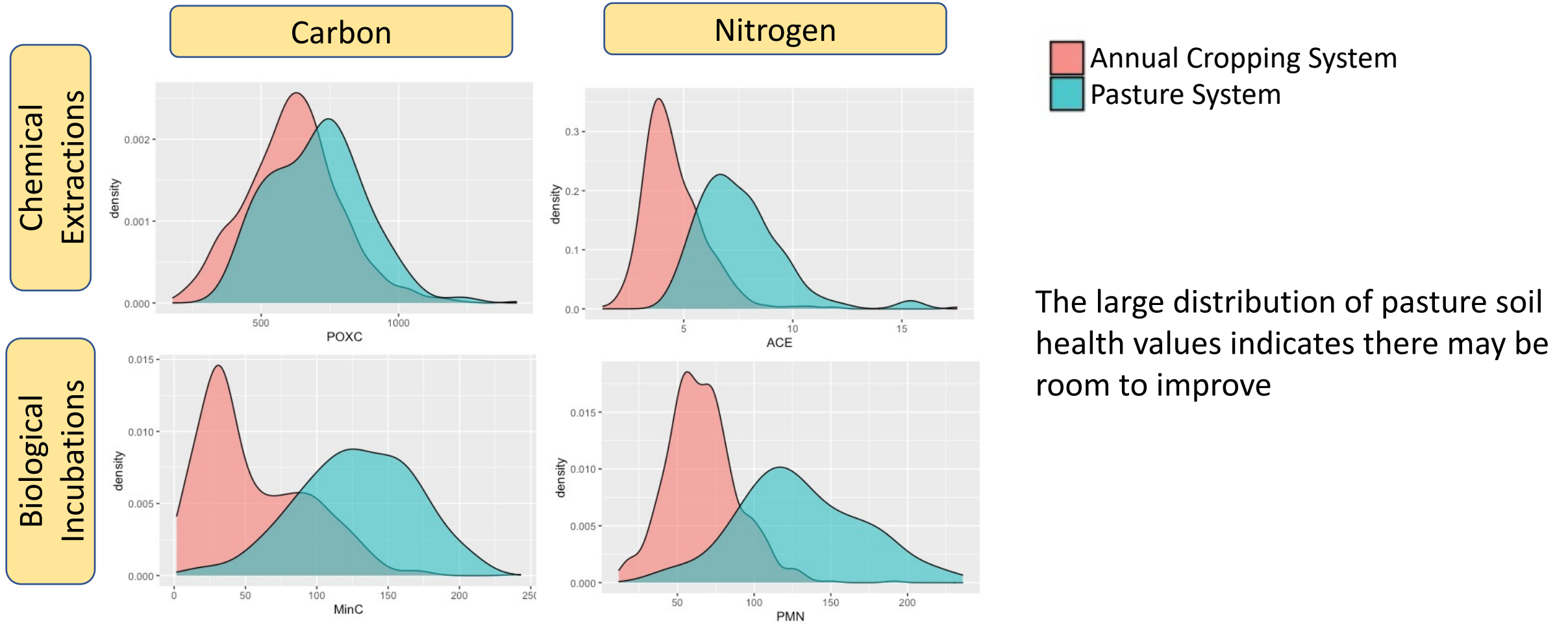
Biological soil health indicators:

labile carbon & nitrogen



- responsive to management
- linked to soil function, productivity, other services
- logistically feasible

Pastures have greater biological soil health values compared to annual cropping systems (obj 1)



Among pastures, what drives soil health values: inherent soil properties or management? (obj 2)

Soil Properties

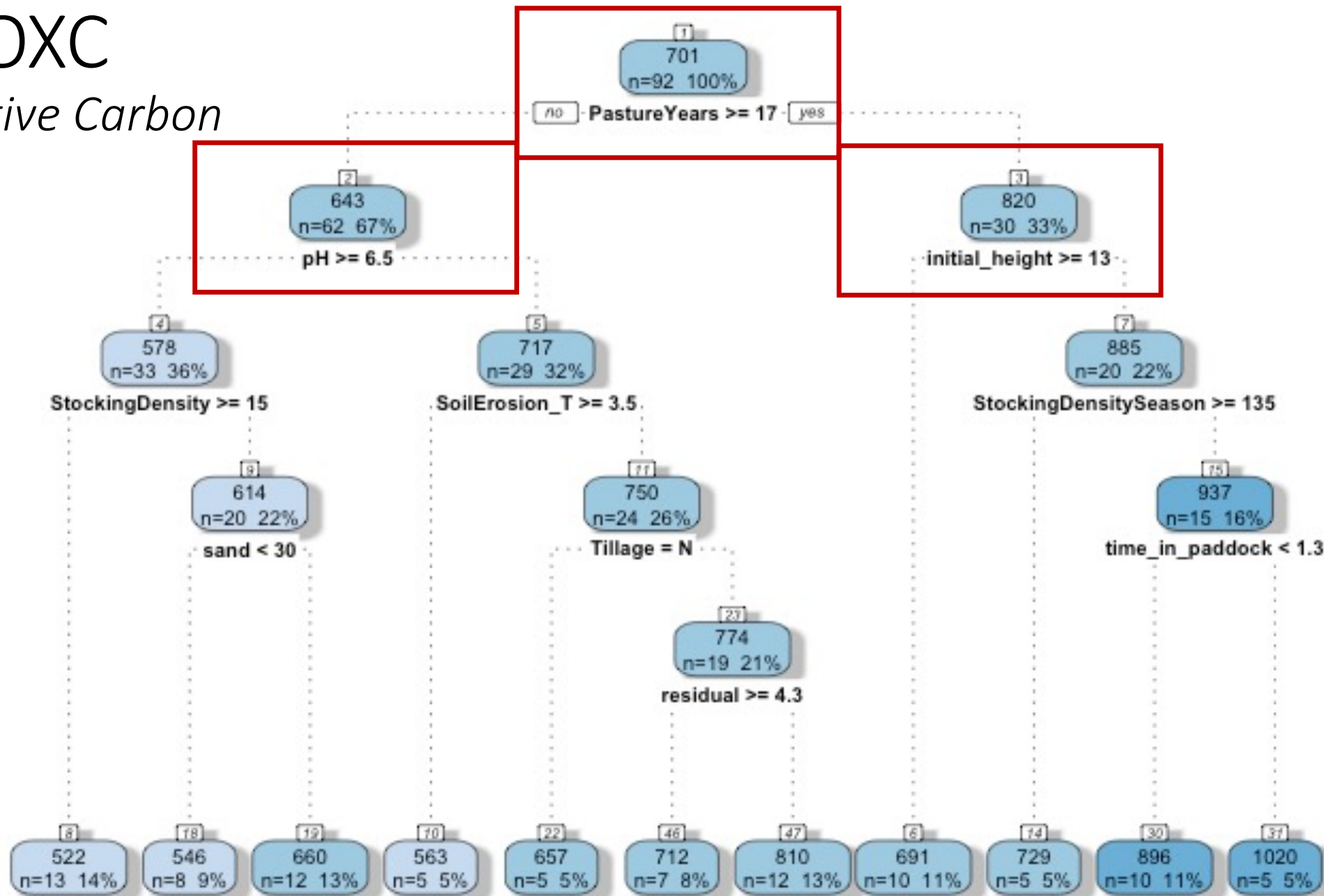
- pH
- Soil texture: sand, clay
- Drainage class
- Landscape properties: slope, landform positioning

Regression tree analysis can help us analyze datasets with a lot of variables

Management

- Rotation factors: time in paddock & rest period
- Pasture Age
- Previous land use
- Pasture composition
- Initial & Residual pasture height
- Stocking rate & density
- Inputs: fertilizer, manure, seeding
- Overwintering

POXC

Active Carbon

error increases

Soil Health Findings:

June sampling time

- POXC & ACE: variation is best described by **pasture age**, followed by inherent soil properties
- Min-C & PMN: variation is best described by **texture**, followed by pasture age
- Other management practices have influence at lower magnitudes
- Teasing out individual effects requires other statistical approaches

Future Work:

Data Analysis

- linear mixed models
- September sampling results

Outreach

- pasture walks & field days
- research briefs & handouts
- conferences
- academic journals

Questions



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