Digging holes in people's yards: Quantifying nitrogen leaching from residential soils in Alachua County, FL

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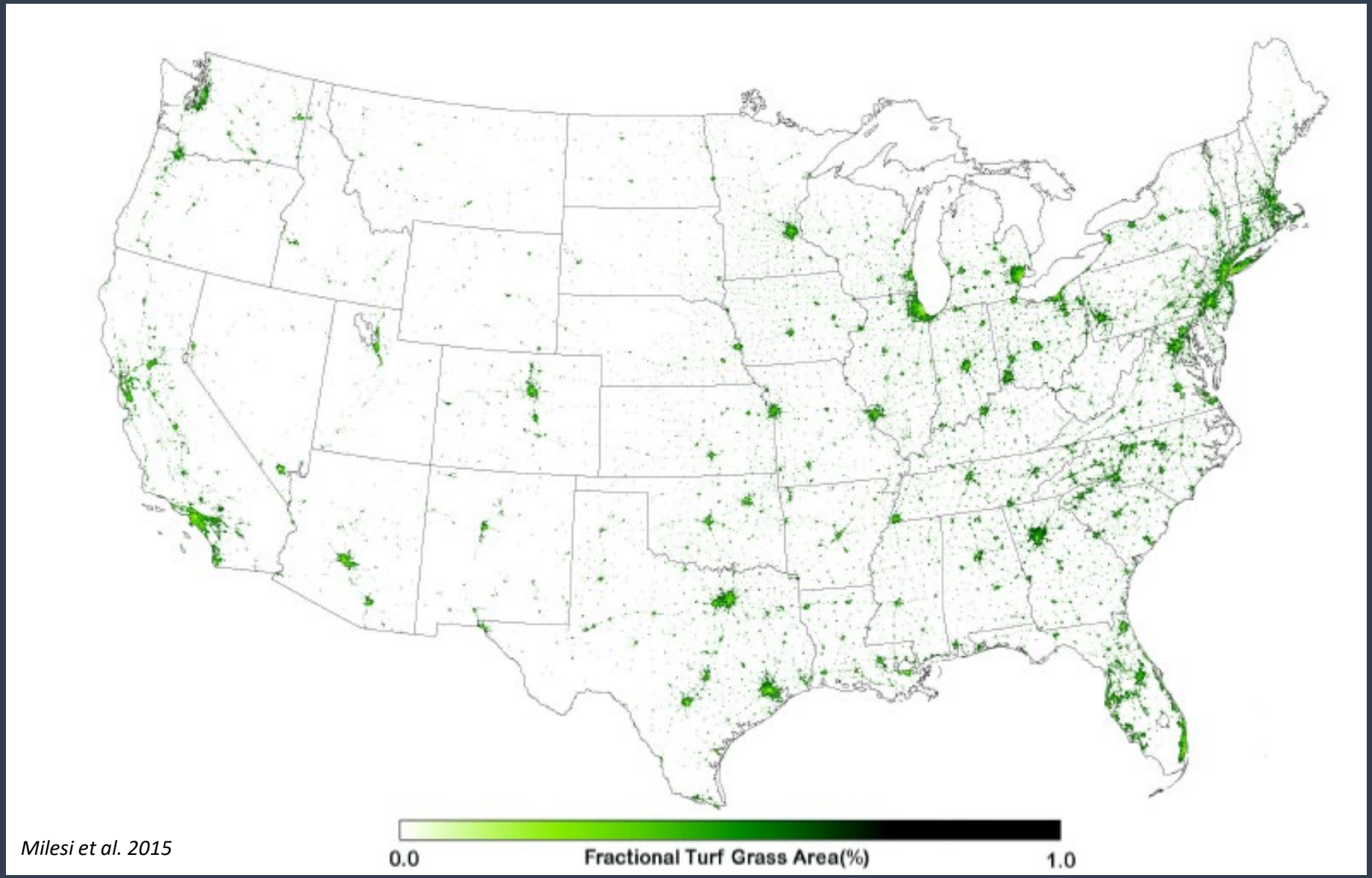
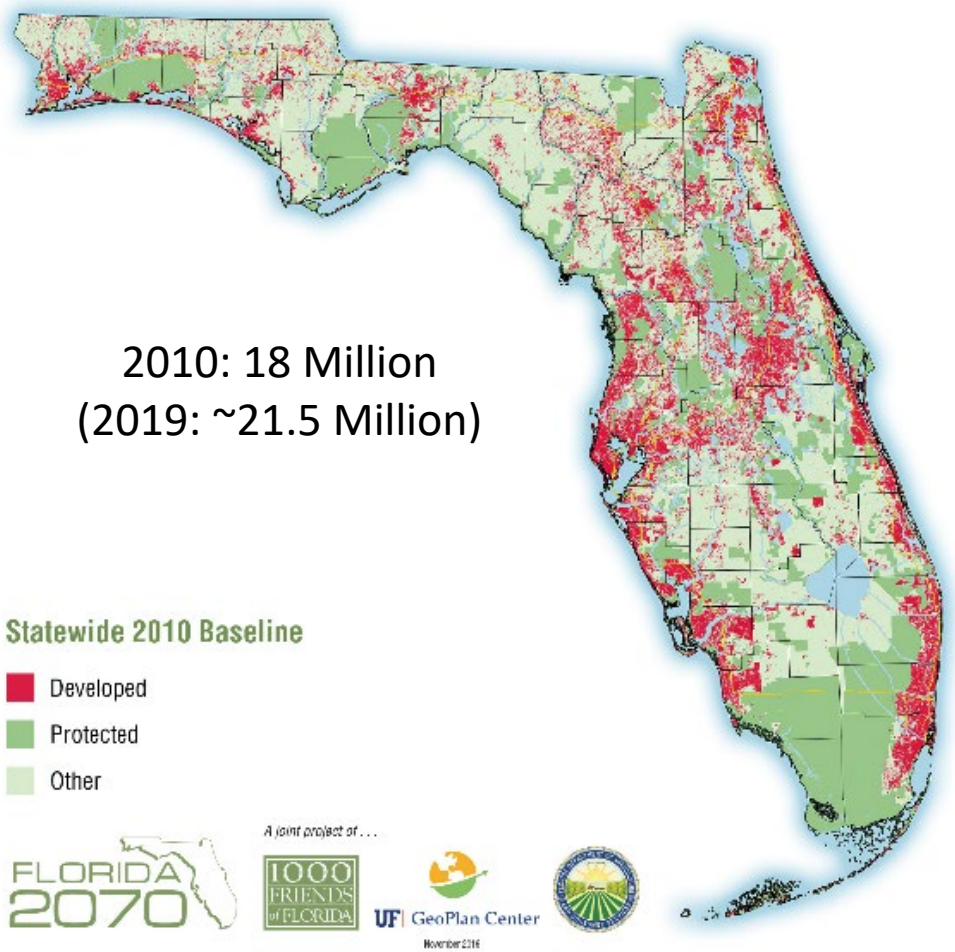
Urbanization of the US

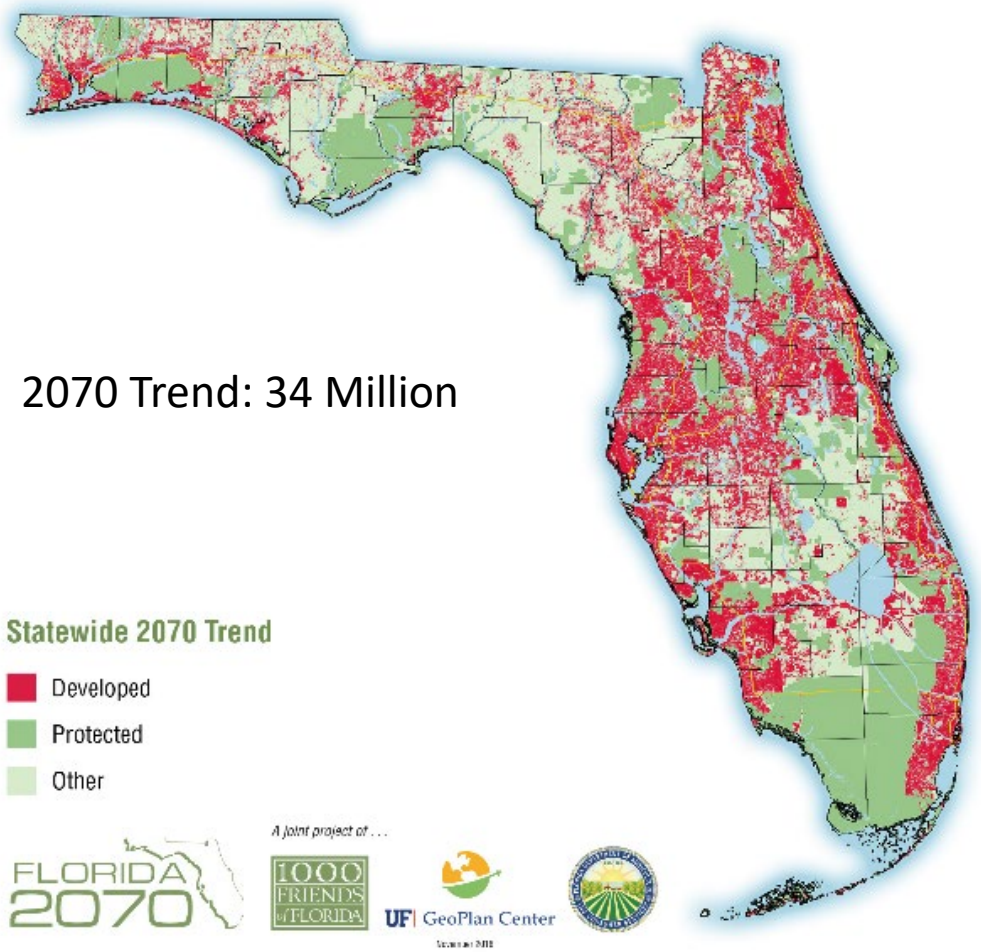
Expansion of residential landscapes



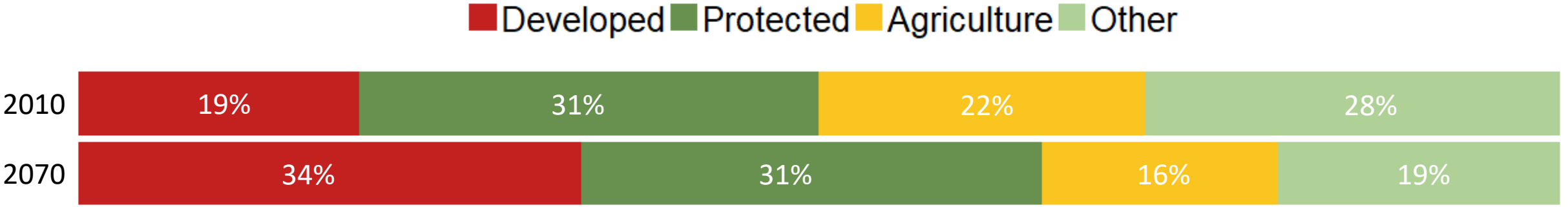
Milesi et al. 2015



2010: 18 Million
(2019: ~21.5 Million)

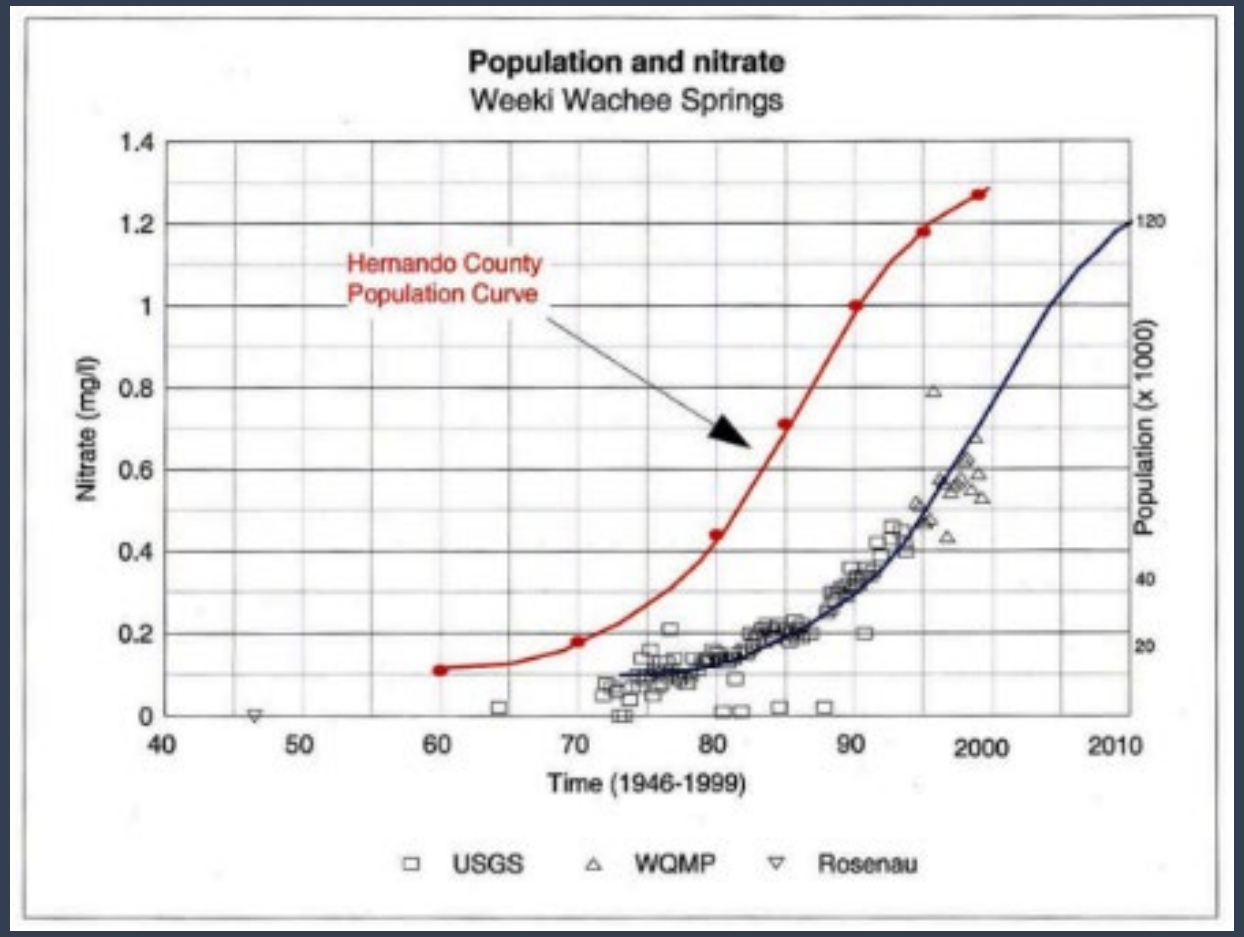


2070 Trend: 34 Million

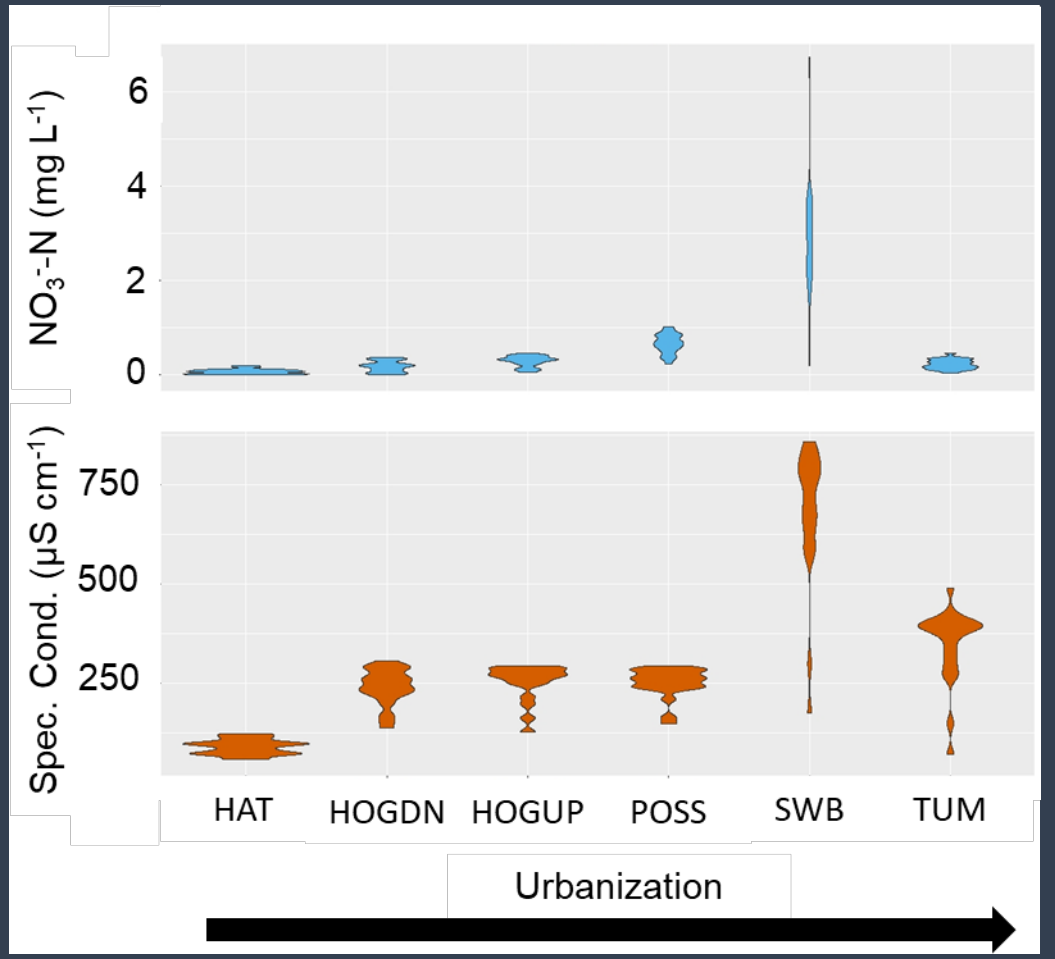



Weand

Associated effects on water quality



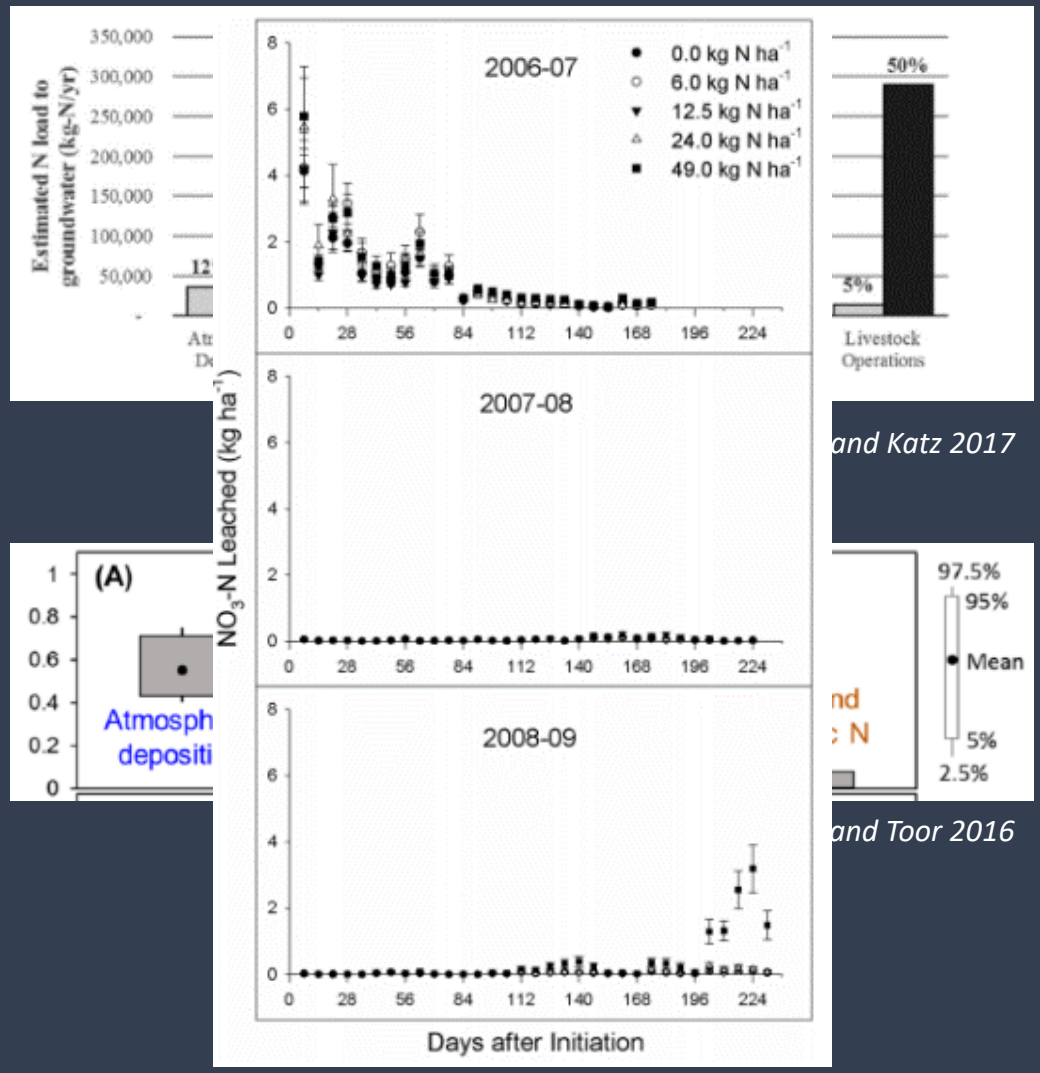
SWFWMD via FL Springs Task Force Report 2000



E. Taylor, unpublished data

But where is the N coming from?

- NSILT Model (FDEP) estimates a range of N sources to groundwater fed systems
- Stable isotope approach quantifies contributions of different sources to urban stormwater runoff
- Under ideal conditions, turfgrass doesn't leach much N



and Katz 2017

and Toor 2016

Shaddox, Unruh, and Trenholm 2016

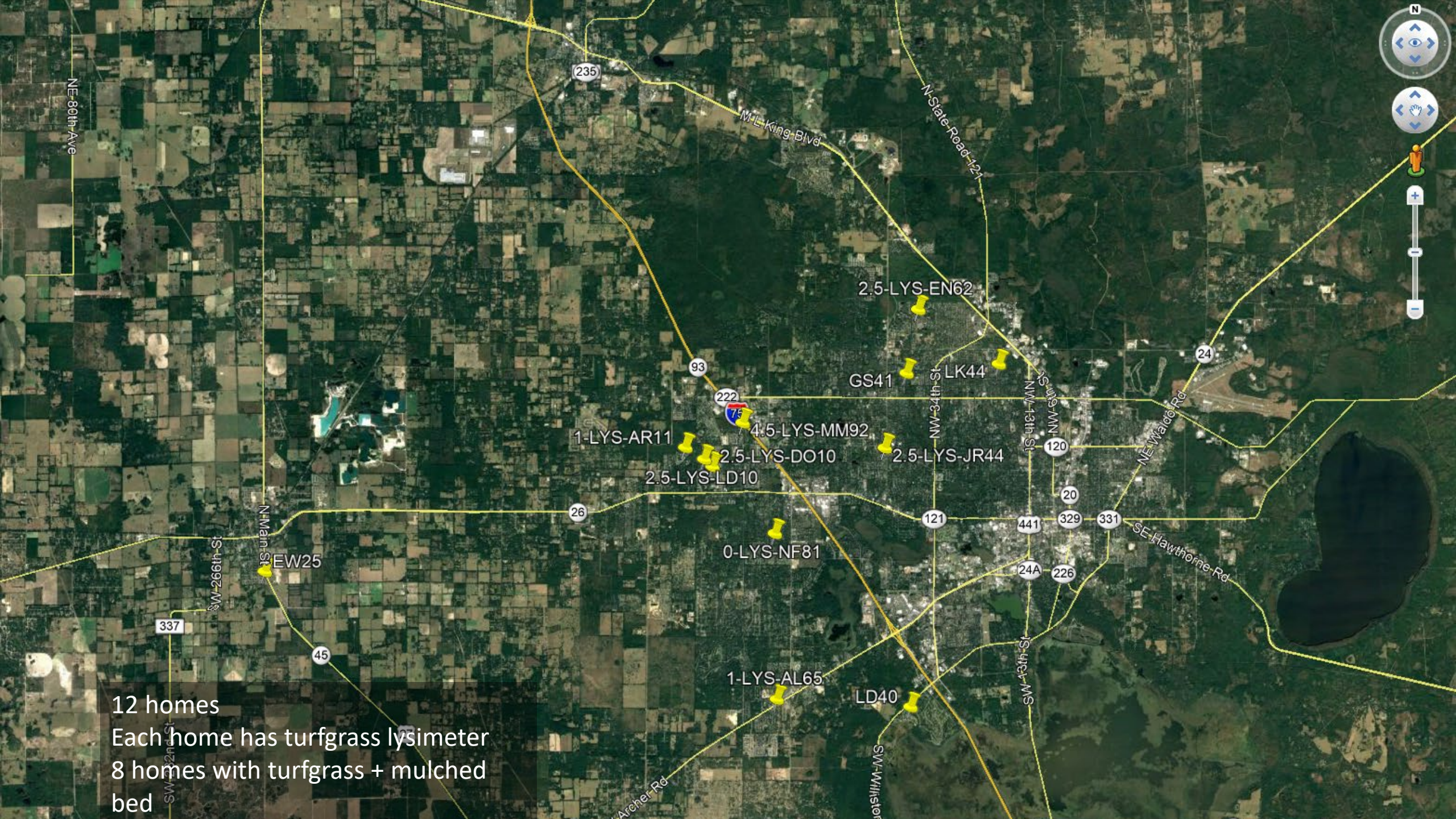
But what happens under real-world lawn management conditions?

How much N leaches from a typical residential landscape in Alachua County?

- Study design and objectives
- Methods
- Preliminary results

Project Outline

- Year long monitoring of nutrient leaching from turfgrass lawns and mulched beds
  - Install lysimeters
  - Collect samples ~weekly
- Rapid leaching assessment
  - 50 landscapes (turfgrass and mulched beds)
  - Wet season and dry season
  - Leaching from an intact core
- Stormwater leaching
  - Intact core leaching from 5 stormwater dry ponds



12 homes
Each home has turfgrass lysimeter
8 homes with turfgrass + mulched bed

Lysimeter installation

4’ hole needed

1’ soil on top of lysimeter

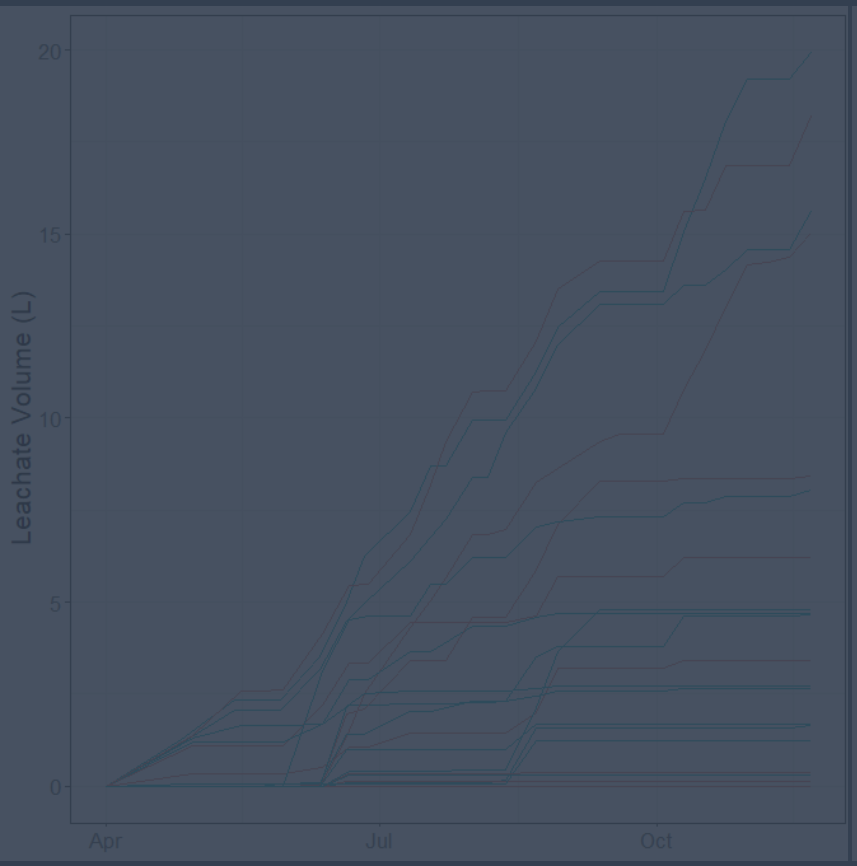
1’ of soil in collector (2’ total integrated)

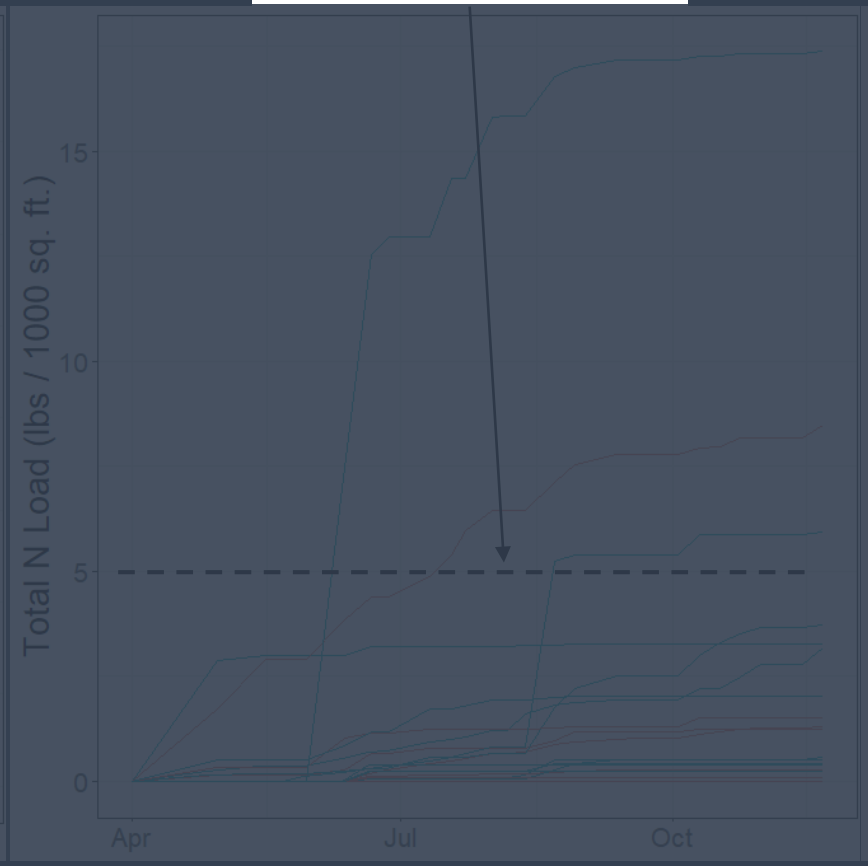
2’ reservoir for collecting leachate

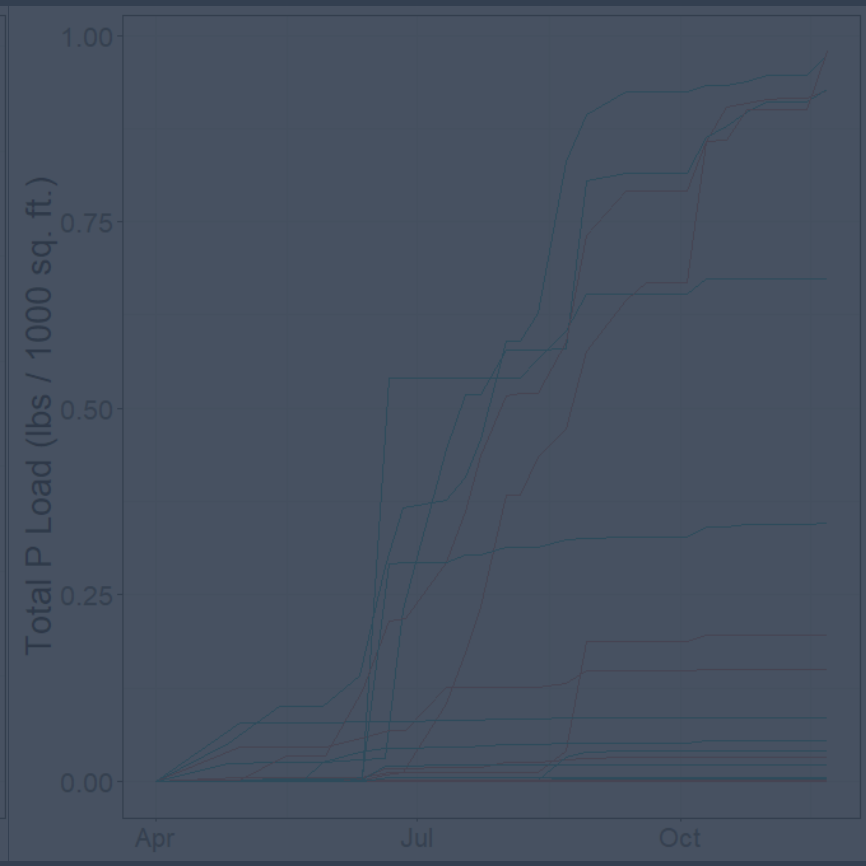
Leachate sampling

The story so far...

IFAS Annual Upper Fertilizer Recommendation for St. Augustine in Central Florida

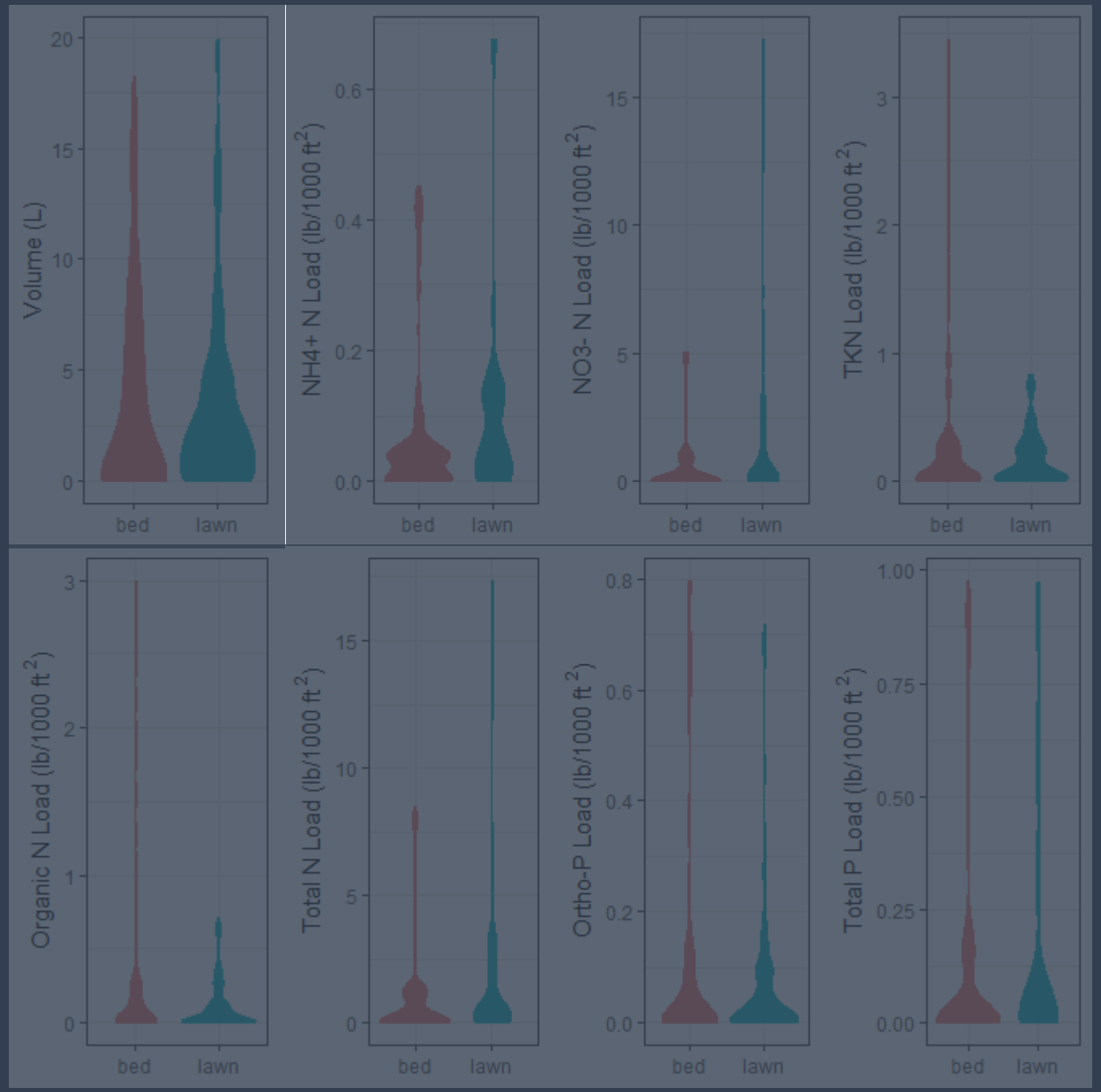






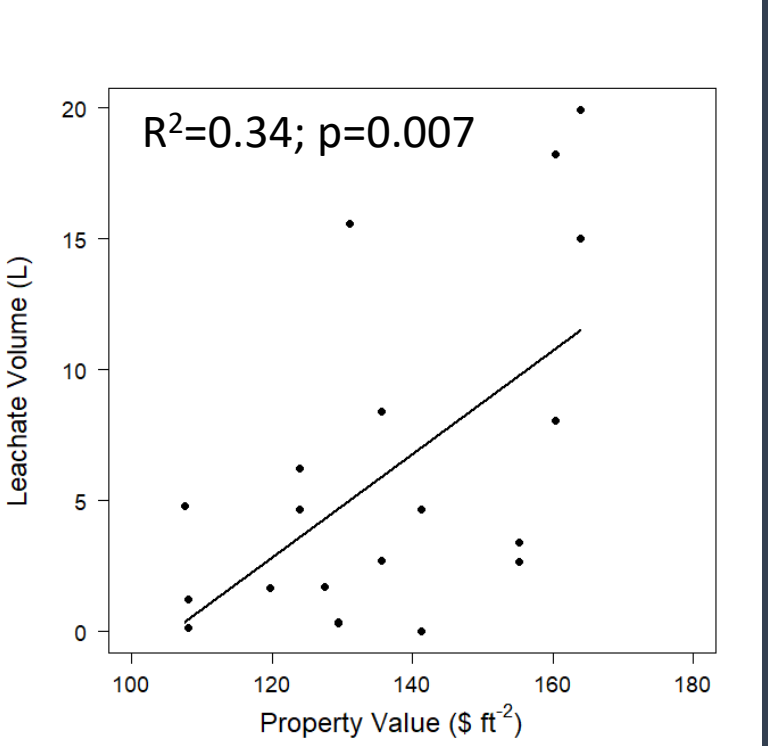
The story so far…

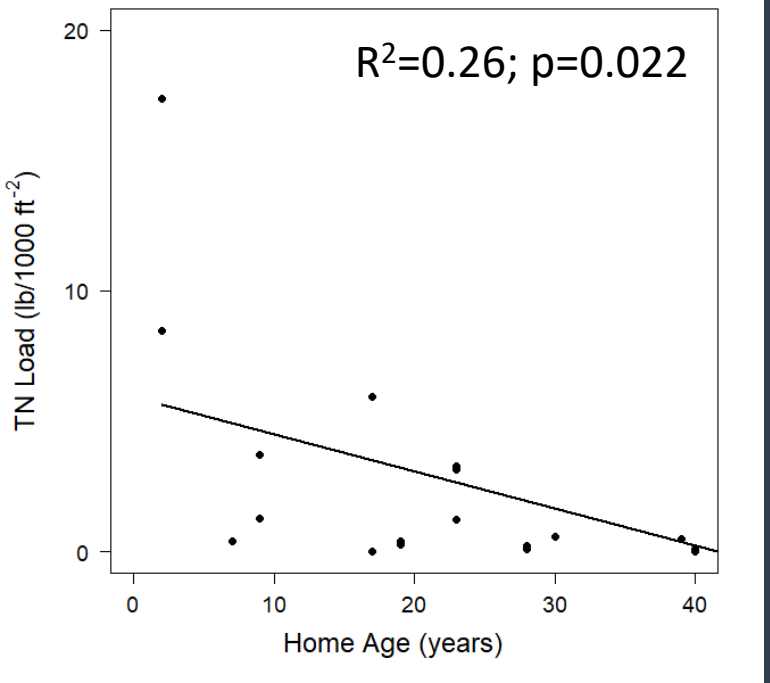
- No differences between beds and lawns for
  - Total volume leached
  - Nitrogen loads (in any form)
  - Phosphorus loads (in any form)
- But there's some obvious variability across landscapes
- What makes a specific site a 'hot-spot' for nutrient leaching?



What controls leaching?

- Assessed correlations between nutrient leaching and:
  - Soil chemistry (OM, N, P, pH)
  - Home age
  - Property values (total $ and $/ft^2)
- Home age and property values correlated with total leaching volume, nitrogen leaching, and phosphorus leaching
- Phosphorus leaching was also related to P in soils





Lysimeter summary

- High variability in the volume of water and nutrient loads leaching through soils across Alachua County
- Multiple sites have leached more N in <9 months than the annual IFAS N fertilizer recommendation
- No obvious differences between lawns and mulched beds
- Leaching appears driven by socioeconomic factors (home age, property value)

Questions?

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