United States Environmental Protection Agency

Influence of inputs and climate on stream nutrients across the US:

Application of EPA's National Aquatic Resources Survey (NARS) and National Nutrient Inventory for ACE research

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Collaborators: SSWR Nutrients Research Topic, Watersheds Topic
PESD Wildfire research team

ACE BOSC meeting
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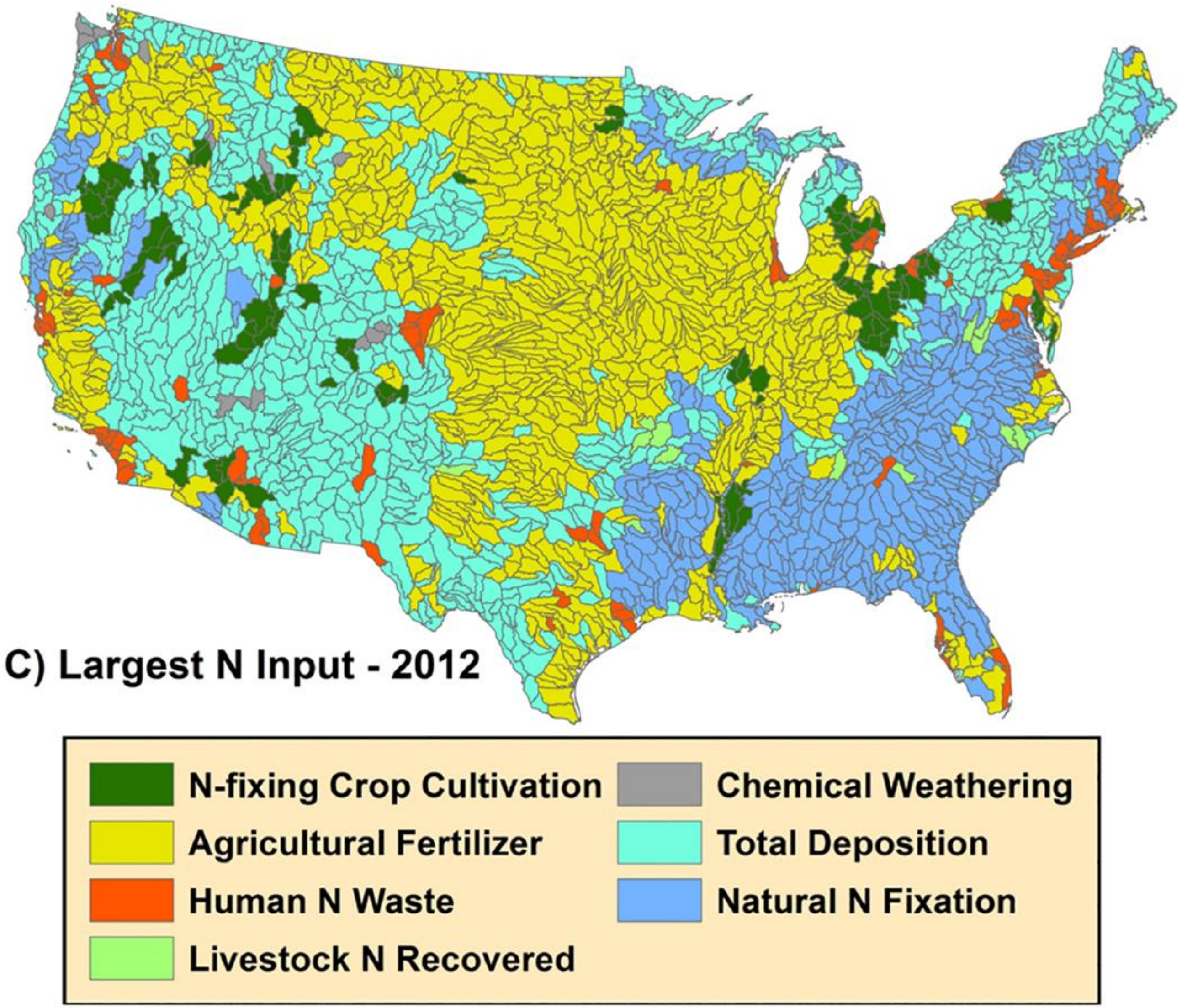
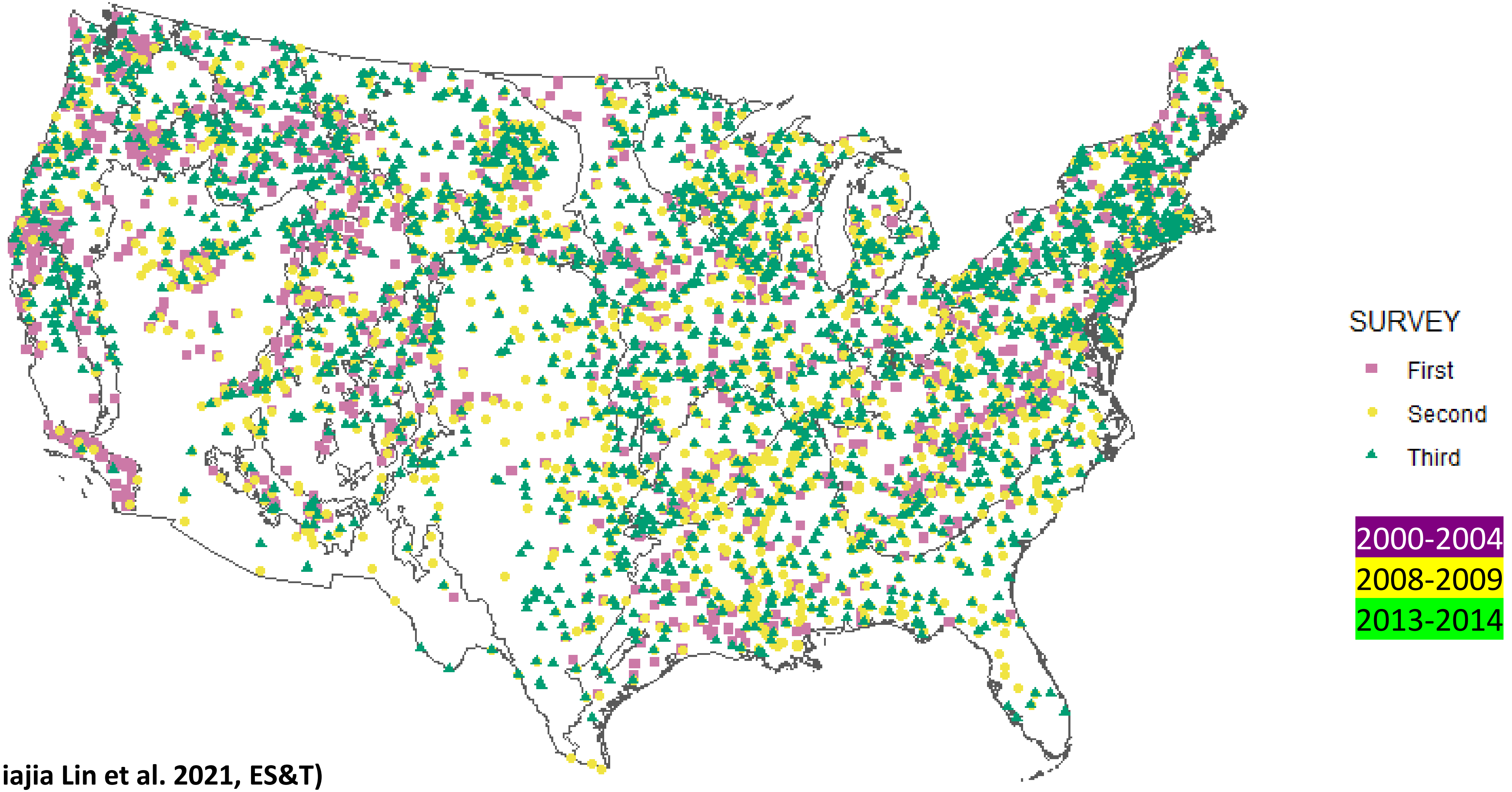
EPA's National Nutrient Inventory

- N and P inputs across the US for 2002, 2007 and 2012
- Largest Anthropogenic Source varies
- Fertilizer is dominant in farmland
- Deposition is largest source in the northeast and west
- Hotspots near cities have human waste as largest source (Puget Sound, Long Island)



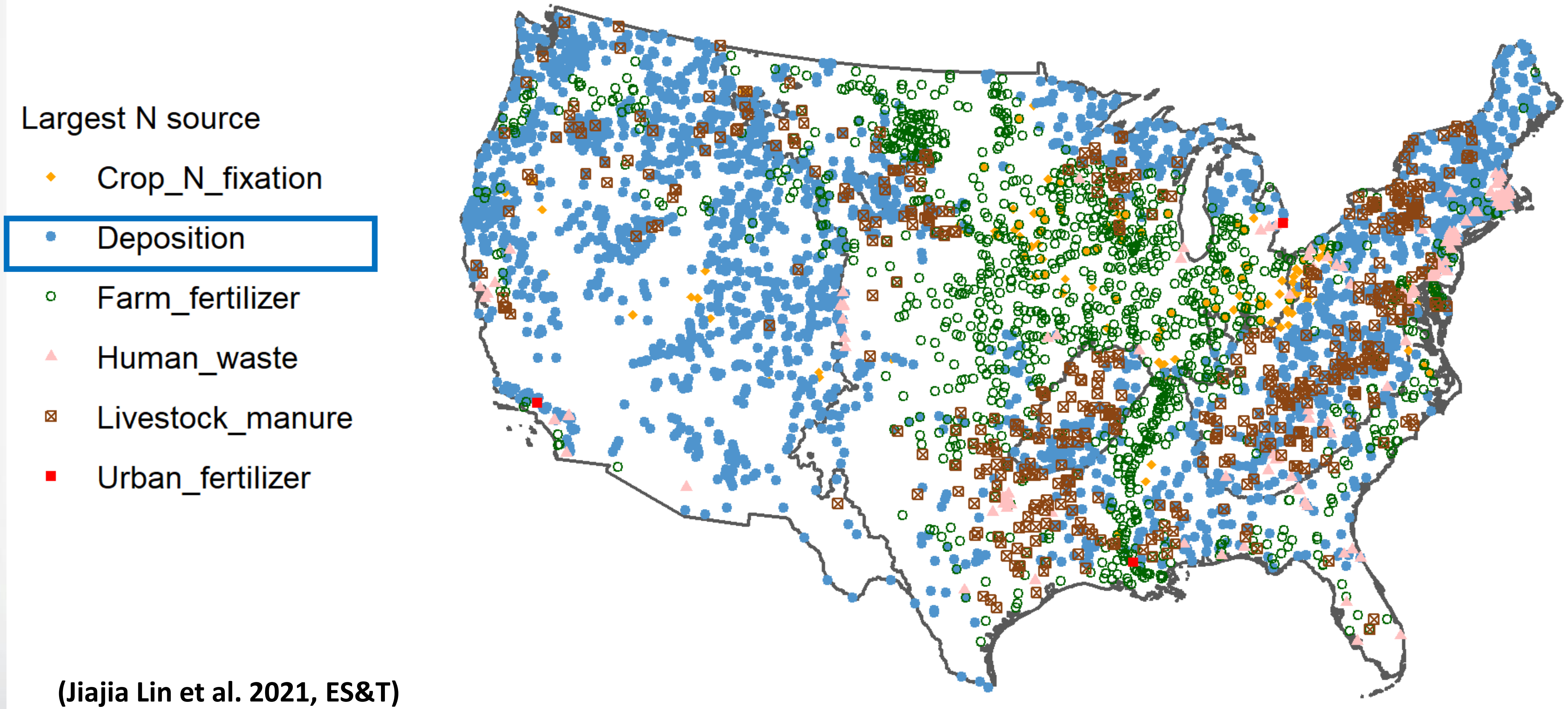
[*Sabo, Clark, Rea, Compton et al. 2019 JGR Biogeosciences*]

National Rivers and Streams Assessment (NRSA)



(Jiajia Lin et al. 2021, ES&T)

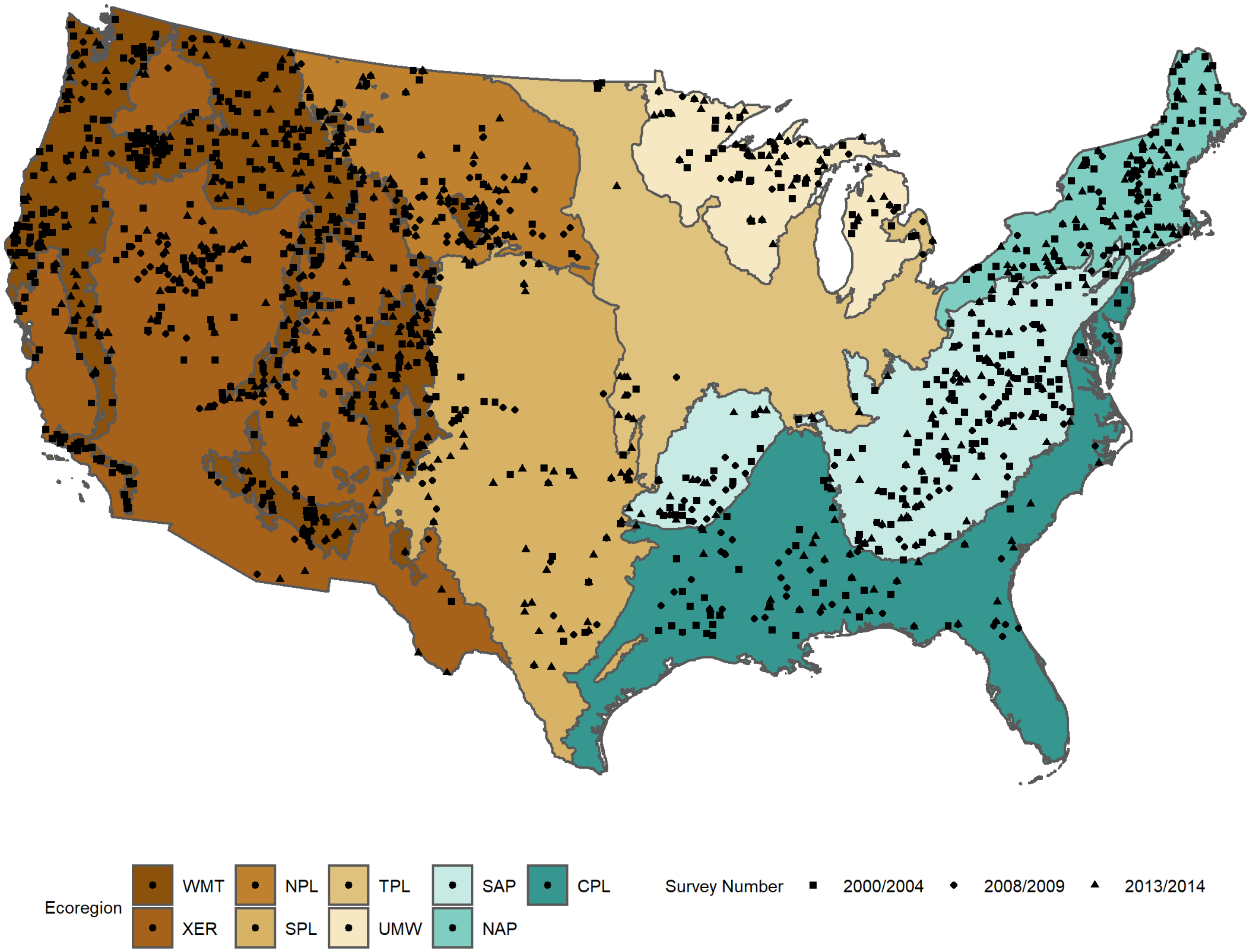
Largest sources for all three NRSA surveys



(Jiajia Lin et al. 2021, ES&T)

Streams where deposition is the largest N source

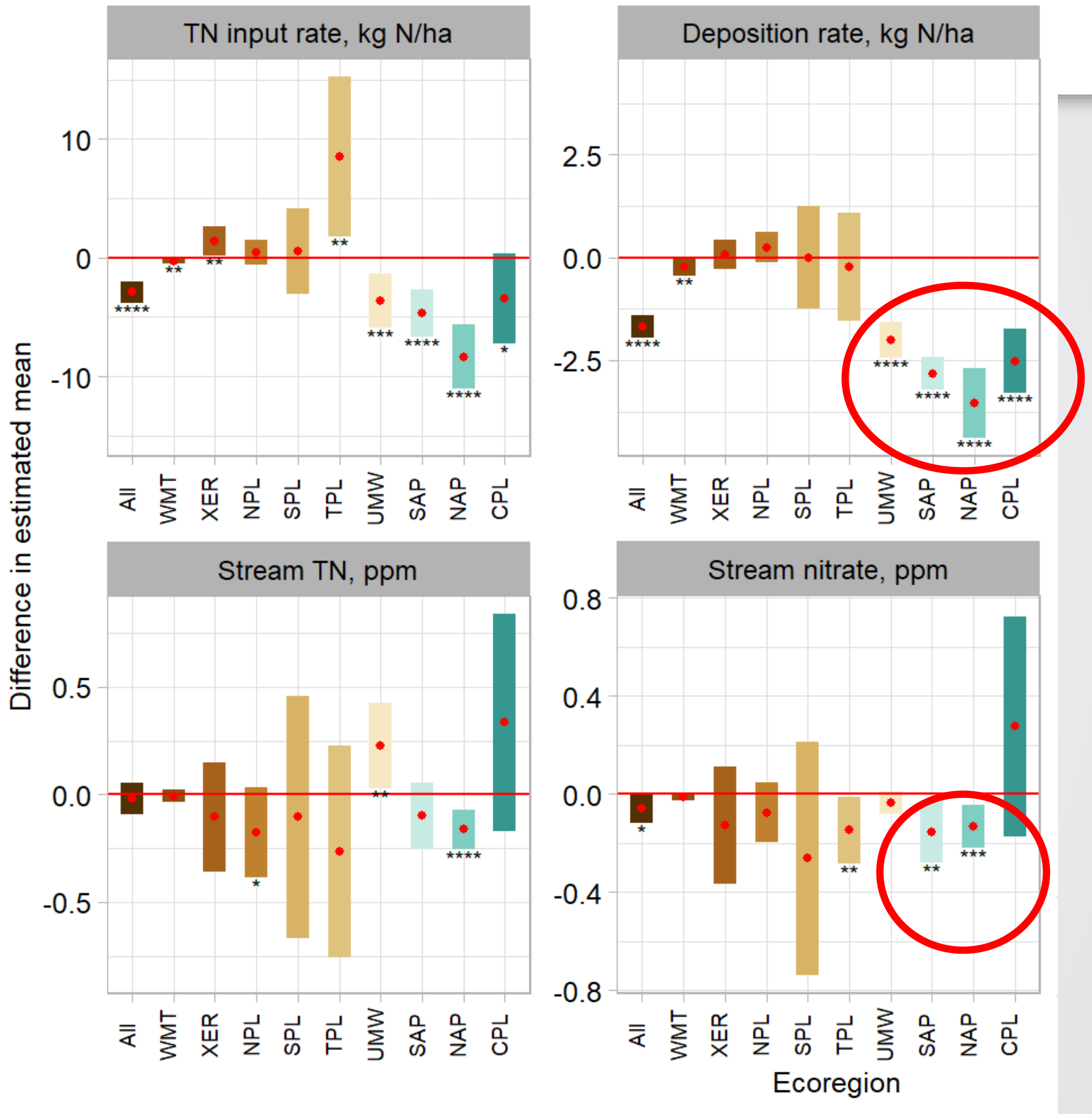
- Conduct weighted population estimates of wadeable streams to compare N concentrations in three surveys
- Examine changes in NO_3, TON, and TN concentrations
- Examine ecoregional differences in these stream responses/temporal trends

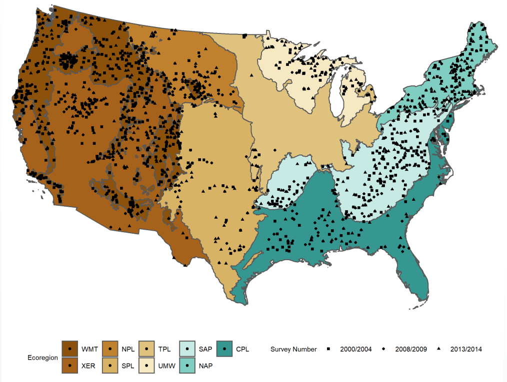


(Lin, Compton, Brooks, Hill, Herlihy, Stoddard, Paulsen In prep.)

Weighted change by ecoregion

- Deposition inputs declines in Appalachians, Coastal Plain & Upper Midwest
- NAP/SAP and UMW are the main regions showing significant reduction in stream NO_3 concentration
- For TN, NAP and NPL show significant reductions

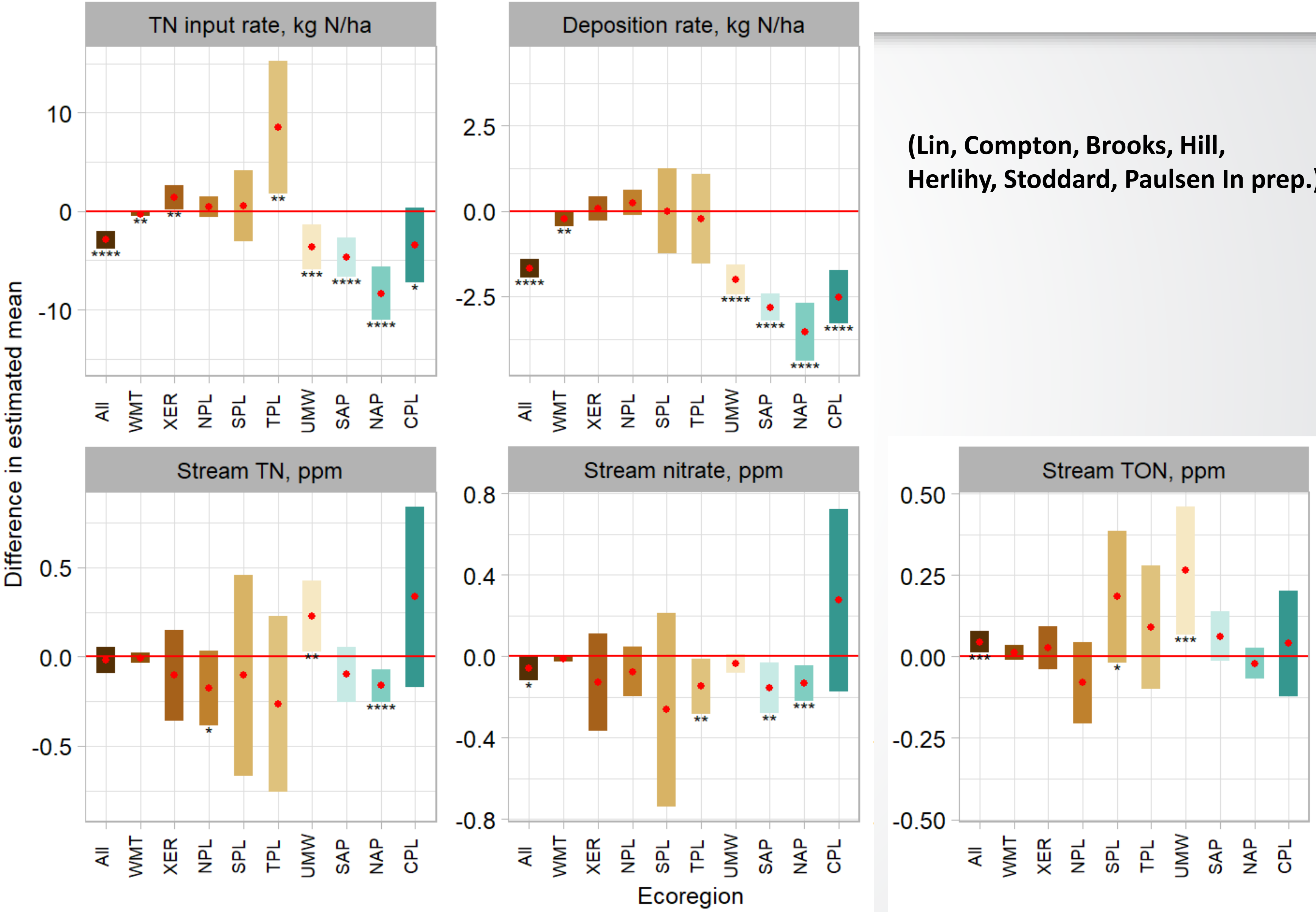




(Lin, Compton, Brooks, Hill, Herlihy, Stoddard, Paulsen In prep.)

Nitrate and ON behave differently

- Increase in TON concentration in some regions can offset NO_3 concentration reduction
- Climate driver of TON? Aligns with large-scale findings of "browning" in northern latitudes
- Implications for drinking water



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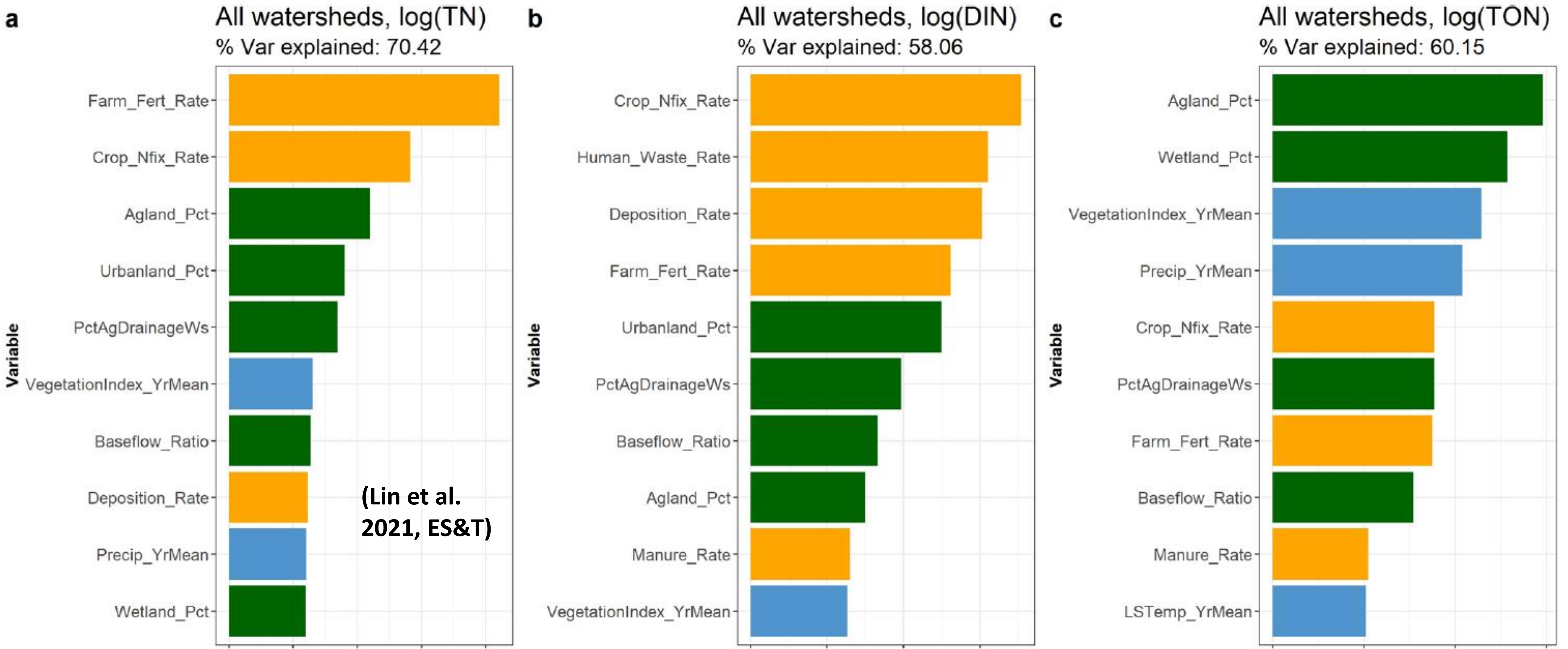
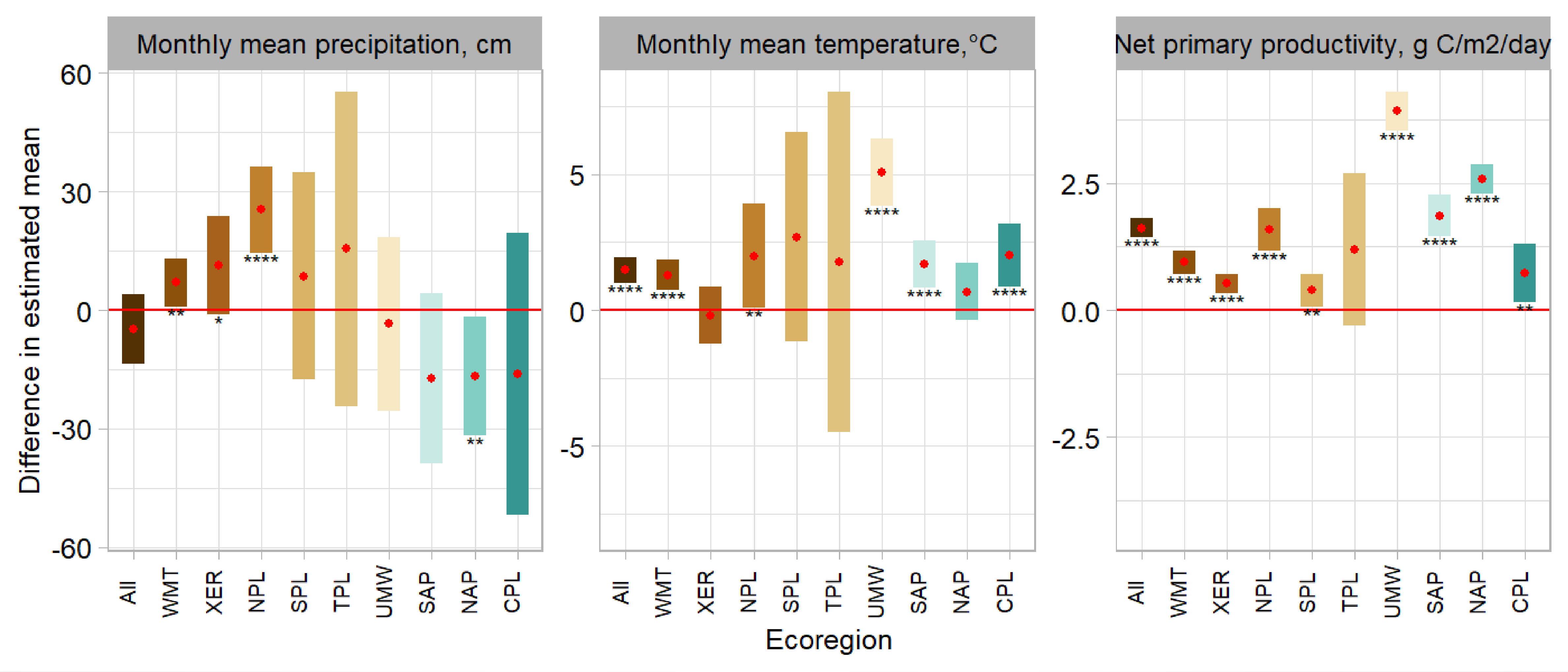
Different drivers for different N forms

Orange = inputs Green = landscape/geology Blue = climate



(Lin et al. 2021, ES&T)

Can examine role of climate – Future research

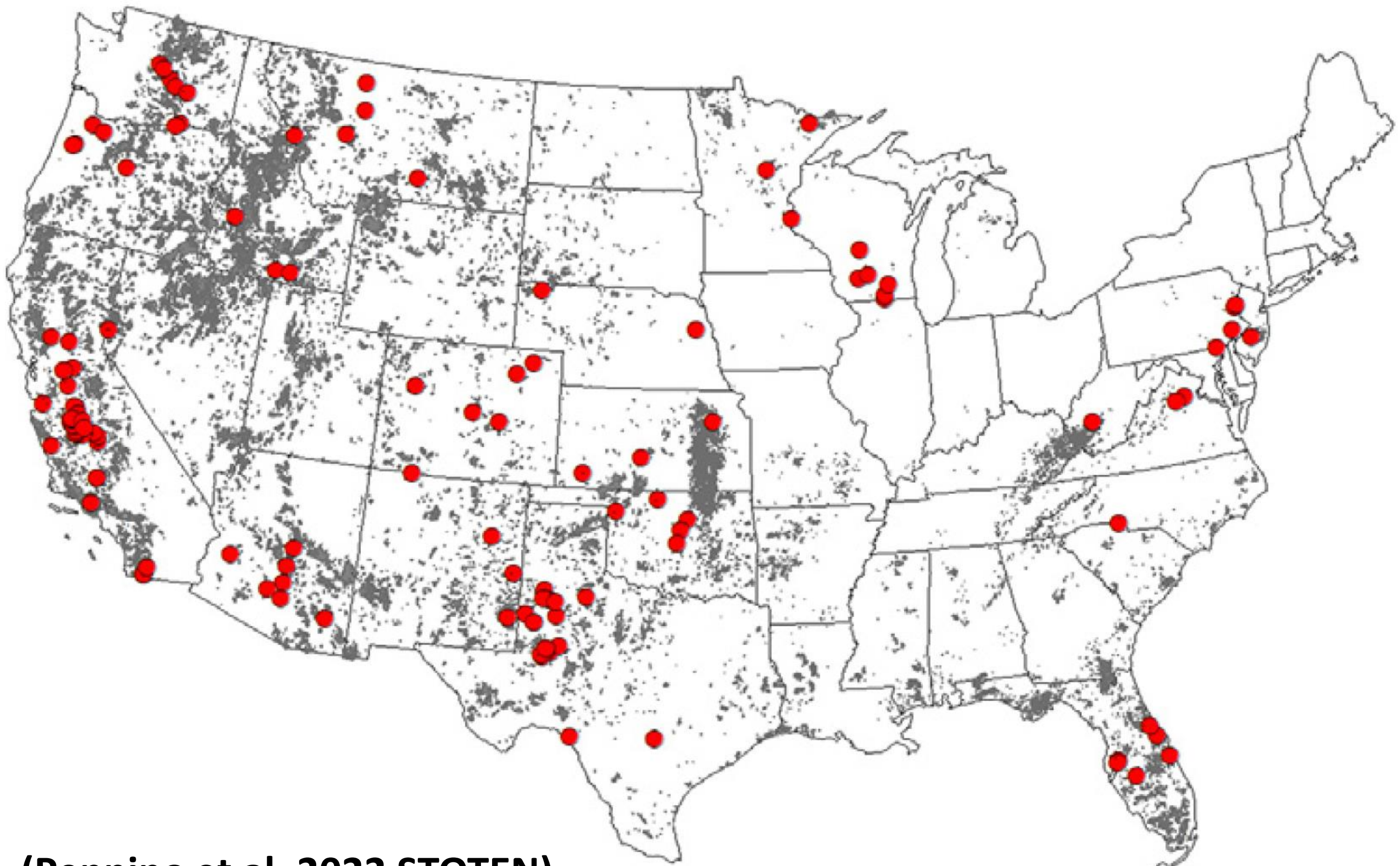


(Lin, Compton, Brooks, Hill, Herlihy, Stoddard, Paulsen In prep.)

Wildfire effects on drinking water violations

- Wildfires occur across much of the conterminous United States.
- Public water systems are often downstream of areas that experience wildfires.
- Used fire records and Safe Drinking Water Information Systems data (SDWIS)
- Wildfires are associated with increased drinking water contaminant levels that can last multiple years after wildfire.
- Nitrate, DBPs, Arsenic

Wildfires (grey) and locations (red) where drinking water violations increased for either nitrate, disinfection byproducts, arsenic, and/or volatile organic compounds

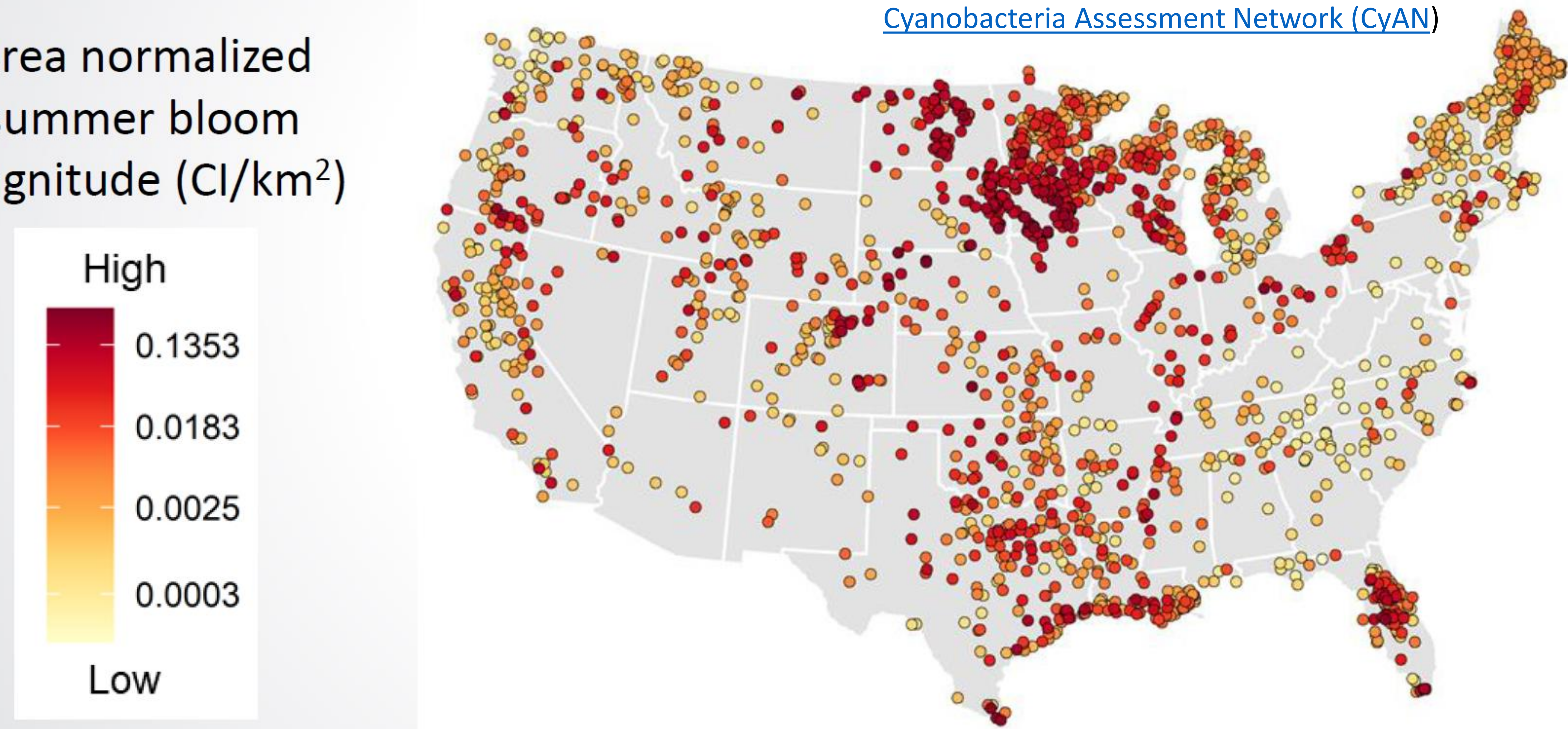


(Pennino et al. 2022 STOTEN)

Cyanobacterial data – weekly over time

[Cyanobacteria Assessment Network (CyAN)](#)

Area normalized summer bloom magnitude (CI/km²)



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