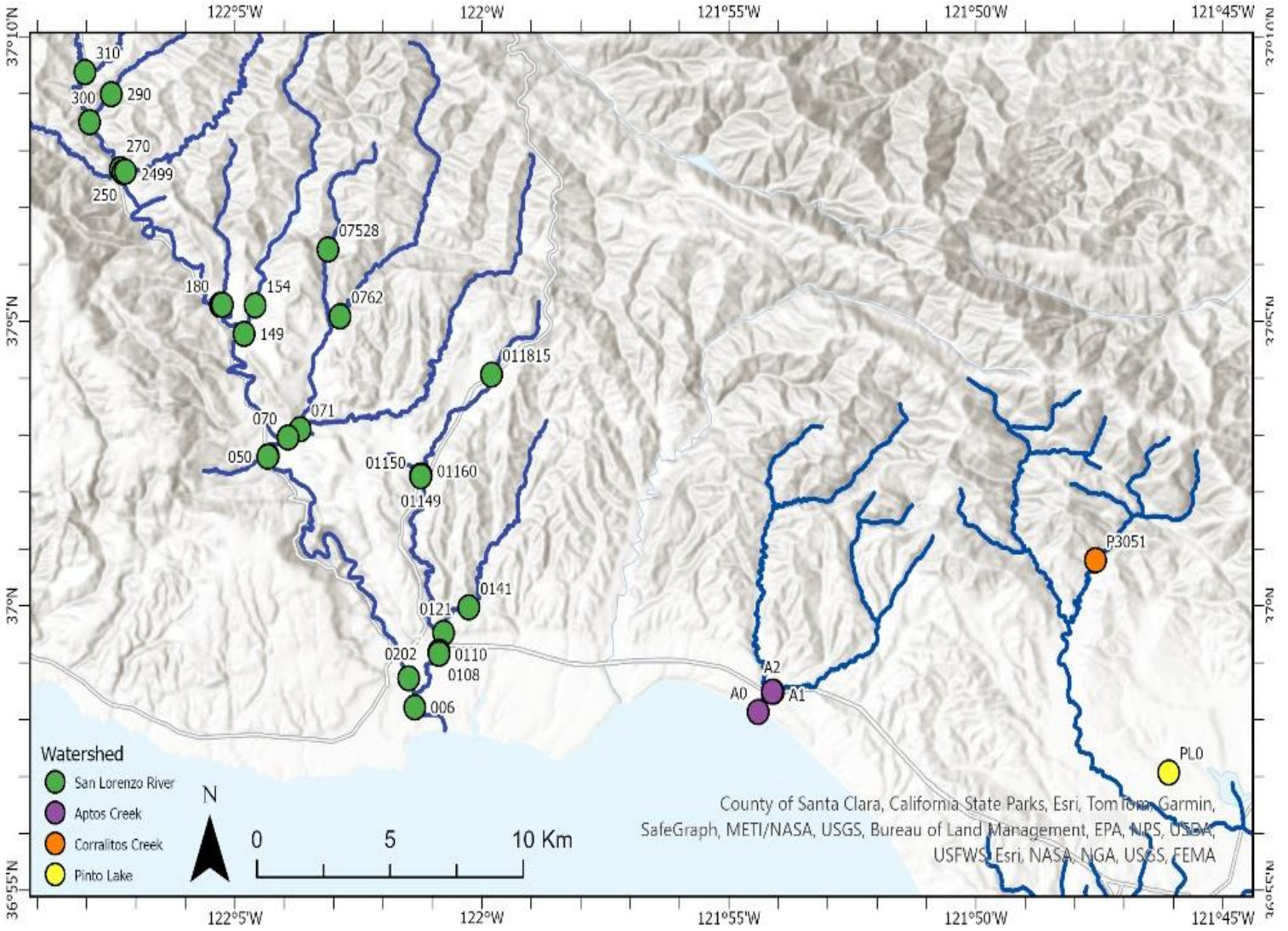
LAMP water quality monitoring trends

Dr. Emily Donham, Supervising Water Quality Specialist

Water quality monitoring program

- 26 sites in LAMP assessment



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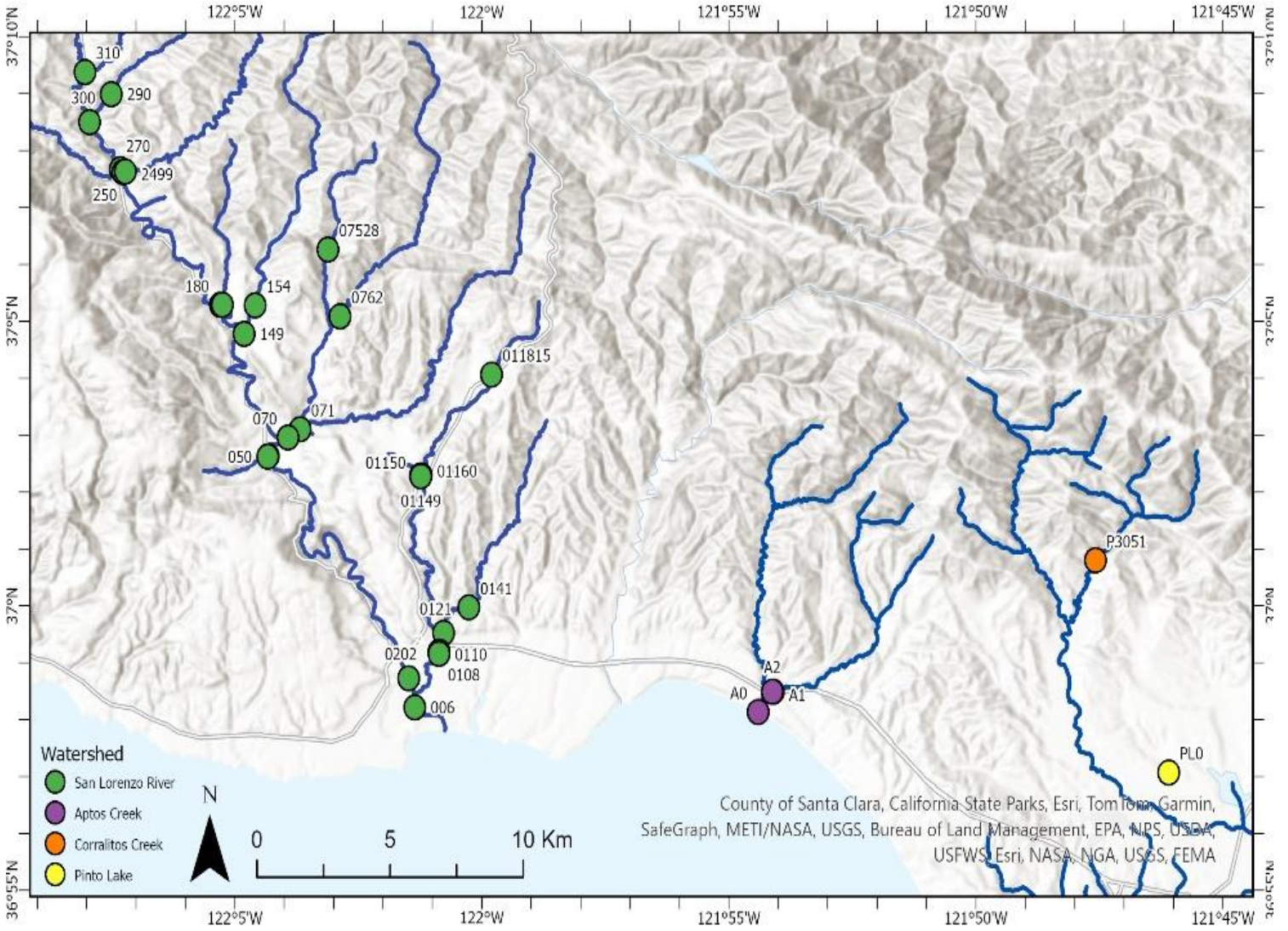

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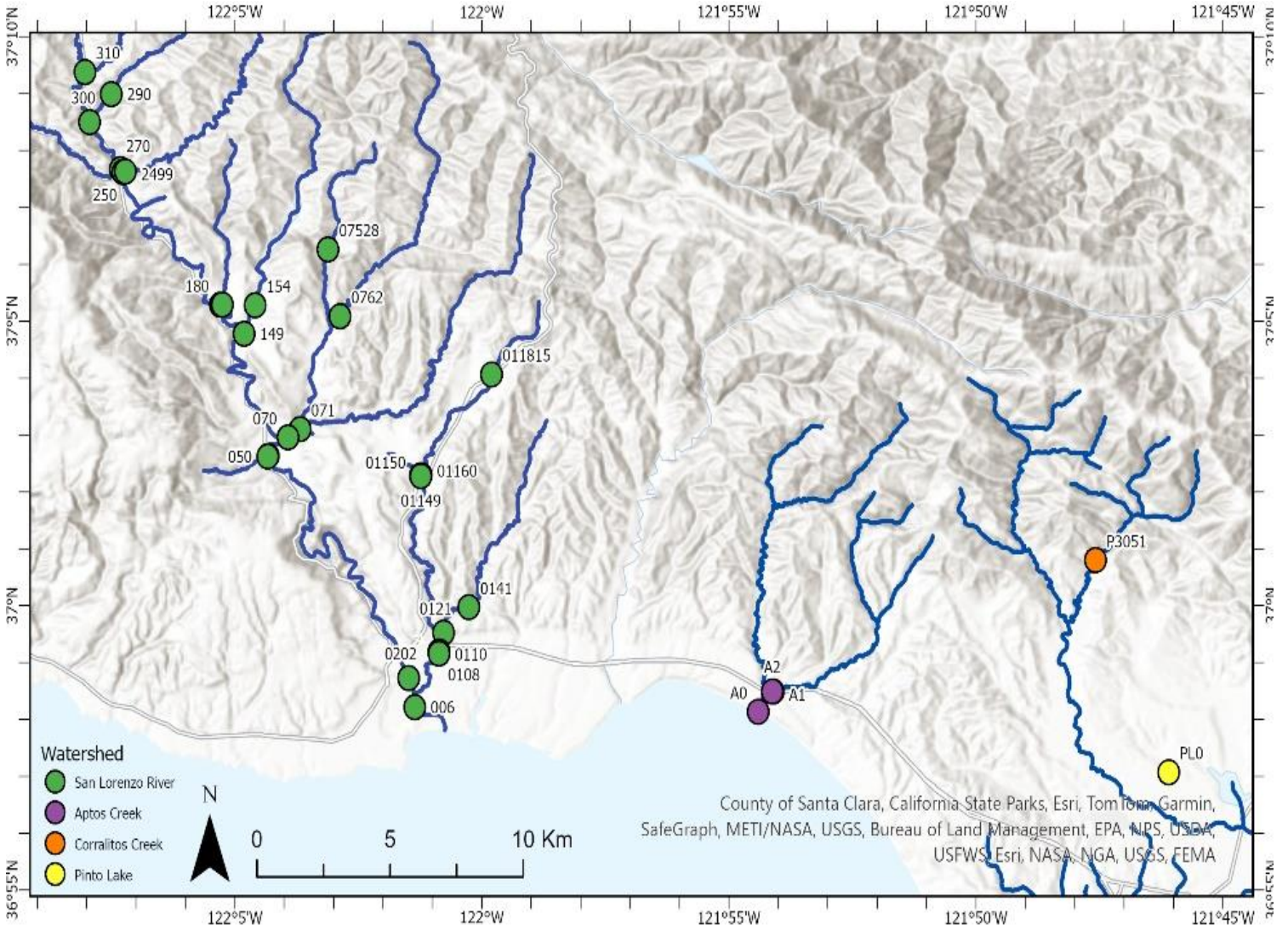

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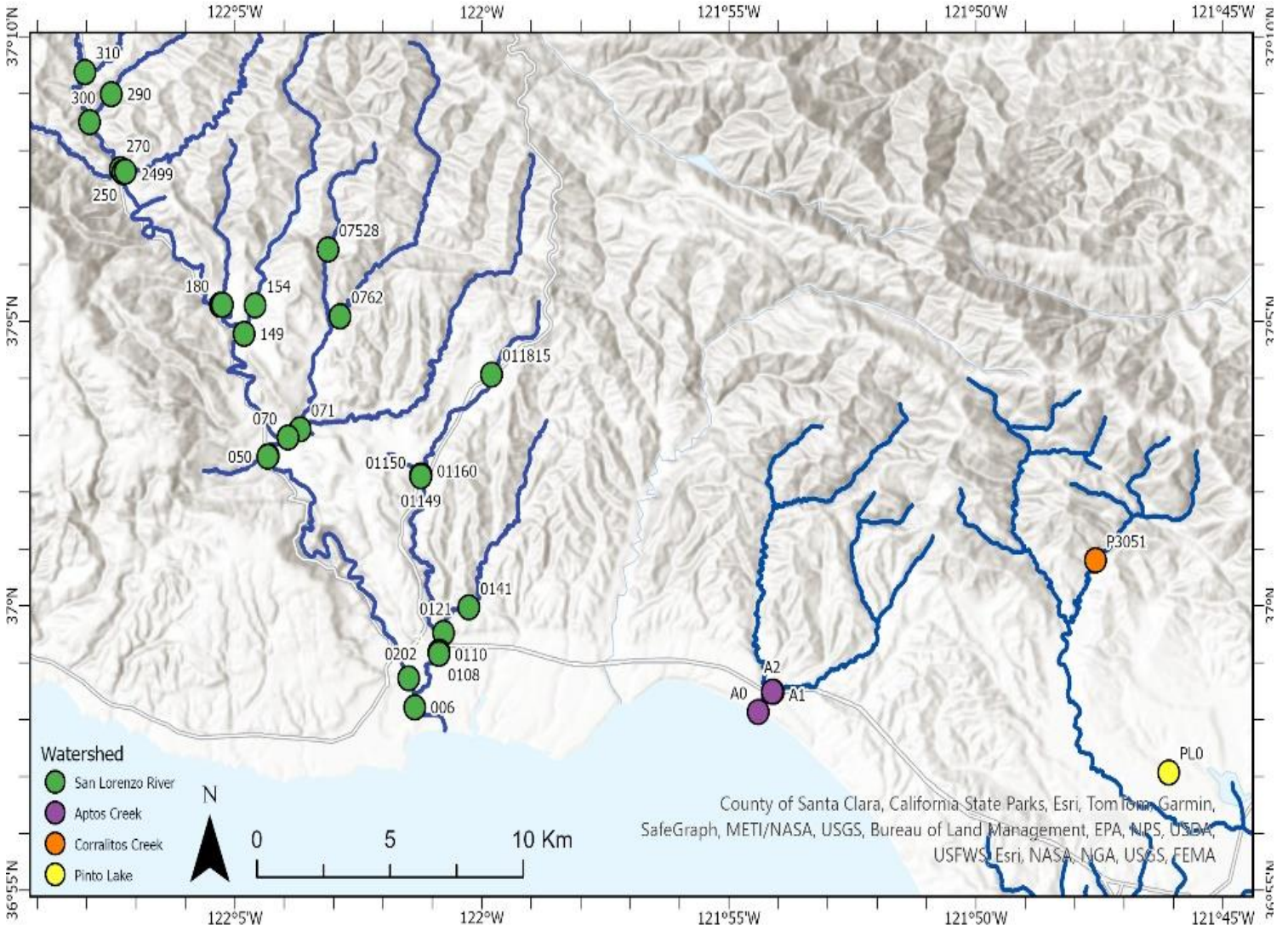
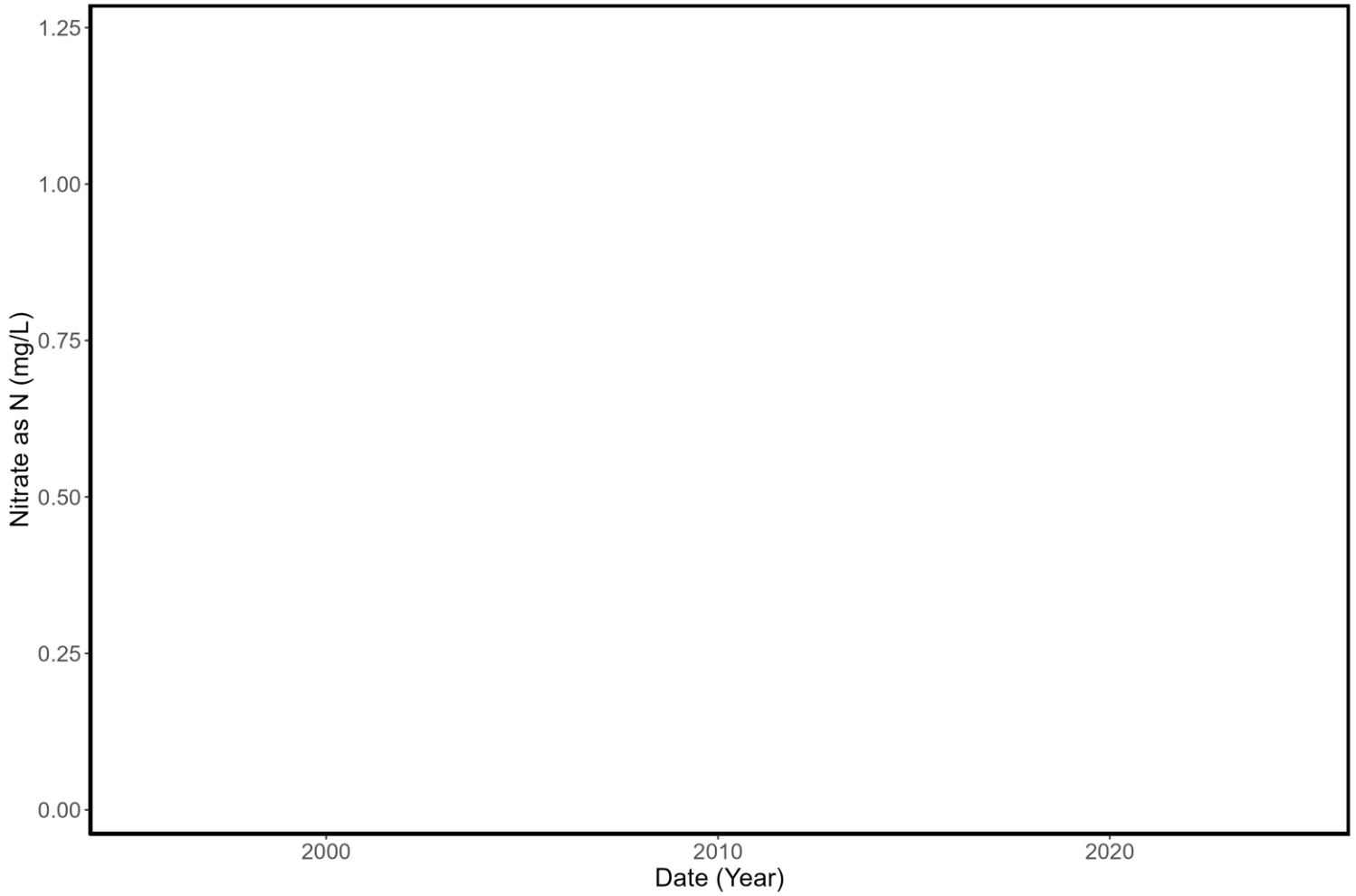


Nitrate trends

Nitrate data

- TMDL target concentration < 0.33 mg/L nitrate as nitrogen
- 6-30 years of nitrate data
- Water years 1994-2024
- San Lorenzo River time series ~30 years
- Aptos and Pinto Lake watersheds 6-20 year time series

Are nitrate concentrations declining over time?



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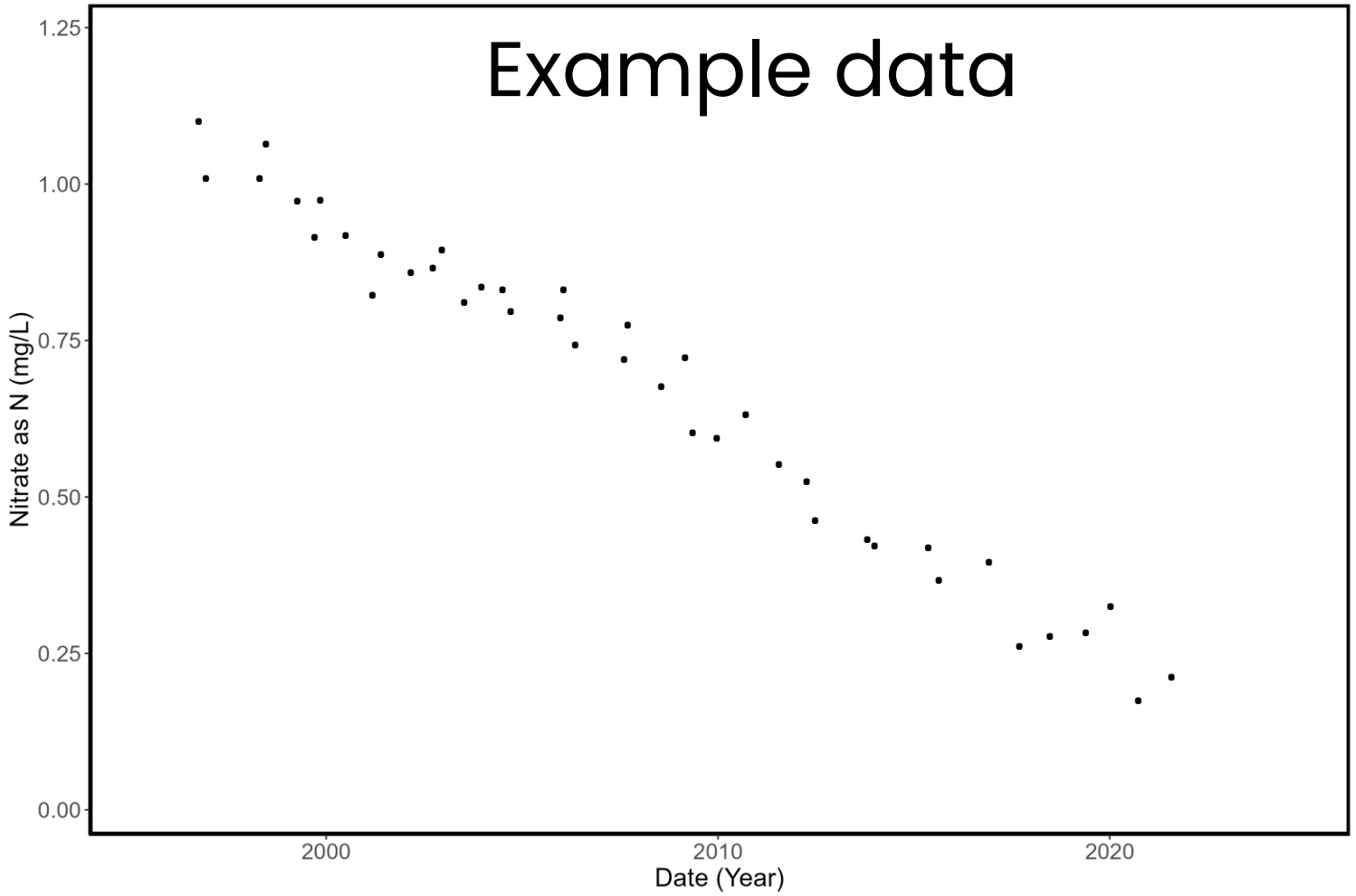

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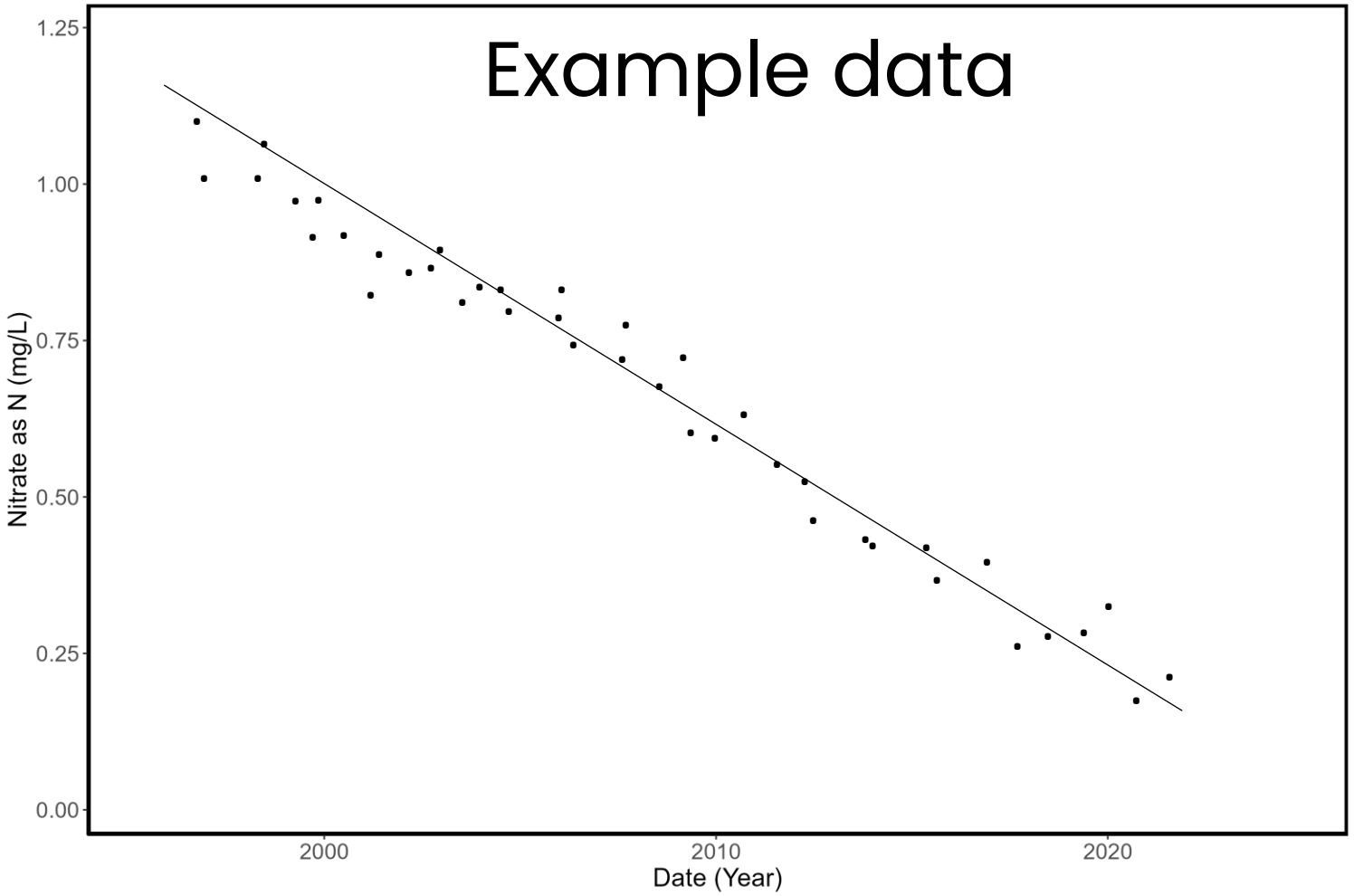
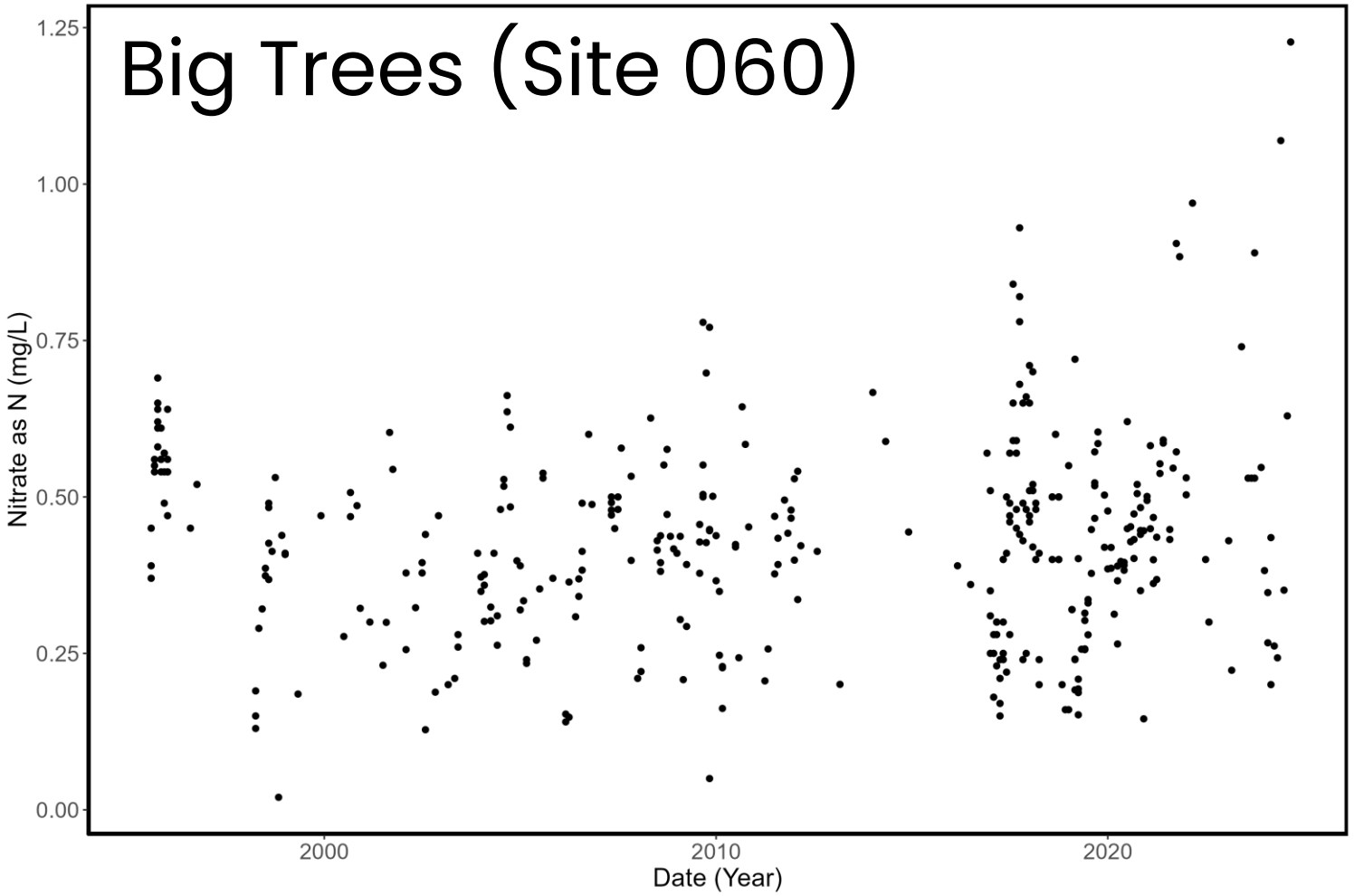
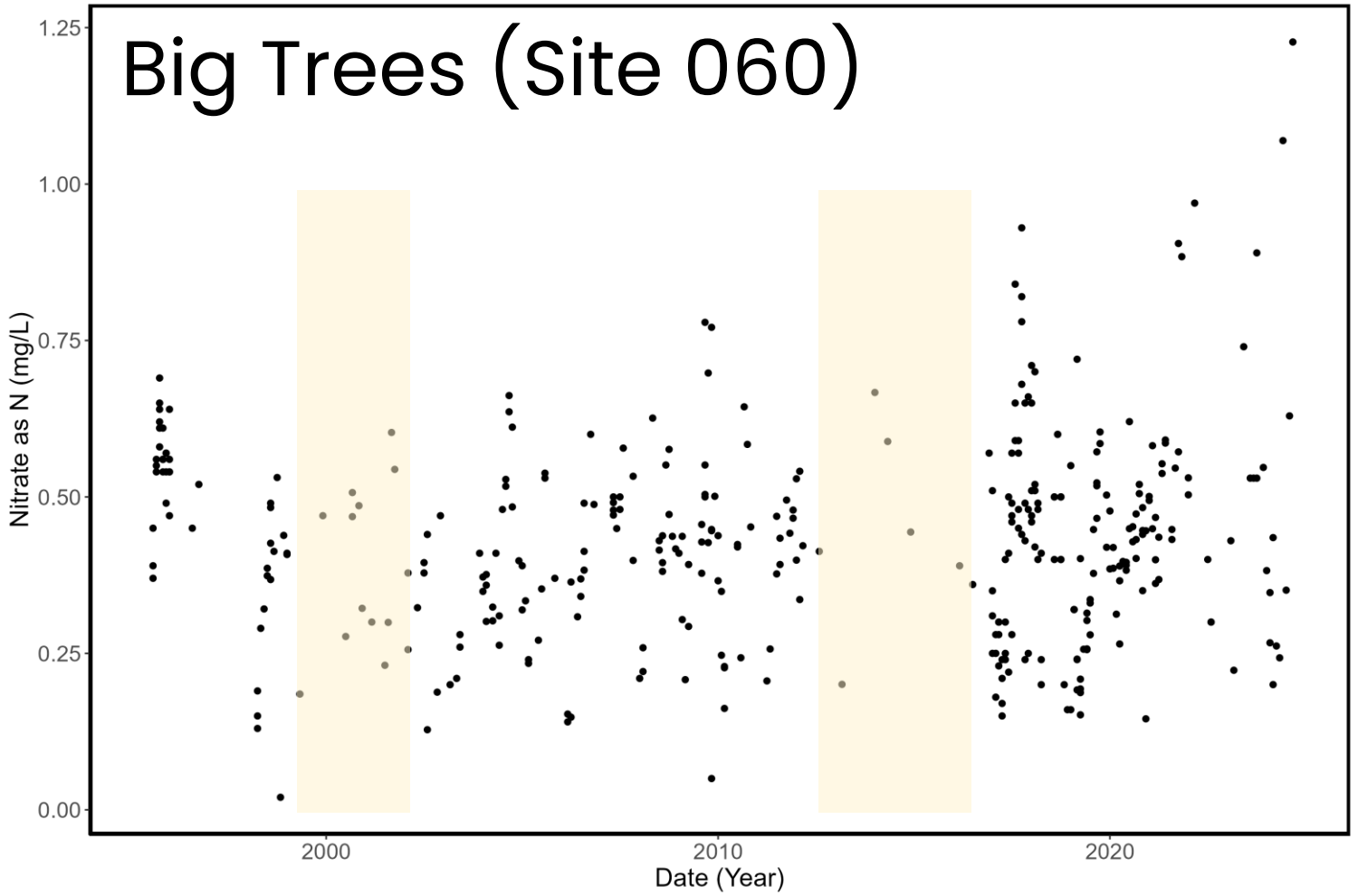


Time series are highly dynamic



Differences in sampling effort over time creates challenges for trend analysis



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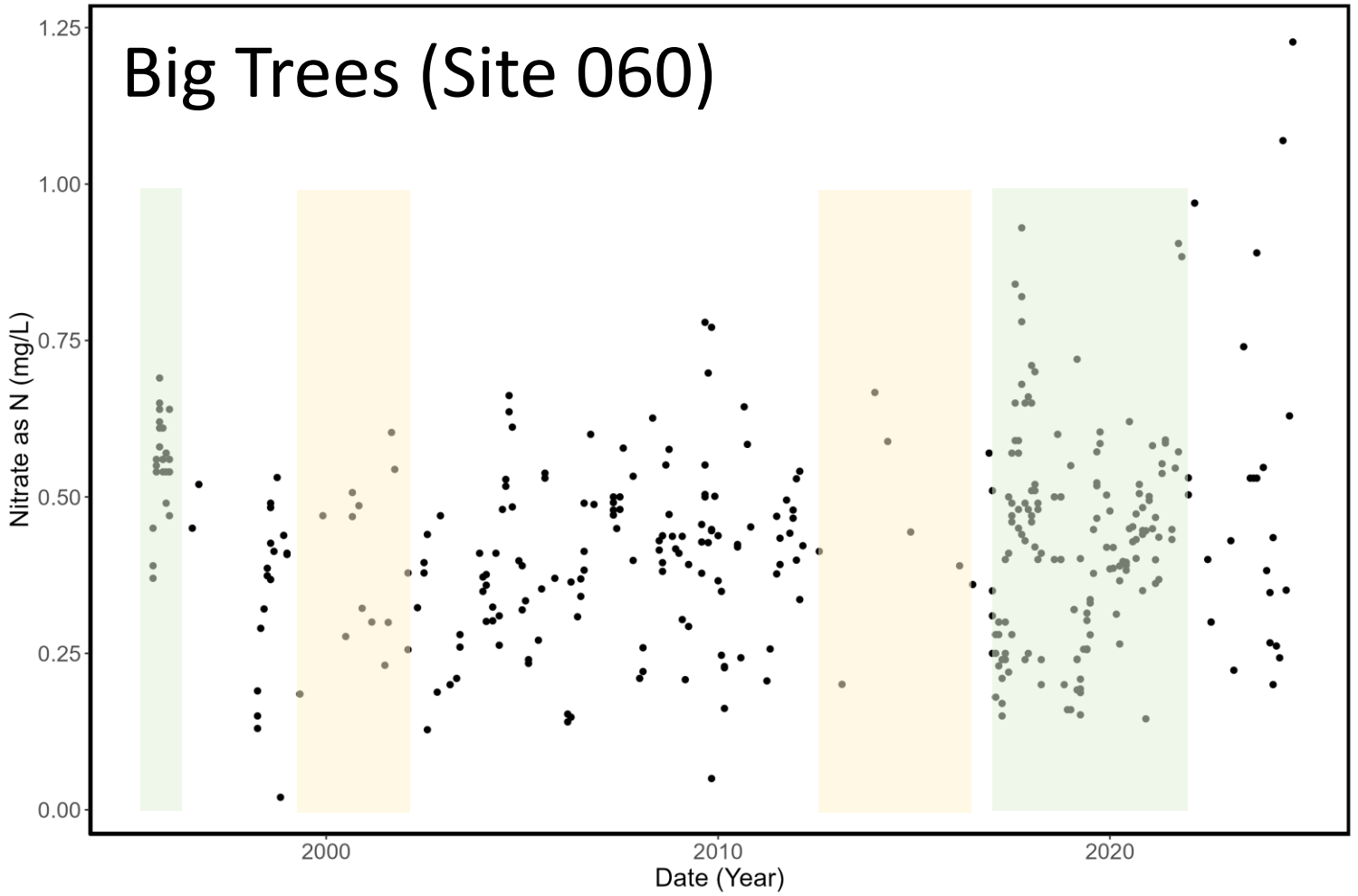
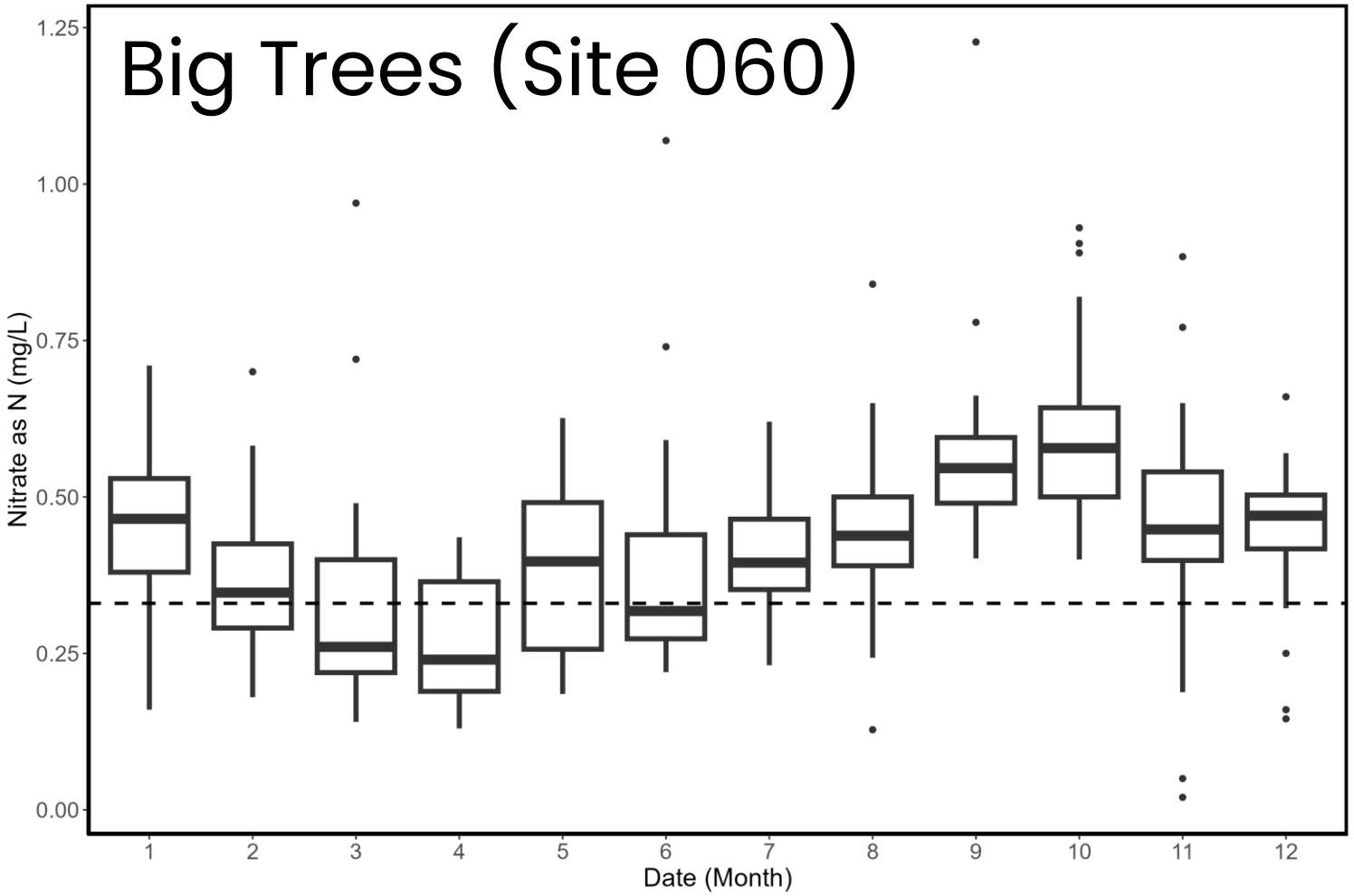
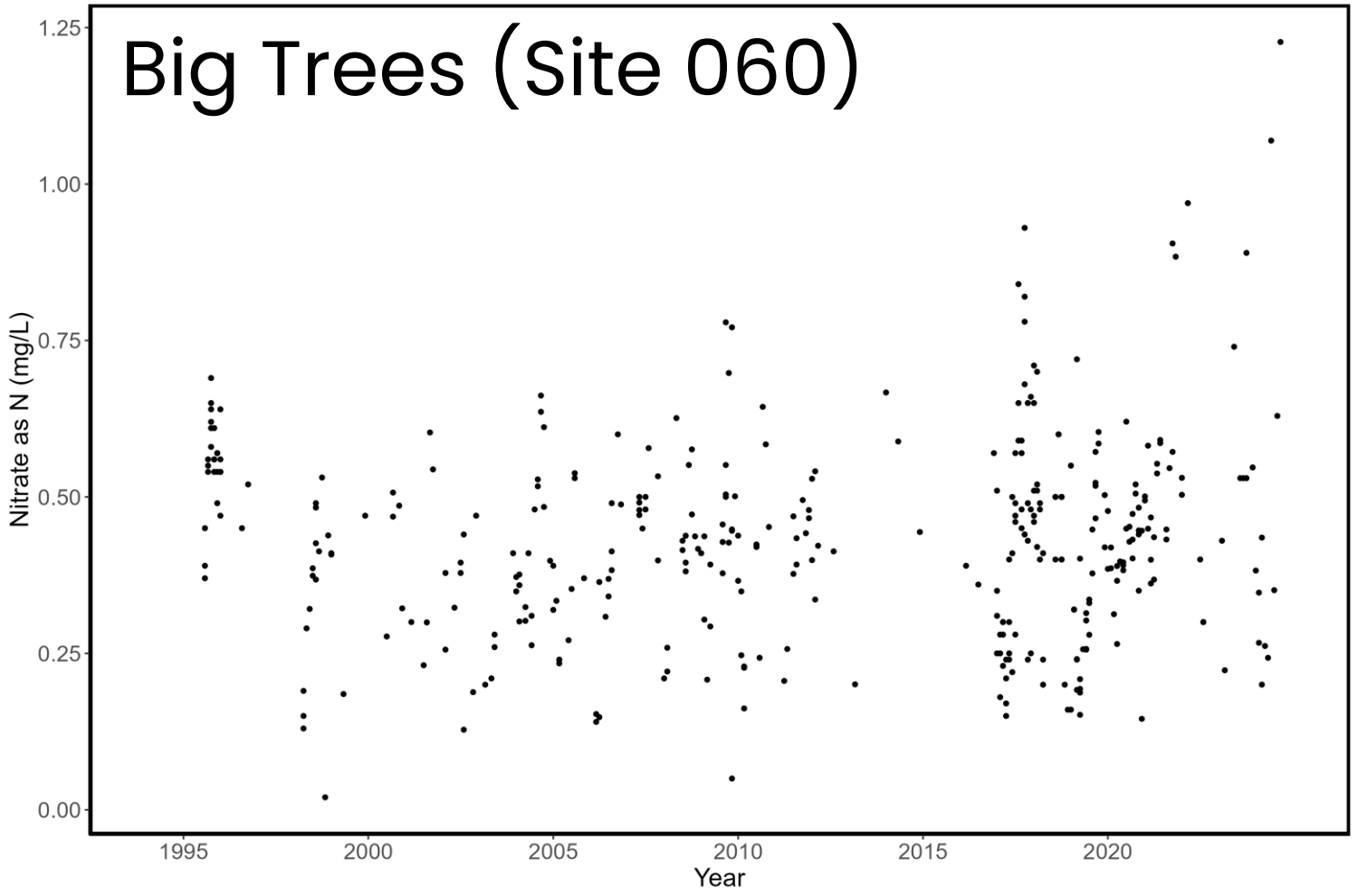


Different scales of variability creates challenges for trend analysis



General additive models can fill in gaps in unevenly sampled data and quantify uncertainty



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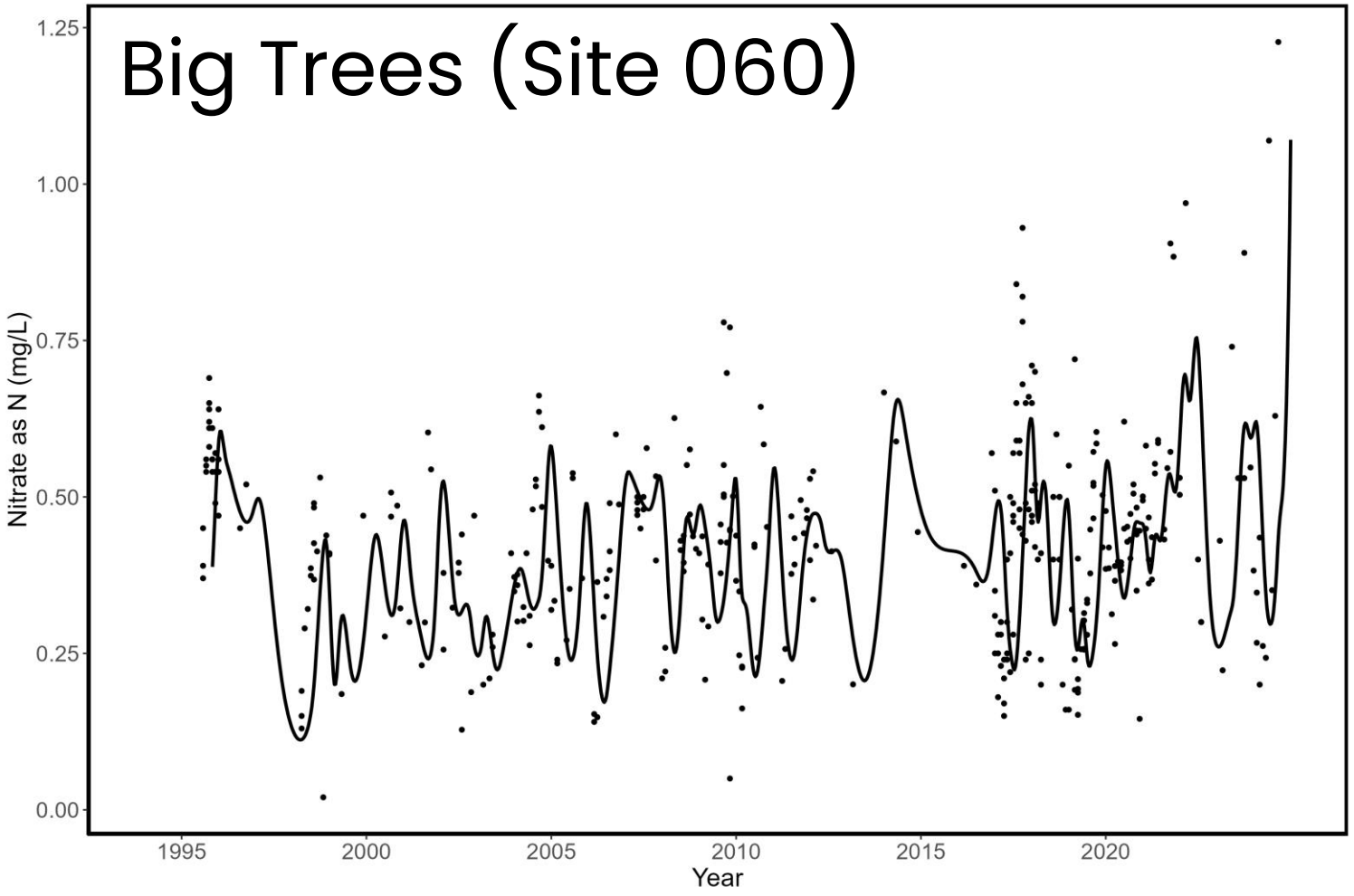
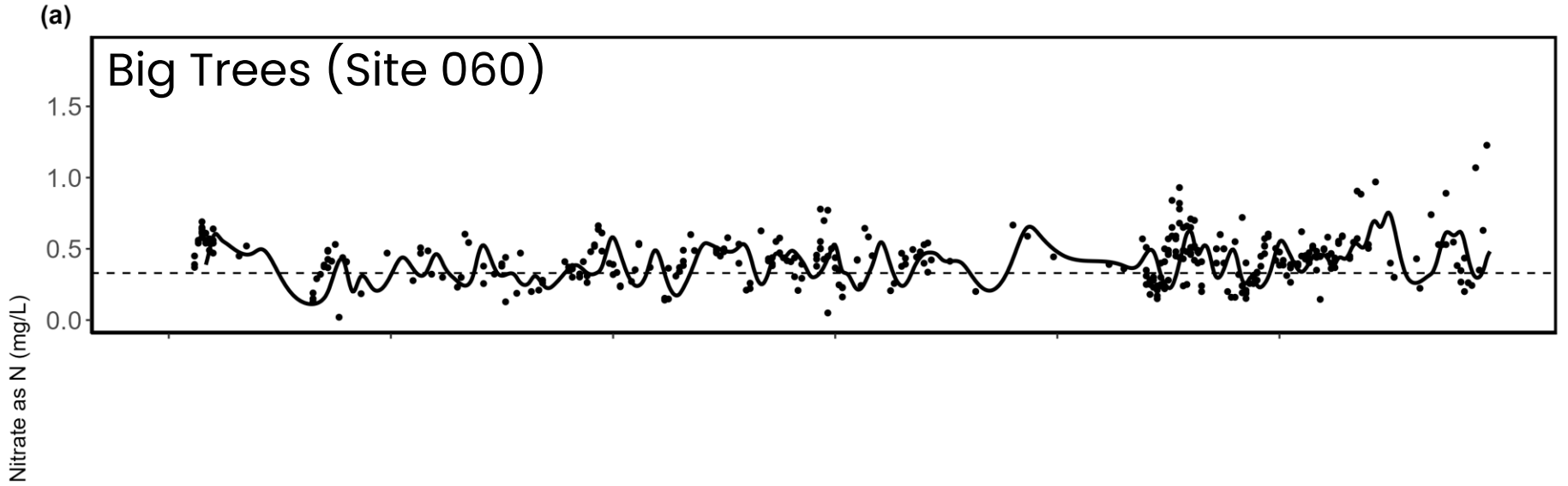


Means and uncertainty from GAMs can be extracted for statistical trend analysis



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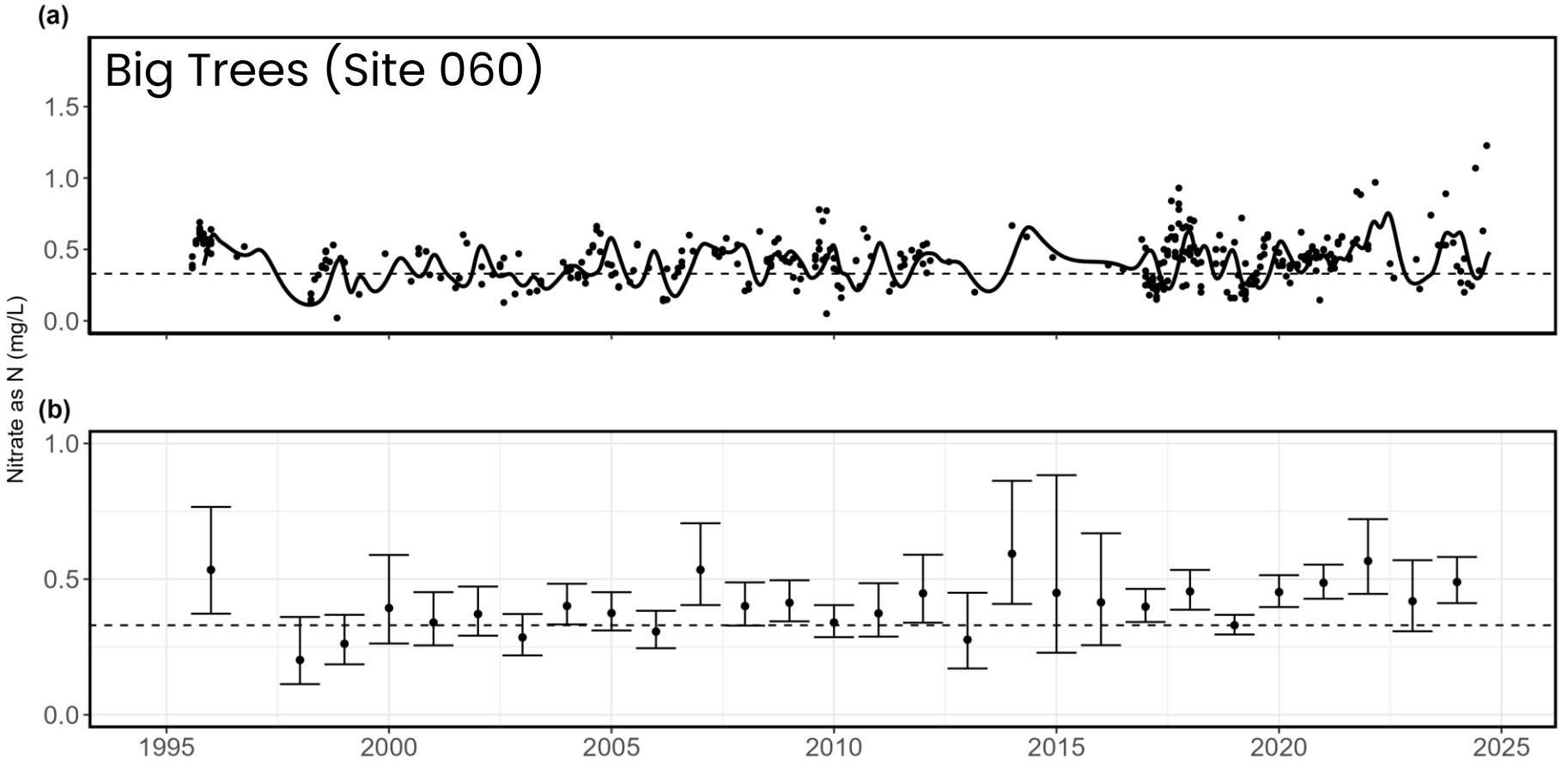

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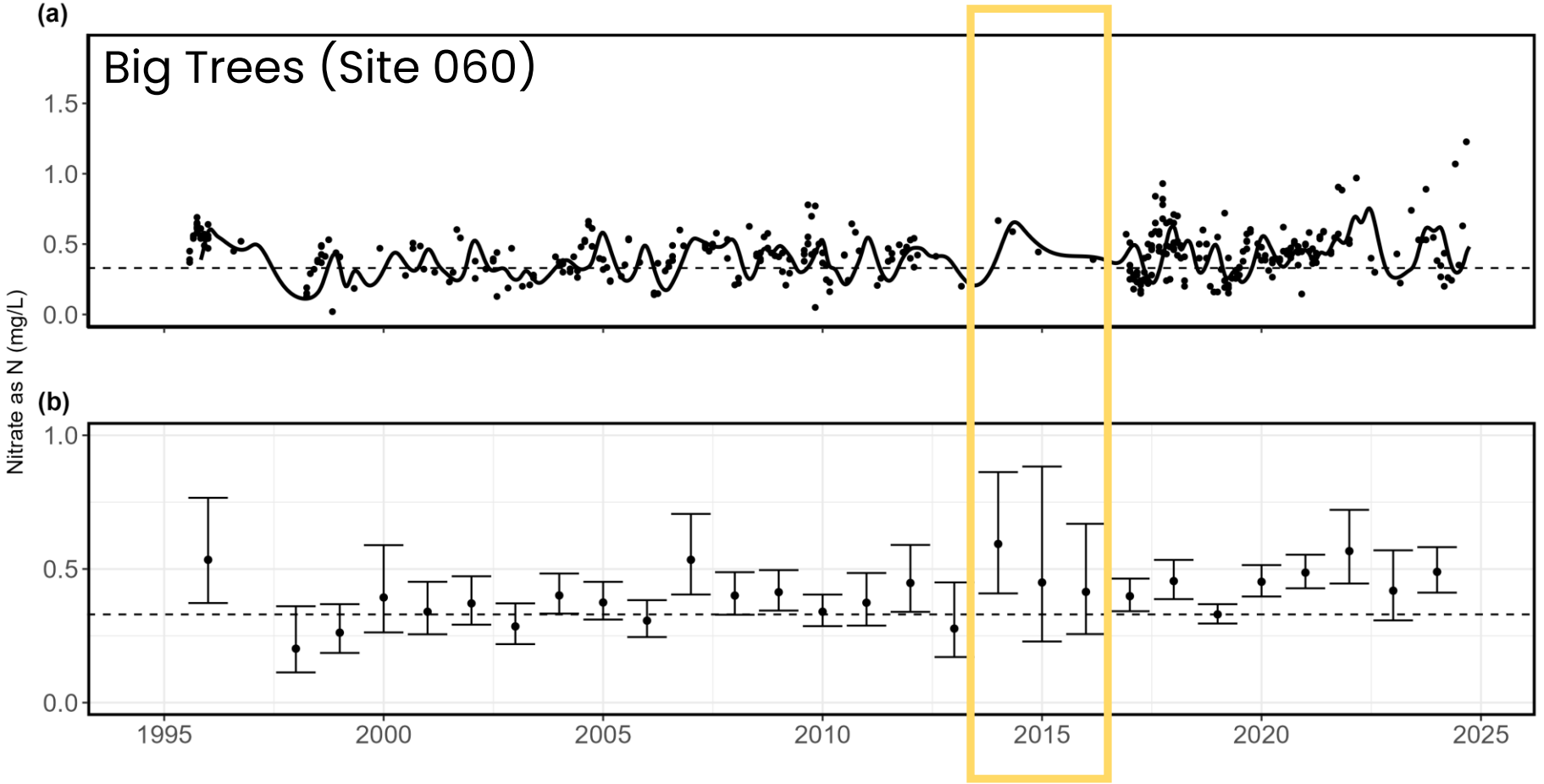

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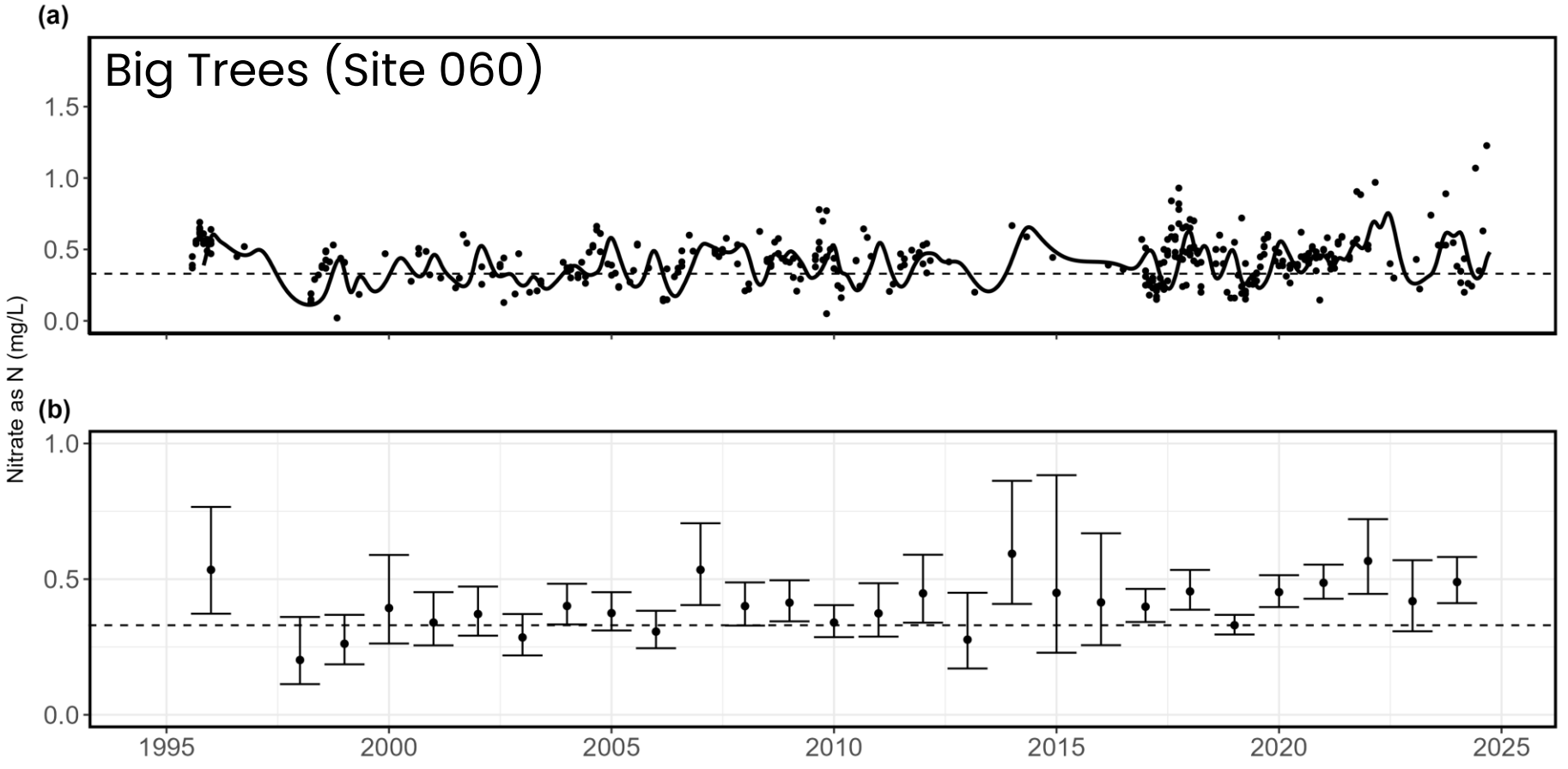

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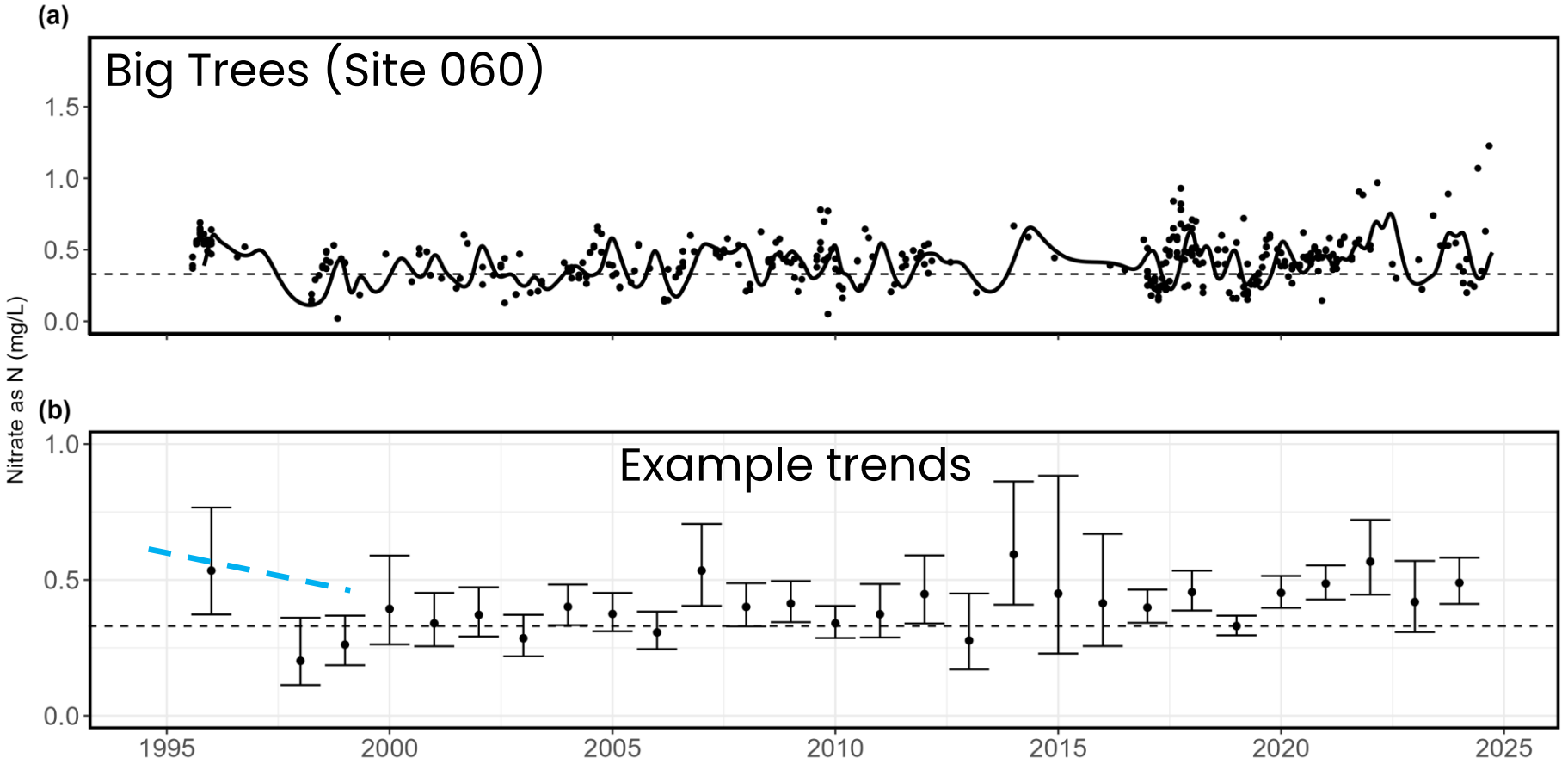

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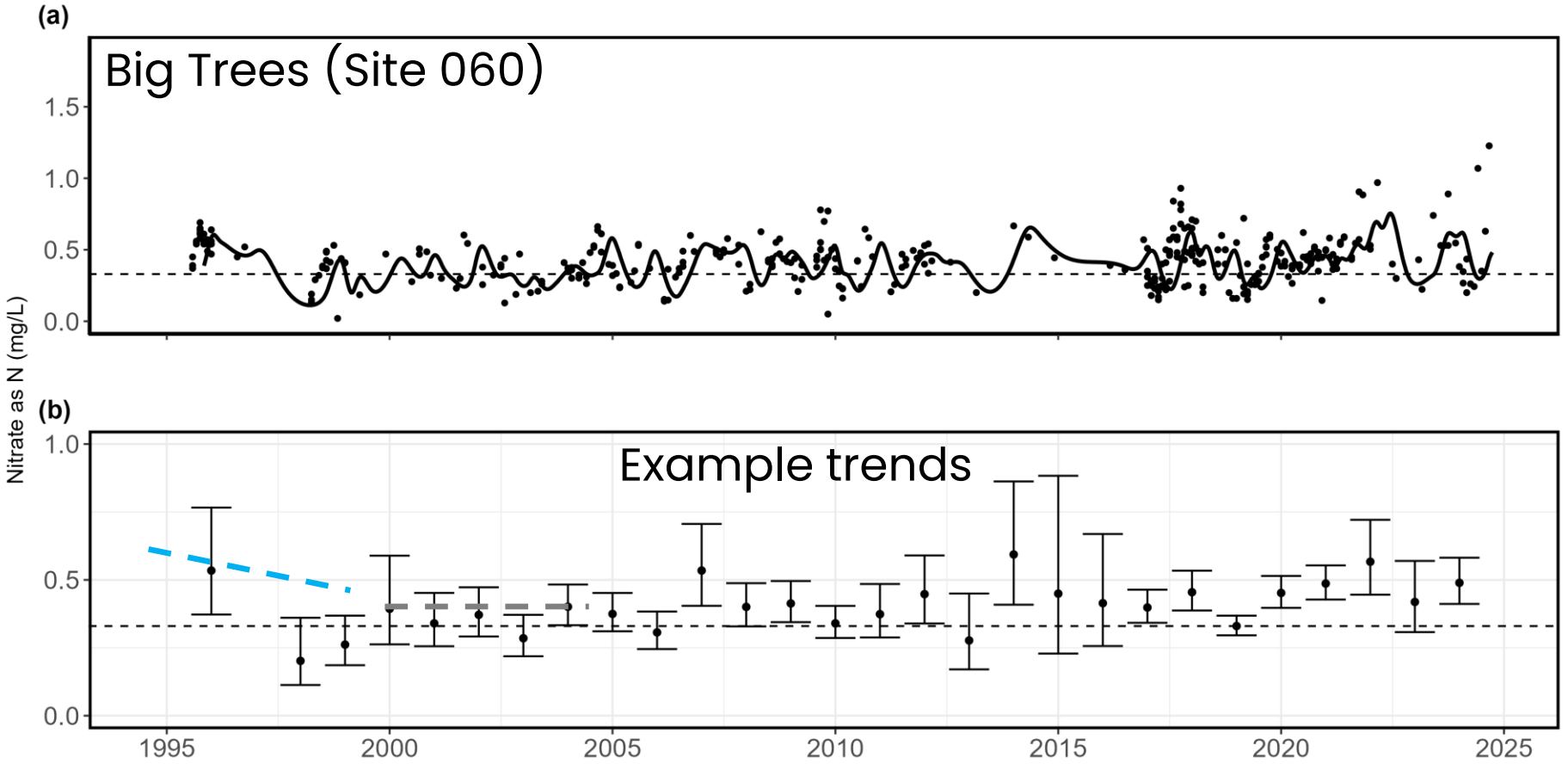

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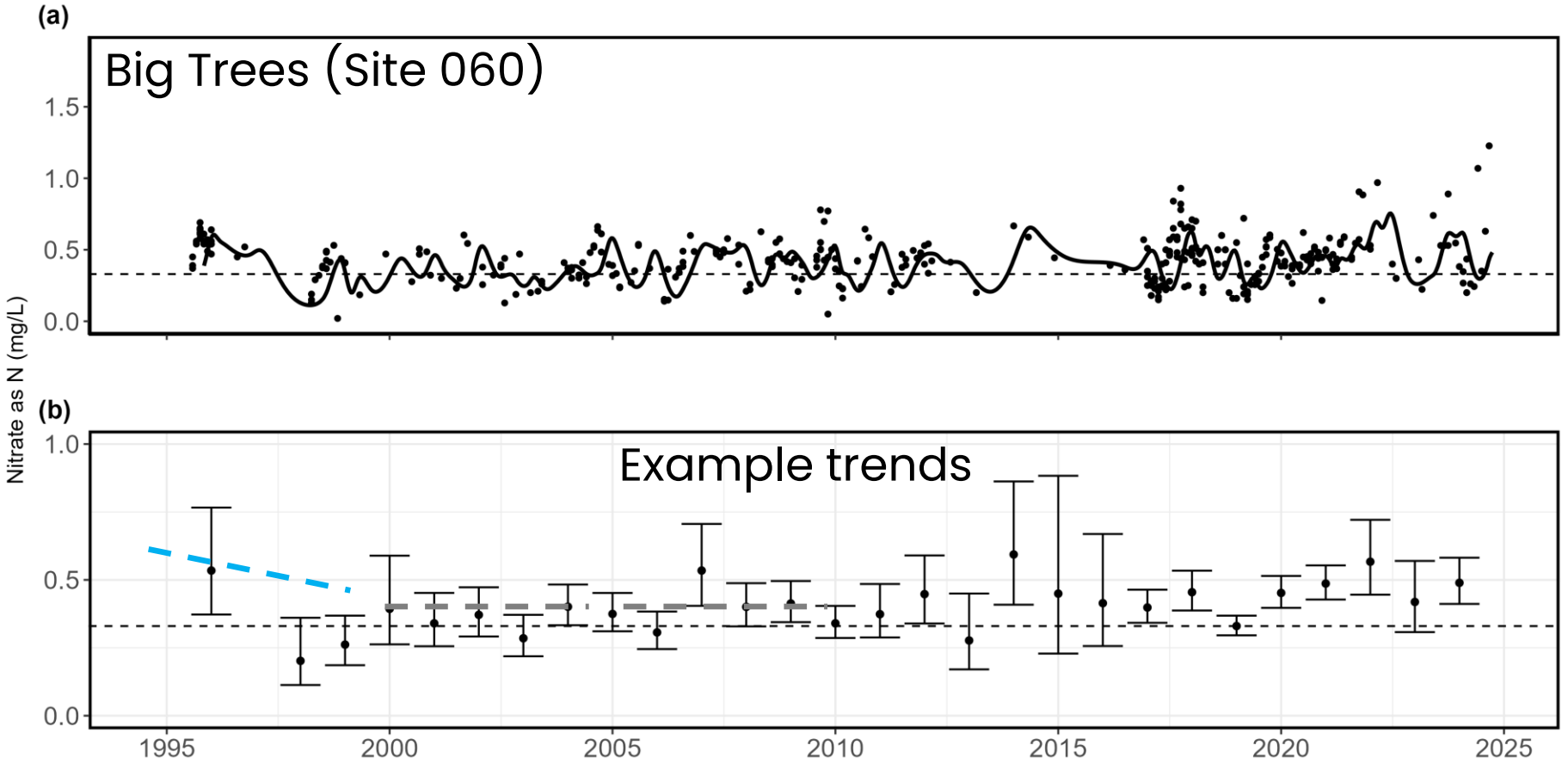

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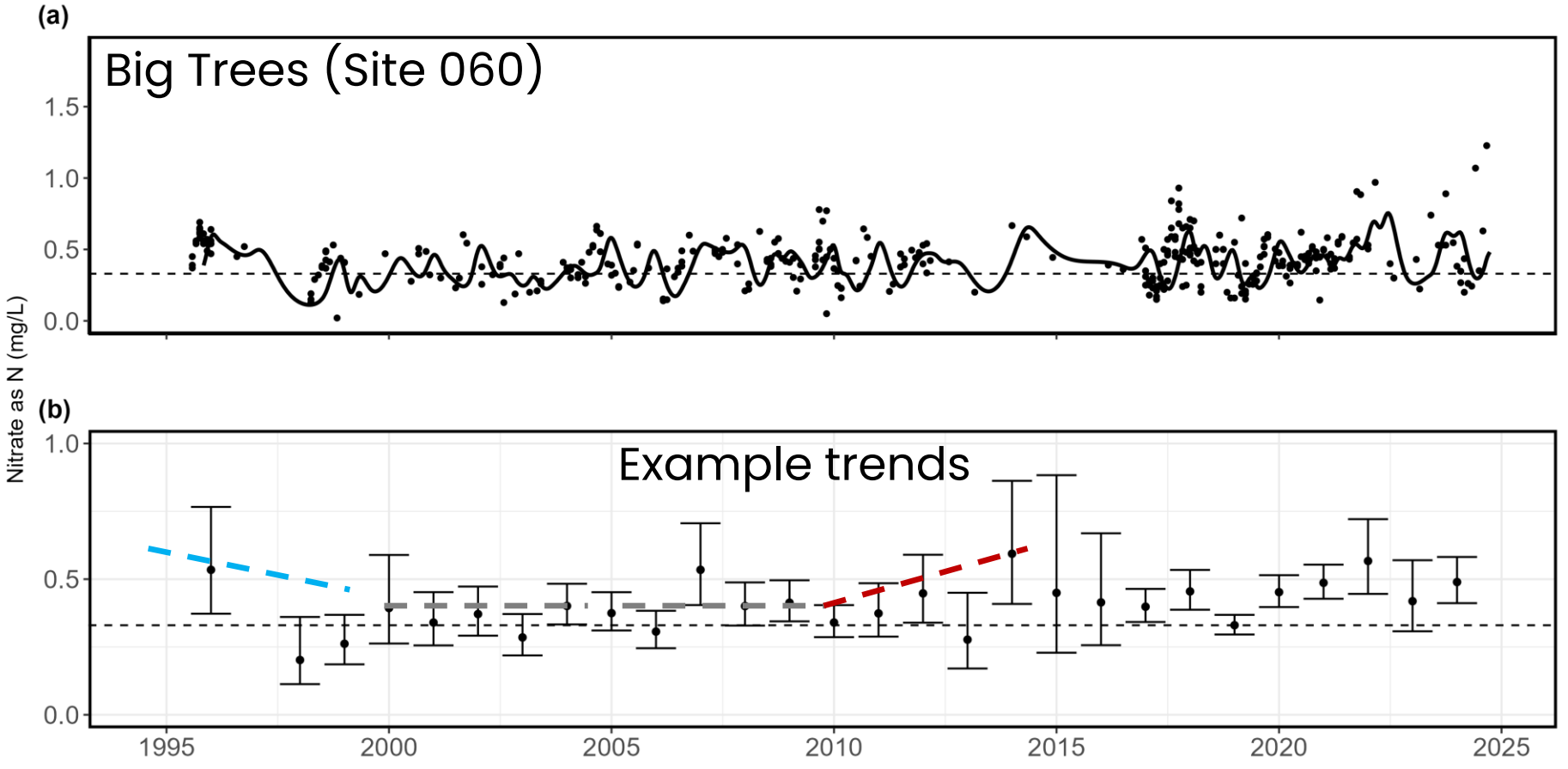

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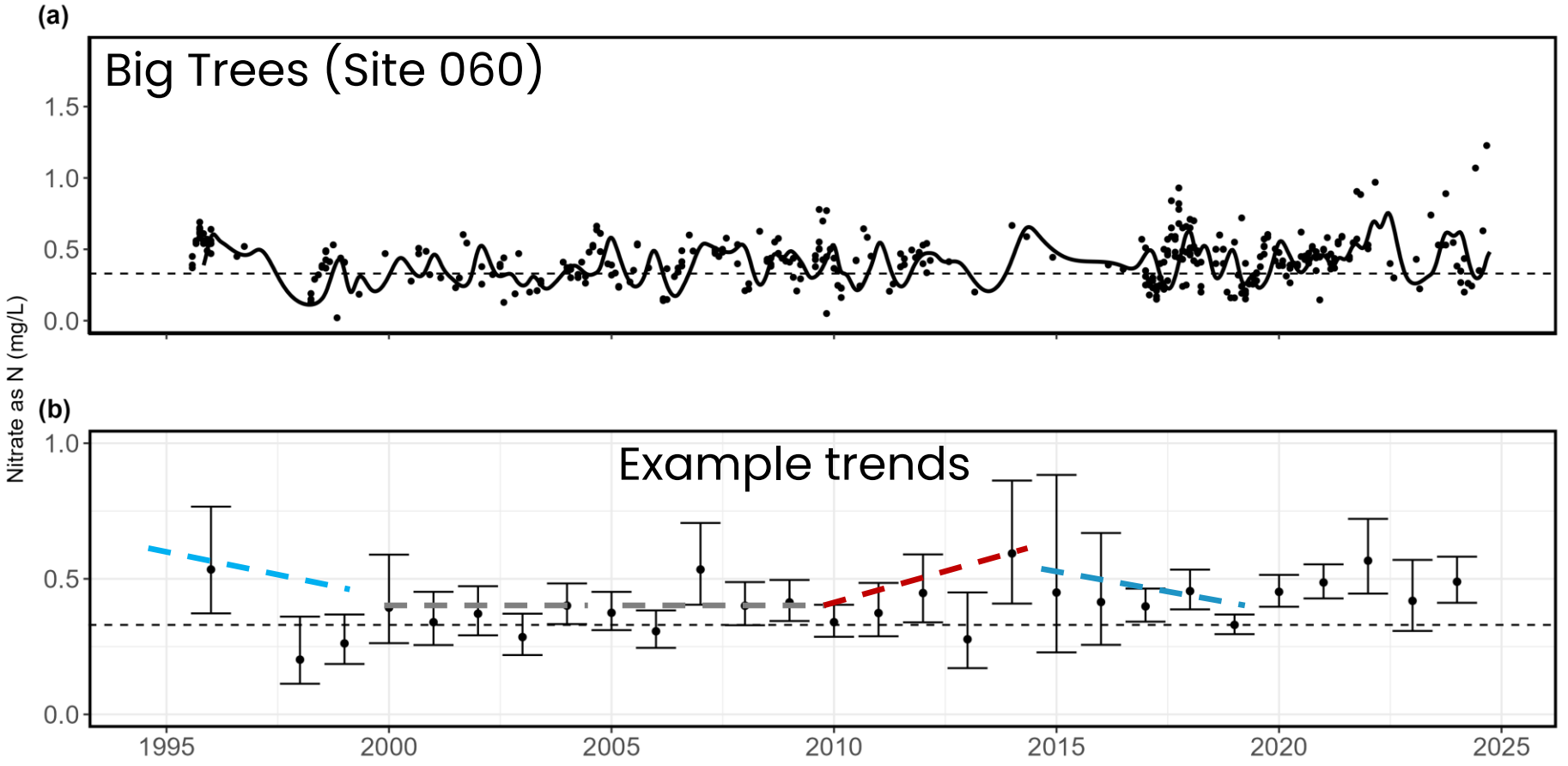

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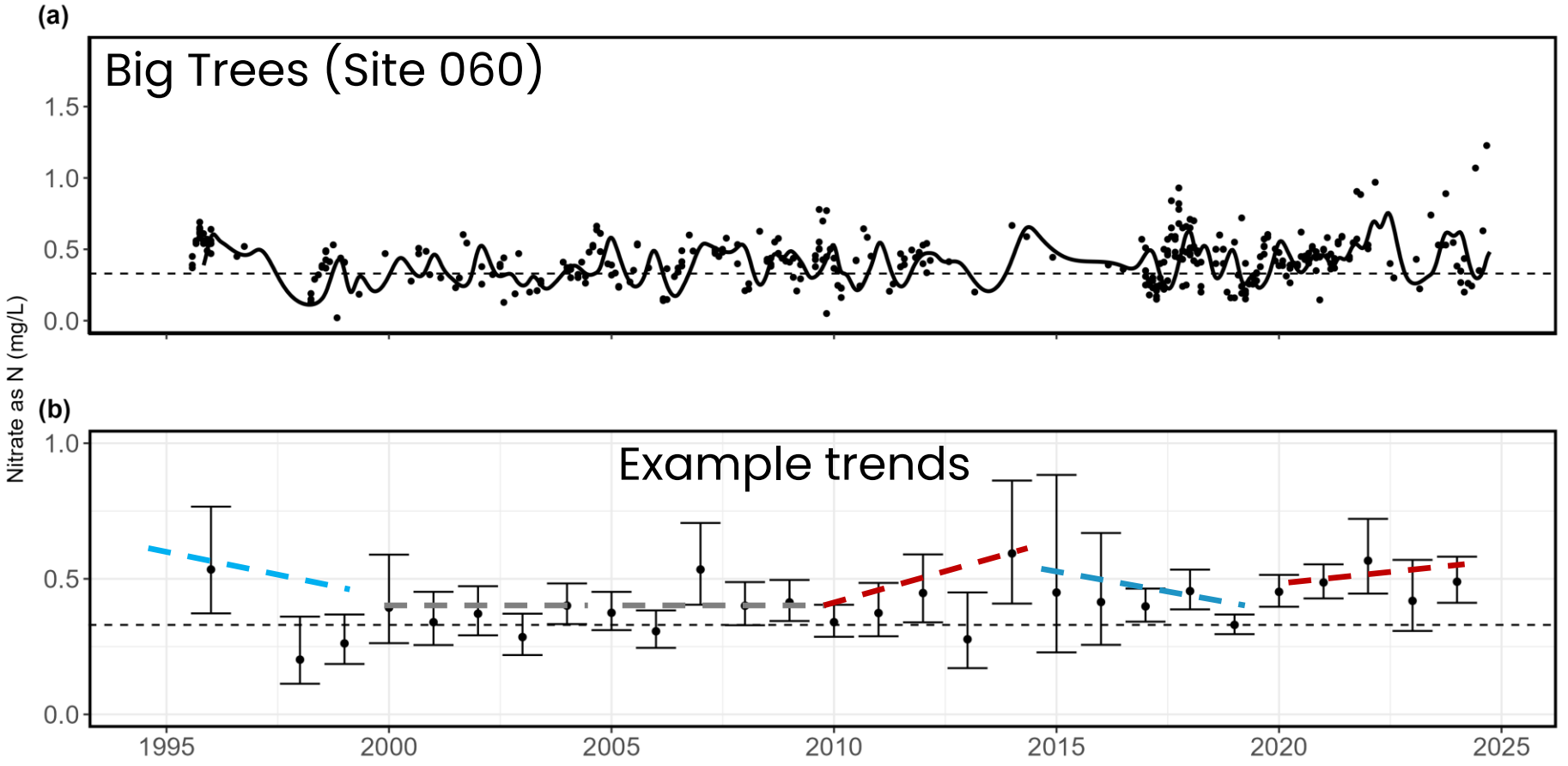
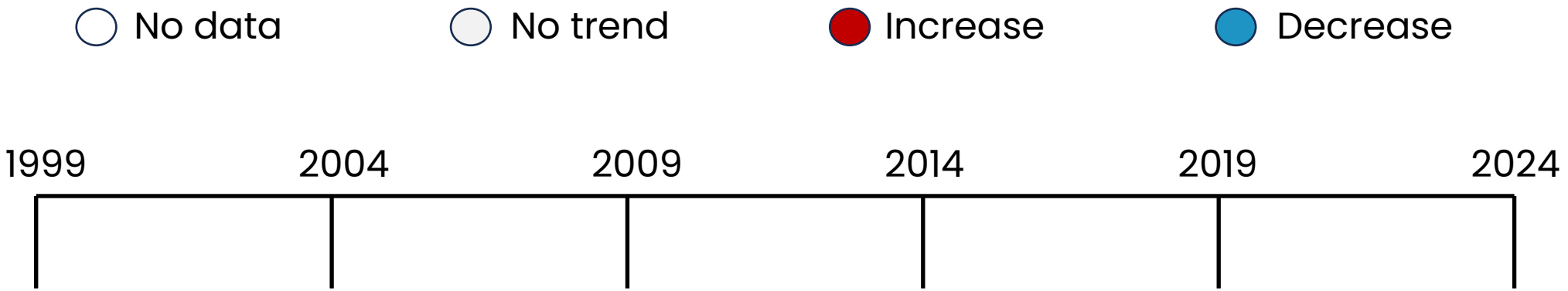


5-year nitrate trends not consistent across time



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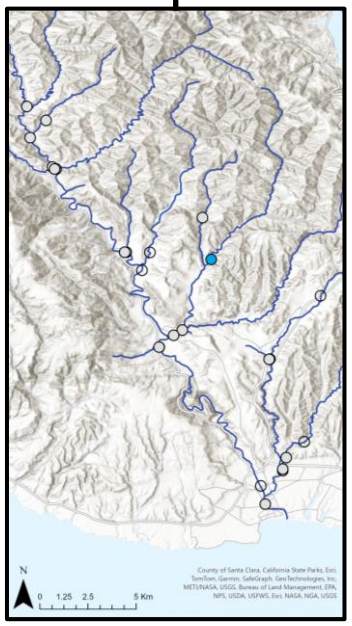

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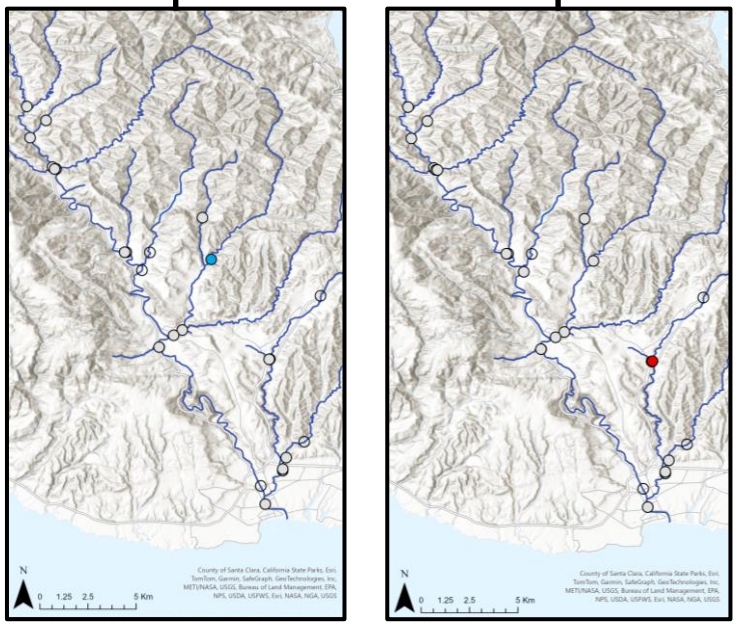

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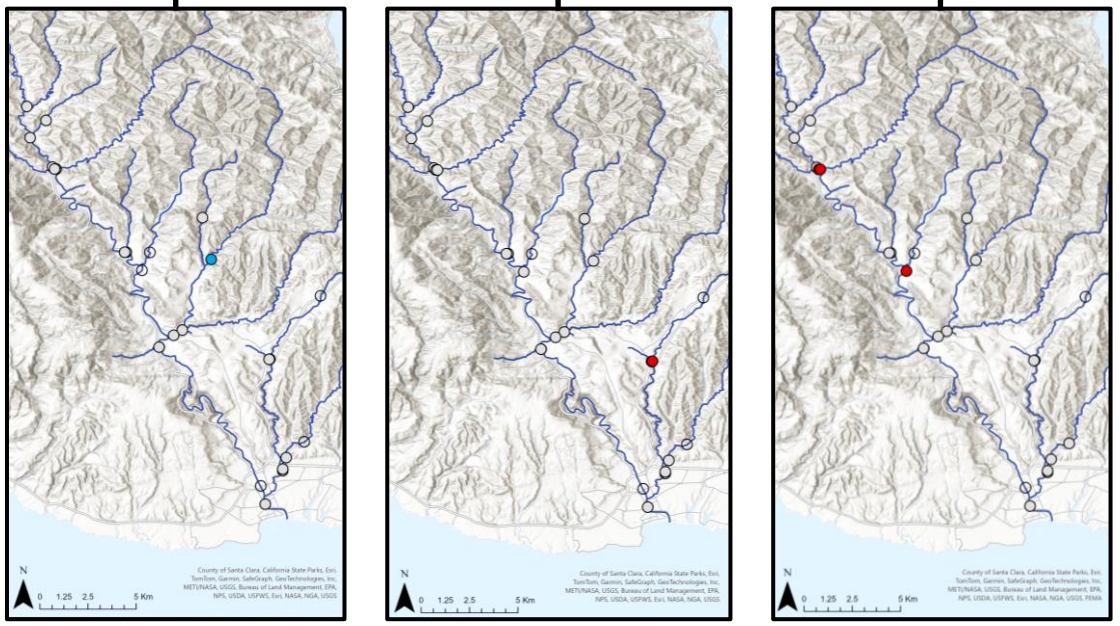

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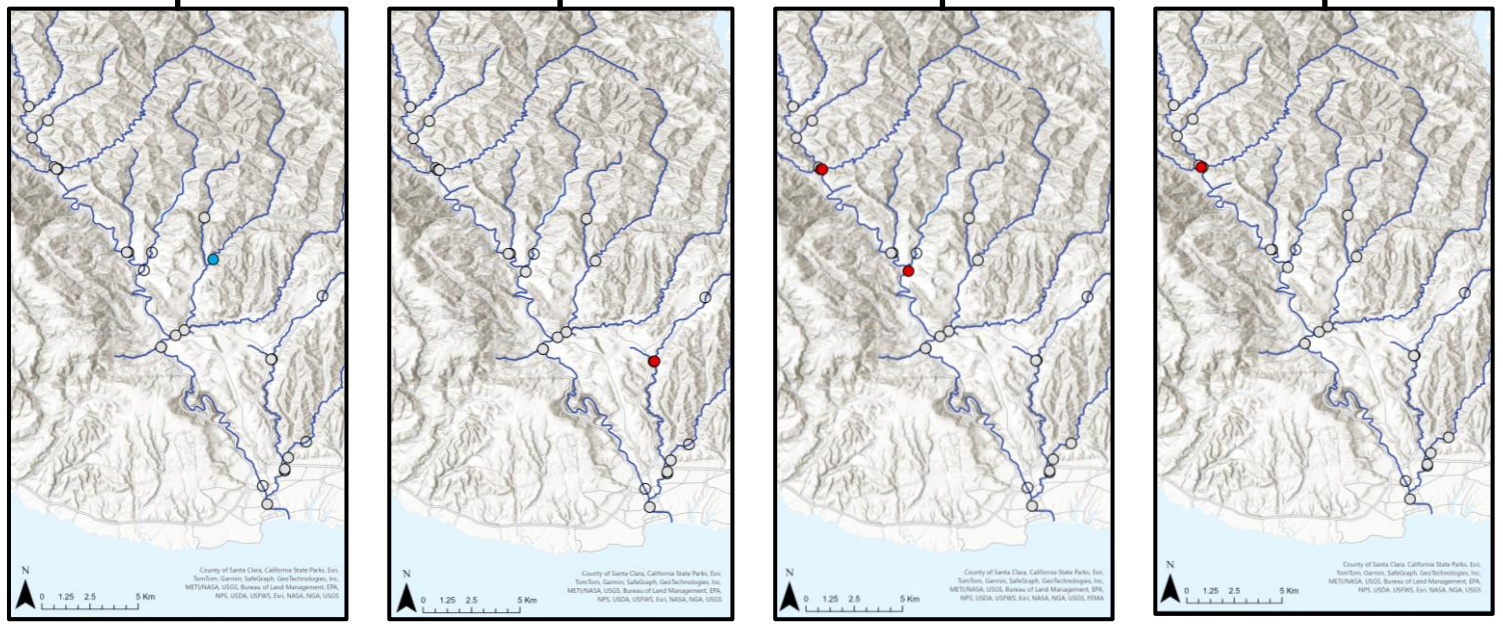

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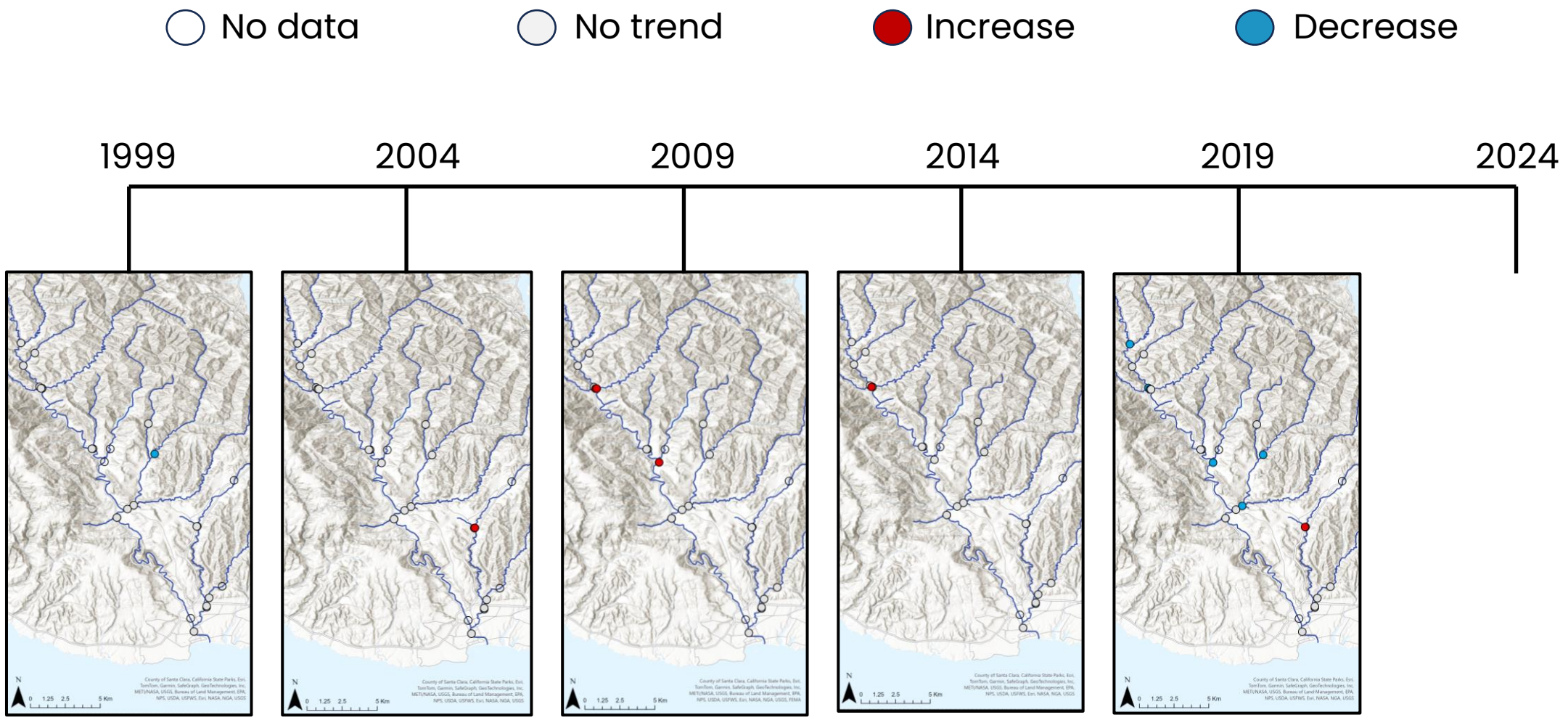

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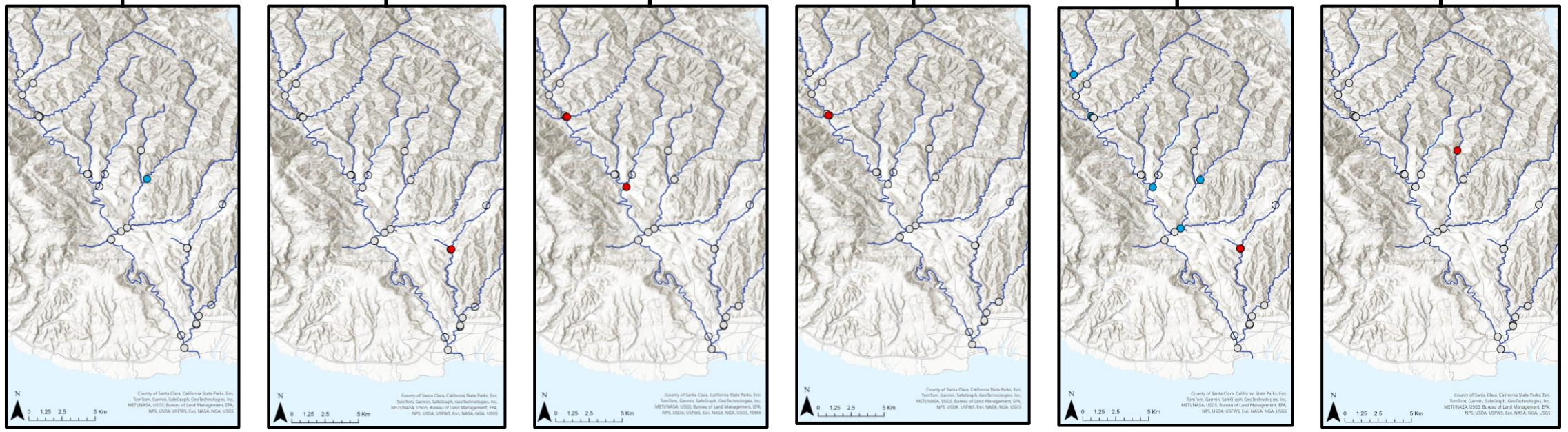
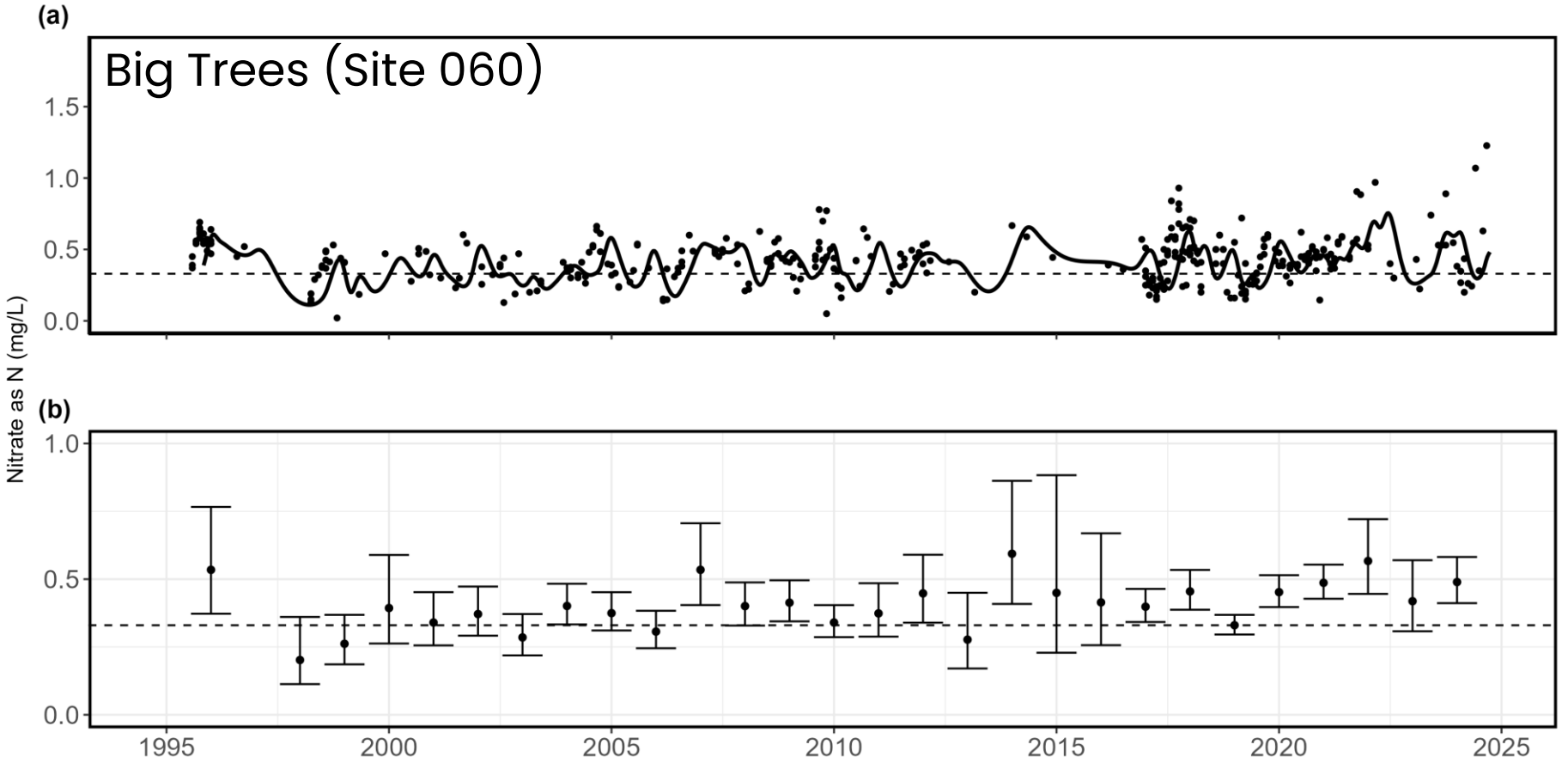


Do long-term trends differ from short-term trends?



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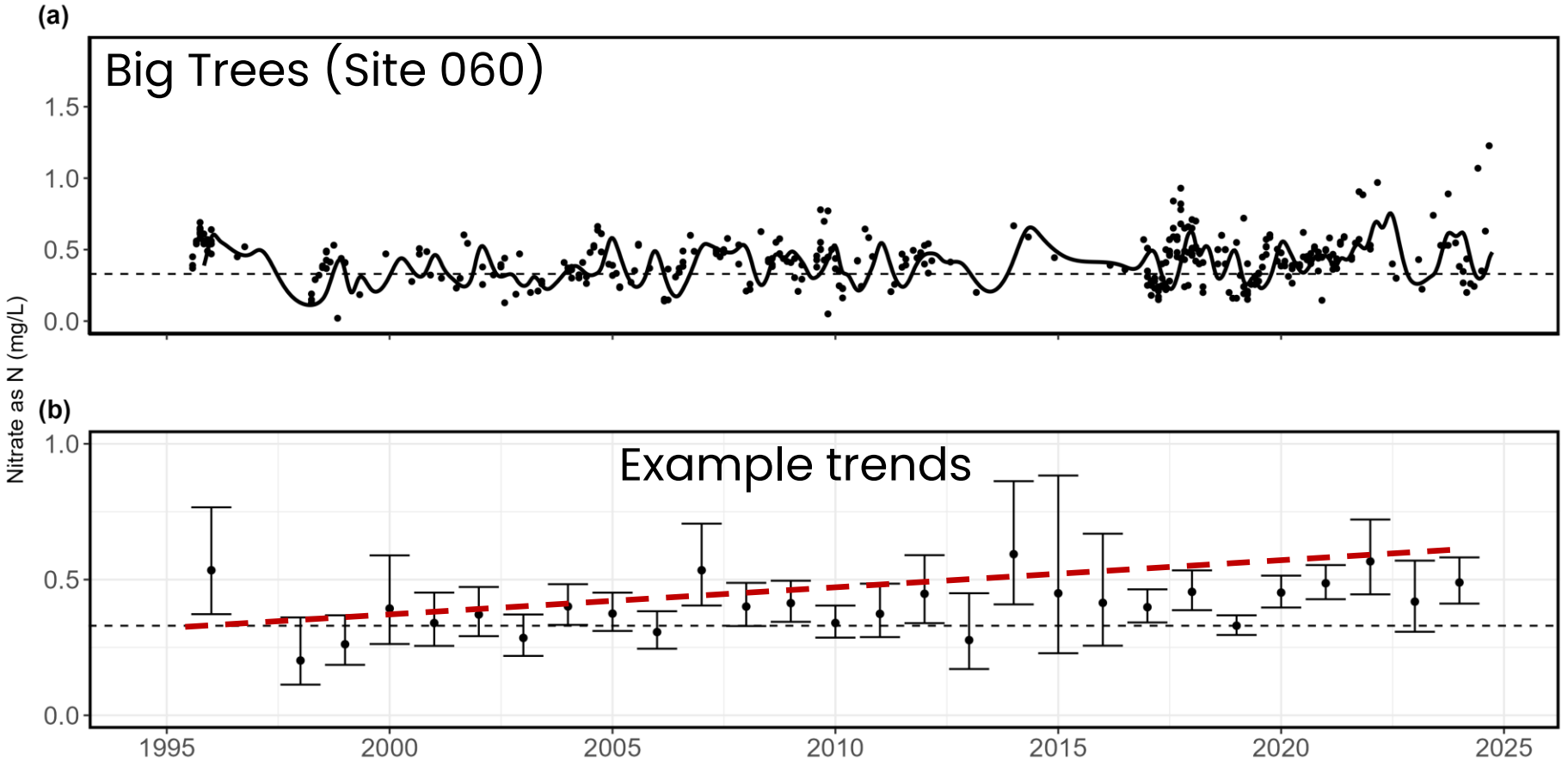
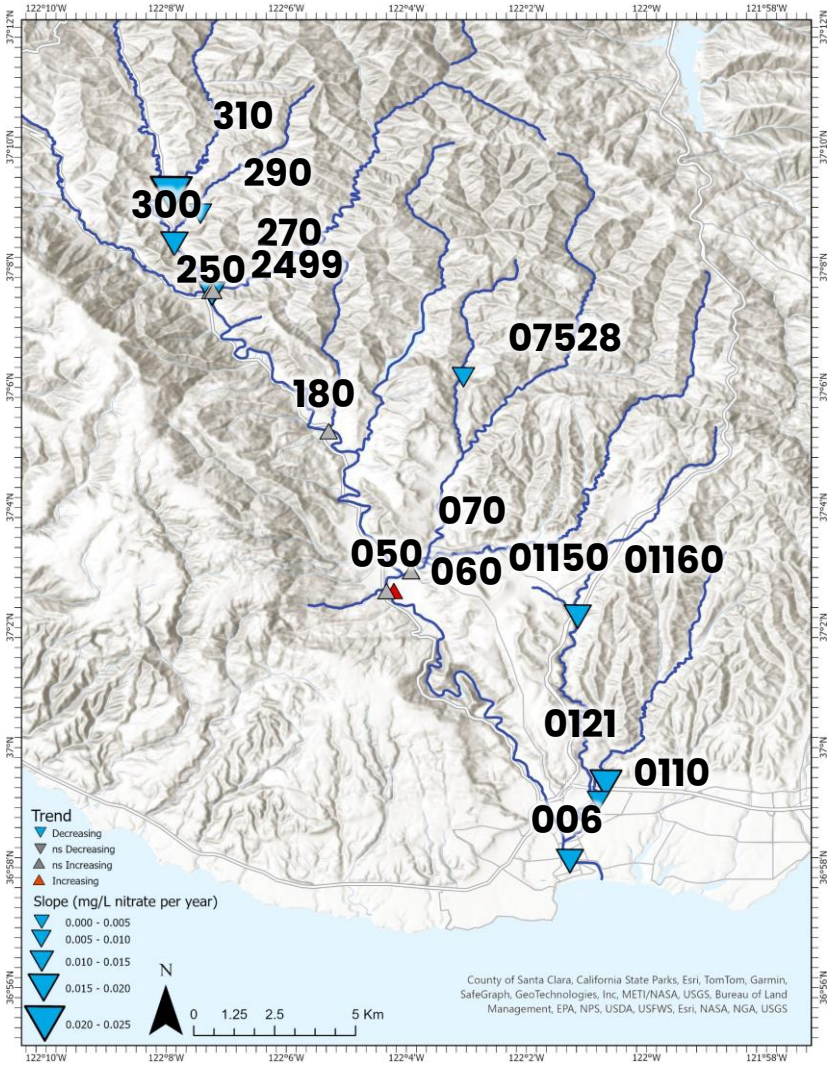


Trends in nitrate differ across watershed



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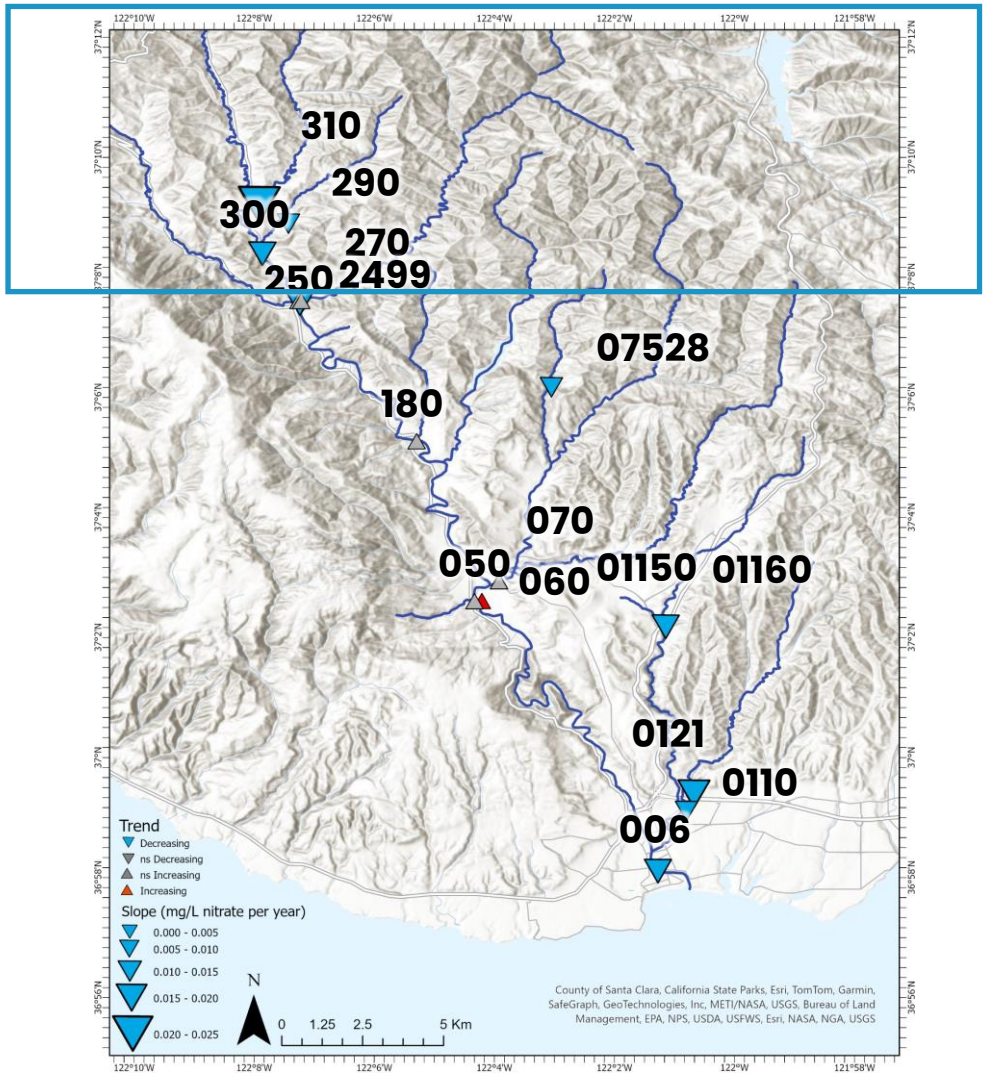

Declining nitrate concentrations

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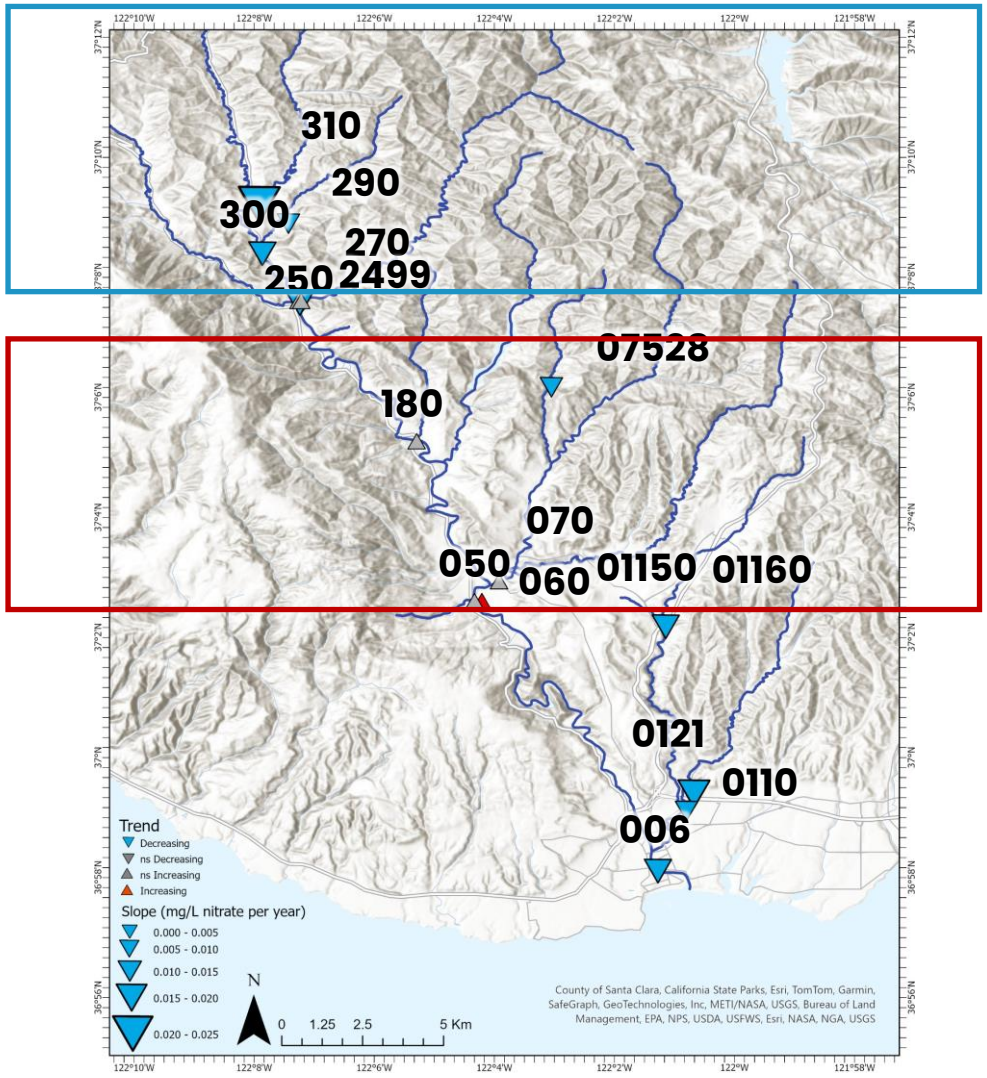

Declining nitrate concentrations

No change/increasing nitrate concentrations

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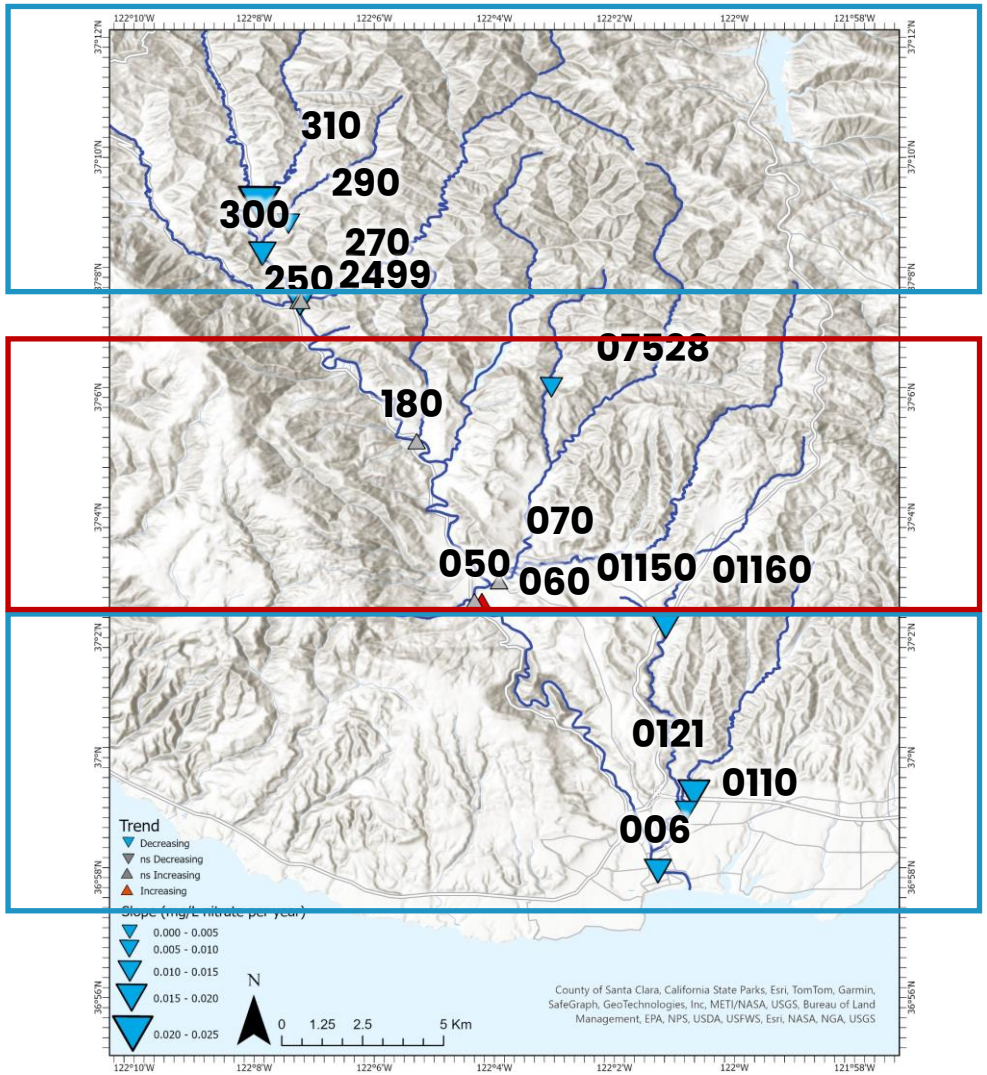


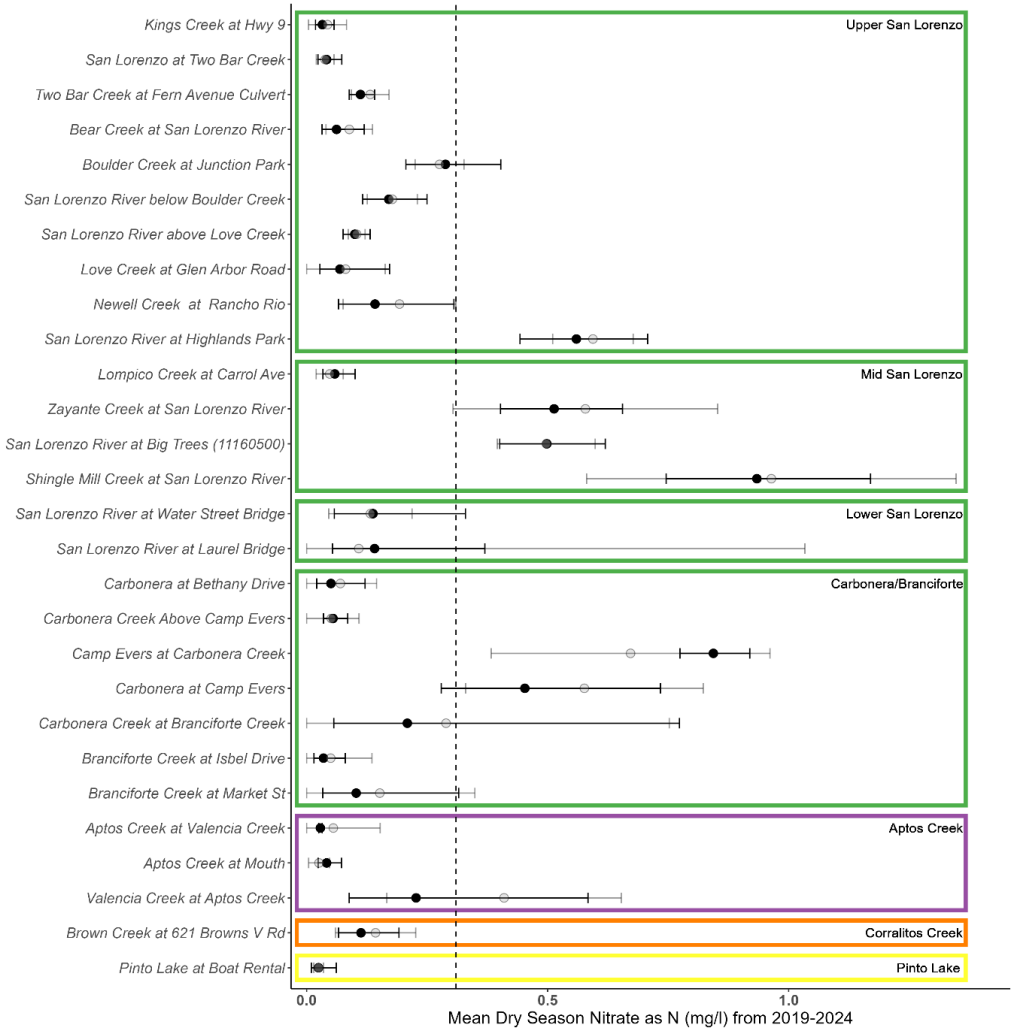
Declining nitrate concentrations

No change/increasing nitrate concentrations

Declining nitrate concentrations

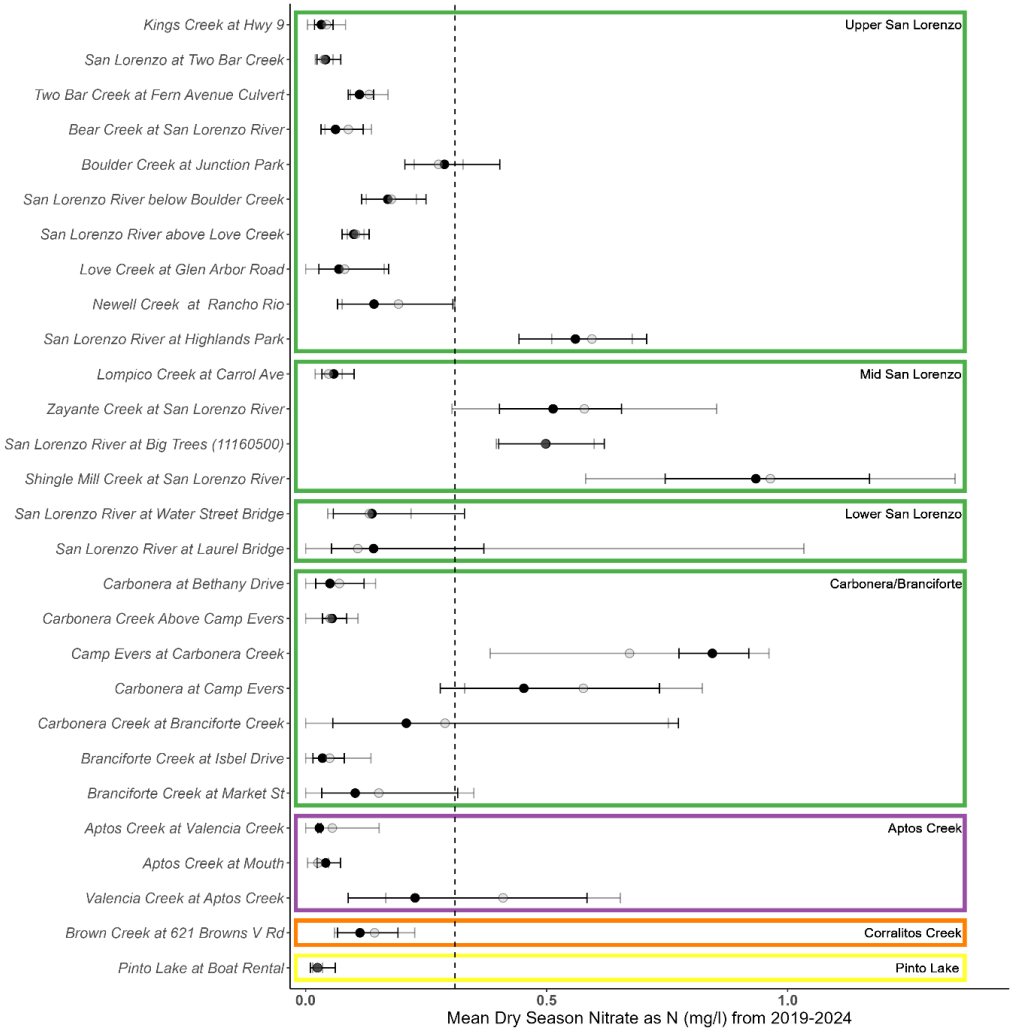
Mean concentrations differ greatly across watershed; not always in line with trends

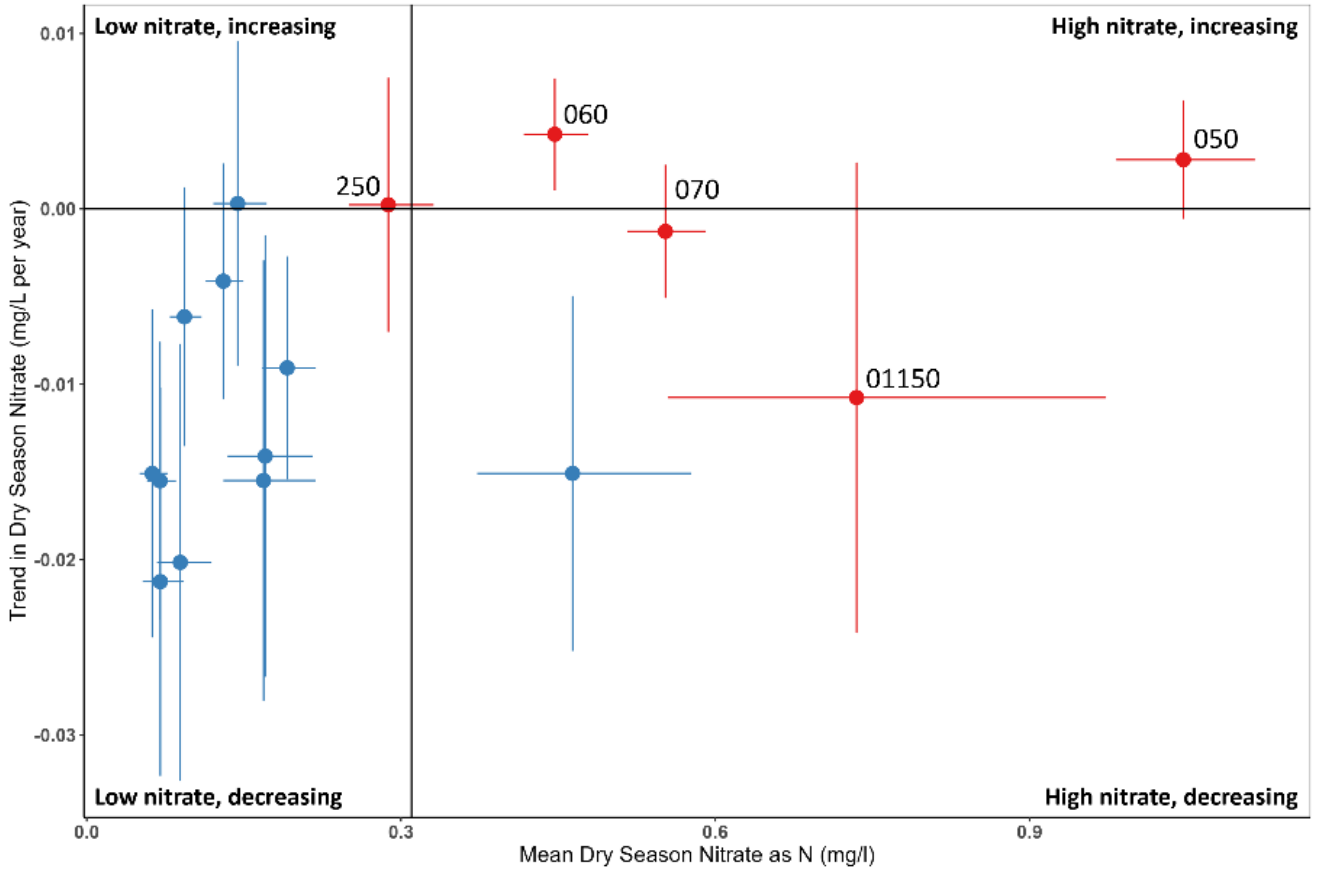
TMDL attainment



High nitrate concentrations and increasing trends should be the focus of future work

TMDL attainment





Take-aways

- Natural variability is high, making it difficult to detect small magnitude trends over short time scales

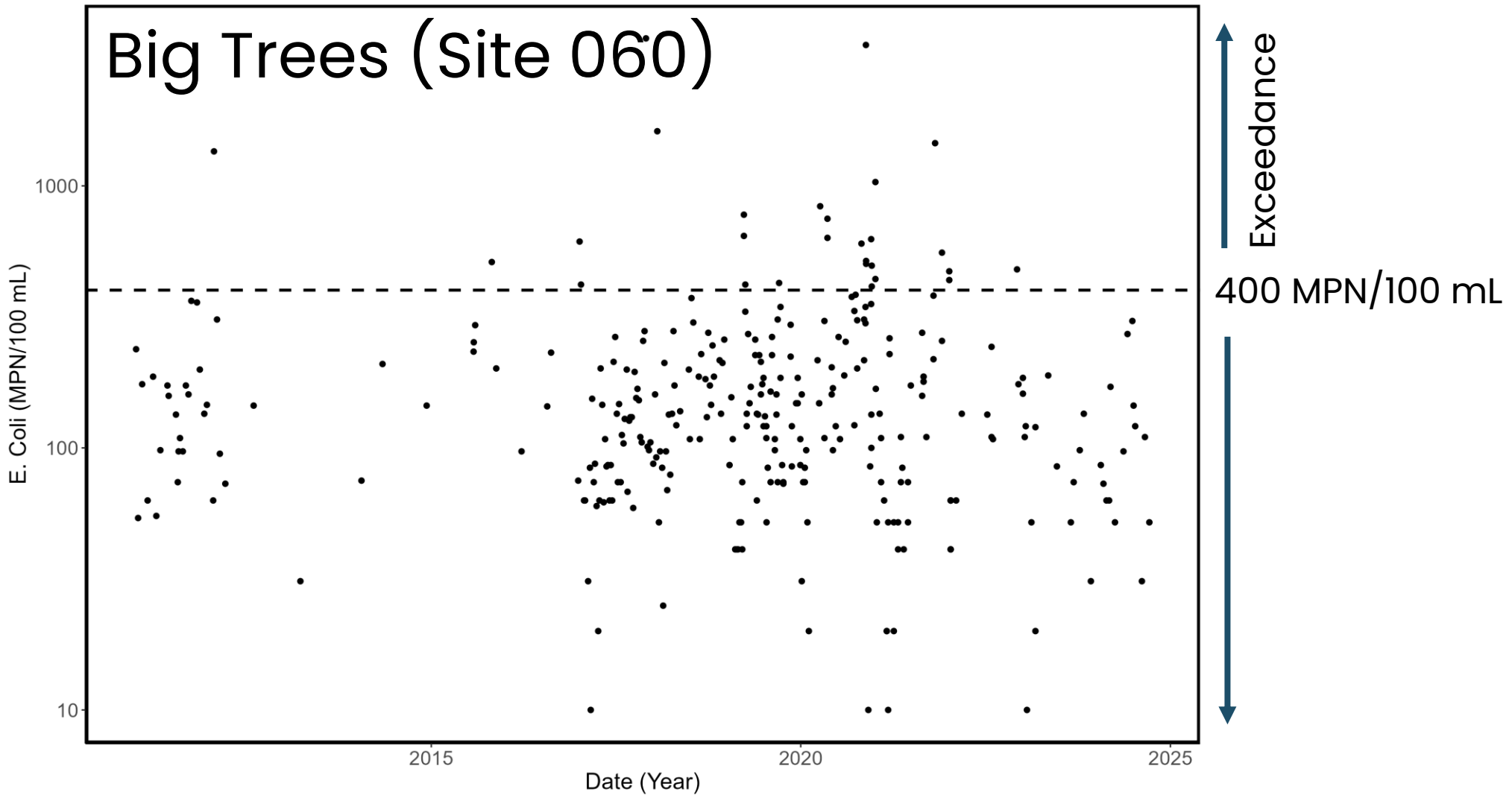
- Some areas of the watershed show declining nitrate concentrations, while other show no change/increase. Likely due to differential impacts of LAMP management across regions.

Pathogen (E. Coli) trends

Pathogen data

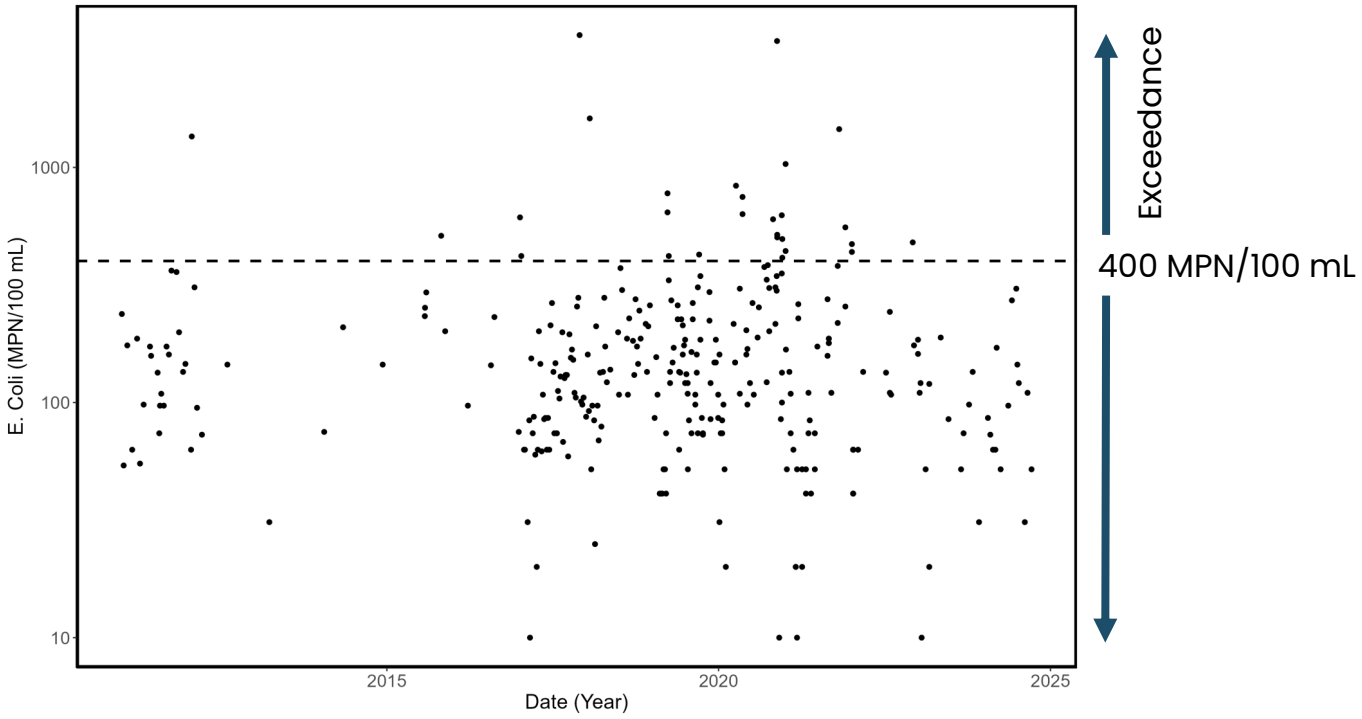
- Collect data on E. Coli, Enterococcus, and Total coliforms
- TMDL targets for E. Coli are 10% of samples < 400 MPN/100mL OR geomean over 30 days < 200 MPN/100mL
- 6-14 years of data
- Water years 2010-2024

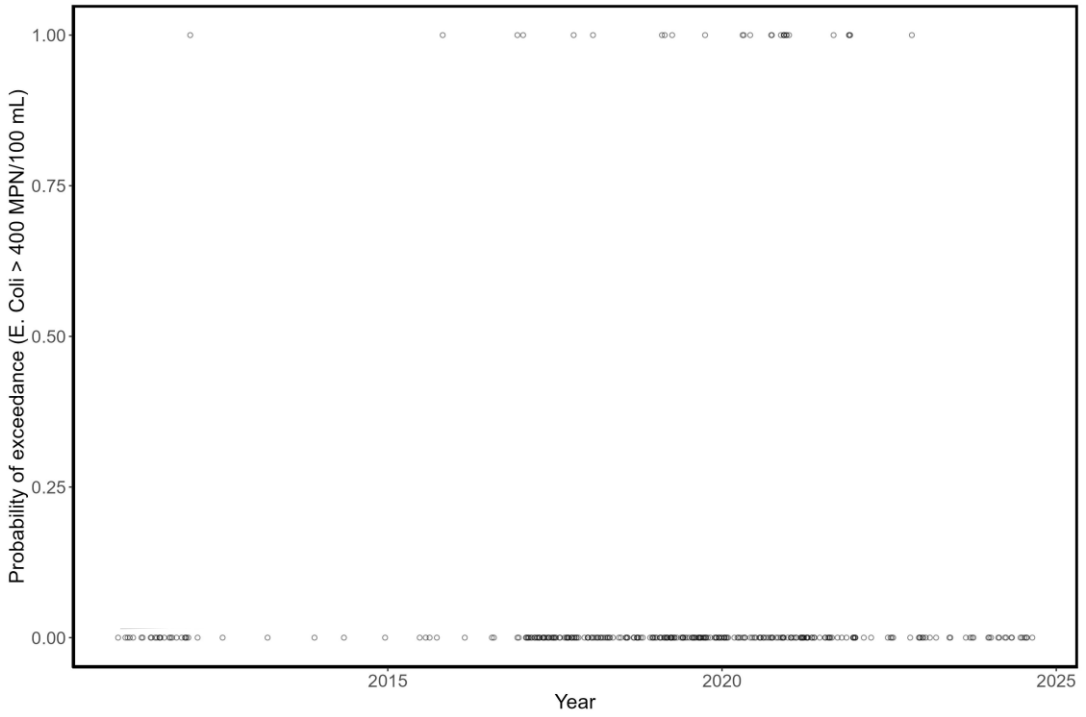
Is there evidence that pathogens are declining over time?



Is the probability of exceedance declining over time?

Big Trees (Site 060)





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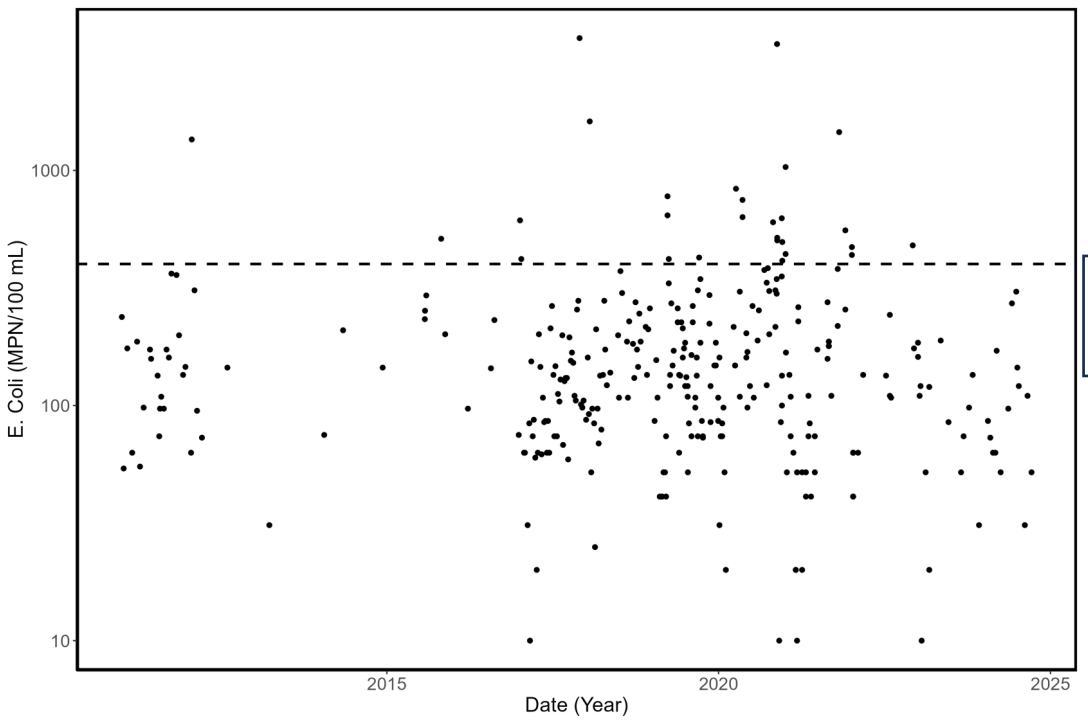
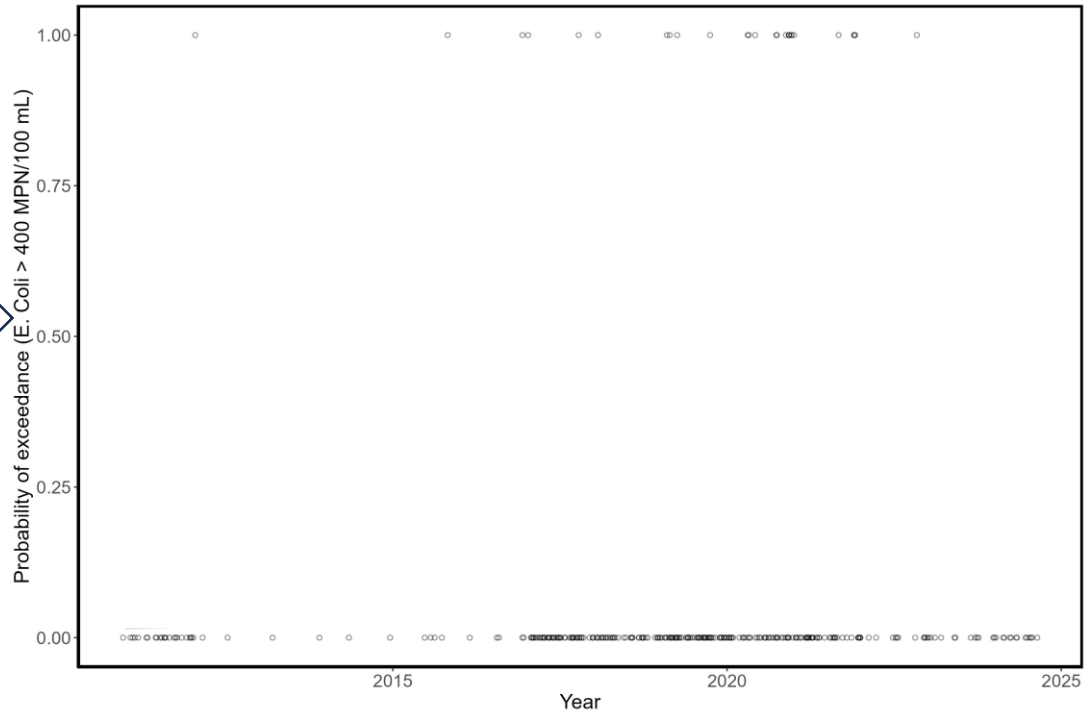
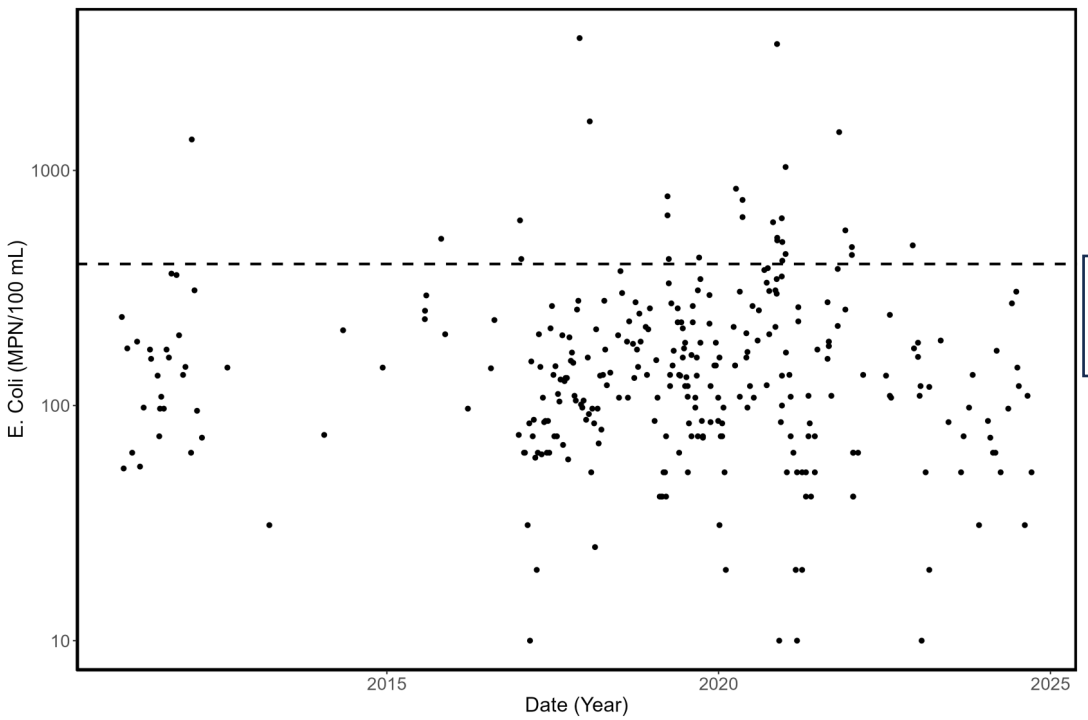


Transform



Logistic regression models binary exceedance data over time

Big Trees (Site 060)



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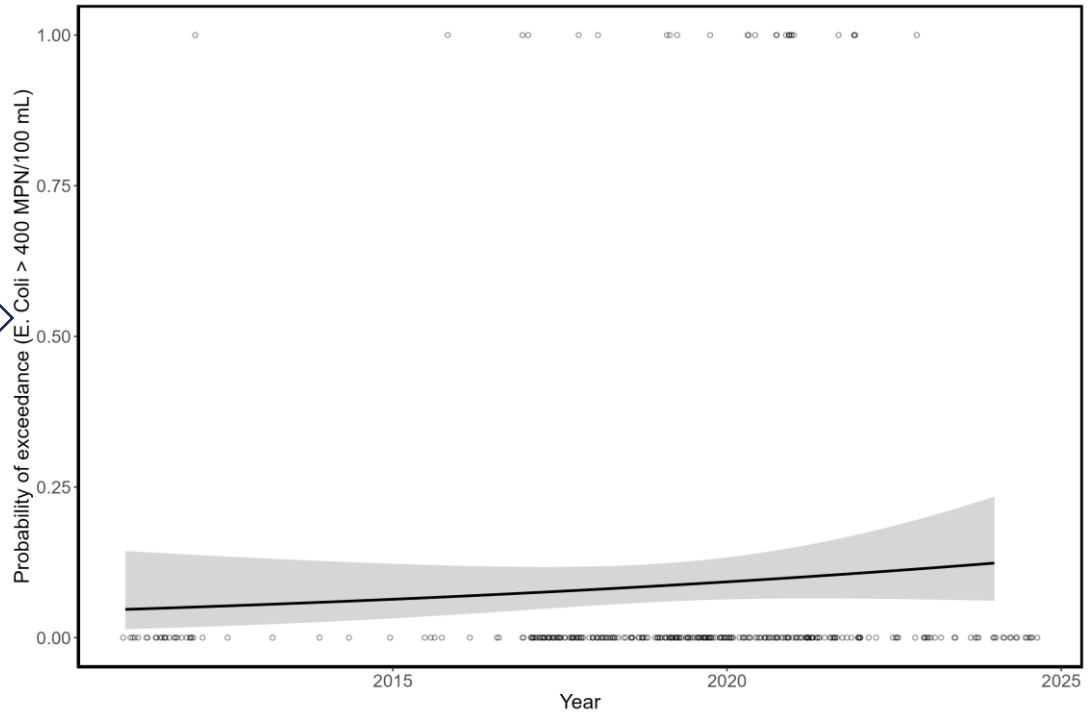
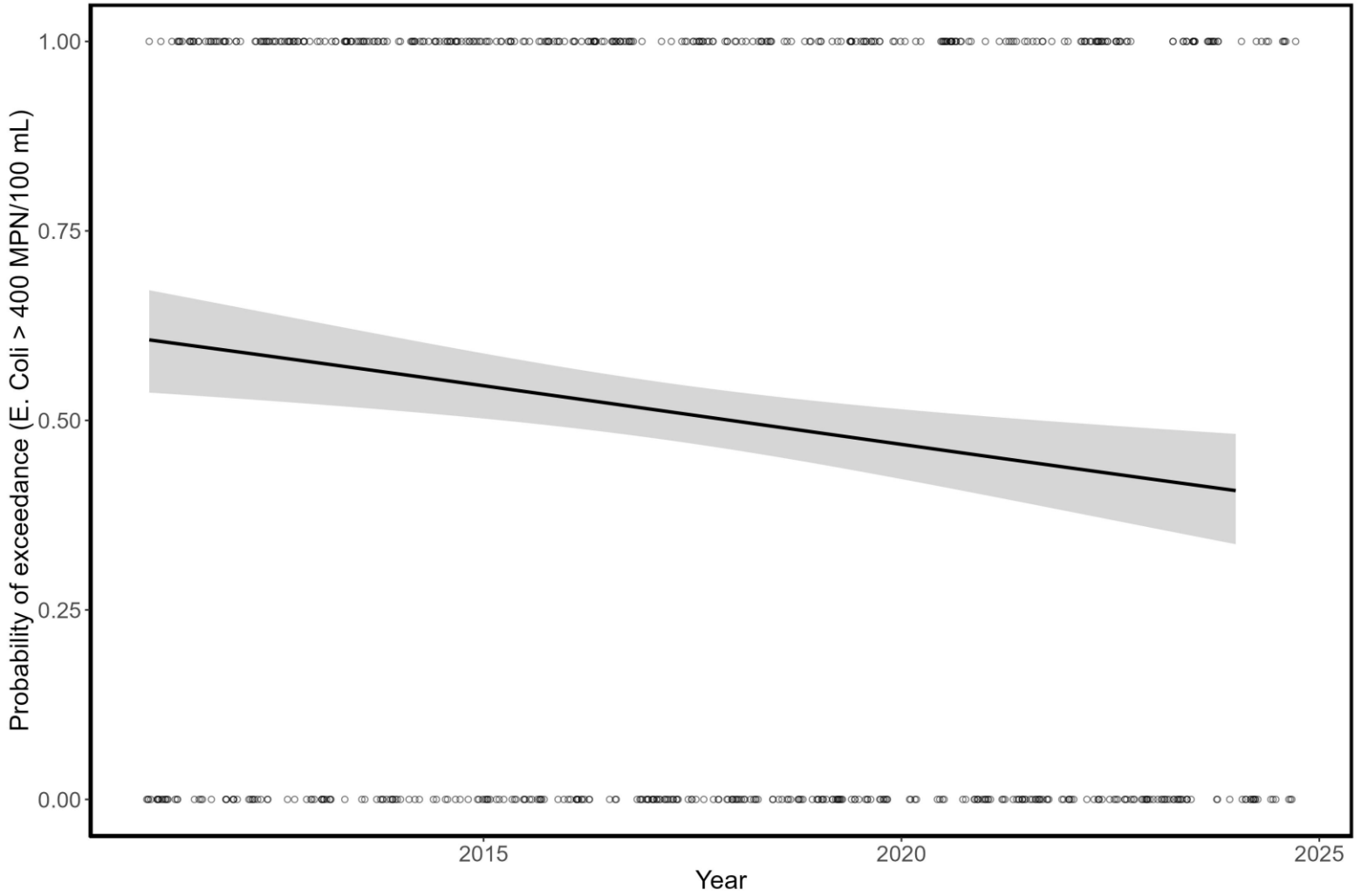


Aptos Lagoon shows decline in probability of exceedance over time



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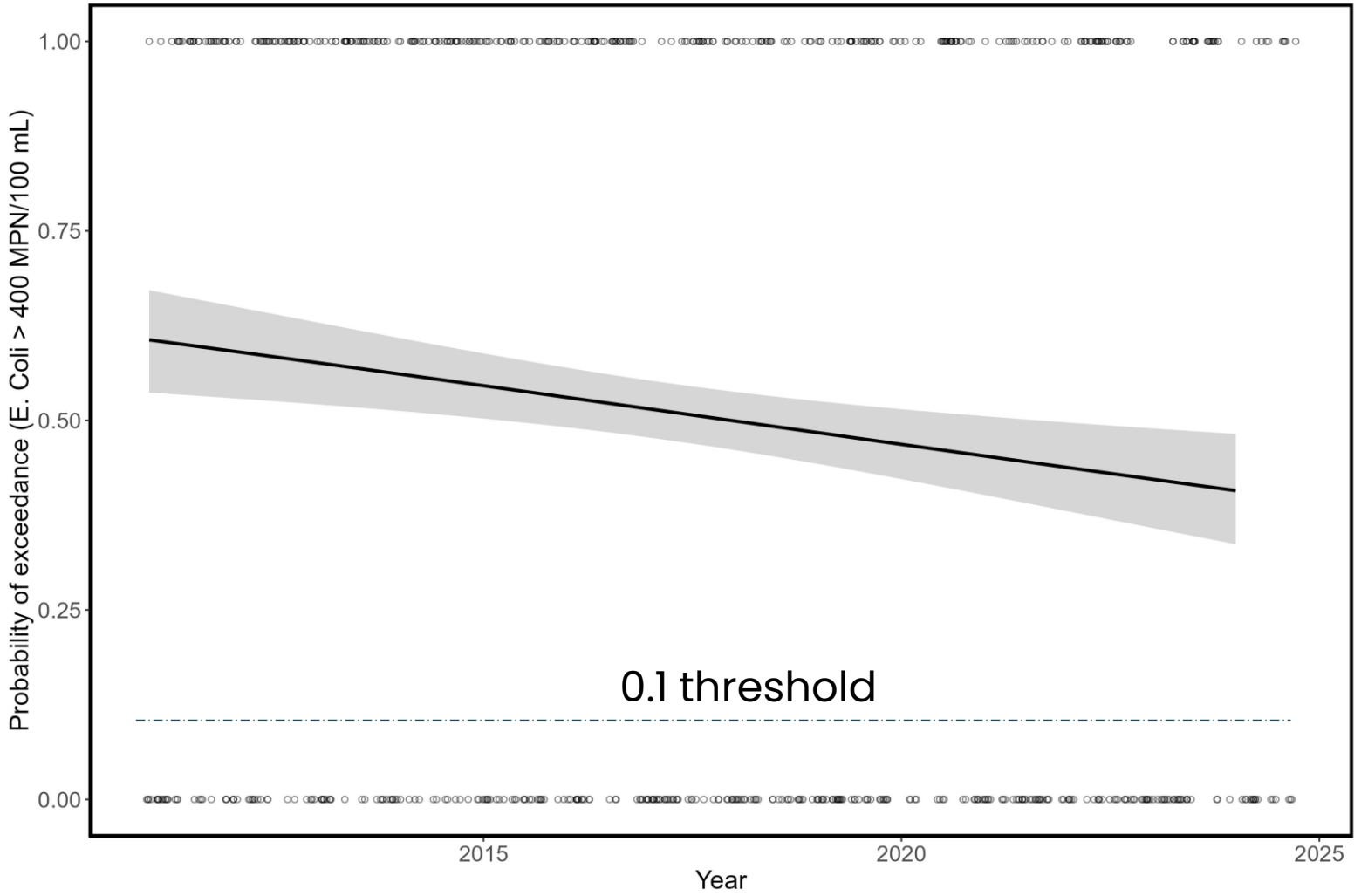
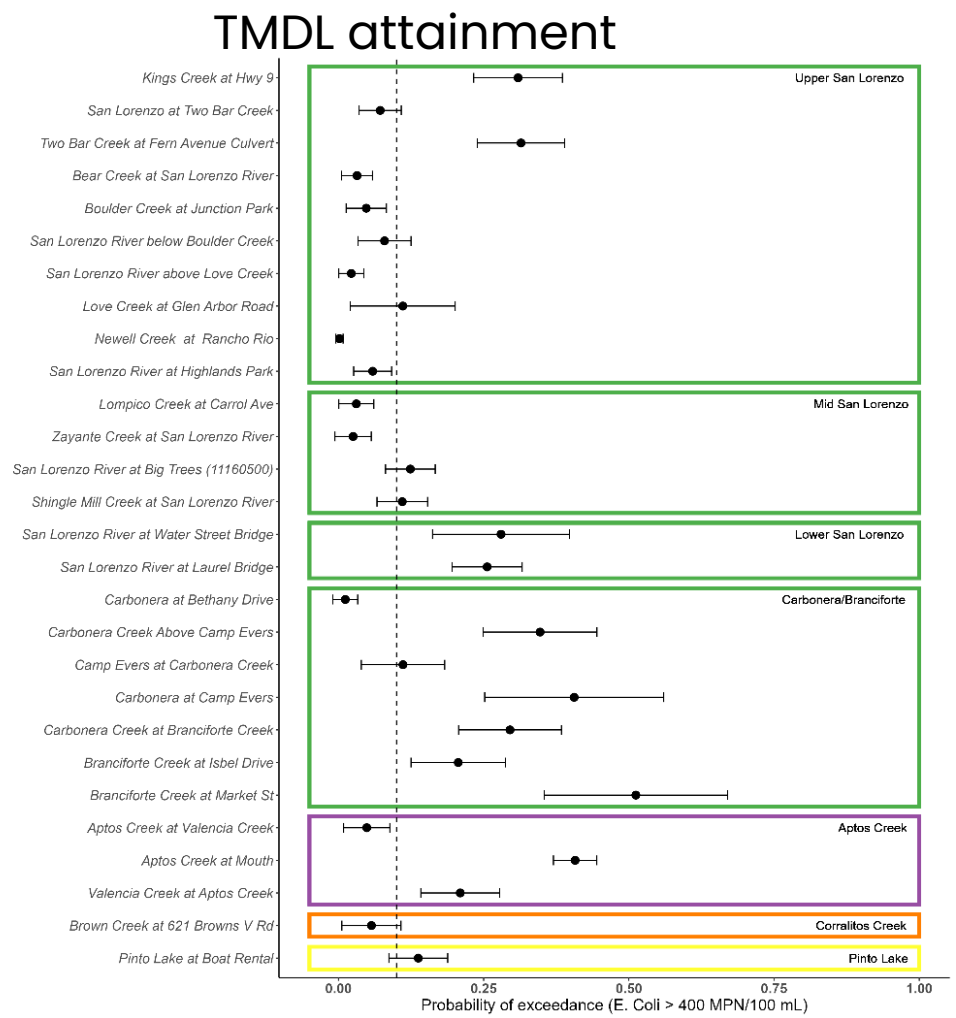


Many sites are already meeting TMDL criteria, others need work



Take-aways

- Probability of exceedance largely unchanged over the 7—14 year time series, except for Aptos lagoon
- Further work is necessary to determine microbial sources underlying pathogen concentrations

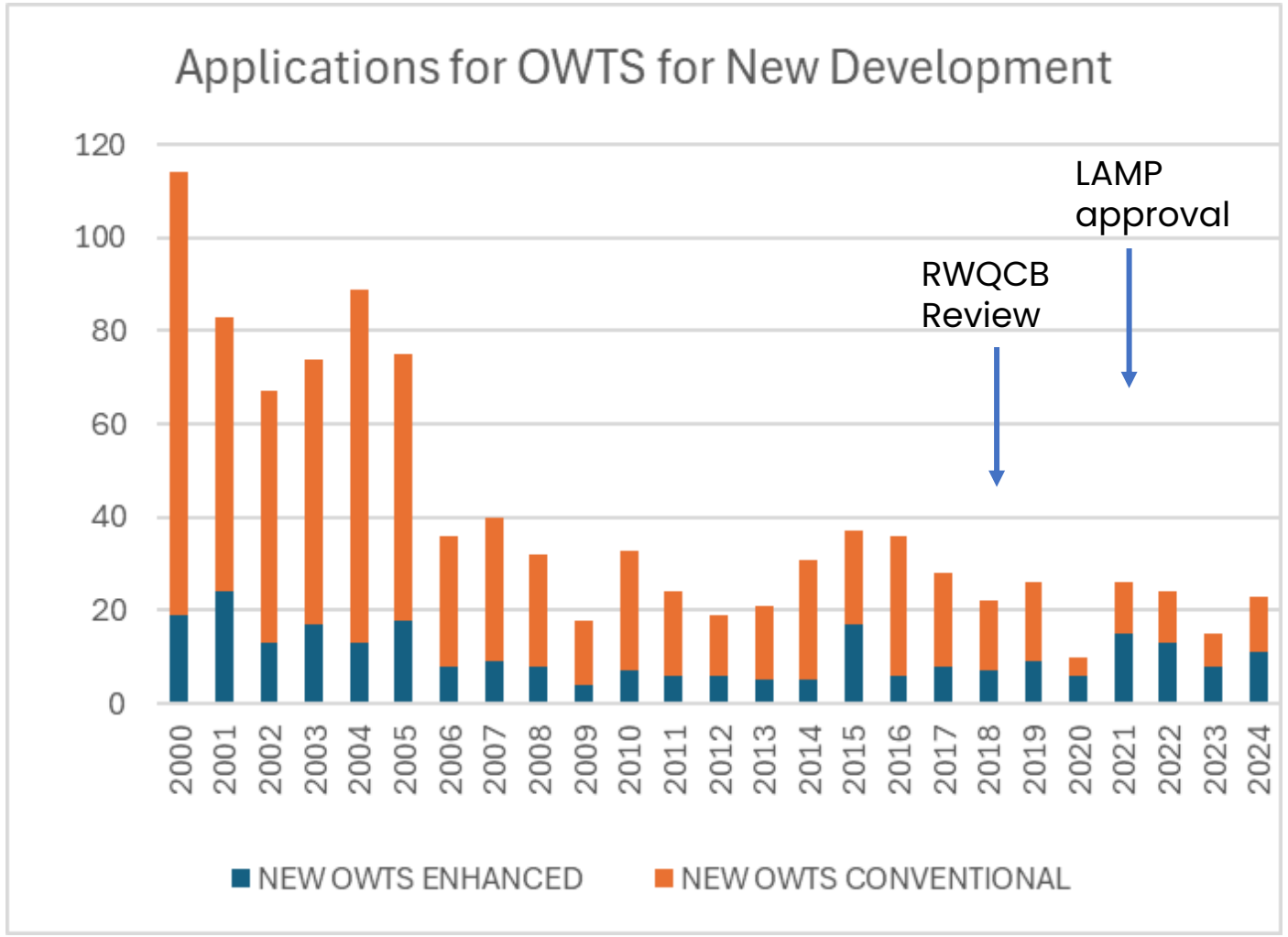
LAMP Permitting trends

Sierra Ryan, John Ricker

Permit Activity – New Development

Number of applications for new OWTS systems from 2000-2024

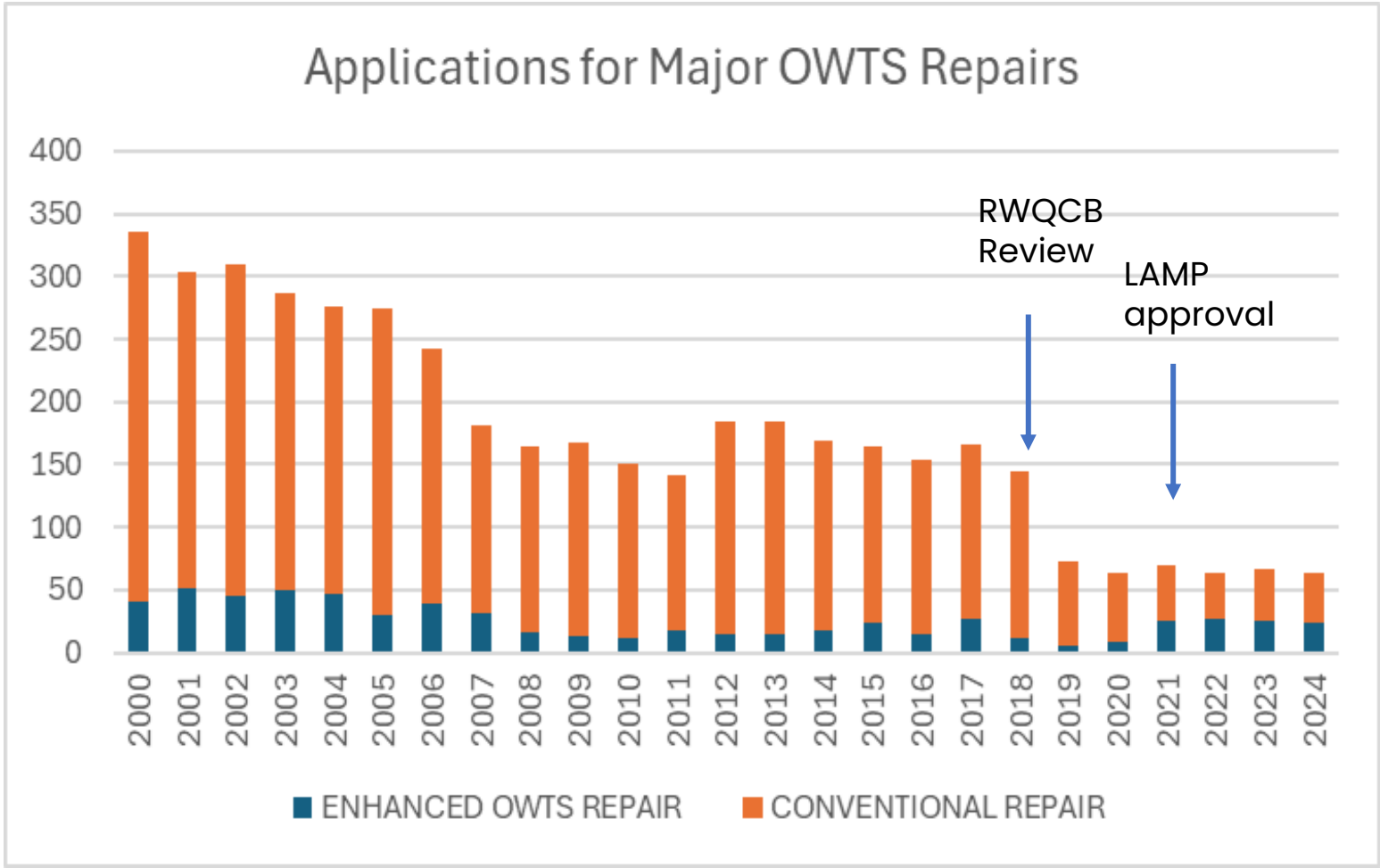
- In May 2018 the RWQCB suspended the County's ability to approve OWTS that did not meet the Tier 1 requirements of the State OWTS policy.
- This was due to delays in LAMP adoption and County staff negotiated for reasonable compromises.
- In October 2021 the LAMP was approved and permitting returned to the County.



Permit Activity – OWTS Repairs Applications

Number of applications for OWTS repairs from 2000-2024

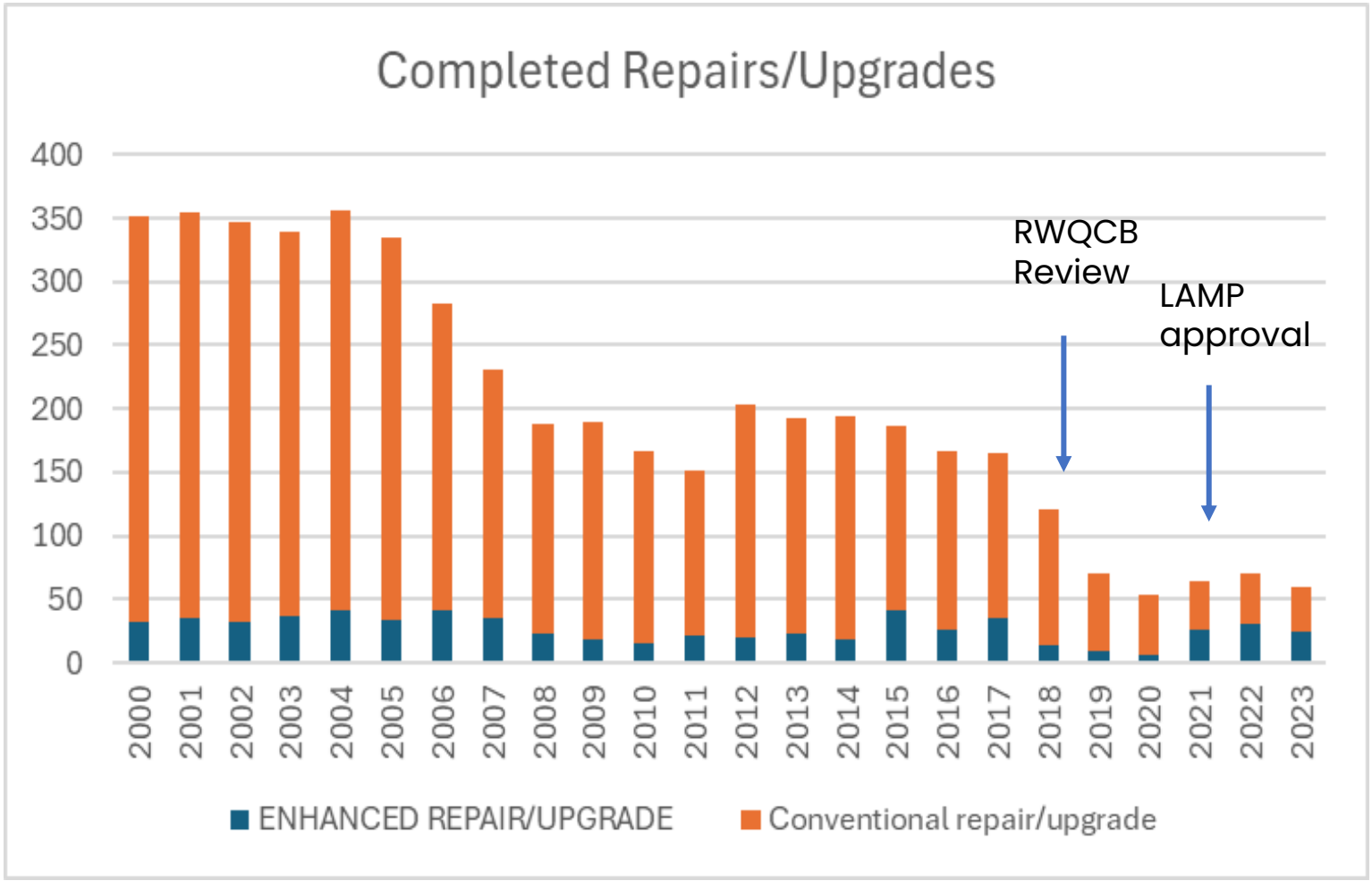
- Historically, the great majority of repairs were initiated voluntarily by property owners
- The more stringent policy often requires enhanced treatment systems likely serving as a deterrent to completing needed repairs on a timely basis.
- This has probably also led to increased failures and degraded water quality during wet periods.
- Point of Sale Requirements likely masking the extent of the problem.



Permit Activity – Completed Repairs

number of completed repairs and upgrades to OWTS systems from 2000-2024

- Deterrent may offset the limited incremental benefit of the more stringent LAMP standards.
- It would be appropriate to revisit some of the requirements for repairs in the LAMP to see if a better balance could be established.



Take-aways

- As County staff feared, data suggests that homeowners are delaying repairs or doing them without permits
- County staff will be working with the Regional Board to amend the LAMP.
  - Some changes will be small and can likely be approved quickly.
  - Larger changes will be more challenging and require the Regional Board to approve, rather than just the Executive Officer.

AI dramatization – not a real photo

Questions?

Thank You