

Unexpected resurgence of the Susquehanna Flats SAV bed: Analysis of time series data

Cassie Gurbisz & Michael Kemp

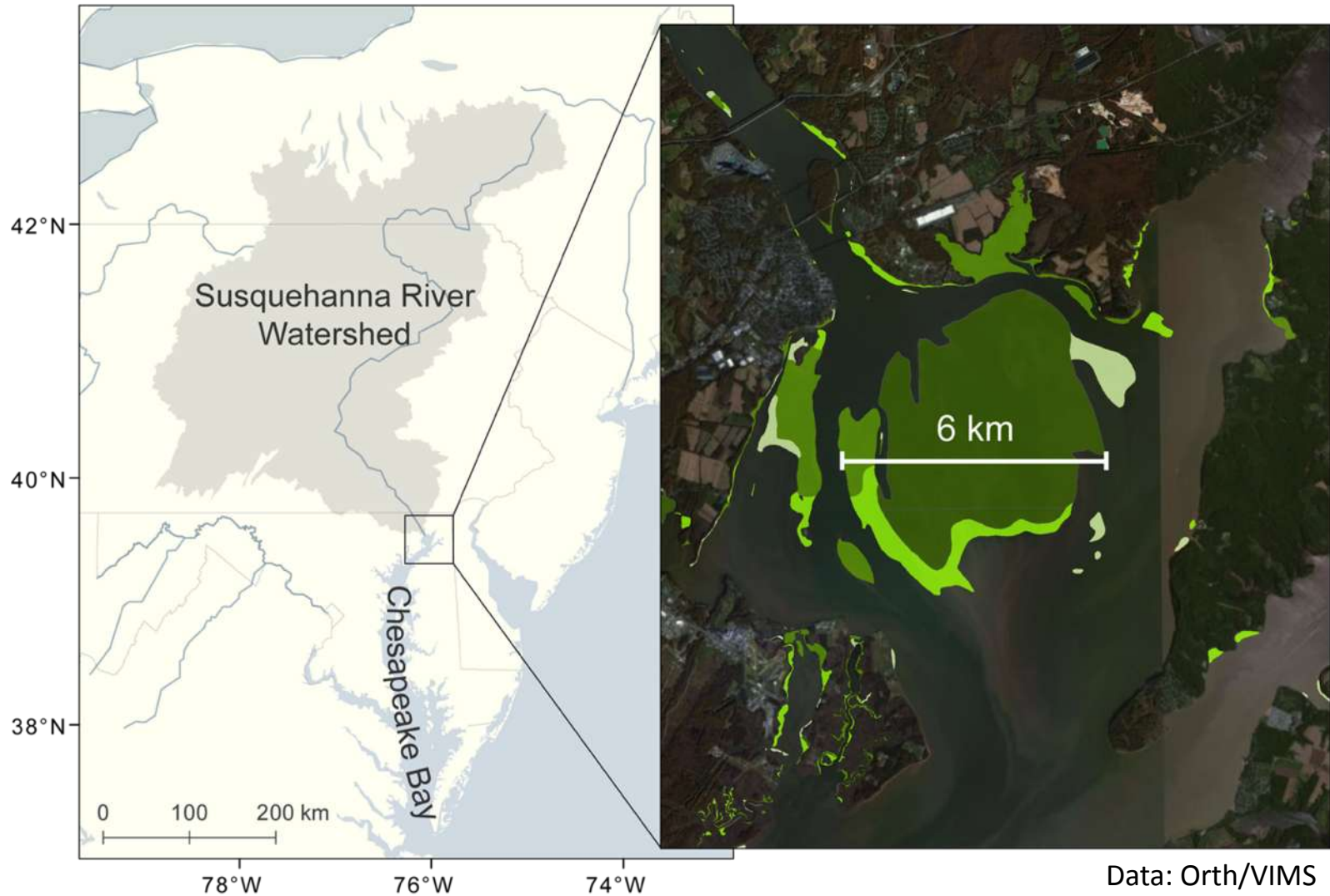
University of Maryland Center for Environmental Science

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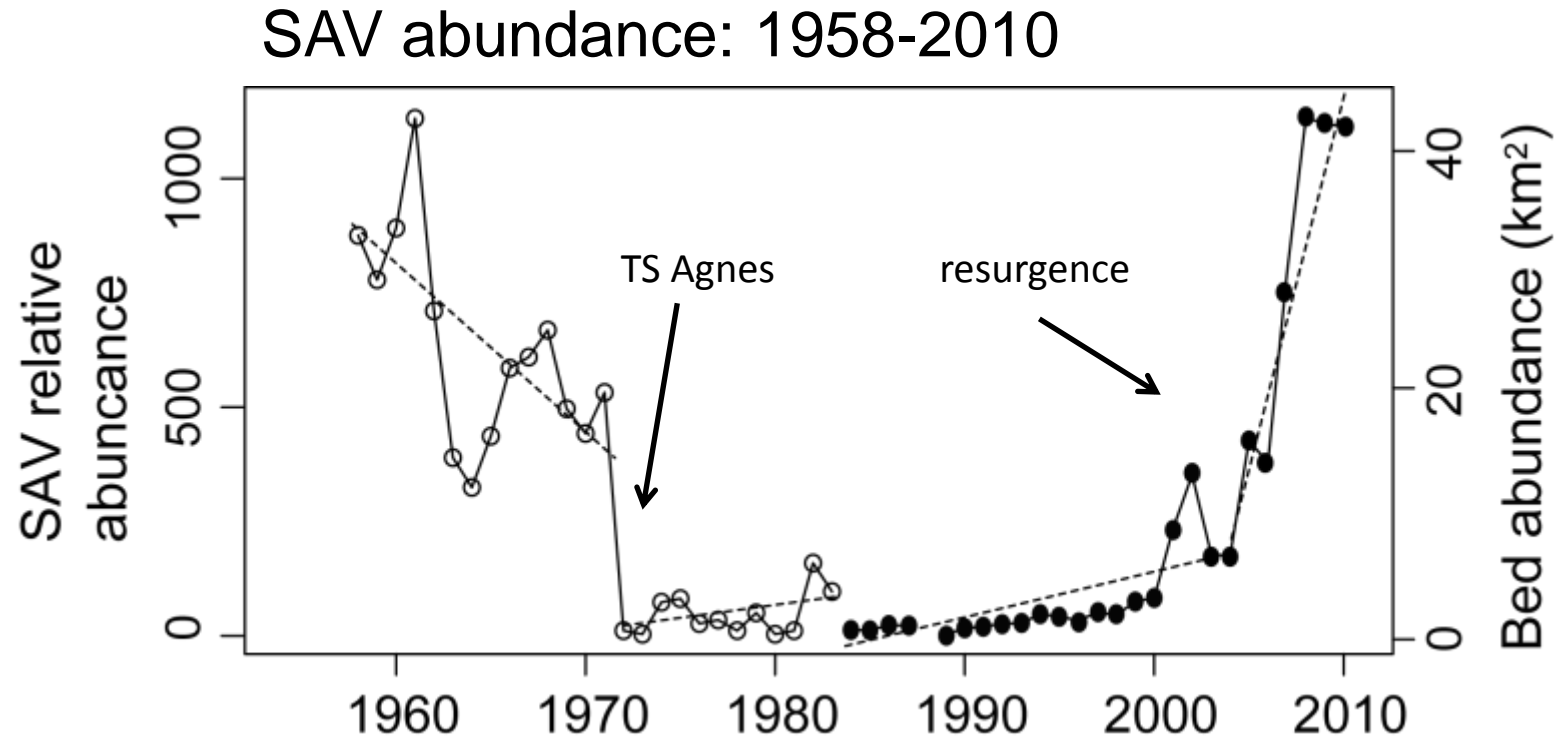
Oct 1 2014 Modeling quarterly review meeting

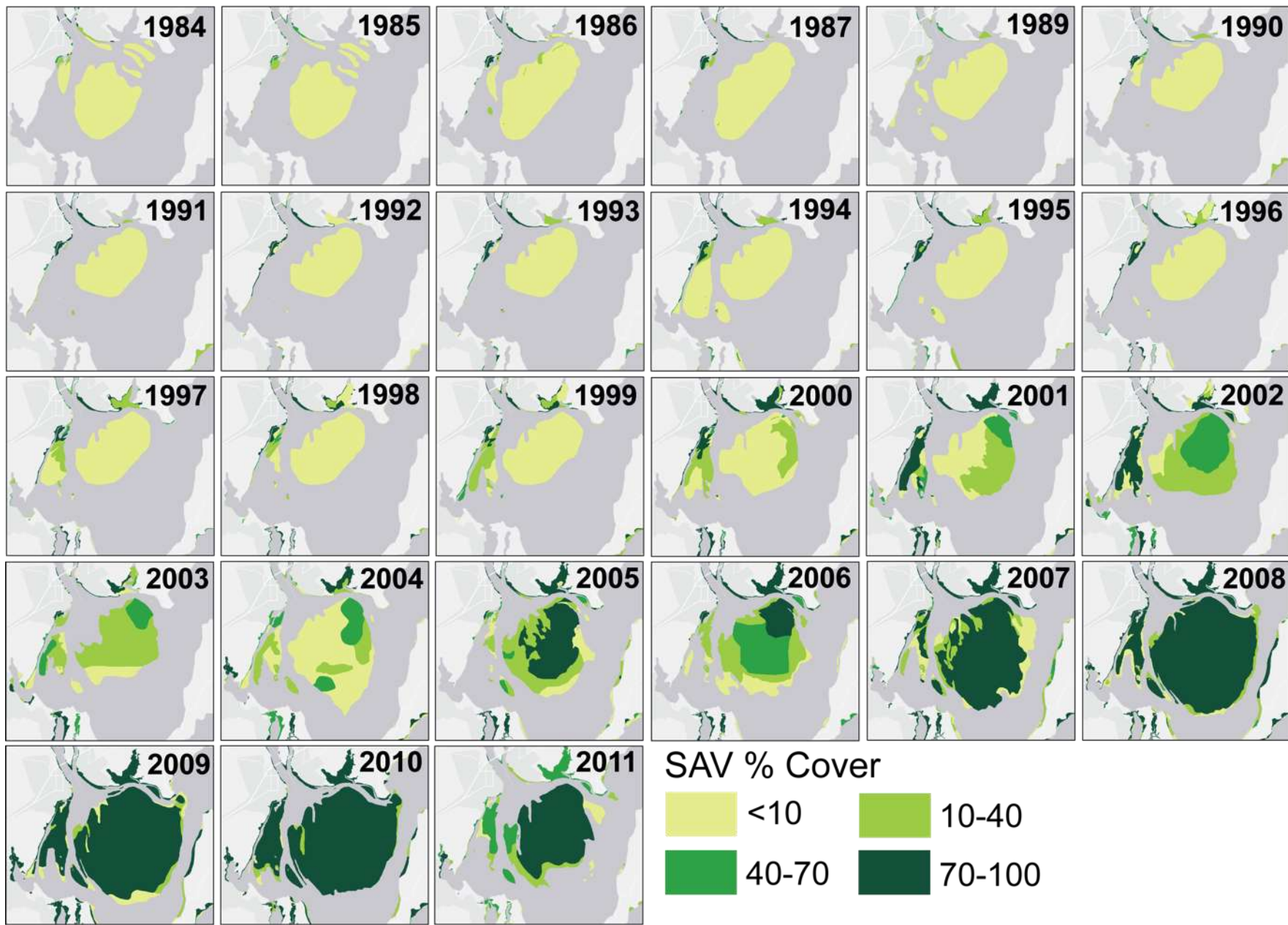


Study site: Susquehanna Flats



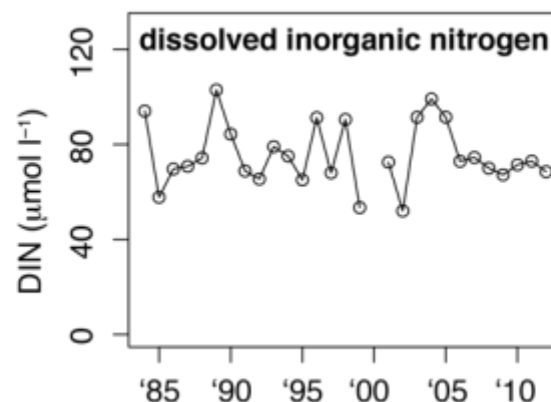
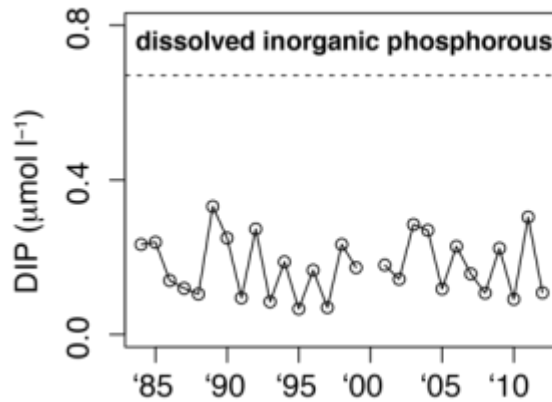
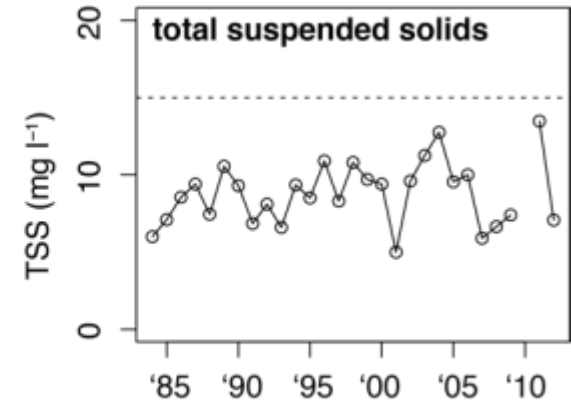
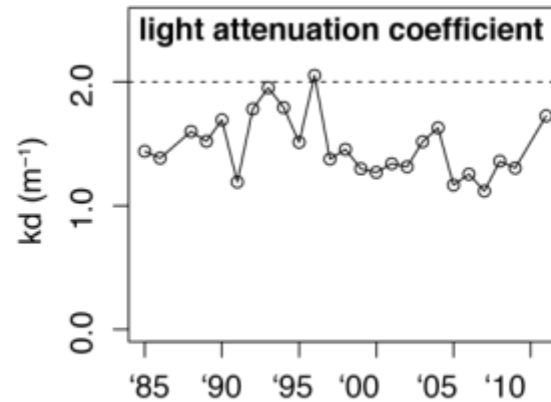
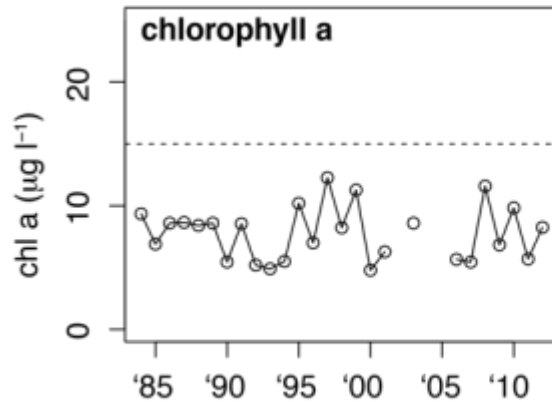
SAV bed disappeared after Agnes then recovered suddenly after 30 years





Data: Orth/VIMS

Resurgence was a surprise because water quality variables already met “habitat requirements”



Why the delayed response? Why the resurgence?

- Lack of propagules
- Environmental drivers

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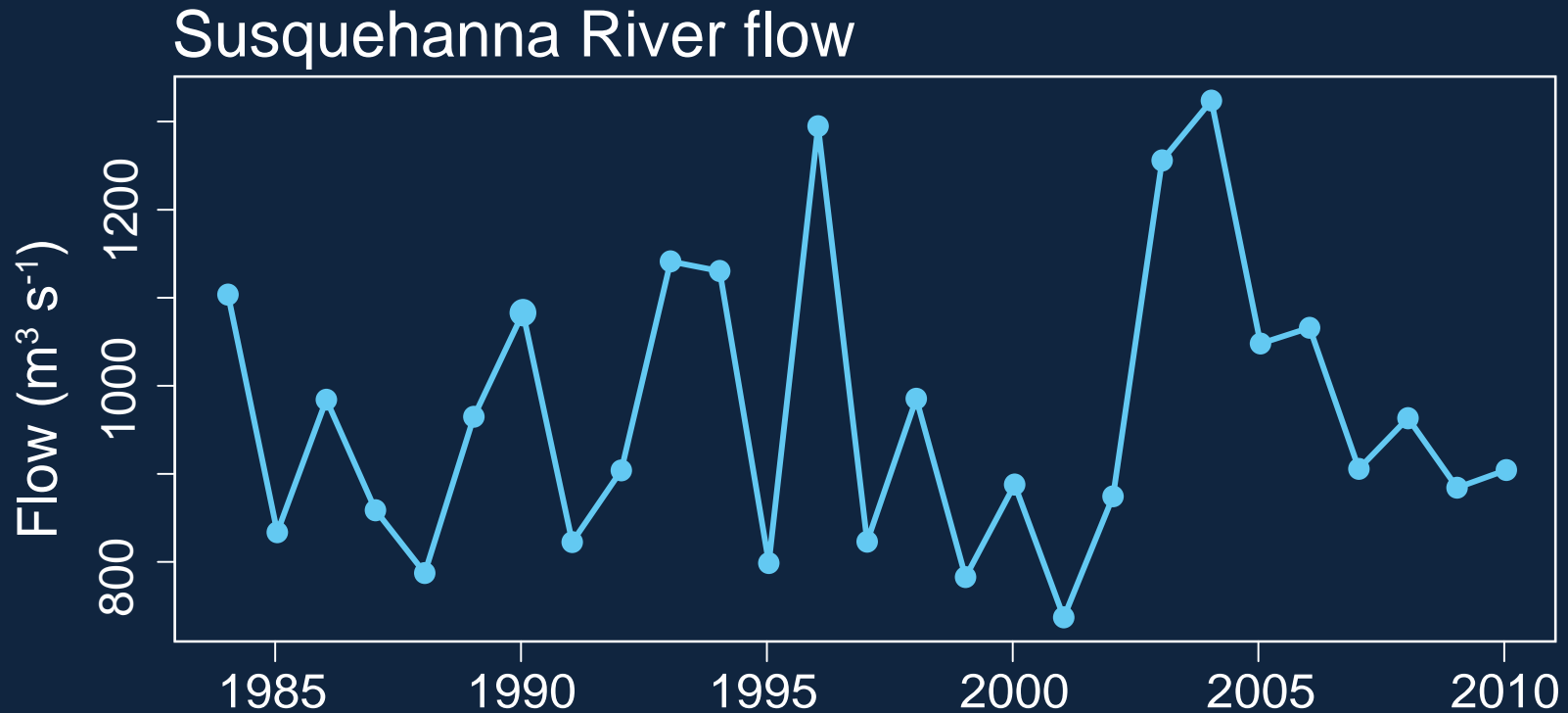
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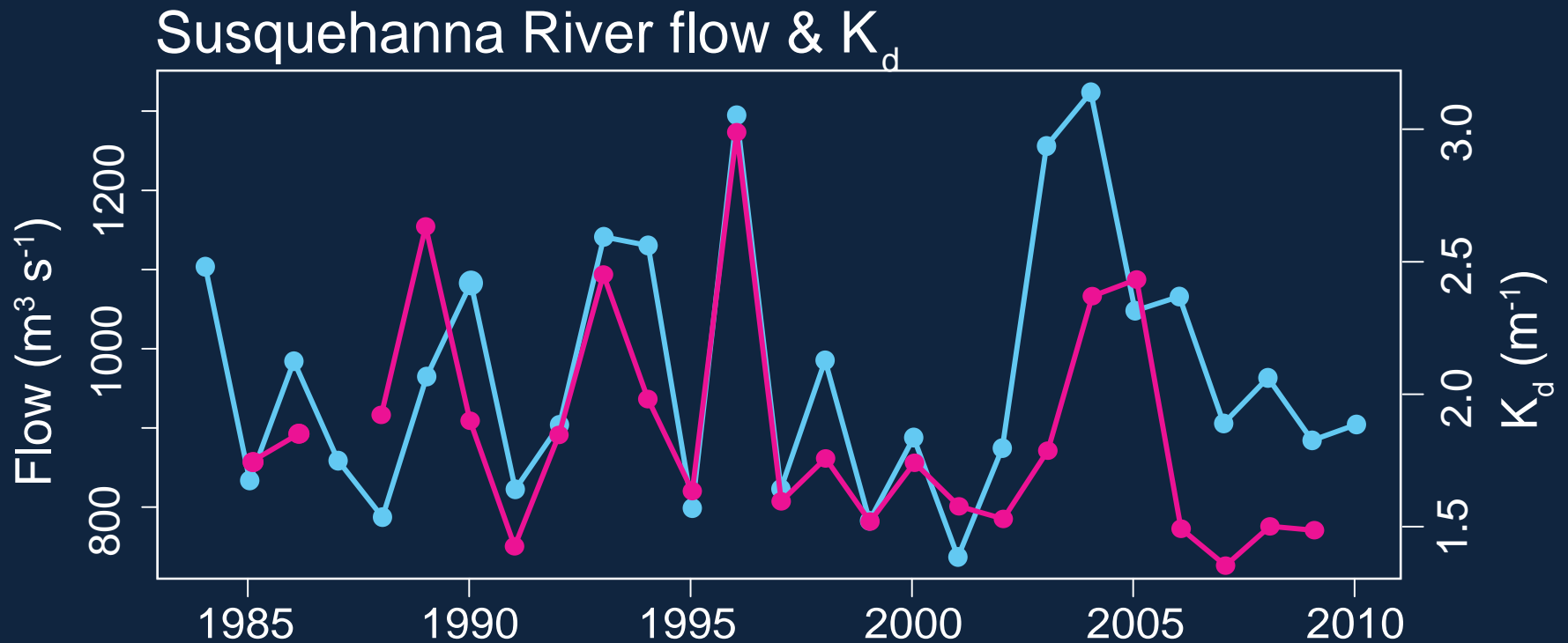
Approach: time series analysis

- Use monitoring data
- Identify driver(s) of environmental change
- Explore the nature of the relationship between driver(s) and SAV response (linear, nonlinear?)
- If nonlinear, why?

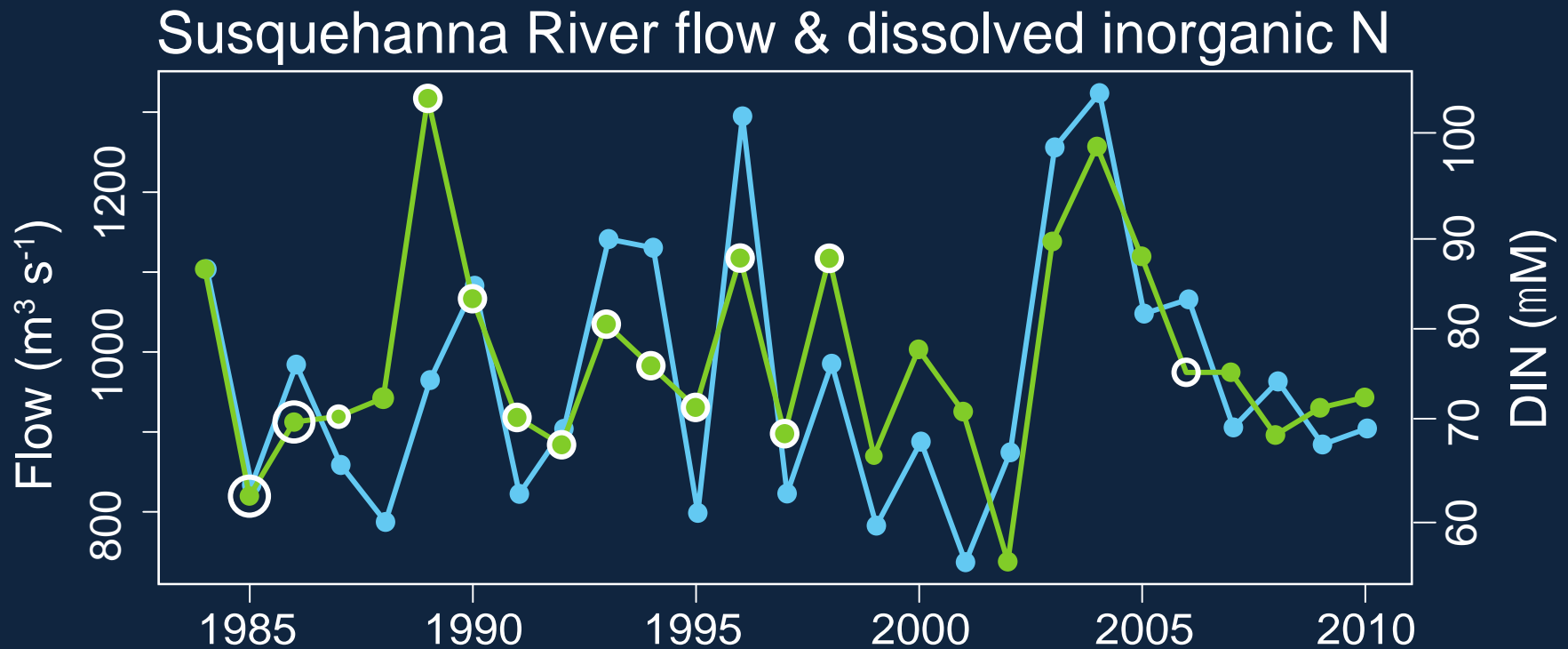
Data indicate coherence among flow and water quality parameters



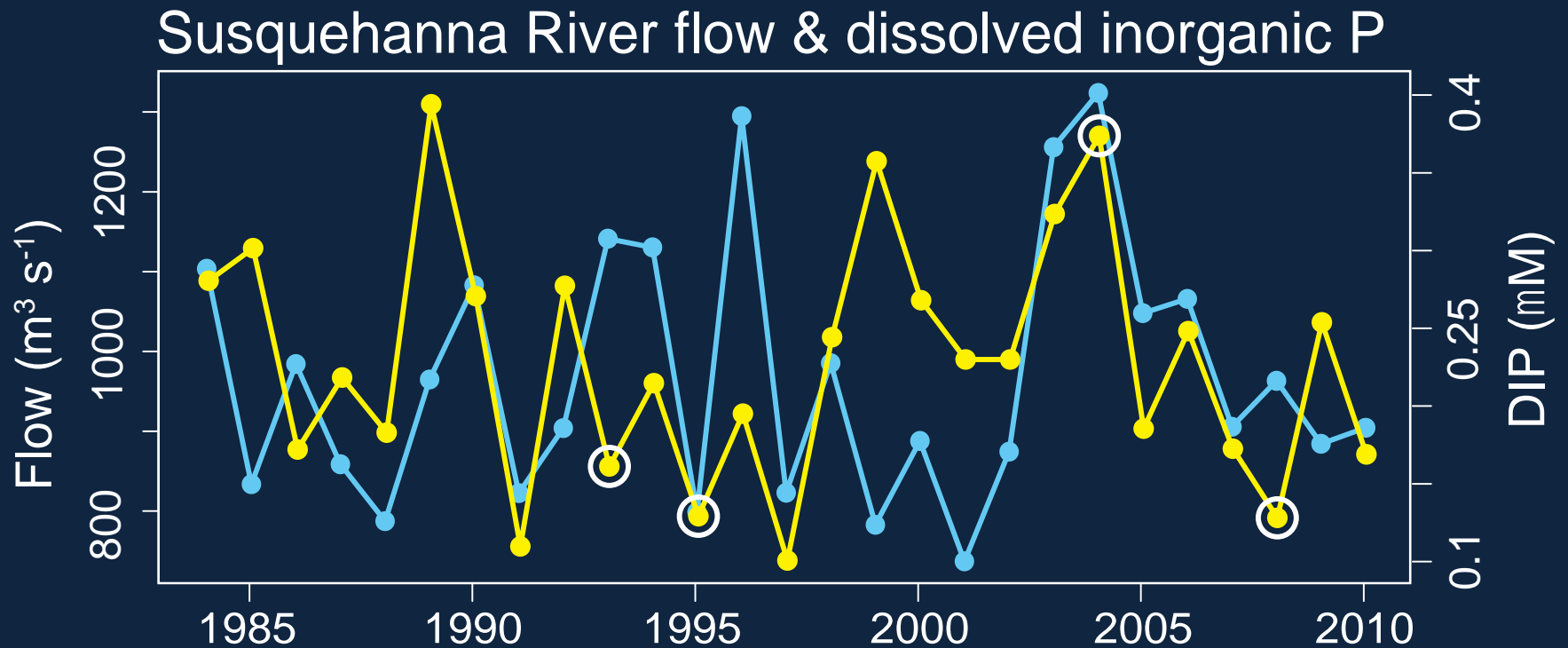
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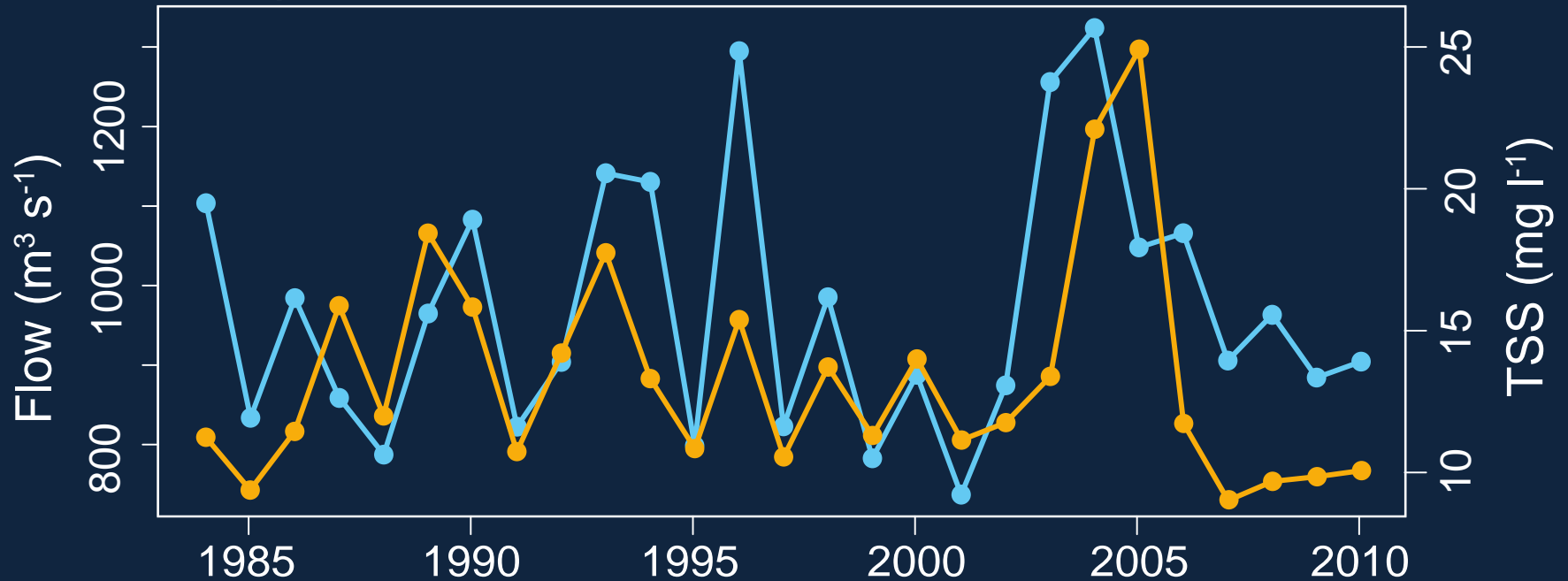


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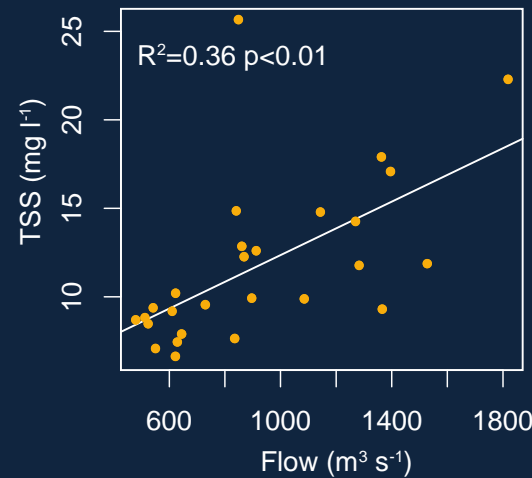
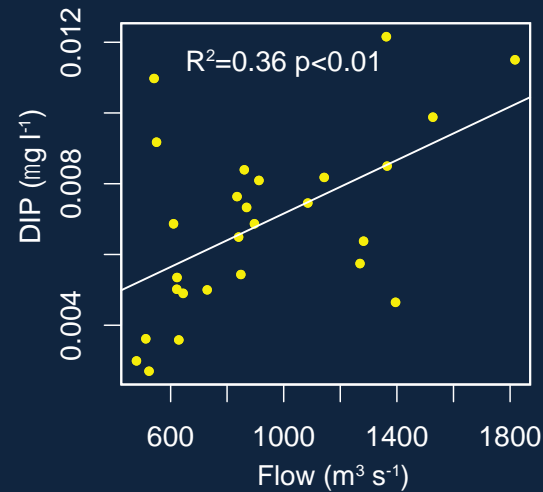
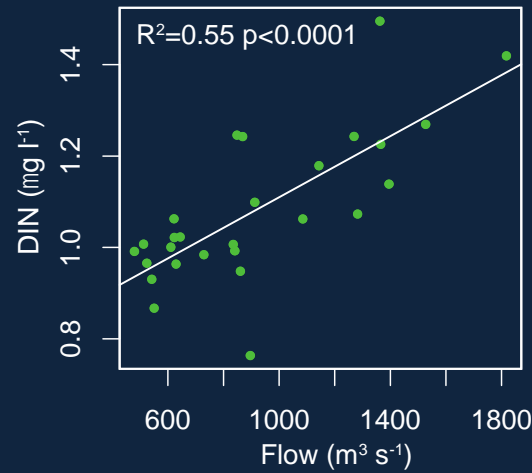
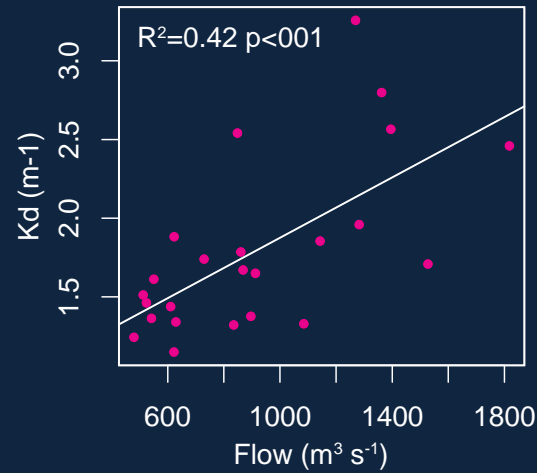


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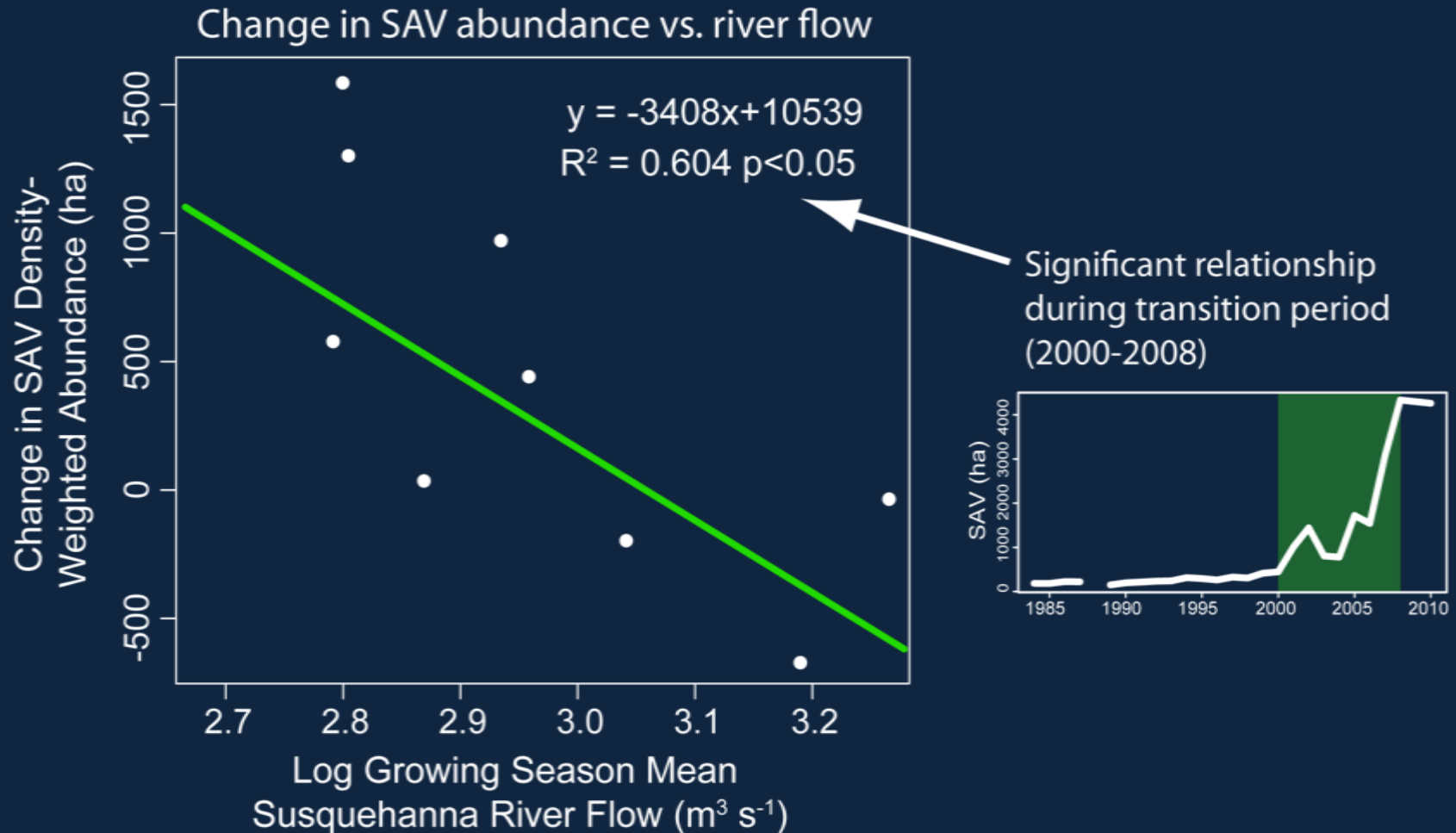
Susquehanna River flow & TSS



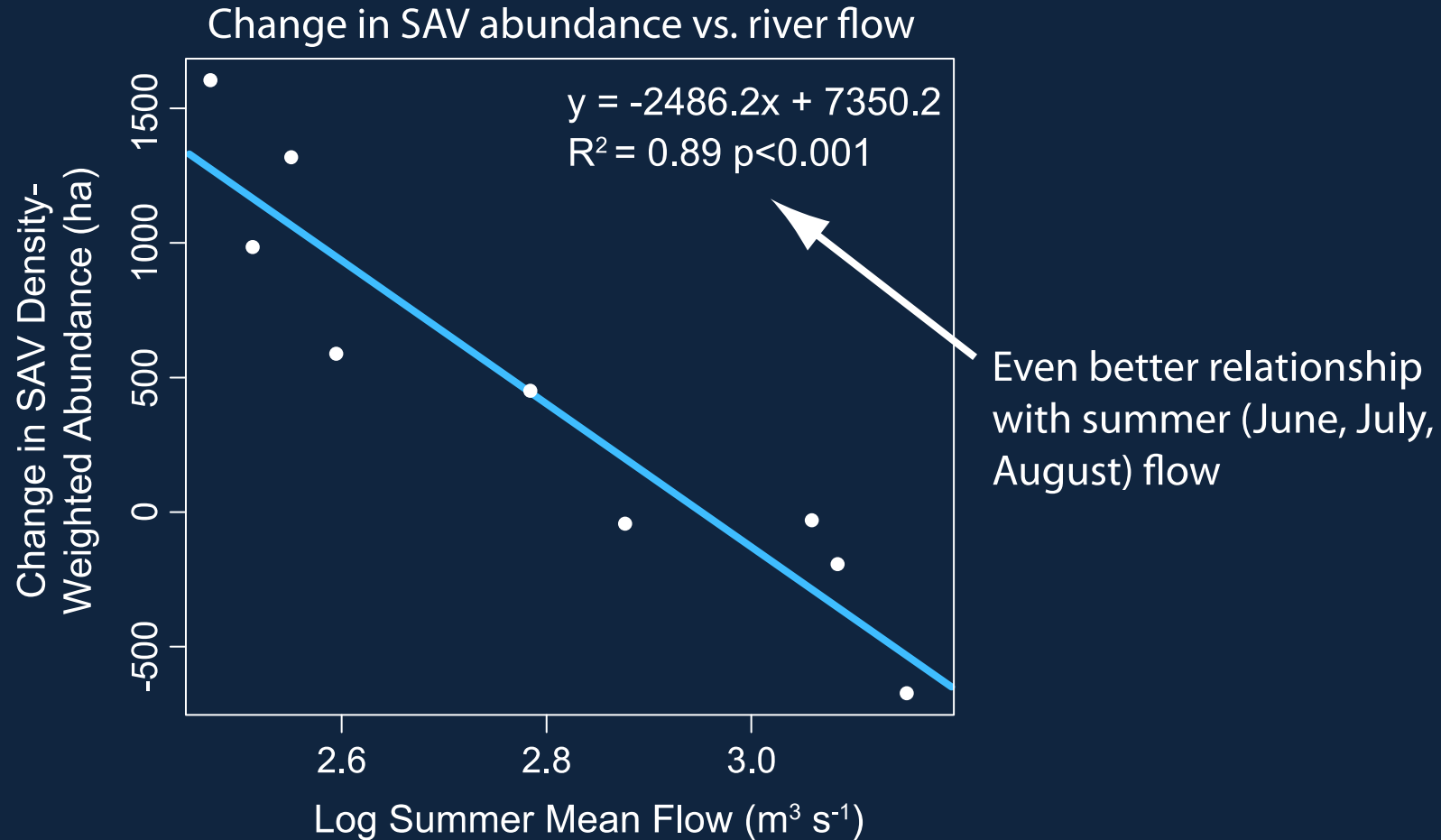
River discharge drives change in water quality



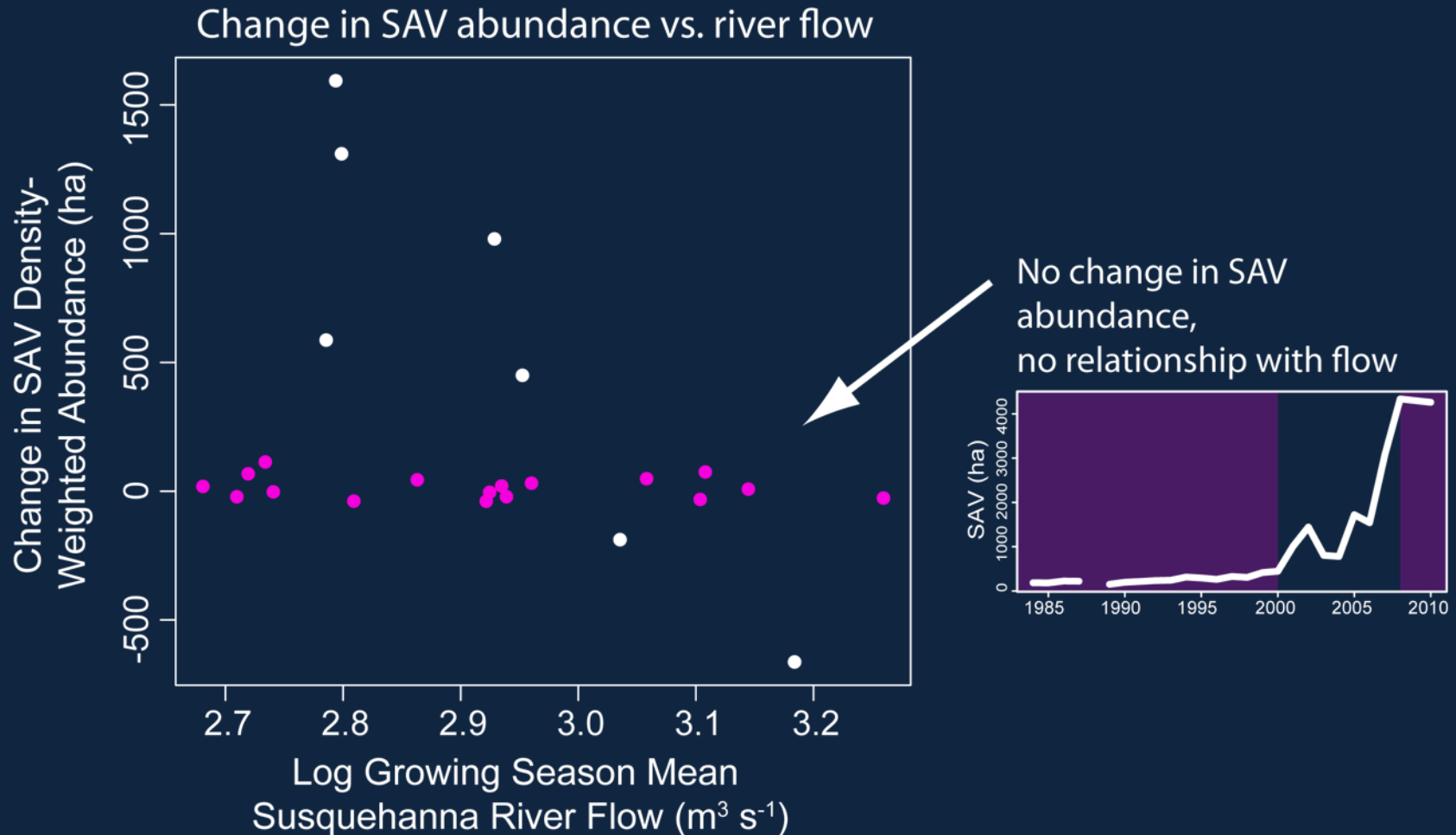
Change in SAV abundance was related to river flow



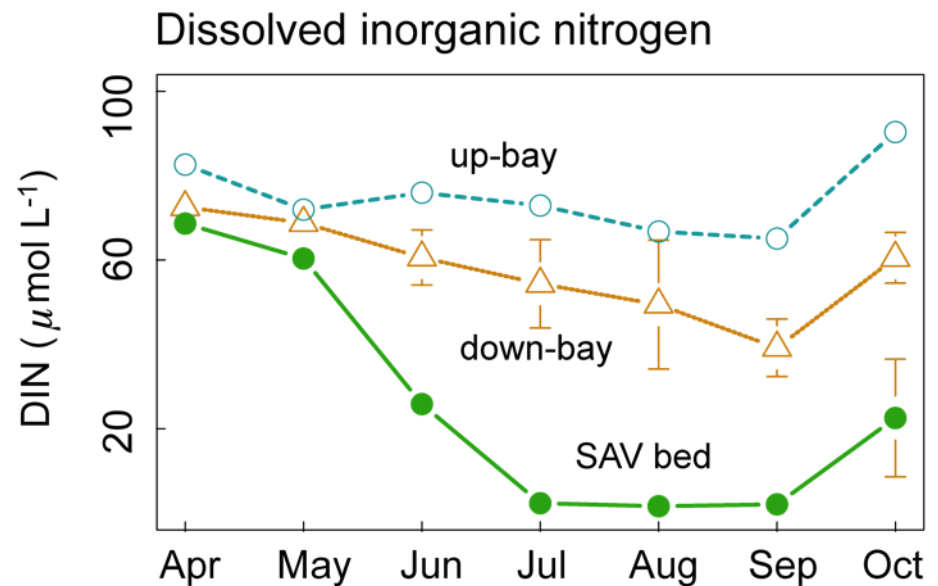
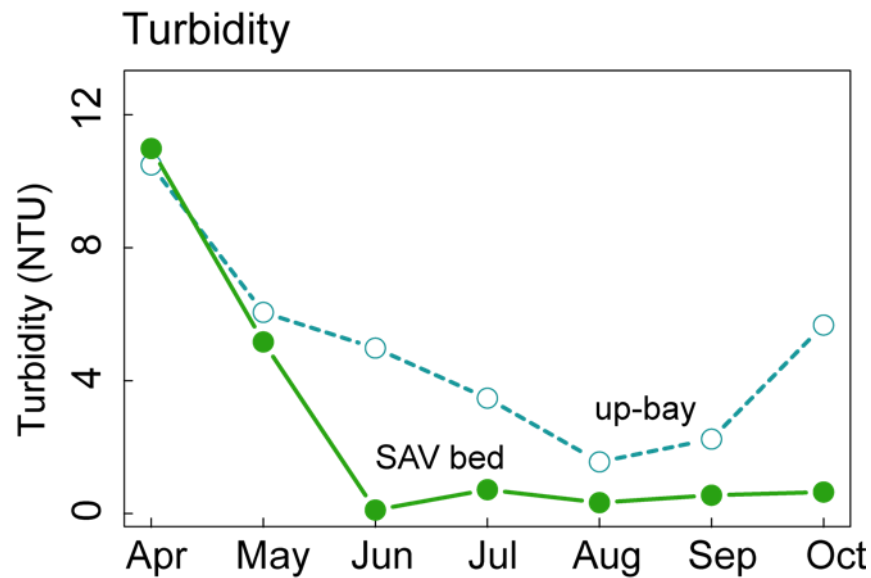
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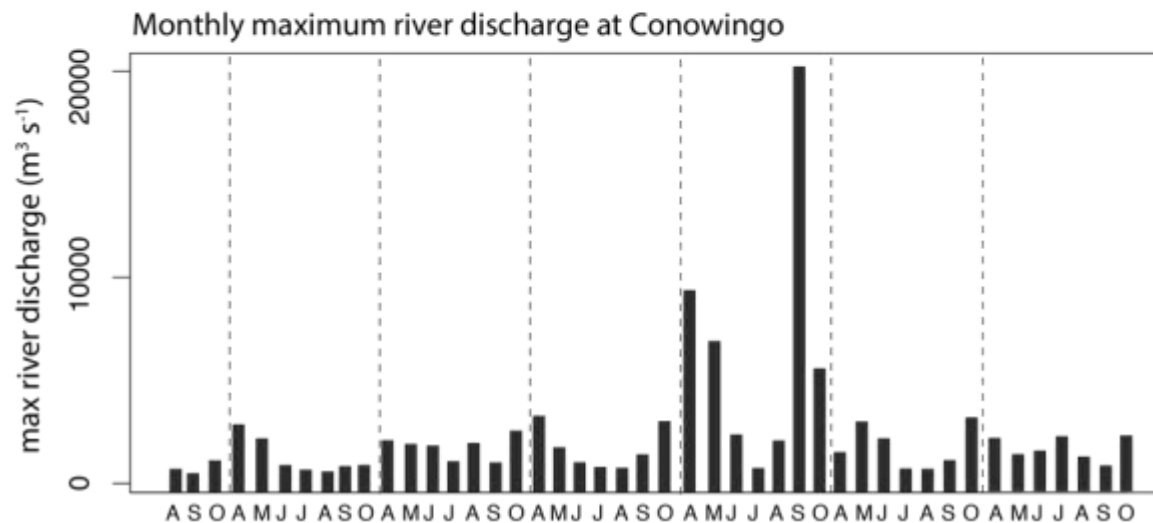
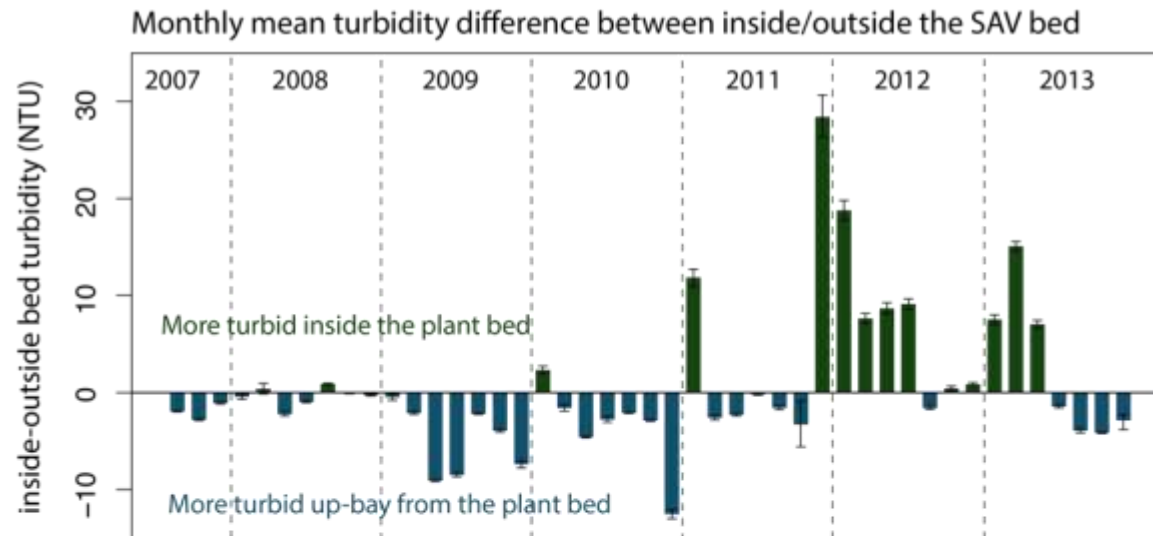
The relationship between SAV and river flow was nonlinear



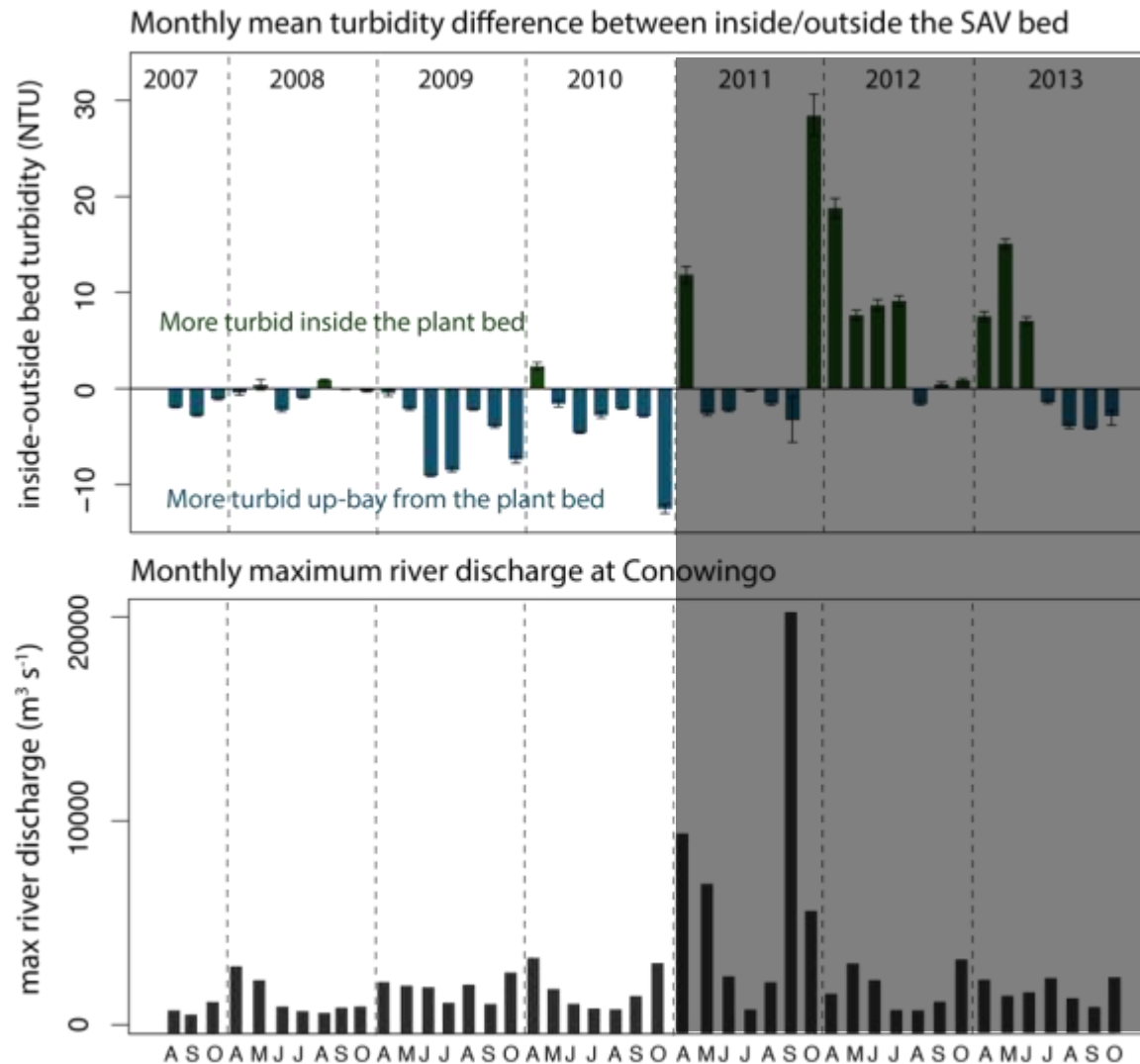
Feedback processes likely drove the non-linear response



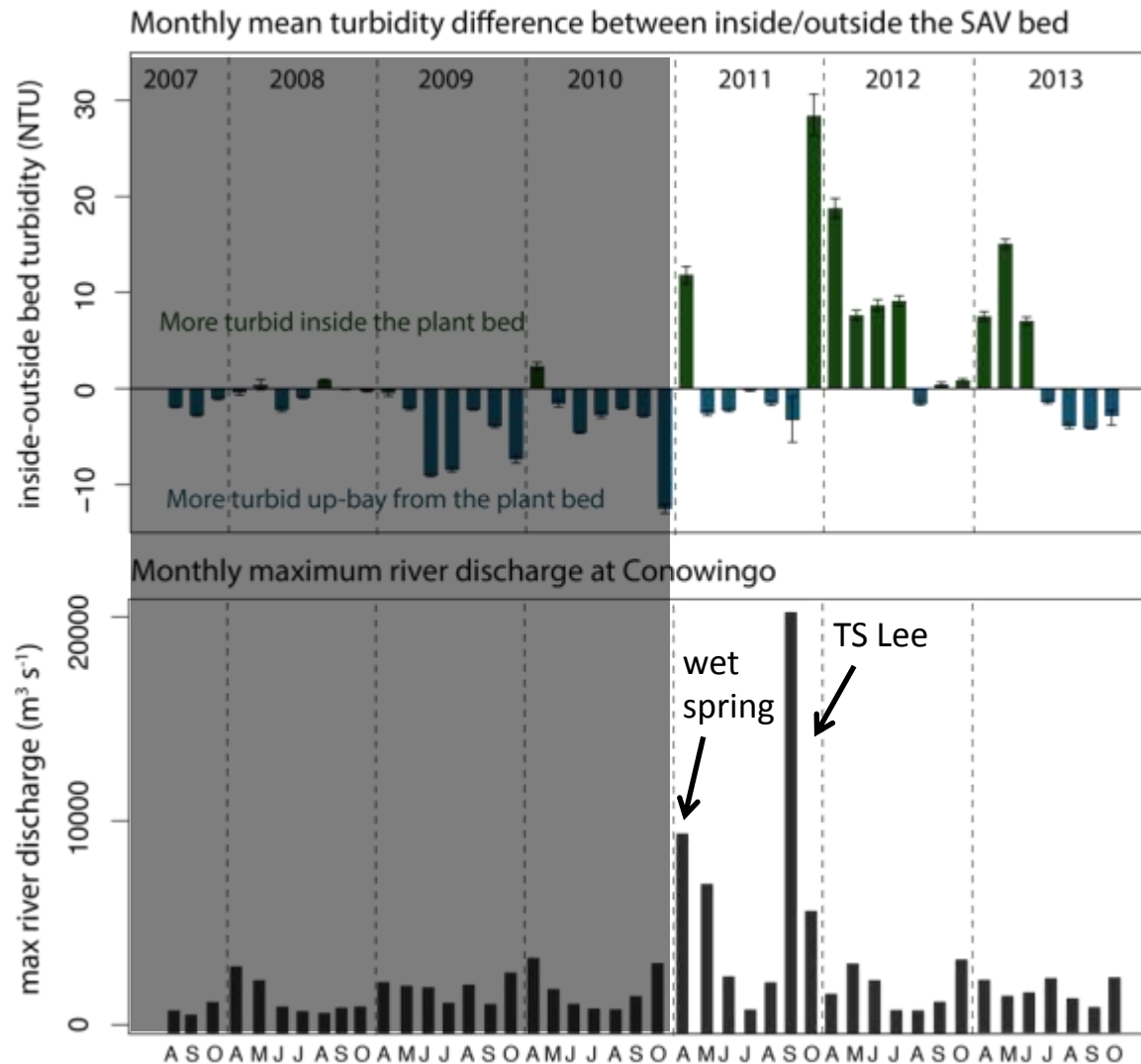
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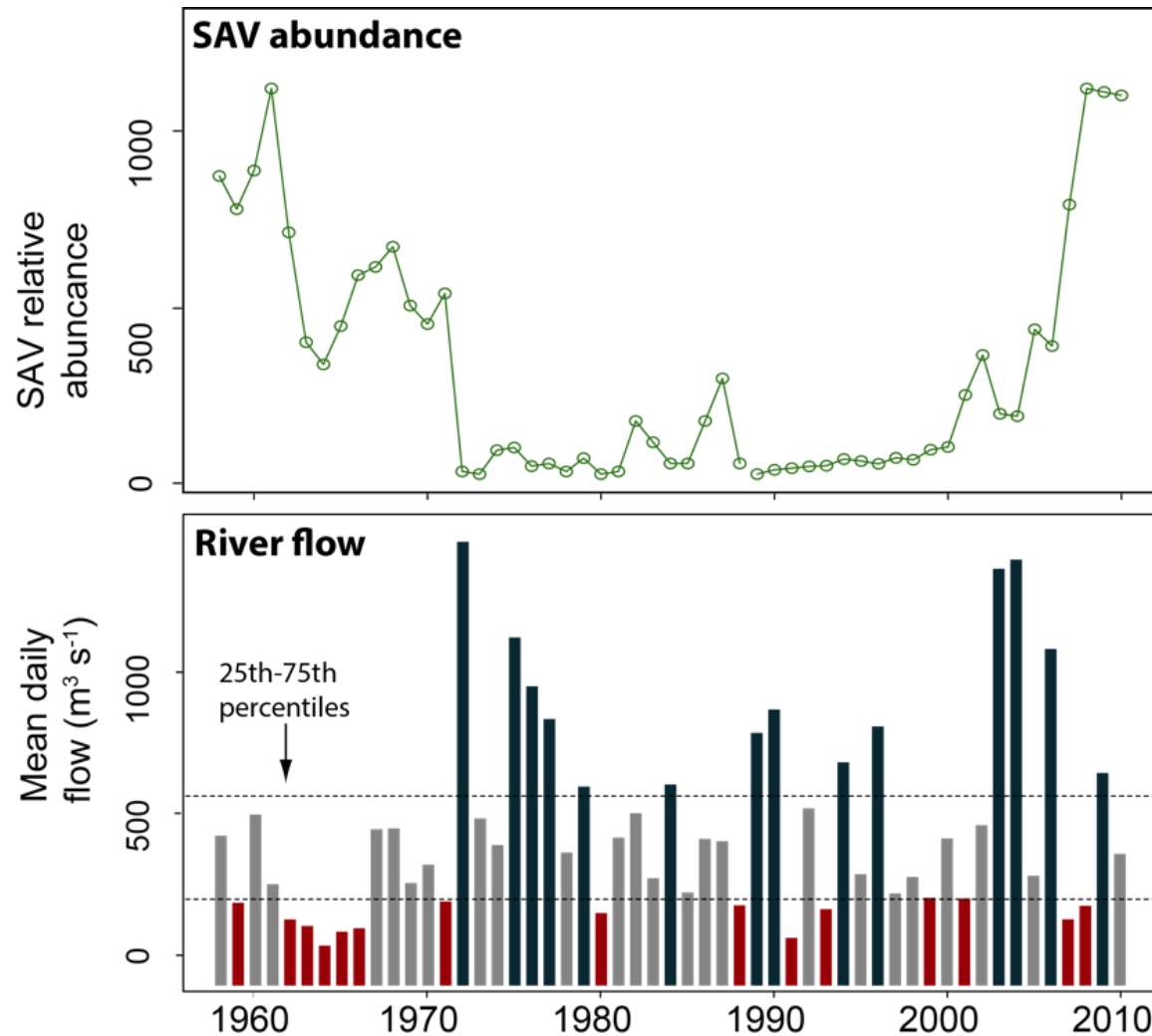
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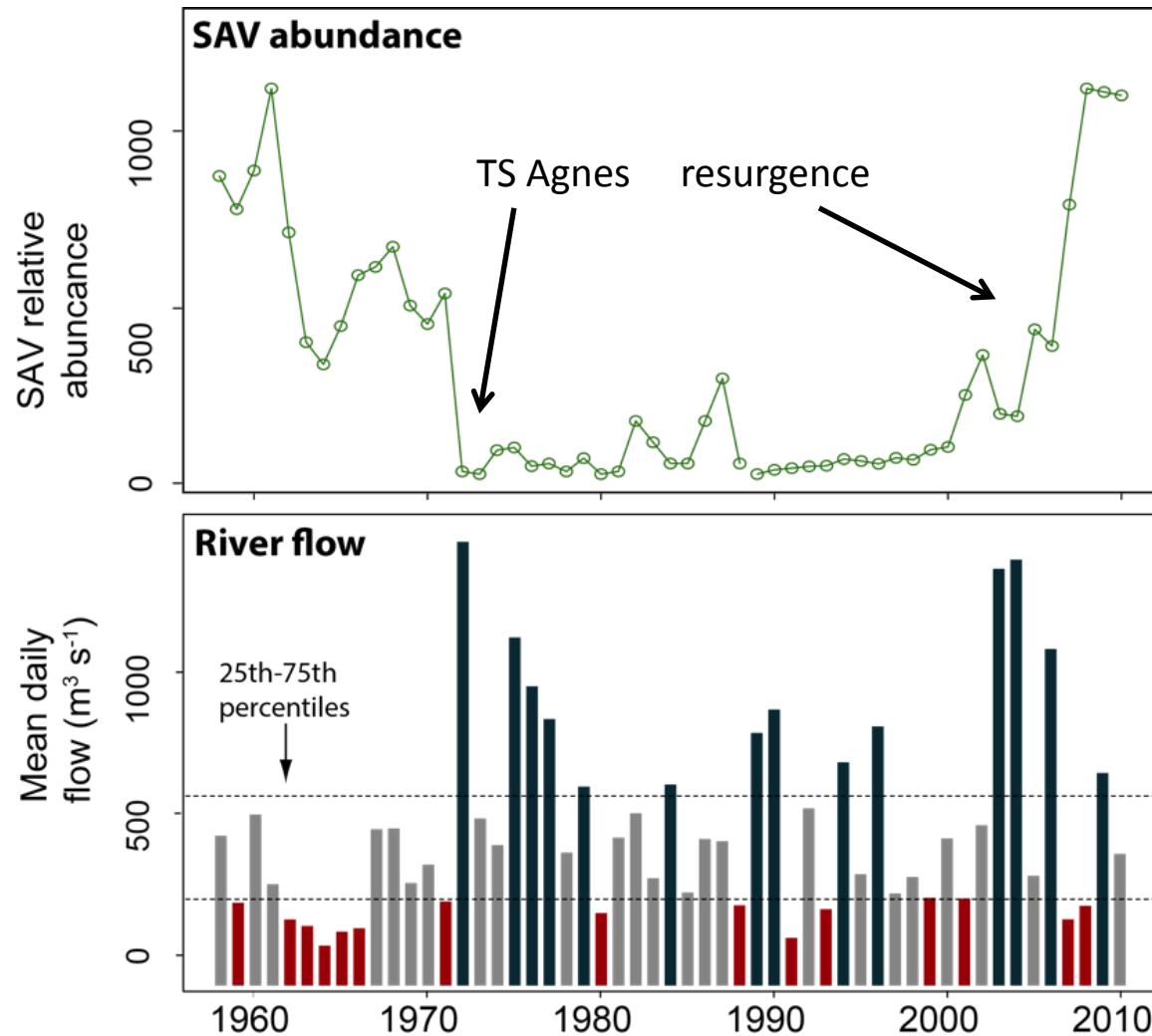
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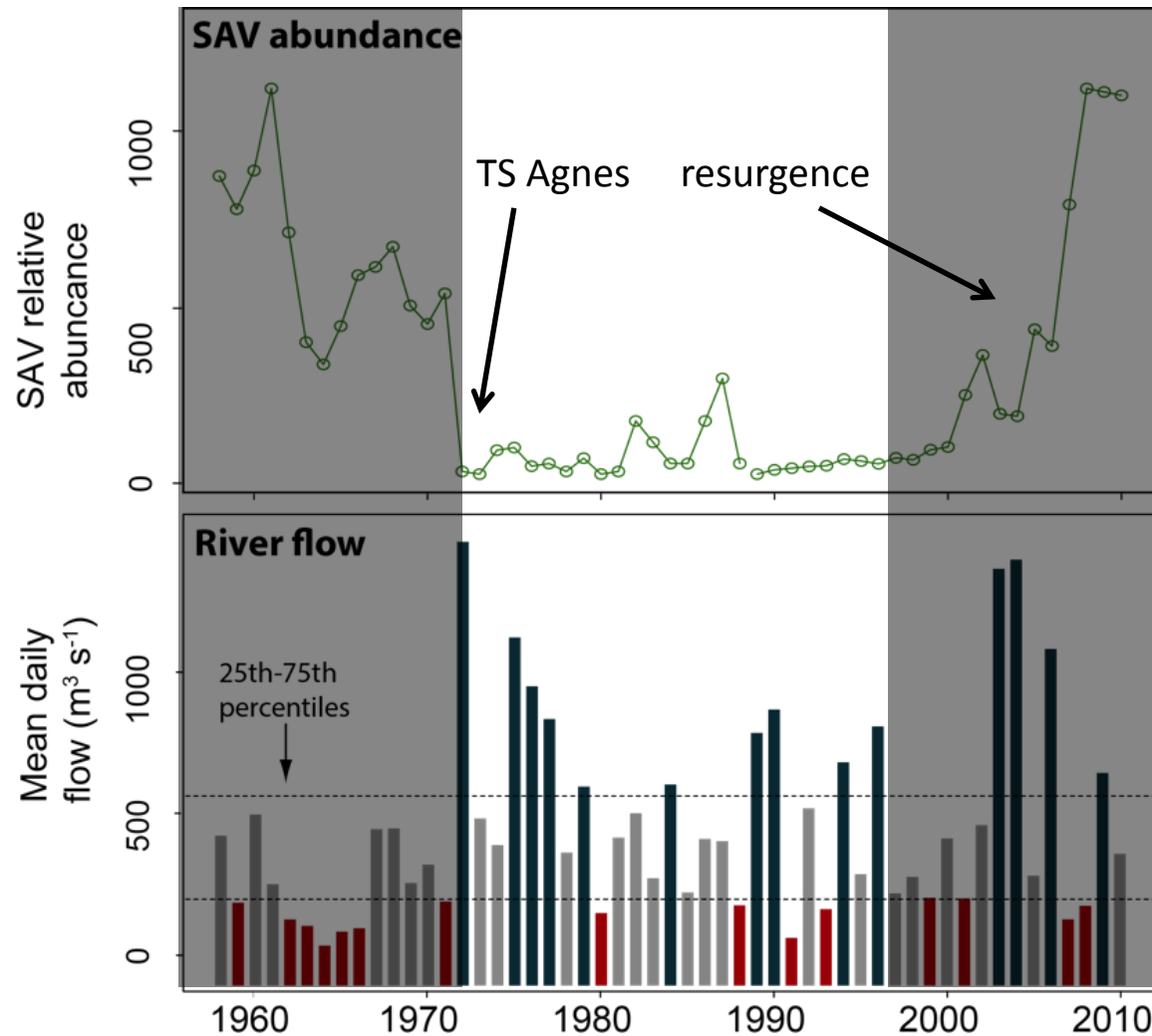
Weather and water quality trends likely triggered the resurgence



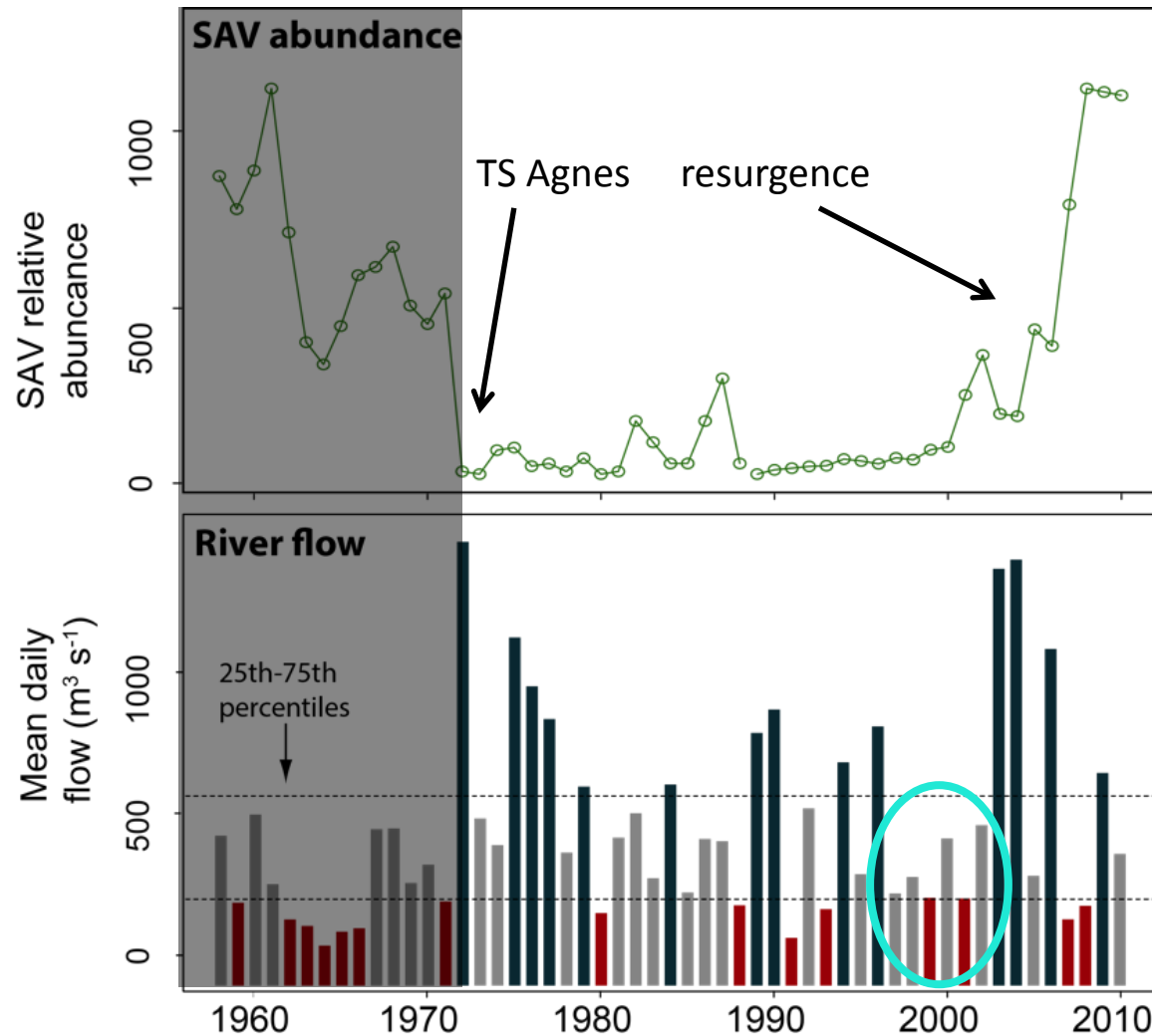
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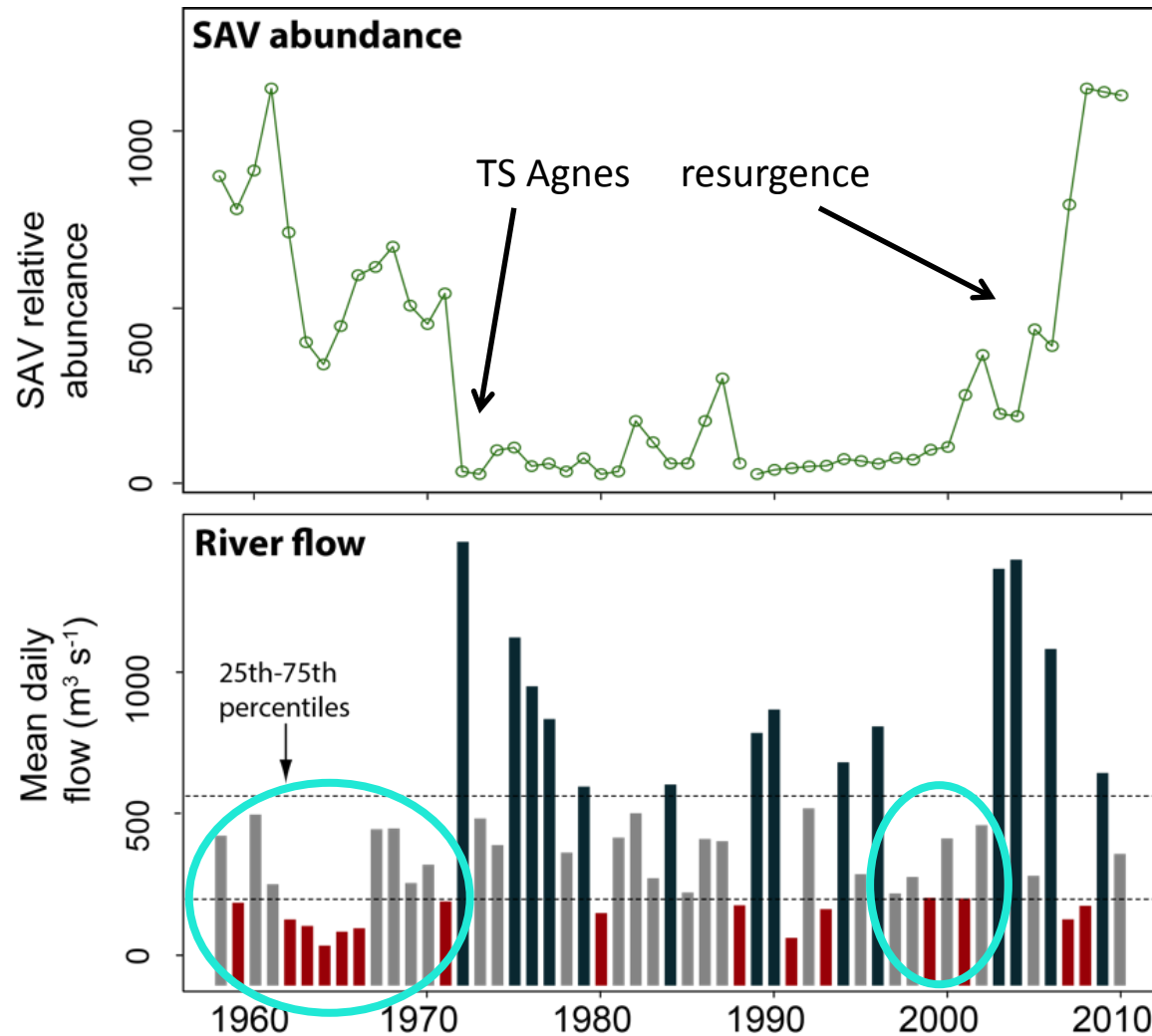
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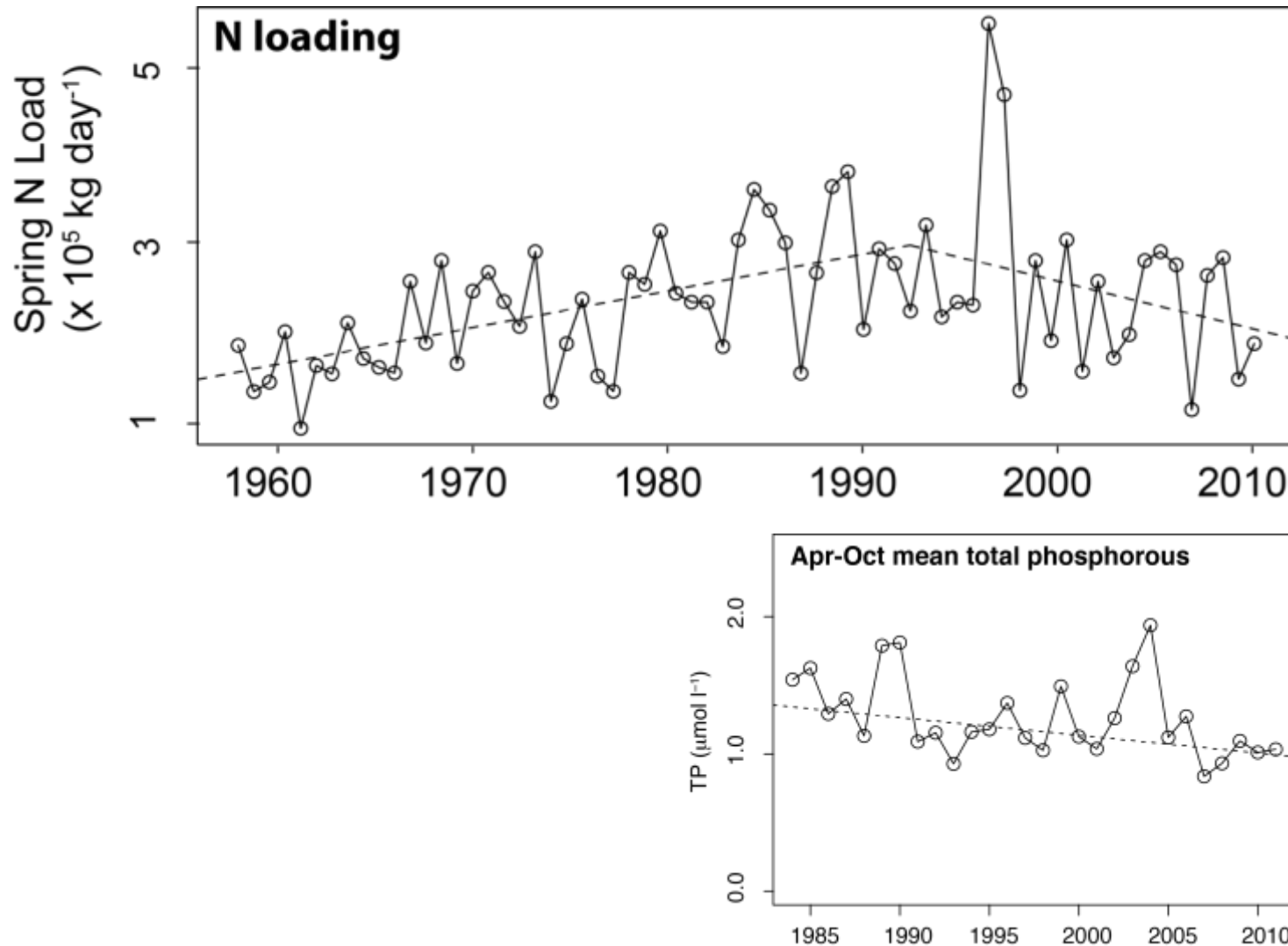
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Summary and conclusions

- River flow is strongly linked to change in water quality and SAV abundance but the relationship is nonlinear
 - No plants: sediments are deposited by rain events and then resuspended, generating turbid water and preventing new plant growth
 - Lots of plants: SAV bed improves water quality, which buffers against loss from flood events
- Absence of rain events appears to have “kick-started” plant resurgence
- Underlying long-term water quality trends are also important

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- Absence of rain events appears to have “kick-started” plant resurgence
- Underlying long-term water quality trends “set the stage”



Timing of events in relation to plant phenology matters

