Exploring impacts of wildfire smoke on phosphorus loading in Cascadilla Creek

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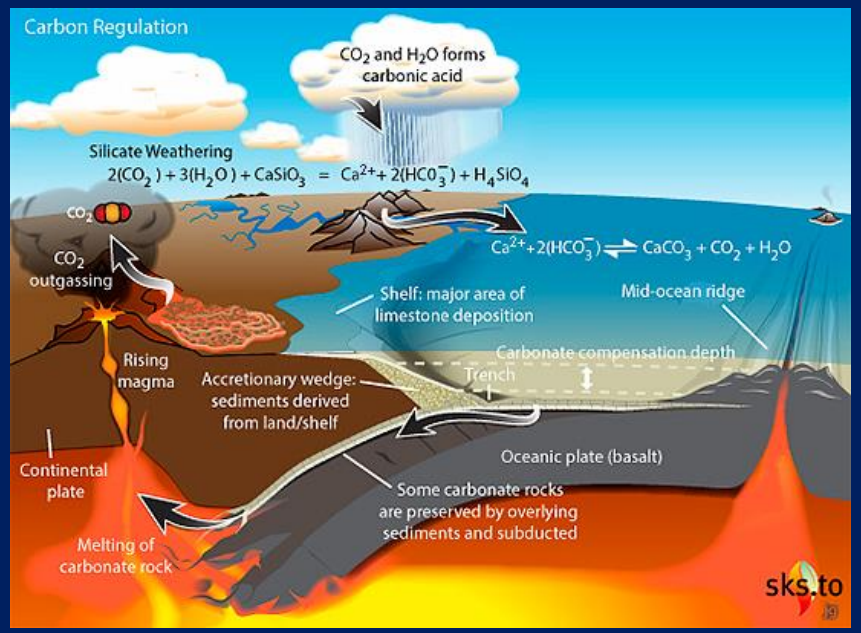
Low temperature geochemistry @ Cornell Earth & Atmospheric Sciences

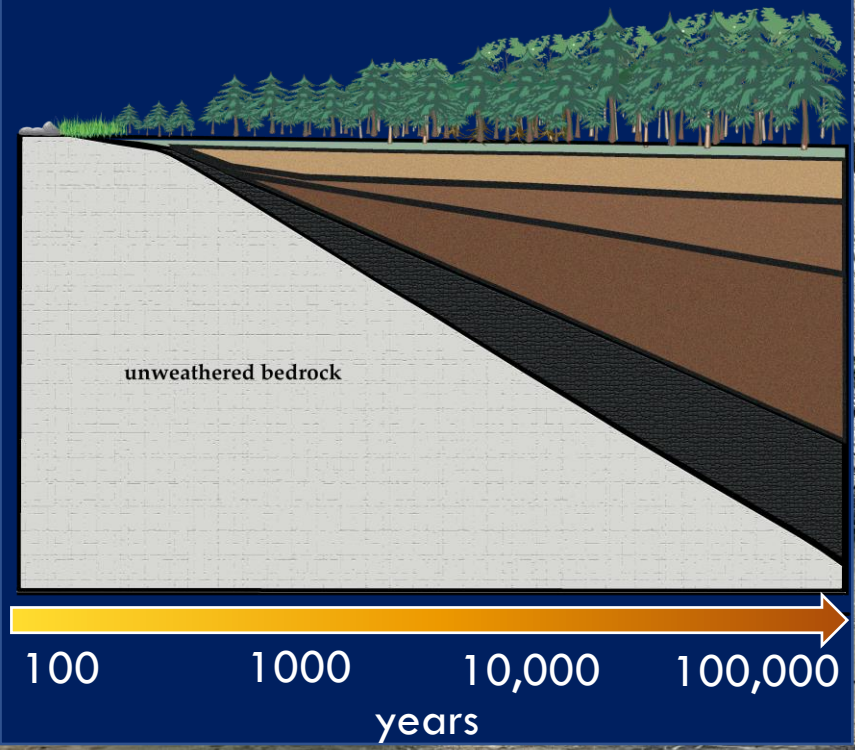
Geologic carbon cycle & Earth's Climate

Long term regulator of Earth's climate, serving as net drawdown of atmospheric CO_2



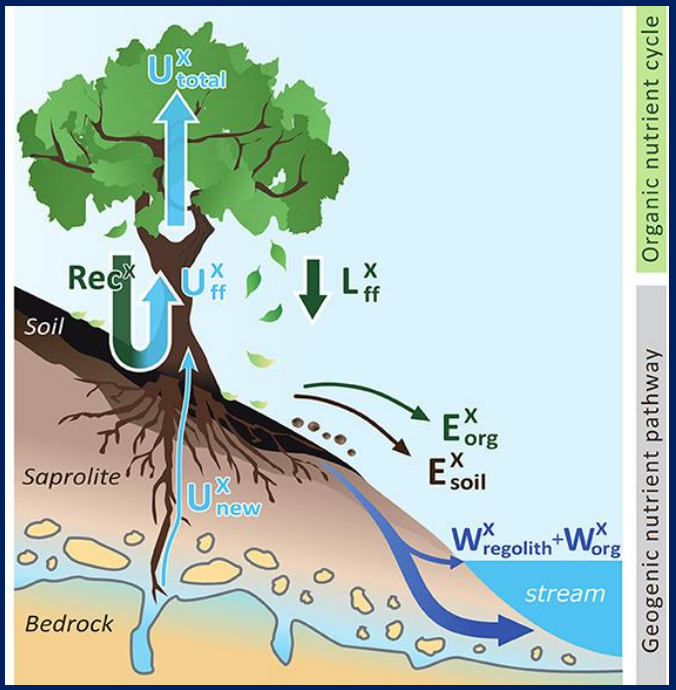
Soil formation & landscape evolution

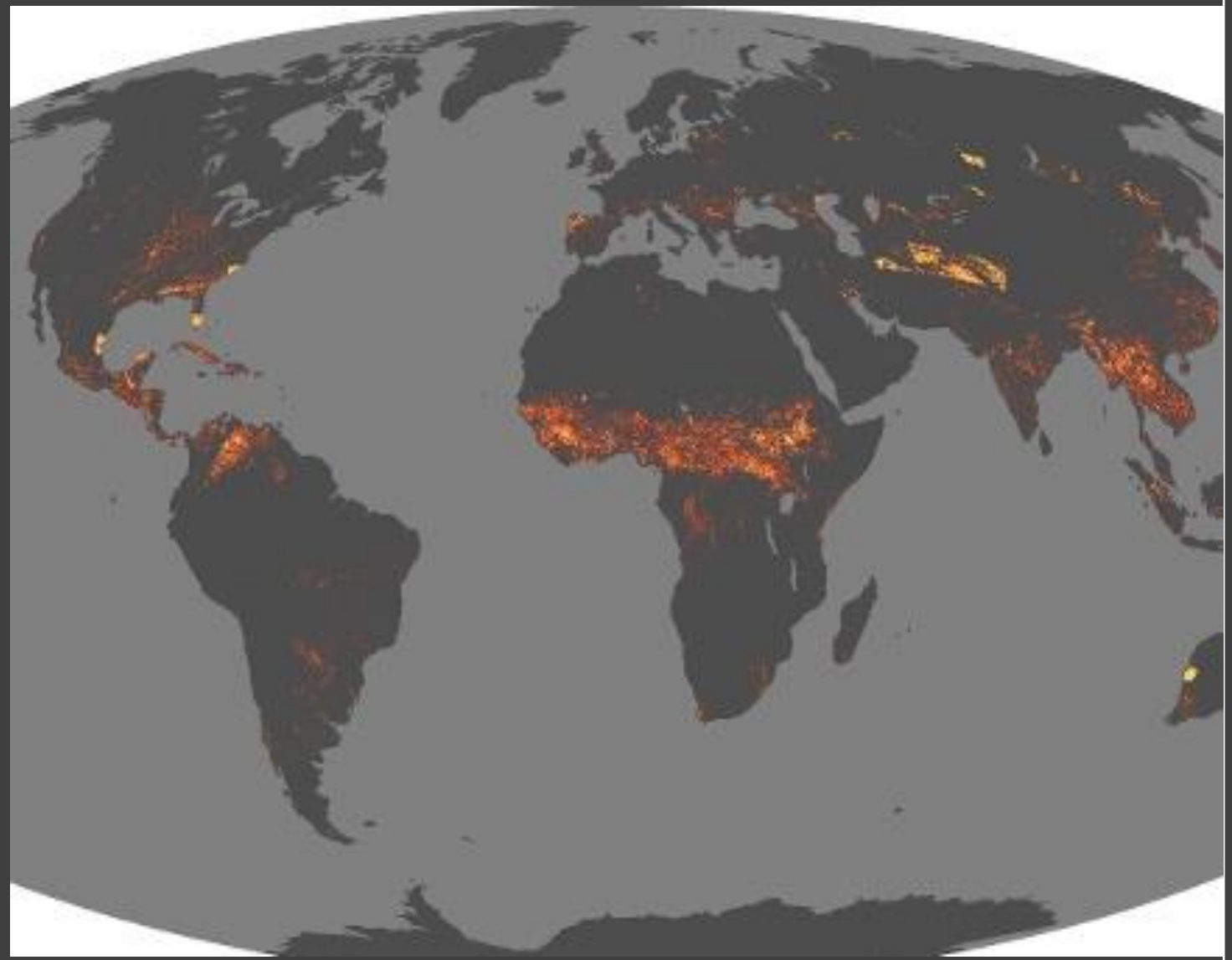
Soil formation through the simple process of converting rock to soil that shape the diverse landscapes

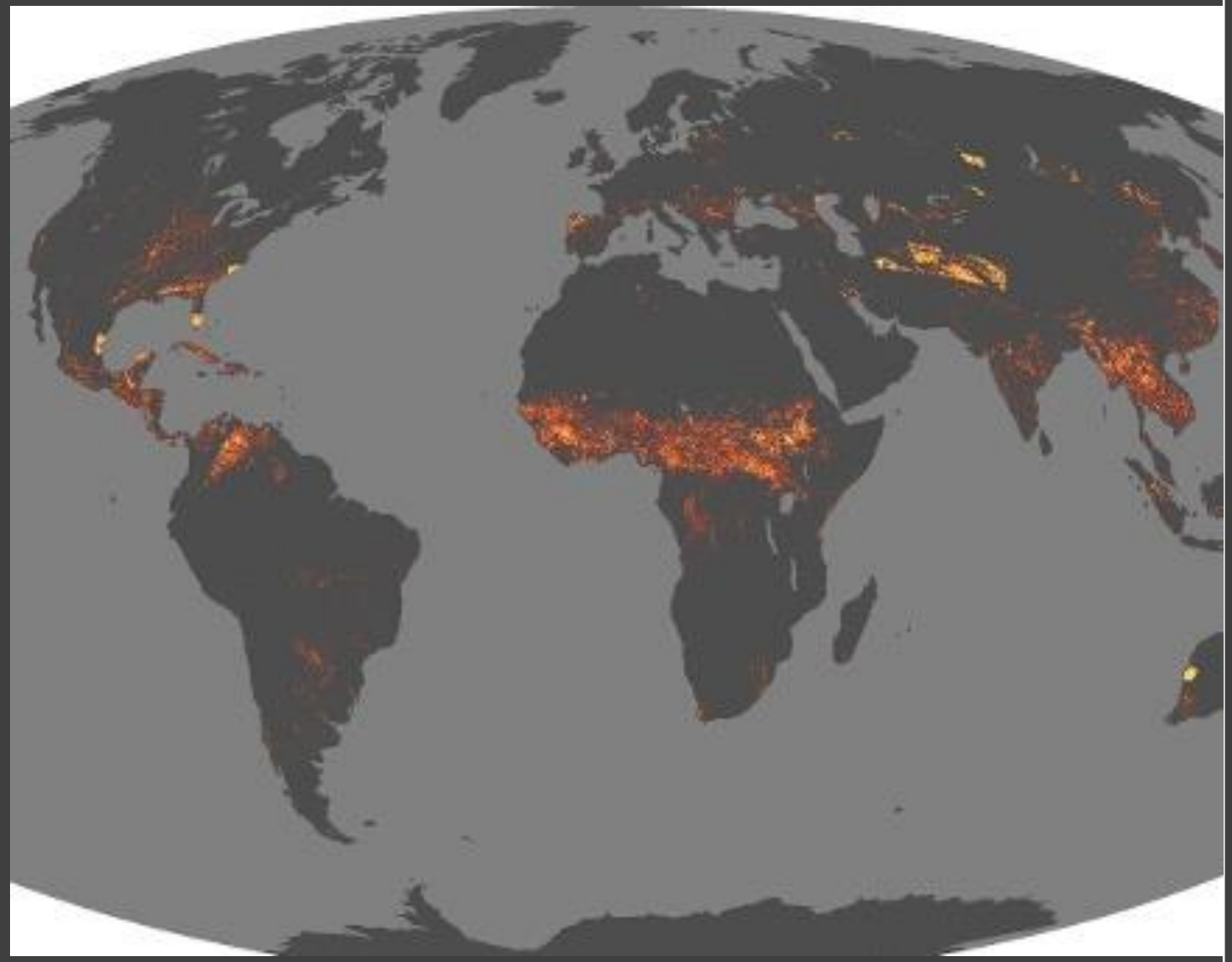


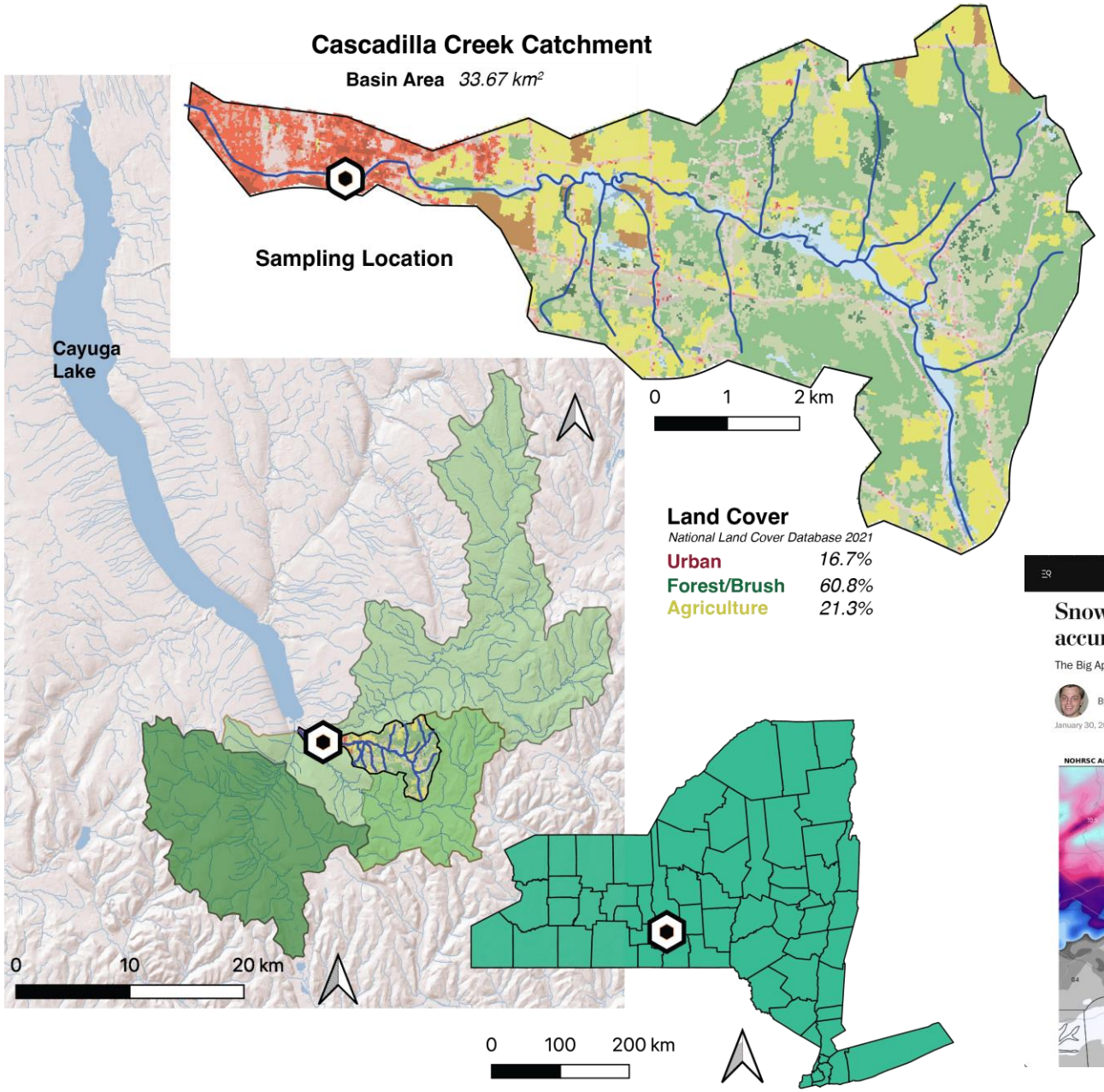
Ecosystem nourishment & resilience

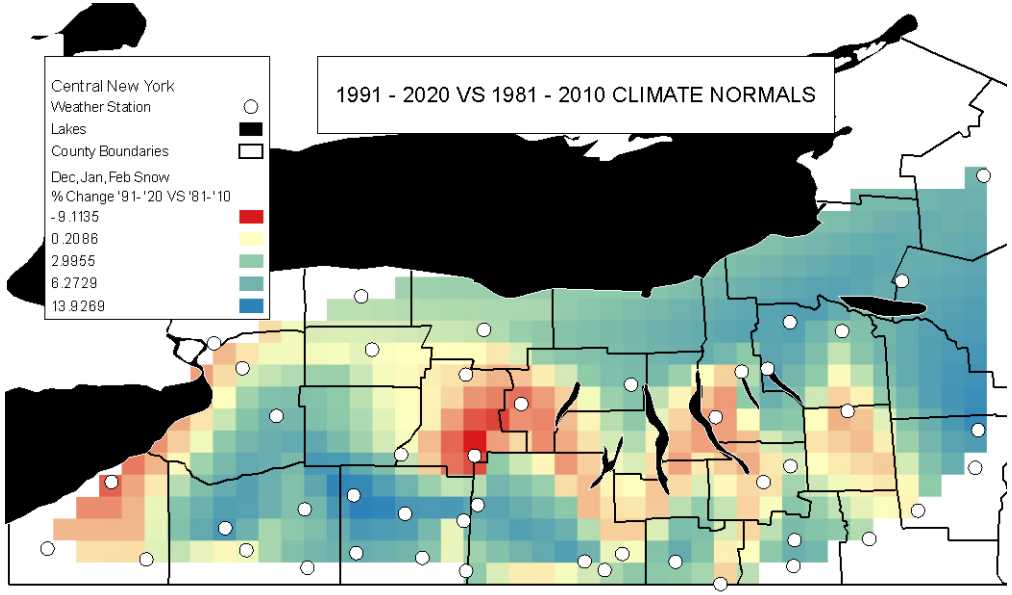
Actively supplies essential nutrients important in supporting and sustaining life.

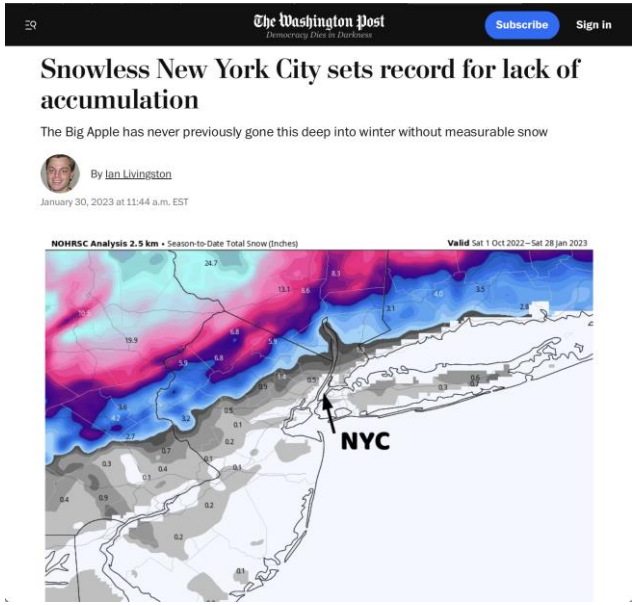












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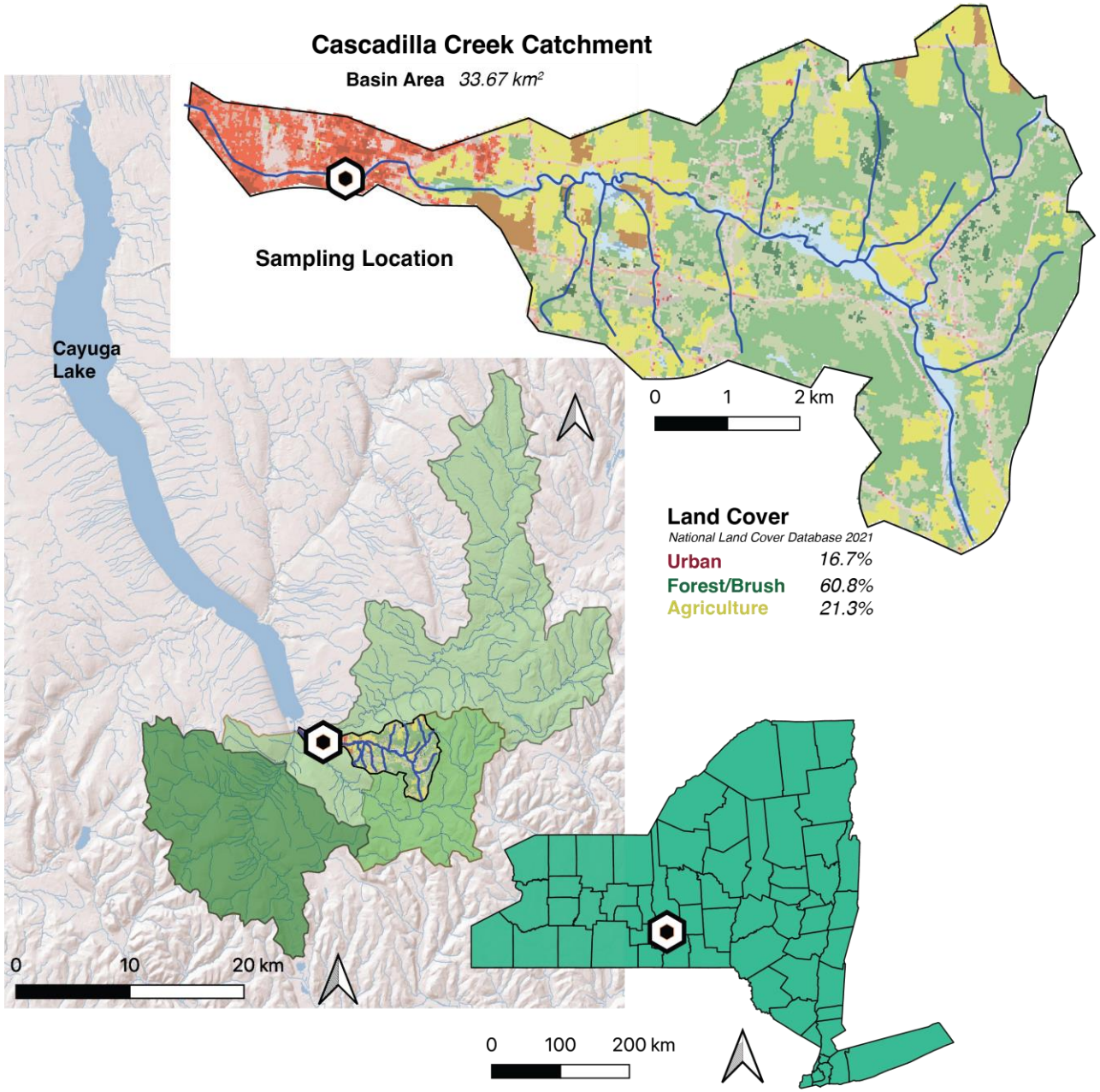

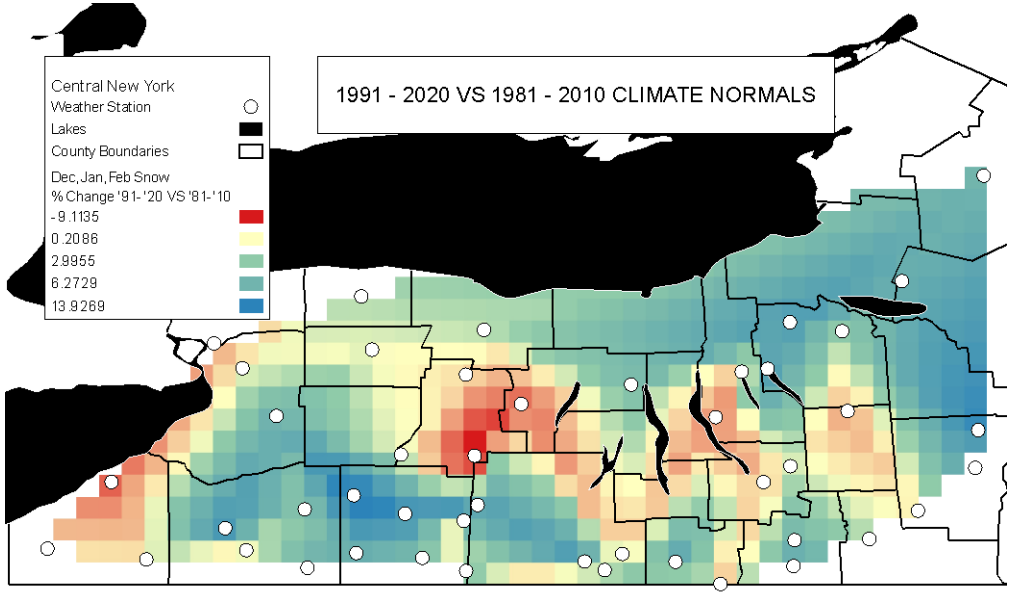

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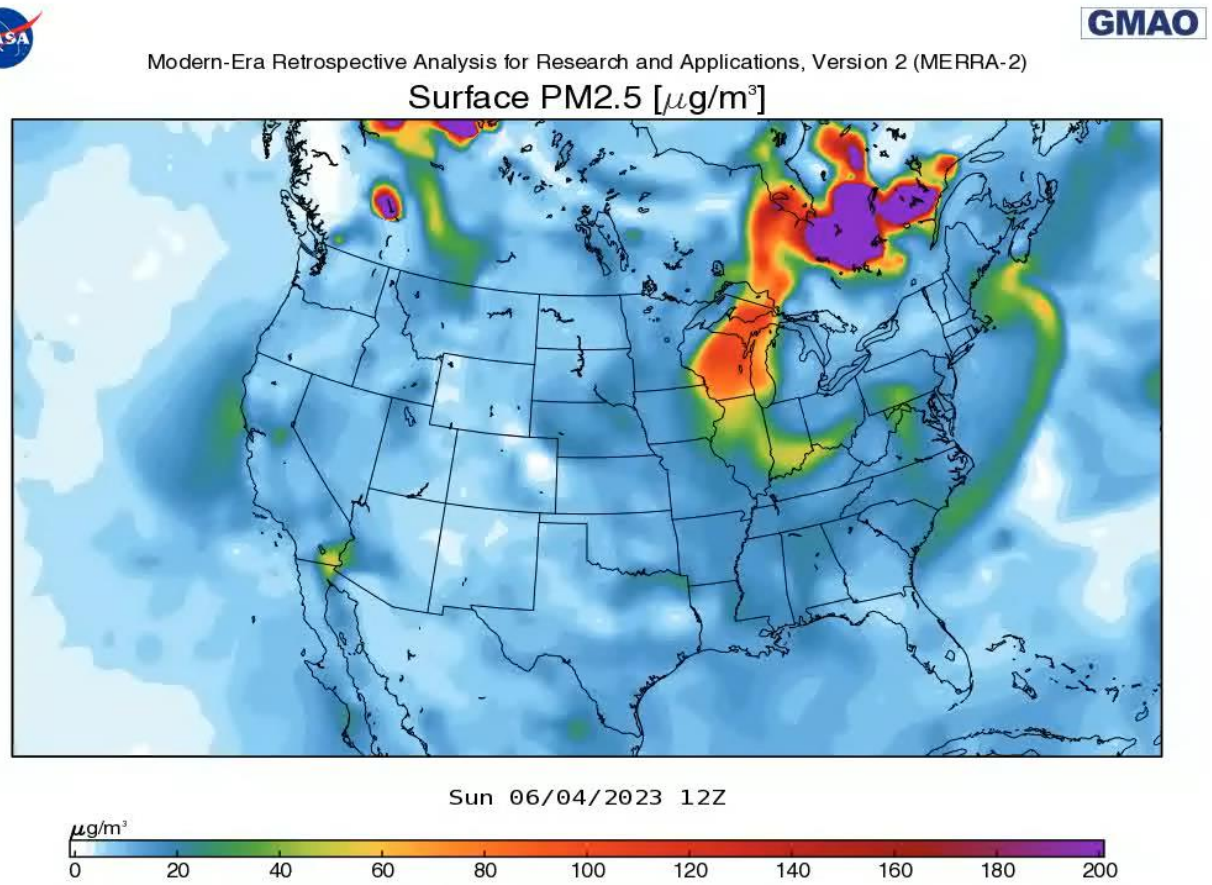
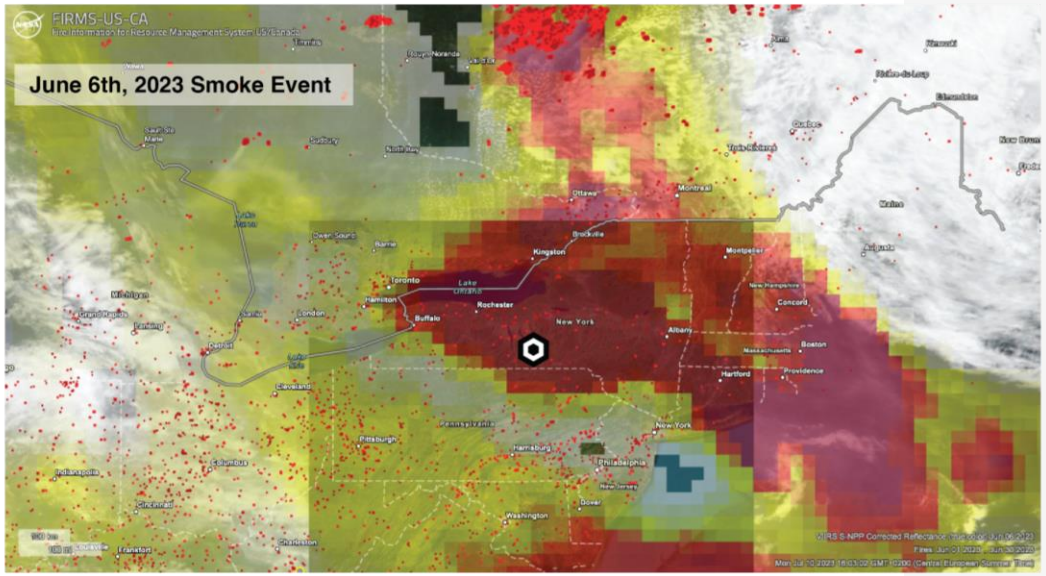
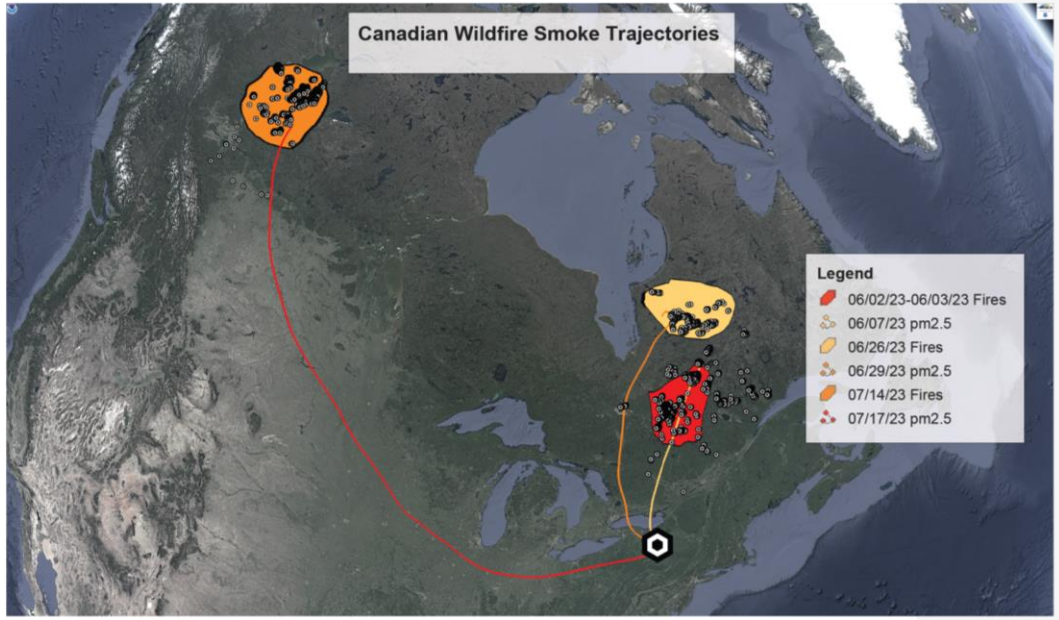
Unprecedented Canadian wildfire season caused an unusually smoky summer







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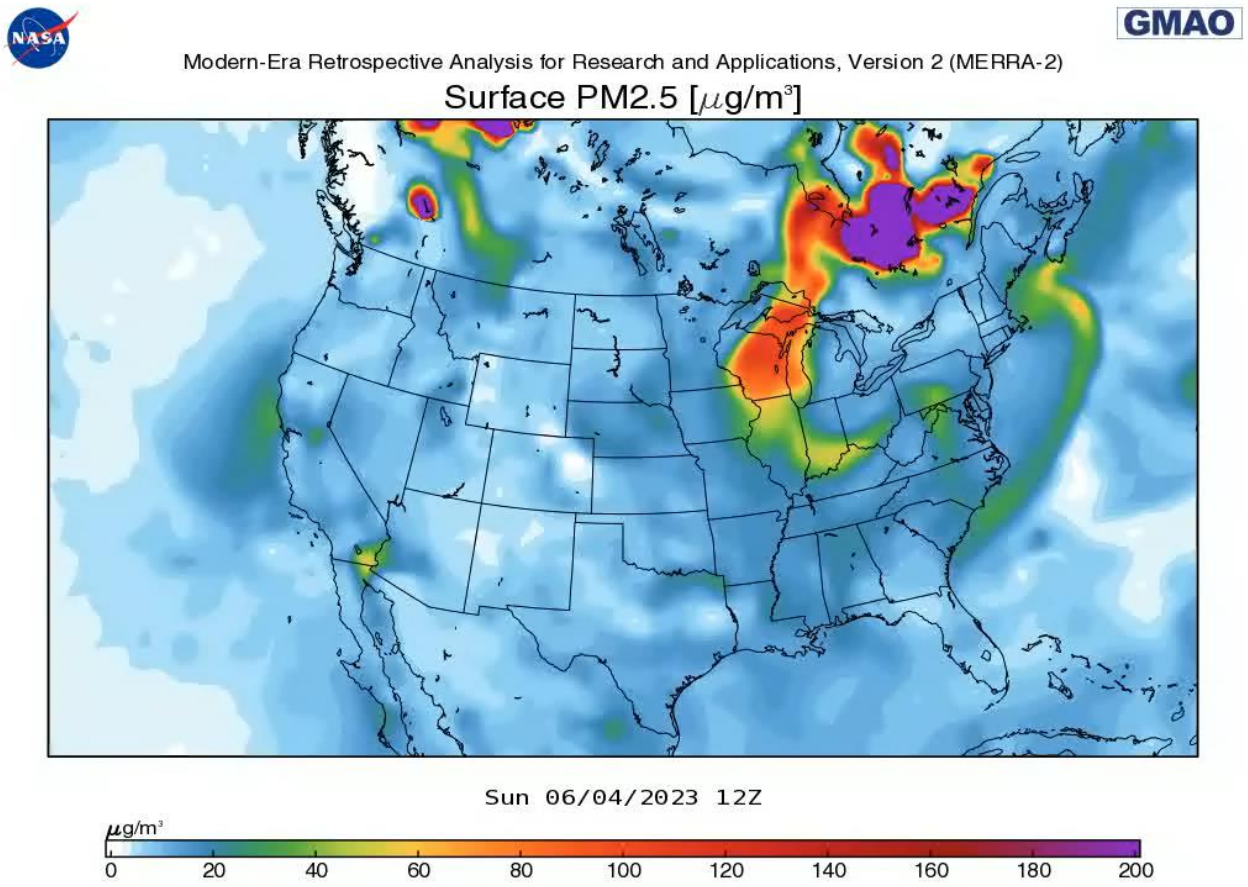

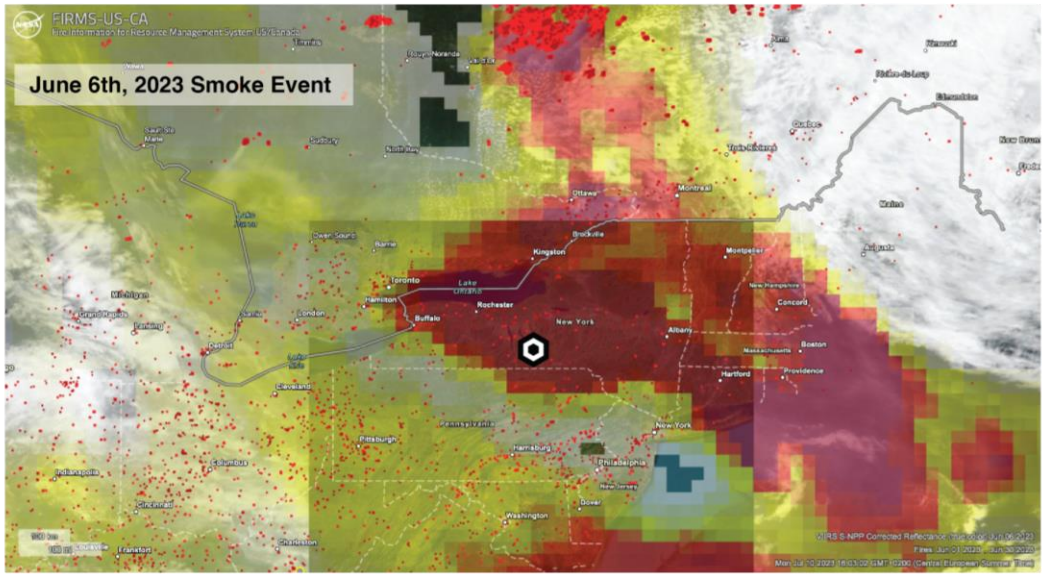

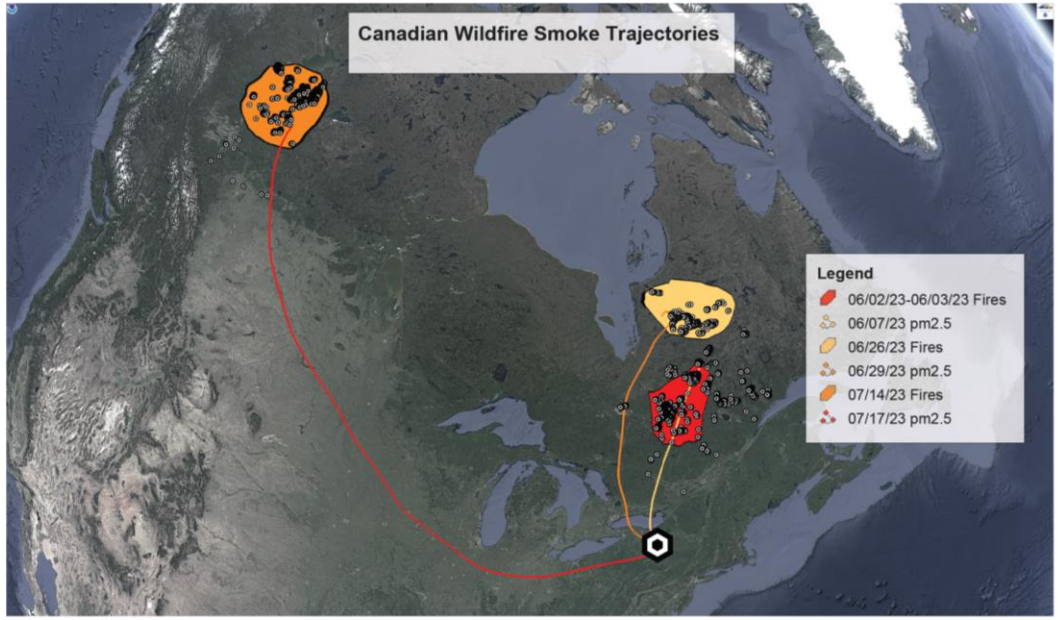

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Dissolved phosphorus behavior over the smoke period

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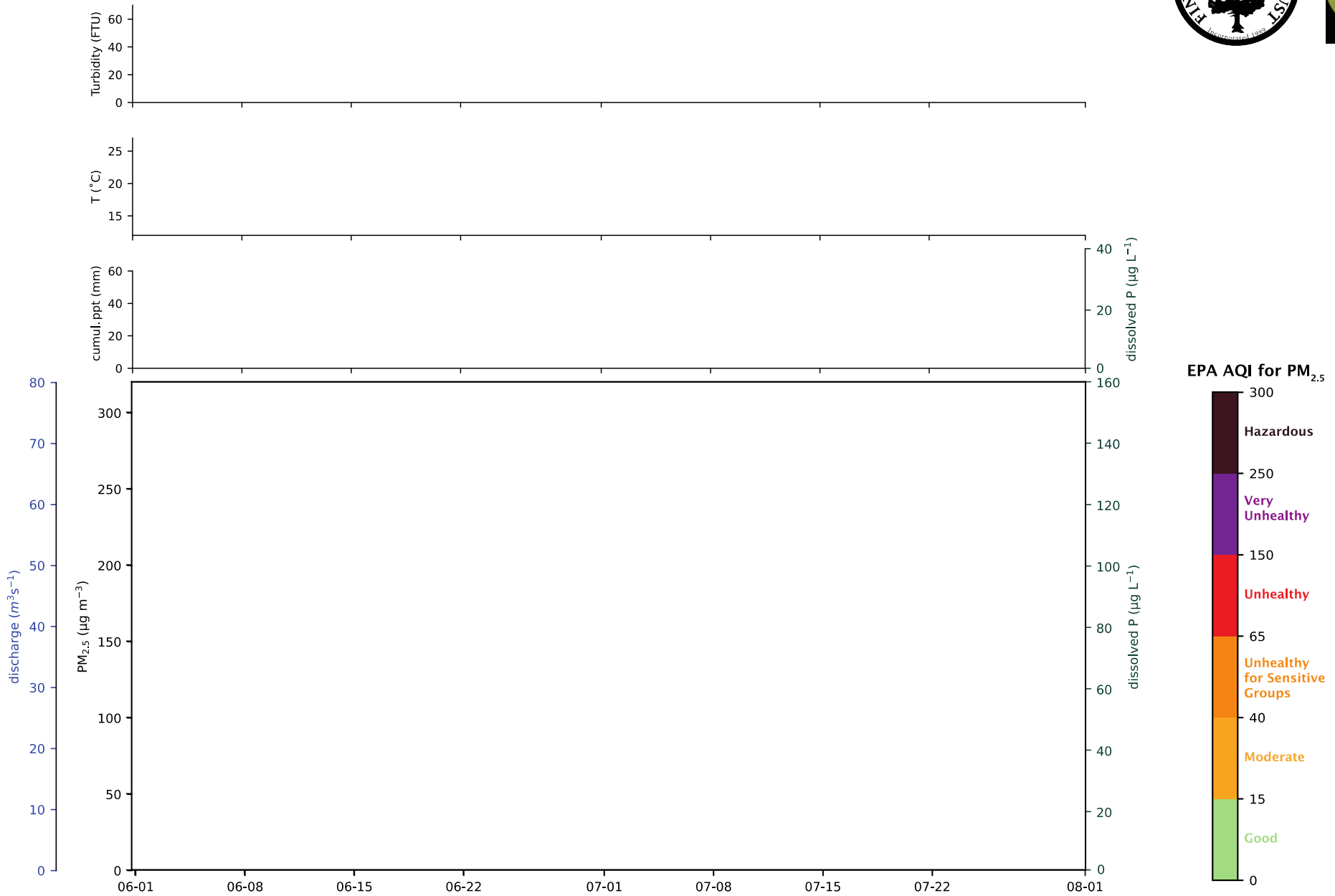

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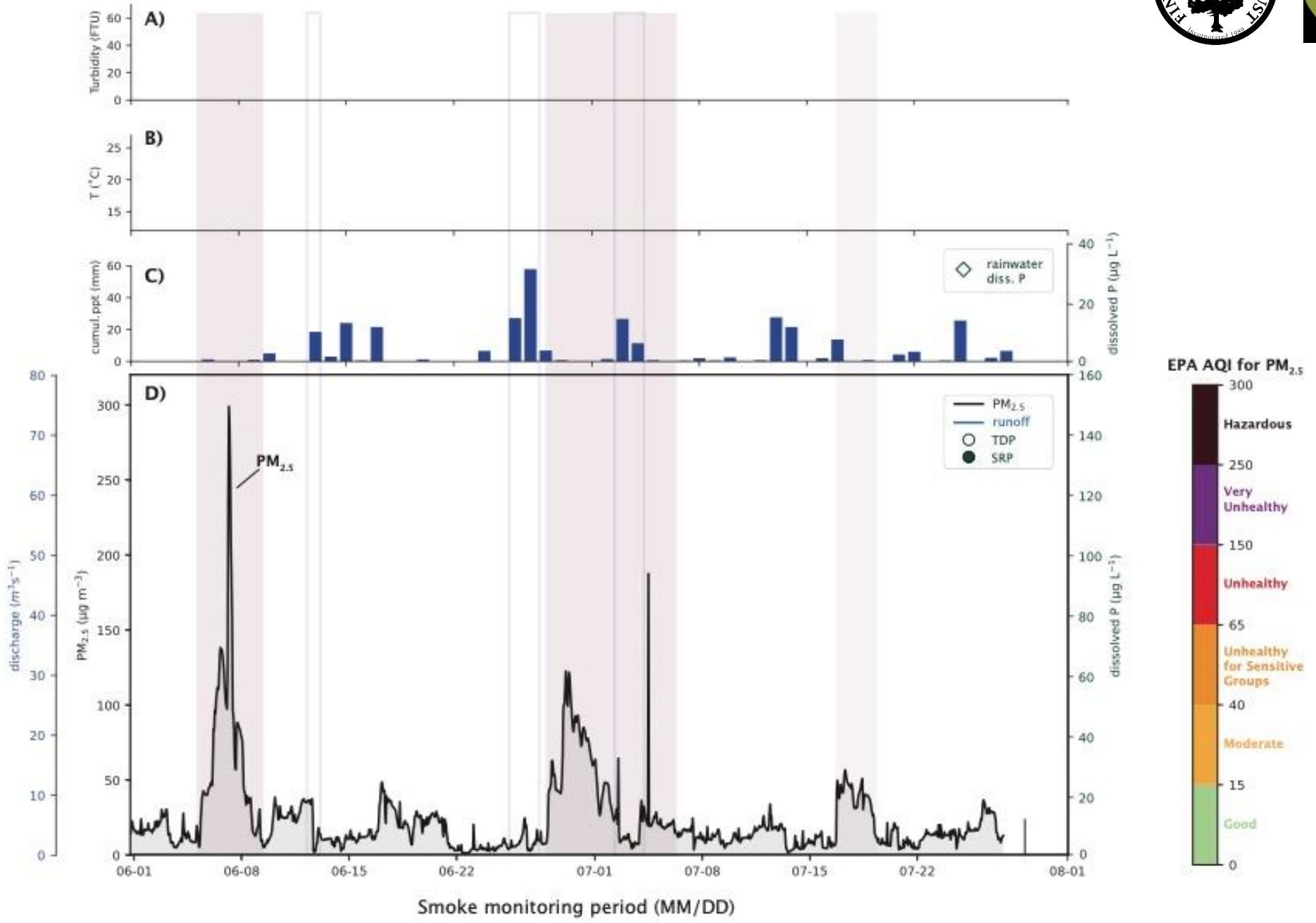

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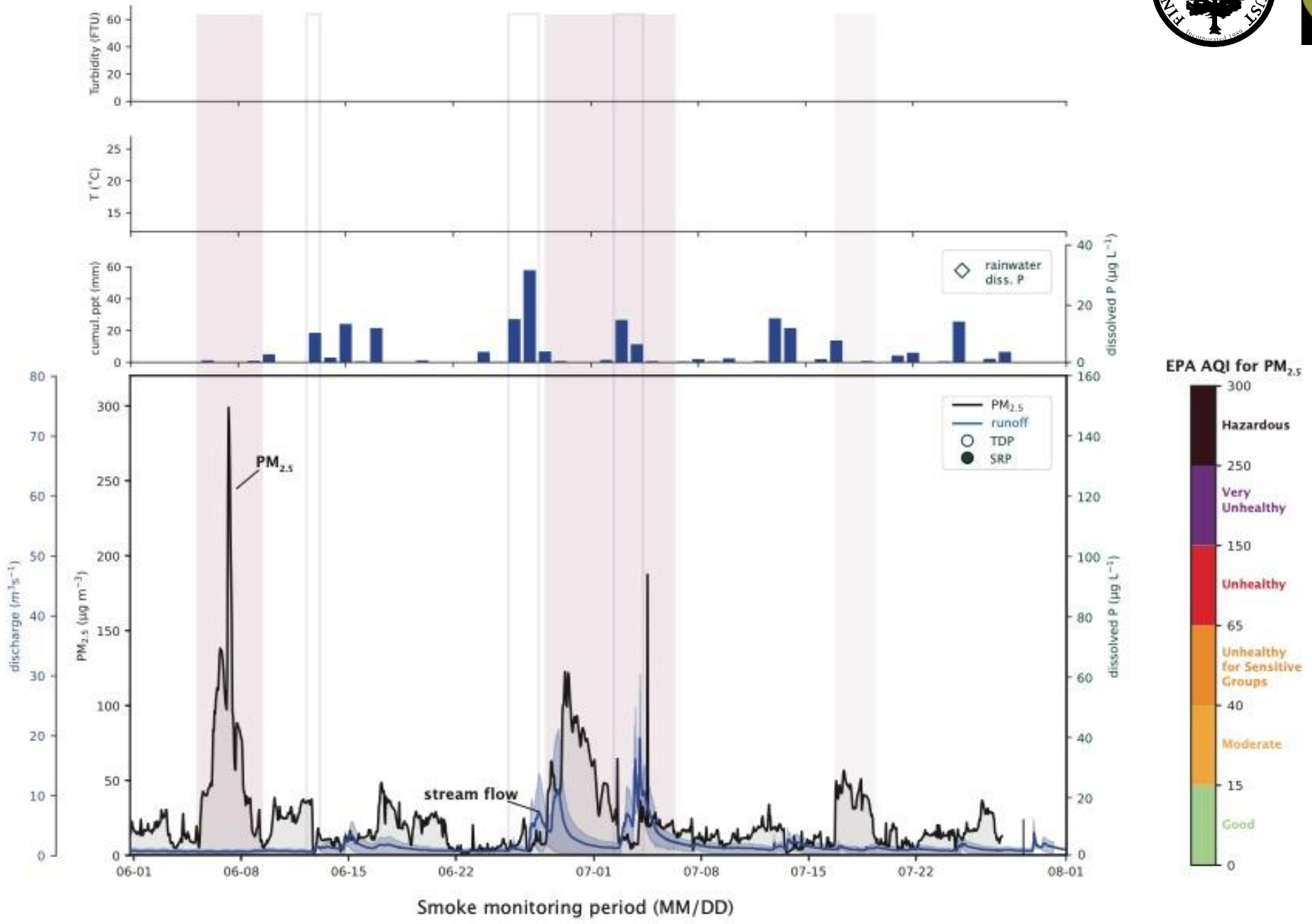

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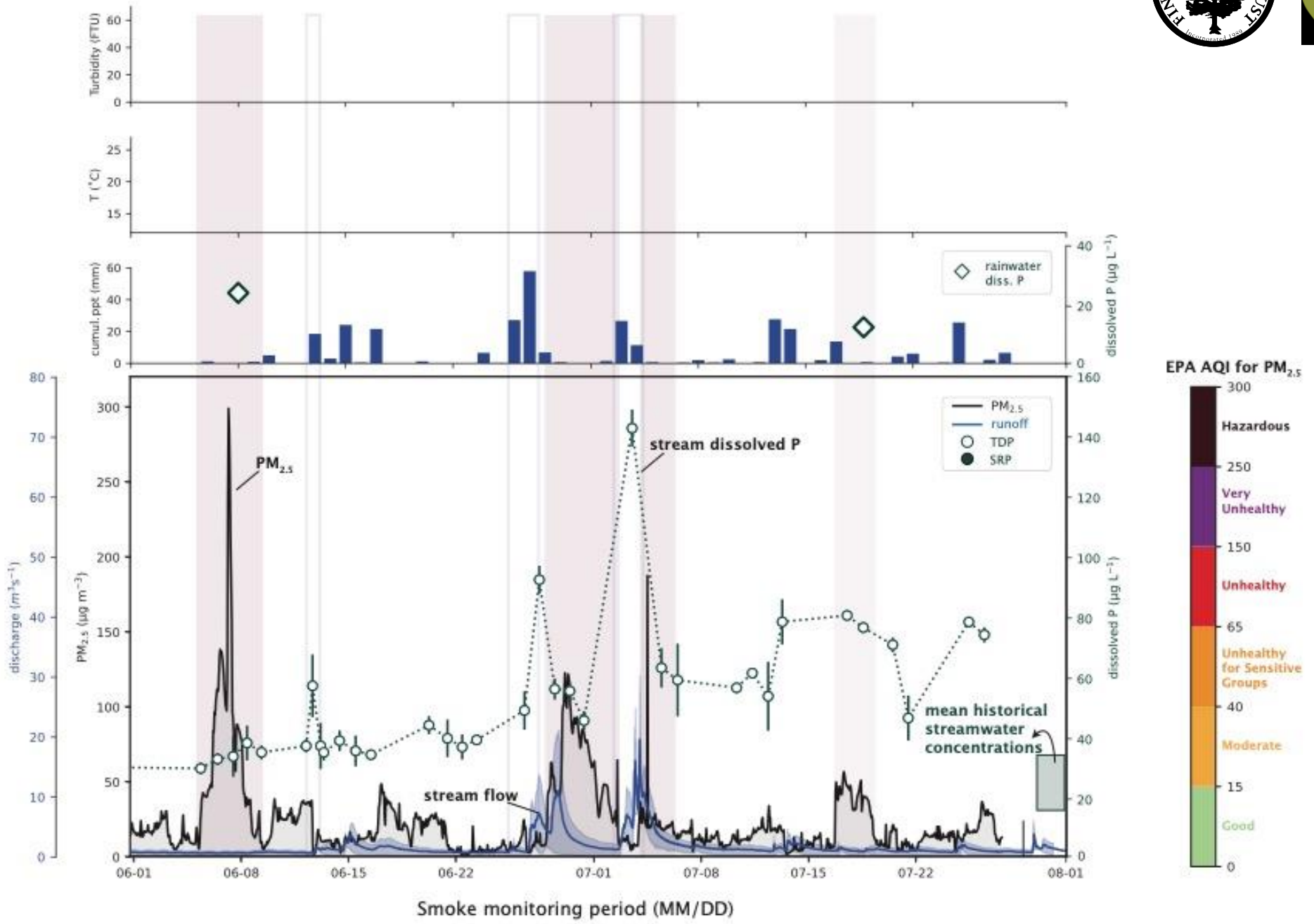

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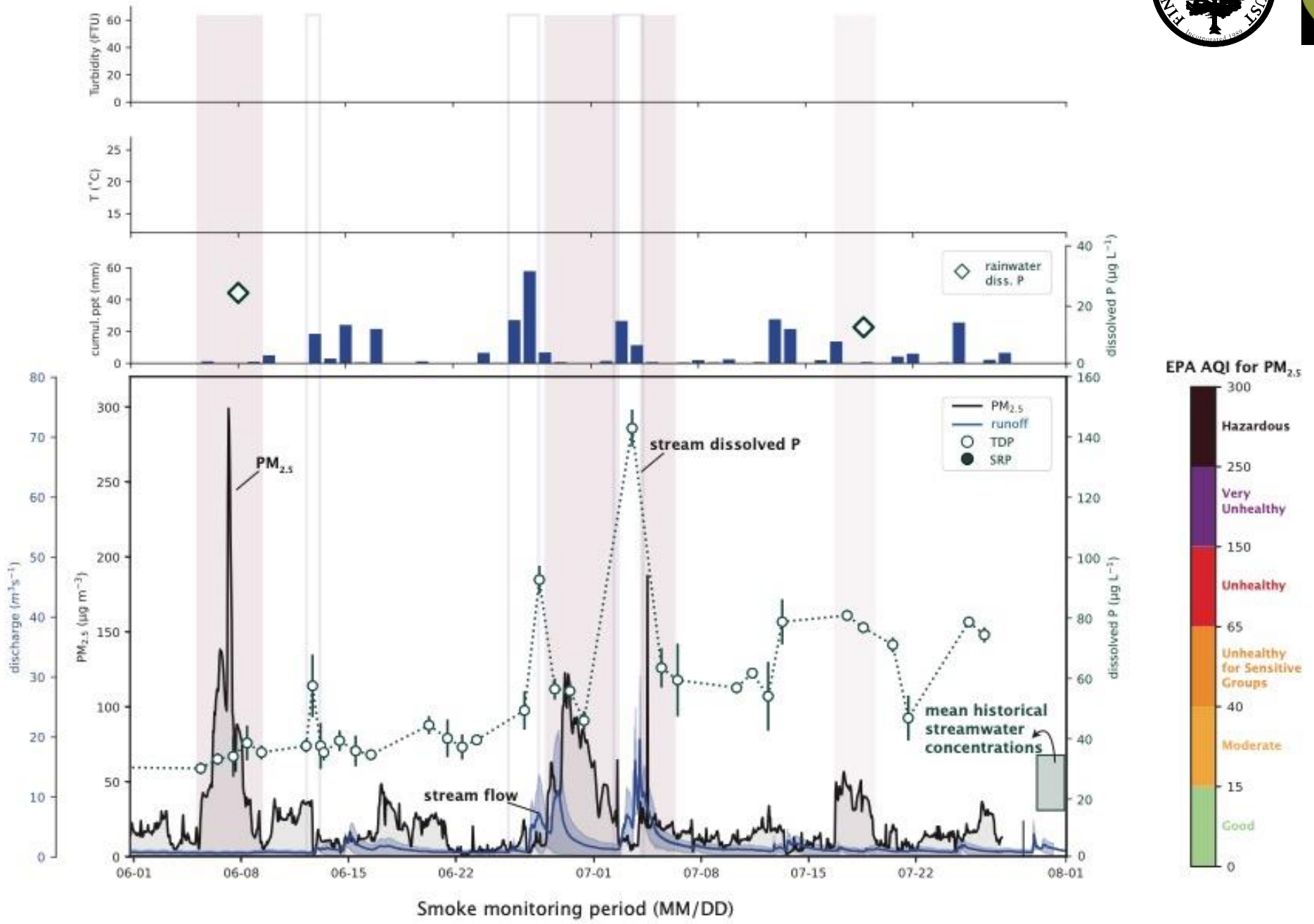

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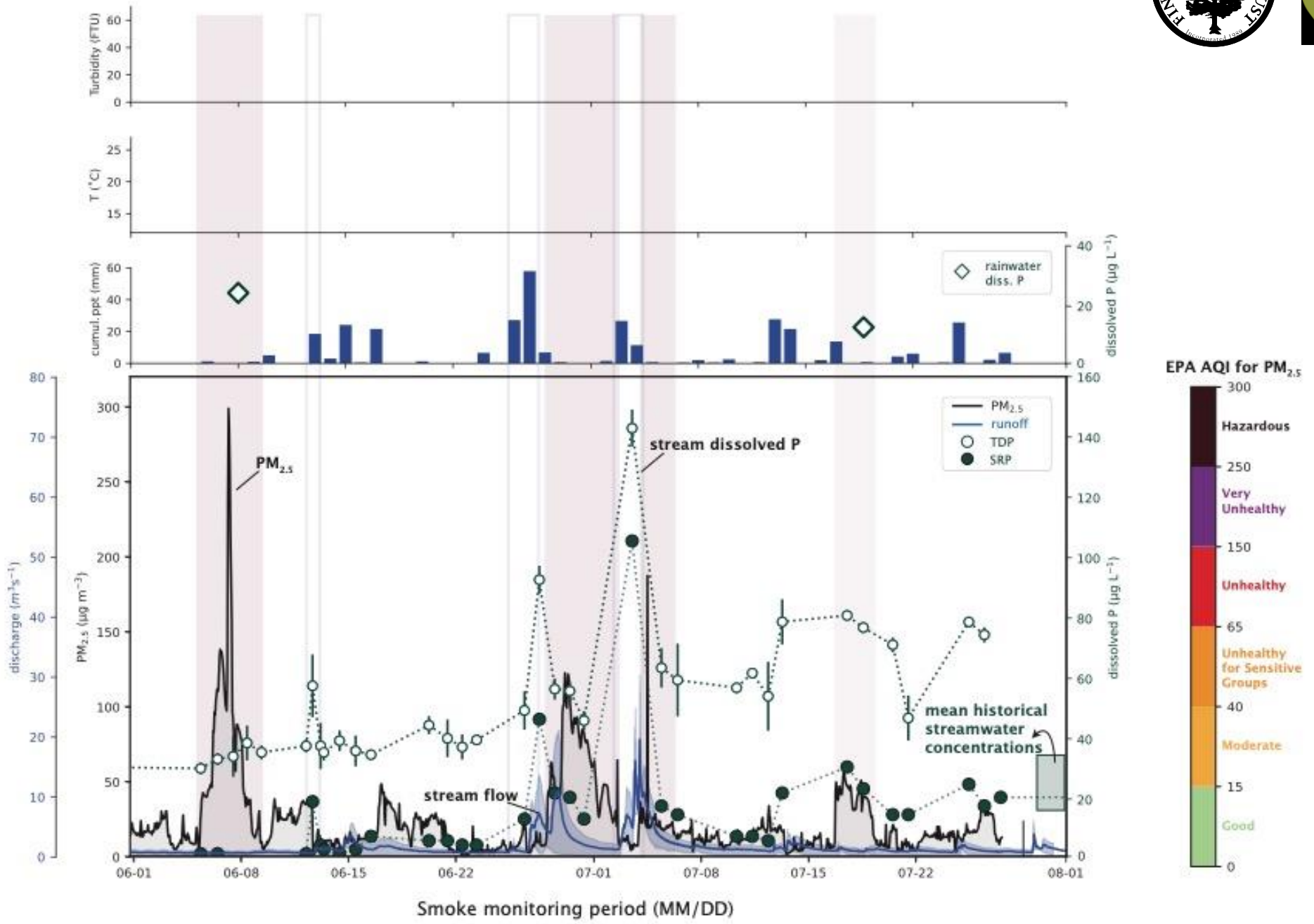

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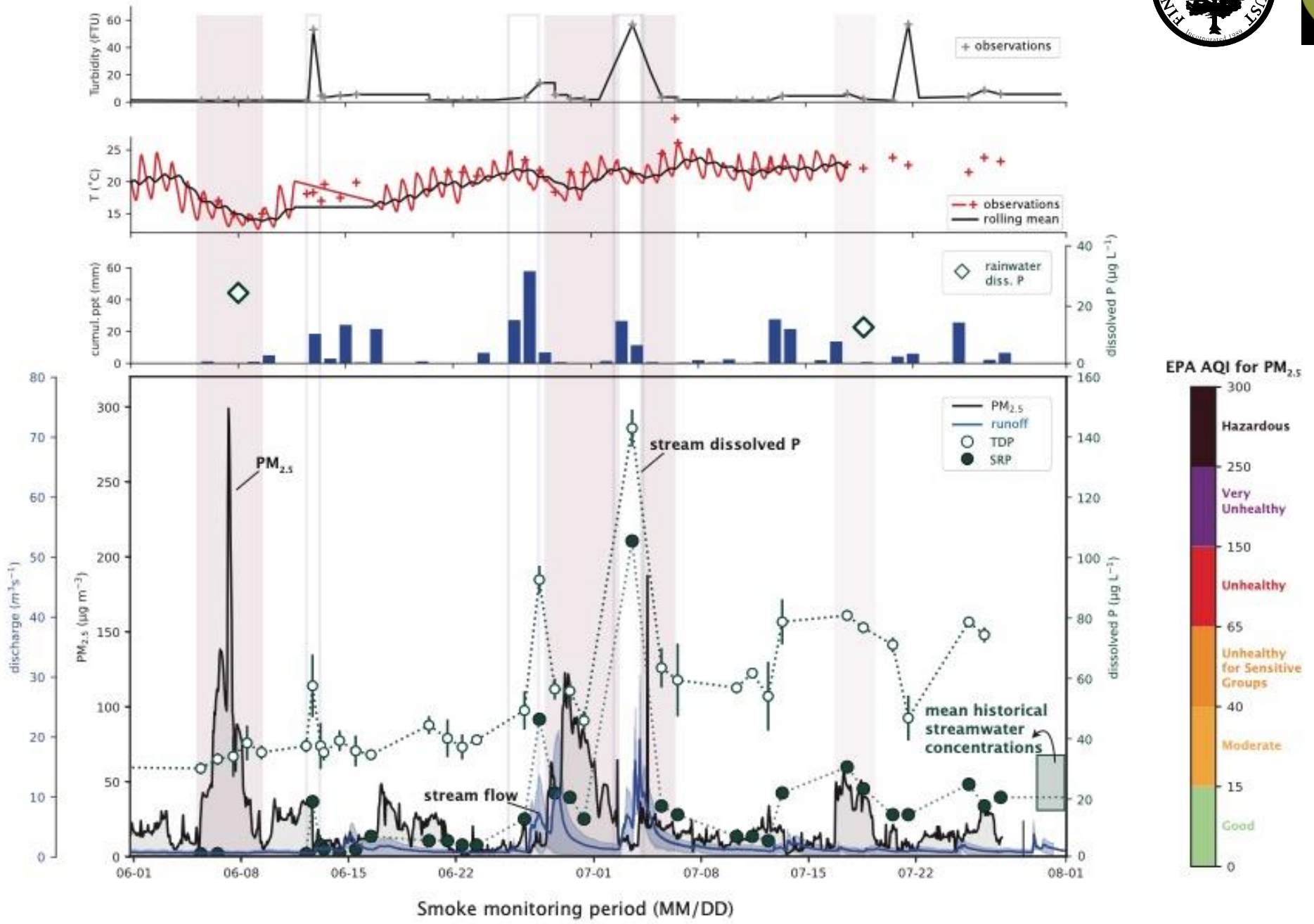

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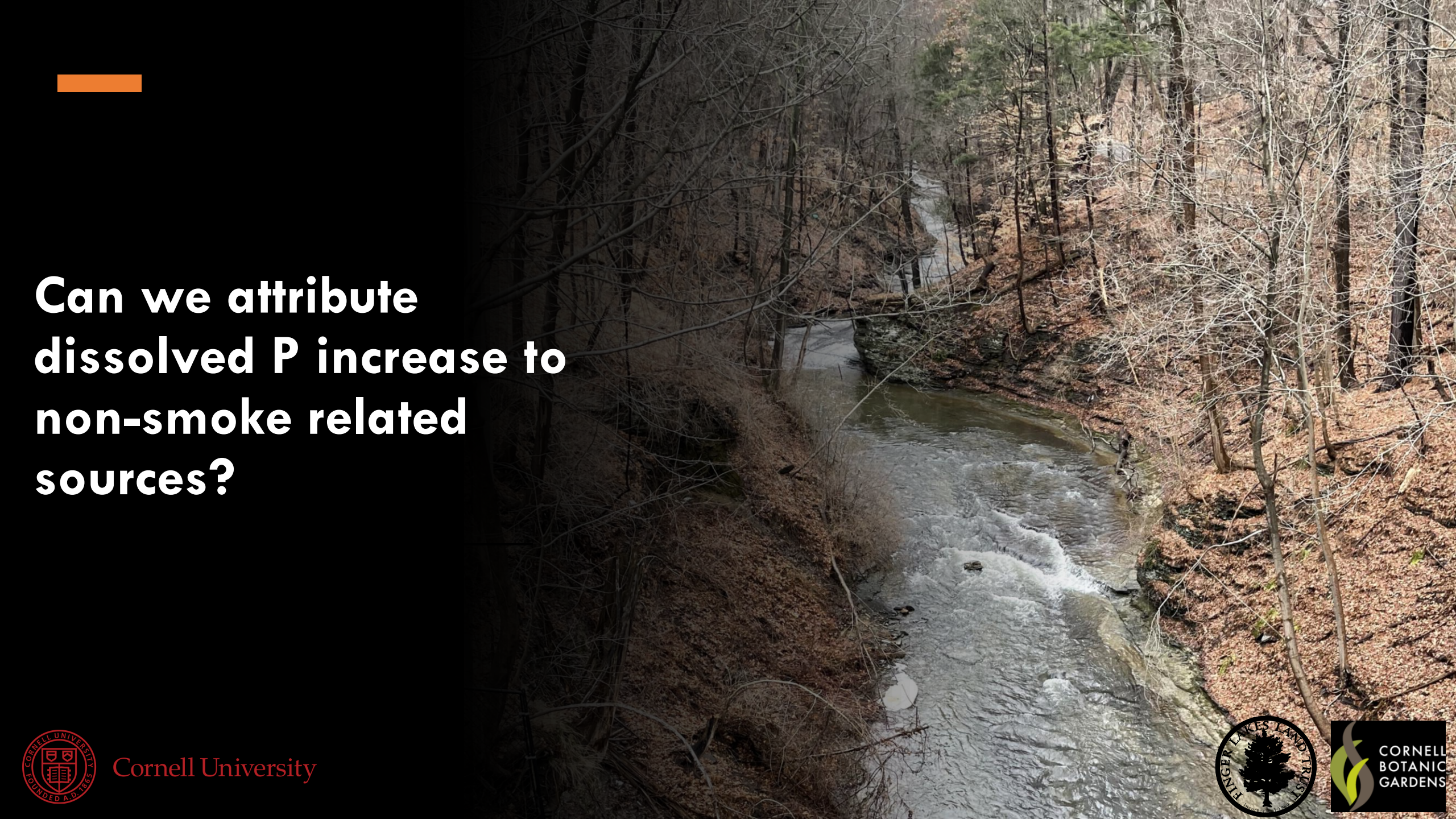
Can we attribute dissolved P increase to non-smoke related sources?



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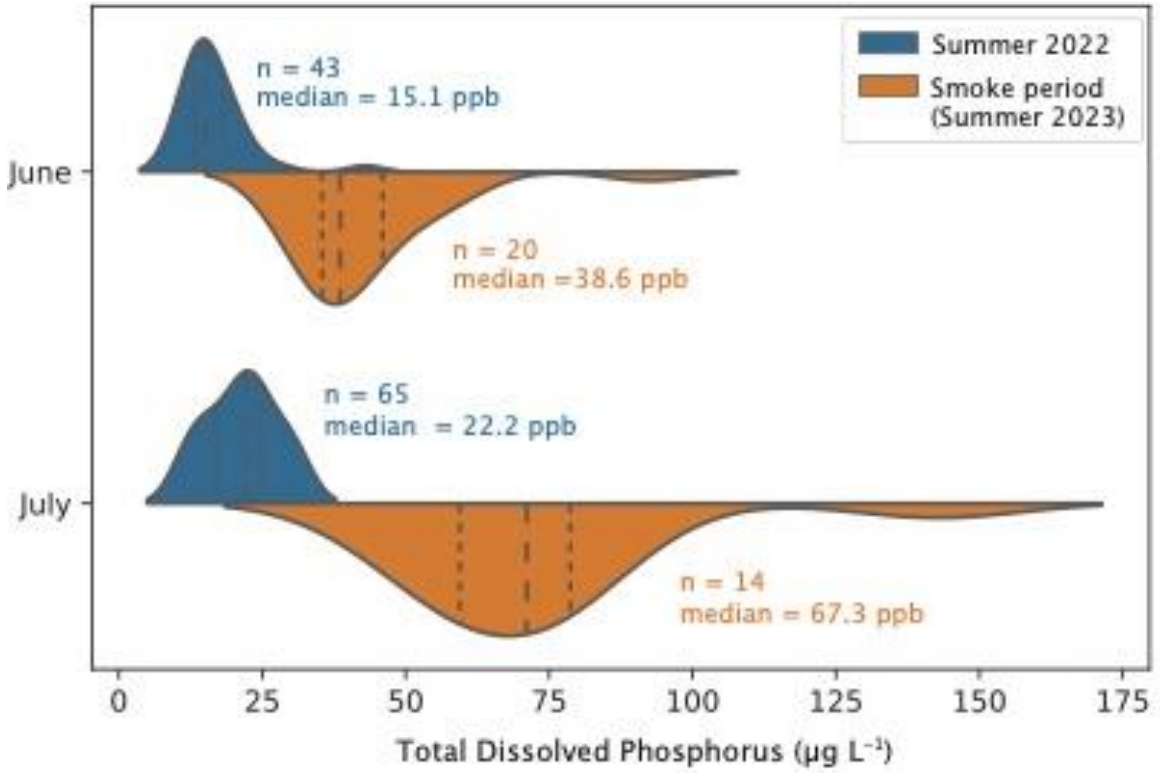
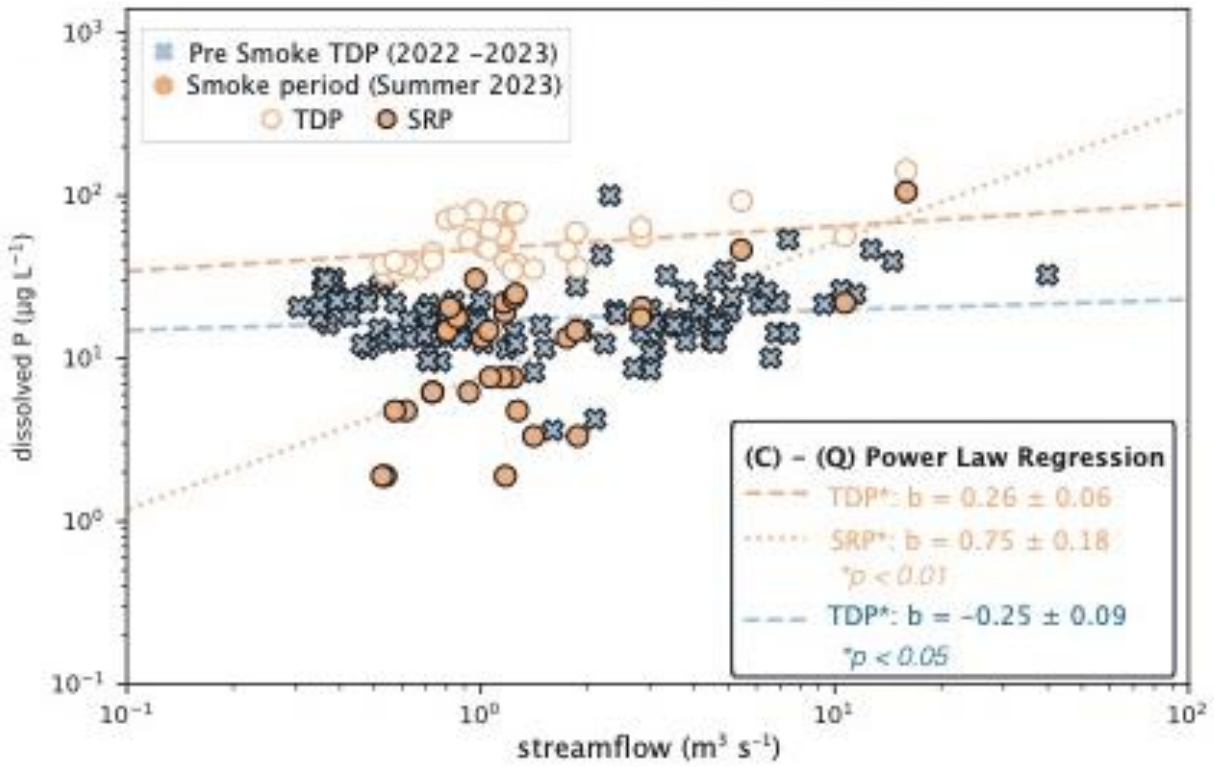
Wildfire smoke as an unaccounted-for source of dissolved P to Cascadilla Creek





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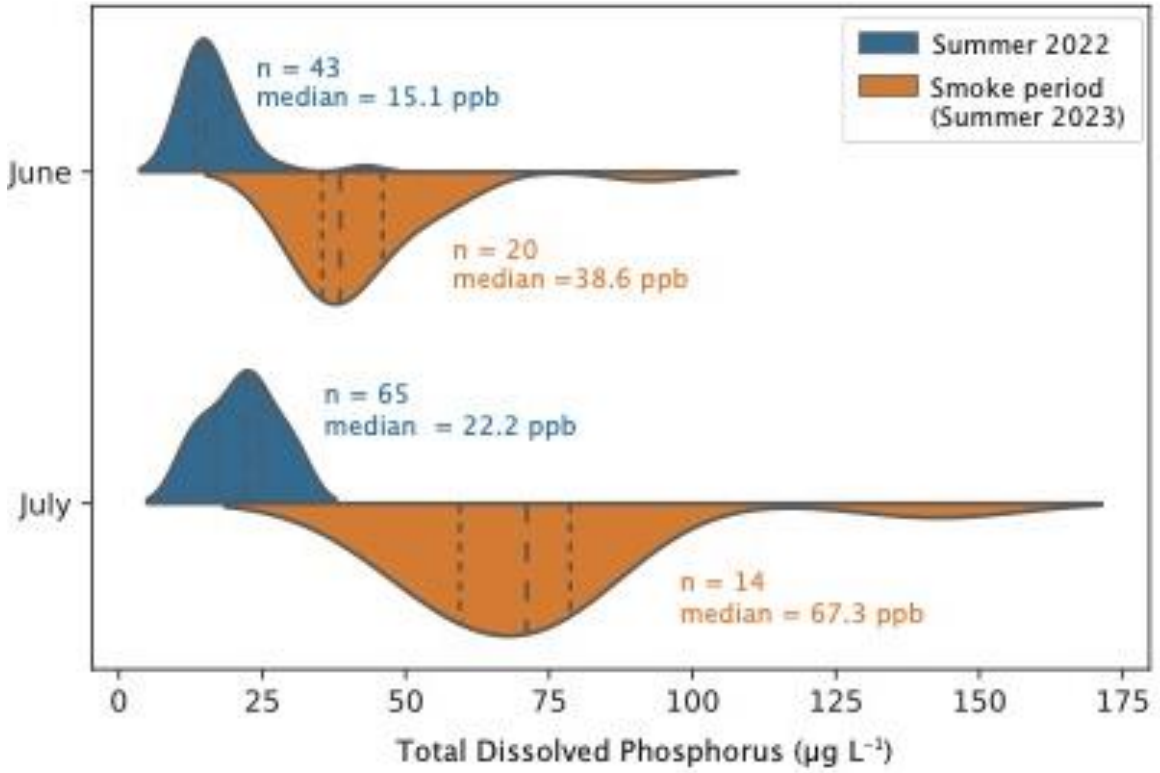

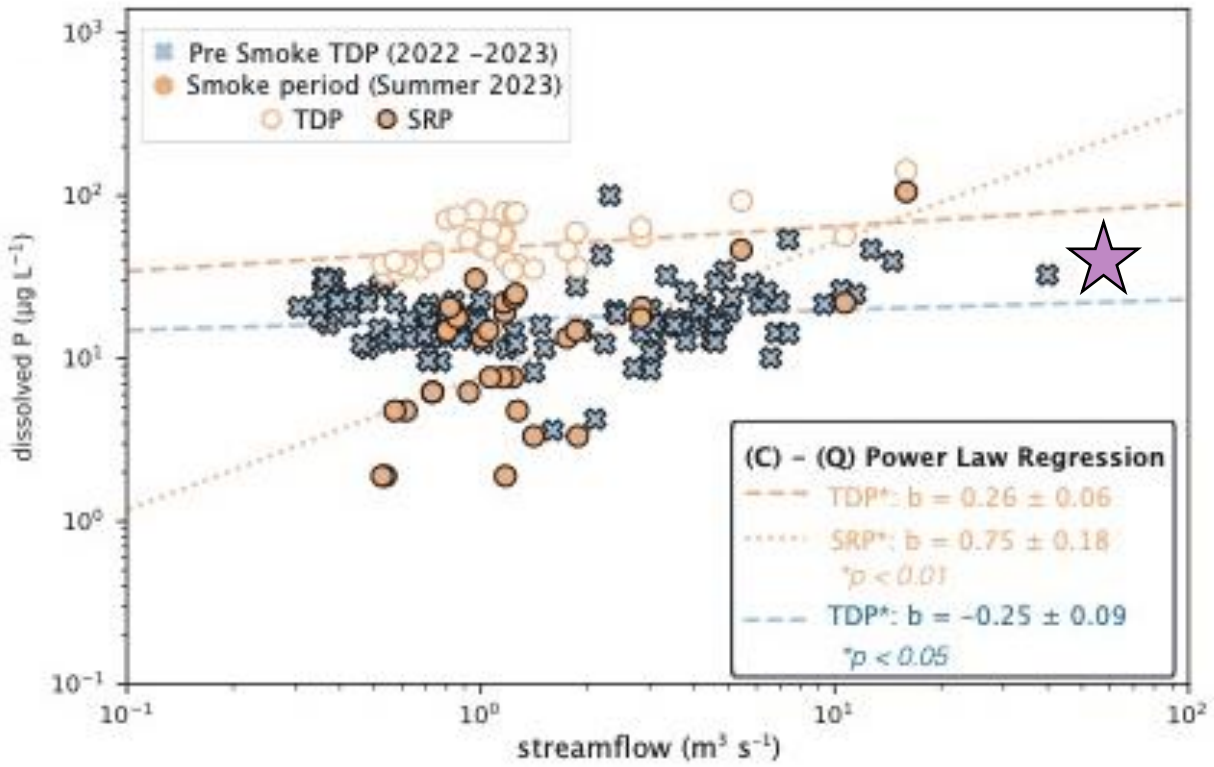

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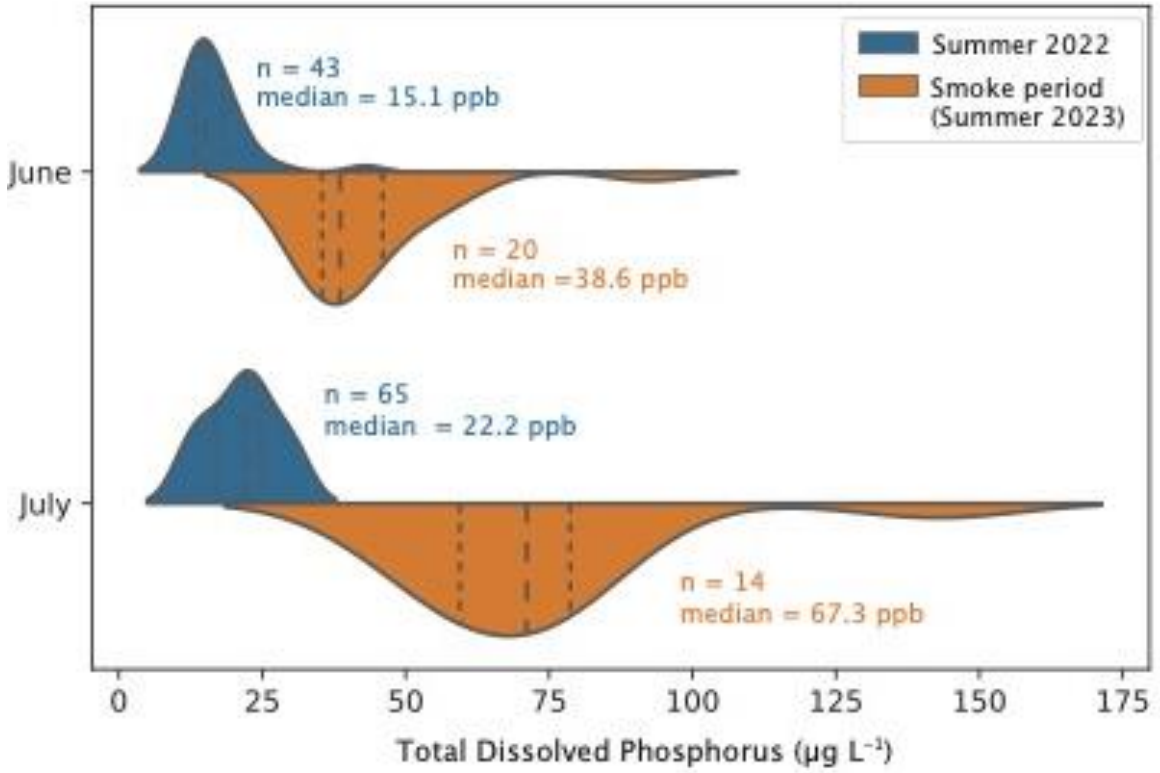
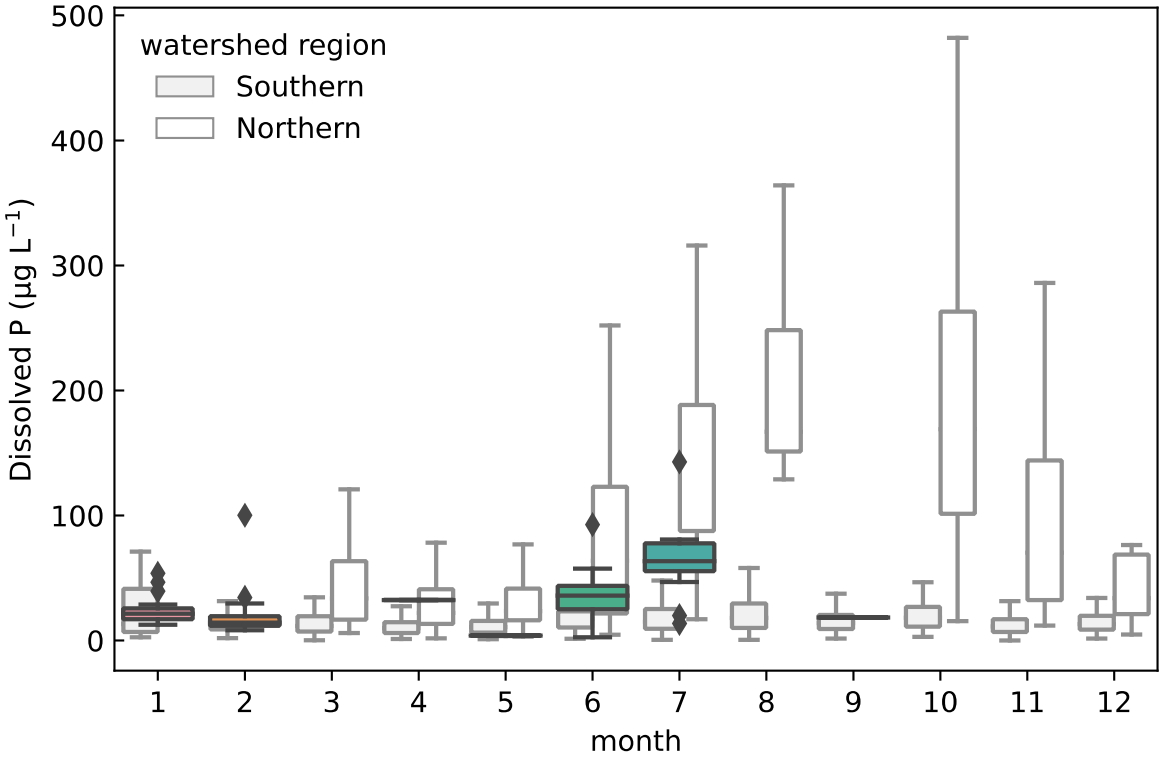


Cornell CritChem group data from Cascadilla Creek monitoring



CSI historical dataset, watershed regions classified according to O'Leary et al. (2019)

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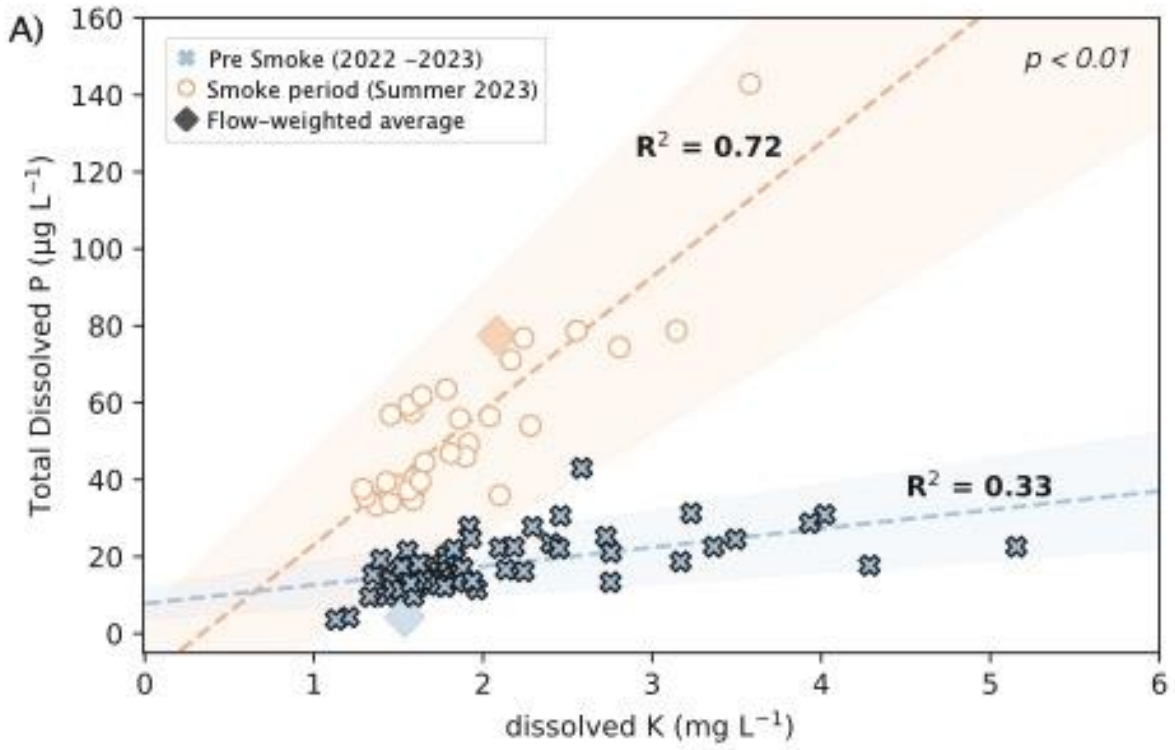
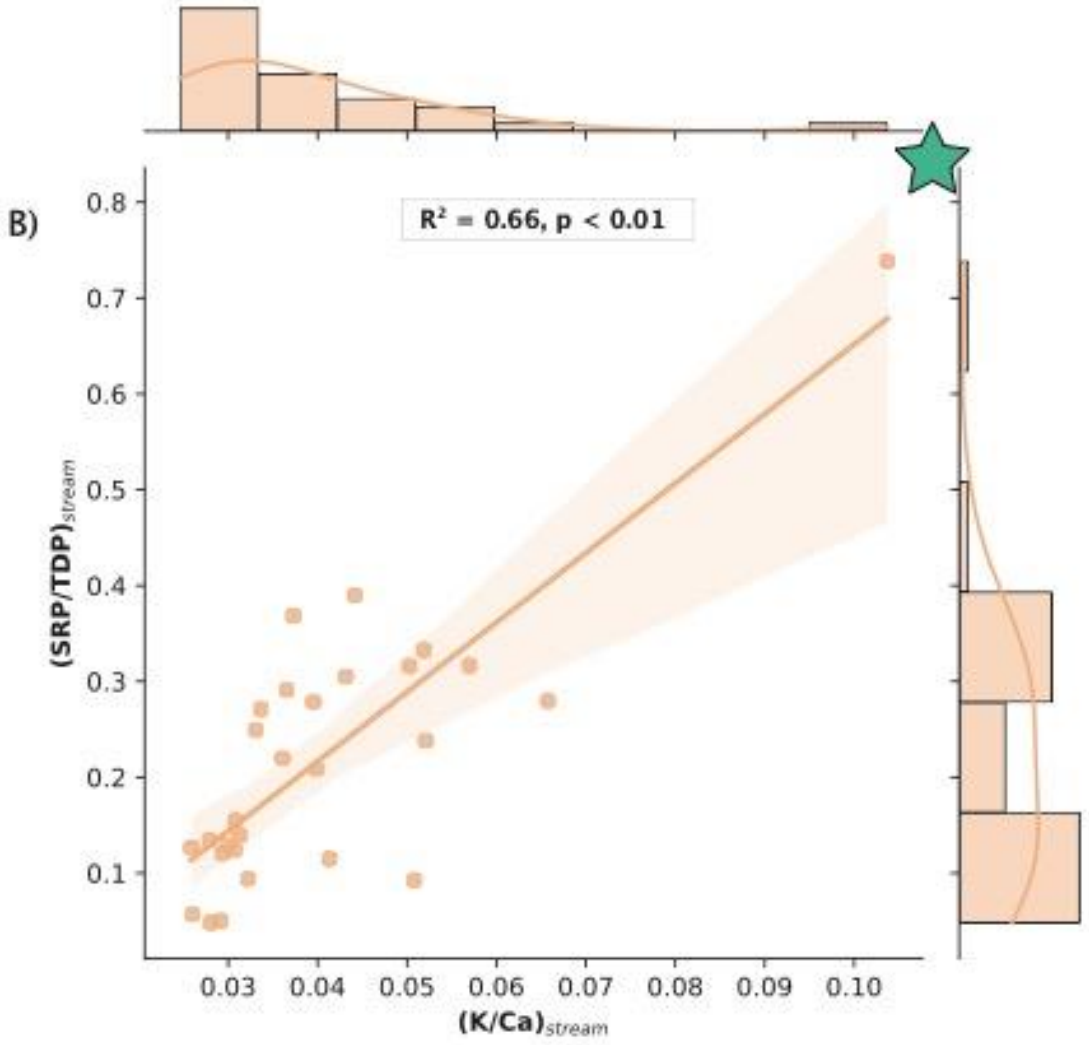
Wildfire smoke as an unaccounted-for source of dissolved P to





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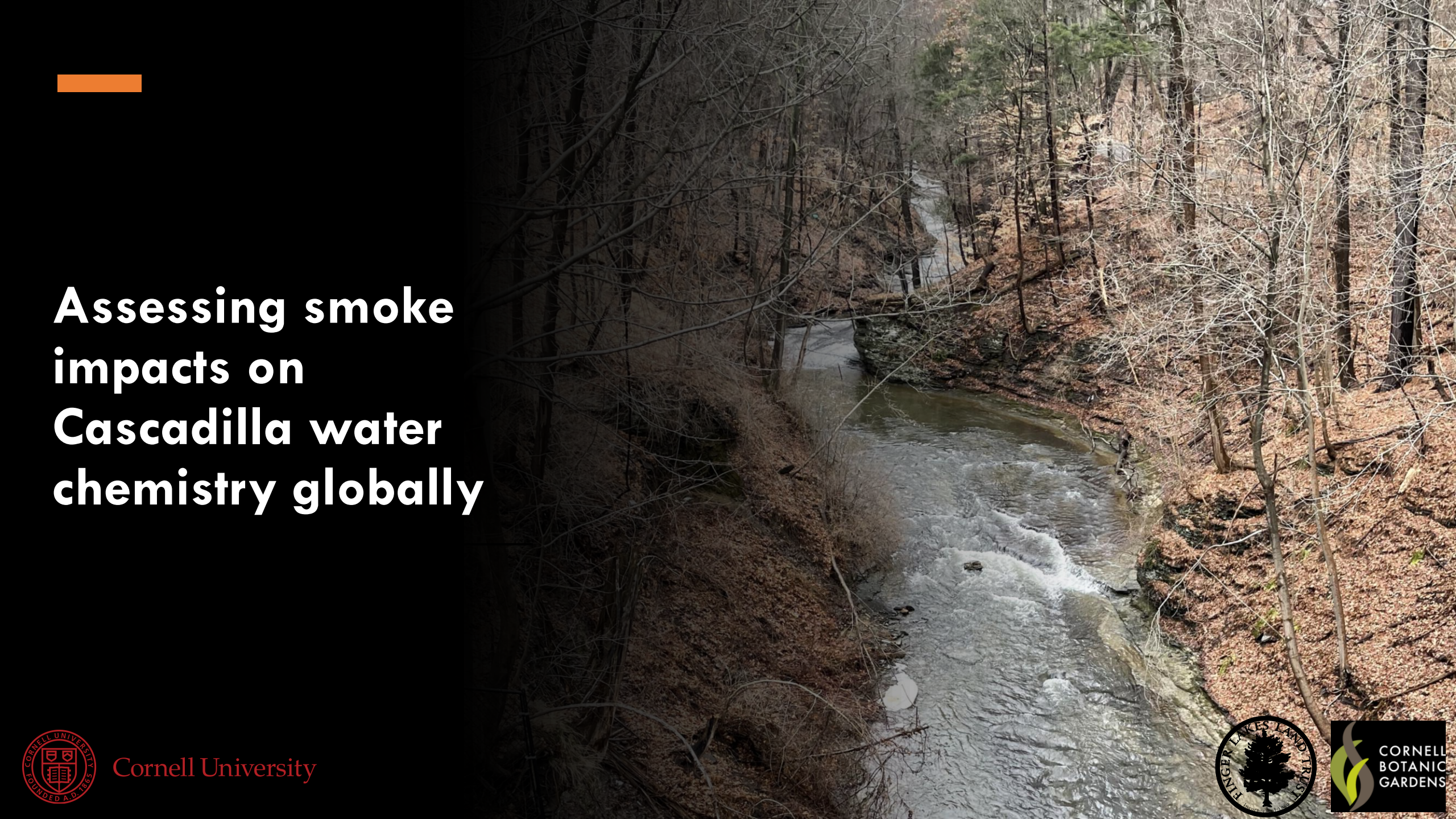
Assessing smoke impacts on Cascadilla water chemistry globally



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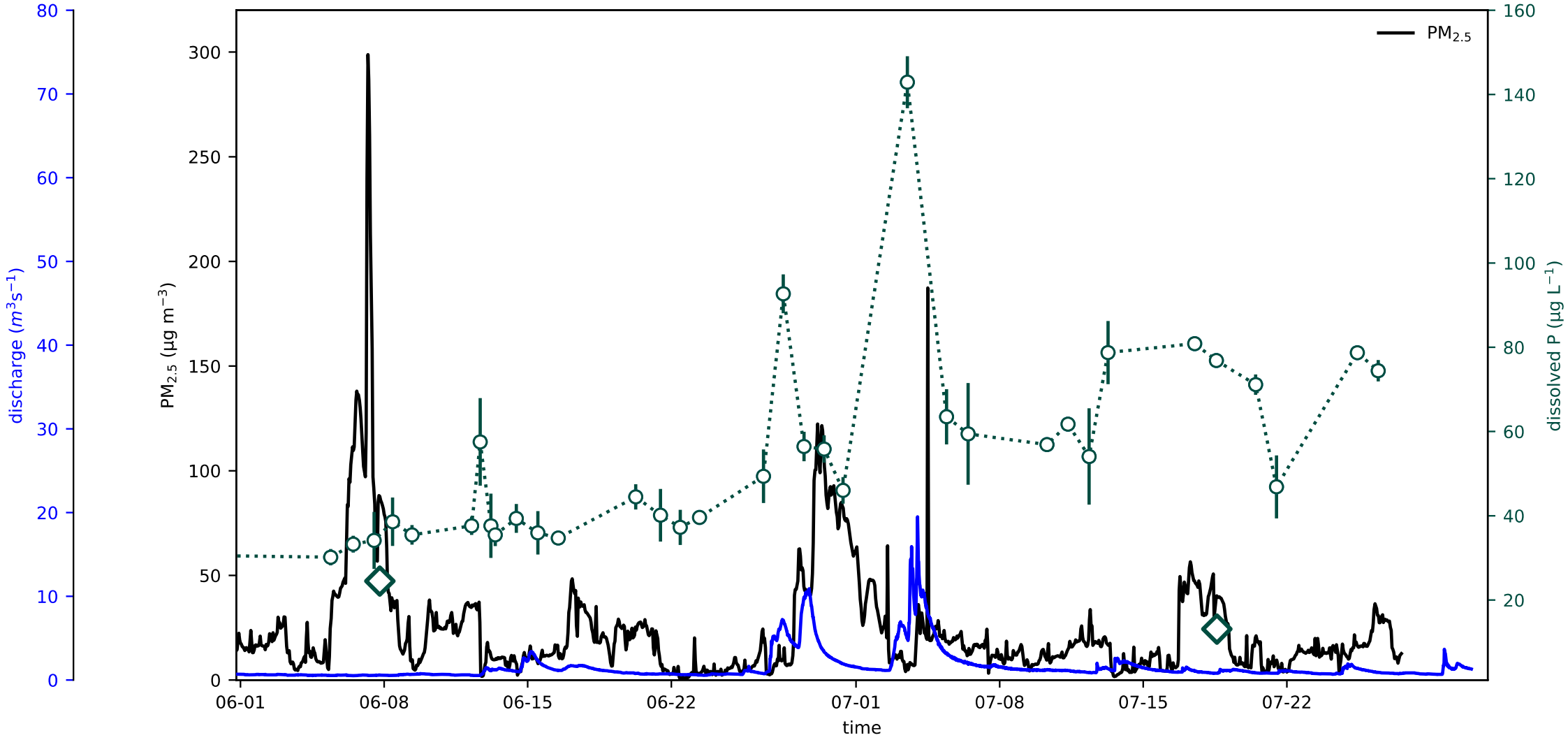
Nitrate alongside total dissolved P for smoke period



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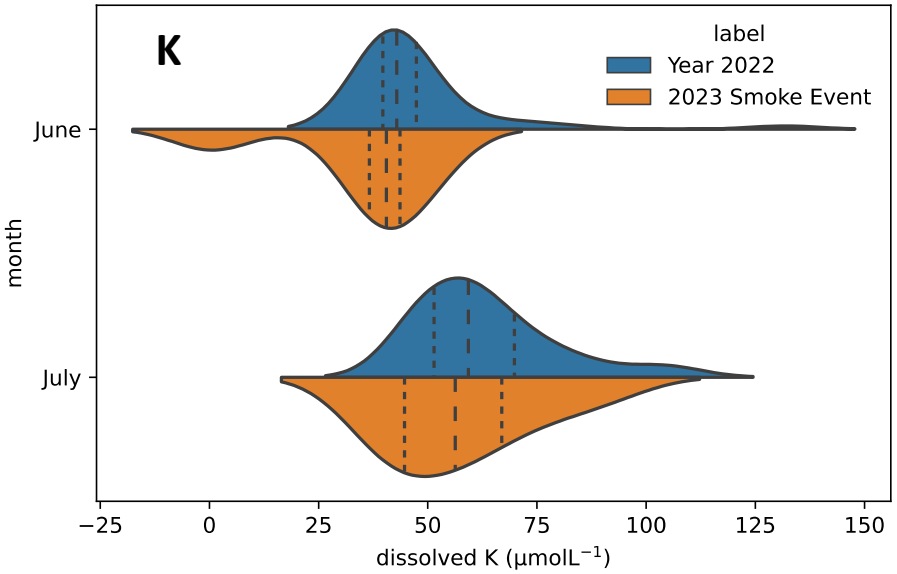
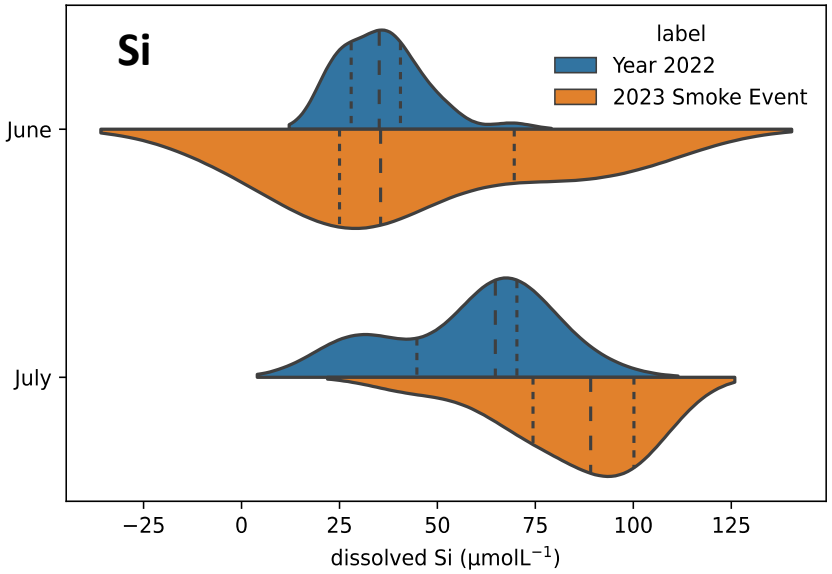
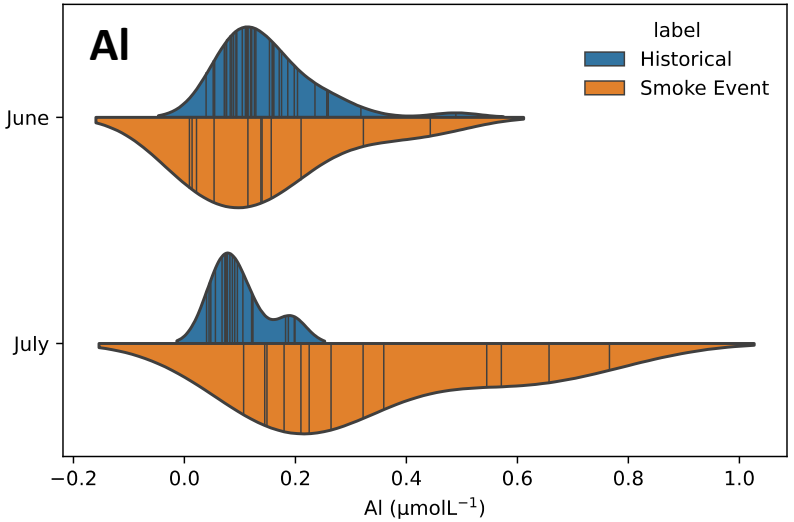
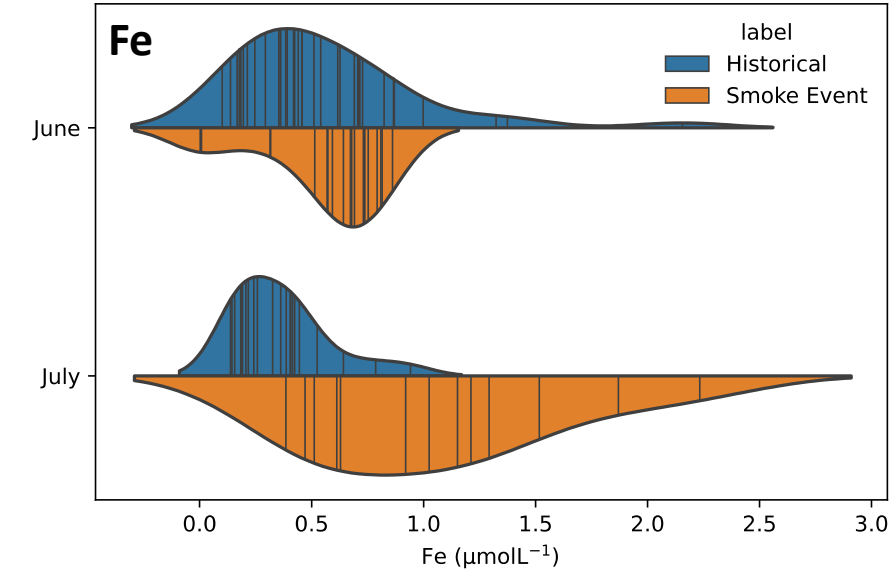
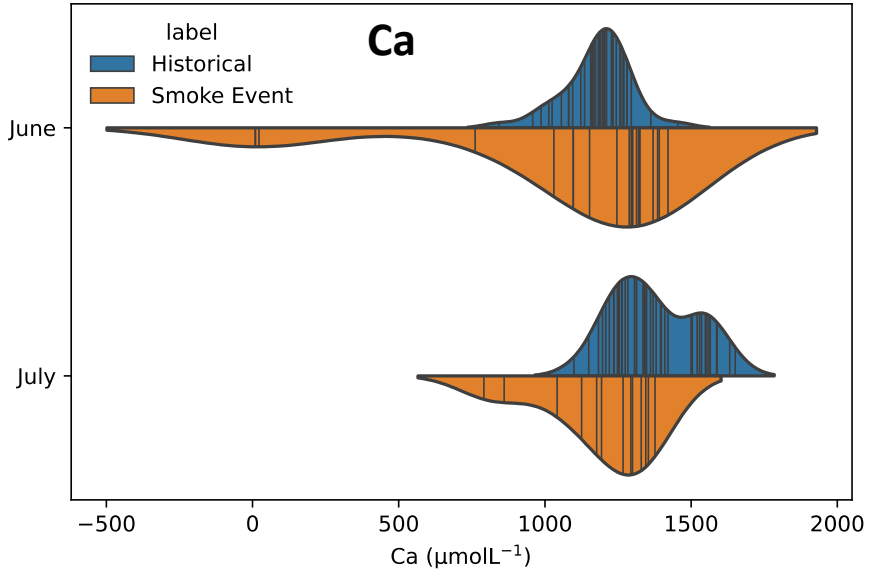
Also looked at a wide array of other elements











Key takeaways

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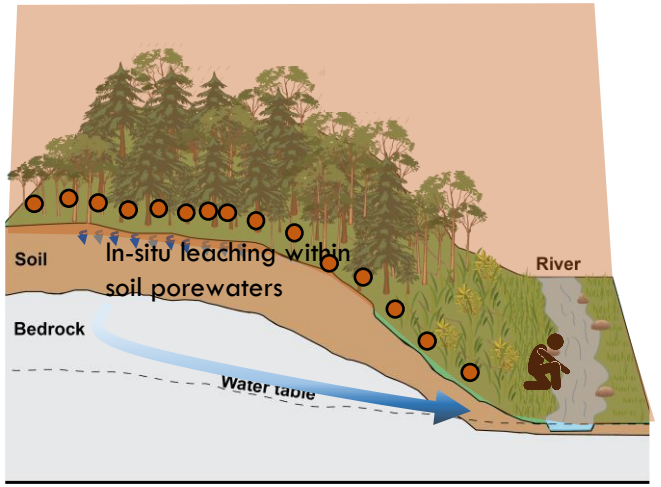
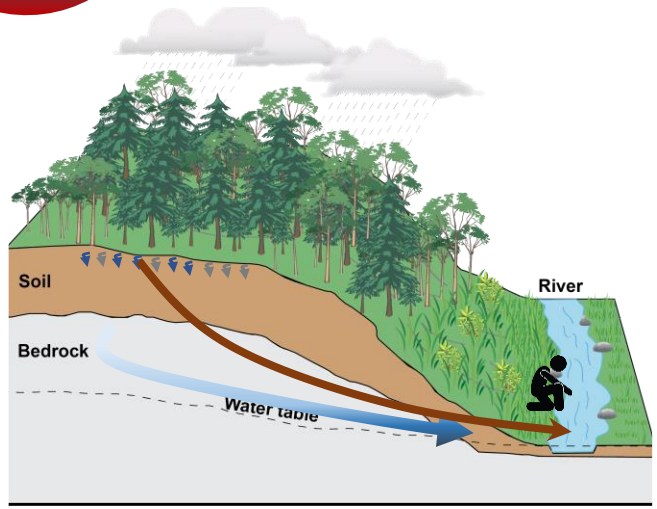
Key takeaways

1. Dissolved P showed high sensitivity to the smoke event.
   - ❖ *The magnitude and timing were strongly dependent on the timing of **rain** after smoke deposition.*





Key takeaways

2. *Should wildfire smoke summers become more frequent in the next decades to come*, smoke-derived sources of nutrients could have longterm consequences for aquatic ecosystems within the Cayuga Lake Watershed.

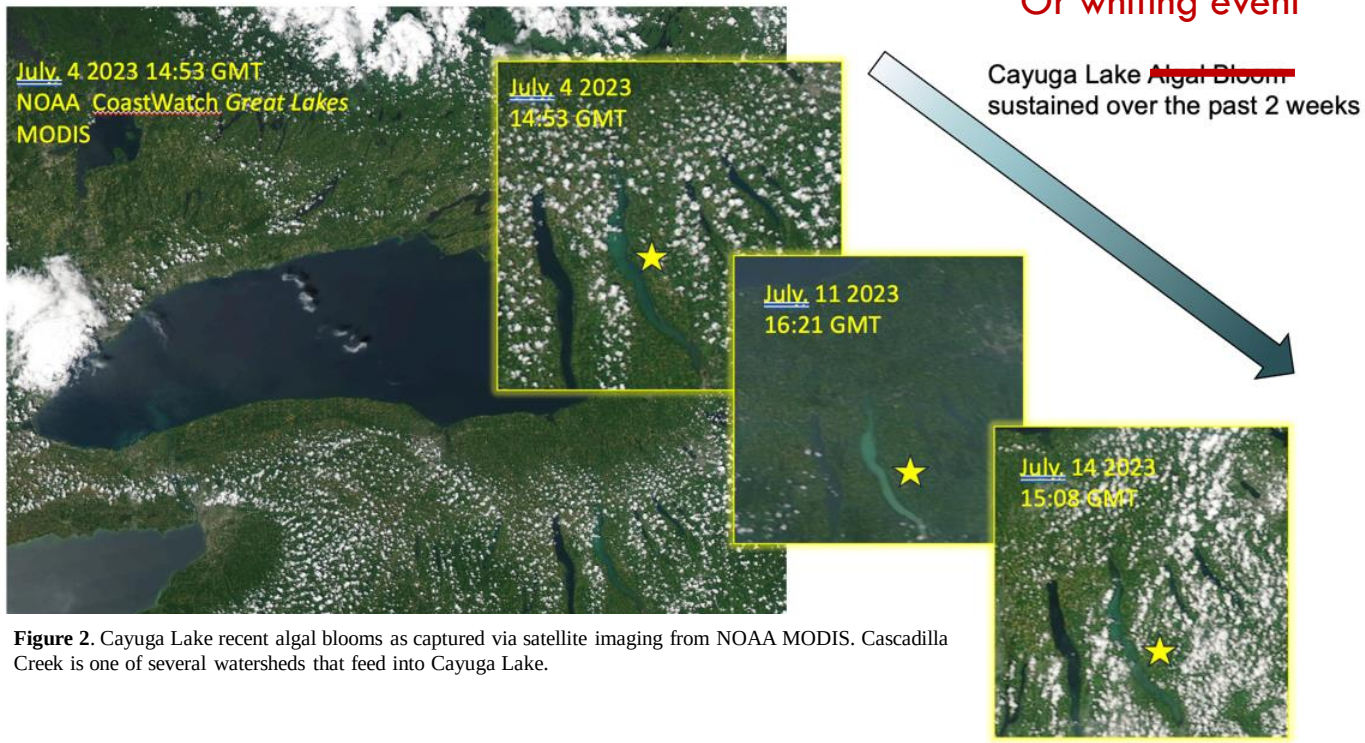


Figure 2. Cayuga Lake recent algal blooms as captured via satellite imaging from NOAA MODIS. Cascadilla Creek is one of several watersheds that feed into Cayuga Lake.

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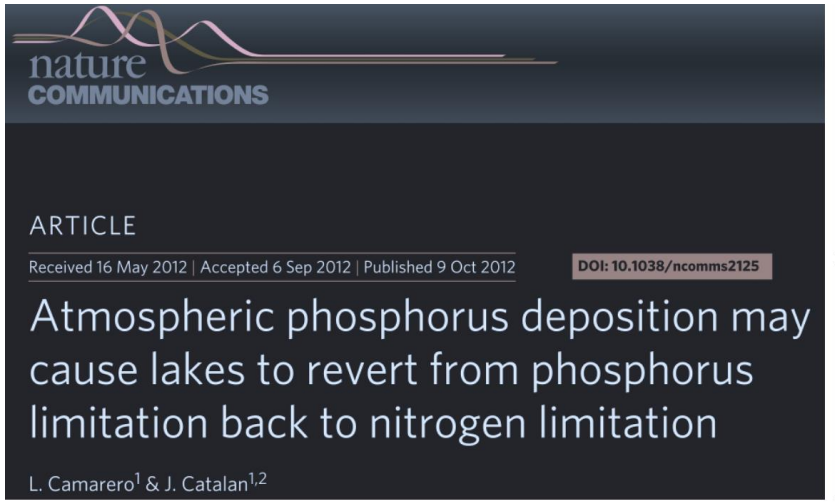

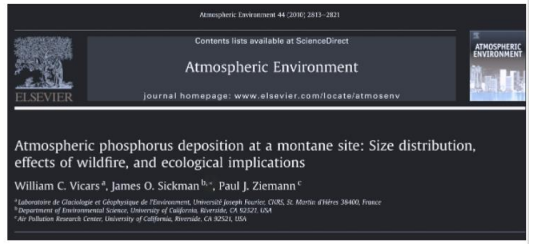

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Thank you!

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