

# Landscape scale risk assessment of cyanobacteria blooms in California lakes

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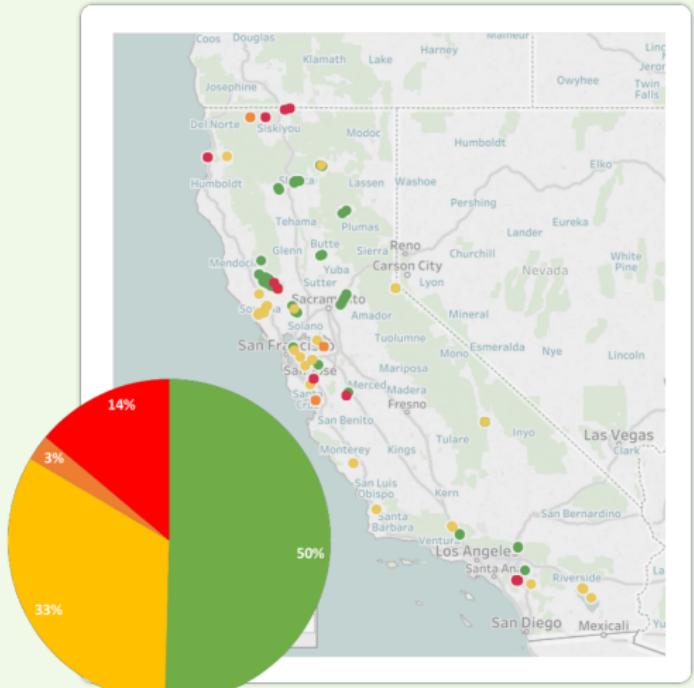
May 24<sup>th</sup>, 2018





# California lakes have a HAB problem

- 2017 targeted sampling on Labor Day revealed a problem
- Over half of sampled lakes exceeded a proposed recreational criteria





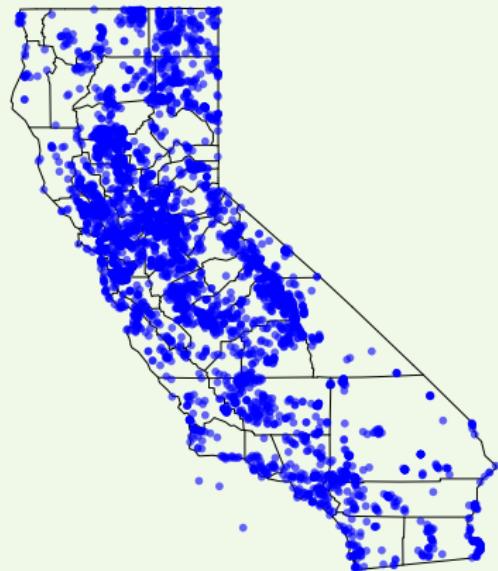
# California lakes have a data problem

Limited *in situ* data for California, tons of watershed data

**NLA07, NLA12: 59 lakes**



**LakeCat: 4924 lakes**



[USEPA, 2009, USEPA, 2017, Hill et al., 2018]



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*Goal: develop screening tool to evaluate the relative risk of lakes exceeding a eutrophication endpoint related to bloom occurrence*



# Develop a screening tool for HAB risk

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4. Identify landscape factors that are related to risk



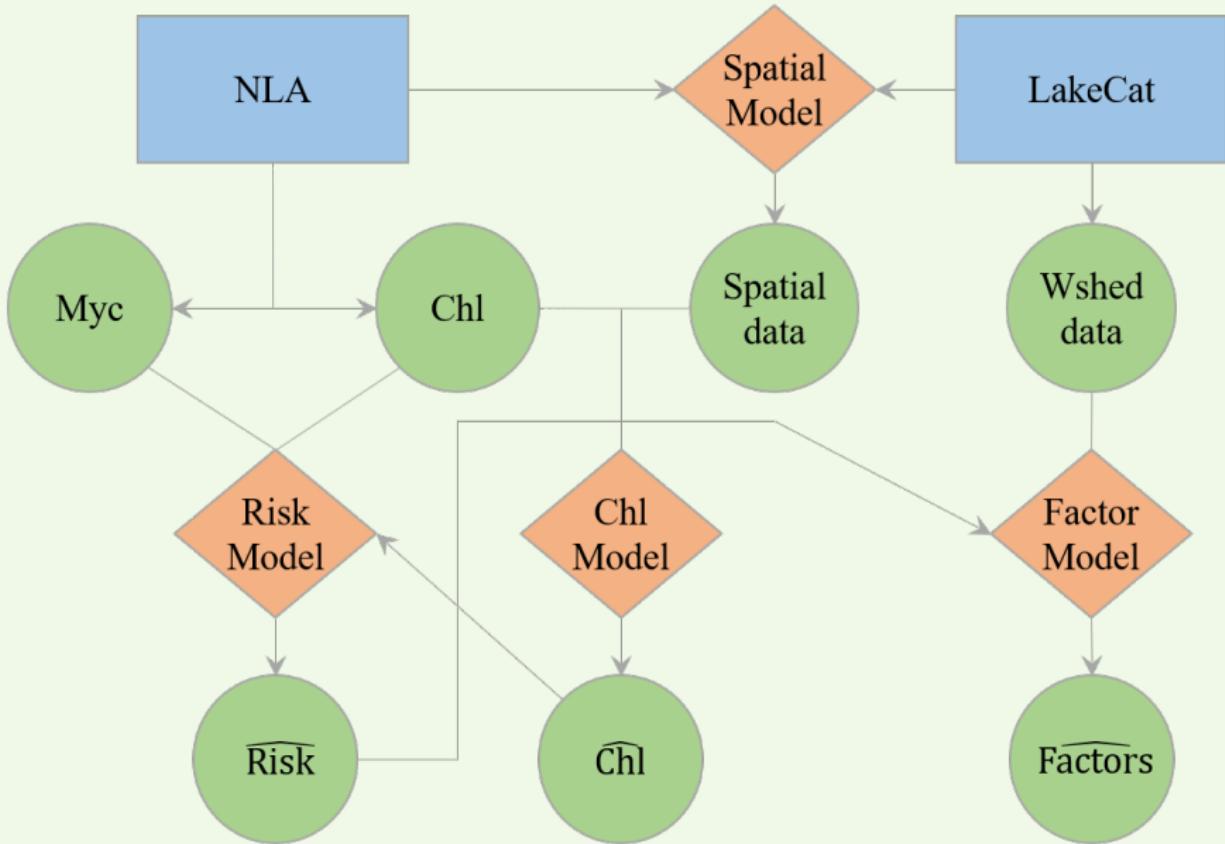
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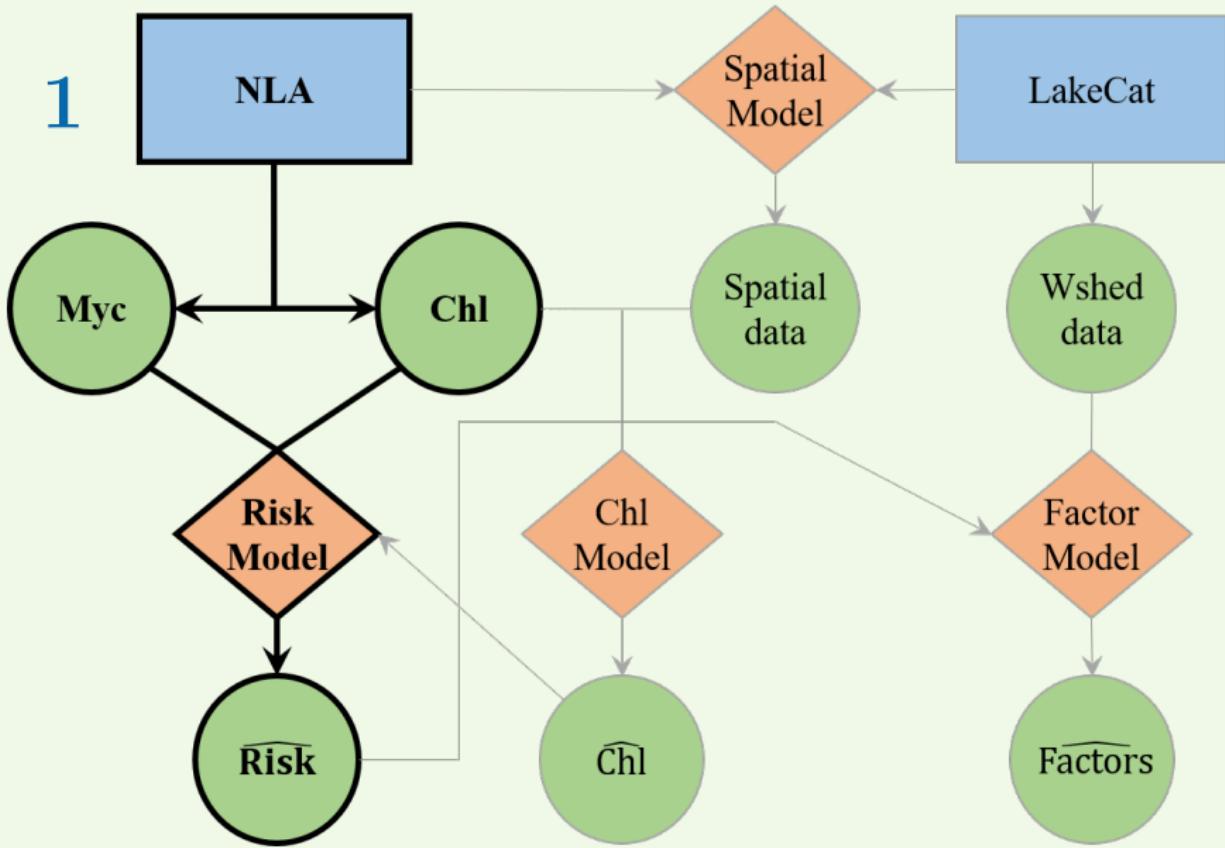
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*An exercise in diminishing returns...*

# Modelling approach

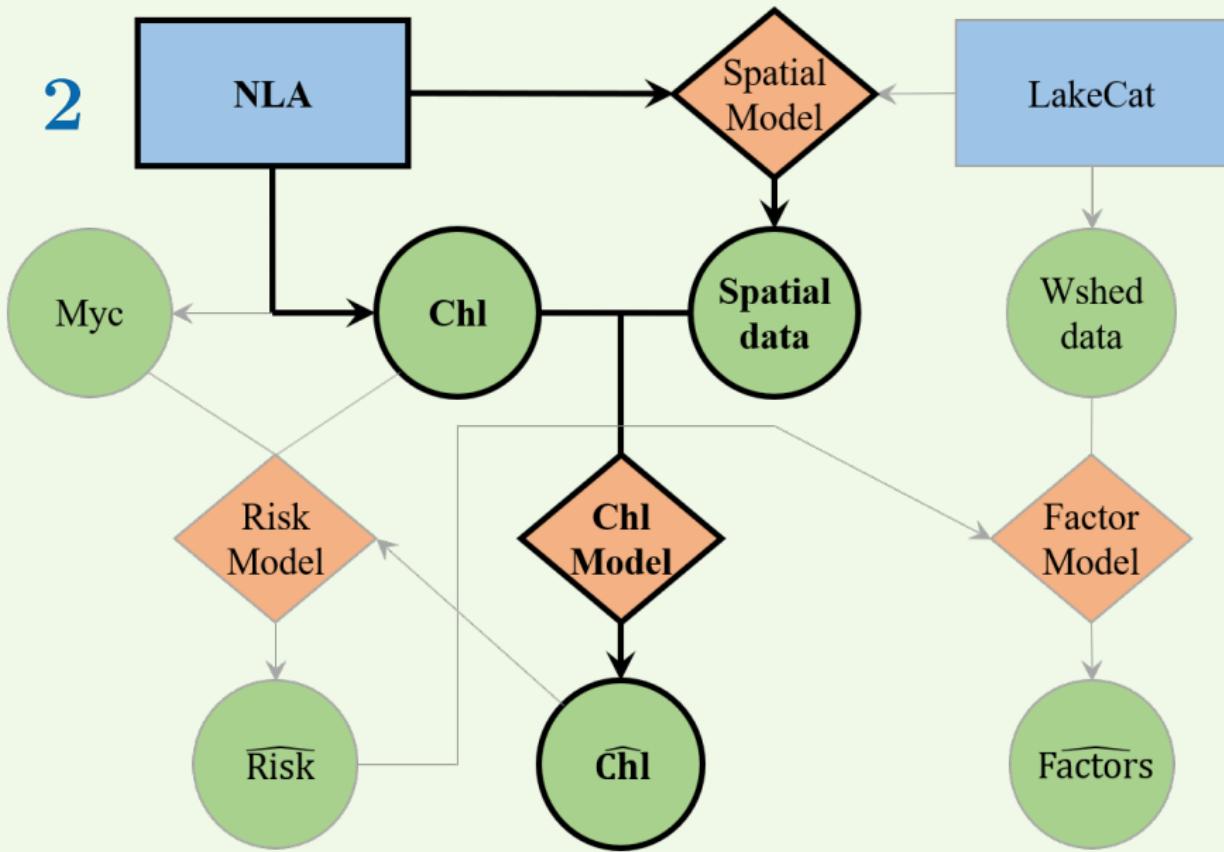


# Modelling approach



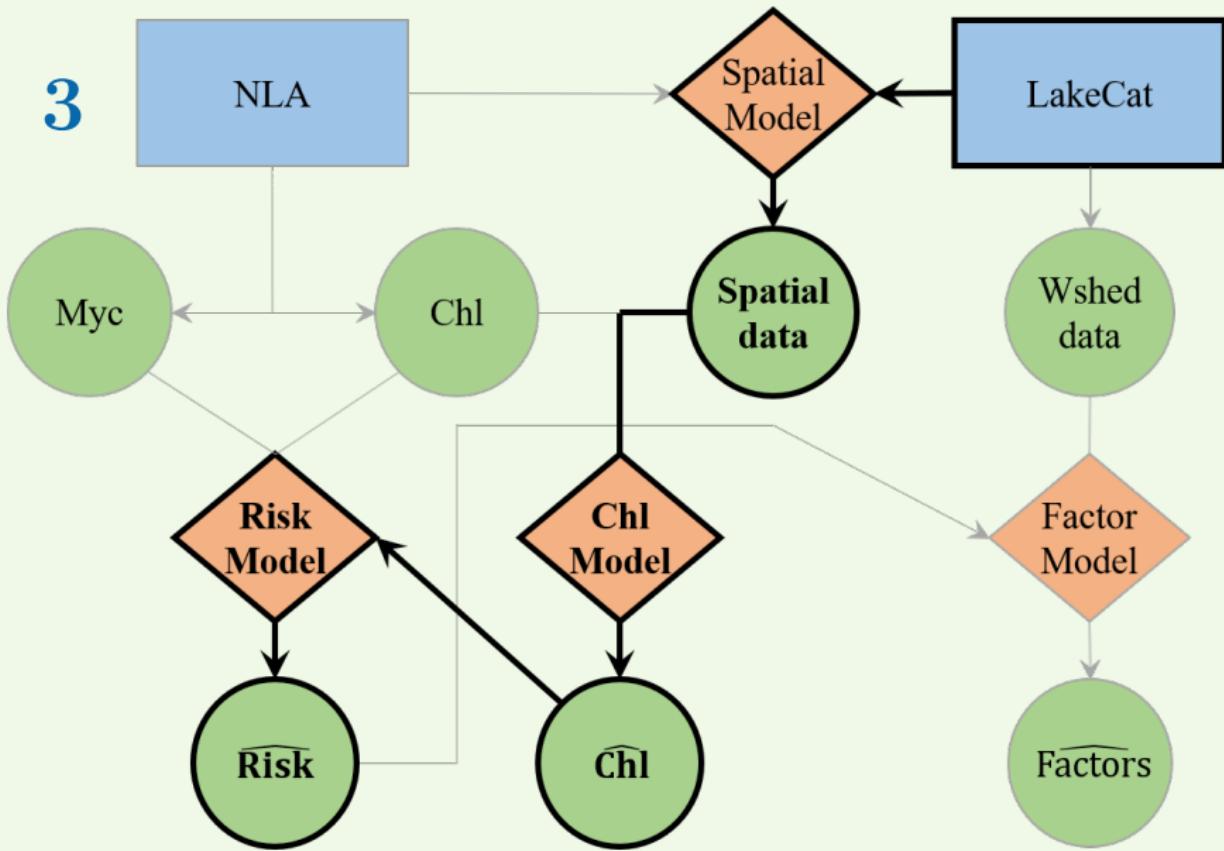
# Modelling approach

2



# Modelling approach

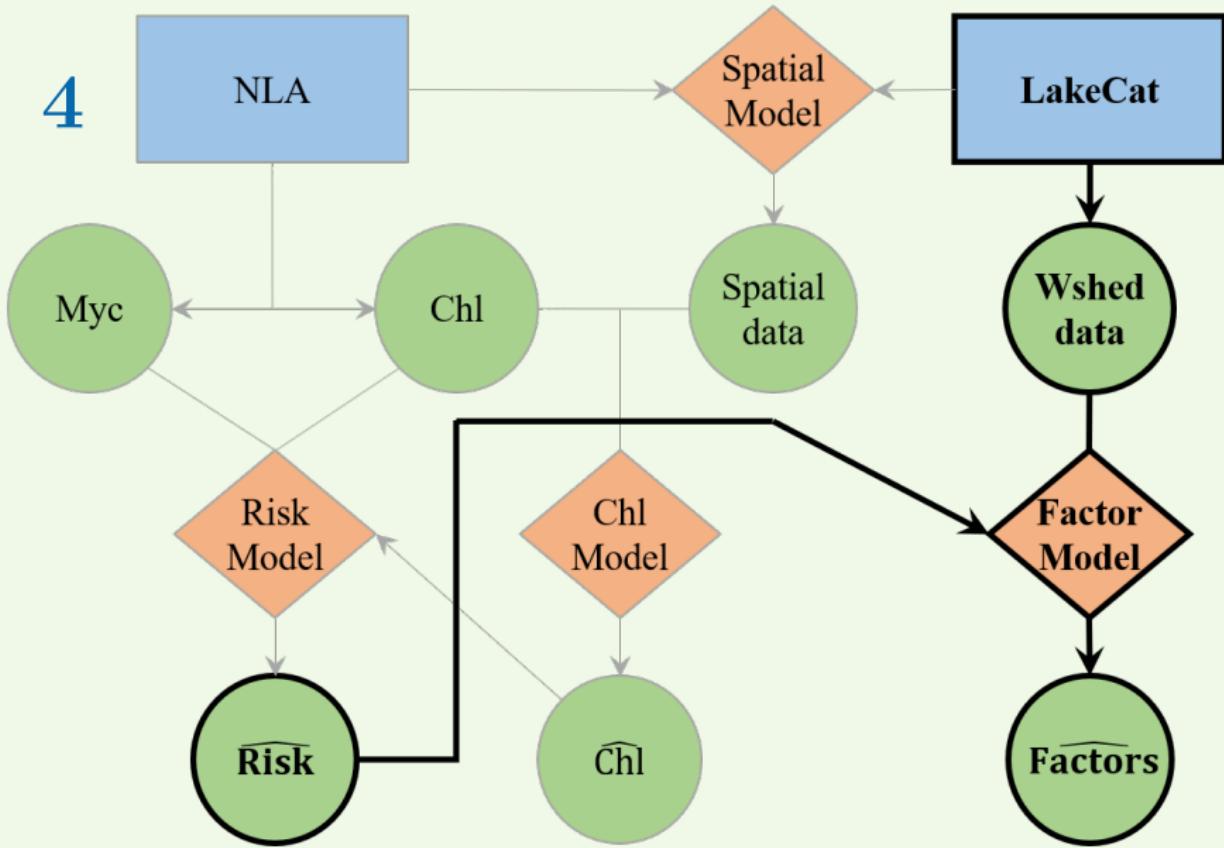
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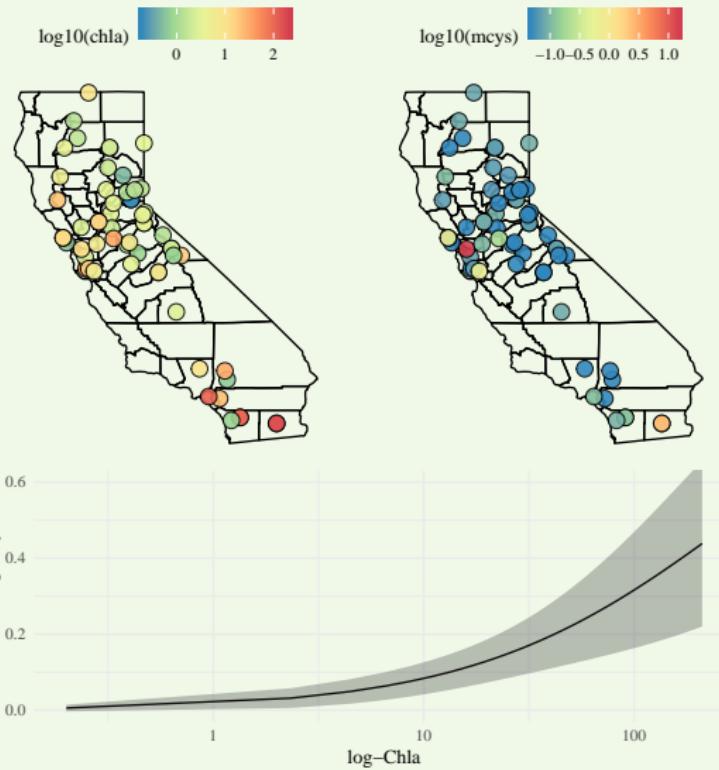
# Modelling approach

4





# 1) Link between chlorophyll and microcystin

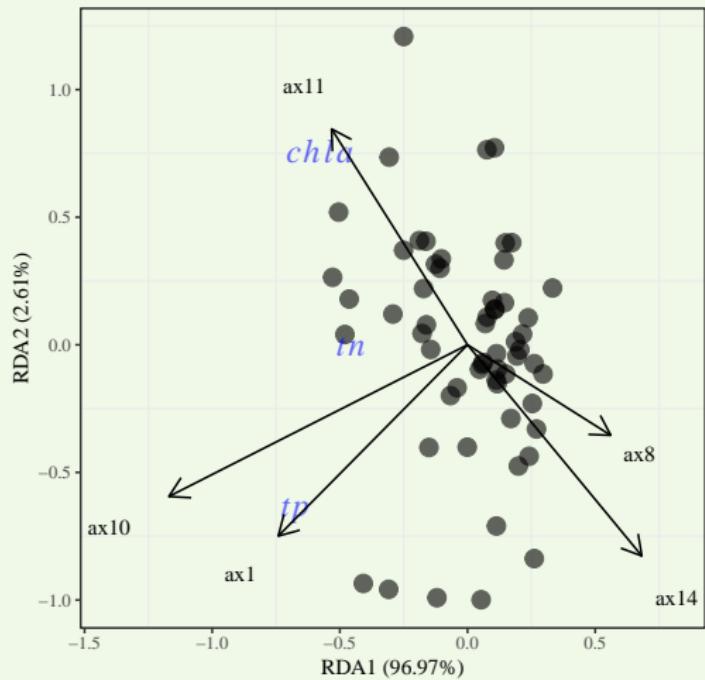
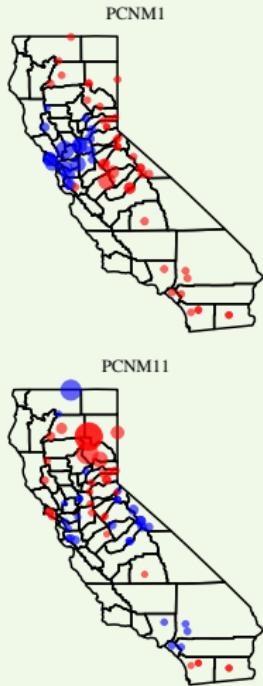


- *In situ* NLA data as probabilistic survey
- Build a simple model of the likelihood of exceeding some threshold
- Define a criteria threshold, arbitrary at this point



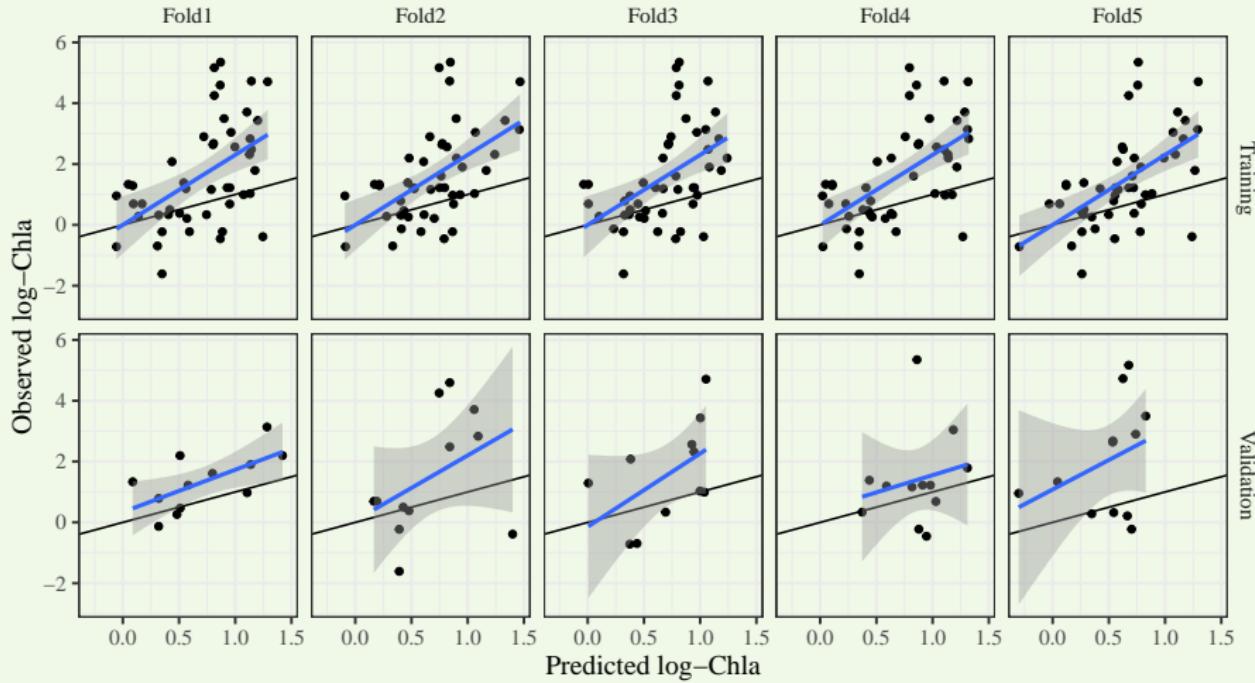
## 2) Link between chlorophyll and location

*Using a spatial model to predict chlorophyll from location*



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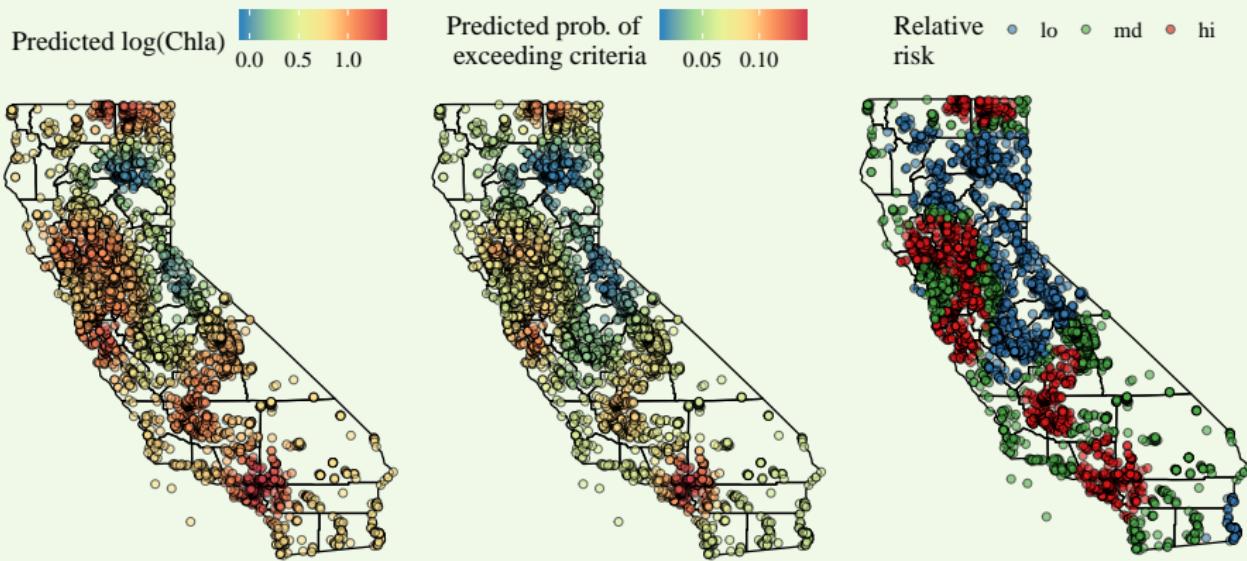
*Predicted chlorophyll from location seems okay*





### 3) Estimated risk from chla prediction

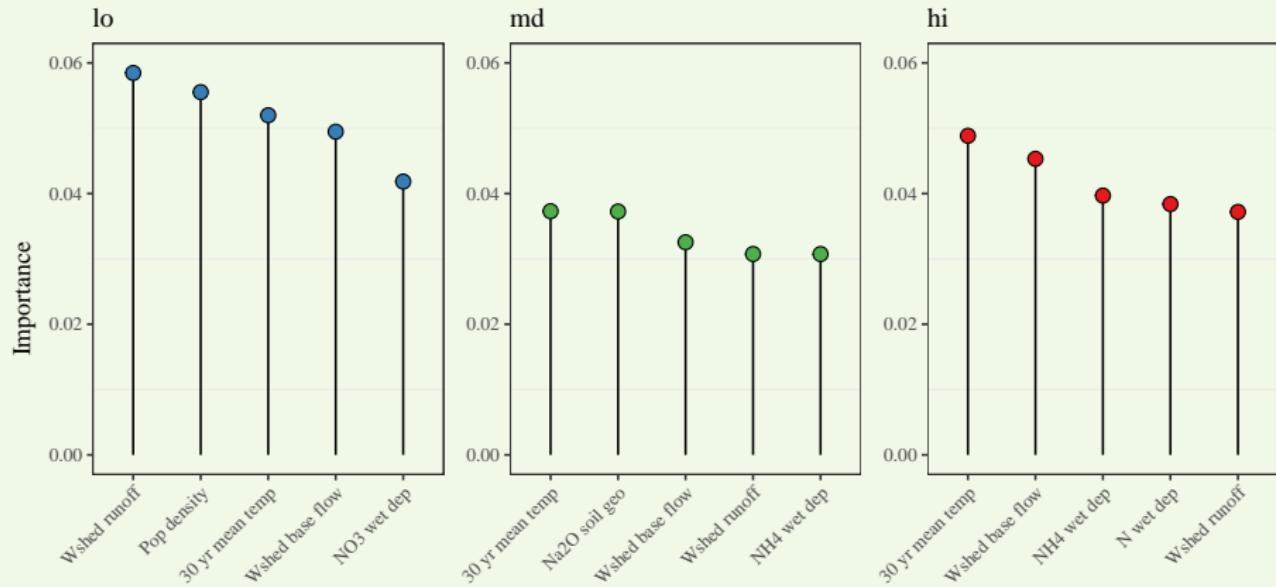
*An additional leap: Use predicted chlorophyll from landscape model, estimate predicted probability of exceeding threshold, categorize relative risk*





## 4) Identify landscape factors related to risk

*Top five most important watershed factors linked to risk categories*





# A vision for lake bioassessment in CA

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# A vision for lake bioassessment in CA

- Despite limited data, we effectively screened lakes by HAB risk
- Relatively low risk in the Sierra Nevada, North Coasts, portions of Central Valley
- Higher risk in Chapparal, Desert, Urban centers
- Landscape position is a potentially powerful predictor of water quality





# A vision for lake bioassessment in CA

- Alternative data acquisition can be explored to further assess risk
- Additional *in situ* and probabilistic sampling needed
- Leverage both for rapid response to bloom incidence



<https://www.epa.gov/water-research/cyanobacteria-assessment-network-cyan>

## *Acknowledgments:*

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## *Funding sources and contact:*



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GitHub (project):  
[https://github.com/fawda123/cali\\_lake](https://github.com/fawda123/cali_lake)

GitHub (presentation):  
[https://github.com/fawda123/SFS\\_2018](https://github.com/fawda123/SFS_2018)

Twitter: @fawda123

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