Inland Freshwater Cyanobacteria Blooms in the mid-Atlantic: Current and Future Threats

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Harmful Cyano Blooms

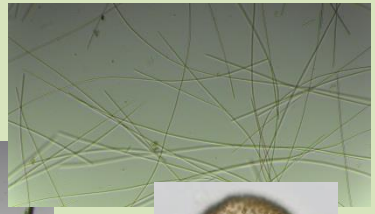
- World-wide global concern
- Large surface areas, e.g., Lake Taihu, Lake Victoria, Baltic Sea, Lake Erie, Grand Lake Saint Mary, Klamath River
- Threats to drinking water, irrigation, domestic animals, wildlife, recreation, property values
- Usually summer blooms driven by excessive nutrient loading

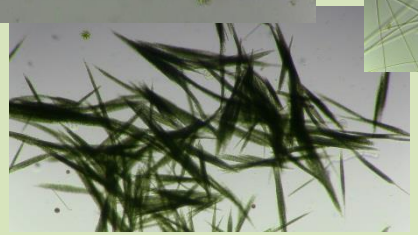
TampaBayTimes

But regionally?

PLANKTONIC CYANOS

- Cosmopolitan *Microcystis aeruginosa* still a major bloom former, as a microcystin producer
- Williston Lake, Higgins Mill Pond, Poplar Island, several E. Shore rivers, James River, irrigation ponds
- However, increasing prevalence of non-*Microcystis* species such as *Anabaena*, *Dolichospermum*, *Aphanizomenon*, *Planktothrix*
- Anatoxin-a, saxitoxin, others?
- Lake Linganore, Lake Anita Louise, Lake Merle, Columbia lakes, Constitution Gardens, Ftn. Rock Quarry, Spahr's Quarry, 3 VA-PA quarries, WV impoundments
- Unique *Woronichinia naegeliana* & winter *Planktothrix* spp.



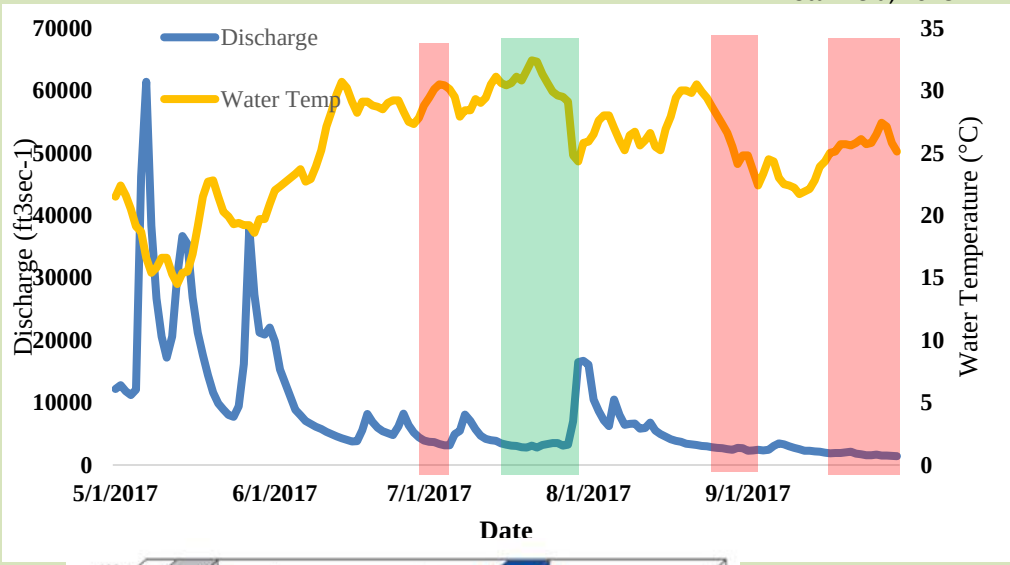


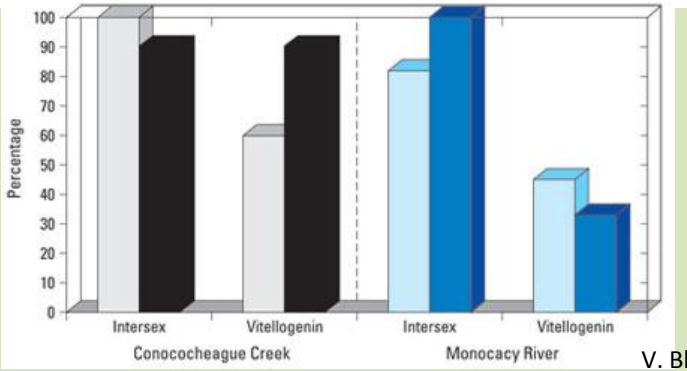
Regional Benthic Cyanos

- Potomac River & tributaries
- *Planktothrx isothrix*, *Lyngbya*, *Phormidium*, *Microcoleus*
- Low flow required & specific temperature range
- Food web impacts: Body burdens; endocrine disruptors and intersex fish; birds
- Drinking water concerns

J. Mullican, MD DNR

K. Stanfield, 2018

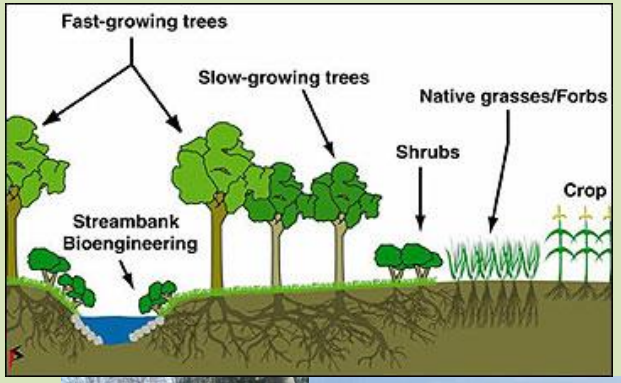




V. Blazer, USGS

Mitigating Cyanobacteria Blooms*

- #1: Reducing non-point sources of N, P, and sediment
- Intervention (band-aids)
  - Algicides (**H_2O_2**, $KMnO_4$, chlorination, $CuSO_4$, **barley straw**)
  - Aeration, mixing, flushing
  - Ultrasound, ozonation, UV
  - Flocculation+capping
  - Shading compounds
  - Skimming
  - P, N removal (Phoslock®, alum, floating wetlands, ATS)



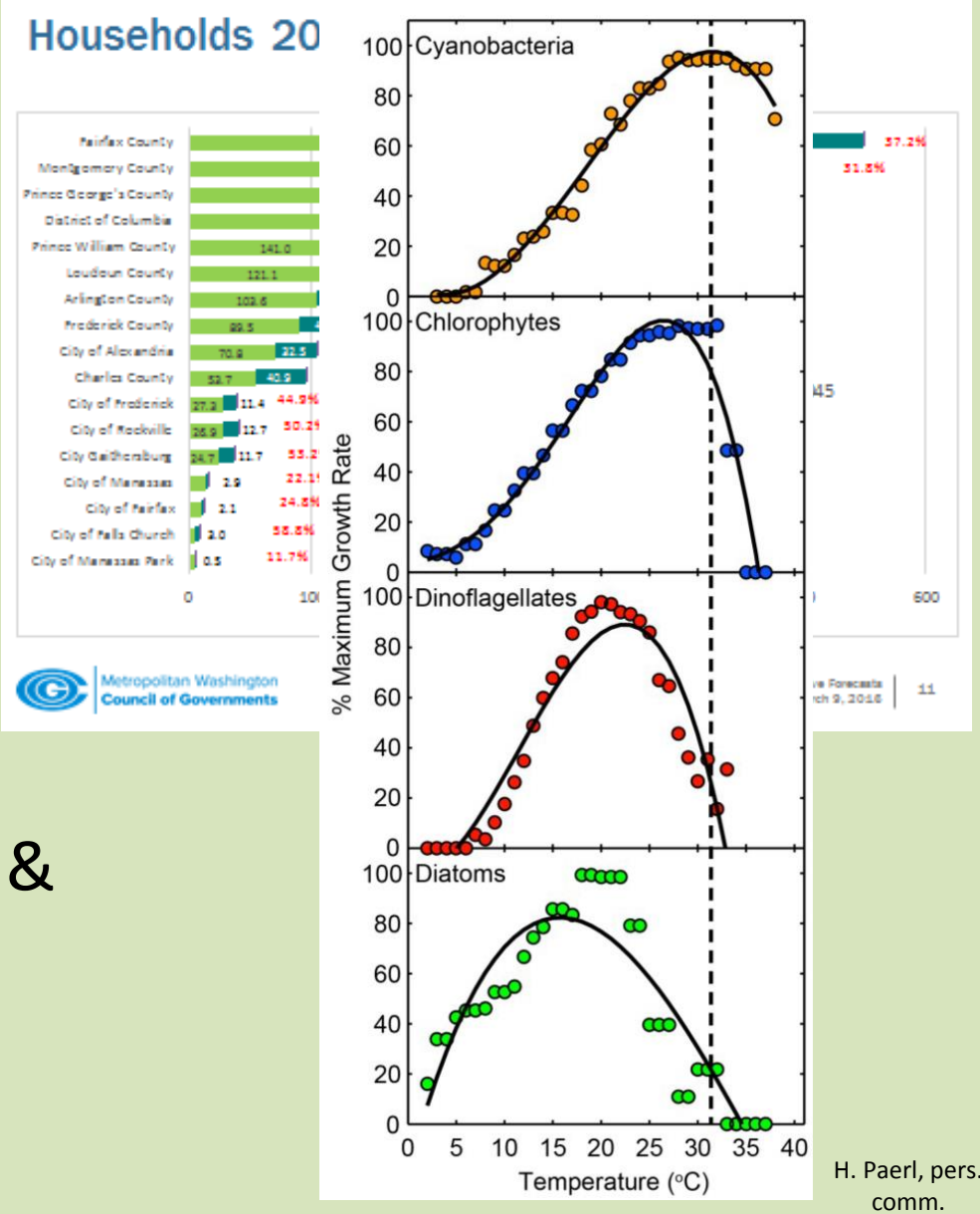
G. Pan, pers. comm.

https://www.lgsonic.com/blogs/algae-control/

*For benthic blooms, lower loads+flushing

Future-Ouch!

- Nutrient reduction!
  - Population growth
  - Food production
  - Clean air?
- Climate
  - Warmer
  - Increasing storm frequency, intensity & long droughts



H. Paerl, pers. comm.

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