Harmful Algal Bloom (HAB): Lady Bird Lake

Brent Bellinger, Ph.D.
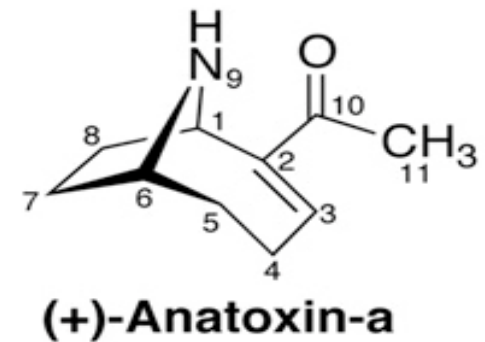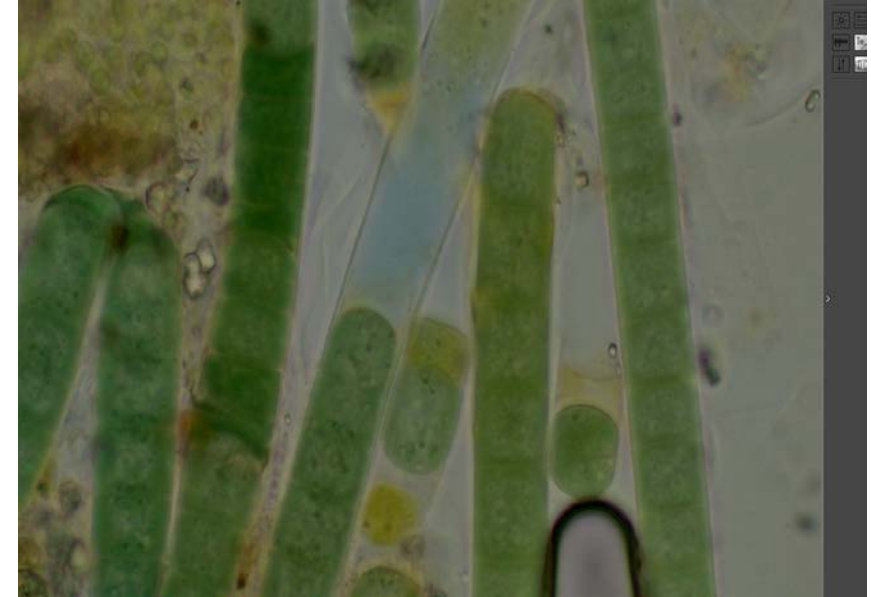
Watershed Protection Department

11/17/2020

What Happened in 2019?

Dog deaths at Red Bud and Auditorium shores

Only observed in Lady Bird (no mortalities reported in 2020)

HAB types

Planktonic (single cells in water column) – Most Common

Lake Erie, Des Moines

Cohesive mats (benthic, floating matrix of filaments)
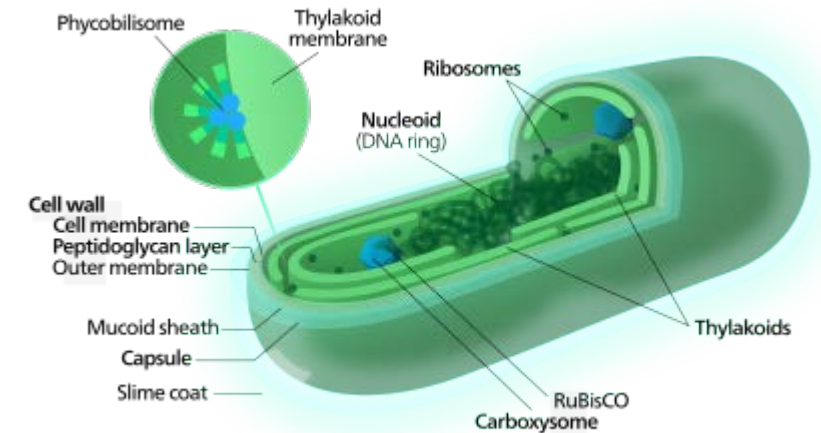
Lady Bird Lake

Cyanobacteria

Primitive!

- Over 3 *billion* years old
- First photosynthetic organisms; changed Earth's atmosphere – the "Great Oxygenation Event"
- 6,000+ estimated species

Capable of producing secondary metabolites

- Geosmin, 2-methylisobroneol (MIB) – linked to taste-and-odor issues in the drinking water
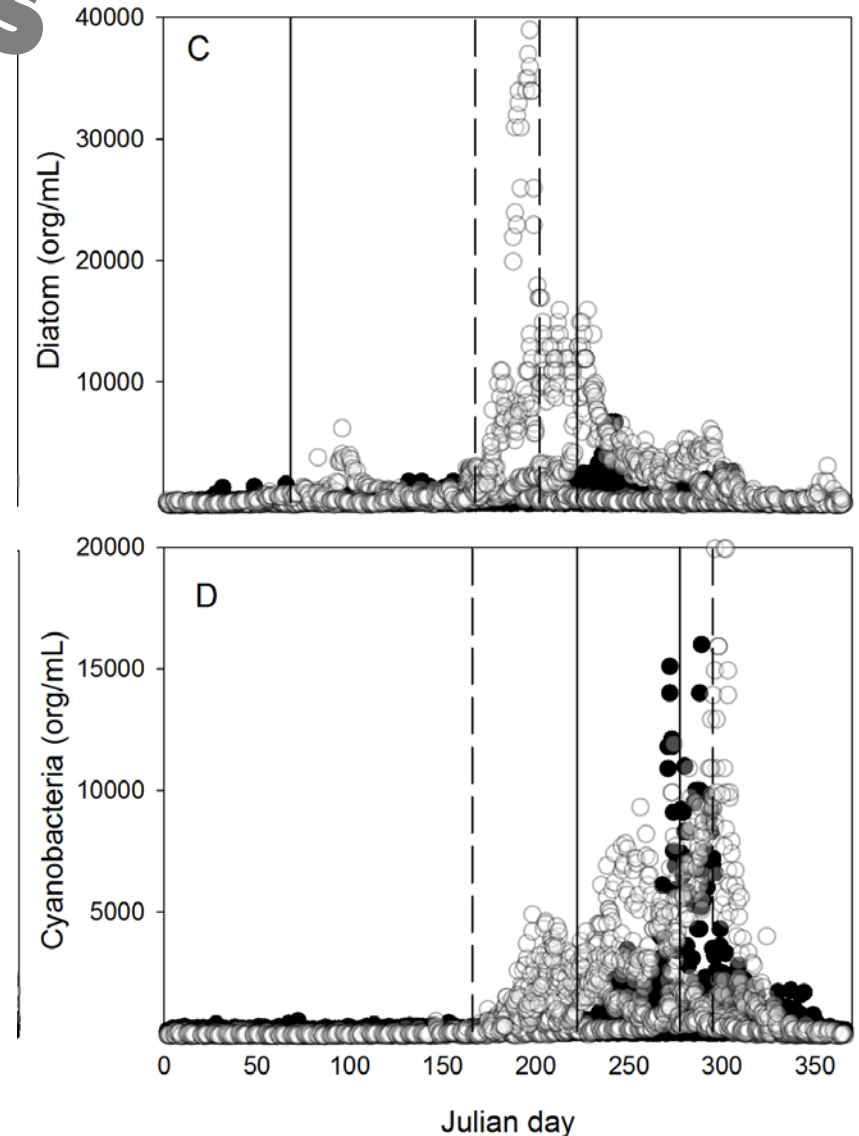- Toxins

Cyano. Pop. Dynamics

Seasonality typical (summer)
(Data from Lake Austin)

"Three pillars" to a toxic bloom

- **Low flows, lack of rain, minimal turbulence**
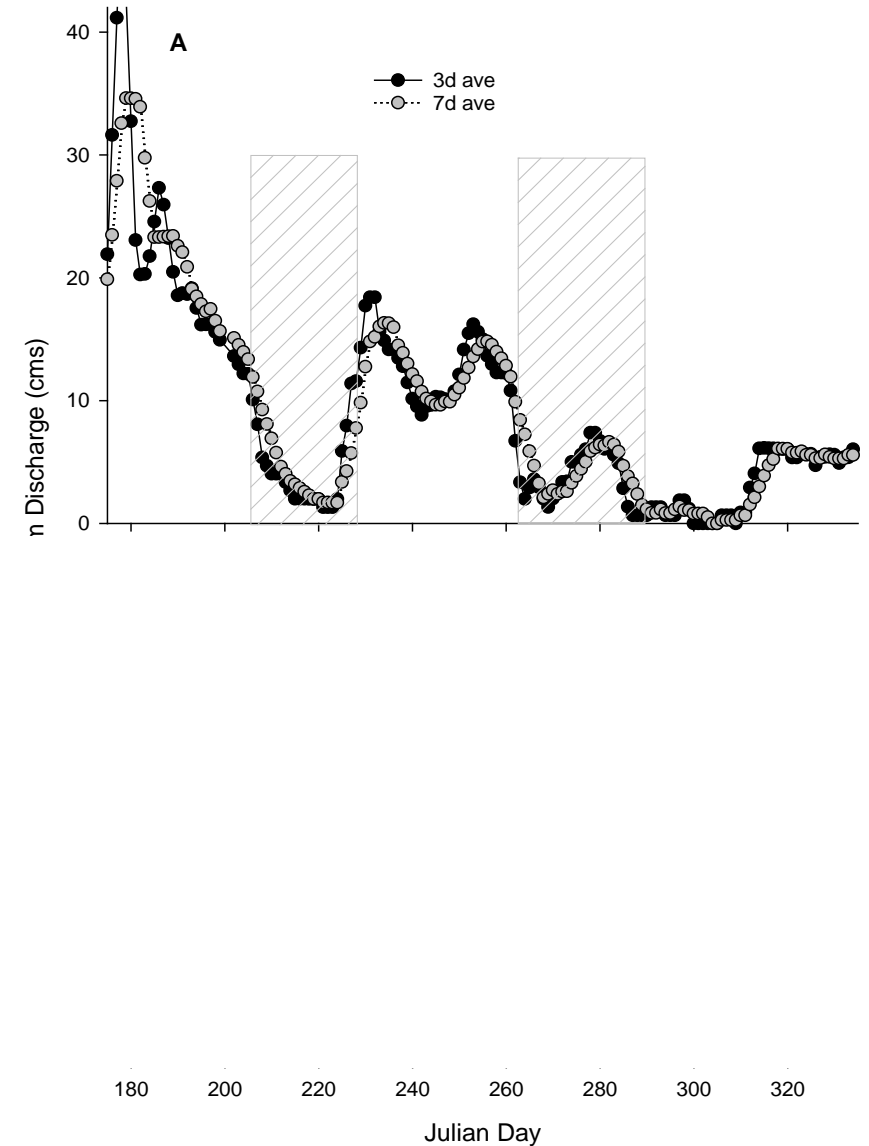- **Hot**
- ***Abundant Nutrients* (N, P)**

The 2019 LBL Event

Discharge rates
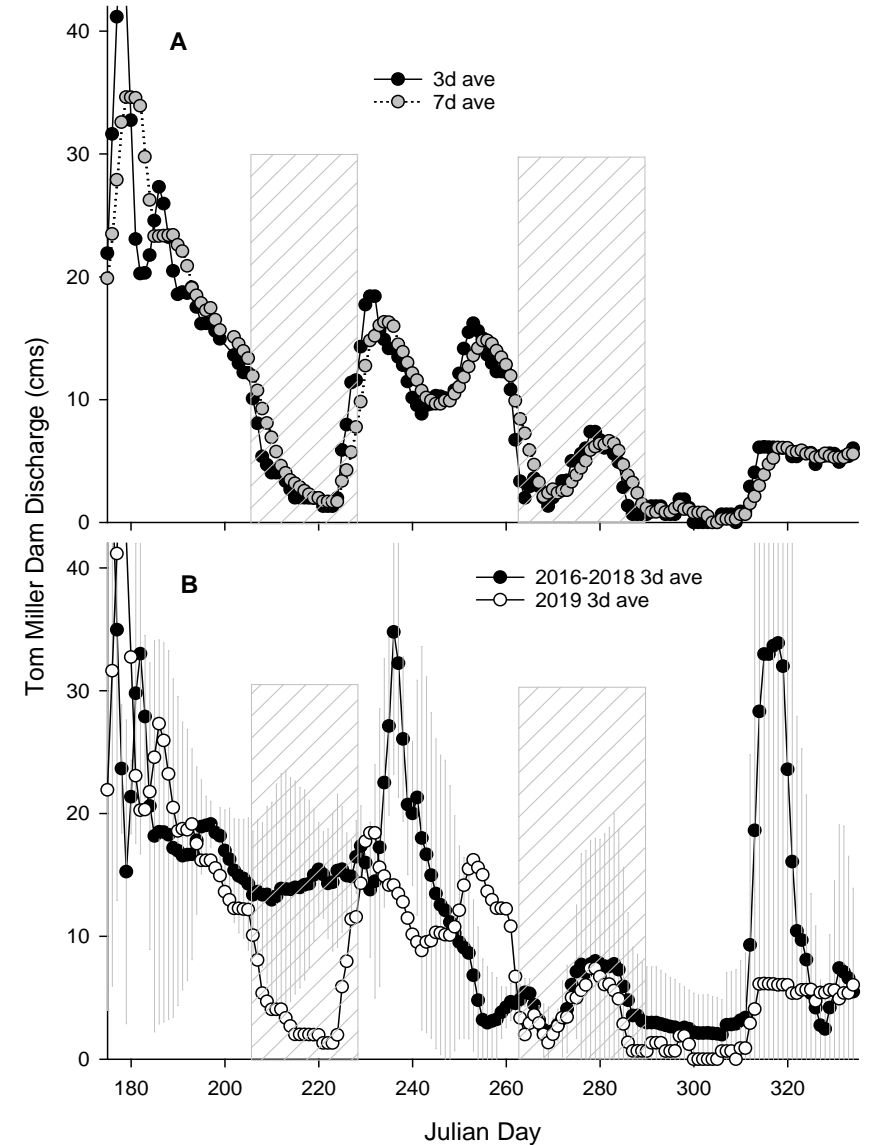
- Late July drop in discharge coincided with bloom and toxins event

Discharge rates

- **Late July drop in discharge coincided with bloom and toxins event**

- **Ave was lower than previous 3-year period**

The 2019 LBL Event

Water Temps

- >30°C weekend of dog deaths

Nutrients

- Significantly higher NH_3, NOx in 2019 and abundant TP at sites where HAB/dog deaths occurred

- Elevated compared to previous years (based on routine monitoring)

Period	Project	NH_3 (µg/L)	NO_x (µg/L)	TP (µg/L)
2019	Bloom	32.5 ± 16.9	253.1 ± 181.4	21.9 ± 15.0
2016 – 2018	Monitoring	8.0 ± 0.0	199.0 ± 198.0	14.1 ± 9.3
2019	Monitoring	19.1 ± 18.2	476.0 ± 488.0	26.4 ± 15.5

- Zebra mussels (new)
  - Alter water chemistry
  - Promote dense benthic growth

- Large flooding, runoff, depositional event (Fall 2018) (new)
  - Altered sediment and water chemistry?

- Climate change (new)
- Dog waste (old)
- (sorta) Low flows (old)
  - But now coupled with new drivers!
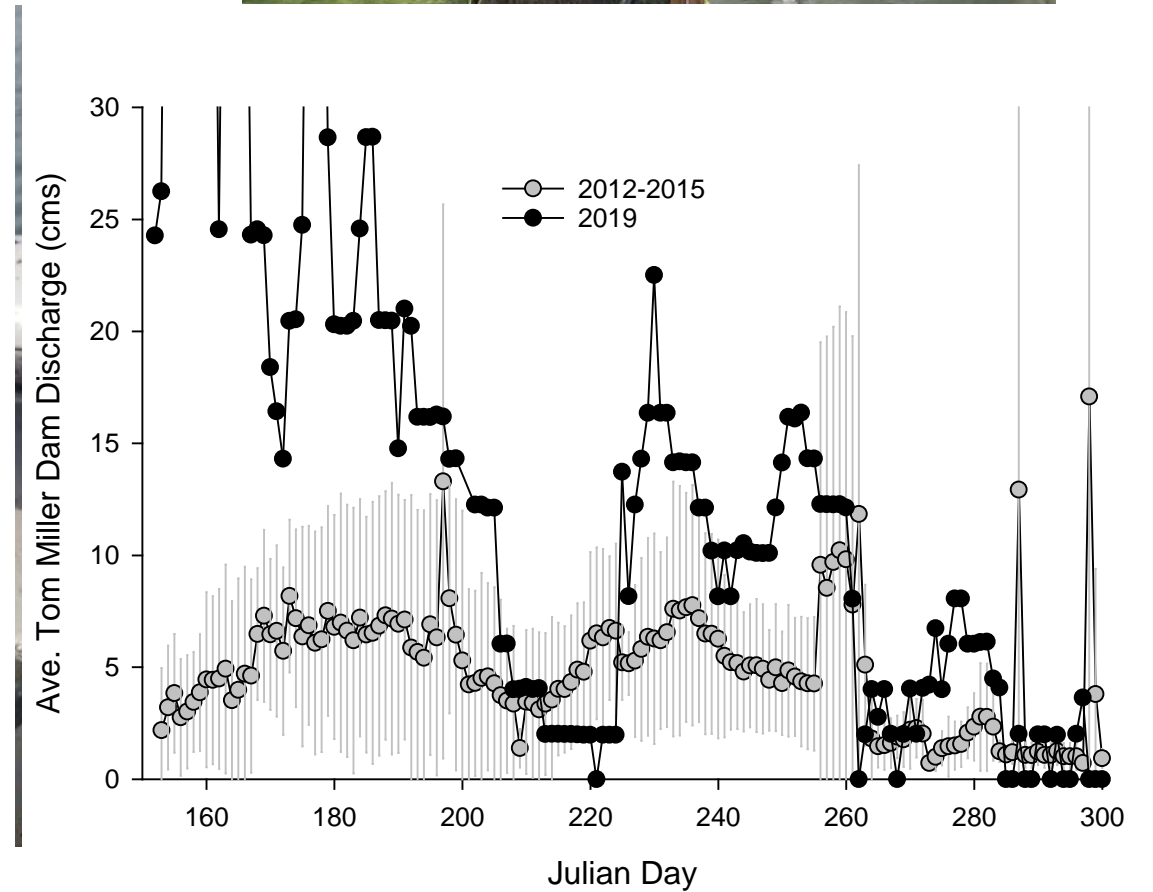
Forecasting and Prevention (?)

"HABs cannot easily be eliminated or prevented, but they can be monitored and predicted, and the potentially negative consequences can be managed and mitigated. Changes in human activities and behaviour could also contribute to prevent or minimize certain HABS and their deleterious effects." Kudela et al. (2015) IOC/UNESCO Report

WPD Approach to Monitoring, Modeling, Mitigation

- Weekly WQ sampling; Daily Discharges; Hourly Temps; Toxin abundances; Species Library (DNA fingerprinting)
    - Developing Models

- Treatment and preventative options being explored
    - Aeration
    - Alum
    - Biochar
    - Physical or Mechanical Removal
    - Chemicals (absolute last resort)

    Unclear how effective any of these treatments would be in reservoir

Questions?

Brent Bellinger, Ph.D., Environmental Scientist Senior
brent.bellinger@austintexas.gov