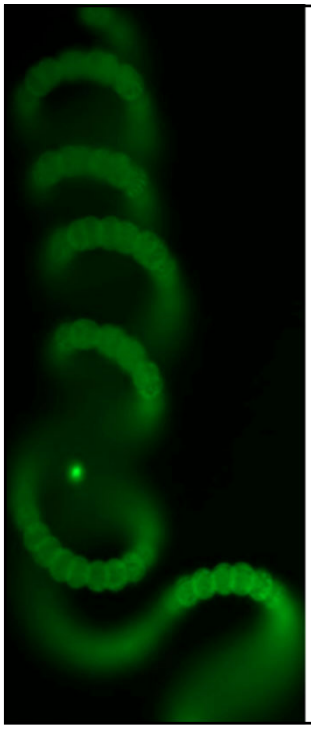


CyanoHABs in Detroit Reservoir, 2011-2022:
How the toxin of concern changed from cylindrospermopsin to microcystin

Theo Dreher
Department of Microbiology, Oregon State University
President, Oregon Lakes Association

Kurt Carpenter
USGS Oregon Water Science Center

Norman Buccola
US Army Corps of Engineers, Portland

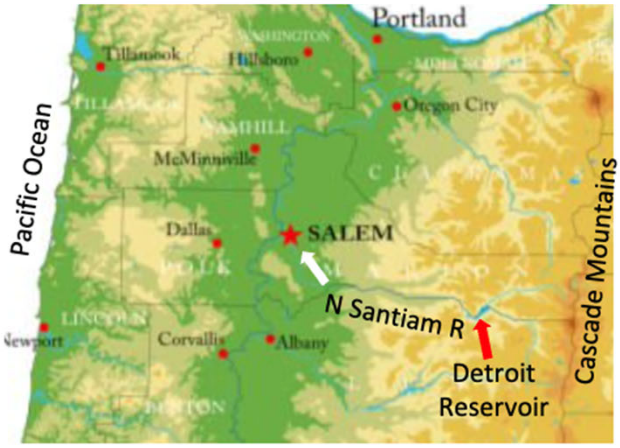
City of Salem water quality staff
Brandin Hilbrandt, Elijah Welch, Paul Mitchell

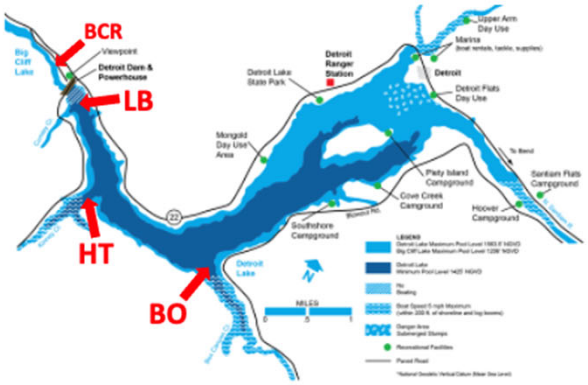
1

Team Detroit ….. Team Muscle

2

Detroit Reservoir and City of Salem water supply

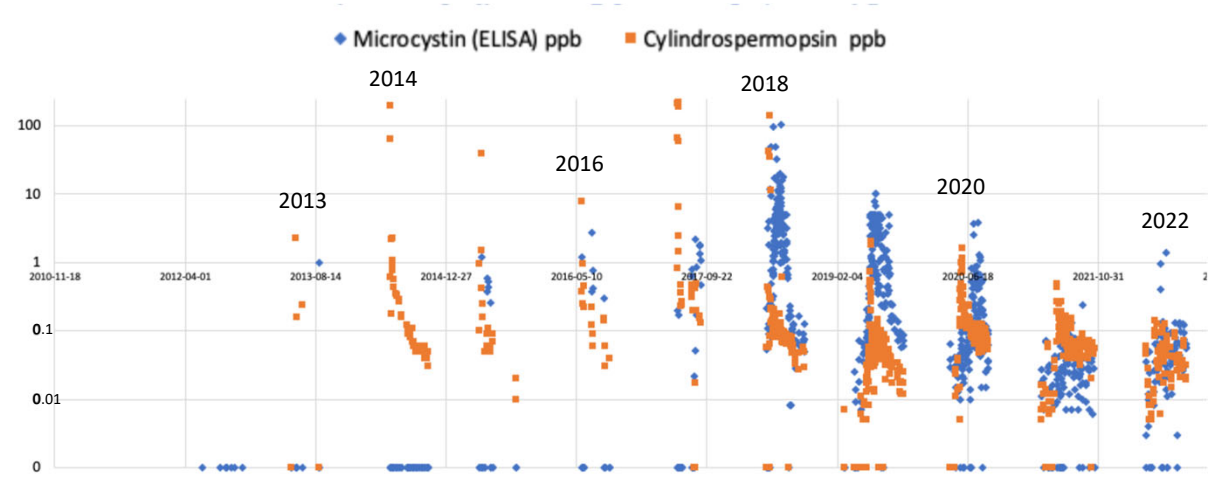




3

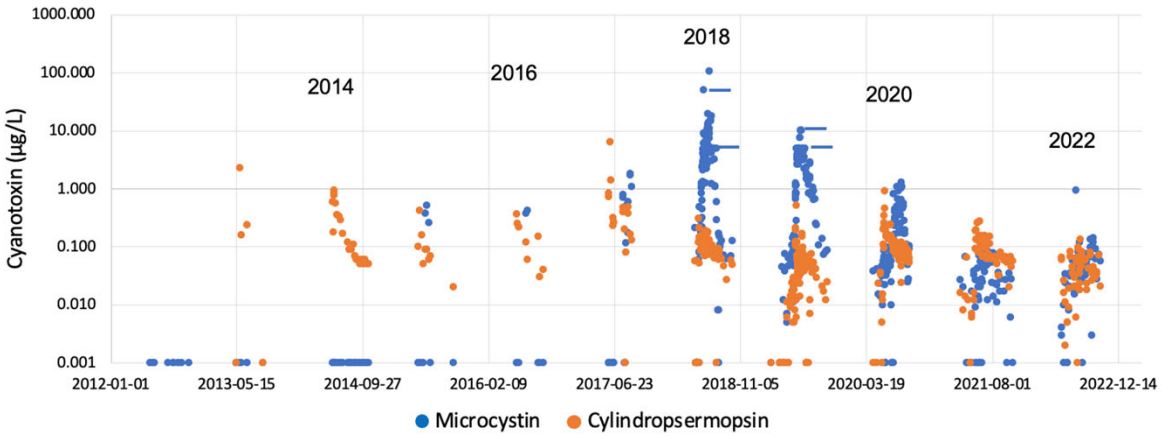
Detroit Reservoir: cylindrospermopsin before 2018, then microcystin

Surface samples, 2012-2022, BO, HT & LB sites



4

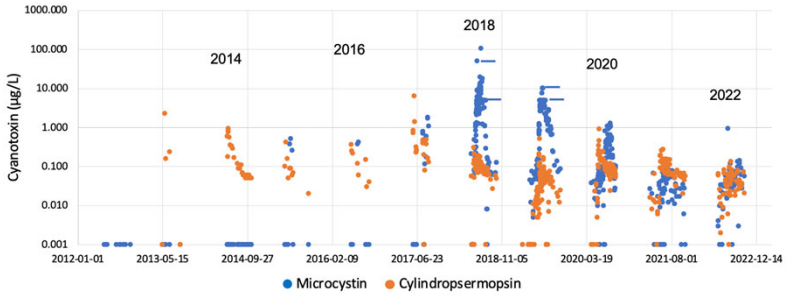
The LB (dam) site is typically less impacted by cylindrospermopsin



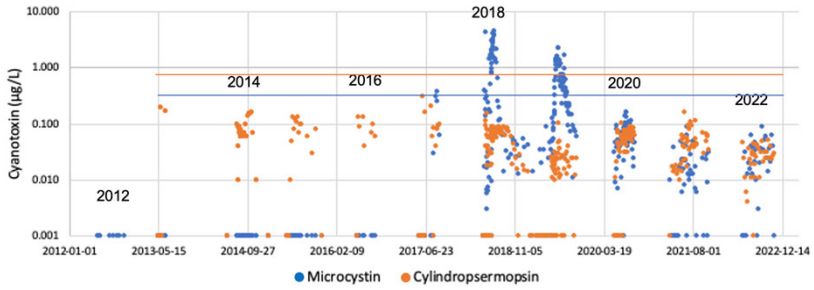
5

Cyanotoxin passage downstream from Detroit Reservoir

Detroit Reservoir
LB/LBS



Santiam River
Packsaddle Park



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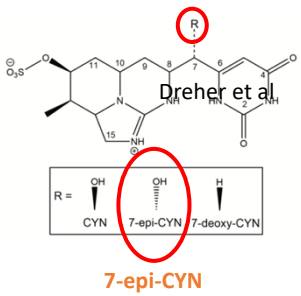
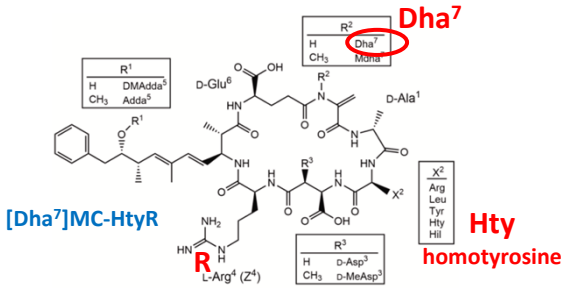
In Detroit Reservoir
Genome sequencing 2015-2018 showed that
***Dolichospermum* sp. DET69 is the CYN producer**
***Dolichospermum* sp.DET73 is the MC producer**



7-epi-CYN



Dreher et al., 2021a, Harmful Algae, 103:102005
Dreher et al., 2021b, Harmful Algae, 103:102037
Dreher et al., 2022, Harmful Algae, 116:102241

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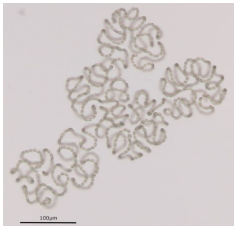
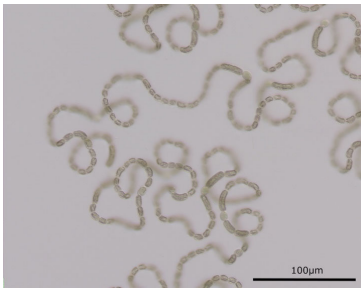
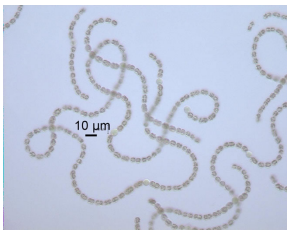
Morphologies of

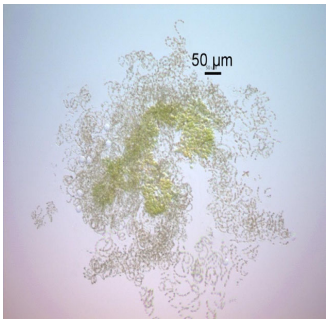
***Dolichospermum* sp. DET69**
the CYN producer





***Dolichospermum* sp.DET73**
the MC producer

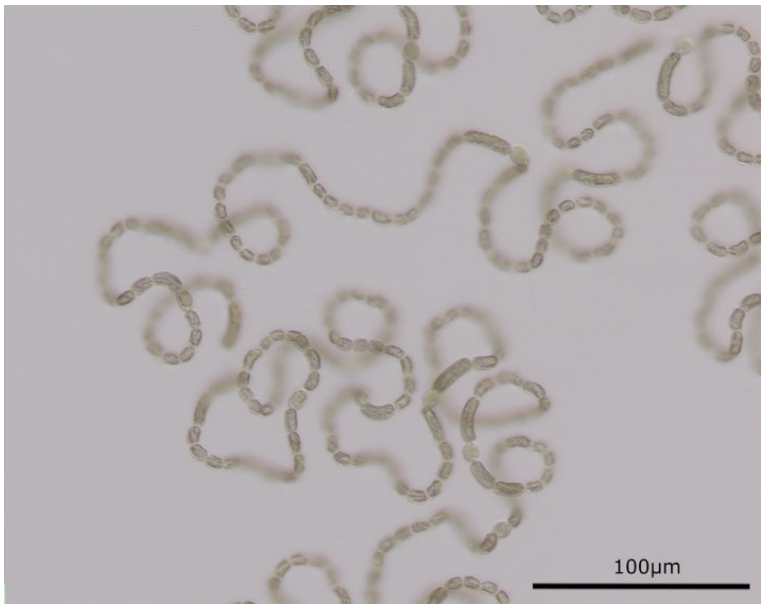




8

V-A-H-A-V morphology of *Dolichospermum* sp. DET69

Characteristic of *Dolichospermum lemmermannii*



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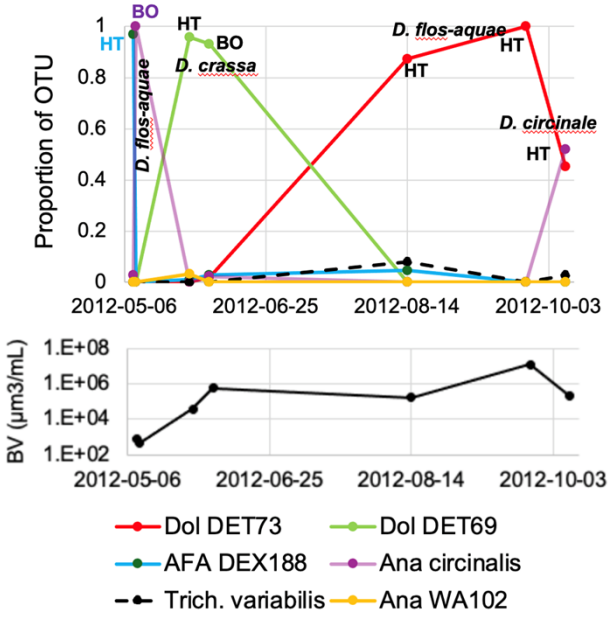
Cyanobacterial genotypes present in Detroit Reservoir, 2012

cpcBA (phycocyanin) genotypes derived from sequencing Roche 454 amplicon libraries

Dolichospermum BV



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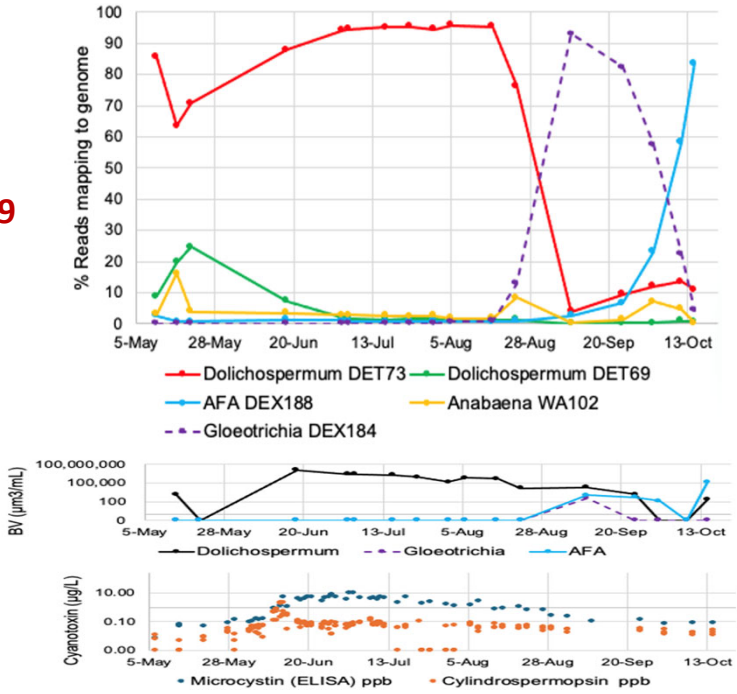
Cyanobacterial genotypes present in Detroit Reservoir, 2019

Best-match genotypes derived from mapping shotgun metagenome library sequences made by Youchul Jeon & Jingrang Lu, EPA Cincinnati



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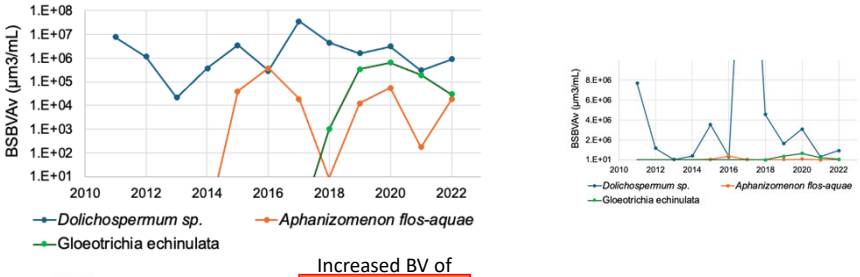
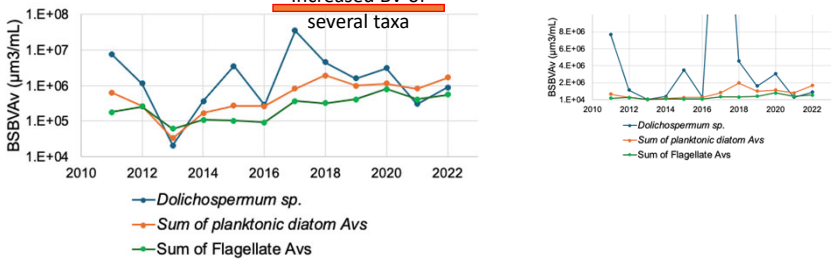
Phytoplankton in Detroit Reservoir, 2011-2022: *Dolichospermum* dominant

Cyanobacteria



Dolichospermum vs diatoms vs flagellates



BSBVAv = Bloom season biovolume average, April through 1st week of November (wk 14-44)
Raw observations collected as weekly and then yearly averages to minimize effects of uneven sampling

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Conclusions

- *Dolichospermum* was the dominant cyanobacterium in Detroit Reservoir 2011-2022
- ***Dolichospermum* DET69 (CYN+)** & ***Dolichospermum* DET73 (MC+)** are probably the only toxigenic strains in the lake
- ***Dolichospermum* DET69 (CYN+)** typically has formed a short spring bloom, with 7-epi-CYN levels decreasing since 2018
- ***Dolichospermum* DET73 (MC+)** was present through spring and summer, and its importance has increased since 2018
- Toxicity in Detroit Reservoir decreased 2018 through 2022
- A variety of taxa (diatoms, flagellates) have been present at increased levels during this period

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