

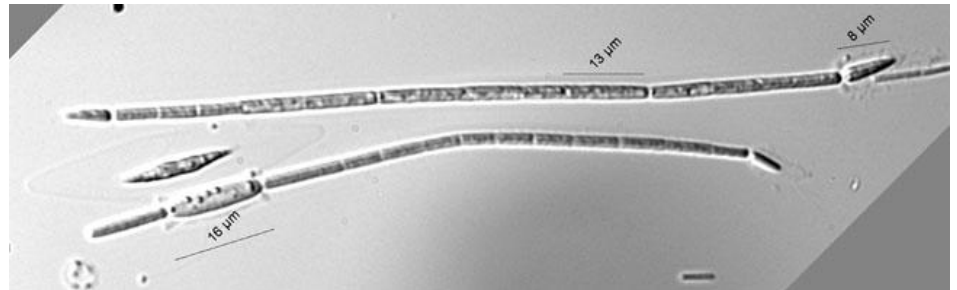
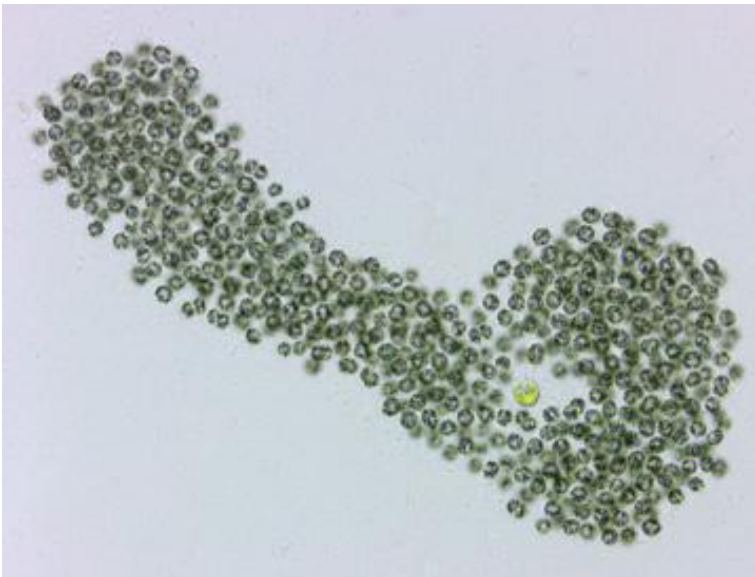


Recreational Water Quality Criteria for Cyanotoxins

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Water Quality Standards Unit

Harmful Algal Blooms and Cyanotoxins

- HABs occur when cyanobacteria rapidly multiply under certain environmental conditions, including excess nutrients, warm water temperatures, and stagnant water.
- Cyanotoxins are produced by cyanobacteria.
- Exposure to high levels of cyanotoxins lead to liver and kidney damage.



Microcystis (left)

https://fmp.conncoll.edu/silicasecchidisk/LucidKeys3.5/Keys_v3.5/Carolina35_Key/Media/Html/Microcystis_Main.html

Cylindrospermopsis raciborskii (above)

https://nas.er.usgs.gov/queries/GreatLakes/FactSheet.aspx?Species_ID=2651

Physical Development of a Harmful Algal Bloom

Chaumiere Lake (2020)



Cyanobacteria Mats



Cyanobacteria Swirls



Cyanobacteria Bloom

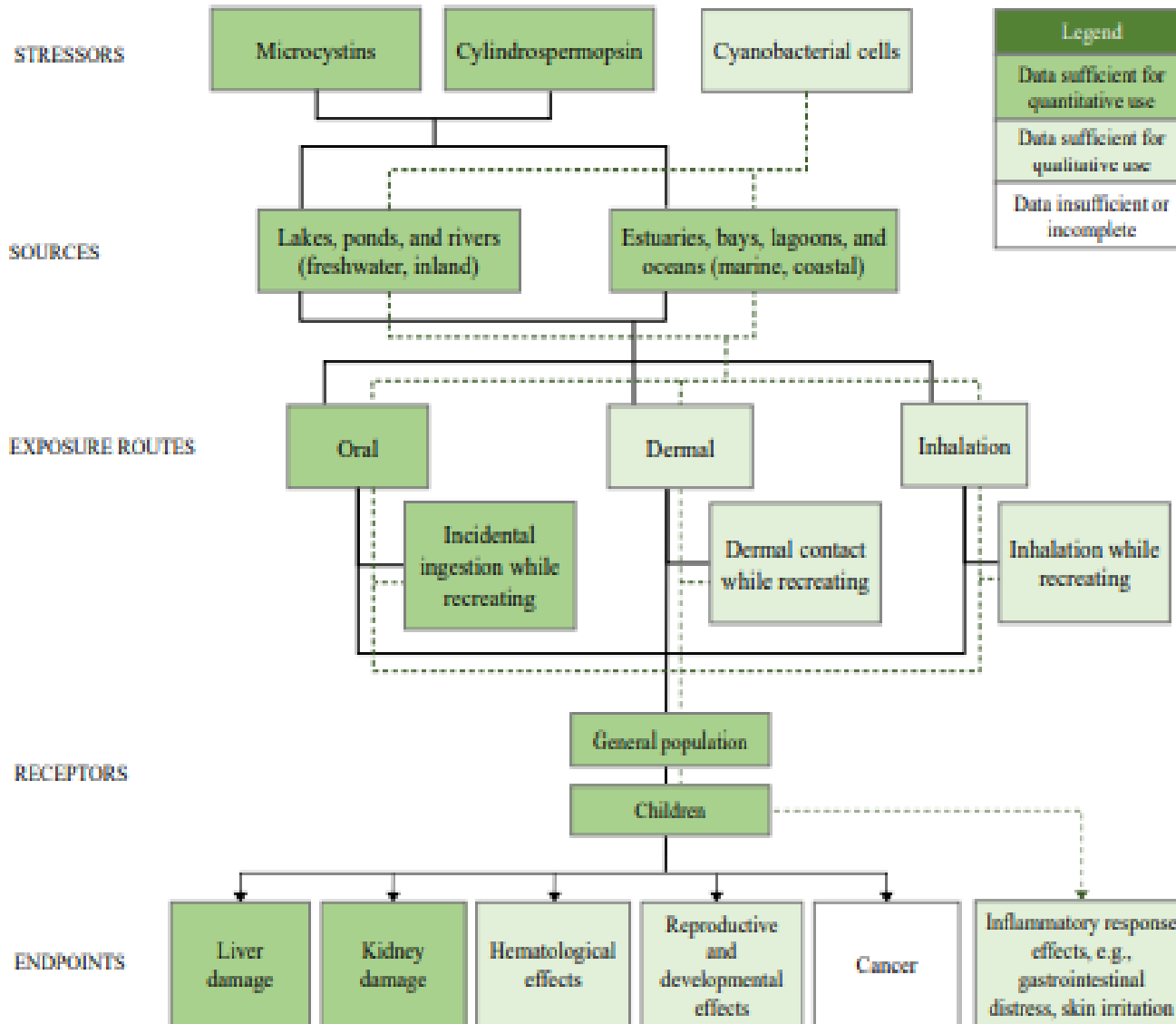
Analysis: Microcystin by Abraxis ELISA

Microcystin

11.3 $\mu\text{g/L}$

Proposed criteria
for microcystin
is 8 $\mu\text{g/L}$

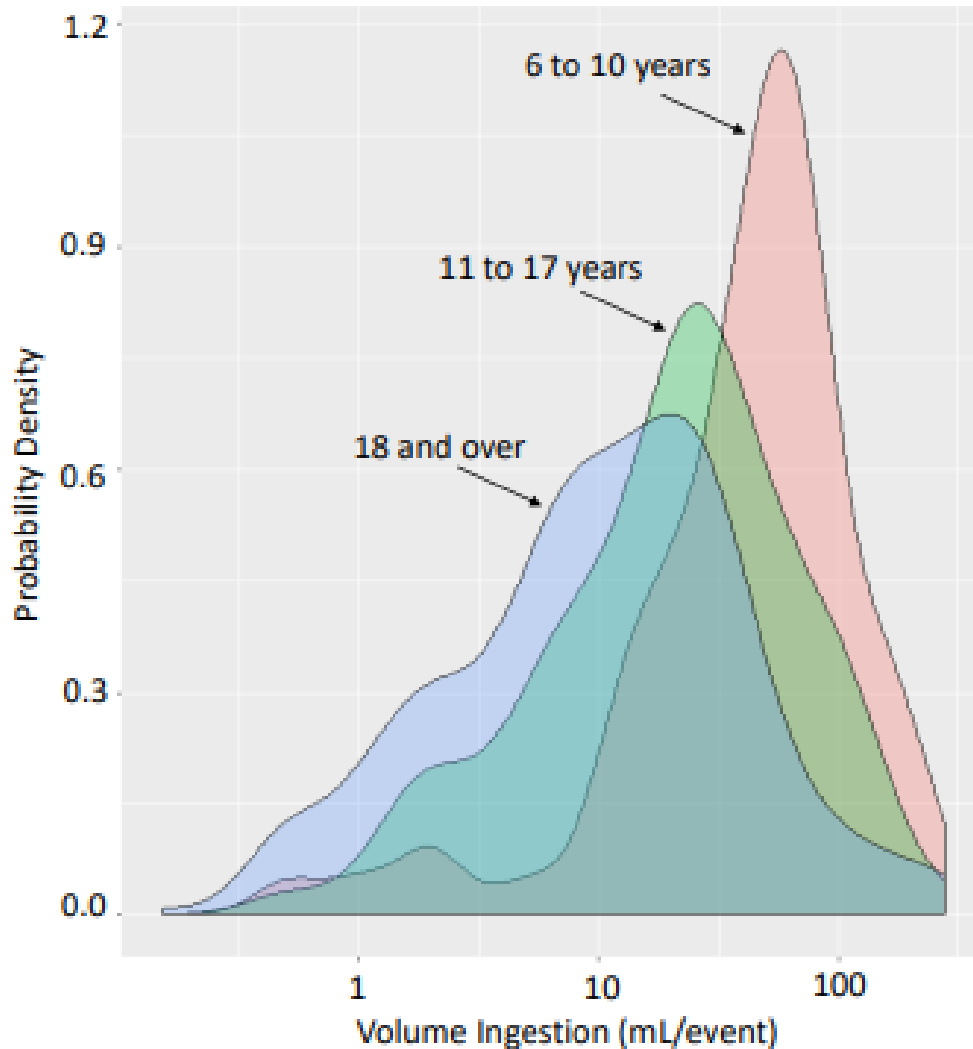
Potential Health Risks: Exposure to Microcystins and Cylindrospermopsin in Recreational Waters



EPA 822-R-19-001. Figure 4-1. Conceptual Model of Exposure Pathways to the Cyanotoxins, Microcystins and Cylindrospermopsin, and Cyanobacteria in Surface Waters While Recreating (2019)

Incidental Ingestion Rates

Combined Distributions for Age Groups



Volume* of incidental ingestion (mL) per recreational event on a log scale

- 548 participants
 - Ages 6 – 81

*EPA adjusted the volume ingested by each participant to one hour based on the length of time the participant reported being in the water

When in Doubt, Stay Out!

Pomme de Terre – 2021



Site	Sample Date	Cyanobacteria Cell Count (cell/mL)	Microcystin (µg/L)	Comments
Pomme de Terre Lake	5/19/2021	4,687,595	438.100	Original Sample diluted 1:100

Proposed criteria
for microcystin
is 8 µg/L

Pomme de Terre – 2022

Hermitage Beach	9.4 ug/L	microcystin
Pittsburg Boat Ramp	3.0 ug/L	microcystin
Pittsburg Beach	0.9 ug/L	microcystin

Proposed criteria for microcystin is 8 µg/L

DNR sample - taken June 3rd, values had decreased below toxin levels by June 13
 All cylindrospermopsin results were below detection.



SITE	Sample Date	Microcystin (µg/L)
PT - L5.5	6/7/2022	4.862
PT - L2	6/7/2022	68.9

US Army Corps of Engineers sampling

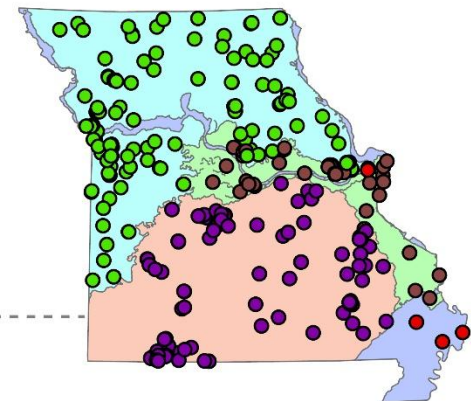
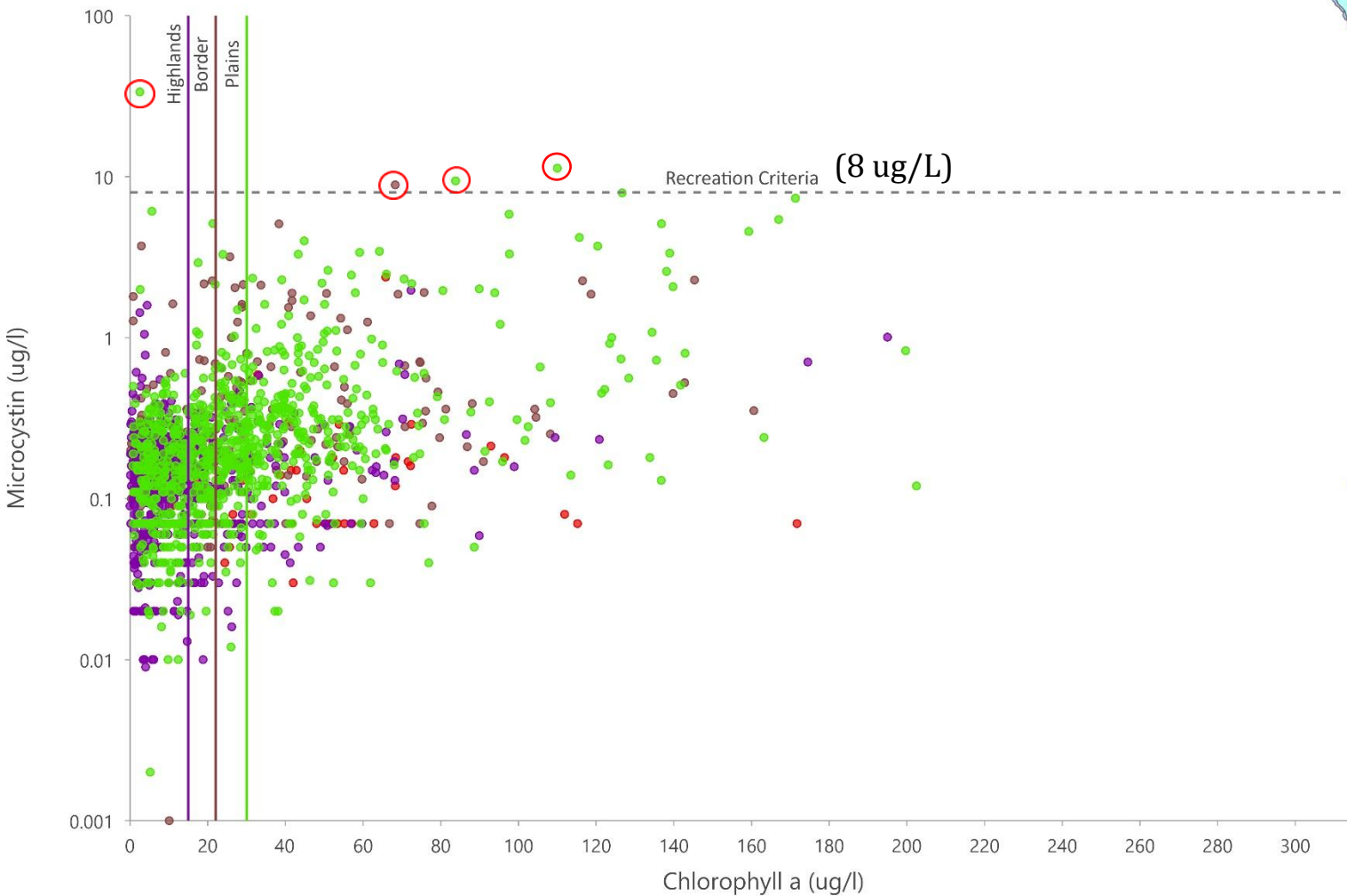
Petition to Amend 10 CSR 7.031

- March 29, 2022 – Department received petition from Missouri Coalition for the Environment (MCE) to adopt EPA's recommendations for cyanotoxins
 - Department has 60 days to respond (RSMo 536.041)
- April 27, 2022 – Department filed a request for an extension with the Joint Committee on Administrative Rules
- July 27, 2022 – Department must formally respond

DNR Potential Response to Petition

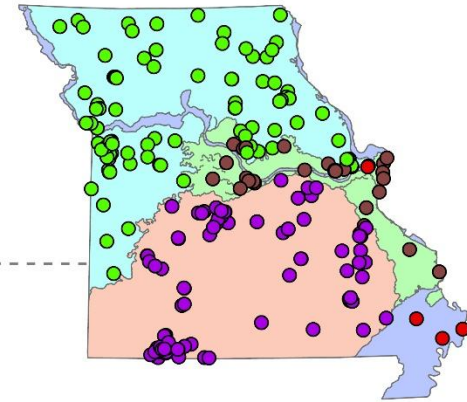
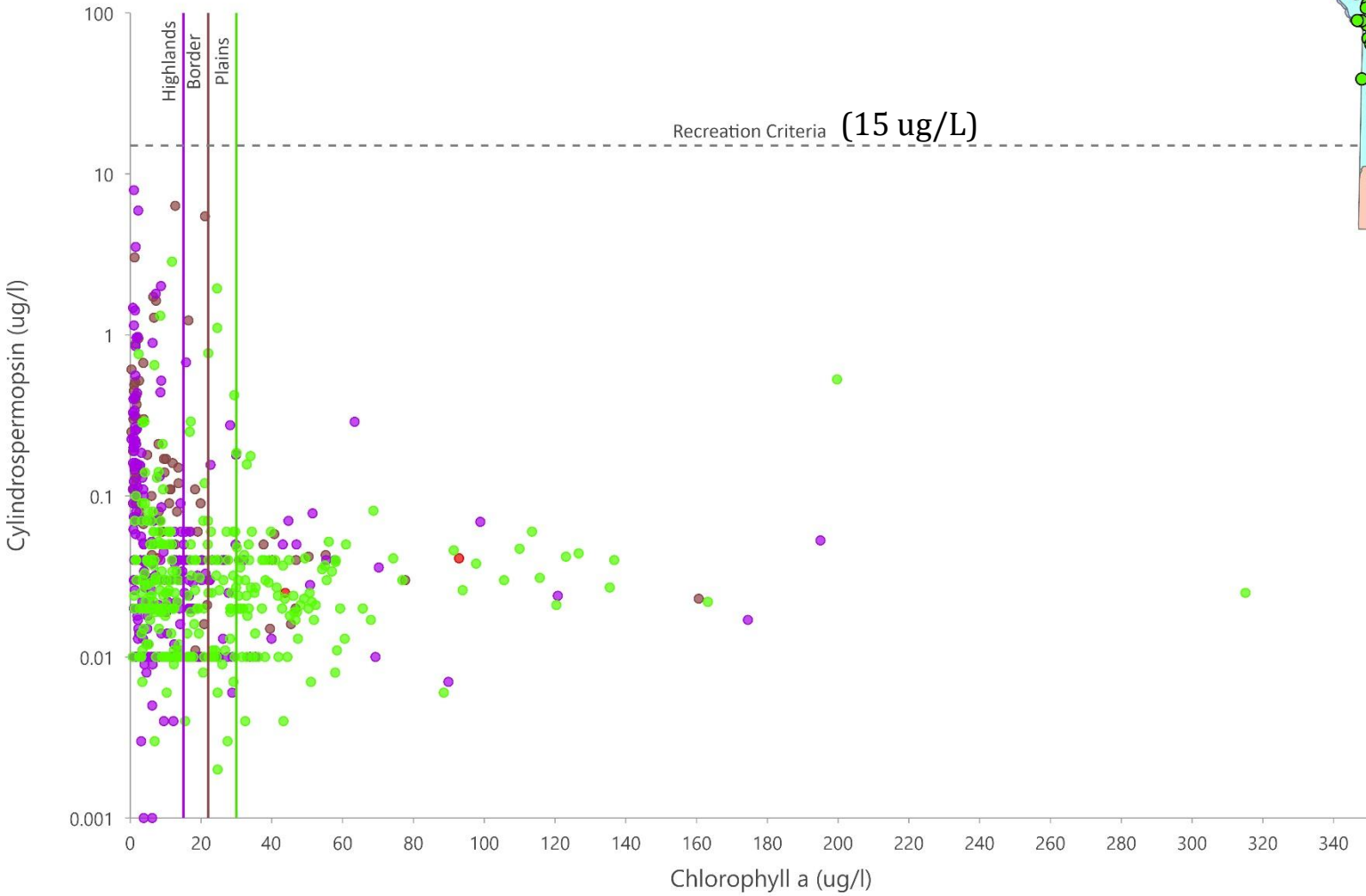
- RSMo 536.041
 - MoDNR must respond with intent to adopt, continue without change, amend, or rescind
- Propose an amendment to 10 CSR 20-7.031 Water Quality Standards to include EPA recommendations.
 - Applicable to all classified lakes and reservoirs 10 acres or greater
 - Not applicable to streams or individual watersheds
 - Recreational human health criteria (WBC)
 - Applicable April 1 – October 31

Microcystin - Chlorophyll a



- Lake Ecoregion
- Big River
 - Ozark Border
 - Ozark Highland
 - Plains

Cylindrospermopsin - Chlorophyll a



Lake Region

- Big River
- Ozark Border
- Ozark Highland
- Plains

Proposed Water Quality Criteria

	Microcystins	Cylindrospermopsin
Magnitude	8 µg/L	15 µg/L
Frequency	Maximum of 3 excursions over more than one recreation season assessed using most recent 3-year data	
Duration	Excursions more than 10 days apart	

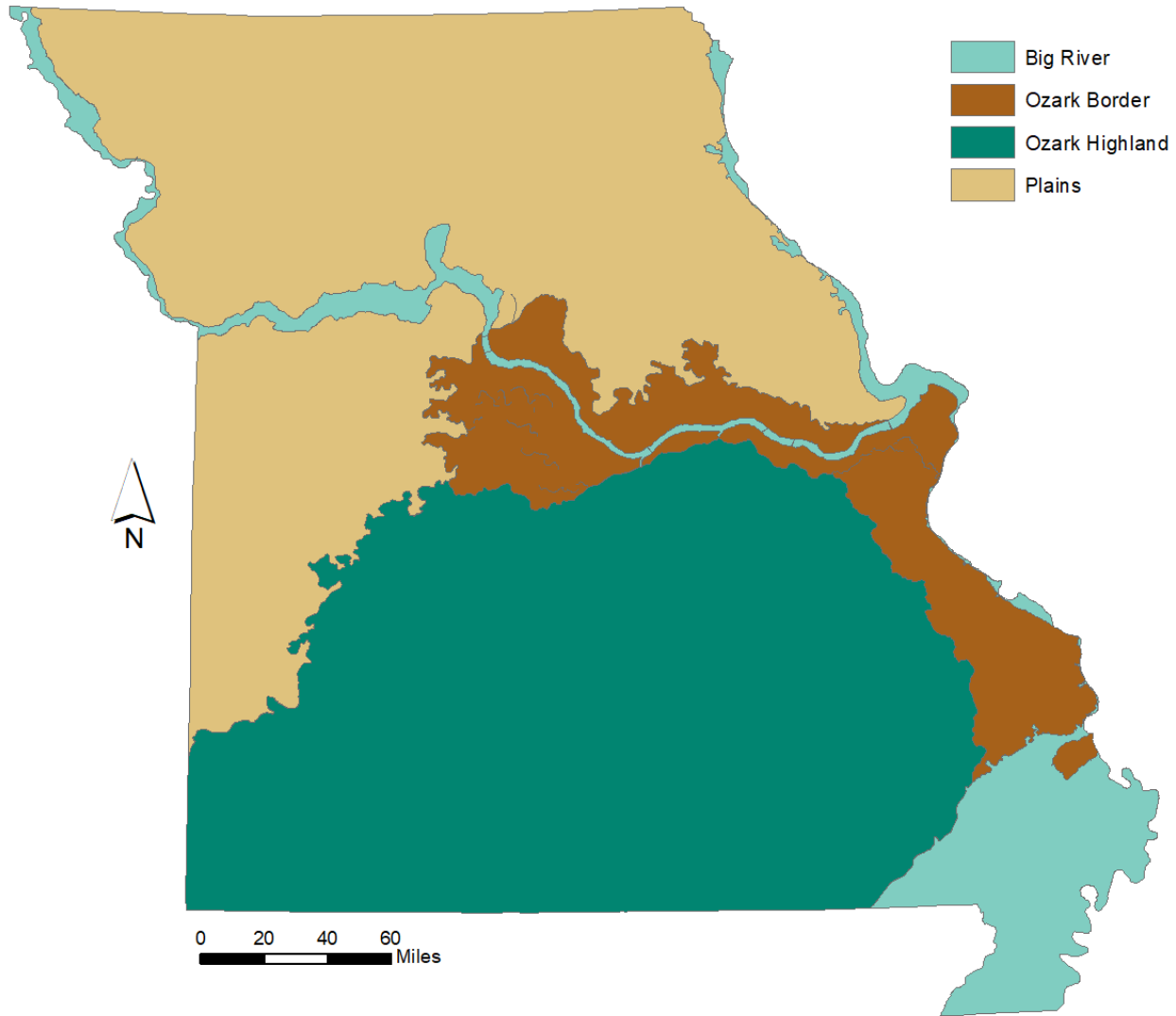
Proposed Rule Language

- 10 CSR 20-7.031(5)(D) Cyanotoxins. The protection of whole body contact recreation is limited to lakes 10 acres or greater and designated for that use. The recreational season is from April 1 to October 31. Lakes shall not have more than three excursions above 8 $\mu\text{g}/\text{L}$ for microcystins or 15 $\mu\text{g}/\text{L}$ for cylindrospermopsin over more than one recreational season in the most recent three years of available data. Excursions must be separated by a minimum of ten days.

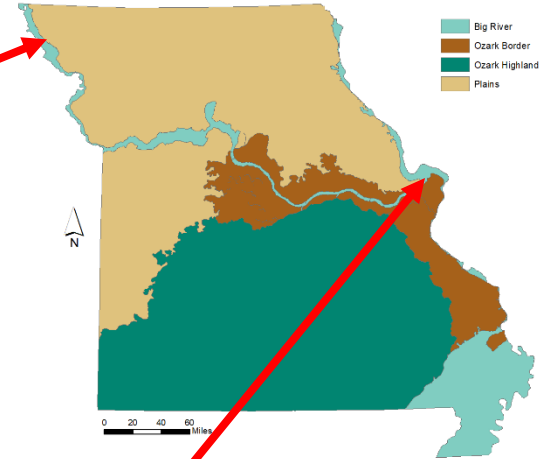
Proposed Applicability

- What is impacted by this rule:
 - ✓ All classified lakes and reservoirs ≥ 10 acres, including those in the Big River Ecoregion
- What is not impacted by this rule:
 - ✗ Lakes and reservoirs < 10 acres
 - ✗ Rivers and streams
 - ✗ Lakes, reservoirs, or ponds that are not waters of the state

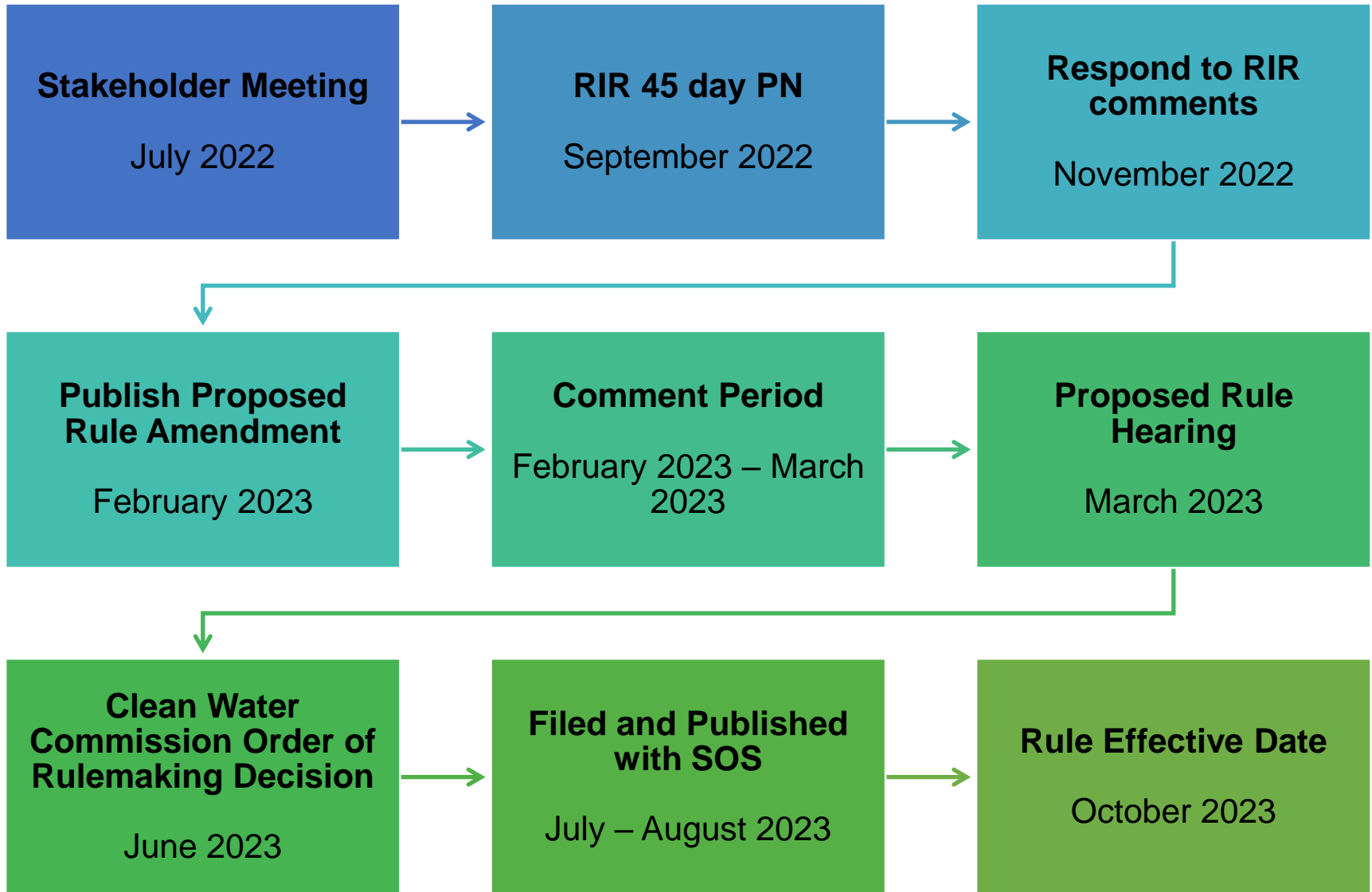
Lake Numeric Nutrient Criteria Ecoregions



Big River Ecoregion



Projected Timeline



Questions?

Contact us at:
wqs@dnr.mo.gov

Seeking more information on HABs?

<https://dnr.mo.gov/water/how-water/pollutants-sources/cyanobacteria-harmful-algal-blooms-blue-green-algae>

Need to report a HAB?

<https://dnr.mo.gov/document-search/suspected-harmful-algal-bloom-notification-form-mo-780-2827>