

# Recreational Ambient Water Quality Criteria or Swimming Advisories (AWQC/SA) for Cyanotoxins

Preparing for HABs Season  
June 20, 2019

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# Presentation Outline

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- Background information on AWQC/SA
- Final Recreational AWQC/SA



An aerial photograph of a wetland area. The foreground and middle ground are dominated by a large, irregularly shaped area of bright green vegetation, likely a wetland or marsh. To the right of this green area, there is a dense line of trees, including palm trees. Further to the right, a paved road with yellow lane markings runs diagonally across the frame. A single dark-colored car is visible on the road. The background shows more greenery and a clear sky.

# Background Information on AWQC/SA

# Genesis of the Recreational AWQC/SA for Cyanotoxins

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- In 2015, EPA published Health Effects Support Documents that describe the human health effects from exposure to the cyanotoxins microcystins, cylindrospermopsin and anatoxin-A.
- Two Drinking Water Health Advisories (2015) were developed for microcystin and cylindrospermopsin.
- Upon publication, EPA received questions about effects from exposure during swimming and fish consumption.



# Development of AWQC/SA and Stakeholder Engagement

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- EPA initiated development of values that reflect the latest science to protect the primary contact recreational use.
- EPA worked with a variety of stakeholders over the last several years.
- Used as either §304(a) recreational criteria or as swimming advisories, or both.
  - Adopted as WQS and approved by EPA under §303(c) and used for CWA purposes.
  - Use as basis for swimming advisories for notification purposes.



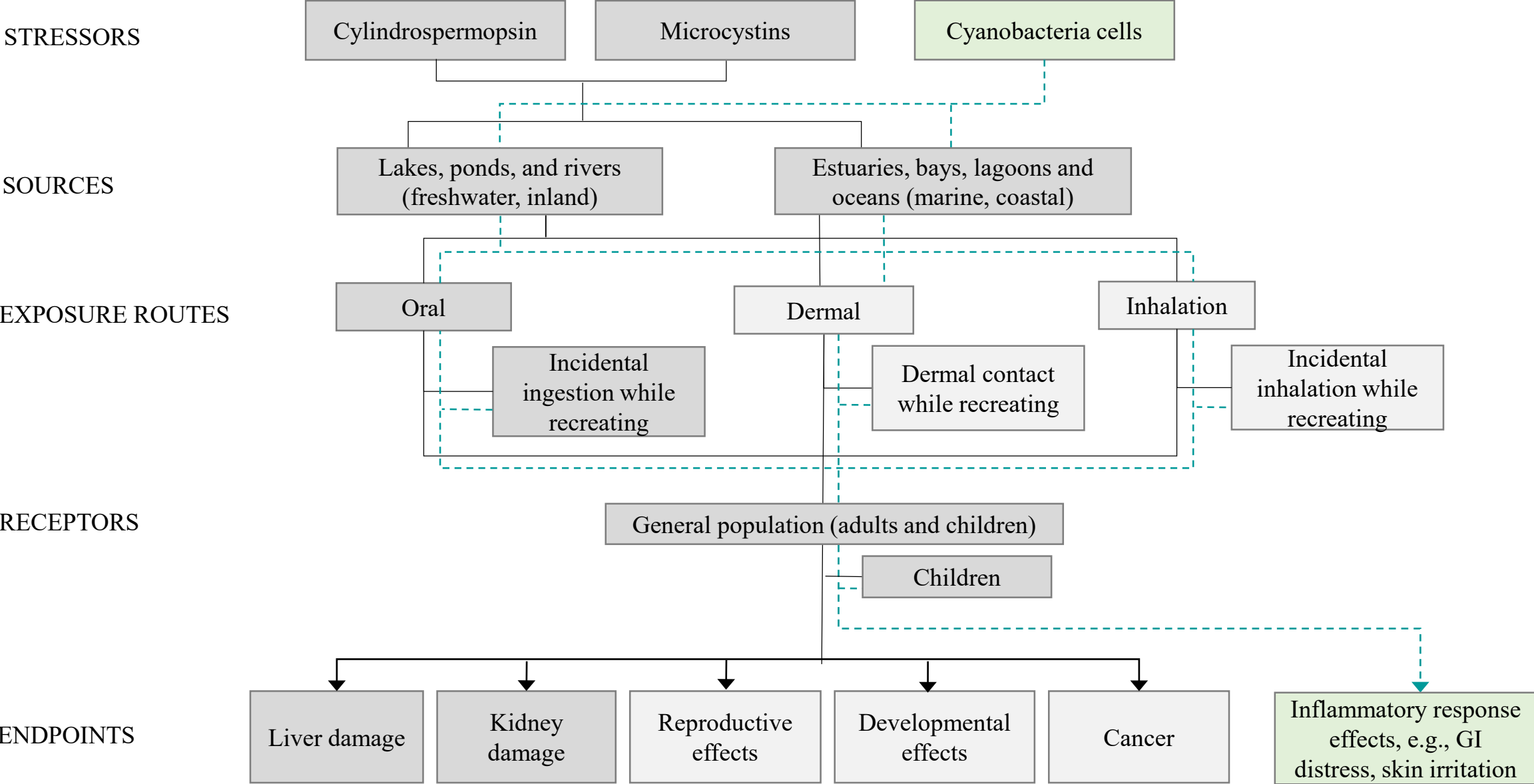
# Development Approach

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- Used peer-reviewed information to develop recommended values for microcystins and cylindrospermopsin.
- Used Agency-recommended recreational exposure values in a scenario which includes immersion and incidental ingestion of ambient water.
- Evaluated science describing health effects from exposure to cyanobacteria cells.



# Conceptual Model of Cyanotoxin and Cyanobacteria Exposure Pathways While Recreating



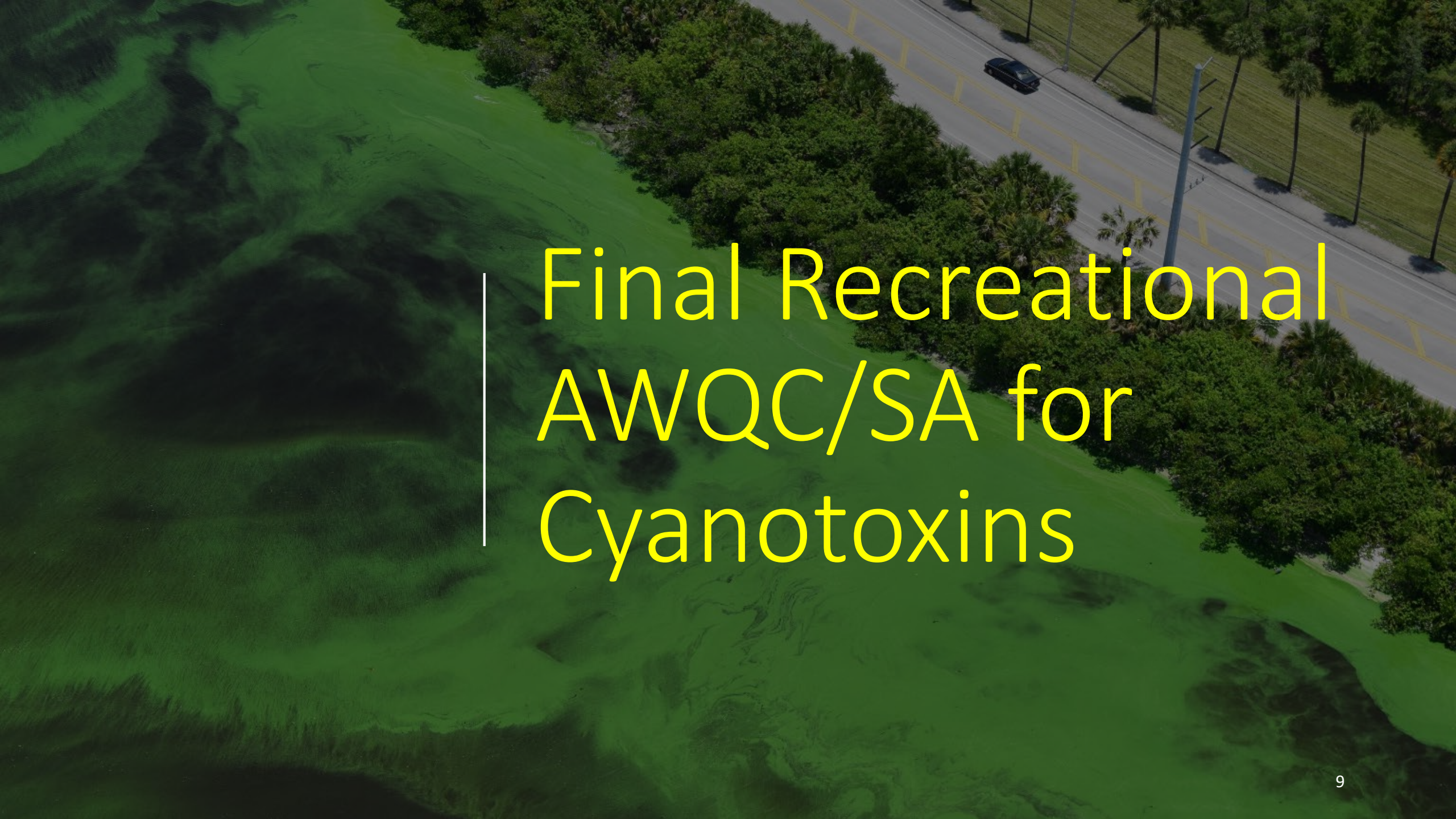
# Draft AWQC/SA Public Comments

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- Draft AWQC/SA posted for public comment in December 2016.
- Public comment period closed March 2017.
- Received comments from 52 entities: states and one tribe, industry representatives and consultants, and environmental organizations.
- AWQC/SA revised based on comments received.
- Published final AWQC/SA and “Response to Comment” documents in May 2019.







# Final Recreational AWQC/SA for Cyanotoxins

# Final AWQC/SA Highlights

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- The document:
  - Incorporated new, more scientifically robust, children's ingestion data published in 2017. Provide additional detail on the science underpinning daily ingestion rate (L/d)
  - Added additional information and detail on toxicological studies.
  - Revised application of relative source contribution parameter, consistent with Guidance.
  - Modified duration and frequency recommendations.
  - Modified estimated toxigenic cell density, in the effects characterization section, based on updated toxicity values for microcystins.

# Children's Exposure and Health

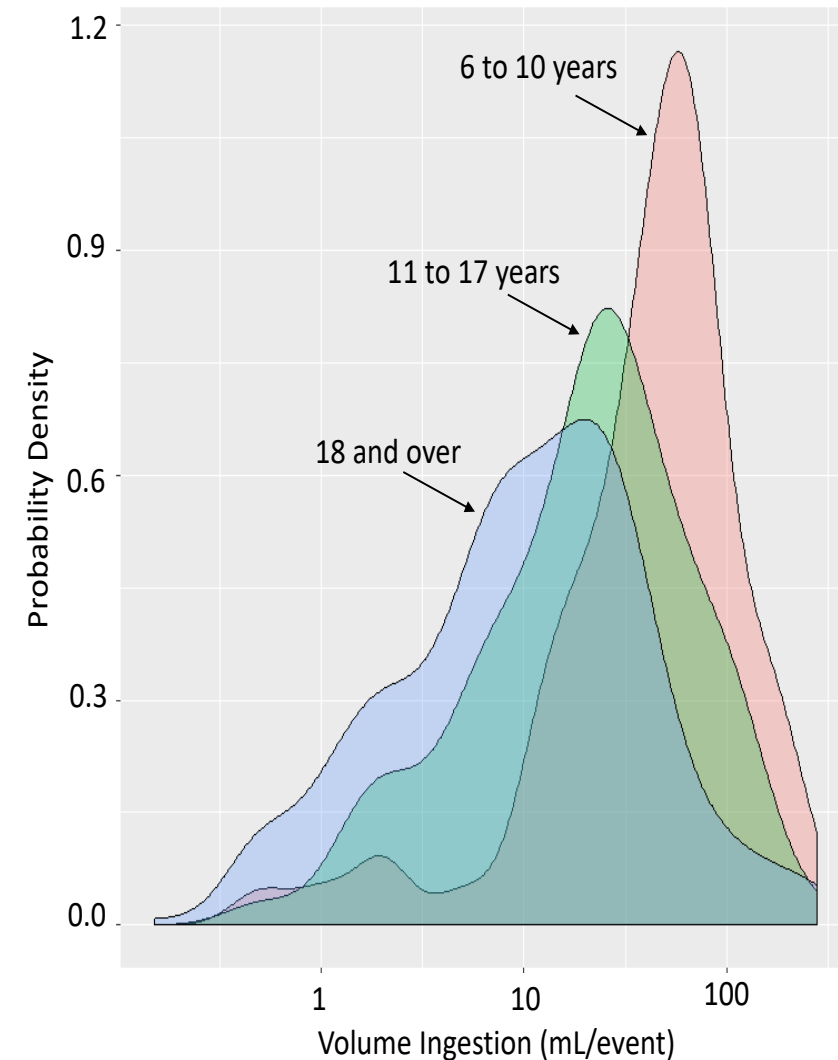
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- Children share a disproportionate share of the incidents during HAB-associated outbreaks (Hilborn et al. 2014; Weirich and Miller 2014).
  - 66% of the outbreaks in 2009-2010 were <19 yr.
  - 35% were <9 yr
  - 80% of all confirmed illness reports due to fresh water cyanotoxin exposure involved children.
- Children have greater potential exposure compared to others when recreating.
  - Incidentally ingest a larger volume of water.
  - Spend more time in the water compared to other age groups.
- Evidence shows younger children can be more highly exposed (DeFlorio-Barker et al. 2017; Dufour et al. 2017; Schets et al. 2011).



# Incidental Ingestion for Age Groups

- Recent data available in Dufour et al. (2017) was incorporated into the exposure analysis. This study included 548 participants, described exposure for additional age groups, and recorded the duration of exposure.
- In the final recommendations, EPA combined two distributions: incidental ingestion volumes based on Dufour et al. (2017) and exposure durations from EPA's (1997) *Exposure Factors Handbook*. The 90th percentile of the *combined* distribution is the basis for the exposure parameter, consistent with EPA's Human Health Methodology (EPA, 2000). The revised ingestion rate for children 6 to 10 is 0.21 L/d.



# Relative Source Contribution (RSC)

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- EPA decided to not include an RSC in the derivation of the final recommended magnitude, consistent with derivation of other recreational criteria.
- Other sources are acknowledged.
- Approach is consistent with the health effects based on short-term exposure.

# Duration and Frequency of the AWQC

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- EPA provided additional scientific rationale and health relevancy for the duration and frequency recommendations.
- EPA aligned the duration component with the 10-day Health Advisory, and to take into consideration seasonal HAB occurrence characteristics such as length of event and severity of occurrence.
  - EPA recommends that the number of years that a pattern of HAB formation occurs that results in impairment of the recreational use is a risk management decision that EPA expects states to define in their water quality standards.

# EPA's FINAL Recommended Recreational AWQC/SA



United States Environmental Protection Agency  
Office of Water  
Mail Code 4304T  
EPA 822-R-19-001  
May 2019

**Recommended Human Health Recreational  
Ambient Water Quality Criteria or  
Swimming Advisories for Microcystins  
and Cylindrospermopsin**

Application of Recommended Values	Microcystins			Cylindrospermopsin		
	Magnitude (µg/L)	Duration	Frequency	Magnitude (µg/L)	Duration	Frequency
Recreational Water Quality Criteria	<b>8</b>	1 in 10-day assessment period across a recreational season	More than 3 excursions in a recreational season, not to be exceeded in more than one year	<b>15</b>	1 in 10-day assessment period across a recreational season	More than 3 excursions in a recreational season, not to be exceeded in more than one year
Swimming Advisory		One day	Not to be exceeded		One day	Not to be exceeded

<https://www.epa.gov/wqc/recommended-human-health-recreational-ambient-water-quality-criteria-or-swimming-advisories>

# Cyanobacterial Cells Characterization

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- Many states indicated they use cell density to manage water quality and were interested in information characterizing the inflammatory effects resulting from exposure to cells
- EPA provided a summary of available information on health effects associated with cyanobacterial cells, but did not derive criteria associated with cell density due to data uncertainties. It includes:
  - tables of cell density guidelines used by states, countries and international organizations,
  - information available demonstrating a link between total cyanobacterial cell exposure and inflammatory illness,
  - a toxigenic microcystin-producing cell density of 40,000 cells/mL based on the recommended AWQC/SA for microcystins



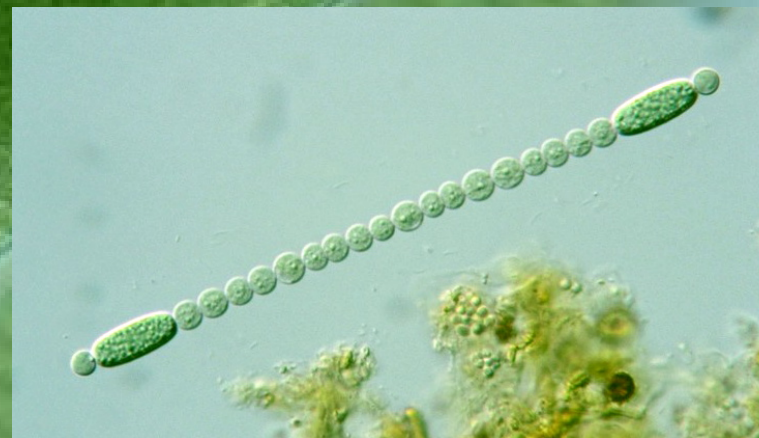
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***EPA's CyanoHABs Website***

[www.epa.gov/cyanoHABs](http://www.epa.gov/cyanoHABs)

