

Cyanotoxins in the Highland Lakes

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Cyanotoxins versus Harmful Algal Blooms (HABs)

Cyanotoxins and irritants produced by planktonic and benthic cyanobacteria

<p>Filamentous Algae</p> 	<p>Spires</p> 	<p>Mats</p> 	<p>Blobs</p> 
 <p>State Water Resources Control Board 1001 I Street Sacramento, CA 95814</p> <p>ATTENTION: Cyanobacteria blooms/HABs can produce toxins that are harmful to humans and animals.</p>			

Source: California Water Board

IDENTIFYING A HARMFUL ALGAL BLOOM (HAB)

This quick guide provides a visual comparison of appearance and color and odor that can be helpful in distinguishing non-toxic green algae and aquatic plants from potentially toxic cyanobacteria blooms or harmful algal blooms (HABs).

Non-toxic Algae & Plants	Cyanobacteria/HAB
APPEARANCE 	
<p>Rooted Plants</p> 	<p>Paint or Soup</p> 
<p>Floating Plants</p> 	<p>Scum, Bubbling or Spit-like Floating Foam</p> 
<p>Plant-like Algae</p> 	<p>Lettuce or Chopped Grass</p> 
<p>Filamentous Algae</p> 	<p>Spires Mats Blobs</p> 
 <p>State Water Resources Control Board 1001 I Street Sacramento, CA 95814</p> <p>ATTENTION: Cyanobacteria blooms/HABs can produce toxins that are harmful to humans and animals.</p>	

What Are The Health Effects Of Cyanotoxins?

- **Cyanobacteria can produce cyanotoxins and other irritants that cause serious health effects in people and animals:**
 - Liver (hepatotoxin)
 - Nervous system (neurotoxin)
 - Skin and mucous membranes (dermatotoxin)
 - General irritation/allergic reaction



How Does Exposure Occur?

- **Animals are especially at risk because of:**
 - Higher exposure while drinking and swimming in affected waters
 - Feeding directly on cyanobacteria or prey (shellfish, fish, macroinvertebrates) containing cyanotoxins (bioaccumulation)
 - Incidental ingestion from grooming cyanobacteria that has accumulated on fur/feathers



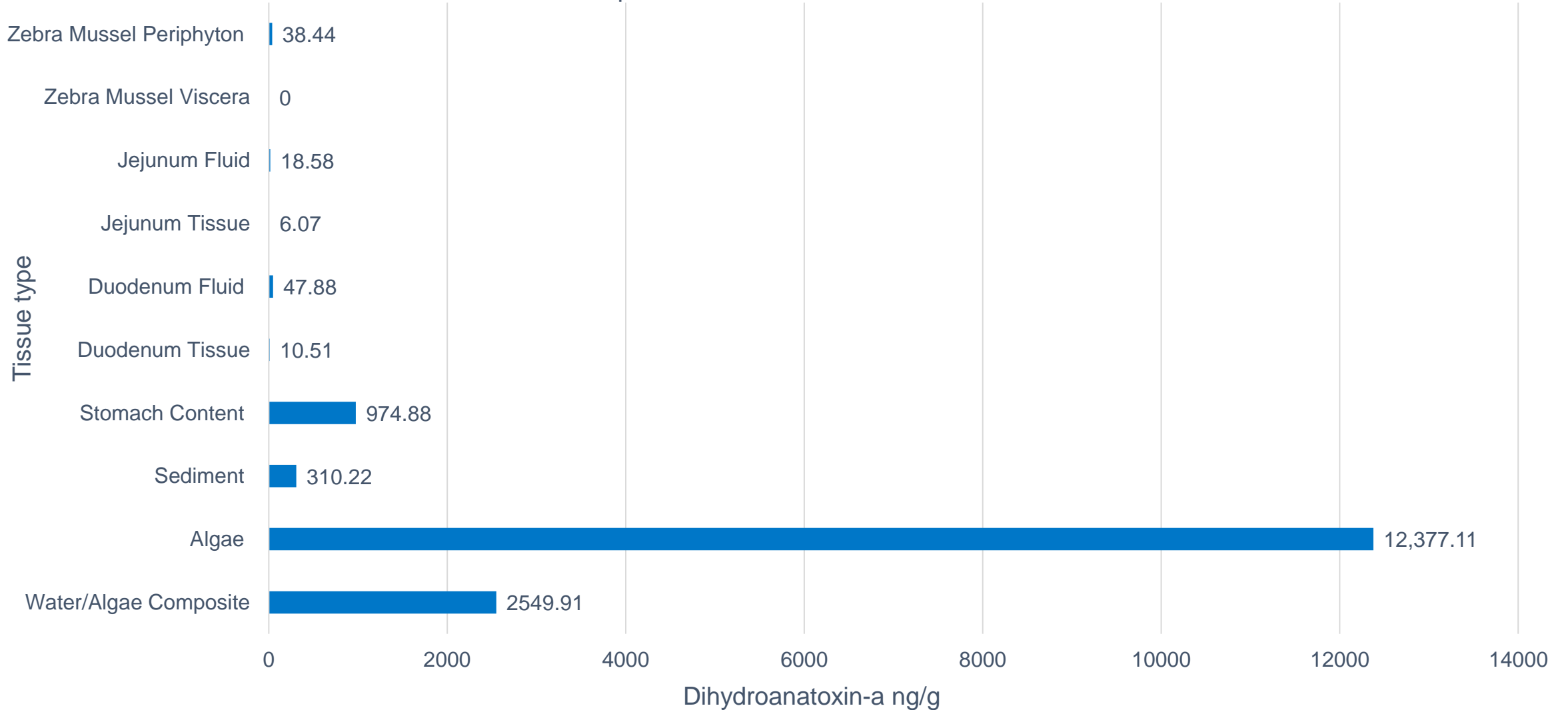
An aerial photograph of a lake with a large, irregular, brownish-red bloom in the center. The water is a deep green color, and the bloom is surrounded by a lighter green ring. The water surface shows ripples and reflections of light.

Toxins in the Highland Lakes

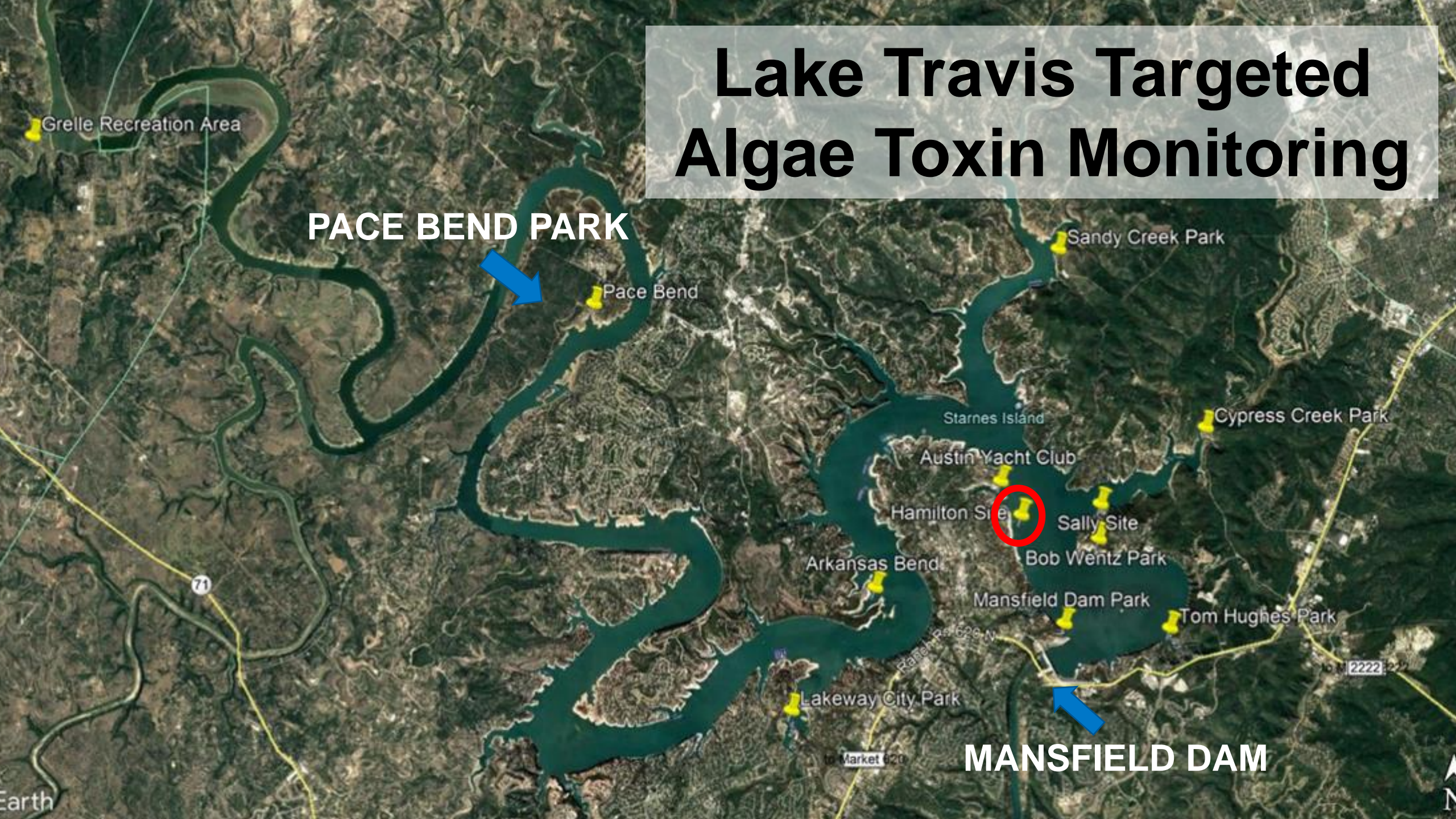
- First dog death report at Lake Travis on Feb. 21, 2021
- Site investigation revealed no visible bloom, but cyanotoxin dhATX was present in high levels at the site
- Responsive monitoring of the site showed toxins remained at high levels until June 2021
- One time survey of all other Highland lakes

Anatoxin-A Threshold for Grams of Dry Weight for Canines

Samples Collected From Hudson Bend



Lake Travis Targeted Algae Toxin Monitoring



PACE BEND PARK



Pace Bend

Sandy Creek Park

Cypress Creek Park

Starnes Island

Austin Yacht Club

Hamilton Site

Sally Site

Bob Wentz Park

Arkansas Bend

Mansfield Dam Park

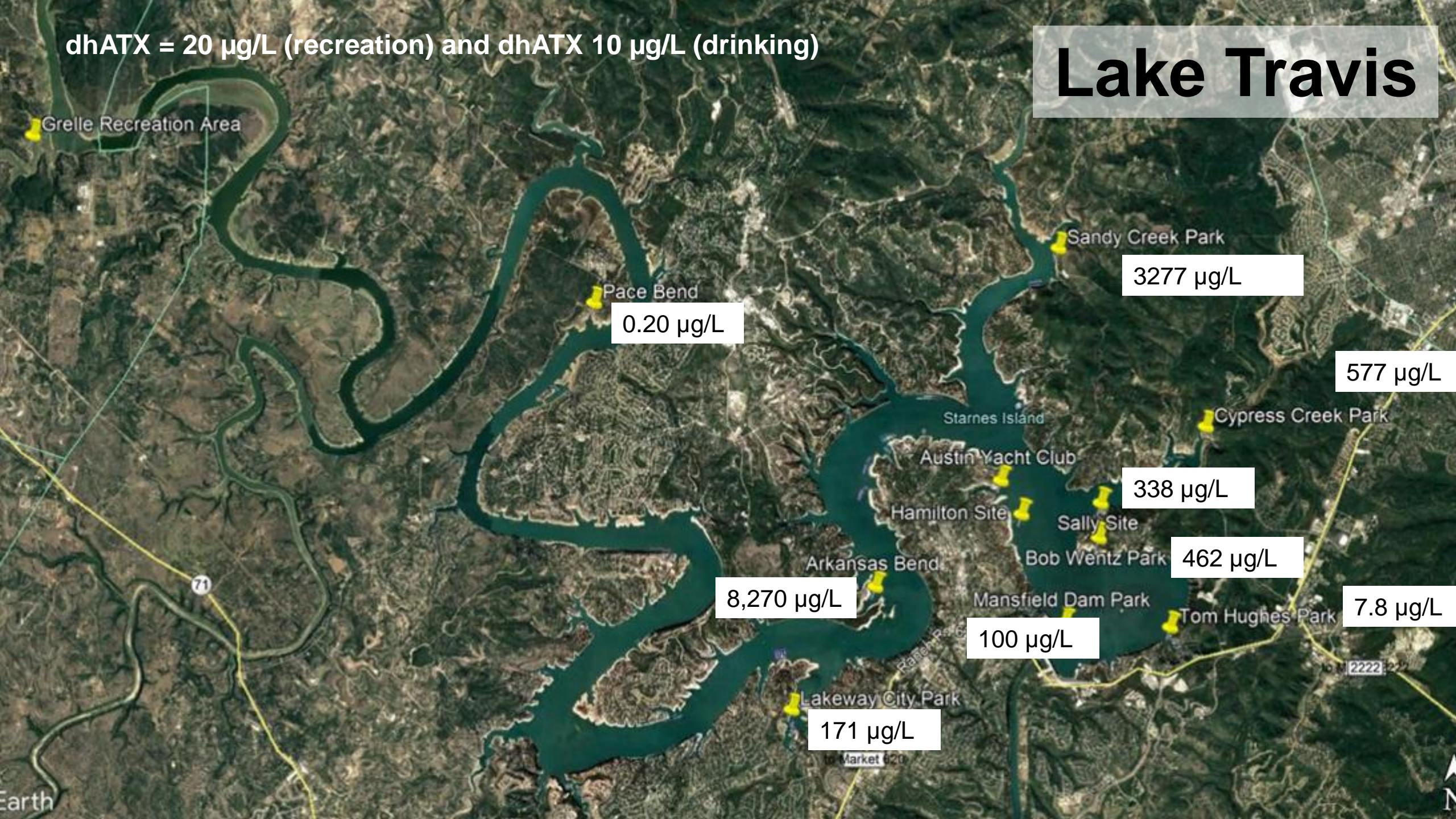
Tom Hughes Park

Lakeway City Park

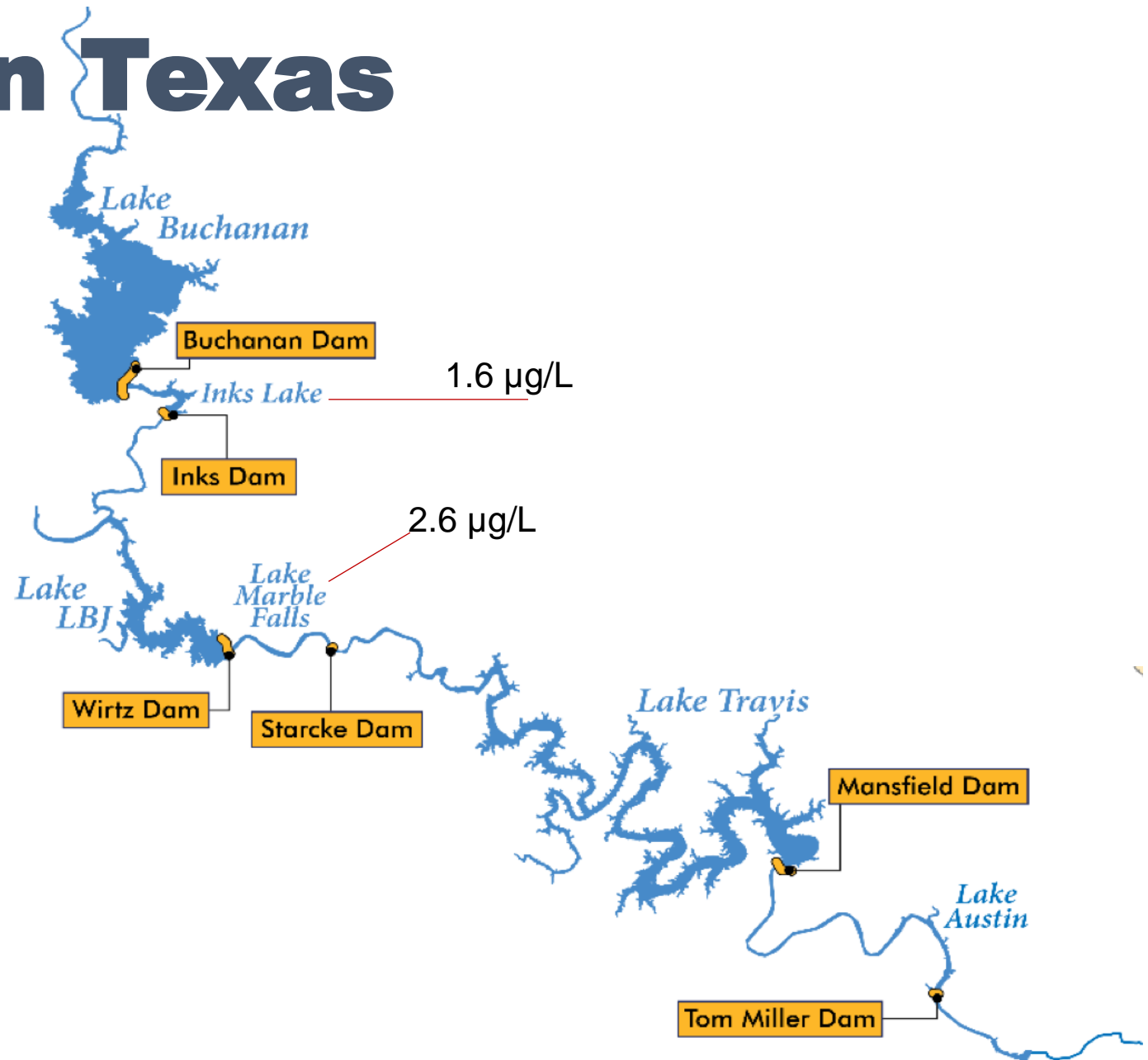
MANSFIELD DAM

dhATX = 20 µg/L (recreation) and dhATX 10 µg/L (drinking)

Lake Travis

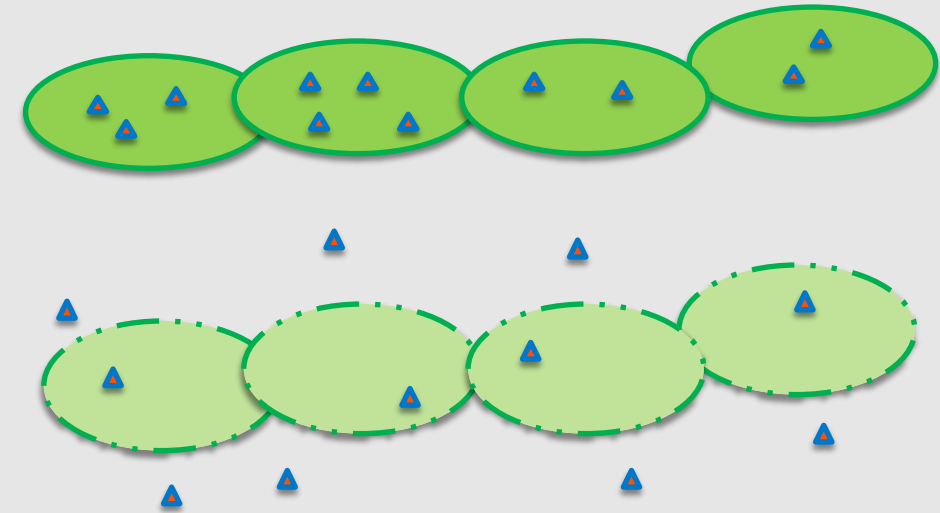


Colorado River in Texas



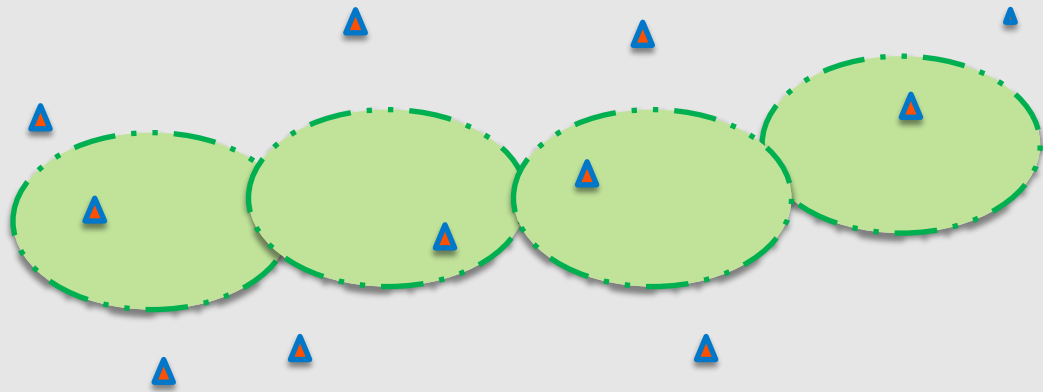
Cyanotoxin Distribution and Stability

- Toxins generally held within the cyanobacterial cell (intracellular)
- Toxins are released to water (extracellular, dissolved) as the cell dies/lyses
 - When the bloom naturally decays
 - When a chemical treatment is applied
 - When cells are ingested
- Degradation rates range from days to months for extracellular cyanotoxins
- Intracellular cyanotoxins can persist while cell is intact



Cyanotoxin Monitoring

- SPATT bags are deployed year-round to track extracellular toxins
- Since 2021, only one detection in SPATT bags for Microcystin (Inks Lake, November 2022)

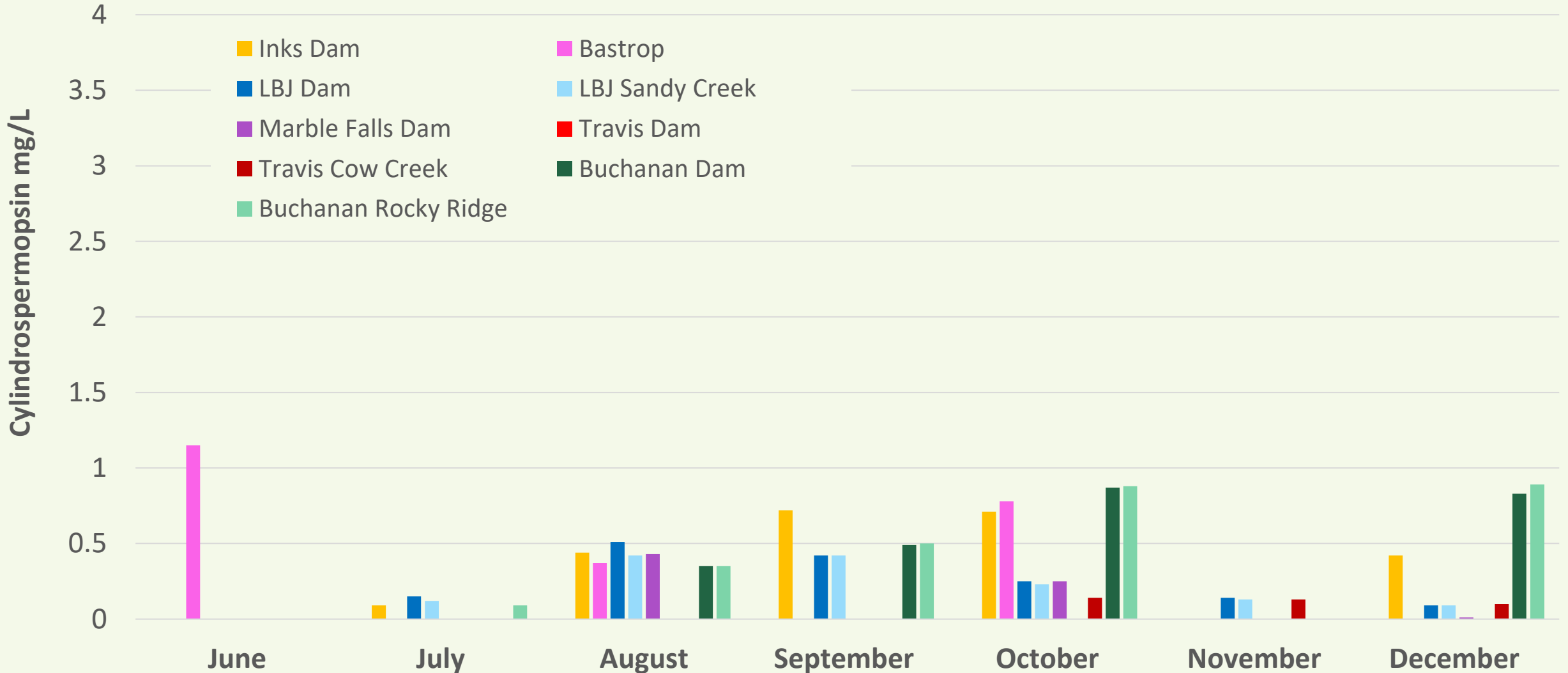


Cyanotoxin Monitoring

- Whole water samples represent intracellular toxins
- Whole water samples represent a single snap shot at the time of collection
- Results have found low levels of ATX and Microcystin occasionally, but the most common cyanotoxin found is Cylindrospermopsin
- Cylindrospermopsin is one toxin that actively releases toxins (not relying on cell death)

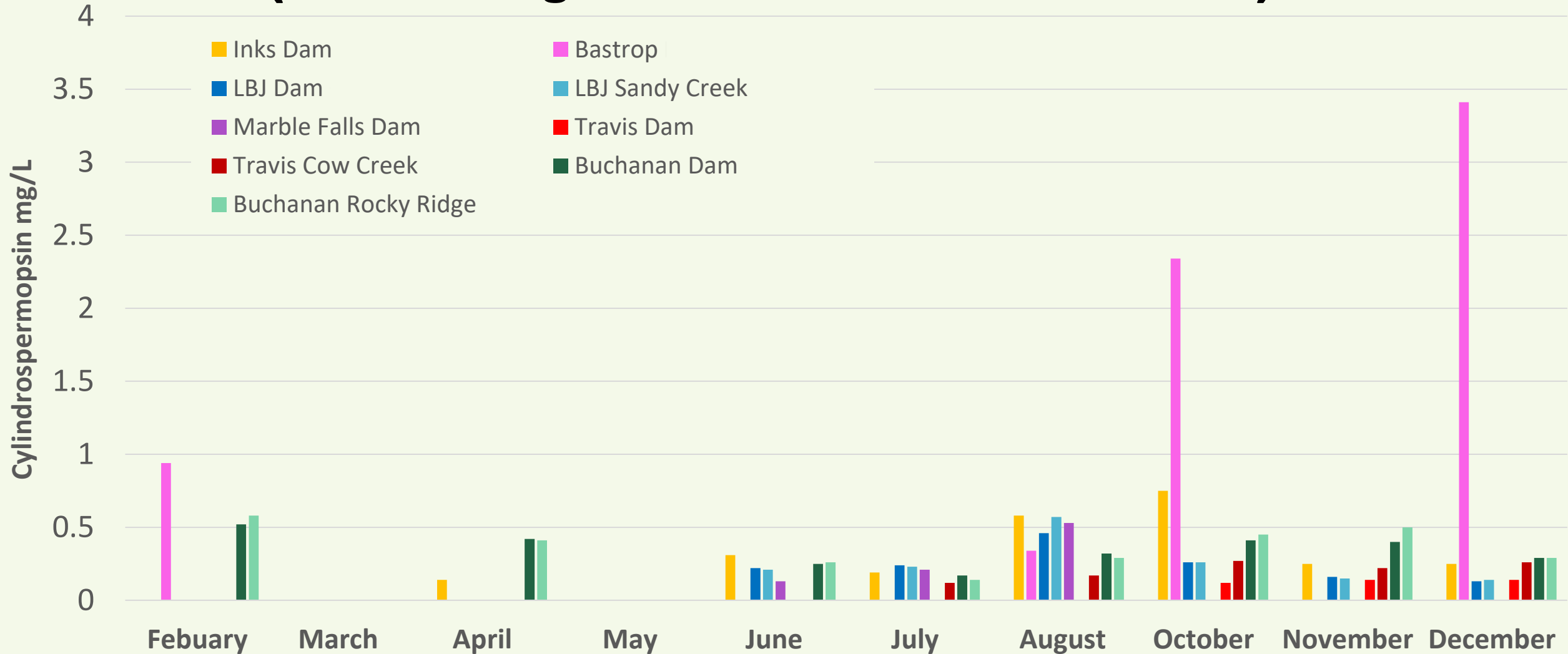
2021 Cylindrospermopsin Levels Detected in Highland Lakes

(Note: 15 mg/L is the recreation threshold)



2022 Cylindrospermopsin Levels Detected in Highland Lakes

(Note: 15 mg/L is the recreation threshold)



Future Tasks

- **LCRA will continue to monitor both intra and extracellular toxins in the Highland Lakes**
- **LCRA and City of Austin are working on a joint study to better understand from where nutrients that feed benthic blooms are coming**



LCRA

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