

Algae in the Highland Lakes

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Algae

Foundation of the food chain in aquatic ecosystem

Produce oxygen through photosynthesis

Need light, nutrients and water

Harmful algae

- Some algae produce toxins
- In freshwater – blue-green algae (cyanobacteria) are the primary culprit
- Cyanobacteria can hide in regular algae

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 	
Rooted Plants 	Paint or Soup 
Floating Plants 	Scum, Bubbling or Spit-like Floating Foam 
Plant-like Algae 	Lettuce or Chopped Grass 
Filamentous Algae 	Spires Mats Blobs 

  State Water Resources Control Board
1001 I Street
Sacramento, CA 95814

! ATTENTION: Cyanobacteria blooms/HABs can produce toxins that are harmful to humans and animals.

Image: California Water Board

Harmful algae toxins

- Microscopes are used to determine species
- Can't tell by looking if they are producing toxins; scientific testing required
- Four main groups – with many variants
 - Anatoxin
 - Cylindrospermopsin
 - Microcystin
 - Saxitoxin



Harmful algae types

- **PLANKTONIC**

- Typically described as harmful algae *blooms* (HABs)
- Free floating microscopic cells
- Suspended in the water column or floating as scum on surface
- Example planktonic HAB: Lake Erie



Photo: Alliance for the Great Lakes

Lake Erie

Harmful algae types

- **BENTHIC**
 - Can grow on bottom of shallow portions of a lake, on substrate or float
 - Hard to detect
 - Example benthic harmful algae events: Lady Bird Lake, Lake Travis, Lake Belton



Pre-February

- Blue-green algae growth known to peak in late summer
 - Hot weather
 - Low flows
 - Nutrients
- All public messaging cautioned of issues in summer/fall

CAUTION: DOG OWNERS

Harmful Algae May Be Present

- Owners assume illness risks by allowing dogs in water.
- Keep dogs away from floating algae mats.
- Rinse dogs after contact with lake water.
- If dog becomes sick, go to a veterinarian immediately and then report it to 3-1-1.



WINTER	SPRING	SUMMER	FALL
LOW RISK No harmful algae expected winter through spring.		INCREASED RISK Harmful algae blooms possible summer through fall due to high temperatures and low water flow.	HIGH RISK Occurs when toxins are detected in algae.

HARMFUL ALGAE CHARACTERISTICS

LOCATION: Floating in mats on surface

COLOR: Most commonly blue/green, dark green, brown, black

More information at austintexas.gov/algae
Ordinance 64051B-C People are not allowed to swim in Lady Bird Lake.

February

- **February 2021**
- 11th Winter temperatures of 3 to -17 C° or 37 to 0 F°
- 20th Hamilton dies after swimming in Lake Travis
- 21st LCRA is alerted, site is sampled (no visible bloom)
- 26th Samples return, testing positive for dihydroanatoxin-a

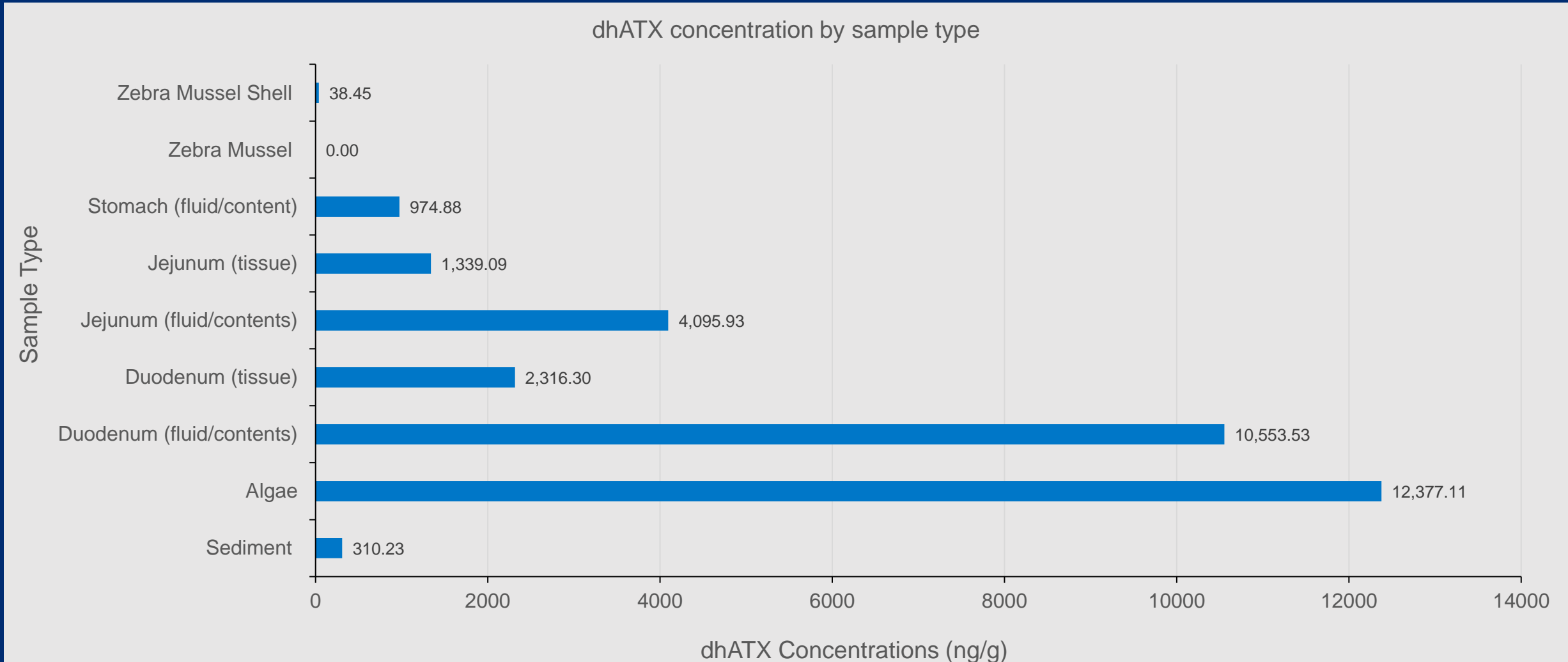


Dihydroanatoxin-a

- Dihydroanatoxin-a (dhATX) is a type of anatoxin-a (ATX), and is commonly found in benthic mats
- World Health Organization (WHO) Provisional Guidelines for dhATX = nonexistent
- WHO Provisional Guidelines for ATX = 60 $\mu\text{g/L}$ (recreation) and ATX 30 $\mu\text{g/L}$ (drinking)
- dhATX was shown to be 3x-4x more toxic than ATX when ingested orally in a lab study (Puddick et al. 2020)
- dhATX = 20 $\mu\text{g/L}$ (recreation) and dhATX 10 $\mu\text{g/L}$ (drinking)
- Water and algal material had dihydroanatoxin-a concentrations of 630-640 $\mu\text{g/L}$

Tissue Sample Results From Hamilton Site

anatoxin-a threshold for canines: 300 ng/g
(EPA 2012)



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

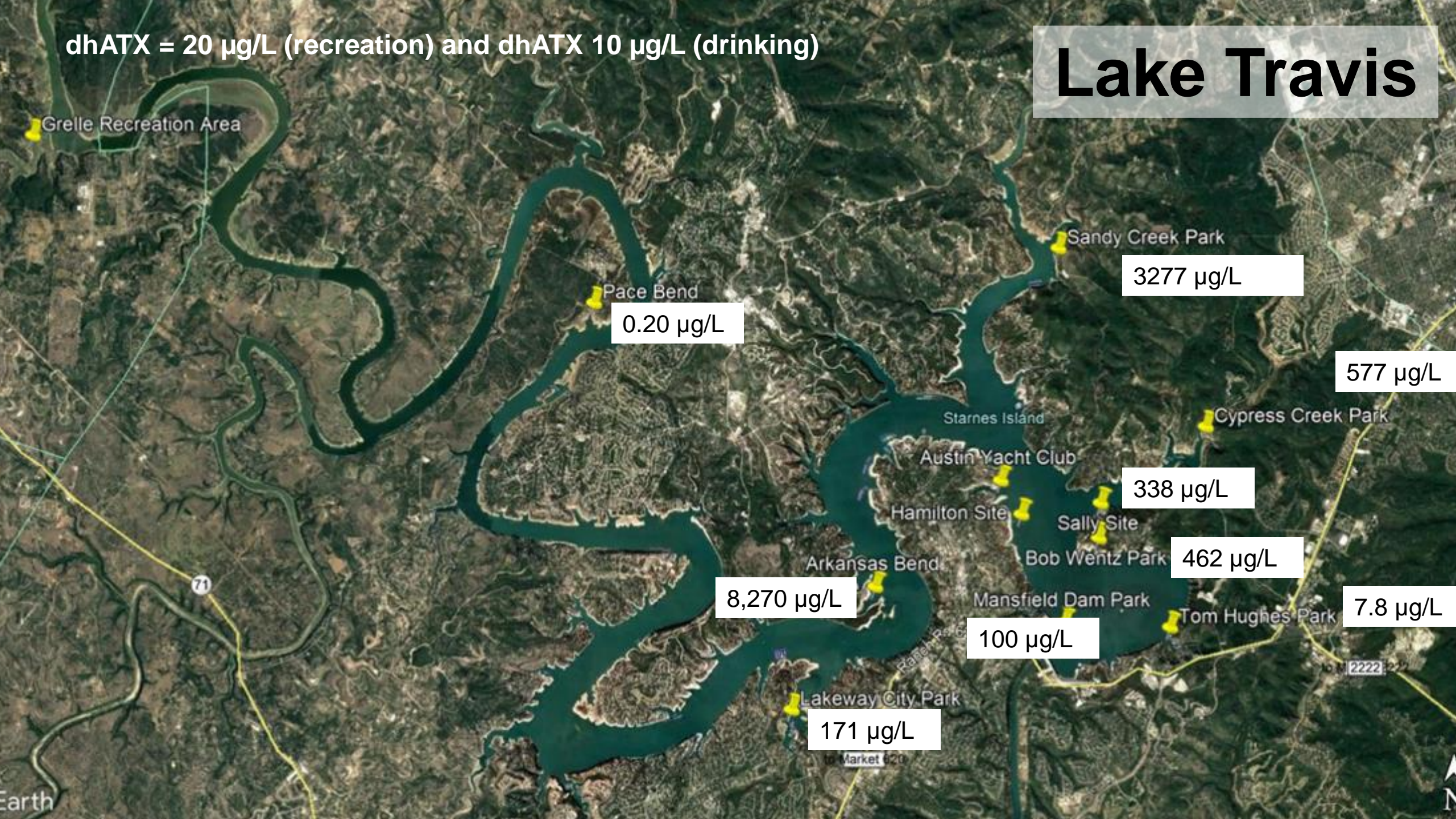
Lakeway City Park

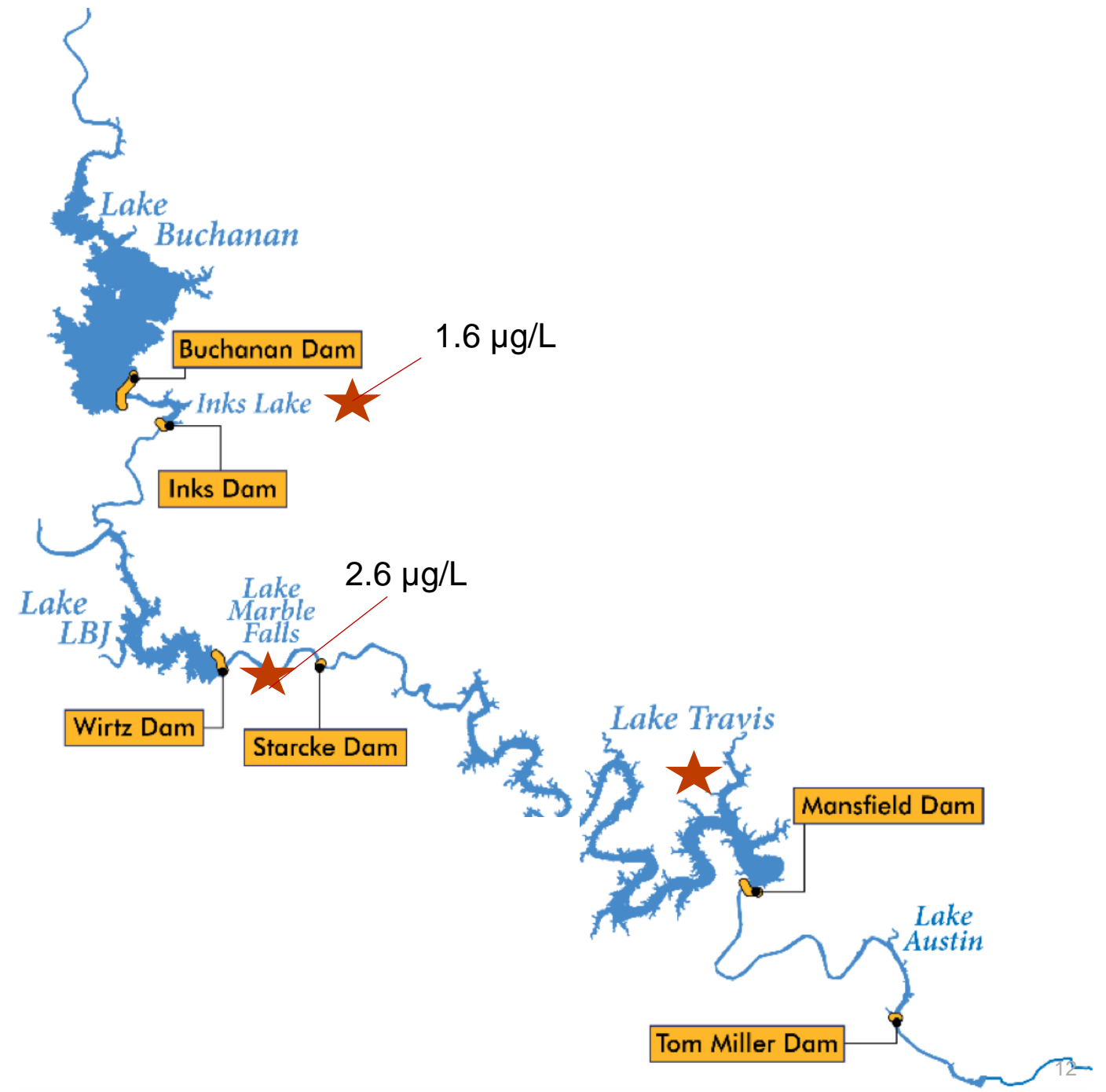
MANSFIELD DAM



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

Lake Travis



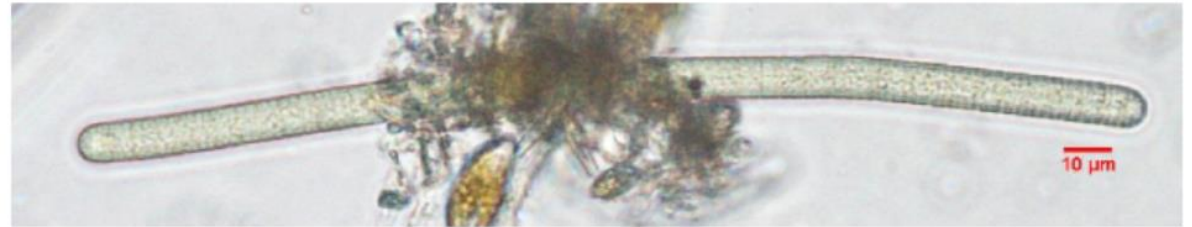


Tests showed:

- Toxicity is largely in the algae, not the water
- At all sites, potentially toxin-producing blue-green algae species were present
- Other species identified: Oscillatoria, Anagnostidinema, Geitlerinema, Microcystis, Dolichospermum, Planktothrix, Lyngbya



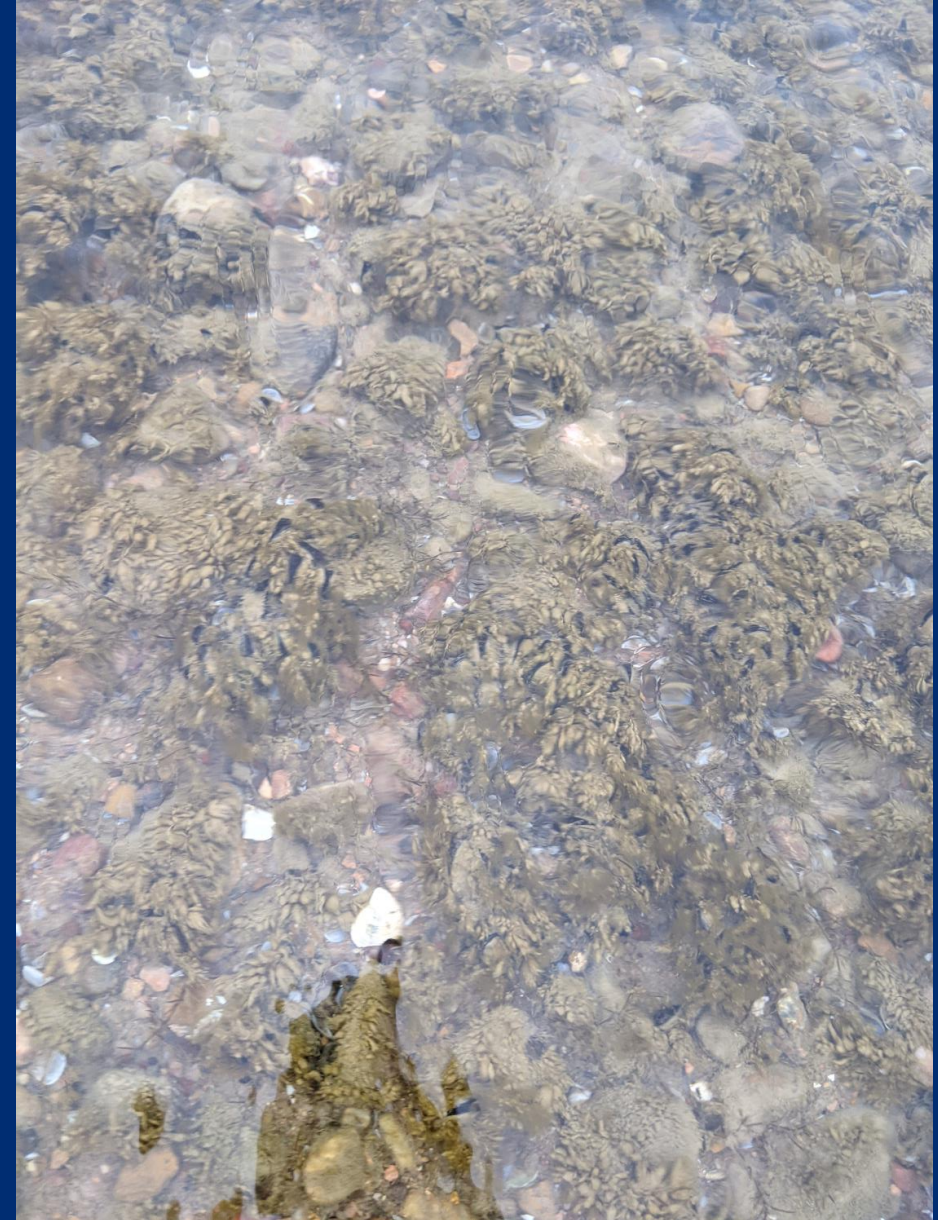
Phormidium/Microcoleus sp. at 400X (**Hamilton Filamentous**)



Oscillatoria sp. at 400X (**Hamilton Filamentous**)

Additional Information:

- Toxins found in filamentous green algae (Spirogyra, Cladophora)
- Occurring in winter, both before and after record cold temperatures
- (Another dog died from similar circumstances in January, and 6 others were reported ill before Hamilton's death)
- Initial event has been persistent

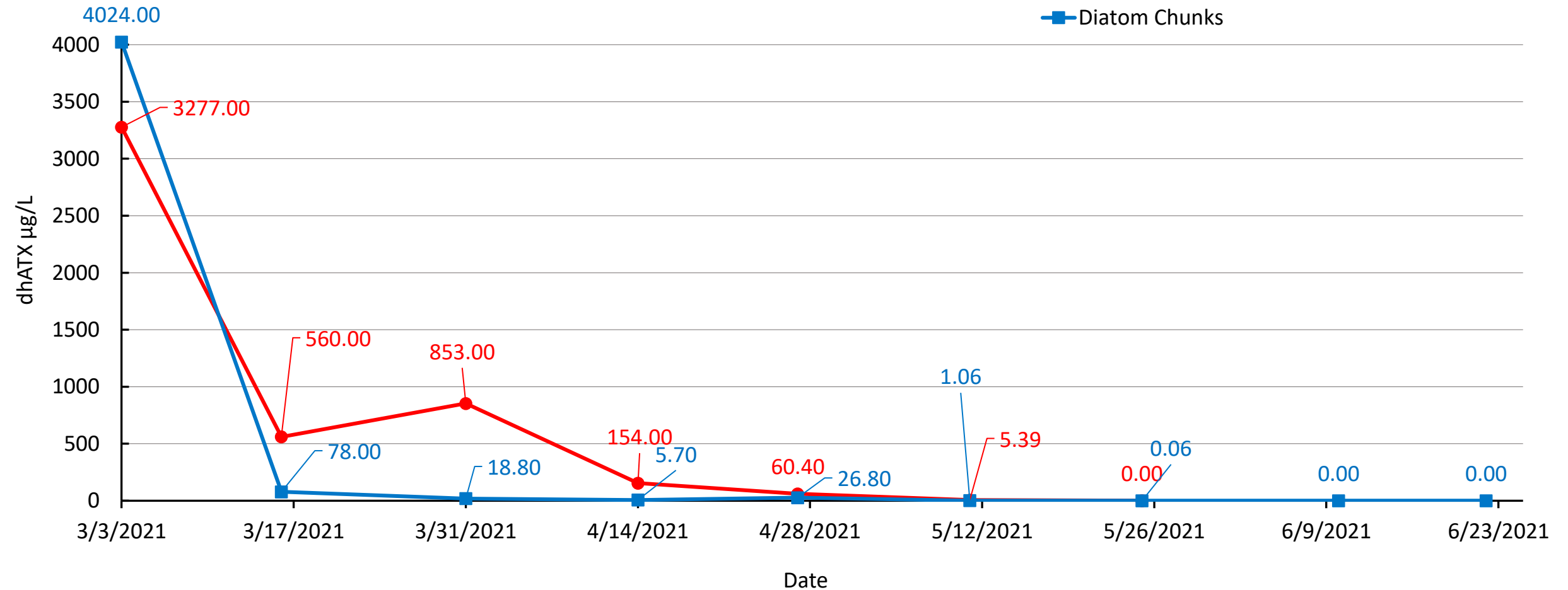


How long do these blooms last?

dhATX Concentrations at Hamilton Site

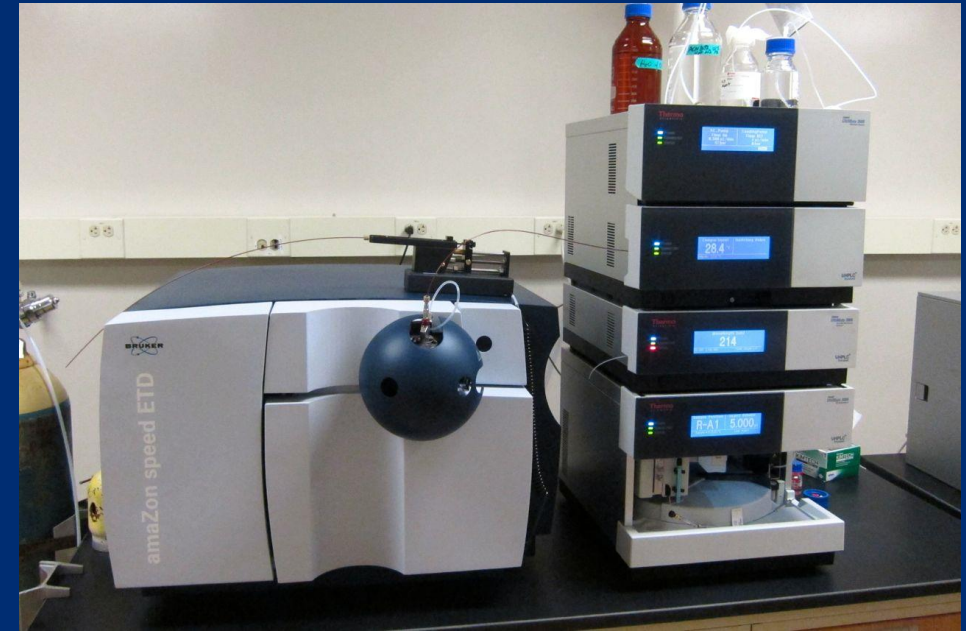
● Filamentous Green Algae

■ Diatom Chunks



Why is this happening now?

- Testing for toxins is very specific, if you don't look for it, you won't find them
- Dihydroanatoxin-a is a relatively understudied variant of anatoxin
 - Not typically searched for in cyanotoxin screenings
 - May have been present before this event
 - To some degree, we're in new territory here
- Zebra mussels have altered water clarity



Why did this happen in winter?

- Basic answer: No one knows with certainty why
- One theory: benthic mats grew in warm water, then lay dormant on lake bottom until mixing during cold weather dislodged them while toxins were present



What is being done?

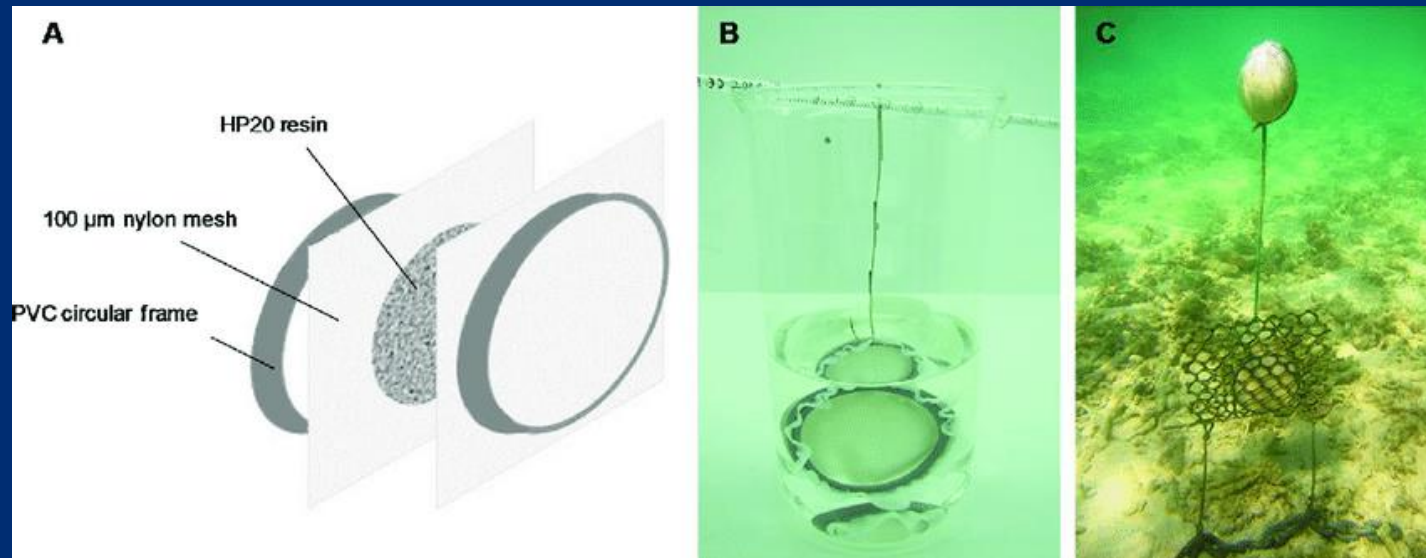
Algae Toxin Monitoring Goals – Year 1

- Open water algae toxin monitoring
 - Monthly water testing for algae toxins at routine sites throughout Highland Lakes
- Shallow water algae toxin monitoring
 - Monthly algae toxin testing at select shallow/cove sites throughout Highland Lakes



Our solution

- Deploy SPATT bags in several shallow water sites throughout the Highland Lakes
- After 3 months, select sites that have the highest average concentration of any toxin
- Those sites will become new monitoring locations



Canyon of the Eagles

Burnet County Park

Llano County Park

Rockaway RV Park

Inks Lake State Park

Buchanan Dam Swim Area

Kingsland

Sunrise Beach

Robinhood Park

Horseshoe Bay

Cottonwood Shores

Lakeside Park

Turkey Bend

Pace Bend

Hamilton Site

Arkansas Bend

Image Landsat / Copernicus

Google Earth

30°45'33.01" N 97°55'04.19" W elev 1011 ft eye alt 59.35 mi

Scientific Collaboration

- Local, national and international researchers
- Interstate Technology & Regulatory Council (ITRC) – Harmful Benthic Algae Project Team
- Contract with University of Texas



Image: ITRC

LCRA.ORG/algae

- Updates on test results
- Ways to minimize exposure
- Tips to minimize growth of algae
- Sign template for parks, HOAs and others

Algae in the Highland Lakes

Do not let dogs touch or ingest algae from water in the Highland Lakes. See how to [minimize risks](#) below. If a pet has excessive drooling, seizures, weakness, vomiting or diarrhea after contact with a natural water body, **seek veterinary help immediately.** People also should avoid contact with algae in the lakes.

Freshwater algae and cyanobacteria

Freshwater algae play an important role in aquatic ecosystems. Most algae are harmless, but some species (notably cyanobacteria, also called blue-green algae) can on occasion produce toxins that can be dangerous to animals and people. These events are known as harmful algal blooms, or HABs, when they occur suspended in the water column. When these events occur as algal mats, they are referred to as harmful algal proliferations, or HAPs.

Current harmful algae status in the Highland Lakes

LCRA is continuing to conduct tests on water and algae throughout the Highland Lakes. We recommend treating all algae as if it could be toxic, and to avoid contact with algae in any of the Highland Lakes.

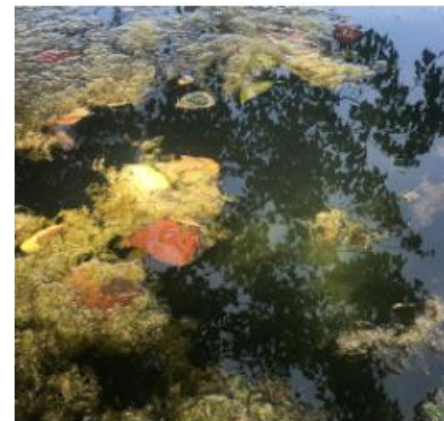
On April 5, 2021, LCRA received test results showing toxic blue-green algae continues to be present in Lake Travis. [Read more.](#)

On March 23, 2021, LCRA received test results showing toxicity from blue-green algae in algae samples taken from Inks Lake, Lake Marble Falls and Lake Travis. [Read more.](#)

On March 12, 2021, LCRA received test results showing toxicity from blue-green algae in algae samples taken at 10 locations on Lake Travis. [Read more.](#)

In late February 2021, LCRA detected cyanotoxin in algal material in Lake Travis along the shoreline on the east side of Hudson Bend. This toxin is suspected to be the cause of several dogs getting ill and dying after playing in the lake in this area.

Blue-green algae



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More information at austintexas.gov/algae
Ordinance 54061E-C People are not allowed to swim in Lady Bird Lake.

CAUTION

HARMFUL ALGAE MAY BE PRESENT

Do not let dogs touch or ingest algae in the water or along the shoreline. Harmful algae can be fatal to dogs.

Rinse dogs after contact with lake water and do not allow them to lick their fur prior to rinsing. Seek veterinary help immediately if your pet becomes ill.

People should also avoid contact with algae and stagnant water.

ENTER WATER AT YOUR OWN RISK

www.lcra.org/algae



ENERGY • WATER • COMMUNITY SERVICES

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Duration of Toxicity at Hamilton Site

dhATX Concentrations

● Filamentous Green Algae

■ Diatom Chunks

