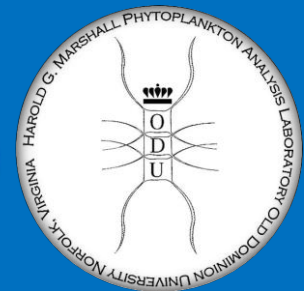


2018 Virginia Freshwater Bloom Overview

Leah Anne Gibala-Smith
Phytoplankton Analysis Laboratory
Old Dominion University





2018 Overview

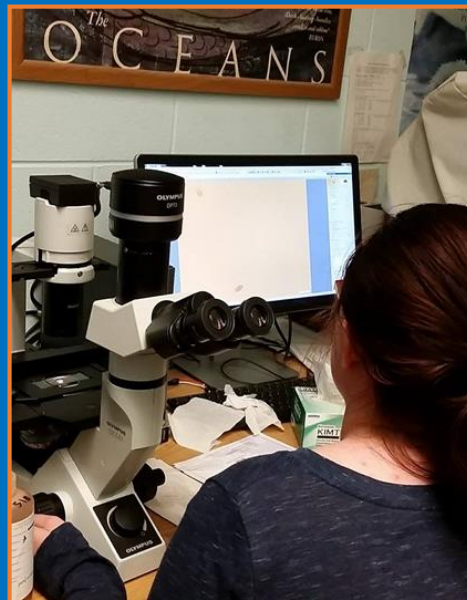
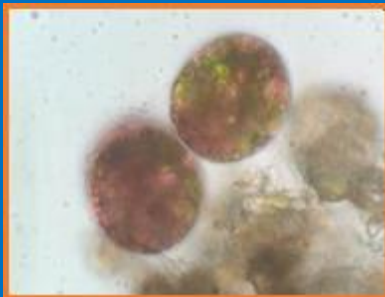
- 9+ freshwater bloom investigations
- 1/26/2018 through 10/23/2018
- 107 freshwater bloom samples analyzed by ODU
- 30 advisories issued by VDH:DEE
- Partners included VDH, DEQ, DCR, CBP, VIMS, Albemarle Co Parks and Rec, and a number of local and regional organizations and municipalities

Freshwater bloom analysis

Identification and Enumeration

Scan is conducted to identify dominant species

Individual cells of target species are counted to determine an estimate of density



Toxin Assays

Abraxis microcystin (ADDA) ELISA

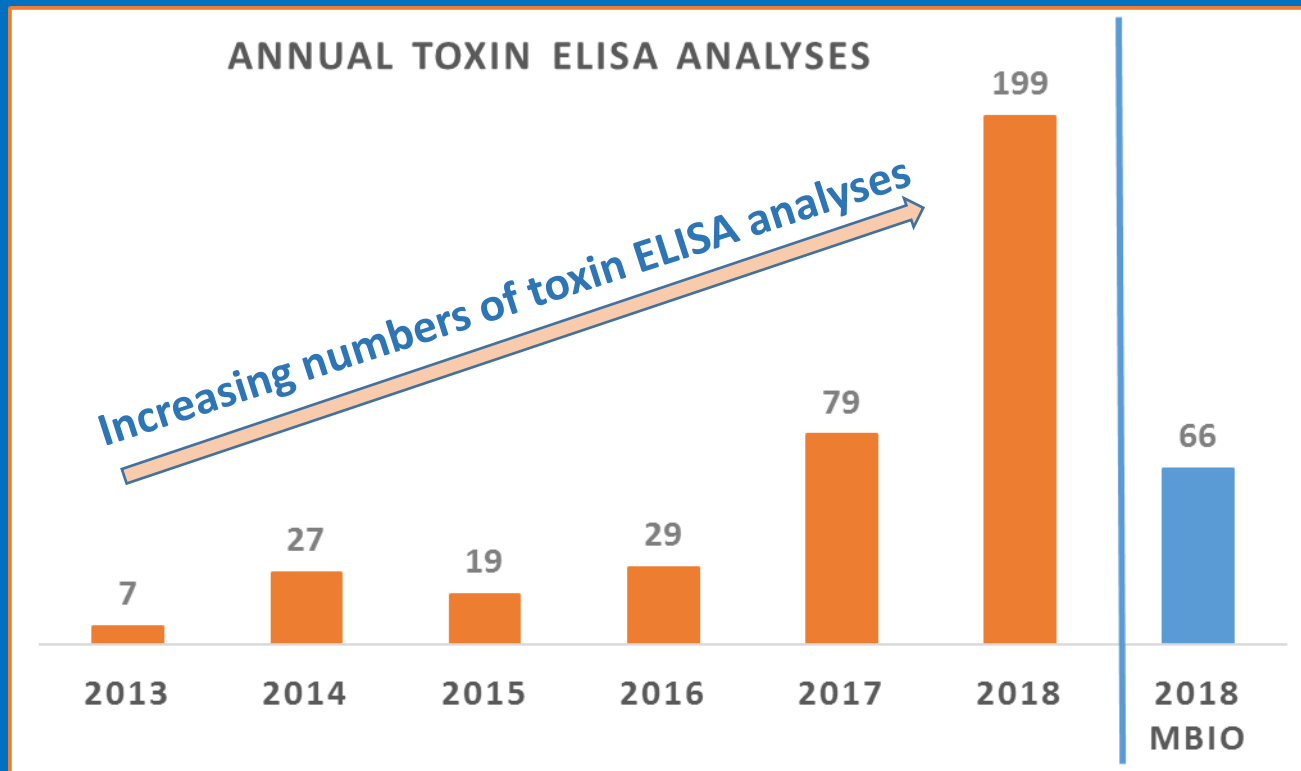
0.15ppb - >5ppb (higher w/dilution)

Abraxis cylindrospermopsin ELISA

0.05ppb - >2ppb (higher w/dilution)



Freshwater bloom analysis



2013-2016 included Microcystins ELISAs only

2017 included Cylindrospermopsin & Saxitoxin ELISAs (10 total)

2018 included Cylindrospermopsin ELISAs (95 total)

Freshwater bloom analysis

Management

Cell densities and toxin concentrations reported to VDH:DEE

Management based on three-tiered approach (by VDH:DEE)

Virginia Recreational Water Guidance for Microcystin and Microcystis Blooms

Provisional Guidance

Prepared by:

The Division of Environmental Epidemiology

Virginia Department of Health

109 Governor Street

Richmond, VA 23219

5,000 to <20,000 <i>Microcystis</i> cells/mL	➤ Local agency notification; initiate bi-weekly water sampling
20,000 to 100,000 <i>Microcystis</i> cells/mL	➤ Public notification indicating a harmful algal bloom is present in recreational water; initiate weekly sampling
> 100,000 <i>Microcystis</i> cells/mL, or > 6 µg/L microcystin concentration, or Blue-green algal “scum” or “mats” on water surface	➤ Immediate public notification to avoid all recreational water contact where bloom is present; continue weekly sampling

* EPA 2016 draft recreation recommended values:
microcystins 4ppb
cylindrospermopsin 8ppb

Freshwater bloom analysis

Management

- Prior to 2017 season, regulatory response was initiated based on reaching thresholds of *Microcystis* spp. cell densities and/or Microcystins concentrations
- VDH:DEE is beginning to use total toxigenic species cell counts and regularly test for both microcystins and cylindrospermopsin
- VDH:DEE has moved to limit FW HAB responses to those events that fall within “swimming season” (5 mos. - Memorial Day thru the end of October)

Appendix B: Toxigenic cyanobacteria and related cyanotoxin information

A variety of species of cyanobacteria are capable of producing toxins that are harmful to people, pets and wildlife (Chorus and Bartram, 1999). The most common toxigenic genera observed during cyanobacteria blooms in Oregon are *Microcystis* and *Dolichospermum*.

Microcystis can produce microcystin (liver toxin) and anatoxin-a (neurotoxin). *Dolichospermum*, in addition to producing microcystin and anatoxin-a, can also produce cylindrospermopsin (liver toxin) and saxitoxin (neurotoxin). A complete listing of toxigenic cyanobacteria considered when issuing health advisories in Oregon is presented in Table B-1.

Table B-1. Toxigenic cyanobacteria (data derived from evidence of toxin production (Chorus and Bartram, 1999; Carey et al., 2007; Funari and Testai, 2008; Voloshko et al., 2008))

	Hepatotoxin (liver toxins)			Neurotoxins	
	Microcystin	Nodularin	Cylindrospermopsin	Anatoxin-a	Saxitoxin
<i>Anabaenopsis</i>	+				
<i>Aphanizomenon</i>			+	+	+
<i>Arthrospira</i>	+				
<i>Cyanobium</i>	+				
<i>Cylindrospermopsis</i>			+		+
<i>Dolichospermum</i>	+		+	+	+
<i>Gloeotrichia</i>	+				
<i>Hapalosiphon</i>	+				
<i>Limnothrix</i>	+				
<i>Lyngba</i>					+
<i>Microcystis</i>	+			+	
<i>Nodularia</i>		+			
<i>Nostoc</i>	+				
<i>Oscillatoria</i>	+			+	
<i>Phormidium</i>	+			+	
<i>Planktothrix</i>	+			+	+
<i>Raphidiopsis</i>			+	+	
<i>Schizothrix</i>					
<i>Synechocystis</i>	+				
<i>Umezakia</i>			+		
<i>Woronichinia</i>	+			+	

Note: Table B-1 is at the genus level. Not all species of a given genus produce all the toxins listed for that genus. Once the species involved in a specific bloom have been identified, OHA recommends that water body managers contact OHA to determine exactly which toxins could be involved. Taxonomy for many types of cyanobacteria is currently being revised. This guidance reflects taxonomy as of 1/2017.

The primary cyanotoxins of concern in Oregon are microcystin and anatoxin because they have been the toxins most frequently tested and detected. However, cylindrospermopsin has been found above OHA RUVs and small amounts of saxitoxin have been detected in Oregon. OHA

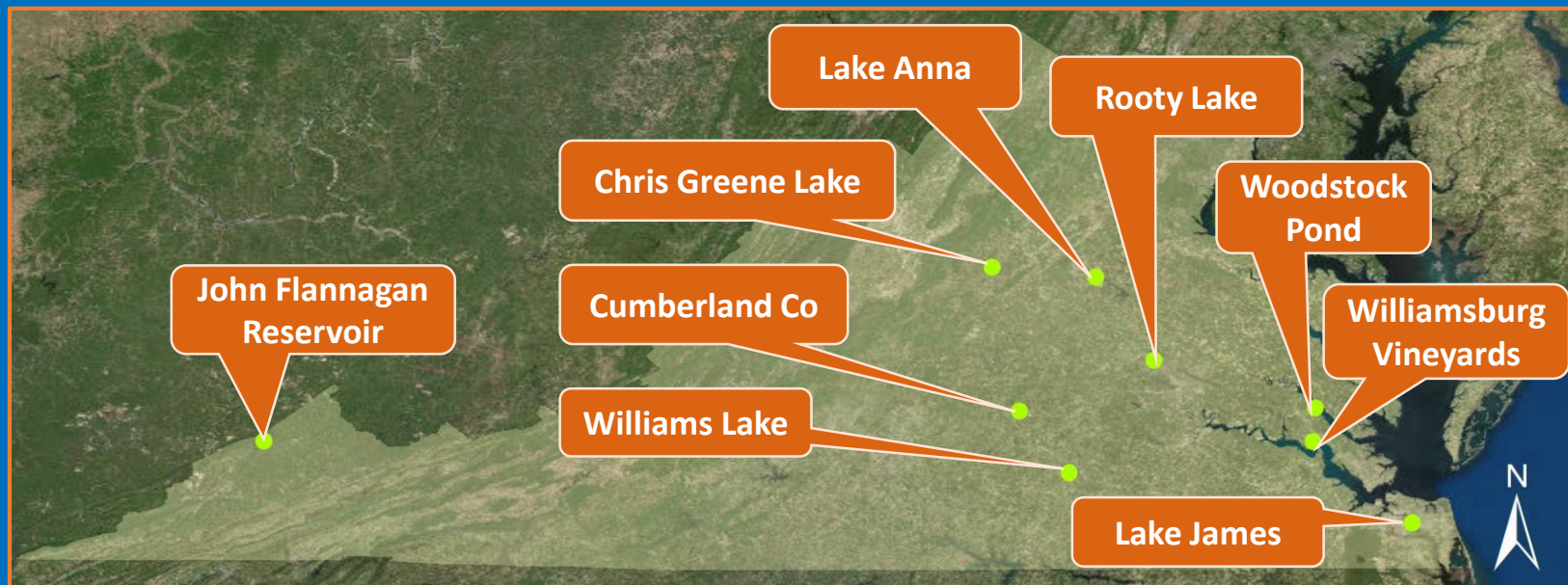
Harmful Algal Bloom Surveillance Program • Center for Health Protection • Advisory Guidelines Updated 9/2018 • 12



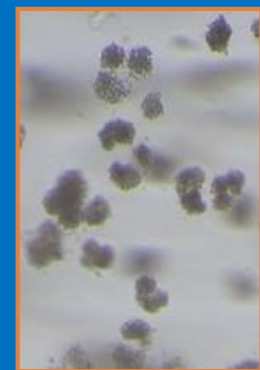
Advisory Guidelines for Harmful Cyanobacteria Blooms in Recreational Waters

Outlines the Oregon Health Authority criteria for issuing and lifting public health advisories due to cyanobacteria blooms.

2018 Freshwater Blooms



Lake James	1/26/2018	1 sampling event	2 samples
Flannagan Lake	1/29/2018 – 2/6/2018	2 sampling events	5 samples
Woodstock Pond	4/6/2018 – 10/22/2018	10 sampling events	33 samples
Chris Greene Lake	6/18/2018 – 10/2/2018	4 sampling events	6 samples
Williams Lake	7/12/2018	1 sampling event	2 samples
Rooty Lake	7/12/2018	1 sampling event	1 samples
Cumberland Co	7/17/2018	1 sampling event	2 samples
Lake Anna	8/15/2018 – 10/23/2018	7 sampling events	55 samples
Williamsburg	9/27/2018	1 sampling event	1 samples



2018 Advisory Overview

Counties affected by advisories (5):

Albemarle	Orange
James City	Louisa
	Spotsylvania

Advisories by month:

June (1) – Chris Greene Lake

July (0)

August (5) - Woodstock Pond

- Pamunkey Creek Branch (1) } Lake Anna
- North Anna Branch (2)
- Fisherman's Cove (1)

September (8) - Woodstock Pond

- Pamunkey Creek Branch (3) } Lake Anna
- North Anna Branch (3)
- Fisherman's Cove (1)

October (11) - Woodstock Pond

- Pamunkey Creek Branch (4) } Lake Anna
- North Anna Branch (5)
- Fisherman's Cove (1)

November (5) - Woodstock Pond

- Pamunkey Creek Branch (3) } Lake Anna
- Fisherman's Cove (1)

2018 13 Recreational Advisories for HABs

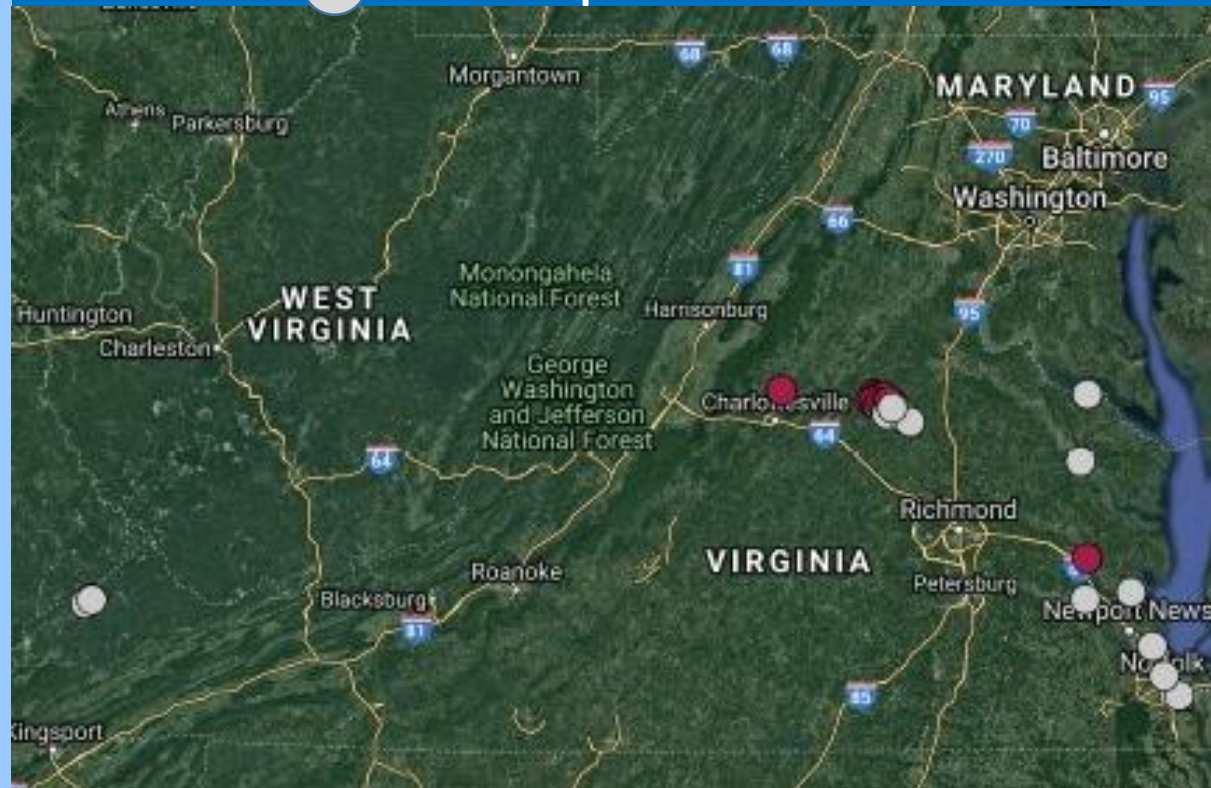
2017 6 Recreational Advisories for HABs



Recreational Advisories Issued for HABs



HAB Response Locations



2018 Total Days Under HAB Recreational Advisory: 89
2017 Total Days Under HAB Recreational Advisory: 132

John Flannagan Reservoir



- Sampled on 1/29/2018 and 2/6/2018 by VDH
- 1143 acre US Army Corps of Engineer impoundment in Dickenson and Buchanan Counties designated for recreation and drinking water use

1/29 *Planktothrix isothrix*
738,000 cells/mL

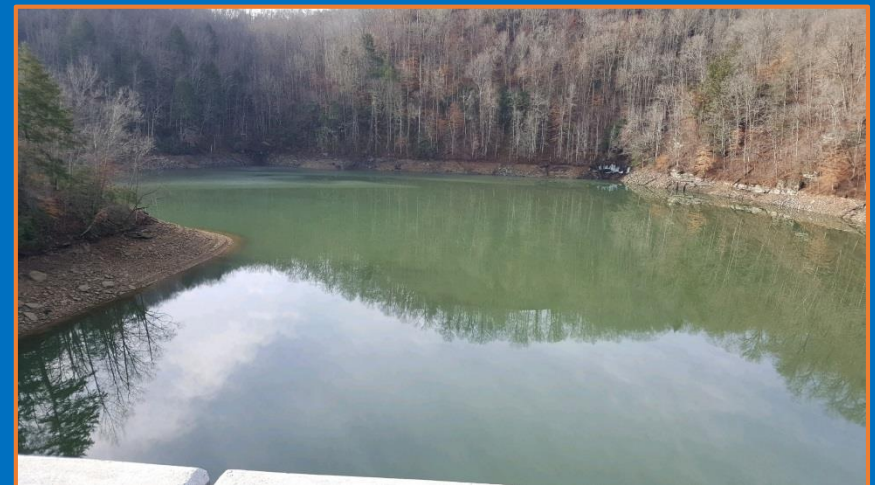
Microcystins: 0.27 – 2.67 ppb

Cylindrospermopsin: 0.15 – 0.28 ppb

2/6 *Planktothrix isothrix*
520 cells/mL

Microcystins: < 0.15 ppb

Cylindrospermopsin: not analyzed

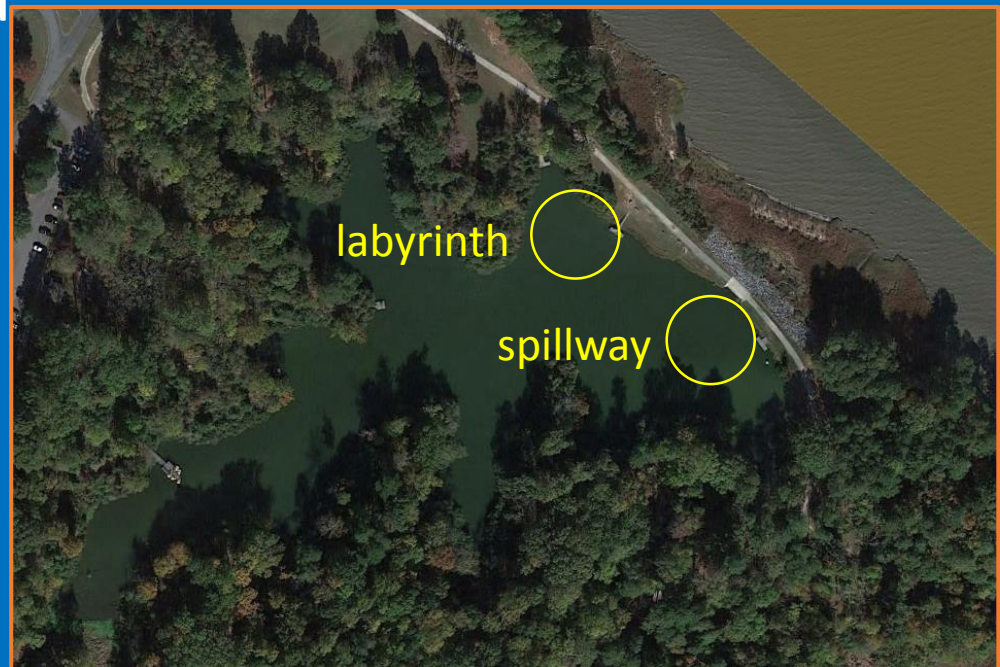


2017 Microcystins: <0.15 ppb
Aphanizomenon flos-aquae 4,800⁹ cells/mL

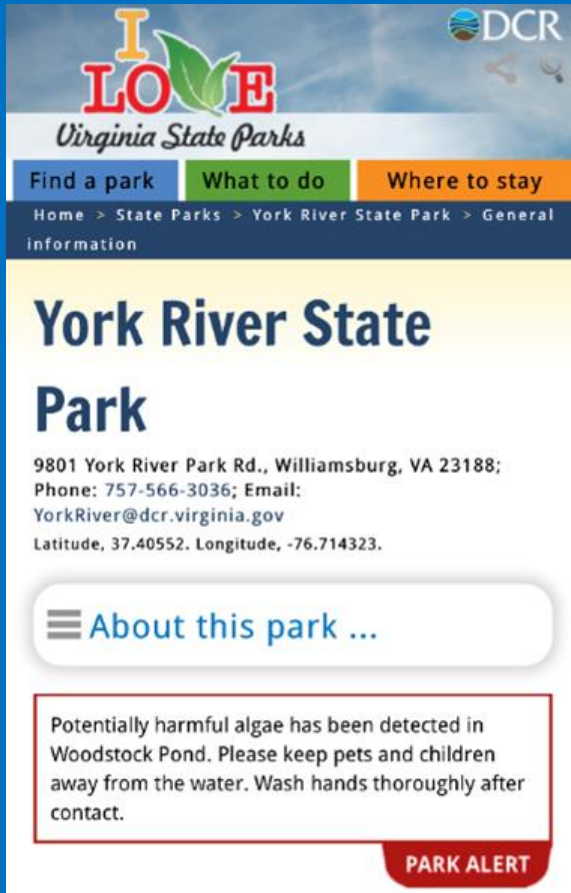
York River State Park Woodstock Pond



- Annual *Microcystis* sp. blooms and advisories since 2012 managed through a cooperative effort between DCR, DEQ, VDH, VIMS, and ODU
- 8 acre recreational lake in York River State Park in James City Co. near Williamsburg, VA
- Sampling throughout season between 4/6/2018 and 10/22/2018 by DCR



York River State Park Woodstock Pond



The screenshot shows the Virginia State Parks website. At the top is the "I LOVE Virginia State Parks" logo and the DCR logo. Below the logo are navigation tabs: "Find a park", "What to do", and "Where to stay". A breadcrumb trail reads: "Home > State Parks > York River State Park > General Information". The main heading is "York River State Park". Below this is the address: "9801 York River Park Rd., Williamsburg, VA 23188; Phone: 757-566-3036; Email: YorkRiver@dcr.virginia.gov". It also lists "Latitude, 37.40552. Longitude, -76.714323." A button labeled "About this park ..." is visible. A red-bordered box contains a "PARK ALERT" message: "Potentially harmful algae has been detected in Woodstock Pond. Please keep pets and children away from the water. Wash hands thoroughly after contact." The alert is labeled "PARK ALERT" in a red box at the bottom right.

York River State Park

9801 York River Park Rd., Williamsburg, VA 23188;
Phone: 757-566-3036; Email:
YorkRiver@dcr.virginia.gov
Latitude, 37.40552. Longitude, -76.714323.

[About this park ...](#)

Potentially harmful algae has been detected in Woodstock Pond. Please keep pets and children away from the water. Wash hands thoroughly after contact.

PARK ALERT

2018 Recreational Advisory – 77 days
2017 Recreational Advisory – 106 days

- Press release initiating advisory was drafted on 8/17/2018
- Limited resources discontinued monitoring and advisory on 10/22/2018 – the end of swimming season (prior years the bloom continued through December)

York River State Park Woodstock Pond

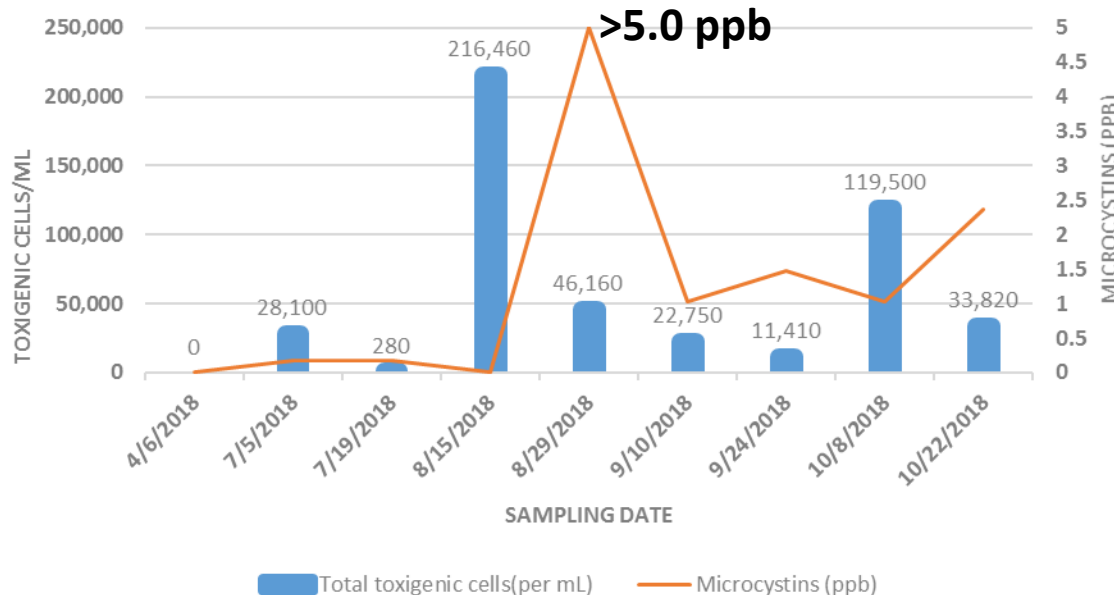


A variety of potentially toxigenic cyanobacteria were observed over the course of 9 sampling events, dominated by *Dolichospermum* sp., *Microcystis* sp., and *Planktothrix* sp.

Microcystins were detected during 7 out of 9 sampling events, but only one was above the USEPA regulatory threshold of 4ppb at **>5ppb** on August 29th.

Cylindrospermopsin was not detected above the 0.05 ppb manufacturer's detection limit in any of the 2018 sample analyses.

Maximum toxigenic cell counts and Microcystins Elisa analyses for 2018 season at Woodstock Pond



Microcystins: <0.15 - >5.0 ppb
Cylindrospermopsin: <0.05 ppb

2017 Microcystins: <0.15 – > 5 ppb
Dolichospermum spp. 590 – 510,000 ¹² cells/mL

York River State Park Woodstock Pond

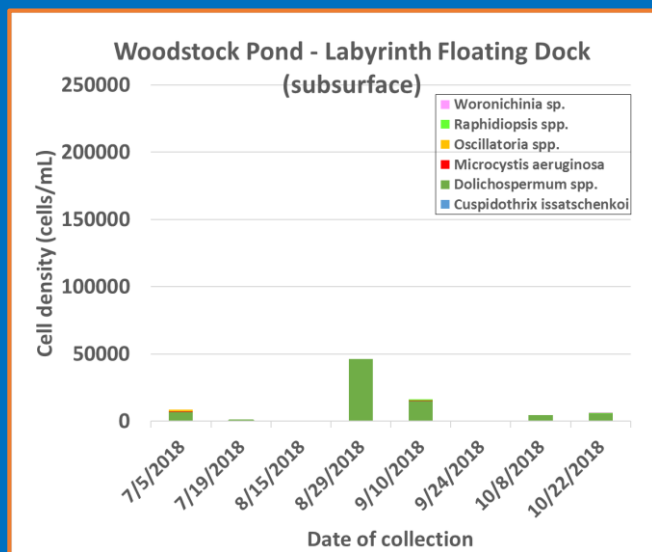
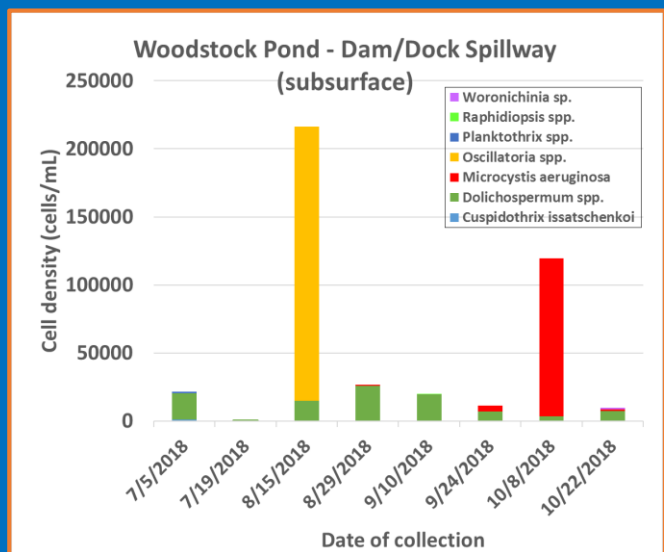
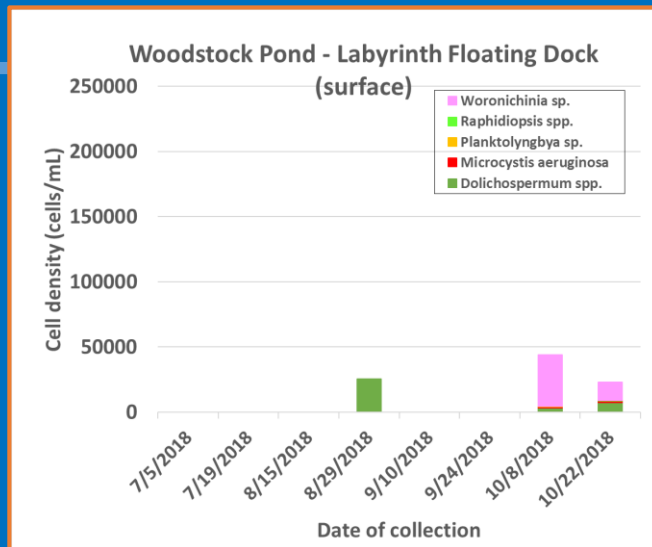
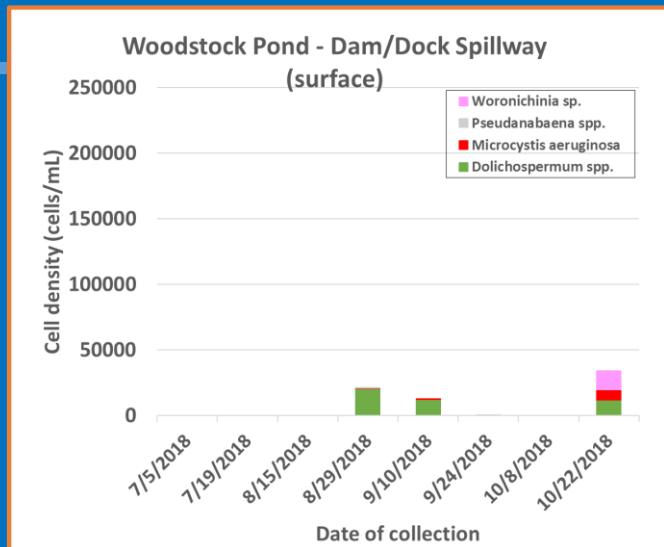


- Pilot barley straw treatment initiated June 2018
- Dr. Al Place (University of MD Center for Environmental Science), VA DCR staff, and VDH:DEE



Species composition throughout 2018 season at two select sampling spots at two depths at Woodstock Pond.

York River State Park Woodstock Pond



Surface sites had < 50,000 cells/mL, dominated by *Woronichinia* sp. and *Dolichospermum* sp. throughout season

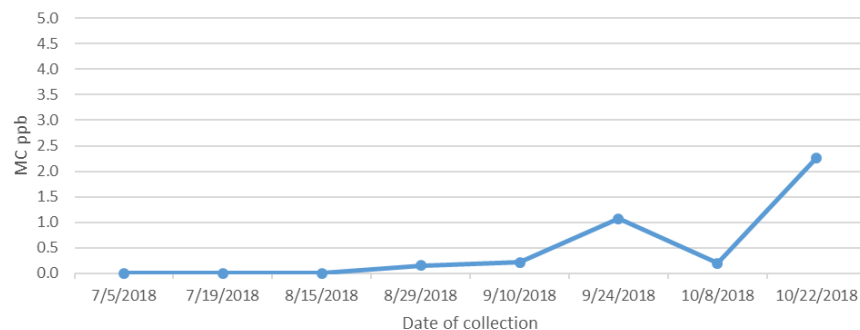
Highest densities were observed at the subsurface location near the spillway with densities exceeding 200,000 cells/mL of *Oscillatoria* sp. and more than 100,000 cells/mL *Microcystis* sp.

2017 dominant species were *Microcystis* sp. and *Dolichospermum* sp.

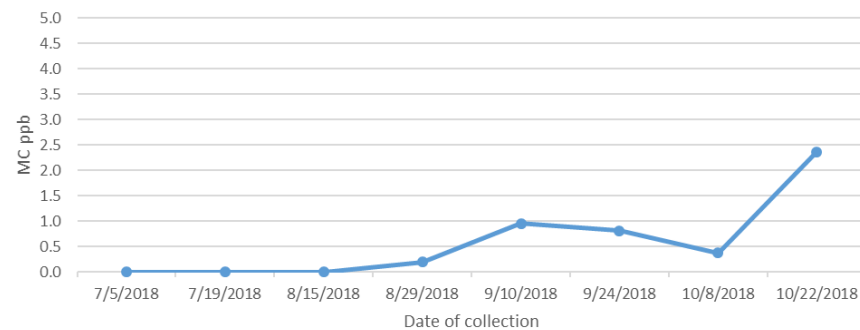
Microcystins concentrations throughout 2018 season at two select sampling spots at two depths at Woodstock Pond.

York River State Park Woodstock Pond

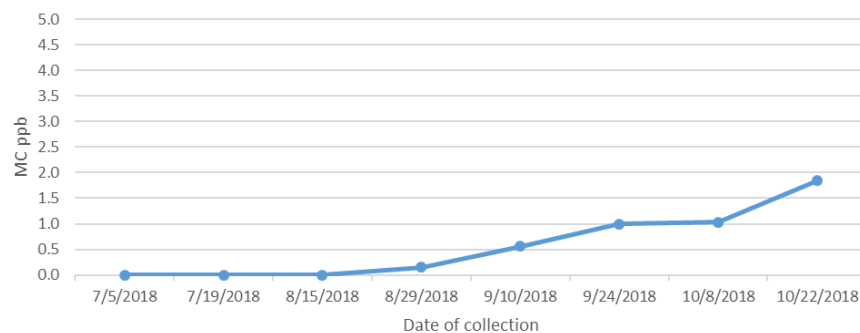
Woodstock Pond - Dam/Dock Spillway (surface)



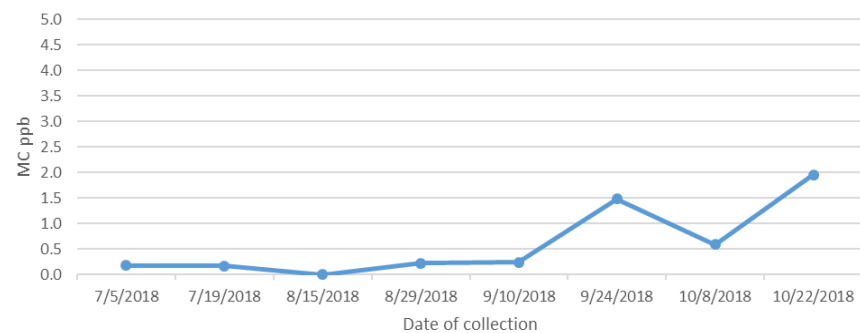
Woodstock Pond - Labyrinth Floating Dock (surface)



Woodstock Pond - Dam/Dock Spillway (subsurface)

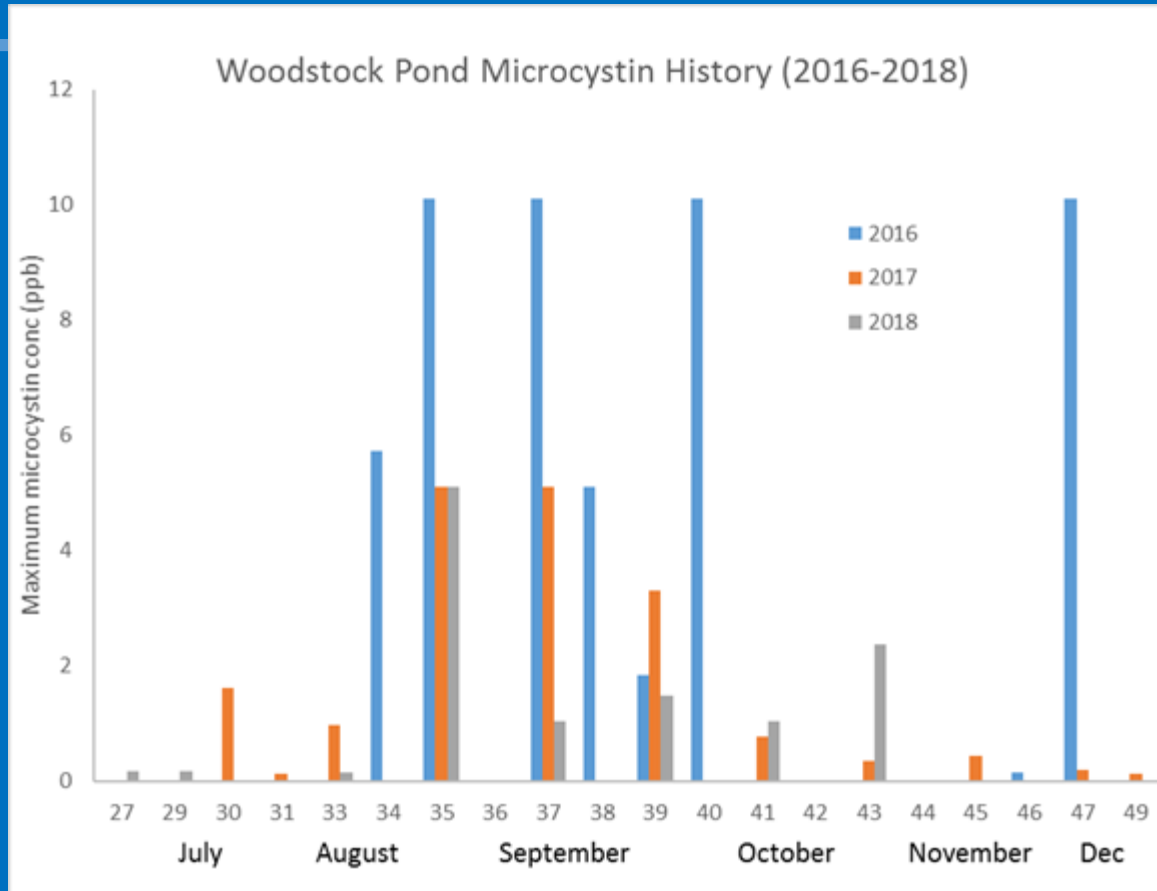


Woodstock Pond - Labyrinth Floating Dock (subsurface)



Throughout the season, there was a steady increase in Microcystins concentrations at the two main sampling locations, at both depths.

York River State Park Woodstock Pond



- >5 ppb Microcystin concentrations observed in summers 2016-2018
- 2016, 2017 *Microcystis* and filamentous, 2018 primarily filamentous taxa
- shorter duration toxin concentrations in 2018

Chris Greene Lake



- Bloom conditions monitored between 6/18/2018 and 10/2/2018 by Albemarle County Parks and Recreation
- 62 acre recreational Lake in Albemarle County outside of Charlottesville VA
- A variety of cyanobacteria were observed over the course of four sampling events

Microcystins: <0.15

Cylindrospermopsin: <0.05 ppb

2017 Microcystins: <0.15 – > 0.45 ppb
Planktothrix sp. 590 – 510,000 cells/mL¹⁷

Chris Greene Lake

2018 Recreational Advisory – 12 days
2017 Recreational Advisory – 98 days

News Release

1130 Rose Hill Drive, Charlottesville, VA 22903

June 15, 2018

FOR IMMEDIATE RELEASE
For More Information Contact
Kathryn W. Goodman, TJD Public Information Officer (434) 270-4802

Harmful Algae Bloom Occurring on Chris Greene Lake – Albemarle Co., Va.
Public advised to avoid water contact at swimming beach, boat ramp, and dog park

(Charlottesville, Va.) – Chris Greene Lake in Albemarle County is experiencing a harmful algae bloom that is a naturally occurring circumstance due to recent weather conditions. The public is advised to avoid contact with the lake water until algae concentrations return to acceptable levels.

People and pets are prohibited from entering the water in the vicinity of the swimming beach, dog park, and boat ramp.

Preliminary tests indicate a blue-green algae *Aphanizomenon* spp. was detected at elevated concentrations in Chris Greene Lake. This algae can produce a toxin that can cause rashes and other illnesses. Algae blooms occur naturally when warm water and nutrients combine to make conditions favorable for algae growth. Additional laboratory testing for samples collected are pending.

Chris Greene Lake is one of three swimming lakes operated by Albemarle County Parks and Recreation. The public should be aware that the other two swimming lakes, Mint Springs and Walnut Creek, have been visually inspected for algae and remain open to season pass holders and others at this time.

Albemarle Co. Parks and Recreation and the Virginia Harmful Algal Bloom Task Force, which includes the Virginia Department of Health, Virginia Department of Environmental Quality, and the Old Dominion Phytoplankton lab, will continue to monitor water quality in the lake. Water access will reopen following a minimum of two consecutive weeks of acceptable levels for algal cell counts and toxin concentration. For more information on acceptable algae levels, see the Virginia Department of Health Recreational Advisory Guidance for Microcystin/Microcystis at www.SwimHealthyVA.com.

To prevent illness, people should:

- Avoid contact with any area of the pond where water is green or an advisory sign is posted.
- Do not allow children or pets to drink from natural bodies of water.
- Keep children and pets out of the HAB water and quickly wash them off with fresh water after coming into contact with algae.
- If you or your animals experience symptoms after swimming in or near an algal bloom, seek medical/veterinarian care.
- If you suspect you experienced health-related effects following exposure to a bloom, contact the Virginia Harmful Algal Bloom Hotline at 1-888-238-6154
- To learn more about HABs or to report an algae bloom or fish kill visit: www.SwimHealthyVA.com

###

Chris Greene Lake closed after dog dies

The Daily Progress staff reports Oct 1, 2018 1 min to read



Chris Greene Lake Park is closed to all water recreation until further notice after a dog became ill and died after swimming in the lake, Albemarle County officials said Monday.

Albemarle County Parks & Recreation was contacted on Monday by a resident who said their dog became ill and died on Sunday after swimming in the lake, according to a news release.

Pet Death Leads to Cautionary Closure of Chris Greene Lake

Posted: Oct 01, 2018 5:11 PM EDT
Updated: Oct 01, 2018 5:15 PM EDT

Recommend 845

ALBEMARLE COUNTY, Va. (WVIR) - Parts of Chris Greene Lake in Albemarle County are closed until further notice.

According to the county, a community member came forward on Monday to say their dog passed away, adding that the dog spent Sunday swimming in Chris Greene Lake.

While no tests link the illness to the lake, out of an abundance of caution, Parks & Recreation decided to limit public contact with the lake until the results from the new water quality tests are available.

Chris Greene Lake is tested for water quality twice a month. Workers completed the most recent tests September 27 and showed no irregularities.

Press Release from the County of Albemarle:

The public is advised to avoid the boat ramp and dog park at Chris Greene Lake Park, as well as fishing areas until further notice. Trails, picnic areas, and the playground remain open. Signs are posted throughout the park. All other County public lakes and dog parks remain open.

On Monday, Parks & Recreation was contacted by a resident who said their dog had become ill and passed away earlier in the day. While no tests link the illness to the lake, out of an abundance of caution, Parks & Recreation has decided to limit public contact with the lake until the results from the new water quality tests are available.

Chris Greene Lake is tested for water quality twice a month. Workers completed on September 27 and precautionary measure, new tests will be completed by the County's contractor, as well as on Monday.

We apologize for the inconvenience. We will post the status.

Chris Greene Lake to reopen following algae bloom

The Daily Progress staff reports Jun 28, 2018 1 min to read



The sun makes an appearance while setting on Chris Greene Lake after heavy rainfall June 1. The series of downpours in May and early June led to a bloom of blue-green algae in the Albemarle County lake that can produce a toxin that can cause rashes and other illnesses. The lake is closed to public access until further notice, but the park remains open. There are no water restrictions at Mint Springs and Walnut Creek parks.

ELLIOTT ROBINSON/THE DAILY PROGRESS

Chris Greene Lake closed for harmful algae bloom



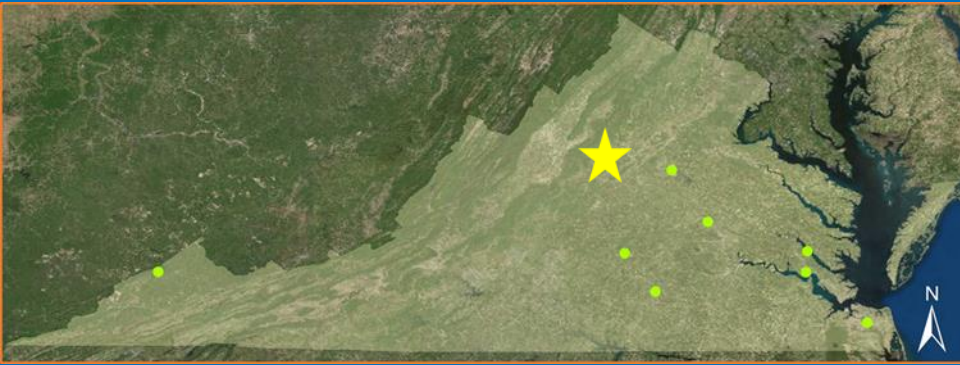
By News Staff (Posted: Fri 4:21 PM, Jun 15, 2018)

ALBEMARLE COUNTY, Va. (CBS19 NEWS) — Albemarle County residents are being advised to stay out of the water at Chris Greene Lake.

According to a release, there is a harmful algae bloom occurring in the water due to recent weather conditions. Preliminary tests show a blue-green algae called *Aphanizomenon* spp. was detected at elevated concentration in the water. The release says this algae can produce a toxin that can cause rashes and other illnesses. So people are being told to stay out of the water at the swimming beach, the dog park and the boat ramp. Algae blooms are naturally occurring when warm water and nutrients combine to make conditions favorable for one.

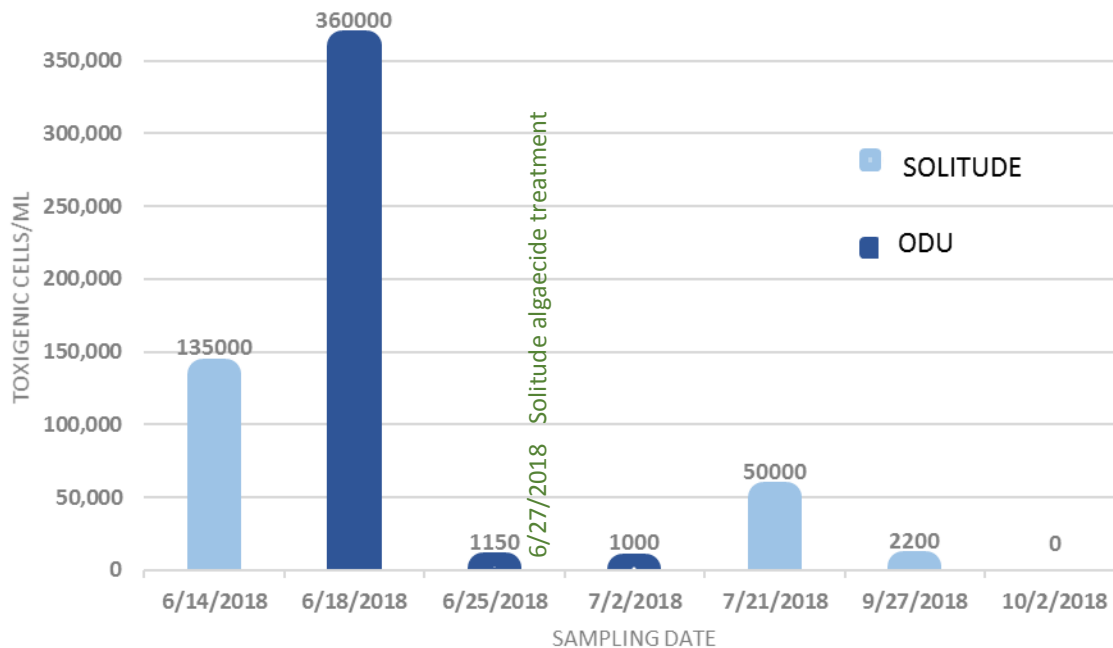
- Albemarle County noticed bloom on June 1, 2018
- Solitude assisted with response
- Press release initiating advisory was drafted on 6/15/2018
- Advisory lifted on 6/27/2018

Chris Greene Lake

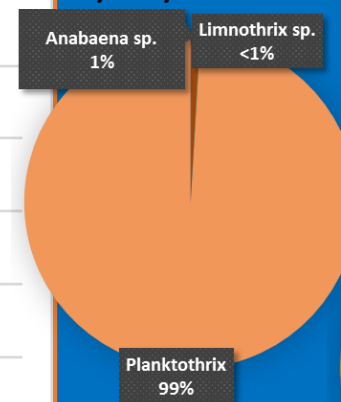


% species composition for sample with maximum cell concentrations pre treatment and post treatment

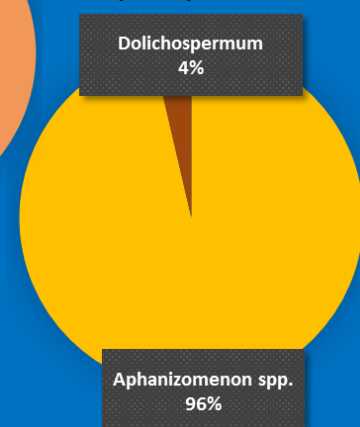
Maximum toxigenic cell counts and *Microcystins Elisa analyses for 2018 season at Chris Green Lake



6/18/2018



7/21/2018



* No Microcystins were detected above the reportable limit in 2018

Lake James

Williams Lake

Rooty Lake

Cumberland County Lake

Williamsburg



Virginia Private Lakes

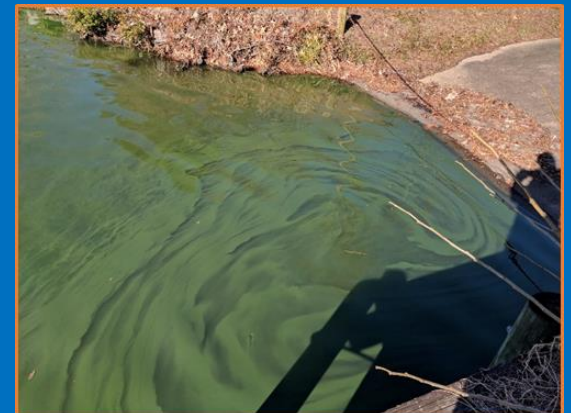
Lake James



- Sampled on 1/26/2018 by DEQ
- 94 acre privately owned residential pond in Virginia Beach
- *Planktothrix isoethrix*
1,043,000 – 8,225,000 cells/mL

Microcystins: 2.27 - >20 ppb

Cylindrospermopsin: 0.48 – 0.49 ppb



Lake James
Williams Lake
Rooty Lake
Cumberland County Lake
Williamsburg

Virginia Private Lakes

Williams Lake

- Sampled on 7/12/2018 by DEQ
- Small private pond outside of Blackstone, VA in Nottoway County
- Total toxigenic species: 17,830 – 31,130 cells/mL

Microcystins: <0.15 – 0.28ppb
Cylindrospermopsin: <0.05ppb

Rooty Lake

- Sampled on 7/12/2018 by VDH
- Small residential lake popular for fishing outside of Richmond, VA in Henrico County
- Total toxigenic species: 445,848 cells/mL

Microcystins: 1.12ppb
Cylindrospermopsin: <0.05ppb

Unnamed Lake in Cumberland Co.

- Sampled on 7/12/2018 by VDH
- Small private lake off Guinea Road, approximately 65 miles SW of Richmond
- No targeted toxigenic species observed

Microcystins: 1.08 – 3.58ppb
Cylindrospermopsin: <0.05ppb

Lake James
Williams Lake
Rooty Lake
Cumberland County Lake
Williamsburg

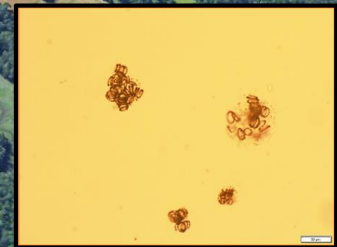
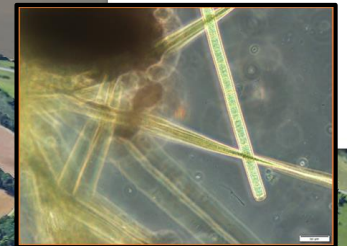
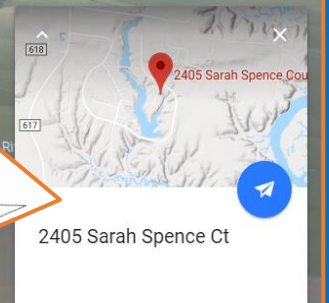
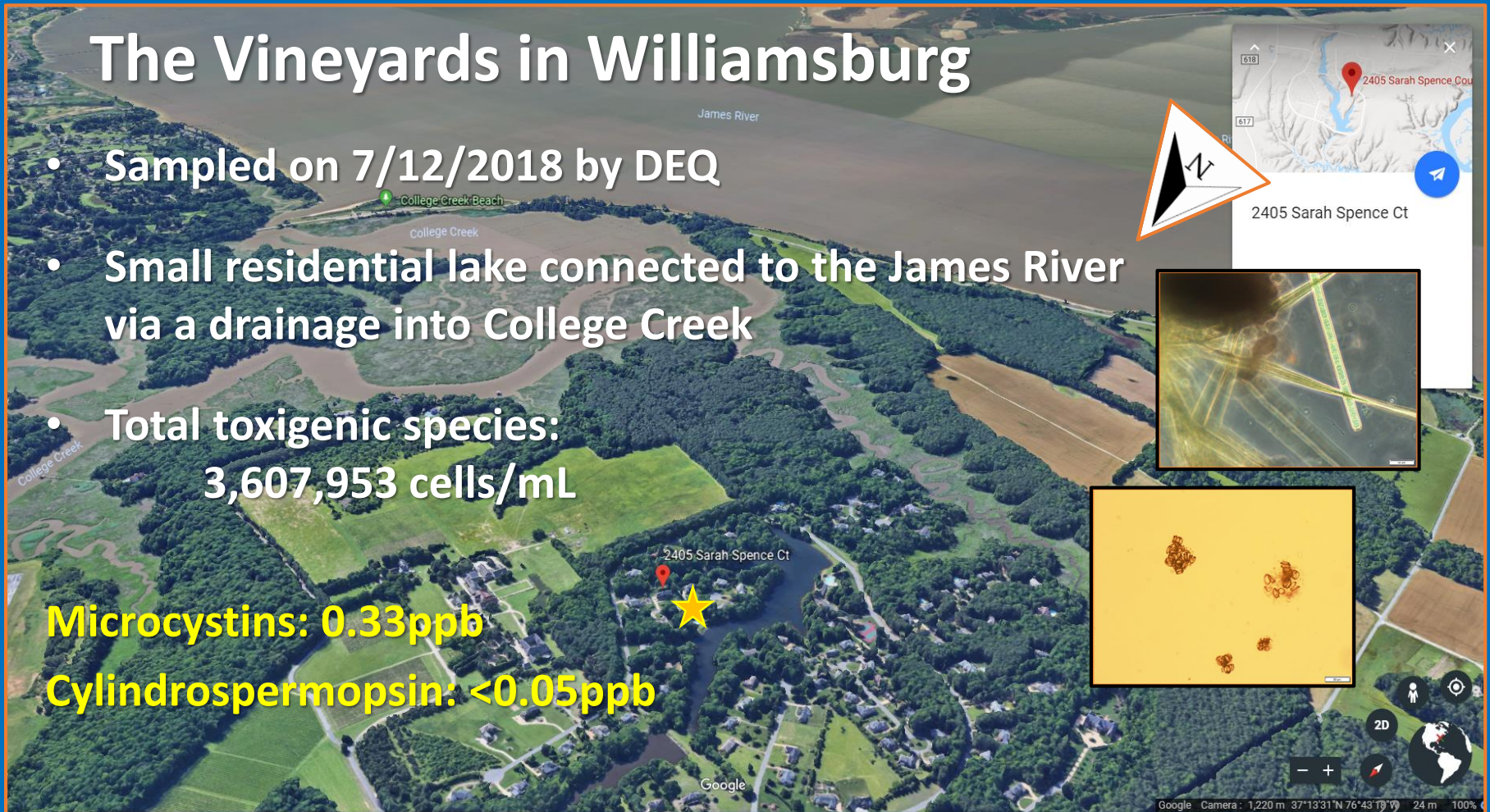
Virginia Private Lakes

The Vineyards in Williamsburg

- Sampled on 7/12/2018 by DEQ
- Small residential lake connected to the James River via a drainage into College Creek
- Total toxigenic species:
3,607,953 cells/mL

Microcystins: 0.33ppb

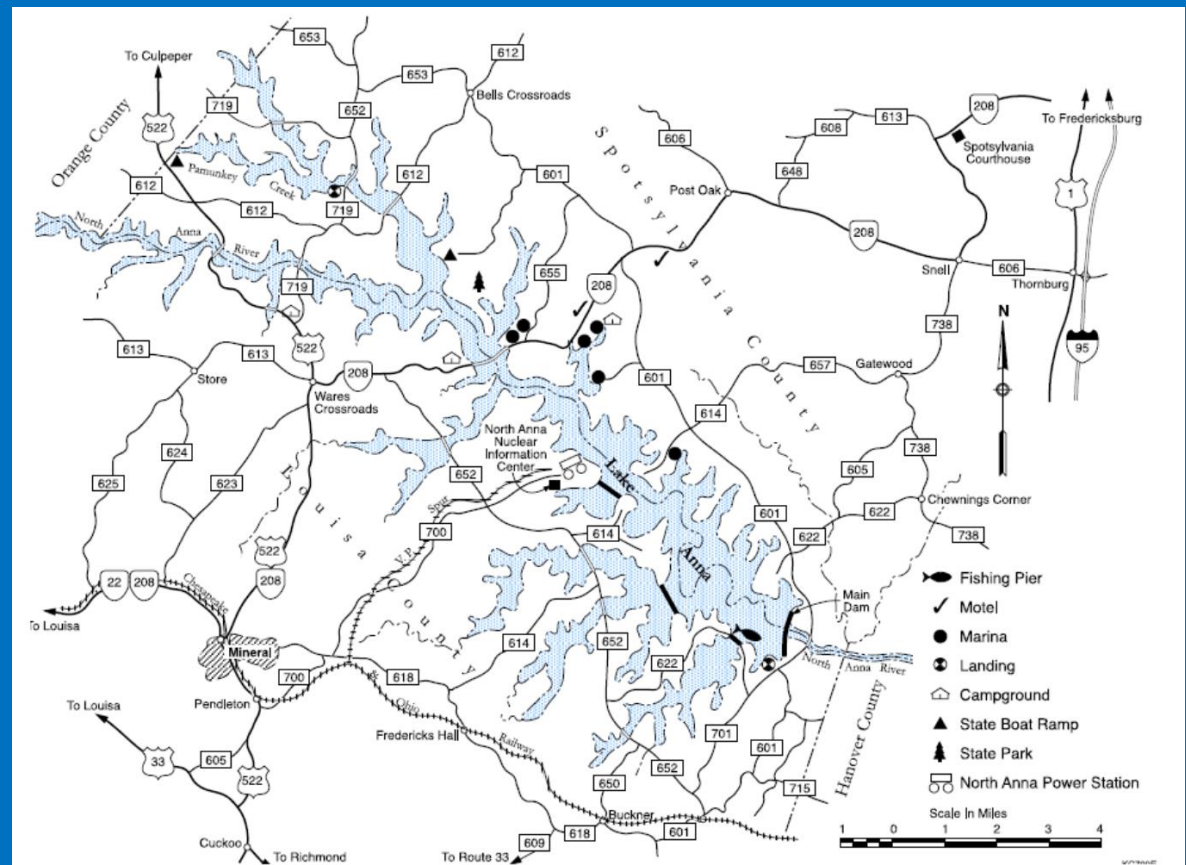
Cylindrospermopsin: <0.05ppb



Lake Anna



- 7 sampling events throughout season between 8/15/2018 and 10/23/2018 collected with a collaborative effort between DEQ, VDH, and DCR and analyzed by ODU
- An additional 5 sampling events occurred in which private funds were used to have private labs analyze
- 13,000 acre recreational lake with a history of *Microcystis* blooms and elevated microcystins

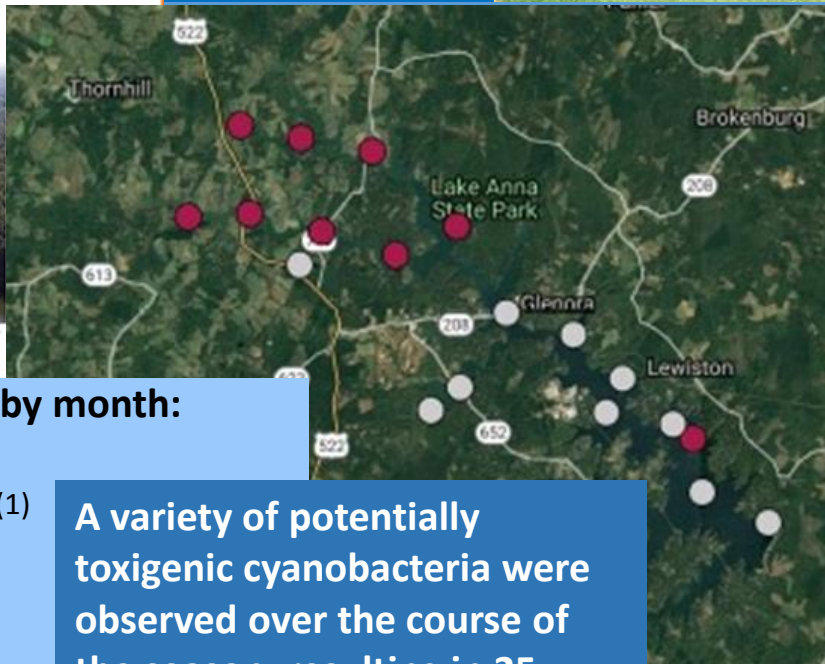


2018 Recreational Advisory – 76 days
2017 Recreational Advisory – none

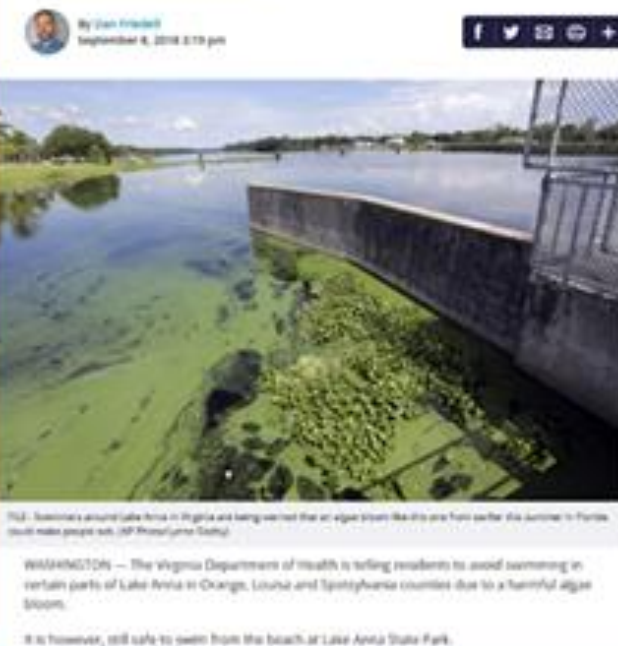
Lake Anna



What's causing toxic algae blooms in Lake Anna?



Lake Anna algae bloom could cause rashes and illness



Lake Anna Advisories by month:

August (4) -

- Pamunkey Creek Branch (1)
- North Anna Branch (2)
- Fisherman's Cove (1)

September (7) –

- Pamunkey Creek Branch (3)
- North Anna Branch (3)
- Fisherman's Cove (1)

October (10) –

- Pamunkey Creek Branch (4)
- North Anna Branch (5)
- Fisherman's Cove (1)

November (4) –

- Pamunkey Creek Branch (3)
- Fisherman's Cove (1)

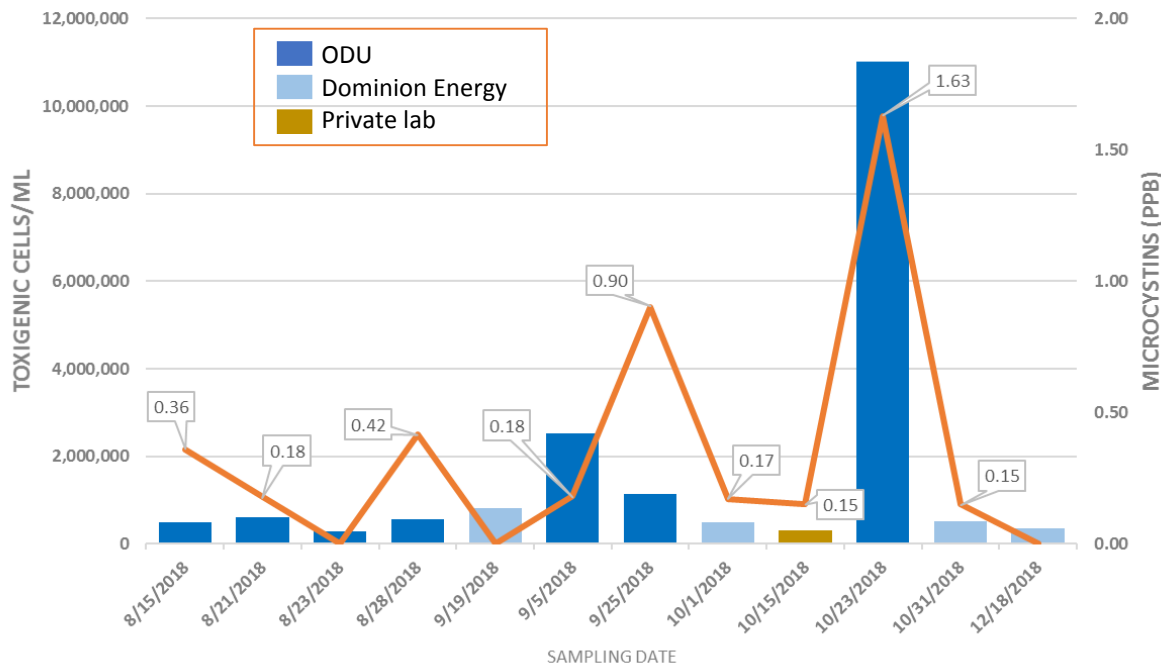
A variety of potentially toxigenic cyanobacteria were observed over the course of the season, resulting in 25 recreational advisories issued over 4 months at 10 discreet areas sampled throughout Lake Anna proper.



Lake Anna



Maximum toxigenic cell counts and Microcystins Elisa analyses
for 2018 season at Lake Anna



Microcystins were detected in 9 out of the 12 sampling events analyzed lake wide by all three labs, and none were above the USEPA regulatory threshold of 4ppb.

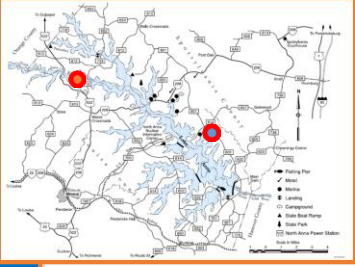
Only one sample that ODU analyzed had a result above the 0.05 ppb manufacturer's detection limit for Cylindrospermopsin on 9/25/2018 at the Upper North Anna Branch (**0.08 ppb**).

Microcystins: <0.15 – 1.63 ppb
Cylindrospermopsin: <0.05 – 0.08 ppb

The results plotted in this figure are the maximum toxigenic cell count and maximum toxin concentration for the sampling event, **lake wide** – the sample in which the toxin result is drawn from does not correlate with the location where the cell count is drawn from.²⁵

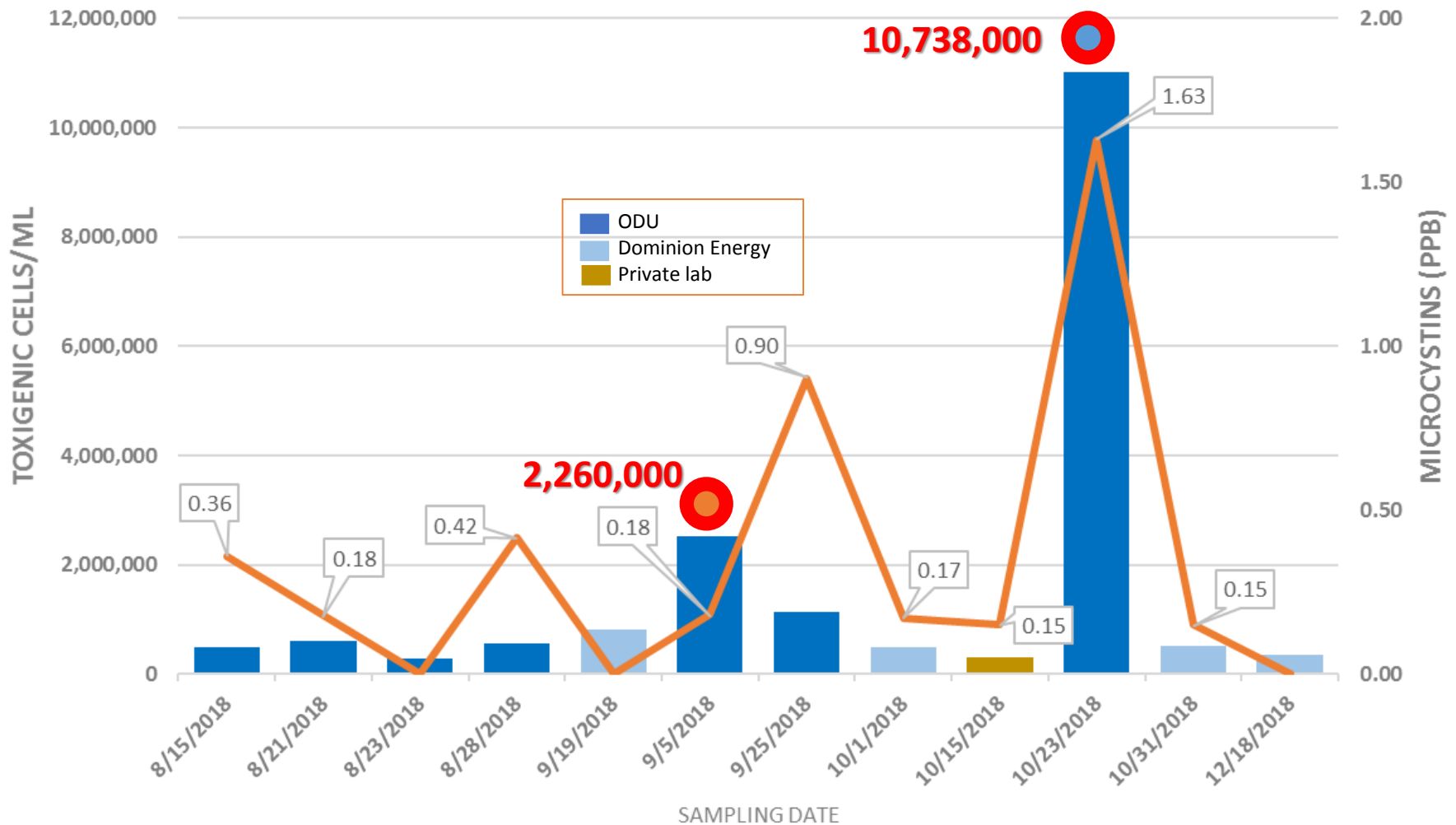
es



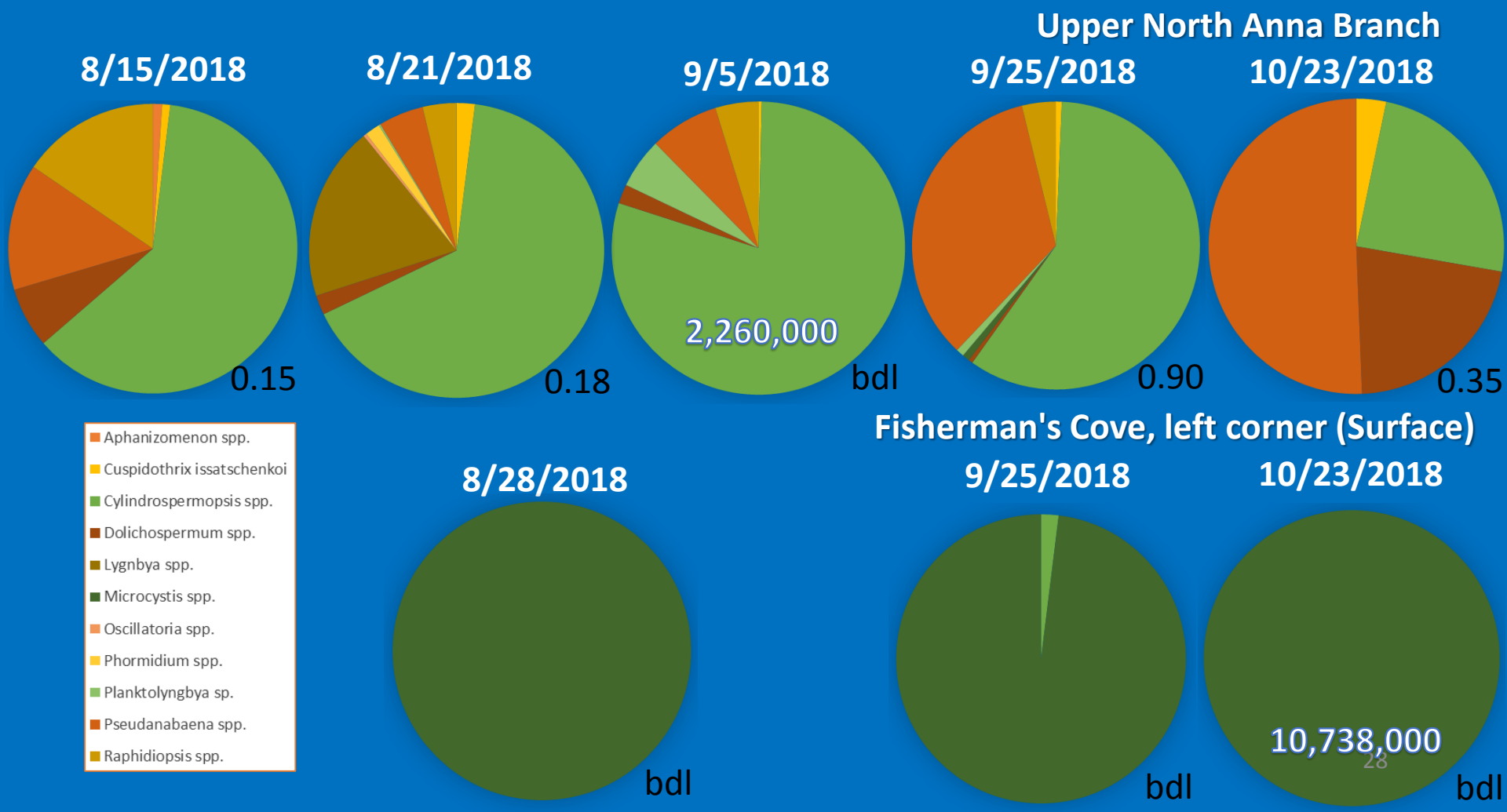


Lake Anna

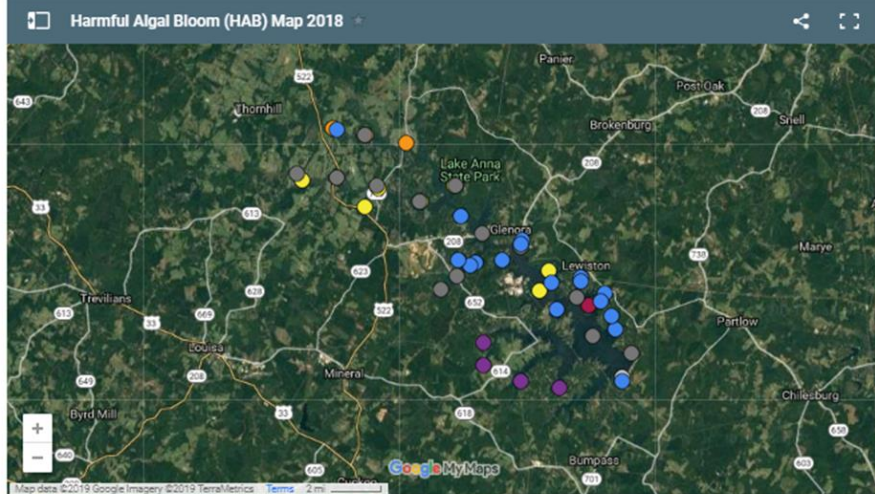
Maximum toxigenic cell counts and Microcystins Elisa analyses for 2018 season at Lake Anna



These two locations, both of which had recreational advisories issued, were observed to have the greatest maximum toxigenic cell counts lake wide, but had very different community structures from one another. The Upper North Anna Branch location was dominated by *Cylindrospermopsis* slowly changing over to *Pseudanabaena* by the cessation of monitoring at the end of October. Fisherman's Cove on the other hand, was dominated by *Microcystis* between late August and late October.



Webpage for updates www.SwimHealthyVa.com



Map Legend Click on sites within map above for sample results and details.

- **Active Algal Bloom – No Human Health Advisory** algal species are not known to be harmful to humans, pets, or fish.*
- **Active Algal Bloom – No Human Health Advisory** algal species are not known to be harmful to humans* or pets but may be capable of producing a toxin harmful to fish.
- **Active Algal Bloom – No Human Health Advisory** algal species present are capable of producing toxin harmful to humans, pets, and fish but are currently at low levels – levels should not pose a health risk to humans*, pets and fish. Water conditions may change quickly. Be aware of blooms while recreating in this area and if a scum forms on the water surface or there is a color change, the public should avoid swimming in the vicinity and submit a report to the online HAB report form. Surveillance is ongoing to monitor bloom levels.
- **Active Algal Bloom – No Human Health Advisory - Public should be aware of blooms in vicinity** algal species capable of producing toxin harmful to humans, pets, and fish are present at levels requiring public notification. Current results indicate a low to moderate health risk to humans*, pets and fish. Water conditions may change quickly. Be aware of blooms while recreating in this area and if a scum forms on the water surface, the public should avoid swimming in the vicinity and submit a report to the online HAB report form. Surveillance is ongoing to monitor bloom levels.
- **Active Algal Bloom – Human Health Advisory in Effect** algal species capable of producing toxin harmful to humans, pets, and fish. Current results indicate toxin or cell concentrations pose a moderate to high health risk to humans, pets and fish. There may be visible scum in the area. **The public is advised to avoid swimming in the vicinity.** Children and pets are particularly vulnerable. Surveillance ongoing to monitor bloom levels.
- **No HABs detected or Prior Bloom Event** – recent samples did not detect harmful algal species or in some areas surveillance may have been discontinued due to the dissipation of the bloom
- **Bloom On Private Lake** – VDH and the Harmful Algal Bloom Taskforce can provide limited monitoring and testing for privately owned lakes and prioritizes support of public waterbodies. A list of private lake management companies is available at the Dept. of Game and Inland Fisheries website at: <https://www.dgif.virginia.gov/wp-content/uploads/Private-Pond-Consultants.pdf>
- **Scum/Algae Report** - There may be visible scum near this crowd-sourced report. Avoid swimming or recreating in areas with reported scum. Children and pets are vulnerable to HAB toxins which tend to accumulate in scums. Reports are not verified by Virginia HAB Task Force with sample collections. Pictures (if provided) may be useful if other scum or blooms have been tested in large waterbodies where it is not feasible to sample each reported location.

*NOTE-While results may indicate no or low risk to human health, the Health Department does not recommend recreational contact with waters with active algal blooms. An algae bloom may be an indication of a water quality issue.

INFORMATION ON THE 2018 HARMFUL ALGAE BLOOM – LAKE ANNA

Updated November 2, 2018

Orange, Louisa, and Spotsylvania Counties, VA

As of 10/31/18, the recreational swimming season for 2018 has concluded.

The HAB Task Force has discontinued water sampling for Lake Anna.

Samples were collected on Tuesday Oct. 23rd in the Pamunkey and North Anna Branches in addition to one site south of Rt. 208 in Fisherman's Cove (on north shore). A summary of results are below.

Moderate to High Health Risk (red map symbol):

Coves, shallow areas, and shorelines may have scum present. Avoid contact with scum.

- Fisherman's Cove (38.0474, -77.74151)

Low to Moderate Health Risk (orange map symbol):

Be aware of the bloom in these areas as water conditions may fluctuate.

- Upper Pamunkey Branch east of Rt. 522 bridge (38.14309, -77.91724)
- Upper-Middle Pamunkey Branch at Simms Point/Harris Lane (38.13942, -77.89372)
- Lower-Middle Pamunkey Branch at Rt. 719 "Dillard's Bridge" (38.13505, -77.8661)

No to Low Health Risk (yellow map symbol):

Cyanobacteria were detected but at levels which should not pose a health concern.

- Lower Pamunkey Branch at Lake Anna State Park Beach (38.11231, -77.833099)
- Upper North Anna Branch near Goldmine Creek and "the Sandbar" (38.11517, -77.93754)
- Upper-Middle North Anna Branch at Rt. 522 Bridge (38.11607, -77.91367)
- Middle North Anna Branch at Rt. 719 Bridge (38.11063, -77.88568)
- Christopher Creek Branch north of Rt. 522 Bridge (38.10049, -77.89427);
- Lower North Anna Branch near Rose Valley Island (38.10347, -77.85698)

VDH will continue to update the HAB Map with citizen reports of scum. To submit a scum report or fish kill visit the online HAB report page. Scum reports (which have not been verified) are symbolized in the HAB Map with blue circles

People visiting the lake to boat or fish should be mindful of blooms which may be ongoing on the Lake and avoid areas with green scum on the water. Scum is more likely to accumulate in shallow areas and along shorelines. Signs similar to the one depicted at right, may be downloaded, laminated, and placed around the watershed to raise awareness about algae blooms during the off season. Signage and awareness will decrease the likelihood of a human or pet exposure during "off-season" months while sampling and advisories for recreational use are not being conducted.

Lake Anna

Harmful A

- Contrary C
- Freshwater
- Sturgeon C
- Dukes Cre
- Lake Anna
- Valentine C
- Lake Anna
- Elk Creek -
- Moody Cre
- Millpond C
- Beaver Cre
- Un-Named
- Blount Cov
- Upper Parr
- Thurman I:
- Contrary C
- Pleasant C
- Windwood
- Sturgeon C
- Contrary C
- Rockland C
- Contrary C
- Dukes Cre
- Hackney C
- Sturgeon C
- Tara Wood
- Dukes Cre
- Rockland Creek - 10/10/18 - Lake Anna

Rockland Creek - 10/10/18 - Lake Anna

name
Rockland Creek - 10/10/18 - Lake Anna

description
Citizen algae report on 10/10/18. Picture provided by citizen appears to harmful algae scum, similar to scum seen elsewhere in the lake. The public is advised to avoid swimming in the vicinity of scum. Children and pets are most vulnerable to HABs. For more information on HABs visit www.SwimHealthyVa.com.

Location of scum observed 10/10/18; helps others be aware of and avoid scum

Click on Points To Expand



Scum/Algae Report - There may be visible scum near this crowd-sourced report. Avoid swimming or recreating in areas with reported scum. Children and pets are vulnerable to HAB toxins which tend to accumulate in scums. Reports are not verified by Virginia HAB Task Force with sample collections. Pictures (if provided) may be useful if other scum or blooms have been tested in large waterbodies where it is not feasible to sample each reported location.

Beginning 9/2018, HAB Map Legend includes scum reporting by citizens

Crowd Sourcing Bloom Reports

MBIO duplex assay

Side by Side Comparison

MBIO

- MBIO microcystin assay
0.4ppb - >3.1ppb (higher w/dilution)
- MBIO cylindrospermopsin assay
0.7ppb - >2.7ppb (higher w/dilution)



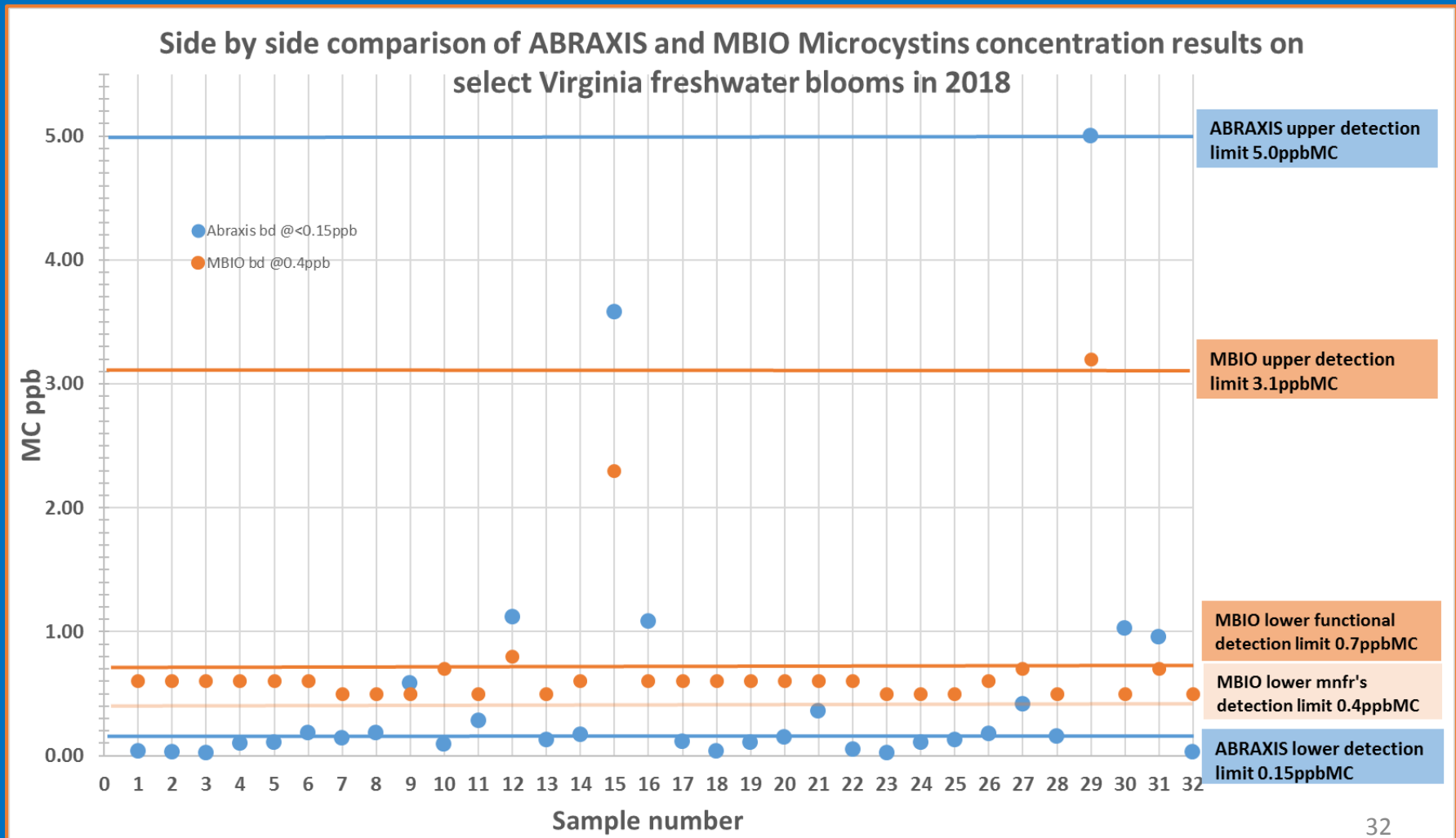
Abraxis

- Abraxis microcystin (ADDA) ELISA
0.15ppb - >5ppb (higher w/dilution)
- Abraxis cylindrospermopsin ELISA
0.05ppb - >2ppb (higher w/dilution)

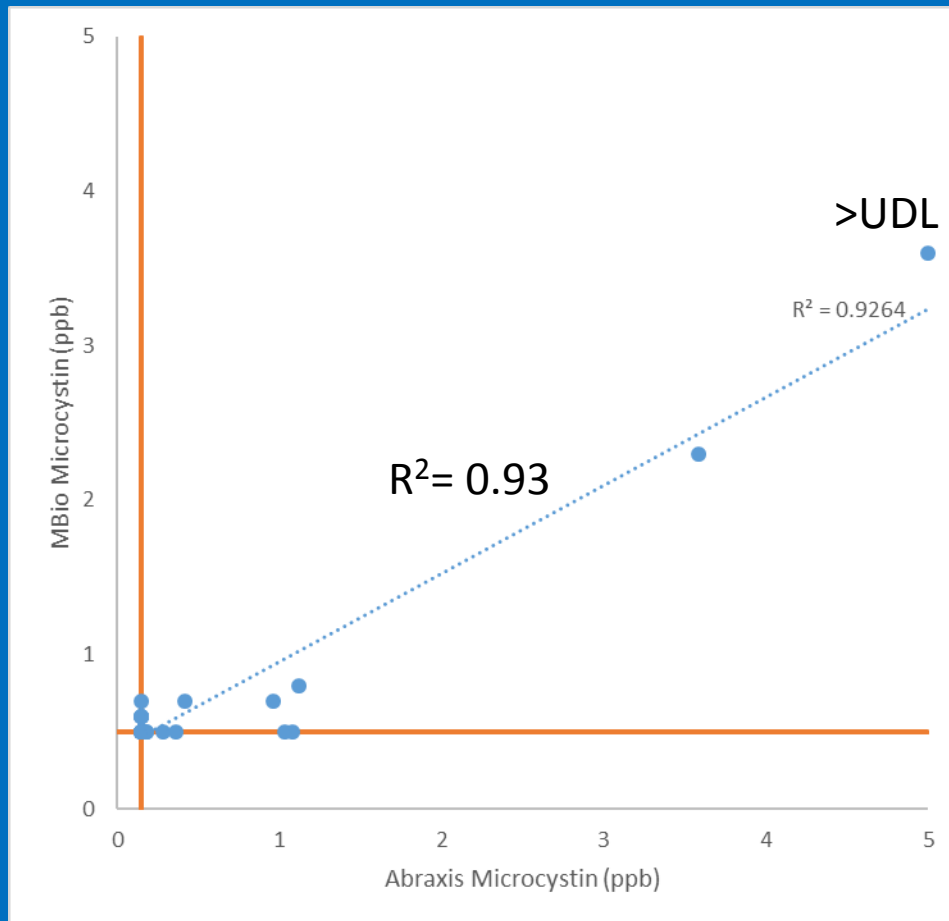


*EPA 2016 draft recreation recommended values:
microcystins 4ppb
cylindrospermopsin 8ppb

MBIO duplex assay



MBIO duplex assay



Side by Side comparison

- Abraxis 0.15ppb - >5ppb
- Mbio 0.5ppb - >3.1ppb
- 32 samples
- Limited working range of comparable samples
- Continued comparisons in 2019



2019 Season

Reports of potential FW blooms across the state (Lake James, Smith Mountain Lake, Lake Anna) in early 2019

HAB Taskforce recreation focus:

- Direct resources towards peak “swimming season” (between Memorial Day and the end of October)
- Sampling only occurs in waters with a designated recreation use

The ODU phytoplankton analysis lab is currently reporting all species observed within a bloom, and VDH:DEE is conducting a review of potential toxin producers to target for regulatory action

Heterocapsa triquetra (15,200 cells/mL) and *Prorocentrum minimum* (150 cells/mL) blooms ongoing in Hampton Roads/Lower Chesapeake Bay

