

Remembering our Why: NEW Water's work to address HABs in the Bay of Green Bay

Sarah Bartlett



Green Bay has a long history of blue green algae (HABs)



Photo credit: Ben Young, NEW Water

Why NEW Water? Who are you?



Photo credit: Ben Young, NEW Water

<https://youtu.be/4KnFR4Bj42w>



Photo credit: Ben Young, NEW Water





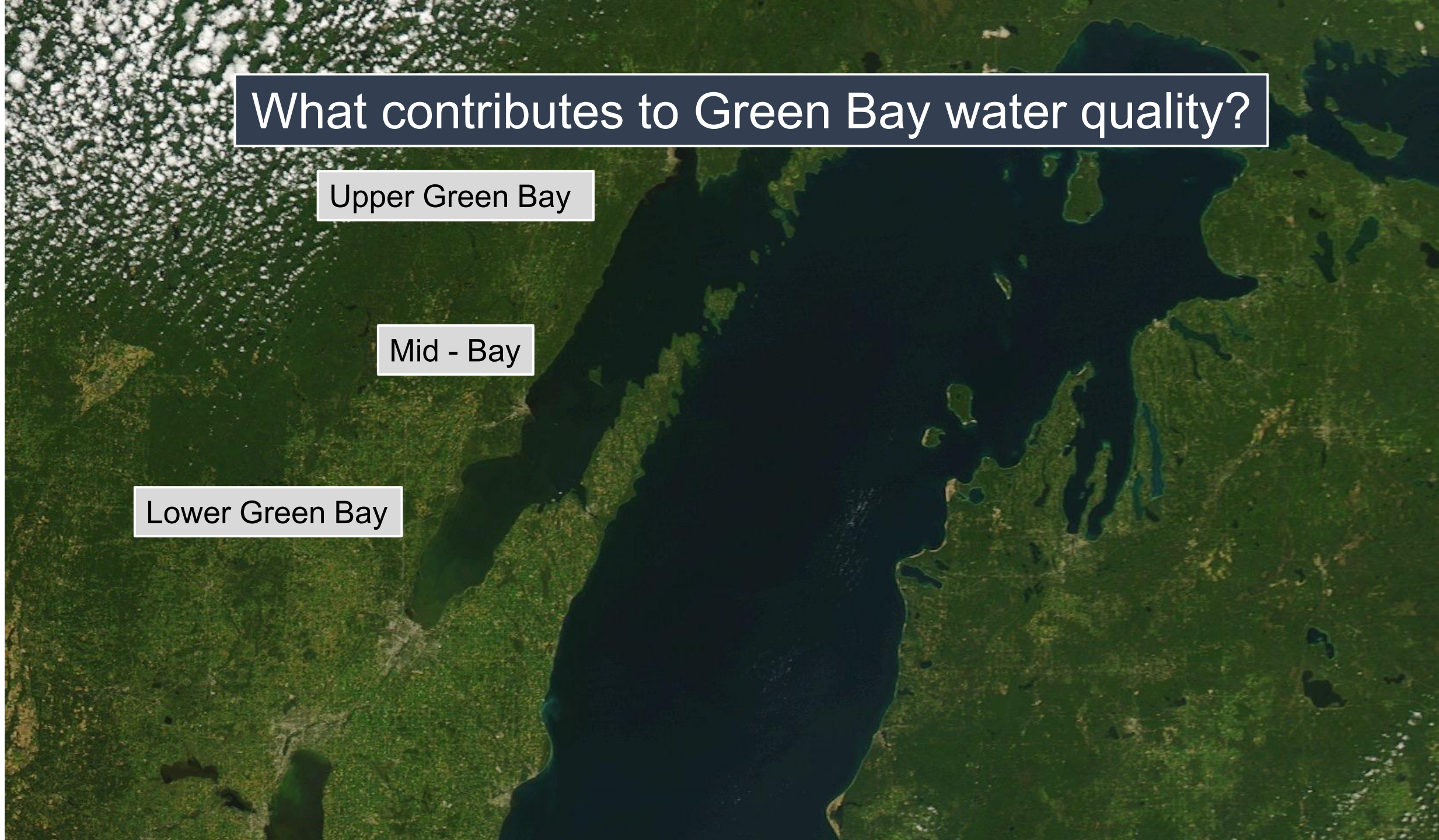
Photo credit: Ben Young, NEW Water

What contributes to Green Bay water quality?

Upper Green Bay

Mid - Bay

Lower Green Bay



What contributes to Green Bay water quality?

Upper Green Bay

Mixing with Lake Michigan



What contributes to Green Bay water quality?

Lower Green Bay

Fox River-Lake
Winnebago
empties into
Green Bay

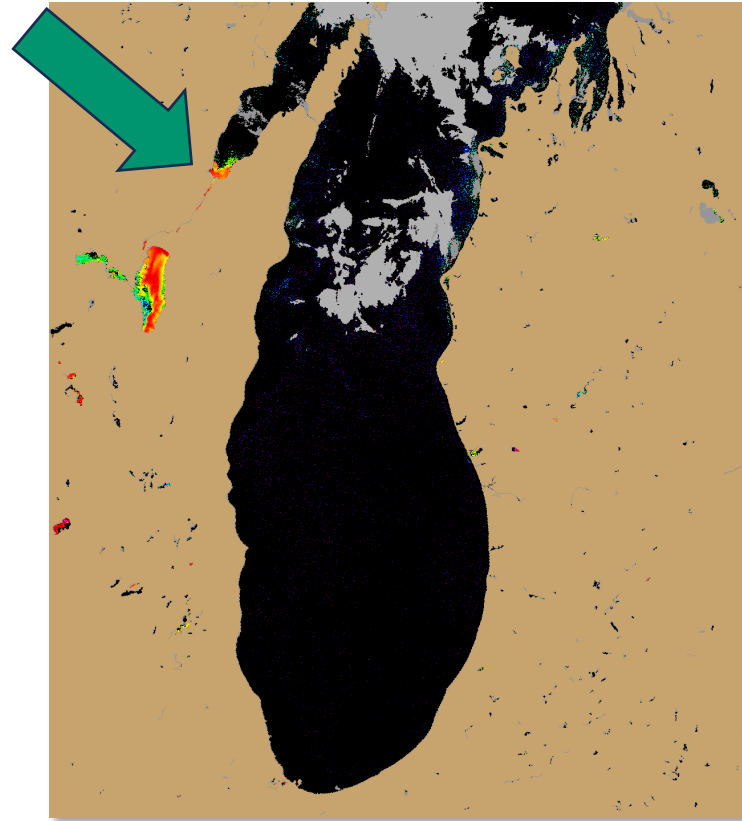


Orientation to Lower Green Bay

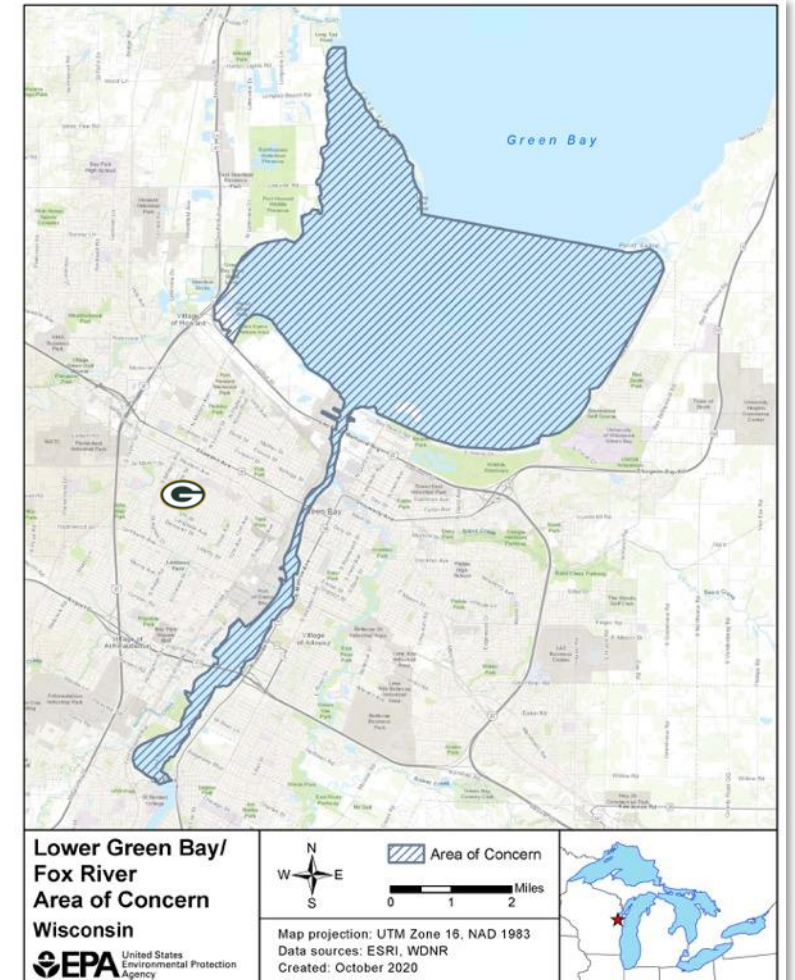
MODIS Satellite



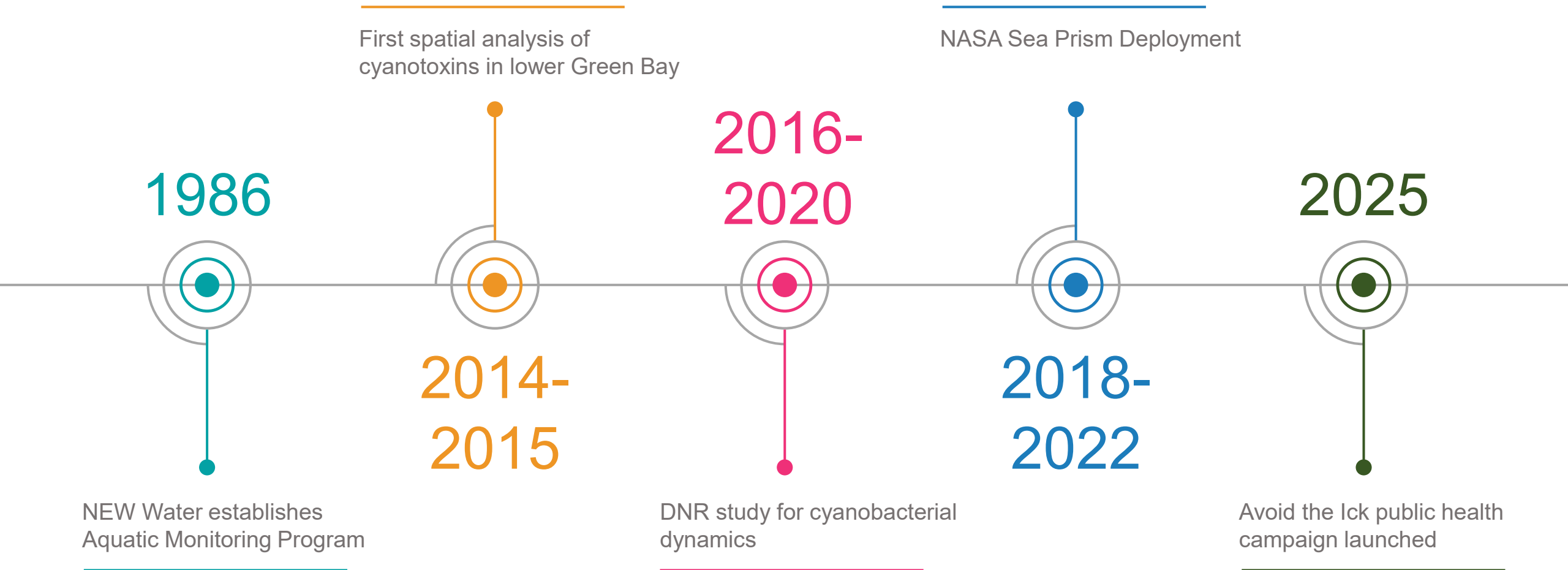
Cyanobacterial Index

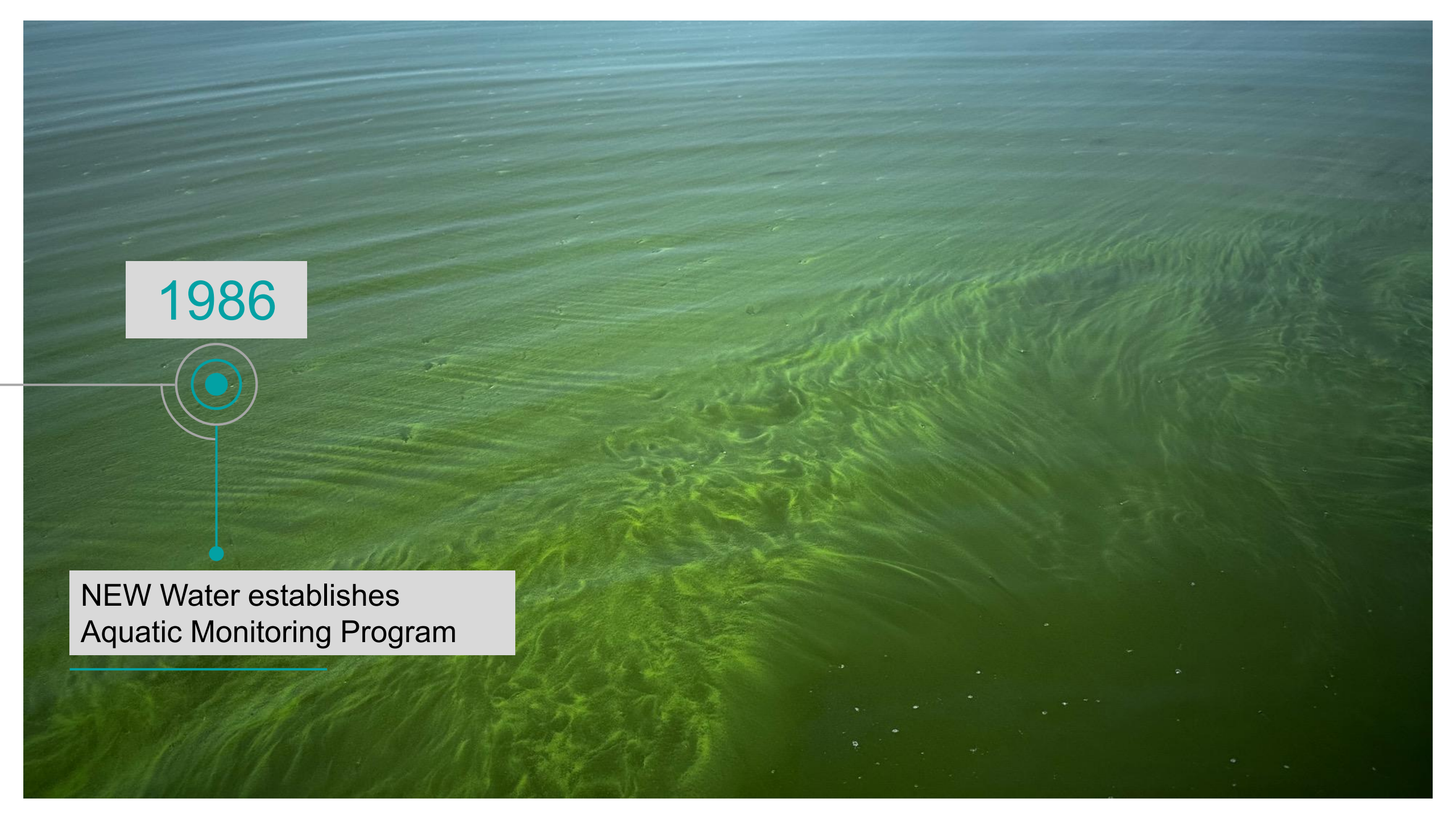


Area of Concern Boundary



NEW Water's Commitment to HABs



An aerial photograph showing a vast expanse of ocean water. A large, swirling area of bright green water, indicating a massive algal bloom, dominates the right and center of the frame. The water in the upper left is a darker, more uniform blue-green. A graphic overlay on the left side includes a white box with the year '1986', a circular icon with a blue dot and concentric circles, and a text box below it.

1986

NEW Water establishes
Aquatic Monitoring Program

NEW Water's Aquatic Monitoring Program

- Monitoring outside the fence for permit compliance



- Weekly sampling May-October
- Measure suite of nutrients and water quality parameters
- Maintain 4 continuous monitoring stations



Photo credit: Ben Young, NEW Water

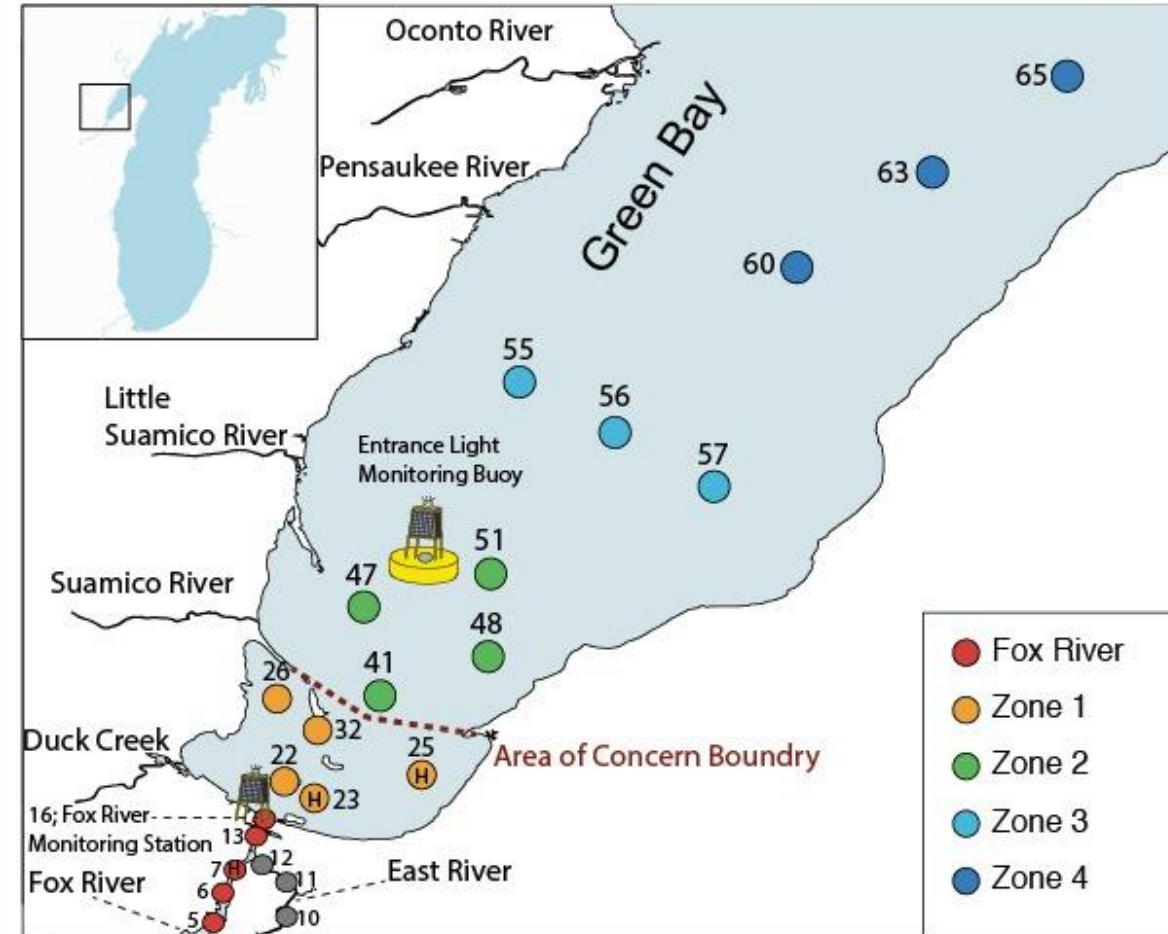
40th Year of Water Quality Monitoring

- **Total Phosphorus**

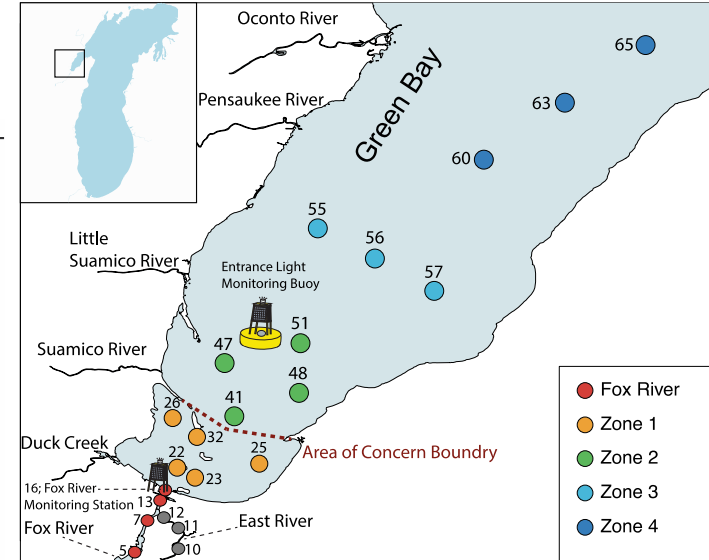
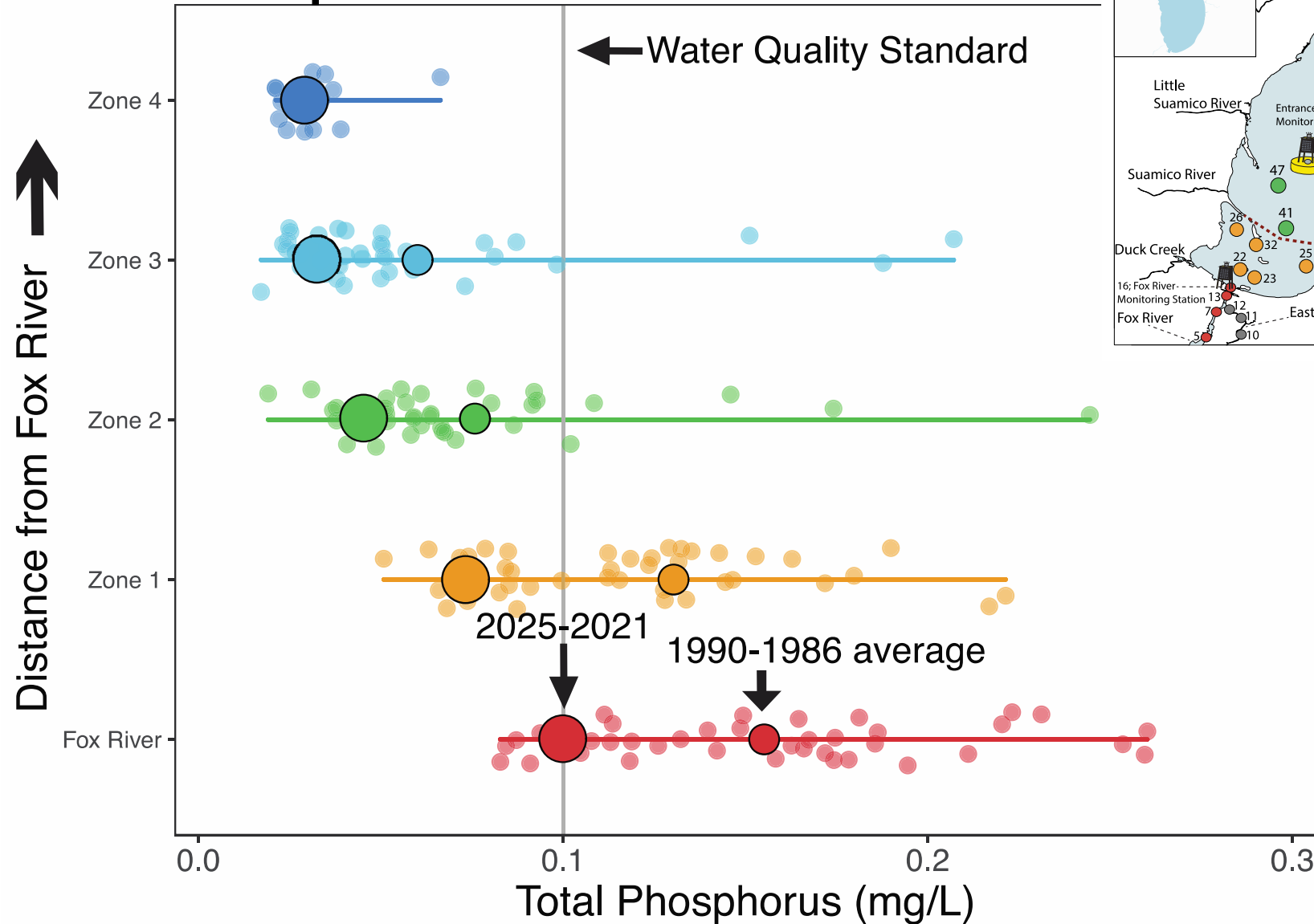
- **Water Quality Standard = 0.1 mg/L for Area of Concern**
- Annual average TP concentration decreased in the Fox River and Zone 1
- Overall 5-year mean meets the water quality standard for Fox River and all zones

- **Total Suspended Solids**

- **Water Quality Standard = 18 mg/L for Area of Concern**
- Annual average TSS concentration decreased in all zones
- Overall 5-year mean in Fox River and Zone 1 is greater than the water quality standard

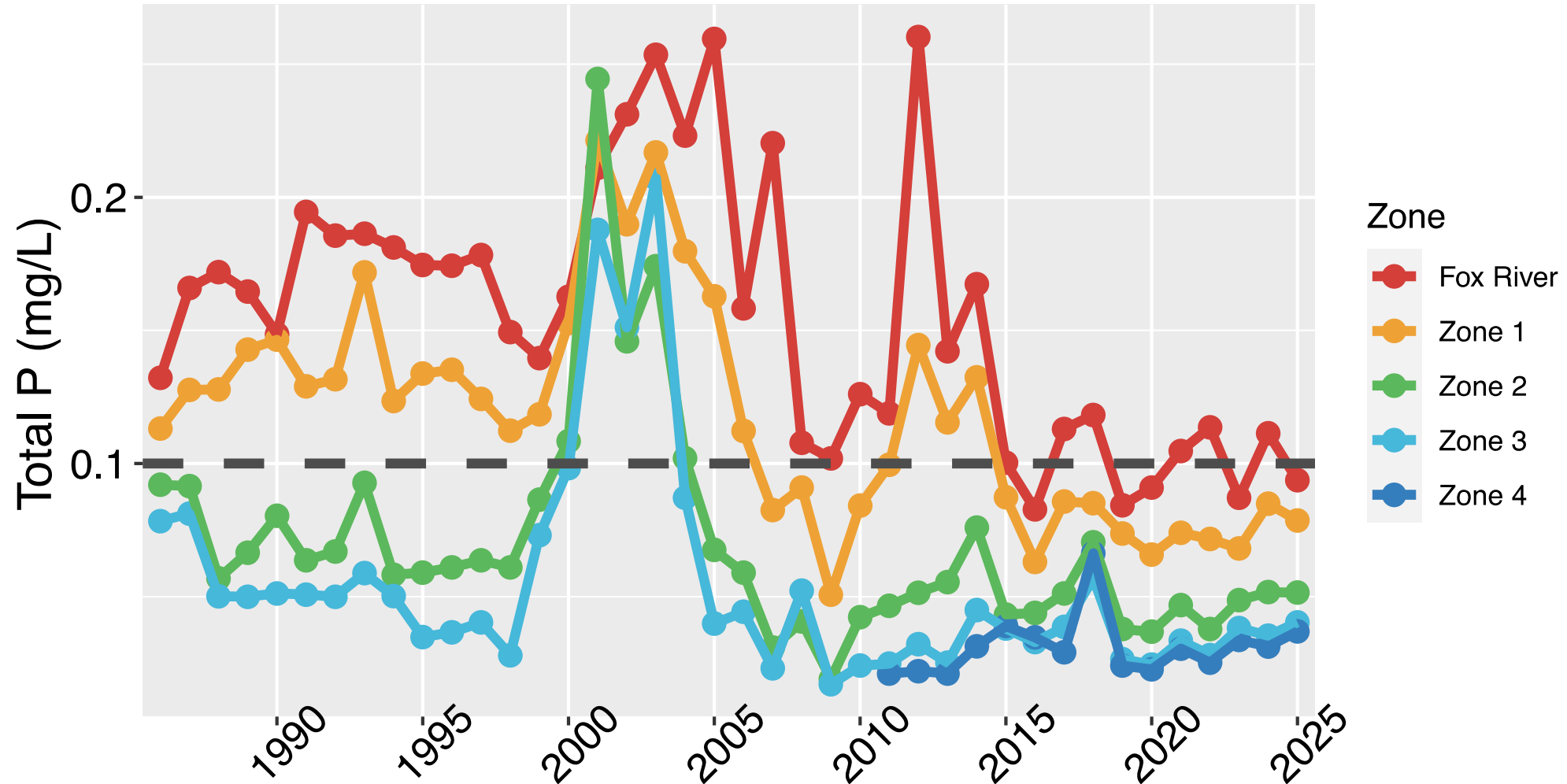


Total Phosphorus Annual Mean

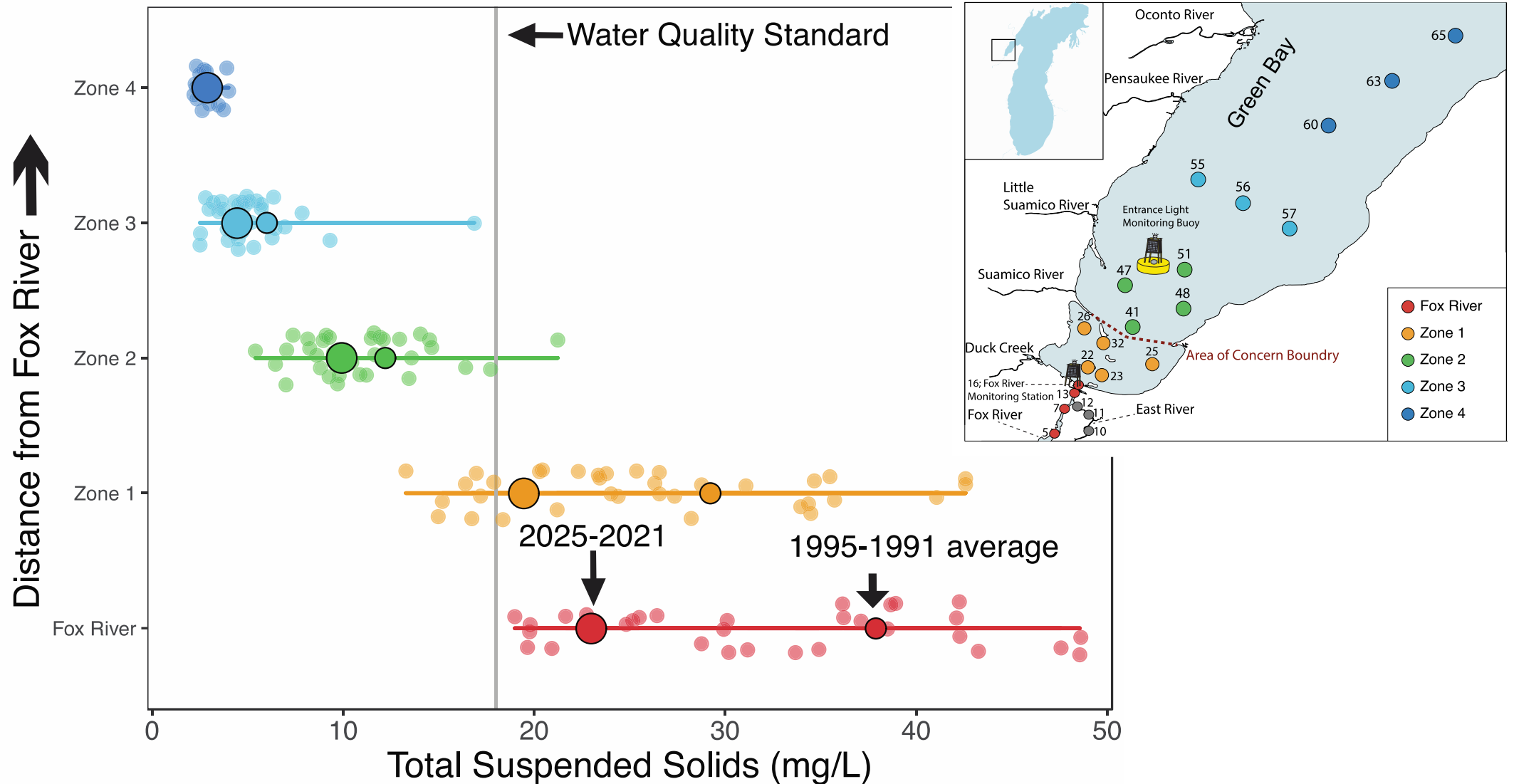


How does 2025 compare to previous years?

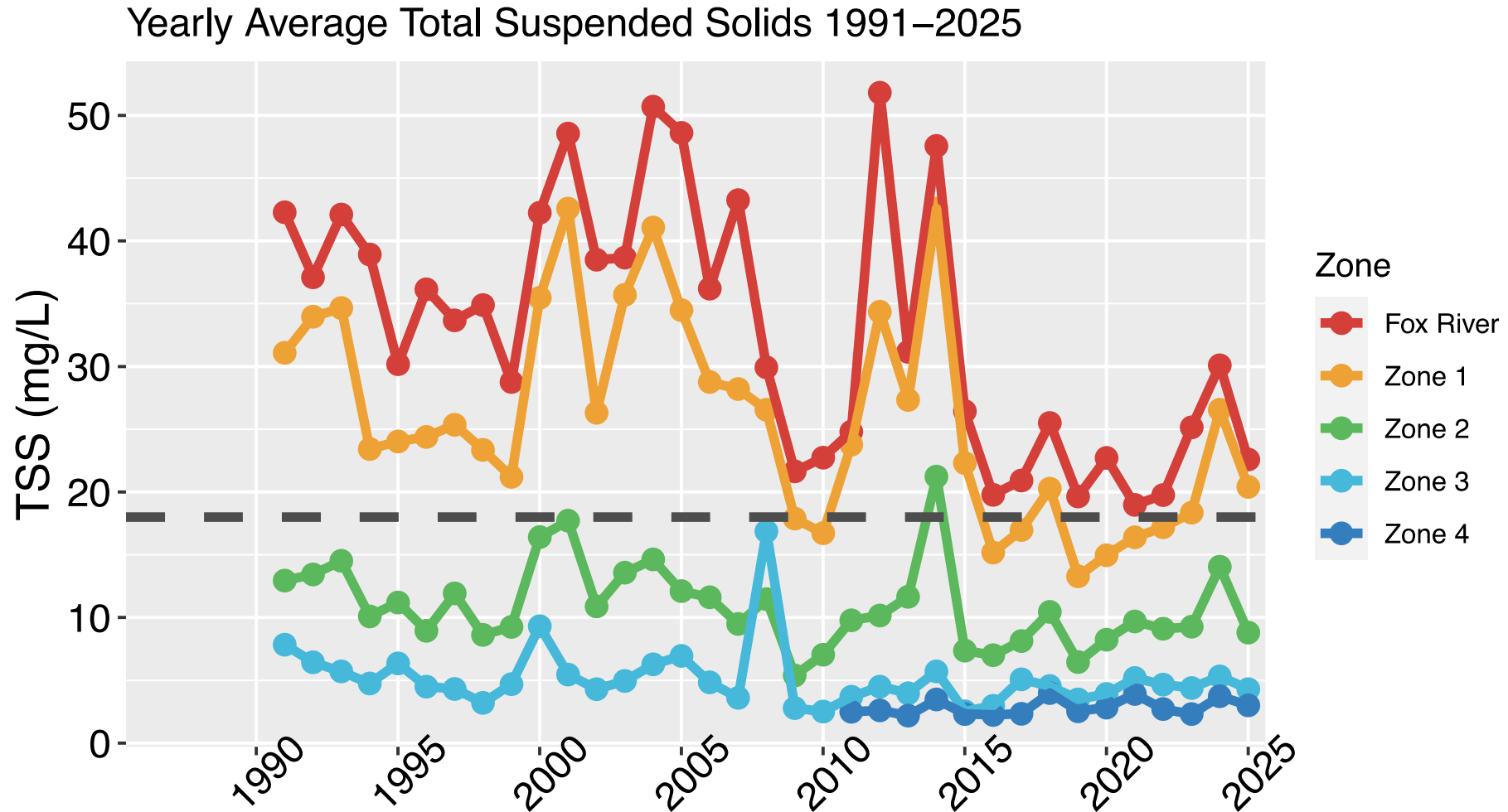
Yearly Average Total Phosphorus 1986–2025

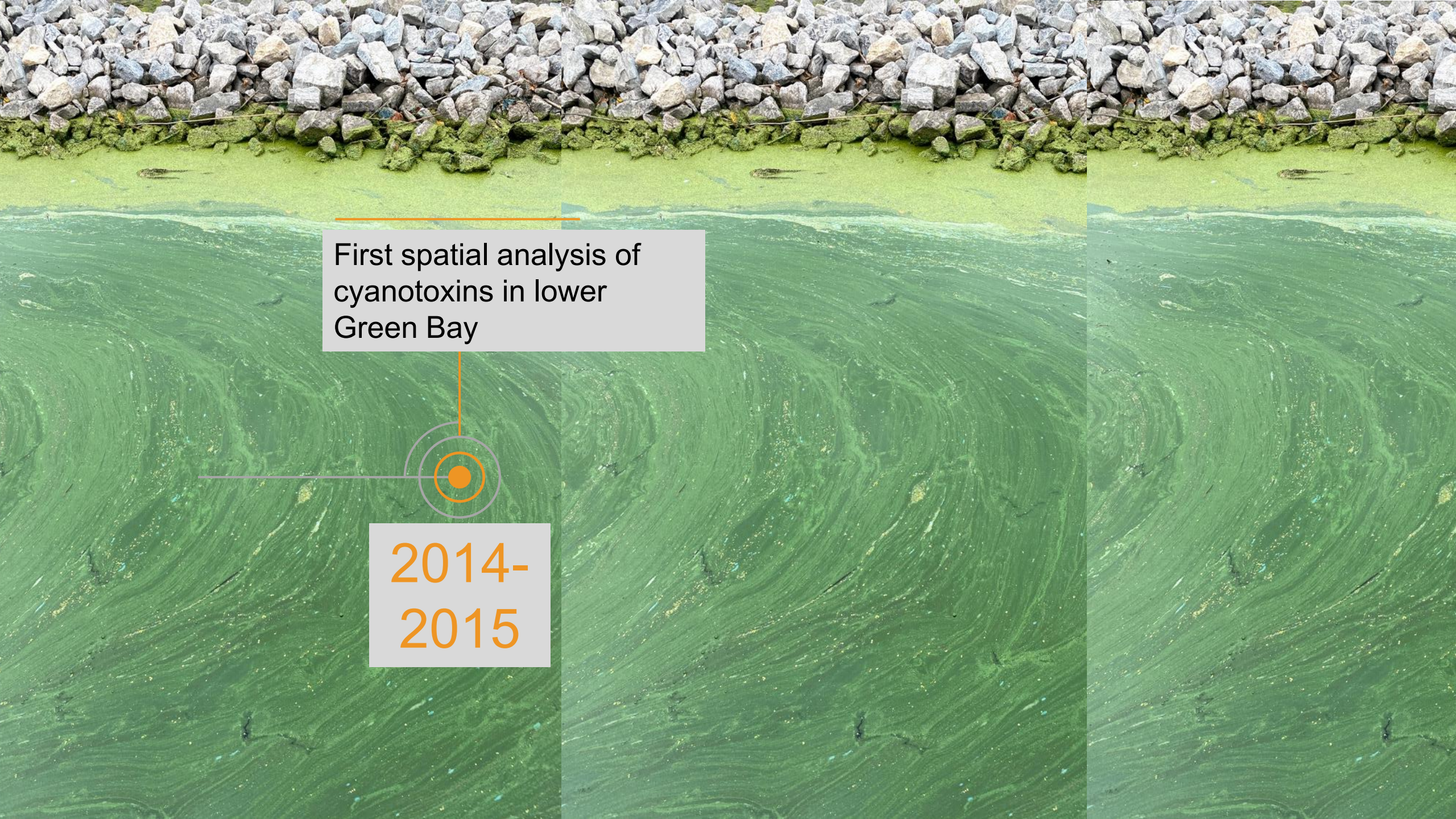


Total Suspended Solids Annual Mean

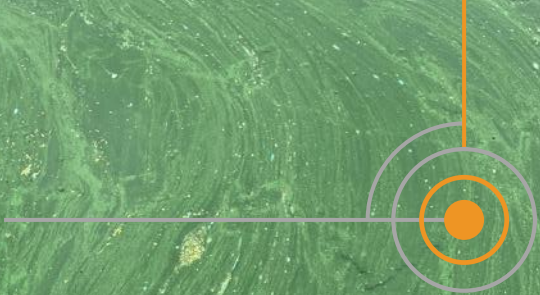


How does 2025 compare to previous years?





First spatial analysis of
cyanotoxins in lower
Green Bay

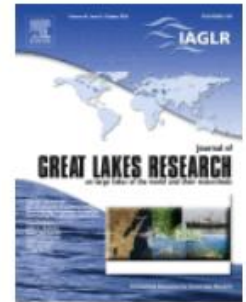


2014-
2015



Journal of Great Lakes Research

Volume 44, Issue 5, October 2018, Pages 924-933



Spatial analysis of toxic or otherwise bioactive cyanobacterial peptides in Green Bay, Lake Michigan

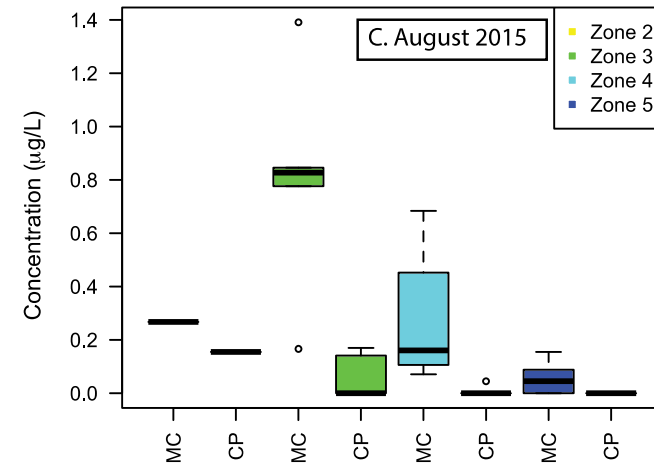
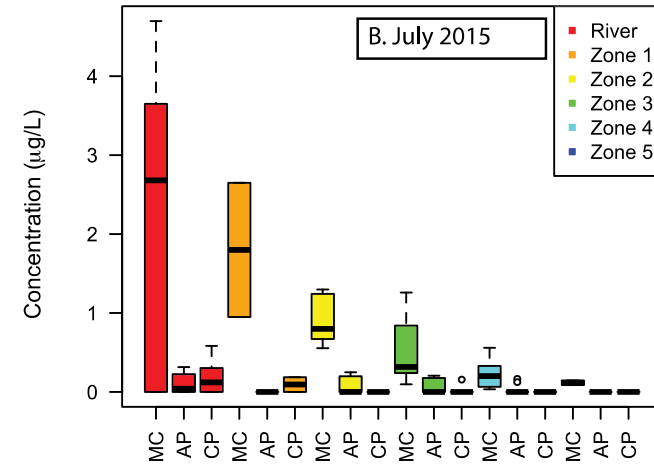
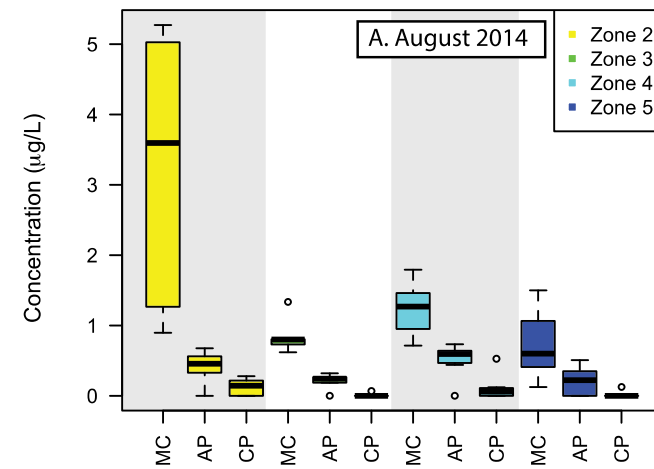
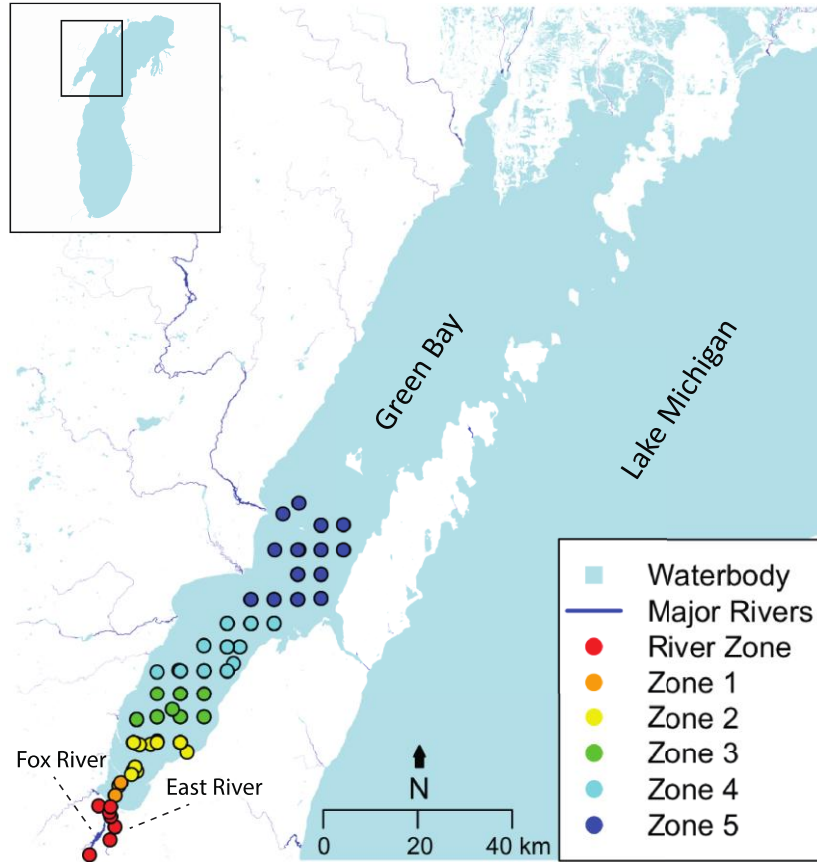
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<https://doi.org/10.1016/j.jglr.2018.08.016>

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Do cyanotoxins follow a trophic gradient?





Conclusions

- Microcystins (a very common cyanotoxin) showed a consistent trend with the strong south-north trophic gradient
- Microcystins (a very common cyanotoxin) showed the strongest correlations with chlorophyll



2016-
2020

DNR study for
cyanobacterial dynamics

Photo credit: Green Bay Parks

Assess the nature, extent, severity, and drivers of CHABs in Lower Green Bay

- Primary goal: evaluate if the current Beach Closings BUI removal targets are being met
 - If not, is the current target is achievable

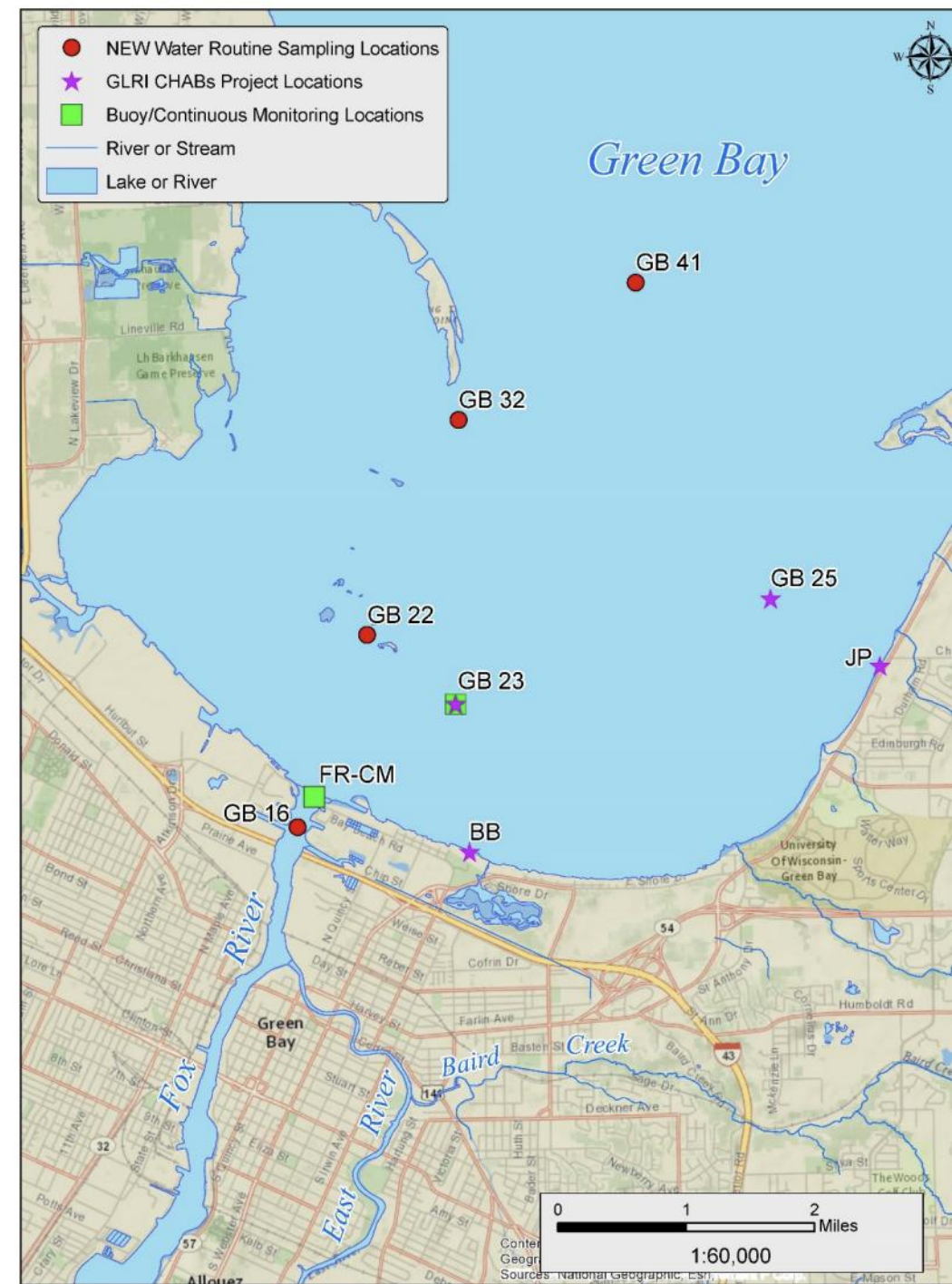
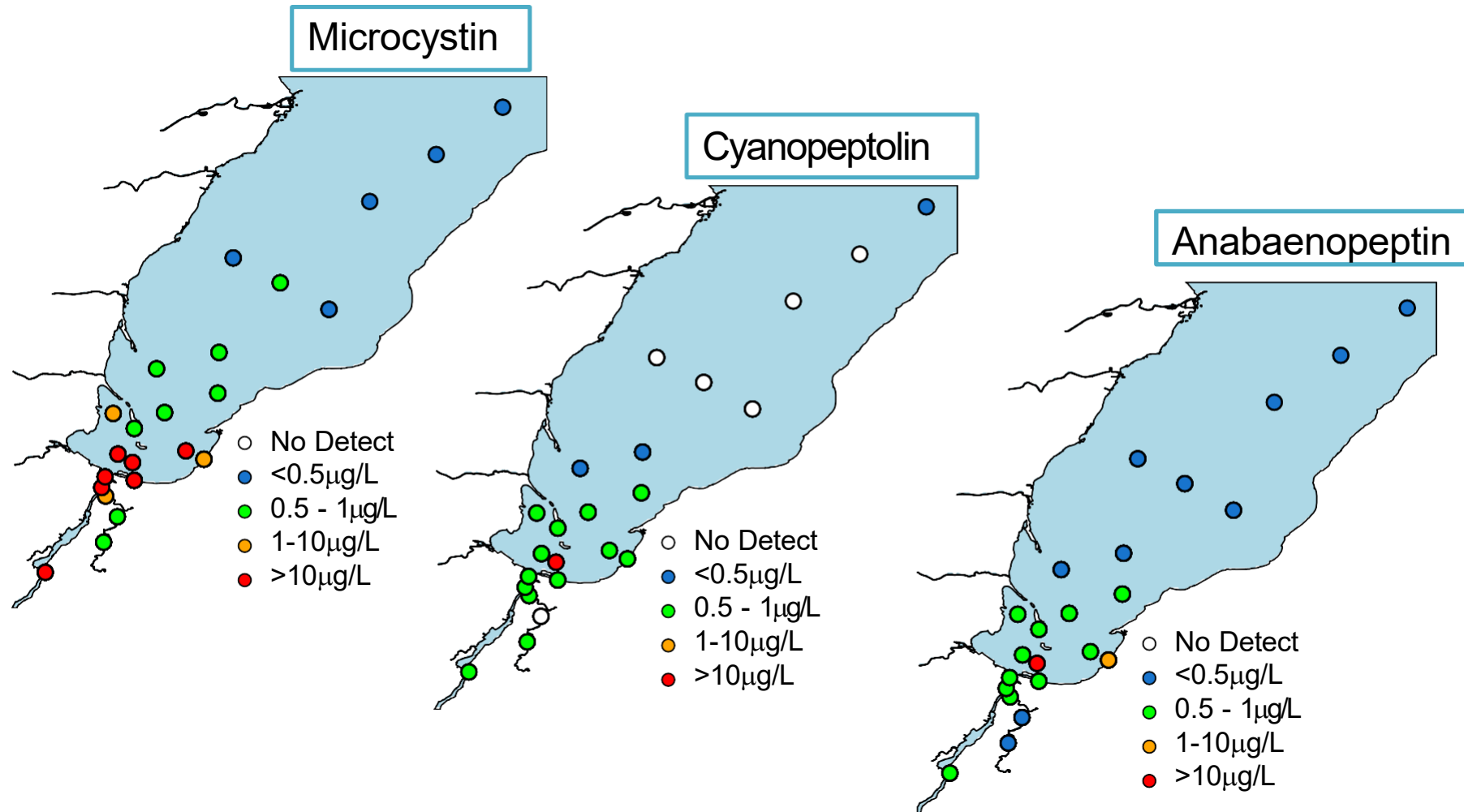




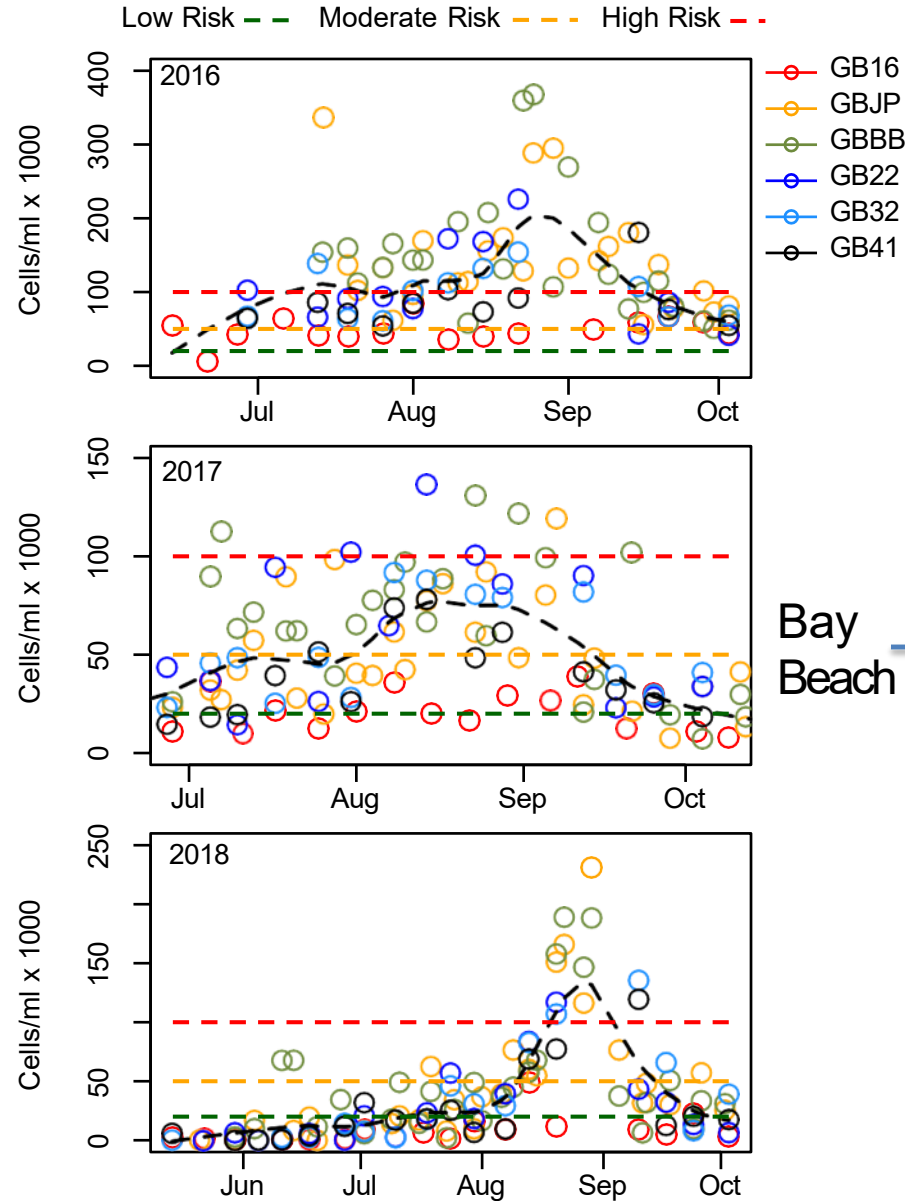
Photo credit: Green Bay Parks

Spatial Distribution of Toxins in Green Bay 2017

Mean Concentration/Site From 25 Sampling Dates, June – October 2017



Trends in Total Cyanobacteria in LGB 2016 - 2018



Risk Assessed by Total Algae in Lower Green Bay

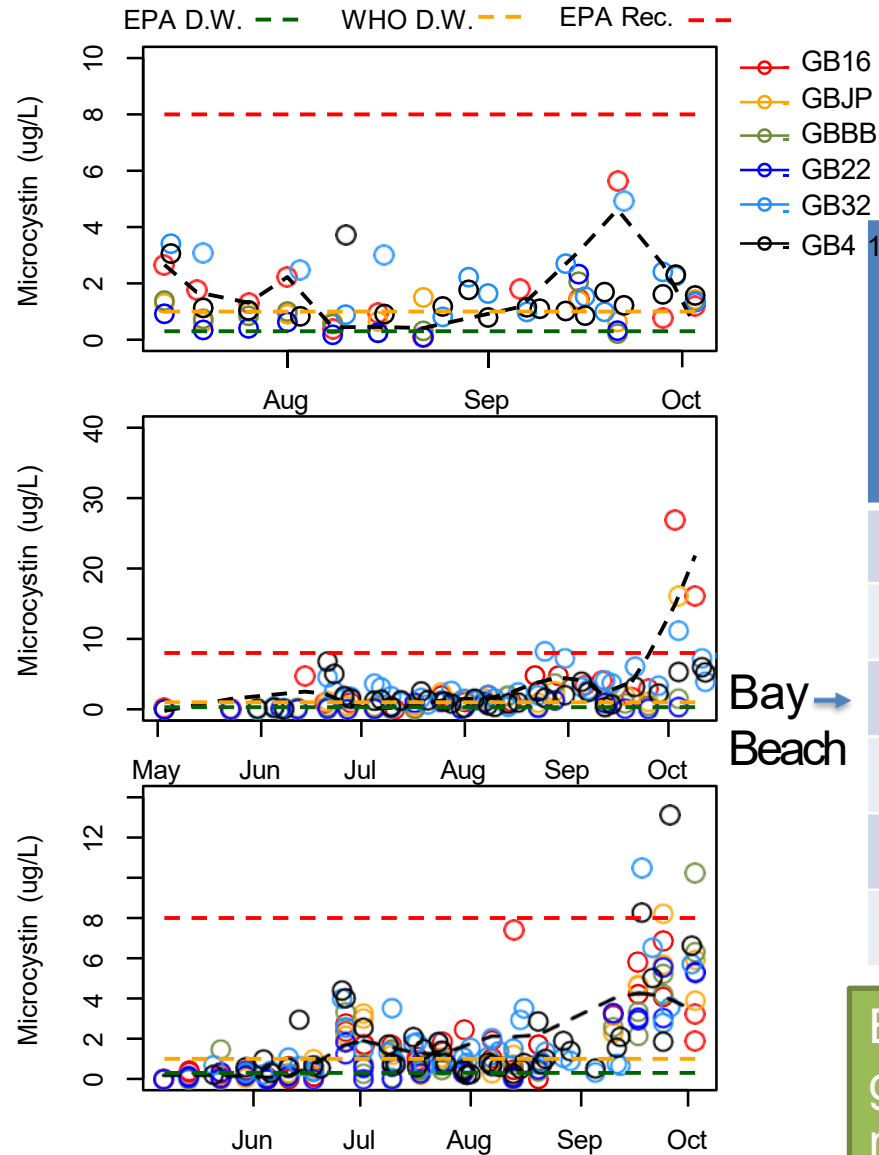
Summary Statistics (2016 – 2018)

Site	Abundance (cells/ml x 1000)		% Days Above Risk Level		
	Mean	Max	L	M	H
GB16	48	85	54	13	0
GBJP	143	337	81	55	30
GBBB	148	367	81	63	33
GB22	106	225	77	48	21
GB32	97	153	81	52	22
GB41	85	180	68	48	8

L = low, M = moderate, H = High

Based on cell abundance of cyanobacteria the lowest risk was at the Fox River mouth site (GB16). Highest risk was at Bay Beach site

Trends in Microcystin in LGB 2016 – 2018



Risk Assessed by Microcystins in Lower GB

Summary Statistics (2016 – 2018)

Site	Concentration (ug/L)		% Days Above Risk Level		
			Drinking		EPA Rec.
	Mean	Max	EPA	WHO	
GB16	2.3	26.8	92	67	3.3
GBJP	2.0	13.1	100	81	2.5
GBBB	2.2	11.1	100	78	2.7
GB22	1.9	44.6	100	40	3.4
GB32	1.8	38.3	80	30	1.8
GB41	1.7	34.0	70	20	0.81

Based on the EPA's microcystin recreational guideline the lowest risk was at site GB41. Highest risk was at GB22, Bay Beach and Joliet Park



NASA Sea Prism

2018 -
2022

Sea Prism

- A field radiometer deployed to support satellite validations
- One of three radiometers deployed in freshwater
 - Lower Green Bay, Lake Erie, and Lake Okeechobee
- Help satellites detect true color and turbidity, especially near land

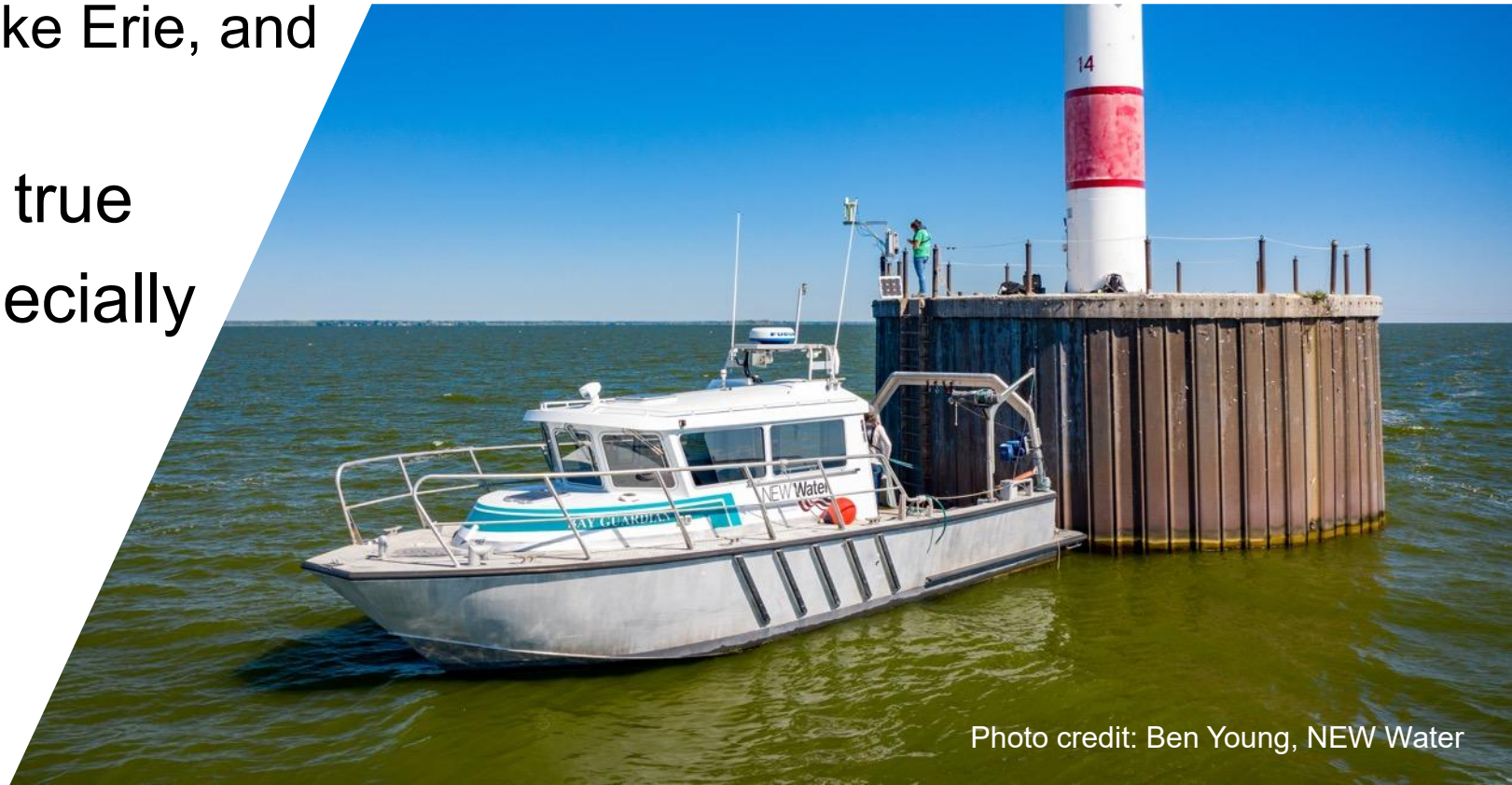


Photo credit: Ben Young, NEW Water



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RECEIVED 02 February 2023

Leveraging multimission satellite data for spatiotemporally coherent cyanoHAB monitoring

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2025



Avoid the lck

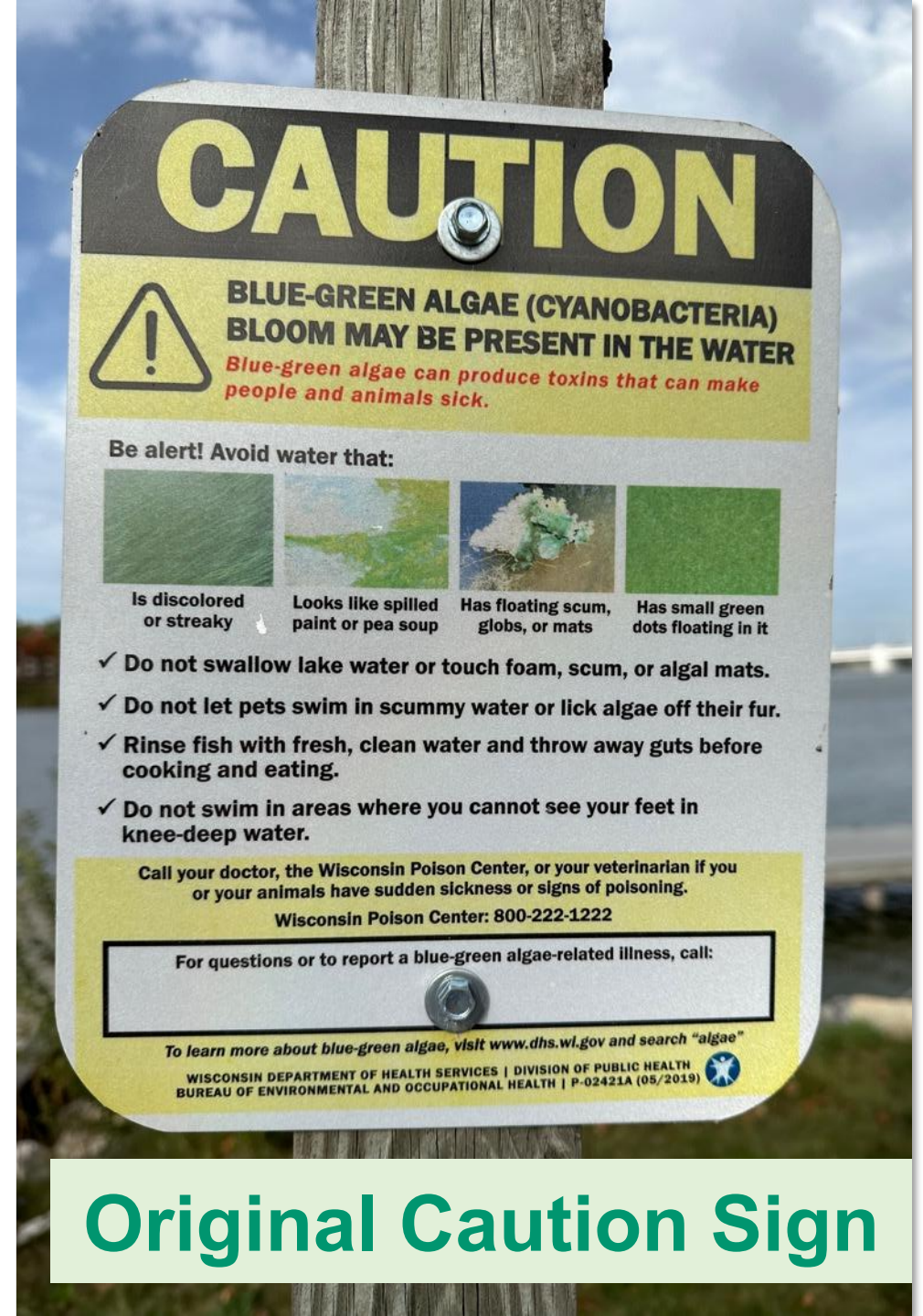
Avoid The Ick

Bringing together the right
partners for a local
harmful algal bloom
campaign



The Overall Challenge

- Communicating science to the public is hard
- Who should organize an educational campaign?
- Where does funding come from?
- Need to get information disseminated



Warning signs are at some boat launches (not all)

- Small in size (8 ½" x 11" paper)
- Not accessible to multilingual communities that use a language other than English
- Located in an overcrowded location



Communications strategy

- **Goal:** Raise public awareness of harmful algal blooms.
- **Audiences:**
 - Primary: NEW Water customers (Brown County's 15 municipalities), including:
 - Those who recreate on the water
 - Old and young (parents of children) who are most at risk
 - Pet owners
 - Secondary: General public
- **Scope:** Develop concept, theme, naming, messaging, tagline and select collateral.

The creative challenge

- Quickly capture attention and get to the point (Think: Mr. Yuk)
- Memorable
- Less is more
- Real, clear pictures since HABs are easy to confuse with Duck Weed
- Do not depict behaviors we are trying to dissuade
- Applicable to multiple cultures and languages, including English, Spanish, Hmong and Somali

BLUE-GREEN ALGAE CAN PRODUCE TOXINS THAT MAKE PEOPLE AND ANIMALS SICK.

STEER CLEAR. | RINSE OFF. | WHEN IN DOUBT, STAY OUT.

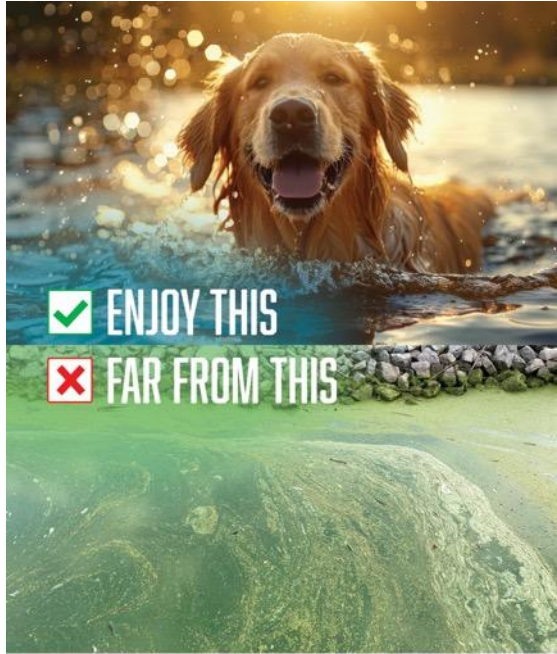




Signs in the Wild

- Brown County Public Health
 - Local entity that promotes and protects health
 - Would install signage at several local beaches





✓ ENJOY THIS
✗ FAR FROM THIS

BLUE-GREEN ALGAE CAN PRODUCE TOXINS THAT MAKE PEOPLE AND ANIMALS SICK.

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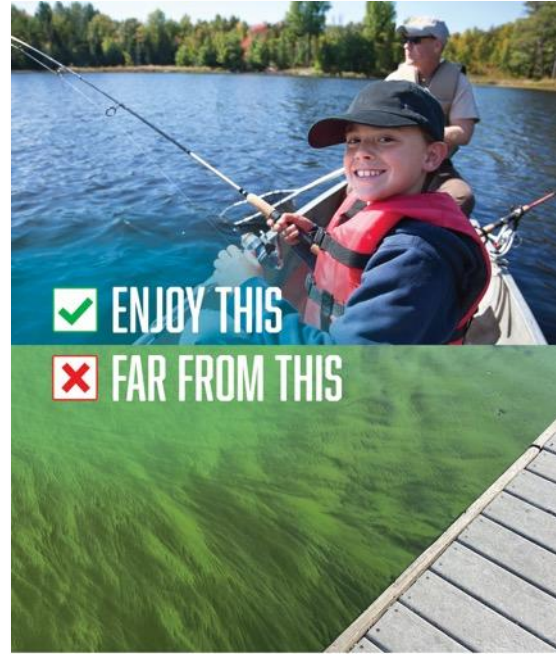
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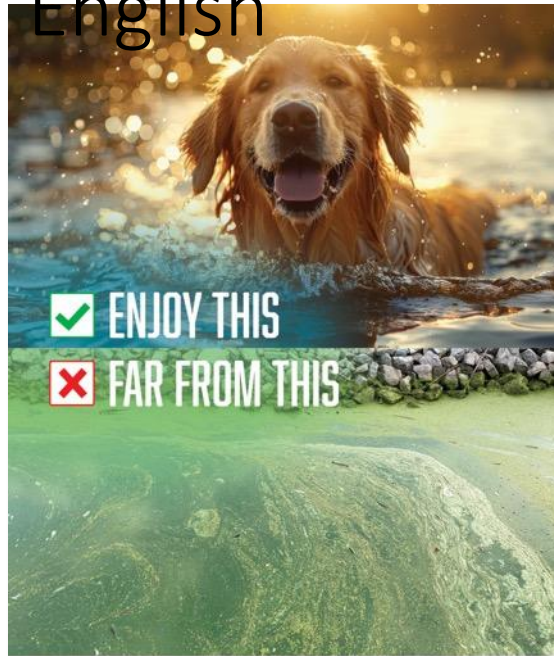
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English



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Hmong



COV NTXHUAB XIM XIAB-NTSUAB TUAJ YEEM TSIM TAU COV KUAB TSHUAJ TXHAUM UAS UA RAU TIB NEEG THIAB TSIAJ TXHUA MUAJ MOB TAU.

ZAM. | SAUV LOS. | YOG TIAS MUJ QHOV XOM XAM, CES TXAV KOM DEB.



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Spanish



LAS ALGAS VERDEAZULADAS PUEDEN PRODUCIR TOXINAS QUE ENFERMAN A LAS PERSONAS Y A LOS ANIMALES.

EVÍTELA. | ENJÁGUESE. | SI NO ESTÁ SEGURO, NO SE META.



Funded by the Wisconsin Coastal Management Program and the National Oceanic and Atmospheric Administration, Office for Coastal Management under the Coastal Zone Management Act, Grant # NA44N0348BC0009.



Somali



ALGIYADA BULUUGA CAGAARAN, WAXAY SOO SAARI KARTAA SUN KA DHIGTA DADKA IYO XAWAYAANKABA INAY JIRAANAADAAN.

U WAD SI CAD. | BIYO KU TIR. | MARKAAD KA SHAKIDO, KA JOOG.



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If you or your pets have sudden illness or signs of poisoning following exposure, please call your doctor or veterinarian, or the Wisconsin Poison Center at 800-222-1222.



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⚠ CAUTION

**BLUE-GREEN ALGAE (CYANOBACTERIA)
BLOOMS CAN PRODUCE TOXINS THAT MAKE
PEOPLE AND ANIMALS SICK.**



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Consulte la información de precaución en español en www.avoidtheick.org
Saiib cov ntaub ntawv qhia txog kev yuav tau ceev faj ua Lus Hmoob ntawm www.avoidtheick.org
Ka eeg maclumaadka feejignaanta oo Soomaali ku qoran bogga www.avoidtheick.org



This public health campaign is funded by the Wisconsin Coastal Management Program and the National Oceanic and Atmospheric Administration, Office for Coastal Management under the Coastal Zone Management Act, Grant # NA24N05X419C0009.



AVOIDTHEICK.ORG

Map Overlays ⓘ

Water
Temp

85°F

74°F

67°F

60°F

51°F

44°F

32°F

Water
Current

Anchored ×



Towers ×



Surface Water Temperature ×



Crivitz

Marine

+2

Sister Bay

Baileys Harbor

Oconto

Sturgeon Bay

+2

Pulaski

Suamico

+7

Green Bay

+2



Fox River Webcam