

Harmful cyanobacterial blooms, loss of recreational opportunities, and environmental justice areas in New York

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What is Environmental Justice?

“The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.”

www.epa.gov/environmentaljustice



Washington Park Pond, Albany, NY; Photo by J. Graham, USGS

Federal Agency Role

Executive Orders 14008 and 12898 call for agencies to make achieving environmental justice part of their missions “by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts.”

The Question: How do we begin to assess if cyanoHABs are an issue of concern from an environmental justice point of view?

- Low-income communities and communities of color are disproportionately impacted by pollution.
- Access to public recreation opportunities is “everyone’s right for a better quality of life”(Kim et al. 2019)
- Heat is the greatest cause of weather-related death in the US (NYSDOH).



An understudied aspect of cyanobacteria blooms

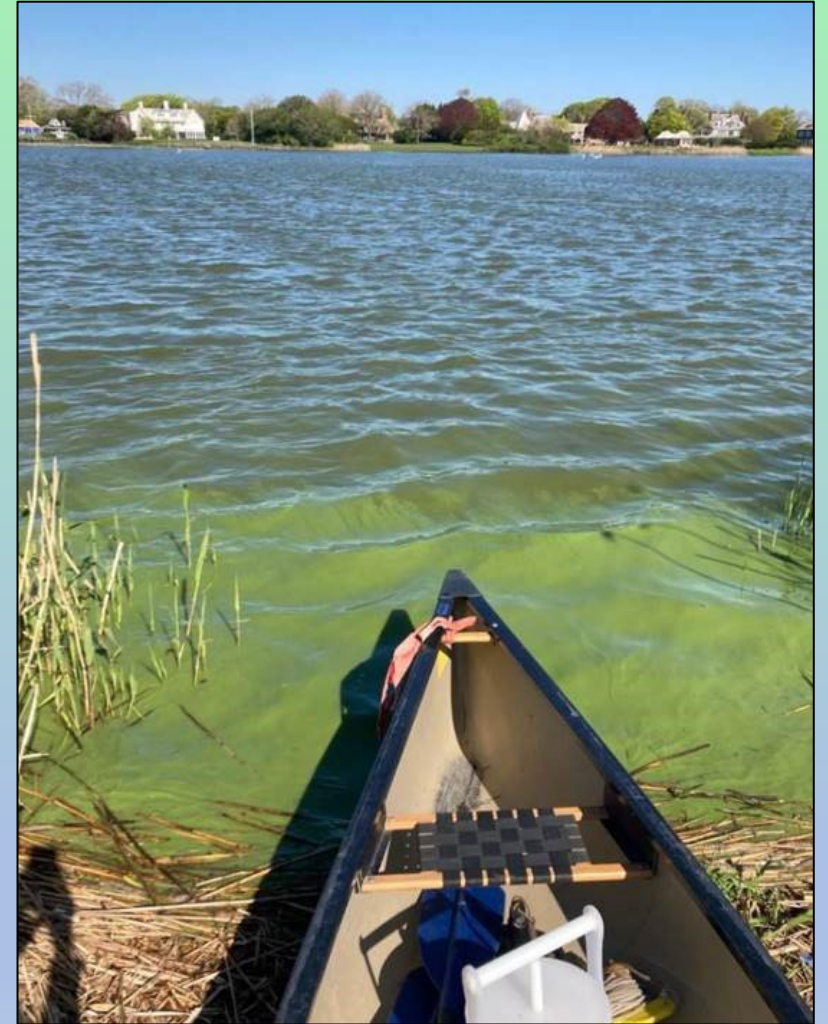
There is currently an identified research gap concerning whether cyanoHABs and the resulting loss of recreational opportunities at closed beaches pose environmental justice concerns (Suddleson and Hoagland, 2021).



Objectives:

To describe and quantify the impacts of cyanobacteria blooms through an environmental justice lens in New York State by:

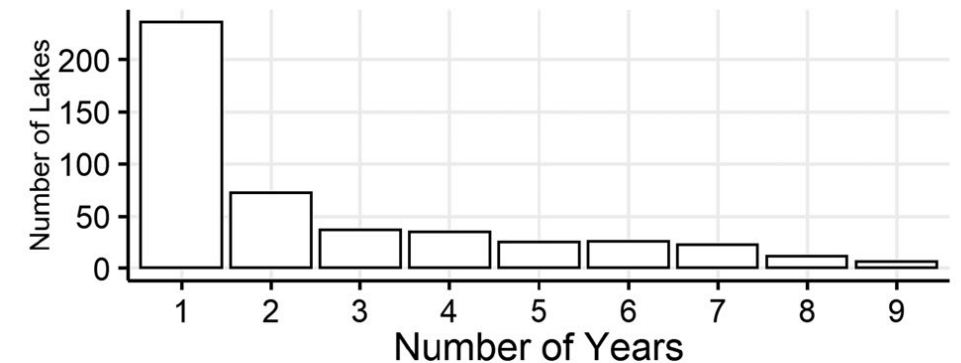
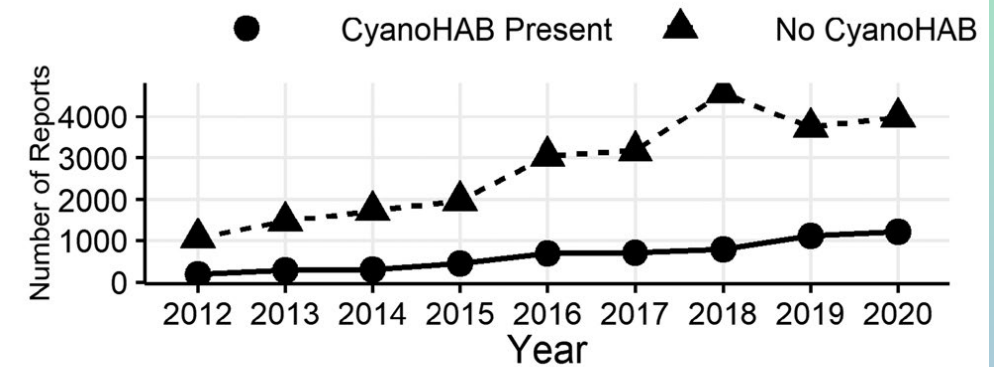
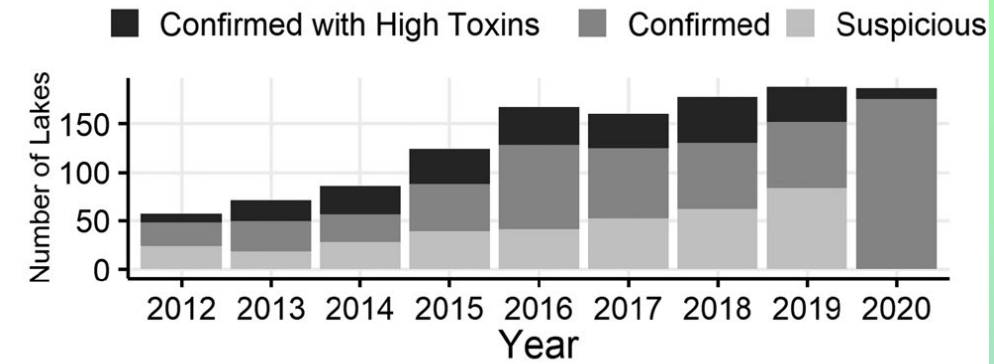
- 1) describing the distribution of reported cyanobacteria blooms in relation to environmental justice areas (EJAs)
- 2) quantifying bloom frequency, duration, and lost recreational opportunities in EJAs and non-EJAs



Agawam Lake, NY, Photo by R. Gorney

Cyanobacteria HABs in NY

- NYS DEC compiles thousands of reports annually
- CyanoHAB monitoring in NY has been rising. Increasing numbers of locations and bloom reports over the last decade
- As a “home rule” state, no lake access closure other than beaches



NYS HABs Beach Closure Guidance

- Closure based on visual determinations
- Reopened after being clear of HAB for 1 day and microcystins are $< 4.0 \mu\text{g/L}$
- > 800 beaches statewide



BEACH CLOSED

Harmful Blue-green Algae Blooms

STAY OUT OF THE WATER

Contact can make people and animals sick.

If contact occurs, rinse with clean water.
If symptoms occur, contact a medical provider.

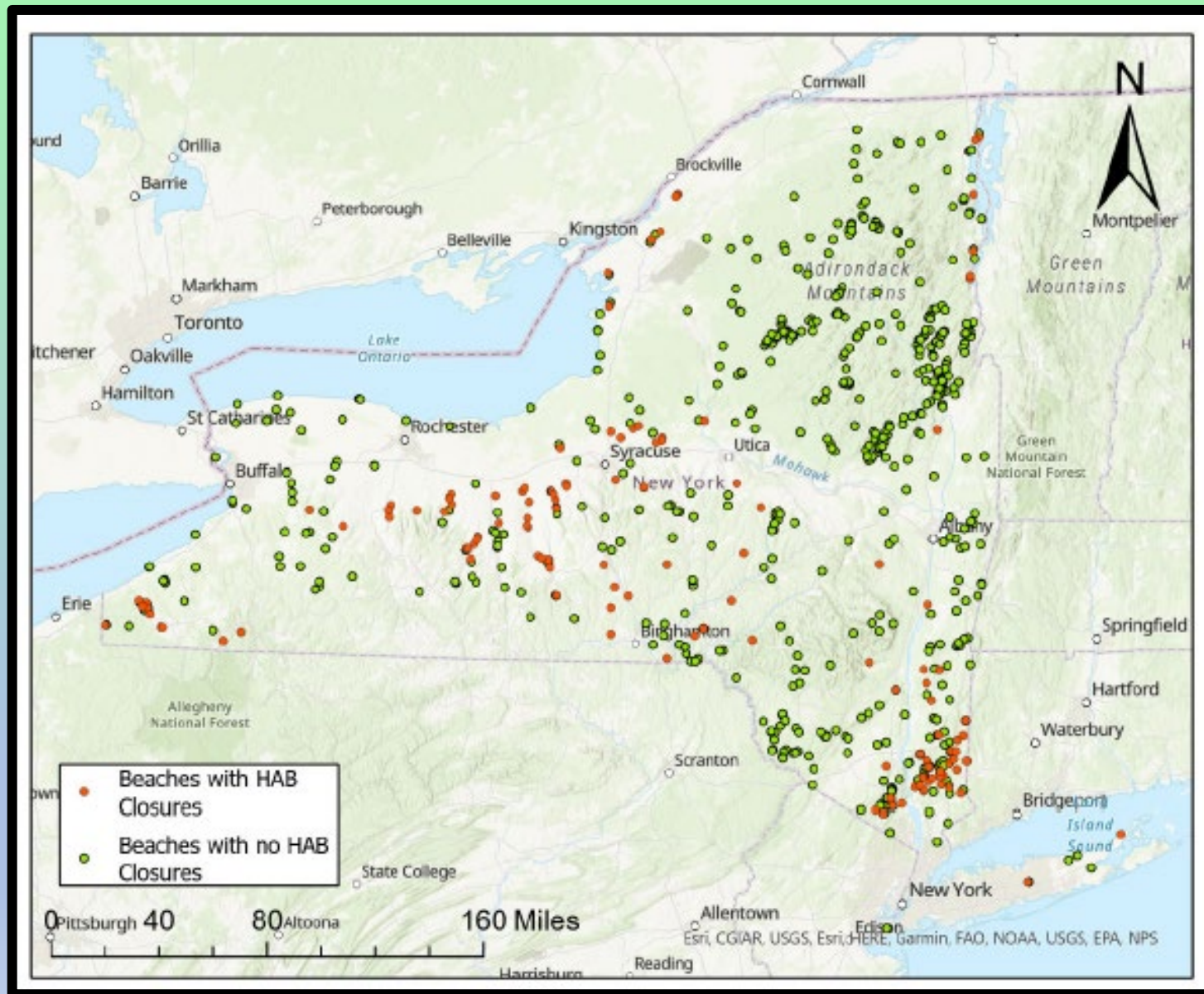


If you see discolored water, blooms, or scum outside the swim area, don't swim, fish, or boat in those areas. Keep kids and pets away.

6638 Learn more: www.health.ny.gov/HarmfulAlgae 6/22

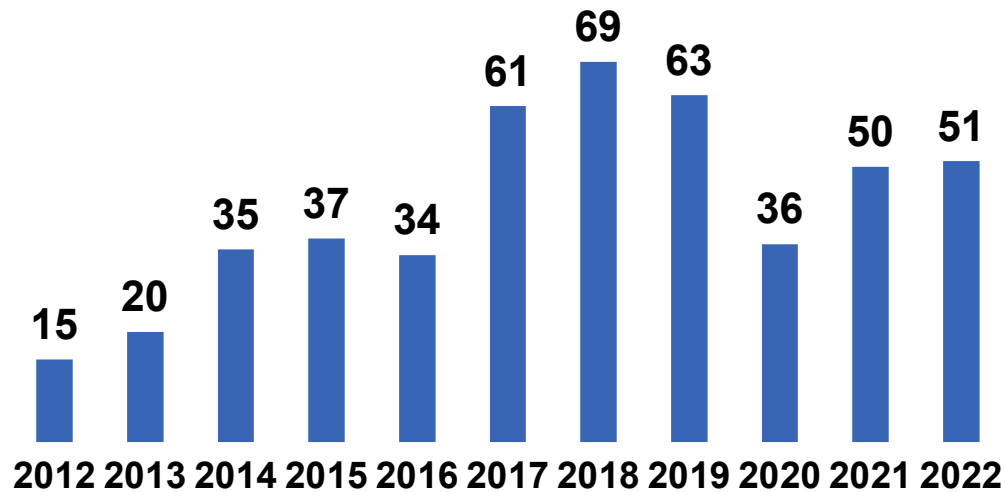
CyanoHABs Beach Closures

- From 2012-2021, 151 beaches were closed
- Broader DEC dataset of cyanobacteria blooms, not just beaches
- Recreational season Memorial Day - Labor Day

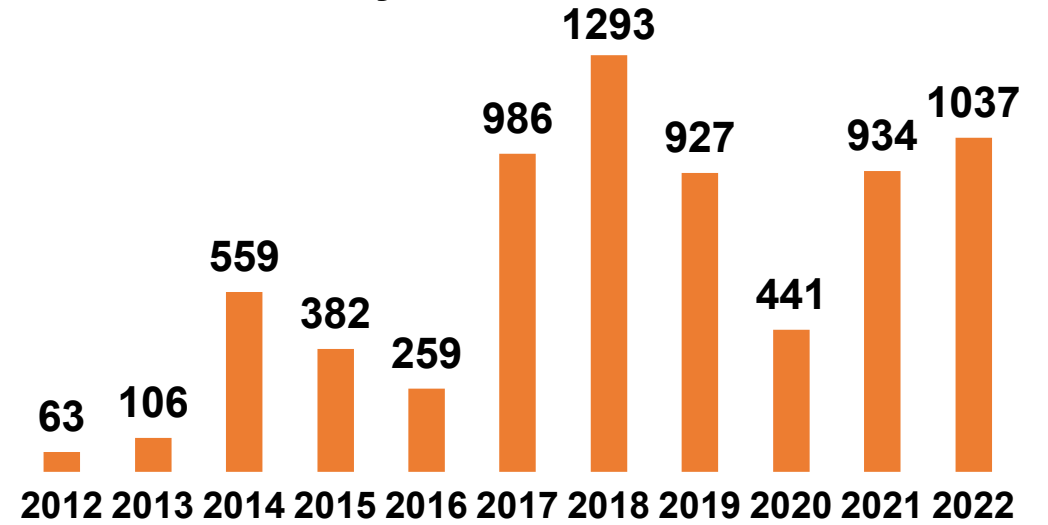


Recreational Opportunity Loss

Number of Beaches Closed due to Harmful Cyanobacteria Blooms



Number of Lost Beach Days due to Harmful Cyanobacteria Blooms



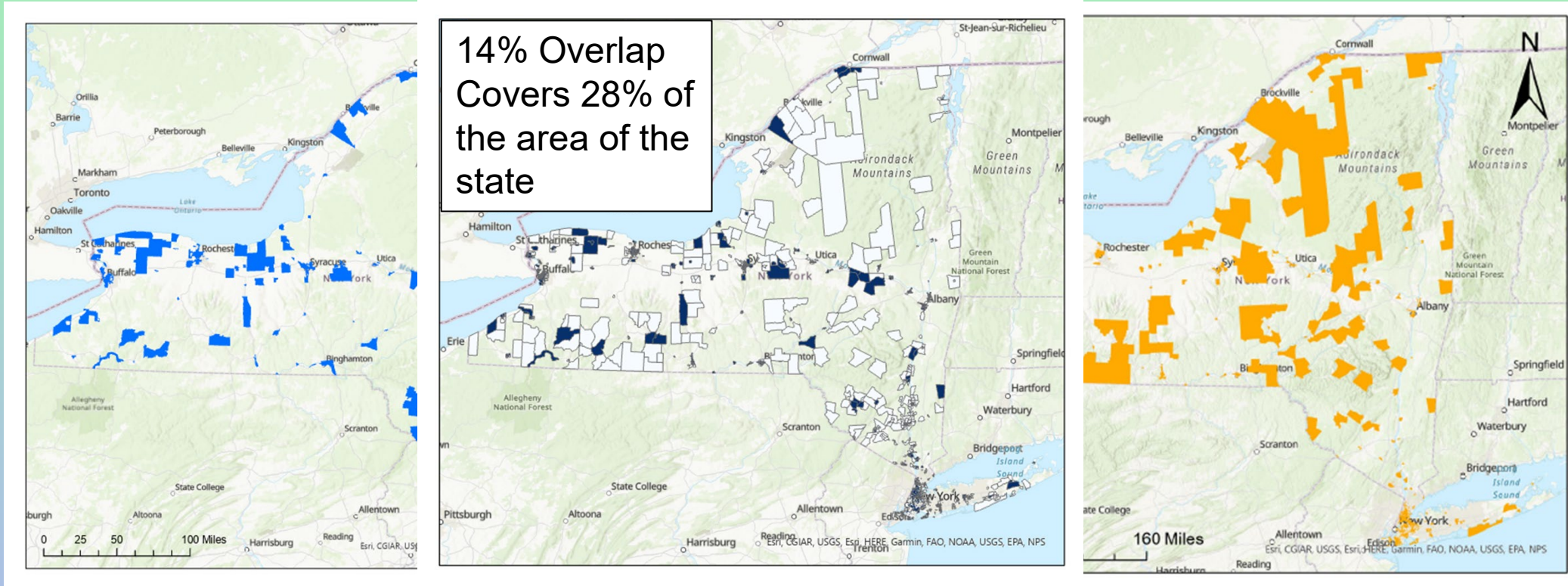
Federal and State EJ Maps

- **New York State Disadvantaged Communities Criteria:** Established by NYS Climate Justice Working Group; based on environmental burdens, climate change risk, population characteristics, and health vulnerabilities
- **Justice40 Initiative:** Established by federal government; towards goal that 40% of the overall benefits of certain Federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution.
- Both are maps of census tracts that meet certain thresholds/criteria

EJ Area Designations

NYS Disadvantaged Communities

Justice40



- 1736/4919 census tracts designated as disadvantaged communities
- Covers 9% of the area of the state
- 1773/4919 census tracts designated as disadvantaged communities
- Covers 23% of the area of the state



What would equitable distribution of loss of recreation due to cyanobacteria blooms look like?



- Many different ways to describe equity – Equal Proportion of Access
- With the data we have now, we use the container method of access
- Loss of recreation has some logical layers; are they the same?

Waterbodies



Beaches



Beach Closures

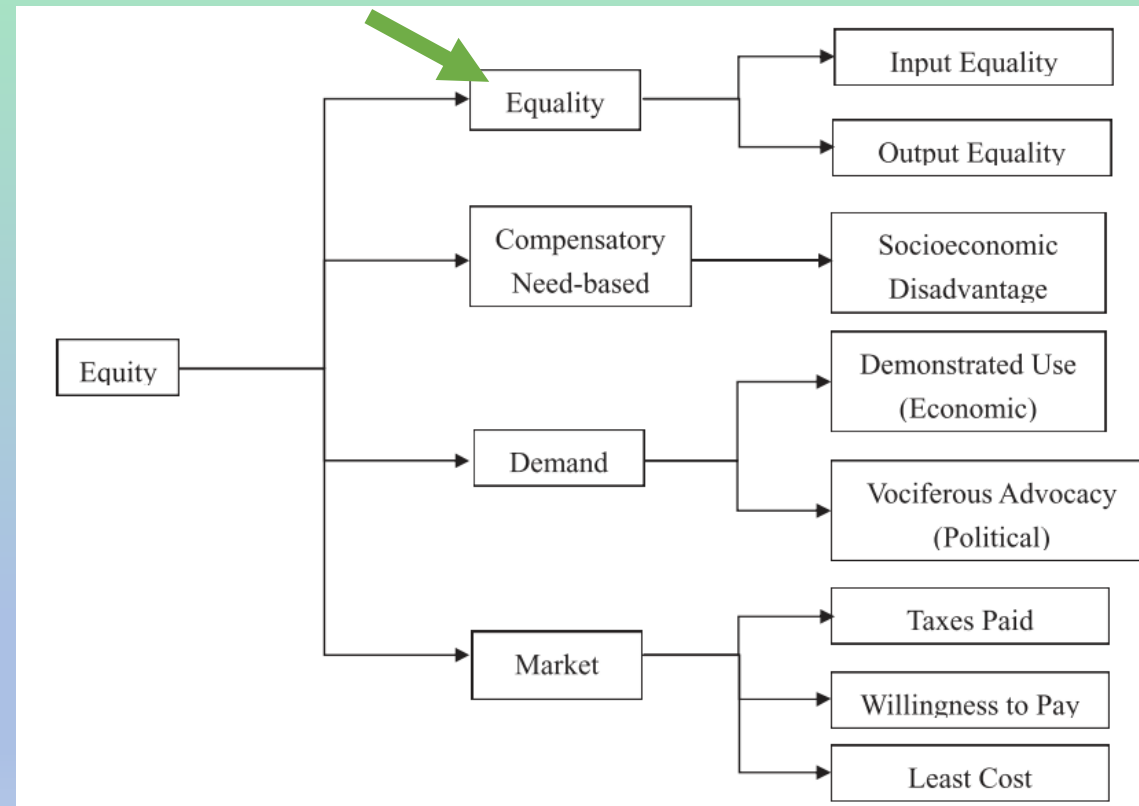
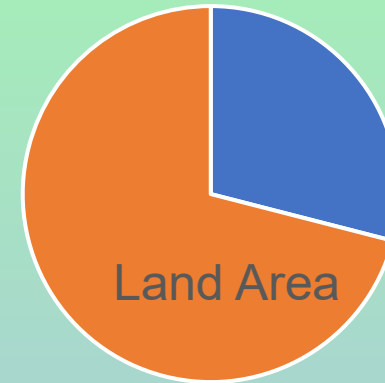


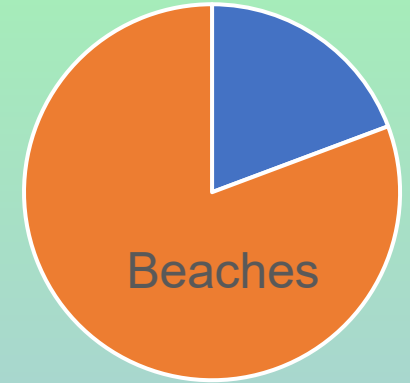
Figure 1. Types of equity (Nicholls 2001, 203, after Crompton and Wicks 1988).

Are resources and loss of resources equitable between EJ and non-EJ areas?

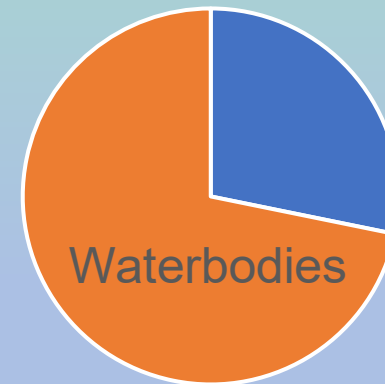
- EJ areas cover 28% of the area of the state
- 27.2% of waterbodies fall within EJ areas
- 18.5% of all beaches fall within EJ areas
- 10% of beach closures happened at beaches within EJ areas
- Average closure length is nearly the same within (8.55 days) and outside (8.82 days) EJ areas



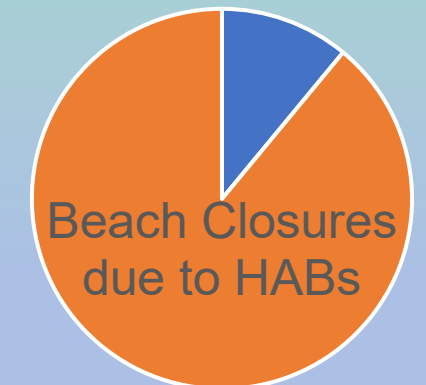
■ EJA ■ Non EJA



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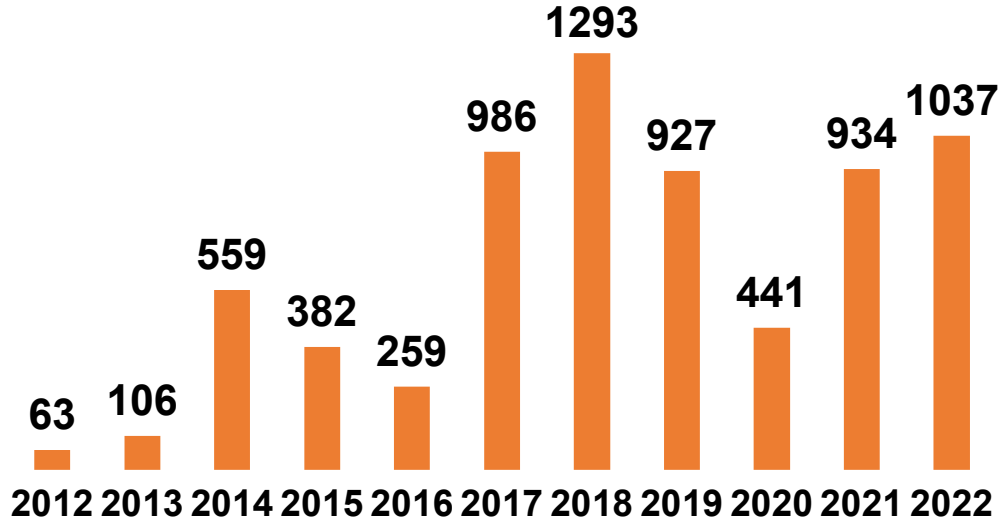
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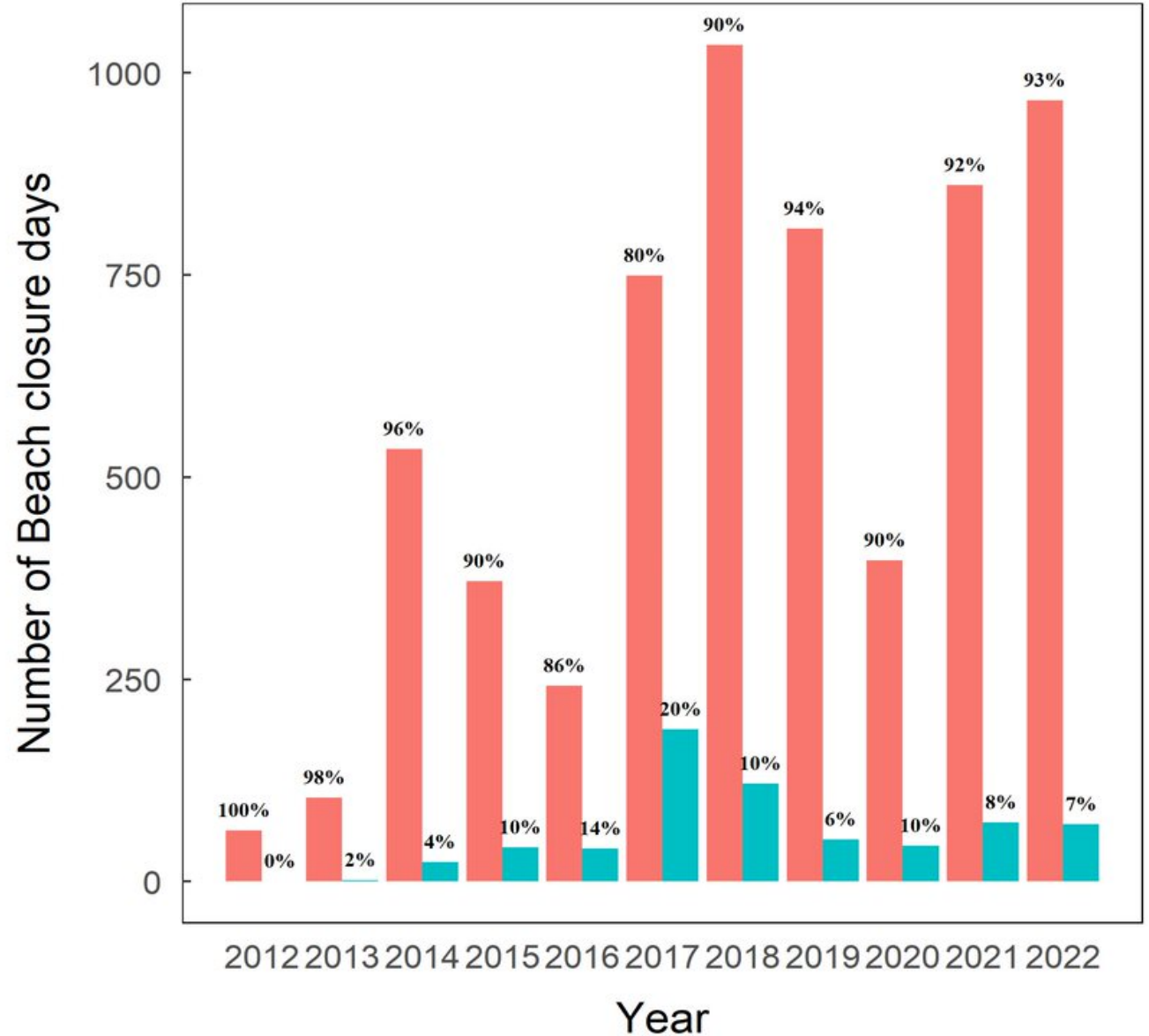
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Temporal trends

Number of Lost Beach Days due to Harmful Cyanobacteria Blooms

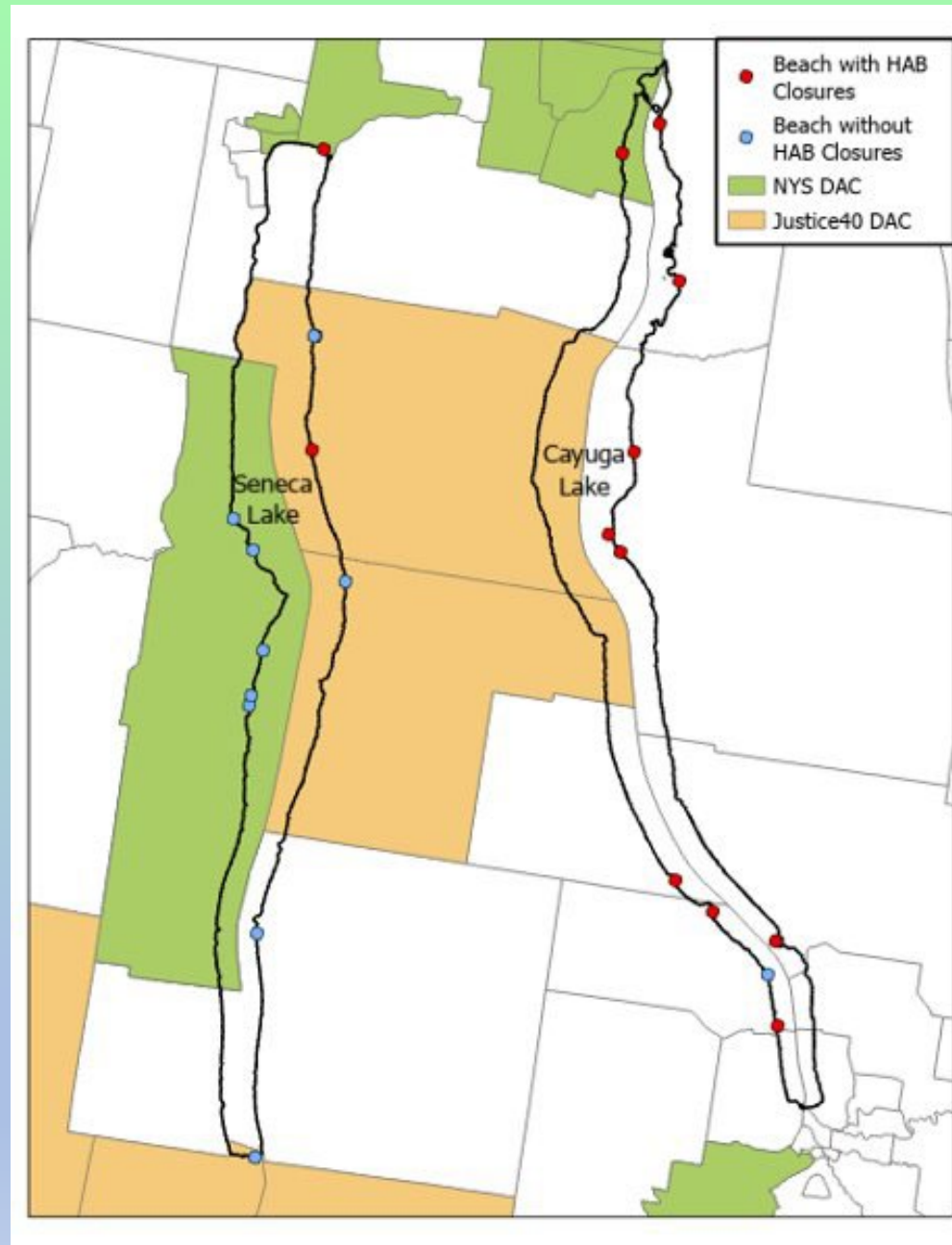


Within EJ Areas No Yes



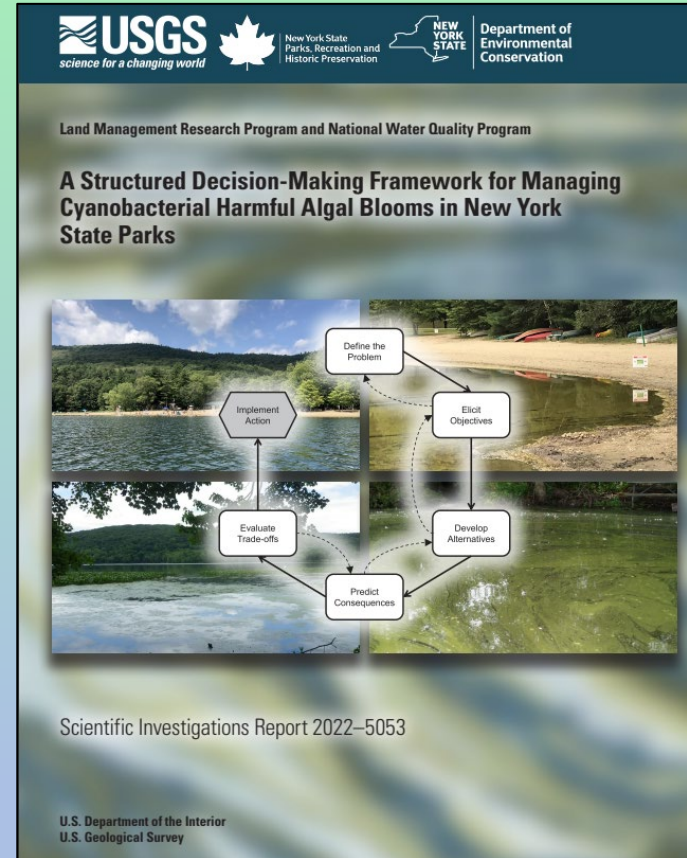
Caveats and Future Directions

- Not all beaches are public
- What constitutes access?
- Beach closures are related to reporting of blooms:
 - not all blooms are reported
 - a bloom on a waterbody but not at a beach doesn't necessarily result in a closure.
- Beaches close for other reasons
- Other recreation opportunities? Boat launches?



Adaptations to impacts on recreation

- Vouchers for use at pools as alternative swimming/cooling options
- Mitigation methods (Lake Welch)
- Structured decision making (Moreau Lake and Rockland Lake)



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Questions?

References:

Gorney, R.M., S. G. June, K. M. Stainbrook and A. J. Smith. (2023a). Detections of cyanobacteria harmful algal blooms (cyanoHABs) in New York State, United States (2012–2020). *Lake and Reservoir Management*. 39(1),21-36.
<https://doi.org/10.1080/10402381.2022.2161436>

Gorney, R.M., Graham, J.L., Murphy, J.C., (2023b) The "H," "A," and "B" of a HAB: A definitional framework, *LakeLine*, 43(2), 7-11.
Links: <https://www.nalms.org/product/lakeline-43-2-harmful-algal-blooms/>, <https://www.nalms.org/wp-content/uploads/2023/07/43-2-3-revised-2.pdf>

Kim, J., & Nicholls, S. (2018). Access for all? Beach access and equity in the Detroit metropolitan area. *Journal of Environmental Planning and Management*, 61(7), 1137–1161. <https://doi.org/10.1080/09640568.2017.1335187>

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