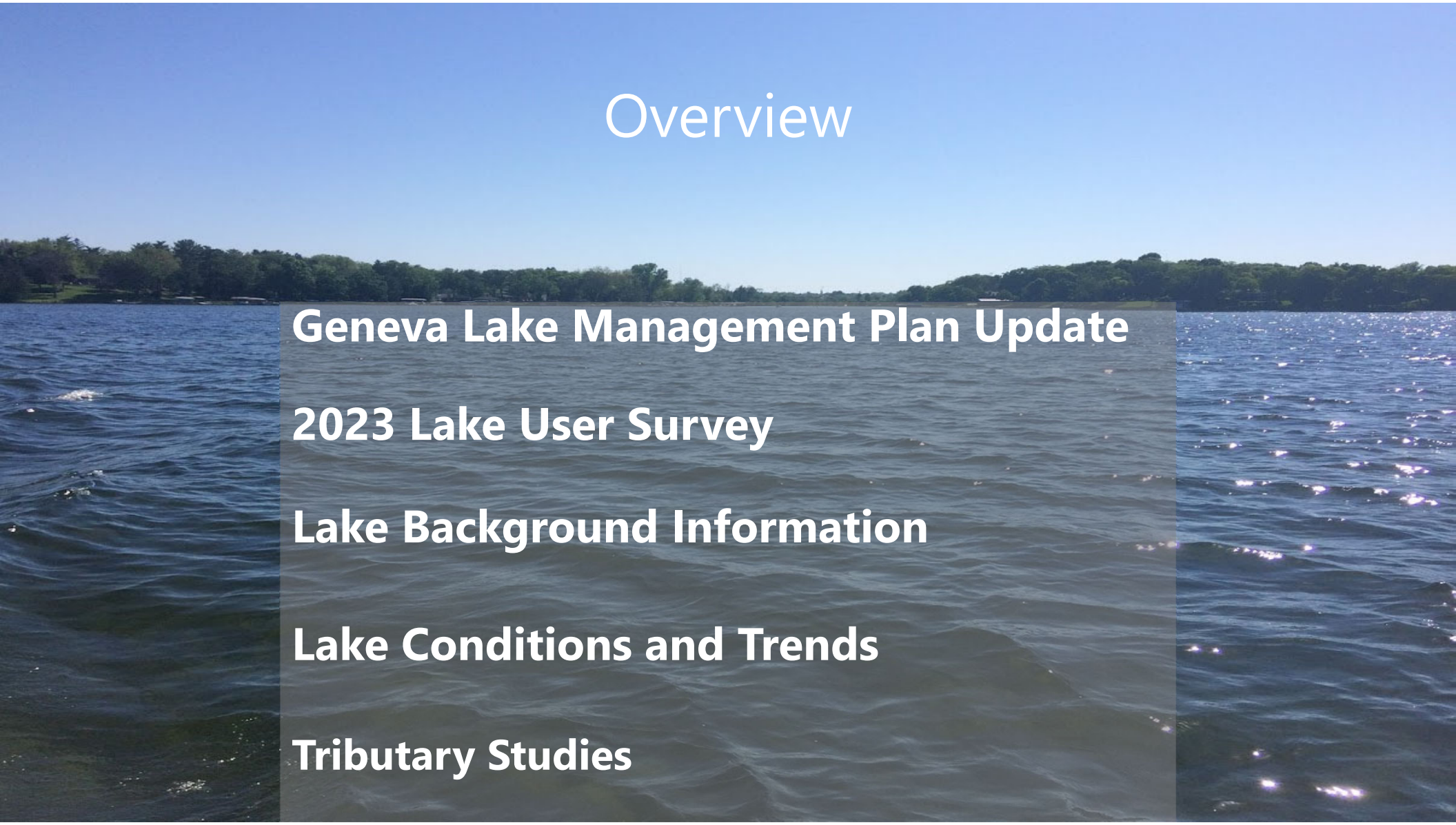
Southeastern Wisconsin

Regional Planning Commission

Geneva Lake Water Quality Conditions

Geneva Lake Management Plan Focus Group Meeting
Lake Geneva, WI
May 20, 2024



Overview

Geneva Lake Management Plan Update

2023 Lake User Survey

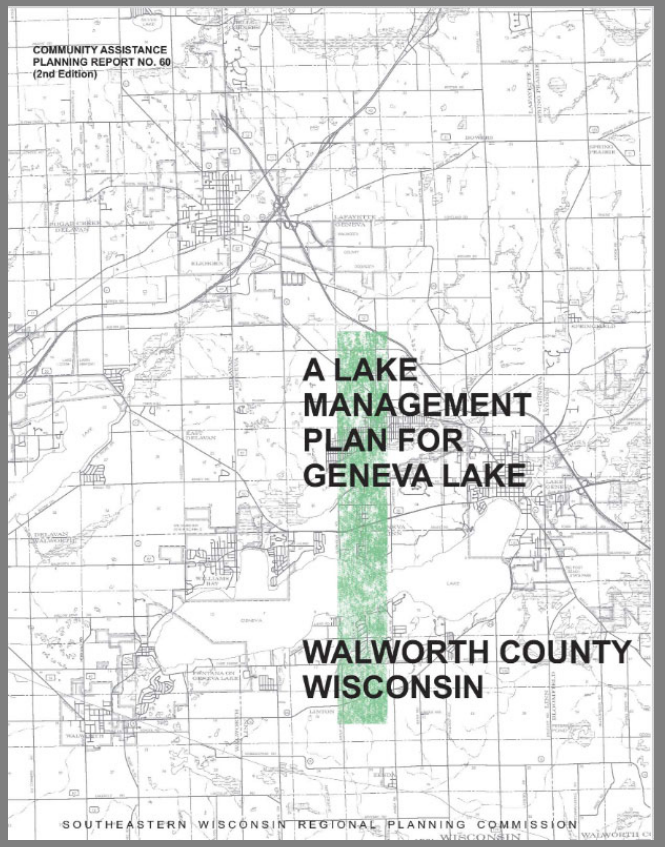
Lake Background Information

Lake Conditions and Trends

Tributary Studies

Geneva Lake Management Plan Update

- Comprehensive lake management plan that covers wide range of topics
  - Water quality, watershed characterization, aquatic plants, recreational use, fisheries, etc.
  - Update from 2008 plan
- Plan development
  - Partially funded by WDNR Surface Water Grant
  - Collaboration with GLC, GLEA, Water Alliance for Geneva Lake, Walworth County, WDNR and other partners
- Feedback from residents and other stakeholders
  - 2023 kickoff meeting and lake user survey
  - 2024 focus group meetings



Water Quality as Part of Management Plan

- 2023 Kickoff Meeting
  - "Water Quality" identified as most important issue for Geneva Lake
- 2023 Lake User Survey
  - Sent to 1,000 households with lake access and another 1,000 households in watershed
  - Multiple questions asking about water quality concerns and management opinions
- Water Quality Studies
  - Examine conditions and trends of Geneva Lake
  - Studies on water quality and conditions of other lake tributaries
  - Pollutant load modeling and recommended practices across watershed
- 2024 Focus Group Meeting
  - Opportunity to hear concerns and ideas from Lake stakeholders

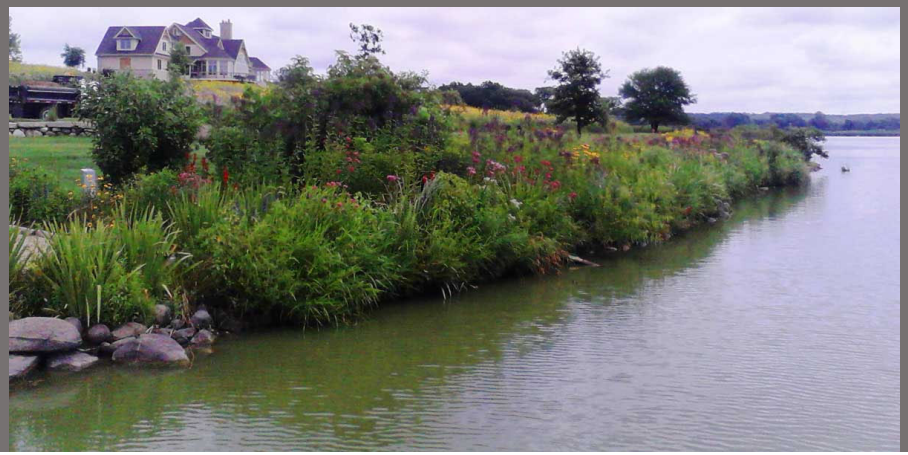
2023 Lake User Survey

- Water quality identified as major concern, but respondents unclear on impacts
  - 32% of respondents “very concerned” about Geneva Lake water quality
  - Most respondents disagreed with the following statements:
    - I would not swim in the Lake because of poor water quality (73% disagree)
    - I have considered moving because of the Lake’s water quality (80% disagree)
  - Many respondents unclear of water quality impacts on fishing (54%) or wildlife (42%

2023 Lake User Survey

- Many respondents already implementing practices that protect water quality
  - 53% of respondents not using fertilizer, insecticide, or herbicide on property
  - 63% incorporate native plants into gardens
  - 42% use curbs or grading to divert runoff from sensitive areas

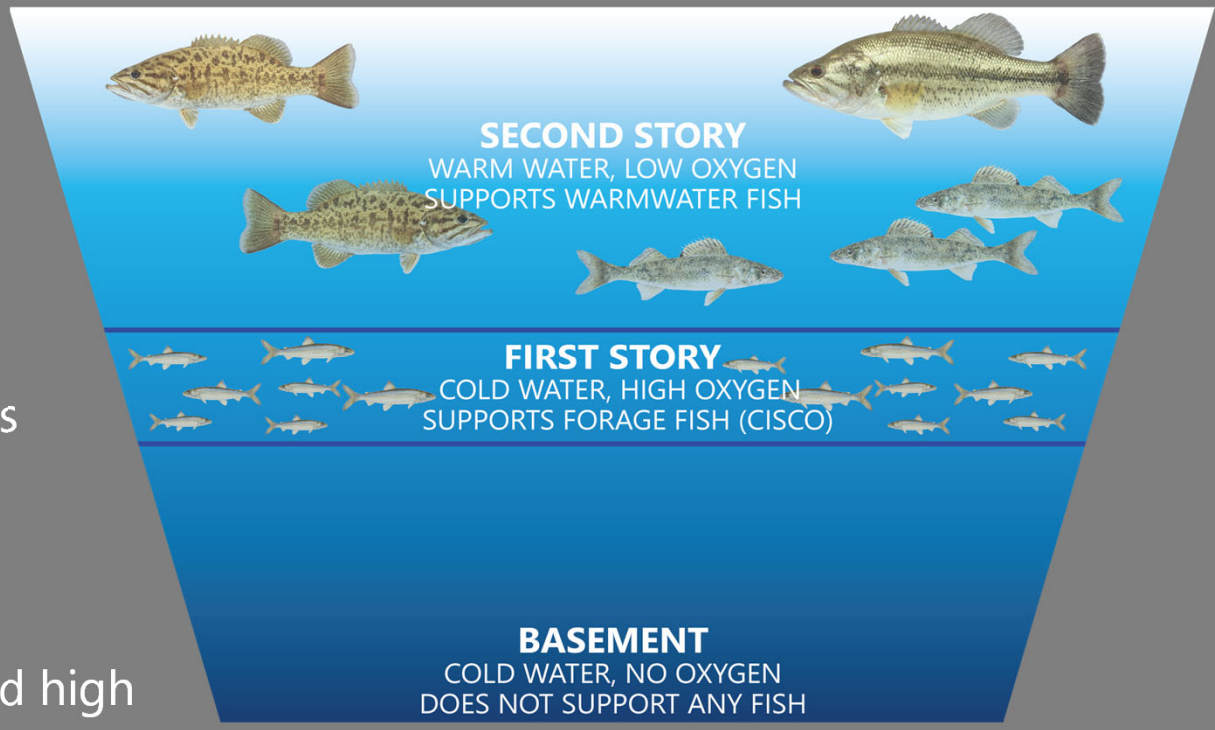
- Lack of information regarding protective practices and programs identified as major barriers to increased use
  - 54% not aware of existing incentive programs to implement practices



Healthy Lakes & Rivers

Geneva Lake Background Information

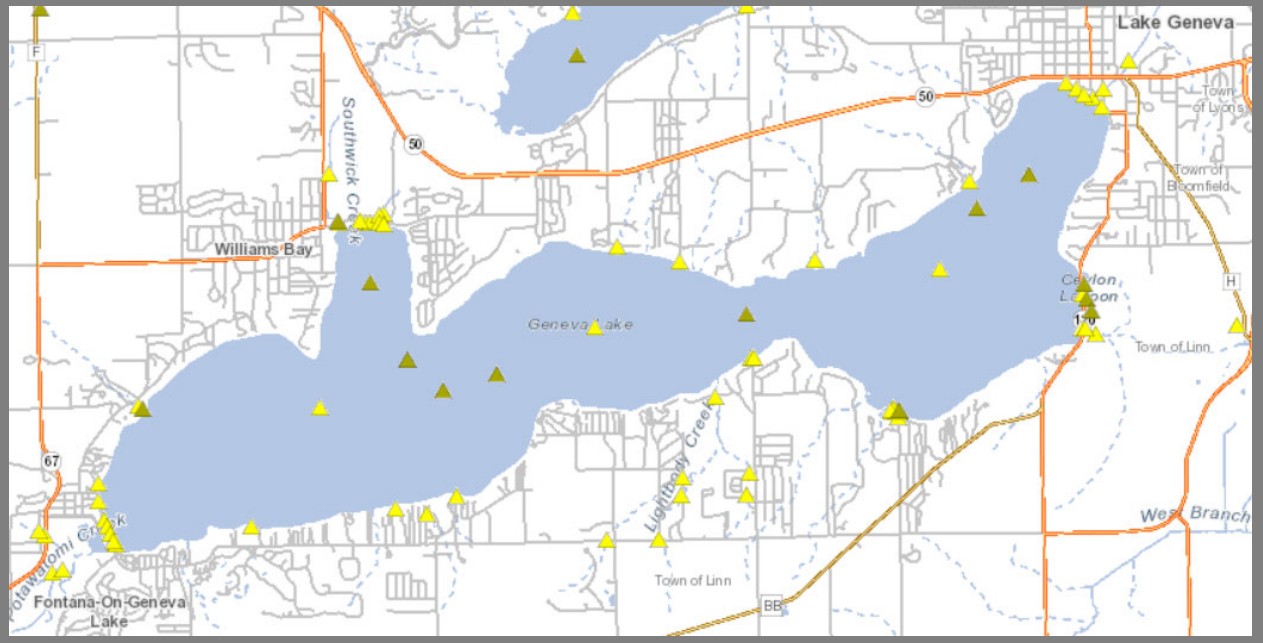
- Morphometry
  - Surface area: 5,262 acres
  - Maximum depth: 140 feet
  - Volume: 320,948 acre-feet
  - Residence time: 13.9 years
  - Shoreline length: 20.2 miles
- Small watershed for size of lake
  - More resilient to watershed activities
- "Two-story" lake
  - Rare lake type in southern WI
  - Has middle layer with cold water and high dissolved oxygen
    - Habitat for cisco, a type of forage fish



What water quality parameters are we measuring?

- **Physical**
  - **Temperature, clarity, color, conductivity**
- **Chemical**
  - **Nutrients (phosphorus, nitrogen), salts, metals (arsenic, iron, calcium), emerging contaminants (PCBs, pesticides, hormones)**
- **Biological**
  - **Indices: Fish, macroinvertebrates, aquatic plants**
  - **Amounts: Algae, bacteria**

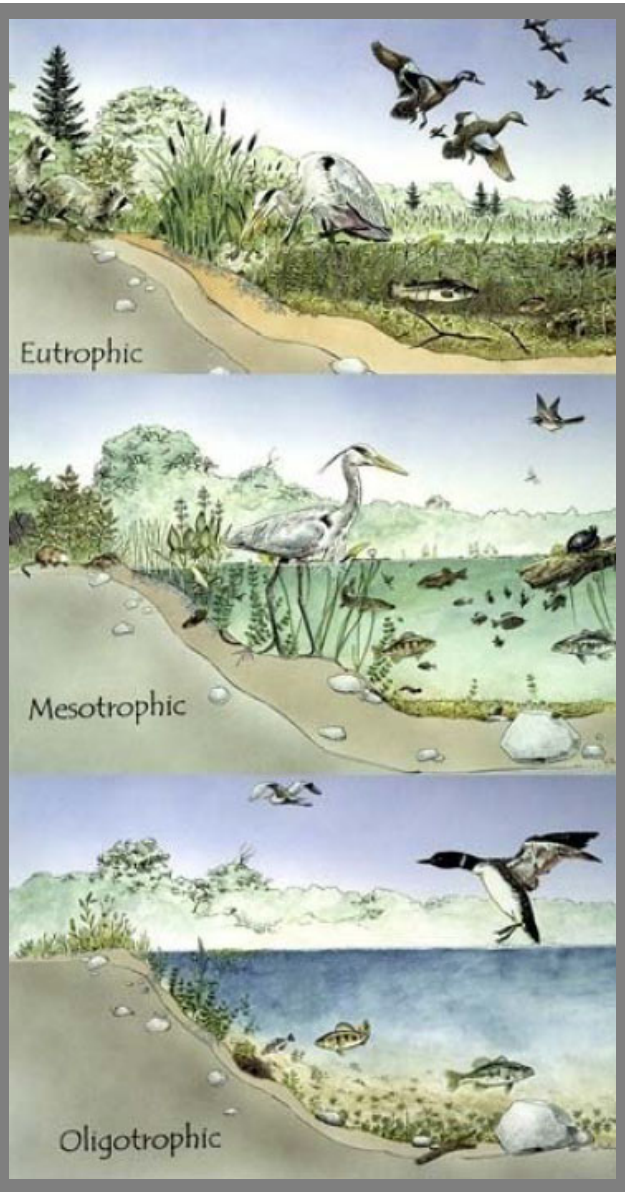
Water Quality Monitoring Efforts



- Geneva Lake Environmental Agency
  - Chemistry through contract with USGS
  - *E. coli* testing at beaches
  - Rotifer and zooplankton surveys
  - Aquatic plant surveys
- Wisconsin Department of Natural Resources
  - Conducted earliest water quality monitoring
- Other organizations
  - Colleges and Universities
  - Geneva Lake Conservancy, SEWRPC

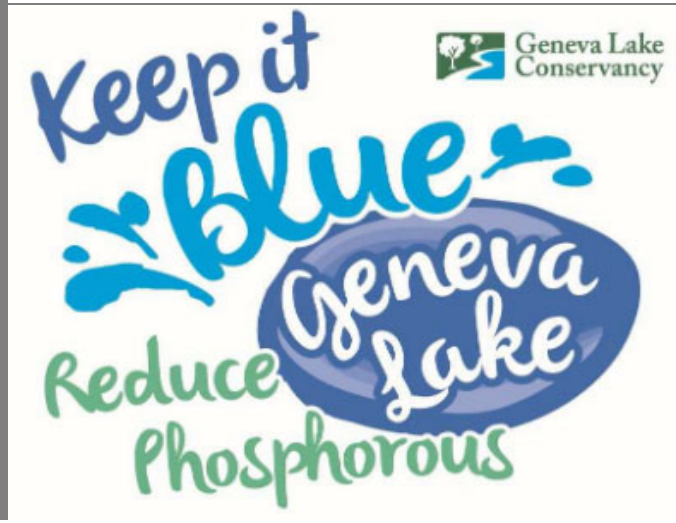
General Water Quality Conditions

- Temperature and dissolved oxygen support "two-story" status
  - Few lakes in southeastern WI sustaining cisco population
- Well-buffered hardwater lake
  - Slightly alkaline pH and high alkalinity
  - High concentrations of minerals (calcium, magnesium)
  - Indicates substantial groundwater contributions
- Low to moderate nutrient status (oligo- to meso-trophic lake)
  - High water clarity
  - Moderate algal abundance
  - Moderate total phosphorus concentrations

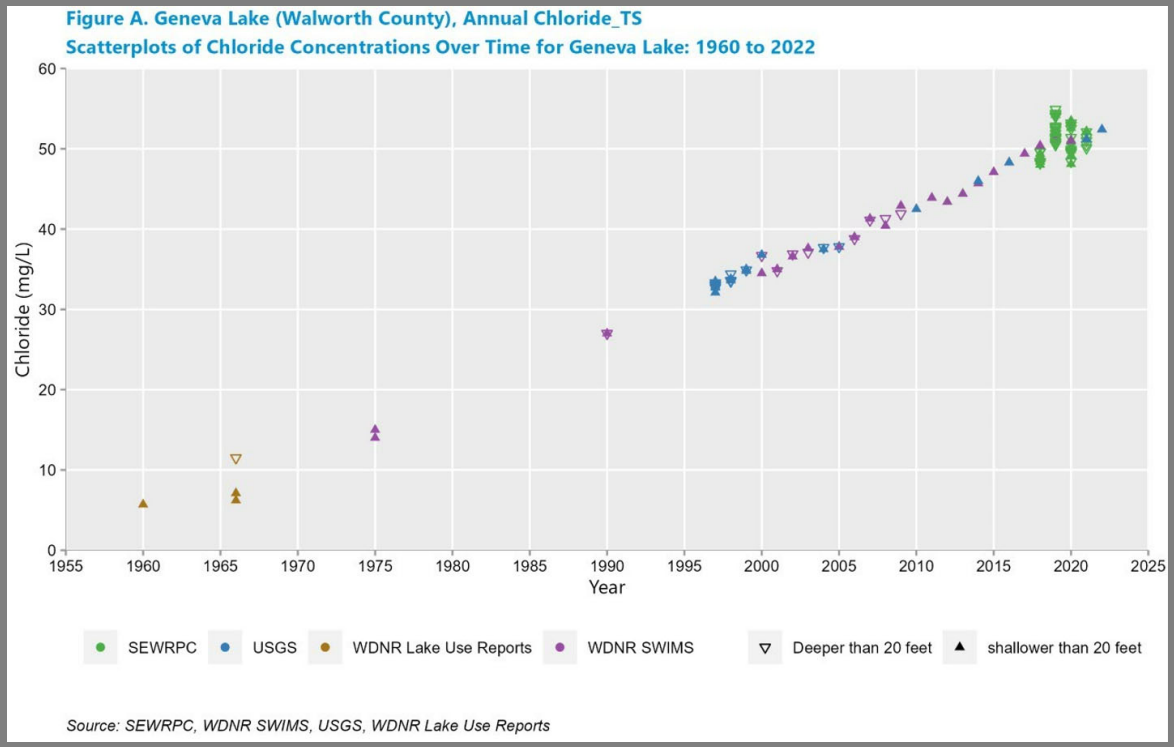


Geneva Lake is a High-Quality Water

- Not listed as impaired waterbody and meets Designated Uses
  - Supporting fish and aquatic life
  - Suitable for recreational use
  - Safe for incidental contact and ingestion
  - Protective of wildlife use
- Identified by WDNR as a "High-Quality Water"
  - Contains unique or rare resource (functioning two-story lake)
  - Meeting water quality standards
- Goal for Geneva Lake is to protect its water quality from degradation



Concerning Trends: Chloride



- Chloride concentrations have increased ~0.8 mg/L per year since 1960s
  - Background concentration: 5 to 10 mg/l
  - Impacts to aquatic life as low as 33 mg/l
  - Pollutant sources include road salt, water softeners, fertilizers, etc.

Concerning Trends: Eutrophication

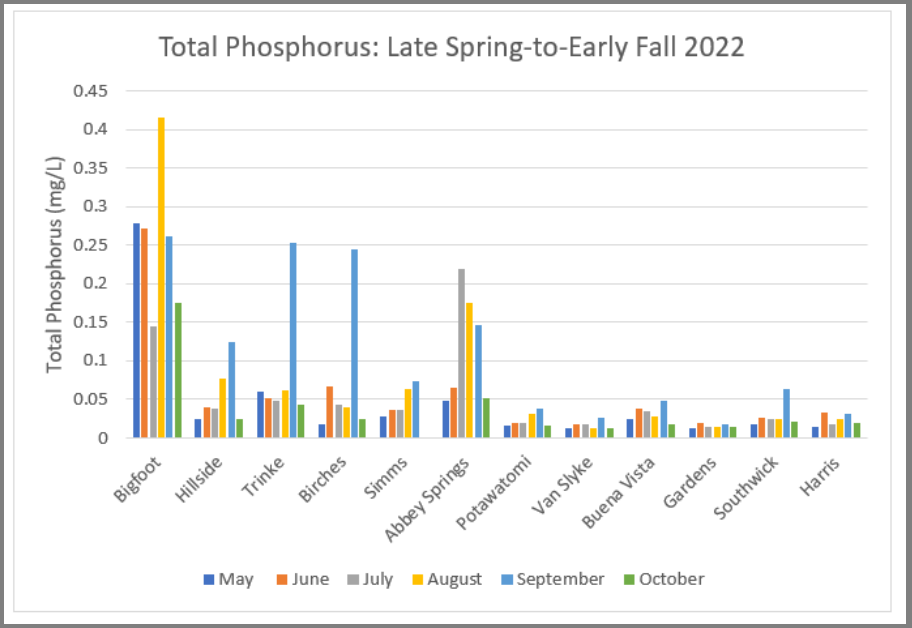
- Eutrophication occurs when a waterbody has excessively high nutrients
  - Often caused by pollutant loading from watershed
    - Erosion, fertilizers, stormwater, leaf litter
  - Impairs water quality
    - Lower water clarity
    - Nuisance plant and algal growth
    - Algal blooms
    - Fish kills from low dissolved oxygen
- Early indicators in Geneva Lake
  - Total phosphorus concentrations
  - Aquatic plant community
  - Filamentous algae growth

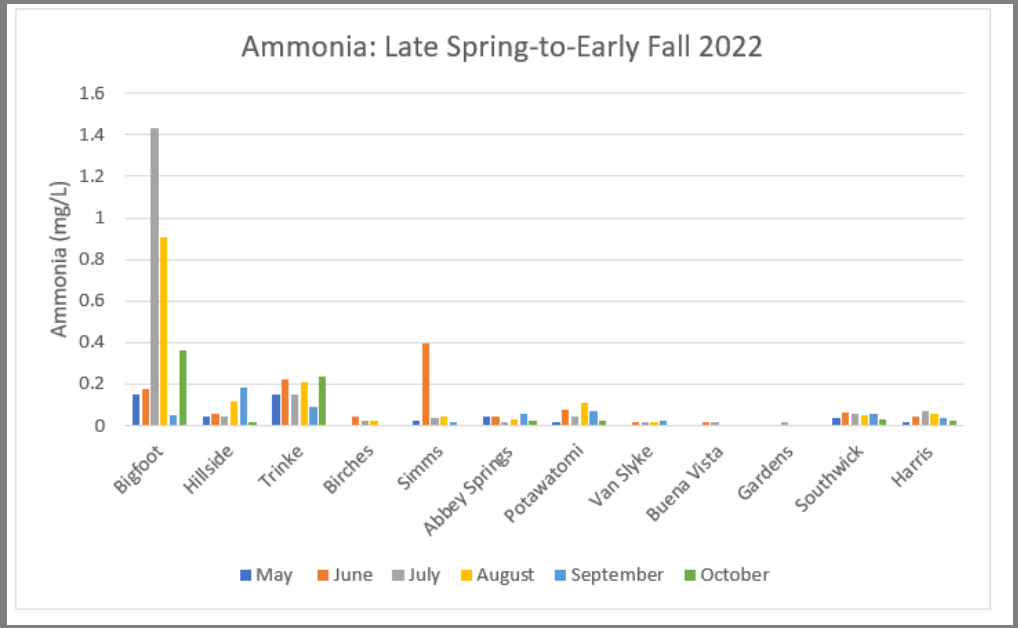
Using a Secchi disc for water clarity monitoring

Tributary Studies: 2020 SEWRPC

- Identified and characterized severe erosion in headwaters of select tributaries
  - Streambank erosion can be major pollutant source in first- and second-order streams
  - Erosion exacerbated by heavier rainfall events and changing land use
- Recommends practices to mitigate erosion and help restore streams

Tributary Studies: 2023 UW-Whitewater





- Monitored baseline and runoff event water quality in 13 lake tributaries
  - Bigfoot Creek exceeds standard for total phosphorus
    - Also highest in ammonia and organic nitrogen
  - Several streams had excellent baseline water quality
  - Total suspended solids most influenced by precipitation events

Source: Dale K. Splinter, *A Late Spring-to-Early Fall Examination of Water Quality in Tributaries of the Geneva Lake Watershed: 2021-2022*, October 2023

Tributary Studies: Bigfoot Creek

- Long-studied creek on Lake's eastern shoreline
  - On 303(d) impaired list for total phosphorus
    - GLEA identified as main phosphorus contributor to Lake
  - Creek can flow with red water that stains beach

- Several former landfill sites along Creek length
  - Suspected pollutant source to Creek and Lake
  - Field visits have documented metal and other debris

- Approach for management plan
  - Summarizing major findings from reports
    - GLEA, WDNR, EPA, and others
  - Field visit with water quality sampling
    - Identify if/where landfill leachate enters stream
  - Inform stream remediation options