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Implementing the Cayuga Lake TMDL

Tony Prestigiacomo, NYSDEC Division of Water, Finger Lakes Watershed Program

2024

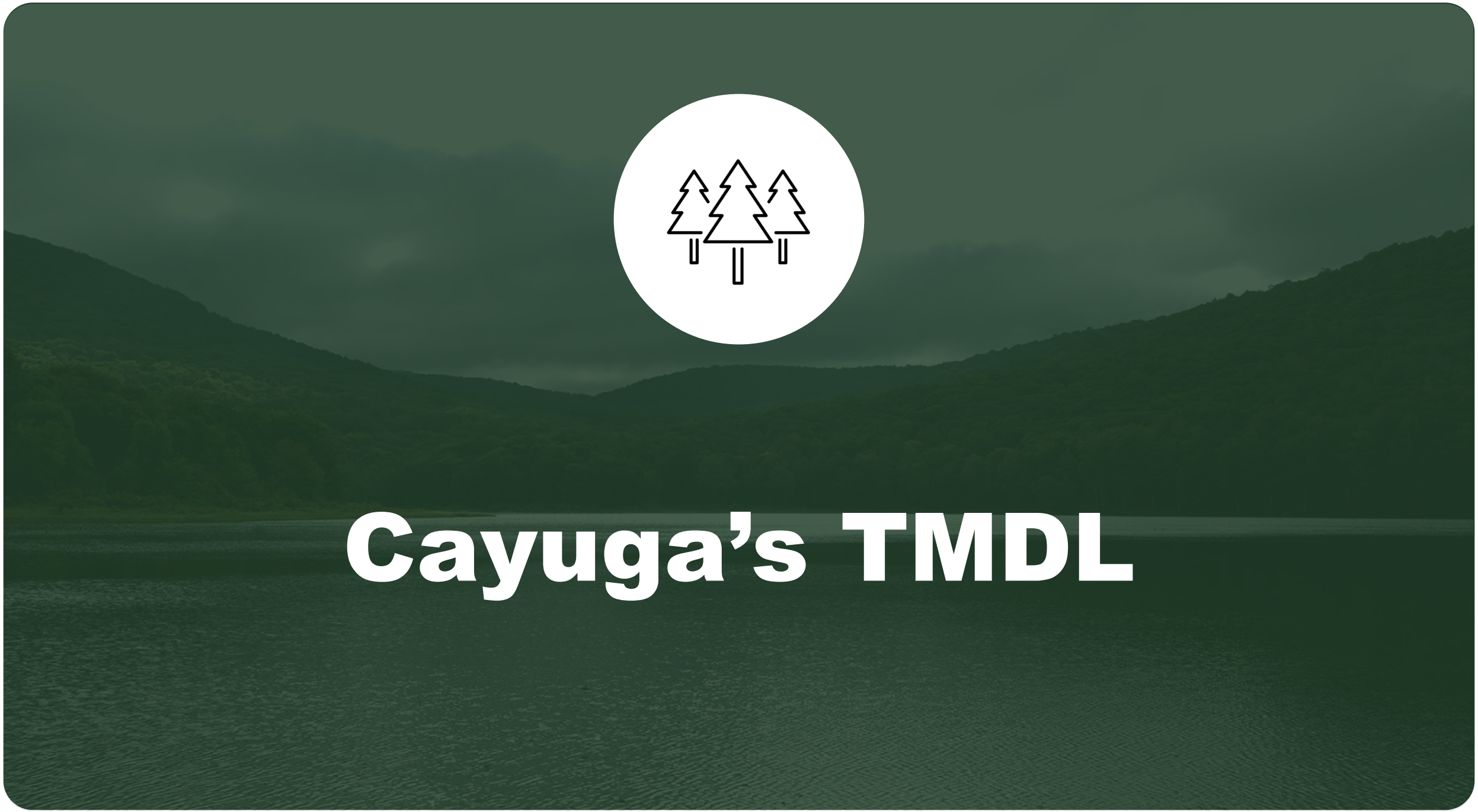
The Cayuga Lake TMDL has been approved by US EPA (July 2024)

What is a Total Max. Daily Load (TMDL)?

- States must develop and EPA must approve a TMDL if a waterbody (or waterbody segment) is impaired for any pollutant
- Required by Section 303(d) of the Clean Water Act
- Requires watershed and in-waterbody modeling
- Implementation plan is not required, can sometimes be separate
- TMDLs can also be done to protect waterbodies
    - This is generally done in conjunction with a restoration TMDL

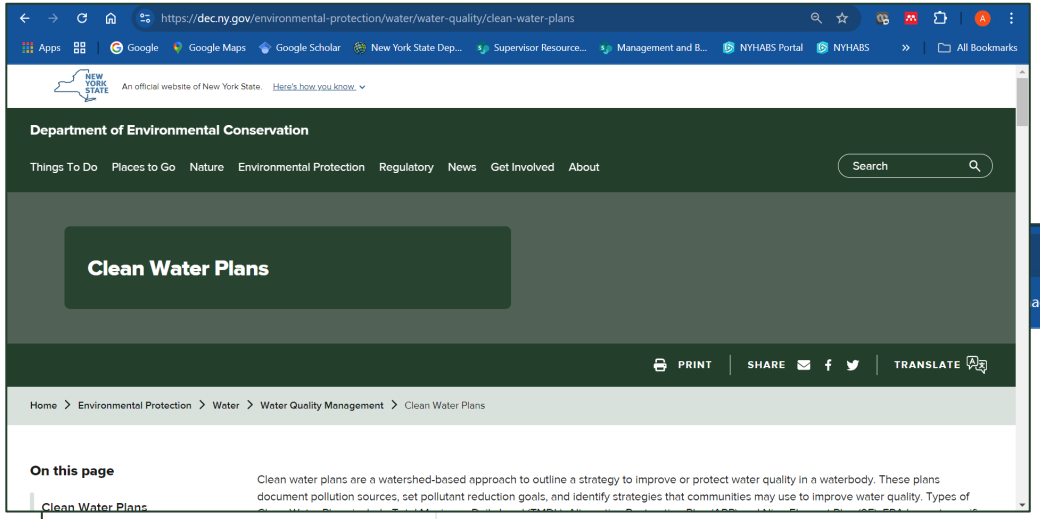
* Determined by DEC's Consolidated Assessment and Listing Methodology (CALM)

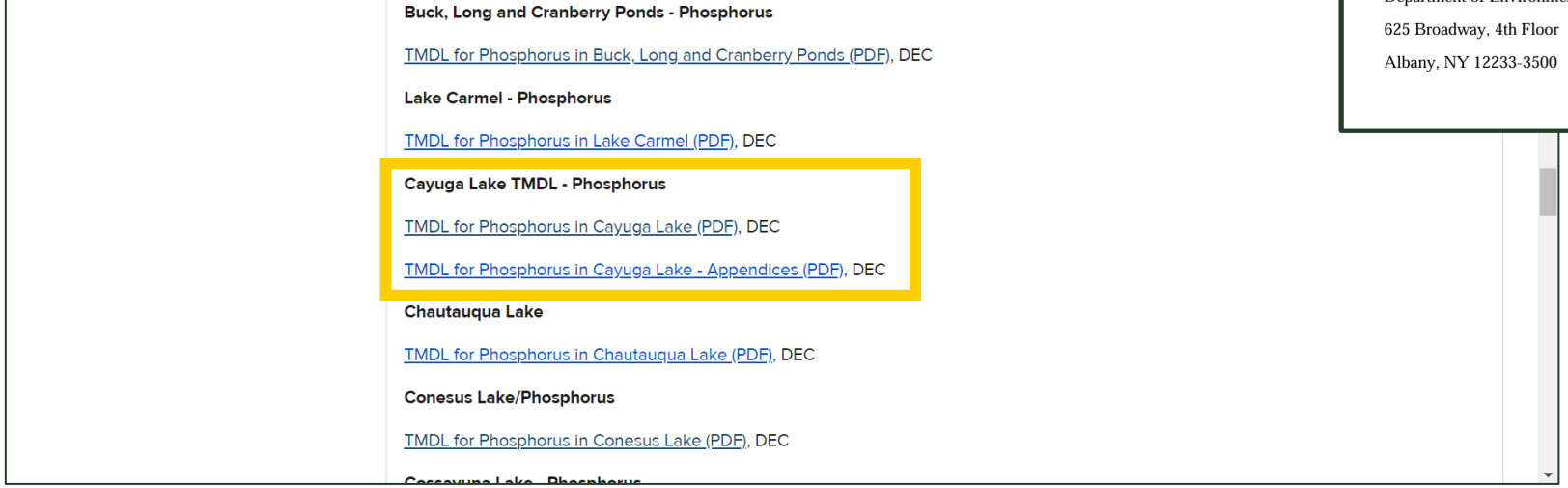
impaired:
the regulatory term referring to waters that do not meet water quality standards, do not support best uses*

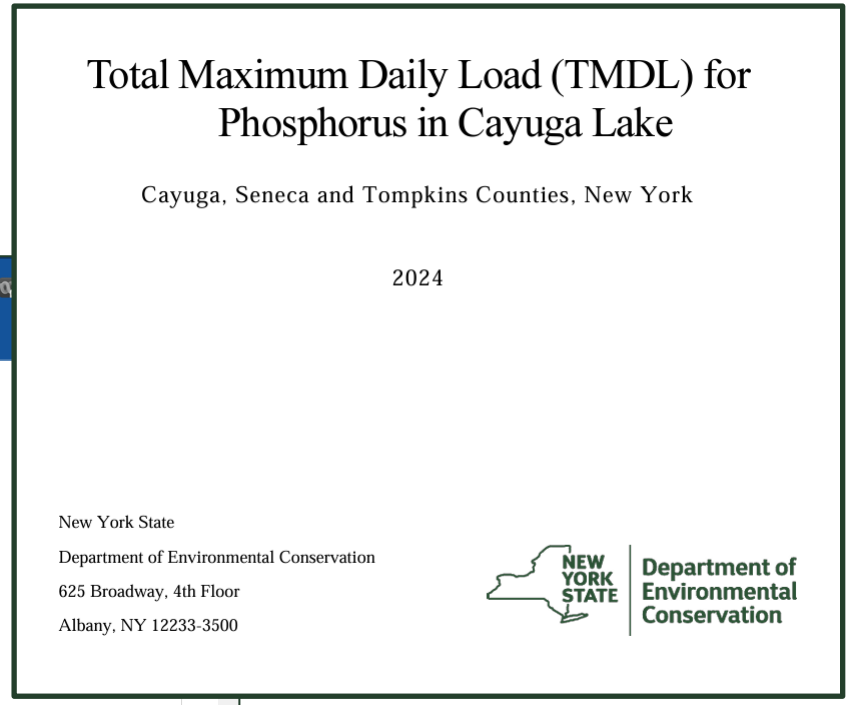


Cayuga’s TMDL

https://dec.ny.gov/environmental-protection/water/water-quality/clean-water-plans






Total Maximum Daily Load (TMDL) for Phosphorus in Cayuga Lake

Cayuga, Seneca and Tompkins Counties, New York

2024

New York State
Department of Environmental Conservation
625 Broadway, 4th Floor
Albany, NY 12233-3500

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How Was the TMDL Calculated?

Essentially…

- Data from lake and streams were collected;
- P inputs to the lake from different sources were estimated (Watershed model);
- The Cayuga Lake Model (CLM) was developed, calibrated, and tested;
- Cayuga Lake was accurately simulated for a 16-year period;
- Different “scenarios” were considered using the CLM, until TMDL targets were reached;
- Point sources assumed at permit limits;
- The TMDL is the TP load at which the targets were reached;
- **Targets reached = water quality standards attained**

Section 2

Appendix B and C

Appendix D

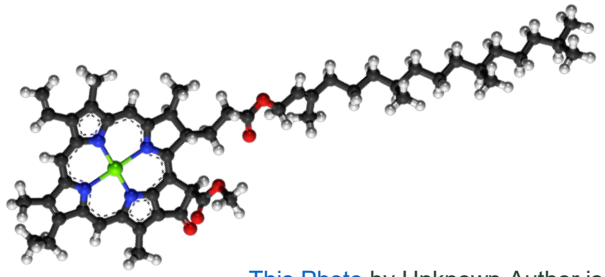
Summarizing Cayuga's TMDL

- The Southern End listed was Impaired for TP – 2002 303d List (TP often exceeded the TP GV – 20 µg/L);
- A whole watershed approach:
  - restore the Southern End segment
  - protect the other Cayuga Lake segments;
- Defines lake **Chl-a Targets** (more on this later)
- Recommends **Phosphorus Reductions** to achieve TMDL Targets and WSQ;
  - Point and Non-point source reductions
  - Non-point source areas ~ 90% of the TP load to the lake

Cayuga’s TMDL Targets

Why Was Chl-a Selected as the Target?

- Chl-a is a measure of lake response to phosphorus loading when P is limiting;
- Use of Chl-a targets in TMDLs for nutrients been approved by USEPA in NYS;
- Reducing TP to the lake will result in lower Chl-a;
- 30% reduction in TP loading will achieve the TMDL Chl-a targets in most years and will result in TP < GV and therefore achieve the WQS



A Little More on Chl-a

Callinan and others 2013

- Looked at TP, Chl-a, and other data in NYS (included Cayuga);
- Recommended Chl-a levels to be protective of source waters (and recreation).

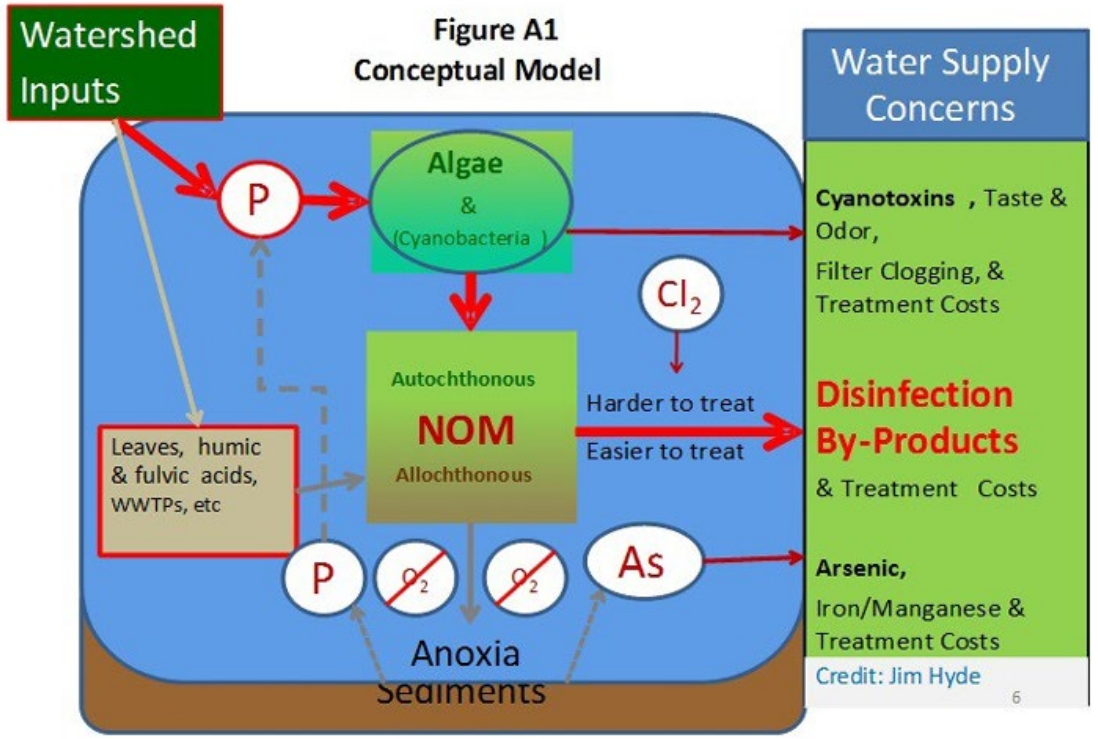
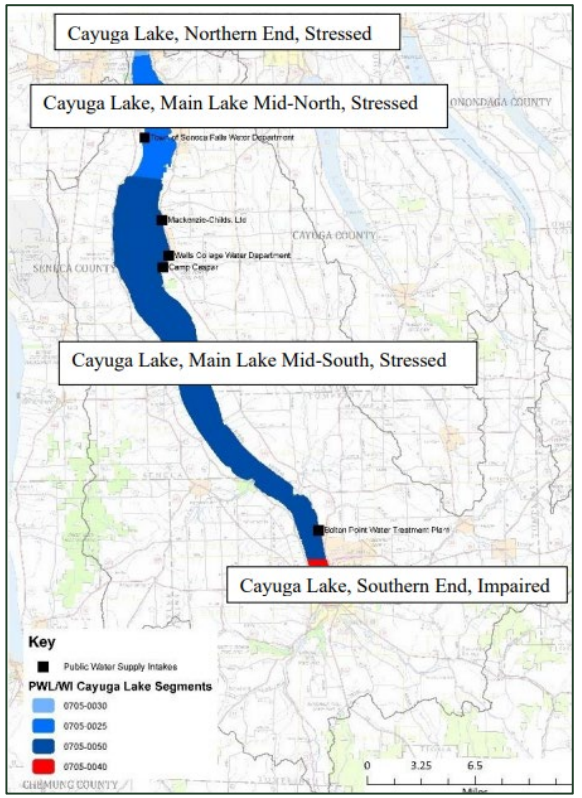


Figure A1. Conceptual model of eutrophication and Public Water Supply concerns.

TMDL (In-Waterbody) Targets

Waterbody Segment (WI/PWL ID)	Classification/ Highest Best Use	Summer Average Total Chl-a Target
Northern End (0705-0030)	Class B – 1º/2º Recreation, Fishing	**8 µg/L**
Main Lake, Mid -North (0705-0025)	Class A – Source Water Supply	**6 µg/L**
Main Lake, Mid -South (0705-0050)	Class AA – Source Water Supply with limited treatment	**4 µg/L**
Southern End (0705-0040)	Class A	**6 µg/L**

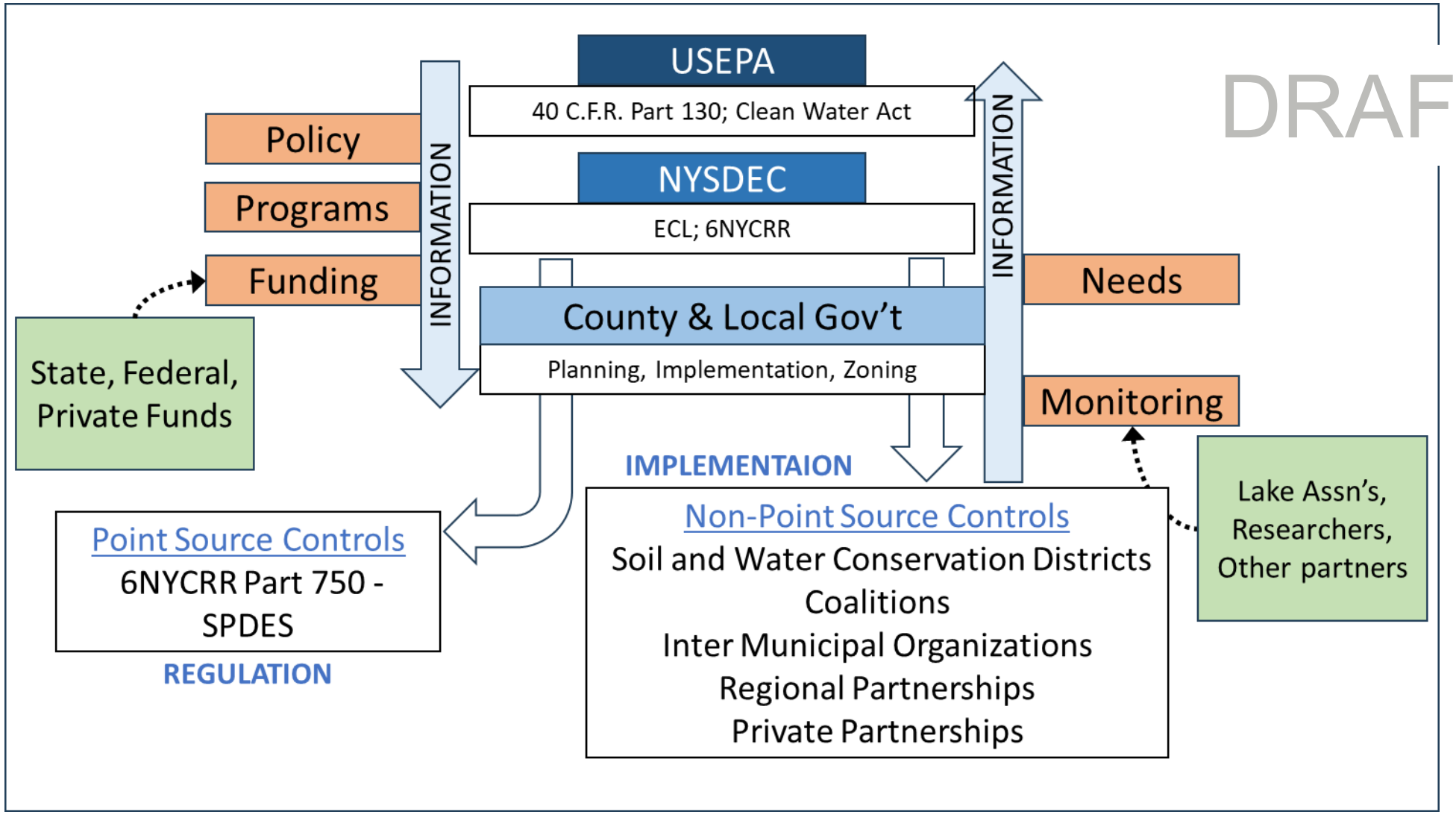


The TMDL Recommends a 30% TP Reduction (131,000 lbs P/year) to meet Targets

Combinations of Point Source and Non-Point Source Needed to Get Reductions

How Do We Get There and Measure Progress?

Phosphorus Reduction Goals


DRAFT
USEPA
40 C.F.R. Part 130; Clean Water Act
NYSDEC
ECL; 6NYCRR
Policy
Programs
Funding
INFORMATION
INFORMATION
Needs
Monitoring
State, Federal, Private Funds
County & Local Gov't
Planning, Implementation, Zoning
IMPLEMENTAION
Point Source Controls
6NYCRR Part 750 - SPDES
REGULATION
Non-Point Source Controls
Soil and Water Conservation Districts
Coalitions
Inter Municipal Organizations
Regional Partnerships
Private Partnerships
Lake Assn's, Researchers, Other partners

Point Sources Reductions

Point Source Reductions

Three SPDES facilities are being modified to include phosphorus concentration limits.

- Freeville WWTF – underway
- Interlaken WWTF – underway
- IAWWTF – underway

Non-Point Source Reductions

Non-Point Source Reductions

- Non-point source pollution is largely addressed through voluntary means
- Continued and more implementation of best management practices

Example Reductions Overall and by Sub-Watershed Segment

Table 17. Summary of Current Nonpoint and Point Source Loads, TMDL Allocation, and Percent Reduction for Cayuga Lake Segments

Segment	Current Nonpoint and Permitted Point Source TP Load (lbs/d)	Cayuga Lake TMDL Allocation with 10% Margin of Safety (lbs/d)	Reduction (lbs/d)
Southern End segment (0705-0040)	269.7	213.8	56
Main Lake, Mid-South segment (0705-0050)	741.2	502.3	239
Main Lake, Mid-North segment (0705-0025)	190.9	129.6	61
Northern End segment (0705-0030)	8.03	5.40	2.6
TMDL Total	1,210	851	359*

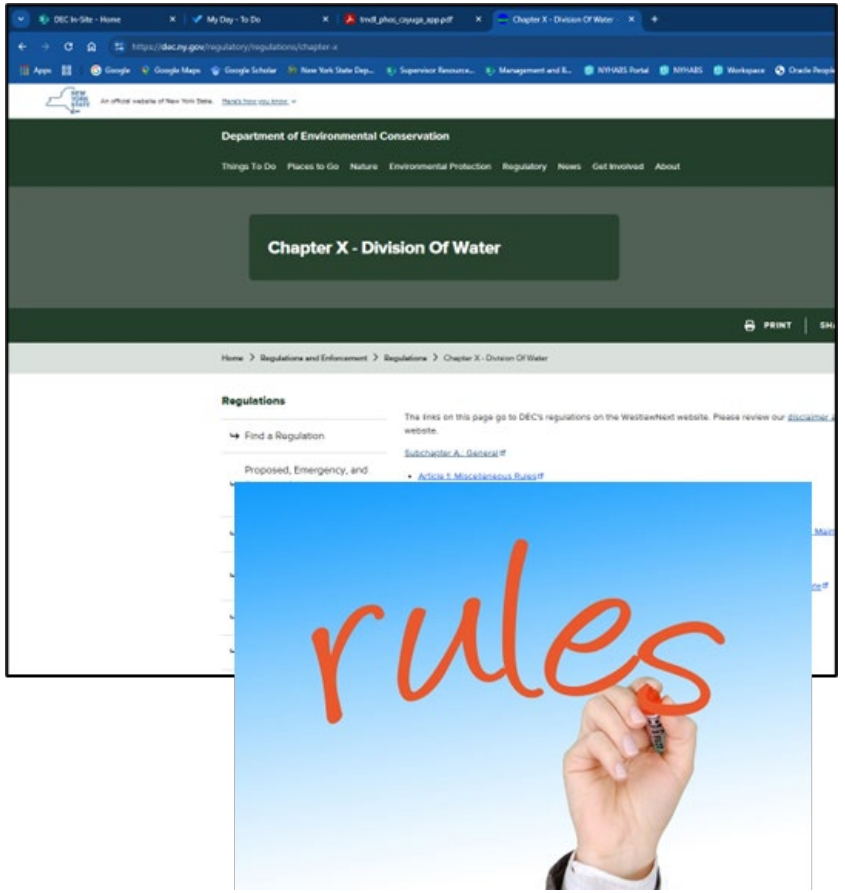
* Overall reduction to the lake will result in a 30% reduction of TP loading to Cayuga Lake.

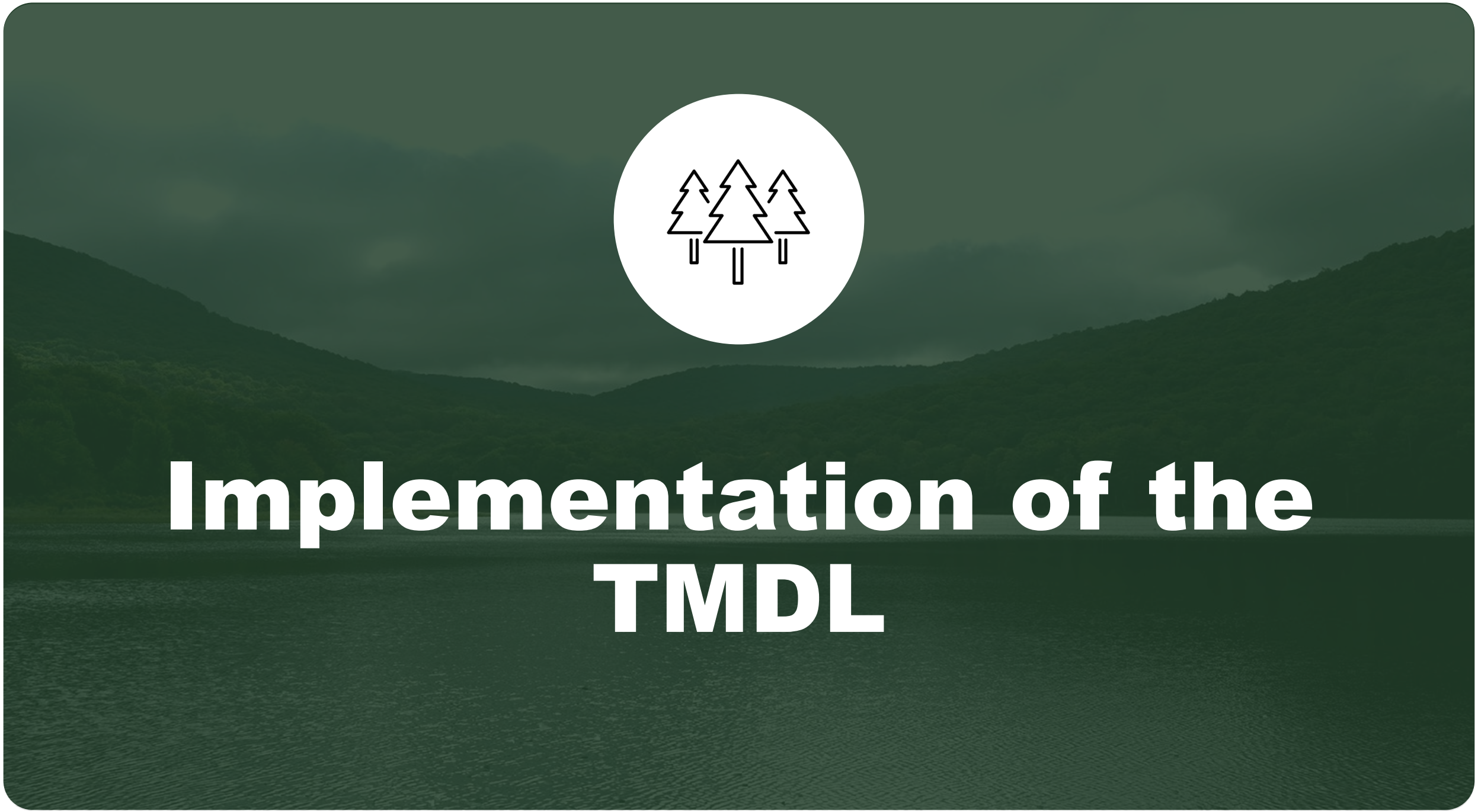
Table 20. TP TMDL for Main Lake, Mid-South segment (0705-0050) as daily loads and existing total phosphorus loads by source.

Main Lake, Mid-South Segment Sources	TP Load (lbs TP/d)	TMDL Allocation (lbs TP/d)	Reduction Percent
Load Allocation (LA)	***708.1***	***425.2***	***40***
Cultivated crops*	540.1	313.2	42
Hay/pasture*	127.3	76.4	40
Forest + Wetlands	24.0	20.4	15
Developed Land	13.9	12.6	10
Onsite Septic Systems	2.74	2.61	5
Wasteload Allocation (WLA)	**33.1**	**31.5**	**5**
Interlaken WWTF (NY0029289)	2.50	0.84	67
Aurora WWTF (NY0023558)	2.50	2.50	0
Trumansburg WWTF (NY0029190)	1.04	1.04	0
MS4s	27.1	27.1	0
LA + WLA	**741.2**	**456.6**	**39**
Margin of Safety (MOS 10%)		**45.7**	
TOTAL	***741.2***	**502.3**	**32**

A Bit on DEC's Regulatory Authority

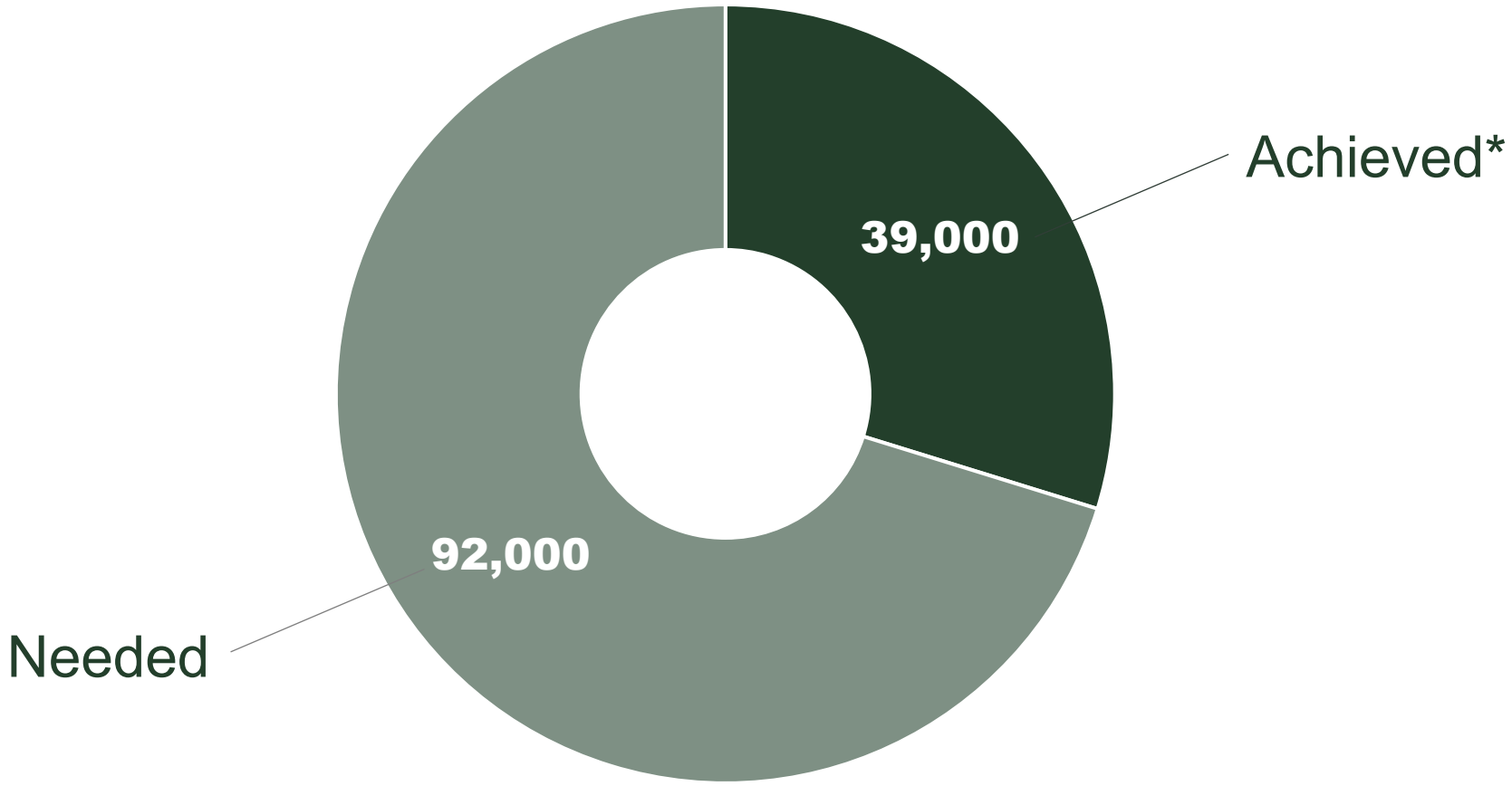
- Environmental Conservation Law
- NYCRR Title 6, Chapter 10, Part 750
  - Article 1. Miscellaneous Rules
  - Article 2. Classifications and Standards of Quality and Purity
  - Article 3. State Pollutant Discharge Elimination System
- DEC also investigates complaints about activities that may violate NYCRR, ECL, and WQS





Implementation of the TMDL

Where Are We?



Progress in Non-Point Source Phosphorus Reduction

NYS, SWCDs, or other entities:
> 40 implementation projects awarded in Cayuga Lake watershed, 2013-2022

> $14 M in funding to Cayuga, more than 39,000 lbs P/yr reduced
nutrient management, cover crops;
streambank stabilization, hydroseeding;
land acquisition, buffers, exclusion;
septic pump outs;

Continued Implementing of the TMDL

Cayuga Lake TMDL, Section 7

What is in Section 7?

- 7.1 Summary
- 7.2 Forms of Phosphorus
- 7.3 Sub-Basin Load Estimates*
- 7.4 Agriculture
- 7.5 Wastewater
- 7.6 Developed Land Use
- 7.7 Compliance and Enforcement
- 7.8 Other Source Categories
- 7.9 Other Key Program Areas

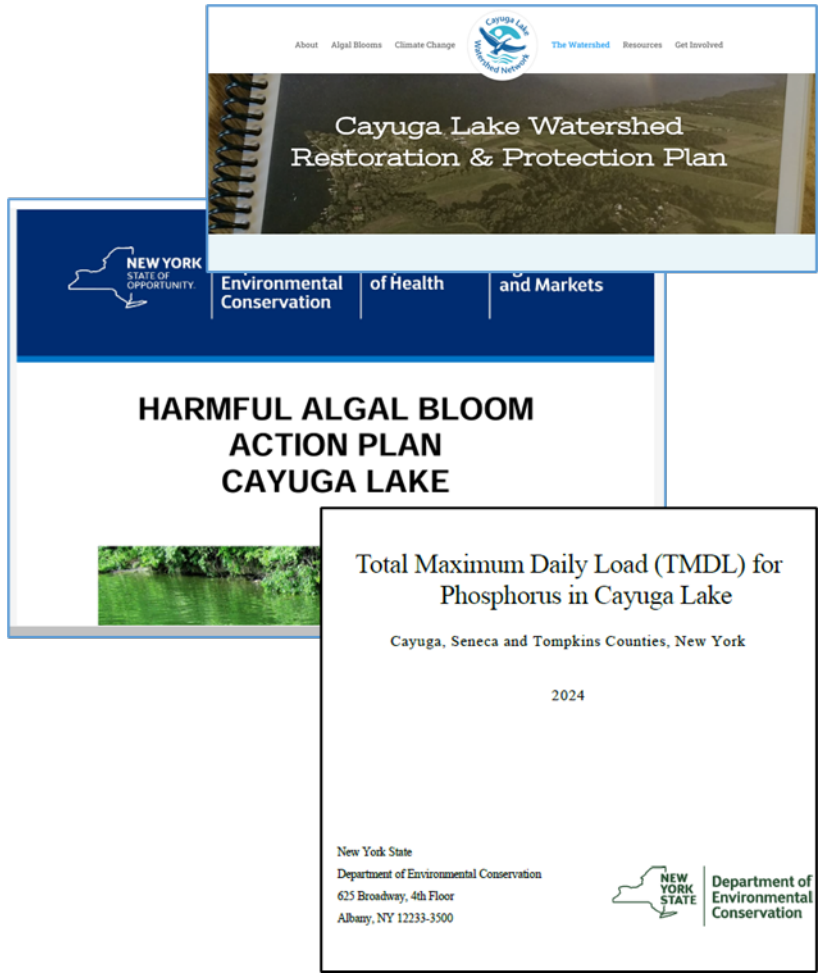
Tables 30-31

- Practices for P-management with cost estimates and P-form target

Cayuga's Clean Water Plans

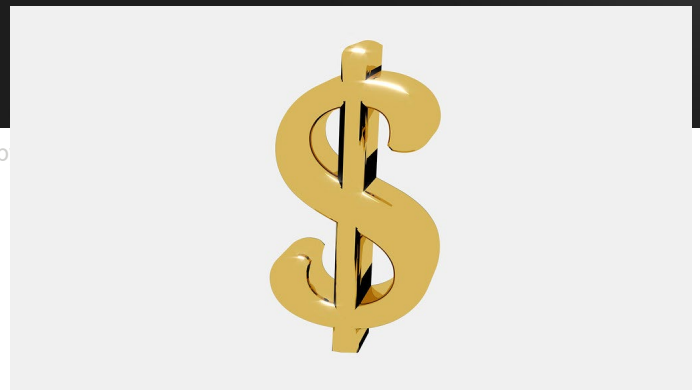
Existing and On-going Planning Documents

1. HAB Action Plan (DEC, Cayuga)
   – complete/implementation ongoing
2. **TMDL (DEC)**
   – FINAL/implementation ongoing
3. DWSP2s (DEC, Cayuga)
   – several in development
4. Cayuga Lake WRPP (DOS, Cayuga)
   – complete/implementation ongoing
5. SWCD Strategic Plans (SWCDs)
   – complete/implementation ongoing



Leveraging Grants Programs to Implement

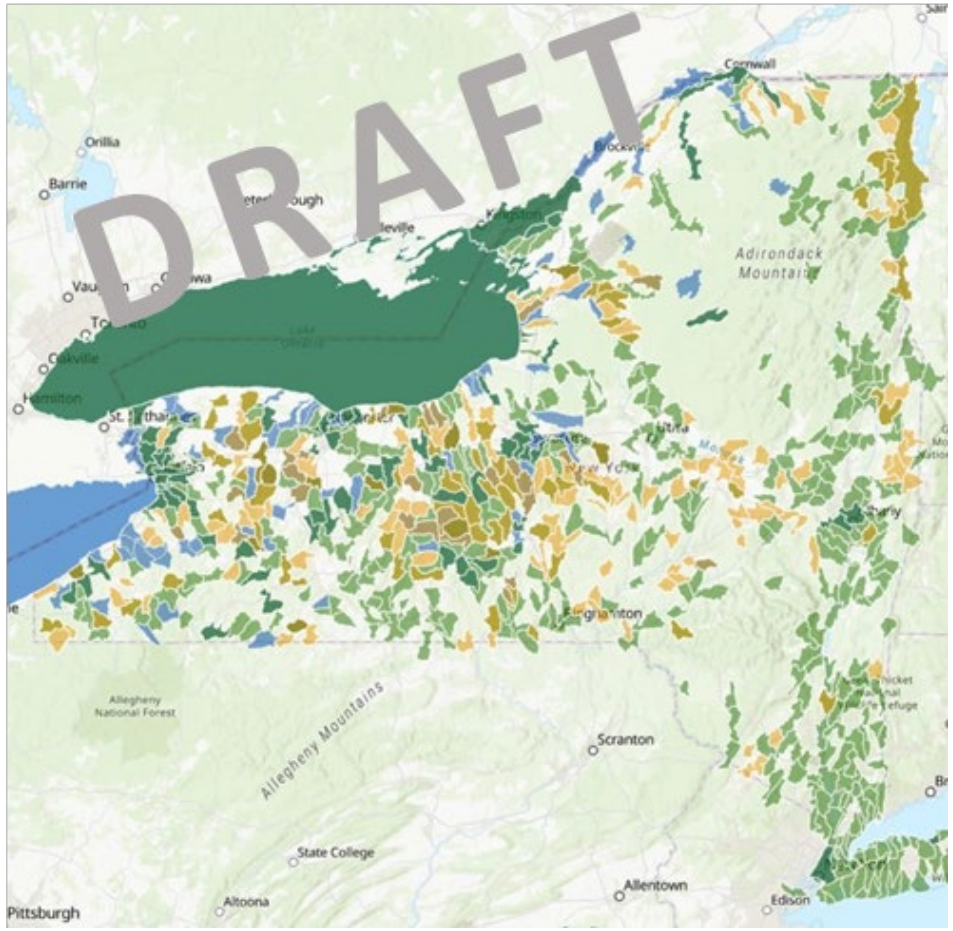
- State Programs:
  - NYSDEC (WQIP, NPG, etc)
  - Environmental Facility Corp (EFC);
  - Department of State (DOS);
  - Department of Agriculture and Markets (AGM);
- Finger Lakes and Great Lakes Specific Funding
  - FLLOWPA
  - GLRI
  - Great Lakes Specific Grants
  - Small Grant Programs



Project Tracking System

- Measures success, locates gaps, provides visualization of progress
- Tools designed to track watershed progress
- Leverages existing databases
- Summaries and co-benefits

Database	Funding Type	Description
Great Lakes Commission Investment Tracker	Federal	• Great Lakes Restoration Initiative (GLRI) • Infrastructure Investment and Jobs Act (IIJA) • Inflation Reduction Act (IRA)
Nonpoint Source Database	State (Ag. & Markets)	• Climate Resilient Farming (AgCRF) • Agriculture Nonpoint Source Abatement and Control Program (AgNPS)
WQIP Database	State (DEC)	• Water Quality Improvement Projects (WQIP)

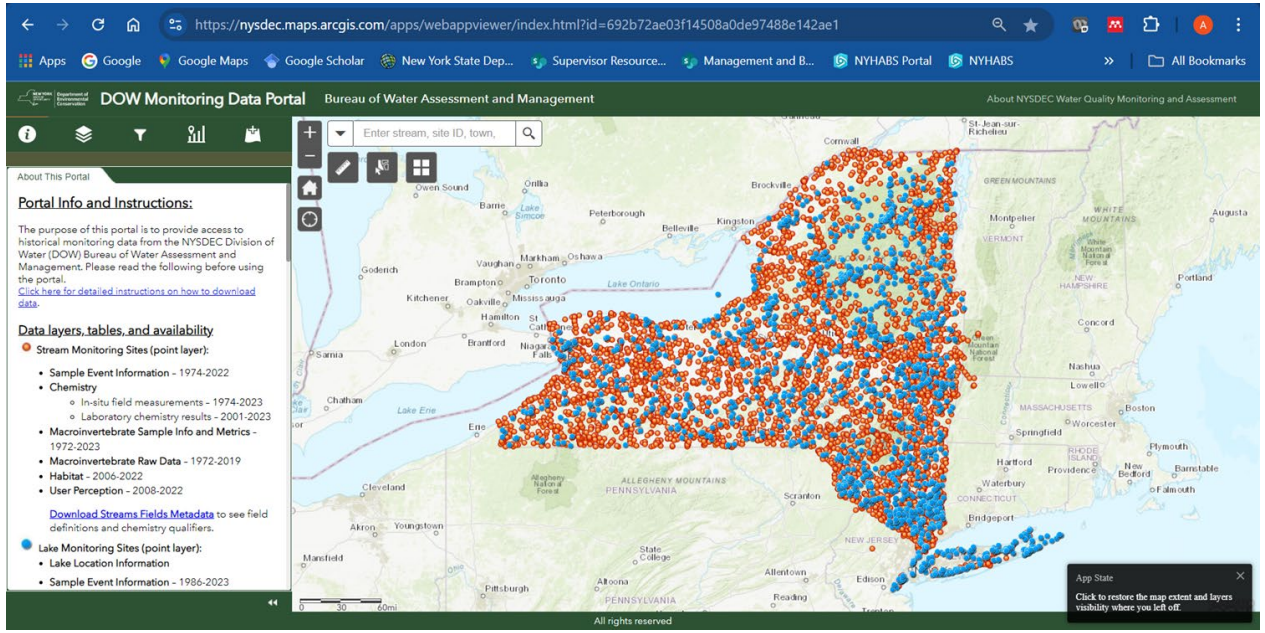


Monitoring Programs

Monitoring:

https://dec.ny.gov/environmental-protection/water/water-quality/monitoring

- CSLAP
- DEC Lakes Program (LCI)
- DEC Streams Program
- NYHABs
- WAVE



- Local monitoring programs
- Non-profit, private, academic research

In-Lake Targets (Summer Average Chl-a) with Current Data

Meeting Target

Not Meeting Target

Year	Summer Average Chl-a (µg/L)			
	Southern End	ML Mid-South	ML Mid-North	Northern End
2018	4.1	3.9	4.4	6.0
2019	5.5	6.8	5.2	9.4
2020	4.5	5.5	4.7	8.0
2021	6.3	7.3	9.7	9.3
2022	8.7	4.5	5.0	9.0
2023	6.1	4.3	5.8	6.0
	Met in 5/6 years	**Met in 2/6 years**	**Met in 5/6 years**	**Met in 3/6 years**

Questions

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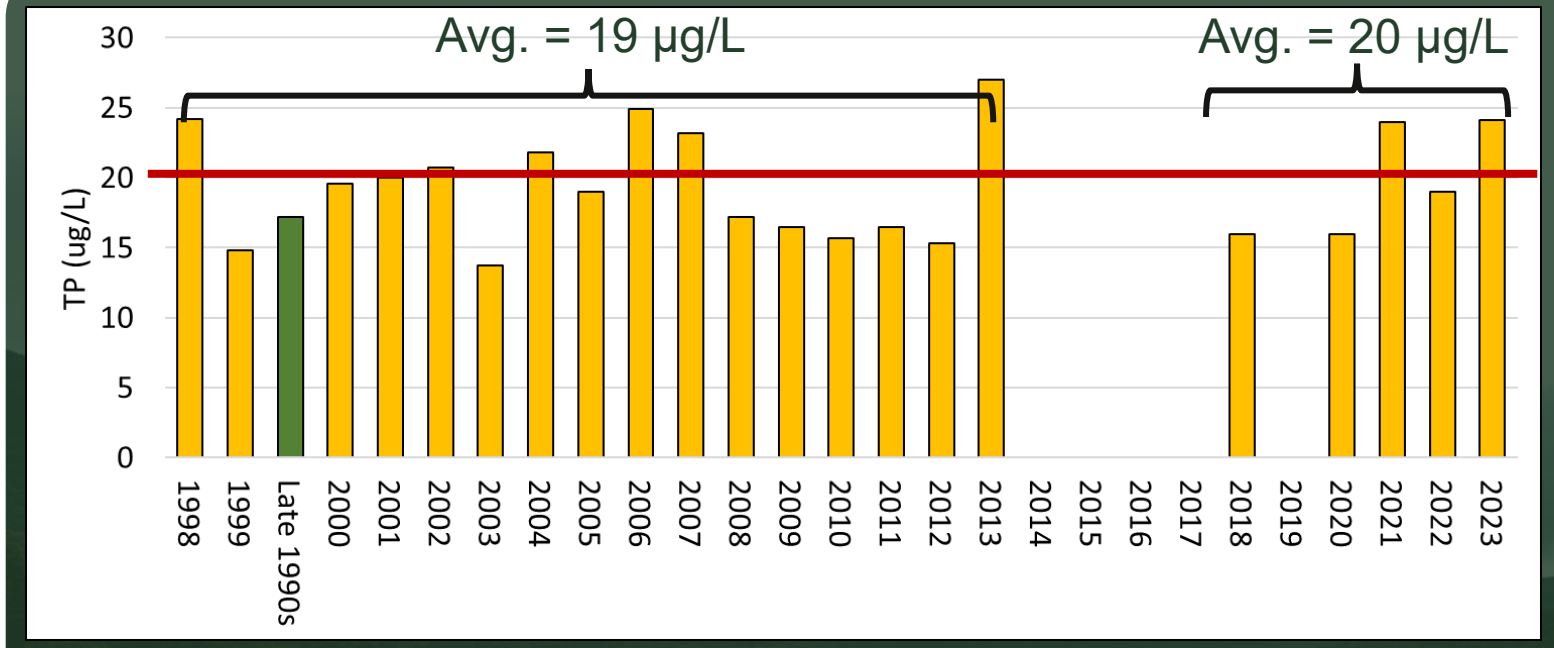
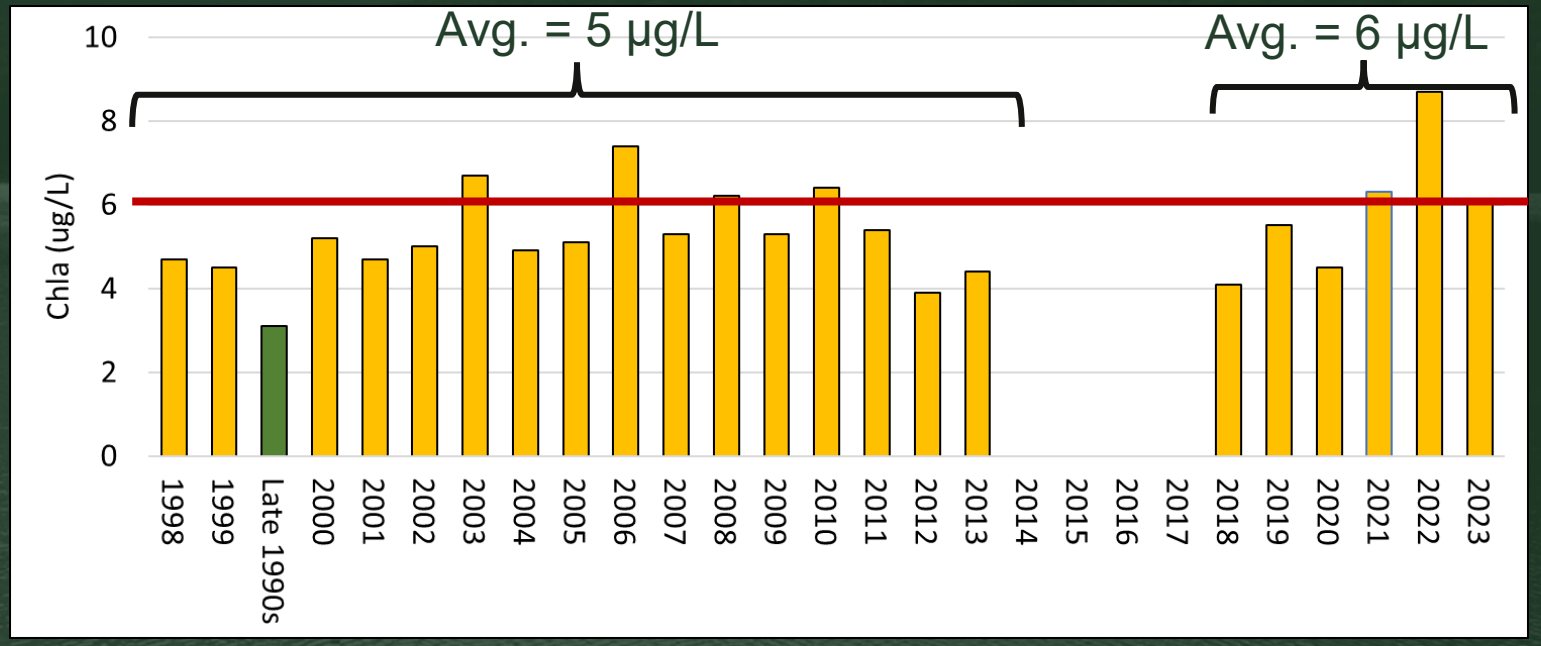
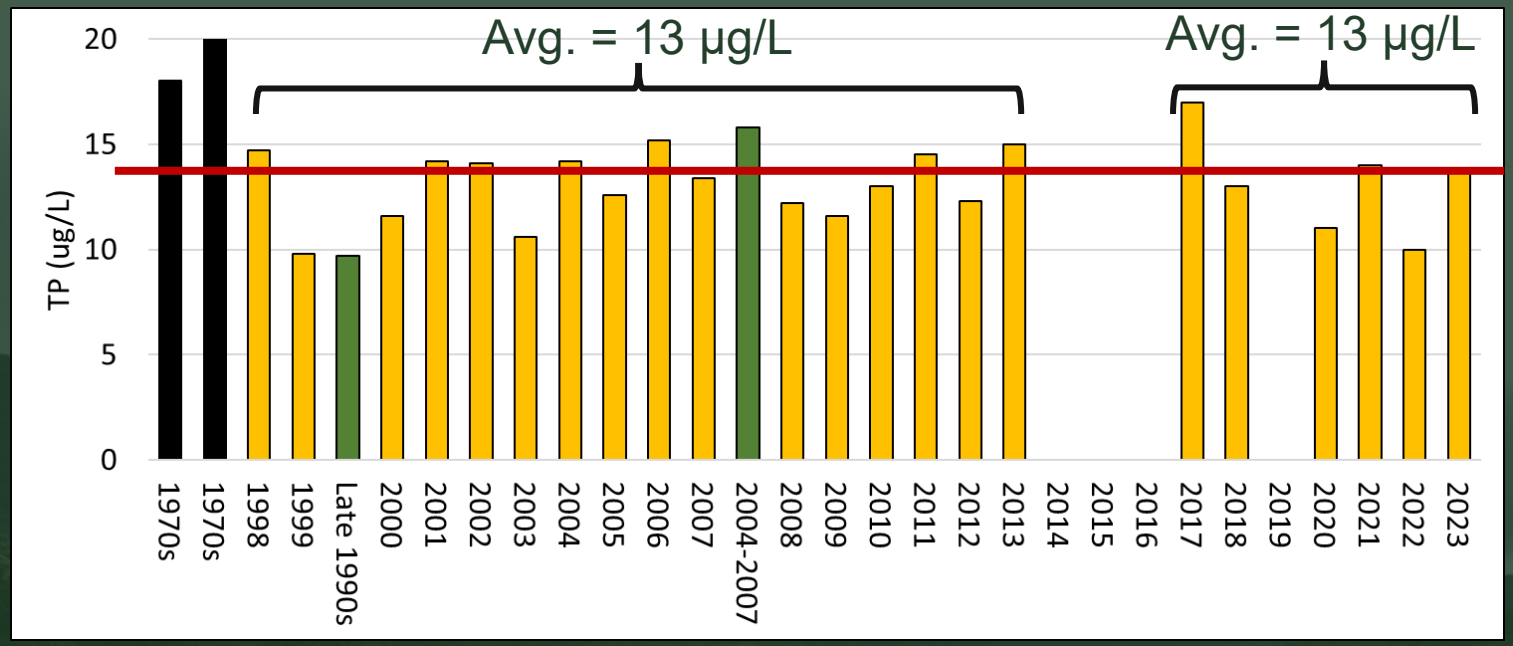


← Southern End TP

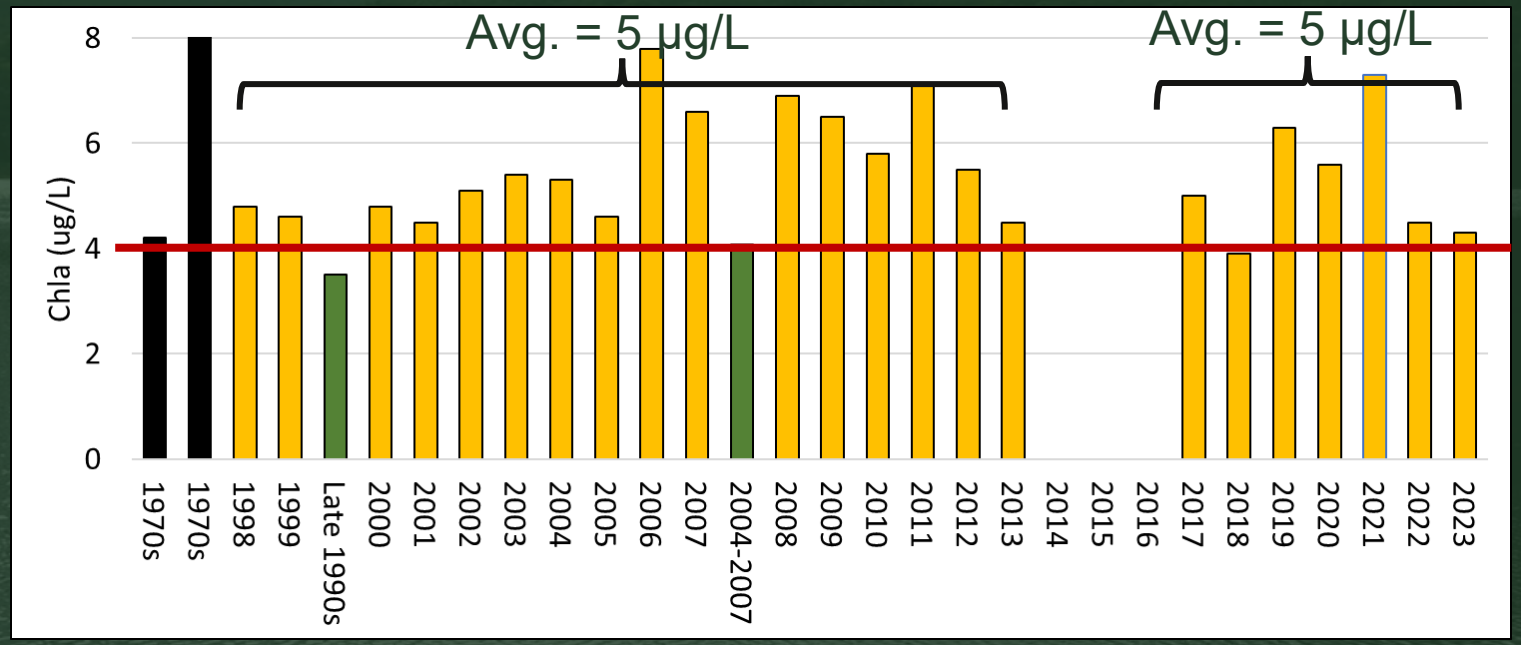
Southern End Chl-a →





← Main Lake Mid-South TP

Main Lake Mid-South Chl-a →



MS4s and Construction GPs

- There is no change envisioned to requirements in the draft 2025 CGP for owners/operators of construction sites in the Cayuga Lake Watershed due to the approval of the Cayuga Lake TDML.

- MS4 Operators need to implement the ‘base program’ (Part VI or VII, depending on the MS4 Operator type) and Part VIII for discharges to a waterbody listed in Appendix C. These are the segments listed in Appendix C which MS4 Operators should already have included in their SWMP Plans;
- The Cayuga TMDL will not be added to the MS4 GP, so there will not be additional/enhanced requirements in Part IX. See Page 46 of the Cayuga TMDL.

Department of Environmental Conservation