

Working Towards a Sustainable Remediation of Georgica Pond



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Why remediate Georgica Pond?



Macroalgae blooms



Blue-green algae blooms

Crabbing Temporarily Closed in Georgica Pond

Blue-green algae blooms have been spotted in this waterbody as a result of the East Hampton Town Trustee water quality testing program:

- Don't swim or wade near the blooms or surface scum
- Don't drink the water
- Keep children and pets away from any blooms or scum
- Rinse with clean water if exposed
- For health safety it is recommended to temporarily not consume any shellfish, crabs, or other marine species from these waters.
- Consider medical attention if you have symptoms of nausea, vomiting, or diarrhea, skin, eye, or throat irritation, allergic reactions or breathing difficulties. Report symptoms to the Suffolk County Department of Health Services at (631) 852-5760

Learn more:
<http://www.health.ny.gov/environmental/water/drinking/bluegreenalgae.htm>
<http://www.dec.ny.gov/chemical/77118.html>

photos from www.ohio.gov

Trustees of the Freeholders and Commonalty of the Town of East Hampton
PO Box 2078 Amagansett, NY 11955 Office (631) 267-8688 www.trustees.easthamptonny.gov

Low oxygen, death of wildlife



Why remediate Georgica Pond?

- Blooms of macroalgae
- Blooms of toxic blue green algae
- Hypoxia, anoxia
- Kills of fish, eels, birds, dogs
- Pathogenic bacteria

Overview

- Observations for 2020
- Long-term trends
- Action to improve conditions



Real-time monitoring buoy rebuild



Georgica Pond

Chart View

Table View

Site Information

GP_south

Site Id

40.934192

Latitude

-72.22572

Longitude

Georgica Pond Buoy - The Gobler Lab of Stony Brook University

Description

As part of The Georgica Pond Project, the Gobler laboratory has installed a water quality monitoring buoy in Georgica Pond. This device is making continuous, real-time measurements of key water quality indicators that are instantly telemetered to this web site.





An investigation led by the Gobler Lab of Stony Brook University



Georgica Pond

Chart View

Table View

Site Information

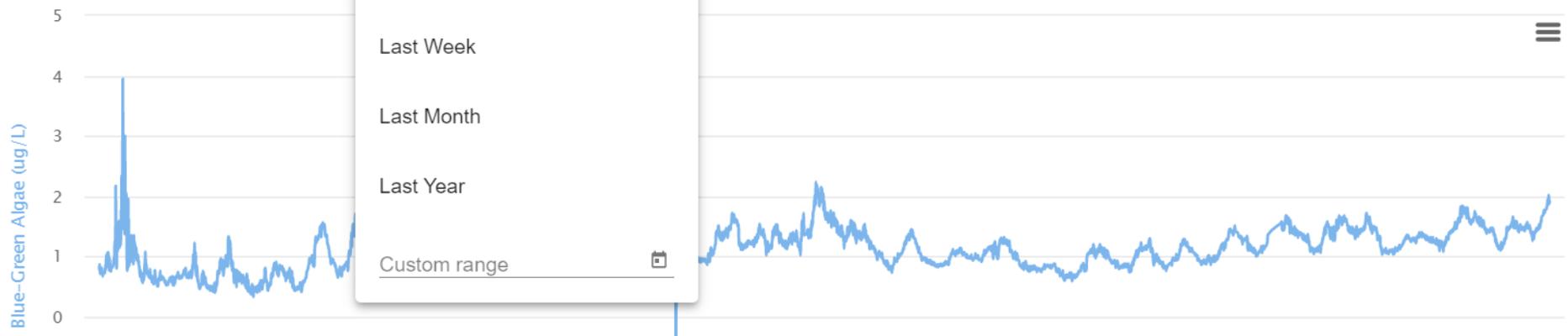
Parameters ▾

Studies ▾

📅 Last Month

Y-axis scaling
Min Max

Clear



Last Day

Last Week

Last Month

Last Year

Custom range



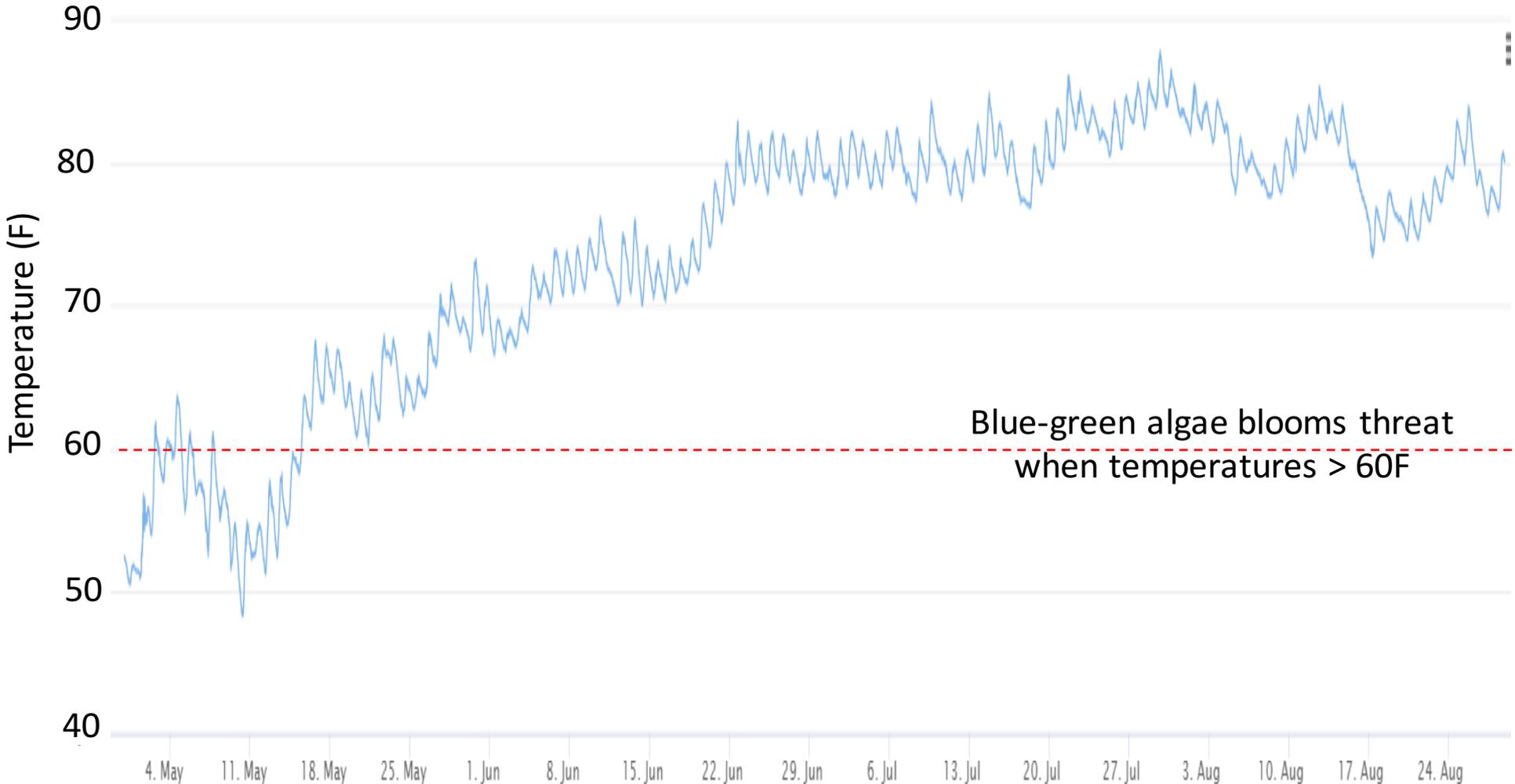
Cut opened in spring, closed since April



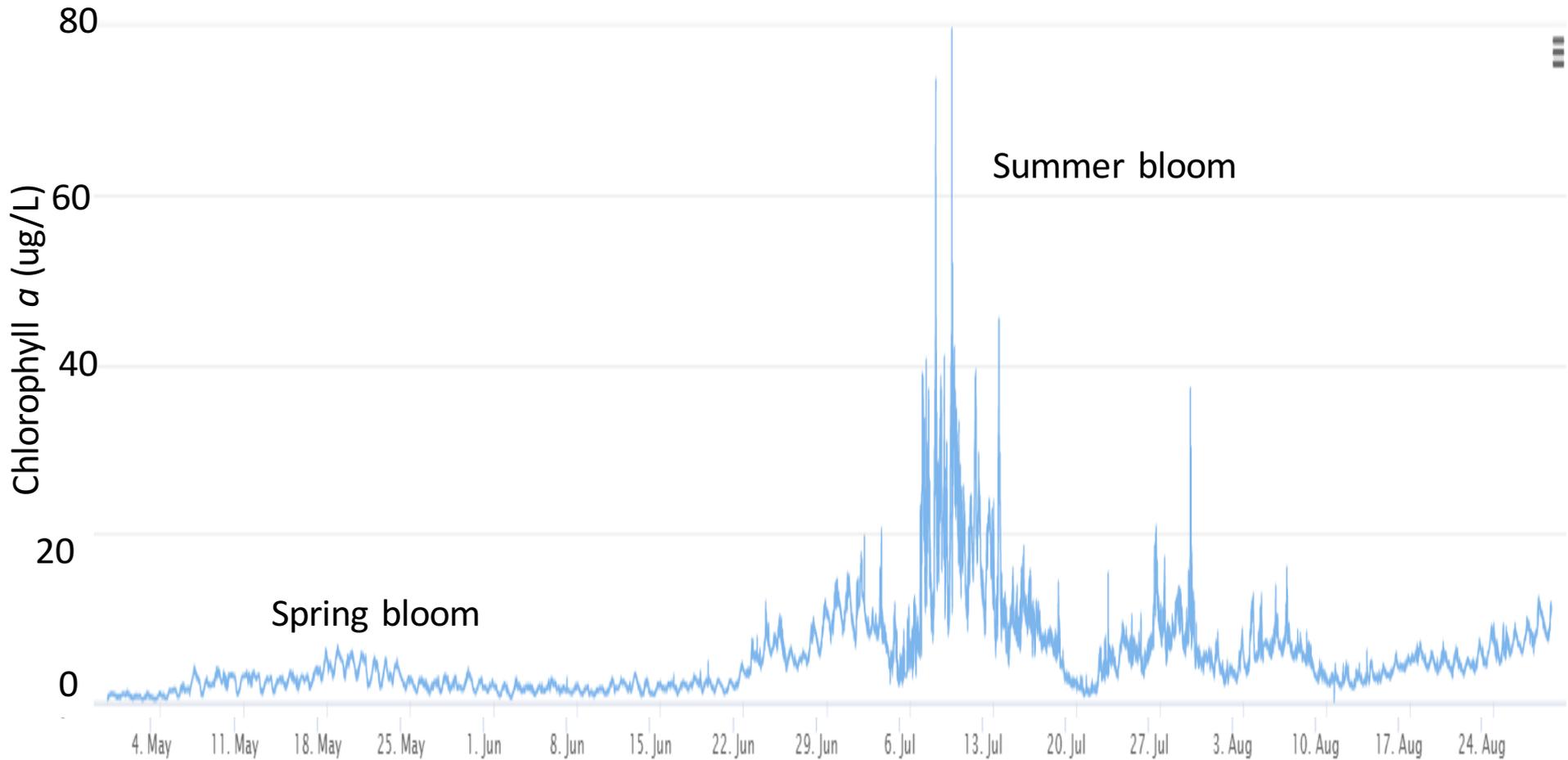
Salinity, buoy



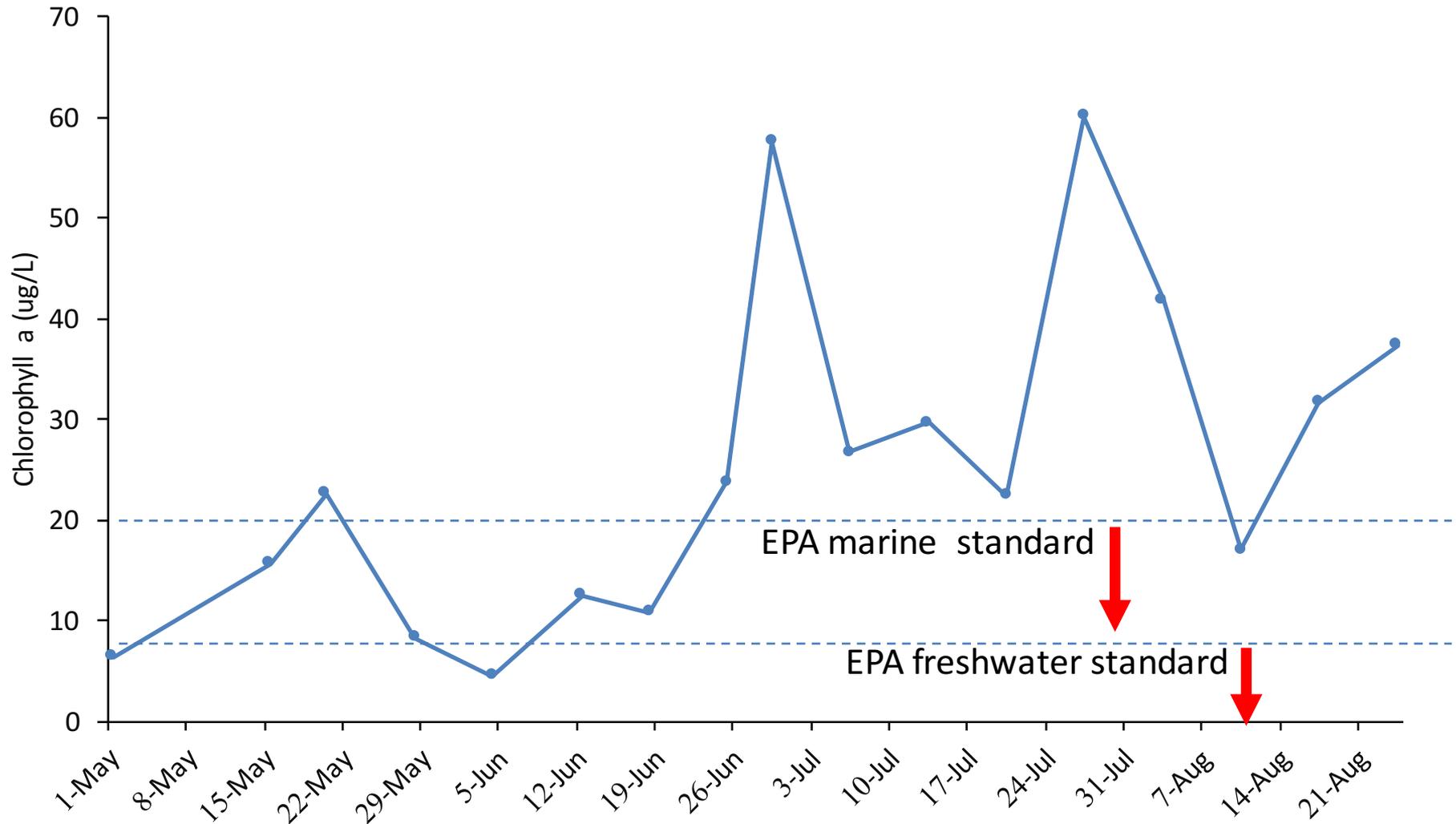
Temperature, buoy



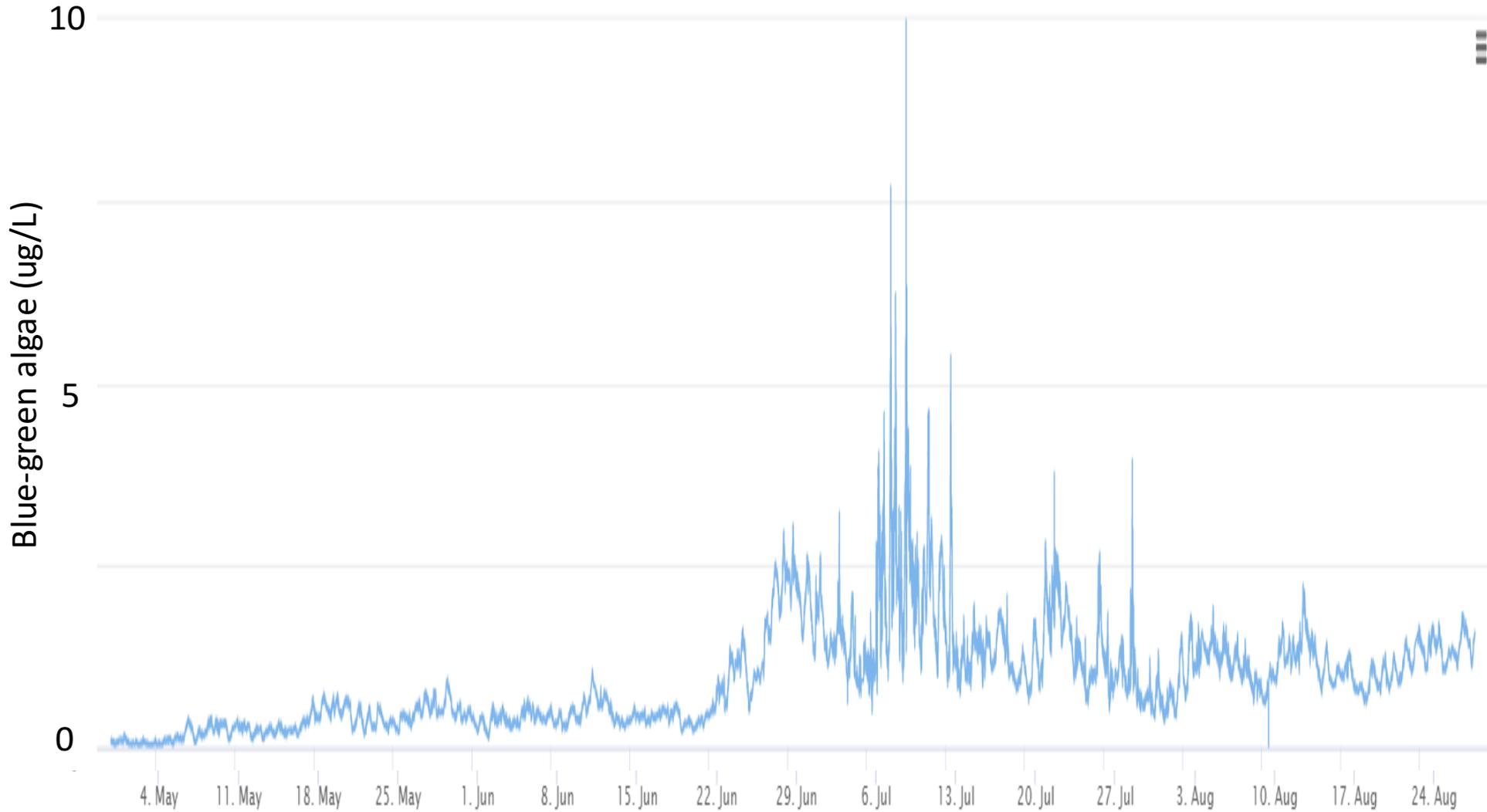
Chlorophyll *a*, buoy



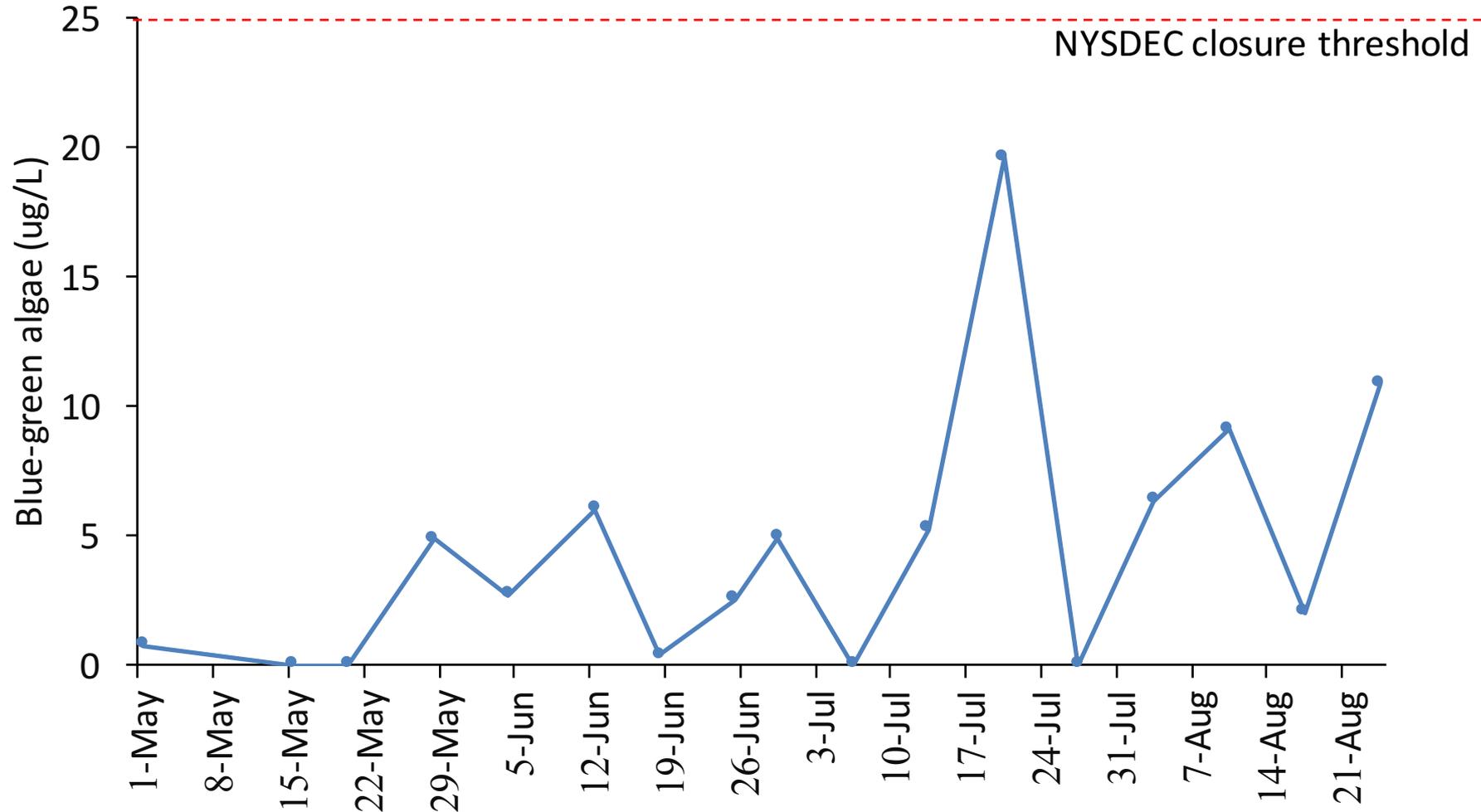
Chlorophyll *a*, extracted



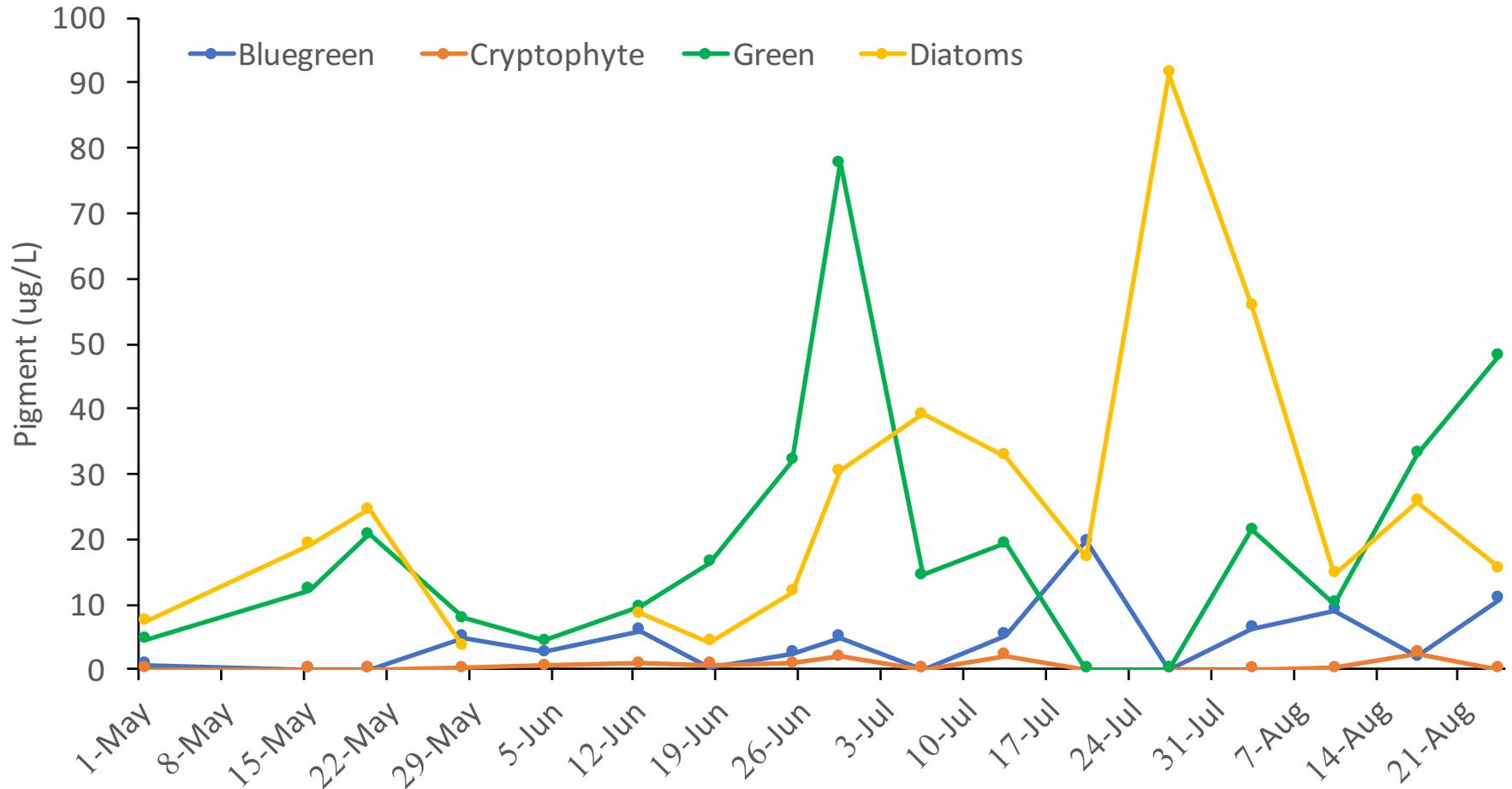
Blue green algae, buoy



Blue-green algae, extracted



Algae communities, 2020



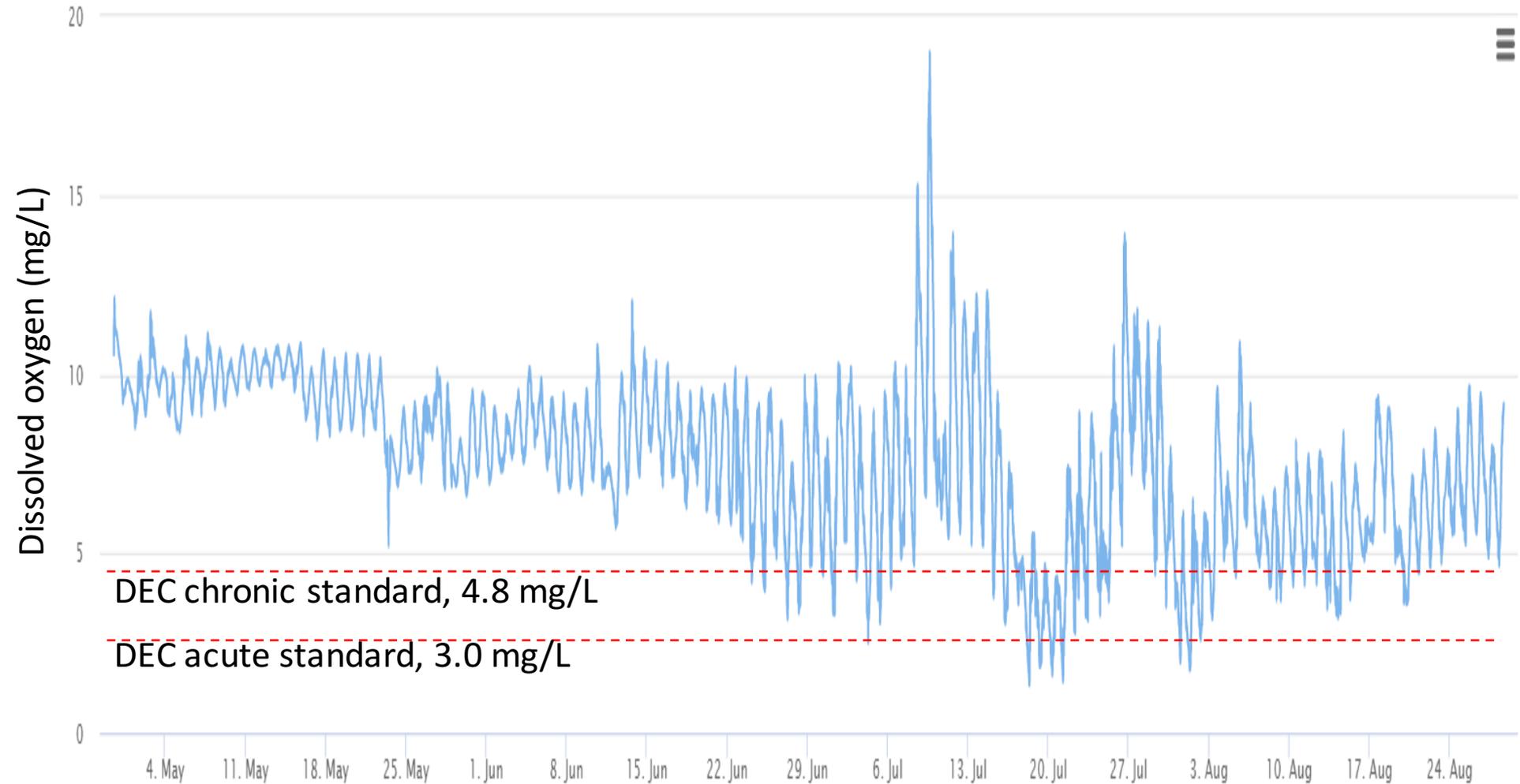
May



June



Dissolved oxygen, 2019



Georgica Pond macroalgae

Excessive
nutrient
loading in
Pond

Macroalgae
bloom



Collapsing
macroalgal
bloom
regenerates
nutrients

Blue-green
algae use
released
nutrients;
hypoxia



2016 - 2018: NYSDEC permitted harvesting of macroalgae funded by FoGP



Georgica Cove, July 21, 2020



The macroalgae – blue green algae connection, 2015

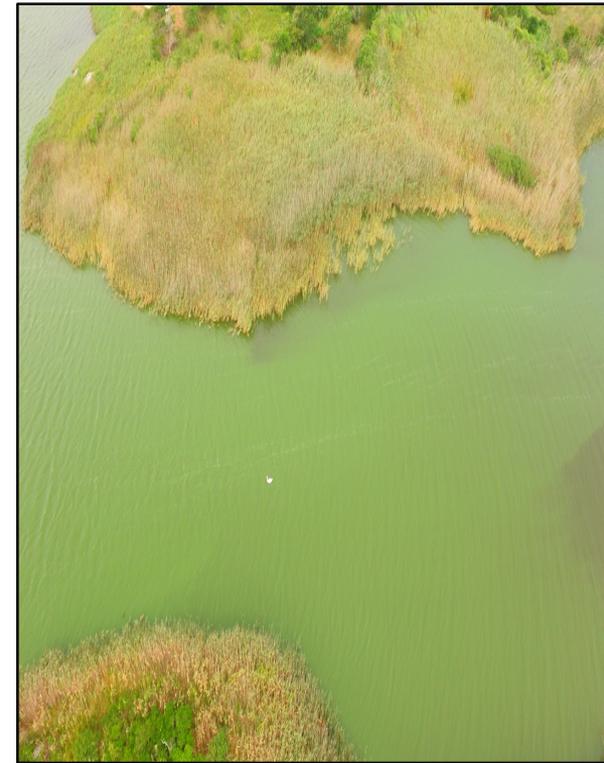
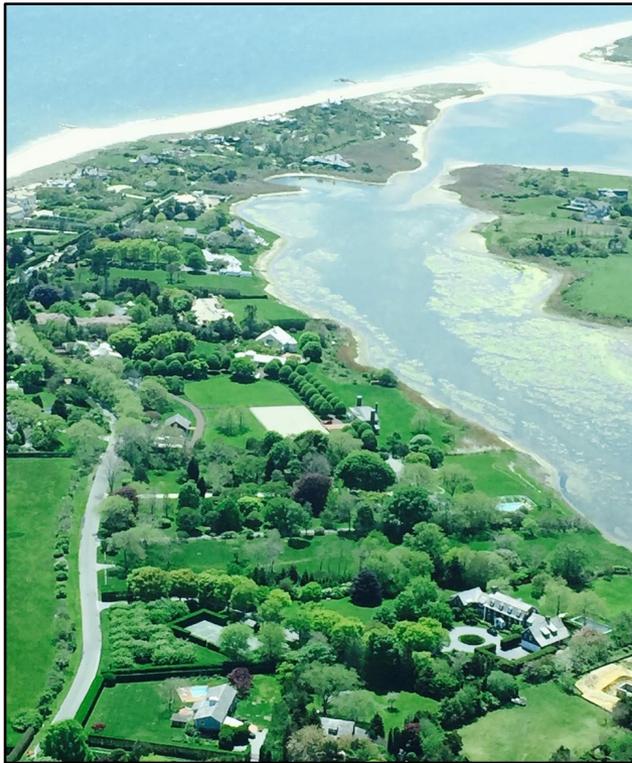
June



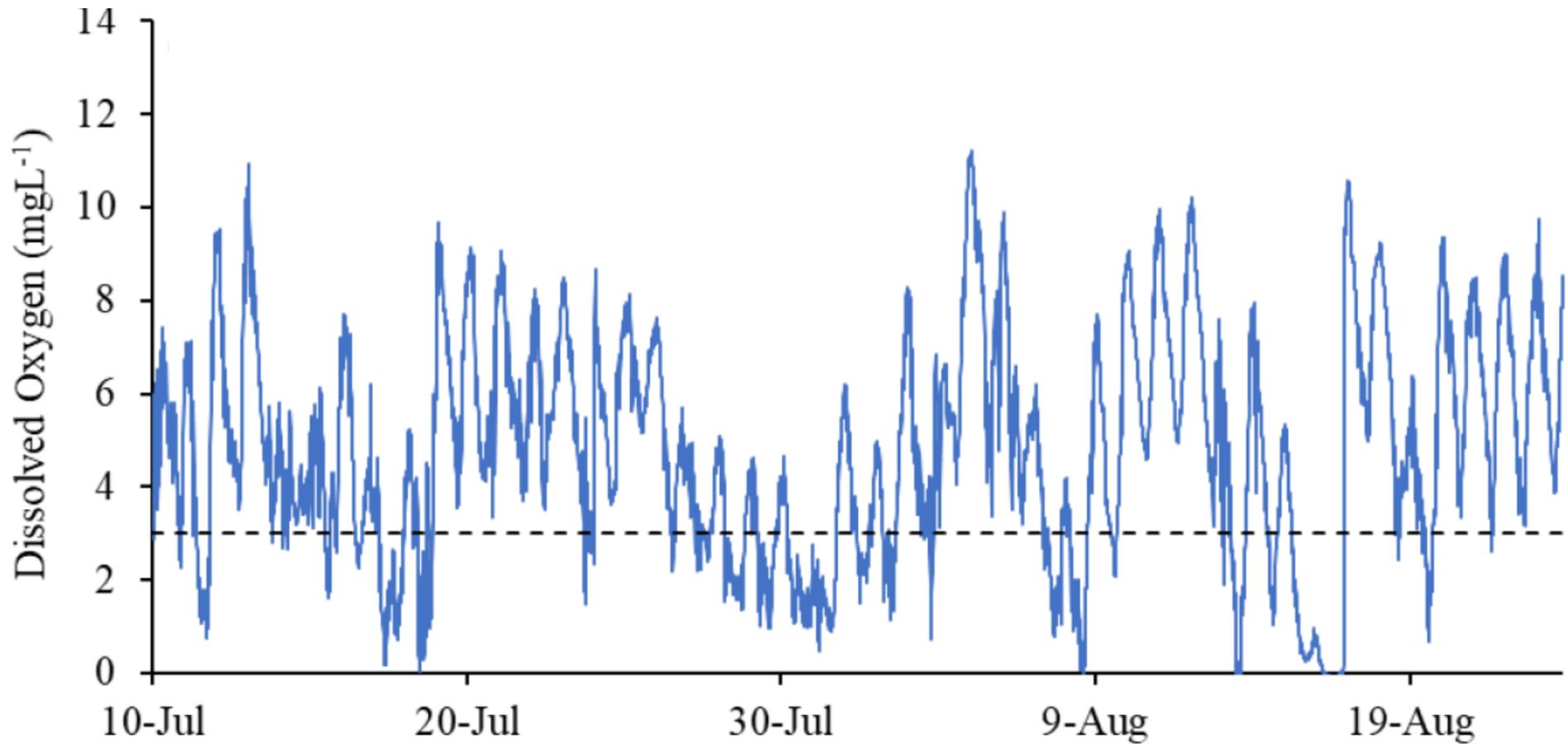
July



August



Georgica Cove dissolved oxygen, 2020



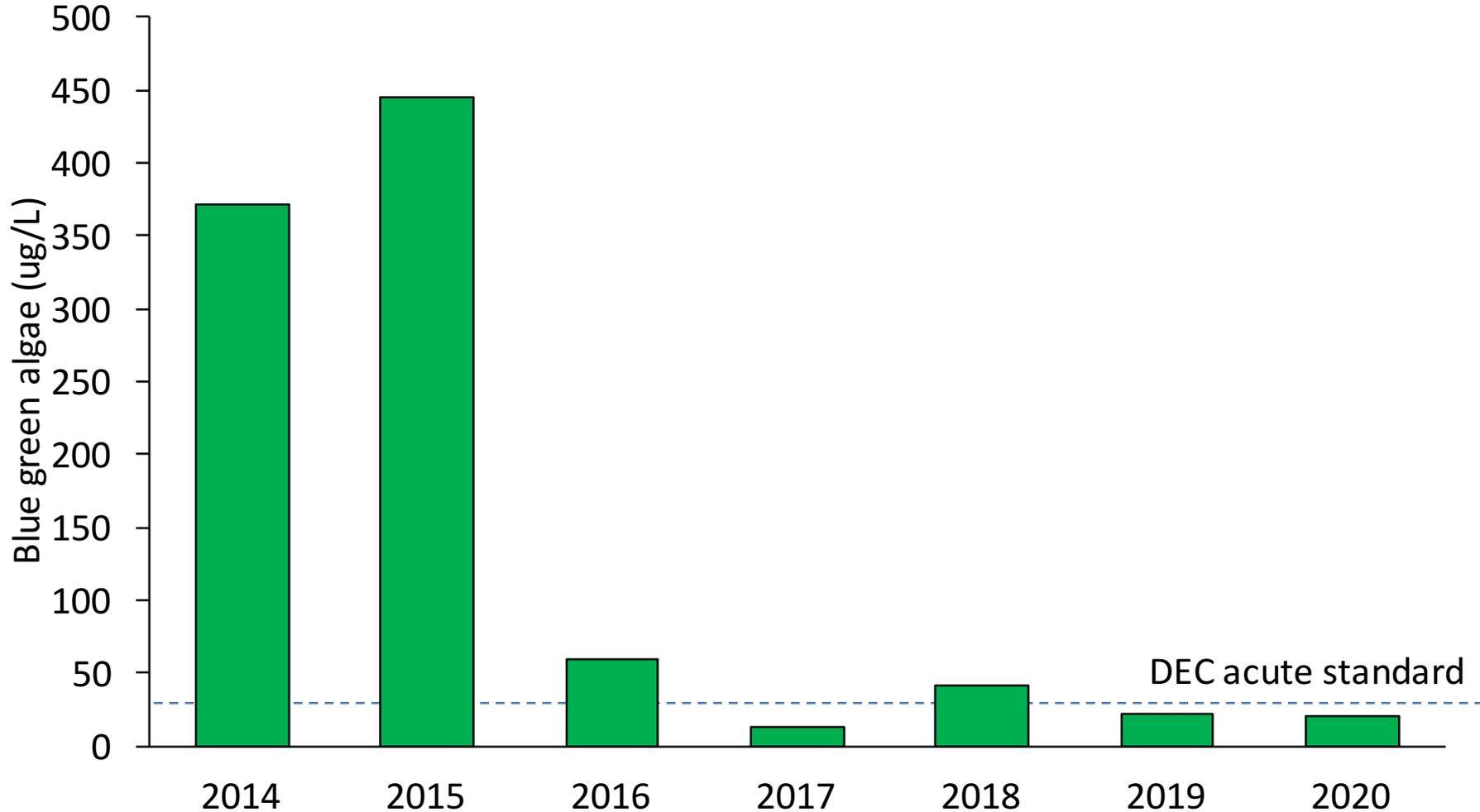
Emergency authorization for harvester granted by DEC, August 2020



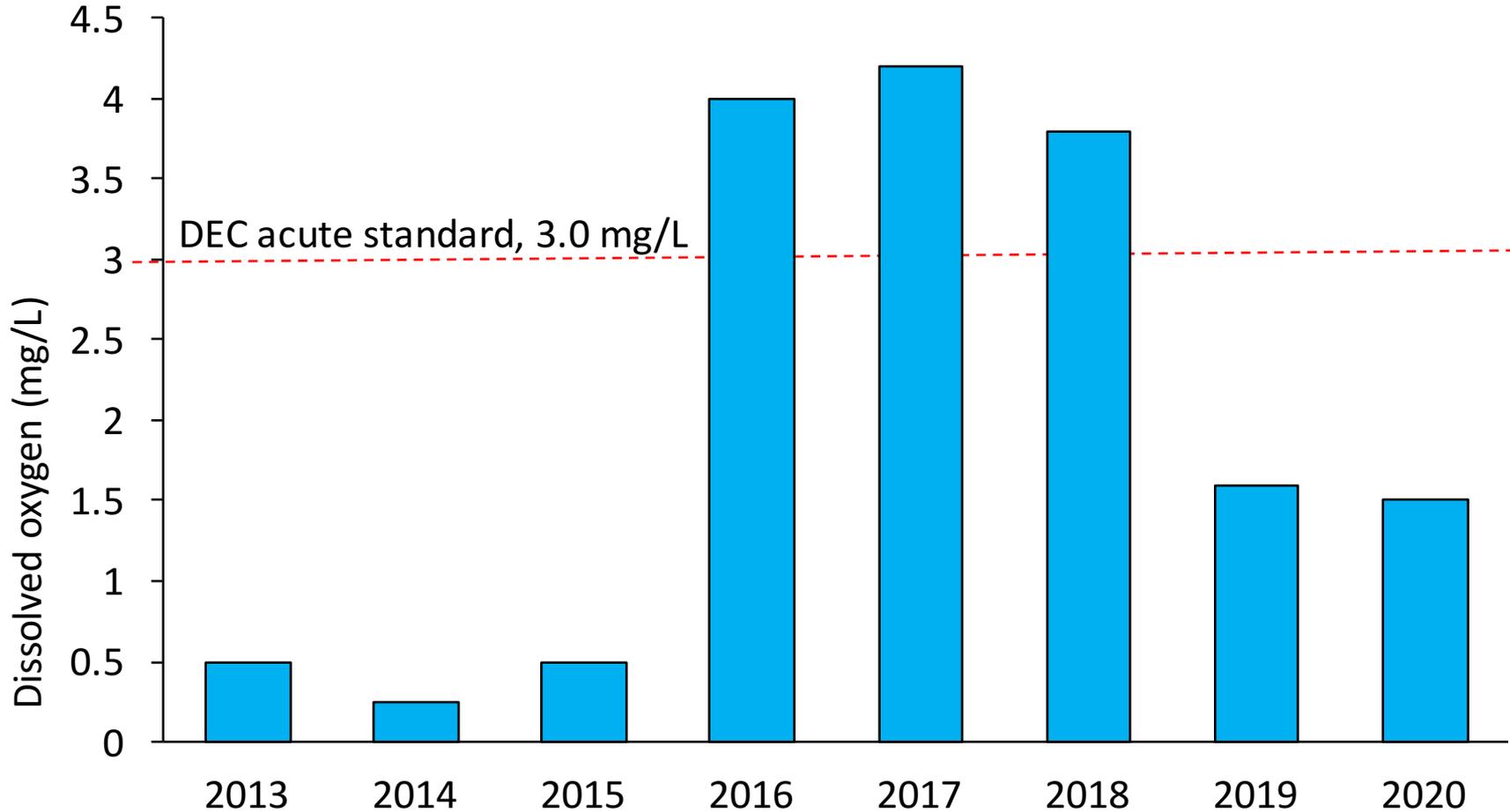
Start of blue-green algae bloom in Georgica Cove?



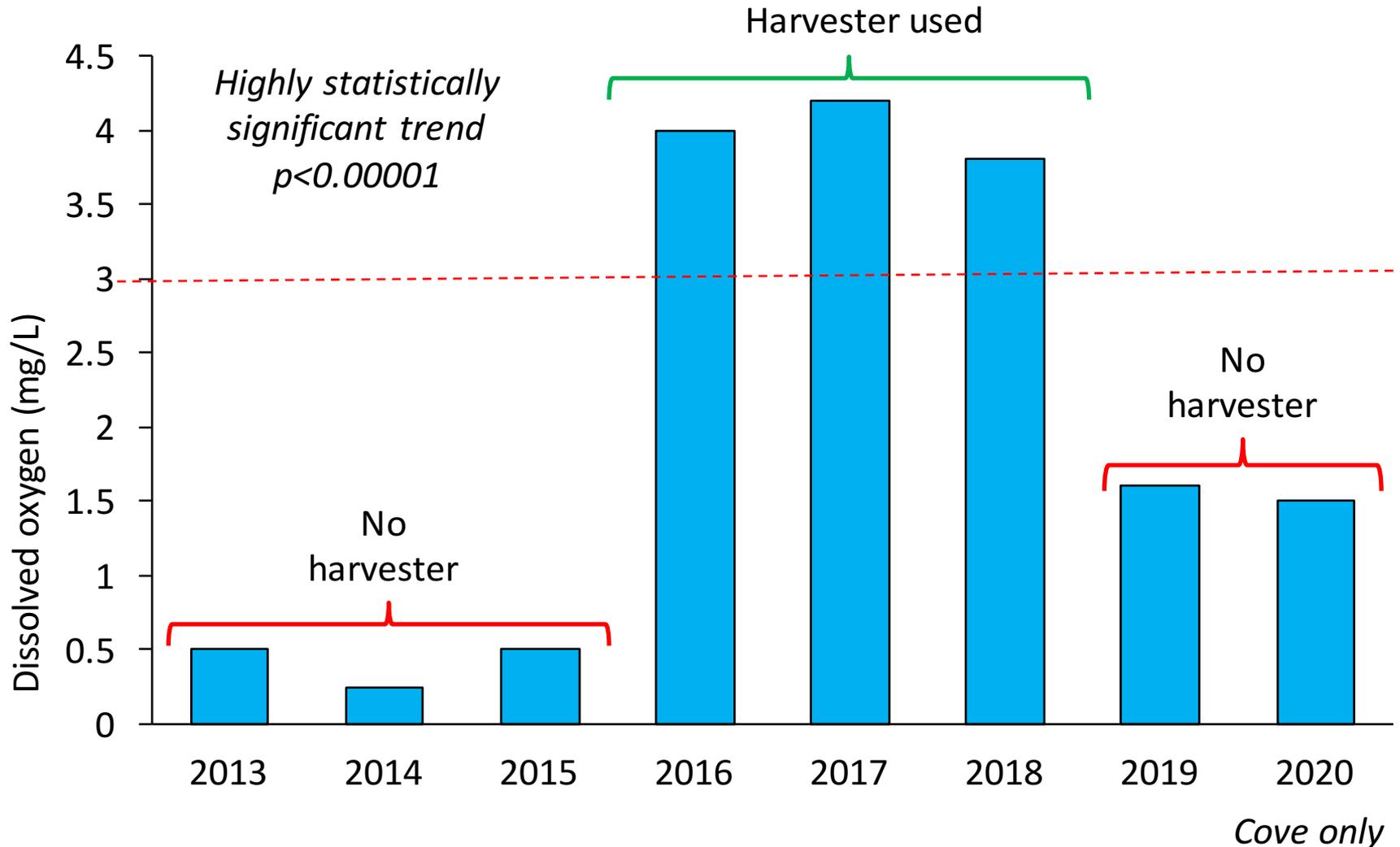
Blue-green algae blooms, 2014-2020



Summer dissolved oxygen minimum by year



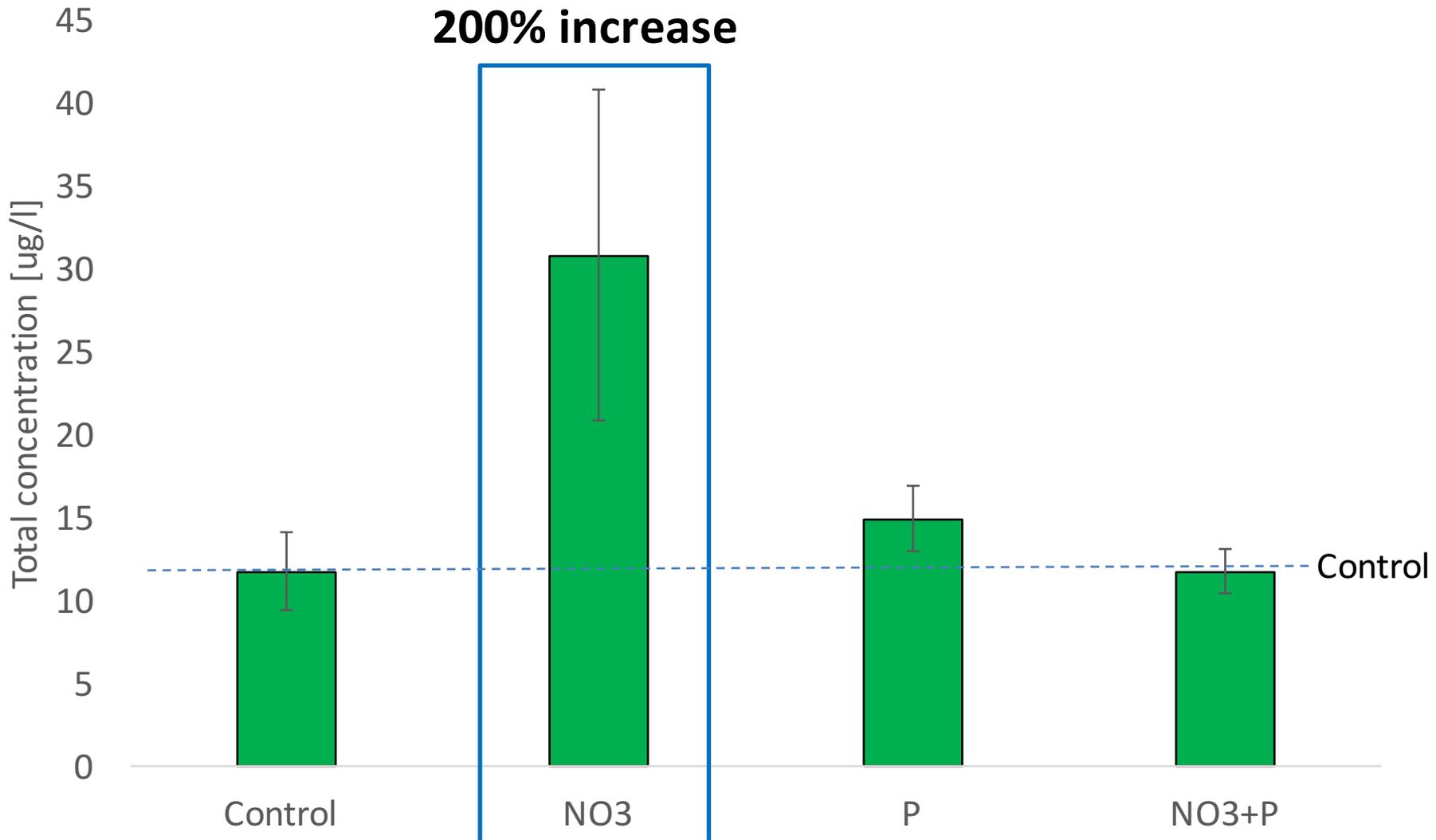
Summer dissolved oxygen minimum by year



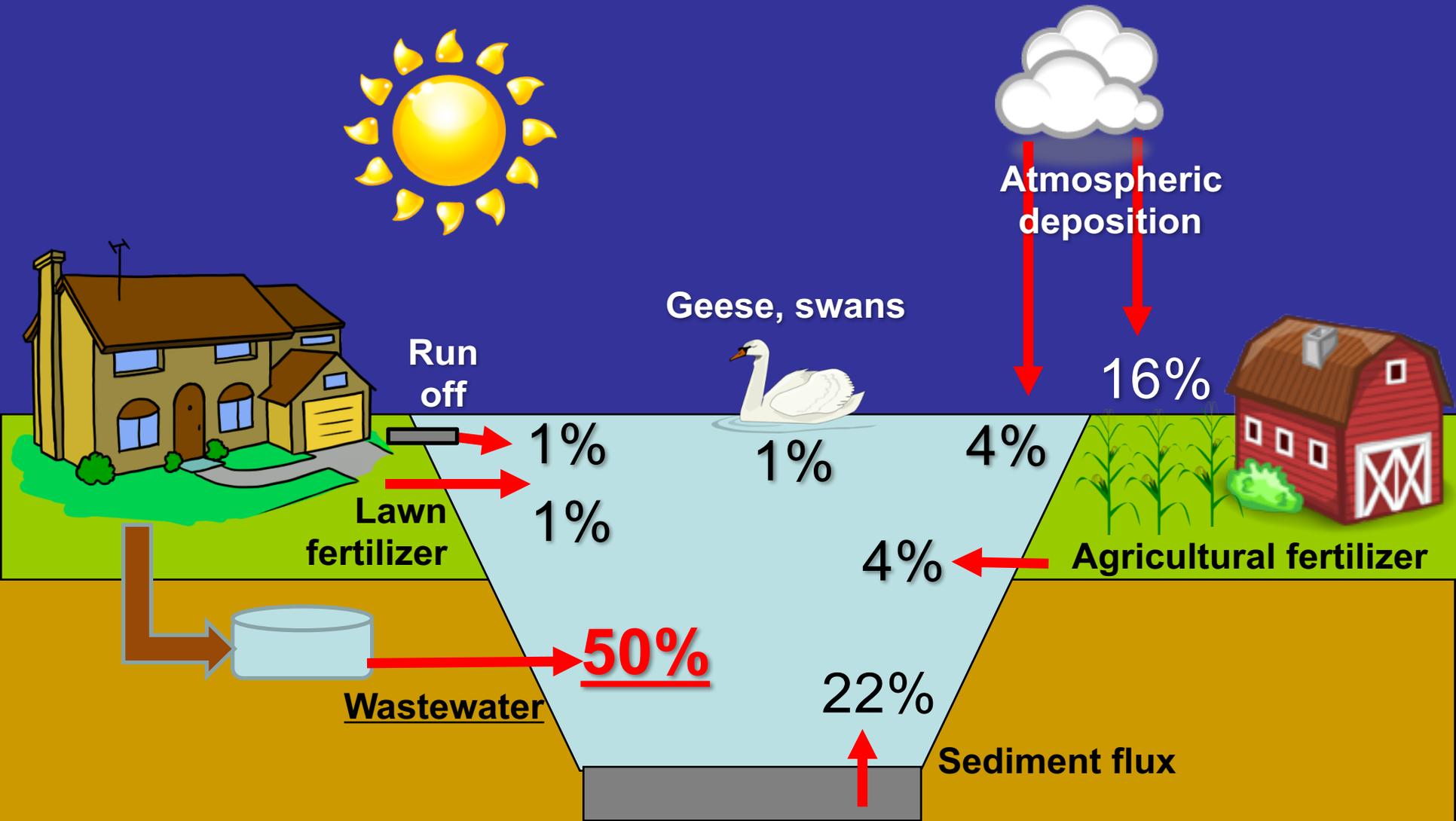
What is promoting algal blooms and low oxygen in Georgica Pond?



Nutrients controlling blue-green algae



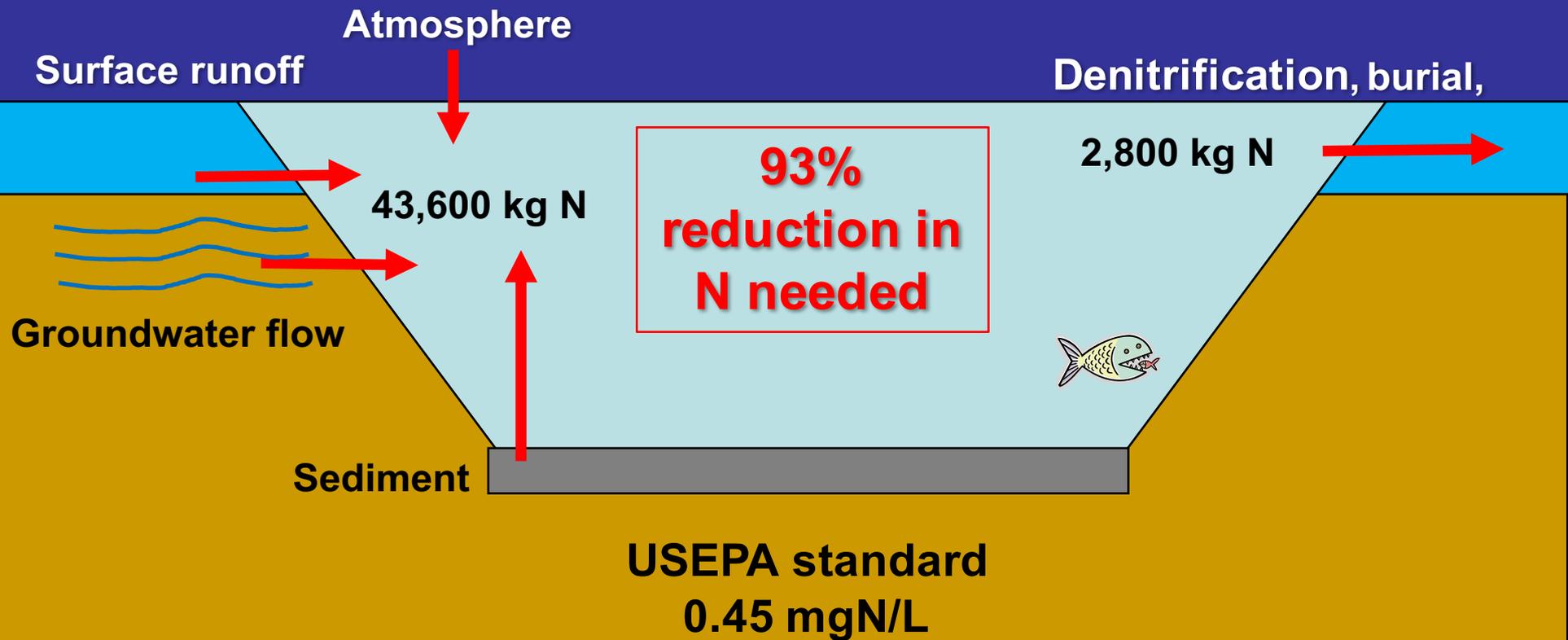
Nitrogen loading model



Total maximum daily load, nitrogen cut open **two** months

Inputs:

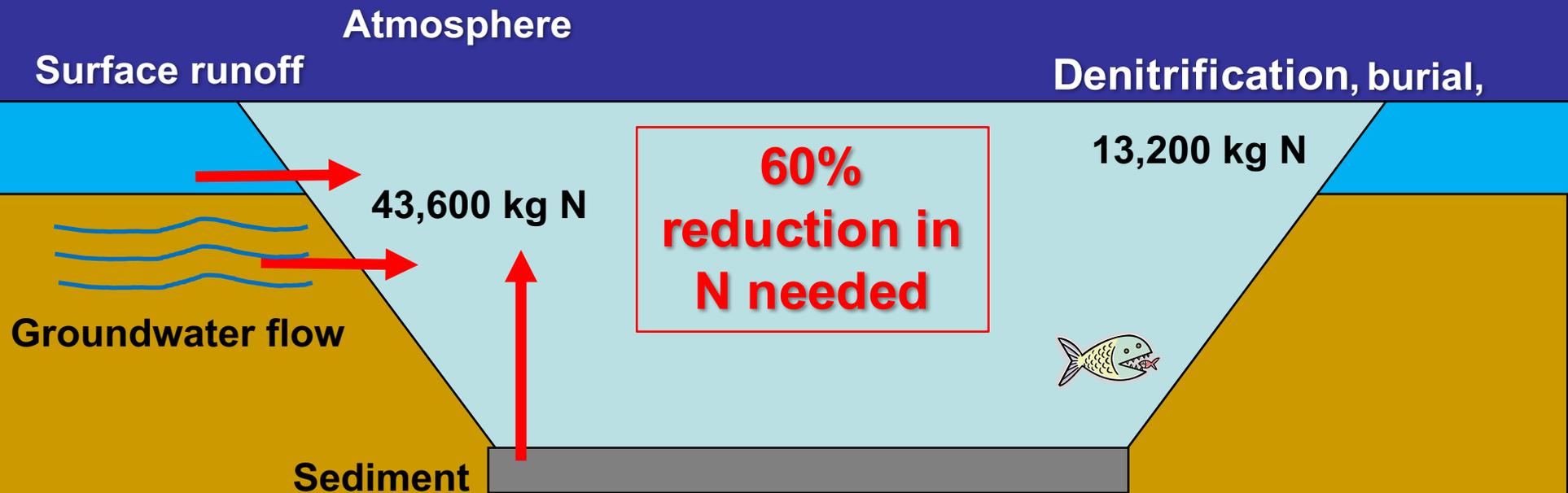
Exports:



Total maximum daily load, nitrogen cut open **ten** months

Inputs:

Exports:



USEPA standard
0.45 mg N/L



Reclaim  Our Water

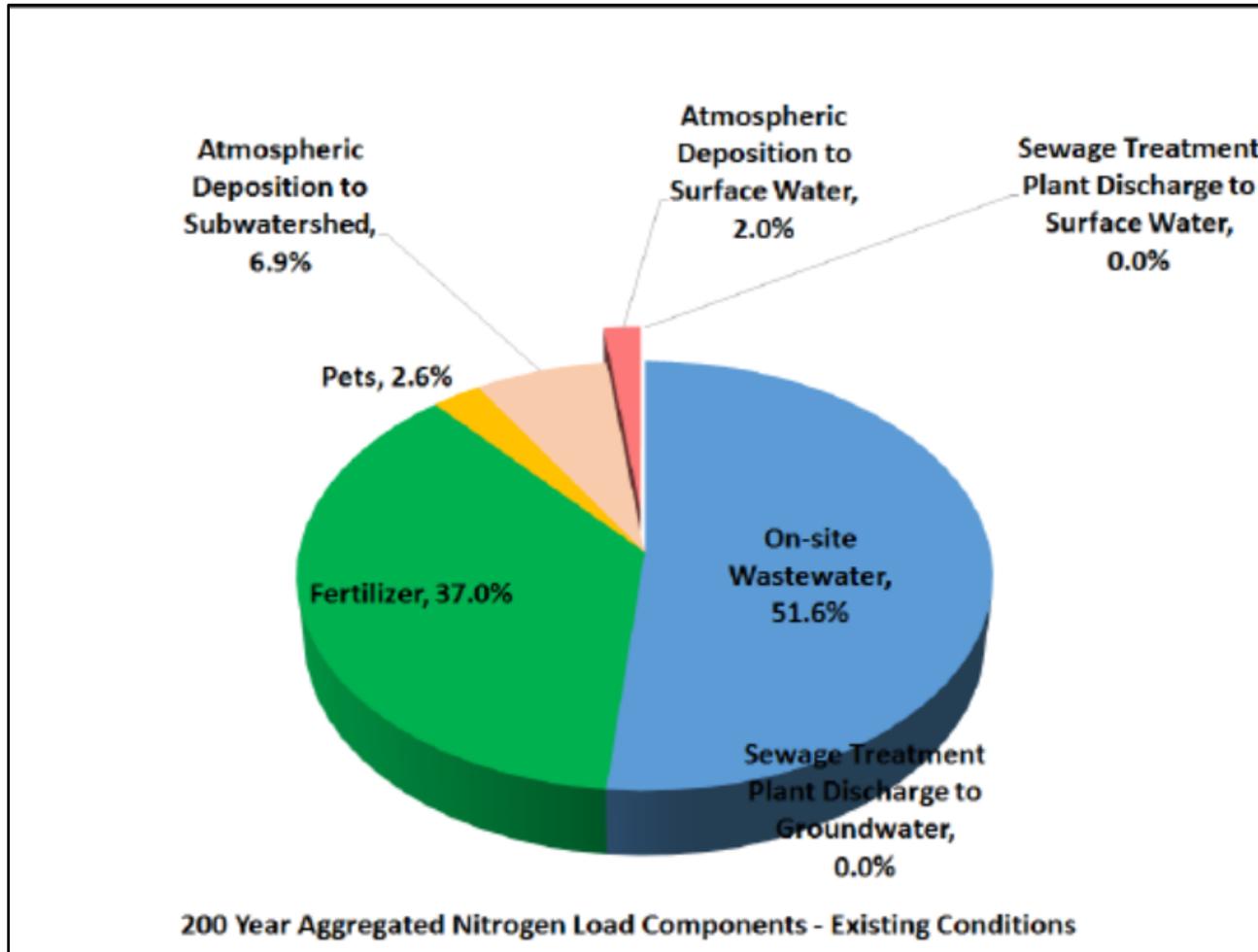
DRAFT SUBWATERSHEDS WASTEWATER PLAN EXECUTIVE SUMMARY

"We are in a county that will no longer allow our water quality crisis to go unaddressed, but will come together to Reclaim Our Water"

Suffolk County Executive Steve Bellone
2014 State of the County

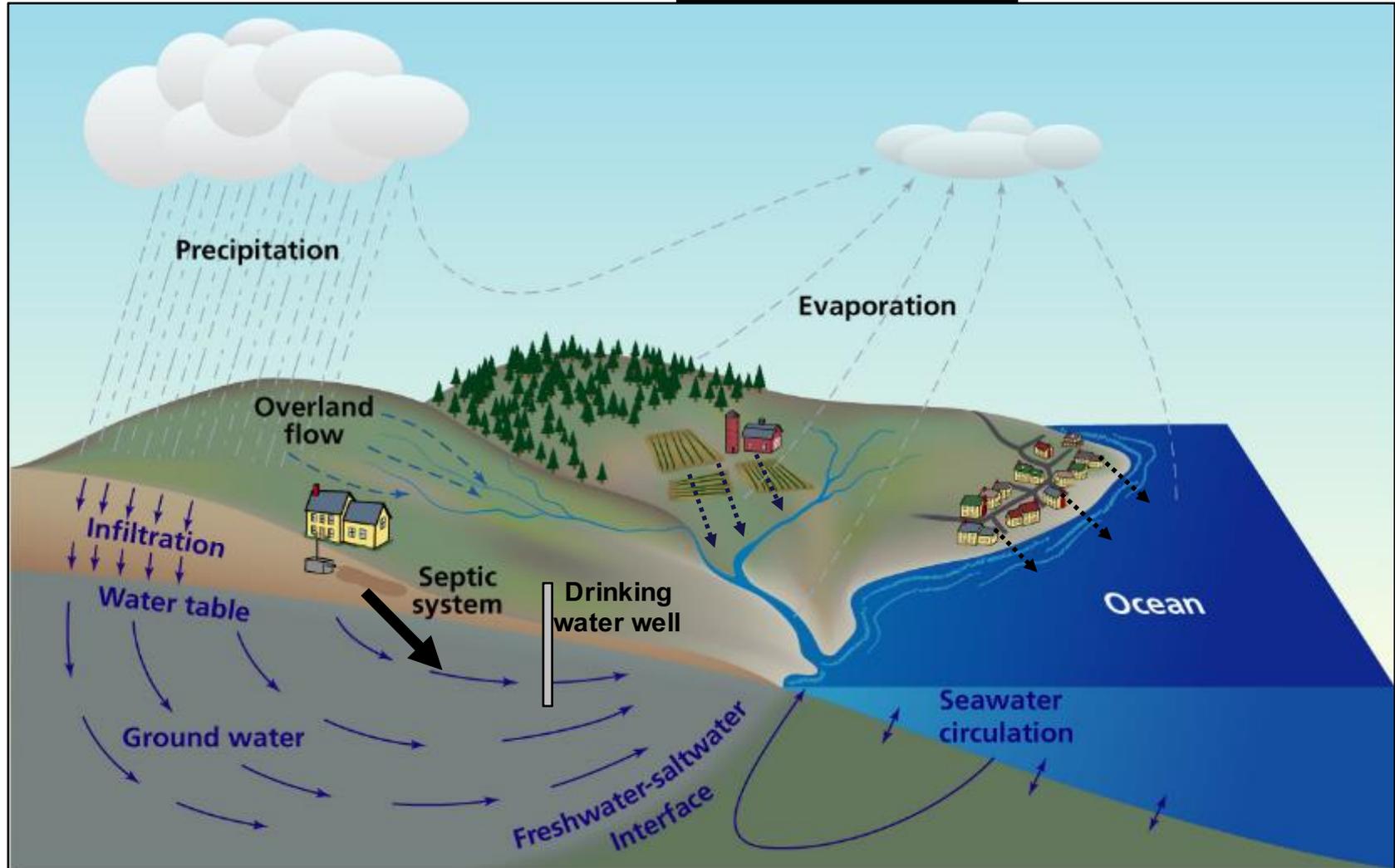
Released, September 2019; approved June 2020

Suffolk County Subwatershed N-budget for Georgica Pond



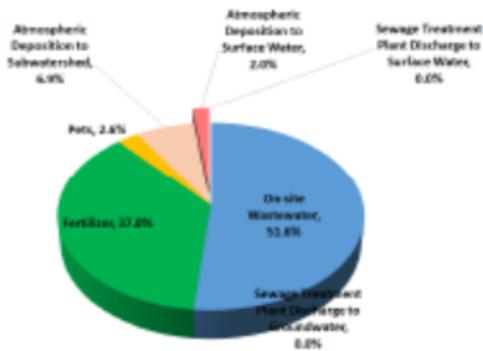
The Watershed

Materials from land enter our groundwater, become our drinking water, and enter our surface waters.

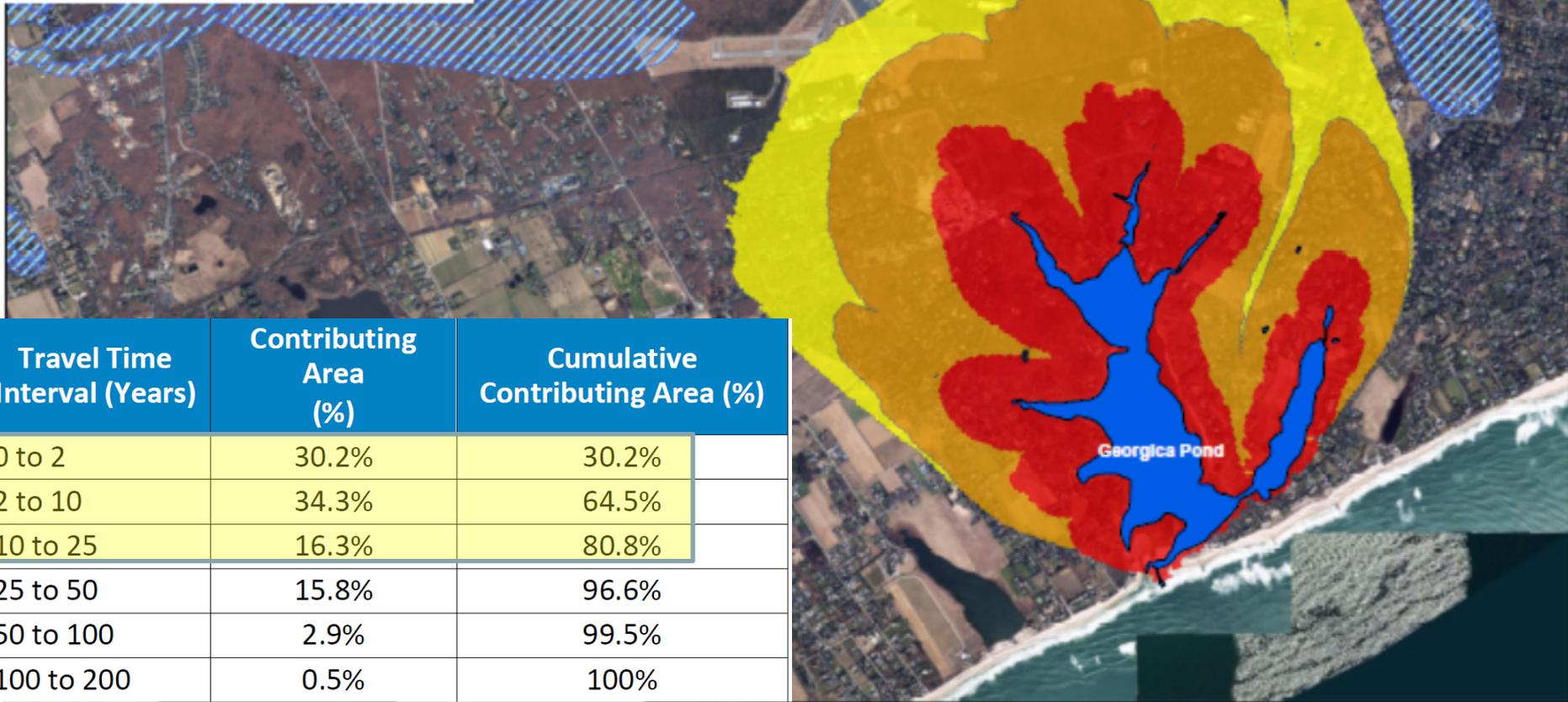


Ecological Sensitivity Rank

1



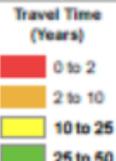
200 Year Aggregated Nitrogen Load Components - Existing Conditions



Travel Time Interval (Years)	Contributing Area (%)	Cumulative Contributing Area (%)
0 to 2	30.2%	30.2%
2 to 10	34.3%	64.5%
10 to 25	16.3%	80.8%
25 to 50	15.8%	96.6%
50 to 100	2.9%	99.5%
100 to 200	0.5%	100%

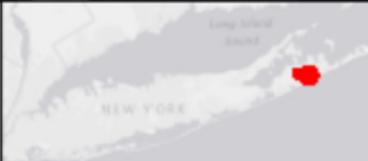
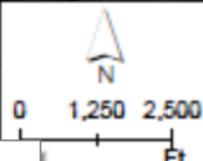


Management Area/Nitrogen Reduction Goal
13 63%



Subwatershed is Poorly Characterized

- Waterbody (Blue)
- Sewered Area (White)
- Well Contrib (Blue Hatched)

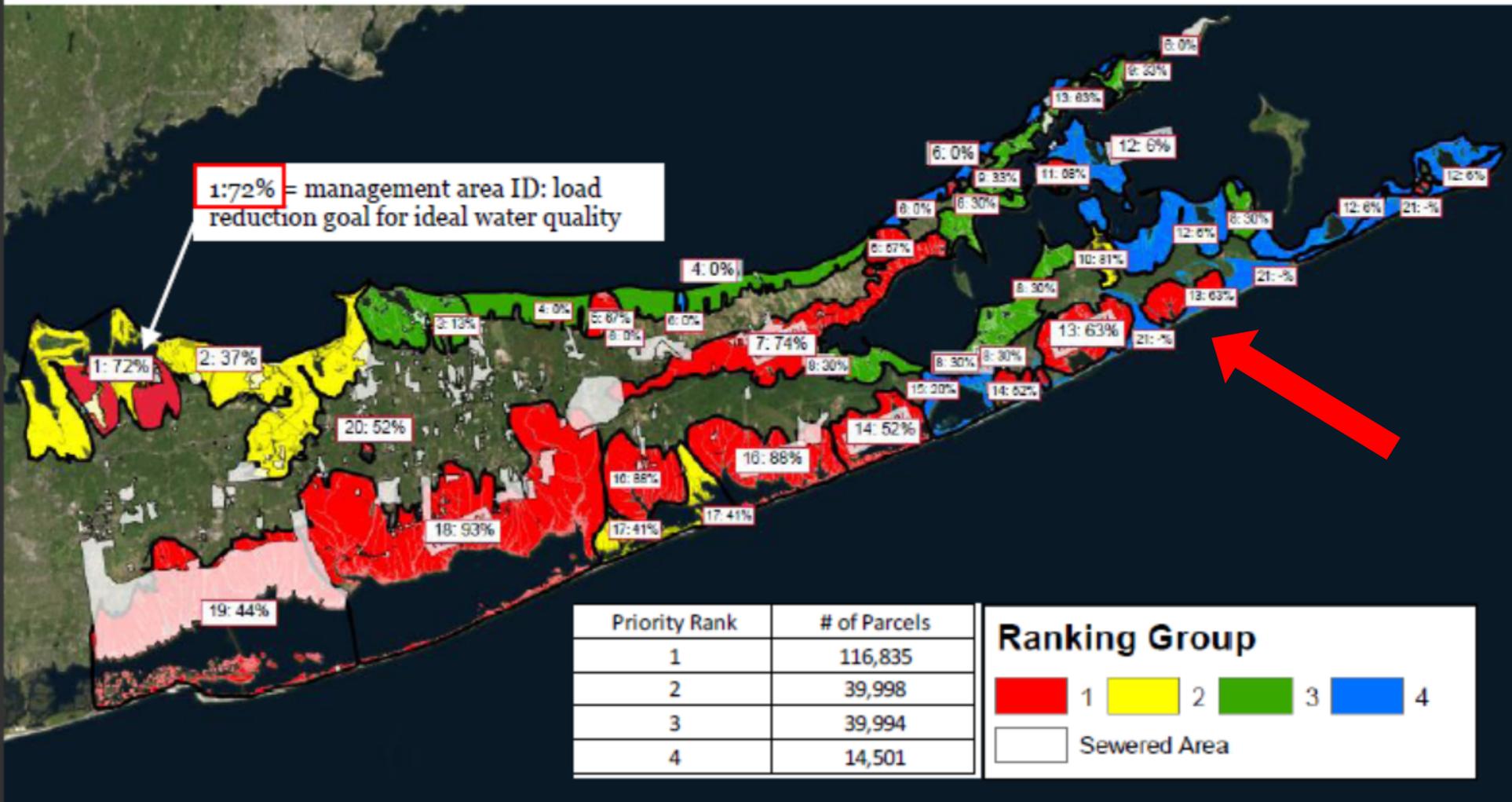


Wastewater Management and Water Quality Characterization
25 Year Contributing Area
1701-0145
Georgia Pond

Suffolk County Subwatershed Nitrogen reductions for Georgica Pond

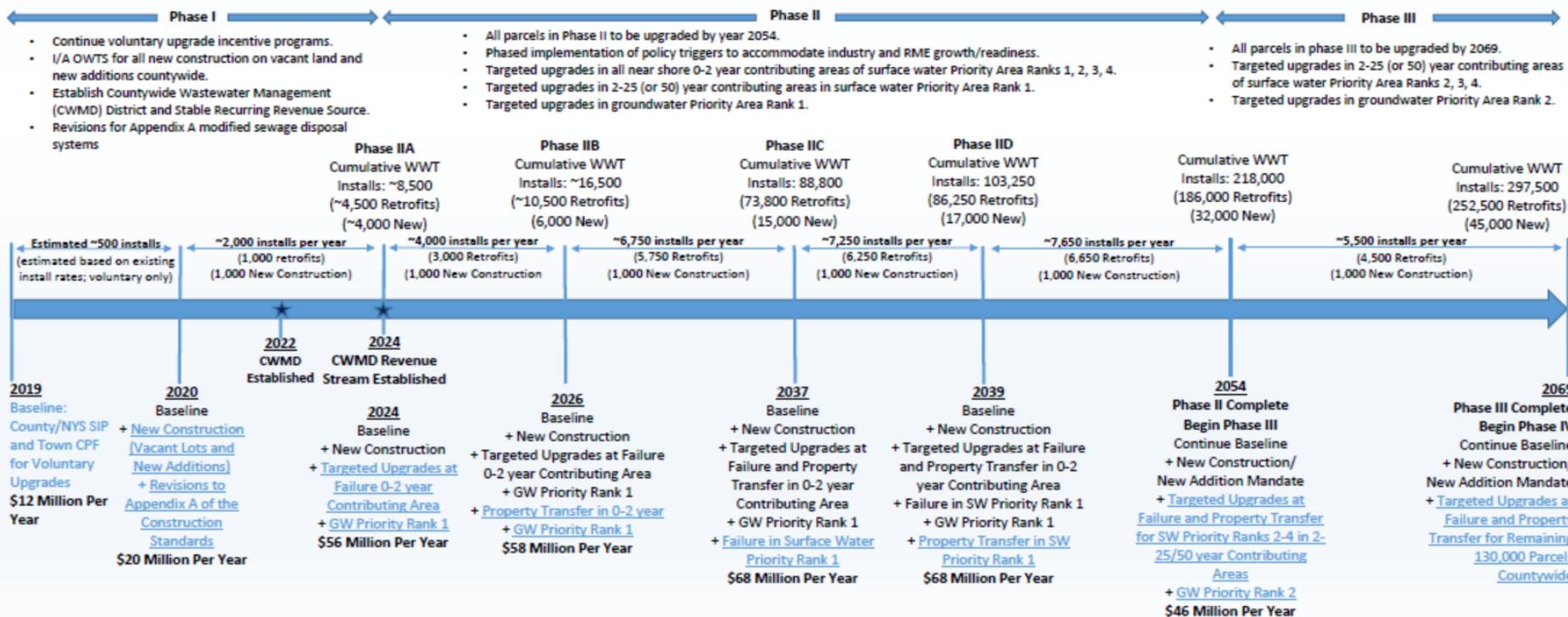
Approach	N reduction recommended
Gobler mass balance, cut open two months	90%
Gobler mass balance, cut open ten months	60%

Georgica Pond is priority #1 for nitrogen load reductions

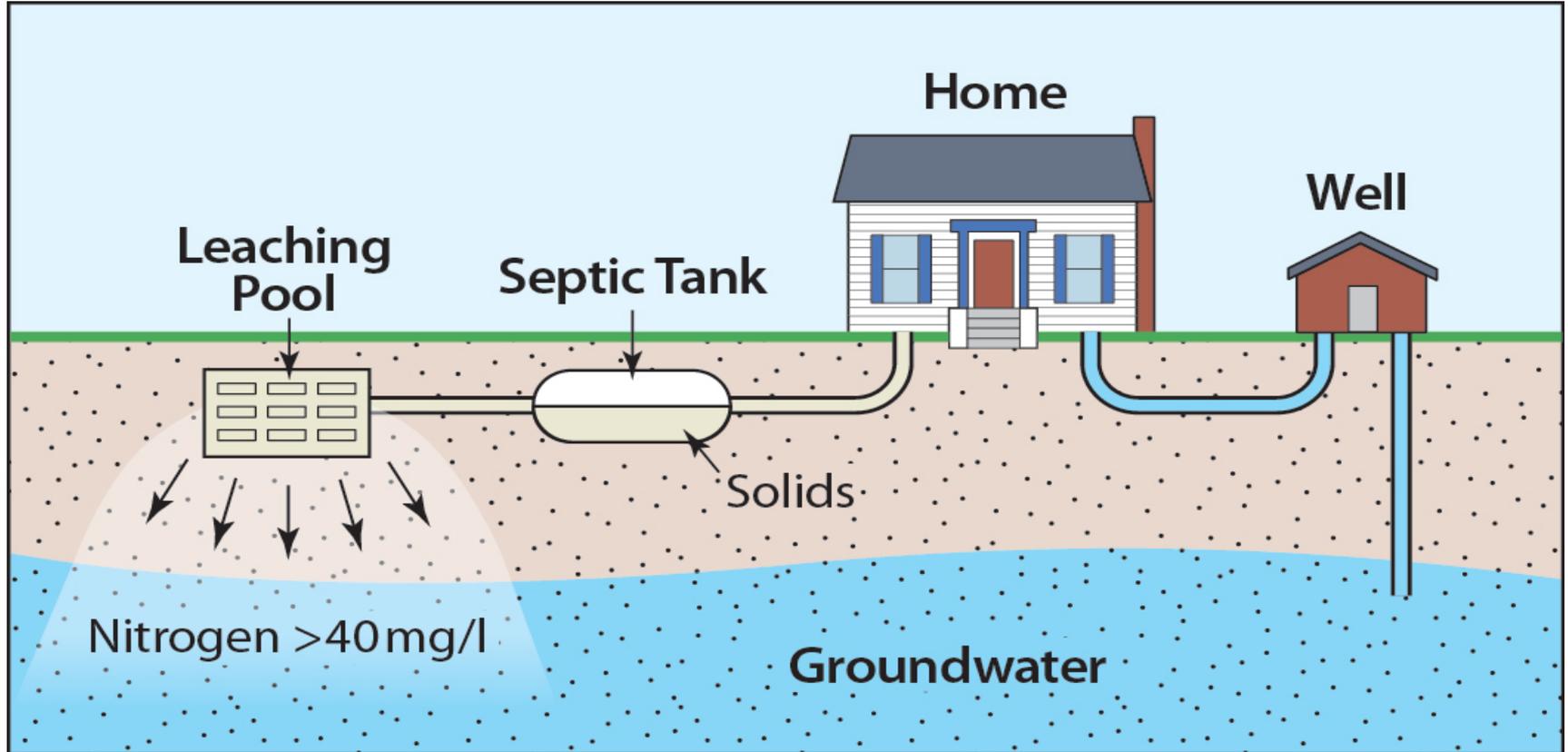


A fifty-year plan

Figure 31 Subwatersheds Wastewater Plan Conceptual Program Timeline



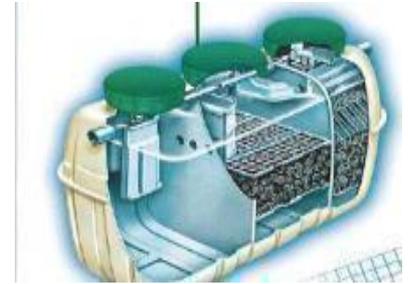
Long Island household wastewater system



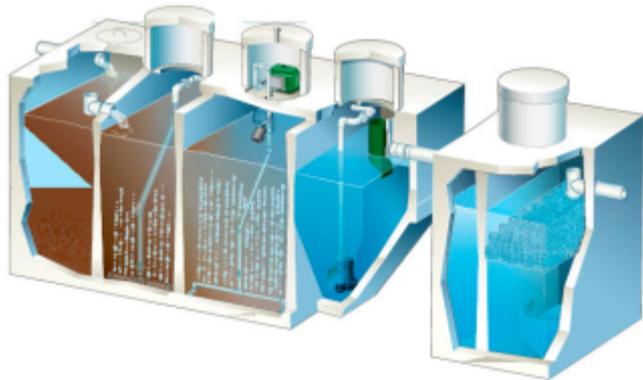
PROVISIONALLY APPROVED I/A OWTS: Reduce N below 19 mg/L



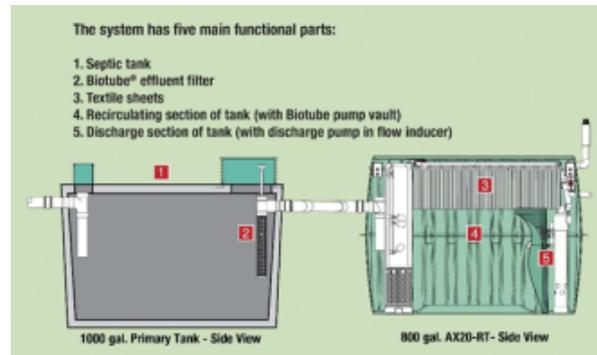
Hydro-Action



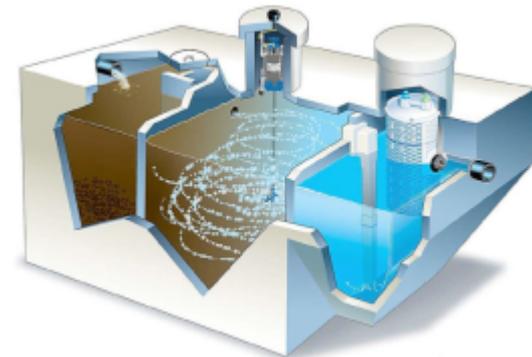
Fuji Clean System



Norweco Hydrokinetic



Orenco Advantex AX-RT

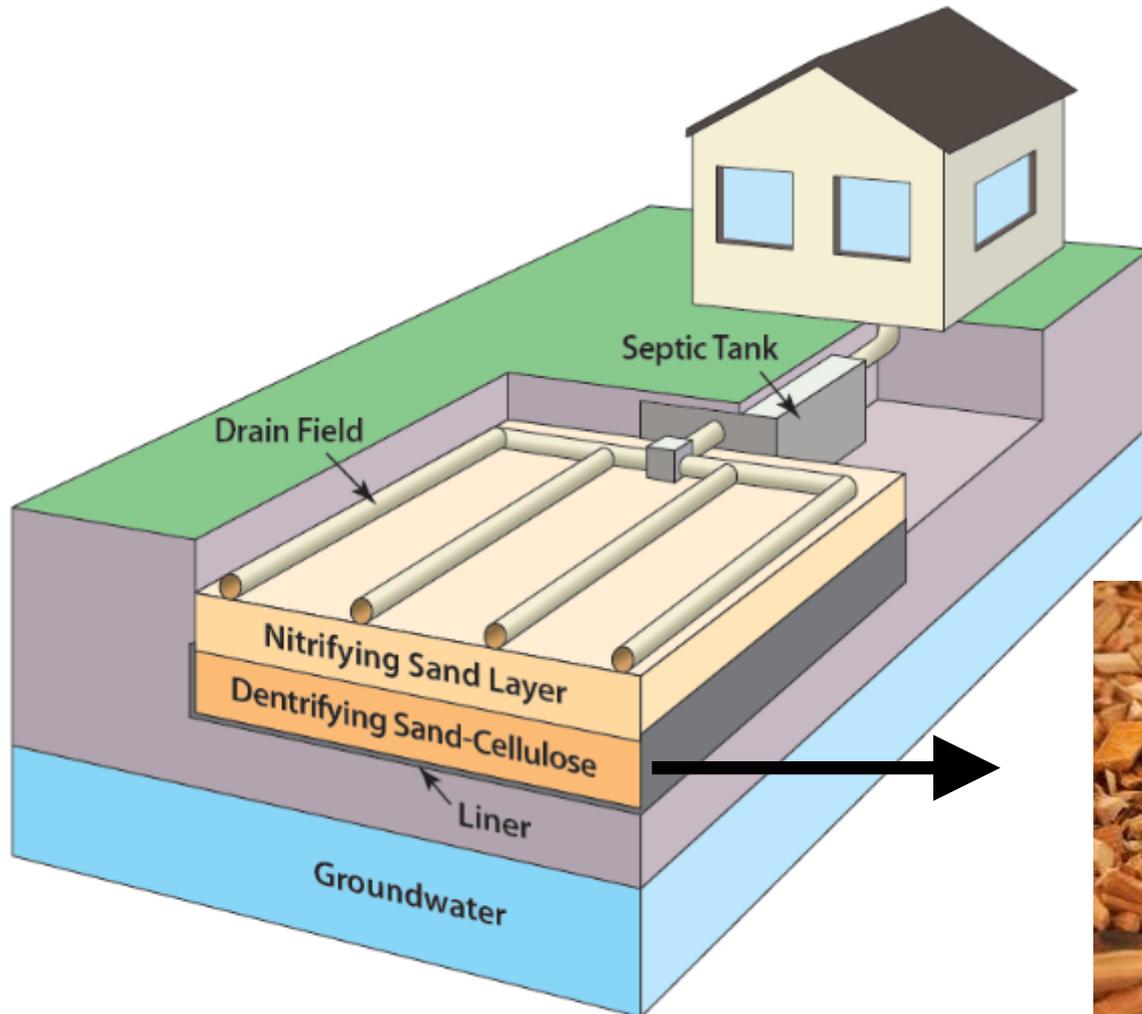


Norweco Singlair TNT

***The New York State Center for
Clean Water Technology:
Innovating solutions to protect our
most vital resource***

Director, Dr. Chris Gobler

Nitrogen Removing Biofilters (NRB)



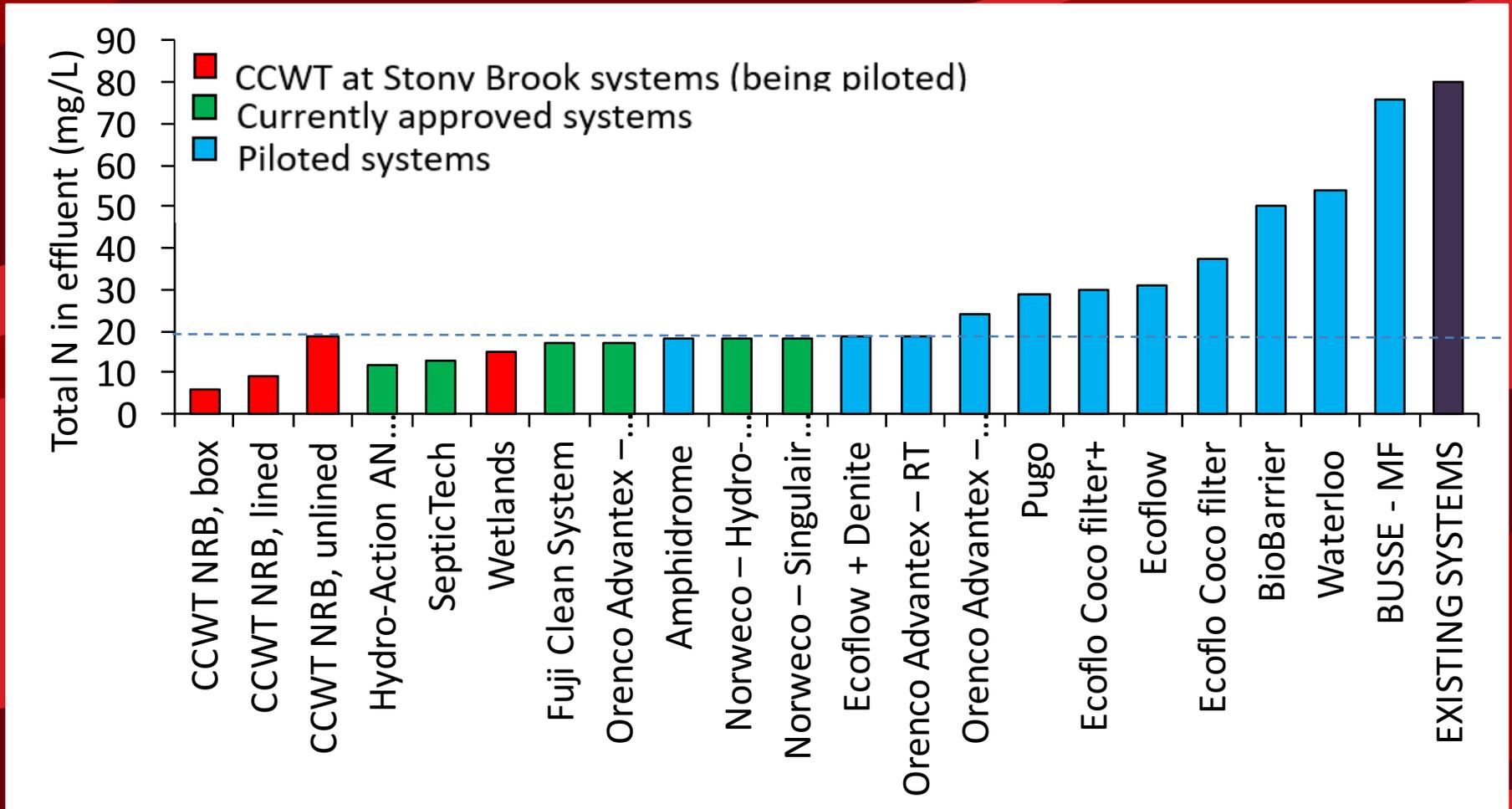
Provisional approval anticipated in 2021.

Lignocellulose = wood, chips



Carbon source to promote denitrification

Comparison of I/A performance in Suffolk County

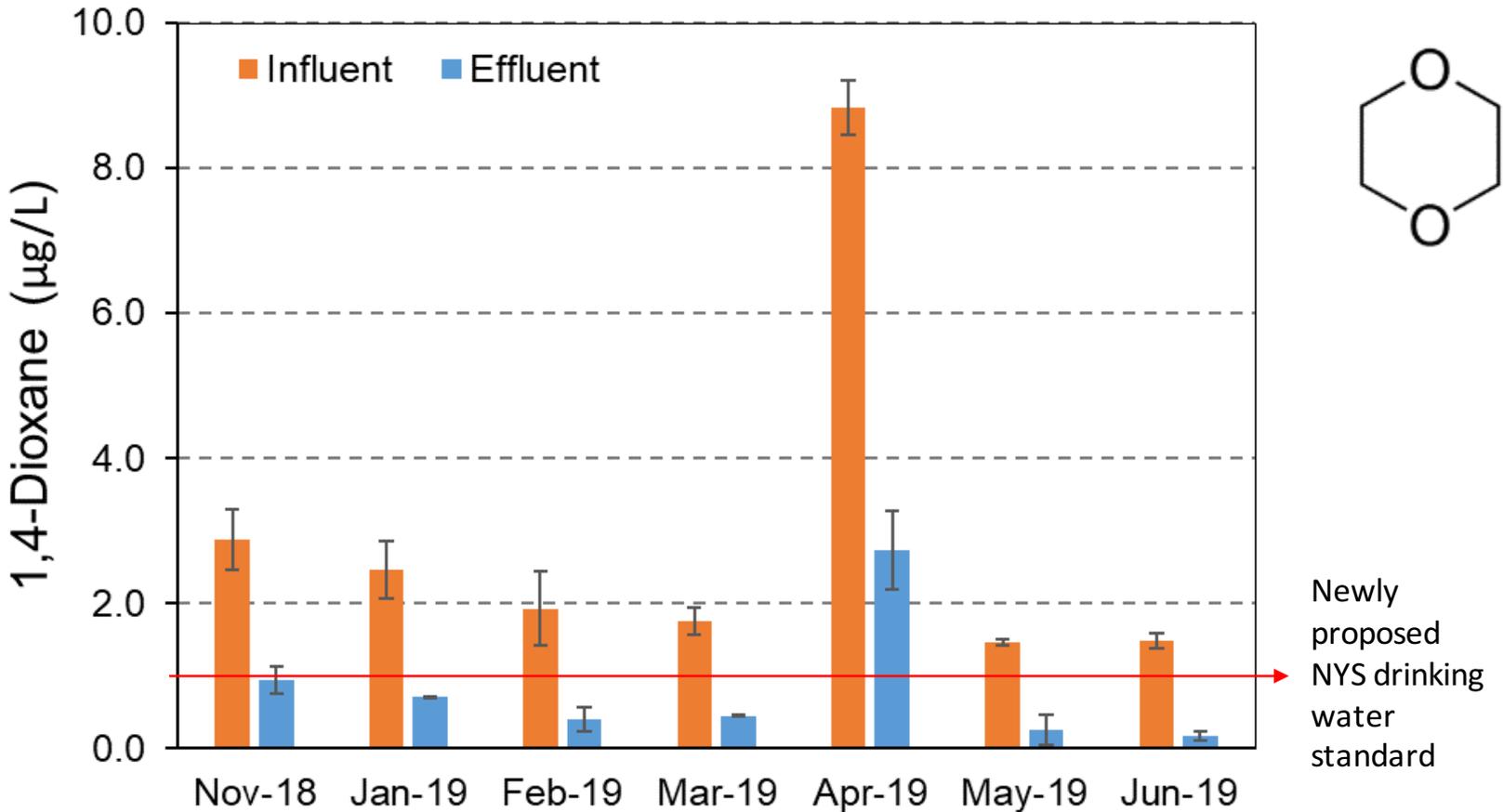


Removal of drugs and pharmaceuticals, Massachusetts Test Center

	Channel Influent (ng/L)	LINED Septic Tank Effluent (ng/L)	LINED Effluent (ng/L)	Removal Channel Influent To Effluent (%)
Acetaminophen	67,000	56,000	<MDL (75)	>99
Atenolol	380	250	21	94
Caffeine	65,000	38,000	<MDL (69)	>99
Cotinine	1,300	1,800	<MDL (48)	96
DEET	5,100	2,500	54	99
Diltiazem	<MDL (123)	<MDL (43)	<MDL (19)	84
Diphenhydramine	470	220	<MDL (23)	95
Metoprolol	350	280	27	92
Nicotine	1,700	1,100	<MDL (24)	99
Paraxanthine	30,000	9,300	<MDL (62)	>99
Sulfamethoxazole	1,000	3,200	50	95
Trimethoprim	560	430	<MDL (21)	96

<MDL values are calculated using the MDL

Removal of 1,4-Dioxane, expected carcinogen, by NRBs



70% removal vs 10– 30% for sewage treatment plant and 0% for conventional septic systems

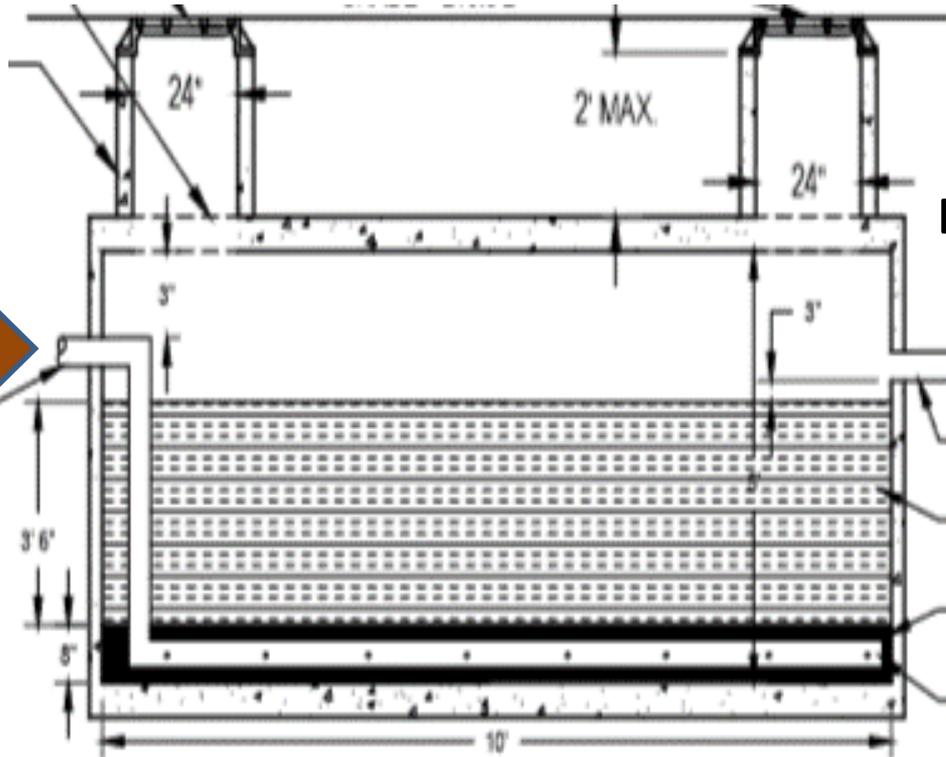
- Data courtesy of Drs. Arjun Venkatesan and Cheng-Shiuan Lee

Woodchip boxes as 'polishing units' for I/A systems across Suffolk County, available now, full price covered grant

Effluent from Suffolk County approved system, ~19 mg N /L



4" Ø PVC PIPE (DR-35)
INV. 213.49



Effluent from NRB box, < 3 mg N /L



4" Ø PVC PIPE (DR-35)
INV. 213.24
3' 6" OF WOODCHIPS
8" OF PEASTONE
4" PERFORATED PVC PIPE

Designed by Dr. Stuart Waugh and Frank Russo, P.E.

Conclusions:

- Georgica Pond suffers from algal blooms, blue-green algae, low oxygen, and fish kills.
- Harvesting macroalgae has been coincident with improved conditions.
- Algal blooms are promoted by excessive nitrogen.
- Suffolk County's 2020 Subwatersheds Study's findings closely match the 2015 study of Georgica Pond by Stony Brook University
- Most of the nitrogen entering Georgica Pond comes from wastewater.
- Accelerating the removal of nitrogen from wastewater is the central long-term solution.
- Long-term, significantly improved water quality can occur in < 10 years if rapid action is taken now.