COMMUNITY CLIMATE DISCUSSION

Ponds Under Pressure: Nature's "Canaries in the Coal Mine"

Island ponds are globally rare ecosystems that are especially sensitive to climate change and development pressures. Please join Emily Reddington, Executive Director of the Great Pond Foundation to learn how our ponds serve as "canaries in the coal mine" and how what we do on land affects their fate. We'll use ponds and watersheds as a framework for discussing the island-wide efforts to amend bylaws that reduce erosion, runoff, and clearcutting while supporting intact, native habitats.

SAT • MARCH 14th • 1:30pm - 3pm

Zoom Hybrid
ID 892 8464 9518

Scan for the Climate & Energy Webpage

The Oak Bluffs Library and Oak Bluffs Climate & Energy Committee welcome you to this discussion. For more information email energy@oakbluffsma.gov

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PONDS UNDER PRESSURE:

nature's "canaries in the coal mine"

Community Climate Discussion
March 14, 2026

Emily Reddington | Biologist & Executive Director


WOODS HOLE
OCEANOGRAPHIC
INSTITUTION®


MASS GIS


MARINE BIOLOGICAL LABORATORY
WOODS HOLE


MARTHA'S VINEYARD
COMMISSION


UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY

Agenda

- Great Pond Foundation Mission
- What is a Great Pond?
- Greatest Pond Challenges
- Nitrogen & Ponds
- Edgartown Great Pond & Nitrogen Impacts
- Chilmark Pond, Cyanobacteria, & Restoration
- How To Protect Ponds

GREAT POND foundation®

MISSION

- To cultivate the resilience of our coastal pond ecosystems through science, collaboration, and education.

What is a Great Pond?

- Any pond 10 acres or greater
  - Legal term
    - public trust doctrine
  - State owned
    - public access
    - navigable waterway

GREAT POND foundation

Great Pond Challenges

 Climate Change

- **Wamer water temperatures** → ecosystem stress
- **More extreme storms**→ erosion, increased runoff
- **Drought periods** → lower water levels, habitat stress, cuts less predictable

 Watershed Development

- **Impervious surfaces** → (roads, roofs) increased runoff
- **Sediment erosion** → (fills ponds, reduces depth
- **Pollutants** → (oil, chemicals, pharmaceuticals, metals) enter ponds
- **Loss of Intact Habitat**→ loss of nitrogen attenuation & carbon sequestration, loss of ecosystem

Great Pond Challenges

Climate Change

Ecosystem Stress

Watershed Development

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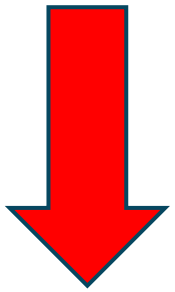
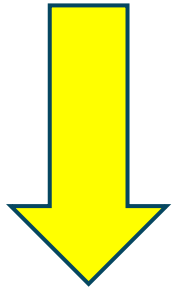
Great Pond Challenges

Climate Change



Watershed Development



Ecosystem Stress

Excess Nitrogen & Toxins

Nitrogen & Ponds

Why is Nitrogen important?

Where does Nitrogen come from?

- Watershed & Wastewater

How does Nitrogen impact ponds?

EGP

- Eelgrass/Shellfish Habitat
- Development

CHP

- Harmful Algal Blooms
- Restoration

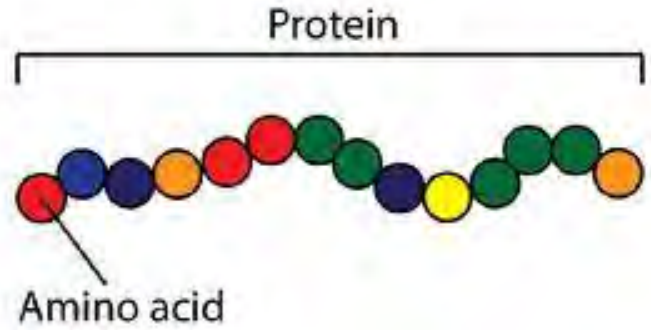
Why is NITROGEN Important??

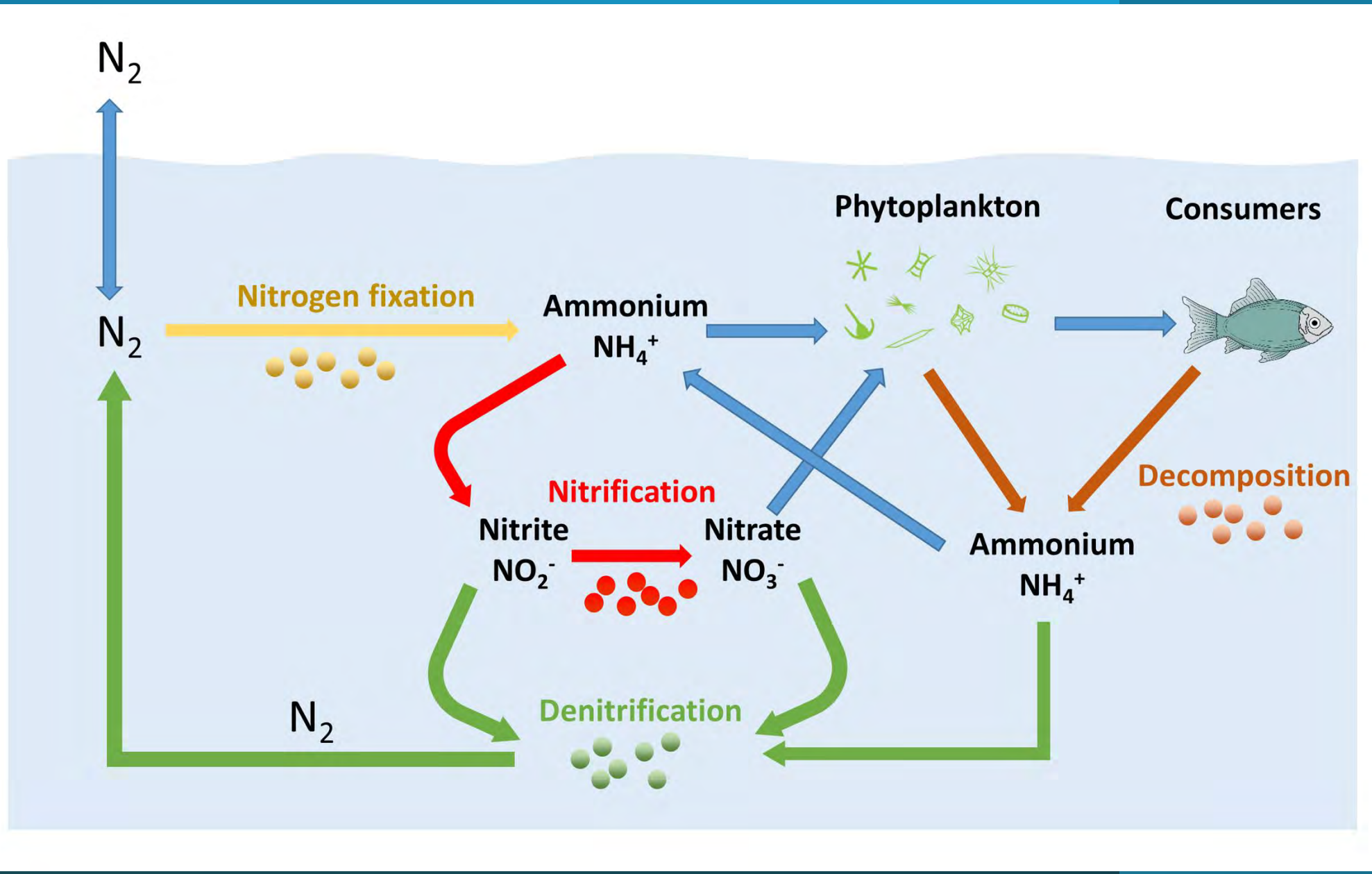
Nitrogen is a KEY component in:

Chlorophyll (Photosynthesis)

DNA (Nucleic Acids)

Proteins and Amino Acids



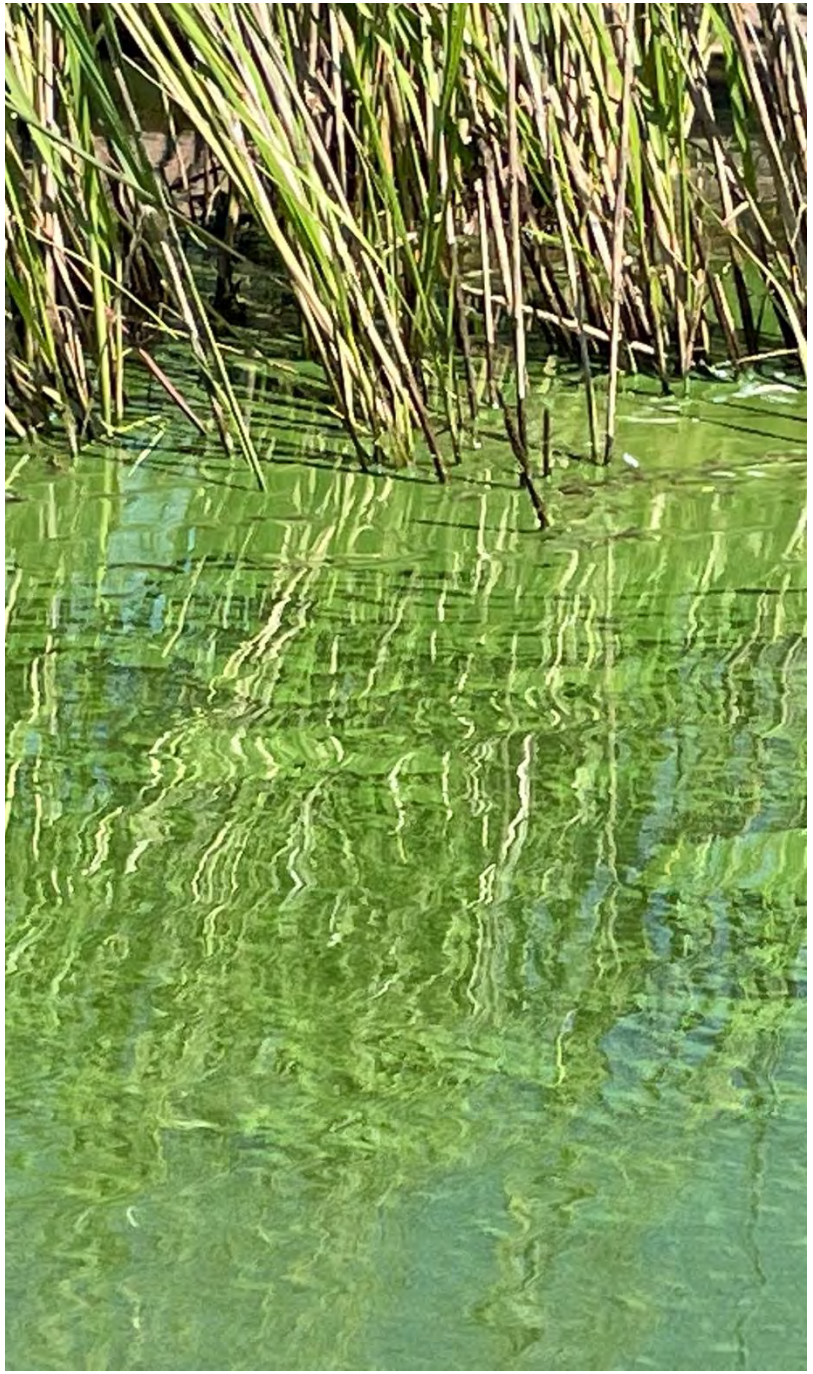

N_2
N_2
Nitrogen fixation
Ammonium
NH_4^+
Phytoplankton
Consumers
Nitrification
Nitrite
NO_2^-
Nitrate
NO_3^-
Ammonium
NH_4^+
Decomposition
N_2
Denitrification

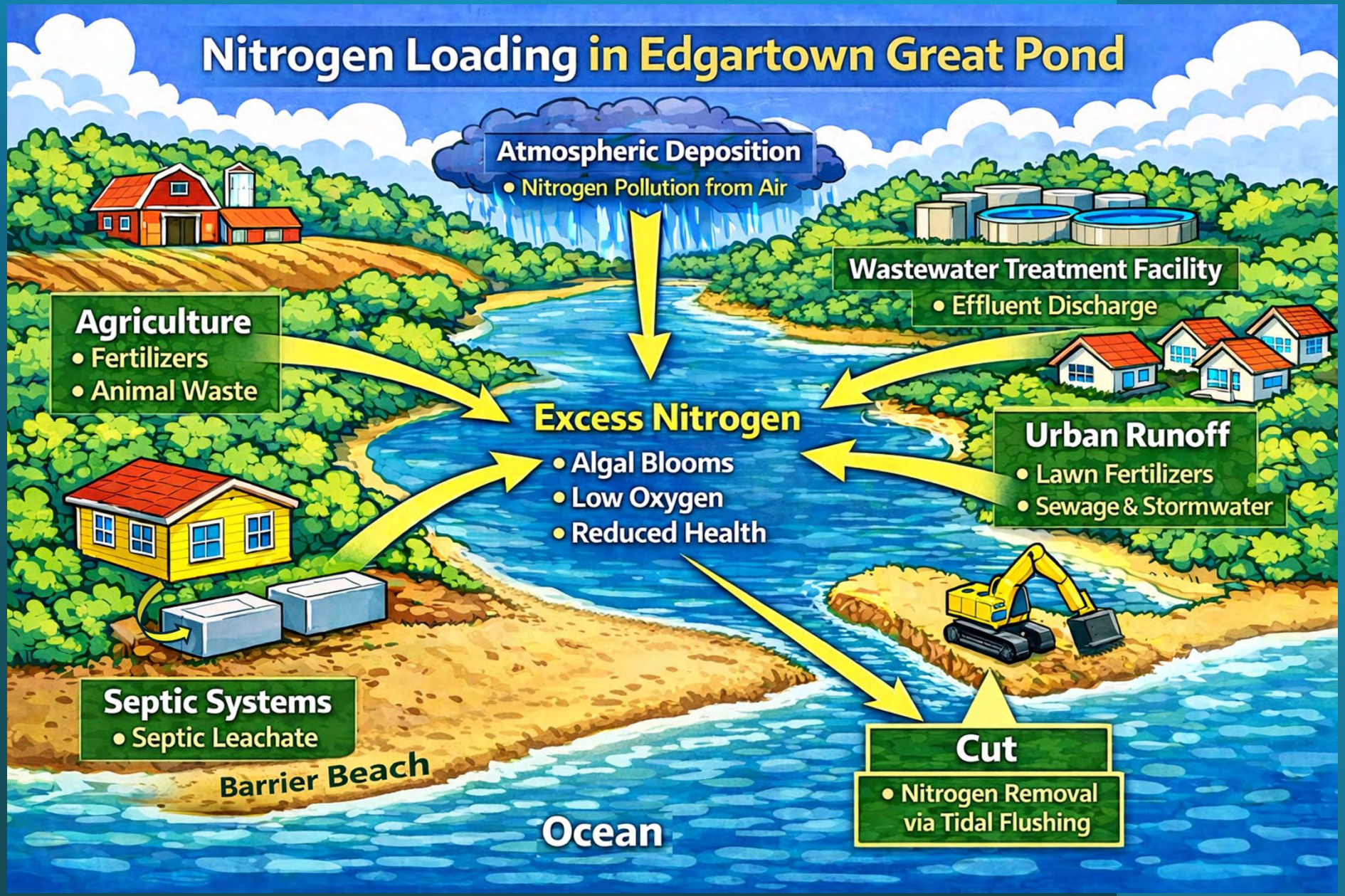
Excess Nitrogen + Warming Temps => Algal Blooms

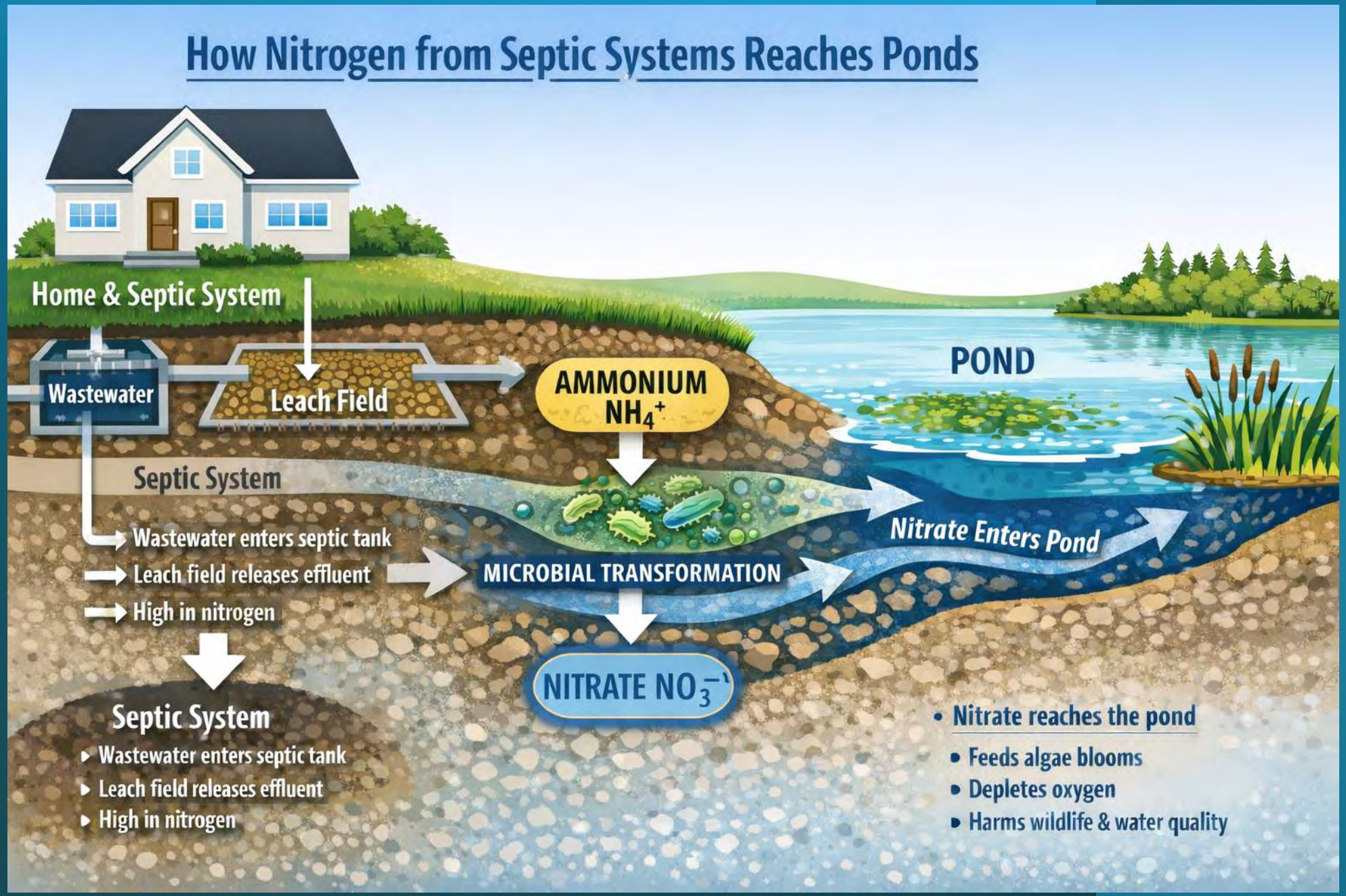
Great Pond foundation

Excess Nitrogen + Warming Temps => Toxic ALGAL Blooms

Great Pond foundation




Nitrogen Loading in Edgartown Great Pond
Atmospheric Deposition
• Nitrogen Pollution from Air
Agriculture
• Fertilizers
• Animal Waste
Wastewater Treatment Facility
• Effluent Discharge
Excess Nitrogen
• Algal Blooms
• Low Oxygen
• Reduced Health
Urban Runoff
• Lawn Fertilizers
• Sewage & Stormwater
Septic Systems
• Septic Leachate
Barrier Beach
Ocean
Cut
• Nitrogen Removal via Tidal Flushing


How Nitrogen from Septic Systems Reaches Ponds
Home & Septic System
Wastewater
Leach Field
AMMONIUM
NH_4^+
POND
Septic System
Wastewater enters septic tank
Leach field releases effluent
High in nitrogen
MICROBIAL TRANSFORMATION
Nitrate Enters Pond
NITRATE NO_3^-
Septic System
Wastewater enters septic tank
Leach field releases effluent
High in nitrogen
Nitrate reaches the pond
Feeds algae blooms
Depletes oxygen
Harms wildlife & water quality

Eelgrass / Shellfish HABITAT

EELGRASS provides ECOSYSTEM SERVICES

HABITAT

provides nursery and foraging habitat for local species

WATER QUALITY

absorbs nutrients and traps sediment, improving water quality

CLIMATE CHANGE

absorbs and stores carbon from atmosphere

CO_2

BIODIVERSITY

supports 100's of ecologically important species

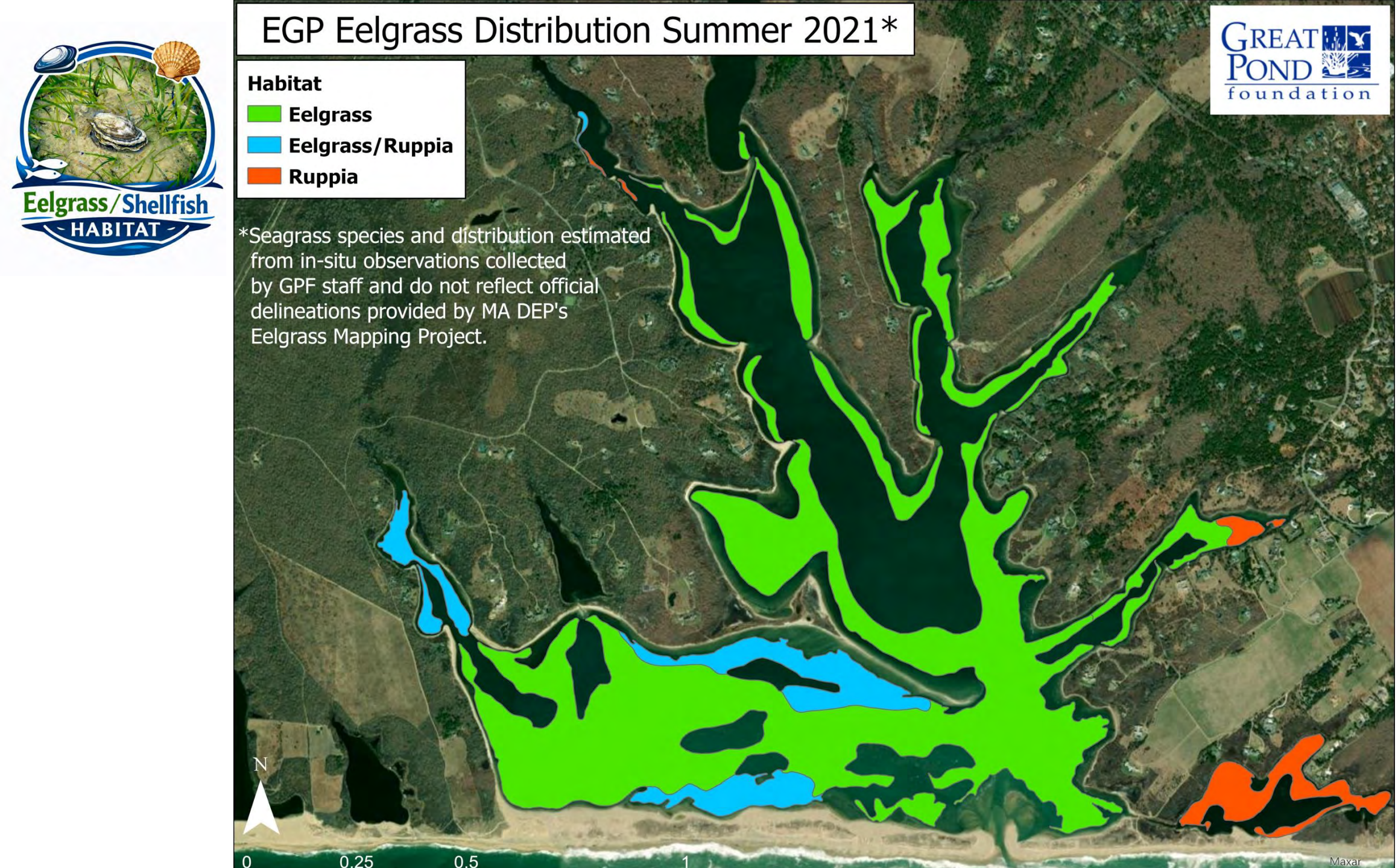
EROSION

minimizes erosion and provides storm protection

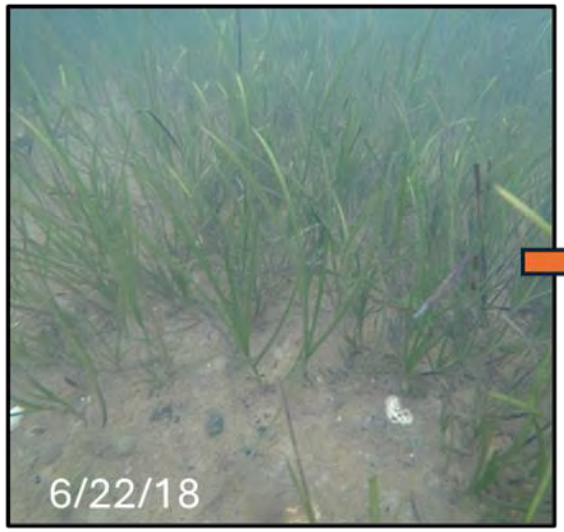
ECONOMY

supports fishermen targeting fish and shellfish

GREAT POND foundation

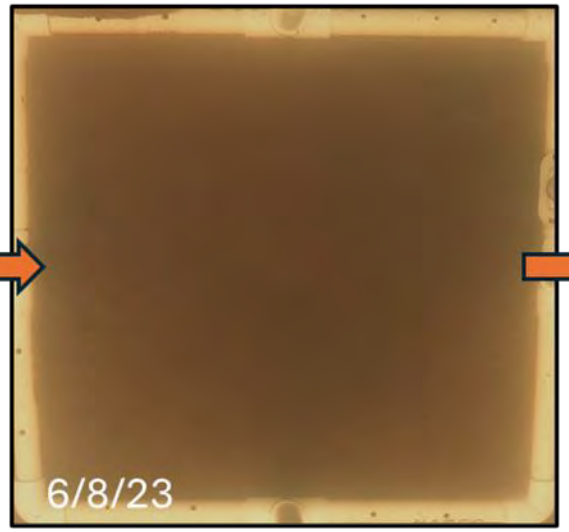

EGP Eelgrass Distribution Summer 2021*
Habitat
Eelgrass
Eelgrass/Ruppia
Ruppia
*Seagrass species and distribution estimated from in-situ observations collected by GPF staff and do not reflect official delineations provided by MA DEP's Eelgrass Mapping Project.
Great Pond foundation
Eelgrass/Shellfish HABITAT
N
0
0.25
0.5
1
Maxar

State of Eelgrass in Lyle's Bay: 2018-2025



June of 2018: Eelgrass beds thriving in clear water conditions.

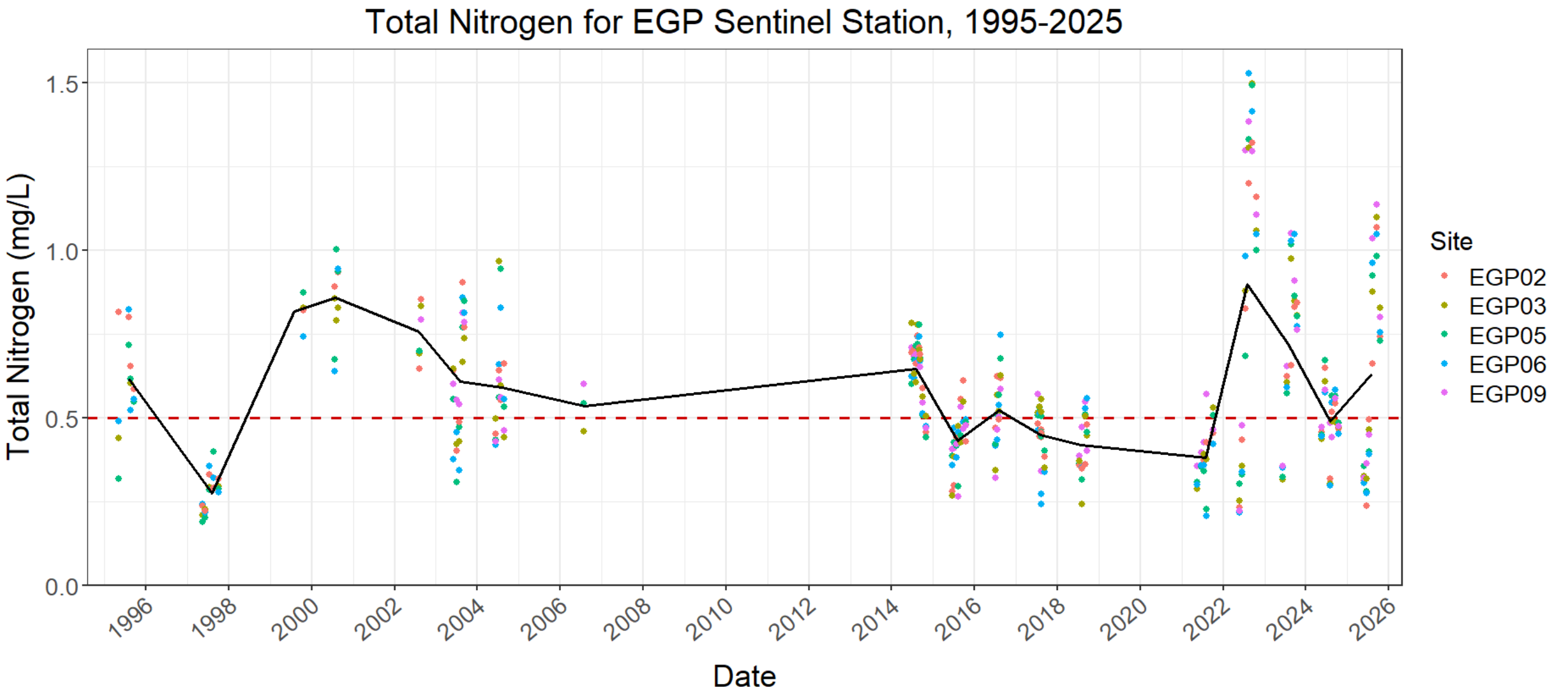
June of 2019: Eelgrass beds present but under turbidity stress.



June of 2023: Eelgrass beds absent after a significant rise in turbidity.

June of 2025: Scattered eelgrass beds present following more than 2 years of absence.

*Only sentinel stations (EGP02, 03, 05, 06, 09) included
*Only includes data from May-October



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GPF data: 2021-2025

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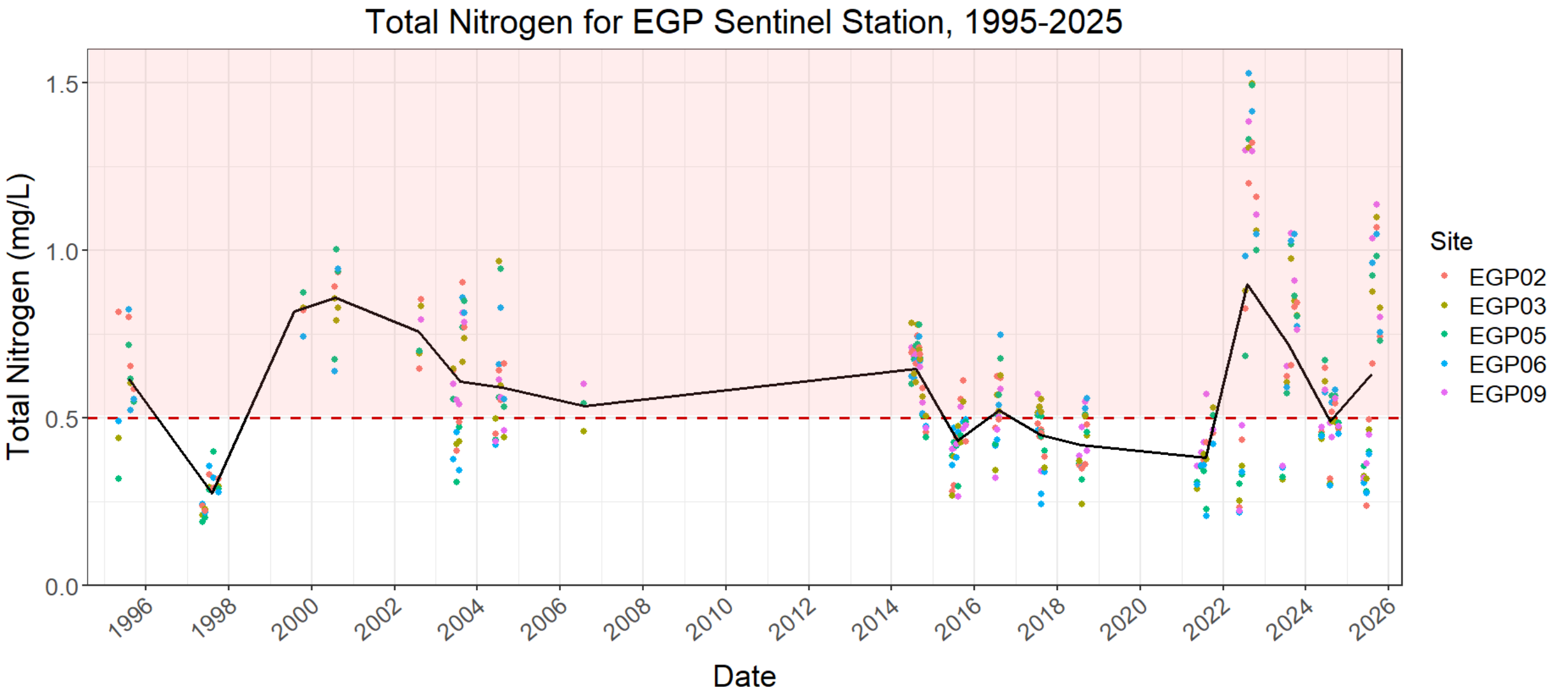

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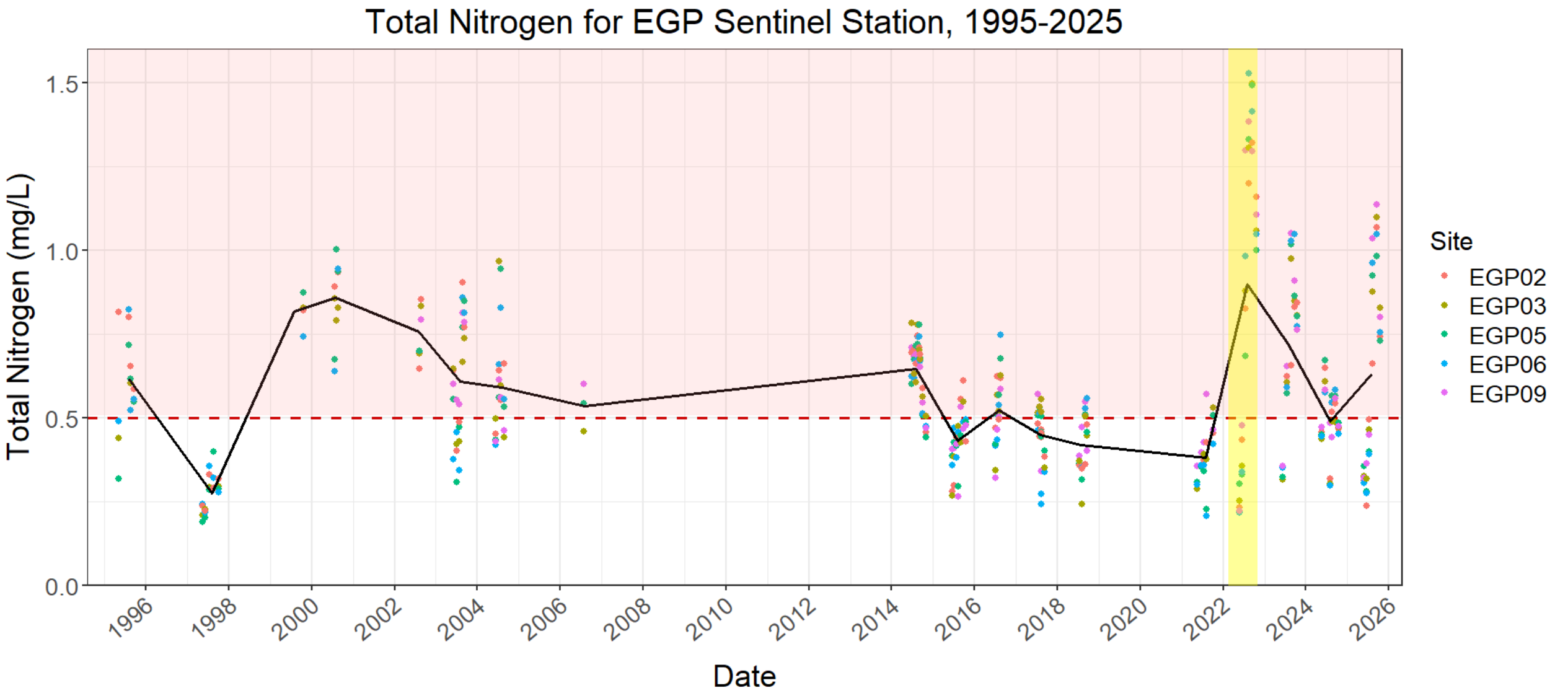

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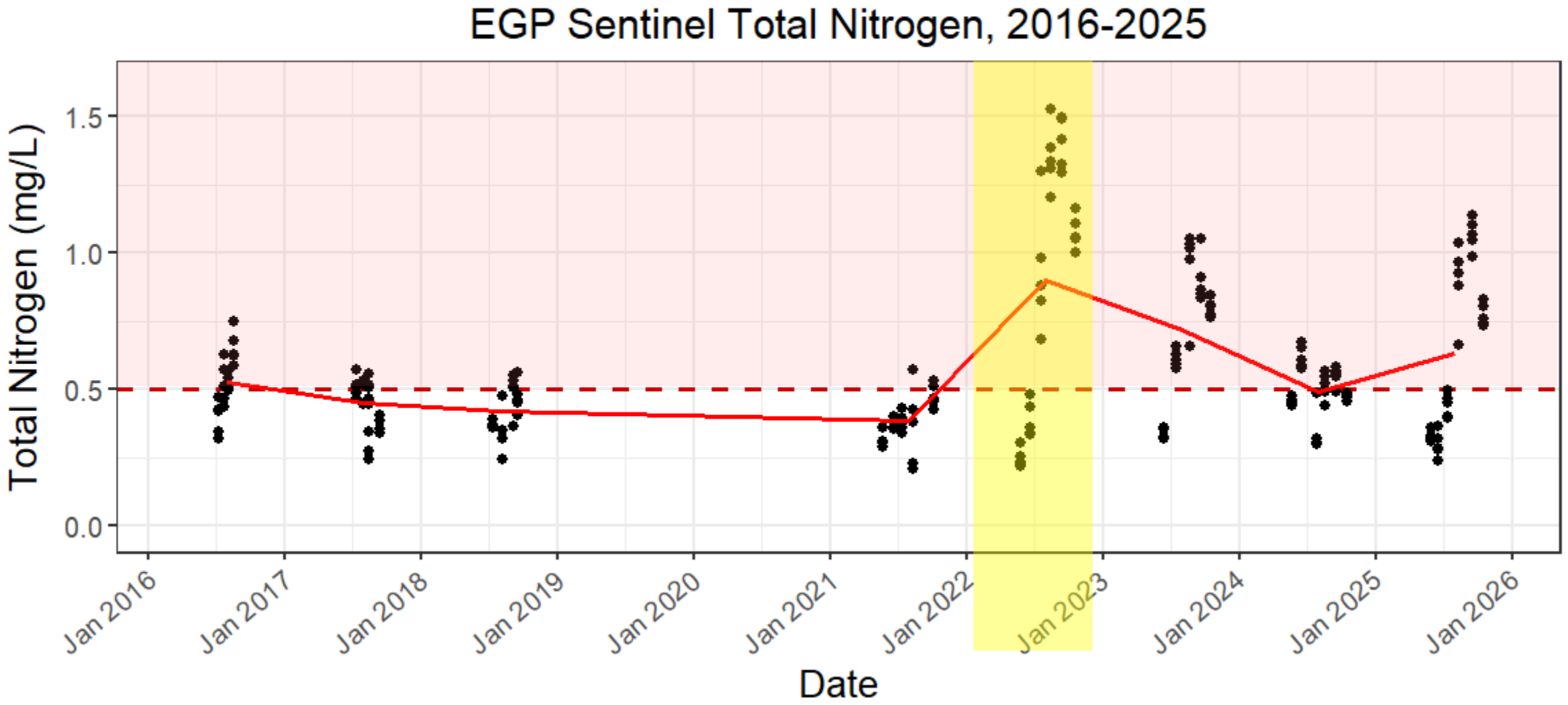

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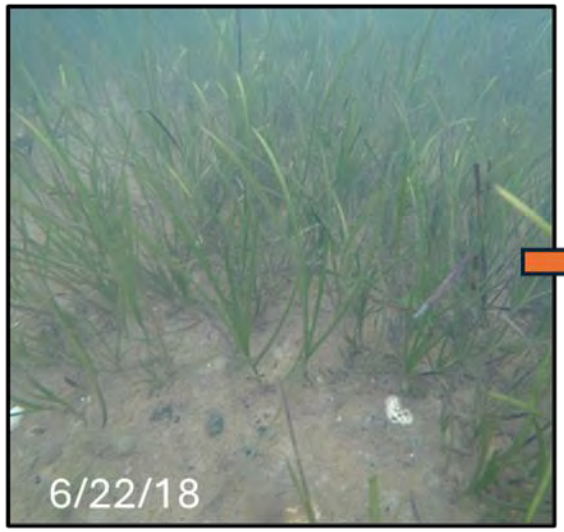
State of Eelgrass in Lyle's Bay: 2018-2025



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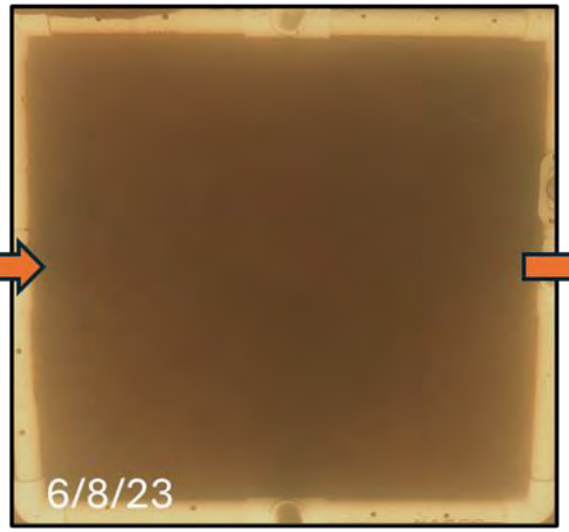

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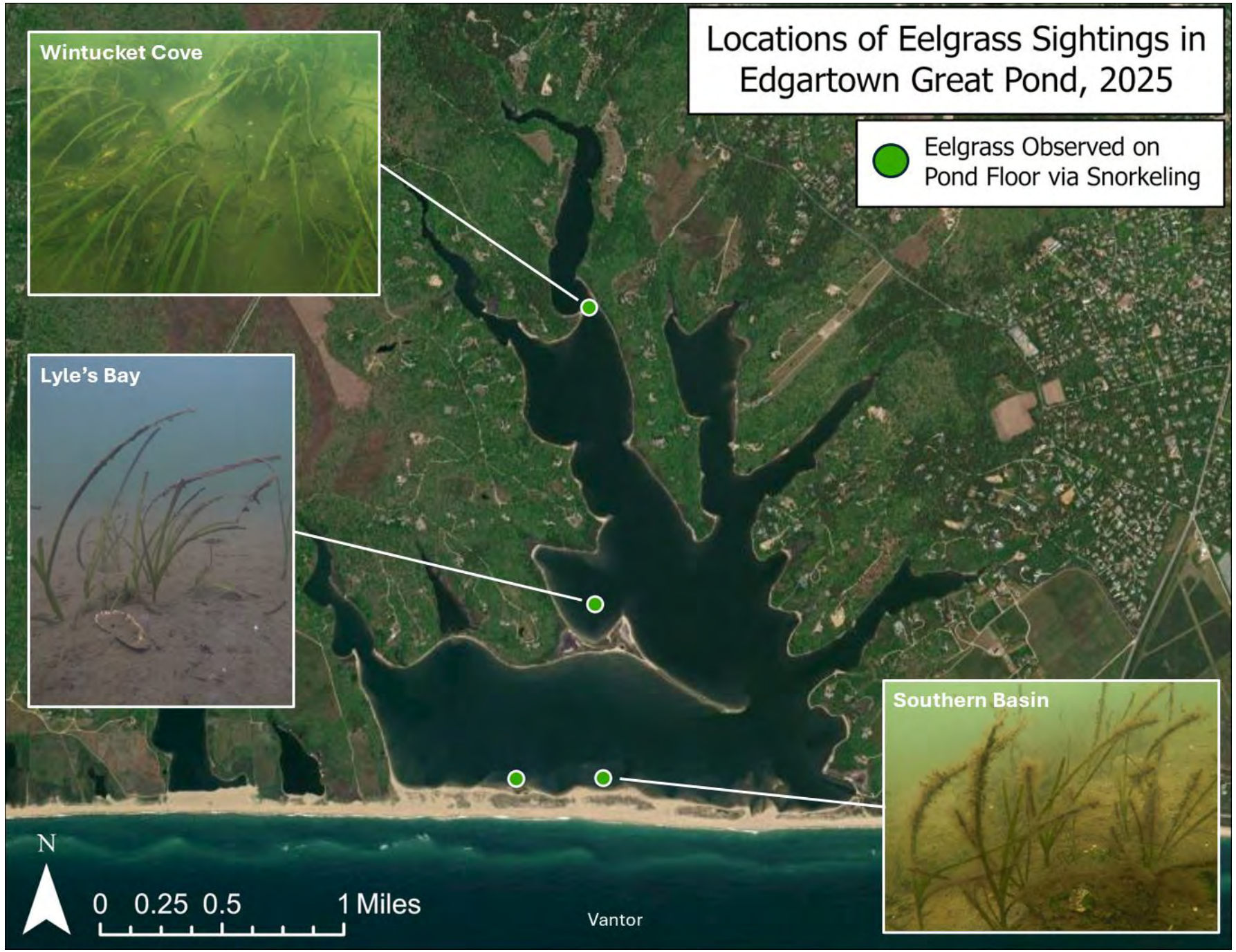
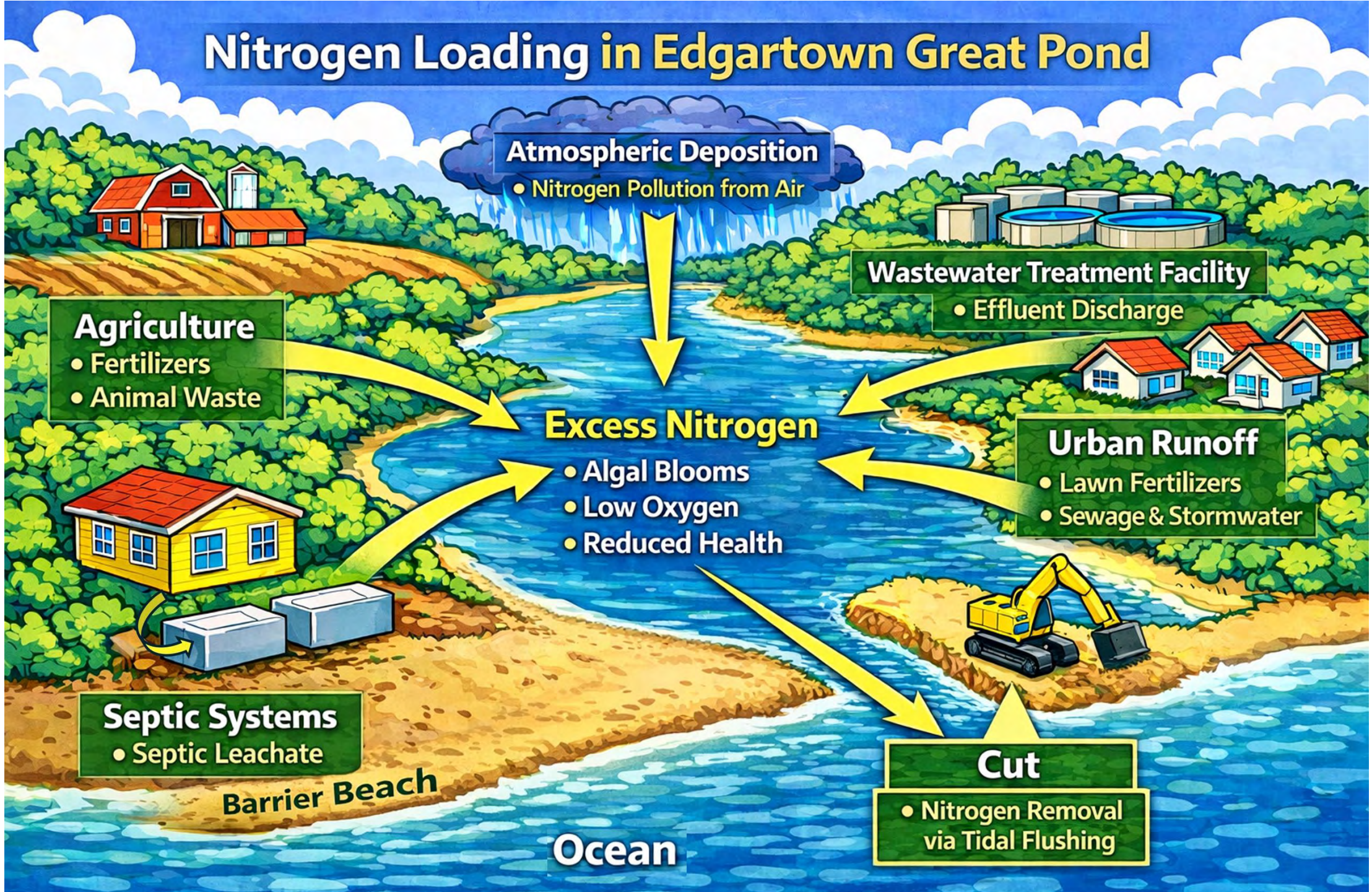

Locations of Eelgrass Sightings in Edgartown Great Pond, 2025
Eelgrass Observed on Pond Floor via Snorkeling
Wintucket Cove
Lyle's Bay
Southern Basin
N
0 0.25 0.5 1 Miles
Vantor

Epiphytic Algae Covering EGP Eelgrass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• Lawn Fertilizers
• Sewage & Stormwater
Septic Systems
• Septic Leachate
Barrier Beach
Cut
• Nitrogen Removal via Tidal Flushing
Ocean

EGP Cut Trends, 2017-2025

Year	Dredge Year?	Days Open (Man-Made Openings Only)	Average Salinity (ppt)	Average Total Nitrogen (mg/L)
2017	Yes	59 days	18.62	0.449
2018	Yes	92 days	19.99	0.419
2019	Yes	78 days	22.70	NA
2020	No	29 days	14.03	NA
2021	Yes	57 days	19.58	0.382
2022	No	15 days	15.03	0.899
2023	Yes	30 days	18.74	0.718
2024	Yes	20 days	18.56	0.491
2025	No	16 days	17.21	0.632
Average	-	**44 days**	**18.27**	**0.570**

*Only salinity and total nitrogen measurements collected between May-October were included in this table's annual averages.

**Average salinity values were calculated using data collected from all EGP monitoring stations. Average total nitrogen values were calculated using data collected only from the monitoring stations comprising the Pond's "sentinel station", as defined by the 2008 MEP report.

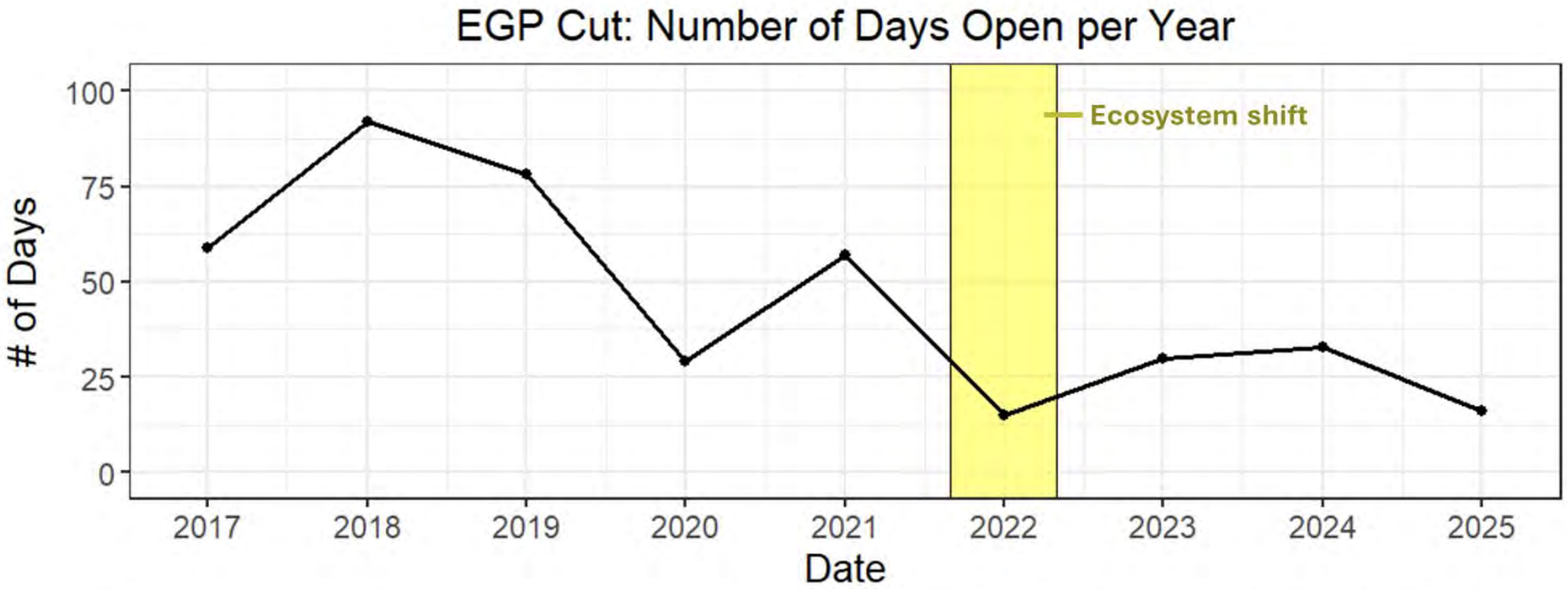
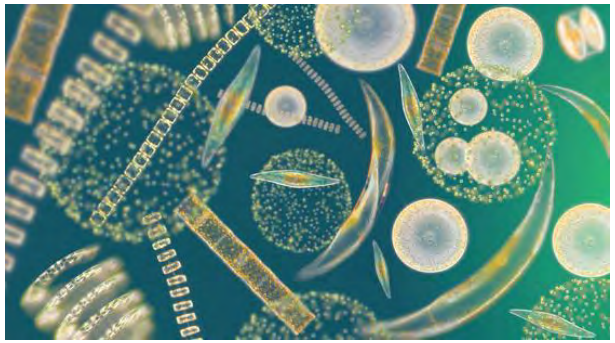
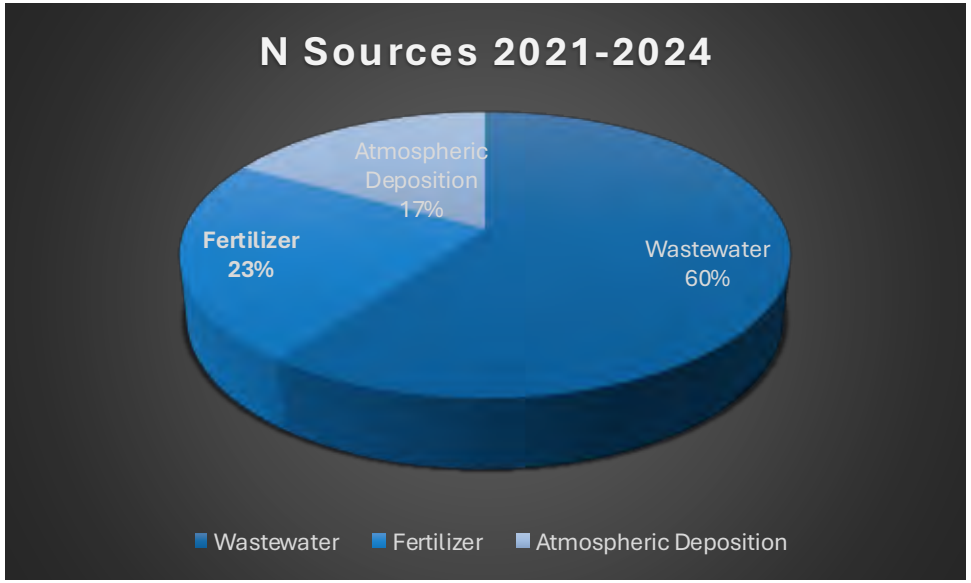


Figure 7. *The total annual number of days that the EGP cut was open for is shown for each year from 2017 to 2025. Both natural and man-made openings are included; 2024 was the only year to have a natural opening.*

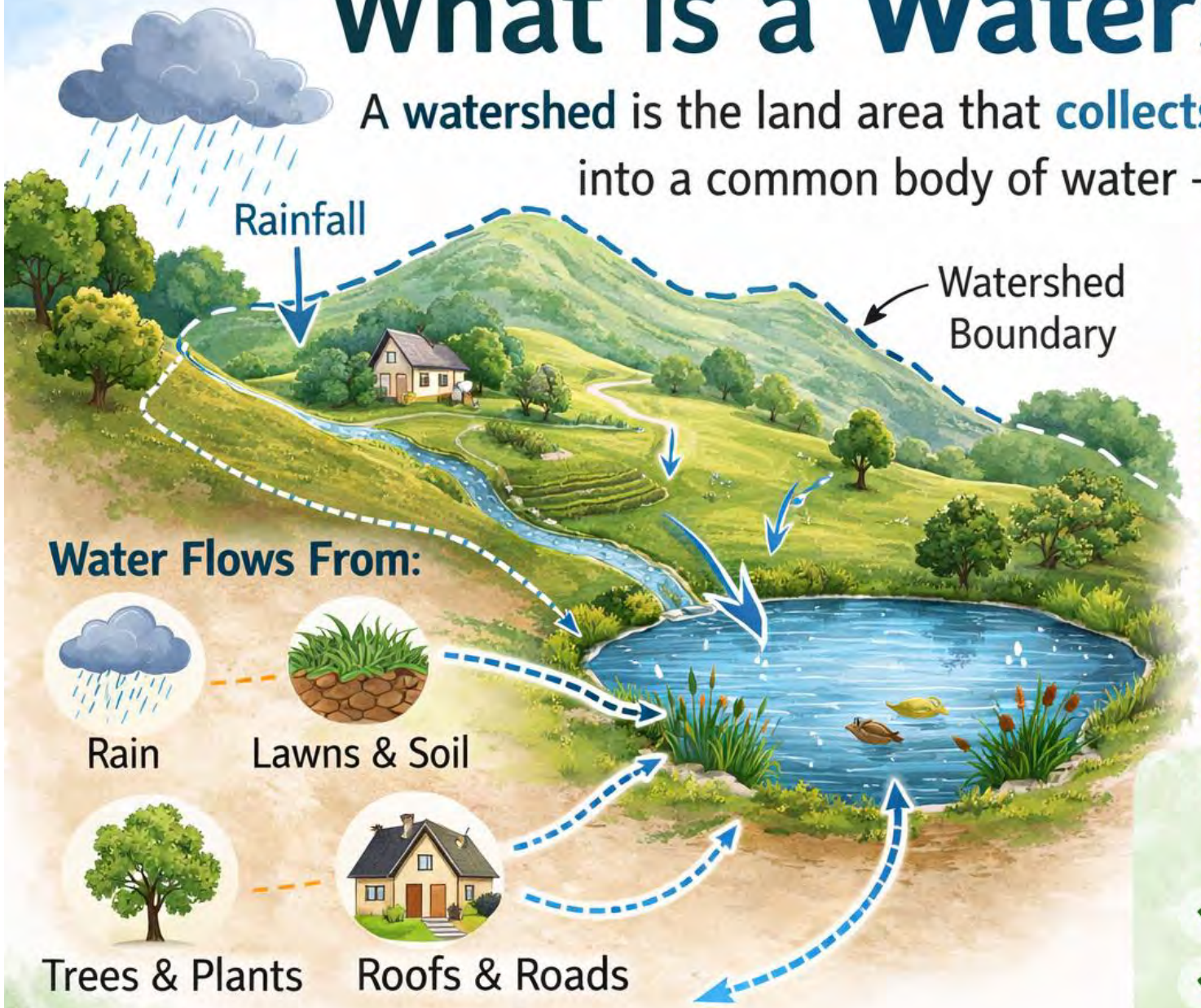




2021-2024	Isotope	Groundwater Model (171 well measurements)
Wastewater (domestic + livestock)	60%	59%
Fertilizer	23%	21%
Atmospheric Deposition	17%	21%

What is a Watershed?

A **watershed** is the land area that **collects** and drains water into a common body of water – like **a pond.**



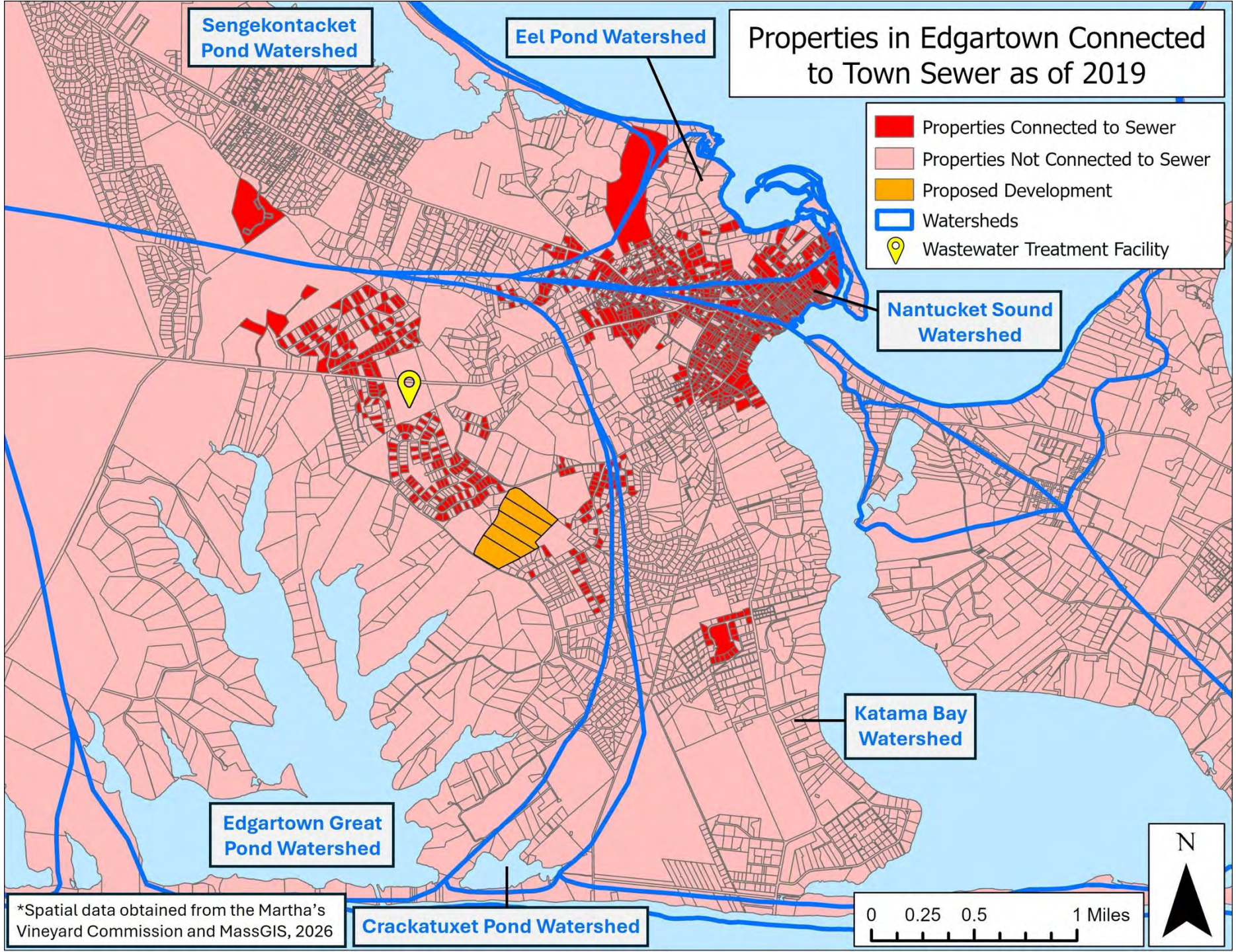
Why is the Pond Important?

- Collects Water
- Supports Wildlife
- Filters Pollutants
- Protects the Environment

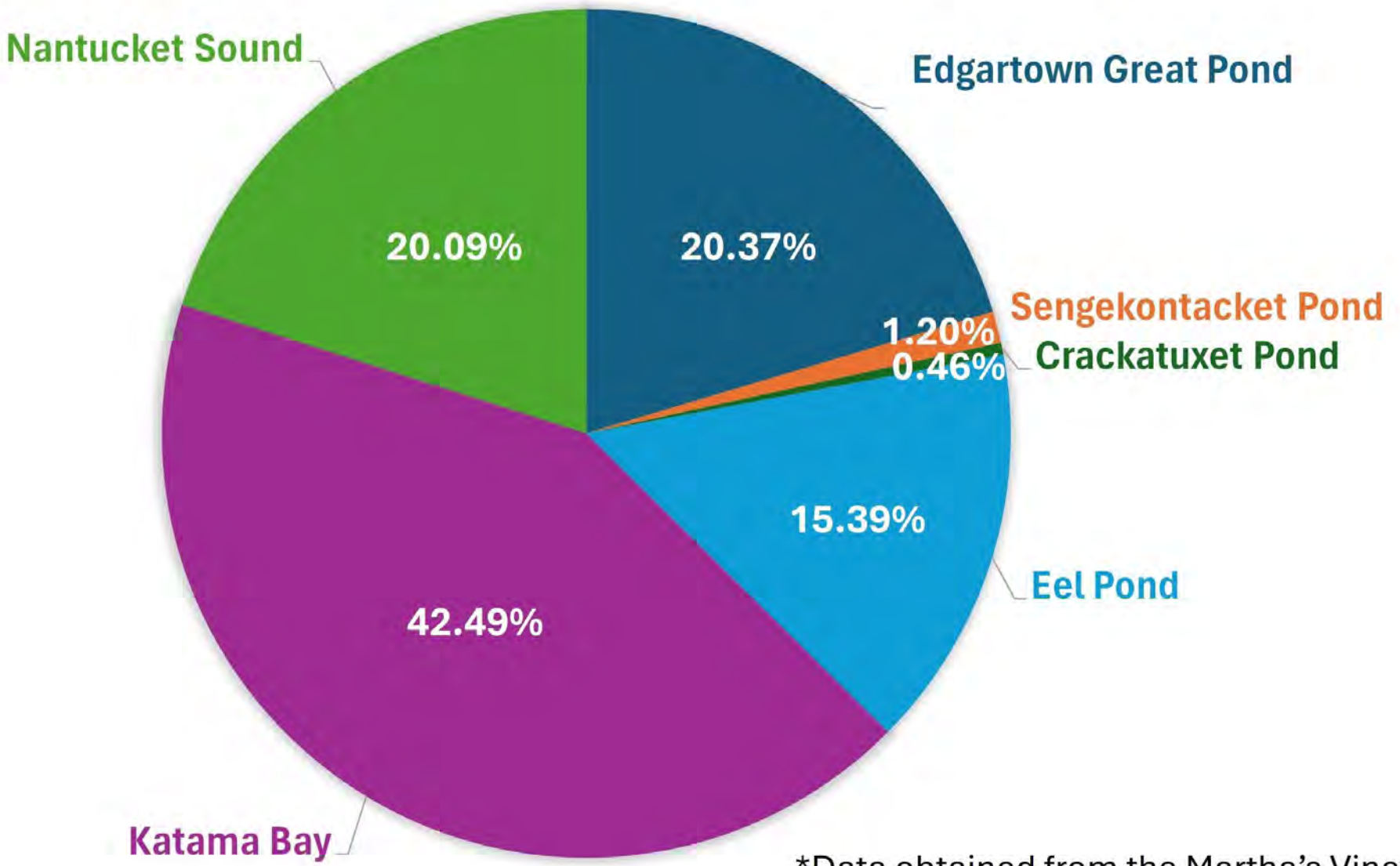
Keep the Watershed Healthy!

- ✓ Plant Trees
- ✓ Reduce Runoff
- ✓ Keep it Clean


N
Edgartown-West Tisbury Road
Meetinghouse Way
Meshacket Way
Night Heron Road
Martha's Road
Proposed
Subdivision
Road to the Plains
Wilson's Landing
Edgartown
Great Pond


Properties in Edgartown Connected to Town Sewer as of 2019
Properties Connected to Sewer
Properties Not Connected to Sewer
Proposed Development
Watersheds
Wastewater Treatment Facility
Sengekontacket Pond Watershed
Eel Pond Watershed
Nantucket Sound Watershed
Katama Bay Watershed
Edgartown Great Pond Watershed
Crackatuxet Pond Watershed
*Spatial data obtained from the Martha's Vineyard Commission and MassGIS, 2026
0 0.25 0.5 1 Miles
N

Edgartown Sewered Parcels by Watershed as of 2019



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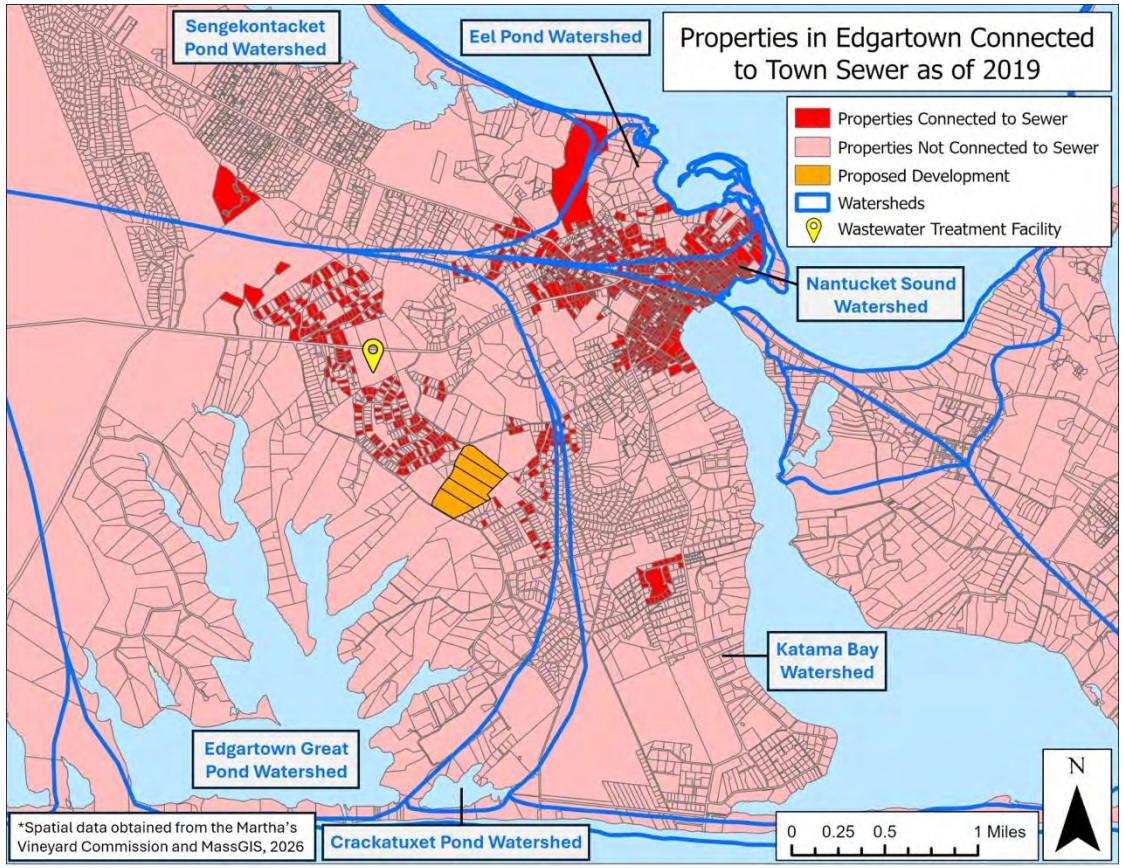
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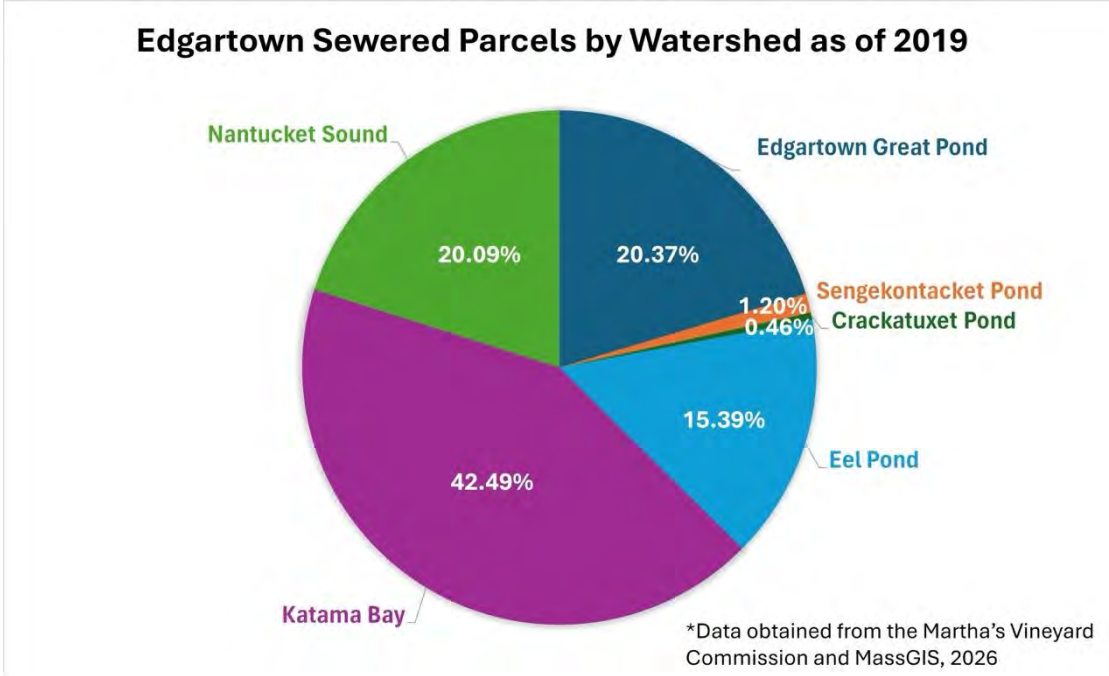
Edgartown Sewered Parcels by Watershed as of 2019
Nantucket Sound
20.09%
Edgartown Great Pond
20.37%
Sengekontacket Pond
1.20%
Crackatuxet Pond
0.46%
15.39%
Eel Pond
42.49%
Katama Bay
*Data obtained from the Martha's Vineyard Commission and MassGIS, 2026

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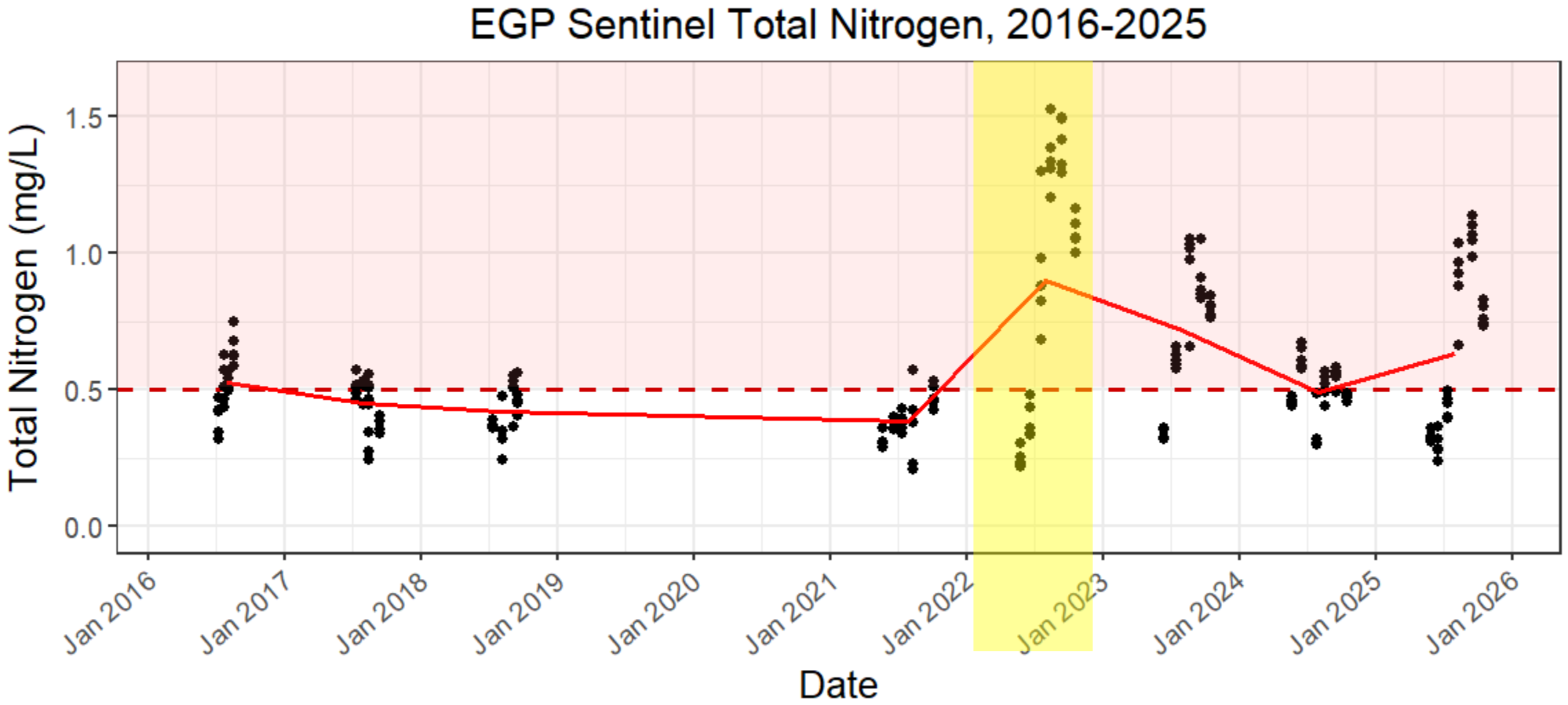


MVC data: 2016-2018
GPF data: 2021-2025

Resilience & Recovery Stage

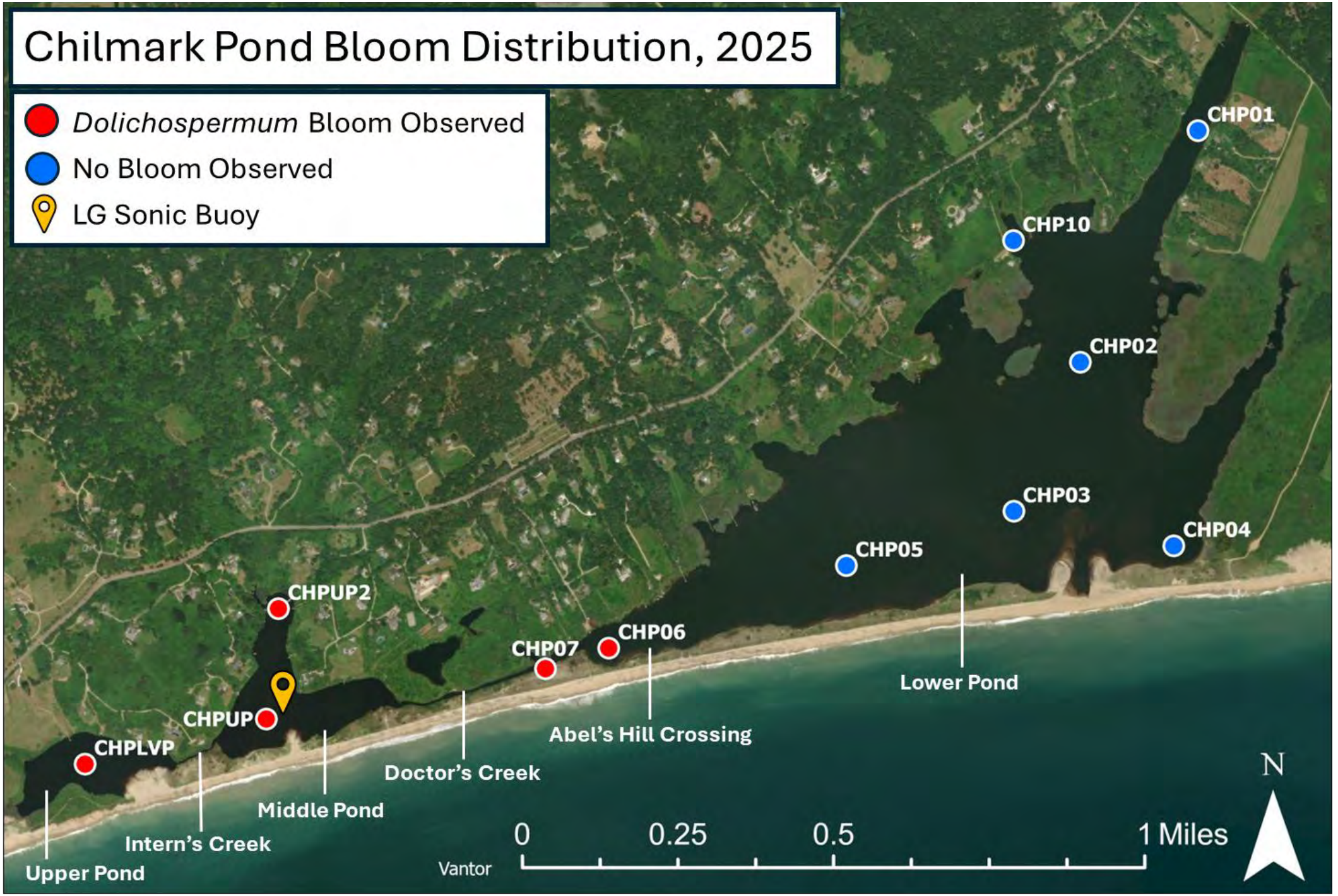
There are decades of N loading

Management & Mitigation Investments

- WWTF Upgrades in 1990's
- Cuts (Town of Edgartown)
- Dredging (Town of Edgartown & GPF)
- Shellfish Restoration (MV Shellfish Group)
- Ecosystem Monitoring

Decades of Development

Warming Temperatures



CHILMARK POND FOUNDATION

CHILMARK
POND
FOUNDATION

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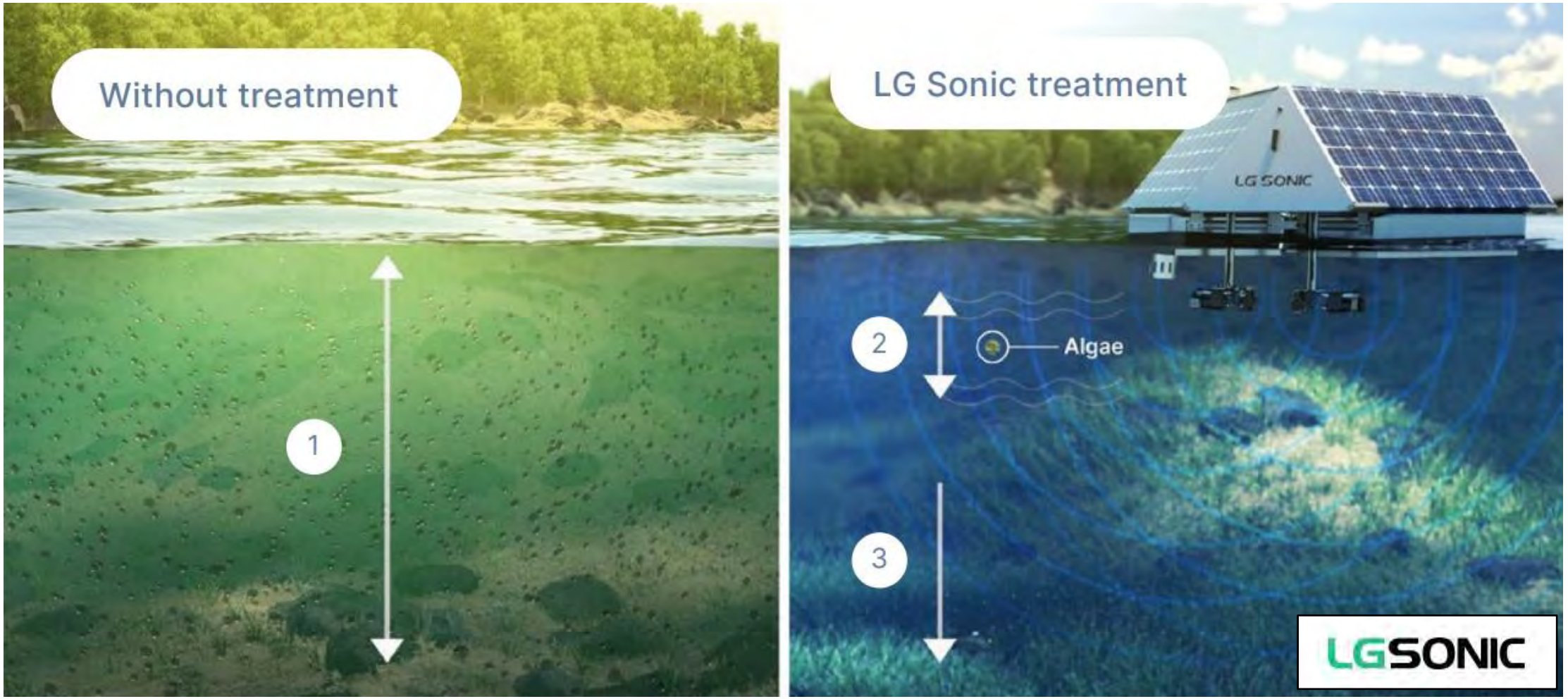

Sourced from LG Sonic's website: MPC-Buoy-brochure-2023.pdf

CHILMARK POND FOUNDATION

Launched: July 23rd

Middle Pond *Dolichospermum* Photo Log, 2023-2025

CHILMARK POND FOUNDATION

	2023	2024	2025
Field	 8/14/23	 10/9/24	 9/3/25
Microscope	 8/14/23	 10/9/24	 9/16/25

Did the buoy reduce cyanobacteria?

CHILMARK
POND
FOUNDATION


Shared Challenges

Coastal Erosion

Great Pond foundation

Coastal Flooding

Warming Temperatures & Algal Blooms

Great Pond foundation

Excess Nitrogen & Algal Blooms

Great Pond foundation


GREAT POND
foundation
What can you do?

PRACTICAL SOLUTIONS

Nitrogen from Fertilizer

- Reduce or eliminate **Nitrogen** + **Phosphorus**
  - Forgo Fertilizer, Protect Ponds → MVCF
- Plant more plants, vegetative buffer, smaller lawn
  - Vineyard Lawn → *Vineyard Conservation Society*
  - Wildlife Habitat – Natural Neighbors →*Bworks*
- *Leave Nature Intact, Protect Native Ecosystems*

Nitrogen from Wastewater

- Have your septic inspected
- Pump your septic regularly
- Consider upgrading to **Nitrogen**-reducing system

Engage in Local Policy Decisions

- Board of Health
- Conservation Commission
- Planning Board
- Select Board
- Create Bylaws Protection Bylaws

GREAT POND foundation

PRACTICAL SOLUTIONS

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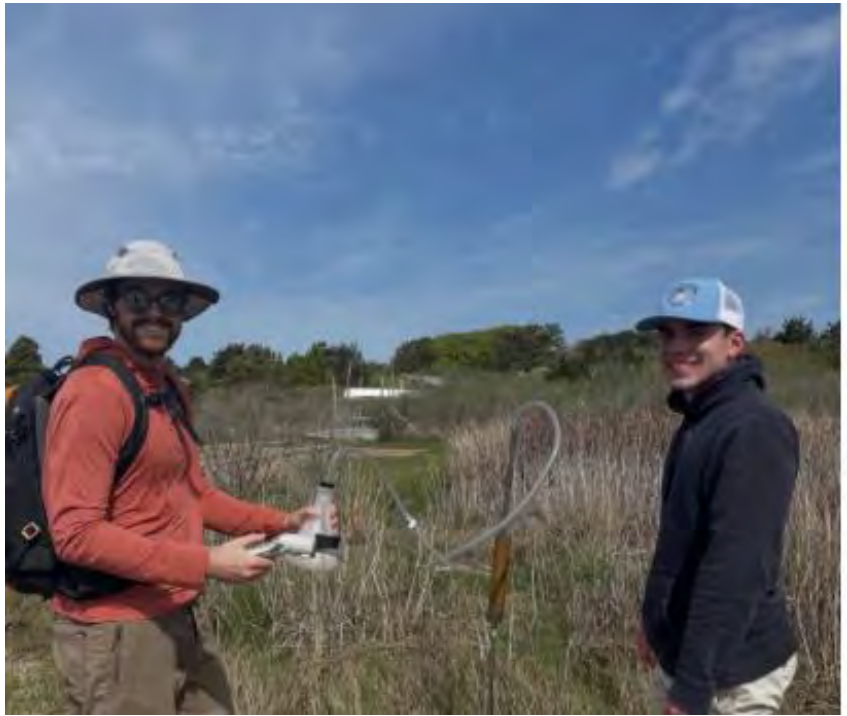
GREAT POND foundation




MV


MS7022AA
MS7022AA
West Marine