

2025

ECOSYSTEM MONITORING REPORT

Watcha Pond

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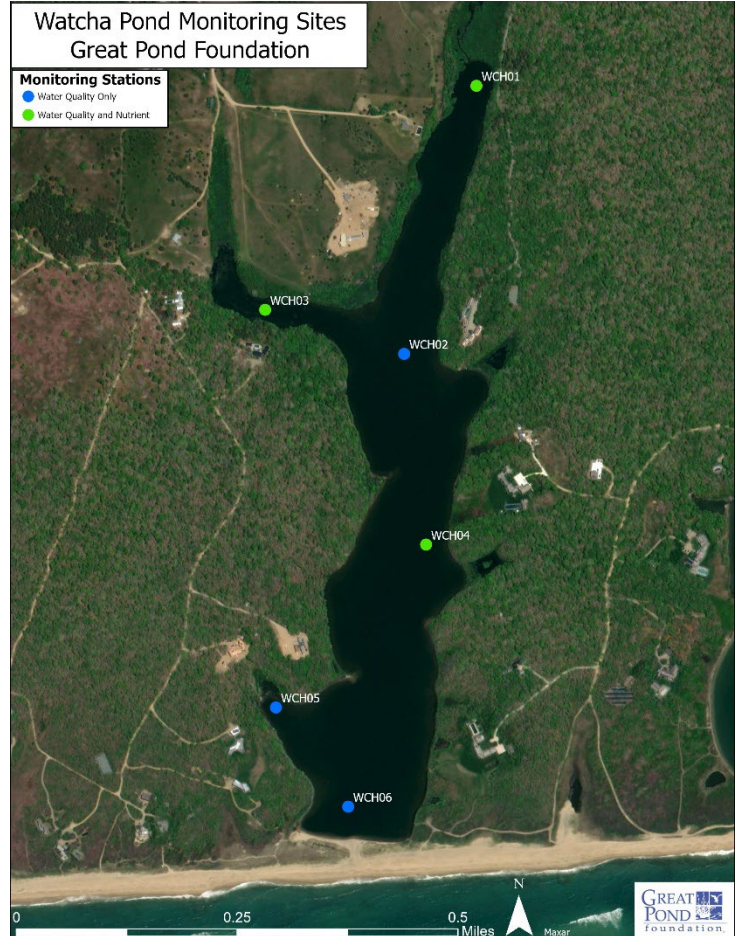
Study Area

Watcha Pond (WCH) is a freshwater coastal pond approximately 65 acres in size located on the southern shoreline of Martha's Vineyard in the Town of West Tisbury, MA. The Pond encompasses a roughly 1,087-acre watershed that remains relatively underdeveloped compared to neighboring ponds along the southern shore of the Island.

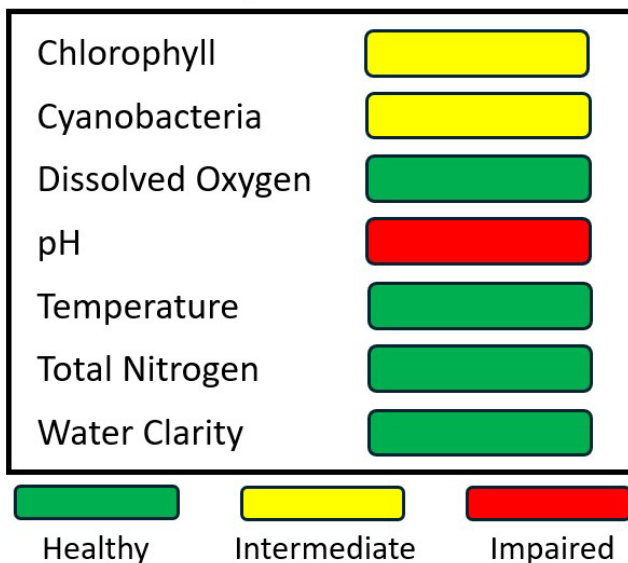
Sampling Regime 2025

In 2025, Great Pond Foundation (GPF) continued its ecosystem monitoring program on Watcha Pond for the 3rd consecutive year, however 2025 is the first time full season monitoring occurred. A total of 8 monitoring trips were conducted between May and October. During each trip, water quality data was obtained for 6 monitoring sites (see map to right). Nutrient samples were collected at 3 of the regular 6 monitoring sites in May, July, and September.

A total of 52 samples were collected from Watcha Pond in 2025 and tested for phytoplankton type and abundance, as part of MV CYANO™, a collaborative cyanobacteria monitoring program between Great Pond Foundation and the Island Boards of Health.



Summary of Metrics, 2025



*The "Summary of Metrics" tool assigns health rankings to individual water quality metrics. Refer to the Appendix for information on how rankings are assigned.

Pond Summary 2025

Watcha Pond, a near pristine freshwater pond, experienced a disturbance event in the winter months of December 2023 and January 2024, when three strong south-facing storms hit the southern shore of Martha's Vineyard. These storms forced ocean water over the barrier beach and into Watcha Pond, increasing the Pond's salinity dramatically. This salt shock triggered an increase in phytoplankton and turbidity as well as a slight elevation in cyanobacteria when compared to previous years.

Unlike other local ponds, nutrient levels remain low. Watcha Pond is recovering quickly from the disturbance event, showcasing the resilience of this ecosystem.

Introduction

Watcha Pond (WCH) is a near pristine freshwater coastal pond located on the southern shore of Martha's Vineyard in the town of West Tisbury, MA. Great Pond Foundation (GPF) started to monitor Watcha Pond sporadically in the summers of 2022, 2023, and 2024, but regular monitoring did not begin until the summer of 2025. Over the course of monitoring, GPF staff witnessed a disturbance event occurring in WCH during the winter months of 2023 and 2024 that impacted the health of the Pond.

In December of 2023 and January of 2024, the southern shore of Martha's Vineyard was hit with three severe south-facing storms. These storms forced ocean water over the barrier beach (overwash) and into Watcha Pond, rapidly increasing the Pond's salinity from 0 parts per thousand (ppt) to over 15 ppt in just a few days (**Figure 1**). For reference, freshwater has a salinity of 0 ppt and the salinity of oceanwater ranges between 34-36 ppt. The sudden influx of ocean water created a brackish environment within WCH.

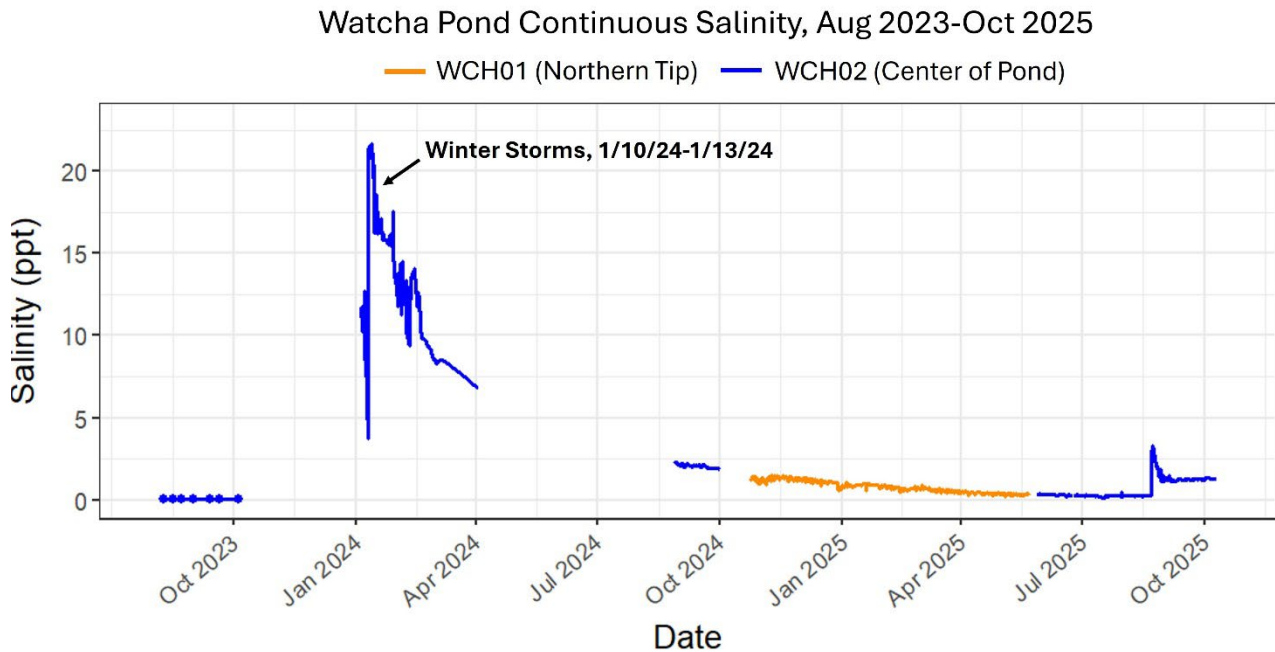


Figure 1. Salinity at the pond bottom measured (in parts per thousand or ppt) from August 2023 through October 2025. The Scatterplot points from 8/09/23–10/04/23 show baseline salinity before the winter storms. Salinity measurements in orange from 10/24/24–5/21/25 were recorded at station WCH01 off a dock; all other measurements were recorded on the pond bottom of station WCH02 located in the center of the Pond.

It is important to note that water with higher salinity is denser than water with lower salinity. Since continuous salinity measurements were taken at the bottom of the pond, the data points

represented above in blue are the highest salinity measurements in the Pond and may not reflect surface or mid depth salinity.

Since the winter storms, WCH has been gradually returning to freshwater. By the beginning of the 2025 field season, salinity was measured at 0.38 ppt and remained below 0.4 ppt until August 2025. In August, the southern shore was hit by another storm, but one that did not result in substantial over-wash and subsequent salinity increase. Although this storm also forced ocean water over the barrier beach, salinity in WCH increased only to 3.4 ppt at its peak. It is reasonable to believe that smaller storms and less impactful over-wash are a common occurrence for WCH, meaning the Pond is well adapted to minor over-wash events and the ecosystem rebounds quickly.

Impact

The disruption in the ecosystem resulting from the over-wash in 2023-2024 created an environment where phytoplankton could thrive. Salt shock, a rapid increase in salinity, causes an increased ionoregulatory demand within freshwater organisms (Sun, X., et al., 2024) that inhibit their ability to maintain proper ion levels. This stress can lead to the death of aquatic plants and animals. When plants and animals die, nutrients, like nitrogen, are released (Nobre, R. et al., 2019) that can be used by existing phytoplankton to grow and reproduce. In the summer of 2024, monitoring revealed an increase in total phytoplankton levels across Watcha Pond. However, as the Pond gradually returned to a freshwater ecosystem, the levels of phytoplankton quickly decreased. By the end of 2025, phytoplankton concentrations were as low as or lower than pre-storm measurements, as the monitoring only covered a partial season in 2022 and 2023 (Figure 2).

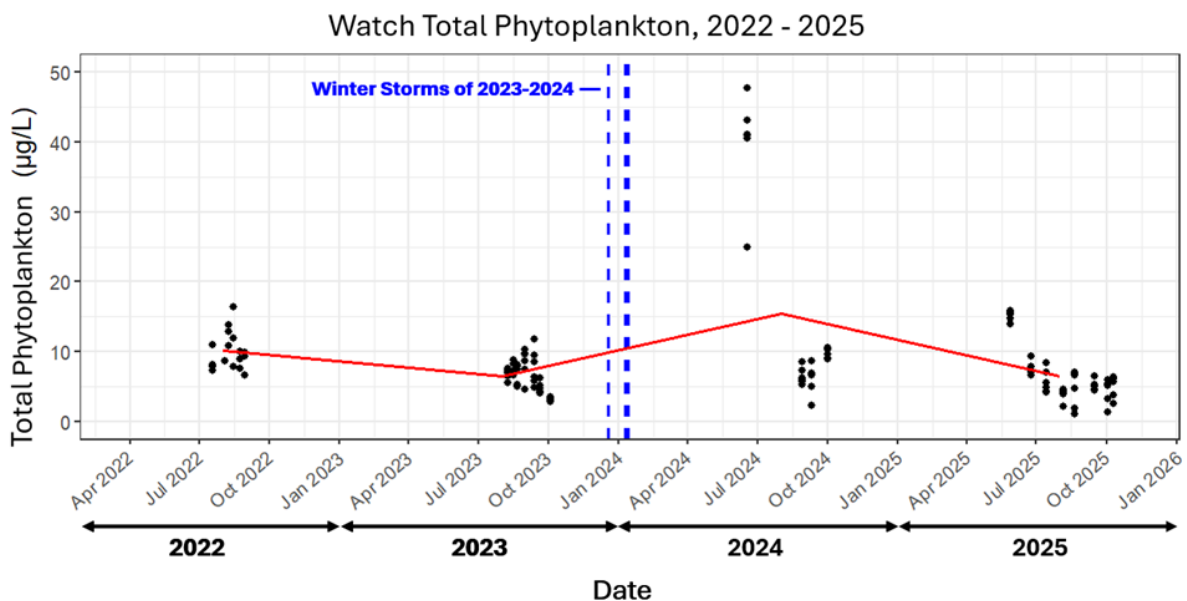


Figure 2. Total Phytoplankton concentration measured from 8/09/23-10/10/25 during standard sampling. Winter storms are indicated by dotted blue lines. These storms occurred on 12/19/23, 1/10/24, and 1/13/24. Red line represents Annual Average Total Phytoplankton concentration (µg/L).

Total phytoplankton is an additive measurement of green algae, cyanobacteria, cryptophyta, and diatoms. Of the 4 types of phytoplankton measured, non-toxic green algae, which are a normal part of a healthy pond ecosystem, were the dominate organisms found in the Pond across all monitoring years (**Figure A1.**) The increase in total phytoplankton impacted turbidity, a measurement of how murky the water is. Phytoplankton live suspended in the water column, and their abundance made the water more turbid immediately following the over-wash events in 2023 and 2024 (**Figure A2**).

Of the types of phytoplankton regularly monitored, cyanobacteria are the only group of concern due to the potential ability to produce and release an array of toxins that impact human and non-human animal health. Cyanobacteria monitoring in Watcha Pond began in 2022 within GPF’s collaborative MV CYANO™ program with the Island Boards of Health. Sarah Gund collected initial samples, and it is because of Sarah and Vicki Riskin’s advocacy, that GPF began working with the Watcha Pond community. When monitoring began, cyanobacteria measured within the green “Bloom Not Present” range (**Figure A3**). Following the winter storms in 2023 and 2024, which resulted in salt shock, cyanobacteria concentrations increased to the yellow “Cyanobacteria Alert” range. Although post salt shock cyanobacteria concentrations were elevated compared to 2022 and 2023, cyanobacteria levels never exceeded the “Cyanobacteria Alert” threshold, indicating cyanobacteria are present, but not at high concentrations (**Figure 3**). This was true for every sampling station in WCH thoroughout the entirety of the 2025 field season (**Figure 4**).

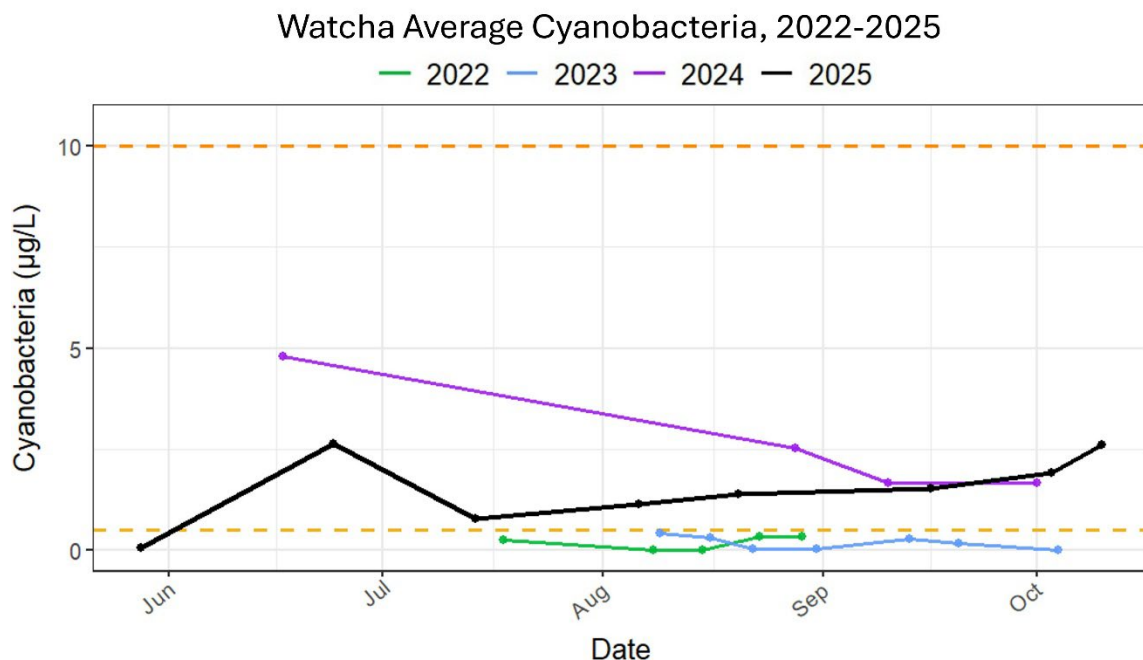


Figure 3. Average cyanobacteria concentrations across the Pond from 2022 through 2025. The dashed lines represent MV CYANO monitoring program risk thresholds; Yellow: “Cyanobacteria Alert”, and Orange: “Cyanobacteria Bloom Watch”

Watcha Cyanobacteria 2025

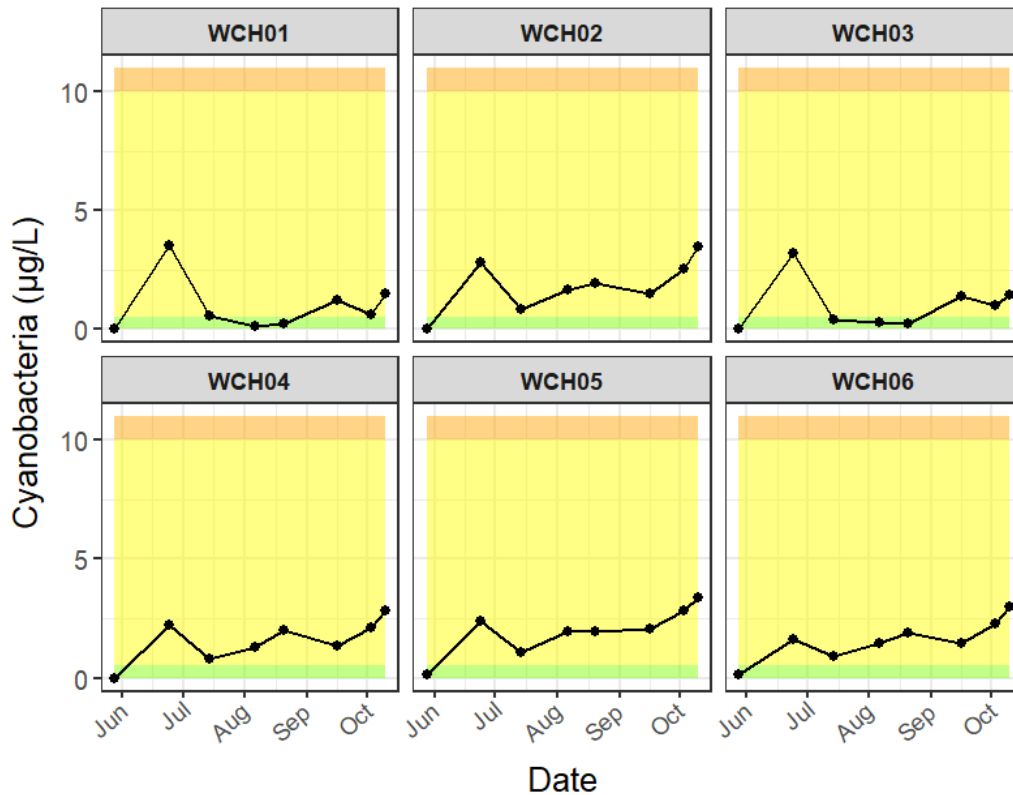


Figure 4. Cyanobacteria concentrations at each sampling site from May 2025 through October 2025. Shaded regions represent MV CYANO monitoring program risk categories. Green: “Bloom Not Present”, Yellow: “Cyanobacteria Alert”, and Orange: “Cyanobacteria Bloom Watch”.

Cyanobacteria appear in a variety of forms, from **planktonic**, floating in the water column or along the surface, to **benthic**, mixed in macroalgal clusters or mats on the pond floor. The mats on the pond floor will sometimes trap air bubbles which cause them to float to the water’s surface. While conducting routine sampling during the 2025 field season, GPF staff spotted algal matting on the water’s surface near WCH01, the northernmost region of the Pond. The mat was relatively small (about the size of an office desk) and moved around the edges of the cove’s head based on wind direction. Samples of the material were collected and analyzed under the microscope in GPF’s lab (**Figure 5**).

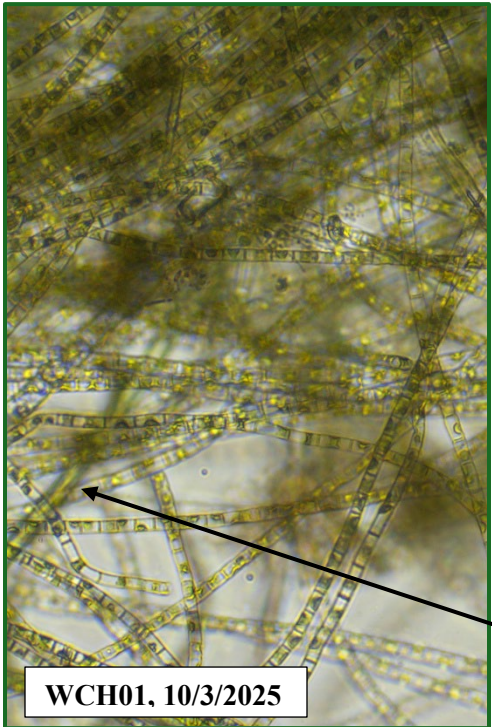
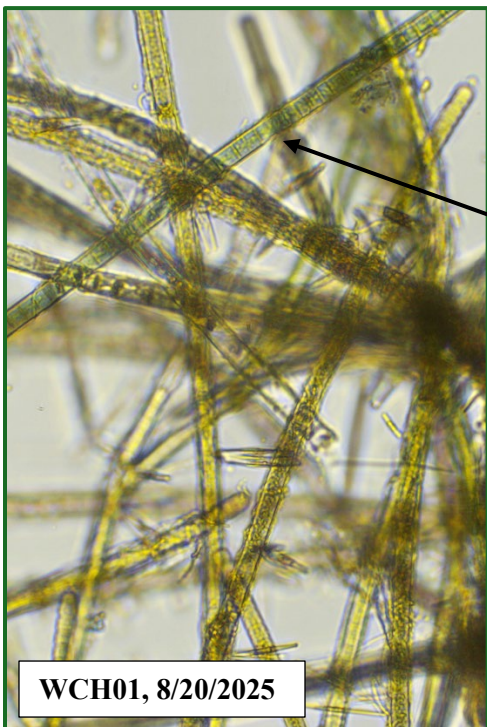
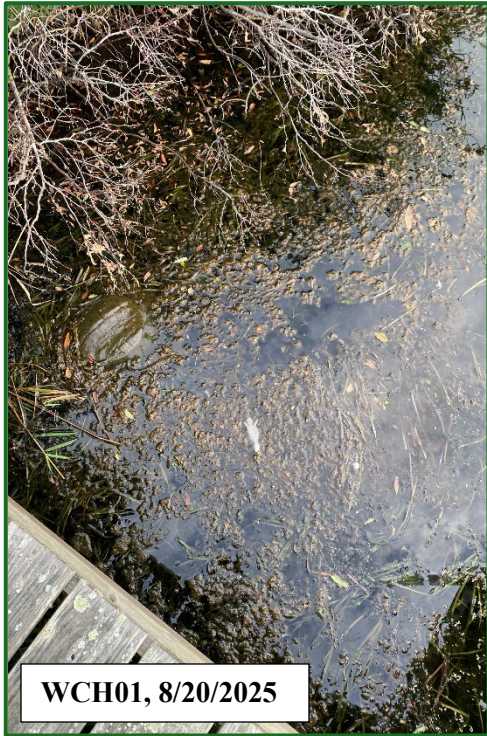


Figure 5. Images depicting algae mats in Watcha Pond as seen in the field (top left and top right) as well as under the microscope (bottom left and bottom right). Arrows point to cyanobacteria observed under the microscope.

When the mats were viewed under the microscope, cyanobacteria were present but were not the dominant organism. The mats were composed primarily of green algae with occasional cyanobacteria present. Green algae are non-toxic and unlike cyanobacteria, they pose no health risk to humans and non-human animals. In large quantities, green algae can block sunlight from other photosynthetic organisms or cause low-oxygen and foul smells during decay, which can be harmful to ecosystems and unpleasant. Fortunately, WCH has low enough nutrient concentrations that pond-wide green algal blooms have not occurred. If nutrient (nitrogen and/or phosphorus) inputs into WCH were to increase, the Pond would be at risk for larger algal matting or potentially harmful algal blooms, because algae use nutrients for energy and growth.

Great Pond Foundation monitors nutrients in many ponds across the Island, and WCH is no exception. Nutrient (nitrogen and phosphorus) samples were collected at mid-depth for the northern tip (WCH01), the western arm (WCH03), and the main basin (WCH04) of the Pond (see Executive Summary for locations). Samples were collected on 9/30/23, 6/17/24, 5/28/25, 7/14/25, and 9/16/25. When comparing data year over year, only the samples collected in September 2023 and September 2025 represent directly comparable measurements, since they were collected in the same month in 2023 (pre disturbance) and 2025 (post disturbance). Total nitrogen (TN) and phosphate concentrations measured in September were not substantially different between 2023 and 2025, suggesting that nutrients were not the cause of increased total phytoplankton and cyanobacteria in Watcha Pond following the winter storms (**Table 1**).

Station	Date	Total Nitrogen (mg/L)	Phosphate (mg/L)
WCH01	9/20/2023	0.310	0.010
	9/16/2025	0.410	0.014
WCH03	9/20/2023	0.351	0.010
	9/16/2025	0.316	0.011
WCH04	9/20/2023	0.303	0.010
	9/16/2025	0.299	0.009
Pond-Wide Average	9/20/2023	0.321	0.010
	9/16/2025	0.342	0.010

Table 1. Comparison of nutrient data (total nitrogen and phosphate) at stations WCH01(the northern tip), WCH03(the western arm), and WCH04(the main basin) in September 2023 and September 2025.

The Massachusetts Estuaries Project (MEP) reports developed for several Martha’s Vineyard ponds recommend a TN management target of <0.5 milligrams per liter (mg/L) (Howes, B. et al., 2008; Howes, B. et al., 2013; Howes, B. et al., 2015). The US Environmental Protection Agency and Massachusetts Department of Environmental Protection (MADEP) recommend a management threshold for total phosphorus in lakes and streams of 0.02 mg/L (MADEP, 2021). All nutrient samples collected in WCH between 9/20/23 and 9/16/25 remained within these

thresholds, except for phosphate on 6/17/24 at WCH01 which measured at 0.03 mg/L and exceeded the management threshold by 0.01 mg/L (**Figure A4**).

One anomaly Watcha Pond experienced throughout the 2025 field season is a major fluctuation in pH, or Potential of Hydrogen. pH is a measurement of acidity, and the State of Massachusetts has set an optimal pH management range between 6.5 and 8.5. In 2025, pH measurements were taken at each station on every sampling day between May and October. The data are indicative of some levels of stress or impairment, with large swings from acidic to basic and some stations staying outside of the ideal range for months (**Figure 6**). There is no clear evidence of the cause of this pH fluctuation, but it will be important to continue future monitoring of pH, as these shifts outside the management range may be indicative of ecosystem imbalance.



Figure 6. pH measurements at each sampling station in Watcha Pond from May 2025 through October 2025. pH at different depths in the water column are represented by differently colored lines.

Conclusion

Watcha Pond demonstrated resilience following stressful over-wash events in December 2023 and January 2024. The rapid increase in salinity, or salt shock, created ecosystem imbalance and

an environment where phytoplankton grew in excess. This in turn increased turbidity and cyanobacteria levels were elevated as compared to the pre-disturbance years of 2022 and 2023. Benthic cyanobacteria were found in floating algal mats at the water's surface for the first time in 2025. Although cyanobacteria concentrations were elevated post disturbance, cyanobacteria concentrations remain comparatively low, with respect to other Island ponds, and of minor concern in Watcha. Analysis of nutrient data, which were below management thresholds, suggests that nutrient inputs were not the cause of these elevated cyanobacteria concentrations. The cause of the pH fluctuation in 2025 outside of management targets is unknown but may be indicative of imbalance.

Recommendations

Watcha Pond remains a near-pristine freshwater ecosystem. The salt shock caused by the south-facing winter storms of 2023 and 2024 disturbed the environment and prompted the growth of phytoplankton, including cyanobacteria. The nutrient data collected and analyzed from 9/30/23 through 9/16/25 further support salt shock as the cause of increased phytoplankton, as there was no meaningful change in nutrient concentrations between 2023 and 2025. The ecosystem's quick recovery following stress, highlights the resilience of Watcha Pond.

It is recommended that regular monitoring continues both to understand health trends of Watcha Pond and to identify any early indications of stress before they result in reduced water quality or impairment. It is reasonable to believe the comparatively lower nutrient concentrations in Watcha Pond are largely due to the limited development within Watcha Pond's watershed. Limiting future development within the watershed will help to keep the Pond healthy, as added nutrients from septic systems, lawns, run-off, and the disruption of natural nitrogen fixation performed by undeveloped and intact native ecosystems will increase nutrient loads within the Pond. Another recommendation is to reduce/limit the use of fertilizers on lawns. Fertilizers add nitrogen and phosphorus to groundwater which, in excess will provide the food source necessary for algal or cyanobacteria blooms to occur. By limiting nutrient inputs now, the Watcha Pond Community can protect long-term ecosystem health and water quality.

Works Cited

Howes, B., Samimy, R., Schlezinger, D., Ramsey, J., & Eichner, E. (2008, December). *Linked Watershed-Embayment Model to Determine Critical Nitrogen Loading Threshold for the Edgartown Great Pond System, Edgartown, MA*. SMAST/MassDEP Massachusetts Estuaries Project, Massachusetts Department of Environmental Protection.

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Howes, B., Eichner, E., Samimy, R., Schlezinger, D., Kelley, S., Ramsey, J., & Detjens, P. (2013, May). *Linked Watershed-Embayment Model to Determine Critical Nitrogen Loading Threshold for the Tisbury Great Pond/Black Point Pond System, Town of Chilmark and West Tisbury, MA*. SMAST/MassDEP Massachusetts Estuaries Project, Massachusetts Department of Environmental Protection.

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Massachusetts Department of Environmental Protection. (2021, December 10). *314 CMR: Division of Water Pollution Control*. Commonwealth of Massachusetts.

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Link: <https://doi.org/10.1016/j.ecoenv.2023.115899>

Appendix

Refer to GPF's [Summary of Metrics Methodology](#) page for information on how the Summary of Metrics rankings included in this report's executive summary are assigned.

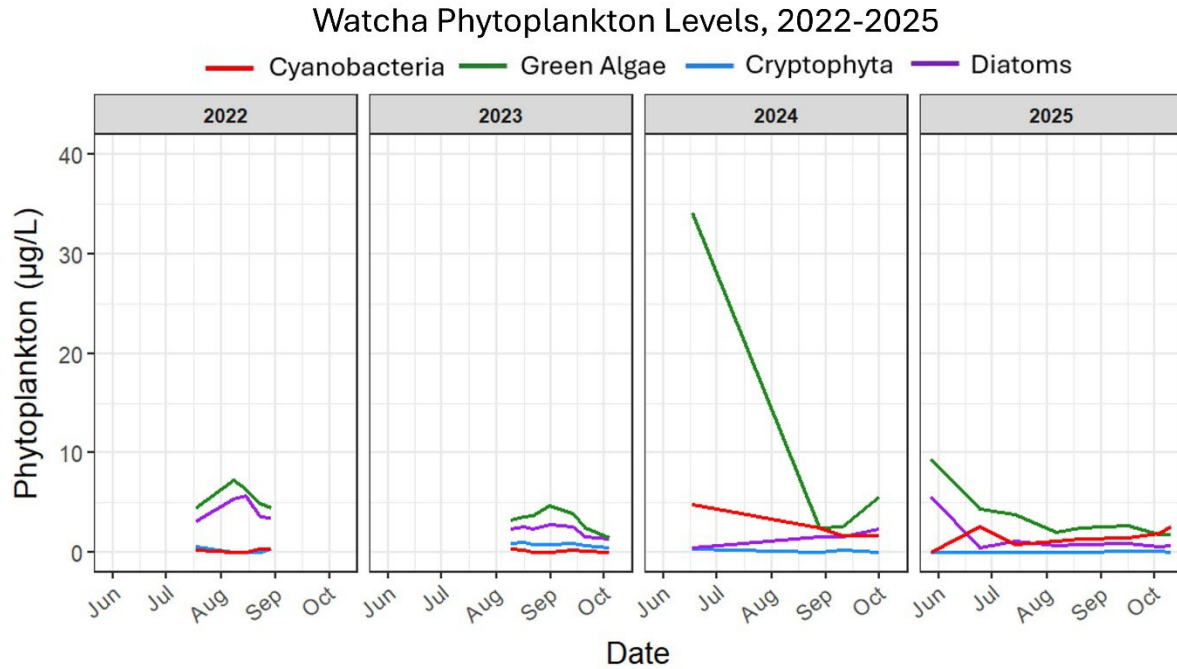


Figure A1. Concentrations of Cyanobacteria (red), Green Algae (green), Cryptophyta (blue), and Diatoms (purple) across the pond in 2022, 2023, 2024, and 2025.

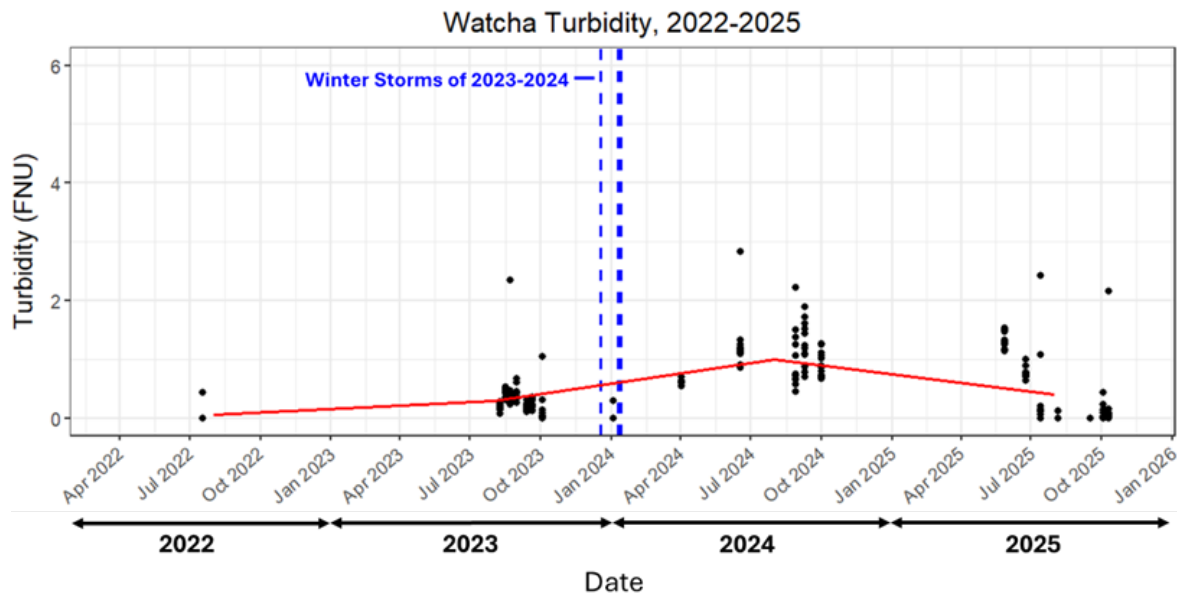


Figure A2. Turbidity (FNU) from 2022-2025. Blue dotted lines represent the winter storms on 12/19/23, 1/10/24, and 1/13/24. The red line represents average turbidity. Only surface and mid depth points are included due to the possibility of skewed data from the densely vegetated pond bottom.


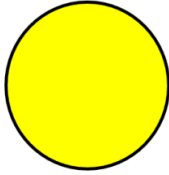
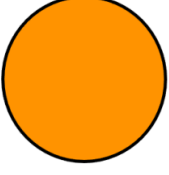
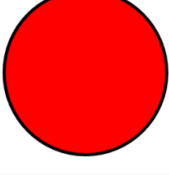
GREEN		<p style="text-align: center;">BLOOM NOT PRESENT</p> <p>Conditions are not favorable for a Cyanobacterial Bloom.</p> <p>OK: Swimming, boating, paddling, wading, fishing, and consuming shellfish, crabs, or finfish. No known cyanobacteria risks to humans, pets, and livestock.</p>
YELLOW		<p style="text-align: center;">CYANOBACTERIA ALERT</p> <p>It is the season where Cyanobacterial Blooms are possible.</p> <p>OK: Swimming, boating, paddling, wading, fishing, and consuming shellfish, crabs, or finfish.</p> <p>USE CAUTION: risk to humans/pets/ livestock when ingesting water.</p>
ORANGE		<p style="text-align: center;">CYANOBACTERIA BLOOM WATCH</p> <p>OK: Boating.</p> <p>USE CAUTION: risk for swimming, paddling, and wading, fishing.</p> <p>ADVISE AGAINST: humans/pets/livestock ingestion of water, consuming shellfish, crabs, or finfish.</p>
RED		<p style="text-align: center;">CYANOBACTERIA BLOOM ADVISORY</p> <p>There is an active Cyanobacteria bloom, cyanotoxins may be present.</p> <p>OK: Boating.</p> <p>ADVISE AGAINST: pets/livestock/human ingestion of water, fishing, consuming shellfish or finfish, swimming, paddling, and wading.</p>



Figure A3. The color-coded risk matrix used by MV CYANO.

Station	Date	Total Nitrogen (mg/L)	Phosphate (mg/L)
WCH01	9/20/2023	0.310	0.010
	6/17/2024	0.393	0.030
	5/28/2025	0.428	0.002
	7/14/2025	0.396	0.002
	9/16/2025	0.410	0.014
WCH03	9/20/2023	0.351	0.010
	6/17/2024	0.384	0.001
	5/28/2025	0.373	0.000
	7/14/2025	0.381	0.001
	9/16/2025	0.316	0.011
WCH04	9/20/2023	0.303	0.010
	6/17/2024	0.353	0.001
	5/28/2025	0.349	0.000
	7/14/2025	0.381	0.002
	9/16/2025	0.299	0.009
Pond-wide Average	9/20/2023	0.321	0.010
	6/17/2024	0.377	0.002
	5/28/2025	0.383	0.000
	7/14/2025	0.386	0.000
	9/16/2025	0.342	0.010

Figure A4. Total Nitrogen and Phosphate concentrations from all nutrient samples collected in Watcha Pond 2023-2025. Total Nitrogen management threshold: <0.5 mg/L; Phosphate management threshold: 0.02 mg/L. Phosphate exceeds management threshold by 0.01 mg/L highlighted in yellow.