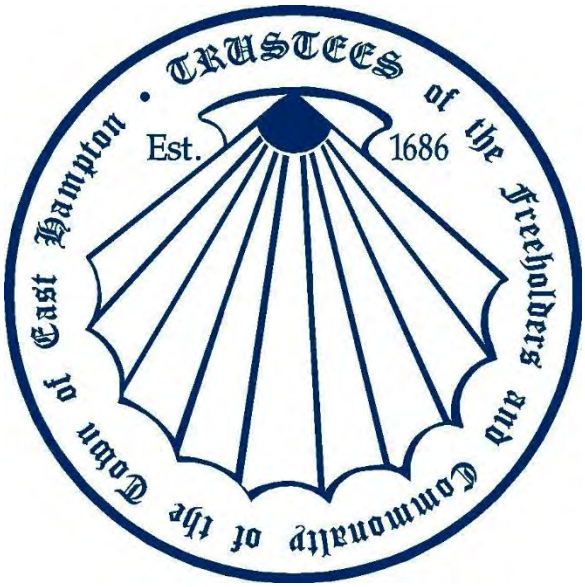
East Hampton Town Trustees 2025 Water Quality Study, Final Report



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Executive Summary

This study was undertaken from May through October of 2025 for the East Hampton Town Trustees to assess water quality, harmful algal blooms, pathogenic bacteria, and sediments in the marine and freshwater bodies of Napeague Harbor, Accabonac Harbor, Hog Creek, Three Mile Harbor, Northwest Creek, Swan Pond, Pond Lane, Fresh Pond, Hook Pond, Georgica Pond, Wainscott Pond, and Fort Pond. The study also included continuous monitoring and/or surface mapping of Three Mile Harbor, Georgica Pond, and Wainscott Pond because of harmful algal blooms and/or low dissolved oxygen conditions at these sites in the past. During 2025, most East Hampton Town Trustees waters were often of a high quality. Fecal coliform bacteria levels across marine and freshwater sites varied throughout the spring and summer, although excursions beyond NYSDEC shellfishing recommendations were observed at multiple sites in Napeague Harbor, Accabonac Harbor, Hog Creek, Three Mile Harbor, Northwest Harbor, and Georgica Pond. In addition, levels of *Enterococcus* exceeded levels recommended for swimming by NYSDOH in both marine and freshwater systems on occasion in 2025. Chlorophyll-*a* levels were usually within a healthy range for most sites although 5 of 16 marine sites displayed levels above guideline values on at least one occasion during late summer or the beginning of fall. *Alexandrium* bloom level was exceeded only in Three Mile Harbor. *Dinophysis* and *Margalefidinium* bloom levels do not exceed the harmful threshold in the summer and fall. Measurements of total nitrogen across all marine sites demonstrated that all 16 marine locations sampled exceeded the Peconic Estuary Program's recommended value of 0.4 mg N/L.

East Hampton Town's freshwater bodies monitored in 2025 displayed a mix of good and poor water quality. Pond Lane, Swan Pond, Wainscott Pond, Georgica Pond, Big Reed Pond, and Fort Pond experienced levels of blue-green algae blooms that exceeded the NYSDEC cyanobacterial bloom threshold (> 25 μg/L). Wainscott Pond was the most impacted system, with every sample (n=30) exceeding bloom level and mean intensity over an order of magnitude greater than the NYSDEC threshold (> 25 μg/L) with the toxin microcystin detected in approximately half of the samples but always at levels below the EPA guideline for recreation. An intensive temporal assessment of Georgica Pond before and after the opening of the cut revealed a dramatic increase in salinity. Collectively, this study revealed regions of East

Hampton with excellent water quality, as well as regions requiring further study, monitoring, and remediation.

1. Background

Coastal marine ecosystems are amongst the most ecologically and economically productive areas on the planet, providing an estimated US$20 trillion in annual resources or about 43% of the global ecosystem goods and services (Costanza et al., 1997). Approximately 40% of the world's population lives within 100 km of a coastline, making these regions subject to a suite of anthropogenic stressors including intense nutrient loading (Nixon, 1995; de Jonge et al., 2002; Valiela, 2006). Excessive nutrient loading into coastal ecosystems promotes algal productivity and the subsequent microbial consumption of this organic matter reduces oxygen levels and can promote hypoxia (Cloern, 2001; Heisler et al., 2008). The rapid acceleration of nutrient loading to coastal zones in recent decades has contributed to a significant expansion of algal blooms, some of which can be harmful to ecosystems or the humans who live around those ecosystems.

Globally, the phytoplankton communities of many coastal ecosystems have become increasingly dominated by harmful algal blooms (HABs) and New York's coastal waters are a prime example of this trend. Prior to 2006, algal blooms in NY were well-known for their ability to disrupt coastal ecosystem and fisheries but were never considered a human health threat. Since 2006, blooms of the saxitoxin-producing dinoflagellate *Alexandrium catenella* have led to paralytic shellfish poisoning (PSP)-inducing closures of thousands of acres of shellfish beds in Suffolk County. In 2008, a second toxic dinoflagellate, *Dinophysis acuminata*, began forming large, annual blooms that generated the toxins okadaic acid and DTX-1, both of which are the causative agents of diarrhetic shellfish poisoning (DSP). During the past decade, moderate levels of *Alexandrium* and *Dinophysis* have recently been detected in East Hampton Town waters. The limited nature of sampling, however, has prohibited definitive conclusions regarding the extent and maximal densities of blooms from being established.

In Suffolk County, blooms of the ichthyotoxic dinoflagellate *Margalefidinium*, formerly *Cochlodinium*, have occurred every year since 2004 in the Peconic Estuary and Shinnecock Bay and bloom water from these regions has been shown to cause rapid morality in fish, shellfish, and shellfish larvae (Gobler et al., 2008; Tang & Gobler, 2009a; 2009b). *Margalefidinium*

polykrikoides forms blooms around the world and the highly lethal effects of these blooms on fish, shellfish, shellfish larvae, zooplankton, and subsequent impacts on fisheries have been well established (Kudela & Gobler, 2012). Studies to date suggest short-lived, labile toxins, and reactive oxygen species (ROS) play a central role in the toxicity of *M. polykrikoides* to fish and shellfish (adult, juvenile, and larvae) (Tang & Gobler, 2009a; 2009b). In 2012, these blooms spread into East Hampton Town marine waters. Large populations of bay scallops, that were otherwise abundant prior to the blooms, died following these bloom events (Deborah Barnes, NYSDEC, pers. comm.). However, the precise distribution of *Margalefidinium polykrikoides* blooms in East Hampton Town waters is unknown.

Toxic cyanobacteria blooms represent a serious threat to aquatic ecosystems. Globally, the frequency and intensity of toxic cyanobacteria blooms have increased greatly during the past decade, and have become commonplace in freshwater, upper reaches of many US estuaries. Toxin concentrations during many of these cyanobacteria blooms often surpass the World Health Organization (WHO) safe drinking water threshold of 1 µg/L and recreational water limit of 20 µg/L (Chorus & Bartram, 1999). There are a multitude of examples of sicknesses and deaths associated with chronic, or even sporadic, consumption of water contaminated with cyanotoxins (O'Neil et al., 2012). Cyanotoxin exposure has been linked to mild and potentially fatal medical conditions in humans including gastrointestinal cancers (i.e., liver, colorectal; Chorus & Bartram, 1999) and more recently, neurological disorders such as Alzheimer's disease (Cox et al., 2005).

Since 2003, the Gobler lab of Stony Brook University has assessed levels of toxic cyanobacteria and microcystin in more than 40 freshwater systems across Suffolk County. Most freshwater bodies sampled contained potentially toxic cyanobacteria (typically *Microcystis* spp., *Dolichospermum* spp., *Planktothrix* spp., or *Aphanizomenon* spp.) and many contained detectable levels of the cyanotoxin, microcystin. Microcystin is a hepatotoxin produced by several genera of cyanobacteria including the cosmopolitan *Microcystis;* it inhibits protein phosphorylation and can cause gastrointestinal issues. In early September 2012, the NYS Department of Health reported that an autopsy of a dog that died suddenly on the shoreline of Georgica Pond revealed *Microcystis*-like cells in its stomach. Although no bloom was detected in Georgica Pond when it was investigated in late September of 2012, typically blooms are ephemeral and the most toxic events are associated with nearshore, wind accumulated scums, rather than open lake water. Historically,

the temporal and spatial dynamics of toxic cyanobacteria in Georgica Pond, as well as densities of other harmful algae in East Hampton waters, have not been well-characterized.

A final group of microbes of concern in coastal ecosystems are pathogenic bacteria. Such pathogens can present a hazard to humans recreating in affected waters by infecting the alimentary canal, ears, eyes, nasal cavity, skin, or upper respiratory tract, which can be exposed through immersion or the splashing of water (Thompson et al., 2005). Consumption of contaminated shellfish is one of the most common exposure routes for marine pathogens. Fecal coliform bacteria and *Enterococcus* are the recommended indicator for human pathogens in marine waters, and gastrointestinal symptoms are a frequent health outcome associated with exposure (Thompson et al., 2005). The presence of high levels of fecal coliform bacteria and/or *Enterococcus* may trigger action by a municipal agency to remediate such conditions. One key obstacle to generating a successful remediation plan for high levels of indicator bacteria such as fecal coliform bacteria and/or *Enterococcus* is that the source of the potentially pathogenic bacteria is often unknown. That is, pathogenic, fecal bacteria co-present with fecal coliform bacteria and/or *Enterococcus* may be derived from any animal, including humans and remedial plans for mitigating bacteria from human wastewater will differ radically from plans focused on the mitigation of animal feces. Moreover, mitigation of feces-derived bacteria from birds that live on the waterbody would differ radically from plans to minimize dog or deer feces that might emanate from road run-off.

The objectives of this study were to assess the temporal and spatial dynamics of coliform bacteria, the PSP-causing dinoflagellate *Alexandrium*, the DSP-causing dinoflagellate *Dinophysis*, and the ichthyotoxic dinoflagellate, *Margalefidinium* in East Hampton Town marine waters. It also assesses the dynamics of toxic cyanobacteria and cyanotoxins in East Hampton's major freshwater/brackish bodies. Sampling for general water quality parameters was also included, and sampling proceeded from May through October of 2025 as part of an ongoing monitoring study.

2. Approach

2.1. Water Quality

The 2025 sampling season ran from 28-May-2025 through 9-Octobler-2025, with select freshwater sites monitored through early December. Marine sampling was done on a bi-weekly basis, and freshwater sites were sampled weekly. Sampling included sixteen marine sites within Napeague Harbor, Accabonac Harbor, Hog Creek, Three Mile Harbor, and Northwest Creek (Fig. 1; Table 1); and eleven freshwater sites within Swan Pond, Pond Lane, Fresh Pond, Hook Pond, Georgica Pond, Wainscott Pond, and Fort Pond (Fig. 1; Table 1).Sampling of Fort Pond, Montauk, was performed in collaboration with the Concerned Citizens of Montauk.

Each marine water body was sampled from two or more individual sites, with at least one located near the water body's inlet to the Peconic estuary, and the others further from the inlet. Northwest Creek was the exception with only one site located near its inlet. General water quality measurements obtained for each site included salinity, temperature, and dissolved oxygen levels measured with a handheld YSI 556 probe. Onset HOBO data loggers were also deployed at the head of Three Mile Harbor to continuously record bottom temperature and dissolved oxygen levels over time. Additionally, water was collected from sites and analyzed for chlorophyll-a, fecal indicator bacteria, and total Nitrogen. Fecal coliform and *Enterococci* bacteria were quantified using Colilert-18 and Enterolert/Quanti-tray kits according to manufacturer instructions, yielding most probable number (MPN) in terms of colony forming units (CFU) per 100 mL (IDEXX).

The pigment chlorophyll-*a*, which serves as an analog for algal biomass, was measured by filtering whole water through glass fiber filters, extracting the collected pigment from the filter with acetone, and measuring the fluorescence (Parsons et al., 1984). To assess the abundance of harmful algae, five of these marine sites were sampled more comprehensively with cell counts.

Alexandrium catenella and *Dinophysis acuminata* are toxic marine dinoflagellates responsible for paralytic shellfish poisoning, and diarrhetic shellfish poisoning (DSP), respectively, and were sampled during May. For these samples, a concentrated Lugol's sample was taken for each site sieving 1 L of water through a 200 µm mesh and a 20 µm sieve backwashed into a 15 mL centrifuge tube filling the tube to 14 mL (Hattenrath-Lehmann et al., 2013). The harmful "rust tide" dinoflagellate *Margalefidinum*, formerly *Cochlodinium*, known for causing

fish kills, was monitored from June through October. For *Margalefidinium* samples, whole water was collected and preserved with Lugol's iodine and cells were counted on a Sedgewick-Rafter slide under a microscope.

At the eleven freshwater sites (one in Swan Pond, one in Pond Lane, one in Fresh Pond, one in Hook Pond, four in Georgica Pond, one in Wainscott Pond, and two in Fort Pond), measurements of temperature, salinity, and dissolved oxygen were taken as described above. Blue-green algae fluorescence, an analog for cyanobacterial biomass, was measured in live samples using a BBE Moldaenke FluoroProbe. Samples which exceeded the cyanobacterial bloom threshold of 25 μg/L bluegreen were then analyzed for total microcystin via enzyme-linked immunosorbent assay (ELISA) with a Gold Standards ADDA ELISA kit. Additional freshwater sites were measured with the FluoroProbe on an *ad hoc* basis if a bloom was suspected by the public, notably Big Reed Pond in Montauk (Fig. 1; Table 1). A telemetry monitoring buoy was deployed in southern Georgica Pond, and uploaded real-time water quality data of temperature, salinity, dissolved oxygen, and chlorophyll. An EXO sonde was also deployed in southern Wainscott Pond to record these same parameters.

2.2. Indicator bacteria quantification

During the present study, fecal bacteria contamination was assessed at two sites within Napeague Harbor, four sites within Accabonac Harbor, two sites within Hog Creek, five sites within Three Mile Harbors, two sites within Northwest Harbor, and one site within Georgica Pond on selected dates spanning from May to October 2025. On each date, surface water (0.25 m depth) samples were collected in sterile 2 L bottles and transported on ice to the laboratory for further processing within two hours of collection. Triplicate whole water samples were collected for DNA analysis in which samples were well-mixed to ensure even distribution of biomass prior to filtering 25 – 100 mL onto a 0.2 μm Millipore polycarbonate filter, depending on water turbidity. Samples were stored at -80°C until further processing. In parallel, these sites and Wainscott Pond were additionally sampled for fecal coliform bacteria and *Enterococci* bacteria from May through October, quantified using the IDEXX Enterolert & Quanti-Tray/2000 sampling kits, giving MPN per 100mL.

2.3 Historic Trends

The appropriate sampling sites were grouped together to represent each major marine waterbody monitored in this study including: Accabonac Harbor, Hog Creek, Northwest Creek Harbor, and Napeague Harbor, Three Mile Harbor. For the last decade of East Hampton sampling data, annual means in water quality metrics were calculated for each marine waterbody. Linear models were run for all the East Hampton monitoring area for each water quality metric (R Core Team, 2024).

3. Findings – Marine Systems

3.1. General Water Quality: Temperature, Salinity & Dissolved Oxygen

Overall average temperatures averaged 22.1°C and ranged 20.8 – 22.99°C across East Hampton's marine sites (Fig. 2). Maximum surface temperatures in East Hampton ranged 24.0 – 31.9°C and overall averaged 27.3°C (Fig. 2). Average maximum salinities in East Hampton ranged 28.9 – 32.0 PSU, and overall averaged 31.4 PSU (Fig. 3). Overall average salinity ranged 24.5 – 30.1 PSU and averaged 27.7 PSU across East Hampton's marine sites (Fig. 3). Overall average dissolved oxygen (DO) concentrations ranged 6.5 – 8.1 mg/L and averaged 7.3 mg/L (Fig. 4).

Minimum surface DO concentrations in East Hampton ranged 4.42 – 6.98 mg/L and averaged 5.5 mg/L (Fig. 4). Overall average DO concentrations were generally above the NYSDEC minimum standard for DO (4.8 mg/L).

Surface water temperature and DO were measured continuously in Three Mile Harbor (EH11) during summer 2025. In Three Mile Harbor, temperature from the end of June until mid–early October ranged 17.89 – 27.2°C and average 22.5°C (Fig. 5). During that time, DO concentrations ranged 0.0 – 7.77 mg/L and averaged 2.8 mg/L (Fig. 6). Throughout the sampling season, dissolved oxygen concentrations in Three Mile Harbor fluctuated above and below the NYSDEC minimum for DO, with DO levels in August lower than the end of June and July (Fig. 6).

Surface water temperature, salinity, and DO were measured at multiple sites at both high and low tides in Napeague Harbor (9/22/2025). Napeague harbor temperatures, salinities and dissolved oxygen ranged from 20.4-22.2 ˚C, 30.9-31.35 ppt, 7.3-8.5 mg/L, respectively, and all environmental parameters were higher at high tide than low tide (Fig. 92-94).

3.2. Nitrogen and Eutrophication

In Napeague Harbor, total N concentrations ranged 0.18 – 0.62 mg N/L on all dates during 2025 between both sites EH1 and EH2 (Fig. 8). On 21-August-2025 and 9-October-2025, concentrations exceeded Peconic Estuary Program threshold for EH1 with a value of 0.62 and 0.47 mg N/L, respectively (Fig. 8). On 26-June-2025 concentrations exceeded the threshold for EH2 with a value of 0.61 mg N/L (Fig. 8). In Accabonac Harbor, total N concentrations ranged 0.21 – 1.15 mg N/L throughout 2025 (Fig. 9). In this region, notable concentrations that exceeded the Peconic Estuary Program threshold were on 17-September-2025 at EH5 with concentration at 0.63 mg N/L (Fig. 9). At EH6a, values exceeded the threshold at all dates throughout the monitoring period (Fig. 9). At EH7a, values exceeded the threshold from at all date except for 9-October-2025 at 0.24 mg N/L (Fig. 9). At EH7b, values exceeded the threshold twice on 28-May-2025 and 21-August-2025 at 0.59 and 0.68 mg N/L, respectively (Fig. 9). In Hog Creek, concentrations ranged 0.22 – 1.02 mg N/L throughout 2025. At EH8 concentrations exceeded the Peconic Estuary total N threshold twice on 28-May-2025 and 21-August-2025 with concentrations at 0.47 and 0.61 mg N/L, respectively (Fig. 10). At EH9, total N concentrations exceeded the threshold throughout the

monitoring period except on 28-July-2025 (Fig. 10). At Three Mile Harbor, concentrations ranged 0.18 – 0.88 mg N/L throughout 2025. All sites had at least one date that exceeded the Peconic Estuary Program total N threshold with EH11 all but one date on 28-May-2025 and EH11a exceeding throughout the monitoring period (Fig. 11). In Northwest Creek, concentrations ranged 0.26 – 0.71 mg N/L (Fig. 12). At EH13, total N concentration exceeded the threshold three times on 28-May-2025, 21-August-2025, and 17-September-2025 (Fig. 12). At EH14A, total concentration exceeded the threshold once on 26-June-2025 at 0.41 mg N/L (Fig. 12). At EH14B, total concentrations exceeded twice on 26-June-2025 and 28-July-2025 at 0.45 and 0.47 mg N/L, respectively (Fig. 12).

The overall average concentration throughout the sites ranged from 0.29 – 0.71 mg N/L (Fig. 7). The maximum ranged from 0.41 – 1.15 mg N/L (Fig. 7).

3.3. Algae and Harmful Algae; Alexandrium, Dinophysis, & Margalefidinium

All algae contain the pigment chlorophyll-*a* and therefore, it is measured as a proxy for total phytoplankton biomass. Moderate levels of algae support productive fisheries and ecosystems, but excessive algal growth can lead to a series of negative ecological consequences, including hypoxia and acidification, and could be a sign of the development of an algal bloom.

Overall average chlorophyll-*a* concentrations ranged 3.1 – 13.8 µg/L and averaged 6.6 µg/L (Fig. 13). Maximum chlorophyll-*a* concentrations were, on average, 14.9 µg/L across all sites and ranged 5.4 – 46.3 µg/L (Fig. 13). The USEPA considers 20 µg/L of chlorophyll-*a* in marine waters as eutrophic. In this season, maximum concentrations in Accabonac Harbor (EH6a), Hog Creek (EH9), and Three Mile Harbor (EH11 and EH11a) exceeded this level (Fig. 13). From late-May through early-August, chlorophyll-*a* concentrations remained below the USEPA maximum chlorophyll-*a* level, except for two sites, one in Accabonac Harbor (EH6a) and Three Mile Harbor (EH11) (Fig. 13). Chlorophyll-*a* concentrations generally exceeded the USEPA maximum in early-August through mid-September. In Three Mile Harbor (E11a), it had the highest concentration amongst all the sites monitored at 46.3 µg/L on 4-September-2025 (Fig. 13).

Surface water chlorophyll-*a* was measured at multiple sites at both high and low tides Napeague Harbor (9/22/2025). Napeague harbor chlorophyll-*a* ranged from 2.10-7.5 µg/L and all were higher at low tide than high tide (Fig. 95).

Alexandrium is a toxic dinoflagellate that synthesizes saxitoxin, which leads to the syndrome of PSP, and can cause illness or death in individuals consuming shellfish containing these toxins (Anderson, 1997). PSP has been occurring annually in New York waters since it first appeared in 2006, with Sag Harbor being the closest region to East Hampton experiencing a shellfish beds closure due to these. In 2013, densities of *Alexandrium* exceeded 1,000 cells/L, levels known to cause toxicity in shellfish (Anderson, 1997). This sampling season there was a bloom of 3,080 cells/L of *Alexandrium* in Three Mile Harbor (EH11) on 28-April-2025, exceeding the bloom threshold of 1,000 cells/L (Fig. 15).

Dinophysis was present in East Hampton waters during 2025, albeit very sparsely across the surveying season. In Napeague Harbor (EH1), there was a maximum bloom of 56 cells/L on 28-May-2025 (Fig. 16). At Northwest Creek (EH13), *Dinophysis* had a maximum of 112 cells/L on 28-May-2025 (Fig. 16). At Hog Creek (EH9), *Dinophysis* had a maximum of 56 cells/L on 26-June-2025 (Fig. 16). In Three Mile Harbor (EH11), *Dinophysis* had a bloom of 3,920 cells.L on 30-June-2025 (Fig. 16). *Dinophysis* concentrations never exceeded the bloom threshold for *Dinophysis* (10,000 cells/L) during 2025.

Margalefidinium, formerly *Cochlodinium*, is an ichthyotoxic dinoflagellate that has caused fish kills across the globe including some sites on eastern Long Island (Kudela & Gobler, 2012). *Margalefidinium* blooms of more than 300 cells/mL have been known to cause mortality in larval fish, which use these estuarine systems as nurseries, and in shellfish (Tang & Gobler, 2009a; 2009b). At all sites, *Margalefidinium* bloomed very sparsely and in very low densities. The highest density was 208 cells/mL on 21-August-2025 at Hog Creek (EH9) (Fig. 18). The distribution and intensity of *Margalefidinium* blooms differ from year-to-year, highlighting the importance of long-term monitoring of water quality trends. It is notable that although *Margalefidinium* does not bloom consistently in each individual location from year to year, it has spread to and reached harmful densities in several harbors. Given its ability to form cysts (Tang & Gobler, 2012), this finding suggests the potential to spread and bloom in more locations in the future.

3.4. Fecal Coliform Bacteria and Enterococcus

Fecal coliform concentrations varied among marine sites in Napeague Harbor, Accabonac Harbor, Hog Creek, Three Mile Harbor, and Northwest Harbor during summer and fall 2025. In

Napeague Harbor, concentrations at EH1 and EH2 ranged from <10 – 9208 colony forming units (CFU) per 100 mL, and averaged 954.6 and 22.41 CFU per 100 mL, respectively (Fig. 19). EH1 and EH2 had maximums of 9208 and 52 CFU per 100 mL respectively (Fig. 21). In Accabonac Harbor, concentrations at EH5, EH6a, EH7a, and EH7b ranged from <10 – 2909 colony forming units (CFU) per 100 mL for summer through fall (Fig. 22). Overall averages at EH5, EH6a, EH7a, and EH7b were 356.7, 299.7, 137.2, and 50.6 CFU per 100 mL, respectively, and maximum values were 2909, 1872, 1210, and 309 CFU per 100 mL, respectively (Fig. 22). At EH5, concentration on 11-July-2025 was the highest at 2909 CFU per 100 mL (Fig. 22), which exceeds the NYSDEC maximum of 14 CFU per 100 mL. Sites EH6a, EH7a, and EH7b had lower concentrations compared to EH5 (Fig. 22). In Hog Creek, EH8 had lower concentrations compared to EH9 and had the highest concentration of 512 CFU per 100 mL on 26-June-2025 at EH9 (Fig. 23). In Three Mile Harbor, concentrations at EH11a exceeded the NYSDEC maximum throughout the whole monitoring period except for one day on 28-May-2025 (Fig. 24). EH11a had concentrations ranging from <10 – 670 CFU per 100 mL (Fig. 24). Almost all concentrations at EH10, EH10a, and EH11 were below the NYSDEC maximum (Fig. 24). Fecal coliform concentrations exceeded the USFDA and NYSDEC shellfishing standards at EH11a most frequently throughout summer and fall 2025 (Fig. 24). In Northwest Harbor, EH14A had lower fecal coliform concentrations compared to EH14B (Fig. 25). EH13 had values <10 CFU per 100 mL throughout most of the monitoring period (Fig. 25). EH14A had a high concentration of 576 CFU per 100 mL on 21-August-2025 and EH14B had a high of 613 CFU per 100 mL on 12-August-2025 (Fig. 25).

Fecal coliform concentrations varied among freshwater sites in Georgica Pond, Fort Pond, and Wainscott Pond during summer and fall 2025. In Georgica Pond, fecal coliform values exceeded the NYSDEC maximum throughout the whole monitoring period. EH18 had the highest concentration of 1540.2 CFU per 100 mL on 20-August-2025 (Fig. 26). In Fort Pond, for a majority of the monitoring period the values exceeded the NYSDEC maximum and had an average of 138.4 CFU per 100 mL (Fig. 27). Fort Pond South had the highest concentration of 730.8 CFU per 100 mL on 4-August-2025 (Fig. 27). Wainscott Pond also had values exceeding the NYSDEC maximum throughout the monitoring period and had very high values, especially in October with the maximum being at 3972.6 CFU per 100 mL on 22-October-2025 (Fig. 28).

Importantly, the National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish (USFDA, 2017) requires 30 data points for an official evaluation of water quality to be considered for shell fishing, which this study now cumulatively exceeds over the past several years. Moreover, it requires highly precise standards (geometric mean & estimated 90th percentile value) for the type of sampling regimen used and method of examining samples (mean probably number vs. filters). The data provided within this report is meant to provide general information on fecal coliform and to assist in guiding future sampling by NYSDEC who have ultimate authority with regards to shellfish sanitation in NY.

Enterococcus bacteria were also quantified for marine sites in Napeague Harbor, Accabonac Harbor, Hog Creek, Three Mile Harbor, and Northwest Harbor as well, which was used by the NYSDOH as an environmental standard for bathing beaches. In Napeague Harbor, EH1 had higher enterococci concentrations than EH2 (Fig. 31). EH1 had one significant value on 9-October-2025 at 1785 CFU per 100 mL (Fig. 31). EH2 did not have any values that exceeded the NYSDOH maximum throughout the monitoring period (Fig. 31). Accabonac Harbor sites had enterococci concentrations that were above NYSDOH maximum concentration only a few times this monitoring period. EH5 had a high concentration on 21-August-2025 at 193 CFU per 100 mL (Fig. 32). EH6a had two highs first on 26-June-2025 at 332 and a second on 9-October-2025 at 448 CFU per 100 mL (Fig. 32). EH7a and EH7b had the lowest concentration, but only EH7b did not exceed the NYSDOH maximum (Fig. 32). Hog Creek had a range of <10 – 2489 CFU per 100 mL (Fig. 32). At EH8 all concentrations were below the NYSDOH maximum (Fig. 32). EH9 had an overall had the highest concentration on 26-June-2025 at 2489 CFU 100 per mL (Fig. 32). In Three Mile Harbor, enterococci concentrations did not exceed the NYSDOH maximum at four of the five sites (Fig. 34). At EH11a, this was the only site that had values over the NYSDOH maximum (Fig. 34). The two highest values were on 12-June-2025 and 26-June-2025 at 1483 and 2247 CFU per 100 mL, respectively (Fig. 34). In Northwest Harbor, EH13 was the only site that idd not exceed the NYSDOH maximum (Fig. 35). At EH14A, two dates exceeded the NYSDOH maximum on 11-July-2025 and 21-August-2025 with concentrations at 110 and 399 CFU per 100 mL, respectively (Fig. 35). EH14A had a range of <10 – 399 CFU per 100 mL (Fig. 35).

Enterococci concentrations varied among freshwater sites in Georgica Pond, Fort Pond, and Wainscott Pond during summer and fall 2025. In Georgica Pond, enterococci values exceeded

the NYSDOH maximum on one day in EH18 at 976.8 CFU per 100 mL on 20-August-2025. EH17 had concentrations that exceeded NYSDOH maximum from 28-May-2025 to 18-June-2025 (Fig. 36). In Fort Pond, the South had more enterococci detections than the North (Fig. 37). Fort Pond North had the highest concentration at 487.8 CFU per 100 mL on 24-September-2025 (Fig. 37). Wainscott Pond also had values exceeding the NYSDEC maximum throughout the monitoring period and had very high values especially on 6-August-2025 at 1632.8 CFU per 100 mL (Fig. 38).

4. Findings - Freshwater Systems

4.1. General Water Quality: Temperature, Salinity & Dissolved Oxygen

The overall average temperature across East Hampton's freshwater sites was 21.9°C and ranged 2.5 – 33.5°C (Fig. 39). Maximum temperature was, on average, 29.0°C and ranged 26.9 – 33.5°C (Fig. 39). Overall average salinity for the freshwater sites was 3.6 PSU and ranged 0 – 31.1 PSU (Fig. 41). Maximum salinity was, on average, 8.39 PSU and ranged 0.14 – 27.5 PSU (Fig. 41).

In Pond Lane (PLEH), DO was, on average, 8.7 mg/L and was above the NYSDEC minimum for DO (4.8 mg/L) on all dates sampled (Fig. 45). In Swan Pond (SPEH), DO averaged 5.3 mg/L and was below the NYSDEC minimum for DO on four out of eight sampling dates (Fig 46). In Fresh Pond (EH4), DO was, on average, 8.8 mg/L and was above the NYSDEC minimum for DO throughout the monitoring period (Fig. 47). In Wainscott Pond (WPS), DO concentrations were, on average, 11.7 mg/L (not including EXO data, see section *4.2* below), and including the sonde data ranged 0 – 17.23 mg/L (Fig. 43; Fig. 48). In Hook Pond (EH17), DO was, on average, 8.8 mg/L and ranged 4.5 – 12.4 mg/L, it was below the NYSDEC minimum for DO on one sampling date (Fig. 43; Fig. 47). DO concentrations varied between the Georgica Pond sites. At EH15, the average DO was 5.3 mg/L and ranged 1.1 – 9.6 mg/L (Fig. 43; Fig. 49). At EH16, the average was 8.3 mg/L and ranged 7.0 – 9.0 mg/L (Fig. 43; Fig. 50). At EH16B, the average was 4.4 mg/L and ranged from 0.01 – 10.2 mg/L (Fig. 43; Fig. 51). At EH18, the average was 9.2 mg/L and ranged from 5.8 – 12.8 mg/L (Fig. 43; Fig. 52). DO concentrations were above the NYSDEC minimum on all dates at the EH18 and EH16 sites, whereas DO concentrations were below the NYSDEC minimum on eleven and nine sampling dates at EH15 and EH16B, respectively.

4.2. *Continuous Monitoring Data*

The monitoring buoy in Georgica Pond, located further East across the Pond from site EH18, continuously recorded data at ten-minute intervals. Water temperature in Georgica Pond was highest in the month of July and declined thereafter (Fig. 40). Salinity of Georgica Pond was less than or equal to 10 PSU from the start of sampling in May until November 15th when it increased from 6 to 24 PSU in a single day due to the opening of the cut two days prior on 13-November-2025 (Fig. 42). Following the opening of the cut, salinity remained high (up to 31 PSU) through the end of monitoring in early December (Fig. 42). Dissolved oxygen levels below the NYSDEC min were recorded in late August through mid-September and again in mid-November (Fig. 44). Chlorophyll-a levels were consistent throughout the monitoring period and frequently exceeded the US EPA maximum (Fig. 56).

The EXO sonde in Wainscott Pond was located in the southern end of the Pond and continuously recorded data at 15-minute intervals from mid-June through mid-November, with the exception of a few weeks where data was unavailable. Water temperature in Wainscott reached highs of 31.5°C during summer and had declined to 3°C by the end of monitoring in mid-November (Fig. 106). The water was consistently fresh, with salinities of ~0 PSU for the duration of the monitoring period (Fig. 107). pH varied between 6 - 10.5 throughout the monitoring period (Fig. 109). Dissolved oxygen levels recorded by the EXO sensor had an average of 8.77 mg/L and frequently were below the NYSDEC minimum (4.8 mg/L) from late June through late September (Fig. 108); this highlights the advantage of continuous deployments for assessing water body health as the lowest dissolved oxygen levels recorded during discrete sampling was 7.13 mg/L (Fig. 48). Chlorophyll-*a* concentrations mimicked the pattern of phycocyanin concentrations throughout the sampling period in Wainscott Pond, indicating the dominance of cyanobacteria in the algal community composition; the only exception to this was the during the last two weeks of the monitoring period in November when chlorophyll levels remained low even as phycocyanin increased (Fig. 110; Fig 111). Phycocyanin concentrations indicated peaks in cyanobacterial biomass in late July, early October, and near the end of the monitoring period in mid-November (Fig. 111).

4.3. Nitrogen and Eutrophication

Fresh Pond (EH4) was the only freshwater site with total nitrogen data available. Concentrations ranged 0.39 – 1.16 mg N/L during 2025, with concentrations exceeding the Peconic Estuary Program total N threshold (0.40 mg N/L) for all but one date in 2025 (Fig. 54). Overall average total N concentration was 0.60 mg N/L, which was above the Peconic Estuary total N threshold (Fig. 54).

4.4. Algae and Harmful Algae; Cyanobacteria

Total algal biomass for freshwater systems was measured using a BBE Moldaenke Fluoroprobe. These values tend to be higher than traditional chlorophyll-*a* extraction. The overall average of chlorophyll-*a* concentration at freshwater sites in East Hampton was 98.61 µg/L and ranged 0.62 – 747.5 µg/L (Fig. 55). Maximum chlorophyll-*a* concentration was, on average, 159.3 µg/L and ranged 28.47 – 747.5 µg/L (Fig. 55). Both averages exceeded the USEPA maximum chlorophyll-*a* concentration for eutrophic freshwater systems (8 µg/L; Fig. 55). In Pond Lane and Swan Pond, average chlorophyll-*a* concentrations were 73.04 and 98.29 µg/L, respectively, and ranged 28.87 – 221.62 µg/L and 16.28 – 206.73 µg/L, respectively (Fig. 56; Fig. 57; Fig. 58). In Fresh Pond, the average concentrations were 29.32 µg/L and ranged 10.82 – 73.74 µg/L (Fig. 59). In Hook Pond, average concentrations were 63.64 µg/L and ranged 13.8 – 183.84 µg/L (Fig. 60). Chlorophyll-*a* concentrations exceeded the USEPA maximum (8 µg/L) for freshwater systems on all dates at Pond Lane, Swan Pond, Fresh Pond, and Hook Pond. In Georgica Pond, chlorophyll-*a* concentrations were, on average, 9.95, 23.62, 19.86, and 25.90 µg/L at EH15, EH16, EH16B, and EH18, respectively, and ranged 0.62 – 28.47, 6.72 – 67.21, 5.16 – 44.15, and 8.06 – 49.93 µg/L respectively (Fig. 62-65). In Wainscott Pond, concentrations were, on average, 414.09 µg/L and ranged 182.99 – 747.5 µg/L, with concentrations on all dates exceeding the USEPA maximum for chlorophyll-*a* in freshwater systems (Fig. 61). In Fort Pond, concentrations were, on average, 31.90 µg/L and 32.71 µg/L for the north and south sites, respectively, and ranged 13.18 – 65.9 µg/L and 15.02 – 62.68 µg/L, respectively, with concentrations on all dates exceeding the USEPA maximum for chlorophyll-*a* in freshwater systems (Fig. 66; Fig. 67).

Toxic cyanobacteria blooms represent a serious threat to aquatic ecosystems and human health. Whereas chlorophyll-*a* is an analog for algal biomass, blue-green algal fluorescence serves as an analog specifically for cyanobacterial biomass. The recreational safety limit of 25 µg/L used by the NYSDEC was surpassed in Pond Lane, Swan Pond, Wainscott Pond, one site in Georgica Pond (EH16), Fort Pond North and South, and Big Reed Pond in 2025. The overall average concentration of blue-green algae across freshwater sites in East Hampton, excluding Big Reed Pond, was 66.27 µg/L and ranged 0 – 725.16 µg/L (Fig. 68). Maximum blue-green algae levels, excluding Big Reed Pond, were on average 95.92 µg/L and ranged 2.79 – 725.16 µg/L (Fig. 68). Big Reed Pond was an anomaly with a concentration of blue-green algae of 28,777.81 µg/L on the only date it was sampled, 30-September-2025 (sample provided by Concerned Citizens of Montauk and Third House Nature Center). In Pond Lane, the average blue-green concentration was 34.37 µg/L and ranged 1.94 – 91.88 µg/L (Fig. 69). In Swan Pond, average concentration was 43.06 µg/L and ranged 7.2 – 77.55 µg/L (Fig. 70). Fresh Pond had very low concentrations of blue-green algae throughout the entire monitoring period with a high of 4.3 µg/L on 09/04/2025 (Fig. 71). In Hook Pond, blue-green algae levels were also relatively low with an average of 5.85 µg/L with the highest concentration on 08/06/2025 at 14.75 µg/L (Fig. 76). In Georgica Pond, at sites EH15, EH16, EH16B, and EH18, blue-green algae concentrations were on average 0.69, 7.38, 1.41, and 4.77 µg/L, respectively, and ranged 0.0 – 2.79, 2.19 – 28.32, 0.0 – 5.43, and 0.0 – 20.0 µg/L, respectively (Fig. 73-76). In EH15, EH16B, and EH18 blue-green algae concentrations never exceeded the NYSDEC bloom threshold. In Wainscott Pond, blue-green algae concentrations exceeded the NYSDEC bloom threshold throughout the whole monitoring period and it was, on average, 350.81 µg/L and ranged 121.13 – 725.16 µg/L (Fig. 72). In Fort Pond, at the north and south sites, blue-green algae levels were, on average, 9.98 µg/L and 10.64 µg/L, respectively, and ranged 0.0 – 52.4 µg/L and 0.0 – 32.51 µg/L, respectively (Fig. 78; Fig. 79).

Regarding cyanotoxins in freshwater sites, concentrations of microcystin varied by site. Microcystin concentration at Pond Lane was measured periodically from mid-June to mid-October and ranged from 1.47 – 4.92 µg/L (Fig. 80). Swan Pond was also measured periodically from mid-June to mid-October and ranged from 0.20 – 0.78 µg/L (Fig. 80). Both Pond Lane and Swan Pond exceeded the drinking water threshold for microcystin on several dates but never exceeded the recreation threshold. Fort Pond North and South had relatively low levels of microcystin from June through mid-November 2025 with maximum concentrations on 10/20/25 of 0.61 and 0.58 µg/L,

respectively (Fig. 80). On 9/30/25, the concentration of microcystin in Big Reed Pond was 0.60 µg/L (Fig. 82). Microcystin was below the minimum detection limit in EH16 and EH18 when measured on 08/20/2025 and 09/03/2025, respectively (Fig. 81). Microcystin was measured once at EH16B on 09/16/2025 and was 0.17 µg/L. In Wainscott Pond, microcystin concentration was frequently below the minimum detection limit (< 0.15 µg/L), with a maximum concentration of only 0.30 µg/L on 08/13/25 (Fig. 83). Several genera of potentially toxic cyanobacteria were identified in EH freshwater bodies in 2025 (Table 2). *Planktothrix* was the dominant genus identified in Wainscott Pond on all dates, whereas the dominant genus at other freshwater EH sites varied more throughout the sampling season.

4.5. Wainscott Pond HYCAT and Sediment Surveys

A HYCAT Autonomous Surface Vehicle was used to survey Wainscott Pond on 24-October-2025. Chlorophyll-*a*, pH, and dissolved oxygen were highest in the southern region of the Pond particularly on the eastern side (Fig. 100; Fig. 101; Fig. 102). Salinity and temperature were lowest in the southwest section of the Pond (Fig. 98; Fig. 99). Bathymetry mapping showed that the depth of the Pond was shallower overall compared to 2018, likely due to infilling that has occurred since then, with depths of 0.43 – 1.73 meters in 2018 compared to depths of 0.13 – 1.23 meters in 2025 (Fig. 97). A sediment survey was conducted in Wainscott Pond on 01-December-2025 consisting of twenty sites across the Pond. The sediment composition of Wainscott Pond is a mix of coarse sand, fine sand, silt and clay with some minimal amounts of gravel, the proportions of each sediment type vary by location in the Pond (Fig. 103; Fig. 112). Percent organic matter was analyzed for each site and organic matter composed 0.21 – 30.38 % of the sediment with large variations even between sites in relatively close proximity to each other (Fig. 112).

5. Decadal Trends in East Hampton Marine Waterbodies

5.1 General Water Quality; Temperature, Salinity, Dissolved Oxygen

Across all East Hampton marine waterbodies, surface and bottom temperatures were the only water quality metric that did not change significantly over the last decade (Fig. 88). Surface and bottom dissolved oxygen have significantly increased with p-values of 0.002, and 0.02, respectively (Fig. 90). Specifically, Three Mile Harbor showed a significant increase in surface and bottom dissolved oxygen (p=0.01, and 0.05, respectively). Additionally, surface and bottom

salinities across East Hampton waterbodies have significantly declined over the last ten years with p-values of 0.05 and 0.003, respectively (Fig. 89). This trend is most significant in Hog Creek bottom salinity (p=0.01) and Three Mile Harbor bottom salinity (p= 0.01).

5.2 Algae and Harmful Algae; Alexandrium catenella, Dinophysis acuminata, Margalefidinium polykrikoides

Over the last decade, there has been a significant increase in annual mean chlorophyll-a values (p=0.003) (Fig. 87). More specifically chlorophyll-a has increased the most in Accabonac Harbor with a p-value of 0.03. Across all East Hampton waterbodies, there is no significant trend in *Alexandrium catenella* or *Margalefidinium polykrikoides* blooms (Fig. 84 & 86). However, in the past decade, the severity of *Dinophysis acuminata* blooms has significantly increased with a p-value of 0.04 (Fig. 85). Annual *D. acuminata* bloom densities from 2020-2025 in Hog Creek, Three Mile Harbor and Northwest Creek were denser than all other annual means measured in the last decade of monitoring data.

5.3 Fecal Coliform Bacteria

Across all waterbodies in East Hampton, there has been no significant change in annual mean fecal coliform bacteria (p=0.01) (Fig. 91). However, significant increases in annual mean fecal coliform bacteria have been seen in Northwest Creek, and Hog Creek with p-values of 0.006, and 0.007, respectively. However, the highest annual means over the last four years were seen in Accabonac Harbor and Hog Creek. In fact, Accabonac Harbor had the highest annual mean in 2022 of more than 1,000 FCU $100mL^{-1}$, which is more than 15 times higher than the New York state mandated annual mean for certified waterbodies (Fig. 91).

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Figures and Tables

Figure 1. Map of the various marine (top, red) and freshwater (bottom, green) sampling sites in East Hampton, NY during 2025.

Waterbody	Location	Abbr.	Coordinates
	Napeague Harbor Rd.	EH1	41.01079, -72.03769
Napeague Harbor	Lazy Pt.	EH2	41.01291, -72.05687
	Louse Pt. Ramp	EH5	41.01982, -72.13599
	Shipyard Ln.	EH6a	41.02133, -72.15191
	Trustees Trail	EH7a	41.03760, -72.14284
Accabonac Harbor	Gerald Dr.	EH7b	41.03011, -72.13845
	Kings Point Rd.	EH8	41.04956, -72.16711
Hog Creek	29 Isle of Wight Rd.	EH9	41.04090, -72.16559
	Gann Rd.	EH10	41.02701, -72.18102
	Squaw Rd.	EH10a	41.02289, -72.18149
	Head of the Harbor	EH11	41.00072, -72.18148
	Soak Hides Preserve	EH11a	40.99860, -72.18582
Three Mile Harbor	Hands Creek Rd.	EH12	41.01880, -72.20211
	NW Landing Rd.	EH13	41.00991, -72.24753
	Little Northwest Creek (creek)	EH14A	41.00155,-72.27044
Northwest Creek	Little Northwest Creek (bay side)	EH14B	41.00164, -72.27167
Swan Pond, East Hampton	Swan Pond	SPEH	41.04625, -72.17085
Pond Lane, East Hampton	Pond Lane	PLEH	41.04537, -72.17411
Fresh Pond, Amagansett	Fresh Pond	EH4	40.99510, -72.11771
Hook Pond	Hook Pond	EH17	40.94619, -72.19077
	Rt. 27	EH15	40.94999, -72.23915
		EH16	40.94074,-72.217699
		EH16B	40.94450, -72.21686
Georgica Pond	4 Eel Cove Rd.	EH18	40.93408, -72.23182
Wainscott Pond	Wainscott Pond, South	WPS	40.92729, -72.23973
	North	FPN	41.04331, -71.95556
Fort Pond	South	FPS	41.03603, -71.94773
Big Reed Pond		BRP	41.07955, -71.90694

Table 1. List of the East Hampton sampling sites in 2025, sites shaded in red and green represent marine and freshwater sites, respectively.

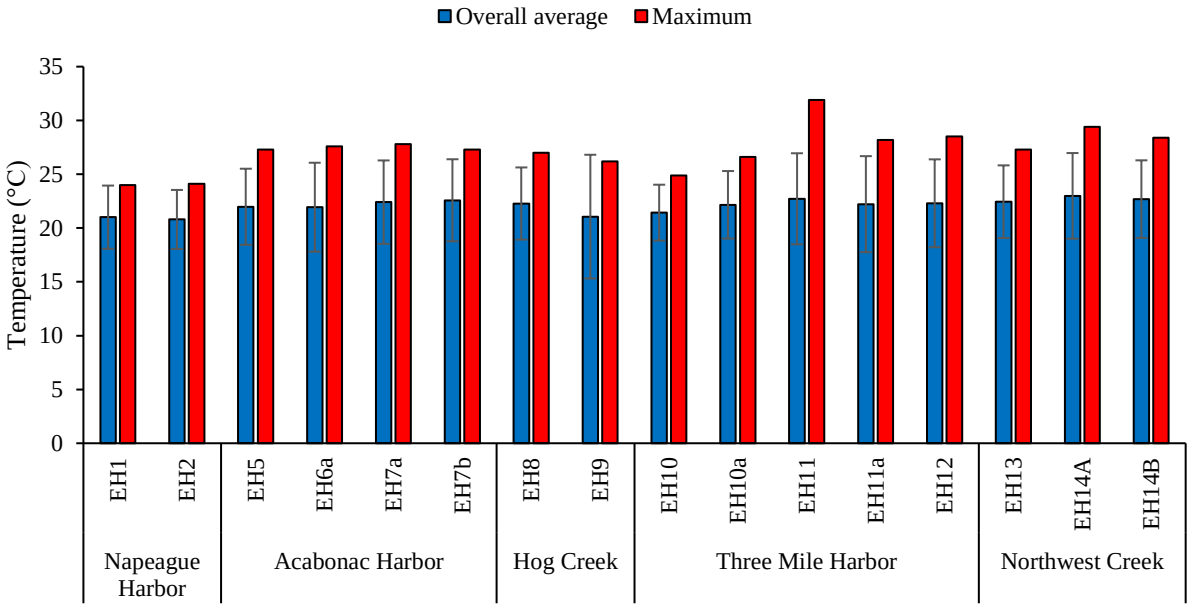


Figure 2. Overall average and maximum surface water temperatures (°C) at various marine sites in East Hampton during 2025. Error bars represent standard deviation.

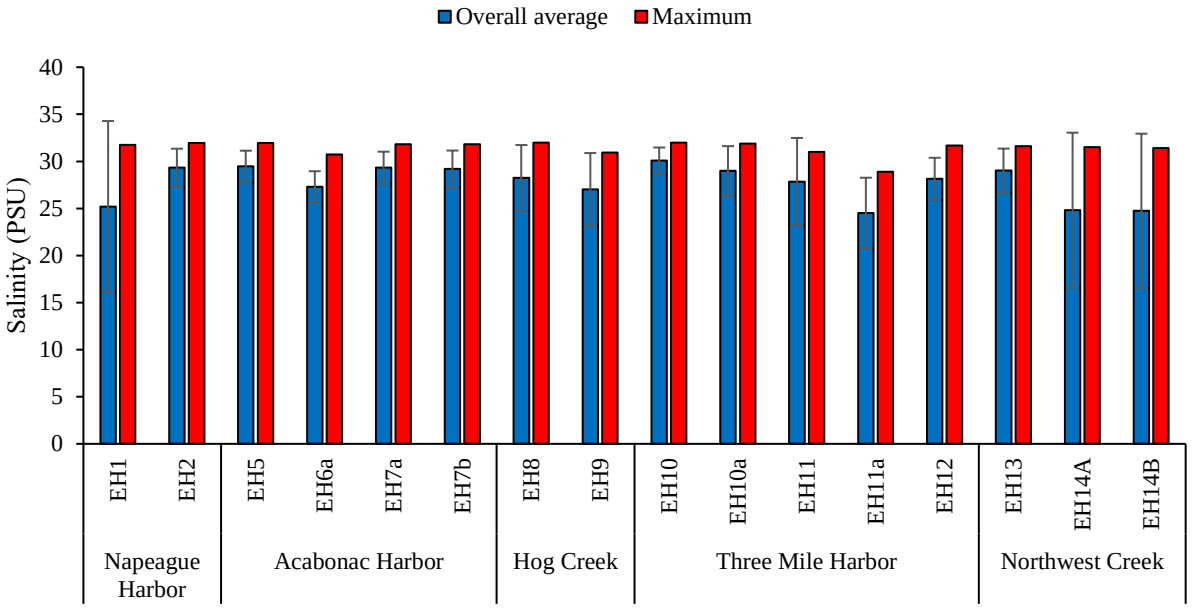


Figure 3. Overall average and maximum surface water salinities (PSU) at various marine sites in East Hampton during 2025. Error bars represent standard deviation.

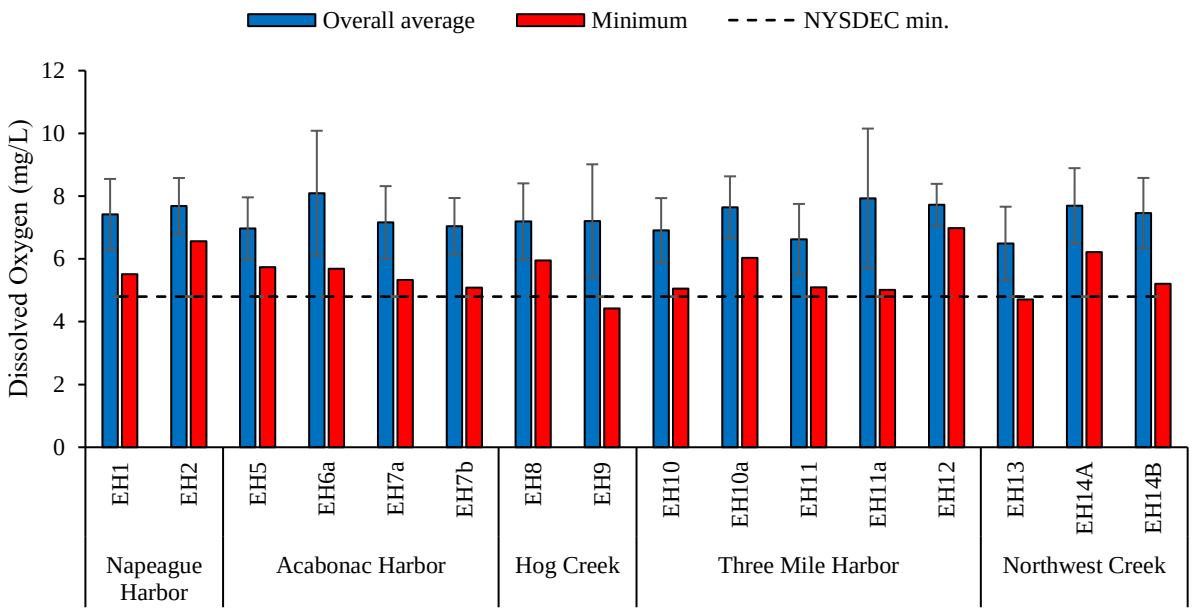


Figure 4. Overall average and minimum surface water dissolved oxygen concentrations (mg/L) at various marine sites in East Hampton during 2025. The dashed line represents the NYSDEC minimum for dissolved oxygen (4.8 mg/L). Error bars represent standard deviation.

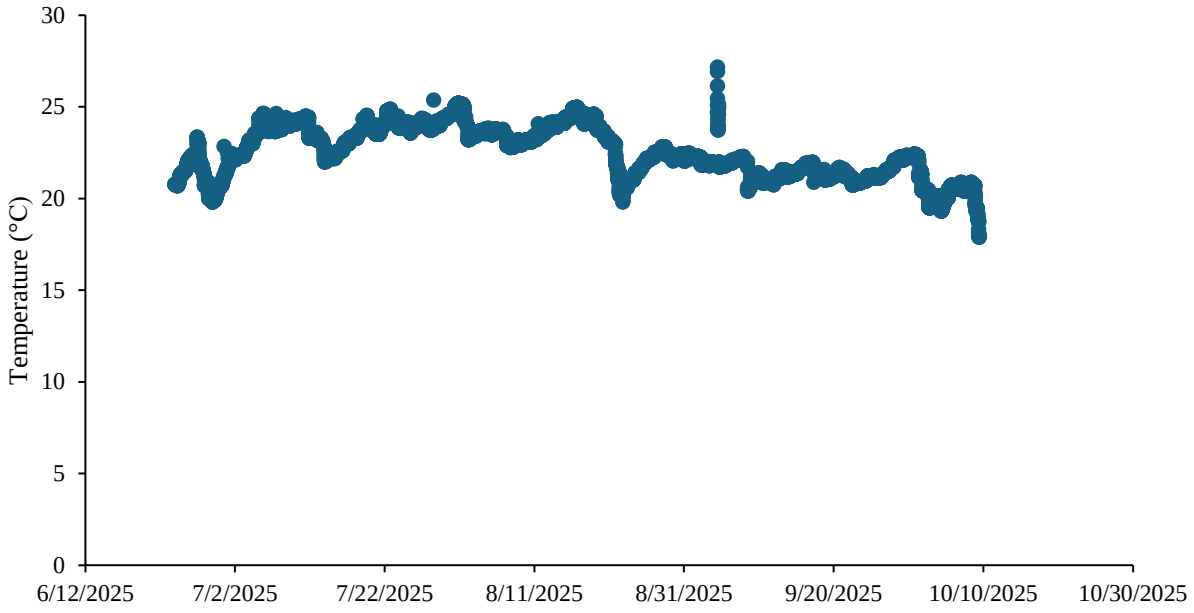


Figure 5. Continuous measurements of temperature (°C) in Three Mile Harbor (EH11) during summer 2025. Gaps in graph were when sensors were malfunctioning, and no data was recorded.

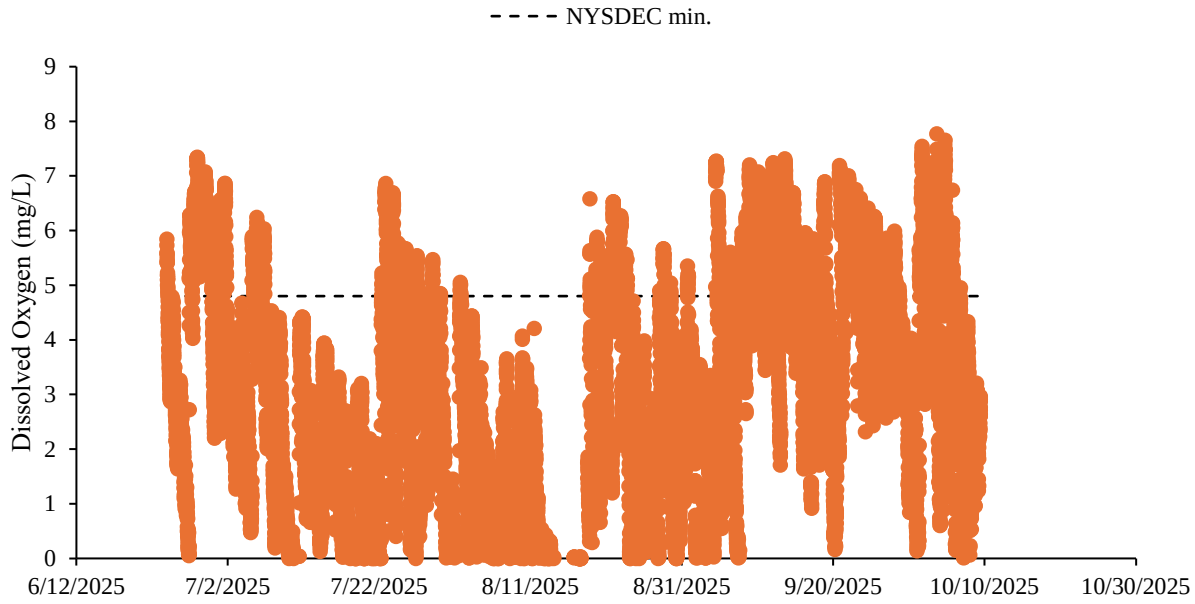


Figure 6. Discrete measurements of dissolved oxygen (mg/L) in Three Mile Harbor (EH11) during summer 2025. The dashed line represents the NYSDEC minimum for dissolved oxygen (4.8 mg/L). Gaps in graph were when sensors were malfunctioning, and no data was recorded.

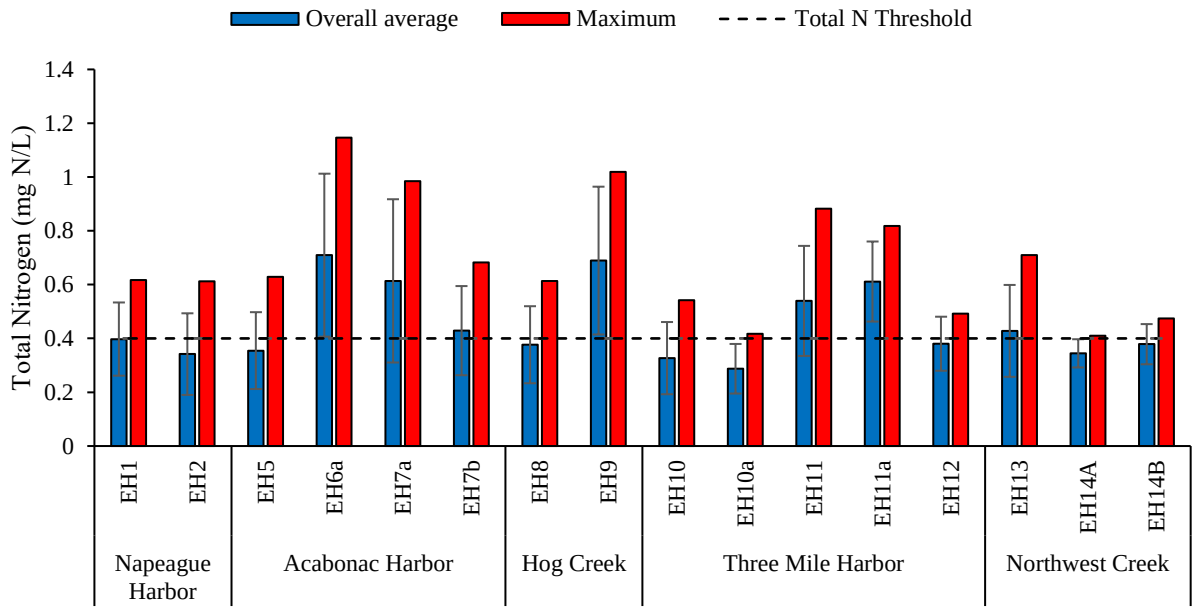


Figure 7. Overall average and maximum dissolved total nitrogen concentrations at various marine sites in East Hampton during 2025. The dashed line represents the Peconic Estuary Program threshold for total nitrogen (0.4 mg N/L). Error bars represent standard deviation

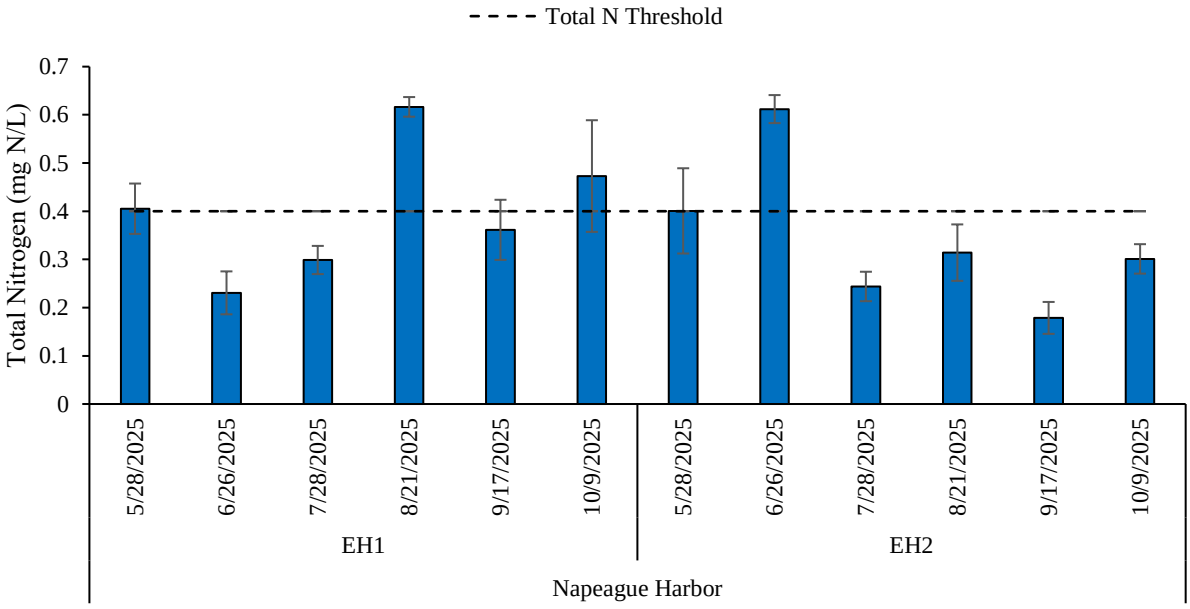


Figure 8. Total nitrogen (N) concentrations (mg N/L) at two sites in Napeague during 2025. Error bars represent standard deviation. The dashed horizontal lines represent the Peconic Estuary Program threshold for total N (0.4 mg N/L).

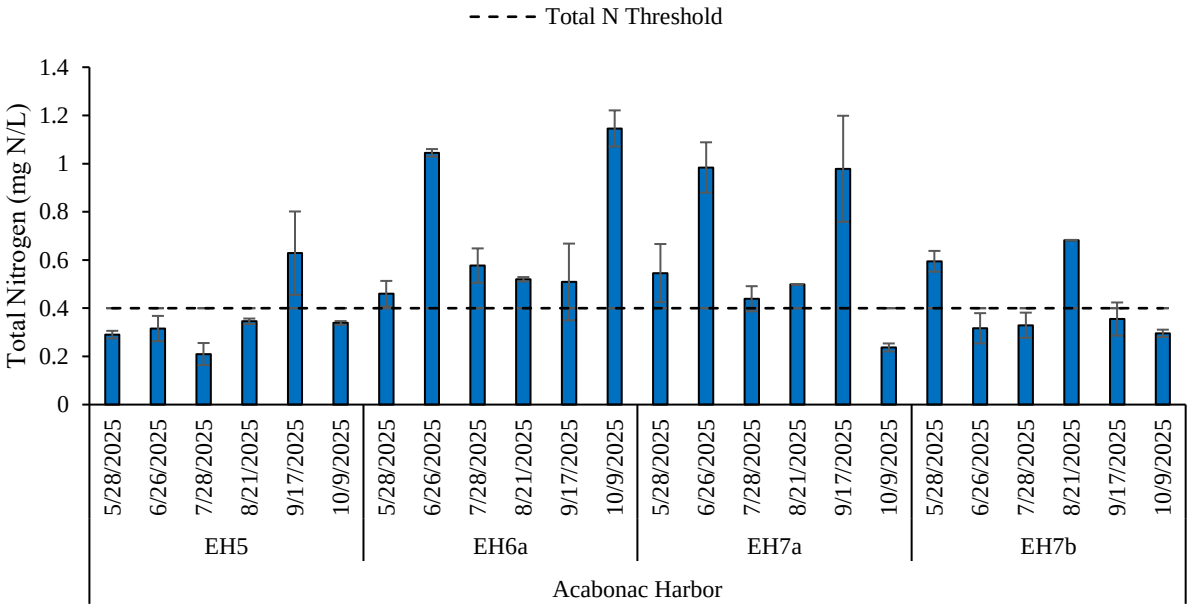


Figure 9. Total nitrogen (N) concentrations (mg N/L) at four sites in Accabonac Harbor during 2025. Error bars represent standard deviation. The dashed horizontal lines represent the Peconic Estuary Program threshold for total N (0.4 mg N/L).

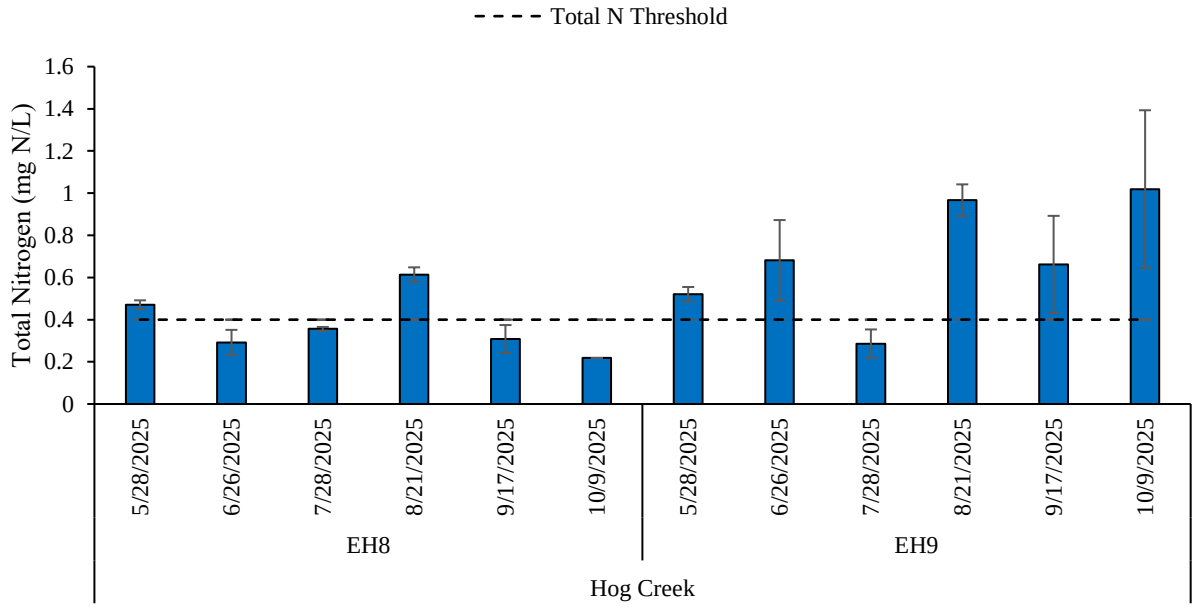


Figure 10. Total nitrogen (N) concentrations (mg N/L) at two sites in Hog Creek during 2025. Error bars represent standard deviation. The dashed horizontal lines represent the Peconic Estuary Program threshold for total N (0.4 mg N/L).

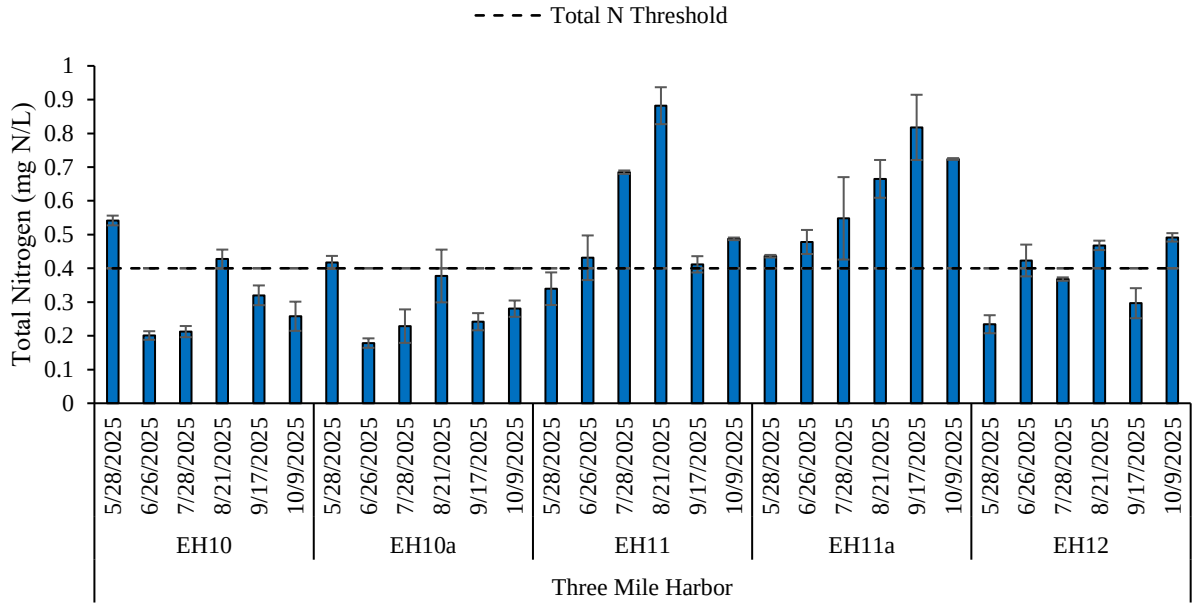


Figure 11. Total nitrogen (N) concentrations (mg N/L) at five sites in Three Mile Harbor during 2025. Error bars represent standard deviation. The dashed horizontal lines represent the Peconic Estuary Program threshold for total N (0.4 mg N/L).

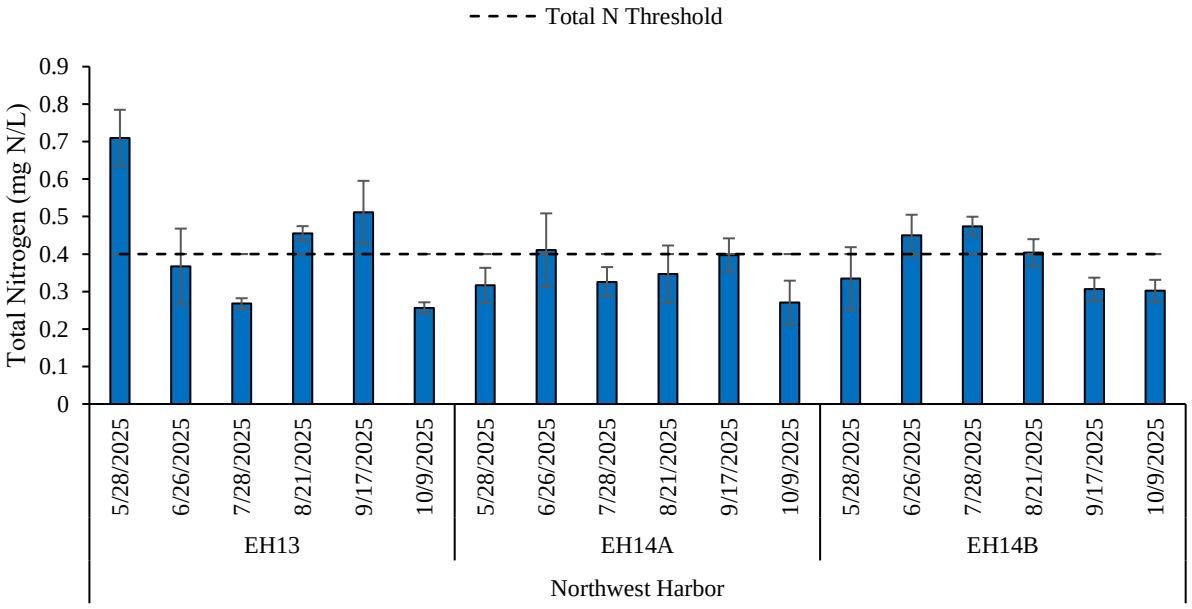


Figure 12. Total nitrogen (N) concentrations (mg N/L) at three sites in Northwest Creek during 2025. Error bars represent standard deviation. The dashed horizontal lines represent the Peconic Estuary Program threshold for total N (0.4 mg N/L).

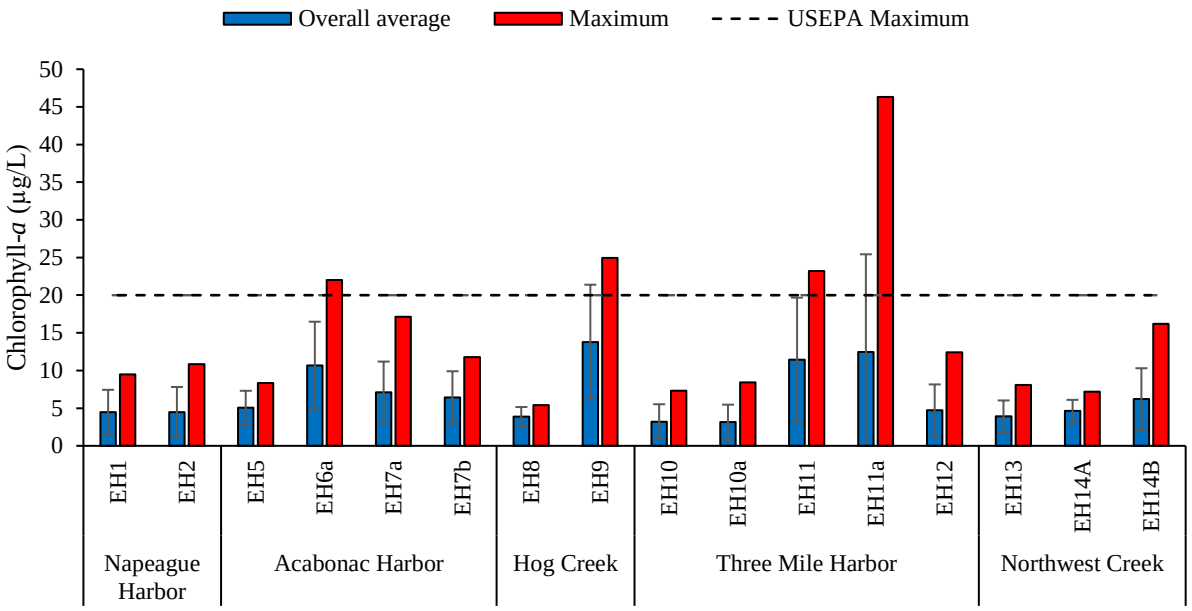


Figure 13. Overall average and maximum chlorophyll-*a* concentration (µg/L) at various marine sites in East Hampton during 2025. The dashed line represents the NOAA maximum for chlorophyll-*a* (20 µg/L). Error bars represent standard deviation.

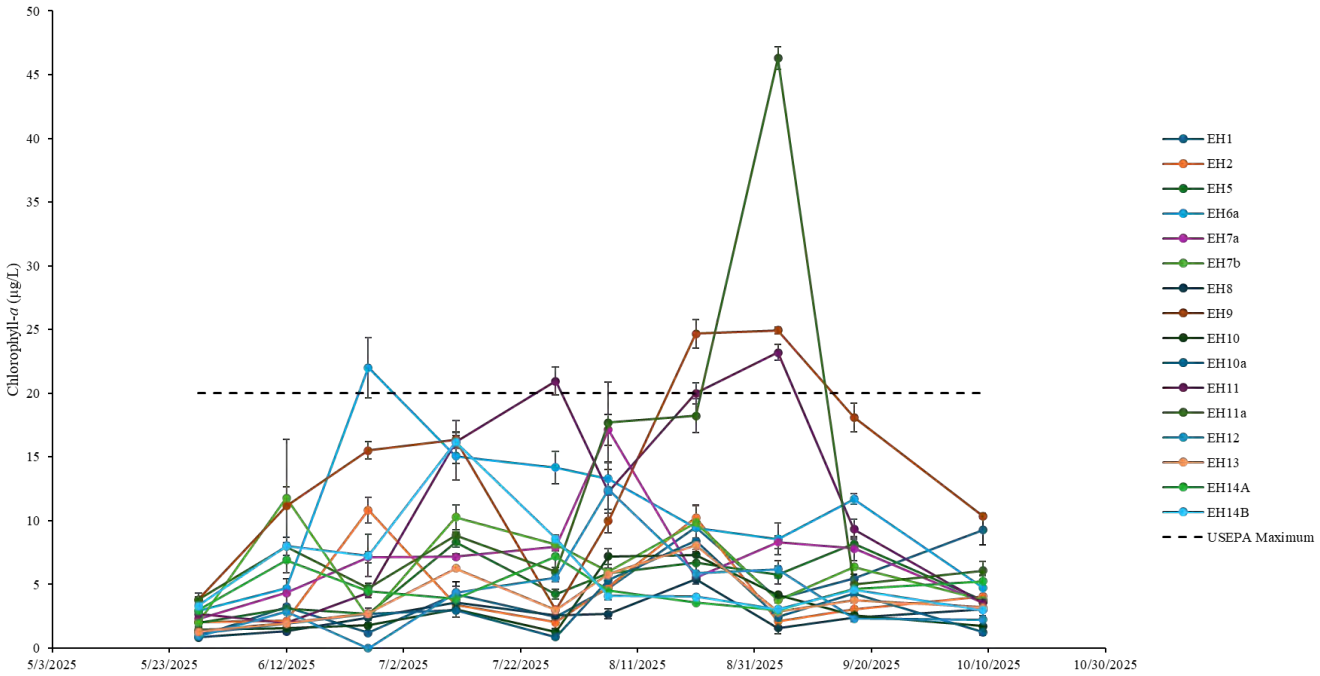


Figure 14. Chlorophyll-*a* concentrations (µg/L) at various marine sites in East Hampton during 2025. The dashed line represents the NOAA maximum for chlorophyll-*a* (20 µg/L). Error bars represent standard deviation.

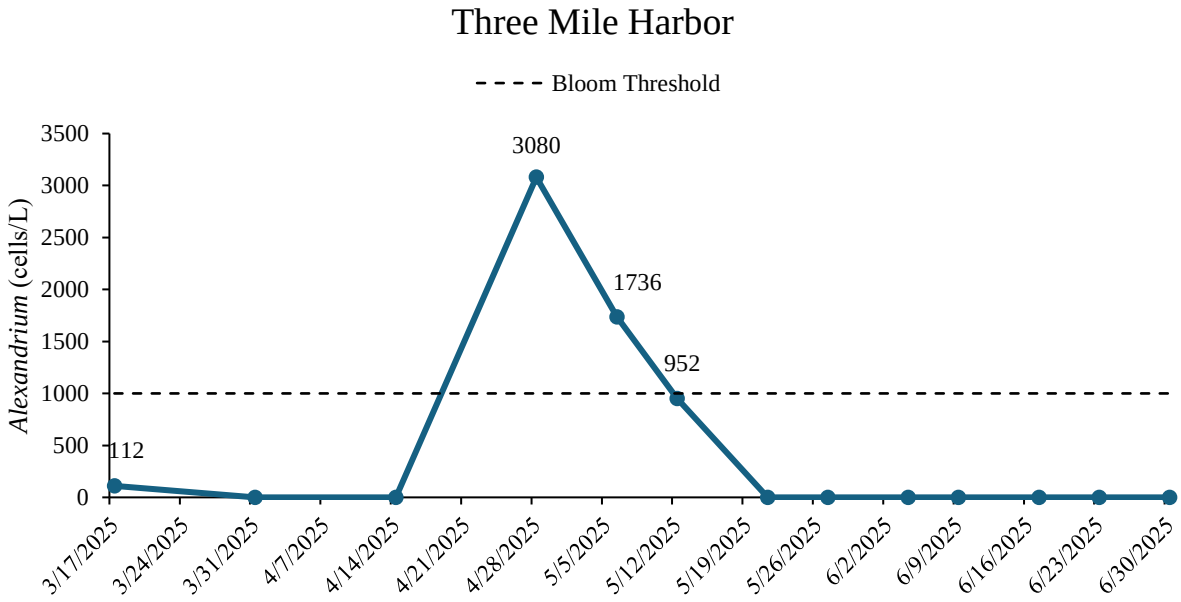


Figure 15. Concentrations of *Alexandrium* (cells/L) at one site in Three Mile Harbor (EH11) during 2025. The dashed lines represent bloom thresholds for *Alexandrium* (1,000 cells/L).

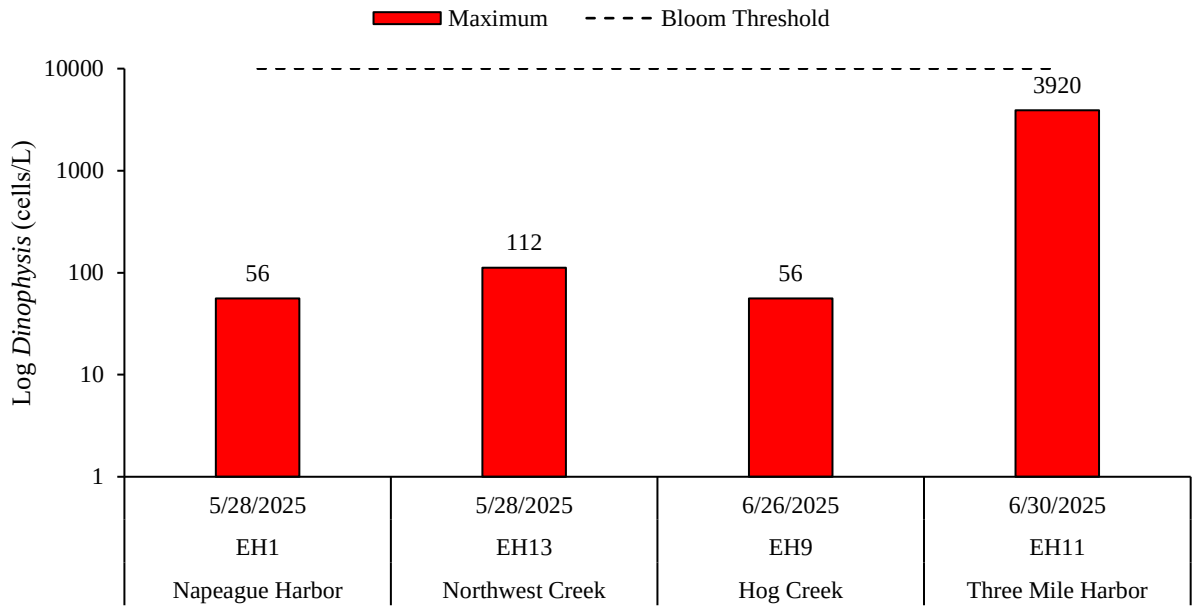


Figure 16. Concentrations of maximum *Dinophysis* (cells/L) across sites in Napeague, Northwest Creek, Hog Creek, and Three Mile Harbor during 2025. The dashed lines represent bloom thresholds for *Dinophysis* (10,000 cells/L).

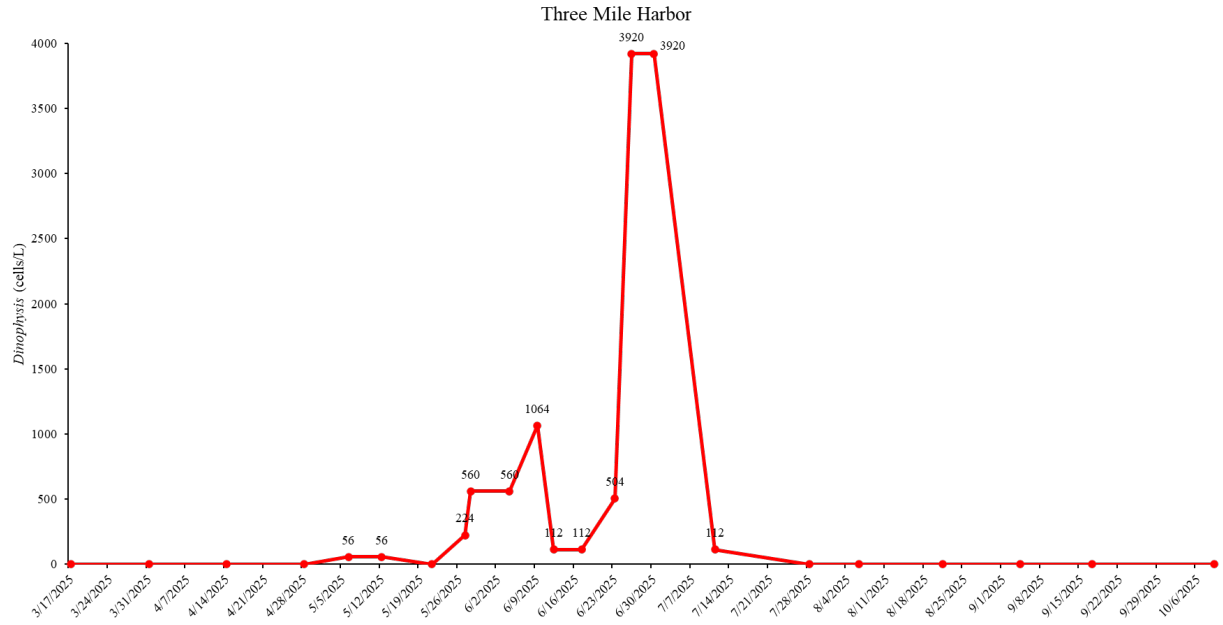


Figure 17. Concentrations of *Dinophysis* (cells/L) at one site in Three Mile Harbor (EH11) during 2025. The dashed lines represent bloom thresholds for *Dinophysis* (10,000 cells/L).

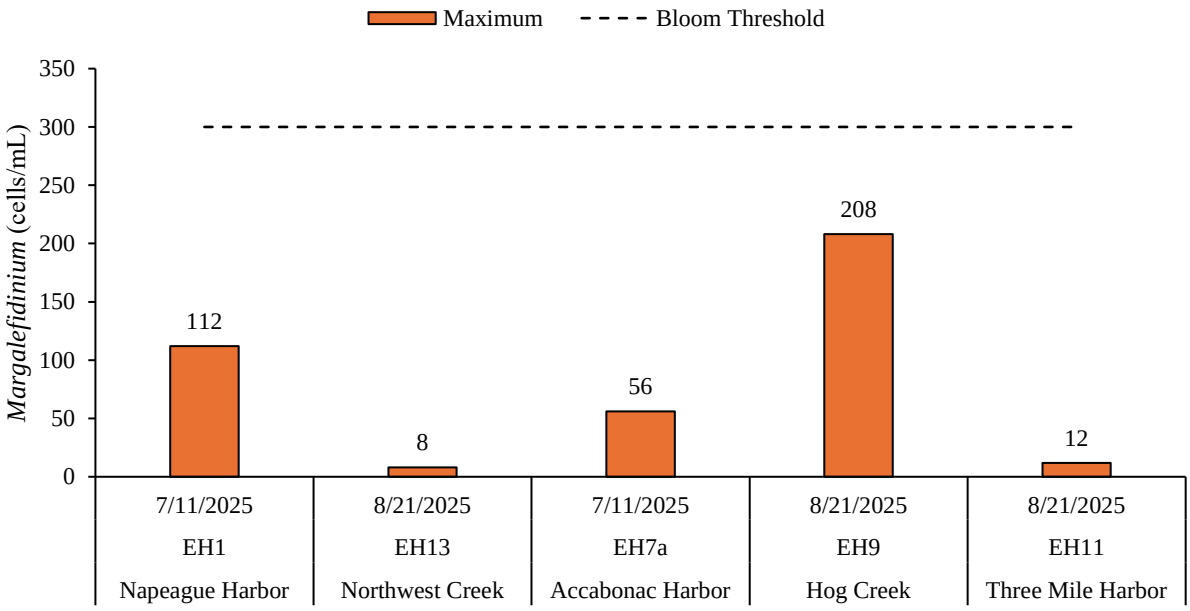


Figure 18. Concentrations of maximum *Margalefidinium* (cells/mL) across sites in Napeague, Northwest Creek, Accabonac Harbor, Hog Creek, and Three Mile Harbor during 2025. The dashed lines represent bloom thresholds for *Margalefidinium* (300 cells/mL).

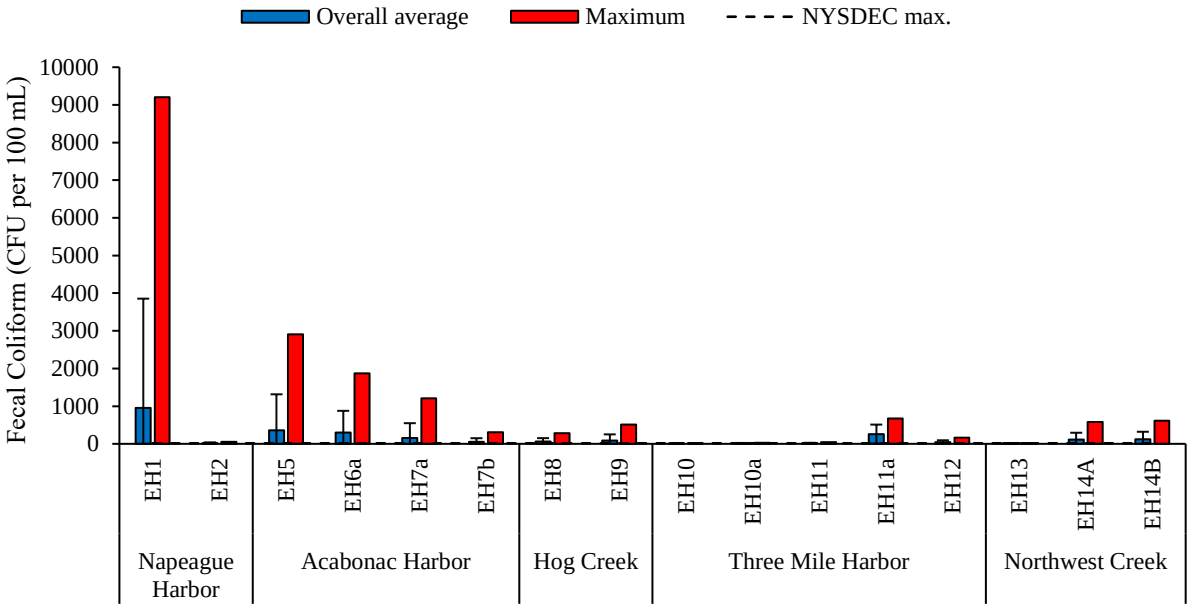


Figure 19. Overall average and maximum fecal coliform levels (CFU per 100 mL) at various marine sites in East Hampton during 2025. The dashed lines are the NYSDEC maximum fecal coliform levels for shellfishing (14 CFU per 100 mL).

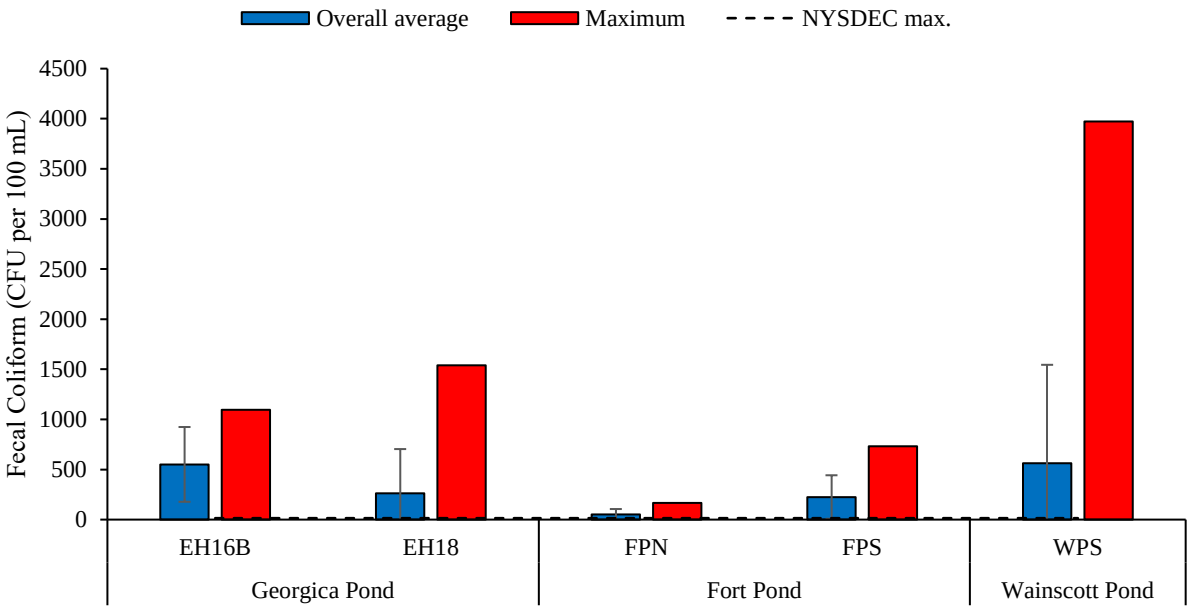


Figure 20. Overall average and maximum fecal coliform levels (CFU per 100 mL) at various freshwater sites in East Hampton during 2025. The dashed lines are the NYSDEC maximum fecal coliform levels for shellfishing (14 CFU per 100 mL).

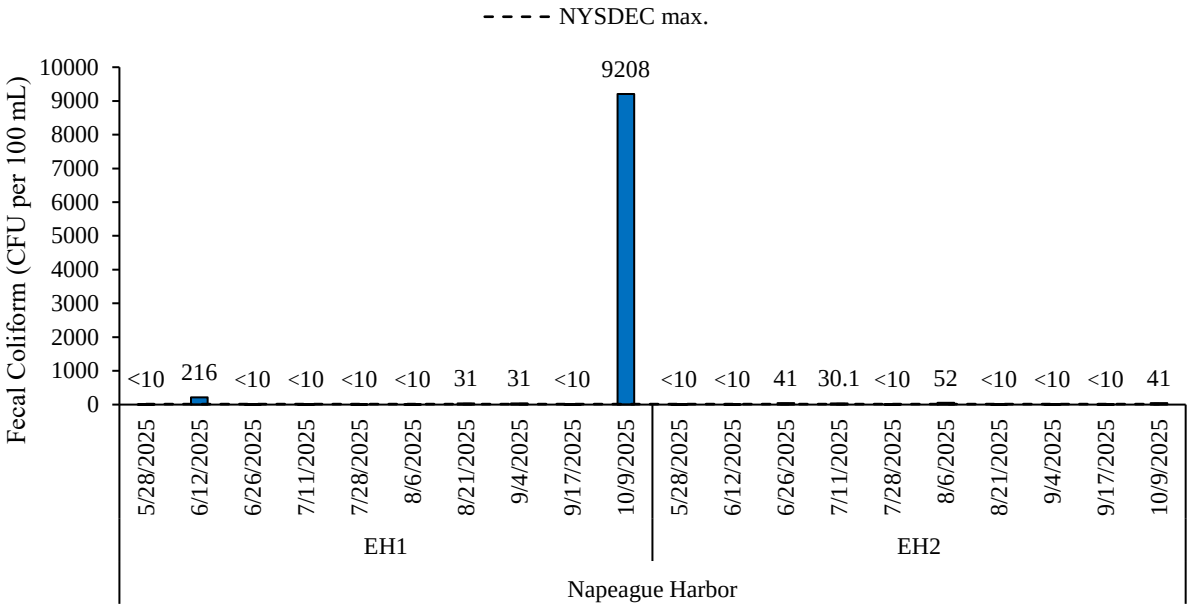


Figure 21. Fecal coliform levels (CFU per 100 mL) at two sites in Napeague Harbor during 2025. The dashed lines are the NYSDEC maximum fecal coliform levels for shellfishing (14 CFU per 100 mL).

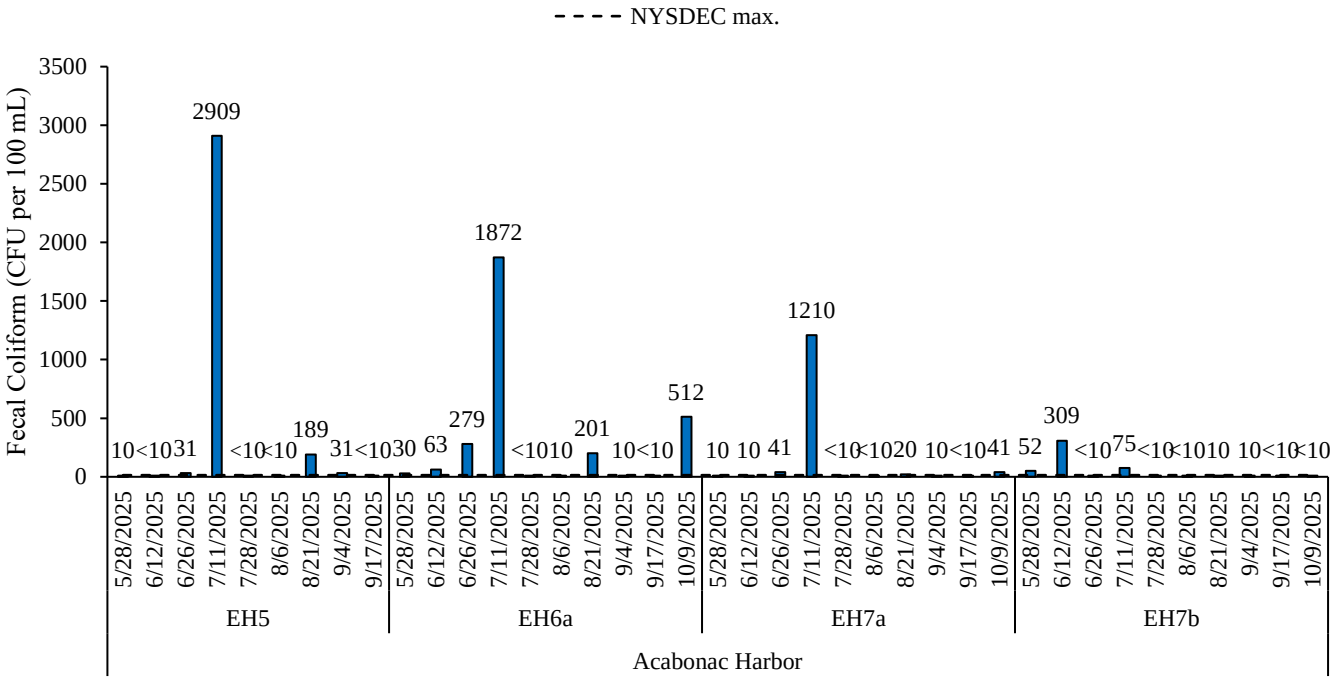


Figure 22. Fecal coliform levels (CFU per 100 mL) at four sites in Accabonac Harbor during 2025. The dashed lines are the NYSDEC maximum fecal coliform levels for shellfishing (14 CFU per 100 mL).

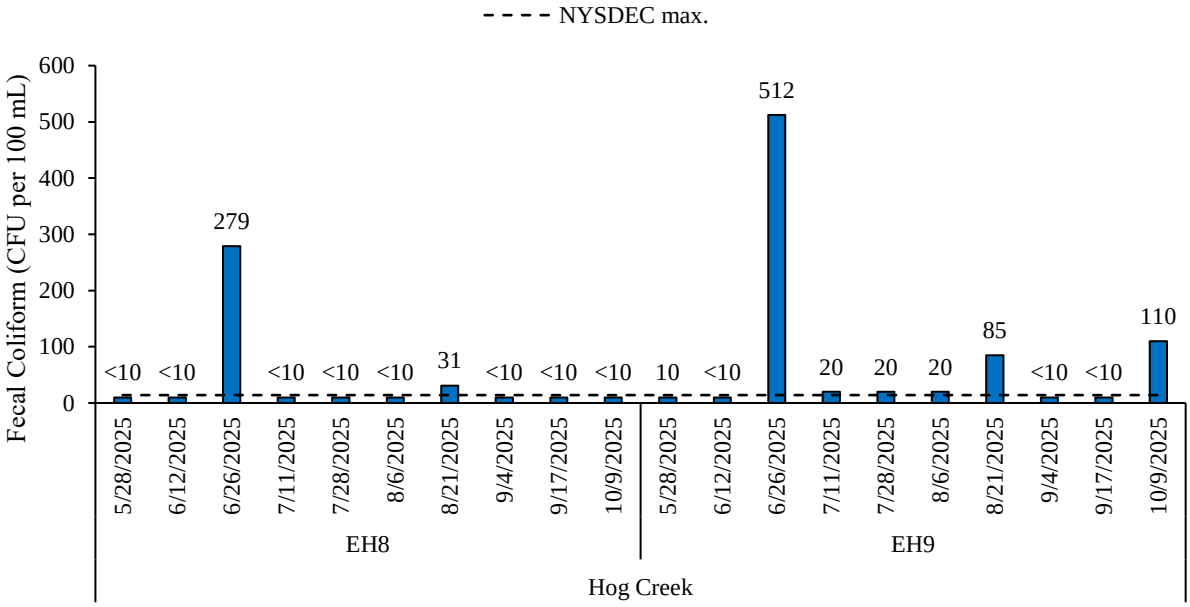


Figure 23. Fecal coliform levels (CFU per 100 mL) at two sites in Hog Creek during 2025. The dashed lines are the NYSDEC maximum fecal coliform levels for shellfishing (14 CFU per 100 mL).

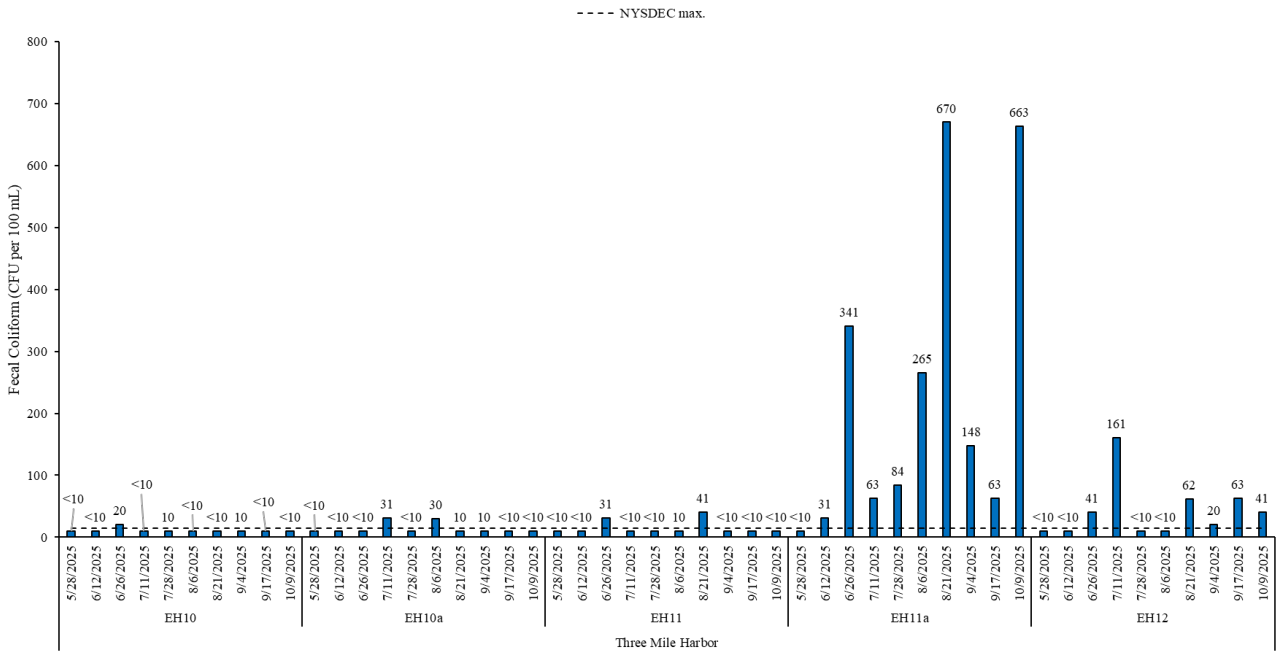


Figure 24. Fecal coliform levels (CFU per 100 mL) at five sites in Three Mile Harbor during 2025. The dashed lines are the NYSDEC maximum fecal coliform levels for shellfishing (14 CFU per 100 mL).

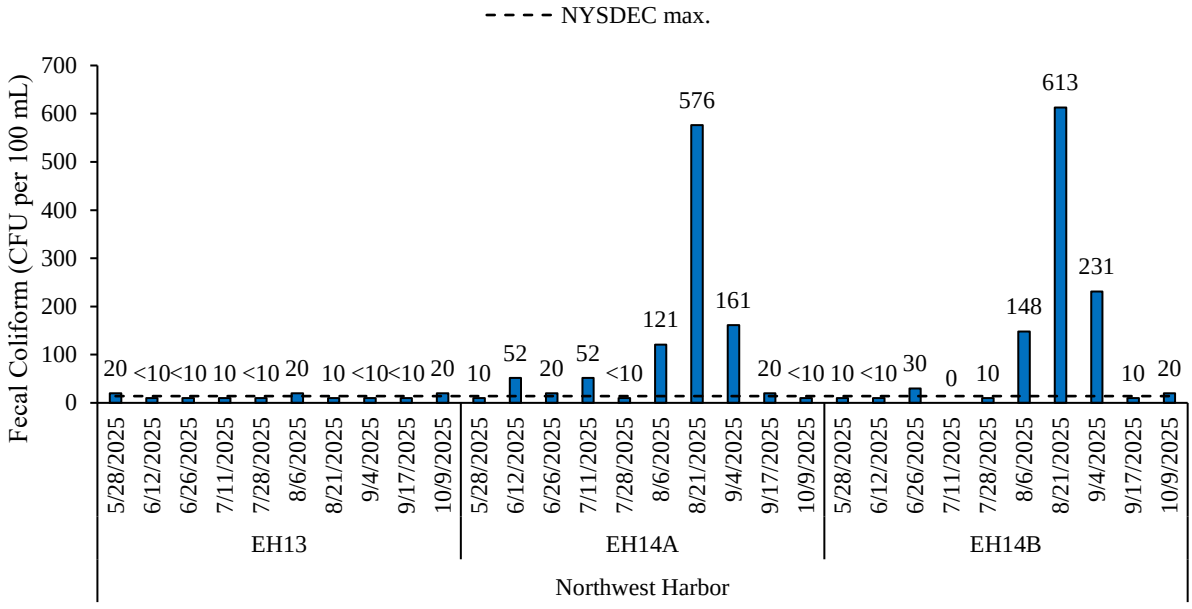


Figure 25. Fecal coliform levels (CFU per 100 mL) at three sites in Northwest Harbor during 2025. The dashed lines are the NYSDEC maximum fecal coliform levels for shellfishing (14 CFU per 100 mL).

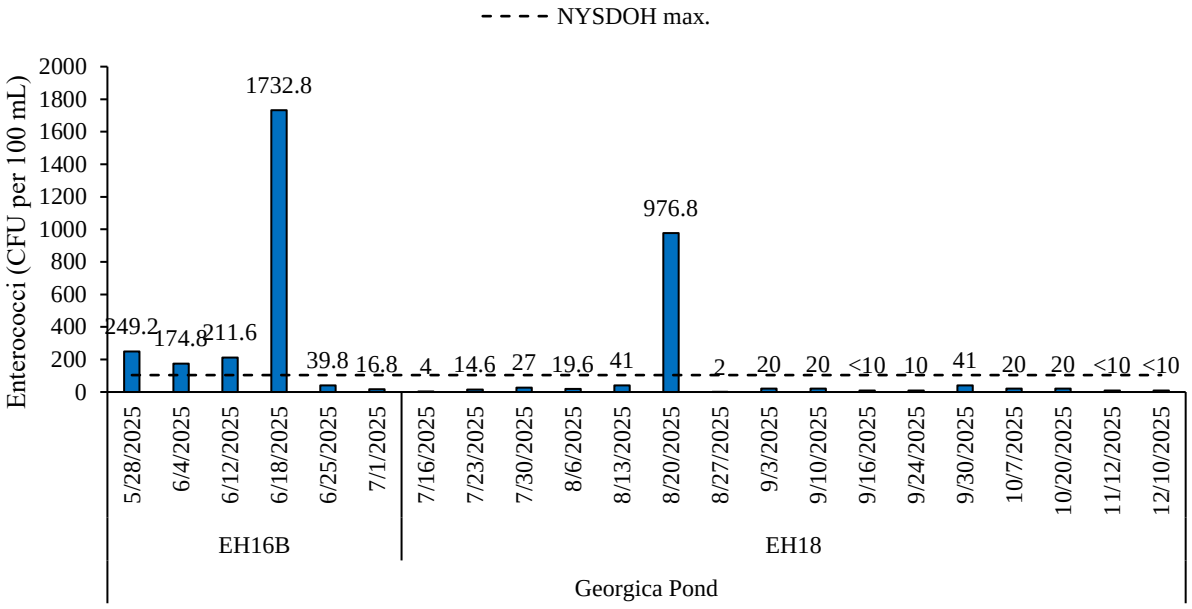


Figure 26. Fecal coliform levels (CFU per 100 mL) at two sites in Georgica Pond during 2025. The dashed lines are the NYSDEC maximum fecal coliform levels for shellfishing (14 CFU per 100 mL).

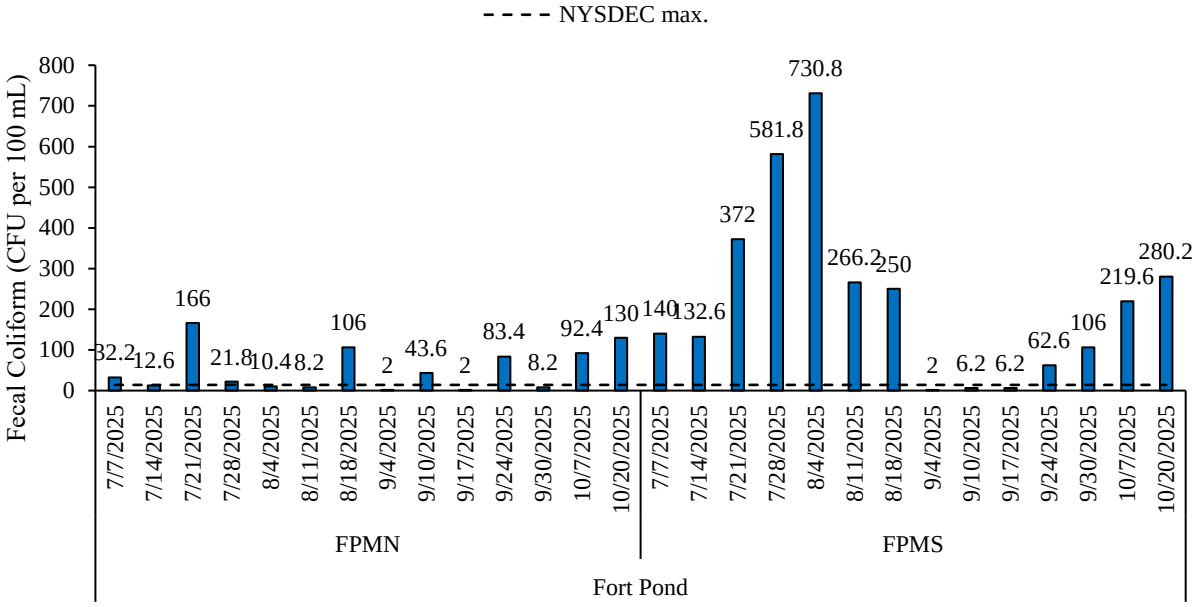


Figure 27. Fecal coliform levels (CFU per 100 mL) at two sites in Fort Pond during 2025. The dashed lines are the NYSDEC maximum fecal coliform levels for shellfishing (14 CFU per 100 mL).

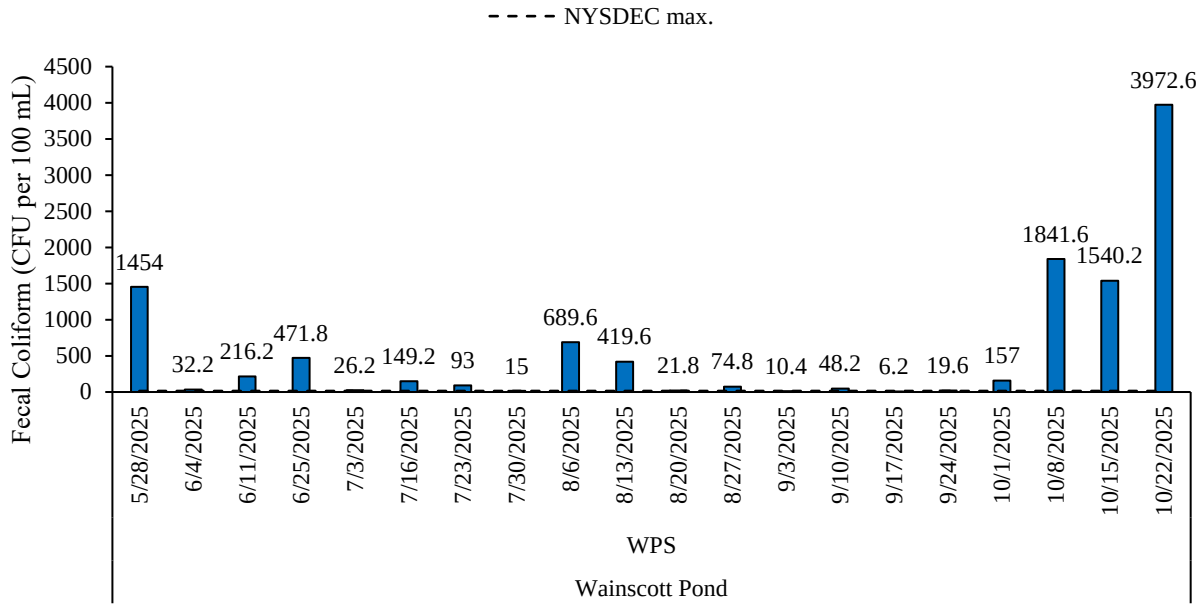


Figure 28. Fecal coliform levels (CFU per 100 mL) at one site in Wainscott Pond during 2025. The dashed lines are the NYSDEC maximum fecal coliform levels for shellfishing (14 CFU per 100 mL).

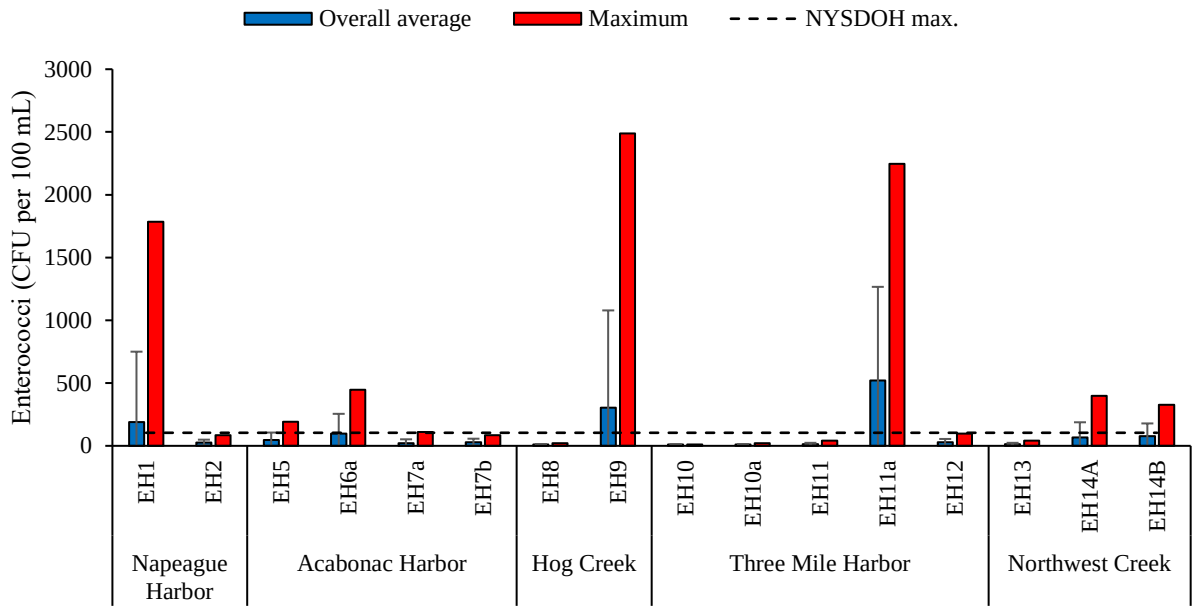


Figure 29. Overall average and maximum enterococci levels (CFU per 100 mL) at various marine sites in East Hampton during 2025. The dashed lines are the NYSDOH maximum enterococci levels for recreational use (104 CFU per 100 mL).

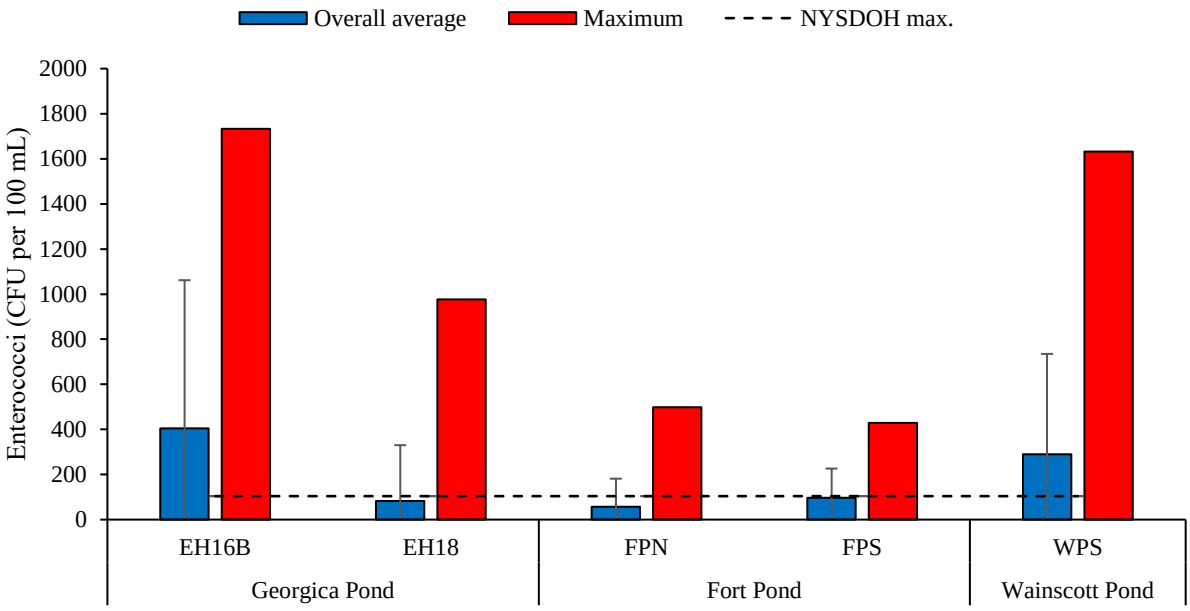


Figure 30. Overall average and maximum enterococci levels (CFU per 100 mL) at various freshwater sites in East Hampton during 2025. The dashed lines are the NYSDOH maximum enterococci levels for recreational use (104 CFU per 100 mL).

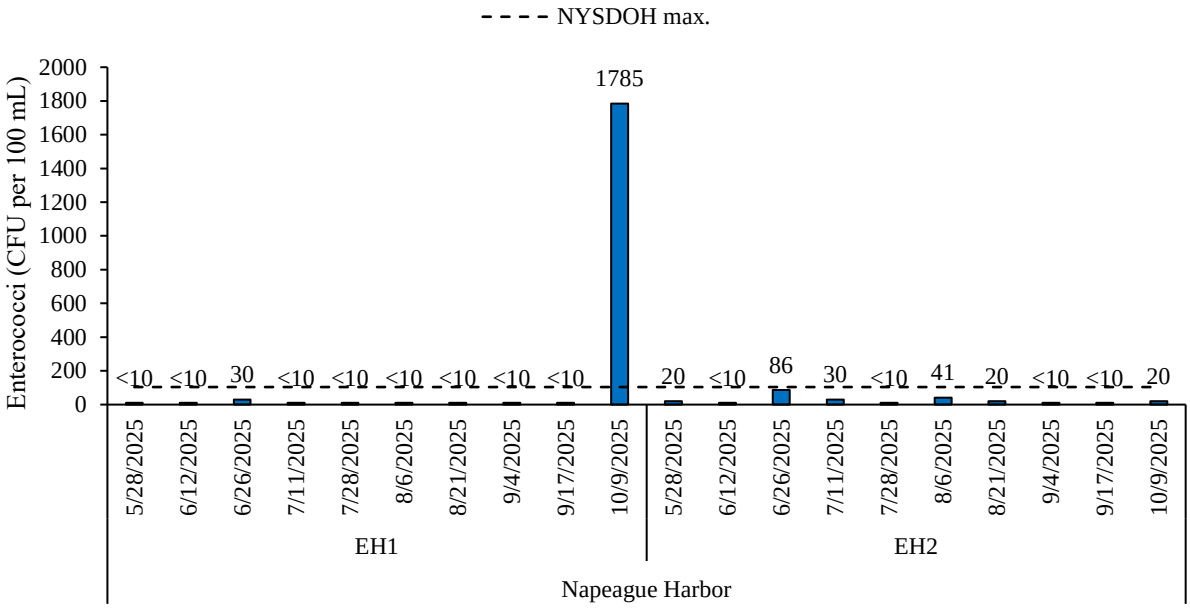


Figure 31. Enterococci levels (CFU per 100 mL) at two sites in Napeague Harbor during 2025. The dashed lines are the NYSDOH maximum enterococci levels for recreational use (104 CFU per 100 mL).

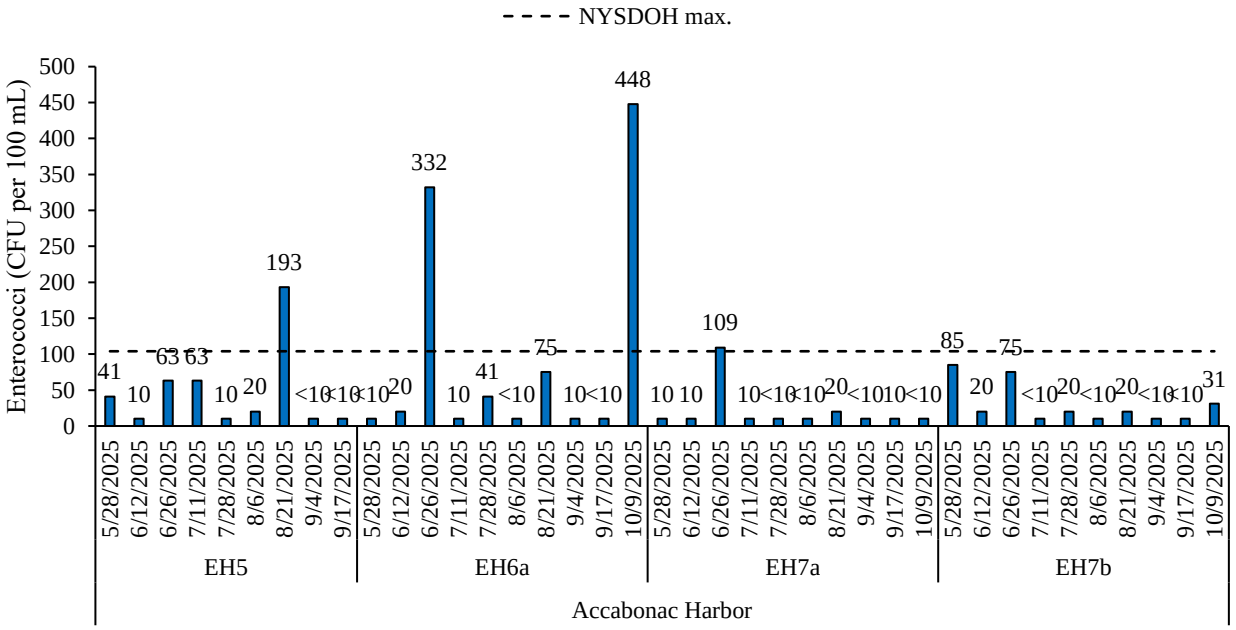


Figure 32. Enterococci levels (CFU per 100 mL) at four sites in Accabonac Harbor during 2025. The dashed lines are the NYSDOH maximum enterococci levels for recreational use (104 CFU per 100 mL).

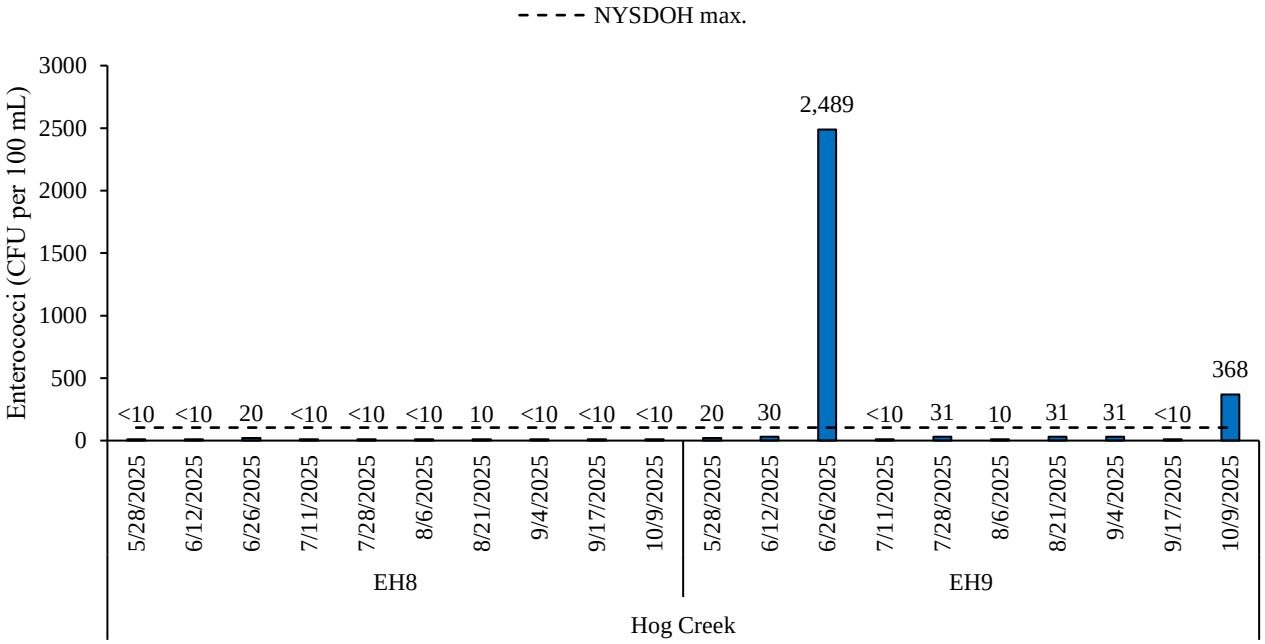


Figure 33. Enterococci levels (CFU per 100 mL) at two sites in Hog Creek during 2025. The dashed lines are the NYSDOH maximum enterococci levels for recreational use (104 CFU per 100 mL).

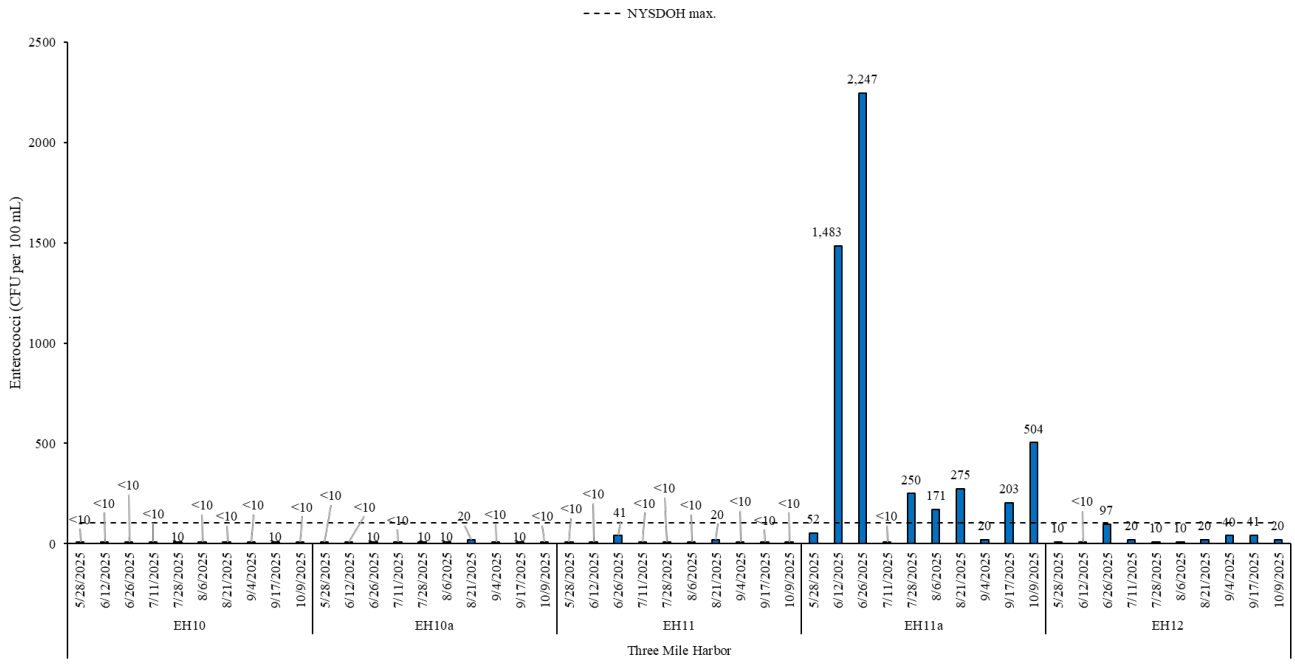


Figure 34. Enterococci levels (CFU per 100 mL) at five sites in Three Mile Harbor during 2025. The dashed lines are the NYSDOH maximum enterococci levels for recreational use (104 CFU per 100 mL).

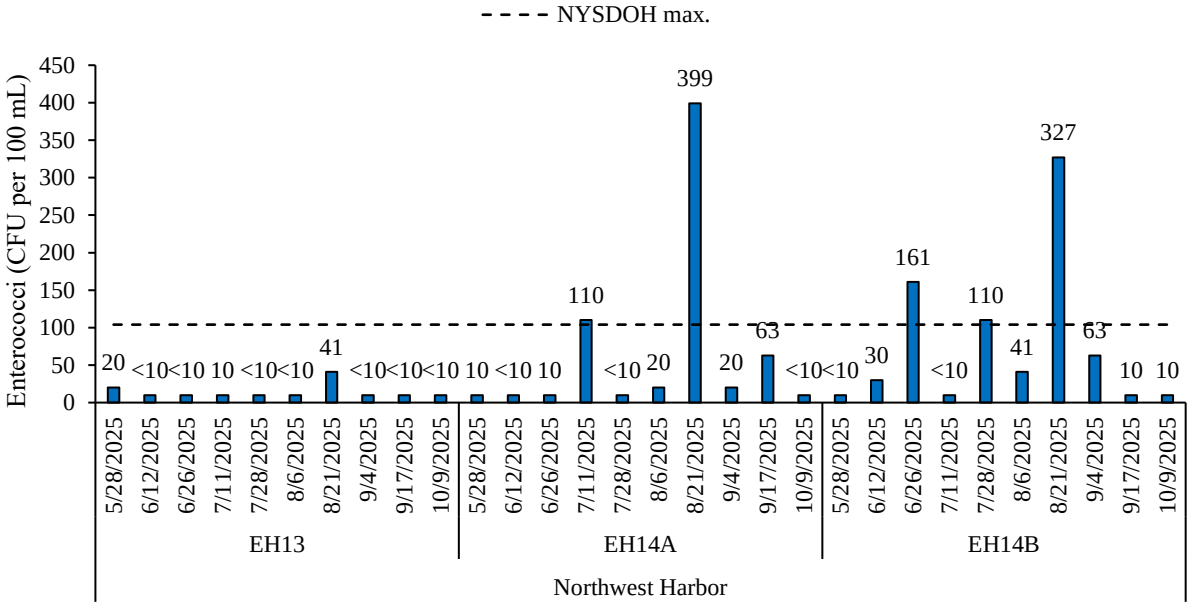


Figure 35. Enterococci levels (CFU per 100 mL) at three sites in Northwest Harbor during 2025. The dashed lines are the NYSDOH maximum enterococci levels for recreational use (104 CFU per 100 mL).

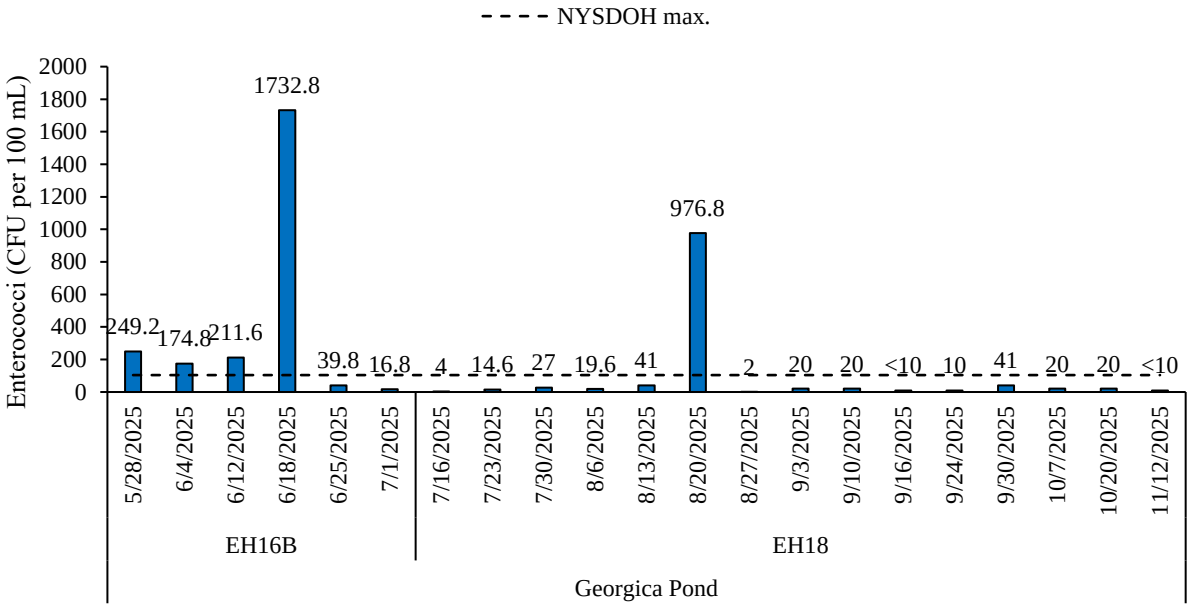


Figure 36. Enterococci levels (CFU per 100 mL) at two sites in Georgica Pond during 2025. The dashed lines are the NYSDOH maximum enterococci levels for recreational use (104 CFU per 100 mL).

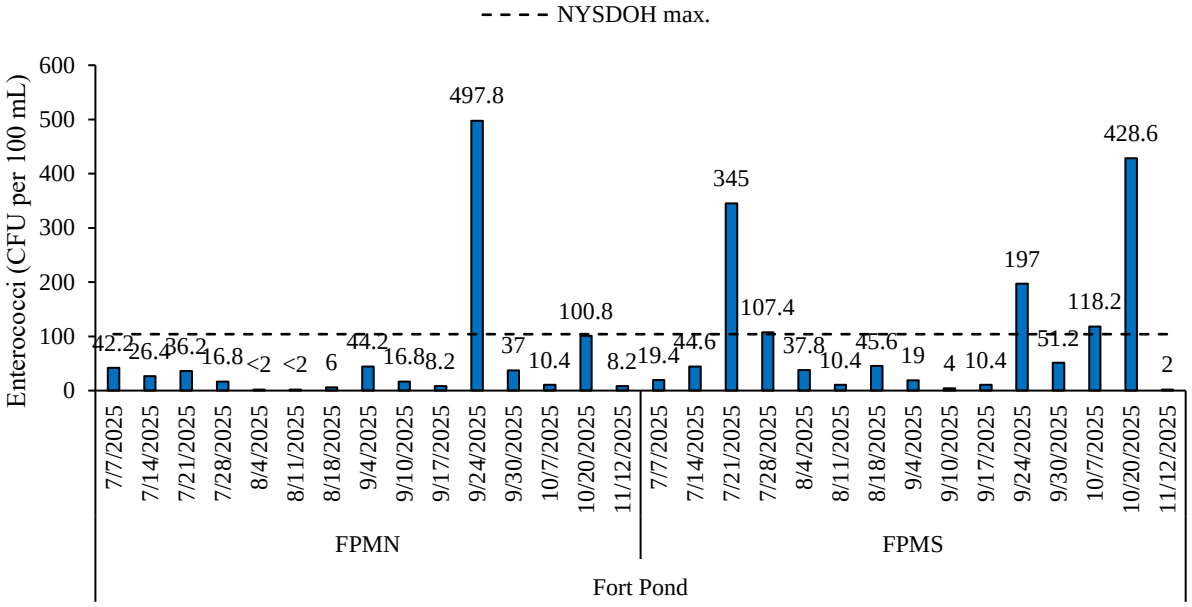


Figure 37. Enterococci levels (CFU per 100 mL) at two sites in Fort Pond during 2025. The dashed lines are the NYSDOH maximum enterococci levels for recreational use (104 CFU per 100 mL).

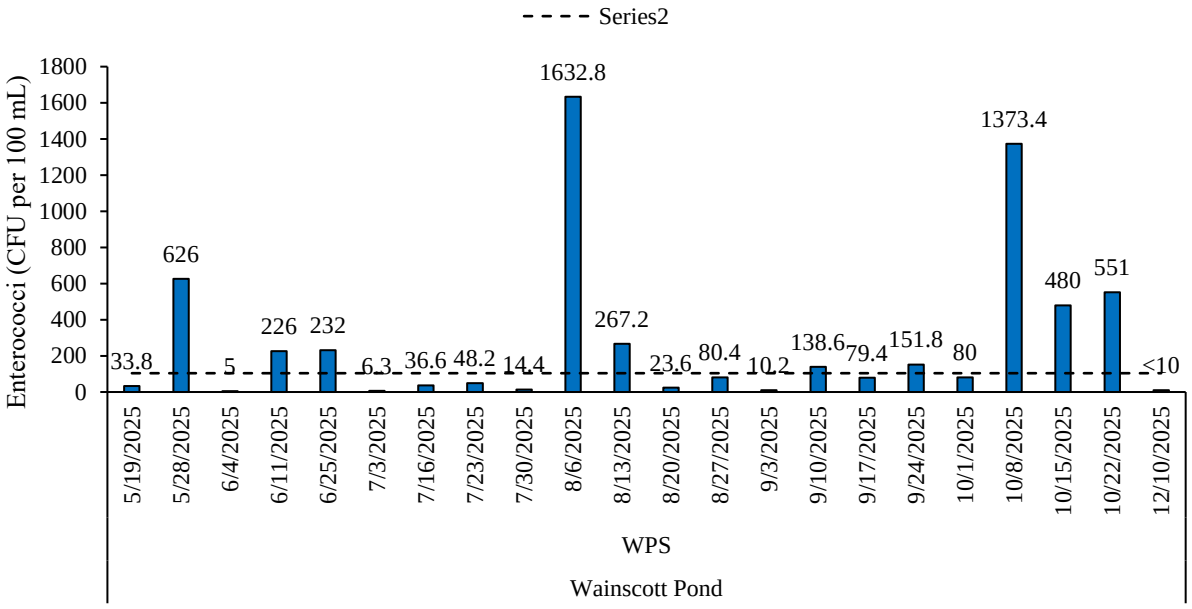


Figure 38. Enterococci levels (CFU per 100 mL) at one site in Wainscott Pond during 2025. The dashed lines are the NYSDOH maximum enterococci levels for recreational use (104 CFU per 100 mL).

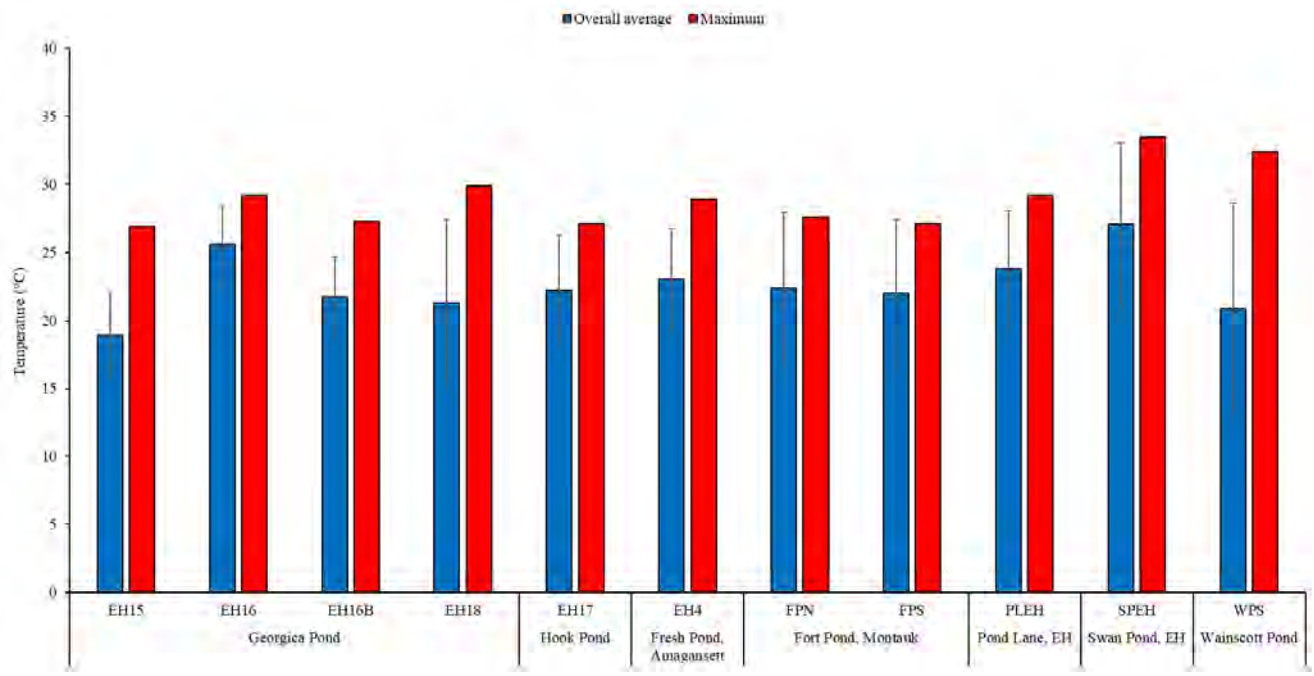


Figure 39. Overall averages and maximum surface water temperatures (°C) at freshwater sites in East Hampton during 2025. Error bars represent standard deviation.

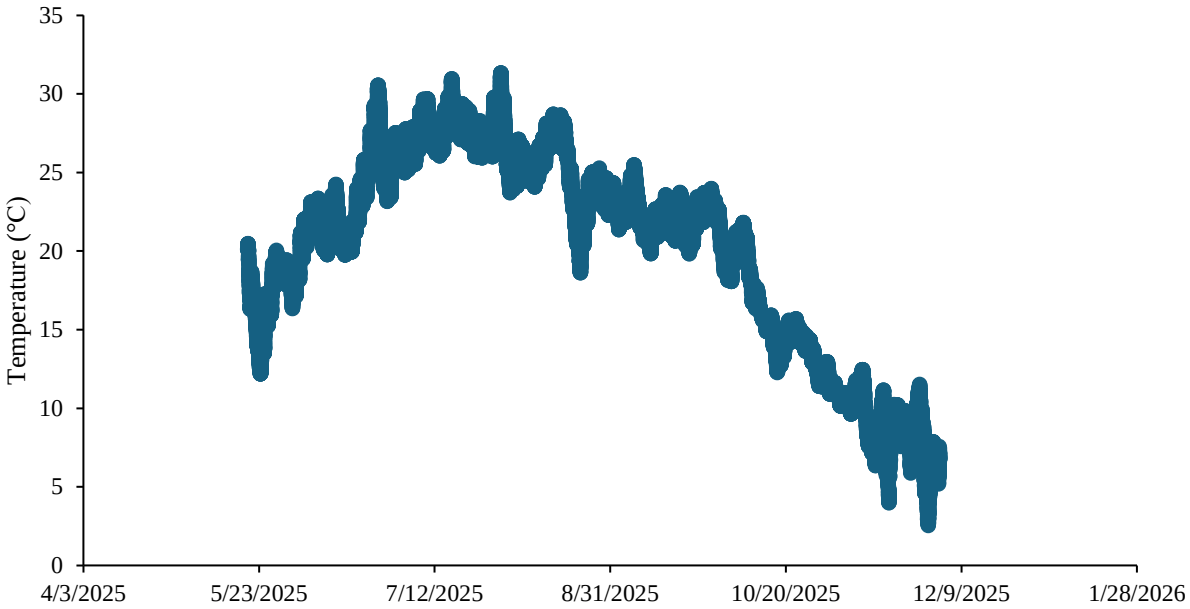


Figure 40. Continuous measurements of temperature (°C) in Georgica Pond during summer 2025.

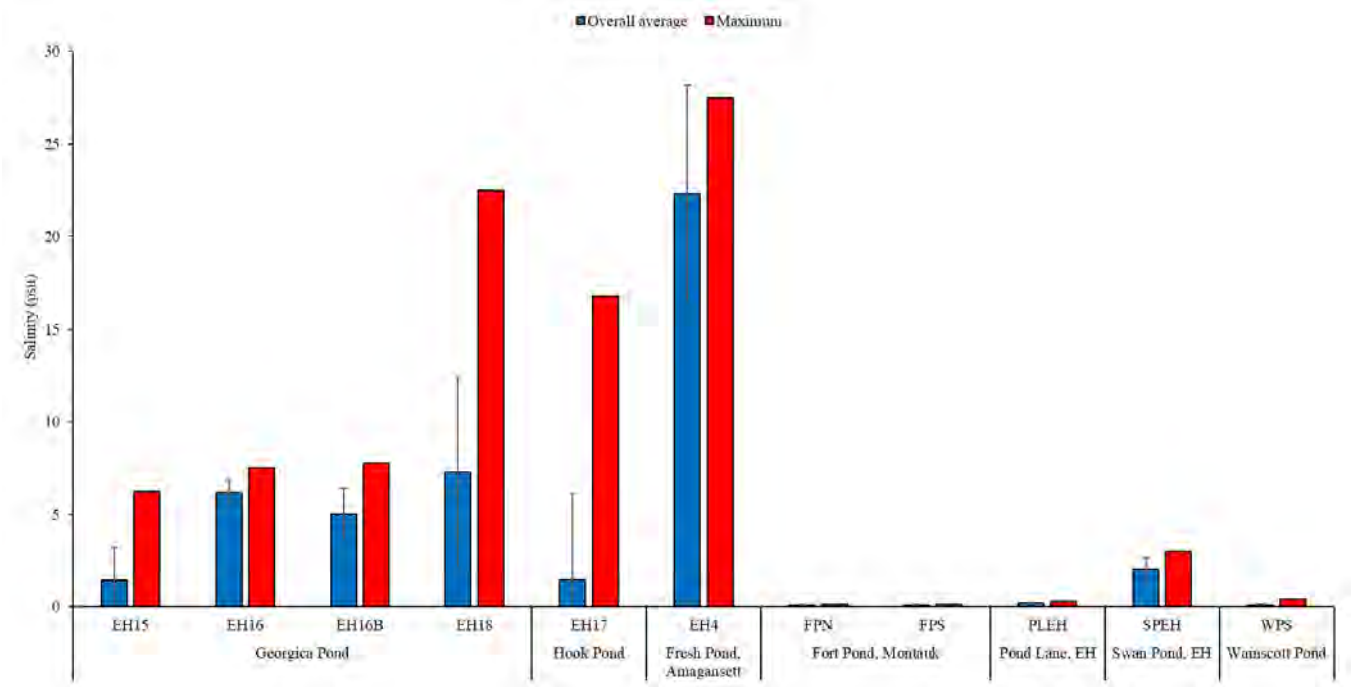


Figure 41. Overall average and maximum salinity (PSU) at freshwater sites in East Hampton during 2025. Error bars represent standard deviation.

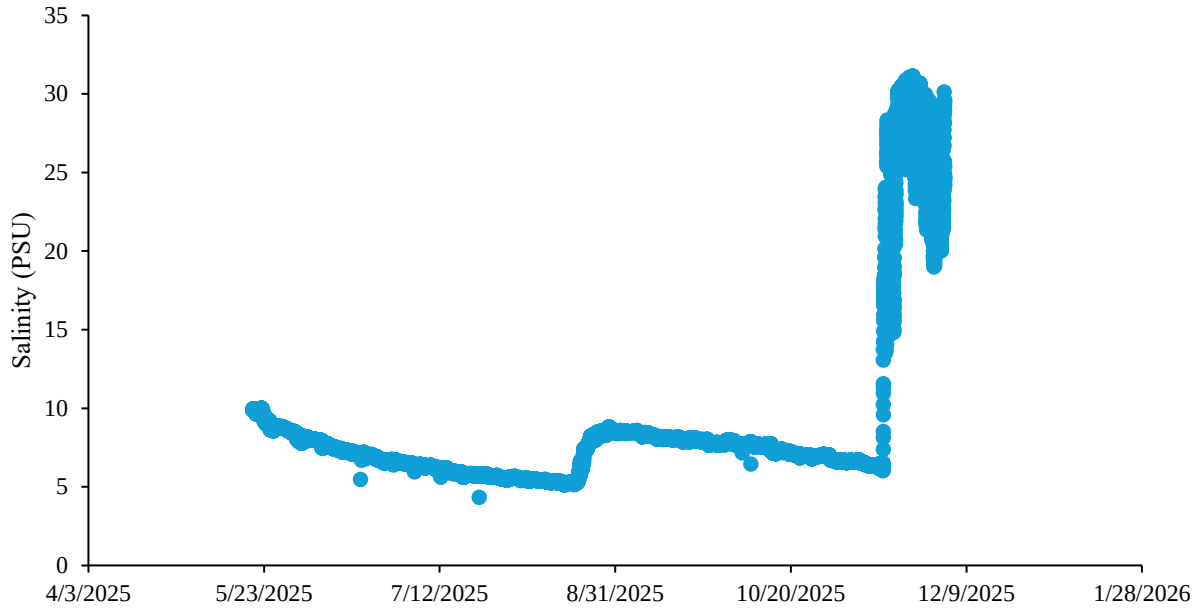


Figure 42. Continuous measurements of salinity (PSU) in Georgica Pond during summer 2025. Gaps in graph were when sensors were malfunctioning, and no data was recorded.

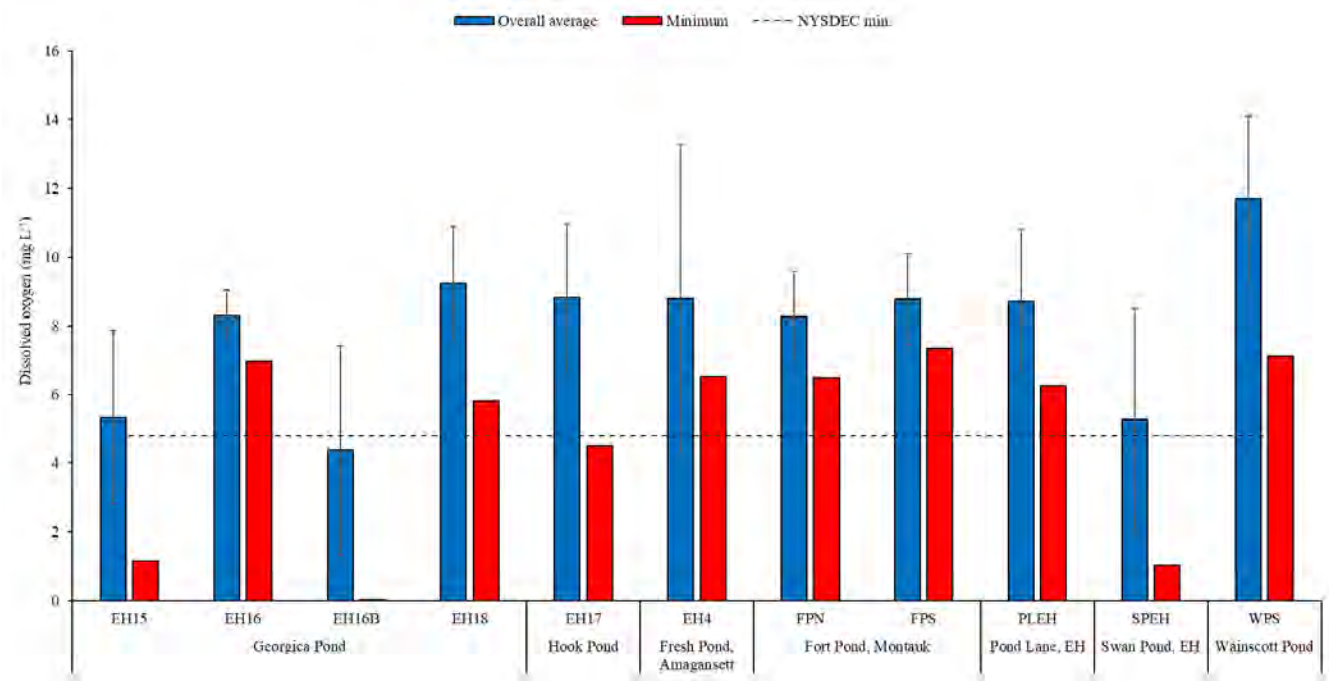


Figure 43. Overall average and minimum surface water dissolved oxygen concentrations (mg/L) at freshwater sites in East Hampton during 2025. The dashed line represents the NYSDEC minimum for dissolved oxygen (4.8 mg/L). Error bars represent standard deviation.

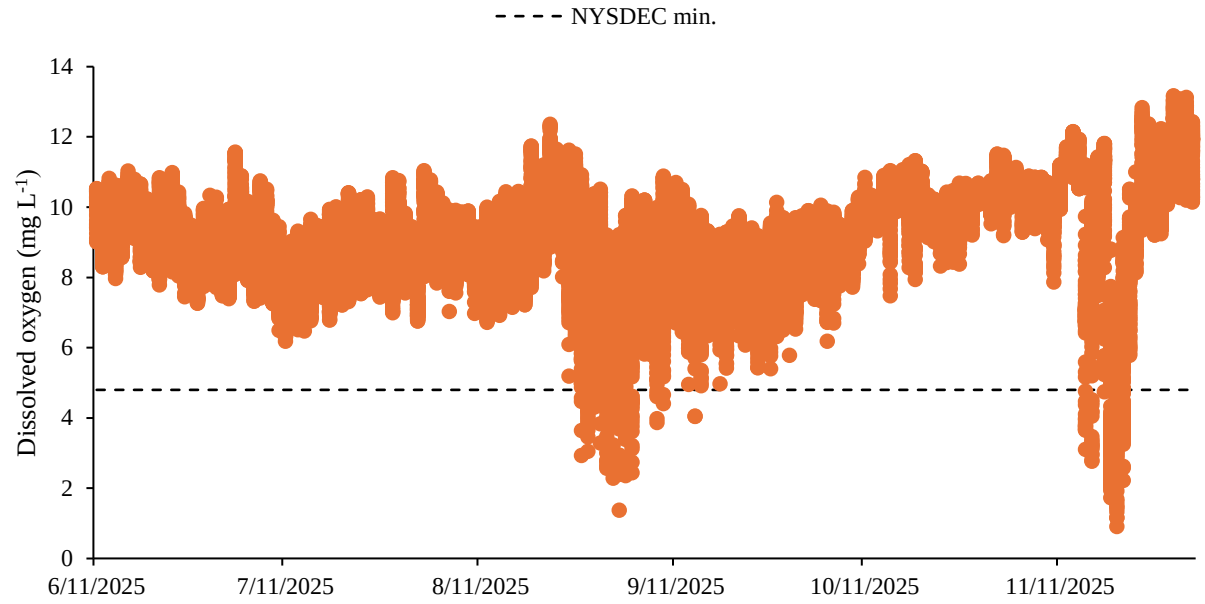


Figure 44. Continuous measurements of dissolved oxygen (mg/L) in Georgica Pond during summer 2025. Gaps in graph were when sensors were malfunctioning, and no data was recorded.

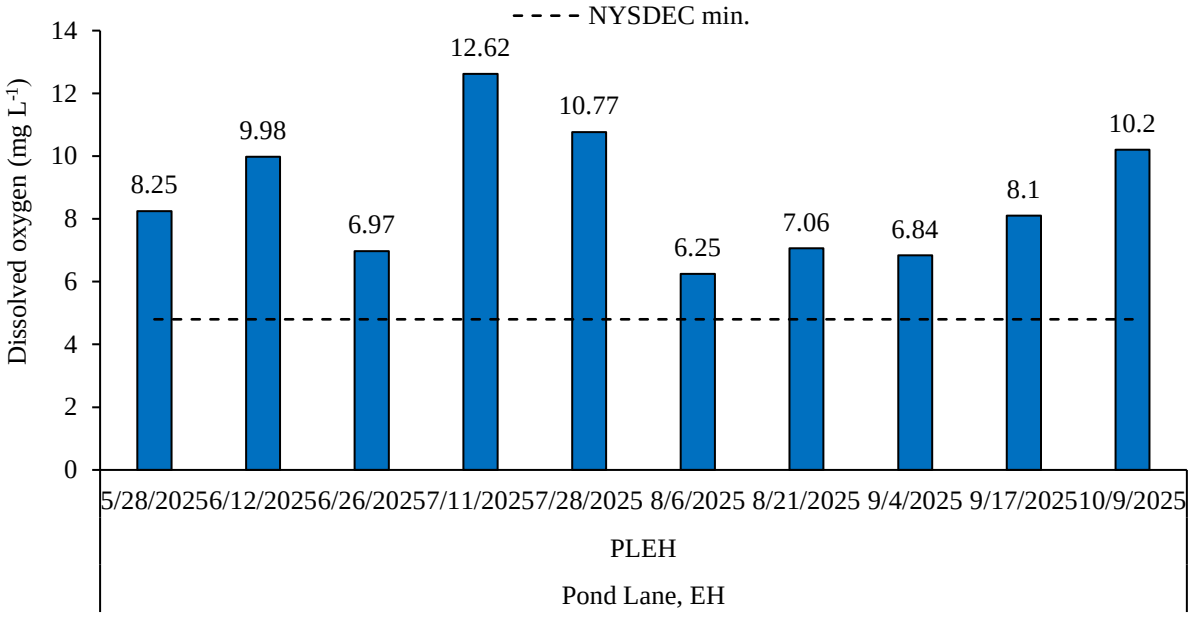


Figure 45. Surface water dissolved oxygen concentrations (mg/L) at Pond Lane, EH (PLEH) during 2025. The dashed line represents the NYSDEC minimum for dissolved oxygen (4.8 mg/L).

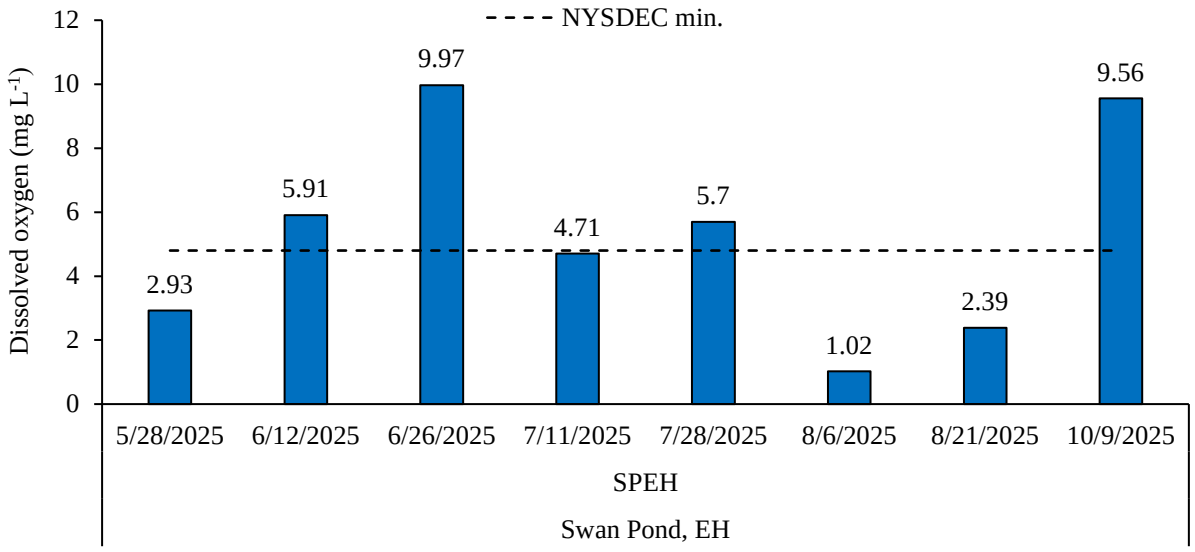


Figure 46. Surface water dissolved oxygen concentrations (mg/L) at Swan Pond, EH (SPEH) during 2025. The dashed line represents the NYSDEC minimum for dissolved oxygen (4.8 mg/L).

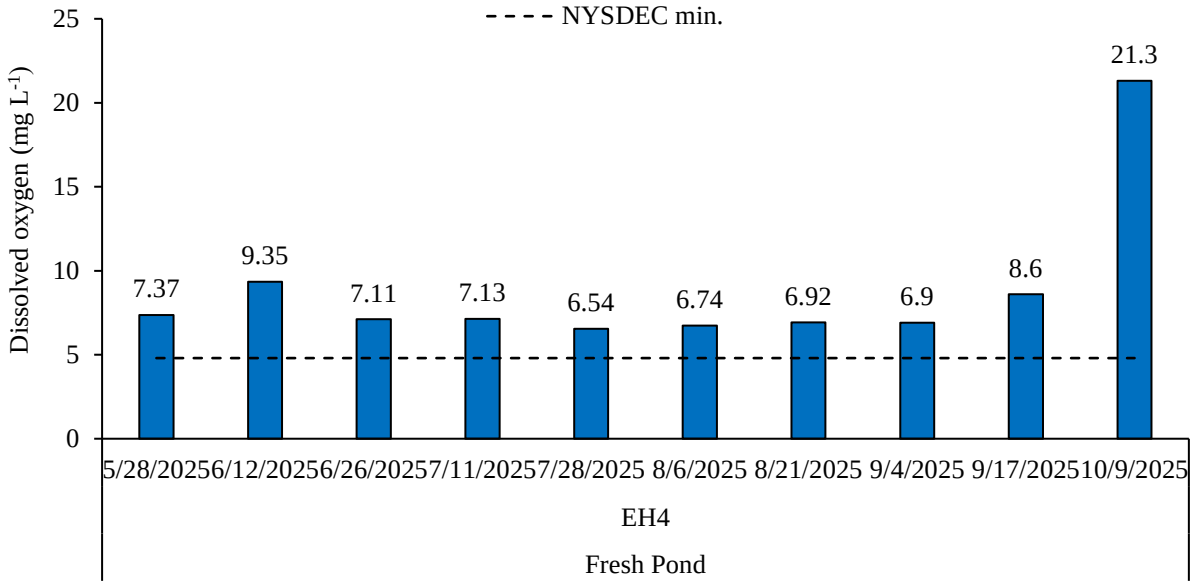


Figure 47. Surface water dissolved oxygen concentrations (mg/L) at Fresh Pond (EH4) during 2025. The dashed line represents the NYSDEC minimum for dissolved oxygen (4.8 mg/L).

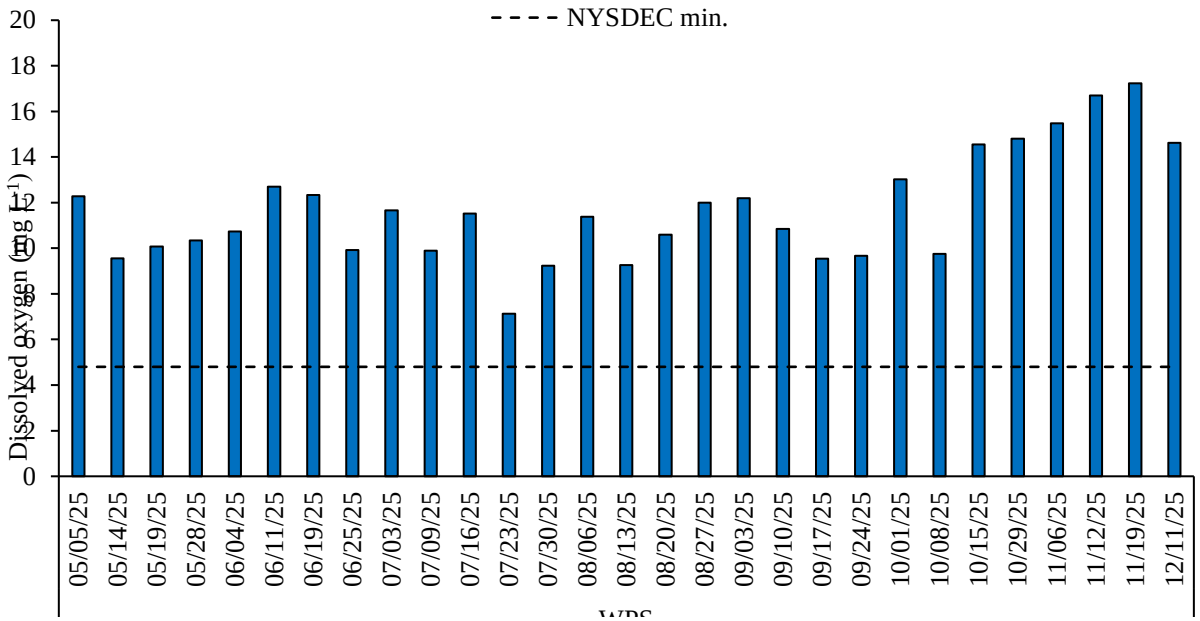


Figure 48. Surface water dissolved oxygen concentrations (mg/L) at Wainscott Pond (WPS) during 2025. The dashed line represents the NYSDEC minimum for dissolved oxygen (4.8 mg/L).

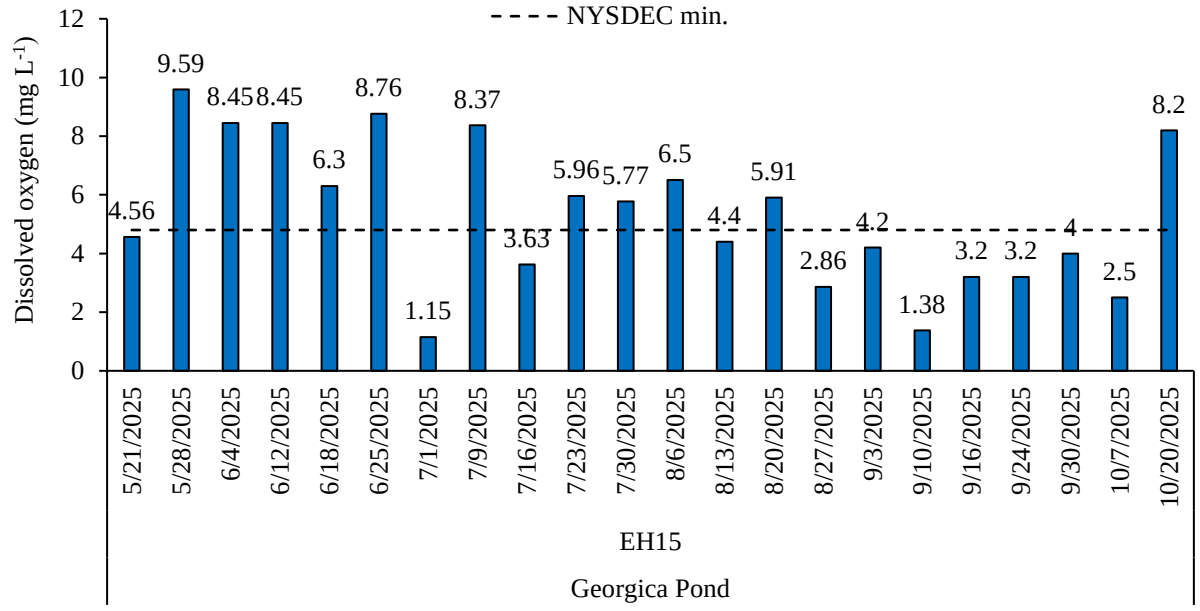


Figure 49. Surface water dissolved oxygen concentrations (mg/L) at a site in Georgica Pond (EH15) during 2025. The dashed line represents the NYSDEC minimum for dissolved oxygen (4.8 mg/L).

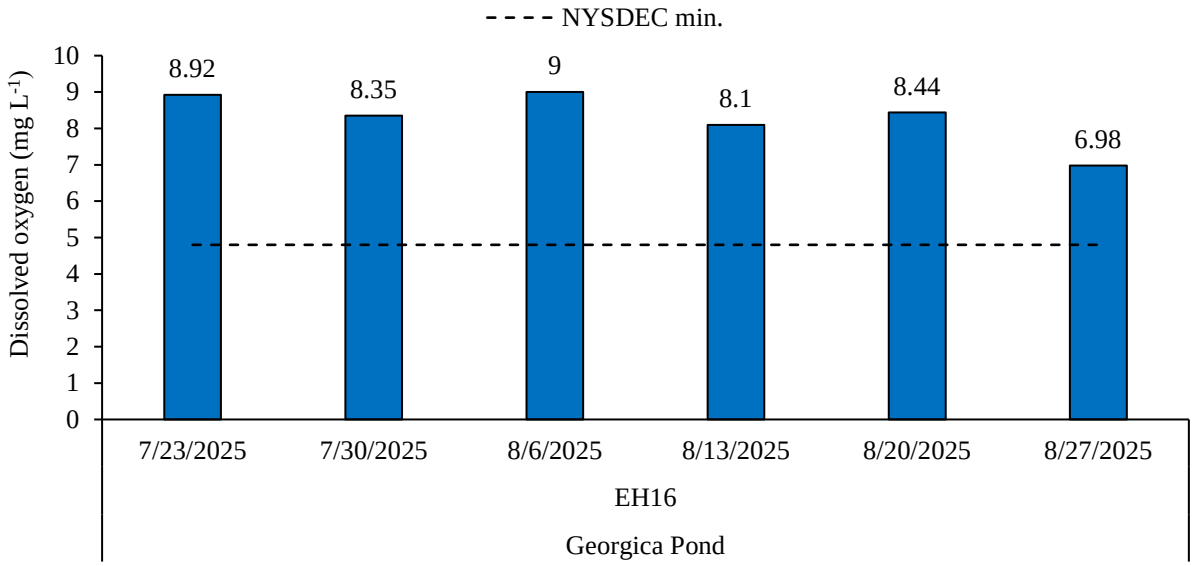


Figure 50. Surface water dissolved oxygen concentrations (mg/L) at a site in Georgica Pond (EH16) during 2025. The dashed line represents the NYSDEC minimum for dissolved oxygen (4.8 mg/L).

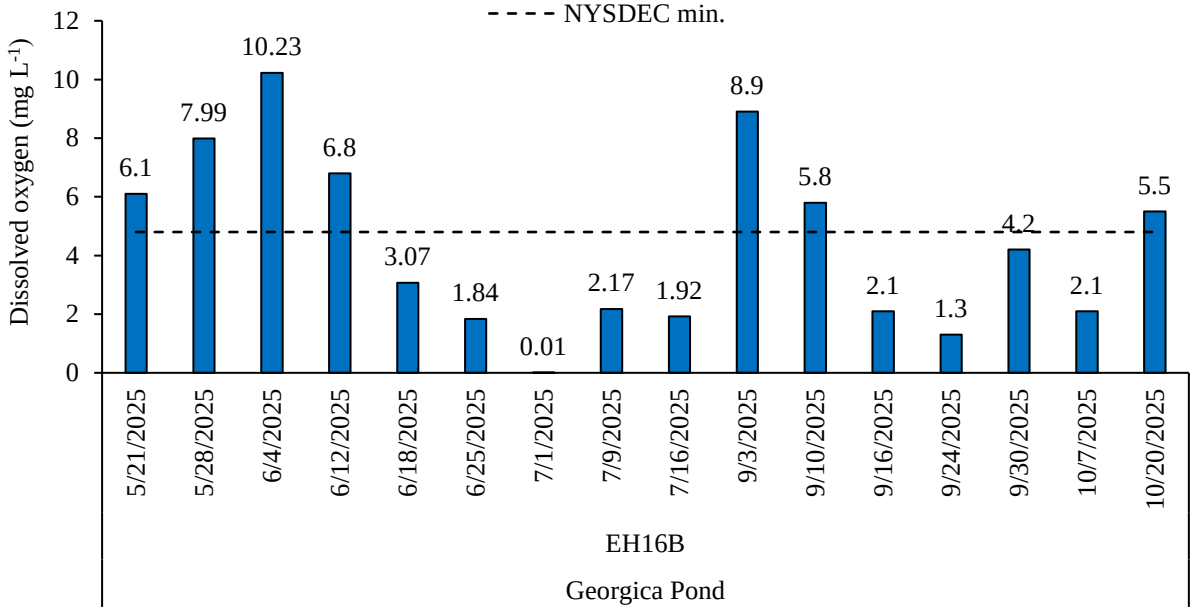


Figure 51. Surface water dissolved oxygen concentrations (mg/L) at a site in Georgica Pond (EH16B) during 2025. The dashed line represents the NYSDEC minimum for dissolved oxygen (4.8 mg/L).

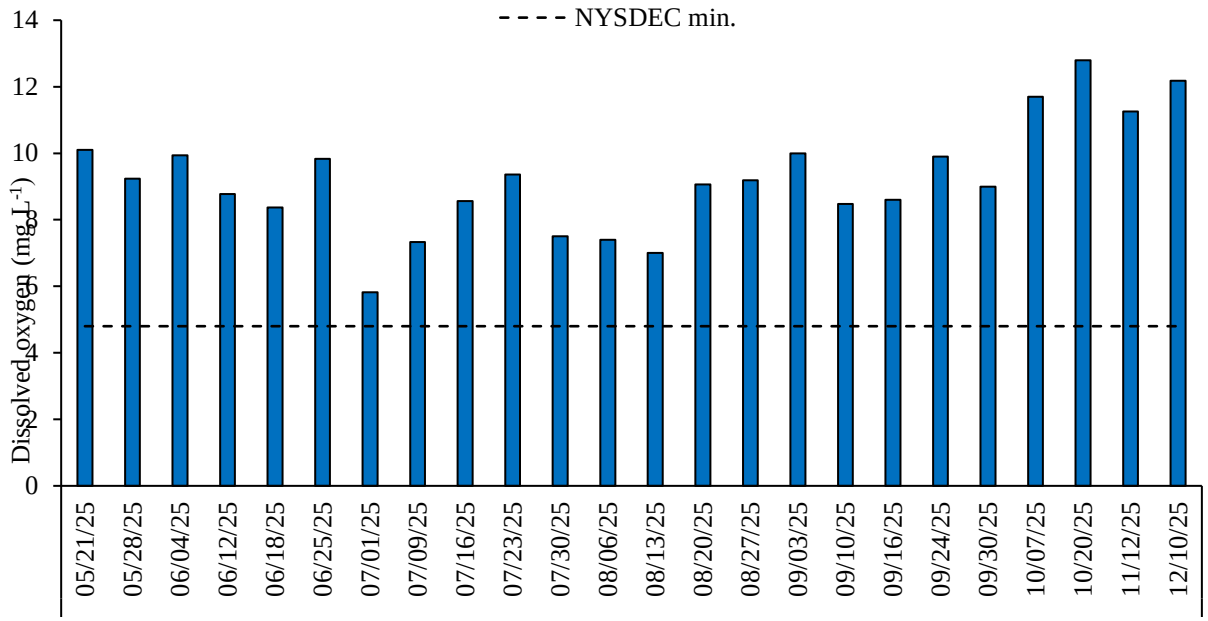


Figure 52. Surface water dissolved oxygen concentrations (mg/L) at a site in Georgica Pond (EH18) during 2025. The dashed line represents the NYSDEC minimum for dissolved oxygen (4.8 mg/L).

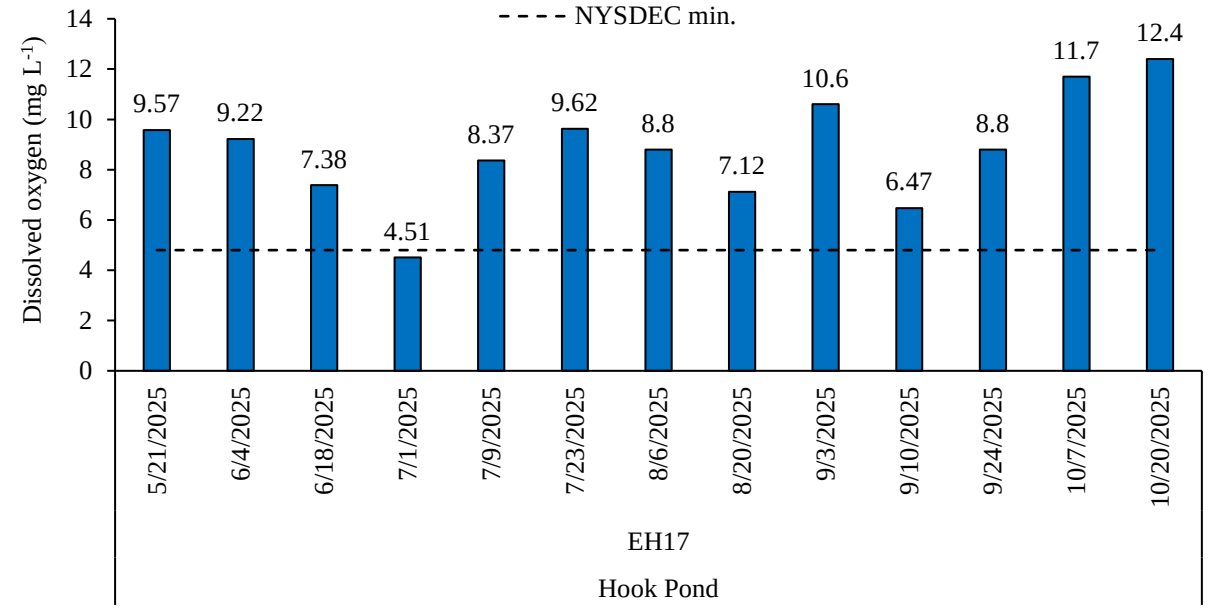


Figure 53. Surface water dissolved oxygen concentrations (mg/L) at Hook Pond (EH17) during 2025. The dashed line represents the NYSDEC minimum for dissolved oxygen (4.8 mg/L).

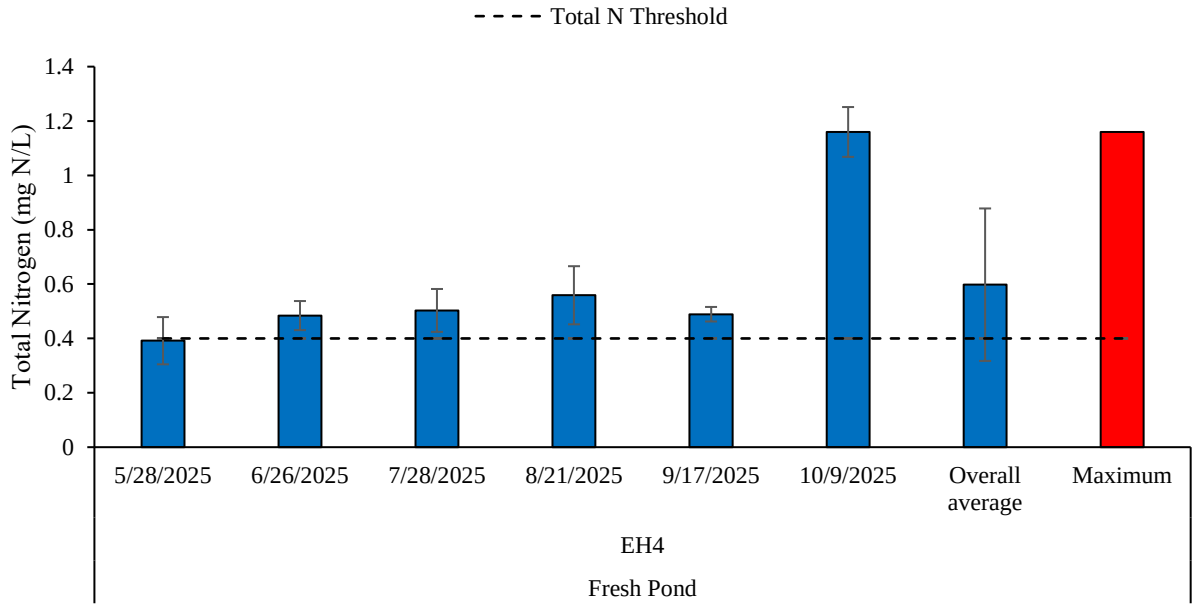


Figure 54. Total N, at Fresh Pond (EH4) during 2025. The dashed line represents the Peconic Estuary total N threshold (0.4 mg N/L). Error bars represent standard deviation.

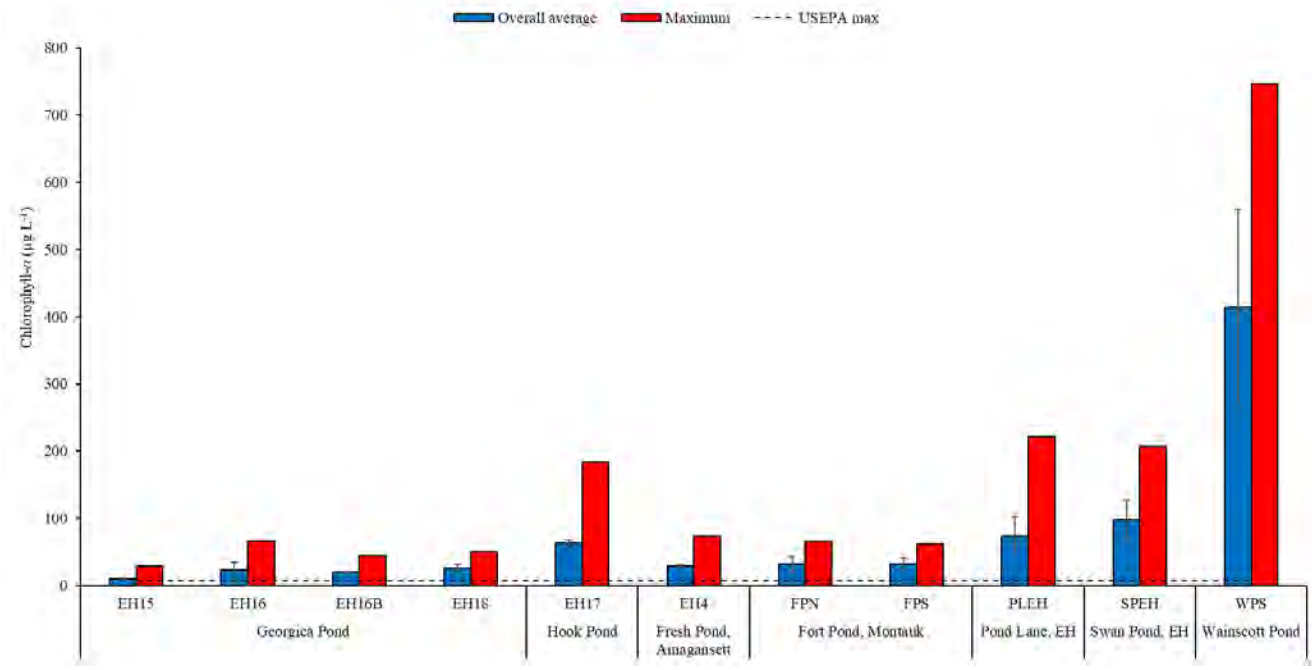


Figure 55. Overall average and minimum chlorophyll-*a* concentrations (µg/L) at freshwater sites in East Hampton during 2025. The dashed line represents the USEPA maximum for chlorophyll-*a* in freshwater systems (8 µg/L). Error bars represent standard deviation.

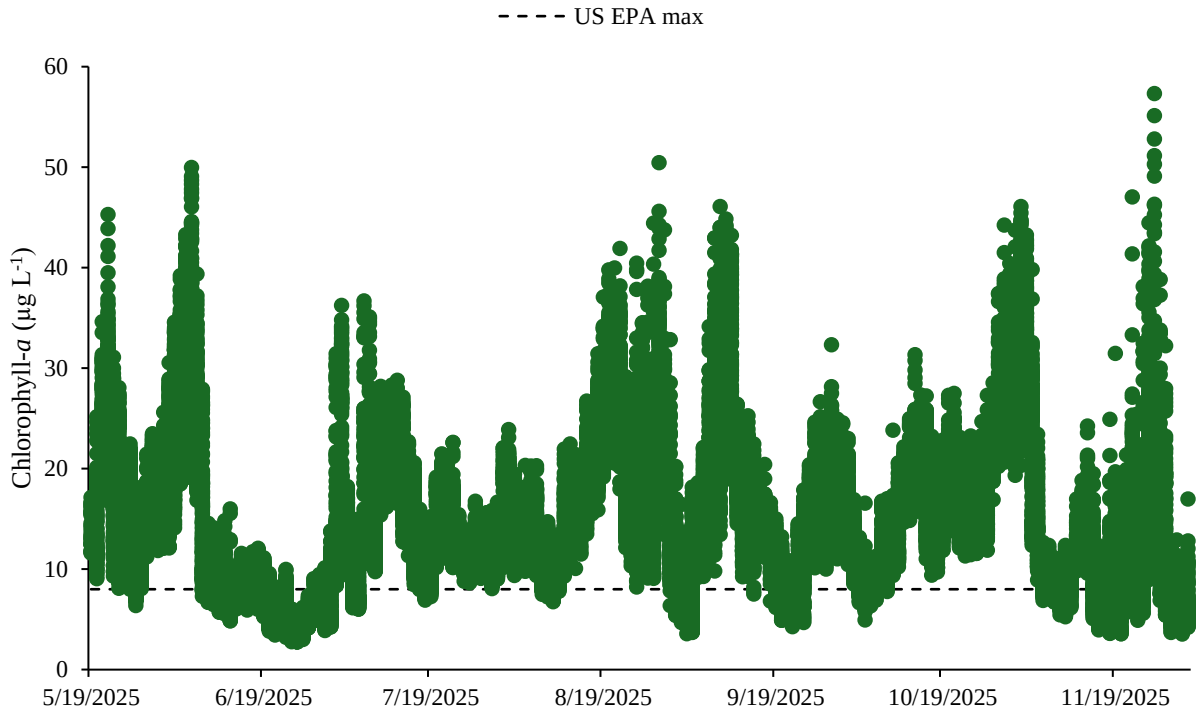


Figure 56. Continuous measurements of chlorophyll-*a* in Georgica Pond during summer 2025.

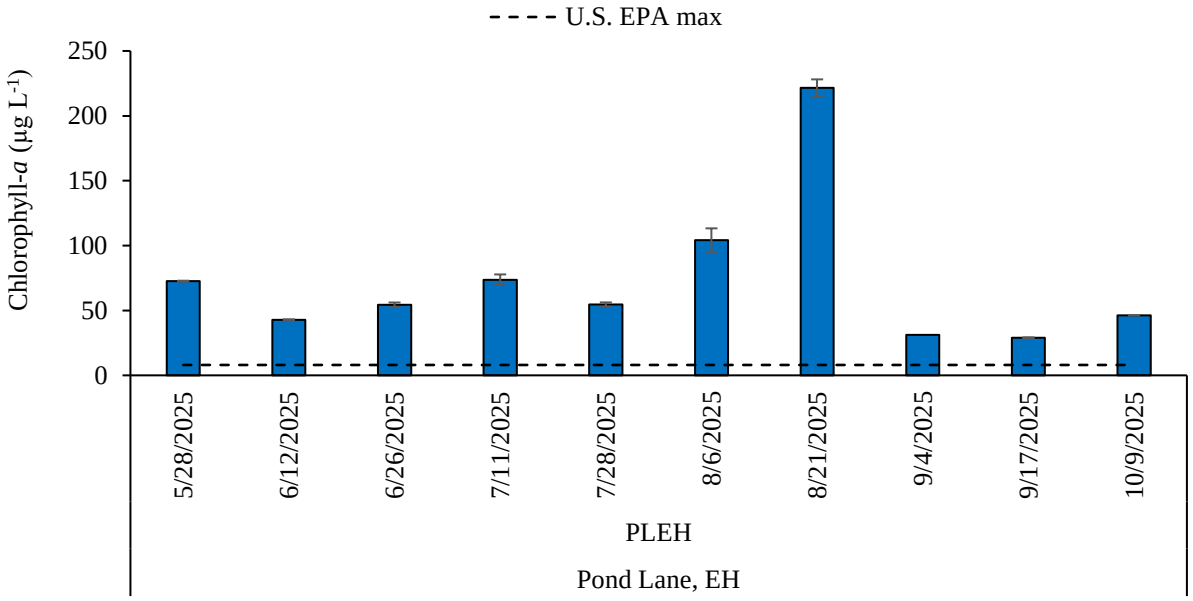


Figure 57. Chlorophyll-*a* concentrations (µg/L) in Pond Lane (PLEH) during 2025. The dashed line represents the USEPA maximum for chlorophyll-*a* in freshwater systems (8 µg/L). Error bars represent standard deviation.

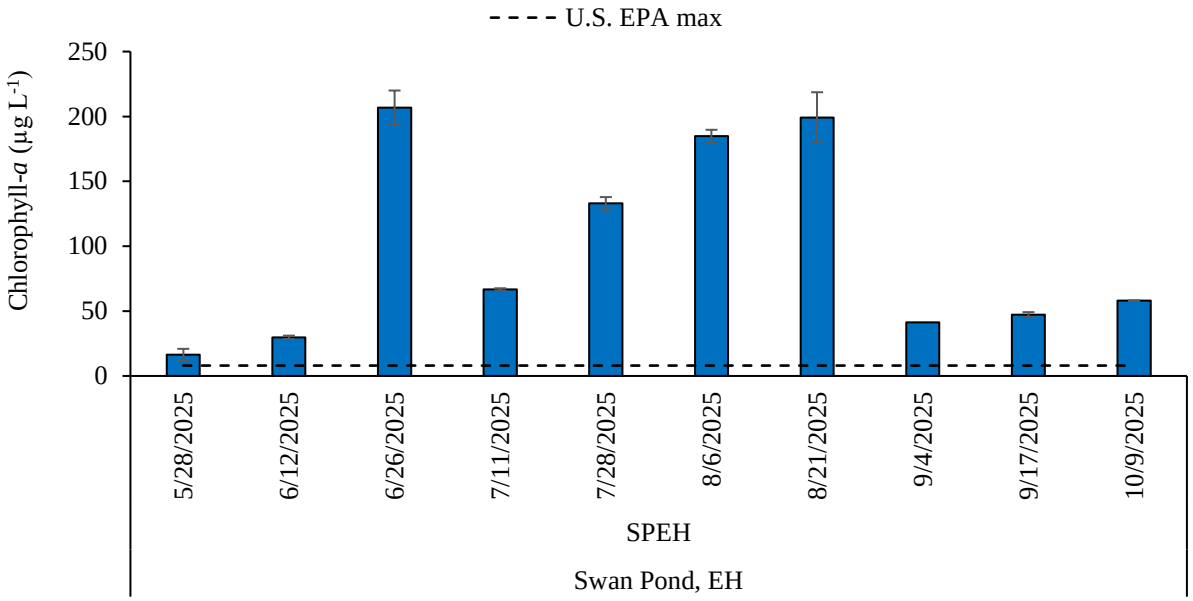


Figure 58. Chlorophyll-*a* concentrations (µg/L) in Swan Pond (SPEH) during 2025. The dashed line represents the USEPA maximum for chlorophyll-*a* in freshwater systems (8 µg/L). Error bars represent standard deviation.

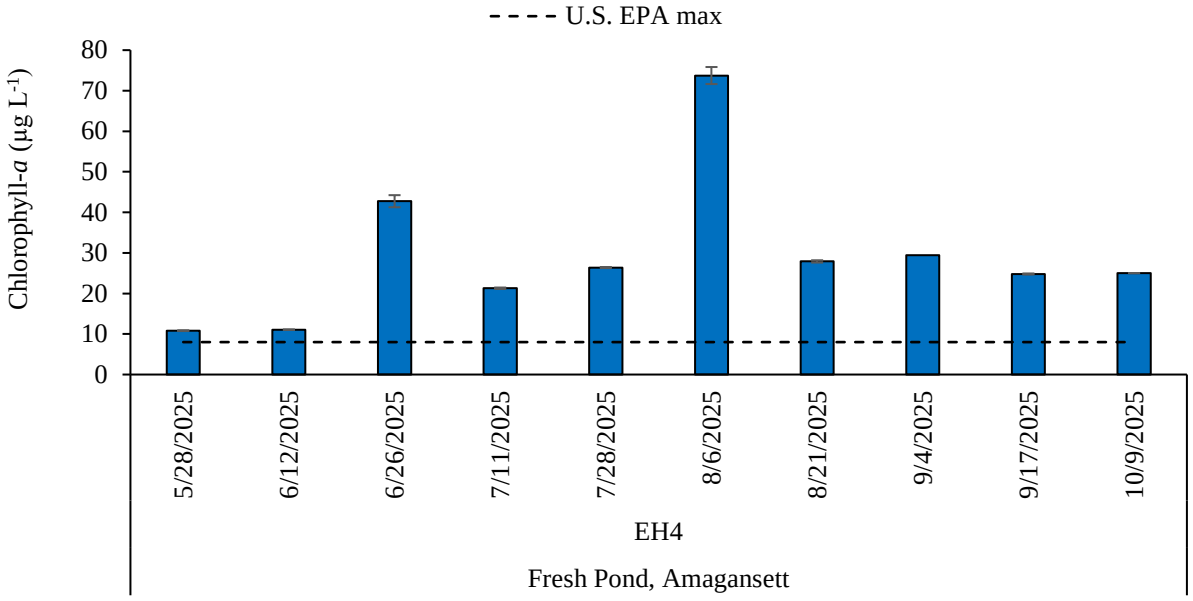


Figure 59. Chlorophyll-*a* concentrations (µg/L) in Fresh Pond (EH4) during 2025. The dashed line represents the USEPA maximum for chlorophyll-*a* in freshwater systems (8 µg/L). Error bars represent standard deviation.

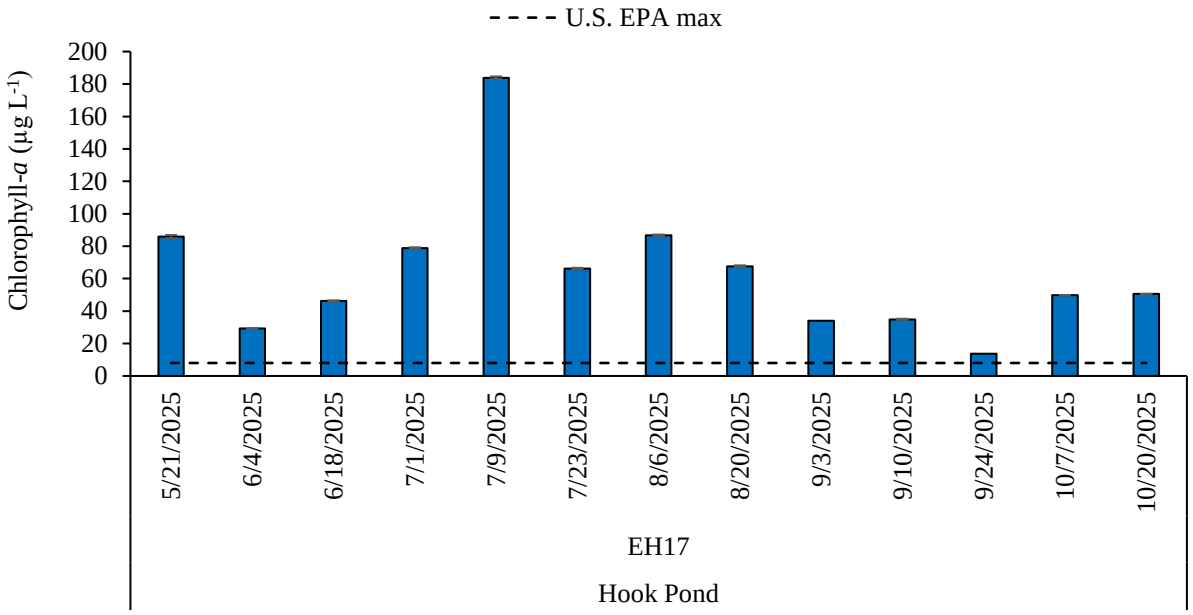


Figure 60. Chlorophyll-*a* concentrations (µg/L) in Hook Pond (EH17) during 2025. The dashed line represents the USEPA maximum for chlorophyll-*a* in freshwater systems (8 µg/L). Error bars represent standard deviation.

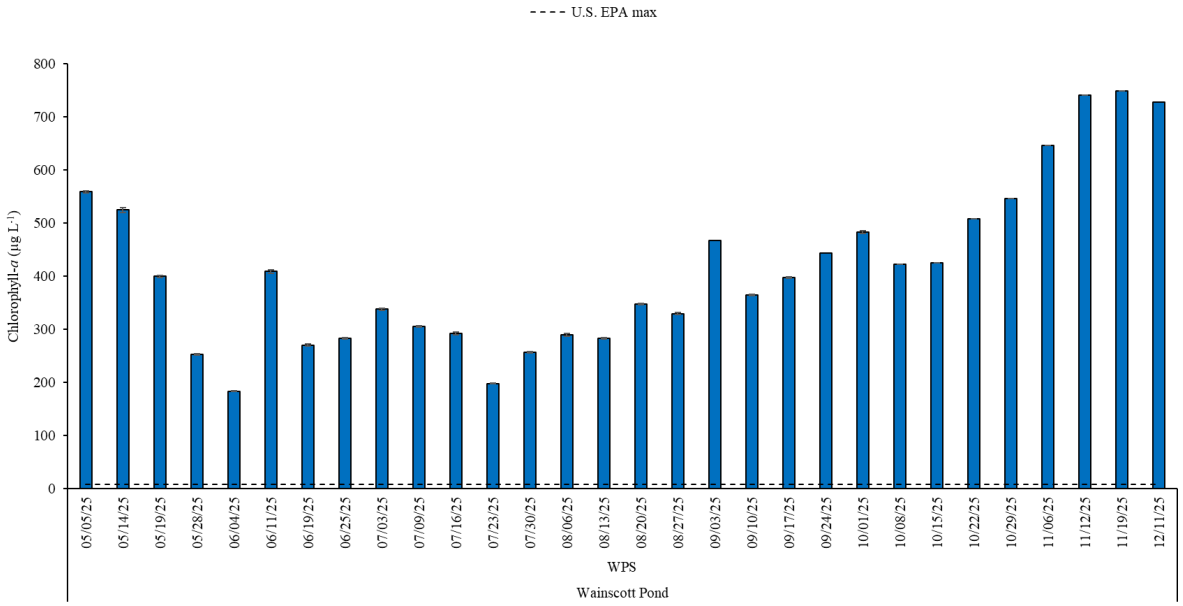


Figure 61. Chlorophyll-*a* concentrations (µg/L) in Wainscott Pond during 2025. The dashed line represents the USEPA maximum for chlorophyll-*a* in freshwater systems (8 µg/L). Error bars represent standard deviation.

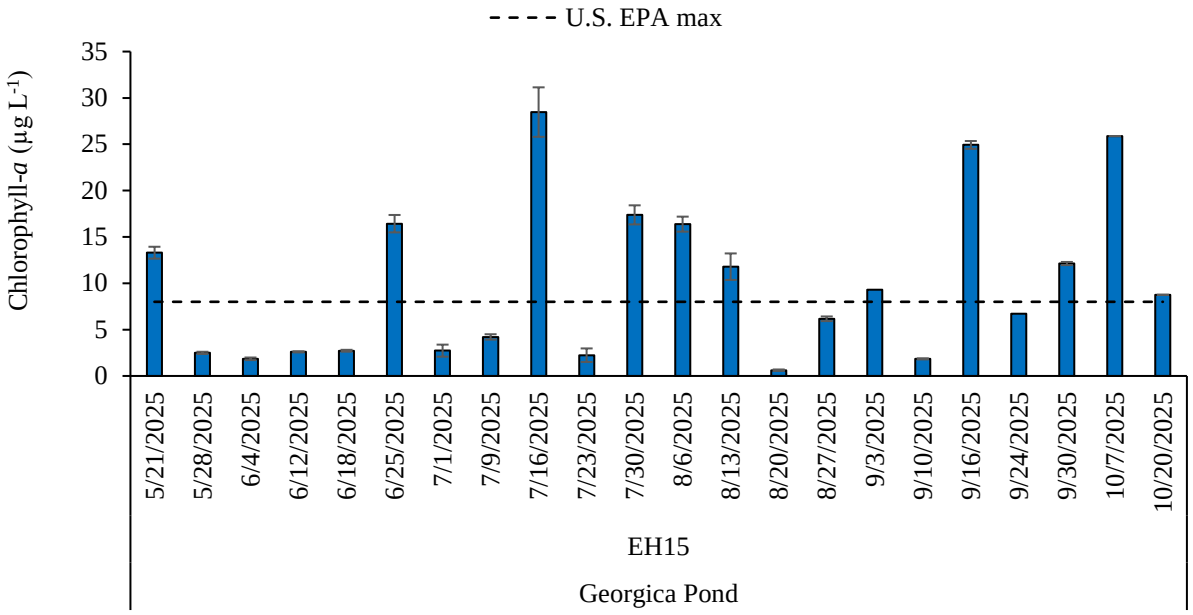


Figure 62. Chlorophyll-*a* concentrations (µg/L) in a site in Georgica Pond (EH15) during 2025. The dashed line represents the USEPA maximum for chlorophyll-*a* in freshwater systems (8 µg/L). Error bars represent standard deviation.

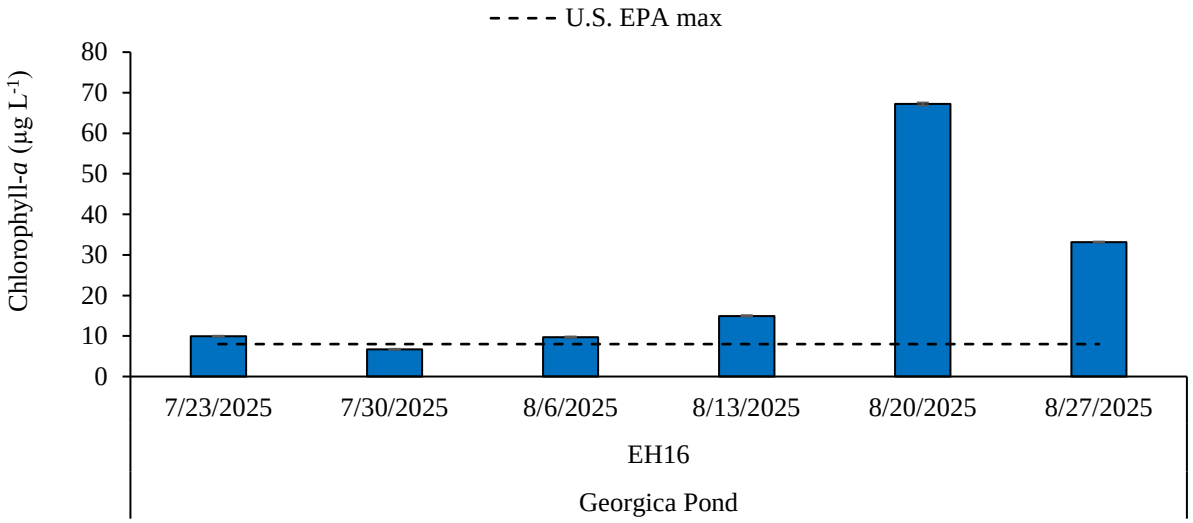


Figure 63. Chlorophyll-*a* concentrations (µg/L) in a site in Georgica Pond (EH16) during 2025. The dashed line represents the USEPA maximum for chlorophyll-*a* in freshwater systems (8 µg/L). Error bars represent standard deviation.

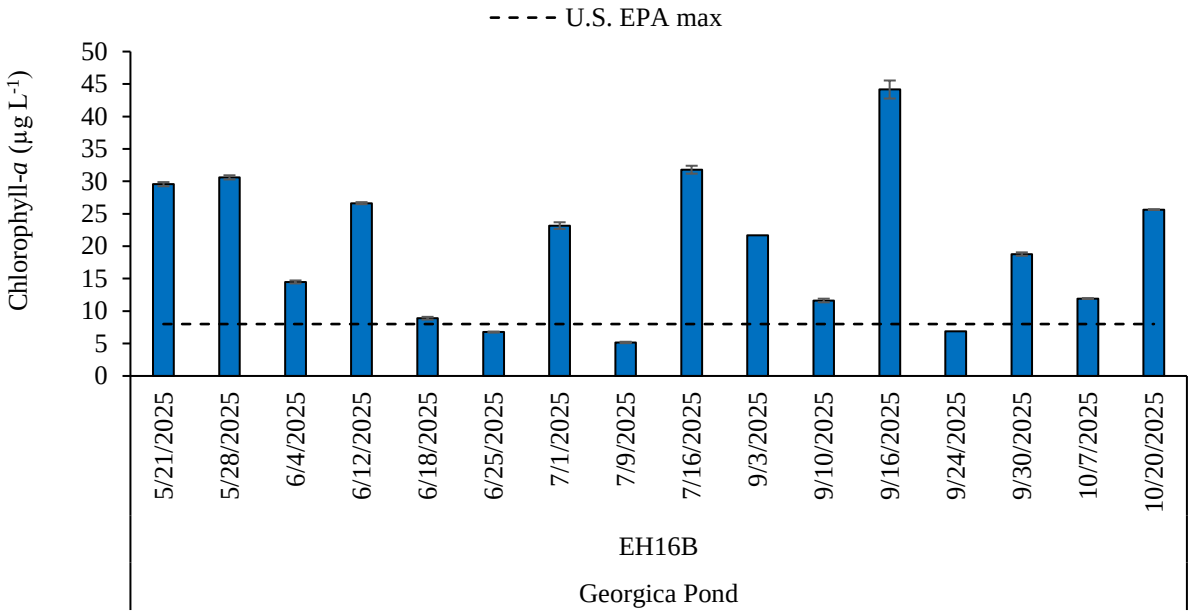


Figure 64. Chlorophyll-*a* concentrations (µg/L) in a site in Georgica Pond (EH16B) during 2025. The dashed line represents the USEPA maximum for chlorophyll-*a* in freshwater systems (8 µg/L). Error bars represent standard deviation.

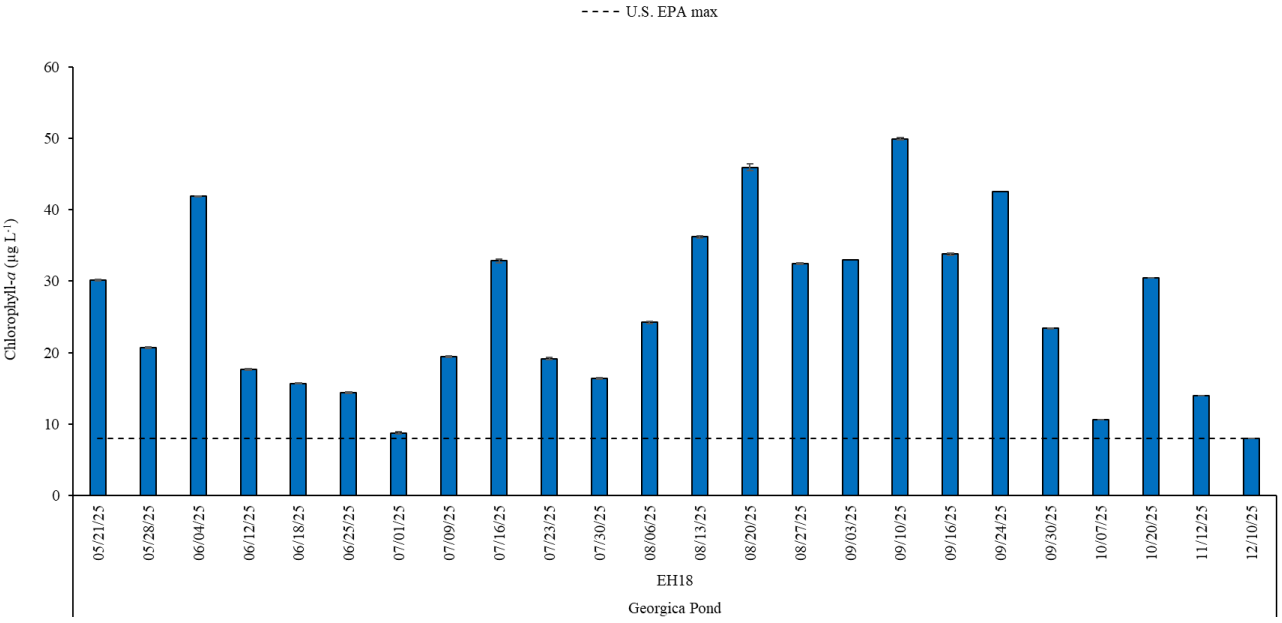


Figure 65. Chlorophyll-a concentrations (µg/L) in a site in Georgica Pond (EH18) during 2025. The dashed line represents the USEPA maximum for chlorophyll-*a* in freshwater systems (8 µg/L). Error bars represent standard deviation.

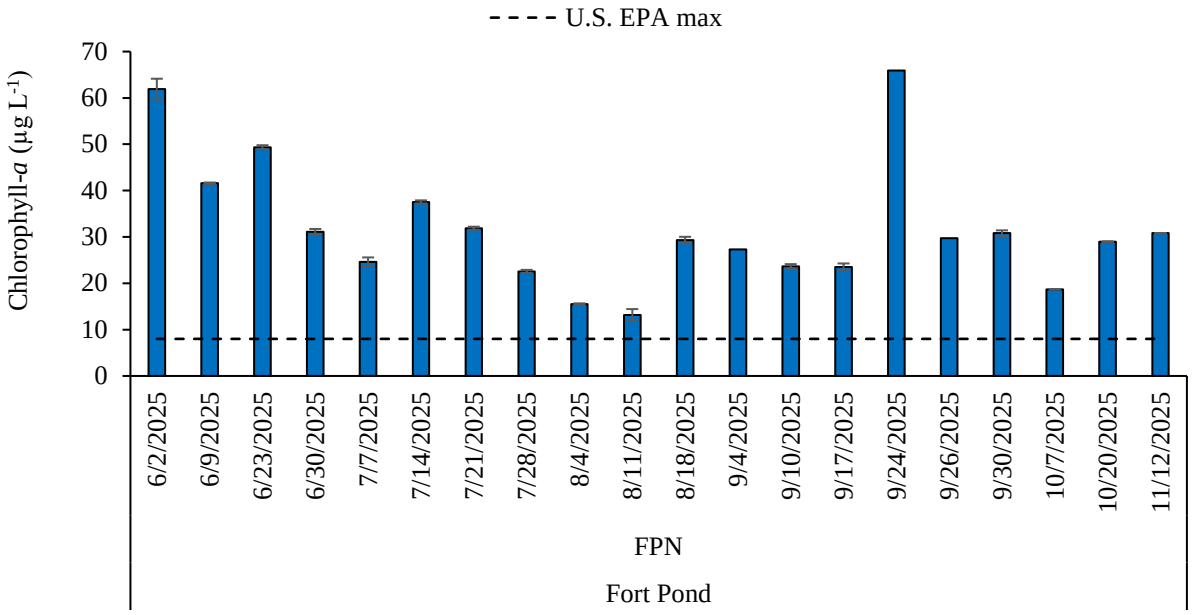


Figure 66. Chlorophyll-*a* concentrations (µg/L) in a site in Fort Pond (North) during 2025. The dashed line represents the USEPA maximum for chlorophyll-*a* in freshwater systems (8 µg/L). Error bars represent standard deviation.

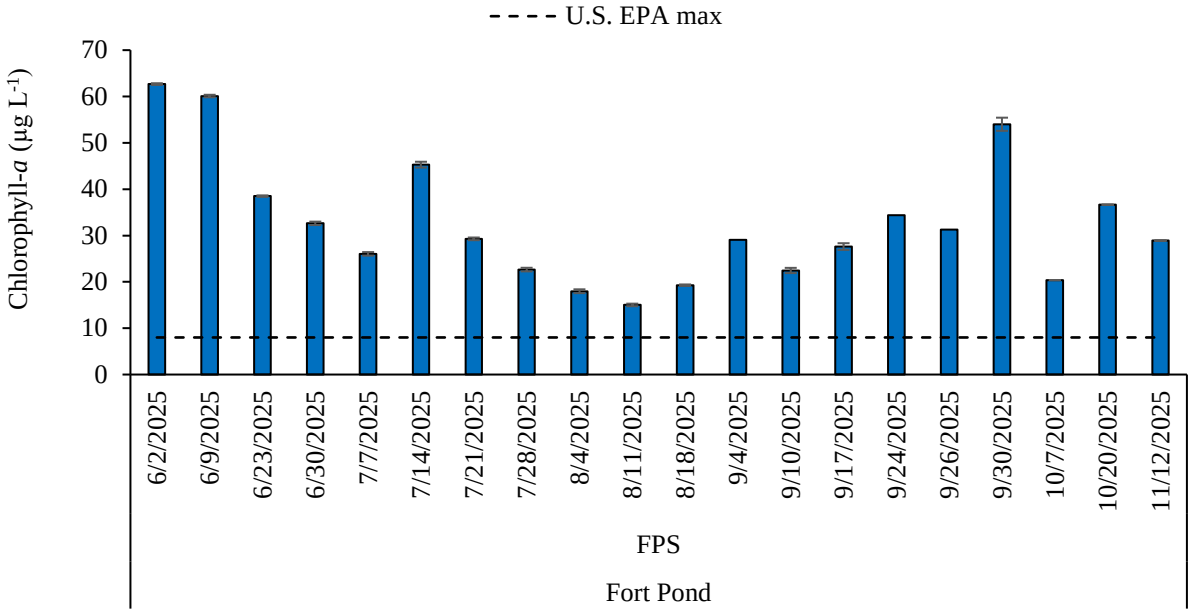


Figure 67. Chlorophyll-*a* concentrations (µg/L) in a site in Fort Pond (South) during 2025. The dashed line represents the USEPA maximum for chlorophyll-*a* in freshwater systems (8 µg/L). Error bars represent standard deviation.

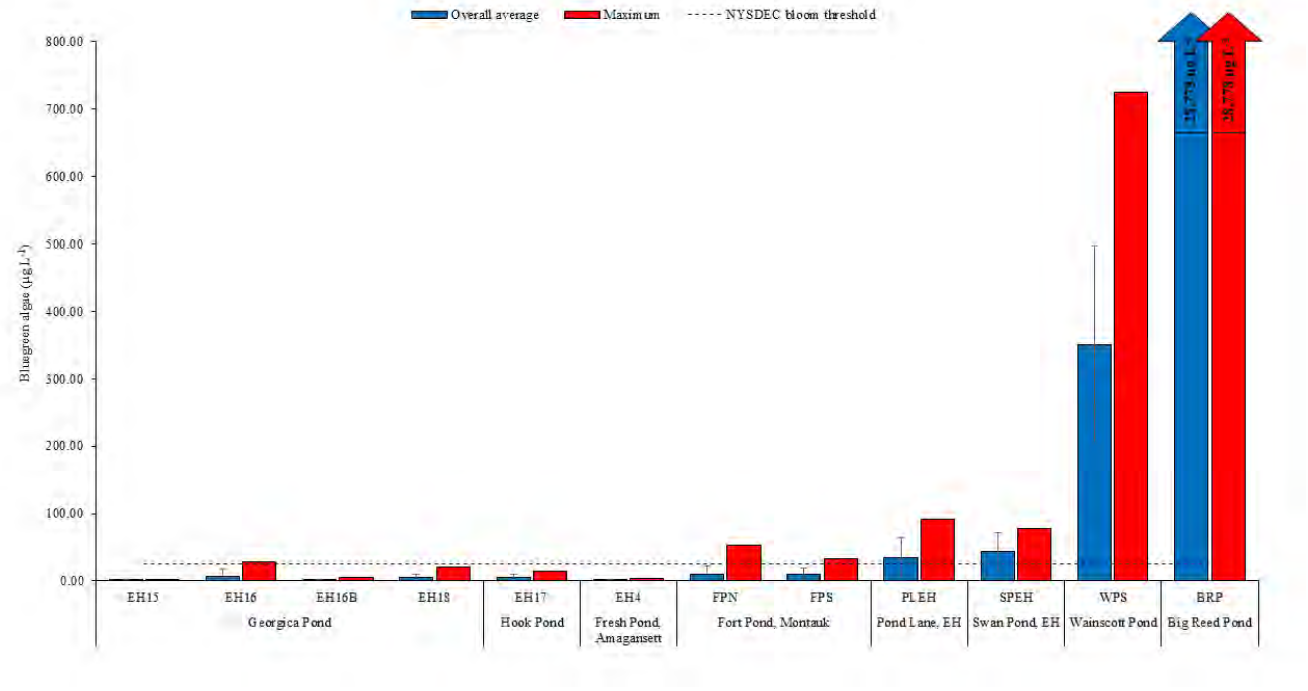


Figure 68. Overall average and minimum blue-green algae concentrations (µg/L) at freshwater sites in East Hampton during 2025. The dashed line represents the NYSDEC bloom threshold for blue-green algae (25 µg/L). Error bars represent standard deviation.

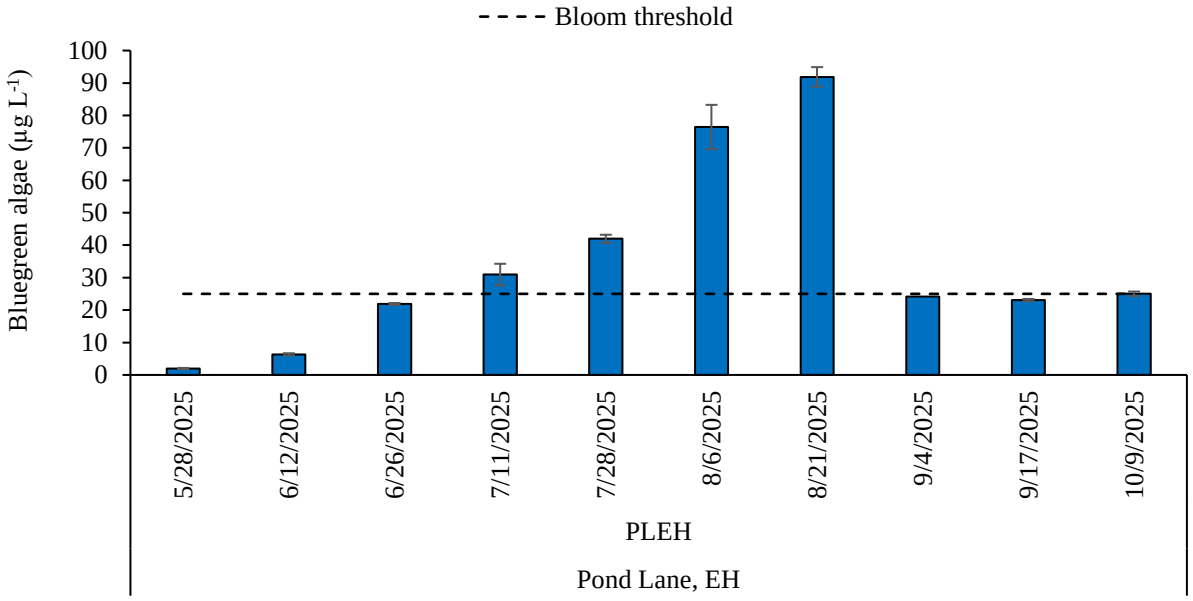


Figure 69. Blue-green algae concentrations (µg/L) in Pond Lane, EH (PLEH) during 2025. The dashed line represents the NYSDEC bloom threshold for blue-green algae (25 µg/L). Error bars represent standard deviation.

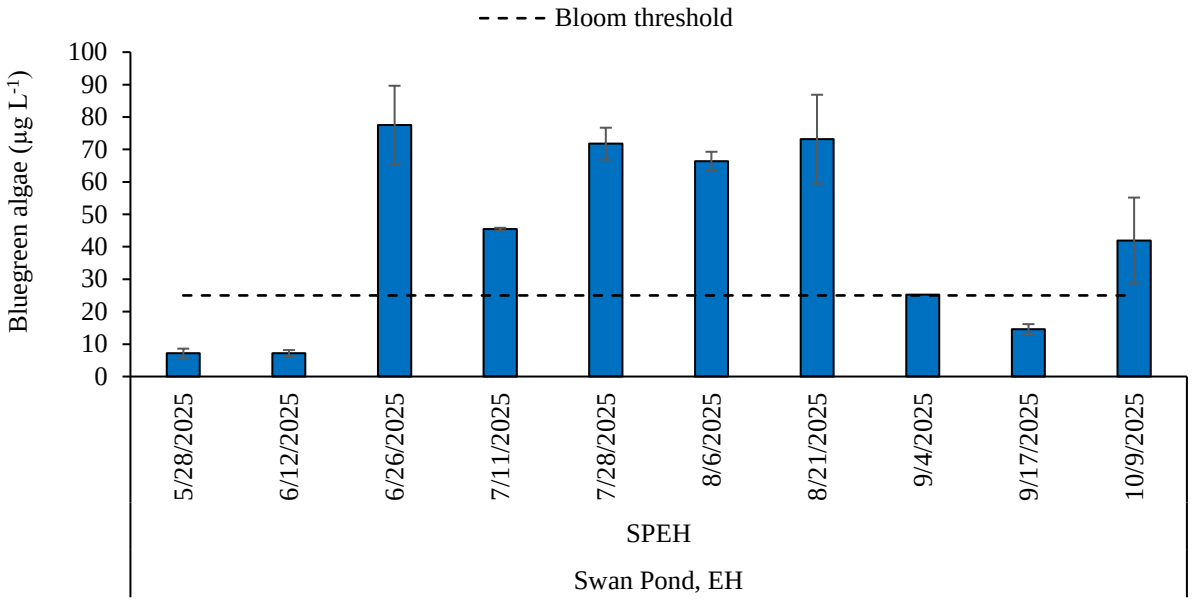


Figure 70. Blue-green algae concentrations (µg/L) in Swan Pond, EH (SPEH) during 2025. The dashed line represents the NYSDEC bloom threshold for blue-green algae (25 µg/L). Error bars represent standard deviation.

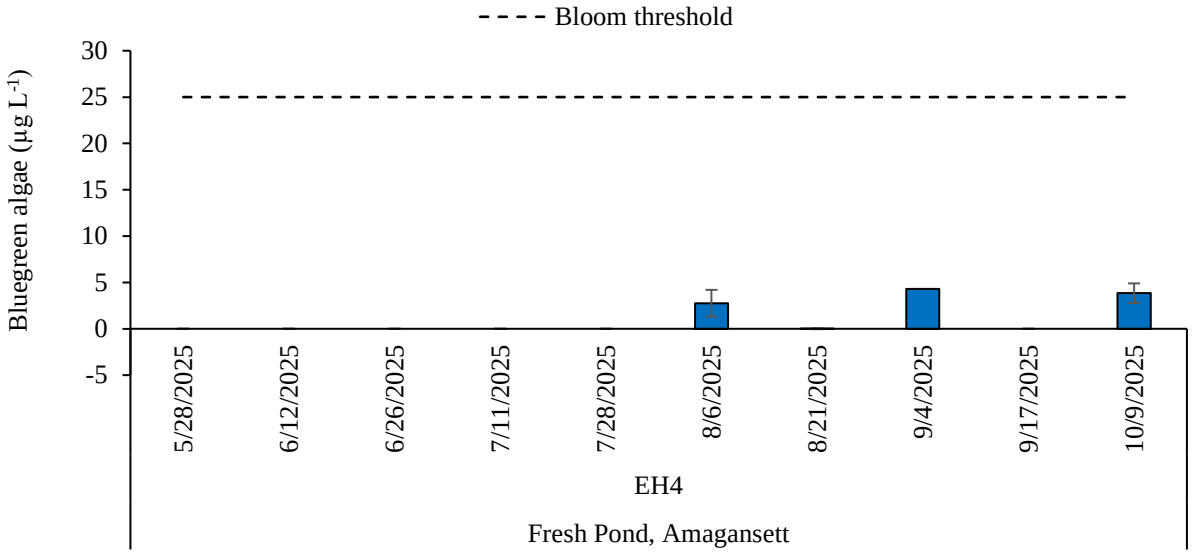


Figure 71. Blue-green algae concentrations (µg/L) in Fresh Pond (EH4) during 2025. The dashed line represents the NYSDEC bloom threshold for blue-green algae (25 µg/L). Error bars represent standard deviation.

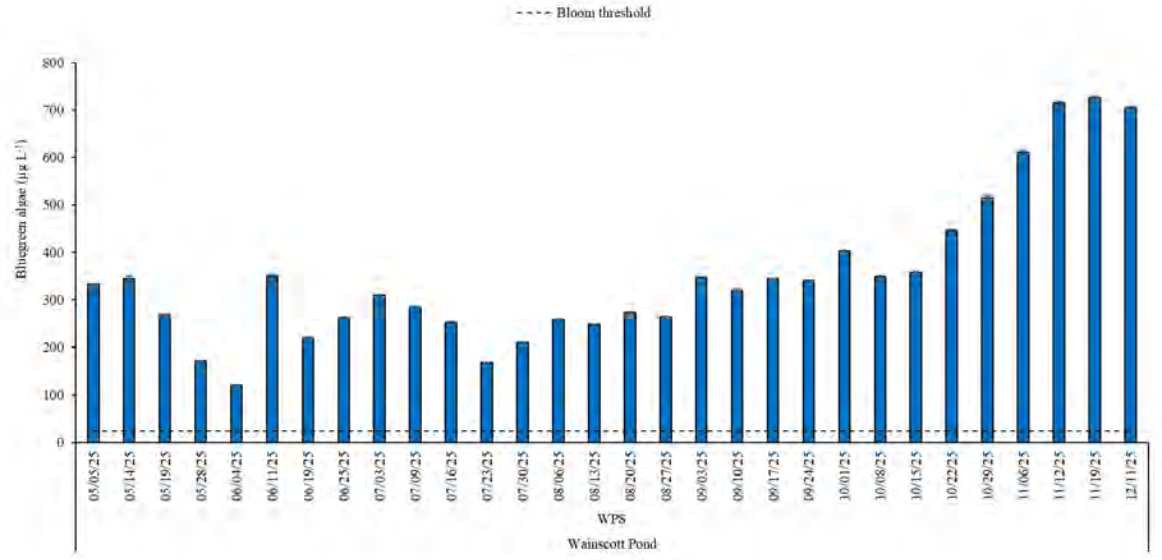


Figure 72. Blue-green algae concentrations (µg/L) at one site in Wainscott Pond (WPS) during 2025. The dashed line represents the NYSDEC bloom threshold for blue-green algae (25 µg/L). Error bars represent standard deviation.

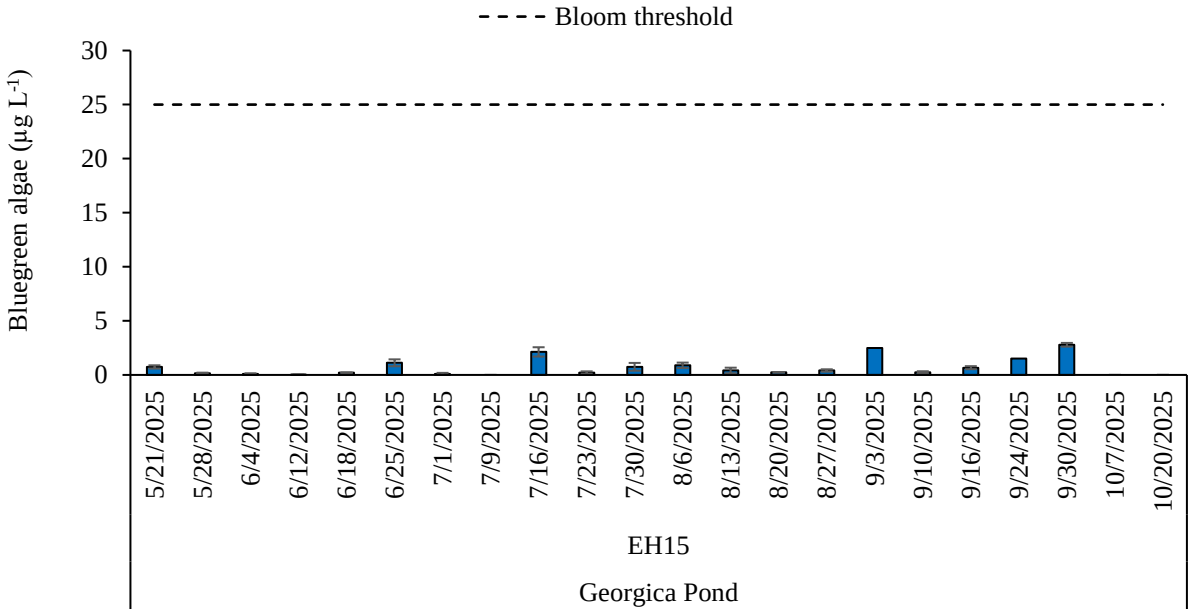


Figure 73. Blue-green algae concentrations (µg/L) in a site in Georgica Pond (EH15) during 2025. The dashed line represents the NYSDEC bloom threshold for blue-green algae (25 µg/L). Error bars represent standard deviation.

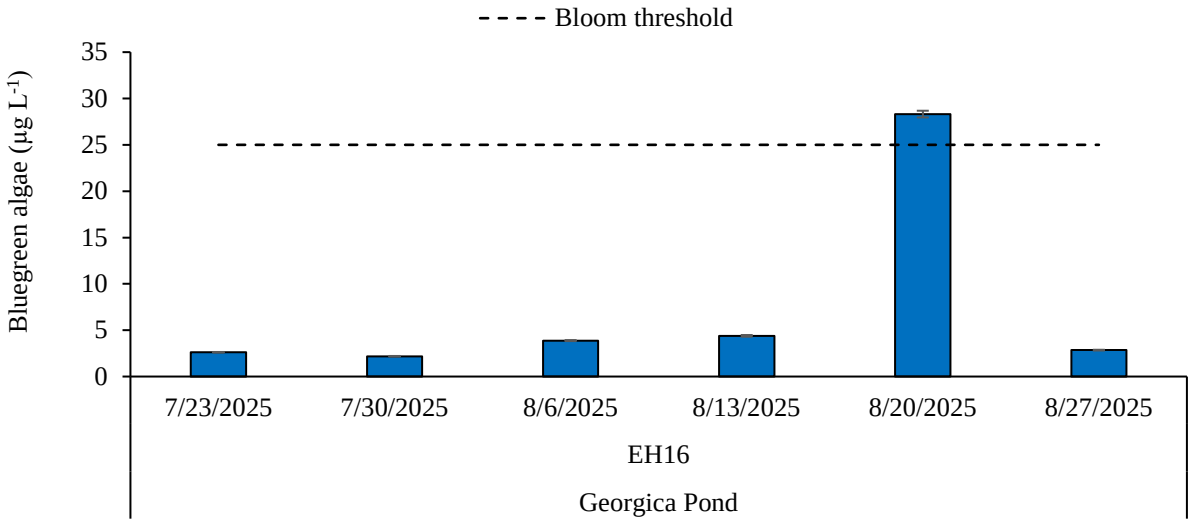


Figure 74. Blue-green algae concentrations (µg/L) in a site in Georgica Pond (EH16) during 2025. The dashed line represents the NYSDEC bloom threshold for blue-green algae (25 µg/L). Error bars represent standard deviation.

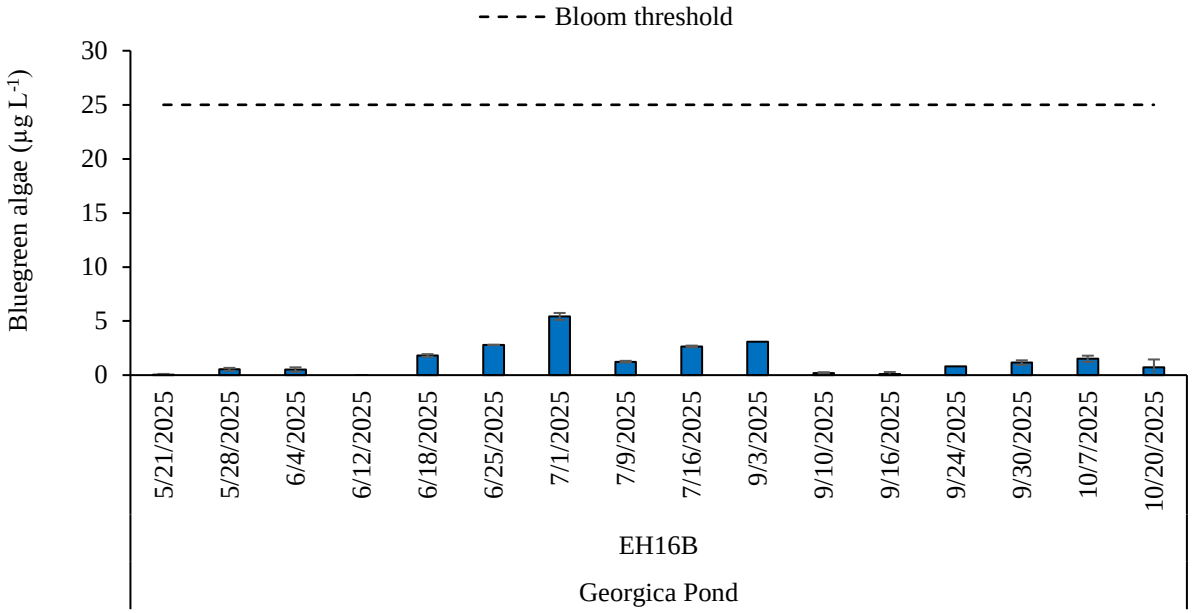


Figure 75. Blue-green algae concentrations (µg/L) in a site in Georgica Pond (EH16B) during 2025. The dashed line represents the NYSDEC bloom threshold for blue-green algae (25 µg/L). Error bars represent standard deviation.

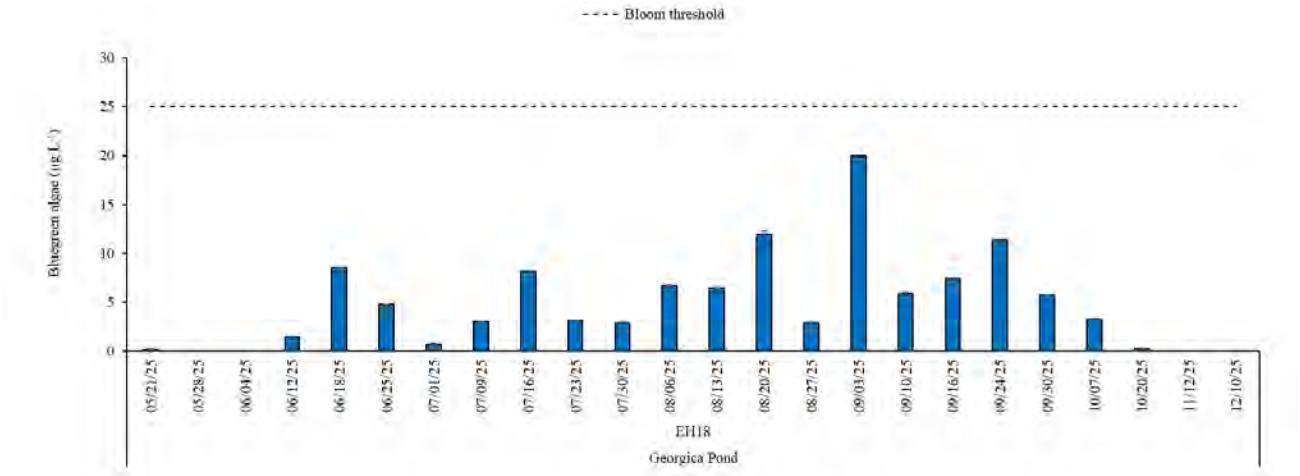


Figure 76. Blue-green algae concentrations (µg/L) in a site in Georgica Pond (EH18) during 2025. The dashed line represents the NYSDEC bloom threshold for blue-green algae (25 µg/L). Error bars represent standard deviation.

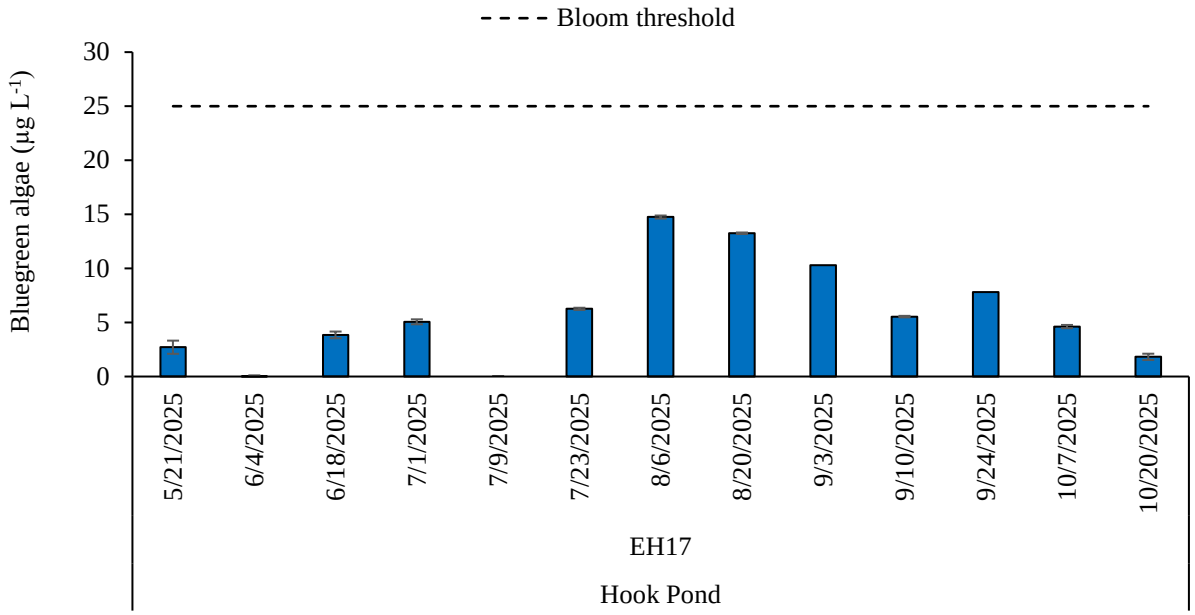


Figure 77. Blue-green algae concentrations (µg/L) in Hook Pond (EH17) during 2025. The dashed line represents the NYSDEC bloom threshold for blue-green algae (25 µg/L). Error bars represent standard deviation.

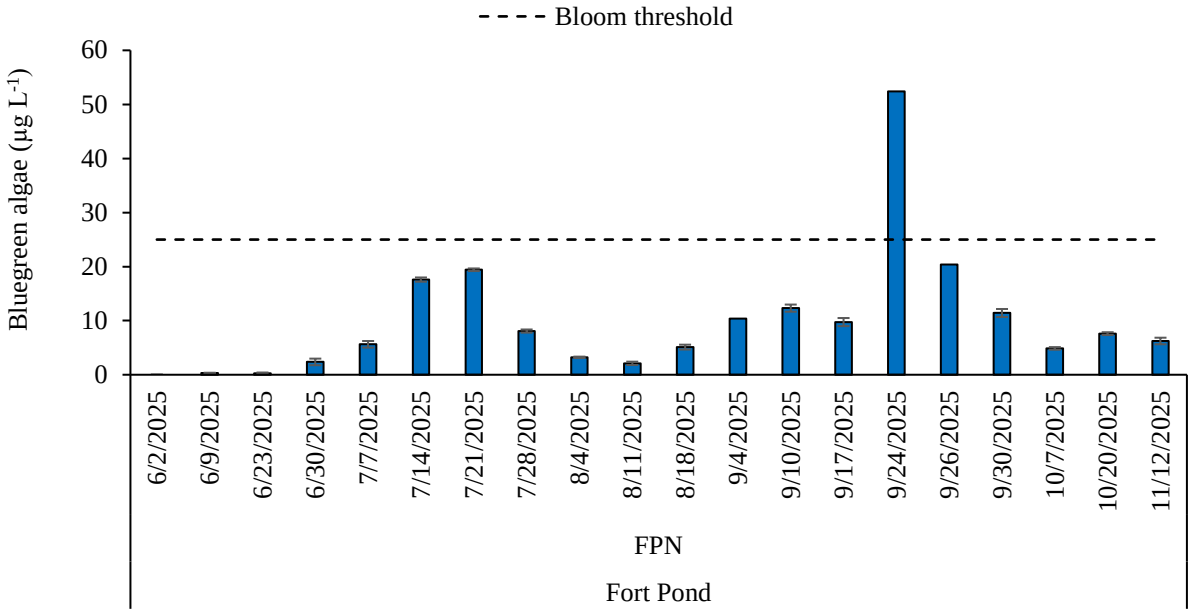


Figure 78. Blue-green algae concentrations (µg/L) in Fort Pond (North) during 2025. The dashed line represents the NYSDEC bloom threshold for blue-green algae (25 µg/L). Error bars represent standard deviation.

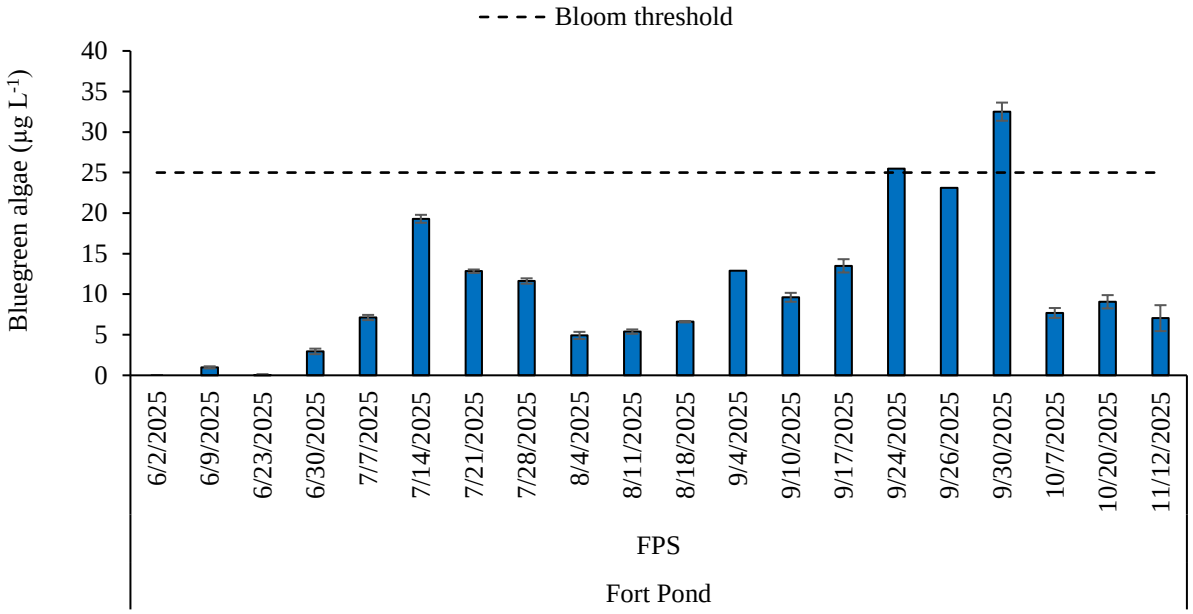


Figure 79. Blue-green algae concentrations (µg/L) in Fort Pond (South) during 2025. The dashed line represents the NYSDEC bloom threshold for blue-green algae (25 µg/L). Error bars represent standard deviation.

Location	Site ID	Cyanobacteria genera identified during bloom
Georgica Pond	EH16	*Sphaerospermopsis, Anabaenopsis*
Fort Pond, Montauk	FPN	*Dolichospermum, Planktothrix, Aphanizomenon*
	FPS	*Aphanizomenon, Dolichospermum, Planktothrix*
Pond Lane, East Hampton	PLEH	*Aphanocapsa, Microcystis, Aphanothece, Dolichospermum, Aphanizomenon, Planktothrix, Woronichinia*
Swan Pond, East Hampton	SPEH	*Aphanocapsa, Oscillatoria, Woronichinia, Limnospira, Planktothix, Microcystis, Aphanizomenon*
Wainscott Pond	WPS	*Planktothrix, Aphanizomenon, Dolichospermum*
Big Reed Pond	BRP	*Dolichospermum*

Table 2. List of cyanobacteria identified at each of the freshwater East Hampton sites in 2025.

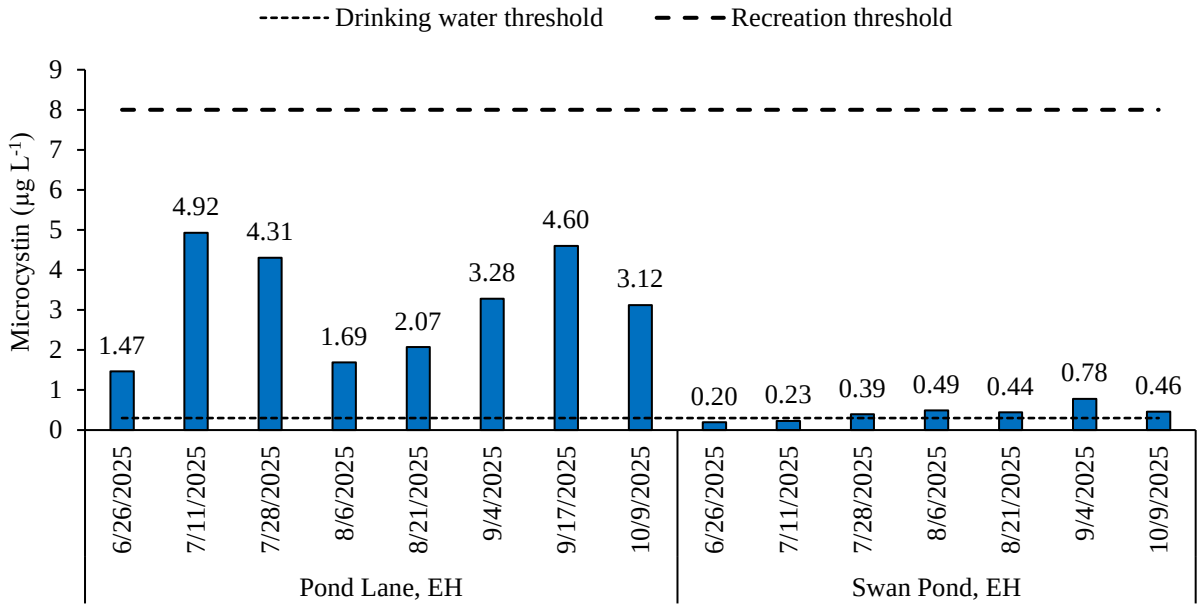


Figure 80. Microcystin concentrations (µg/L) at Pond Lane, Swan Pond during 2025. The standard thresholds for drinking water and recreation are 0.3 and 8 µg/L, respectively.

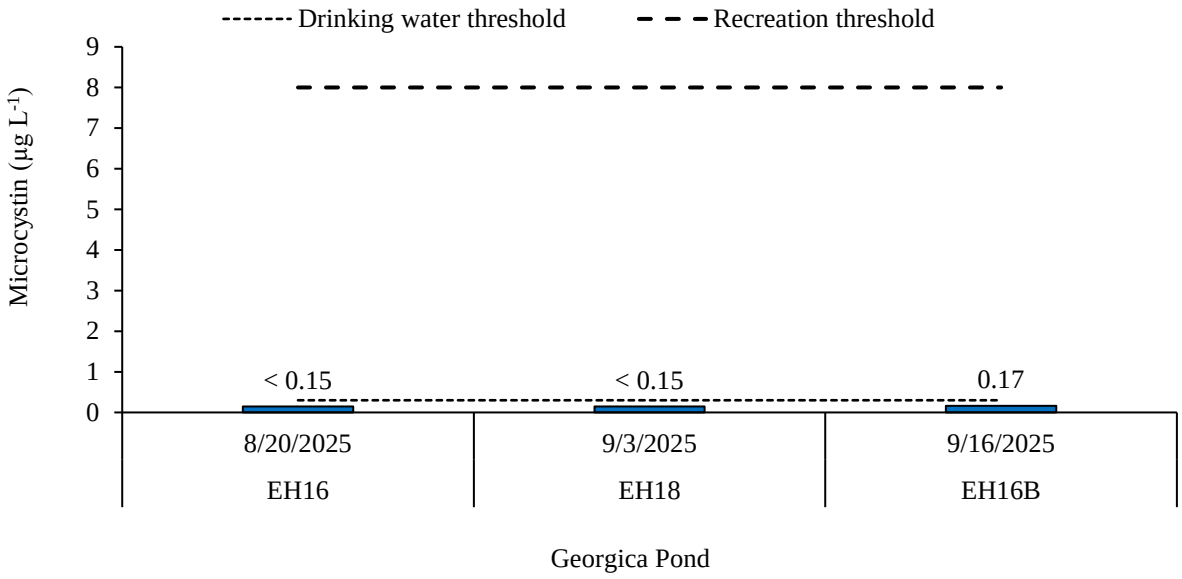


Figure 81. Microcystin concentrations (µg/L) at Georgica Pond during 2025. The standard thresholds for drinking water and recreation are 0.3 and 8 µg/L, respectively.

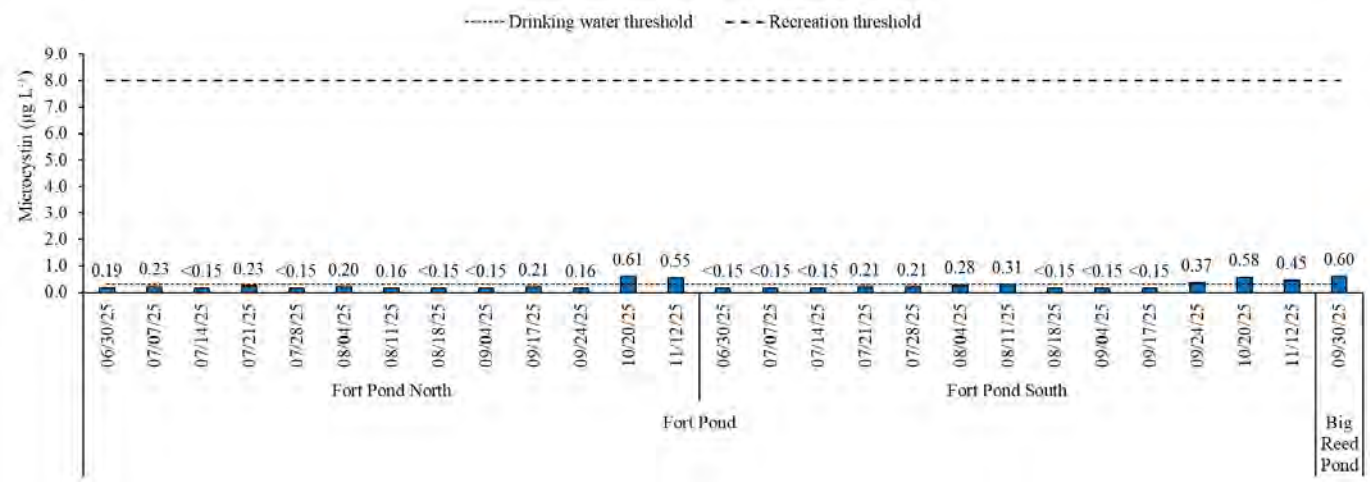


Figure 82. Microcystin concentrations (µg/L) at various sites in Fort Pond during 2025. The standard thresholds for drinking water and recreation are 0.3 and 8 µg/L, respectively.

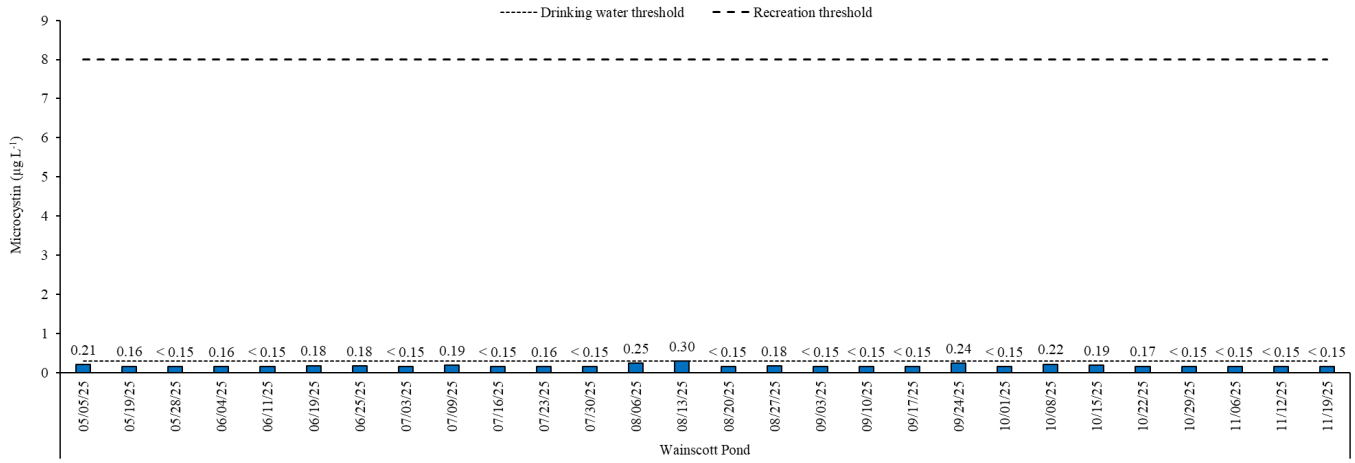


Figure 83. Microcystin concentrations (µg/L) at Wainscott Pond during 2025. The standard thresholds for drinking water and recreation are 0.3 and 8 µg/L, respectively.

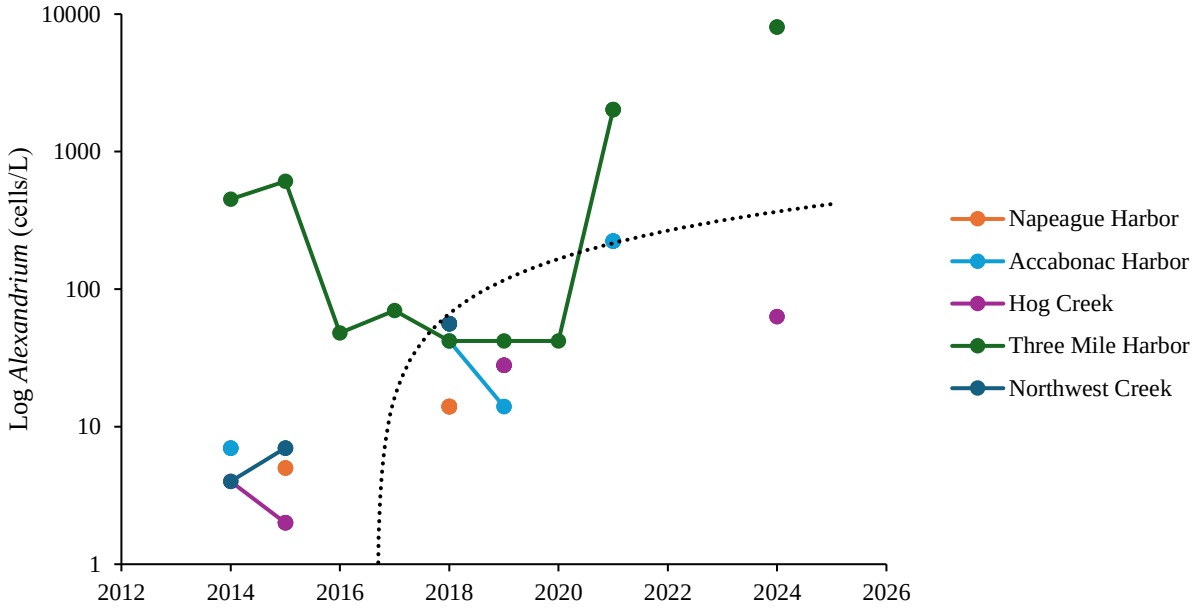


Figure 84. Annual maximum densities of *Alexandrium catenella* cell counts from East Hampton sampling locations from 2014-2025. Black dashed line represents a linear regression of all annual means.

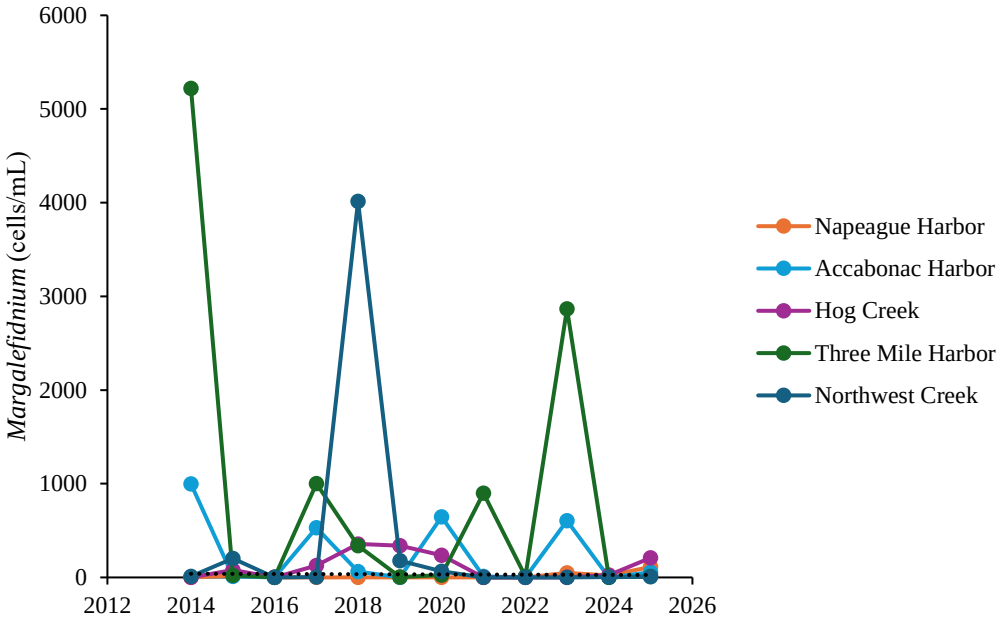


Figure 85. Annual maximum densities of *Dinophysis acuminata* cell counts from East Hampton sampling locations from 2014-2025. Black dashed line represents a linear regression of all annual means.

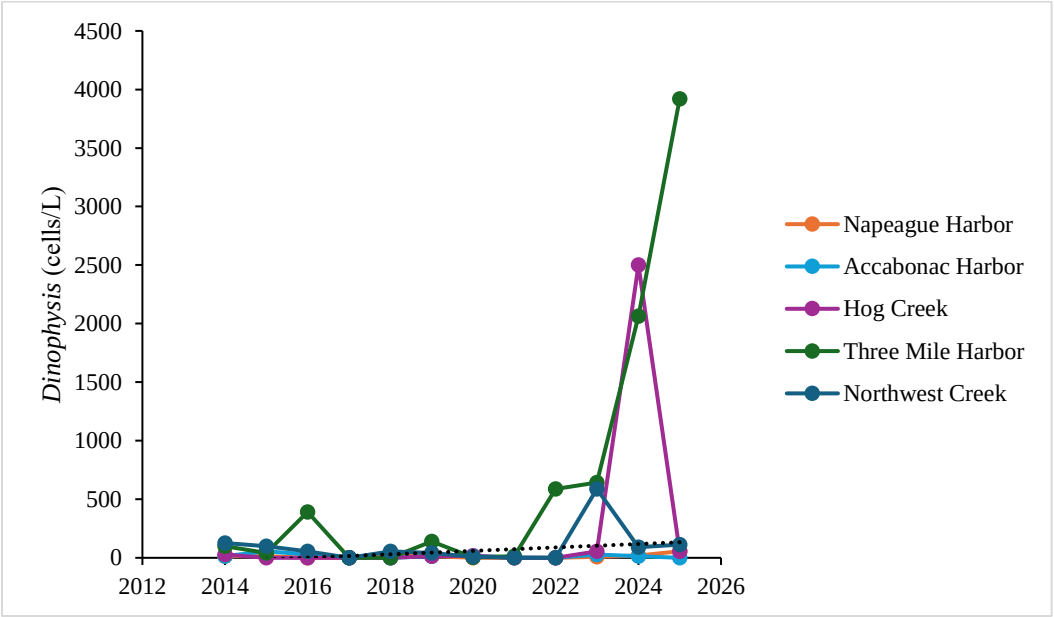


Figure 86. Annual maximum densities of *Margalefidinium polykrikoides* cell counts from East Hampton sampling locations from 2014-2025. Black dashed line represents a linear regression of all annual means.

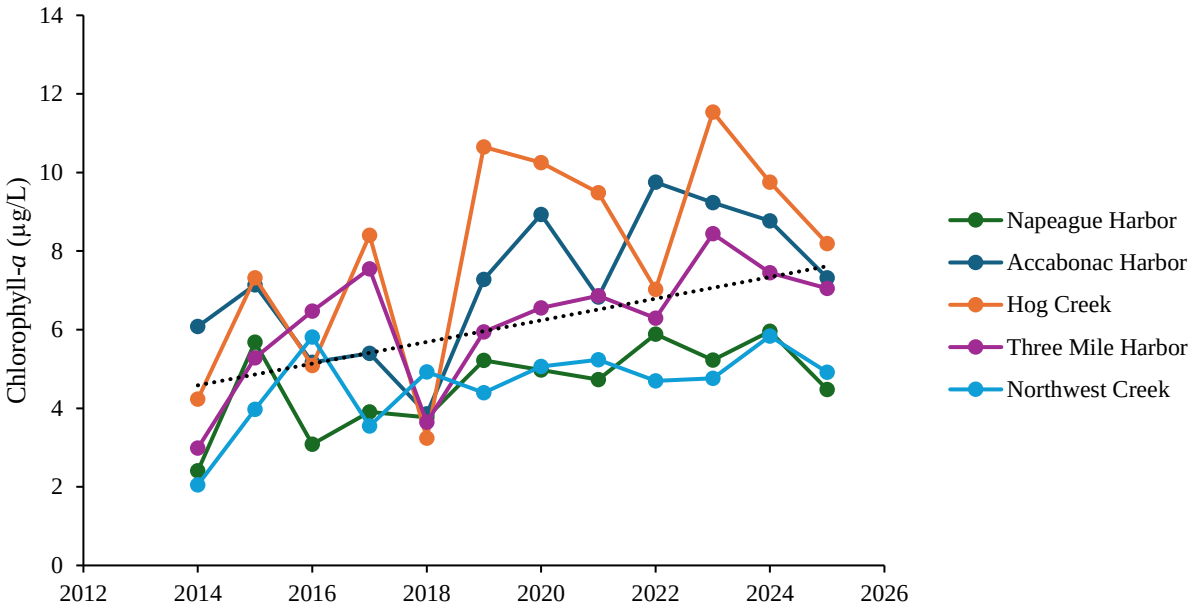
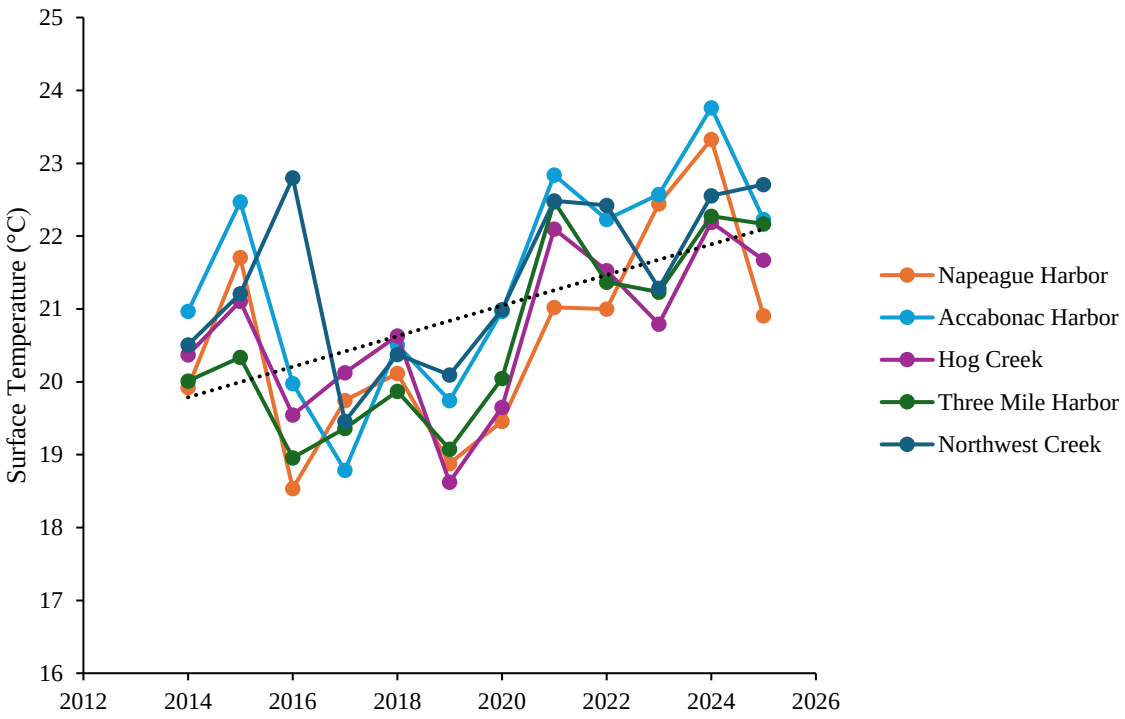


Figure 87. Yearly averages of chlorophyll-a (µg/L) from East Hampton sampling locations from 2014-2025. Black dashed line represents a linear regression of all annual means.

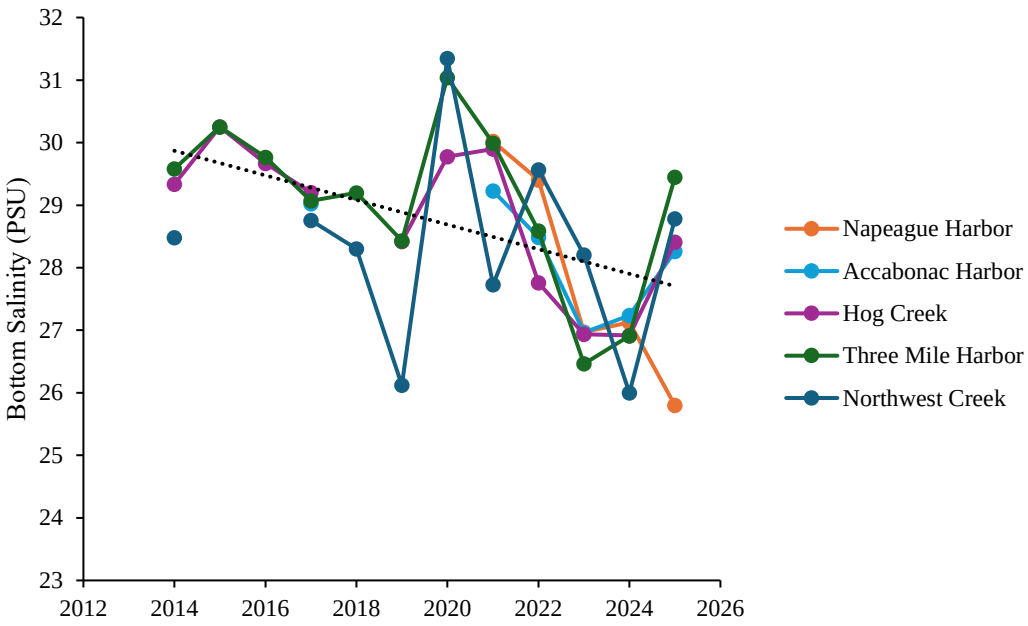
A)



B)

Figure 88. Yearly averages of surface (A) and bottom (B) temperature measurements from East Hampton sampling locations from 2014-2025. Black dashed line represents a linear regression of all annual means.

A)



B)

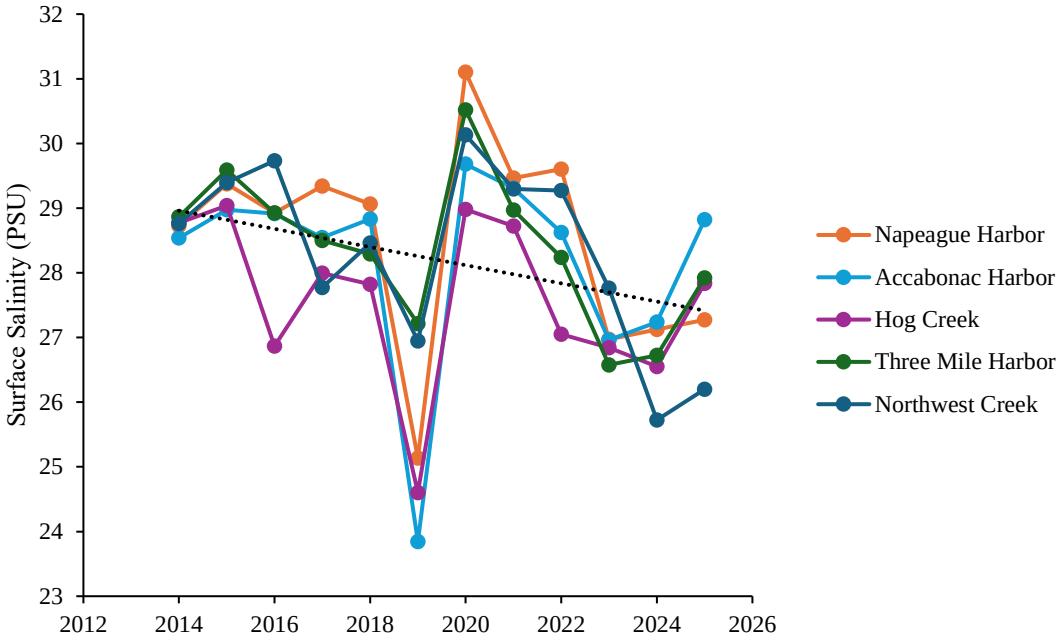


Figure 89. Yearly averages of surface (A) and bottom (B) salinity measurements from East Hampton sampling locations from 2014-2025. Black dashed line represents a linear regression of all annual means.

A)

B)

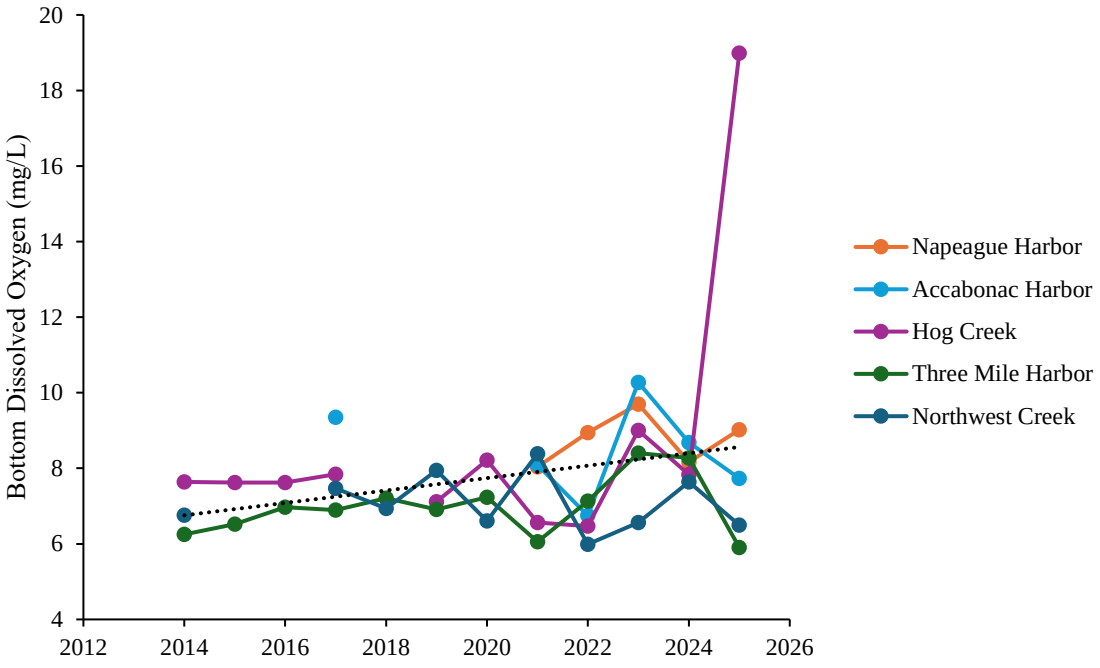


Figure 90. Yearly averages of surface (A) and bottom (B) dissolved oxygen measurements from East Hampton sampling locations from 2014-2025. Black dashed line represents a linear regression of all annual means.

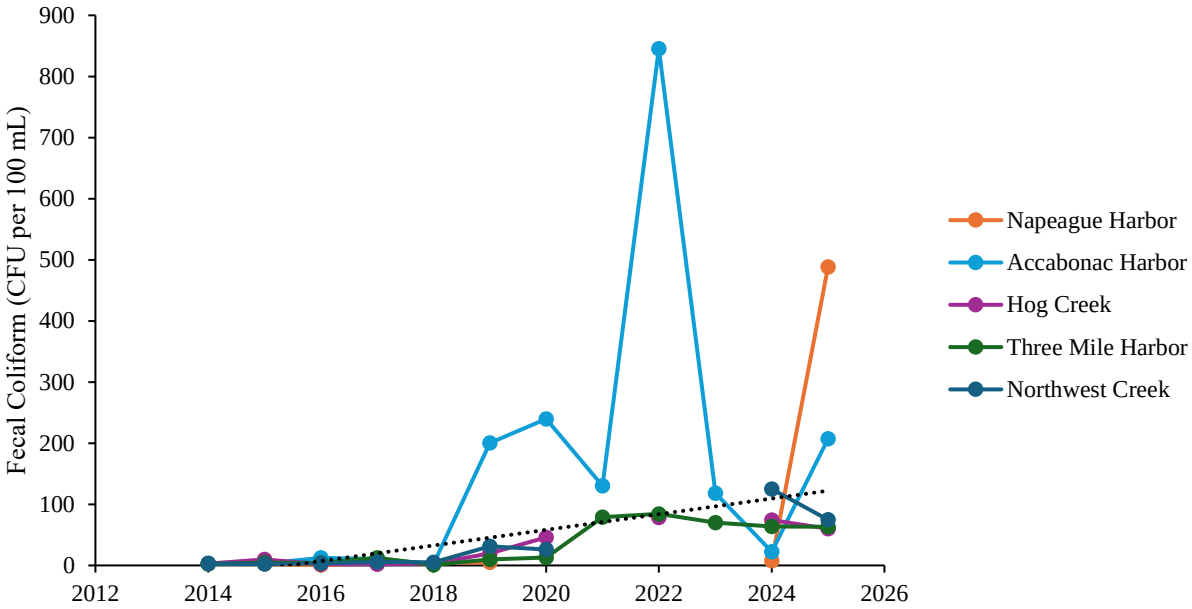
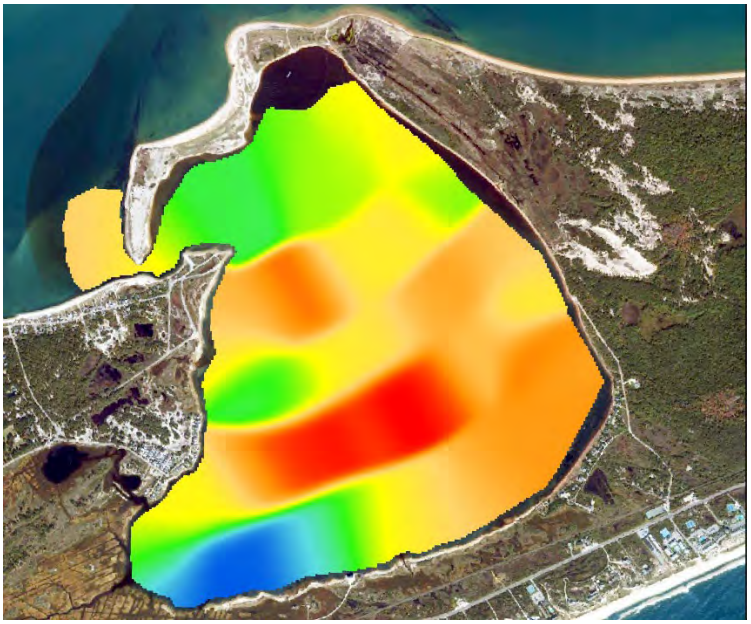
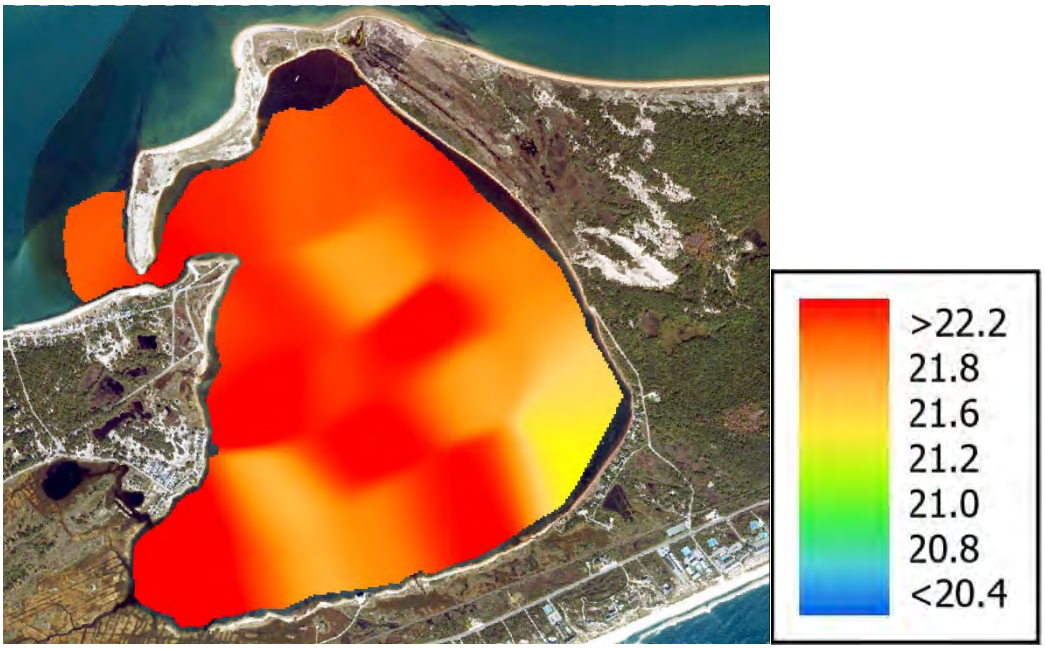


Figure 91. Yearly averages of fecal coliform bacteria (FCU per 100mL) from East Hampton sampling locations from 2014-2025. Black dashed line represents a linear regression of all annual means.

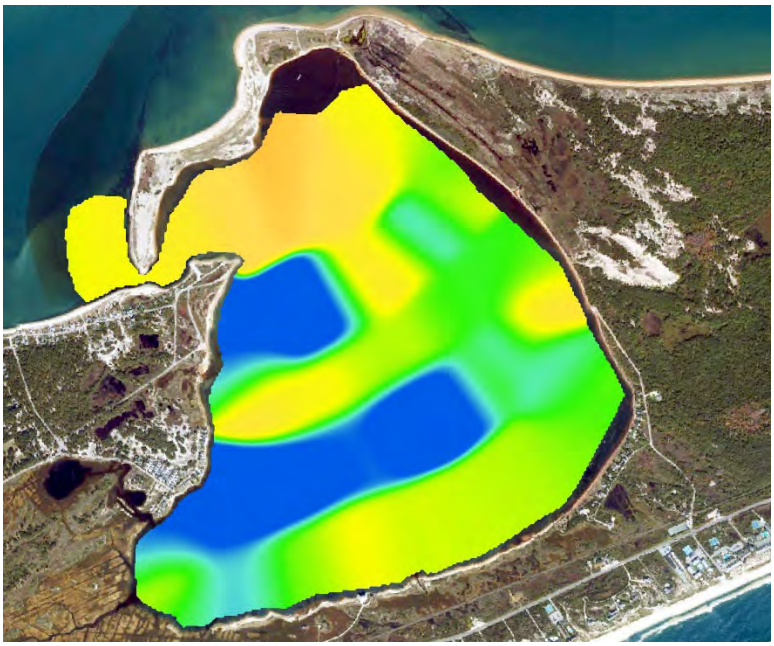


A) High tide

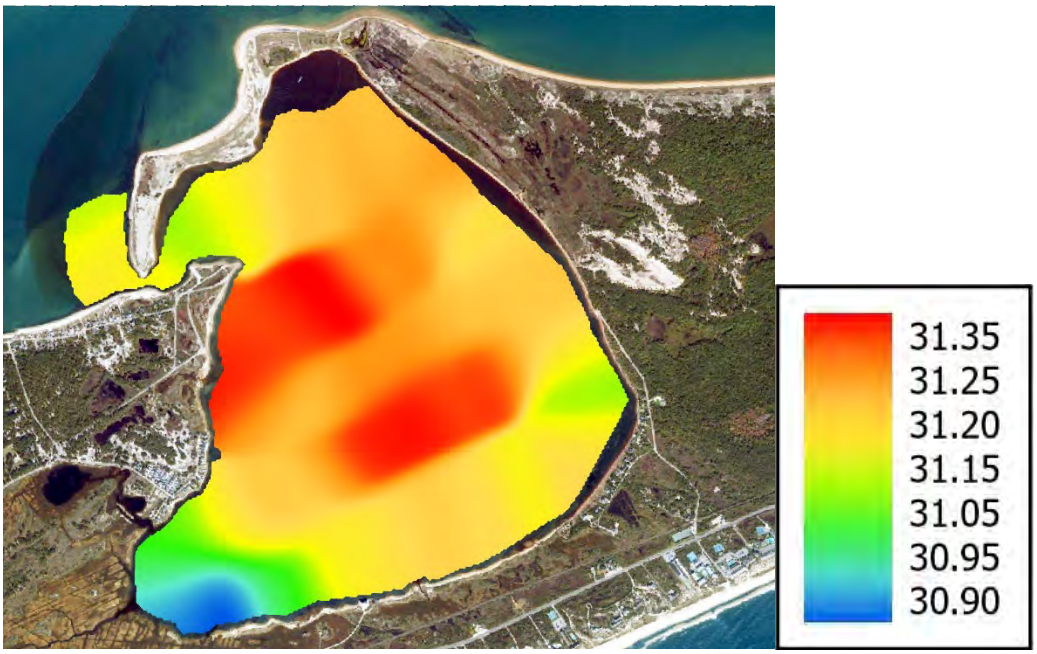


B) Low tide

Figure 92. Interpolation of temperatures (˚C) at (A) high tide and (B) low tide in Napeague Harbor where maps utilize a normalized scale.



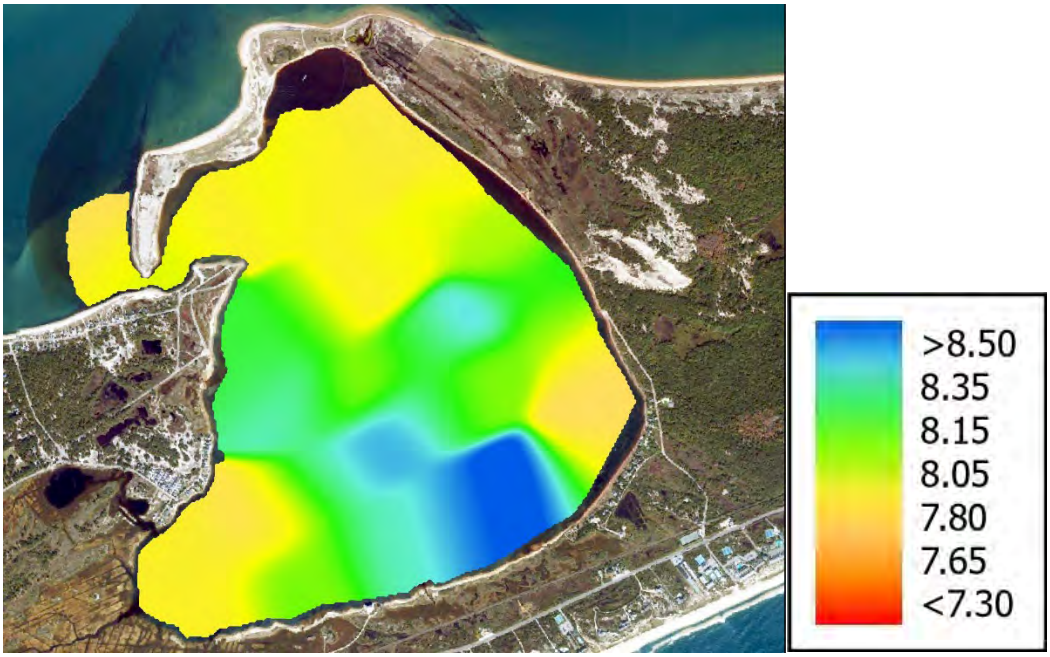
A) High tide



B) Low tide

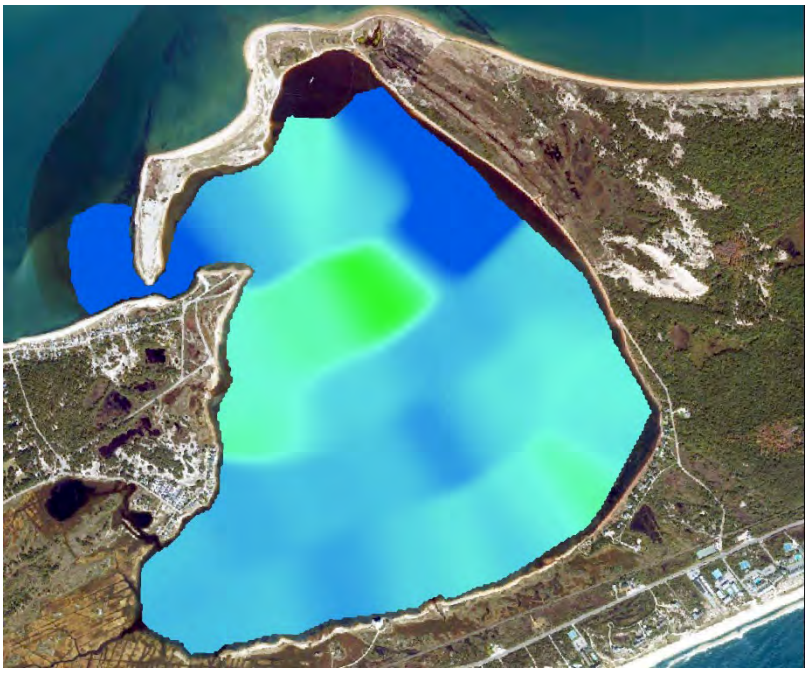
Figure 93. Interpolation of salinity (ppt) at (A) high tide and (B) low tide in Napeague Harbor where maps utilize a normalized scale.

A) High tide

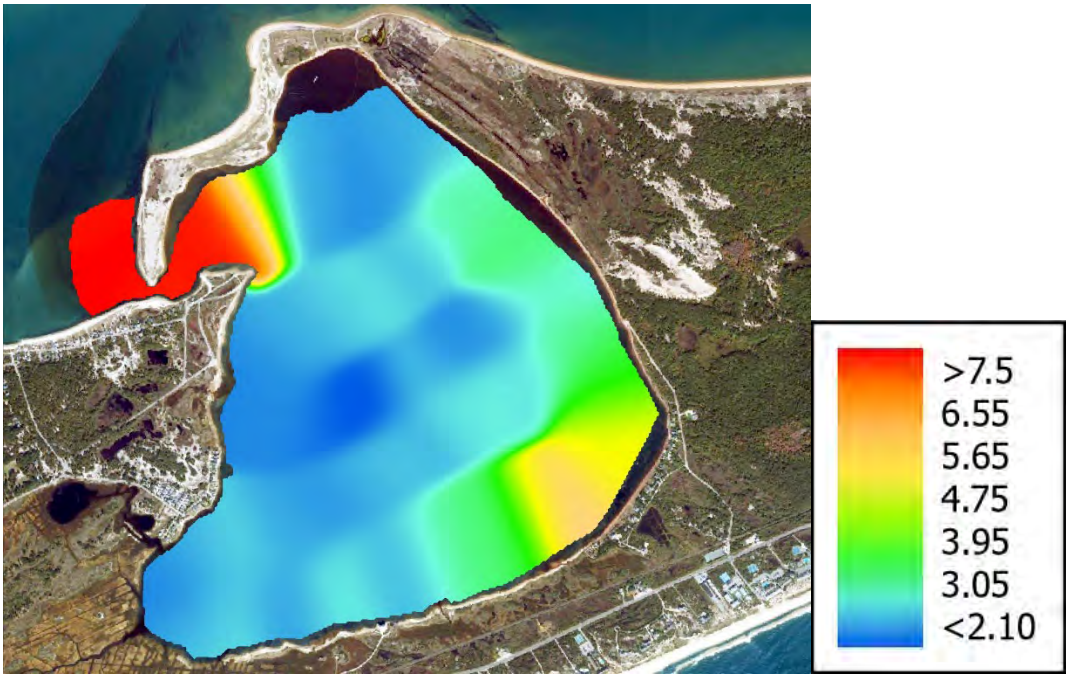


B) Low tide

Figure 94. Interpolation of dissolved oxygen (mg/L) at (A) high tide and (b) low tide in Napeague Harbor where maps utilize a normalized scale.

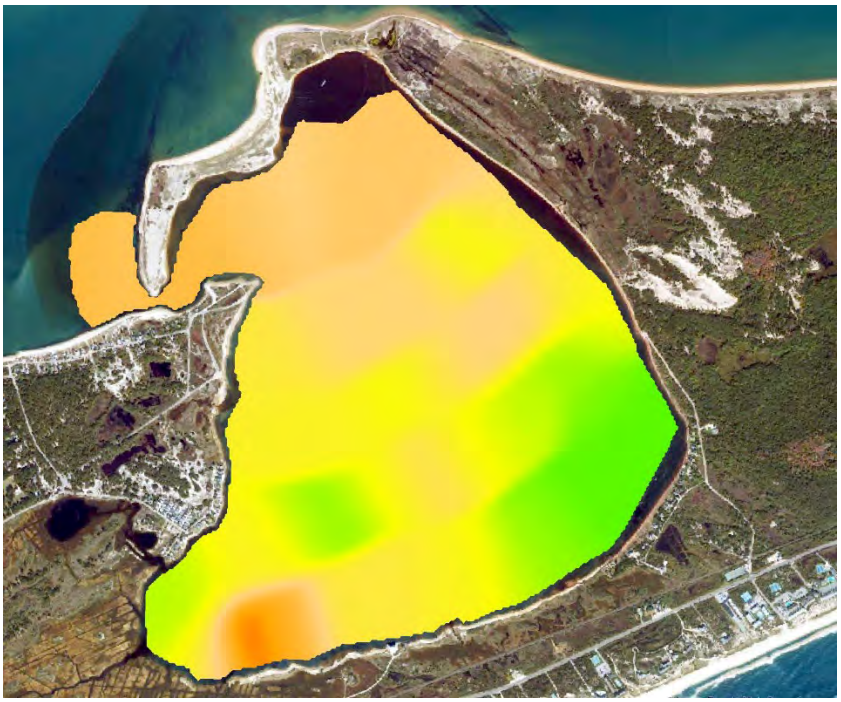


A) High tide

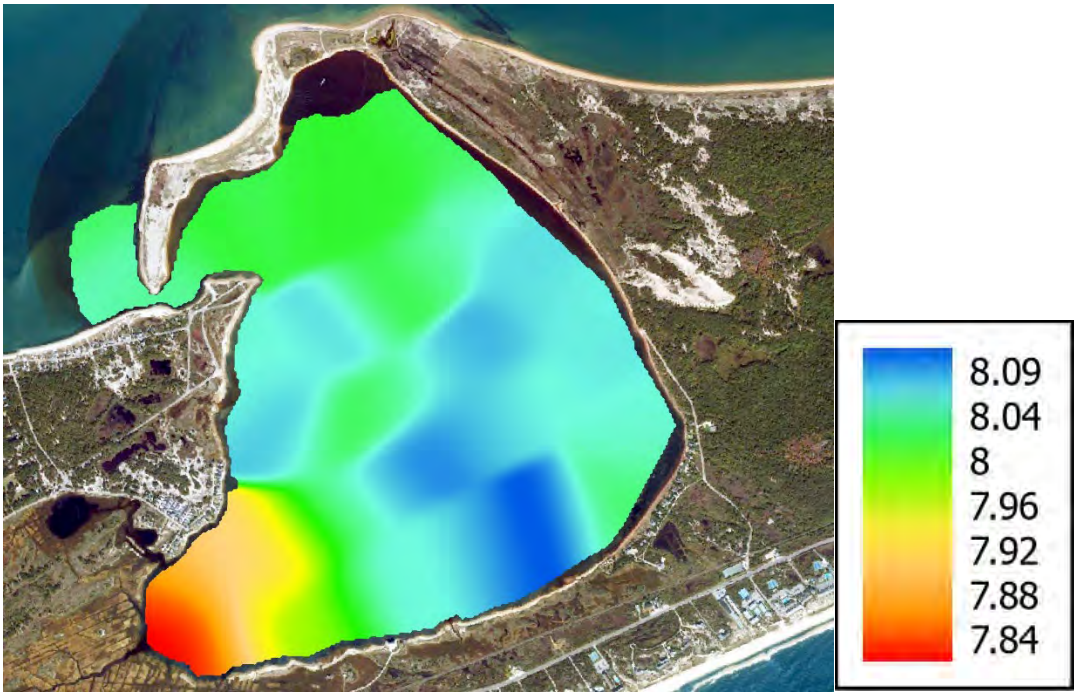


B) Low tide

Figure 95. Interpolation of chlorophyll-*a* (µg/L) at (A) high tide and (B) low tide in Napeague Harbor where maps utilize a normalized scale.



A) High tide



B) Low tide

Figure 96. Interpolation of pH at (A) high tide and (b) low tide in Napeague Harbor where maps utilize a normalized scale.

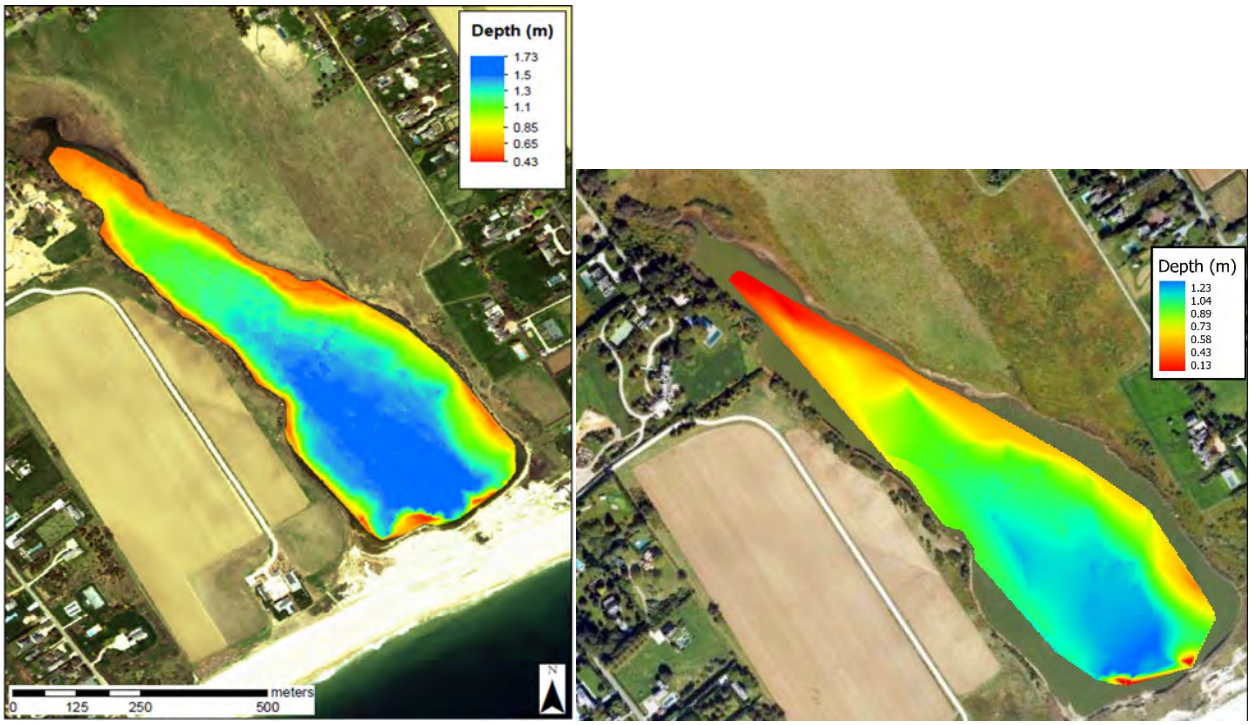


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Figure 97. Interpolation of depth (m) 2018 vs 2025 in Wainscott Pond.

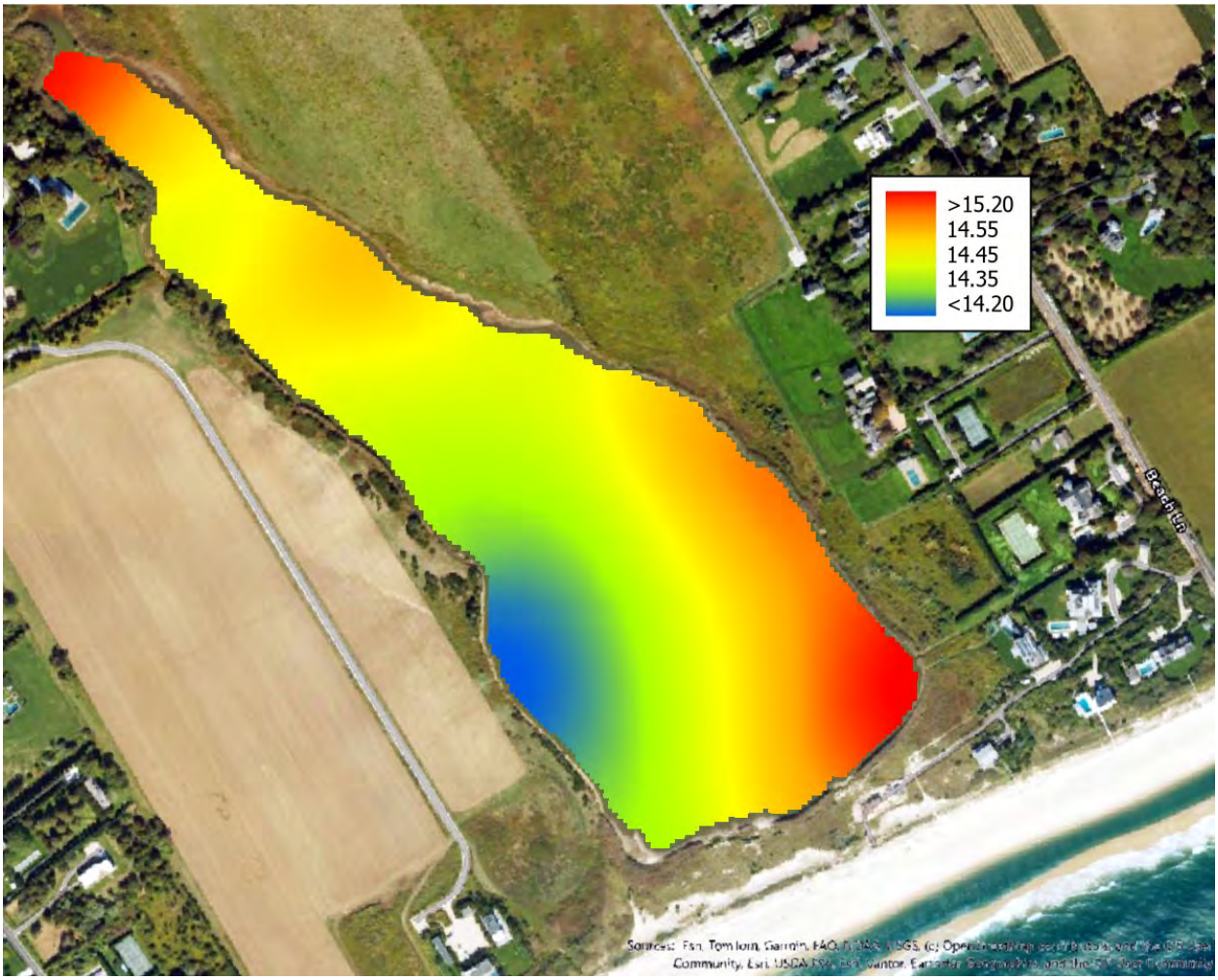


Figure 98. Interpolation of temperatures (˚C) in Wainscott Pond.

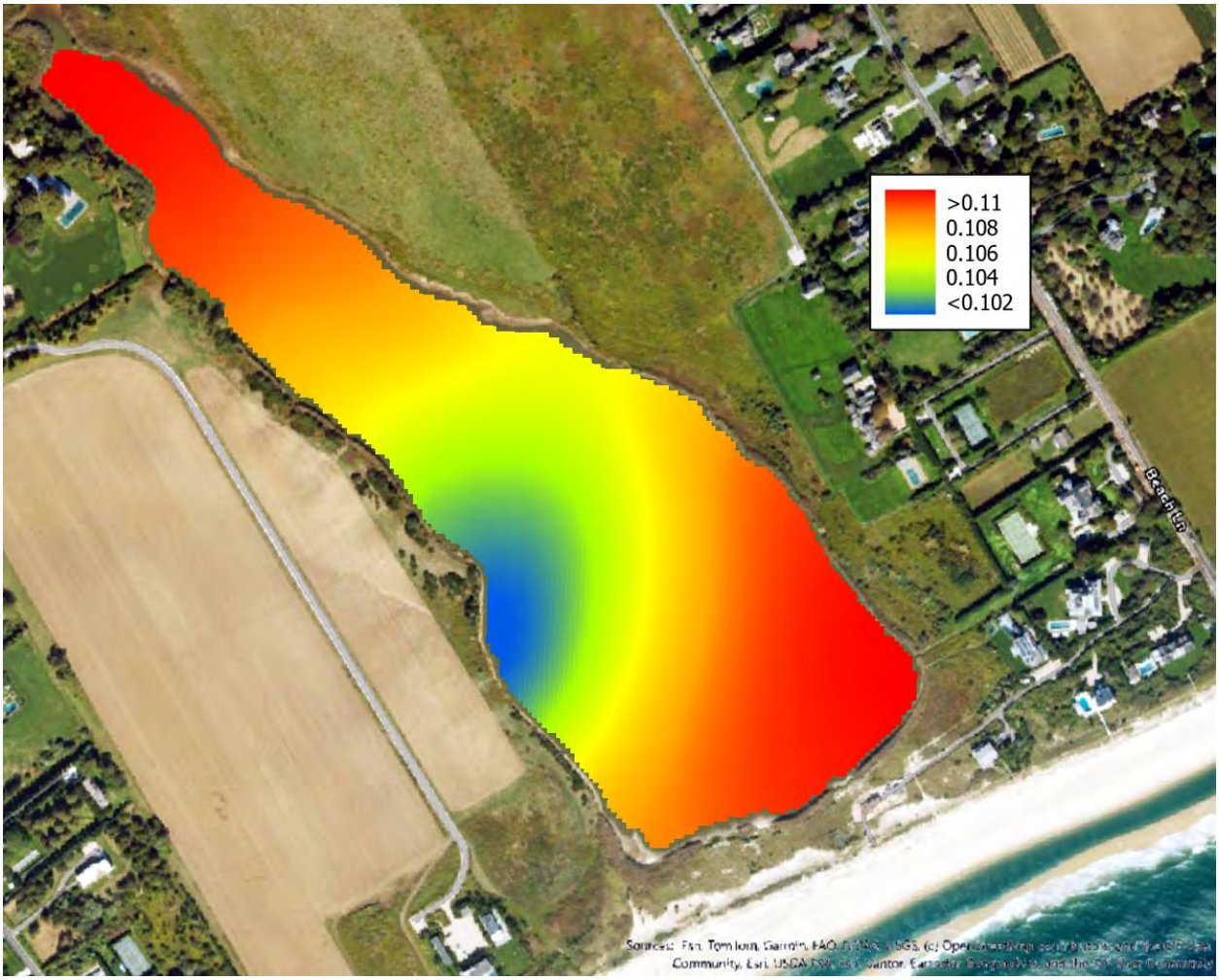


Figure 99. Interpolation of salinity (ppt) in Wainscott Pond.

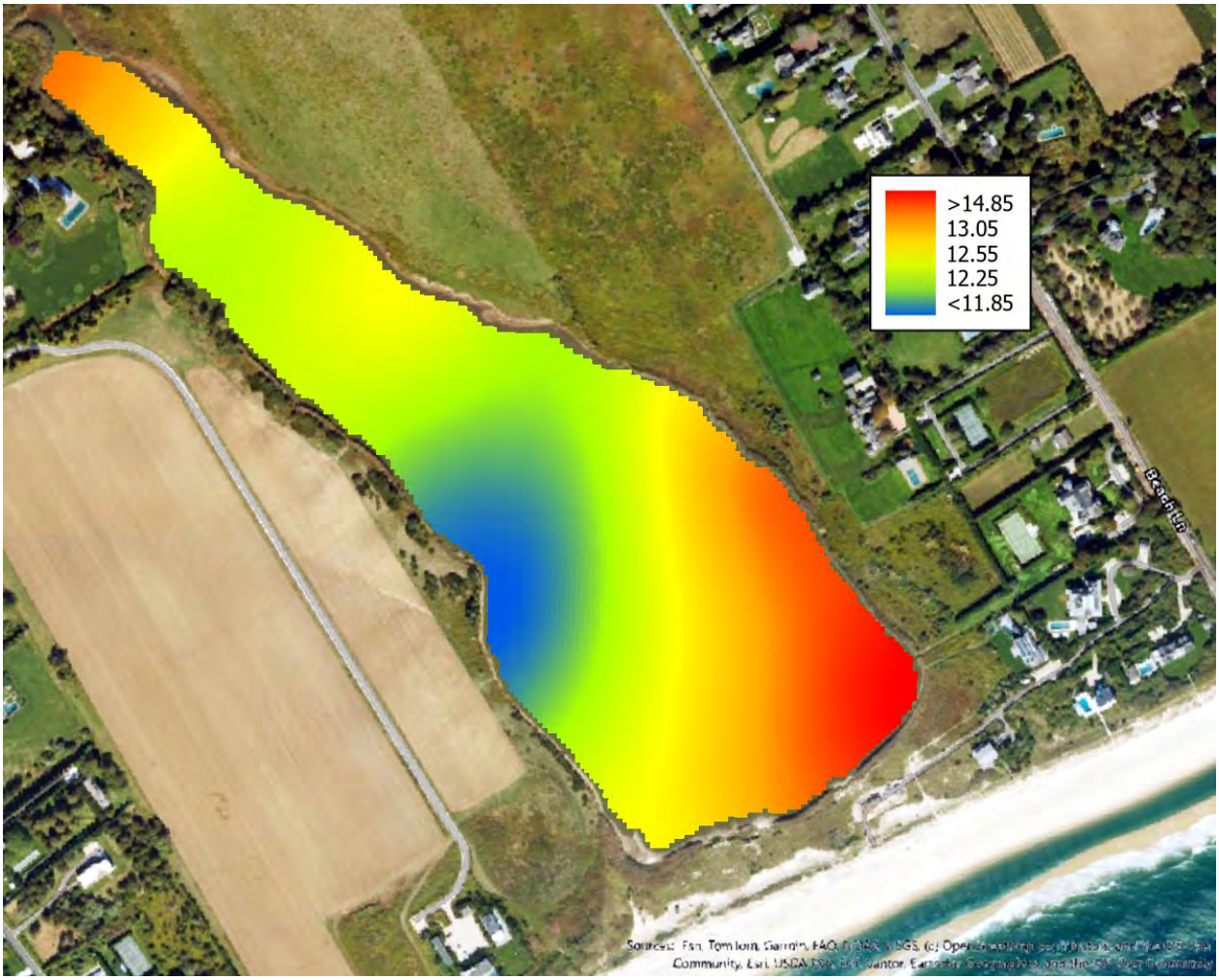


Figure 100. Interpolation of dissolved oxygen (mg/L) in Wainscott Pond.

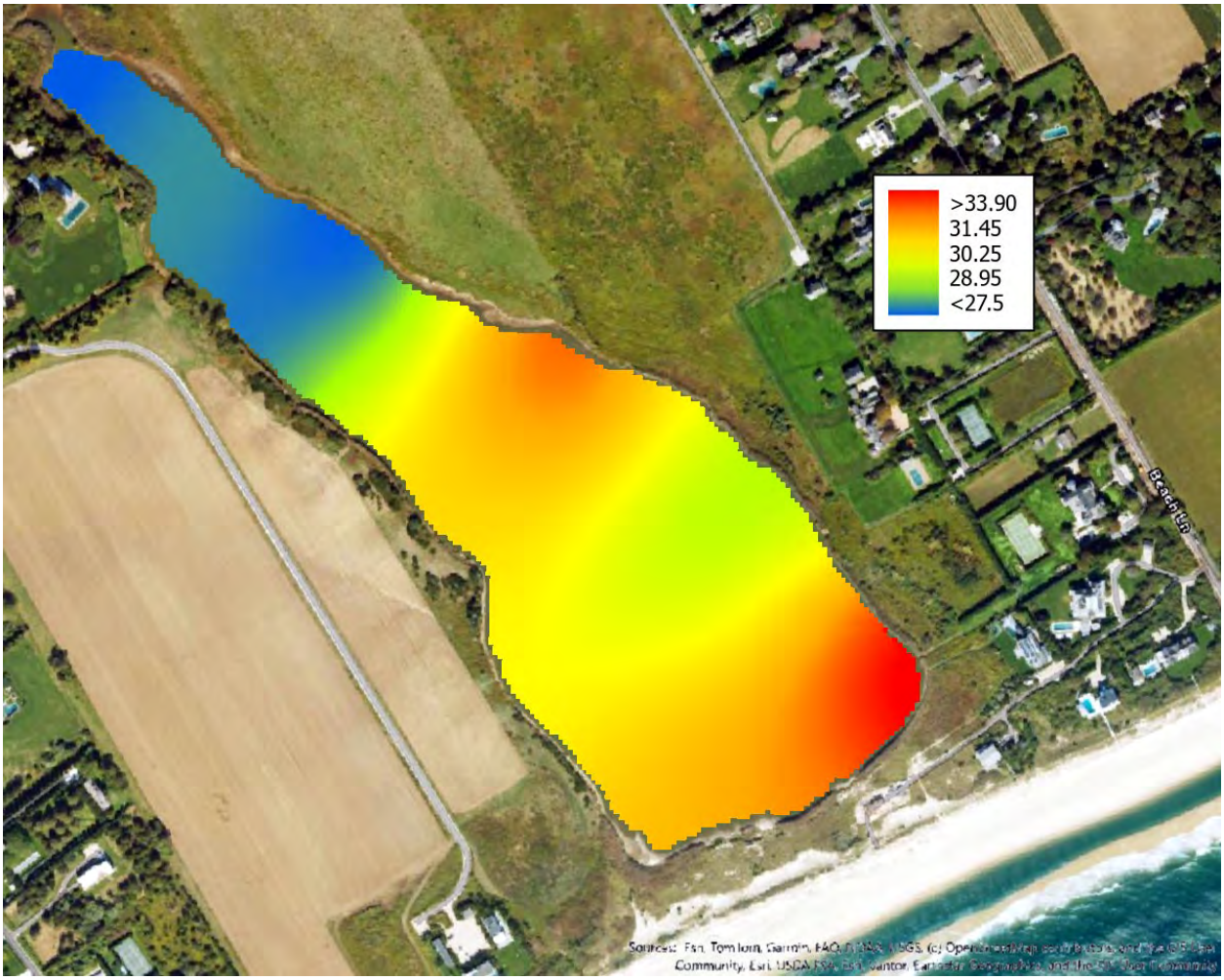


Figure 101. Interpolation of chlorophyll-*a* (µg/L) in Wainscott Pond.

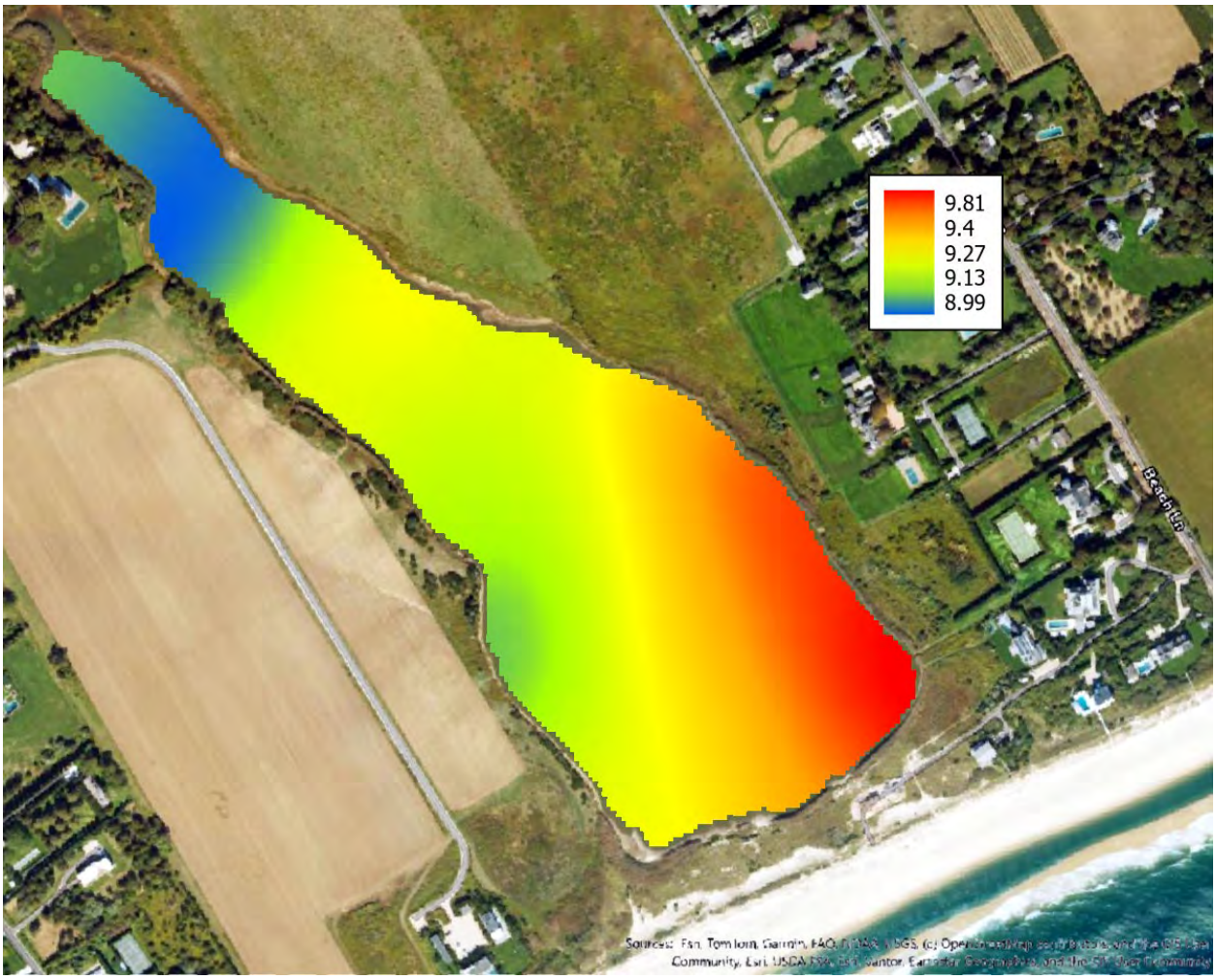


Figure 102. Interpolation of pH in Wainscott Pond.

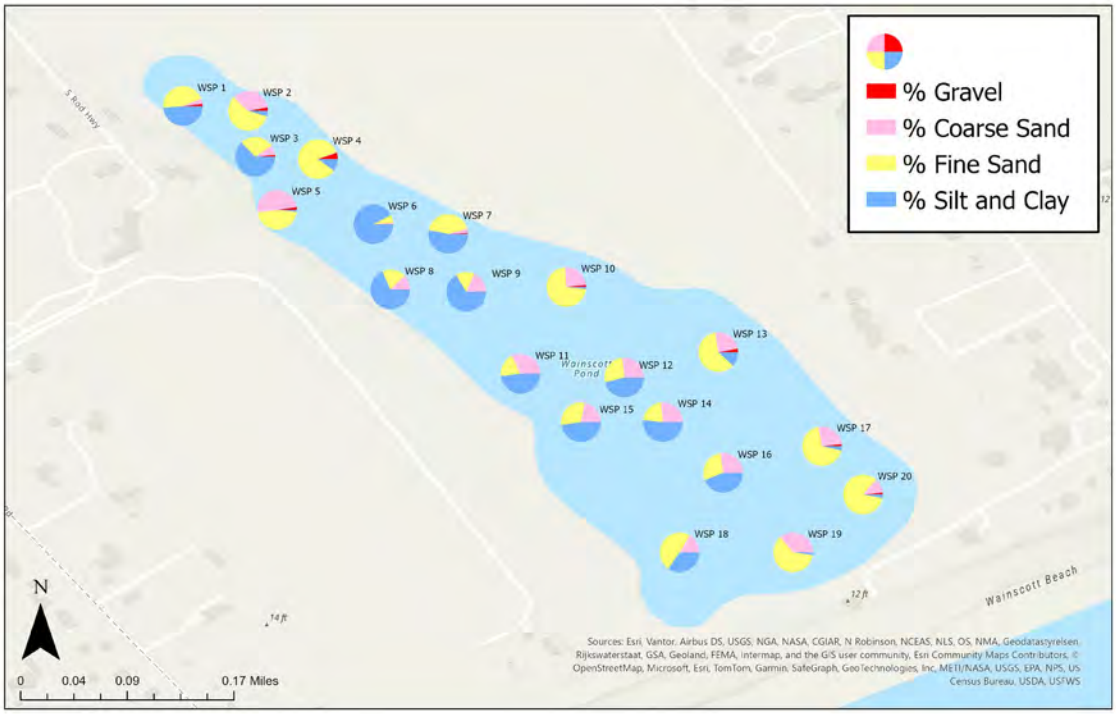


Figure 103. Wainscott Pond sediment composition.

Figure 104. Wainscott Pond bloom 7/23/25

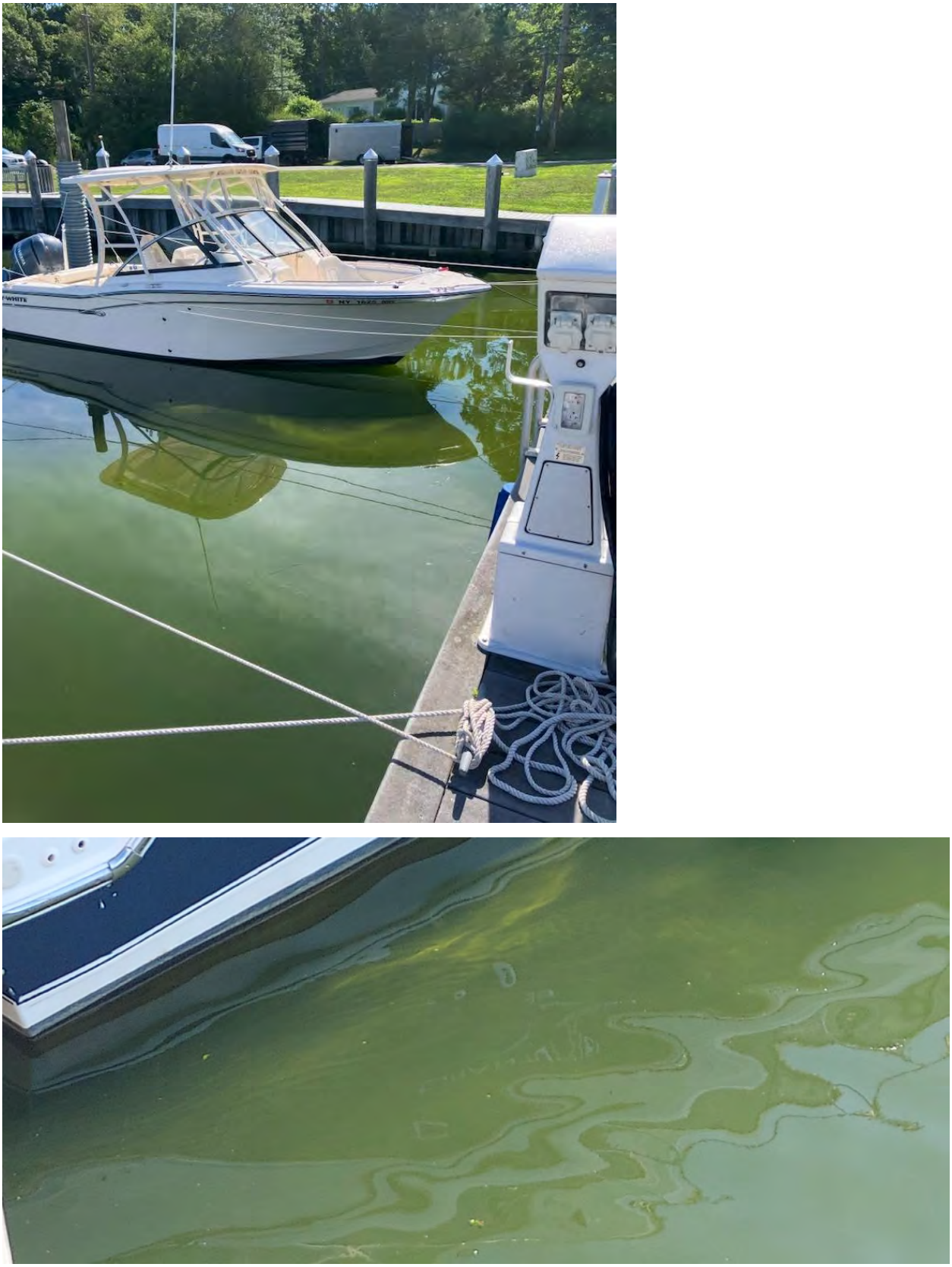


Figure 105. Three Mile Harbor Bloom 7/22/25

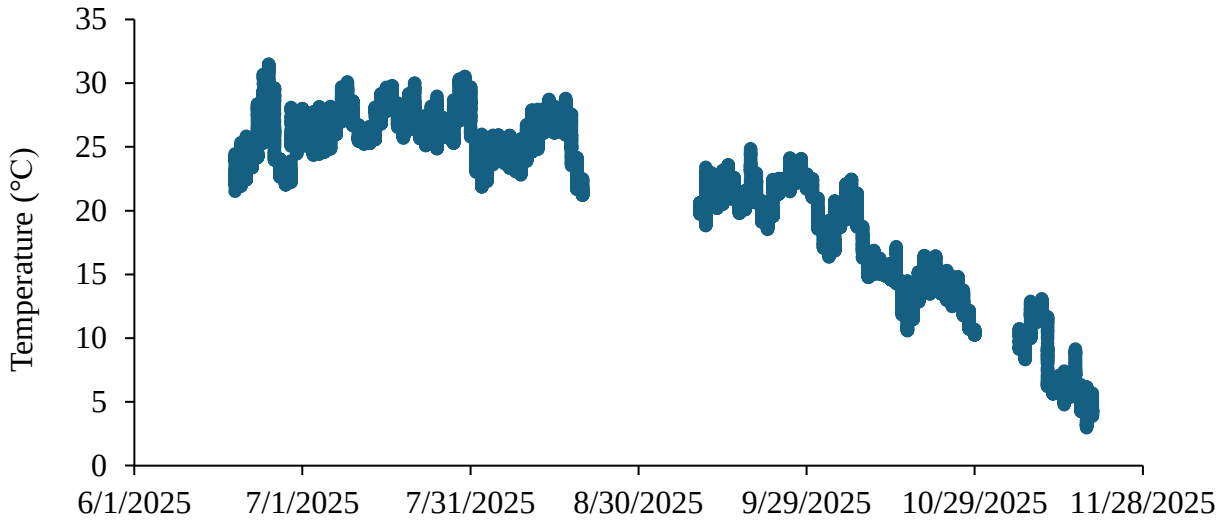


Figure 106. Continuous measurements of temperature (°C) in Wainscott Pond during 2025. Gaps in graph were when sensors were malfunctioning, and no data was recorded.

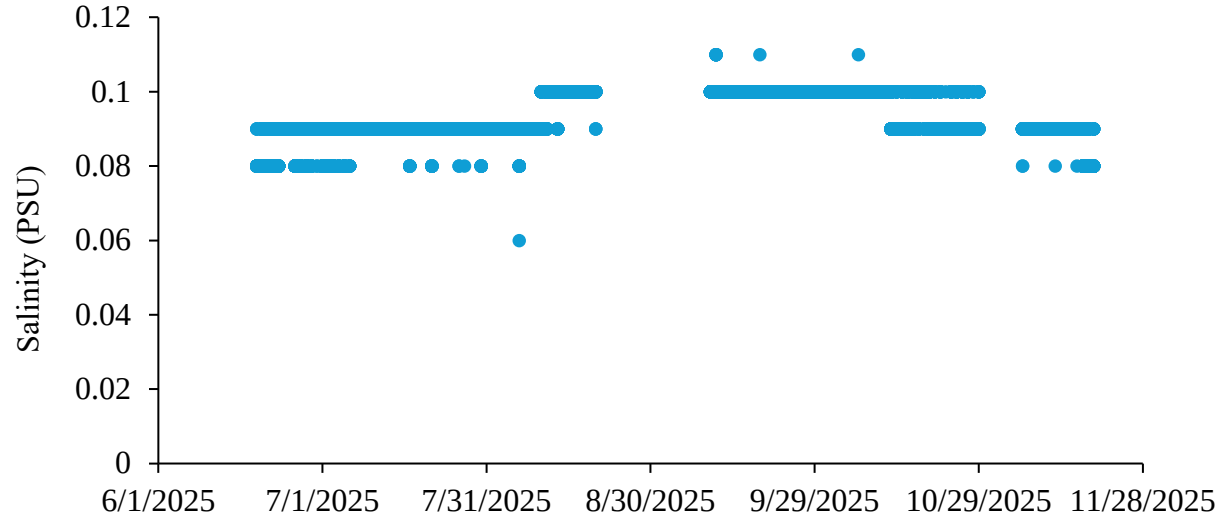


Figure 107. Continuous measurements of salinity (PSU) in Wainscott Pond during 2025. Gaps in graph were when sensors were malfunctioning, and no data was recorded.

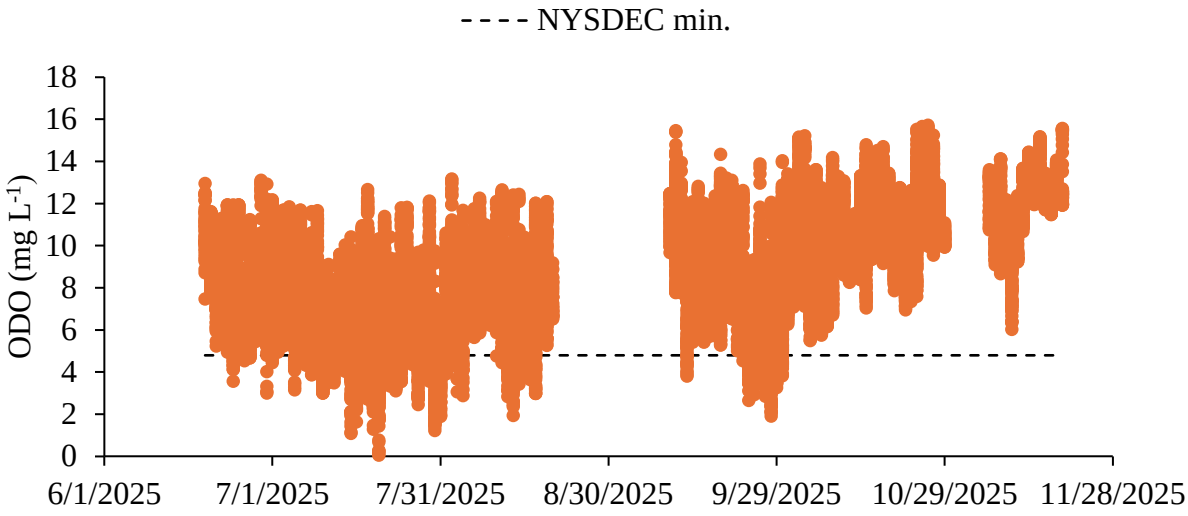


Figure 108. Continuous measurements of dissolved oxygen (mg/L) in Wainscott Pond during 2025. The dashed line represents the NYSDEC minimum for dissolved oxygen (4.8 mg/L). Gaps in graph were when sensors were malfunctioning, and no data was recorded.

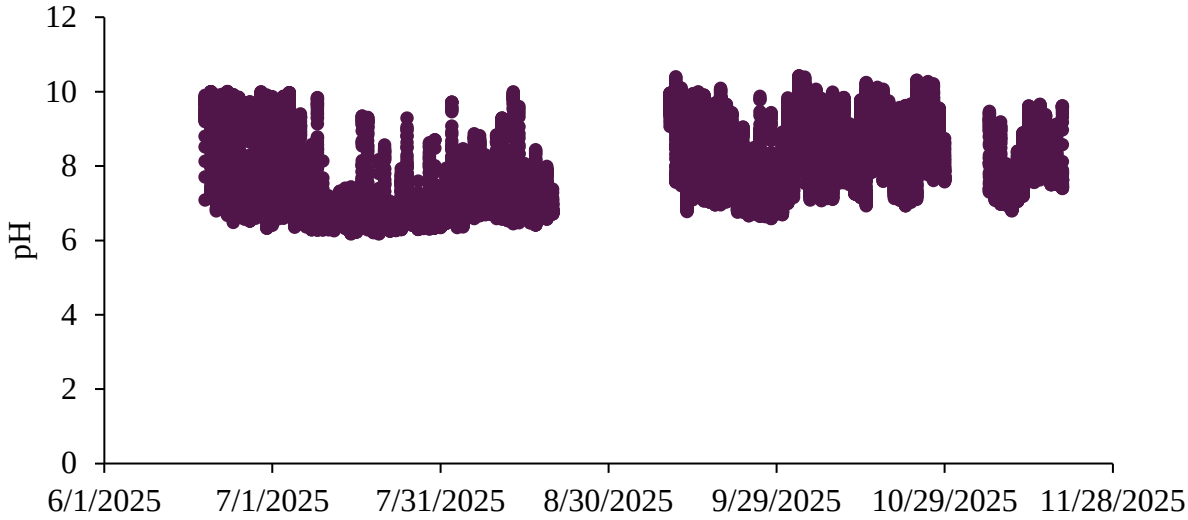


Figure 109. Continuous measurements of pH in Wainscott Pond during 2025. Gaps in graph were when sensors were malfunctioning, and no data was recorded.

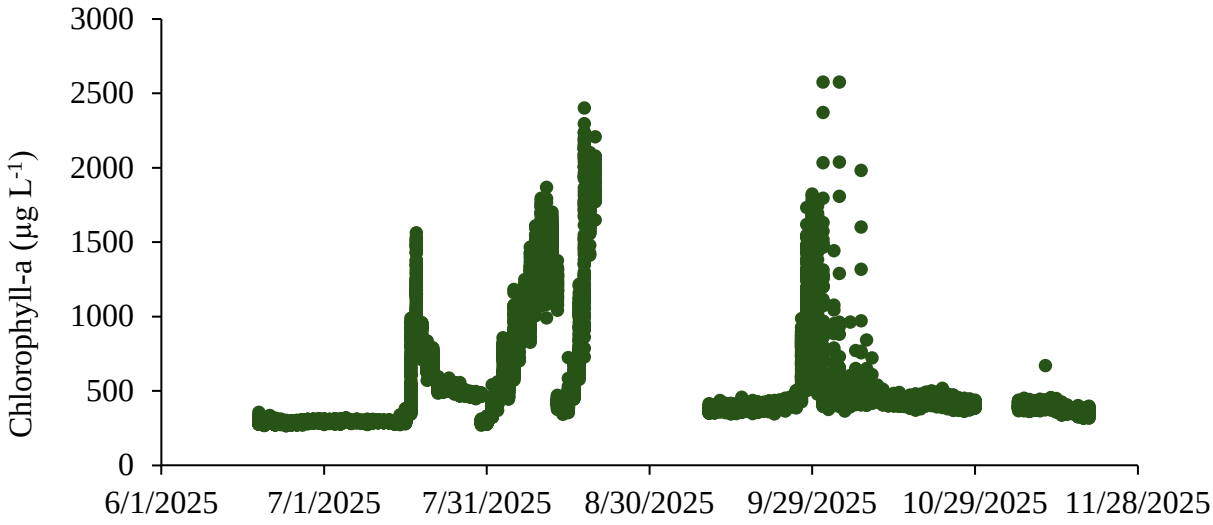


Figure 110. Continuous measurements of chlorophyll-a in Wainscott Pond during 2025. Chlorophyll-a values were adjusted based on a linear regression ($R^2 = 0.87$) with the discrete BBE FluoroProbe data of total chlorophyll-a. Gaps in graph were when sensors were malfunctioning, and no data was recorded.

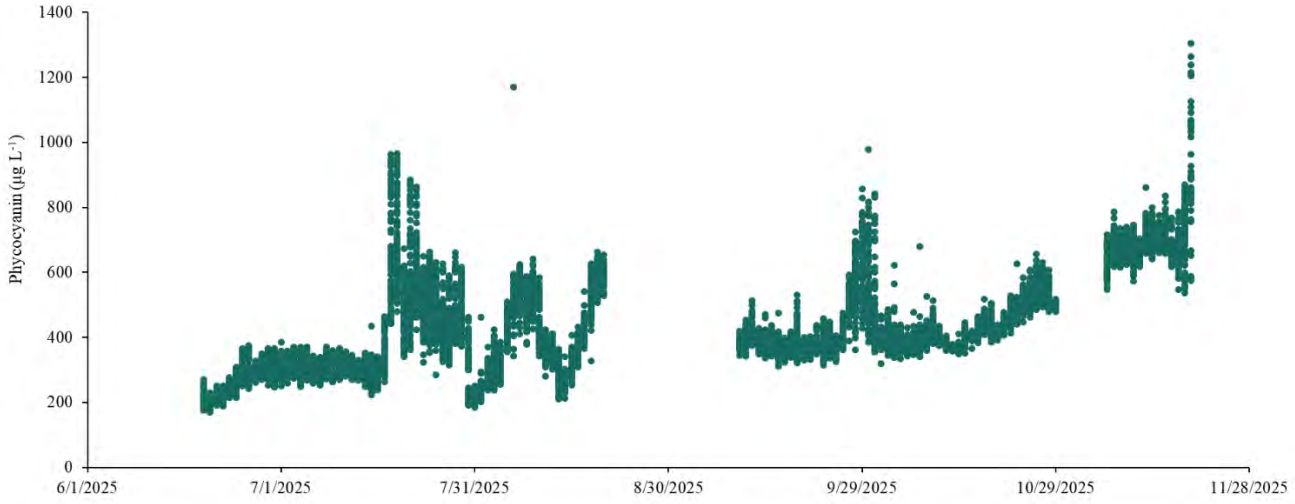
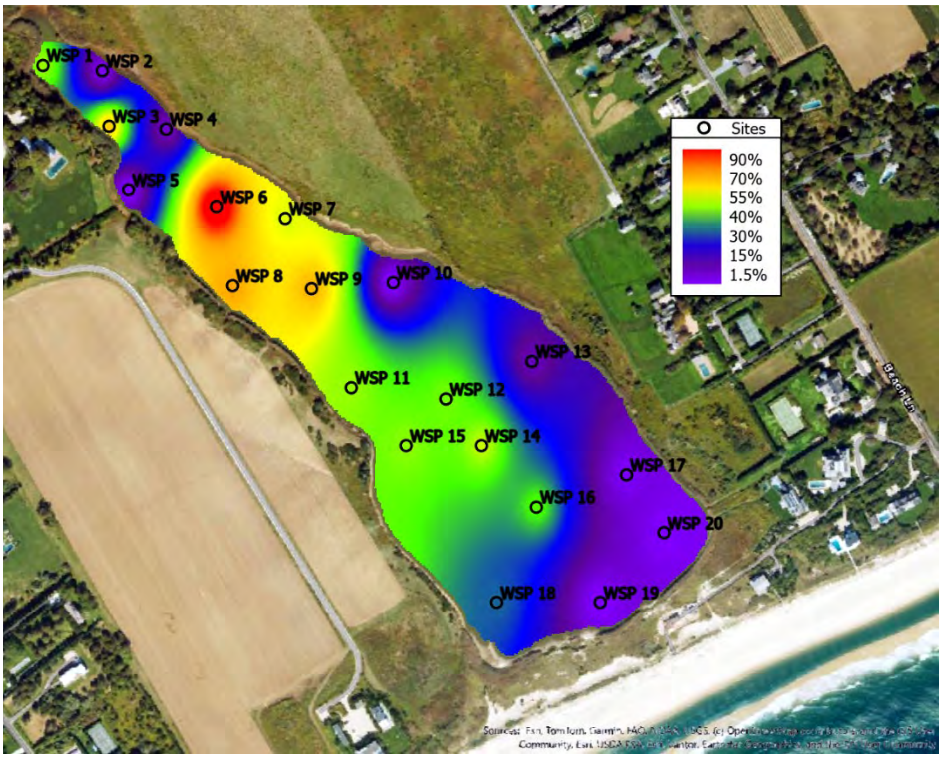


Figure 111. Continuous measurements of phycocyanin in Wainscott Pond during 2025. Phycocyanin values were adjusted based on a linear regression ($R^2 = 0.98$) with the discrete BBE FluoroProbe data of bluegreen algae. Gaps in graph were when sensors were malfunctioning, and no data was recorded.

A



B

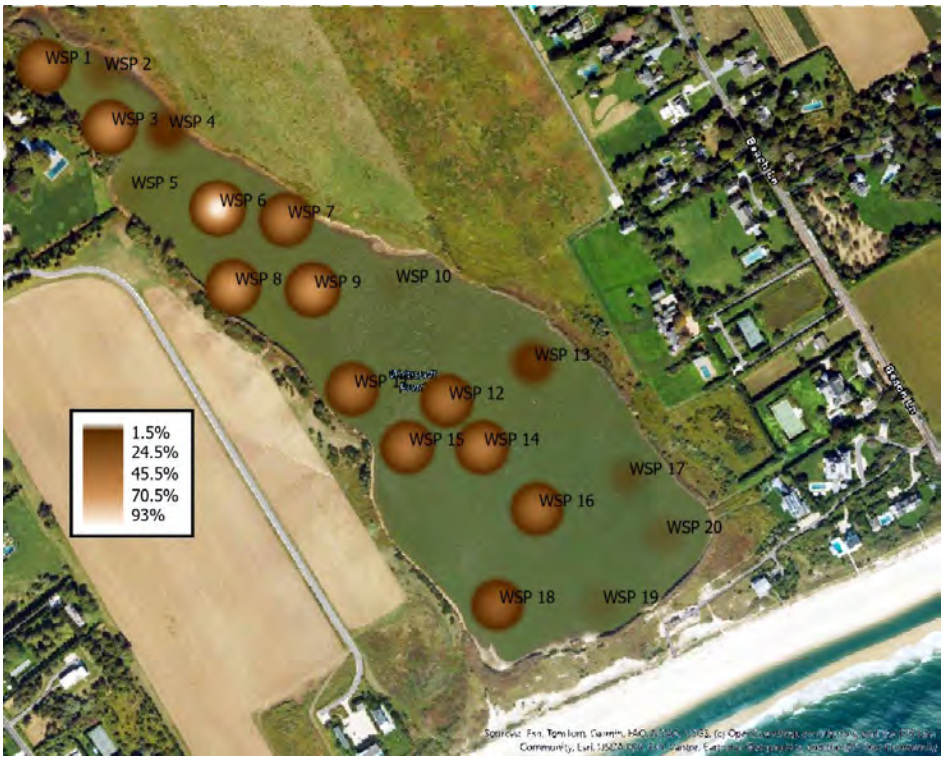


Figure 112. (A) % Silt/clay heat map vs (B) % organic matter

Figure 113. Big Reed Pond bloom 9/28/25

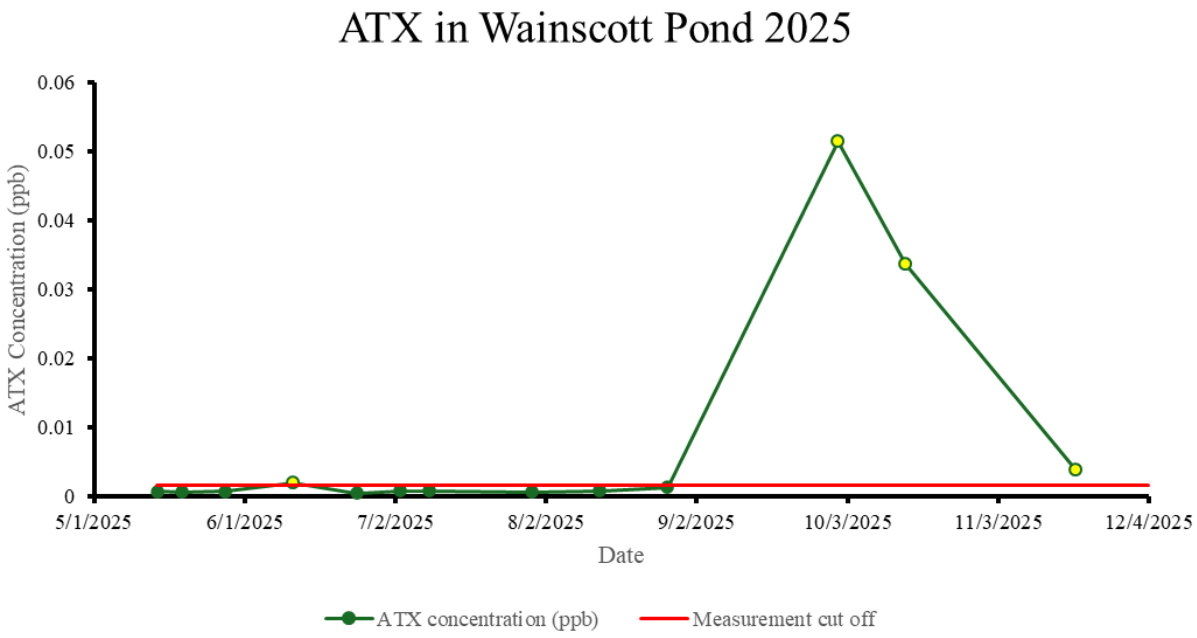


Figure 114. Anatoxin time series for Wainscott Pond 2025