

October 29, 2025

Town of Concord
Division of Natural Resources
141 Keyes Road
Concord, Massachusetts 01742

**RE: 2024-2025 Summary of Findings - Ecological Restoration of White Pond's Water Quality
HEA Project No. 03136**

This letter report serves to summarize our activities, data and findings for ecological restoration services completed by our firm, Higgins Environmental Associates, Inc. (HEA) in Year 2024 through June 2025 at White Pond in Concord, Massachusetts in accordance with our Proposal No. 10220E dated June 27, 2024. Ecological restoration focused on permanently removing and reducing health risks associated with cyanobacteria also referred to as harmful algae blooms (HABs) or blue green algae (BGA) collectively "cyanoHABs" and excess nutrients and cyanotoxins from White Pond. Ecological restoration work was completed by passively harvesting and removing cyanobacteria from White Pond using a technology called the A-Pod (U.S. Patent No. 10,745.879). The Town of Concord purchased two Sentinel A-Pods in 2024 and training for operation and use of these was provided to the Town by HEA in June and July 2025.

To assist in HEA's evaluation and for the benefit of Concord, we have also included a summary of significant milestones achieved by HEA and passive harvesting with the A-Pods since 2021 at White Pond, initially for the National Science Foundation (NSF) field trial and then for Concord. A summary of field information from 2021 to early 2025 is provided in **Table 1 - Monthly Field Data Summaries**. Laboratory data for surface water sampling are summarized on **Table 2 - Surface Water Sampling Results**. Laboratory results for suspended solids, benthic algae, cyanoHABs, tree pollen and forest particulates, and sediment are summarized on **Table 3 - Recovered Solids and Sediment Sample Results**. Laboratory datasheets for samples collected in 2024 and 2025 are attached. HEA has provided detailed summary reports to the Town of Concord for work completed in 2022 and 2023. Monthly charts of water quality sonde data for 2024 are attached. Results in June 2025 were consistent with prior spring results since 2023.

The remainder of this letter report is broken down by section to aid the reader in understanding work completed and results achieved

2021-2025 SIGNIFICANT ECOLOGICAL, HEALTH AND RECREATIONAL MILESTONES ACHIEVED

As documented by information (field data and laboratory testing results) provided with this and prior summary reports, significant ecological restoration milestones have been achieved at White Pond as follows:

Control and Removal of CyanoHABs and Excess Nutrients

From the Fall of 2021 through 2022, an estimated 388.5 dry to moist pounds of cyanoHABs were permanently and sustainably removed from White Pond and biodegraded on land in a controlled manner. By laboratory analysis and weight of cyanoHABs removed, this equated to 0.97 pounds (0.44

kilograms) of phosphorus removed from the pond.

A fifty one percent (51 %) reduction in cyanoHAB biovolume (e.g., cyanoHAB biomass by water body volume) was achieved for White Pond from October 2021 to October 2022. As such, the total biomass of cyanoHABs in White Pond prior to removal using the A-Pods represented approximately 2 pounds of phosphorus. In 2021, cyanoHABs were the dominant phytoplankton specie to a depth of 50 feet in this 42 acre, 63 foot deep glacial kettle pond.

In 2023, a total of 349 pounds of primarily tree pollen and forest particulates were removed using the A-Pods with nominal cyanoHAB biomass content. Based on laboratory analysis, this represented a removal of 1.09 pounds of phosphorus.

In 2024, a total of 603 pounds of primarily tree pollen and forest particulates with nominal cyanoHABs biomass were removed which corresponded to a total of 0.70 pounds of phosphorus.

Although a larger amount of tree pollen and forest particulates (dry deposition) were removed in 2024 than prior years, the concentration of phosphorus by laboratory analysis in 2024 was approximately one third the concentration as in prior years, **Tables 1 and 3**.

In 2025, a total of 132 pounds of tree pollen with nominal cyanoHAB biomass was removed by the end of June using the A-Pods. Based on laboratory analysis, this represented 0.30 pounds of phosphorus. Based on observations and weight of pollen recovered with the A-Pods, 2025 was the lightest pollen year since 2021. Additional phosphorus will likely be removed as forest particulates for the remainder of the 2025 season.

In summary, based on laboratory analysis and measured amounts of phosphorus removed using the A-Pods as primarily pollen and forest particulates, annually recurring dry deposition (a non-point source of nutrients) would otherwise be sufficient in and of itself to support growth and potential health risks associated with cyanoHABs if not removed. Importantly, early season dry deposition also occurs in an otherwise clear-water, low nutrient time of the year for water bodies like White Pond and allows shallow water, ultraviolet light tolerant cyanoHAB species such as *Microcystis* and *Dolichospermum* to become a biovolume-dominant form by out competing other types of cyanoHABs and phytoplankton for these nutrients.

Control of Health Risks Posed by CyanoHABs

Board of Health restrictions or advisories for water contact were not required or issued in 2022 through present (July 2025 end of contract) when A-Pods were in-place and functioning to control and remove cyanoHABs, cyanotoxin health risks and excess nutrients notably from dry deposition (tree pollen and forest particulate). Health risks and water use restrictions had been posted annually for approximately five years at White Pond before use of the A-Pods to reduce risks and improve water quality.

Aquatic Habitat and Water Quality Improvements

Water clarity improved by approximately five feet in 2022 during cyanoHAB removal versus the prior 30-year median and water clarity improvements were sustained through 2023. In 2024, water clarity dropped to a seasonal median of 18.1 feet; attributed to particularly heavy tree pollen deposition. In 2025, water clarity was consistent with prior spring seasons and less tree pollen deposition was trapped and removed (132 pounds) than in 2024.

In 2023, the zooplankton population at White Pond had a higher biomass than observed by HEA at our reference station, Walden Pond. Similar types of zooplankton were observed at both ponds. By laboratory analysis of shallow (3 foot) and deep (30-50 foot) water samples, the phytoplankton community at White Pond in 2023 was diverse and not dominated by cyanoHABs.

A sustained increase in the depth of cold water suitable dissolved oxygen content occurred after removal of the dominant cyanoHAB biomass in 2021-2022. HEA attributes this to increased photic activity of the naturally-occurring, extensive benthic meadows at White Pond as a result of water clarity improvements by cyanoHAB removal in 2022. Cold water fisheries at White Pond had approximately five feet more favorable conditions than prior years.

Recreational Use and Water Body User Feedback

HEA continues to receive positive, unsolicited feedback from pond users (swimmers, fisherpeople) and residents around the pond. Feedback indicates the quality (improved water clarity; lack of health closures and cyanoHAB scums) of White Pond is the best people have seen in 30 years or more.

SIGNIFICANT FINDINGS

1. Passive Harvesting: A-Pod use allowed for quantifying the amount in pounds of nutrients and suspended solids (cyanoHABs and dry deposition of tree pollen and forest particulates) removed from White Pond.

CyanoHAB removal: The 2021-2022 removed biomass of cyanoHABs weighed out at 388.5 pounds with a phosphorus content of 0.97 pounds and corresponded to a 51 percent reduction in cyanoHAB biomass measured with multiparameter sonde vertical profile surveys within the pond biovolume. Pounds of phosphorus removed combined with a biomass decrease of cyanoHABs of 51 percent indicates a total cyanoHAB biomass phosphorus content in White Pond, before removal of cyanoHABs, of approximately 2 pounds.

Dry deposition removal: The non-point source nutrient loading content of dry deposition (tree pollen and forest particulates) removed in 2023 and 2024 with the A-Pods represented 70 percent or greater (0.70 to 1.09 pounds of phosphorus) of the 0.97 pounds of phosphorus in cyanoHABs removed from October 2021 to October 2022 (*i.e.*, equated to a 51 percent reduction of previously dominant cyanoHAB biomass).

2. Dry deposition, similar to USGS findings (Colman et al, 2001, USGS) for Walden Pond (*i.e.* 47 percent of annual non-point source loading by phosphorus calculated to be from dry deposition of tree pollen and forest particulates) represents a significant source of annually-recurring, non-point source nutrient loading to White Pond; more than enough to promote cyanoHAB dominance if not controlled and removed.

Dry deposition of tree pollen in particular also occurs early in the otherwise low-nutrient “clear water” surface water quality season (May to June). HEA’s work at White Pond documented that early season pollen can be rapidly colonized as a nutrient source by cyanoHABs to increase their own biomass. CyanoHABs in shallow water with a high tolerance for ultraviolet (UV) light, such as *Microcystis* and *Dolichospermum* as noted at White Pond, can utilize this early-season nutrient loading source more readily than other, less UV-tolerant cyanoHABs.

The biomass, duration and annual frequency of nutrient-rich tree pollen production has been steadily increasing since 1990 due to climate change. Based on laboratory analysis, tree pollen and cyanoHABs at White Pond contained similar amounts of nutrients (carbon, iron, nitrogen, phosphorus and sulfur).

3. Recommendation: Annual removal of dry deposition using the A-Pods, particularly from May to June, should limit the development of health risks posed by cyanoHABs. It is also easier and safer to focus on removing this early season nutrient source as opposed to removing cyanoHABs that may otherwise develop later in the season.
4. After removal of the dominant cyanoHAB specie (*Microcystis*) in 2021-2022, a more diverse population of phytoplankton including cyanobacteria at depth, were documented in 2023. Water quality and aquatic habitat were improved by increases in both water clarity and dissolved oxygen content following removal of previously dominant cyanoHABs from the pond.
5. Based upon seasonal sediment gravity core sampling and laboratory analysis combined with reference to chronological dating of sediment layering by others, internal loading of nutrients from pond sediments, despite a relatively high nutrient content for phosphorus, is not occurring sufficiently to impact water quality or to be interpreted as a source of internal loading of concern. Part of this is due to lower ratios of sulfate/sulfide concentrations relative to iron in both sediment and surface waters compared to other water bodies where internal loading, caused by higher amounts of sulfur to iron are present.

Importantly, the seasonal flux of phosphorus from sediment to surface water was also determined to be negative (a loss from surface water and binding with sediment over time). It may be that testing of upper sediment layers for available, amenable or “free” phosphorus would indicate that internal loading was occurring, but the seasonal flux (gaining or losing to surface waters) combined with lower ratios of sulfur to iron determines availability and uptake of phosphorus from sediment to surface water. Settling of nutrient-rich dry deposition, detritus and seston and non-seasonal assessment of internal loading (non-flux), may also lead to a bias that phosphorus is more available to surface water than is actually occurring over time. The in-place, soft sediment nutrient profile with sediment depth and age at White Pond also documented sedimentation (loss) of phosphorus over the past 1,500 hundred years at White Pond.

6. Despite a lack of inlets or outlets, White Pond has water currents that can be leveraged as part of passive harvesting using the A-Pods. Water currents and patterns were assessed using multiple hydrologic drogues deployed within the top 2 feet, at 4 feet and at 10 feet below the water surface with movements tracked over time. The direction and pattern of shallow water flow at White Pond was primarily clockwise (at 4 to 8 feet per minute depending upon depth). Only nominal flow was measured at 10 feet below the water surface.

These water flow patterns and characteristics are not unique or uncommon as they relate to the interaction of a water body’s internal conditions and forces (bathymetry, frictional forces, turbulence, shoreline morphology, water pressure and density) with external forces (wind direction, duration-strength and fetch, coriolis effect on large water bodies). The patented A-Pod technology uses these common natural water flow patterns to passively and sustainably trap and remove suspended solids like the cyanoHABs, early season tree pollen and ongoing forest particulate non-point nutrient sources.

7. Extensive beds of benthic, rooted algae, were, similar to Walden Pond, documented at White Pond. These “benthic meadows” would serve as important sinks for nutrients, as documented by laboratory analysis (**Table 3**) in addition to increasing biodiversity, habitat and improving water quality by their photosynthesis and increase in dissolved oxygen content of surface waters. Notably, benthic meadows were documented to a depth of approximately 45 feet, well below the secchi disc water clarity depth between 18 to 24 feet. While not visibly apparent to most people, it is important to safeguard and preserve the benthic meadows at White Pond.

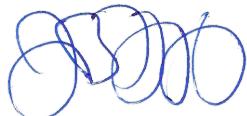
REFERENCES

Any references to work or findings by others are fully documented in HEA’s prior 2023 and 2024 annual summary reports provided to the Town of Concord for White Pond.

HEA has appreciated the opportunity to work with the Town of Concord on reducing health risks posed by cyanoHABs and sustainably improving the aquatic habitat and water quality of White Pond.

Sincerely,

Higgins Environmental Associates, Inc.



Jonathan B. Higgins, C.P.G., LSP
Principal Earth Scientist

Attachments:

- Figure 1** - White Pond showing A-Pod location, bathymetry and mapped water currents
- Table 1** - 2021 to 2025 Monthly Field Data
- Table 2** - Surface Water Laboratory Results
- Table 3** - Benthic Algae, Pollen, Trap Residue and Sediment Laboratory Results

Charts of 2024 Monthly Sonde Vertical Profile Data

- (BGA-Phycocyanin; Chlorophyll a; dissolved oxygen; oxidation-reduction potential; pH; temperature; and, water clarity.

Laboratory Datasheets for samples from 2024 and 2025 (WP-Pollen and A-Pod Residue)

D:/Projects/03136/2024-2025 Summary Report fnl.wpd
October 29, 2025 at 8:49 AM



White Pond

40 Acres

Concord

Concord River Watershed

Coordinates: 71°23'14" W 42°25'44" N

USGS Quad: Maynard

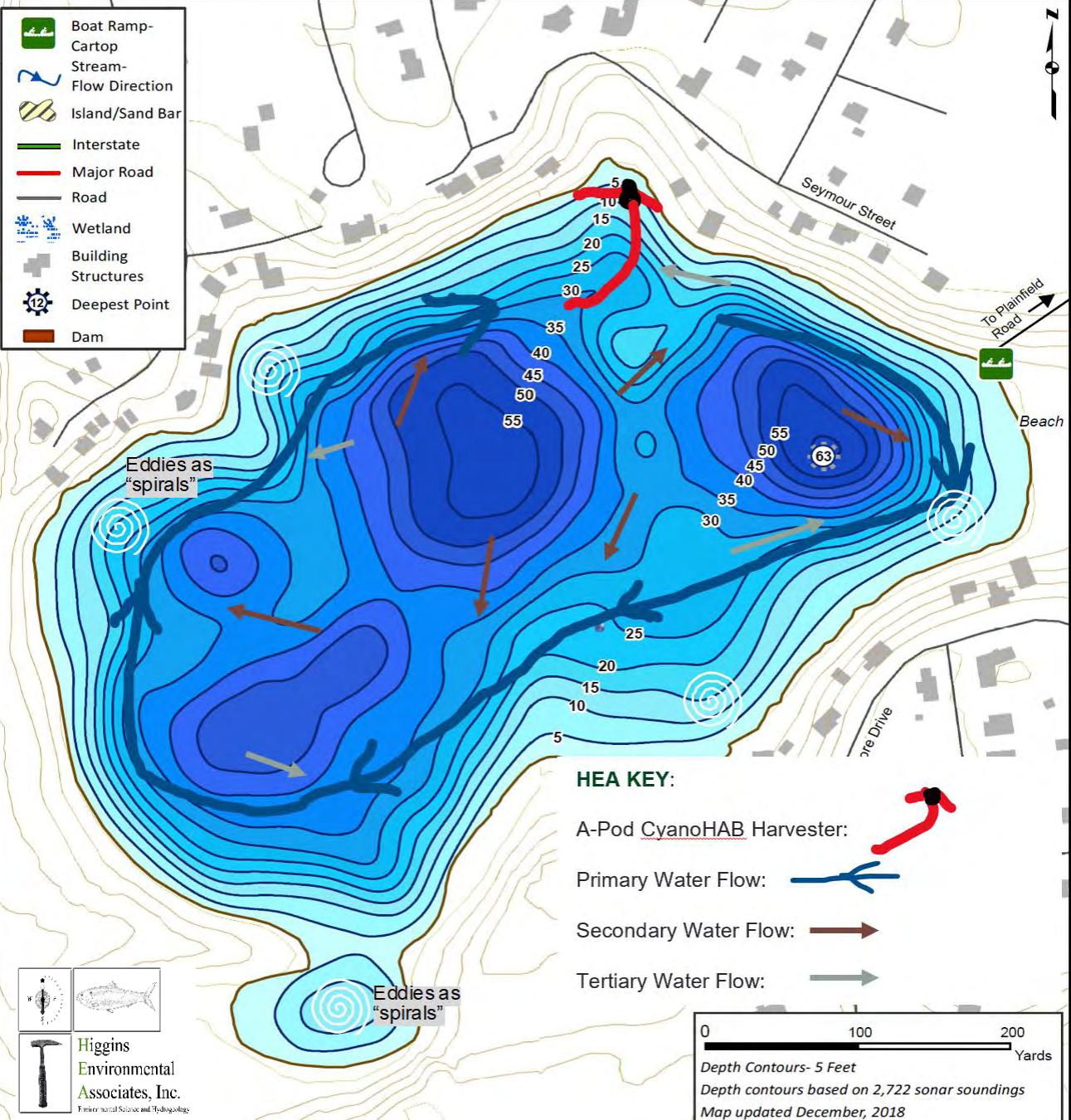


TABLE 1 - 2021-2025 MONTHLY FIELD DATA SUMMARIES FOR WHITE POND RESTORATION with A-Pods - EMPHASIS ON CYANOBACTERIA DATA

| White Pond Monthly Records | Toxic Cyanobacteria Data Pounds Recovered (monthly) | Maximum Field BGA-PC A-Pod Trap | Maximum Field Chi-s A-Pod Trap | C-Pod Field PC and Cyanotoxins Field Sonde PC | Field BGA-PC (Chi-s) Open Water - @ 3 feet | Open Water lab PC and Cyanotoxins Lab PC | Wade- Water Clarity (Secchi depth in Feet) Lab Cyanotoxins | White P. - Water Clarity (Secchi depth in Feet) | Depth to Sediment Depth in Feet | CyanoHAB Scums In Pond? |
|----------------------------|---|--|--------------------------------|---|--|--|--|---|---------------------------------|-------------------------|
| Units of Measurement | U.S. Pounds | RFUs | RFUs | ug/L | ug/L | RFUs | ug/L | Feet | Feet | Visual |
| 1987-2014 Data (by others) | None | Not Measured | | Not Applicable | Not Applicable | Not Measured | Not Measured | | Median of 6 Meters[19.6ft] | Yes |
| 2021 HEA White Pond Data | | | | | | | | | | |
| July (7/16/21 East Hole) | No A-Pod | No A-Pod | | No A-Pod | No A-Pod | 2.32 | | | Not measured | Yes |
| August (8/26/21 East Hole) | No A-Pod | No A-Pod | | No A-Pod | No A-Pod | 2.39 | | | Not measured | Yes |
| October (10/7 Center Hole) | 40 | 9.7 (Oct. 7) | | 221.03 | | 2.14 | 4.27 | | Not measured | Yes |
| October (10/14 Trap) | 60 | 131.5 (Oct. 14) | | 8689 | 35.9 Microcystin | | | | Not measured | Yes |
| Year 2021 | 100 (estimate) | 131.6 | | 8689 | 35.9 Microcystin | 2.28 | 4.27 | | | Yes |
| 2022 HEA White Pond Data | | | | | | | | | | |
| May (5/5 East Basin) | None | | | | 1.69 | | | | 31 | 61.9 |
| June (6/2 Center Basin) | 75 | 13.46 (Jun. 14) | 7.23 | Not Detected | 1.96 | 1.92 | Not Detected | | Not measured | No-Pollen |
| July (7/13 East Basin) | 110 | 24.86 (Jul. 5) | | | 2.68 | | | | 16.5 to 18.3 | 62.6 |
| August (8/16 East Basin) | 35.5 | 18.57(Aug. 20) | 17.2 | 0.08 Anatoxin | 1.88 | 2.38 | Not Detected | | 18.3 to 20.1 | 60.2 |
| September(9/8 East Basin) | 8 | 10.32 (Sept. 27) | | | 1.55 | | | | 19.6 to 22.5 | 58.7 |
| October (10/12 East Basin) | 40 | 53 (Oct. 16) | 113.24 | 0.802 Microcystin | 1.07 | 2.61 | Not Detected | | 32.6 | 61.9 |
| November (11/9 East Basin) | 20 | 7.76 (Nov. 2) | | | 1.20 | | | | 20 to 27.6 | 60.4 |
| December (12/5 East Basin) | A-Pod removed 11/22/22 | Not applicable | | Not applicable | Not applicable | 1.05 | | | Not measured | 59.2 |
| Year 2022 | 288.5 | 53 | 113.24 | 0.802 Microcystin | 1.64 | 2.61 | Not Detected | | Median of 24.2 | 60.4 |
| 2023 HEA White Pond Data | A-Pod Setup May 11-12 | | | | | | | | | |
| May (5/8-12 East Basin) | None (Tree Pollen increasing) | 0 | 0.0244 | | 0(0.0) | | | | 33.7 | 19.9 |
| June (6/5 East Basin) | 382 (pollen has Microcystis zoning) | 0 | 6.558 | | 0(0.359) | | | | 15.6 | 21.8 |
| June 20th A-Pod | Pollen with cyanobHABs | 0.385 | 6.811 | | | | | | | No |
| June 20th C-Pod | Pollen, Pond Water and cyanoHAB | 54.75 ¹² | 6.31 ¹² | 54.755 RFUs ¹² | 7.9 Microcystin ¹² | | | | | |
| June 24th C-Pod | Pollen, Pond Water and cyanoHAB | 185.955 ¹² | 6.796 ¹² | 185.955 RFUs ¹² | 52.9 Microcystin ¹² | | | | | |
| June 24th A-Pod | Pollen with cyanobHABs | 10.26 | 6.885 | | | | | | | |
| July (7/5 East Basin) | 24 (pollen and detritus) | 1.626 | 7.253 | | 1.46(0.0) | | | | 25.1 | 28.3 |
| August (8/2 East Basin) | 1.48 (Aug 9th) | 0.516 (Aug 9th) | | 3.40 (0.004518313) | | | | | 20.4 | 24.2 |
| September(9/6 East Basin) | 2.63 | 1.008 | | | 2.87(0.0) | Sep 12th lab samples algae ID | | | 26.6 | 62.28 |
| October (10/3 East Hole) | 23 A-Pod trap residue (no HABs) | 0 | 0.6901 | | 0.72(0.0) | | | | 25.5 | 25.1 |
| November (11/6 East Basin) | | 0 | 0.653 | | 0(0.000664315) | | | | 23 | 62.93 |
| Year 2023 | 349 pollen and detritus in traps | 10.26 (A-Pod 186(Cpod) ¹³) | 3.955 | max. 185.955 | max. 52.9 | mean 0.89(0.052) | Concord BOH testing low BOH low | Median 25.3 | Median 24.2 | Median 62.57 |
| 2024 HEA White Pond Data | A-Pod Setup May 29 | | | | | | | | | |
| May 29th East Basin | Tree Pollen being trapped | 0 | 0.00846 | | 0(0.012) | | | | | 61.7 |
| June 5-11th A-Pod/Basin | 467 Tree Pollen | 0 | 0.0068 | | 0(0.359) | Sampled trap pollen | | | | No |
| June 15th A-Pod/Basin | 30 Pollen in traps | 0 | NT | | 0(NT) | | | | 15.5 | No |
| June 18th A-Pod/Basin | less pollen in traps | NT | 0.0049 | | | | | | 18 | No |
| June 26th East Basin | 22 pollen and forest part. | NT | NT | | 1.68(0.002) | | | | 18.7 | 55.2 |
| July 2nd A-Pod/periimeter | Little pollen and forest part. | 1.62 | 1.76 | | | perimeter survey | | | | No |
| July 8th A-Pod | 15 Forest particulates | 1.21 | 0.035 | | | | | | | No |
| July 16 A-Pod | 30 Forest particulates | 2.01 | 1.33 | | 2.02(0.000) | | | | 17.1 | No |
| July 24 A-Pod | 15 Forest particulates | 1.83 | 1.43 | | | | | | | No |
| July 31 A-Pod | 5 Forest particulates | 1.23 | 1.42 | | | | | | | No |
| August 7 A-Pod/Basin | 0.99 | 1.73 | | 1.73(0.000) | | | | | 19 | No |
| August 22 A-Pod/Basin | non HAB Scum in traps | 0.81 | 2.55 | | 1.26(0.000) | | | | 15.1 | 60.3 |
| September 10 A-Pod/Basin | 14 forest part and non HAB scum | 0.65 | 4.39 | | 0.48(0.000) | | | | 18.4 | 63 |
| Oct 8 A-Pod/Basin | | 0.23 | 2.7 | | 1.12(0.47) | | | | 20.4 | No |
| Nov 7 A-Pod/Basin | | 0.42 | 0.011 | | 0.93(0.26) | Sampled trap residuals | | | 19.9 | 65 |
| Dec 5 A-Pod | | 0.73 | 0.027 | | 0.92(0.000) | | | | 20.7 | No |
| Dec 17 Basin | 5 trap residue removed | | | | | | | | | |
| Year 2024 | 467 pollen + 136 mixed other | 2.01 | 4.39 | | 2.02(0.47) | | | | Median 18.4 | Median 62 |
| 2025 HEA White Pond Data | A-Pod Setup/Training June 2 | | | | | | | | | |
| June 5-8 A-Pod | 90 Tree Pollen | NT | NT | | NT | | | | | No |
| June 12 A-Pod/Basin | 42 Pollen and HAB Scum | 95.21 | 4.69 | | 1.75(0.0024) | Dolichospermum L. | | | 18 | 54 |
| June 26 A-Pod/Basin | slight forest particulates | 1.08 | 0.016 | | 1.99(0.010) | perimeter survey | | | | 61.3 |
| July 9 - 18 Training | slight forest particulates | NT | NT | | NT | | | | 21.8 | No |
| Contract over June 30th | 132 pounds subtotal for 2025 | | | | | | | | | |

Note: 1. Year 2022 monthly records represent by month: dry-moist pounds of cyanobacteria removed with the A-Pods; maximum BGA-PC in the A-Pod Trap; lab results when available; water clarity by secchi disc; PC and Cyanotoxin results on dates noted in "1" in column or by Monthly Records Column date.

2. 2021 data is from Higgins Environmental Associates National Science Foundation (NSF) funded field trial with dates noted in "1". Sonde fitted with 30 foot cable for measurements (correction value applied of +1.54893 for 100 foot cable comparison). In 2022, sonde fitted with 100 foot cable.

3. Monthly records maintained by Higgins Environmental Associates field staff and noted otherwise; 1987-2014 data from W. Walker, 2015 Summer White Pond Data (<http://www.wawaker.net/whitepond/>)

4. Field measurements include a multi-point vertical sonde (Aqua-Hell 1000) with 1000 RFUs and a multi-point vertical sonde with 1000 RFUs and a multi-point vertical sonde with 1000 RFUs in Relative Fluorescence Units (RFUs).

5. Most data is from vertical sonde surveys taken monthly and during lab sampling. Sonde snapshots were collected more frequently from A-Pod Trap areas. Other vertical sonde surveys were collected throughout the pond to assess water body quality variance.

6. Lab PC data results provided by the University of New Hampshire. Field BGA-PC at same time/day/location noted in "1". Lab PC is reported in micrograms per liter (ug/L).

7. Average field water BGA-PC reading the average of vertical sonde surveys taken from the corresponding date and location noted in the Monthly Records.

8. Average field water PC reading the average of vertical sonde surveys taken from the corresponding date and location noted in the Monthly Records.

9. Water clarity as reported was measured with a secchi disc without the use of a view scope. 1987-2017 secchi disc utilized a view scope. As such, 2022 results are considered conservative.

A mean of the maximum depth (i.e., water clarity) reading from 1987 to 2017 was calculated at approximately 6 meters (19.7 feet). This has been referred to as the historic baseline secchi depth.

Most of the historic baseline secchi readings were taken in June to August when the sunlight angle is the steepest and therefore the water clarity is the lowest for the year. Our baseline value in both 2022 and 2023 were each 24.2 feet (approx. 8 meters).

10. A total of 288.5 (dry-moist) pounds of cyanobacteria were removed in Year 2022 using the A-Pod and were composted on land in a controlled manner. Approximately 100 (moist) to wet pounds were removed in 2021 and composted as part of our NSF-funded trial.

11. On September 28, 2022 water velocity in White Pond calculated using depth specific drogues to be: 8 feet/minute at 2 feet deep, 6 to 7.5 feet/minute at 4 feet deep, negligible at 10 feet deep. Drogue flow patterns in 2022 indicate clockwise flow pattern with eddies near shore/structure/area.

12. On June 20 and 24th, field PC readings within the C-Pod after addition of trap contents ranged from 54.755 to 185.955 RFUs; Chi-s ranged from 6.31 to 6.796 RFUs; and cyanotoxins (MC) ranged from 7.9 to 52.9 ug/L, respectively. C-Pod contents removed on June 24, 2022 after sampling.

13. June 2023 through July 18th focused on A-Pod training to Town. HAB scum noted in traps only on June 12th. Likely colonization of free cellulose in traps. Trap contents removed each day and composted. HAB scum and pollen 12th placed in rotavator compost bin for bio-degradation.

Table 2 - Surface Water Sample Results - White Pond, Concord, MA

| Horizontal Water Quality Profiles | | | | | | | | | | | | | | | | | | | | | |
|---|---|--------------------|-----------------------------------|--------------------|------------------------------------|--------------------|-------------------------------------|--------------------|---------------------------------|--------------------|----------------------------------|--------------------|-----------------------------------|--------------------|----------------------------------|--------------------|-----------------------------------|--------------------|------------------------------------|--------------------|-------|
| Parameter | Sample ID: Lab Sample Number: Date Sampled: | | WP-Trap 2F03025-01 6/2/2022 | | WP-Trap 2H17031-01 8/16/2022 | | WP-Trap 2J13028-01 10/12/2022 | | WP-In 2F03025-02 6/2/2022 | | WP-In 2H17031-02 8/16/2022 | | WP-In 2J13028-02 10/12/2022 | | WP-Out 2F03025-03 6/2/2022 | | WP-Out 2H17031-03 8/16/2022 | | WP-Out 2J13028-03 10/12/2022 | | Units |
| | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | |
| General Chemistry | | | | | | | | | | | | | | | | | | | | | |
| Nitrate and Nitrite as N | ND | 0.03 | ND | 0.03 | ND | 0.03 | 0.03 | 0.03 | 0.08 | 0.03 | 0.04 | 0.03 | 0.03 | 0.04 | 0.03 | ND | 0.03 | ND | 0.03 | mg/L | |
| Total Nitrogen | 0.6 | 0.1 | 0.8 | 0.1 | 1.1 | 0.1 | 0.23 | 0.1 | 0.38 | 0.1 | 0.54 | 0.1 | 0.13 | 0.1 | 0.34 | 0.1 | 0.5 | 0.1 | 0.1 | mg/L | |
| Kjeldahl Nitrogen | 0.6 | 0.1 | 0.8 | 0.1 | 1.1 | 0.1 | 0.2 | 0.1 | 0.3 | 0.1 | 0.5 | 0.1 | 0.1 | 0.3 | 0.1 | 0.5 | 0.1 | 0.5 | 0.1 | mg/L | |
| Total Phosphorous | 0.05 | 0.02 | ND | 0.02 | ND | 0.02 | ND | 0.02 | ND | 0.02 | ND | 0.02 | ND | 0.02 | ND | 0.02 | ND | 0.02 | ND | mg/L | |
| Total Organic Carbon | 3.7 | 0.5 | 3.1 | 0.2 | 4 | 0.2 | 2.7 | 0.5 | 2.7 | 0.2 | 2.4 | 0.2 | 2.7 | 0.5 | 2.7 | 0.2 | 2.5 | 0.2 | 2.5 | mg/L | |
| Total Metals | | | | | | | | | | | | | | | | | | | | mg/L | |
| Iron | 0.17 | 0.05 | 0.49 | 0.05 | 0.4 | 0.05 | ND | 0.05 | ND | 0.05 | 0.08 | 0.05 | ND | 0.05 | ND | 0.05 | 0.05 | 0.05 | 0.05 | RFUs | |
| Sulfur | 1.5 | 0.5 | 1.3 | 0.5 | 1.2 | 0.5 | 1.4 | 0.5 | 1.3 | 0.5 | 1.2 | 0.5 | 1.3 | 0.5 | 1.4 | 0.5 | 1.2 | 0.5 | 0.5 | mg/L | |
| Field Measured Phycocyanin at Sampling | | | | | | | | | | | | | | | | | | | | RFUs | |
| Phycocyanin | 1.87 | | 1.95 | | 4.02 | | 0.251 | | 1.91 | | 0.87 | | 2.09 | | 1.74 | | 1.1 | | | RFUs | |
| Phycocyanin and Cyanotoxins by Laboratory Analysis | | | | | | | | | | | | | | | | | | | | ug/L | |
| Phycocyanin | 7.23 | | 17.2 | | 113.24 | | 4.46 | | 2.51 | | 1.69 | | 1.92 | | 2.38 | | 2.61 | | | ug/L | |
| Cyanotoxin | ND | | see below | | see below | | ND | | see below | | ND | | ND | | ND | | ND | | ND | ug/L | |
| Microcystin | | | | | 0.802 | | | | | | | | | | | | | | | ug/L | |
| Anatoxin | | | 0.08 | | | | | 0.11 | | | | | | | | | | | | ug/L | |

| Vertical Water Quality Profiles | | | | | | | | | | | |
|---|---|--------------------|----------------------------------|--------------------|----------------------------------|--------------------|----------------------------------|--------------------|----------------------------------|--------------------|-------|
| Parameter | Sample ID: Lab Sample Number: Date Sampled: | | WP-10 3I28075-01 9/27/2023 | | WP-30 3I28075-02 9/27/2023 | | WP-50 3I28075-03 9/27/2023 | | WP-55 3I28075-04 9/27/2023 | | Units |
| | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | |
| General Chemistry | | | | | | | | | | | mg/L |
| Nitrate and Nitrite as N | ND | 0.25 | ND | 0.25 | ND | 0.25 | ND | 0.25 | ND | 0.25 | mg/L |
| Total Nitrogen | ND | 0.1 | 0.7 | 0.1 | 0.6 | 0.1 | 2.7 | 0.1 | ND | 0.1 | mg/L |
| Kjeldahl Nitrogen | ND | 0.1 | 0.7 | 0.1 | 0.6 | 0.1 | 2.7 | 0.1 | ND | 0.1 | mg/L |
| Total Phosphorous | 0.006 | 0.005 | 0.005 | 0.005 | 0.015 | 0.005 | 0.048 | 0.005 | ND | 0.005 | mg/L |
| Total Organic Carbon | 2.4 | 0.2 | 2.6 | 0.2 | 2.4 | 0.2 | 4.3 | 0.2 | ND | 0.2 | mg/L |
| Total Metals | | | | | | | | | | | mg/L |
| Iron | ND | 0.05 | 0.09 | 0.05 | 0.22 | 0.05 | 5.4 | 0.05 | ND | 0.05 | mg/L |
| Sulfur | 1.3 | 0.5 | 1.3 | 0.5 | 1.4 | 0.5 | 1 | 0.5 | ND | 0.5 | mg/L |
| Additional Historical Testing by Others | | | | | | | | | | | ug/L |
| Chlorophyll-a | | | | | | | | | | | ug/L |
| Secchi Depth (during sampling 9/27/24) | 24.5 | | 24.5 | | 24.5 | | 24.5 | | | | feet |
| | | | | | | | | | | | ug/L |
| Field Measured Phycocyanin and Chlorophyll-a in RFUs | | | | | | | | | | | RFUs |
| Phycocyanin | 0.56 | | 0.53 | | 3.21 | | 2.03 | | | | RFUs |
| Chlorophyll-a | 0.004 | | 0.004 | | 2.33 | | 1.06 | | | | RFUs |
| Phycocyanin and Cyanotoxins by Laboratory Analysis | | | | | | | | | | | ug/L |
| Phycocyanin (WLW PC to low on field RFUs) | | | | | | | | | | | ug/L |
| Cyanotoxin (refer to Concord BOH files) | | | | | | | | | | | ug/L |
| Microcystin | | | | | | | | | | | ug/L |
| Anatoxin | | | | | | | | | | | ug/L |

Notes for Table 2:

- All samples collected as discrete (grab) samples.
- All results reported as total on a wet weight basis. mg/L = milligrams per liter; RFUs = relative fluorescence units; ug/L = micrograms per liter.
- ND = not detected at or above reporting limit noted.
- Detected results are highlighted in yellow with bold typeface. Cyanotoxin non-detect data also highlighted in yellow and bold typeface given its importance.
- Preservatives - laboratory pre-preserved bottles per Standard Methods and Analytes (HNO3 for Fe, S; H2SO4 for N and C; none for P and N; all cooled to less than 4 degrees Celcius from collection to analysis).

Table 3 - Benthic Macroalgae (Nitella), Recovered CyanoHABs, A-Pod Residue and Sediment Sample Results - White Pond

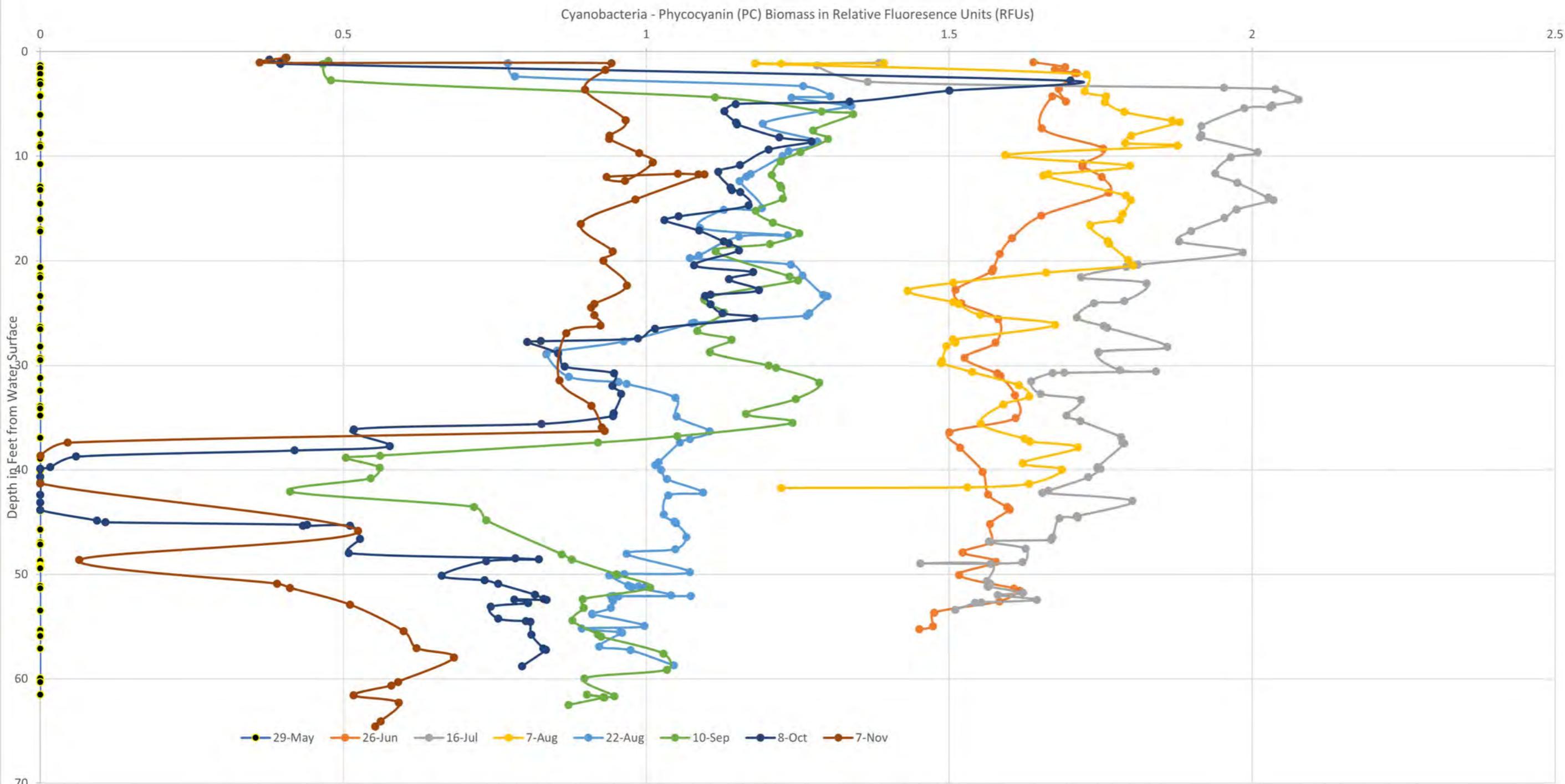
| Benthic Algae | | 2021 to 2022 Cyanobacteria (HAB) Samples | | | | | | 2023 | | 2023 | | 2023 | | 2024 | | 2024 | | 2025 | |
|---|------------------------------------|--|---------------|-----------------------------------|---------------|-----------------------------------|---------------|--|---------------|--|---------------|--|---------------|-------------------------------------|---------------|--|---------------|-------------------------------------|-------------|
| Sample ID: Lab Sample Number: Date Sampled: | BPLNT-1 1115020-03 7/14/2021 | APOD HAB 1115038-04 7/14/2021 | | HAB1-22 2H17029-06 7/5/2022 | | HAB-2-22 2H13027-01 10/7/22 | | WP-Oak Pollen 3E18042-04 5/16/2023 | | WP-Pine Pollen 3K09056-01 6/1/2023 | | A-Pod Residue 4K11017-01 11/7/2024 | | WP-Pollen 4F24019-01 6/5/2024 | | A-Pod Residue 4K11017-01 11/7/2024 | | WP-Pollen 5G30011-01 6/5/2025 | |
| Parameter | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Units |
| General Chemistry | | | | | | | | | | | | | | | | | | | |
| Nitrate and Nitrite as N | Not Tested | | Not Tested | | 492 | 23 | ND | 7 | Not Tested | | Not Tested | | Not Tested | | Not Tested | | ND | 28.7 | mg/kg |
| Total Nitrogen | 3050 | 10 | 5860 | 0.1 | 12400 | 10 | 18200 | 10 | 11500 | 10 | 10500 | 10 | 1240 | 10 | 10000 | 10 | 213 | 10 | mg/kg |
| Kjeldahl Nitrogen | Not Tested | | Not Tested | | 11900 | 440 | 18200 | 1490 | Not Tested | | Not Tested | | Not Tested | | Not Tested | | 1340 | 57 | mg/kg |
| Total Phosphorous | 1570 | 1.39 | 3630 | 2.39 | 2200 | 1.62 | 2040 | 2.53 | 2710 | 4.33 | 2820 | 3.71 | 3810 | 1.23 | 1430 | 3.03 | 882 | 1.58 | mg/kg |
| Total Organic Carbon | 46 | 0 | 40 | 0 | 36 | 0 | 40 | 0 | 52 | 0 | 52 | 0 | 36 | 0 | 50 | 0 | 44 | 0 | Percent (%) |
| Total Metals | | | | | | | | | | | | | | | | | | | |
| Iron | 9550 | 14 | 12000 | 24.1 | 9360 | 16.3 | 7320 | 25.6 | 2130 | 58.8 | 4320 | 37.4 | 2170 | 12.4 | 3050 | 30.6 | 5550 | 15.9 | mg/kg |
| Sulfur | 3970 | 140 | 3680 | 241 | 3230 | 163 | 2690 | 256 | 2350 | 588 | 1930 | 374 | 2070 | 124 | 1650 | 306 | 2200 | 159 | mg/kg |

| 2021 to 2022 Sediment Samples | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---------------|---------------------------------------|---------------|-----------------|-----------------------------|---------------|-----------------|-------------------------------------|-----------------|-------------------------------------|-----------------|-------------------------------------|-----------------|-------------------------------------|-----------------|-------------------------------------|-----------------|--------------------------------------|-----------------|--|-----------------|---------------------------------------|-----------------|---------------------------------------|-----------------|--|-----------------|--|-----------------|---------------------------------------|--|-------|
| Sample ID: Lab Sample Number: Date Sampled: | | SED 1 WHTS 1G21034-01 7/16/2021 | | | | | | SED 2 WP 1H31016-01 8/26/2021 | | SED 3 -WPS 1K10047-01 11/9/21 | | WP-ED-6" 2H17028-03 8/10/2022 | | WP-CD-6" 2H17028-04 8/10/2022 | | WP-WD-6" 2H17028-05 8/10/2022 | | WP-EH-62' 2K10018-03 11/7/2022 | | EH-T2"-Core 3E18042-01 5/16/2023 | | EH-6"-CORE 3E18042-02 5/16/2023 | | EH-62"-T2" 3E18042-03 5/16/2023 | | WP-EH-6"-CORE 3I28075-05 9/27/2023 | | EH-T2"-Core 3K09056-02 11/6/2023 | | EH-62"-T2" 3K09056-03 11/6/2023 | | Units |
| Parameter | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Results East Hole | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | Sample Result | Reporting Limit | | | |
| General Chemistry | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nitrate and Nitrite as N | Not Tested | | Not Tested | | 153 | 7 | 224 | 11 | 504 | 24 | 204 | 10 | Not Tested | | Not Tested | | Not Tested | | 3.24 | 2.25 | Not Tested | | Not Tested | | Not Tested | | Not Tested | | mg/kg | | | |
| Total Nitrogen | 7620 | 0.1 | 229 | 10 | 1130/1680/1650 | 10500 | 10 | 14500 | 10 | 22400 | 10 | 8840 | 10 | 1360 | 10 | 5510 | 10 | 17700 | 10 | 798 | 10 | 16000 | 10 | 24200 | 10 | mg/kg | | | | | | |
| Kjeldahl Nitrogen | Not Tested | | Not Tested | | Not Tested | | 10300 | 154 | 14300 | 236 | 21900 | 443 | 8640 | 985 | Not Tested | | Not Tested | | Not Tested | | 795 | 110 | Not Tested | | Not Tested | | mg/kg | | | | | |
| Total Phosphorous | 580 | 2.39 | 899 | 1.47 | 2250/2740/2460 | 2100 | 0.55 | 2410 | 0.91 | 2390 | 1.22 | 1990 | 1.6 | 2250 | 2.57 | 2520 | 3.87 | 3190 | 6.4 | 2040 | 6.4 | 3440 | 3.78 | 2140 | 1.6 | mg/kg | | | | | | |
| Total Organic Carbon | 3 | 0 | 10 | 0 | 16/30/29 | 16 | 0 | 23 | 0 | 26 | 0 | 16 | 0 | 49 | 0 | 50 | 0 | 51 | 0 | 21 | 0 | 22 | 0 | 25 | 0 | Percent (%) | | | | | | |
| Total Metals | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Iron | 8600 | 24.1 | 10500 | 14.8 | 27300/10100/9280 | 18100 | 5.5 | 10500 | 9.1 | 11000 | 12.3 | 25700 | 16.2 | 28000 | 26 | 10100 | 39 | 36000 | 64.6 | 7450 | 64.6 | 30000 | 38.2 | 19600 | 16.2 | mg/kg | | | | | | |
| Sulfur | 2370 | 241 | 3030 | 148 | 9870/4790/4470 | 6000 | 55.4 | 5280 | 91.4 | 6180 | 123 | 11400 | 162 | 11800 | 260 | 4720 | 390 | 13200 | 646 | 20200 | 646 | 10800 | 382 | 7110 | 162 | mg/kg | | | | | | |

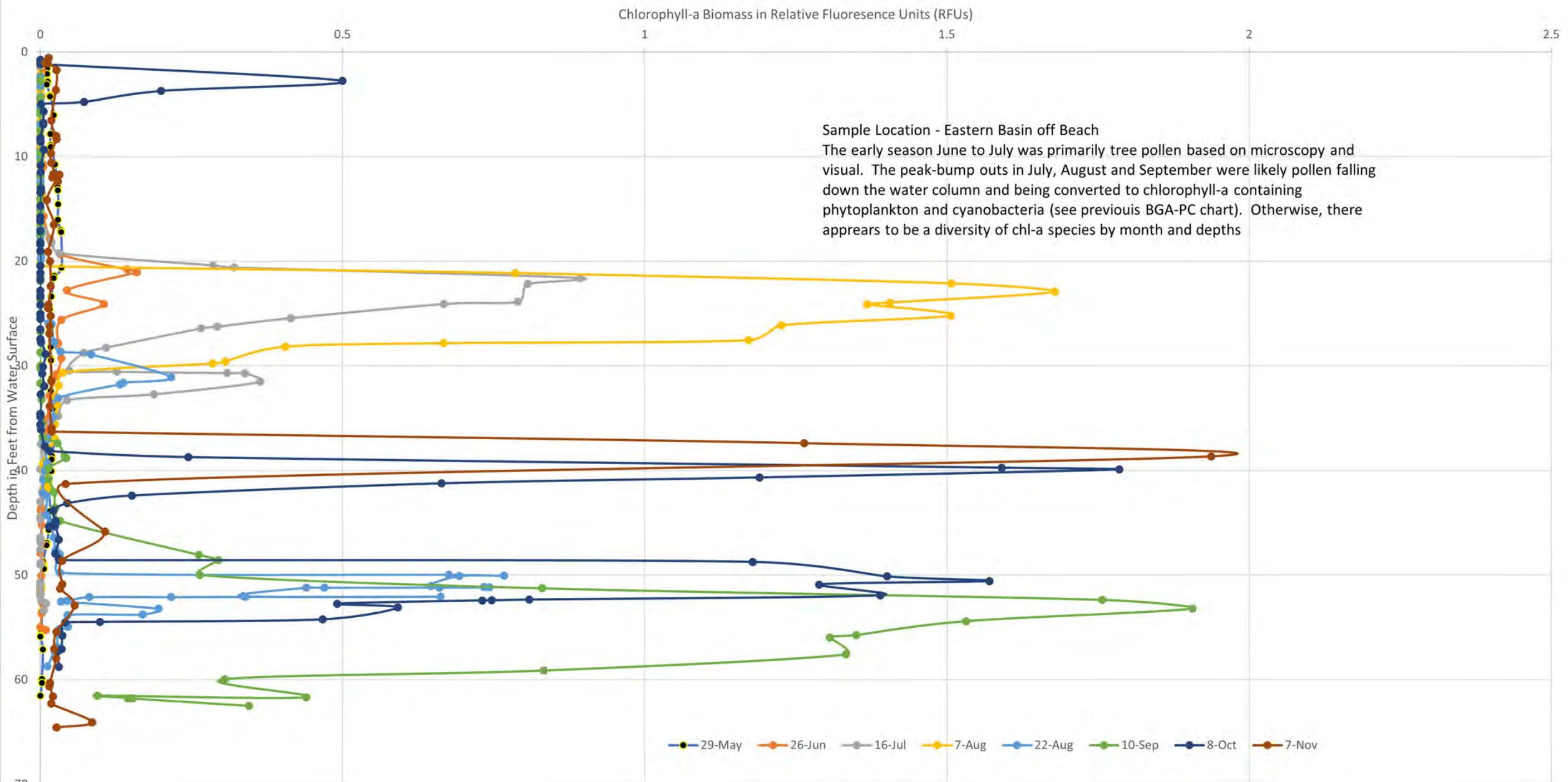
Notes for Table 3:

1. HAB = harmful algae bloom; HAB1-22 sample is a composite of 35 pounds of partially-dried HAB removed from main A-Pod Trap "A" on June 29, 2022; HAB2-22 is a composite of 40 pounds of partially-dried HABs removed from A-Pod "A" in Oct 2022.
2. All HAB samples collected as composite samples on date sampled. Sediment samples collected as discrete samples over specified interval (either top 2 inches; top 6 inches; or at 6 inch intervals at SED3-WPS from a 0 to 24 inch core sample).
3. All results reported as total on a dry weight basis.
4. ND = not detected at or above reporting limit noted.
5. Detected results are highlighted in yellow with bold typeface.
6. Preservatives - samples frozen after collection until laboratory analysis.
7. APOD HAB sample from 10/14/21 was part of our NSF funded work; and serves as a Year 2021 end "background sample" for Concord's Year 2022 work and results for HAB solids.
8. Most sediment samples were collected and analyzed as part of HEA's National Science Foundation (NSF) work; presented results are summarized for informational purposes only.
9. Sample SED3-WPS was collected using a gravity corer with intact recovery of 24 inches (60 centimeters) of soft sediment. Discrete sediment samples were collected and results reported from the core as follows: top 2 inches/ 4 to 8 inches / 16 to 24 inches.
10. Sample WP-EH-62 was collected in the east hole (deep basin off beach) using a discrete water sampler which is helpful for collecting the very loose, almost smoke-like top 2 inches of sediment. This sample was primarily green-colored detritus with active microbial populations.
11. BPLNT1 = benthic macroalgae (Nitella) sample collected as part of HEA's NSF work from a grab sample approximately 30 feet deep south of Thoreau's cove.
12. 2023 A-Pod residue sample is a sample of residue collected within the A-Pod trap over the July to October 2023 season (a brown organic-rich material). May-July trap contents were previously removed as tree pollen solids with some cyanoHAB colonization.
13. 2023 EH-T6" AND T2"-CORE samples collected as part of in situ gravity core sample with top six inches and top two inches respectively. Core sediments were visually undisturbed and overlying core water was not turbid. Sediment layering noted and top included black mottling (interpreted as sulfides).
14. 2023 EH-62"-T2" sample collected using a discrete water sampler of the very fine, easily suspended sediments (top 2 inches and less) at 62 feet (east deep hole); same location as EH-T2"-CORE. This sample would include more recent detritus/eston by volume than the CORE sample.
15. 2024 Samples collected as composite samples from trap contents on day of sampling.
16. 2025 WP Pollen sample collected as composite sample from trap contents removed on June 5, 2025; sample kept frozen until lab analysis.
17. Unless noted otherwise, samples labeled "pollen" were primarily white pine pollen based on microscopic confirmation.
18. Year 2025 was a lighter pollen year than 2024 and 2023. Year 2024 had the most pine pollen collected based on trap content weight based on scale measurements and microscopic confirmation.

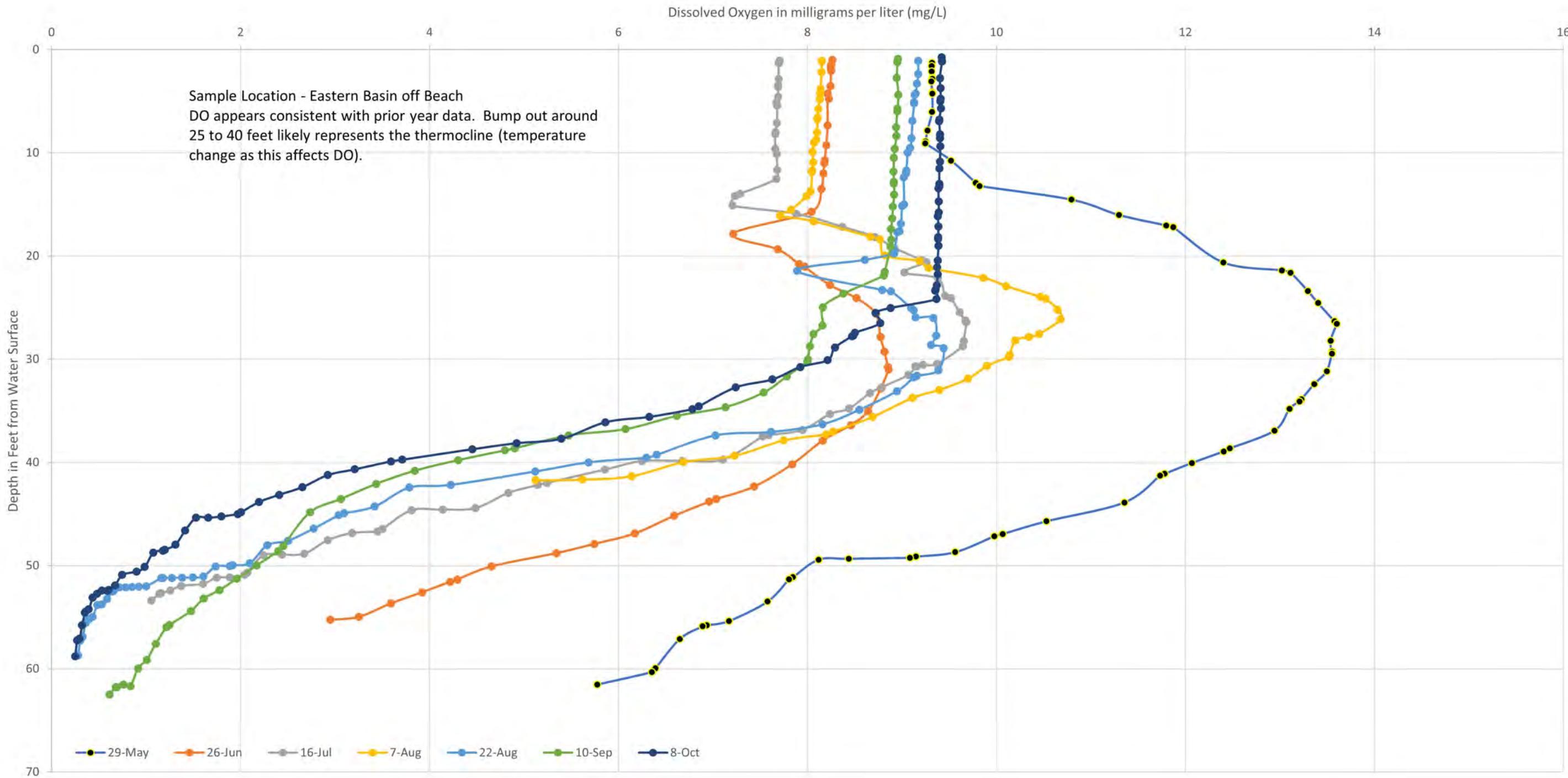
Year 2024 BGA-PC in White Pond



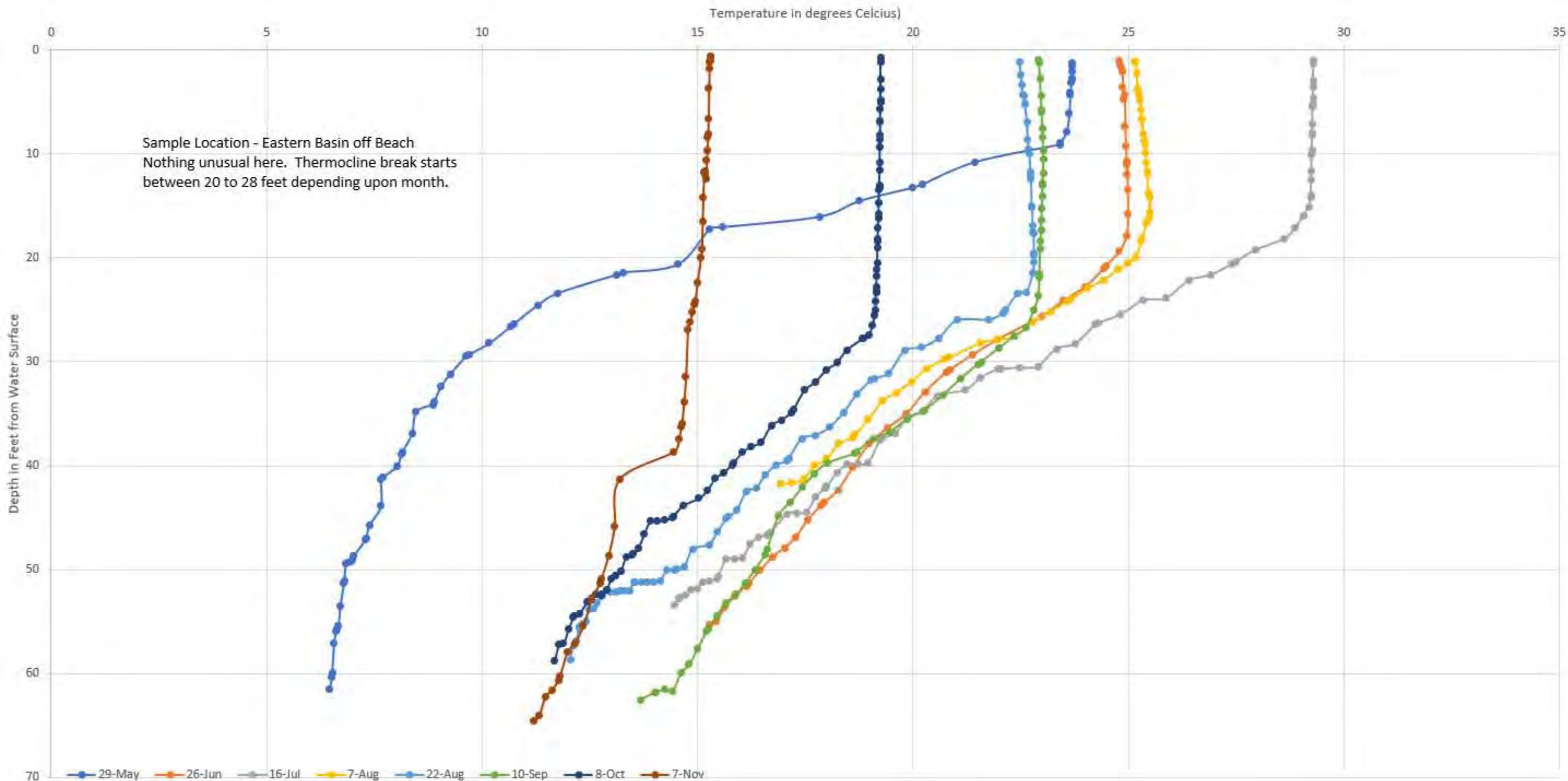
Year 2024 Chlorophyll-a in White Pone



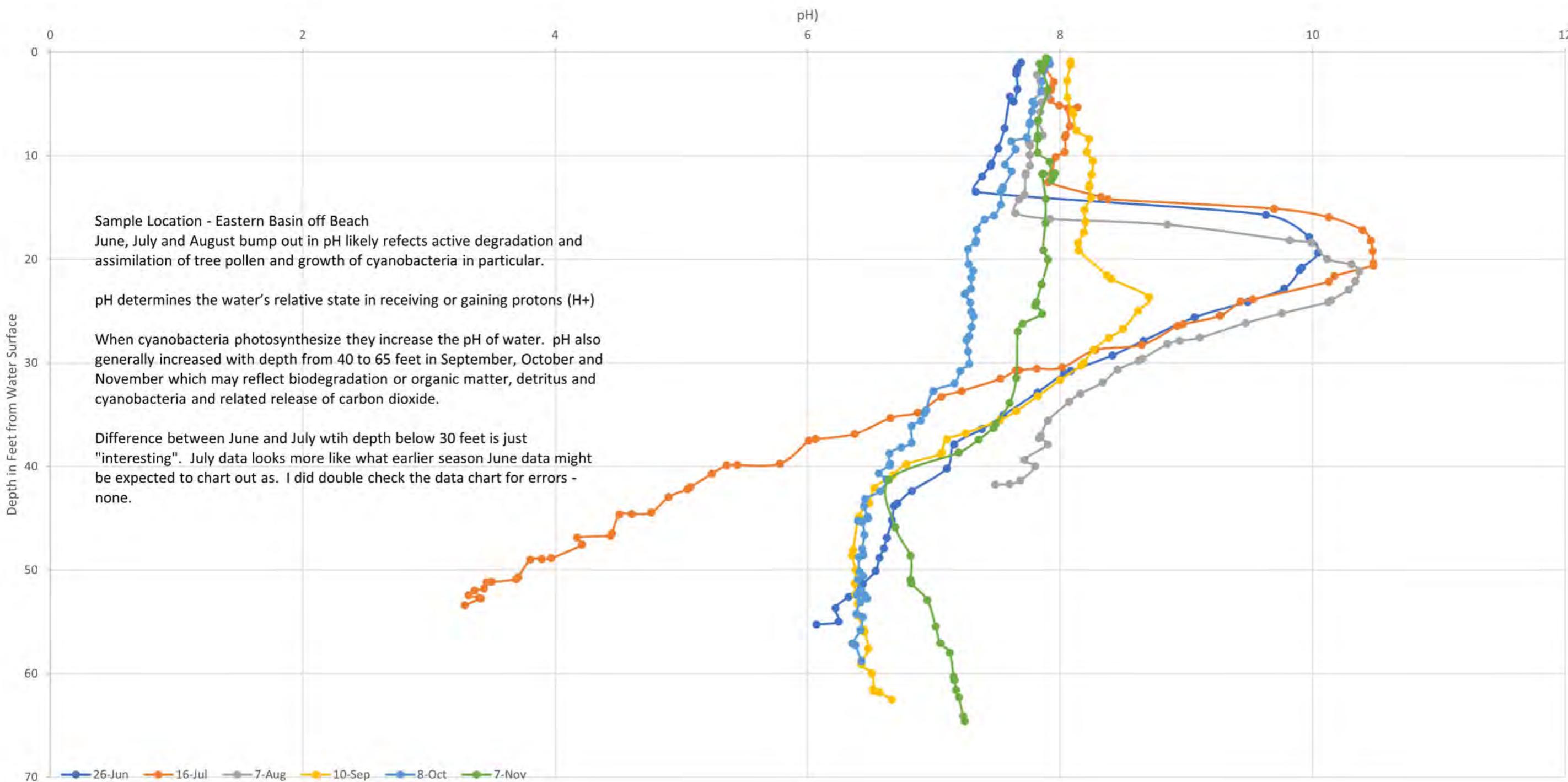
Year 2024 Dissolved Oxygen in White Pond



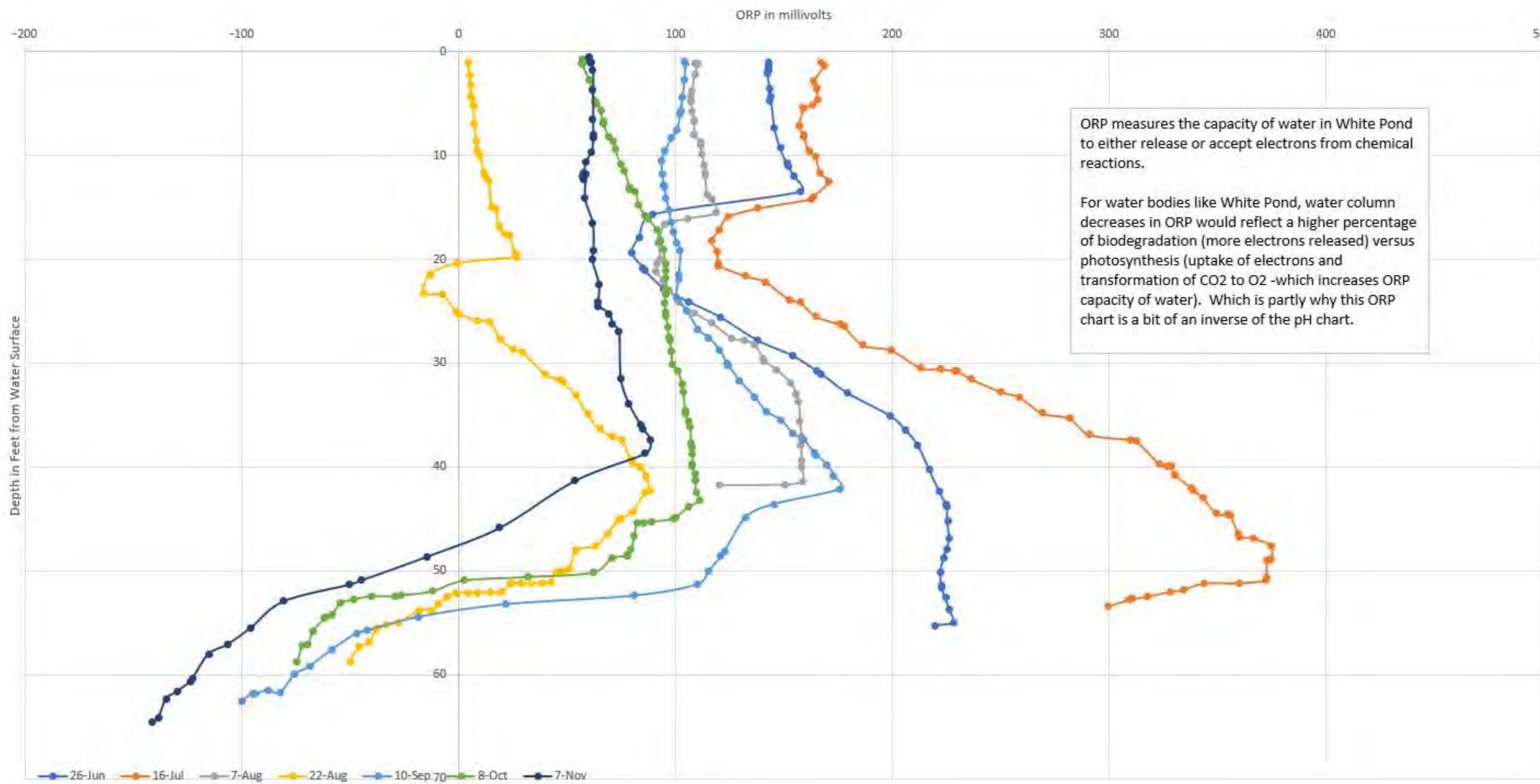
Year 2024 Temperature in White Pond



Year 2024 pH in White Pond Eastern Basin



Year 2024 Oxidation-Reduction Potential (ORP) in White Pond



White Pond 2024 Max. Secchi Depth in feet

