GREAT EAST LAKE

2023 SAMPLING HIGHLIGHTS

Station Deep

Wakefield, NH

NH Extension

Water quality data displayed in Tables 1 and 2 are surface water measurements with the exception of the dissolved oxygen data that are collected near the lake bottom. Summary statistics are provided for samples collected between April 26 and August 16, 2023.

Blue = Oligotrophic

Yellow = Mesotrophic

Red = Eutrophic

Gray = No Data

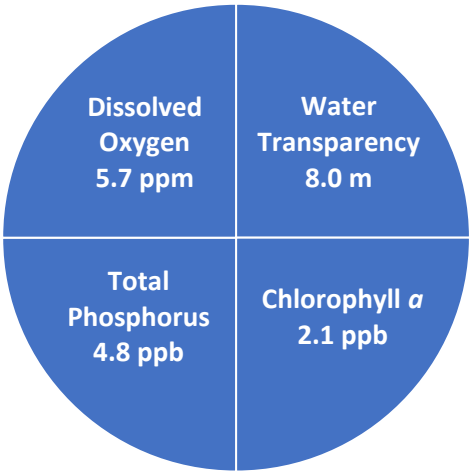


Figure 1. Great East Lake Water Quality (2023)

Table 1. 2023 Great East Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria[1]

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Great East Lake Average (range)	Great East Lake Classification
Water Clarity (meters)	**> 4.0 – 7.0**	**2.5 - 4.0**	**< 2.5**	**8.0** meters (6.4 – 8.4)	**Oligotrophic**
Chlorophyll *a* [1] (ppb)	**< 3.3**	**3.3 – 5.0**	**> 5.0 – 11.0**	**2.1** ppb (1.4 – 3.3)	**Oligotrophic**
Total Phosphorus [1] (ppb)	**< 8.0**	**8.0 – 12.0**	**> 12.0 – 28.0**	**4.8** ppb (4.4 – 5.5)	**Oligotrophic**
Dissolved Oxygen (ppm)	**> 5.0 – 7.0**	**2.0 – 5.0**	**< 2.0**	**5.7** ppm (4.7 – 6.9) *	**Oligotrophic**

* Dissolved oxygen concentrations were measured between 11.0 and 29.5 meters, in the bottom water layer, on August 16, 2023.

Table 2. 2023 Great East Lake Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Great East Lake Average (range)	Great East Lake Classification
Color (color units)	**< 10 uncolored**	**10 – 20 slightly colored**	**20 – 40 lightly tea colored**	**40 – 80 tea colored**	**> 80 highly colored**	**13.9** color units (range: 10.4 – 19.8)	**Slightly colored**
Alkalinity (ppm)	**< 0.0 acidified**	**0.1 – 2.0 extremely vulnerable**	**2.1 – 10 moderately vulnerable**	**10.1 – 25.0 low vulnerability**	**> 25.0 not vulnerable**	**8.0** ppm (range: 8.4 – 8.8)	**Moderately vulnerable**
pH (std units)	**< 5.5 suboptimal for successful growth and reproduction**		**6.5 – 9.0 optimal range for fish growth and reproduction**			**7.1** standard units (range: 7.0 – 7.2)	**Optimal range for fish growth and reproduction**
Specific Conductivity (*u*S/cm)	**< 50 *u*S/cm Characteristic of minimally impacted NH lakes**		**50-100 *u*S/cm Lakes with some human influence**	**> 100 *u*S/cm Characteristic of lakes experiencing human disturbances**		**80.7** *u*S/cm (range: 76.5 – 82.8)	**Characteristic of lakes with some human influence**

Strategies to stabilize and improve water quality

Implement Best Management Practices (BMPs) within the Great East Lake watershed to minimize the adverse impacts of polluted runoff and erosion into Great East Lake. Refer to "Landscaping at the Water's Edge: An Ecological Approach" and "New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions for Your Home" and the Acton Wakefield Watershed Alliance webpages for more information on how to reduce nutrient loading caused by overland runoff. NH Lakes also provides a series of resources aimed at educating residents and protecting our lakes and ponds.

Figure 2. Great East Lake (2023 Seasonal Data)
Secchi Disk Transparency and Chlorophyll *a* Data

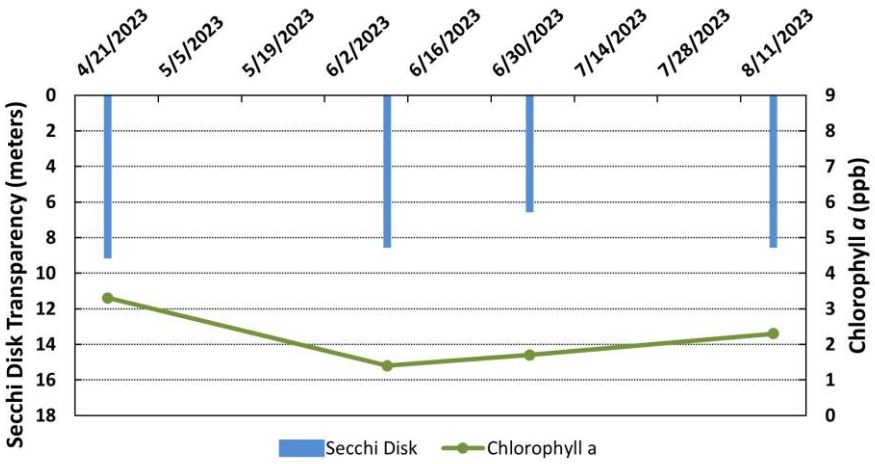


Figure 3. Great East Lake (2023 Seasonal Data)
Secchi Disk Transparency and Dissolved Color Data

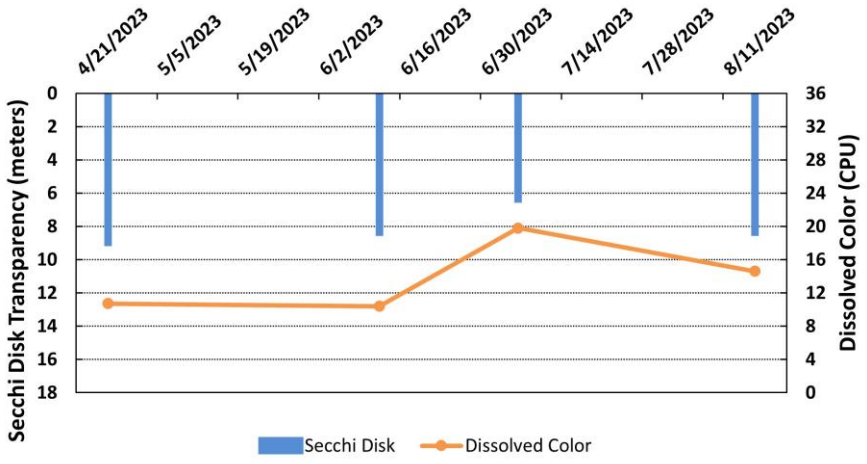


Figure 4. Great East Lake - Site 1 Center (1974-2023)
Long-term Secchi Disk Transparency and Chlorophyll *a* Data

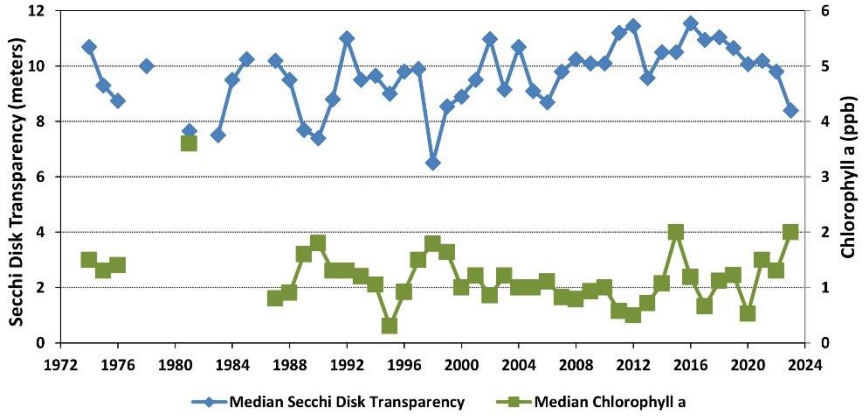
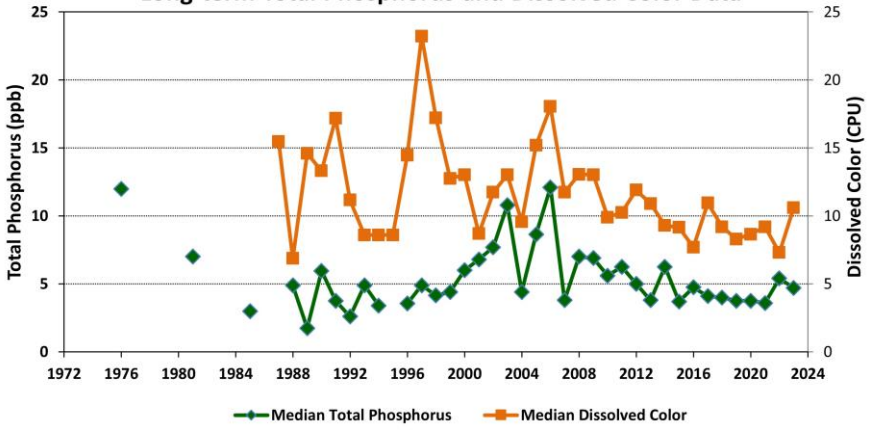


Figure 5. Great East Lake - Site 1 Center (1974-2023)
Long-term Total Phosphorus and Dissolved Color Data



Figures 2 and 3. Seasonal comparison of Great East Lake water transparency (Secchi Disk depth), chlorophyll *a*, dissolved color and total phosphorus for 2023. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll *a* and/or color concentrations.

Figures 4 and 5. Annual median Great East Lake water transparency, chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1974 and 2023, through the New Hampshire Lakes Lay Monitoring Program, the Maine Volunteer Lake Monitoring Program and the New Hampshire Department of Environmental Services**.** The long-term data provide insight into the water quality fluctuations, among years, that have been documented in Great East Lake.

Figure 6. Great East Lake - Site 1 Center
Temperature Profiles (April 26 through August 16, 2023)

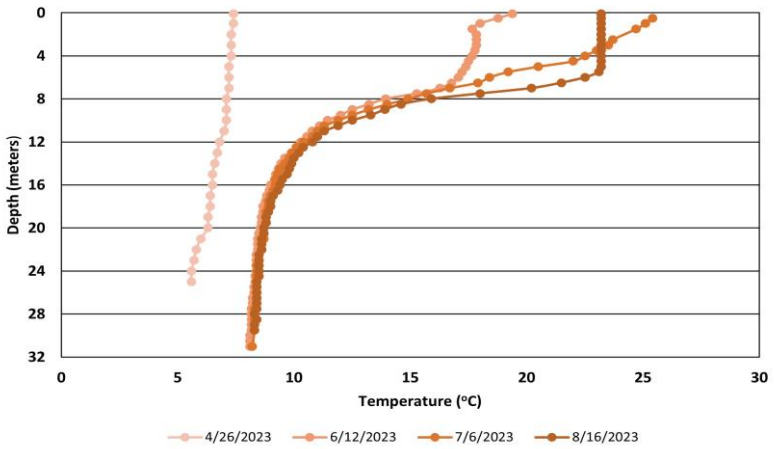


Figure 7. Great East Lake - Site 1 Center
Dissolved Oxygen Profiles (April 26 through August 16, 2023)

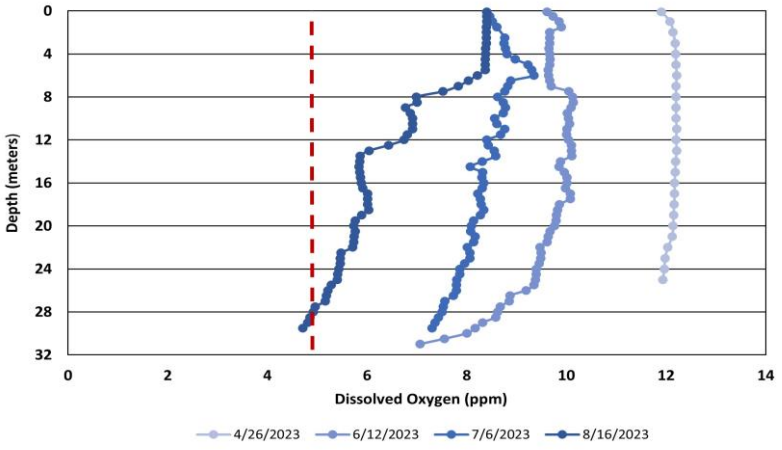


Figure 8. Great East Lake - Site 1 Center
Specific Conductivity Profiles (April 26 through August 16, 2023)

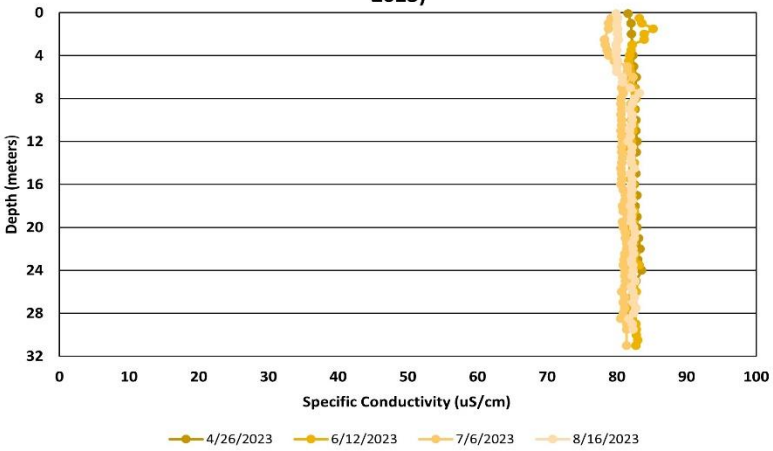
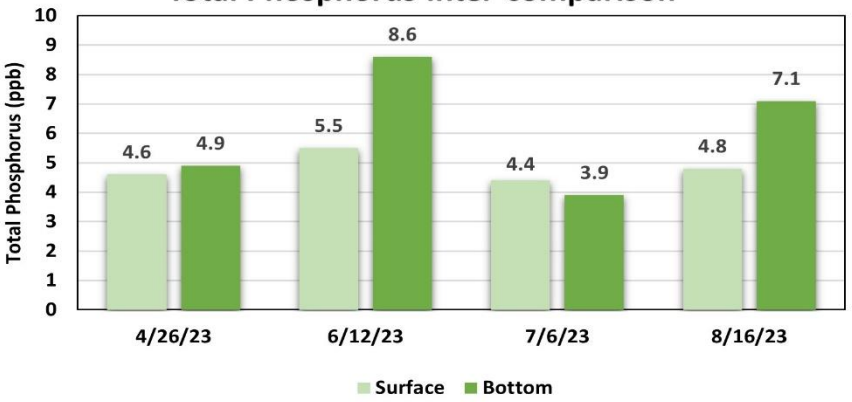


Figure 9. Great East Lake - Site 1 Center
Total Phosphorus inter-comparison



Figures 6, 7 and 8. Temperature, dissolved oxygen and specific conductivity profiles displaying the water quality differences in 0.5-meter increments. Notice the decreasing dissolved oxygen concentrations, near the lake bottom, through the season. The dashed vertical red line in Figure 7 displays the dissolved oxygen threshold for the successful growth and reproduction of cold-water fish such as trout and salmon.

Figure 9. Total phosphorus comparison between the surface (epilimnion) and bottom water (hypolimnion) zones. Notice the differences in the bottom water total phosphorus concentrations, relative to surface water concentrations.

Table 3. Salmon Falls River Watershed Lakes (Acton ME and Wakefield NH)
(2023 water quality data collected between April 26 and October 2)

Lake	Average (range) Secchi Disk Transparency (meters)	Average (range) Total Phosphorus (ppb)	Average (range) Chlorophyll-*a* (ppb)	Average (range) Dissolved Oxygen (ppm)
Great East Lake	8.0 meters (range: 6.4 – 8.4)	4.8 ppb (range: 4.4 – 5.5)	2.1 ppb (range: 1.4 – 3.3)	5.7 ppm (range: 4.7 – 6.9)
Horn Pond	Not assessed	Not assessed	Not assessed	Not assessed
Lake Ivanhoe/Round Pond	4.4 meters (range: 3.8 – 5.1)	9.0 ppb (range: 7.9 – 10.1)	3.2 ppb (range: 2.6 – 4.1)	------
Lovell Lake	5.5 meters (range: 4.4 – 6.8)	7.7 ppb (range: 5.7 – 9.0)	3.6 ppb (range: 2.6 – 6.1)	0.3 ppm (range: 0.0 – 1.3)
Wilson Lake	Not assessed	Not assessed	Not assessed	Not assessed

- Water quality data are reported for a deep reference sampling location in each water body
- Dissolved oxygen measurements were taken late season and from the middle or bottom water layer
- ------ indicates the site is too shallow to form a bottom water layer

Data Interpretation: Overview of factors to consider when reviewing the Great East Lake data

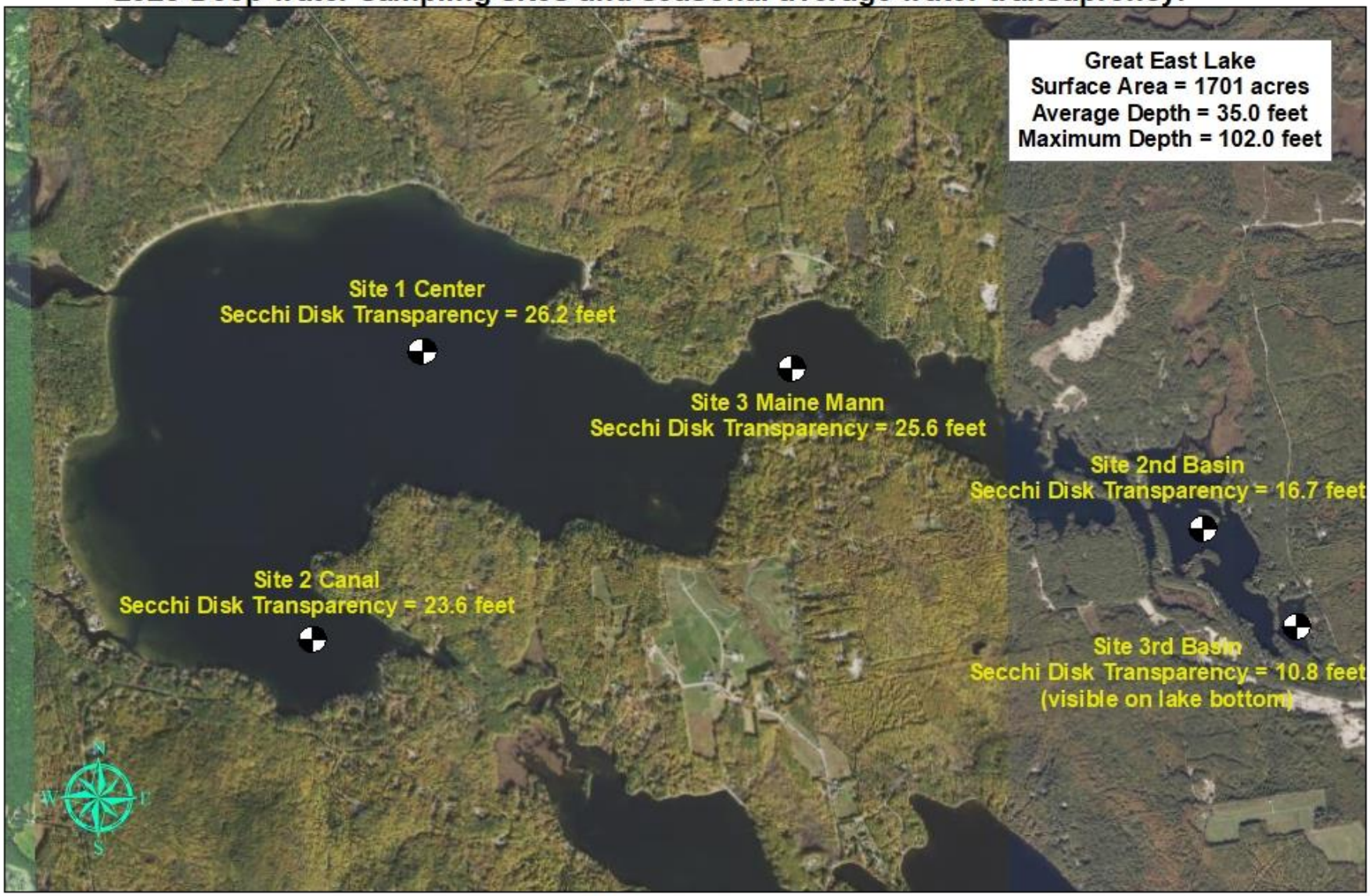
This highlight report provides a general overview of the current and historical conditions of Great East Lake. The report is intended to provide a simple assessment of the water quality trends. Should you have additional questions about interpreting your water quality results, we would be happy to discuss the data with you and/or any concerns you may have. In general, some factors that influence the current and long-term water quality results/trends for our New Hampshire lakes and ponds include:

- **Land-use Patterns** within the watershed (drainage basin) – Research indicates land use patterns have an impact on how much phosphorus (nutrient) is washing into our lakes. In general, more urbanized watersheds have a greater degree of phosphorus runoff than highly forested/vegetated drainage areas.
- **Weather Patterns** – Rainfall and temperature can influence water quality. Wet periods, and overland runoff, tend to be a time when elevated nutrients and other pollutants are transported into our lakes. Temperature can also influence water quality conditions since many aquatic plants and algae tend to respond to changing seasonal conditions. Unusually warm periods are sometimes tied to short-term algal and cyanobacteria blooms.
- **Best Management Practices (BMPs)** – The presence/absence of best management practices can have an interplay on water quality. BMPs are measures that are used to manage nutrients and other pollutants that could otherwise make their way into our lakes. Properties that employ BMPs, designed specifically to remove pollutants of concern (e.g. sediments and phosphorus), are less likely to contribute nutrients and other pollutants into our lakes.
- **Temperature (Thermal) Stratification** – Many lakes become thermally stratified during the summer months and may form three distinct thermal layers: upper water layer (epilimnion), middle lake layer (metalimnion) and bottom cold-water layer (hypolimnion). These thermal zones form a barrier to lake mixing, during the summer months, and can coincide with differences in dissolved oxygen and specific conductivity through the water column (Figures 6, 7 and 9).
- **Internal Nutrient Loading** (nutrients that are introduced from the sediments along the lake bottom) – Some of our lakes experience significant internal nutrient loading. Such lakes generally tend to be well stratified and exhibit increasing deep water phosphorus concentrations, relative to surface levels.

Figure 10. Great East Lake

Acton, ME and Wakefield, NH

2023 Deep water sampling sites and seasonal average water transaprency.



Aerial Orthophoto Source: USDA National Agricultural Imagery Program
GPS Coordinates collected by the UNH Center for Freshwater Biology

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