

Lake Water Quality

Sampling has been conducted periodically over the years to evaluate baseline water quality conditions in Hess Lake. The discussion below provides background information on lake water quality and key sampling parameters.

Oligotrophic lakes are generally deep and clear with little aquatic plant growth. These lakes maintain sufficient dissolved oxygen in the cool, deep bottom waters during late summer to support cold-water fish such as trout and whitefish.

Eutrophic lakes have poor clarity and support abundant aquatic plant growth. In deep eutrophic lakes, the cool bottom waters usually contain little or no dissolved oxygen. Therefore, these lakes can only support warm-water fish such as bass and pike.

Lakes that fall between the two extremes of oligotrophic and eutrophic are called mesotrophic lakes.

Hess Lake is eutrophic.

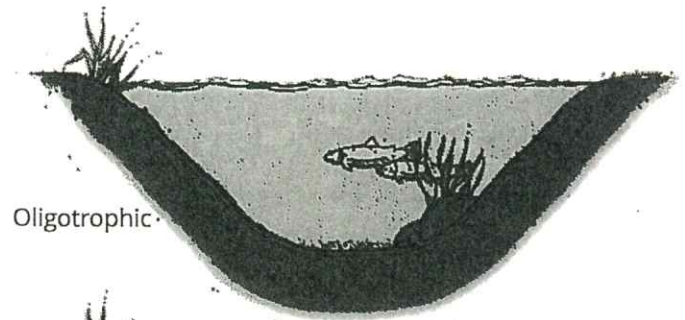
Key parameters used to classify lakes and to evaluate water quality include total phosphorus, chlorophyll-a, and Secchi transparency.

Phosphorus is the nutrient that most often stimulates excessive growth of aquatic plants and causes premature lake aging. By measuring phosphorus levels, it is possible to gauge the overall health of a lake. Lakes with a phosphorus concentration of 20 parts per billion or greater are eutrophic or nutrient-enriched.

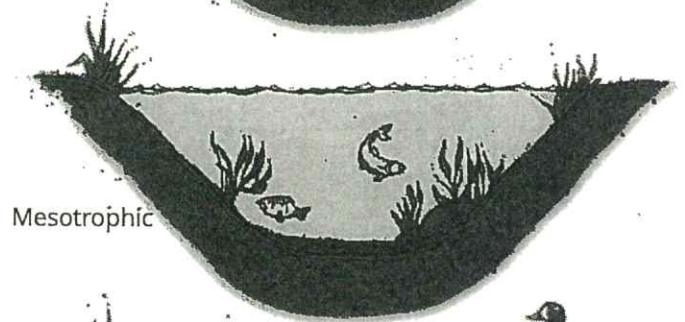
Chlorophyll-a is a pigment that imparts a green color to plants and algae. A rough estimate of the quantity of algae present in the water column can be made by measuring the amount of chlorophyll-a in the water column. A chlorophyll-a concentration greater than 6 parts per billion is characteristic of a eutrophic condition.

A **Secchi disk** is a round, black and white, 8-inch disk that is used to estimate water clarity. Eutrophic lakes have a Secchi transparency of less than 7.5 feet. Generally, it has been found that plants can grow to a depth of about twice the Secchi disk transparency.

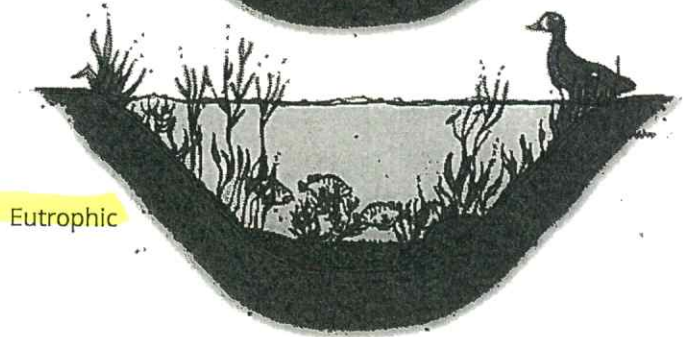
A review of historical water quality data collected from Hess Lake between 1974 and 2019 found a mean phosphorus level of 33 parts per billion, a mean chlorophyll *a* value of 12 parts per billion, and a mean Secchi transparency of 3.3 feet. **These data indicate that Hess Lake is nutrient-enriched and highly eutrophic.**



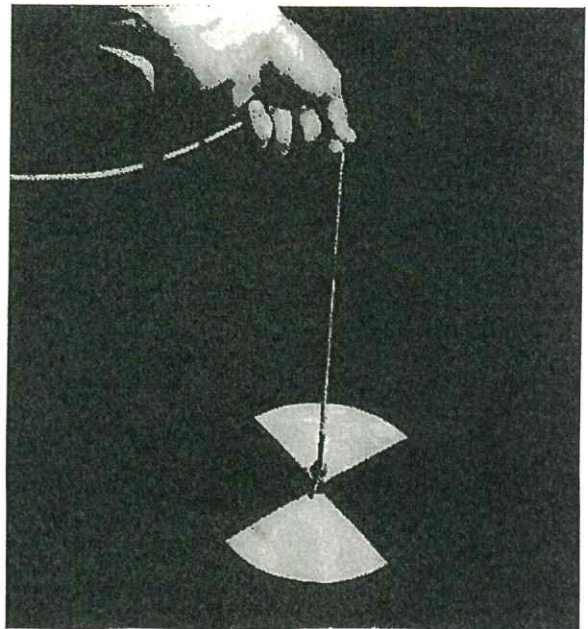
Oligotrophic



Mesotrophic



Eutrophic



SOURCE: PROGRESSIVE AE AND HL 1 B

HESS LAKE SUMMARY STATISTICS, 1974-2023

| | Total Phosphorus ($\mu\text{g/L}$) ¹ | Chlorophyll-a ($\mu\text{g/L}$) ¹ | Secchi Transparency (feet) |
|--------------------|--|---|-------------------------------|
| Mean | 36 | 12 | 3.3 |
| Standard deviation | 20 | 8 | 1.8 |
| Median | 33 | 10 | 2.5 |
| Minimum | 5 | 3 | 1.5 |
| Maximum | 90 | 35 | 10.5 |
| Number of samples | 74 | 52 | 188 |

SOURCE: PROGRESSIVE AE AND HLIB

**TABLE 1
LAKE CLASSIFICATION CRITERIA**

| Lake Classification | Total Phosphorus ($\mu\text{g/L}$) ¹ | Chlorophyll-a ($\mu\text{g/L}$) ¹ | Secchi Transparency (feet) |
|---------------------|---|--|----------------------------|
| Oligotrophic | Less than 10 | Less than 2.2 | Greater than 15.0 |
| Mesotrophic | 10 to 20 | 2.2 to 6.0 | 7.5 to 15.0 |
| Eutrophic | Greater than 20 | Greater than 6.0 | Less than 7.5 |

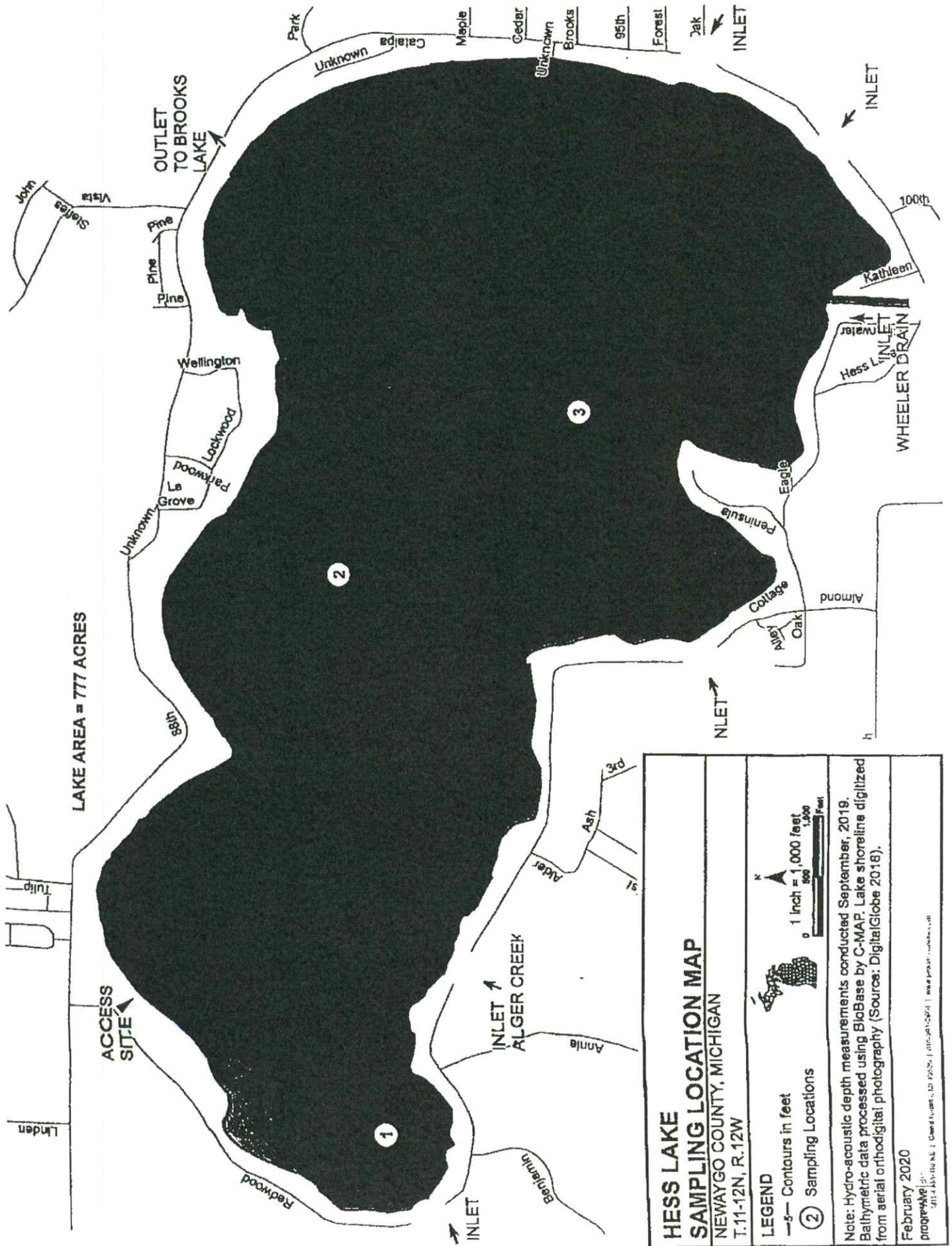
**TABLE 2
HESS LAKE SUMMER 2023 DEEP BASIN WATER QUALITY DATA**

| Date | Station | Sample Depth (feet) | Temperature (°F) | Dissolved Oxygen (mg/L) ² | Total Phosphorus ($\mu\text{g/L}$) ¹ |
|----------|---------|---------------------|------------------|--------------------------------------|---|
| 4-Aug-23 | 1 | 1 | 77 | 9.0 | 58 |
| 4-Aug-23 | 1 | 6 | 78 | 5.4 | 55 |
| 4-Aug-23 | 1 | 11 | 68 | 0.2 | 75 |
| 4-Aug-23 | 2 | 1 | 78 | 9.1 | 42 |
| 4-Aug-23 | 2 | 12 | 78 | 8.8 | 59 |
| 4-Aug-23 | 2 | 23 | 68 | 0.2 | 77 |
| 4-Aug-23 | 3 | 1 | 78 | 9.3 | 29 |
| 4-Aug-23 | 3 | 8 | 78 | 9.2 | 33 |
| 4-Aug-23 | 3 | 17 | 75 | 0.3 | 77 |

**TABLE 3
WHEELER DRAIN SUMMER 2023 WATER QUALITY DATA**

| Date | Site | Total Phosphorus ($\mu\text{g/L}$) ¹ | Discharge (c.f.s) ³ | Total Suspended Solids (mg/L) ² | Temperature (°F) |
|-----------|-----------------|---|--------------------------------|--|------------------|
| 4-Aug-23 | Hess Lake Drive | 91 | 0.5 | 8 | 66 |
| 4-Aug-23 | 108th Street | 88 | 1 | 5 | 64 |
| 15-Aug-23 | Hess Lake Drive | 80 | 6 | 9 | - |
| 15-Aug-23 | 108th Street | 96 | 4 | 9 | - |

1 $\mu\text{g/L}$ = micrograms per liter = parts per billion.
2 mg/L = milligrams per liter = parts per million.



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