Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>90 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO<sub>3</sub> alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>13 - 20</td>
<td>17 (8)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>490 - 711</td>
<td>591 (8)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 10</td>
<td>5 (8)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.7 - 12.5</td>
<td>8.0 (8)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.7 - 3.8</td>
<td>2.5 (8)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>14 - 26</td>
<td>18 (3)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
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- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Trophic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Ada</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>277672</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7703</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2856</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>21 ha or 53 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1997 to 2006</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>17 (13 to 20)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>591 (490 to 711)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
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4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Ada trend plots of year by average. The R² value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R² the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). **Total phosphorus** (TP No Trend, R² = 0.00, p = 0.94), **total nitrogen** (TN No Trend, R² = 0.05, p = 0.59), **chlorophyll** (CHL No Trend, R² = 0.23, p = 0.23) and **Secchi depth** (Secchi No Trend, R² = 0.09, p = 0.46).
Introduction for Lakes

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Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Color and Conductance Conditions</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>160 µg/L¹</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td>1270 µg/L</td>
<td>2230 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>90 µg/L</td>
</tr>
<tr>
<td>and &gt; 20 mg/L CaCO₃ or</td>
<td></td>
<td>1050 µg/L</td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>&gt;100 µS/cm@25 C Clear Hard Water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td>and ≤ 20 mg/L CaCO₃ or</td>
<td></td>
<td>510 µg/L</td>
<td>930 µg/L</td>
</tr>
<tr>
<td>&lt; 100 µS/cm@25 C Clear Soft Water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

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<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>37 - 74</td>
<td>51 (22)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>676 - 1265</td>
<td>1017 (22)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>20 - 86</td>
<td>34 (22)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.0 - 4.5</td>
<td>2.7 (22)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.6 - 1.4</td>
<td>0.8 (22)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>22 - 73</td>
<td>45 (15)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>136 - 184</td>
<td>159 (9)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

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- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Adelaide</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>277694</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6652</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3649</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>9 ha or 23 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1992 to 2015</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>51 (37 to 74)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1017 (676 to 1265)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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   a. The Lake Classification tells you which row to use in Table 1.
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   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
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Figure 2. Lake Adelaide trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.00$, $p = 1.00$), total nitrogen (TN No Trend, $R^2 = 0.00$, $p = 0.97$), chlorophyll (CHL No Trend, $R^2 = 0.03$, $p = 0.46$) and Secchi depth (Secchi Decreasing, $R^2 = 0.53$, $p = 0.00$).
Florida LAKEWATCH Report for Alma in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

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Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm @25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; \textbf{colored lakes} (color greater than 40 Pt-Co units), \textbf{clear soft water lakes} (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and \textbf{clear hard water lakes} (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>105 - 194</td>
<td>154 (5)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1590 - 2978</td>
<td>2214 (5)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>14 - 68</td>
<td>30 (5)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.2 - 2.1</td>
<td>1.6 (5)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.4 - 0.6</td>
<td>0.5 (5)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Alma</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>277811</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7186</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3542</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>8 ha or 20 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1996 to 2000</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>154 (105 to 194)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>2214 (1590 to 2978)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Figure 2. Lake Alma trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP Decreasing, $R^2 = 0.81$, $p = 0.04$), total nitrogen (TN Increasing, $R^2 = 0.97$, $p = 0.00$), chlorophyll (CHL No Trend, $R^2 = 0.61$, $p = 0.12$) and Secchi depth (Secchi Decreasing, $R^2 = 0.99$, $p = 0.00$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>160 µg/L&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>90 µg/L</td>
</tr>
<tr>
<td></td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td></td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

<sup>1</sup> For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO<sub>3</sub> alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>20 - 85</td>
<td>47 (6)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1012 - 1908</td>
<td>1347 (6)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>5 - 39</td>
<td>15 (6)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.9 - 3.5</td>
<td>2.4 (4)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.6 - 1.1</td>
<td>0.7 (4)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>75 - 97</td>
<td>83 (6)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>284 - 322</td>
<td>298 (4)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

### Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Amory</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>277840</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7803</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3137</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>2.8 ha or 7 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2005 to 2010</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>47 (20 to 85)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1347 (1012 to 1908)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Amory trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.64$, $p = 0.06$), total nitrogen (TN No Trend, $R^2 = 0.15$, $p = 0.45$), chlorophyll (CHL No Trend, $R^2 = 0.60$, $p = 0.07$) and Secchi depth (Secchi No Trend, $R^2 = 0.40$, $p = 0.37$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with **five or more years of data**. Step by step instructions on how to use the data tables are provided on page 4 of this report.

**Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)**

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

**Long-Term Data Summary for Lakes (Table 2): Definitions**

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>90 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>12 - 24</td>
<td>15 (6)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>369 - 806</td>
<td>476 (6)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 20</td>
<td>6 (6)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.3 - 10.0</td>
<td>7.8 (6)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.3 - 3.0</td>
<td>2.4 (6)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>9 - 13</td>
<td>11 (3)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Ann</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>277888</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6268</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3079</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>6 ha or 14 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1997 to 2004</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>15 (12 to 24)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>476 (369 to 806)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
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   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Ann trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.43$, $p = 0.16$), total nitrogen (TN No Trend, $R^2 = 0.48$, $p = 0.13$), chlorophyll (CHL No Trend, $R^2 = 0.51$, $p = 0.11$) and Secchi depth (Secchi No Trend, $R^2 = 0.55$, $p = 0.09$).
Florida LAKEWATCH Report for Asher in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

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<th>Annual Geometric Mean Chlorophyll-corrected</th>
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</tr>
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<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hardwater Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

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<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>15 - 65</td>
<td>32 (9)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>521 - 1238</td>
<td>765 (9)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 31</td>
<td>9 (9)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.7 - 6.4</td>
<td>4.0 (9)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.8 - 1.9</td>
<td>1.2 (9)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>30 - 49</td>
<td>39 (6)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>148 - 188</td>
<td>169 (4)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td><strong>Clear Hardwater</strong></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
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- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Asher</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6598</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.4468</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1998 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>32 (15 to 65)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>765 (521 to 1238)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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   a. The Lake Classification tells you which row to use in Table 1.
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   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
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Figure 2. Lake Asher trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP Increasing, $R^2 = 0.91$, $p = 0.00$), total nitrogen (TN Increasing, $R^2 = 0.82$, $p = 0.00$), chlorophyll (CHL Increasing, $R^2 = 0.80$, $p = 0.00$) and Secchi depth (Secchi Decreasing, $R^2 = 0.72$, $p = 0.00$).
Introduction for Lakes

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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
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<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>13 - 24</td>
<td>16 (5)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>385 - 470</td>
<td>425 (5)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 8</td>
<td>5 (5)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>6.5 - 10.3</td>
<td>8.3 (5)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.0 - 3.1</td>
<td>2.5 (5)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>21 - 24</td>
<td>22 (4)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>166 - 245</td>
<td>213 (3)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td>Clear Hardwater</td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

| County       | Semi
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Banana</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>278077</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7775</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3657</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>7.3 ha or 18 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2004 to 2019</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>16 (13 to 24)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>425 (385 to 470)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Banana trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.19$, $p = 0.47$), total nitrogen (TN No Trend, $R^2 = 0.02$, $p = 0.83$), chlorophyll (CHL No Trend, $R^2 = 0.13$, $p = 0.55$) and Secchi depth (Secchi No Trend, $R^2 = 0.23$, $p = 0.41$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25°C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25°C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>11 - 11</td>
<td>11 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>490 - 490</td>
<td>490 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>6 - 6</td>
<td>6 (1)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>7.4 - 7.4</td>
<td>7.4 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.2 - 2.2</td>
<td>2.2 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
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- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>Country</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Baptismal</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6144</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2480</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1996 to 1996</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>11 (11 to 11)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>490 (490 to 490)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
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   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
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Introduction for Lakes

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a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
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<tbody>
<tr>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO(_3) or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO(_3) or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

\(^1\) For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO\(_3\) alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>31 - 114</td>
<td>55 (4)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1018 - 1140</td>
<td>1076 (4)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>9 - 38</td>
<td>17 (4)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.9 - 4.3</td>
<td>3.3 (4)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.9 - 1.3</td>
<td>1.0 (4)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>32 - 79</td>
<td>45 (4)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>210 - 210</td>
<td>210 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Bath</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>278172</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6439</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1987</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>5.6 ha or 14 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2004 to 2008</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>55 (31 to 114)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1076 (1018 to 1140)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2\textsuperscript{nd} column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

**Nutrient Zones and “Natural Background”**

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>9 - 18</td>
<td>13 (32)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>363 - 706</td>
<td>506 (32)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 13</td>
<td>5 (32)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.9 - 18.0</td>
<td>10.4 (32)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.8 - 5.5</td>
<td>3.2 (32)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>9 - 18</td>
<td>12 (22)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>212 - 299</td>
<td>255 (16)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Bear</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>278334</td>
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<tr>
<td>Latitude</td>
<td>28.6542</td>
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<tr>
<td>Longitude</td>
<td>-81.4496</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>187 ha or 463 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>13 (9 to 18)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>506 (363 to 706)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
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   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
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Nutrient Zones and “Natural Background”

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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Bear trend plots of year by average. The R² value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R² the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, R² = 0.00, p = 0.98), total nitrogen (TN Increasing, R² = 0.77, p = 0.00), chlorophyll (CHL Increasing, R² = 0.54, p = 0.00) and Secchi depth (Secchi Decreasing, R² = 0.36, p = 0.00).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

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b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>160 µg/L¹</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO³ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>90 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO³ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>30 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO³ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>33 - 68</td>
<td>40 (16)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>819 - 1492</td>
<td>1012 (16)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>20 - 57</td>
<td>34 (16)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.0 - 3.7</td>
<td>2.9 (16)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.6 - 1.1</td>
<td>0.9 (16)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>28 - 85</td>
<td>52 (14)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>139 - 181</td>
<td>157 (9)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
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- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Bear Gully</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>278314</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6223</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2703</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>56 ha or 138 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1999 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>40 (33 to 68)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1012 (819 to 1492)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Bear Gully trend plots of year by average. The \( R^2 \) value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the \( R^2 \) the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). **Total phosphorus** (TP No Trend, \( R^2 = 0.15, p = 0.13 \)), **total nitrogen** (TN Decreasing, \( R^2 = 0.31, p = 0.02 \)), **chlorophyll** (CHL Decreasing, \( R^2 = 0.45, p = 0.00 \)) and **Secchi depth** (Secchi Increasing, \( R^2 = 0.72, p = 0.00 \)).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>212 - 341</td>
<td>269 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>3498 - 6014</td>
<td>4587 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>109 - 286</td>
<td>177 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>0.7 - 1.5</td>
<td>1.1 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.2 - 0.5</td>
<td>0.3 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>58 - 67</td>
<td>62 (2)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>8345 - 8631</td>
<td>8487 (2)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Beatrice</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7238</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.0584</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2012 to 2013</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Hypereutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>269 (212 to 341)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>4587 (3498 to 6014)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with **five or more years of data**. Step by step instructions on how to use the data tables are provided on page 4 of this report.

**Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)**

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

**Long-Term Data Summary for Lakes (Table 2): Definitions**

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2230 µg/L</td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO$_3$ or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td>90 µg/L</td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO$_3$ or &lt;100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td>30 µg/L</td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO$_3$ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>31 - 60</td>
<td>41 (6)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>595 - 796</td>
<td>661 (6)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 16</td>
<td>8 (6)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.3 - 5.2</td>
<td>4.7 (5)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.3 - 1.6</td>
<td>1.4 (5)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>23 - 41</td>
<td>31 (6)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>103 - 152</td>
<td>131 (6)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Beaumont</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6617</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3319</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2010 to 2016</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>41 (31 to 60)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>661 (595 to 796)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2\(^{nd}\) column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.frules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Beaumont trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.37$, $p = 0.20$), total nitrogen (TN No Trend, $R^2 = 0.55$, $p = 0.09$), chlorophyll (CHL No Trend, $R^2 = 0.02$, $p = 0.77$) and Secchi depth (Secchi No Trend, $R^2 = 0.69$, $p = 0.08$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L)**: Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L)**: Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L)**: Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m)**: Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units)**: LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C)**: Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification**: Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>14 - 21</td>
<td>17 (3)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>687 - 825</td>
<td>776 (3)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 10</td>
<td>4 (3)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>7.1 - 10.3</td>
<td>8.6 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.2 - 3.1</td>
<td>2.6 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>39 - 55</td>
<td>46 (2)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Bel-Air</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>278407</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7797</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3090</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area</td>
<td>14 ha or 34 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2000 to 2005</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>17 (14 to 21)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>776 (687 to 825)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2\textsuperscript{nd} column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
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Introduction for Lakes

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For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

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- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
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<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

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<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>12 - 15</td>
<td>13 (4)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>620 - 903</td>
<td>796 (4)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 7</td>
<td>5 (3)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.8 - 6.6</td>
<td>6.2 (3)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.8 - 2.0</td>
<td>1.9 (3)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
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- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Bingham</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>278785</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7391</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3099</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>7 ha or 17 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 1996</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>13 (12 to 15)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>796 (620 to 903)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
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   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
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Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Florida LAKEWATCH Report for Brantley in Seminole County  
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>9 - 25</td>
<td>12 (24)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>290 - 632</td>
<td>466 (23)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>1 - 22</td>
<td>5 (24)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.6 - 12.0</td>
<td>8.9 (24)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.7 - 3.7</td>
<td>2.7 (24)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>11 - 24</td>
<td>15 (17)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>185 - 228</td>
<td>203 (14)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Brantley</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>279342</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6872</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.4250</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>109 ha or 269 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1994 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>12 (9 to 25)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>466 (290 to 632)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Brantley trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.00$, $p = 0.90$), **total nitrogen** (TN Increasing, $R^2 = 0.30$, $p = 0.01$), **chlorophyll** (CHL No Trend, $R^2 = 0.14$, $p = 0.07$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.01$, $p = 0.62$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
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<th>Maximum calculated numeric interpretation</th>
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<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
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<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>16 - 20</td>
<td>18 (7)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>671 - 807</td>
<td>737 (7)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>1 - 9</td>
<td>4 (7)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.4 - 5.3</td>
<td>4.7 (7)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.3 - 1.6</td>
<td>1.4 (7)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>18 - 46</td>
<td>34 (6)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

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- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Buck</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>279581</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7163</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1297</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>63 ha or 158 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2000 to 2006</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>18 (16 to 20)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>737 (671 to 807)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
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Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.frules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Buck trend plots of year by average. The R² value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R² the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, R² = 0.46, p = 0.10), total nitrogen (TN No Trend, R² = 0.04, p = 0.65), chlorophyll (CHL No Trend, R² = 0.39, p = 0.13) and Secchi depth (Secchi No Trend, R² = 0.20, p = 0.31).
Introduction for Lakes

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a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

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- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

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<th>Annual Geometric Mean Chlorophyll-corrected</th>
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<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>18 - 48</td>
<td>31 (9)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>694 - 1690</td>
<td>1057 (9)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 27</td>
<td>10 (9)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.5 - 7.0</td>
<td>4.1 (8)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.8 - 2.1</td>
<td>1.2 (8)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>18 - 35</td>
<td>29 (7)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>251 - 327</td>
<td>285 (4)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Charm</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>280331</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6787</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1973</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>8 ha or 19 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2000 to 2021</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>31 (18 to 48)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1057 (694 to 1690)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Charm trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.41$, p = 0.06), **total nitrogen** (TN No Trend, $R^2 = 0.07$, p = 0.48), **chlorophyll** (CHL No Trend, $R^2 = 0.42$, p = 0.06) and **Secchi depth** (Secchi No Trend, $R^2 = 0.27$, p = 0.18).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with **five or more years of data**. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L)**: Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L)**: Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L)**: Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m)**: Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units)**: LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C)**: Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification**: Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>90 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>30 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>11 - 17</td>
<td>14 (7)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>607 - 751</td>
<td>684 (7)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 6</td>
<td>5 (7)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.0 - 9.9</td>
<td>6.8 (7)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.5 - 3.0</td>
<td>2.1 (7)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>20 - 52</td>
<td>36 (7)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>58 - 76</td>
<td>68 (7)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Softwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Clear</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>280531</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6699</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2949</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2016 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>14 (11 to 17)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>684 (607 to 751)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

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Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Clear trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP Increasing, $R^2 = 0.71$, $p = 0.02$), total nitrogen (TN No Trend, $R^2 = 0.51$, $p = 0.07$), chlorophyll (CHL No Trend, $R^2 = 0.00$, $p = 0.91$) and Secchi depth (Secchi Decreasing, $R^2 = 0.92$, $p = 0.00$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

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For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
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- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
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<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
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<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
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<td>Total Phosphorus (µg/L)</td>
<td>12 - 12</td>
<td><strong>12 (1)</strong></td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1065 - 1065</td>
<td><strong>1065 (1)</strong></td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>11 - 11</td>
<td><strong>11 (1)</strong></td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.6 - 1.6</td>
<td>1.6 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.5 - 0.5</td>
<td>0.5 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
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- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Cochran</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>294350</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7403</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1400</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1999 to 1999</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>12 (12 to 12)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1065 (1065 to 1065)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Florida LAKEWATCH Report for Como in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>18 - 18</td>
<td>18 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>543 - 543</td>
<td>543 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 4</td>
<td>4 (1)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>6.4 - 6.4</td>
<td>6.4 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.0 - 2.0</td>
<td>2.0 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>36 - 36</td>
<td>36 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>111 - 111</td>
<td>111 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County:** Name of county in which the lake resides.
- **Name:** Lake name that LAKEWATCH uses for the system.
- **GNIS Number:** Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude:** Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type:** Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre):** LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft):** This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year):** Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone:** Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max):** Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Como</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
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<tr>
<td>Longitude</td>
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</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2021 to 2021</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>18 (18 to 18)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>543 (543 to 543)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
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Nutrient Zones and “Natural Background”

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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

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a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>23 - 50</td>
<td>37 (27)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>529 - 1021</td>
<td>688 (27)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>12 - 37</td>
<td>23 (27)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.7 - 5.1</td>
<td>3.5 (27)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.8 - 1.6</td>
<td>1.1 (27)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>6 - 18</td>
<td>14 (21)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>117 - 270</td>
<td>162 (16)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
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- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Concord</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>280709</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6742</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3344</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>8 ha or 20 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1996 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>37 (23 to 50)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>688 (529 to 1021)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Concord trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP Decreasing, $R^2 = 0.40$, $p = 0.00$), **total nitrogen** (TN No Trend, $R^2 = 0.07$, $p = 0.17$), **chlorophyll** (CHL Decreasing, $R^2 = 0.16$, $p = 0.04$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.01$, $p = 0.71$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm @25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>&gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>&lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>26 - 105</td>
<td>47 (9)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>504 - 903</td>
<td>654 (9)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>5 - 24</td>
<td>12 (9)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.0 - 7.0</td>
<td>4.1 (9)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.9 - 2.1</td>
<td>1.2 (9)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>19 - 46</td>
<td>25 (3)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Cranes Roost</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>281005</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6662</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3866</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>14 ha or 35 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1995 to 2003</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>47 (26 to 105)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>654 (504 to 903)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Cranes Roost trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP Increasing, $R^2 = 0.47$, $p = 0.04$), **total nitrogen** (TN Increasing, $R^2 = 0.61$, $p = 0.01$), **chlorophyll** (CHL Increasing, $R^2 = 0.70$, $p = 0.00$) and **Secchi depth** (Secchi Decreasing, $R^2 = 0.71$, $p = 0.00$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>160 µg/L 1</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>90 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>30 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>9 - 23</td>
<td>15 (12)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>397 - 660</td>
<td>521 (12)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 9</td>
<td>5 (12)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.4 - 11.2</td>
<td>6.6 (12)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.7 - 3.4</td>
<td>2.0 (12)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>13 - 35</td>
<td>27 (9)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>195 - 237</td>
<td>209 (5)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Crescent</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6507</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1296</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre).</td>
<td>ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2002 to 2021</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>15 (9 to 23)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>521 (397 to 660)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Crescent trend plots of year by average. The R² value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R² the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, R² = 0.01, p = 0.74), total nitrogen (TN No Trend, R² = 0.04, p = 0.56), chlorophyll (CHL No Trend, R² = 0.00, p = 1.00) and Secchi depth (Secchi No Trend, R² = 0.27, p = 0.08).
Florida LAKEWATCH Report for Crystal Bowl in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO(_3) or (&gt;100 \mu\text{S/cm}@25\ C) Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO(_3) or (&lt;100 \mu\text{S/cm}@25\ C) Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

\(^1\) For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO\(_3\) alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>6 - 13</td>
<td>10 (18)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>282 - 587</td>
<td>403 (18)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 13</td>
<td>5 (18)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.8 - 13.3</td>
<td>10.3 (18)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.8 - 4.0</td>
<td>3.1 (18)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>3 - 12</td>
<td>6 (18)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>89 - 106</td>
<td>98 (16)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Softwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County:** Name of county in which the lake resides.
- **Name:** Lake name that LAKEWATCH uses for the system.
- **GNIS Number:** Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude:** Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type:** Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre):** LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft):** This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year):** Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone:** Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max):** Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Crystal Bowl</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>281115</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6641</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3149</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>2.85 ha or 7 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2005 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>10 (6 to 13)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>403 (282 to 587)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Crystal Bowl trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.01$, $p = 0.75$), **total nitrogen** (TN Decreasing, $R^2 = 0.63$, $p = 0.00$), **chlorophyll** (CHL Decreasing, $R^2 = 0.34$, $p = 0.01$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.14$, $p = 0.13$).
Florida LAKEWATCH Report for Cub in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

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- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
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- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25°C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>9 - 18</td>
<td>14 (19)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>560 - 729</td>
<td>641 (19)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 8</td>
<td>5 (19)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.5 - 11.2</td>
<td>8.4 (19)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.7 - 3.4</td>
<td>2.6 (19)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>15 - 24</td>
<td>17 (17)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>223 - 304</td>
<td>264 (16)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Cub</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>281141</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6473</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.4397</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>6 ha or 14 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1999 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>14 (9 to 18)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>641 (560 to 729)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Cub trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.04$, $p = 0.44$), total nitrogen (TN Increasing, $R^2 = 0.35$, $p = 0.01$), chlorophyll (CHL Increasing, $R^2 = 0.45$, $p = 0.00$) and Secchi depth (Secchi No Trend, $R^2 = 0.19$, $p = 0.06$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25°C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25°C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>9 - 13</td>
<td>11 (4)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>406 - 455</td>
<td>434 (4)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 5</td>
<td>3 (4)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>8.0 - 10.5</td>
<td>9.5 (4)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.4 - 3.2</td>
<td>2.9 (4)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>8 - 22</td>
<td>12 (4)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>139 - 139</td>
<td>139 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Deep</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>281431</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6117</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2546</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>17 ha or 43 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2001 to 2007</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Oligotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>11 (9 to 13)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>434 (406 to 455)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO$_3$ or $&gt;100$ µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO$_3$ or $&lt;100$ µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

$^1$ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of $<100$ µS/cm@25 C used to estimate the mg/L CaCO$_3$ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>22 - 30</td>
<td>25 (4)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>670 - 876</td>
<td>771 (4)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 18</td>
<td>9 (4)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.3 - 7.7</td>
<td>5.8 (4)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.3 - 2.3</td>
<td>1.8 (4)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>61 - 61</td>
<td>61 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>DeForest</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>298078</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7826</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3111</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>4 ha or 10 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1996 to 2003</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>25 (22 to 30)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>771 (670 to 876)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Florida LAKEWATCH Report for Dot in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

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Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
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- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/em @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/em @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>61 - 72</td>
<td>69 (4)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1134 - 1533</td>
<td>1379 (4)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>30 - 56</td>
<td>40 (4)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.0 - 3.2</td>
<td>2.4 (4)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.6 - 1.0</td>
<td>0.7 (4)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>35 - 35</td>
<td>35 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Base File Data for Lakes: Definitions and Nutrient Zone Maps**

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

**Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.**

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Dot</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7511</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2857</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td></td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1999 to 2006</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>69 (61 to 72)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1379 (1134 to 1533)</td>
</tr>
</tbody>
</table>

**Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012).** Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
**Florida LAKEWATCH Report for East in Seminole County**
**Using Data Downloaded 12/9/2022**

**Introduction for Lakes**

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

**Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)**

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

**Long-Term Data Summary for Lakes (Table 2): Definitions**

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: *colored lakes* (color greater than 40 Pt-Co units), *clear soft water lakes* (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and *clear hard water lakes* (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

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<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>58 - 177</td>
<td>84 (6)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>841 - 1227</td>
<td>997 (6)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>20 - 41</td>
<td>29 (6)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.2 - 4.8</td>
<td>4.1 (6)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.0 - 1.5</td>
<td>1.3 (6)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>45 - 85</td>
<td>67 (5)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>161 - 189</td>
<td>173 (4)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>East</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>281995</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7056</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3458</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>2.8 ha or 7 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2004 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>84 (58 to 177)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>997 (841 to 1227)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E., Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake East trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.05$, $p = 0.66$), total nitrogen (TN No Trend, $R^2 = 0.08$, $p = 0.58$), chlorophyll (CHL No Trend, $R^2 = 0.29$, $p = 0.27$) and Secchi depth (Secchi No Trend, $R^2 = 0.29$, $p = 0.27$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO$_3$ or &gt; 100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO$_3$ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO$_3$ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>10 - 17</td>
<td>13 (11)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>648 - 1040</td>
<td>766 (11)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 7</td>
<td>4 (11)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>7.0 - 10.2</td>
<td>8.1 (11)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.1 - 3.1</td>
<td>2.5 (11)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>34 - 34</td>
<td>34 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County:** Name of county in which the lake resides.
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- **Surface Area (ha and acre):** LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft):** This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year):** Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone:** Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max):** Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>East Crystal</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>281126</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7666</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3107</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 2005</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>13 (10 to 17)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>766 (648 to 1040)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake East Crystal trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.10$, $p = 0.35$), total nitrogen (TN No Trend, $R^2 = 0.05$, $p = 0.50$), chlorophyll (CHL No Trend, $R^2 = 0.00$, $p = 0.92$) and Secchi depth (Secchi No Trend, $R^2 = 0.01$, $p = 0.76$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ and &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ and &lt;100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

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<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>24 - 24</td>
<td>24 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1877 - 1877</td>
<td>1877 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>12 - 12</td>
<td>12 (1)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.0 - 3.0</td>
<td>3.0 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.9 - 0.9</td>
<td>0.9 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>134 - 134</td>
<td>134 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>134 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
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- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

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<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Emily</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>282201</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6728</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3133</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>2 ha or 5 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2004 to 2004</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>24 (24 to 24)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1877 (1877 to 1877)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
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2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
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   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
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Florida LAKEWATCH Report for Emma in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td></td>
<td></td>
<td>160 µg/L&lt;sup&gt;1&lt;/sup&gt; 2230 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td>90 µg/L 1910 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td>30 µg/L 930 µg/L</td>
</tr>
</tbody>
</table>

<sup>1</sup> For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO<sub>3</sub> alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>7 - 8</td>
<td>7 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>993 - 1001</td>
<td>997 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 2</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County:** Name of county in which the lake resides.
- **Name:** Lake name that LAKEWATCH uses for the system.
- **GNIS Number:** Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude:** Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type:** Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre):** LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft):** This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year):** Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone:** Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max):** Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

**Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.**

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Emma</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>282204</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7624</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3492</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>20 ha or 49 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 1992</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Oligotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>7 (7 to 8)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>997 (993 to 1001)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Geometric Mean Chlorophyll-corrected</td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO(_3) or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO(_3) or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
</tr>
</tbody>
</table>

\(^1\) For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO\(_3\) alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>16 - 27</td>
<td>22 (7)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>575 - 987</td>
<td>661 (7)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>9 - 24</td>
<td>16 (7)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.0 - 6.0</td>
<td>4.7 (7)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.9 - 1.8</td>
<td>1.4 (7)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>10 - 24</td>
<td>15 (7)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>132 - 182</td>
<td>160 (6)</td>
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<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, riverstreams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
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<td>Name</td>
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<td>Longitude</td>
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<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>20.4 ha or 50 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2006 to 2012</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>22 (16 to 27)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>661 (575 to 987)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Fairy trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.04$, $p = 0.65$), **total nitrogen** (TN No Trend, $R^2 = 0.11$, $p = 0.47$), **chlorophyll** (CHL No Trend, $R^2 = 0.01$, $p = 0.85$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.23$, $p = 0.28$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
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- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>11 - 16</td>
<td>14 (6)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>430 - 585</td>
<td>504 (6)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 14</td>
<td>7 (6)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.3 - 11.3</td>
<td>7.9 (6)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.6 - 3.5</td>
<td>2.4 (6)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>5 - 12</td>
<td>9 (4)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

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- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Florence</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>282593</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6302</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2903</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>13 ha or 32 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1999 to 2004</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>14 (11 to 16)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>504 (430 to 585)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

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   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Figure 2. Lake Florence trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.52$, $p = 0.11$), total nitrogen (TN No Trend, $R^2 = 0.01$, $p = 0.89$), chlorophyll (CHL No Trend, $R^2 = 0.14$, $p = 0.47$) and Secchi depth (Secchi No Trend, $R^2 = 0.43$, $p = 0.16$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µs/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO$_3$ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO$_3$ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO$_3$ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>24 - 80</td>
<td>43 (19)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>663 - 1321</td>
<td>894 (19)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>5 - 42</td>
<td>18 (19)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.4 - 5.0</td>
<td>3.7 (19)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.7 - 1.5</td>
<td>1.1 (19)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>46 - 102</td>
<td>62 (13)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>130 - 152</td>
<td>140 (7)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Florida</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>282623</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6755</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3630</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>14 ha or 33 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1995 to 2016</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>43 (24 to 80)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>894 (663 to 1321)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Figure 2. Lake Florida trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP Decreasing, $R^2 = 0.32$, $p = 0.01$), **total nitrogen** (TN No Trend, $R^2 = 0.05$, $p = 0.36$), **chlorophyll** (CHL No Trend, $R^2 = 0.10$, $p = 0.18$) and **Secchi depth** (Secchi Decreasing, $R^2 = 0.32$, $p = 0.01$).
Florida LAKEWATCH Report for Forest in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
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- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
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<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>160 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>90 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt;100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>30 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>115 - 121</td>
<td>118 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1476 - 1485</td>
<td>1480 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>16 - 27</td>
<td>21 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.6 - 1.8</td>
<td>1.7 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.5 - 0.5</td>
<td>0.5 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>156 - 157</td>
<td>157 (2)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
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- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Forest</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.8180</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3465</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2004 to 2005</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>118 (115 to 121)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1480 (1476 to 1485)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Florida LAKEWATCH Report for Fruitwood in Seminole County  
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO$_3$ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO$_3$ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO$_3$ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>13 - 95</td>
<td>43 (9)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>620 - 1421</td>
<td>870 (9)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>12 - 96</td>
<td>30 (9)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.0 - 4.6</td>
<td>3.2 (9)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.6 - 1.4</td>
<td>1.0 (9)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Fruitwood</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6818</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3077</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 1999</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>43 (13 to 95)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>870 (620 to 1421)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Fruitwood trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.07$, $p = 0.49$), total nitrogen (TN No Trend, $R^2 = 0.00$, $p = 0.99$), chlorophyll (CHL No Trend, $R^2 = 0.00$, $p = 0.98$) and Secchi depth (Secchi No Trend, $R^2 = 0.03$, $p = 0.65$).
**Florida LAKEWATCH Report for Gem in Seminole County**
**Using Data Downloaded 12/9/2022**

**Introduction for Lakes**

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

**Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)**

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

**Long-Term Data Summary for Lakes (Table 2): Definitions**

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
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- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

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<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>5 - 35</td>
<td>13 (10)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>240 - 945</td>
<td>407 (10)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 42</td>
<td>6 (10)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.3 - 9.0</td>
<td>6.4 (9)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.0 - 2.7</td>
<td>1.9 (9)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>49 - 120</td>
<td>70 (4)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Gem</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>283009</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6466</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2060</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>4 ha or 9 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1995 to 2006</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>13 (5 to 35)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>407 (240 to 945)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s *Lake Classification* in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The *Lake Classification* tells you which row to use in Table 1.
2. Identify your waterbody’s *Grand Geometric Mean* Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the *Annual Geometric Mean Chlorophyll-corrected* (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the *Minimum calculated numeric interpretation* columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the *Maximum calculated numeric interpretation* columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen *Grand Geometric Mean* concentration in Table 2 and compare them to the appropriate *Annual Geometric Mean Total Phosphorus* and *Annual Geometric Mean Total Nitrogen* values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Gem trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.19$, $p = 0.21$), total nitrogen (TN No Trend, $R^2 = 0.19$, $p = 0.20$), chlorophyll (CHL No Trend, $R^2 = 0.08$, $p = 0.42$) and Secchi depth (Secchi No Trend, $R^2 = 0.00$, $p = 0.98$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>21 - 21</td>
<td>21 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>530 - 530</td>
<td>530 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 3</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.0 - 5.0</td>
<td>5.0 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.5 - 1.5</td>
<td>1.5 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Golden</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>283154</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7671</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2432</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>18 ha or 45 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1998 to 1998</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>21 (21 to 21)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>530 (530 to 530)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.frlrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
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</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td>or &lt; 100 µS/cm@25 C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>8 - 13</td>
<td>11 (8)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>554 - 707</td>
<td>618 (8)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 12</td>
<td>5 (8)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>6.9 - 10.7</td>
<td>8.5 (7)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.1 - 3.3</td>
<td>2.6 (7)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>16 - 36</td>
<td>25 (8)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>157 - 197</td>
<td>179 (5)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

### Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Gore</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>283228</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6488</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1037</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>12.24 ha or 30 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2003 to 2012</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>11 (8 to 13)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>618 (554 to 707)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

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   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E,. Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Gore trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.34$, $p = 0.13$), total nitrogen (TN No Trend, $R^2 = 0.05$, $p = 0.59$), chlorophyll (CHL Increasing, $R^2 = 0.58$, $p = 0.03$) and Secchi depth (Secchi No Trend, $R^2 = 0.02$, $p = 0.79$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
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- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt;100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>25 - 25</td>
<td>25 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>615 - 615</td>
<td>615 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 4</td>
<td>4 (1)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>8.6 - 8.6</td>
<td>8.6 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.6 - 2.6</td>
<td>2.6 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>52 - 52</td>
<td>52 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>123 - 123</td>
<td>123 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County:** Name of county in which the lake resides.
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- **Surface Area (ha and acre):** LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft):** This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year):** Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone:** Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max):** Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90\textsuperscript{th} percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Grace</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>283257</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7250</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3745</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>13.1 ha or 32 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2018 to 2018</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>25 (25 to 25)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>615 (615 to 615)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.frlrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>16 - 363</td>
<td>40 (10)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>575 - 1663</td>
<td>825 (10)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>1 - 65</td>
<td>9 (10)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.0 - 8.5</td>
<td>5.1 (10)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.2 - 2.6</td>
<td>1.6 (10)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>21 - 32</td>
<td>24 (7)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>138 - 179</td>
<td>160 (6)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

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<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Griffin</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>283449</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6799</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3419</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>4 ha or 10 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1992 to 2013</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td><strong>TP4</strong></td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td><strong>40 (16 to 363)</strong></td>
</tr>
<tr>
<td>TN Zone</td>
<td><strong>TN4</strong></td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td><strong>825 (575 to 1663)</strong></td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Griffin trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP Decreasing, $R^2 = 0.54$, $p = 0.01$), total nitrogen (TN Decreasing, $R^2 = 0.71$, $p = 0.00$), chlorophyll (CHL Decreasing, $R^2 = 0.61$, $p = 0.01$) and Secchi depth (Secchi No Trend, $R^2 = 0.09$, $p = 0.41$).
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<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>90 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>30 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

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<th>Parameter</th>
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<th>Grand Geometric Mean (Sampling years)</th>
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<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>9 - 38</td>
<td>22 (15)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>370 - 854</td>
<td>597 (15)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 40</td>
<td>12 (15)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.8 - 9.9</td>
<td>5.4 (14)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.2 - 3.0</td>
<td>1.6 (14)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>16 - 31</td>
<td>24 (7)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>131 - 165</td>
<td>151 (3)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td><strong>Clear Hardwater</strong></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
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- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Hayes</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>283838</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6333</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2086</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>5 ha or 12 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 2013</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>22 (9 to 38)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>597 (370 to 854)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Hayes trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.16$, $p = 0.15$), **total nitrogen** (TN No Trend, $R^2 = 0.00$, $p = 0.92$), **chlorophyll** (CHL No Trend, $R^2 = 0.26$, $p = 0.05$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.01$, $p = 0.69$).
Florida LAKEWATCH Report for Hodge in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25°C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25°C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>6 µg/L</td>
<td>510 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td></td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>90 µg/L</td>
</tr>
<tr>
<td></td>
<td>2230 µg/L</td>
<td>1910 µg/L</td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>11 - 16</td>
<td>13 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>520 - 570</td>
<td>544 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 4</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.1 - 6.5</td>
<td>5.2 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.2 - 2.0</td>
<td>1.6 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>30 - 34</td>
<td>32 (2)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>146 - 146</td>
<td>146 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
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Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Hodge</td>
</tr>
<tr>
<td>GNIS Number</td>
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<tr>
<td>Latitude</td>
<td>28.6903</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3210</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>6.7 ha or 16 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2006 to 2007</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>13 (11 to 16)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>544 (520 to 570)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

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b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

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- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

<sup>1</sup> For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO<sub>3</sub> alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>8 - 22</td>
<td>13 (6)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>410 - 902</td>
<td>579 (6)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 8</td>
<td>5 (6)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.4 - 5.2</td>
<td>2.5 (6)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.4 - 1.6</td>
<td>0.8 (6)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>65 - 408</td>
<td>177 (4)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Horseshoe</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>284311</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6296</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1322</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>38 ha or 95 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1998 to 2004</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>13 (8 to 22)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>579 (410 to 902)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Horseshoe trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.35$, $p = 0.21$), total nitrogen (TN No Trend, $R^2 = 0.46$, $p = 0.14$), chlorophyll (CHL No Trend, $R^2 = 0.01$, $p = 0.82$) and Secchi depth (Secchi No Trend, $R^2 = 0.02$, $p = 0.80$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO$_3$ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO$_3$ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO$_3$ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>13 - 38</td>
<td>26 (13)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>400 - 883</td>
<td>658 (13)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 5</td>
<td>3 (13)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.1 - 4.7</td>
<td>3.0 (13)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.6 - 1.4</td>
<td>0.9 (13)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>74 - 202</td>
<td>123 (10)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>139 - 236</td>
<td>173 (9)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Horseshoe North</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>284311</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6401</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1351</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2001 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>26 (13 to 38)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>658 (400 to 883)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

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Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
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2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
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Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

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For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

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<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units Colored Lakes and &gt; 20 mg/L CaCO$_3$ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO$_3$ alkalinity concentration until such time that alkalinity data are available.

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<thead>
<tr>
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<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>18 - 19</td>
<td>18 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>427 - 687</td>
<td>541 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 5</td>
<td>3 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.1 - 4.5</td>
<td>4.3 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.2 - 1.4</td>
<td>1.3 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Howard</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>284351</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.8009</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.4027</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>3 ha or 7.5 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2015 to 2016</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>18 (18 to 19)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>541 (427 to 687)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with **five or more years of data**. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L)**: Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L)**: Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L)**: Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m)**: Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units)**: LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C)**: Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification**: Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>160 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>90 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>30 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>28 - 80</td>
<td>42 (24)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>652 - 1356</td>
<td>894 (24)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>15 - 57</td>
<td>31 (24)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.0 - 4.0</td>
<td>2.9 (24)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.6 - 1.2</td>
<td>0.9 (24)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>15 - 33</td>
<td>27 (12)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>145 - 193</td>
<td>175 (10)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>

2
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Howell</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>284360</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6378</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3153</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>164 ha or 406 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 2018</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>42 (28 to 80)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>894 (652 to 1356)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Howell trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP Decreasing, $R^2 = 0.28$, $p = 0.01$), **total nitrogen** (TN No Trend, $R^2 = 0.11$, $p = 0.11$), **chlorophyll** (CHL Decreasing, $R^2 = 0.61$, $p = 0.00$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.00$, $p = 0.92$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
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- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three groups based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units <strong>Colored Lakes</strong></td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C <strong>Clear Hard Water Lakes</strong></td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C <strong>Clear Soft Water Lakes</strong></td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>48 - 73</td>
<td>59 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1264 - 1757</td>
<td>1490 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>39 - 41</td>
<td>40 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.6 - 2.2</td>
<td>1.9 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.5 - 0.7</td>
<td>0.6 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>86 - 106</td>
<td>95 (2)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>102 - 131</td>
<td>116 (2)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County:** Name of county in which the lake resides.
- **Name:** Lake name that LAKEWATCH uses for the system.
- **GNIS Number:** Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude:** Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type:** Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre):** LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft):** This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year):** Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone:** Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max):** Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90\(^{th}\) percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Island North</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7039</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3635</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2011 to 2012</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Hypereutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>59 (48 to 73)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1490 (1264 to 1757)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

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Introduction for Lakes

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Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>5 - 14</td>
<td>7 (7)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>192 - 3253</td>
<td>574 (7)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>1 - 11</td>
<td>2 (7)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.4 - 9.9</td>
<td>6.6 (7)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.3 - 3.0</td>
<td>2.0 (7)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>1 - 27</td>
<td>4 (6)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Base File Data for Lakes: Definitions and Nutrient Zone Maps**

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L:: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

### Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Island Pond</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>284619</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7216</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1359</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>31 ha or 72 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2000 to 2006</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Oligotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>7 (5 to 14)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>574 (192 to 3253)</td>
</tr>
</tbody>
</table>

**Figure 1.** Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Island Pond trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP Decreasing, $R^2 = 0.60$, $p = 0.04$), total nitrogen (TN No Trend, $R^2 = 0.53$, $p = 0.06$), chlorophyll (CHL Decreasing, $R^2 = 0.76$, $p = 0.01$) and Secchi depth (Secchi No Trend, $R^2 = 0.42$, $p = 0.12$).
Introduction for Lakes

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Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

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<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
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<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
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<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

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<thead>
<tr>
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<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>26 - 51</td>
<td>33 (13)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>579 - 937</td>
<td>682 (13)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>7 - 31</td>
<td>13 (13)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.6 - 6.6</td>
<td>4.8 (13)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.1 - 2.0</td>
<td>1.5 (13)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>15 - 24</td>
<td>19 (13)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>119 - 195</td>
<td>151 (7)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td><strong>Clear Hardwater</strong></td>
<td><strong>Clear Hardwater</strong></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

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- **Name**: Lake name that LAKEWATCH uses for the system.
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- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Jane</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>284726</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6893</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3392</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>0 ha or 1 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2001 to 2013</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td><strong>33 (26 to 51)</strong></td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td><strong>682 (579 to 937)</strong></td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
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Figure 2. Lake Jane trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.27$, $p = 0.07$), total nitrogen (TN No Trend, $R^2 = 0.01$, $p = 0.80$), chlorophyll (CHL No Trend, $R^2 = 0.01$, $p = 0.71$) and Secchi depth (Secchi No Trend, $R^2 = 0.09$, $p = 0.32$).
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</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units <strong>Colored Lakes</strong></td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C <strong>Clear Hard Water Lakes</strong></td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C <strong>Clear Soft Water Lakes</strong></td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>8 - 33</td>
<td>20 (5)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>482 - 1214</td>
<td>879 (5)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 21</td>
<td>13 (5)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.6 - 8.5</td>
<td>3.6 (5)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.8 - 2.6</td>
<td>1.1 (5)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>17 - 32</td>
<td>25 (3)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>469 - 469</td>
<td>469 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td><strong>Clear Hardwater</strong></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
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- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Jennie</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>284752</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7768</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2821</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area</td>
<td>9 ha or 22 acre</td>
</tr>
<tr>
<td>Period of Record</td>
<td>2000 to 2011</td>
</tr>
<tr>
<td>Lake Trophic Status</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration</td>
<td>20 (8 to 33)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration</td>
<td>879 (482 to 1214)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E., Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Jennie trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP Decreasing, $R^2 = 0.99$, $p = 0.00$), **total nitrogen** (TN Decreasing, $R^2 = 0.92$, $p = 0.01$), **chlorophyll** (CHL No Trend, $R^2 = 0.47$, $p = 0.20$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.70$, $p = 0.08$).
Florida LAKEWATCH Report for Jesup in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; *colored lakes* (color greater than 40 Pt-Co units), *clear soft water lakes* (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µs/cm @25 C), and *clear hard water lakes* (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td>≤ 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td>and &gt; 20 mg/L CaCO₃</td>
<td>or &gt;100 µS/cm@25 C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td>≤ 40 Platinum Cobalt Units</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
</tr>
<tr>
<td>and ≤ 20 mg/L CaCO₃</td>
<td>or &lt; 100 µS/cm@25 C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td>1 For lakes with color &gt; 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of &lt;100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>88 - 192</td>
<td>129 (22)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1548 - 4179</td>
<td>2678 (22)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>80 - 206</td>
<td>119 (22)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>0.5 - 1.9</td>
<td>1.0 (22)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.2 - 0.6</td>
<td>0.3 (22)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>47 - 72</td>
<td>58 (17)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>438 - 980</td>
<td>608 (14)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
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- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Jesup</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>295793</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7102</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2525</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>4051 ha or 10011 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 2020</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Hypereutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>129 (88 to 192)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>2678 (1548 to 4179)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
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Nutrient Zones and “Natural Background”

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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
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Figure 2. Lake Jesup trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP Decreasing, $R^2 = 0.70$, $p = 0.00$), **total nitrogen** (TN No Trend, $R^2 = 0.00$, $p = 0.98$), **chlorophyll** (CHL No Trend, $R^2 = 0.01$, $p = 0.68$) and **Secchi depth** (Secchi Decreasing, $R^2 = 0.55$, $p = 0.00$).
Introduction for Lakes

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- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
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- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>87 - 186</td>
<td>120 (22)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1753 - 3591</td>
<td>2422 (22)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>56 - 146</td>
<td>92 (22)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>0.8 - 1.5</td>
<td>1.2 (22)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.2 - 0.5</td>
<td>0.4 (22)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>57 - 118</td>
<td>77 (22)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>546 - 1187</td>
<td>766 (16)</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

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- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Jesup North</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>295793</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7789</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1798</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2001 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Hypereutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>120 (87 to 186)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>2422 (1753 to 3591)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Jesup North trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP Decreasing, $R^2 = 0.34$, $p = 0.00$), **total nitrogen** (TN No Trend, $R^2 = 0.04$, $p = 0.40$), **chlorophyll** (CHL No Trend, $R^2 = 0.11$, $p = 0.13$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.00$, $p = 0.78$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>160 µg/L</td>
<td>2230 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90 µg/L</td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ and &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 µg/L</td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>134 - 262</td>
<td>188 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1767 - 2619</td>
<td>2151 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>39 - 42</td>
<td>40 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.7 - 1.9</td>
<td>1.8 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.5 - 0.6</td>
<td>0.5 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
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<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Jesup-eastern shore</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td></td>
</tr>
<tr>
<td>Longitude</td>
<td></td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1993 to 1994</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Hypereutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td><strong>188 (134 to 262)</strong></td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td><strong>2151 (1767 to 2619)</strong></td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO$_3$ or &gt;100 µS/cm@25°C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO$_3$ or &lt; 100 µS/cm@25°C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25°C used to estimate the mg/L CaCO$_3$ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>54 - 89</td>
<td>70 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1382 - 1456</td>
<td>1419 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>17 - 17</td>
<td>17 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.5 - 3.3</td>
<td>2.8 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.8 - 1.0</td>
<td>0.9 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25°C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
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- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Jesup-river</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td></td>
</tr>
<tr>
<td>Longitude</td>
<td></td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1993 to 1994</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>70 (54 to 89)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1419 (1382 to 1456)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µs/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td></td>
<td>160 µg/L&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td>90 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td>30 µg/L</td>
</tr>
</tbody>
</table>

<sup>1</sup> For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO<sub>3</sub> alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>24 - 35</td>
<td>29 (6)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>697 - 1034</td>
<td>802 (6)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>11 - 27</td>
<td>19 (5)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.6 - 4.3</td>
<td>3.8 (4)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.1 - 1.3</td>
<td>1.2 (4)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>31 - 60</td>
<td>41 (4)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>151 - 156</td>
<td>153 (3)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Kathryn</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>285021</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6798</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3286</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>32 ha or 76 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2004 to 2017</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>29 (24 to 35)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>802 (697 to 1034)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Kathryn trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.38$, $p = 0.19$), **total nitrogen** (TN No Trend, $R^2 = 0.17$, $p = 0.42$), **chlorophyll** (CHL No Trend, $R^2 = 0.08$, $p = 0.66$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.06$, $p = 0.76$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt; 100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>32 - 34</td>
<td>33 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>630 - 670</td>
<td>650 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>5 - 7</td>
<td>6 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>51 - 51</td>
<td>51 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>67 - 67</td>
<td>67 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
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- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>LESA Pond</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6674</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2122</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2015 to 2016</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>33 (32 to 34)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>650 (630 to 670)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s *Lake Classification* in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The *Lake Classification* tells you which row to use in Table 1.
2. Identify your waterbody’s *Grand Geometric Mean Chlorophyll-uncorrected* in Table 2.
   a. Compare this number to the *Annual Geometric Mean Chlorophyll-corrected* (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen *Grand Geometric Mean* concentration in Table 2 and compare them to the appropriate *Annual Geometric Mean Total Phosphorus* and *Annual Geometric Mean Total Nitrogen* values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td></td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>11 - 19</td>
<td>14 (31)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>440 - 913</td>
<td>619 (31)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 12</td>
<td>5 (31)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.9 - 13.0</td>
<td>8.4 (31)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.5 - 4.0</td>
<td>2.6 (31)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>10 - 22</td>
<td>15 (22)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>216 - 267</td>
<td>244 (16)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td>Clear Hardwater</td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County:** Name of county in which the lake resides.
- **Name:** Lake name that LAKEWATCH uses for the system.
- **GNIS Number:** Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude:** Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type:** Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre):** LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft):** This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year):** Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone:** Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max):** Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Little Bear</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>285600</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6457</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.4461</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>12 ha or 28 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1992 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>14 (11 to 19)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>619 (440 to 913)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
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4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Little Bear trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.00$, $p = 0.78$), **total nitrogen** (TN Increasing, $R^2 = 0.14$, $p = 0.04$), **chlorophyll** (CHL No Trend, $R^2 = 0.00$, $p = 0.87$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.04$, $p = 0.28$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>14 - 27</td>
<td>19 (25)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>455 - 1287</td>
<td>671 (25)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 18</td>
<td>8 (25)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.4 - 8.0</td>
<td>5.5 (25)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.3 - 2.4</td>
<td>1.7 (25)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>12 - 60</td>
<td>35 (18)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>112 - 145</td>
<td>126 (12)</td>
</tr>
</tbody>
</table>

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.
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The long-term data summary will include the following parameters listed with a definition after each one:

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- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Little Howell</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>285729</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6701</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2788</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>40 ha or 99 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1998 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>19 (14 to 27)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>671 (455 to 1287)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
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Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Little Howell trend plots of year by average. The R² value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R² the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, R² = 0.00, p = 0.79), total nitrogen (TN No Trend, R² = 0.00, p = 0.95), chlorophyll (CHL No Trend, R² = 0.01, p = 0.59) and Secchi depth (Secchi No Trend, R² = 0.03, p = 0.38).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

**Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)**

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

**Long-Term Data Summary for Lakes (Table 2): Definitions**

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

<sup>1</sup> For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO<sub>3</sub> alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>7 - 13</td>
<td>10 (20)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>435 - 792</td>
<td>644 (20)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 5</td>
<td>4 (20)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>7.2 - 12.9</td>
<td>9.8 (20)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.2 - 3.9</td>
<td>3.0 (20)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>15 - 33</td>
<td>21 (13)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>56 - 88</td>
<td>65 (7)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Softwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County:** Name of county in which the lake resides.
- **Name:** Lake name that LAKEWATCH uses for the system.
- **GNIS Number:** Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude:** Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type:** Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre):** LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft):** This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year):** Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone:** Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max):** Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Little Mary</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7480</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3169</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 2020</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>10 (7 to 13)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>644 (435 to 792)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Little Mary trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP Increasing, $R^2 = 0.41$, $p = 0.00$), total nitrogen (TN Increasing, $R^2 = 0.66$, $p = 0.00$), chlorophyll (CHL Increasing, $R^2 = 0.58$, $p = 0.00$) and Secchi depth (Secchi Decreasing, $R^2 = 0.58$, $p = 0.00$).
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<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
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<td>1270 µg/L</td>
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<tr>
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<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

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<thead>
<tr>
<th>Parameter</th>
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<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>8 - 38</td>
<td>18 (14)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>430 - 920</td>
<td>597 (14)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 10</td>
<td>6 (14)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.9 - 9.9</td>
<td>7.0 (13)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.5 - 3.0</td>
<td>2.1 (13)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>26 - 36</td>
<td>31 (6)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>200 - 260</td>
<td>231 (6)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
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- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Long</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>286020</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6680</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1898</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>28 ha or 69 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 2016</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>18 (8 to 38)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>597 (430 to 920)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Long trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.22$, $p = 0.09$), total nitrogen (TN No Trend, $R^2 = 0.10$, $p = 0.26$), chlorophyll (CHL No Trend, $R^2 = 0.00$, $p = 0.83$) and Secchi depth (Secchi No Trend, $R^2 = 0.08$, $p = 0.35$).
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a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

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- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
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- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µs/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt;100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>18 - 26</td>
<td>22 (10)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>614 - 815</td>
<td>724 (10)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>5 - 16</td>
<td>9 (10)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.1 - 5.0</td>
<td>4.6 (10)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.2 - 1.5</td>
<td>1.4 (10)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>36 - 67</td>
<td>50 (10)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>146 - 170</td>
<td>161 (9)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County:** Name of county in which the lake resides.
- **Name:** Lake name that LAKEWATCH uses for the system.
- **GNIS Number:** Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude:** Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type:** Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre):** LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft):** This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year):** Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone:** Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max):** Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Lost</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>286110</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6699</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3219</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>4.6 ha or 11 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2006 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>22 (18 to 26)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>724 (614 to 815)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s *Lake Classification* in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The *Lake Classification* tells you which row to use in Table 1.

2. Identify your waterbody’s *Grand Geometric Mean* Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the *Annual Geometric Mean Chlorophyll-corrected* (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the *Minimum calculated numeric interpretation* columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the *Maximum calculated numeric interpretation* columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen *Grand Geometric Mean* concentration in Table 2 and compare them to the appropriate *Annual Geometric Mean Total Phosphorus* and *Annual Geometric Mean Total Nitrogen* values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

**Nutrient Zones and “Natural Background”**

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Lost trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.34$, $p = 0.08$), total nitrogen (TN No Trend, $R^2 = 0.30$, $p = 0.10$), chlorophyll (CHL No Trend, $R^2 = 0.00$, $p = 0.86$) and Secchi depth (Secchi No Trend, $R^2 = 0.28$, $p = 0.11$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @ 25°C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25°C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>31 - 73</td>
<td>55 (13)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>684 - 1164</td>
<td>932 (13)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>17 - 55</td>
<td>31 (13)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.4 - 4.5</td>
<td>3.3 (13)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.7 - 1.4</td>
<td>1.0 (13)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>39 - 65</td>
<td>47 (11)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>168 - 237</td>
<td>199 (8)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Lotus</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>286128</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6517</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.4210</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>46 ha or 115 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2003 to 2016</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>55 (31 to 73)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>932 (684 to 1164)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

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Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Lotus trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.22$, $p = 0.10$), **total nitrogen** (TN No Trend, $R^2 = 0.18$, $p = 0.15$), **chlorophyll** (CHL Decreasing, $R^2 = 0.50$, $p = 0.01$) and **Secchi depth** (Secchi Increasing, $R^2 = 0.68$, $p = 0.00$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
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- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25°C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25°C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>90 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>17 - 23</td>
<td>19 (3)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>652 - 770</td>
<td>717 (3)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 13</td>
<td>7 (3)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.3 - 2.9</td>
<td>2.5 (3)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.7 - 0.9</td>
<td>0.8 (3)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>38 - 53</td>
<td>45 (3)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>144 - 159</td>
<td>151 (2)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
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- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Lotus 2</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>286129</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6757</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3441</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>1.22 ha or 3 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2006 to 2008</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>19 (17 to 23)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>717 (652 to 770)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO3 or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO3 or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>22 - 43</td>
<td>33 (8)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>750 - 1137</td>
<td>934 (8)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>8 - 23</td>
<td>15 (8)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.2 - 6.6</td>
<td>4.4 (8)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.0 - 2.0</td>
<td>1.3 (8)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>21 - 46</td>
<td>29 (8)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>173 - 199</td>
<td>189 (3)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
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- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Marion</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>286433</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6798</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3666</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>5.2 ha or 13 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2002 to 2015</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>33 (22 to 43)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>934 (750 to 1137)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
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   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Marion trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.09$, $p = 0.48$), **total nitrogen** (TN Increasing, $R^2 = 0.52$, $p = 0.04$), **chlorophyll** (CHL Increasing, $R^2 = 0.56$, $p = 0.03$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.49$, $p = 0.05$).
Florida LAKEWATCH Report for Marion North in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

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For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
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- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO$_3$ or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO$_3$ or &lt;100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO$_3$ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>40 - 42</td>
<td>41 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>997 - 1130</td>
<td>1061 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>14 - 16</td>
<td>15 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.9 - 4.0</td>
<td>4.0 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.2 - 1.2</td>
<td>1.2 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Marion North</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>286433</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6815</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3695</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>5.2 ha or 13 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2005 to 2006</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td><strong>41 (40 to 42)</strong></td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td><strong>1061 (997 to 1130)</strong></td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
**Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.**

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td>160 µg/L&lt;sup&gt;1&lt;/sup&gt;</td>
<td>2230 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td>90 µg/L</td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td>30 µg/L</td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

<sup>1</sup> For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO<sub>3</sub> alkalinity concentration until such time that alkalinity data are available.

**Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>8 - 17</td>
<td>13 (27)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>376 - 847</td>
<td>627 (27)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>1 - 7</td>
<td>3 (27)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.4 - 10.5</td>
<td>8.3 (27)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.7 - 3.2</td>
<td>2.5 (27)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>13 - 36</td>
<td>21 (18)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>96 - 166</td>
<td>147 (12)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
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</thead>
<tbody>
<tr>
<td>Name</td>
<td>Mary</td>
</tr>
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<td>GNIS Number</td>
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<tr>
<td>Latitude</td>
<td>28.7540</td>
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<td>Longitude</td>
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<td>Water Body Type</td>
<td>Lake</td>
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<td>Surface Area (ha and acre)</td>
<td>63 ha or 156 acre</td>
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<tr>
<td>Period of Record (year)</td>
<td>1991 to 2022</td>
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<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>13 (8 to 17)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>627 (376 to 847)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Mary trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP Increasing, $R^2 = 0.29$, $p = 0.00$), **total nitrogen** (TN Increasing, $R^2 = 0.15$, $p = 0.04$), **chlorophyll** (CHL No Trend, $R^2 = 0.10$, $p = 0.10$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.04$, $p = 0.33$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
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- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25°C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25°C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td>90 µg/L</td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td>30 µg/L</td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>11 - 21</td>
<td>14 (12)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>354 - 653</td>
<td>493 (12)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 14</td>
<td>4 (12)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.1 - 10.1</td>
<td>7.0 (12)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.2 - 3.1</td>
<td>2.1 (12)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>16 - 63</td>
<td>33 (10)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>167 - 204</td>
<td>179 (9)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
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- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Mills</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>286888</td>
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<tr>
<td>Latitude</td>
<td>28.6325</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1195</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>94 ha or 232 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1993 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>14 (11 to 21)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>493 (354 to 653)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Mills trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.13$, $p = 0.26$), total nitrogen (TN No Trend, $R^2 = 0.05$, $p = 0.49$), chlorophyll (CHL No Trend, $R^2 = 0.11$, $p = 0.28$) and Secchi depth (Secchi No Trend, $R^2 = 0.00$, $p = 0.99$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µs/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Geometric Mean Chlorophyll-corrected Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
</tbody>
</table>

- **> 40 Platinum Cobalt Units Colored Lakes**
  - Total Phosphorus: 20 µg/L
  - Total Nitrogen: 50 µg/L
  - Chlorophyll-corrected: 1270 µg/L
  - Color (Pt-Co Units): 160 µg/L
- **≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO₃ or >100 µS/cm@25 C Clear Hard Water Lakes**
  - Total Phosphorus: 20 µg/L
  - Total Nitrogen: 30 µg/L
  - Chlorophyll-corrected: 1050 µg/L
  - Color (Pt-Co Units): 90 µg/L
- **≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or < 100 µS/cm@25 C Clear Soft Water Lakes**
  - Total Phosphorus: 6 µg/L
  - Total Nitrogen: 10 µg/L
  - Chlorophyll-corrected: 510 µg/L
  - Color (Pt-Co Units): 30 µg/L

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>40 - 112</td>
<td>61 (8)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1073 - 1789</td>
<td>1451 (8)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 63</td>
<td>30 (8)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.3 - 2.5</td>
<td>1.7 (8)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.4 - 0.8</td>
<td>0.5 (8)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>72 - 313</td>
<td>155 (8)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>108 - 221</td>
<td>166 (6)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>

2
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Minnie</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>286964</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7535</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2936</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>1 ha or 2 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2005 to 2012</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>61 (40 to 112)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1451 (1073 to 1789)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Minnie trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.39$, $p = 0.10$), **total nitrogen** (TN No Trend, $R^2 = 0.07$, $p = 0.53$), **chlorophyll** (CHL Increasing, $R^2 = 0.61$, $p = 0.02$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.15$, $p = 0.34$).
Florida LAKEWATCH Report for Mirror in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

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- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
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- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td>90 µg/L</td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td>510 µg/L</td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

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<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>19 - 20</td>
<td>19 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>797 - 863</td>
<td>829 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>6 - 16</td>
<td>10 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.5 - 4.5</td>
<td>4.5 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.4 - 1.4</td>
<td>1.4 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Mirror</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>286981</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6682</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.4395</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>14 ha or 34 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1994 to 2006</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>19 (19 to 20)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>829 (797 to 863)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µs/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &gt;100 µS/cm@25 C</td>
<td>Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &lt; 100 µS/cm@25 C</td>
<td>Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
</tr>
</tbody>
</table>

<sup>1</sup> For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO<sub>3</sub> alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>58 - 125</td>
<td>77 (11)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1237 - 2105</td>
<td>1712 (11)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>6 - 54</td>
<td>23 (11)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.5 - 2.5</td>
<td>1.9 (10)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.5 - 0.8</td>
<td>0.6 (10)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>52 - 181</td>
<td>111 (8)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>856 - 1665</td>
<td>1249 (5)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Trophic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Monroe East</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>287074</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.8170</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2487</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2000 to 2014</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>77 (58 to 125)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1712 (1237 to 2105)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Monroe East trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.07$, $p = 0.44$), total nitrogen (TN No Trend, $R^2 = 0.00$, $p = 0.92$), chlorophyll (CHL No Trend, $R^2 = 0.03$, $p = 0.62$) and Secchi depth (Secchi No Trend, $R^2 = 0.15$, $p = 0.28$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
**Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.**

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units <strong>Colored Lakes</strong></td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C <strong>Clear Hard Water Lakes</strong></td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C <strong>Clear Soft Water Lakes</strong></td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

**Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly).** Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>41 - 115</td>
<td>69 (15)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1201 - 1879</td>
<td>1509 (15)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 63</td>
<td>10 (15)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.6 - 2.9</td>
<td>2.1 (15)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.5 - 0.9</td>
<td>0.6 (15)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>54 - 213</td>
<td>114 (12)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>539 - 1587</td>
<td>1043 (6)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Monroe West</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>287074</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.8339</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3114</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2000 to 2014</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>69 (41 to 115)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1509 (1201 to 1879)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration...
Figure 2. Lake Monroe West trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.00$, $p = 0.85$), total nitrogen (TN No Trend, $R^2 = 0.19$, $p = 0.11$), chlorophyll (CHL No Trend, $R^2 = 0.17$, $p = 0.13$) and Secchi depth (Secchi No Trend, $R^2 = 0.01$, $p = 0.72$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units <strong>Colored Lakes</strong></td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>90 µg/L</td>
</tr>
<tr>
<td>and &gt; 20 mg/L CaCO₃ or &gt; 100 µS/cm@25 C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Clear Hard Water Lakes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Clear Soft Water Lakes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>90 - 90</td>
<td>90 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1748 - 1748</td>
<td>1748 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>44 - 44</td>
<td>44 (1)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.1 - 1.1</td>
<td>1.1 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.3 - 0.3</td>
<td>0.3 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>55 - 55</td>
<td>55 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>0 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td><strong>Colored</strong></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

### Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Mullet</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>287461</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7908</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1320</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2001 to 2001</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Hypereutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>90 (90 to 90)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1748 (1748 to 1748)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO$_3$ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO$_3$ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Chlorophyll-corrected</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO$_3$ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO$_3$ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO$_3$ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>14 - 33</td>
<td>21 (8)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>727 - 1784</td>
<td>1100 (8)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 18</td>
<td>8 (8)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.9 - 7.3</td>
<td>4.9 (7)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.9 - 2.2</td>
<td>1.5 (7)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>22 - 84</td>
<td>38 (5)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County:** Name of county in which the lake resides.
- **Name:** Lake name that LAKEWATCH uses for the system.
- **GNIS Number:** Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude:** Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type:** Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre):** LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft):** This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year):** Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone:** Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max):** Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Myrtle</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>287514</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7269</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3632</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>26 ha or 65 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1998 to 2006</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>21 (14 to 33)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1100 (727 to 1784)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Myrtle trend plots of year by average. The R² value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R² the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, R² = 0.05, p = 0.58), total nitrogen (TN No Trend, R² = 0.00, p = 0.98), chlorophyll (CHL No Trend, R² = 0.02, p = 0.71) and Secchi depth (Secchi No Trend, R² = 0.03, p = 0.71).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>9 - 15</td>
<td>12 (3)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>414 - 667</td>
<td>502 (3)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 4</td>
<td>4 (3)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>9.3 - 10.8</td>
<td>9.9 (3)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.8 - 3.3</td>
<td>3.0 (3)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Noname</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6280</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2643</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 1993</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>12 (9 to 15)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>502 (414 to 667)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

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<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td></td>
<td>160 µg/L&lt;sup&gt;1&lt;/sup&gt;</td>
<td>2230 µg/L</td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td></td>
<td>90 µg/L</td>
<td>1910 µg/L</td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td></td>
<td>30 µg/L</td>
<td>930 µg/L</td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup> For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO<sub>3</sub> alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>36 - 67</td>
<td>47 (28)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>892 - 1707</td>
<td>1183 (28)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>10 - 76</td>
<td>45 (28)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.3 - 3.6</td>
<td>1.8 (28)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.4 - 1.1</td>
<td>0.6 (28)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>16 - 37</td>
<td>21 (21)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>97 - 216</td>
<td>178 (15)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Orienta 1</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>288237</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6518</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3776</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1995 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Hypereutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>47 (36 to 67)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1183 (892 to 1707)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Orienta 1 trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.00$, $p = 0.77$), **total nitrogen** (TN No Trend, $R^2 = 0.02$, $p = 0.46$), **chlorophyll** (CHL No Trend, $R^2 = 0.12$, $p = 0.07$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.00$, $p = 0.87$).
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</tr>
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<tbody>
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<td></td>
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<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
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<td>1270 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>30 - 52</td>
<td>41 (28)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>858 - 1690</td>
<td>1124 (28)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>15 - 75</td>
<td>44 (28)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.4 - 3.5</td>
<td>2.0 (28)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.4 - 1.1</td>
<td>0.6 (28)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>17 - 25</td>
<td>20 (21)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>151 - 246</td>
<td>187 (15)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:
- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Orienta 2</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>288237</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6585</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3735</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1995 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Hypereutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>41 (30 to 52)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1124 (858 to 1690)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s *Lake Classification* in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The *Lake Classification* tells you which row to use in Table 1.
2. Identify your waterbody’s *Grand Geometric Mean* Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the *Annual Geometric Mean Chlorophyll-corrected* (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the *Minimum calculated numeric interpretation* columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the *Maximum calculated numeric interpretation* columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen *Grand Geometric Mean* concentration in Table 2 and compare them to the appropriate *Annual Geometric Mean Total Phosphorus* and *Annual Geometric Mean Total Nitrogen* values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

**Nutrient Zones and “Natural Background”**

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Orienta 2 trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.09$, $p = 0.12$), **total nitrogen** (TN No Trend, $R^2 = 0.00$, $p = 0.73$), **chlorophyll** (CHL No Trend, $R^2 = 0.12$, $p = 0.07$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.08$, $p = 0.14$).
Florida LAKEWATCH Report for Orienta East in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L)**: Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L)**: Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L)**: Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m)**: Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units)**: LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C)**: Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification**: Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt;100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>23 - 49</td>
<td>37 (27)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>724 - 1590</td>
<td>1104 (27)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>12 - 72</td>
<td>42 (25)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.4 - 3.3</td>
<td>2.1 (26)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.4 - 1.0</td>
<td>0.6 (26)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>17 - 26</td>
<td>19 (21)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>153 - 215</td>
<td>182 (15)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
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- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Orienta East</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>288237</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6590</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3706</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>0.0 ha or 0.0 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1995 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Hypereutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>37 (23 to 49)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1104 (724 to 1590)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
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Introduction for Lakes

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a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

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- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
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- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>18 - 44</td>
<td>29 (27)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>531 - 1284</td>
<td>845 (27)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>5 - 47</td>
<td>25 (25)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.7 - 12.2</td>
<td>3.0 (26)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.5 - 3.7</td>
<td>0.9 (26)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>13 - 22</td>
<td>18 (21)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>84 - 206</td>
<td>163 (15)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
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- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Orienta North</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>288237</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6616</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3694</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1995 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>29 (18 to 44)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>845 (531 to 1284)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Orienta North trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.05$, $p = 0.25$), total nitrogen (TN No Trend, $R^2 = 0.02$, $p = 0.46$), chlorophyll (CHL Decreasing, $R^2 = 0.23$, $p = 0.02$) and Secchi depth (Secchi No Trend, $R^2 = 0.14$, $p = 0.06$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO3 or specific conductance less than or equal to 100 µs/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO3 or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

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<thead>
<tr>
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<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>20 - 26</td>
<td>22 (4)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>704 - 829</td>
<td>759 (4)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>8 - 14</td>
<td>10 (4)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>6.3 - 7.6</td>
<td>7.0 (4)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.9 - 2.3</td>
<td>2.1 (4)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>15 - 17</td>
<td>16 (3)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Pearl</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>288635</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6607</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3452</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>6 ha or 14 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1999 to 2006</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>22 (20 to 26)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>759 (704 to 829)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Florida LAKEWATCH Report for Pearl 2 in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td></td>
<td>160 µg/L¹</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td>90 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt;100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td>30 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>30 - 41</td>
<td>35 (6)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>573 - 921</td>
<td>790 (6)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>18 - 25</td>
<td>22 (6)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.4 - 6.1</td>
<td>5.1 (6)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.4 - 1.9</td>
<td>1.6 (6)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>17 - 24</td>
<td>20 (6)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>116 - 162</td>
<td>142 (6)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Pearl 2</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>288636</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6644</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.4251</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>12 ha or 29 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2017 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>35 (30 to 41)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>790 (573 to 921)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
**Interpreting FDEP’s Numeric Nutrient Criteria (NNC):** These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s *Lake Classification* in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The *Lake Classification* tells you which row to use in Table 1.

2. Identify your waterbody’s *Grand Geometric Mean* Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the *Annual Geometric Mean Chlorophyll-corrected* (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the *Minimum calculated numeric interpretation* columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the *Maximum calculated numeric interpretation* columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen *Grand Geometric Mean* concentration in Table 2 and compare them to the appropriate *Annual Geometric Mean Total Phosphorus* and *Annual Geometric Mean Total Nitrogen* values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

**Nutrient Zones and “Natural Background”**

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

**Interpreting Florida LAKEWATCH’s Nutrient Zones:** These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Pearl 2 trend plots of year by average. The R² value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R² the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). **Total phosphorus** (TP No Trend, R² = 0.06, p = 0.65), **total nitrogen** (TN No Trend, R² = 0.30, p = 0.26), **chlorophyll** (CHL No Trend, R² = 0.07, p = 0.61) and **Secchi depth** (Secchi No Trend, R² = 0.05, p = 0.66).
Florida LAKEWATCH Report for Pickett in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>90 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>30 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>11 - 13</td>
<td>12 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>522 - 529</td>
<td>525 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 7</td>
<td>6 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>6.8 - 8.4</td>
<td>7.5 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.1 - 2.6</td>
<td>2.3 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>37 - 55</td>
<td>45 (2)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>130 - 139</td>
<td>135 (2)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Pickett</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>288777</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6122</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1211</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>300 ha or 742 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2015 to 2016</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td><strong>TP4</strong></td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td><strong>12 (11 to 13)</strong></td>
</tr>
<tr>
<td>TN Zone</td>
<td><strong>TN4</strong></td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td><strong>525 (522 to 529)</strong></td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s *Lake Classification* in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The *Lake Classification* tells you which row to use in Table 1.
2. Identify your waterbody’s *Grand Geometric Mean* Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the *Annual Geometric Mean Chlorophyll-corrected* (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen *Grand Geometric Mean* concentration in Table 2 and compare them to the appropriate *Annual Geometric Mean Total Phosphorus* and *Annual Geometric Mean Total Nitrogen* values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Florida LAKEWATCH Report for Pickett East in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>90 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>12 - 17</td>
<td>14 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>506 - 623</td>
<td>561 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 6</td>
<td>5 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>6.0 - 10.6</td>
<td>8.0 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.8 - 3.2</td>
<td>2.4 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>35 - 62</td>
<td>47 (2)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>155 - 161</td>
<td>158 (2)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Pickett East</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>288777</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6094</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1107</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>300 ha or 742 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2017 to 2018</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>14 (12 to 17)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>561 (506 to 623)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
### Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>160 µg/L&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>90 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td>1050 µg/L</td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td>510 µg/L</td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

<sup>1</sup> For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO<sub>3</sub> alkalinity concentration until such time that alkalinity data are available.

### Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>27 - 33</td>
<td>30 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>900 - 1070</td>
<td>981 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>9 - 10</td>
<td>10 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.7 - 6.4</td>
<td>4.9 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.1 - 2.0</td>
<td>1.5 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>49 - 49</td>
<td>49 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Pine</td>
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<td>GNIS Number</td>
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<tr>
<td>Latitude</td>
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<td>Longitude</td>
<td>-81.3132</td>
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<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>1 ha or 2 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1999 to 2005</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>30 (27 to 33)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>981 (900 to 1070)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
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   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
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Nutrient Zones and “Natural Background”

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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Florida LAKEWATCH Report for Plaza Oval in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

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For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

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- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>17 - 21</td>
<td>20 (3)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>559 - 591</td>
<td>572 (3)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 9</td>
<td>7 (3)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.2 - 4.1</td>
<td>3.6 (3)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.0 - 1.3</td>
<td>1.1 (3)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>37 - 42</td>
<td>40 (2)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.
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The long-term data summary will include the following parameters listed with a definition after each one:

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- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

**Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.**

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Plaza Oval</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>289045</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6822</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3406</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2000 to 2002</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>20 (17 to 21)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>572 (559 to 591)</td>
</tr>
</tbody>
</table>

**Figure 1.** Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
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Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Florida LAKEWATCH Report for Pot in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO(_3) or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO(_3) or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

\(^1\) For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO\(_3\) alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>27 - 49</td>
<td>36 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>592 - 697</td>
<td>642 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>14 - 26</td>
<td>19 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.3 - 8.1</td>
<td>6.6 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.6 - 2.5</td>
<td>2.0 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>25 - 30</td>
<td>27 (2)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>144 - 167</td>
<td>155 (2)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Pot</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6539</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3579</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2016 to 2017</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>36 (27 to 49)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>642 (592 to 697)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Florida LAKEWATCH Report for Prairie in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with **five or more years of data**. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm @25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>160 µg/L&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>&gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td>90 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>&lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td>30 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

<sup>1</sup> For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO<sub>3</sub> alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>11 - 19</td>
<td>16 (12)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>487 - 729</td>
<td>617 (12)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 10</td>
<td>6 (12)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.1 - 14.1</td>
<td>7.5 (12)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.6 - 4.3</td>
<td>2.3 (12)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>9 - 14</td>
<td>11 (6)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
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- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Prairie</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>289287</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6586</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3543</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>50 ha or 124 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1995 to 2006</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>16 (11 to 19)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>617 (487 to 729)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

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   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Prairie trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.07$, $p = 0.41$), **total nitrogen** (TN No Trend, $R^2 = 0.00$, $p = 0.98$), **chlorophyll** (CHL No Trend, $R^2 = 0.15$, $p = 0.21$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.09$, $p = 0.35$).
Florida LAKEWATCH Report for Quail Pond in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>13 - 26</td>
<td>16 (15)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>685 - 905</td>
<td>745 (15)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>5 - 9</td>
<td>7 (15)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.2 - 6.9</td>
<td>6.2 (15)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.6 - 2.1</td>
<td>1.9 (15)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>22 - 29</td>
<td>25 (15)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>138 - 200</td>
<td>172 (14)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Quail Pond</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>289395</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6712</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3353</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>1.2 ha or 3 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2006 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>16 (13 to 26)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>745 (685 to 905)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2\textsuperscript{nd} column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.frlrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Quail Pond trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP Increasing, $R^2 = 0.35$, $p = 0.02$), total nitrogen (TN No Trend, $R^2 = 0.04$, $p = 0.47$), chlorophyll (CHL No Trend, $R^2 = 0.11$, $p = 0.23$) and Secchi depth (Secchi No Trend, $R^2 = 0.03$, $p = 0.55$).
Introduction for Lakes

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Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

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- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
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<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
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<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
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<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

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<tr>
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<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>34 - 76</td>
<td>52 (26)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>619 - 1226</td>
<td>915 (26)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>18 - 55</td>
<td>35 (26)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.0 - 3.8</td>
<td>2.6 (26)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.6 - 1.2</td>
<td>0.8 (26)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>71 - 274</td>
<td>119 (20)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>144 - 164</td>
<td>153 (14)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
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- **Name**: Lake name that LAKEWATCH uses for the system.
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- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

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<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Queens Mirror</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>289401</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6631</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3242</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>5 ha or 12 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1996 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>52 (34 to 76)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>915 (619 to 1226)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
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2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
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   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Queens Mirror trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.12$, $p = 0.09$), total nitrogen (TN No Trend, $R^2 = 0.02$, $p = 0.48$), chlorophyll (CHL No Trend, $R^2 = 0.04$, $p = 0.32$) and Secchi depth (Secchi No Trend, $R^2 = 0.12$, $p = 0.08$).
Florida LAKEWATCH Report for Red Bug in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

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- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>160 µg/L&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2230 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>90 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

<sup>1</sup> For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>20 - 25</td>
<td>22 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>637 - 664</td>
<td>650 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>6 - 7</td>
<td>6 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.3 - 5.7</td>
<td>5.0 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.3 - 1.8</td>
<td>1.5 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
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- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Red Bug</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>289539</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6516</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2923</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>11 ha or 28 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 1992</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>22 (20 to 25)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>650 (637 to 664)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

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<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt;100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>29 - 29</td>
<td>29 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1136 - 1136</td>
<td>1136 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>11 - 11</td>
<td>11 (1)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.4 - 4.4</td>
<td>4.4 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.3 - 1.3</td>
<td>1.3 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>88 - 88</td>
<td>88 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>140 - 140</td>
<td>140 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
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- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Rice</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>289666</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7490</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3777</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>18 ha or 45 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2021 to 2021</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>29 (29 to 29)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1136 (1136 to 1136)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Florida LAKEWATCH Report for Rock in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

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<tr>
<td></td>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
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<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>8 - 17</td>
<td>11 (32)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>439 - 732</td>
<td>540 (32)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 8</td>
<td>4 (32)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.2 - 12.1</td>
<td>6.9 (32)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.3 - 3.7</td>
<td>2.1 (32)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>11 - 37</td>
<td>25 (22)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>108 - 156</td>
<td>144 (16)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:
- **County**: Name of county in which the lake resides.
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- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Rock</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>289838</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7031</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3690</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>8 ha or 19 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>11 (8 to 17)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>540 (439 to 732)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

**Nutrient Zones and “Natural Background”**

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Rock trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP Increasing, $R^2 = 0.41$, $p = 0.00$), total nitrogen (TN Increasing, $R^2 = 0.13$, $p = 0.04$), chlorophyll (CHL No Trend, $R^2 = 0.01$, $p = 0.54$) and Secchi depth (Secchi Decreasing, $R^2 = 0.76$, $p = 0.00$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L)**: Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L)**: Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L)**: Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m)**: Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units)**: LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C)**: Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification**: Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chlorophyll-corrected</td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

<sup>1</sup> For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO<sub>3</sub> alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>26 - 30</td>
<td>28 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1085 - 1382</td>
<td>1225 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>6 - 11</td>
<td>8 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.2 - 5.8</td>
<td>5.5 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.6 - 1.8</td>
<td>1.7 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>37 - 37</td>
<td>37 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>577 - 577</td>
<td>577 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
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- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Rogers</td>
</tr>
<tr>
<td>GNIS Number</td>
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</tr>
<tr>
<td>Latitude</td>
<td>28.6550</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.1958</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>1.6 ha or 4 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2008 to 2009</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max)</td>
<td>28 (26 to 30)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max)</td>
<td>1225 (1085 to 1382)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
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   a. The Lake Classification tells you which row to use in Table 1.
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   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
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b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

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- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td></td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td>160 µg/L</td>
<td>2230 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td>90 µg/L</td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td>30 µg/L</td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>39 - 74</td>
<td>56 (14)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>836 - 1335</td>
<td>1086 (14)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>15 - 53</td>
<td>29 (14)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.4 - 3.6</td>
<td>2.9 (14)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.7 - 1.1</td>
<td>0.9 (14)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>46 - 91</td>
<td>59 (11)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>126 - 150</td>
<td>138 (5)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County:** Name of county in which the lake resides.
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- **Period of Record (year):** Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone:** Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max):** Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Searcy</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>290798</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7054</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3559</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>4 ha or 11 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1998 to 2011</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>56 (39 to 74)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1086 (836 to 1335)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Searcy trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.03$, $p = 0.58$), total nitrogen (TN No Trend, $R^2 = 0.17$, $p = 0.14$), chlorophyll (CHL No Trend, $R^2 = 0.00$, $p = 0.98$) and Secchi depth (Secchi No Trend, $R^2 = 0.02$, $p = 0.66$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units <strong>Colored Lakes</strong></td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C <strong>Clear Hard Water Lakes</strong></td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C <strong>Clear Soft Water Lakes</strong></td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

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<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>19 - 35</td>
<td>26 (27)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>475 - 736</td>
<td>617 (27)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>7 - 25</td>
<td>12 (27)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.7 - 6.8</td>
<td>4.5 (27)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.1 - 2.1</td>
<td>1.4 (27)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>11 - 36</td>
<td>24 (21)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>116 - 240</td>
<td>155 (16)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td><strong>Clear Hardwater</strong></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

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<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Secret</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>290813</td>
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<tr>
<td>Latitude</td>
<td>28.6735</td>
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<tr>
<td>Longitude</td>
<td>-81.3278</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>2 ha or 5 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1996 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>26 (19 to 35)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
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<table>
<thead>
<tr>
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<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>160 µg/L(^1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2230 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO(_3) or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>90 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO(_3) or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

\(^1\) For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO\(_3\) alkalinity concentration until such time that alkalinity data are available.

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<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>5 - 11</td>
<td>8 (27)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>345 - 507</td>
<td>405 (27)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 5</td>
<td>3 (27)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>11.0 - 18.7</td>
<td>13.8 (27)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>3.4 - 5.7</td>
<td>4.2 (27)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>6 - 16</td>
<td>10 (16)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>202 - 229</td>
<td>216 (10)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
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- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Seminary</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>290825</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6437</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3601</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>27 ha or 68 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1990 to 2016</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Oligotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>8 (5 to 11)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>405 (345 to 507)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
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4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Seminary trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.00$, $p = 0.79$), **total nitrogen** (TN No Trend, $R^2 = 0.12$, $p = 0.08$), **chlorophyll** (CHL No Trend, $R^2 = 0.00$, $p = 0.96$) and **Secchi depth** (Secchi Decreasing, $R^2 = 0.18$, $p = 0.03$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td></td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>160 µg/L¹</td>
<td>2230 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90 µg/L</td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 µg/L</td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>9 - 17</td>
<td>12 (17)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>360 - 585</td>
<td>445 (17)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 7</td>
<td>4 (17)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.8 - 15.0</td>
<td>10.1 (17)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.8 - 4.6</td>
<td>3.1 (17)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>5 - 15</td>
<td>9 (13)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>191 - 282</td>
<td>234 (7)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td>Clear Hardwater</td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Silver</td>
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<td>GNIS Number</td>
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<tr>
<td>Latitude</td>
<td>28.7635</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2524</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>13 ha or 33 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1998 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>12 (9 to 17)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>445 (360 to 585)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpacted.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.frlrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
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4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Silver trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.12$, $p = 0.17$), total nitrogen (TN No Trend, $R^2 = 0.05$, $p = 0.41$), chlorophyll (CHL No Trend, $R^2 = 0.00$, $p = 0.99$) and Secchi depth (Secchi Increasing, $R^2 = 0.42$, $p = 0.01$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

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a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

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<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>16 - 54</td>
<td>31 (30)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>731 - 1904</td>
<td>1156 (30)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>8 - 76</td>
<td>30 (30)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.5 - 5.9</td>
<td>2.8 (30)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.5 - 1.8</td>
<td>0.9 (30)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>8 - 24</td>
<td>18 (22)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>175 - 244</td>
<td>204 (16)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
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- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Spring</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>291552</td>
</tr>
<tr>
<td>Latitude</td>
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</tr>
<tr>
<td>Longitude</td>
<td>-81.3939</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>35 ha or 87 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>31 (16 to 54)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1156 (731 to 1904)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Spring trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP Decreasing, $R^2 = 0.68$, $p = 0.00$), **total nitrogen** (TN Decreasing, $R^2 = 0.62$, $p = 0.00$), **chlorophyll** (CHL Decreasing, $R^2 = 0.60$, $p = 0.00$) and **Secchi depth** (Secchi Increasing, $R^2 = 0.30$, $p = 0.00$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus** (µg/L): Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen** (µg/L): Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected** (µg/L): Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi** (ft), **Secchi** (m): Secchi measurements are estimates of water clarity.
- **Color** (Pt-Co Units): LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance** (µS/cm@25°C): Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification**: Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td>160 µg/L</td>
<td>2230 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td>90 µg/L</td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ and &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td>30 µg/L</td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>112 - 112</td>
<td>112 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>668 - 668</td>
<td>668 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>20 - 20</td>
<td>20 (1)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.8 - 3.8</td>
<td>3.8 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.2 - 1.2</td>
<td>1.2 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>42 - 42</td>
<td>42 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>273 - 273</td>
<td>273 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
The long-term data summary will include the following parameters listed with a definition after each one:

- **County:** Name of county in which the lake resides.
- **Name:** Lake name that LAKEWATCH uses for the system.
- **GNIS Number:** Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude:** Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type:** Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre):** LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft):** This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year):** Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone:** Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max):** Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

**Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.**

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Sweetwater Cove</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7075</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.4374</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2014 to 2014</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>112 (112 to 112)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>668 (668 to 668)</td>
</tr>
</tbody>
</table>

**Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.**
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

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- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µs/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
### Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td>160 µg/L</td>
<td>2230 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td></td>
<td>90 µg/L</td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C</td>
<td></td>
<td>30 µg/L</td>
<td>930 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

### Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>10 - 28</td>
<td>15 (21)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>545 - 1077</td>
<td>804 (21)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 13</td>
<td>6 (21)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.6 - 6.7</td>
<td>4.9 (21)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.8 - 2.1</td>
<td>1.5 (21)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>19 - 144</td>
<td>49 (19)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>141 - 226</td>
<td>183 (14)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Sylvan</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>291981</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.8015</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3812</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>75 ha or 186 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1998 to 2020</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>15 (10 to 28)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>804 (545 to 1077)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Sylvan trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.00$, $p = 0.90$), total nitrogen (TN No Trend, $R^2 = 0.01$, $p = 0.67$), chlorophyll (CHL No Trend, $R^2 = 0.17$, $p = 0.07$) and Secchi depth (Secchi Increasing, $R^2 = 0.28$, $p = 0.01$).
Florida LAKEWATCH Report for Tony in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>13 - 27</td>
<td>17 (15)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>508 - 1022</td>
<td>695 (15)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 24</td>
<td>8 (15)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.9 - 7.4</td>
<td>5.3 (15)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.2 - 2.2</td>
<td>1.6 (15)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>22 - 79</td>
<td>29 (12)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>80 - 161</td>
<td>114 (12)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al. (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Tony</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>292359</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6731</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2887</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>9 ha or 22 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1999 to 2021</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>17 (13 to 27)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>695 (508 to 1022)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Tony trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP No Trend, $R^2 = 0.26$, $p = 0.05$), total nitrogen (TN Decreasing, $R^2 = 0.45$, $p = 0.01$), chlorophyll (CHL Decreasing, $R^2 = 0.57$, $p = 0.00$) and Secchi depth (Secchi No Trend, $R^2 = 0.21$, $p = 0.08$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td></td>
<td>160 µg/L(^1)</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO(_3) or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td>90 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO(_3) or &lt;100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td>30 µg/L</td>
</tr>
</tbody>
</table>

\(^1\) For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO\(_3\) alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>20 - 47</td>
<td>33 (27)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>599 - 976</td>
<td>804 (27)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 32</td>
<td>11 (27)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.5 - 4.4</td>
<td>3.2 (27)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.8 - 1.3</td>
<td>1.0 (27)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>34 - 107</td>
<td>74 (22)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>115 - 162</td>
<td>143 (16)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Triplet Middle</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>292445</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6715</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3272</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td></td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1996 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>33 (20 to 47)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>804 (599 to 976)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s *Lake Classification* in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The *Lake Classification* tells you which row to use in Table 1.
2. Identify your waterbody’s *Grand Geometric Mean* Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the *Annual Geometric Mean Chlorophyll-corrected* (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen *Grand Geometric Mean* concentration in Table 2 and compare them to the appropriate *Annual Geometric Mean Total Phosphorus* and *Annual Geometric Mean Total Nitrogen* values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

**Nutrient Zones and “Natural Background”**

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.frules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Triplet Middle trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP Decreasing, $R^2 = 0.43$, $p = 0.00$), total nitrogen (TN No Trend, $R^2 = 0.00$, $p = 0.84$), chlorophyll (CHL Decreasing, $R^2 = 0.48$, $p = 0.00$) and Secchi depth (Secchi No Trend, $R^2 = 0.05$, $p = 0.25$).
Florida LAKEWATCH Report for Triplet North in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 μg/L</td>
<td>50 μg/L</td>
<td>160 μg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO$_3$ or &gt;100 μS/cm@25 C</td>
<td>20 μg/L</td>
<td>30 μg/L</td>
<td>90 μg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO$_3$ or &lt; 100 μS/cm@25 C</td>
<td>6 μg/L</td>
<td>10 μg/L</td>
<td>30 μg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 μg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 μS/cm@25 C used to estimate the mg/L CaCO$_3$ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (μg/L)</td>
<td>16 - 45</td>
<td>30 (27)</td>
</tr>
<tr>
<td>Total Nitrogen (μg/L)</td>
<td>554 - 1273</td>
<td>809 (27)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (μg/L)</td>
<td>4 - 35</td>
<td>13 (27)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.5 - 5.7</td>
<td>3.5 (27)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.8 - 1.7</td>
<td>1.1 (27)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>24 - 91</td>
<td>64 (21)</td>
</tr>
<tr>
<td>Specific Conductance (μS/cm@25 C)</td>
<td>96 - 160</td>
<td>139 (16)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Triplet North</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6749</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3241</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1996 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>30 (16 to 45)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>809 (554 to 1273)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Triplet North trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP Decreasing, $R^2 = 0.60$, $p = 0.00$), total nitrogen (TN No Trend, $R^2 = 0.09$, $p = 0.12$), chlorophyll (CHL Decreasing, $R^2 = 0.68$, $p = 0.00$) and Secchi depth (Secchi No Trend, $R^2 = 0.07$, $p = 0.17$).
Introduction for Lakes

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For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

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<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>26 - 74</td>
<td>43 (27)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>667 - 1079</td>
<td>854 (27)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>9 - 39</td>
<td>17 (27)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.3 - 4.1</td>
<td>3.0 (27)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.7 - 1.3</td>
<td>0.9 (27)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>45 - 123</td>
<td>84 (22)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>99 - 167</td>
<td>141 (16)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

**Table 3. Base File Data for Lakes, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.**

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Triplet South</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>292445</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6663</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3249</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1996 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>43 (26 to 74)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>854 (667 to 1079)</td>
</tr>
</tbody>
</table>

**Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012).** Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Triplet South trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). Total phosphorus (TP Decreasing, $R^2 = 0.34$, $p = 0.00$), total nitrogen (TN No Trend, $R^2 = 0.01$, $p = 0.57$), chlorophyll (CHL Decreasing, $R^2 = 0.36$, $p = 0.00$) and Secchi depth (Secchi No Trend, $R^2 = 0.06$, $p = 0.22$).
Florida LAKEWATCH Report for Twin in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units <strong>Colored Lakes</strong></td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C <strong>Clear Hard Water Lakes</strong></td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C <strong>Clear Soft Water Lakes</strong></td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>36 - 39</td>
<td>37 (3)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>643 - 699</td>
<td>670 (3)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 18</td>
<td>10 (3)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>6.2 - 7.1</td>
<td>6.6 (3)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.9 - 2.2</td>
<td>2.0 (3)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>17 - 21</td>
<td>20 (3)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>142 - 188</td>
<td>162 (3)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td><strong>Clear Hardwater</strong></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Twin</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>292611</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7079</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3702</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>10 ha or 25 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2012 to 2014</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>37 (36 to 39)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>670 (643 to 699)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s *Lake Classification* in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The *Lake Classification* tells you which row to use in Table 1.

2. Identify your waterbody’s *Grand Geometric Mean Chlorophyll-uncorrected* in Table 2.
   a. Compare this number to the *Annual Geometric Mean Chlorophyll-corrected* (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen *Grand Geometric Mean* concentration in Table 2 and compare them to the appropriate *Annual Geometric Mean Total Phosphorus* and *Annual Geometric Mean Total Nitrogen* values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

**Nutrient Zones and “Natural Background”**

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

**Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.**

1. Identify your lake’s *TP Zone* in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

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<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
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<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>160 µg/L¹</td>
<td>2230 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90 µg/L</td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 µg/L</td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>16 - 24</td>
<td>21 (3)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1060 - 1503</td>
<td>1238 (3)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>7 - 10</td>
<td>8 (3)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.3 - 5.4</td>
<td>5.3 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.6 - 1.6</td>
<td>1.6 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

**Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.**

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Twin East</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>292612</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7919</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3333</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1993 to 1998</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>21 (16 to 24)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1238 (1060 to 1503)</td>
</tr>
</tbody>
</table>

**Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.**
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

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a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

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- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
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**Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.**

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td></td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>Colored Lakes</td>
<td></td>
<td></td>
<td>160 µg/L(^1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2230 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO(_3) or &gt;100 µS/cm@25 C</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>Clear Hard Water Lakes</td>
<td></td>
<td></td>
<td>90 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO(_3) or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td></td>
<td></td>
<td>30 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

\(^1\) For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO\(_3\) alkalinity concentration until such time that alkalinity data are available.

**Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>14 - 24</td>
<td>20 (20)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>623 - 1157</td>
<td>901 (20)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>6 - 21</td>
<td>10 (20)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.5 - 9.0</td>
<td>5.1 (20)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.1 - 2.7</td>
<td>1.5 (20)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>24 - 33</td>
<td>27 (17)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>114 - 239</td>
<td>184 (12)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:
- **County:** Name of county in which the lake resides.
- **Name:** Lake name that LAKEWATCH uses for the system.
- **GNIS Number:** Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude:** Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type:** Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre):** LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft):** This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year):** Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone:** Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max):** Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Wekiva</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>290535</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6856</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.4561</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>16.4 ha or 41 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1996 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>20 (14 to 24)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>901 (623 to 1157)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.frules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Figure 2. Lake Wekiva trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, R^2 = 0.02, p = 0.52), total nitrogen (TN No Trend, R^2 = 0.01, p = 0.71), chlorophyll (CHL Decreasing, R^2 = 0.38, p = 0.00) and Secchi depth (Secchi No Trend, R^2 = 0.09, p = 0.20).
Florida LAKEWATCH Report for West in Seminole County
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>9 - 9</td>
<td>9 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>527 - 527</td>
<td>527 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>12.0 - 12.0</td>
<td>12.0 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>3.7 - 3.7</td>
<td>3.7 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>16 - 16</td>
<td>16 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>148 - 148</td>
<td>148 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:
- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>West</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>293086</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7093</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3530</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>10 ha or 25 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2010 to 2010</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td></td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>9 (9 to 9)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>527 (527 to 527)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
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Introduction for Lakes

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a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

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- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @ 25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

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<thead>
<tr>
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<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
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<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>10 - 21</td>
<td>14 (9)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>425 - 926</td>
<td>650 (9)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 12</td>
<td>5 (9)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.2 - 8.0</td>
<td>6.5 (9)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.6 - 2.5</td>
<td>2.0 (9)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>44 - 56</td>
<td>50 (2)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>128 - 128</td>
<td>128 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
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- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>West Crystal</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>281125</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7616</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3272</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>55 ha or 137 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1991 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>14 (10 to 21)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>650 (425 to 926)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake West Crystal trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.01$, $p = 0.79$), **total nitrogen** (TN No Trend, $R^2 = 0.01$, $p = 0.79$), **chlorophyll** (CHL No Trend, $R^2 = 0.00$, $p = 0.87$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.12$, $p = 0.36$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>27 - 27</td>
<td>27 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>663 - 663</td>
<td>663 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>15 - 15</td>
<td>15 (1)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.8 - 4.8</td>
<td>4.8 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.5 - 1.5</td>
<td>1.5 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>17 - 17</td>
<td>17 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>201 - 201</td>
<td>201 (1)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td><strong>Clear Hardwater</strong></td>
<td></td>
</tr>
</tbody>
</table>
The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
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- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>West Pearl</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6631</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.4297</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td></td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2015 to 2015</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>27 (27 to 27)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>663 (663 to 663)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Florida LAKEWATCH Report for Wildmere in Seminole County  
Using Data Downloaded 12/9/2022

Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

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Long-Term Data Summary for Lakes (Table 2): Definitions

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Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
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<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>20 µg/L</td>
<td>160 µg/L</td>
<td>2230 µg/L</td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>20 µg/L</td>
<td>90 µg/L</td>
<td>1910 µg/L</td>
<td></td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td>6 µg/L</td>
<td>30 µg/L</td>
<td>930 µg/L</td>
<td></td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

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<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>12 - 18</td>
<td>15 (5)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>345 - 573</td>
<td>447 (5)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>4 - 13</td>
<td>6 (5)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>6.2 - 11.2</td>
<td>9.4 (5)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.9 - 3.4</td>
<td>2.9 (5)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>16 - 21</td>
<td>18 (5)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>121 - 180</td>
<td>154 (5)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
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- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

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<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Wildmere</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>293300</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6963</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3363</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>13.3 ha or 33 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2011 to 2022</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>15 (12 to 18)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>447 (345 to 573)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The Lake Regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Figure 2. Lake Wildmere trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP No Trend, $R^2 = 0.12$, $p = 0.58$), **total nitrogen** (TN No Trend, $R^2 = 0.64$, $p = 0.11$), **chlorophyll** (CHL No Trend, $R^2 = 0.05$, $p = 0.71$) and **Secchi depth** (Secchi No Trend, $R^2 = 0.05$, $p = 0.73$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>160 µg/L&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>90 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO&lt;sub&gt;3&lt;/sub&gt; or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30 µg/L</td>
</tr>
</tbody>
</table>

<sup>1</sup> For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO<sub>3</sub> alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>25 - 59</td>
<td>39 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1213 - 1635</td>
<td>1408 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>18 - 41</td>
<td>27 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>0.2 - 2.7</td>
<td>0.7 (2)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.1 - 0.8</td>
<td>0.2 (2)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Wildwood</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.7522</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2809</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td></td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1999 to 2000</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>39 (25 to 59)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1408 (1213 to 1635)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
**Introduction for Lakes**

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with **five or more years of data**. Step by step instructions on how to use the data tables are provided on page 4 of this report.

**Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)**

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

**Long-Term Data Summary for Lakes (Table 2): Definitions**

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>160 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1270 µg/L</td>
<td>2230 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO$_3$ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>90 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1050 µg/L</td>
<td>1910 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO$_3$ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>510 µg/L</td>
<td>930 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO$_3$ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>29 - 29</td>
<td>29 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1148 - 1148</td>
<td>1148 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>6 - 6</td>
<td>6 (1)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>8.3 - 8.3</td>
<td>8.3 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.5 - 2.5</td>
<td>2.5 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Willa</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6786</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.2239</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2000 to 2000</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>29 (29 to 29)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1148 (1148 to 1148)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- Total Phosphorus (µg/L): Nutrient most often limiting growth of plant/algae.
- Total Nitrogen (µg/L): Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- Chlorophyll-uncorrected (µg/L): Chlorophyll concentrations are used to measure relative abundances of open water algae.
- Secchi (ft), Secchi (m): Secchi measurements are estimates of water clarity.
- Color (Pt-Co Units): LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- Specific Conductance (µS/cm@25°C): Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- Lake Classification: Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Colored Lakes</th>
<th>Clear Hard Water Lakes</th>
<th>Clear Soft Water Lakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units</td>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C</td>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C</td>
</tr>
<tr>
<td>Annual Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>Annual Geometric Mean Chlorophyll-corrected</td>
<td>Minimum calculated numeric interpretation</td>
<td>Maximum calculated numeric interpretation</td>
</tr>
<tr>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>25 - 25</td>
<td>25 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>850 - 850</td>
<td>850 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>29 - 29</td>
<td>29 (1)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.3 - 5.3</td>
<td>5.3 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.6 - 1.6</td>
<td>1.6 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Woodlake</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6421</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3848</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>. ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2001 to 2001</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>25 (25 to 25)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>850 (850 to 850)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.
2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
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Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; **colored lakes** (color greater than 40 Pt-Co units), **clear soft water lakes** (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and **clear hard water lakes** (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
**Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.**

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

**Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>21 - 44</td>
<td>33 (25)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>651 - 1081</td>
<td>766 (25)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>10 - 57</td>
<td>25 (25)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.3 - 6.9</td>
<td>3.7 (25)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.7 - 2.1</td>
<td>1.1 (25)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>16 - 26</td>
<td>21 (17)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>155 - 173</td>
<td>166 (11)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Clear Hardwater</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Woods</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>282327</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6469</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3487</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>13.3 ha or 33 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1993 to 2019</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>33 (21 to 44)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>766 (651 to 1081)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s *Lake Classification* in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The *Lake Classification* tells you which row to use in Table 1.
2. Identify your waterbody’s *Grand Geometric Mean* Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the *Annual Geometric Mean Chlorophyll-corrected* (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the *Minimum calculated numeric interpretation* columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the *Maximum calculated numeric interpretation* columns.
3. Identify your lake’s Total Phosphorus and Total Nitrogen *Grand Geometric Mean* concentration in Table 2 and compare them to the appropriate *Annual Geometric Mean Total Phosphorus* and *Annual Geometric Mean Total Nitrogen* values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

**Nutrient Zones and “Natural Background”**

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2. Lake Woods trend plots of year by average. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relation) and the p value indicates if the relation is significant ($p < 0.05$ is significant). **Total phosphorus** (TP Decreasing, $R^2 = 0.76$, $p = 0.00$), **total nitrogen** (TN Decreasing, $R^2 = 0.35$, $p = 0.00$), **chlorophyll** (CHL Decreasing, $R^2 = 0.79$, $p = 0.00$) and **Secchi depth** (Secchi Increasing, $R^2 = 0.53$, $p = 0.00$).
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Annual Geometric Mean Chlorophyll-corrected</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
<td>Annual Geometric Mean Total Phosphorus</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
<td>1270 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>510 µg/L</td>
</tr>
</tbody>
</table>

1 For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>17 - 17</td>
<td>17 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>737 - 737</td>
<td>737 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 2</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>6.9 - 6.9</td>
<td>6.9 (1)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.1 - 2.1</td>
<td>2.1 (1)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>56 - 56</td>
<td>56 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td>Colored</td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Yvonne</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6735</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.4336</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>2 ha or 6 acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>2006 to 2006</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Oligotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP4</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>17 (17 to 17)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>737 (737 to 737)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s Lake Classification in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The Lake Classification tells you which row to use in Table 1.

2. Identify your waterbody’s Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the Annual Geometric Mean Chlorophyll-corrected concentration use the Minimum calculated numeric interpretation columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the Annual Geometric Mean Chlorophyll-corrected concentration use the Maximum calculated numeric interpretation columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen Grand Geometric Mean concentration in Table 2 and compare them to the appropriate Annual Geometric Mean Total Phosphorus and Annual Geometric Mean Total Nitrogen values in Table 1.
4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

Nutrient Zones and “Natural Background”

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake’s location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bigham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.
3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.
4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.
Introduction for Lakes

This report summarizes data collected on systems that have been part of the LAKEWATCH program. Data are from the period of record for individual systems. Part one allows the comparison of data with Florida Department of Environmental Protection’s Numeric Nutrient Criteria. Part two allows a comparison of the long-term mean nutrient concentrations with nutrient zone concentrations published by LAKEWATCH staff (Bachmann et al. 2012; https://lakewatch.ifas.ufl.edu/resources/bibliography/). Finally, this report examines data for long-term trends that may be occurring in individual systems but only for systems with five or more years of data. Step by step instructions on how to use the data tables are provided on page 4 of this report.

Florida Department of Environmental Protection (FDEP) Nutrient Criteria for Lakes (Table 1)

For lakes, the numeric interpretations of the nutrient criterion in paragraph 62-302.530(47)(b), F.A.C., based on chlorophyll are shown in Table 1. The applicable interpretations for TN and TP will vary on an annual basis, depending on the availability and concentration of chlorophyll data for the lake. The numeric interpretations for TN, TP, and chlorophyll shall not be exceeded more than once in any consecutive three year period.

a. If annual geometric mean chlorophyll does not exceed the chlorophyll value for one of three lake classification groups listed in the table below, then the TN and TP numeric interpretations for that calendar year shall be the annual geometric means of the maximum calculated numeric interpretation in Table 1.

b. If there are insufficient data to calculate the annual geometric mean chlorophyll for a given year or the annual geometric mean chlorophyll exceeds the values in Table 1 for the correct lake classification group, then the applicable numeric interpretations for TN and TP shall be the minimum values in Table 1.

Long-Term Data Summary for Lakes (Table 2): Definitions

- **Total Phosphorus (µg/L):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen (µg/L):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algae.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- **Specific Conductance (µS/cm@25°C):** Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- **Lake Classification:** Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance: colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µS/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater than 100 µS/cm @ 25 C).
Table 1. Florida Department of Environmental Protection’s Numeric Nutrient Criteria for lakes.

<table>
<thead>
<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</th>
<th>Minimum calculated numeric interpretation</th>
<th>Maximum calculated numeric interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>Annual Geometric Mean Chlorophyll-corrected</td>
<td>Annual Geometric Mean Total Phosphorus</td>
<td>Annual Geometric Mean Total Nitrogen</td>
</tr>
<tr>
<td>&gt; 40 Platinum Cobalt Units Colored Lakes</td>
<td>20 µg/L</td>
<td>50 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and &gt; 20 mg/L CaCO₃ or &gt;100 µS/cm@25 C Clear Hard Water Lakes</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
</tr>
<tr>
<td>≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
</tr>
</tbody>
</table>

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 µg/L TP streams threshold for the region.

For the purpose of subparagraph 62-302.531(2)(b)1., F.A.C., color shall be assessed as true color and shall be free from turbidity. Lake color and alkalinity shall be the long-term geometric mean, based on a minimum of ten data points over at least three years with at least one data point in each year. If insufficient alkalinity data are available, long-term geometric mean specific conductance values shall be used, with a value of <100 µS/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Table 2. Long-term trophic state data collected monthly by LAKEWATCH volunteers and classification variables color and specific conductance (collected quarterly). Values in bold can be used with Table 1 to evaluate compliance with nutrient criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum and Maximum Annual Geometric Means</th>
<th>Grand Geometric Mean (Sampling years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>17 - 89</td>
<td>34 (3)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>467 - 1266</td>
<td>674 (3)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>1 - 78</td>
<td>7 (3)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.1 - 9.7</td>
<td>5.6 (3)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.9 - 2.9</td>
<td>1.7 (3)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>-</td>
<td>(0)</td>
</tr>
<tr>
<td>Lake Classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Base File Data for Lakes: Definitions and Nutrient Zone Maps

The long-term data summary will include the following parameters listed with a definition after each one:

- **County**: Name of county in which the lake resides.
- **Name**: Lake name that LAKEWATCH uses for the system.
- **GNIS Number**: Number created by USGS’s Geographic Names Information System.
- **Latitude and Longitude**: Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type**: Four different types of systems; lakes, estuaries, river/streams and springs.
- **Surface Area (ha and acre)**: LAKEWATCH lists the surface area of a lake if it is available.
- **Mean Depth (m and ft)**: This mean depth is calculated from multiple depth finder transects across a lake that LAKEWATCH uses for estimating plant abundances.
- **Period of Record (year)**: Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone**: Nutrient zones defined by Bachmann et al (2012).
- **Long-Term TP and TN Geometric Mean Concentration (µg/L: min and max)**: Grand Geometric Means of all annual geometric means (µg/L) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL)**: Tropic state classification using the long-term chlorophyll average.

Table 3. Base File Data, long-term nutrient grand geometric means and Nutrient Zone classification listing the 90th percentile concentrations in Figure 1. Values in bold can be used for Nutrient Zone comparisons.

<table>
<thead>
<tr>
<th>County</th>
<th>Seminole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Yvonne-2</td>
</tr>
<tr>
<td>GNIS Number</td>
<td>293613</td>
</tr>
<tr>
<td>Latitude</td>
<td>28.6700</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.3159</td>
</tr>
<tr>
<td>Water Body Type</td>
<td>Lake</td>
</tr>
<tr>
<td>Surface Area (ha and acre)</td>
<td>Ha or . acre</td>
</tr>
<tr>
<td>Period of Record (year)</td>
<td>1995 to 1997</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP3</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>34 (17 to 89)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN4</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>674 (467 to 1266)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.
Interpreting FDEP’s Numeric Nutrient Criteria (NNC): These are instructions for using Table 1 and 2 to determine impairment status based on FDEP’s NNC.

1. Identify your lake’s *Lake Classification* in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
   a. The *Lake Classification* tells you which row to use in Table 1.

2. Identify your waterbody’s *Grand Geometric Mean* Chlorophyll-uncorrected in Table 2.
   a. Compare this number to the *Annual Geometric Mean Chlorophyll-corrected* (2nd column) in Table 1.
   b. If your lake’s Chlorophyll-uncorrected concentration is greater than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the *Minimum calculated numeric interpretation* columns.
   c. If your lake’s Chlorophyll-uncorrected concentration is less than the *Annual Geometric Mean Chlorophyll-corrected* concentration use the *Maximum calculated numeric interpretation* columns.

3. Identify your lake’s Total Phosphorus and Total Nitrogen *Grand Geometric Mean* concentration in Table 2 and compare them to the appropriate *Annual Geometric Mean Total Phosphorus* and *Annual Geometric Mean Total Nitrogen* values in Table 1.

4. If your lake’s concentrations from Table 2 are greater than FDEP’s NNC values from Table 1, your lake may be considered impaired. If they are below, it may be considered unimpaired.

**Nutrient Zones and “Natural Background”**

Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a similar unaltered waterbody, historical pre-alteration data, paleolimnological examination of sediment cores, or examination of geology and soils. When determining natural background conditions for a lake, the lake's location and regional characteristics as described and depicted in the U.S. Environmental Protection Agency document titled Lake Regions of Florida (EPA/R-97/127, dated 1997, U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR) (http://www.flrules.org/Gateway/reference.asp?No=Ref-06267), which is incorporated by reference herein, shall also be considered. The lake regions in this document are grouped Nutrient Zones according to ambient total phosphorus and total nitrogen concentrations listed in Table 1 found in Bachmann, R. W., Bingham D. L., Hoyer M. V., Canfield D. E, Jr. 2012. A strategy for establishing numeric nutrient criteria for Florida lakes. Lake Reservoir Management. 28:84-92.

**Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.**

1. Identify your lake’s TP Zone in Table 3.
   a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.

2. Locate your lake’s Long-Term Grand Geometric Mean TP Concentration value in Table 3.

3. Compare your lake’s Long-Term Grand Geometric Mean TP Concentration from Table 3 to the appropriate TP Zone nutrient concentration from Figure 1.
   a. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake’s nutrient concentration is above “Natural Background”.
   b. If your lake’s Long-Term Grand Geometric Mean TP Concentration number is lower than the TP zone nutrient concentration, your lake’s nutrient concentration is within “Natural Background”.

4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration.