Florida LAKEWATCH Report for Donut in Lee County
Using Data Downloaded 12/9/2020

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 three lake classification group 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>Color/Lake Classification</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>51 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 - 8</td>
<td>8 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>973 - 973</td>
<td>973 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>17 - 17</td>
<td>17 (1)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.1 - 5.1</td>
<td>5.1 (1.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.6 - 1.6</td>
<td>1.6 (1.0)</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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Donut</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.7538</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.7630</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>2006 to 2006</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>8 (8 to 8)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>973 (973 to 973)</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 Dunes in Lee County
Using Data Downloaded 12/9/2020

Introduction 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>
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</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>
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<td>30 µg/L</td>
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</tr>
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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>208 - 1034</td>
<td>383 (11)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1835 - 4869</td>
<td>2648 (11)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>3 - 168</td>
<td>35 (11)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.2 - 4.5</td>
<td>2.2 (9.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.4 - 1.4</td>
<td>0.7 (9.0)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>48 - 57</td>
<td>51 (3)</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>

2
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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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Dunes</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4551</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.0529</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 2003</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>383 (208 to 1034)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>2648 (1835 to 1835)</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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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 LAKENWATCH’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 and Figure 3. Trend plots of annual average total phosphorus and annual average total nitrogen versus year. 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). Trend Status are reported on plots.

**Dunes (Lee)**

- **Total Phosphorus (μg/L)**
  - $p = 0.13$, $R^2 = 0.23$
  - No Trend

- **Year**

- **Graph Details**
  - Data points and trend line

**Dunes (Lee)**

- **Total Nitrogen (μg/L)**
  - $p = 0.13$, $R^2 = 0.23$
  - No Trend

- **Year**

- **Graph Details**
  - Data points and trend line
Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relations and the p value indicates if the relation is significant ($p < 0.05$ is significant). Trend status are reported on plots.

**Dunes (Lee)**

![Graph showing increasing trend in Total Chlorophyll with $p = 0.01$, $R^2 = 0.53$.](image)

**Dunes (Lee)**

![Graph showing decreasing trend in Secchi depth with $p = 0.01$, $R^2 = 0.68$.](image)
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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 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>51 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>35 - 74</td>
<td>44 (5)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1702 - 3228</td>
<td>2197 (5)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>20 - 83</td>
<td>34 (5)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.3 - 3.3</td>
<td>2.0 (5.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.4 - 1.0</td>
<td>0.6 (5.0)</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.
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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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>East Rocks</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4343</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.1138</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>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>44 (35 to 74)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>2197 (1702 to 1702)</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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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 and Figure 3. Trend plots of annual average total phosphorus and annual average total nitrogen versus year. 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). Trend Status are reported on plots.
Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relations and the p value indicates if the relation is significant ($p < 0.05$ is significant). Trend status are reported on plots.

**East Rocks (Lee)**

- **Total Chlorophyll ($\mu g/L$)**
  - $p = 0.38$, $R^2 = 0.26$
  - No Trend

**Year**

- 1992
- 1994
- 1996
- 1998

**Secchi depth (ft)**

- $p = 0.08$, $R^2 = 0.69$
- No Trend

**Year**

- 1992
- 1994
- 1996
- 1998
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 three lake classification group 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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<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>
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<td></td>
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<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>≤ 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>≤ 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>51 µg/L</td>
</tr>
<tr>
<td></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.

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</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>44 - 51</td>
<td>47 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1673 - 1918</td>
<td>1791 (2)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>16 - 16</td>
<td>16 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>5.2 - 5.3</td>
<td>5.2 (2.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.6 - 1.6</td>
<td>1.6 (2.0)</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>
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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.

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<th>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>East Rocks West</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4377</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.1158</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 1992</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>47 (44 to 51)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1791 (1673 to 1673)</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.
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</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>51 µg/L</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>47 - 169</td>
<td>77 (5)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1318 - 2344</td>
<td>1808 (5)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>10 - 20</td>
<td>14 (5)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.1 - 4.5</td>
<td>4.0 (5.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.9 - 1.4</td>
<td>1.2 (5.0)</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.
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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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Gulf Pines</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4454</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.1313</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 1997</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>77 (47 to 169)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1808 (1318 to 1318)</td>
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</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.
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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.
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4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2 and Figure 3. Trend plots of annual average total phosphorus and annual average total nitrogen versus year. 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). Trend Status are reported on plots.

**Gulf Pines (Lee)**

- **Total Phosphorus ($\mu$g/L):**
  - $p = 0.13$, $R^2 = 0.58$
  - No Trend


- **Total Nitrogen ($\mu$g/L):**
  - $p = 0.32$, $R^2 = 0.32$
  - No Trend

Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relations and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Trend status are reported on plots.
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 three lake classification group 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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- **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>51 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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<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 - 85</td>
<td>48 (7)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1035 - 2426</td>
<td>1585 (7)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>7 - 47</td>
<td>14 (7)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.8 - 7.7</td>
<td>4.5 (7.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.9 - 2.4</td>
<td>1.4 (7.0)</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.
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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.
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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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Gulf Shores</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4456</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.1325</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 1997</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>48 (32 to 85)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1585 (1035 to 1035)</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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Interpreting Florida LAKEWATCH’s Nutrient Zones: These are instructions for using Table 3 and Figure 1 to determine nutrient status based on Nutrient Zones.

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**Gulf Shores (Lee)**

- **Total Chlorophyll (μg/L):**
  - $p = 0.07$, $R^2 = 0.52$
  - No Trend


**Gulf Shores (Lee)**

- **Secchi depth (ft):**
  - $p = 0.03$, $R^2 = 0.64$
  - Increasing

Florida LAKEWATCH Report for Gulf Shores West in Lee County
Using Data Downloaded 12/9/2020

Introduction for Lakes

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<tbody>
<tr>
<td>Total Phosphorus (µg/L)</td>
<td>99 - 205</td>
<td>143 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>2805 - 3143</td>
<td>2969 (2)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>54 - 150</td>
<td>90 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.5 - 2.3</td>
<td>1.9 (2.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.5 - 0.7</td>
<td>0.6 (2.0)</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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Gulf Shores West</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
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<tr>
<td>Latitude</td>
<td>26.4477</td>
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<td>Longitude</td>
<td>-82.1341</td>
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<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 1992</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Hypereutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>143 (99 to 205)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>2969 (2805 to 2805)</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 Gumbo Limbo in Lee County
Using Data Downloaded 12/9/2020

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 three lake classification group 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>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>38 - 89</td>
<td>53 (7)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>847 - 1468</td>
<td>1064 (7)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>5 - 16</td>
<td>8 (7)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>6.6 - 11.0</td>
<td>8.3 (7.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.0 - 3.4</td>
<td>2.5 (7.0)</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>

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:

- **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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Gumbo Limbo</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4454</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.0598</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>1992 to 1998</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>53 (38 to 89)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1064 (847 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.

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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 and Figure 3. Trend plots of annual average total phosphorus and annual average total nitrogen versus year. 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). Trend Status are reported on plots.

**Gumbo Limbo (Lee)**

- **Total Phosphorus (µg/L)**
- $p = 0.06$, $R^2 = 0.54$
- **No Trend**

**Year**

- 1992
- 1993
- 1994
- 1995
- 1996
- 1997
- 1998

**Gumbo Limbo (Lee)**

- **Total Nitrogen (µg/L)**
- $p = 0.19$, $R^2 = 0.31$
- **No Trend**

**Year**

- 1992
- 1993
- 1994
- 1995
- 1996
- 1997
- 1998
Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relations and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Trend status are reported on plots.
Florida LAKEWATCH Report for Harborage East in Lee County
Using Data Downloaded 12/9/2020

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 three lake classification group 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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- **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 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>7 - 10</td>
<td>8 (6)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>380 - 606</td>
<td>466 (6)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>2 - 6</td>
<td>4 (6)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>7.0 - 13.5</td>
<td>9.6 (6.0)</td>
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<tr>
<td>Secchi (m)</td>
<td>2.1 - 4.1</td>
<td>2.9 (6.0)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
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<td>7 (5)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>621 - 694</td>
<td>694 (5)</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.
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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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Harborage East</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4807</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.8455</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 2020</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>8 (7 to 10)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>466 (380 to 380)</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 and Figure 3. Trend plots of annual average total phosphorus and annual average total nitrogen versus year. 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). Trend Status are reported on plots.
Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relations and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Trend status are reported on plots.

**Harborage East (Lee)**

![Graph 1](image1)

$p = 0.15, R^2 = 0.44$

No Trend

**Harborage East (Lee)**

![Graph 2](image2)

$p = 0.05, R^2 = 0.66$

Decreasing
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 three lake classification group 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&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>51 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 - 10</td>
<td>8 (6)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>324 - 488</td>
<td>392 (6)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>2 - 5</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>7.5 - 18.4</td>
<td>12.0 (6.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>2.3 - 5.6</td>
<td>3.7 (6.0)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>3 - 7</td>
<td>5 (5)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>1055 - 1223</td>
<td>1223 (5)</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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Harborage West</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4859</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.8514</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 2020</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Oligotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>8 (7 to 10)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>392 (324 to 324)</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 and Figure 3. Trend plots of annual average total phosphorus and annual average total nitrogen versus year. 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). Trend Status are reported on plots.

**Harborage West (Lee)**

- **Total Phosphorus (µg/L)**
  - P = 0.16, $R^2 = 0.43$
  - No Trend

- **Year**
  - 2015 to 2020

**Harborage West (Lee)**

- **Total Nitrogen (µg/L)**
  - P = 0.35, $R^2 = 0.22$
  - No Trend

- **Year**
  - 2015 to 2020
Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relations and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Trend status are reported on plots.
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 three lake classification group 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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- **Chlorophyll-uncorrected (µg/L)**: Chlorophyll concentrations are used to measure relative abundances of open water 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>230 - 230</td>
<td>230 (1)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1846 - 1846</td>
<td>1846 (1)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>34 - 34</td>
<td>34 (1)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.6 - 3.6</td>
<td>3.6 (1.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.1 - 1.1</td>
<td>1.1 (1.0)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>39 - 39</td>
<td>39 (1)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>1225 - 1225</td>
<td>1225 (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.
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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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Hopefield</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.6194</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.0268</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>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>230 (230 to 230)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1846 (1846 to 1846)</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 Lady Finger in Lee County
Using Data Downloaded 12/9/2020

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 three lake classification group 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>51 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>31 - 40</td>
<td>35 (2)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>2398 - 3133</td>
<td>2741 (2)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>7 - 8</td>
<td>8 (2)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.4 - 4.7</td>
<td>4.6 (2.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.3 - 1.4</td>
<td>1.4 (2.0)</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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Lady Finger</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4666</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.1562</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 1992</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>35 (31 to 40)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>2741 (2398 to 2398)</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 three lake classification group 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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- **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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<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>Colored Lakes</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>≤ 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>6 µg/L</td>
<td>10 µg/L</td>
<td>51 µg/L</td>
</tr>
<tr>
<td>Clear Soft Water Lakes</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>51 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>15 - 35</td>
<td>21 (16)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1306 - 2717</td>
<td>1829 (16)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>6 - 20</td>
<td>11 (16)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.3 - 4.7</td>
<td>3.4 (16.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.7 - 1.4</td>
<td>1.0 (16.0)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>9 - 15</td>
<td>12 (8)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>6481 - 7000</td>
<td>7000 (2)</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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- **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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Little Murex</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4333</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.0976</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 2008</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>21 (15 to 35)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1829 (1306 to 1306)</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.](image-url)
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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.

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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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4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration
Figure 2 and Figure 3. Trend plots of annual average total phosphorus and annual average total nitrogen versus year. 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). Trend Status are reported on plots.

**Little Murex (Lee)**

![Graph of Total Phosphorus vs Year](image1)

- $p = 0.06, R^2 = 0.23$
- No Trend

![Graph of Total Nitrogen vs Year](image2)

- $p = 0, R^2 = 0.63$
- Decreasing
Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relations and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Trend status are reported on plots.

**Little Murex (Lee)**

- **Total Chlorophyll (µg/L)**

  - $p = 0.64$, $R^2 = 0.02$
  - **No Trend**

- **Year**
  - 1995, 2000, 2005

**Little Murex (Lee)**

- **Secchi depth (ft)**

  - $p = 0.32$, $R^2 = 0.07$
  - **No Trend**

- **Year**
  - 1995, 2000, 2005
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 three lake classification group 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.
- **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>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>51 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>16 - 43</td>
<td>27 (7)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>443 - 1475</td>
<td>819 (7)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>15 - 61</td>
<td>32 (7)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.3 - 7.3</td>
<td>3.7 (7.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.7 - 2.2</td>
<td>1.1 (7.0)</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.
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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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Little Portion</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4272</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.9063</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 1999</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>27 (16 to 43)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>819 (443 to 443)</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
Figure 2 and Figure 3. Trend plots of annual average total phosphorus and annual average total nitrogen versus year. 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). Trend Status are reported on plots.
Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relations and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Trend status are reported on plots.

**Little Portion (Lee)**

- **Total Chlorophyll ($\mu$g/L)**
  - $p = 0.21$, $R^2 = 0.29$
  - No Trend


**Little Portion (Lee)**

- **Secchi depth (ft)**
  - $p = 0.11$, $R^2 = 0.44$
  - No Trend

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 three lake classification group 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).
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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>51 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>72 - 617</td>
<td>220 (13)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1277 - 2685</td>
<td>1830 (13)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>9 - 53</td>
<td>19 (13)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.4 - 5.2</td>
<td>2.8 (13.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.4 - 1.6</td>
<td>0.8 (13.0)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>11 - 20</td>
<td>15 (4)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>588 - 1421</td>
<td>1421 (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.
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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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Murex</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4313</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.0983</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 2010</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>220 (72 to 617)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1830 (1277 to 1277)</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”.
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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>
<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>2230 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>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 and ≤ 20 mg/L CaCO₃ or &lt; 100 µS/cm@25 C</td>
<td>6 µg/L</td>
<td>10 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>26 - 92</td>
<td>46 (6)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1121 - 2522</td>
<td>1670 (6)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>7 - 69</td>
<td>19 (6)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.5 - 6.3</td>
<td>3.0 (6.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.5 - 1.9</td>
<td>0.9 (6.0)</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 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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Roseate</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4375</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.0652</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>TP5</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>46 (26 to 92)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1670 (1121 to 1121)</td>
</tr>
</tbody>
</table>

Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90\textsuperscript{th} 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 and Figure 3. Trend plots of annual average total phosphorus and annual average total nitrogen versus year. 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). Trend Status are reported on plots.

**Roseate (Lee)**

![Trend plot for total phosphorus](image)

$p = 0.04, R^2 = 0.68$

Decreasing

![Trend plot for total nitrogen](image)

$p = 0, R^2 = 0.9$

Decreasing
Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relations and the p value indicates if the relation is significant (p < 0.05 is significant). Trend status are reported on plots.

**Roseate (Lee)**

![Graph showing trend of total chlorophyll](image)

$p = 0.09, R^2 = 0.55$

No Trend

**Roseate (Lee)**

![Graph showing trend of Secchi depth](image)

$p = 0.03, R^2 = 0.74$

Increasing
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 three lake classification group 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 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 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></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>51 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>126 - 339</td>
<td>202 (3)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1111 - 1437</td>
<td>1227 (3)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>29 - 45</td>
<td>35 (3)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.8 - 3.5</td>
<td>3.0 (3.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.8 - 1.1</td>
<td>0.9 (3.0)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>26 - 30</td>
<td>28 (2)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>586 - 594</td>
<td>594 (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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Sandoval 1</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.6107</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.0257</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 2019</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>202 (126 to 339)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1227 (1111 to 1111)</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.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
Florida LAKEWATCH Report for Sandoval 6 in Lee County
Using Data Downloaded 12/9/2020

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 three lake classification group 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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- **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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<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>51 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>79 - 192</td>
<td>134 (4)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1357 - 1631</td>
<td>1459 (4)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>36 - 84</td>
<td>61 (4)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.5 - 3.6</td>
<td>2.8 (4.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.8 - 1.1</td>
<td>0.9 (4.0)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>32 - 47</td>
<td>37 (3)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>740 - 935</td>
<td>935 (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.
- **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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Sandoval 6</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.6207</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.0254</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 2019</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Hypereutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>134 (79 to 192)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1459 (1357 to 1357)</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 three lake classification group 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>51 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>67 - 158</td>
<td>100 (3)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1275 - 1560</td>
<td>1446 (3)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>25 - 32</td>
<td>28 (3)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.7 - 4.0</td>
<td>3.8 (3.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.1 - 1.2</td>
<td>1.2 (3.0)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>20 - 37</td>
<td>27 (3)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>841 - 1153</td>
<td>1153 (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.
- **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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Sandoval 13</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.6176</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.0281</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 2019</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>100 (67 to 158)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1446 (1275 to 1275)</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.
   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 three lake classification group 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.
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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 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>
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<td>6 µg/L</td>
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<td>51 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>138 - 333</td>
<td>224 (3)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1135 - 1515</td>
<td>1333 (3)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>4 - 27</td>
<td>13 (3)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.1 - 7.3</td>
<td>5.0 (3.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.3 - 2.2</td>
<td>1.5 (3.0)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>26 - 41</td>
<td>35 (3)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>858 - 1223</td>
<td>1223 (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:

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- **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.

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<thead>
<tr>
<th>County</th>
<th>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Sandoval 15</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.6214</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.0282</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 2019</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>224 (138 to 333)</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1333 (1135 to 1135)</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 Sandoval 18 in Lee County
Using Data Downloaded 12/9/2020

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 three lake classification group 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 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>≤ 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>51 µg/L</td>
</tr>
<tr>
<td></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>94 - 170</td>
<td>115 (3)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1326 - 1399</td>
<td>1366 (3)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>26 - 45</td>
<td>35 (3)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>2.7 - 3.9</td>
<td>3.2 (3.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.8 - 1.2</td>
<td>1.0 (3.0)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>35 - 47</td>
<td>39 (3)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>708 - 976</td>
<td>976 (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.
- **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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Sandoval 18</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.6254</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.0281</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 2019</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>115 (94 to 170)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1366 (1326 to 1326)</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”

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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.

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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
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 three lake classification group 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.
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<tr>
<th>Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance</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</td>
<td>20 µg/L</td>
<td>30 µg/L</td>
<td>1050 µg/L</td>
</tr>
<tr>
<td>or &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</td>
<td>6 µg/L</td>
<td>10 µg/L</td>
<td>51 µg/L</td>
</tr>
<tr>
<td>or &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>76 - 157</td>
<td>104 (3)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1118 - 1613</td>
<td>1300 (3)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>15 - 69</td>
<td>25 (3)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.1 - 5.2</td>
<td>4.1 (3.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.9 - 1.6</td>
<td>1.3 (3.0)</td>
</tr>
<tr>
<td>Color (Pt-Co Units)</td>
<td>18 - 48</td>
<td>33 (3)</td>
</tr>
<tr>
<td>Specific Conductance (µS/cm@25 C)</td>
<td>703 - 809</td>
<td>809 (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.
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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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Sandoval 20</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.6284</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.0284</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 2019</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>104 (76 to 157)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1300 (1118 to 1118)</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 Sea Oats in Lee County
Using Data Downloaded 12/9/2020

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 three lake classification group 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></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>51 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>28 - 48</td>
<td>37 (7)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1297 - 2639</td>
<td>1805 (7)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>13 - 48</td>
<td>25 (7)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>1.6 - 3.5</td>
<td>2.4 (7.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>0.5 - 1.1</td>
<td>0.7 (7.0)</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></th>
<th>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>County</td>
<td>Lee</td>
</tr>
<tr>
<td>Name</td>
<td>Sea Oats</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4356</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.1117</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 1999</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>37 (28 to 48)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1805 (1297 to 1297)</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.
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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.

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Figure 2 and Figure 3. Trend plots of annual average total phosphorus and annual average total nitrogen versus year. 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). Trend Status are reported on plots.

**Sea Oats (Lee)**

- **Total Phosphorus (µg/L):**
  - $p = 0.69$, $R^2 = 0.03$
  - No Trend

**Sea Oats (Lee)**

- **Total Nitrogen (µg/L):**
  - $p = 0.24$, $R^2 = 0.26$
  - No Trend
Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relations and the p value indicates if the relation is significant ($p < 0.05$ is significant). Trend status are reported on plots.

**Sea Oats (Lee)**

![Trend plot of annual average chlorophyll vs. year.](image)

$p = 0.24, R^2 = 0.26$

No Trend

**Sea Oats (Lee)**

![Trend plot of Secchi depth vs. year.](image)

$p = 0.26, R^2 = 0.25$

No Trend
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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 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>
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<td>6 µg/L</td>
<td>10 µg/L</td>
<td>51 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>26 - 54</td>
<td>37 (5)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>826 - 2076</td>
<td>1249 (5)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>9 - 29</td>
<td>14 (5)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.8 - 7.0</td>
<td>5.0 (5.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.2 - 2.1</td>
<td>1.5 (5.0)</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>
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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>St. Kilda</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4292</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.0963</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 1997</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>37 (26 to 54)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1249 (826 to 826)</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
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**St. Kilda (Lee)**

![Graph showing trend in total phosphorus](image)

- $p = 0.45$, $R^2 = 0.2$
- No Trend

![Graph showing trend in total nitrogen](image)

- $p = 0.01$, $R^2 = 0.9$
- Decreasing
Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The \( R^2 \) value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the \( R^2 \) the stronger the relations and the p value indicates if the relation is significant (p < 0.05 is significant). Trend status are reported on plots.

**St. Kilda (Lee)**

![Trend plot for chlorophyll](image)

- \( p = 0.63, R^2 = 0.09 \)
- No Trend

![Trend plot for Secchi depth](image)

- \( p = 0.93, R^2 = 0 \)
- No Trend
Florida LAKEWATCH Report for Venus in Lee County
Using Data Downloaded 12/9/2020

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 three lake classification group 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>51 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>42 - 65</td>
<td>52 (3)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>2026 - 2960</td>
<td>2448 (3)</td>
</tr>
<tr>
<td>Chlorophyll-uncorrected (µg/L)</td>
<td>7 - 18</td>
<td>10 (3)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>3.6 - 6.9</td>
<td>5.0 (2.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.1 - 2.1</td>
<td>1.5 (2.0)</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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Venus</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4619</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.0514</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>1997 to 1999</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Eutrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>52 (42 to 65)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>2448 (2026 to 2026)</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

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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 three lake classification group 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 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>51 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.

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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 - 84</td>
<td>29 (8)</td>
</tr>
<tr>
<td>Total Nitrogen (µg/L)</td>
<td>1116 - 1933</td>
<td>1472 (8)</td>
</tr>
<tr>
<td>Chlorophyll- uncorrected (µg/L)</td>
<td>3 - 7</td>
<td>4 (7)</td>
</tr>
<tr>
<td>Secchi (ft)</td>
<td>4.3 - 6.9</td>
<td>5.4 (6.0)</td>
</tr>
<tr>
<td>Secchi (m)</td>
<td>1.3 - 2.1</td>
<td>1.6 (6.0)</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:

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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>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>West Rocks</td>
</tr>
<tr>
<td>GNIS Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>26.4379</td>
</tr>
<tr>
<td>Longitude</td>
<td>-82.1193</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>1989 to 1997</td>
</tr>
<tr>
<td>Lake Trophic Status (CHL)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>TP Zone</td>
<td>TP5</td>
</tr>
<tr>
<td>Grand TP Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>29 (12 to 84)</td>
</tr>
<tr>
<td>TN Zone</td>
<td>TN5</td>
</tr>
<tr>
<td>Grand TN Geometric Mean Concentration (µg/L, min. and max.)</td>
<td>1472 (1116 to 1116)</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.

**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 and Figure 3. Trend plots of annual average total phosphorus and annual average total nitrogen versus year. 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). Trend Status are reported on plots.

**West Rocks (Lee)**

![Graph showing trend in total phosphorus](image)

- $p = 0.38$, $R^2 = 0.13$
- No Trend

![Graph showing trend in total nitrogen](image)

- $p = 0.11$, $R^2 = 0.36$
- No Trend
Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The $R^2$ value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the $R^2$ the stronger the relations and the $p$ value indicates if the relation is significant ($p < 0.05$ is significant). Trend status are reported on plots.