

Florida LAKEWATCH Report for Banyan in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	62 - 62	62 (1)
Total Nitrogen (µg/L)	1520 - 1520	1520 (1)
Chlorophyll- uncorrected (µg/L)	46 - 46	46 (1)
Secchi (ft)	2.6 - 2.6	2.6 (1.0)
Secchi (m)	0.8 - 0.8	0.8 (1.0)
Color (Pt-Co Units)	30 - 30	30 (1)
Specific Conductance (µS/cm@25 C)	1221 - 1221	1221 (1)
Lake Classification	Clear Hardwater	

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Trophic state classification using the long-term chlorophyll average.

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

County	Collier
Name	Banyan
GNIS Number	
Latitude	26.1614
Longitude	-81.8026
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2012 to 2012
Lake Trophic Status (CHL)	Hypereutrophic
TP Zone	TP5
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	62 (62 to 62)
TN Zone	TN5
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	1520 (1520 to 1520)

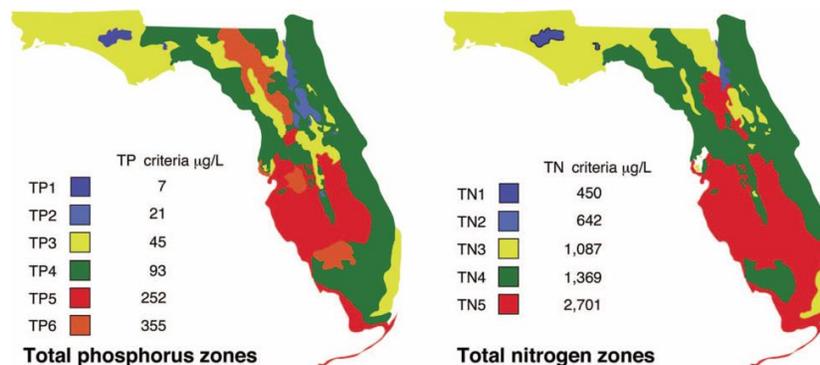


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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 Beachwalk A in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
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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 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.

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	93 - 93	93 (1)
Total Nitrogen (µg/L)	915 - 915	915 (1)
Chlorophyll- uncorrected (µg/L)	10 - 10	10 (1)
Secchi (ft)	3.4 - 3.4	3.4 (1.0)
Secchi (m)	1.0 - 1.0	1.0 (1.0)
Color (Pt-Co Units)	-	(0)
Specific Conductance (µS/cm@25 C)	-	(0)
Lake Classification		

Base File Data for Lakes: Definitions and Nutrient Zone Maps

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

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

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

County	Collier
Name	Beachwalk A
GNIS Number	
Latitude	26.2534
Longitude	-81.8094
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2020 to 2020
Lake Trophic Status (CHL)	Eutrophic
TP Zone	TP5
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	93 (93 to 93)
TN Zone	TN5
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	915 (915 to 915)

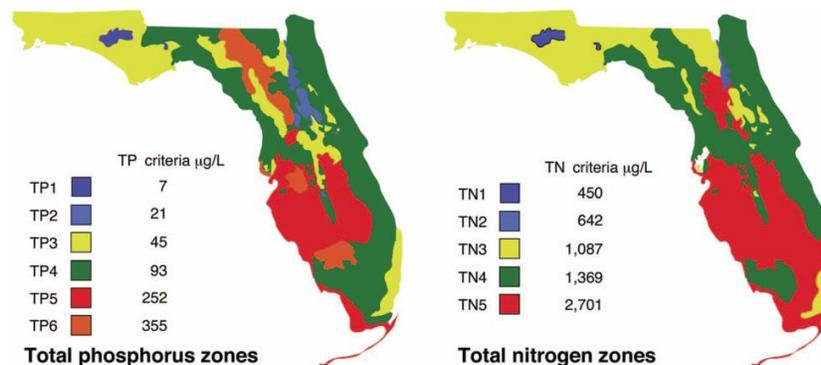


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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Florida LAKEWATCH Report for Beachwalk B in Collier County Using Data Downloaded 12/9/2020

Introduction for Lakes

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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.

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	151 - 151	151 (1)
Total Nitrogen (µg/L)	1031 - 1031	1031 (1)
Chlorophyll- uncorrected (µg/L)	4 - 4	4 (1)
Secchi (ft)	3.9 - 3.9	3.9 (1.0)
Secchi (m)	1.2 - 1.2	1.2 (1.0)
Color (Pt-Co Units)	-	(0)
Specific Conductance (µS/cm@25 C)	-	(0)
Lake Classification		

Base File Data for Lakes: Definitions and Nutrient Zone Maps

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

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

County	Collier
Name	Beachwalk B
GNIS Number	
Latitude	26.2532
Longitude	-81.8115
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2020 to 2020
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP5
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	151 (151 to 151)
TN Zone	TN5
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	1031 (1031 to 1031)

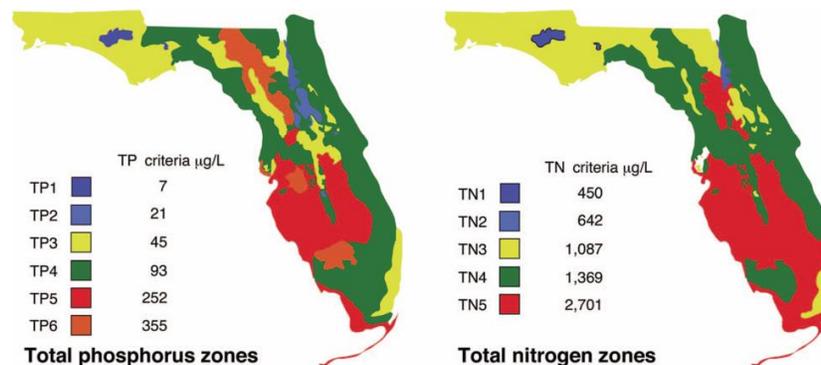


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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 Beachwalk C in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	107 - 107	107 (1)
Total Nitrogen (µg/L)	934 - 934	934 (1)
Chlorophyll- uncorrected (µg/L)	6 - 6	6 (1)
Secchi (ft)	1.9 - 1.9	1.9 (1.0)
Secchi (m)	0.6 - 0.6	0.6 (1.0)
Color (Pt-Co Units)	-	(0)
Specific Conductance (µS/cm@25 C)	-	(0)
Lake Classification		

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Trophic state classification using the long-term chlorophyll average.

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

County	Collier
Name	Beachwalk C
GNIS Number	
Latitude	26.2537
Longitude	-81.8155
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2020 to 2020
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP5
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	107 (107 to 107)
TN Zone	TN5
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	934 (934 to 934)

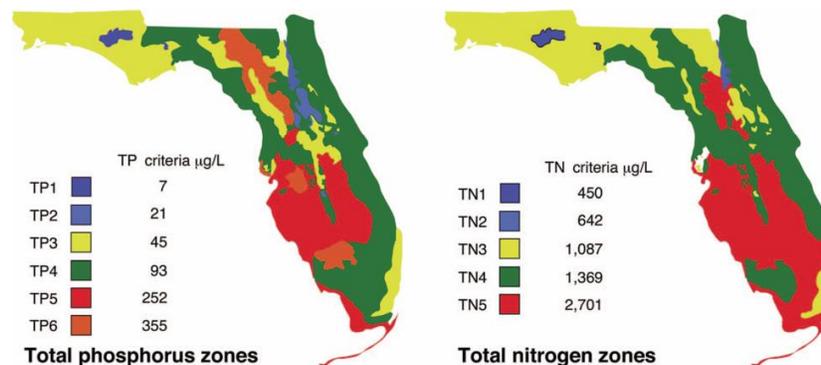


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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 Crystal in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	9 - 14	11 (3)
Total Nitrogen (µg/L)	590 - 704	627 (3)
Chlorophyll- uncorrected (µg/L)	4 - 5	5 (3)
Secchi (ft)	6.3 - 8.0	7.2 (3.0)
Secchi (m)	1.9 - 2.4	2.2 (3.0)
Color (Pt-Co Units)	8 - 11	9 (3)
Specific Conductance (µS/cm@25 C)	257 - 302	302 (3)
Lake Classification	Clear Hardwater	

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Trophic state classification using the long-term chlorophyll average.

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

County	Collier
Name	Crystal
GNIS Number	
Latitude	26.2643
Longitude	-81.6856
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2018 to 2020
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP4
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	11 (9 to 14)
TN Zone	TN4
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	627 (590 to 590)

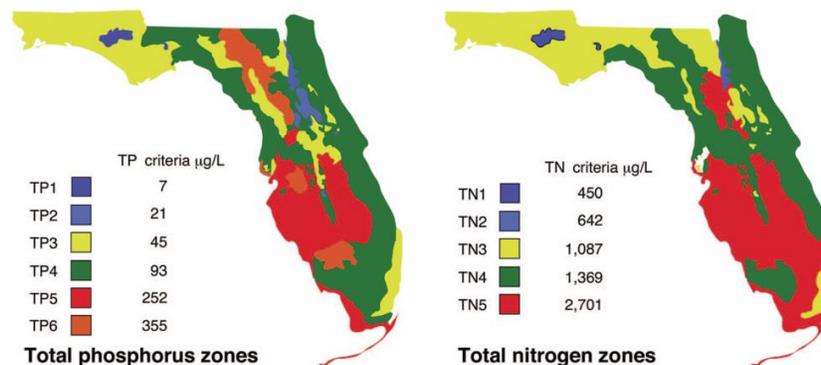


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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 Harveys in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	12 - 12	12 (1)
Total Nitrogen (µg/L)	1060 - 1060	1060 (1)
Chlorophyll- uncorrected (µg/L)	6 - 6	6 (1)
Secchi (ft)	6.5 - 6.5	6.5 (1.0)
Secchi (m)	2.0 - 2.0	2.0 (1.0)
Color (Pt-Co Units)	-	(0)
Specific Conductance (µS/cm@25 C)	-	(0)
Lake Classification		

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

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

County	Collier
Name	Harveys
GNIS Number	
Latitude	26.1079
Longitude	-81.7720
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2020 to 2020
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP5
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	12 (12 to 12)
TN Zone	TN5
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	1060 (1060 to 1060)

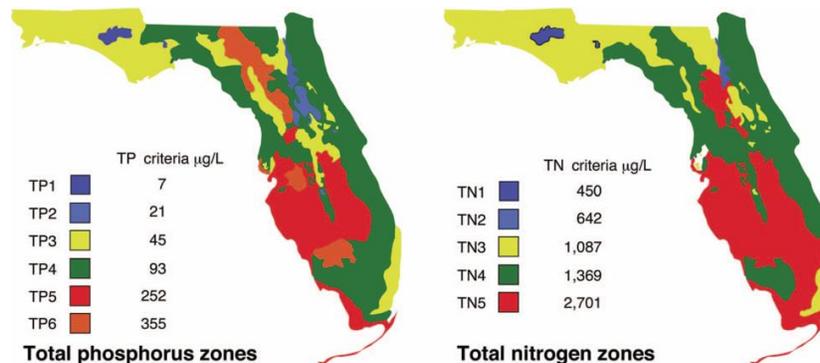


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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 IFAS Collier Pond in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	10 - 10	10 (1)
Total Nitrogen (µg/L)	493 - 493	493 (1)
Chlorophyll- uncorrected (µg/L)	3 - 3	3 (1)
Secchi (ft)	8.5 - 8.5	8.5 (1.0)
Secchi (m)	2.6 - 2.6	2.6 (1.0)
Color (Pt-Co Units)	12 - 12	12 (1)
Specific Conductance (µS/cm@25 C)	233 - 233	233 (1)
Lake Classification	Clear Hardwater	

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

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

County	Collier
Name	IFAS Collier Pond
GNIS Number	
Latitude	26.3054
Longitude	-81.5927
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2020 to 2020
Lake Trophic Status (CHL)	Oligotrophic
TP Zone	TP4
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	10 (10 to 10)
TN Zone	TN4
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	493 (493 to 493)

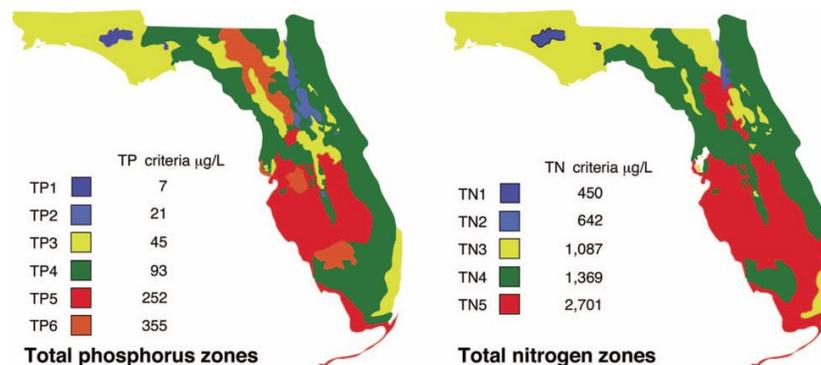


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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 Islandwalk in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	17 - 17	17 (1)
Total Nitrogen (µg/L)	452 - 452	452 (1)
Chlorophyll- uncorrected (µg/L)	3 - 3	3 (1)
Secchi (ft)	7.1 - 7.1	7.1 (1.0)
Secchi (m)	2.2 - 2.2	2.2 (1.0)
Color (Pt-Co Units)	22 - 22	22 (1)
Specific Conductance (µS/cm@25 C)	277 - 277	277 (1)
Lake Classification	Clear Hardwater	

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Trophic state classification using the long-term chlorophyll average.

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

County	Collier
Name	Islandwalk
GNIS Number	
Latitude	26.2556
Longitude	-81.7067
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2020 to 2020
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP4
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	17 (17 to 17)
TN Zone	TN4
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	452 (452 to 452)

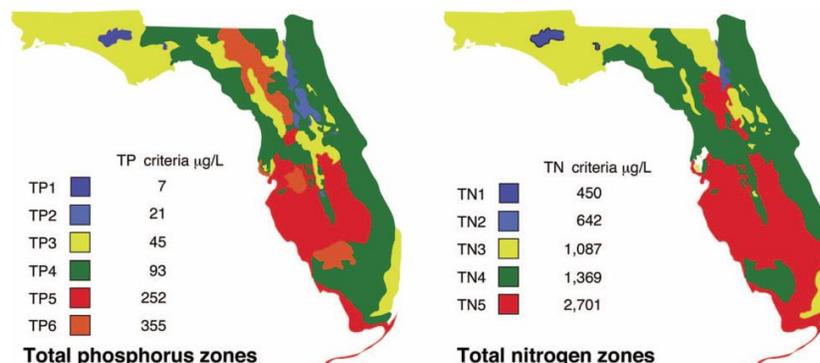


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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 Lantern in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	201 - 201	201 (1)
Total Nitrogen (µg/L)	1774 - 1774	1774 (1)
Chlorophyll- uncorrected (µg/L)	81 - 81	81 (1)
Secchi (ft)	1.9 - 1.9	1.9 (1.0)
Secchi (m)	0.6 - 0.6	0.6 (1.0)
Color (Pt-Co Units)	58 - 58	58 (1)
Specific Conductance (µS/cm@25 C)	6928 - 6928	6928 (1)
Lake Classification	Colored	

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Trophic state classification using the long-term chlorophyll average.

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

County	Collier
Name	Lantern
GNIS Number	
Latitude	26.1186
Longitude	-81.8010
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2016 to 2016
Lake Trophic Status (CHL)	Hypereutrophic
TP Zone	TP5
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	201 (201 to 201)
TN Zone	TN5
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	1774 (1774 to 1774)

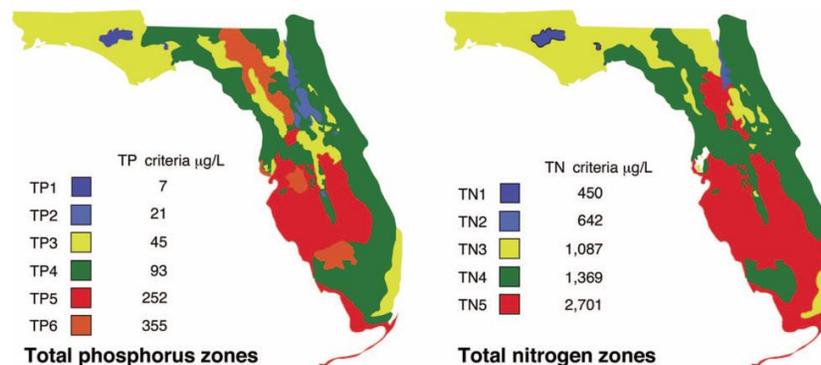


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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 Longshore in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	19 - 31	24 (5)
Total Nitrogen (µg/L)	611 - 778	711 (5)
Chlorophyll- uncorrected (µg/L)	4 - 12	7 (5)
Secchi (ft)	4.8 - 7.8	6.3 (5.0)
Secchi (m)	1.5 - 2.4	1.9 (5.0)
Color (Pt-Co Units)	-	(0)
Specific Conductance (µS/cm@25 C)	-	(0)
Lake Classification		

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

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

County	Collier
Name	Longshore
GNIS Number	
Latitude	26.2660
Longitude	-81.7170
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	1996 to 2000
Lake Trophic Status (CHL)	Eutrophic
TP Zone	TP4
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	24 (19 to 31)
TN Zone	TN4
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	711 (611 to 611)

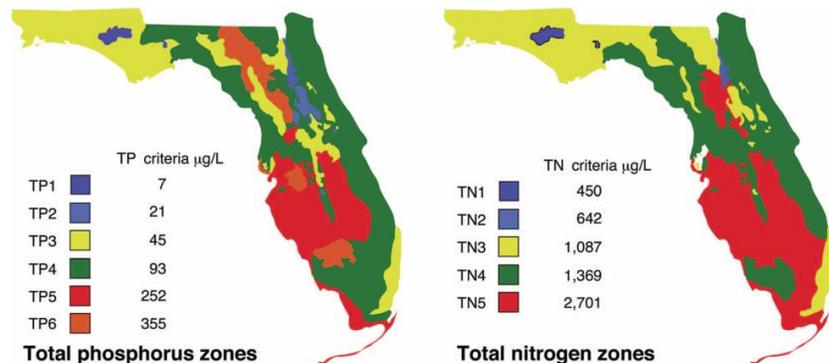


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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”

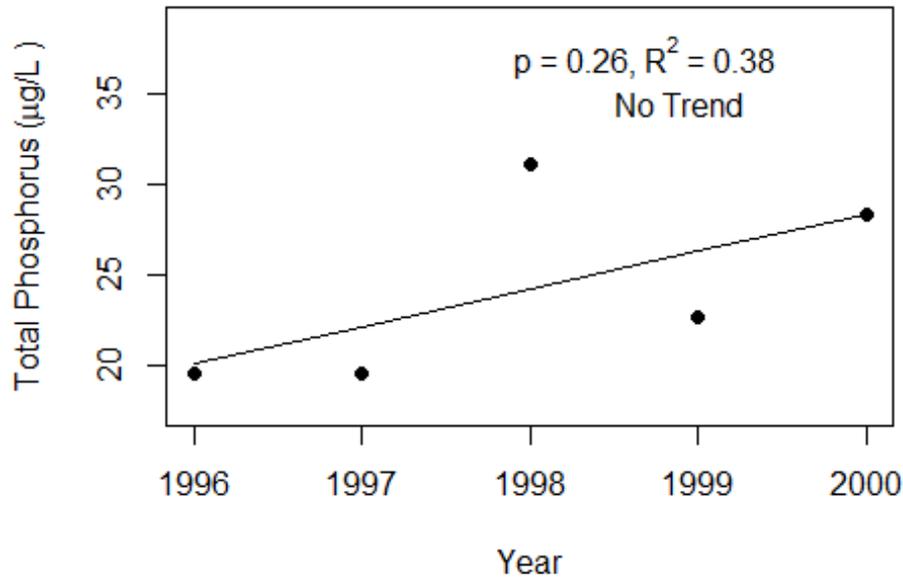
Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a 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.

Longshore (Collier)



Longshore (Collier)

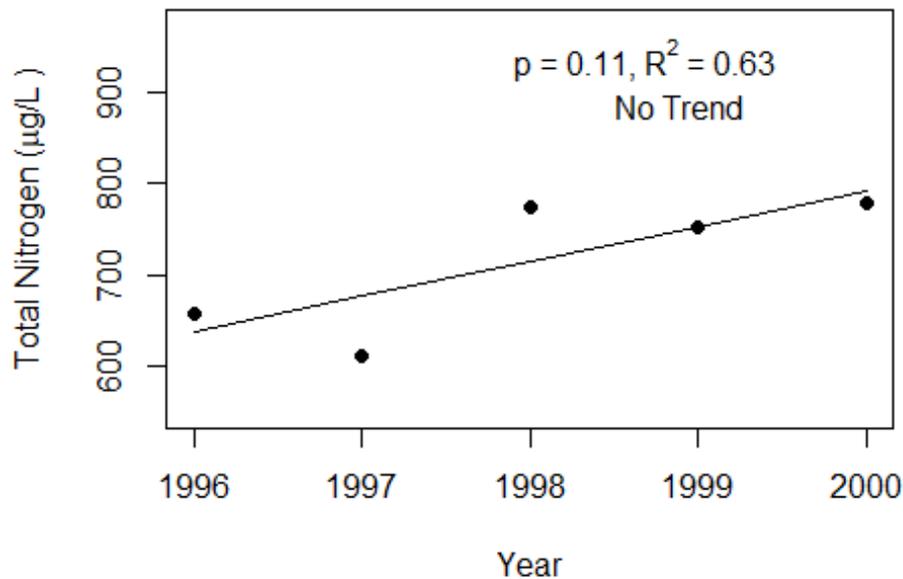
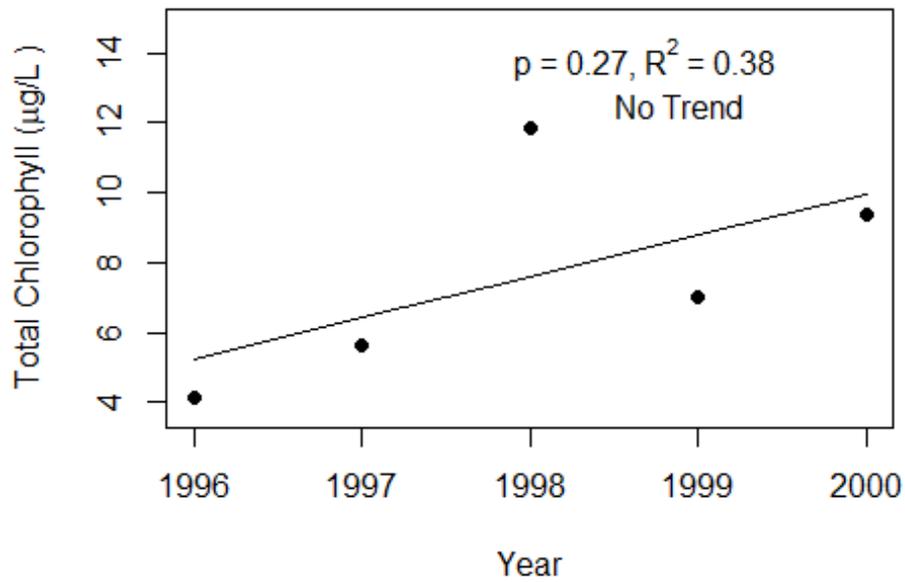
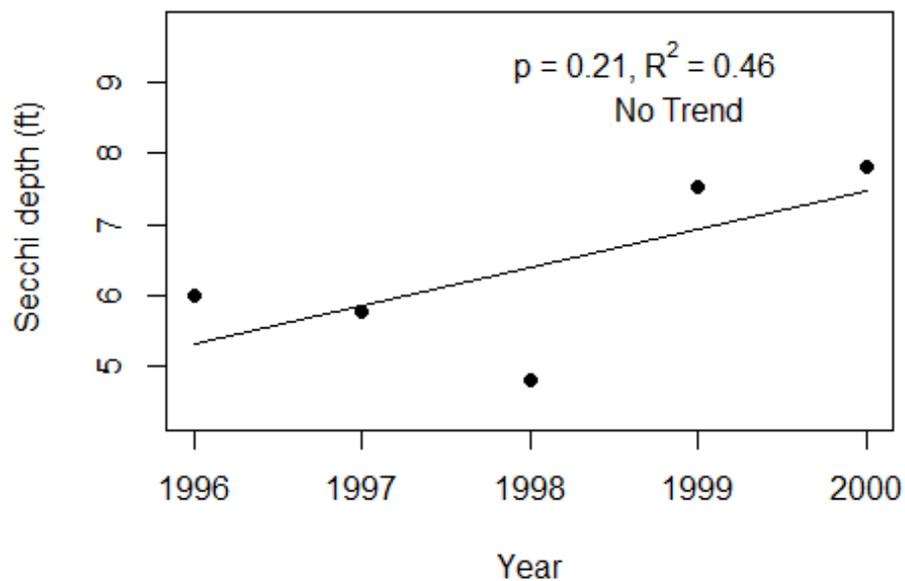


Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relations and the p value indicates if the relation is significant ($p < 0.05$ is significant).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

Longshore (Collier)



Longshore (Collier)



Florida LAKEWATCH Report for PCL-2 in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	13 - 17	15 (2)
Total Nitrogen (µg/L)	474 - 512	493 (2)
Chlorophyll- uncorrected (µg/L)	3 - 3	3 (2)
Secchi (ft)	7.7 - 7.7	7.7 (1.0)
Secchi (m)	2.4 - 2.4	2.4 (1.0)
Color (Pt-Co Units)	11 - 11	11 (1)
Specific Conductance (µS/cm@25 C)	260 - 260	260 (1)
Lake Classification	Clear Hardwater	

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

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

County	Collier
Name	PCL-2
GNIS Number	
Latitude	26.2745
Longitude	-81.7507
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2019 to 2020
Lake Trophic Status (CHL)	Oligotrophic
TP Zone	TP4
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	15 (13 to 17)
TN Zone	TN4
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	493 (474 to 474)

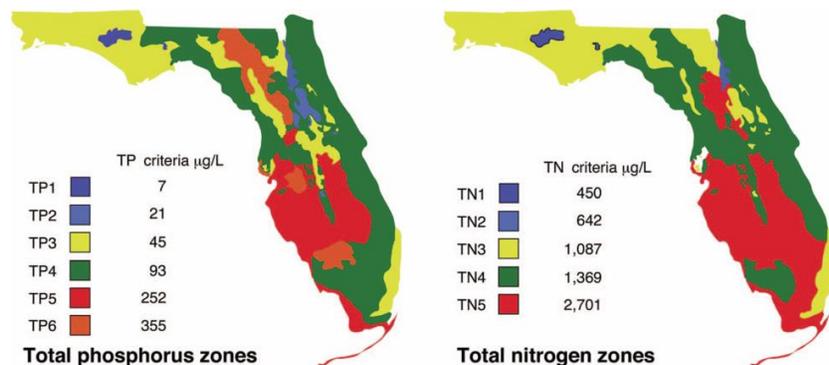


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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 PCL-5 in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	10 - 12	11 (2)
Total Nitrogen (µg/L)	504 - 647	571 (2)
Chlorophyll- uncorrected (µg/L)	3 - 4	4 (2)
Secchi (ft)	7.1 - 8.5	7.7 (2.0)
Secchi (m)	2.2 - 2.6	2.4 (2.0)
Color (Pt-Co Units)	11 - 11	11 (1)
Specific Conductance (µS/cm@25 C)	275 - 275	275 (1)
Lake Classification	Clear Hardwater	

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Trophic state classification using the long-term chlorophyll average.

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

County	Collier
Name	PCL-5
GNIS Number	
Latitude	26.2786
Longitude	-81.7498
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2019 to 2020
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP4
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	11 (10 to 12)
TN Zone	TN4
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	571 (504 to 504)

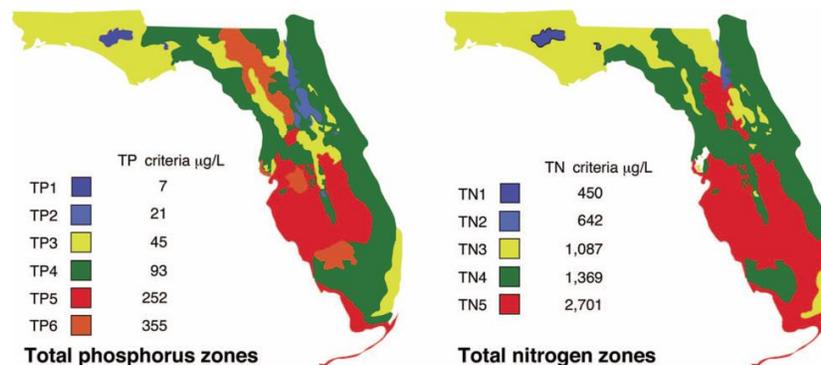


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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 PCL-16 in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	10 - 11	10 (2)
Total Nitrogen (µg/L)	429 - 470	449 (2)
Chlorophyll- uncorrected (µg/L)	2 - 3	2 (2)
Secchi (ft)	9.4 - 10.5	10.0 (2.0)
Secchi (m)	2.9 - 3.2	3.0 (2.0)
Color (Pt-Co Units)	13 - 13	13 (1)
Specific Conductance (µS/cm@25 C)	384 - 384	384 (1)
Lake Classification	Clear Hardwater	

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Trophic state classification using the long-term chlorophyll average.

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

County	Collier
Name	PCL-16
GNIS Number	
Latitude	26.2796
Longitude	-81.7531
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2019 to 2020
Lake Trophic Status (CHL)	Oligotrophic
TP Zone	TP4
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	10 (10 to 11)
TN Zone	TN4
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	449 (429 to 429)

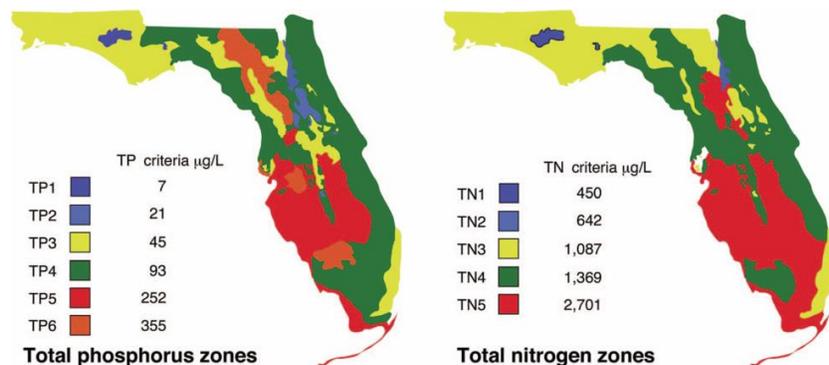


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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 Pelican in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	12 - 18	14 (3)
Total Nitrogen (µg/L)	615 - 792	711 (3)
Chlorophyll- uncorrected (µg/L)	4 - 8	6 (3)
Secchi (ft)	4.2 - 6.4	5.5 (3.0)
Secchi (m)	1.3 - 1.9	1.7 (3.0)
Color (Pt-Co Units)	8 - 13	10 (2)
Specific Conductance (µS/cm@25 C)	4000 - 4554	4554 (2)
Lake Classification	Clear Hardwater	

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

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

County	Collier
Name	Pelican
GNIS Number	
Latitude	26.0340
Longitude	-81.6987
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2015 to 2017
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP4
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	14 (12 to 18)
TN Zone	TN4
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	711 (615 to 615)

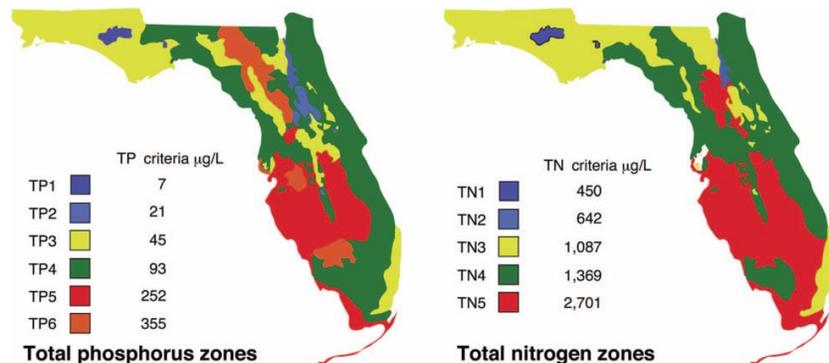


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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 Quarry in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	6 - 14	8 (8)
Total Nitrogen (µg/L)	703 - 814	756 (8)
Chlorophyll- uncorrected (µg/L)	2 - 7	3 (8)
Secchi (ft)	6.3 - 8.8	7.5 (8.0)
Secchi (m)	1.9 - 2.7	2.3 (8.0)
Color (Pt-Co Units)	22 - 64	35 (8)
Specific Conductance (µS/cm@25 C)	250 - 310	310 (8)
Lake Classification	Clear Hardwater	

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

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

County	Collier
Name	Quarry
GNIS Number	
Latitude	26.2870
Longitude	-81.6786
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2013 to 2020
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP4
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	8 (6 to 14)
TN Zone	TN4
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	756 (703 to 703)

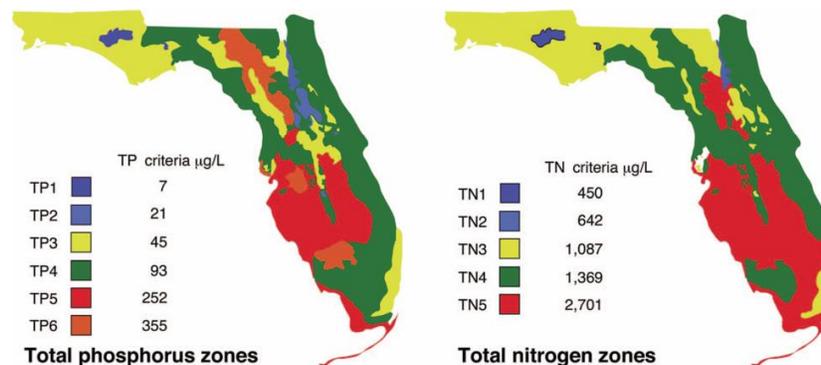


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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”

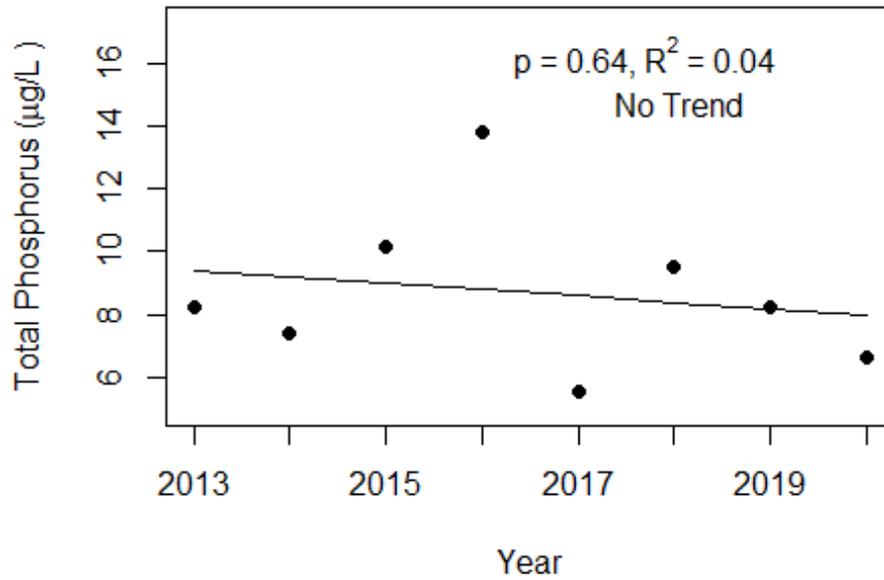
Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a 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.

Quarry (Collier)



Quarry (Collier)

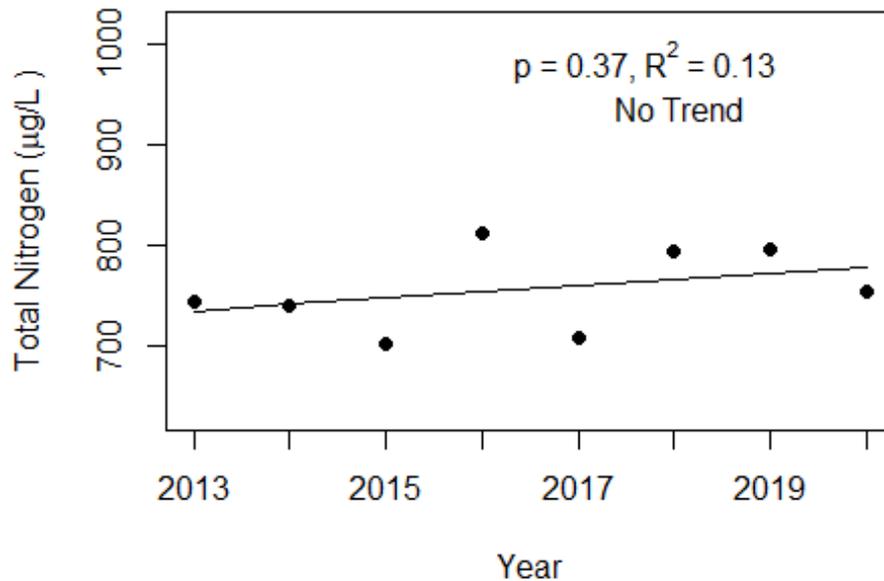
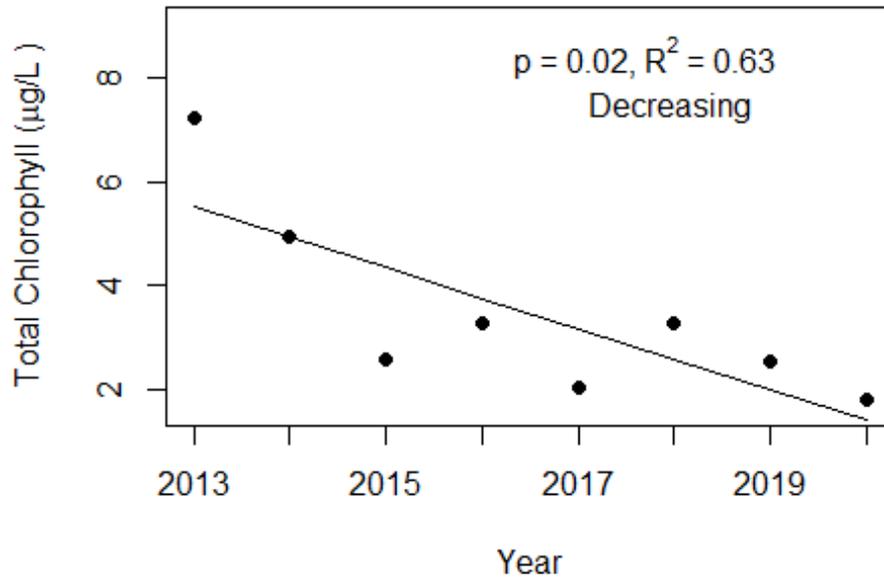
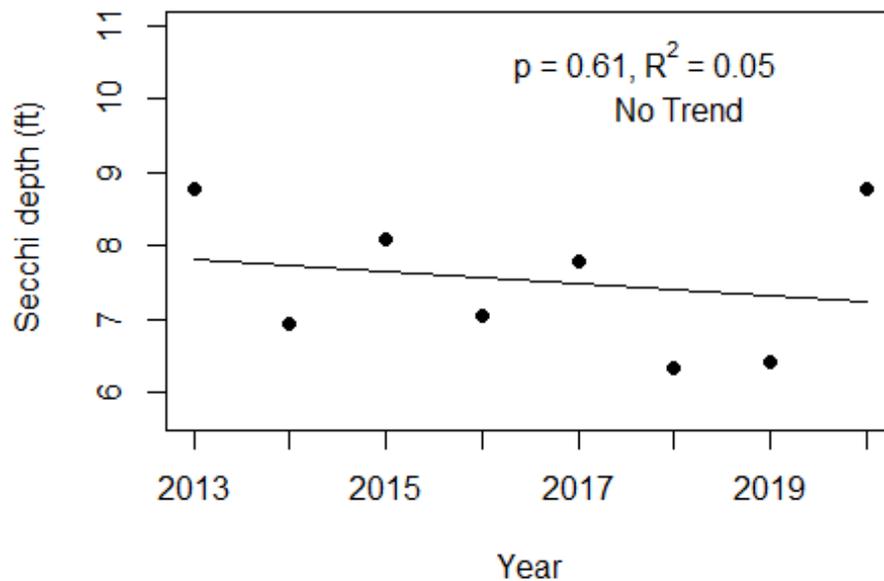


Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relations and the p value indicates if the relation is significant ($p < 0.05$ is significant).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

Quarry (Collier)



Quarry (Collier)



Florida LAKEWATCH Report for SB-61 in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	25 - 26	25 (2)
Total Nitrogen (µg/L)	501 - 505	503 (2)
Chlorophyll- uncorrected (µg/L)	11 - 18	14 (2)
Secchi (ft)	3.5 - 4.0	3.8 (2.0)
Secchi (m)	1.1 - 1.2	1.1 (2.0)
Color (Pt-Co Units)	13 - 15	14 (2)
Specific Conductance (µS/cm@25 C)	106 - 119	119 (2)
Lake Classification	Clear Hardwater	

Base File Data for Lakes: Definitions and Nutrient Zone Maps

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

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

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

County	Collier
Name	SB-61
GNIS Number	
Latitude	26.2411
Longitude	-81.6887
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2019 to 2020
Lake Trophic Status (CHL)	Eutrophic
TP Zone	TP4
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	25 (25 to 26)
TN Zone	TN4
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	503 (501 to 501)

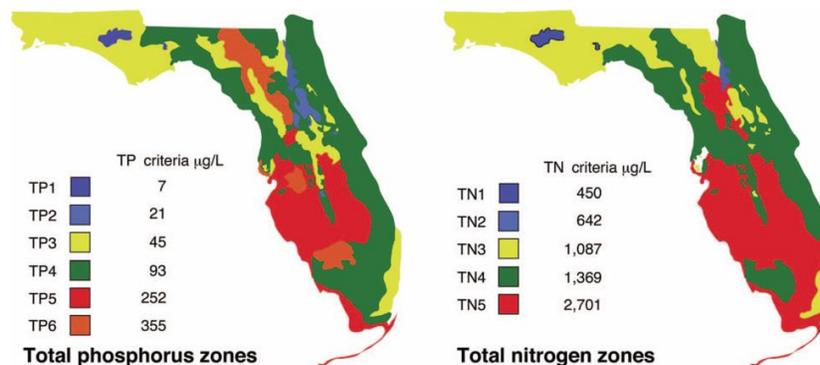


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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 Swan in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	119 - 119	119 (1)
Total Nitrogen (µg/L)	1071 - 1071	1071 (1)
Chlorophyll- uncorrected (µg/L)	26 - 26	26 (1)
Secchi (ft)	2.9 - 2.9	2.9 (1.0)
Secchi (m)	0.9 - 0.9	0.9 (1.0)
Color (Pt-Co Units)	63 - 63	63 (1)
Specific Conductance (µS/cm@25 C)	741 - 741	741 (1)
Lake Classification	Colored	

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Trophic state classification using the long-term chlorophyll average.

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

County	Collier
Name	Swan
GNIS Number	
Latitude	26.1977
Longitude	-81.8063
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2016 to 2016
Lake Trophic Status (CHL)	Eutrophic
TP Zone	TP5
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	119 (119 to 119)
TN Zone	TN5
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	1071 (1071 to 1071)

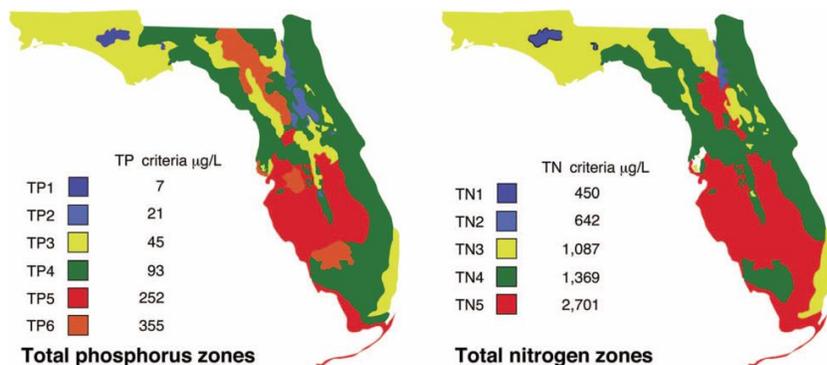


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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 Trafford in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	84 - 295	143 (13)
Total Nitrogen (µg/L)	2097 - 5562	2846 (13)
Chlorophyll- uncorrected (µg/L)	37 - 117	55 (13)
Secchi (ft)	0.8 - 1.6	1.2 (13.0)
Secchi (m)	0.2 - 0.5	0.4 (13.0)
Color (Pt-Co Units)	32 - 75	48 (12)
Specific Conductance (µS/cm@25 C)	239 - 369	369 (12)
Lake Classification	Colored	

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

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

County	Collier
Name	Trafford
GNIS Number	292393
Latitude	26.4297
Longitude	-81.4952
Water Body Type	Lake
Surface Area (ha and acre)	605 ha or 1494 acre
Period of Record (year)	2001 to 2018
Lake Trophic Status (CHL)	Hypereutrophic
TP Zone	TP6
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	143 (84 to 295)
TN Zone	TN5
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	2846 (2097 to 2097)

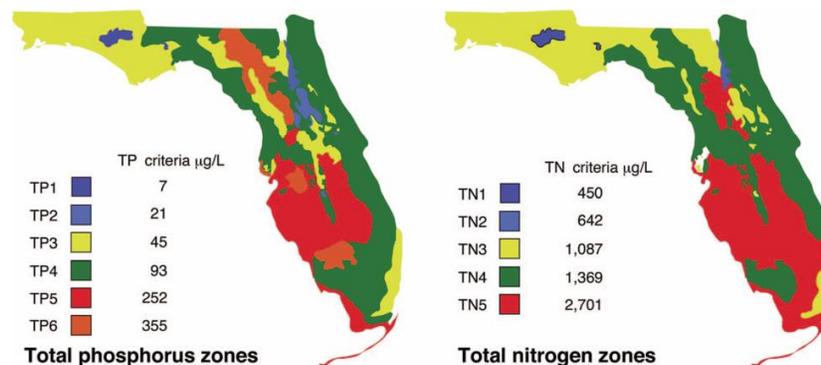


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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”

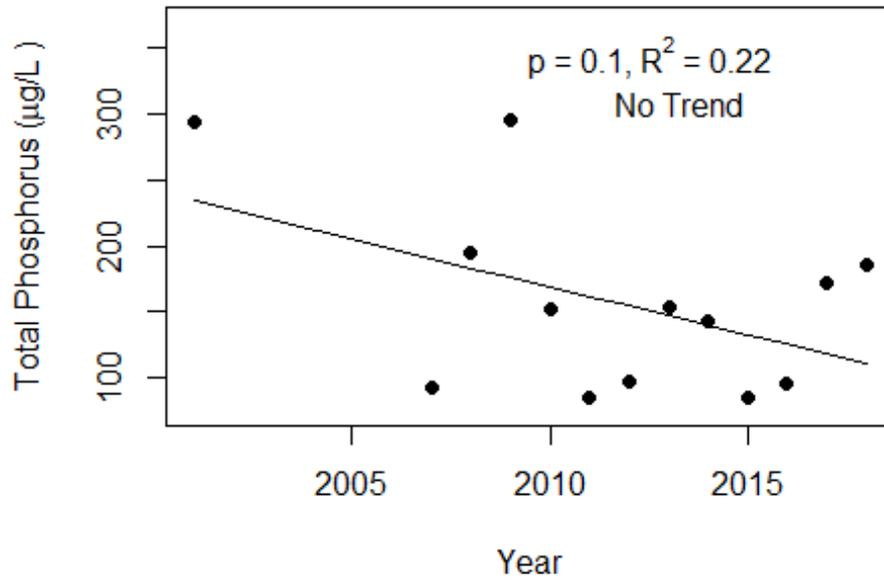
Administrative code definitions 62-302.200 (19): “Natural background” shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department. The establishment of natural background for an altered waterbody may be based upon a 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.

Trafford (Collier)



Trafford (Collier)

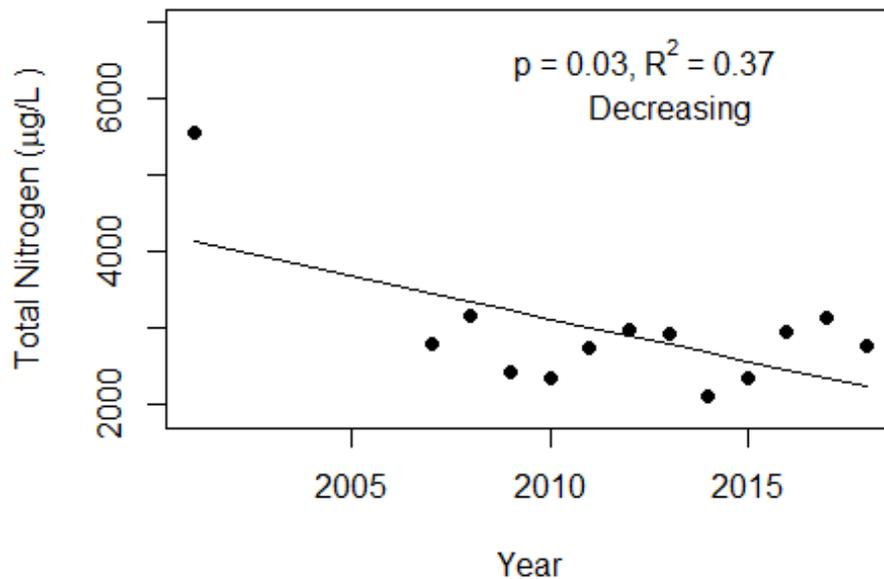
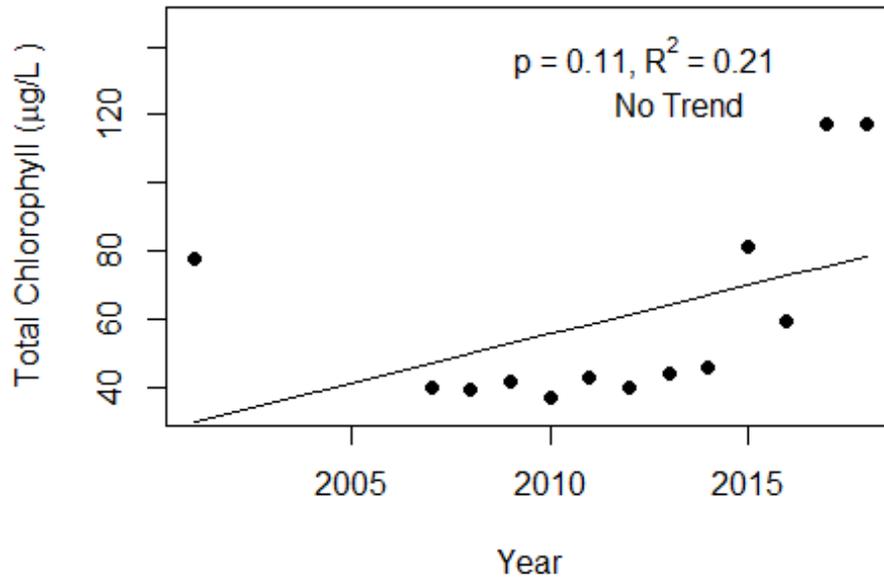
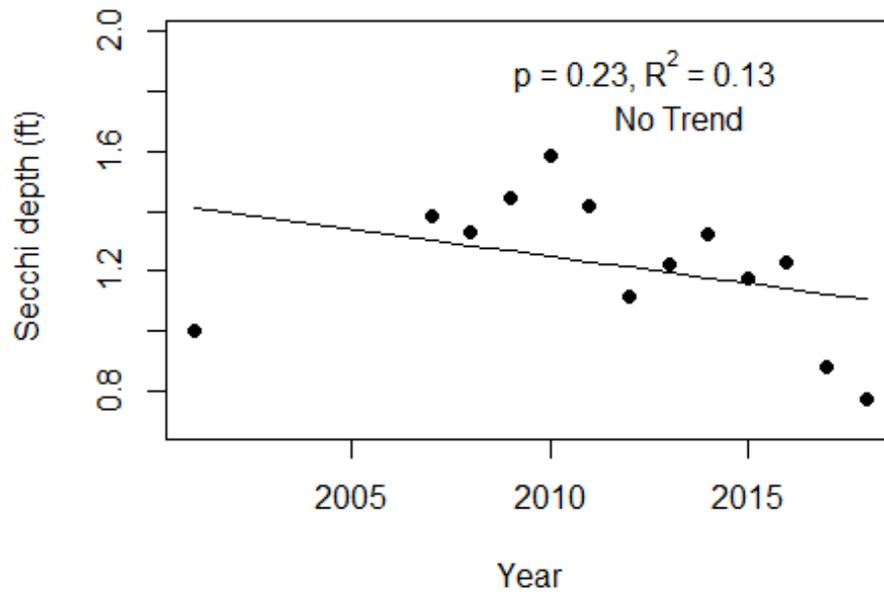


Figure 4 and Figure 5. Trend plots of annual average chlorophyll and annual average Secchi versus year. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relations and the p value indicates if the relation is significant ($p < 0.05$ is significant).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

Trafford (Collier)



Trafford (Collier)



Florida LAKEWATCH Report for Verona Walk in Collier 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 ($\mu\text{g/L}$):** Nutrient most often limiting growth of plant/algae.
- **Total Nitrogen ($\mu\text{g/L}$):** Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$):** 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 $\mu\text{S/cm @ 25 C}$), 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 $\mu\text{S/cm @ 25 C}$).

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

Long Term Geometric Mean Lake Color and Long-Term Geometric Mean Color, Alkalinity and Specific Conductance	Annual Geometric Mean Chlorophyll-corrected	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
> 40 Platinum Cobalt Units Colored Lakes	20 µg/L	50 µg/L	1270 µg/L	160 µg/L ¹	2230 µg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃ or >100 µS/cm@25 C Clear Hard Water Lakes	20 µg/L	30 µg/L	1050 µg/L	90 µg/L	1910 µg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃ or < 100 µS/cm@25 C Clear Soft Water Lakes	6 µg/L	10 µg/L	51 µg/L	30 µg/L	930 µg/L

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

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

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

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	8 - 8	8 (1)
Total Nitrogen (µg/L)	882 - 882	882 (1)
Chlorophyll- uncorrected (µg/L)	3 - 3	3 (1)
Secchi (ft)	8.4 - 8.4	8.4 (1.0)
Secchi (m)	2.6 - 2.6	2.6 (1.0)
Color (Pt-Co Units)	29 - 29	29 (1)
Specific Conductance (µS/cm@25 C)	907 - 907	907 (1)
Lake Classification	Clear Hardwater	

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 ($\mu\text{g/L}$: min and max):** Grand Geometric Means of all annual geometric means ($\mu\text{g/L}$) with minimum and maximum annual geometric means.
- **Lake Trophic Status (CHL):** Tropic state classification using the long-term chlorophyll average.

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

County	Collier
Name	Verona Walk
GNIS Number	
Latitude	26.0872
Longitude	-81.6771
Water Body Type	Lake
Surface Area (ha and acre)	ha or acre
Period of Record (year)	2014 to 2014
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP4
Grand TP Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	8 (8 to 8)
TN Zone	TN4
Grand TN Geometric Mean Concentration ($\mu\text{g/L}$, min. and max.)	882 (882 to 882)

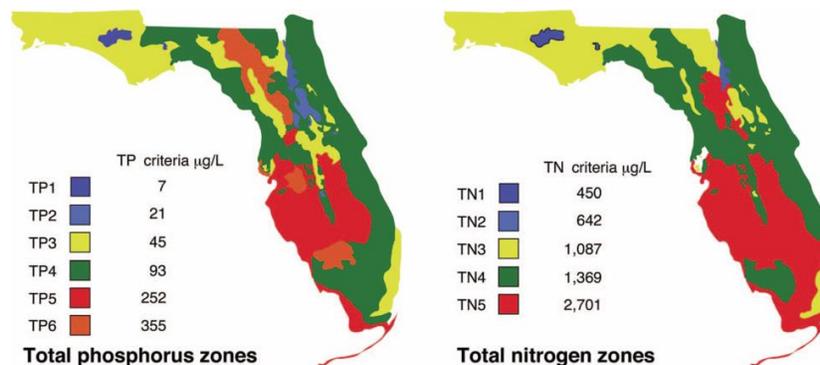


Figure 1. Maps showing Florida phosphorus and nitrogen zones and the nutrient concentrations of the upper 90% of lakes within each zone (Bachmann et al. 2012). Explanation on how to interpret the Nutrient Zones on page 4.

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