Florida LAKEWATCH Report for Allen in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

Long Term Geometric	Annual	Minimum	calculated	Maximum	calculated
Mean Lake Color and Long-	Geometric	numeric interpretation		numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 μg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum	Grand Geometric Mean	
	Annual Geometric Means	(Sampling years)	
Total Phosphorus (µg/L)	9 - 24	14 (20)	
Total Nitrogen (µg/L)	518 - 1351	710 (20)	
Chlorophyll- uncorrected (µg/L)	2 - 12	4 (20)	
Secchi (ft)	1.6 - 2.7	2.3 (20)	
Secchi (m)	0.5 - 0.8	0.7 (20)	
Color (Pt-Co Units)	89 - 290	168 (20)	
Specific Conductance (µS/cm@25 C)	53 - 250	97 (16)	
Lake Classification	Colored		

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	Walton
Name	Allen
GNIS Number	
Latitude	30.3542
Longitude	-86.2534
Water Body Type	Dune Lake
Surface Area (ha and acre)	7.12272 ha or 17.6 acre
Period of Record (year)	2003 to 2022
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (μ g/L, min. and max.)	14 (9 to 24)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	710 (518 to 1351)



- 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.

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

Figure 2. Lake Allen trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, $R^2 = 0.03$, p = 0.49), total nitrogen (TN Decreasing, $R^2 = 0.23$, p = 0.03), chlorophyll (CHL No Trend, $R^2 = 0.05$, p = 0.34) and Secchi depth (Secchi No Trend, $R^2 = 0.14$, p = 0.11).



Florida LAKEWATCH Report for Alligator in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

Long Term Geometric	Annual	Minimum	calculated	Maximum	calculated
Mean Lake Color and Long-	Geometric	numeric interpretation		numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 µg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum	Grand Geometric Mean	
	Annual Geometric Means	(Sampling years)	
Total Phosphorus (µg/L)	9 - 15	12 (23)	
Total Nitrogen (µg/L)	294 - 758	518 (23)	
Chlorophyll- uncorrected (µg/L)	1 - 5	3 (23)	
Secchi (ft)	1.3 - 3.1	2.1 (23)	
Secchi (m)	0.4 - 0.9	0.6 (23)	
Color (Pt-Co Units)	67 - 359	176 (22)	
Specific Conductance (µS/cm@25 C)	558 - 17277	2638 (16)	
Lake Classification	Colored		

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- **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.
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- **Period of Record (year):** Years a lake has been in the LAKEWATCH program.
- **TP Zone and TN Zone:** Nutrient zones defined by Bachmann et al (2012).
- Long-Term TP and TN Geometric Mean Concentration ($\mu g/L$: min and max): Grand Geometric Means of all annual geometric means ($\mu g/L$) 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	Walton
Name	Alligator
GNIS Number	277797
Latitude	30.3330
Longitude	-86.1743
Water Body Type	Dune Lake
Surface Area (ha and acre)	6.43473 ha or 15.9 acre
Period of Record (year)	2000 to 2022
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	12 (9 to 15)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	518 (294 to 758)



- 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.

- 1. Identify your lake's TP Zone in Table 3.
 - a. Locate this TP Zone (left map) and its corresponding nutrient concentration in Figure 1.
- 2. Locate your lake's Long-Term Grand Geometric Mean TP Concentration value in Table 3.
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 - a. If your lake's Long-Term Grand Geometric Mean TP Concentration number is higher than the TP zone nutrient concentration, your lake's nutrient concentration is above "Natural Background".
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- 4. Repeat these same steps with the TN Zone and Long-term Grand Geometric Mean TN Concentration

Figure 2. Lake Alligator trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP Increasing, $R^2 = 0.27$, p = 0.01), total nitrogen (TN Decreasing, $R^2 = 0.20$, p = 0.03), chlorophyll (CHL No Trend, $R^2 = 0.01$, p = 0.73) and Secchi depth (Secchi No Trend, $R^2 = 0.00$, p = 0.80).



Florida LAKEWATCH Report for Big Red Fish in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

Long Term Geometric	Annual	Minimum	calculated	Maximum	calculated
Mean Lake Color and Long-	Geometric	numeric interpretation		numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 μg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum	Grand Geometric Mean	
	Annual Geometric Means	(Sampling years)	
Total Phosphorus (µg/L)	5 - 23	14 (25)	
Total Nitrogen (µg/L)	149 - 657	366 (25)	
Chlorophyll- uncorrected (µg/L)	2 - 10	6 (25)	
Secchi (ft)	2.2 - 5.0	3.3 (25)	
Secchi (m)	0.7 - 1.5	1.0 (25)	
Color (Pt-Co Units)	31 - 188	95 (21)	
Specific Conductance (µS/cm@25 C)	360 - 28723	8412 (16)	
Lake Classification	Colored		

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 ($\mu g/L$: min and max): Grand Geometric Means of all annual geometric means ($\mu g/L$) 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	Walton
Name	Big Red Fish
GNIS Number	278731
Latitude	30.3396
Longitude	-86.1964
Water Body Type	Dune Lake
Surface Area (ha and acre)	9.22716 ha or 22.8 acre
Period of Record (year)	1998 to 2022
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	14 (5 to 23)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	366 (149 to 657)



- 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.

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

Figure 2. Lake Big Red Fish trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP Increasing, $R^2 = 0.45$, p = 0.00), total nitrogen (TN No Trend, $R^2 = 0.13$, p = 0.08), chlorophyll (CHL No Trend, $R^2 = 0.12$, p = 0.09) and Secchi depth (Secchi No Trend, $R^2 = 0.06$, p = 0.22).



Florida LAKEWATCH Report for Camp Creek in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

Long Term Geometric	Annual	Minimum calculated		Maximum calculated	
Mean Lake Color and Long-	Geometric	numeric int	erpretation	numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 μg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum	Grand Geometric Mean
	Annual Geometric Means	(Sampling years)
Total Phosphorus (µg/L)	4 - 12	8 (31)
Total Nitrogen (µg/L)	214 - 487	381 (31)
Chlorophyll- uncorrected (µg/L)	1 - 5	3 (31)
Secchi (ft)	2.2 - 4.8	3.5 (29)
Secchi (m)	0.7 - 1.5	1.1 (29)
Color (Pt-Co Units)	27 - 164	72 (22)
Specific Conductance (µS/cm@25 C)	677 - 11981	2470 (16)
Lake Classification	Colored	

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 ($\mu g/L$: min and max): Grand Geometric Means of all annual geometric means ($\mu g/L$) 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	Walton
Name	Camp Creek
GNIS Number	279893
Latitude	30.2956
Longitude	-86.0625
Water Body Type	Dune Lake
Surface Area (ha and acre)	23.35119 ha or 57.7 acre
Period of Record (year)	1992 to 2022
Lake Trophic Status (CHL)	Oligotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	8 (4 to 12)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	381 (214 to 487)



- 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.

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

Figure 2. Lake Camp Creek trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP Increasing, $R^2 = 0.41$, p = 0.00), total nitrogen (TN No Trend, $R^2 = 0.01$, p = 0.57), chlorophyll (CHL Decreasing, $R^2 = 0.14$, p = 0.04) and Secchi depth (Secchi No Trend, $R^2 = 0.13$, p = 0.05).



Florida LAKEWATCH Report for Campbell in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

Table 1.	Florida	Department of	of Environmen	tal Protection	ı's Numeric	Nutrient	Criteria	for lakes.
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Long Term Geometric	Annual	Minimum calculated		Maximum calculated	
Mean Lake Color and Long-	Geometric	numeric int	erpretation	numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 μg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	3 - 11	7 (24)
Total Nitrogen (µg/L)	154 - 578	343 (24)
Chlorophyll- uncorrected (µg/L)	1 - 4	2 (24)
Secchi (ft)	2.7 - 11.7	6.5 (23)
Secchi (m)	0.8 - 3.6	2.0 (23)
Color (Pt-Co Units)	2 - 67	17 (20)
Specific Conductance (µS/cm@25 C)	50 - 336	99 (16)
Lake Classification	Clear Softwater	

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 ($\mu g/L$: min and max): Grand Geometric Means of all annual geometric means ($\mu g/L$) 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	Walton
Name	Campbell
GNIS Number	279948
Latitude	30.3672
Longitude	-86.2927
Water Body Type	Dune Lake
Surface Area (ha and acre)	44.47653 ha or 109.9 acre
Period of Record (year)	1995 to 2022
Lake Trophic Status (CHL)	Oligotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	7 (3 to 11)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	343 (154 to 578)



- 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.

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

Figure 2. Lake Campbell trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP Increasing, $R^2 = 0.63$, p = 0.00), total nitrogen (TN No Trend, $R^2 = 0.03$, p = 0.44), chlorophyll (CHL No Trend, $R^2 = 0.09$, p = 0.15) and Secchi depth (Secchi No Trend, $R^2 = 0.15$, p = 0.06).



Florida LAKEWATCH Report for Deer in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

Table 1.	Florida	Department of	of Environmen	tal Protection	ı's Numeric	Nutrient	Criteria	for lakes.
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Long Term Geometric	Annual	Minimum calculated		Maximum	calculated
Mean Lake Color and Long-	Geometric	numeric int	erpretation	numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 μg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum	Grand Geometric Mean
	Annual Geometric Means	(Sampling years)
Total Phosphorus (µg/L)	8 - 14	11 (25)
Total Nitrogen (µg/L)	221 - 802	441 (25)
Chlorophyll- uncorrected (µg/L)	2 - 8	4 (25)
Secchi (ft)	1.8 - 4.8	3.0 (25)
Secchi (m)	0.5 - 1.5	0.9 (25)
Color (Pt-Co Units)	46 - 201	99 (22)
Specific Conductance (µS/cm@25 C)	396 - 26551	5492 (16)
Lake Classification	Colored	

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 ($\mu g/L$: min and max): Grand Geometric Means of all annual geometric means ($\mu g/L$) 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	Walton
Name	Deer
GNIS Number	281450
Latitude	30.3074
Longitude	-86.0793
Water Body Type	Dune Lake
Surface Area (ha and acre)	16.91646 ha or 41.8 acre
Period of Record (year)	1998 to 2022
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	11 (8 to 14)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	441 (221 to 802)



- 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.

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

Figure 2. Lake Deer trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, $R^2 = 0.10$, p = 0.13), total nitrogen (TN No Trend, $R^2 = 0.11$, p = 0.10), chlorophyll (CHL Decreasing, $R^2 = 0.32$, p = 0.00) and Secchi depth (Secchi No Trend, $R^2 = 0.00$, p = 0.79).



Florida LAKEWATCH Report for Draper in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

Table 1.	Florida	Department of	of Environmen	tal Protection	n's Numeric	Nutrient	Criteria	for lakes.
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Long Term Geometric	Annual	Minimum calculated		Maximum calculated		
Mean Lake Color and Long-	Geometric	numeric interpretation		numeric interpretation		
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual	
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric	
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total	
		Phosphorus	Nitrogen	Phosphorus	Nitrogen	
> 40 Platinum Cobalt Units	20 µg/L	50 μg/L	1270 μg/L	160 μg/L ¹	2230 µg/L	
Colored Lakes						
\leq 40 Platinum Cobalt Units						
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L	
or						
>100 µS/cm@25 C						
Clear Hard Water Lakes						
\leq 40 Platinum Cobalt Units						
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L	
or			μg/L			
< 100 µS/cm@25 C						
Clear Soft Water Lakes						

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum	Grand Geometric Mean
	Annual Geometric Means	(Sampling years)
Total Phosphorus (µg/L)	7 - 22	12 (22)
Total Nitrogen (µg/L)	222 - 527	316 (22)
Chlorophyll- uncorrected (µg/L)	1 - 10	3 (22)
Secchi (ft)	1.9 - 5.5	3.8 (22)
Secchi (m)	0.6 - 1.7	1.2 (22)
Color (Pt-Co Units)	23 - 191	53 (20)
Specific Conductance (µS/cm@25 C)	1724 - 23875	7998 (16)
Lake Classification	Colored	

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	Walton
Name	Draper
GNIS Number	281750
Latitude	30.3444
Longitude	-86.2156
Water Body Type	Dune Lake
Surface Area (ha and acre)	11.45301 ha or 28.3 acre
Period of Record (year)	1996 to 2022
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	12 (7 to 22)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	316 (222 to 527)



- 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.

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

Figure 2. Lake Draper trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP Decreasing, $R^2 = 0.36$, p = 0.00), total nitrogen (TN Decreasing, $R^2 = 0.33$, p = 0.01), chlorophyll (CHL Decreasing, $R^2 = 0.33$, p = 0.01) and Secchi depth (Secchi No Trend, $R^2 = 0.09$, p = 0.19).



Florida LAKEWATCH Report for Eastern in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

- Total Phosphorus (µg/L): Nutrient most often limiting growth of plant/algae.
- Total Nitrogen (µg/L): Nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10 (by mass).
- Chlorophyll-uncorrected (µg/L): Chlorophyll concentrations are used to measure relative abundances of open water algae.
- Secchi (ft), Secchi (m): Secchi measurements are estimates of water clarity.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filtered out.
- Specific Conductance (µS/cm@25°C): Measurement of the ability of water to conduct electricity and can be used to estimate the amount of dissolved materials in water.
- Lake Classification: Numeric nutrient criteria for Florida require that lakes must first be classified into one of three group based on color and alkalinity or specific conductance; colored lakes (color greater than 40 Pt-Co units), clear soft water lakes (color less than or equal to 40 Pt-Co units and alkalinity less than or equal to 20 mg/L as CaCO₃ or specific conductance less than or equal to 100 µs/cm @25 C), and clear hard water lakes (color less than 40 Pt-Co units and alkalinity greater than 20 mg/L as CaCO₃ or specific conductance greater 100 µS/cm @ 25 C).
| Table 1. | Florida | Department of | of Environmen | tal Protection | ı's Numeric | Nutrient | Criteria | for lakes. |
|-----------|-----------|---------------|---------------|----------------|-----------------|---------------|-----------|------------|
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Long Term Geometric	Annual	Minimum calculated		Maximum calculated	
Mean Lake Color and Long-	Geometric	numeric int	erpretation	numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 μg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	9 - 19	13 (26)
Total Nitrogen (µg/L)	203 - 422	288 (26)
Chlorophyll- uncorrected (µg/L)	2 - 7	4 (26)
Secchi (ft)	3.0 - 6.5	4.7 (26)
Secchi (m)	0.9 - 2.0	1.4 (26)
Color (Pt-Co Units)	14 - 134	46 (23)
Specific Conductance (µS/cm@25 C)	2799 - 23717	10704 (15)
Lake Classification	Colored	

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 ($\mu g/L$: min and max): Grand Geometric Means of all annual geometric means ($\mu g/L$) 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	Walton
Name	Eastern
GNIS Number	282040
Latitude	30.3122
Longitude	-86.0931
Water Body Type	Dune Lake
Surface Area (ha and acre)	25.41516 ha or 62.8 acre
Period of Record (year)	1997 to 2022
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	13 (9 to 19)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	288 (203 to 422)



- 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.

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

Figure 2. Lake Eastern trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP Increasing, $R^2 = 0.41$, p = 0.00), total nitrogen (TN Increasing, $R^2 = 0.15$, p = 0.05), chlorophyll (CHL No Trend, $R^2 = 0.05$, p = 0.27) and Secchi depth (Secchi Decreasing, $R^2 = 0.27$, p = 0.01).



Florida LAKEWATCH Report for Eastern North in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

Table 1.	Florida	Department of	of Environmen	tal Protection	ı's Numeric	Nutrient	Criteria	for lakes.
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Long Term Geometric	Annual	Minimum calculated		Maximum calculated	
Mean Lake Color and Long-	Geometric	numeric int	erpretation	numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 μg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum	Grand Geometric Mean
	Annual Geometric Means	(Sampling years)
Total Phosphorus (µg/L)	8 - 19	14 (20)
Total Nitrogen (µg/L)	241 - 505	334 (20)
Chlorophyll- uncorrected (µg/L)	2 - 8	4 (20)
Secchi (ft)	2.7 - 6.0	3.7 (20)
Secchi (m)	0.8 - 1.8	1.1 (20)
Color (Pt-Co Units)	25 - 132	60 (20)
Specific Conductance (µS/cm@25 C)	1865 - 22644	9788 (15)
Lake Classification	Colored	

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 ($\mu g/L$: min and max): Grand Geometric Means of all annual geometric means ($\mu g/L$) 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	Walton
Name	Eastern North
GNIS Number	282040
Latitude	30.3136
Longitude	-86.0928
Water Body Type	Dune Lake
Surface Area (ha and acre)	. ha or . acre
Period of Record (year)	2003 to 2022
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	14 (8 to 19)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	334 (241 to 505)



- 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.

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

Figure 2. Lake Eastern North trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, $R^2 = 0.10$, p = 0.17), total nitrogen (TN No Trend, $R^2 = 0.00$, p = 0.80), chlorophyll (CHL No Trend, $R^2 = 0.03$, p = 0.46) and Secchi depth (Secchi No Trend, $R^2 = 0.17$, p = 0.07).



Florida LAKEWATCH Report for Fuller in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

Table 1.	Florida	Department of	of Environmen	tal Protection	ı's Numeric	Nutrient	Criteria	for lakes.
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Long Term Geometric	Annual	Minimum calculated		Maximum calculated	
Mean Lake Color and Long-	Geometric	numeric int	erpretation	numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 μg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	10 - 15	13 (21)
Total Nitrogen (µg/L)	550 - 1164	778 (21)
Chlorophyll- uncorrected (μ g/L)	1 - 6	3 (20)
Secchi (ft)	1.0 - 4.3	2.0 (21)
Secchi (m)	0.3 - 1.3	0.6 (21)
Color (Pt-Co Units)	22 - 352	170 (20)
Specific Conductance (µS/cm@25 C)	66 - 726	153 (16)
Lake Classification	Colored	

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	Walton
Name	Fuller
GNIS Number	282853
Latitude	30.3753
Longitude	-86.3170
Water Body Type	Dune Lake
Surface Area (ha and acre)	20.03265 ha or 49.5 acre
Period of Record (year)	2002 to 2022
Lake Trophic Status (CHL)	Oligotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	13 (10 to 15)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	778 (550 to 1164)



- 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.

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

Figure 2. Lake Fuller trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, $R^2 = 0.04$, p = 0.38), total nitrogen (TN Decreasing, $R^2 = 0.25$, p = 0.02), chlorophyll (CHL No Trend, $R^2 = 0.03$, p = 0.44) and Secchi depth (Secchi No Trend, $R^2 = 0.10$, p = 0.17).



Florida LAKEWATCH Report for Grayton in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

Long Term Geometric	Annual	Minimum calculated		Maximum calculated	
Mean Lake Color and Long-	Geometric	numeric interpretation		numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 µg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum	Grand Geometric Mean
	Annual Geometric Means	(Sampling years)
Total Phosphorus (µg/L)	11 - 20	14 (24)
Total Nitrogen (µg/L)	239 - 450	354 (24)
Chlorophyll- uncorrected (µg/L)	2 - 6	3 (24)
Secchi (ft)	2.7 - 5.1	4.1 (24)
Secchi (m)	0.8 - 1.6	1.3 (24)
Color (Pt-Co Units)	24 - 136	65 (22)
Specific Conductance (µS/cm@25 C)	4305 - 22583	13215 (16)
Lake Classification	Colored	

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 ($\mu g/L$: min and max): Grand Geometric Means of all annual geometric means ($\mu g/L$) 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	Walton
Name	Grayton
GNIS Number	293134
Latitude	30.3328
Longitude	-86.1628
Water Body Type	Dune Lake
Surface Area (ha and acre)	. ha or . acre
Period of Record (year)	1999 to 2022
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	14 (11 to 20)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	354 (239 to 450)



- 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.

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

Figure 2. Lake Grayton trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, $R^2 = 0.09$, p = 0.15), total nitrogen (TN No Trend, $R^2 = 0.05$, p = 0.28), chlorophyll (CHL No Trend, $R^2 = 0.00$, p = 0.85) and Secchi depth (Secchi Decreasing, $R^2 = 0.20$, p = 0.03).



Florida LAKEWATCH Report for Little Red Fish in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

Table 1.	Florida	Department of	of Environmen	tal Protection	ı's Numeric	Nutrient	Criteria	for lakes.
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Long Term Geometric	Annual	Minimum calculated		Maximum calculated	
Mean Lake Color and Long-	Geometric	numeric interpretation		numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 μg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum	Grand Geometric Mean	
	Annual Geometric Means	(Sampling years)	
Total Phosphorus (µg/L)	12 - 26	17 (21)	
Total Nitrogen (µg/L)	328 - 666	530 (21)	
Chlorophyll- uncorrected (µg/L)	2 - 16	6 (21)	
Secchi (ft)	1.1 - 3.5	2.2 (21)	
Secchi (m)	0.3 - 1.1	0.7 (21)	
Color (Pt-Co Units)	50 - 421	130 (21)	
Specific Conductance (µS/cm@25 C)	4121 - 30000	11594 (16)	
Lake Classification	Colored		

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	Walton
Name	Little Red Fish
GNIS Number	285774
Latitude	30.3367
Longitude	-86.1831
Water Body Type	Dune Lake
Surface Area (ha and acre)	5.01828 ha or 12.4 acre
Period of Record (year)	2002 to 2022
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	17 (12 to 26)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	530 (328 to 666)



- 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.

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

Figure 2. Lake Little Red Fish trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, $R^2 = 0.02$, p = 0.53), total nitrogen (TN Decreasing, $R^2 = 0.47$, p = 0.00), chlorophyll (CHL No Trend, $R^2 = 0.01$, p = 0.65) and Secchi depth (Secchi Increasing, $R^2 = 0.29$, p = 0.01).



Florida LAKEWATCH Report for Morris in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

Long Term Geometric	Annual	Minimum calculated		Maximum calculated	
Mean Lake Color and Long-	Geometric	numeric interpretation		numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 µg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum Annual Geometric Means	Grand Geometric Mean (Sampling years)
Total Phosphorus (µg/L)	5 - 13	9 (21)
Total Nitrogen (µg/L)	324 - 696	516 (21)
Chlorophyll- uncorrected (μ g/L)	1 - 5	2 (21)
Secchi (ft)	1.8 - 7.9	3.4 (21)
Secchi (m)	0.6 - 2.4	1.0 (21)
Color (Pt-Co Units)	4 - 188	77 (21)
Specific Conductance (µS/cm@25 C)	69 - 3529	238 (16)
Lake Classification	Colored	

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 ($\mu g/L$: min and max): Grand Geometric Means of all annual geometric means ($\mu g/L$) 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	Walton
Name	Morris
GNIS Number	287148
Latitude	30.3694
Longitude	-86.3033
Water Body Type	Dune Lake
Surface Area (ha and acre)	31.68801 ha or 78.3 acre
Period of Record (year)	2002 to 2022
Lake Trophic Status (CHL)	Oligotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	9 (5 to 13)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	516 (324 to 696)



- 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.

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

Figure 2. Lake Morris trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP Increasing, $R^2 = 0.47$, p = 0.00), total nitrogen (TN Decreasing, $R^2 = 0.40$, p = 0.00), chlorophyll (CHL Increasing, $R^2 = 0.20$, p = 0.04) and Secchi depth (Secchi No Trend, $R^2 = 0.00$, p = 0.84).



Florida LAKEWATCH Report for Oyster in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

Table 1.	Florida	Department of	of Environmen	tal Protection	n's Numeric	Nutrient	Criteria	for lakes.
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Long Term Geometric	Annual	Minimum calculated		Maximum calculated	
Mean Lake Color and Long-	Geometric	numeric interpretation		numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 μg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum	Grand Geometric Mean
	Annual Geometric Means	(Sampling years)
Total Phosphorus (µg/L)	31 - 158	68 (22)
Total Nitrogen (µg/L)	465 - 1043	727 (22)
Chlorophyll- uncorrected (µg/L)	2 - 32	6 (22)
Secchi (ft)	1.3 - 3.7	2.4 (22)
Secchi (m)	0.4 - 1.1	0.7 (22)
Color (Pt-Co Units)	53 - 293	132 (22)
Specific Conductance (µS/cm@25 C)	270 - 20850	3610 (16)
Lake Classification	Colored	

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 ($\mu g/L$: min and max): Grand Geometric Means of all annual geometric means ($\mu g/L$) 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	Walton
Name	Oyster
GNIS Number	288345
Latitude	30.3535
Longitude	-86.2445
Water Body Type	Dune Lake
Surface Area (ha and acre)	8.9034 ha or 22 acre
Period of Record (year)	2001 to 2022
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	68 (31 to 158)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	727 (465 to 1043)



- 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.

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

Figure 2. Lake Oyster trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, $R^2 = 0.02$, p = 0.48), total nitrogen (TN No Trend, $R^2 = 0.05$, p = 0.31), chlorophyll (CHL Increasing, $R^2 = 0.43$, p = 0.00) and Secchi depth (Secchi No Trend, $R^2 = 0.08$, p = 0.22).



Florida LAKEWATCH Report for Powell in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

Table 1.	Florida	Department of	of Environmen	tal Protection	n's Numeric	Nutrient	Criteria	for lakes.
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Long Term Geometric	Annual	Minimum calculated		Maximum calculated	
Mean Lake Color and Long-	Geometric	numeric interpretation		numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 µg/L	1270 μg/L	160 µg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

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 μ S/cm@25 C used to estimate the mg/L CaCO₃ alkalinity concentration until such time that alkalinity data are available.

Parameter	Minimum and Maximum	Grand Geometric Mean
	Annual Geometric Means	(Sampling years)
Total Phosphorus (µg/L)	11 - 20	14 (20)
Total Nitrogen (µg/L)	237 - 462	379 (20)
Chlorophyll- uncorrected (µg/L)	2 - 6	4 (20)
Secchi (ft)	3.1 - 6.0	4.4 (20)
Secchi (m)	1.0 - 1.8	1.3 (20)
Color (Pt-Co Units)	19 - 96	45 (20)
Specific Conductance (µS/cm@25 C)	10152 - 28000	16050 (16)
Lake Classification	Colored	
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 ($\mu g/L$: min and max): Grand Geometric Means of all annual geometric means ($\mu g/L$) 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	Walton
Name	Powell
GNIS Number	289278
Latitude	30.2815
Longitude	-85.9958
Water Body Type	Dune Lake
Surface Area (ha and acre)	6.43473 ha or 15.9 acre
Period of Record (year)	2003 to 2022
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	14 (11 to 20)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	379 (237 to 462)



- 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.

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

Figure 2. Lake Powell trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, $R^2 = 0.04$, p = 0.38), total nitrogen (TN No Trend, $R^2 = 0.09$, p = 0.19), chlorophyll (CHL No Trend, $R^2 = 0.02$, p = 0.57) and Secchi depth (Secchi No Trend, $R^2 = 0.06$, p = 0.31).



Florida LAKEWATCH Report for Stallworth in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

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

Table 1.	Florida	Department of	of Environmen	tal Protection	ı's Numeric	Nutrient	Criteria	for lakes.
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Long Term Geometric	Annual	Minimum	calculated	Maximum calculated	
Mean Lake Color and Long-	Geometric	numeric int	erpretation	numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 μg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 μ g/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 μ S/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	Grand Geometric Mean
	Annual Geometric Means	(Sampling years)
Total Phosphorus (µg/L)	7 - 26	12 (22)
Total Nitrogen (µg/L)	252 - 849	371 (22)
Chlorophyll- uncorrected (µg/L)	1 - 18	4 (22)
Secchi (ft)	2.6 - 7.5	4.2 (22)
Secchi (m)	0.8 - 2.3	1.3 (22)
Color (Pt-Co Units)	22 - 105	51 (21)
Specific Conductance (µS/cm@25 C)	111 - 10000	1300 (16)
Lake Classification	Colored	

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 ($\mu g/L$: min and max): Grand Geometric Means of all annual geometric means ($\mu g/L$) 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	Walton
Name	Stallworth
GNIS Number	291611
Latitude	30.3565
Longitude	-86.2619
Water Body Type	Dune Lake
Surface Area (ha and acre)	69.2037 ha or 171 acre
Period of Record (year)	2001 to 2022
Lake Trophic Status (CHL)	Mesotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (μ g/L, min. and max.)	12 (7 to 26)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	371 (252 to 849)



- 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.

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

Figure 2. Lake Stallworth trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, $R^2 = 0.00$, p = 0.97), total nitrogen (TN No Trend, $R^2 = 0.06$, p = 0.27), chlorophyll (CHL No Trend, $R^2 = 0.02$, p = 0.51) and Secchi depth (Secchi No Trend, $R^2 = 0.13$, p = 0.09).



Florida LAKEWATCH Report for Western in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

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

Table 1.	Florida	Department of	of Environmen	tal Protection	ı's Numeric	Nutrient	Criteria	for lakes.
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Long Term Geometric	Annual	Minimum	calculated	Maximum calculated	
Mean Lake Color and Long-	Geometric	numeric int	erpretation	numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 µg/L	1270 μg/L	160 µg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 μ g/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 μ S/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	Grand Geometric Mean
	Annual Geometric Means	(Sampling years)
Total Phosphorus (µg/L)	5 - 17	8 (26)
Total Nitrogen (µg/L)	169 - 414	292 (26)
Chlorophyll- uncorrected (µg/L)	1 - 4	2 (24)
Secchi (ft)	2.4 - 7.3	4.2 (26)
Secchi (m)	0.7 - 2.2	1.3 (26)
Color (Pt-Co Units)	25 - 171	68 (22)
Specific Conductance (µS/cm@25 C)	2303 - 16000	6139 (16)
Lake Classification	Colored	

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	Walton
Name	Western
GNIS Number	293134
Latitude	30.3268
Longitude	-86.1535
Water Body Type	Dune Lake
Surface Area (ha and acre)	69.2037 ha or 171 acre
Period of Record (year)	1996 to 2022
Lake Trophic Status (CHL)	Oligotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	8 (5 to 17)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	292 (169 to 414)



- 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.

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

Figure 2. Lake Western trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP No Trend, $R^2 = 0.12$, p = 0.09), total nitrogen (TN No Trend, $R^2 = 0.13$, p = 0.07), chlorophyll (CHL Increasing, $R^2 = 0.17$, p = 0.05) and Secchi depth (Secchi No Trend, $R^2 = 0.11$, p = 0.11).



Florida LAKEWATCH Report for Western Northeast in Walton County Using Data Downloaded 12/9/2022

Introduction for Lakes

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

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

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

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

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

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

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

Table 1.	Florida	Department of	of Environmen	tal Protection	ı's Numeric	Nutrient	Criteria	for lakes.
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Long Term Geometric	Annual	Minimum	calculated	Maximum calculated	
Mean Lake Color and Long-	Geometric	numeric int	erpretation	numeric interpretation	
Term Geometric Mean	Mean	Annual	Annual	Annual	Annual
Color, Alkalinity and	Chlorophyll-	Geometric	Geometric	Geometric	Geometric
Specific Conductance	corrected	Mean Total	Mean Total	Mean Total	Mean Total
		Phosphorus	Nitrogen	Phosphorus	Nitrogen
> 40 Platinum Cobalt Units	20 µg/L	50 μg/L	1270 μg/L	160 μg/L ¹	2230 µg/L
Colored Lakes					
\leq 40 Platinum Cobalt Units					
and $> 20 \text{ mg/L CaCO}_3$	20 µg/L	30 µg/L	1050 μg/L	90 μg/L	1910 µg/L
or					
>100 µS/cm@25 C					
Clear Hard Water Lakes					
\leq 40 Platinum Cobalt Units					
and $\leq 20 \text{ mg/L CaCO}_3$	6 µg/L	10 µg/L	510	30 µg/L	930 μg/L
or			μg/L		
< 100 µS/cm@25 C					
Clear Soft Water Lakes					

¹ For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit shall be the 490 μ g/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 μ S/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	Grand Geometric Mean
	Annual Geometric Means	(Sampling years)
Total Phosphorus (µg/L)	5 - 14	8 (24)
Total Nitrogen (µg/L)	174 - 536	343 (24)
Chlorophyll- uncorrected (µg/L)	1 - 3	2 (23)
Secchi (ft)	1.7 - 8.0	3.6 (24)
Secchi (m)	0.5 - 2.4	1.1 (24)
Color (Pt-Co Units)	33 - 204	86 (21)
Specific Conductance (µS/cm@25 C)	881 - 26967	5349 (16)
Lake Classification	Colored	

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 ($\mu g/L$: min and max): Grand Geometric Means of all annual geometric means ($\mu g/L$) 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	Walton
Name	Western Northeast
GNIS Number	293134
Latitude	30.3282
Longitude	-86.1465
Water Body Type	Dune Lake
Surface Area (ha and acre)	. ha or . acre
Period of Record (year)	1999 to 2022
Lake Trophic Status (CHL)	Oligotrophic
TP Zone	TP3
Grand TP Geometric Mean Concentration (µg/L, min. and max.)	8 (5 to 14)
TN Zone	TN3
Grand TN Geometric Mean Concentration (µg/L, min. and max.)	343 (174 to 536)



- 1. Identify your lake's *Lake Classification* in Table 2 (Colored, Clear Hard Water, or Clear Soft Water) (if no classification is listed then there is not enough data available to classify your lake).
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- 2. Identify your waterbody's Grand Geometric Mean Chlorophyll-uncorrected in Table 2.
 - a. Compare this number to the Annual Geometric Mean Chlorophyll-corrected (2nd column) in Table 1.
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- 3. Identify your lake's Total Phosphorus and Total Nitrogen *Grand Geometric Mean* concentration in Table 2 and compare them to the appropriate *Annual Geometric Mean Total Phosphorus* and *Annual Geometric Mean Total Nitrogen* values in Table 1.
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Nutrient Zones and "Natural Background"

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

Figure 2. Lake Western Northeast trend plots of year by average. The R^2 value indicates the strength of the relations (ranges from 0.0 to 1.0; higher the R^2 the stronger the relation) and the p value indicates if the relation is significant (p < 0.05 is significant). Total phosphorus (TP Increasing, $R^2 = 0.64$, p = 0.00), total nitrogen (TN Increasing, $R^2 = 0.56$, p = 0.00), chlorophyll (CHL Increasing, $R^2 = 0.27$, p = 0.01) and Secchi depth (Secchi Decreasing, $R^2 = 0.56$, p = 0.00).

