

LAKEWATCH Report for Gemini Springs in Volusia County Using Data Downloaded 10/17/2016

Introduction Streams

For many decades Florida has had a narrative nutrient water quality criterion in place to protect Florida’s waters against nutrient over-enrichment. In 2009, the Florida Department of Environmental Protection (FDEP) initiated rulemaking and, by 2011, adopted what would be the first set of statewide numeric nutrient standards for Florida’s waters. By 2015, almost all of the remaining waters in Florida have numeric nutrient standards (see for Florida Department of Environmental Regulation Nutrient Criteria’s for: Streams, spring vents: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

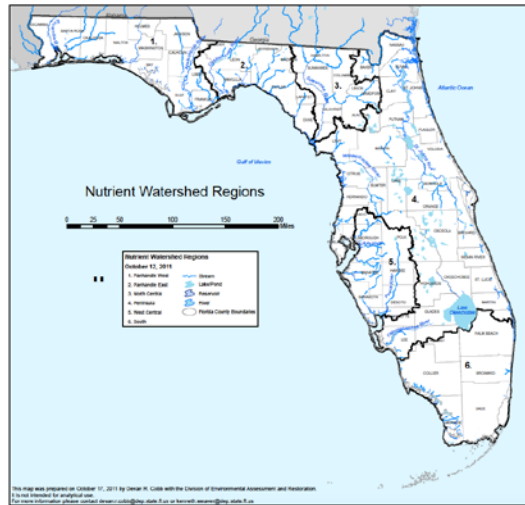


Figure 1. Map showing nutrient thresholds areas for streams set forth by FDEP.

Base File Data: Definitions

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

- **County:** Name of county in which the stream resides.
- **Name:** Stream name that LAKEWATCH uses for the 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, streams and springs.
- **Period of Record (year):** Years a stream has been in the LAKEWATCH program.

County	Volusia
Name	Gemini Springs
Latitude	28.8631
Longitude	-81.3116
Water Body Type	Spring
Period of Record (year)	1992 to 2016
Nutrient Watershed Region	Peninsula

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The nutrient thresholds for streams set forth by FDEP are listed in table below along with the map showing zones.

Nutrient Watershed Region	Total Phosphorus Nutrient Threshold ¹	Total Nitrogen Nutrient Threshold ¹
Panhandle West	60 µg/L	670 µg/L
Panhandle East	180 µg/L	1030 µg/L
North Central	300 µ/L	1870 µg/L
Peninsular	120 µg/L	1540 µg/L
West Central	490 µg/L	1650 µg/L
South Florida	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.

¹These values are annual geometric mean concentrations not to be exceeded more than once in any three calendar year periods.

Long-Term Data Summary Streams: Definitions

The following long-term data are the primary trophic state parameters collected by LAKEWATCH volunteers and classification variables color and specific conductance (LAKEWATCH recently began analyzing samples quarterly for color and specific conductance):

- **Total Phosphorus (µg/L):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
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- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algal population.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity (how far one can see into the water) and are listed with English and metric units.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filter 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 dissolve materials in water.

Long-Term Data Summary Streams: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus (µg/L)	48 - 68	57 (15)
Total Nitrogen (µg/L)	737 - 1247	1047 (15)
Chlorophyll- uncorrected (µg/L)	0.5 - 5.3	1.1 (15)
Secchi (ft)	-	()
Secchi (m)	-	()
Color (Pt-Co Units)	2 - 9	4 (13)
Specific Conductance (µS/cm@25 C)	1721 - 2200	1998 (8)

LAKEWATCH Report for Gemini Springs in Volusia County Using Data Downloaded 10/17/2016

Trend Analyses Streams

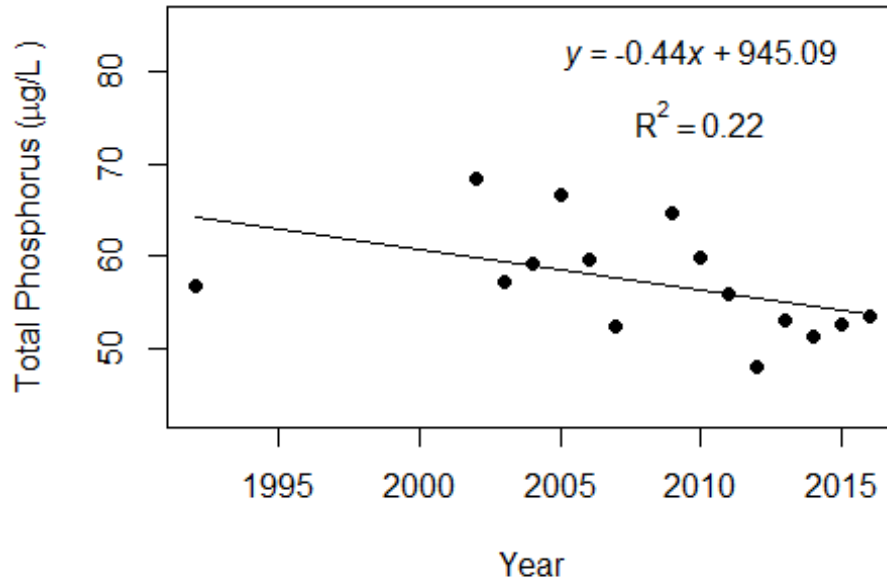
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over time. These analyses define statistics based on the best fit line drawn through the data after plotting them with year on the horizontal line (x-axis) and the data value on the vertical line (y-axis). Figure 2 shows example plots with linear regression statistic of lakes that show significant total phosphorus increases, decreases and no change over time. The statistics that are listed include the following:

- **Number of years (n):** This is simply the number of years of data that were used to calculate annual means.
- **Intercept (a):** This is the value on the y-axis that the fitted line would have cross if the x-axis where zero.
- **Slope (b):** This is the rate at which the fitted line increases (positive number) or decreases (negative number).
- **Coefficient of determination (R²):** This value is an indication of how much variance above and below the fitted line there is in the data. This value ranges from 0 to 1. A high value means a tight fit and a low value means a loose fit.
- **Probability of Significance (p):** For most statistical analyses a p-value of less than 0.05 means the statistic is significant and analyses with p-values greater than 0.05 are not significant.

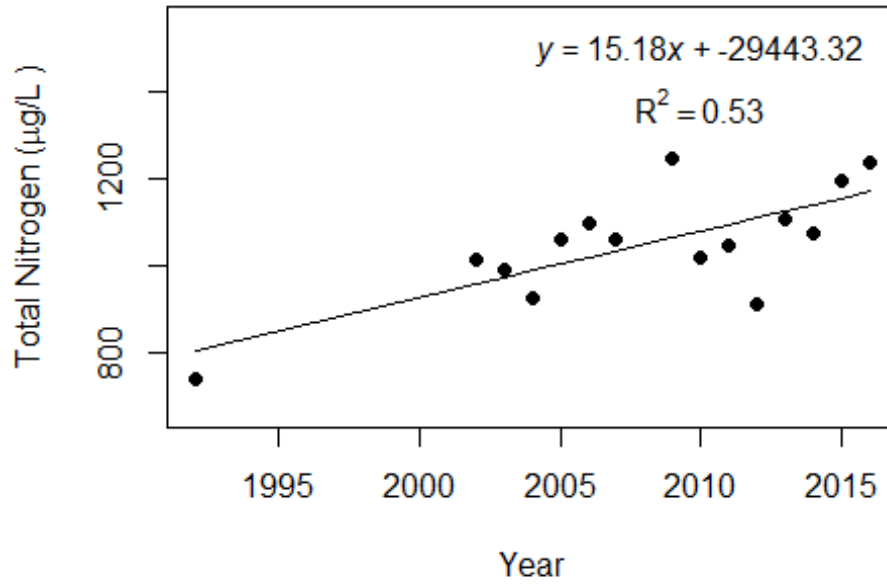
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	15	15	15	
Intercept (a)	945	-29443	136	
Slope (b)	-0.44	15.18	-0.07	
Coefficient of Determination (R ²)	0.22	0.53	0.12	
Probability of Significance (p)	0.08	0.00	0.21	
Potential Trend	No Trend	Increasing	No Trend	

The following graphs on the next two pages are trend analyses examining regression between year and annual means of total phosphorus, total nitrogen, chlorophyll, and Secchi depth for Gemini Springs in Volusia County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

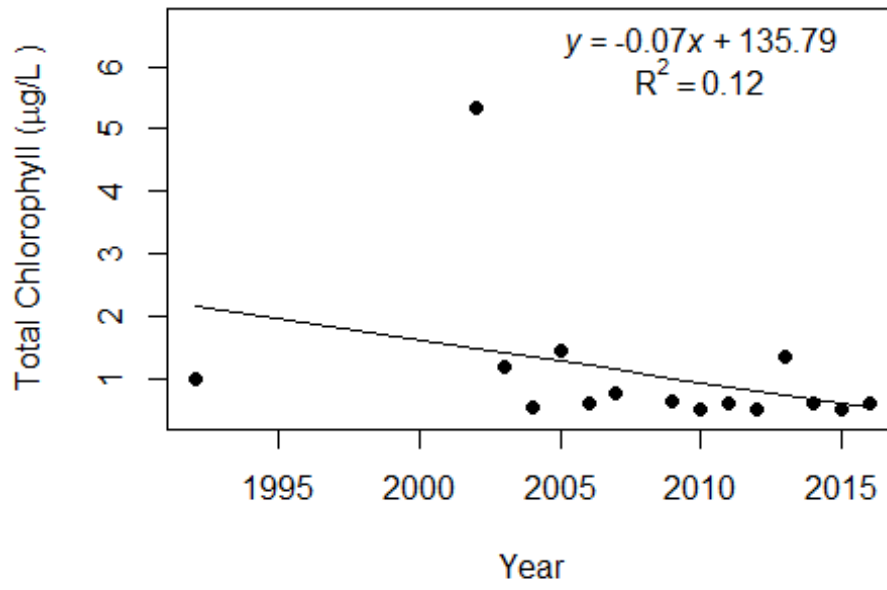
Gemini Springs (Volusia)



Gemini Springs (Volusia)



Gemini Springs (Volusia)



LAKEWATCH Report for Green Springs in Volusia County Using Data Downloaded 10/17/2016

Introduction Streams

For many decades Florida has had a narrative nutrient water quality criterion in place to protect Florida's waters against nutrient over-enrichment. In 2009, the Florida Department of Environmental Protection (FDEP) initiated rulemaking and, by 2011, adopted what would be the first set of statewide numeric nutrient standards for Florida's waters. By 2015, almost all of the remaining waters in Florida have numeric nutrient standards (see for Florida Department of Environmental Regulation Nutrient Criteria's for: Streams, spring vents: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

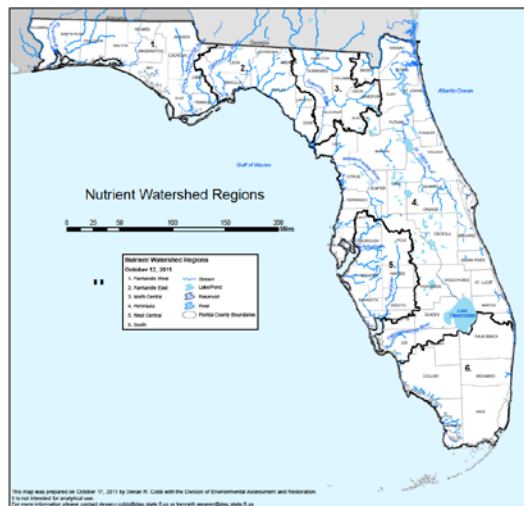


Figure 1. Map showing nutrient thresholds areas for streams set forth by FDEP.

Base File Data: Definitions

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

- **County:** Name of county in which the stream resides.
- **Name:** Stream name that LAKEWATCH uses for the 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, streams and springs.
- **Period of Record (year):** Years a stream has been in the LAKEWATCH program.

County	Volusia
Name	Green Springs
Latitude	28.8627
Longitude	-81.2477
Water Body Type	Spring
Period of Record (year)	2002 to 2016
Nutrient Watershed Region	Peninsula

LAKEWATCH Report for Green Springs in Volusia County Using Data Downloaded 10/17/2016

The nutrient thresholds for streams set forth by FDEP are listed in table below along with the map showing zones.

Nutrient Watershed Region	Total Phosphorus Nutrient Threshold ¹	Total Nitrogen Nutrient Threshold ¹
Panhandle West	60 µg/L	670 µg/L
Panhandle East	180 µg/L	1030 µg/L
North Central	300 µ/L	1870 µg/L
Peninsular	120 µg/L	1540 µg/L
West Central	490 µg/L	1650 µg/L
South Florida	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.

¹These values are annual geometric mean concentrations not to be exceeded more than once in any three calendar year periods.

Long-Term Data Summary Streams: Definitions

The following long-term data are the primary trophic state parameters collected by LAKEWATCH volunteers and classification variables color and specific conductance (LAKEWATCH recently began analyzing samples quarterly for color and specific conductance):

- **Total Phosphorus (µg/L):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen (µg/L):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algal population.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity (how far one can see into the water) and are listed with English and metric units.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filter 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 dissolve materials in water.

Long-Term Data Summary Streams: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus (µg/L)	51 - 71	61 (15)
Total Nitrogen (µg/L)	360 - 710	565 (15)
Chlorophyll- uncorrected (µg/L)	0.0 - 20.9	2.9 (15)
Secchi (ft)	-	()
Secchi (m)	-	()
Color (Pt-Co Units)	4 - 23	11 (13)
Specific Conductance (µS/cm@25 C)	1416 - 2234	1766 (8)

LAKEWATCH Report for Green Springs in Volusia County Using Data Downloaded 10/17/2016

Trend Analyses Streams

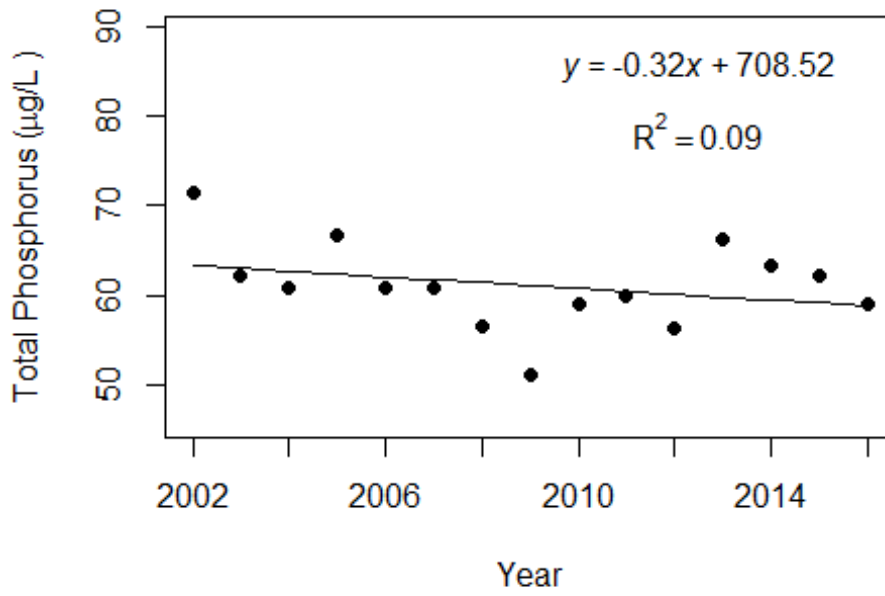
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over time. These analyses define statistics based on the best fit line drawn through the data after plotting them with year on the horizontal line (x-axis) and the data value on the vertical line (y-axis). Figure 2 shows example plots with linear regression statistic of lakes that show significant total phosphorus increases, decreases and no change over time. The statistics that are listed include the following:

- **Number of years (n):** This is simply the number of years of data that were used to calculate annual means.
- **Intercept (a):** This is the value on the y-axis that the fitted line would have cross if the x-axis where zero.
- **Slope (b):** This is the rate at which the fitted line increases (positive number) or decreases (negative number).
- **Coefficient of determination (R²):** This value is an indication of how much variance above and below the fitted line there is in the data. This value ranges from 0 to 1. A high value means a tight fit and a low value means a loose fit.
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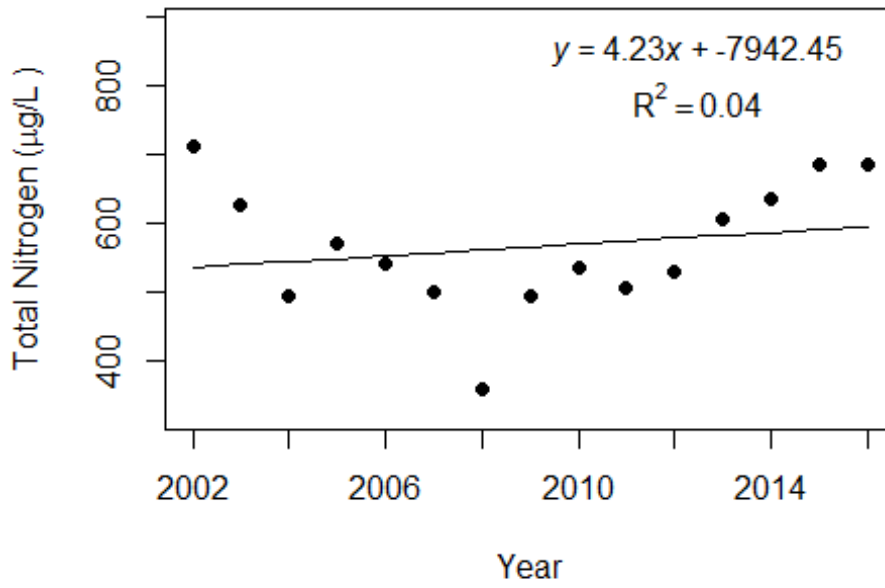
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	15	15	15	
Intercept (a)	709	-7942	125	
Slope (b)	-0.32	4.23	-0.06	
Coefficient of Determination (R ²)	0.09	0.04	0.00	
Probability of Significance (p)	0.28	0.47	0.85	
Potential Trend	No Trend	No Trend	No Trend	

The following graphs on the next two pages are trend analyses examining regression between year and annual means of total phosphorus, total nitrogen, chlorophyll, and Secchi depth for Green Springs in Volusia County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

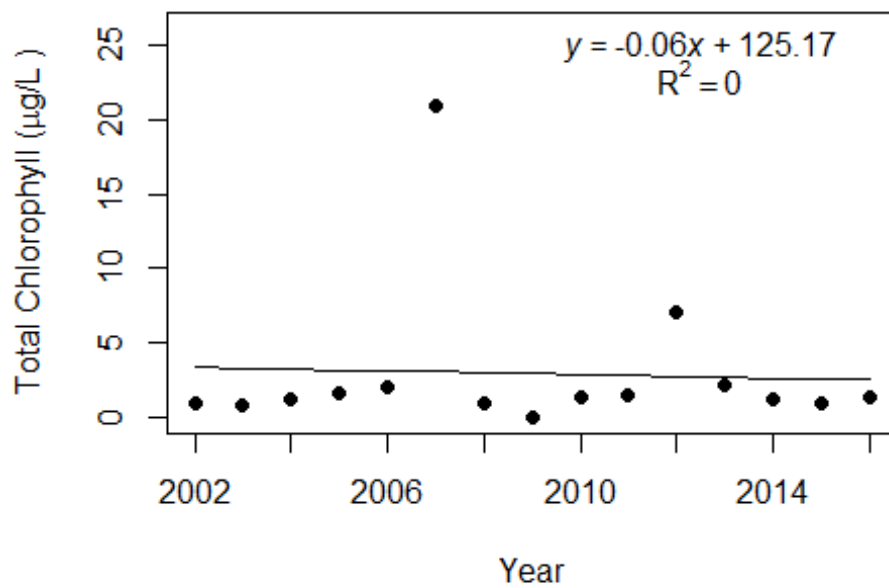
Green Springs (Volusia)



Green Springs (Volusia)



Green Springs (Volusia)



LAKEWATCH Report for Halifax River-1 in Volusia County Using Data Downloaded 10/17/2016

Introduction Streams

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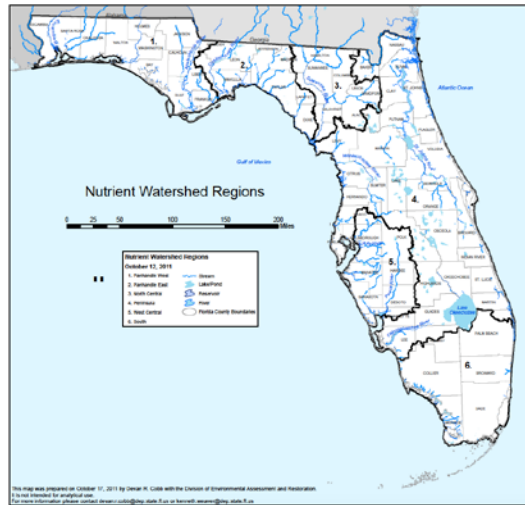


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- **Period of Record (year):** Years a stream has been in the LAKEWATCH program.

County	Volusia
Name	Halifax River-1
Latitude	29.1604
Longitude	-80.9885
Water Body Type	Stream
Period of Record (year)	2001 to 2016
Nutrient Watershed Region	Peninsular

LAKEWATCH Report for Halifax River-1 in Volusia County Using Data Downloaded 10/17/2016

The nutrient thresholds for streams set forth by FDEP are listed in table below along with the map showing zones.

Nutrient Watershed Region	Total Phosphorus Nutrient Threshold ¹	Total Nitrogen Nutrient Threshold ¹
Panhandle West	60 µg/L	670 µg/L
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Long-Term Data Summary Streams: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus (µg/L)	72 - 111	88 (16)
Total Nitrogen (µg/L)	383 - 718	567 (16)
Chlorophyll- uncorrected (µg/L)	6.1 - 16.5	10.8 (16)
Secchi (ft)	2.4 - 4.4	3.2 (16)
Secchi (m)	0.7 - 1.3	1.0 (16)
Color (Pt-Co Units)	13 - 71	28 (16)
Specific Conductance (µS/cm@25 C)	25412 - 45000	37011 (16)

LAKEWATCH Report for Halifax River-1 in Volusia County Using Data Downloaded 10/17/2016

Trend Analyses Streams

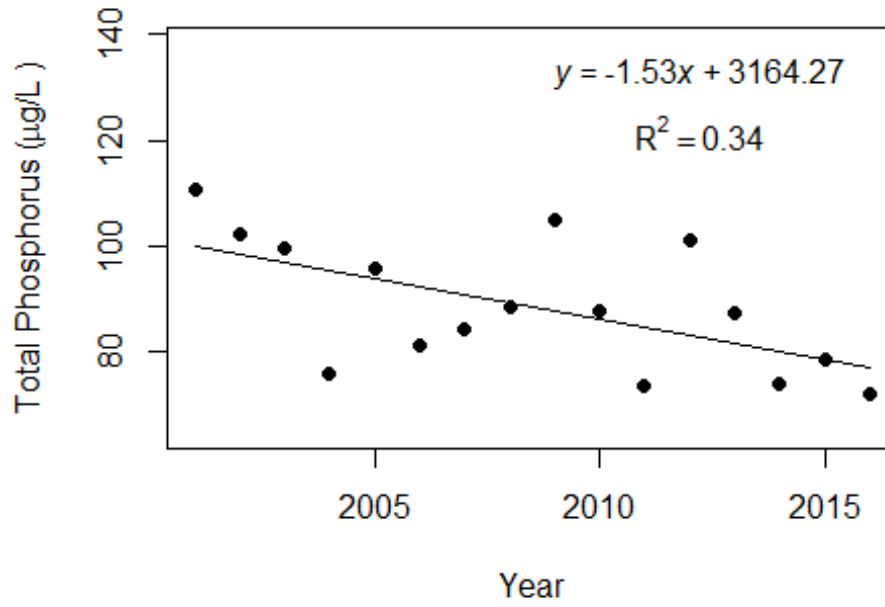
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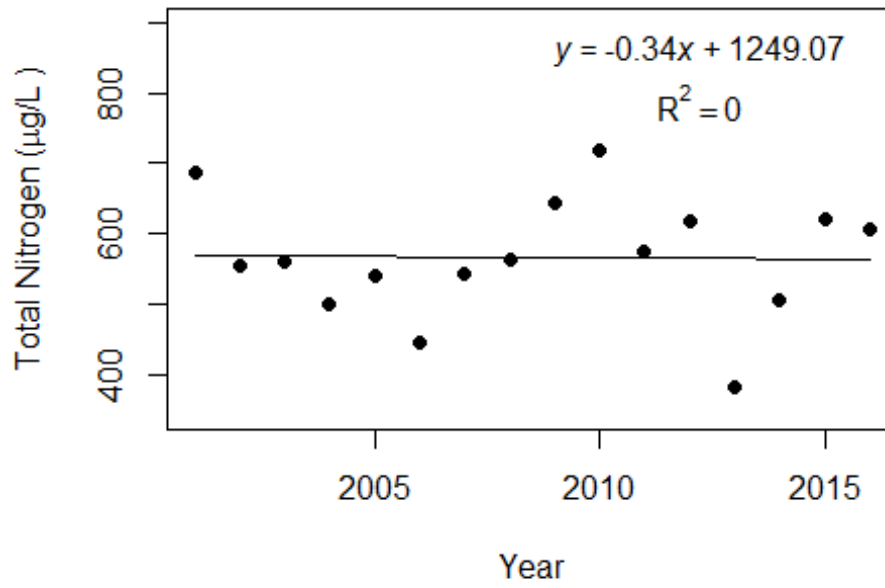
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	16	16	16	16
Intercept (a)	3164	1249	588	23
Slope (b)	-1.53	-0.34	-0.29	-0.01
Coefficient of Determination (R ²)	0.34	0.00	0.17	0.01
Probability of Significance (p)	0.02	0.94	0.11	0.69
Potential Trend	Decreasing	No Trend	No Trend	No Trend

The following graphs on the next two pages are trend analyses examining regression between year and annual means of total phosphorus, total nitrogen, chlorophyll, and Secchi depth for Halifax River-1 in Volusia County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

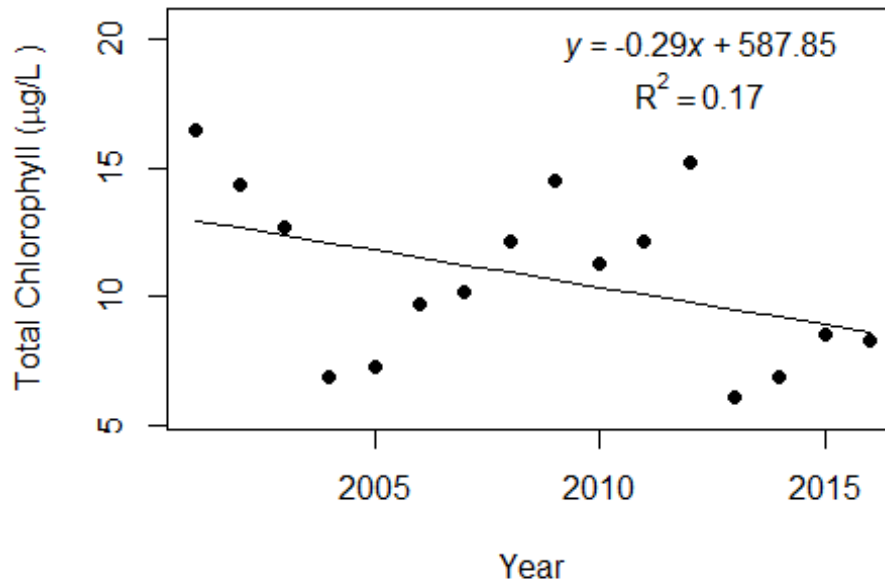
Halifax River-1 (Volusia)



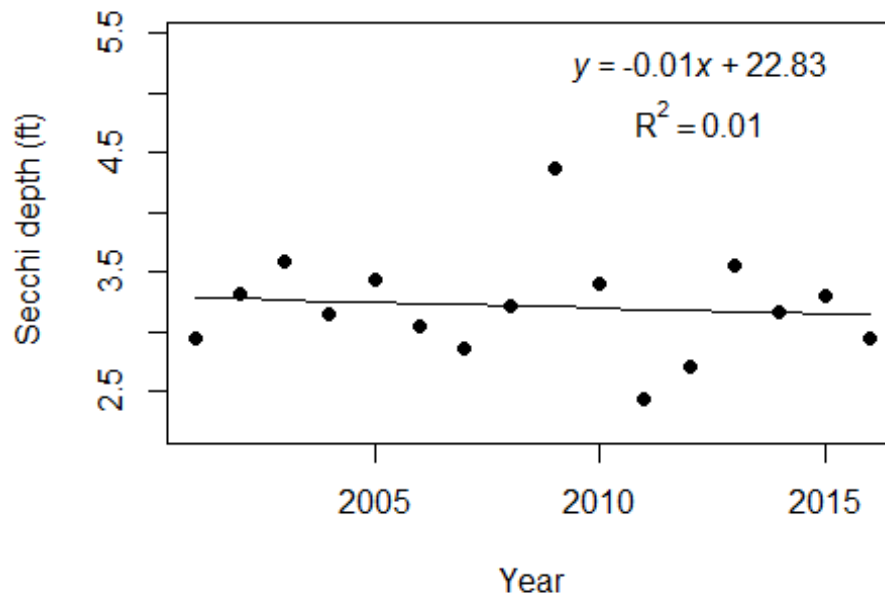
Halifax River-1 (Volusia)



Halifax River-1 (Volusia)



Halifax River-1 (Volusia)



LAKEWATCH Report for Halifax River-2 in Volusia County Using Data Downloaded 10/17/2016

Introduction Streams

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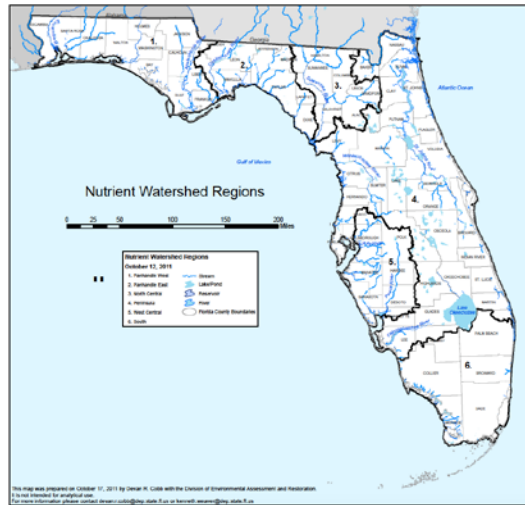


Figure 1. Map showing nutrient thresholds areas for streams set forth by FDEP.

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- **Period of Record (year):** Years a stream has been in the LAKEWATCH program.

County	Volusia
Name	Halifax River-2
Latitude	29.171
Longitude	-80.9939
Water Body Type	Stream
Period of Record (year)	2001 to 2016
Nutrient Watershed Region	Peninsular

LAKEWATCH Report for Halifax River-2 in Volusia County Using Data Downloaded 10/17/2016

The nutrient thresholds for streams set forth by FDEP are listed in table below along with the map showing zones.

Nutrient Watershed Region	Total Phosphorus Nutrient Threshold ¹	Total Nitrogen Nutrient Threshold ¹
Panhandle West	60 µg/L	670 µg/L
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- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filter 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 dissolve materials in water.

Long-Term Data Summary Streams: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus (µg/L)	73 - 125	97 (16)
Total Nitrogen (µg/L)	419 - 722	574 (16)
Chlorophyll- uncorrected (µg/L)	7.1 - 19.0	11.9 (16)
Secchi (ft)	2.4 - 3.8	3.1 (16)
Secchi (m)	0.7 - 1.2	1.0 (16)
Color (Pt-Co Units)	14 - 75	31 (16)
Specific Conductance (µS/cm@25 C)	21417 - 44000	35853 (16)

LAKEWATCH Report for Halifax River-2 in Volusia County Using Data Downloaded 10/17/2016

Trend Analyses Streams

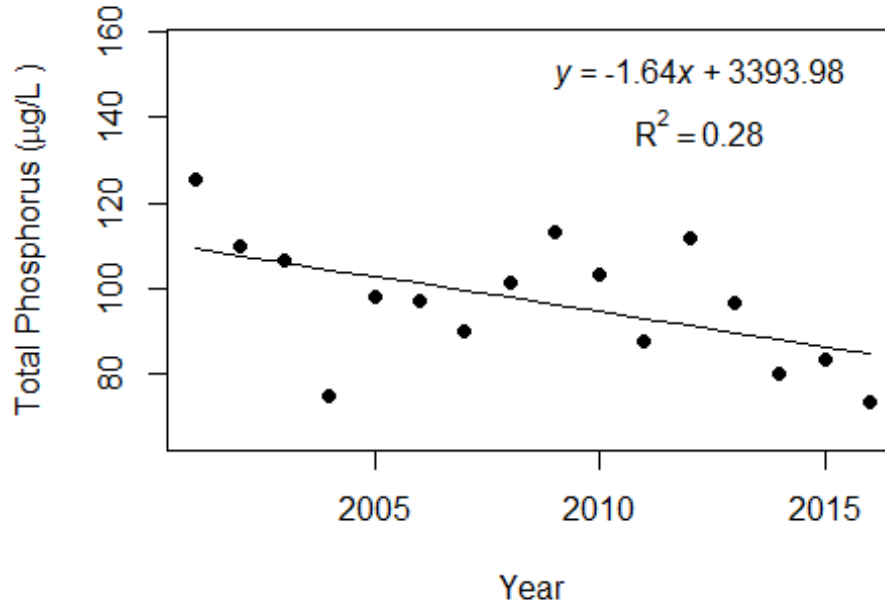
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- **Number of years (n):** This is simply the number of years of data that were used to calculate annual means.
- **Intercept (a):** This is the value on the y-axis that the fitted line would have cross if the x-axis where zero.
- **Slope (b):** This is the rate at which the fitted line increases (positive number) or decreases (negative number).
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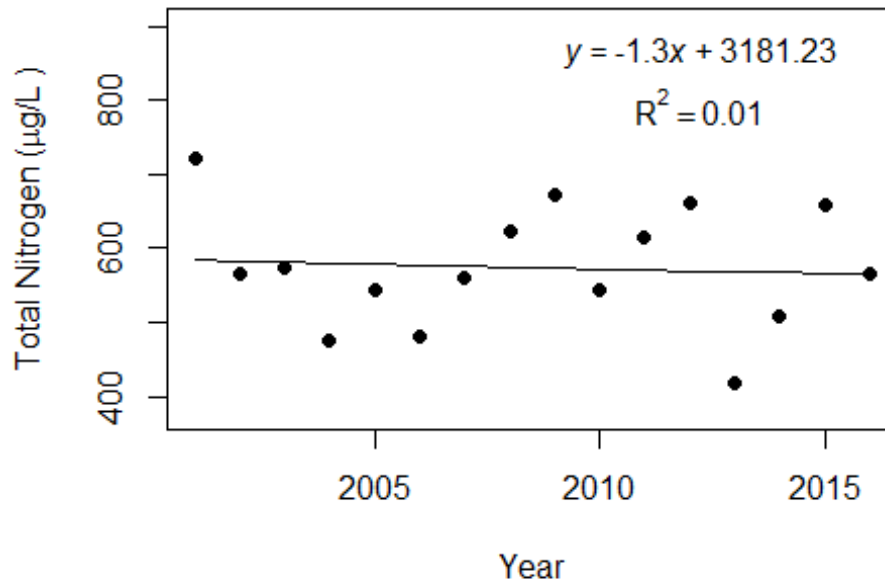
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	16	16	16	16
Intercept (a)	3394	3181	515	-18
Slope (b)	-1.64	-1.30	-0.25	0.01
Coefficient of Determination (R ²)	0.28	0.01	0.10	0.02
Probability of Significance (p)	0.03	0.78	0.23	0.63
Potential Trend	Decreasing	No Trend	No Trend	No Trend

The following graphs on the next two pages are trend analyses examining regression between year and annual means of total phosphorus, total nitrogen, chlorophyll, and Secchi depth for Halifax River-2 in Volusia County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

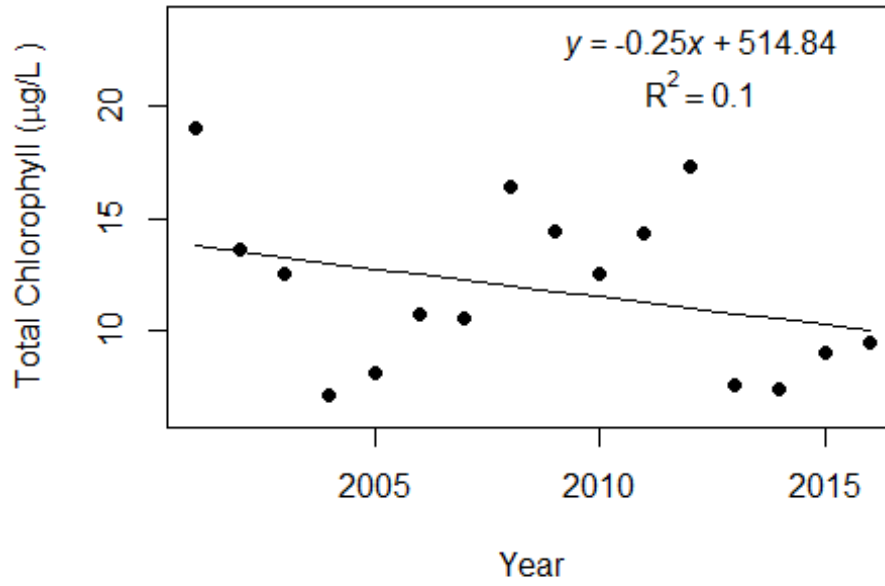
Halifax River-2 (Volusia)



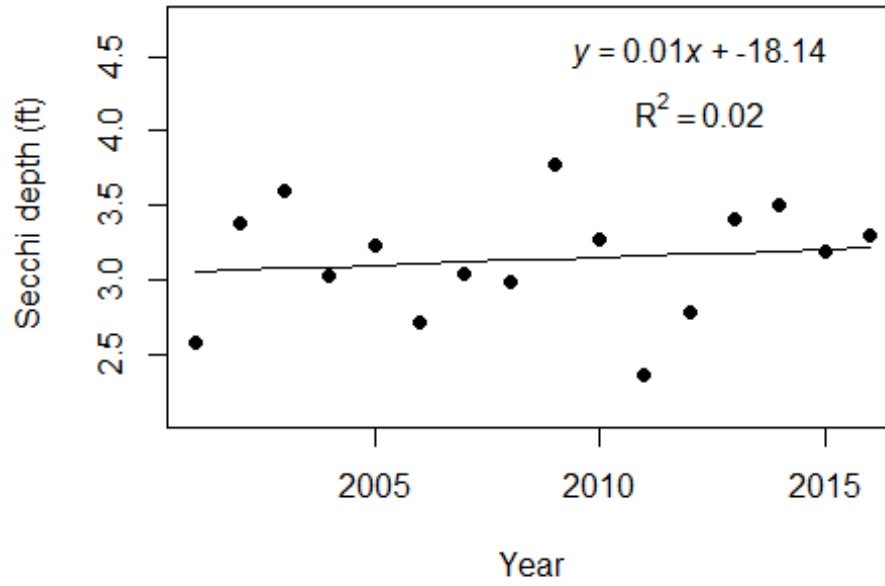
Halifax River-2 (Volusia)



Halifax River-2 (Volusia)



Halifax River-2 (Volusia)



LAKEWATCH Report for Halifax River-3 in Volusia County Using Data Downloaded 10/17/2016

Introduction Streams

For many decades Florida has had a narrative nutrient water quality criterion in place to protect Florida's waters against nutrient over-enrichment. In 2009, the Florida Department of Environmental Protection (FDEP) initiated rulemaking and, by 2011, adopted what would be the first set of statewide numeric nutrient standards for Florida's waters. By 2015, almost all of the remaining waters in Florida have numeric nutrient standards (see for Florida Department of Environmental Regulation Nutrient Criteria's for: Streams, spring vents: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).



Figure 1. Map showing nutrient thresholds areas for streams set forth by FDEP.

Base File Data: Definitions

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

- **County:** Name of county in which the stream resides.
- **Name:** Stream name that LAKEWATCH uses for the 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, streams and springs.
- **Period of Record (year):** Years a stream has been in the LAKEWATCH program.

County	Volusia
Name	Halifax River-3
Latitude	29.1921
Longitude	-81.0021
Water Body Type	Stream
Period of Record (year)	2001 to 2016
Nutrient Watershed Region	Peninsular

LAKEWATCH Report for Halifax River-3 in Volusia County Using Data Downloaded 10/17/2016

The nutrient thresholds for streams set forth by FDEP are listed in table below along with the map showing zones.

Nutrient Watershed Region	Total Phosphorus Nutrient Threshold ¹	Total Nitrogen Nutrient Threshold ¹
Panhandle West	60 µg/L	670 µg/L
Panhandle East	180 µg/L	1030 µg/L
North Central	300 µ/L	1870 µg/L
Peninsular	120 µg/L	1540 µg/L
West Central	490 µg/L	1650 µg/L
South Florida	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.

¹These values are annual geometric mean concentrations not to be exceeded more than once in any three calendar year periods.

Long-Term Data Summary Streams: Definitions

The following long-term data are the primary trophic state parameters collected by LAKEWATCH volunteers and classification variables color and specific conductance (LAKEWATCH recently began analyzing samples quarterly for color and specific conductance):

- **Total Phosphorus (µg/L):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen (µg/L):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algal population.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity (how far one can see into the water) and are listed with English and metric units.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filter 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 dissolve materials in water.

Long-Term Data Summary Streams: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus (µg/L)	80 - 136	107 (16)
Total Nitrogen (µg/L)	455 - 798	634 (16)
Chlorophyll- uncorrected (µg/L)	5.0 - 21.4	11.9 (16)
Secchi (ft)	2.3 - 4.1	3.3 (16)
Secchi (m)	0.7 - 1.3	1.0 (16)
Color (Pt-Co Units)	16 - 79	34 (16)
Specific Conductance (µS/cm@25 C)	25009 - 43083	34839 (16)

LAKEWATCH Report for Halifax River-3 in Volusia County Using Data Downloaded 10/17/2016

Trend Analyses Streams

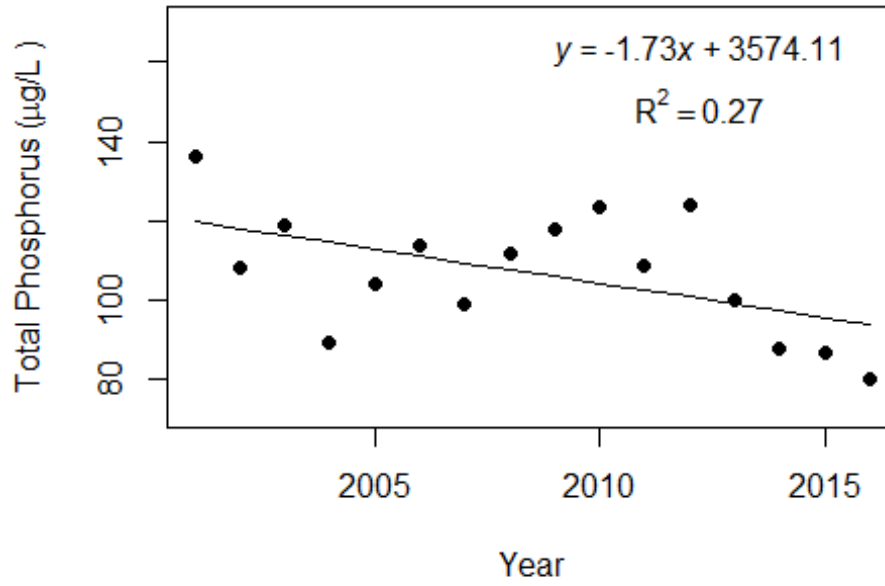
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over time. These analyses define statistics based on the best fit line drawn through the data after plotting them with year on the horizontal line (x-axis) and the data value on the vertical line (y-axis). Figure 2 shows example plots with linear regression statistic of lakes that show significant total phosphorus increases, decreases and no change over time. The statistics that are listed include the following:

- **Number of years (n):** This is simply the number of years of data that were used to calculate annual means.
- **Intercept (a):** This is the value on the y-axis that the fitted line would have cross if the x-axis where zero.
- **Slope (b):** This is the rate at which the fitted line increases (positive number) or decreases (negative number).
- **Coefficient of determination (R²):** This value is an indication of how much variance above and below the fitted line there is in the data. This value ranges from 0 to 1. A high value means a tight fit and a low value means a loose fit.
- **Probability of Significance (p):** For most statistical analyses a p-value of less than 0.05 means the statistic is significant and analyses with p-values greater than 0.05 are not significant.

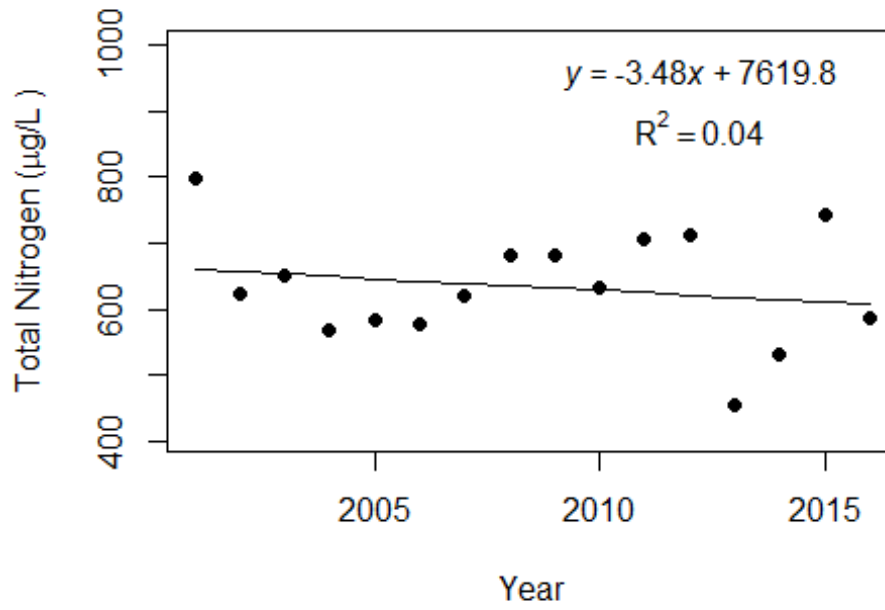
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	16	16	16	16
Intercept (a)	3574	7620	486	-33
Slope (b)	-1.73	-3.48	-0.24	0.02
Coefficient of Determination (R ²)	0.27	0.04	0.07	0.03
Probability of Significance (p)	0.04	0.47	0.33	0.50
Potential Trend	Decreasing	No Trend	No Trend	No Trend

The following graphs on the next two pages are trend analyses examining regression between year and annual means of total phosphorus, total nitrogen, chlorophyll, and Secchi depth for Halifax River-3 in Volusia County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

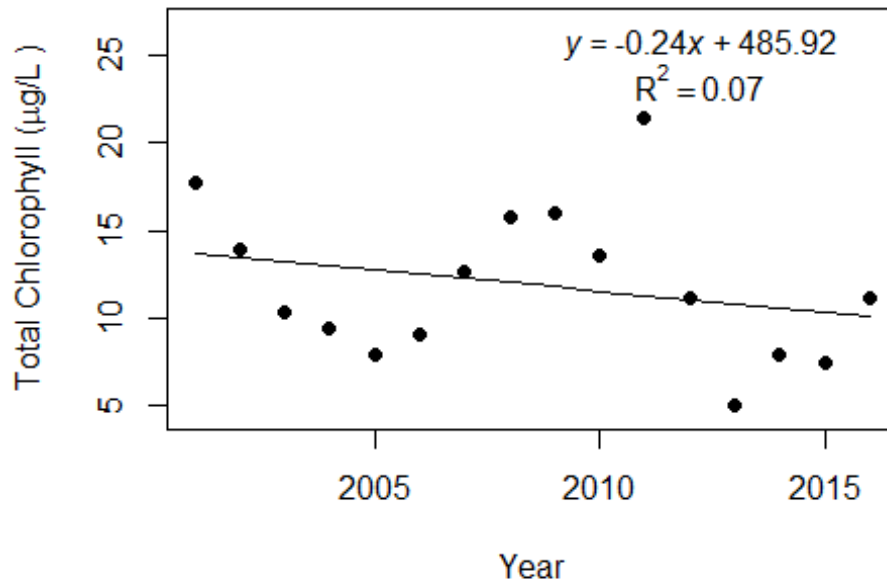
Halifax River-3 (Volusia)



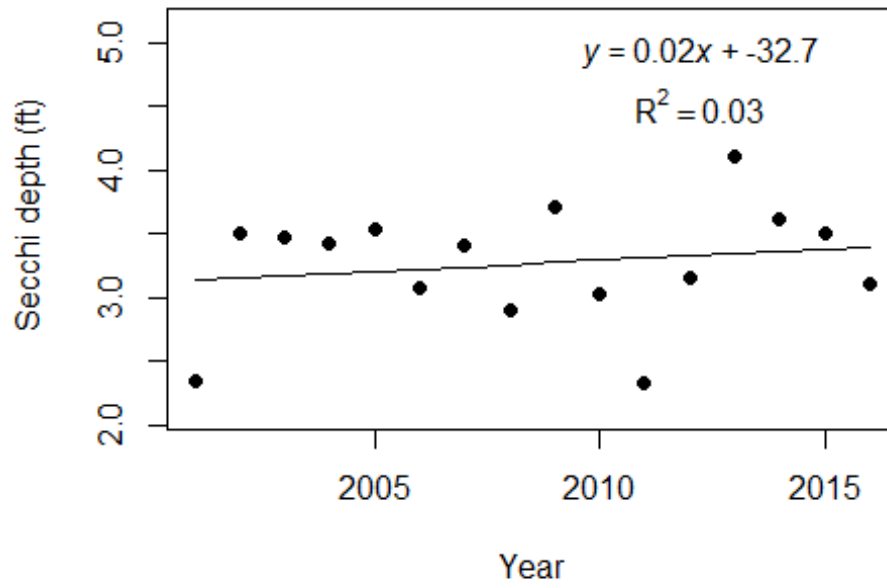
Halifax River-3 (Volusia)



Halifax River-3 (Volusia)



Halifax River-3 (Volusia)



LAKEWATCH Report for Indian River North-1 in Volusia County Using Data Downloaded 10/17/2016

Introduction Streams

For many decades Florida has had a narrative nutrient water quality criterion in place to protect Florida’s waters against nutrient over-enrichment. In 2009, the Florida Department of Environmental Protection (FDEP) initiated rulemaking and, by 2011, adopted what would be the first set of statewide numeric nutrient standards for Florida’s waters. By 2015, almost all of the remaining waters in Florida have numeric nutrient standards (see for Florida Department of Environmental Regulation Nutrient Criteria’s for: Streams, spring vents: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).



Figure 1. Map showing nutrient thresholds areas for streams set forth by FDEP.

Base File Data: Definitions

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

- **County:** Name of county in which the stream resides.
- **Name:** Stream name that LAKEWATCH uses for the 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, streams and springs.
- **Period of Record (year):** Years a stream has been in the LAKEWATCH program.

County	Volusia
Name	Indian River North-1
Latitude	29.0196
Longitude	-80.9164
Water Body Type	Stream
Period of Record (year)	2003 to 2010
Nutrient Watershed Region	Peninsular

LAKEWATCH Report for Indian River North-1 in Volusia County Using Data Downloaded 10/17/2016

The nutrient thresholds for streams set forth by FDEP are listed in table below along with the map showing zones.

Nutrient Watershed Region	Total Phosphorus Nutrient Threshold ¹	Total Nitrogen Nutrient Threshold ¹
Panhandle West	60 µg/L	670 µg/L
Panhandle East	180 µg/L	1030 µg/L
North Central	300 µ/L	1870 µg/L
Peninsular	120 µg/L	1540 µg/L
West Central	490 µg/L	1650 µg/L
South Florida	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.

¹These values are annual geometric mean concentrations not to be exceeded more than once in any three calendar year periods.

Long-Term Data Summary Streams: Definitions

The following long-term data are the primary trophic state parameters collected by LAKEWATCH volunteers and classification variables color and specific conductance (LAKEWATCH recently began analyzing samples quarterly for color and specific conductance):

- **Total Phosphorus (µg/L):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen (µg/L):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algal population.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity (how far one can see into the water) and are listed with English and metric units.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filter 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 dissolve materials in water.

Long-Term Data Summary Streams: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus (µg/L)	38 - 55	44 (8)
Total Nitrogen (µg/L)	320 - 527	428 (8)
Chlorophyll- uncorrected (µg/L)	5.4 - 10.5	8.0 (8)
Secchi (ft)	3.9 - 5.6	4.6 (8)
Secchi (m)	1.2 - 1.7	1.4 (8)
Color (Pt-Co Units)	6 - 15	10 (7)
Specific Conductance (µS/cm@25 C)	23773 - 53333	41925 (7)

LAKEWATCH Report for Indian River North-1 in Volusia County Using Data Downloaded 10/17/2016

Trend Analyses Streams

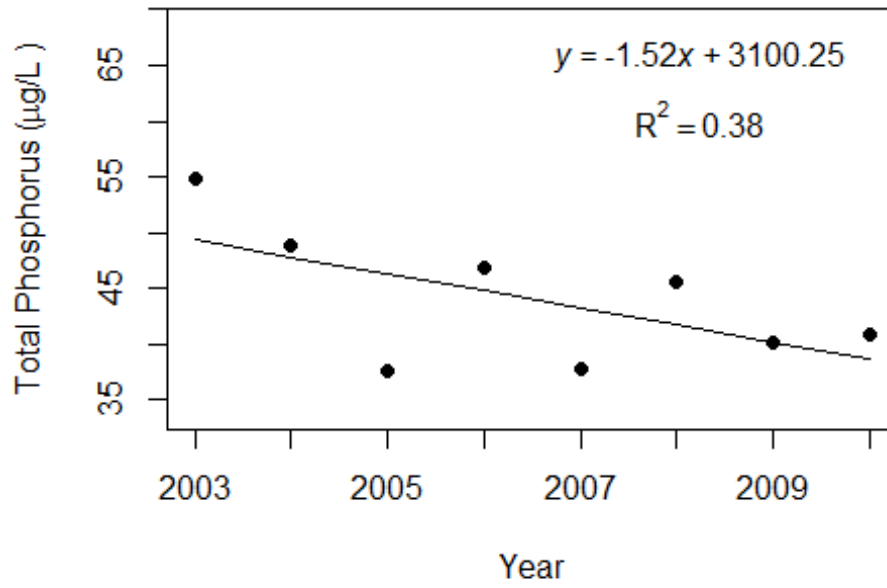
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over time. These analyses define statistics based on the best fit line drawn through the data after plotting them with year on the horizontal line (x-axis) and the data value on the vertical line (y-axis). Figure 2 shows example plots with linear regression statistic of lakes that show significant total phosphorus increases, decreases and no change over time. The statistics that are listed include the following:

- **Number of years (n):** This is simply the number of years of data that were used to calculate annual means.
- **Intercept (a):** This is the value on the y-axis that the fitted line would have cross if the x-axis where zero.
- **Slope (b):** This is the rate at which the fitted line increases (positive number) or decreases (negative number).
- **Coefficient of determination (R²):** This value is an indication of how much variance above and below the fitted line there is in the data. This value ranges from 0 to 1. A high value means a tight fit and a low value means a loose fit.
- **Probability of Significance (p):** For most statistical analyses a p-value of less than 0.05 means the statistic is significant and analyses with p-values greater than 0.05 are not significant.

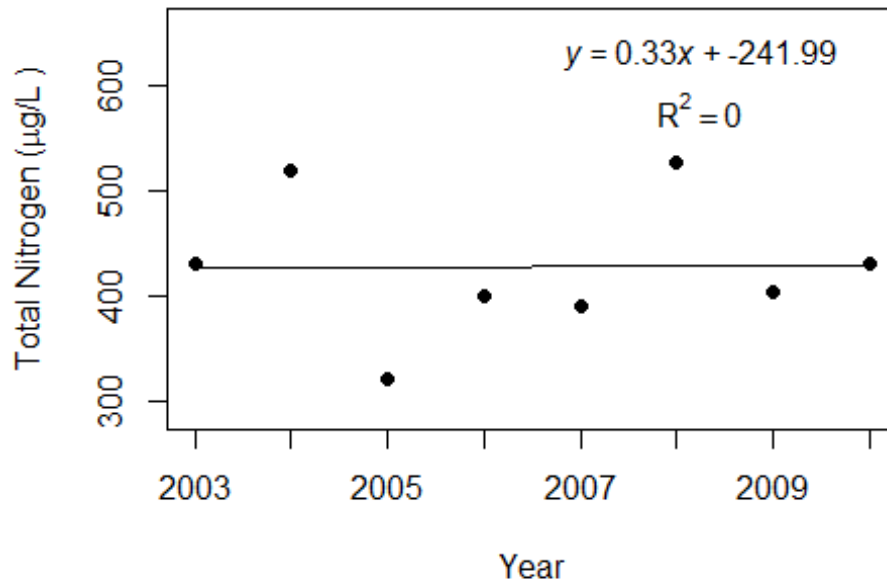
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	8	8	8	8
Intercept (a)	3100	-242	-537	-53
Slope (b)	-1.52	0.33	0.27	0.03
Coefficient of Determination (R ²)	0.38	0.00	0.18	0.02
Probability of Significance (p)	0.11	0.98	0.30	0.74
Potential Trend	No Trend	No Trend	No Trend	No Trend

The following graphs on the next two pages are trend analyses examining regression between year and annual means of total phosphorus, total nitrogen, chlorophyll, and Secchi depth for Indian River North-1 in Volusia County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

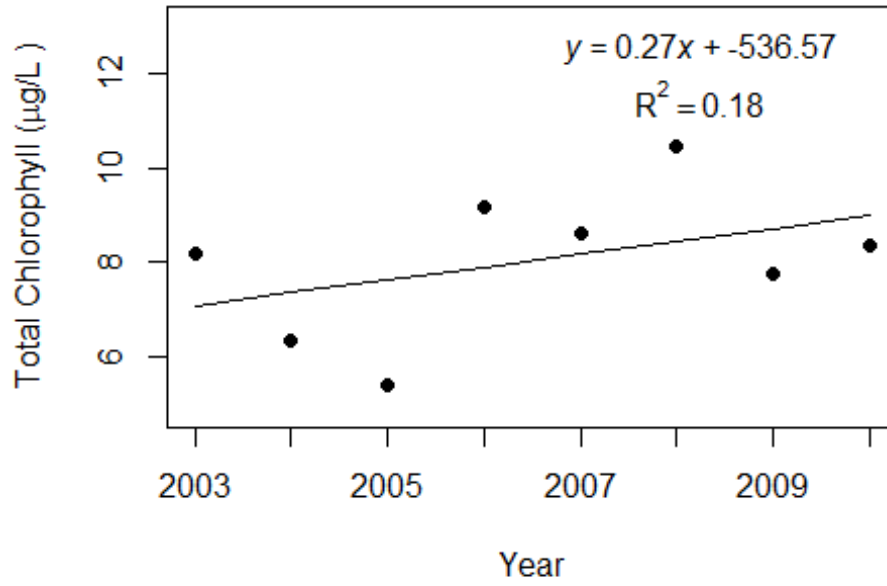
Indian River North-1 (Volusia)



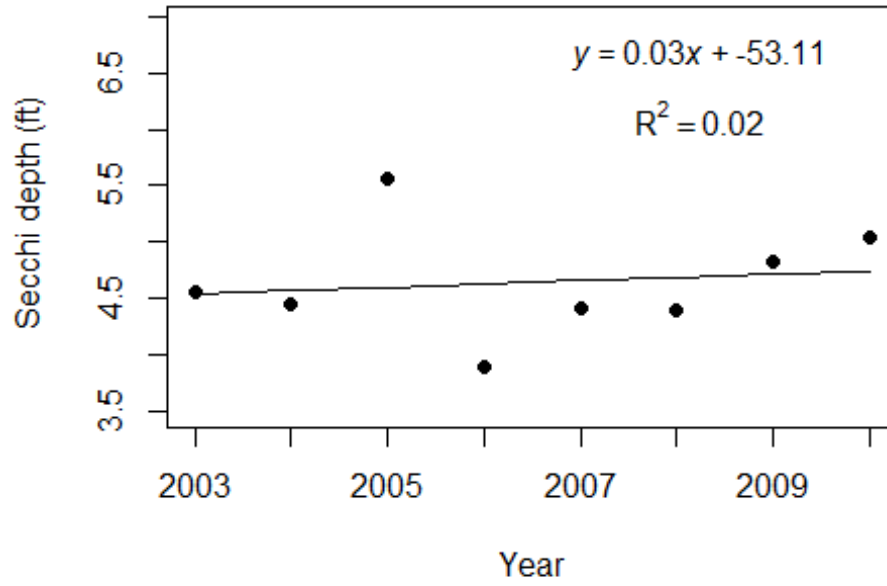
Indian River North-1 (Volusia)



Indian River North-1 (Volusia)



Indian River North-1 (Volusia)



LAKEWATCH Report for Indian River North-2 in Volusia County Using Data Downloaded 10/17/2016

Introduction Streams

For many decades Florida has had a narrative nutrient water quality criterion in place to protect Florida's waters against nutrient over-enrichment. In 2009, the Florida Department of Environmental Protection (FDEP) initiated rulemaking and, by 2011, adopted what would be the first set of statewide numeric nutrient standards for Florida's waters. By 2015, almost all of the remaining waters in Florida have numeric nutrient standards (see for Florida Department of Environmental Regulation Nutrient Criteria's for: Streams, spring vents: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).



Figure 1. Map showing nutrient thresholds areas for streams set forth by FDEP.

Base File Data: Definitions

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

- **County:** Name of county in which the stream resides.
- **Name:** Stream name that LAKEWATCH uses for the 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, streams and springs.
- **Period of Record (year):** Years a stream has been in the LAKEWATCH program.

County	Volusia
Name	Indian River North-2
Latitude	29.0261
Longitude	-80.9201
Water Body Type	Stream
Period of Record (year)	2003 to 2010
Nutrient Watershed Region	Peninsular

LAKEWATCH Report for Indian River North-2 in Volusia County Using Data Downloaded 10/17/2016

The nutrient thresholds for streams set forth by FDEP are listed in table below along with the map showing zones.

Nutrient Watershed Region	Total Phosphorus Nutrient Threshold ¹	Total Nitrogen Nutrient Threshold ¹
Panhandle West	60 µg/L	670 µg/L
Panhandle East	180 µg/L	1030 µg/L
North Central	300 µ/L	1870 µg/L
Peninsular	120 µg/L	1540 µg/L
West Central	490 µg/L	1650 µg/L
South Florida	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.

¹These values are annual geometric mean concentrations not to be exceeded more than once in any three calendar year periods.

Long-Term Data Summary Streams: Definitions

The following long-term data are the primary trophic state parameters collected by LAKEWATCH volunteers and classification variables color and specific conductance (LAKEWATCH recently began analyzing samples quarterly for color and specific conductance):

- **Total Phosphorus (µg/L):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen (µg/L):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algal population.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity (how far one can see into the water) and are listed with English and metric units.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filter 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 dissolve materials in water.

Long-Term Data Summary Streams: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus (µg/L)	44 - 61	53 (8)
Total Nitrogen (µg/L)	412 - 583	486 (8)
Chlorophyll- uncorrected (µg/L)	2.0 - 9.0	6.6 (8)
Secchi (ft)	3.1 - 4.5	3.8 (8)
Secchi (m)	1.0 - 1.4	1.2 (8)
Color (Pt-Co Units)	7 - 15	10 (7)
Specific Conductance (µS/cm@25 C)	22021 - 53500	41008 (7)

LAKEWATCH Report for Indian River North-2 in Volusia County Using Data Downloaded 10/17/2016

Trend Analyses Streams

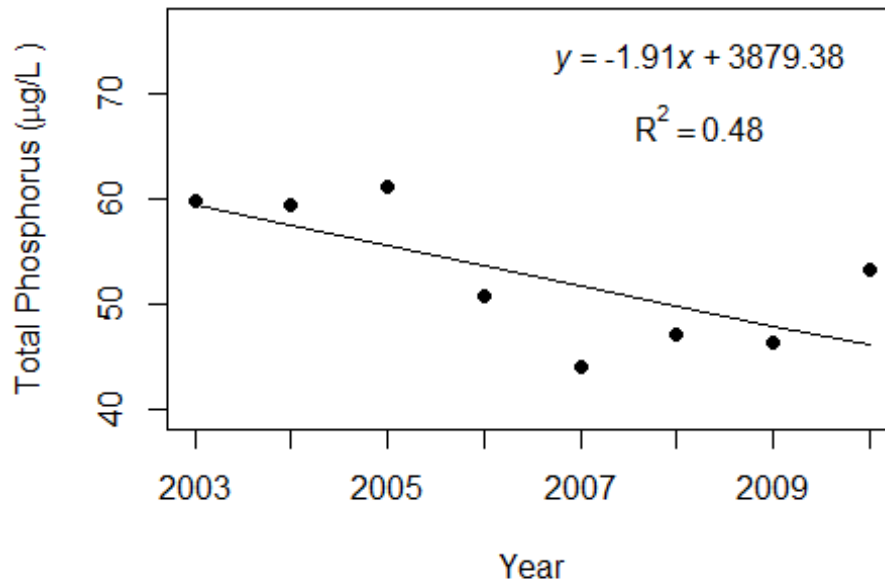
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over time. These analyses define statistics based on the best fit line drawn through the data after plotting them with year on the horizontal line (x-axis) and the data value on the vertical line (y-axis). Figure 2 shows example plots with linear regression statistic of lakes that show significant total phosphorus increases, decreases and no change over time. The statistics that are listed include the following:

- **Number of years (n):** This is simply the number of years of data that were used to calculate annual means.
- **Intercept (a):** This is the value on the y-axis that the fitted line would have cross if the x-axis where zero.
- **Slope (b):** This is the rate at which the fitted line increases (positive number) or decreases (negative number).
- **Coefficient of determination (R²):** This value is an indication of how much variance above and below the fitted line there is in the data. This value ranges from 0 to 1. A high value means a tight fit and a low value means a loose fit.
- **Probability of Significance (p):** For most statistical analyses a p-value of less than 0.05 means the statistic is significant and analyses with p-values greater than 0.05 are not significant.

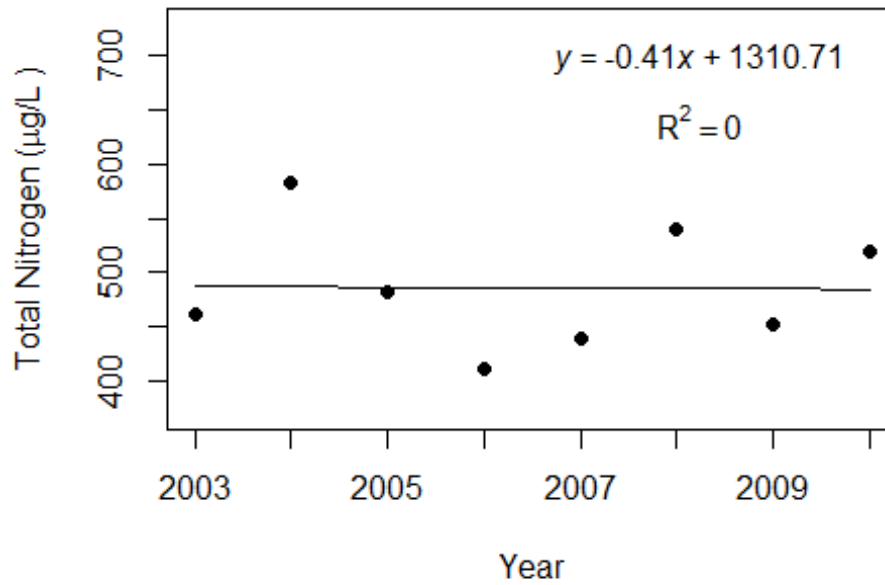
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	8	8	8	8
Intercept (a)	3879	1311	-671	-131
Slope (b)	-1.91	-0.41	0.34	0.07
Coefficient of Determination (R ²)	0.48	0.00	0.16	0.14
Probability of Significance (p)	0.06	0.97	0.32	0.37
Potential Trend	No Trend	No Trend	No Trend	No Trend

The following graphs on the next two pages are trend analyses examining regression between year and annual means of total phosphorus, total nitrogen, chlorophyll, and Secchi depth for Indian River North-2 in Volusia County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

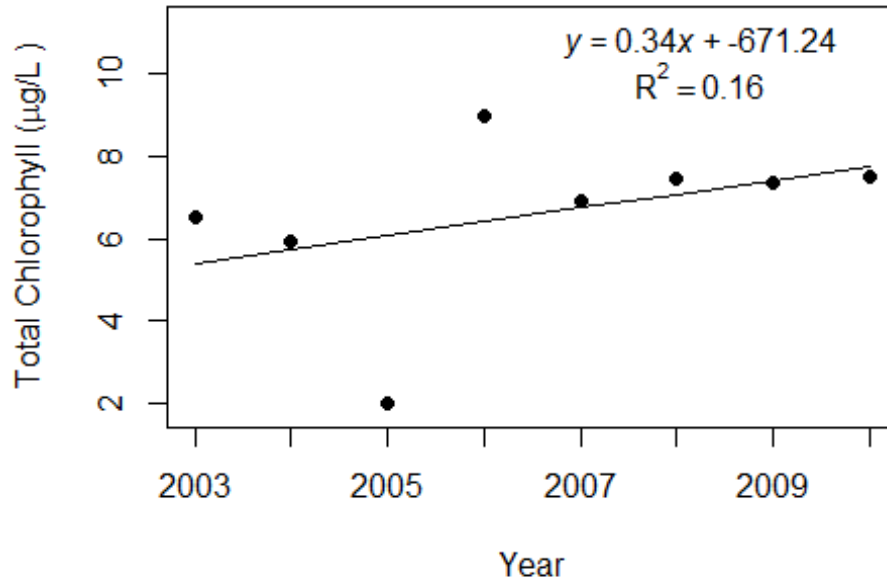
Indian River North-2 (Volusia)



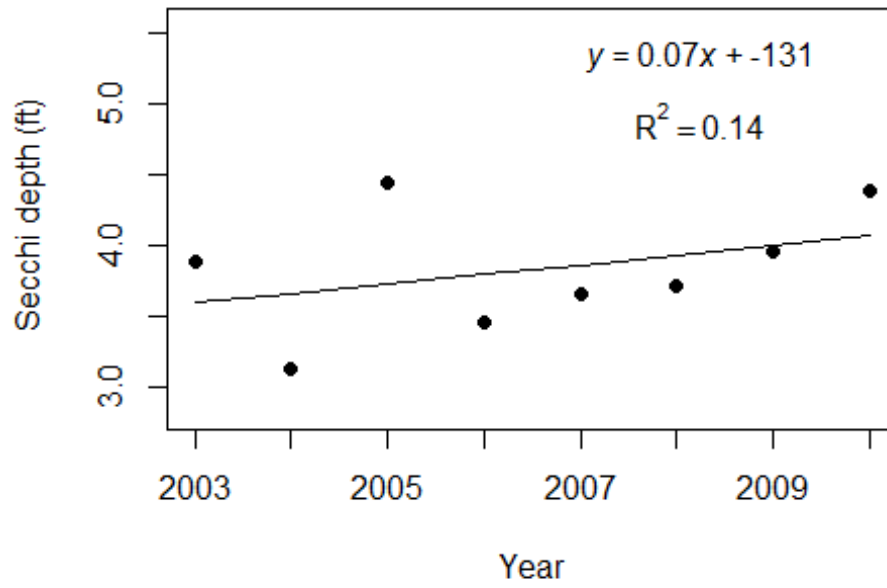
Indian River North-2 (Volusia)



Indian River North-2 (Volusia)



Indian River North-2 (Volusia)



LAKEWATCH Report for Indian River North-3 in Volusia County Using Data Downloaded 10/17/2016

Introduction Streams

For many decades Florida has had a narrative nutrient water quality criterion in place to protect Florida's waters against nutrient over-enrichment. In 2009, the Florida Department of Environmental Protection (FDEP) initiated rulemaking and, by 2011, adopted what would be the first set of statewide numeric nutrient standards for Florida's waters. By 2015, almost all of the remaining waters in Florida have numeric nutrient standards (see for Florida Department of Environmental Regulation Nutrient Criteria's for: Streams, spring vents: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

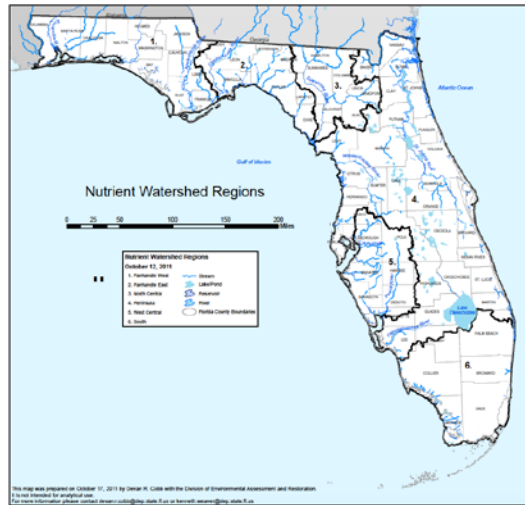


Figure 1. Map showing nutrient thresholds areas for streams set forth by FDEP.

Base File Data: Definitions

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

- **County:** Name of county in which the stream resides.
- **Name:** Stream name that LAKEWATCH uses for the 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, streams and springs.
- **Period of Record (year):** Years a stream has been in the LAKEWATCH program.

County	Volusia
Name	Indian River North-3
Latitude	29.0268
Longitude	-80.9163
Water Body Type	Stream
Period of Record (year)	2003 to 2010
Nutrient Watershed Region	Peninsular

LAKEWATCH Report for Indian River North-3 in Volusia County Using Data Downloaded 10/17/2016

The nutrient thresholds for streams set forth by FDEP are listed in table below along with the map showing zones.

Nutrient Watershed Region	Total Phosphorus Nutrient Threshold ¹	Total Nitrogen Nutrient Threshold ¹
Panhandle West	60 µg/L	670 µg/L
Panhandle East	180 µg/L	1030 µg/L
North Central	300 µ/L	1870 µg/L
Peninsular	120 µg/L	1540 µg/L
West Central	490 µg/L	1650 µg/L
South Florida	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.

¹These values are annual geometric mean concentrations not to be exceeded more than once in any three calendar year periods.

Long-Term Data Summary Streams: Definitions

The following long-term data are the primary trophic state parameters collected by LAKEWATCH volunteers and classification variables color and specific conductance (LAKEWATCH recently began analyzing samples quarterly for color and specific conductance):

- **Total Phosphorus (µg/L):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen (µg/L):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algal population.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity (how far one can see into the water) and are listed with English and metric units.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filter 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 dissolve materials in water.

Long-Term Data Summary Streams: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus (µg/L)	35 - 53	44 (8)
Total Nitrogen (µg/L)	314 - 561	435 (8)
Chlorophyll- uncorrected (µg/L)	5.8 - 10.3	8.2 (8)
Secchi (ft)	3.7 - 5.1	4.5 (8)
Secchi (m)	1.1 - 1.6	1.4 (8)
Color (Pt-Co Units)	5 - 12	9 (7)
Specific Conductance (µS/cm@25 C)	22775 - 53500	40913 (7)

LAKEWATCH Report for Indian River North-3 in Volusia County Using Data Downloaded 10/17/2016

Trend Analyses Streams

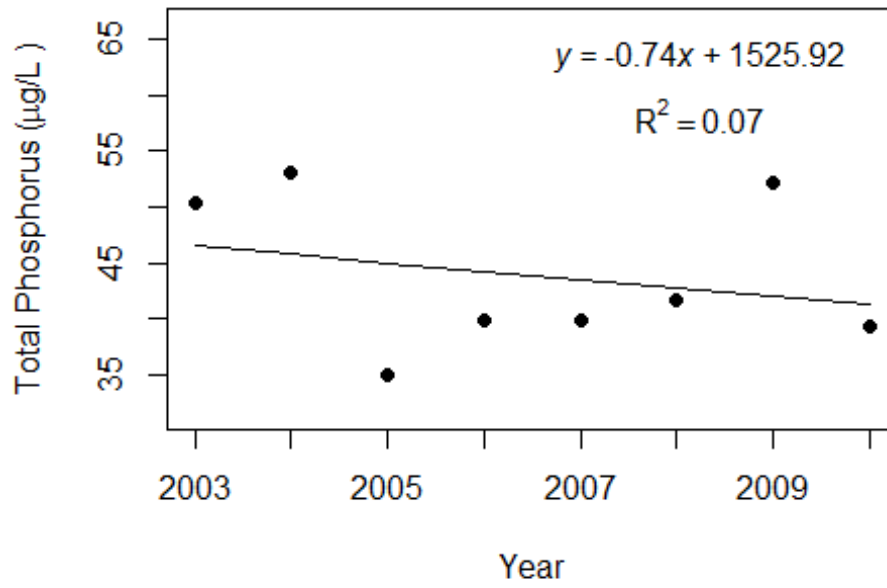
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over time. These analyses define statistics based on the best fit line drawn through the data after plotting them with year on the horizontal line (x-axis) and the data value on the vertical line (y-axis). Figure 2 shows example plots with linear regression statistic of lakes that show significant total phosphorus increases, decreases and no change over time. The statistics that are listed include the following:

- **Number of years (n):** This is simply the number of years of data that were used to calculate annual means.
- **Intercept (a):** This is the value on the y-axis that the fitted line would have cross if the x-axis where zero.
- **Slope (b):** This is the rate at which the fitted line increases (positive number) or decreases (negative number).
- **Coefficient of determination (R²):** This value is an indication of how much variance above and below the fitted line there is in the data. This value ranges from 0 to 1. A high value means a tight fit and a low value means a loose fit.
- **Probability of Significance (p):** For most statistical analyses a p-value of less than 0.05 means the statistic is significant and analyses with p-values greater than 0.05 are not significant.

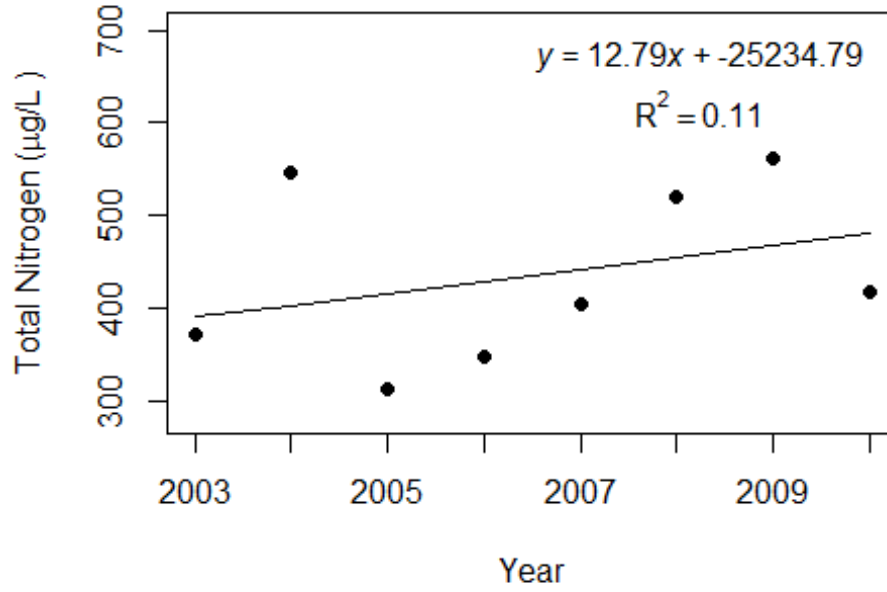
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	8	8	8	8
Intercept (a)	1526	-25235	-358	-23
Slope (b)	-0.74	12.79	0.18	0.01
Coefficient of Determination (R ²)	0.07	0.11	0.12	0.01
Probability of Significance (p)	0.53	0.42	0.41	0.86
Potential Trend	No Trend	No Trend	No Trend	No Trend

The following graphs on the next two pages are trend analyses examining regression between year and annual means of total phosphorus, total nitrogen, chlorophyll, and Secchi depth for Indian River North-3 in Volusia County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

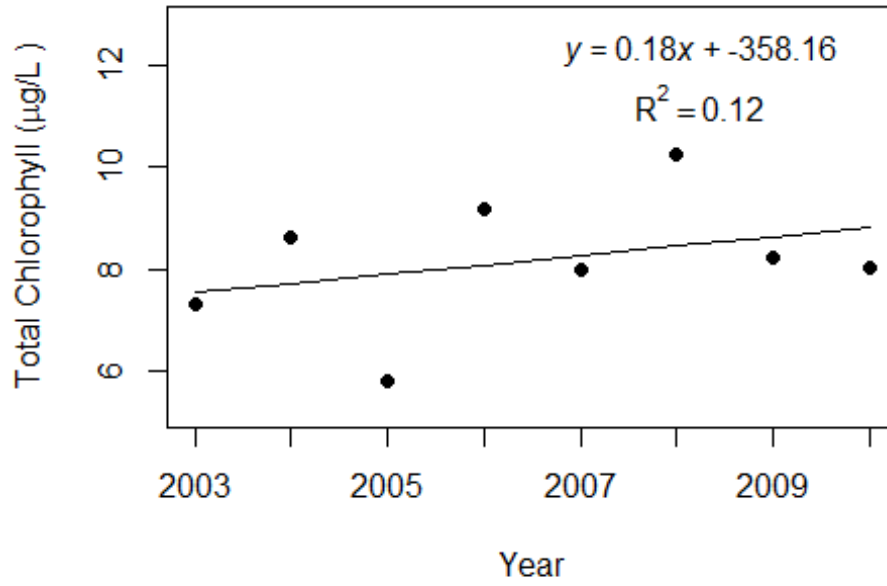
Indian River North-3 (Volusia)



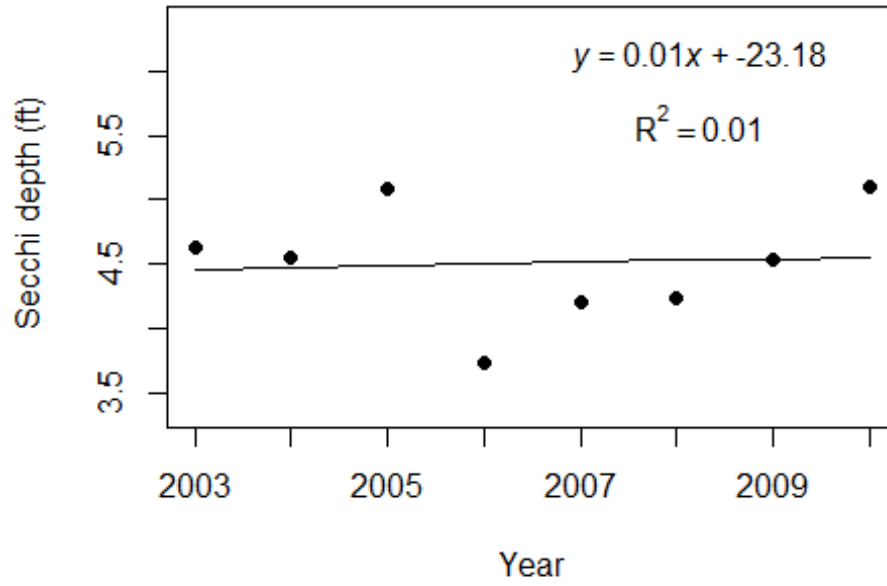
Indian River North-3 (Volusia)



Indian River North-3 (Volusia)



Indian River North-3 (Volusia)



LAKEWATCH Report for Indian River North-4 in Volusia County Using Data Downloaded 10/17/2016

Introduction Streams

For many decades Florida has had a narrative nutrient water quality criterion in place to protect Florida's waters against nutrient over-enrichment. In 2009, the Florida Department of Environmental Protection (FDEP) initiated rulemaking and, by 2011, adopted what would be the first set of statewide numeric nutrient standards for Florida's waters. By 2015, almost all of the remaining waters in Florida have numeric nutrient standards (see for Florida Department of Environmental Regulation Nutrient Criteria's for: Streams, spring vents: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

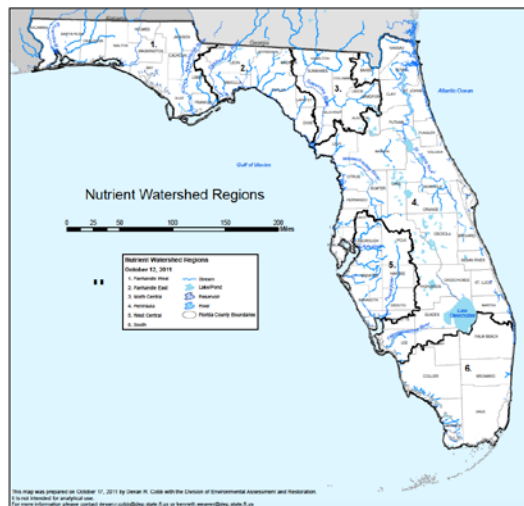


Figure 1. Map showing nutrient thresholds areas for streams set forth by FDEP.

Base File Data: Definitions

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

- **County:** Name of county in which the stream resides.
- **Name:** Stream name that LAKEWATCH uses for the 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, streams and springs.
- **Period of Record (year):** Years a stream has been in the LAKEWATCH program.

County	Volusia
Name	Indian River North-4
Latitude	29.0299
Longitude	-80.9161
Water Body Type	Stream
Period of Record (year)	2003 to 2010
Nutrient Watershed Region	Peninsular

LAKEWATCH Report for Indian River North-4 in Volusia County Using Data Downloaded 10/17/2016

The nutrient thresholds for streams set forth by FDEP are listed in table below along with the map showing zones.

Nutrient Watershed Region	Total Phosphorus Nutrient Threshold ¹	Total Nitrogen Nutrient Threshold ¹
Panhandle West	60 µg/L	670 µg/L
Panhandle East	180 µg/L	1030 µg/L
North Central	300 µ/L	1870 µg/L
Peninsular	120 µg/L	1540 µg/L
West Central	490 µg/L	1650 µg/L
South Florida	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.

¹These values are annual geometric mean concentrations not to be exceeded more than once in any three calendar year periods.

Long-Term Data Summary Streams: Definitions

The following long-term data are the primary trophic state parameters collected by LAKEWATCH volunteers and classification variables color and specific conductance (LAKEWATCH recently began analyzing samples quarterly for color and specific conductance):

- **Total Phosphorus (µg/L):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen (µg/L):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algal population.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity (how far one can see into the water) and are listed with English and metric units.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filter 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 dissolve materials in water.

Long-Term Data Summary Streams: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus (µg/L)	33 - 52	42 (8)
Total Nitrogen (µg/L)	315 - 565	418 (8)
Chlorophyll- uncorrected (µg/L)	5.8 - 10.2	8.3 (8)
Secchi (ft)	3.6 - 5.3	4.4 (8)
Secchi (m)	1.1 - 1.6	1.3 (8)
Color (Pt-Co Units)	5 - 15	10 (7)
Specific Conductance (µS/cm@25 C)	24017 - 53500	39720 (7)

LAKEWATCH Report for Indian River North-4 in Volusia County Using Data Downloaded 10/17/2016

Trend Analyses Streams

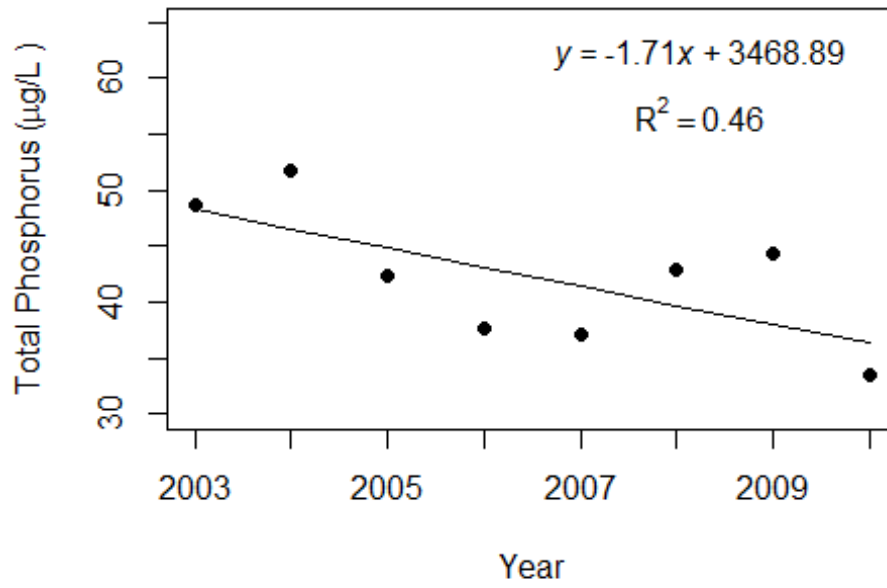
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over time. These analyses define statistics based on the best fit line drawn through the data after plotting them with year on the horizontal line (x-axis) and the data value on the vertical line (y-axis). Figure 2 shows example plots with linear regression statistic of lakes that show significant total phosphorus increases, decreases and no change over time. The statistics that are listed include the following:

- **Number of years (n):** This is simply the number of years of data that were used to calculate annual means.
- **Intercept (a):** This is the value on the y-axis that the fitted line would have cross if the x-axis where zero.
- **Slope (b):** This is the rate at which the fitted line increases (positive number) or decreases (negative number).
- **Coefficient of determination (R²):** This value is an indication of how much variance above and below the fitted line there is in the data. This value ranges from 0 to 1. A high value means a tight fit and a low value means a loose fit.
- **Probability of Significance (p):** For most statistical analyses a p-value of less than 0.05 means the statistic is significant and analyses with p-values greater than 0.05 are not significant.

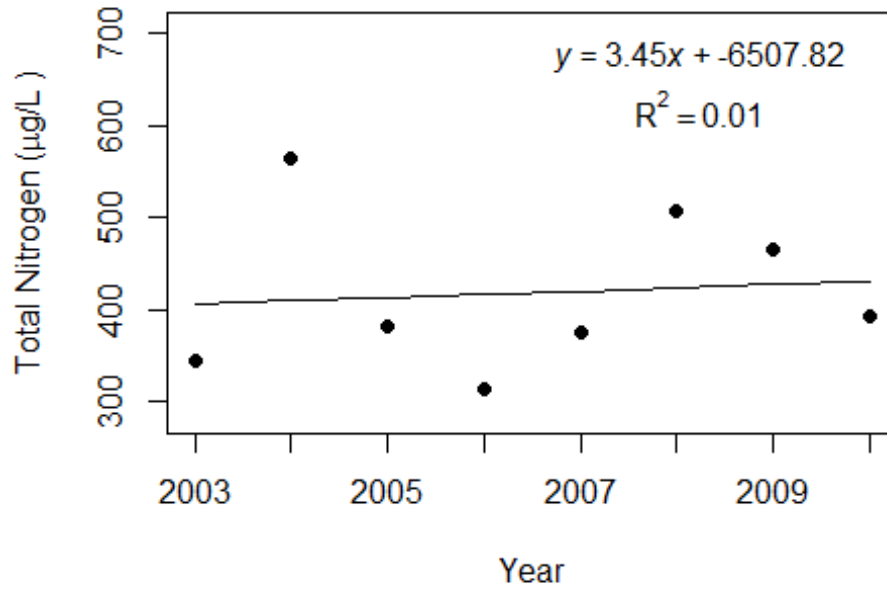
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	8	8	8	8
Intercept (a)	3469	-6508	-464	-3
Slope (b)	-1.71	3.45	0.24	0.00
Coefficient of Determination (R ²)	0.46	0.01	0.16	0.00
Probability of Significance (p)	0.06	0.82	0.33	0.96
Potential Trend	No Trend	No Trend	No Trend	No Trend

The following graphs on the next two pages are trend analyses examining regression between year and annual means of total phosphorus, total nitrogen, chlorophyll, and Secchi depth for Indian River North-4 in Volusia County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

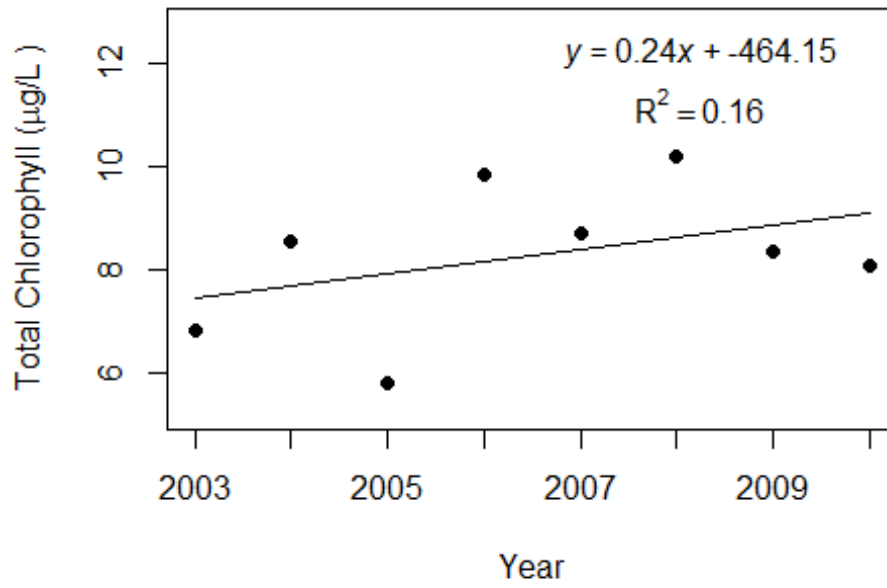
Indian River North-4 (Volusia)



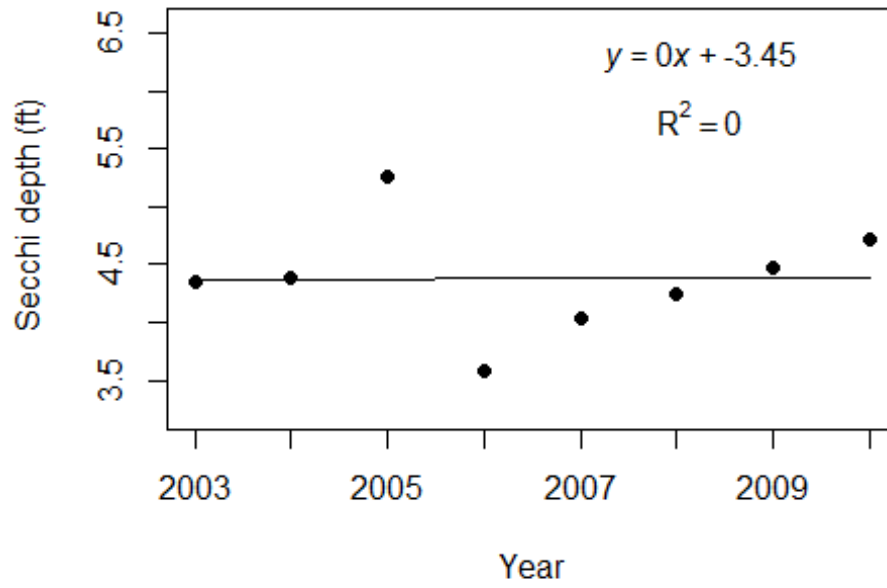
Indian River North-4 (Volusia)



Indian River North-4 (Volusia)



Indian River North-4 (Volusia)



LAKEWATCH Report for Spruce Creek-1 in Volusia County Using Data Downloaded 10/17/2016

Introduction Streams

For many decades Florida has had a narrative nutrient water quality criterion in place to protect Florida’s waters against nutrient over-enrichment. In 2009, the Florida Department of Environmental Protection (FDEP) initiated rulemaking and, by 2011, adopted what would be the first set of statewide numeric nutrient standards for Florida’s waters. By 2015, almost all of the remaining waters in Florida have numeric nutrient standards (see for Florida Department of Environmental Regulation Nutrient Criteria’s for: Streams, spring vents: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

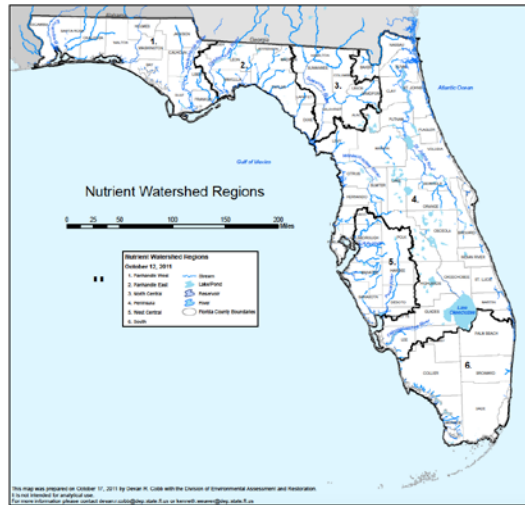


Figure 1. Map showing nutrient thresholds areas for streams set forth by FDEP.

Base File Data: Definitions

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

- **County:** Name of county in which the stream resides.
- **Name:** Stream name that LAKEWATCH uses for the 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, streams and springs.
- **Period of Record (year):** Years a stream has been in the LAKEWATCH program.

County	Volusia
Name	Spruce Creek-1
Latitude	29.0725
Longitude	-81.0683
Water Body Type	Stream
Period of Record (year)	1995 to 2016
Nutrient Watershed Region	Peninsular

LAKEWATCH Report for Spruce Creek-1 in Volusia County Using Data Downloaded 10/17/2016

The nutrient thresholds for streams set forth by FDEP are listed in table below along with the map showing zones.

Nutrient Watershed Region	Total Phosphorus Nutrient Threshold ¹	Total Nitrogen Nutrient Threshold ¹
Panhandle West	60 µg/L	670 µg/L
Panhandle East	180 µg/L	1030 µg/L
North Central	300 µ/L	1870 µg/L
Peninsular	120 µg/L	1540 µg/L
West Central	490 µg/L	1650 µg/L
South Florida	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.

¹These values are annual geometric mean concentrations not to be exceeded more than once in any three calendar year periods.

Long-Term Data Summary Streams: Definitions

The following long-term data are the primary trophic state parameters collected by LAKEWATCH volunteers and classification variables color and specific conductance (LAKEWATCH recently began analyzing samples quarterly for color and specific conductance):

- **Total Phosphorus (µg/L):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen (µg/L):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algal population.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity (how far one can see into the water) and are listed with English and metric units.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filter 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 dissolve materials in water.

Long-Term Data Summary Streams: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus (µg/L)	37 - 183	74 (22)
Total Nitrogen (µg/L)	881 - 1875	1390 (22)
Chlorophyll- uncorrected (µg/L)	2.8 - 23.3	8.8 (22)
Secchi (ft)	-	()
Secchi (m)	-	()
Color (Pt-Co Units)	42 - 617	228 (16)
Specific Conductance (µS/cm@25 C)	182 - 348	275 (10)

LAKEWATCH Report for Spruce Creek-1 in Volusia County Using Data Downloaded 10/17/2016

Trend Analyses Streams

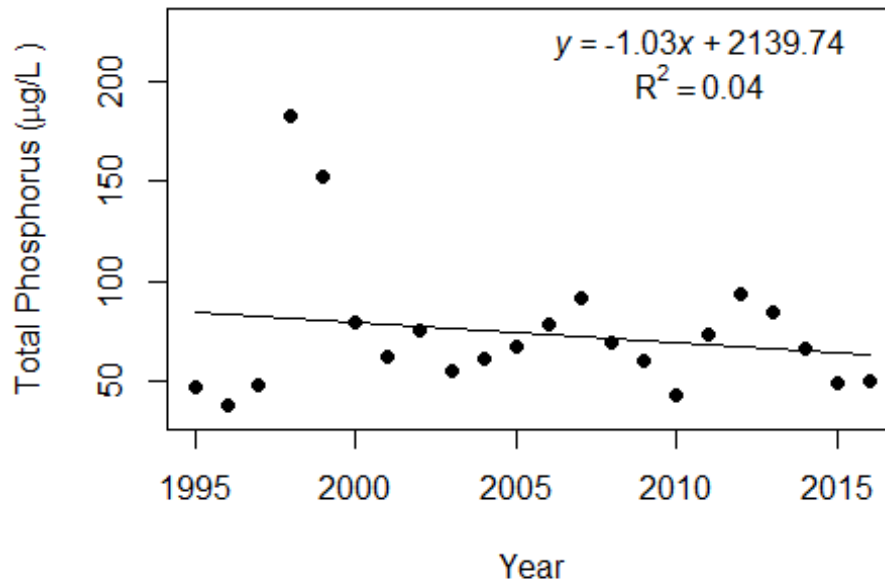
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over time. These analyses define statistics based on the best fit line drawn through the data after plotting them with year on the horizontal line (x-axis) and the data value on the vertical line (y-axis). Figure 2 shows example plots with linear regression statistic of lakes that show significant total phosphorus increases, decreases and no change over time. The statistics that are listed include the following:

- **Number of years (n):** This is simply the number of years of data that were used to calculate annual means.
- **Intercept (a):** This is the value on the y-axis that the fitted line would have cross if the x-axis where zero.
- **Slope (b):** This is the rate at which the fitted line increases (positive number) or decreases (negative number).
- **Coefficient of determination (R²):** This value is an indication of how much variance above and below the fitted line there is in the data. This value ranges from 0 to 1. A high value means a tight fit and a low value means a loose fit.
- **Probability of Significance (p):** For most statistical analyses a p-value of less than 0.05 means the statistic is significant and analyses with p-values greater than 0.05 are not significant.

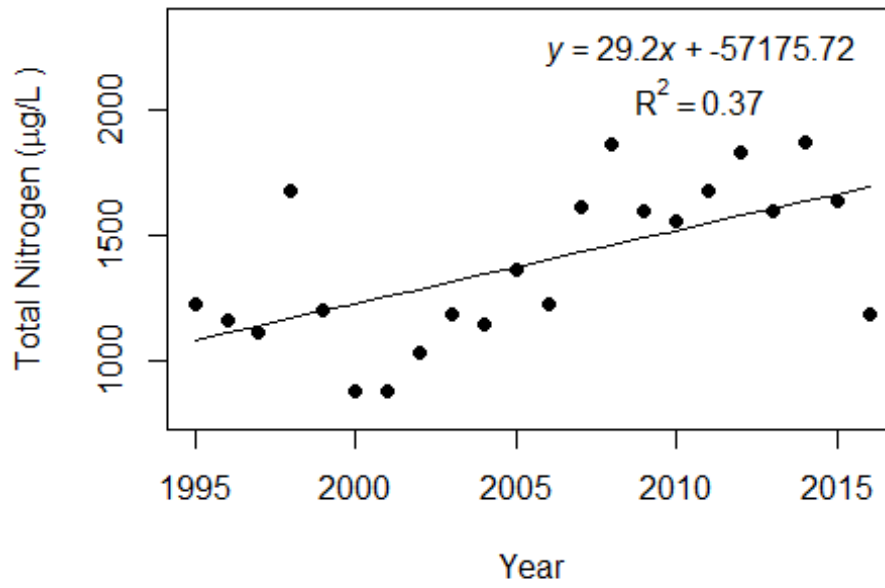
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	22	22	22	
Intercept (a)	2140	-57176	-419	
Slope (b)	-1.03	29.20	0.21	
Coefficient of Determination (R ²)	0.04	0.37	0.07	
Probability of Significance (p)	0.39	0.00	0.23	
Potential Trend	No Trend	Increasing	No Trend	

The following graphs on the next two pages are trend analyses examining regression between year and annual means of total phosphorus, total nitrogen, chlorophyll, and Secchi depth for Spruce Creek-1 in Volusia County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

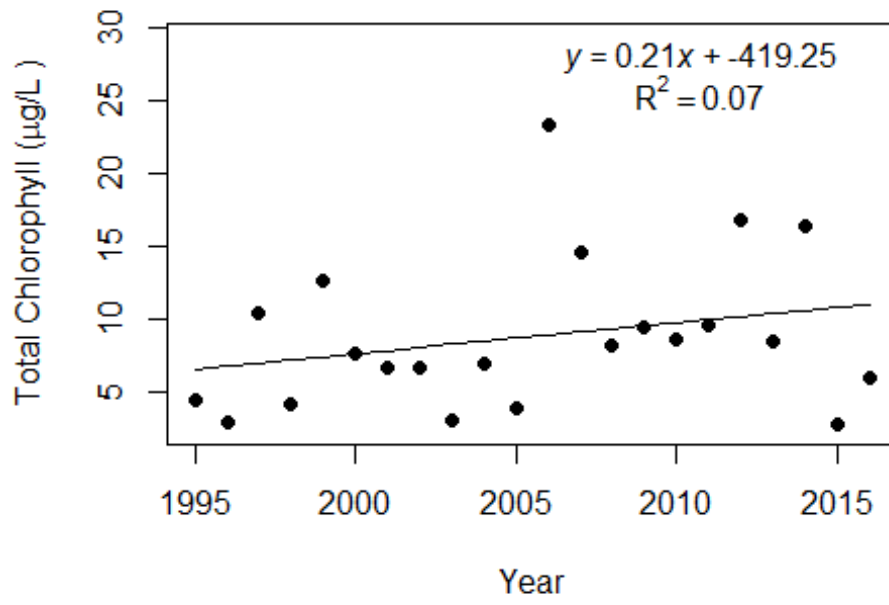
Spruce Creek-1 (Volusia)



Spruce Creek-1 (Volusia)



Spruce Creek-1 (Volusia)



LAKEWATCH Report for Spruce Creek-2 in Volusia County Using Data Downloaded 10/17/2016

Introduction Streams

For many decades Florida has had a narrative nutrient water quality criterion in place to protect Florida's waters against nutrient over-enrichment. In 2009, the Florida Department of Environmental Protection (FDEP) initiated rulemaking and, by 2011, adopted what would be the first set of statewide numeric nutrient standards for Florida's waters. By 2015, almost all of the remaining waters in Florida have numeric nutrient standards (see for Florida Department of Environmental Regulation Nutrient Criteria's for: Streams, spring vents: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

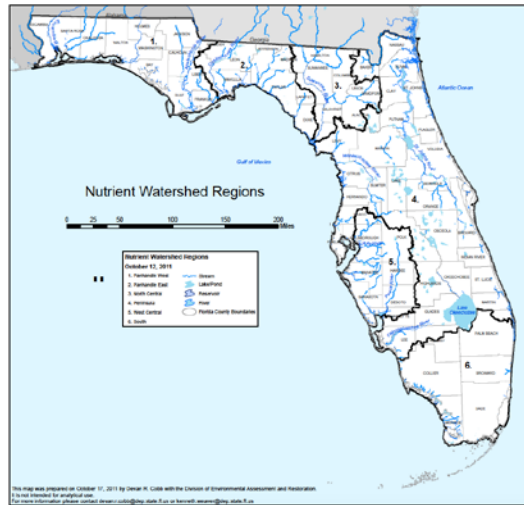


Figure 1. Map showing nutrient thresholds areas for streams set forth by FDEP.

Base File Data: Definitions

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

- **County:** Name of county in which the stream resides.
- **Name:** Stream name that LAKEWATCH uses for the 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, streams and springs.
- **Period of Record (year):** Years a stream has been in the LAKEWATCH program.

County	Volusia
Name	Spruce Creek-2
Latitude	29.0569
Longitude	-81.0508
Water Body Type	Stream
Period of Record (year)	1995 to 2016
Nutrient Watershed Region	Peninsular

LAKEWATCH Report for Spruce Creek-2 in Volusia County Using Data Downloaded 10/17/2016

The nutrient thresholds for streams set forth by FDEP are listed in table below along with the map showing zones.

Nutrient Watershed Region	Total Phosphorus Nutrient Threshold ¹	Total Nitrogen Nutrient Threshold ¹
Panhandle West	60 µg/L	670 µg/L
Panhandle East	180 µg/L	1030 µg/L
North Central	300 µ/L	1870 µg/L
Peninsular	120 µg/L	1540 µg/L
West Central	490 µg/L	1650 µg/L
South Florida	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.

¹These values are annual geometric mean concentrations not to be exceeded more than once in any three calendar year periods.

Long-Term Data Summary Streams: Definitions

The following long-term data are the primary trophic state parameters collected by LAKEWATCH volunteers and classification variables color and specific conductance (LAKEWATCH recently began analyzing samples quarterly for color and specific conductance):

- **Total Phosphorus (µg/L):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen (µg/L):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algal population.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity (how far one can see into the water) and are listed with English and metric units.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filter 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 dissolve materials in water.

Long-Term Data Summary Streams: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus (µg/L)	70 - 218	130 (22)
Total Nitrogen (µg/L)	763 - 1667	1212 (22)
Chlorophyll- uncorrected (µg/L)	1.2 - 10.7	3.0 (22)
Secchi (ft)	-	()
Secchi (m)	-	()
Color (Pt-Co Units)	23 - 434	133 (16)
Specific Conductance (µS/cm@25 C)	223 - 418	342 (10)

LAKEWATCH Report for Spruce Creek-2 in Volusia County Using Data Downloaded 10/17/2016

Trend Analyses Streams

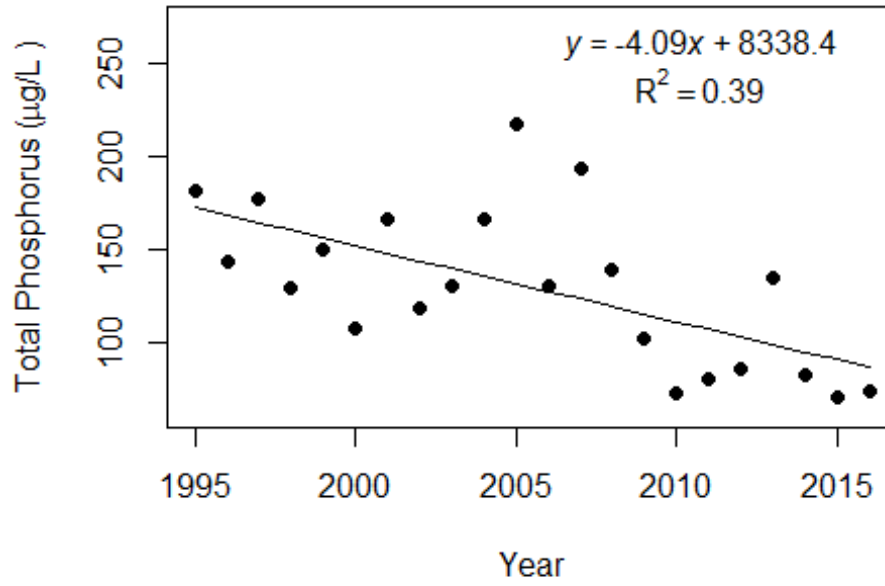
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over time. These analyses define statistics based on the best fit line drawn through the data after plotting them with year on the horizontal line (x-axis) and the data value on the vertical line (y-axis). Figure 2 shows example plots with linear regression statistic of lakes that show significant total phosphorus increases, decreases and no change over time. The statistics that are listed include the following:

- **Number of years (n):** This is simply the number of years of data that were used to calculate annual means.
- **Intercept (a):** This is the value on the y-axis that the fitted line would have cross if the x-axis where zero.
- **Slope (b):** This is the rate at which the fitted line increases (positive number) or decreases (negative number).
- **Coefficient of determination (R²):** This value is an indication of how much variance above and below the fitted line there is in the data. This value ranges from 0 to 1. A high value means a tight fit and a low value means a loose fit.
- **Probability of Significance (p):** For most statistical analyses a p-value of less than 0.05 means the statistic is significant and analyses with p-values greater than 0.05 are not significant.

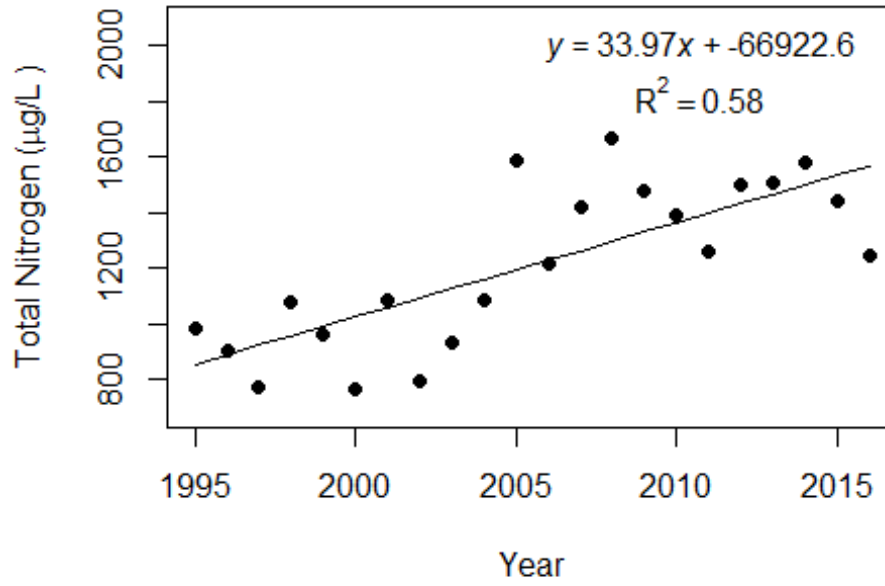
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	22	22	22	
Intercept (a)	8338	-66923	-281	
Slope (b)	-4.09	33.97	0.14	
Coefficient of Determination (R ²)	0.39	0.58	0.18	
Probability of Significance (p)	0.00	0.00	0.05	
Potential Trend	Decreasing	Increasing	No Trend	

The following graphs on the next two pages are trend analyses examining regression between year and annual means of total phosphorus, total nitrogen, chlorophyll, and Secchi depth for Spruce Creek-2 in Volusia County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

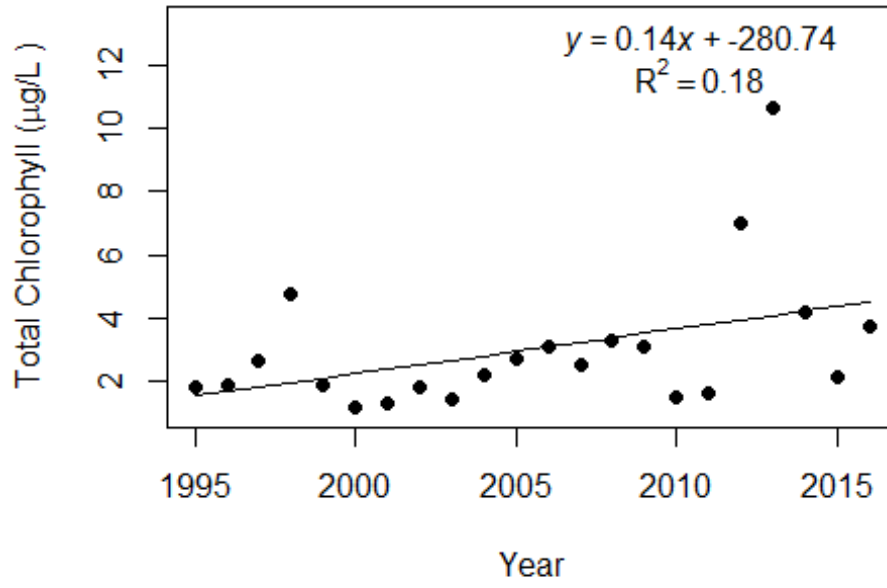
Spruce Creek-2 (Volusia)



Spruce Creek-2 (Volusia)



Spruce Creek-2 (Volusia)



LAKEWATCH Report for Spruce Creek-3 in Volusia County Using Data Downloaded 10/17/2016

Introduction Streams

For many decades Florida has had a narrative nutrient water quality criterion in place to protect Florida's waters against nutrient over-enrichment. In 2009, the Florida Department of Environmental Protection (FDEP) initiated rulemaking and, by 2011, adopted what would be the first set of statewide numeric nutrient standards for Florida's waters. By 2015, almost all of the remaining waters in Florida have numeric nutrient standards (see for Florida Department of Environmental Regulation Nutrient Criteria's for: Streams, spring vents: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

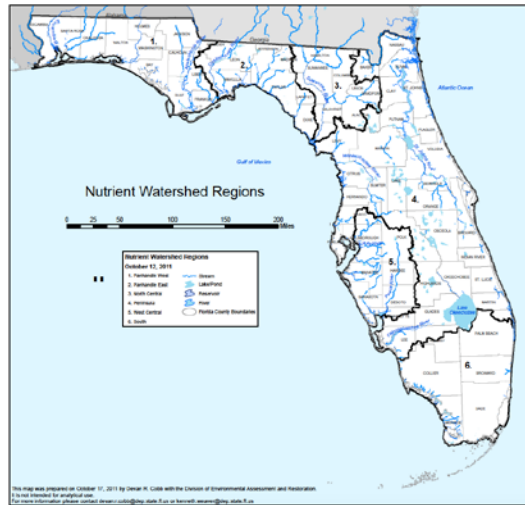


Figure 1. Map showing nutrient thresholds areas for streams set forth by FDEP.

Base File Data: Definitions

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

- **County:** Name of county in which the stream resides.
- **Name:** Stream name that LAKEWATCH uses for the 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, streams and springs.
- **Period of Record (year):** Years a stream has been in the LAKEWATCH program.

County	Volusia
Name	Spruce Creek-3
Latitude	29.0692
Longitude	-81.0267
Water Body Type	Stream
Period of Record (year)	1995 to 2016
Nutrient Watershed Region	Peninsular

LAKEWATCH Report for Spruce Creek-3 in Volusia County Using Data Downloaded 10/17/2016

The nutrient thresholds for streams set forth by FDEP are listed in table below along with the map showing zones.

Nutrient Watershed Region	Total Phosphorus Nutrient Threshold ¹	Total Nitrogen Nutrient Threshold ¹
Panhandle West	60 µg/L	670 µg/L
Panhandle East	180 µg/L	1030 µg/L
North Central	300 µ/L	1870 µg/L
Peninsular	120 µg/L	1540 µg/L
West Central	490 µg/L	1650 µg/L
South Florida	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.	No numeric nutrient threshold. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.

¹These values are annual geometric mean concentrations not to be exceeded more than once in any three calendar year periods.

Long-Term Data Summary Streams: Definitions

The following long-term data are the primary trophic state parameters collected by LAKEWATCH volunteers and classification variables color and specific conductance (LAKEWATCH recently began analyzing samples quarterly for color and specific conductance):

- **Total Phosphorus (µg/L):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen (µg/L):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected (µg/L):** Chlorophyll concentrations are used to measure relative abundances of open water algal population.
- **Secchi (ft), Secchi (m):** Secchi measurements are estimates of water clarity (how far one can see into the water) and are listed with English and metric units.
- **Color (Pt-Co Units):** LAKEWATCH measures true color, which is the color of the water after particles have been filter 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 dissolve materials in water.

Long-Term Data Summary Streams: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus (µg/L)	37 - 401	106 (22)
Total Nitrogen (µg/L)	669 - 1520	1110 (22)
Chlorophyll- uncorrected (µg/L)	14.8 - 62.6	27.0 (22)
Secchi (ft)	-	()
Secchi (m)	-	()
Color (Pt-Co Units)	19 - 87	37 (16)
Specific Conductance (µS/cm@25 C)	254 - 370	313 (10)

LAKEWATCH Report for Spruce Creek-3 in Volusia County Using Data Downloaded 10/17/2016

Trend Analyses Streams

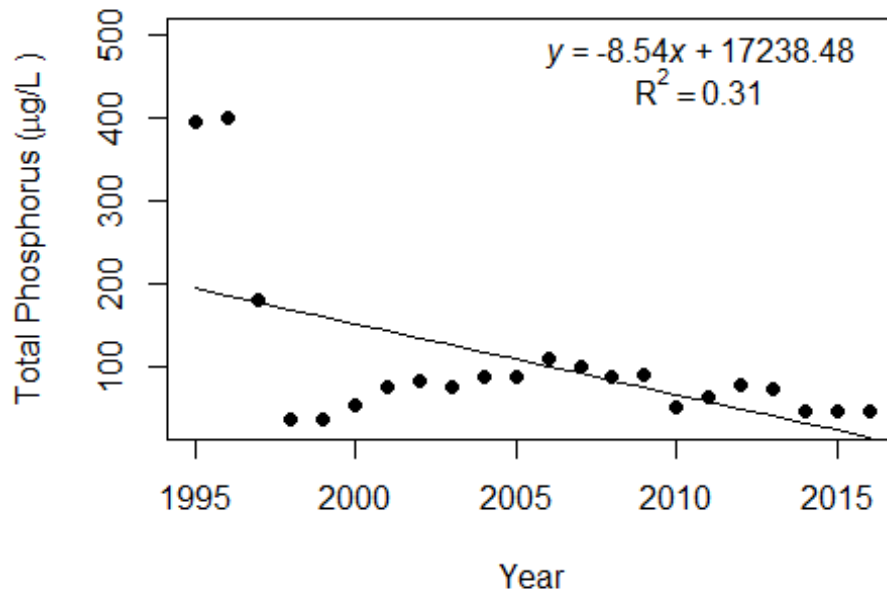
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- **Number of years (n):** This is simply the number of years of data that were used to calculate annual means.
- **Intercept (a):** This is the value on the y-axis that the fitted line would have cross if the x-axis where zero.
- **Slope (b):** This is the rate at which the fitted line increases (positive number) or decreases (negative number).
- **Coefficient of determination (R²):** This value is an indication of how much variance above and below the fitted line there is in the data. This value ranges from 0 to 1. A high value means a tight fit and a low value means a loose fit.
- **Probability of Significance (p):** For most statistical analyses a p-value of less than 0.05 means the statistic is significant and analyses with p-values greater than 0.05 are not significant.

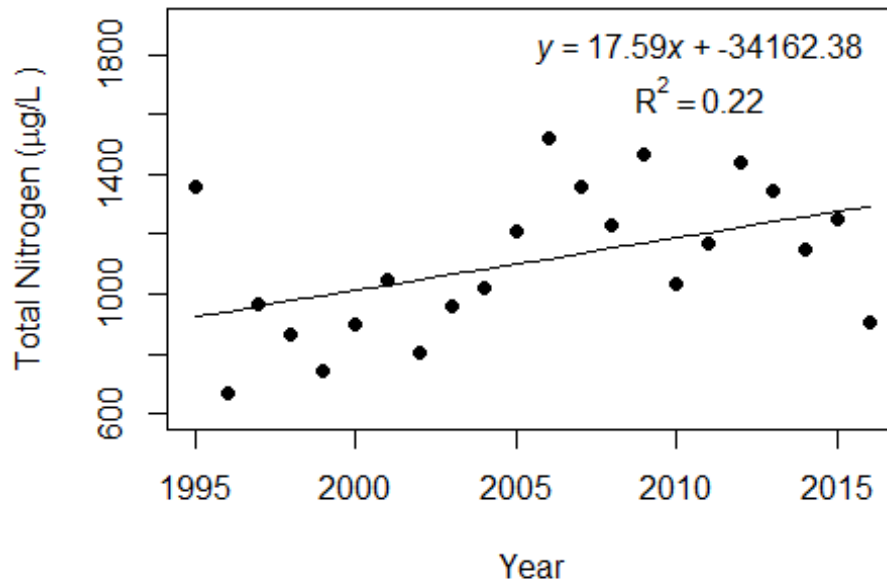
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	22	22	22	
Intercept (a)	17238	-34162	721	
Slope (b)	-8.54	17.59	-0.35	
Coefficient of Determination (R ²)	0.31	0.22	0.04	
Probability of Significance (p)	0.01	0.03	0.35	
Potential Trend	Decreasing	Increasing	No Trend	

The following graphs on the next two pages are trend analyses examining regression between year and annual means of total phosphorus, total nitrogen, chlorophyll, and Secchi depth for Spruce Creek-3 in Volusia County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

Spruce Creek-3 (Volusia)



Spruce Creek-3 (Volusia)



Spruce Creek-3 (Volusia)

