

LAKEWATCH Report for Money Bayou-1 in Gulf County Using Data Downloaded 10/17/2016

Introduction Estuary

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: Estuaries and coastal segments: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

The near shore Florida coastline is separated into estuary and estuary segments within the estuary. Deeper coastal waters are separated into coastal nutrient regions and coastal nutrient segments within the regions. Numeric nutrient criteria are established for all estuary segments, including criteria for total nitrogen, total phosphorus, and chlorophyll a. For open ocean coastal waters, numeric criteria are established for chlorophyll a, that is derived from satellite remote sensing techniques. For those locations without defined segments there are narrative nutrient criteria (e.g., Florida Keys Halo Zone).

The maps defining individual estuaries and coastal segments can be found at: <https://www.flrules.org/Gateway/reference.asp?No=Ref-05420>.

The individual nutrient criteria can be found at: <https://www.flrules.org/gateway/ruleNo.asp?id=62-302.532>

Estuary lies in the following location:

Estuary	Estuary Segment	Coastal Nutrient Region	Coastal Nutrient Segment
St. Joseph Bay	St. Joseph Bay		

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 estuary resides.
- **Name:** Estuary 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 an estuary has been in the LAKEWATCH program.

County	Gulf
Name	Money Bayou-1
Latitude	29.6946
Longitude	-85.2818
Water Body Type	Estuary
Period of Record (year)	2016 to 2016

LAKEWATCH Report for Money Bayou-1 in Gulf County Using Data Downloaded 10/17/2016

Long-Term Data Summary Estuary: 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 ($\mu\text{g/L}$):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen ($\mu\text{g/L}$):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$), Salinity (ppt):** 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 Estuary: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus ($\mu\text{g/L}$)	84 - 84	84 (1)
Total Nitrogen ($\mu\text{g/L}$)	1520 - 1520	1520 (1)
Chlorophyll- uncorrected ($\mu\text{g/L}$)	27.0 - 27.0	27.0 (1)
Secchi (ft)	-	-
Secchi (m)	-	-
Color (Pt-Co Units)	296 -296	296 (1)
Specific Conductance ($\mu\text{S/cm@25 C}$)	951 - 951	951 (1)
Salinity (ppt)	-	-

Coastal Trophic State

Trophic status is a measure of a systems biological productivity and LAKEWATCH uses total chlorophyll averages as a trophic state measure. Since the total chlorophyll measurement indicates how much algae is actually present in a water body, it is the most direct indicator of biological productivity. For freshwater lakes, LAKEWATCH uses the trophic state classification criteria proposed by Forsberg and Ryding (1980). LAKEWATCH staff sampled coastal systems around all of Florida (Hoyer et al. 2002) and discovered that chlorophyll concentrations are significantly less for the same amount of algae than freshwater lakes. Thus, to classify trophic status of coastal waters using similar classification terminology LAKEWATCH provided the table below accounting for the chlorophyll differences reported by Hoyer et al. (2002).

Trophic Status	Freshwater Chlorophyll ($\mu\text{g/L}$) (Forsberg and Ryding 1980)	Coastal Chlorophyll ($\mu\text{g/L}$) (Hoyer et al. 2002)
Oligotrophic	< 3.0	< 0.5
Mesotrophic	3.0 - 7.0	0.5 - 1.8
Eutrophic	7.0 - 40.0	1.8 - 12.4
Hypereutrophic	> 40.0	> 12.4

Hoyer, M. V., T. K. Frazer, S. K. Notestein and D. E. Canfield, Jr. 2002. Nutrient, chlorophyll, and water clarity relationships in Florida's nearshore coastal waters with comparisons to freshwater lakes. Canadian Journal of Fisheries and Aquatic Sciences 59:1-8.

LAKEWATCH Report for Money Bayou-1 in Gulf County Using Data Downloaded 10/17/2016

Trend Analyses Estuary

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 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 values 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)				
Intercept (a)				
Slope (b)				
Coefficient of Determination (R ²)				
Probability of Significance (p)				
Potential 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 Money Bayou-1 in Gulf County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

LAKEWATCH Report for Simmons Bayou-1 in Gulf County Using Data Downloaded 10/17/2016

Introduction Estuary

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: Estuaries and coastal segments: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

The near shore Florida coastline is separated into estuary and estuary segments within the estuary. Deeper coastal waters are separated into coastal nutrient regions and coastal nutrient segments within the regions. Numeric nutrient criteria are established for all estuary segments, including criteria for total nitrogen, total phosphorus, and chlorophyll a. For open ocean coastal waters, numeric criteria are established for chlorophyll a, that is derived from satellite remote sensing techniques. For those locations without defined segments there are narrative nutrient criteria (e.g., Florida Keys Halo Zone).

The maps defining individual estuaries and coastal segments can be found at: <https://www.flrules.org/Gateway/reference.asp?No=Ref-05420>.

The individual nutrient criteria can be found at: <https://www.flrules.org/gateway/ruleNo.asp?id=62-302.532>

Estuary lies in the following location:

Estuary	Estuary Segment	Coastal Nutrient Region	Coastal Nutrient Segment
St. Joseph Bay	St. Joseph Bay		

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 estuary resides.
- **Name:** Estuary 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 an estuary has been in the LAKEWATCH program.

County	Gulf
Name	Simmons Bayou-1
Latitude	29.7538
Longitude	-85.3028
Water Body Type	Estuary
Period of Record (year)	2016 to 2016

LAKEWATCH Report for Simmons Bayou-1 in Gulf County Using Data Downloaded 10/17/2016

Long-Term Data Summary Estuary: 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 ($\mu\text{g/L}$):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen ($\mu\text{g/L}$):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$), Salinity (ppt):** 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 Estuary: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus ($\mu\text{g/L}$)	24 - 24	24 (1)
Total Nitrogen ($\mu\text{g/L}$)	480 - 480	480 (1)
Chlorophyll- uncorrected ($\mu\text{g/L}$)	78.5 - 78.5	78.5 (1)
Secchi (ft)	-	-
Secchi (m)	-	-
Color (Pt-Co Units)	64 -64	64 (1)
Specific Conductance ($\mu\text{S/cm@25 C}$)	752 - 752	752 (1)
Salinity (ppt)	-	-

Coastal Trophic State

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Trophic Status	Freshwater Chlorophyll ($\mu\text{g/L}$) (Forsberg and Ryding 1980)	Coastal Chlorophyll ($\mu\text{g/L}$) (Hoyer et al. 2002)
Oligotrophic	< 3.0	< 0.5
Mesotrophic	3.0 - 7.0	0.5 - 1.8
Eutrophic	7.0 - 40.0	1.8 - 12.4
Hypereutrophic	> 40.0	> 12.4

Hoyer, M. V., T. K. Frazer, S. K. Notestein and D. E. Canfield, Jr. 2002. Nutrient, chlorophyll, and water clarity relationships in Florida's nearshore coastal waters with comparisons to freshwater lakes. Canadian Journal of Fisheries and Aquatic Sciences 59:1-8.

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Trend Analyses Estuary

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:

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- **Intercept (a):** This is the value on the y-axis that the fitted line would 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 values 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)				
Intercept (a)				
Slope (b)				
Coefficient of Determination (R ²)				
Probability of Significance (p)				
Potential 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 Simmons Bayou-1 in Gulf County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

LAKEWATCH Report for St. Joseph Bay-1 in Gulf County Using Data Downloaded 10/17/2016

Introduction Estuary

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: Estuaries and coastal segments: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

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The individual nutrient criteria can be found at: <https://www.flrules.org/gateway/ruleNo.asp?id=62-302.532>

Estuary lies in the following location:

Estuary	Estuary Segment	Coastal Nutrient Region	Coastal Nutrient Segment
St. Joseph Bay	St. Joseph Bay		

Base File Data: Definitions

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

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- **Latitude and Longitude:** Coordinates identifying the exact location of station 1 for each system.
- **Water Body Type:** Four different types of systems; lakes, estuaries, streams and springs.
- **Period of Record (year):** Years an estuary has been in the LAKEWATCH program.

County	Gulf
Name	St. Joseph Bay-1
Latitude	29.6932
Longitude	-85.3205
Water Body Type	Estuary
Period of Record (year)	2001 to 2016

LAKEWATCH Report for St. Joseph Bay-1 in Gulf County Using Data Downloaded 10/17/2016

Long-Term Data Summary Estuary: 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):

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- **Specific Conductance ($\mu\text{S/cm@25}^\circ\text{C}$), Salinity (ppt):** 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 Estuary: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus ($\mu\text{g/L}$)	7 - 24	16 (7)
Total Nitrogen ($\mu\text{g/L}$)	230 - 536	364 (7)
Chlorophyll- uncorrected ($\mu\text{g/L}$)	0.7 - 4.0	1.6 (7)
Secchi (ft)	3.0 - 3.0	3.0 (7)
Secchi (m)	0.9 - 0.9	0.9 (7)
Color (Pt-Co Units)	5 -14	8 (5)
Specific Conductance ($\mu\text{S/cm@25 C}$)	31500 - 49000	41900 (5)
Salinity (ppt)	20 - 31	26 (5)

Coastal Trophic State

Trophic status is a measure of a systems biological productivity and LAKEWATCH uses total chlorophyll averages as a trophic state measure. Since the total chlorophyll measurement indicates how much algae is actually present in a water body, it is the most direct indicator of biological productivity. For freshwater lakes, LAKEWATCH uses the trophic state classification criteria proposed by Forsberg and Ryding (1980). LAKEWATCH staff sampled coastal systems around all of Florida (Hoyer et al. 2002) and discovered that chlorophyll concentrations are significantly less for the same amount of algae than freshwater lakes. Thus, to classify trophic status of coastal waters using similar classification terminology LAKEWATCH provided the table below accounting for the chlorophyll differences reported by Hoyer et al. (2002).

Trophic Status	Freshwater Chlorophyll ($\mu\text{g/L}$) (Forsberg and Ryding 1980)	Coastal Chlorophyll ($\mu\text{g/L}$) (Hoyer et al. 2002)
Oligotrophic	< 3.0	< 0.5
Mesotrophic	3.0 - 7.0	0.5 - 1.8
Eutrophic	7.0 - 40.0	1.8 - 12.4
Hypereutrophic	> 40.0	> 12.4

Hoyer, M. V., T. K. Frazer, S. K. Notestein and D. E. Canfield, Jr. 2002. Nutrient, chlorophyll, and water clarity relationships in Florida's nearshore coastal waters with comparisons to freshwater lakes. Canadian Journal of Fisheries and Aquatic Sciences 59:1-8.

LAKEWATCH Report for St. Joseph Bay-1 in Gulf County Using Data Downloaded 10/17/2016

Trend Analyses Estuary

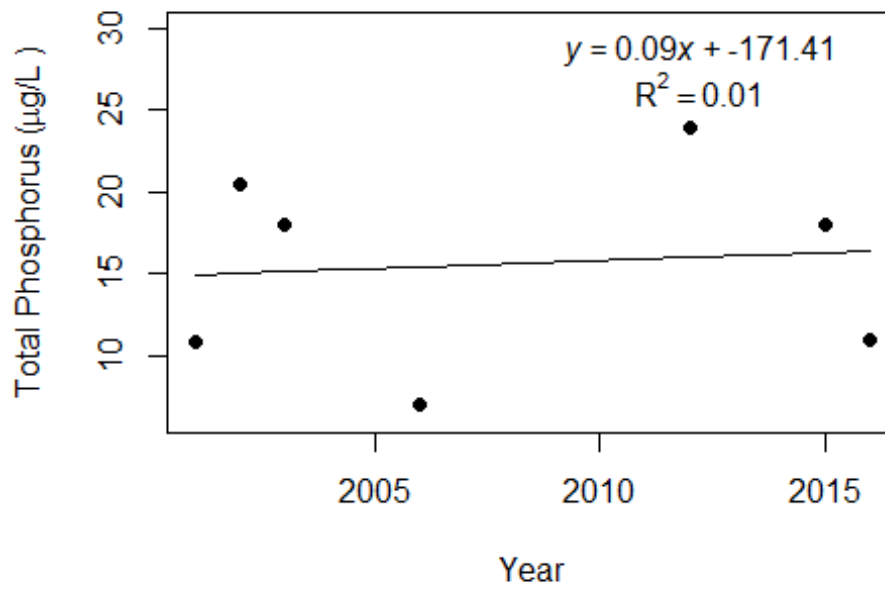
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over 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 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 values ranges from 0 to 1. A high value means a tight fit and a low value means a loose fit.
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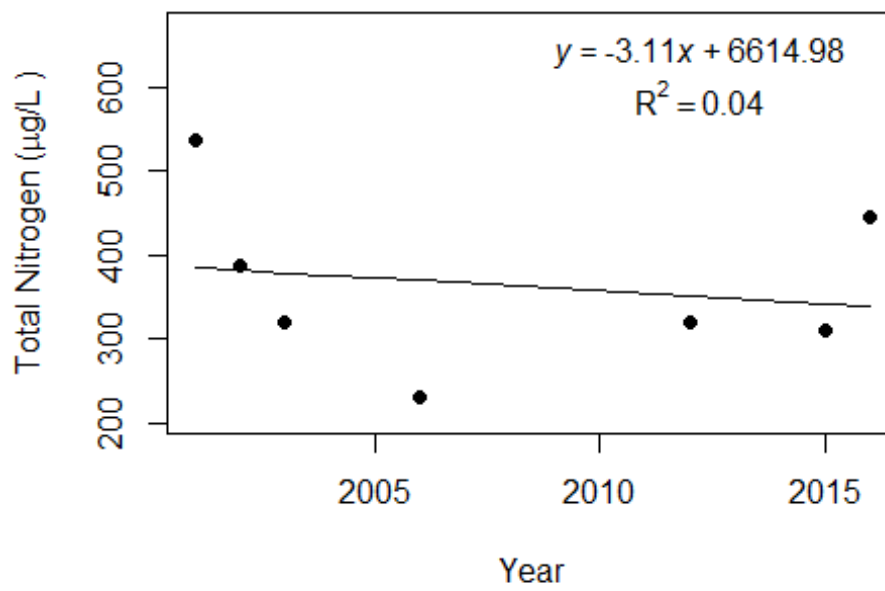
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	7	7	7	
Intercept (a)	-171	6615	-146	
Slope (b)	0.09	-3.11	0.07	
Coefficient of Determination (R ²)	0.01	0.04	0.13	
Probability of Significance (p)	0.84	0.67	0.48	
Potential Trend	No Trend	No Trend	No Trend	

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 St. Joseph Bay-1 in Gulf County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

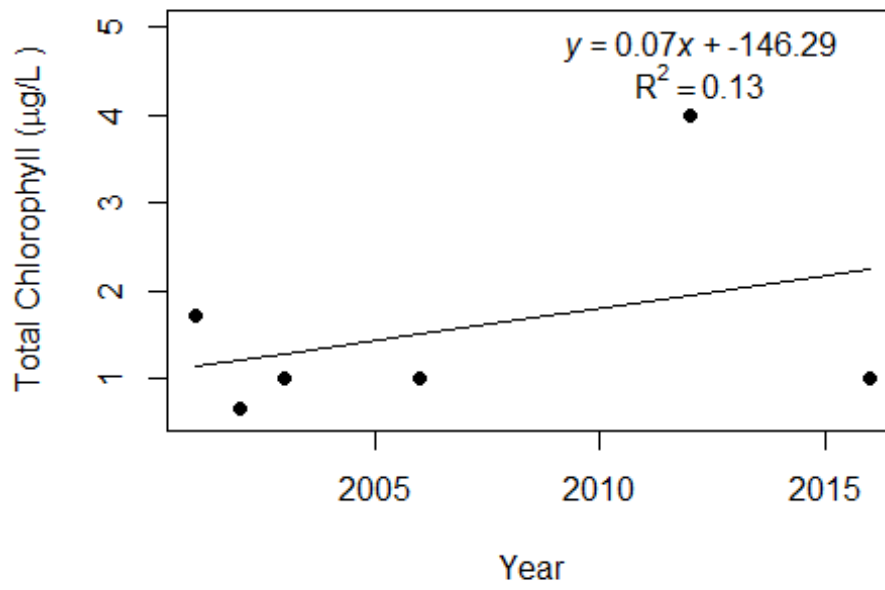
St. Joseph Bay-1 (Gulf)



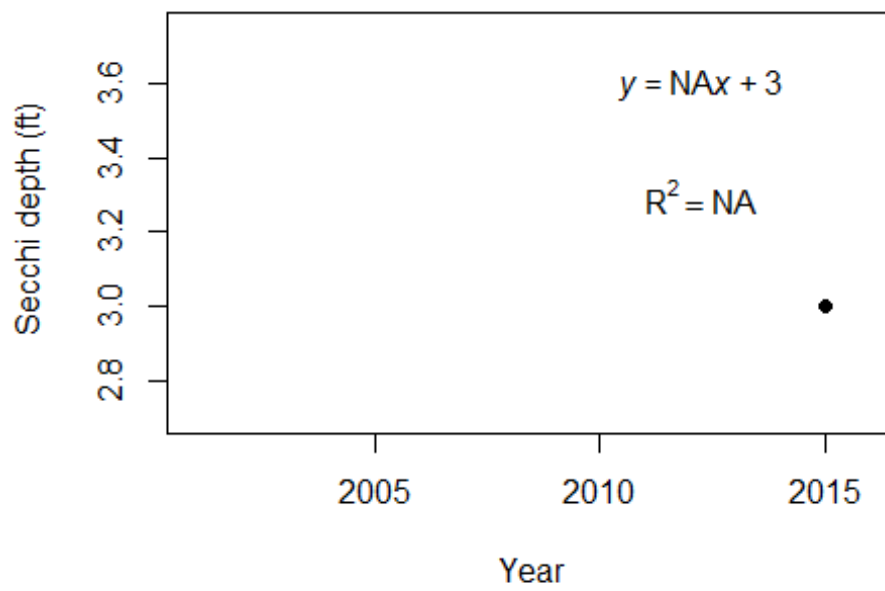
St. Joseph Bay-1 (Gulf)



St. Joseph Bay-1 (Gulf)



St. Joseph Bay-1 (Gulf)



LAKEWATCH Report for St. Joseph Bay-2 in Gulf County Using Data Downloaded 10/17/2016

Introduction Estuary

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: Estuaries and coastal segments: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

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The maps defining individual estuaries and coastal segments can be found at: <https://www.flrules.org/Gateway/reference.asp?No=Ref-05420>.

The individual nutrient criteria can be found at: <https://www.flrules.org/gateway/ruleNo.asp?id=62-302.532>

Estuary lies in the following location:

Estuary	Estuary Segment	Coastal Nutrient Region	Coastal Nutrient Segment
St. Joseph Bay	St. Joseph Bay		

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 estuary resides.
- **Name:** Estuary 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 an estuary has been in the LAKEWATCH program.

County	Gulf
Name	St. Joseph Bay-2
Latitude	29.719
Longitude	-85.3327
Water Body Type	Estuary
Period of Record (year)	2001 to 2016

LAKEWATCH Report for St. Joseph Bay-2 in Gulf County Using Data Downloaded 10/17/2016

Long-Term Data Summary Estuary: Definitions

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- **Total Phosphorus ($\mu\text{g/L}$):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen ($\mu\text{g/L}$):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$), Salinity (ppt):** 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 Estuary: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus ($\mu\text{g/L}$)	7 - 19	13 (16)
Total Nitrogen ($\mu\text{g/L}$)	130 - 350	270 (16)
Chlorophyll- uncorrected ($\mu\text{g/L}$)	0.5 - 5.2	1.7 (16)
Secchi (ft)	5.0 - 12.0	9.4 (16)
Secchi (m)	1.5 - 3.7	2.9 (16)
Color (Pt-Co Units)	5 -11	7 (14)
Specific Conductance ($\mu\text{S/cm@25 C}$)	26500 - 47000	38815 (14)
Salinity (ppt)	16 - 29	24 (14)

Coastal Trophic State

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Trophic Status	Freshwater Chlorophyll ($\mu\text{g/L}$) (Forsberg and Ryding 1980)	Coastal Chlorophyll ($\mu\text{g/L}$) (Hoyer et al. 2002)
Oligotrophic	< 3.0	< 0.5
Mesotrophic	3.0 - 7.0	0.5 - 1.8
Eutrophic	7.0 - 40.0	1.8 - 12.4
Hypereutrophic	> 40.0	> 12.4

Hoyer, M. V., T. K. Frazer, S. K. Notestein and D. E. Canfield, Jr. 2002. Nutrient, chlorophyll, and water clarity relationships in Florida's nearshore coastal waters with comparisons to freshwater lakes. Canadian Journal of Fisheries and Aquatic Sciences 59:1-8.

LAKEWATCH Report for St. Joseph Bay-2 in Gulf County Using Data Downloaded 10/17/2016

Trend Analyses Estuary

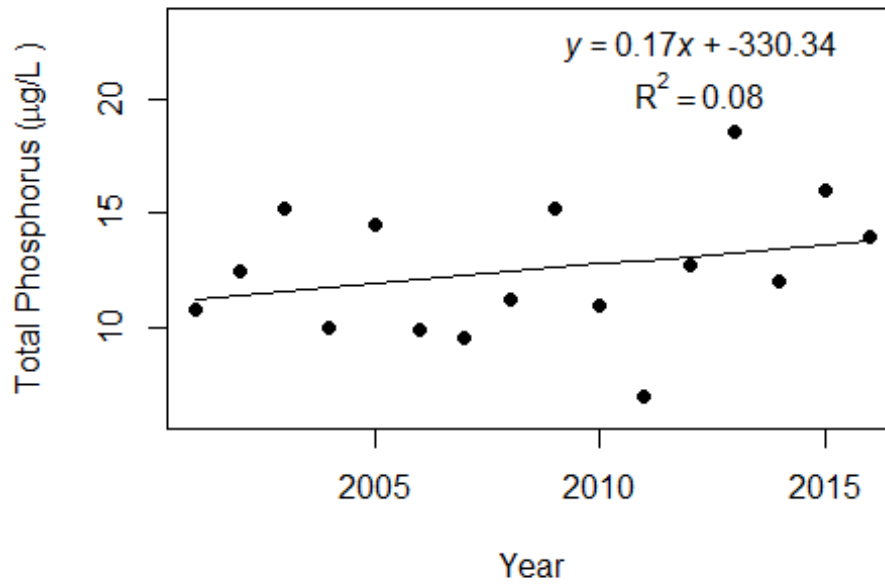
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- **Number of years (n):** This is simply the number of years of data that were used to calculate annual means.
- **Intercept (a):** This is the value on the y-axis that the fitted line would cross if the x-axis were zero.
- **Slope (b):** This is 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.

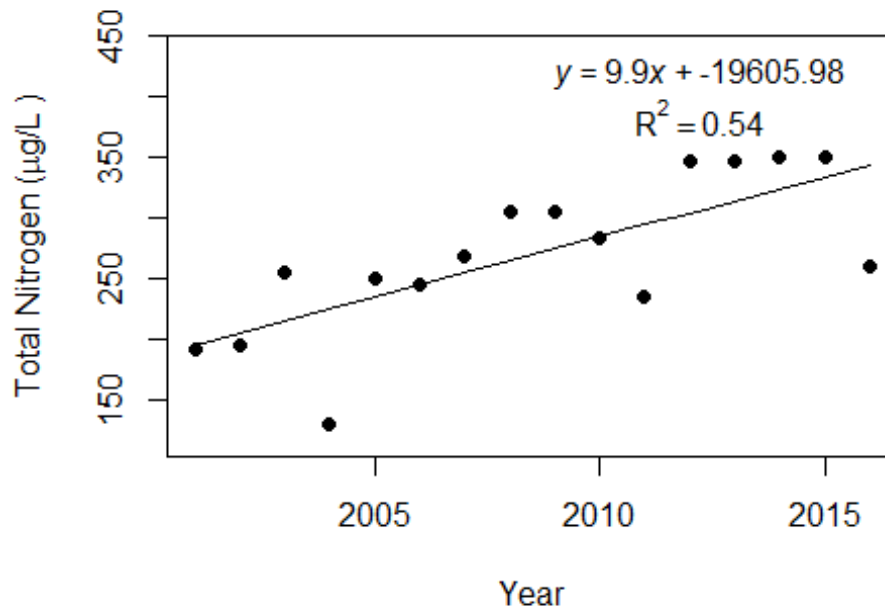
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	16	16	16	16
Intercept (a)	-330	-19606	187	351
Slope (b)	0.17	9.90	-0.09	-0.17
Coefficient of Determination (R ²)	0.08	0.54	0.16	0.19
Probability of Significance (p)	0.30	0.00	0.13	0.47
Potential Trend	No Trend	Increasing	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 St. Joseph Bay-2 in Gulf County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

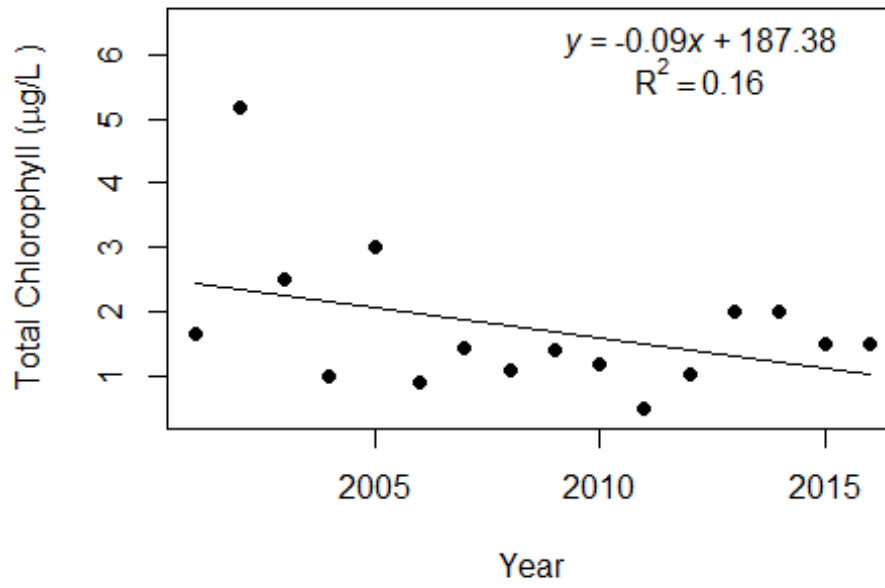
St. Joseph Bay-2 (Gulf)



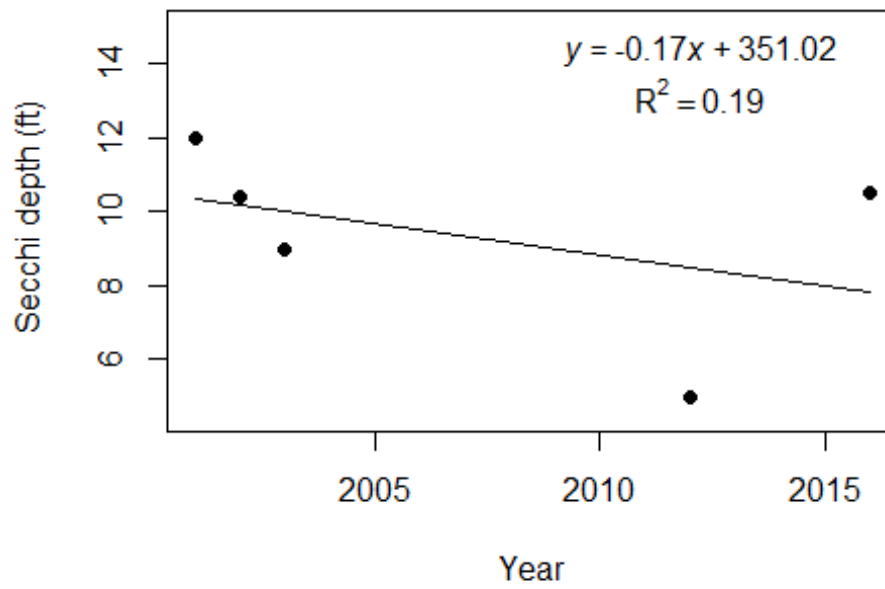
St. Joseph Bay-2 (Gulf)



St. Joseph Bay-2 (Gulf)



St. Joseph Bay-2 (Gulf)



LAKEWATCH Report for St. Joseph Bay-3 in Gulf County Using Data Downloaded 10/17/2016

Introduction Estuary

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: Estuaries and coastal segments: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

The near shore Florida coastline is separated into estuary and estuary segments within the estuary. Deeper coastal waters are separated into coastal nutrient regions and coastal nutrient segments within the regions. Numeric nutrient criteria are established for all estuary segments, including criteria for total nitrogen, total phosphorus, and chlorophyll a. For open ocean coastal waters, numeric criteria are established for chlorophyll a, that is derived from satellite remote sensing techniques. For those locations without defined segments there are narrative nutrient criteria (e.g., Florida Keys Halo Zone).

The maps defining individual estuaries and coastal segments can be found at: <https://www.flrules.org/Gateway/reference.asp?No=Ref-05420>.

The individual nutrient criteria can be found at: <https://www.flrules.org/gateway/ruleNo.asp?id=62-302.532>

Estuary lies in the following location:

Estuary	Estuary Segment	Coastal Nutrient Region	Coastal Nutrient Segment
St. Joseph Bay	St. Joseph Bay		

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 estuary resides.
- **Name:** Estuary 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 an estuary has been in the LAKEWATCH program.

County	Gulf
Name	St. Joseph Bay-3
Latitude	29.6994
Longitude	-85.3632
Water Body Type	Estuary
Period of Record (year)	2001 to 2016

LAKEWATCH Report for St. Joseph Bay-3 in Gulf County Using Data Downloaded 10/17/2016

Long-Term Data Summary Estuary: 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 ($\mu\text{g/L}$):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen ($\mu\text{g/L}$):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$), Salinity (ppt):** 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 Estuary: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus ($\mu\text{g/L}$)	10 - 20	14 (16)
Total Nitrogen ($\mu\text{g/L}$)	170 - 324	267 (16)
Chlorophyll- uncorrected ($\mu\text{g/L}$)	0.4 - 3.8	1.9 (16)
Secchi (ft)	5.0 - 11.3	8.3 (16)
Secchi (m)	1.5 - 3.4	2.5 (16)
Color (Pt-Co Units)	4 -11	7 (14)
Specific Conductance ($\mu\text{S/cm@25 C}$)	25000 - 47500	39867 (14)
Salinity (ppt)	15 - 30	25 (14)

Coastal Trophic State

Trophic status is a measure of a systems biological productivity and LAKEWATCH uses total chlorophyll averages as a trophic state measure. Since the total chlorophyll measurement indicates how much algae is actually present in a water body, it is the most direct indicator of biological productivity. For freshwater lakes, LAKEWATCH uses the trophic state classification criteria proposed by Forsberg and Ryding (1980). LAKEWATCH staff sampled coastal systems around all of Florida (Hoyer et al. 2002) and discovered that chlorophyll concentrations are significantly less for the same amount of algae than freshwater lakes. Thus, to classify trophic status of coastal waters using similar classification terminology LAKEWATCH provided the table below accounting for the chlorophyll differences reported by Hoyer et al. (2002).

Trophic Status	Freshwater Chlorophyll ($\mu\text{g/L}$) (Forsberg and Ryding 1980)	Coastal Chlorophyll ($\mu\text{g/L}$) (Hoyer et al. 2002)
Oligotrophic	< 3.0	< 0.5
Mesotrophic	3.0 - 7.0	0.5 - 1.8
Eutrophic	7.0 - 40.0	1.8 - 12.4
Hypereutrophic	> 40.0	> 12.4

Hoyer, M. V., T. K. Frazer, S. K. Notestein and D. E. Canfield, Jr. 2002. Nutrient, chlorophyll, and water clarity relationships in Florida's nearshore coastal waters with comparisons to freshwater lakes. Canadian Journal of Fisheries and Aquatic Sciences 59:1-8.

LAKEWATCH Report for St. Joseph Bay-3 in Gulf County Using Data Downloaded 10/17/2016

Trend Analyses Estuary

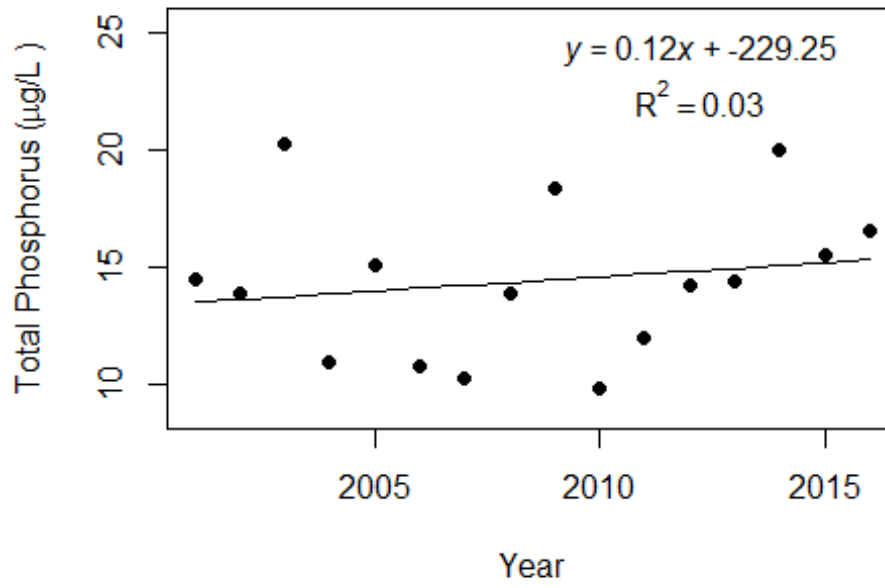
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over 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 cross if the x-axis were 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.

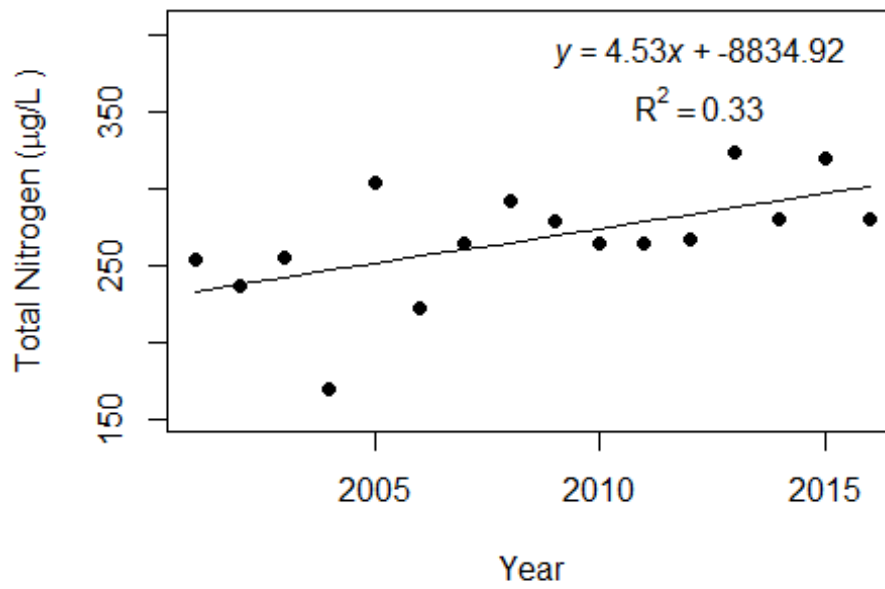
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	16	16	16	16
Intercept (a)	-229	-8835	111	365
Slope (b)	0.12	4.53	-0.05	-0.18
Coefficient of Determination (R ²)	0.03	0.33	0.08	0.16
Probability of Significance (p)	0.51	0.02	0.29	0.44
Potential Trend	No Trend	Increasing	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 St. Joseph Bay-3 in Gulf County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

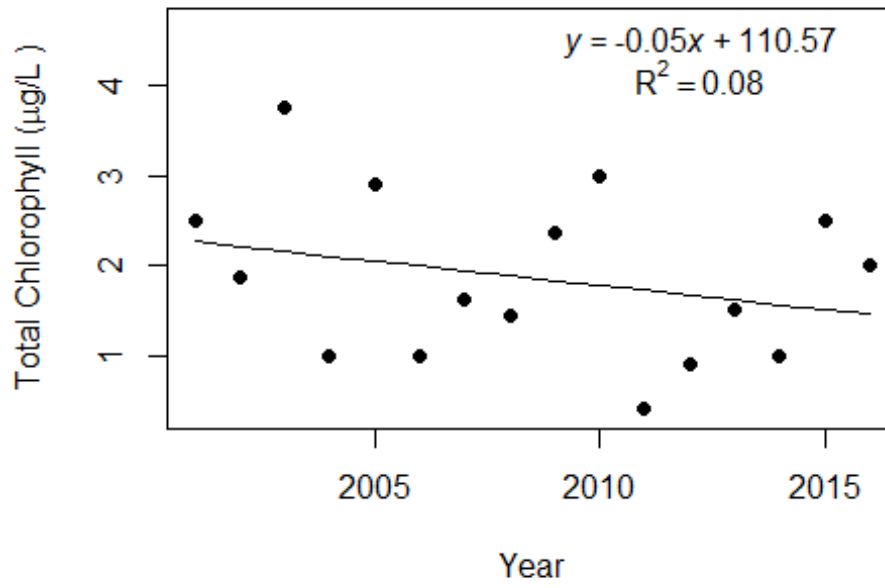
St. Joseph Bay-3 (Gulf)



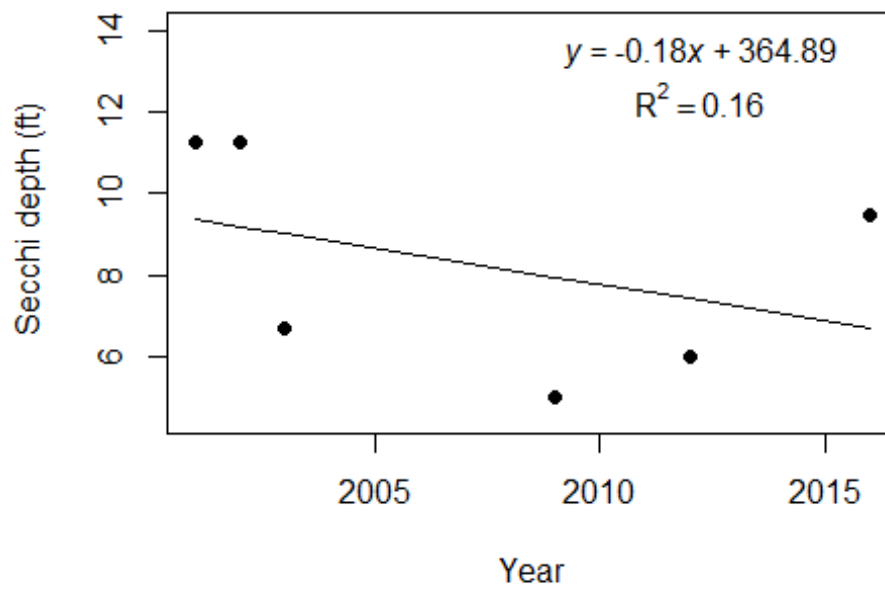
St. Joseph Bay-3 (Gulf)



St. Joseph Bay-3 (Gulf)



St. Joseph Bay-3 (Gulf)



LAKEWATCH Report for St. Joseph Bay-4 in Gulf County Using Data Downloaded 10/17/2016

Introduction Estuary

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: Estuaries and coastal segments: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

The near shore Florida coastline is separated into estuary and estuary segments within the estuary. Deeper coastal waters are separated into coastal nutrient regions and coastal nutrient segments within the regions. Numeric nutrient criteria are established for all estuary segments, including criteria for total nitrogen, total phosphorus, and chlorophyll a. For open ocean coastal waters, numeric criteria are established for chlorophyll a, that is derived from satellite remote sensing techniques. For those locations without defined segments there are narrative nutrient criteria (e.g., Florida Keys Halo Zone).

The maps defining individual estuaries and coastal segments can be found at: <https://www.flrules.org/Gateway/reference.asp?No=Ref-05420>.

The individual nutrient criteria can be found at: <https://www.flrules.org/gateway/ruleNo.asp?id=62-302.532>

Estuary lies in the following location:

Estuary	Estuary Segment	Coastal Nutrient Region	Coastal Nutrient Segment
St. Joseph Bay	St. Joseph Bay		

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 estuary resides.
- **Name:** Estuary 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 an estuary has been in the LAKEWATCH program.

County	Gulf
Name	St. Joseph Bay-4
Latitude	29.7698
Longitude	-85.4021
Water Body Type	Estuary
Period of Record (year)	2001 to 2016

LAKEWATCH Report for St. Joseph Bay-4 in Gulf County Using Data Downloaded 10/17/2016

Long-Term Data Summary Estuary: 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 ($\mu\text{g/L}$):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen ($\mu\text{g/L}$):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$), Salinity (ppt):** 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 Estuary: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus ($\mu\text{g/L}$)	10 - 23	13 (15)
Total Nitrogen ($\mu\text{g/L}$)	170 - 304	231 (15)
Chlorophyll- uncorrected ($\mu\text{g/L}$)	0.0 - 7.4	2.2 (15)
Secchi (ft)	4.7 - 8.0	6.6 (15)
Secchi (m)	1.4 - 2.4	2.0 (15)
Color (Pt-Co Units)	3 -16	7 (13)
Specific Conductance ($\mu\text{S/cm@25 C}$)	28000 - 49000	39538 (13)
Salinity (ppt)	17 - 31	25 (13)

Coastal Trophic State

Trophic status is a measure of a systems biological productivity and LAKEWATCH uses total chlorophyll averages as a trophic state measure. Since the total chlorophyll measurement indicates how much algae is actually present in a water body, it is the most direct indicator of biological productivity. For freshwater lakes, LAKEWATCH uses the trophic state classification criteria proposed by Forsberg and Ryding (1980). LAKEWATCH staff sampled coastal systems around all of Florida (Hoyer et al. 2002) and discovered that chlorophyll concentrations are significantly less for the same amount of algae than freshwater lakes. Thus, to classify trophic status of coastal waters using similar classification terminology LAKEWATCH provided the table below accounting for the chlorophyll differences reported by Hoyer et al. (2002).

Trophic Status	Freshwater Chlorophyll ($\mu\text{g/L}$) (Forsberg and Ryding 1980)	Coastal Chlorophyll ($\mu\text{g/L}$) (Hoyer et al. 2002)
Oligotrophic	< 3.0	< 0.5
Mesotrophic	3.0 - 7.0	0.5 - 1.8
Eutrophic	7.0 - 40.0	1.8 - 12.4
Hypereutrophic	> 40.0	> 12.4

Hoyer, M. V., T. K. Frazer, S. K. Notestein and D. E. Canfield, Jr. 2002. Nutrient, chlorophyll, and water clarity relationships in Florida's nearshore coastal waters with comparisons to freshwater lakes. Canadian Journal of Fisheries and Aquatic Sciences 59:1-8.

LAKEWATCH Report for St. Joseph Bay-4 in Gulf County Using Data Downloaded 10/17/2016

Trend Analyses Estuary

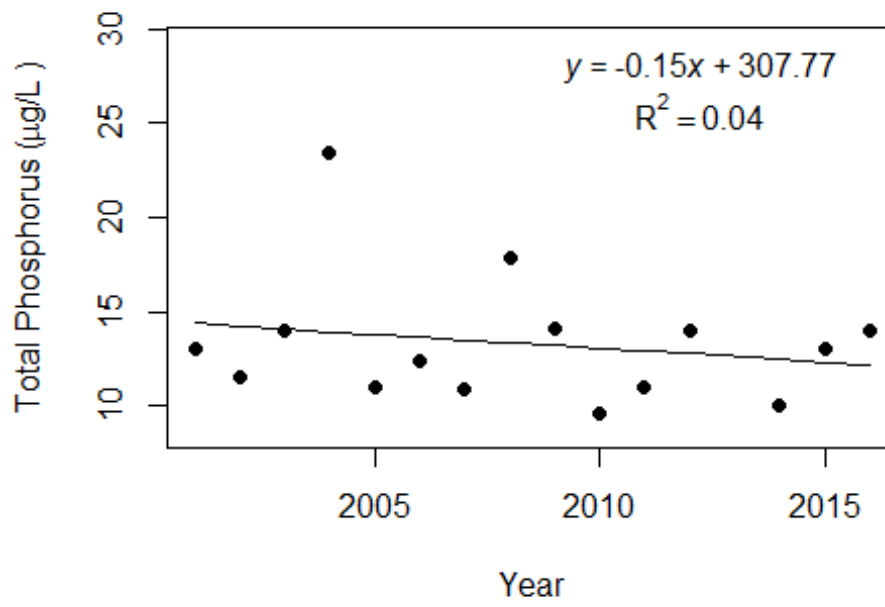
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over 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 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 values 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.

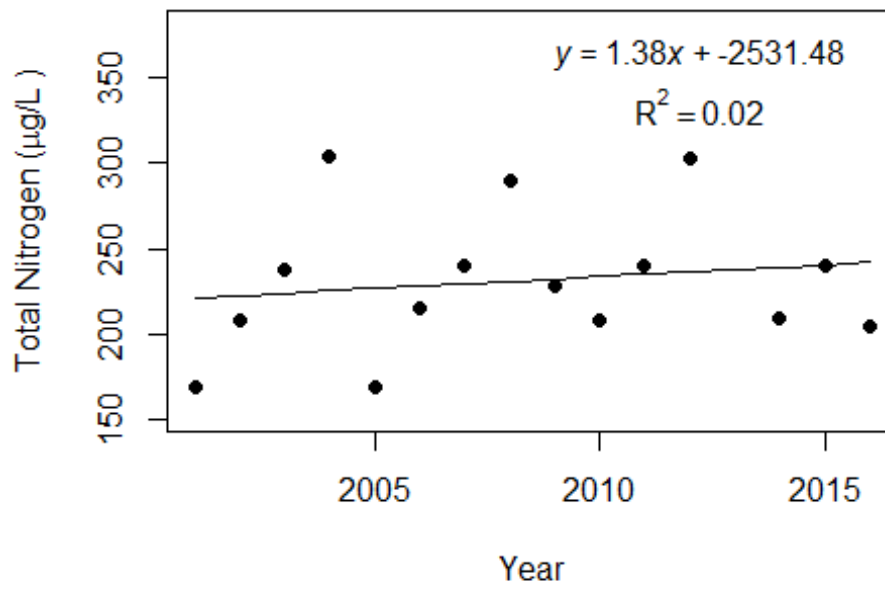
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	15	15	15	15
Intercept (a)	308	-2531	323	-933
Slope (b)	-0.15	1.38	-0.16	0.47
Coefficient of Determination (R ²)	0.04	0.03	0.18	0.43
Probability of Significance (p)	0.47	0.57	0.13	0.34
Potential Trend	No Trend	No Trend	No 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 St. Joseph Bay-4 in Gulf County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

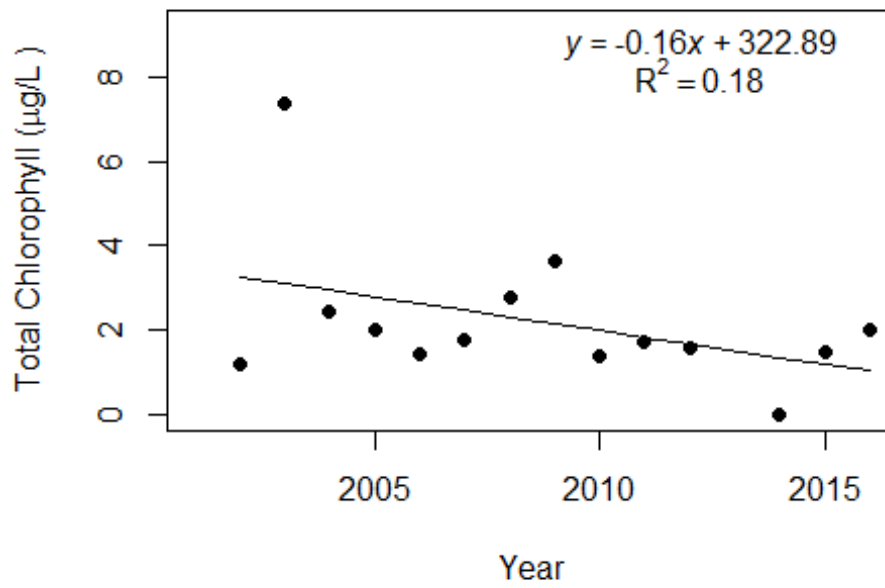
St. Joseph Bay-4 (Gulf)



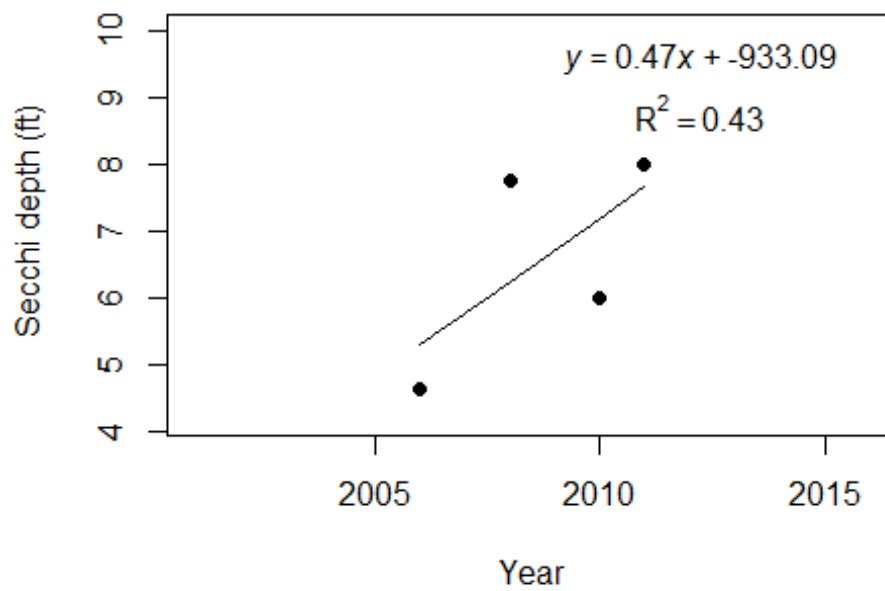
St. Joseph Bay-4 (Gulf)



St. Joseph Bay-4 (Gulf)



St. Joseph Bay-4 (Gulf)



LAKEWATCH Report for St. Joseph Bay-5 in Gulf County Using Data Downloaded 10/17/2016

Introduction Estuary

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: Estuaries and coastal segments: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

The near shore Florida coastline is separated into estuary and estuary segments within the estuary. Deeper coastal waters are separated into coastal nutrient regions and coastal nutrient segments within the regions. Numeric nutrient criteria are established for all estuary segments, including criteria for total nitrogen, total phosphorus, and chlorophyll a. For open ocean coastal waters, numeric criteria are established for chlorophyll a, that is derived from satellite remote sensing techniques. For those locations without defined segments there are narrative nutrient criteria (e.g., Florida Keys Halo Zone).

The maps defining individual estuaries and coastal segments can be found at: <https://www.flrules.org/Gateway/reference.asp?No=Ref-05420>.

The individual nutrient criteria can be found at: <https://www.flrules.org/gateway/ruleNo.asp?id=62-302.532>

Estuary lies in the following location:

Estuary	Estuary Segment	Coastal Nutrient Region	Coastal Nutrient Segment
St. Joseph Bay	St. Joseph Bay		

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 estuary resides.
- **Name:** Estuary 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 an estuary has been in the LAKEWATCH program.

County	Gulf
Name	St. Joseph Bay-5
Latitude	29.7585
Longitude	-85.3844
Water Body Type	Estuary
Period of Record (year)	2001 to 2016

LAKEWATCH Report for St. Joseph Bay-5 in Gulf County Using Data Downloaded 10/17/2016

Long-Term Data Summary Estuary: 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 ($\mu\text{g/L}$):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen ($\mu\text{g/L}$):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$), Salinity (ppt):** 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 Estuary: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus ($\mu\text{g/L}$)	8 - 20	14 (14)
Total Nitrogen ($\mu\text{g/L}$)	150 - 303	216 (14)
Chlorophyll- uncorrected ($\mu\text{g/L}$)	1.0 - 5.3	2.5 (14)
Secchi (ft)	3.3 - 7.0	5.4 (14)
Secchi (m)	1.0 - 2.1	1.6 (14)
Color (Pt-Co Units)	3 -11	6 (14)
Specific Conductance ($\mu\text{S/cm@25 C}$)	26000 - 45250	38199 (14)
Salinity (ppt)	16 - 28	24 (14)

Coastal Trophic State

Trophic status is a measure of a systems biological productivity and LAKEWATCH uses total chlorophyll averages as a trophic state measure. Since the total chlorophyll measurement indicates how much algae is actually present in a water body, it is the most direct indicator of biological productivity. For freshwater lakes, LAKEWATCH uses the trophic state classification criteria proposed by Forsberg and Ryding (1980). LAKEWATCH staff sampled coastal systems around all of Florida (Hoyer et al. 2002) and discovered that chlorophyll concentrations are significantly less for the same amount of algae than freshwater lakes. Thus, to classify trophic status of coastal waters using similar classification terminology LAKEWATCH provided the table below accounting for the chlorophyll differences reported by Hoyer et al. (2002).

Trophic Status	Freshwater Chlorophyll ($\mu\text{g/L}$) (Forsberg and Ryding 1980)	Coastal Chlorophyll ($\mu\text{g/L}$) (Hoyer et al. 2002)
Oligotrophic	< 3.0	< 0.5
Mesotrophic	3.0 - 7.0	0.5 - 1.8
Eutrophic	7.0 - 40.0	1.8 - 12.4
Hypereutrophic	> 40.0	> 12.4

Hoyer, M. V., T. K. Frazer, S. K. Notestein and D. E. Canfield, Jr. 2002. Nutrient, chlorophyll, and water clarity relationships in Florida's nearshore coastal waters with comparisons to freshwater lakes. Canadian Journal of Fisheries and Aquatic Sciences 59:1-8.

LAKEWATCH Report for St. Joseph Bay-5 in Gulf County Using Data Downloaded 10/17/2016

Trend Analyses Estuary

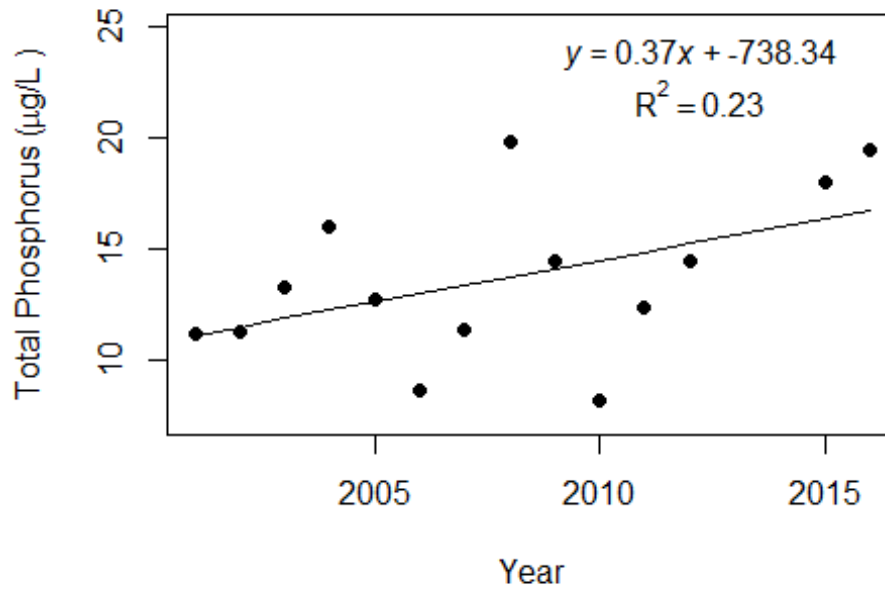
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over 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 cross if the x-axis were 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.

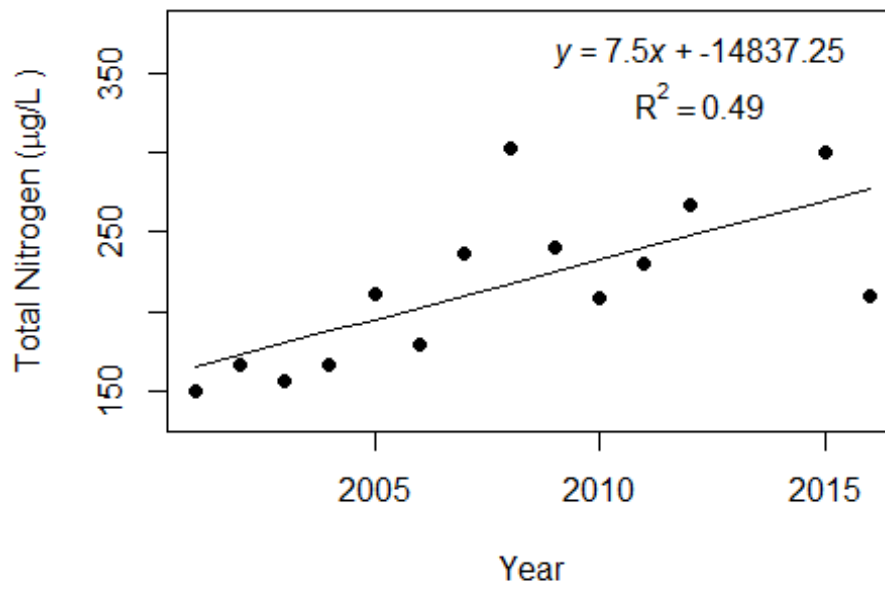
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	14	14	14	14
Intercept (a)	-738	-14837	275	-55
Slope (b)	0.37	7.50	-0.14	0.03
Coefficient of Determination (R ²)	0.23	0.49	0.25	0.00
Probability of Significance (p)	0.08	0.01	0.07	0.90
Potential Trend	No Trend	Increasing	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 St. Joseph Bay-5 in Gulf County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

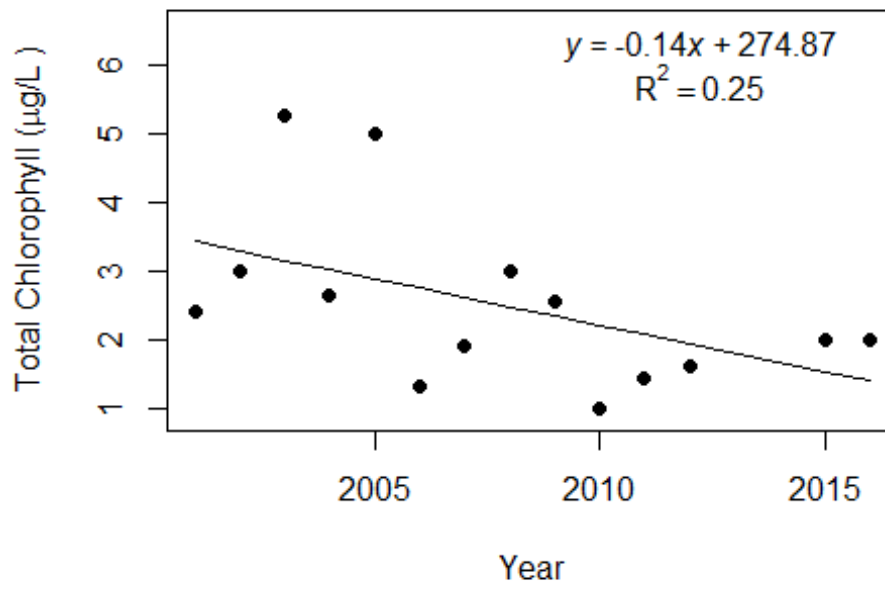
St. Joseph Bay-5 (Gulf)



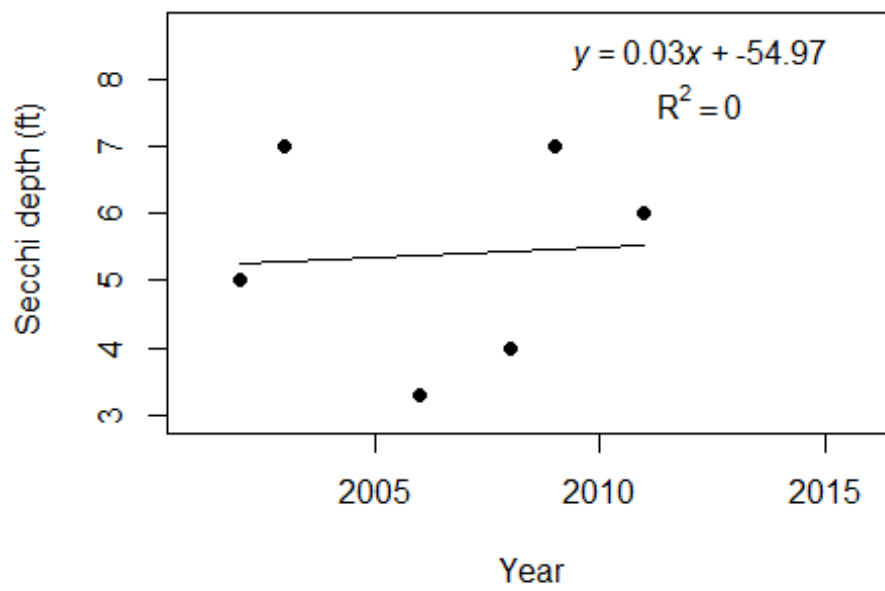
St. Joseph Bay-5 (Gulf)



St. Joseph Bay-5 (Gulf)



St. Joseph Bay-5 (Gulf)



LAKEWATCH Report for St. Joseph Bay-6 in Gulf County Using Data Downloaded 10/17/2016

Introduction Estuary

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: Estuaries and coastal segments: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

The near shore Florida coastline is separated into estuary and estuary segments within the estuary. Deeper coastal waters are separated into coastal nutrient regions and coastal nutrient segments within the regions. Numeric nutrient criteria are established for all estuary segments, including criteria for total nitrogen, total phosphorus, and chlorophyll a. For open ocean coastal waters, numeric criteria are established for chlorophyll a, that is derived from satellite remote sensing techniques. For those locations without defined segments there are narrative nutrient criteria (e.g., Florida Keys Halo Zone).

The maps defining individual estuaries and coastal segments can be found at: <https://www.flrules.org/Gateway/reference.asp?No=Ref-05420>.

The individual nutrient criteria can be found at: <https://www.flrules.org/gateway/ruleNo.asp?id=62-302.532>

Estuary lies in the following location:

Estuary	Estuary Segment	Coastal Nutrient Region	Coastal Nutrient Segment
St. Joseph Bay	St. Joseph Bay		

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 estuary resides.
- **Name:** Estuary 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 an estuary has been in the LAKEWATCH program.

County	Gulf
Name	St. Joseph Bay-6
Latitude	29.7984
Longitude	-85.3047
Water Body Type	Estuary
Period of Record (year)	2001 to 2016

LAKEWATCH Report for St. Joseph Bay-6 in Gulf County Using Data Downloaded 10/17/2016

Long-Term Data Summary Estuary: 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 ($\mu\text{g/L}$):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen ($\mu\text{g/L}$):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$), Salinity (ppt):** 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 Estuary: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus ($\mu\text{g/L}$)	10 - 20	15 (16)
Total Nitrogen ($\mu\text{g/L}$)	159 - 417	251 (16)
Chlorophyll- uncorrected ($\mu\text{g/L}$)	1.5 - 8.0	3.3 (16)
Secchi (ft)	3.5 - 6.0	4.2 (16)
Secchi (m)	1.1 - 1.8	1.3 (16)
Color (Pt-Co Units)	4 -45	11 (16)
Specific Conductance ($\mu\text{S/cm@25 C}$)	27250 - 48000	37356 (16)
Salinity (ppt)	17 - 30	23 (16)

Coastal Trophic State

Trophic status is a measure of a systems biological productivity and LAKEWATCH uses total chlorophyll averages as a trophic state measure. Since the total chlorophyll measurement indicates how much algae is actually present in a water body, it is the most direct indicator of biological productivity. For freshwater lakes, LAKEWATCH uses the trophic state classification criteria proposed by Forsberg and Ryding (1980). LAKEWATCH staff sampled coastal systems around all of Florida (Hoyer et al. 2002) and discovered that chlorophyll concentrations are significantly less for the same amount of algae than freshwater lakes. Thus, to classify trophic status of coastal waters using similar classification terminology LAKEWATCH provided the table below accounting for the chlorophyll differences reported by Hoyer et al. (2002).

Trophic Status	Freshwater Chlorophyll ($\mu\text{g/L}$) (Forsberg and Ryding 1980)	Coastal Chlorophyll ($\mu\text{g/L}$) (Hoyer et al. 2002)
Oligotrophic	< 3.0	< 0.5
Mesotrophic	3.0 - 7.0	0.5 - 1.8
Eutrophic	7.0 - 40.0	1.8 - 12.4
Hypereutrophic	> 40.0	> 12.4

Hoyer, M. V., T. K. Frazer, S. K. Notestein and D. E. Canfield, Jr. 2002. Nutrient, chlorophyll, and water clarity relationships in Florida's nearshore coastal waters with comparisons to freshwater lakes. Canadian Journal of Fisheries and Aquatic Sciences 59:1-8.

LAKEWATCH Report for St. Joseph Bay-6 in Gulf County Using Data Downloaded 10/17/2016

Trend Analyses Estuary

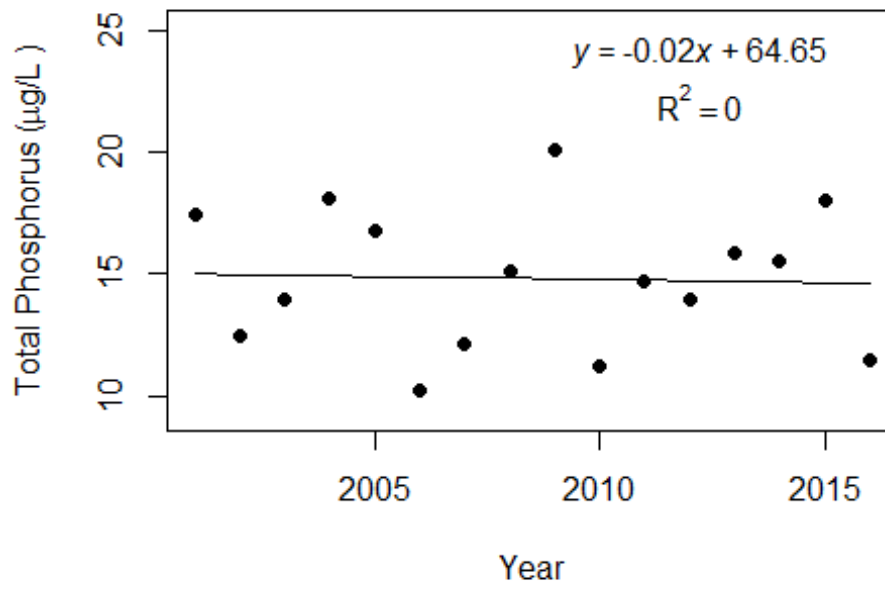
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over 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 cross if the x-axis were 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.

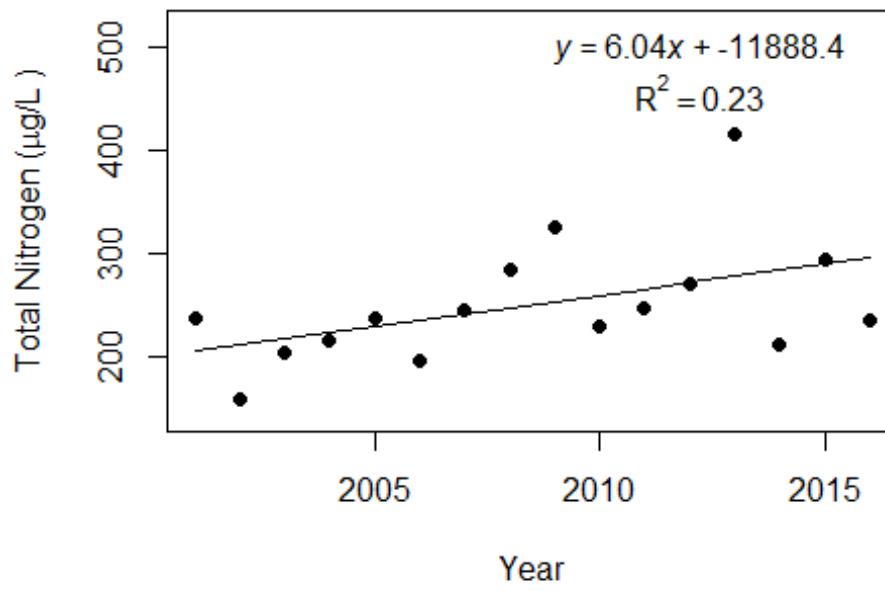
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	16	16	16	16
Intercept (a)	65	-11888	340	58
Slope (b)	-0.02	6.04	-0.17	-0.03
Coefficient of Determination (R ²)	0.00	0.23	0.26	0.03
Probability of Significance (p)	0.88	0.06	0.04	0.73
Potential Trend	No Trend	No Trend	Decreasing	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 St. Joseph Bay-6 in Gulf County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

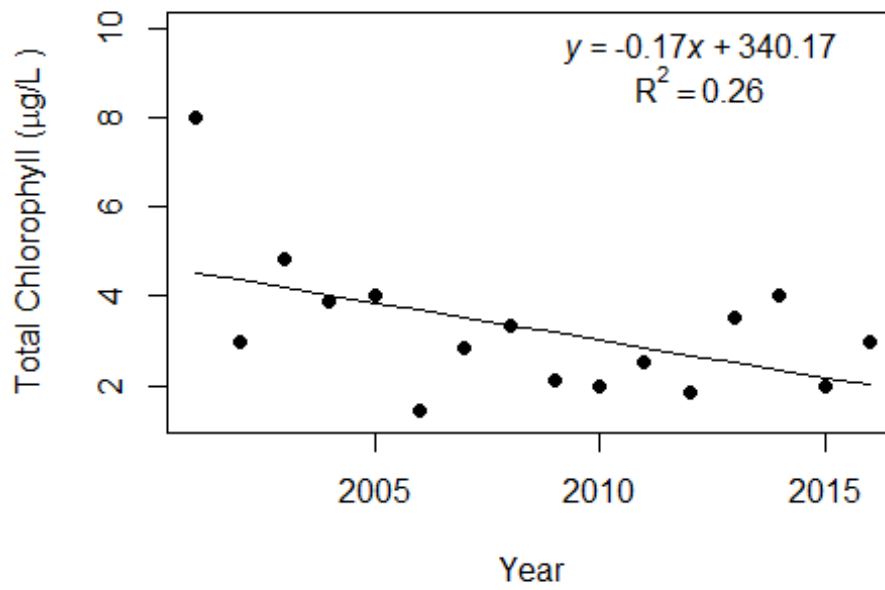
St. Joseph Bay-6 (Gulf)



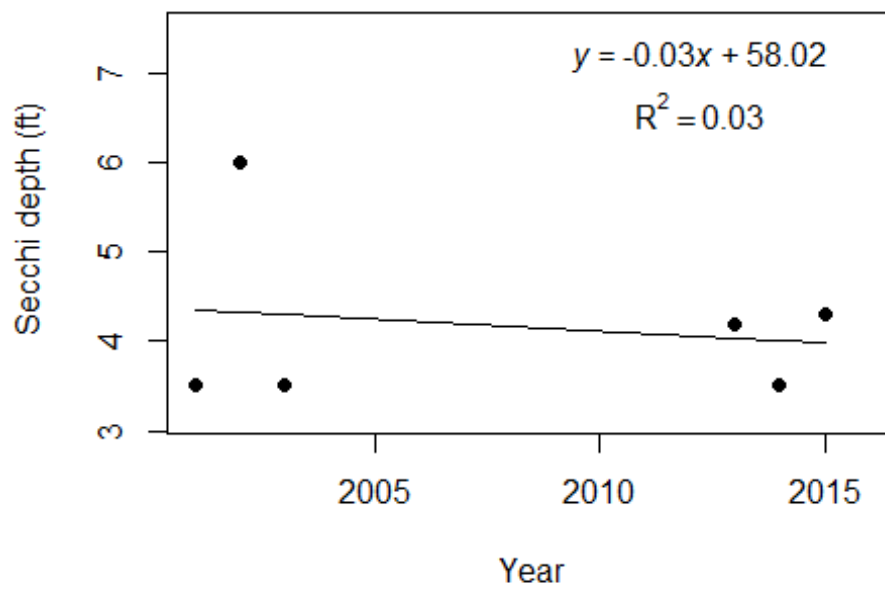
St. Joseph Bay-6 (Gulf)



St. Joseph Bay-6 (Gulf)



St. Joseph Bay-6 (Gulf)



LAKEWATCH Report for St. Joseph Bay-7 in Gulf County Using Data Downloaded 10/17/2016

Introduction Estuary

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: Estuaries and coastal segments: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

The near shore Florida coastline is separated into estuary and estuary segments within the estuary. Deeper coastal waters are separated into coastal nutrient regions and coastal nutrient segments within the regions. Numeric nutrient criteria are established for all estuary segments, including criteria for total nitrogen, total phosphorus, and chlorophyll a. For open ocean coastal waters, numeric criteria are established for chlorophyll a, that is derived from satellite remote sensing techniques. For those locations without defined segments there are narrative nutrient criteria (e.g., Florida Keys Halo Zone).

The maps defining individual estuaries and coastal segments can be found at: <https://www.flrules.org/Gateway/reference.asp?No=Ref-05420>.

The individual nutrient criteria can be found at: <https://www.flrules.org/gateway/ruleNo.asp?id=62-302.532>

Estuary lies in the following location:

Estuary	Estuary Segment	Coastal Nutrient Region	Coastal Nutrient Segment
St. Joseph Bay	St. Joseph Bay		

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 estuary resides.
- **Name:** Estuary 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 an estuary has been in the LAKEWATCH program.

County	Gulf
Name	St. Joseph Bay-7
Latitude	29.7436
Longitude	-85.3274
Water Body Type	Estuary
Period of Record (year)	2001 to 2016

LAKEWATCH Report for St. Joseph Bay-7 in Gulf County Using Data Downloaded 10/17/2016

Long-Term Data Summary Estuary: 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 ($\mu\text{g/L}$):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen ($\mu\text{g/L}$):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$), Salinity (ppt):** 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 Estuary: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus ($\mu\text{g/L}$)	7 - 26	14 (16)
Total Nitrogen ($\mu\text{g/L}$)	160 - 330	238 (16)
Chlorophyll- uncorrected ($\mu\text{g/L}$)	1.0 - 12.7	2.9 (16)
Secchi (ft)	6.0 - 10.4	8.8 (16)
Secchi (m)	1.8 - 3.2	2.7 (16)
Color (Pt-Co Units)	5 - 8	6 (14)
Specific Conductance ($\mu\text{S/cm@25 C}$)	27000 - 47750	38921 (13)
Salinity (ppt)	17 - 30	24 (13)

Coastal Trophic State

Trophic status is a measure of a systems biological productivity and LAKEWATCH uses total chlorophyll averages as a trophic state measure. Since the total chlorophyll measurement indicates how much algae is actually present in a water body, it is the most direct indicator of biological productivity. For freshwater lakes, LAKEWATCH uses the trophic state classification criteria proposed by Forsberg and Ryding (1980). LAKEWATCH staff sampled coastal systems around all of Florida (Hoyer et al. 2002) and discovered that chlorophyll concentrations are significantly less for the same amount of algae than freshwater lakes. Thus, to classify trophic status of coastal waters using similar classification terminology LAKEWATCH provided the table below accounting for the chlorophyll differences reported by Hoyer et al. (2002).

Trophic Status	Freshwater Chlorophyll ($\mu\text{g/L}$) (Forsberg and Ryding 1980)	Coastal Chlorophyll ($\mu\text{g/L}$) (Hoyer et al. 2002)
Oligotrophic	< 3.0	< 0.5
Mesotrophic	3.0 - 7.0	0.5 - 1.8
Eutrophic	7.0 - 40.0	1.8 - 12.4
Hypereutrophic	> 40.0	> 12.4

Hoyer, M. V., T. K. Frazer, S. K. Notestein and D. E. Canfield, Jr. 2002. Nutrient, chlorophyll, and water clarity relationships in Florida's nearshore coastal waters with comparisons to freshwater lakes. Canadian Journal of Fisheries and Aquatic Sciences 59:1-8.

LAKEWATCH Report for St. Joseph Bay-7 in Gulf County Using Data Downloaded 10/17/2016

Trend Analyses Estuary

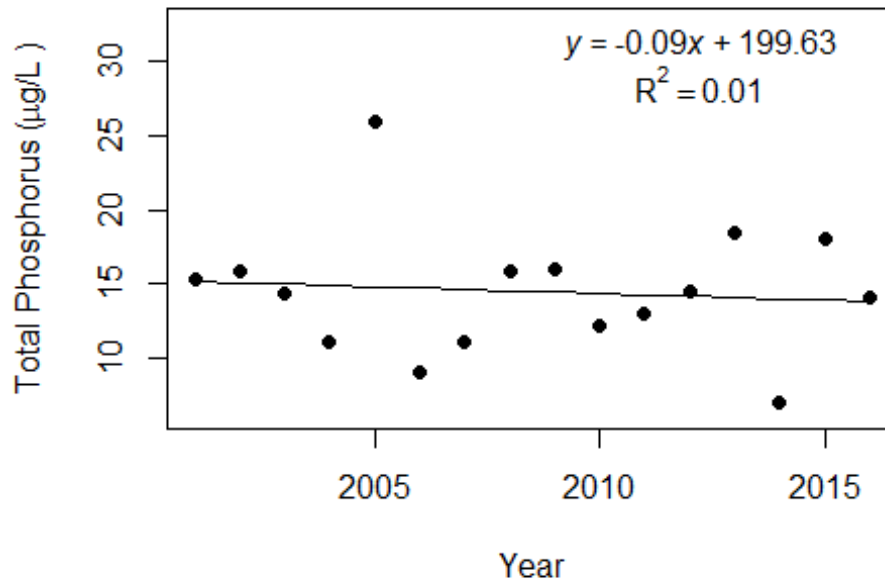
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over 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 cross if the x-axis were 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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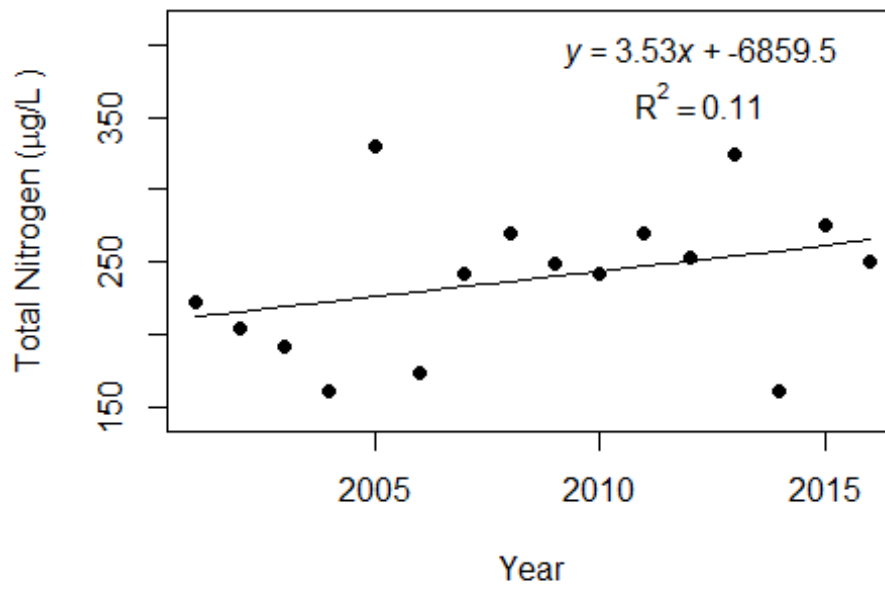
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	16	16	16	16
Intercept (a)	200	-6860	341	68
Slope (b)	-0.09	3.53	-0.17	-0.03
Coefficient of Determination (R ²)	0.01	0.11	0.08	0.02
Probability of Significance (p)	0.71	0.22	0.28	0.67
Potential Trend	No Trend	No Trend	No 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 St. Joseph Bay-7 in Gulf County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

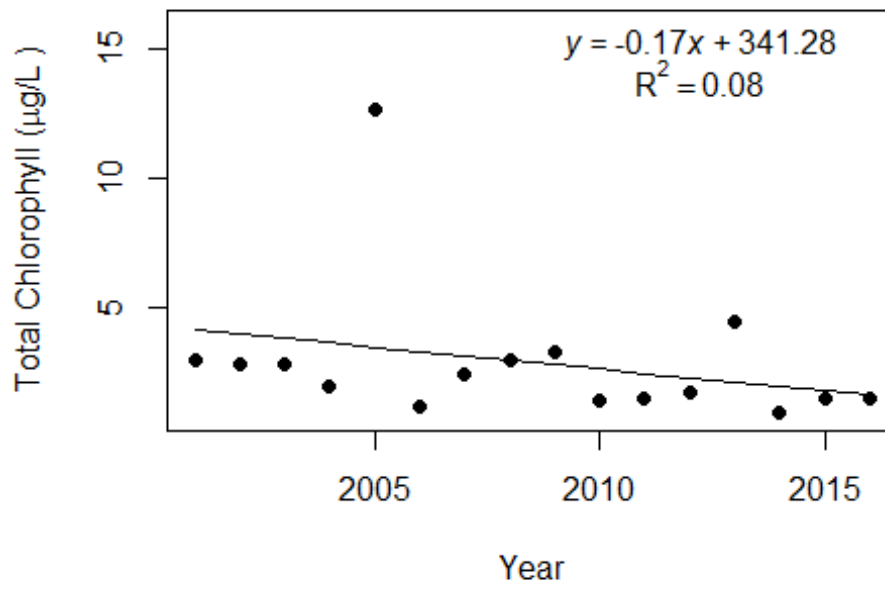
St. Joseph Bay-7 (Gulf)



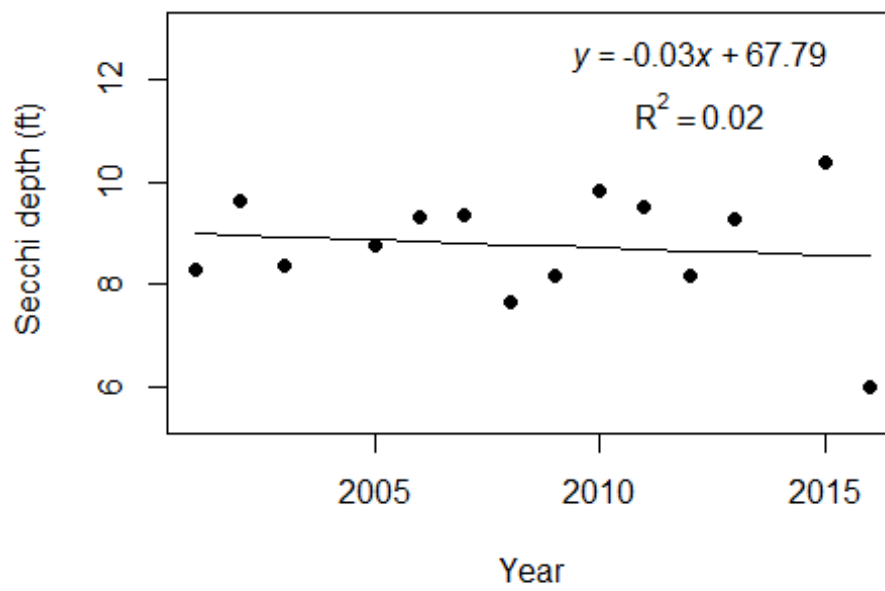
St. Joseph Bay-7 (Gulf)



St. Joseph Bay-7 (Gulf)



St. Joseph Bay-7 (Gulf)



LAKEWATCH Report for St. Joseph Bay-8 in Gulf County Using Data Downloaded 10/17/2016

Introduction Estuary

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: Estuaries and coastal segments: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

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The maps defining individual estuaries and coastal segments can be found at: <https://www.flrules.org/Gateway/reference.asp?No=Ref-05420>.

The individual nutrient criteria can be found at: <https://www.flrules.org/gateway/ruleNo.asp?id=62-302.532>

Estuary lies in the following location:

Estuary	Estuary Segment	Coastal Nutrient Region	Coastal Nutrient Segment
St. Joseph Bay	St. Joseph Bay		

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 estuary resides.
- **Name:** Estuary 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 an estuary has been in the LAKEWATCH program.

County	Gulf
Name	St. Joseph Bay-8
Latitude	29.8285
Longitude	-85.3287
Water Body Type	Estuary
Period of Record (year)	2007 to 2016

LAKEWATCH Report for St. Joseph Bay-8 in Gulf County Using Data Downloaded 10/17/2016

Long-Term Data Summary Estuary: 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 ($\mu\text{g/L}$):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen ($\mu\text{g/L}$):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$), Salinity (ppt):** 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 Estuary: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus ($\mu\text{g/L}$)	11 - 19	15 (6)
Total Nitrogen ($\mu\text{g/L}$)	225 - 320	264 (6)
Chlorophyll- uncorrected ($\mu\text{g/L}$)	0.5 - 3.7	2.3 (6)
Secchi (ft)	6.9 - 12.5	9.7 (6)
Secchi (m)	2.1 - 3.8	3.0 (6)
Color (Pt-Co Units)	5 -33	14 (6)
Specific Conductance ($\mu\text{S/cm@25 C}$)	20667 - 43750	28569 (6)
Salinity (ppt)	13 - 27	18 (6)

Coastal Trophic State

Trophic status is a measure of a systems biological productivity and LAKEWATCH uses total chlorophyll averages as a trophic state measure. Since the total chlorophyll measurement indicates how much algae is actually present in a water body, it is the most direct indicator of biological productivity. For freshwater lakes, LAKEWATCH uses the trophic state classification criteria proposed by Forsberg and Ryding (1980). LAKEWATCH staff sampled coastal systems around all of Florida (Hoyer et al. 2002) and discovered that chlorophyll concentrations are significantly less for the same amount of algae than freshwater lakes. Thus, to classify trophic status of coastal waters using similar classification terminology LAKEWATCH provided the table below accounting for the chlorophyll differences reported by Hoyer et al. (2002).

Trophic Status	Freshwater Chlorophyll ($\mu\text{g/L}$) (Forsberg and Ryding 1980)	Coastal Chlorophyll ($\mu\text{g/L}$) (Hoyer et al. 2002)
Oligotrophic	< 3.0	< 0.5
Mesotrophic	3.0 - 7.0	0.5 - 1.8
Eutrophic	7.0 - 40.0	1.8 - 12.4
Hypereutrophic	> 40.0	> 12.4

Hoyer, M. V., T. K. Frazer, S. K. Notestein and D. E. Canfield, Jr. 2002. Nutrient, chlorophyll, and water clarity relationships in Florida's nearshore coastal waters with comparisons to freshwater lakes. Canadian Journal of Fisheries and Aquatic Sciences 59:1-8.

LAKEWATCH Report for St. Joseph Bay-8 in Gulf County Using Data Downloaded 10/17/2016

Trend Analyses Estuary

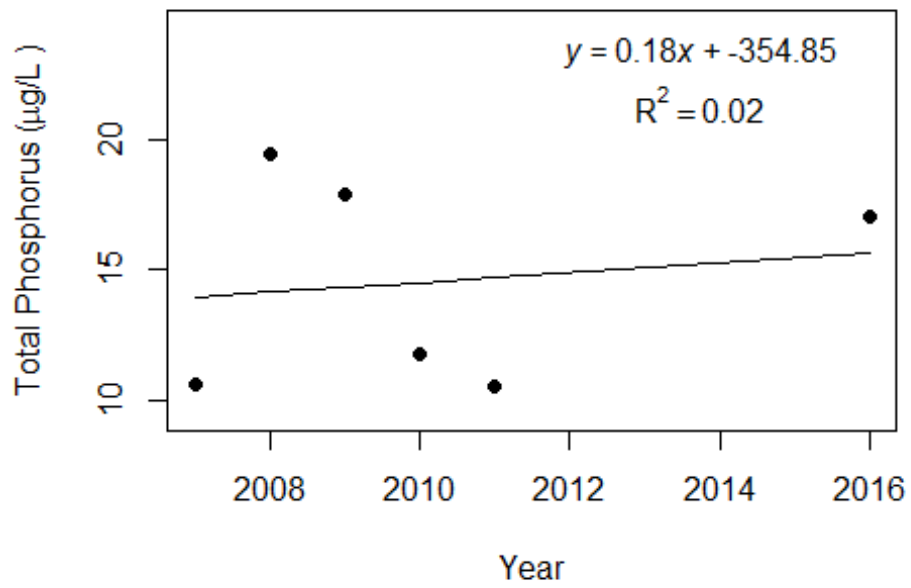
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- **Number of years (n):** This is simply the number of years of data that were used to calculate annual means.
- **Intercept (a):** This is the value on the y-axis that the fitted line would cross if the x-axis were zero.
- **Slope (b):** This is 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.

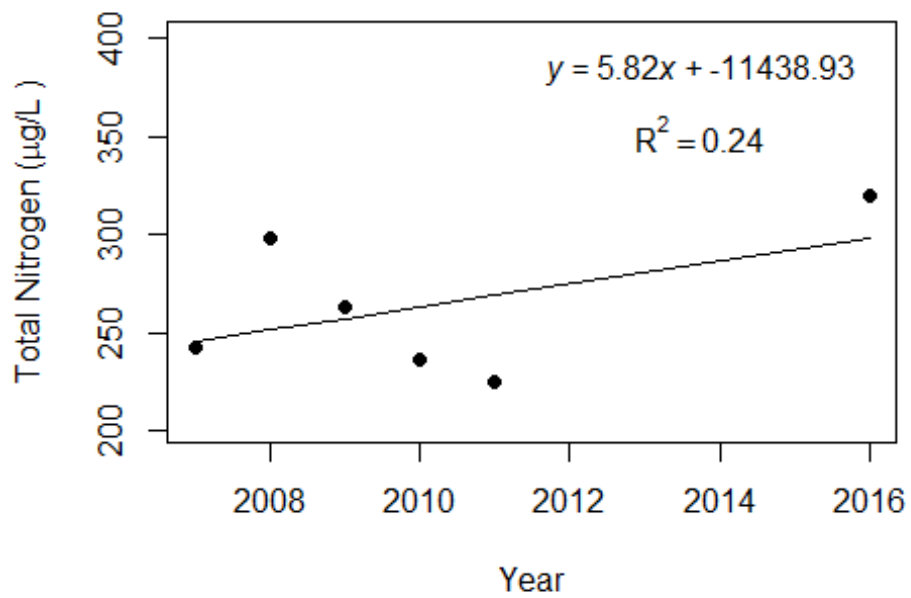
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	6	6	6	6
Intercept (a)	-355	-11439	122	-896
Slope (b)	0.18	5.82	-0.06	0.45
Coefficient of Determination (R ²)	0.02	0.24	0.03	0.34
Probability of Significance (p)	0.78	0.32	0.73	0.22
Potential Trend	No Trend	No Trend	No Trend	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 St. Joseph Bay-8 in Gulf County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

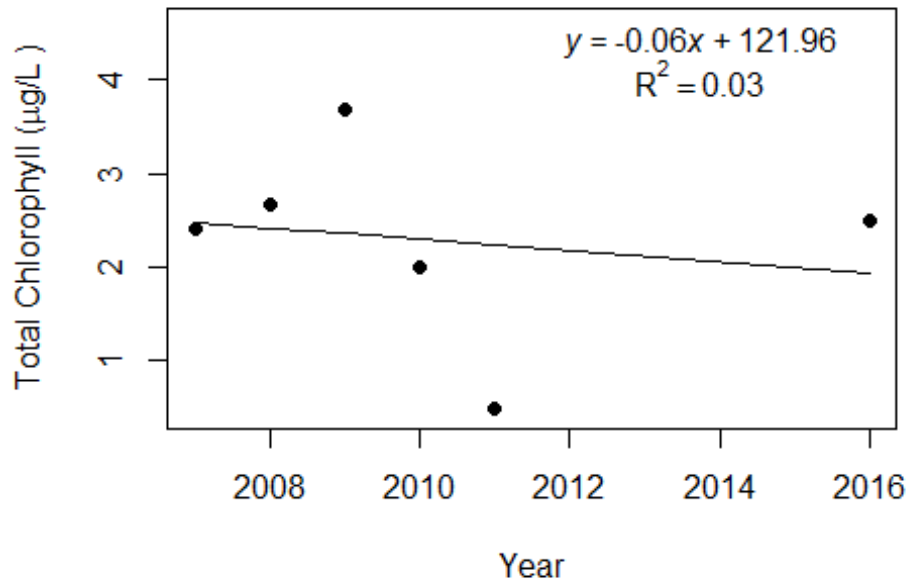
St. Joseph Bay-8 (Gulf)



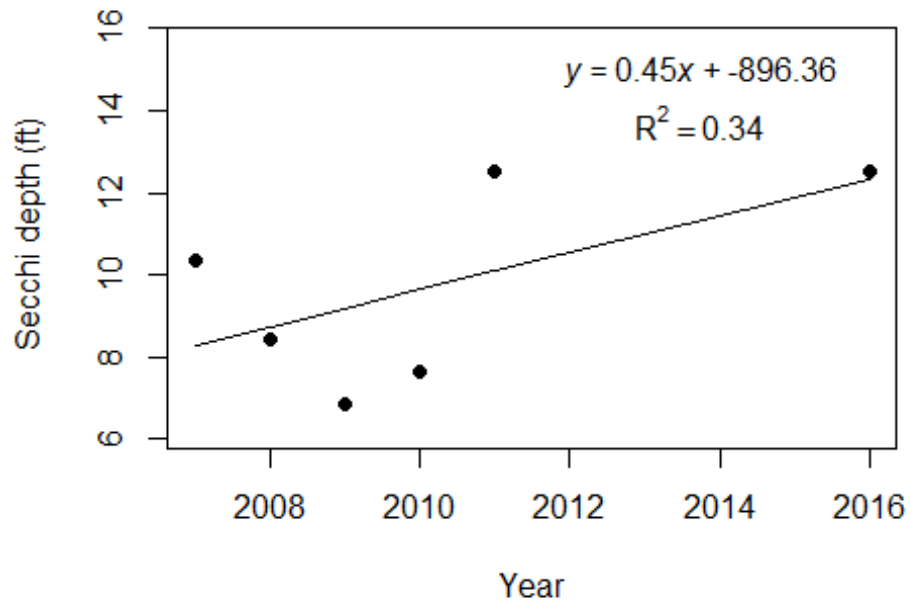
St. Joseph Bay-8 (Gulf)



St. Joseph Bay-8 (Gulf)



St. Joseph Bay-8 (Gulf)



LAKEWATCH Report for St. Joseph Bay-9 in Gulf County Using Data Downloaded 10/17/2016

Introduction Estuary

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: Estuaries and coastal segments: <http://www.dep.state.fl.us/water/wqssp/nutrients/index.htm>).

The near shore Florida coastline is separated into estuary and estuary segments within the estuary. Deeper coastal waters are separated into coastal nutrient regions and coastal nutrient segments within the regions. Numeric nutrient criteria are established for all estuary segments, including criteria for total nitrogen, total phosphorus, and chlorophyll a. For open ocean coastal waters, numeric criteria are established for chlorophyll a, that is derived from satellite remote sensing techniques. For those locations without defined segments there are narrative nutrient criteria (e.g., Florida Keys Halo Zone).

The maps defining individual estuaries and coastal segments can be found at: <https://www.flrules.org/Gateway/reference.asp?No=Ref-05420>.

The individual nutrient criteria can be found at: <https://www.flrules.org/gateway/ruleNo.asp?id=62-302.532>

Estuary lies in the following location:

Estuary	Estuary Segment	Coastal Nutrient Region	Coastal Nutrient Segment
St. Joseph Bay	St. Joseph Bay		

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 estuary resides.
- **Name:** Estuary 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 an estuary has been in the LAKEWATCH program.

County	Gulf
Name	St. Joseph Bay-9
Latitude	29.7357
Longitude	-85.3849
Water Body Type	Estuary
Period of Record (year)	2012 to 2016

LAKEWATCH Report for St. Joseph Bay-9 in Gulf County Using Data Downloaded 10/17/2016

Long-Term Data Summary Estuary: 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 ($\mu\text{g/L}$):** The nutrient most often limiting growth of plant/algae in Florida's fresh and saltwater environments.
- **Total Nitrogen ($\mu\text{g/L}$):** Another nutrient needed for aquatic plant/algae growth but only limiting when nitrogen to phosphorus ratios are generally less than 10.
- **Chlorophyll-uncorrected ($\mu\text{g/L}$):** 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 ($\mu\text{S/cm@25}^\circ\text{C}$), Salinity (ppt):** 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 Estuary: Data

Parameter	Minimum and Maximum Annual Means	Mean of Annual Means (Sampling years)
Total Phosphorus ($\mu\text{g/L}$)	9 - 17	13 (5)
Total Nitrogen ($\mu\text{g/L}$)	235 - 350	288 (5)
Chlorophyll- uncorrected ($\mu\text{g/L}$)	1.0 - 2.0	1.3 (5)
Secchi (ft)	5.5 - 5.5	5.5 (5)
Secchi (m)	1.7 - 1.7	1.7 (5)
Color (Pt-Co Units)	4 -10	7 (4)
Specific Conductance ($\mu\text{S/cm@25 C}$)	39500 - 46500	42800 (4)
Salinity (ppt)	25 - 29	27 (4)

Coastal Trophic State

Trophic status is a measure of a systems biological productivity and LAKEWATCH uses total chlorophyll averages as a trophic state measure. Since the total chlorophyll measurement indicates how much algae is actually present in a water body, it is the most direct indicator of biological productivity. For freshwater lakes, LAKEWATCH uses the trophic state classification criteria proposed by Forsberg and Ryding (1980). LAKEWATCH staff sampled coastal systems around all of Florida (Hoyer et al. 2002) and discovered that chlorophyll concentrations are significantly less for the same amount of algae than freshwater lakes. Thus, to classify trophic status of coastal waters using similar classification terminology LAKEWATCH provided the table below accounting for the chlorophyll differences reported by Hoyer et al. (2002).

Trophic Status	Freshwater Chlorophyll ($\mu\text{g/L}$) (Forsberg and Ryding 1980)	Coastal Chlorophyll ($\mu\text{g/L}$) (Hoyer et al. 2002)
Oligotrophic	< 3.0	< 0.5
Mesotrophic	3.0 - 7.0	0.5 - 1.8
Eutrophic	7.0 - 40.0	1.8 - 12.4
Hypereutrophic	> 40.0	> 12.4

Hoyer, M. V., T. K. Frazer, S. K. Notestein and D. E. Canfield, Jr. 2002. Nutrient, chlorophyll, and water clarity relationships in Florida's nearshore coastal waters with comparisons to freshwater lakes. Canadian Journal of Fisheries and Aquatic Sciences 59:1-8.

LAKEWATCH Report for St. Joseph Bay-9 in Gulf County Using Data Downloaded 10/17/2016

Trend Analyses Estuary

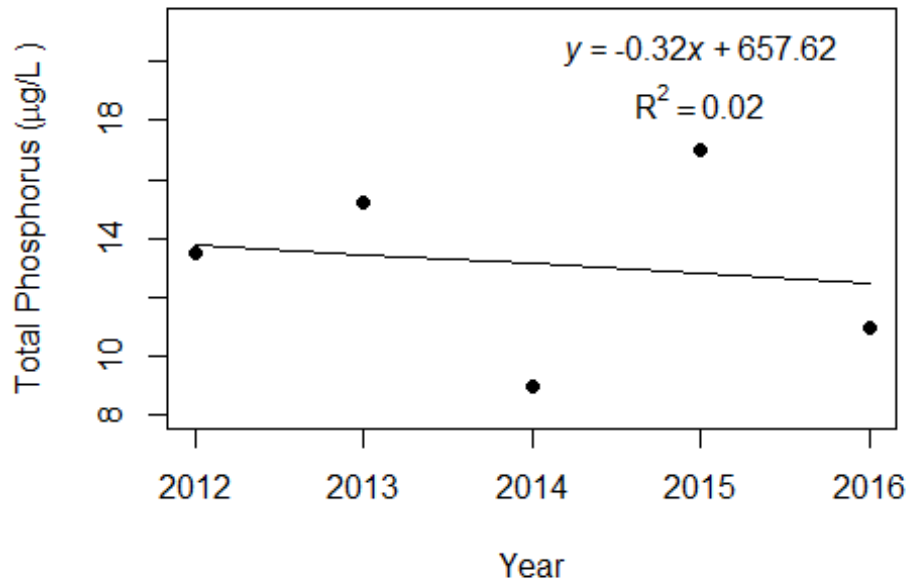
The following data are for linear regression statistics derived by plotting annual average total phosphorus, total nitrogen, chlorophyll, and Secchi data by year of data collection. Linear regression analysis is a common statistical approach used to determine if significant trends are occurring over 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 cross if the x-axis were 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.

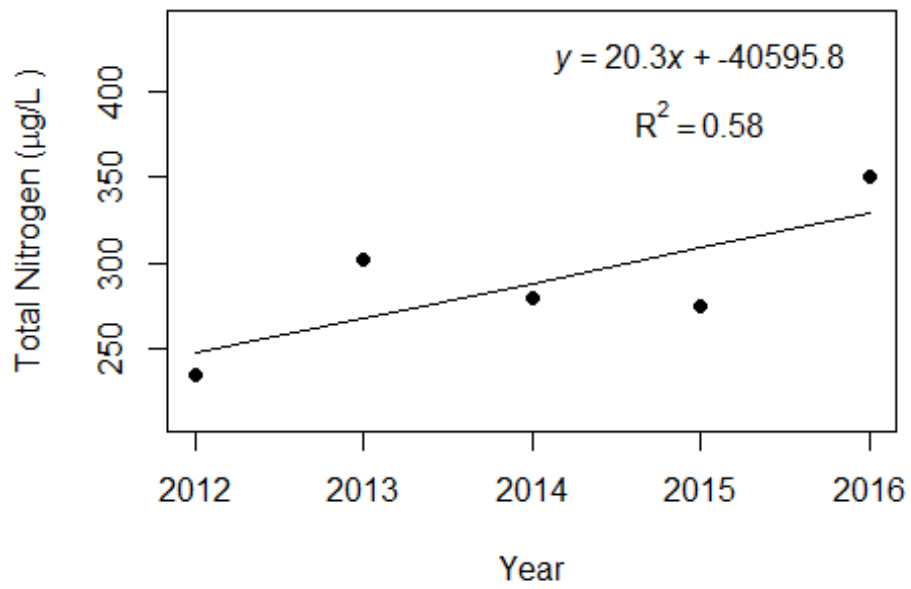
Statistic	Total Phosphorus	Total Nitrogen	Chlorophyll	Secchi
Number of Years (n)	5	5	5	5
Intercept (a)	658	-40596	-452	6
Slope (b)	-0.32	20.30	0.23	
Coefficient of Determination (R ²)	0.03	0.58	0.69	
Probability of Significance (p)	0.80	0.13	0.08	
Potential Trend	No Trend	No Trend	No Trend	

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 St. Joseph Bay-9 in Gulf County. If there are no plots then there is less than five years of data, which is not enough for the analysis.

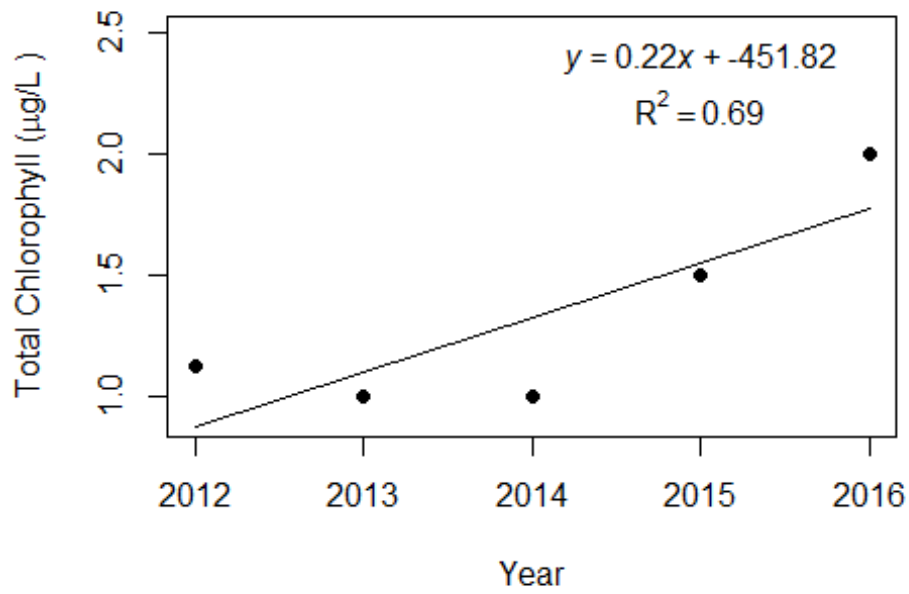
St. Joseph Bay-9 (Gulf)



St. Joseph Bay-9 (Gulf)



St. Joseph Bay-9 (Gulf)



St. Joseph Bay-9 (Gulf)

