

# Tomoka Marsh Aquatic Preserve

## SEACAR Habitat Analyses

Last compiled on 18 March, 2024

### Contents

<b>Threshold Filtering</b>	<b>2</b>
<b>Value Qualifiers</b>	<b>3</b>
<b>Water Column</b>	<b>5</b>
<b>Seasonal Kendall-Tau Analysis</b>	<b>5</b>
<b>Water Quality - Discrete</b>	<b>5</b>
Dissolved Oxygen - Discrete Water Quality . . . . .	6
Dissolved Oxygen Saturation - Discrete Water Quality . . . . .	8
pH - Discrete Water Quality . . . . .	9
Salinity - Discrete Water Quality . . . . .	12
Secchi Depth - Discrete Water Quality . . . . .	14
Total Nitrogen - Discrete Water Quality . . . . .	16
Total Phosphorus - Discrete Water Quality . . . . .	19
Total Suspended Solids - Discrete Water Quality . . . . .	21
Turbidity - Discrete Water Quality . . . . .	24
Water Temperature - Discrete Water Quality . . . . .	27
<b>Water Quality - Continuous</b>	<b>30</b>

## Threshold Filtering

Threshold filters, following the guidance of Florida Department of Environmental Protection's (*FDEP*) Division of Environmental Assessment and Restoration (*DEAR*) are used to exclude specific results values from the SEACAR Analysis. Based on the threshold filters, Quality Assurance / Quality Control (*QAQC*) Flags are inserted into the *SEACAR\_QAQCFlagCode* and *SEACAR\_QAQC\_Description* columns of the export data. The *Include* column indicates whether the *QAQC* Flag will also indicate that data are excluded from analysis. No data are excluded from the data export, but the analysis scripts can use the *Include* column to exclude data (1 to include, 0 to exclude).

Table 1: Continuous Water Quality threshold values

Parameter Name	Units	Low Threshold	High Threshold	Sensor Type
Dissolved Oxygen	mg/L	0	50	YSI EXOs
Dissolved Oxygen	mg/L	0	50	Analysis Only - 2022-04-04
Dissolved Oxygen	mg/L	0	50	6600 Series
Salinity	ppt	0	70	6600 Series
Salinity	ppt	0	70	YSI EXOs
Salinity	ppt	0	70	Analysis Only - 2022-04-04
Water Temperature	Degrees C	-5	45	YSI EXOs
Water Temperature	Degrees C	-5	45	Analysis Only - 2022-04-04
Water Temperature	Degrees C	-5	45	6600 Series
pH	pH	2	14	Analysis Only - 2022-04-04
pH	pH	2	14	6600 Series
pH	pH	2	14	YSI EXOs
Dissolved Oxygen Saturation	%	0	500	YSI EXOs
Dissolved Oxygen Saturation	%	0	500	6600 Series
Dissolved Oxygen Saturation	%	0	500	Analysis Only - 2022-04-04
Specific Conductivity	mS/cm	0	100	6600 Series
Specific Conductivity	mS/cm	0	200	YSI EXOs
Turbidity	NTU	0	4000	YSI EXOs
Turbidity	NTU	0	1000	6600 Series
Turbidity	NTU	0	4000	Analysis Only - 2022-04-04

Table 2: Discrete Water Quality threshold values

Parameter Name	Units	Low Threshold	High Threshold
Dissolved Oxygen	mg/L	0.000001	22
Salinity	ppt	0	70
Water Temperature	Degrees C	3	40
pH		2	13
Dissolved Oxygen Saturation	%	0.000001	310
Specific Conductivity	mS/cm	0.005000001	100
Turbidity	NTU	0	-
Total Suspended Solids (TSS)	mg/L	0	-
Chlorophyll a uncorrected for pheophytin	ug/L	0	-
Chlorophyll a corrected for pheophytin	ug/L	0	-
Secchi Depth	m	0.000001	50
Light Extinction Coefficient	m^1	0	-
Colored dissolved organic matter, CDOM	PCU	0	-
Fluorescent dissolved organic matter, FDOM	QSE	0	-
Total Nitrogen	mg/L	0	-
Total Kjeldahl Nitrogen TKN	mg/L	0	-
NO2+3 Filtered	mg/L	0	-
NH4 Filtered	mg/L	0	-
Total Phosphorus	mg/L	0	-

Parameter Name	Units	Low Threshold	High Threshold
PO4 Filtered	mg/L	0	-
Ammonia- Un-ionized (NH3)	mg/L	0	-
Nitrate (N)	mg/L	0	-
Nitrite (N)	mg/L	0	-
Nitrogen, organic	mg/L	0	-

Table 3: Quality Assurance Flags inserted based on threshold checks listed in Table 1 & 2

SEACAR QAQC Description	Include	SEACAR QAQCFlagCode
Exceeds Maximum threshold. Not verified in raw data	No	2Q
Exceeds Maximum threshold. Verified in raw data	No	3Q
Below Minimum threshold. Not verified in raw data	No	4Q
Below Minimum threshold. Verified in raw data	No	5Q
Within threshold tolerance	Yes	6Q
No defined thresholds for this parameter	Yes	7Q

## Value Qualifiers

Value qualifier codes included within the data are used to exclude certain results from the analysis. The data are retained in the data export files, but the analysis uses the *Include* column to filter the results.

### STORET and WIN value qualifier codes

Value qualifier codes from *STORET* and *WIN* data are examined with the database and used to populate the *Include* column in data exports.

Table 4: Value Qualifier codes excluded from analysis

Qualifier Source	Value Qualifier	Include	MDL	Description
STORET-WIN	H	No	0	Value based on field kit determination; results may not be accurate
STORET-WIN	J	No	0	Estimated value
STORET-WIN	V	No	0	Analyte was detected at or above method detection limit
STORET-WIN	Y	No	0	Lab analysis from an improperly preserved sample; data may be inaccurate

### Discrete Water Quality Value Qualifiers

The following value qualifiers are highlighted in the Discrete Water Quality section of this report. An exception is made for **Program 476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network** and data flagged with Value Qualifier **H** are included for this program only.

**H** - Value based on field kit determination; results may not be accurate. This code shall be used if a field screening test (e.g., field gas chromatograph data, immunoassay, or vendor-supplied field kit) was used to generate the value and the field kit or method has not been recognized by the Department as equivalent to laboratory methods.

**I** - The reported value is greater than or equal to the laboratory method detection limit but less than the laboratory practical quantitation limit.

**Q** - Sample held beyond the accepted holding time. This code shall be used if the value is derived from a sample that was prepared or analyzed after the approved holding time restrictions for sample preparation or analysis.

**S** - Secchi disk visible to bottom of waterbody. The value reported is the depth of the waterbody at the location of the Secchi disk measurement.

**U** - Indicates that the compound was analyzed for but not detected. This symbol shall be used to indicate that the specified component was not detected. The value associated with the qualifier shall be the laboratory method detection limit. Unless requested by the client, less than the method detection limit values shall not be reported.

### Systemwide Monitoring Program (SWMP) value qualifier codes

Value qualifier codes from the *SWMP* continuous program are examined with the database and used to populate the *Include* column in data exports. *SWMP* Qualifier Codes are indicated by *QualifierSource=SWMP*.

Table 5: SWMP Value Qualifier codes

<i>Qualifier Source</i>	<i>Value Qualifier</i>	<i>Include</i>	<i>Description</i>
SWMP	-1	Yes	Optional parameter not collected
SWMP	-2	No	Missing data
SWMP	-3	No	Data rejected due to QA/QC
SWMP	-4	No	Outside low sensor range
SWMP	-5	No	Outside high sensor range
SWMP	0	Yes	Passed initial QA/QC checks
SWMP	1	No	Suspect data
SWMP	2	Yes	Reserved for future use
SWMP	3	Yes	Calculated data: non-vented depth/level sensor correction for changes in barometric pressure
SWMP	4	Yes	Historical: Pre-auto QA/QC
SWMP	5	Yes	Corrected data

## Water Column

The water column habitat extends from the surface of all water bodies to the bottom sediments and encompasses the different features found in the water at different depths (National Oceanographic Center, 2016). The water column habitat must be viewed in relation to its interconnectedness with other habitats. A healthy water column is an integral component in ensuring a healthy marine and coastal ecosystem. Having a flourishing marine and coastal ecosystem in Florida is necessary to support a strong economy. The health of the water column is dependent upon factors as diverse as land use (e.g., agriculture, mining, forestry practices); human population growth; emissions, (e.g., power plants, automobiles, wastewater); climate (e.g., rainfall, temperature, winds and currents); and decadal trends (e.g., El Niño/La Niña, Atlantic Multidecadal Oscillation, climate change).

The water column is composed of various physical, chemical and biological features, and only a small number of them are adequately monitored. Features of the water column that are monitored are used as indicators of the water column health and help assess the status of other habitats. These indicators include nutrient concentrations (nitrogen and phosphorus); water quality (dissolved oxygen, temperature, salinity and pH); water clarity (Secchi depth, turbidity, chlorophyll-a and colored dissolved organic matter); and nekton (fish, macroinvertebrates and megafauna).

## Seasonal Kendall-Tau Analysis

Indicators must have a minimum of five to ten years, depending on the habitat, of data within the geographic range of the analysis to be included in the analysis. Ten years of data are required for discrete parameters, and five years of data are required for continuous parameters. If there are insufficient years of data, the number of years of data available will be noted and labeled as “insufficient data to conduct analysis”. Further, for the preferred Seasonal Kendall-Tau test, there must be data from at least two months in common across at least two consecutive years within the RCP managed area being analyzed. Values that pass both of these tests will be included in the analysis and be labeled as *Use\_In\_Analysis* = **TRUE**. Any that fail either test will be excluded from the analyses and labeled as *Use\_In\_Analysis* = **FALSE**.

## Water Quality - Discrete

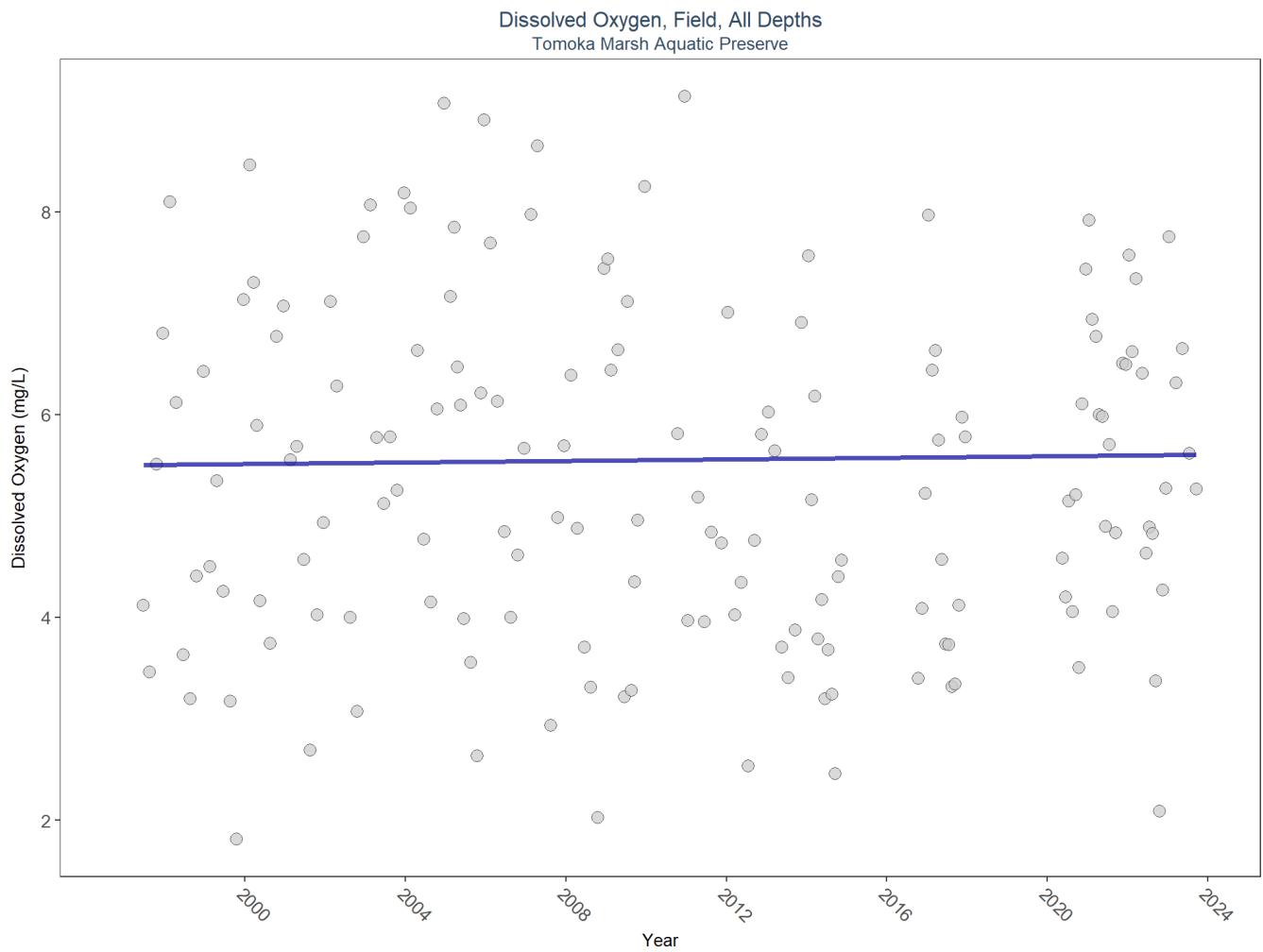
The following files were used in the discrete analysis:

- *Combined\_WQ\_WC\_NUT\_Chlorophyll\_a\_corrected\_for\_pheophytin-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_Chlorophyll\_a\_uncorrected\_for\_pheophytin-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_Colored\_dissolved\_organic\_matter\_CDOM-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_Dissolved\_Oxygen-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_Dissolved\_Oxygen\_Saturation-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_pH-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_Salinity-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_Secchi\_Depth-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_Total\_Nitrogen-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_Total\_Phosphorus-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_Total\_Suspended\_Solids\_TSS-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_Turbidity-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_Water\_Temperature-2024-Feb-22.txt*

## Dissolved Oxygen - Discrete Water Quality

**Dissolved Oxygen (DO)** is a key indicator of water quality. Oxygen enters surface waters by air-sea gas exchange, by wind action, or as a byproduct of aquatic plant photosynthesis. The actual quantity of DO in aquatic environments is dependent on the above processes as well as water temperature and salinity.

### Seasonal Kendall-Tau Trend Analysis



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	624	24	5.4	TRUE	0.0733	0.6246	0.003857143	5.502568	15.3057	0.1689	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Map showing location of Discrete sampling sites for Dissolved Oxygen



The bubble size on the above plots reflects the amount of data available at each sampling site

Table 6: Programs contributing data for Dissolved Oxygen

ProgramID	N_Data	YearMin	YearMax
5002	595	1997	2023
95	24	2017	2017
103	15	2020	2021
69	4	2001	2004

#### Program names:

5002 - Florida STORET / WIN

95 - Harmful Algal Bloom Marine Observation Network

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

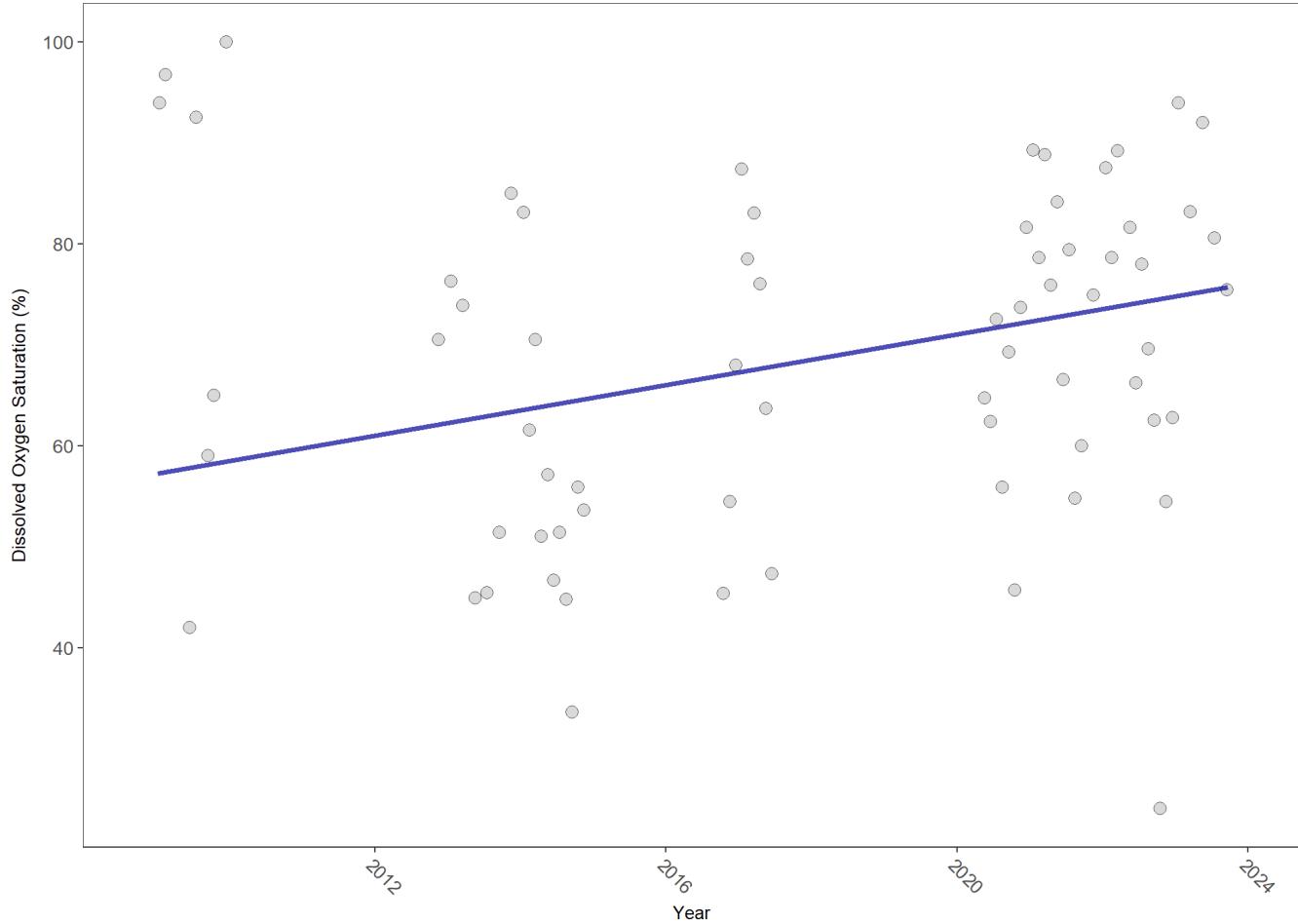
69 - Fisheries-Independent Monitoring (FIM) Program

There are no qualifying Value Qualifiers for Dissolved Oxygen in Tomoka Marsh Aquatic Preserve

## Dissolved Oxygen Saturation - Discrete Water Quality

### Seasonal Kendall-Tau Trend Analysis

Dissolved Oxygen Saturation, Field, All Depths  
Tomoka Marsh Aquatic Preserve

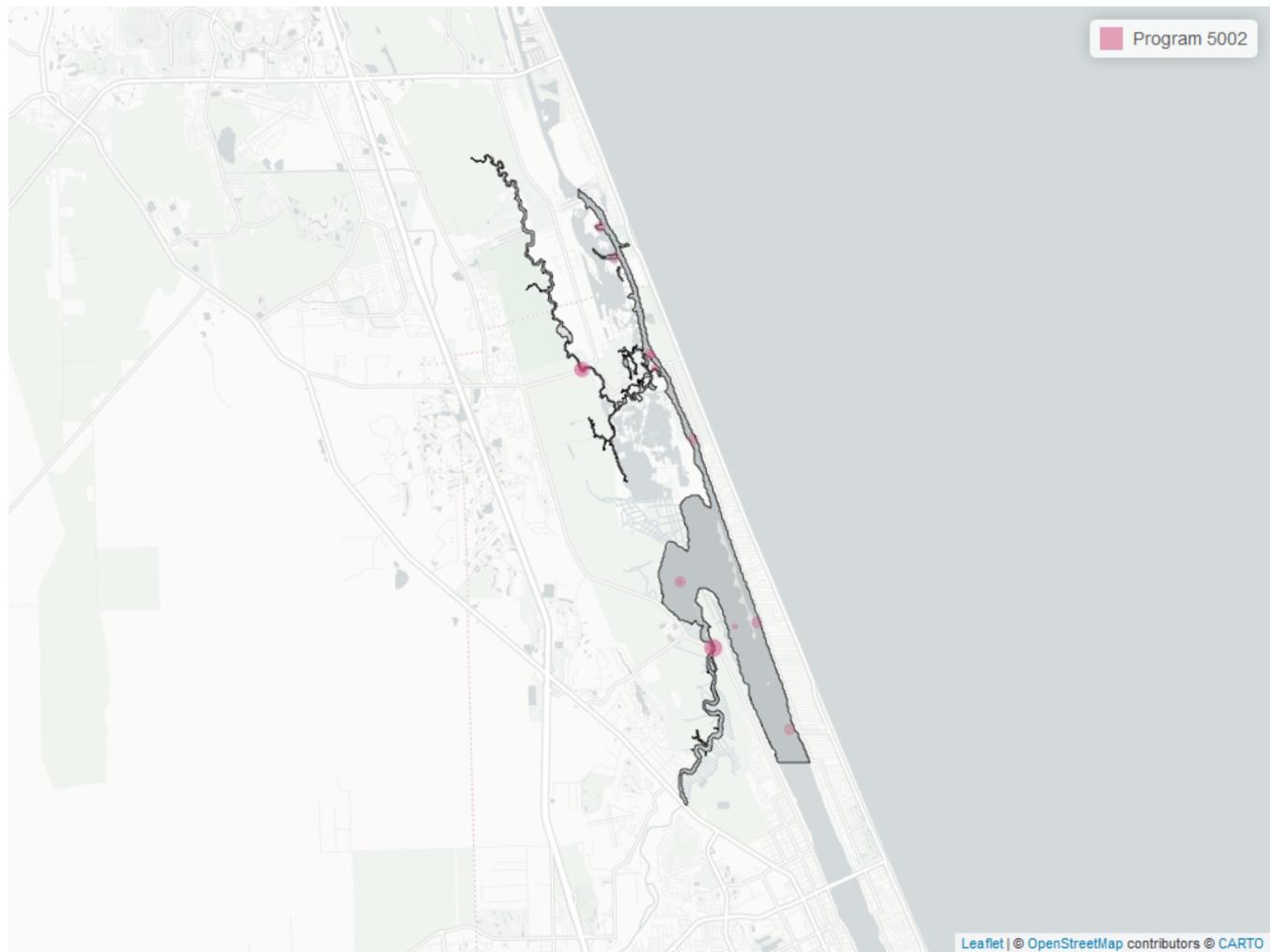


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	317	10	70.9	TRUE	0.3059	0.0012	1.254544	57.2058	22.2854	0.0223	1

$p < 0.00005$  appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Dissolved Oxygen Saturation



The bubble size on the above plots reflects the amount of data available at each sampling site

Table 7: Programs contributing data for Dissolved Oxygen Saturation

ProgramID	N_Data	YearMin	YearMax
5002	319	2009	2023

#### Program names:

5002 - Florida STORET / WIN

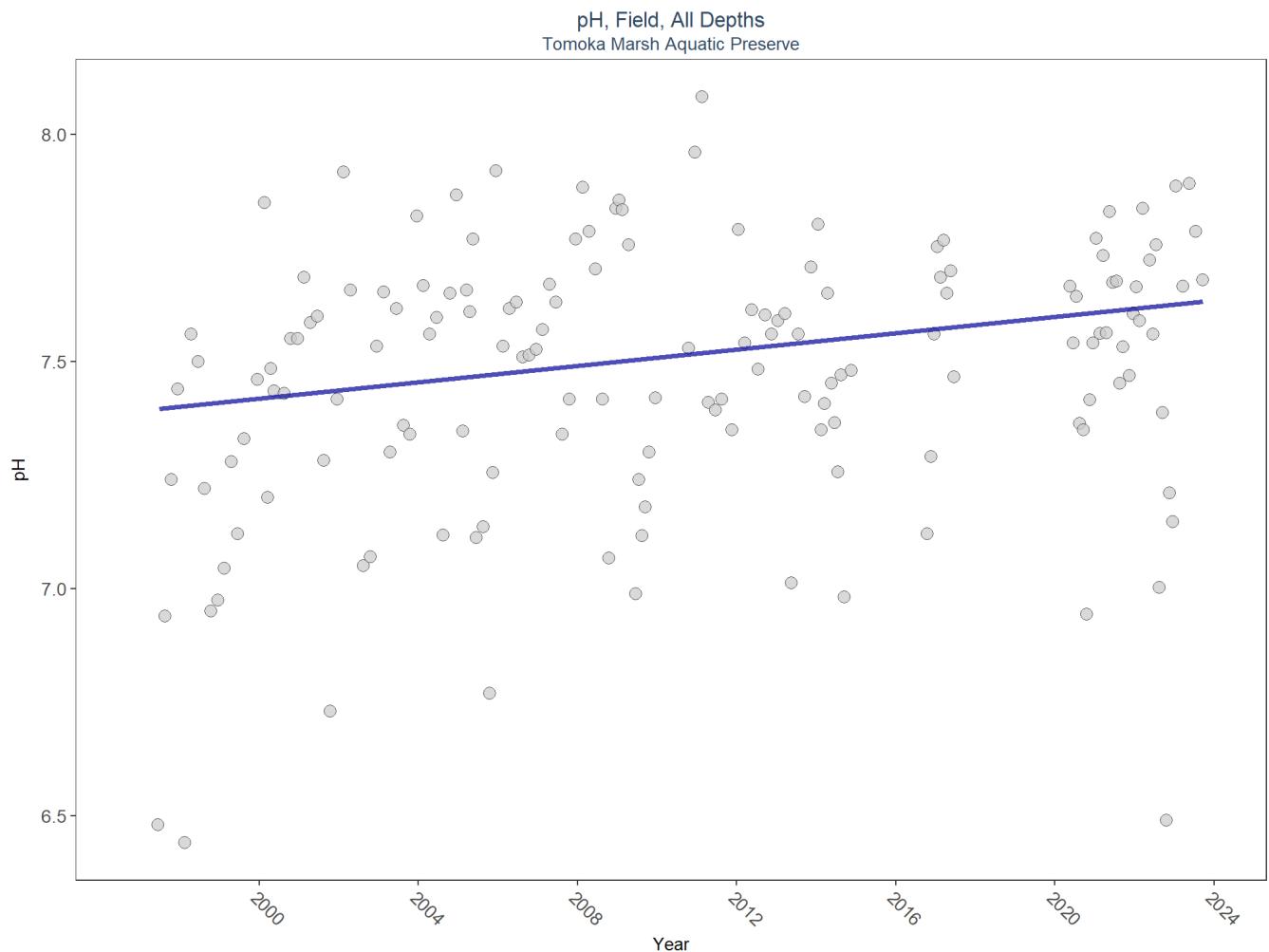
There are no qualifying Value Qualifiers for Dissolved Oxygen Saturation in Tomoka Marsh Aquatic Preserve

#### pH - Discrete Water Quality

The **pH** of water is the measure of how acidic or basic the water body is on a scale of 0-14, with lower readings indicating acidic and higher readings indicating basic, and a pH of 7 being neutral. Florida's natural waters fall

between 6.5 and 8.5 on this scale. A water body's pH can change due to precipitation, geology, vegetation, water pollution and air pollution.

### Seasonal Kendall-Tau Trend Analysis



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	613	24	7.54	TRUE	0.2227	0.0013	0.009	7.391447	13.0743	0.2885	1

$p < 0.00005$  appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for pH



The bubble size on the above plots reflects the amount of data available at each sampling site

Table 8: Programs contributing data for pH

ProgramID	N_Data	YearMin	YearMax
5002	595	1997	2023
103	15	2020	2021
69	4	2001	2004

#### Program names:

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

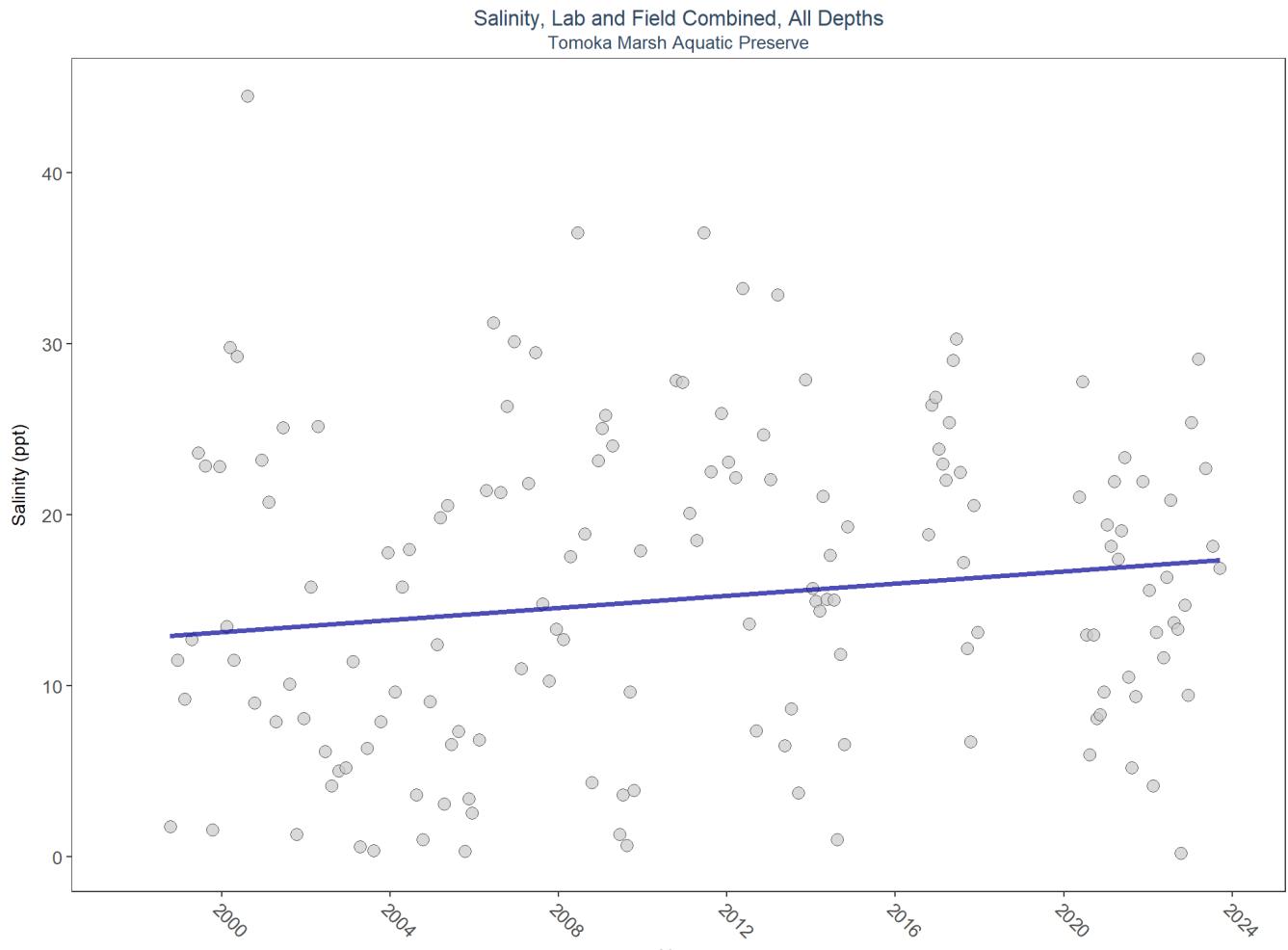
69 - Fisheries-Independent Monitoring (FIM) Program

There are no qualifying Value Qualifiers for pH in Tomoka Marsh Aquatic Preserve

## Salinity - Discrete Water Quality

Salinity is a measure of the amount of salt in the water. In estuarine ecosystems, salinity is influenced by precipitation, evaporation, surface-water inputs, and exchange with coastal waters.

### Seasonal Kendall-Tau Trend Analysis



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	602	23	16.075	TRUE	0.0759	0.2037	0.1771362	12.79583	13.2011	0.2804	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Map showing location of Discrete sampling sites for Salinity



The bubble size on the above plots reflects the amount of data available at each sampling site

Table 9: Programs contributing data for Salinity

ProgramID	N_Data	YearMin	YearMax
5002	575	1998	2023
95	24	2017	2017
69	4	2001	2004

#### Program names:

5002 - Florida STORET / WIN

95 - Harmful Algal Bloom Marine Observation Network

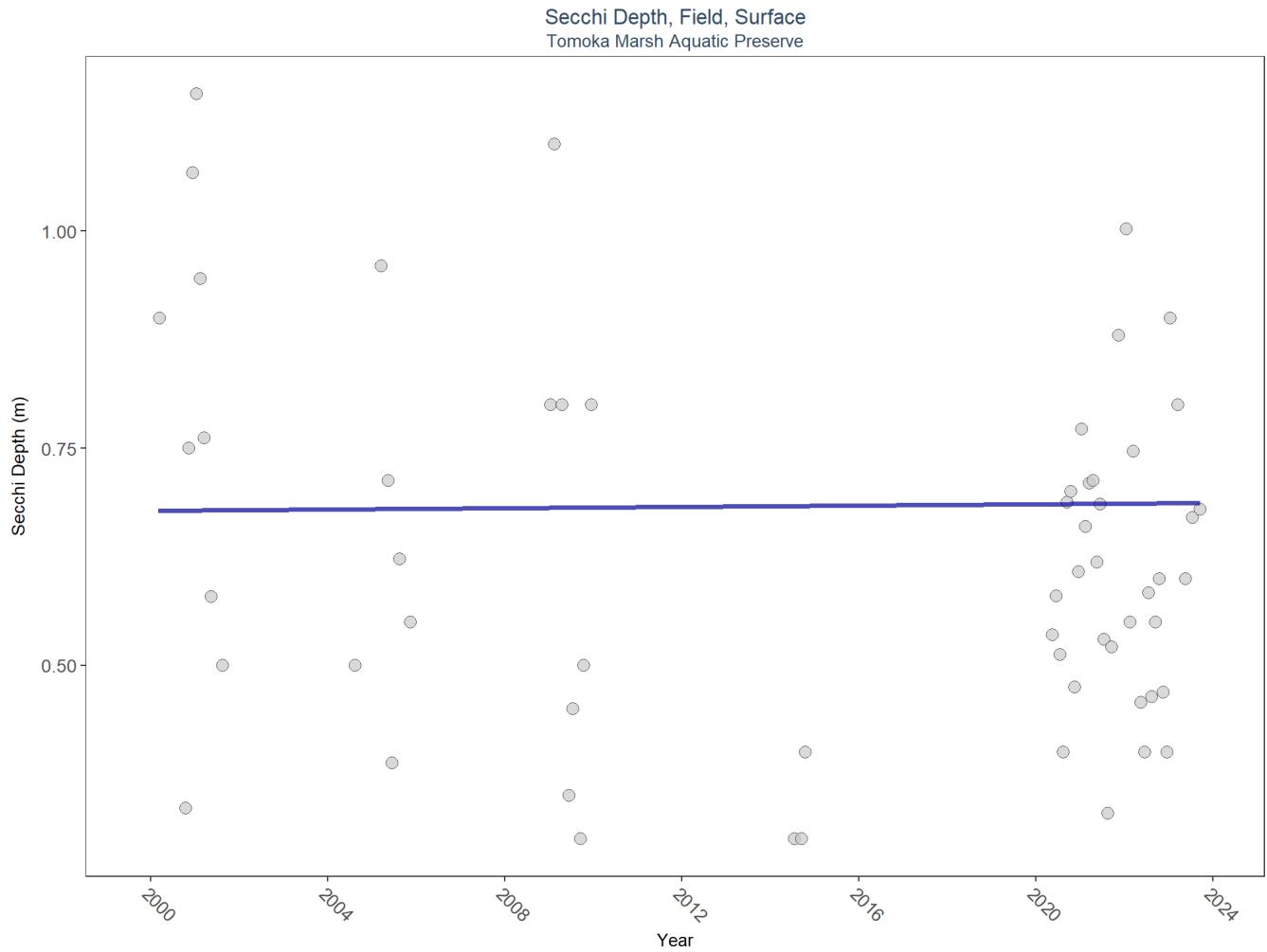
69 - Fisheries-Independent Monitoring (FIM) Program

There are no qualifying Value Qualifiers for Salinity in Tomoka Marsh Aquatic Preserve

## Secchi Depth - Discrete Water Quality

**Secchi depth** is a measure of the transparency or clarity of the water by a device called a Secchi disk. A Secchi disk is a black and white disk that is lowered into the water on a cord. The Secchi depth is the depth at which the disk can no longer be seen. The deeper the Secchi depth, the greater the water clarity.

### Seasonal Kendall-Tau Trend Analysis



$p < 0.00005$  appear as 0 due to rounding.

*SennIntercept* is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Secchi Depth



The bubble size on the above plots reflects the amount of data available at each sampling site

Table 10: Programs contributing data for Secchi Depth

ProgramID	N_Data	YearMin	YearMax
5002	235	2000	2023
514	35	2000	2001
103	5	2020	2021
69	4	2001	2004

#### Program names:

- 5002 - Florida STORET / WIN
- 514 - Florida LAKEWATCH Program
- 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
- 69 - Fisheries-Independent Monitoring (FIM) Program

#### Value Qualifiers

- $N_{\text{Total}}$  is total amount of data for a given year
- $N_{\text{S}}$  is the total amount of values flagged with the respective value qualifier in a given year
- $\text{perc}_{\text{S}}$  is the percent of data flagged with the respective value qualifier as a proportion of  $N_{\text{Total}}$

Table 11: Value Qualifiers for Secchi Depth

Year	$N_{\text{Total}}$	$N_{\text{S}}$	$\text{perc}_{\text{S}}$
2020	38	12	31.6
2021	73	26	35.6
2022	49	7	14.3
2023	25	3	12.0

**Note:**  $^1\mathbf{S}$  - Secchi disk visible to bottom of waterbody

**Programs containing Value Qualified data:**

5002 - Florida STORET / WIN

## Total Nitrogen - Discrete Water Quality

**Nitrogen** and **Phosphorous** are key nutrients that provide nourishment essential for the growth and maintenance of aquatic plants and animals; however, excess nutrients can cause harmful algal blooms and other water quality concerns. Nutrients enter water bodies several ways, including runoff from rain events and atmospheric deposition from natural and industrial sources.

**Total Nitrogen Calculation:**

The logic for calculated Total Nitrogen was provided by Kevin O'Donnell and colleagues at FDEP (with the help of Jay Silvanima, Watershed Monitoring Section). The following logic is used, in this order, based on the availability of specific nitrogen components.

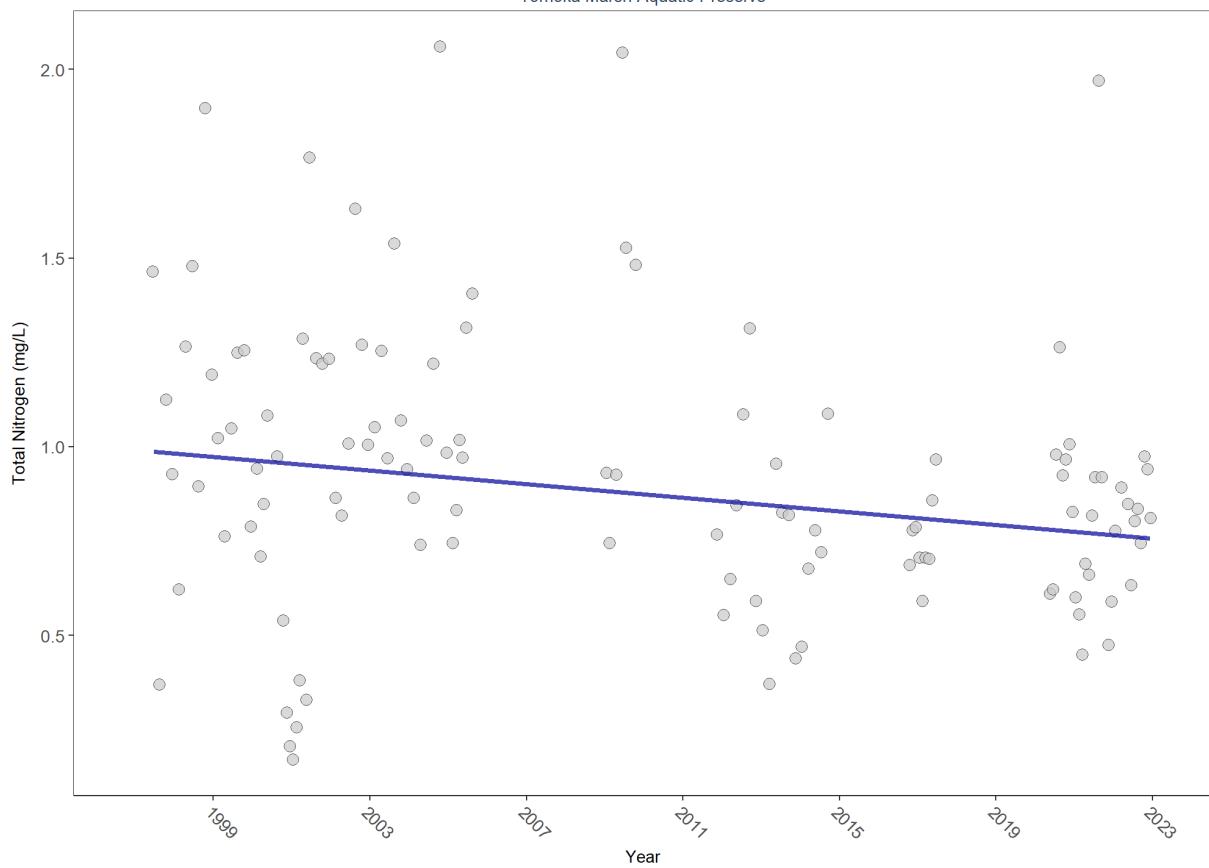
- 1)  $\text{TN} = \text{TKN} + \text{NO}_3\text{O}_2;$
- 2)  $\text{TN} = \text{TKN} + \text{NO}_3 + \text{NO}_2;$
- 3)  $\text{TN} = \text{ORGN} + \text{NH}_4 + \text{NO}_3\text{O}_2;$
- 4)  $\text{TN} = \text{ORGN} + \text{NH}_4 + \text{NO}_2 + \text{NO}_3;$
- 5)  $\text{TN} = \text{TKN} + \text{NO}_3;$
- 6)  $\text{TN} = \text{ORGN} + \text{NH}_4 + \text{NO}_3;$

Additional Information:

- Rules for use of sample fraction:
  - FDEP report that if both “Total” and “Dissolved” are reported, only “Total” is used. If the total is not reported, they do use dissolved as a best available replacement.
  - An analysis of all SEACAR data shows that 90% of all possible TN calculations can be done using nitrogen components with the same sample fraction, rather than use nitrogen components with mixed total/dissolved sample fractions. In other words, TN can be calculated when TKN and  $\text{NO}_3\text{O}_2$  are both total sample fraction, or when both are dissolved sample fraction. This is important, because then the calculated TN value is not based on components with mixed sample fractions.
- Values inserted into data:
  - ParameterName = “Total Nitrogen”
  - SEACAR\_QAQCFlagCode = “1Q”
  - SEACAR\_QAQC\_Description = “SEACAR Calculated”

## Seasonal Kendall-Tau Trend Analysis

Total Nitrogen, Lab, All Depths  
Tomoka Marsh Aquatic Preserve

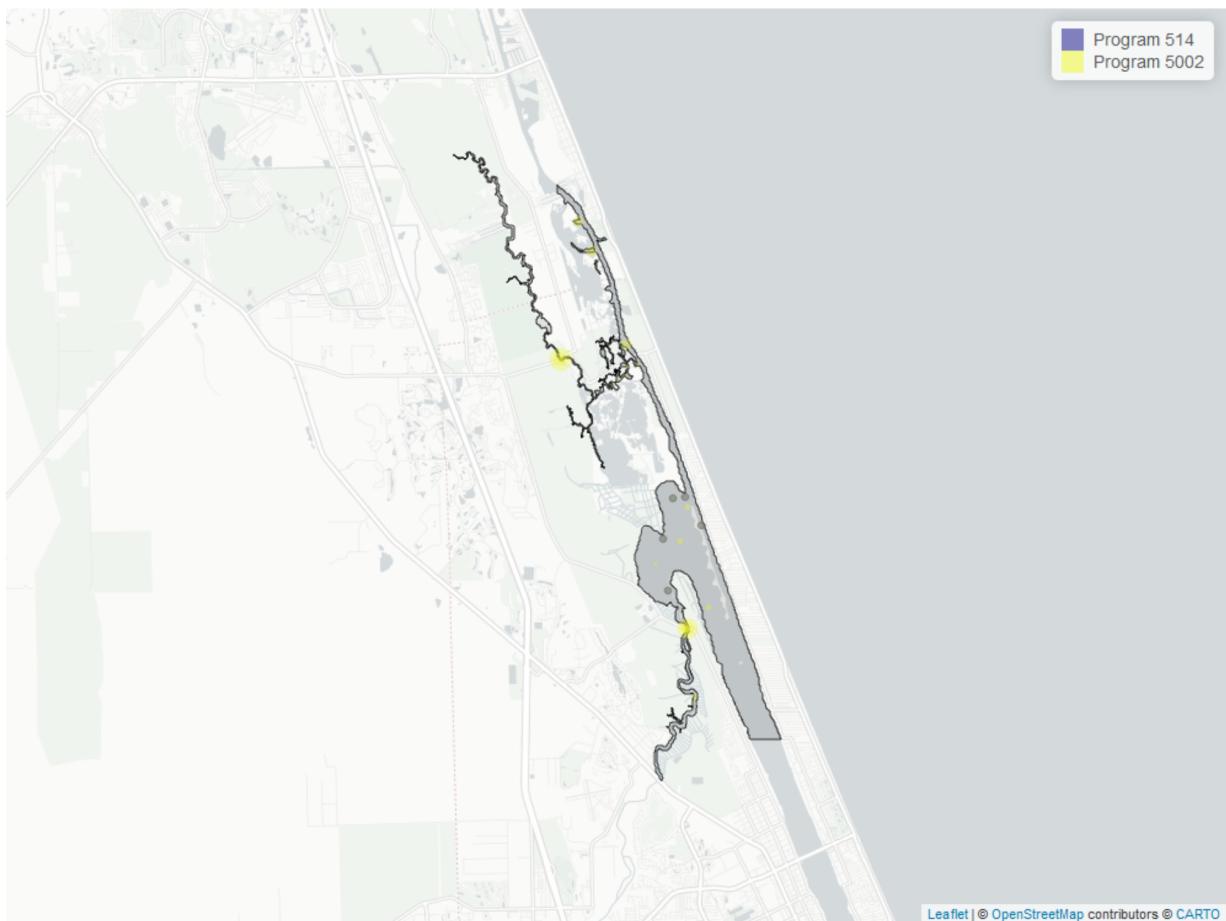


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	360	19	0.8045	TRUE	-0.1653	0.0184	-0.008980833	0.990825	20.7905	0.0356	-1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Map showing location of Discrete sampling sites for Total Nitrogen



The bubble size on the above plots reflects the amount of data available at each sampling site

Table 12: Programs contributing data for Total Nitrogen

ProgramID	N_Data	YearMin	YearMax
5002	324	1997	2022
514	36	2000	2001

**Program names:**

5002 - Florida STORET / WIN

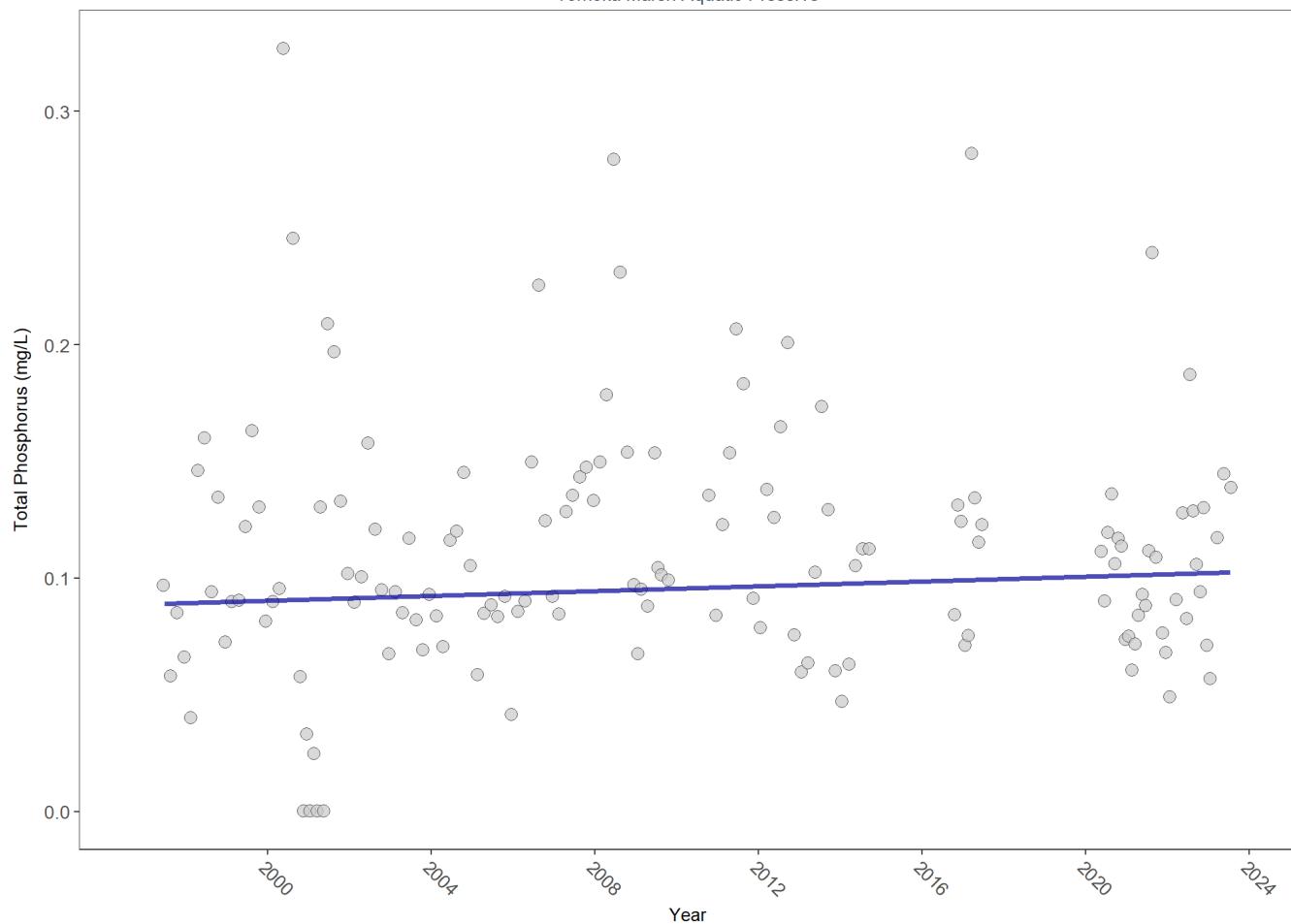
514 - Florida LAKEWATCH Program

There are no qualifying Value Qualifiers for Total Nitrogen in Tomoka Marsh Aquatic Preserve

## Total Phosphorus - Discrete Water Quality

### Seasonal Kendall-Tau Trend Analysis

Total Phosphorus, Lab, All Depths  
Tomoka Marsh Aquatic Preserve



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	604	24	0.0985	TRUE	0.0639	0.3347	0.0005111325	0.0889083	14.0293	0.2314	0

$p < 0.00005$  appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Total Phosphorus



The bubble size on the above plots reflects the amount of data available at each sampling site

Table 13: Programs contributing data for Total Phosphorus

ProgramID	N_Data	YearMin	YearMax
5002	555	1997	2023
514	36	2000	2001
103	18	2020	2021

#### Program names:

5002 - Florida STORET / WIN

514 - Florida LAKEWATCH Program

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

#### Value Qualifiers

- $N_{Total}$  is total amount of data for a given year

- $N_{\_}$  is the total amount of values flagged with the respective value qualifier in a given year
- $perc_{\_}$  is the percent of data flagged with the respective value qualifier as a proportion of  $N_{\_Total}$

Table 14: Value Qualifiers for Total Phosphorus

<i>Year</i>	<i>N_Total</i>	<i>N_I</i>	<i>perc_I</i>	<i>N_Q</i>	<i>perc_Q</i>
2001	32			2	6.2
2005	12	3	25.0		
2006	12	9	75.0		
2007	12	11	91.7		
2008	12	5	41.7		
2009	16	4	25.0		
2010	4	2	50.0		
2011	12	2	16.7		
2012	24	12	50.0		
2013	24	8	33.3		
2014	20	13	65.0		
2016	12	10	83.3		
2017	24	19	79.2		
2021	141	5	3.5	2	1.4
2022	67	1	1.5		
2023	20			5	25.0

**Note:** <sup>1</sup>**I** - Reported value is greater than or equal to lab method detection limit, but less than quantitation limit <sup>2</sup>**Q**  
 - Sample held beyond the accepted holding time

#### Programs containing Value Qualified data:

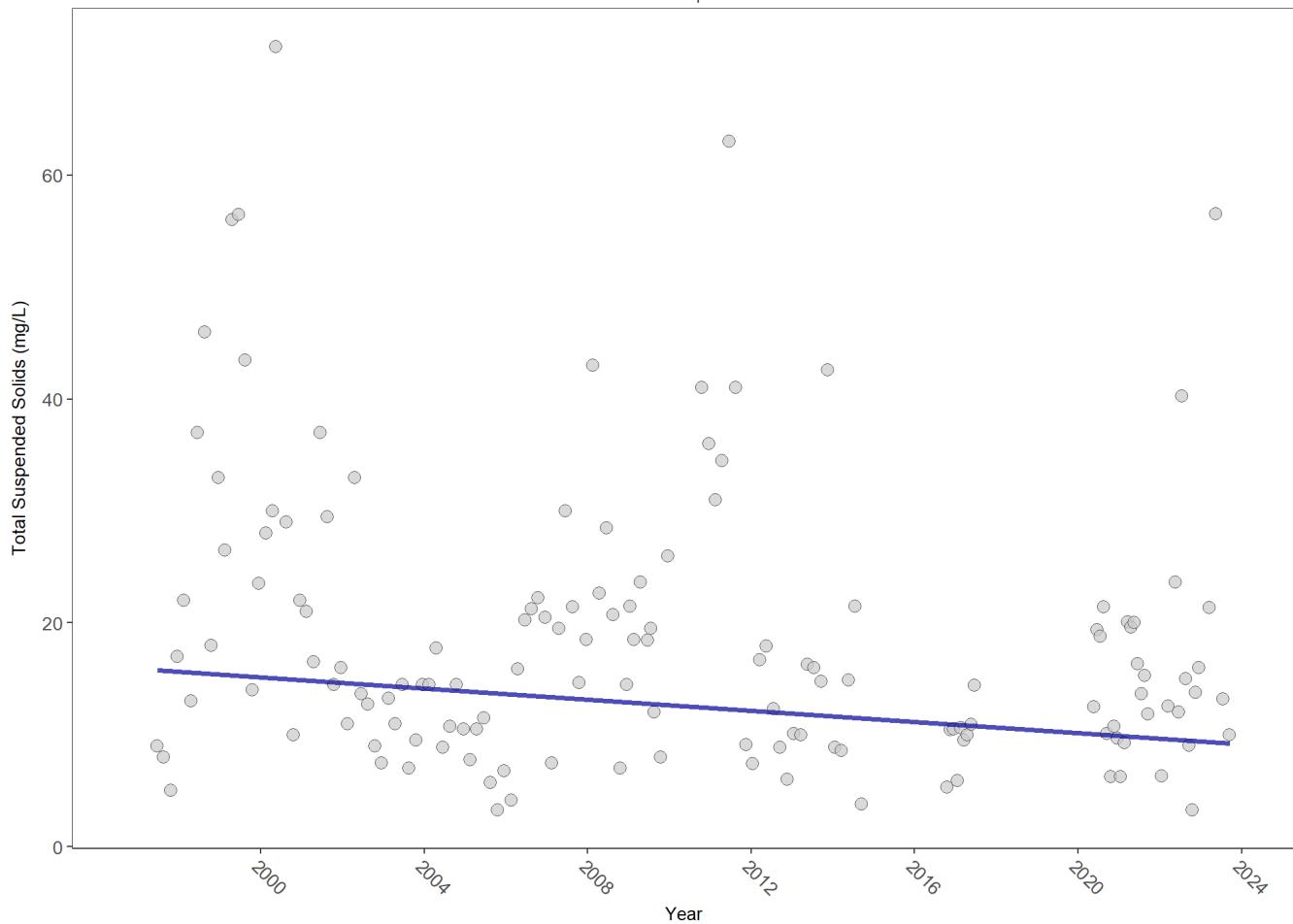
5002 - Florida STORET / WIN

### Total Suspended Solids - Discrete Water Quality

**Total Suspended Solids (TSS)** are solid particles suspended in water that exceed 2 microns in size and can be trapped by a filter.

#### Seasonal Kendall-Tau Trend Analysis

Total Suspended Solids, Lab and Field Combined, All Depths  
Tomoka Marsh Aquatic Preserve



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	393	24	14	TRUE	-0.0733	0.1234	-0.25	15.9026	8.7777	0.6424	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Map showing location of Discrete sampling sites for Total Suspended Solids



The bubble size on the above plots reflects the amount of data available at each sampling site

Table 15: Programs contributing data for Total Suspended Solids

ProgramID	N_Data	YearMin	YearMax
5002	388	1997	2023
103	5	2020	2021

#### Program names:

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

#### Value Qualifiers

- $N_{Total}$  is total amount of data for a given year
- $N_{\cdot}$  is the total amount of values flagged with the respective value qualifier in a given year
- $perc_{\cdot}$  is the percent of data flagged with the respective value qualifier as a proportion of  $N_{Total}$

Table 16: Value Qualifiers for Total Suspended Solids

Year	N_Total	N_I	perc_I	N_Q	perc_Q	N_U	perc_U
1997	4					1	25.0
2000	12					1	8.3
2001	12			2	16.7		
2002	13	1	7.7			1	7.7
2009	17	2	11.8	1	5.9		
2012	12	5	41.7				
2014	10	4	40.0				
2016	6	3	50.0				
2017	12	5	41.7				
2020	44	11	25.0	3	6.8		
2021	63	16	25.4				
2022	50	17	34.0			7	14.0
2023	20	1	5.0				

**Note:** <sup>1</sup>I - Reported value is greater than or equal to lab method detection limit, but less than quantitation limit <sup>2</sup>Q  
- Sample held beyond the accepted holding time <sup>3</sup>U - Compound was analyzed for but not detected

#### Programs containing Value Qualified data:

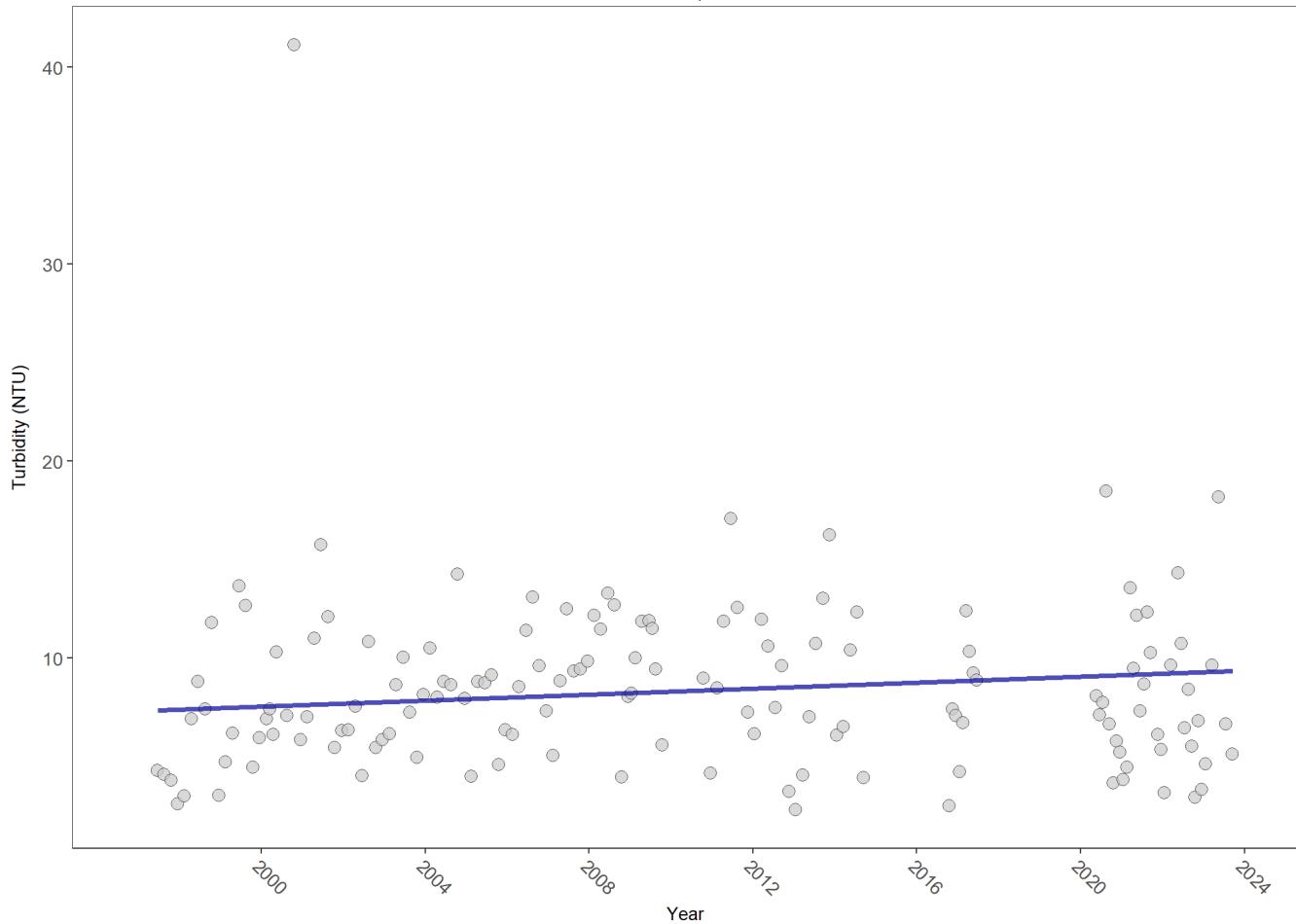
5002 - Florida STORET / WIN

### Turbidity - Discrete Water Quality

**Turbidity** results from suspended solids in the water, including silts, clays, tannins, industrial wastes, sewage and plankton, which are all factors that contribute to how clouded or murky a water column is. Turbidity is caused by soil erosion, excess nutrients, pollutants, and physical forces such as winds, currents and bottom feeders.

#### Seasonal Kendall-Tau Trend Analysis

Turbidity, Lab and Field Combined, All Depths  
Tomoka Marsh Aquatic Preserve

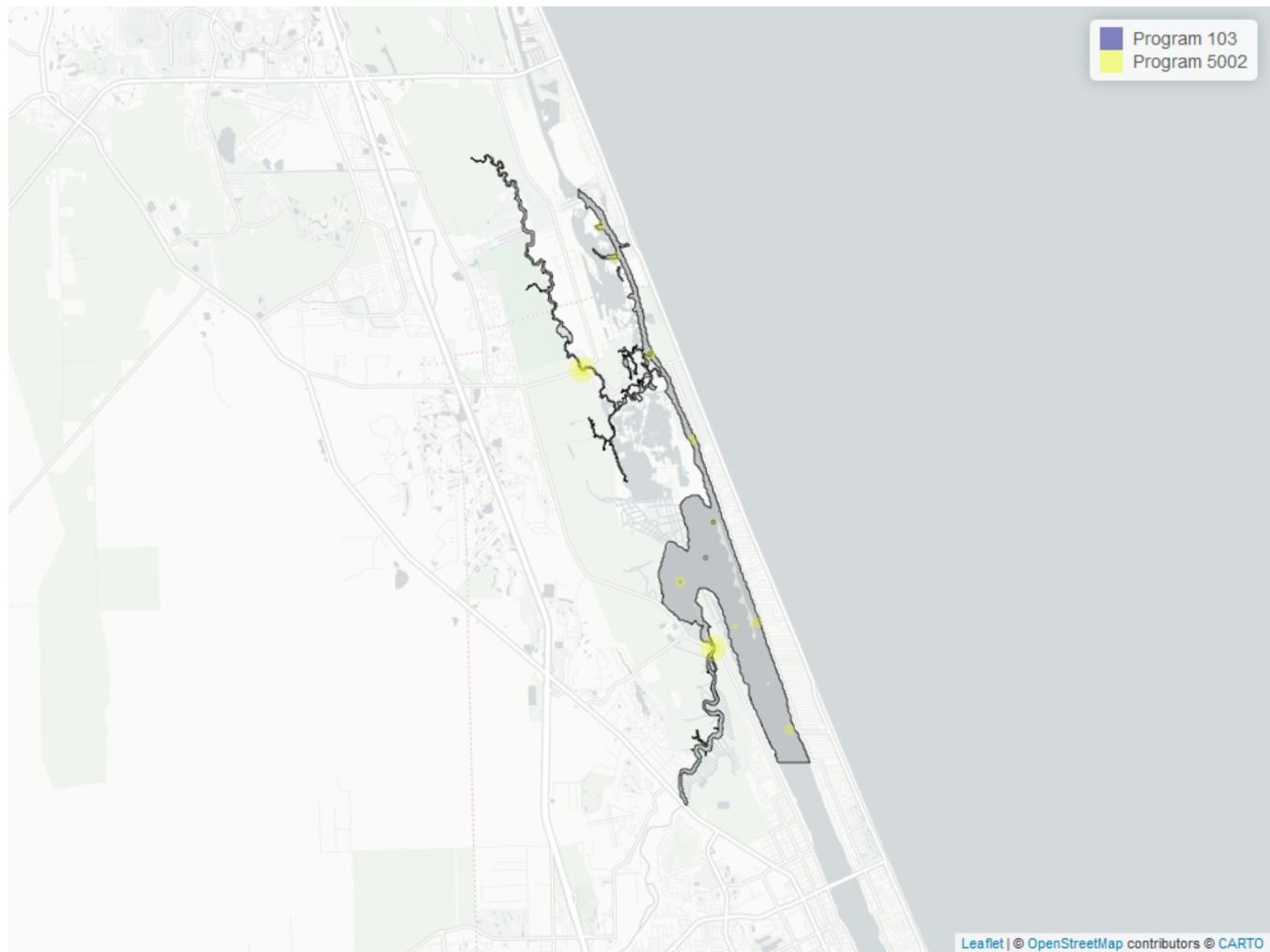


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	432	24	7.08158	TRUE	0.0753	0.1071	0.07614584	7.299557	24.1354	0.0122	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Map showing location of Discrete sampling sites for Turbidity



The bubble size on the above plots reflects the amount of data available at each sampling site

Table 17: Programs contributing data for Turbidity

ProgramID	N_Data	YearMin	YearMax
5002	417	1997	2023
103	15	2020	2021

#### Program names:

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

#### Value Qualifiers

- $N_{Total}$  is total amount of data for a given year
- $N_{\cdot}$  is the total amount of values flagged with the respective value qualifier in a given year
- $perc_{\cdot}$  is the percent of data flagged with the respective value qualifier as a proportion of  $N_{Total}$

Table 18: Value Qualifiers for Turbidity

<i>Year</i>	<i>N_Total</i>	<i>N_I</i>	<i>perc_I</i>	<i>N_Q</i>	<i>perc_Q</i>
1997	4			1	25.0
2002	13			2	15.4
2009	18			1	5.6
2011	10			2	20.0
2012	12			2	16.7
2021	94	3	3.2	2	2.1

**Note:** <sup>1</sup>**I** - Reported value is greater than or equal to lab method detection limit, but less than quantitation limit <sup>2</sup>**Q**  
- Sample held beyond the accepted holding time

**Programs containing Value Qualified data:**

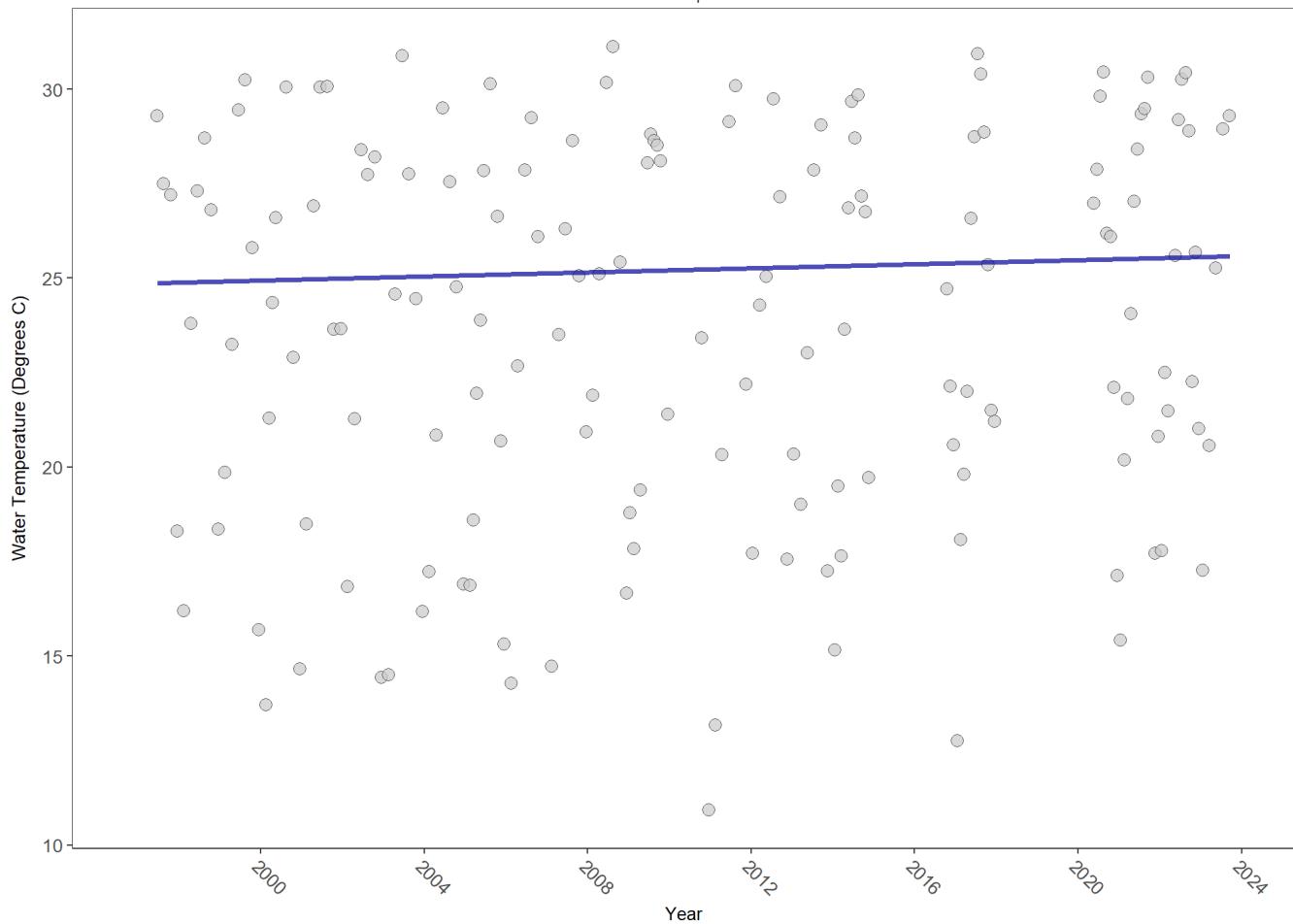
5002 - Florida STORET / WIN

### Water Temperature - Discrete Water Quality

**Temperature** determines the capacity of water to hold oxygen. Cooler water can hold more dissolved oxygen because water molecules are more tightly packed, making it harder for oxygen to escape. Additionally, as water temperature increases, fish and other aquatic organisms become more active and consume oxygen at a faster rate.

**Seasonal Kendall-Tau Trend Analysis**

Water Temperature, Field, All Depths  
Tomoka Marsh Aquatic Preserve



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	640	24	25	TRUE	0.114	0.0729	0.027	24.85033	9.9784	0.5323	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Map showing location of Discrete sampling sites for Water Temperature



The bubble size on the above plots reflects the amount of data available at each sampling site

Table 19: Programs contributing data for Water Temperature

ProgramID	N_Data	YearMin	YearMax
5002	600	1997	2023
95	24	2017	2017
103	15	2020	2021
69	4	2001	2004

#### Program names:

5002 - Florida STORET / WIN

95 - Harmful Algal Bloom Marine Observation Network

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

69 - Fisheries-Independent Monitoring (FIM) Program

There are no qualifying Value Qualifiers for Water Temperature in Tomoka Marsh Aquatic Preserve

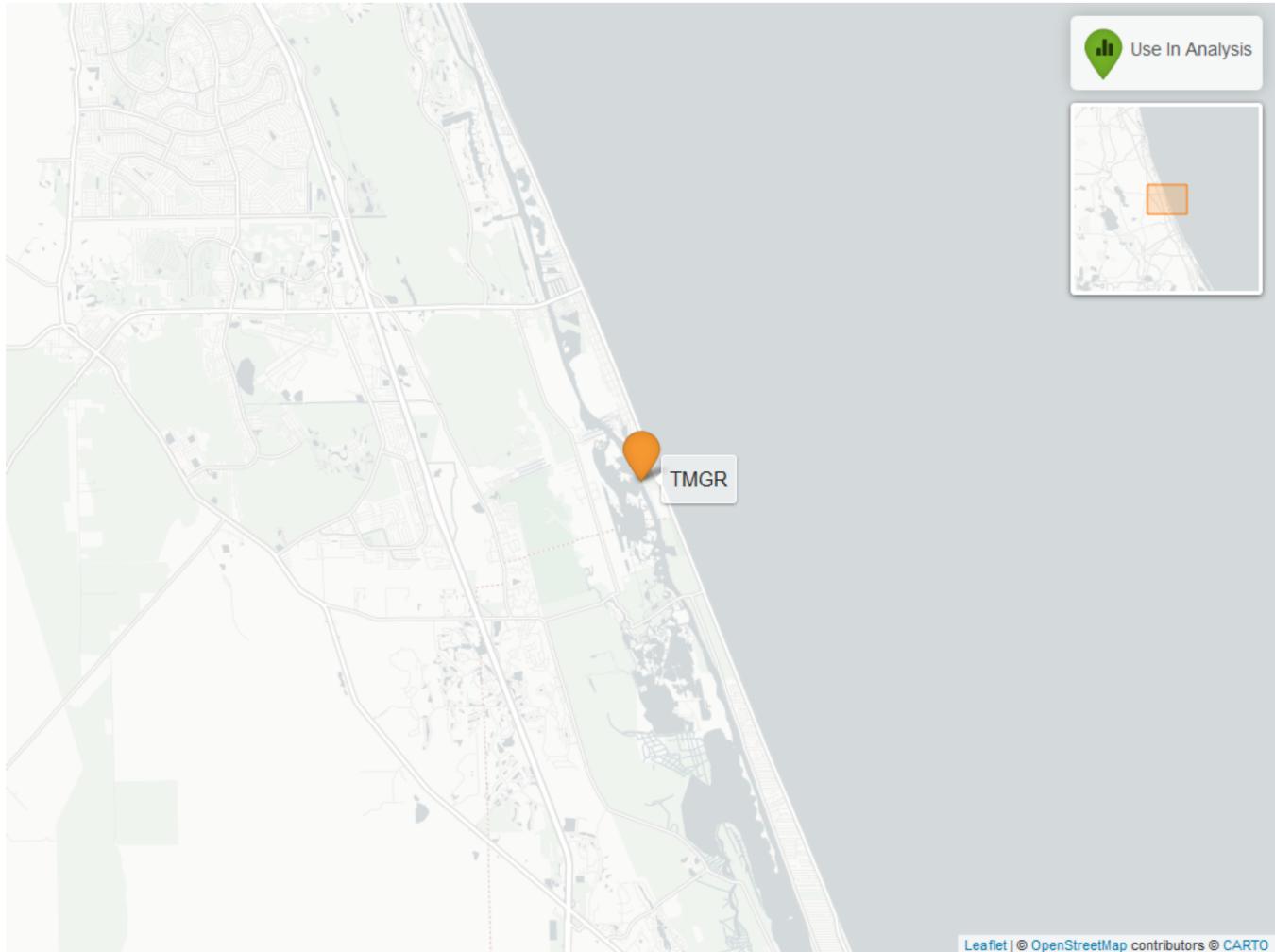
## Water Quality - Continuous

The following files were used in the continuous analysis:

- *Combined\_WQ\_WC\_NUT\_cont\_Dissolved\_Oxygen\_NE-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_cont\_Dissolved\_Oxygen\_Saturation\_NE-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_cont\_pH\_NE-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_cont\_Salinity\_NE-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_cont\_Turbidity\_NE-2024-Feb-22.txt*
- *Combined\_WQ\_WC\_NUT\_cont\_Water\_Temperature\_NE-2024-Feb-22.txt*

Table 20: Tomoka Marsh Aquatic Preserve Continuous Water Quality Monitoring (10003)

<i>Program</i>	<i>LocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
TMGR		2	FALSE	DO , DOS , pH , Sal , Turb , TempW



Map showing Continuous Water Quality Monitoring sampling locations within the boundaries of Tomoka Marsh Aquatic Preserve. Sites marked as *Use In Analysis* are featured in this report.