

# Mosquito Lagoon Aquatic Preserve

## SEACAR Habitat Analyses

Last compiled on 03 September, 2024

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## 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

<i>Parameter Name</i>	<i>Units</i>	<i>Low Threshold</i>	<i>High Threshold</i>	<i>Sensor Type</i>
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

<i>Parameter Name</i>	<i>Units</i>	<i>Low Threshold</i>	<i>High Threshold</i>
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	-
NO <sub>2</sub> +3 Filtered	mg/L	0	-
NH <sub>4</sub> 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

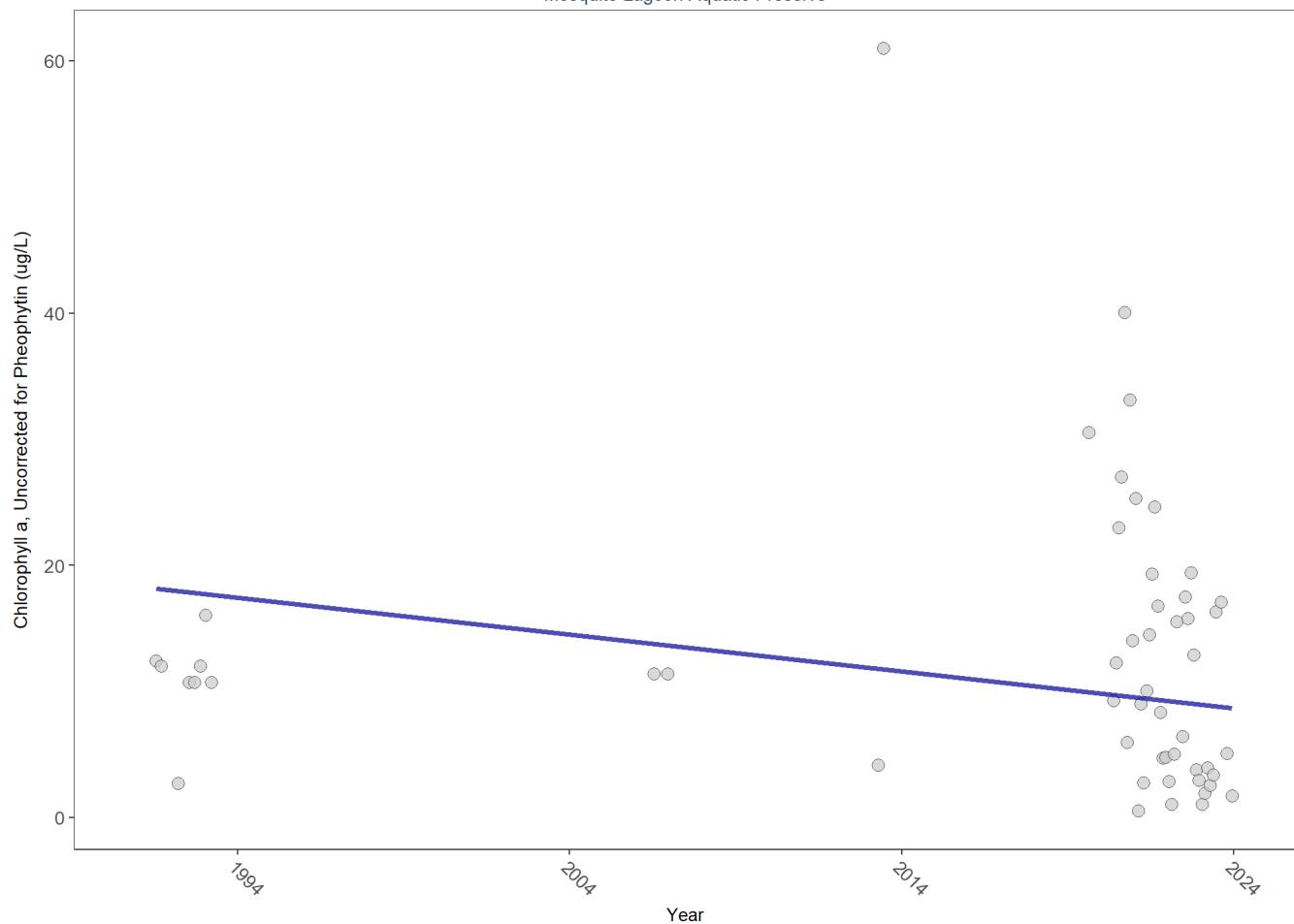
The following files were used in the discrete analysis:

- *Combined\_WQ\_WC\_NUT\_Chlorophyll\_a\_corrected\_for\_pheophytin-2024-Jul-11.txt*
- *Combined\_WQ\_WC\_NUT\_Chlorophyll\_a\_uncorrected\_for\_pheophytin-2024-Jul-11.txt*
- *Combined\_WQ\_WC\_NUT\_Colored\_dissolved\_organic\_matter\_CDOM-2024-Jul-11.txt*
- *Combined\_WQ\_WC\_NUT\_Dissolved\_Oxygen-2024-Jul-11.txt*
- *Combined\_WQ\_WC\_NUT\_Dissolved\_Oxygen\_Saturation-2024-Jul-11.txt*
- *Combined\_WQ\_WC\_NUT\_pH-2024-Jul-11.txt*
- *Combined\_WQ\_WC\_NUT\_Salinity-2024-Jul-11.txt*
- *Combined\_WQ\_WC\_NUT\_Secchi\_Depth-2024-Jul-11.txt*
- *Combined\_WQ\_WC\_NUT\_Total\_Nitrogen-2024-Jul-11.txt*
- *Combined\_WQ\_WC\_NUT\_Total\_Phosphorus-2024-Jul-11.txt*
- *Combined\_WQ\_WC\_NUT\_Total\_Suspended\_Solids\_TSS-2024-Jul-11.txt*
- *Combined\_WQ\_WC\_NUT\_Turbidity-2024-Jul-11.txt*
- *Combined\_WQ\_WC\_NUT\_Water\_Temperature-2024-Jul-11.txt*

# Chlorophyll a, Uncorrected for Pheophytin - Discrete Water Quality

## Seasonal Kendall-Tau Trend Analysis

Chlorophyll a, Uncorrected for Pheophytin, Lab, All Depths  
Mosquito Lagoon Aquatic Preserve

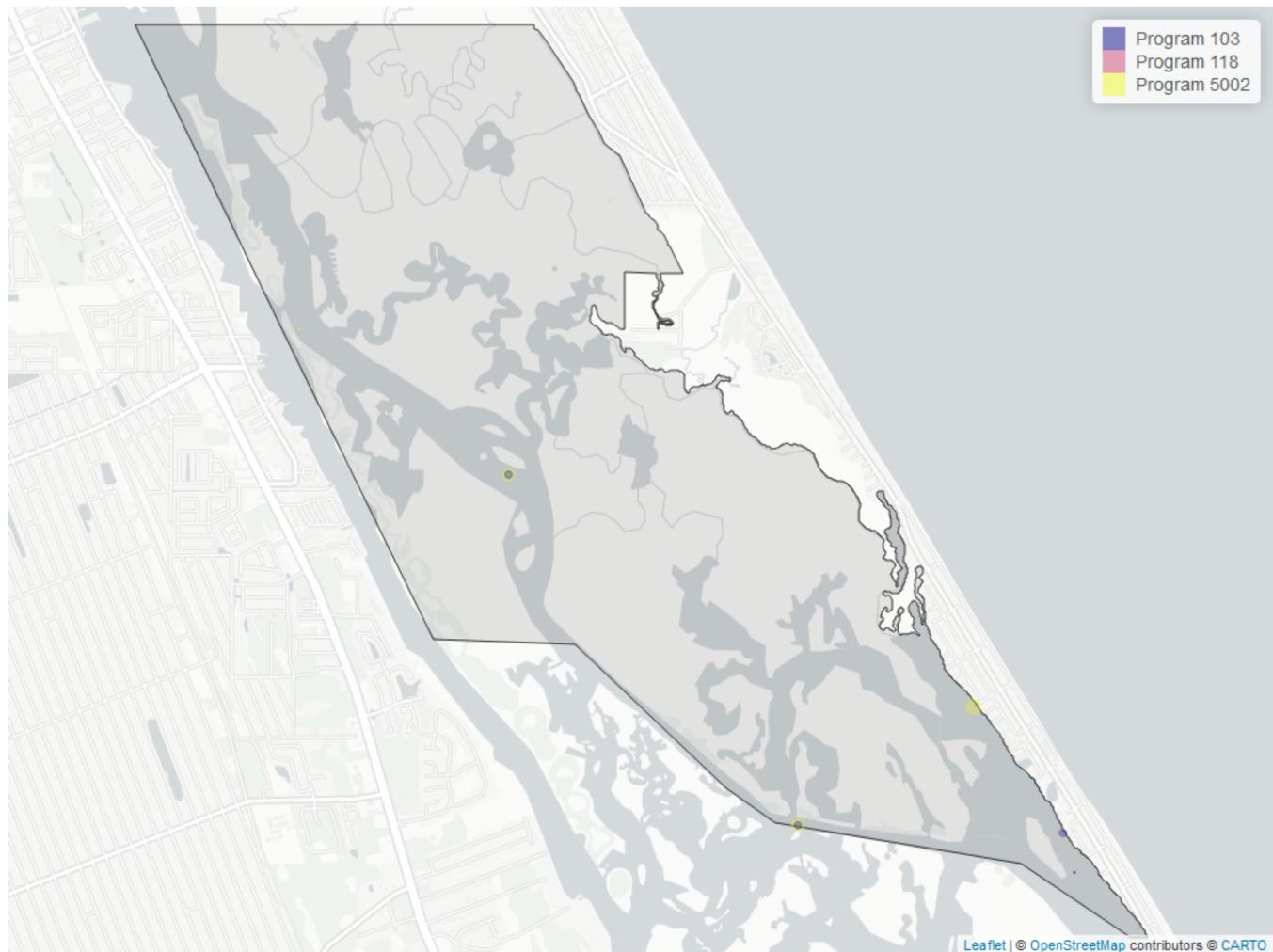


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	110	10	10.66388	TRUE	-0.2013	0.1465	-0.292685	18.32114	14.5141	0.2058	0

*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 Chlorophyll a, Uncorrected for Pheophytin



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

Table 6: Programs contributing data for Chlorophyll a, Uncorrected for Pheophytin

ProgramID	N_Data	YearMin	YearMax
5002	81	2013	2023
103	29	1991	2021
118	1	2006	2006

**Program names:**

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

118 - National Aquatic Resource Surveys, National Coastal Condition Assessment

**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 7: Value Qualifiers for Chlorophyll a, Uncorrected for Pheo-phytin

Year	$N_{Total}$	$N_I$	$perc_I$	$N_Q$	$perc_Q$	$N_U$	$perc_U$
2021	40	3	7.5	1	2.5	1	2.5
2022	20	3	15.0			1	5.0
2023	17	8	47.1			1	5.9

**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:

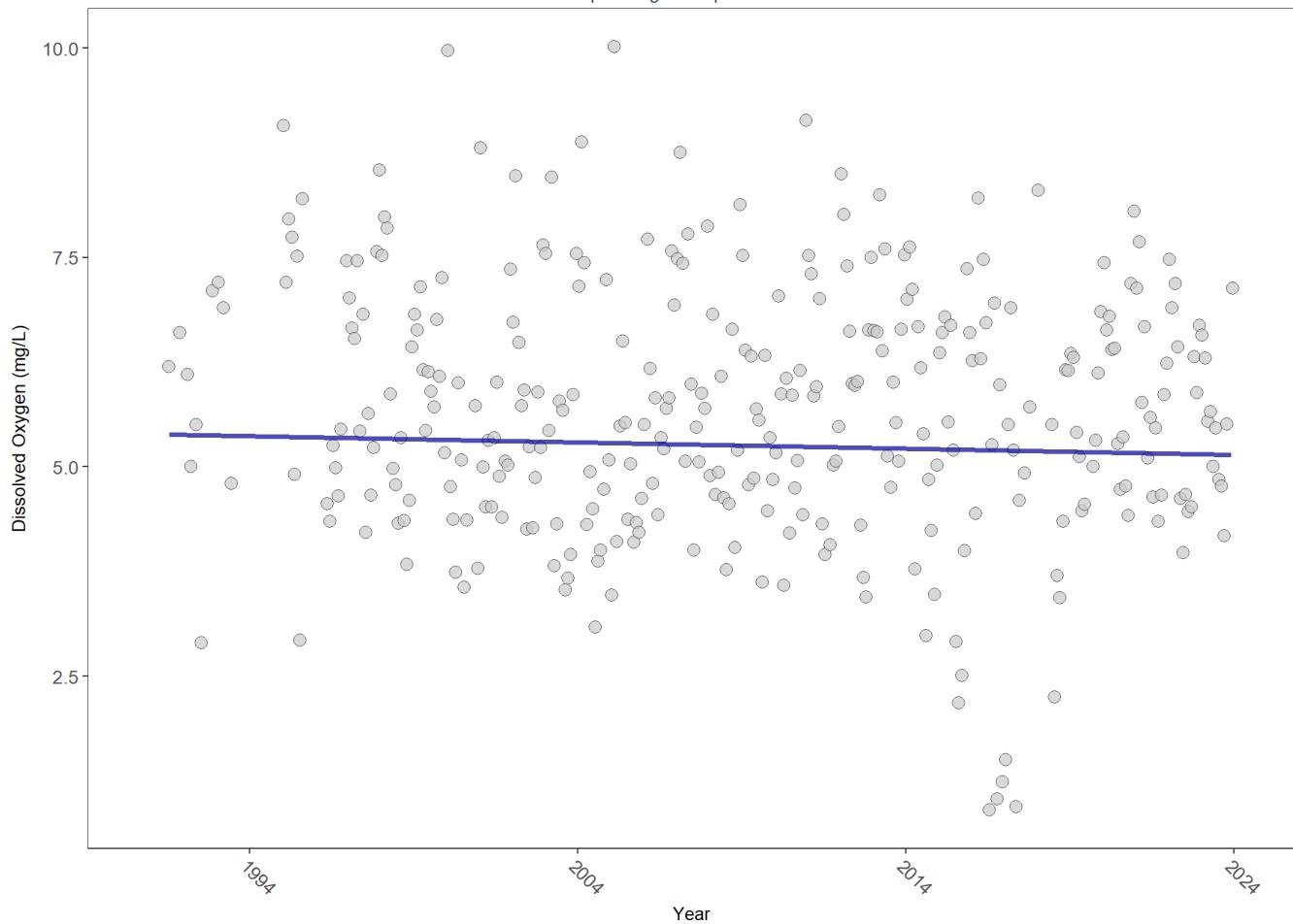
5002 - Florida STORET / WIN

### 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

Dissolved Oxygen, Field, All Depths  
Mosquito Lagoon Aquatic Preserve

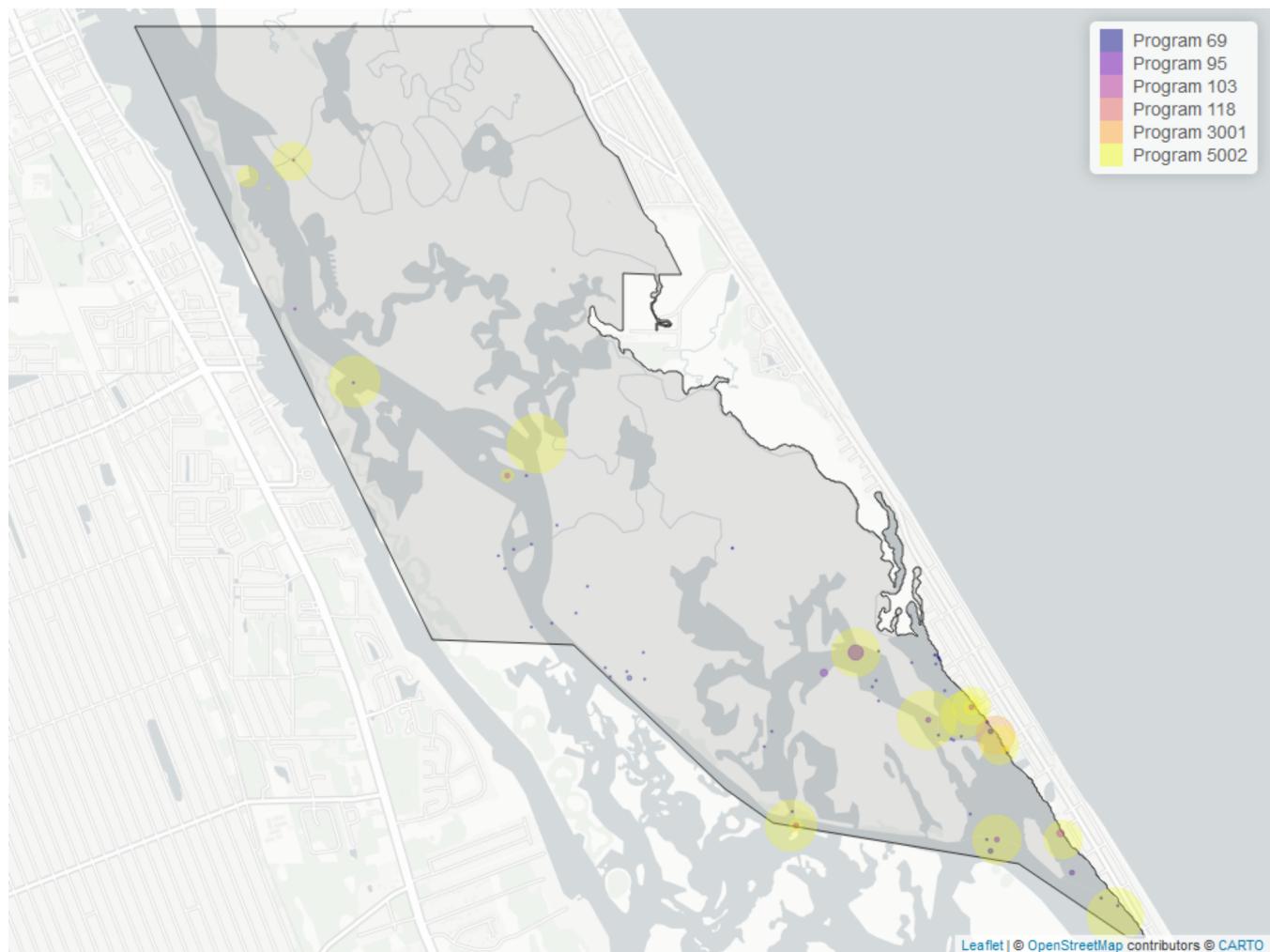


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	4790	32	5.4	TRUE	-0.0417	0.2853	-0.007375	5.387199	5.3549	0.9128	0

*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 8: Programs contributing data for Dissolved Oxygen

ProgramID	N_Data	YearMin	YearMax
5002	4366	1995	2023
3001	243	2009	2023
69	88	2006	2020
95	60	2007	2018
103	26	1991	2021
3013	18	2009	2019
118	1	2006	2006

#### Program names:

5002 - Florida STORET / WIN

3001 - Lagoon Watch (Formerly Marine Discovery Center)

69 - Fisheries-Independent Monitoring (FIM) Program

95 - Harmful Algal Bloom Marine Observation Network

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

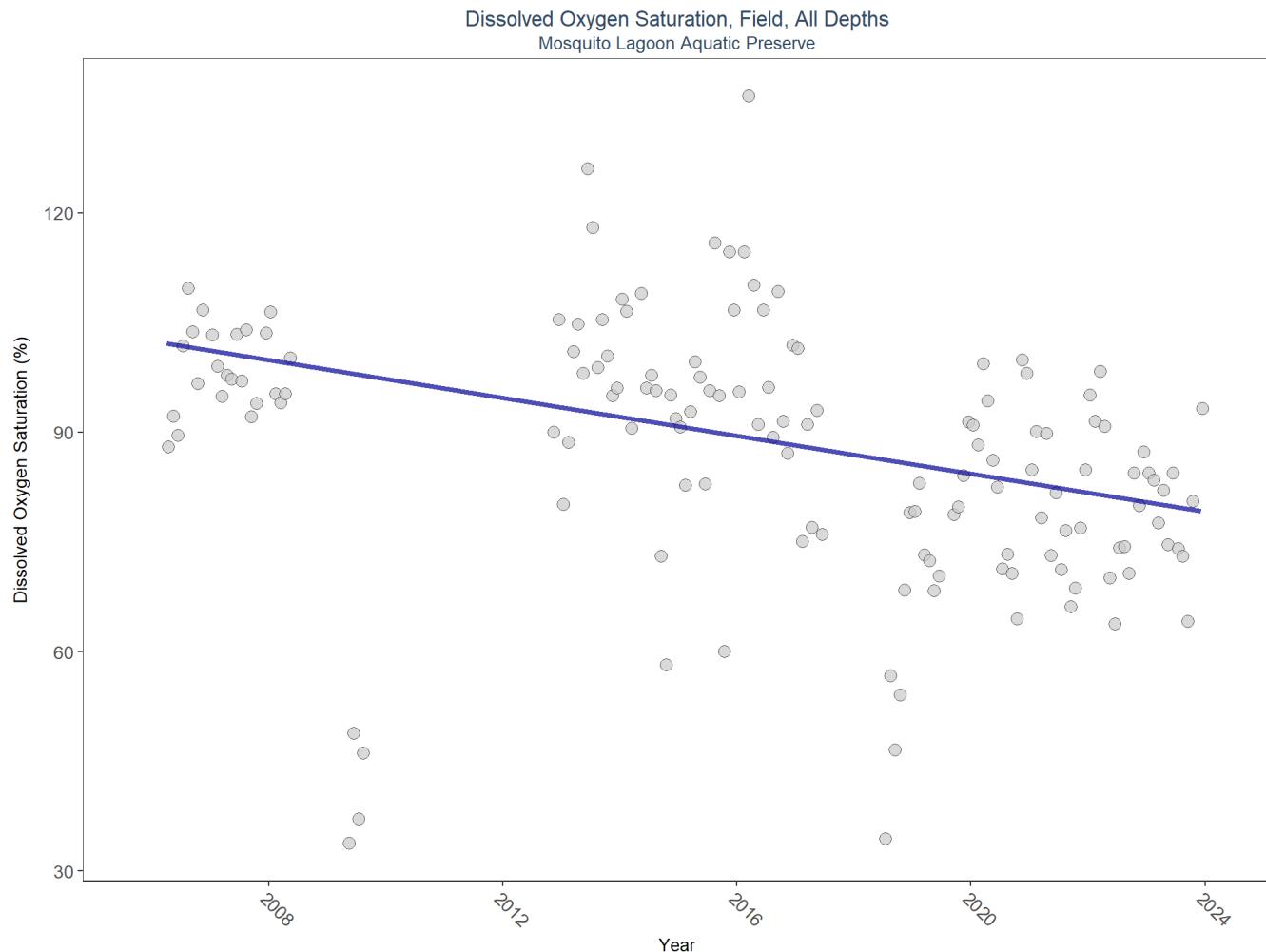
3013 - Seagrass (SJRWMD)

118 - National Aquatic Resource Surveys, National Coastal Condition Assessment

There are no qualifying Value Qualifiers for Dissolved Oxygen in Mosquito Lagoon Aquatic Preserve

## Dissolved Oxygen Saturation - Discrete Water Quality

### Seasonal Kendall-Tau Trend Analysis

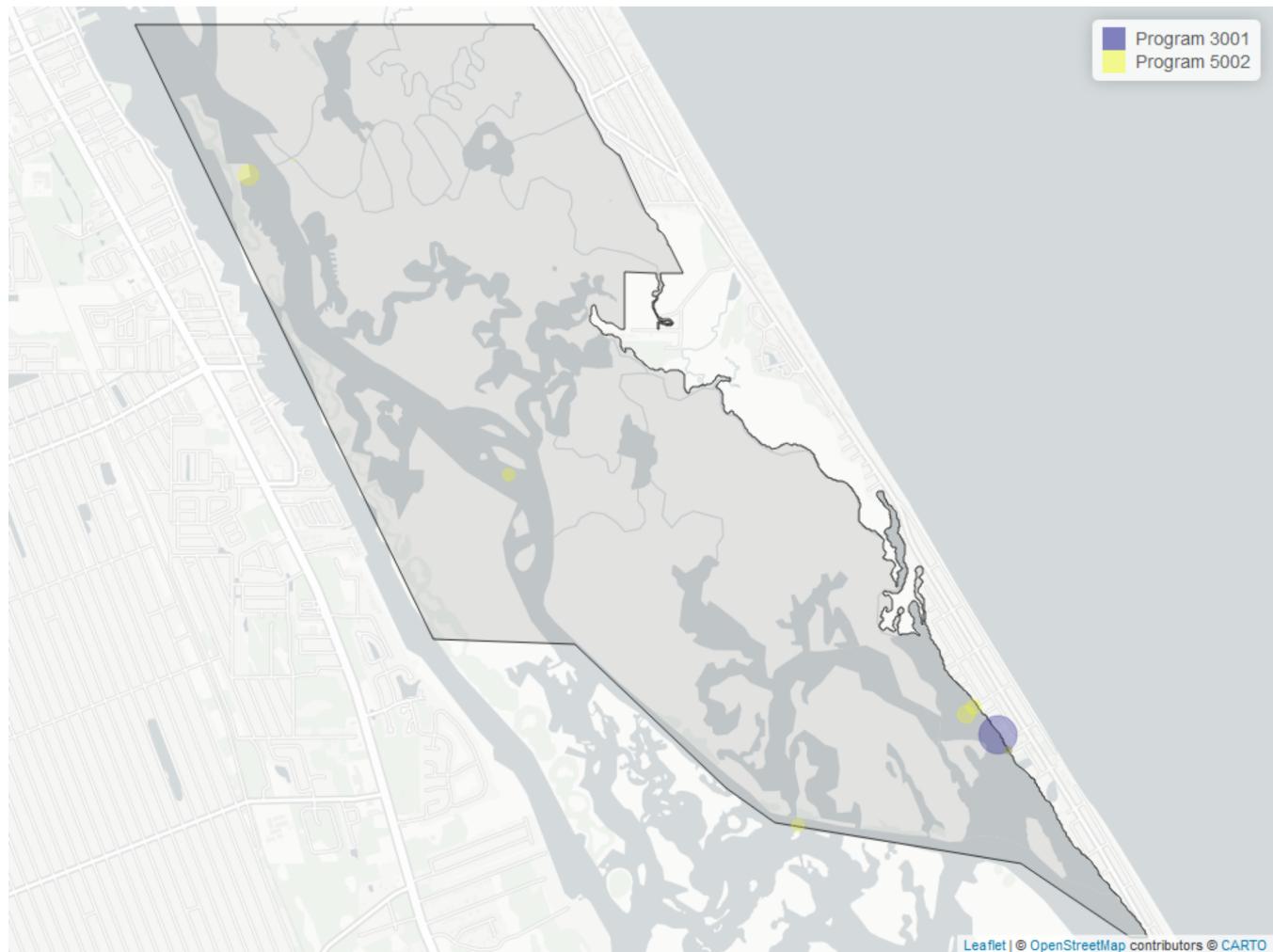


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	459	16	84.9	TRUE	-0.3302	0.0000	-1.295865	102.4756	2.3142	0.9971	-1

*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 9: Programs contributing data for Dissolved Oxygen Saturation

ProgramID	N_Data	YearMin	YearMax
3001	243	2009	2023
5002	216	2006	2023
3013	2	2019	2019

**Program names:**

3001 - Lagoon Watch (Formerly Marine Discovery Center)

5002 - Florida STORET / WIN

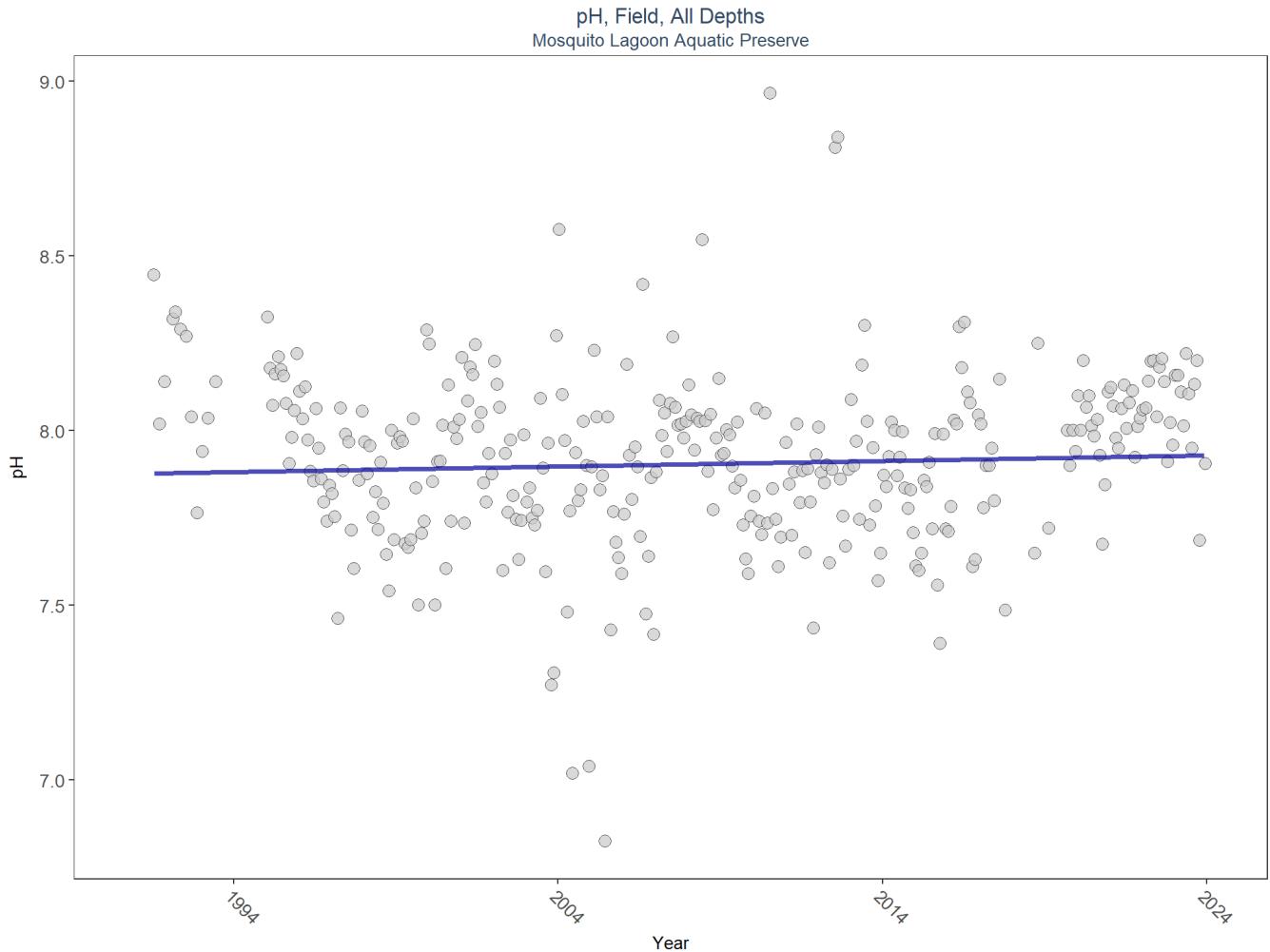
3013 - Seagrass (SJRWMD)

There are no qualifying Value Qualifiers for Dissolved Oxygen Saturation in Mosquito Lagoon 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.

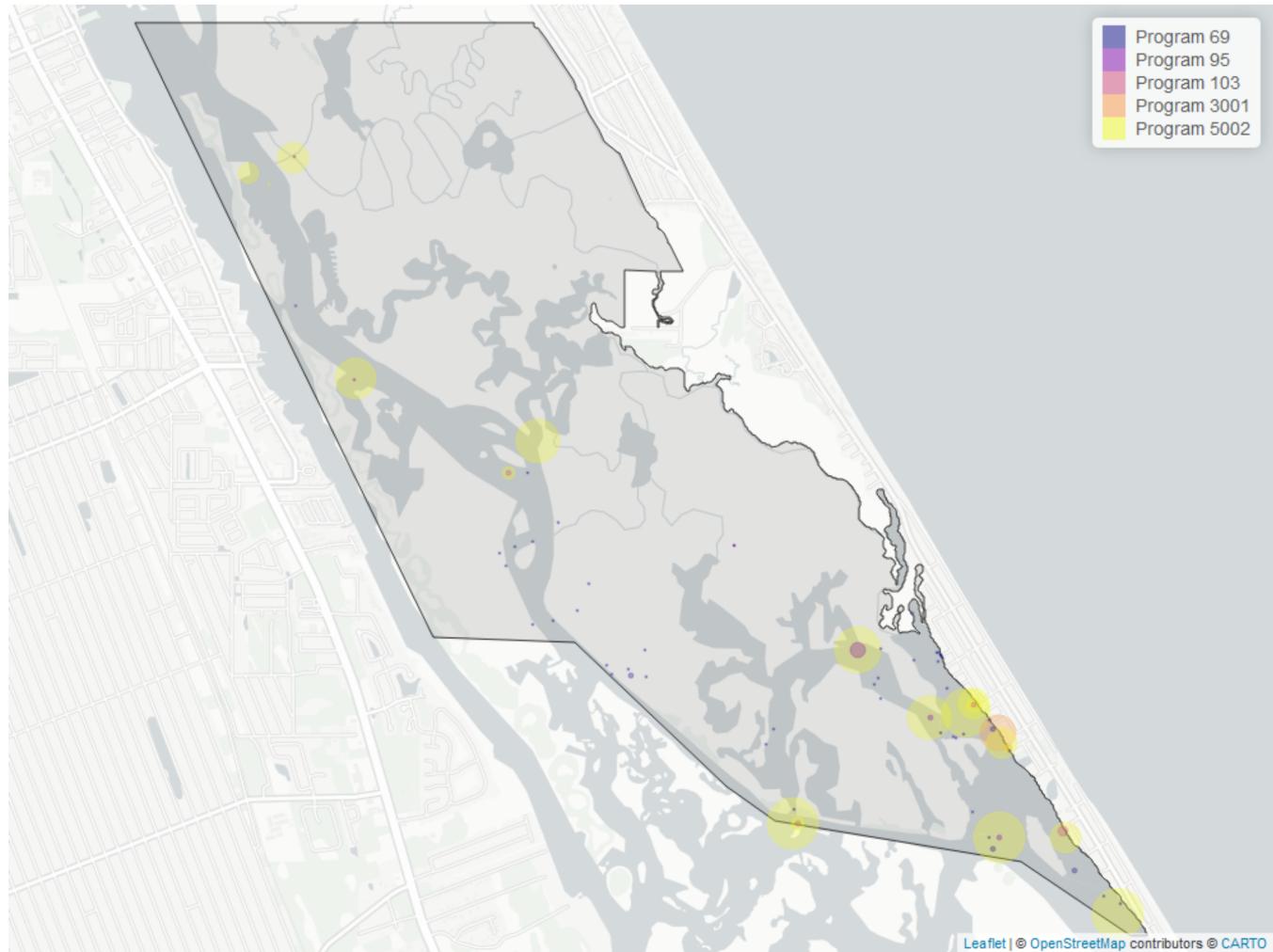
### Seasonal Kendall-Tau Trend Analysis



*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 10: Programs contributing data for pH

ProgramID	N_Data	YearMin	YearMax
5002	3401	1995	2023
3001	199	2009	2023
69	88	2006	2020
95	48	2007	2018
103	36	1991	2021
3013	18	2009	2019

#### Program names:

5002 - Florida STORET / WIN

3001 - Lagoon Watch (Formerly Marine Discovery Center)

69 - Fisheries-Independent Monitoring (FIM) Program

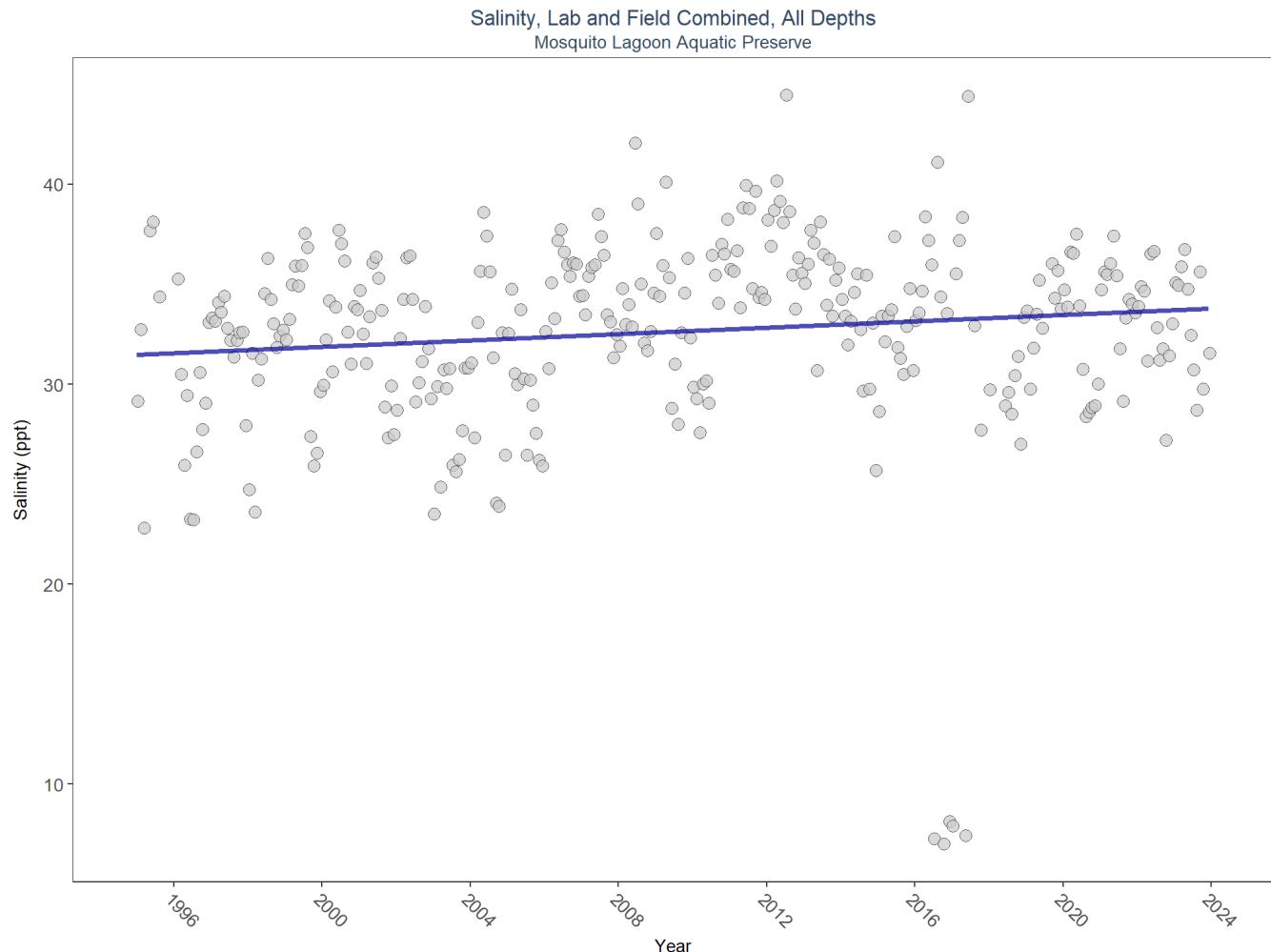
95 - Harmful Algal Bloom Marine Observation Network  
 103 - EPA STOrage and RETrieval Data Warehouse (STORET)  
 3013 - Seagrass (SJRWMD)

There are no qualifying Value Qualifiers for pH in Mosquito Lagoon 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

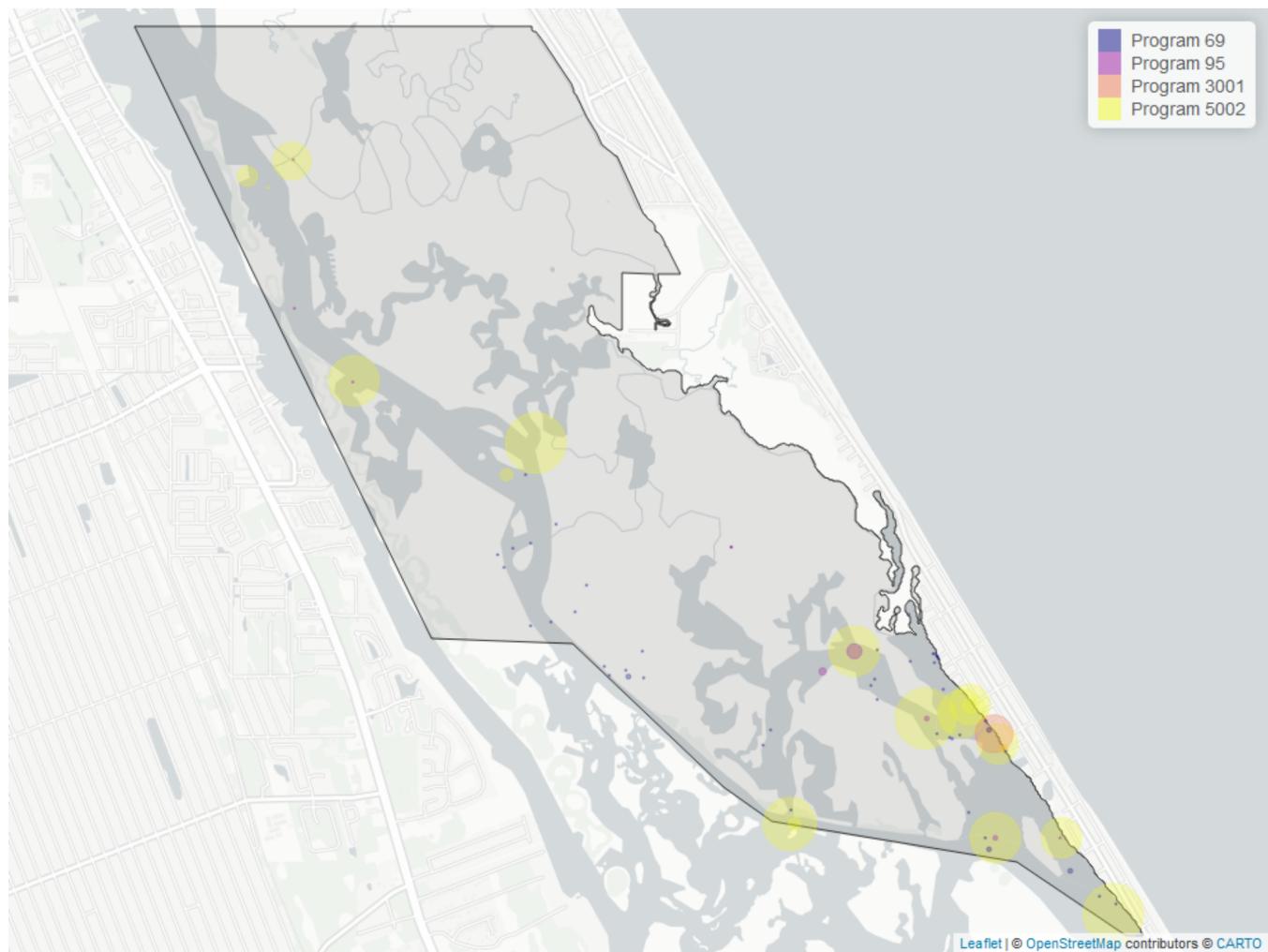


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	5220	29	32.5	TRUE	0.1416	0.0003	0.08028877	31.47281	15.4804	0.1615	1

*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 Salinity



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

Table 11: Programs contributing data for Salinity

ProgramID	N_Data	YearMin	YearMax
5002	4805	1995	2023
3001	243	2009	2023
69	88	2006	2020
95	66	2007	2018
3013	20	2009	2019

#### Program names:

5002 - Florida STORET / WIN

3001 - Lagoon Watch (Formerly Marine Discovery Center)

69 - Fisheries-Independent Monitoring (FIM) Program

95 - Harmful Algal Bloom Marine Observation Network

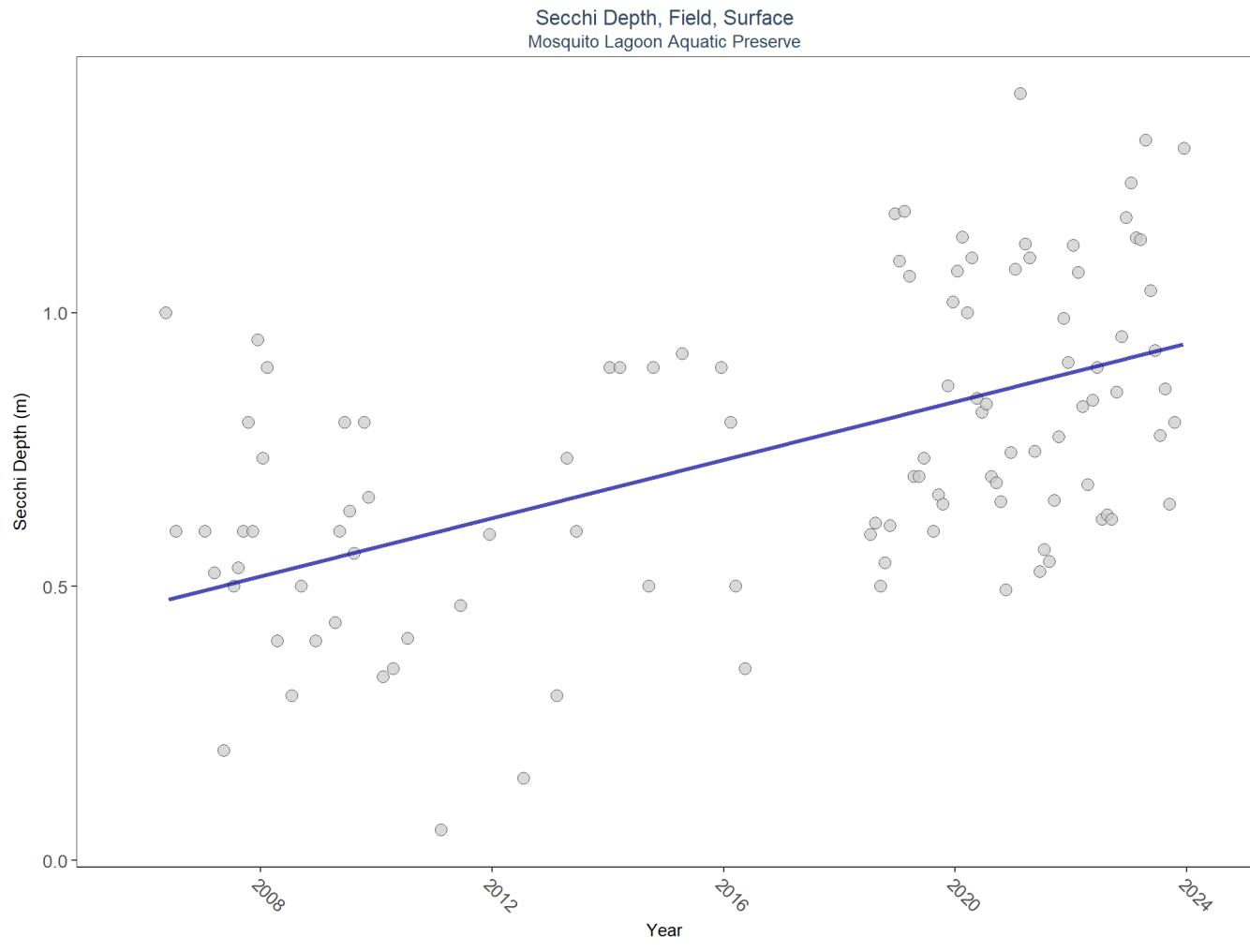
3013 - Seagrass (SJRWM)

There are no qualifying Value Qualifiers for Salinity in Mosquito Lagoon 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.

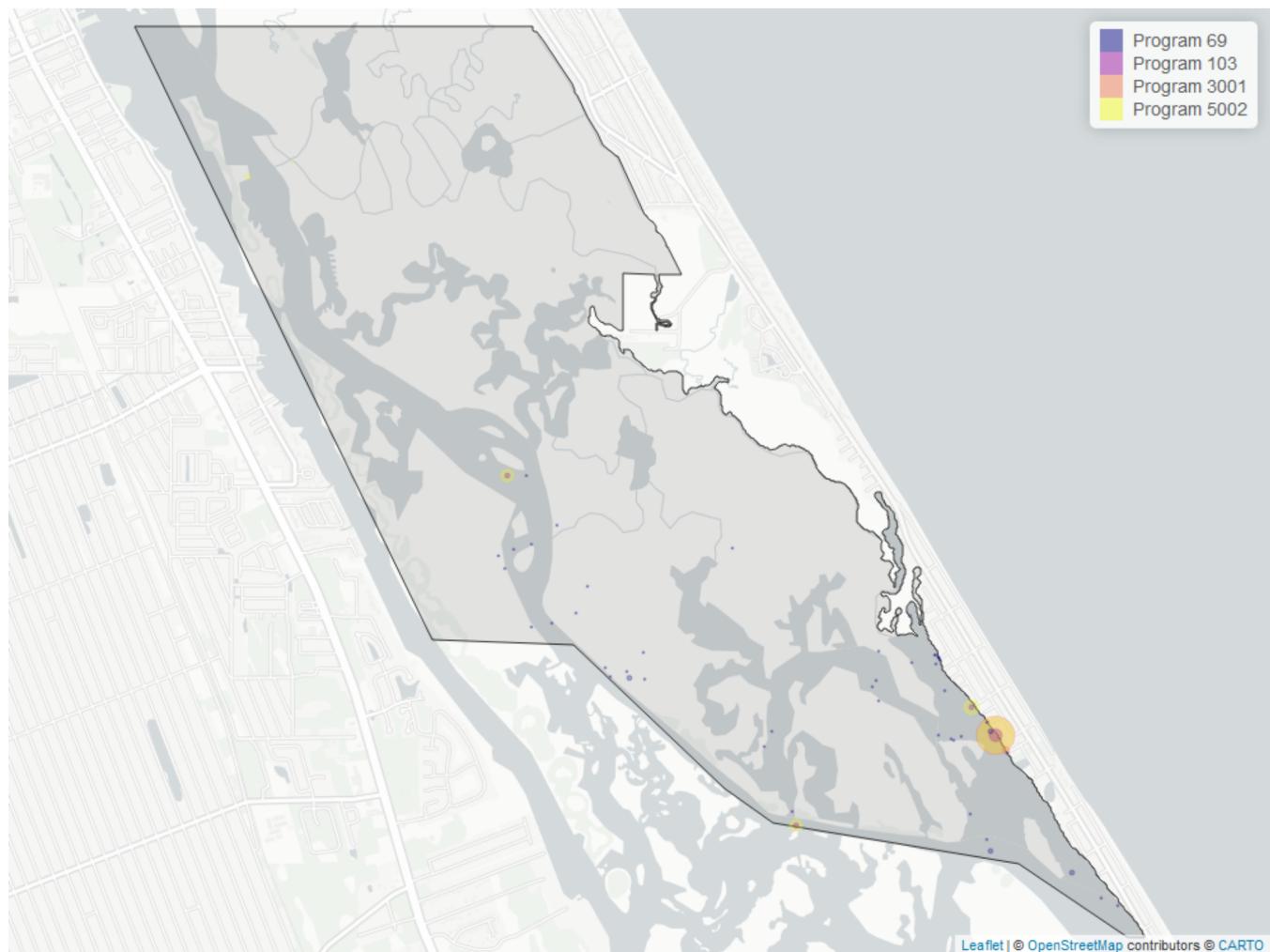
### Seasonal Kendall-Tau Trend Analysis



$p < 0.00005$  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 12: Programs contributing data for Secchi Depth

ProgramID	N_Data	YearMin	YearMax
5002	293	2006	2023
3001	241	2009	2023
69	88	2006	2020
103	45	2020	2021
3013	22	2009	2023

#### Program names:

5002 - Florida STORET / WIN

3001 - Lagoon Watch (Formerly Marine Discovery Center)

69 - Fisheries-Independent Monitoring (FIM) 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 13: Value Qualifiers for Secchi Depth

Year	$N_{\_Total}$	$N_{\_S}$	$perc_{\_S}$
2018	36	2	5.6
2019	82	6	7.3
2020	134	5	3.7
2021	153	13	8.5
2022	106	8	7.6
2023	72	13	18.1

**Note:**  $^1S$  - 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.

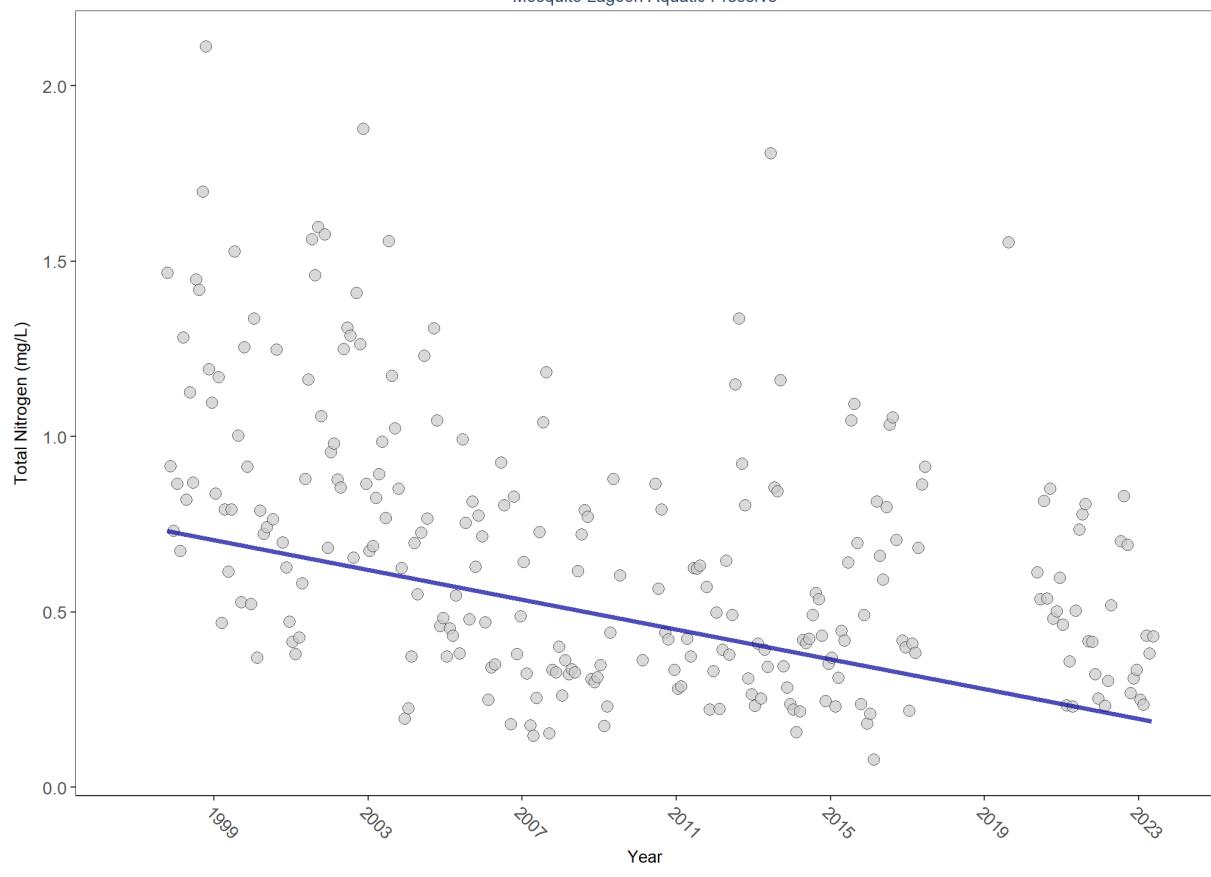
- 1)  $TN = TKN + NO_3O_2;$
- 2)  $TN = TKN + NO_3 + NO_2;$
- 3)  $TN = ORGN + NH_4 + NO_3O_2;$
- 4)  $TN = ORGN + NH_4 + NO_2 + NO_3;$
- 5)  $TN = TKN + NO_3;$
- 6)  $TN = ORGN + NH_4 + NO_3;$

### 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  $NO_3O_2$  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\_QAACFlagCode = “1Q”
  - SEACAR\_QAAC>Description = “SEACAR Calculated”

## Seasonal Kendall-Tau Trend Analysis

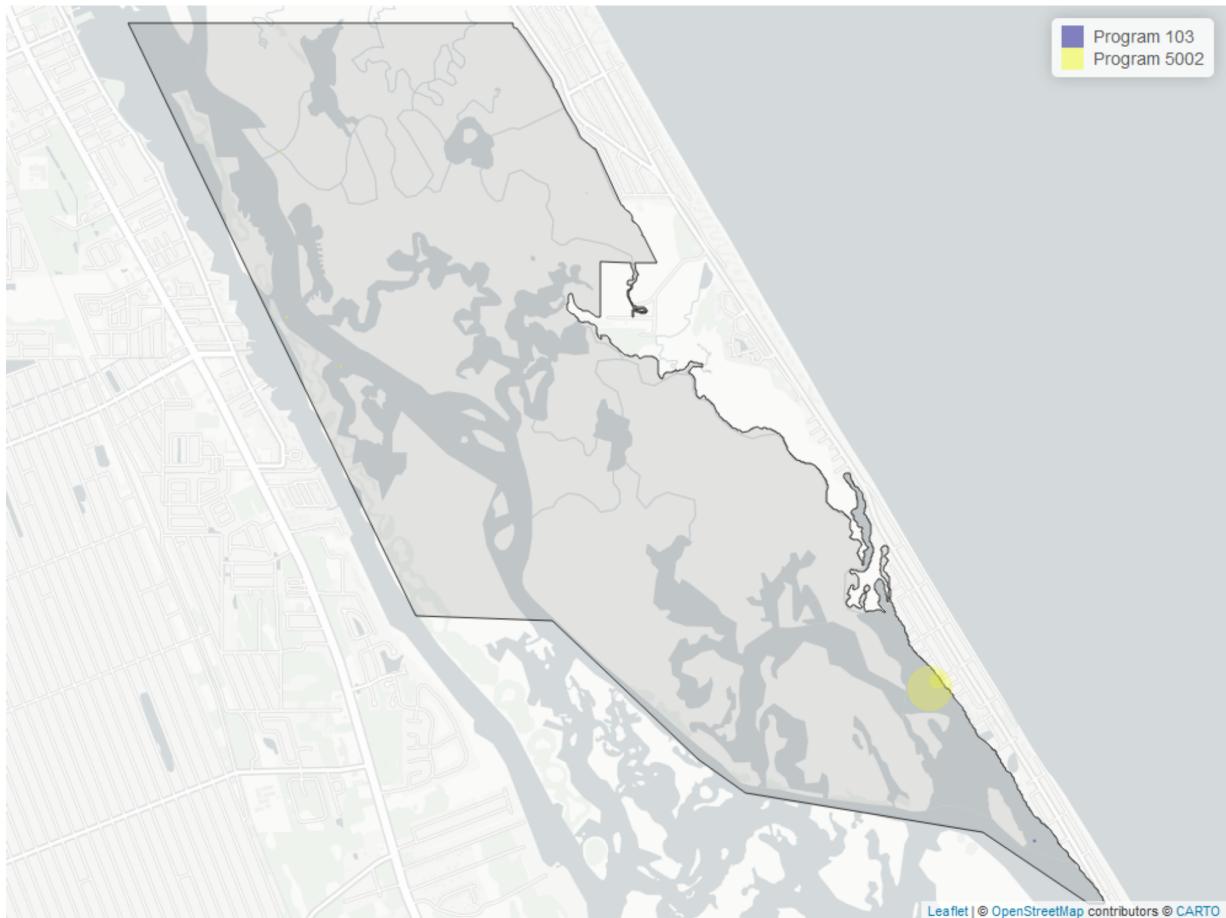
Total Nitrogen, Lab, All Depths  
Mosquito Lagoon Aquatic Preserve



*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 14: Programs contributing data for Total Nitrogen

ProgramID	N_Data	YearMin	YearMax
5002	360	1997	2023
103	2	2006	2006

**Program names:**

5002 - Florida STORET / WIN

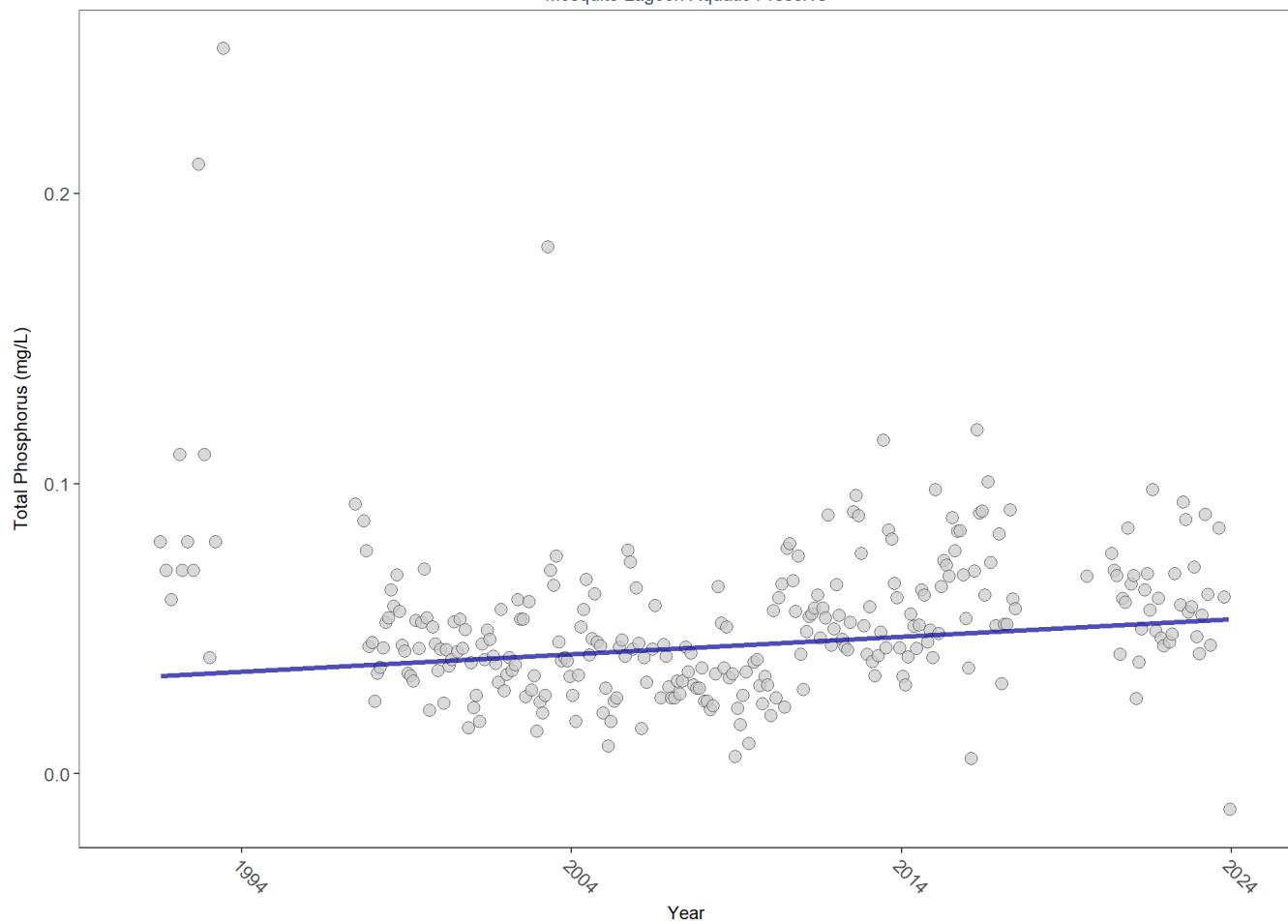
103 - EPA STOrage and RETrieval Data Warehouse (STORET)

There are no qualifying Value Qualifiers for Total Nitrogen in Mosquito Lagoon Aquatic Preserve

## Total Phosphorus - Discrete Water Quality

### Seasonal Kendall-Tau Trend Analysis

Total Phosphorus, Lab, All Depths  
Mosquito Lagoon Aquatic Preserve

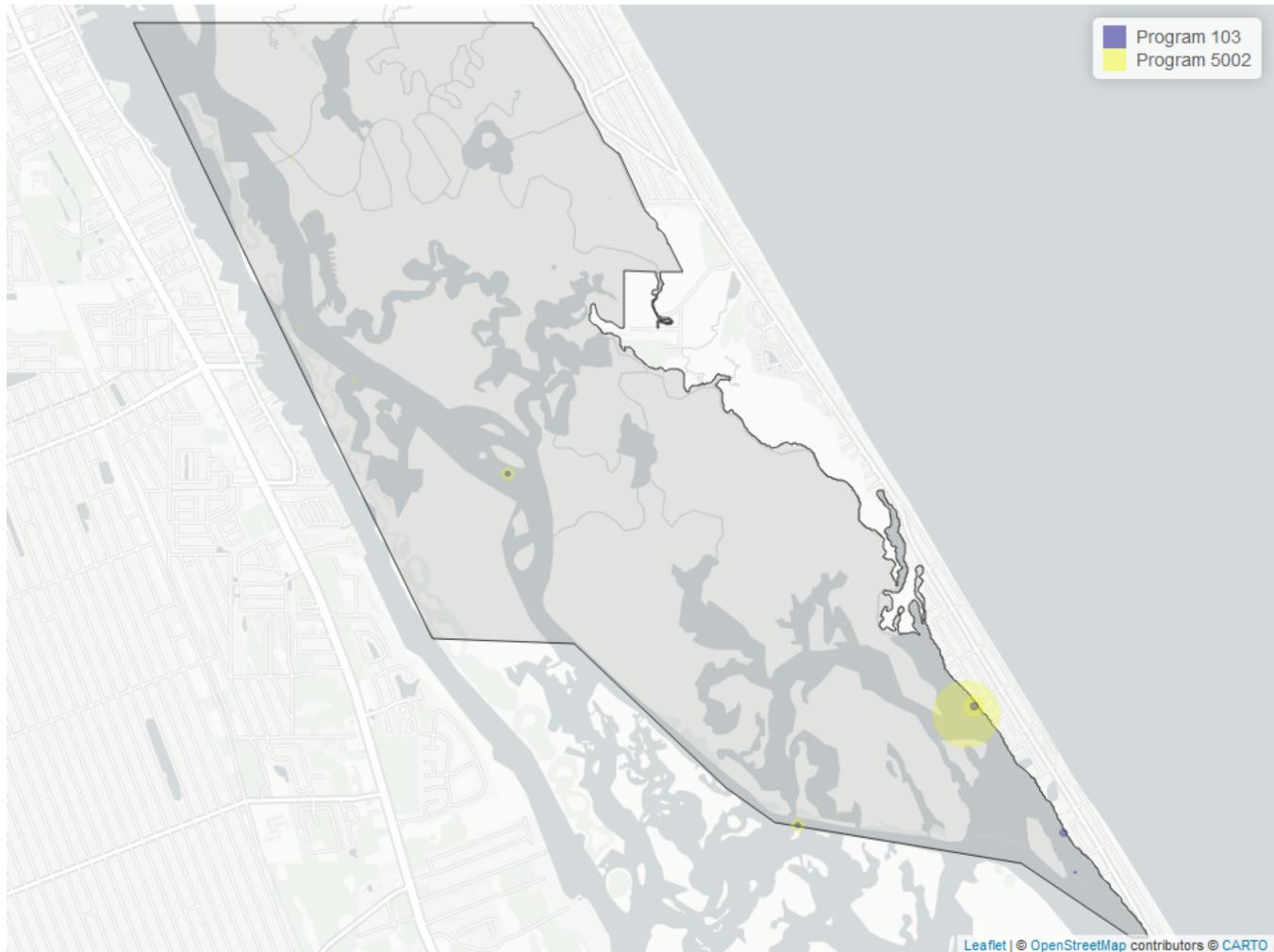


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	827	29	0.042	TRUE	0.1721	0.0001	0.0006	0.03348039	5.6031	0.8985	1

*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 Phosphorus



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

Table 15: Programs contributing data for Total Phosphorus

ProgramID	N_Data	YearMin	YearMax
5002	804	1997	2023
103	36	1991	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
- $N_{\text{Qual}}$  is the total amount of values flagged with the respective value qualifier in a given year
- $\text{perc}_{\text{Qual}}$  is the percent of data flagged with the respective value qualifier as a proportion of  $N_{Total}$

Table 16: 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>
1997	24	7	29.2		
1998	96	47	49.0	2	2.1
1999	71	12	16.9	1	1.4
2001	48			4	8.3
2002	48	17	35.4	4	8.3
2003	31	15	48.4		
2004	23	14	60.9		
2005	24	12	50.0		
2006	26	10	38.5		
2007	24	9	37.5		
2008	24	13	54.2		
2009	23	6	26.1		
2010	23	15	65.2	2	8.7
2011	24	19	79.2	2	8.3
2012	24	18	75.0		
2013	27	19	70.4		
2014	24	22	91.7		
2015	24	19	79.2	2	8.3
2016	24	10	41.7	2	8.3
2017	12	8	66.7		
2020	28	8	28.6		
2021	54	14	25.9		
2022	32	7	21.9	2	6.2
2023	20	2	10.0		

**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:

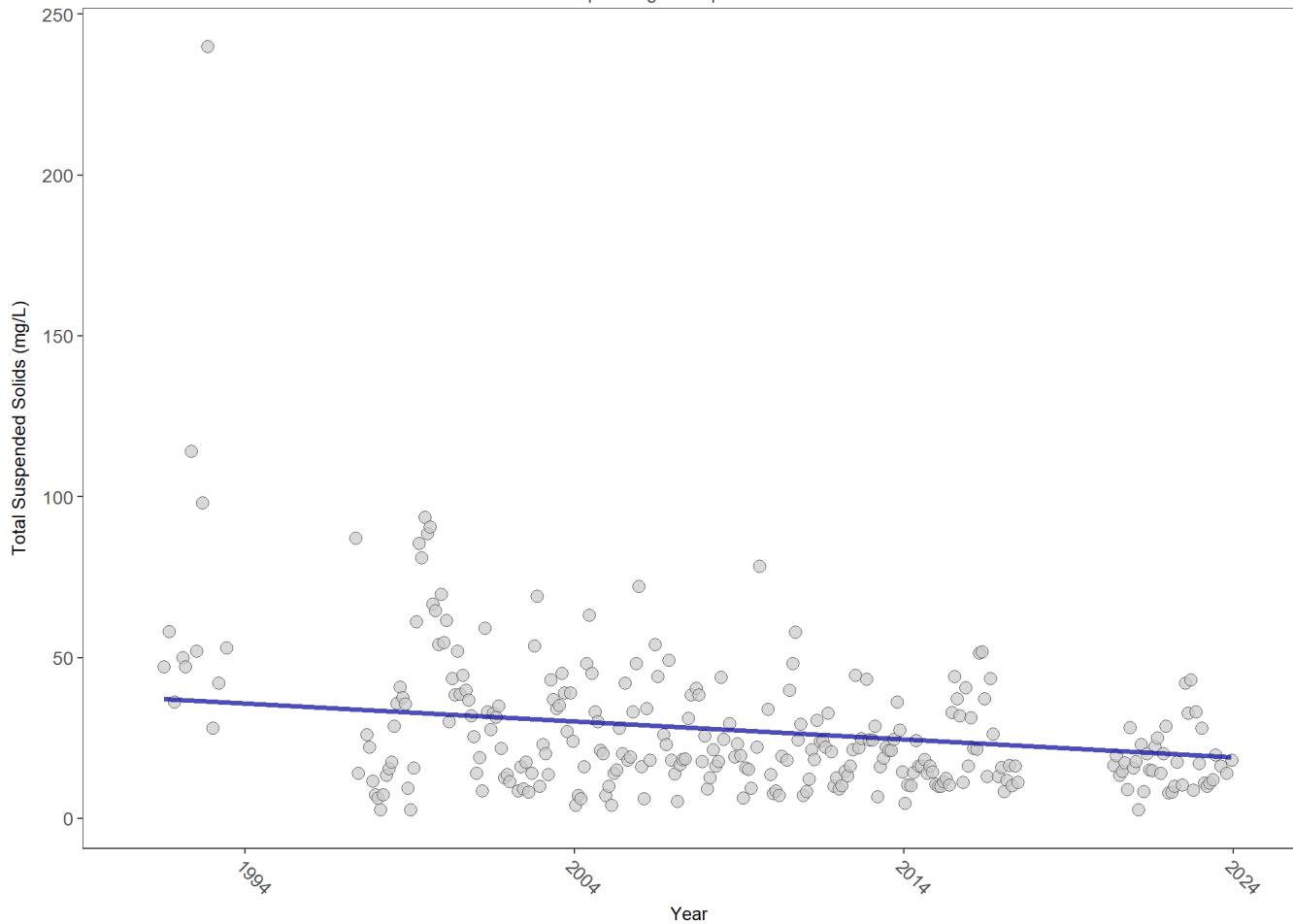
5002 - Florida STORET / WIN

#### 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  
Mosquito Lagoon Aquatic Preserve

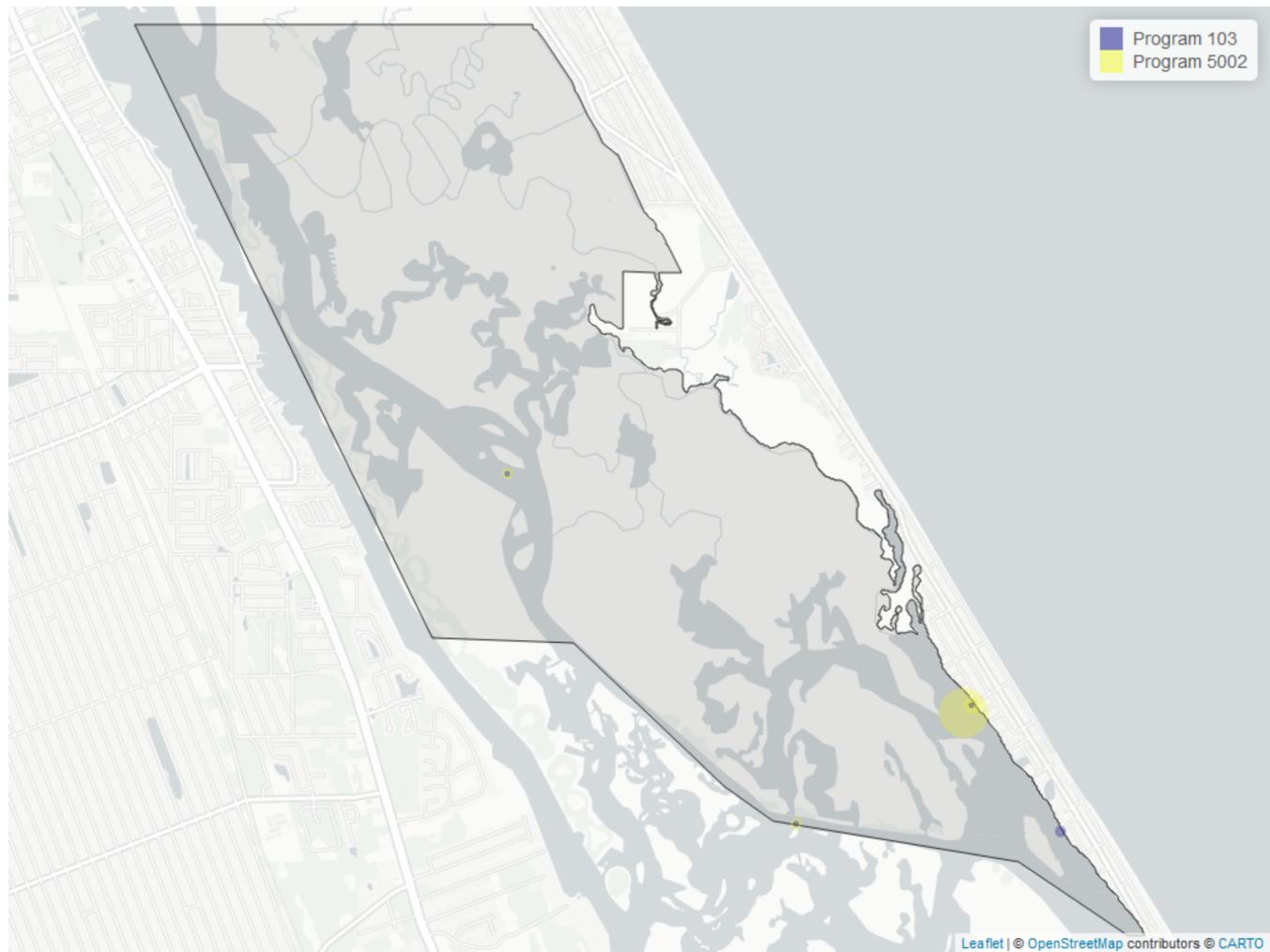


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	435	28	20	TRUE	-0.2377	0.0000	-0.5545455	37.35877	15.0304	0.1811	-1

*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 Suspended Solids



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

Table 17: Programs contributing data for Total Suspended Solids

ProgramID	N_Data	YearMin	YearMax
5002	418	1997	2023
103	29	1991	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
- $N_{\text{Qualifier}}$  is the total amount of values flagged with the respective value qualifier in a given year
- $\text{perc}_{\text{Qualifier}}$  is the percent of data flagged with the respective value qualifier as a proportion of  $N_{Total}$

Table 18: Value Qualifiers for Total Suspended Solids

<i>Year</i>	<i>N_Total</i>	<i>N_I</i>	<i>perc_I</i>	<i>N_Q</i>	<i>perc_Q</i>	<i>N_U</i>	<i>perc_U</i>
1997	14	7	50.0	1	7.1		
1998	48	22	45.8				
1999	36	2	5.6				
2000	24			2	8.3		
2001	24					1	4.2
2002	20	4	20.0				
2003	16	3	18.8	2	12.5		
2004	12	4	33.3				
2005	12	1	8.3				
2006	12	1	8.3	1	8.3		
2007	11	1	9.1				
2009	12	1	8.3				
2011	12			1	8.3		
2013	14	2	14.3				
2014	12	2	16.7				
2015	12	1	8.3				
2016	12	1	8.3				
2020	19			2	10.5		
2021	35	4	11.4	3	8.6		
2022	20	6	30.0				
2023	15	2	13.3	1	6.7		

**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:

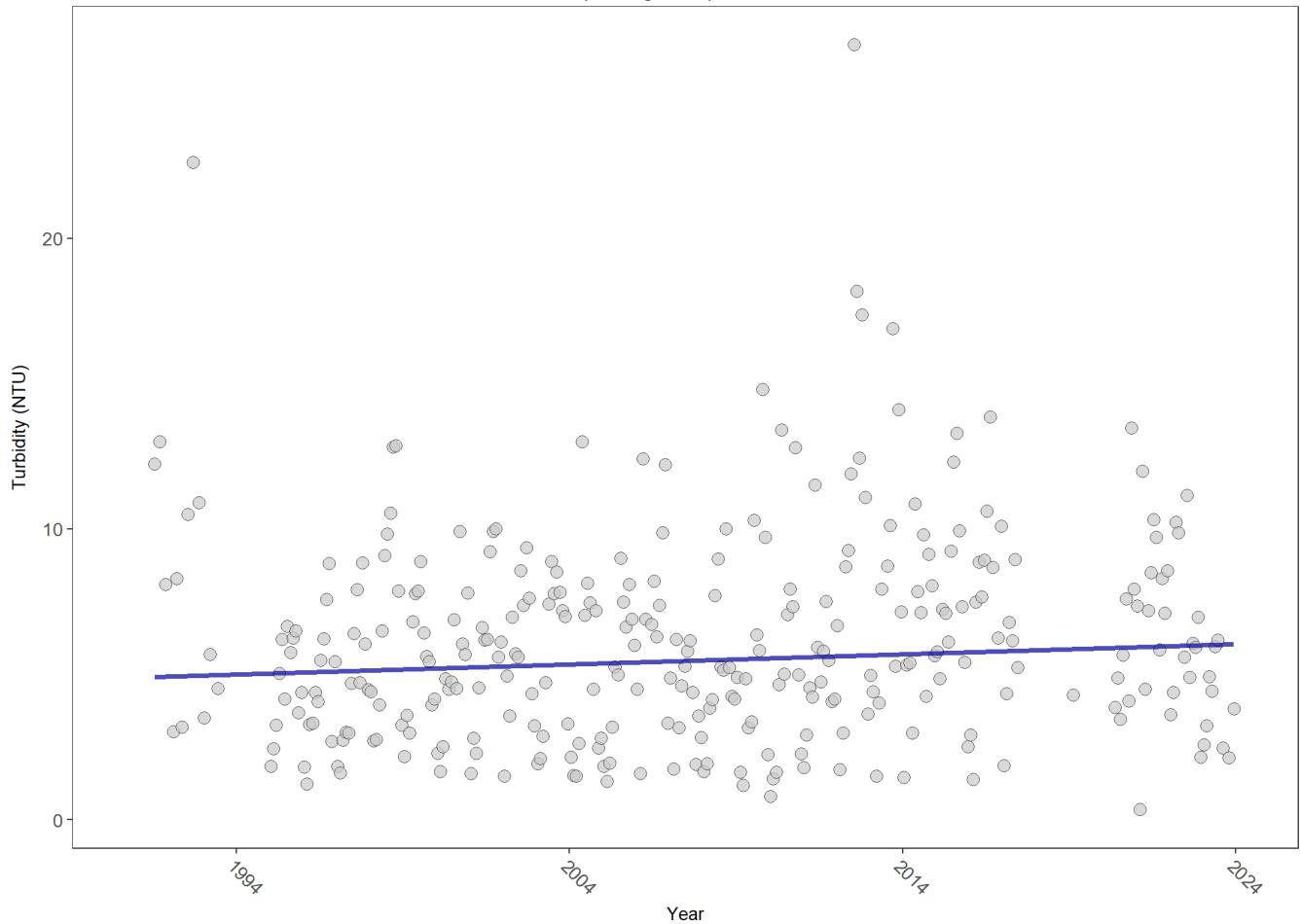
5002 - Florida STORET / WIN

### 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  
Mosquito Lagoon Aquatic Preserve



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	3521	31	4.6	TRUE	0.0954	0.0149	0.035	4.893027	9.5253	0.5735	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 Turbidity

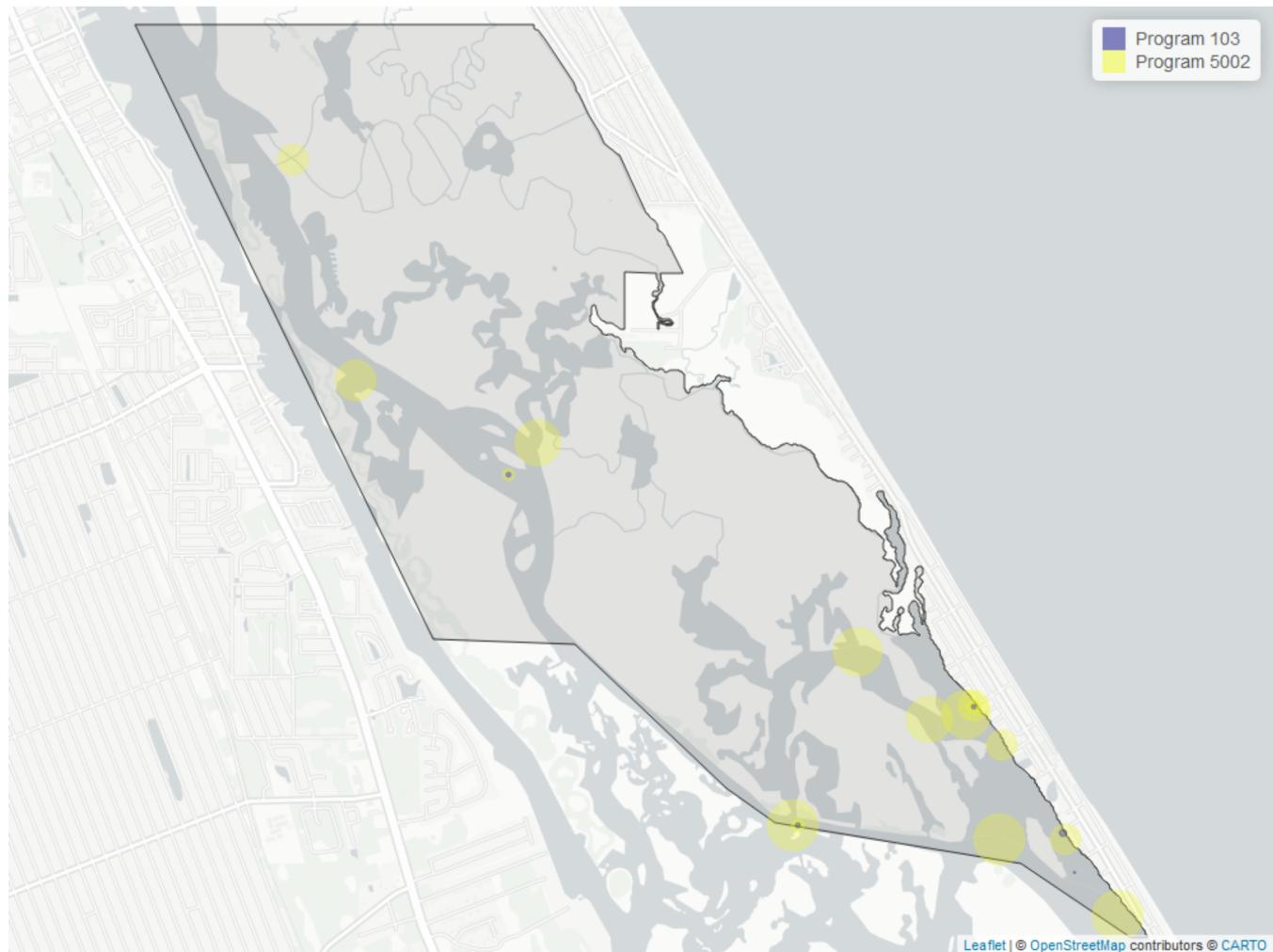


Table 19: Programs contributing data for Turbidity

ProgramID	N_Data	YearMin	YearMax
5002	3475	1995	2023
103	29	1991	2021
3013	22	2009	2019

#### Program names:

- 5002 - Florida STORET / WIN
- 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
- 3013 - Seagrass (SJRWMD)

#### 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 20: Value Qualifiers for Turbidity

Year	$N_{\_Total}$	$N_{\_I}$	$perc_{\_I}$	$N_{\_Q}$	$perc_{\_Q}$	$N_{\_U}$	$perc_{\_U}$
1998	283	3	1.1				
1999	201	2	1.0				
2003	243	2	0.8	2	0.8		
2004	158	2	1.3	1	0.6		
2005	203	1	0.5	1	0.5		
2007	132	2	1.5				
2008	157	1	0.6				
2009	137			1	0.7		
2013	14	1	7.1				
2014	12	1	8.3	1	8.3		
2015	12			1	8.3		
2016	12	1	8.3	1	8.3		
2021	37			1	2.7	1	2.7
2022	22	2	9.1	2	9.1		
2023	17	2	11.8				

**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:

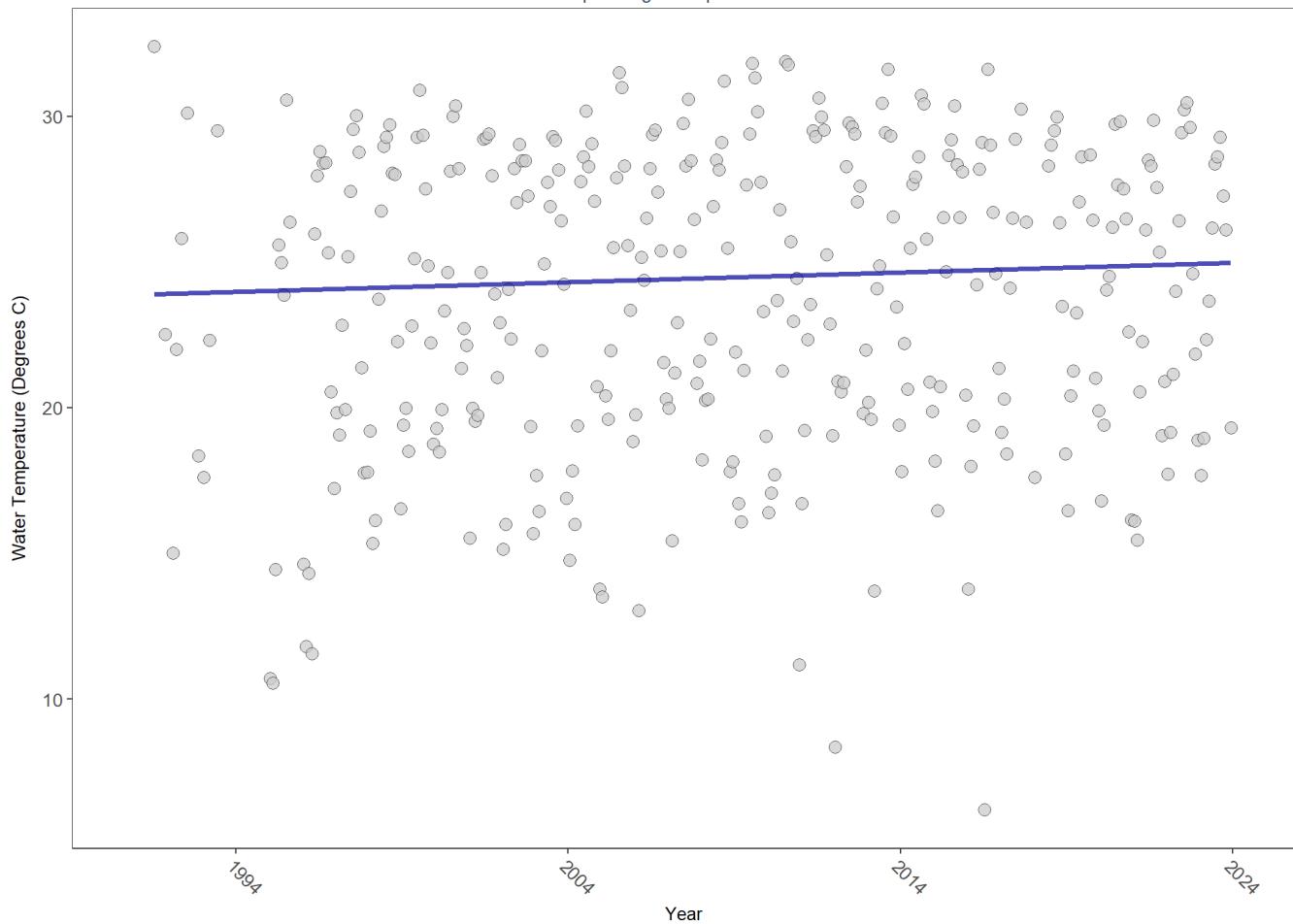
5002 - Florida STORET / WIN

### 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  
Mosquito Lagoon Aquatic Preserve

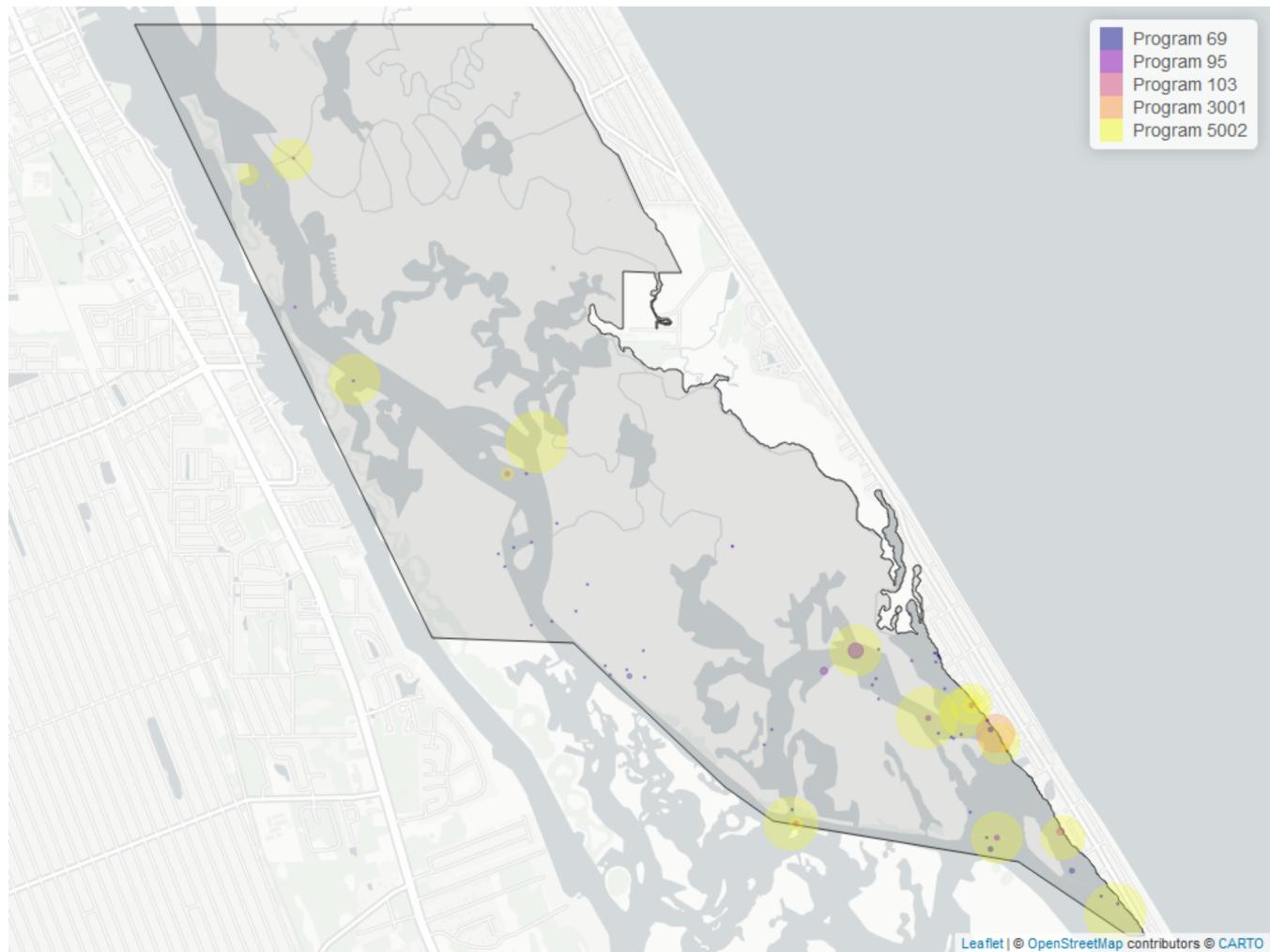


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	5333	32	25	TRUE	0.1215	0.0016	0.03333333	23.87961	15.0703	0.1793	1

*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 Water Temperature



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

Table 21: Programs contributing data for Water Temperature

ProgramID	N_Data	YearMin	YearMax
5002	4969	1995	2023
3001	242	2009	2023
69	88	2006	2020
95	62	2007	2018
103	26	1991	2021
3013	20	2009	2019

**Program names:**

5002 - Florida STORET / WIN

3001 - Lagoon Watch (Formerly Marine Discovery Center)

69 - Fisheries-Independent Monitoring (FIM) Program

*95* - Harmful Algal Bloom Marine Observation Network

*103* - EPA STOrage and RETrieval Data Warehouse (STORET)

*3013* - Seagrass (SJRWMD)

There are no qualifying Value Qualifiers for Water Temperature in Mosquito Lagoon Aquatic Preserve

# Submerged Aquatic Vegetation

The data file used is: All\_SAV\_Parameters-2024-Jul-02.txt

**Submerged aquatic vegetation (SAV)** refers to plants and plant-like macroalgae species that live entirely underwater. The two primary categories of SAV inhabiting Florida estuaries are *benthic macroalgae* and *seagrasses*. They often grow together in dense beds or meadows that carpet the seafloor. *Macroalgae* include multicellular species of green, red and brown algae that often live attached to the substrate by a holdfast. They tend to grow quickly and can tolerate relatively high nutrient levels, making them a threat to seagrasses and other benthic habitats in areas with poor water quality. In contrast, *seagrasses* are grass-like, vascular, flowering plants that are attached to the seafloor by extensive root systems. *Seagrasses* occur throughout the coastal areas of Florida, including protected bays and lagoons as well as deeper offshore waters on the continental shelf. *Seagrasses* have taken advantage of the broad, shallow shelf and clear water to produce two of the most extensive seagrass beds anywhere in continental North America.

## Parameters

**Percent Cover** measures the fraction of an area of seafloor that is covered by SAV, usually estimated by evaluating multiple small areas of seafloor. Percent cover is often estimated for total SAV, individual types of vegetation (seagrass, attached algae, drift algae) and individual species.

**Frequency of Occurrence** was calculated as the number of times a taxon was observed in a year divided by the number of sampling events, multiplied by 100. Analysis is conducted at the quadrat level and is inclusive of all quadrats (i.e., quadrats evaluated using Braun-Blanquet, modified Braun-Blanquet, and percent cover.)

## Species

**Turtle grass** (*Thalassia testudinum*) is the largest of the Florida seagrasses, with longer, thicker blades and deeper root structures than any of the other seagrasses. It is considered a climax seagrass species.

**Shoal grass** (*Halodule wrightii*) is an early colonizer of vegetated areas and usually grows in water too shallow for other species except *widgeon grass*. It can often tolerate larger salinity ranges than other seagrass species. *Shoal grass* is characterized by thin, flat blades, that are narrower than *turtle grass* blades.

**Manatee grass** (*Syringodium filiforme*) is easily recognizable because its leaves are thin and cylindrical instead of the flat, ribbon-like form shared by many other seagrass species. The leaves can grow up to half a meter in length. *Manatee grass* is usually found in mixed seagrass beds or small, dense monospecific patches.

**Widgeon grass** (*Ruppia maritima*) grows in both fresh and salt water and is widely distributed throughout Florida's estuaries in less saline areas, particularly in inlets along the east coast. This species resembles *shoal grass* in certain environments but can be identified by the pointed tips of its leaves.

Three species of *Halophila spp.* are found in Florida - **Star grass** (*Halophila engelmannii*), **Paddle grass** (*Halophila decipiens*), and **Johnson's seagrass** (*Halophila johnsonii*). These are smaller, more fragile seagrasses than other Florida species and are considered ephemeral. They grow along a single long rhizome, with short blades. These species are not well-studied, although surveys are underway to define their ecological roles.

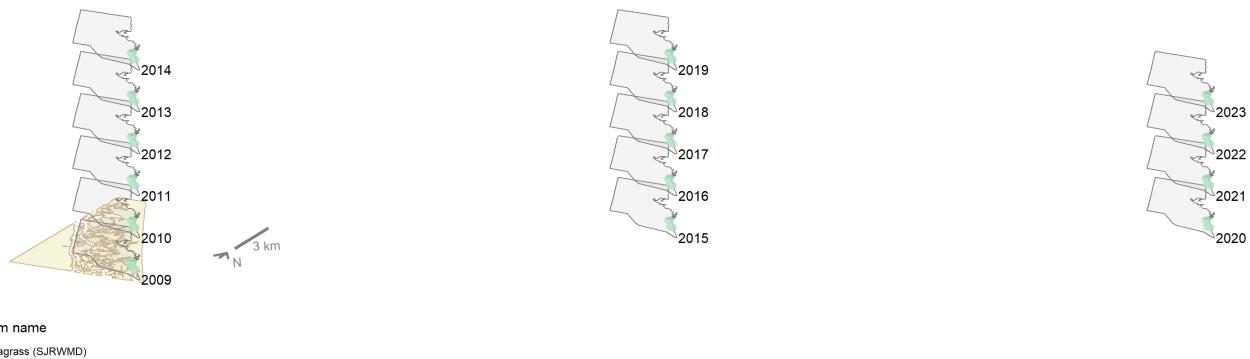
## Notes

*Star grass*, *Paddle grass*, and *Johnson's seagrass* will be grouped together and listed as **Halophila spp.** in the following managed areas. This is because several surveys did not specify to the species level:

- Banana River Aquatic Preserve
- Indian River-Malabar to Vero Beach Aquatic Preserve
- Indian River-Vero Beach to Ft. Pierce Aquatic Preserve
- Jensen Beach to Jupiter Inlet Aquatic Preserve
- Loxahatchee River-Lake Worth Creek Aquatic Preserve
- Mosquito Lagoon Aquatic Preserve

- Biscayne Bay Aquatic Preserve
- Florida Keys National Marine Sanctuary

Mosquito Lagoon Aquatic Preserve  
SAV Percent Cover - Sample Locations



Maps showing the temporal scope of SAV sampling sites within the boundaries of *Mosquito Lagoon Aquatic Preserve* by Program name.

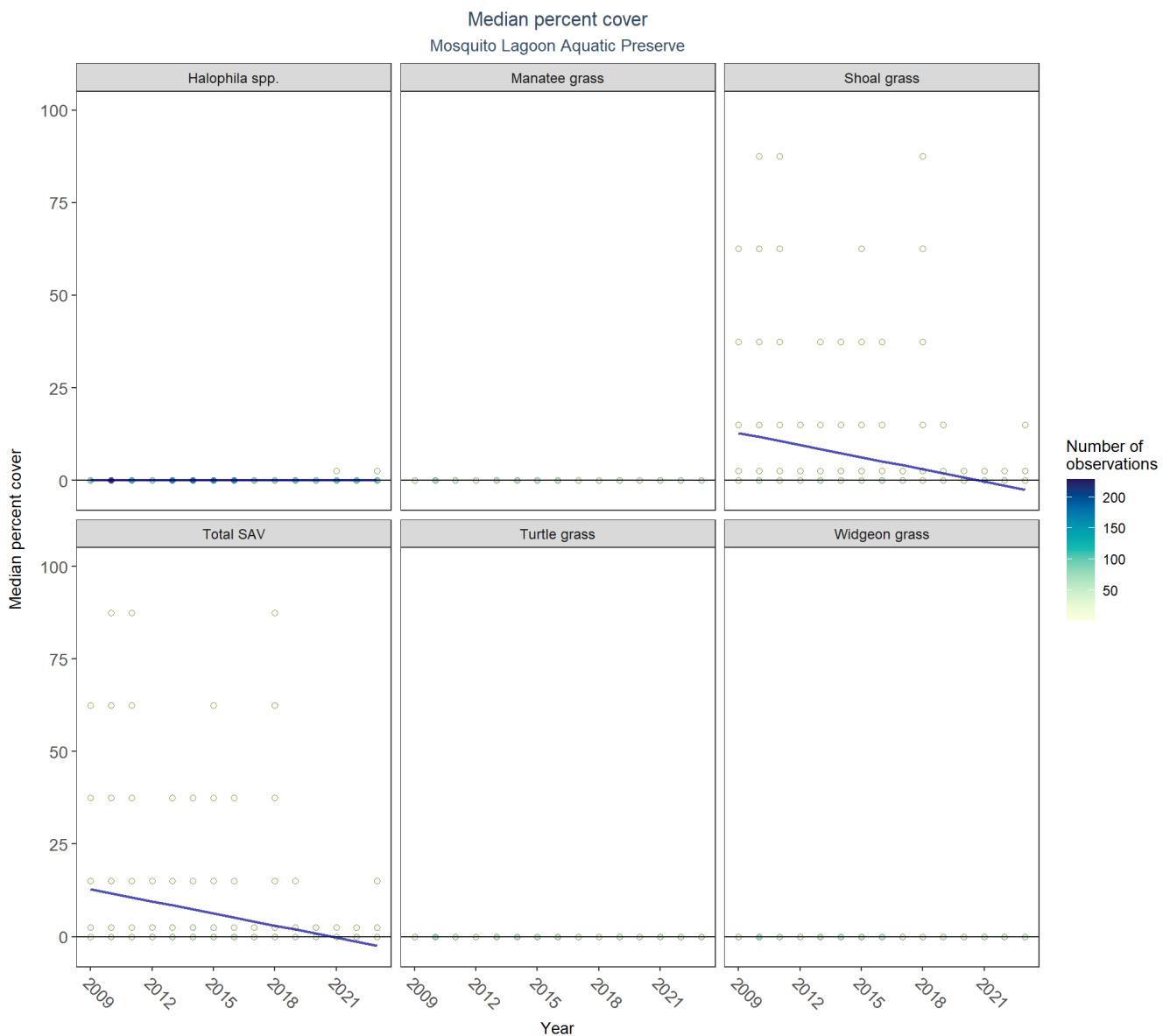
**Sampling locations by Program:**



Map showing SAV sampling sites within the boundaries of *Mosquito Lagoon Aquatic Preserve*. The point size reflects the number of samples at a given sampling site.

Table 22: Seagrass (SJRWMD) - Program 3013

<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>	<i>Collection Method</i>	<i>Sample Locations</i>
4944	2009	2023	Percent Cover	2
5560	2009	2023	Percent Occurrence	2



Median percent cover by species in *Mosquito Lagoon Aquatic Preserve*. Linear mixed-effects models are applied to each species to produce species trends. The trendlines are then isolated and reproduced below for ease of viewing. The LME results are available in table form beneath the supplemental trendplot below.

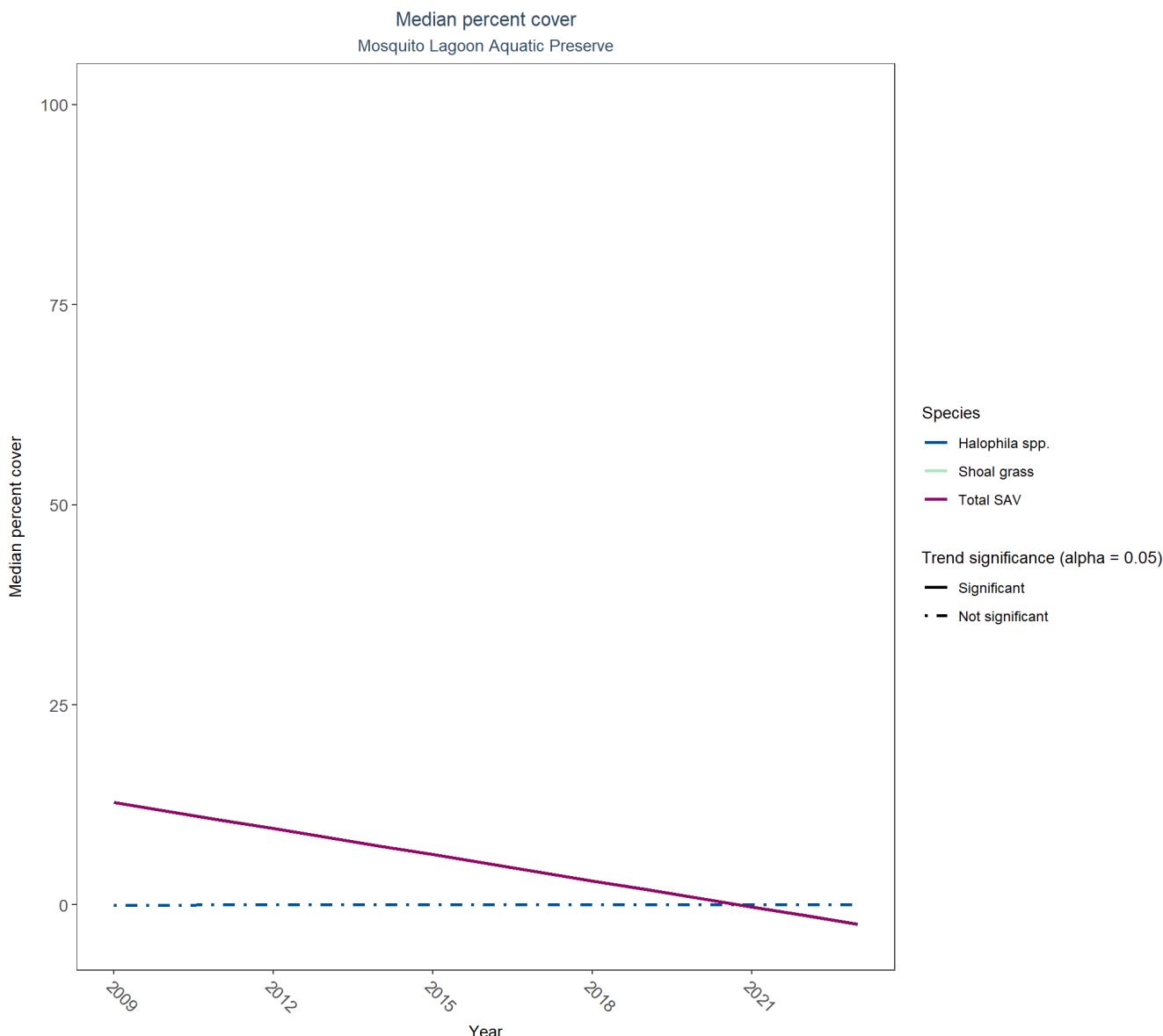
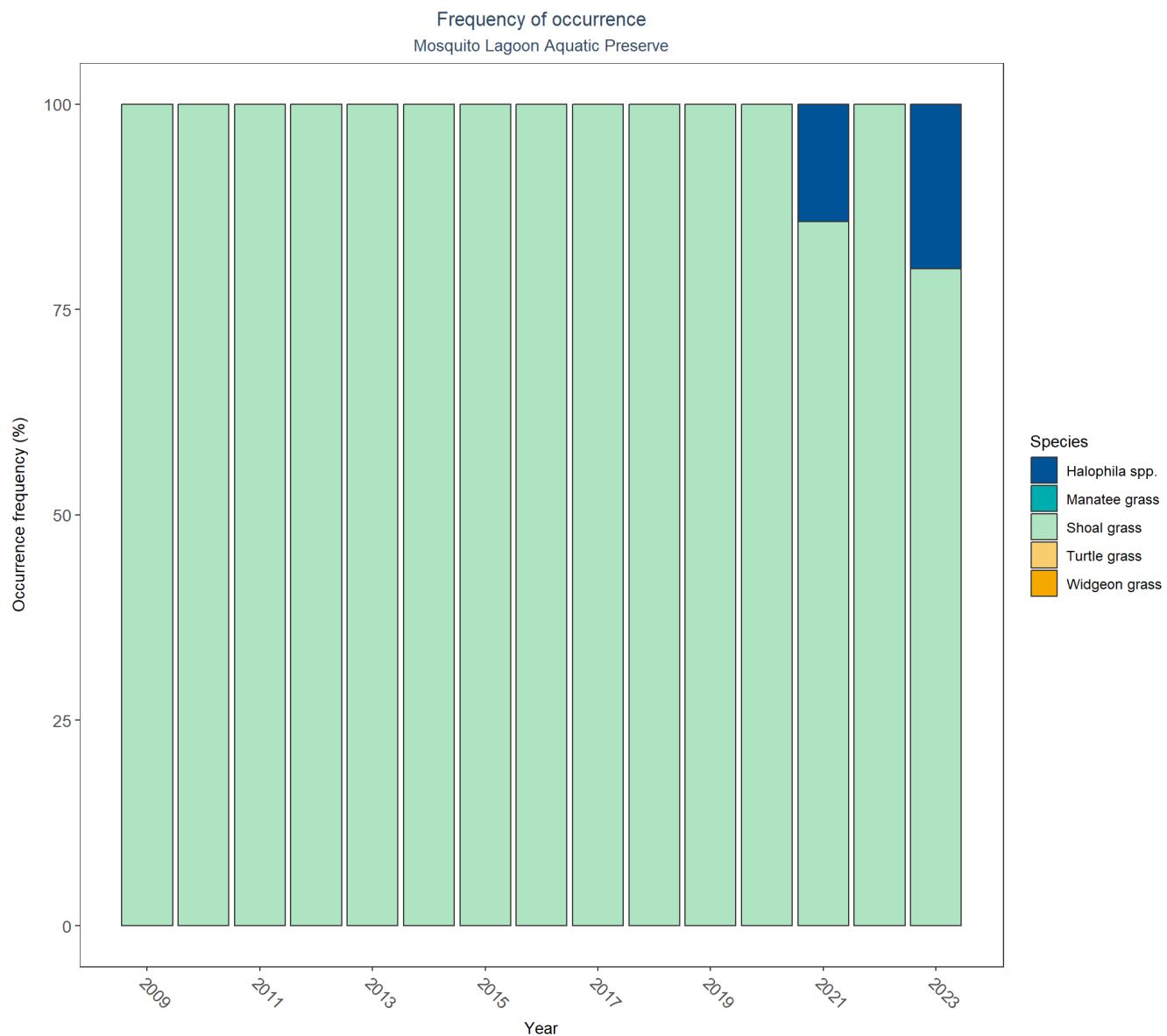
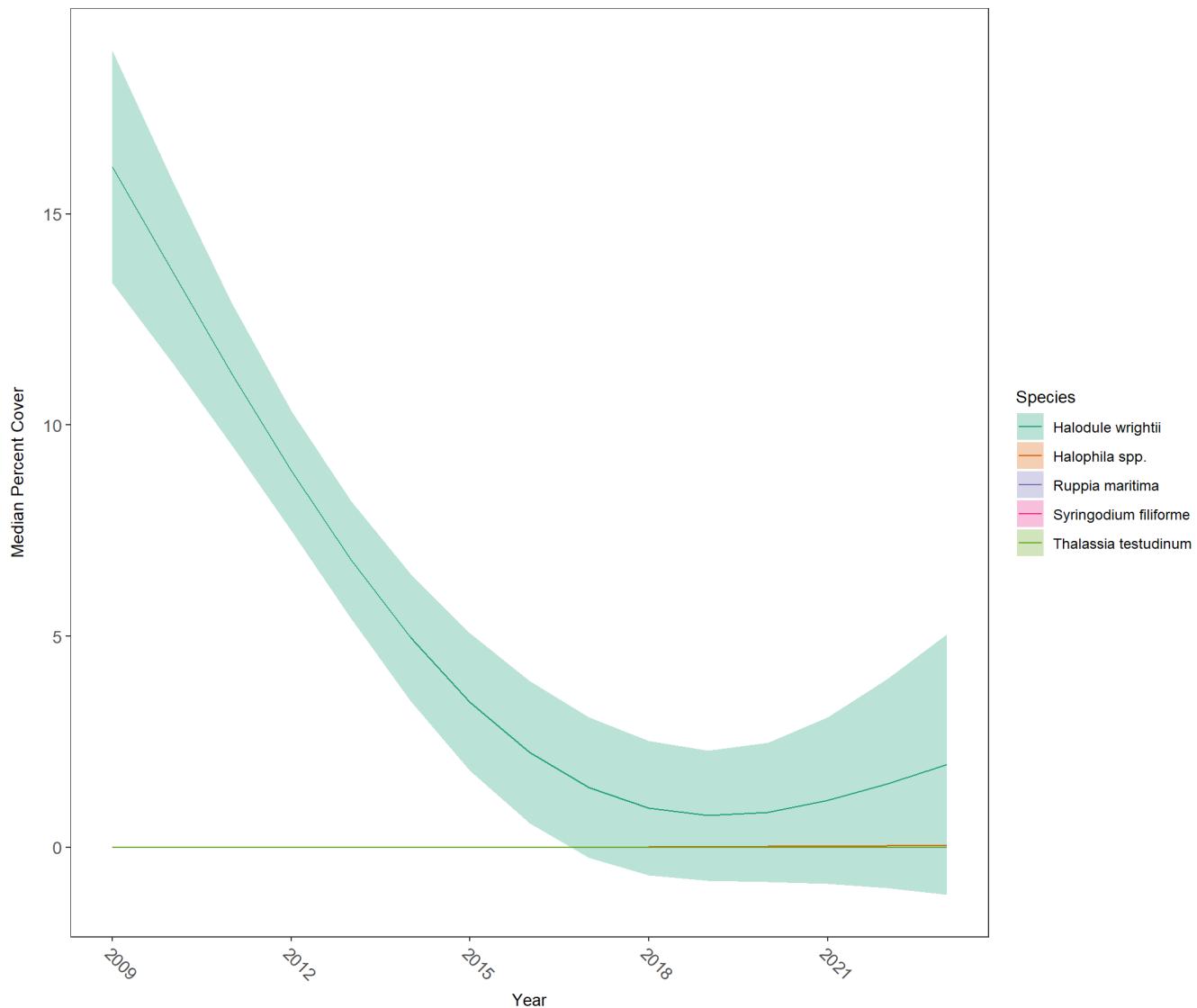


Table 23: Percent Cover Trend Analysis for Mosquito Lagoon Aquatic Preserve

Species	Common Name	Trend Significance (0.05)	Period of Record	LME-Intercept	LME-Slope	p
Drift algae		Insufficient data to calculate trend				
Halodule wrightii	Shoal grass	Significantly decreasing trend	2009 - 2023	29.1689	-1.0903	0.0057
Halophila spp.		No significant trend	2009 - 2023	-0.0543	0.0029	0.3208
Ruppia maritima	Widgeon grass	Model did not fit the available data	2009 - 2023			
Syringodium filiforme	Manatee grass	Model did not fit the available data	2009 - 2023			
Thalassia testudinum	Turtle grass	Model did not fit the available data	2009 - 2023			
Total SAV		Significantly decreasing trend	2009 - 2023	29.1100	-1.0871	0.0055
Total seagrass		Insufficient data to calculate trend				



Median Percent Cover for seagrass species  
Mosquito Lagoon Aquatic Preserve



Generalized additive models for each species in Mosquito Lagoon Aquatic Preserve. Species must have at least 10 years of data to be evaluated.

*Drift algae, Total seagrass, Attached algae, No grass in Quadrat, and Total SAV* are excluded from the analyses.