

Pinellas County Aquatic Preserve

SEACAR Habitat Analyses

Last compiled on 08 April, 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 ₂ +3 Filtered	mg/L	0	-
NH ₄ 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

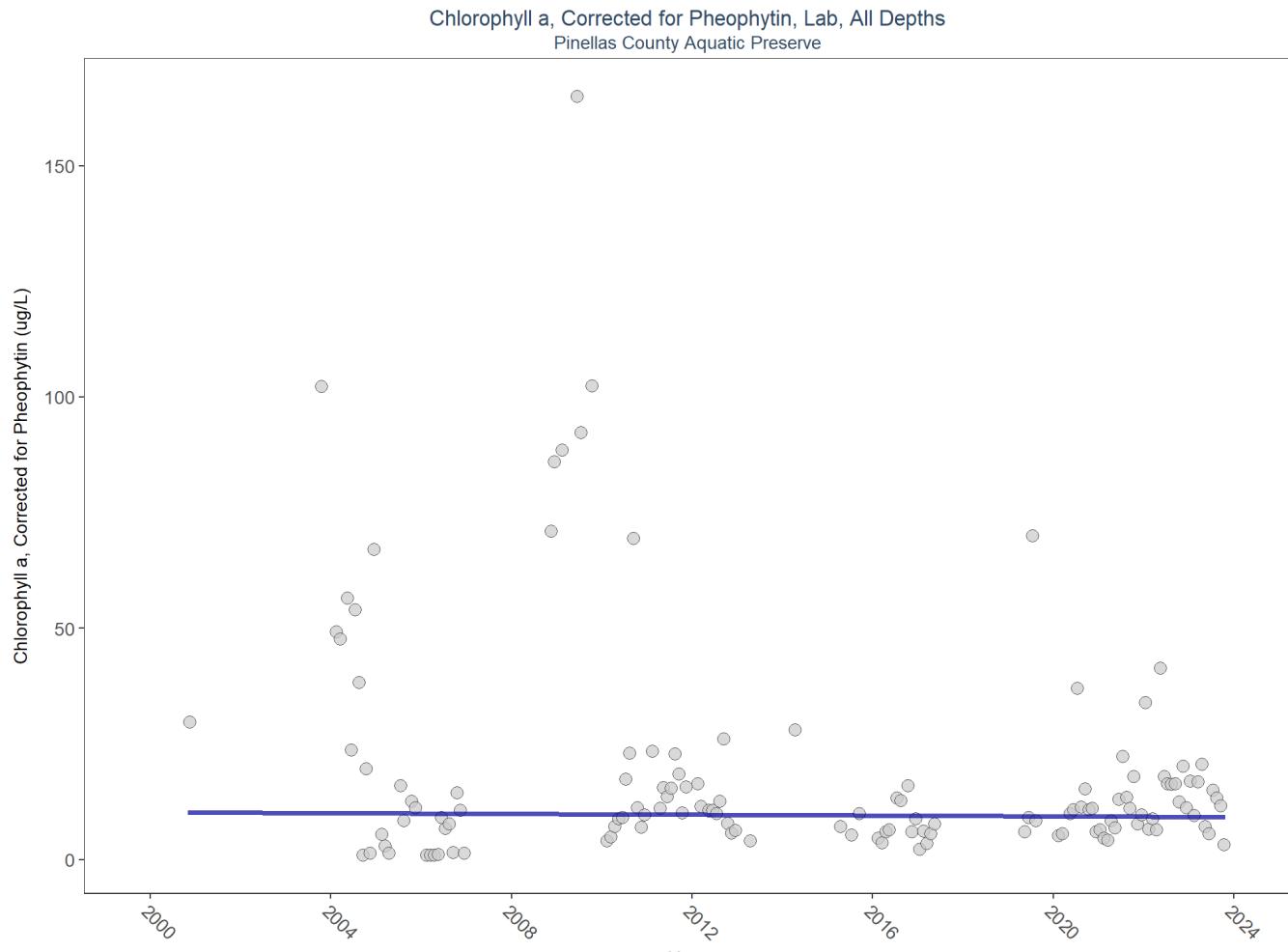
The following files were used in the discrete analysis:

- *Combined_WQ_WC_NUT_Chlorophyll_a_corrected_for_pheophytin-2024-Mar-27.txt*
- *Combined_WQ_WC_NUT_Chlorophyll_a_uncorrected_for_pheophytin-2024-Mar-27.txt*
- *Combined_WQ_WC_NUT_Colored_dissolved_organic_matter_CDOM-2024-Mar-27.txt*
- *Combined_WQ_WC_NUT_Dissolved_Oxygen-2024-Mar-27.txt*
- *Combined_WQ_WC_NUT_Dissolved_Oxygen_Saturation-2024-Mar-27.txt*
- *Combined_WQ_WC_NUT_pH-2024-Mar-27.txt*
- *Combined_WQ_WC_NUT_Salinity-2024-Mar-27.txt*
- *Combined_WQ_WC_NUT_Secchi_Depth-2024-Mar-27.txt*
- *Combined_WQ_WC_NUT_Total_Nitrogen-2024-Mar-27.txt*
- *Combined_WQ_WC_NUT_Total_Phosphorus-2024-Mar-27.txt*
- *Combined_WQ_WC_NUT_Total_Suspended_Solids_TSS-2024-Mar-27.txt*
- *Combined_WQ_WC_NUT_Turbidity-2024-Mar-27.txt*
- *Combined_WQ_WC_NUT_Water_Temperature-2024-Mar-27.txt*

Chlorophyll a, Corrected for Pheophytin - Discrete Water Quality

Chlorophyll-a is monitored as a measure of microalgae growing in the water. Algae are a natural part of coastal and aquatic ecosystems but in excess can cause poor water quality and clarity, and decreased levels of dissolved oxygen.

Seasonal Kendall-Tau Trend Analysis

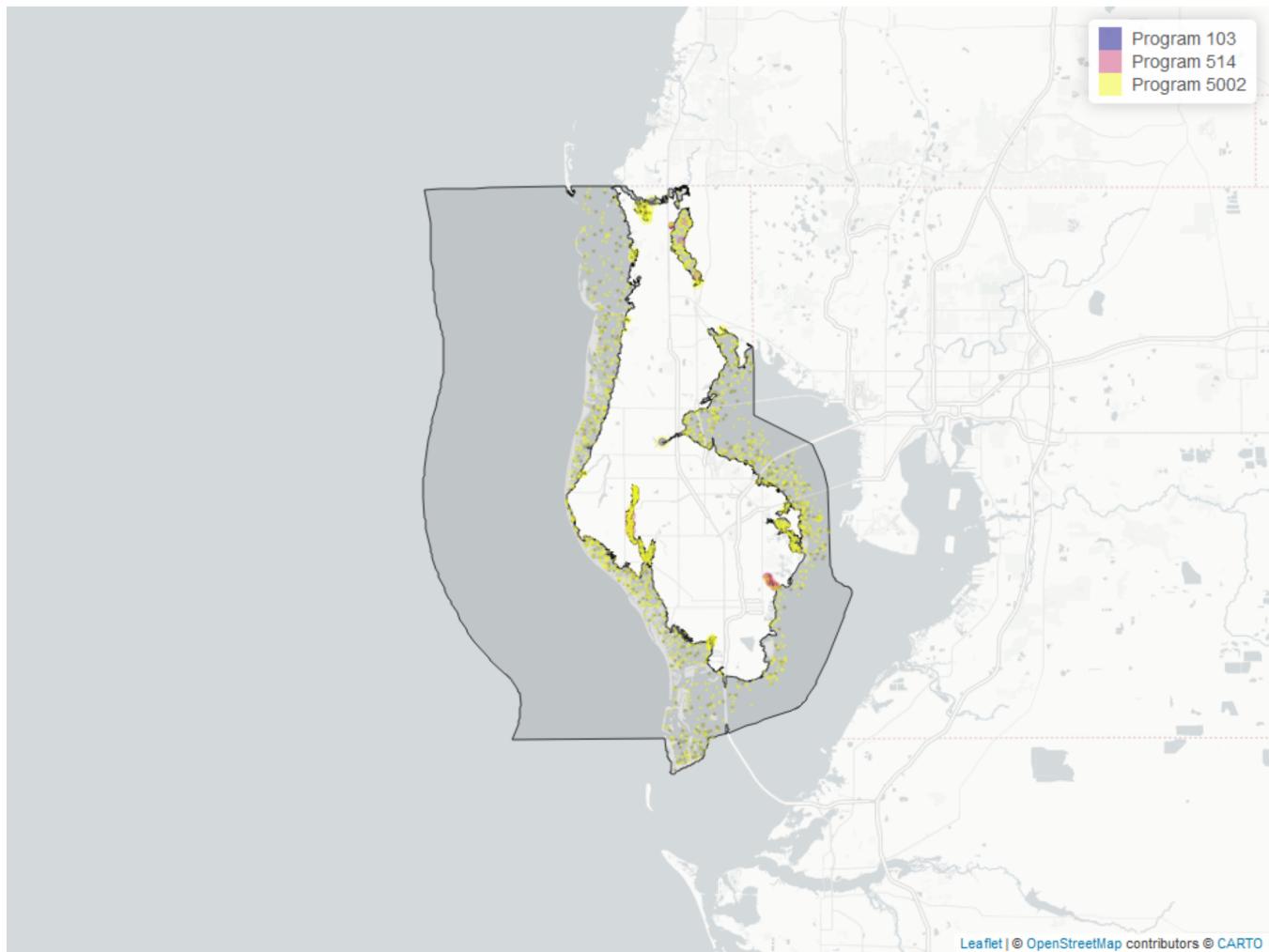


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	3048	20	5.8	TRUE	-0.001	0.7374	-0.04532647	10.24559	10.0325	0.5275	0

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, Corrected 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, Corrected for Pheophytin

ProgramID	N_Data	YearMin	YearMax
5002	2434	2000	2023
103	478	2020	2021
514	171	2020	2023

Program names:

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

514 - Florida LAKEWATCH Program

Value Qualifiers

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

Table 7: Value Qualifiers for Chlorophyll a, Corrected for Pheophytin

Year	N_{Total}	N_{I}	perc_{I}	N_{Q}	perc_{Q}	N_{U}	perc_{U}
2003	3					1	33.3
2004	79	5	6.3			34	43.0
2005	30	1	3.3			10	33.3
2006	34	2	5.9			24	70.6
2012	78	1	1.3				
2016	38	1	2.6				
2019	7			1	14.3		
2020	585	1	0.2			27	4.6
2021	1113	13	1.2			10	0.9
2022	568	3	0.5			2	0.3
2023	421	3	0.7				

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

Programs containing Value Qualified data:

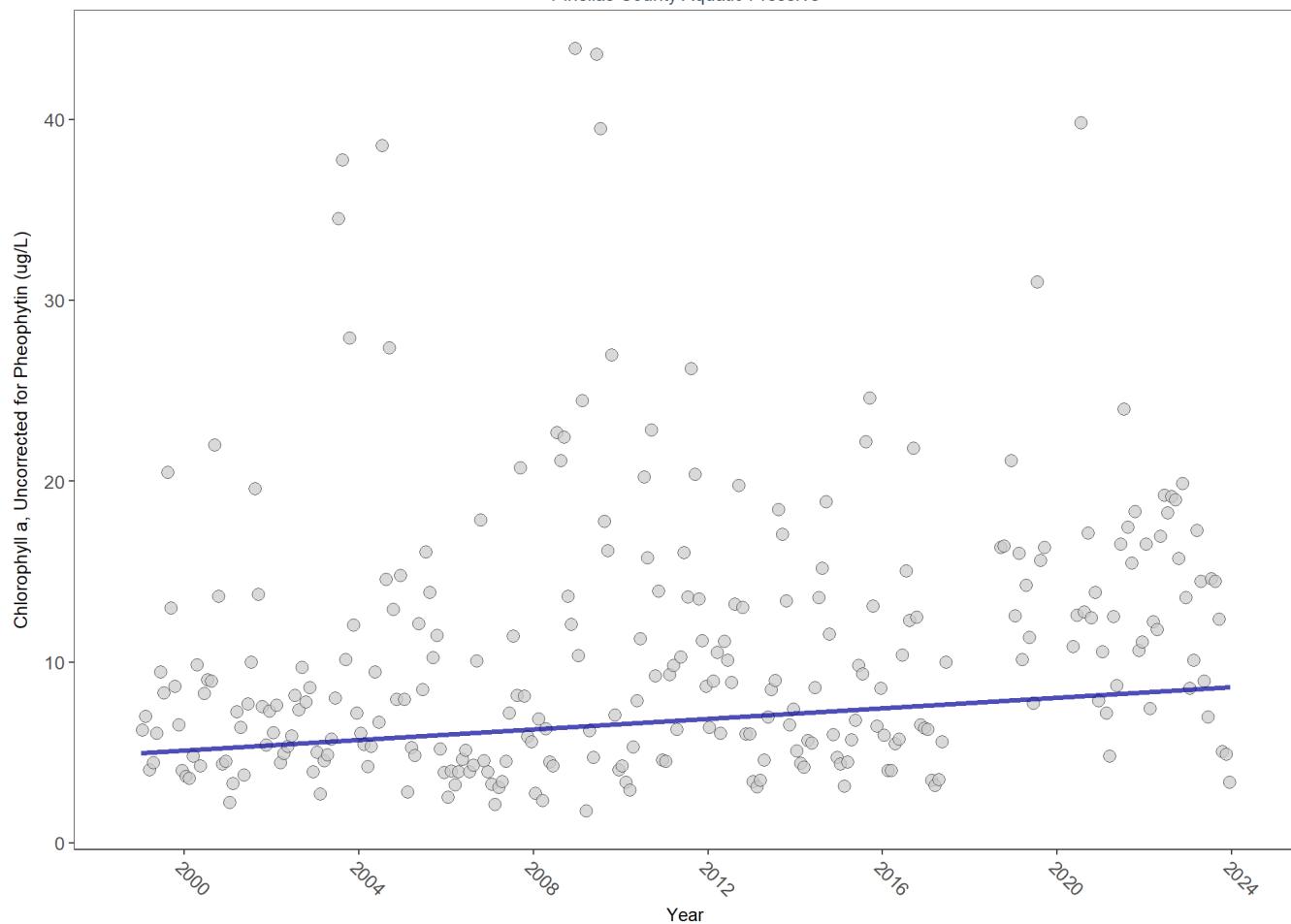
5002 - Florida STORET / WIN

514 - Florida LAKEWATCH Program

Chlorophyll a, Uncorrected for Pheophytin - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

Chlorophyll a, Uncorrected for Pheophytin, Lab, All Depths
Pinellas County Aquatic Preserve

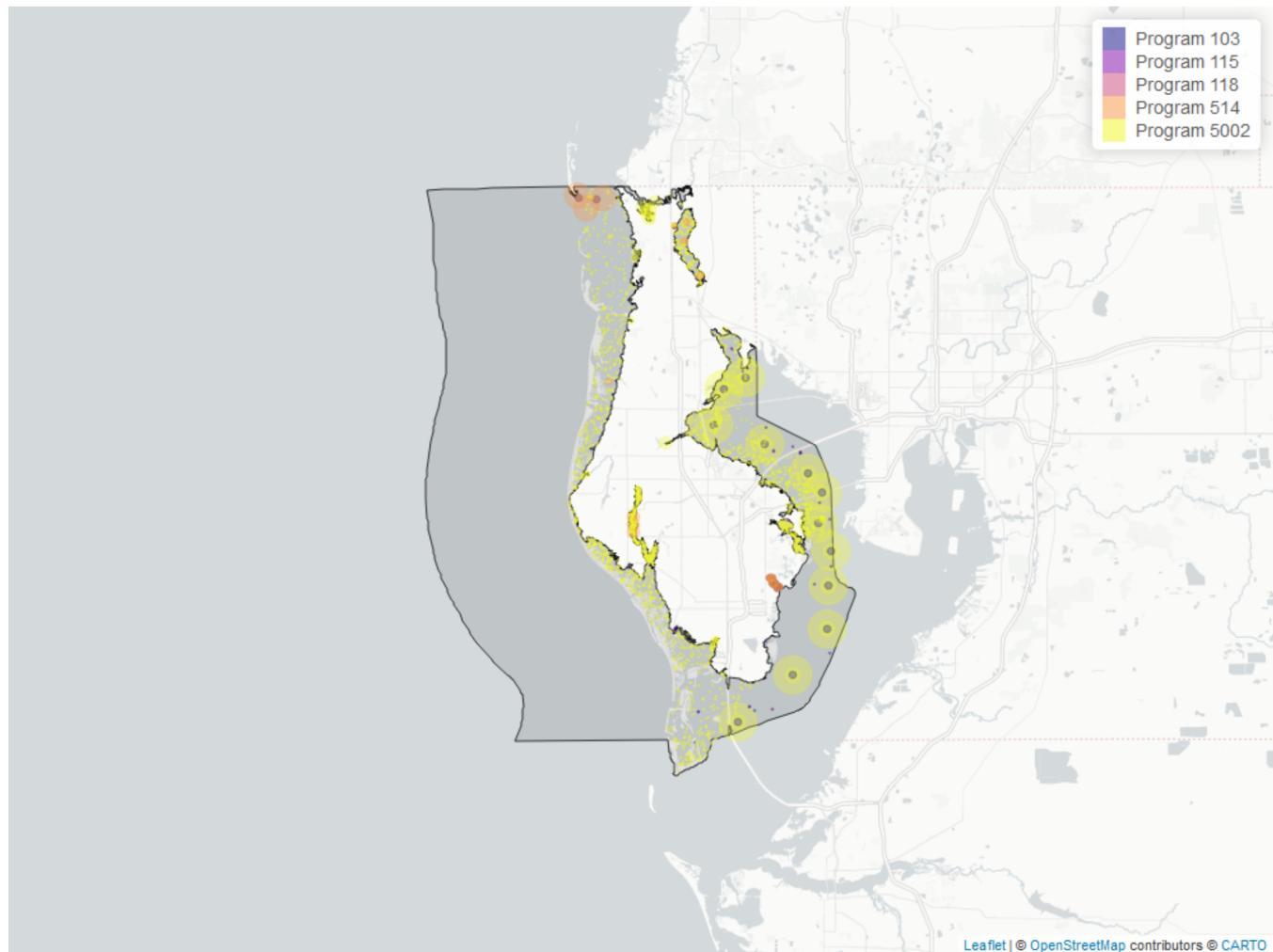


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	6190	25	6.3	TRUE	0.2107	0.0000	0.1456061	4.976912	6.5731	0.8325	1

$p < 0.00005$ 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 Chlorophyll a, Uncorrected for Pheophytin



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

Table 8: Programs contributing data for Chlorophyll a, Uncorrected for Pheophytin

ProgramID	N_Data	YearMin	YearMax
5002	5247	1999	2023
514	658	2001	2023
103	292	2000	2021
115	9	2000	2004
118	5	2000	2006

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 9: Value Qualifiers for Chlorophyll a, Uncorrected for Pheophytin

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
2004	194	100	51.5			3	1.6
2005	188	96	51.1			11	5.8
2006	190	58	30.5			3	1.6
2007	181	31	17.1				
2009	189	7	3.7				
2010	190	15	7.9			4	2.1
2011	198	70	35.4			26	13.1
2012	230	91	39.6			24	10.4
2013	144	83	57.6			32	22.2
2014	145	83	57.2			18	12.4
2015	155	46	29.7			10	6.4
2016	182	57	31.3				
2017	76	38	50.0			4	5.3
2019	88			1	1.1		
2020	560	17	3.0				
2021	1015	83	8.2	2	0.2	4	0.4
2022	664	56	8.4			7	1.0
2023	565	80	14.2			4	0.7

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

Programs containing Value Qualified data:

5002 - Florida STORET / WIN

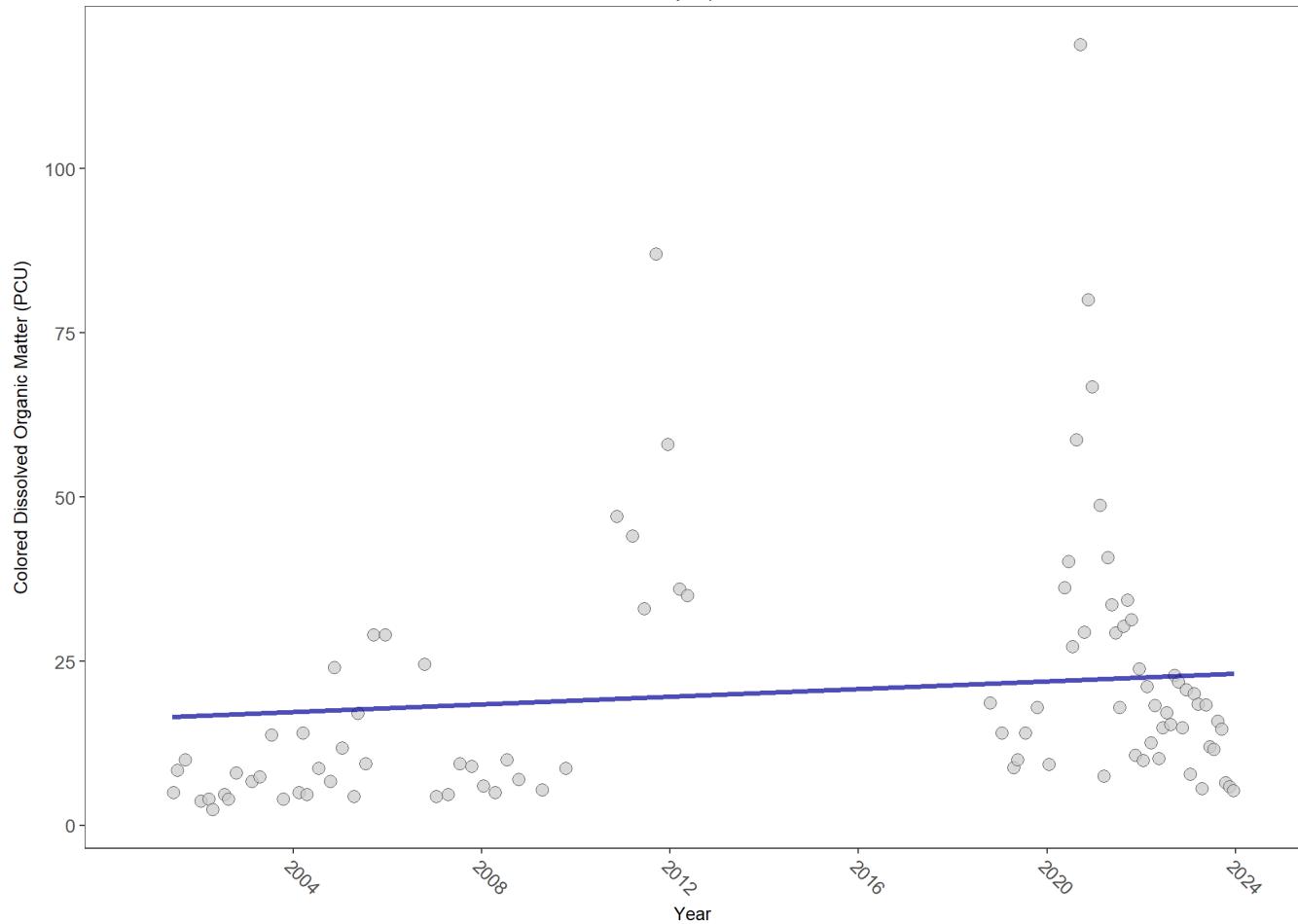
514 - Florida LAKEWATCH Program

Colored Dissolved Organic Matter - Discrete Water Quality

Colored Dissolved Organic Matter (CDOM) occurs naturally in every water body. It is made up of mainly plant material, algae and bacteria. The composition is determined by its source; plants, soil, algae, and wastewater are common sources.

Seasonal Kendall-Tau Trend Analysis

Colored Dissolved Organic Matter, Lab, All Depths
Pinellas County Aquatic Preserve

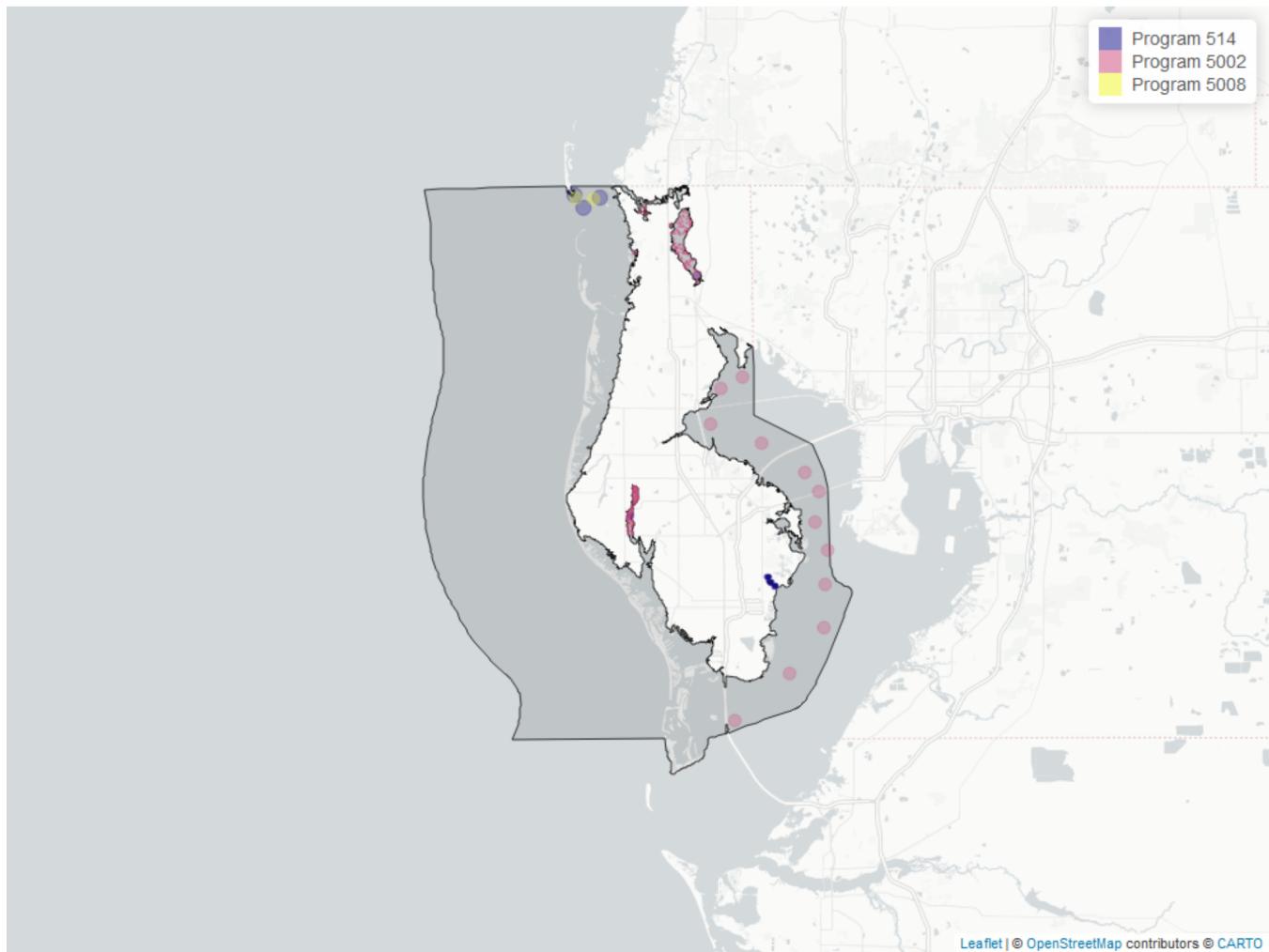


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	828	18	10	TRUE	0.1524	0.0037	0.2929056	16.39878	20.6812	0.0368	1

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 Colored Dissolved Organic Matter



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

Table 10: Programs contributing data for Colored Dissolved Organic Matter

ProgramID	N_Data	YearMin	YearMax
5002	579	2020	2023
514	192	2001	2022
5008	60	2021	2023

Program names:

5002 - Florida STORET / WIN

514 - Florida LAKEWATCH Program

5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region

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 11: Value Qualifiers for Colored Dissolved Organic Matter

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$
2020	91			27	29.7
2021	152	9	5.9	13	8.6
2022	215	11	5.1	6	2.8
2023	214	31	14.5	1	0.5

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

Programs containing Value Qualified data:

5002 - Florida STORET / WIN

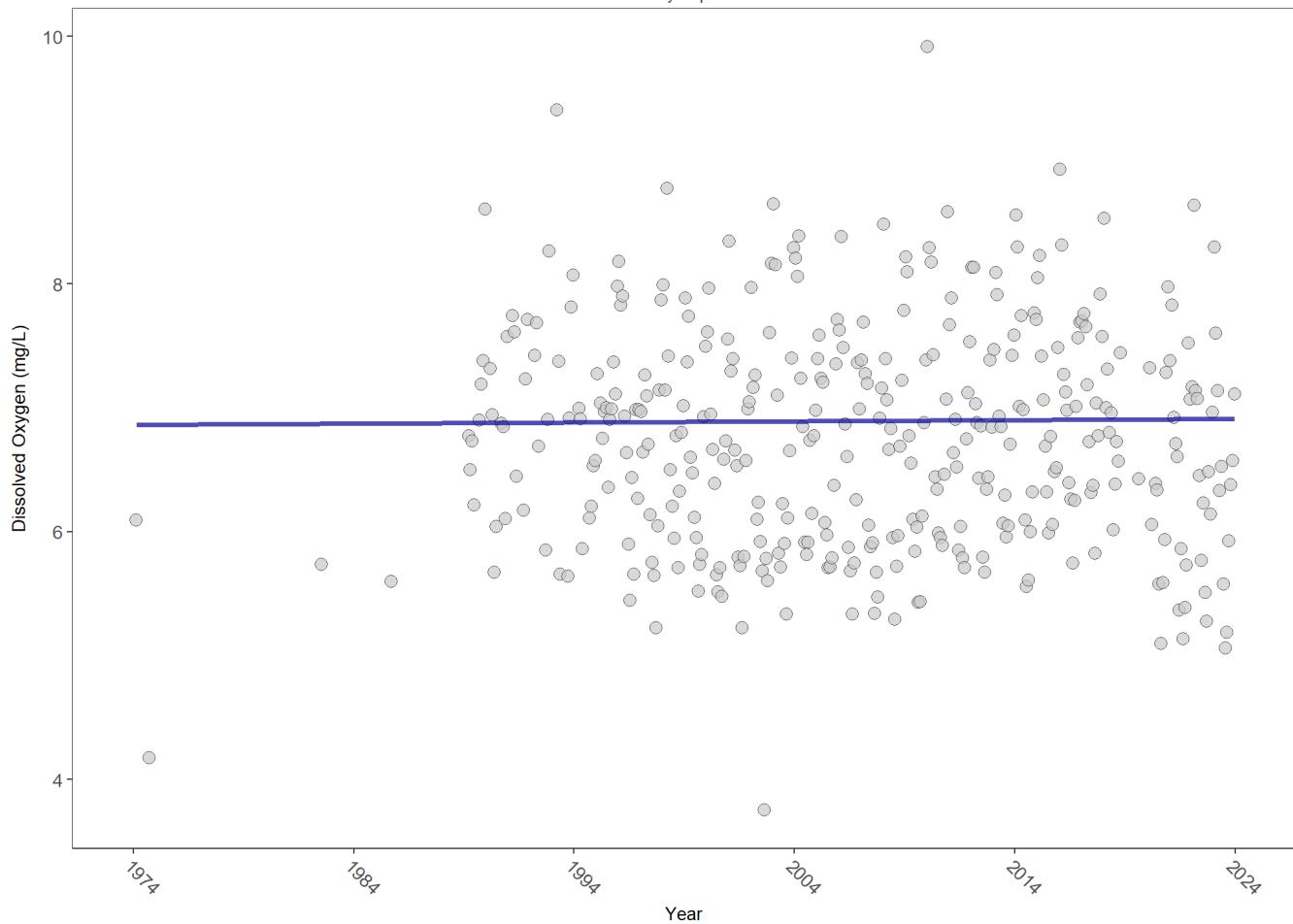
514 - Florida LAKEWATCH Program

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
Pinellas County Aquatic Preserve

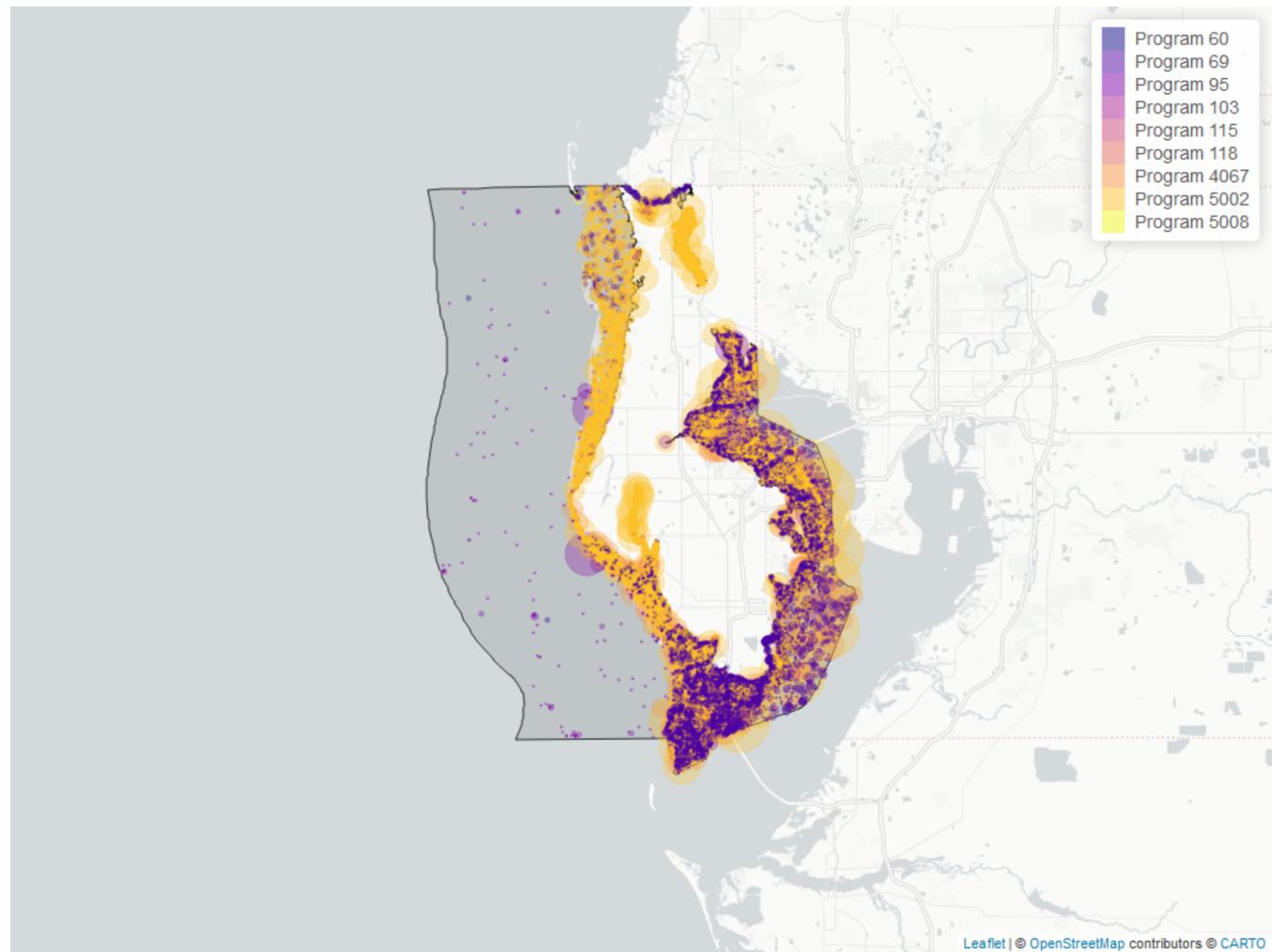


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	90162	38	6.6	TRUE	0.015	0.7798	0.0009418026	6.864036	14.5866	0.2022	0

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 12: Programs contributing data for Dissolved Oxygen

ProgramID	N_Data	YearMin	YearMax
5002	50187	1995	2023
69	25181	1989	2017
4067	11501	1993	2021
95	2365	1974	2018
103	1543	2003	2021
5008	60	2021	2023
115	26	2000	2004
60	6	2014	2014
118	5	2000	2006

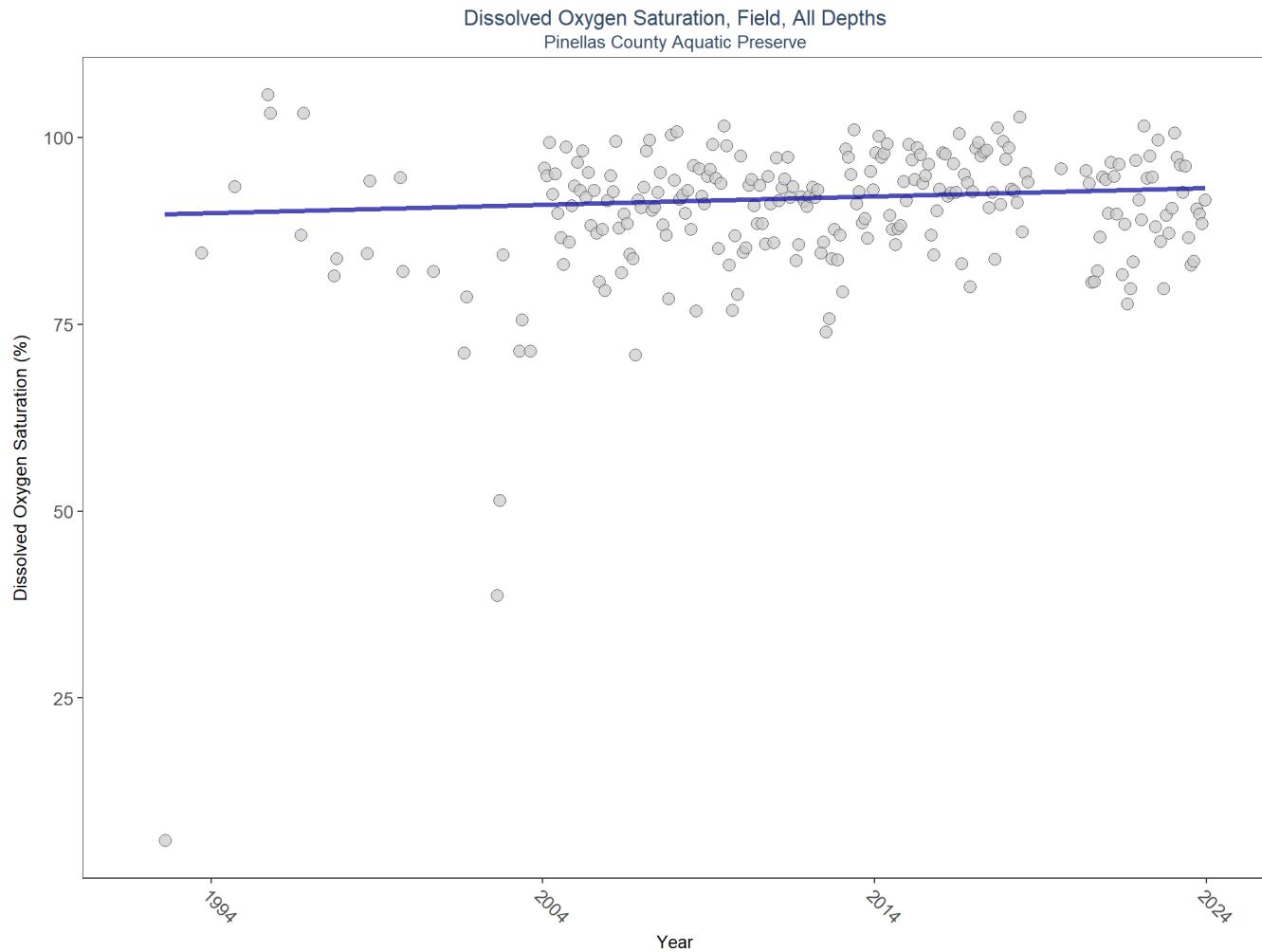
Program names:

5002 - Florida STORET / WIN
 69 - Fisheries-Independent Monitoring (FIM) Program
 4067 - Tampa Bay Benthic Monitoring
 95 - Harmful Algal Bloom Marine Observation Network
 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
 5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region
 115 - Environmental Monitoring Assessment Program
 60 - Southeast Area Monitoring and Assessment Program (SEAMAP) - Gulf of Mexico Fall & Summer Shrimp/Groundfish Survey
 118 - National Aquatic Resource Surveys, National Coastal Condition Assessment

There are no qualifying Value Qualifiers for Dissolved Oxygen in Pinellas County Aquatic Preserve

Dissolved Oxygen Saturation - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

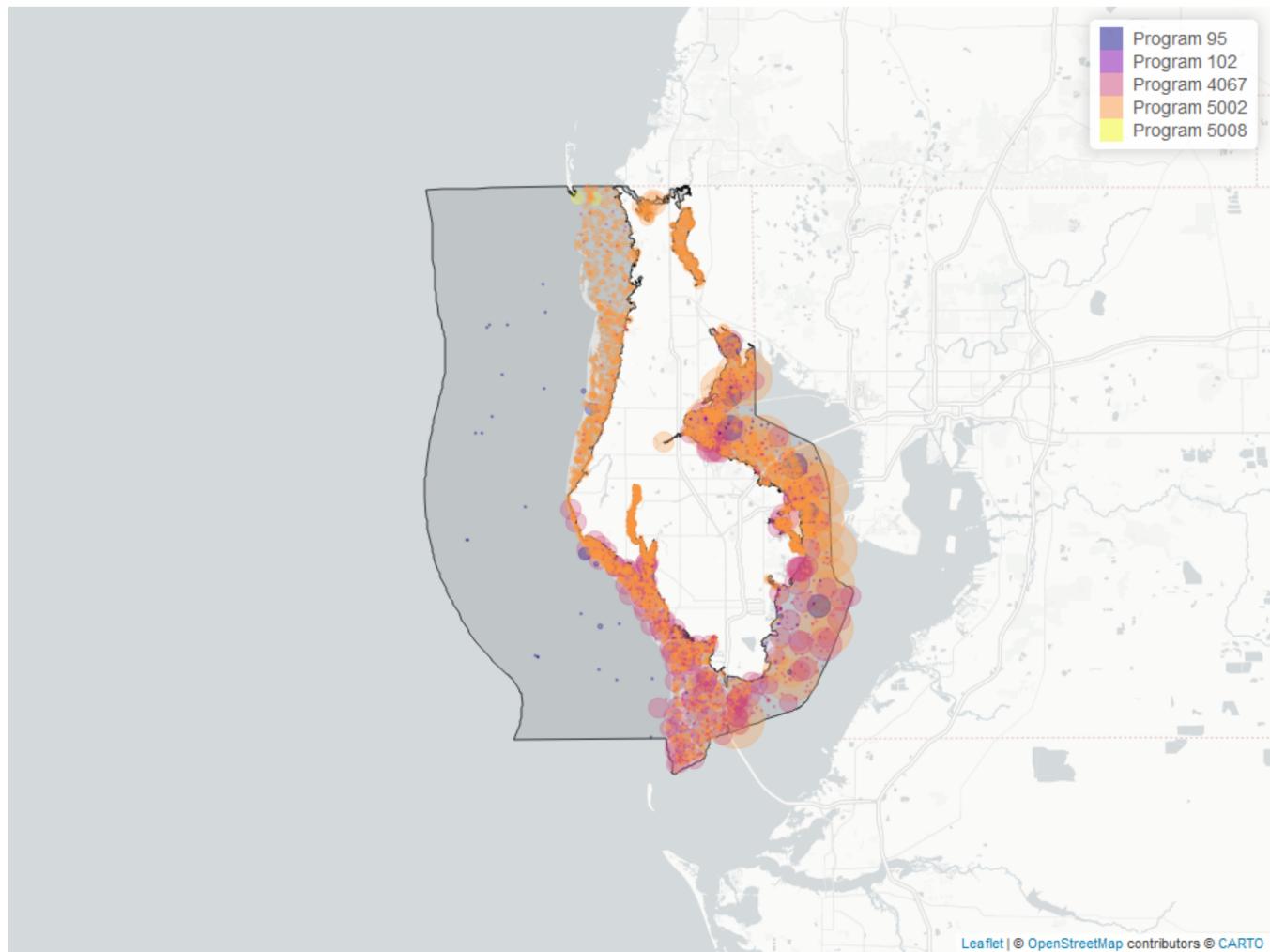


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	29352	32	90.9	TRUE	0.0955	0.0421	0.112194	89.6797	16.2938	0.1306	1

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 13: Programs contributing data for Dissolved Oxygen Saturation

ProgramID	N_Data	YearMin	YearMax
5002	18155	2004	2023
4067	10936	1993	2021
95	638	2002	2018
102	66	1992	1992
5008	60	2021	2023

Program names:

5002 - Florida STORET / WIN

4067 - Tampa Bay Benthic Monitoring

95 - Harmful Algal Bloom Marine Observation Network

102 - National Status and Trends Mussel Watch

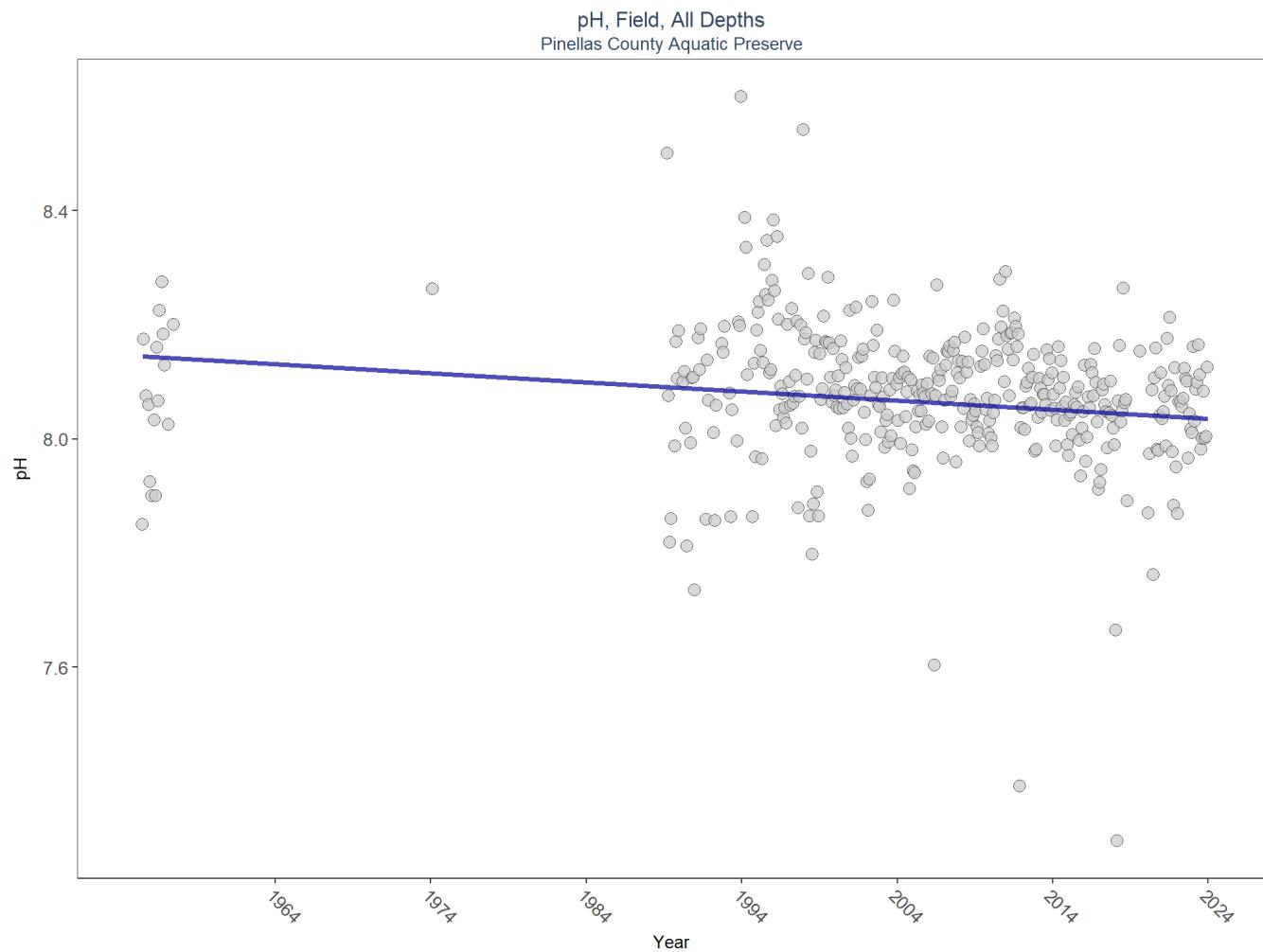
5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region

There are no qualifying Value Qualifiers for Dissolved Oxygen Saturation in Pinellas County 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.

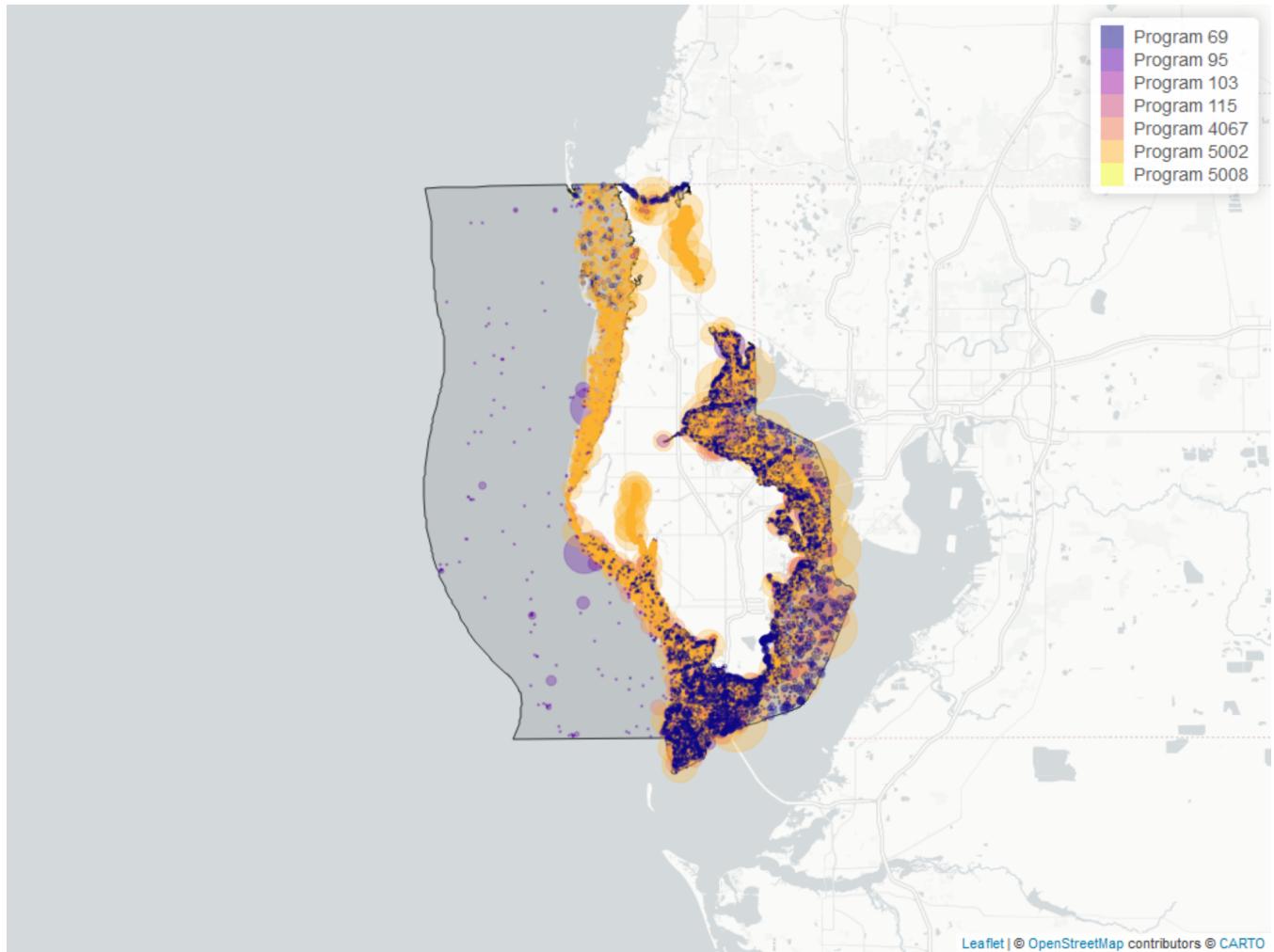
Seasonal Kendall-Tau Trend Analysis



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 14: Programs contributing data for pH

ProgramID	N_Data	YearMin	YearMax
5002	47993	1995	2023
69	24816	1989	2017
4067	8940	1993	2021
95	2301	1955	2018
103	1561	2020	2021
5008	60	2021	2023
115	26	2000	2004

Program names:

5002 - Florida STORET / WIN

69 - Fisheries-Independent Monitoring (FIM) Program

4067 - Tampa Bay Benthic Monitoring

95 - Harmful Algal Bloom Marine Observation Network

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region

115 - Environmental Monitoring Assessment Program

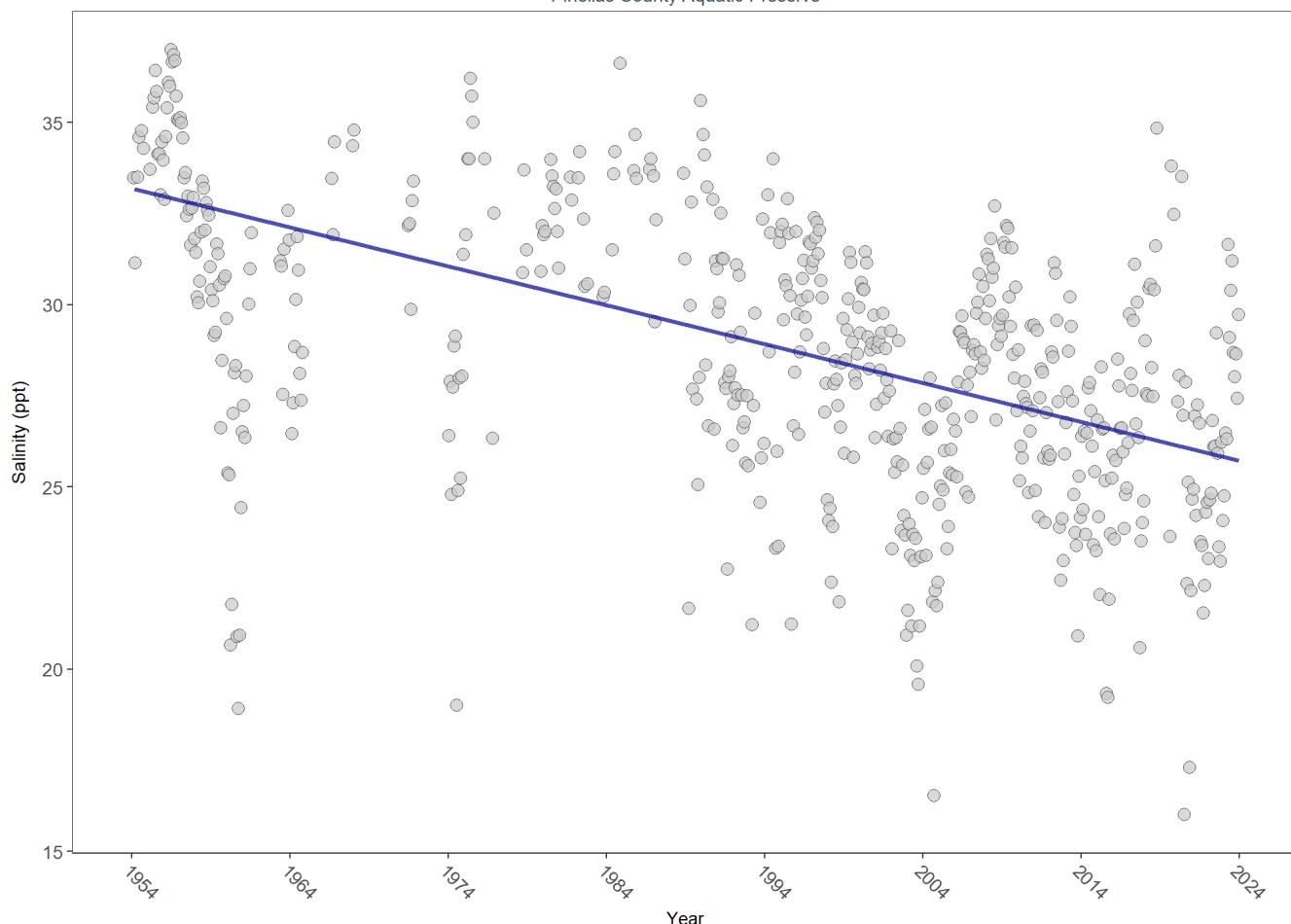
There are no qualifying Value Qualifiers for pH in Pinellas County Aquatic Preserve

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

Salinity, Lab and Field Combined, All Depths
Pinellas County Aquatic Preserve

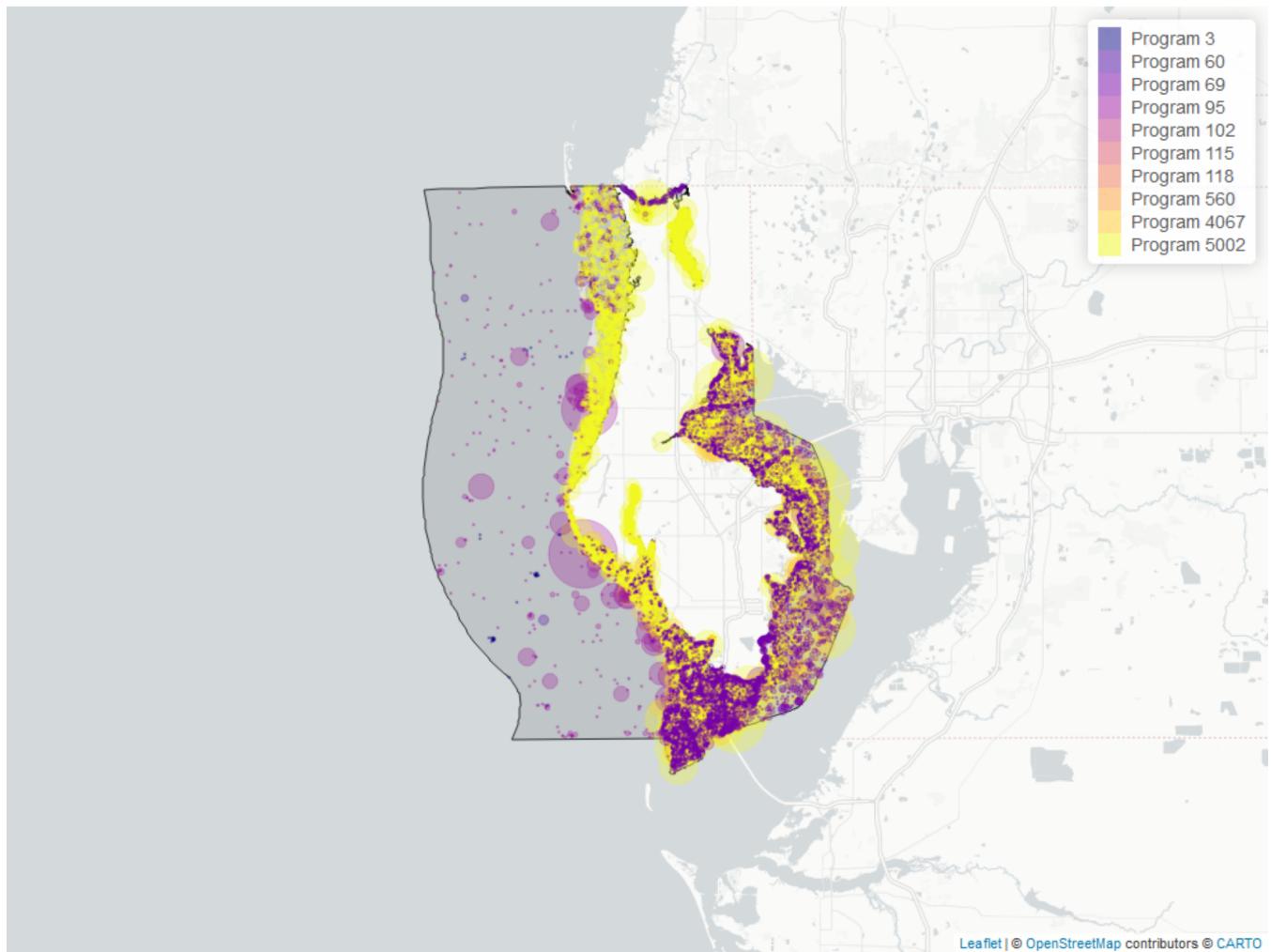


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	87672	63	28.96	TRUE	-0.3909	0.0000	-0.1067864	33.18407	8.6318	0.6558	-1

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 15: Programs contributing data for Salinity

ProgramID	N_Data	YearMin	YearMax
5002	47851	1995	2023
69	25454	1989	2017
95	7189	1954	2018
4067	7180	1993	2021
102	66	1992	1992
3	46	2018	2022
115	26	2000	2004
560	24	2021	2023
118	24	2015	2020
60	21	2014	2014

Program names:

5002 - Florida STORET / WIN
69 - Fisheries-Independent Monitoring (FIM) Program
95 - Harmful Algal Bloom Marine Observation Network
4067 - Tampa Bay Benthic Monitoring
102 - National Status and Trends Mussel Watch
3 - Atlantic Oceanographic and Meteorological Laboratory (AOML) South Florida Program Synoptic Shipboard Surveys
115 - Environmental Monitoring Assessment Program
560 - Big Bend Seagrasses & Nature Coast Aquatic Preserves - Seagrass Monitoring
118 - National Aquatic Resource Surveys, National Coastal Condition Assessment
60 - Southeast Area Monitoring and Assessment Program (SEAMAP) - Gulf of Mexico Fall & Summer Shrimp/Groundfish Survey

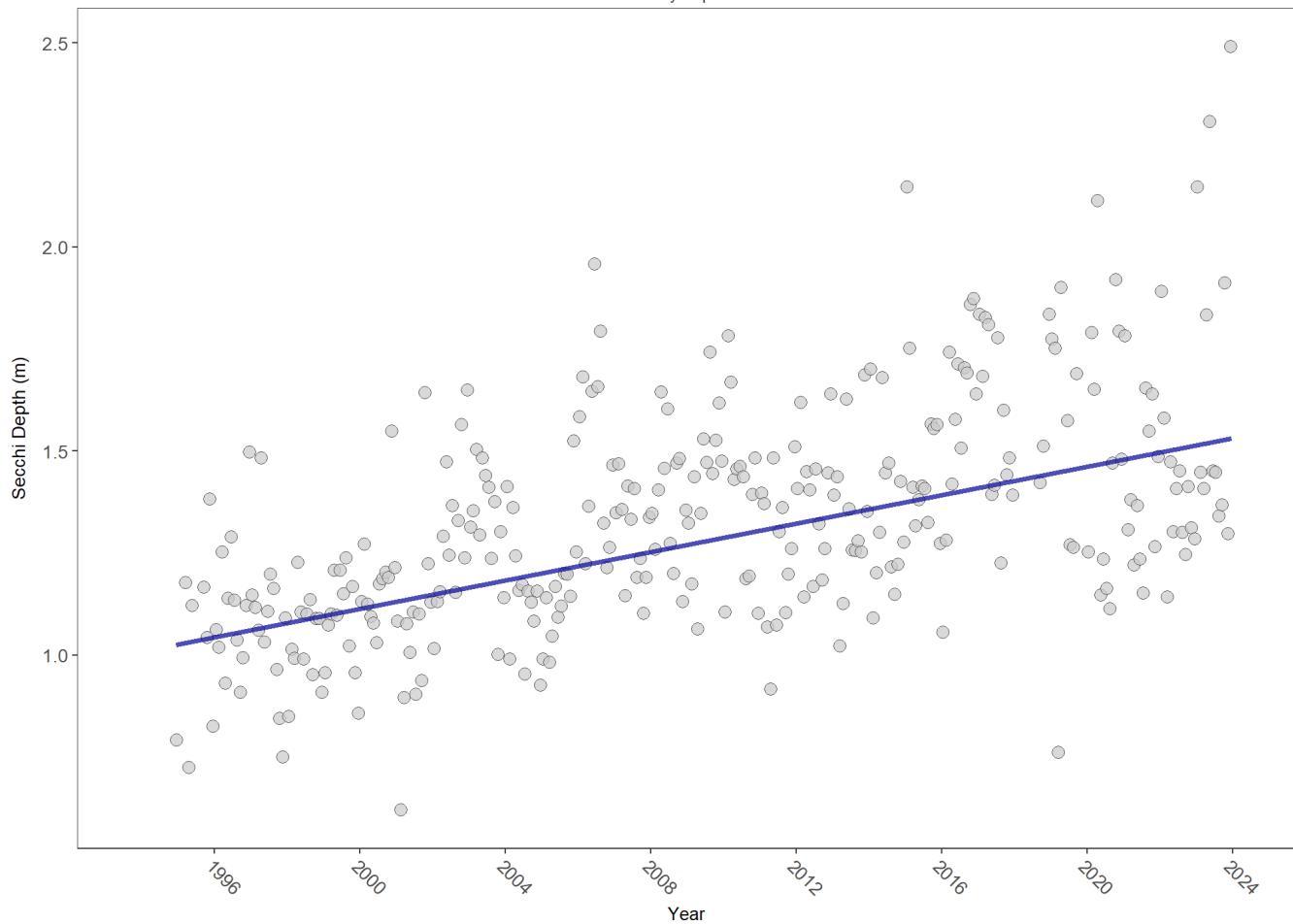
There are no qualifying Value Qualifiers for Salinity in Pinellas County Aquatic Preserve

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

Secchi Depth, Field, Surface
Pinellas County Aquatic Preserve

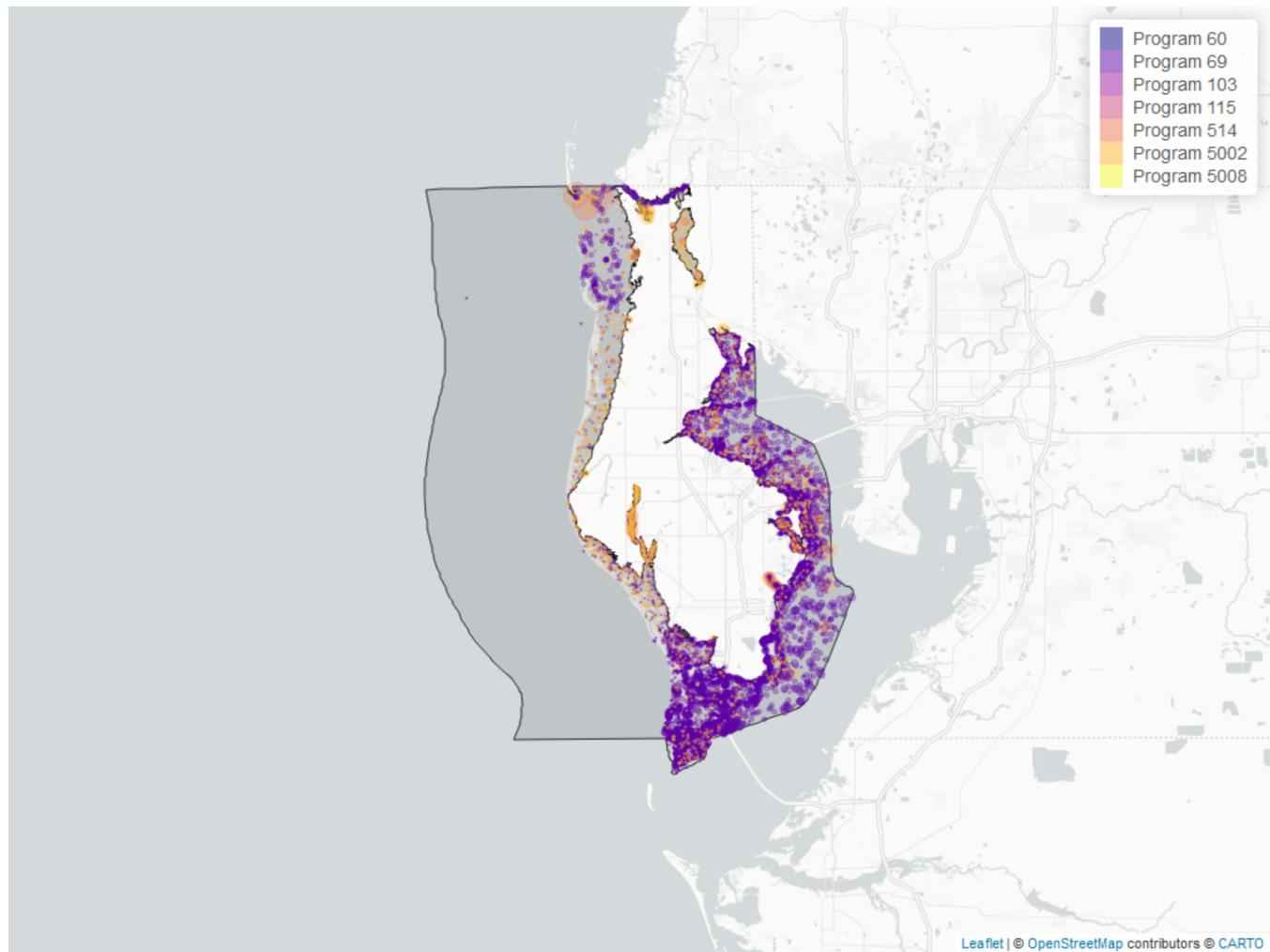


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	25859	30	1.2	TRUE	0.42	0.0000	0.01739615	1.009443	5.9217	0.8785	1

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 Secchi Depth



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

Table 16: Programs contributing data for Secchi Depth

ProgramID	N_Data	YearMin	YearMax
69	22007	1994	2017
5002	2412	1999	2023
514	702	2001	2023
103	699	2020	2021
5008	30	2021	2022
115	8	2000	2004
60	2	2014	2014

Program names:

69 - Fisheries-Independent Monitoring (FIM) Program

5002 - Florida STORET / WIN

514 - Florida LAKEWATCH Program

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region

115 - Environmental Monitoring Assessment Program

60 - Southeast Area Monitoring and Assessment Program (SEAMAP) - Gulf of Mexico Fall & Summer Shrimp/Groundfish Survey

Value Qualifiers

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

Table 17: Value Qualifiers for Secchi Depth

Year	N_{Total}	N_{S}	perc_{S}
2015	1034	25	2.4
2016	1445	10	0.7
2017	1229	4	0.3
2020	419	94	22.4
2021	1277	261	20.4
2022	765	291	38.0
2023	487	177	36.3

Note: ¹S - Secchi disk visible to bottom of waterbody

Programs containing Value Qualified data:

5002 - Florida STORET / WIN

514 - Florida LAKEWATCH Program

5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region

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) $\text{TN} = \text{ORG}_N + \text{NH}_4 + \text{NO}_3\text{O}_2;$
- 4) $\text{TN} = \text{ORG}_N + \text{NH}_4 + \text{NO}_2 + \text{NO}_3;$
- 5) $\text{TN} = \text{TKN} + \text{NO}_3;$
- 6) $\text{TN} = \text{ORG}_N + \text{NH}_4 + \text{NO}_3;$

Additional Information:

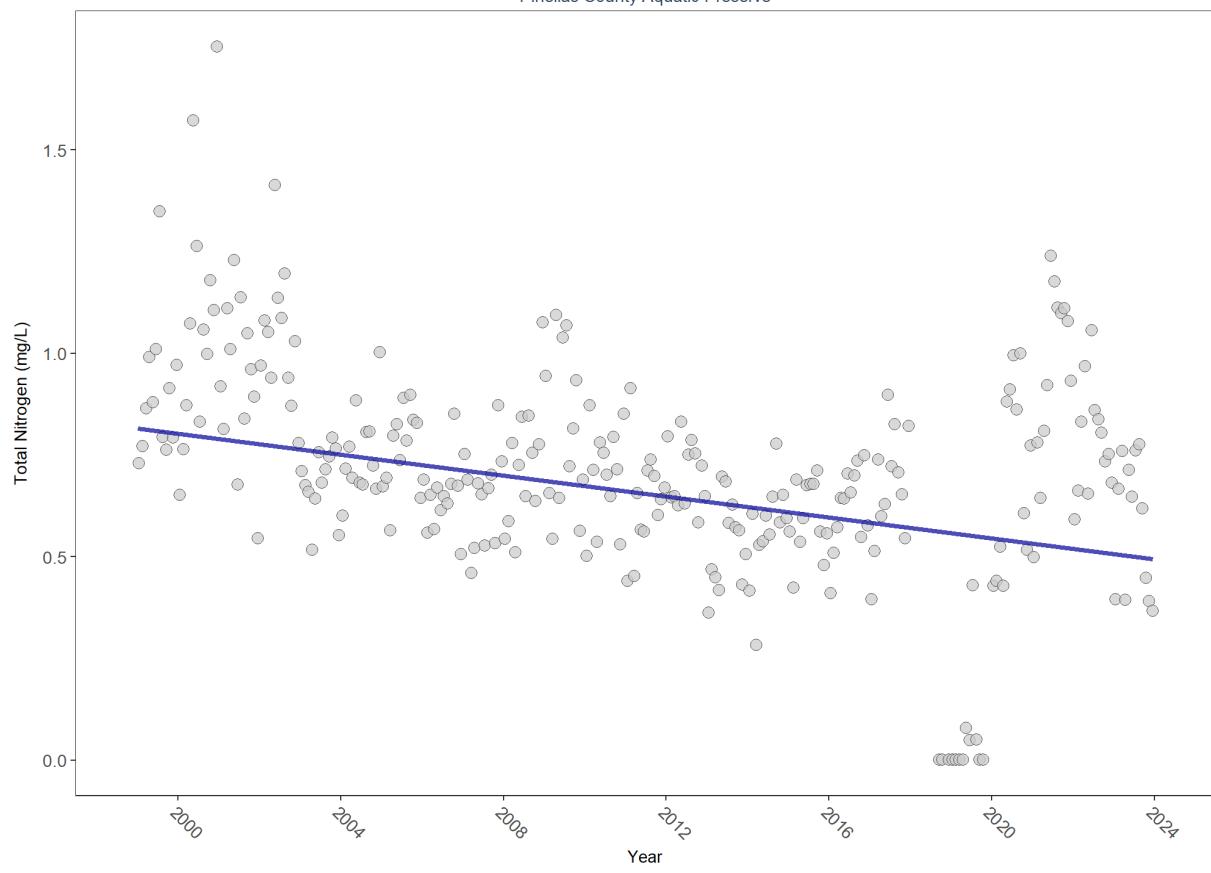
- Rules for use of sample fraction:
 - FDEP report that if both “Total” and “Dissolved” are reported, only “Total” is used. If the total is not reported, they do use dissolved as a best available replacement.
 - An analysis of all SEACAR data shows that 90% of all possible TN calculations can be done 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 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_QAQCFlagCode = “1Q”
 - SEACAR_QAQC_Description = “SEACAR Calculated”

Seasonal Kendall-Tau Trend Analysis

Total Nitrogen, Lab, All Depths
Pinellas County Aquatic Preserve

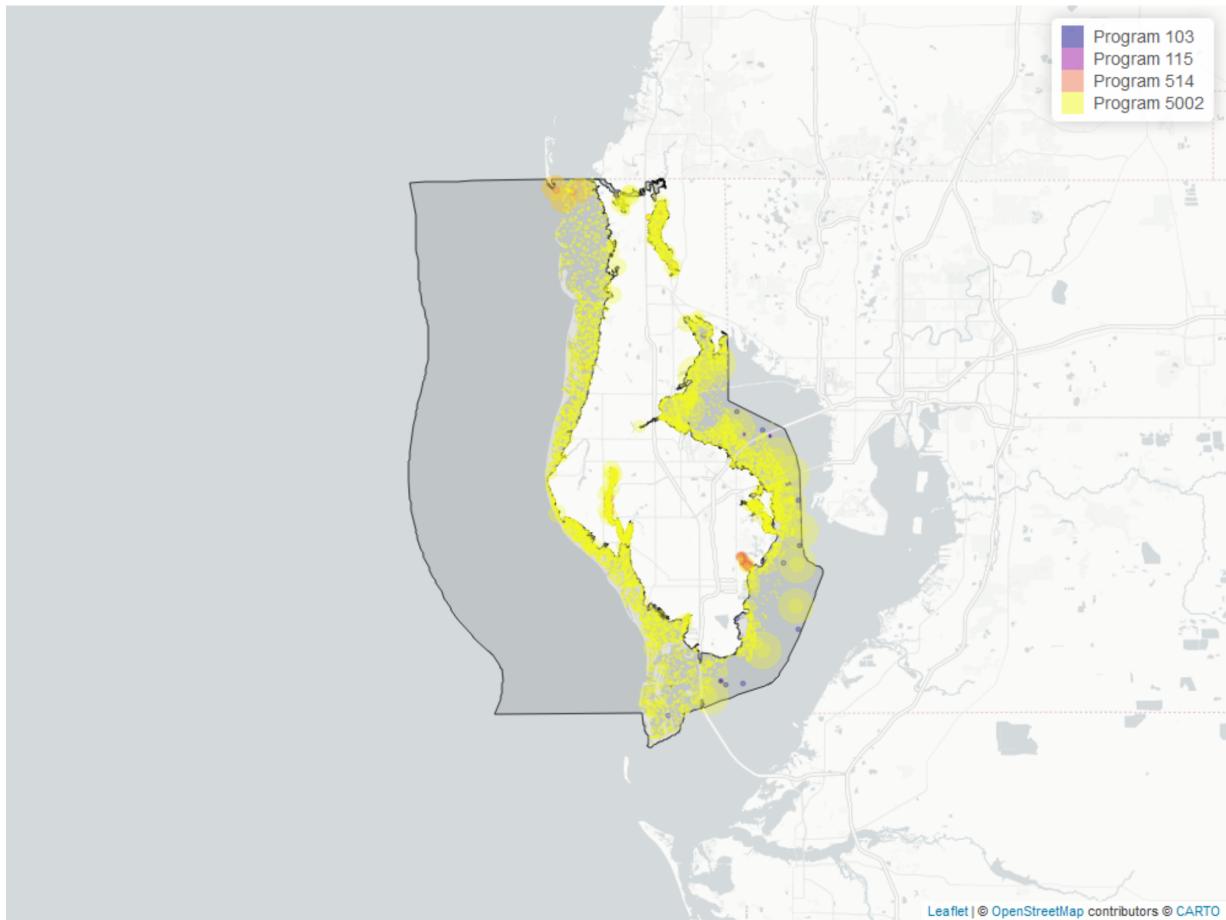


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	15524	25	0.598	TRUE	-0.2933	0.0000	-0.01283879	0.8152565	9.5562	0.5707	-1

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 18: Programs contributing data for Total Nitrogen

<i>ProgramID</i>	<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>
5002	14828	1999	2023
514	679	2001	2023
103	69	2000	2006
115	9	2000	2004

Program names:

5002 - Florida STORET / WIN

514 - Florida LAKEWATCH Program

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

115 - Environmental Monitoring Assessment Program

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 19: Value Qualifiers for Total Nitrogen

<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>
2007	629	3	0.5			1	0.2
2008	708					1	0.1
2010	617					2	0.3
2011	411	2	0.5				
2013	501	2	0.4				
2015	615	1	0.2			3	0.5
2016	669	12	1.8			1	0.1
2017	586	6	1.0			2	0.3
2020	562			45		8	

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

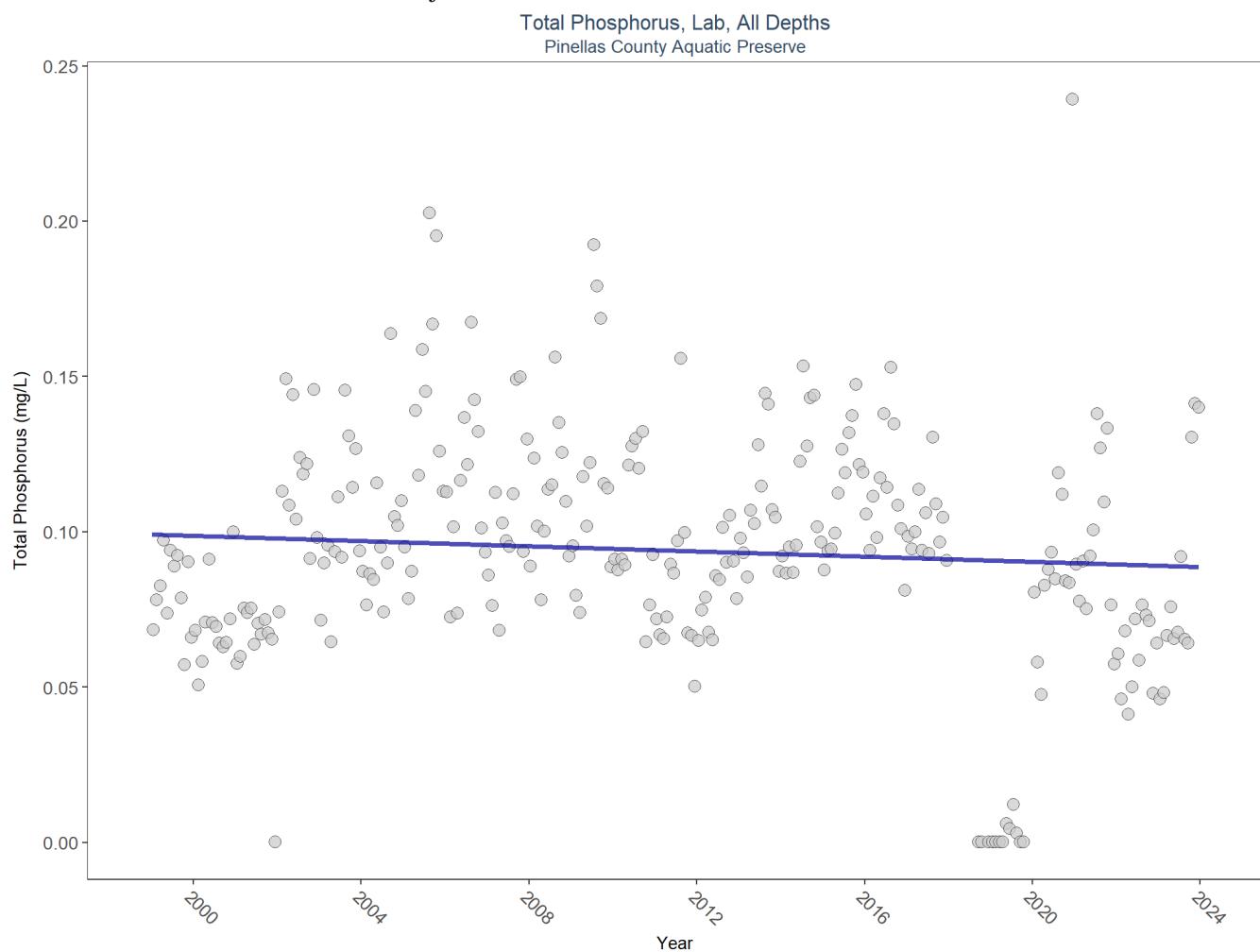
Programs containing Value Qualified data:

514 - Florida LAKEWATCH Program

5002 - Florida STORET / WIN

Total Phosphorus - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

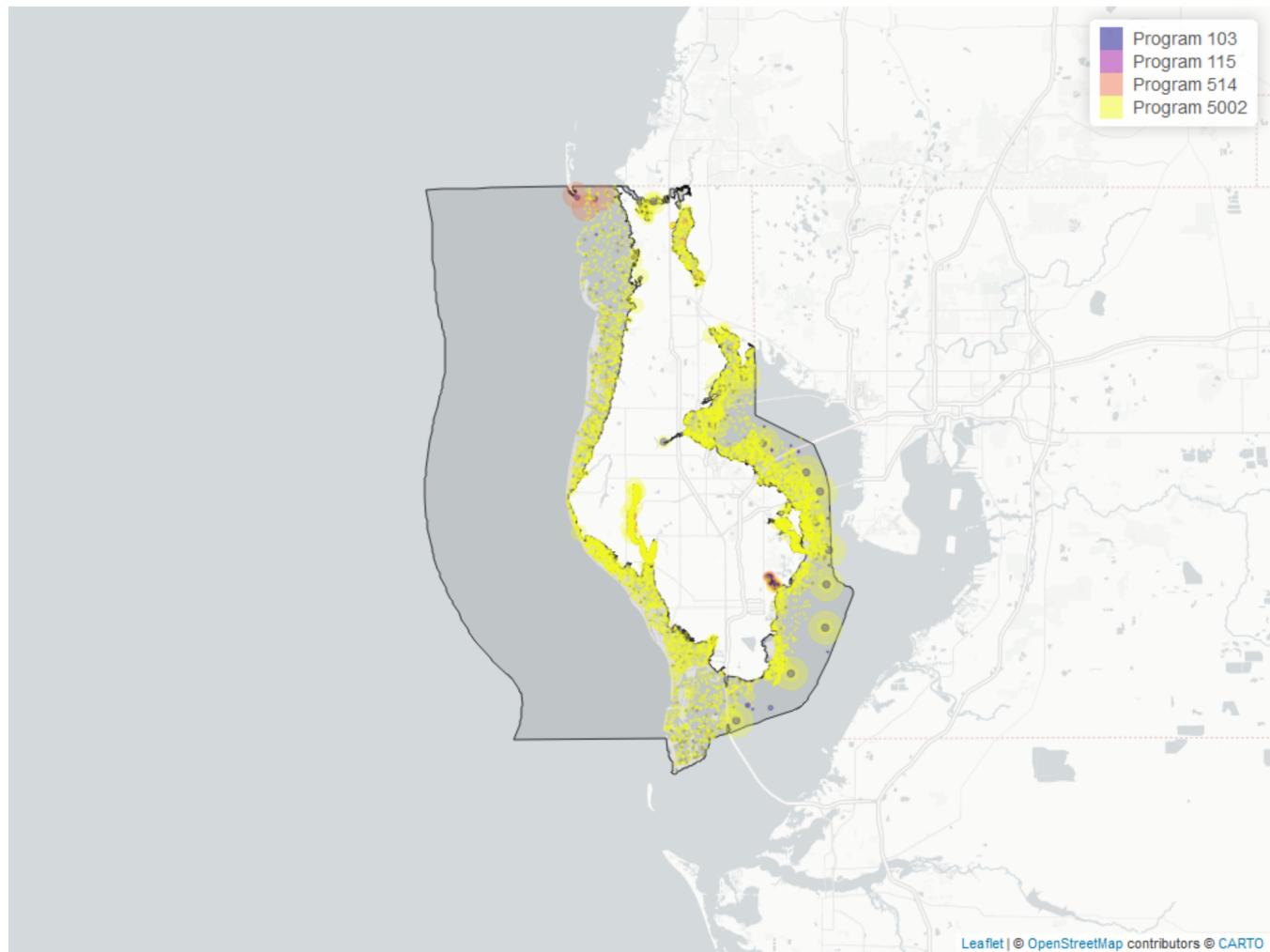


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	15236	25	0.09	TRUE	-0.068	0.1076	-0.0004135444	0.09906477	3.9073	0.9726	0

$p < 0.00005$ 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 20: Programs contributing data for Total Phosphorus

ProgramID	N_Data	YearMin	YearMax
5002	13941	1999	2023
103	723	2000	2021
514	679	2001	2023
115	9	2000	2004

Program names:

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

514 - Florida LAKEWATCH Program

115 - Environmental Monitoring Assessment Program

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 21: 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>	<i>N_U</i>	<i>perc_U</i>
2004	848	35	4.1				
2005	683	24	3.5				
2006	706	18	2.5			1	0.1
2009	648	2	0.3			6	0.9
2010	652	6	0.9			59	9.1
2011	582	13	2.2			154	26.5
2012	668					52	7.8
2013	530	3	0.6				
2014	549	6	1.1			24	4.4
2015	590	1	0.2				
2016	607					15	2.5
2017	503					3	0.6
2020	705	105	14.9	48	6.8	45	6.4
2021	1415	239	16.9	21	1.5	62	4.4
2022	716	240	33.5	2	0.3	120	16.8
2023	556	171	30.8			163	29.3

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

Programs containing Value Qualified data:

5002 - Florida STORET / WIN

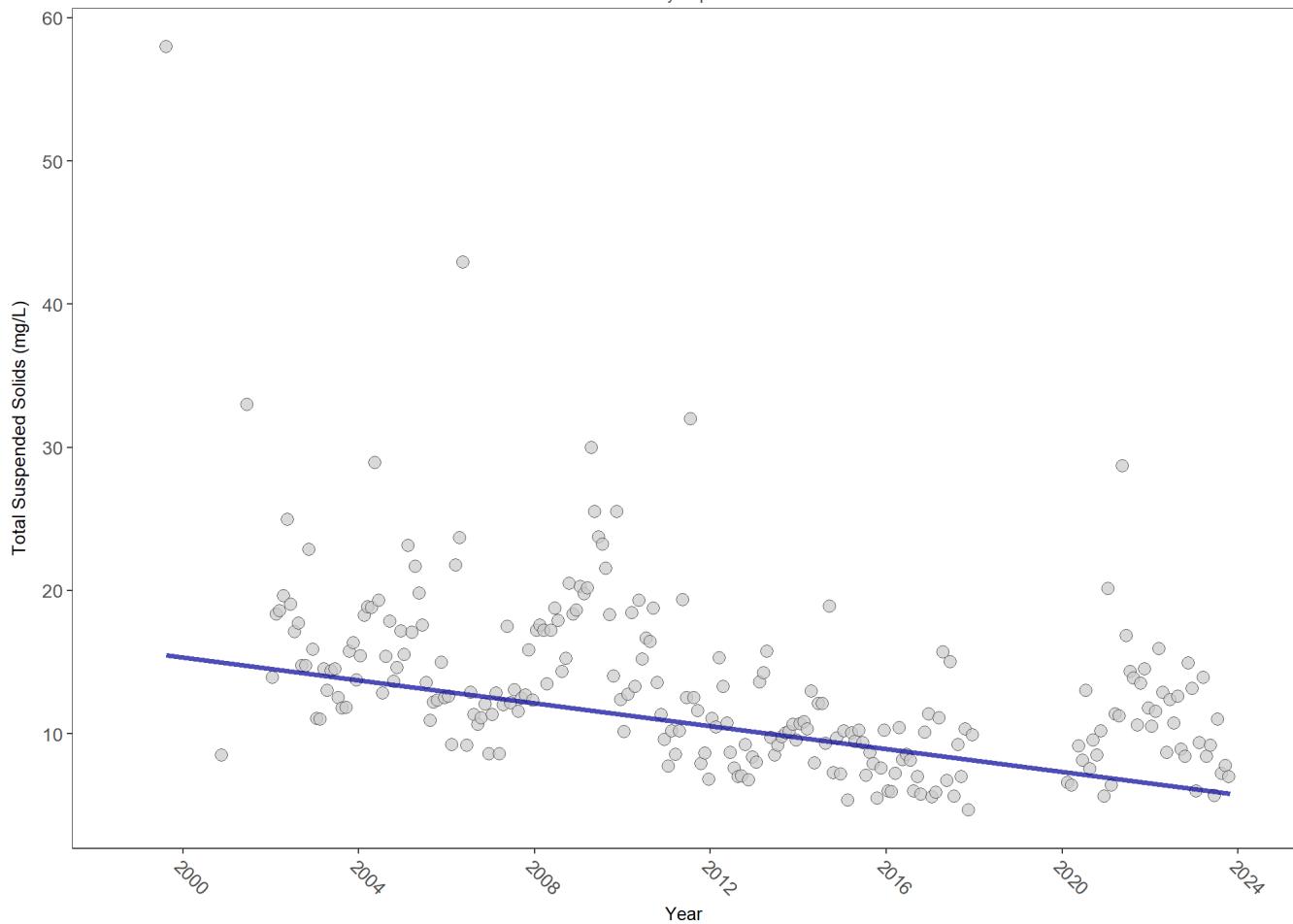
514 - Florida LAKEWATCH Program

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
Pinellas County Aquatic Preserve

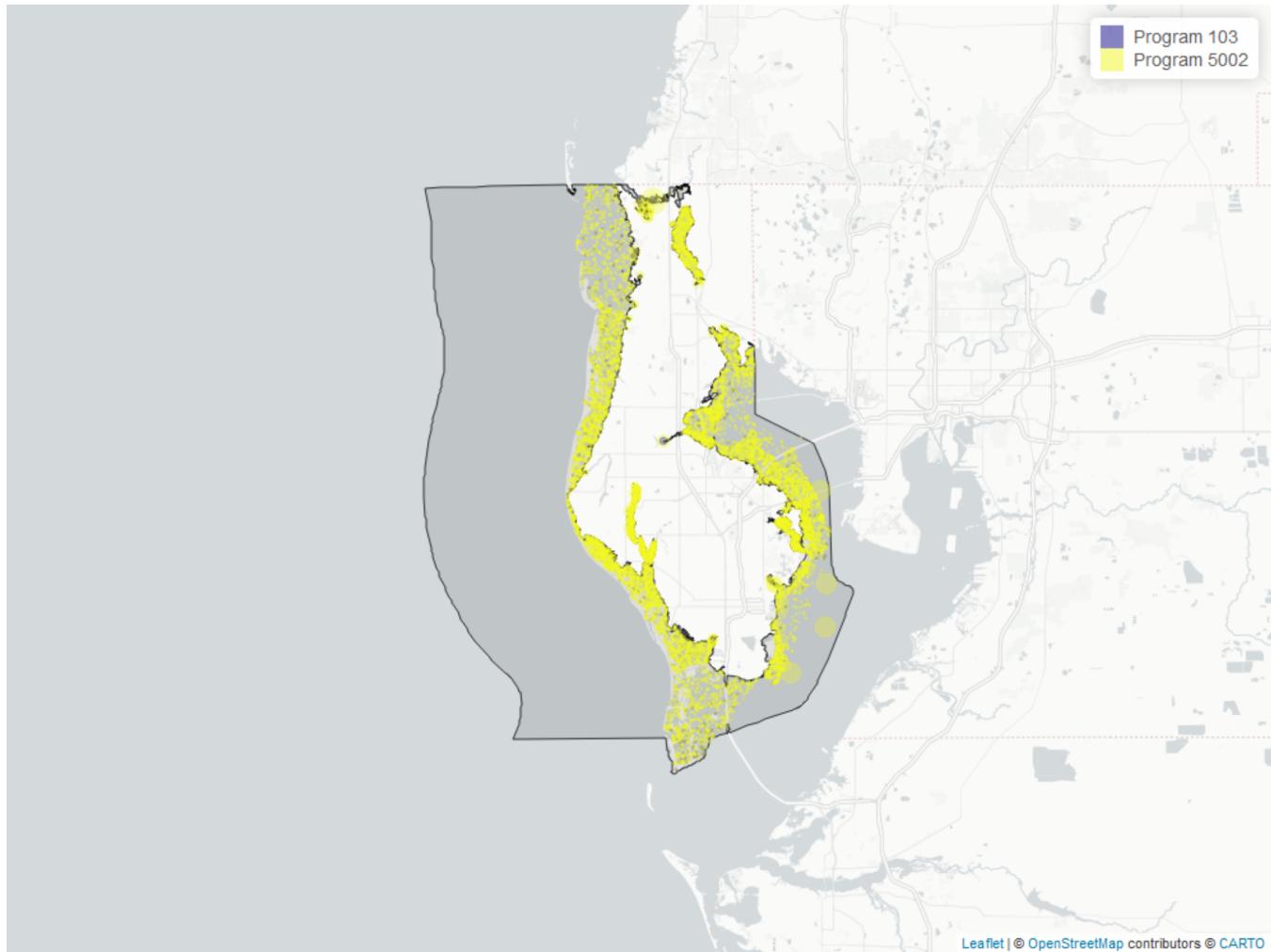


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	12263	23	10	TRUE	-0.3933	0.0000	-0.3993513	15.73606	3.0746	0.9897	-1

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 22: Programs contributing data for Total Suspended Solids

ProgramID	N_Data	YearMin	YearMax
5002	11841	1999	2023
103	484	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_{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 23: Value Qualifiers for Total Suspended Solids

<i>Year</i>	<i>N_Total</i>	<i>N_I</i>	<i>perc_I</i>	<i>N_U</i>	<i>perc_U</i>
2000	4	4	100.0		
2003	647	1	0.1		
2004	702	23	3.3	1	0.1
2005	660	25	3.8	1	0.1
2006	624	17	2.7	13	2.1
2007	607	19	3.1		
2008	621			2	0.3
2009	582	3	0.5	1	0.2
2010	600	20	3.3	6	1.0
2011	474	18	3.8	3	0.6
2012	646	60	9.3	26	4.0
2013	550	9	1.6		
2014	586	19	3.2	19	3.2
2015	584	12	2.0	6	1.0
2016	617	29	4.7	5	0.8
2017	583	20	3.4	4	0.7
2020	557	11	2.0	3	0.5
2021	1063	14	1.3	7	0.7
2022	521	13	2.5	3	0.6
2023	407	5	1.2	2	0.5

Note: ¹**I** - Reported value is greater than or equal to lab method detection limit, but less than quantitation limit ²**U**
 - Compound was analyzed for but not detected

Programs containing Value Qualified data:

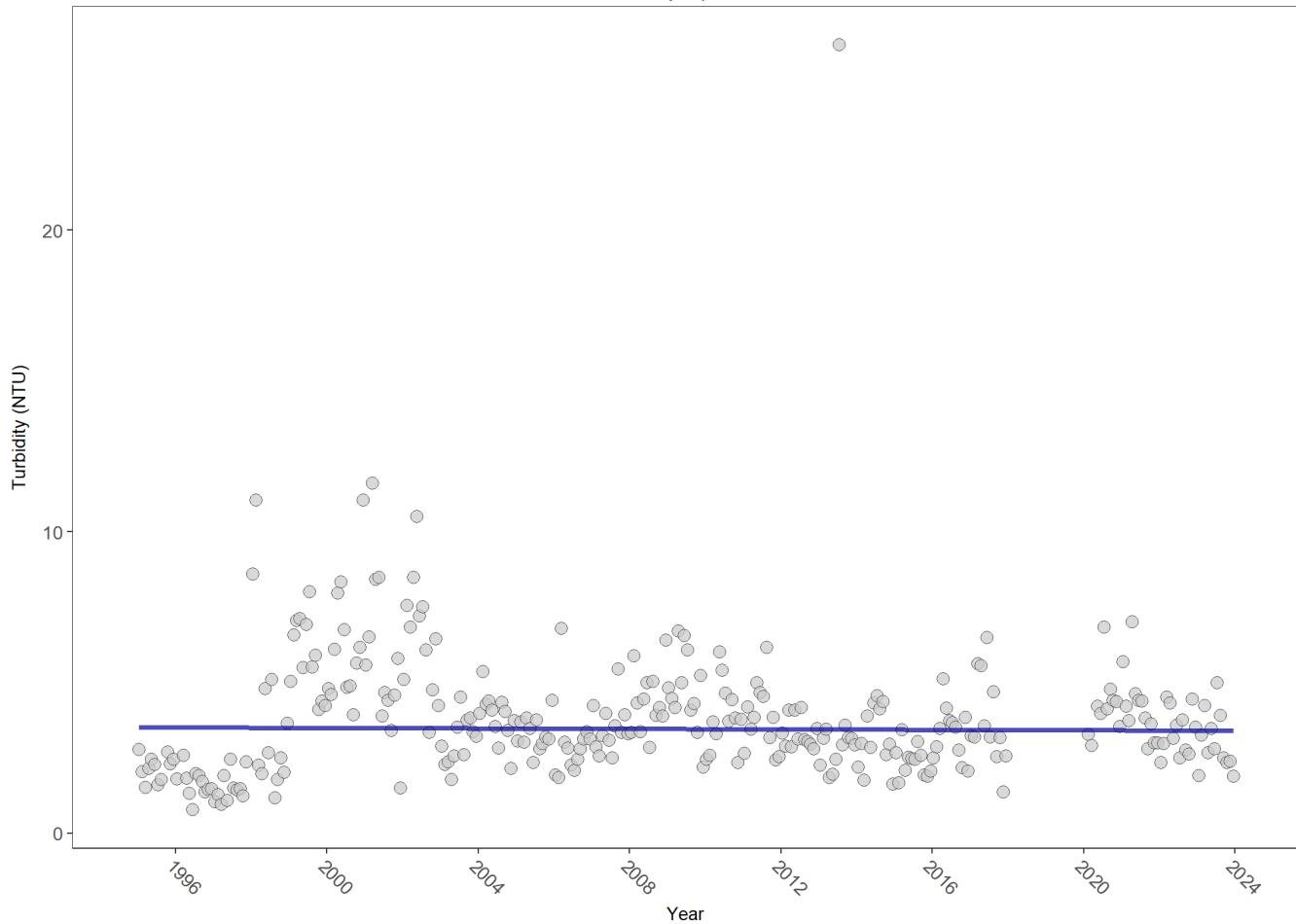
5002 - Florida STORET / WIN

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
Pinellas County Aquatic Preserve

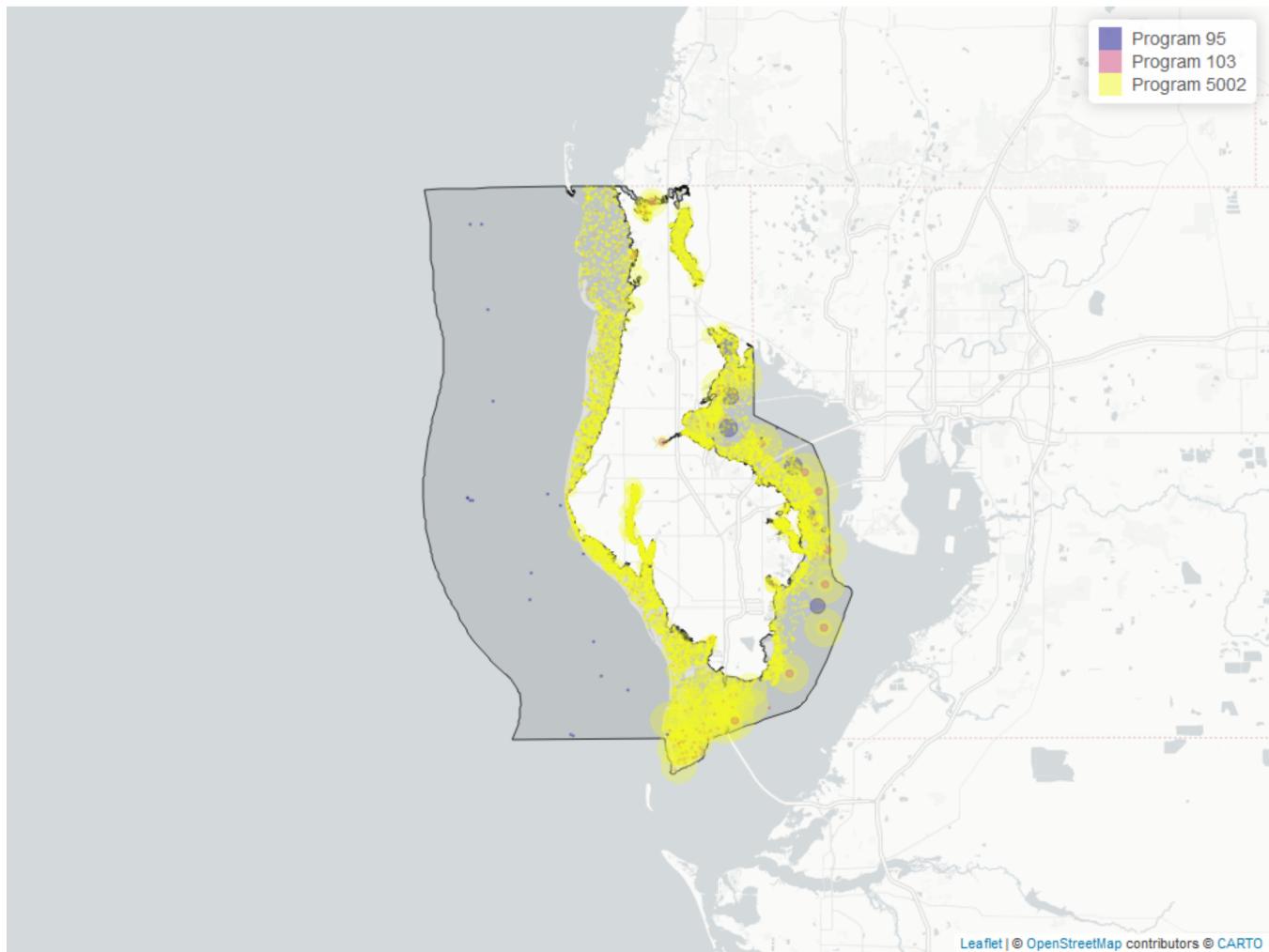


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	22203	27	2.5	TRUE	-0.0125	0.7818	-0.003605369	3.514129	8.1807	0.697	0

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 24: Programs contributing data for Turbidity

ProgramID	N_Data	YearMin	YearMax
5002	21362	1995	2023
103	621	2006	2021
95	323	2000	2016

Program names:

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

95 - Harmful Algal Bloom Marine Observation Network

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 25: Value Qualifiers for Turbidity

Year	$N_{_Total}$	$N_{_I}$	$perc_{_I}$	$N_{_Q}$	$perc_{_Q}$	$N_{_U}$	$perc_{_U}$
2004	962	4	0.4				
2005	875	1	0.1				
2006	948			2	0.2		
2007	898	3	0.3				
2009	907	3	0.3	8	0.9	1	0.1
2010	982	5	0.5	10	1.0		
2011	969	3	0.3	1	0.1		
2012	896	3	0.3			1	0.1
2013	827	4	0.5	4	0.5		
2014	784	13	1.7			37	4.7
2015	729	6	0.8			2	0.3
2016	771	1	0.1				
2020	626	1	0.2				
2021	1334			8	0.6	1	0.1
2022	654	2	0.3				
2023	551	5	0.9				

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

Programs containing Value Qualified data:

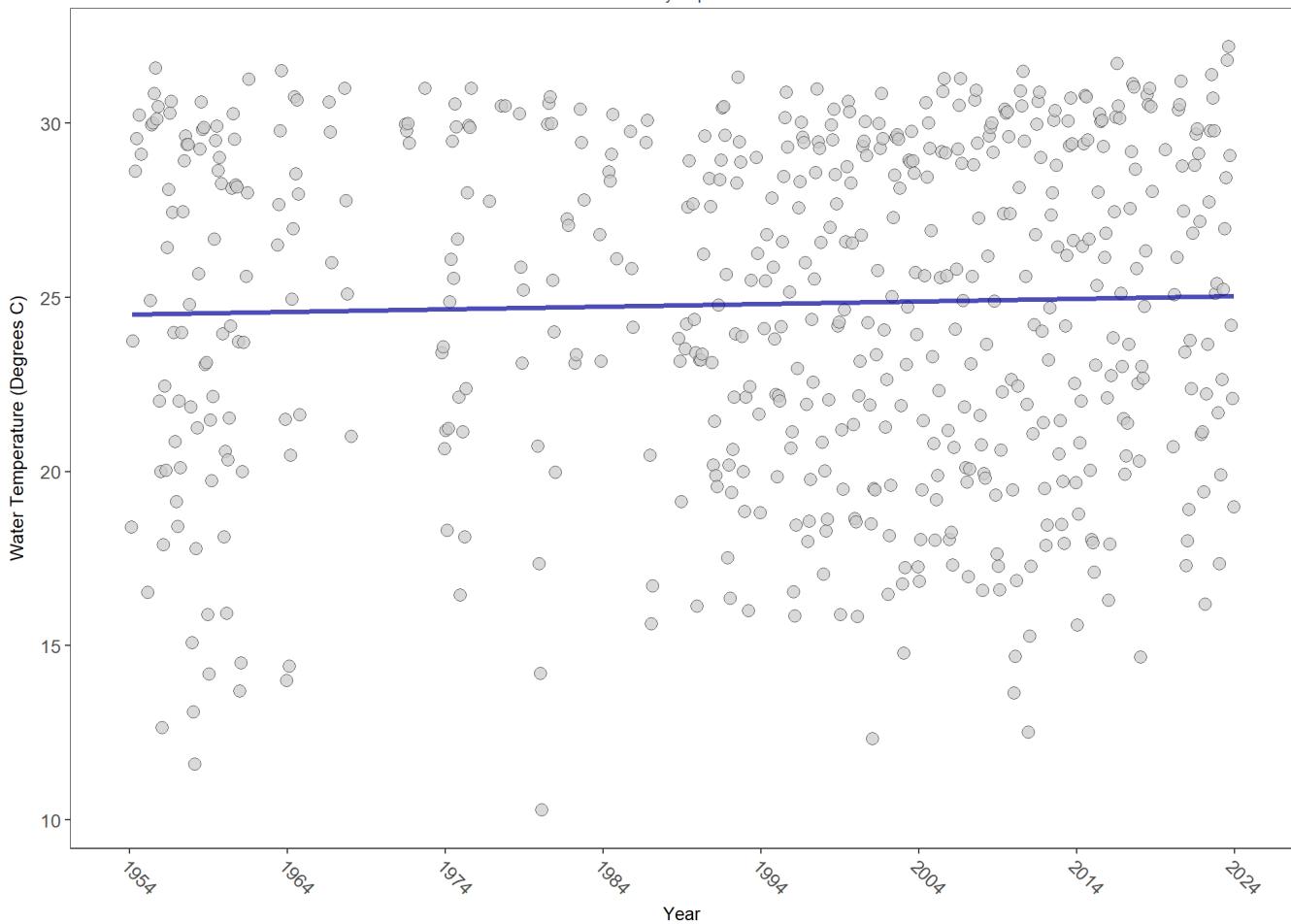
5002 - Florida STORET / WIN

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
Pinellas County Aquatic Preserve

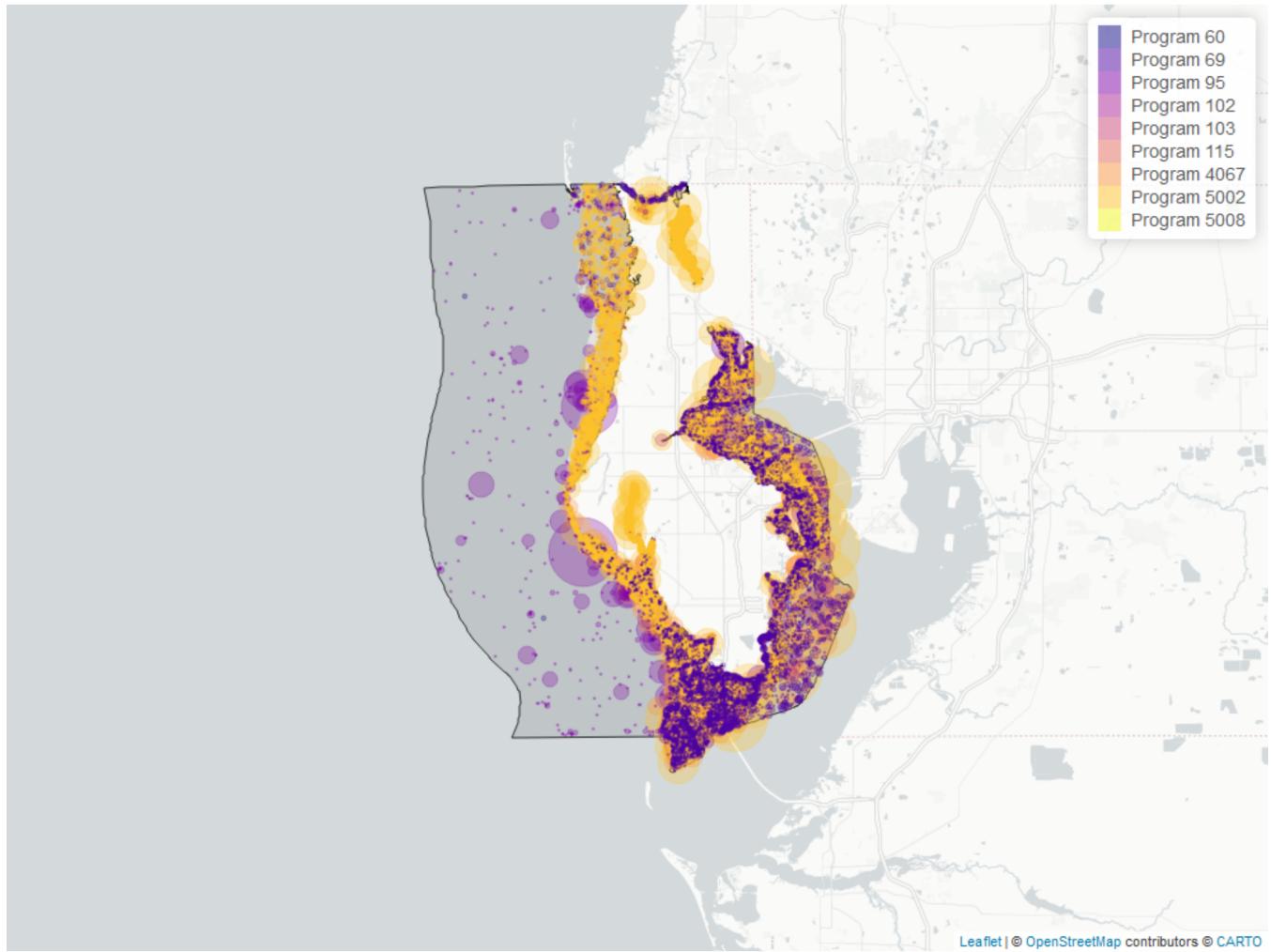


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	95789	66	26.57	TRUE	0.0824	0.0061	0.00757674	24.50867	7.2454	0.7789	1

$p < 0.00005$ 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 26: Programs contributing data for Water Temperature

ProgramID	N_Data	YearMin	YearMax
5002	50600	1995	2023
69	25518	1989	2017
4067	10379	1993	2021
95	7590	1954	2018
103	1562	2004	2021
102	66	1992	1992
5008	60	2021	2023
115	26	2000	2004
60	6	2014	2014

Program names:

5002 - Florida STORET / WIN
69 - Fisheries-Independent Monitoring (FIM) Program
4067 - Tampa Bay Benthic Monitoring
95 - Harmful Algal Bloom Marine Observation Network
103 - EPA STOrage and RETrieval Data Warehouse (STORET)
102 - National Status and Trends Mussel Watch
5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region
115 - Environmental Monitoring Assessment Program
60 - Southeast Area Monitoring and Assessment Program (SEAMAP) - Gulf of Mexico Fall & Summer Shrimp/Groundfish Survey

There are no qualifying Value Qualifiers for Water Temperature in Pinellas County Aquatic Preserve

Water Quality - Continuous

The following files were used in the continuous analysis:

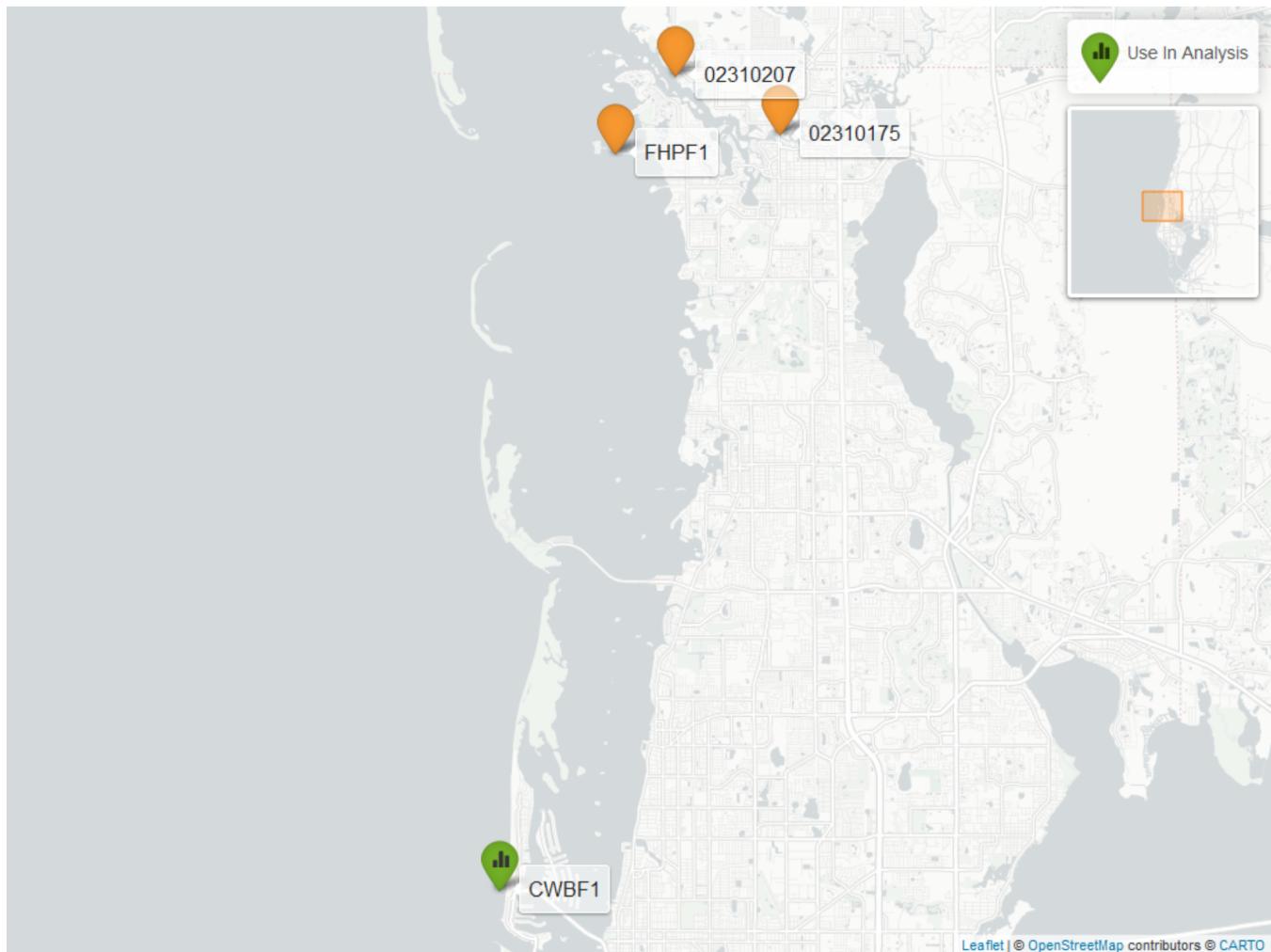
- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_SW-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_Saturation_SW-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_pH_SW-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Salinity_SW-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Turbidity_SW-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Water_Temperature_SW-2024-Mar-23.txt*

Table 27: National Data Buoy Center (5)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
CWBF1	19	TRUE	TempW
FHPF1	4	FALSE	TempW

Table 28: National Water Information System (7)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
02310175	4	FALSE	TempW
02310207	3	FALSE	TempW



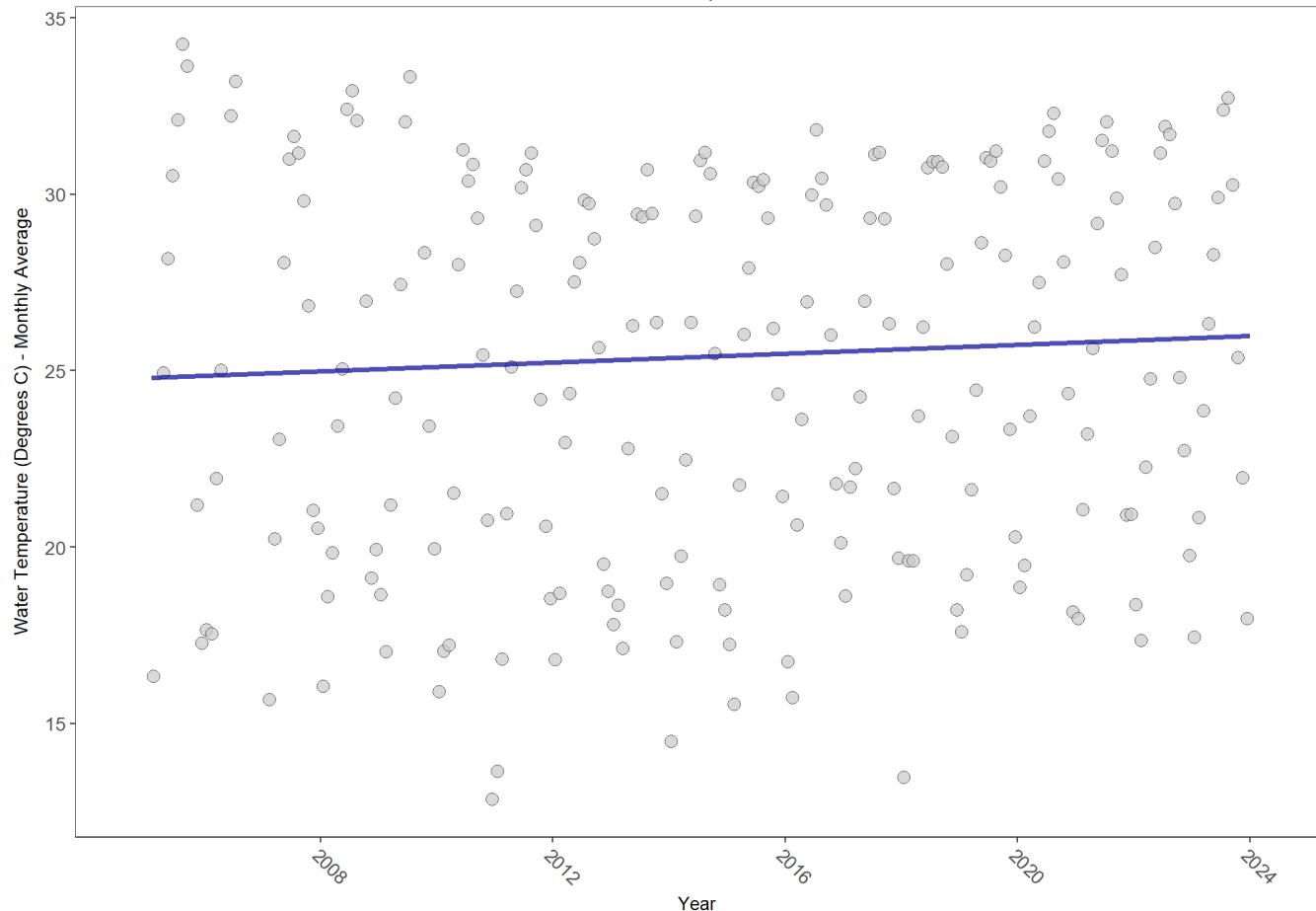
Map showing Continuous Water Quality Monitoring sampling locations within the boundaries of Pinellas County Aquatic Preserve. Sites marked as *Use In Analysis* are featured in this report.

Water Temperature - Continuous Water Quality

CWBF1

National Data Buoy Center (5)

Pinellas County Aquatic Preserve
CWBF1
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	1333301	19	25.3	TRUE	0.1689	0.0008	0.06281647	24.79948	9.8547	0.5435	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Submerged Aquatic Vegetation

The data file used is: All_SAV_Parameters-2024-Mar-29.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.

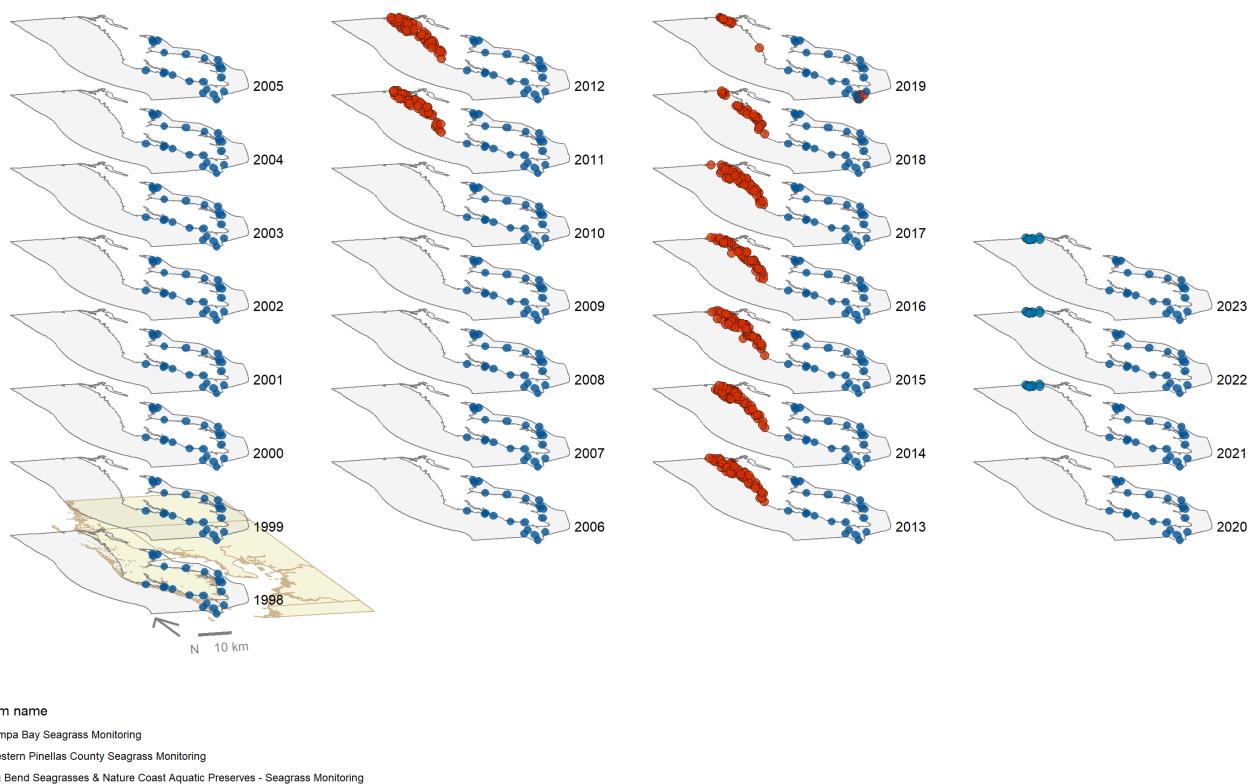
Notes

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

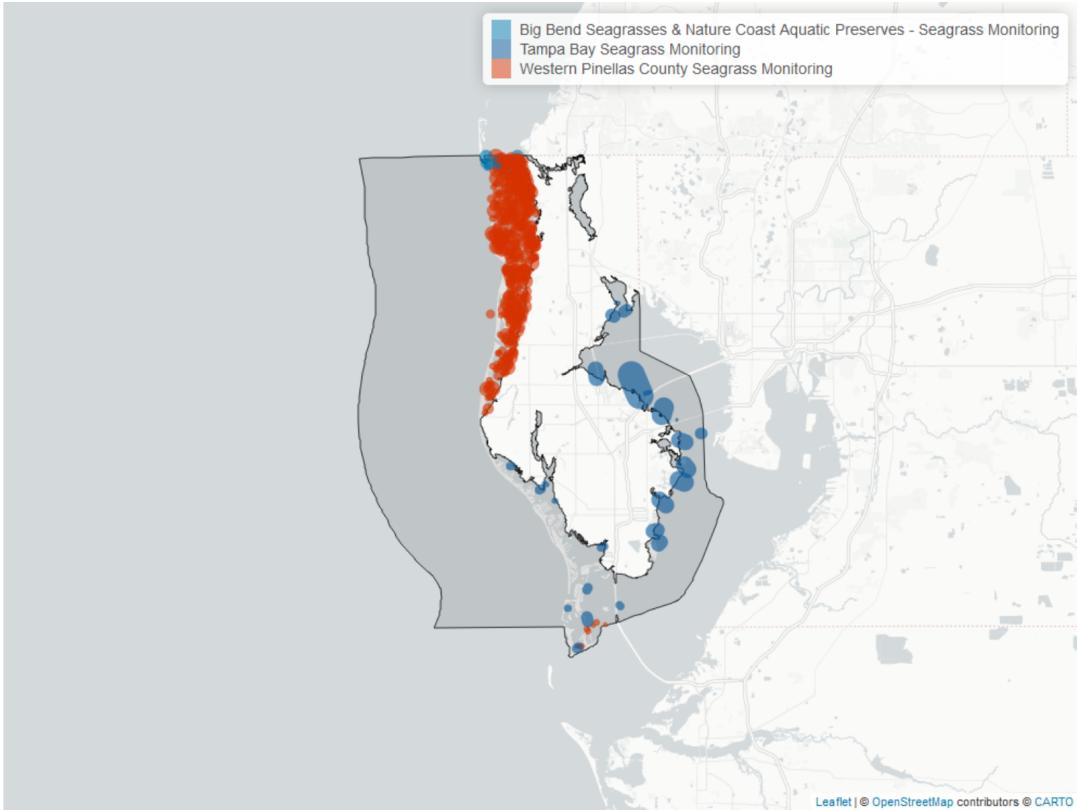
- Biscayne Bay Aquatic Preserve
- Florida Keys National Marine Sanctuary

Pinellas County Aquatic Preserve
SAV Percent Cover - Sample Locations



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

Sampling locations by Program:



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

Table 29: Western Pinellas County Seagrass Monitoring - *Program 564*

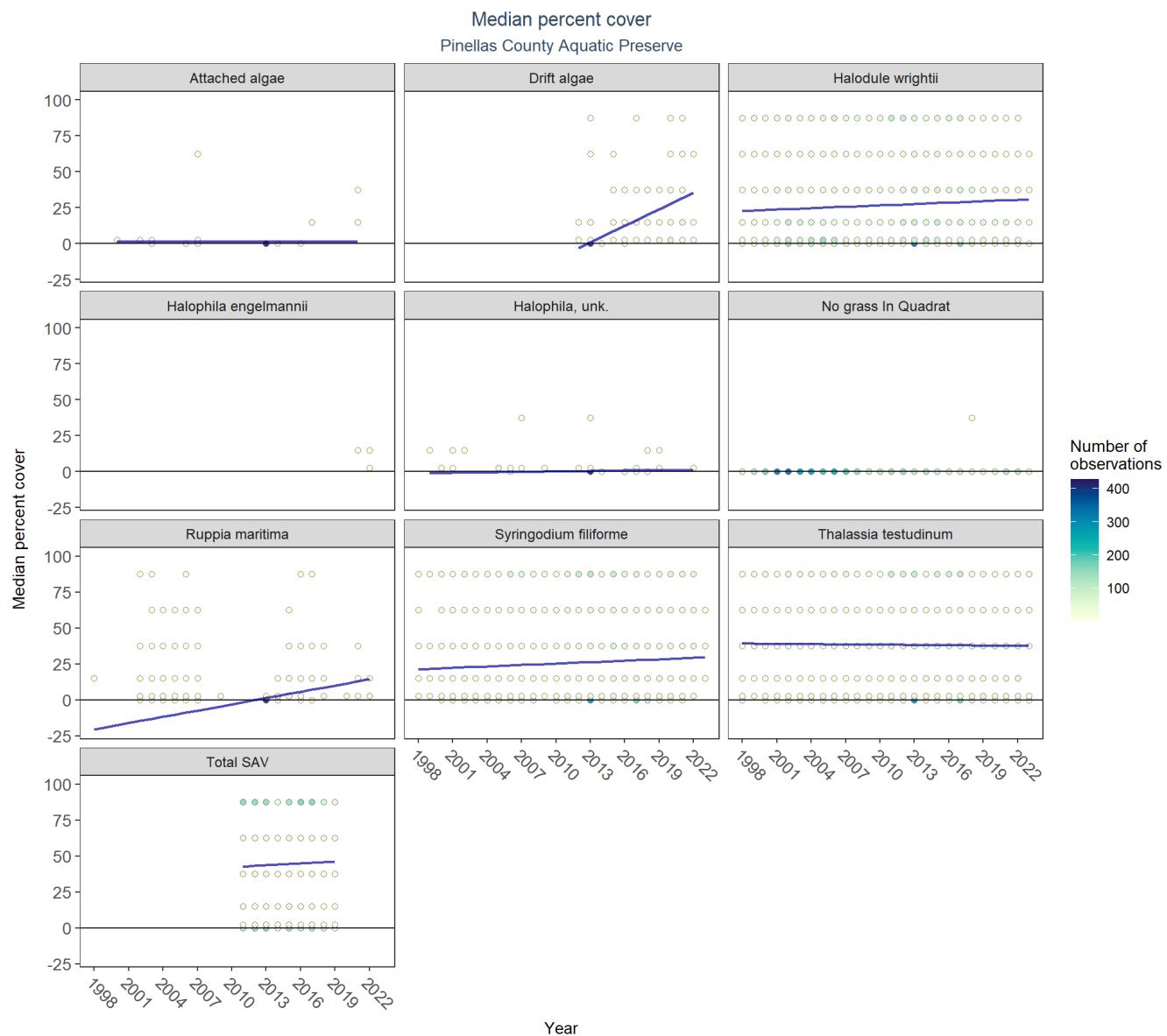
<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>	<i>Collection Method</i>	<i>Sample Locations</i>
8342	2011	2019	Percent Cover	441

Table 30: Big Bend Seagrasses & Nature Coast Aquatic Preserves - Seagrass Monitoring - *Program 560*

<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>	<i>Collection Method</i>	<i>Sample Locations</i>
106	2021	2023	Modified Braun Blanquet	8
122	2022	2023	Percent Cover	8

Table 31: Tampa Bay Seagrass Monitoring - *Program 565*

<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>	<i>Collection Method</i>	<i>Sample Locations</i>
14772	1998	2022	Braun Blanquet	27



Median percent cover by species in *Pinellas County 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.

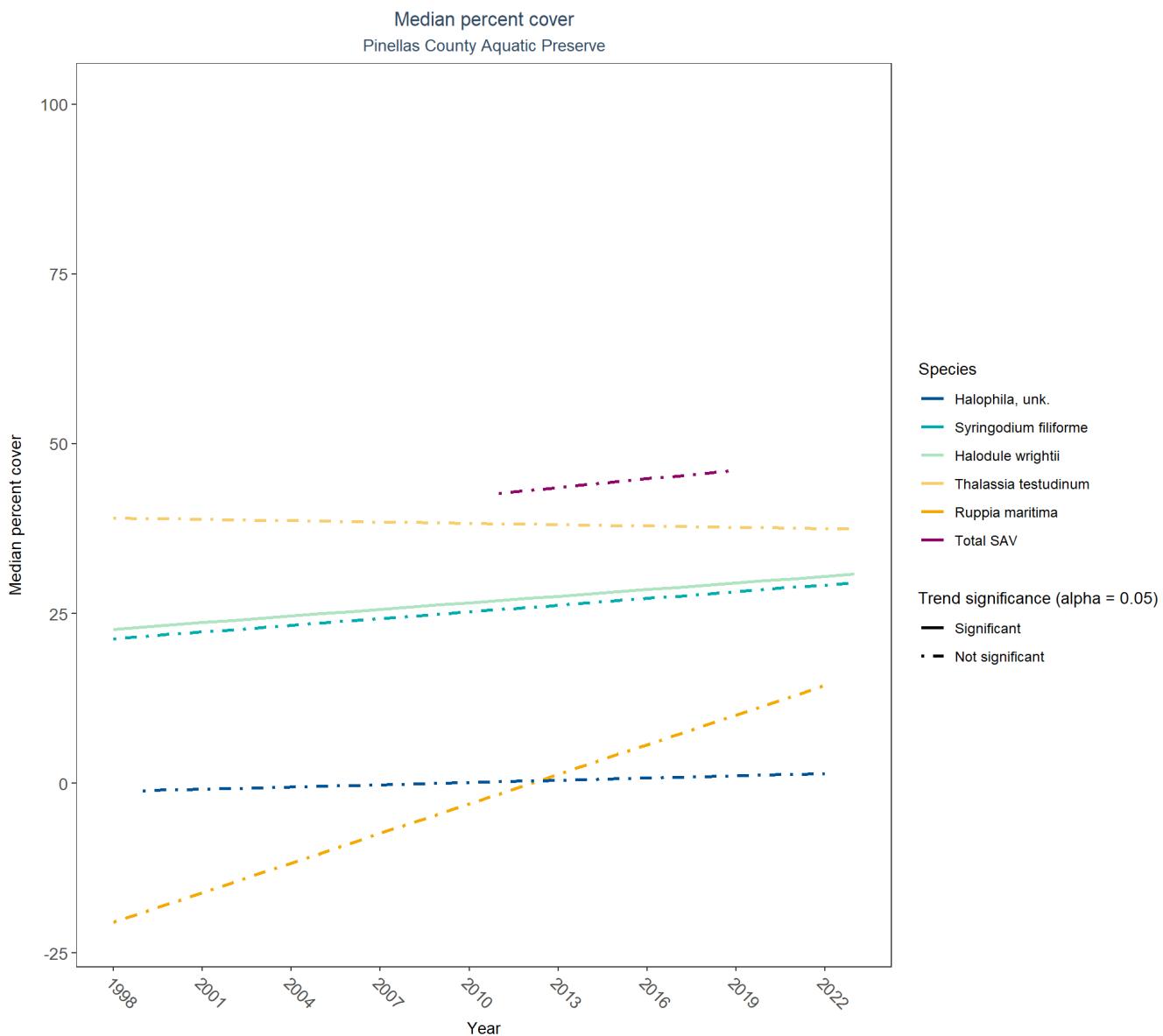
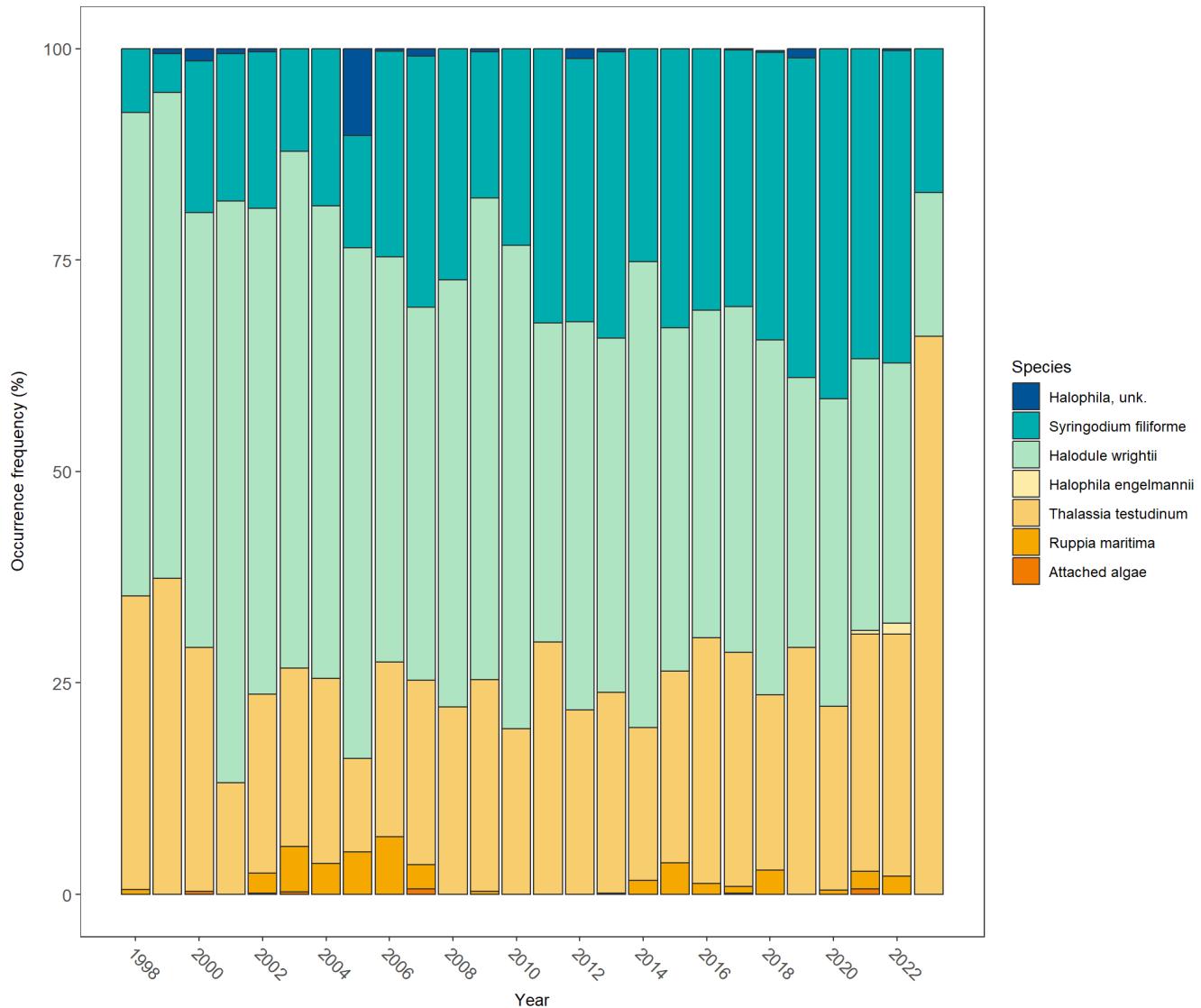
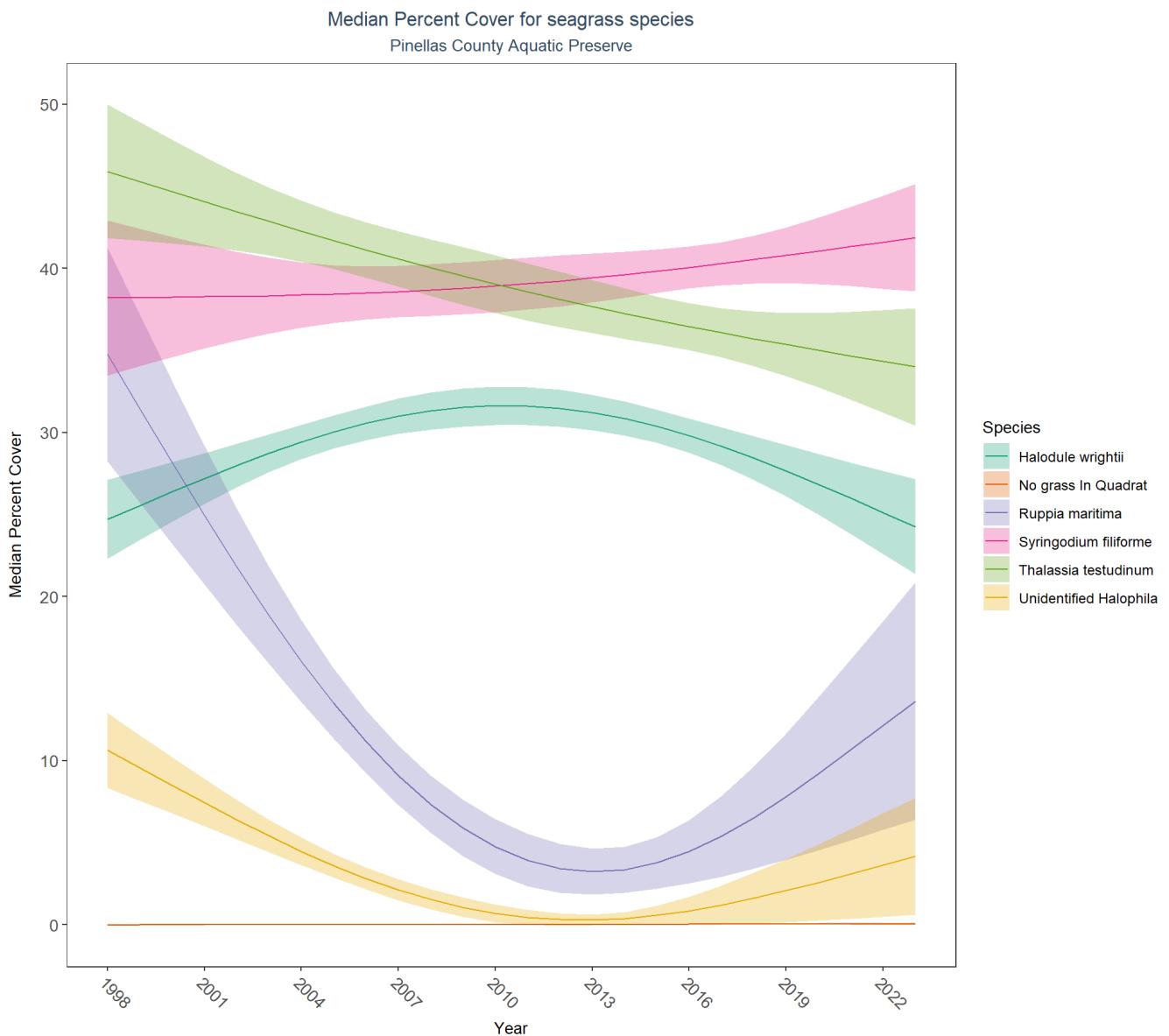


Table 32: Percent Cover Trend Analysis for Pinellas County Aquatic Preserve

Species	CommonName	Trend Significance (0.05)	Period of Record	LME-Intercept	LME-Slope	p
Attached algae		No significant trend	2000 - 2021	1.3460	-0.0087	0.9565
Drift algae		Significantly increasing trend	2012 - 2022	-72.0120	3.8327	0.0000
Halodule wrightii	Shoal grass	Significantly increasing trend	1998 - 2023	21.3982	0.3242	0.0268
Halophila engelmannii	Star grass	Insufficient data to calculate trend				
No grass In Quadrat		Model did not fit the available data	1998 - 2023			
Ruppia maritima	Widgeon grass	No significant trend	1998 - 2022	-26.2970	1.4532	0.3562
Syringodium filiforme	Manatee grass	No significant trend	1998 - 2023	19.9604	0.3298	0.1534
Thalassia testudinum	Turtle grass	No significant trend	1998 - 2023	39.3192	-0.0642	0.7267
Total SAV		No significant trend	2011 - 2019	35.6054	0.4199	0.5741
Halophila, unk.		No significant trend	1999 - 2022	-1.6374	0.1094	0.6580

Frequency of occurrence
Pinellas County Aquatic Preserve



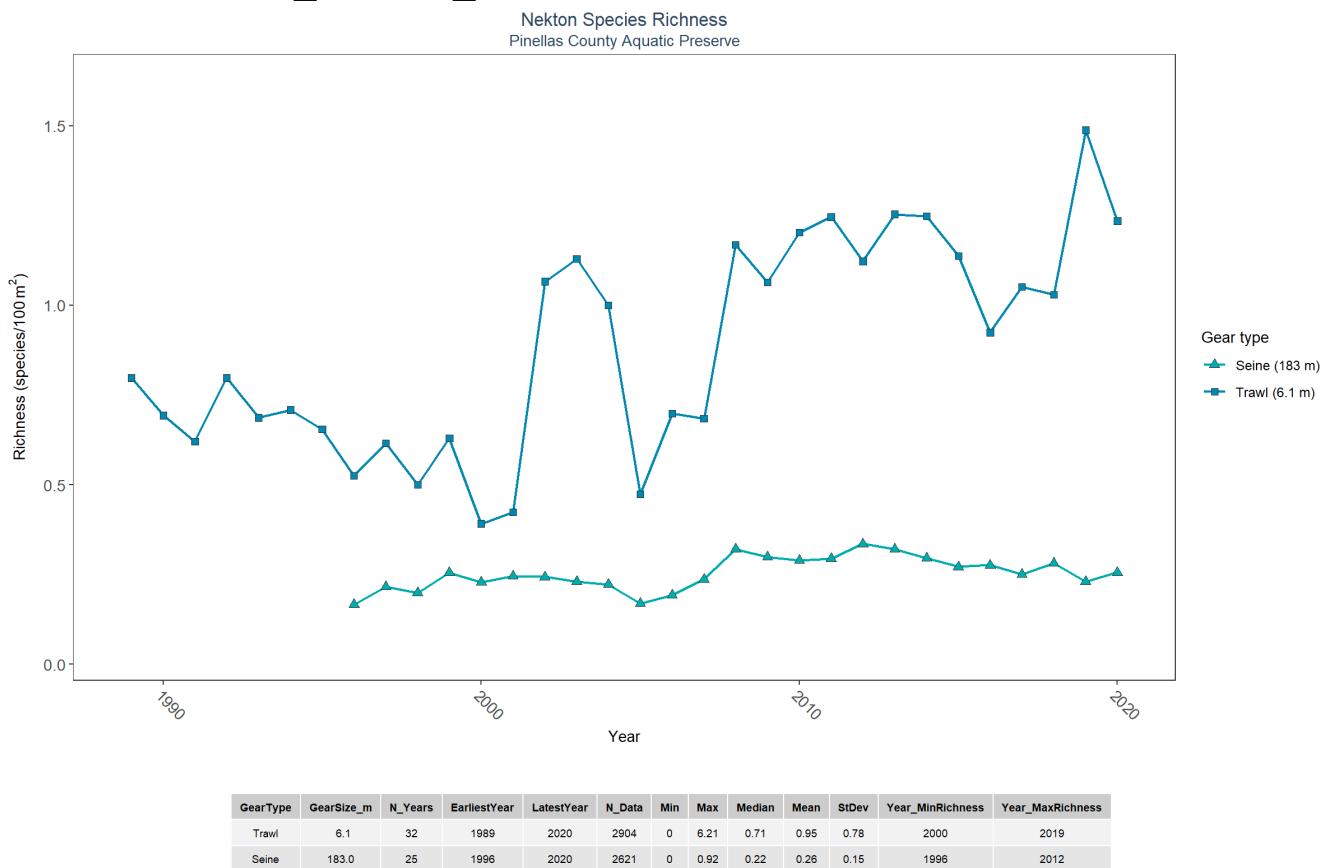


Generalized additive models for each species in Pinellas County Aquatic Preserve. Species must have at least 10 years of data to be evaluated.

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

Nekton

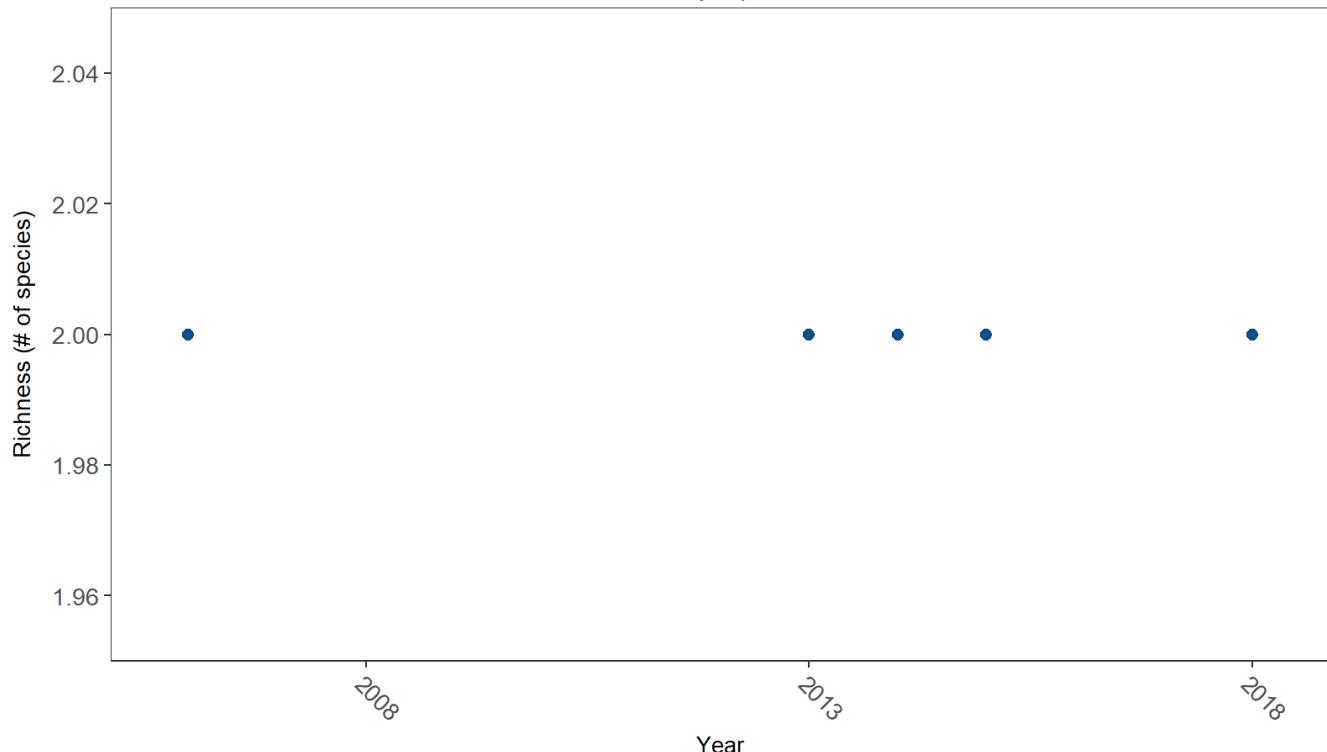
The data file used is: All_NEKTON_Parameters-2024-Mar-27.txt



Coral Reef

The data file used is: All_CORAL_Parameters-2024-Mar-28.txt

Grazers and Reef-Dependent Species Richness
Pinellas County Aquatic Preserve



N_Years	EarliestYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	Year_MinRichness	Year_MaxRichness
5	2006	2018	9	2	2	2	2	0	2006	2006