

Gasparilla Sound-Charlotte Harbor 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 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

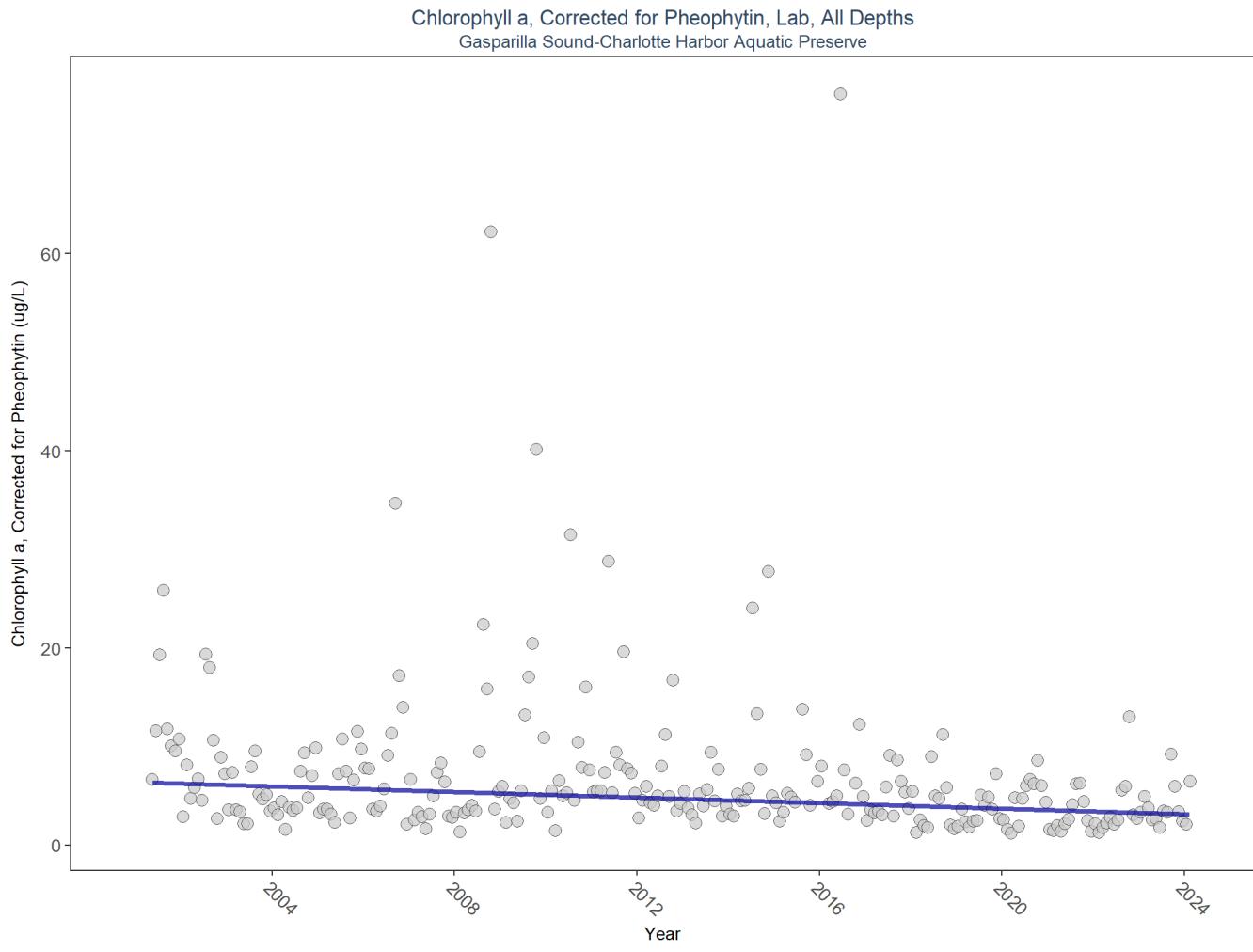
The following files were used in the discrete analysis:

- *Combined_WQ_WC_NUT_Chlorophyll_a_corrected_for_pheophytin-2024-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, 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.

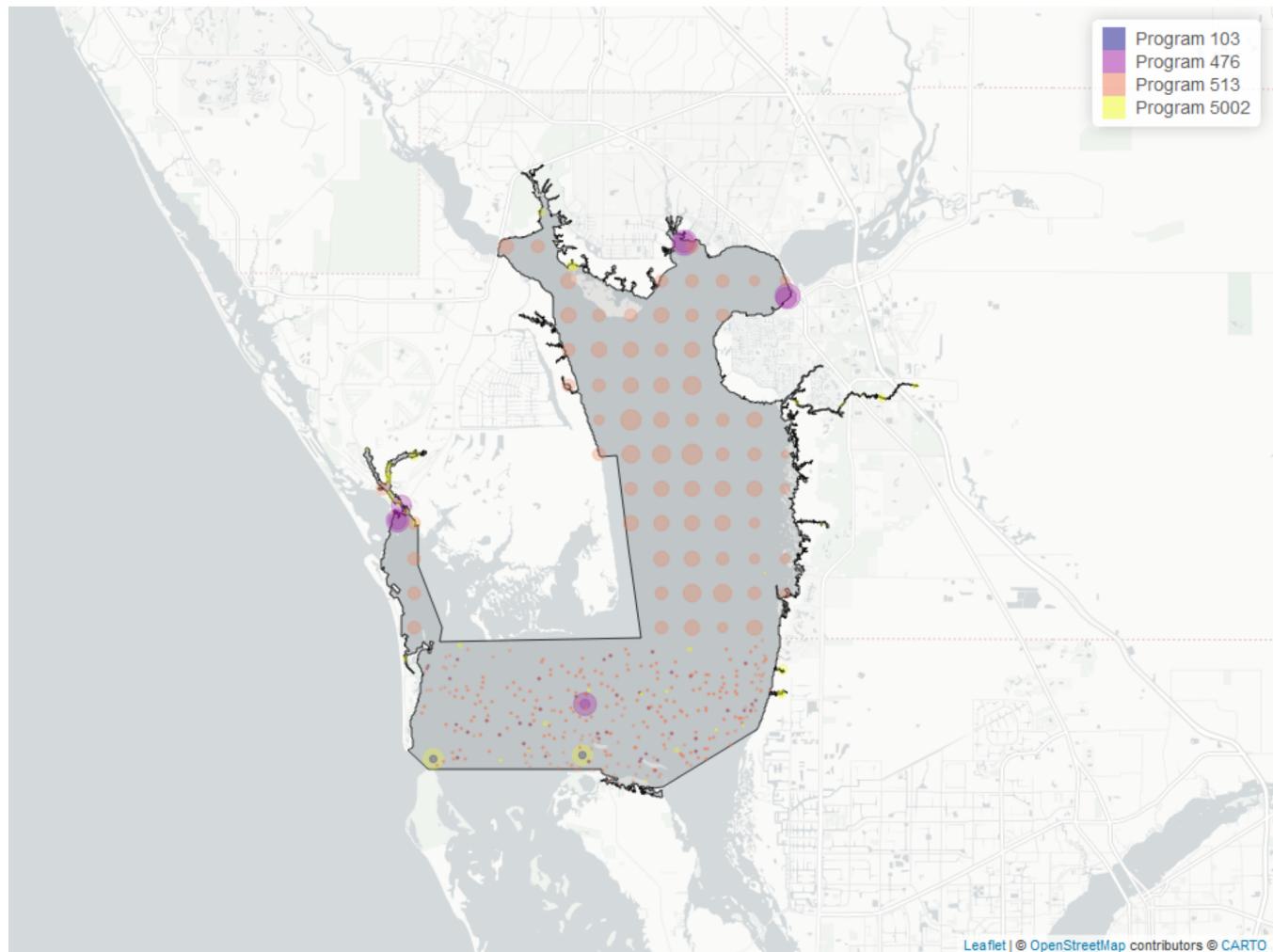
Seasonal Kendall-Tau Trend Analysis



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
513	2537	2001	2024
476	621	2008	2024
5002	341	2001	2024
103	88	2020	2021
5028	2	2024	2024

Program names:

513 - Coastal Charlotte Harbor Monitoring Network

476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)
 5028 - Charlotte Harbor Aquatic Preserves Monthly Water Quality 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 7: Value Qualifiers for Chlorophyll a, Corrected for Pheo-phytin

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
2001	143					7	4.9
2002	192					12	6.2
2003	227					25	11.0
2004	226					21	9.3
2005	246	1	0.4			34	13.8
2006	229	22	9.6			20	8.7
2007	302	44	14.6			28	9.3
2008	245	6	2.5			10	4.1
2009	262	8	3.0				
2010	130	11	8.5	2	1.5	1	0.8
2011	55	4	7.3	6	10.9		
2012	61	7	11.5				
2013	51	12	23.5				
2014	41	9	22.0	1	2.4		
2015	33	5	15.2				
2016	40	4	10.0	1	2.5		
2017	47	4	8.5				
2018	144	54	37.5			3	2.1
2019	163	55	33.7				
2020	167	57	34.1			3	1.8
2021	239	80	33.5			10	4.2
2022	174	76	43.7	6	3.5	25	14.4
2023	154	59	38.3	2	1.3	38	24.7
2024	18	6	33.3			6	33.3

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

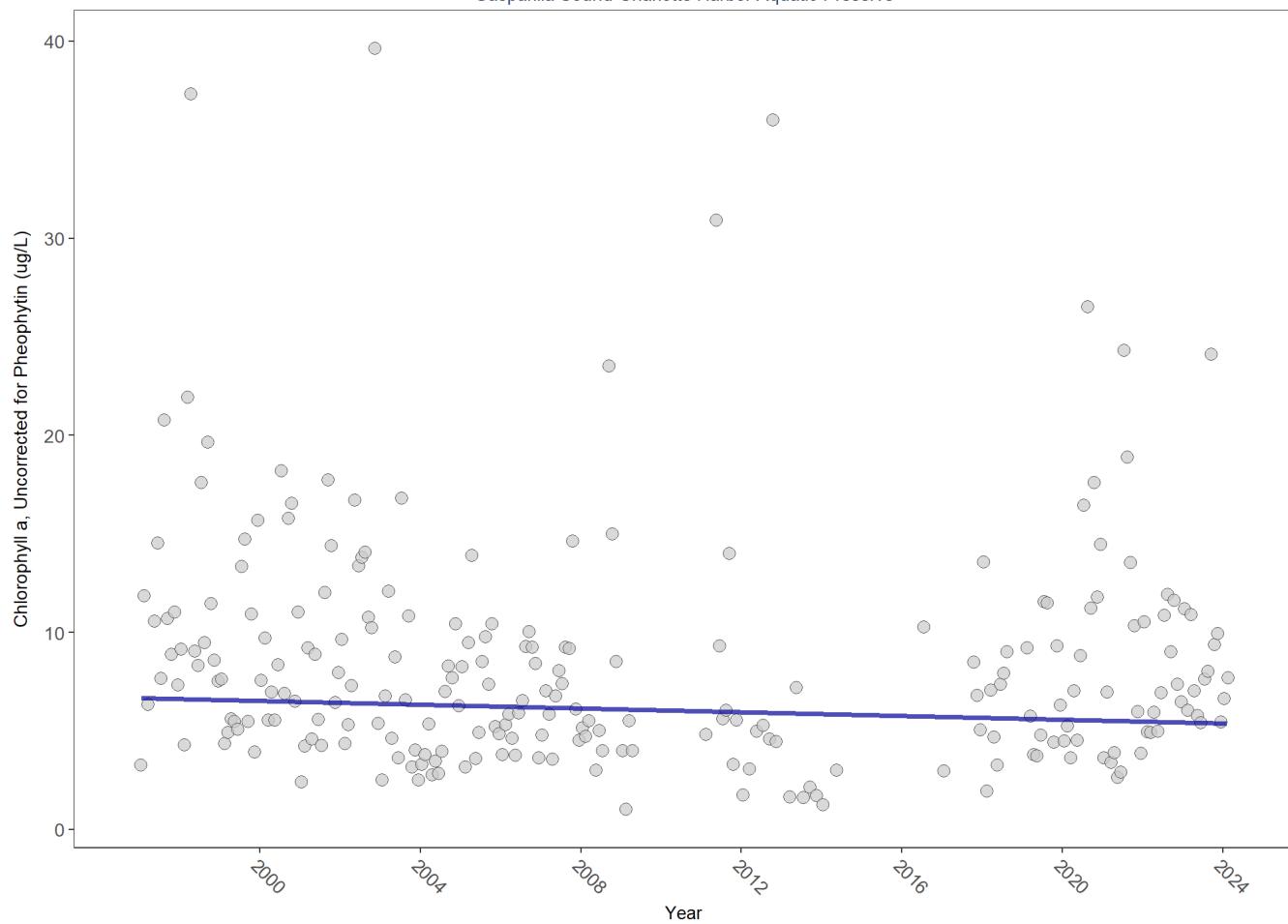
Programs containing Value Qualified data:

513 - Coastal Charlotte Harbor Monitoring Network
 476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network
 5002 - Florida STORET / WIN

Chlorophyll a, Uncorrected for Pheophytin - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

Chlorophyll a, Uncorrected for Pheophytin, Lab, All Depths
Gasparilla Sound-Charlotte Harbor Aquatic Preserve

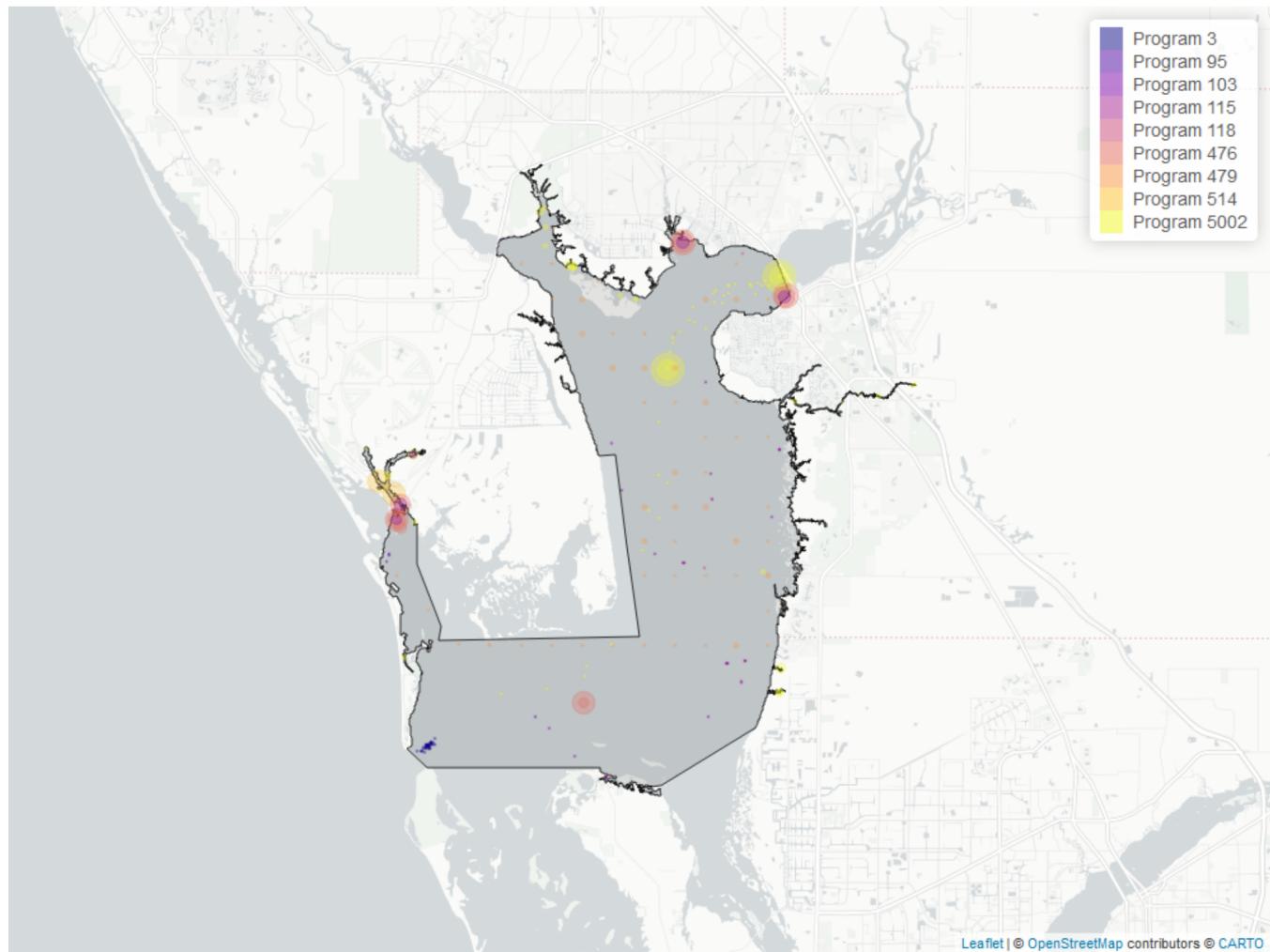


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	1718	26	5.36	TRUE	-0.0807	0.0972	-0.04774306	6.665903	7.1825	0.7841	0

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

<i>ProgramID</i>	<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>
476	668	1998	2024
5002	668	1997	2024
514	165	2000	2009
103	129	2000	2022
479	116	2002	2021
3	47	2001	2023
95	7	2003	2010
115	6	2000	2004
118	5	2000	2010
5028	3	2024	2024

Program names:

476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network
 5002 - Florida STORET / WIN
 514 - Florida LAKEWATCH Program
 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
 479 - Southwest Florida Water Management District - Water Quality Monitoring
 3 - Atlantic Oceanographic and Meteorological Laboratory (AOML) South Florida Program Synoptic Shipboard Surveys
 95 - Harmful Algal Bloom Marine Observation Network
 115 - Environmental Monitoring Assessment Program
 118 - National Aquatic Resource Surveys, National Coastal Condition Assessment
 5028 - Charlotte Harbor Aquatic Preserves Monthly Water Quality 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 9: Value Qualifiers for Chlorophyll a, Uncorrected for Pheo-phytin

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
1998	72					4	5.6
1999	106					5	4.7
2000	103					3	2.9
2001	101					2	2.0
2003	100	2	2.0			28	28.0
2004	74	1	1.4			2	2.7
2005	80					3	3.8
2006	55					4	7.3
2007	109	15	13.8			4	3.7
2008	26	4	15.4			1	3.9
2013	10	1	10.0				
2014	3	1	33.3				
2018	33	2	6.1			1	3.0
2019	43	6	13.9				
2020	117	32	27.4			14	12.0
2021	321	49	15.3			14	4.4
2022	126	37	29.4	3	2.4	16	12.7
2023	56	3	5.4	1	1.8		

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:

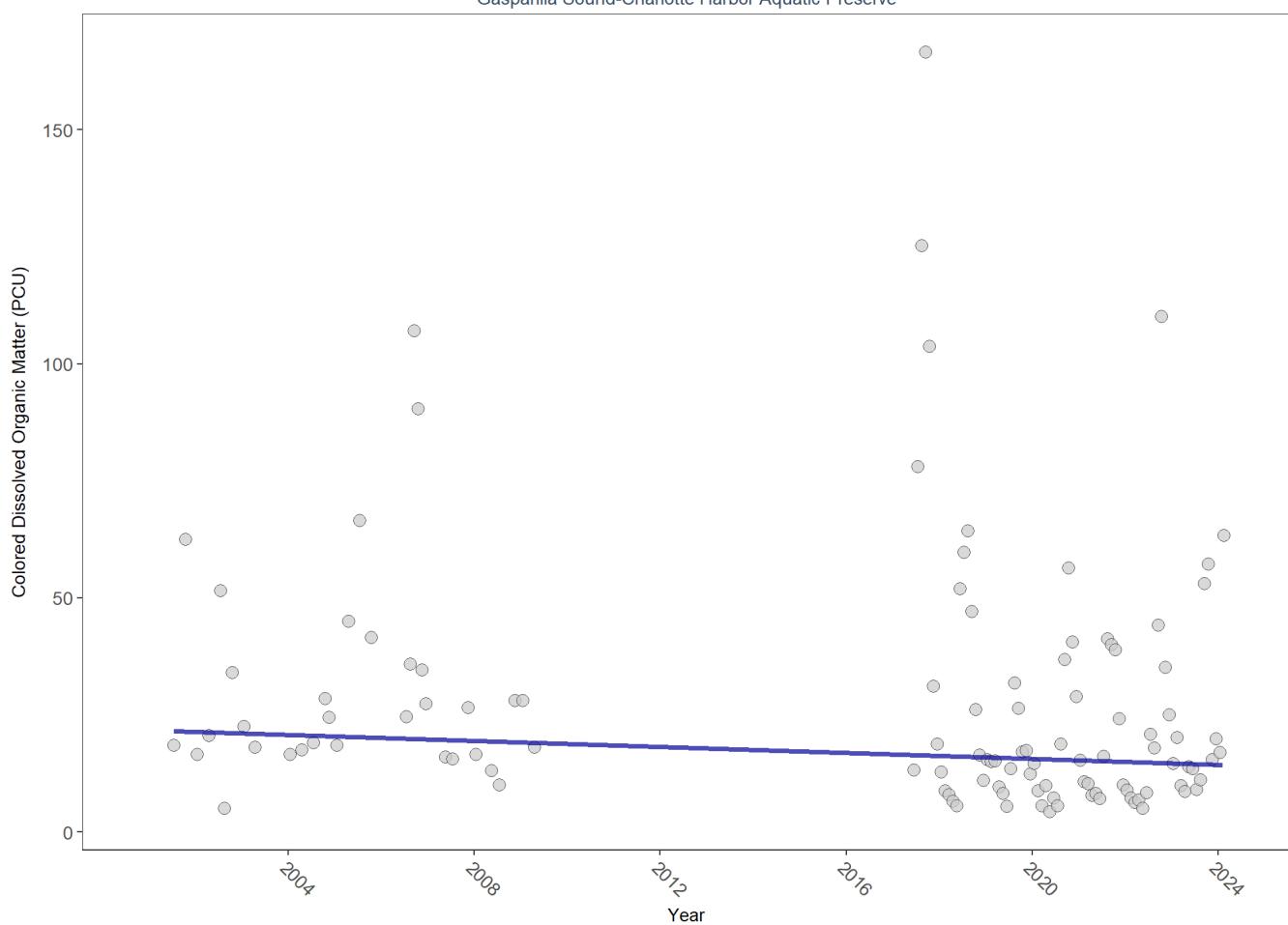
5002 - Florida STORET / WIN
 476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network
 479 - Southwest Florida Water Management District - Water Quality Monitoring

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
Gasparilla Sound-Charlotte Harbor Aquatic Preserve

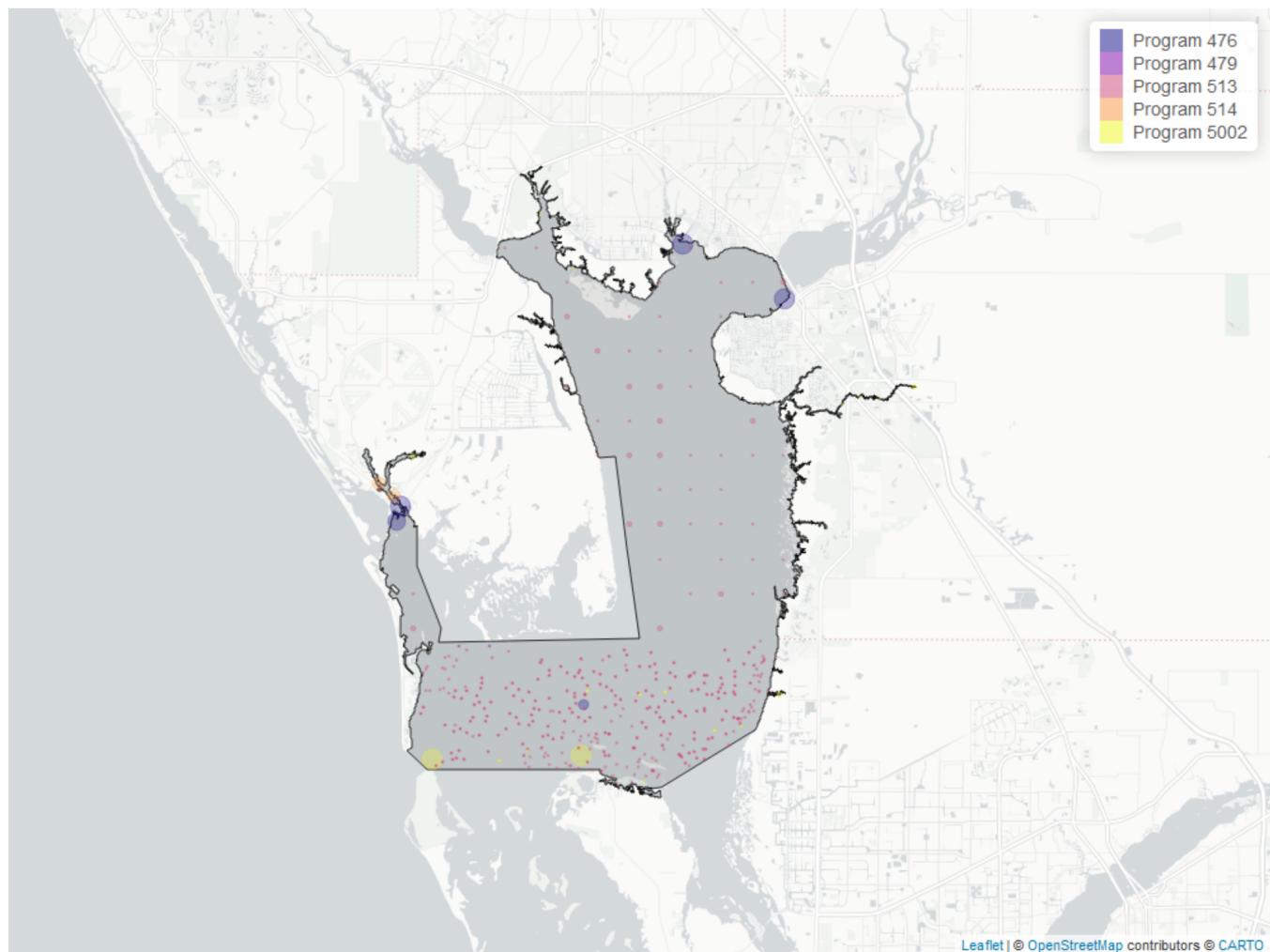


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	1093	17	13.5	TRUE	-0.1569	0.0157	-0.3188906	21.65812	10.1875	0.5136	-1

$p < 0.00005$ 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
513	630	2006	2024
476	257	2017	2024
5002	155	2018	2024
514	49	2001	2009
479	2	2002	2002

Program names:

513 - Coastal Charlotte Harbor Monitoring Network

476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network

5002 - Florida STORET / WIN

514 - Florida LAKEWATCH Program

479 - Southwest Florida Water Management District - Water Quality Monitoring

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	$perc_Q$	N_U	$perc_U$
2017	29	1	3.5			2	6.9
2018	144	32	22.2			8	5.6
2019	161	28	17.4			12	7.4
2020	133	42	31.6			7	5.3
2021	155	27	17.4			9	5.8
2022	145	33	22.8	3	2.1	9	6.2
2023	144	29	20.1			11	7.6
2024	16			2	12.5		

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:

513 - Coastal Charlotte Harbor Monitoring Network

476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network

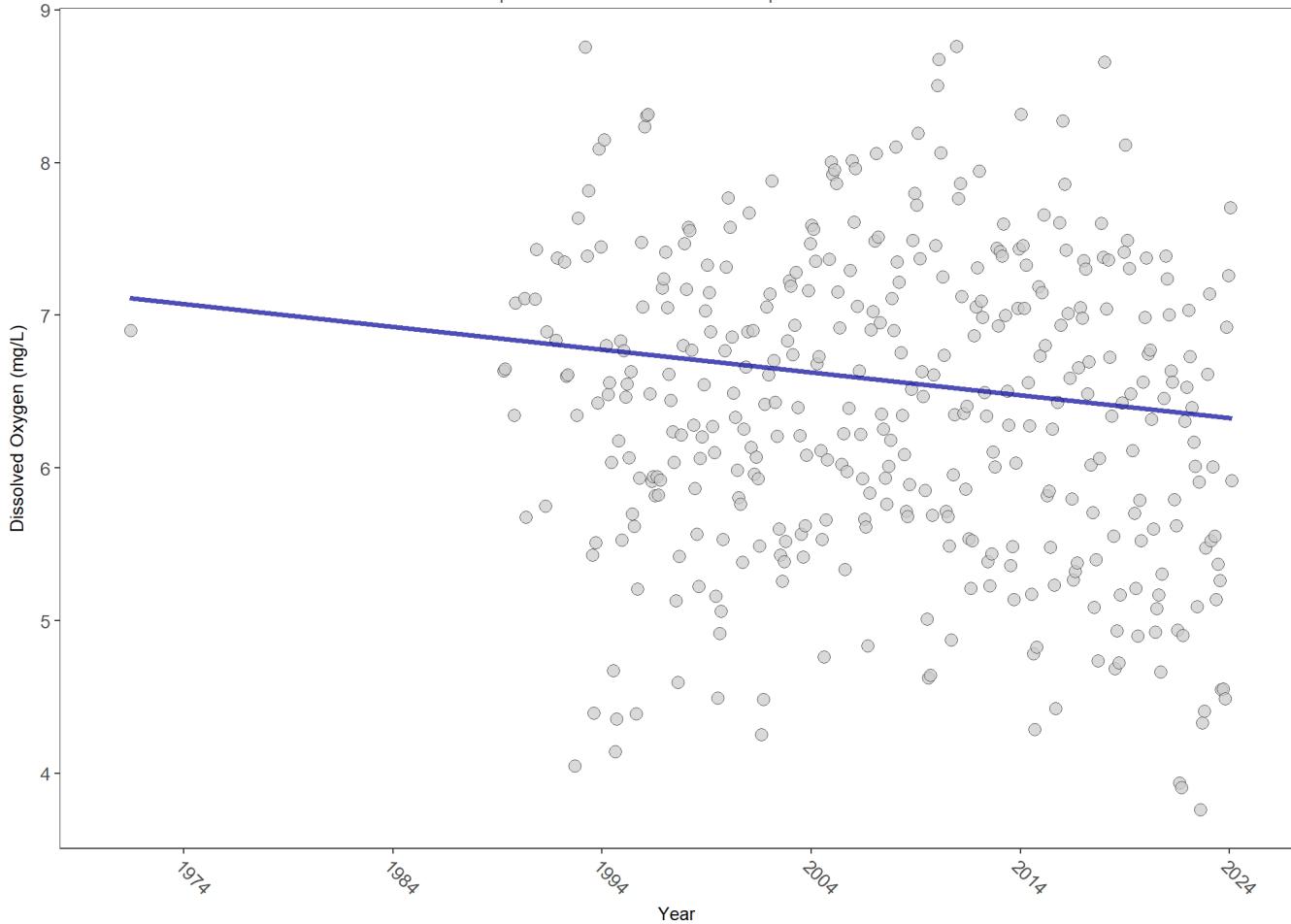
5002 - Florida STORET / WIN

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
Gasparilla Sound-Charlotte Harbor Aquatic Preserve



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	68897	37	6.56	TRUE	-0.18	0.0000	-0.01500986	7.12129	13.2282	0.2787	-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

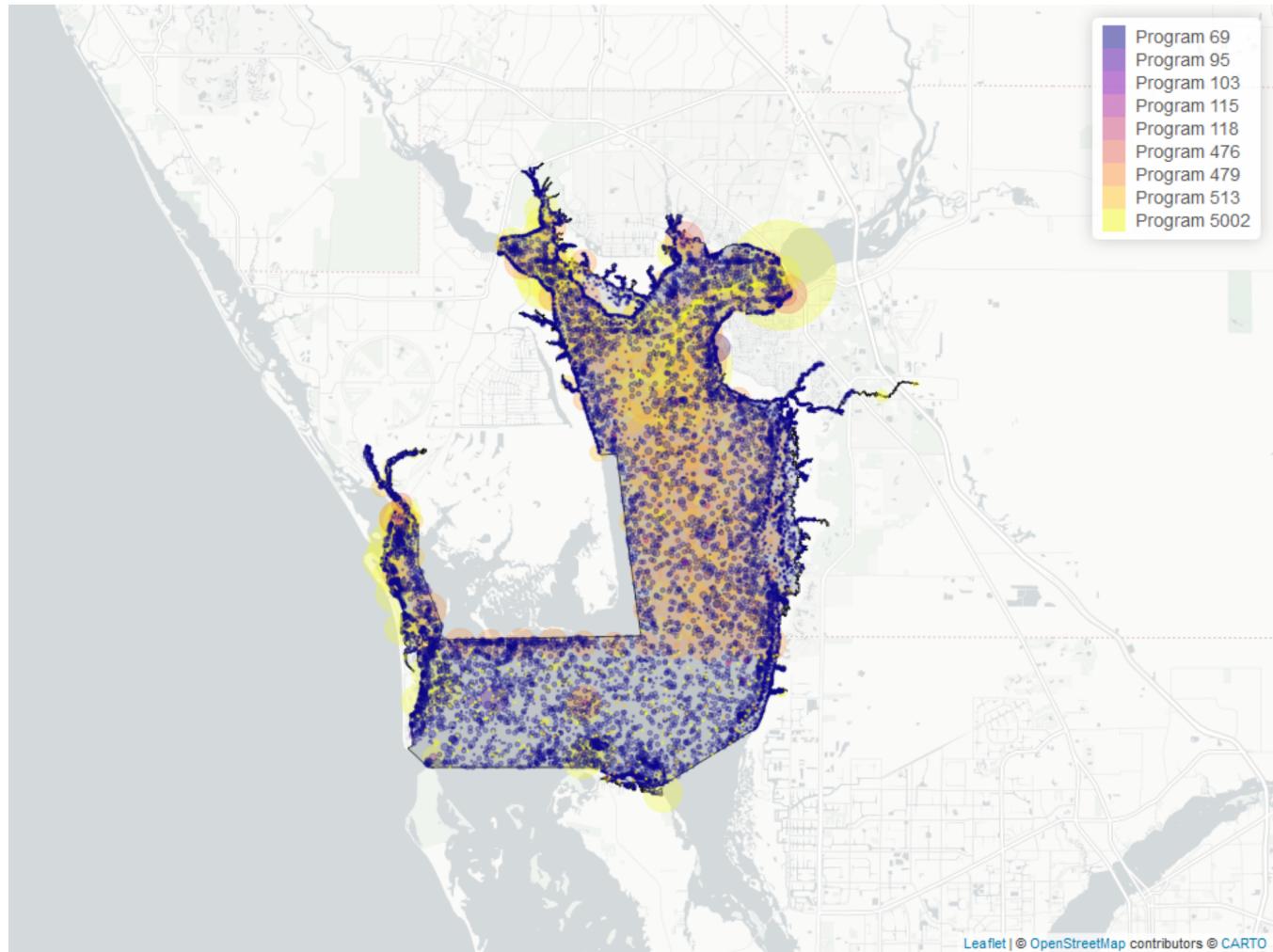


Table 12: Programs contributing data for Dissolved Oxygen

ProgramID	N_Data	YearMin	YearMax
69	35920	1989	2022
5002	13652	1993	2024
479	12593	2001	2021
513	5190	2001	2024
476	1082	1996	2024
95	397	1971	2018
103	151	2003	2022
115	27	2000	2004
118	3	2000	2006
5028	2	2024	2024

Program names:

69 - Fisheries-Independent Monitoring (FIM) Program
5002 - Florida STORET / WIN
479 - Southwest Florida Water Management District - Water Quality Monitoring
513 - Coastal Charlotte Harbor Monitoring Network
476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network
95 - Harmful Algal Bloom Marine Observation Network
103 - EPA STOrage and RETrieval Data Warehouse (STORET)
115 - Environmental Monitoring Assessment Program
118 - National Aquatic Resource Surveys, National Coastal Condition Assessment
5028 - Charlotte Harbor Aquatic Preserves Monthly Water Quality Program

Value Qualifiers

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

Table 13: Value Qualifiers for Dissolved Oxygen

Year	N_{Total}	N_H	$perc_H$
2008	2852	8	0.3

Note: 1H - Value based on field kit determination

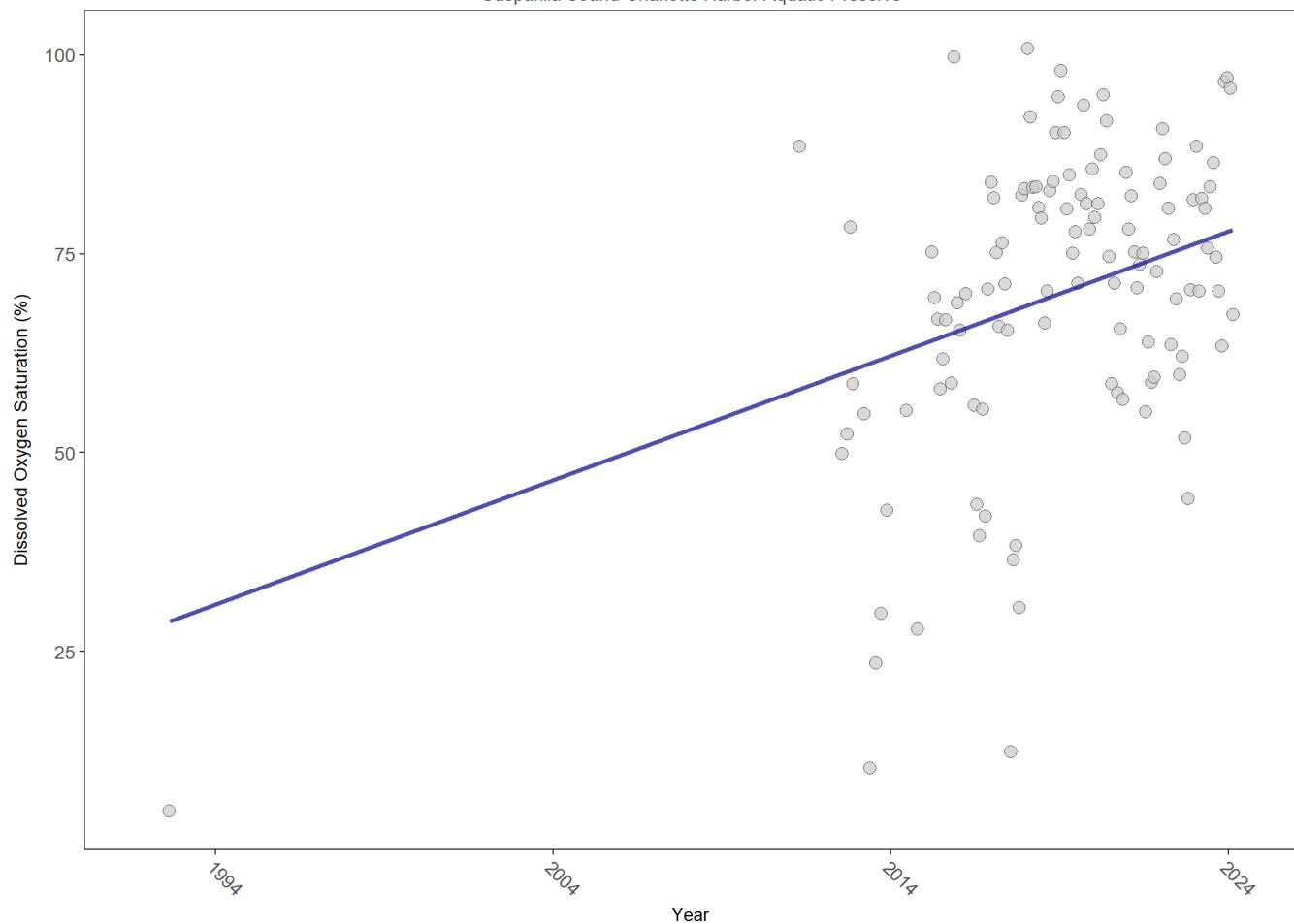
Programs containing Value Qualified data:

513 - Coastal Charlotte Harbor Monitoring Network
476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network

Dissolved Oxygen Saturation - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

Dissolved Oxygen Saturation, Field, All Depths
Gasparilla Sound-Charlotte Harbor Aquatic Preserve

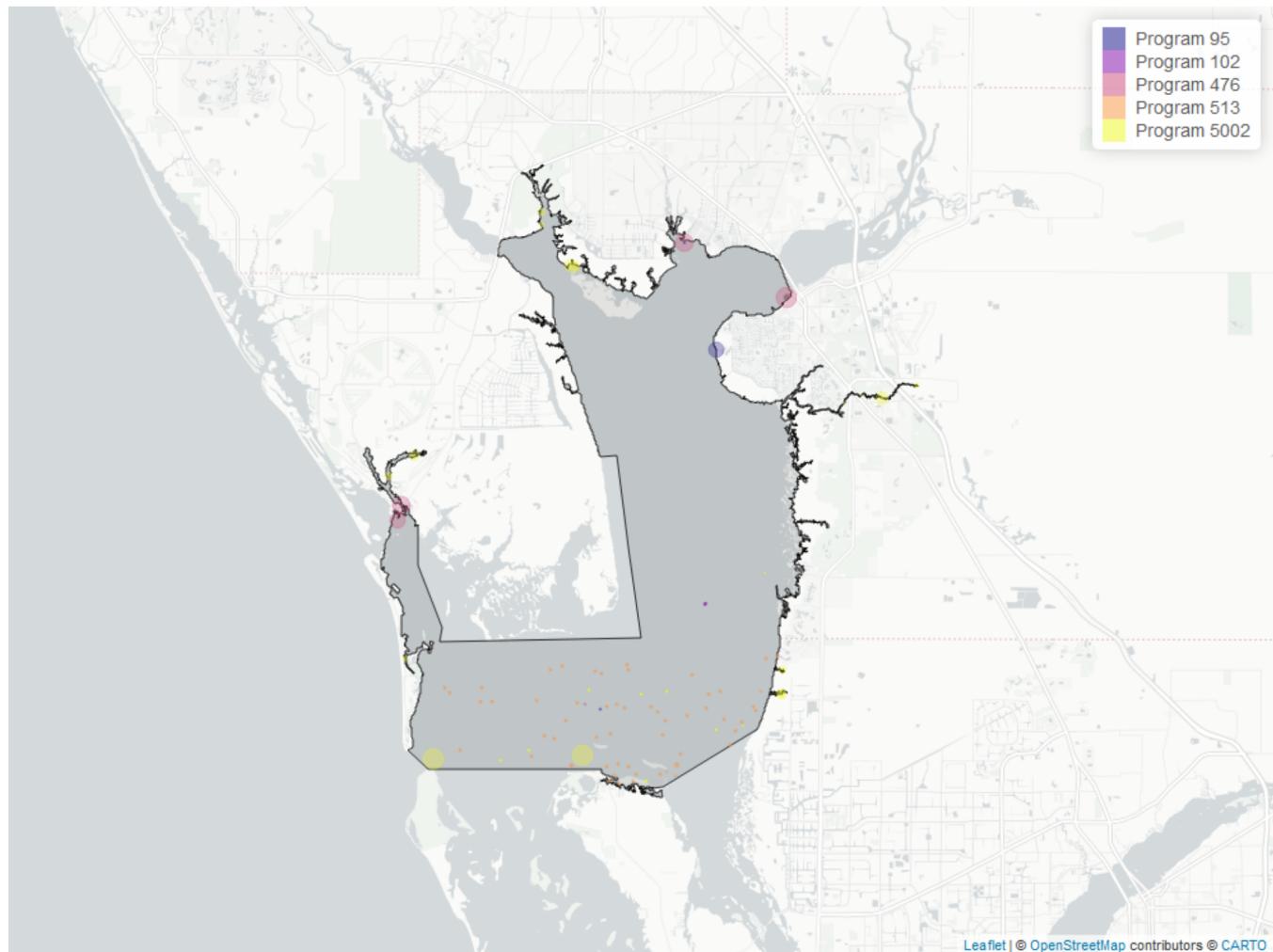


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	649	15	80.4	TRUE	0.2389	0.0007	1.563704	27.78969	13.0749	0.2885	1

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

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Dissolved Oxygen Saturation



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

Table 14: Programs contributing data for Dissolved Oxygen Saturation

ProgramID	N_Data	YearMin	YearMax
5002	290	2012	2024
476	211	2016	2024
513	130	2022	2024
95	43	2011	2018
102	6	1992	1992
5028	2	2024	2024

Program names:

5002 - Florida STORET / WIN

476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network

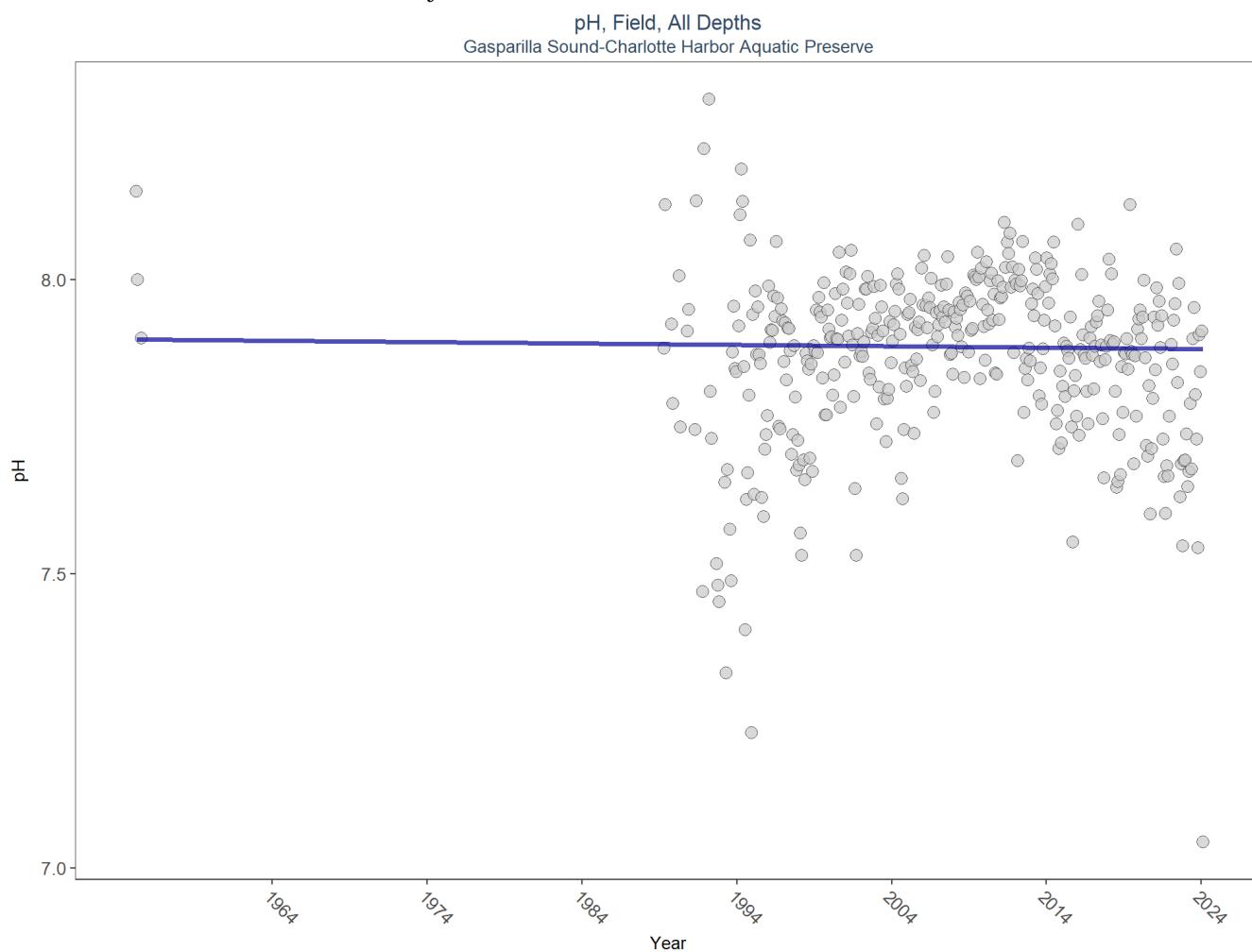
- 513 - Coastal Charlotte Harbor Monitoring Network
 95 - Harmful Algal Bloom Marine Observation Network
 102 - National Status and Trends Mussel Watch
 5028 - Charlotte Harbor Aquatic Preserves Monthly Water Quality Program

There are no qualifying Value Qualifiers for Dissolved Oxygen Saturation in Gasparilla Sound-Charlotte Harbor Aquatic Preserve

pH - Discrete Water Quality

The **pH** of water is the measure of how acidic or basic the water body is on a scale of 0-14, with lower readings indicating acidic and higher readings indicating basic, and a pH of 7 being neutral. Florida's natural waters fall between 6.5 and 8.5 on this scale. A water body's pH can change due to precipitation, geology, vegetation, water pollution and air pollution.

Seasonal Kendall-Tau Trend Analysis

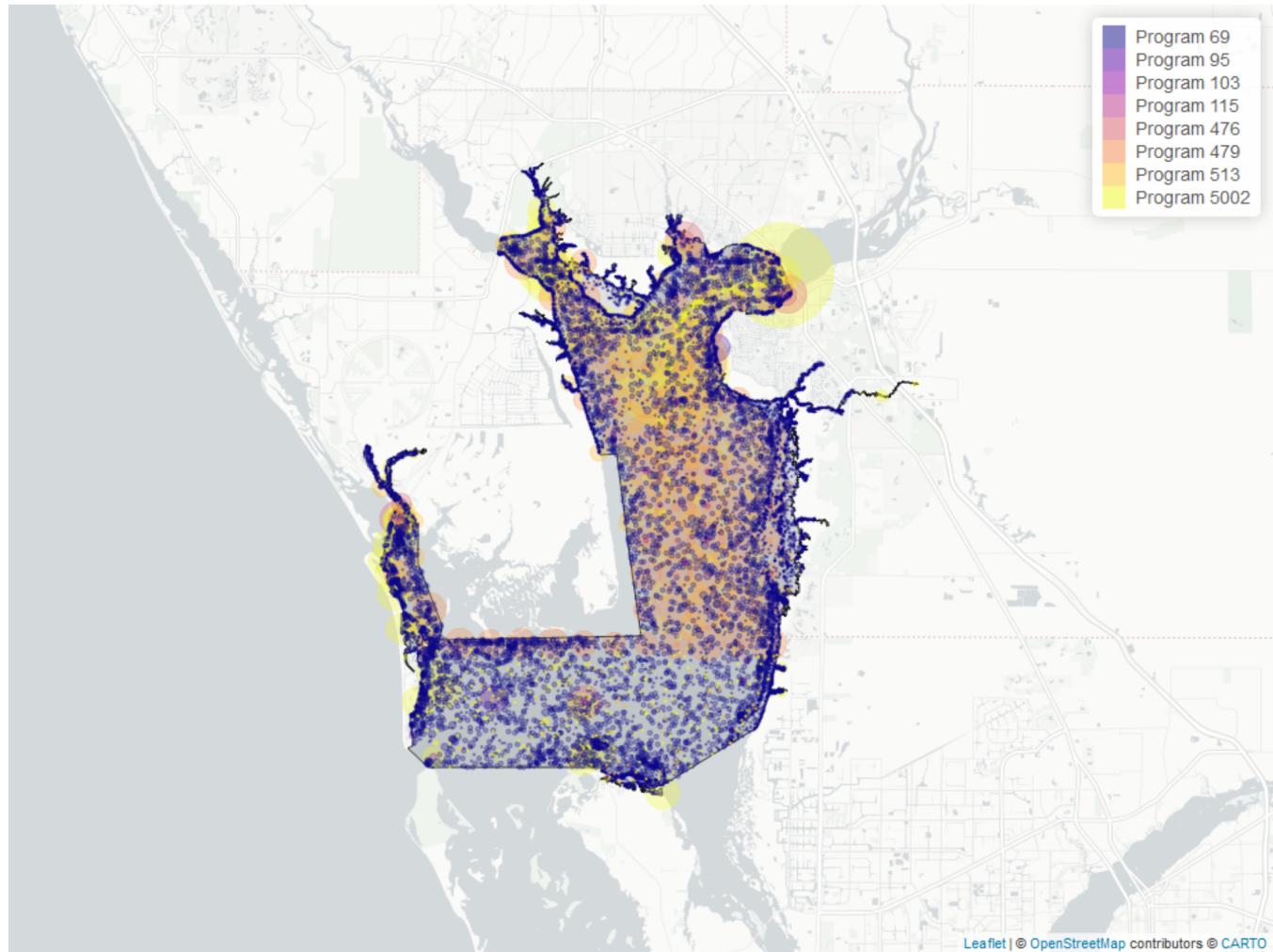


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	65564	37	7.91	TRUE	-0.0116	0.7272	-0.0002380611	7.898167	5.7426	0.89	0

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 pH



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

Table 15: Programs contributing data for pH

ProgramID	N_Data	YearMin	YearMax
69	35469	1989	2022
479	12380	2001	2021
5002	10947	1993	2024
513	5140	2001	2024
476	1117	1996	2024
95	365	1955	2018
103	151	2003	2022
115	27	2000	2004
5028	2	2024	2024

Program names:

69 - Fisheries-Independent Monitoring (FIM) Program
479 - Southwest Florida Water Management District - Water Quality Monitoring
5002 - Florida STORET / WIN
513 - Coastal Charlotte Harbor Monitoring Network
476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network
95 - Harmful Algal Bloom Marine Observation Network
103 - EPA STOrage and RETrieval Data Warehouse (STORET)
115 - Environmental Monitoring Assessment Program
5028 - Charlotte Harbor Aquatic Preserves Monthly Water Quality Program

Value Qualifiers

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

Table 16: Value Qualifiers for pH

Year	N_{Total}	N_Q	$perc_Q$
2014	3077	1	0

Note: ¹**Q** - Sample held beyond the accepted holding time

Programs containing Value Qualified data:

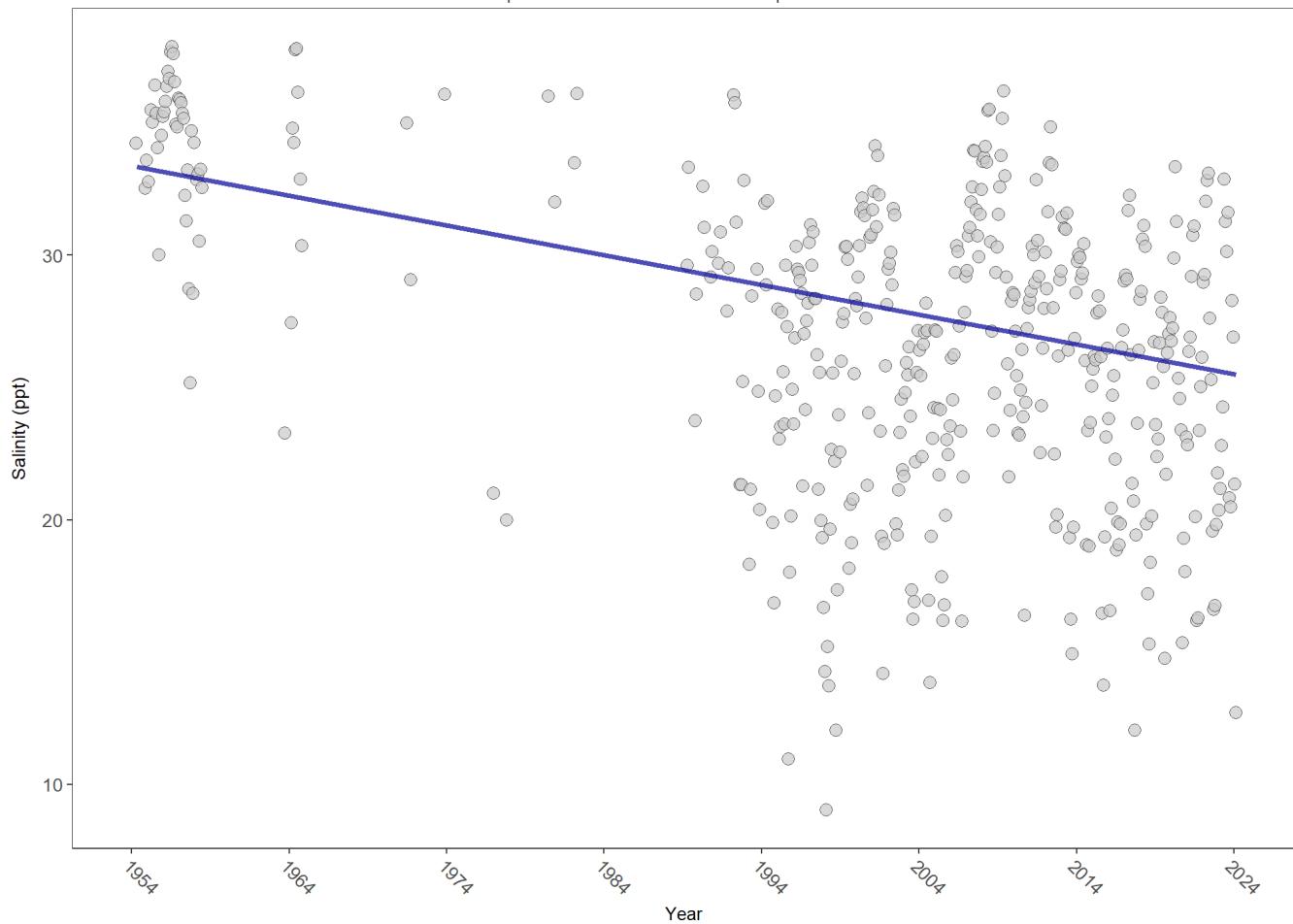
513 - Coastal Charlotte Harbor Monitoring Network
5002 - Florida STORET / WIN

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
Gasparilla Sound-Charlotte Harbor Aquatic Preserve

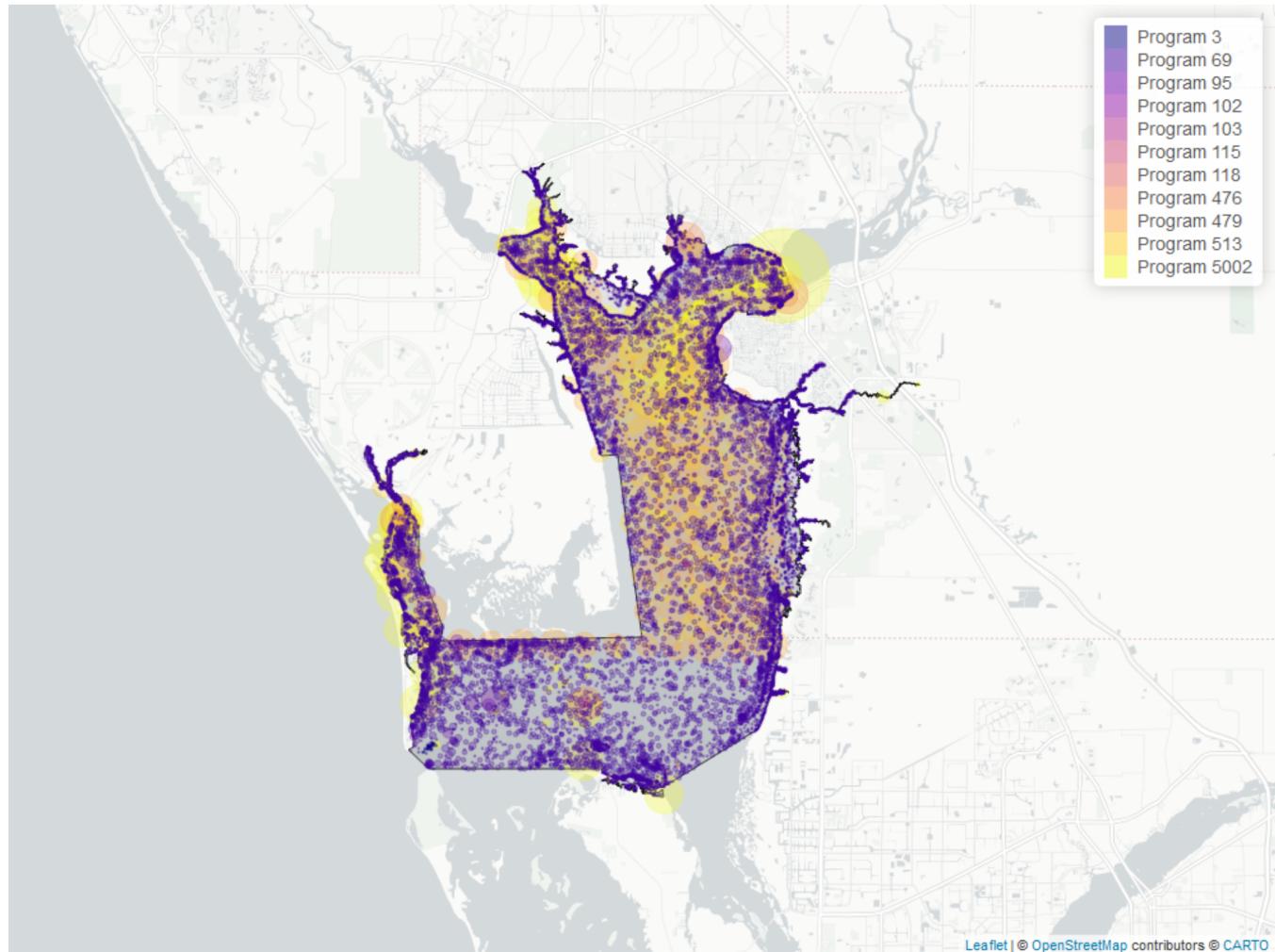


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	67518	49	26.9	TRUE	-0.27	0.0000	-0.1126872	33.38269	3.6569	0.9789	-1

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 17: Programs contributing data for Salinity

ProgramID	N_Data	YearMin	YearMax
69	36265	1989	2022
479	12603	2001	2021
5002	11565	1995	2024
513	5070	2001	2023
476	1111	1996	2024
95	802	1954	2018
3	50	2001	2023
115	27	2000	2004
118	26	2015	2020
102	6	1992	1992
103	5	2003	2004
5028	2	2024	2024

Program names:

69 - Fisheries-Independent Monitoring (FIM) Program
479 - Southwest Florida Water Management District - Water Quality Monitoring
5002 - Florida STORET / WIN
513 - Coastal Charlotte Harbor Monitoring Network
476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network
95 - Harmful Algal Bloom Marine Observation Network
3 - Atlantic Oceanographic and Meteorological Laboratory (AOML) South Florida Program Synoptic Shipboard Surveys
115 - Environmental Monitoring Assessment Program
118 - National Aquatic Resource Surveys, National Coastal Condition Assessment
102 - National Status and Trends Mussel Watch
103 - EPA STOrage and RETrieval Data Warehouse (STORET)
5028 - Charlotte Harbor Aquatic Preserves Monthly Water Quality Program

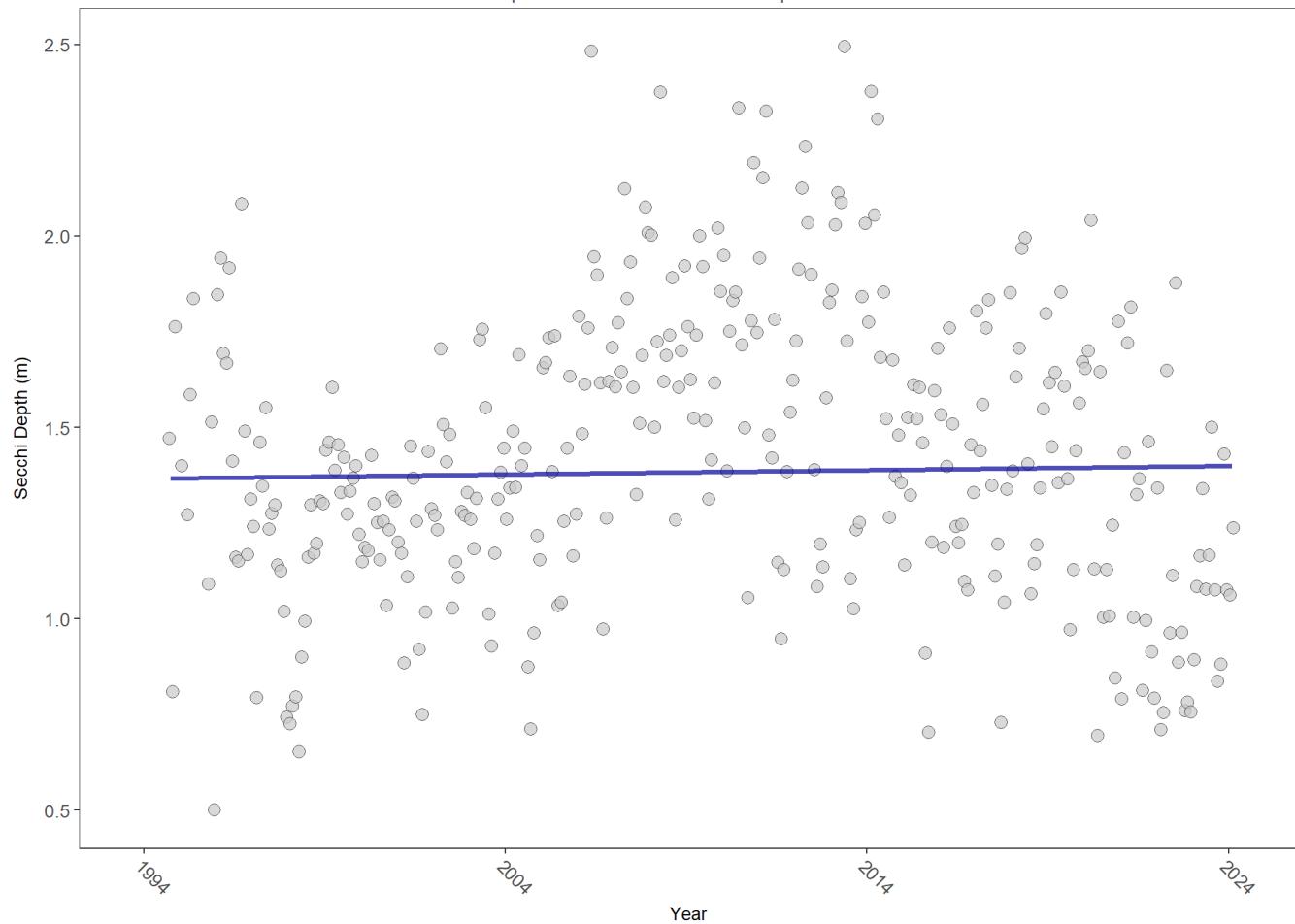
There are no qualifying Value Qualifiers for Salinity in Gasparilla Sound-Charlotte Harbor Aquatic Preserve

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
Gasparilla Sound-Charlotte Harbor Aquatic Preserve

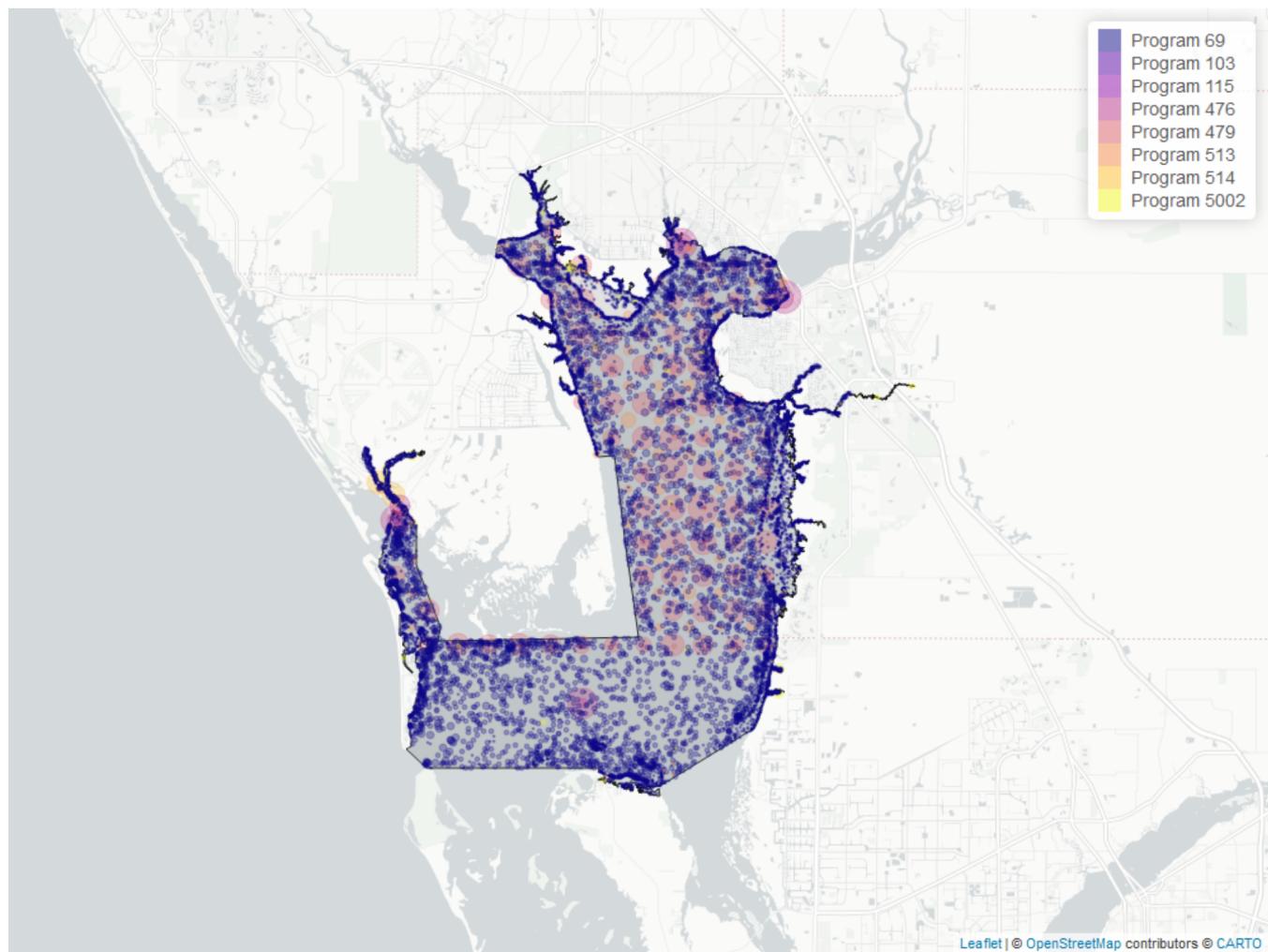


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	41406	31	1.2	TRUE	0.0141	0.7049	0.00108369	1.367133	15.3754	0.1659	0

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 Secchi Depth



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

Table 18: Programs contributing data for Secchi Depth

ProgramID	N_Data	YearMin	YearMax
69	33261	1994	2022
479	5682	2001	2021
513	1071	2001	2023
476	895	1996	2024
5002	277	2003	2024
514	159	2000	2009
103	65	2020	2022
115	5	2000	2004
5028	2	2024	2024

Program names:

69 - Fisheries-Independent Monitoring (FIM) Program
 479 - Southwest Florida Water Management District - Water Quality Monitoring
 513 - Coastal Charlotte Harbor Monitoring Network
 476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network
 5002 - Florida STORET / WIN
 514 - Florida LAKEWATCH Program
 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
 115 - Environmental Monitoring Assessment Program
 5028 - Charlotte Harbor Aquatic Preserves Monthly Water Quality Program

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 19: Value Qualifiers for Secchi Depth

Year	N_{Total}	N_S	$perc_S$
2016	2069	4	0.2
2017	1828	7	0.4
2018	1752	13	0.7
2019	1938	22	1.1
2020	1660	25	1.5
2021	1630	82	5.0
2022	1256	47	3.7
2023	67	35	52.2
2024	9	6	66.7

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

Programs containing Value Qualified data:

5002 - Florida STORET / WIN
 479 - Southwest Florida Water Management District - Water Quality Monitoring
 476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network
 513 - Coastal Charlotte Harbor Monitoring Network
 5028 - Charlotte Harbor Aquatic Preserves Monthly Water Quality Program

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.

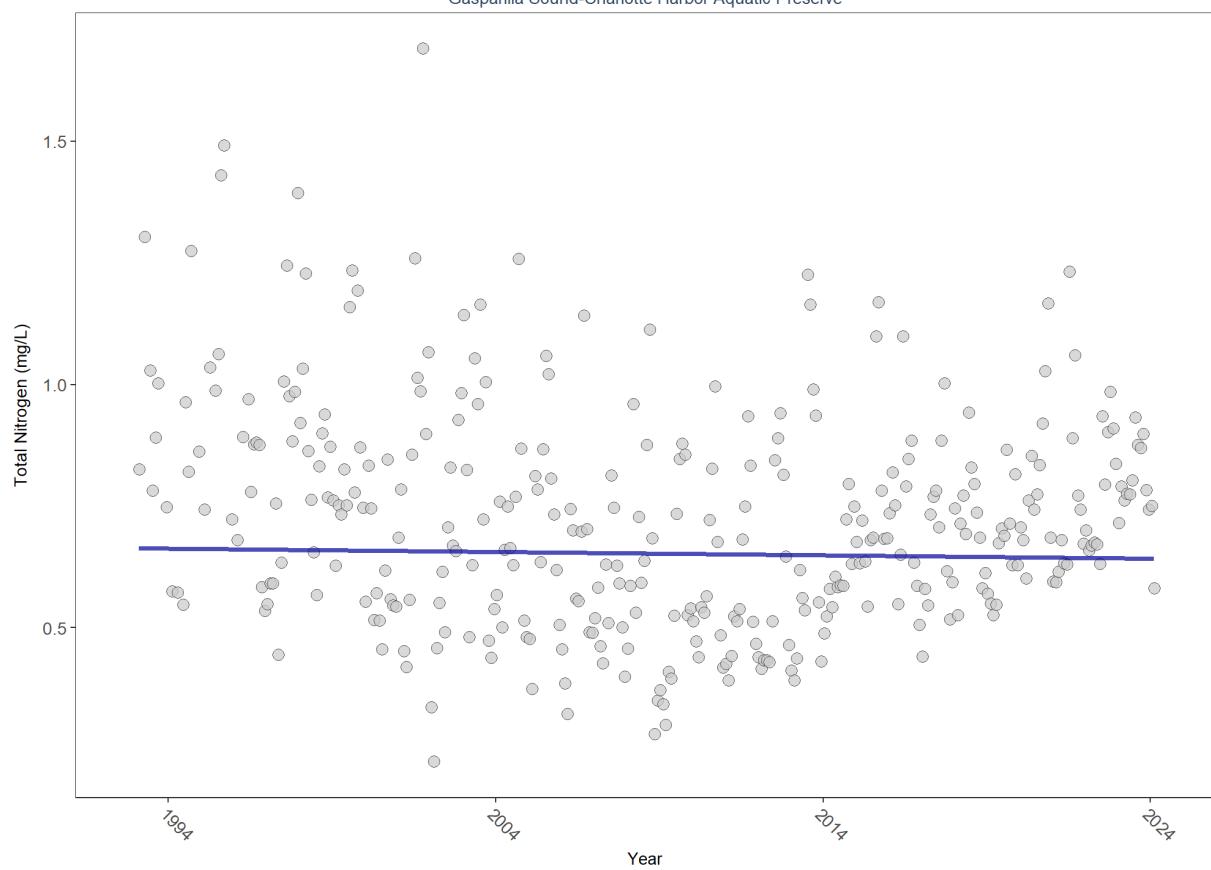
- 1) $TN = TKN + NO_3O_2;$
- 2) $TN = TKN + NO_3 + NO_2;$
- 3) $TN = ORGN + NH_4 + NO_3O_2;$
- 4) $TN = ORGN + NH_4 + NO_2 + NO_3;$
- 5) $TN = TKN + NO_3;$
- 6) $TN = ORGN + NH_4 + NO_3;$

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 NO₃O₂ 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
Gasparilla Sound-Charlotte Harbor Aquatic Preserve

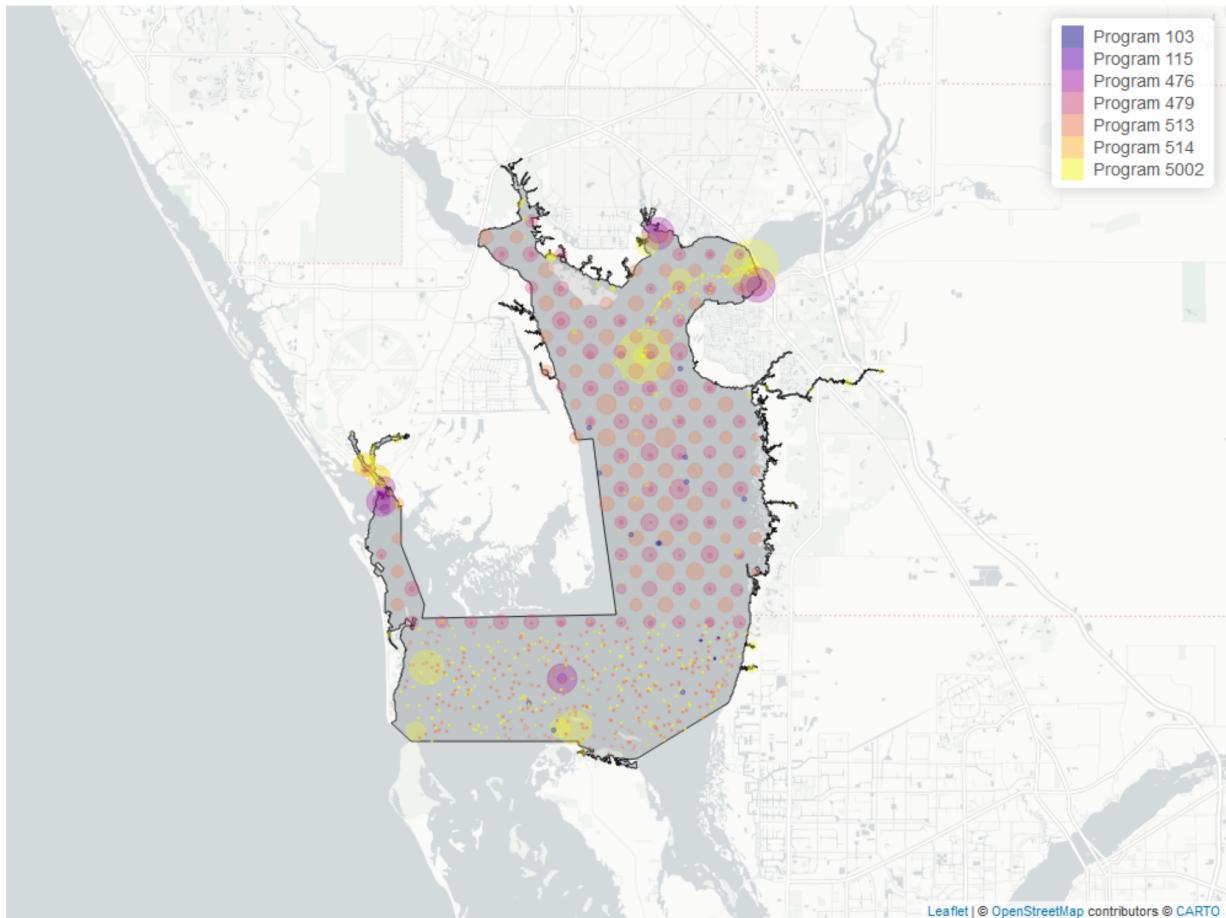


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	8637	32	0.624	TRUE	-0.0196	0.5285	-0.0006717682	0.6627927	5.5428	0.9021	0

$p < 0.00005$ 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 Nitrogen



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

Table 20: Programs contributing data for Total Nitrogen

ProgramID	N_Data	YearMin	YearMax
5002	2606	1993	2024
513	2526	2001	2024
479	2376	2002	2021
476	955	1998	2024
514	169	2000	2009
103	43	2000	2006
115	4	2000	2003
5028	2	2024	2024

Program names:

5002 - Florida STORET / WIN

513 - Coastal Charlotte Harbor Monitoring Network

479 - Southwest Florida Water Management District - Water Quality Monitoring

476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network

514 - Florida LAKEWATCH Program

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

115 - Environmental Monitoring Assessment Program

5028 - Charlotte Harbor Aquatic Preserves Monthly Water Quality 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 Nitrogen

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
1996	52					1	1.9
1997	81					2	2.5
1998	105					4	3.8
1999	107	2	1.9			2	1.9
2001	273					7	2.6
2002	398					16	4.0
2003	391					4	1.0
2004	420	1	0.2				
2005	435	6	1.4			8	1.8
2006	356	40	11.2			19	5.3
2007	531	27	5.1			4	0.8
2008	609	16	2.6				
2009	610	20	3.3			4	0.7
2011	387	3	0.8			5	1.3
2012	380	2	0.5			3	0.8
2013	379	5	1.3			3	0.8
2014	430	17	4.0			2	0.5
2020	343					2	0.6
2021	337			1	0.3		

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:

513 - Coastal Charlotte Harbor Monitoring Network

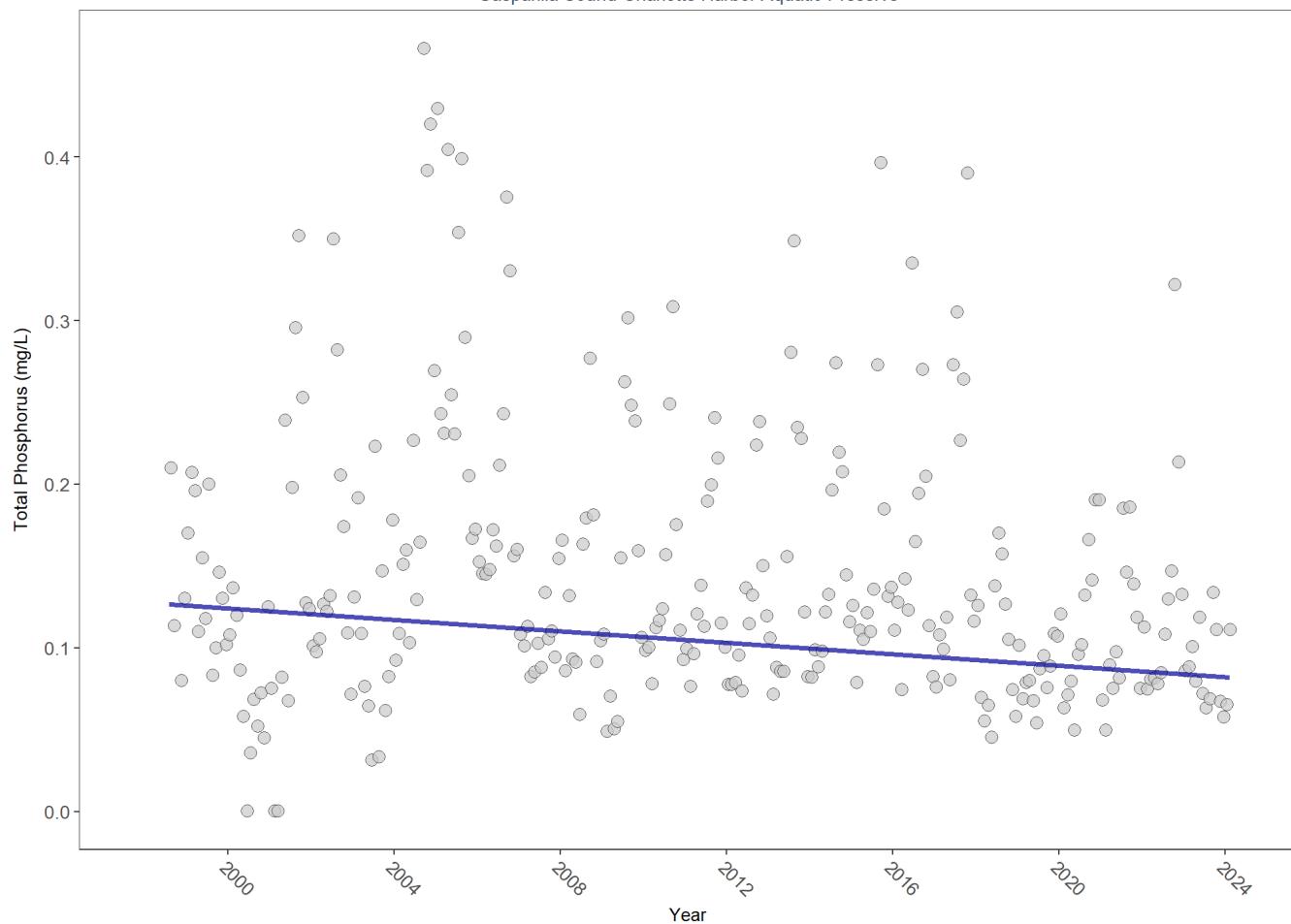
5002 - Florida STORET / WIN

479 - Southwest Florida Water Management District - Water Quality Monitoring

Total Phosphorus - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

Total Phosphorus, Lab, All Depths
Gasparilla Sound-Charlotte Harbor Aquatic Preserve

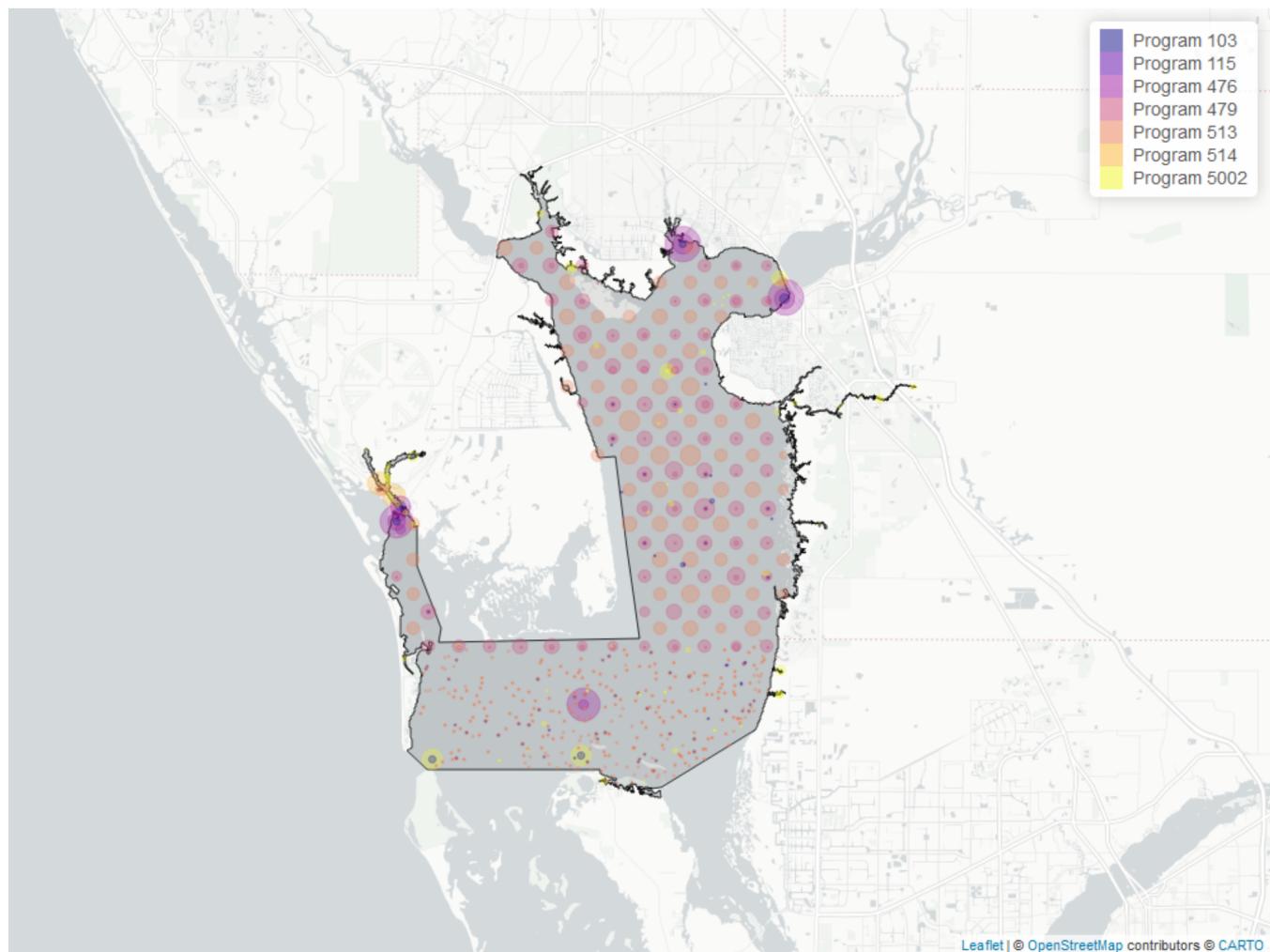


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	6713	27	0.11	TRUE	-0.173	0.0000	-0.0001749969	0.127604	8.6281	0.6562	-1

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 22: Programs contributing data for Total Phosphorus

ProgramID	N_Data	YearMin	YearMax
513	2548	2001	2024
479	2363	2002	2021
476	1042	1998	2024
5002	461	2001	2024
103	185	2000	2022
514	169	2000	2009
115	4	2000	2003
5028	2	2024	2024

Program names:

513 - Coastal Charlotte Harbor Monitoring Network

479 - Southwest Florida Water Management District - Water Quality Monitoring
 476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network
 5002 - Florida STORET / WIN
 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
 514 - Florida LAKEWATCH Program
 115 - Environmental Monitoring Assessment Program
 5028 - Charlotte Harbor Aquatic Preserves Monthly Water Quality Program

Value Qualifiers

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

Table 23: Value Qualifiers for Total Phosphorus

Year	N_{Total}	N_I	perc_I	N_Q	perc_Q	N_U	perc_U
1999	53			5	9.4		
2000	53			2	3.8		
2001	183			3	1.6	4	2.2
2002	288					6	2.1
2003	291					53	18.2
2004	300	7	2.3	4	1.3	1	0.3
2005	328	6	1.8			3	0.9
2006	285	16	5.6				
2007	454	172	37.9			2	0.4
2008	525	57	10.9			6	1.1
2009	532	1	0.2			1	0.2
2010	383	3	0.8			2	0.5
2018	144	9	6.2			11	7.6
2019	163	7	4.3				
2020	317	18	5.7				
2021	431	6	1.4				
2022	239	7	2.9	6	2.5	5	2.1
2023	155	4	2.6				
2024	18	1	5.6				

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:

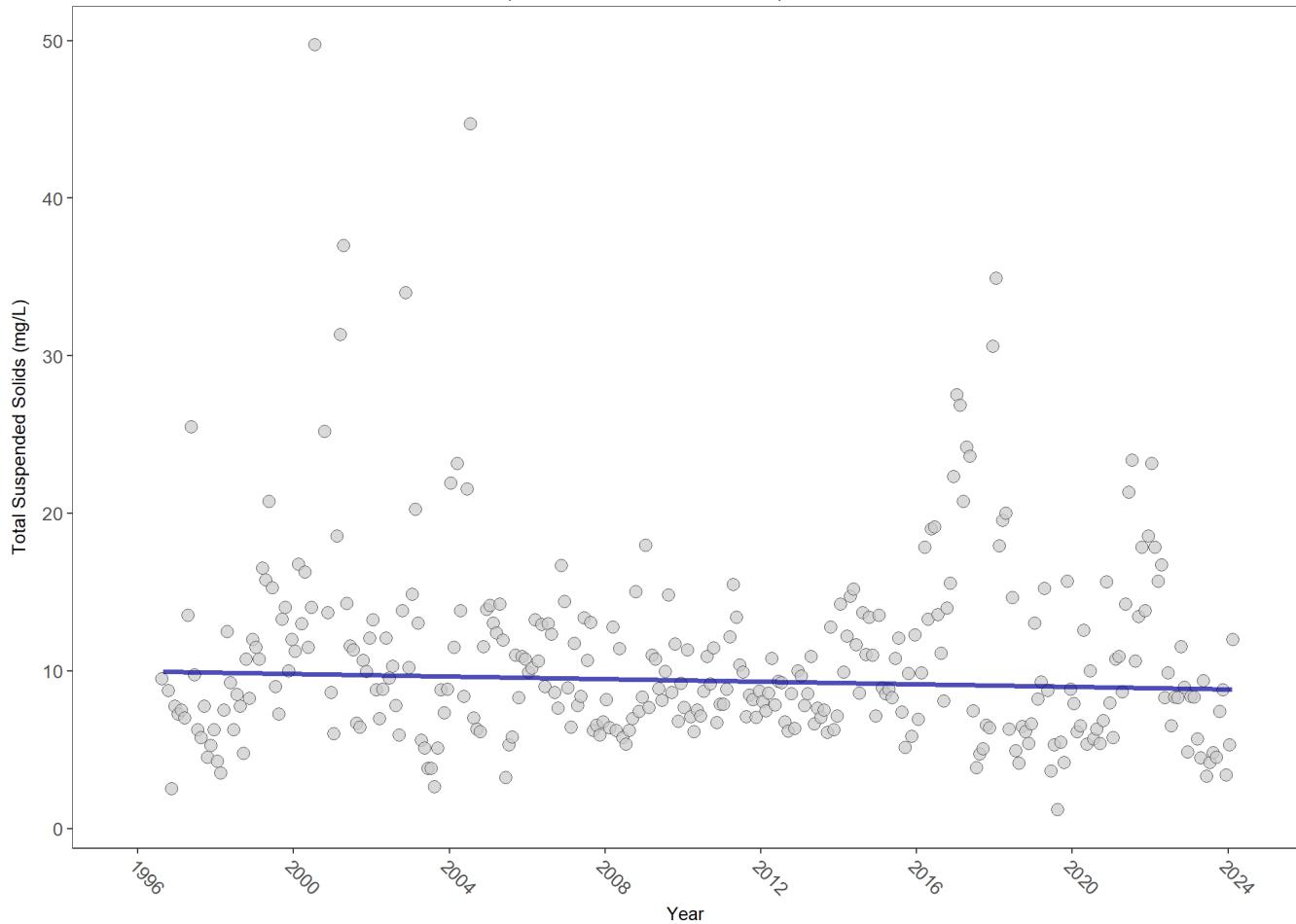
513 - Coastal Charlotte Harbor Monitoring Network
 5002 - Florida STORET / WIN
 476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network
 479 - Southwest Florida Water Management District - Water Quality Monitoring

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
Gasparilla Sound-Charlotte Harbor Aquatic Preserve

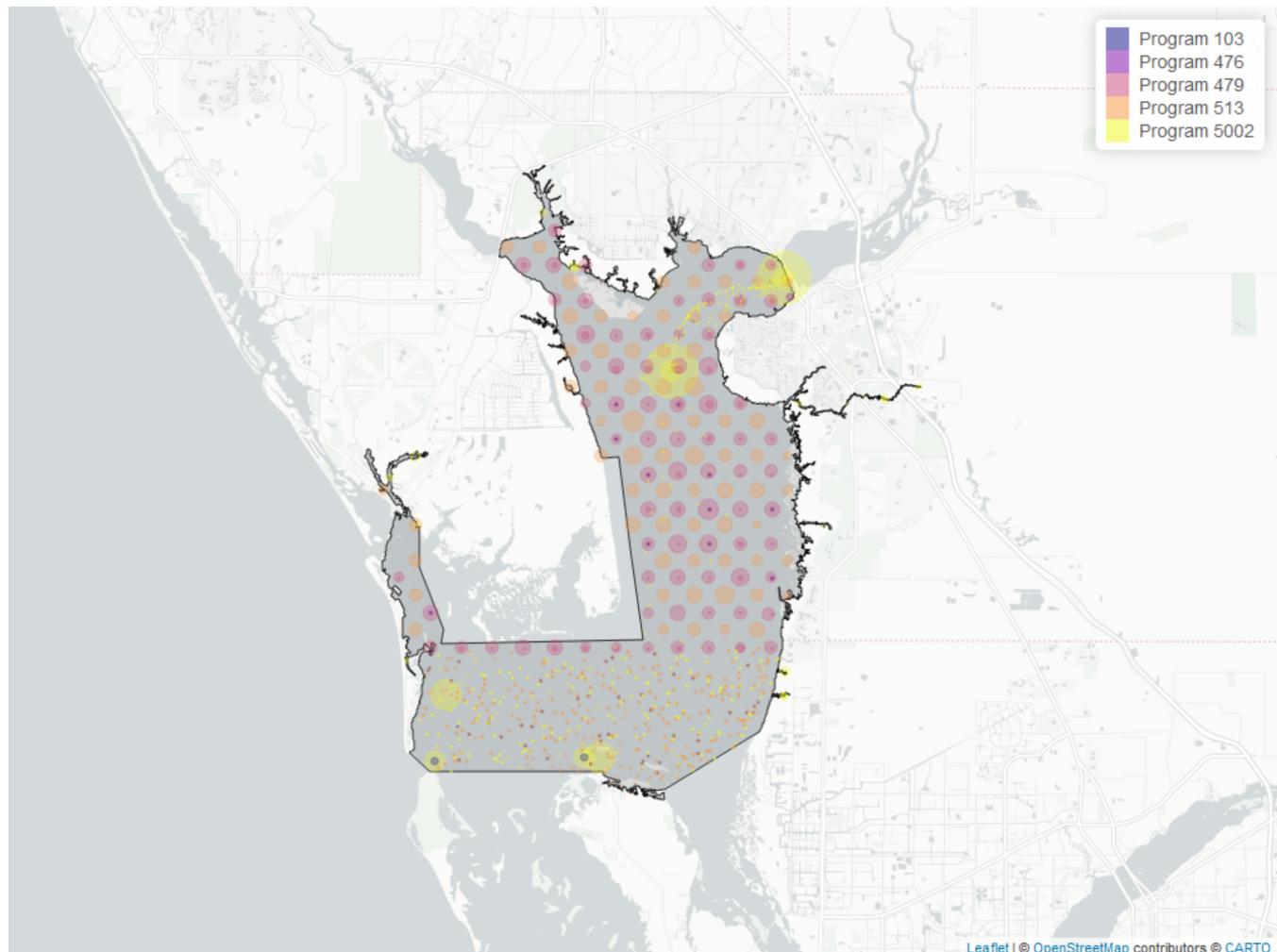


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	6824	29	7.2	TRUE	-0.0582	0.1447	-0.04166667	9.979728	3.3801	0.9847	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Total Suspended Solids



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

Table 24: Programs contributing data for Total Suspended Solids

ProgramID	N_Data	YearMin	YearMax
513	2438	2001	2024
479	2382	2002	2021
5002	1970	1996	2024
103	115	2020	2021
476	10	2016	2016

Program names:

513 - Coastal Charlotte Harbor Monitoring Network

479 - Southwest Florida Water Management District - Water Quality Monitoring

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
- $N_{}$ 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 Total Suspended Solids

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
2001	191	5	2.6				
2003	249	7	2.8	2	0.8	116	46.6
2004	324	12	3.7	18	5.6	52	16.0
2005	338			1	0.3	34	10.1
2006	306	1	0.3				
2007	399	2	0.5				
2008	467			2	0.4	1	0.2
2009	553	3	0.5				
2010	422	1	0.2				
2011	355	4	1.1			2	0.6
2012	341	11	3.2	1	0.3	4	1.2
2013	340	6	1.8			5	1.5
2014	385	2	0.5			1	0.3
2015	327	3	0.9			1	0.3
2016	178	14	7.9			5	2.8
2017	104	5	4.8				
2018	111	6	5.4			1	0.9
2019	120	20	16.7			3	2.5
2020	355	34	9.6	12	3.4	8	2.2
2021	373	13	3.5			4	1.1
2022	194	25	12.9	3	1.6	1	0.5
2023	114	16	14.0			2	1.8
2024	12	1	8.3				

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

513 - Coastal Charlotte Harbor Monitoring Network

479 - Southwest Florida Water Management District - Water Quality Monitoring

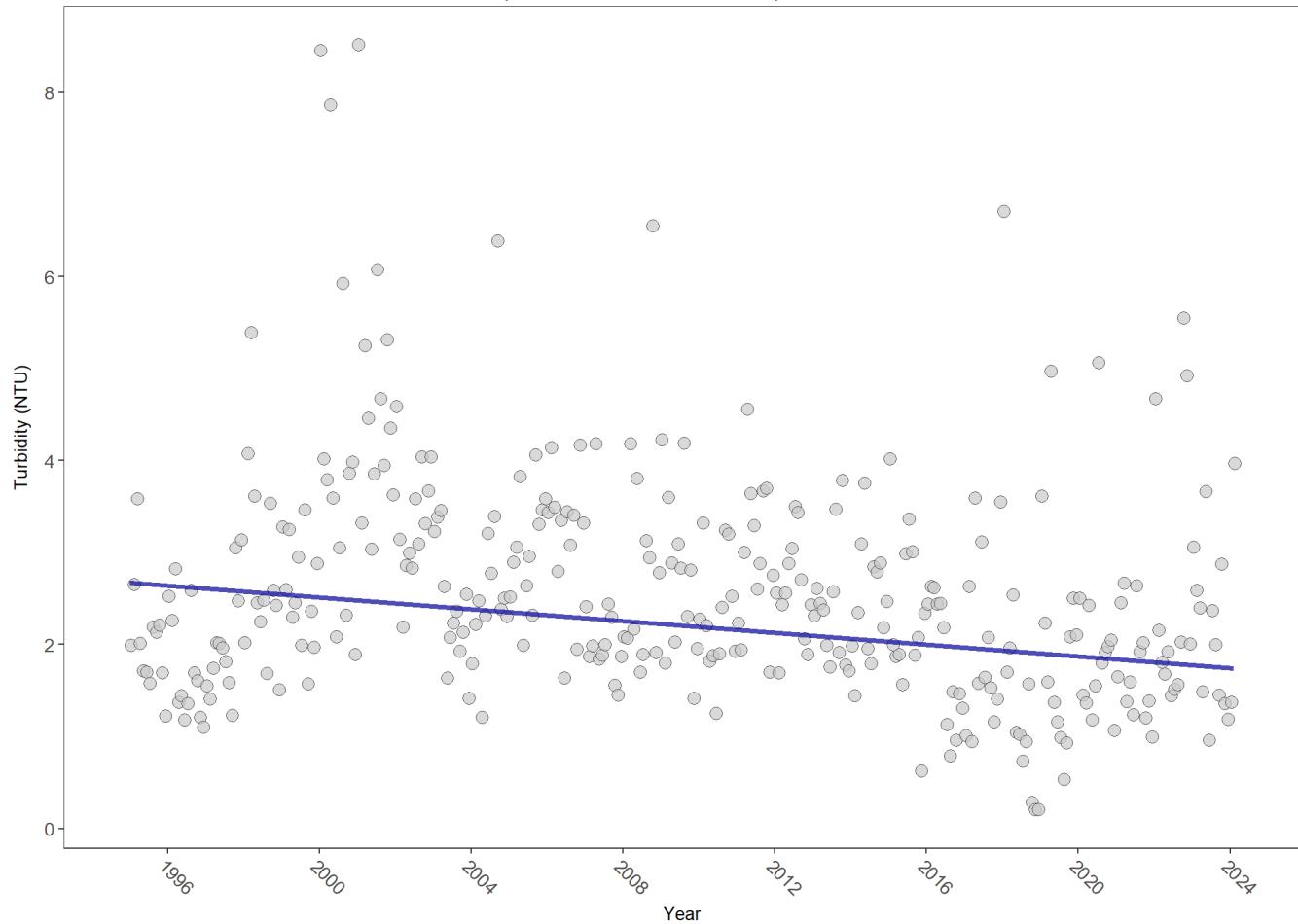
476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network

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
Gasparilla Sound-Charlotte Harbor Aquatic Preserve

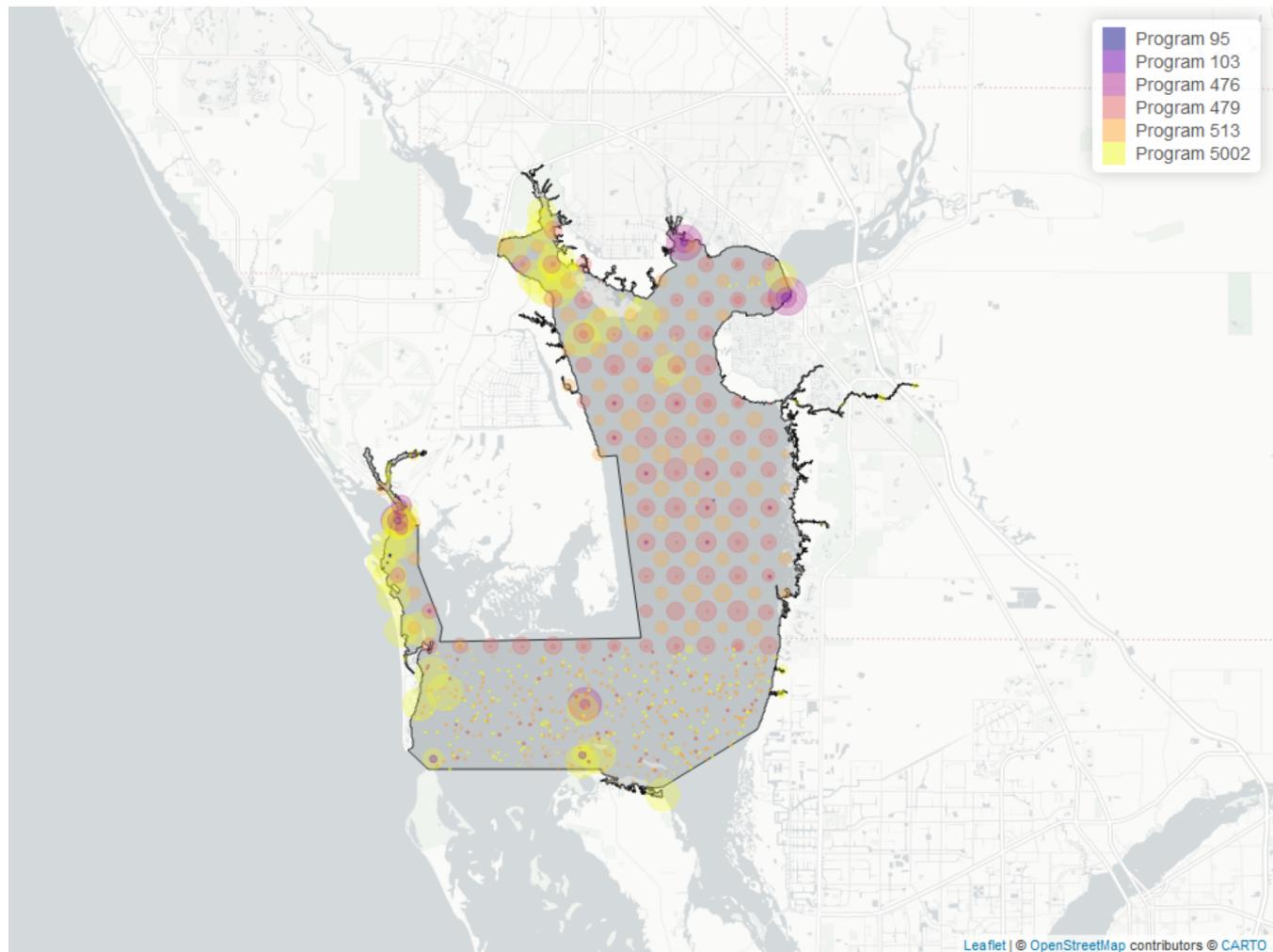


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	13439	30	1.95	TRUE	-0.1891	0.0000	-0.03195053	2.670404	6.2497	0.8562	-1

$p < 0.00005$ 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



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

Table 26: Programs contributing data for Turbidity

ProgramID	N_Data	YearMin	YearMax
5002	6067	1995	2024
479	3631	2001	2021
513	2535	2001	2024
476	1083	1998	2024
103	159	2006	2022
95	6	2003	2003

Program names:

5002 - Florida STORET / WIN

479 - Southwest Florida Water Management District - Water Quality Monitoring

513 - Coastal Charlotte Harbor Monitoring Network

476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network
 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 27: Value Qualifiers for Turbidity

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
2002	844			1	0.1		
2003	848	23	2.7			6	0.7
2004	749	13	1.7			2	0.3
2006	639	5	0.8	6	0.9		
2007	833	1	0.1	12	1.4		
2010	708			2	0.3		
2011	497			5	1.0		
2012	437			1	0.2		
2013	329			1	0.3		
2014	372			1	0.3		
2018	145	42	29.0			32	22.1
2019	161	25	15.5			33	20.5
2020	315	34	10.8			17	5.4
2021	404	47	11.6			1	0.2
2022	178	22	12.4	4	2.2		
2023	158	28	17.7	1	0.6	3	1.9
2024	16	3	18.8	2	12.5	1	6.2

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:

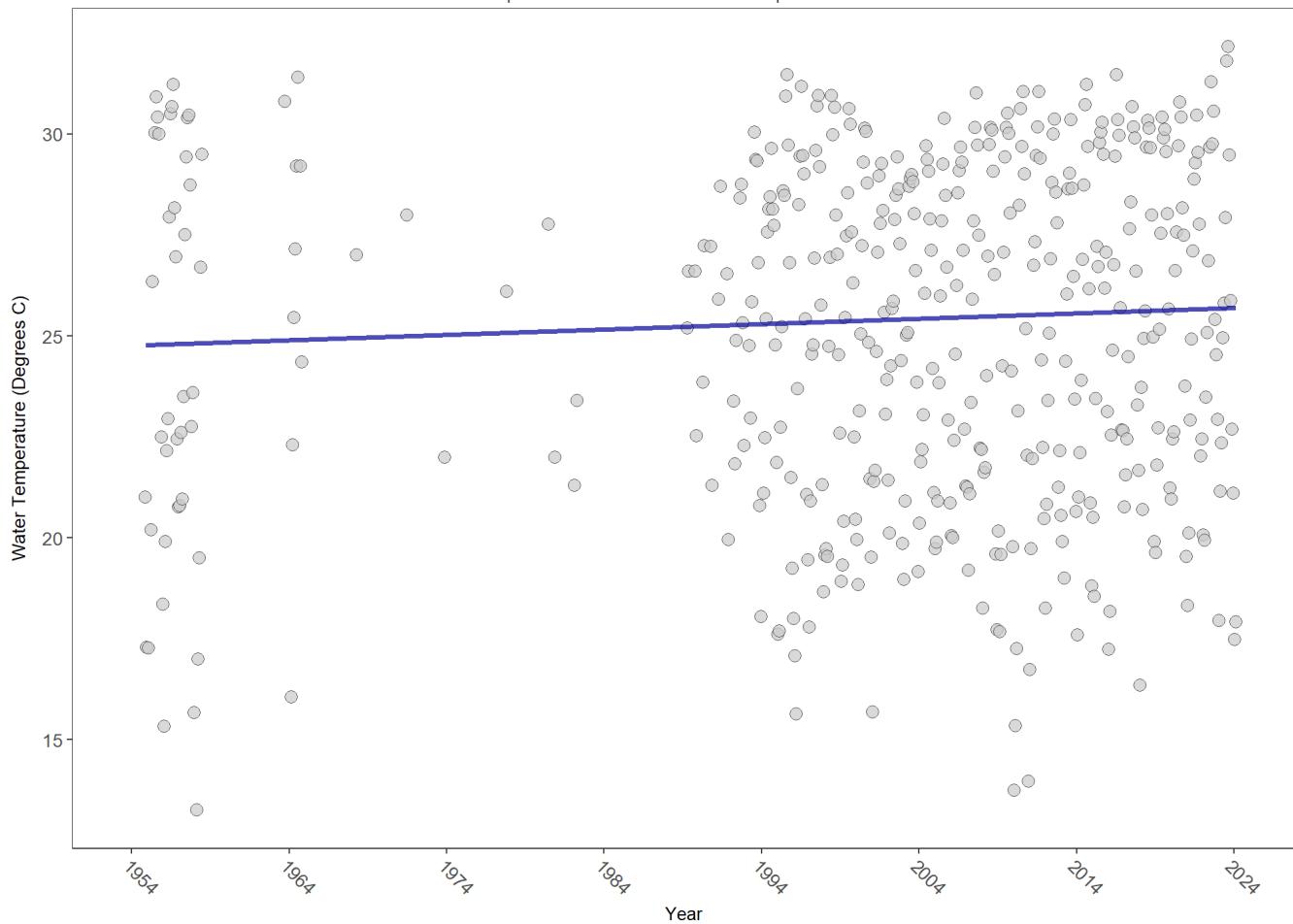
476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network
 513 - Coastal Charlotte Harbor Monitoring Network
 5002 - Florida STORET / WIN

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
Gasparilla Sound-Charlotte Harbor Aquatic Preserve

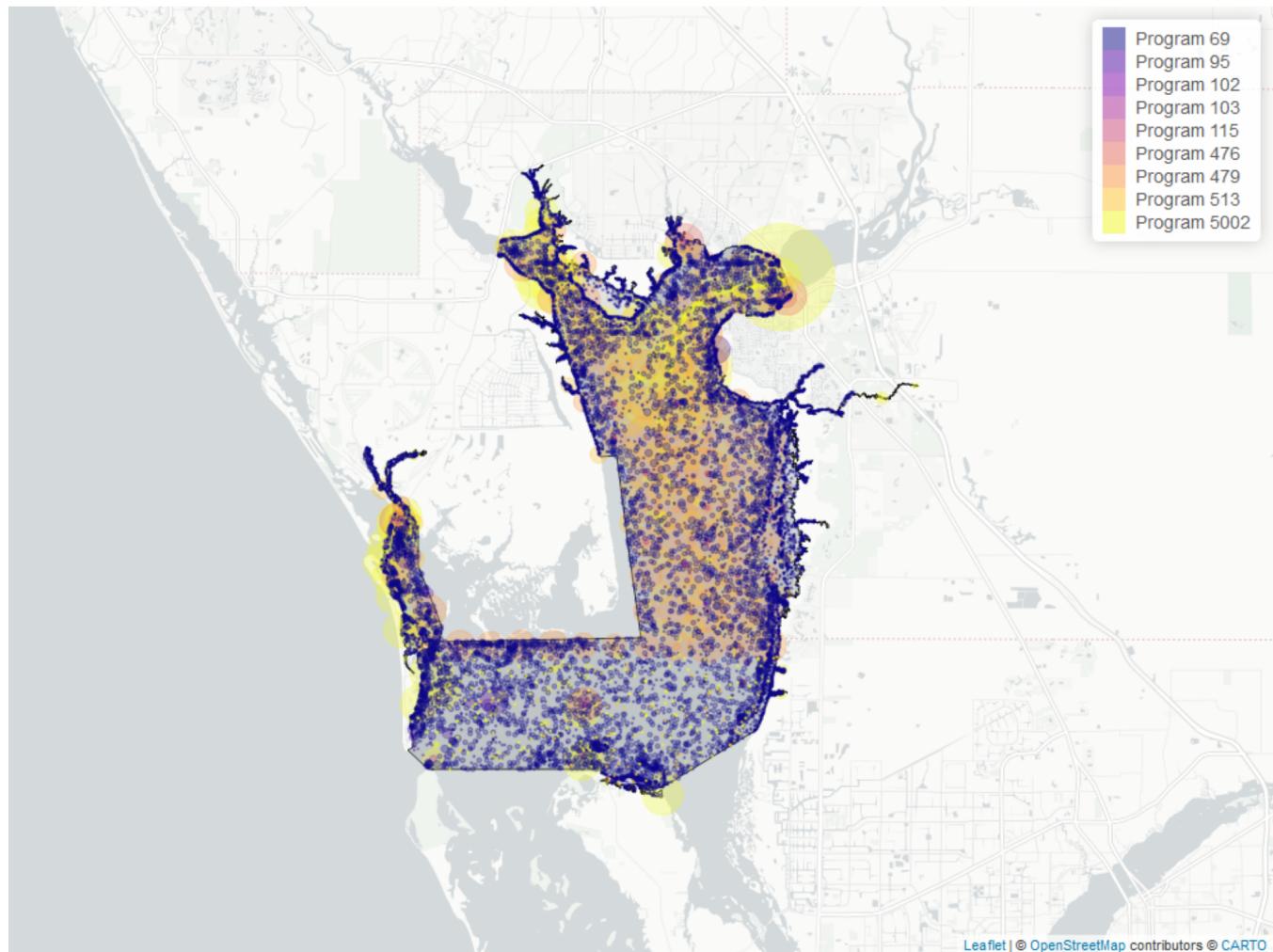


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	69945	49	26	TRUE	0.1152	0.0005	0.01313471	24.76794	10.2052	0.512	1

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 28: Programs contributing data for Water Temperature

ProgramID	N_Data	YearMin	YearMax
69	36270	1989	2022
5002	13872	1993	2024
479	12595	2001	2021
513	5189	2001	2024
476	1114	1996	2024
95	722	1954	2018
103	150	2003	2022
115	27	2000	2004
102	6	1992	1992
5028	2	2024	2024

Program names:

69 - Fisheries-Independent Monitoring (FIM) Program

5002 - Florida STORET / WIN

479 - Southwest Florida Water Management District - Water Quality Monitoring

513 - Coastal Charlotte Harbor Monitoring Network

476 - Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network

95 - Harmful Algal Bloom Marine Observation Network

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

115 - Environmental Monitoring Assessment Program

102 - National Status and Trends Mussel Watch

5028 - Charlotte Harbor Aquatic Preserves Monthly Water Quality Program

There are no qualifying Value Qualifiers for Water Temperature in Gasparilla Sound-Charlotte Harbor Aquatic Preserve

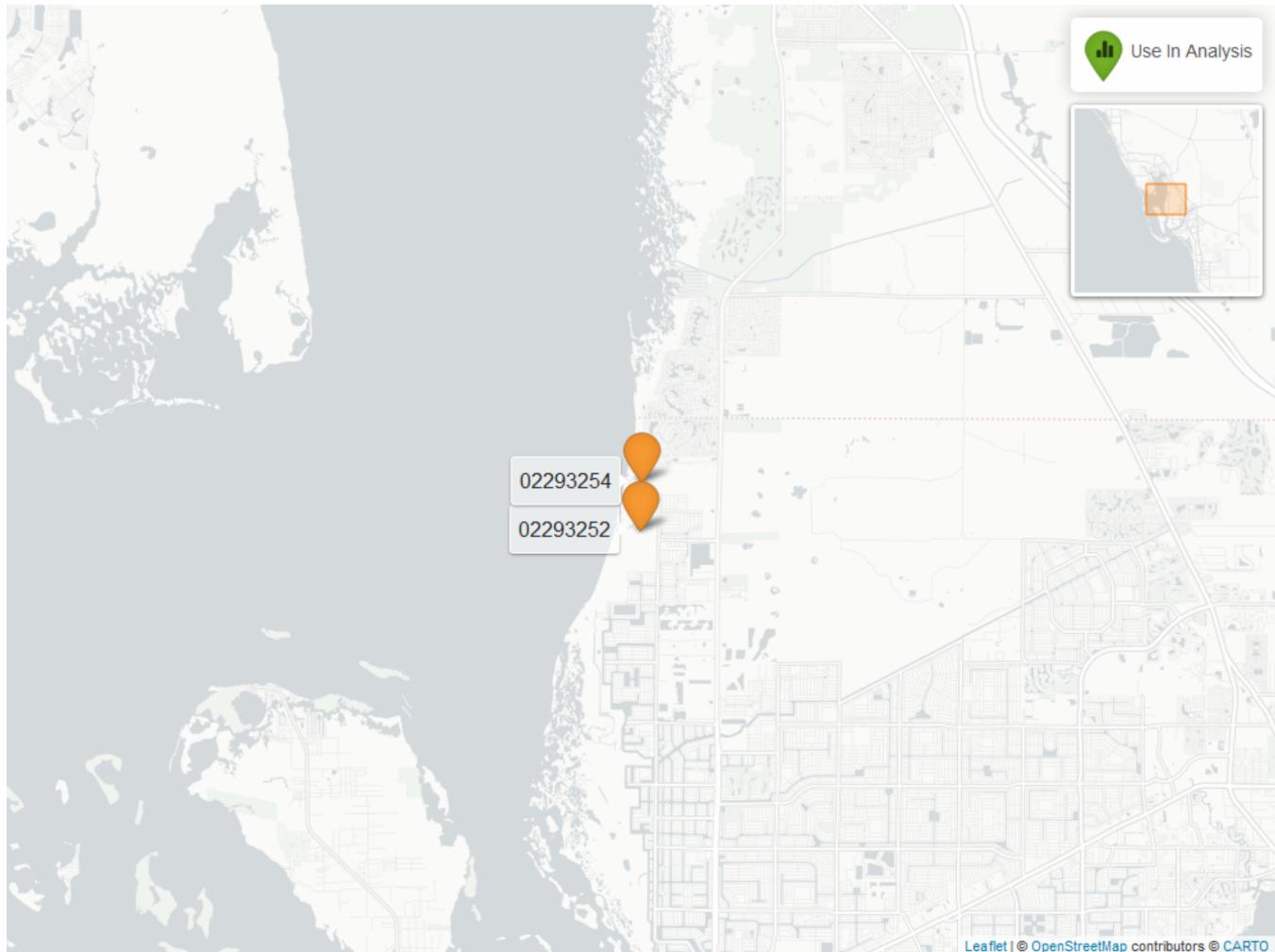
Water Quality - Continuous

The following files were used in the continuous analysis:

- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_SW-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_Saturation_SW-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_pH_SW-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_Salinity_SW-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_Turbidity_SW-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_Water_Temperature_SW-2024-Jul-02.txt*

Table 29: National Water Information System (7)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
02293252	4	FALSE	Sal , TempW
02293254	4	FALSE	Sal , TempW



Map showing Continuous Water Quality Monitoring sampling locations within the boundaries of Gasparilla Sound-Charlotte Harbor Aquatic Preserve. Sites marked as *Use In Analysis* are featured in this report.

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.

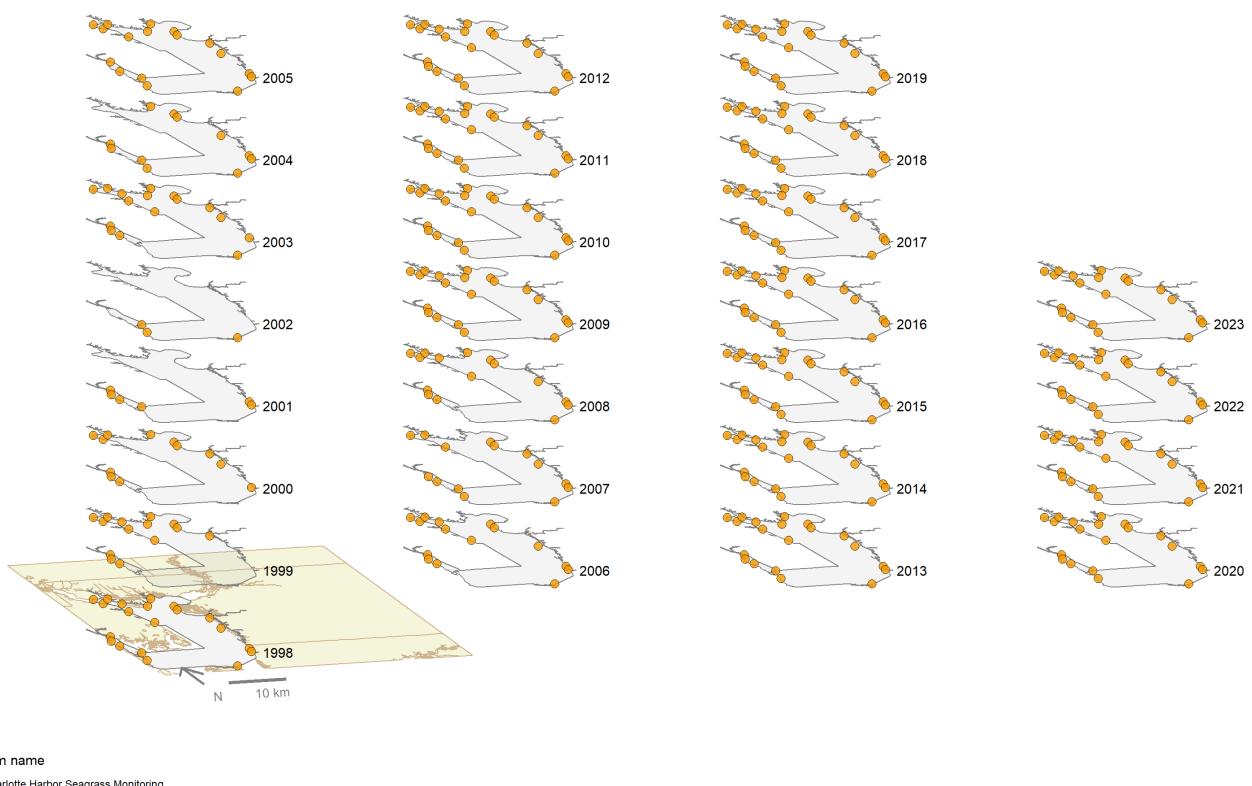
Notes

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

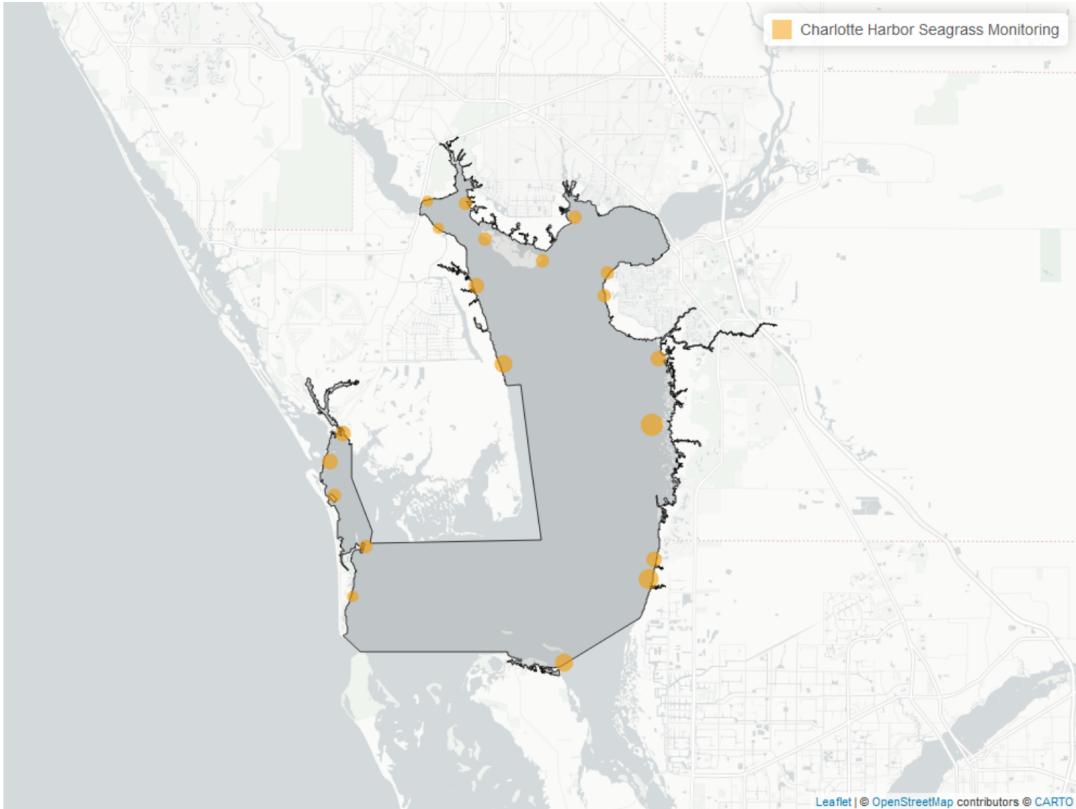
- Biscayne Bay Aquatic Preserve
- Florida Keys National Marine Sanctuary

Gasparilla Sound-Charlotte Harbor Aquatic Preserve
SAV Percent Cover - Sample Locations



Maps showing the temporal scope of SAV sampling sites within the boundaries of *Gasparilla Sound-Charlotte Harbor Aquatic Preserve* by Program name.

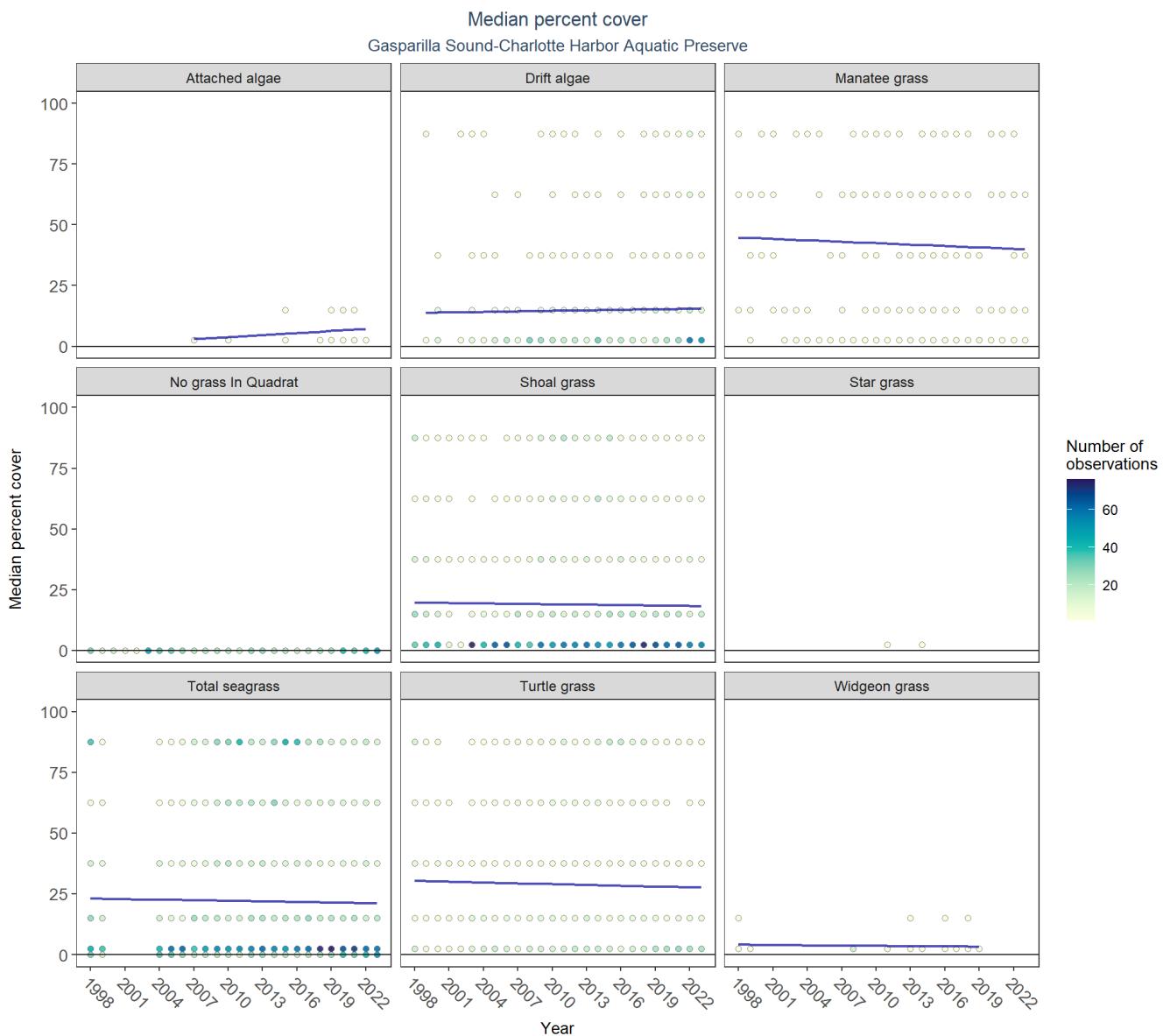
Sampling locations by Program:



Map showing SAV sampling sites within the boundaries of *Gasparilla Sound-Charlotte Harbor Aquatic Preserve*. The point size reflects the number of samples at a given sampling site.

Table 30: Charlotte Harbor Seagrass Monitoring - *Program 570*

<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>	<i>Collection Method</i>	<i>Sample Locations</i>
8237	1998	2023	Braun Blanquet	20



Median percent cover by species in *Gasparilla Sound-Charlotte Harbor 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.

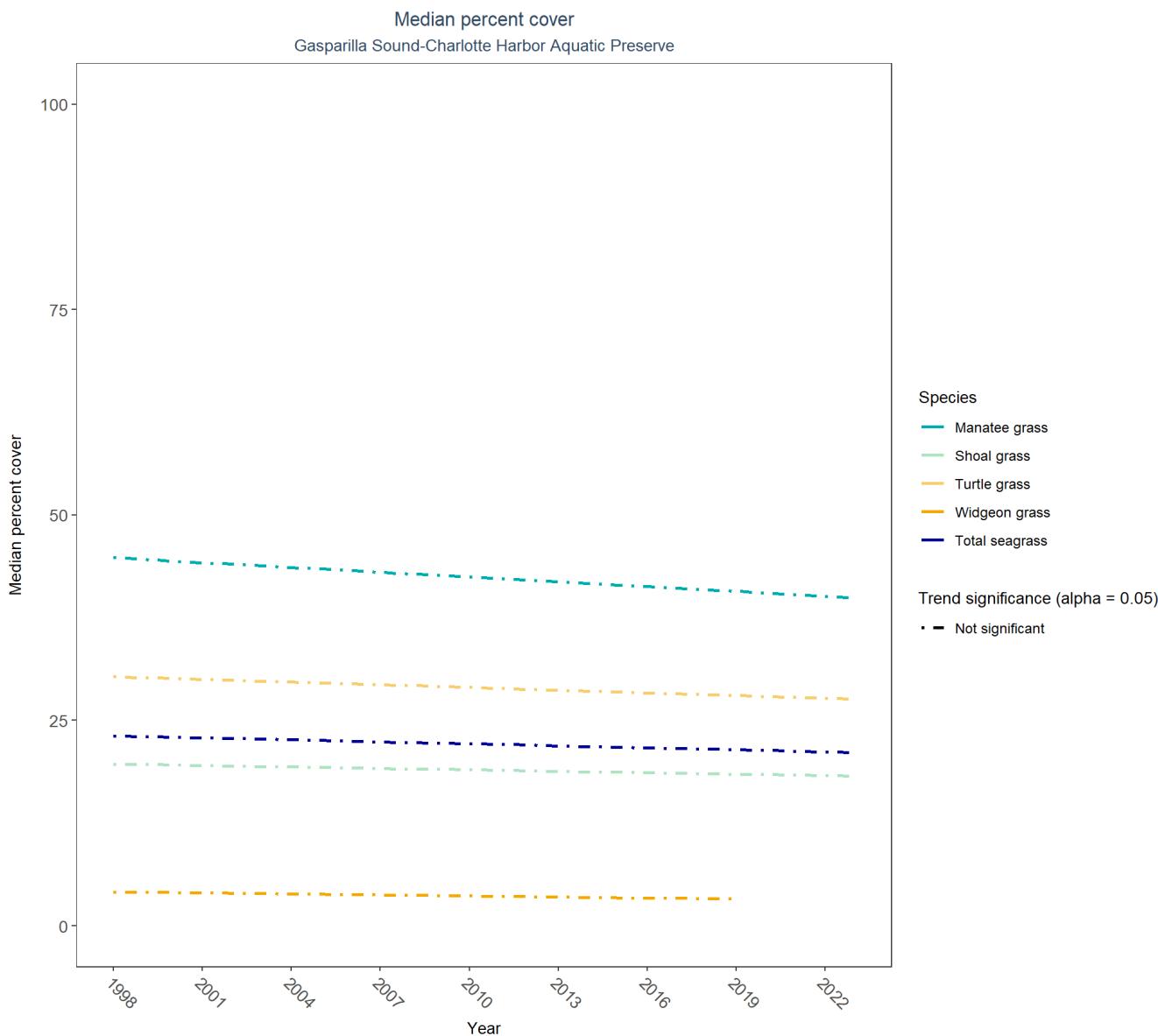
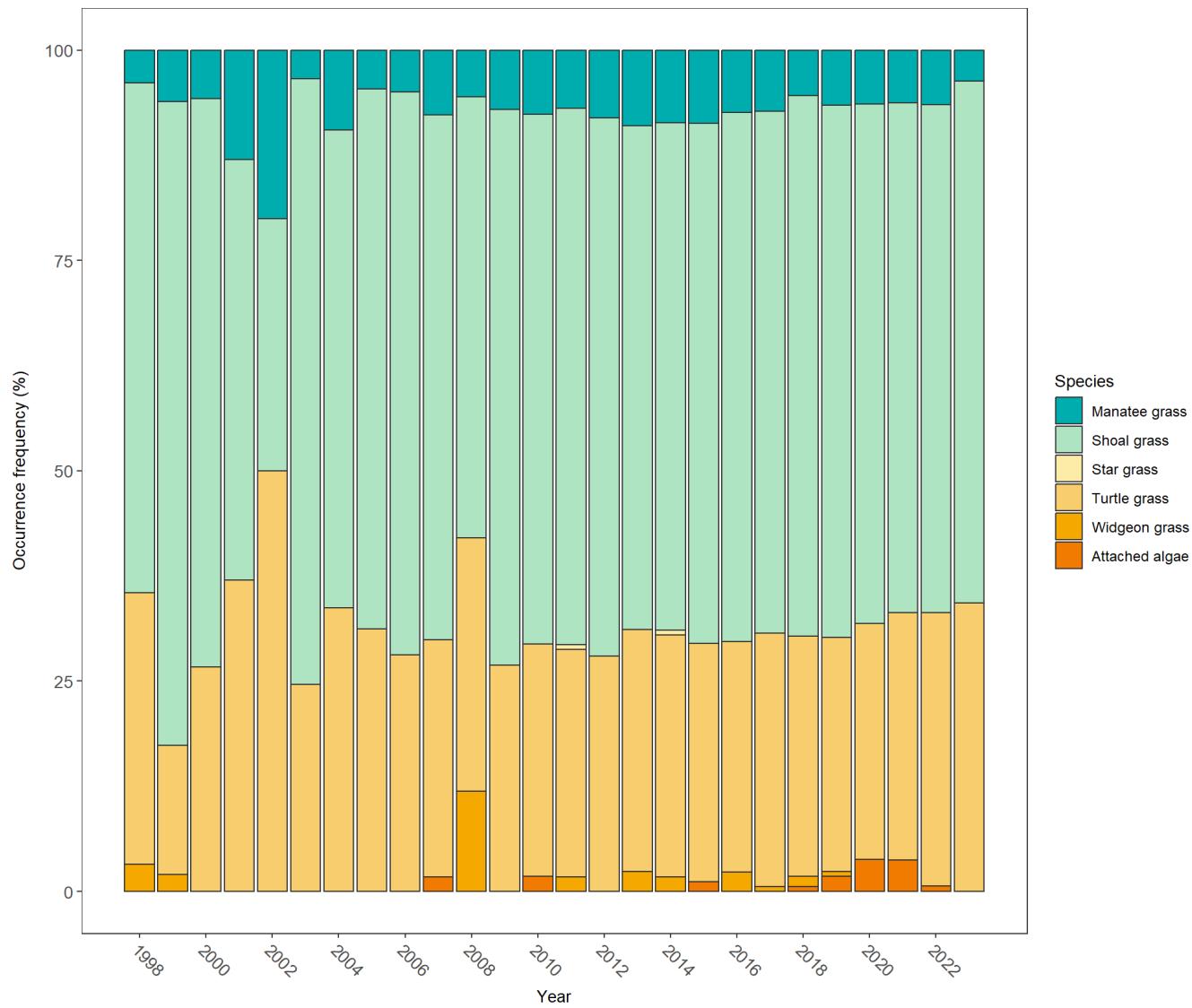


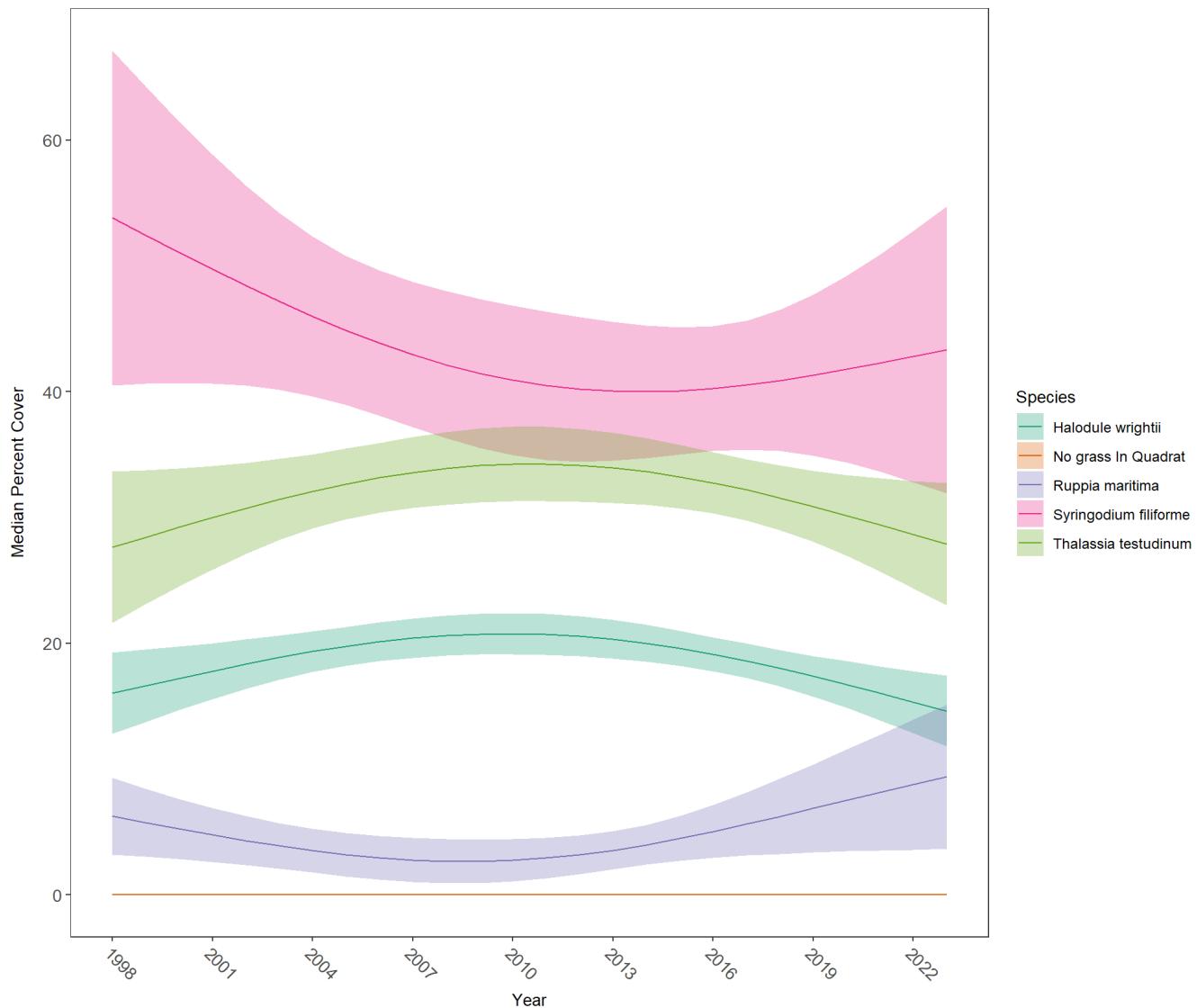
Table 31: Percent Cover Trend Analysis for Gasparilla Sound-Charlotte Harbor Aquatic Preserve

Species	Common Name	Trend Significance (0.05)	Period of Record	LME-Intercept	LME-Slope	p
Attached algae		No significant trend	2007 - 2022	-0.7445	0.2839	0.3168
Drift algae		No significant trend	1999 - 2023	13.4262	0.0716	0.7737
Halodule wrightii	Shoal grass	No significant trend	1998 - 2023	19.9204	-0.0583	0.4404
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 - 2019	4.2619	-0.0393	0.7956
Syringodium filiforme	Manatee grass	No significant trend	1998 - 2023	45.5874	-0.1951	0.7378
Thalassia testudinum	Turtle grass	No significant trend	1998 - 2023	30.7773	-0.1101	0.5651
Total seagrass		No significant trend	1998 - 2023	23.4554	-0.0813	0.2854

Frequency of occurrence
Gasparilla Sound-Charlotte Harbor Aquatic Preserve



Median Percent Cover for seagrass species
Gasparilla Sound-Charlotte Harbor Aquatic Preserve



Generalized additive models for each species in Gasparilla Sound-Charlotte Harbor 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.