

Guana Tolomato Matanzas National Estuarine Research Reserve

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

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

Table 2: Discrete Water Quality threshold values

Parameter Name	Units	Low Threshold	High Threshold
Dissolved Oxygen	mg/L	0.000001	22
Salinity	ppt	0	70
Water Temperature	Degrees C	3	40
pH		2	13
Dissolved Oxygen Saturation	%	0.000001	310
Specific Conductivity	mS/cm	0.005000001	100
Turbidity	NTU	0	-
Total Suspended Solids (TSS)	mg/L	0	-
Chlorophyll a uncorrected for pheophytin	ug/L	0	-
Chlorophyll a corrected for pheophytin	ug/L	0	-
Secchi Depth	m	0.000001	50
Light Extinction Coefficient	m^{-1}	0	-
Colored dissolved organic matter, CDOM	PCU	0	-
Fluorescent dissolved organic matter, FDOM	QSE	0	-
Total Nitrogen	mg/L	0	-
Total Kjeldahl Nitrogen TKN	mg/L	0	-
NO ₂ +3 Filtered	mg/L	0	-
NH4 Filtered	mg/L	0	-
Total Phosphorus	mg/L	0	-

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

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

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

Value Qualifiers

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

STORET and WIN value qualifier codes

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

Table 4: Value Qualifier codes excluded from analysis

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

Discrete Water Quality Value Qualifiers

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

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

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

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

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

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

Systemwide Monitoring Program (SWMP) value qualifier codes

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

Table 5: SWMP Value Qualifier codes

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

Water Column

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

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

Seasonal Kendall-Tau Analysis

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

Water Quality - Discrete

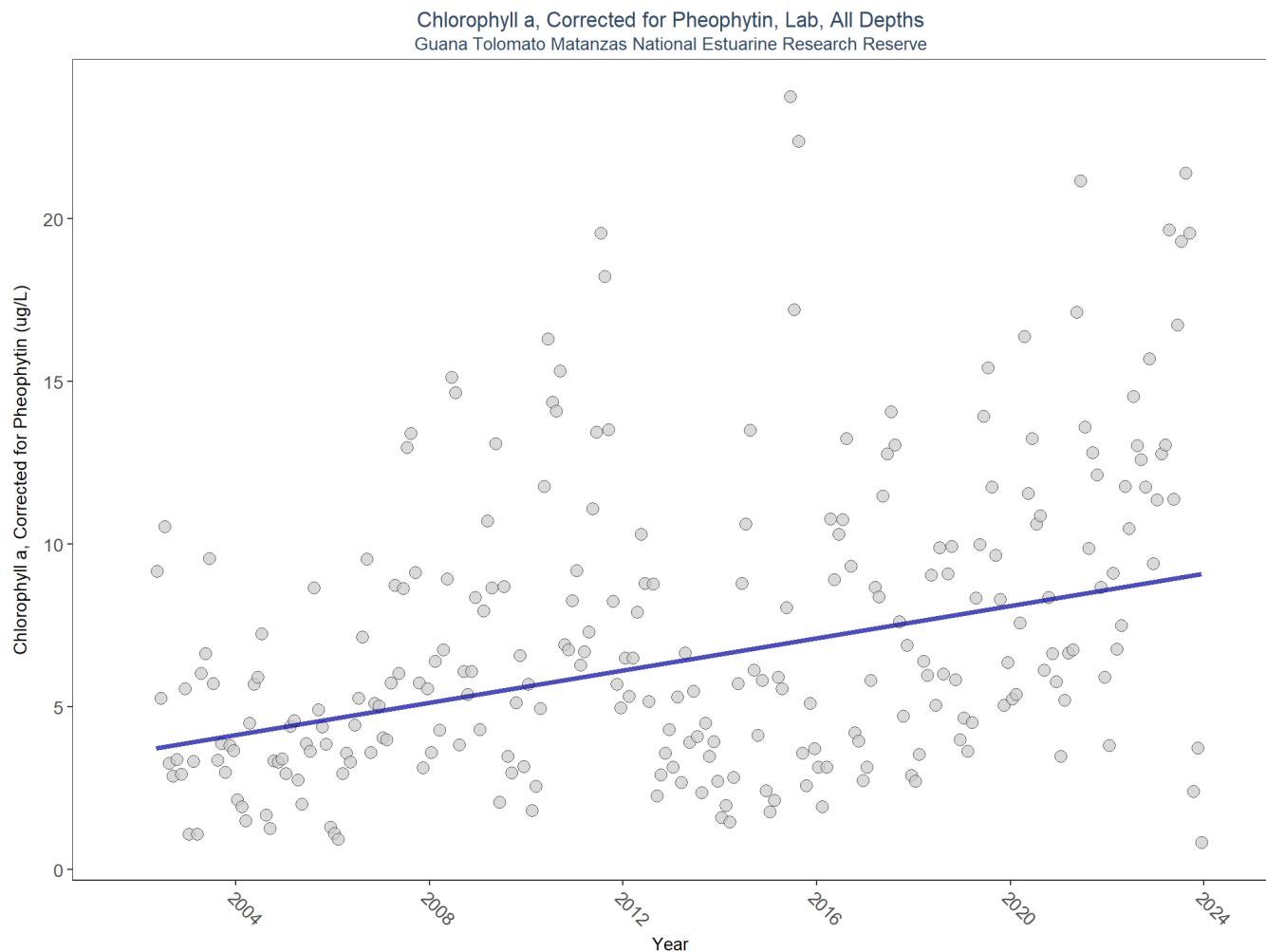
The following files were used in the discrete analysis:

- *Combined_WQ_WC_NUT_Chlorophyll_a_corrected_for_pheophytin-2024-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



$p < 0.00005$ 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

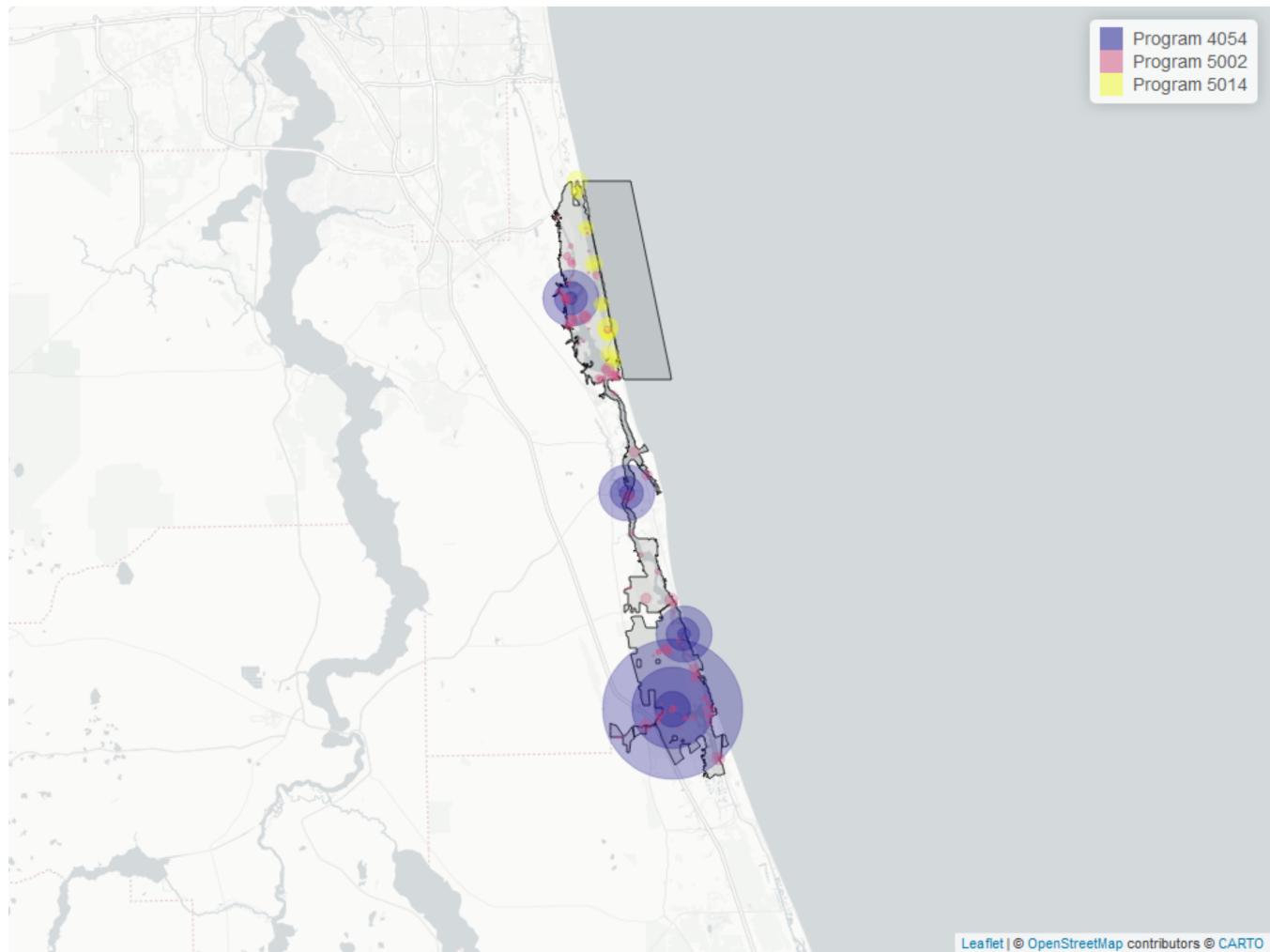


Table 6: Programs contributing data for Chlorophyll a, Corrected for Pheophytin

ProgramID	N_Data	YearMin	YearMax
4054	6200	2002	2021
5002	711	2002	2023
5014	619	2017	2023

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

5002 - Florida STORET / WIN

5014 - Guana River and Guana Lake 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 7: Value Qualifiers for Chlorophyll a, Corrected for Pheophytin

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
2004	258	2	0.8	2	0.8	40	15.5
2005	424	18	4.2	8	1.9	123	29.0
2006	251					23	9.2
2008	234	2	0.8			1	0.4
2009	272					1	0.4
2010	254	4	1.6			4	1.6
2011	234	2	0.8				
2012	235	1	0.4	2	0.8		
2013	460	40	8.7	15	3.3	10	2.2
2014	460	43	9.3	17	3.7	11	2.4
2015	480	39	8.1	15	3.1	12	2.5
2016	446	33	7.4	18	4.0	4	0.9
2017	504	36	7.1	13	2.6	15	3.0
2018	599	51	8.5	20	3.3	13	2.2
2019	602	61	10.1	13	2.2	13	2.2
2020	537	58	10.8	11	2.0	19	3.5
2021	445	34	7.6	10	2.2	17	3.8
2022	183	17	9.3			21	11.5
2023	73	2	2.7	11	15.1	5	6.8

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:

5014 - Guana River and Guana Lake Water Quality Monitoring

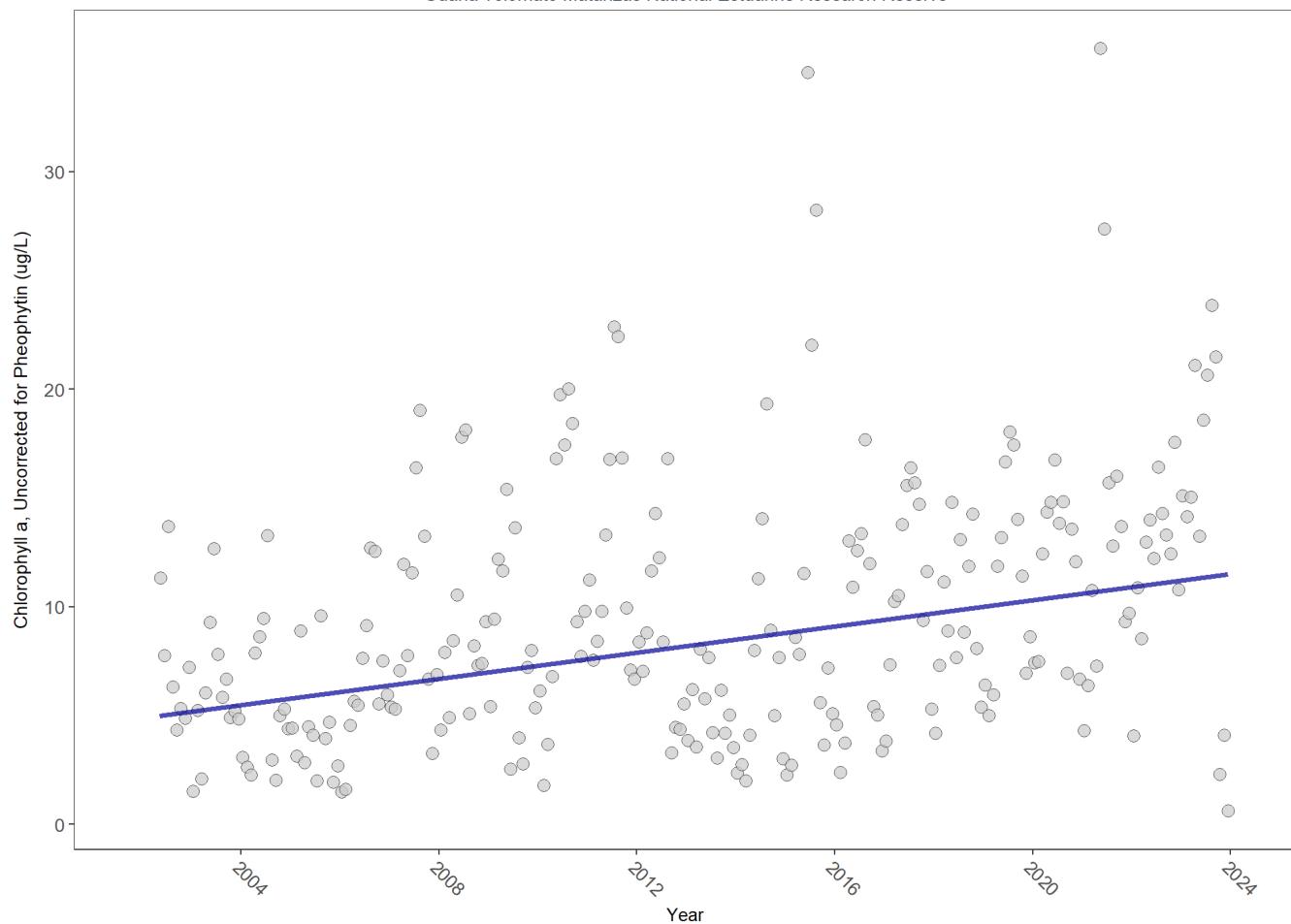
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

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
 Guana Tolomato Matanzas National Estuarine Research Reserve

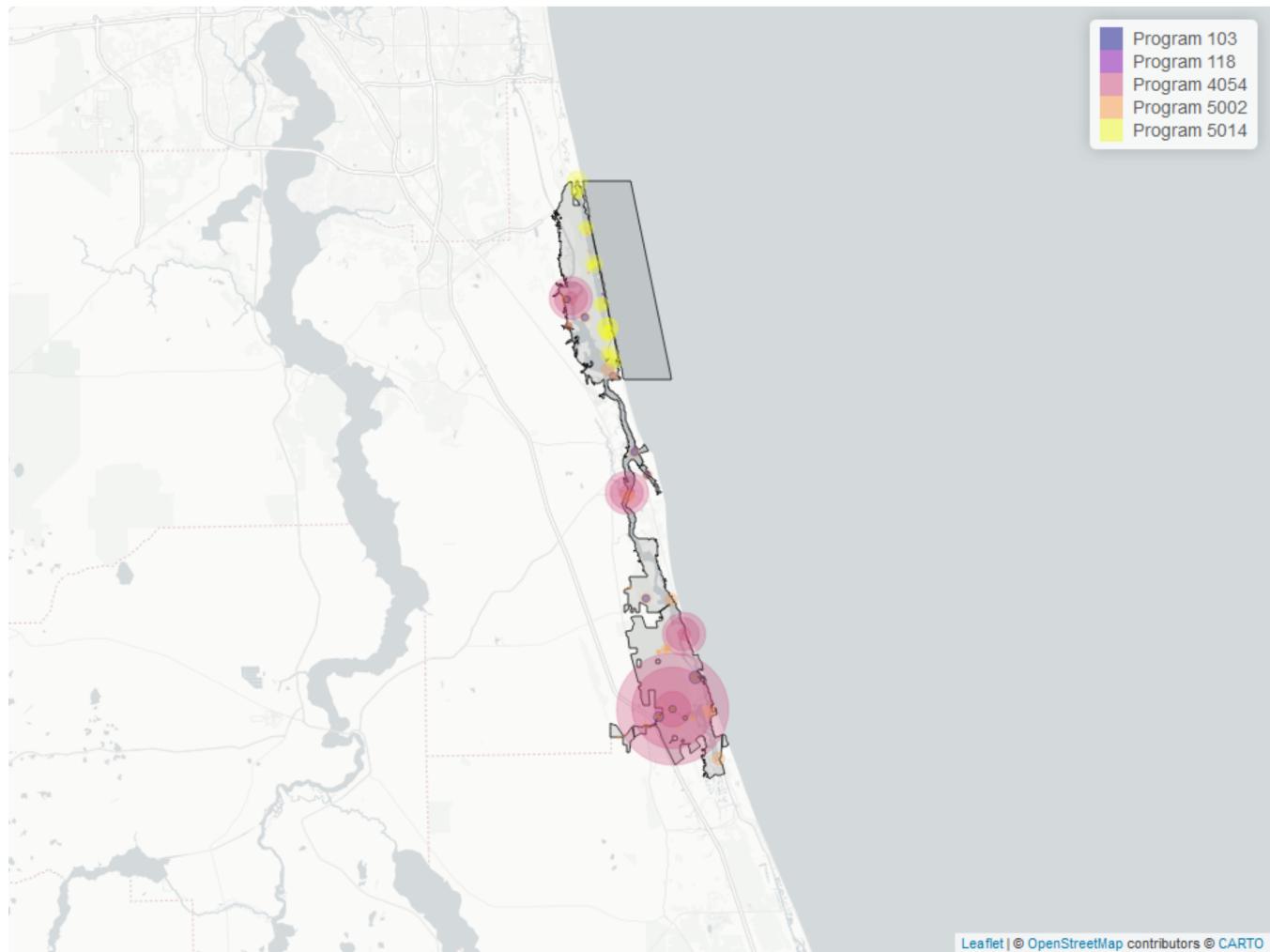


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	5502	22	6.2	TRUE	0.3047	0.0000	0.3004353	4.89195	3.7902	0.9757	1

$p < 0.00005$ 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
4054	4632	2002	2020
5014	678	2017	2023
5002	331	2008	2023
103	118	2020	2021
118	2	2006	2006

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

5014 - Guana River and Guana Lake Water Quality Monitoring

5002 - Florida STORET / WIN

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	$perc_U$
2011	230	2	0.9				
2012	230			2	0.9		
2013	246	16	6.5	15	6.1	1	0.4
2014	455	17	3.7	17	3.7		
2015	299	10	3.3	15	5.0	3	1.0
2016	257	12	4.7	18	7.0	1	0.4
2017	347	19	5.5	13	3.8	6	1.7
2018	434	23	5.3	20	4.6	1	0.2
2019	403	18	4.5	13	3.2	5	1.2
2020	317	33	10.4	11	3.5	2	0.6
2021	329	17	5.2	10	3.0	9	2.7
2022	183	8	4.4			17	9.3
2023	73	3	4.1	11	15.1	4	5.5

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 ³U - Compound was analyzed for but not detected

Programs containing Value Qualified data:

5002 - Florida STORET / WIN

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

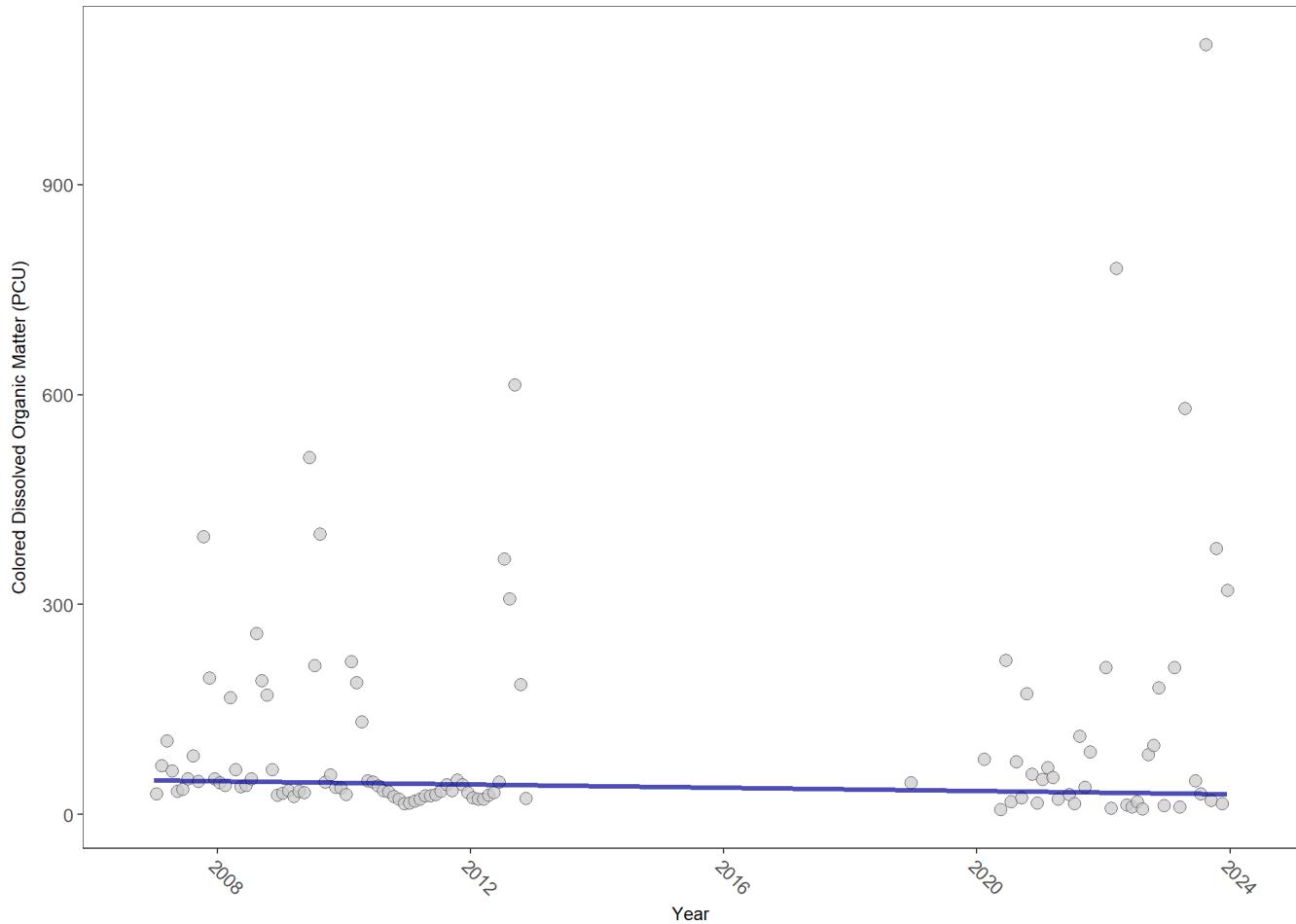
5014 - Guana River and Guana Lake Water Quality Monitoring

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
Guana Tolomato Matanzas National Estuarine Research Reserve

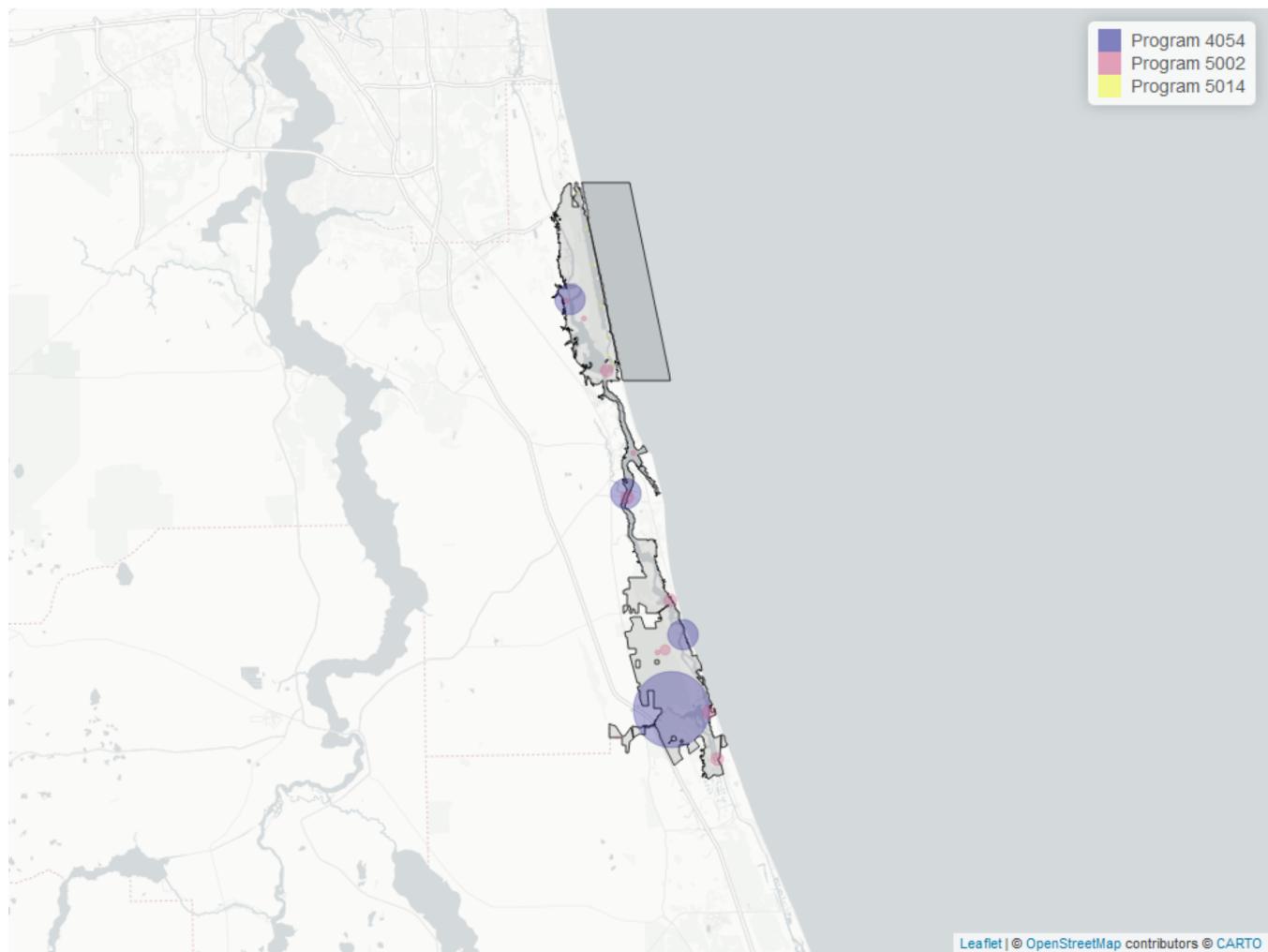


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	1483	11	38.2	TRUE	-0.1617	0.0368	-1.168068	49.06626	6.6607	0.8259	-1

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
4054	1334	2007	2012
5002	148	2020	2023
5014	7	2018	2018

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program
5002 - Florida STORET / WIN

5014 - Guana River and Guana Lake 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

<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>
2020	39	10	25.6	5	12.8		
2021	45	7	15.6				
2022	43	12	27.9	5	11.6		
2023	21					5	23.8

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:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

5002 - Florida STORET / WIN

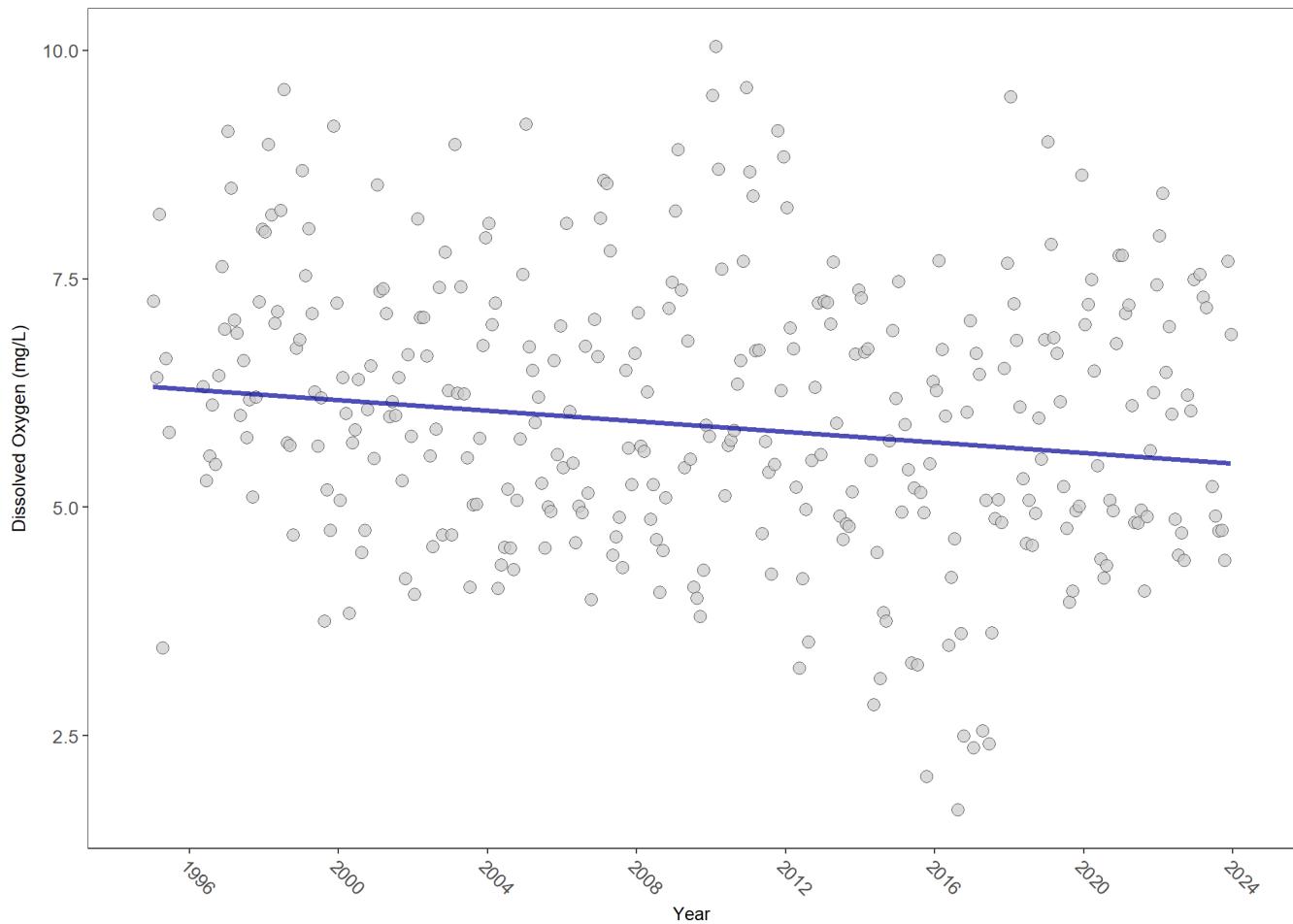
5014 - Guana River and Guana Lake Water Quality Monitoring

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
 Guana Tolomato Matanzas National Estuarine Research Reserve



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	21501	29	6	TRUE	-0.1733	0.0000	-0.02904828	6.321064	20.8372	0.0351	-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

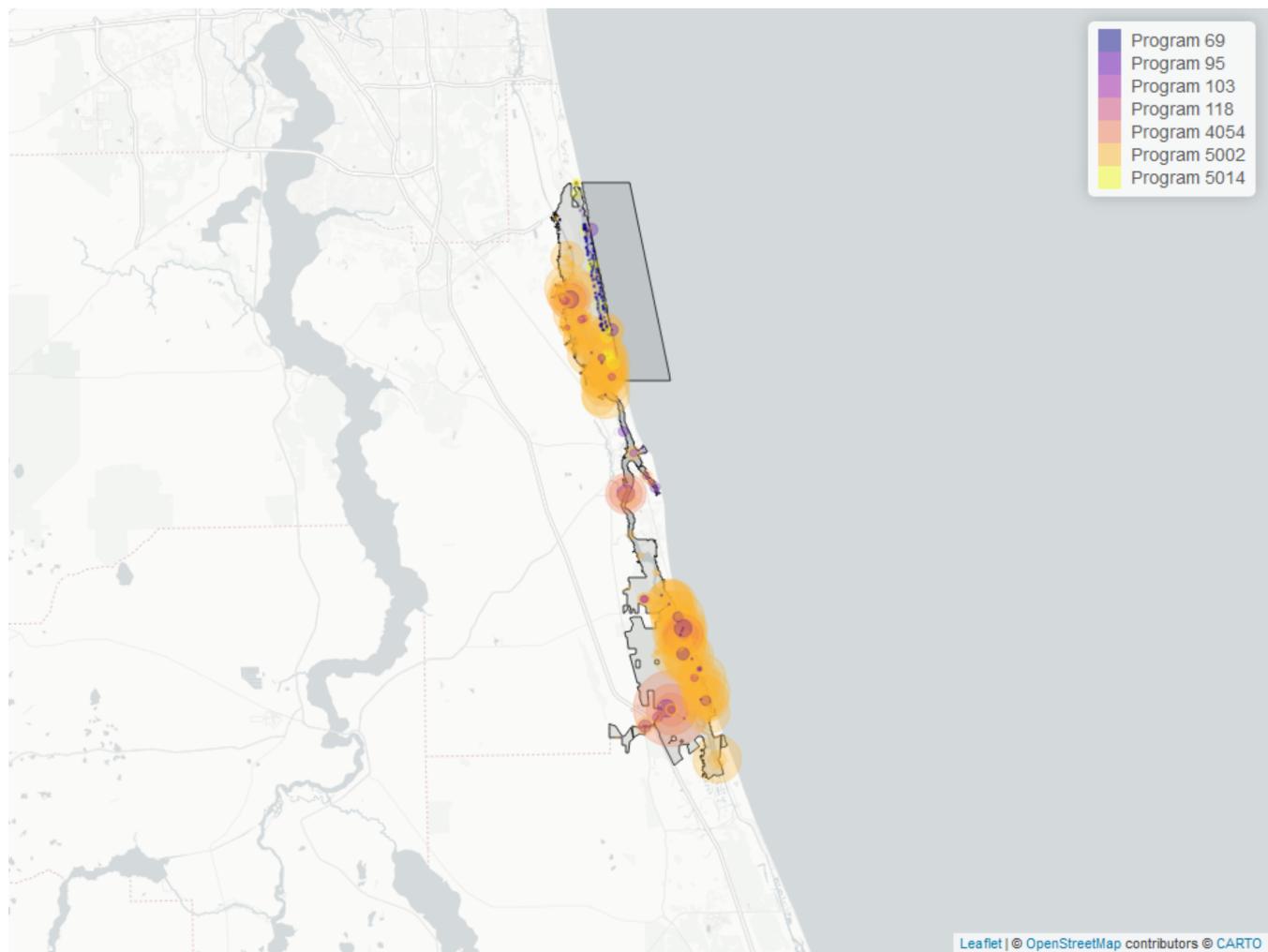


Table 12: Programs contributing data for Dissolved Oxygen

ProgramID	N_Data	YearMin	YearMax
5002	17797	1995	2023
4054	2817	2002	2020
95	395	2007	2018
5014	276	2017	2022
69	171	2001	2010
103	168	2020	2021
118	1	2006	2006

Program names:

5002 - Florida STORET / WIN

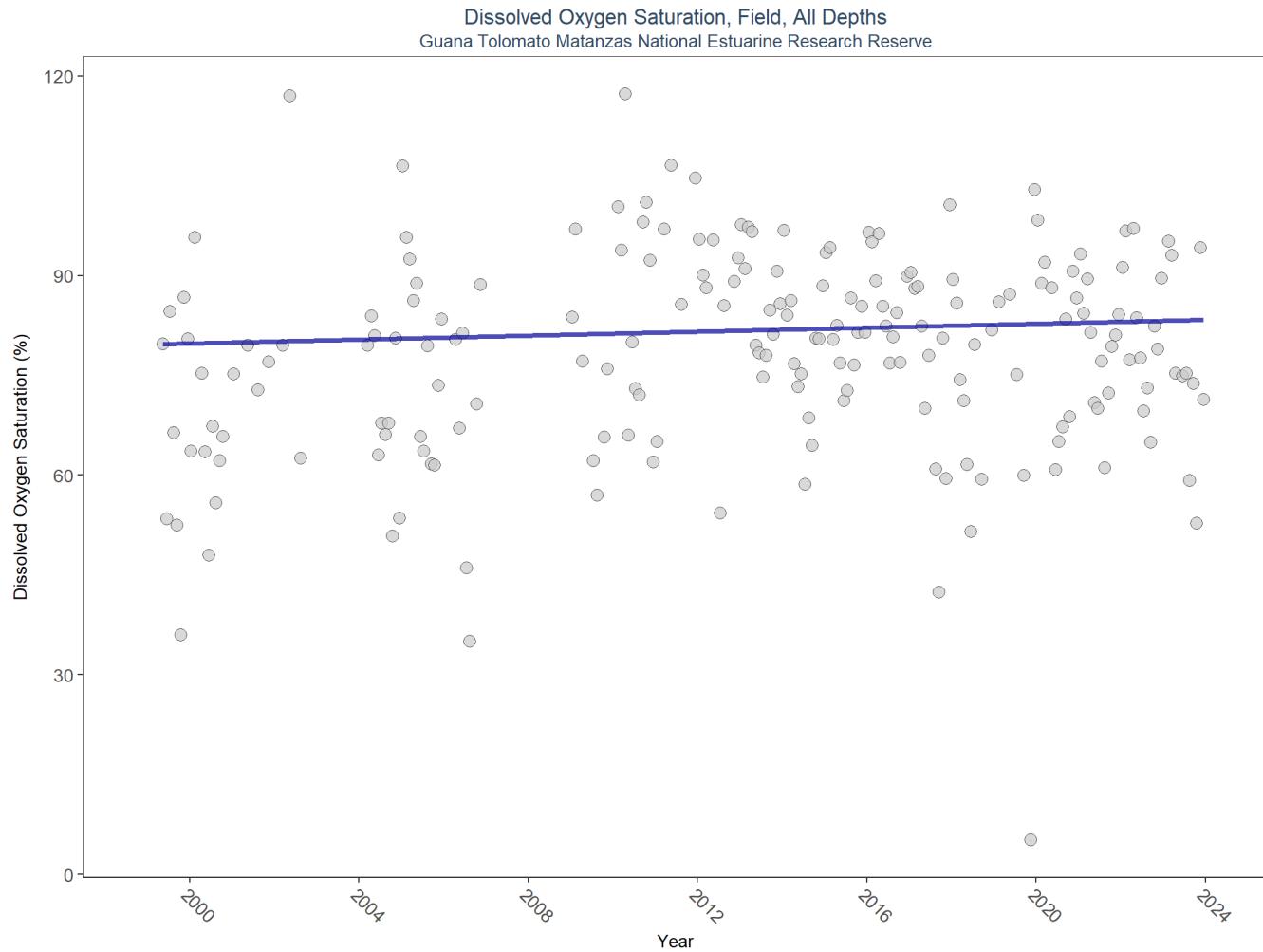
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

- 95 - Harmful Algal Bloom Marine Observation Network
 5014 - Guana River and Guana Lake Water Quality Monitoring
 69 - Fisheries-Independent Monitoring (FIM) Program
 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
 118 - National Aquatic Resource Surveys, National Coastal Condition Assessment

There are no qualifying Value Qualifiers for Dissolved Oxygen in Guana Tolomato Matanzas National Estuarine Research Reserve

Dissolved Oxygen Saturation - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

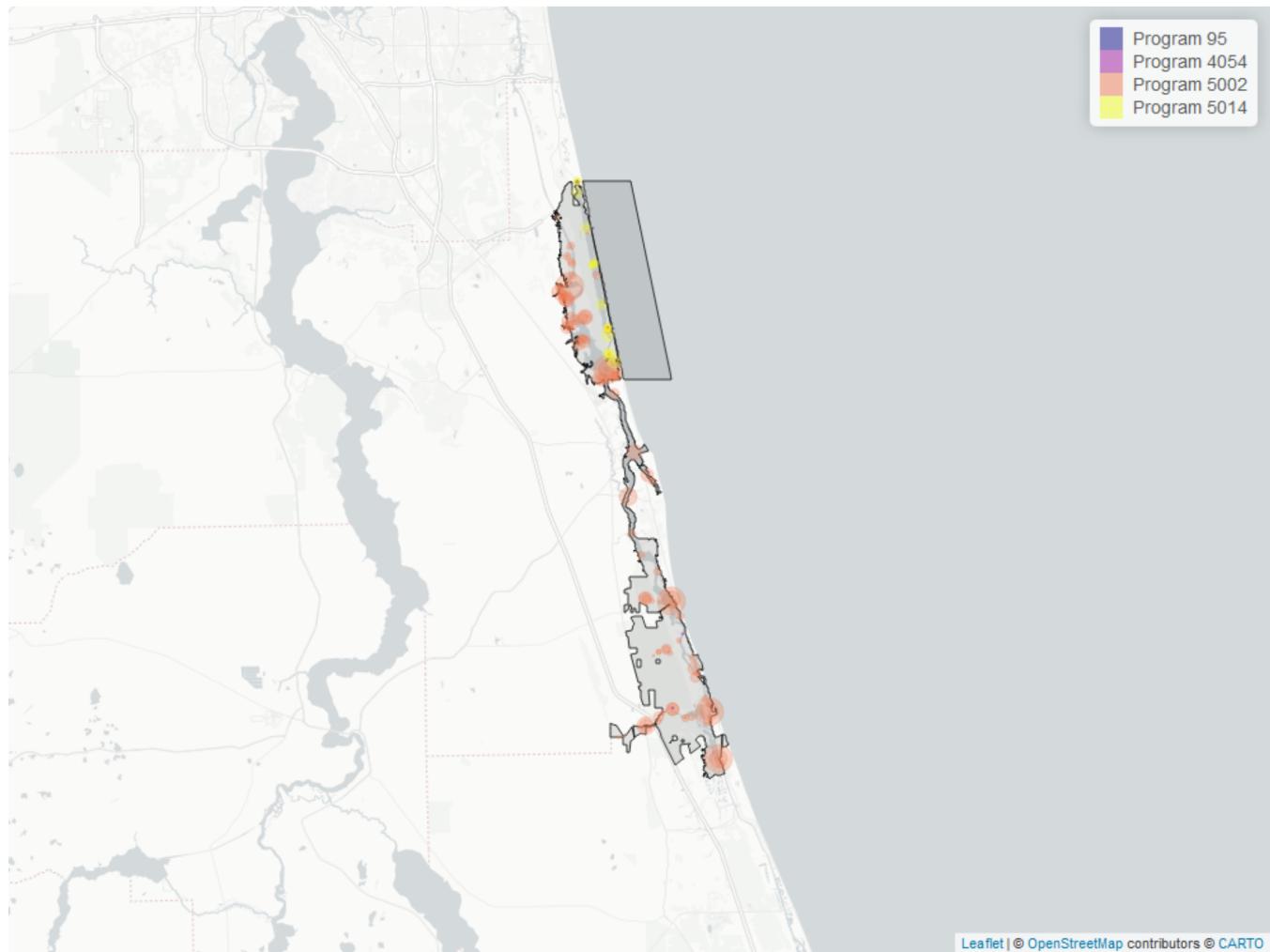


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	2194	22	81	TRUE	0.0716	0.1710	0.1513333	79.61967	7.2931	0.7749	0

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 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	1975	1999	2023
5014	254	2017	2022
4054	4	2018	2019
95	3	2012	2013

Program names:

5002 - Florida STORET / WIN

5014 - Guana River and Guana Lake Water Quality Monitoring

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

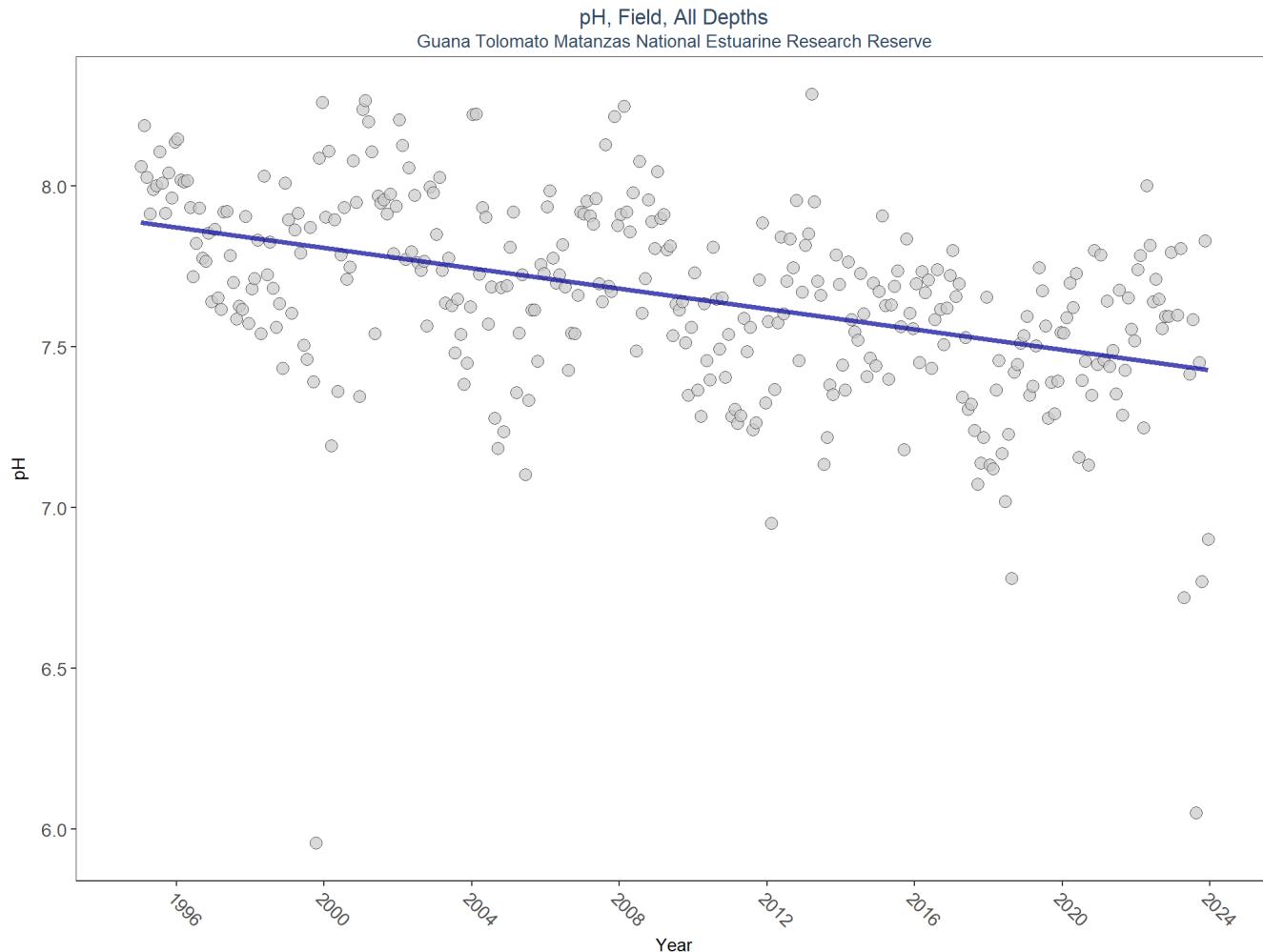
95 - Harmful Algal Bloom Marine Observation Network

There are no qualifying Value Qualifiers for Dissolved Oxygen Saturation in Guana Tolomato Matanzas National Estuarine Research Reserve

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

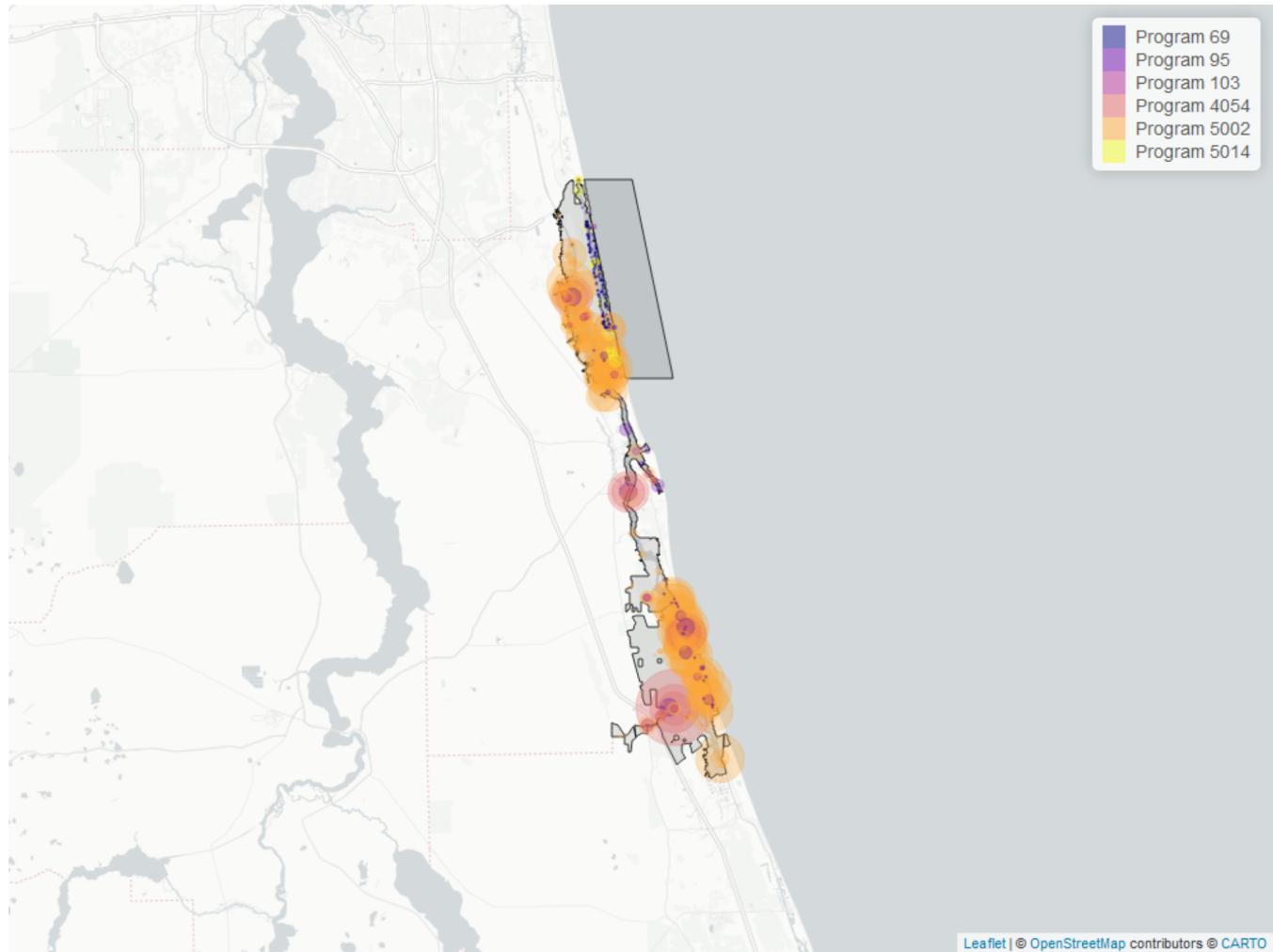


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	17684	29	7.8	TRUE	-0.368	0.0000	-0.01581572	7.887555	3.1729	0.9882	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for pH



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

Table 14: Programs contributing data for pH

ProgramID	N_Data	YearMin	YearMax
5002	14424	1995	2023
4054	2801	2002	2020
95	393	2007	2018
5014	283	2017	2022
69	176	2001	2010
103	168	2020	2021

Program names:

5002 - Florida STORET / WIN

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

95 - Harmful Algal Bloom Marine Observation Network

5014 - Guana River and Guana Lake Water Quality Monitoring

69 - Fisheries-Independent Monitoring (FIM) Program

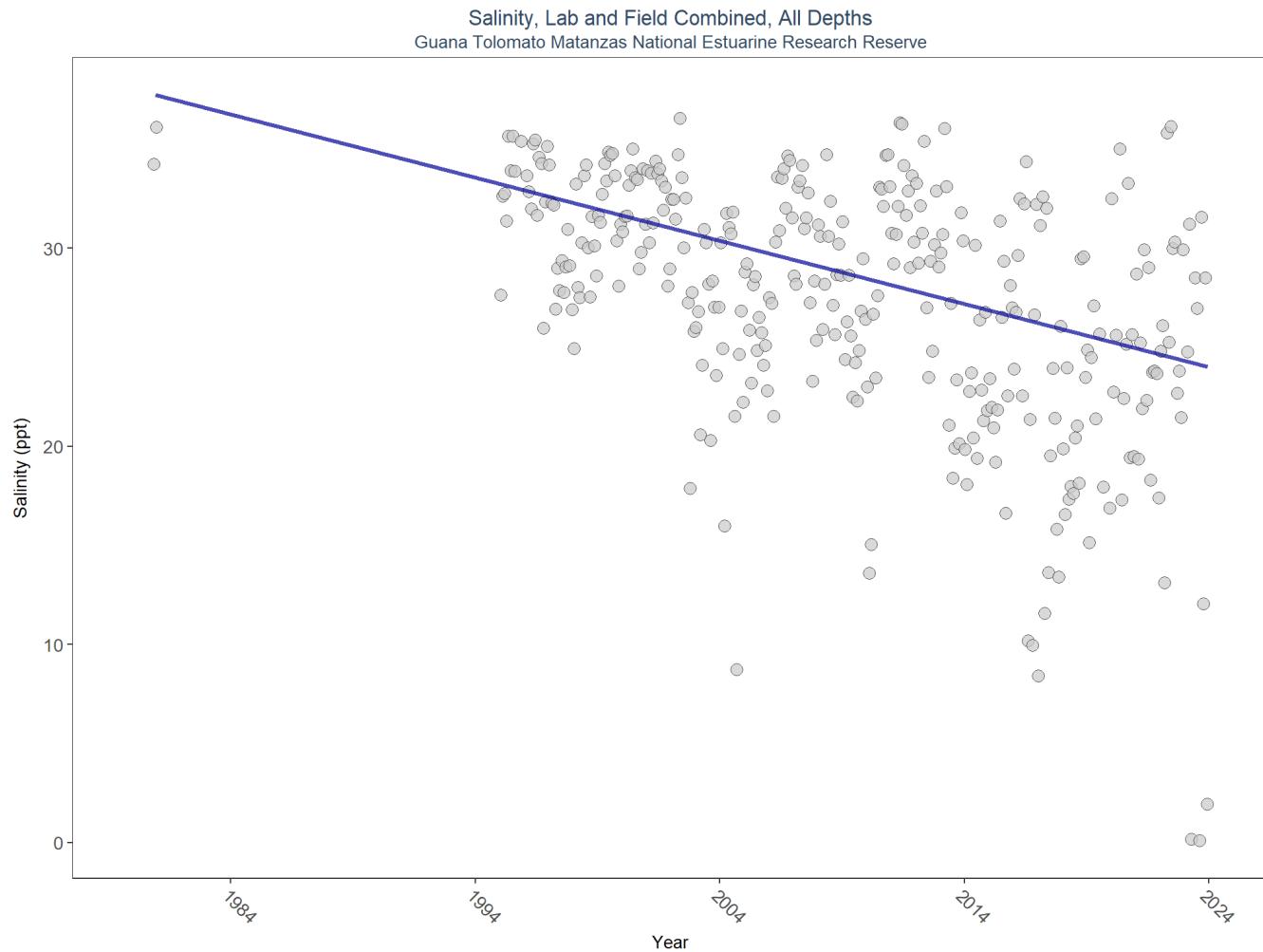
103 - EPA STOrage and RETrieval Data Warehouse (STORET)

There are no qualifying Value Qualifiers for pH in Guana Tolomato Matanzas National Estuarine Research Reserve

Salinity - Discrete Water Quality

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

Seasonal Kendall-Tau Trend Analysis

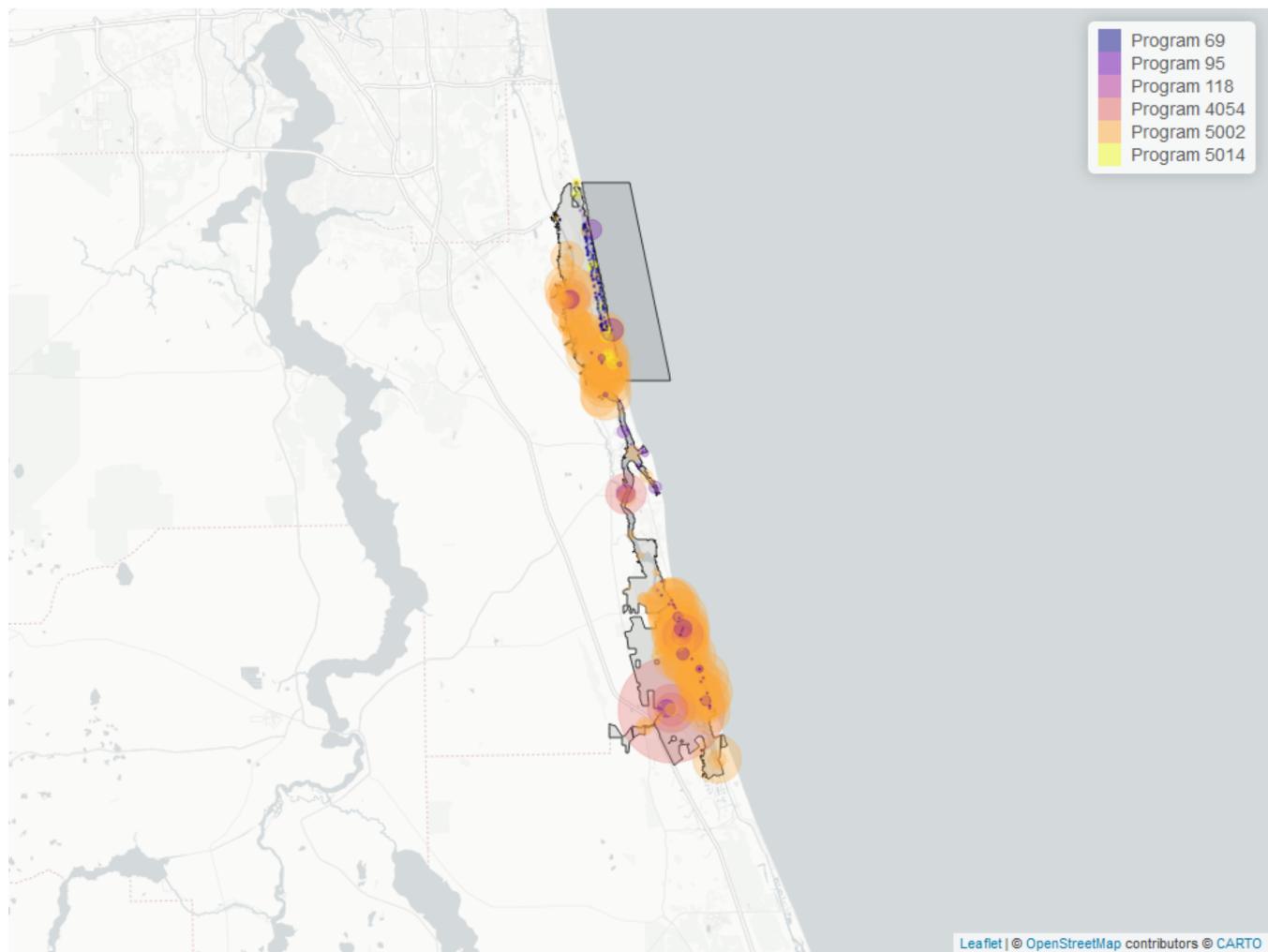


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	24767	30	31.8	TRUE	-0.3585	0.0000	-0.3190867	38.04552	3.688	0.9782	-1

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	20468	1995	2023
4054	3361	2002	2019
95	556	1980	2018
5014	283	2017	2022
69	176	2001	2010
118	2	2015	2015

Program names:

5002 - Florida STORET / WIN

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

95 - Harmful Algal Bloom Marine Observation Network

5014 - Guana River and Guana Lake Water Quality Monitoring

69 - Fisheries-Independent Monitoring (FIM) Program

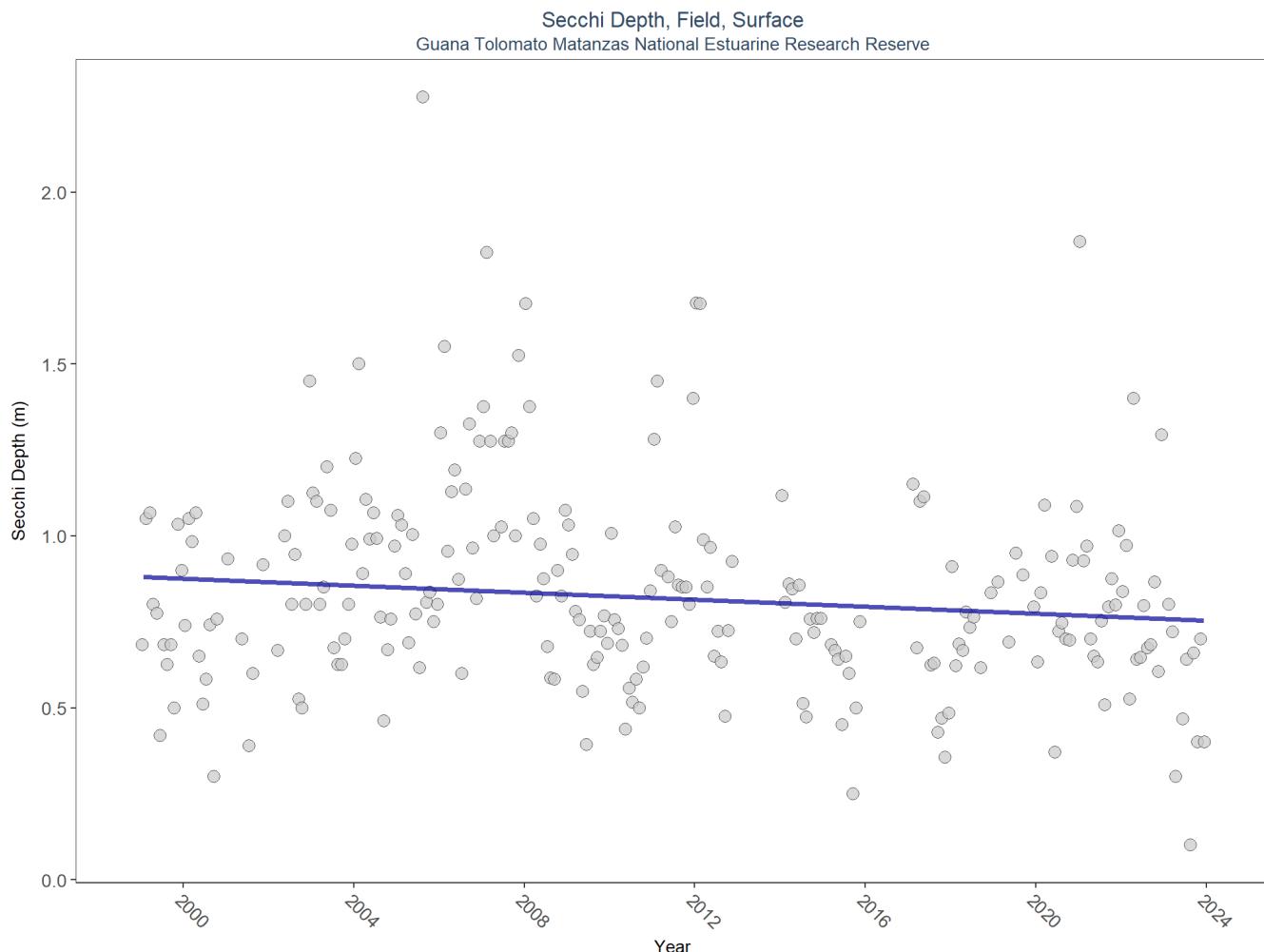
118 - National Aquatic Resource Surveys, National Coastal Condition Assessment

There are no qualifying Value Qualifiers for Salinity in Guana Tolomato Matanzas National Estuarine Research Reserve

Secchi Depth - Discrete Water Quality

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

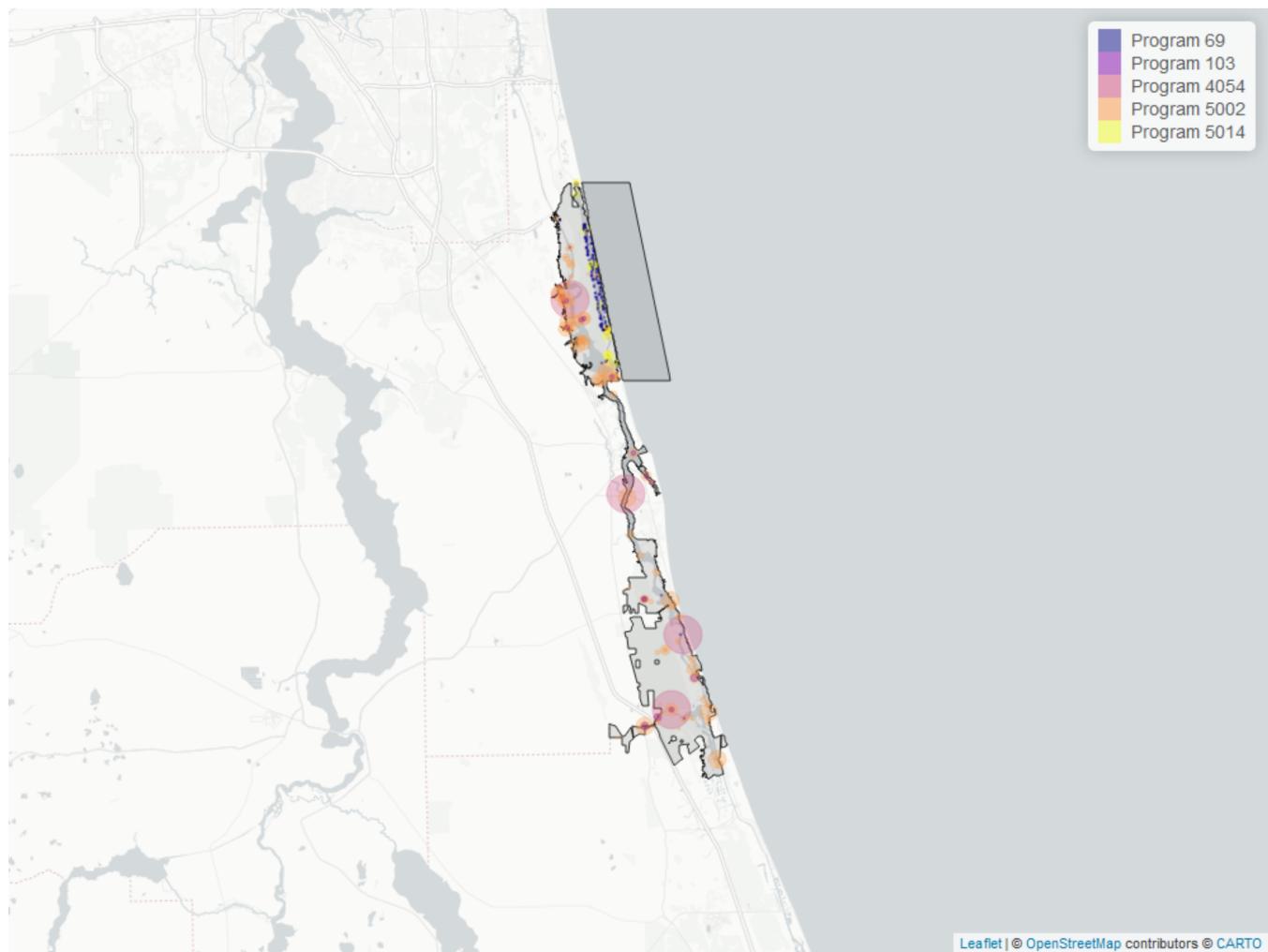
Seasonal Kendall-Tau Trend Analysis



p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Secchi Depth



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

Table 16: Programs contributing data for Secchi Depth

ProgramID	N_Data	YearMin	YearMax
5002	1268	1999	2023
4054	937	2002	2014
5014	240	2017	2022
69	176	2001	2010
103	93	2020	2021

Program names:

5002 - Florida STORET / WIN

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

5014 - Guana River and Guana Lake Water Quality Monitoring

69 - Fisheries-Independent Monitoring (FIM) 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 17: Value Qualifiers for Secchi Depth

Year	$N_{_Total}$	$N_{_S}$	$perc_{_S}$
2017	65	1	1.5
2018	73	1	1.4
2019	32	3	9.4
2020	171	13	7.6
2021	279	10	3.6
2022	180	15	8.3
2023	35	1	2.9

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

Programs containing Value Qualified data:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

5002 - Florida STORET / WIN

5014 - Guana River and Guana Lake Water Quality Monitoring

Total Nitrogen - Discrete Water Quality

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

Total Nitrogen Calculation:

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

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

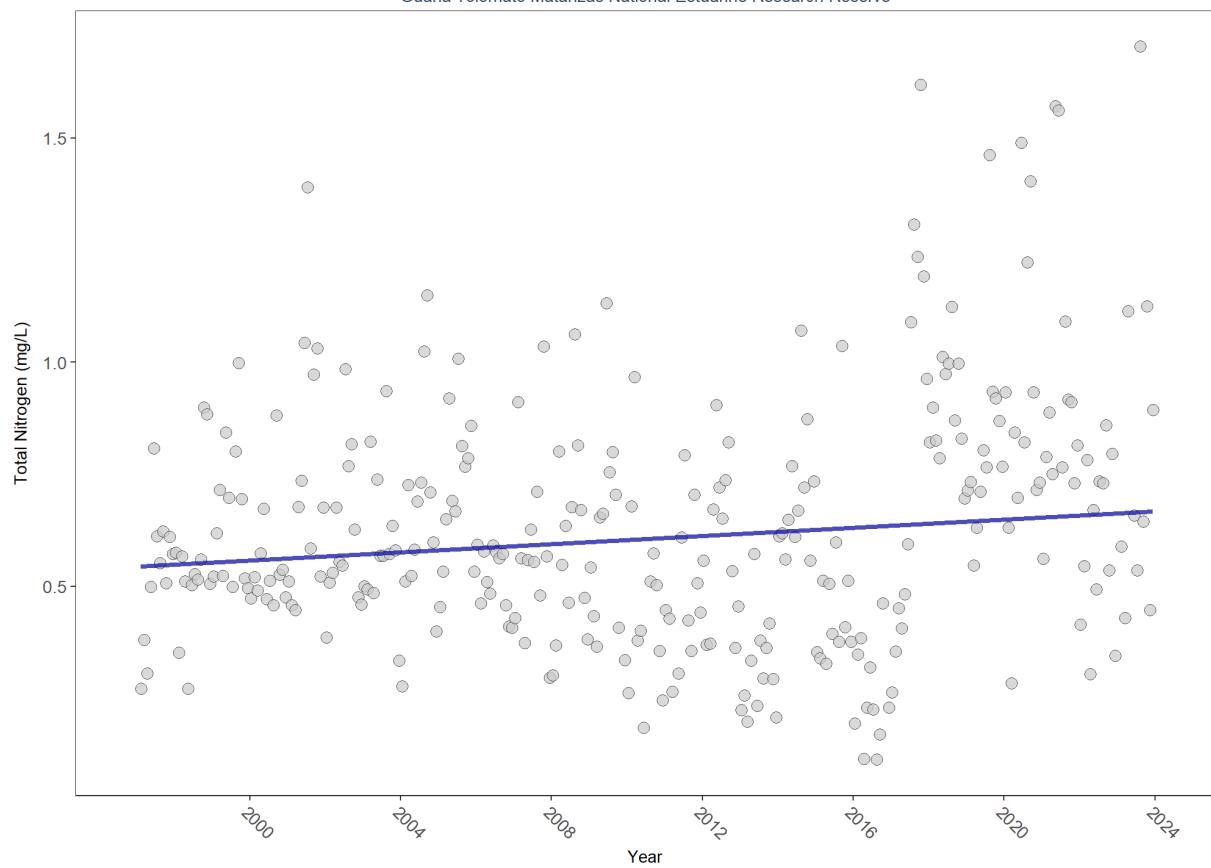
Additional Information:

- Rules for use of sample fraction:
 - FDEP report that if both “Total” and “Dissolved” are reported, only “Total” is used. If the total is not reported, they do use dissolved as a best available replacement.
 - An analysis of all SEACAR data shows that 90% of all possible TN calculations can be done using nitrogen components with the same sample fraction, rather than use nitrogen components with mixed total/dissolved sample fractions. In other words, TN can be calculated when TKN and NO_3O_2 are both total sample fraction, or when both are dissolved sample fraction. This is important, because then the calculated TN value is not based on components with mixed sample fractions.
- Values inserted into data:
 - ParameterName = “Total Nitrogen”
 - SEACAR_QAACFlagCode = “1Q”

- SEACAR_QAQC_Description = “SEACAR Calculated”

Seasonal Kendall-Tau Trend Analysis

Total Nitrogen, Lab, All Depths
Guana Tolomato Matanzas National Estuarine Research Reserve

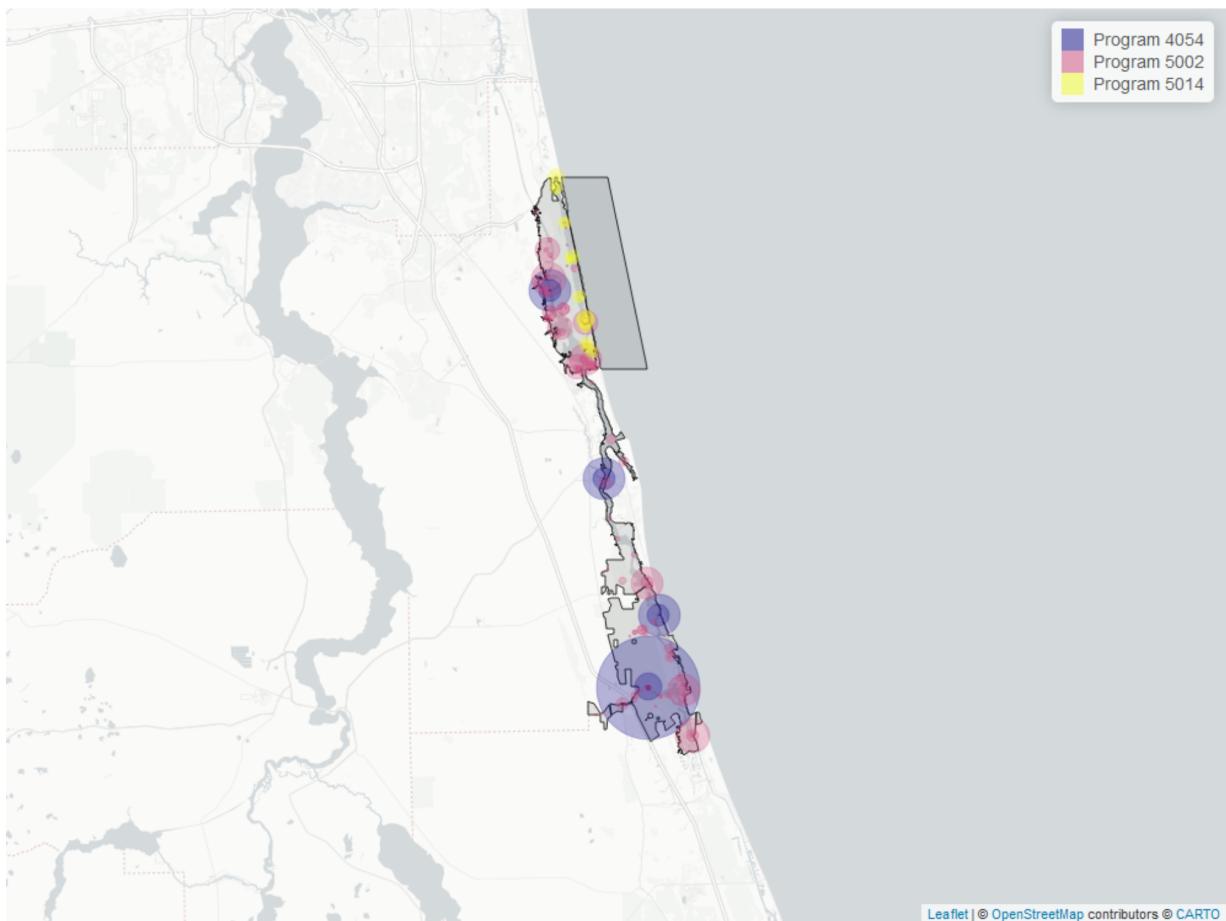


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	5368	27	0.54535	TRUE	0.0925	0.0199	0.00455668	0.5449409	3.3891	0.9845	1

$p < 0.00005$ 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

ProgramID	N_Data	YearMin	YearMax
4054	3002	2002	2020
5002	1998	1997	2023
5014	550	2017	2022

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

5002 - Florida STORET / WIN

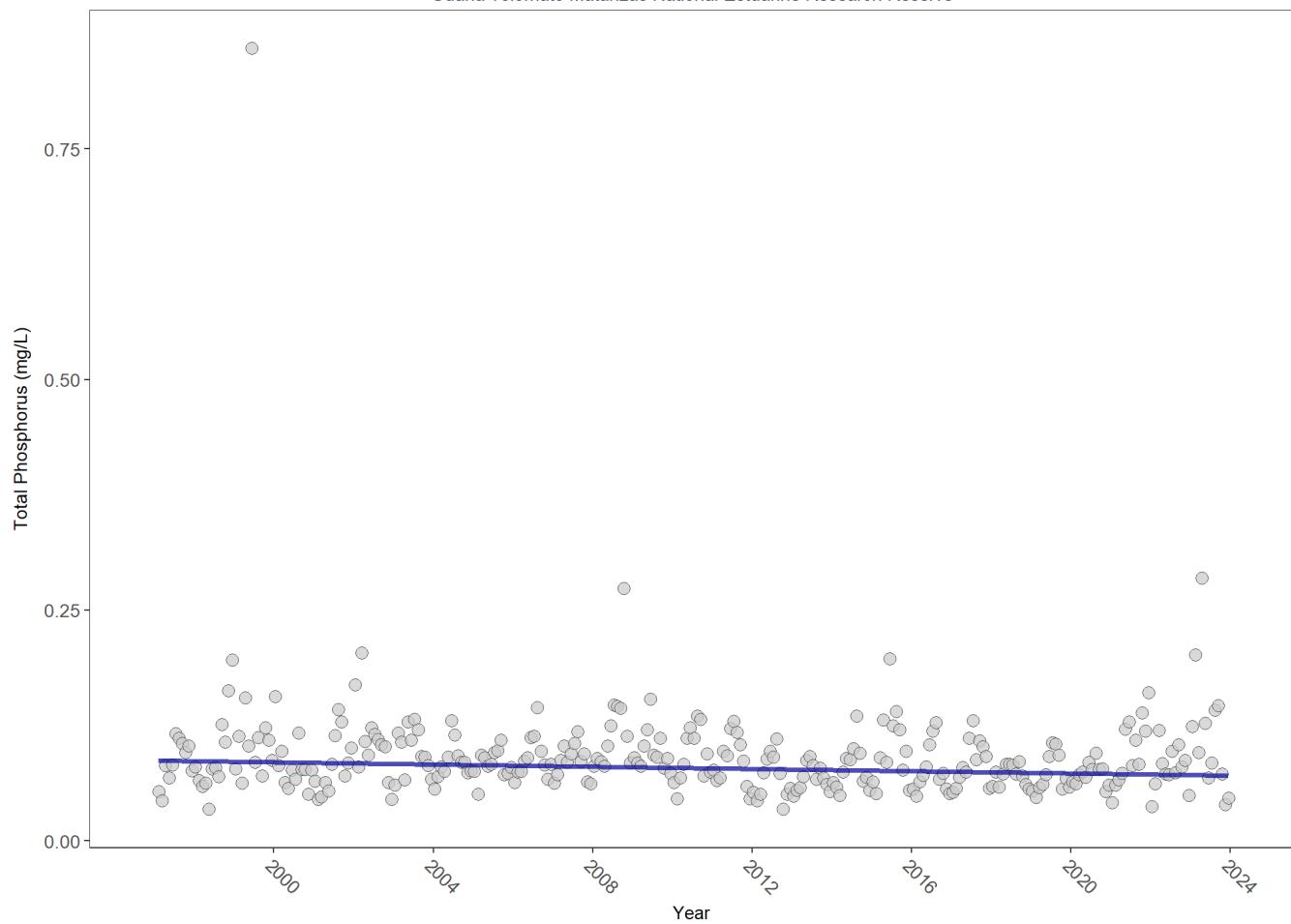
5014 - Guana River and Guana Lake Water Quality Monitoring

There are no qualifying Value Qualifiers for Total Nitrogen in Guana Tolomato Matanzas National Estuarine Research Reserve

Total Phosphorus - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

Total Phosphorus, Lab, All Depths
Guana Tolomato Matanzas National Estuarine Research Reserve

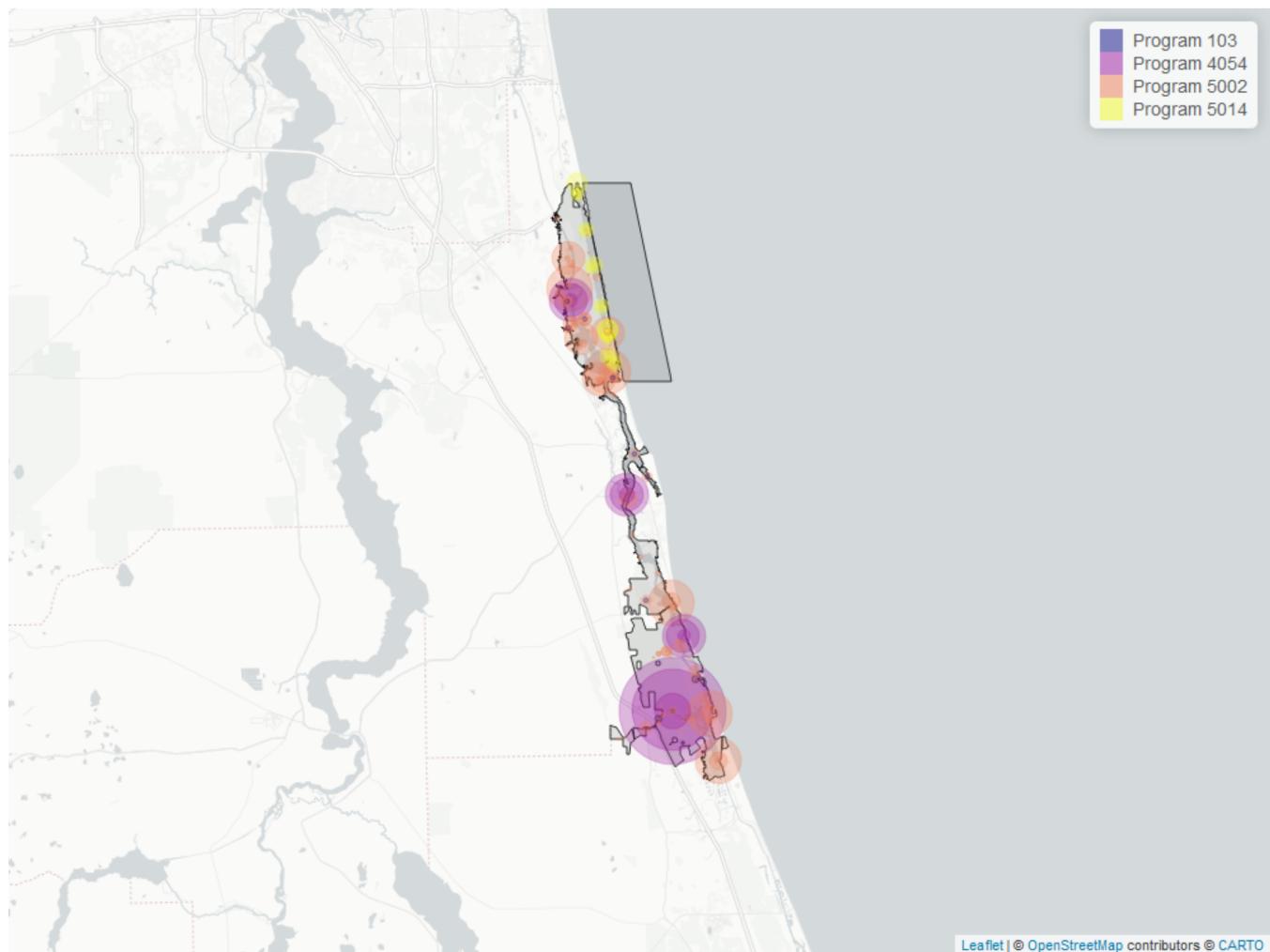


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	8011	27	0.074	TRUE	-0.1388	0.0005	-0.0006093633	0.08704061	11.181	0.4282	-1

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 19: Programs contributing data for Total Phosphorus

ProgramID	N_Data	YearMin	YearMax
4054	4495	2002	2020
5002	3137	1997	2023
5014	620	2017	2023
103	59	2020	2021

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

5002 - Florida STORET / WIN

5014 - Guana River and Guana Lake Water Quality Monitoring

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 20: Value Qualifiers for Total Phosphorus

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
1997	102					1	1.0
1998	120			1	0.8	5	4.2
1999	154			7	4.6	8	5.2
2000	124			3	2.4	1	0.8
2001	114			9	7.9		
2002	256			2	0.8		
2004	371	3	0.8				
2005	524	127	24.2			1	0.2
2006	356	104	29.2				
2007	335	92	27.5				
2008	344	79	23.0	1	0.3		
2009	365	96	26.3				
2010	358	94	26.3				
2011	349	70	20.1				
2012	358	89	24.9				
2013	356	94	26.4				
2014	574	74	12.9				
2015	374	92	24.6	14	3.7		
2016	349	91	26.1				
2017	344	45	13.1				
2018	370					3	0.8
2019	385					2	0.5
2020	388	18	4.6	8	2.1	1	0.3
2021	313	23	7.3	2	0.6	36	11.5
2022	224	10	4.5	2	0.9	8	3.6
2023	73	1	1.4				

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:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

5002 - Florida STORET / WIN

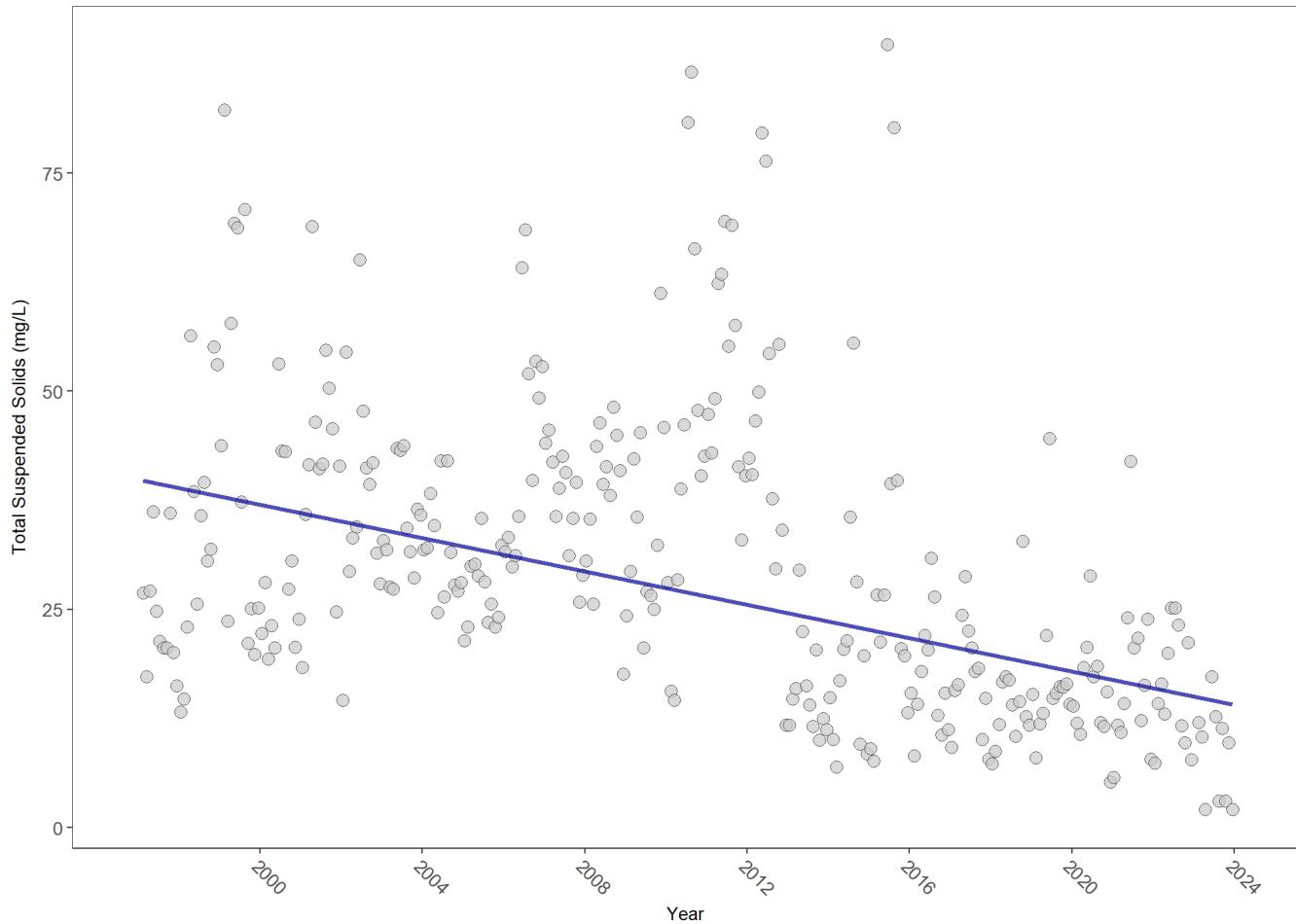
5014 - Guana River and Guana Lake Water Quality Monitoring

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
Guana Tolomato Matanzas National Estuarine Research Reserve

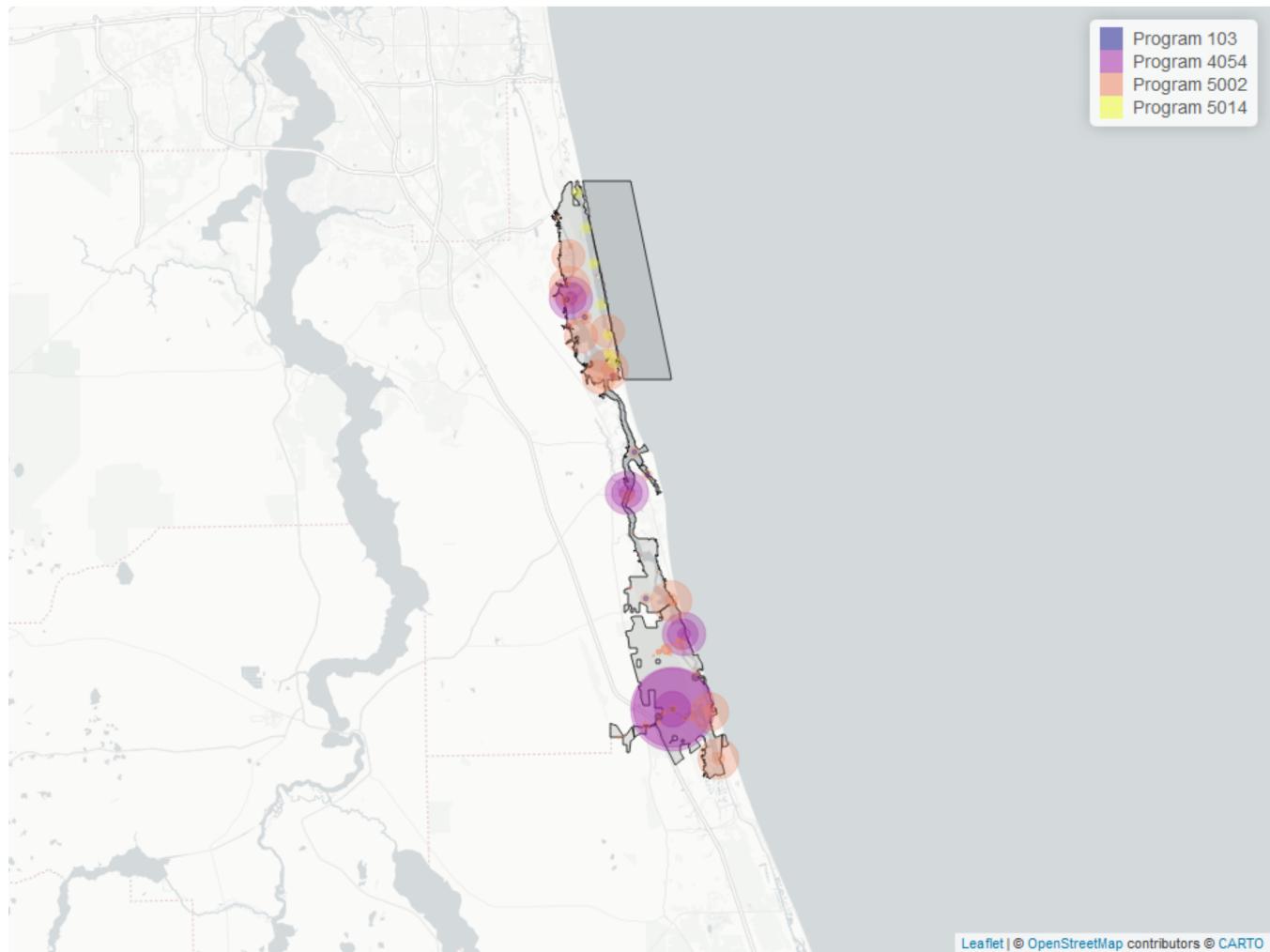


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	6130	27	23	TRUE	-0.3751	0.0000	-0.9557633	39.87559	4.3971	0.9568	-1

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 21: Programs contributing data for Total Suspended Solids

<i>ProgramID</i>	<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>
4054	3713	2002	2020
5002	2393	1997	2023
5014	139	2018	2022
103	60	2020	2021

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program
 5002 - Florida STORET / WIN

5014 - Guana River and Guana Lake Water Quality Monitoring
 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 22: Value Qualifiers for Total Suspended Solids

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
1998	120			2	1.7		
1999	120			2	1.7	1	0.8
2000	117			2	1.7		
2001	114			21	18.4		
2002	166	1	0.6	11	6.6	2	1.2
2004	207	3	1.4				
2005	230	10	4.3				
2009	365	11	3.0			3	0.8
2010	357	6	1.7	10	2.8	6	1.7
2011	332	4	1.2	7	2.1		
2012	293	17	5.8	1	0.3		
2013	299	93	31.1			1	0.3
2014	512	93	18.2				
2015	323	83	25.7			3	0.9
2016	294	90	30.6	2	0.7	2	0.7
2017	261	52	19.9	1	0.4		
2018	271	105	38.8	1	0.4	3	1.1
2019	288	69	24.0	3	1.0		
2020	263	71	27.0	1	0.4	3	1.1
2021	178	39	21.9	5	2.8	5	2.8
2022	116	36	31.0			3	2.6
2023	24	11	45.8			1	4.2

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:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

5002 - Florida STORET / WIN

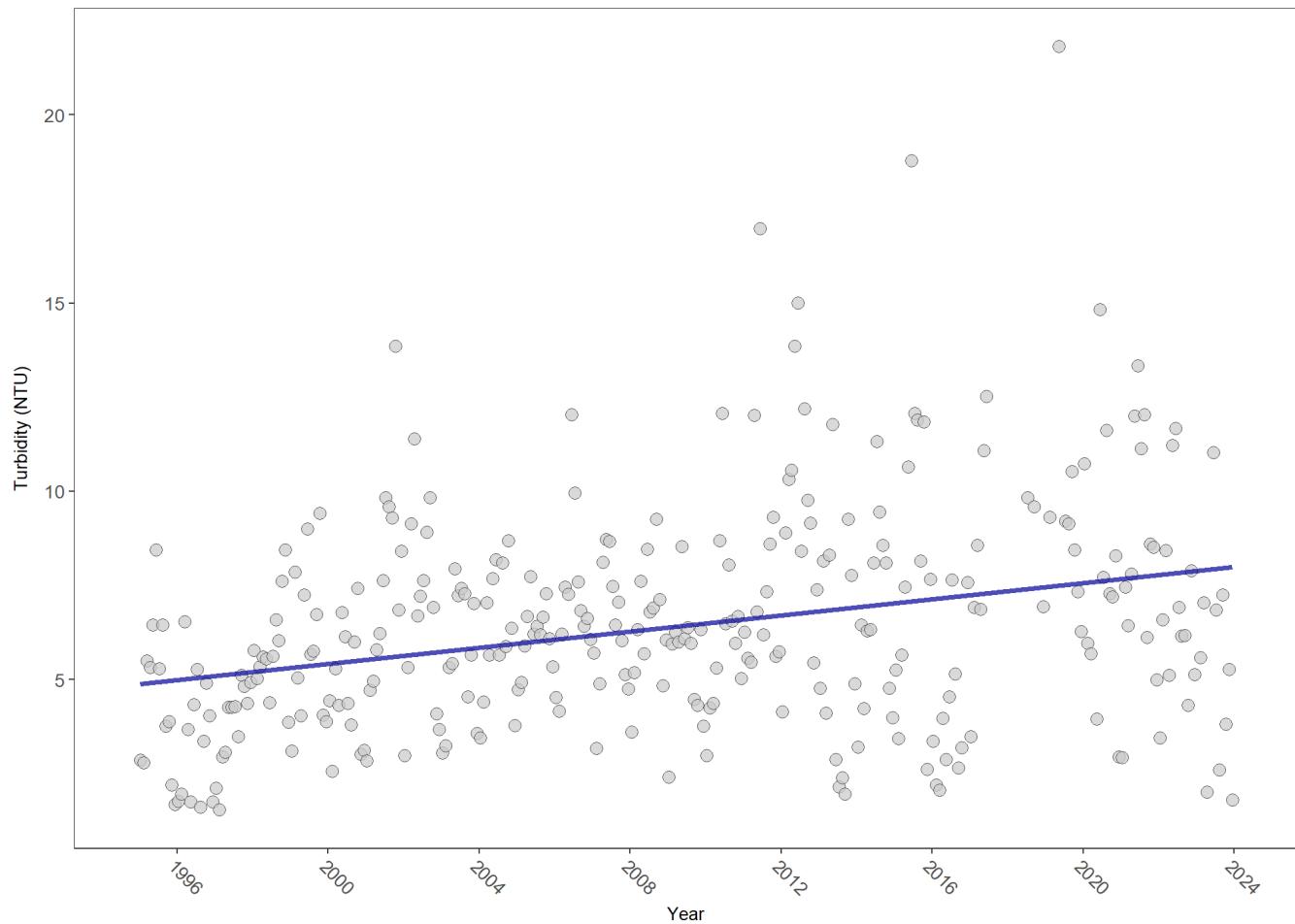
5014 - Guana River and Guana Lake Water Quality Monitoring

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
Guana Tolomato Matanzas National Estuarine Research Reserve

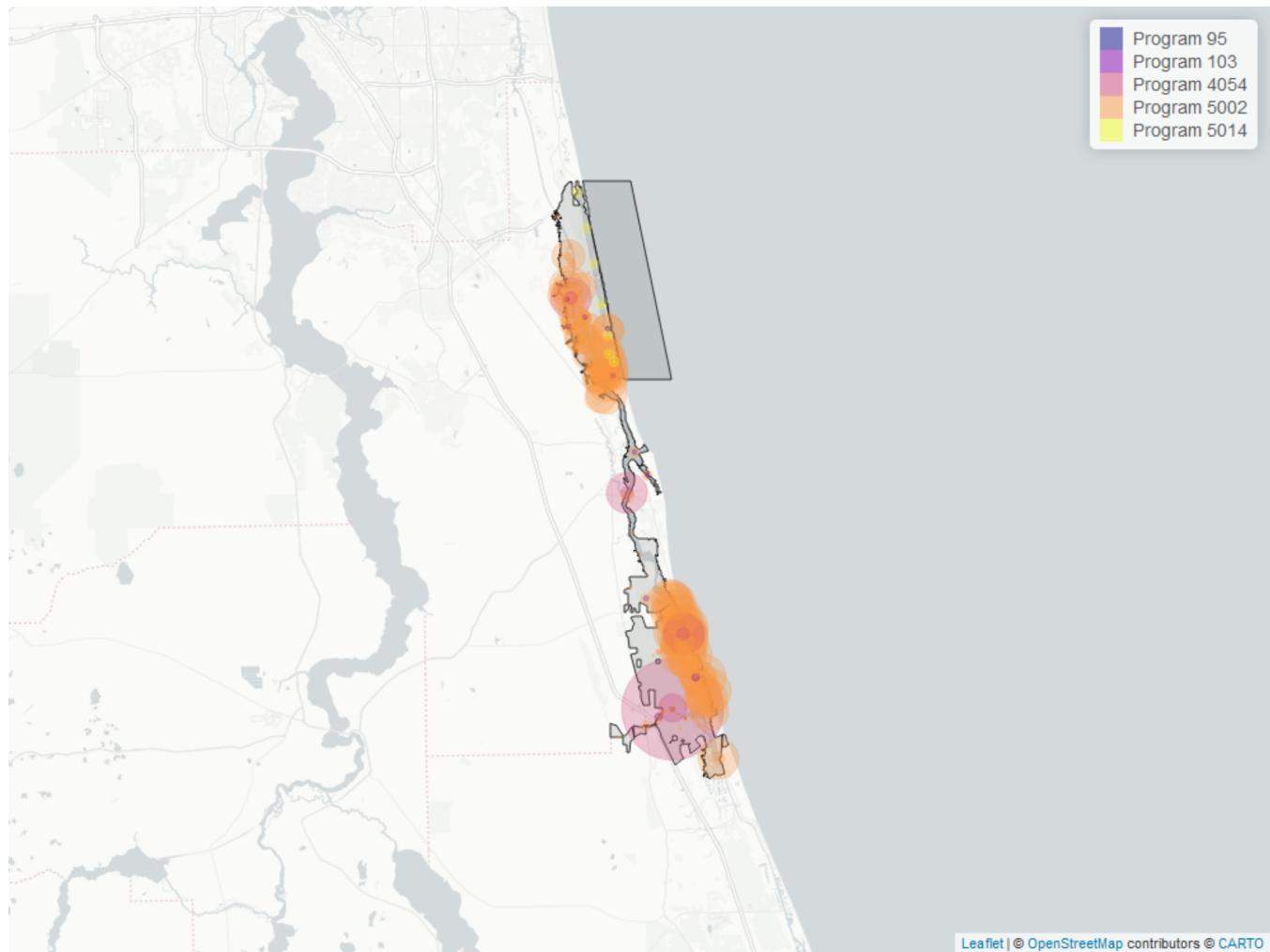


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	17118	29	4.8	TRUE	0.268	0.0000	0.1075408	4.873193	8.6739	0.652	1

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 23: Programs contributing data for Turbidity

ProgramID	N_Data	YearMin	YearMax
5002	14347	1995	2023
4054	2581	2002	2020
5014	139	2018	2022
103	59	2020	2021
95	4	2012	2012

Program names:

5002 - Florida STORET / WIN

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

5014 - Guana River and Guana Lake Water Quality Monitoring

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

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 24: Value Qualifiers for Turbidity

Year	N_{Total}	N_I	perc_I	N_Q	perc_Q	N_U	perc_U
1997	1279			2	0.2		
1998	1062			3	0.3		
2001	810			1	0.1		
2010	788	1	0.1	2	0.2		
2011	686			7	1.0		
2013	59	1	1.7	10	17.0		
2015	81	1	1.2	11	13.6		
2016	61	3	4.9	1	1.6		
2019	150			7	4.7		
2020	182			3	1.6		
2021	177	1	0.6			1	0.6
2022	116	2	1.7				

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:

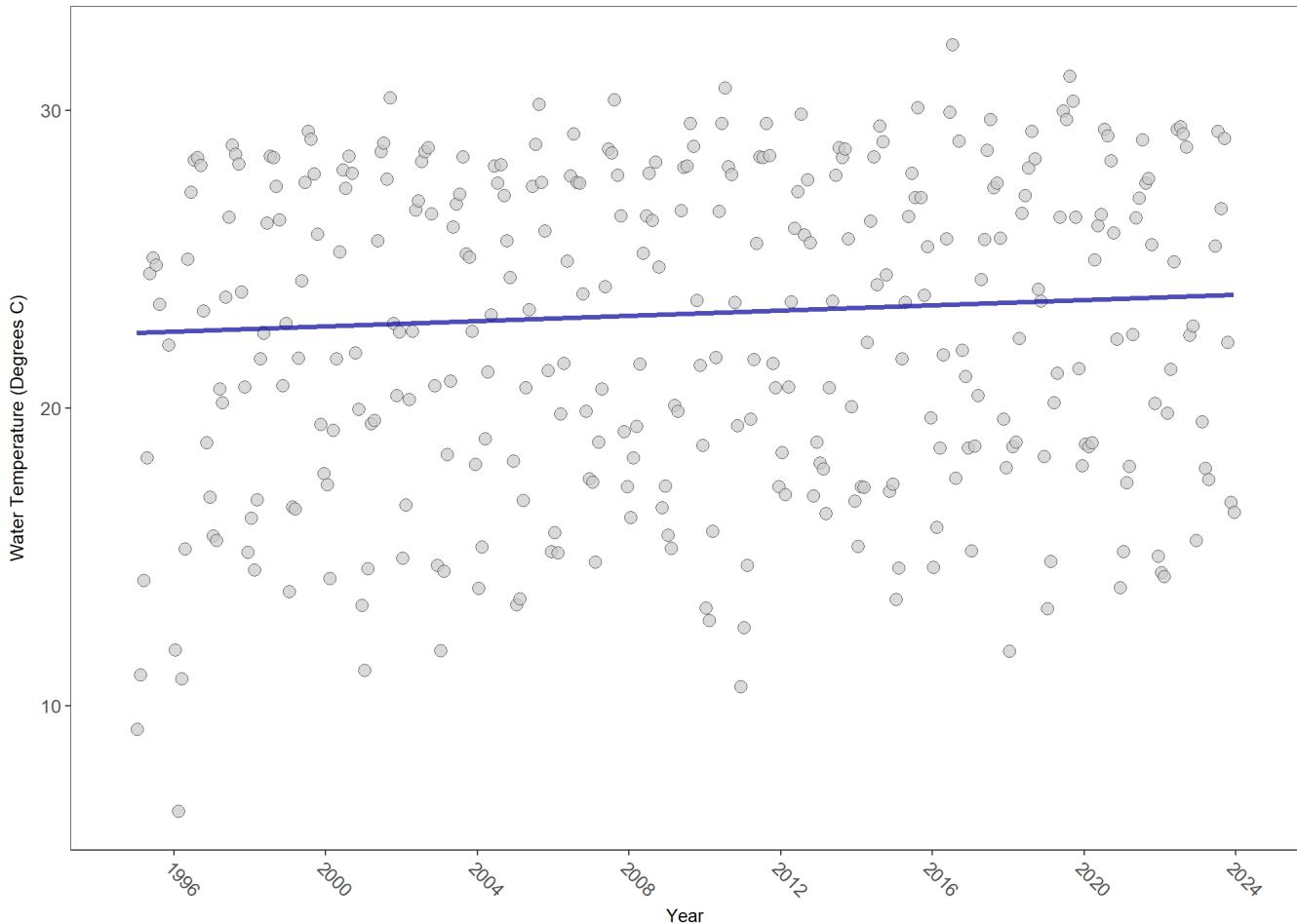
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program
 5002 - Florida STORET / WIN
 5014 - Guana River and Guana Lake Water Quality Monitoring

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
Guana Tolomato Matanzas National Estuarine Research Reserve

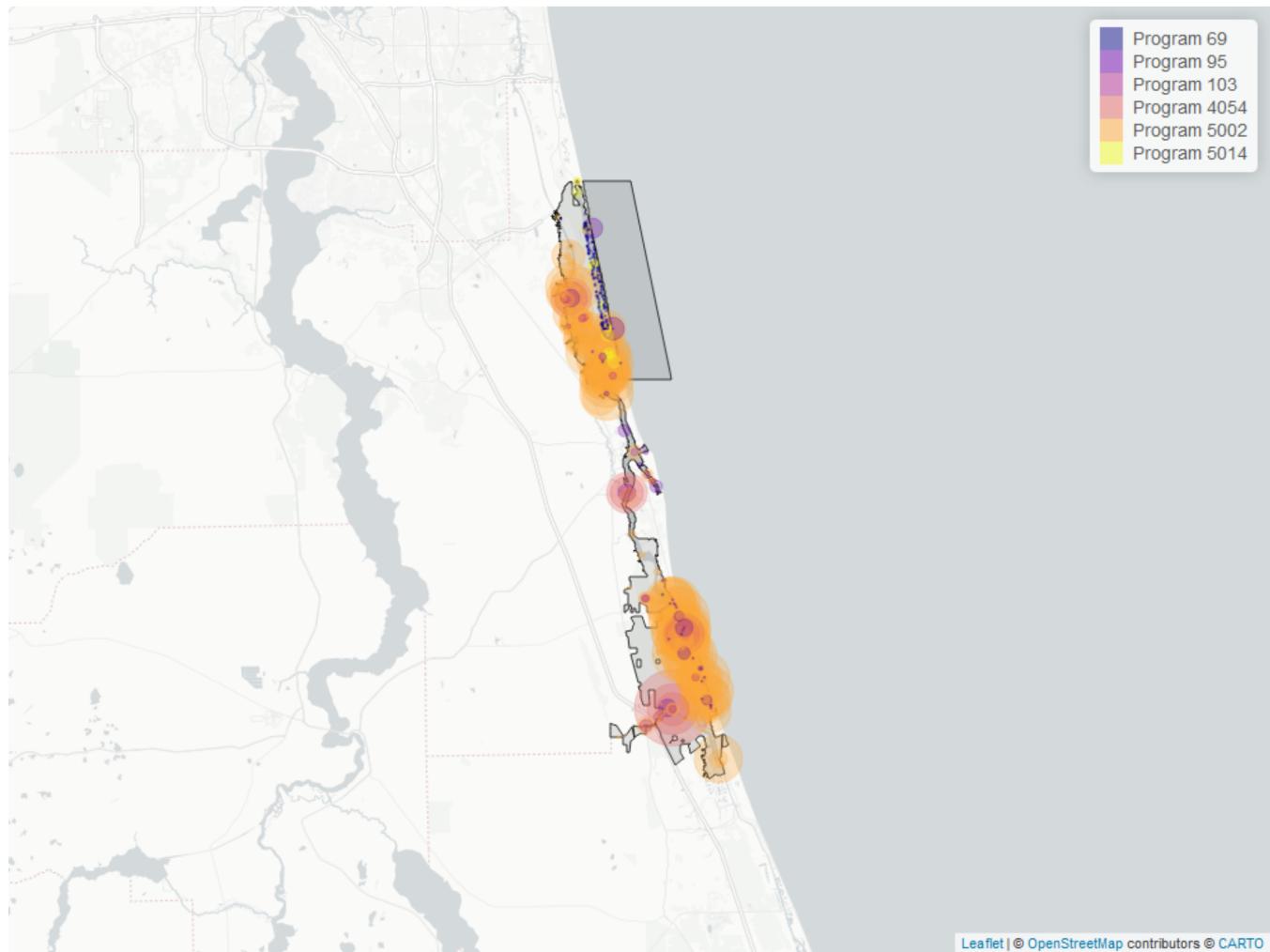


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	24240	29	23.3	TRUE	0.1665	0.0000	0.044238	22.52867	14.2868	0.2175	1

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 25: Programs contributing data for Water Temperature

ProgramID	N_Data	YearMin	YearMax
5002	20952	1995	2023
4054	2878	2002	2020
95	527	2007	2018
5014	283	2017	2022
69	176	2001	2010
103	168	2020	2021

Program names:

5002 - Florida STORET / WIN

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

95 - Harmful Algal Bloom Marine Observation Network

5014 - Guana River and Guana Lake Water Quality Monitoring

69 - Fisheries-Independent Monitoring (FIM) Program

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

There are no qualifying Value Qualifiers for Water Temperature in Guana Tolomato Matanzas National Estuarine Research Reserve

Water Quality - Continuous

The following files were used in the continuous analysis:

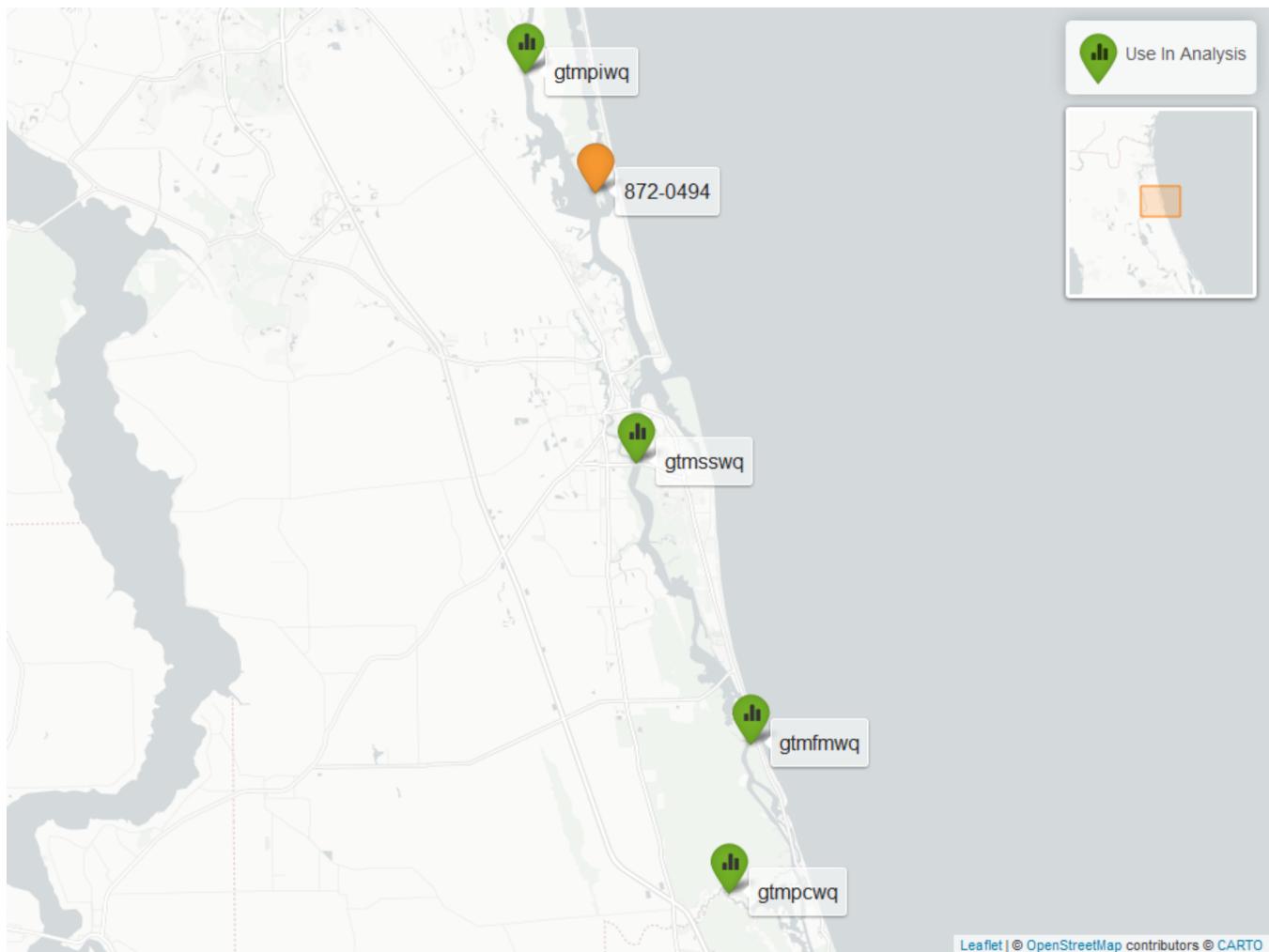
- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_NE-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_Saturation_NE-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_pH_NE-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Salinity_NE-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Turbidity_NE-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Water_Temperature_NE-2024-Mar-23.txt*

Table 26: Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
gtmfmwq	22	TRUE	DO , DOS , pH , Sal , Turb , TempW
gtmpcwq	21	TRUE	DO , DOS , pH , Sal , Turb , TempW
gtmpiwq	22	TRUE	DO , DOS , pH , Sal , Turb , TempW
gtmsswq	21	TRUE	DO , DOS , pH , Sal , Turb , TempW

Table 27: FDEP Bureau of Survey and Mapping Continuous Water Quality Program (5062)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
872-0494	2	FALSE	Sal , TempW



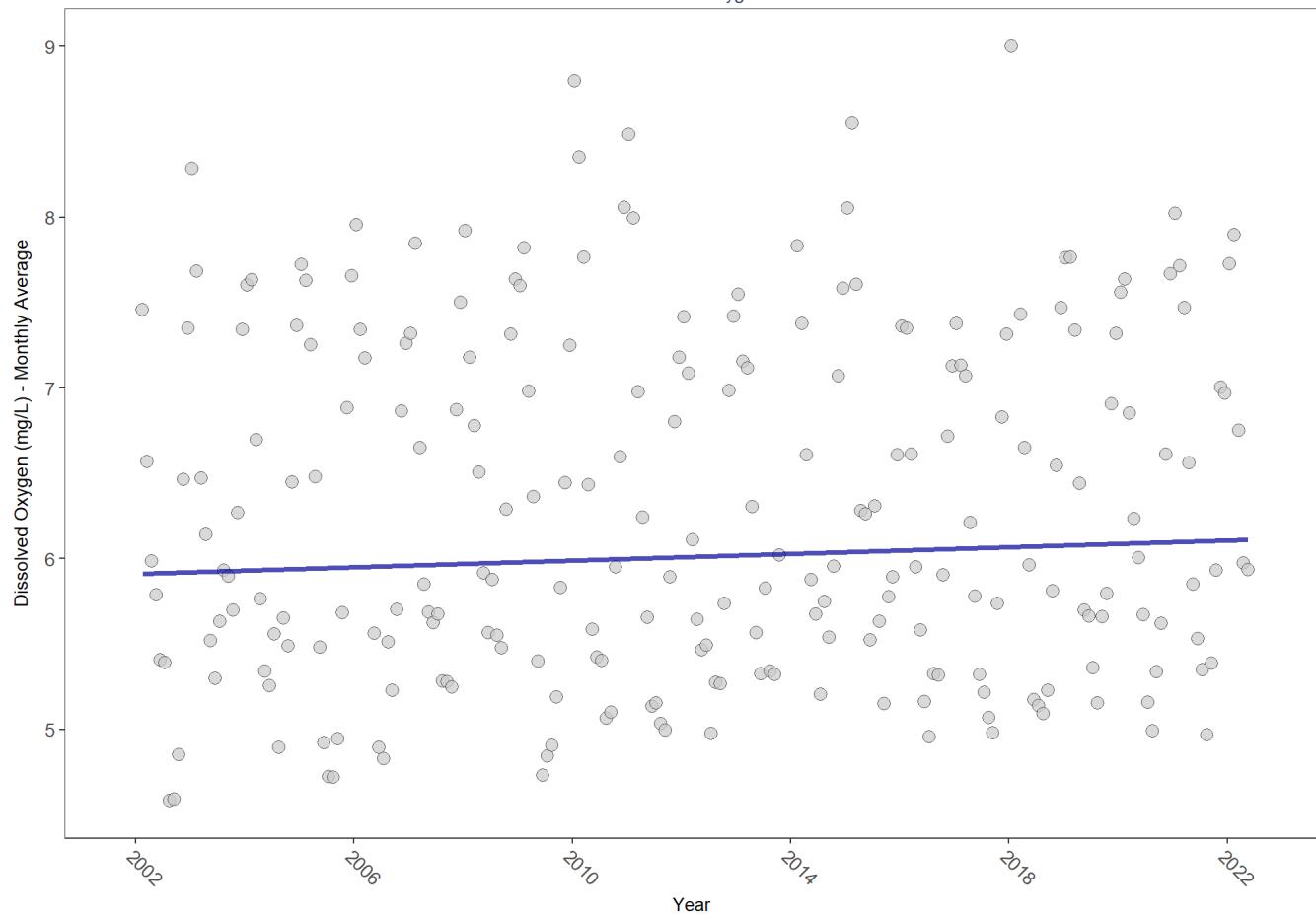
Map showing Continuous Water Quality Monitoring sampling locations within the boundaries of Guana Tolomato Matanzas National Estuarine Research Reserve. Sites marked as *Use In Analysis* are featured in this report.

Dissolved Oxygen - Continuous Water Quality

gtmsswq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmsswq
Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	573658	21	6.3	TRUE	0.1383	0.0026	0.009828629	5.91074	9.954	0.5345	1

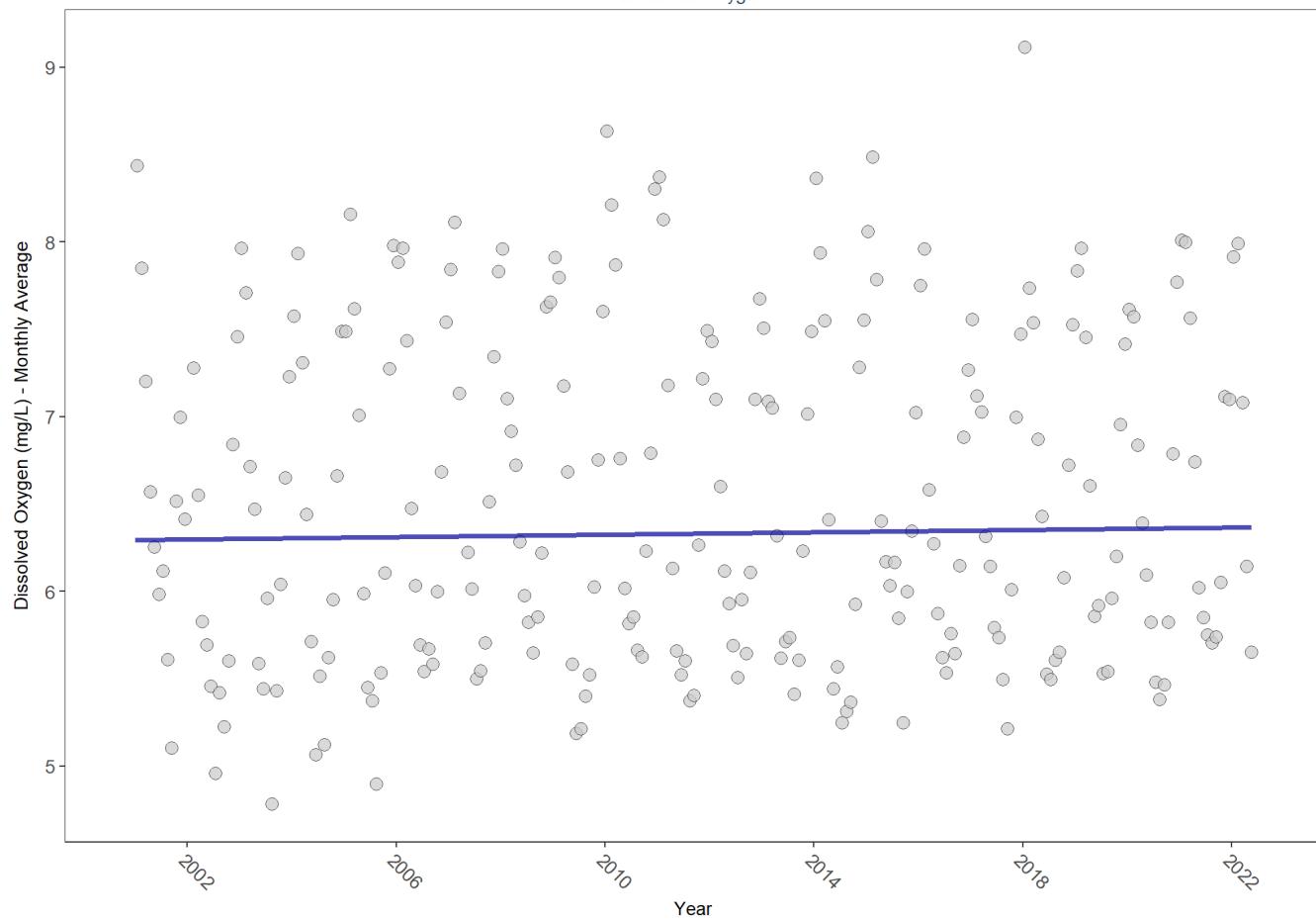
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

gtmfmwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmfmwq
Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	596140	22	6.5	TRUE	0.0561	0.2176	0.003407322	6.292628	5.3156	0.9149	0

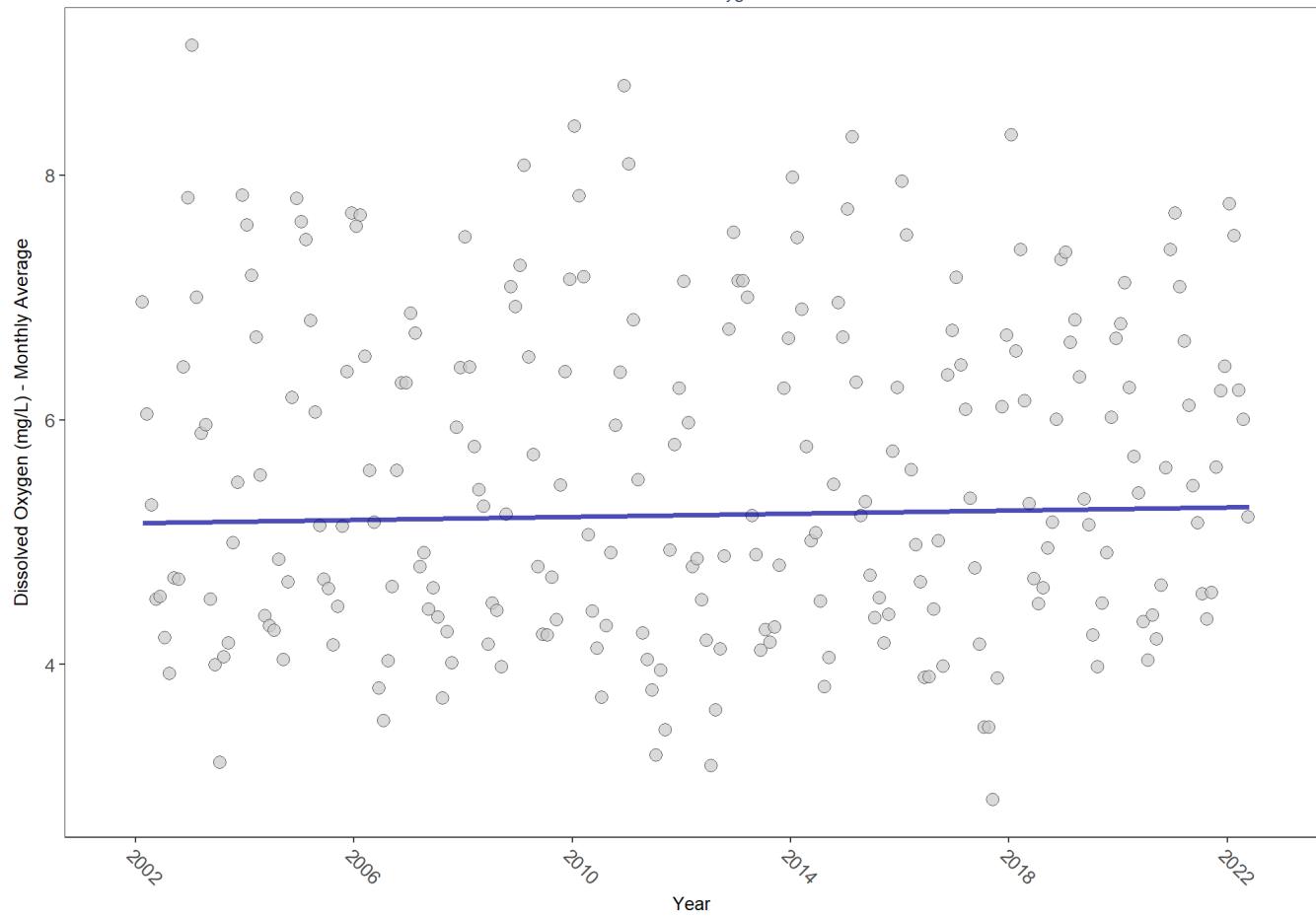
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

gtmpcwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmpcwq
Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	600043	21	5.5	TRUE	0.0468	0.2935	0.006489737	5.157244	15.2417	0.1717	0

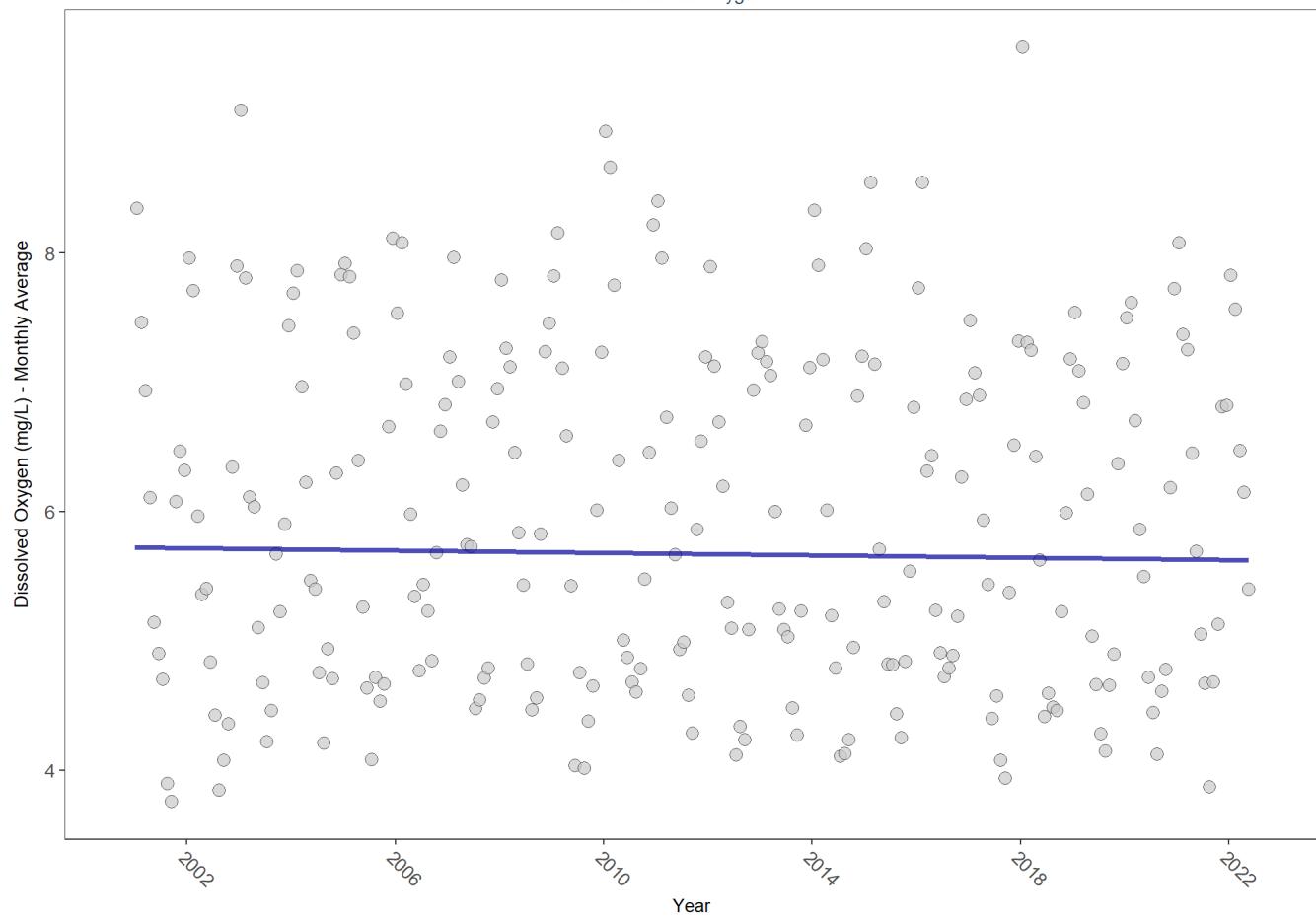
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

gttmpiwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gttmpiwq
Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	576064	22	5.9	TRUE	-0.0485	0.2940	-0.004492187	5.721386	3.1878	0.988	0

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

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

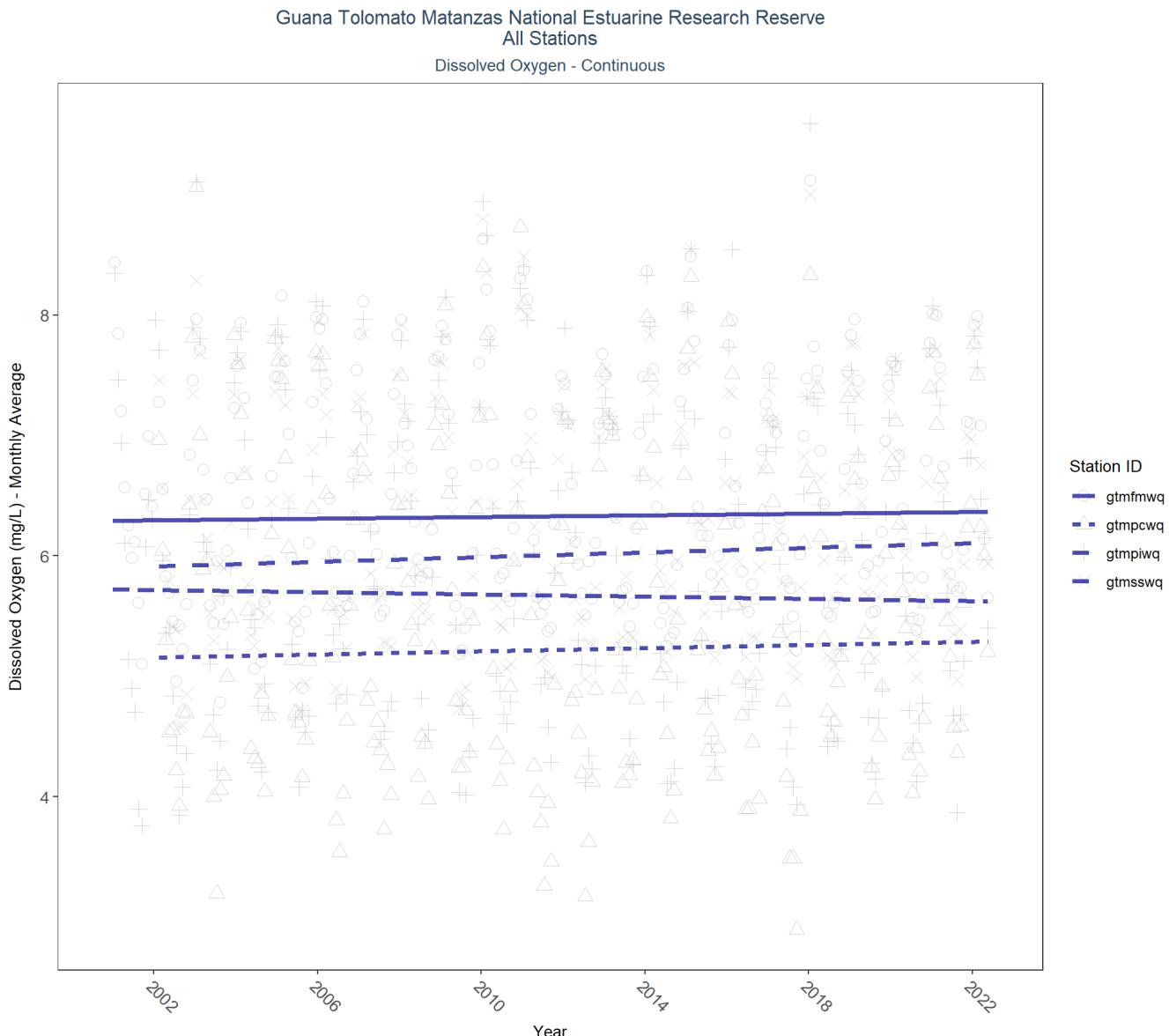


Table 28: Seasonal Kendall-Tau Results for All Stations - Dissolved Oxygen

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
gtmsswq	573658	21	2002 - 2022	6.3	0.14	5.91	0.01	0.0026
gtmfmwq	596140	22	2001 - 2022	6.5	0.06	6.29	0.00	0.2176
gtmcwq	600043	21	2002 - 2022	5.5	0.05	5.16	0.01	0.2935
gtmpiwq	576064	22	2001 - 2022	5.9	-0.05	5.72	0.00	0.2940

Dissolved Oxygen Saturation - Continuous Water Quality

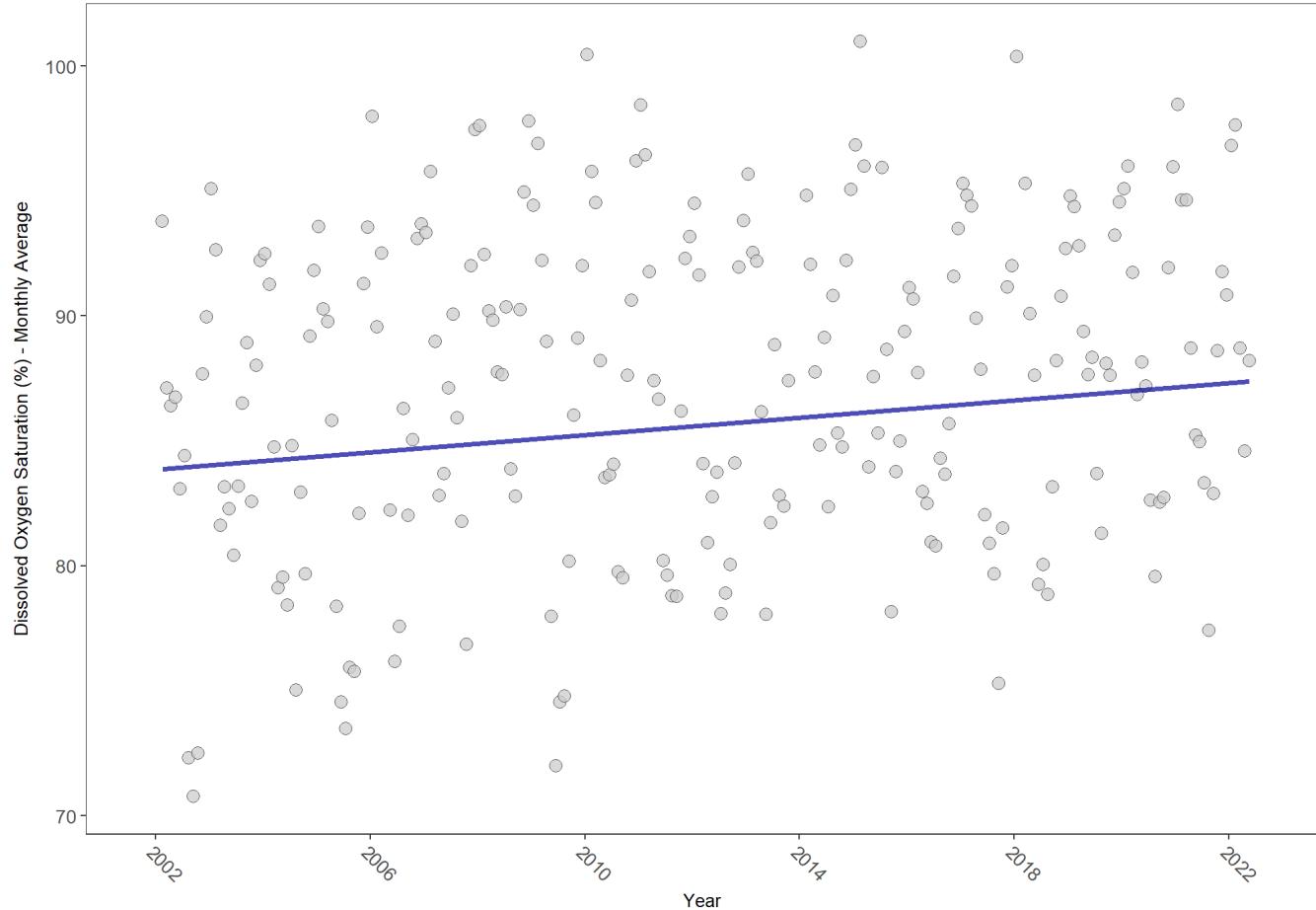
gtmsswq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve

gtmsswq

Dissolved Oxygen Saturation



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	579594	21	89.6	TRUE	0.2066	0.0000	0.1737915	83.84279	6.9462	0.8034	1

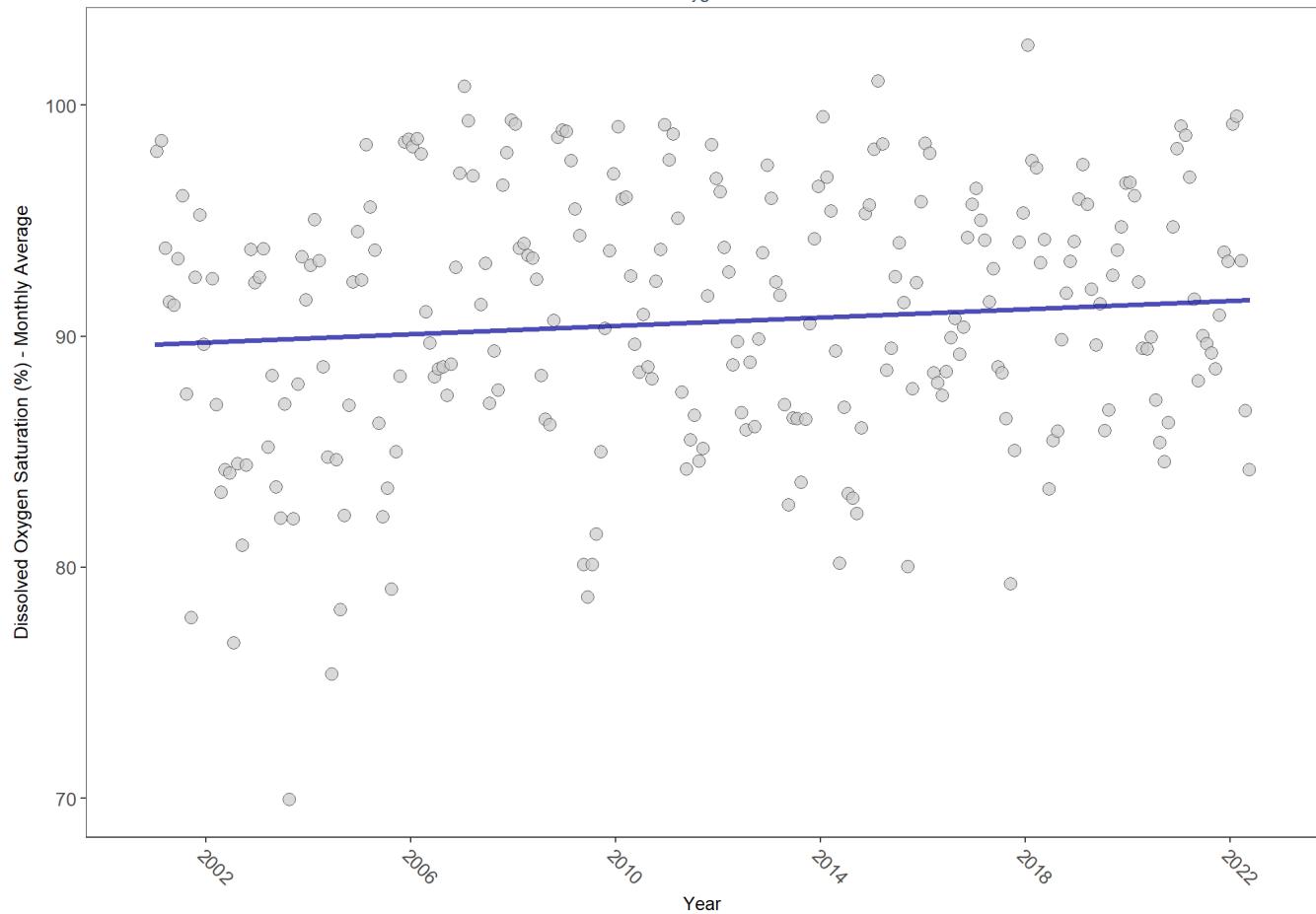
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

gtmfmwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmfmwq
Dissolved Oxygen Saturation



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	603708	22	92.6	TRUE	0.1244	0.0062	0.08940822	89.65478	6.8755	0.8091	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

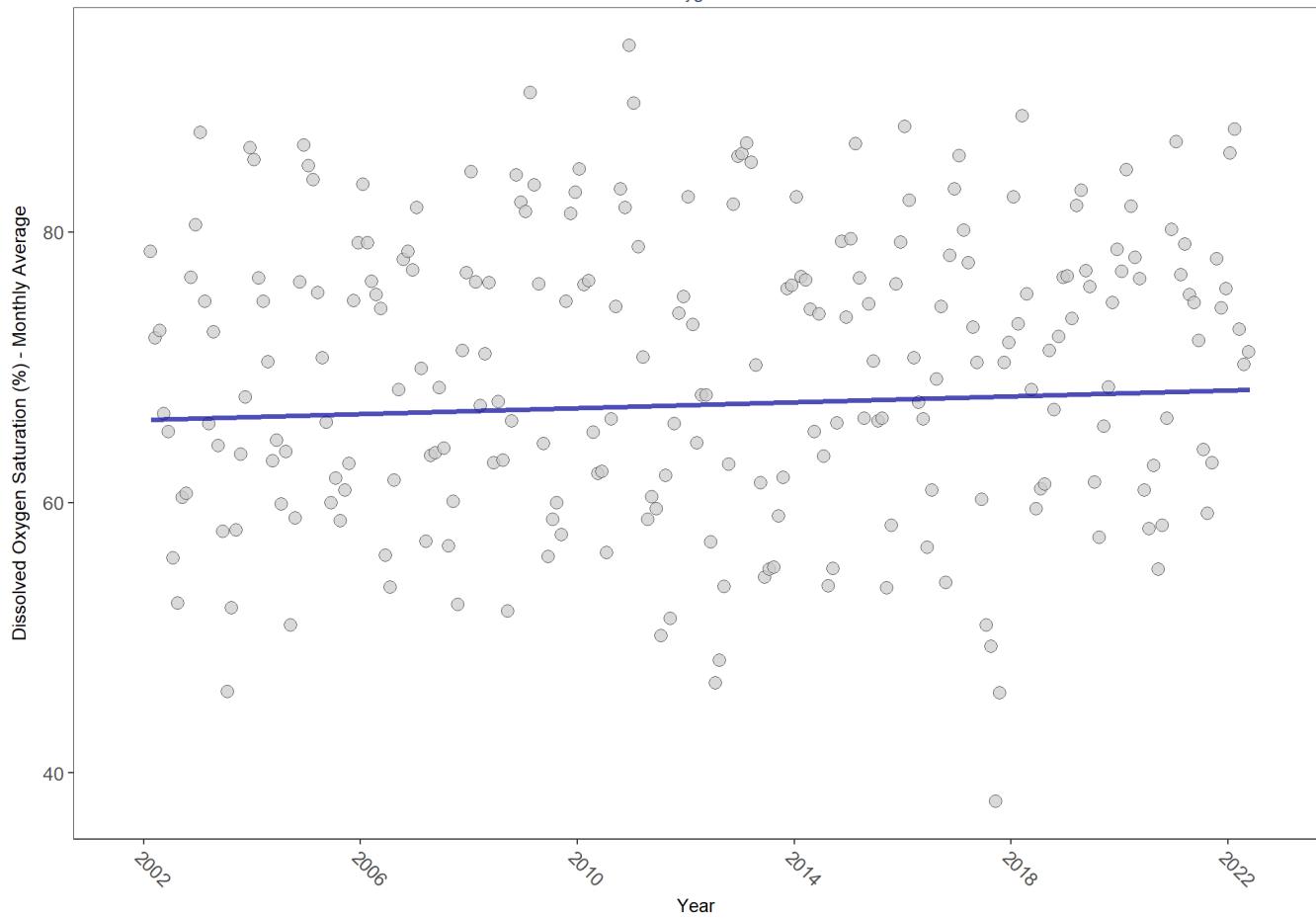
gtmpcwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve

gtmpcwq

Dissolved Oxygen Saturation



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	600043	21	71.1	TRUE	0.0696	0.1183	0.1098156	66.10236	16.4188	0.1263	0

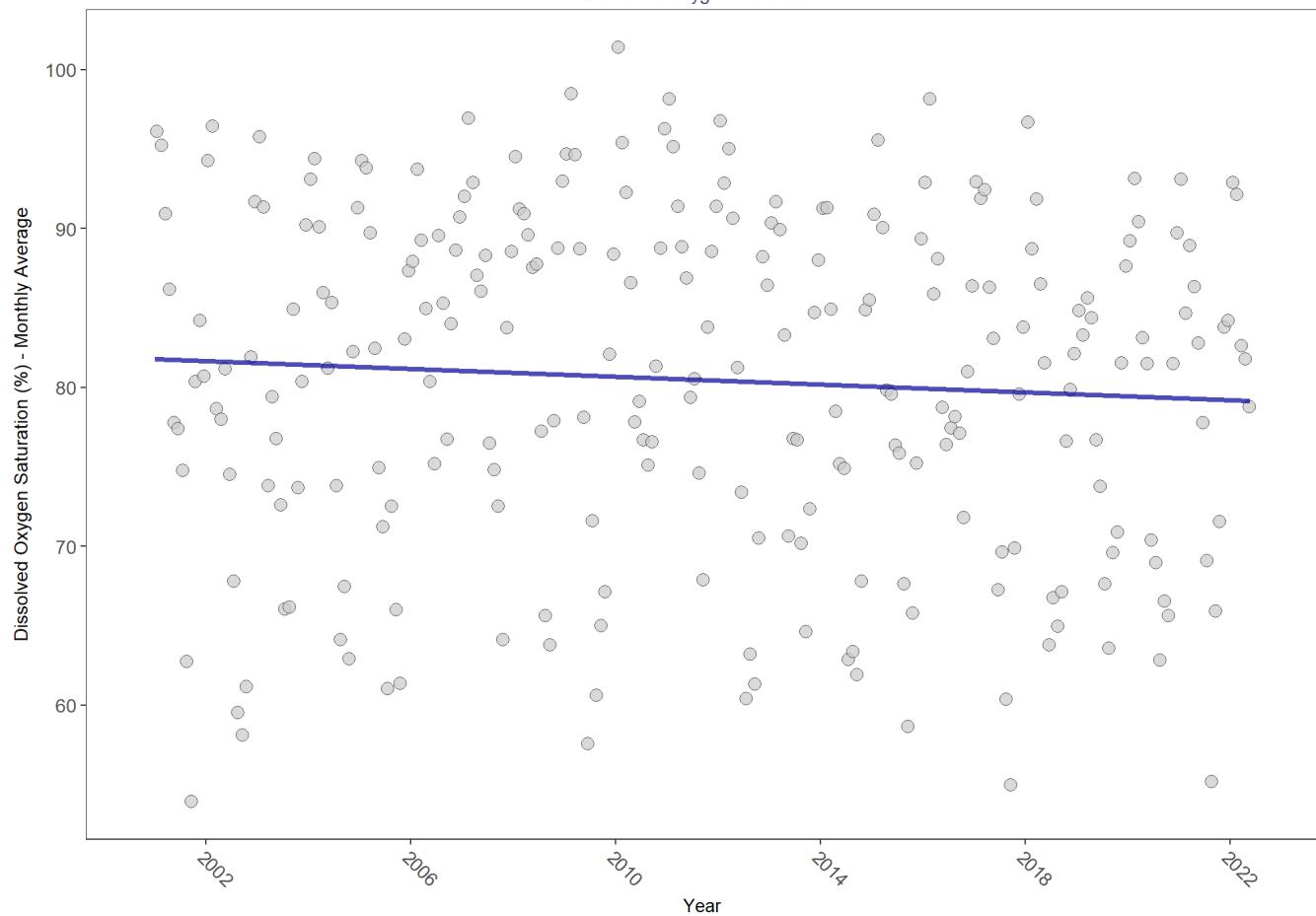
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

gttmpiwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gttmpiwq
Dissolved Oxygen Saturation



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	580954	22	83.1	TRUE	-0.1098	0.0155	-0.1238298	81.7863	7.889	0.7232	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

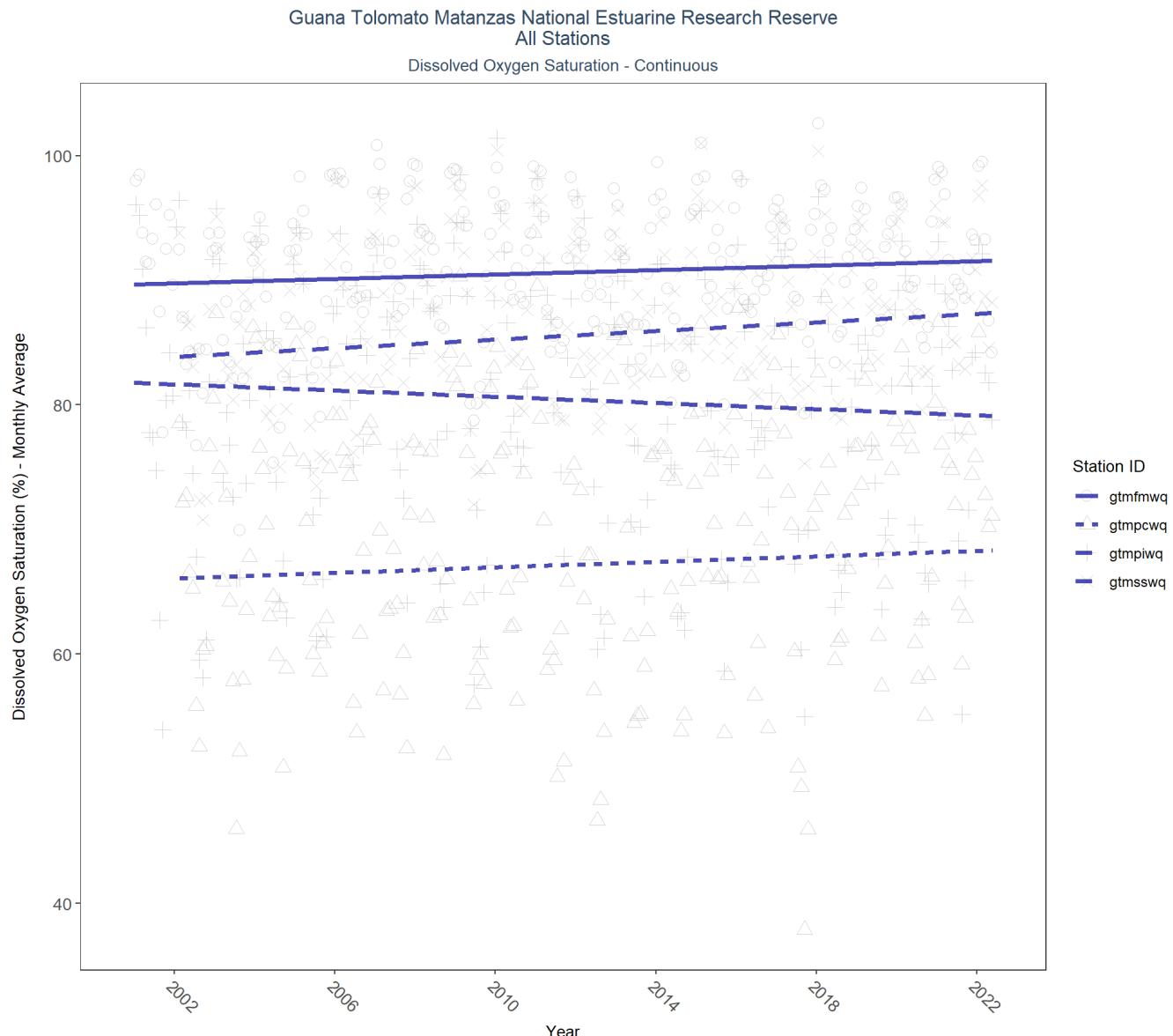


Table 29: Seasonal Kendall-Tau Results for All Stations - Dissolved Oxygen Saturation

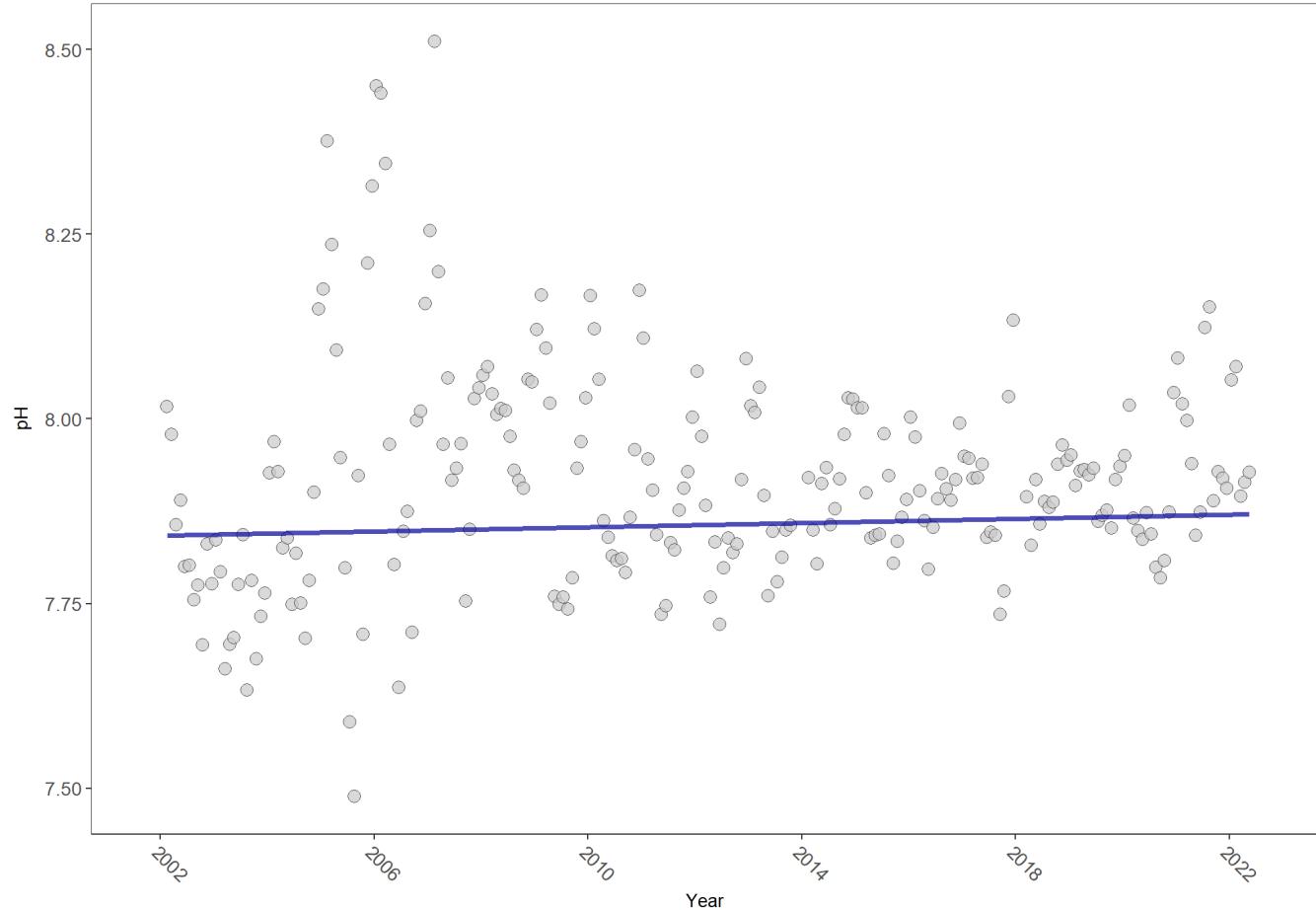
Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
gtmsswq	579594	21	2002 - 2022	89.6	0.21	83.84	0.17	0.0000
gtmfmwq	603708	22	2001 - 2022	92.6	0.12	89.65	0.09	0.0062
gtmcwq	600043	21	2002 - 2022	71.1	0.07	66.10	0.11	0.1183
gtmpiwq	580954	22	2001 - 2022	83.1	-0.11	81.79	-0.12	0.0155

pH - Continuous Water Quality

gtmsswq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmsswq
pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	551772	21	7.9	TRUE	0.0595	0.1882	0.001417057	7.841643	25.1518	0.0087	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

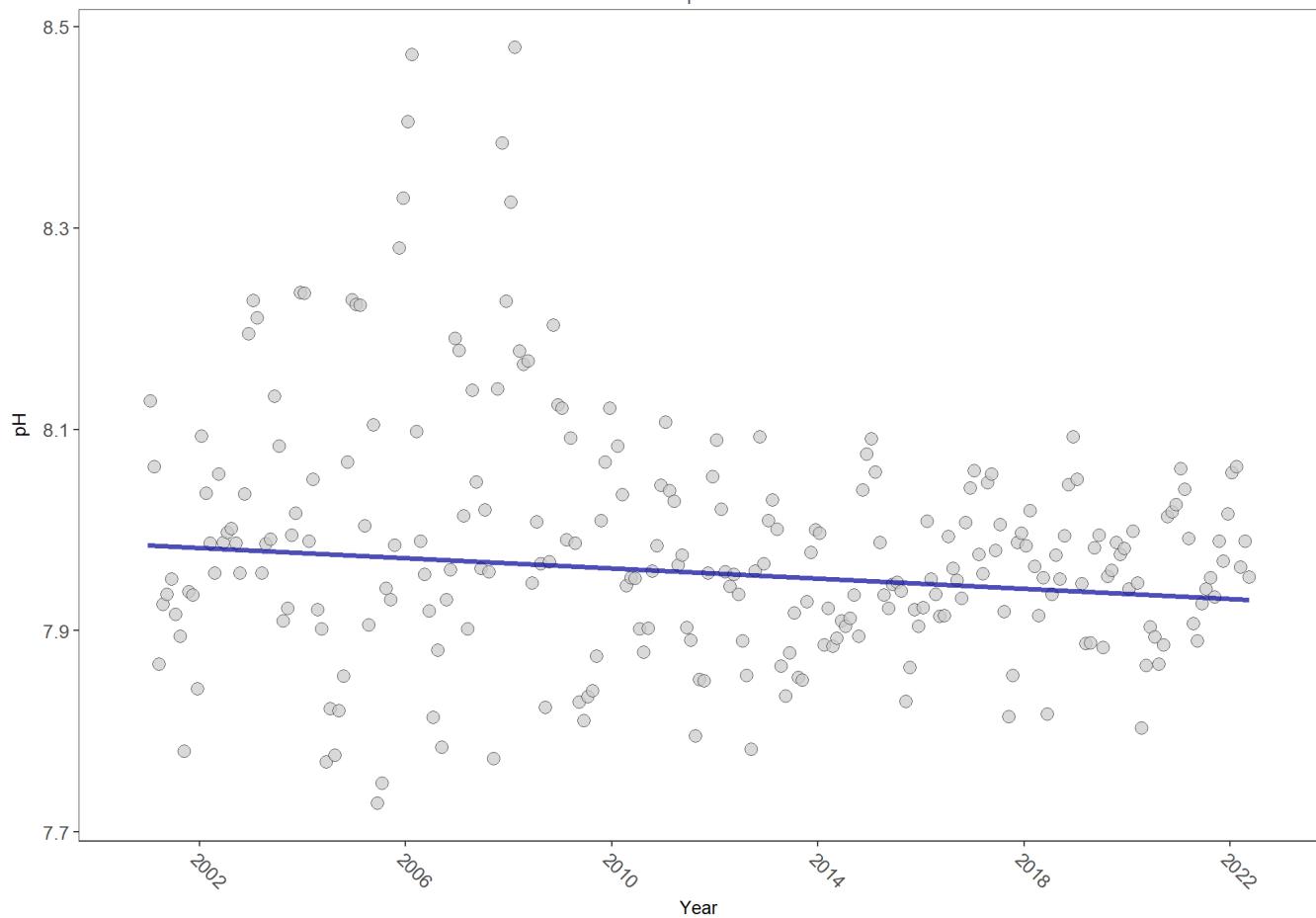
gtmfmwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve

gtmfmwq

pH



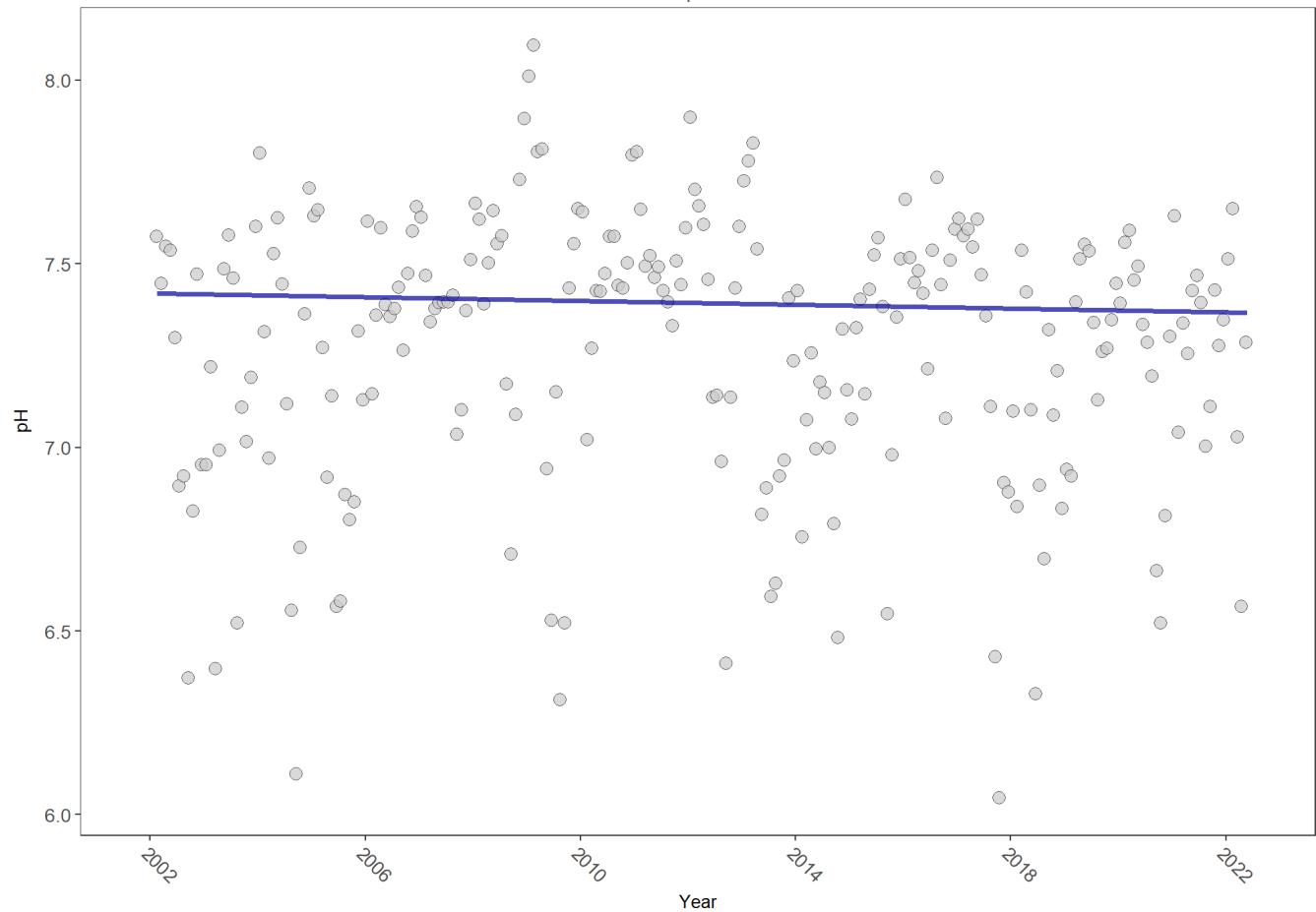
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

gtmpcwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmpcwq
pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	589314	21	7.4	TRUE	-0.0478	0.3107	-0.002579871	7.419372	12.4426	0.3313	0

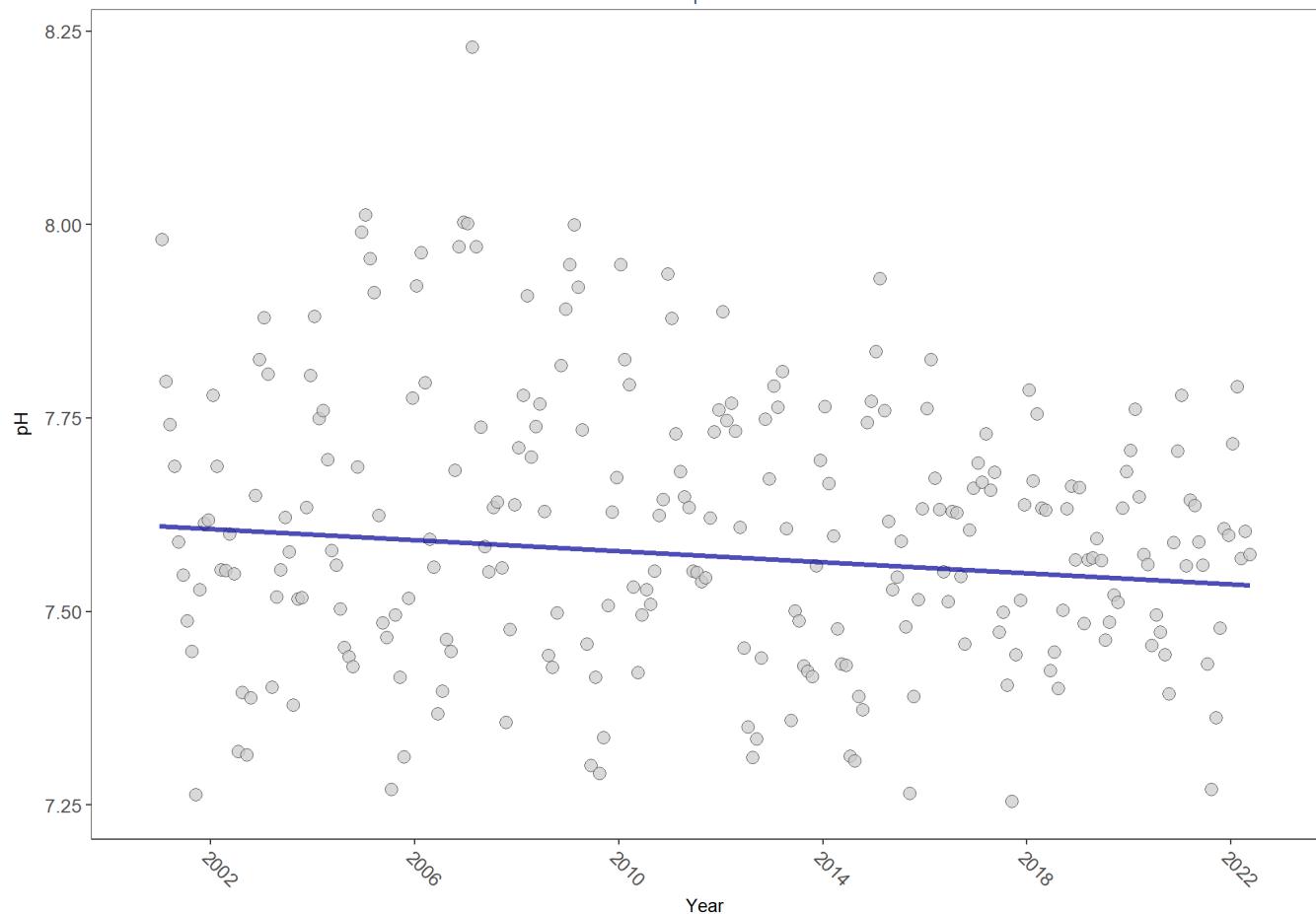
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

gttmpiwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gttmpiwq
pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	572116	22	7.6	TRUE	-0.1489	0.0009	-0.003539015	7.609804	13.6578	0.2525	-1

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

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

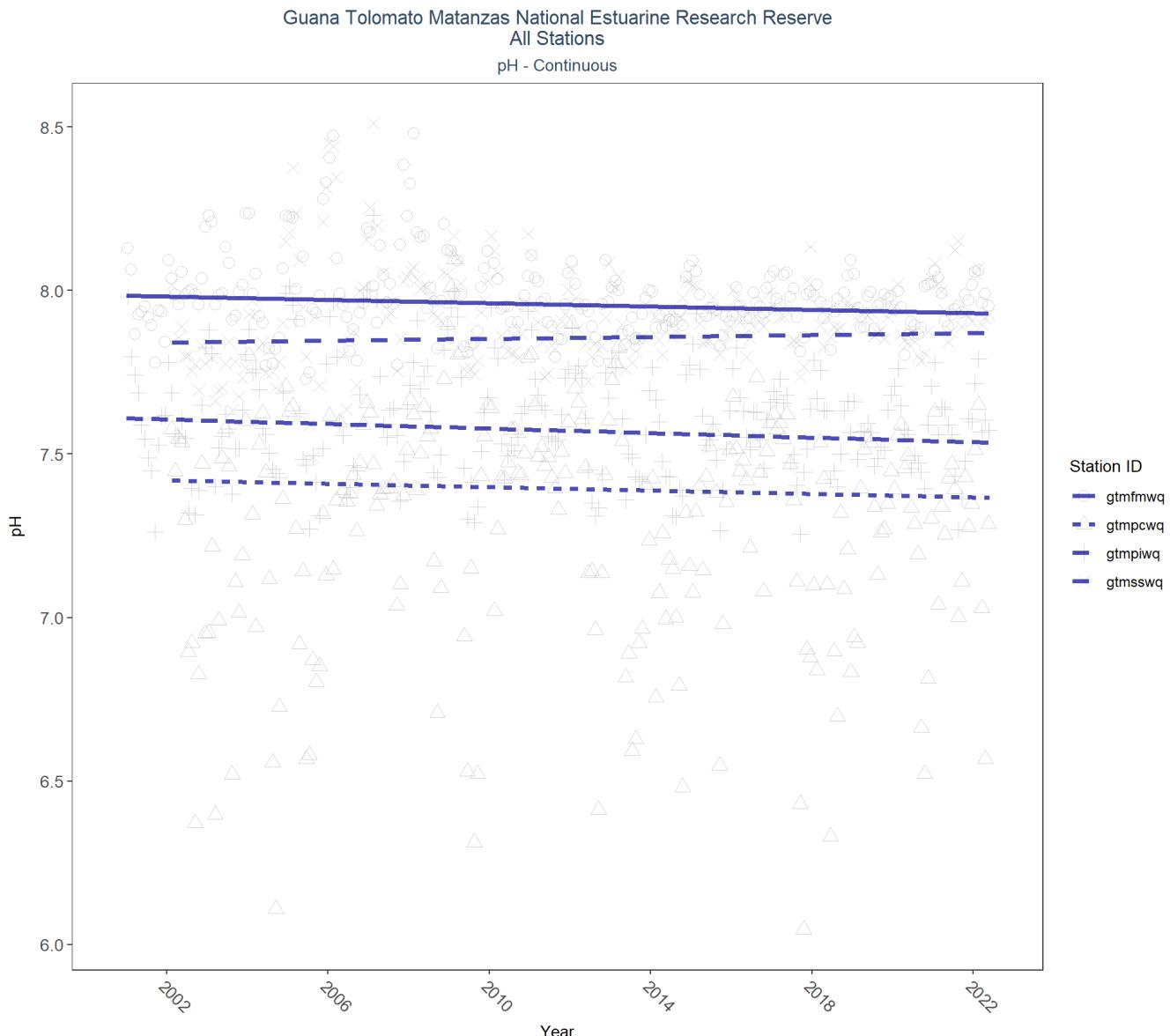


Table 30: Seasonal Kendall-Tau Results for All Stations - pH

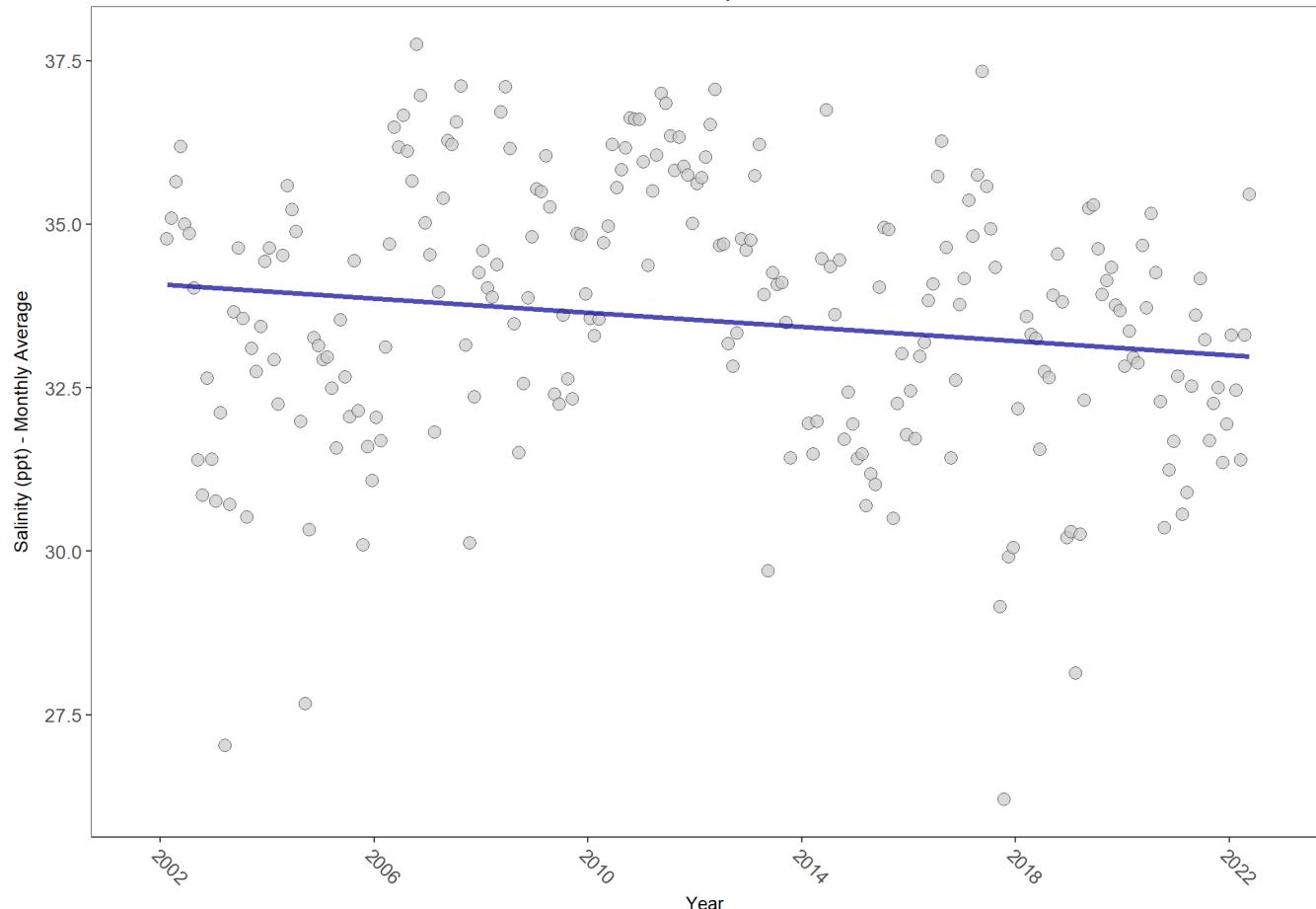
Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
gtmsswq	551772	21	2002 - 2022	7.9	0.06	7.84	0	0.1882
gtmfmwq	581432	22	2001 - 2022	8.0	-0.14	7.98	0	0.0025
gtmcpcwq	589314	21	2002 - 2022	7.4	-0.05	7.42	0	0.3107
gtmpiwq	572116	22	2001 - 2022	7.6	-0.15	7.61	0	0.0009

Salinity - Continuous Water Quality

gtmsswq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmsswq
Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	559678	21	34	TRUE	-0.0985	0.0379	-0.05414325	34.08232	3.3843	0.9846	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

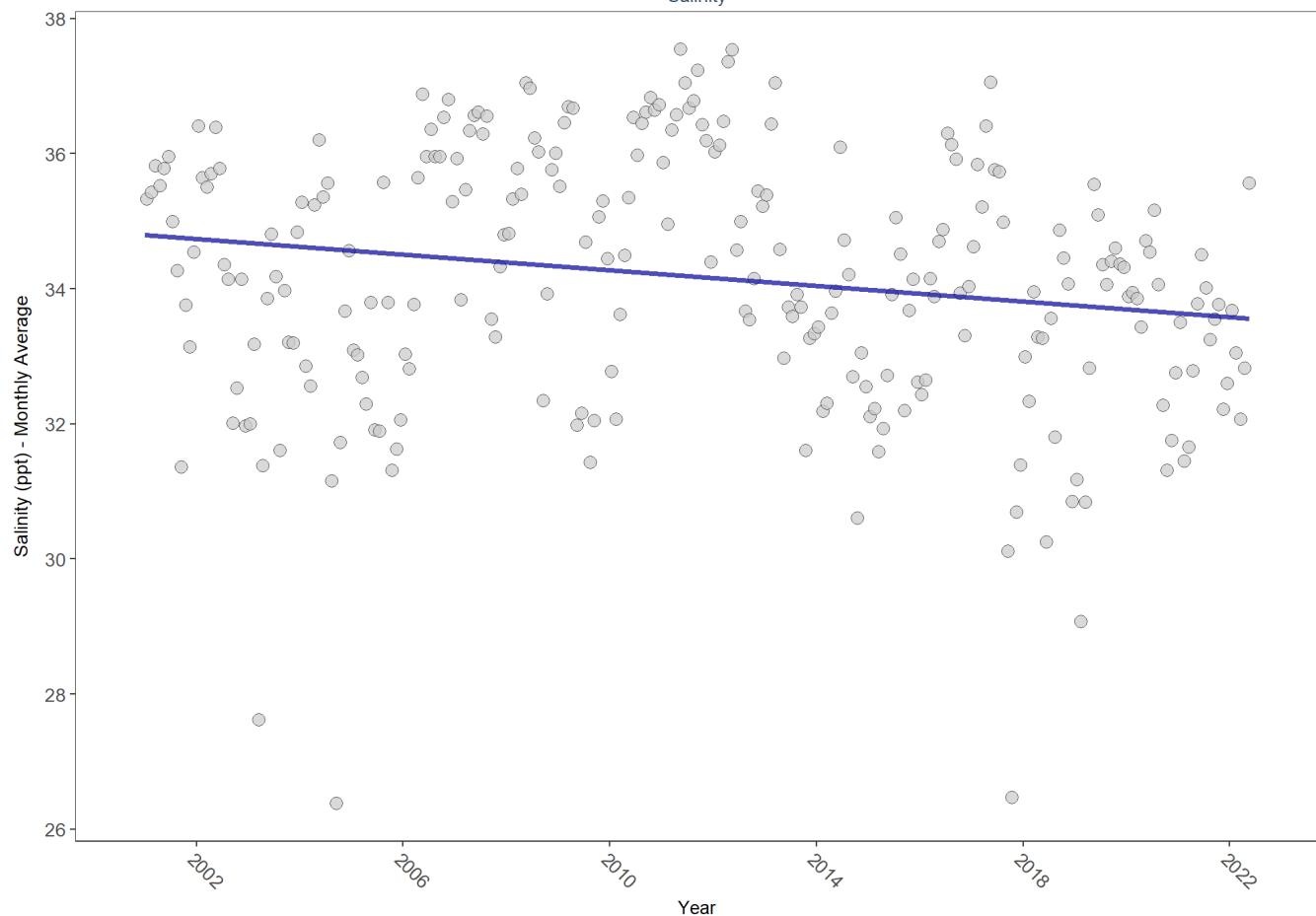
gtmfmwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve

gtmfmwq

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	588038	22	34.5	TRUE	-0.1326	0.0031	-0.05763067	34.79182	6.197	0.8599	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

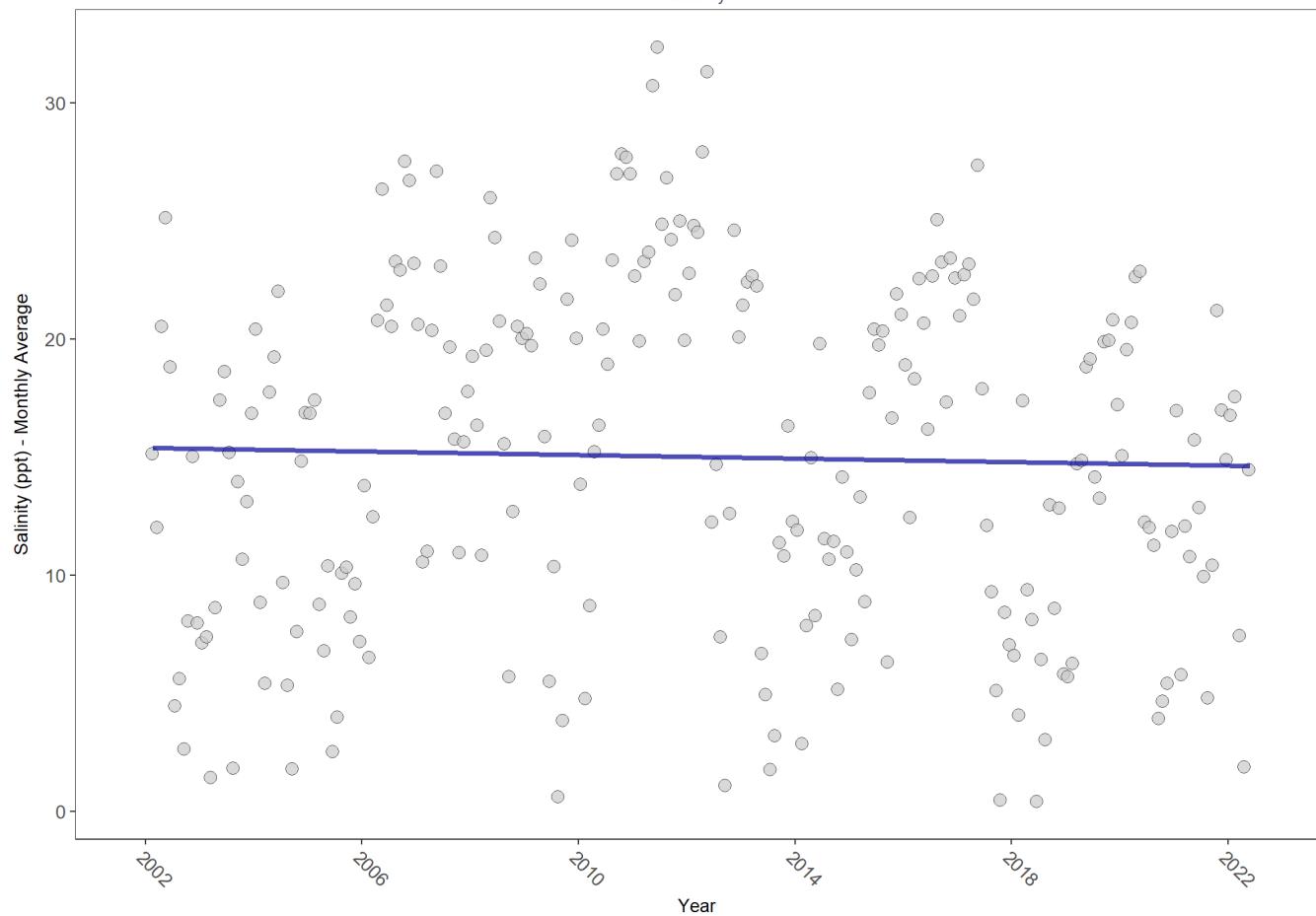
gtmpcwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve

gtmpcwq

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	606028	21	17	TRUE	-0.02	0.6811	-0.03801027	15.39822	4.7428	0.943	0

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

SennIntercept is intercept value at beginning of record for monitoring location

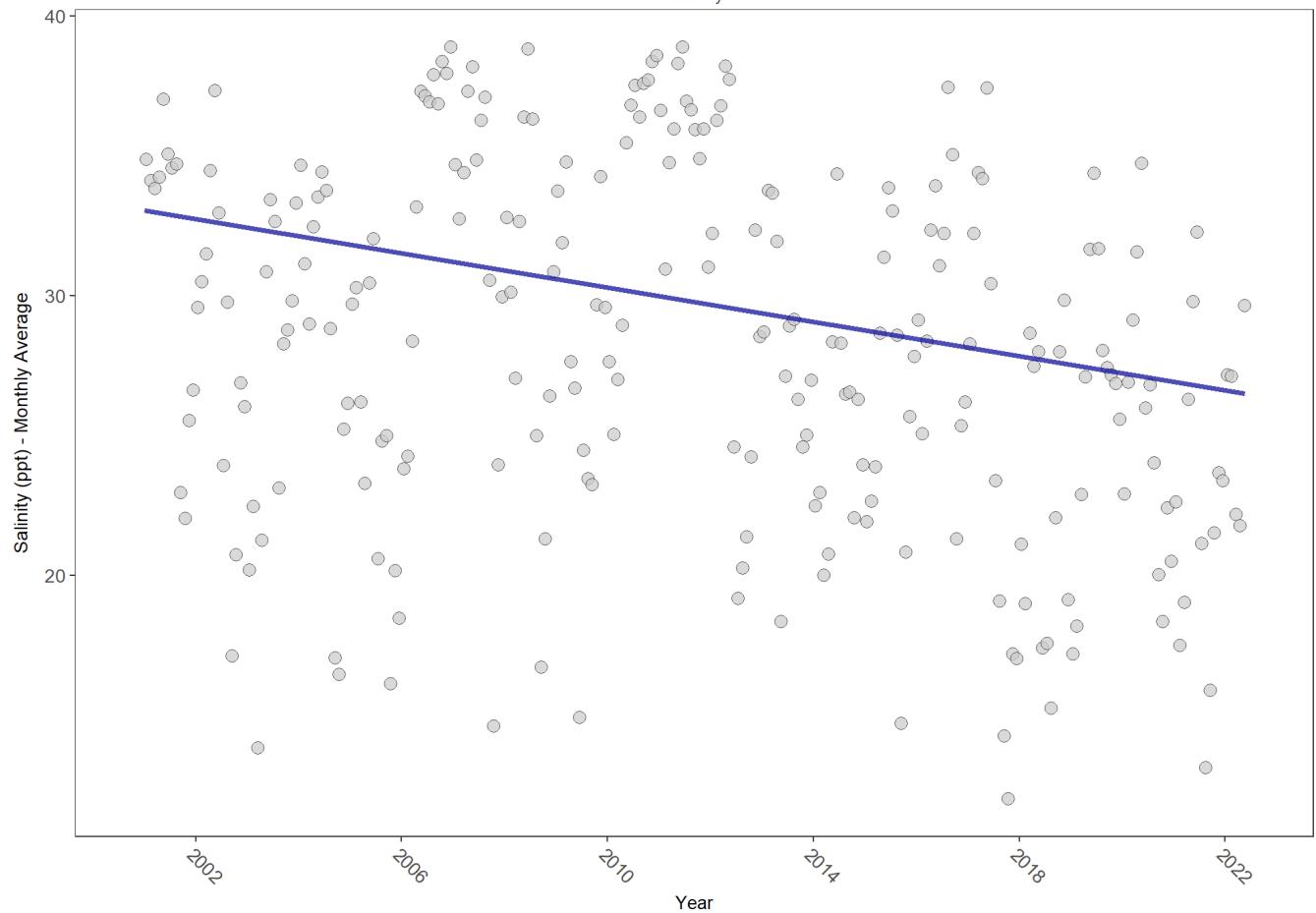
gttmpiwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve

gttmpiwq

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	577716	22	28.3	TRUE	-0.2337	0.0000	-0.3058606	33.03749	4.0445	0.9686	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

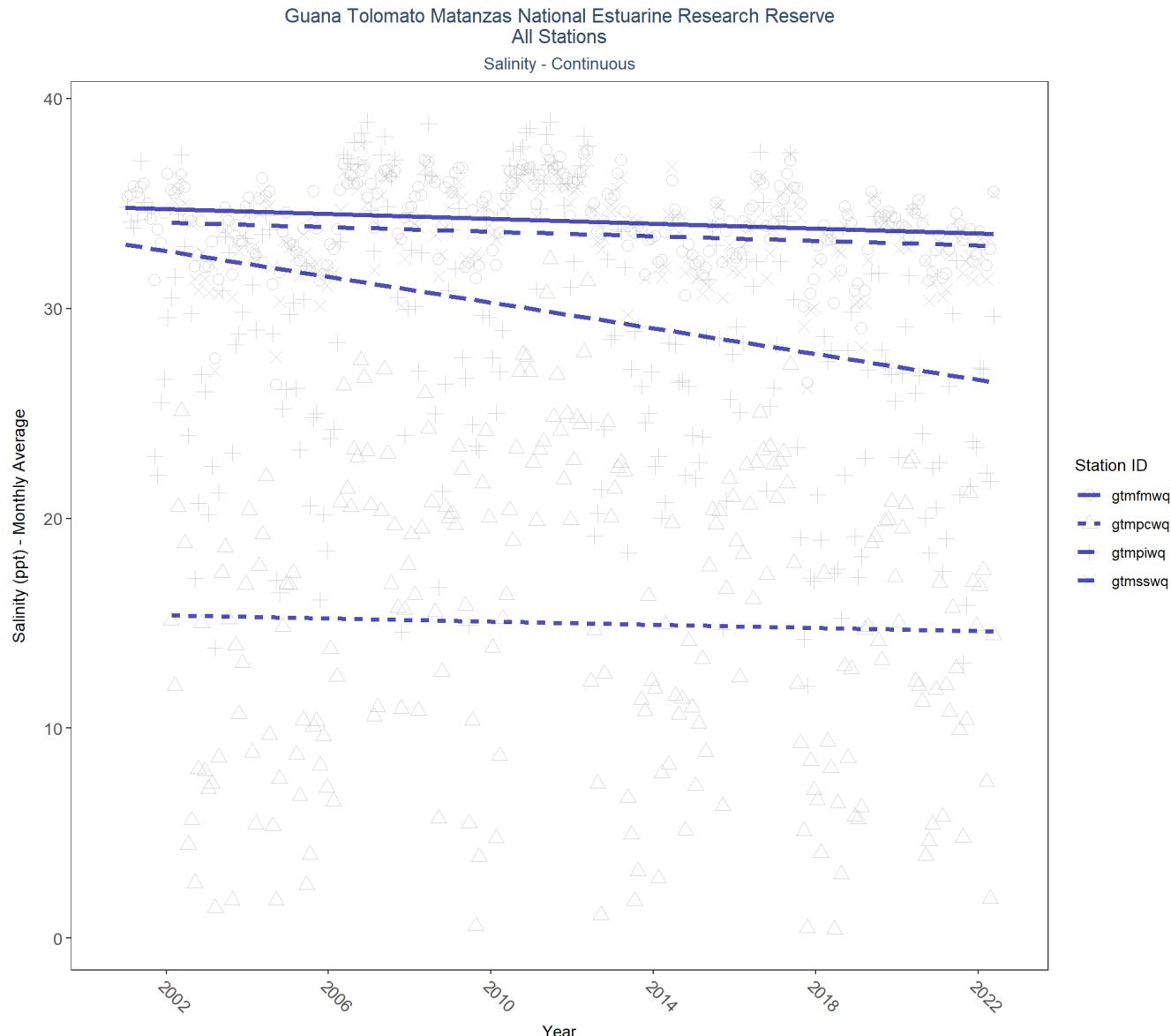


Table 31: Seasonal Kendall-Tau Results for All Stations - Salinity

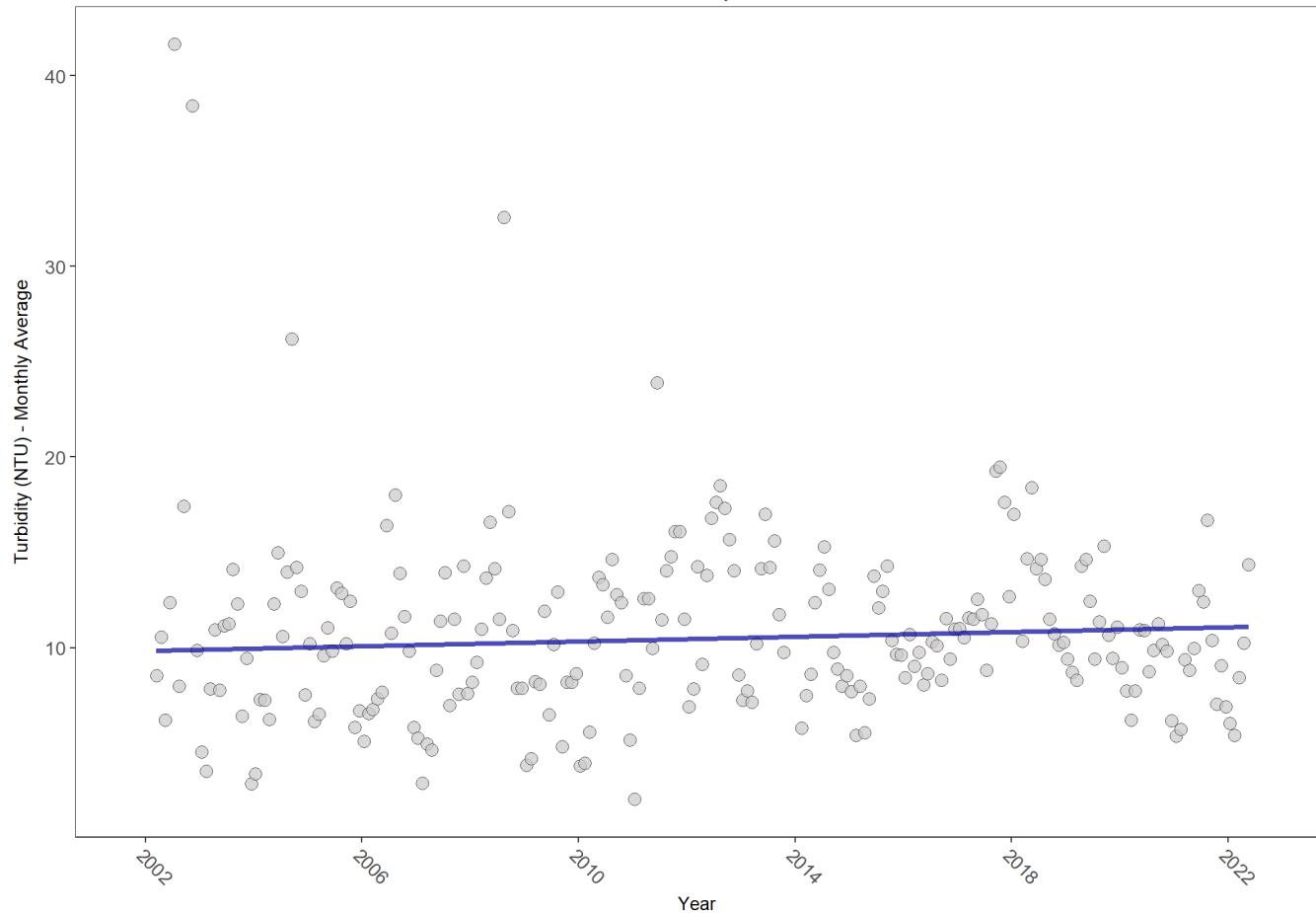
Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
gtmsswq	559678	21	2002 - 2022	34.00	-0.1	34.08	-0.05	0.0379
gtmfmwq	588038	22	2001 - 2022	34.50	-0.13	34.79	-0.06	0.0031
gtmcwq	606028	21	2002 - 2022	17.00	-0.02	15.4	-0.04	0.6811
gtmpiwq	577716	22	2001 - 2022	28.30	-0.23	33.04	-0.31	0.0000
872-0494	34918	2	2020 - 2021	8.99	-	-	-	-

Turbidity - Continuous Water Quality

gtmsswq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmsswq
Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	548508	21	9	TRUE	0.0706	0.1350	0.06210797	9.829929	14.0481	0.2303	0

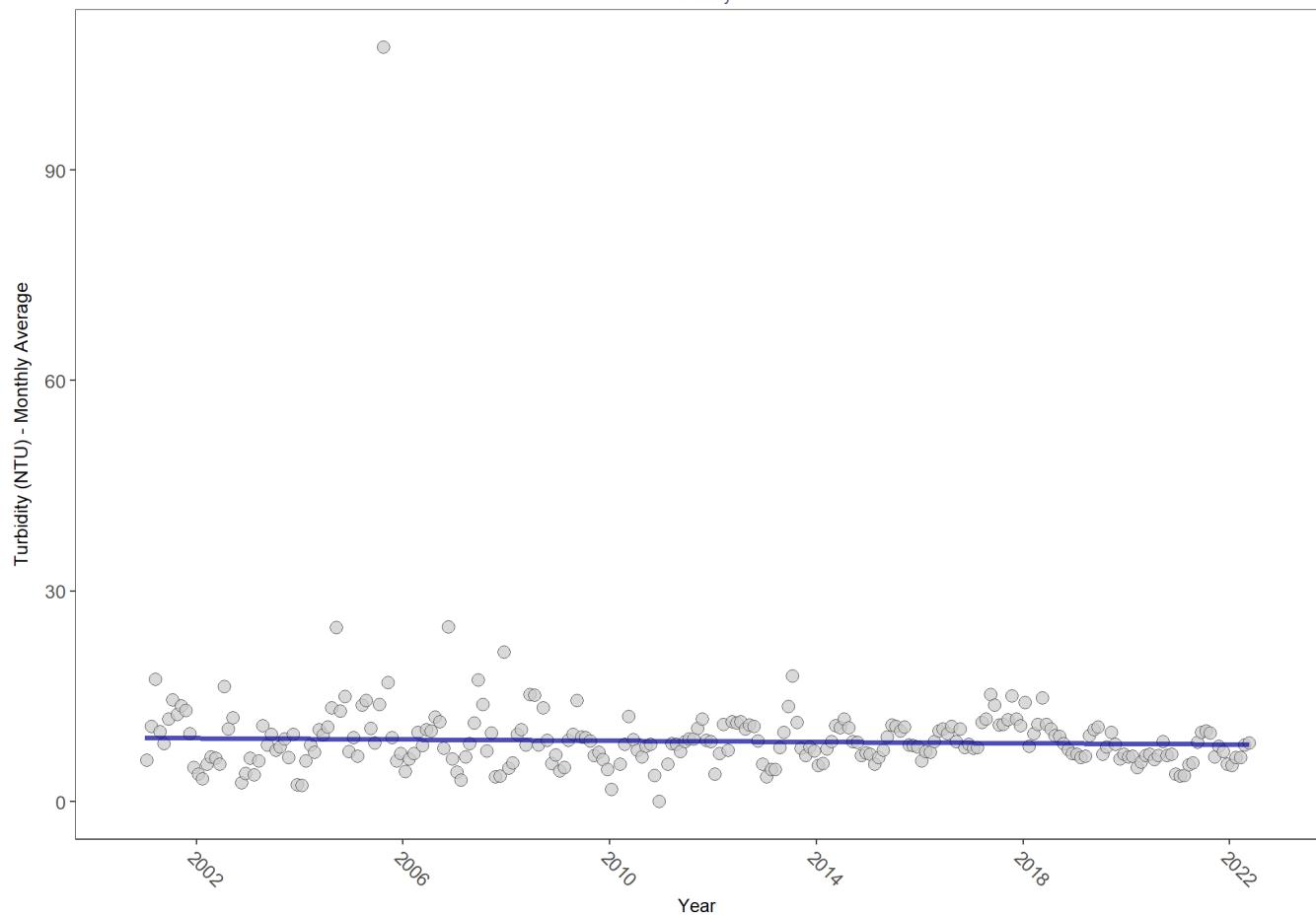
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

gtmfmwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmfmwq
Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	588931	22	7	TRUE	-0.0587	0.1966	-0.04031601	9.037476	15.5537	0.1585	0

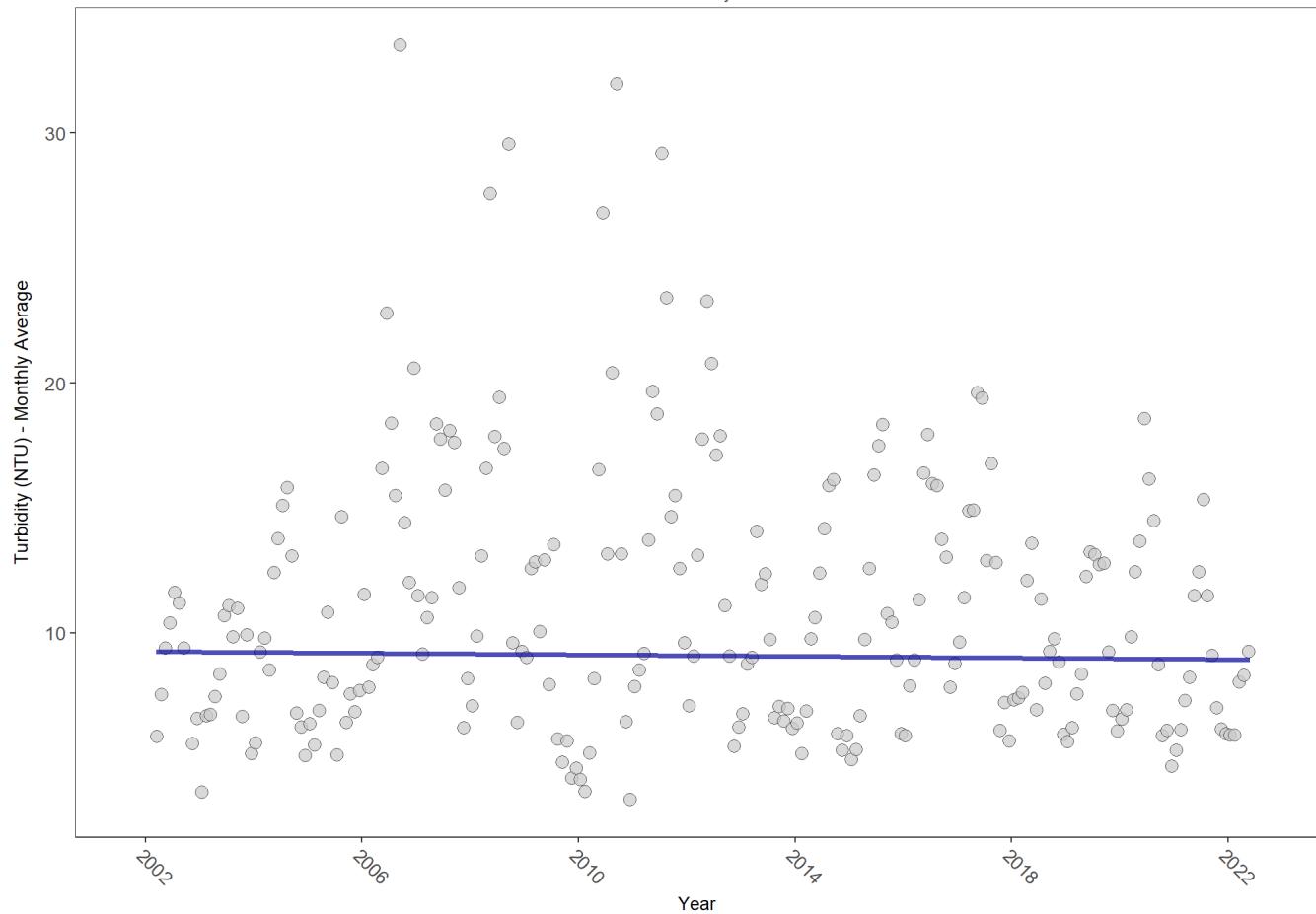
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

gtmpcwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmpcwq
Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	584674	21	9	TRUE	-0.0262	0.6048	-0.01675907	9.266042	5.8476	0.8833	0

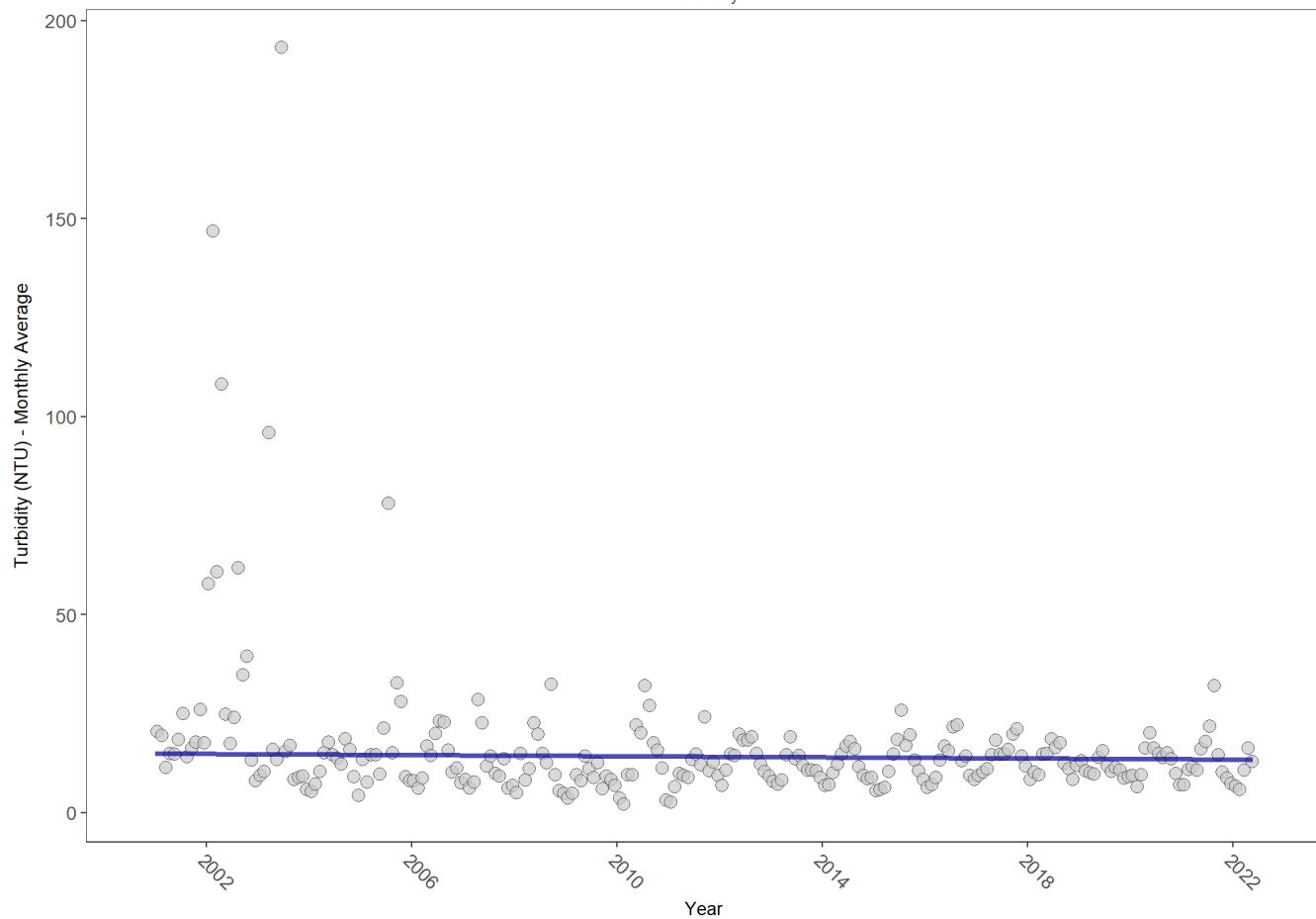
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

gttmpiwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gttmpiwq
Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	552290	22	10	TRUE	-0.0883	0.0496	-0.07148746	14.97332	4.049	0.9685	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

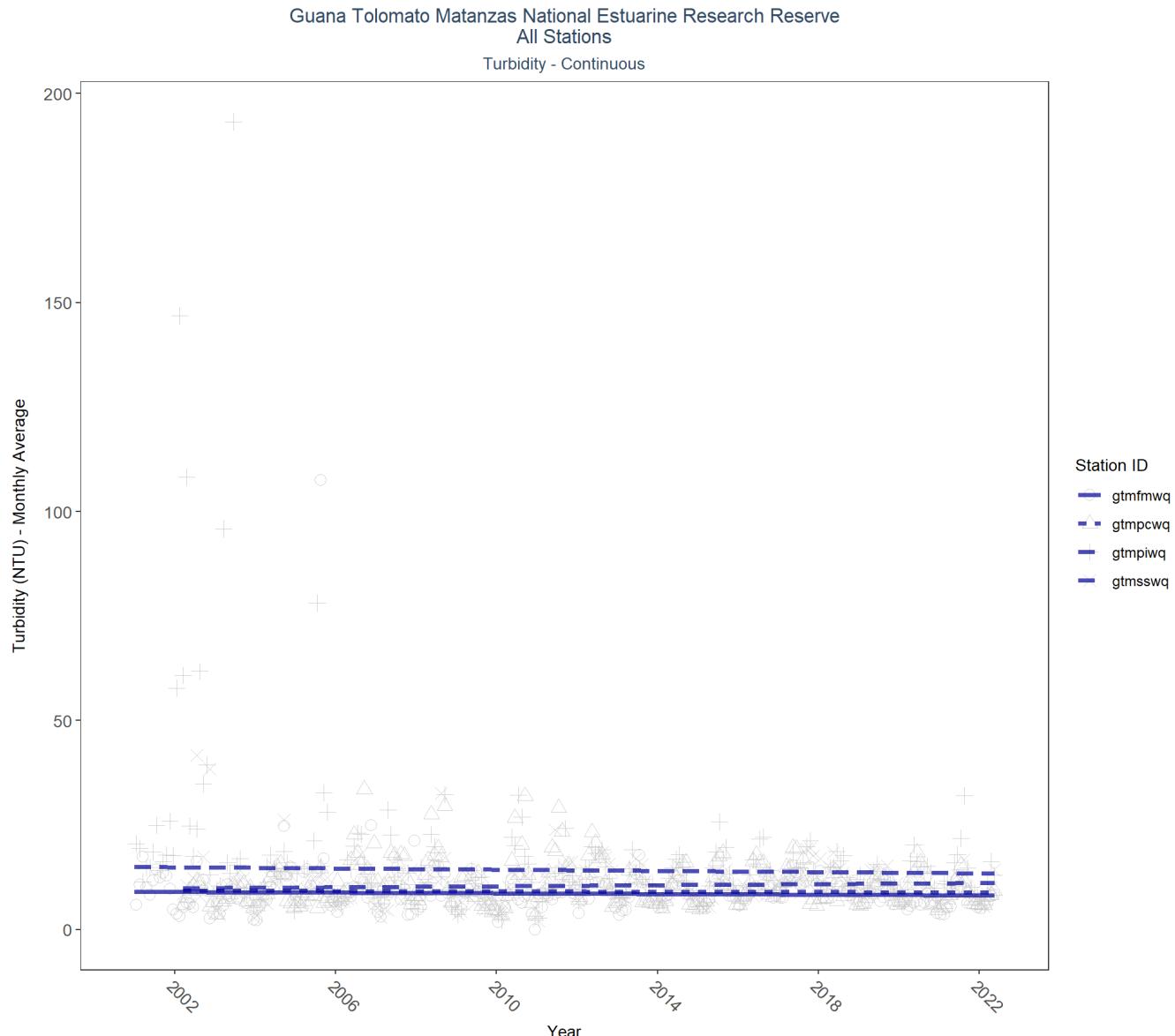


Table 32: Seasonal Kendall-Tau Results for All Stations - Turbidity

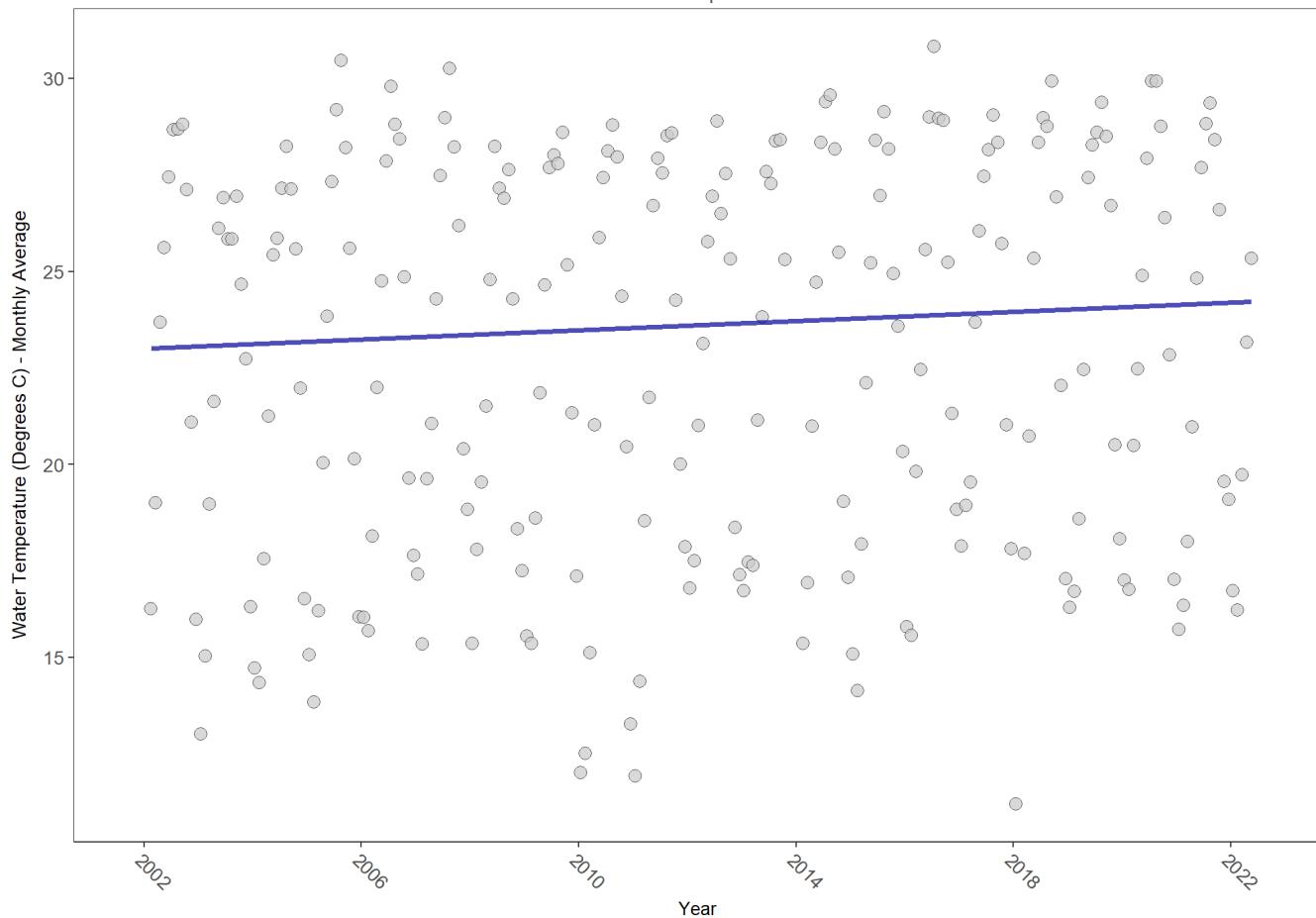
Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
gtmsswq	548508	21	2002 - 2022	9	0.07	9.83	0.06	0.1350
gtmfwmwq	588931	22	2001 - 2022	7	-0.06	9.04	-0.04	0.1966
gtmcwq	584674	21	2002 - 2022	9	-0.03	9.27	-0.02	0.6048
gtmpiwq	552290	22	2001 - 2022	10	-0.09	14.97	-0.07	0.0496

Water Temperature - Continuous Water Quality

gtmsswq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmsswq
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	591934	21	23.7	TRUE	0.2136	0.0000	0.0595351	22.9992	4.8176	0.9397	1

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

SennIntercept is intercept value at beginning of record for monitoring location

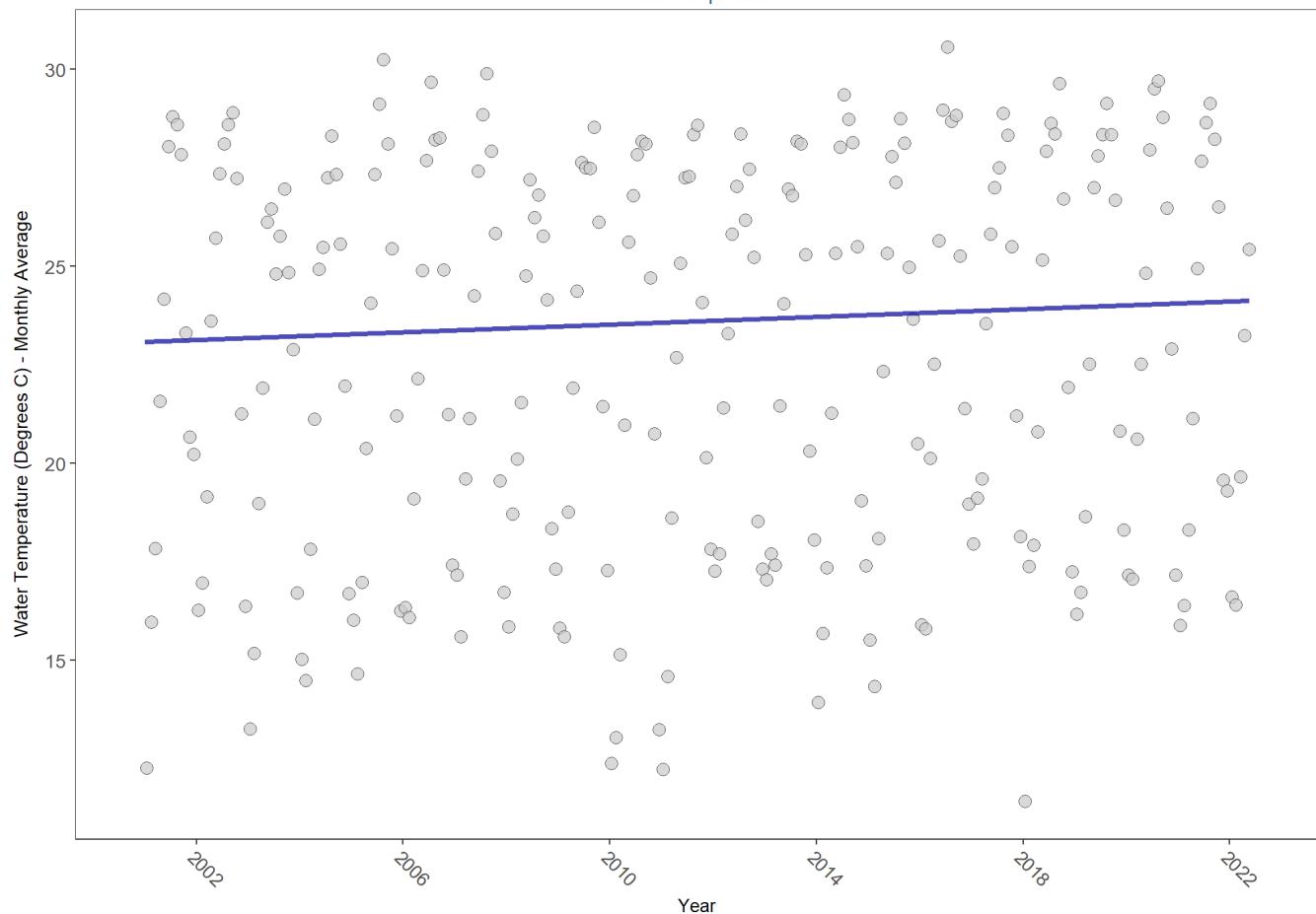
gtmfmwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve

gtmfmwq

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	623154	22	23.5	TRUE	0.2122	0.0000	0.04856711	23.08626	5.098	0.9263	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

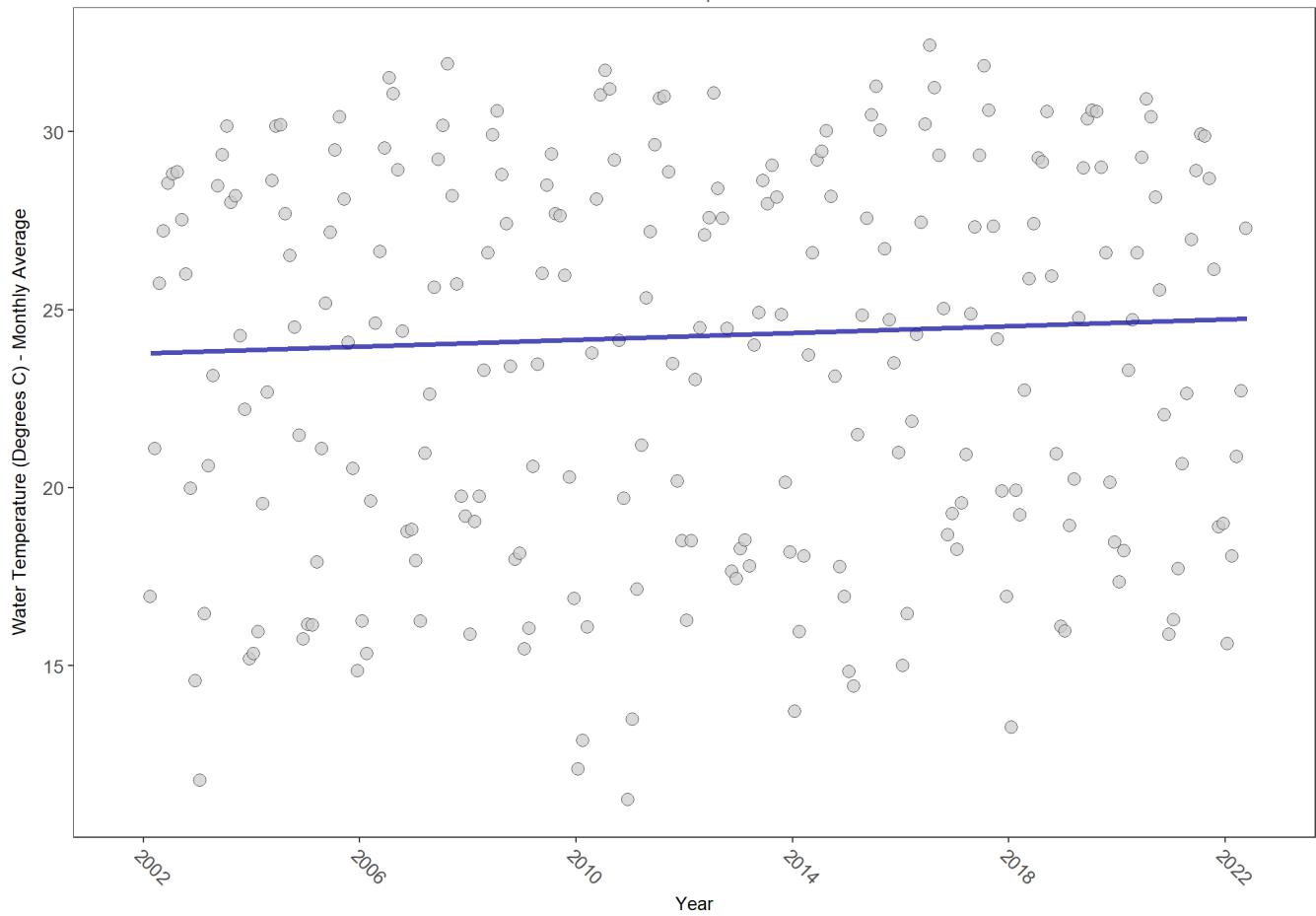
gtmpcwq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve

gtmpcwq

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	613439	21	24.3	TRUE	0.1407	0.0025	0.04796957	23.7734	4.1474	0.9654	1

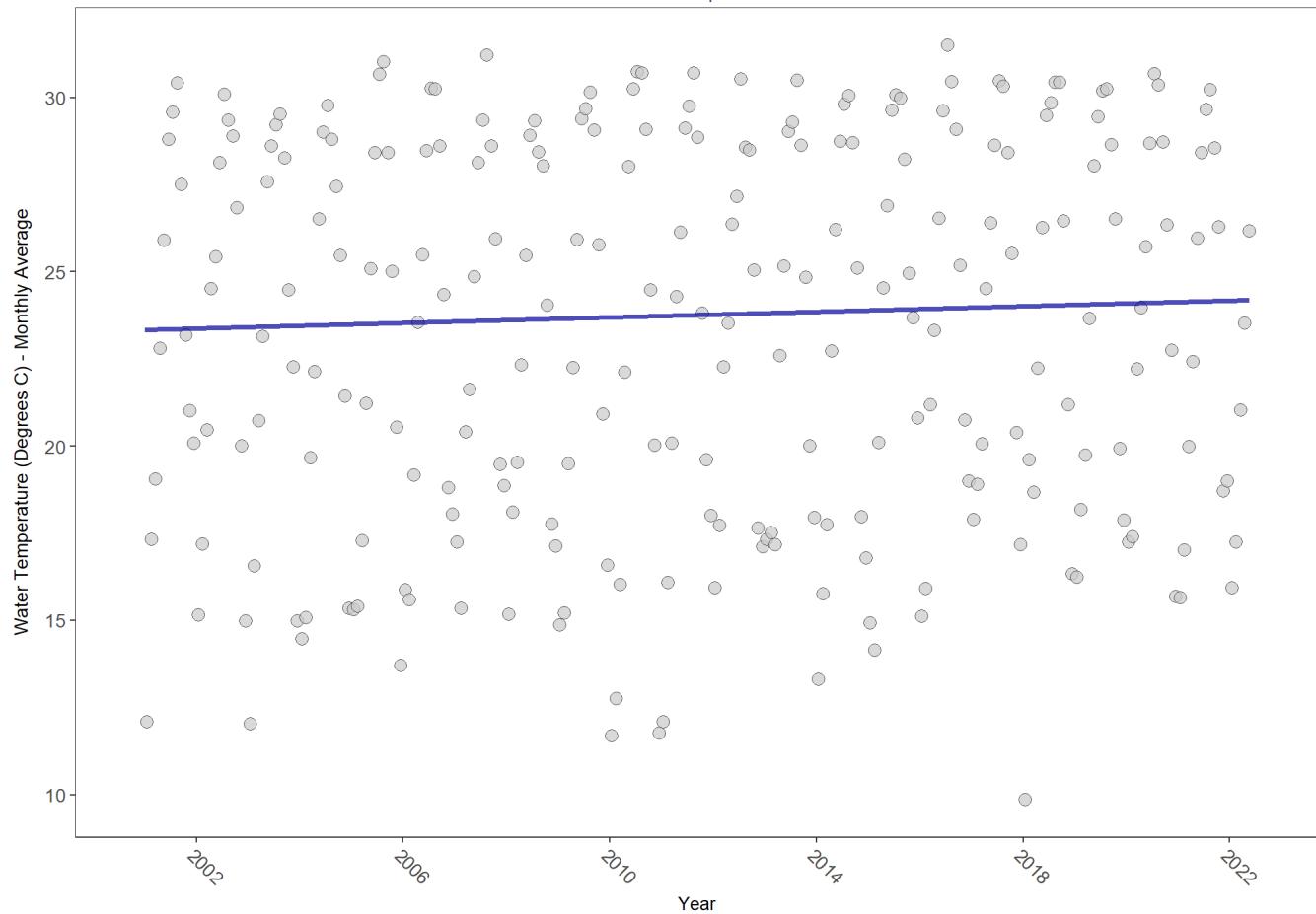
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

gtmipiwrq

Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program (4054)

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmipiwrq
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	627043	22	24.1	TRUE	0.1768	0.0001	0.04030242	23.33673	4.5392	0.9514	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

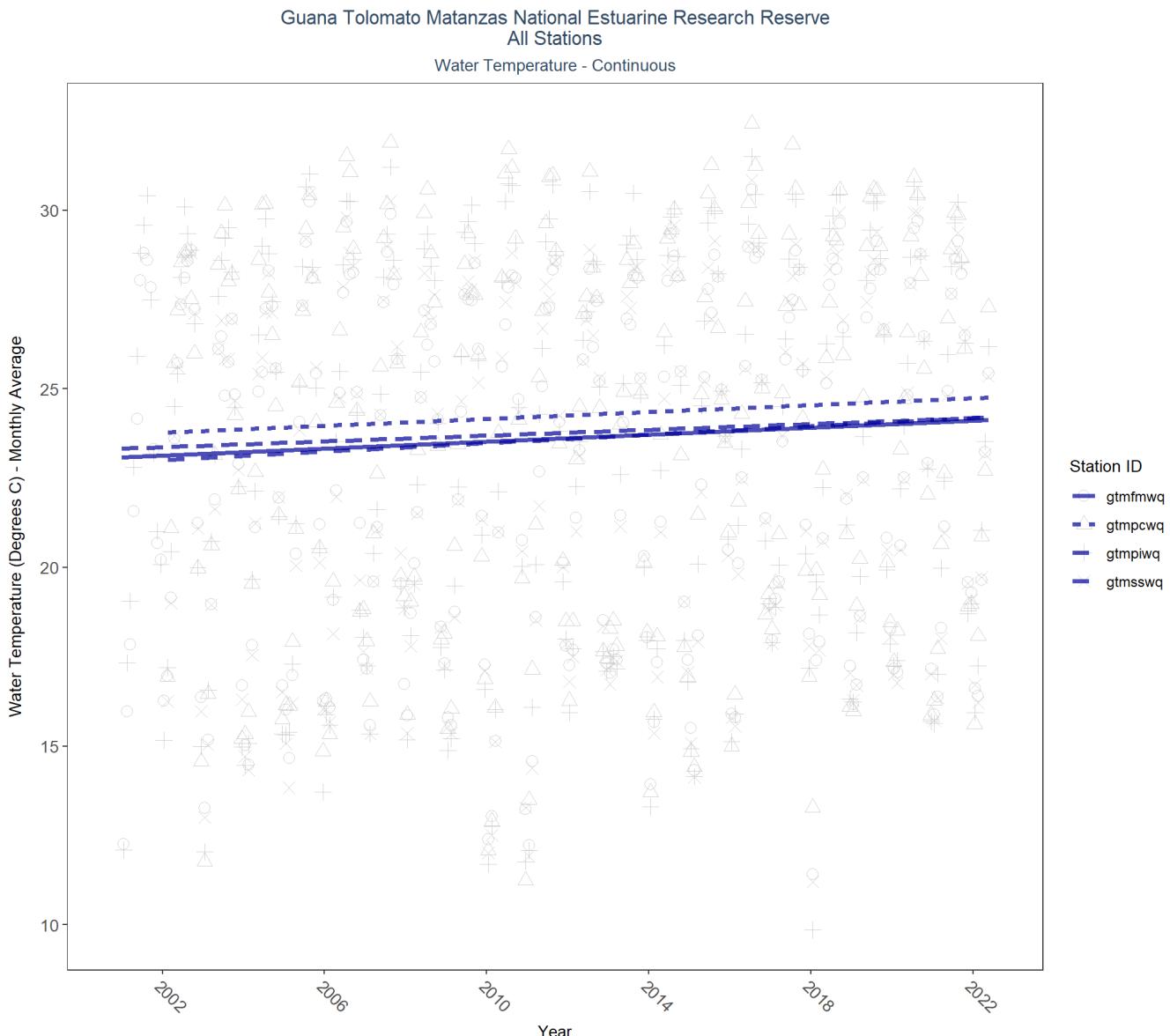


Table 33: Seasonal Kendall-Tau Results for All Stations - Water Temperature

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
gtmsswq	591934	21	2002 - 2022	23.70	0.21	23	0.06	0.0000
gtmfmwq	623154	22	2001 - 2022	23.50	0.21	23.09	0.05	0.0000
gtmcpcwq	613439	21	2002 - 2022	24.30	0.14	23.77	0.05	0.0025
gtmpiwq	627043	22	2001 - 2022	24.10	0.18	23.34	0.04	0.0001
872-0494	35473	2	2020 - 2021	22.34	-	-	-	-