

Guana Tolomato Matanzas National Estuarine Research Reserve

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:

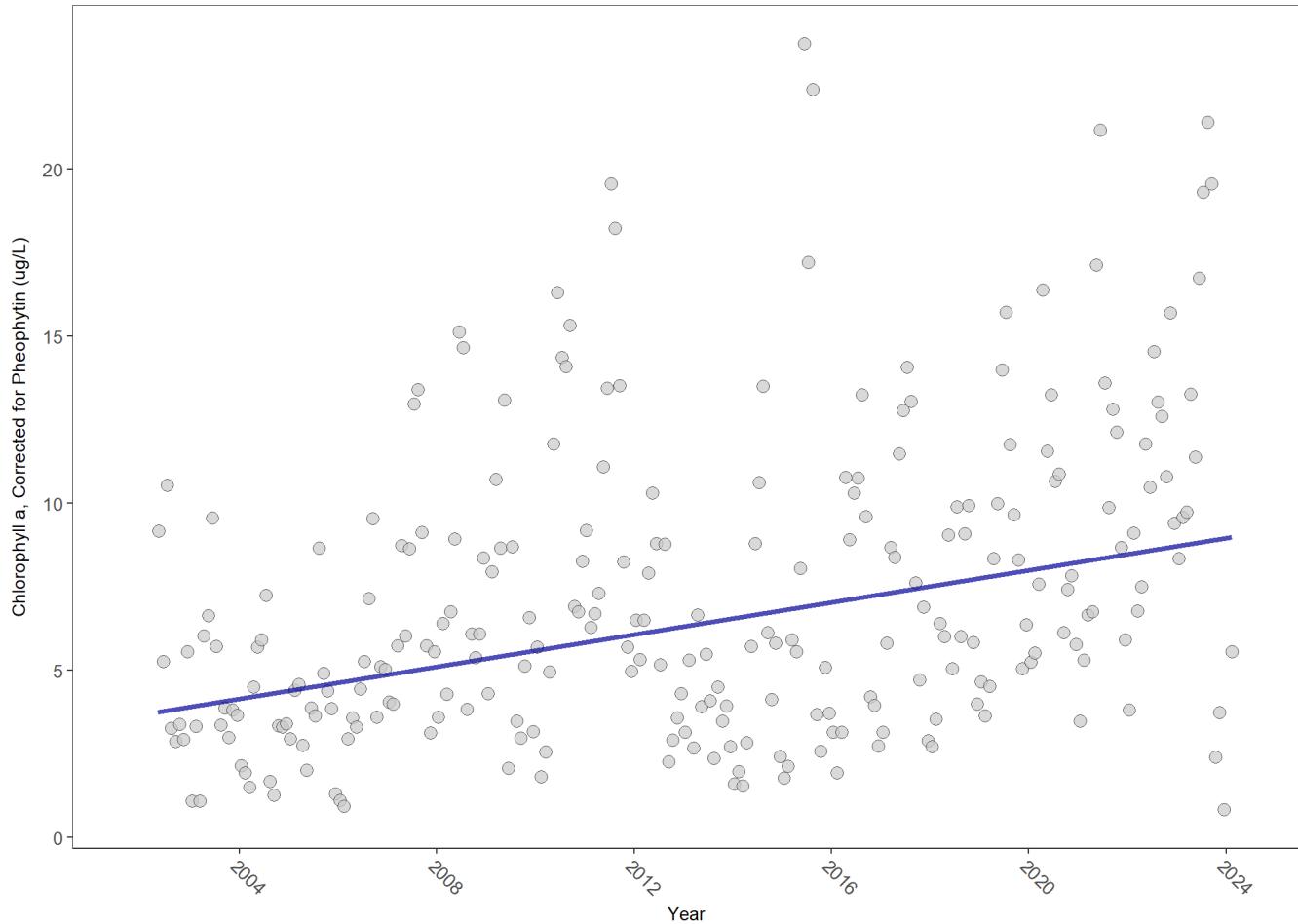
- *Combined_WQ_WC_NUT_Chlorophyll_a_corrected_for_pheophytin-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Chlorophyll_a_uncorrected_for_pheophytin-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Colored_dissolved_organic_matter_CDOM-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Dissolved_Oxygen-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Dissolved_Oxygen_Saturation-2024-Jul-11.txt*
- *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

Chlorophyll a, Corrected for Pheophytin, Lab, All Depths
Guana Tolomato Matanzas National Estuarine Research Reserve

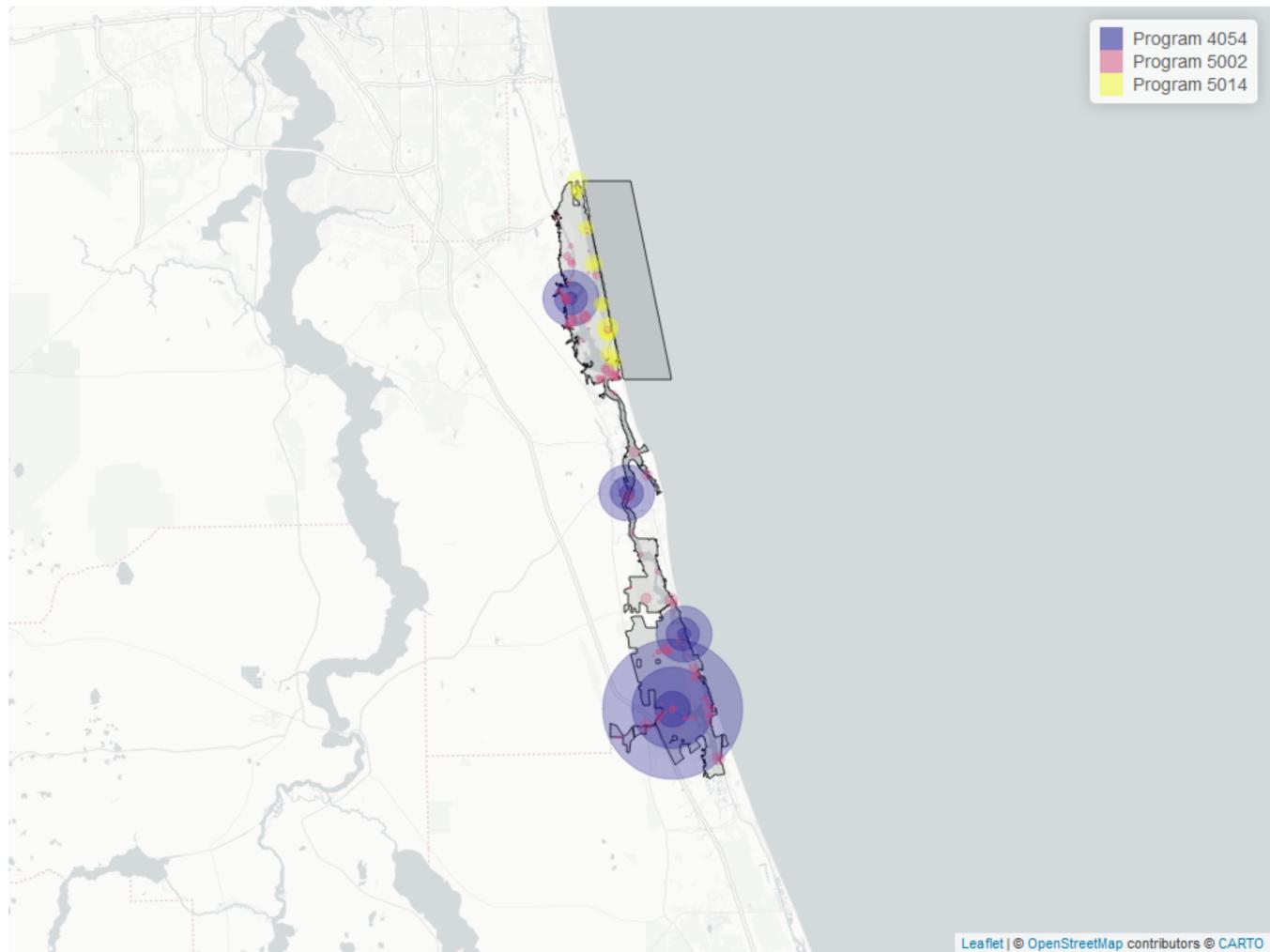


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	7127	23	4.7	TRUE	0.3321	0.0000	0.2402179	3.667237	5.0783	0.9273	1

$p < 0.00005$ 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, 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
4054	6211	2002	2021
5002	736	2002	2024
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	459	39	8.5	15	3.3	10	2.2
2014	460	43	9.3	17	3.7	11	2.4
2015	481	38	7.9	15	3.1	13	2.7
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	549	63	11.5	12	2.2	23	4.2
2021	445	34	7.6	10	2.2	17	3.8
2022	185	19	10.3			21	11.3
2023	93	10	10.8	11	11.8	6	6.4

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

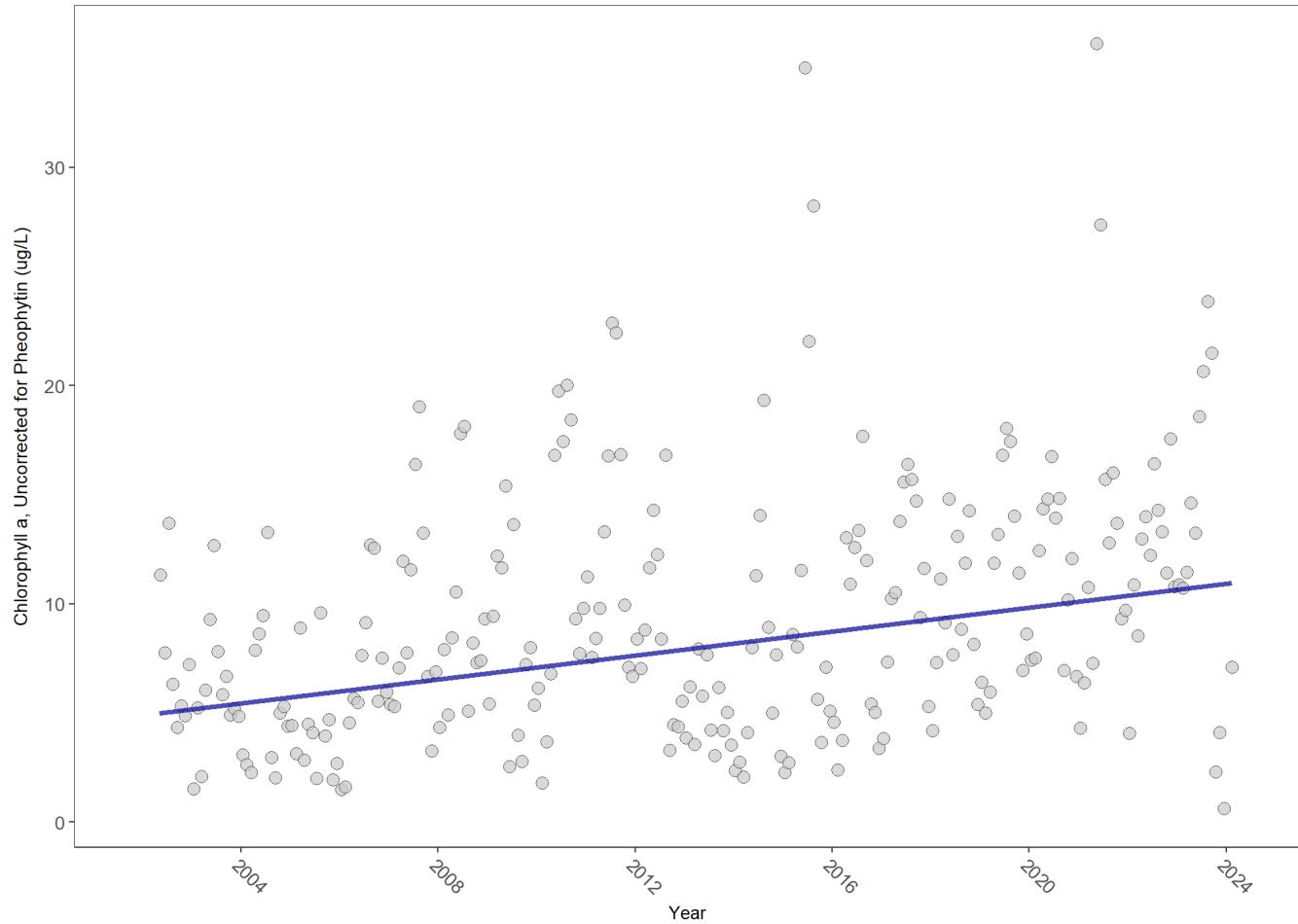
5002 - Florida STORET / WIN

5014 - Guana River and Guana Lake Water Quality Monitoring

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	5526	23	6.2	TRUE	0.3013	0.0000	0.2736842	4.908226	3.8717	0.9735	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

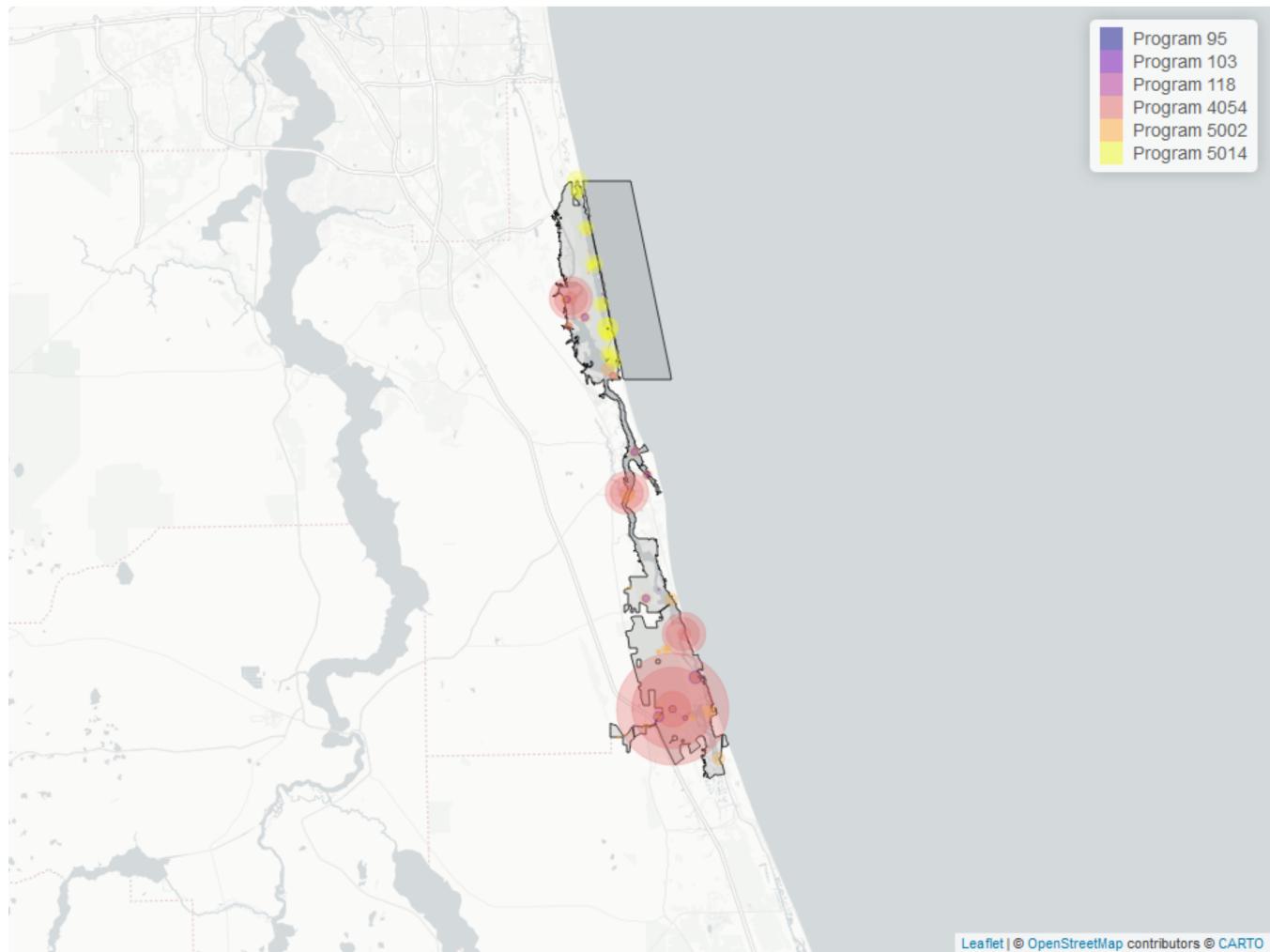


Table 8: Programs contributing data for Chlorophyll a, Uncorrected for Pheophytin

ProgramID	N_Data	YearMin	YearMax
4054	4683	2002	2020
5014	679	2017	2023
5002	356	2008	2024
103	118	2020	2021
118	3	2006	2010
95	1	2012	2012

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

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

118 - National Aquatic Resource Surveys, National Coastal Condition Assessment

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 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	245	15	6.1	15	6.1	1	0.4
2014	455	17	3.7	17	3.7		
2015	300	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	329	36	10.9	12	3.6	5	1.5
2021	329	17	5.2	10	3.0	9	2.7
2022	185	9	4.9			18	9.7
2023	93	7	7.5	11	11.8	5	5.4

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

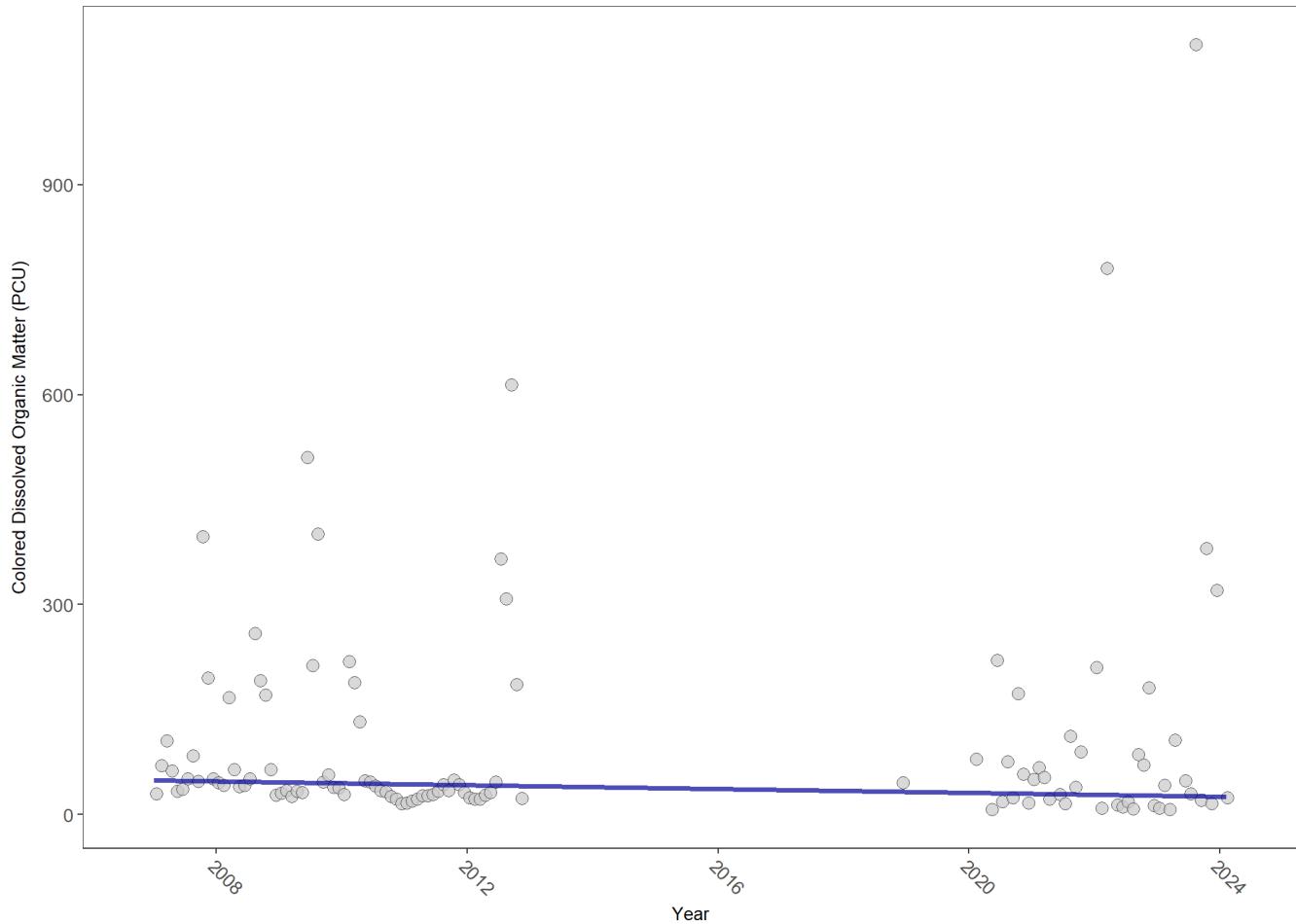
5014 - Guana River and Guana Lake Water Quality Monitoring

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	1507	12	37.9	TRUE	-0.2074	0.0069	-1.354972	49.06626	4.9373	0.9342	-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

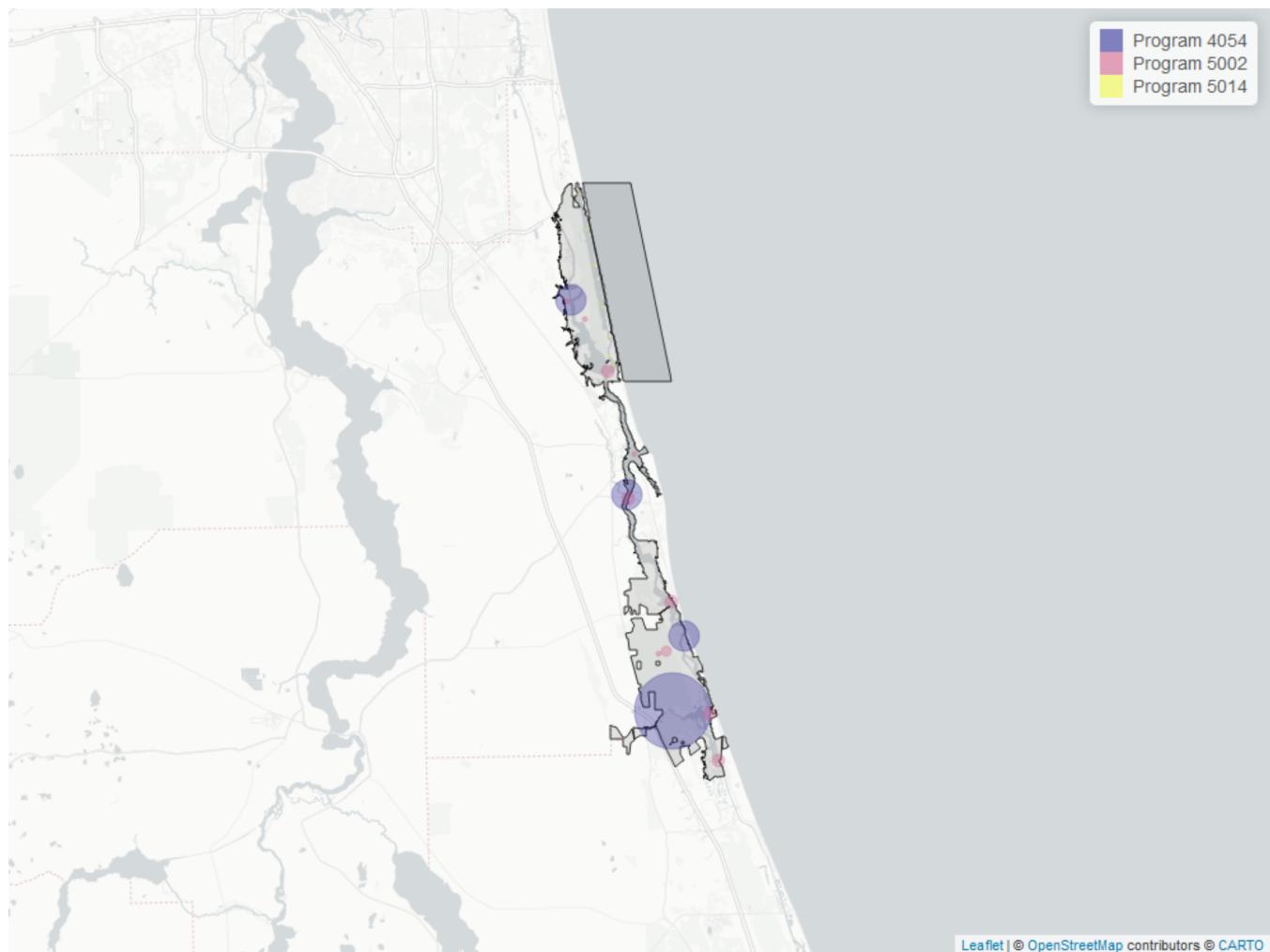


Table 10: Programs contributing data for Colored Dissolved Organic Matter

ProgramID	N_Data	YearMin	YearMax
4054	1334	2007	2012
5002	172	2020	2024
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

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
2020	39	10	25.6	5	12.8		
2021	45	7	15.6				
2022	45	12	26.7	5	11.1		
2023	41	14	34.1			5	12.2
2024	2					1	50.0

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

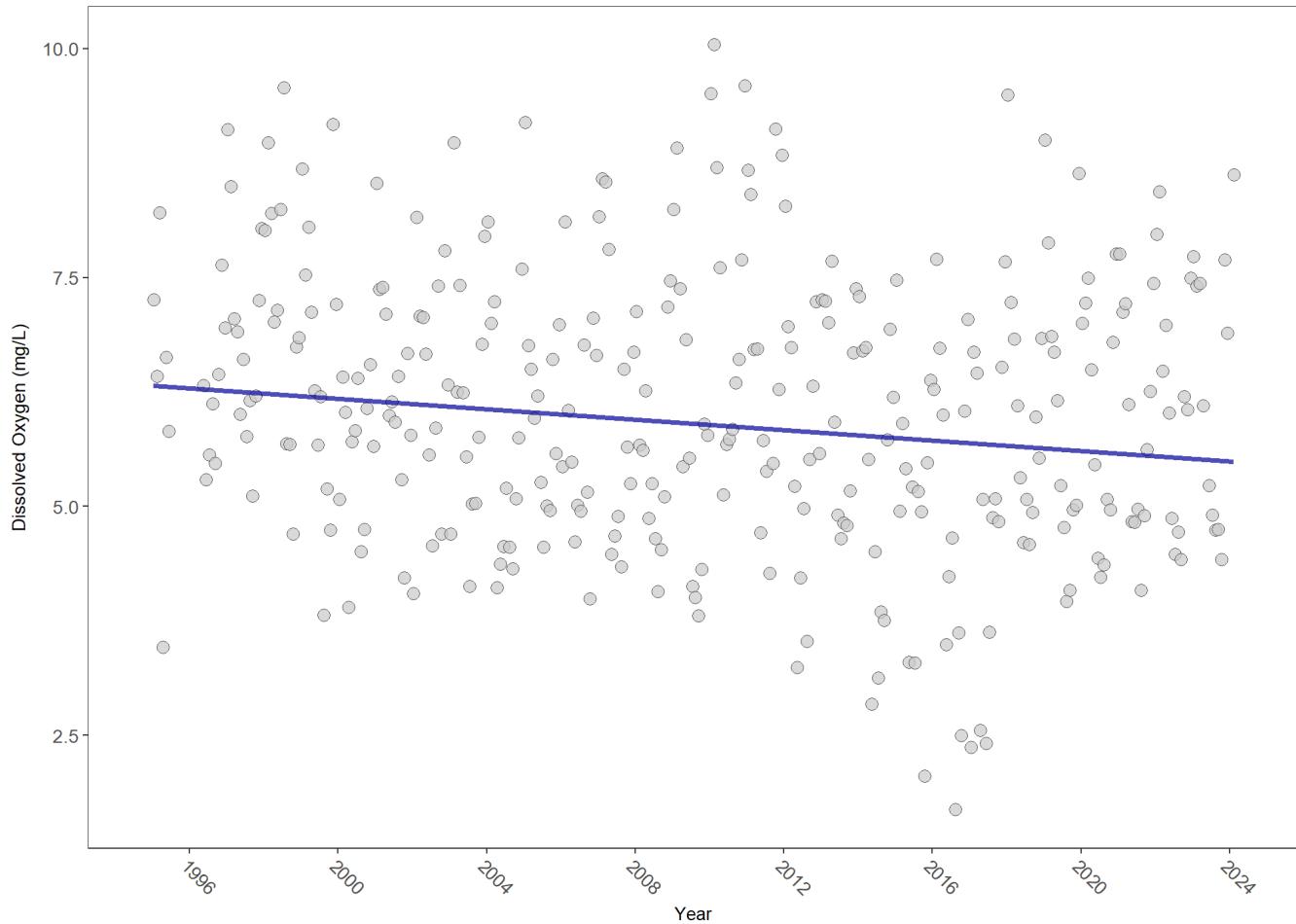
5014 - Guana River and Guana Lake Water Quality Monitoring

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

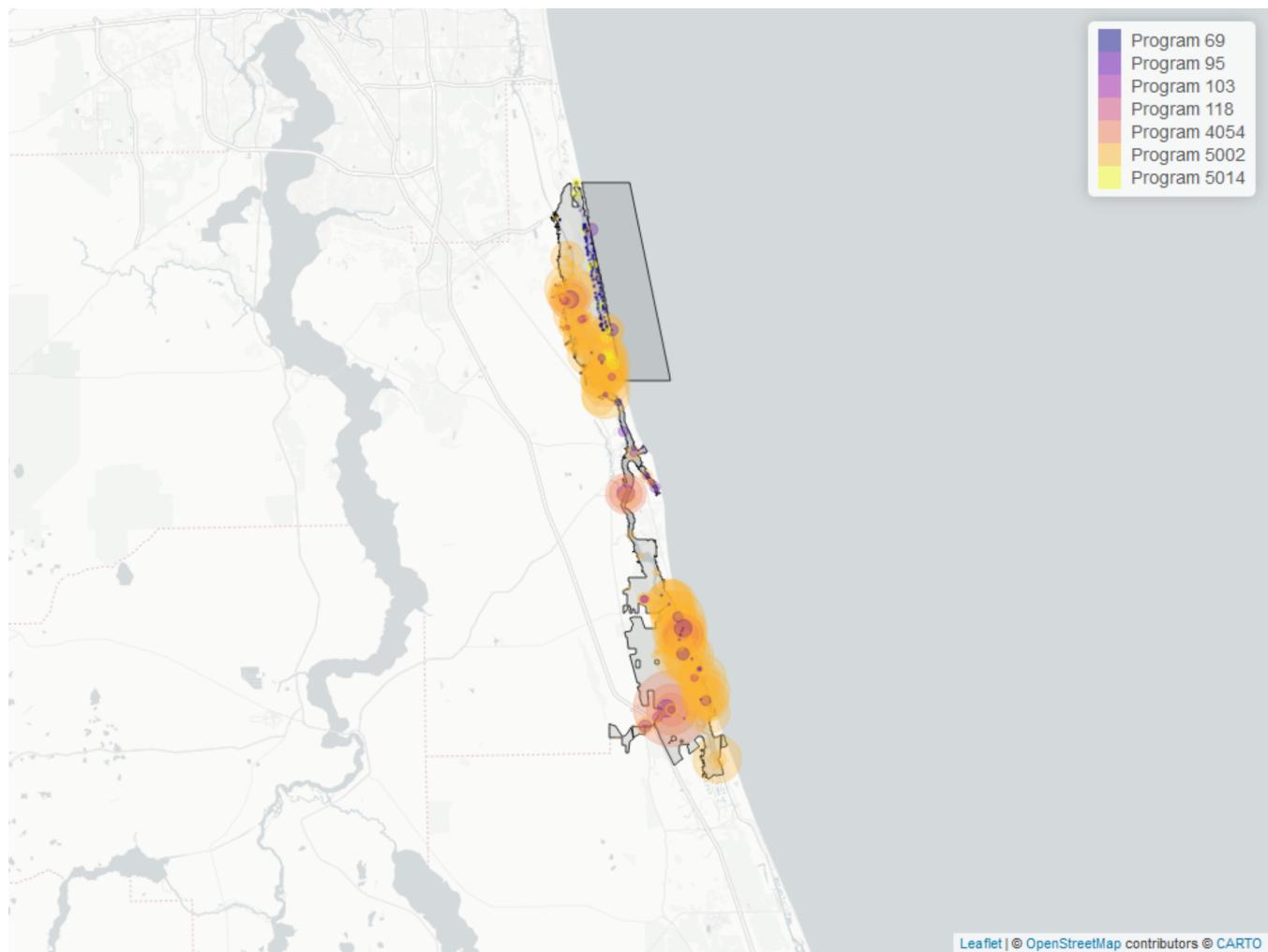


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	21603	30	6	TRUE	-0.1742	0.0000	-0.02864025	6.319793	19.7489	0.0489	-1

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



Leaflet | © OpenStreetMap contributors © CARTO

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

Table 12: Programs contributing data for Dissolved Oxygen

ProgramID	N_Data	YearMin	YearMax
5002	17880	1995	2024
4054	2829	2002	2020
95	400	2007	2018
5014	276	2017	2022
69	185	2001	2010
103	168	2020	2021
118	1	2006	2006

Program names:

5002 - Florida STORET / WIN

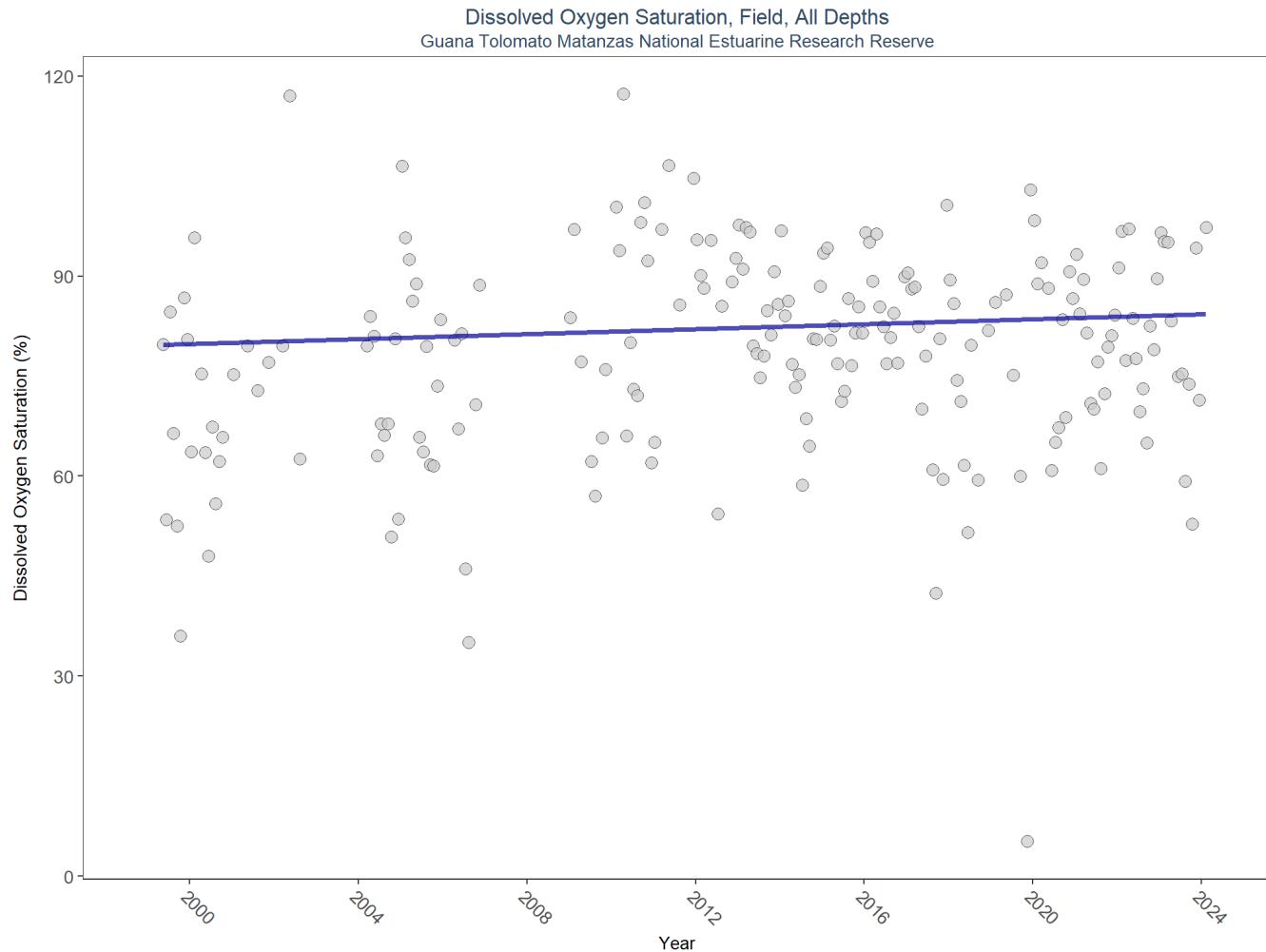
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program

- 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

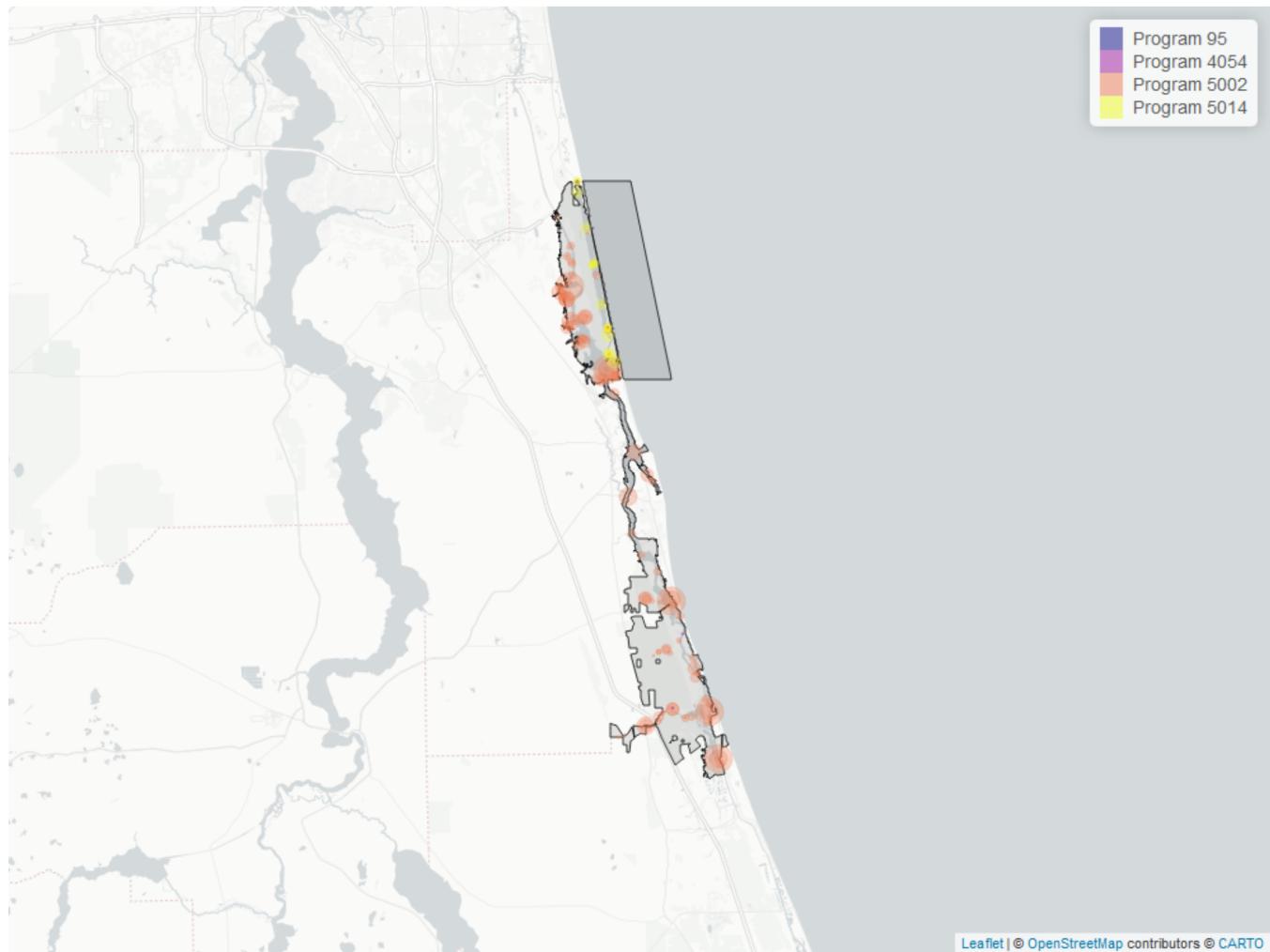
Seasonal Kendall-Tau Trend Analysis



$p < 0.00005$ 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	2023	1999	2024
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

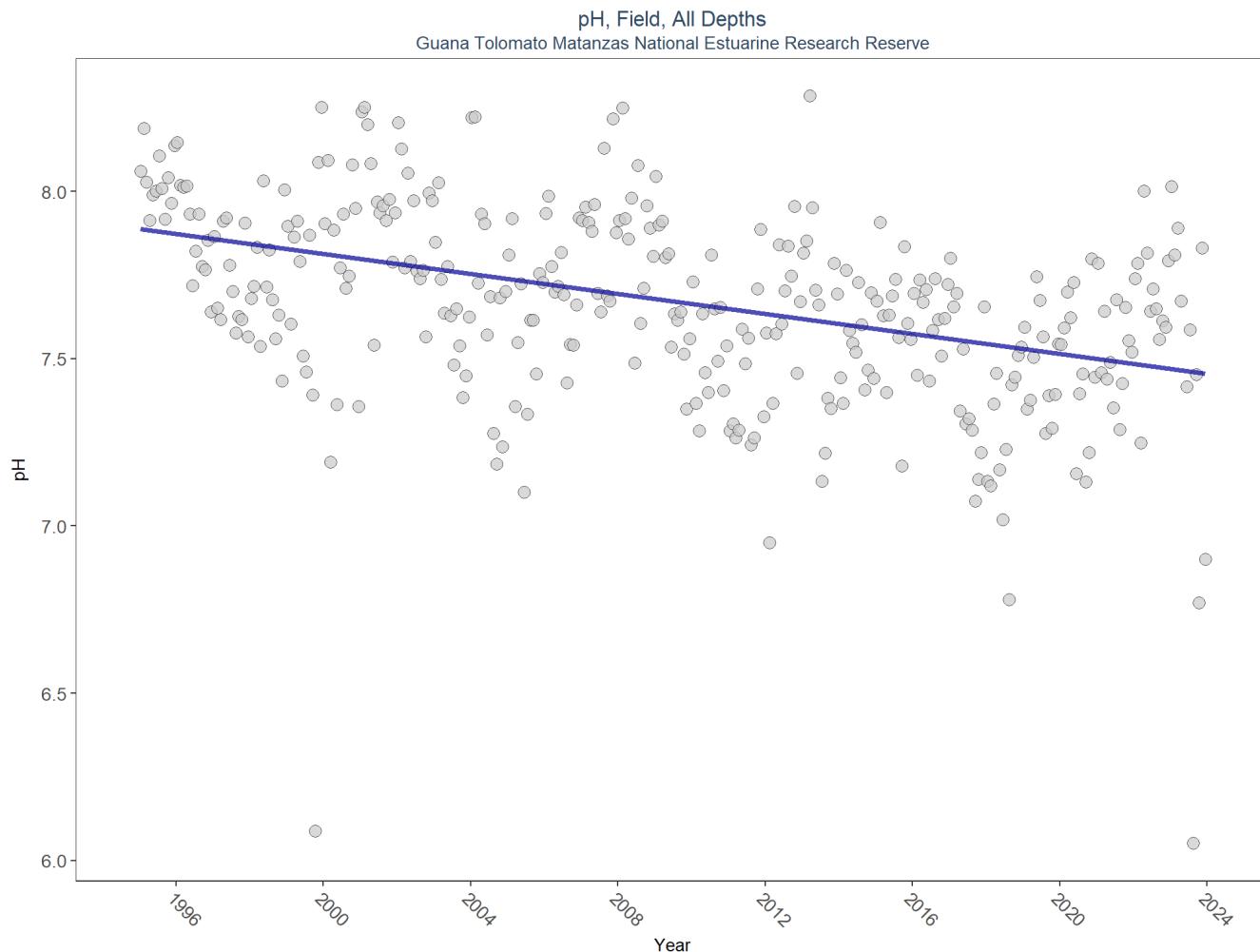
95 - Harmful Algal Bloom Marine Observation Network

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

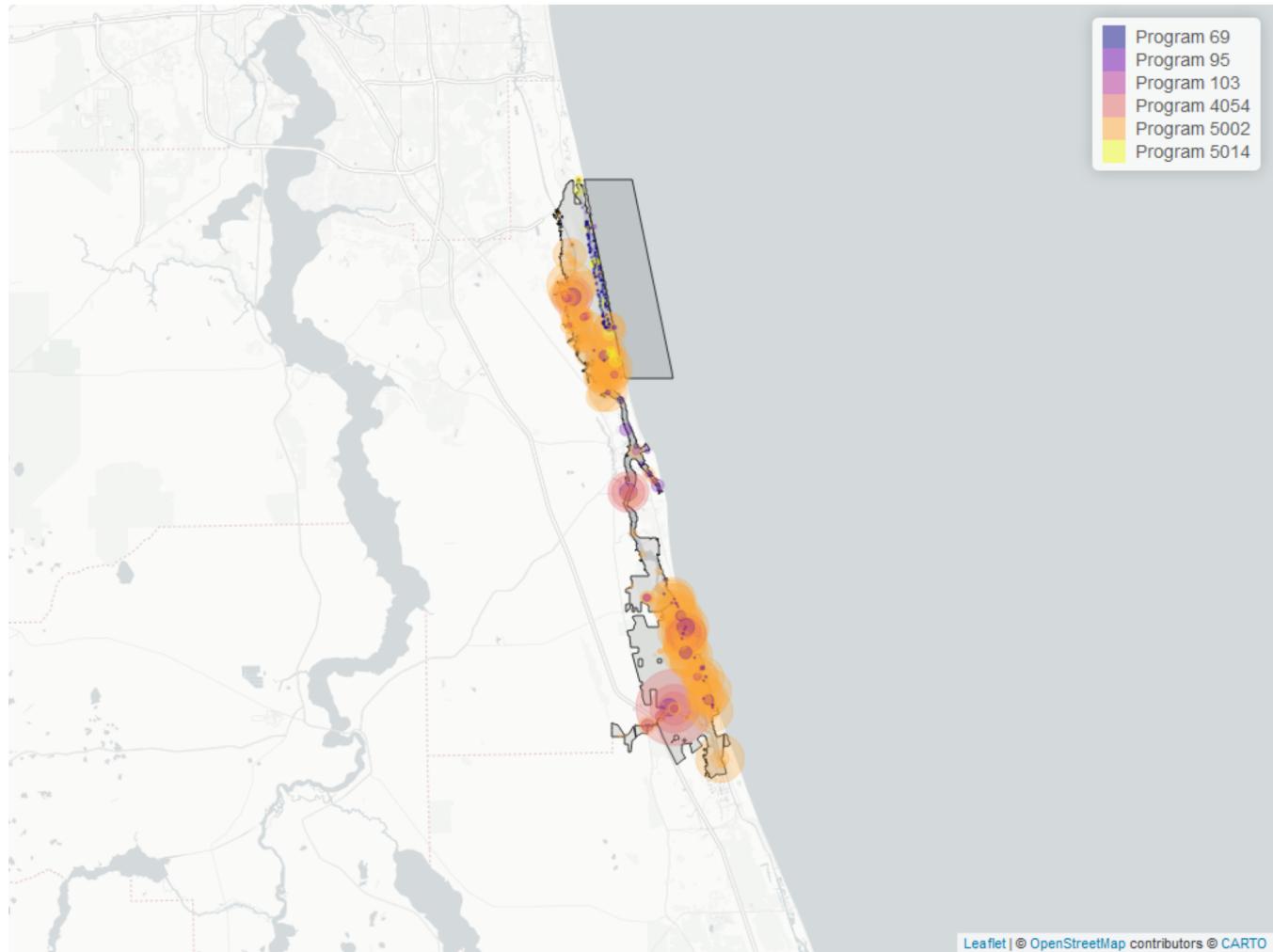


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	17801	29	7.8	TRUE	-0.3554	0.0000	-0.01491675	7.887555	2.7585	0.9935	-1

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	14511	1995	2024
4054	2813	2002	2020
95	401	2007	2018
5014	283	2017	2022
69	190	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

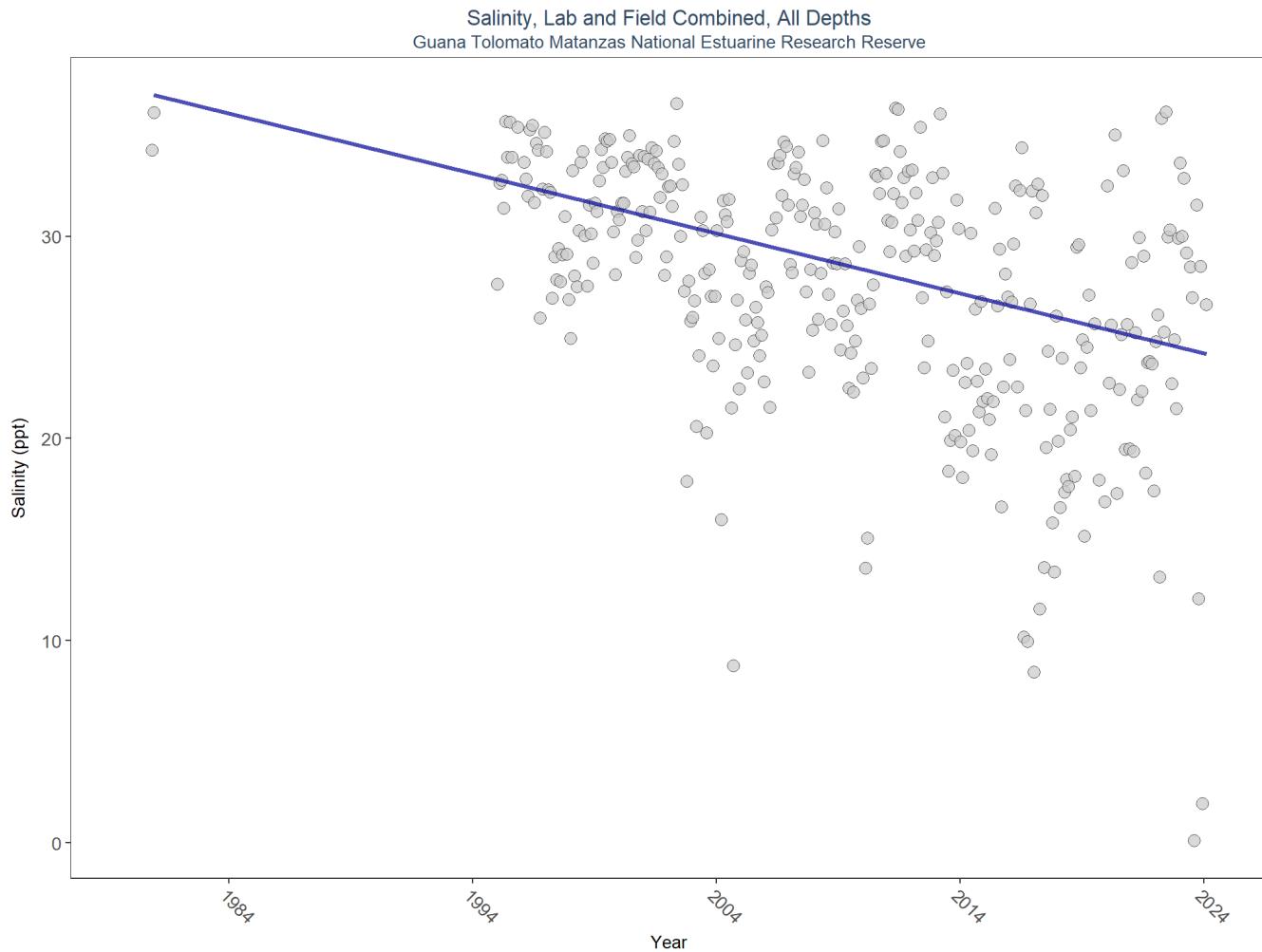
103 - EPA STOrage and RETrieval Data Warehouse (STORET)

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	24865	31	31.8	TRUE	-0.3373	0.0000	-0.2972765	37.27619	5.0831	0.9271	-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

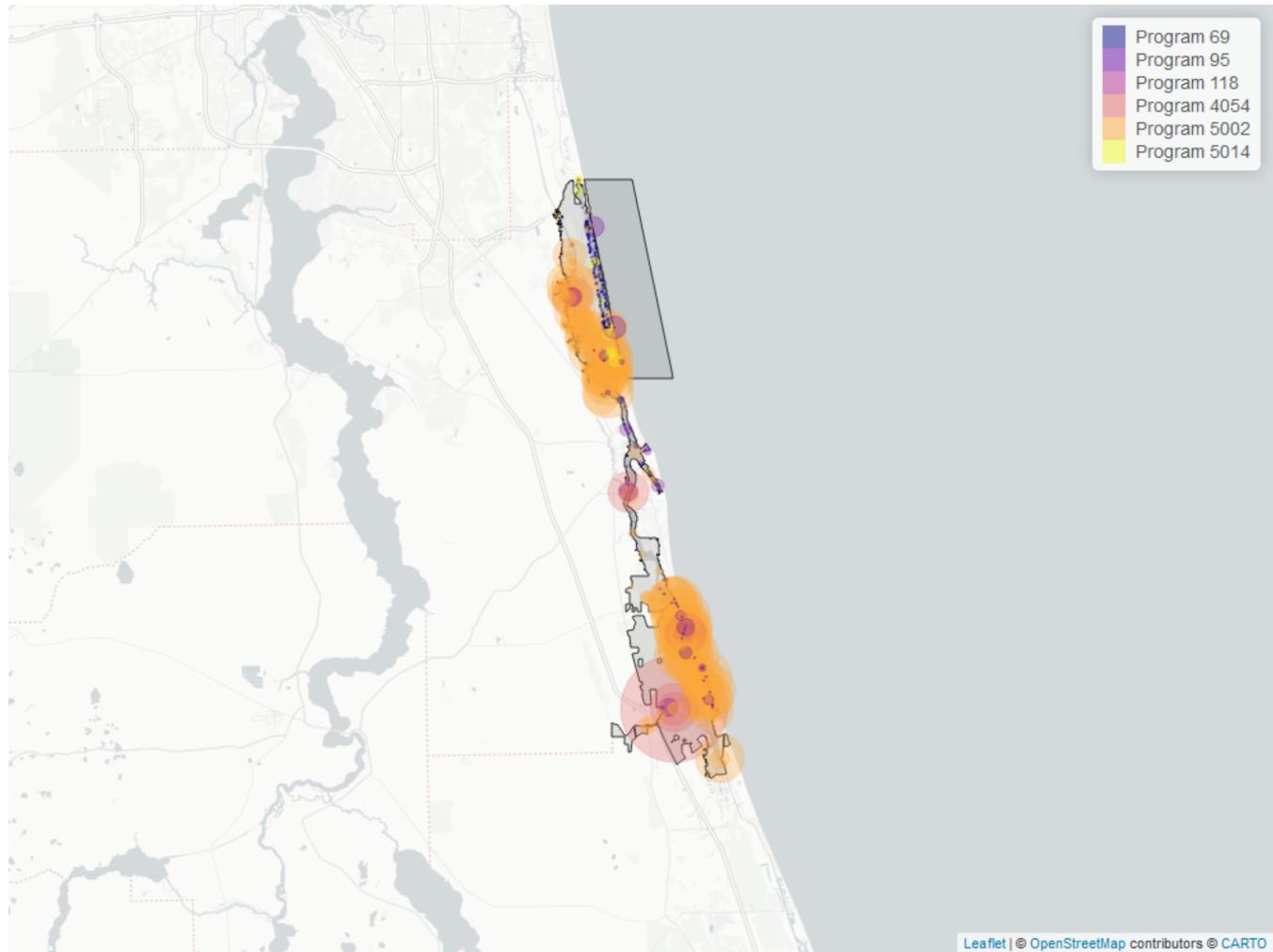


Table 15: Programs contributing data for Salinity

ProgramID	N_Data	YearMin	YearMax
5002	20545	1995	2024
4054	3361	2002	2019
95	563	1980	2018
5014	283	2017	2022
69	190	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

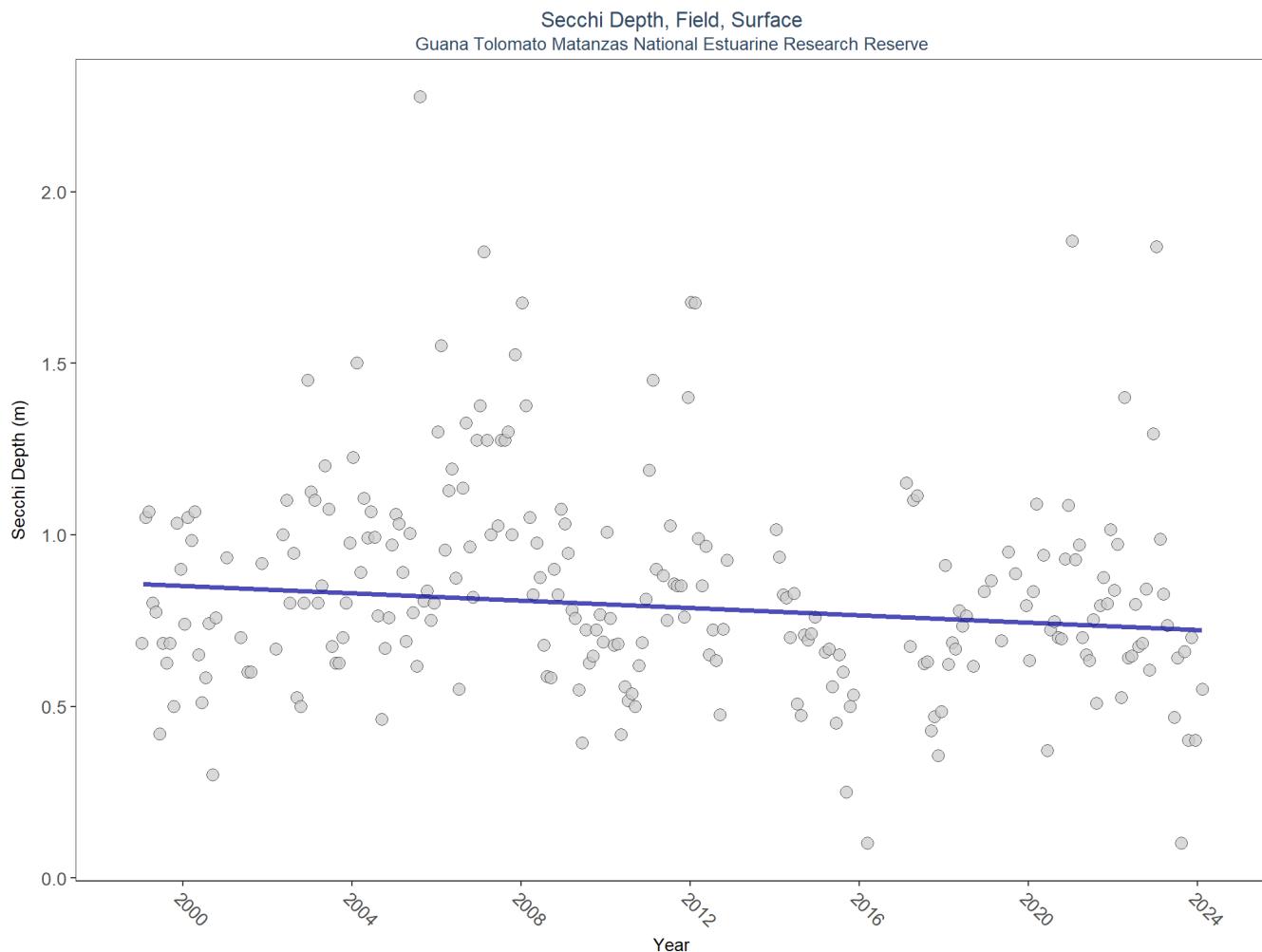
118 - National Aquatic Resource Surveys, National Coastal Condition Assessment

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.

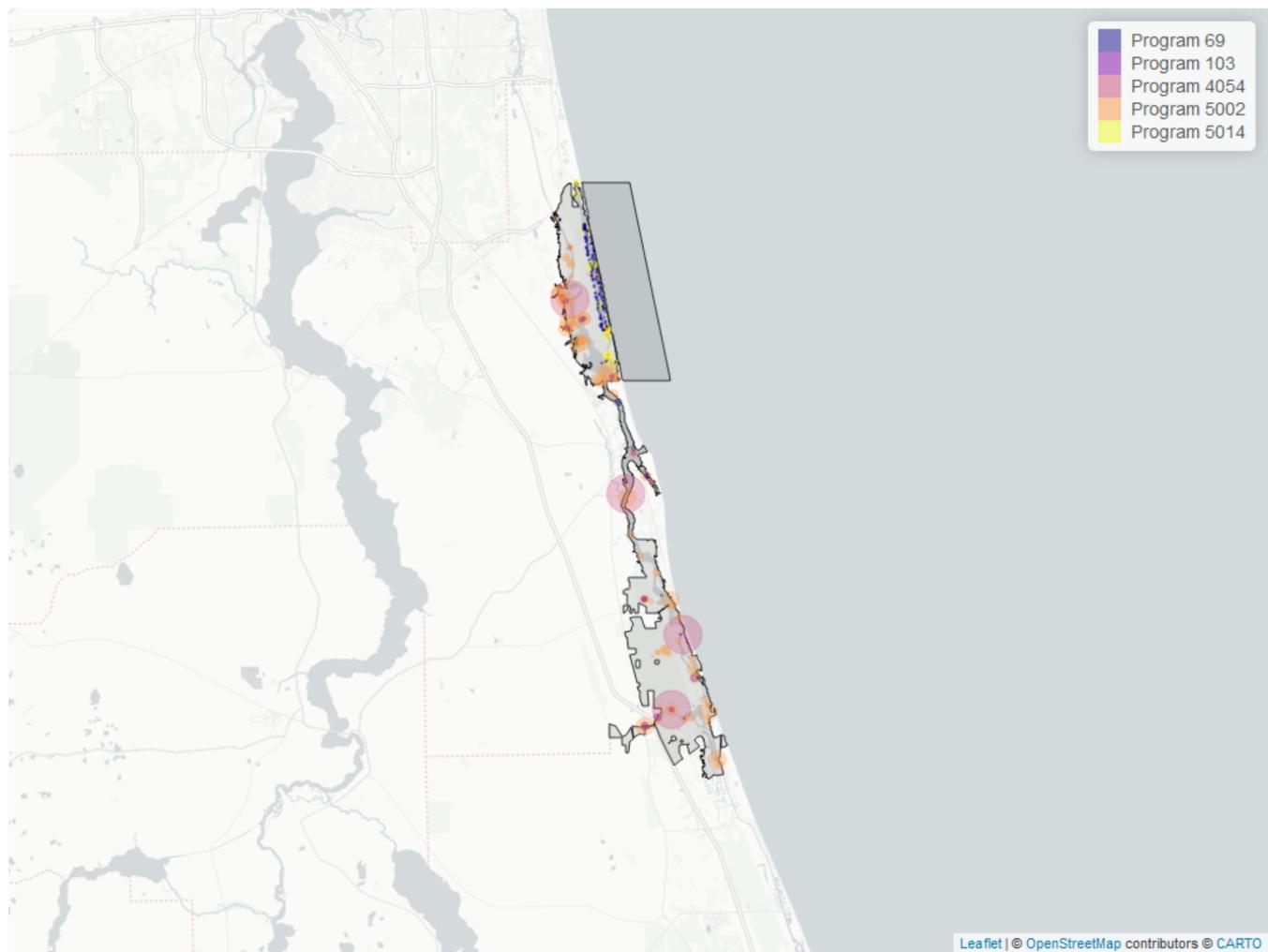
Seasonal Kendall-Tau Trend Analysis



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	1350	1999	2024
4054	937	2002	2014
5014	240	2017	2022
69	190	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	184	15	8.2
2023	75	1	1.3

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) $TN = ORGN + NH_4 + NO_3;$

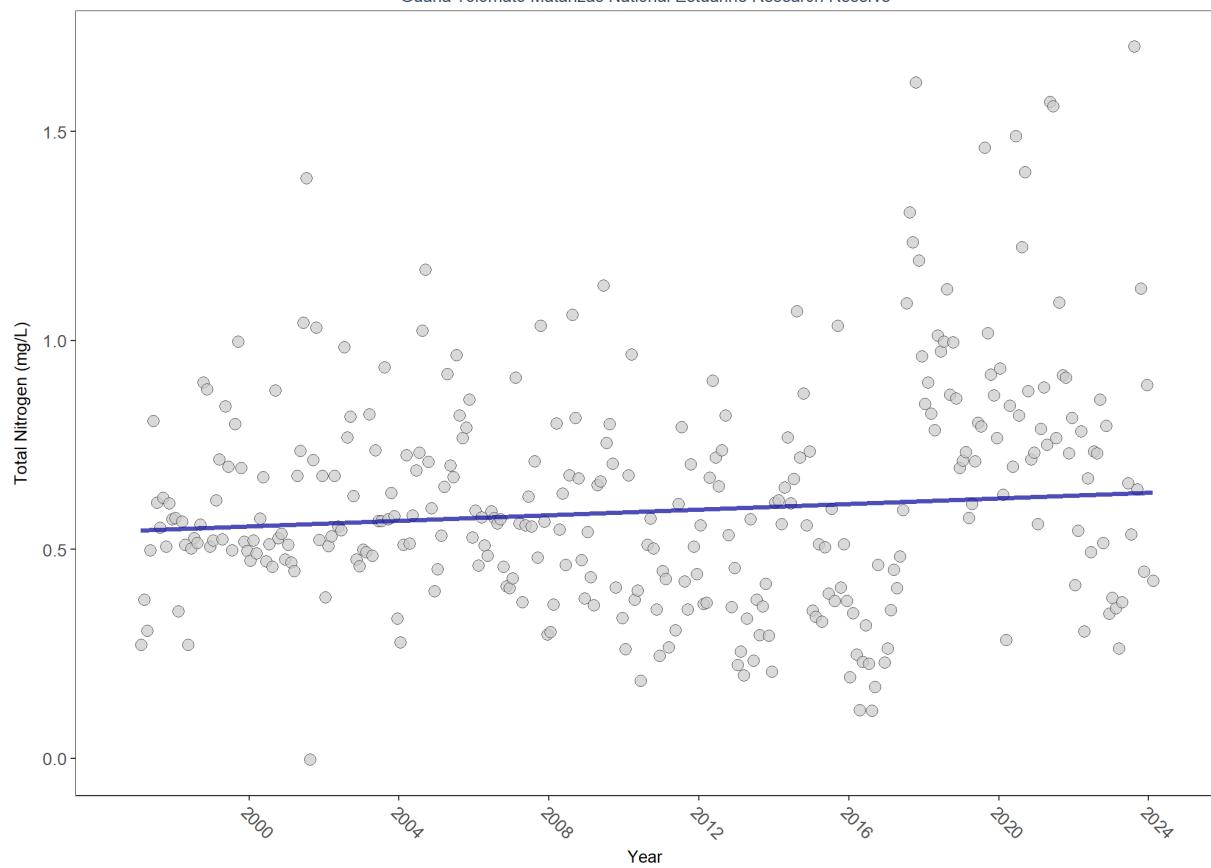
Additional Information:

- 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_QAQCFlagCode = “1Q”

- SEACAR_QAQC_Description = “SEACAR Calculated”

Seasonal Kendall-Tau Trend Analysis

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

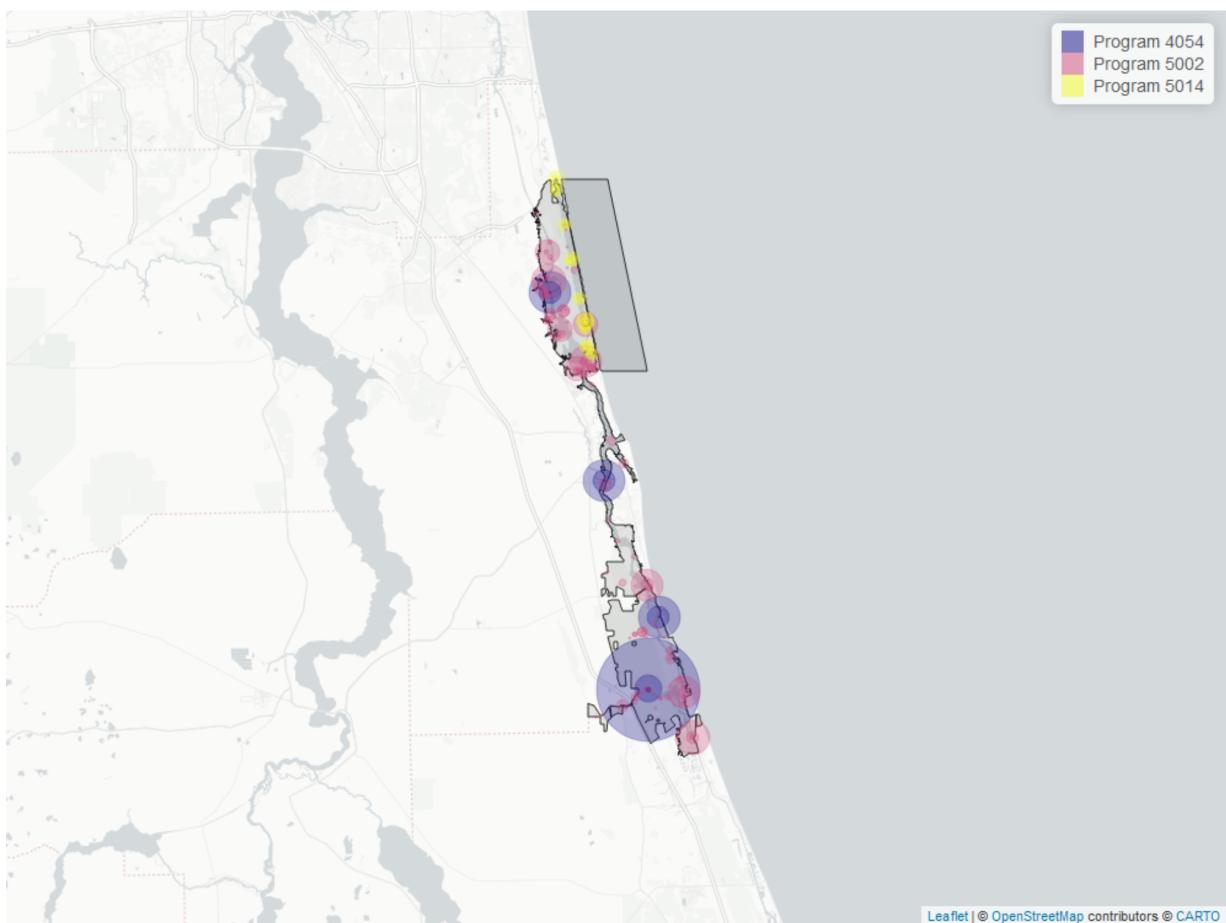


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	5389	28	0.544	TRUE	0.0729	0.0659	0.003383039	0.5449409	4.9064	0.9356	0

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 18: Programs contributing data for Total Nitrogen

ProgramID	N_Data	YearMin	YearMax
4054	3004	2002	2020
5002	2017	1997	2024
5014	550	2017	2022

Program names:

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

5002 - Florida STORET / WIN

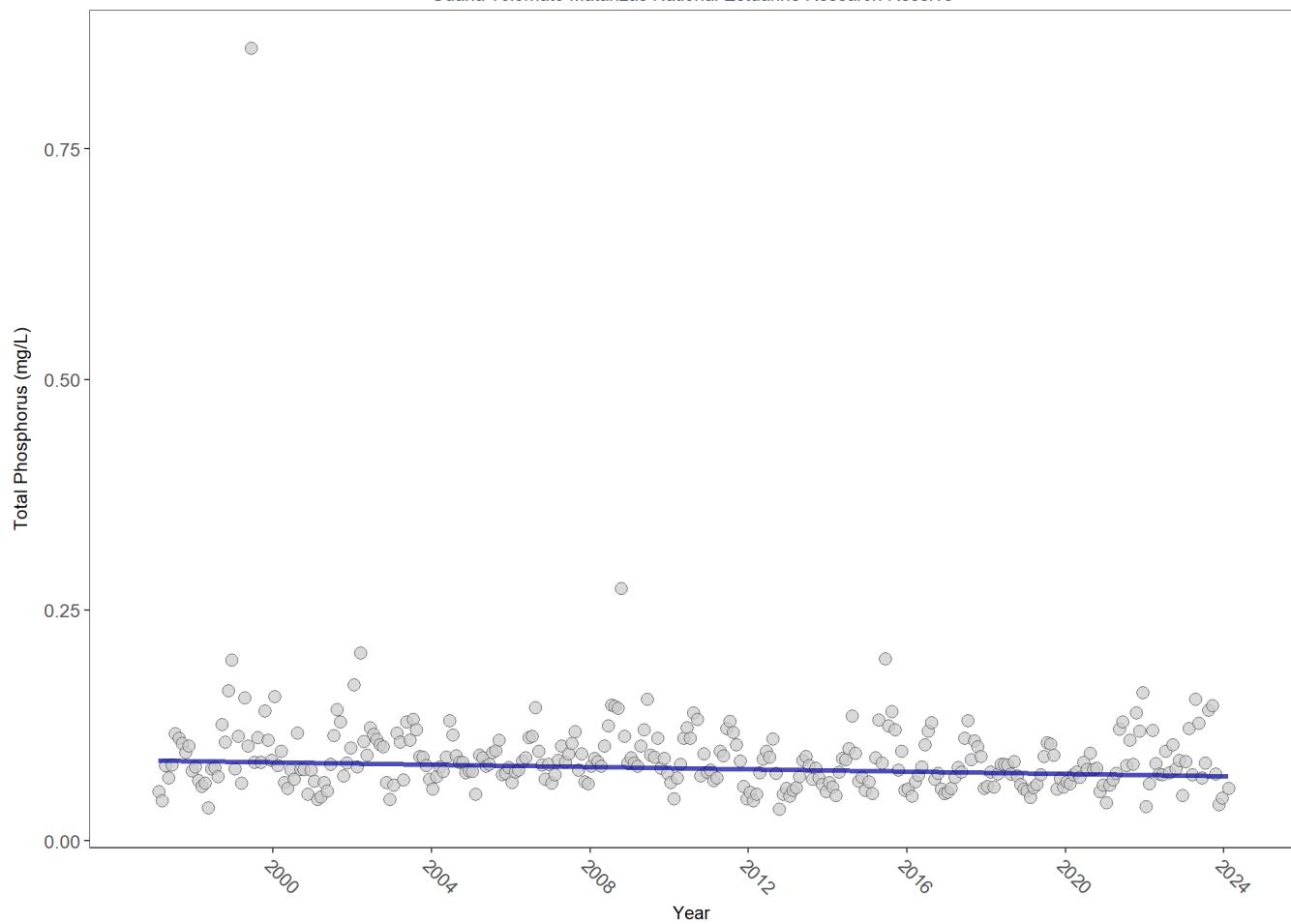
5014 - Guana River and Guana Lake Water Quality Monitoring

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	8054	28	0.074	TRUE	-0.1478	0.0002	-0.0006377778	0.08704904	10.6711	0.4712	-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

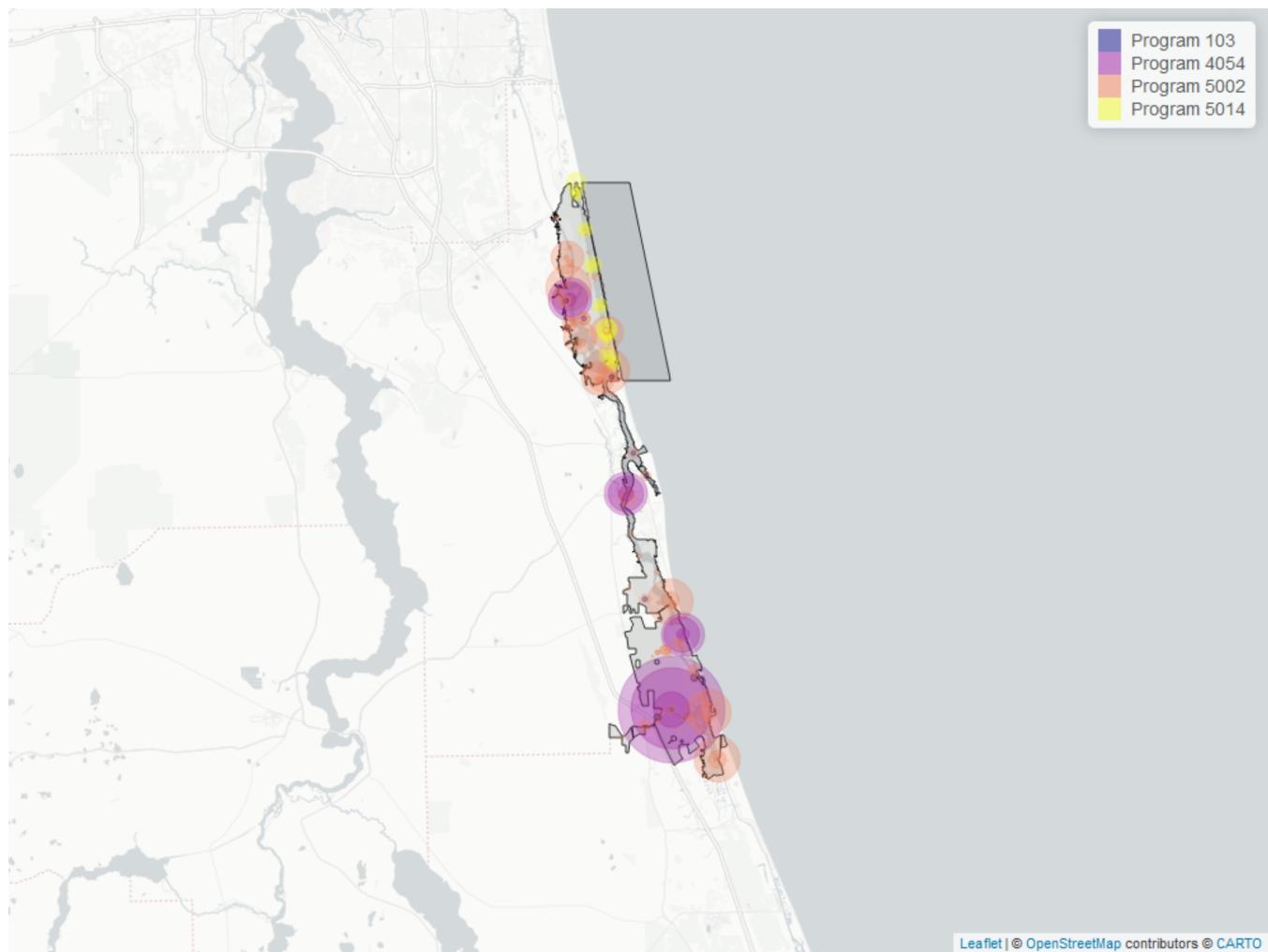


Table 19: Programs contributing data for Total Phosphorus

ProgramID	N_Data	YearMin	YearMax
4054	4506	2002	2020
5002	3184	1997	2024
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	375	92	24.5	14	3.7		
2016	349	91	26.1				
2017	344	45	13.1				
2018	370					3	0.8
2019	385					2	0.5
2020	399	18	4.5	8	2.0	1	0.2
2021	313	23	7.3	2	0.6	36	11.5
2022	228	10	4.4	2	0.9	8	3.5
2023	113	15	13.3				

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:

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

5002 - Florida STORET / WIN

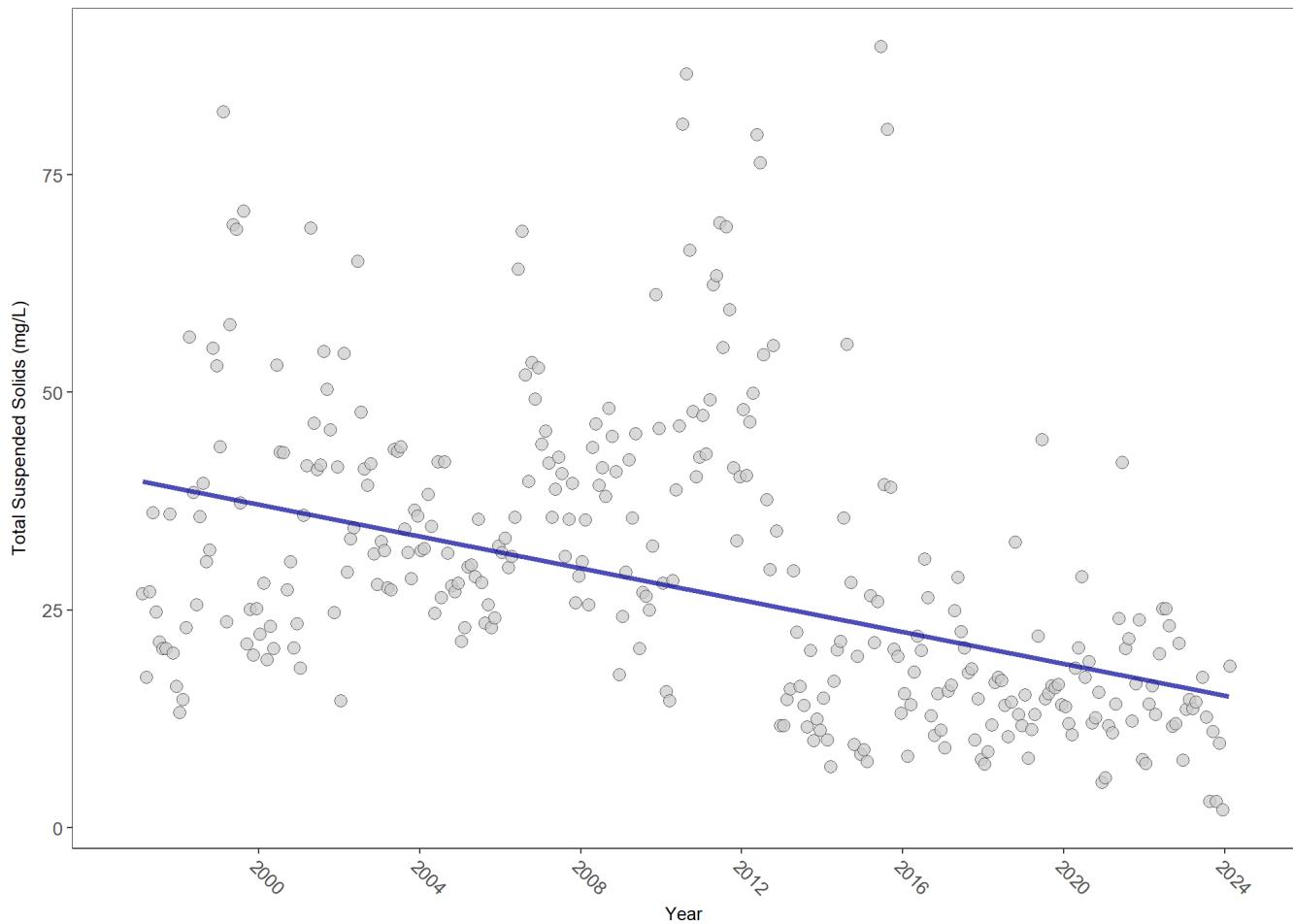
5014 - Guana River and Guana Lake Water Quality Monitoring

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	6144	28	23	TRUE	-0.3675	0.0000	-0.9135781	39.87559	4.0483	0.9685	-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

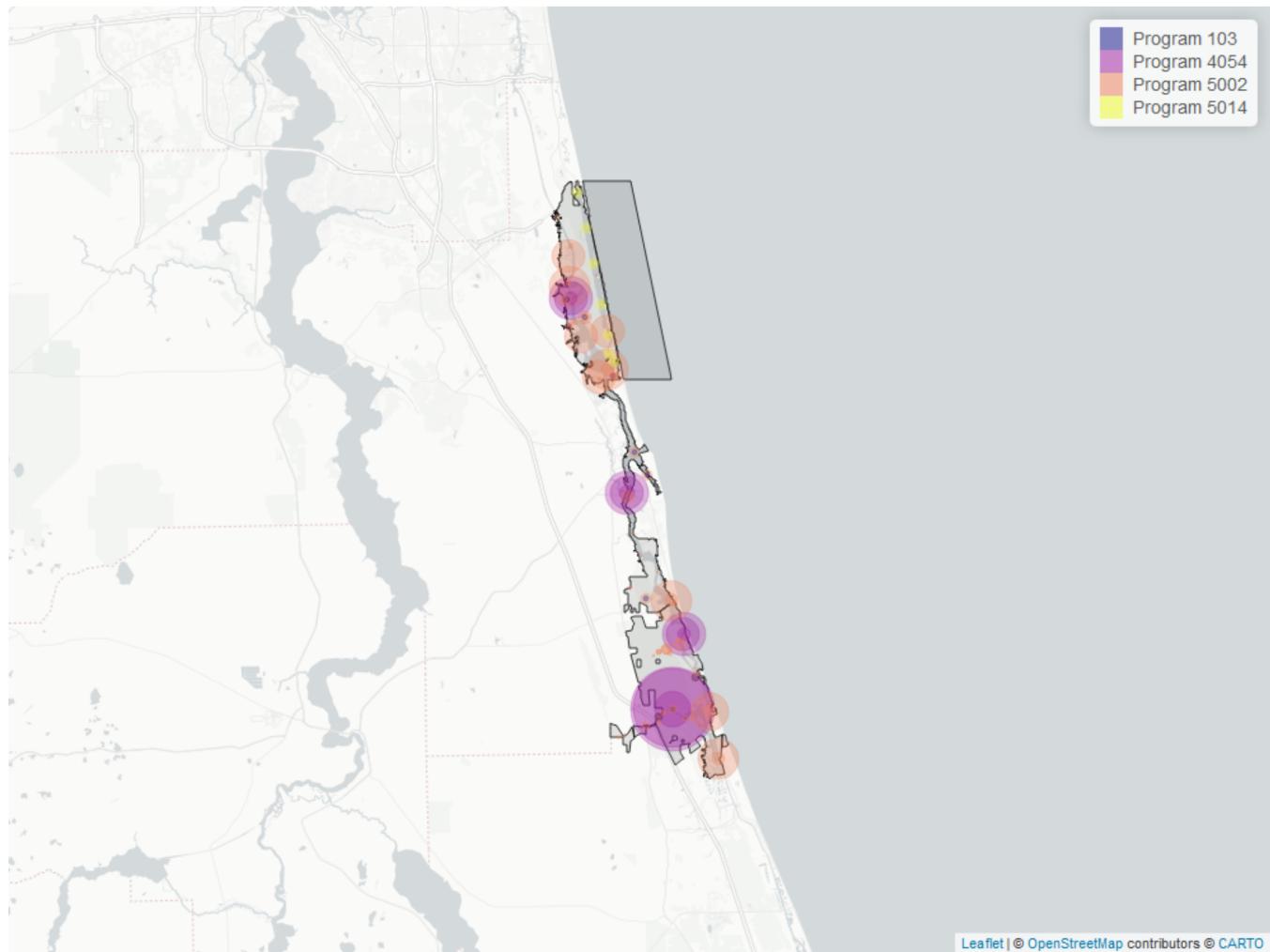


Table 21: Programs contributing data for Total Suspended Solids

<i>ProgramID</i>	<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>
4054	3724	2002	2020
5002	2420	1997	2024
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	118			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	325	84	25.9			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	274	76	27.7	1	0.4	3	1.1
2021	178	39	21.9	5	2.8	5	2.8
2022	118	36	30.5			3	2.5
2023	44	16	36.4			1	2.3

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

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

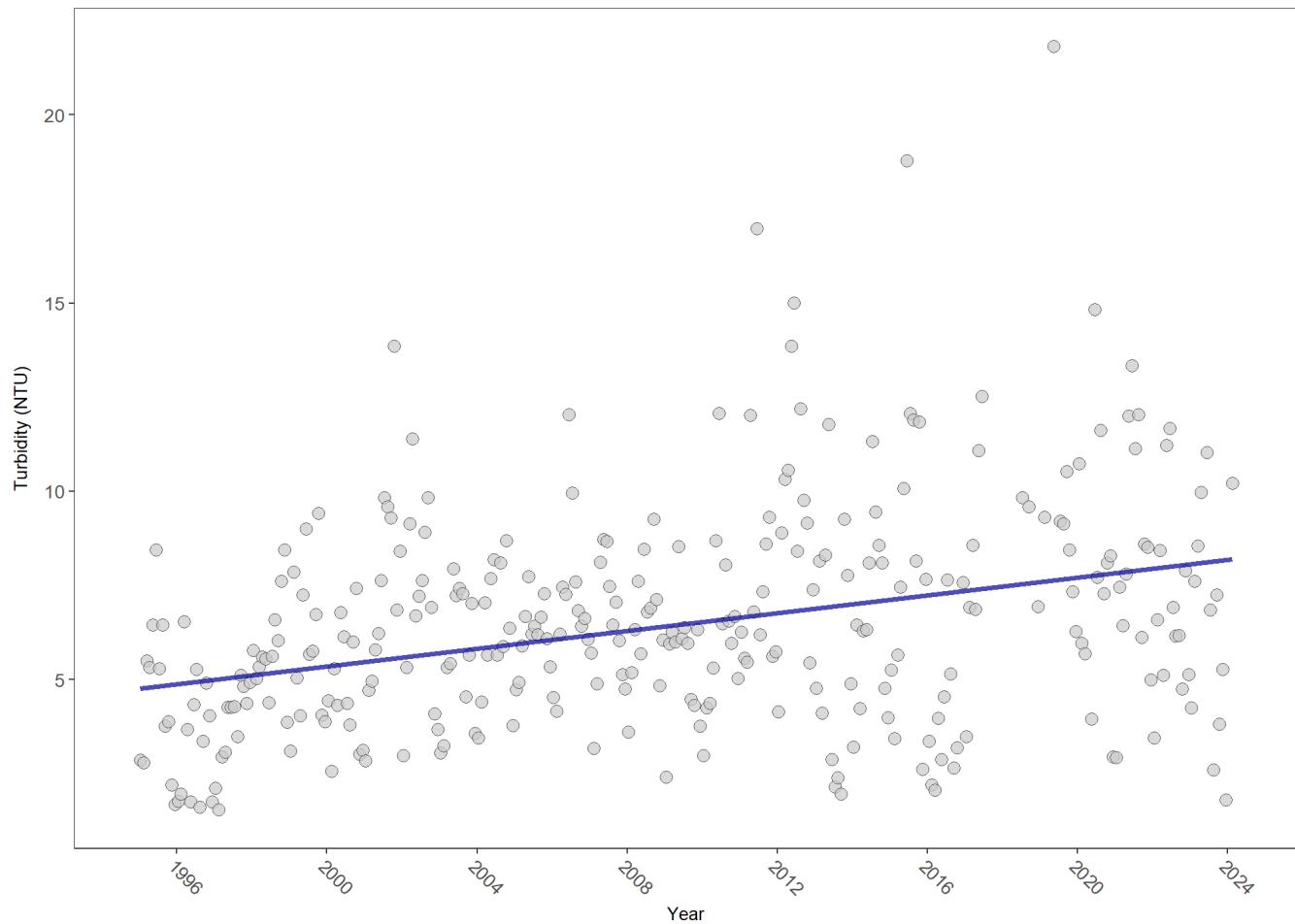
5014 - Guana River and Guana Lake Water Quality Monitoring

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	17153	30	4.8	TRUE	0.2885	0.0000	0.1178786	4.763718	9.2337	0.6003	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Turbidity

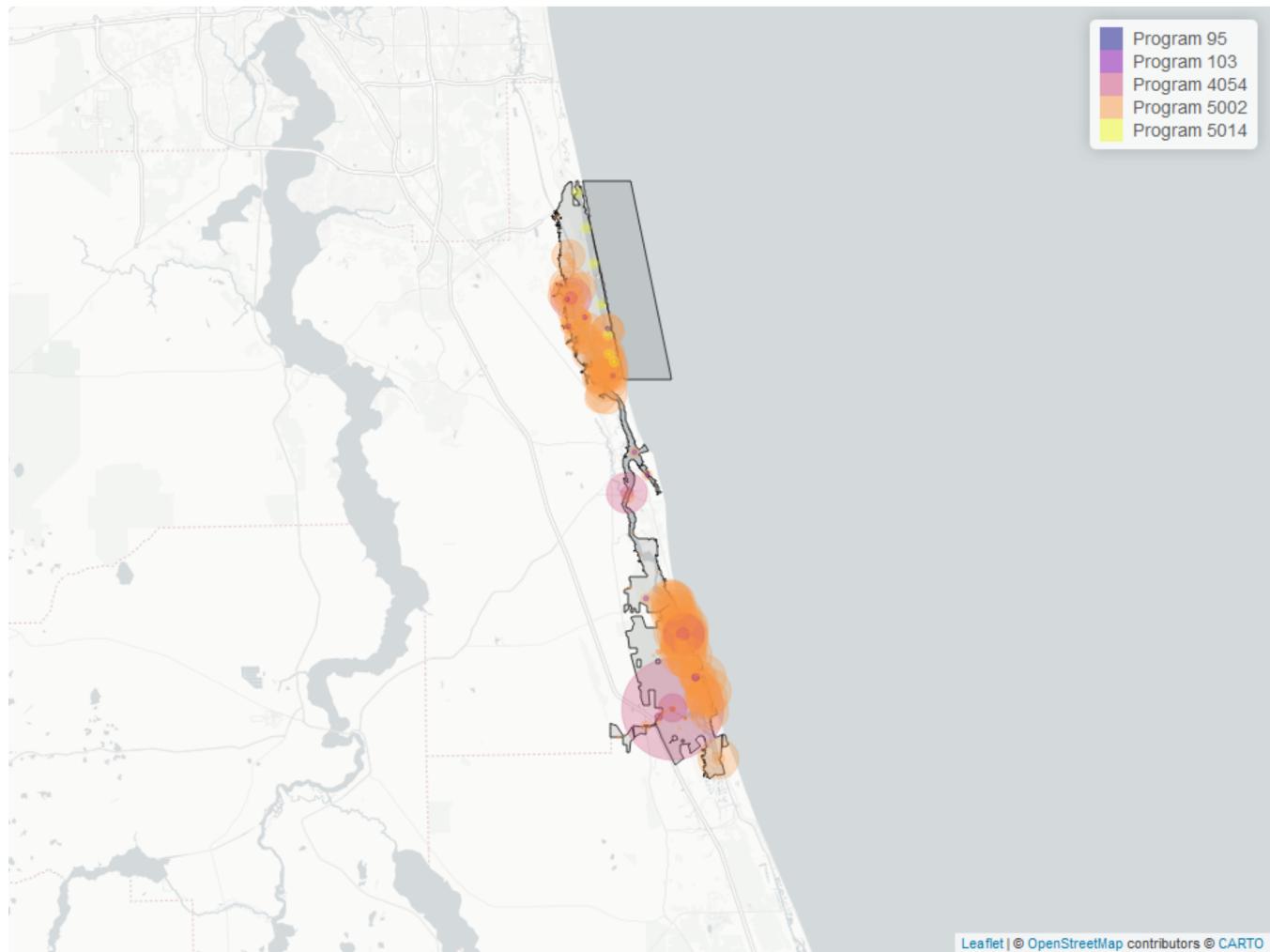


Table 23: Programs contributing data for Turbidity

ProgramID	N_Data	YearMin	YearMax
5002	14372	1995	2024
4054	2592	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
- $N_{}$ 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 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	82	1	1.2	11	13.4		
2016	61	3	4.9	1	1.6		
2019	150			7	4.7		
2020	193			4	2.1		
2021	177	1	0.6			1	0.6
2022	118	2	1.7				
2023	44	1	2.3				

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:

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

5002 - Florida STORET / WIN

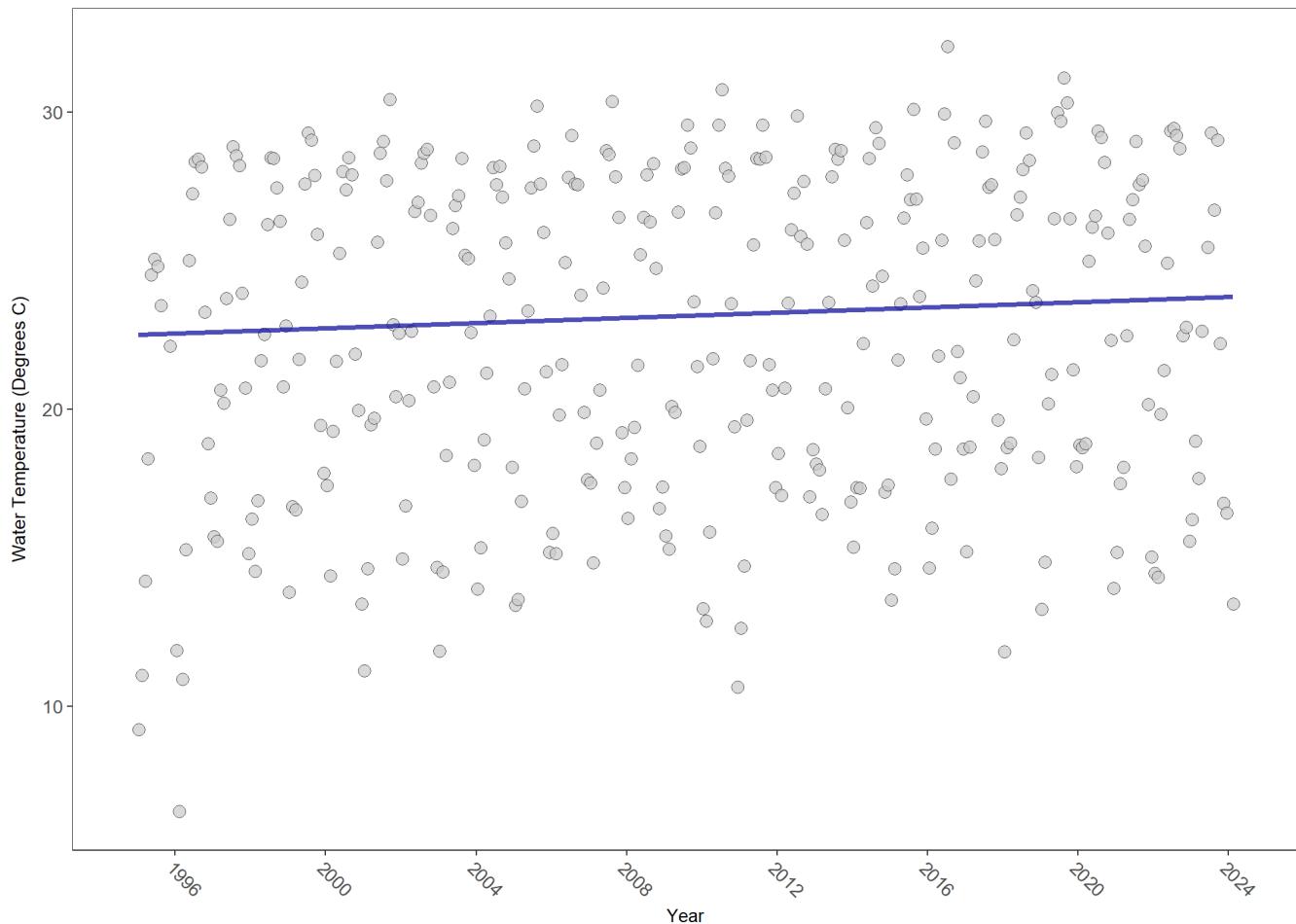
5014 - Guana River and Guana Lake Water Quality Monitoring

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

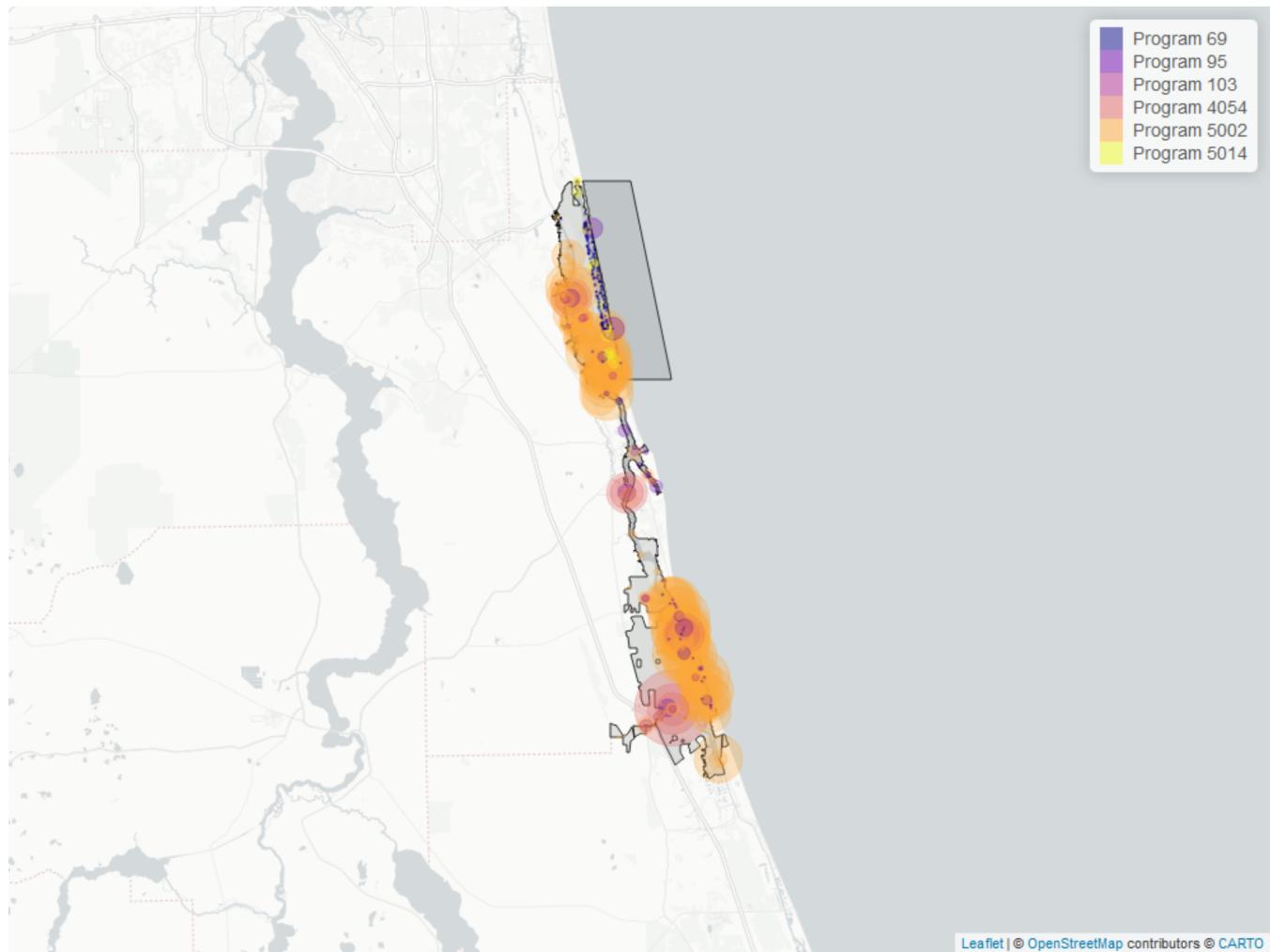


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	24348	30	23.3	TRUE	0.1703	0.0000	0.04408421	22.50907	14.9873	0.1831	1

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	21038	1995	2024
4054	2890	2002	2020
95	534	2007	2018
5014	283	2017	2022
69	190	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:

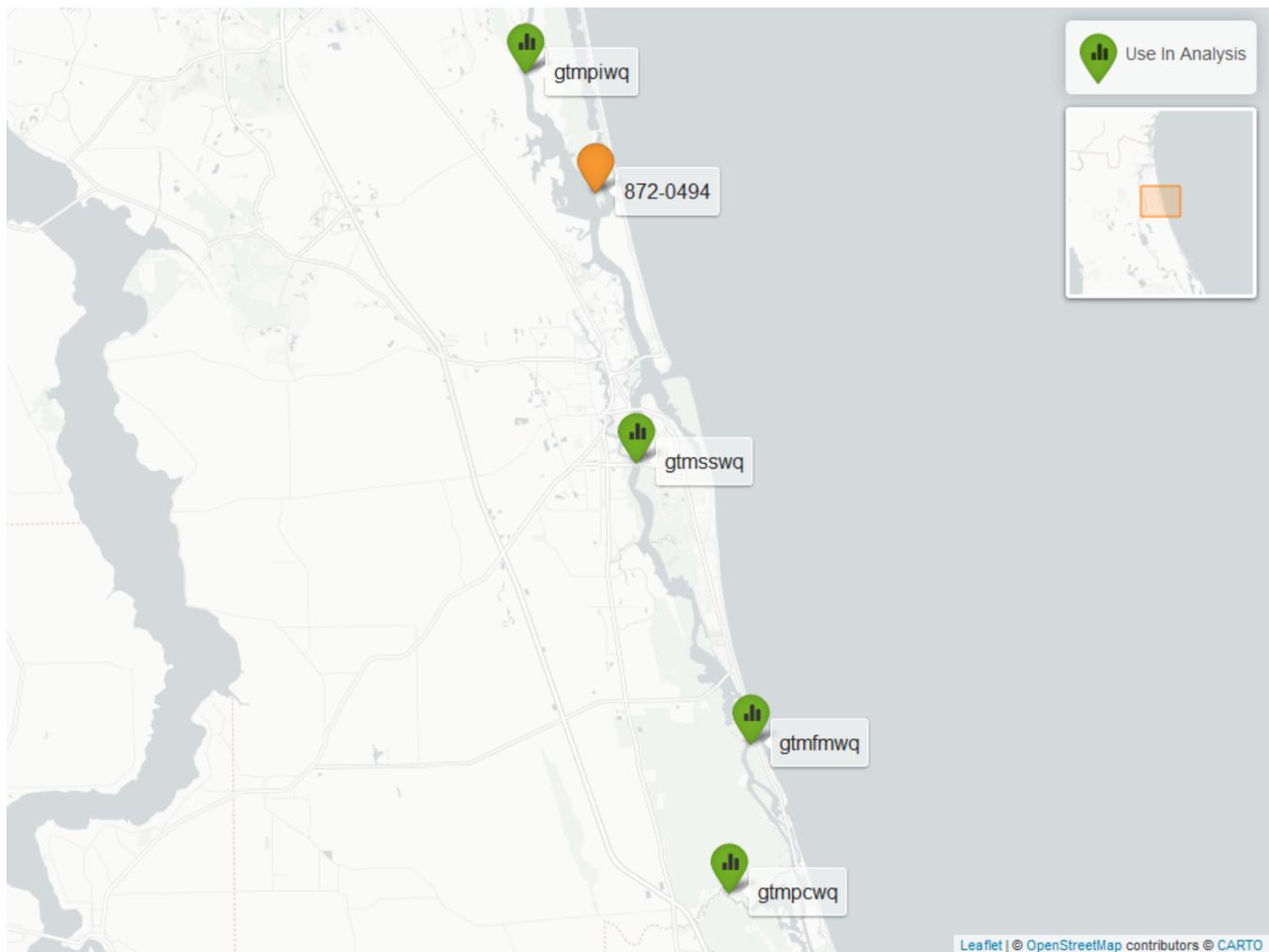
- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_NE-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_Saturation_NE-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_pH_NE-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_Salinity_NE-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_Turbidity_NE-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_Water_Temperature_NE-2024-Jul-02.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	24	TRUE	DO , DOS , pH , Sal , Turb , TempW
gtmpcwq	23	TRUE	DO , DOS , pH , Sal , Turb , TempW
gtmipiwb	24	TRUE	DO , DOS , pH , Sal , Turb , TempW
gtmsswq	23	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



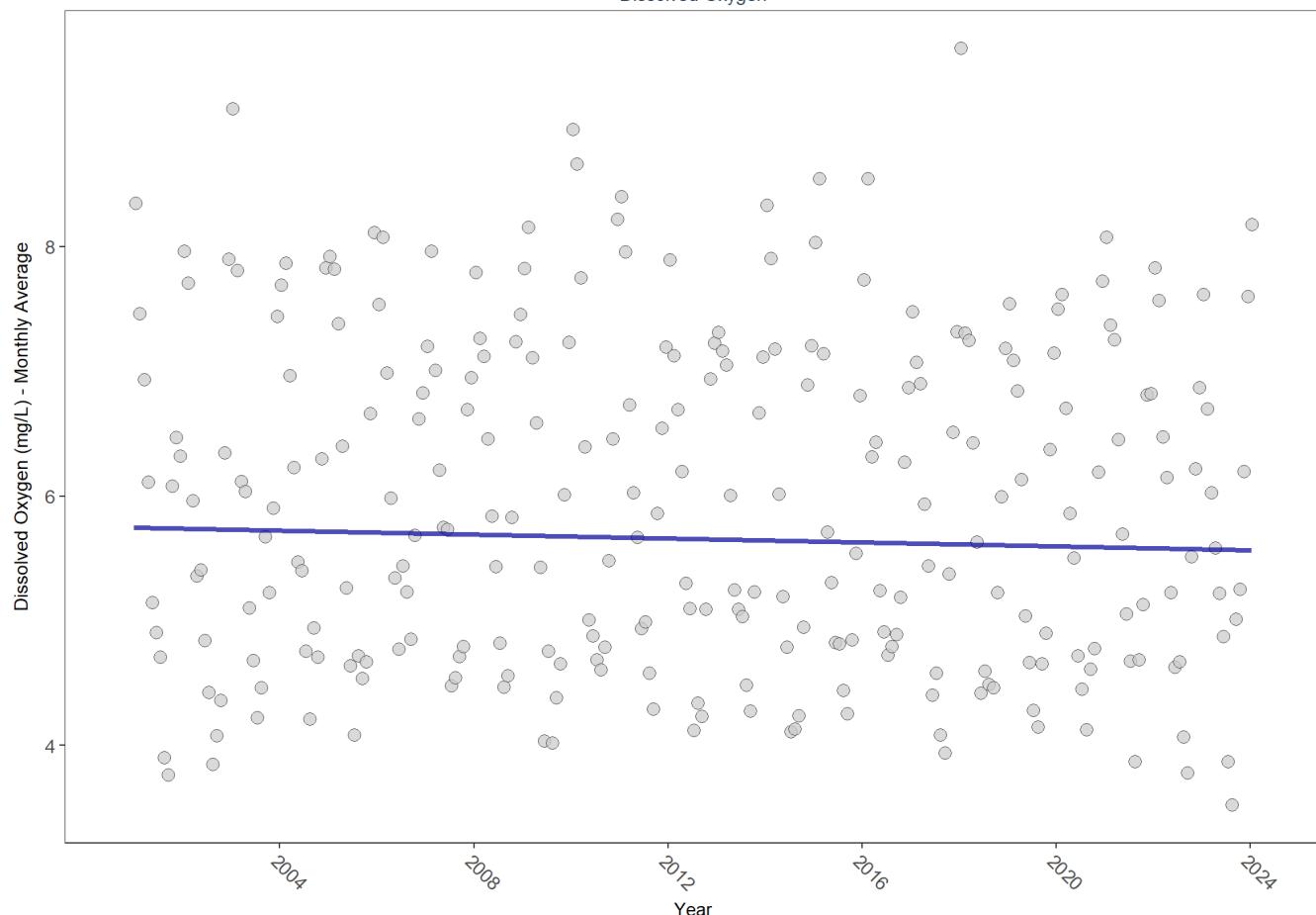
Map showing Continuous Water Quality Monitoring sampling locations within the boundaries of Guana Tolomato Matanzas National Estuarine Research Reserve. Sites marked as *Use In Analysis* are featured in this report.

Dissolved Oxygen - Continuous Water Quality

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	632504	24	5.9	TRUE	-0.0919	0.0338	-0.007942326	5.747765	3.3316	0.9856	-1

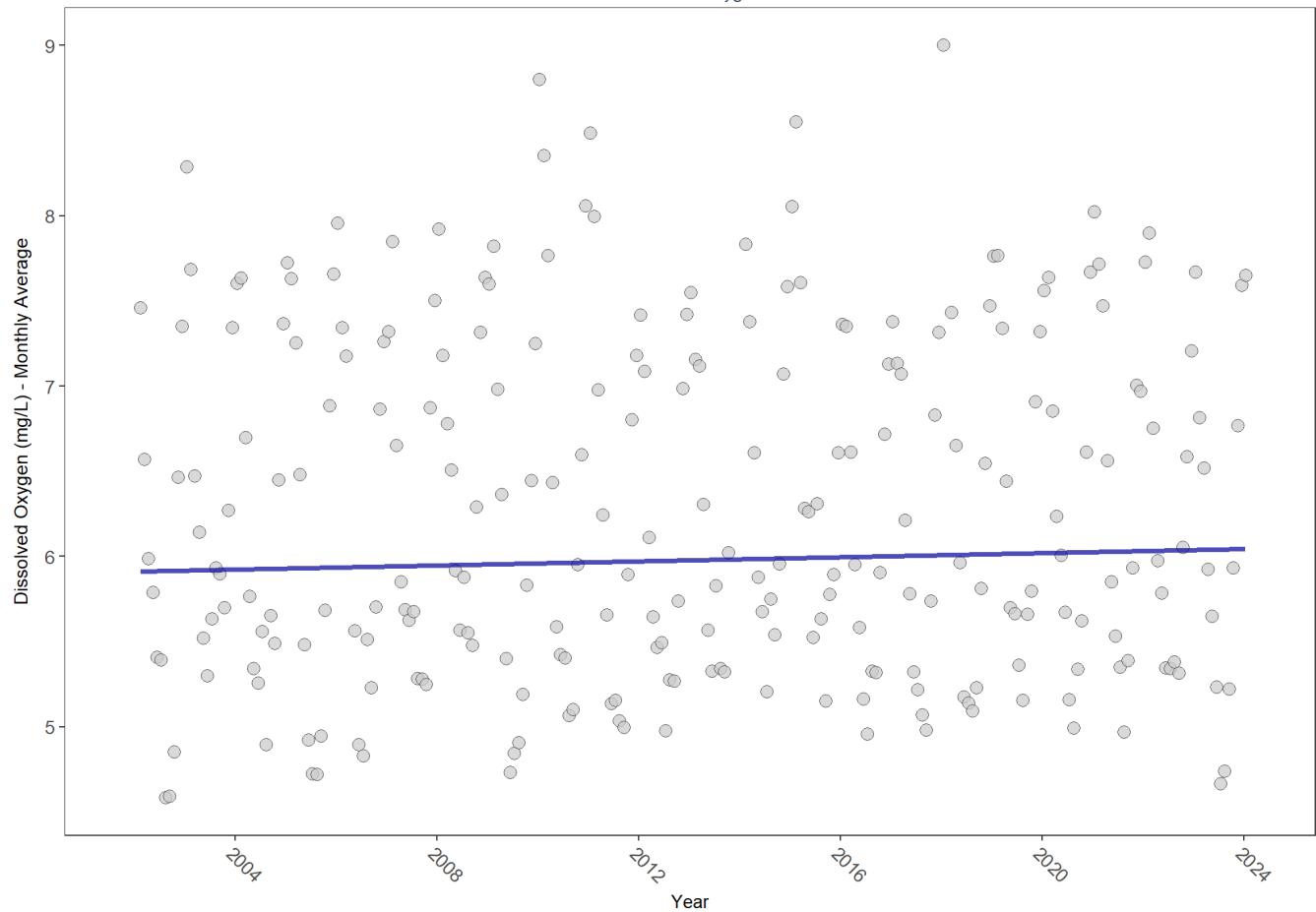
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

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	629699	23	6.3	TRUE	0.0858	0.0523	0.006080578	5.912037	10.3379	0.5003	0

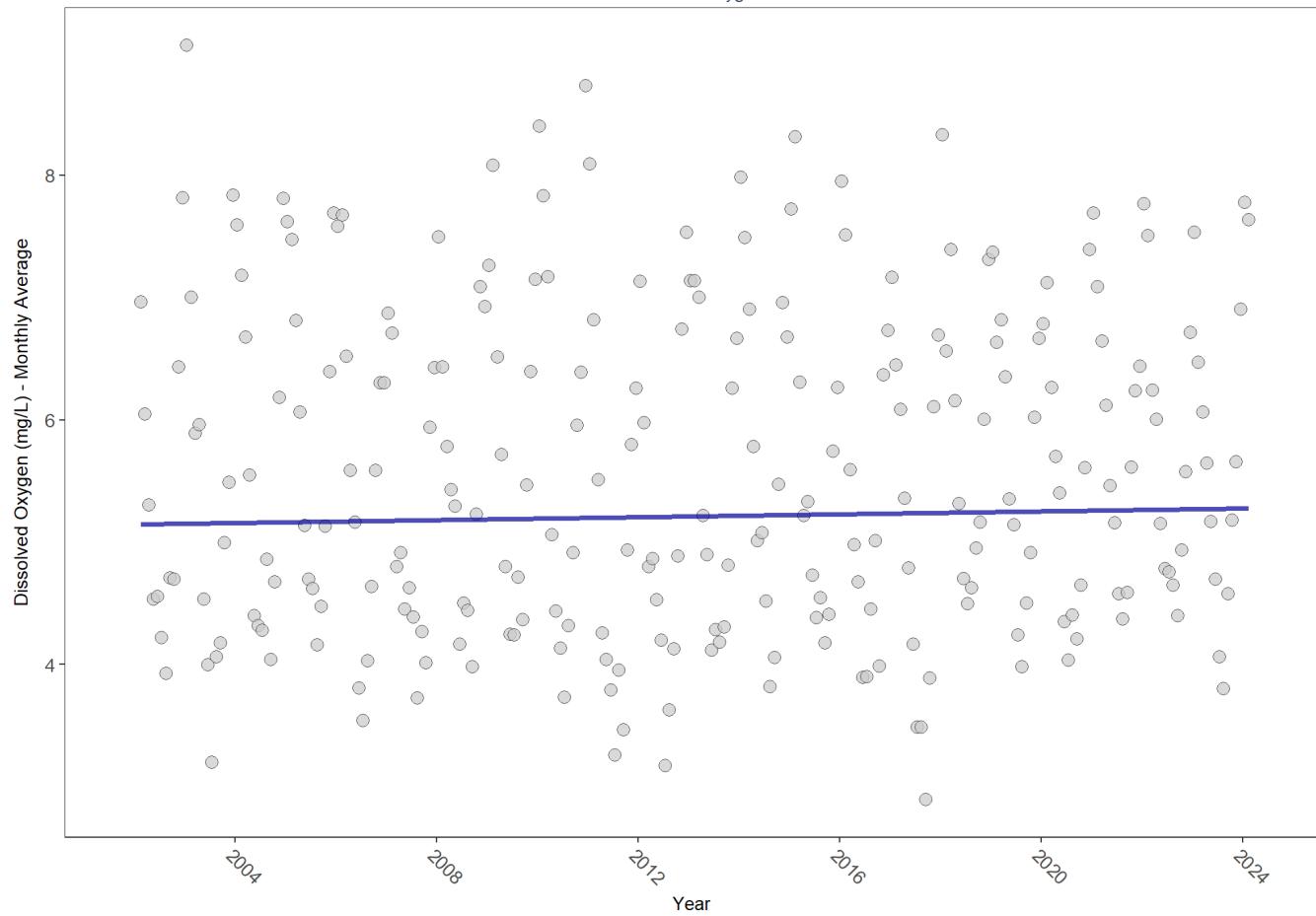
p < 0.00005 appear as 0 due to rounding.

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	654725	23	5.5	TRUE	0.0539	0.2279	0.005954947	5.146371	18.5251	0.0702	0

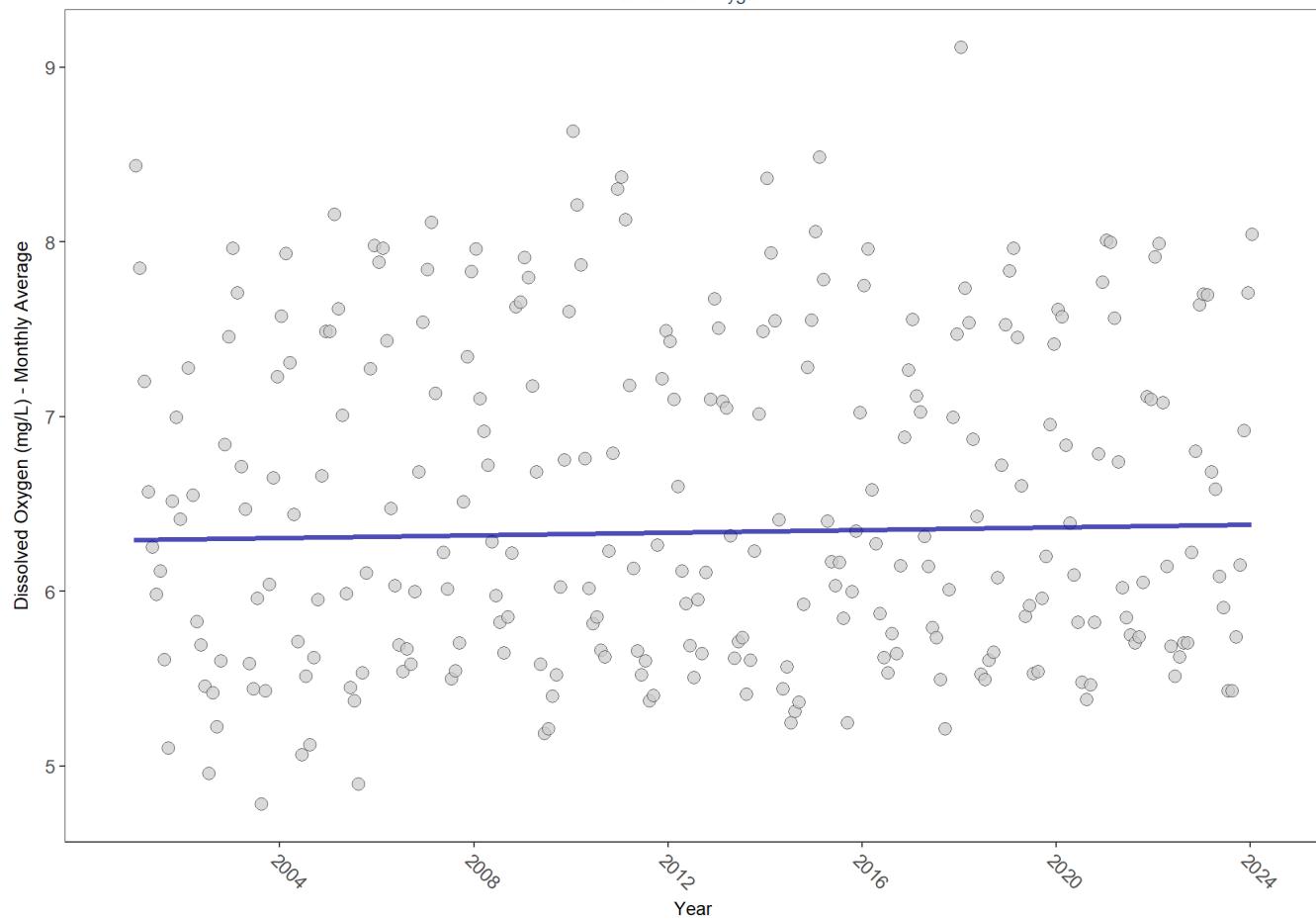
p < 0.00005 appear as 0 due to rounding.

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
Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	652173	24	6.5	TRUE	0.068	0.1162	0.003755002	6.294263	6.0508	0.87	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

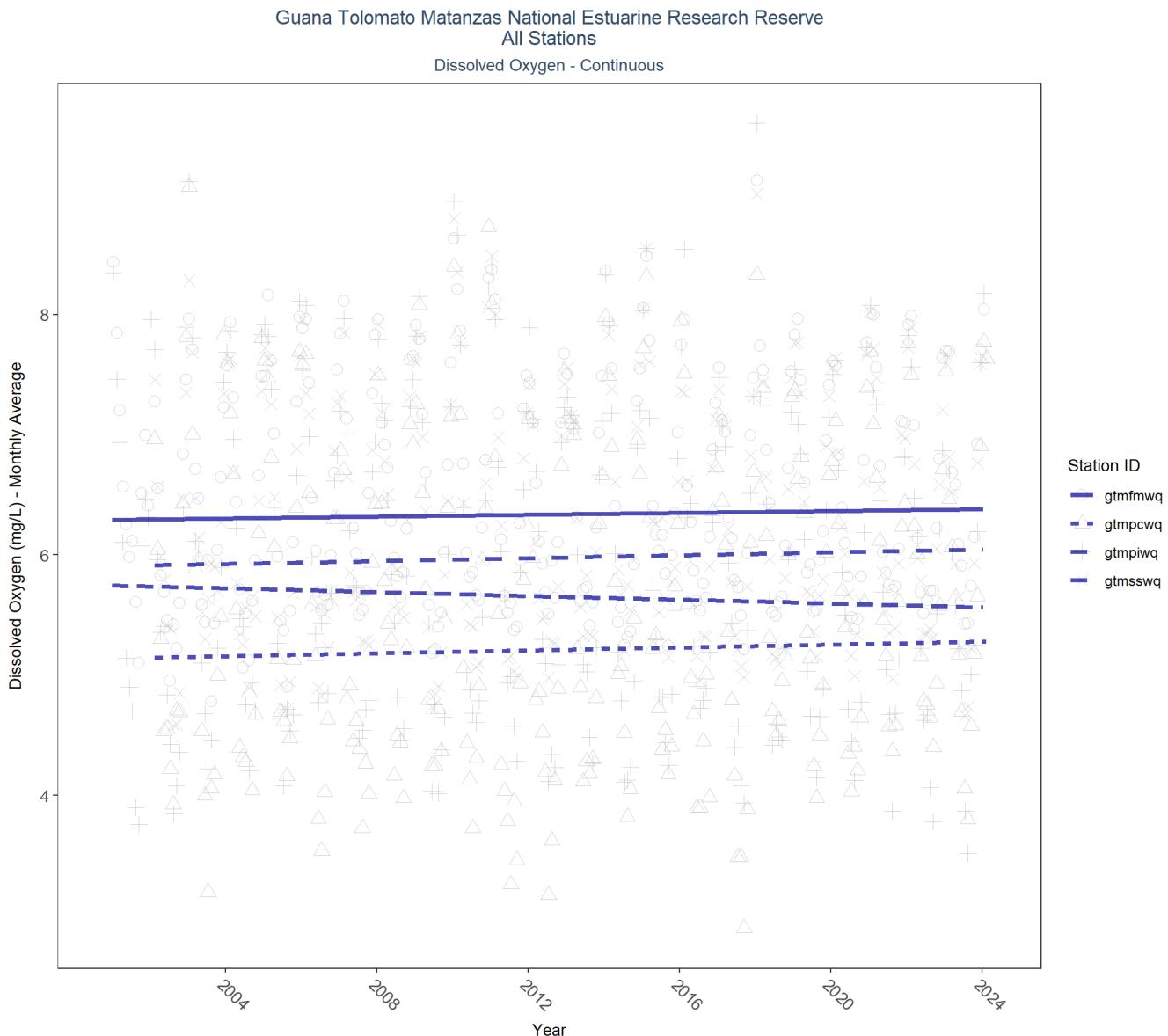


Table 28: Seasonal Kendall-Tau Results for All Stations - Dissolved Oxygen

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
gtmpiwq	632504	24	2001 - 2024	5.9	-0.09	5.75	-0.01	0.0338
gtmsswq	629699	23	2002 - 2024	6.3	0.09	5.91	0.01	0.0523
gtmpcwa	654725	23	2002 - 2024	5.5	0.05	5.15	0.01	0.2279
gtmfmwq	652173	24	2001 - 2024	6.5	0.07	6.29	0.00	0.1162

Dissolved Oxygen Saturation - Continuous Water Quality

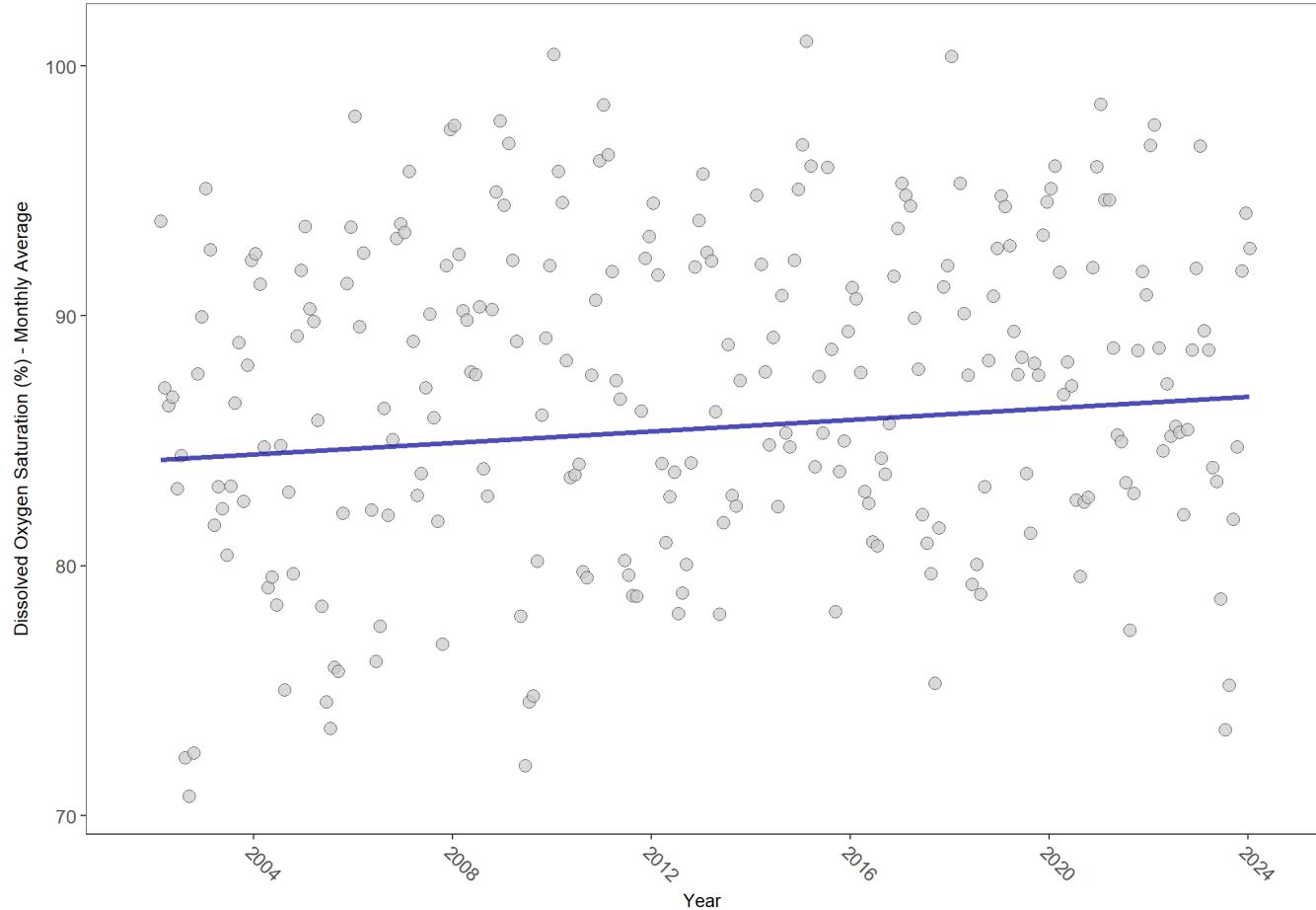
gtmsswq

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	635635	23	89.4	TRUE	0.1369	0.0022	0.1148785	84.24353	5.1016	0.9261	1

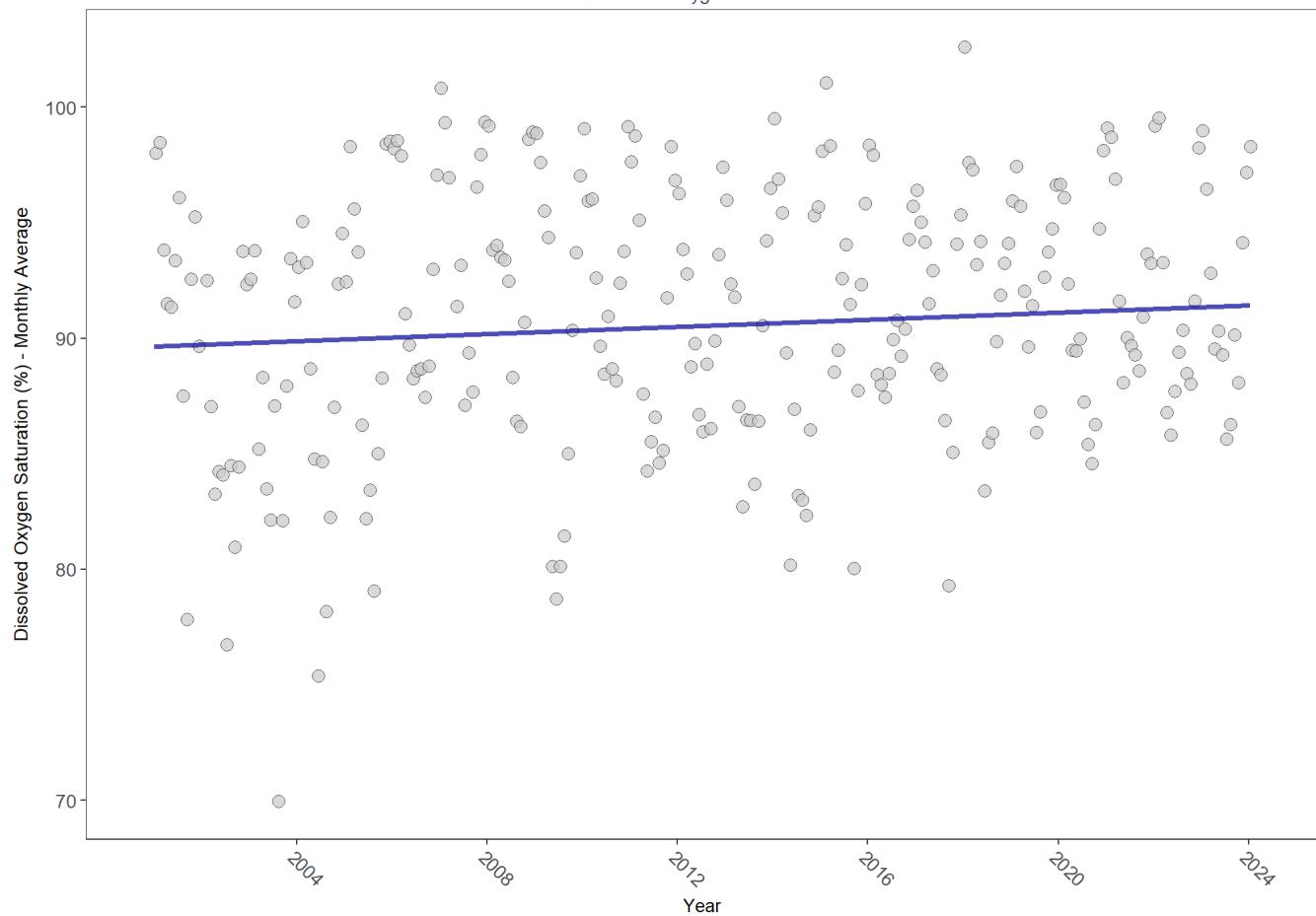
$p < 0.00005$ appear as 0 due to rounding.

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	659741	24	92.6	TRUE	0.1256	0.0037	0.07680269	89.64726	9.753	0.5527	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

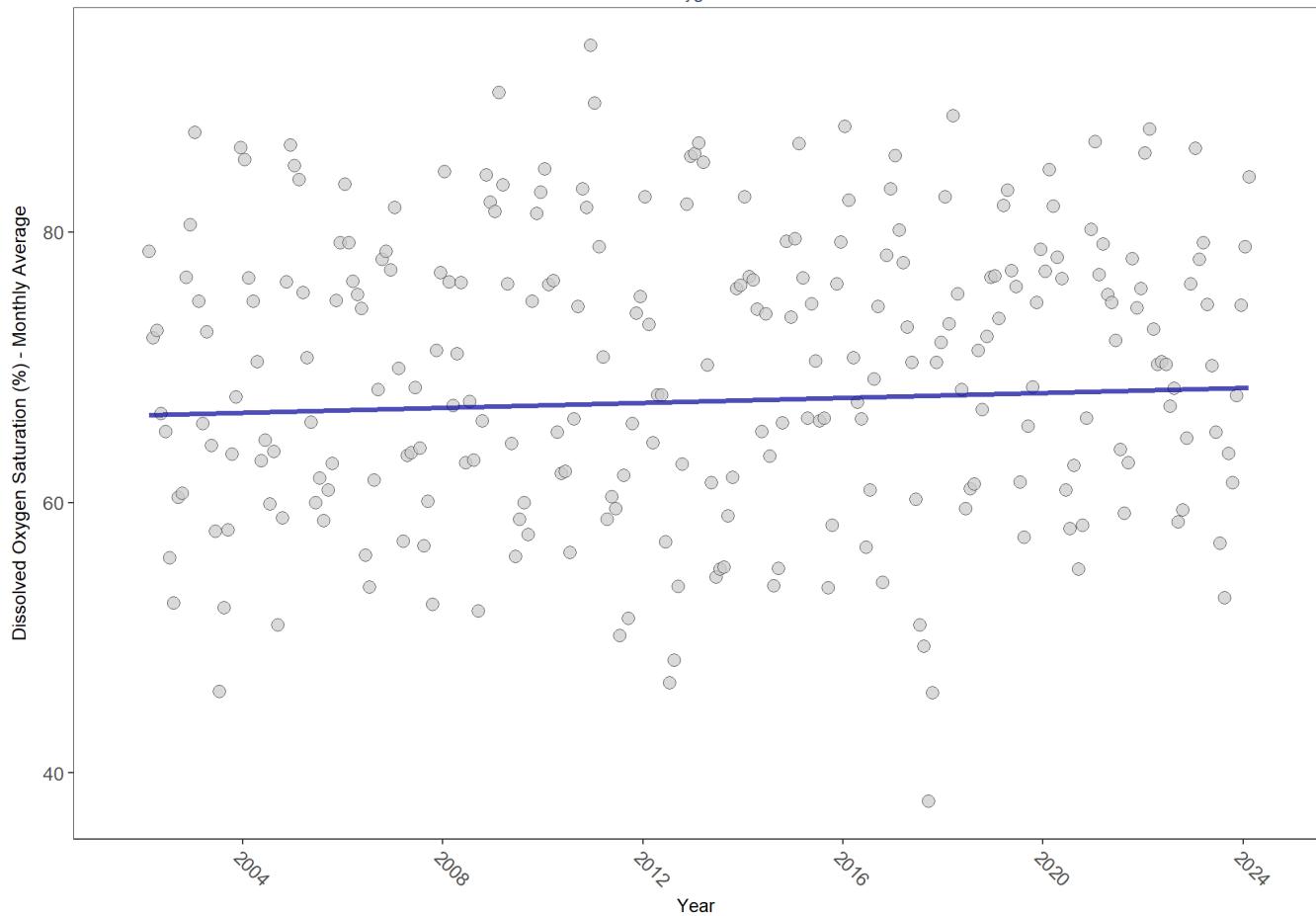
gtmpcwq

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	654731	23	70.9	TRUE	0.0626	0.1567	0.09166135	66.47898	24.6202	0.0104	0

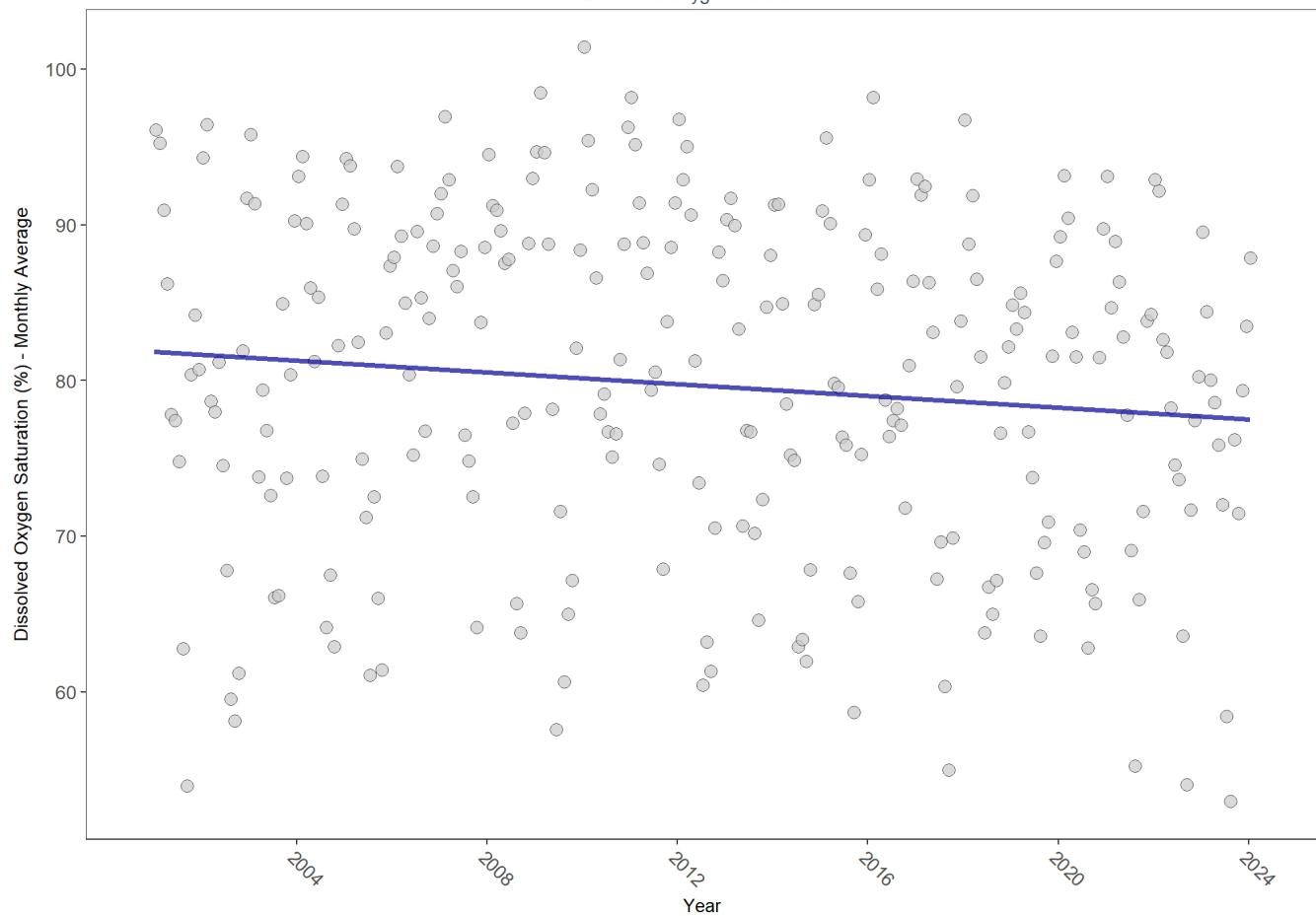
$p < 0.00005$ appear as 0 due to rounding.

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	638316	24	82.3	TRUE	-0.175	0.0000	-0.1897277	81.85254	10.7861	0.4614	-1

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

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

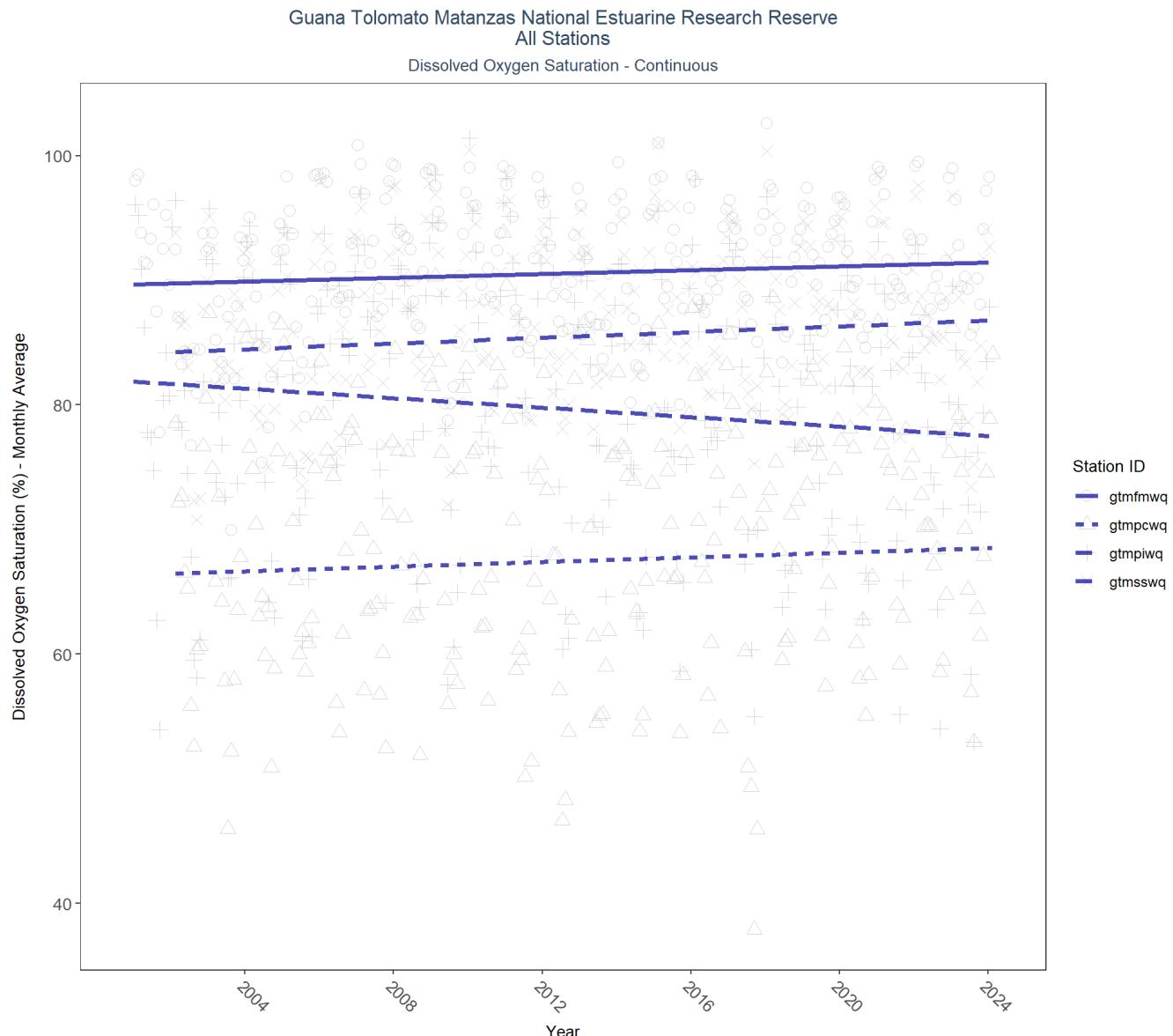


Table 29: Seasonal Kendall-Tau Results for All Stations - Dissolved Oxygen Saturation

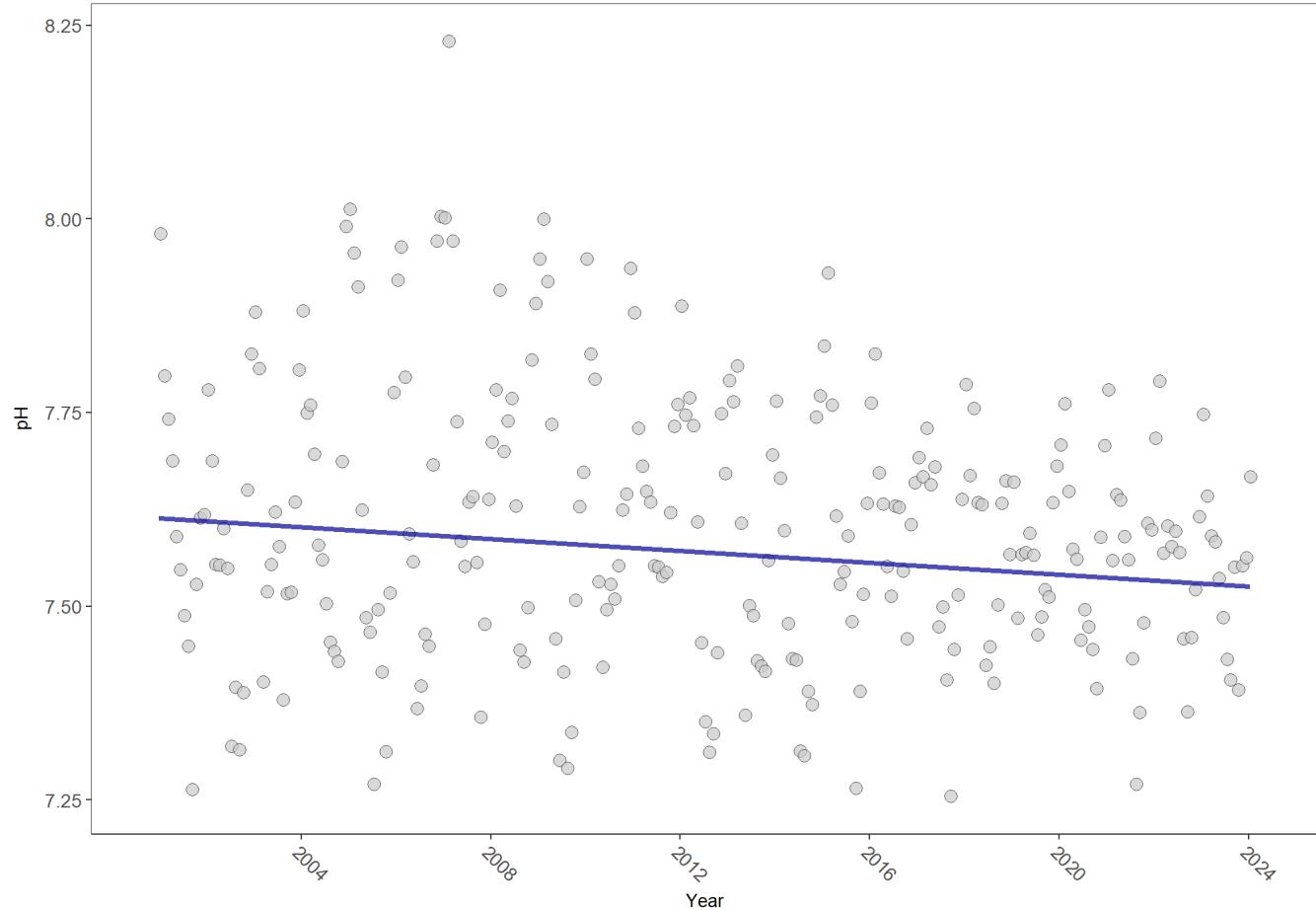
Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
gtmsswq	635635	23	2002 - 2024	89.4	0.14	84.24	0.11	0.0022
gtmfmwq	659741	24	2001 - 2024	92.6	0.13	89.65	0.08	0.0037
gtmcwq	654731	23	2002 - 2024	70.9	0.06	66.48	0.09	0.1567
gtmpiwq	638316	24	2001 - 2024	82.3	-0.17	81.85	-0.19	0.0000

pH - Continuous Water Quality

gtmipiwrq

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

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmipiwrq
pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	628572	24	7.6	TRUE	-0.1735	0.0001	-0.003840246	7.613662	19.2092	0.0574	-1

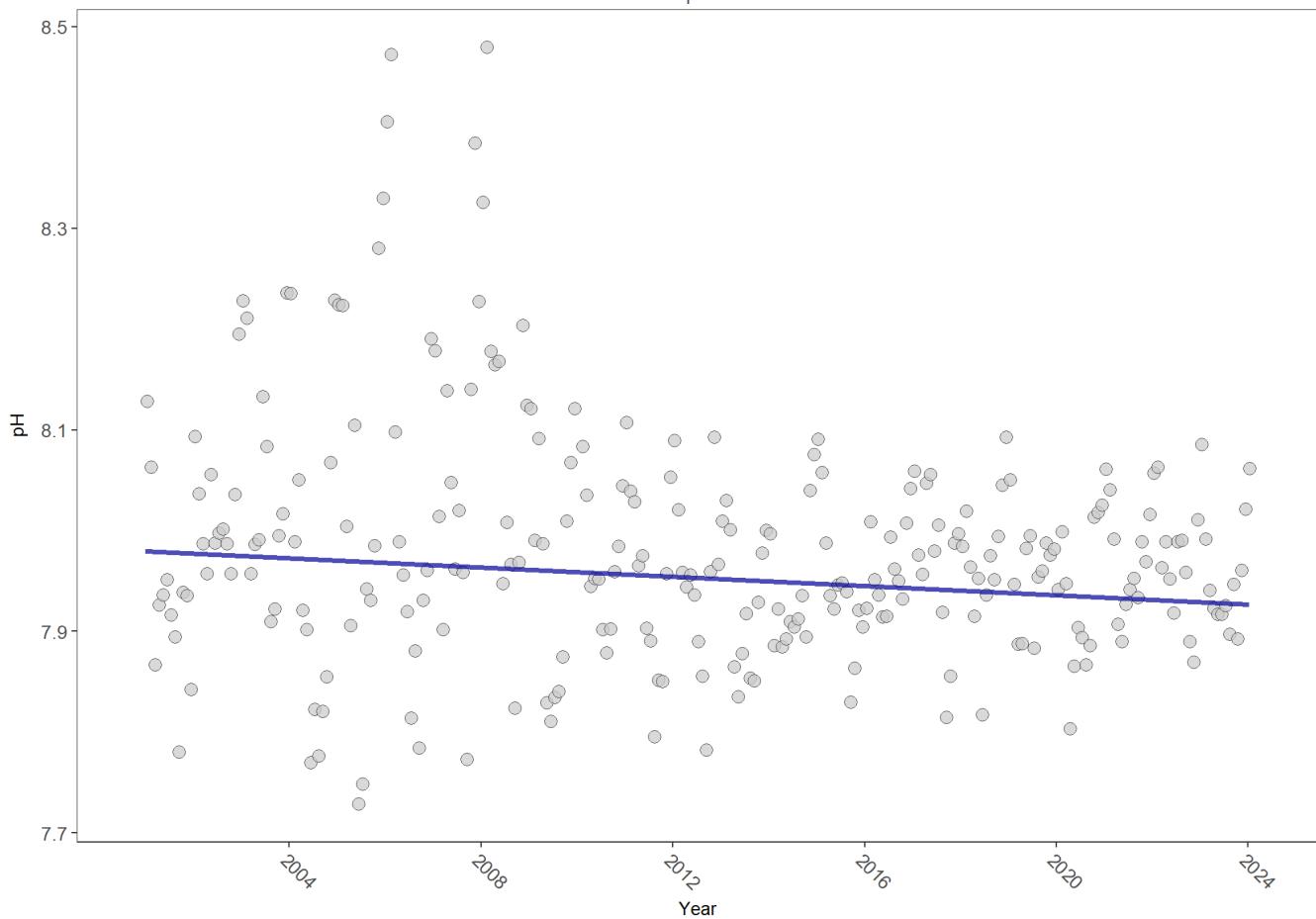
$p < 0.00005$ appear as 0 due to rounding.

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
pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	634207	24	8	TRUE	-0.1423	0.0010	-0.002283661	7.979462	27.6299	0.0037	-1

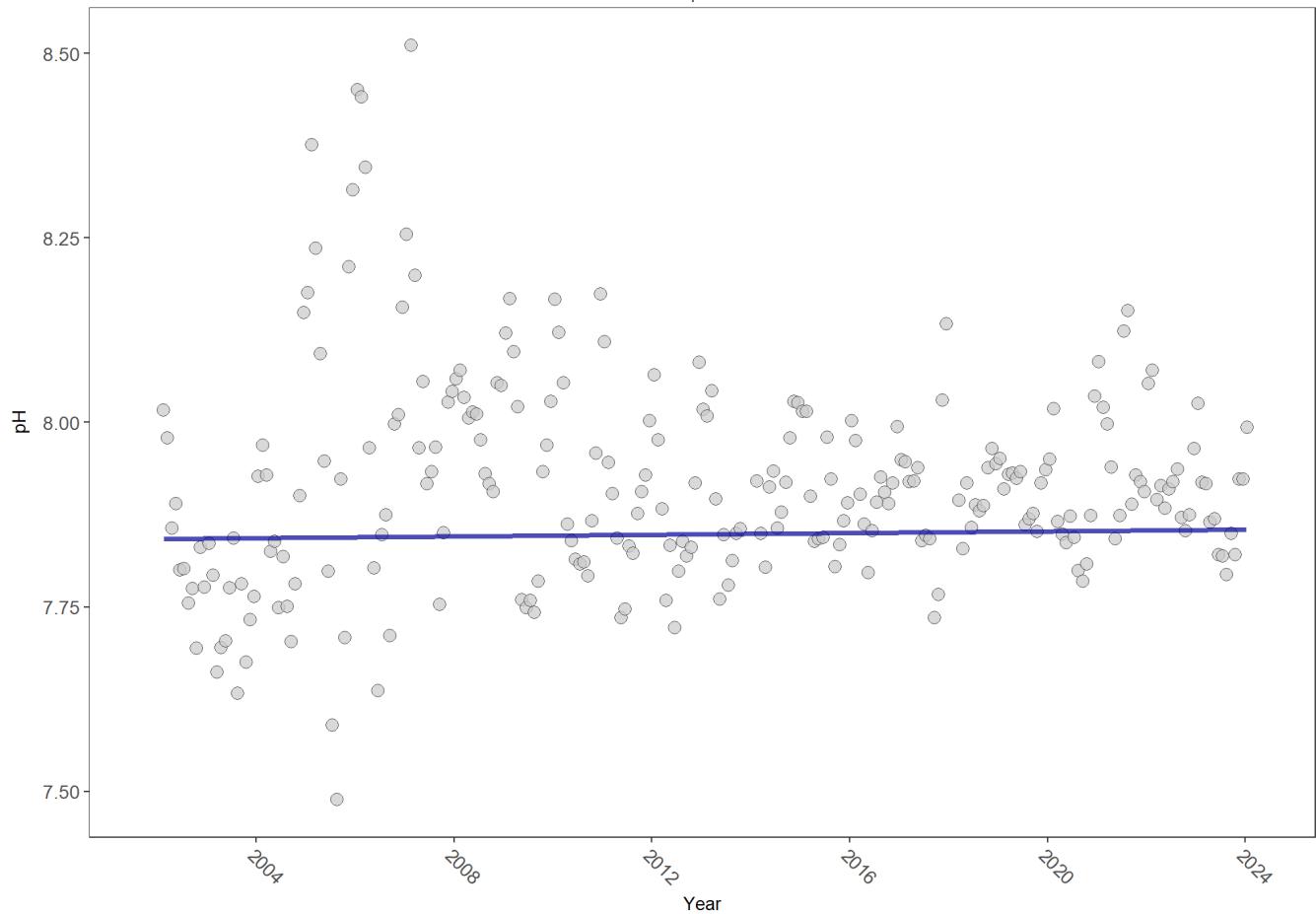
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

gtmsswq

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

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmsswq
pH



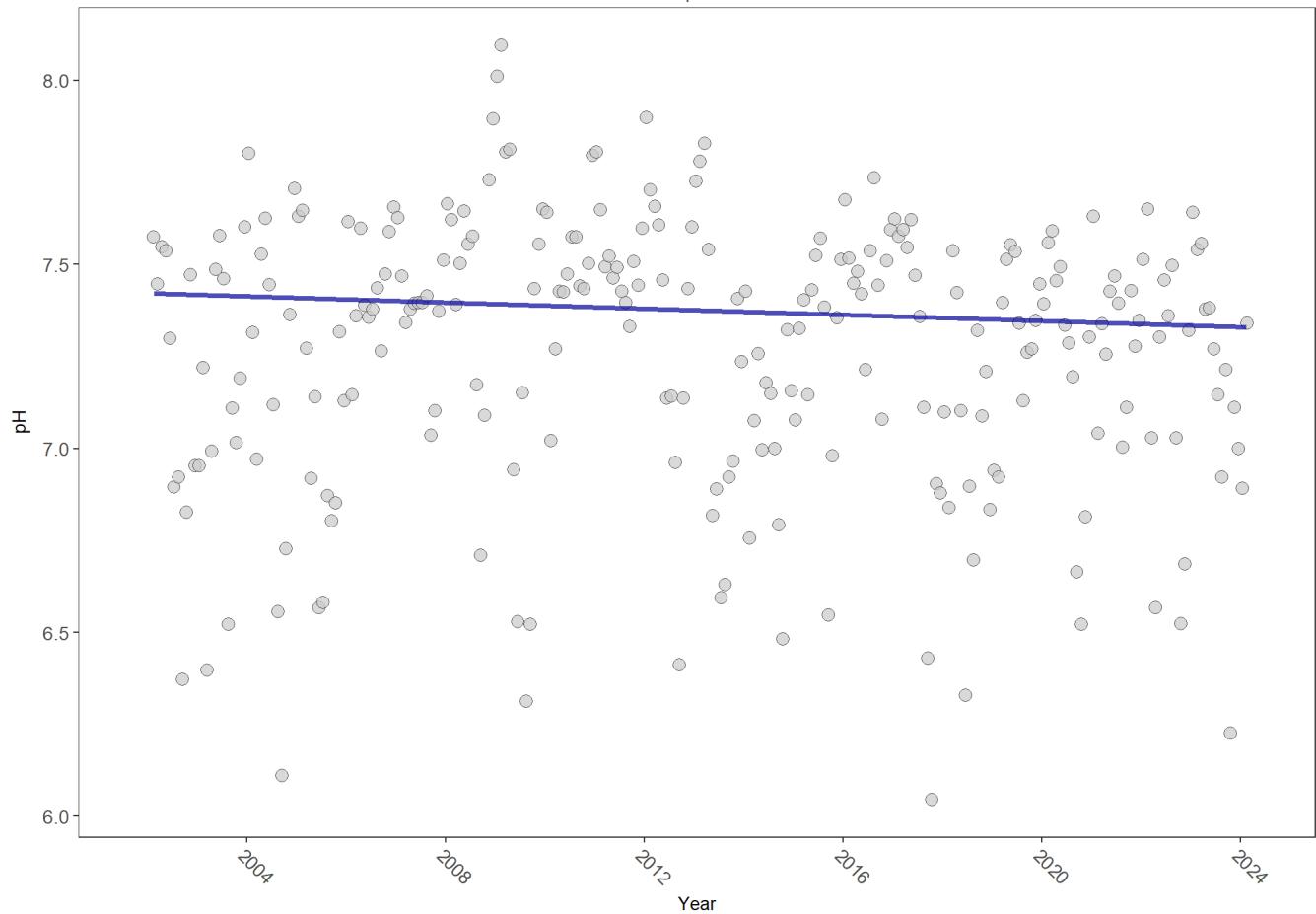
$p < 0.00005$ appear as 0 due to rounding.

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



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

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

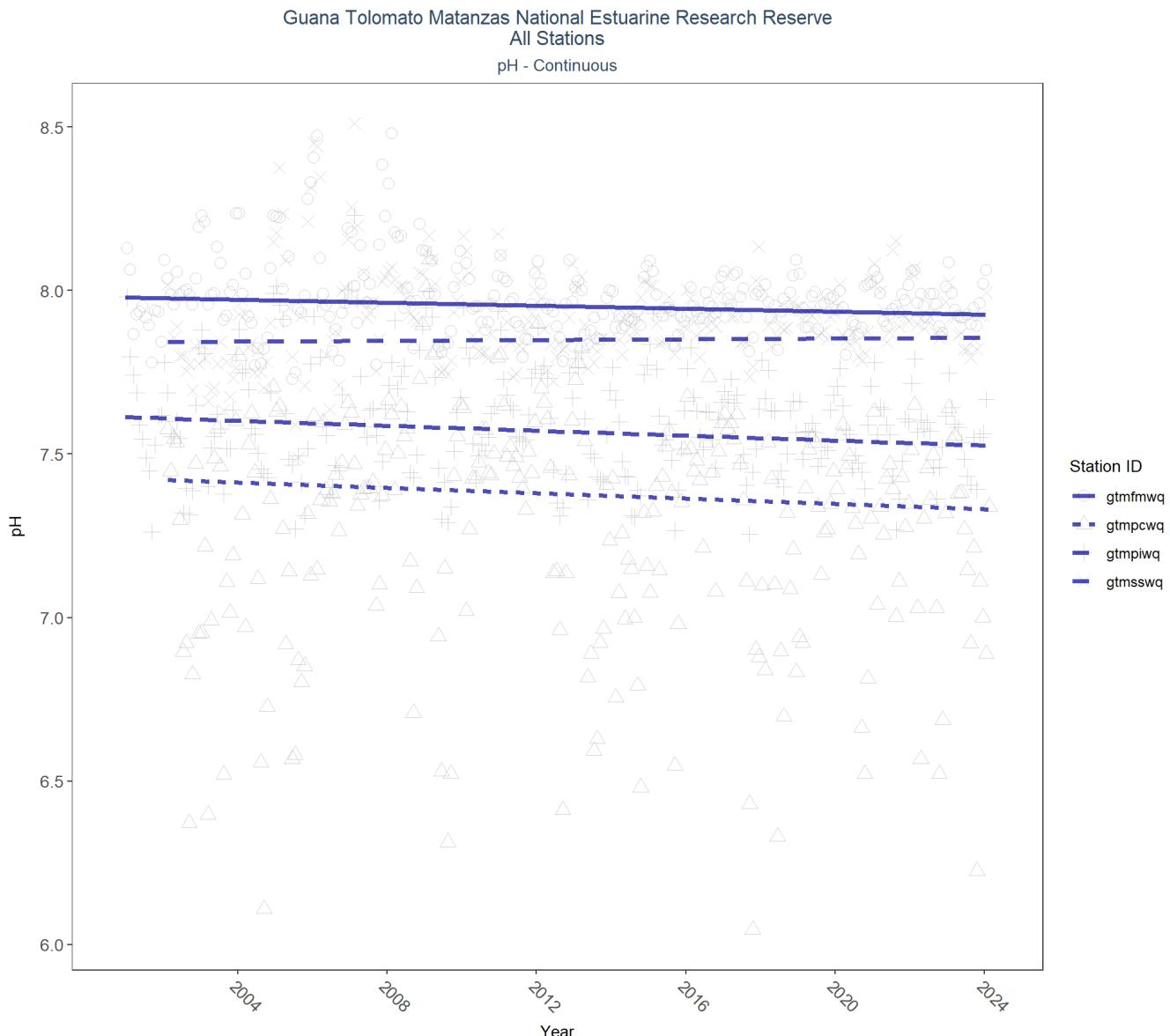


Table 30: Seasonal Kendall-Tau Results for All Stations - pH

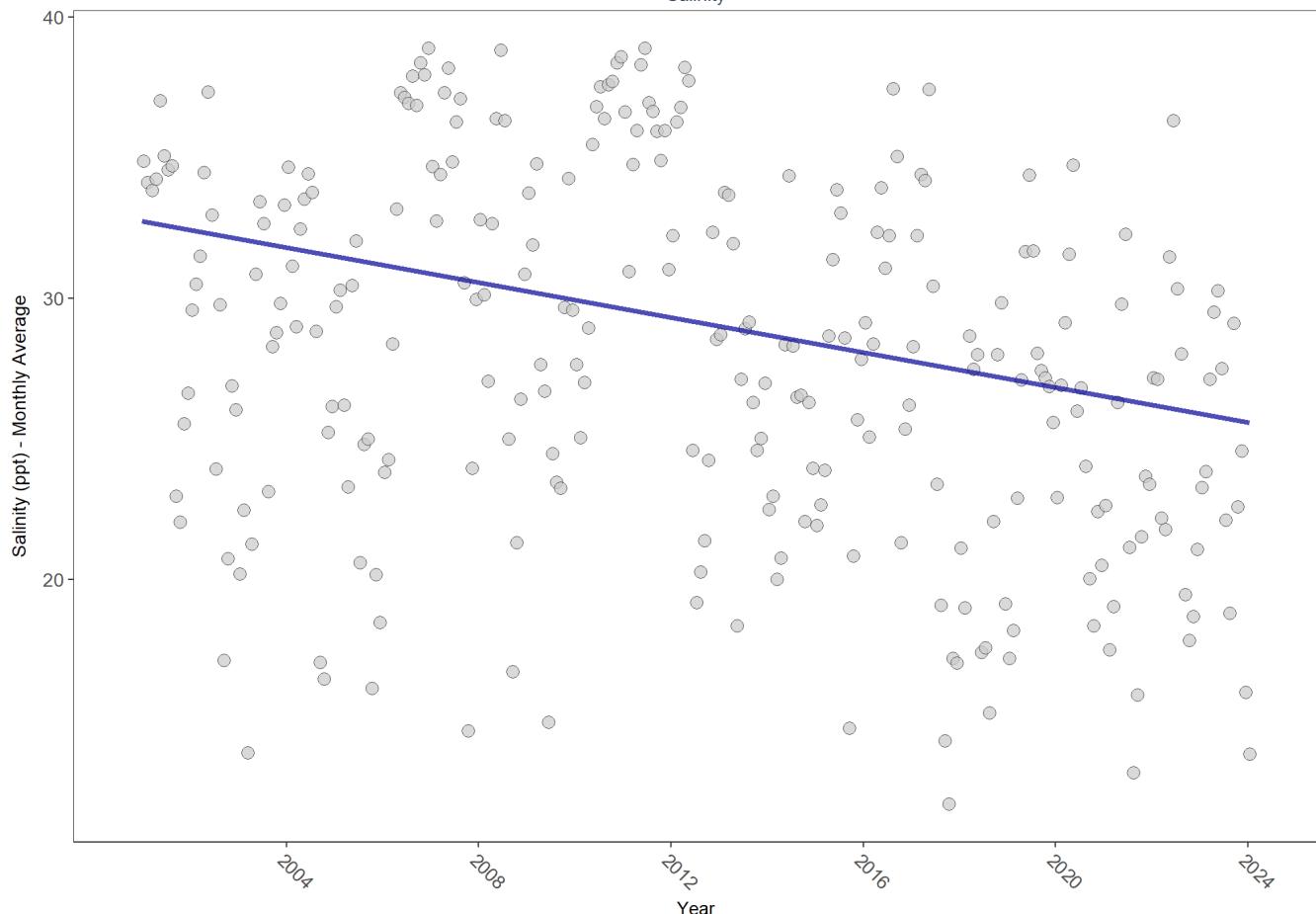
Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
gtmpiwq	628572	24	2001 - 2024	7.6	-0.17	7.61	0	0.0001
gtmfmwq	634207	24	2001 - 2024	8.0	-0.14	7.98	0	0.0010
gtmsswq	607813	23	2002 - 2024	7.9	0.03	7.84	0	0.4467
gtmpcwa	646677	23	2002 - 2024	7.4	-0.08	7.42	0	0.0819

Salinity - Continuous Water Quality

gtmpiwq

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

Guana Tolomato Matanzas National Estuarine Research Reserve
gtmpiwq
Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	634559	24	28	TRUE	-0.2507	0.0000	-0.3114955	32.75009	6.3583	0.8484	-1

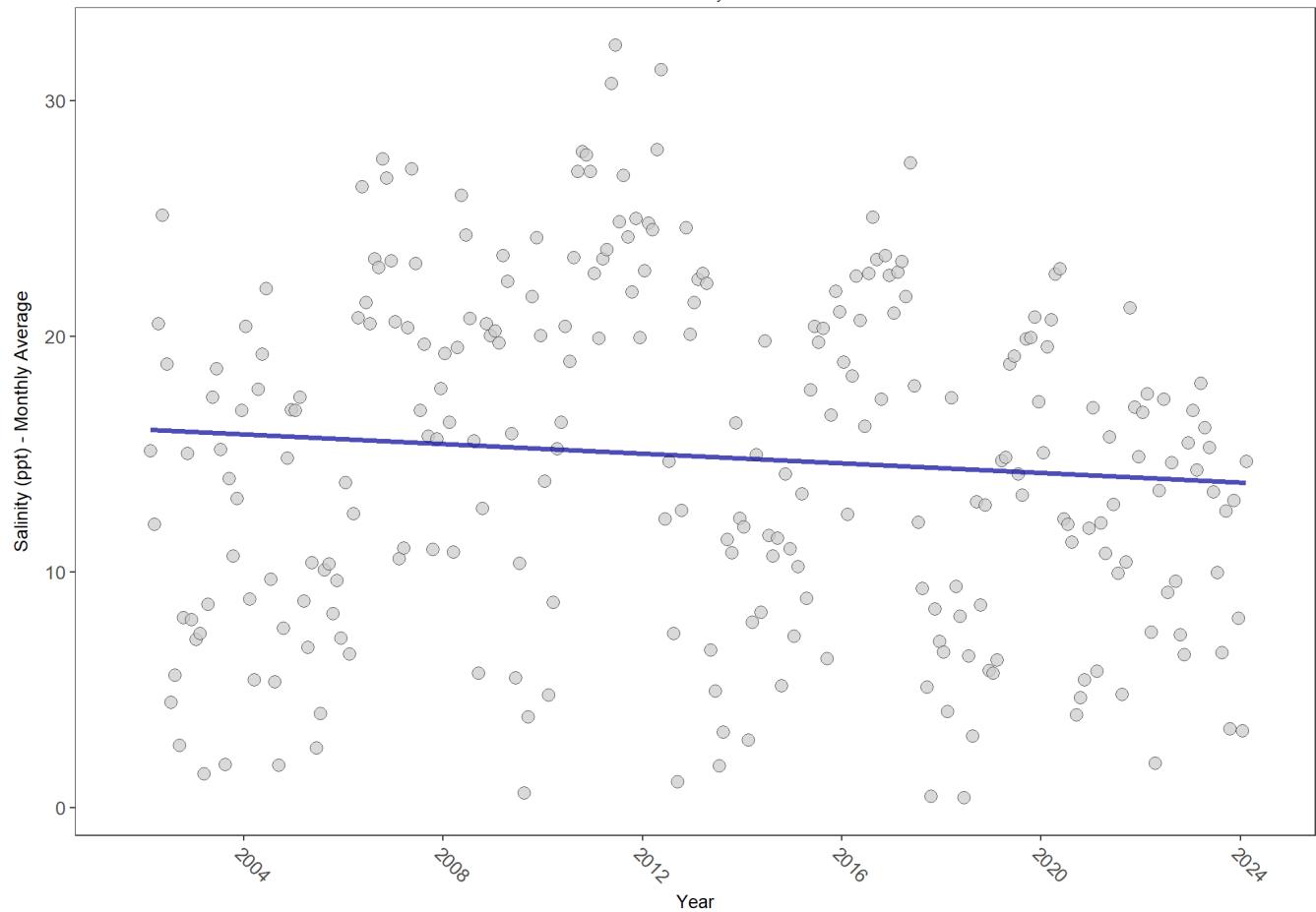
p < 0.00005 appear as 0 due to rounding.

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	663389	23	16.5	TRUE	-0.0656	0.1430	-0.1020744	16.05204	7.4236	0.7638	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

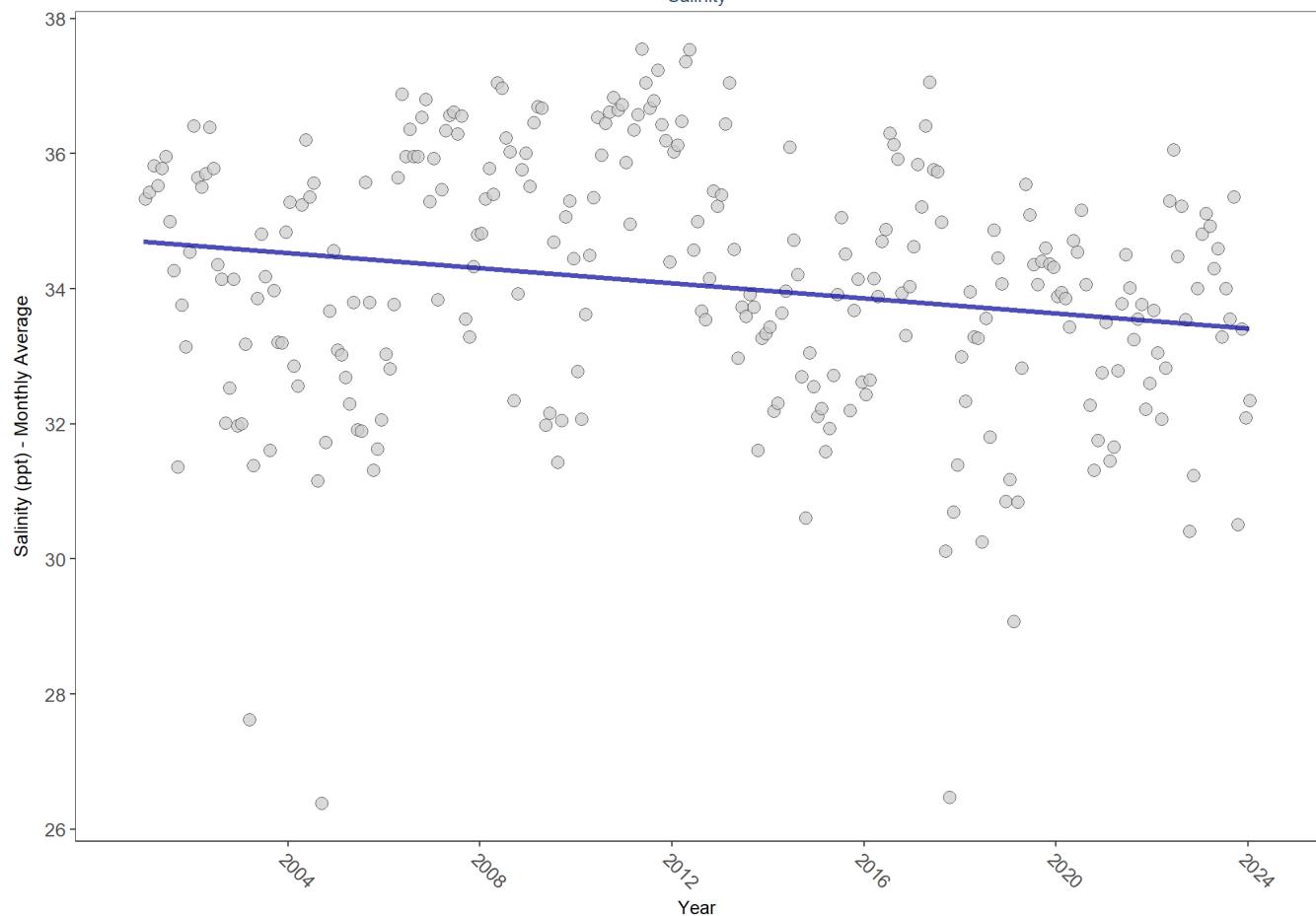
gtmfmwq

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

Guana Tolomato Matanzas National Estuarine Research Reserve

gtmfmwq

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	640374	24	34.4	TRUE	-0.1504	0.0005	-0.05570957	34.69295	6.1351	0.8642	-1

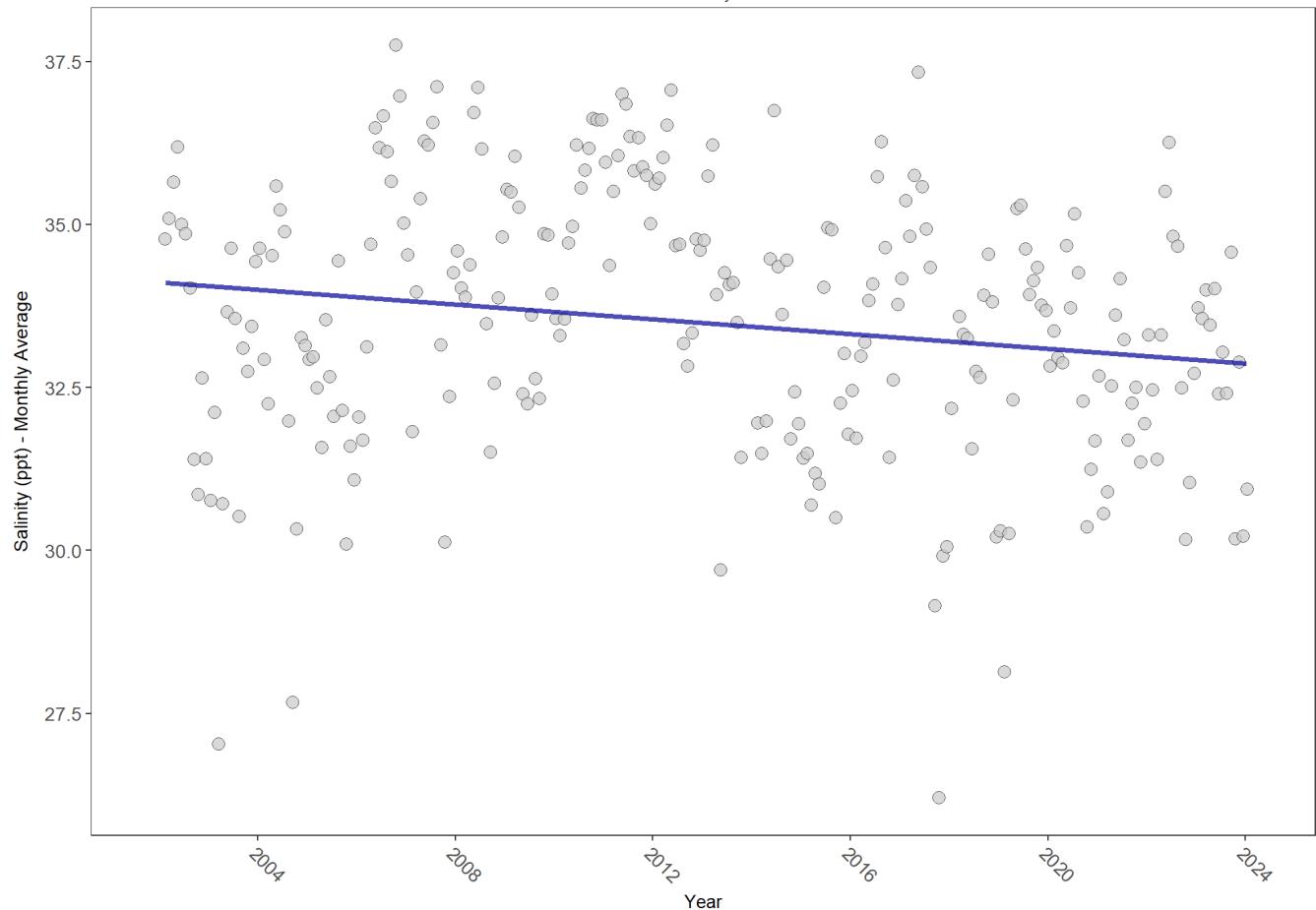
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

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	614376	23	33.9	TRUE	-0.1165	0.0101	-0.05695934	34.11695	4.9622	0.933	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

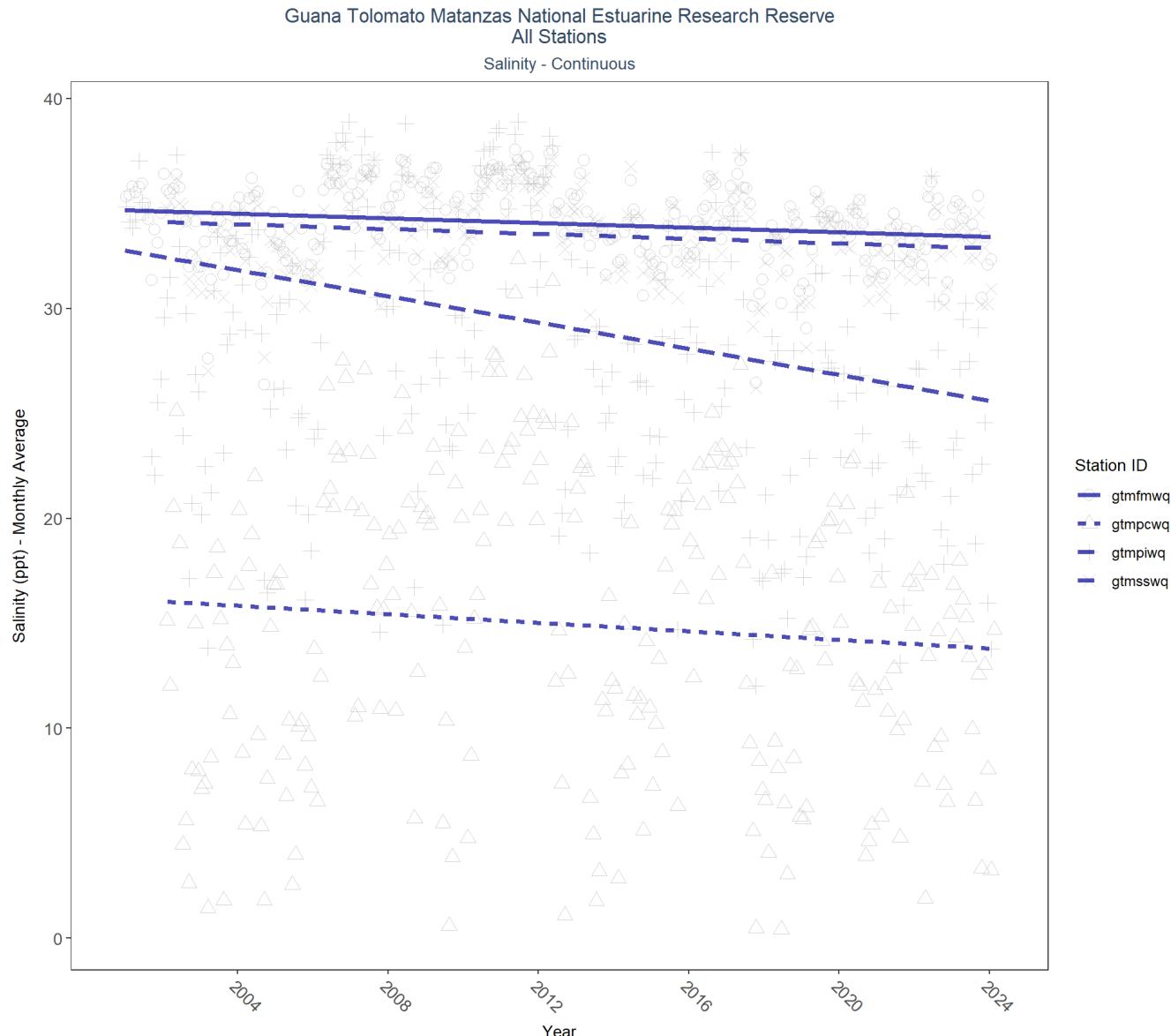


Table 31: Seasonal Kendall-Tau Results for All Stations - Salinity

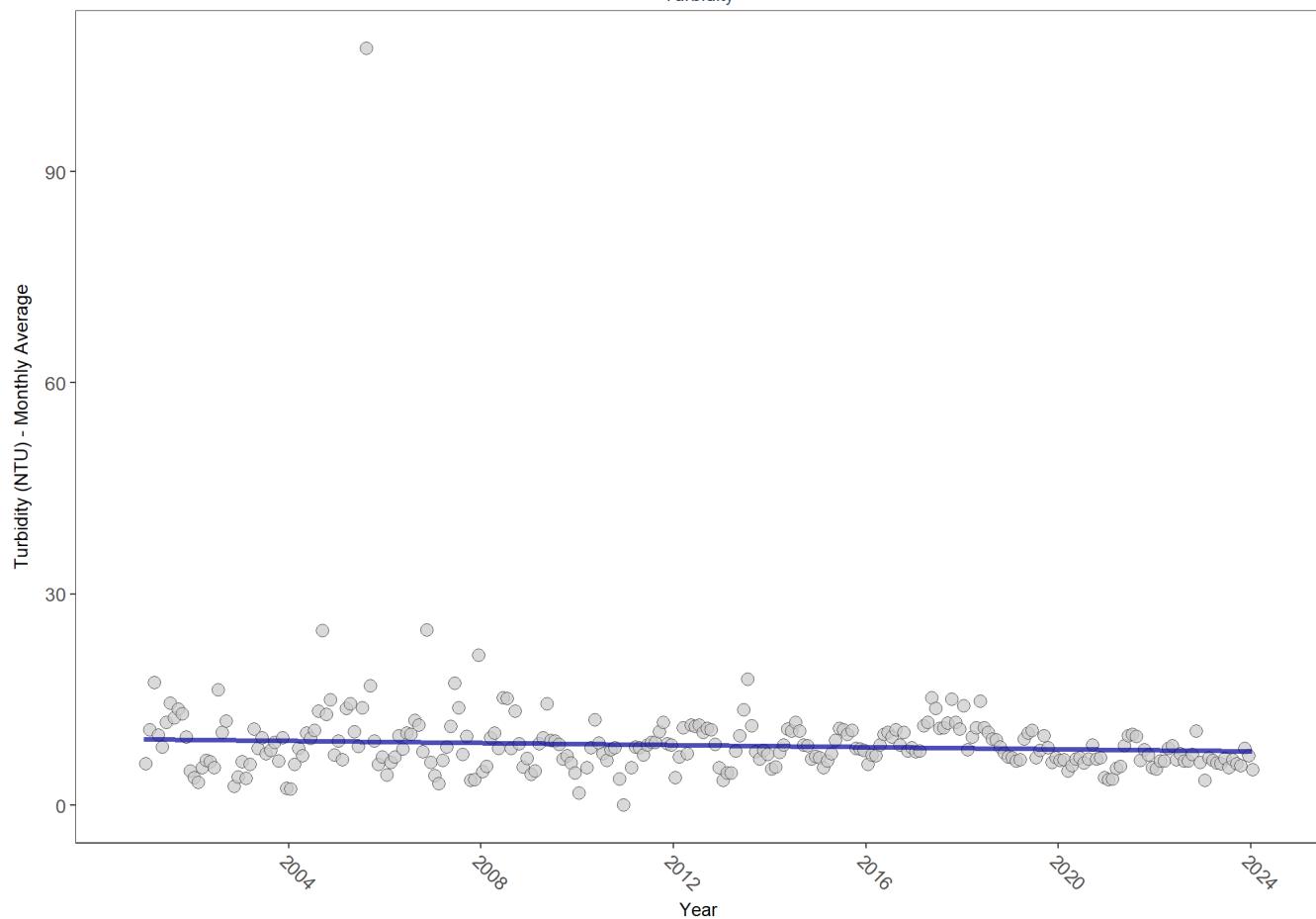
Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
gtmpiwq	634559	24	2001 - 2024	28.00	-0.25	32.75	-0.31	0.0000
gtmpcwq	663389	23	2002 - 2024	16.50	-0.07	16.05	-0.1	0.1430
gtmfwmwq	640374	24	2001 - 2024	34.40	-0.15	34.69	-0.06	0.0005
gtmsswq	614376	23	2002 - 2024	33.90	-0.12	34.12	-0.06	0.0101
872-0494	34918	2	2020 - 2021	8.99	-	-	-	-

Turbidity - Continuous Water Quality

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	645684	24	7	TRUE	-0.1188	0.0060	-0.07365712	9.404738	22.4623	0.021	-1

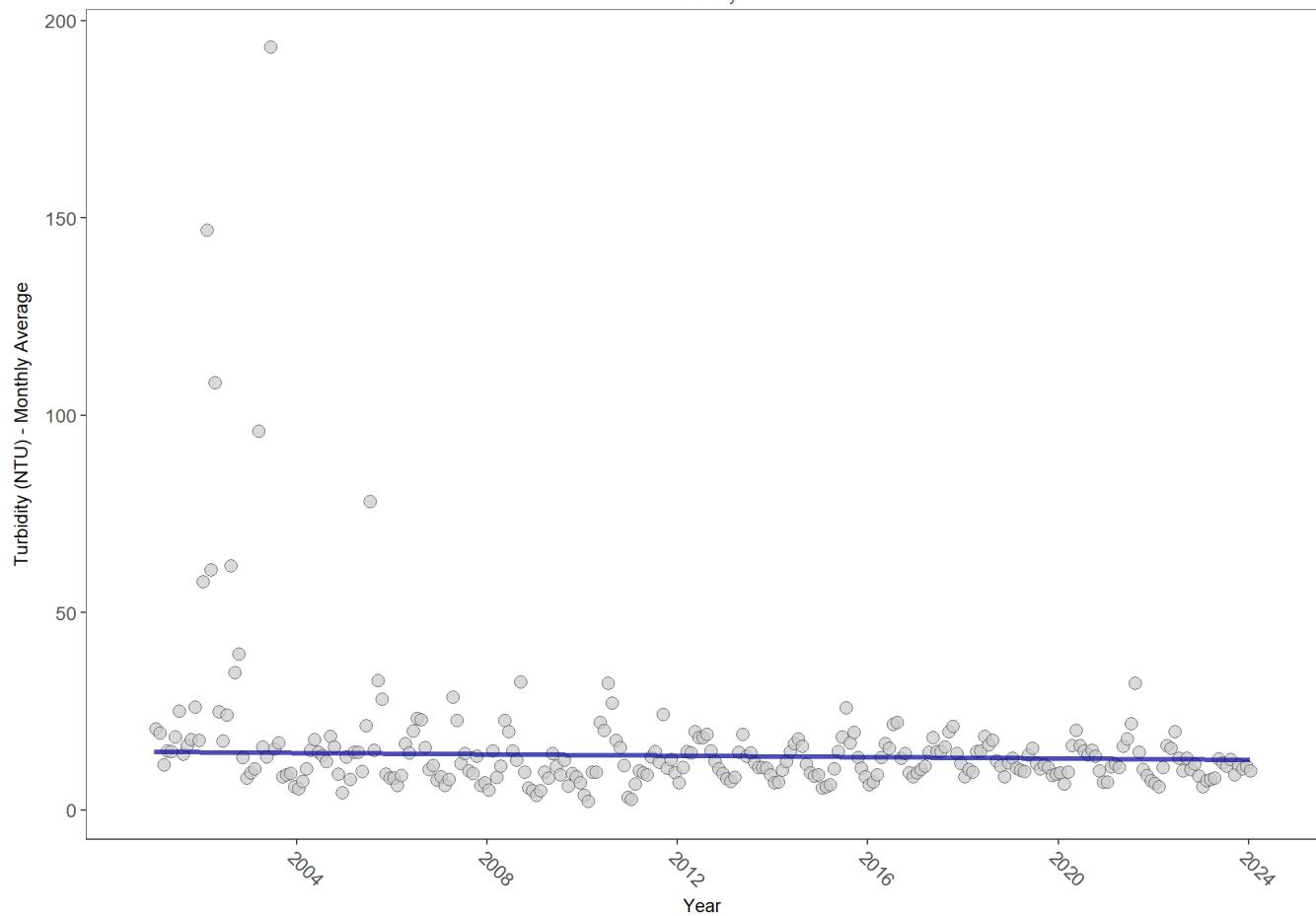
p < 0.00005 appear as 0 due to rounding.

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	608557	24	10	TRUE	-0.1097	0.0113	-0.09046291	14.81472	7.7672	0.734	-1

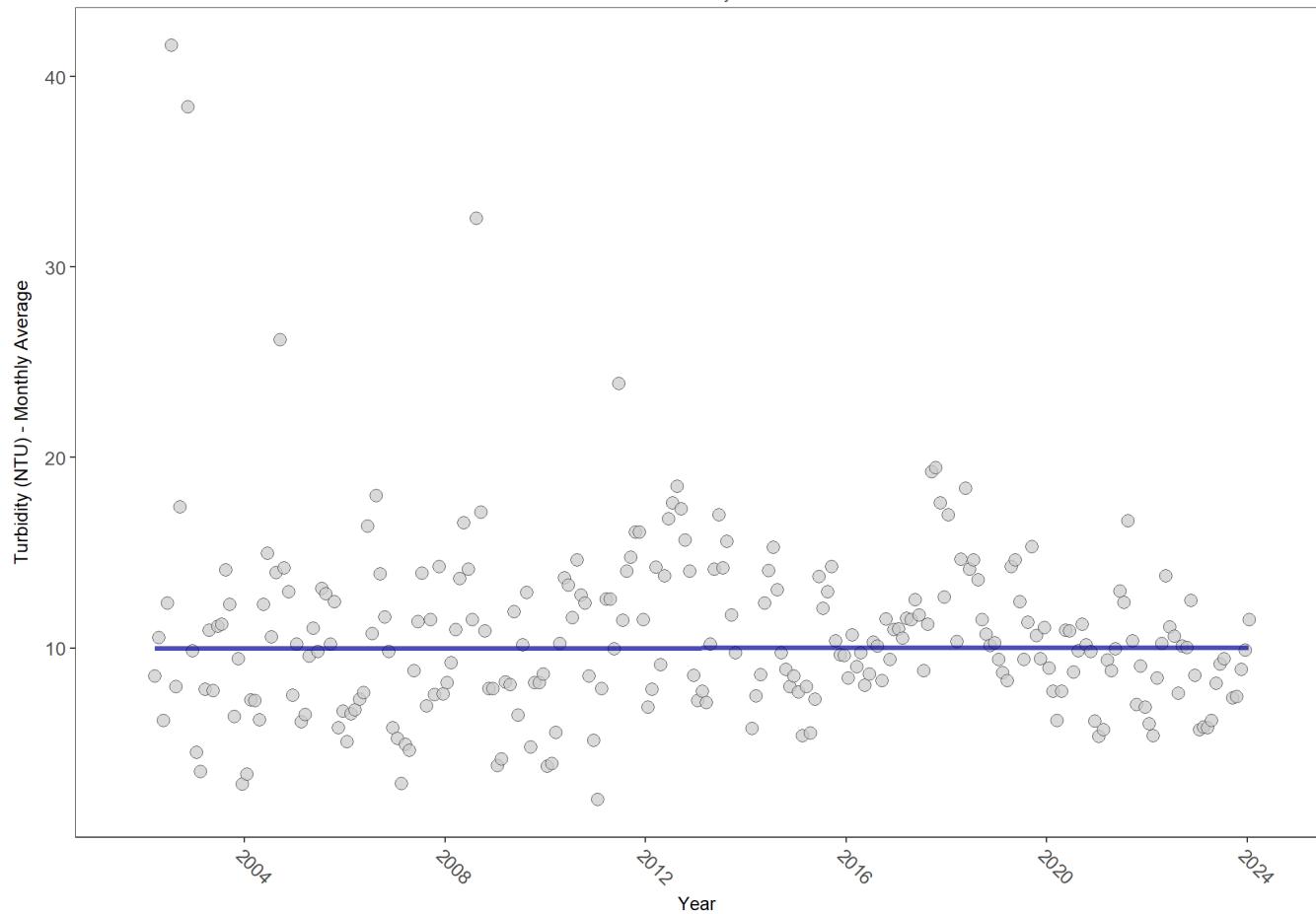
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

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	601037	23	9	TRUE	0.0043	0.9663	0.001515046	9.994192	20.43	0.0398	0

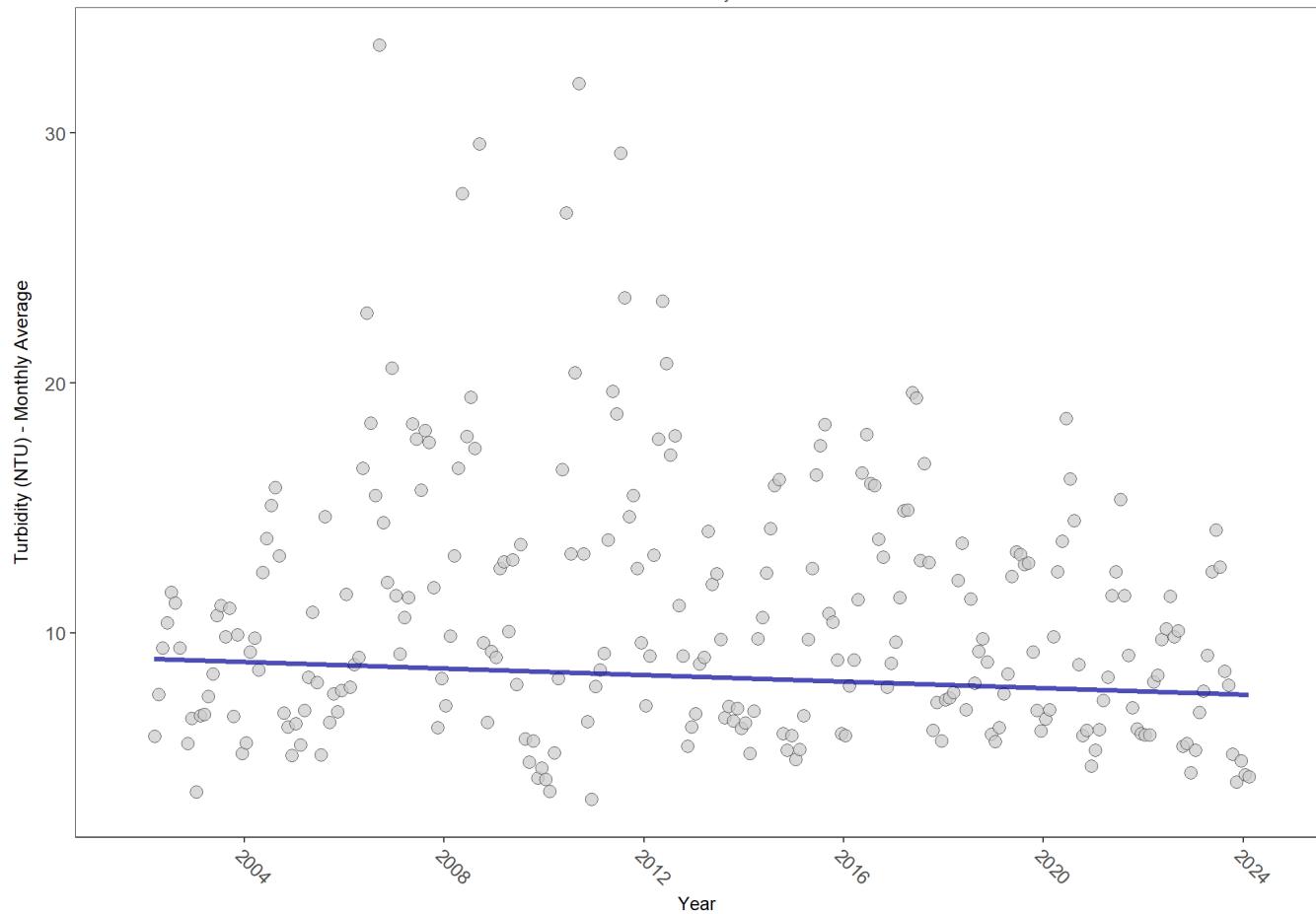
p < 0.00005 appear as 0 due to rounding.

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	637554	23	9	TRUE	-0.1115	0.0129	-0.06493616	8.978332	9.2395	0.5998	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

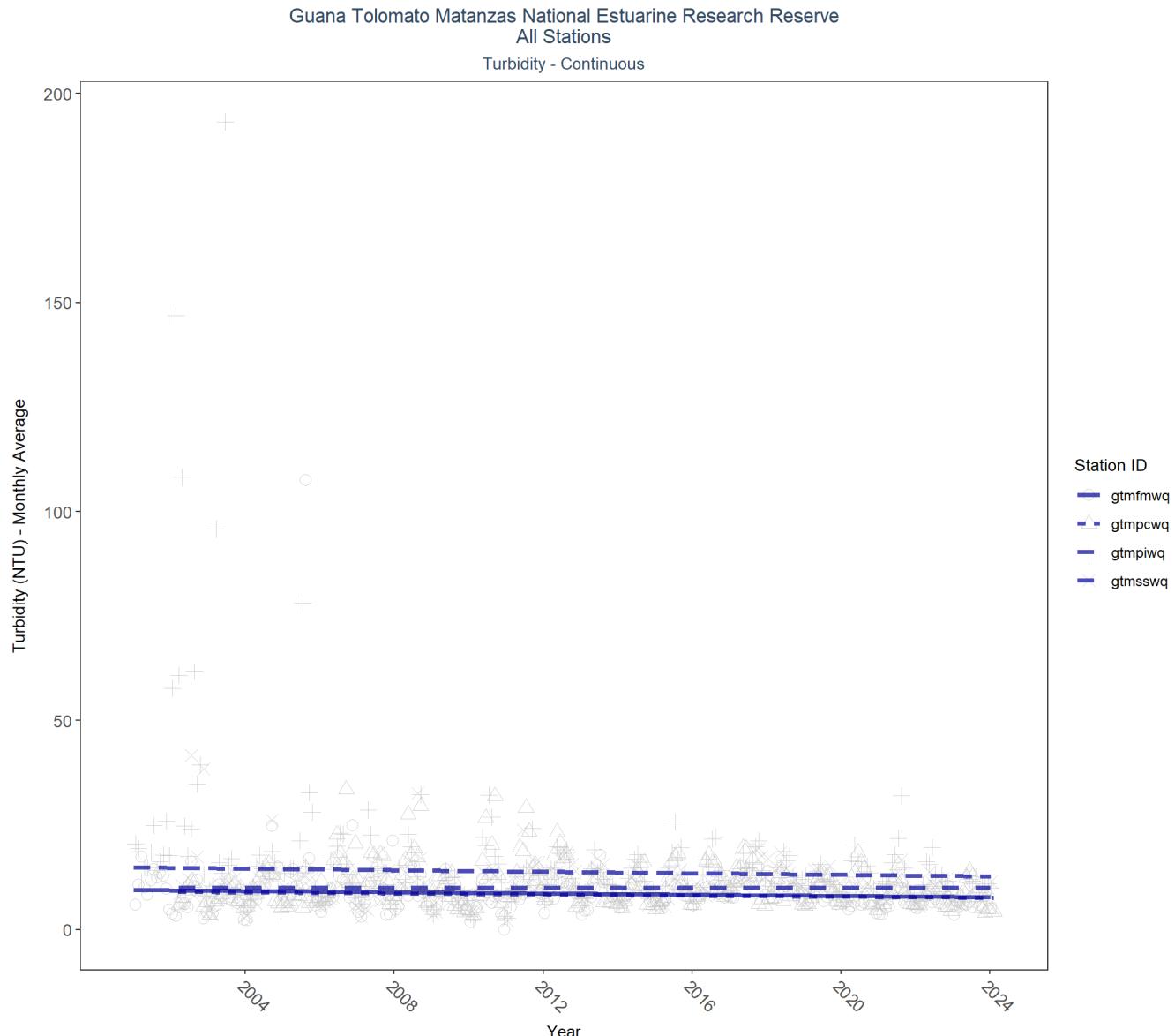


Table 32: Seasonal Kendall-Tau Results for All Stations - Turbidity

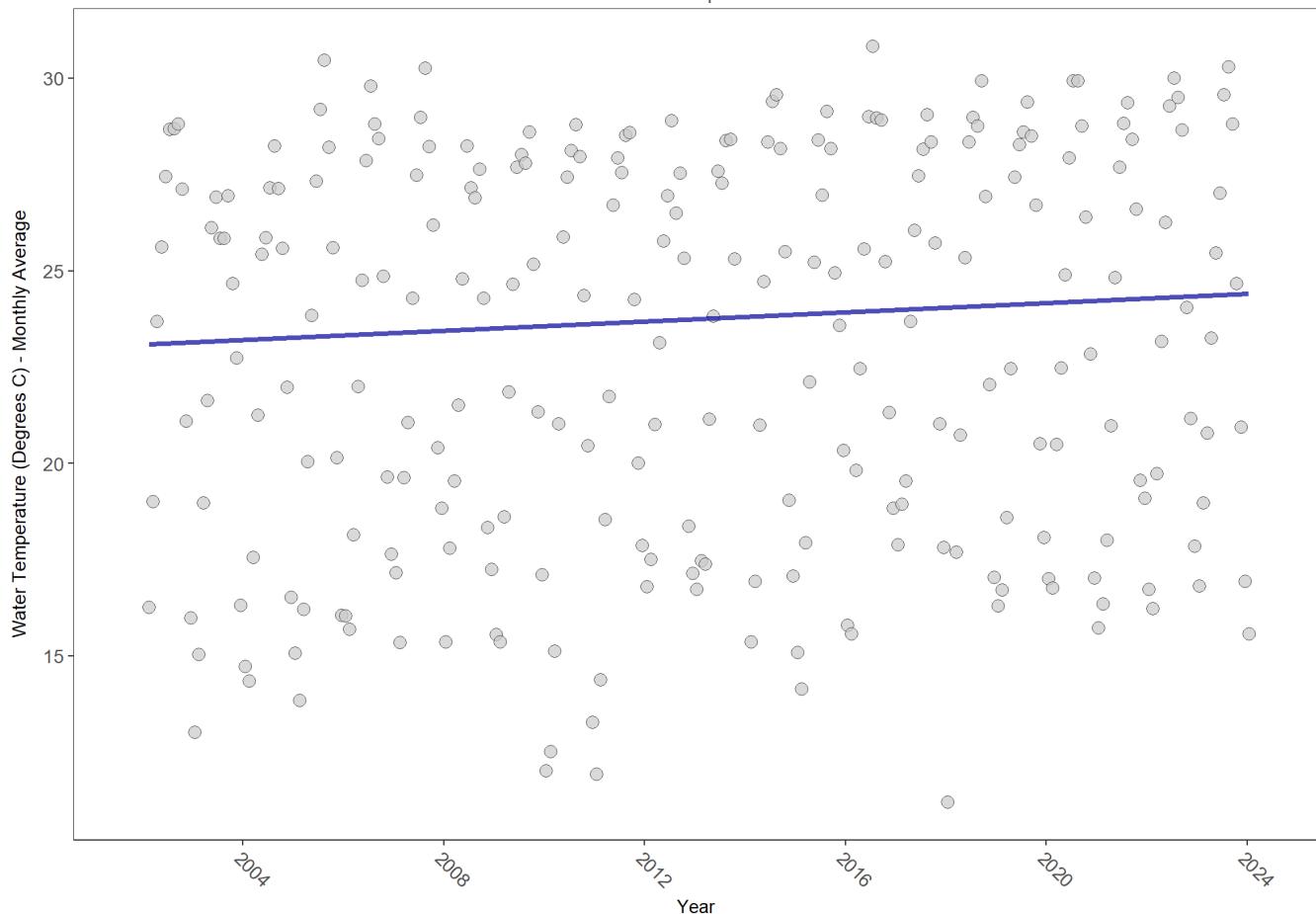
Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
gtmfmwq	645684	24	2001 - 2024	7	-0.12	9.40	-0.07	0.0060
gtmpiwh	608557	24	2001 - 2024	10	-0.11	14.81	-0.09	0.0113
gtmsswq	601037	23	2002 - 2024	9	0.00	9.99	0.00	0.9663
gtmpcwq	637554	23	2002 - 2024	9	-0.11	8.98	-0.06	0.0129

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	647975	23	23.8	TRUE	0.2355	0.0000	0.06012872	23.08651	5.9356	0.8776	1

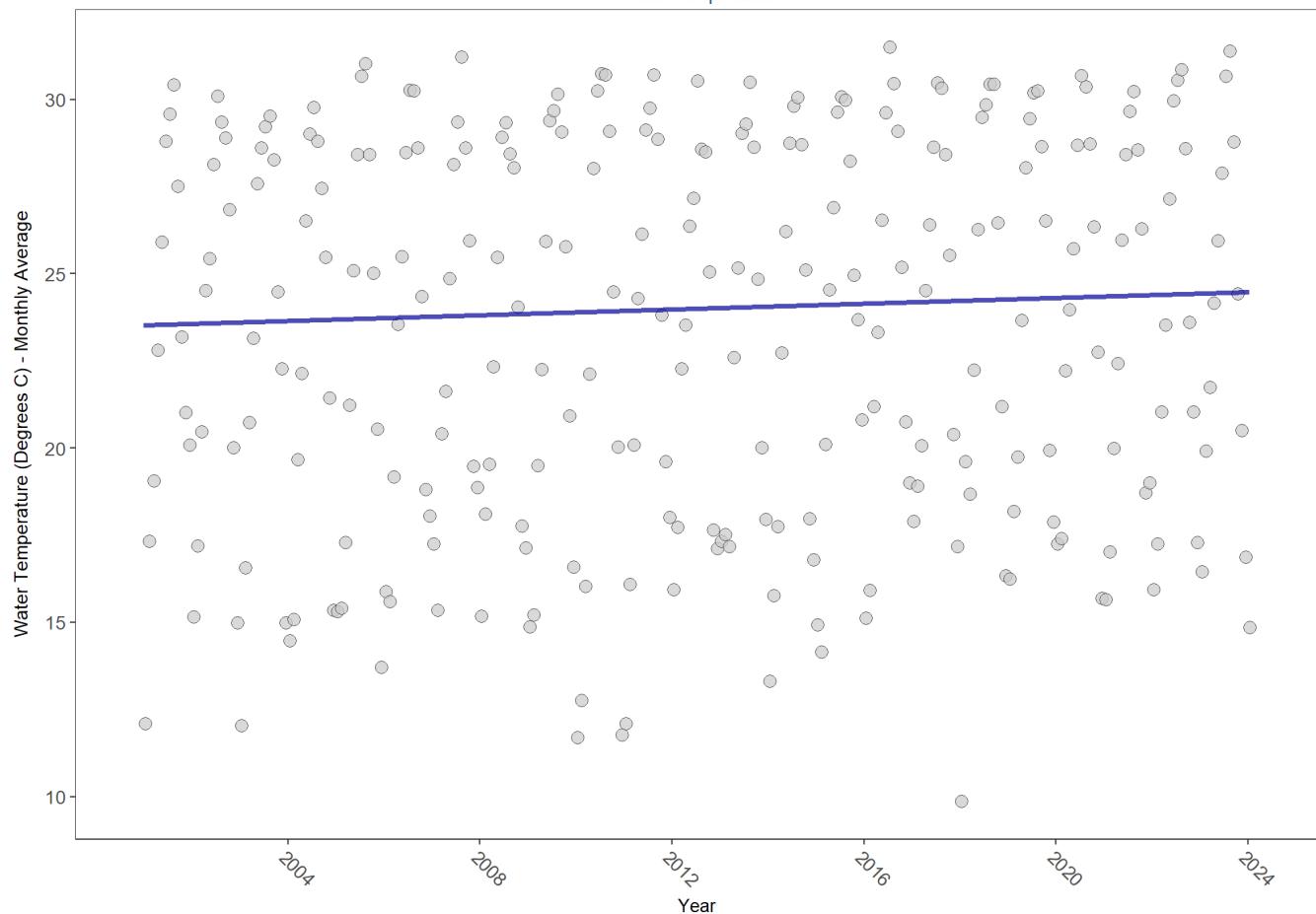
p < 0.00005 appear as 0 due to rounding.

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
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	684842	24	24.2	TRUE	0.1924	0.0000	0.04179789	23.52153	2.8825	0.9922	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

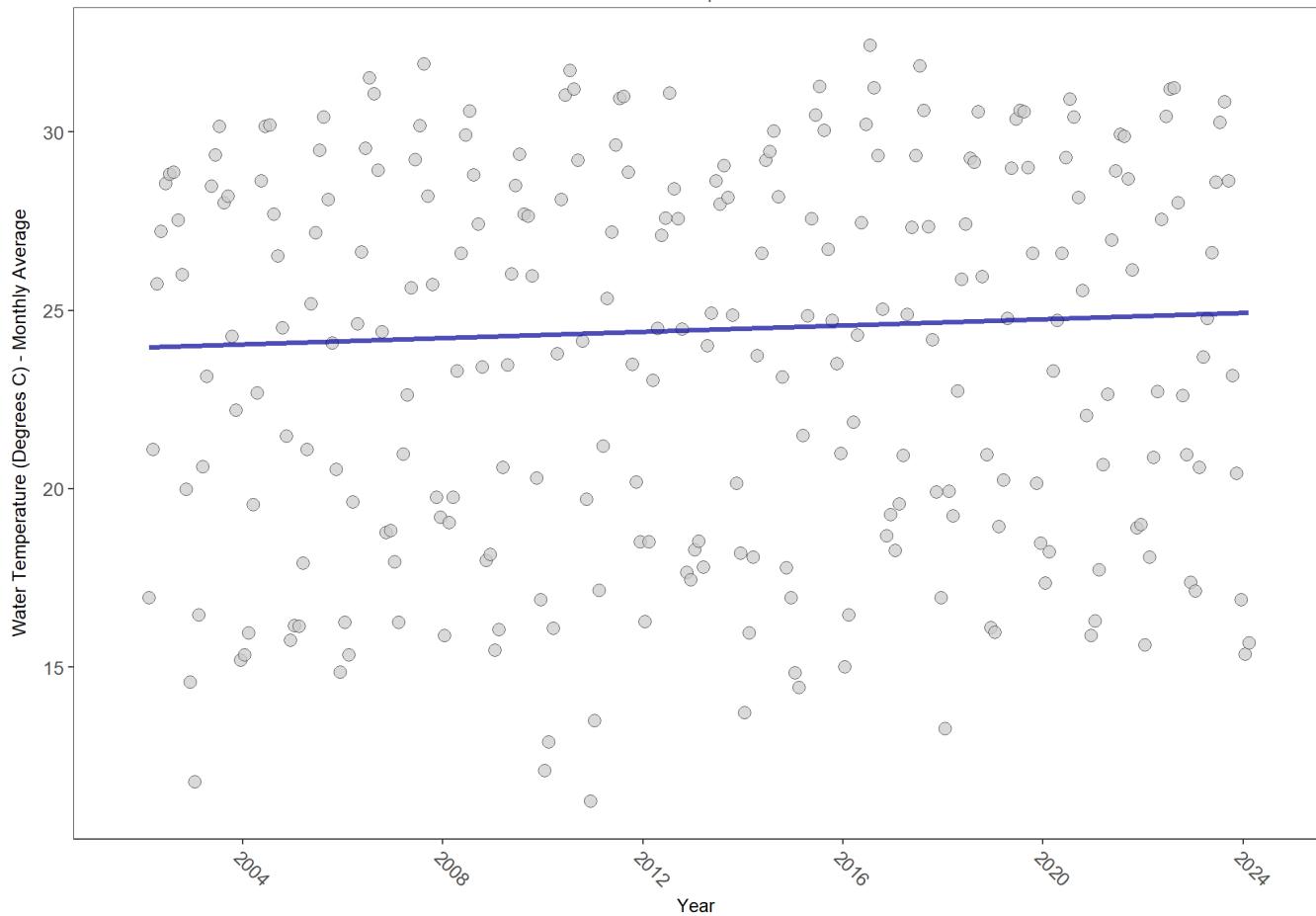
gtmpcwq

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	670806	23	24.3	TRUE	0.1406	0.0015	0.04421507	23.95507	3.4705	0.9829	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

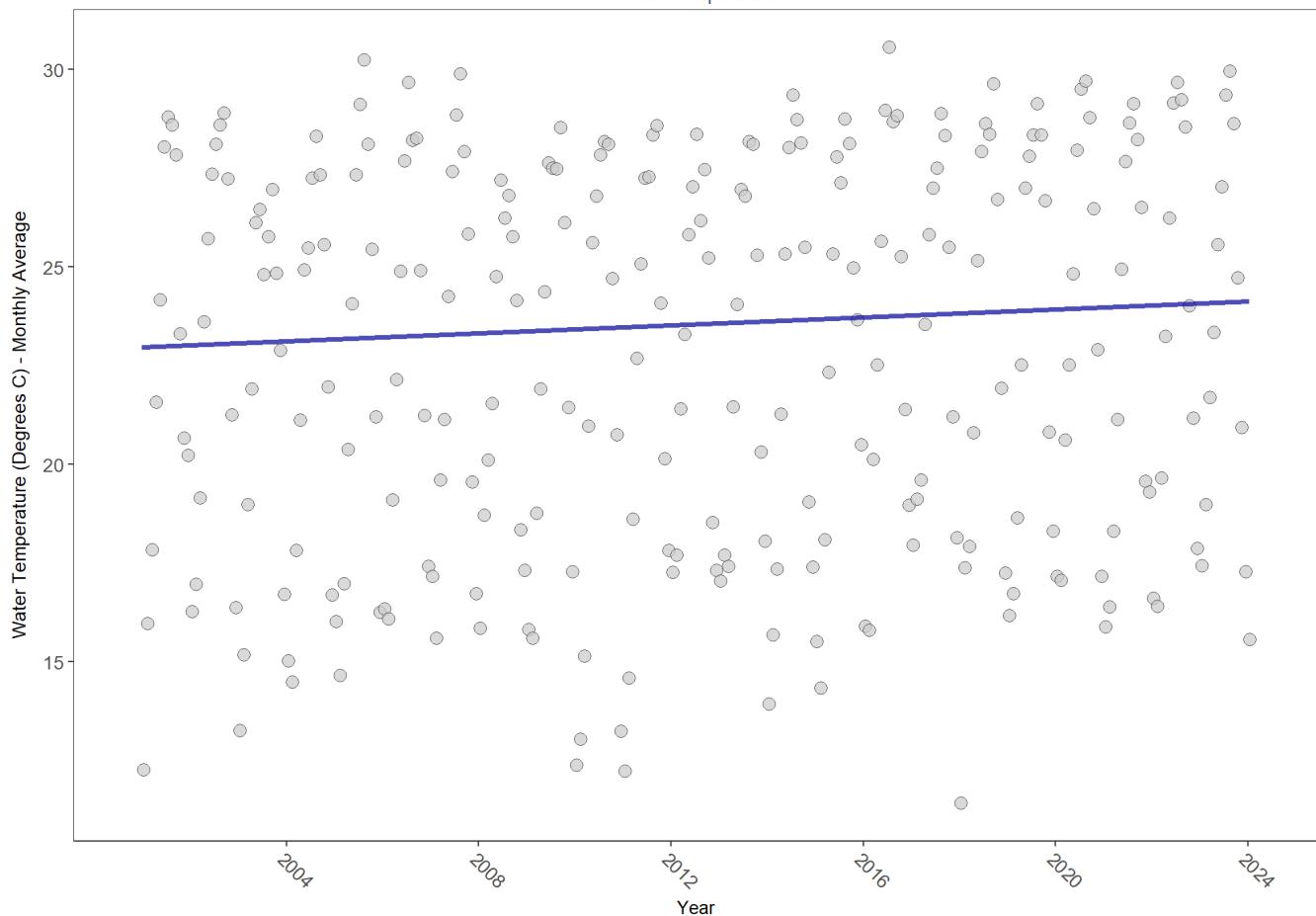
gtmfmwq

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	679187	24	23.7	TRUE	0.2332	0.0000	0.05095486	22.96644	6.2835	0.8538	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

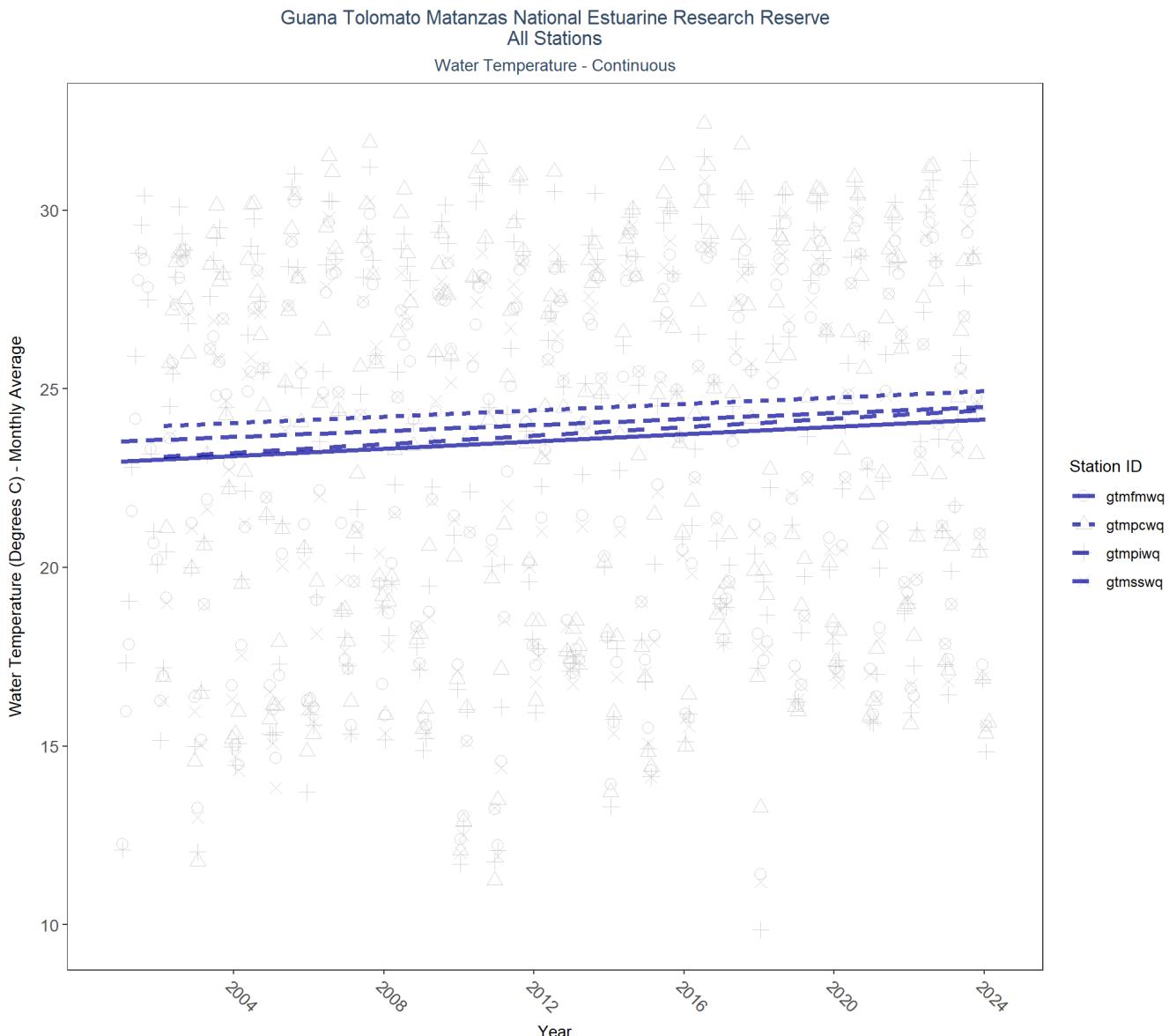


Table 33: Seasonal Kendall-Tau Results for All Stations - Water Temperature

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
gtmsswq	647975	23	2002 - 2024	23.80	0.24	23.09	0.06	0.0000
gtmpiwq	684842	24	2001 - 2024	24.20	0.19	23.52	0.04	0.0000
gtmcwq	670806	23	2002 - 2024	24.30	0.14	23.96	0.04	0.0015
gtmfmwq	679187	24	2001 - 2024	23.70	0.23	22.97	0.05	0.0000
872-0494	35473	2	2020 - 2021	22.34	-	-	-	-