

Nassau River-St. Johns River Marshes Aquatic Preserve

SEACAR Habitat Analyses

Last compiled on 08 April, 2024

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Threshold Filtering

Threshold filters, following the guidance of Florida Department of Environmental Protection's (*FDEP*) Division of Environmental Assessment and Restoration (*DEAR*) are used to exclude specific results values from the SEACAR Analysis. Based on the threshold filters, Quality Assurance / Quality Control (*QAQC*) Flags are inserted into the *SEACAR_QAQCFlagCode* and *SEACAR_QAQC_Description* columns of the export data. The *Include* column indicates whether the *QAQC* Flag will also indicate that data are excluded from analysis. No data are excluded from the data export, but the analysis scripts can use the *Include* column to exclude data (1 to include, 0 to exclude).

Table 1: Continuous Water Quality threshold values

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

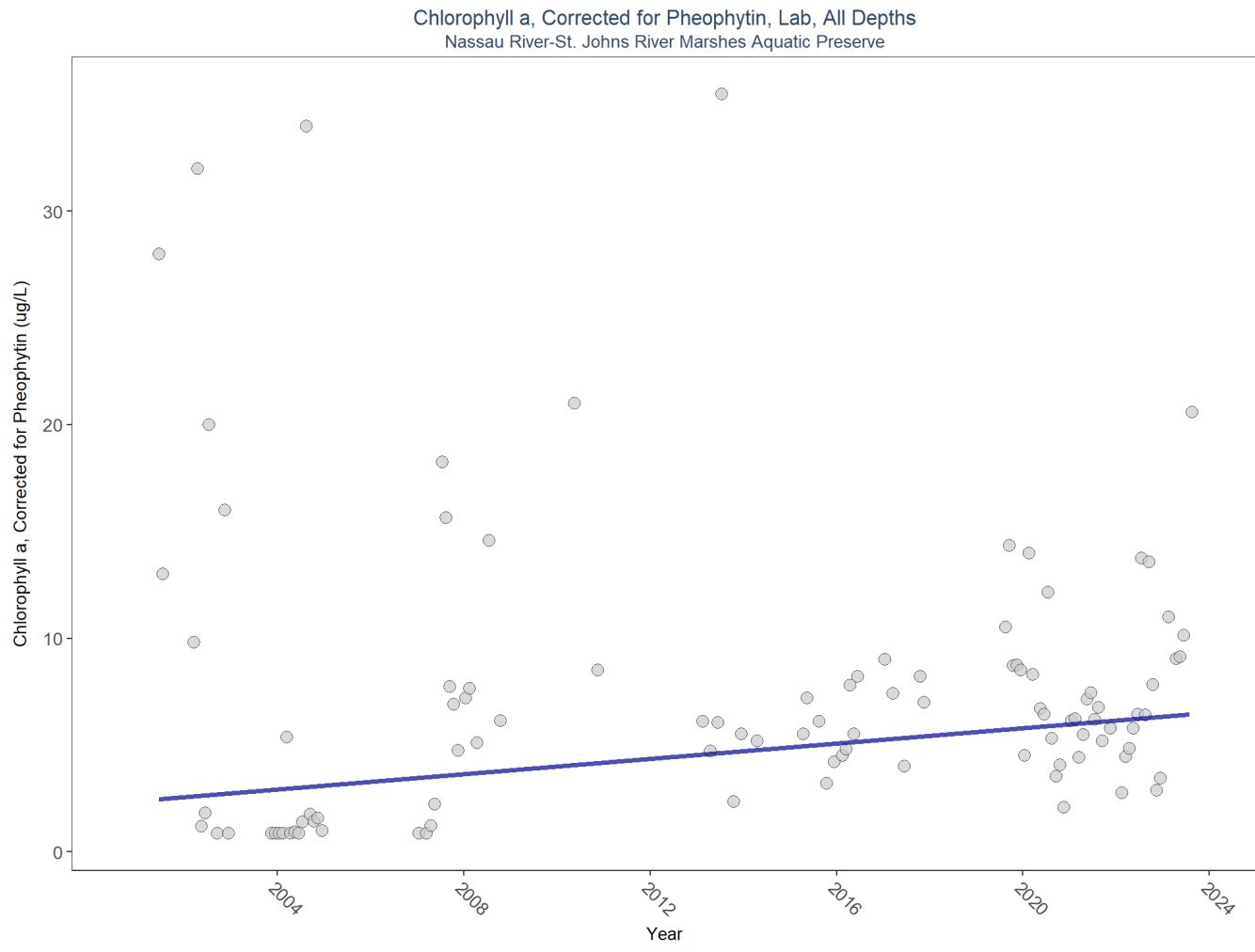
The following files were used in the discrete analysis:

- *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.

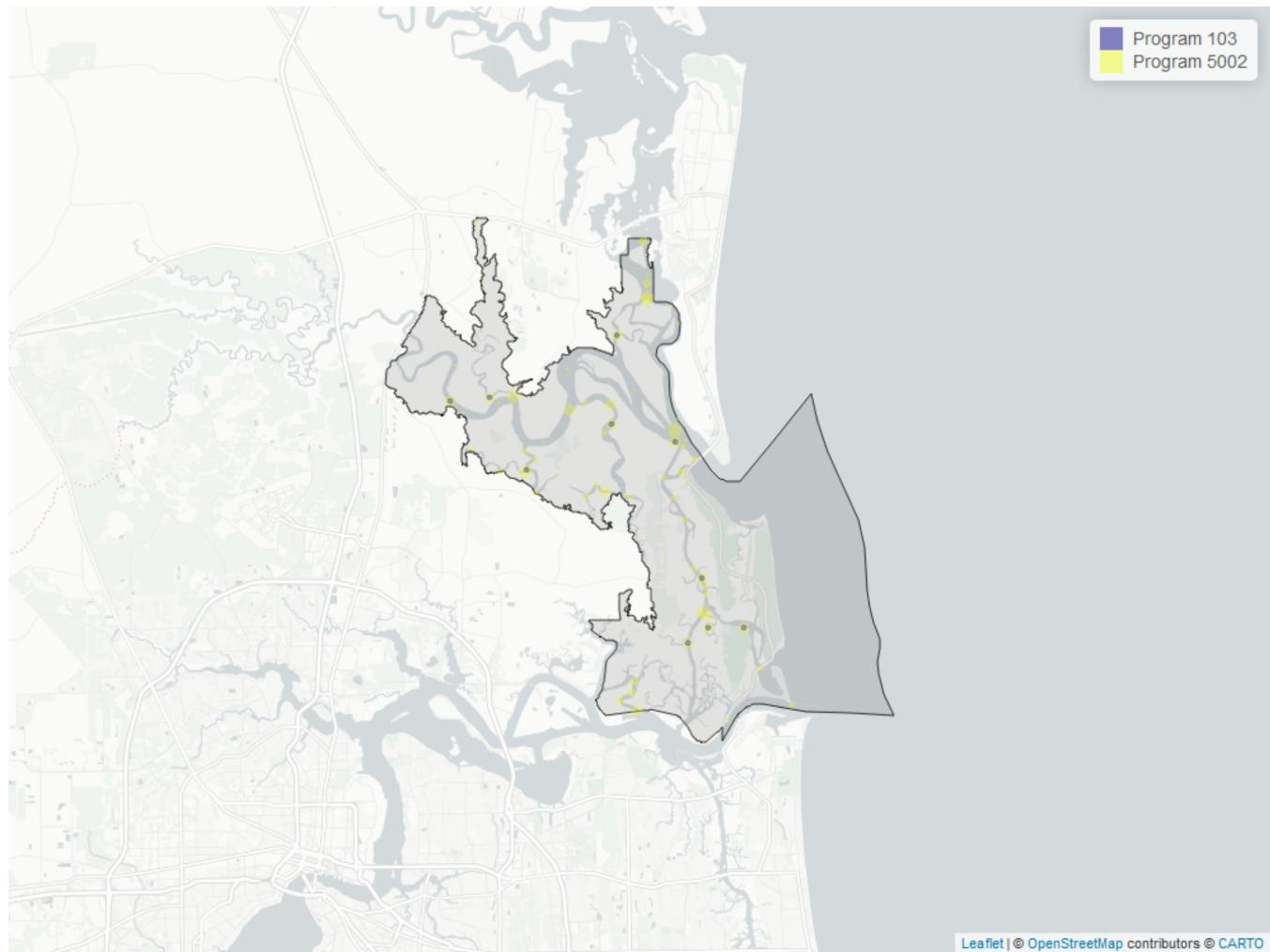
Seasonal Kendall-Tau Trend Analysis



$p < 0.00005$ 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



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

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

ProgramID	N_Data	YearMin	YearMax
5002	530	2001	2023
103	39	2021	2021

Program names:

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

Value Qualifiers

- N_{Total} is total amount of data for a given year
- $N_{_}$ 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

<i>Year</i>	<i>N_Total</i>	<i>N_I</i>	<i>perc_I</i>	<i>N_Q</i>	<i>perc_Q</i>	<i>N_U</i>	<i>perc_U</i>
2004	47	2	4.3	1	2.1	34	72.3
2007	28	2	7.1			12	42.9
2008	84	1	1.2				
2013	15	1	6.7				
2020	63	8	12.7			1	1.6
2021	142	10	7.0	9	6.3	5	3.5
2022	105	12	11.4				

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

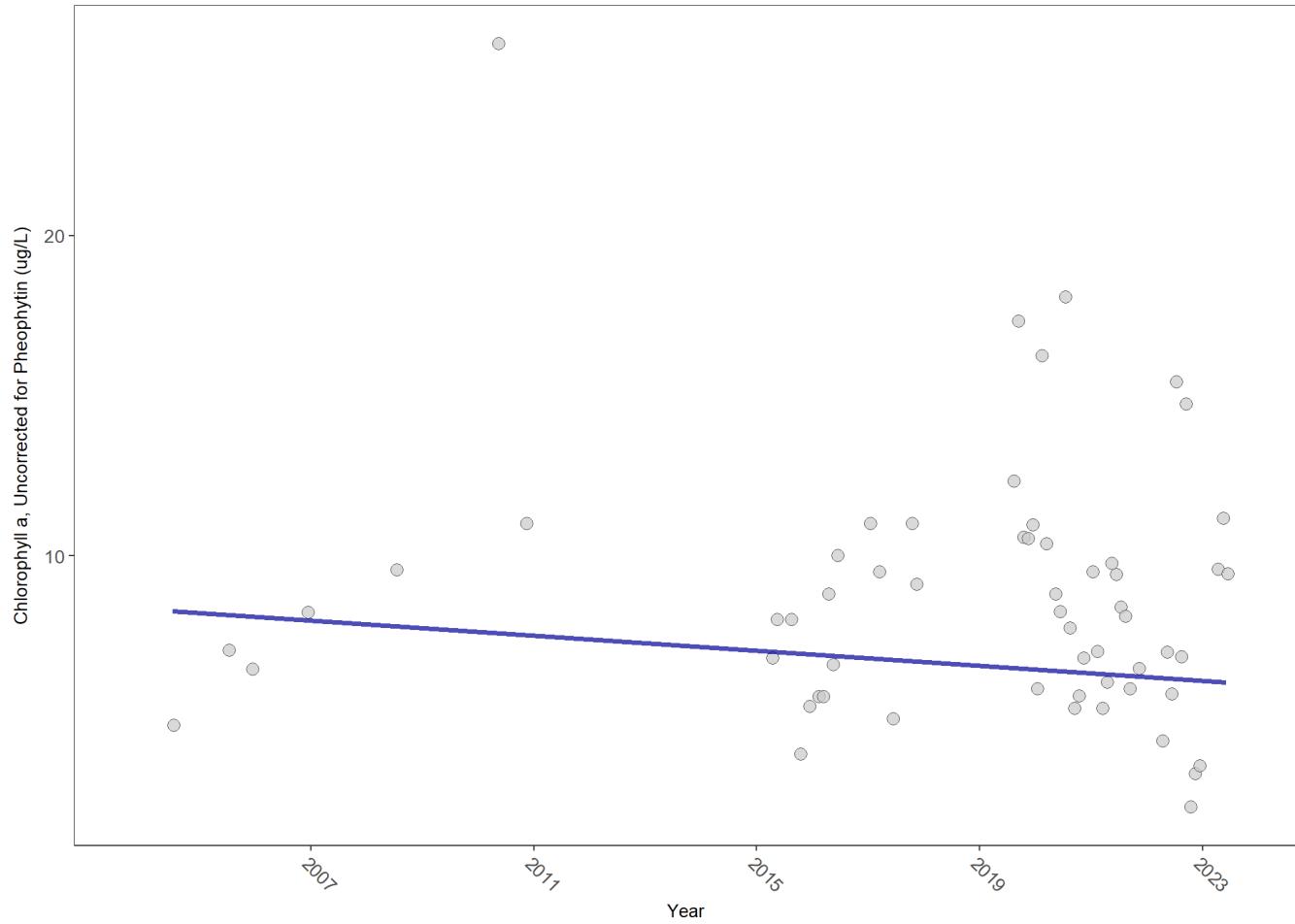
Programs containing Value Qualified data:

5002 - Florida STORET / WIN

Chlorophyll a, Uncorrected for Pheophytin - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

Chlorophyll a, Uncorrected for Pheophytin, Lab, All Depths
Nassau River-St. Johns River Marshes Aquatic Preserve

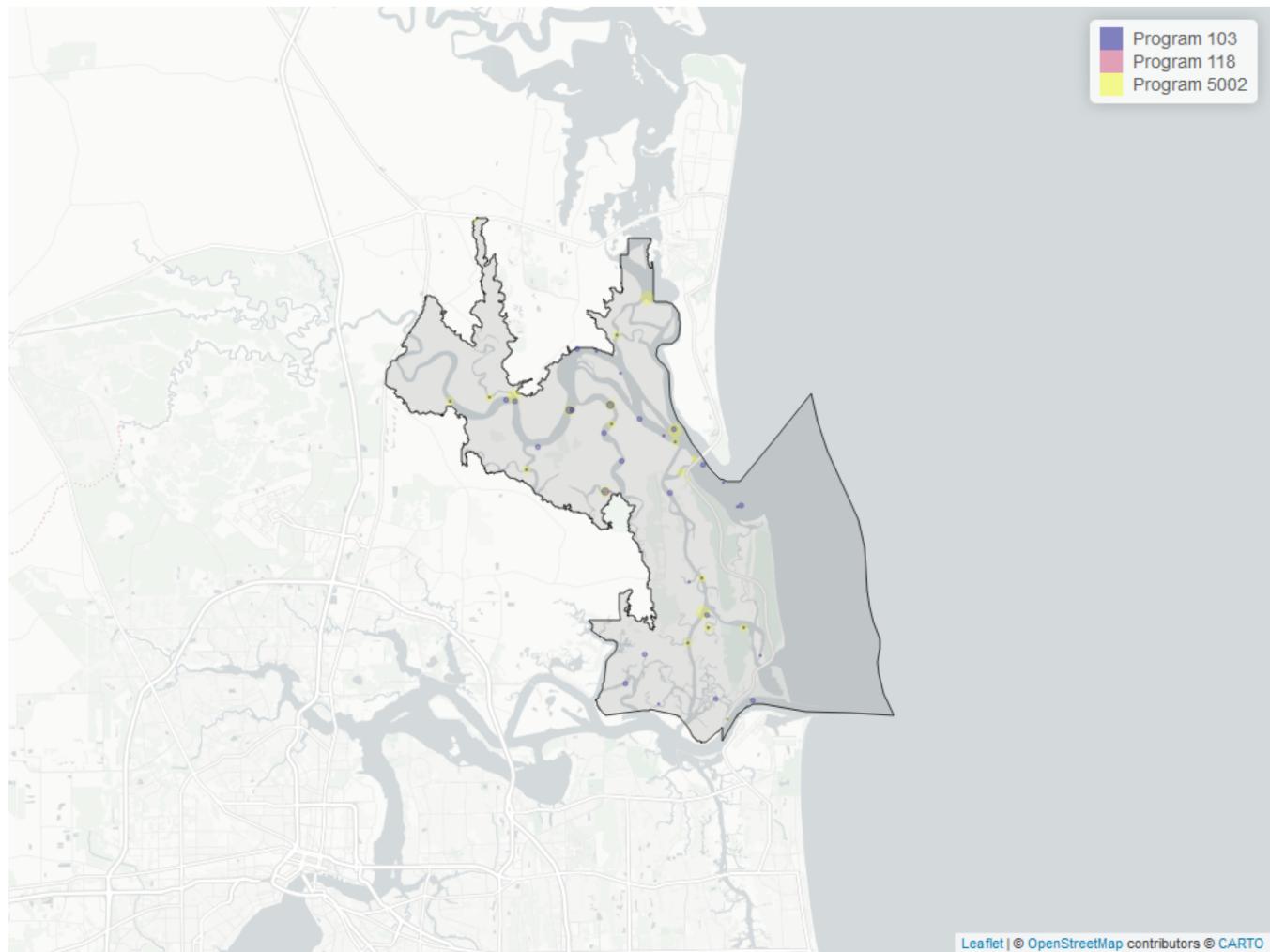


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	382	13	7.8	TRUE	-0.0994	0.4590	-0.1170311	8.323569	10.9038	0.4514	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Chlorophyll a, Uncorrected for Pheophytin



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

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

ProgramID	N_Data	YearMin	YearMax
5002	245	2010	2023
103	139	2004	2021
118	2	2005	2006

Program names:

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

118 - National Aquatic Resource Surveys, National Coastal Condition Assessment

Value Qualifiers

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

Table 9: Value Qualifiers for Chlorophyll a, Uncorrected for Pheophytin

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
2020	64					1	1.6
2021	134	4		3		7.5	
2022	45	9		20		7	5.2

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

Programs containing Value Qualified data:

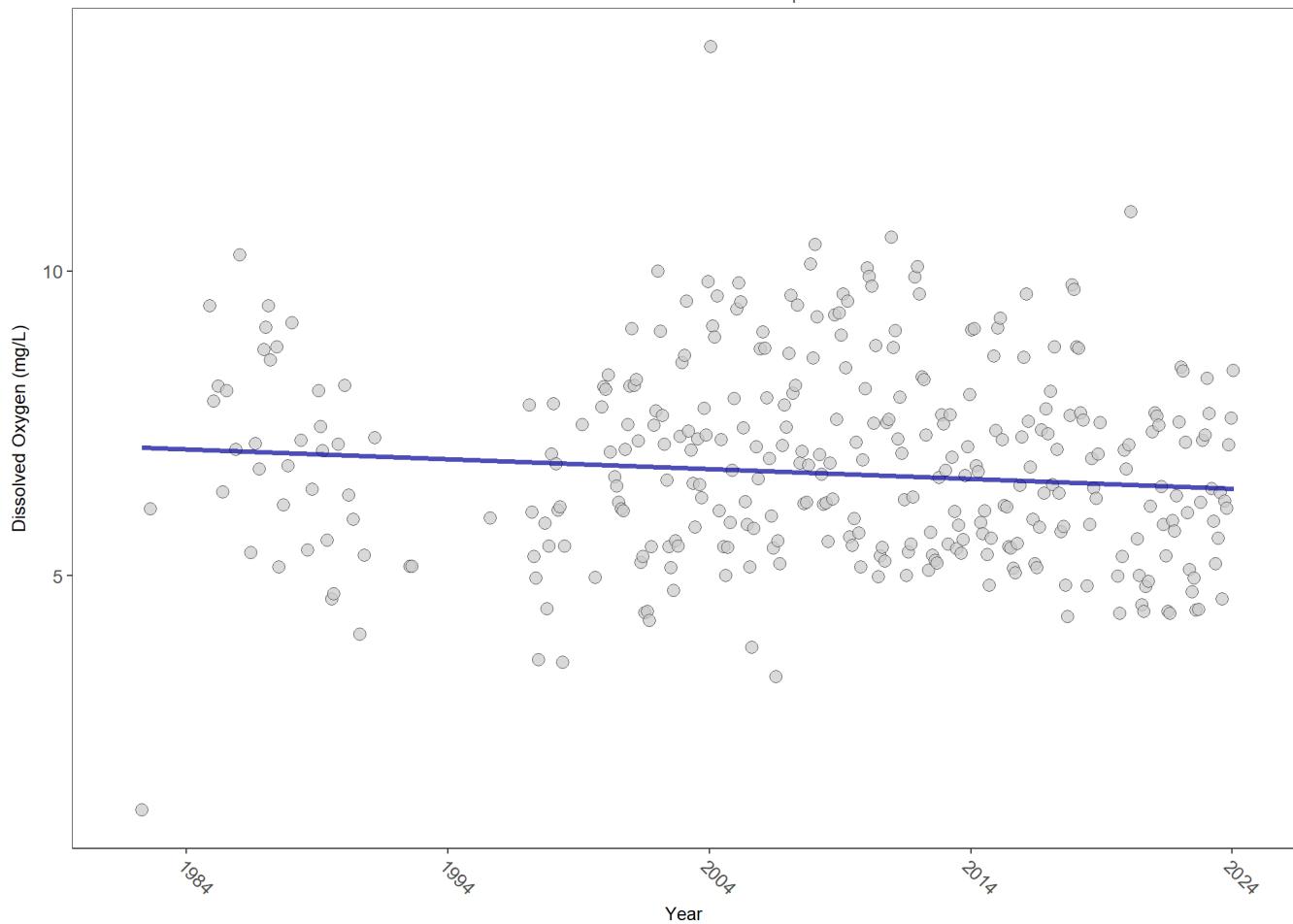
5002 - Florida STORET / WIN

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
Nassau River-St. Johns River Marshes Aquatic Preserve

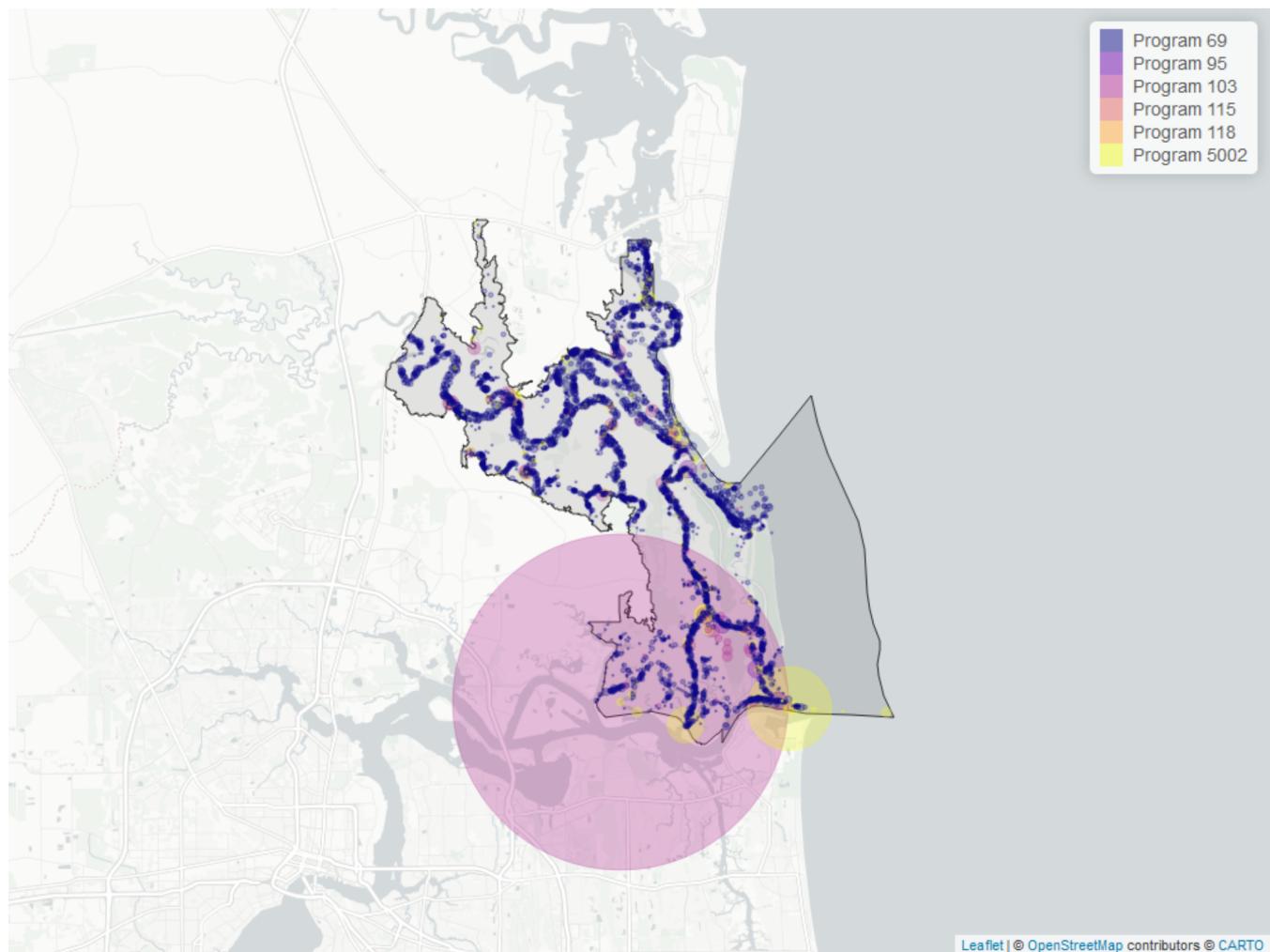


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	35029	39	6.29	TRUE	-0.1146	0.0030	-0.01630556	7.114474	6.4672	0.8404	-1

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



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

Table 10: Programs contributing data for Dissolved Oxygen

ProgramID	N_Data	YearMin	YearMax
103	18455	1982	2021
69	14077	2001	2017
5002	2383	1997	2024
95	189	2013	2018
115	4	1995	1995
118	2	2005	2006

Program names:

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

69 - Fisheries-Independent Monitoring (FIM) Program

5002 - Florida STORET / WIN

95 - Harmful Algal Bloom Marine Observation Network

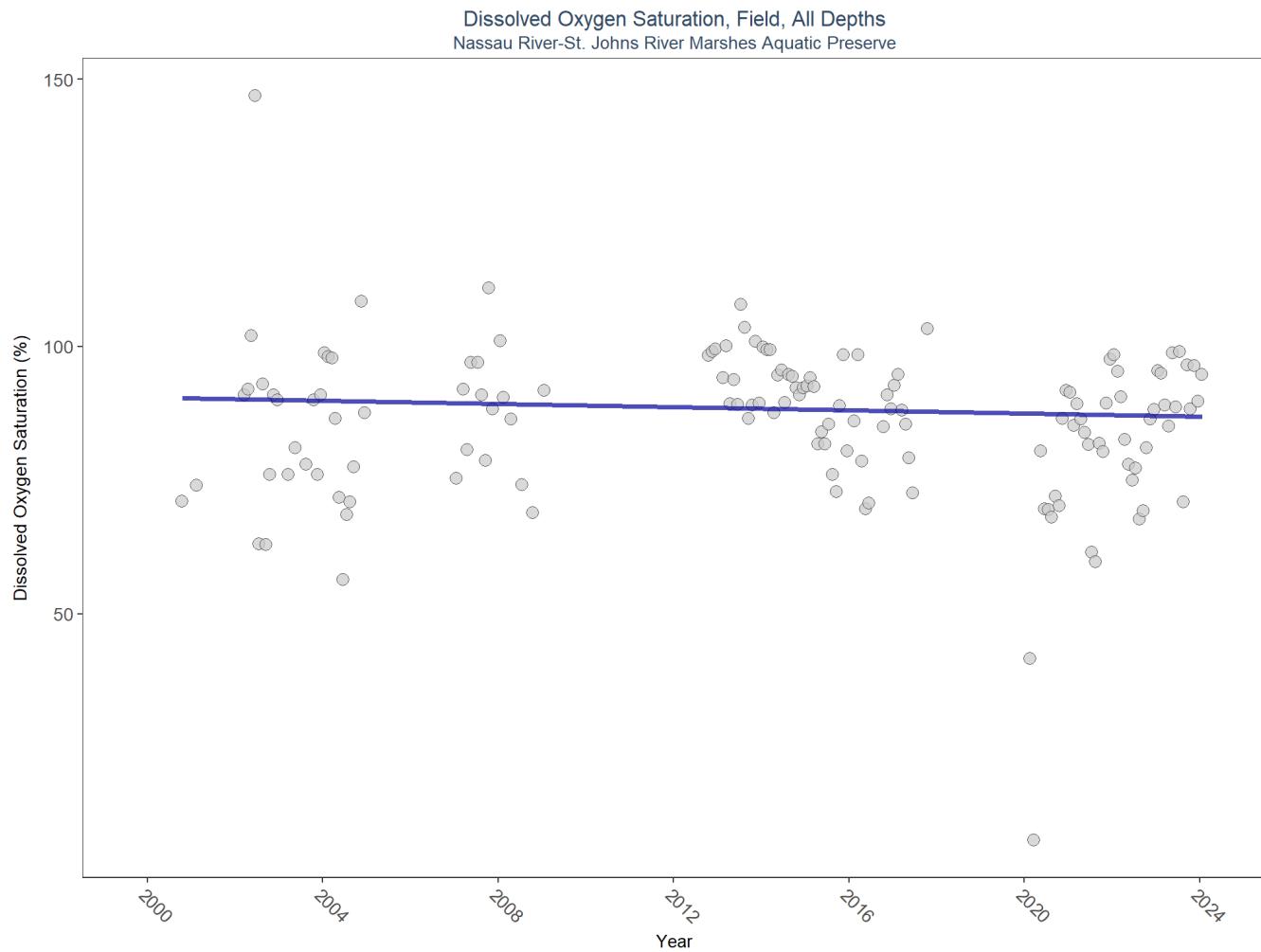
115 - Environmental Monitoring Assessment Program

118 - National Aquatic Resource Surveys, National Coastal Condition Assessment

There are no qualifying Value Qualifiers for Dissolved Oxygen in Nassau River-St. Johns River Marshes Aquatic Preserve

Dissolved Oxygen Saturation - Discrete Water Quality

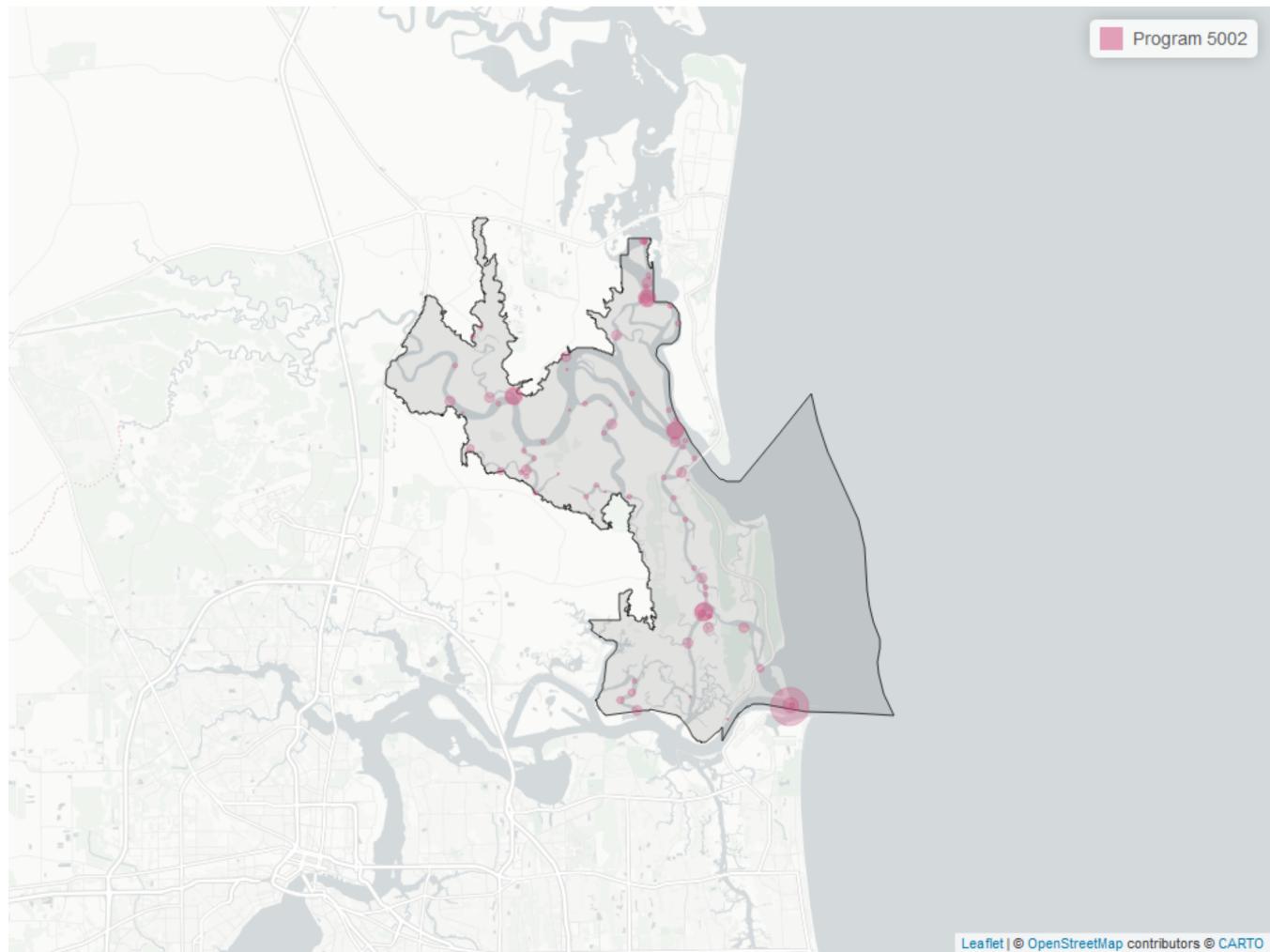
Seasonal Kendall-Tau Trend Analysis



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 11: Programs contributing data for Dissolved Oxygen Saturation

ProgramID	N_Data	YearMin	YearMax
5002	1099	2000	2024

Program names:

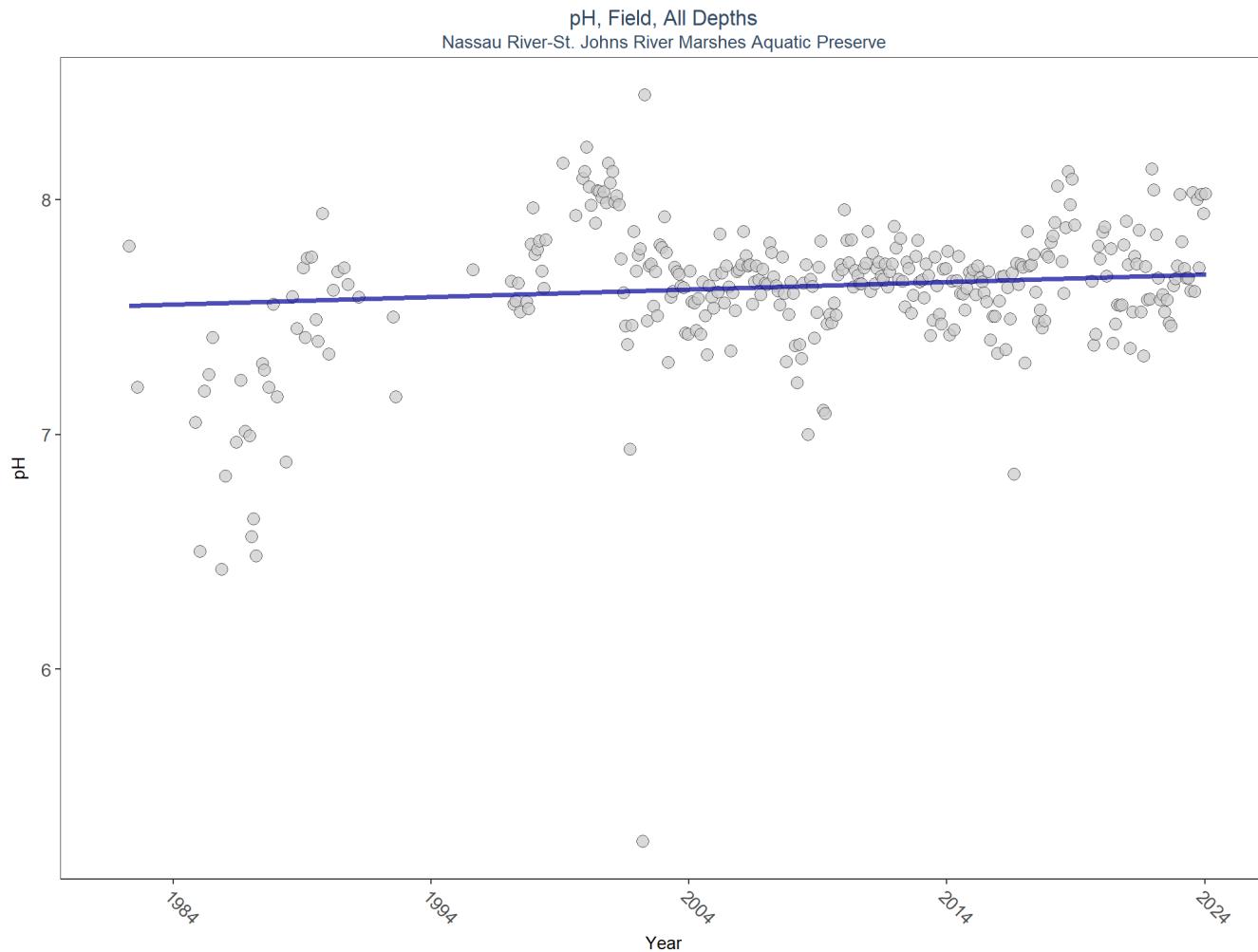
5002 - Florida STORET / WIN

There are no qualifying Value Qualifiers for Dissolved Oxygen Saturation in Nassau River-St. Johns River Marshes Aquatic Preserve

pH - Discrete Water Quality

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

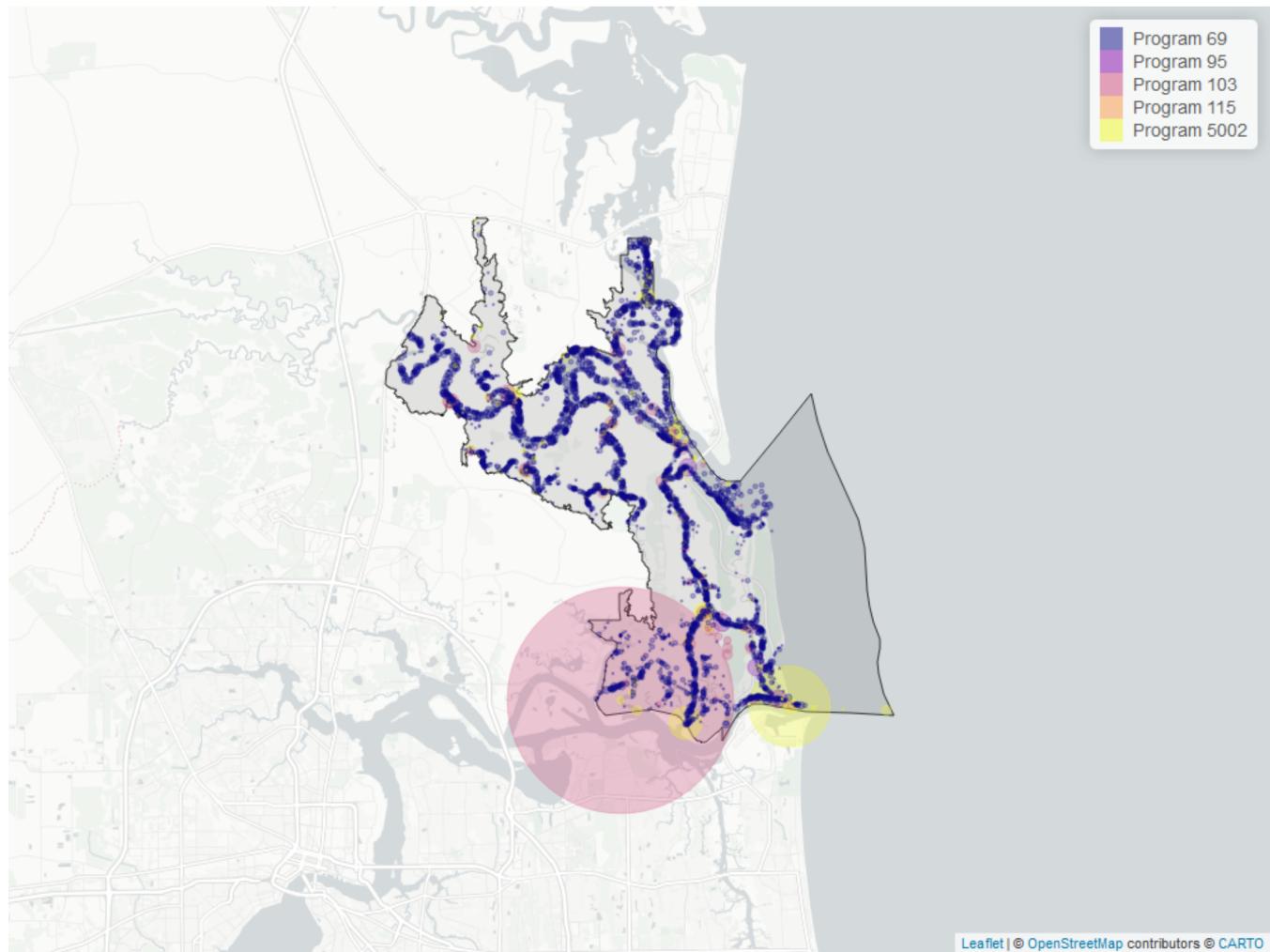
Seasonal Kendall-Tau Trend Analysis



p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for pH



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

Table 12: Programs contributing data for pH

ProgramID	N_Data	YearMin	YearMax
69	14083	2001	2017
103	8896	1982	2021
5002	2272	1997	2024
95	192	2013	2018
115	3	1995	1995

Program names:

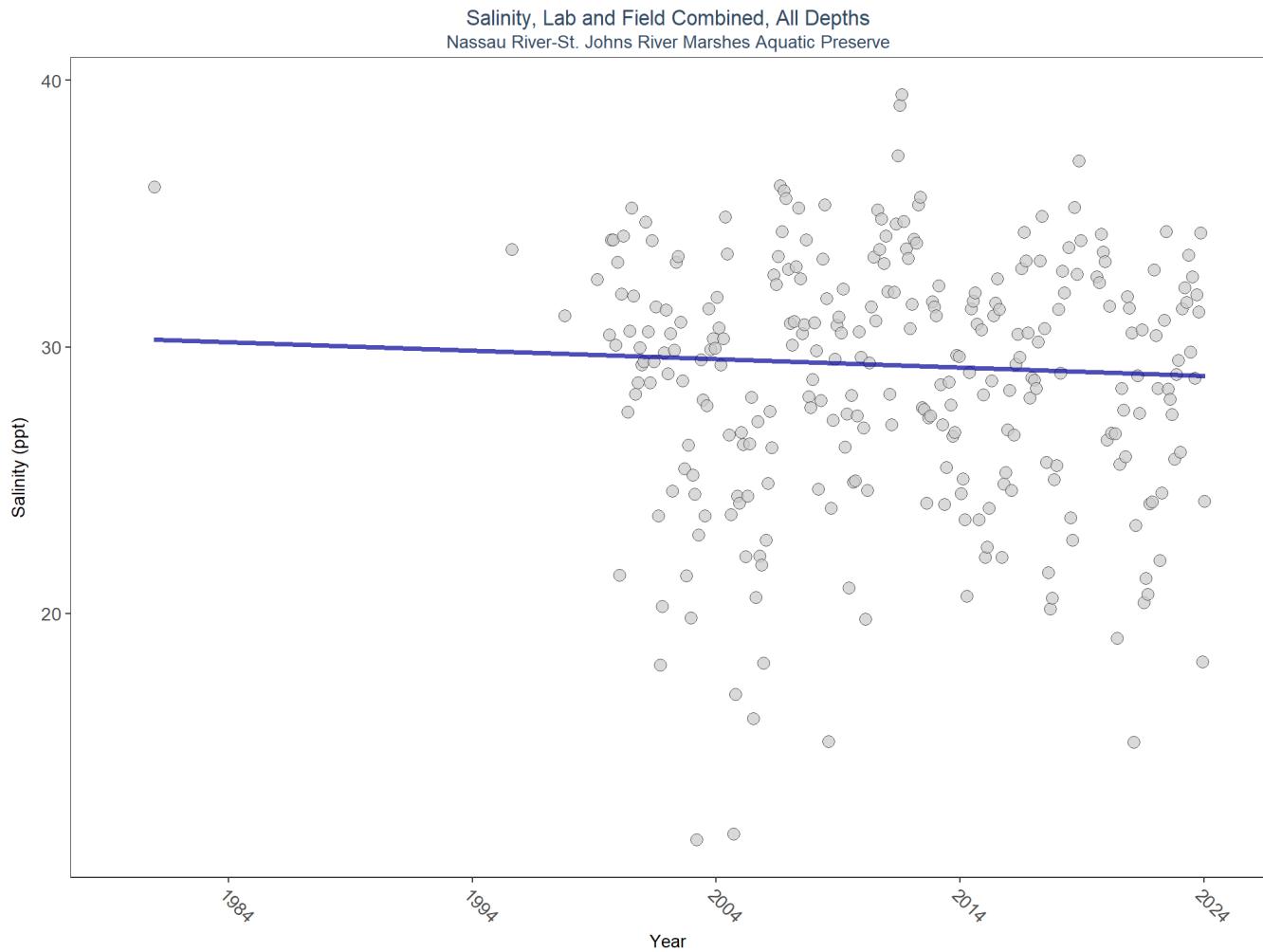
- 69 - Fisheries-Independent Monitoring (FIM) Program
- 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
- 5002 - Florida STORET / WIN
- 95 - Harmful Algal Bloom Marine Observation Network

There are no qualifying Value Qualifiers for pH in Nassau River-St. Johns River Marshes Aquatic Preserve

Salinity - Discrete Water Quality

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

Seasonal Kendall-Tau Trend Analysis

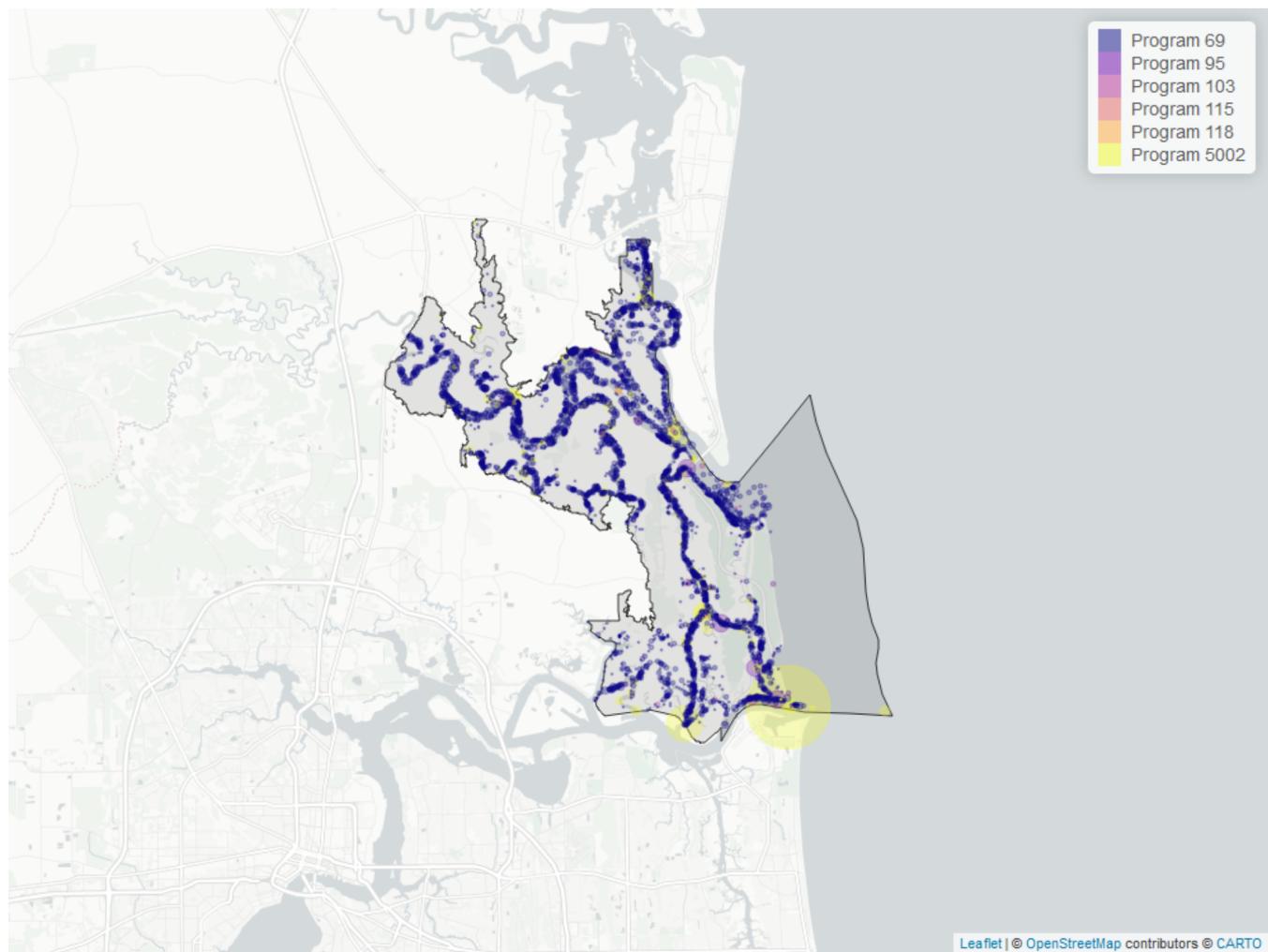


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	16861	29	30.7	TRUE	-0.0287	0.4856	-0.03164706	30.31639	4.4307	0.9556	0

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 Salinity



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

Table 13: Programs contributing data for Salinity

ProgramID	N_Data	YearMin	YearMax
69	14139	2001	2017
5002	2375	1997	2024
95	212	1980	2018
103	136	2004	2008
118	13	2015	2021
115	4	1995	1995

Program names:

69 - Fisheries-Independent Monitoring (FIM) Program

5002 - Florida STORET / WIN

95 - Harmful Algal Bloom Marine Observation Network

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

118 - National Aquatic Resource Surveys, National Coastal Condition Assessment

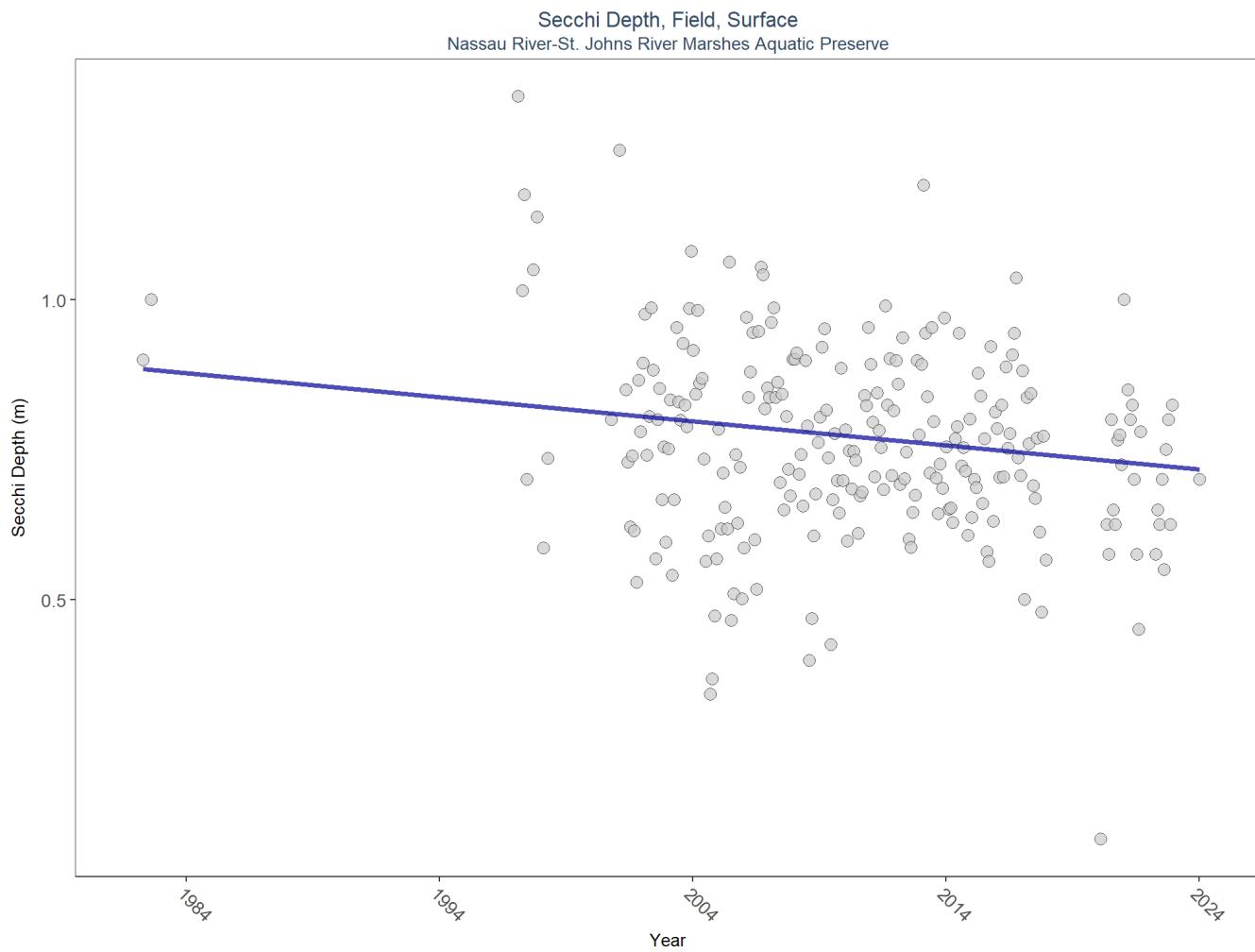
115 - Environmental Monitoring Assessment Program

There are no qualifying Value Qualifiers for Salinity in Nassau River-St. Johns River Marshes Aquatic Preserve

Secchi Depth - Discrete Water Quality

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

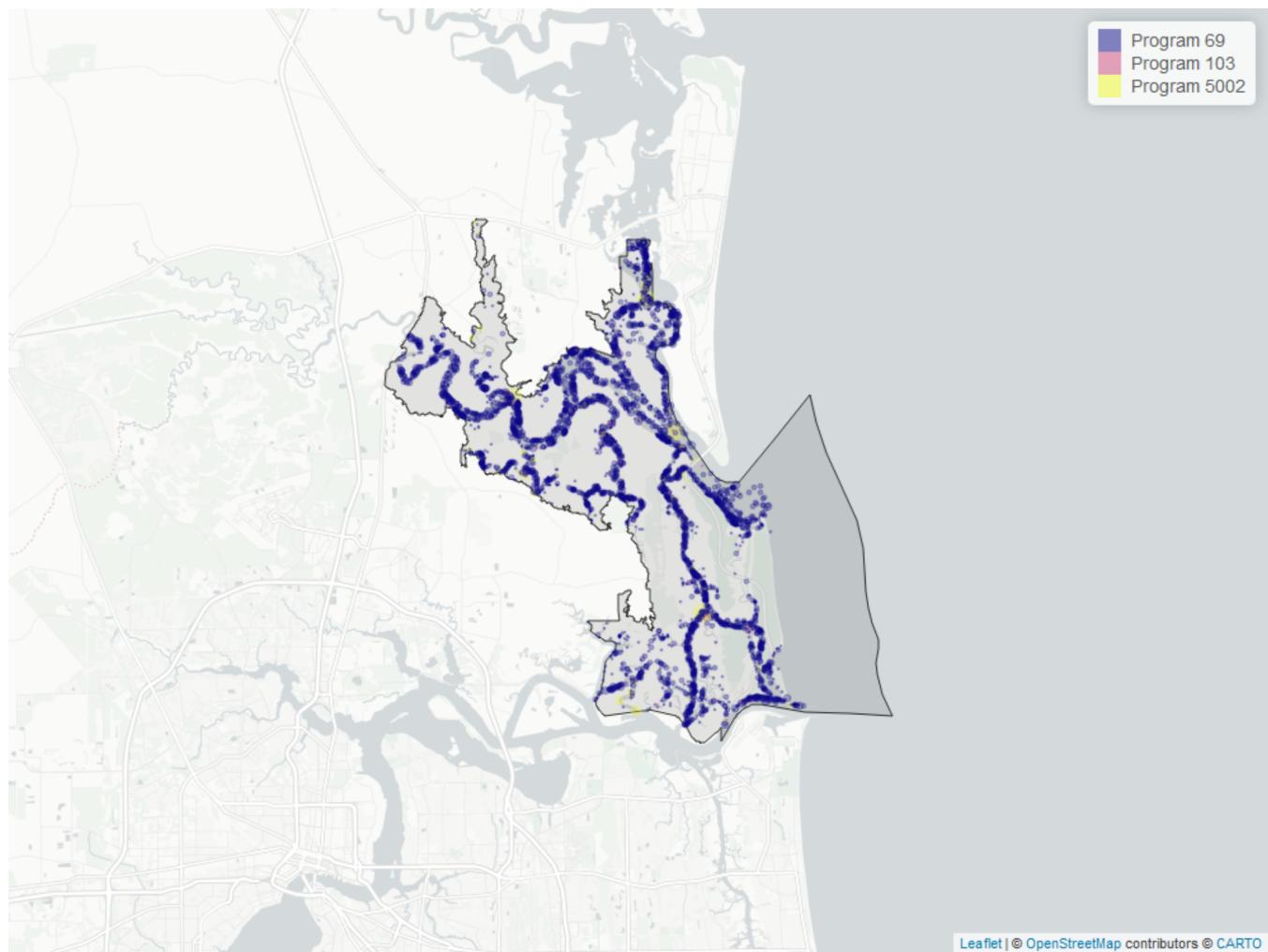
Seasonal Kendall-Tau Trend Analysis



p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Secchi Depth



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

Table 14: Programs contributing data for Secchi Depth

ProgramID	N_Data	YearMin	YearMax
69	14096	2001	2017
5002	434	2000	2024
103	94	1982	2021

Program names:

69 - Fisheries-Independent Monitoring (FIM) Program

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

Value Qualifiers

- N_{Total} is total amount of data for a given year

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

Table 15: Value Qualifiers for Secchi Depth

<i>Year</i>	<i>N_Total</i>	<i>N_S</i>	<i>perc_S</i>
2017	813	1	0.1
2020	63	1	1.6
2021	66	1	1.5

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

Programs containing Value Qualified data:

5002 - Florida STORET / WIN

Total Nitrogen - Discrete Water Quality

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

Total Nitrogen Calculation:

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

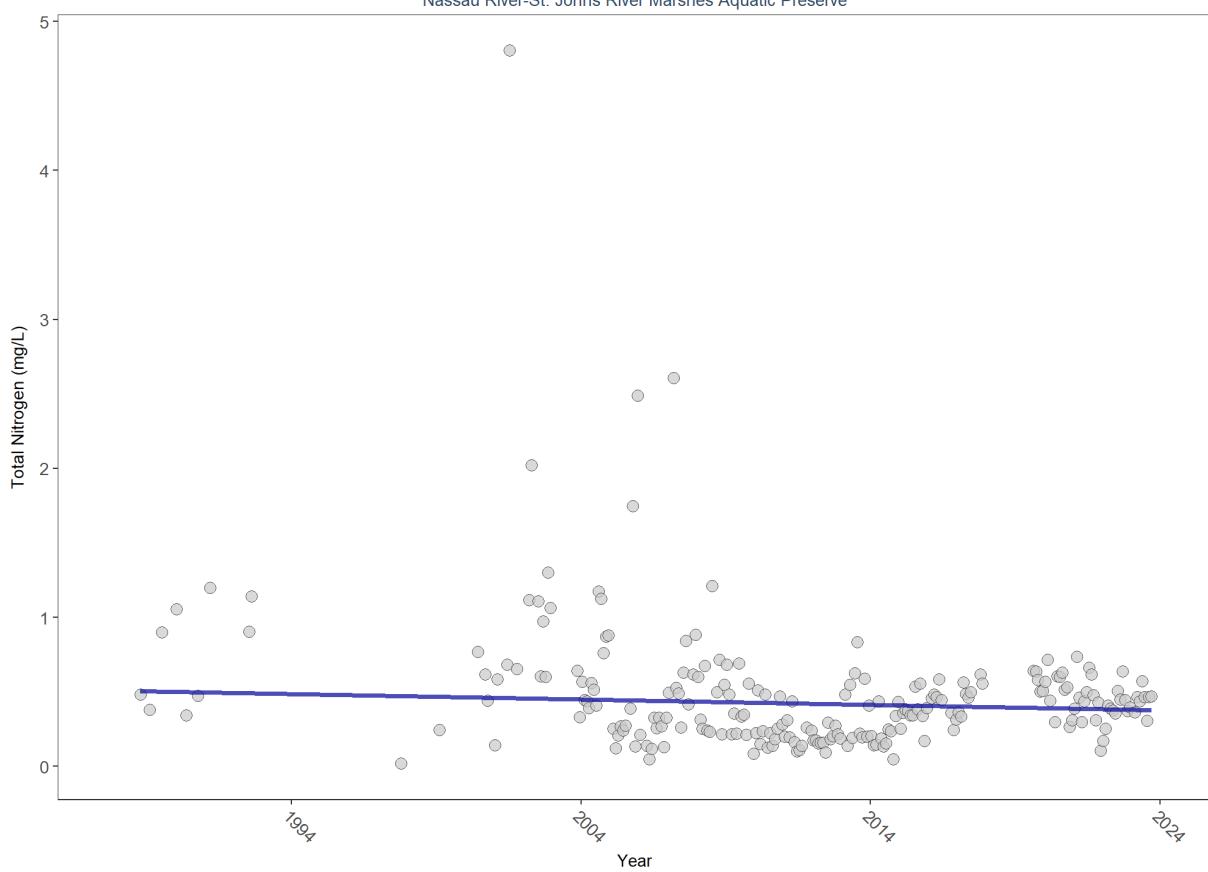
- 1) $TN = TKN + NO_3O_2;$
- 2) $TN = TKN + NO_3 + NO_2;$
- 3) $TN = ORGN + NH_4 + NO_3O_2;$
- 4) $TN = ORGN + NH_4 + NO_2 + NO_3;$
- 5) $TN = TKN + NO_3;$
- 6) $TN = ORGN + NH_4 + NO_3;$

Additional Information:

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

Seasonal Kendall-Tau Trend Analysis

Total Nitrogen, Lab, All Depths
Nassau River-St. Johns River Marshes Aquatic Preserve

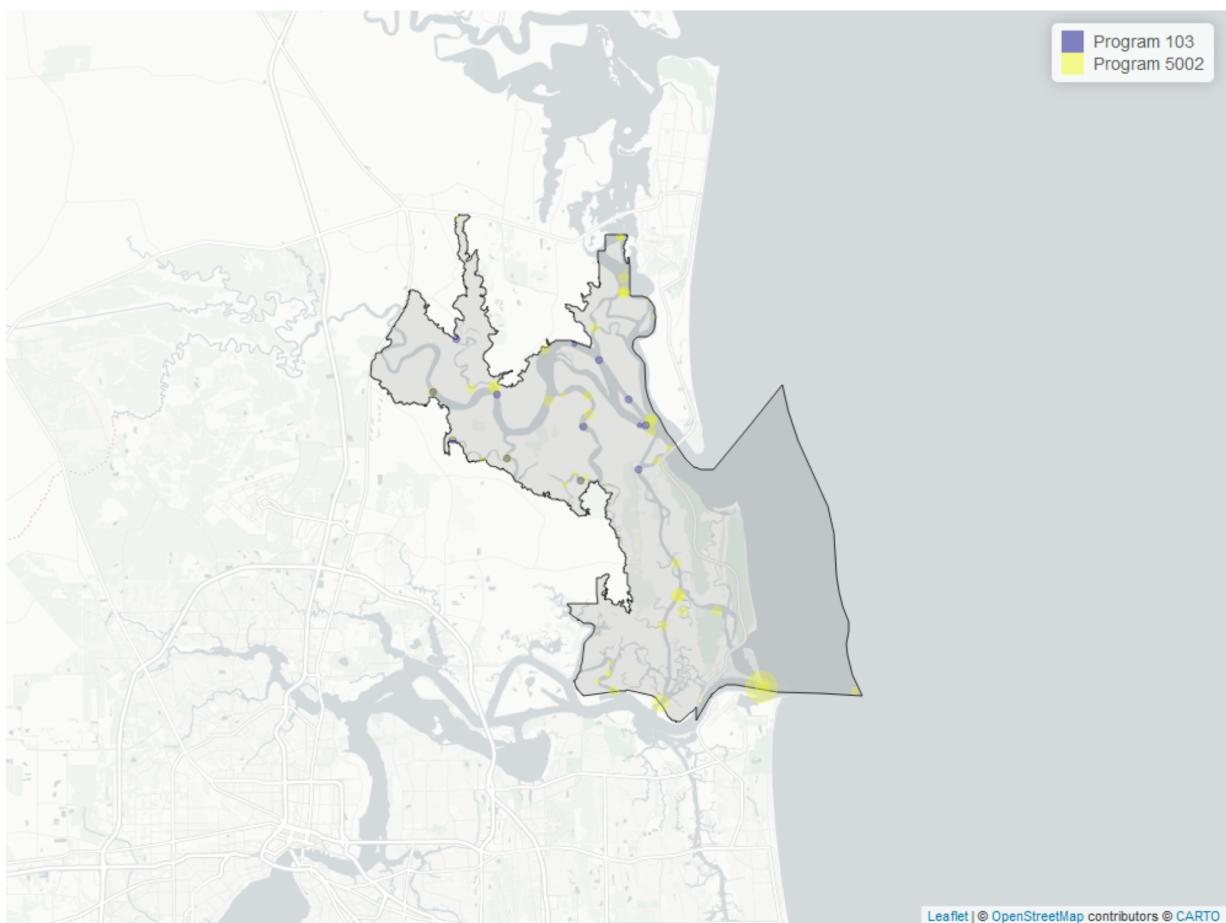


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	897	30	0.424	TRUE	-0.0636	0.1920	-0.003587626	0.5054924	6.1655	0.8621	0

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 16: Programs contributing data for Total Nitrogen

ProgramID	N_Data	YearMin	YearMax
5002	803	1997	2023
103	94	1988	2005

Program names:

5002 - Florida STORET / WIN

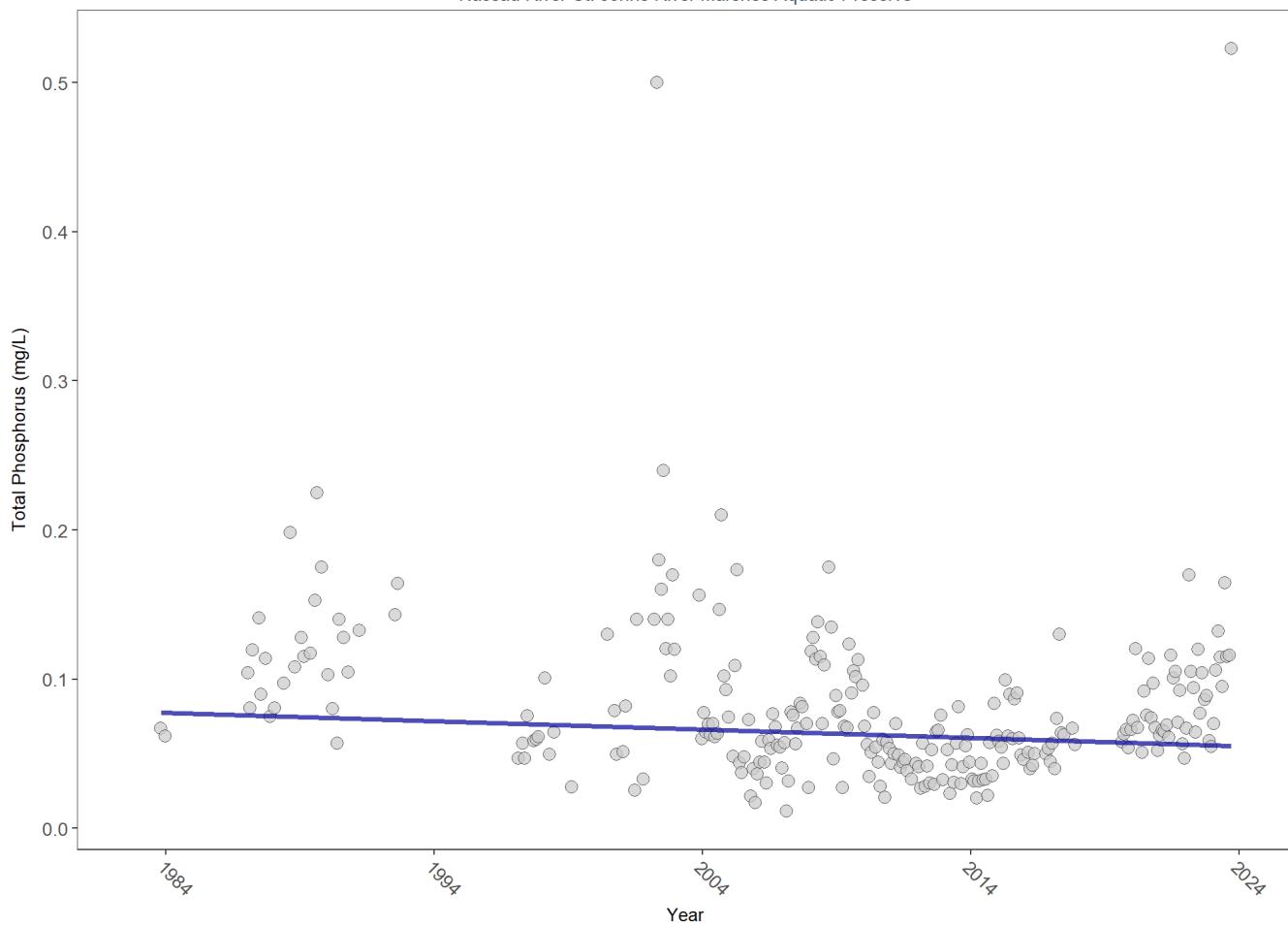
103 - EPA STOrage and RETrieval Data Warehouse (STORET)

There are no qualifying Value Qualifiers for Total Nitrogen in Nassau River-St. Johns River Marshes Aquatic Preserve

Total Phosphorus - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

Total Phosphorus, Lab, All Depths
Nassau River-St. Johns River Marshes Aquatic Preserve

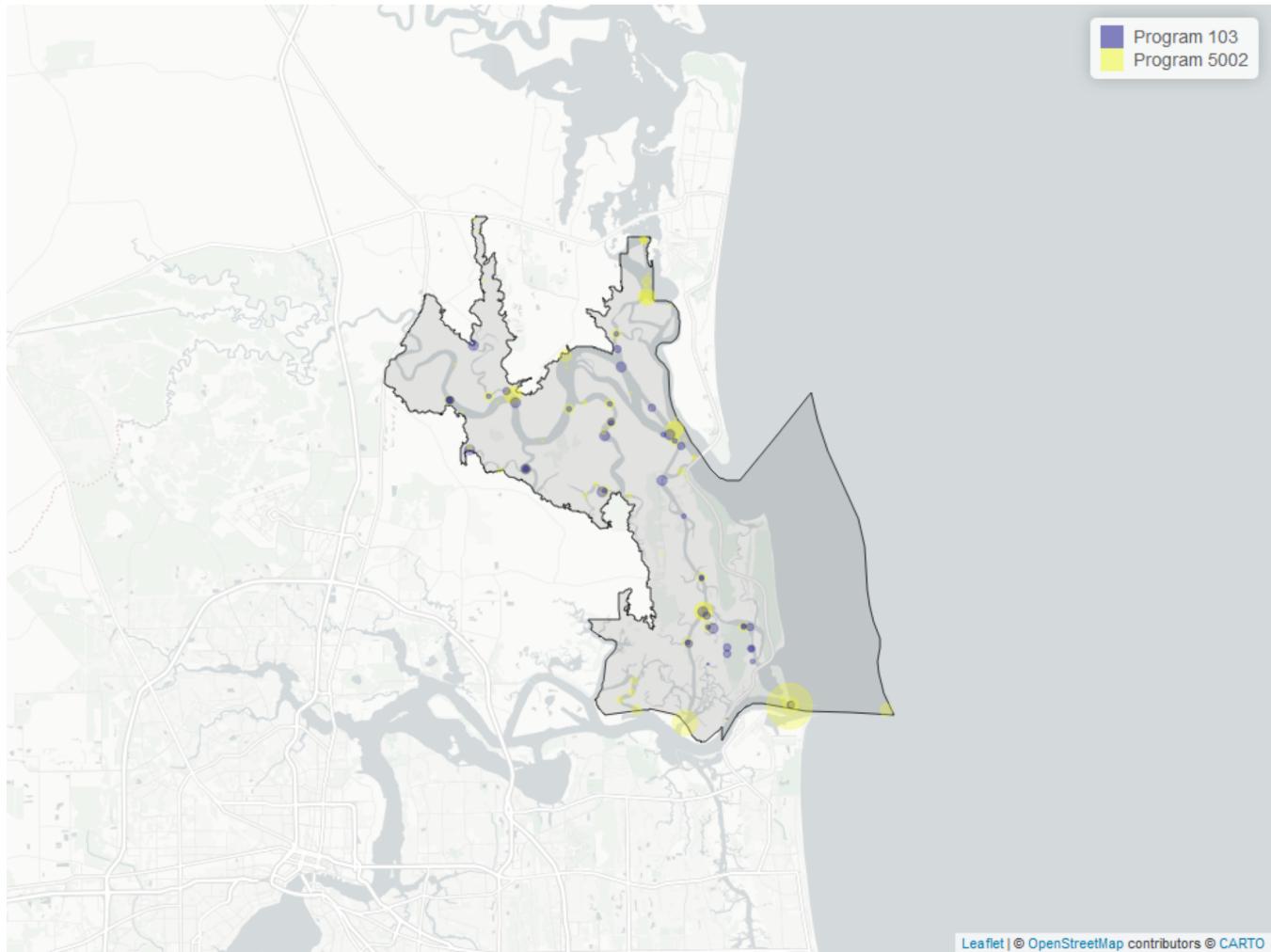


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	1618	33	0.07	TRUE	-0.12	0.0107	-0.0005595299	0.07785479	4.9158	0.9352	-1

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 17: Programs contributing data for Total Phosphorus

ProgramID	N_Data	YearMin	YearMax
5002	1255	1997	2023
103	376	1983	2021

Program names:

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

Value Qualifiers

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

Table 18: Value Qualifiers for Total Phosphorus

Year	N_Total	N_I	perc_I	N_Q	perc_Q	N_U	perc_U
2002	14			1	7.1		
2003	8	1	12.5				
2004	86	12	13.9				
2005	24	8	33.3				
2006	24	14	58.3				
2007	75	28	37.3	2	2.7		
2008	67	33	49.2	1	1.5		
2009	55	36	65.4				
2010	55	22	40.0				
2011	36	15	41.7	2	5.6		
2012	24	14	58.3				
2013	37	16	43.2				
2014	39	28	71.8	3	7.7		
2015	131	92	70.2	10	7.6		
2016	36	19	52.8				
2017	57	35	61.4	2	3.5		
2020	99	17	17.2	1	1.0		
2021	204	21	10.3	2	1.0	1	0.5
2022	151	10	6.6			1	0.7
2023	58			11	19.0		

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:

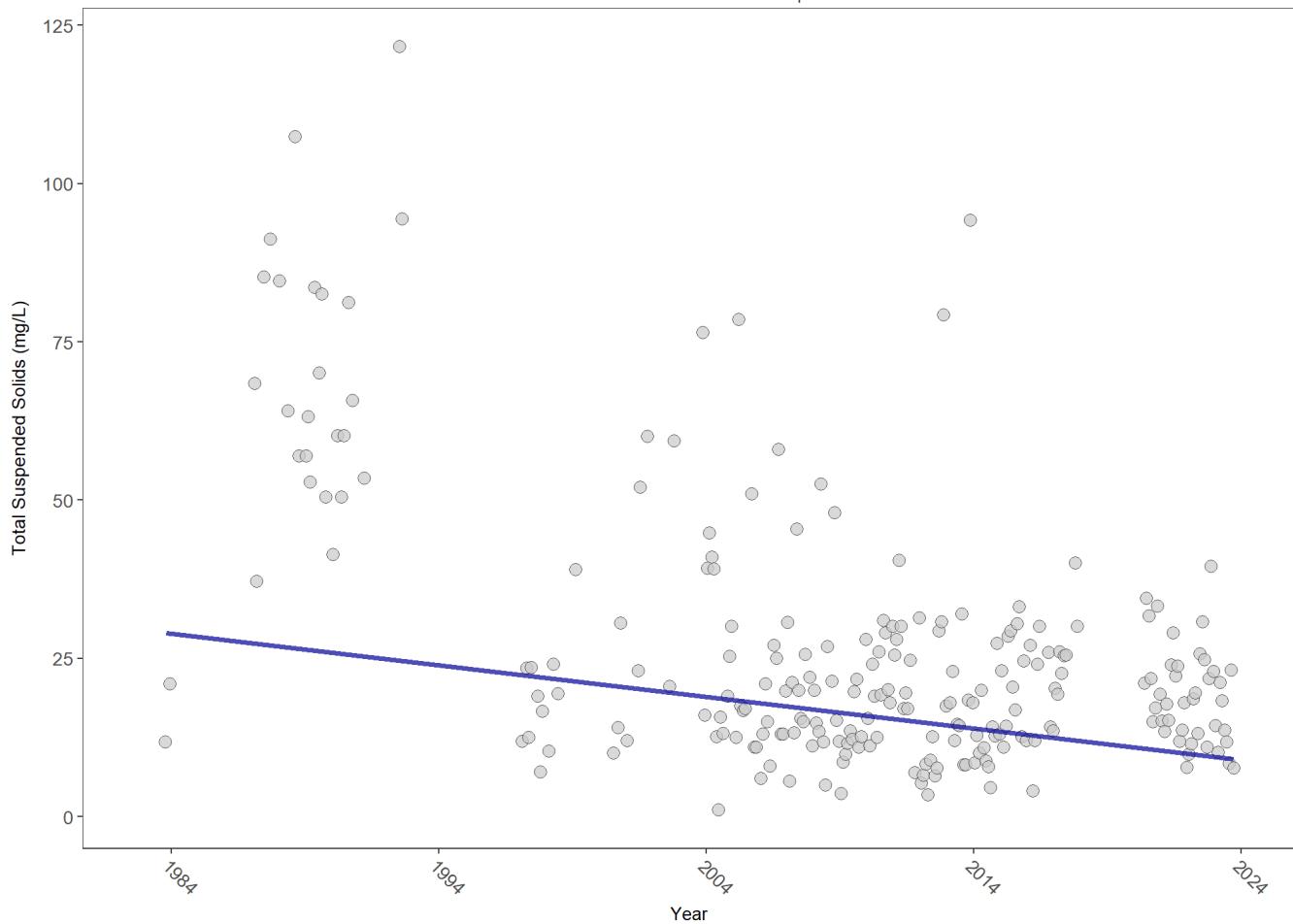
5002 - Florida STORET / WIN

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
Nassau River-St. Johns River Marshes Aquatic Preserve

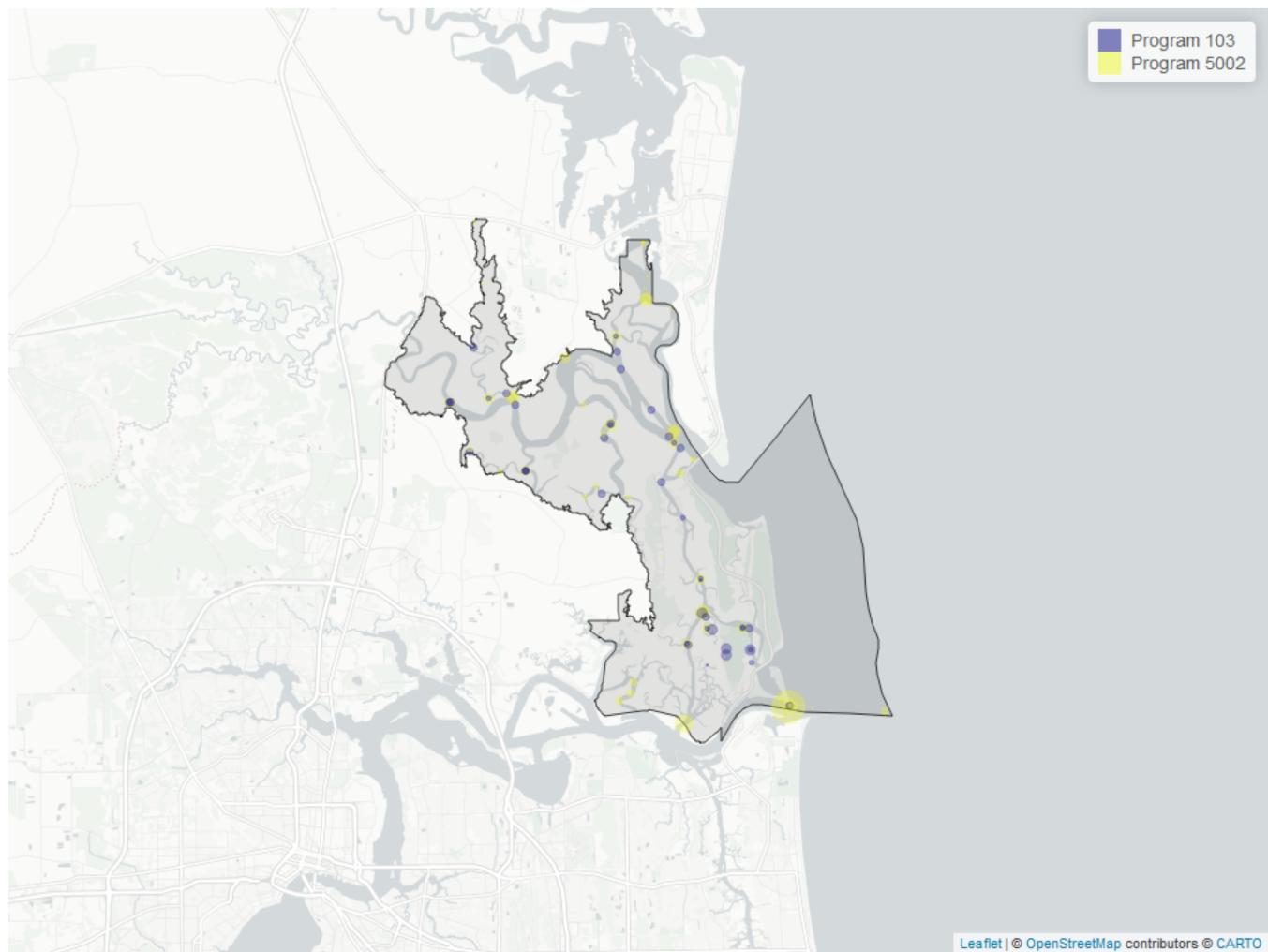


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	1036	32	19.3	TRUE	-0.1836	0.0001	-0.5	29.40856	12.4143	0.3333	-1

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 19: Programs contributing data for Total Suspended Solids

ProgramID	N_Data	YearMin	YearMax
5002	726	1997	2023
103	321	1983	2021

Program names:

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

Value Qualifiers

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

Table 20: Value Qualifiers for Total Suspended Solids

Year	N_Total	N_I	perc_I	N_Q	perc_Q	N_U	perc_U
2001	7					1	14.3
2006	12	1	8.3	1	8.3		
2007	49	3	6.1				
2009	27	1	3.7	1	3.7		
2010	28	2	7.1				
2011	17	1	5.9	2	11.8		
2012	12	5	41.7				
2013	26	3	11.5				
2014	20	3	15.0				
2015	69	16	23.2	6	8.7		
2016	21	4	19.0				
2017	31	2	6.4				
2020	56			8	14.3		
2021	150	2	1.3				
2022	112	6	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:

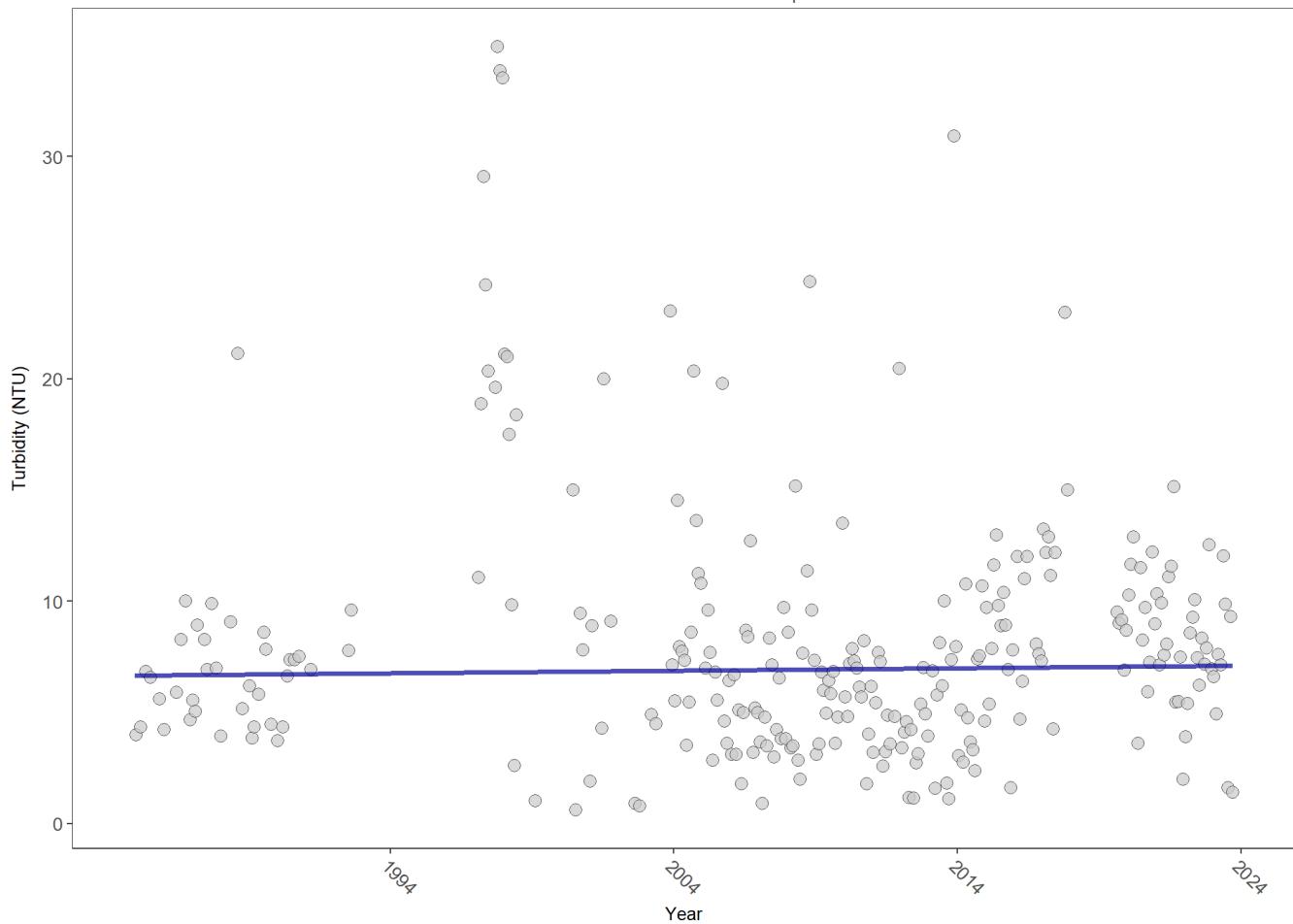
5002 - Florida STORET / WIN

Turbidity - Discrete Water Quality

Turbidity results from suspended solids in the water, including silts, clays, tannins, industrial wastes, sewage and plankton, which are all factors that contribute to how clouded or murky a water column is. Turbidity is caused by soil erosion, excess nutrients, pollutants, and physical forces such as winds, currents and bottom feeders.

Seasonal Kendall-Tau Trend Analysis

Turbidity, Lab and Field Combined, All Depths
Nassau River-St. Johns River Marshes Aquatic Preserve

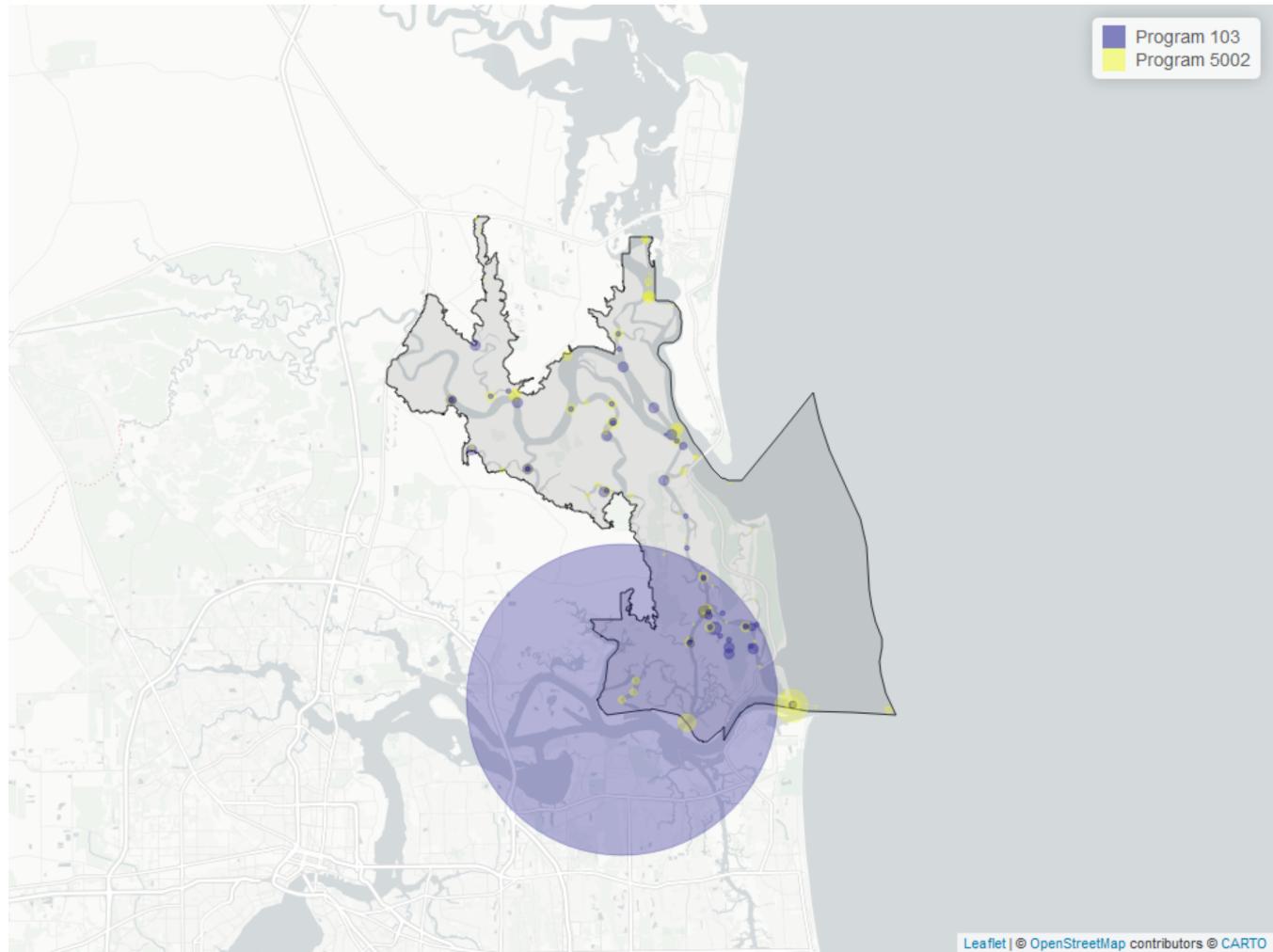


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	16106	34	15.8	TRUE	0.0097	0.6372	0.01100355	6.667175	10.9547	0.4471	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Turbidity



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

Table 21: Programs contributing data for Turbidity

ProgramID	N_Data	YearMin	YearMax
103	15270	1985	2021
5002	838	1997	2023

Program names:

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

5002 - Florida STORET / WIN

Value Qualifiers

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

Table 22: Value Qualifiers for Turbidity

<i>Year</i>	<i>N_Total</i>	<i>N_I</i>	<i>perc_I</i>	<i>N_Q</i>	<i>perc_Q</i>
2007	53	1	1.9		
2011	17	1	5.9	3	17.6
2012	12	2	16.7	2	16.7
2013	26	3	11.5	1	3.9
2014	20	1	5.0	6	30.0
2015	69	1	1.4	3	4.3
2016	21			1	4.8
2021	173			1	0.6

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

Programs containing Value Qualified data:

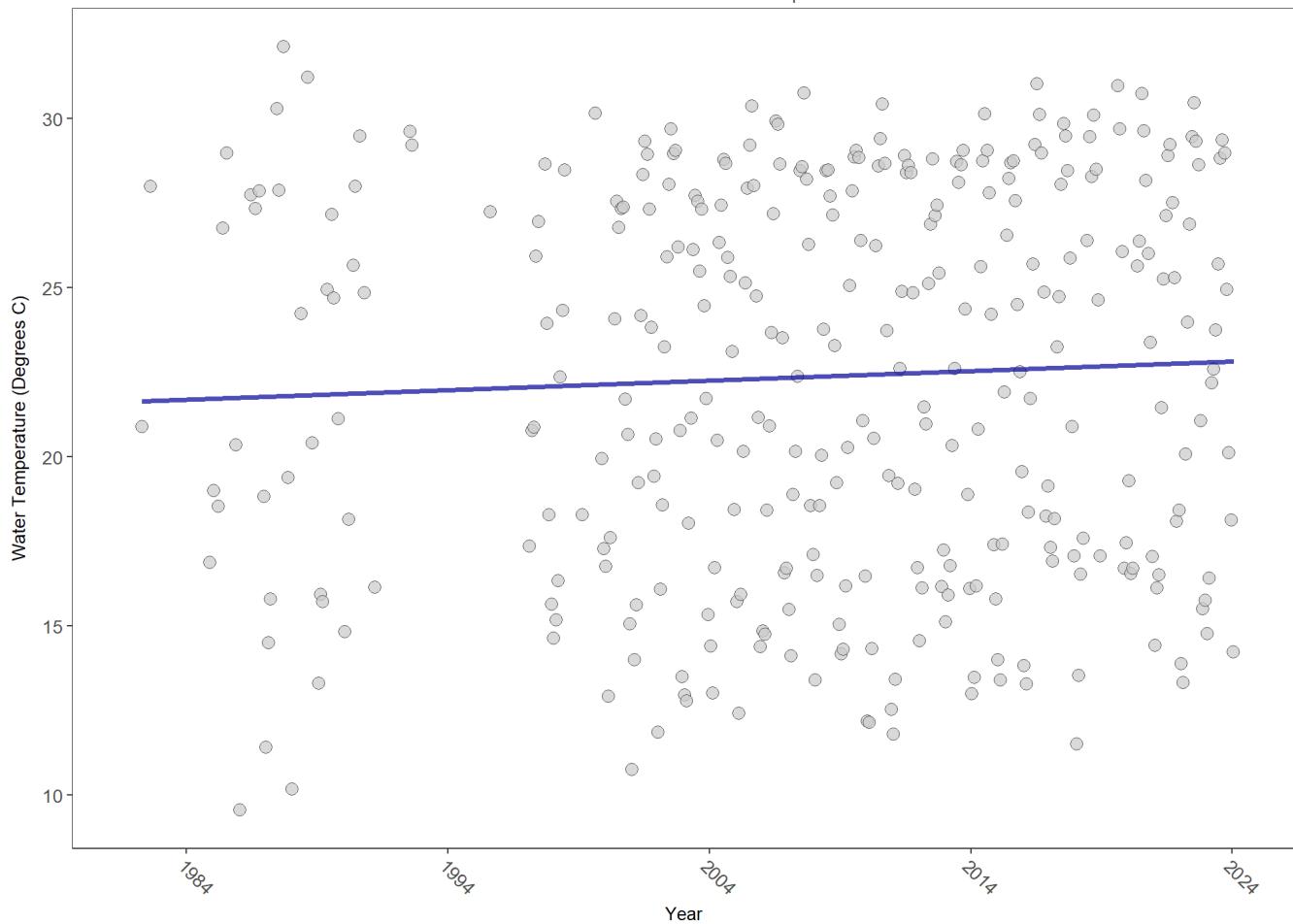
5002 - Florida STORET / WIN

Water Temperature - Discrete Water Quality

Temperature determines the capacity of water to hold oxygen. Cooler water can hold more dissolved oxygen because water molecules are more tightly packed, making it harder for oxygen to escape. Additionally, as water temperature increases, fish and other aquatic organisms become more active and consume oxygen at a faster rate.

Seasonal Kendall-Tau Trend Analysis

Water Temperature, Field, All Depths
Nassau River-St. Johns River Marshes Aquatic Preserve

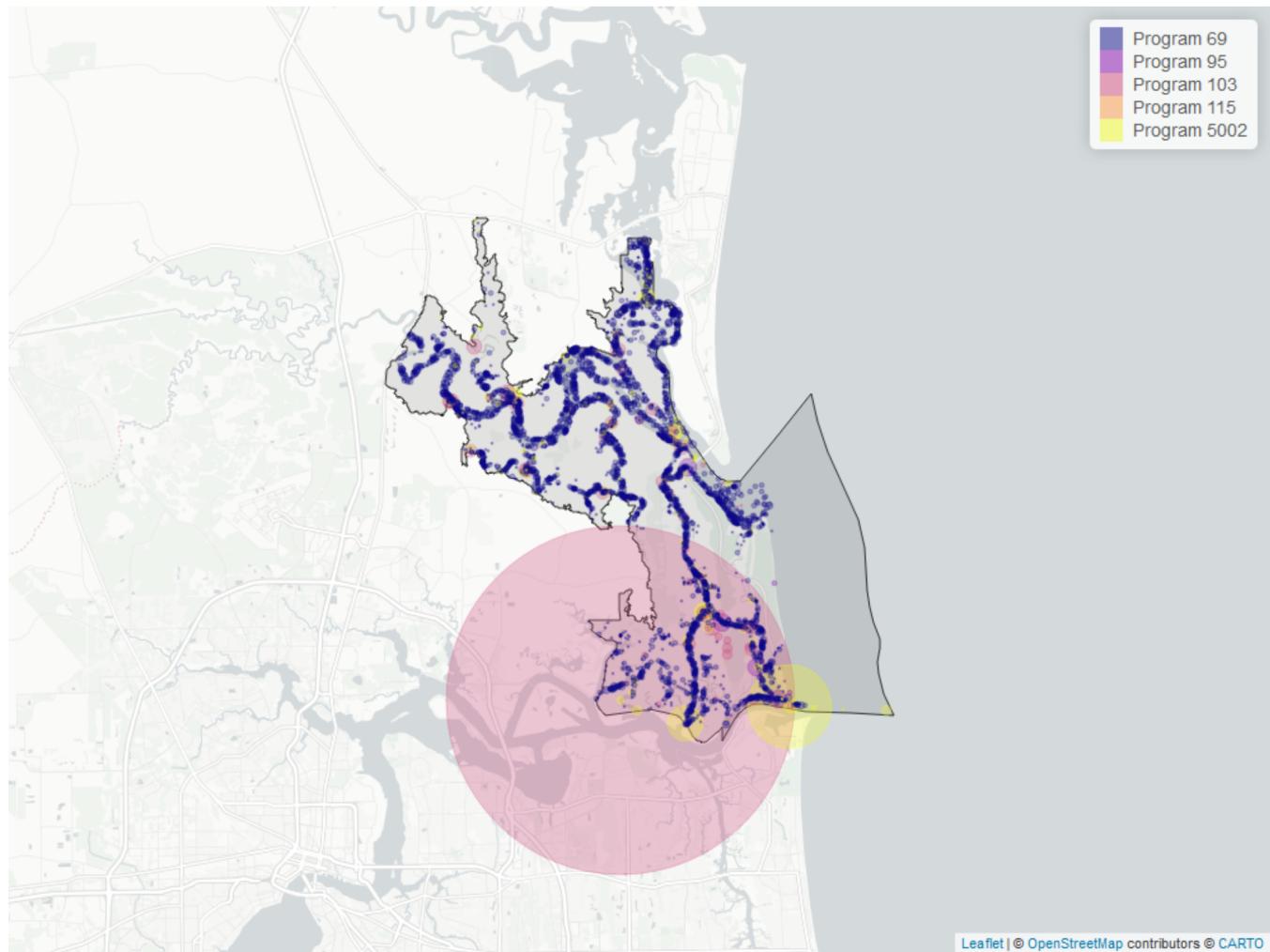


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	36605	39	21.5	TRUE	0.1189	0.0021	0.02781049	21.64863	7.2319	0.78	1

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 23: Programs contributing data for Water Temperature

ProgramID	N_Data	YearMin	YearMax
103	19853	1982	2021
69	14142	2001	2017
5002	2401	1997	2024
95	212	2007	2018
115	4	1995	1995

Program names:

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

69 - Fisheries-Independent Monitoring (FIM) Program

5002 - Florida STORET / WIN

95 - Harmful Algal Bloom Marine Observation Network

115 - Environmental Monitoring Assessment Program

There are no qualifying Value Qualifiers for Water Temperature in Nassau River-St. Johns River Marshes Aquatic Preserve

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 24: National Water Information System (7)

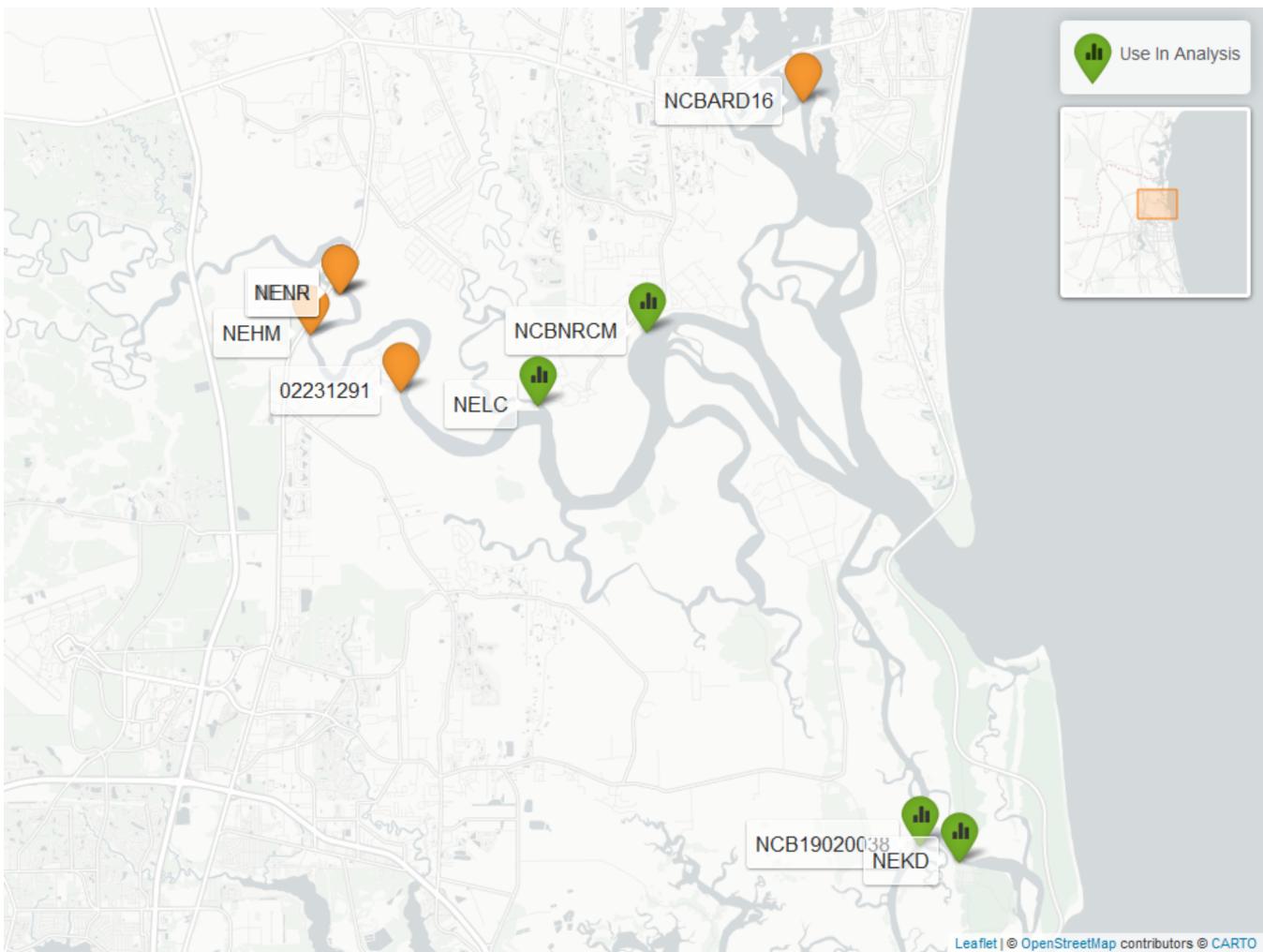
<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
02231291	3	FALSE	DO , TempW

Table 25: Northeast Aquatic Preserves Continuous Water Quality Monitoring (5006)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
NEHM	2	FALSE	DO , DOS , pH , Sal , Turb , TempW
NEKD	8	TRUE	DO , DOS , pH , Sal , Turb , TempW
NELC	7	TRUE	DO , DOS , pH , Sal , Turb , TempW
NELN	1	FALSE	DO , DOS , pH , Sal , Turb , TempW
NENR	3	FALSE	DO , DOS , pH , Sal , Turb , TempW

Table 26: St. Johns River Water Management District Continuous Water Quality Programs (5061)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
NCB19020038	5	TRUE	DO , DOS , pH , Sal , Turb , TempW
NCBARD16	2	FALSE	DO , DOS , pH , Sal , Turb , TempW
NCBNRCM	5	TRUE	DO , DOS , pH , Sal , Turb , TempW



Map showing Continuous Water Quality Monitoring sampling locations within the boundaries of Nassau River-St. Johns River Marshes Aquatic Preserve. Sites marked as *Use In Analysis* are featured in this report.

Dissolved Oxygen - Continuous Water Quality

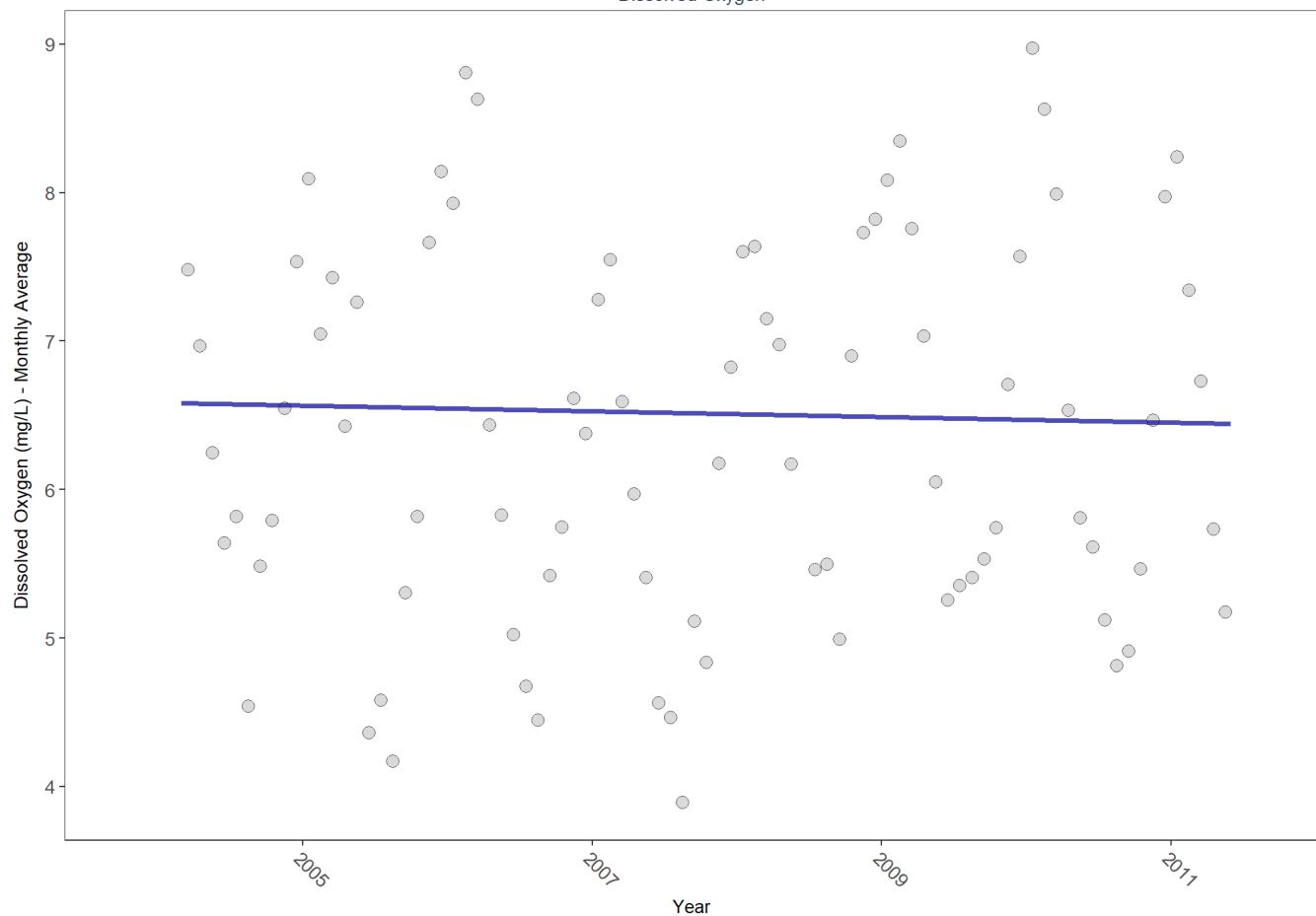
NEKD

Northeast Aquatic Preserves Continuous Water Quality Monitoring (5006)

Nassau River-St. Johns River Marshes Aquatic Preserve

NEKD

Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	110958	8	6.4	TRUE	-0.0447	0.5607	-0.01927373	6.586815	9.5559	0.5707	0

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

SennIntercept is intercept value at beginning of record for monitoring location

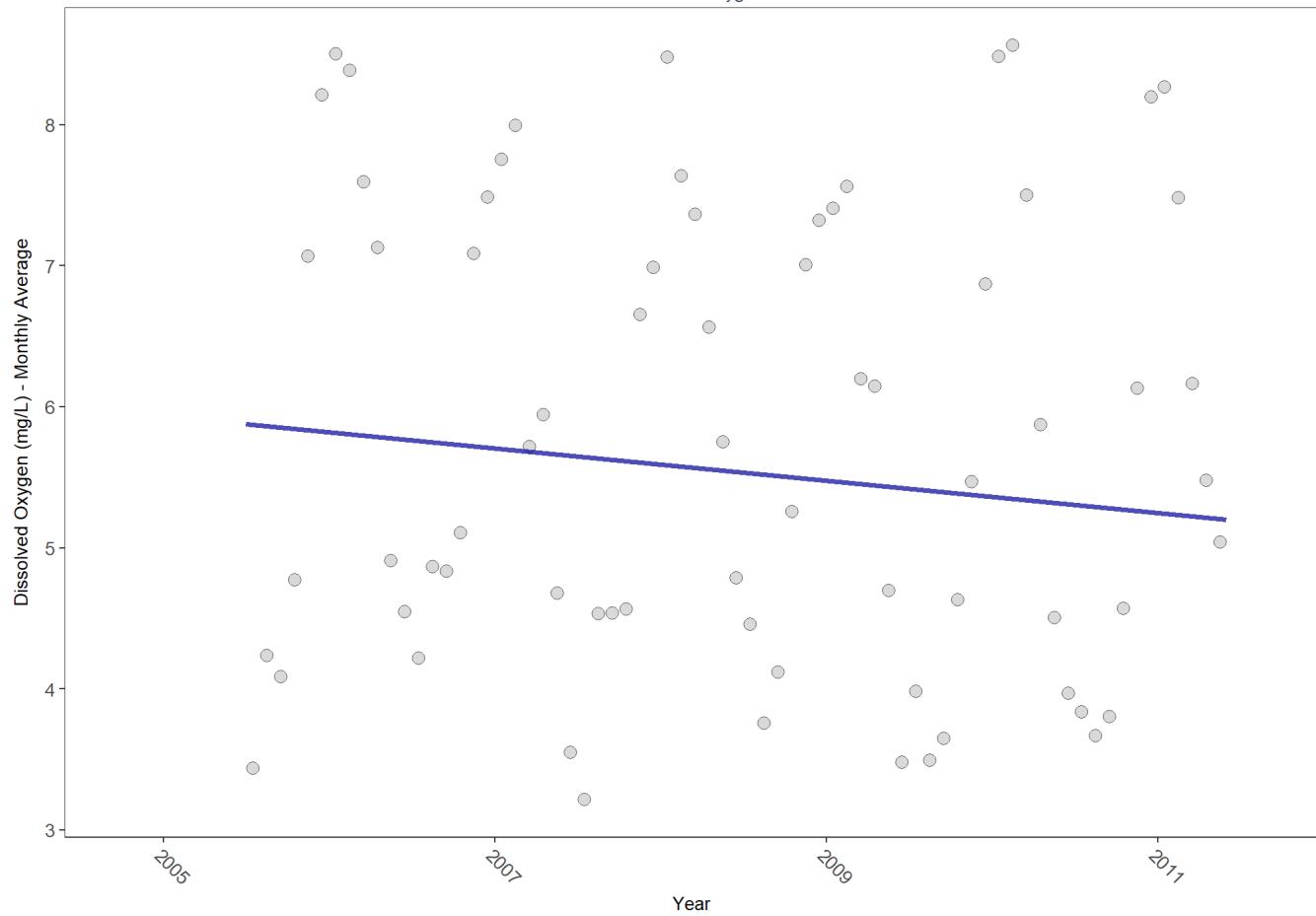
NELC

Northeast Aquatic Preserves Continuous Water Quality Monitoring (5006)

Nassau River-St. Johns River Marshes Aquatic Preserve

NELC

Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	95860	7	5.6	TRUE	-0.3352	0.0014	-0.1139401	5.932437	5.1427	0.9241	-1

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

SennIntercept is intercept value at beginning of record for monitoring location

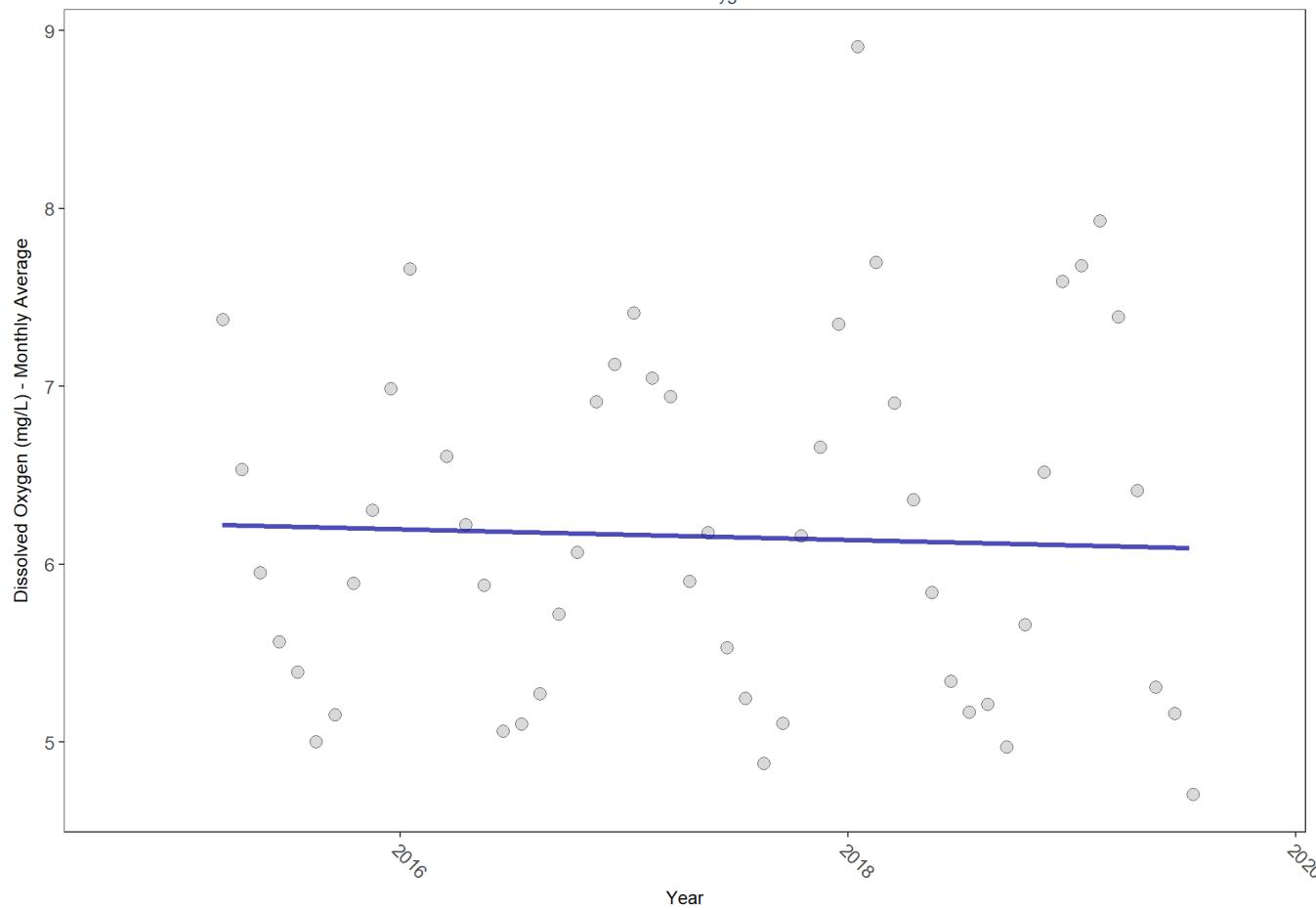
NCB19020038

St. Johns River Water Management District Continuous Water Quality Programs (5061)

Nassau River-St. Johns River Marshes Aquatic Preserve

NCB19020038

Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	34476	5	6.16	TRUE	-0.0256	0.6108	-0.02995256	6.227101	14.4149	0.2109	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

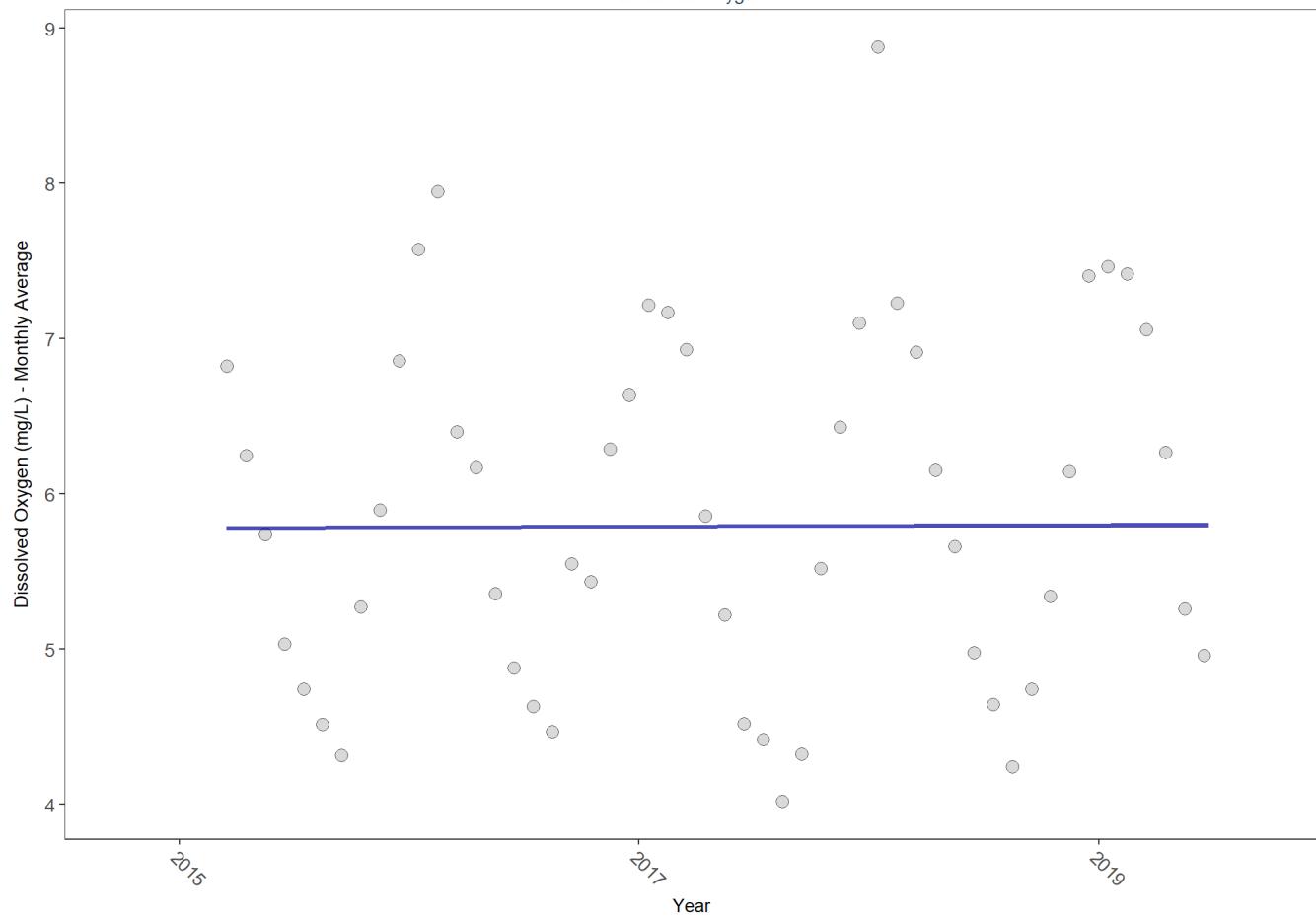
NCBNRCM

St. Johns River Water Management District Continuous Water Quality Programs (5061)

Nassau River-St. Johns River Marshes Aquatic Preserve

NCBNRCM

Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	35477	5	5.79	TRUE	0.0513	0.7970	0.005475297	5.776387	8.7446	0.6455	0

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

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

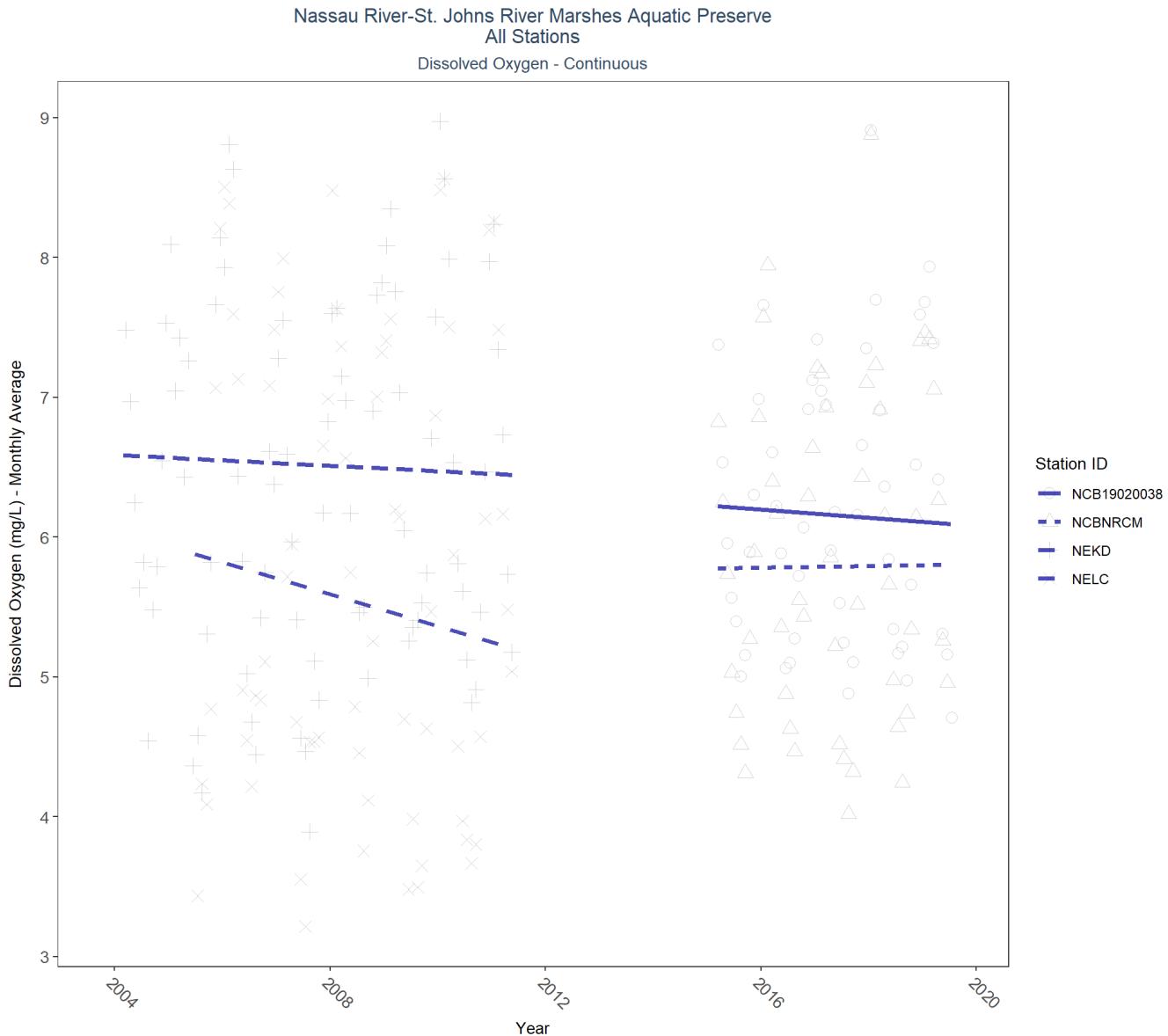


Table 27: Seasonal Kendall-Tau Results for All Stations - Dissolved Oxygen

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
02231291	689	3	2014 - 2016	6.10	-	-	-	-
NEKD	110958	8	2004 - 2011	6.40	-0.04	6.59	-0.02	0.5607
NELC	95860	7	2005 - 2011	5.60	-0.34	5.93	-0.11	0.0014
NENR	31438	3	2009 - 2011	5.80	-	-	-	-
NELN	17020	1	2023 - 2023	4.80	-	-	-	-
NEHM	27804	2	2022 - 2023	5.70	-	-	-	-
NCB19020038	34476	5	2015 - 2019	6.16	-0.03	6.23	-0.03	0.6108
NCBARD16	7417	2	2015 - 2016	5.08	-	-	-	-
NCBNRCM	35477	5	2015 - 2019	5.79	0.05	5.78	0.01	0.7970

Dissolved Oxygen Saturation - Continuous Water Quality

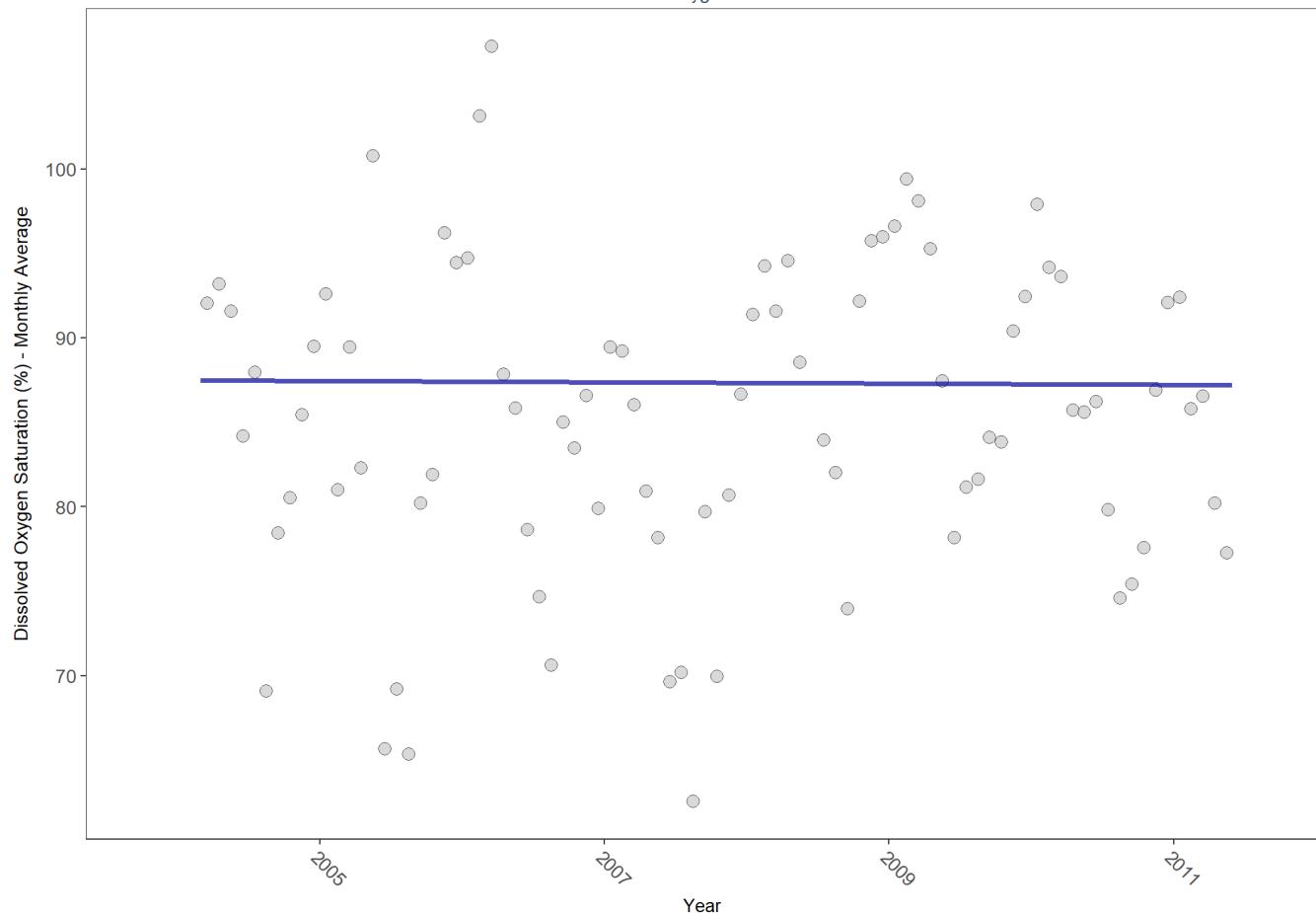
NEKD

Northeast Aquatic Preserves Continuous Water Quality Monitoring (5006)

Nassau River-St. Johns River Marshes Aquatic Preserve

NEKD

Dissolved Oxygen Saturation



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	110983	8	89.1	TRUE	0.0029	0.9338	-0.04101835	87.49355	6.883	0.8085	0

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

SennIntercept is intercept value at beginning of record for monitoring location

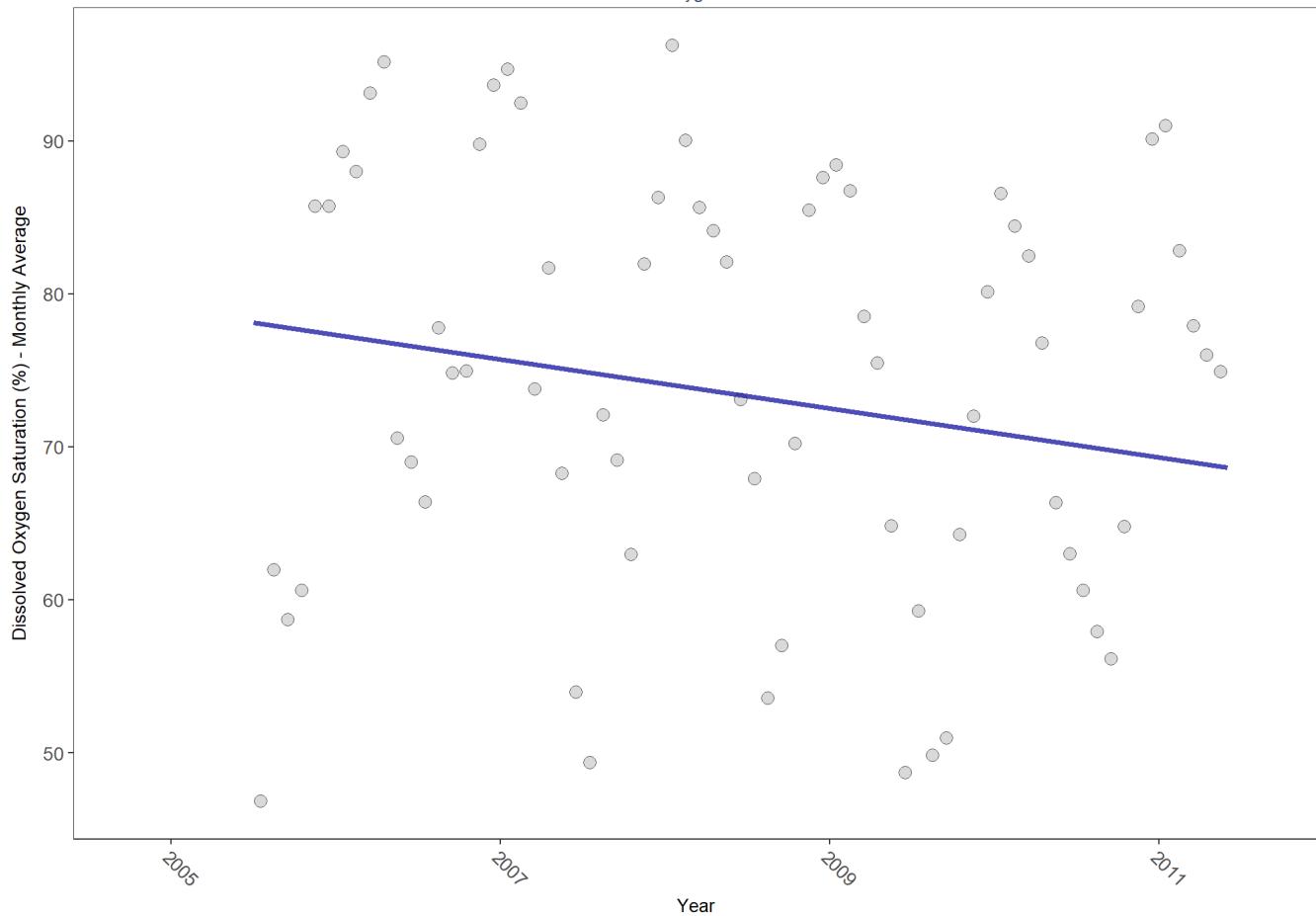
NELC

Northeast Aquatic Preserves Continuous Water Quality Monitoring (5006)

Nassau River-St. Johns River Marshes Aquatic Preserve

NELC

Dissolved Oxygen Saturation



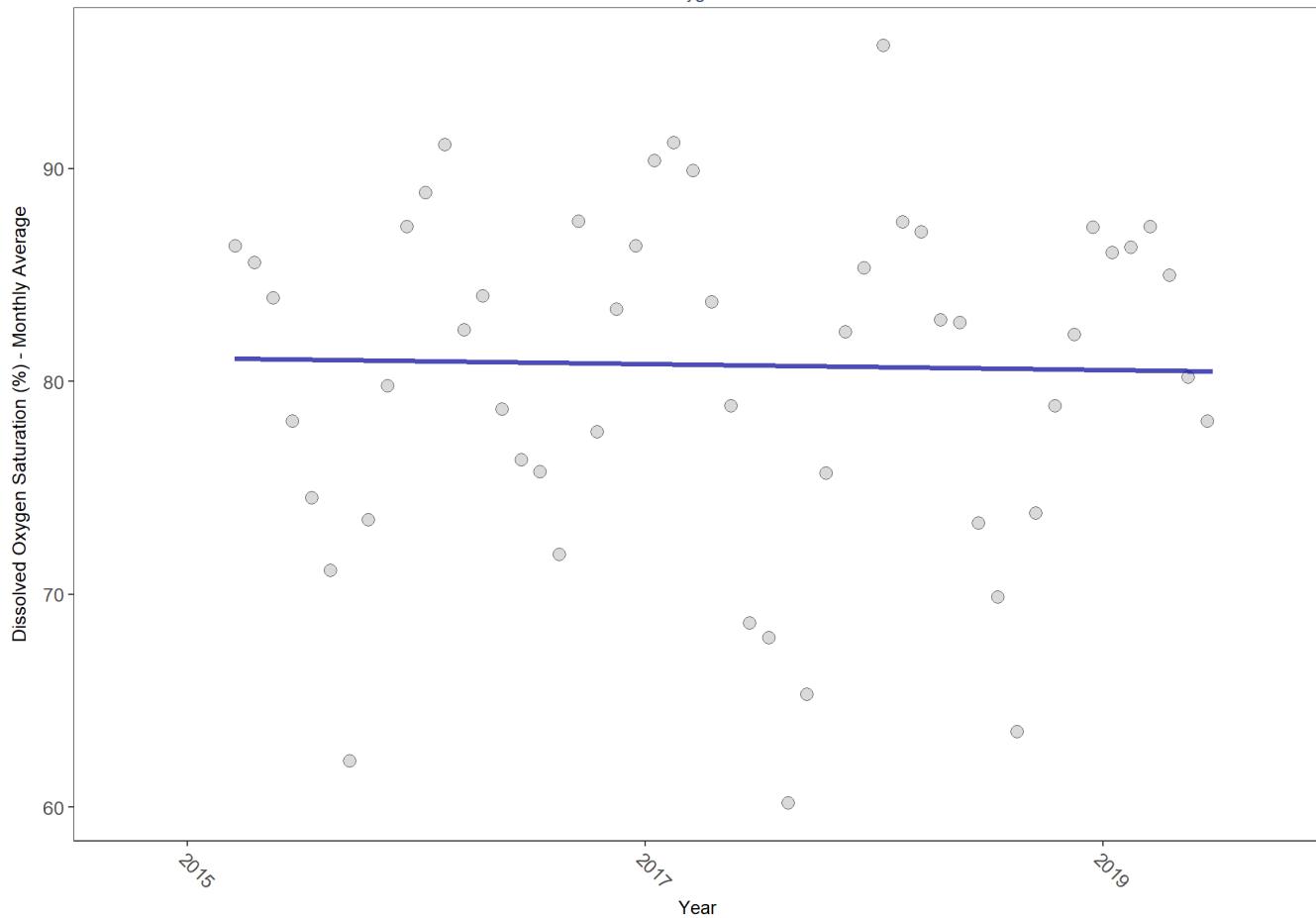
RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	95868	7	77.9	TRUE	-0.2676	0.0111	-1.604914	78.92834	10.6209	0.4755	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

NCBNRCM

St. Johns River Water Management District Continuous Water Quality Programs (5061)
 Nassau River-St. Johns River Marshes Aquatic Preserve
 NCBNRCM
 Dissolved Oxygen Saturation

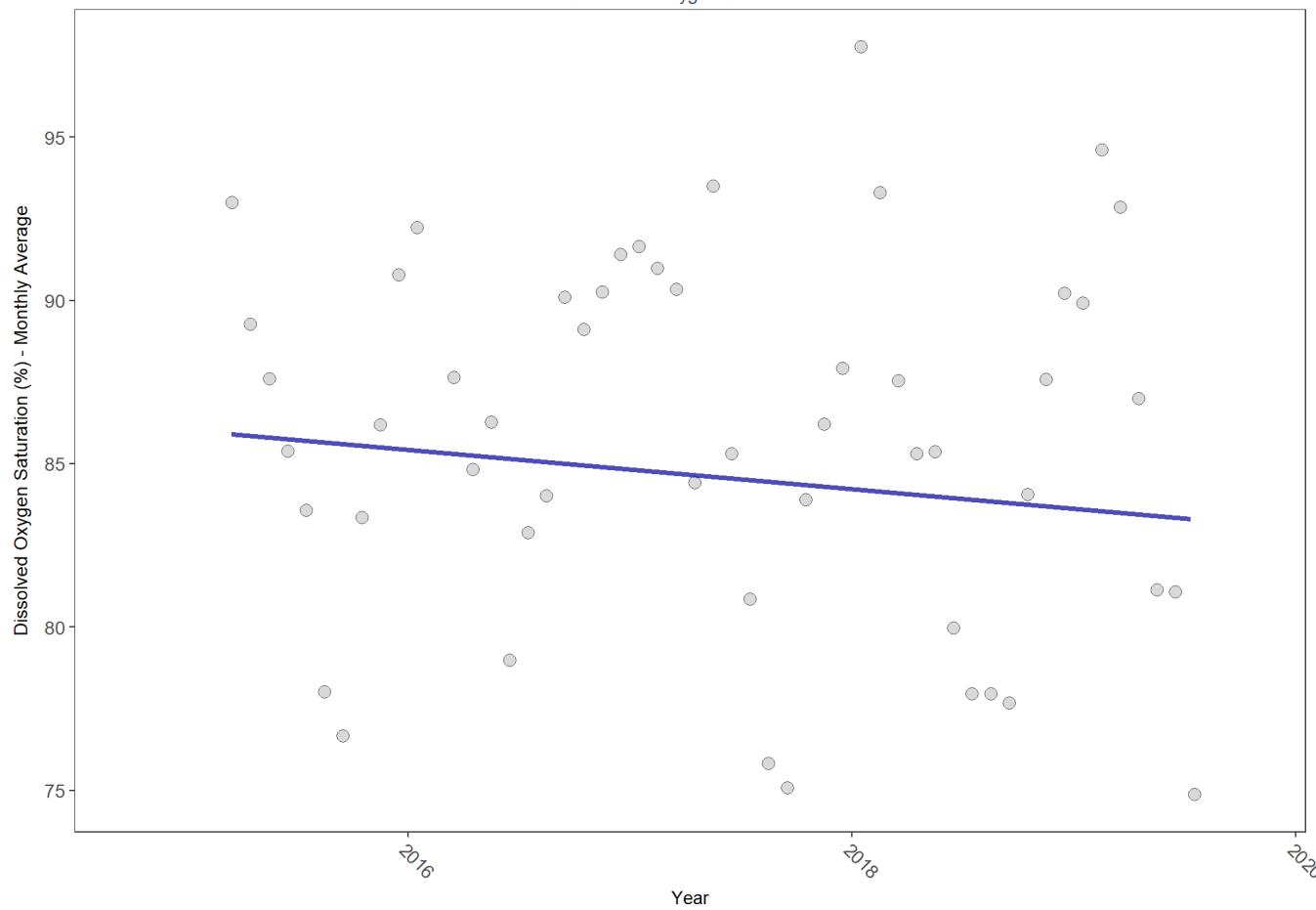


SennIntercept is intercept value at beginning of record for monitoring location

p < 0.00005 appear as 0 due to rounding.

NCB19020038

St. Johns River Water Management District Continuous Water Quality Programs (5061)
 Nassau River-St. Johns River Marshes Aquatic Preserve
 NCB19020038
 Dissolved Oxygen Saturation



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	34438	5	87.058	TRUE	-0.1603	0.1268	-0.5969938	86.01865	12.0611	0.3591	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

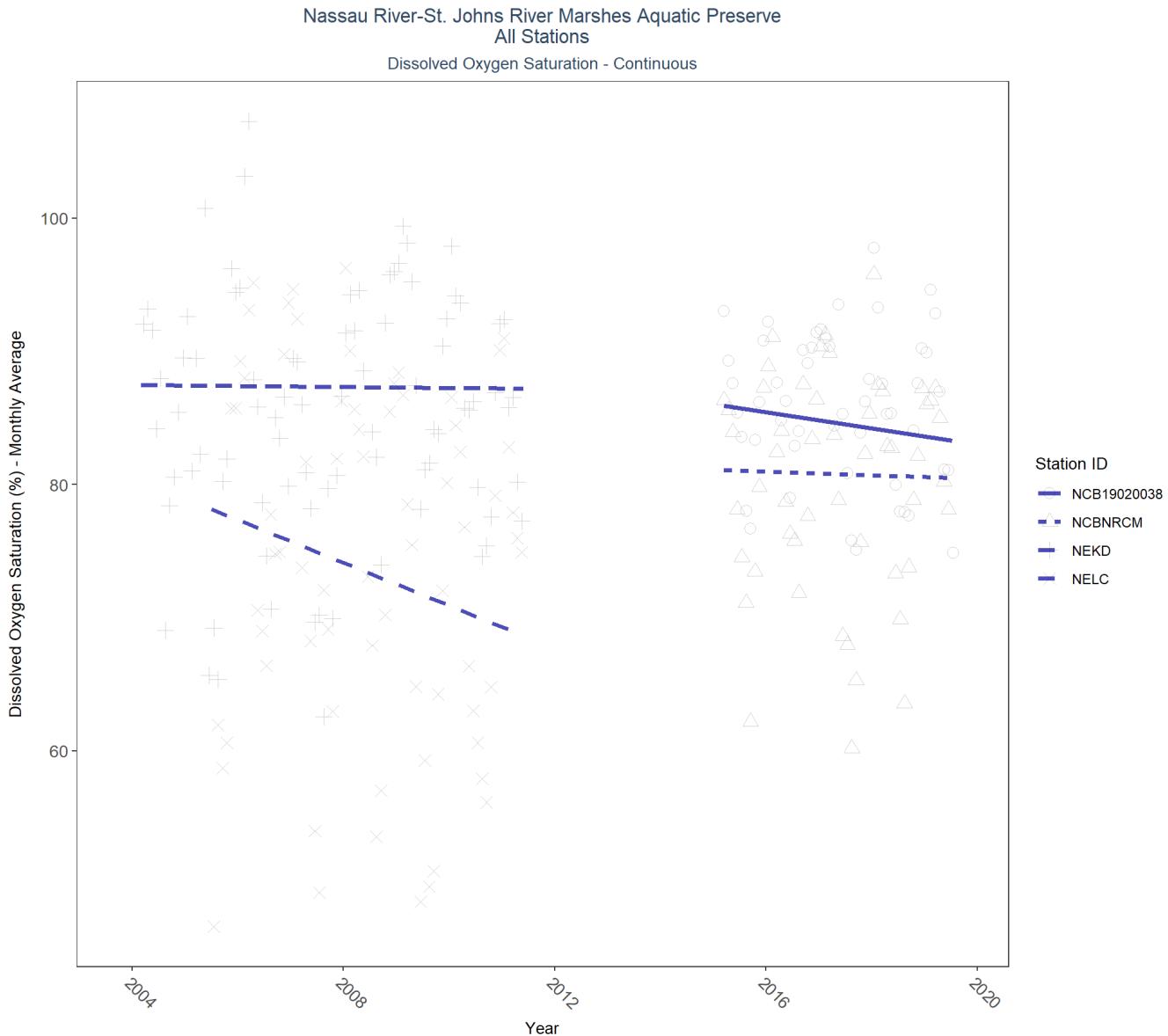


Table 28: Seasonal Kendall-Tau Results for All Stations - Dissolved Oxygen Saturation

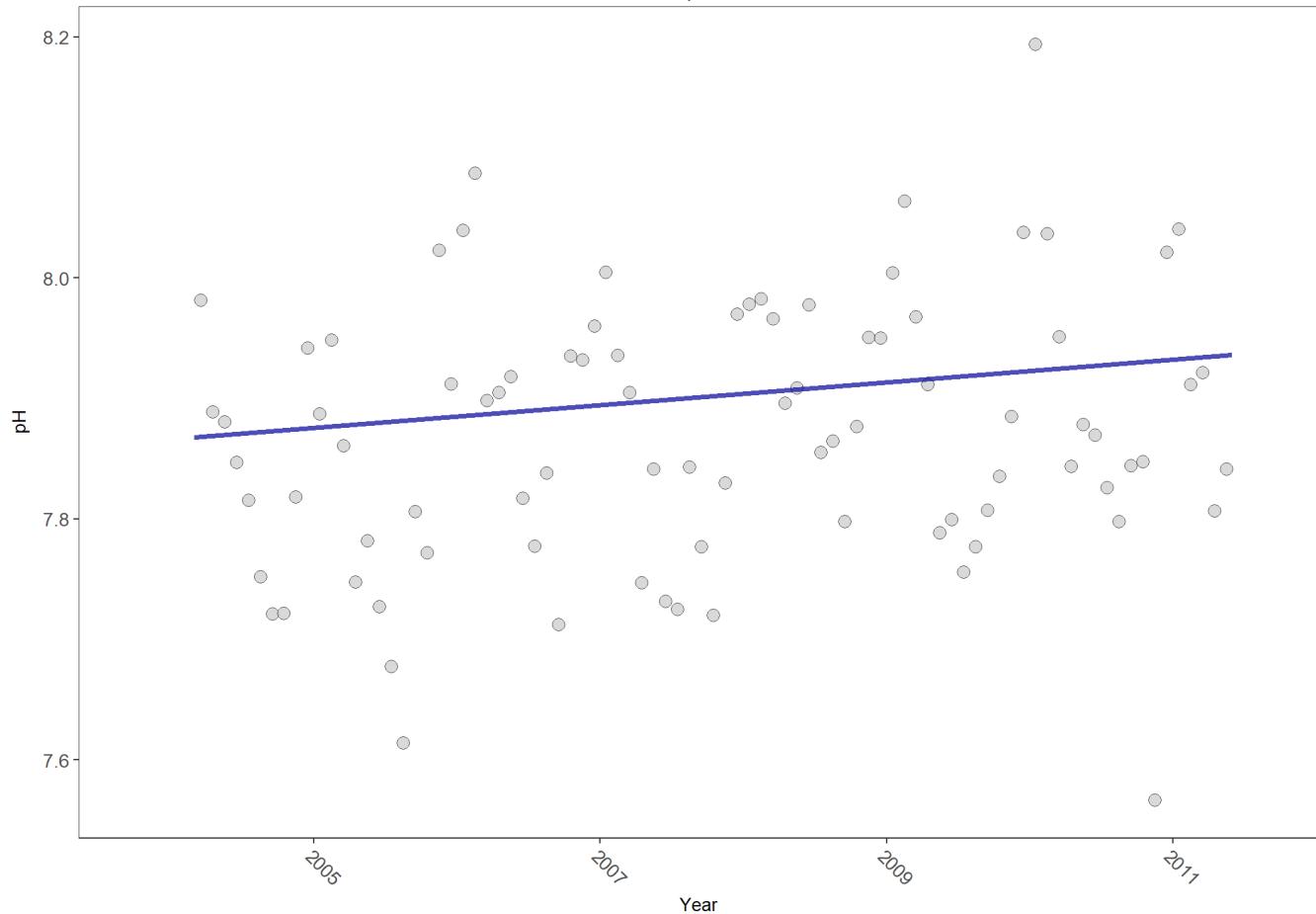
Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
NEKD	110983	8	2004 - 2011	89.10	0	87.49	-0.04	0.9338
NELC	95868	7	2005 - 2011	77.90	-0.27	78.93	-1.6	0.0111
NENR	31438	3	2009 - 2011	73.20	-	-	-	-
NELN	17020	1	2023 - 2023	62.50	-	-	-	-
NEHM	27804	2	2022 - 2023	77.70	-	-	-	-
NCBNRCM	35240	5	2015 - 2019	82.06	-0.05	81.1	-0.14	0.7970
NCBARD16	7417	2	2015 - 2016	74.44	-	-	-	-
NCB19020038	34438	5	2015 - 2019	87.06	-0.16	86.02	-0.6	0.1268

pH - Continuous Water Quality

NEKD

Northeast Aquatic Preserves Continuous Water Quality Monitoring (5006)

Nassau River-St. Johns River Marshes Aquatic Preserve
NEKD
pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	113471	8	7.9	TRUE	0.1877	0.0491	0.009431004	7.866128	8.9917	0.6227	1

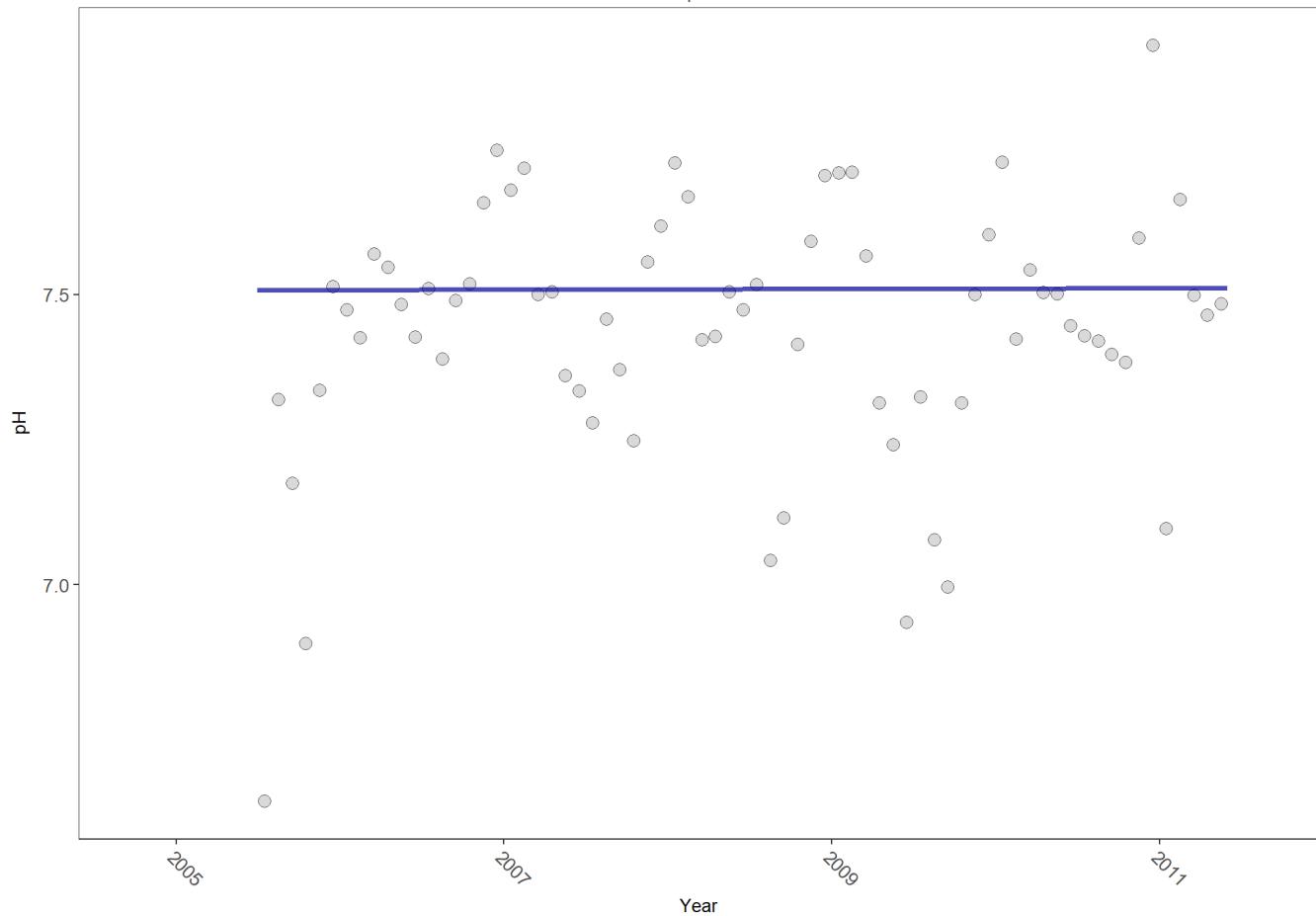
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

NELC

Northeast Aquatic Preserves Continuous Water Quality Monitoring (5006)

Nassau River-St. Johns River Marshes Aquatic Preserve
NELC
pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	96488	7	7.5	TRUE	0.0169	0.9121	0.0007435948	7.507162	6.0088	0.8728	0

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

SennIntercept is intercept value at beginning of record for monitoring location

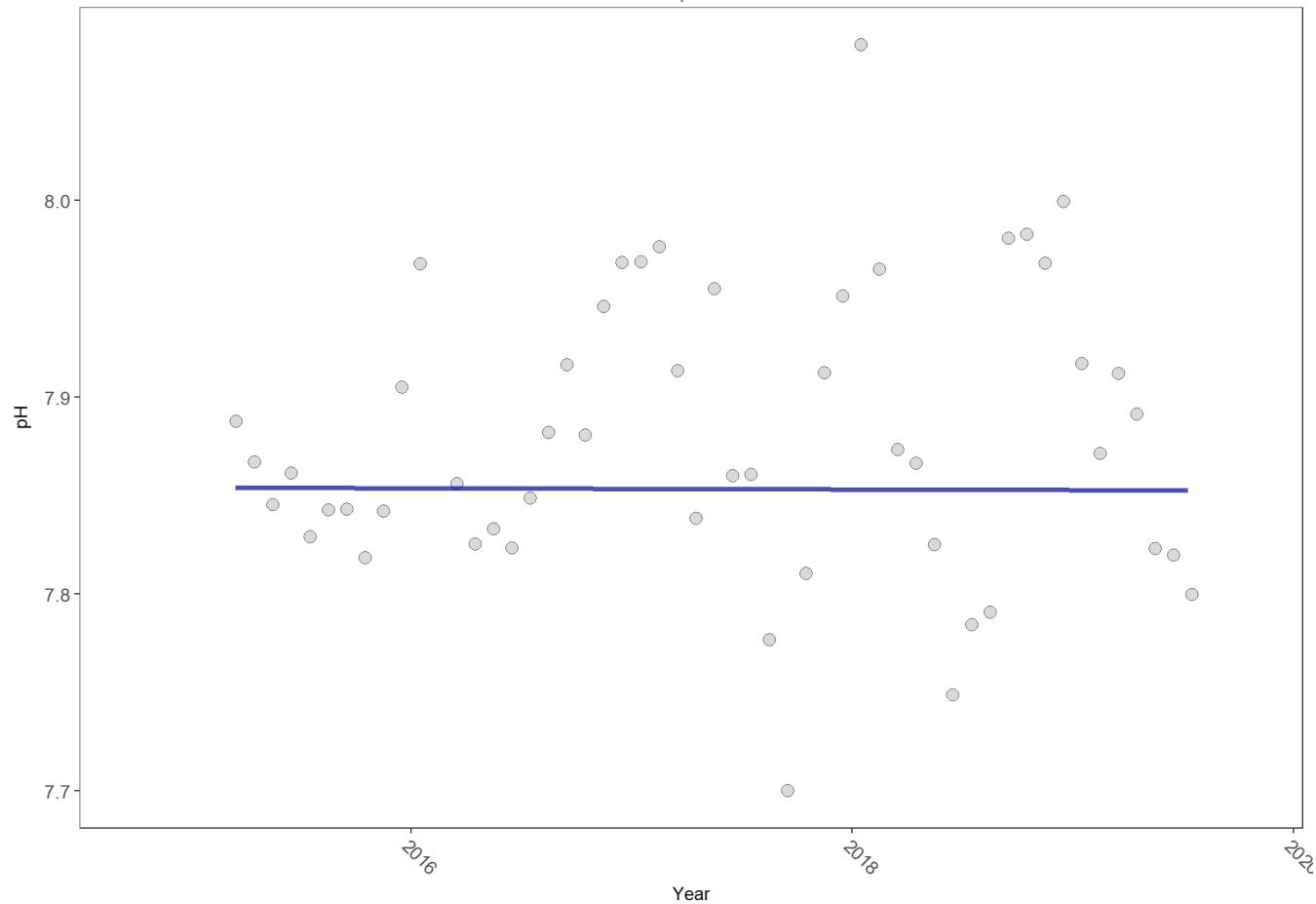
NCB19020038

St. Johns River Water Management District Continuous Water Quality Programs (5061)

Nassau River-St. Johns River Marshes Aquatic Preserve

NCB19020038

pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	34405	5	7.88	TRUE	-0.0064	1.0000	-0.0003055556	7.854219	13.2901	0.2748	0

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

SennIntercept is intercept value at beginning of record for monitoring location

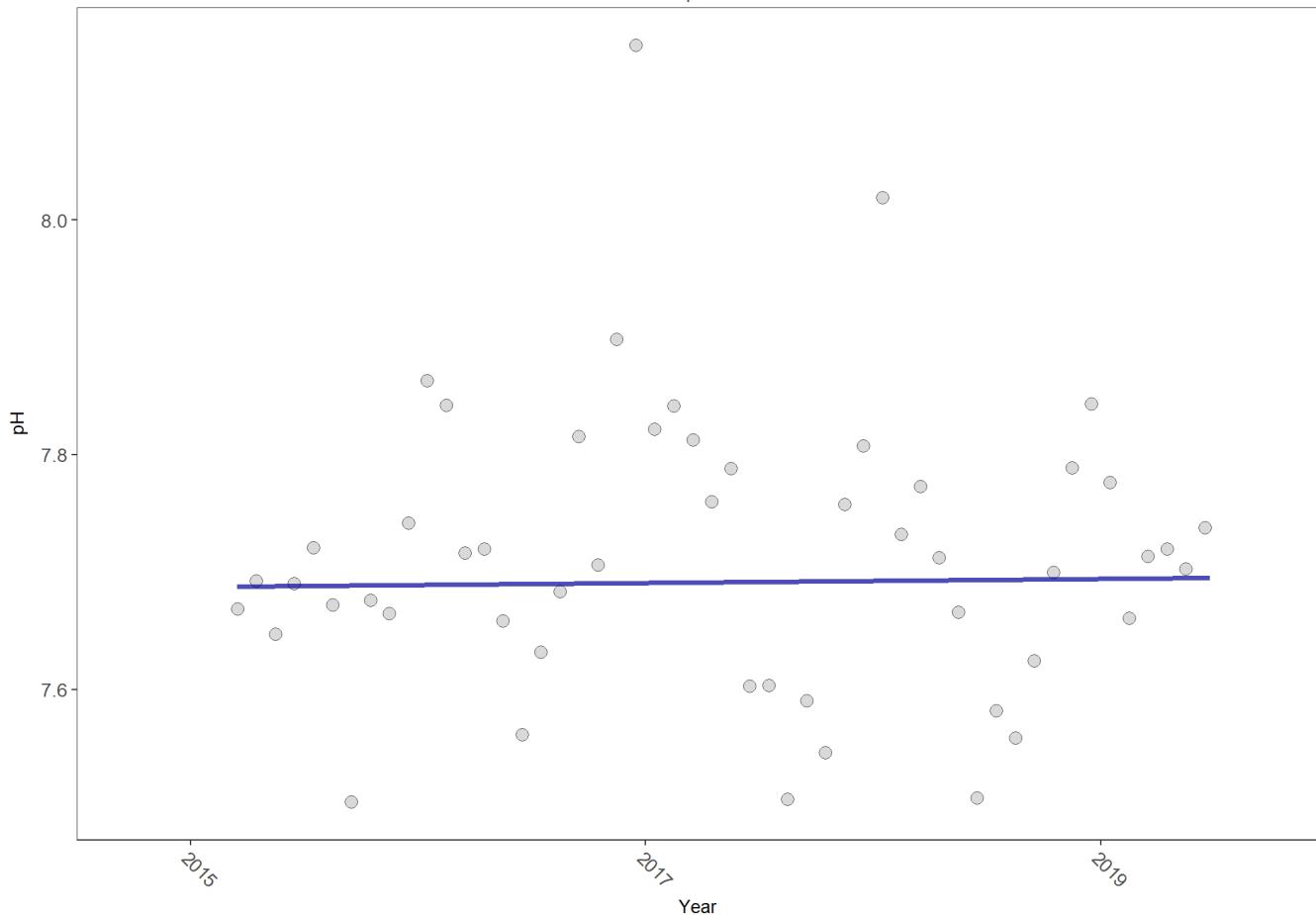
NCBNRCM

St. Johns River Water Management District Continuous Water Quality Programs (5061)

Nassau River-St. Johns River Marshes Aquatic Preserve

NCBNRCM

pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	35819	5	7.72	TRUE	-0.0128	0.9317	0.001818175	7.687072	13.9579	0.2353	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

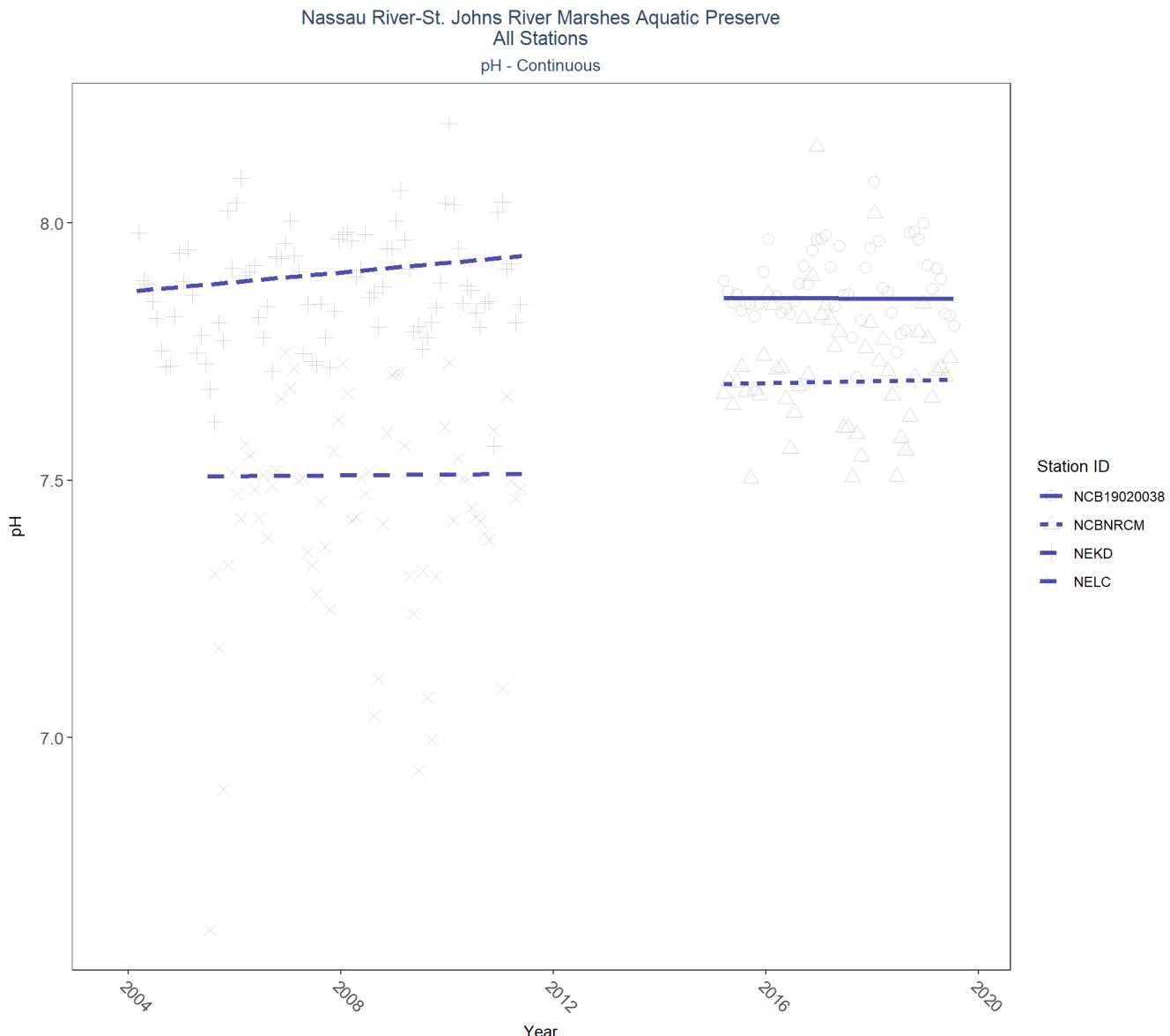


Table 29: Seasonal Kendall-Tau Results for All Stations - pH

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
NEKD	113471	8	2004 - 2011	7.90	0.19	7.87	0.01	0.0491
NEHM	27812	2	2022 - 2023	7.30	-	-	-	-
NELC	96488	7	2005 - 2011	7.50	0.02	7.51	0	0.9121
NENR	31438	3	2009 - 2011	7.10	-	-	-	-
NELN	17025	1	2023 - 2023	6.90	-	-	-	-
NCB19020038	34405	5	2015 - 2019	7.88	-0.01	7.85	0	1.0000
NCBARD16	6952	2	2015 - 2016	7.66	-	-	-	-
NCBNRCM	35819	5	2015 - 2019	7.72	-0.01	7.69	0	0.9317

Salinity - Continuous Water Quality

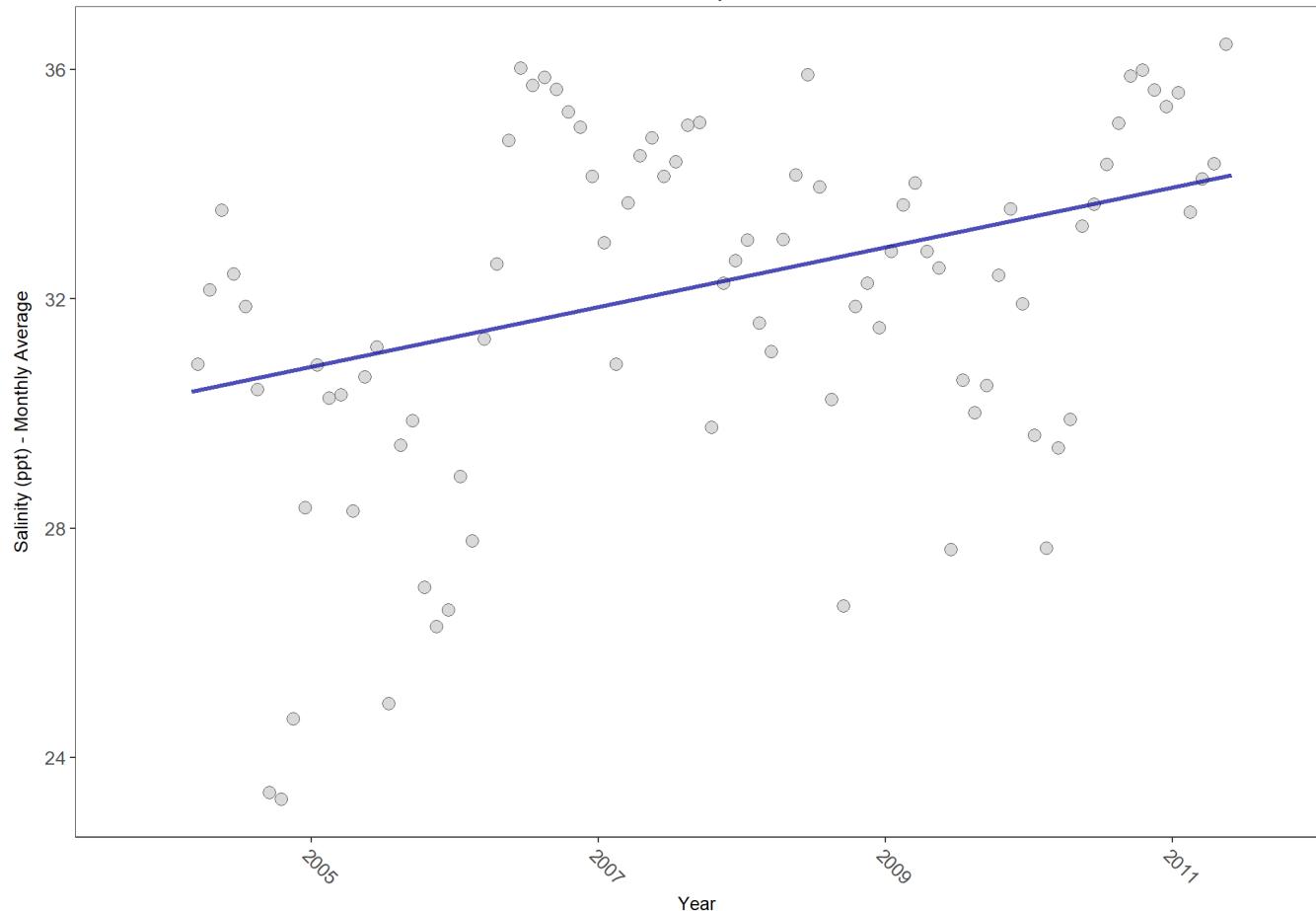
NEKD

Northeast Aquatic Preserves Continuous Water Quality Monitoring (5006)

Nassau River-St. Johns River Marshes Aquatic Preserve

NEKD

Salinity



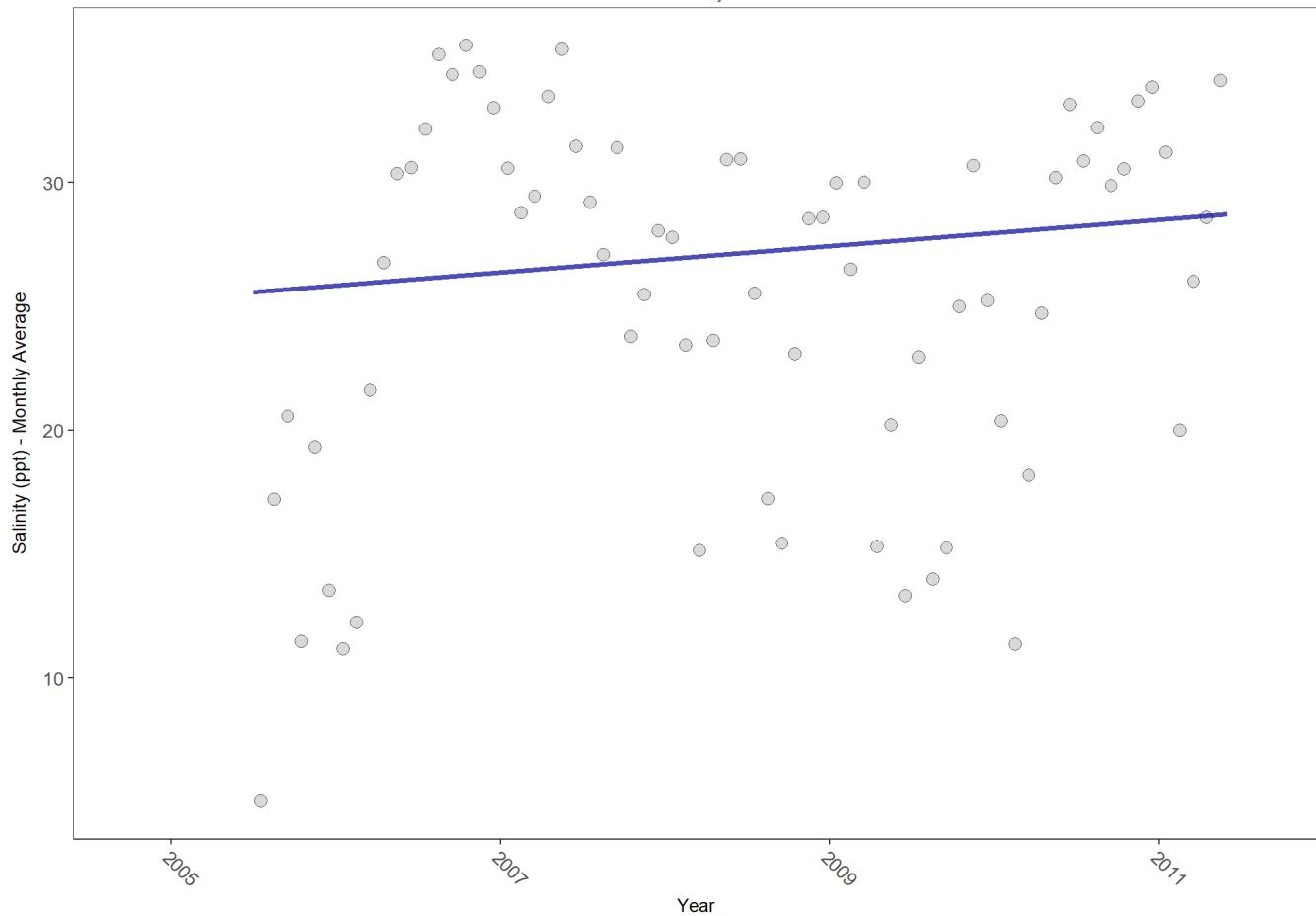
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

NELC

Northeast Aquatic Preserves Continuous Water Quality Monitoring (5006)

Nassau River-St. Johns River Marshes Aquatic Preserve
NELC
Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	100339	7	27.9	TRUE	0.0873	0.4397	0.5338517	25.29957	5.2765	0.917	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

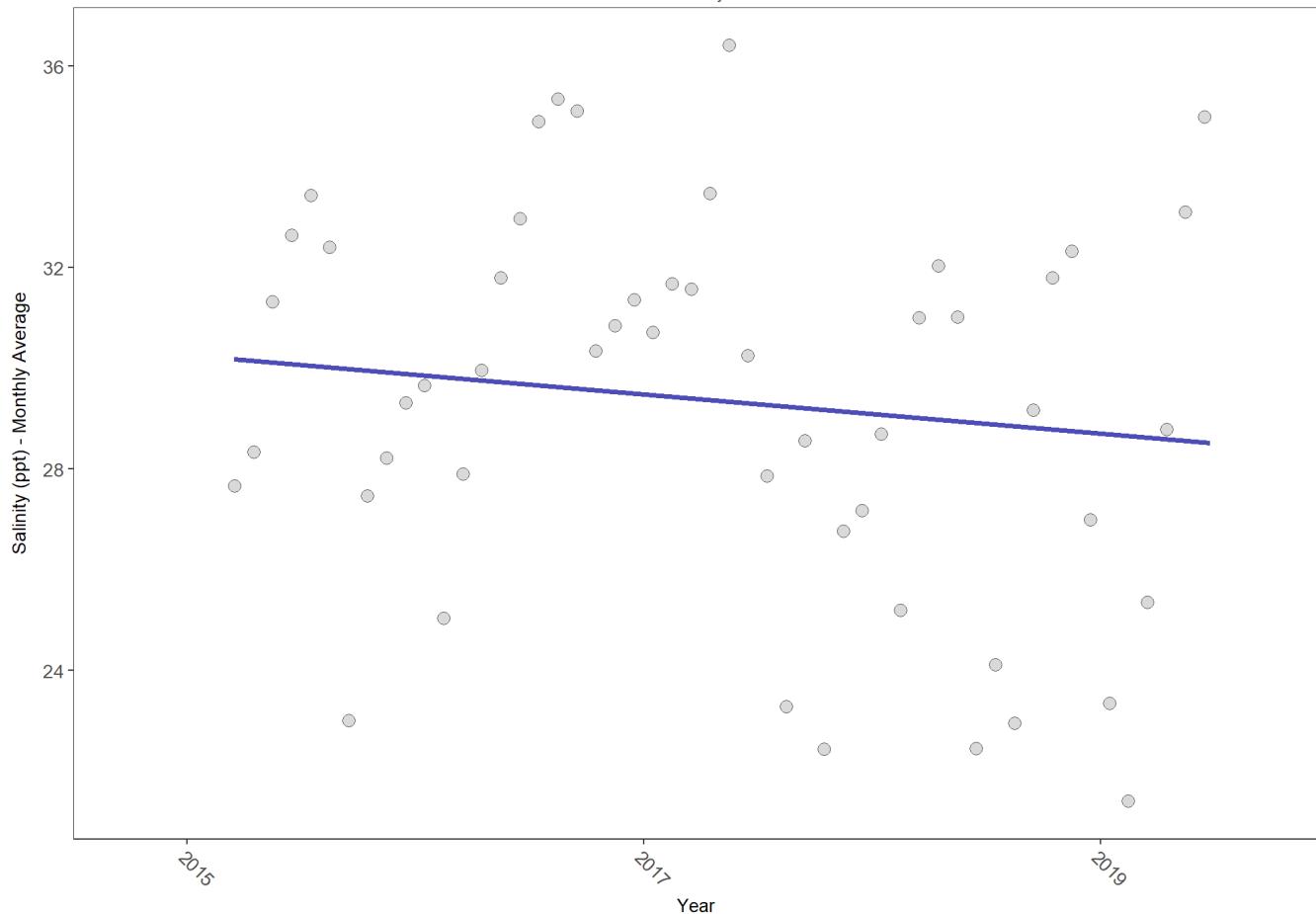
NCBNRCM

St. Johns River Water Management District Continuous Water Quality Programs (5061)

Nassau River-St. Johns River Marshes Aquatic Preserve

NCBNRCM

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	35411	5	30.2857	TRUE	-0.1154	0.5483	-0.3904351	30.26491	8.9118	0.63	0

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

SennIntercept is intercept value at beginning of record for monitoring location

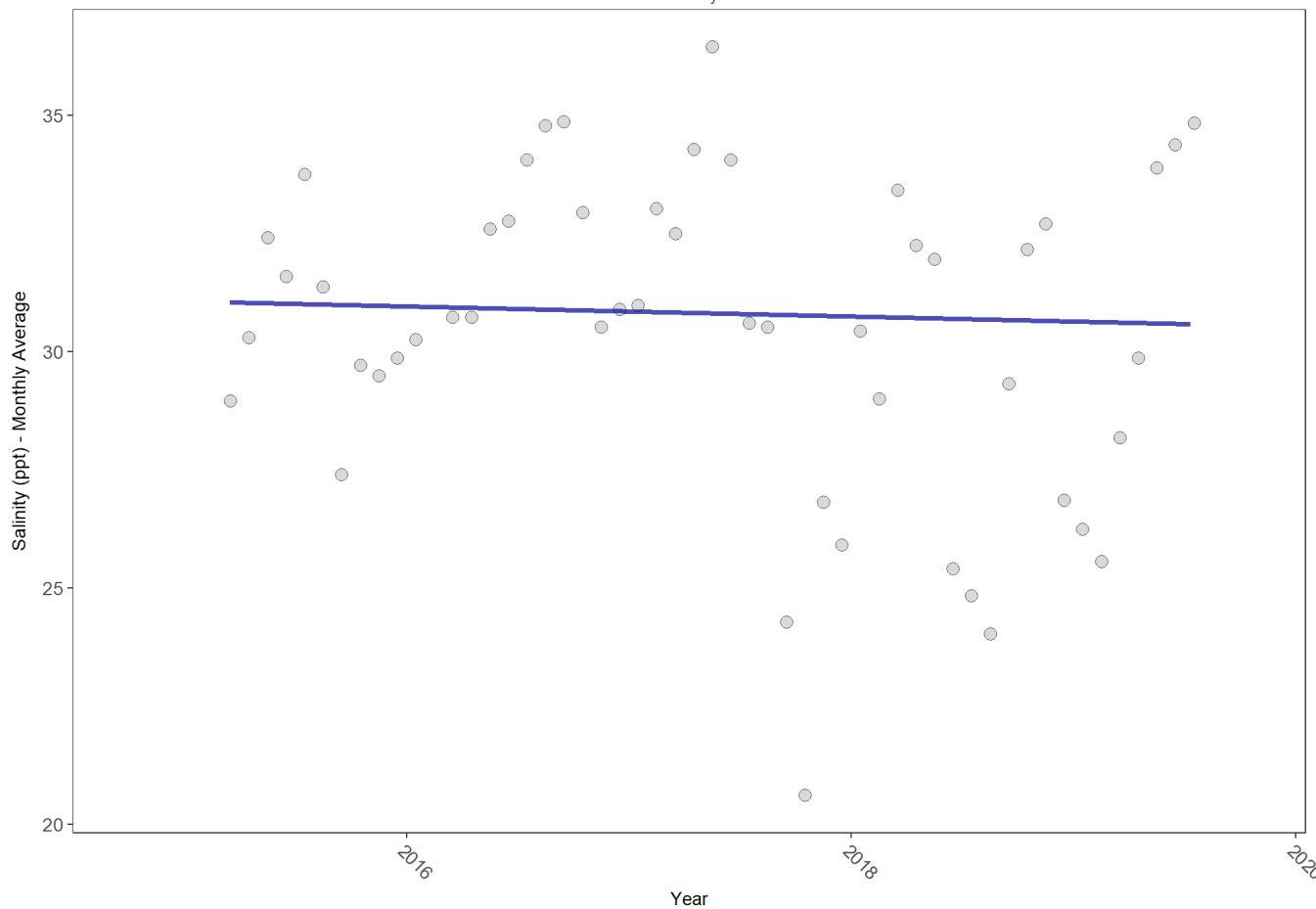
NCB19020038

St. Johns River Water Management District Continuous Water Quality Programs (5061)

Nassau River-St. Johns River Marshes Aquatic Preserve

NCB19020038

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	34438	5	31.75222	TRUE	-0.0577	1.0000	-0.108309	31.06804	6.8998	0.8071	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

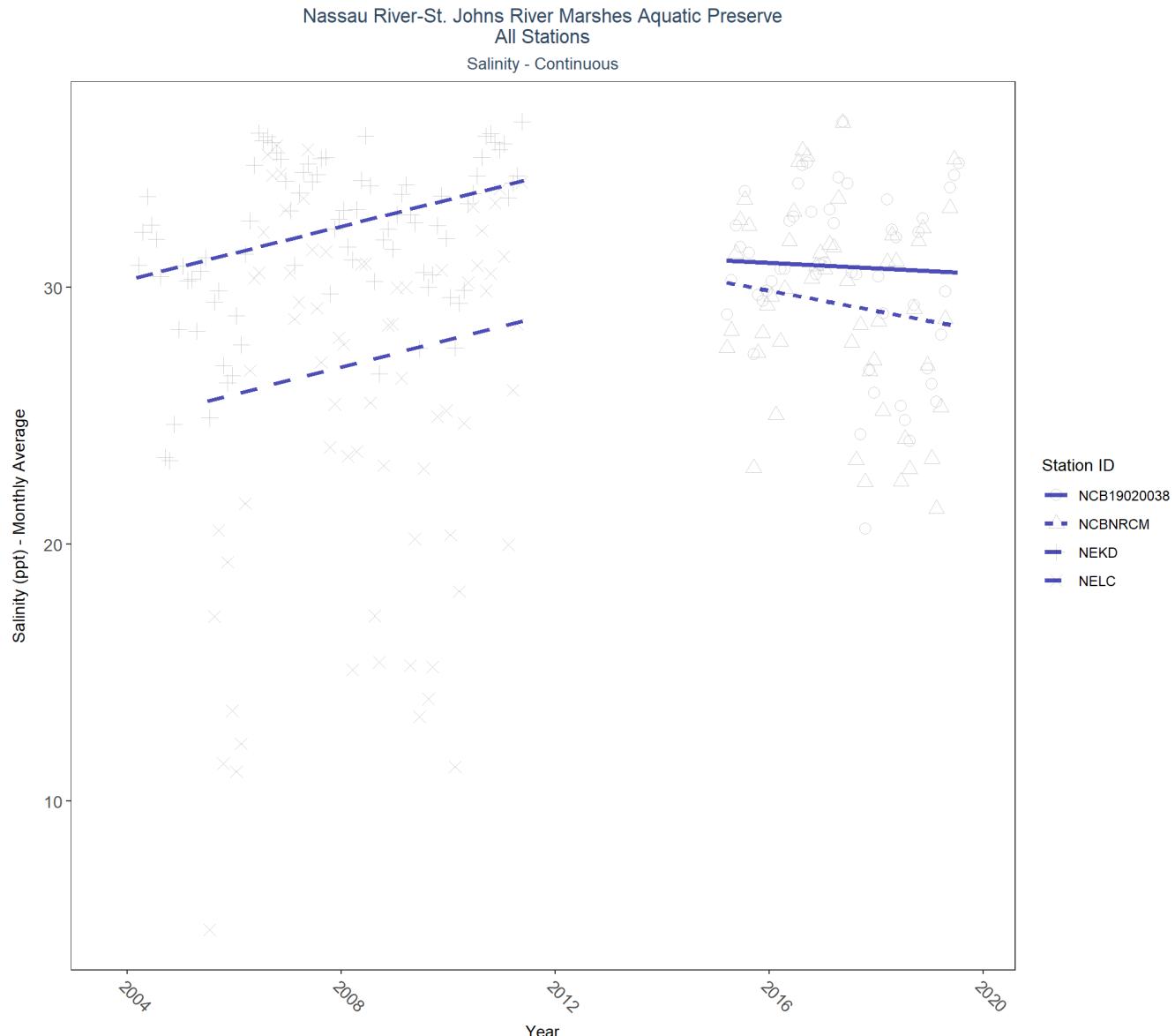


Table 30: Seasonal Kendall-Tau Results for All Stations - Salinity

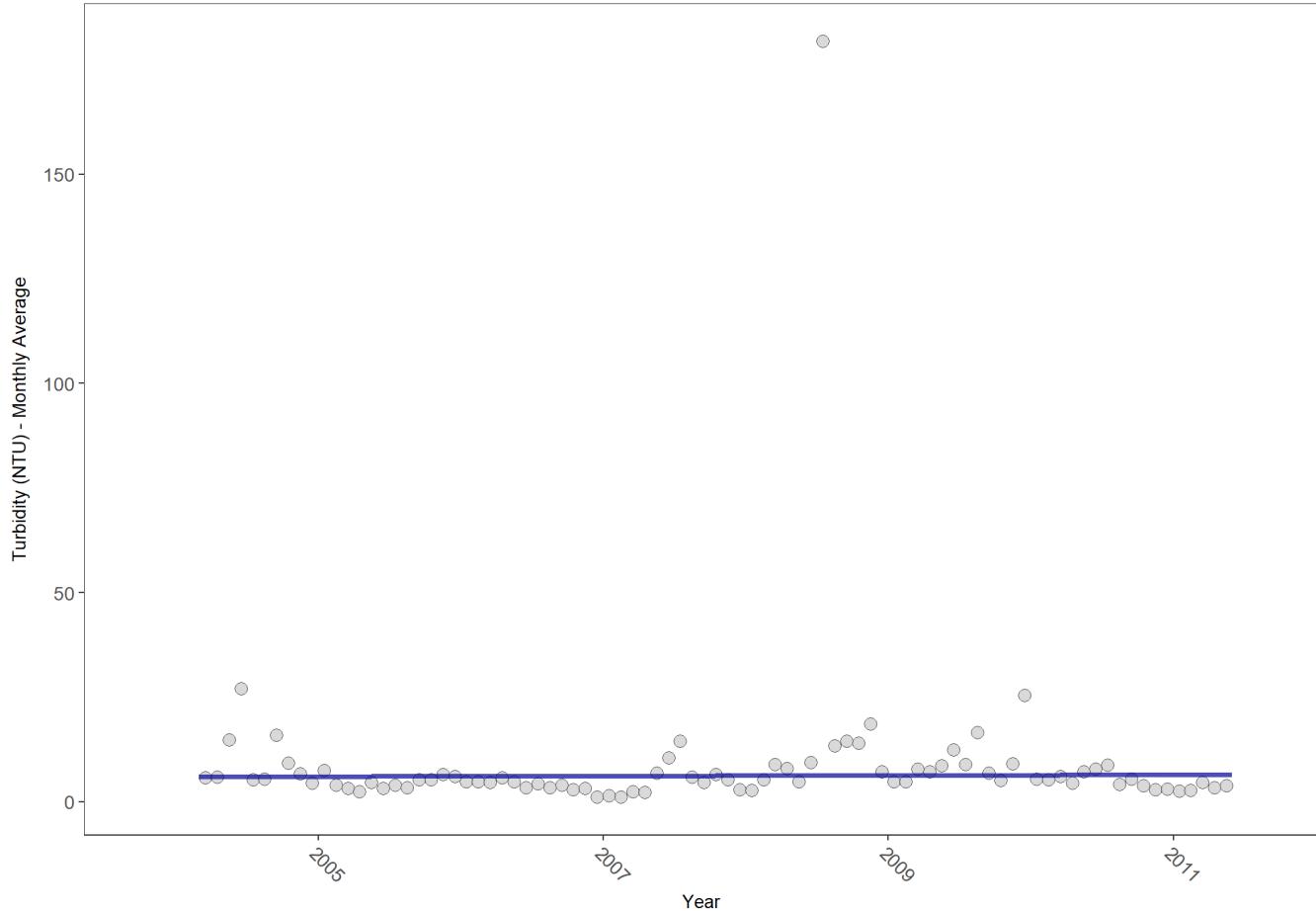
Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
NEKD	118328	8	2004 - 2011	33.20	0.31	30.29	0.52	0.0006
NELC	100339	7	2005 - 2011	27.90	0.09	25.3	0.53	0.4397
NENR	31438	3	2009 - 2011	12.40	-	-	-	-
NELN	17025	1	2023 - 2023	5.20	-	-	-	-
NEHM	27811	2	2022 - 2023	20.60	-	-	-	-
NCBARD16	7418	2	2015 - 2016	30.07	-	-	-	-
NCBNRCM	35411	5	2015 - 2019	30.29	-0.12	30.26	-0.39	0.5483
NCB19020038	34438	5	2015 - 2019	31.75	-0.06	31.07	-0.11	1.0000

Turbidity - Continuous Water Quality

NEKD

Northeast Aquatic Preserves Continuous Water Quality Monitoring (5006)

Nassau River-St. Johns River Marshes Aquatic Preserve
NEKD
Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	114181	8	4	TRUE	0.0203	0.8697	0.04741014	6.06342	4.3028	0.9602	0

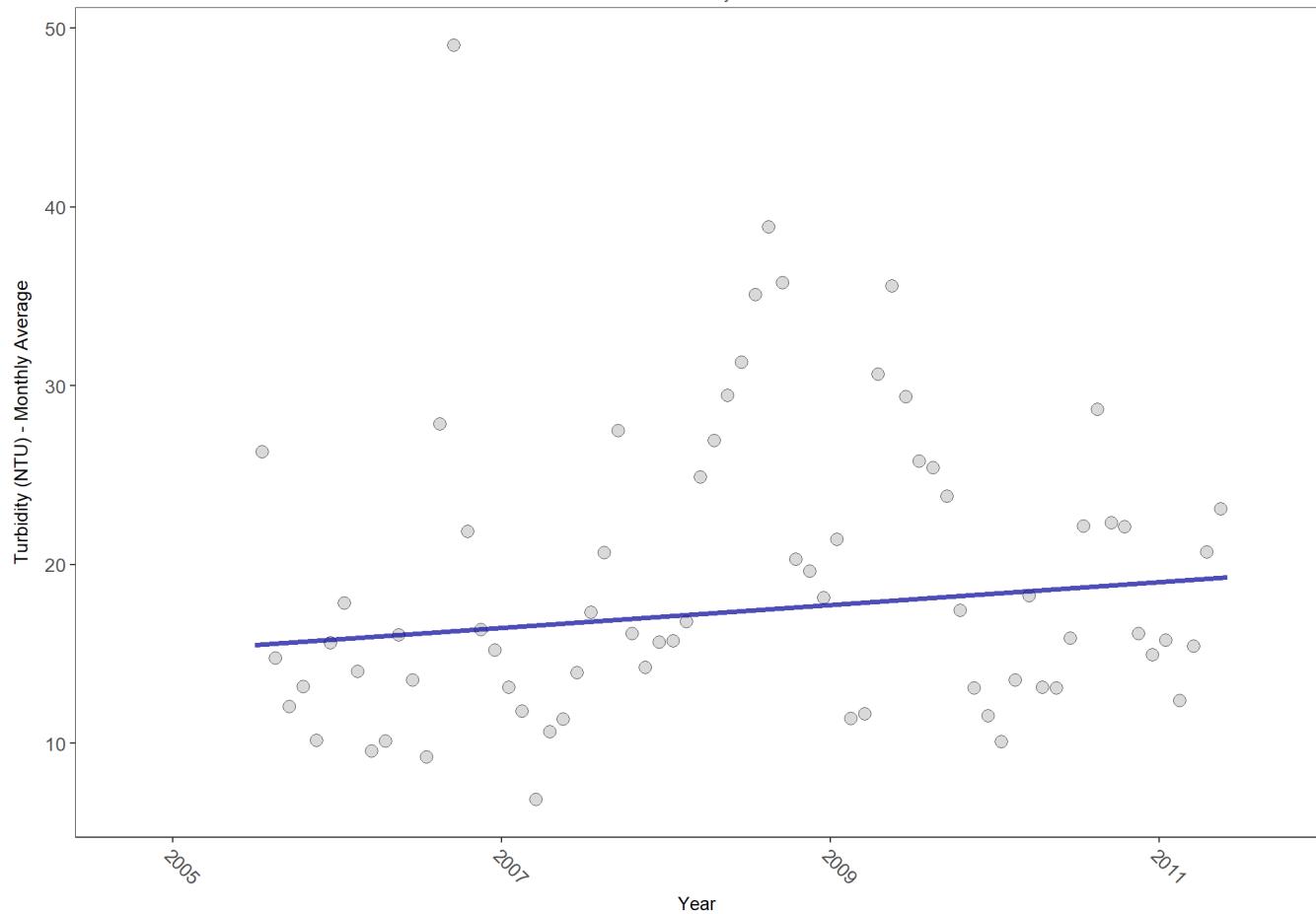
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

NELC

Northeast Aquatic Preserves Continuous Water Quality Monitoring (5006)

Nassau River-St. Johns River Marshes Aquatic Preserve
NELC
Turbidity



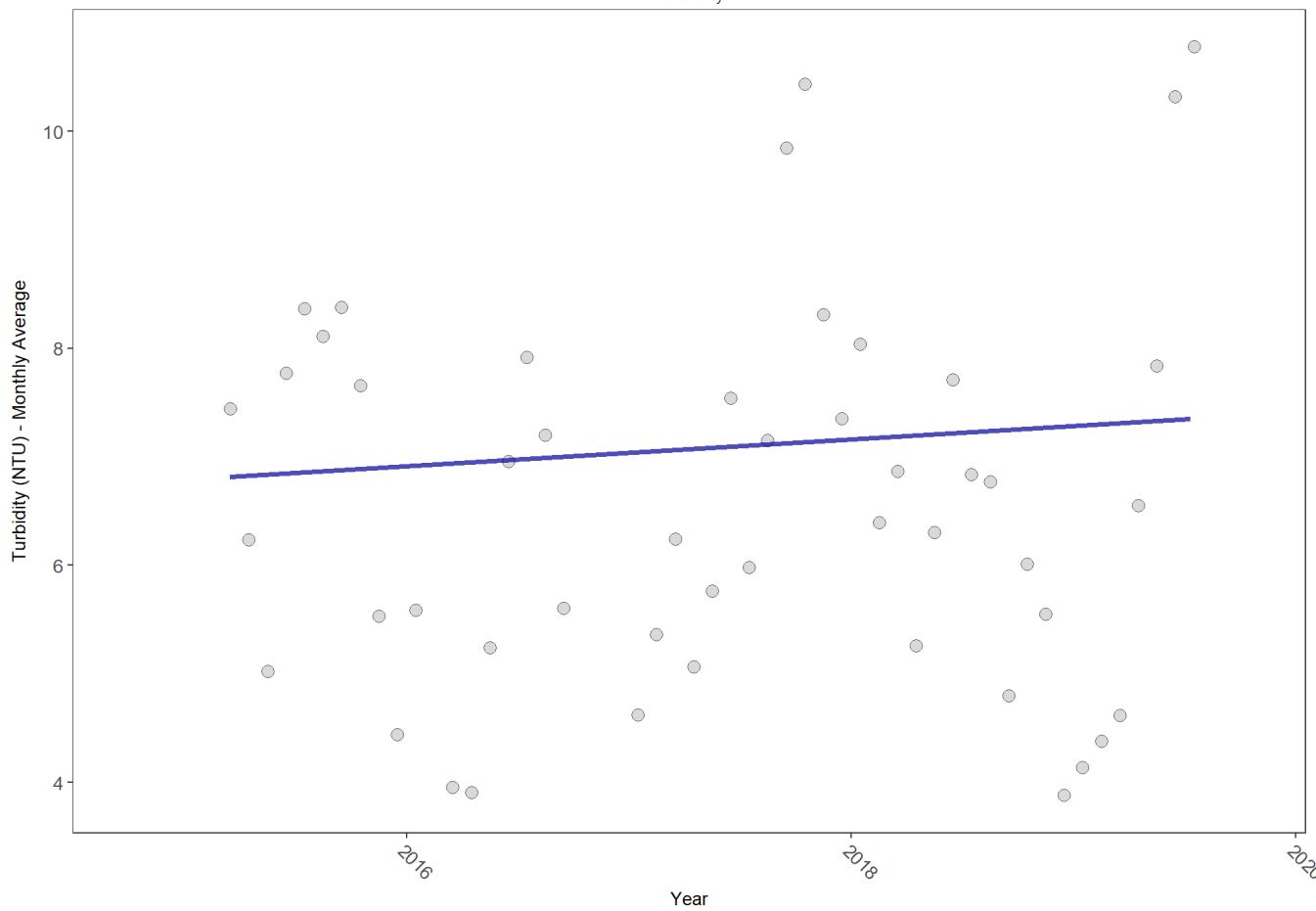
RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	96153	7	15	TRUE	0.1577	0.1513	0.6379887	15.18443	6.3479	0.8492	0

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

SennIntercept is intercept value at beginning of record for monitoring location

NCB19020038

St. Johns River Water Management District Continuous Water Quality Programs (5061)
 Nassau River-St. Johns River Marshes Aquatic Preserve
 NCB19020038
 Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	31407	5	5.77	TRUE	-0.0136	0.7876	0.1241474	6.789956	14.3051	0.2166	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

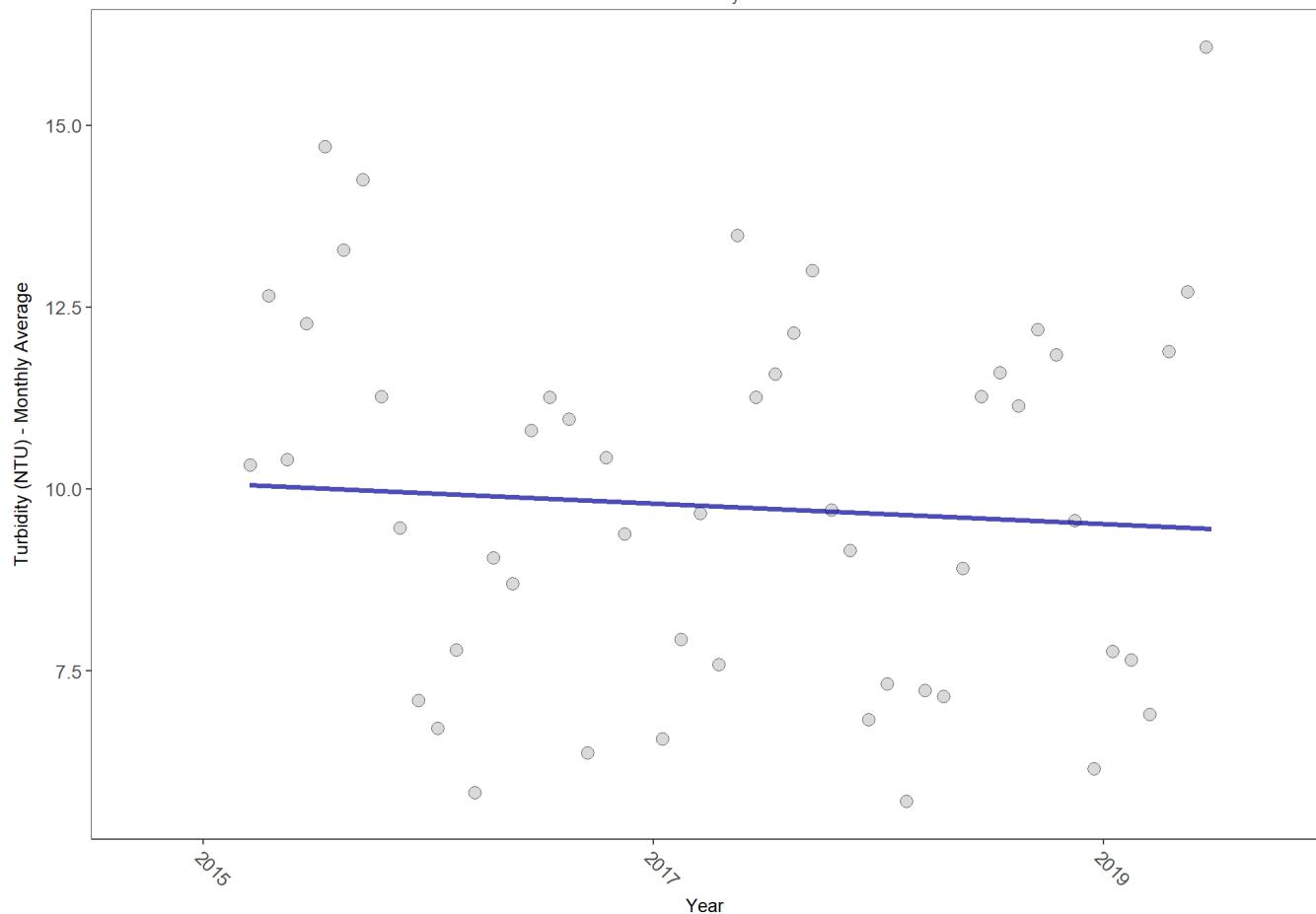
NCBNRCM

St. Johns River Water Management District Continuous Water Quality Programs (5061)

Nassau River-St. Johns River Marshes Aquatic Preserve

NCBNRCM

Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	34696	5	8.64	TRUE	-0.1046	0.6001	-0.1419202	10.0869	8.1815	0.697	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

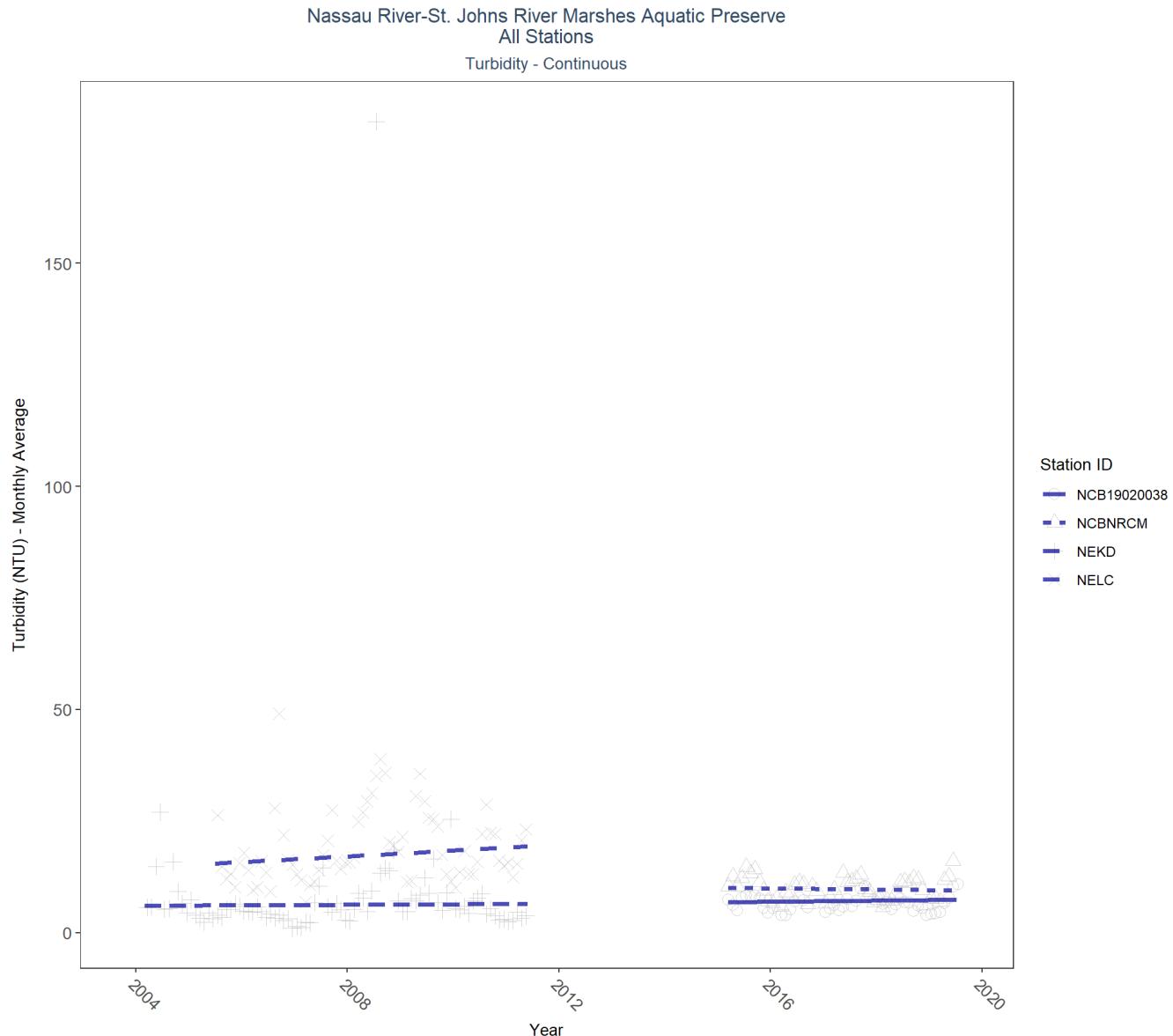


Table 31: Seasonal Kendall-Tau Results for All Stations - Turbidity

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
NEKD	114181	8	2004 - 2011	4.00	0.02	6.06	0.05	0.8697
NELC	96153	7	2005 - 2011	15.00	0.16	15.18	0.64	0.1513
NENR	31087	3	2009 - 2011	21.00	-	-	-	-
NELN	17016	1	2023 - 2023	9.00	-	-	-	-
NEHM	27767	2	2022 - 2023	8.00	-	-	-	-
NCBARD16	7385	2	2015 - 2016	12.89	-	-	-	-
NCB19020038	31407	5	2015 - 2019	5.77	-0.01	6.79	0.12	0.7876
NCBNRCM	34696	5	2015 - 2019	8.64	-0.1	10.09	-0.14	0.6001

Water Temperature - Continuous Water Quality

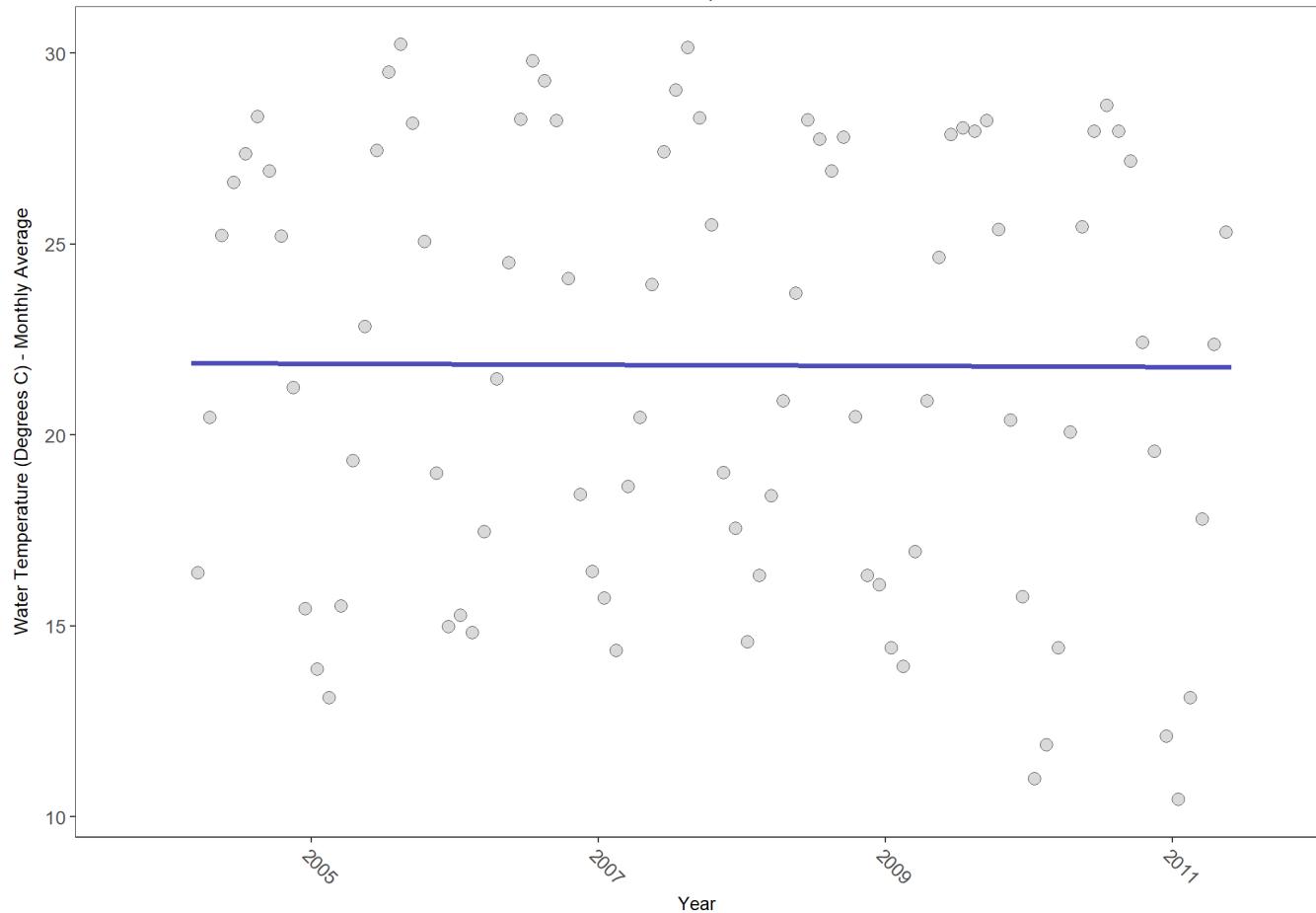
NEKD

Northeast Aquatic Preserves Continuous Water Quality Monitoring (5006)

Nassau River-St. Johns River Marshes Aquatic Preserve

NEKD

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	118328	8	22.1	TRUE	-0.0367	0.8057	-0.01301241	21.87533	9.189	0.6045	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

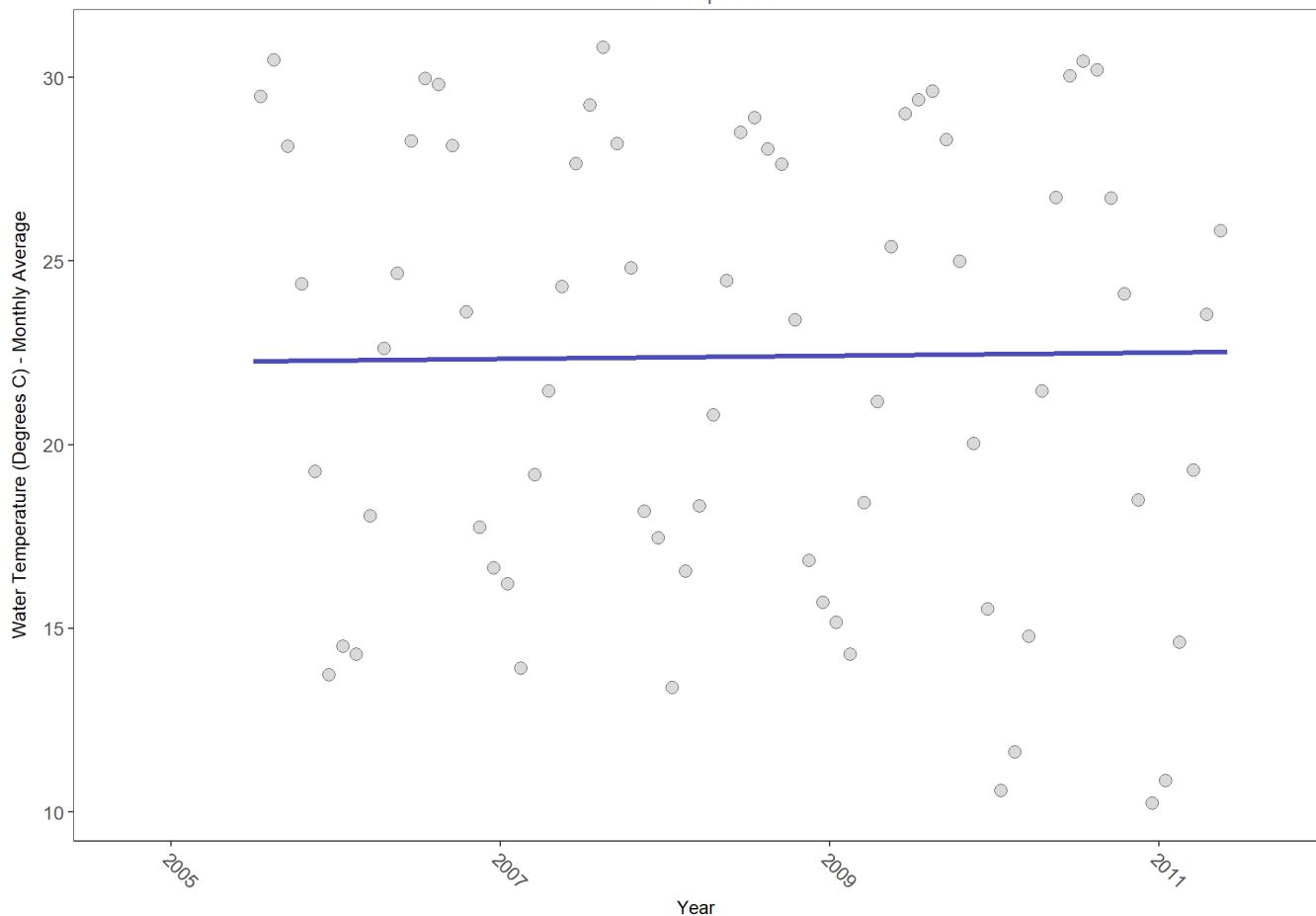
NELC

Northeast Aquatic Preserves Continuous Water Quality Monitoring (5006)

Nassau River-St. Johns River Marshes Aquatic Preserve

NELC

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	100343	7	22.7	TRUE	0.0507	0.7405	0.041875	22.25686	9.8961	0.5398	0

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

SennIntercept is intercept value at beginning of record for monitoring location

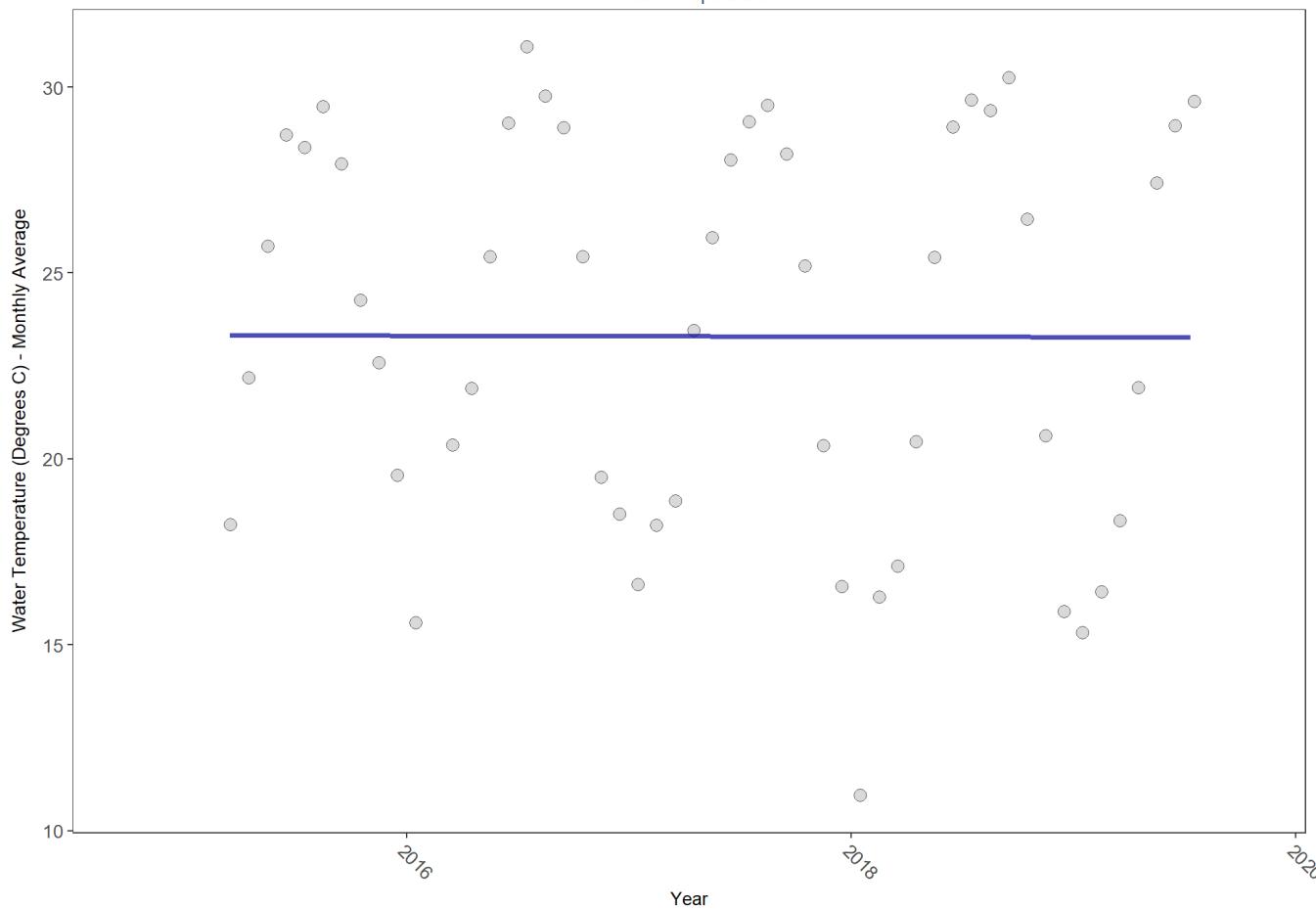
NCB19020038

St. Johns River Water Management District Continuous Water Quality Programs (5061)

Nassau River-St. Johns River Marshes Aquatic Preserve

NCB19020038

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	34483	5	24.78	TRUE	-0.0256	1.0000	-0.01292339	23.32298	10.1997	0.5125	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

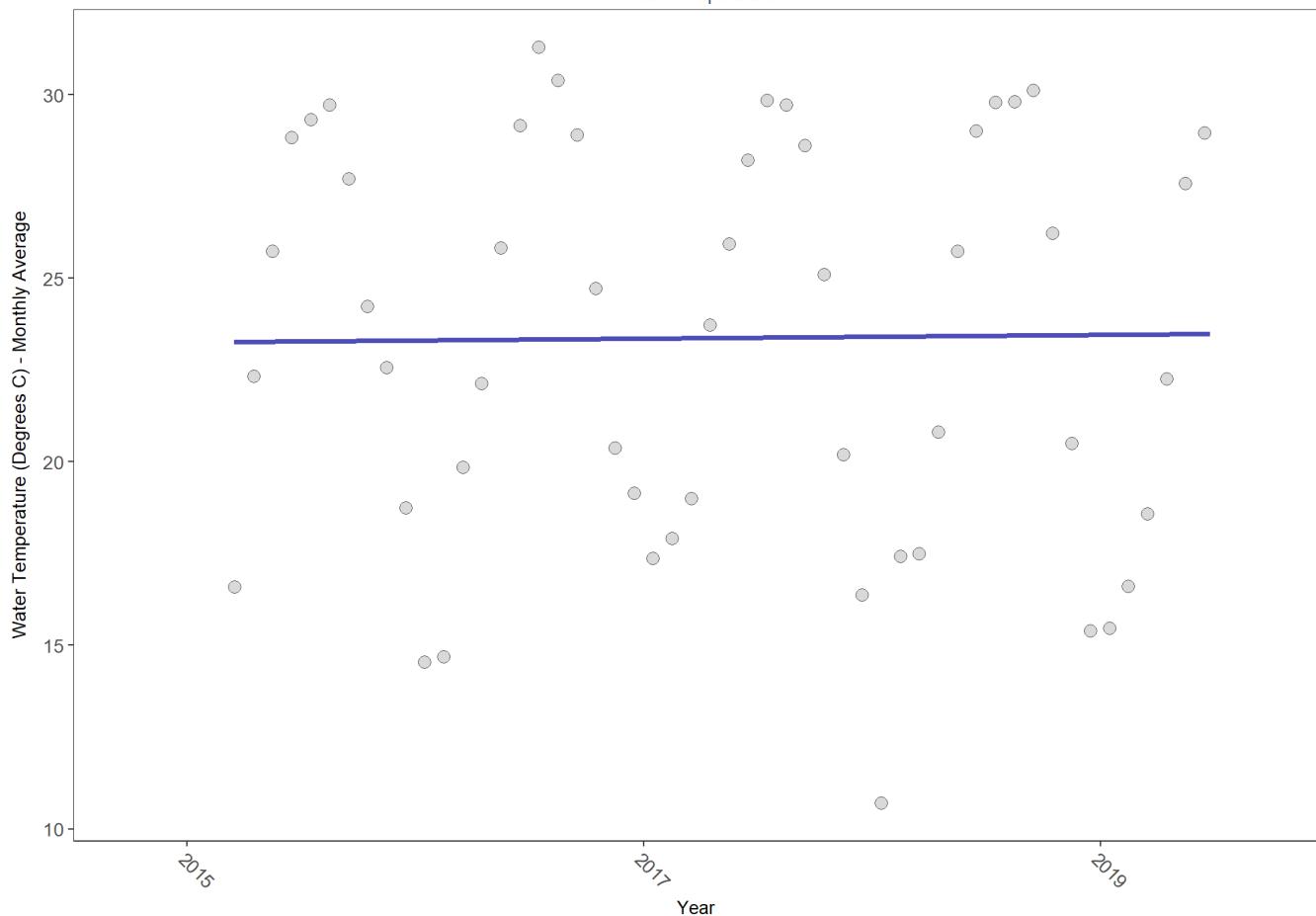
NCBNRCM

St. Johns River Water Management District Continuous Water Quality Programs (5061)

Nassau River-St. Johns River Marshes Aquatic Preserve

NCBNRCM

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	35817	5	24.03	TRUE	0.0705	0.6681	0.05057755	23.25543	9.2229	0.6013	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

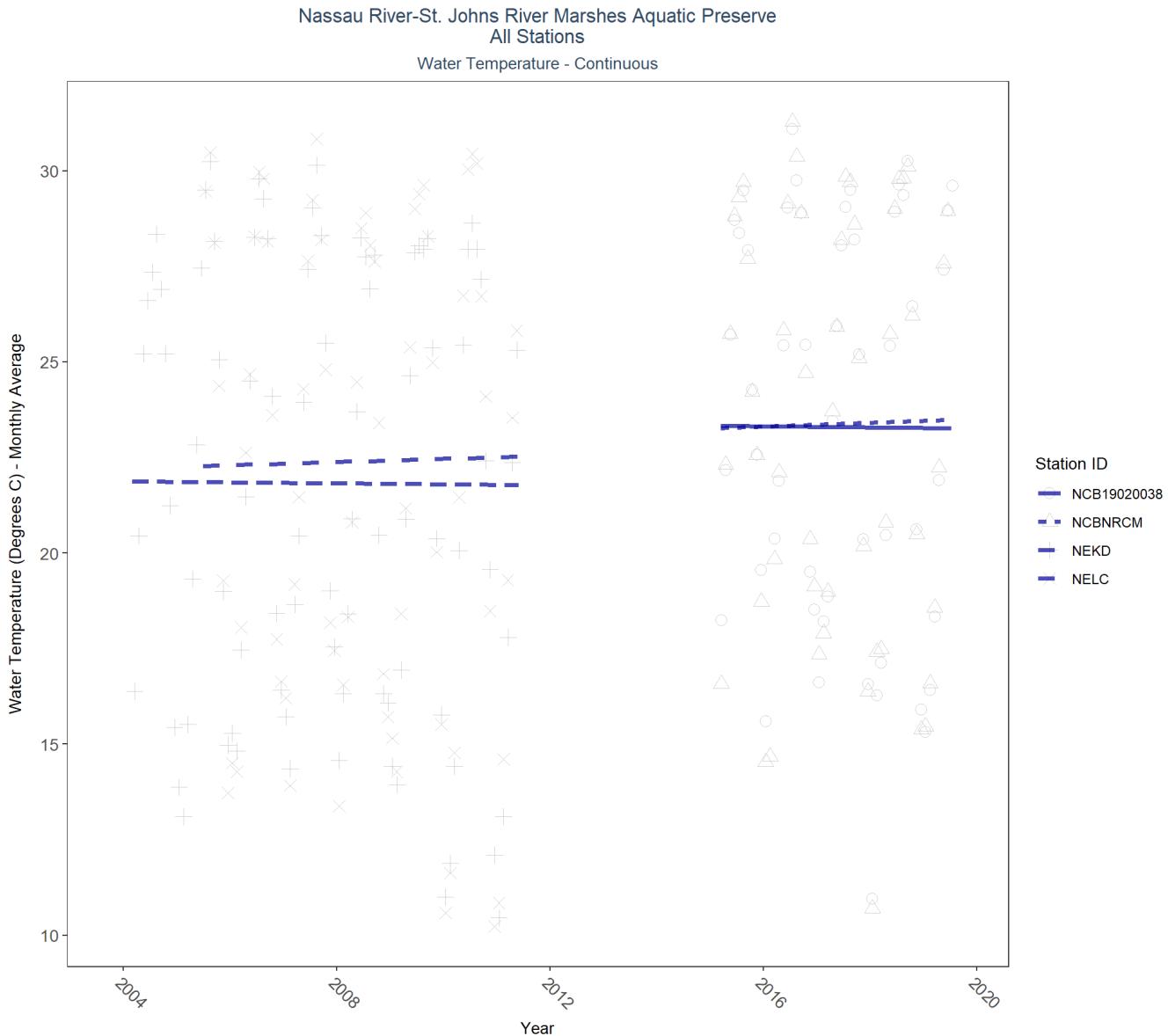


Table 32: Seasonal Kendall-Tau Results for All Stations - Water Temperature

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
02231291	710	3	2014 - 2016	24.50	-	-	-	-
NEKD	118328	8	2004 - 2011	22.10	-0.04	21.88	-0.01	0.8057
NELC	100343	7	2005 - 2011	22.70	0.05	22.26	0.04	0.7405
NENR	31438	3	2009 - 2011	22.00	-	-	-	-
NELN	17025	1	2023 - 2023	27.70	-	-	-	-
NEHM	27857	2	2022 - 2023	23.90	-	-	-	-
NCB19020038	34483	5	2015 - 2019	24.78	-0.03	23.32	-0.01	1.0000
NCBNRCM	35817	5	2015 - 2019	24.03	0.07	23.26	0.05	0.6681
NCBARD16	7419	2	2015 - 2016	25.08	-	-	-	-