

Cape Romano-Ten Thousand Islands 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

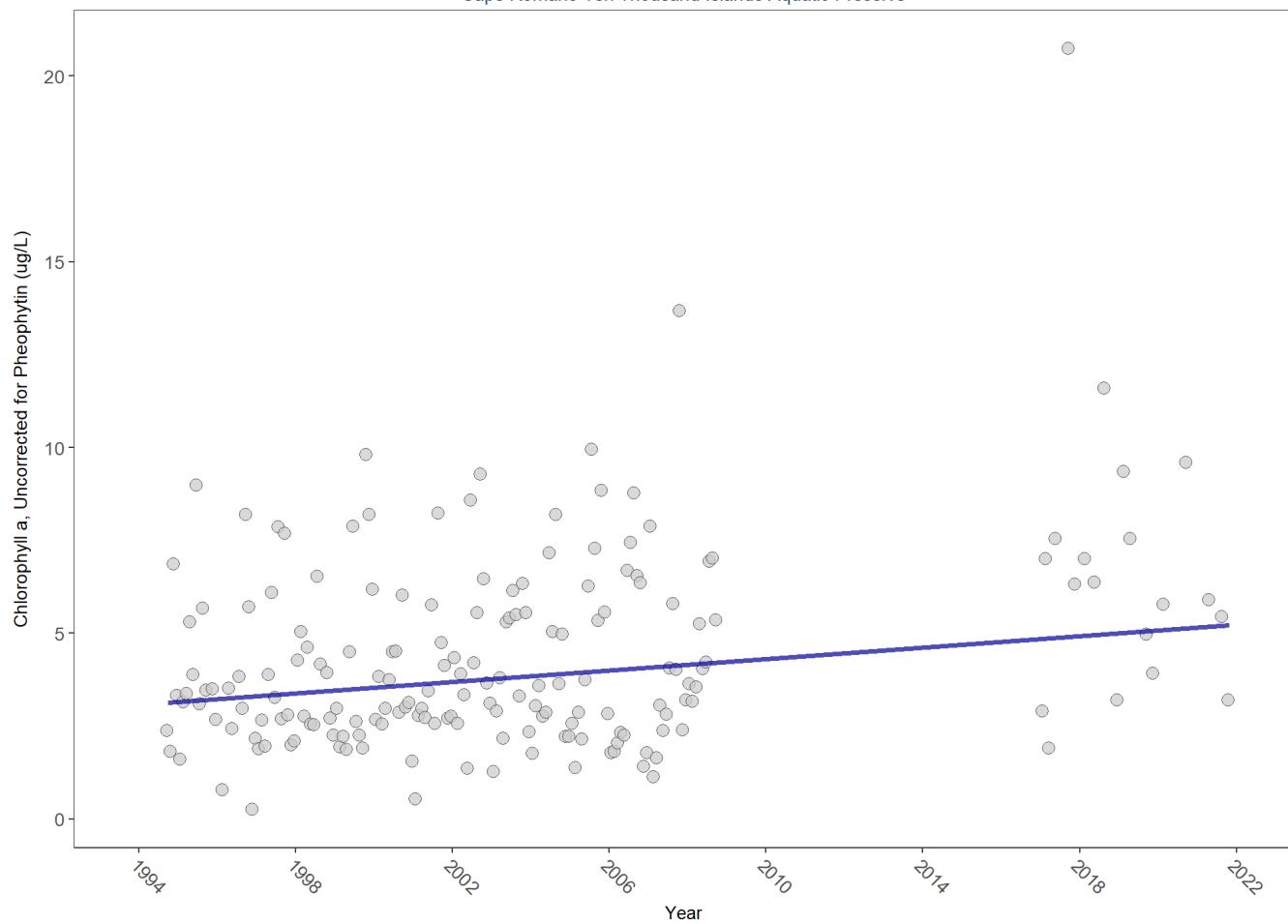
The following files were used in the discrete analysis:

- *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, Uncorrected for Pheophytin - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

Chlorophyll a, Uncorrected for Pheophytin, Lab, All Depths
Cape Romano-Ten Thousand Islands Aquatic Preserve

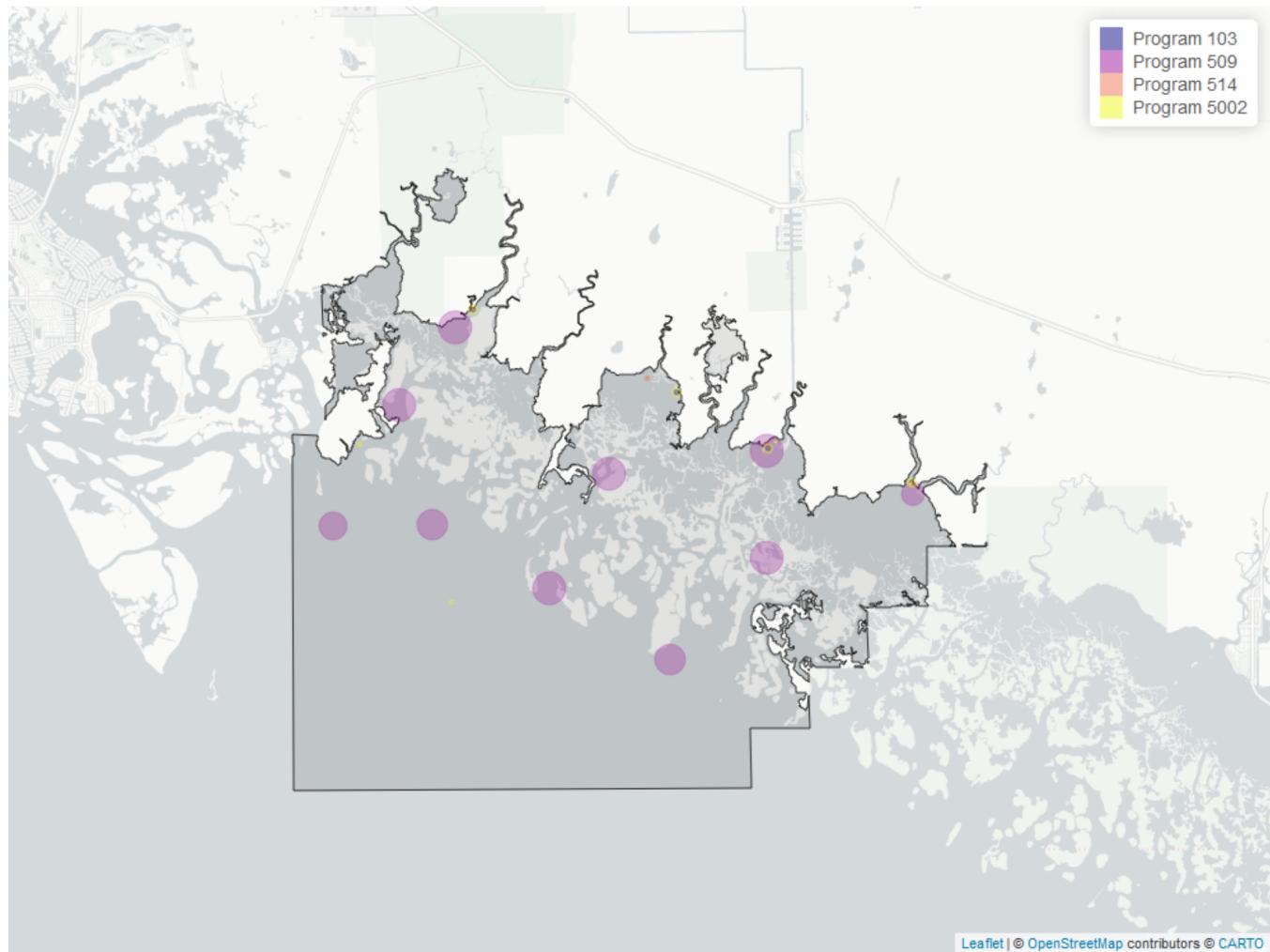


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	1620	20	3.2344	TRUE	0.1619	0.0024	0.07734062	3.068897	8.4089	0.6763	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

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



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

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

ProgramID	N_Data	YearMin	YearMax
509	1512	1994	2008
5002	72	2001	2021
103	24	2021	2021
514	15	2001	2001

Program names:

509 - SERC Water Quality Monitoring Network

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

514 - Florida LAKEWATCH Program

Value Qualifiers

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

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

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$
2017	16			4	25
2021	36	1	2.8		

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

Programs containing Value Qualified data:

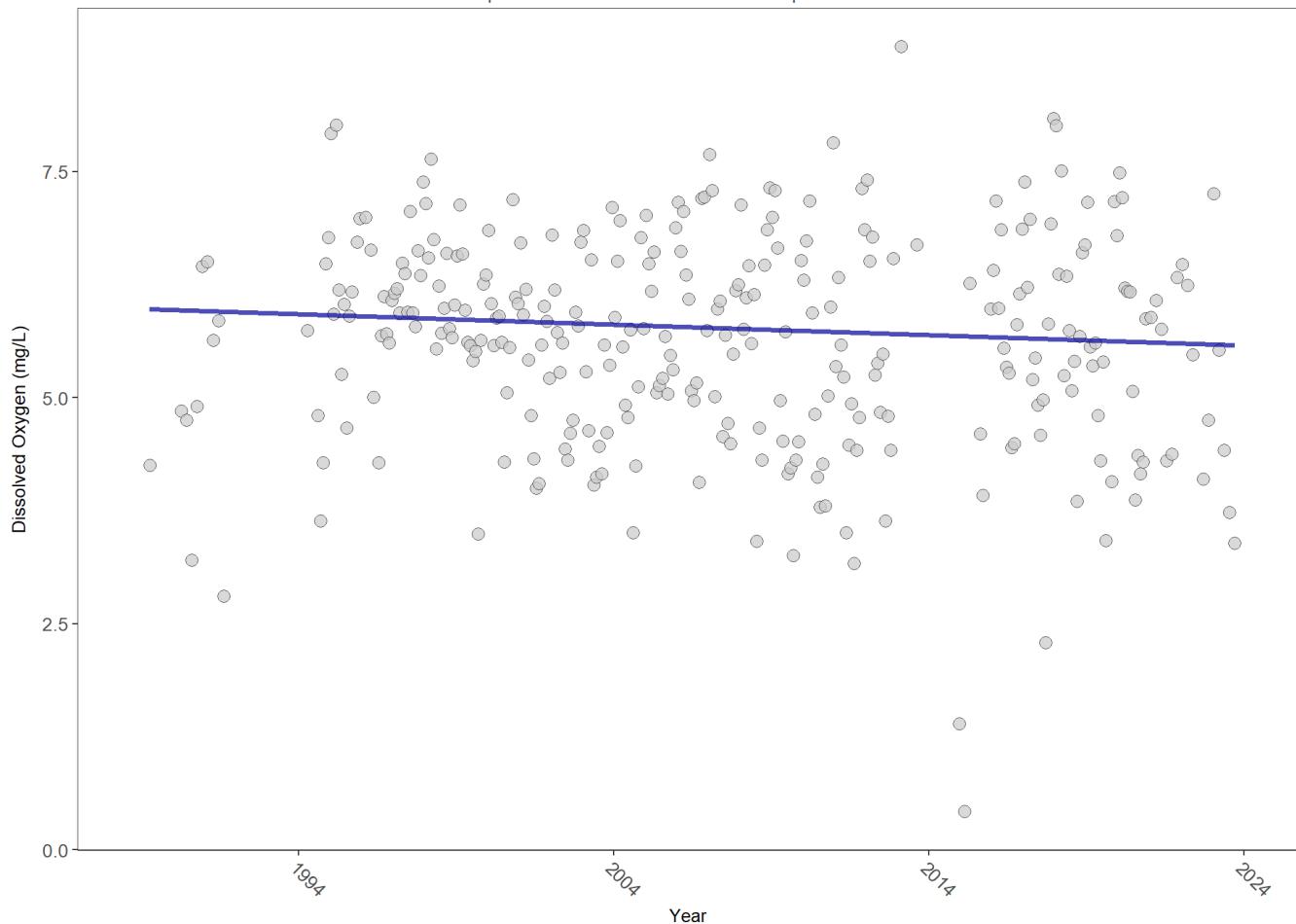
5002 - Florida STORET / WIN

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
Cape Romano-Ten Thousand Islands Aquatic Preserve



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	10010	33	5.8	TRUE	-0.0746	0.0650	-0.01152476	5.980721	13.0475	0.2902	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Dissolved Oxygen

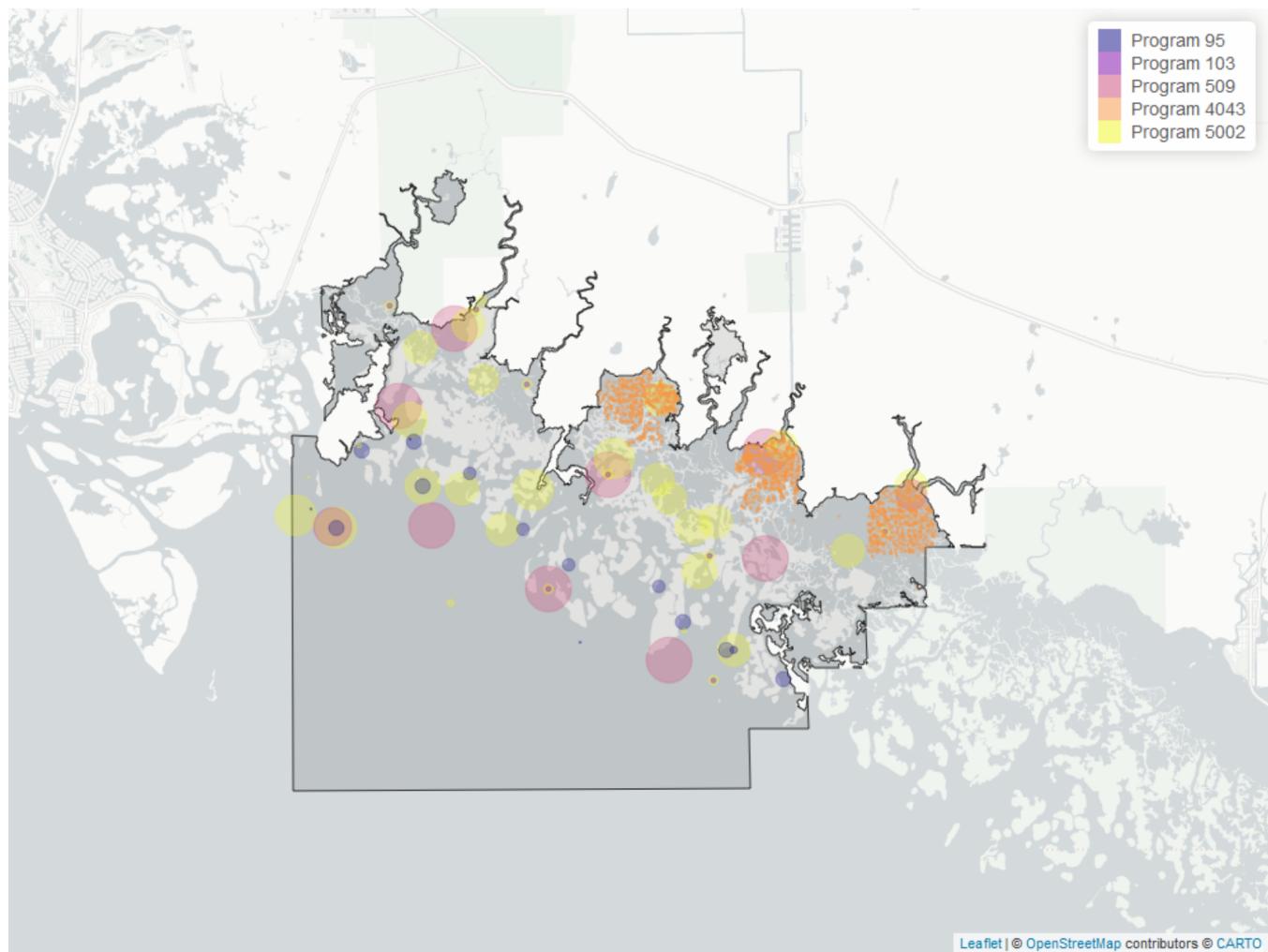


Table 8: Programs contributing data for Dissolved Oxygen

ProgramID	N_Data	YearMin	YearMax
5002	4150	1989	2023
509	2974	1994	2008
4043	2478	1999	2020
95	360	1997	2018
103	48	2021	2021

Program names:

5002 - Florida STORET / WIN

509 - SERC Water Quality Monitoring Network

4043 - RBNERR Fish Assessment

95 - Harmful Algal Bloom Marine Observation Network

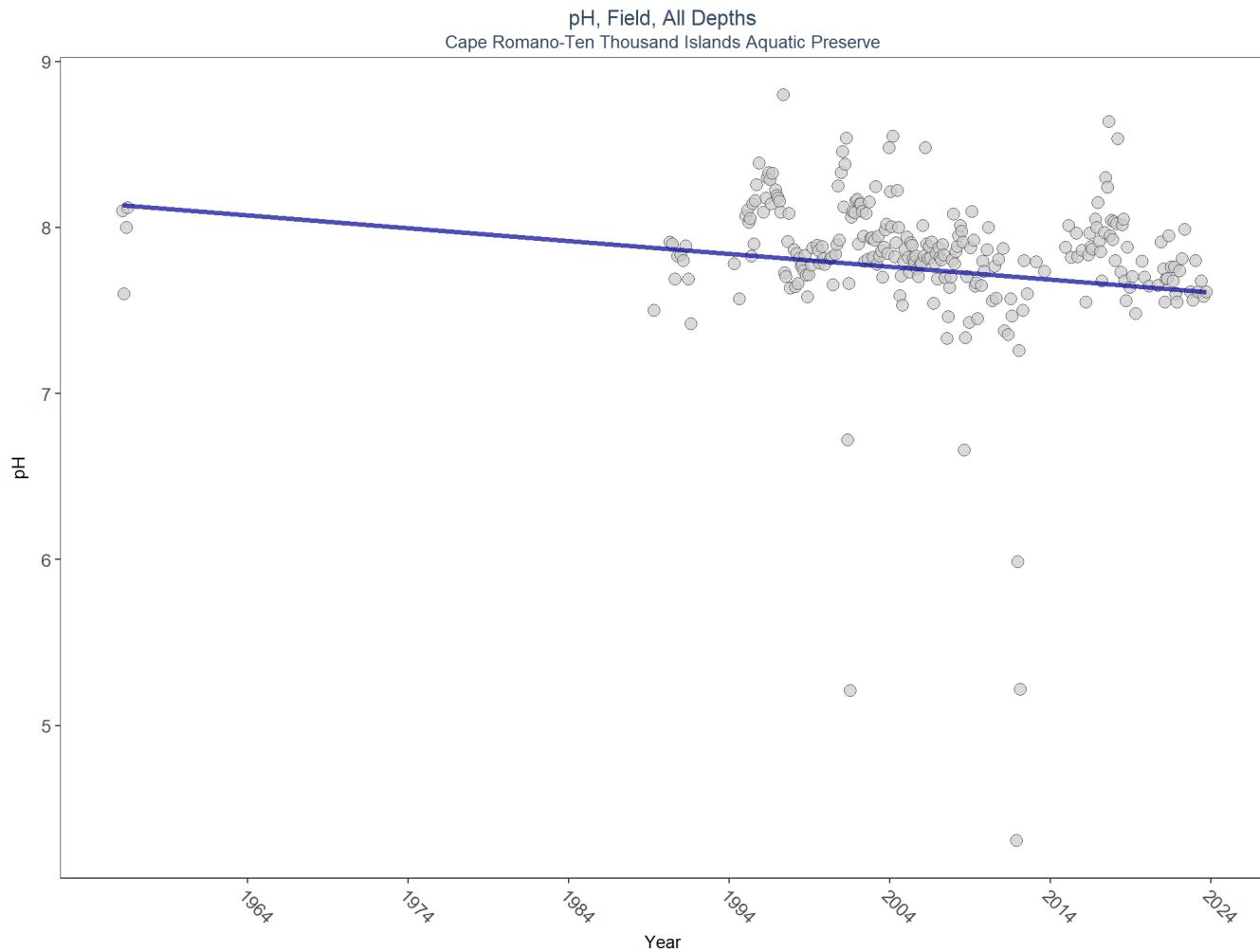
103 - EPA STOrage and RETrieval Data Warehouse (STORET)

There are no qualifying Value Qualifiers for Dissolved Oxygen in Cape Romano-Ten Thousand Islands Aquatic Preserve

pH - Discrete Water Quality

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

Seasonal Kendall-Tau Trend Analysis

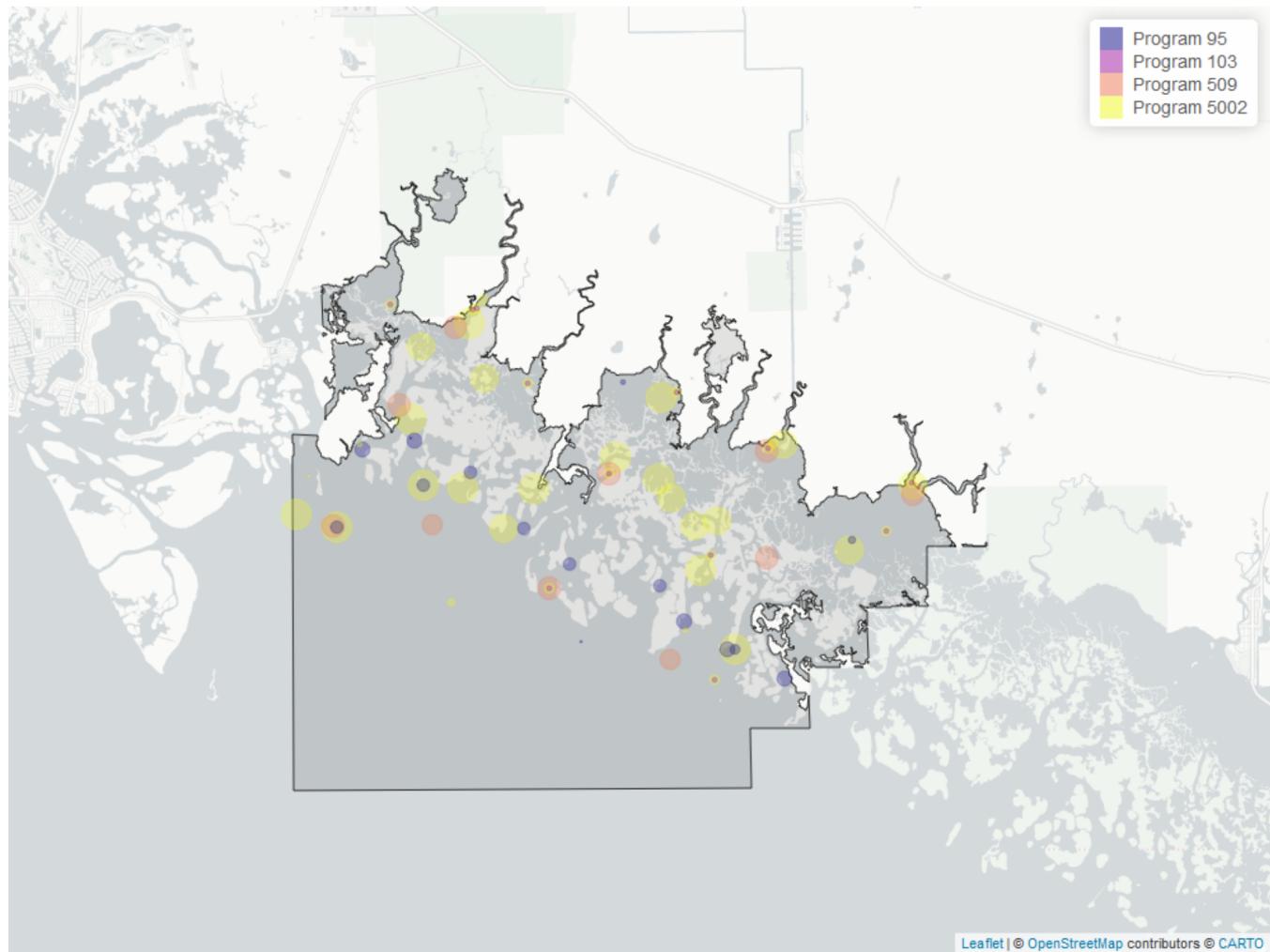


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	4208	34	7.9	TRUE	-0.2085	0.0000	-0.007758344	8.136432	16.0185	0.1404	-1

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 9: Programs contributing data for pH

ProgramID	N_Data	YearMin	YearMax
5002	3049	1989	2023
509	748	2001	2008
95	348	1956	2018
103	63	2021	2021

Program names:

5002 - Florida STORET / WIN

509 - SERC Water Quality Monitoring Network

95 - Harmful Algal Bloom Marine Observation Network

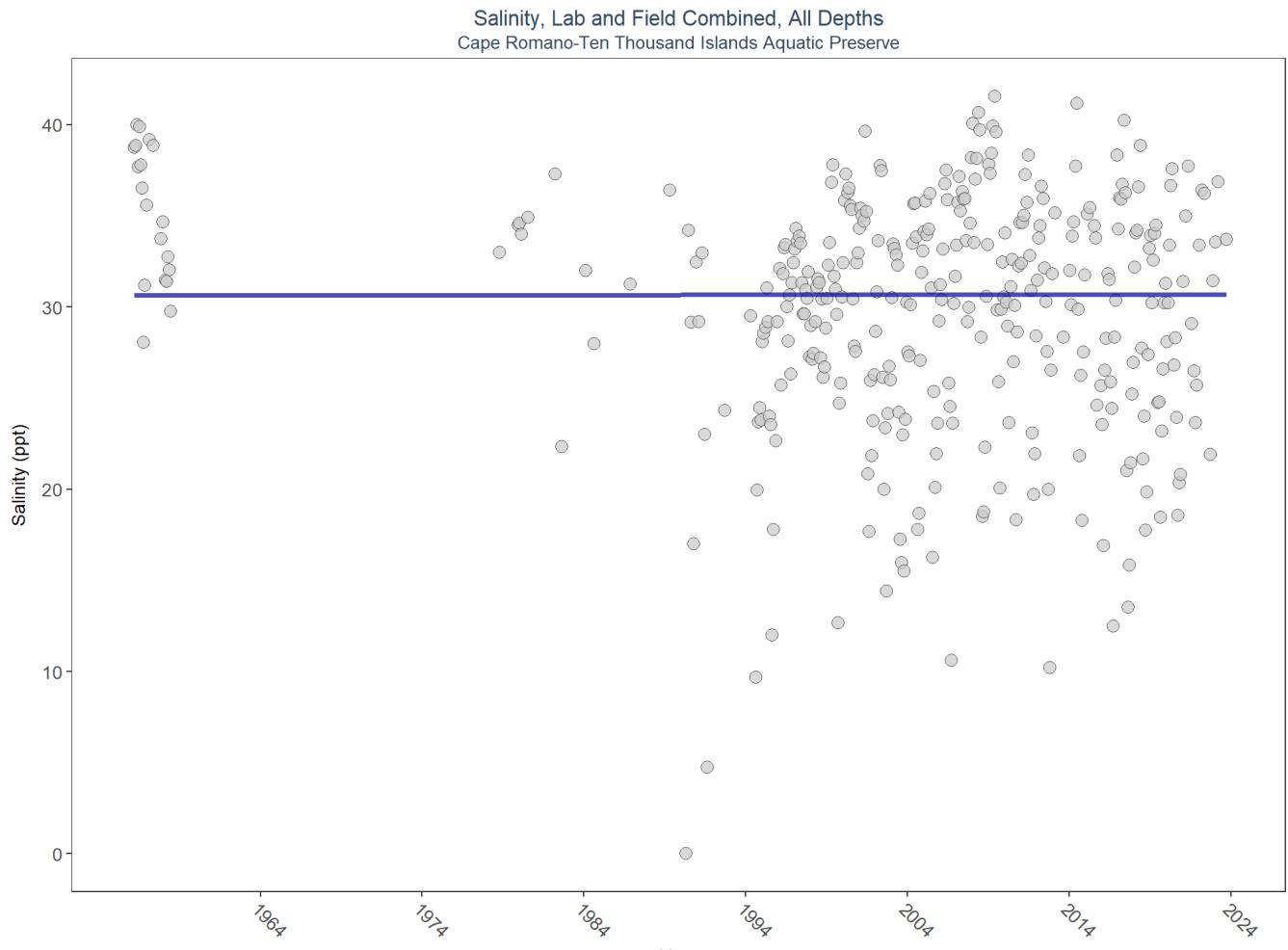
103 - EPA STOrage and RETrieval Data Warehouse (STORET)

There are no qualifying Value Qualifiers for pH in Cape Romano-Ten Thousand Islands 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

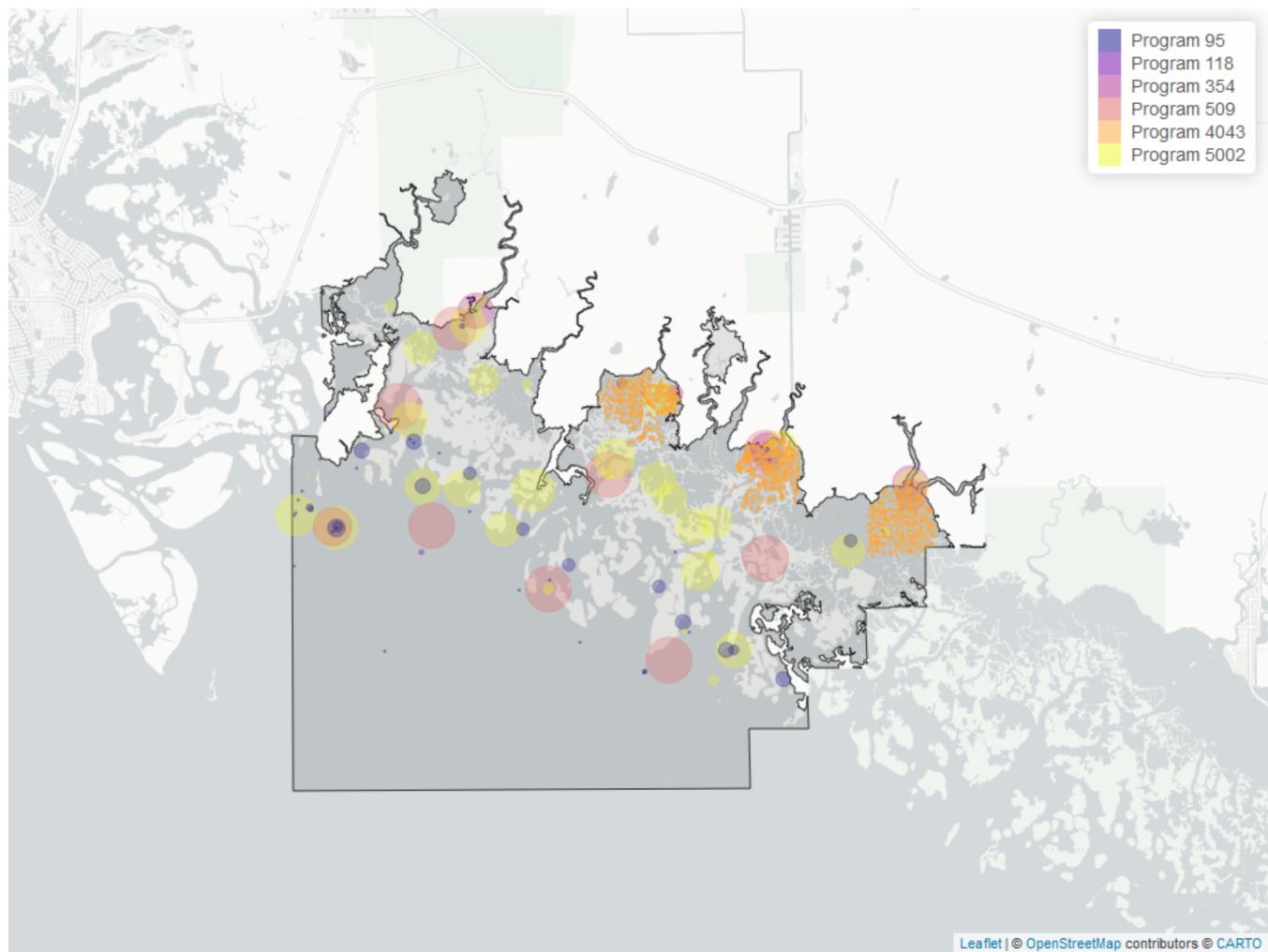


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	10916	43	31.9	TRUE	0.0004	0.9748	0.0003939138	30.64712	10.8597	0.4551	0

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 10: Programs contributing data for Salinity

ProgramID	N_Data	YearMin	YearMax
5002	4337	1989	2023
509	2948	1994	2008
4043	2537	1999	2020
354	598	2002	2015
95	507	1956	2018
118	8	2015	2021

Program names:

5002 - Florida STORET / WIN

509 - SERC Water Quality Monitoring Network

4043 - RBNERR Fish Assessment

354 - Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program

95 - Harmful Algal Bloom Marine Observation Network

118 - National Aquatic Resource Surveys, National Coastal Condition Assessment

There are no qualifying Value Qualifiers for Salinity in Cape Romano-Ten Thousand Islands Aquatic Preserve

Total Nitrogen - Discrete Water Quality

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

Total Nitrogen Calculation:

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

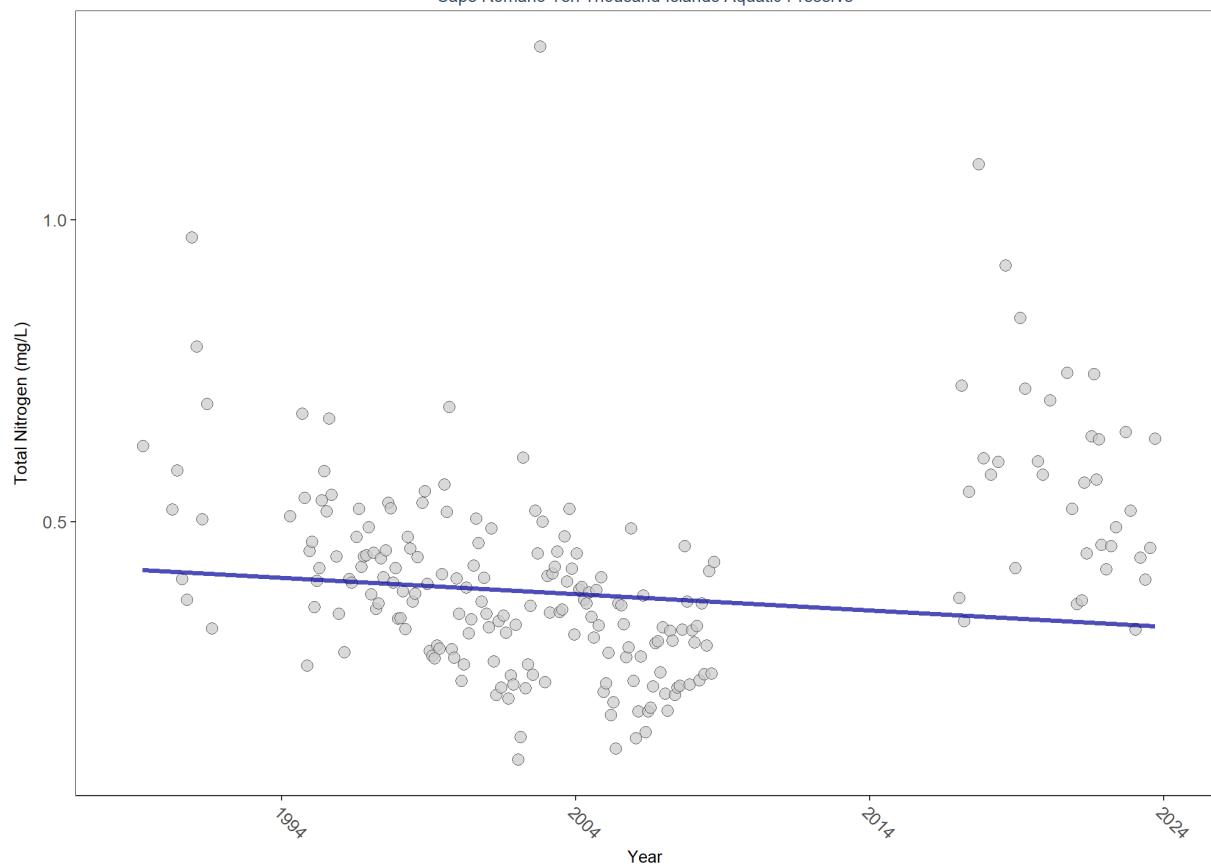
- 1) $TN = TKN + NO_3O_2;$
- 2) $TN = TKN + NO_3 + NO_2;$
- 3) $TN = ORGN + NH_4 + NO_3O_2;$
- 4) $TN = ORGN + NH_4 + NO_2 + NO_3;$
- 5) $TN = TKN + NO_3;$
- 6) $TN = ORGN + NH_4 + NO_3;$

Additional Information:

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

Seasonal Kendall-Tau Trend Analysis

Total Nitrogen, Lab, All Depths
Cape Romano-Ten Thousand Islands Aquatic Preserve

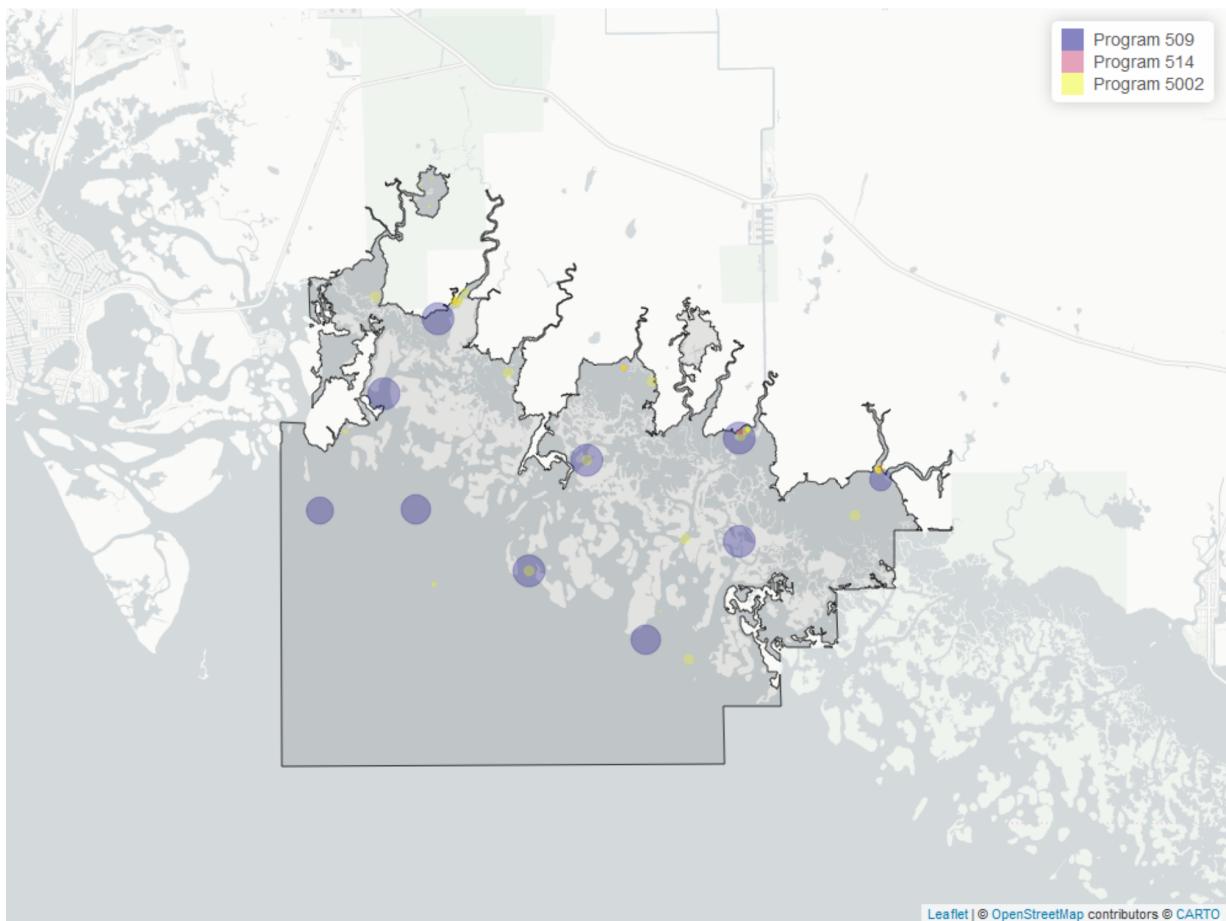


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	1808	25	0.36905	TRUE	-0.1059	0.0724	-0.002697018	0.4203379	20.5311	0.0386	0

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 11: Programs contributing data for Total Nitrogen

ProgramID	N_Data	YearMin	YearMax
509	1512	1994	2008
5002	261	1989	2023
514	35	2001	2001

Program names:

509 - SERC Water Quality Monitoring Network

5002 - Florida STORET / WIN

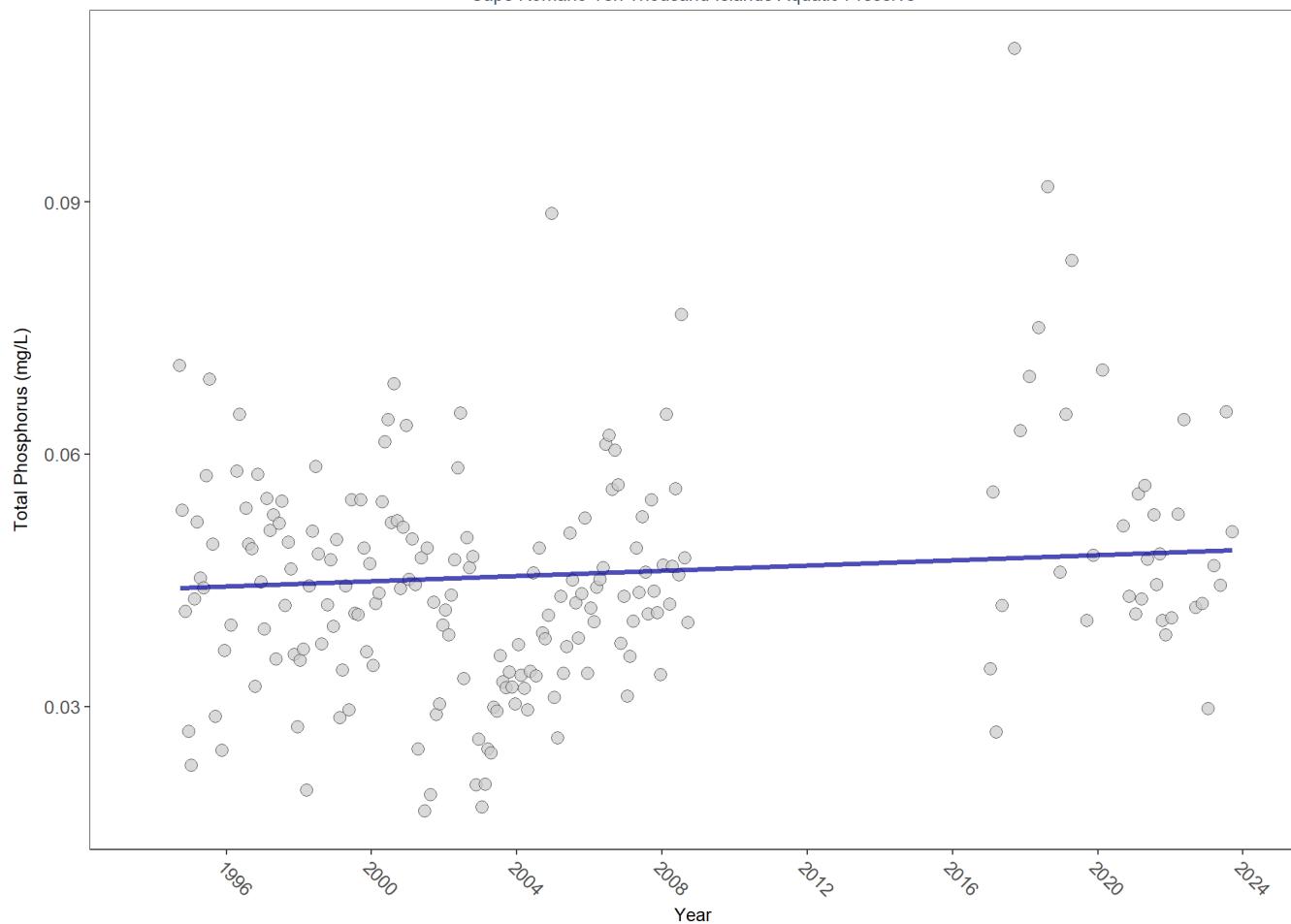
514 - Florida LAKEWATCH Program

There are no qualifying Value Qualifiers for Total Nitrogen in Cape Romano-Ten Thousand Islands Aquatic Preserve

Total Phosphorus - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

Total Phosphorus, Lab, All Depths
Cape Romano-Ten Thousand Islands Aquatic Preserve

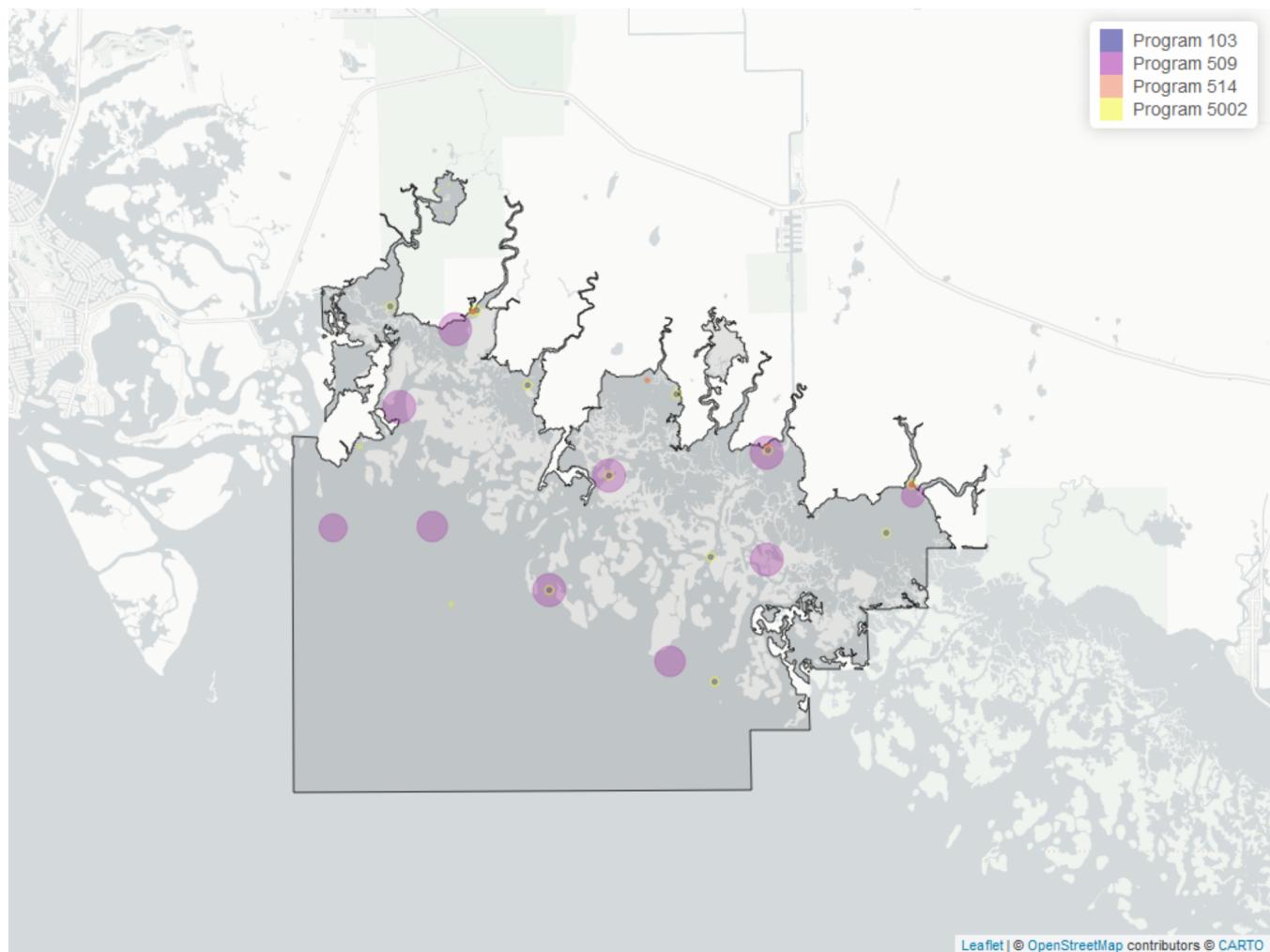


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	1796	22	0.0417	TRUE	0.0693	0.1468	0.000155	0.04400495	5.0564	0.9284	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Total Phosphorus



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

Table 12: Programs contributing data for Total Phosphorus

ProgramID	N_Data	YearMin	YearMax
509	1499	1994	2008
5002	207	2002	2023
103	64	2021	2021
514	31	2001	2001

Program names:

509 - SERC Water Quality Monitoring Network

5002 - Florida STORET / WIN

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

514 - Florida LAKEWATCH Program

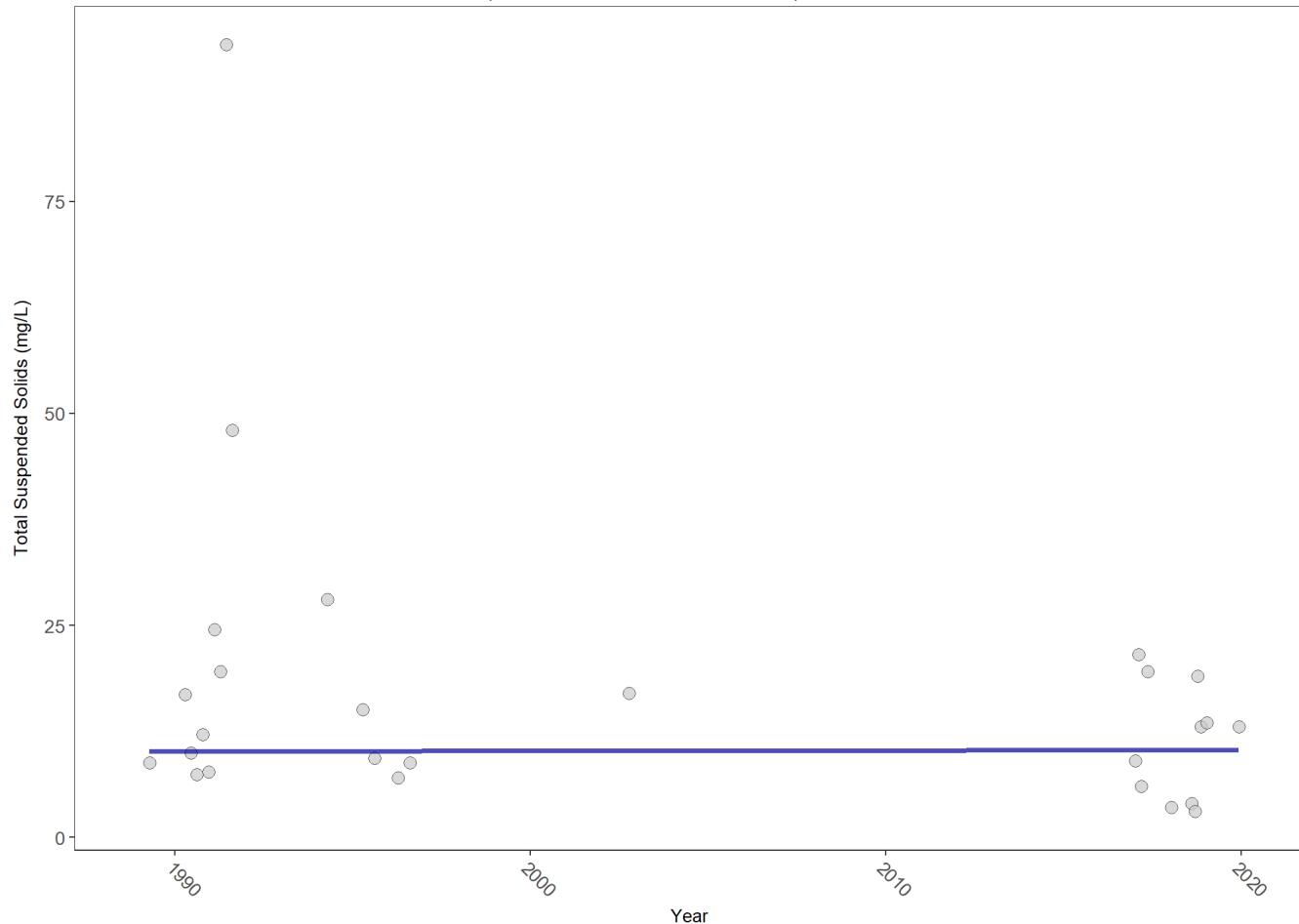
There are no qualifying Value Qualifiers for Total Phosphorus in Cape Romano-Ten Thousand Islands Aquatic Preserve

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

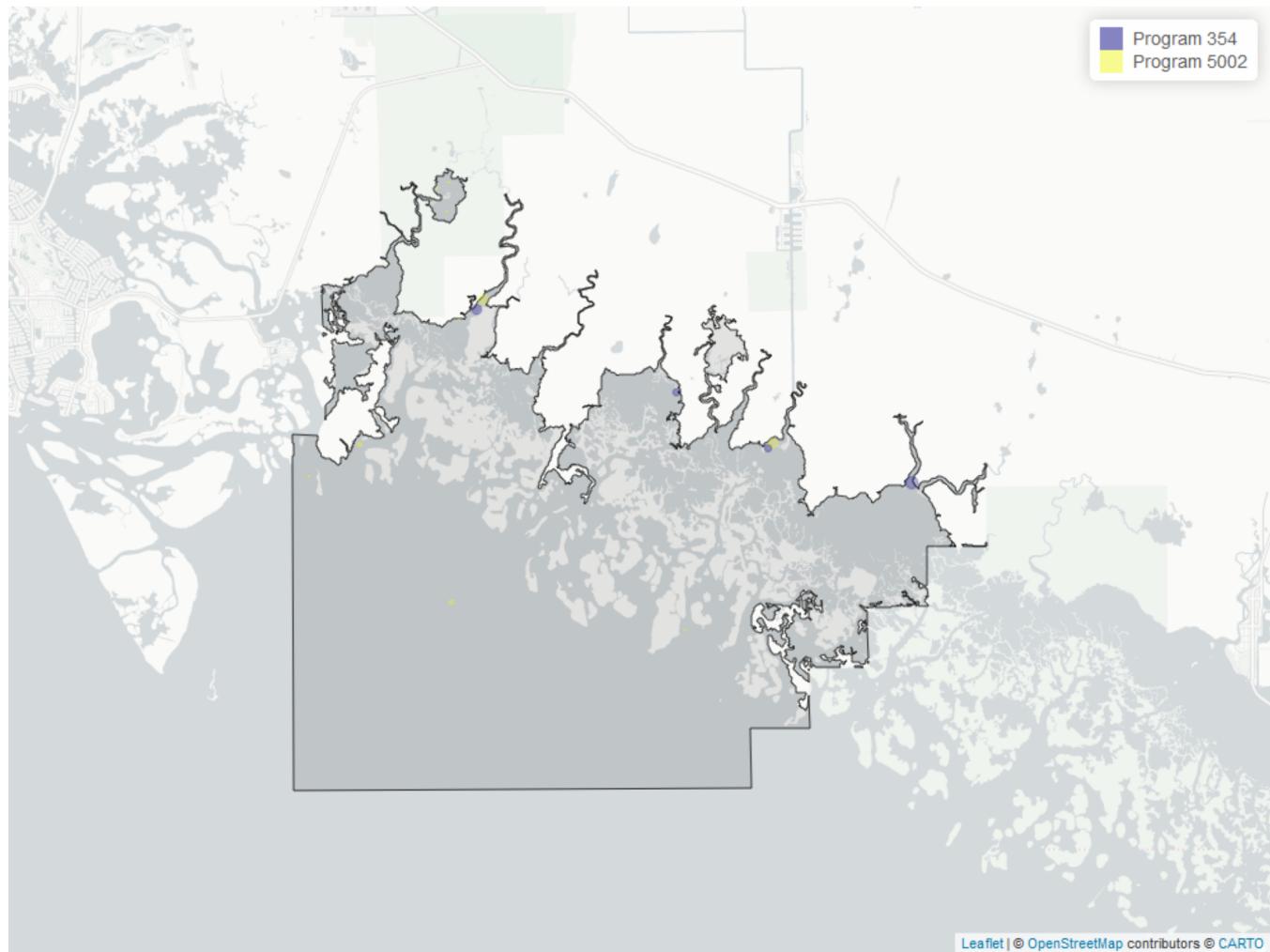
Total Suspended Solids, Lab and Field Combined, All Depths
Cape Romano-Ten Thousand Islands Aquatic Preserve



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 13: Programs contributing data for Total Suspended Solids

ProgramID	N_Data	YearMin	YearMax
354	54	2016	2019
5002	45	1989	2017

Program names:

354 - Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program
5002 - Florida STORET / WIN

Value Qualifiers

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

Table 14: Value Qualifiers for Total Suspended Solids

<i>Year</i>	<i>N_Total</i>	<i>N_I</i>	<i>perc_I</i>
2002	3	1	33.3
2017	24	4	16.7

Note: ¹**I** - Reported value is greater than or equal to lab method detection limit, but less than quantitation limit

Programs containing Value Qualified data:

354 - Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program

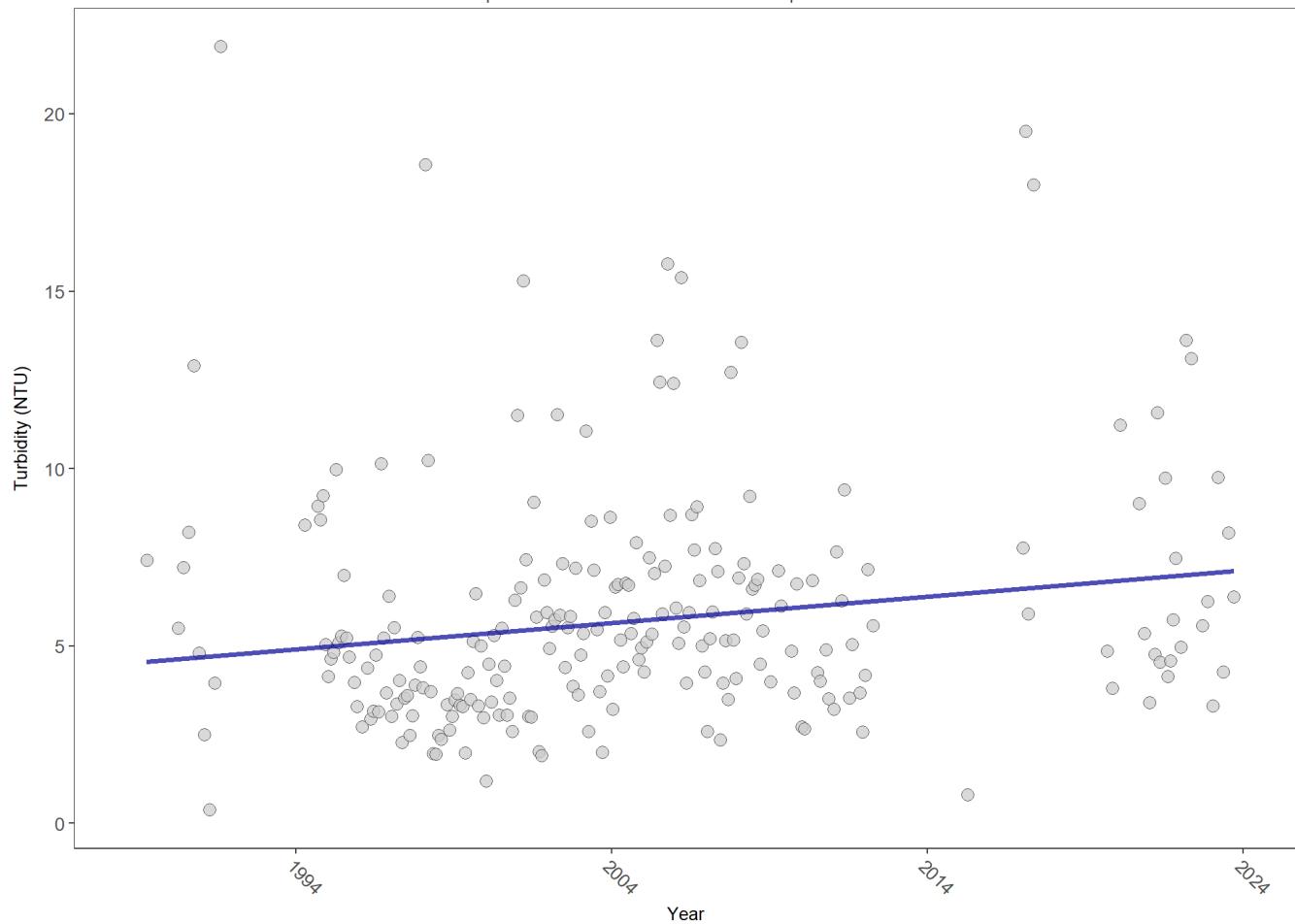
5002 - Florida STORET / WIN

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
Cape Romano-Ten Thousand Islands Aquatic Preserve

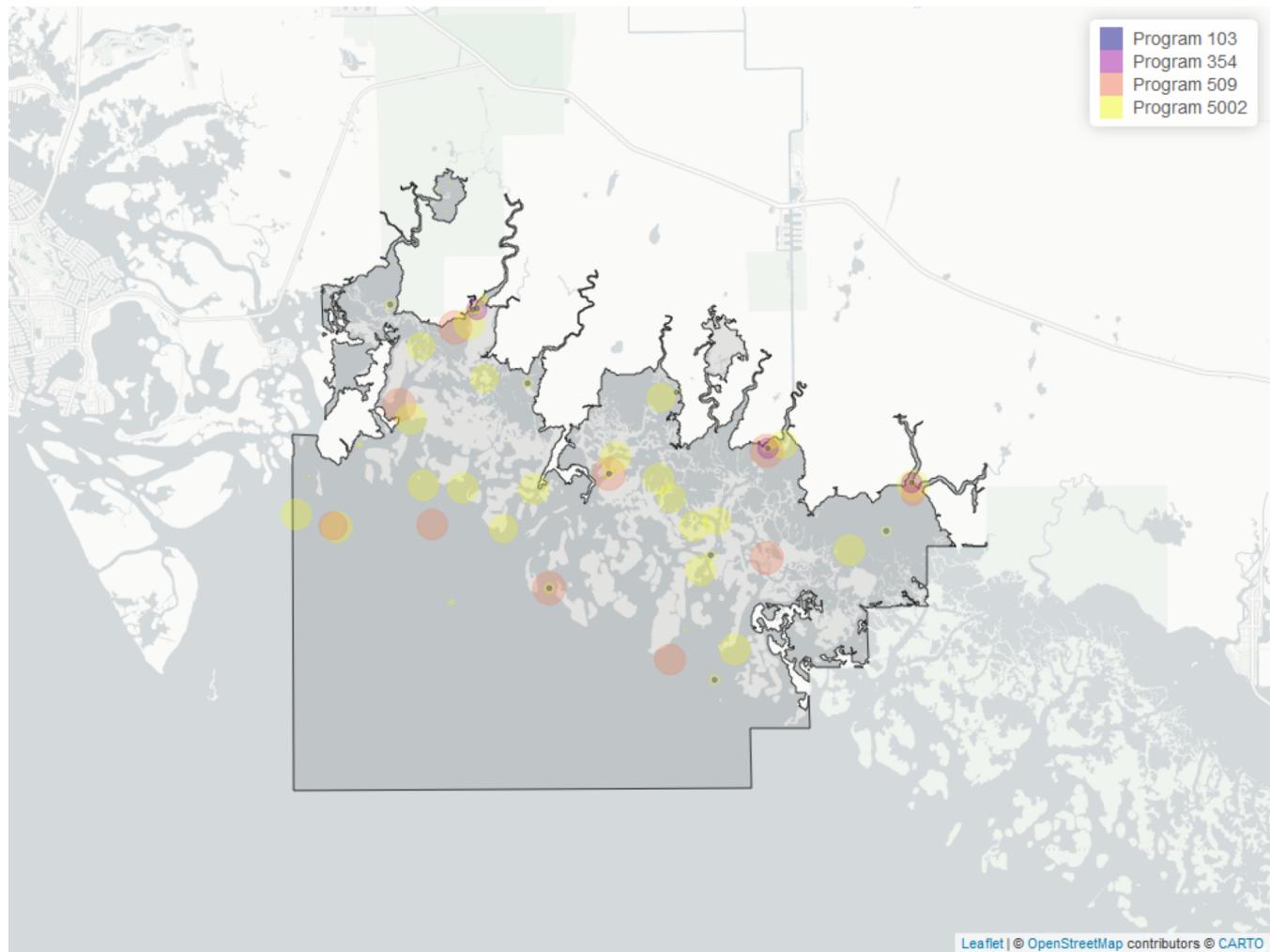


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	4886	29	4.0825	TRUE	0.1403	0.0026	0.07454068	4.534105	11.4005	0.4103	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Turbidity



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

Table 15: Programs contributing data for Turbidity

ProgramID	N_Data	YearMin	YearMax
5002	3109	1989	2023
509	1510	1994	2008
354	207	2002	2006
103	60	2021	2021

Program names:

5002 - Florida STORET / WIN

509 - SERC Water Quality Monitoring Network

354 - Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

Value Qualifiers

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

Table 16: Value Qualifiers for Turbidity

<i>Year</i>	<i>N_Total</i>	<i>N_Q</i>	<i>perc_Q</i>
2017	8	2	25

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

Programs containing Value Qualified data:

354 - Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program

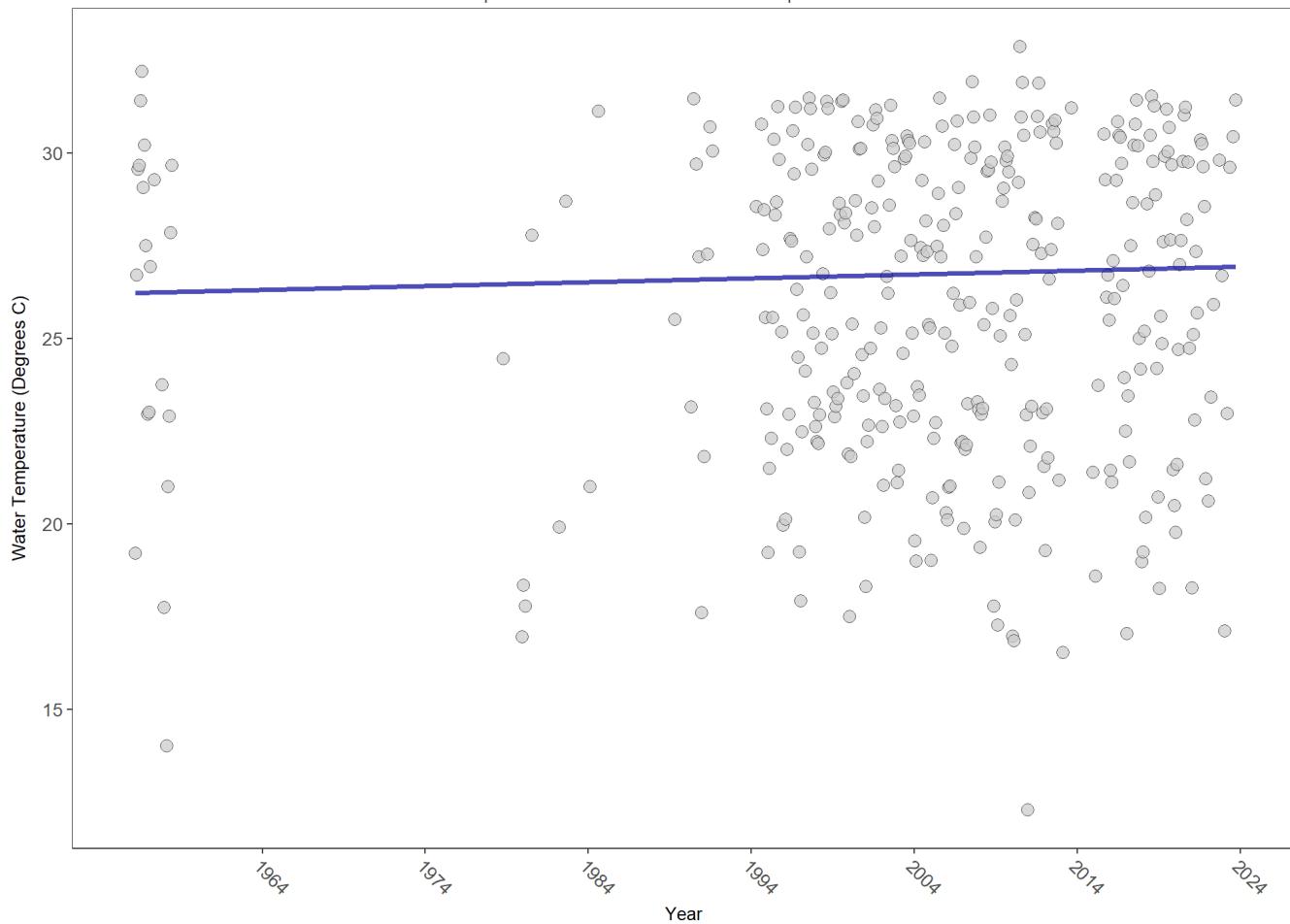
5002 - Florida STORET / WIN

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
Cape Romano-Ten Thousand Islands Aquatic Preserve



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	10525	41	26.8	TRUE	0.0563	0.1216	0.01054975	26.22288	14.4658	0.2083	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 Water Temperature

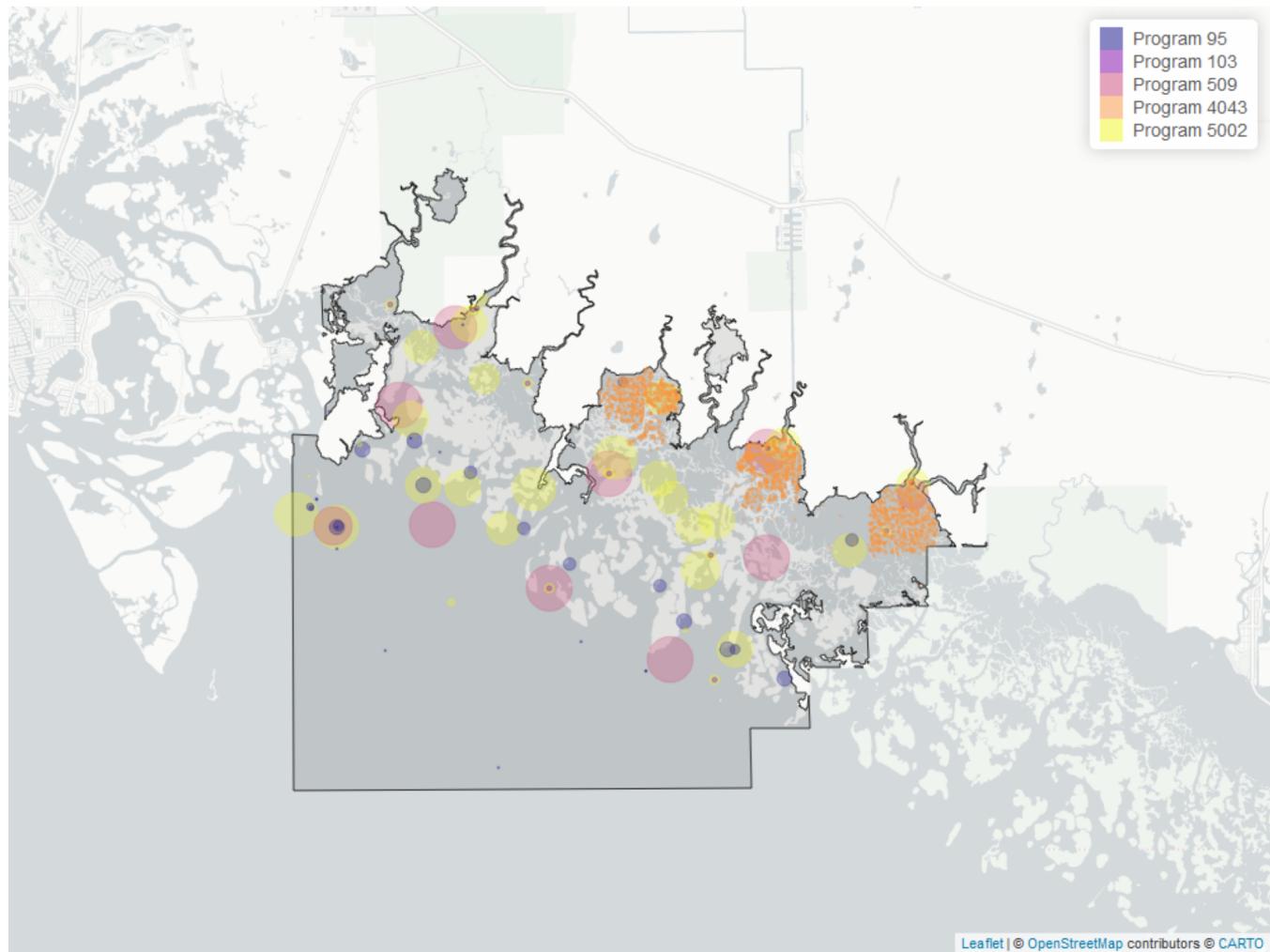


Table 17: Programs contributing data for Water Temperature

ProgramID	N_Data	YearMin	YearMax
5002	4548	1989	2023
509	2944	1994	2008
4043	2532	1999	2020
95	438	1956	2018
103	63	2021	2021

Program names:

5002 - Florida STORET / WIN

509 - SERC Water Quality Monitoring Network

4043 - RBNERR Fish Assessment

95 - Harmful Algal Bloom Marine Observation Network

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

There are no qualifying Value Qualifiers for Water Temperature in Cape Romano-Ten Thousand Islands Aquatic Preserve

Water Quality - Continuous

The following files were used in the continuous analysis:

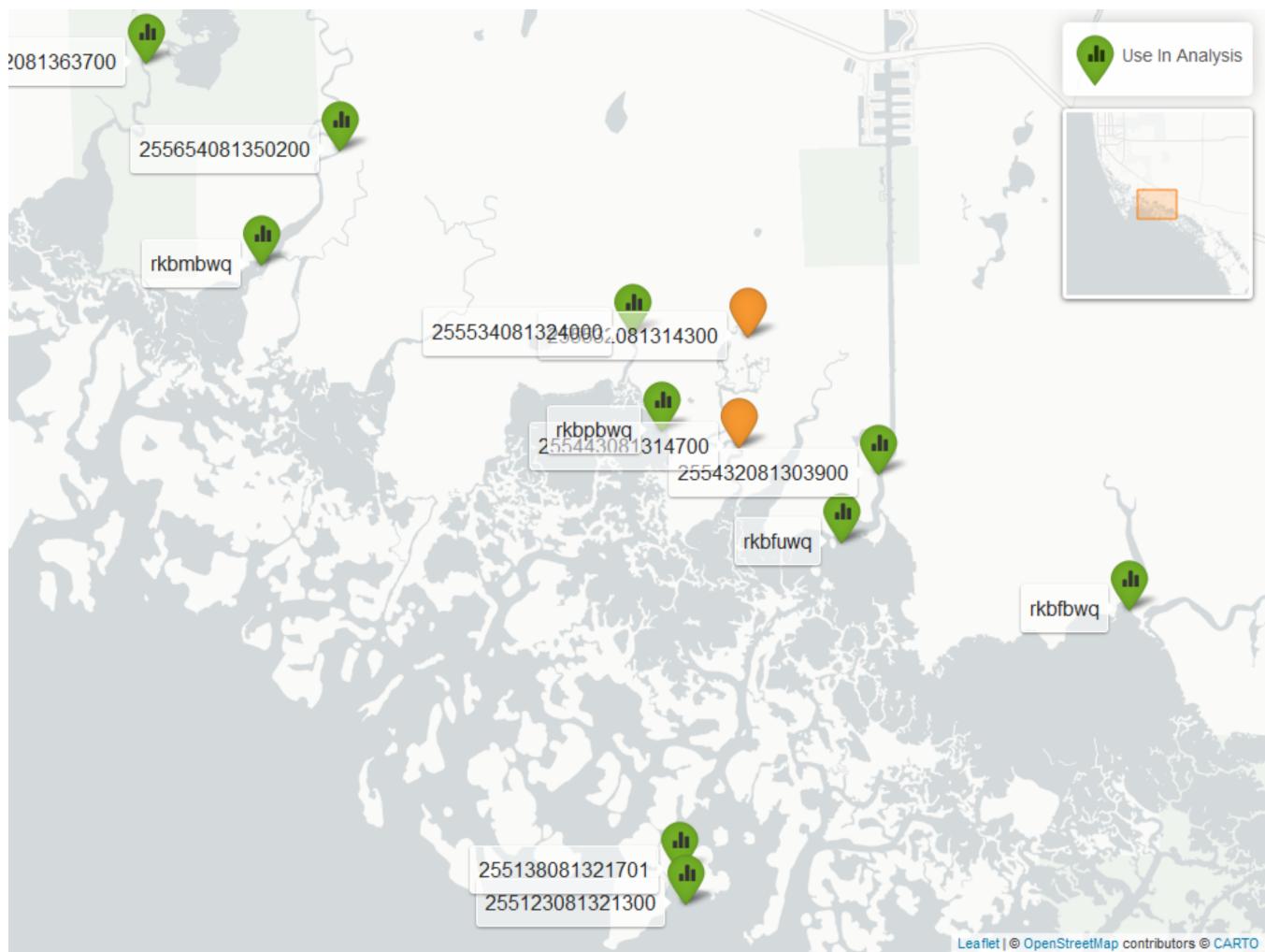
- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_SW-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_Saturation_SW-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_pH_SW-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Salinity_SW-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Turbidity_SW-2024-Mar-23.txt*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

Table 18: Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
rkbfbwq	23	TRUE	DO , DOS , pH , Sal , Turb , TempW
rkbfwq	23	TRUE	DO , DOS , pH , Sal , Turb , TempW
rkbmbwq	25	TRUE	DO , DOS , pH , Sal , Turb , TempW
rkbpbwq	9	TRUE	DO , DOS , pH , Sal , Turb , TempW

Table 19: National Water Information System (7)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
255123081321300	11	TRUE	Sal , TempW
255138081321701	8	TRUE	Sal , TempW
255432081303900	19	TRUE	Sal , TempW
255443081314700	5	FALSE	Sal , TempW
255532081314300	3	FALSE	Sal , TempW
255534081324000	18	TRUE	Sal , TempW
255654081350200	18	TRUE	Sal , TempW
255732081363700	5	TRUE	Sal , TempW



Map showing Continuous Water Quality Monitoring sampling locations within the boundaries of Cape Romano-Ten Thousand Islands Aquatic Preserve. Sites marked as *Use In Analysis* are featured in this report.

Dissolved Oxygen - Continuous Water Quality

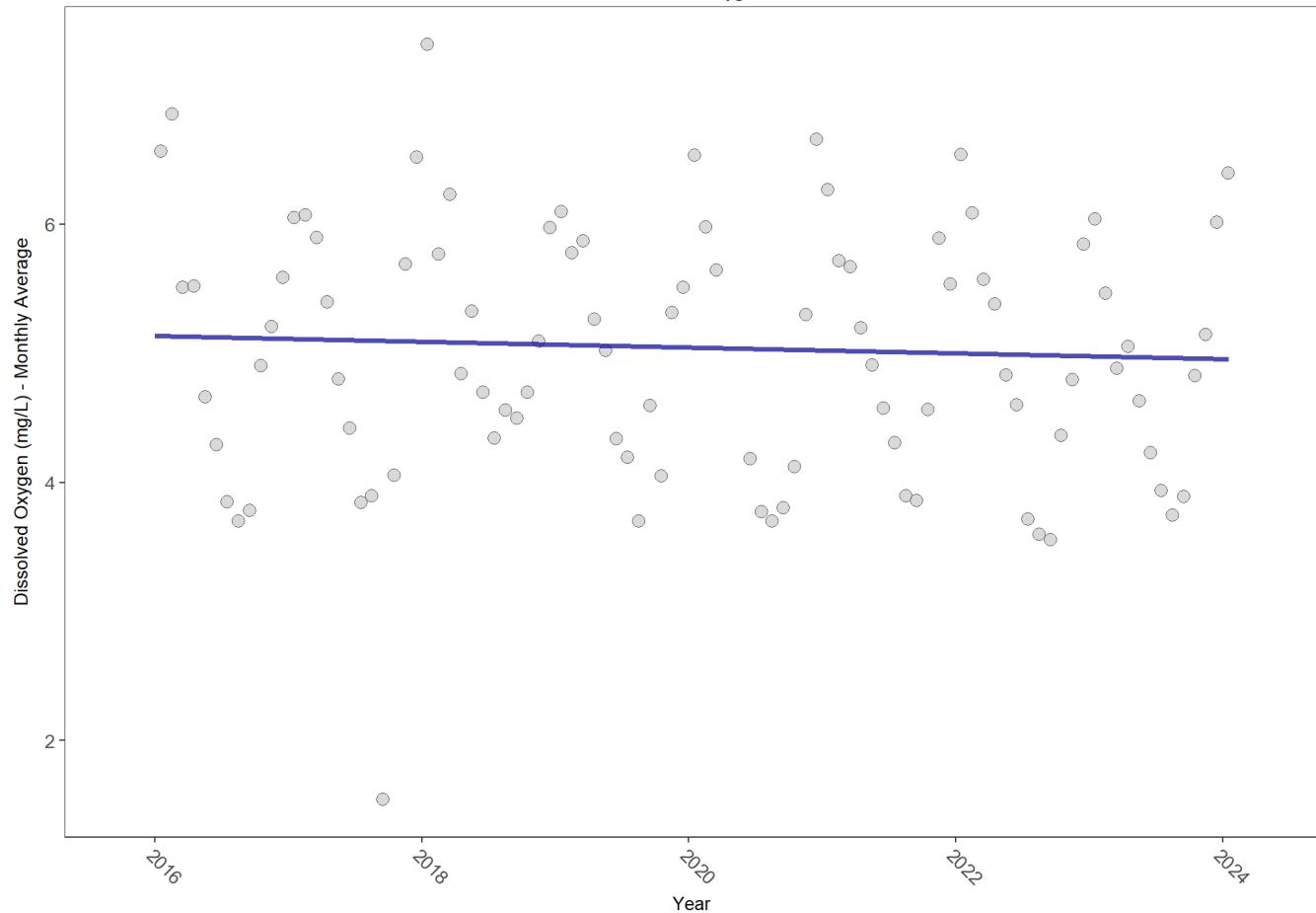
rkbpbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbpbwq

Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	265255	9	5	TRUE	-0.1361	0.1209	-0.02269027	5.137504	5.0929	0.9266	0

p < 0.00005 appear as 0 due to rounding.

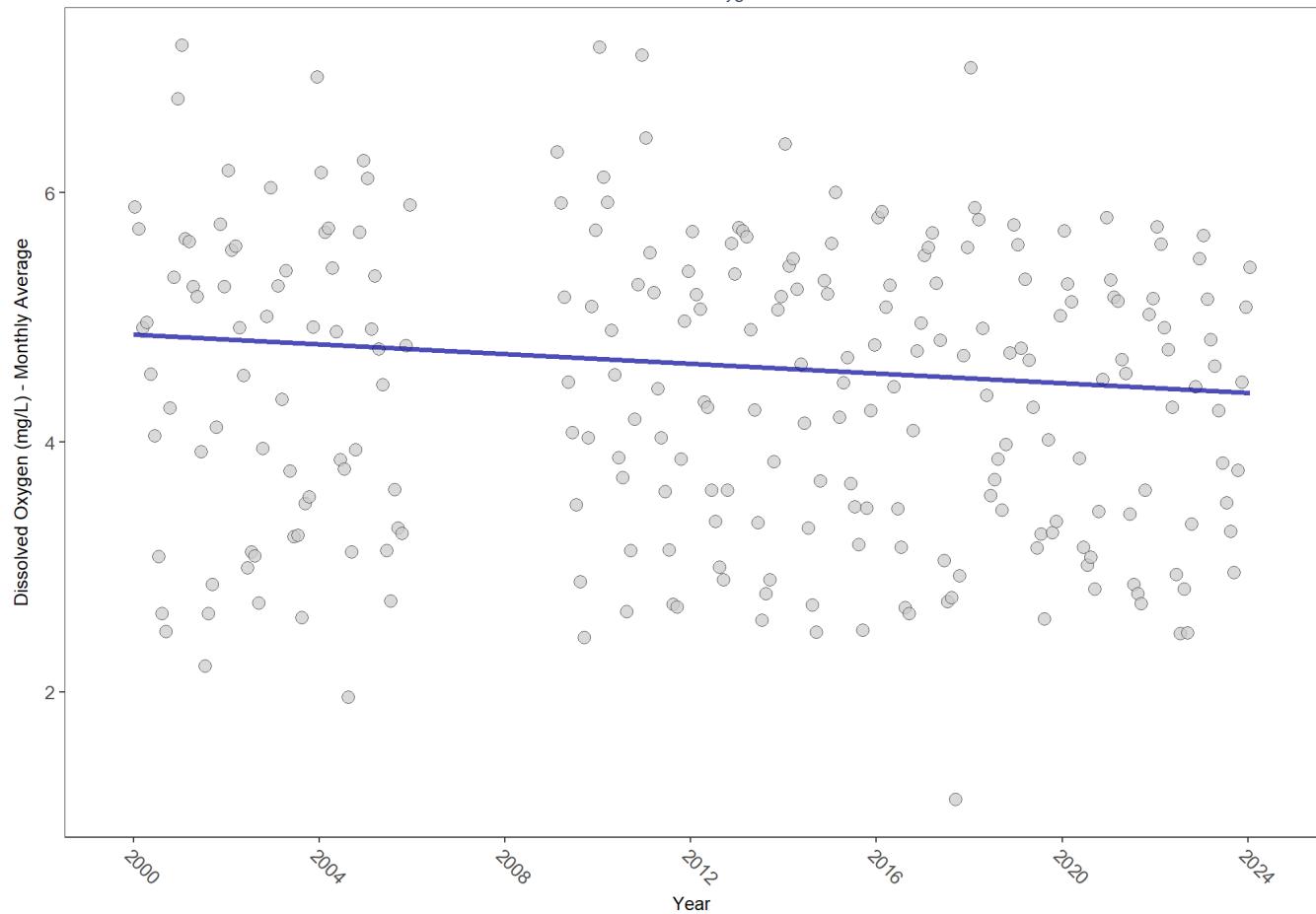
SennIntercept is intercept value at beginning of record for monitoring location

rkbmbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbmbwq
Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	587313	22	4.4	TRUE	-0.2213	0.0000	-0.01941125	4.862686	19.9079	0.0466	-1

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

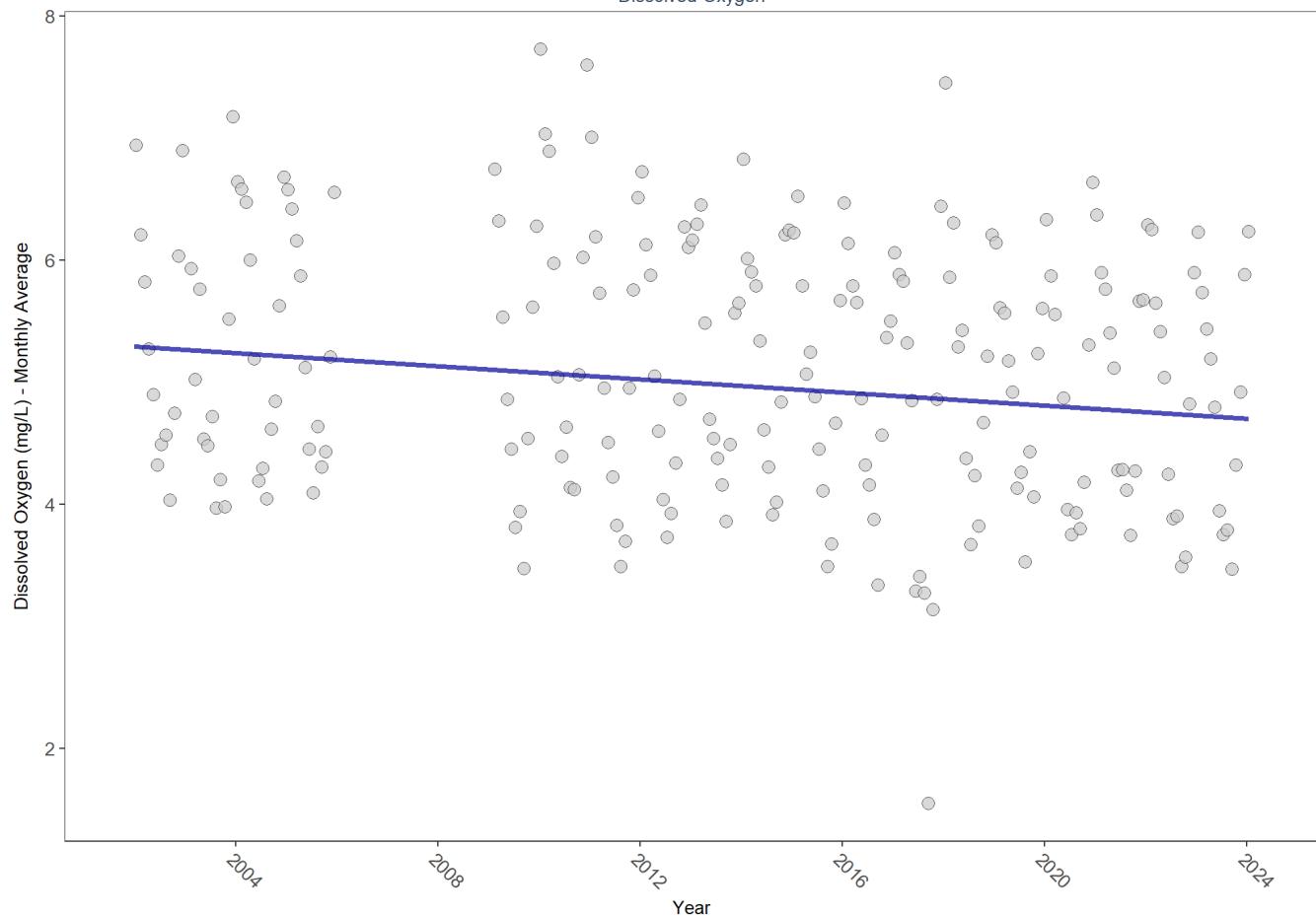
SennIntercept is intercept value at beginning of record for monitoring location

rkbftuwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbftuwq
Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	568567	20	5.1	TRUE	-0.3134	0.0000	-0.02688907	5.292392	7.7285	0.7374	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

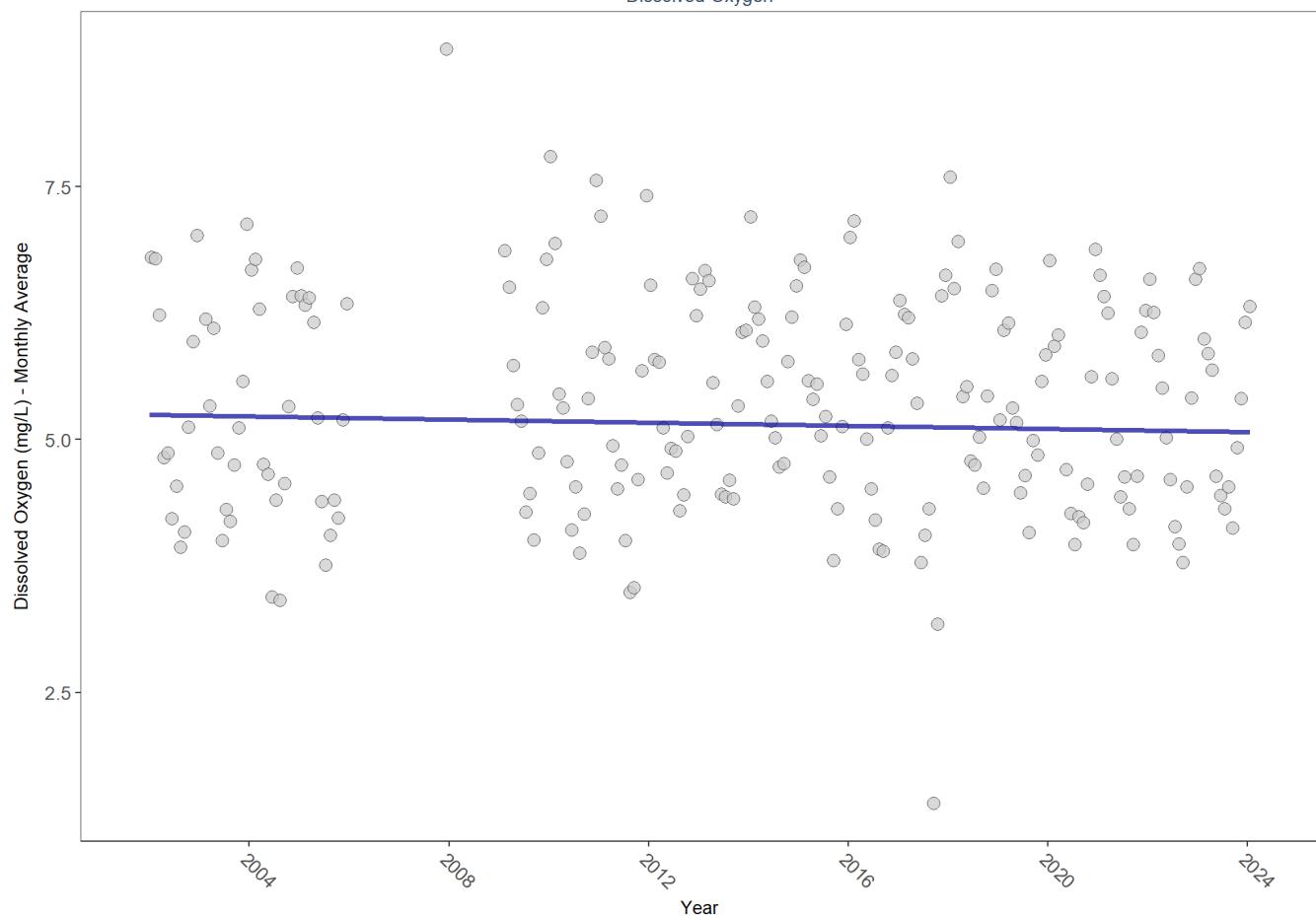
rkbfbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbfbwq

Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	533434	21	5.4	TRUE	-0.061	0.2007	-0.007723325	5.245141	13.7234	0.2487	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

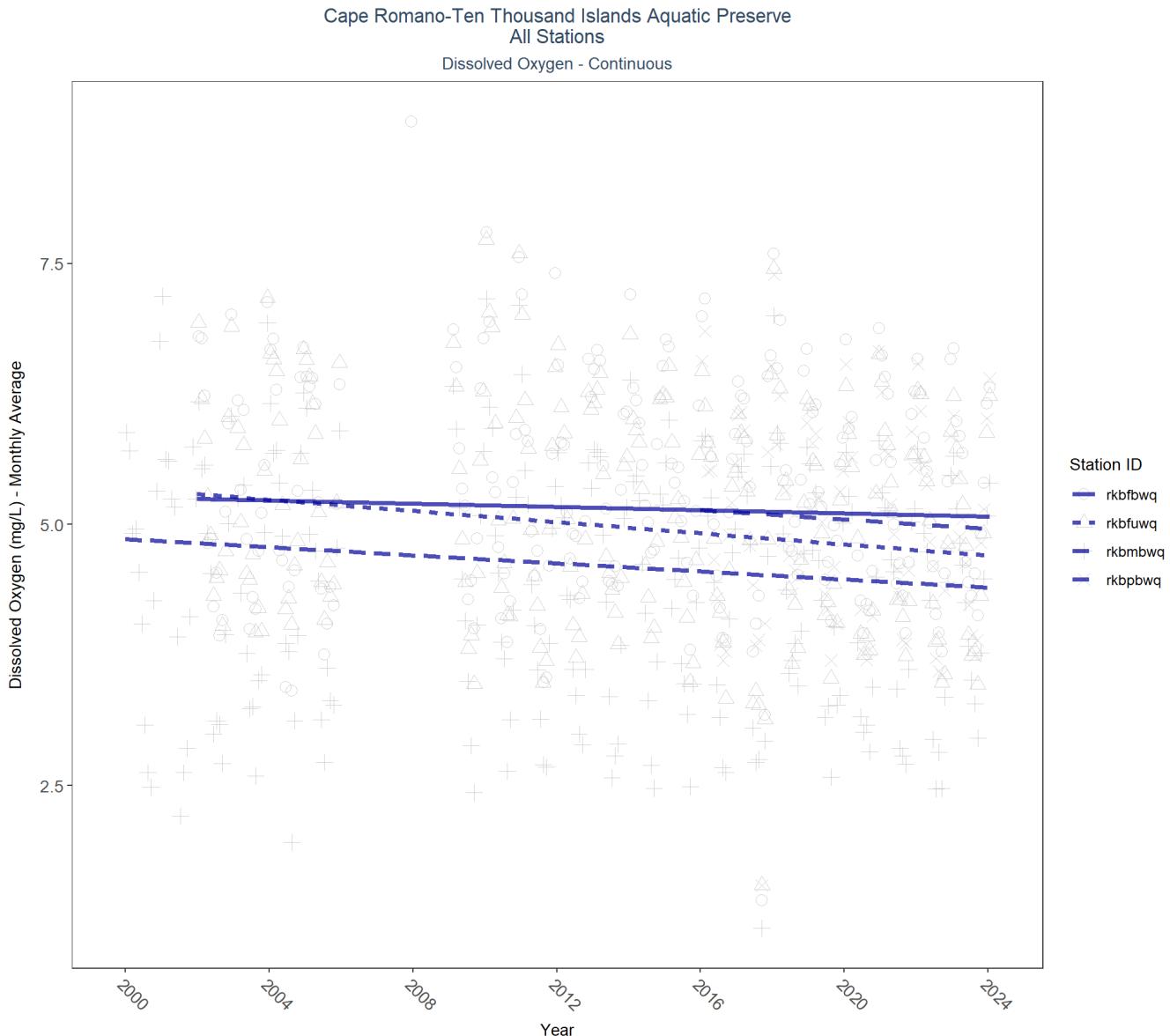


Table 20: Seasonal Kendall-Tau Results for All Stations - Dissolved Oxygen

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
rkbpbwq	265255	9	2016 - 2024	5.0	-0.14	5.14	-0.02	0.1209
rkbmbwq	587313	22	2000 - 2024	4.4	-0.22	4.86	-0.02	0.0000
rkbfuwq	568567	20	2002 - 2024	5.1	-0.31	5.29	-0.03	0.0000
rkbfbwq	533434	21	2002 - 2024	5.4	-0.06	5.25	-0.01	0.2007

Dissolved Oxygen Saturation - Continuous Water Quality

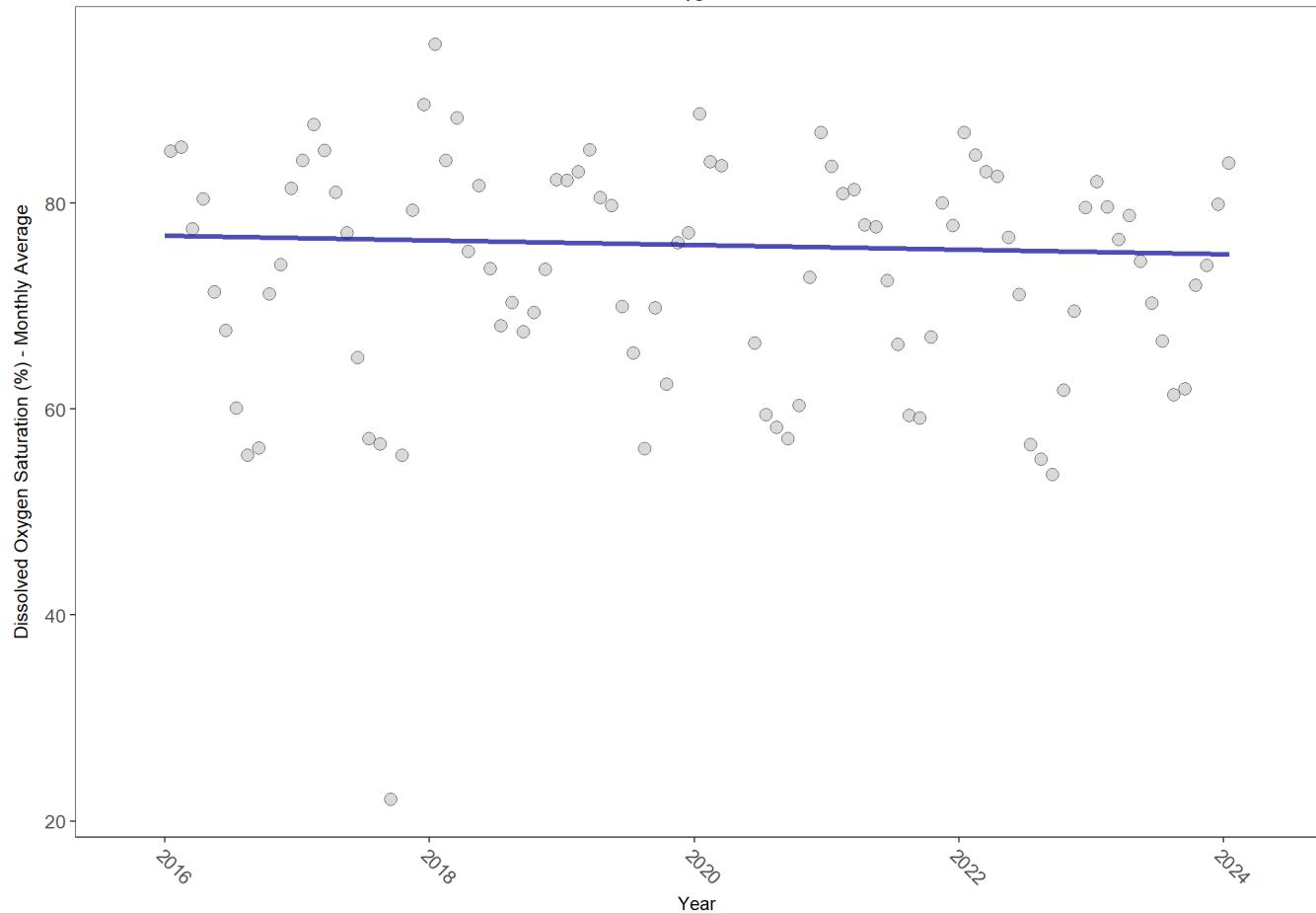
rkbpbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbpbwq

Dissolved Oxygen Saturation



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	266877	9	72.8	TRUE	-0.0875	0.2956	-0.2261626	76.83201	8.2709	0.6888	0

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

SennIntercept is intercept value at beginning of record for monitoring location

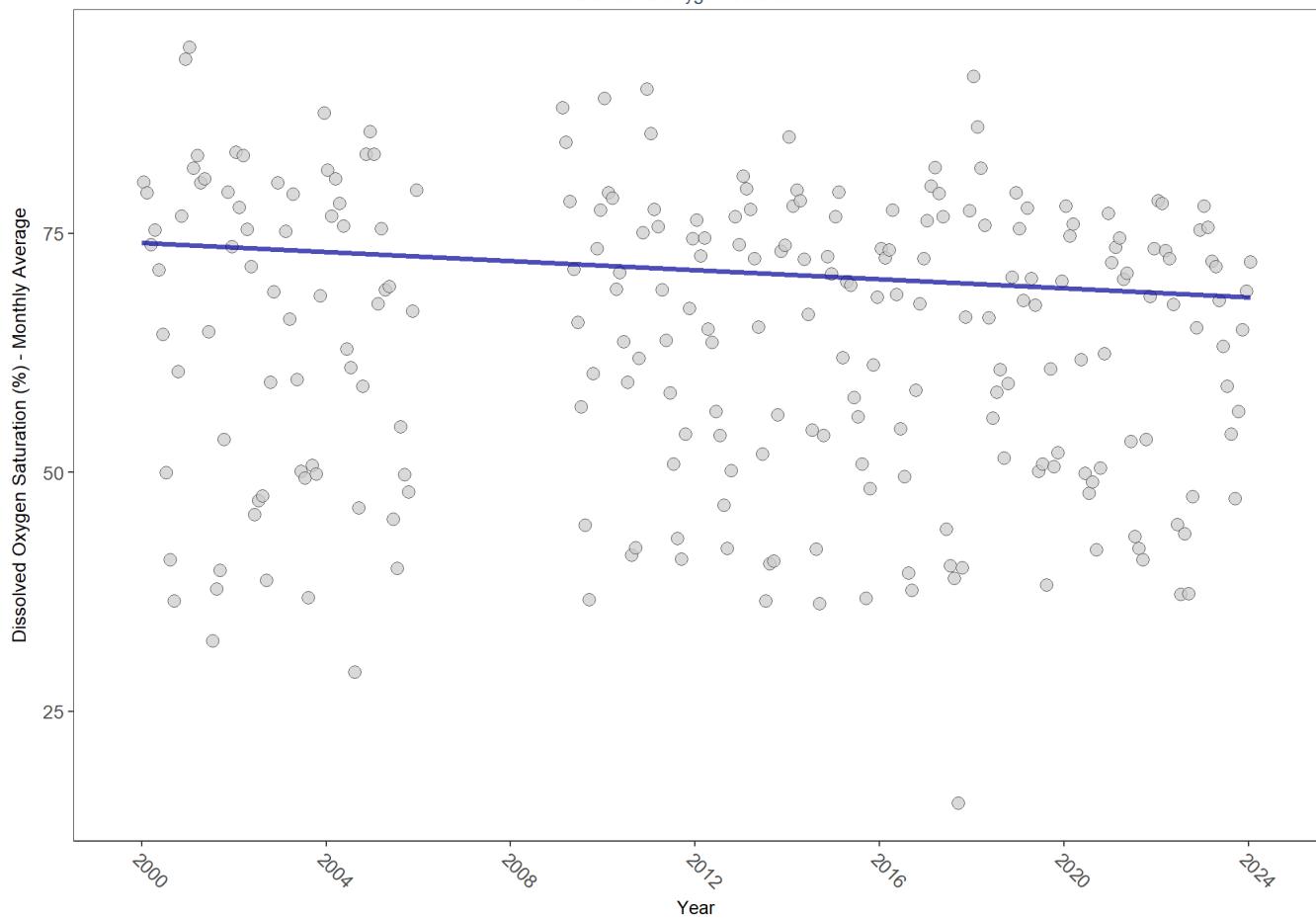
rkbmbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbmbwq

Dissolved Oxygen Saturation



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	593607	22	65.4	TRUE	-0.1926	0.0000	-0.2366685	73.98255	18.5399	0.0699	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

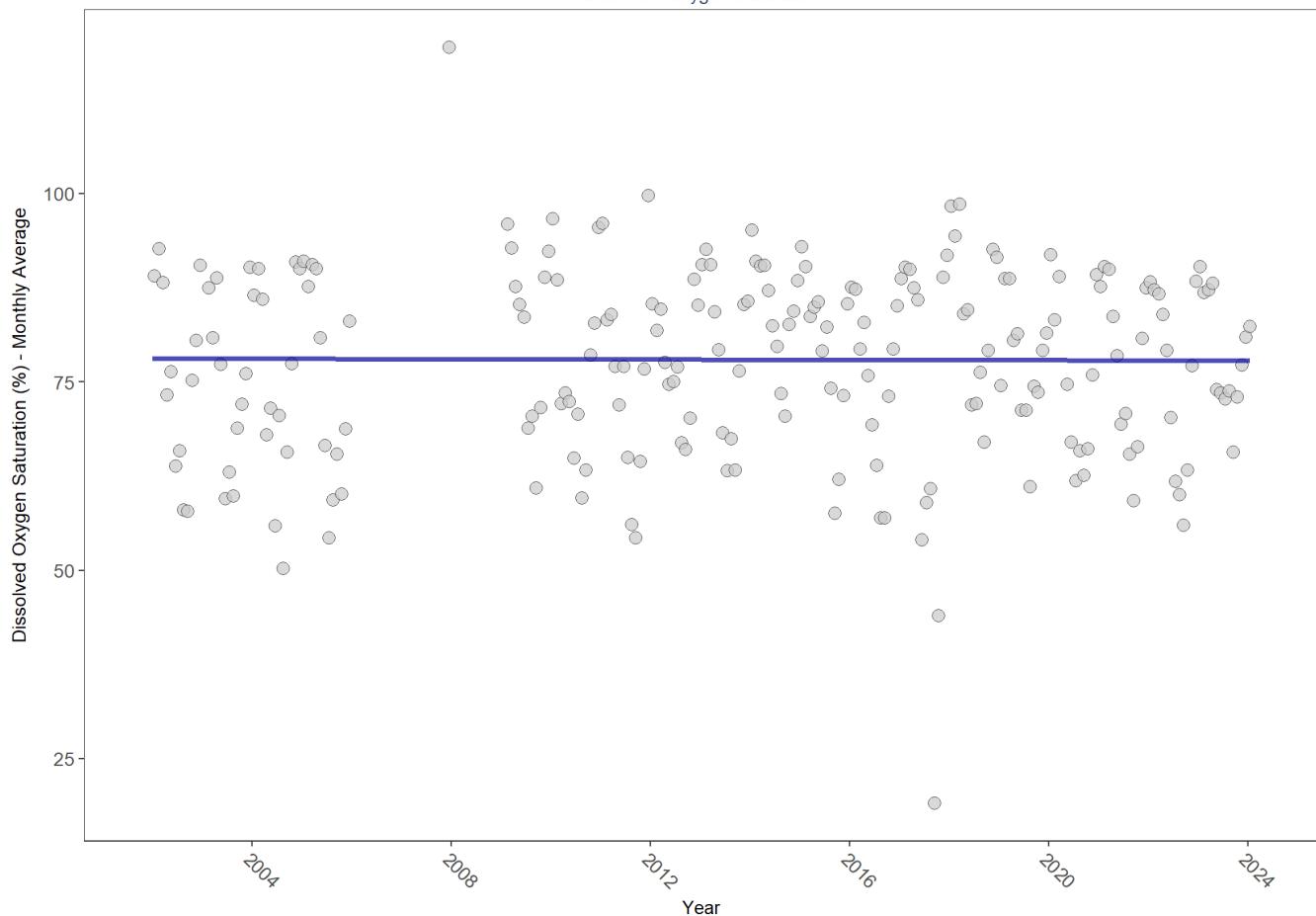
rkbfbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbfbwq

Dissolved Oxygen Saturation



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	537719	21	78.6	TRUE	-0.002	0.9514	-0.01294134	78.13503	13.3462	0.2713	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

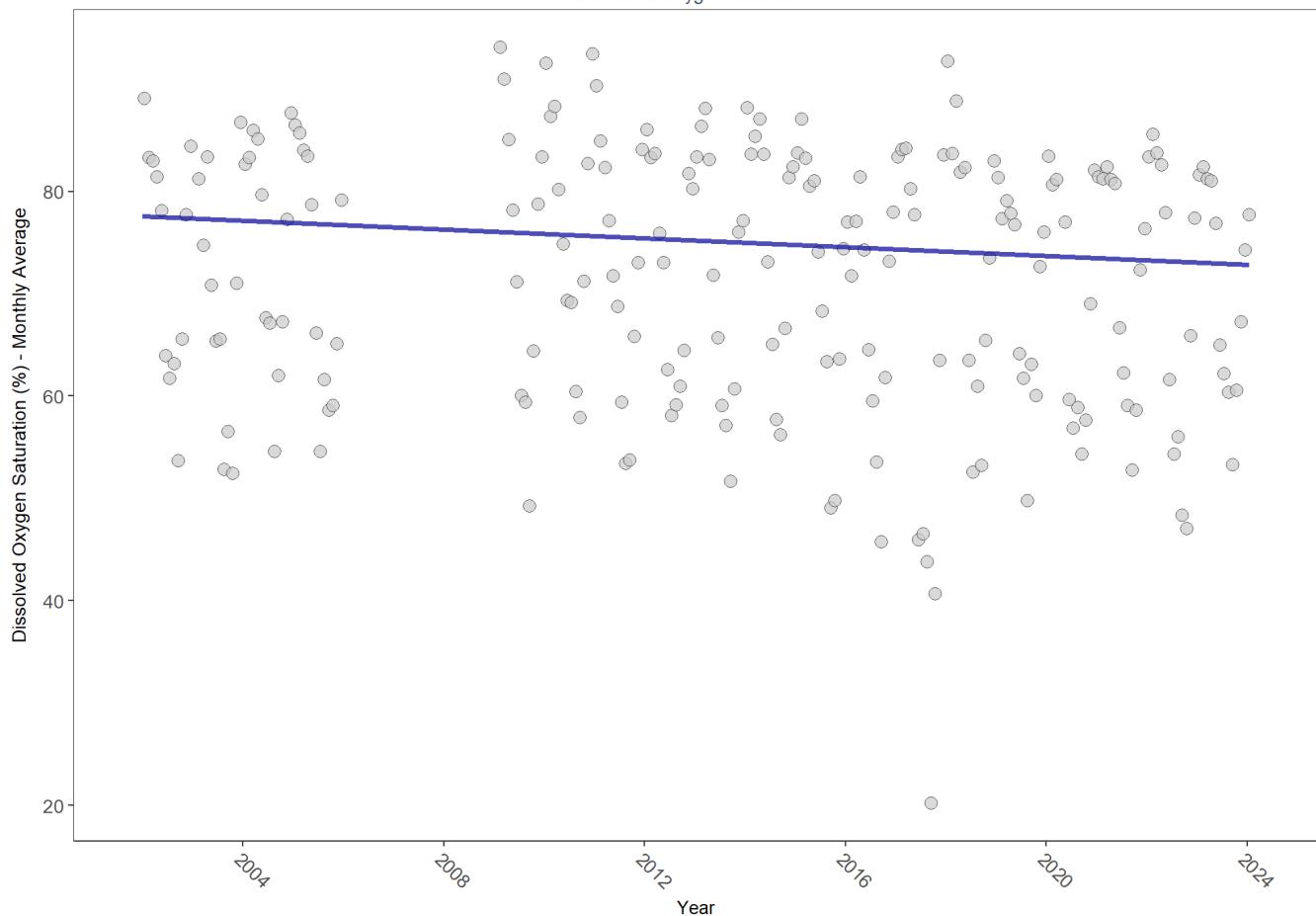
rkbftuwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbftuwq

Dissolved Oxygen Saturation



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	568826	20	72.5	TRUE	-0.2238	0.0000	-0.2137134	77.54466	9.3021	0.594	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

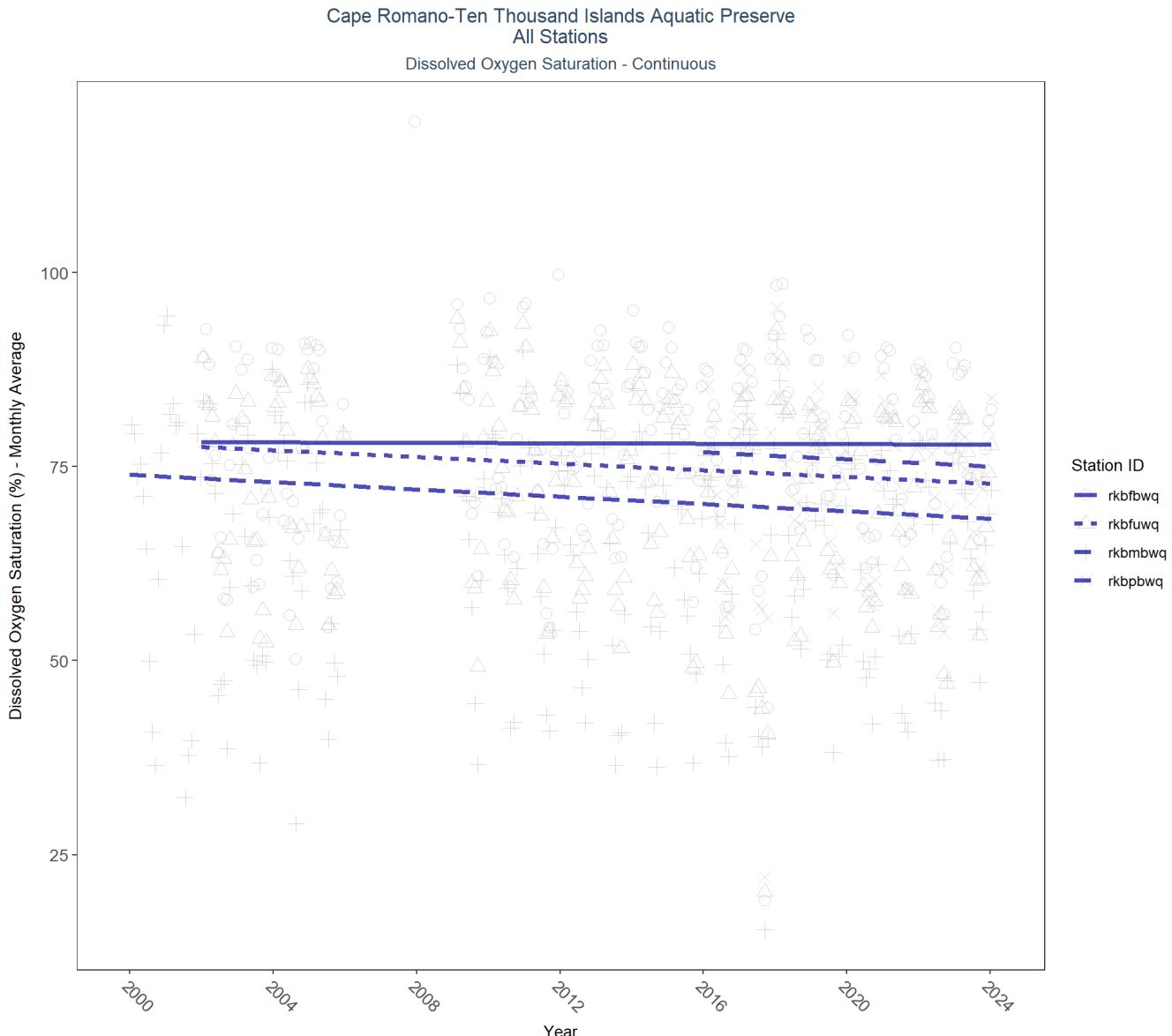


Table 21: Seasonal Kendall-Tau Results for All Stations - Dissolved Oxygen Saturation

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
rkbpbwq	266877	9	2016 - 2024	72.8	-0.09	76.83	-0.23	0.2956
rkbmbwq	593607	22	2000 - 2024	65.4	-0.19	73.98	-0.24	0.0000
rkbfbwq	537719	21	2002 - 2024	78.6	0.00	78.14	-0.01	0.9514
rkbfuwq	568826	20	2002 - 2024	72.5	-0.22	77.54	-0.21	0.0000

pH - Continuous Water Quality

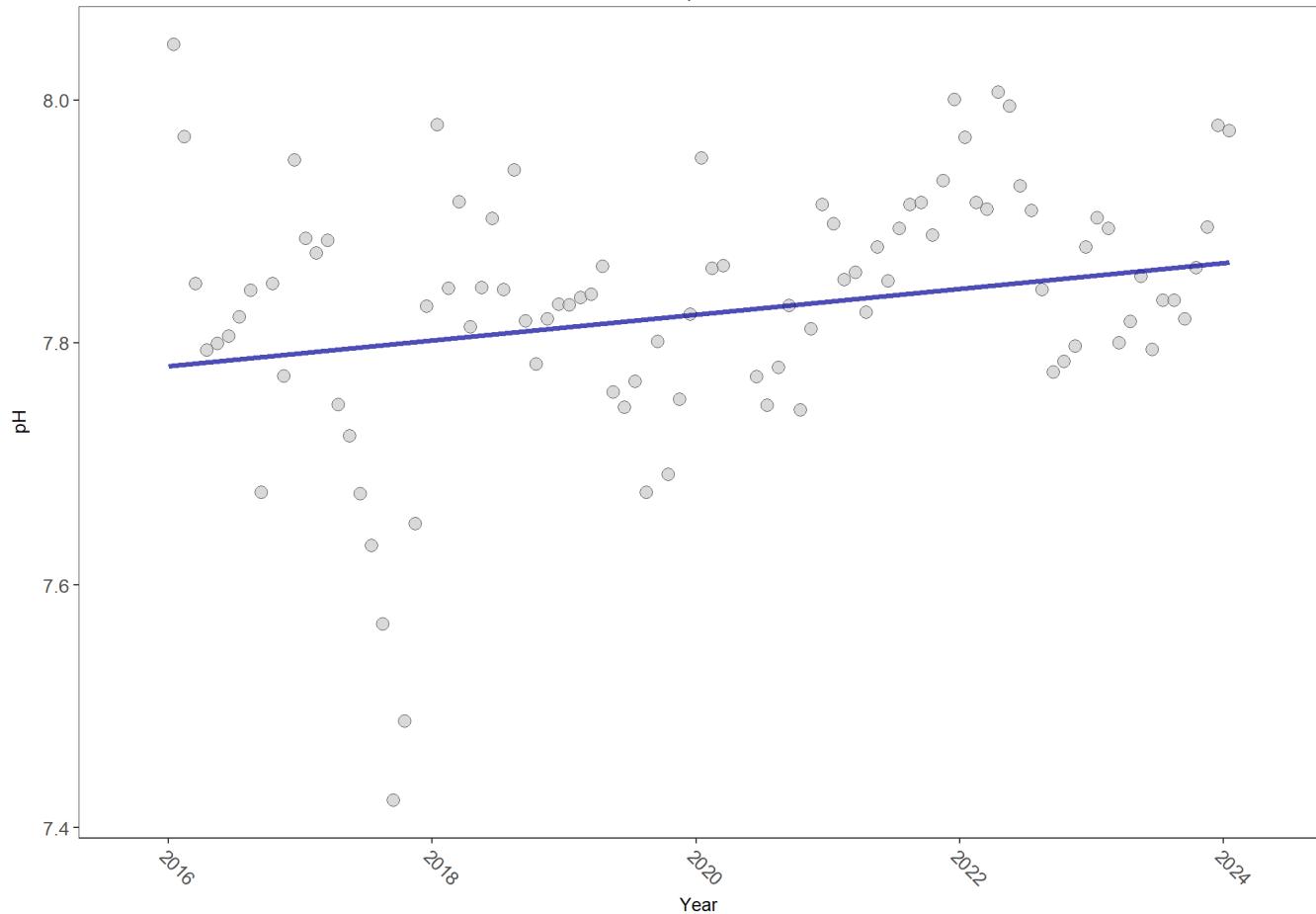
rkbpbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbpbwq

pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	258730	9	7.8	TRUE	0.2576	0.0035	0.01059503	7.780725	5.7876	0.8872	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

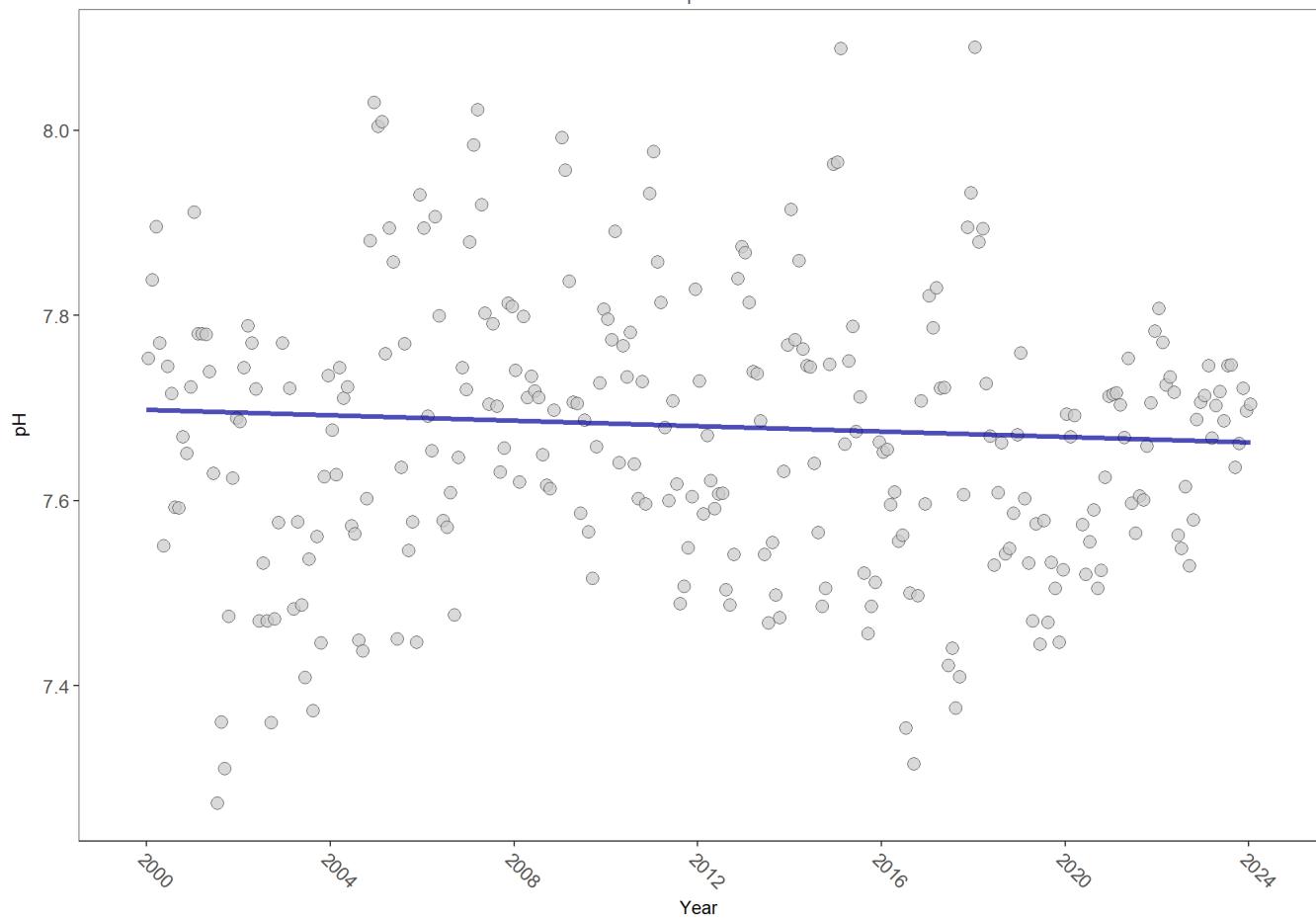
rkbmbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbmbwq

pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	657568	25	7.7	TRUE	-0.066	0.1270	-0.001481863	7.698423	8.2436	0.6913	0

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

SennIntercept is intercept value at beginning of record for monitoring location

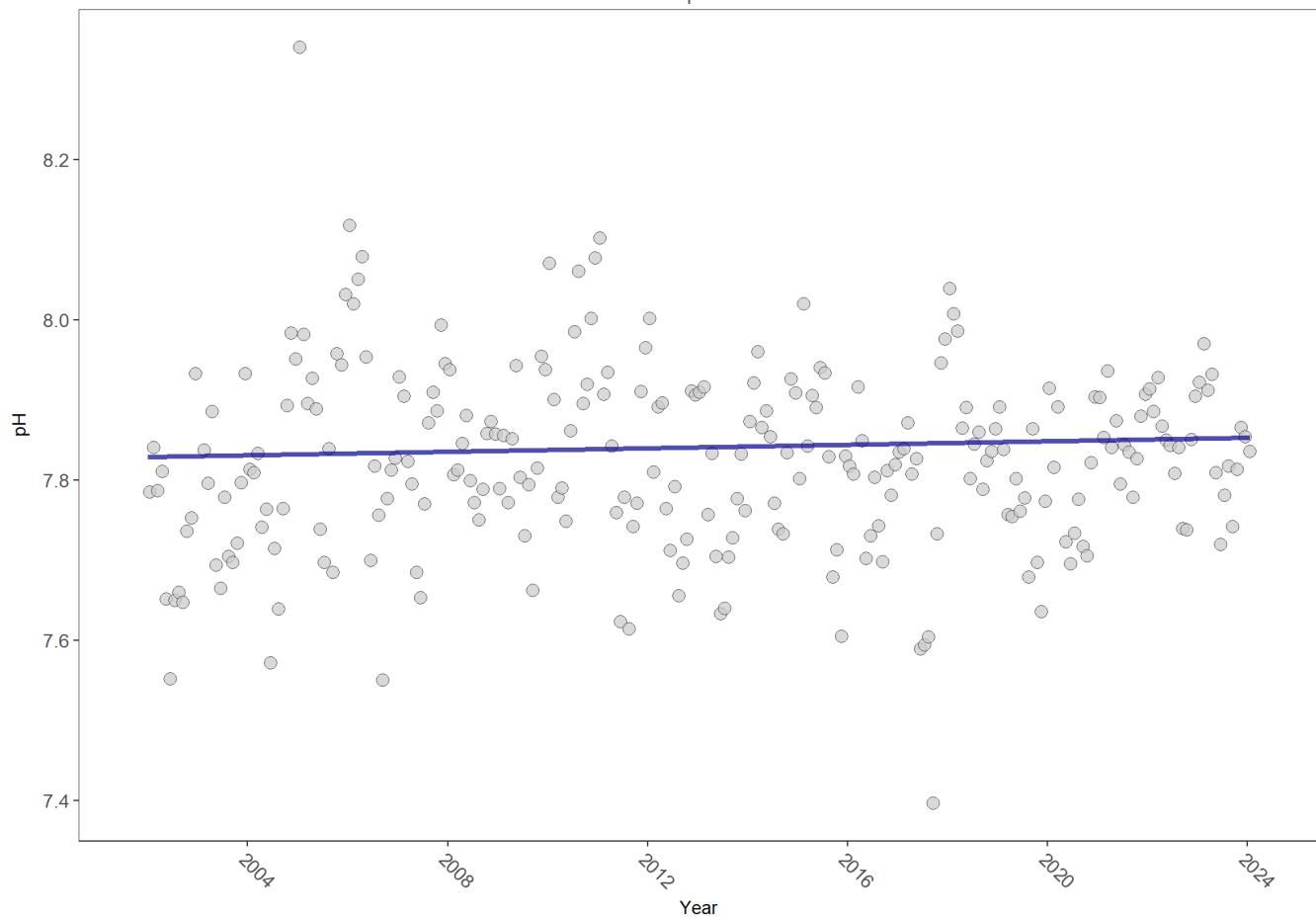
rkbfbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbfbwq

pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	600183	23	7.8	TRUE	0.0535	0.2322	0.00106079	7.82921	14.627	0.2002	0

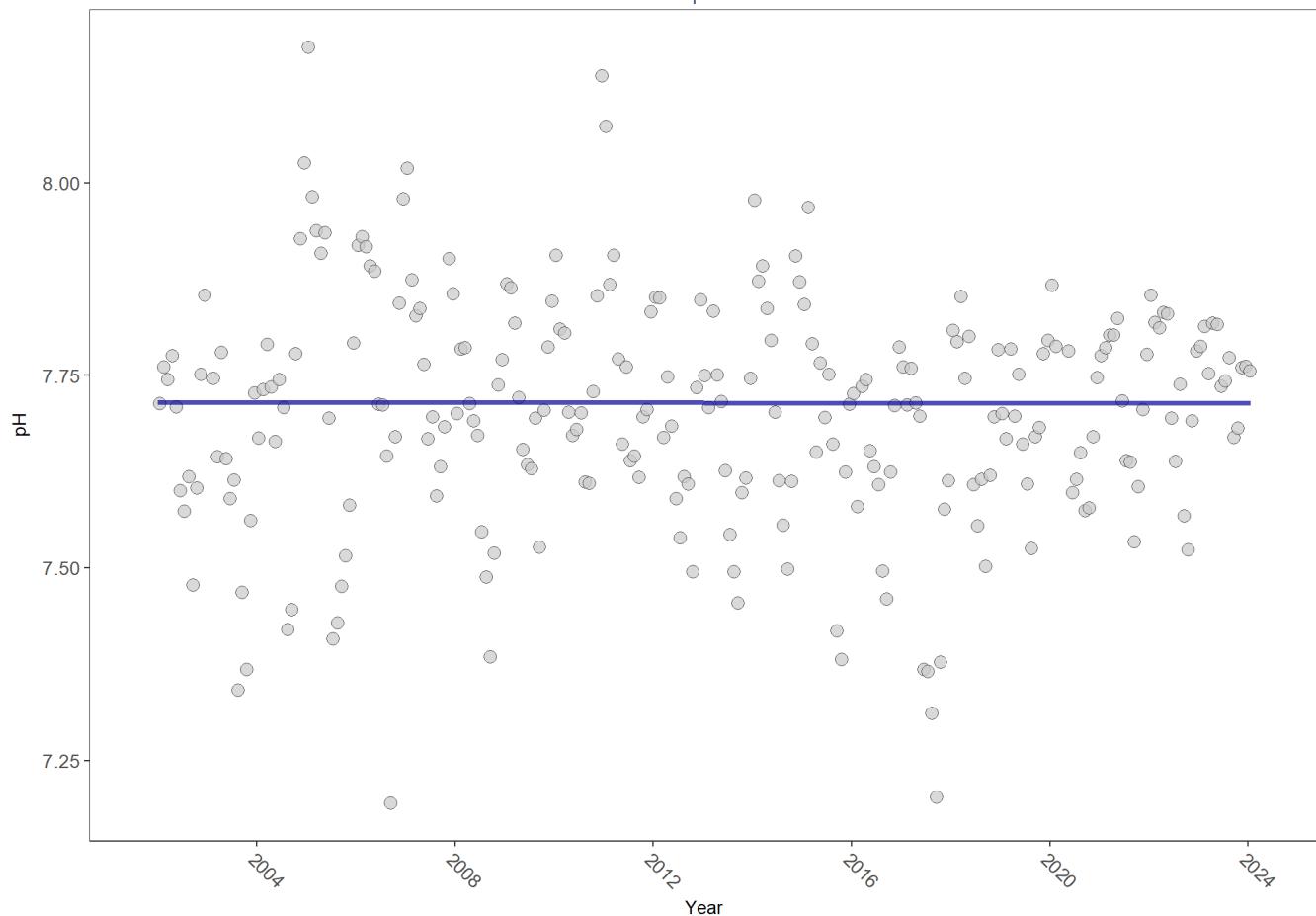
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

rkbftuwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve
rkbftuwq
pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	623866	23	7.7	TRUE	-0.0021	0.9803	-0.0000416198	7.715122	18.8823	0.0632	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

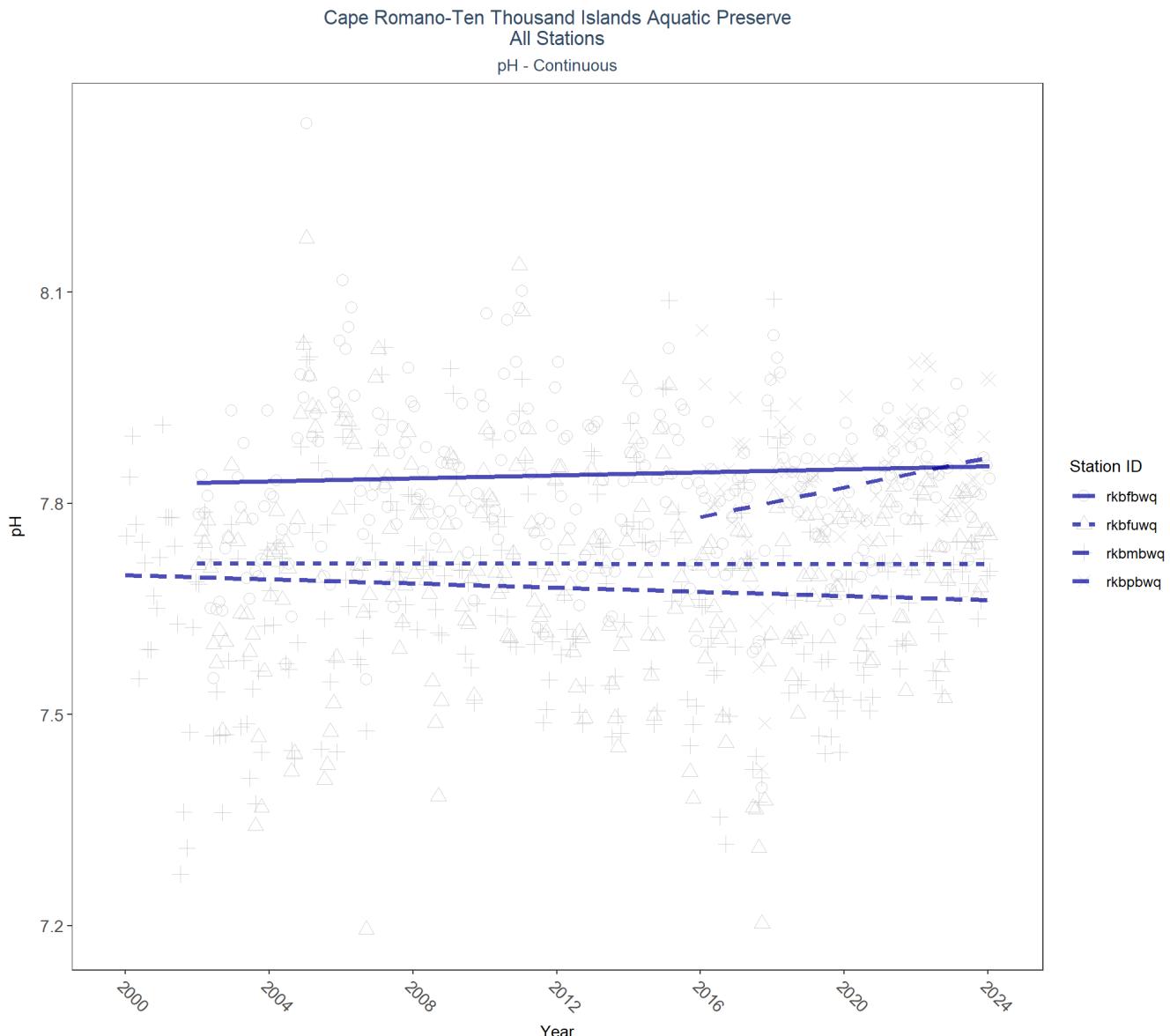


Table 22: Seasonal Kendall-Tau Results for All Stations - pH

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
rkbpbwq	258730	9	2016 - 2024	7.8	0.26	7.78	0.01	0.0035
rkbmbwq	657568	25	2000 - 2024	7.7	-0.07	7.70	0.00	0.1270
rkbfbwq	600183	23	2002 - 2024	7.8	0.05	7.83	0.00	0.2322
rkbfuwq	623866	23	2002 - 2024	7.7	0.00	7.72	0.00	0.9803

Salinity - Continuous Water Quality

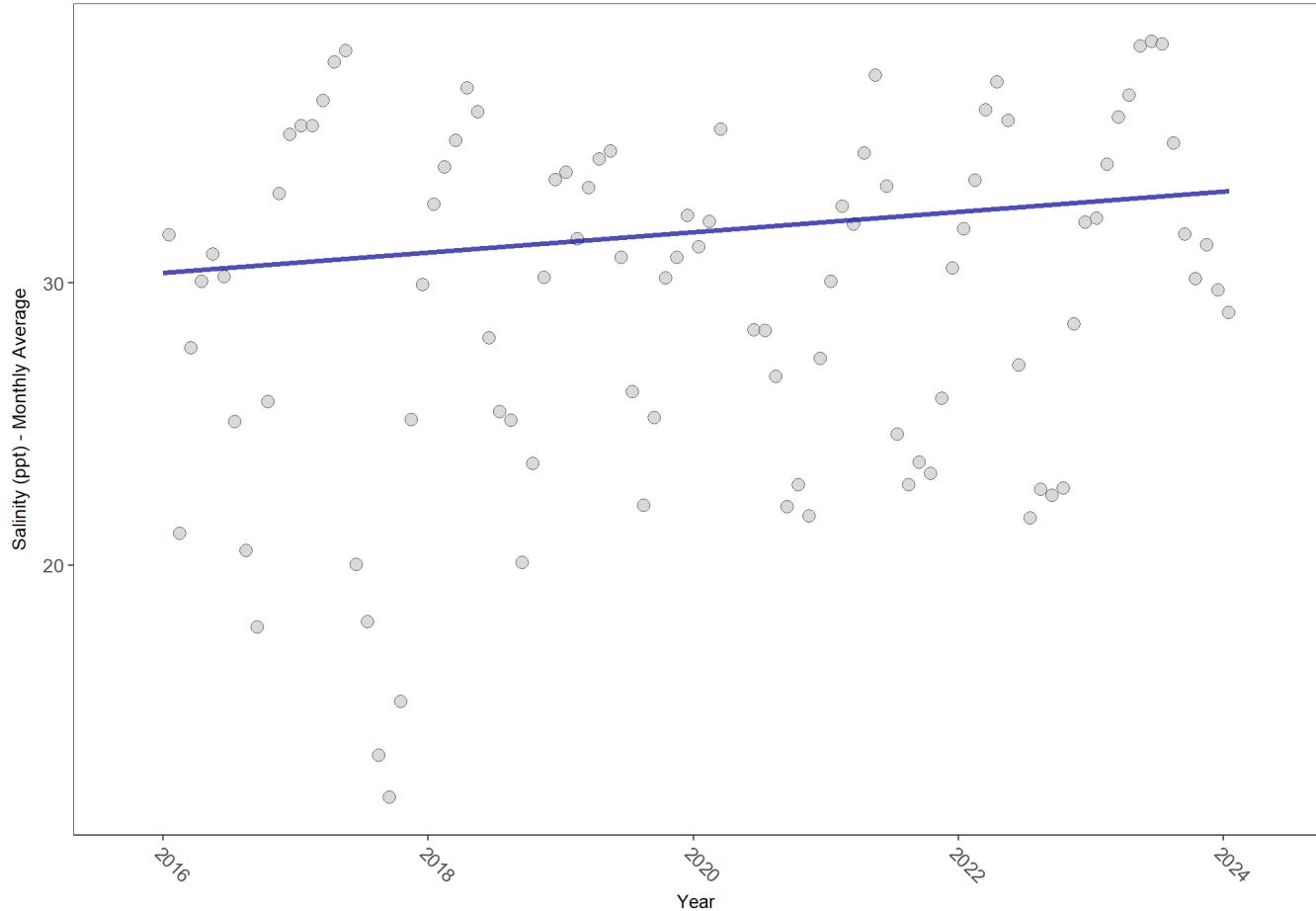
rkbpbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbpbwq

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	265563	9	30.5	TRUE	0.1546	0.0900	0.3607148	30.35187	14.1483	0.2249	0

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

SennIntercept is intercept value at beginning of record for monitoring location

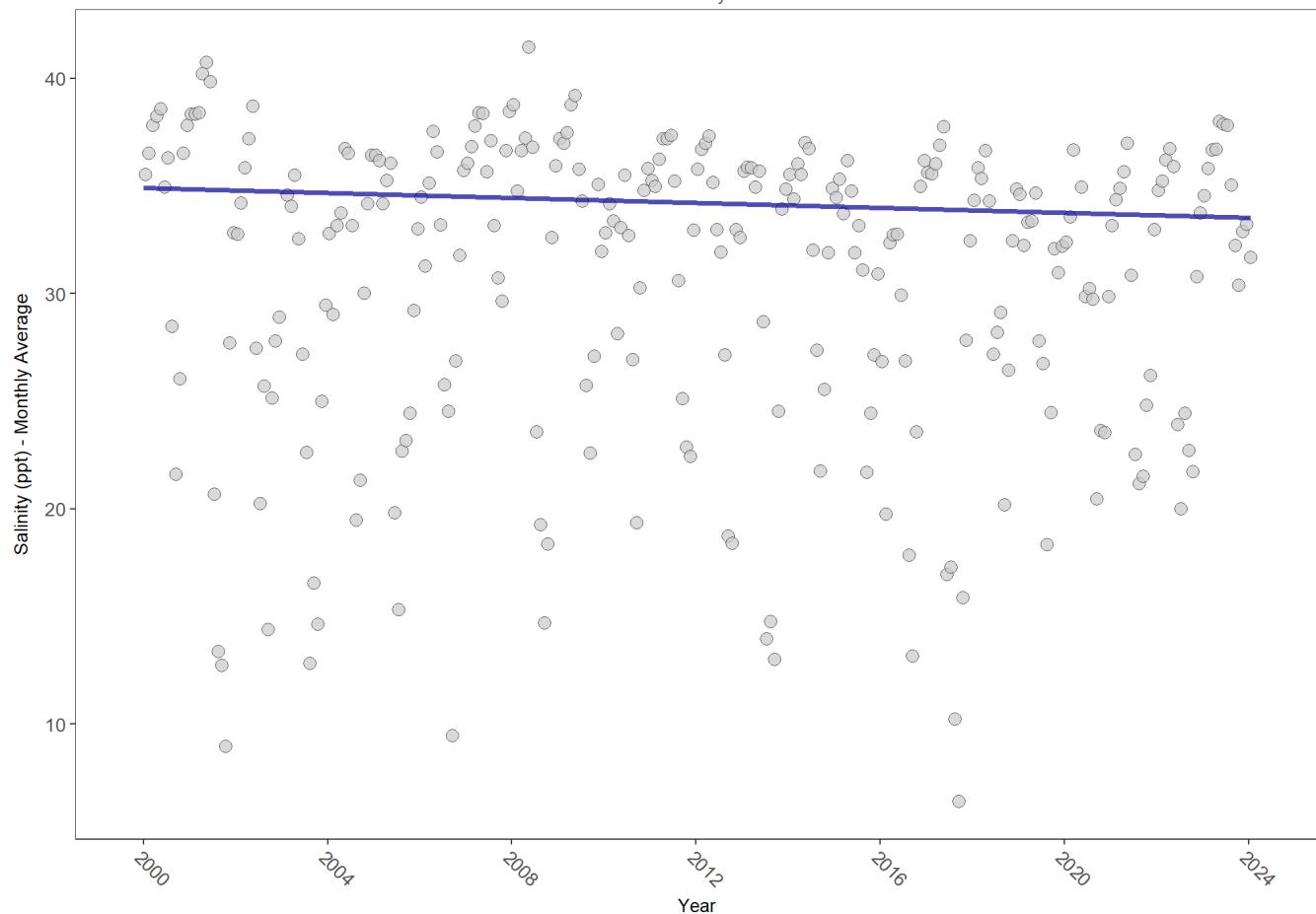
rkbmbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbmbwq

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	668919	25	33.4	TRUE	-0.0817	0.0556	-0.05712366	34.8987	12.5693	0.3224	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

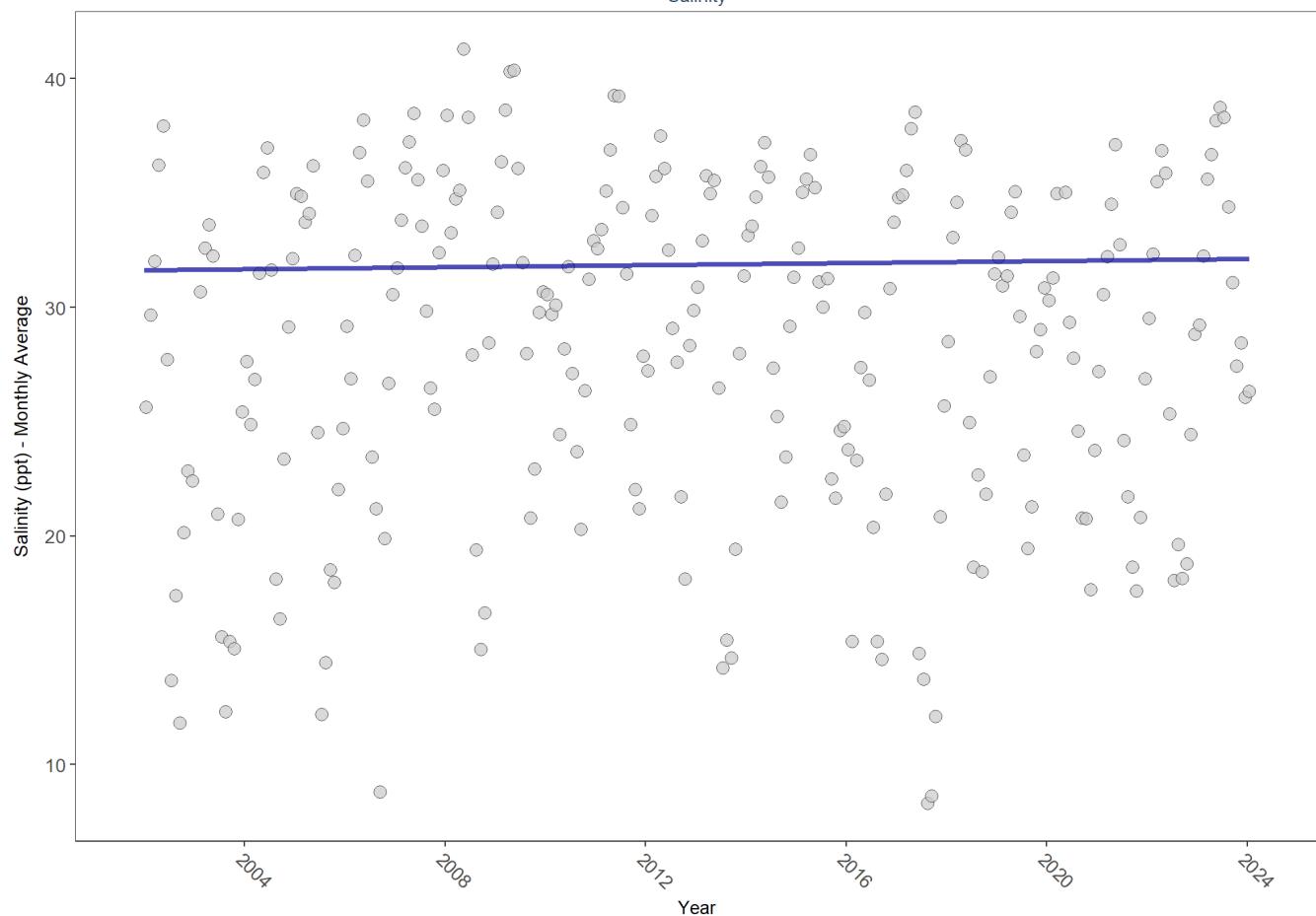
rkbfbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbfbwq

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	632702	23	29.9	TRUE	0.024	0.6004	0.02121711	31.63733	6.8237	0.8132	0

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

SennIntercept is intercept value at beginning of record for monitoring location

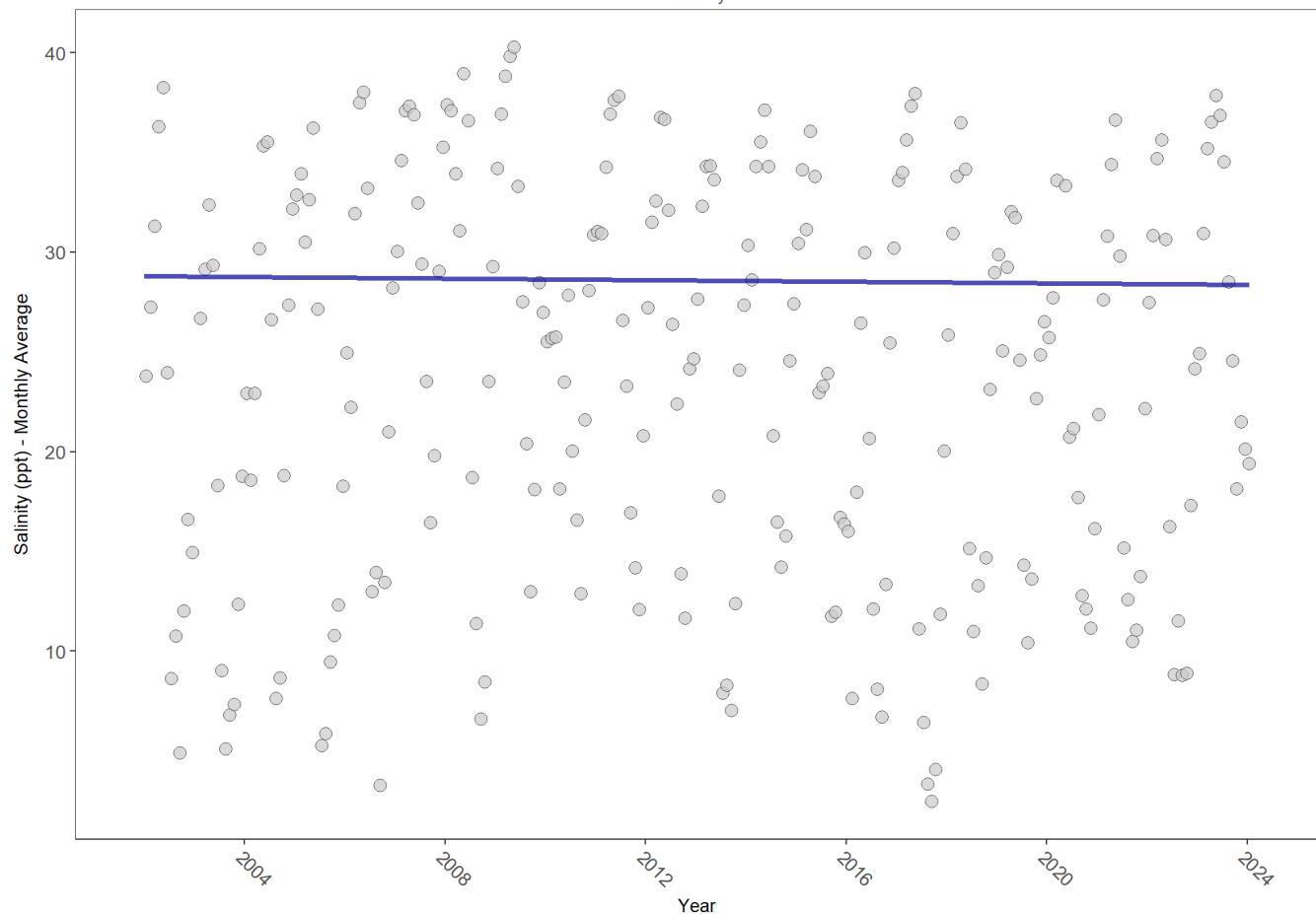
rkbftuwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbftuwq

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	649121	23	26.3	TRUE	-0.0162	0.7188	-0.01908569	28.79302	8.9425	0.6272	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

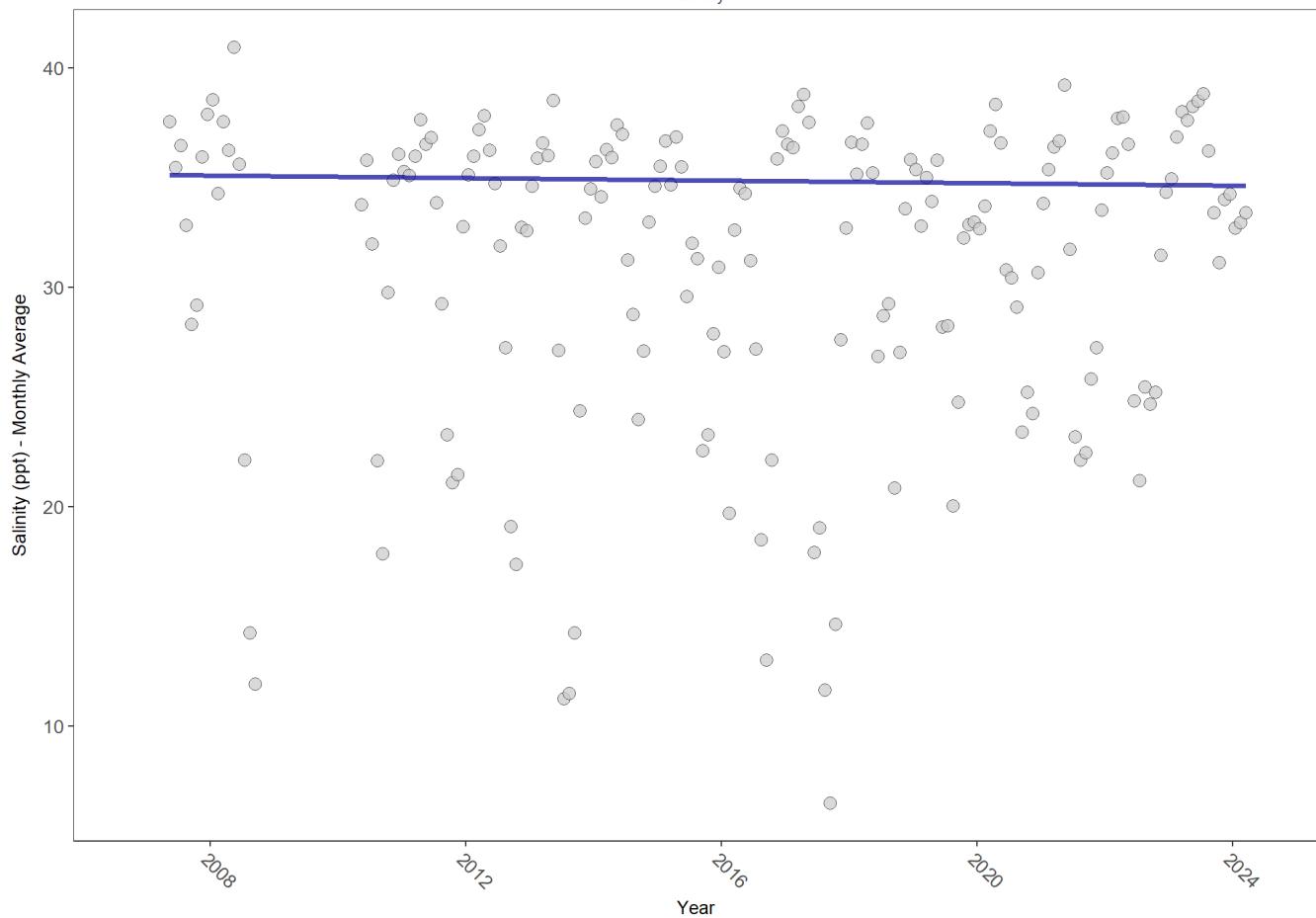
255654081350200

National Water Information System (7)

Cape Romano-Ten Thousand Islands Aquatic Preserve

255654081350200

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	5992	17	34	TRUE	-0.039	0.4902	-0.02903226	35.12257	9.1204	0.6108	0

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

SennIntercept is intercept value at beginning of record for monitoring location

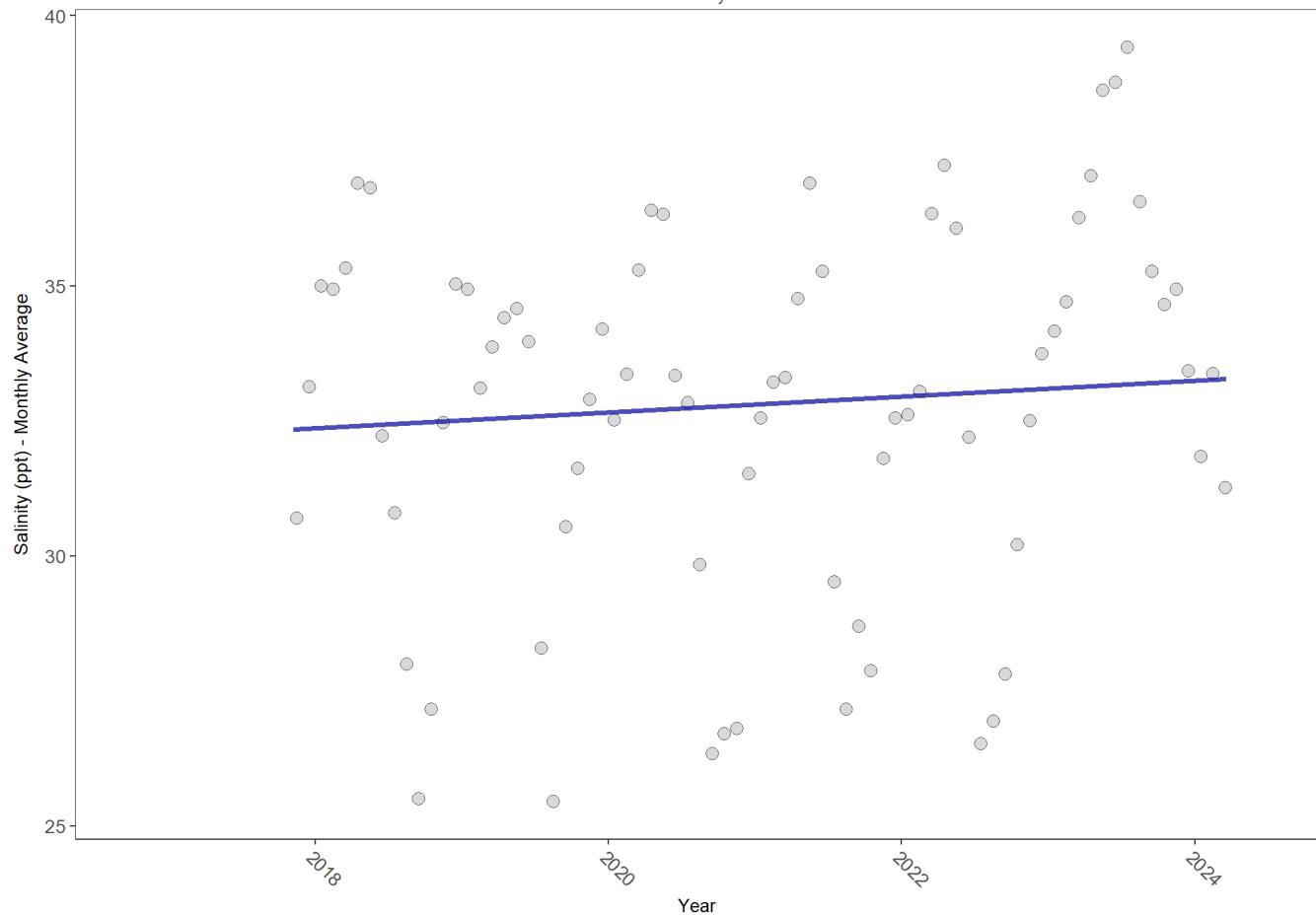
255138081321701

National Water Information System (7)

Cape Romano-Ten Thousand Islands Aquatic Preserve

255138081321701

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	2288	8	33	TRUE	0.1411	0.2225	0.1468586	32.21864	8.3328	0.6832	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

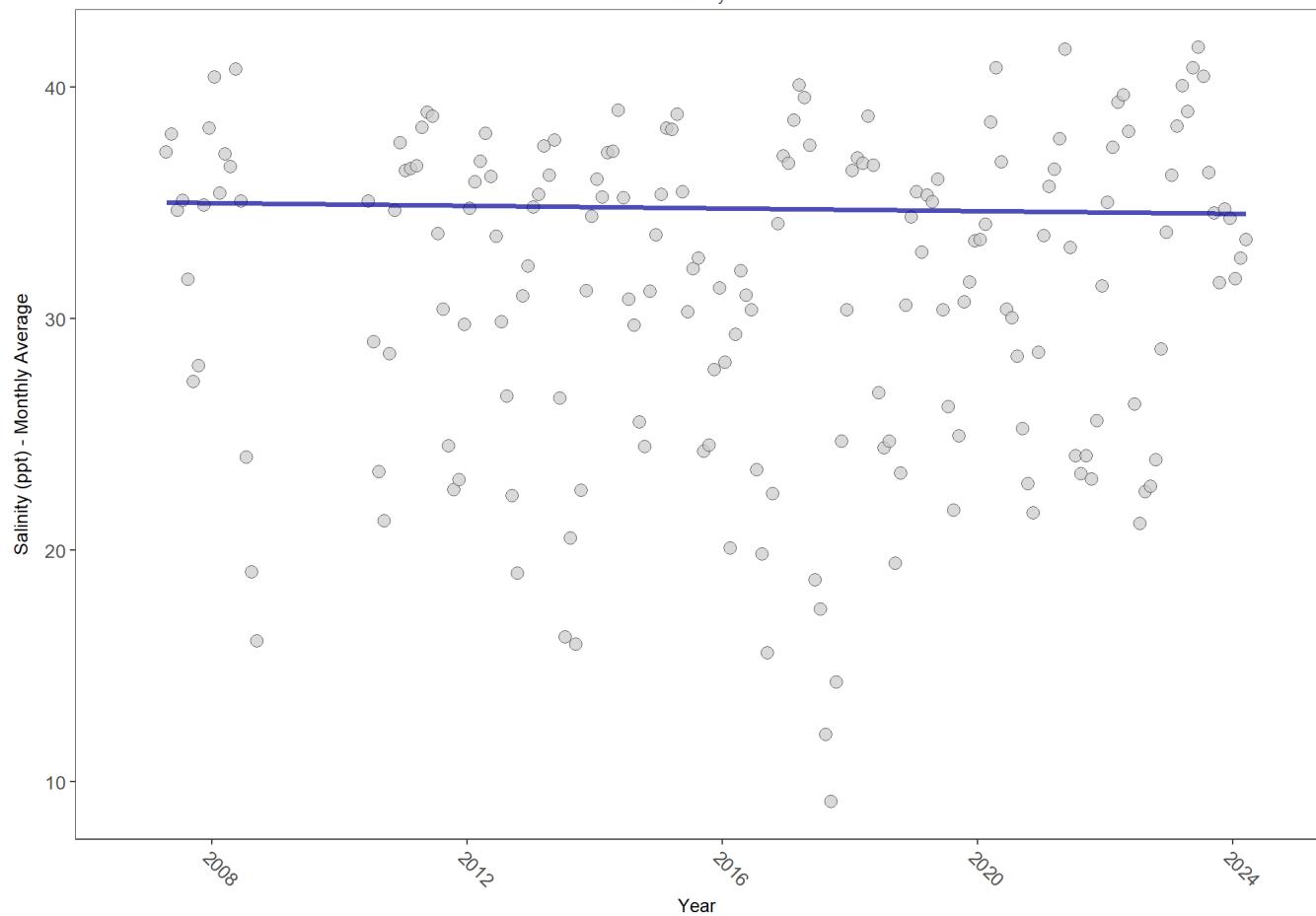
255534081324000

National Water Information System (7)

Cape Romano-Ten Thousand Islands Aquatic Preserve

255534081324000

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	5987	17	33	TRUE	-0.0261	0.6385	-0.02965352	35.03156	8.4654	0.6711	0

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

SennIntercept is intercept value at beginning of record for monitoring location

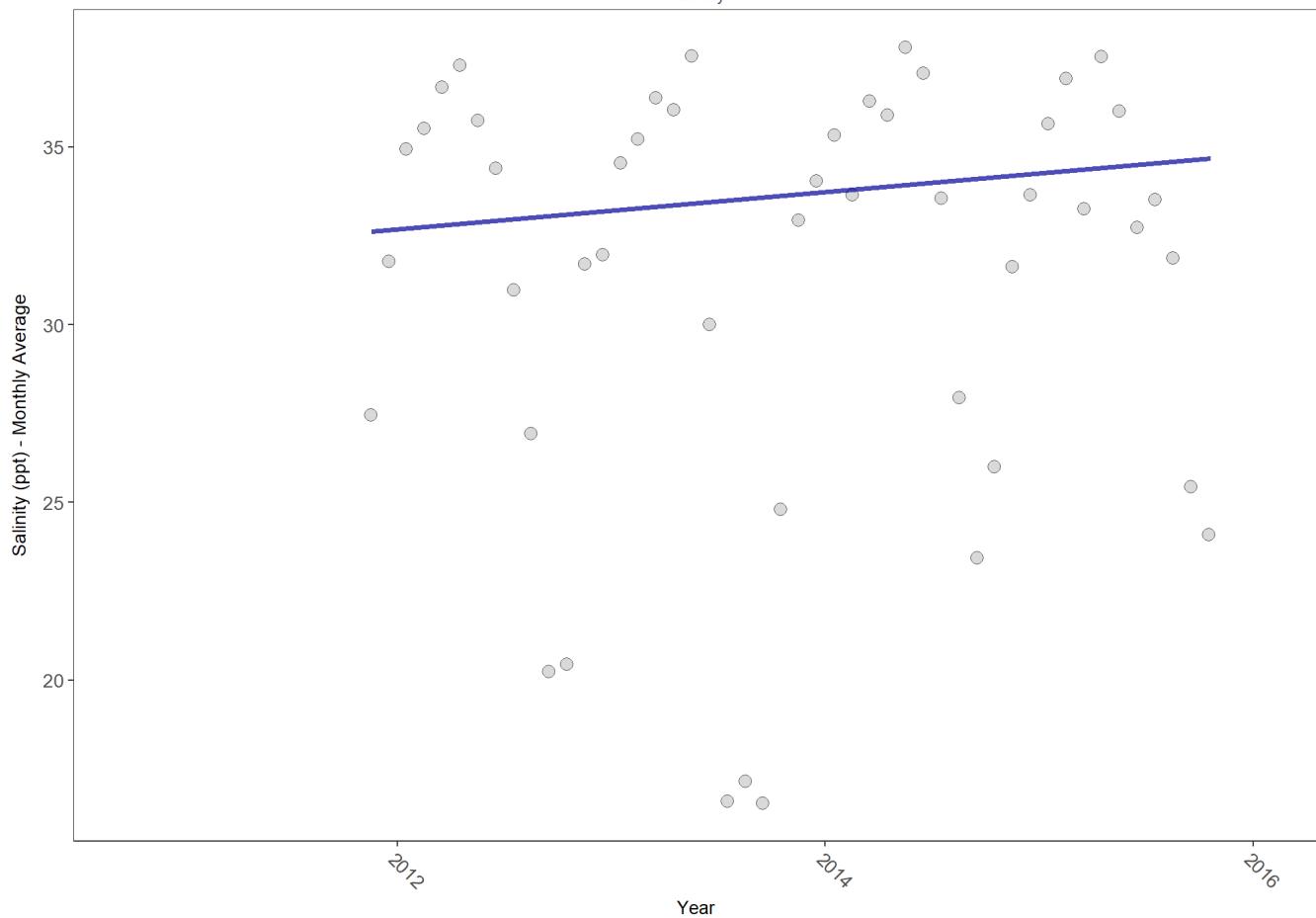
255732081363700

National Water Information System (7)

Cape Romano-Ten Thousand Islands Aquatic Preserve

255732081363700

Salinity



p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

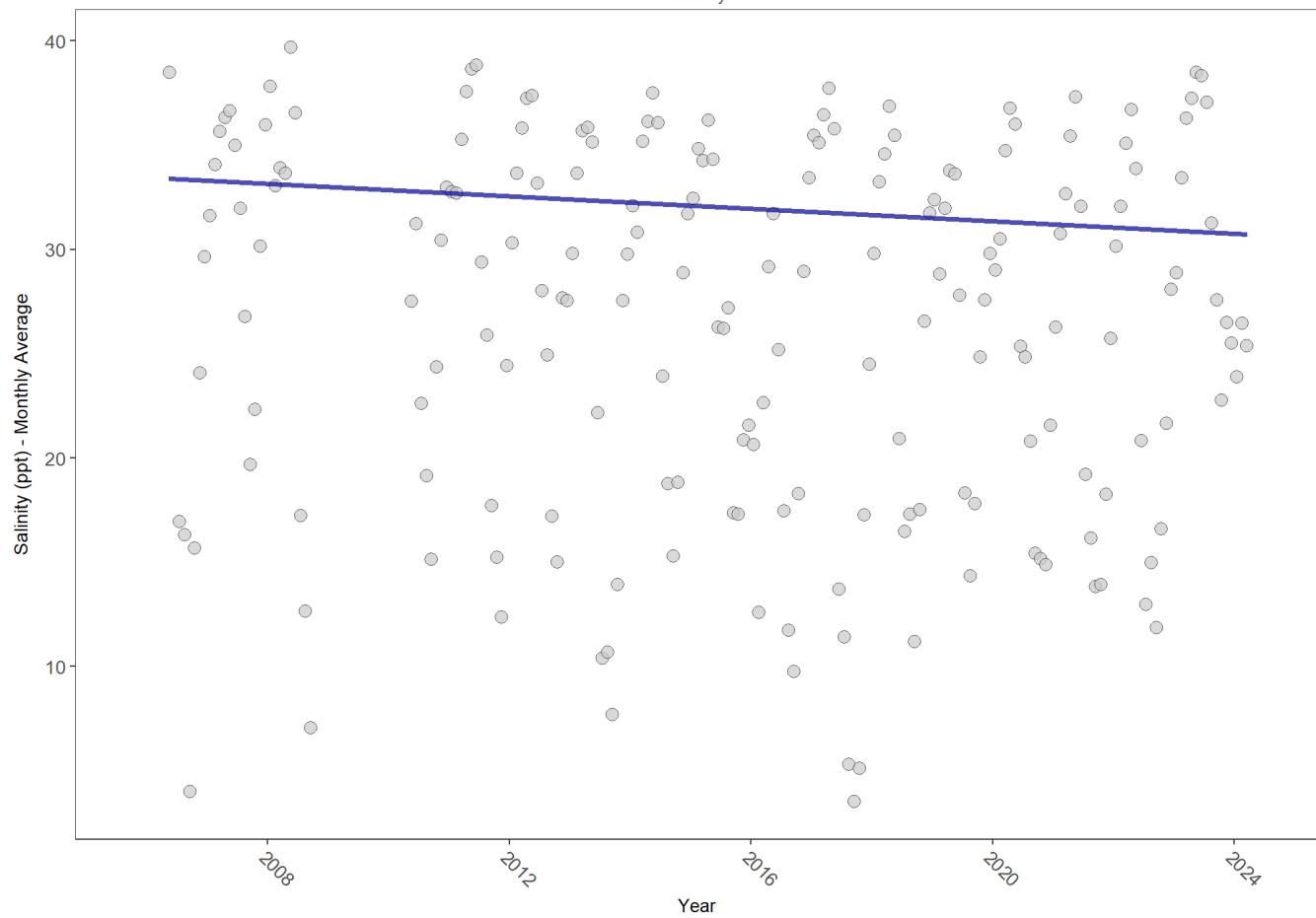
255432081303900

National Water Information System (7)

Cape Romano-Ten Thousand Islands Aquatic Preserve

255432081303900

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	6582	18	29	TRUE	-0.1445	0.0072	-0.1496599	33.44656	8.7021	0.6494	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

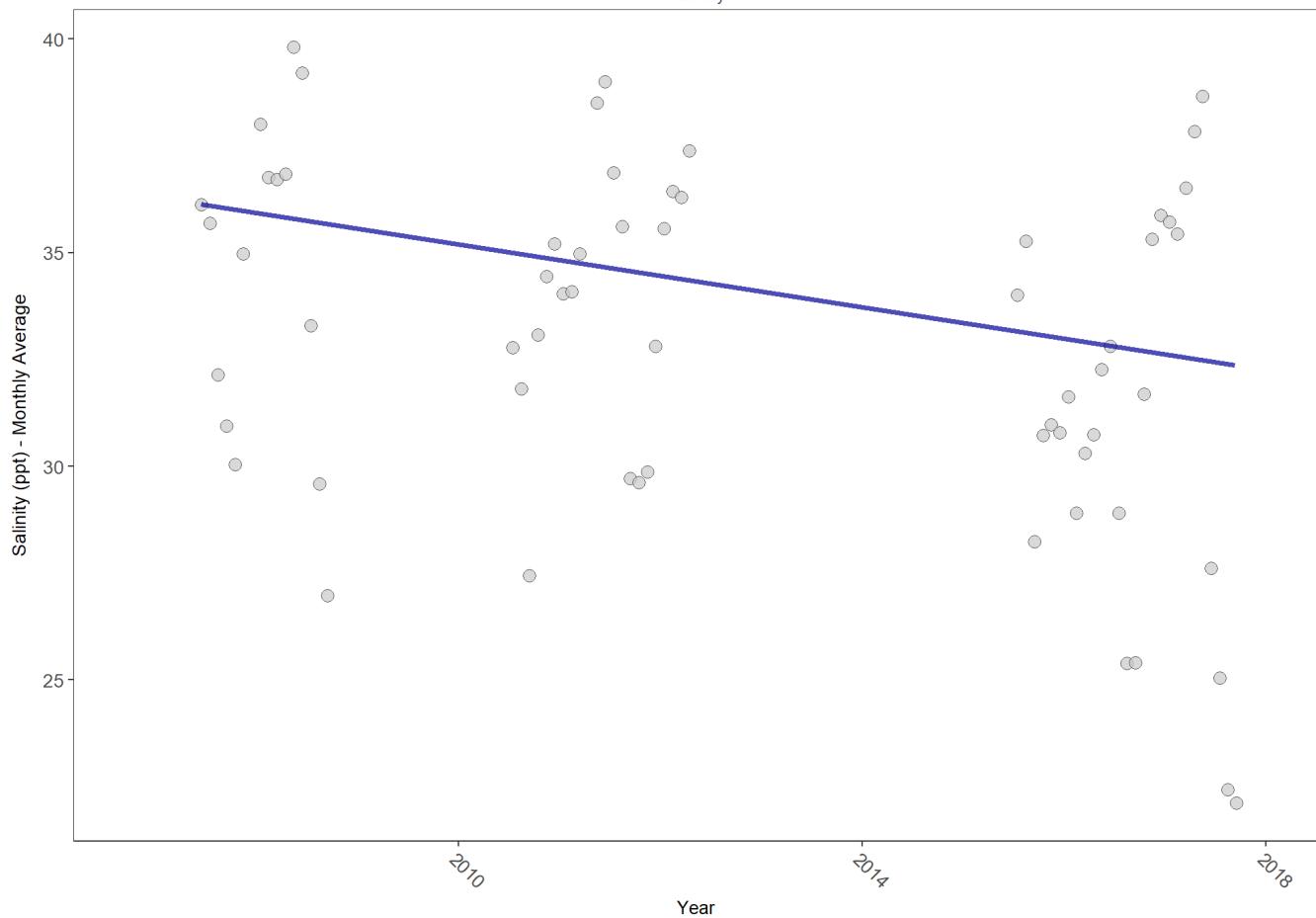
255123081321300

National Water Information System (7)

Cape Romano-Ten Thousand Islands Aquatic Preserve

255123081321300

Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	1809	8	34	TRUE	-0.2487	0.0129	-0.3686275	36.29955	6.8924	0.8077	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

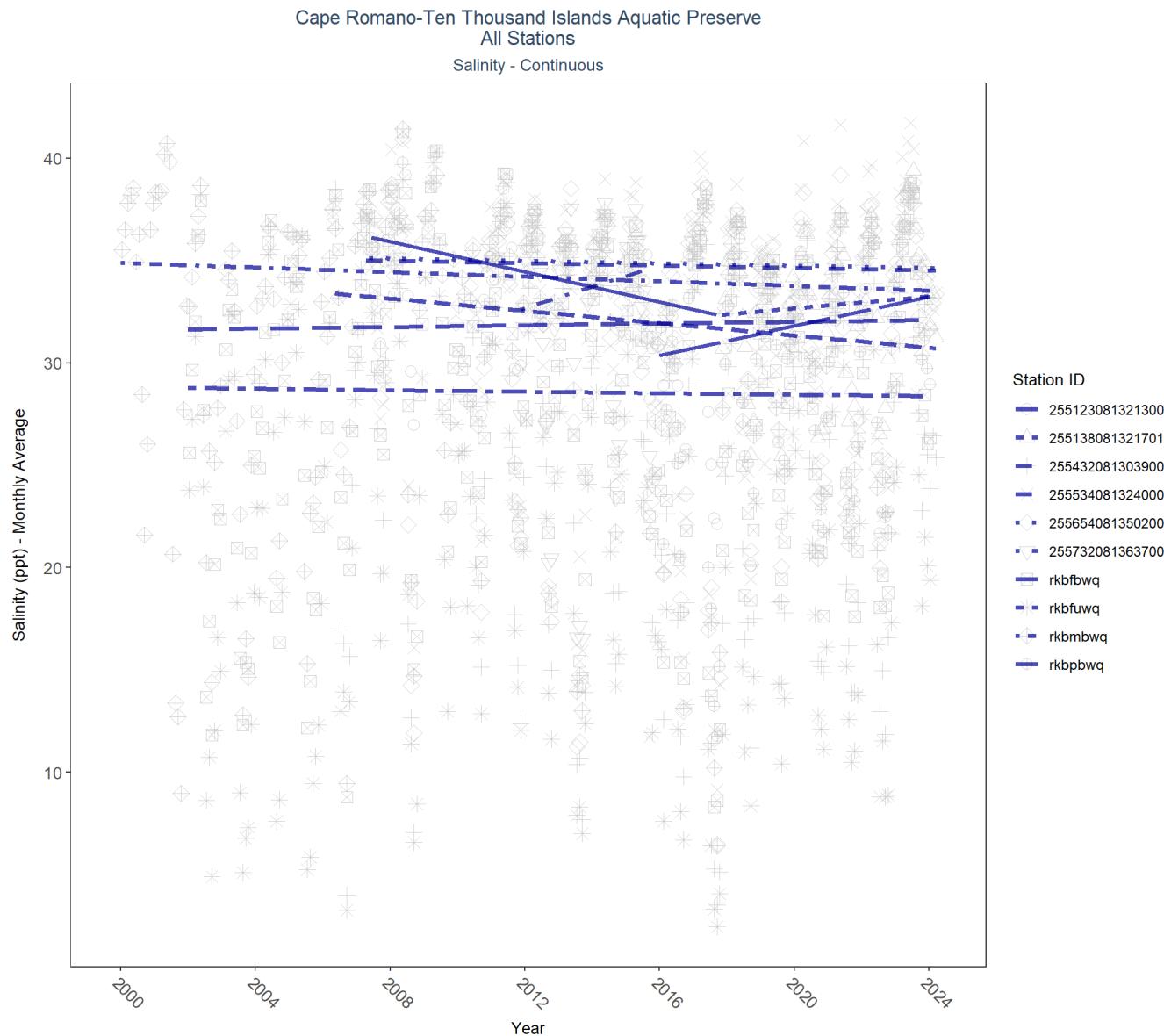


Table 23: Seasonal Kendall-Tau Results for All Stations - Salinity

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
rkbpbwq	265563	9	2016 - 2024	30.5	0.15	30.35	0.36	0.0900
rkbmbwq	668919	25	2000 - 2024	33.4	-0.08	34.9	-0.06	0.0556
rkbfbwq	632702	23	2002 - 2024	29.9	0.02	31.64	0.02	0.6004
rkbfuwq	649121	23	2002 - 2024	26.3	-0.02	28.79	-0.02	0.7188
255654081350200	5992	17	2007 - 2024	34.0	-0.04	35.12	-0.03	0.4902
255138081321701	2288	8	2017 - 2024	33.0	0.14	32.22	0.15	0.2225
255534081324000	5987	17	2007 - 2024	33.0	-0.03	35.03	-0.03	0.6385
255443081314700	1465	4	2007 - 2011	32.0	-	-	-	-
255732081363700	1434	5	2011 - 2015	34.0	0.25	32.15	0.52	0.0955
255432081303900	6582	18	2006 - 2024	29.0	-0.14	33.45	-0.15	0.0072
255123081321300	1809	8	2007 - 2017	34.0	-0.25	36.3	-0.37	0.0129
255532081314300	902	3	2009 - 2011	31.0	-	-	-	-

Turbidity - Continuous Water Quality

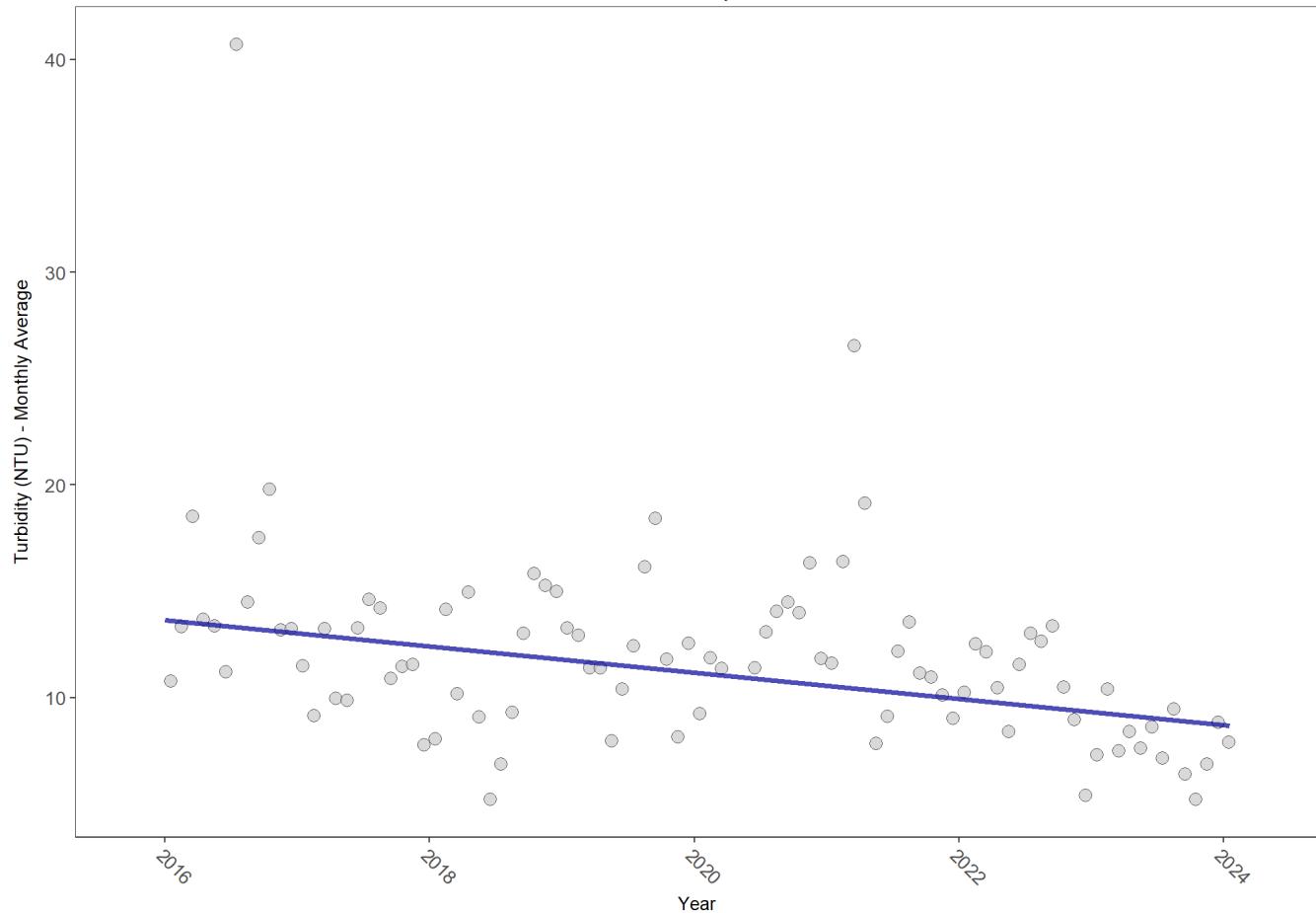
rkbpbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbpbwq

Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	261955	9	10	TRUE	-0.3975	0.0000	-0.6183176	13.64361	5.1262	0.9249	-1

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

SennIntercept is intercept value at beginning of record for monitoring location

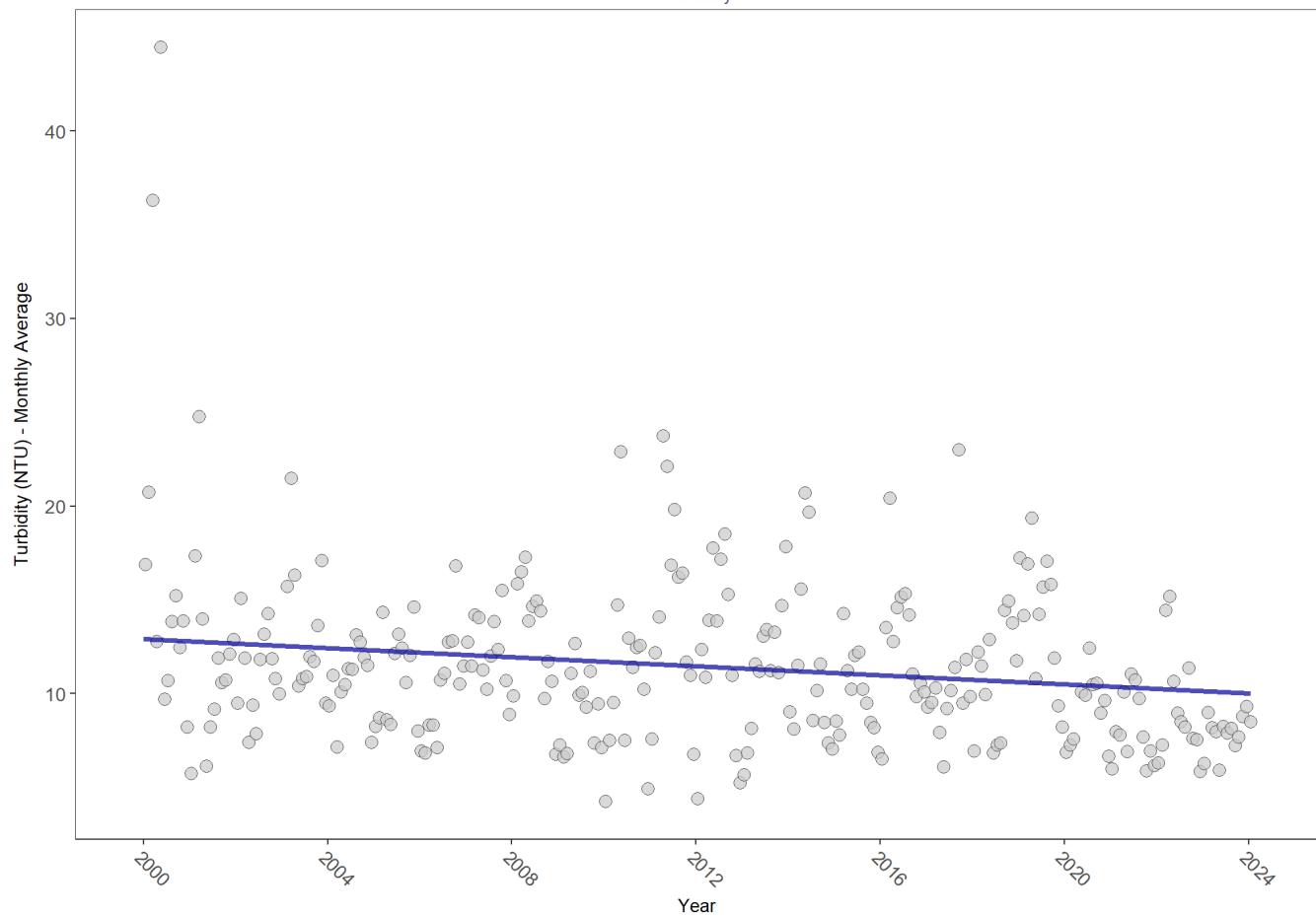
rkbmbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbmbwq

Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	645856	25	10	TRUE	-0.1961	0.0000	-0.1199739	12.91775	10.9129	0.4506	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

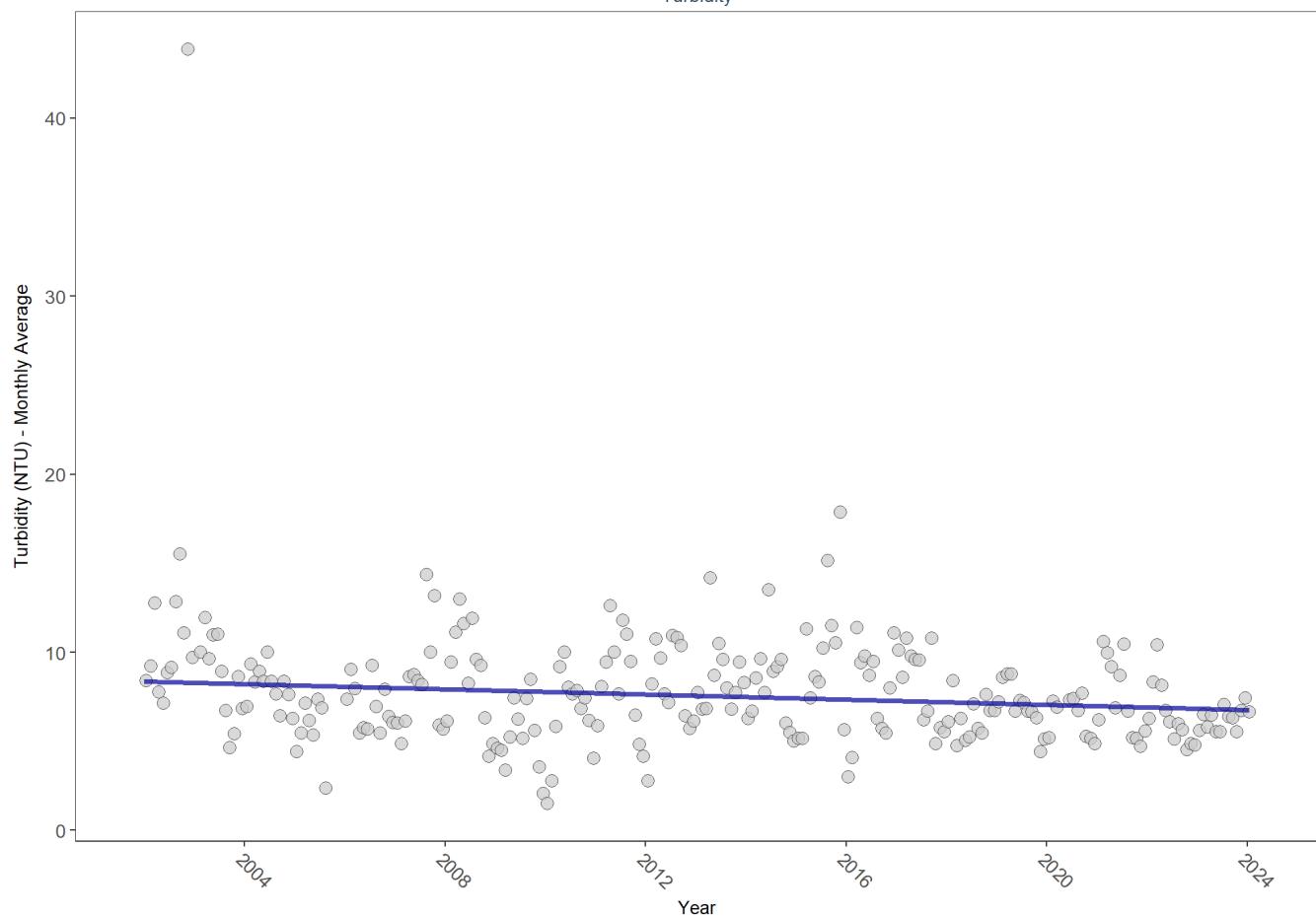
rkbftuwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbftuwq

Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	589837	23	6	TRUE	-0.1683	0.0002	-0.07335832	8.366577	6.7185	0.8214	-1

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

SennIntercept is intercept value at beginning of record for monitoring location

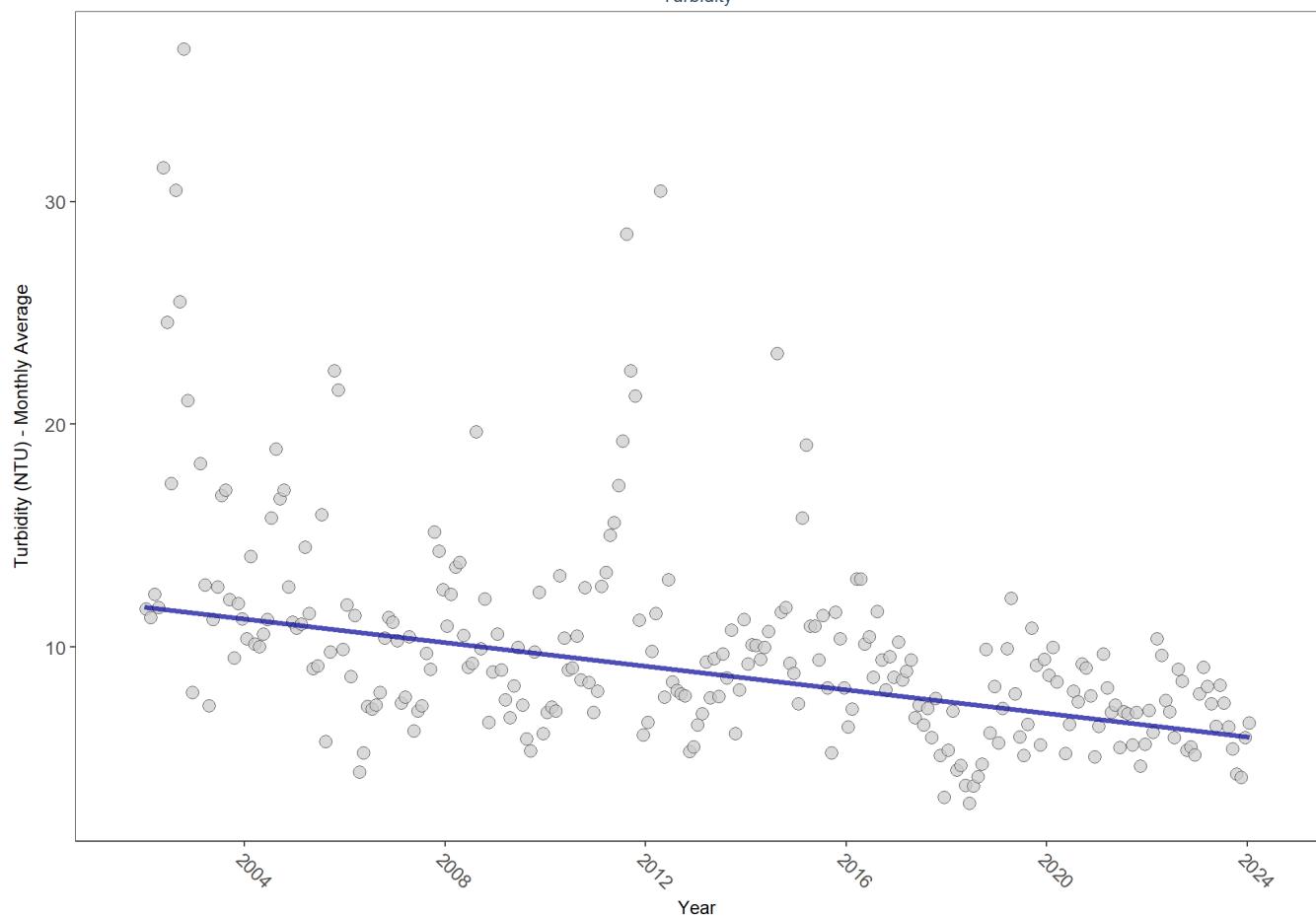
rkbfbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbfbwq

Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	612433	23	7	TRUE	-0.4019	0.0000	-0.2658098	11.79978	10.1303	0.5187	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

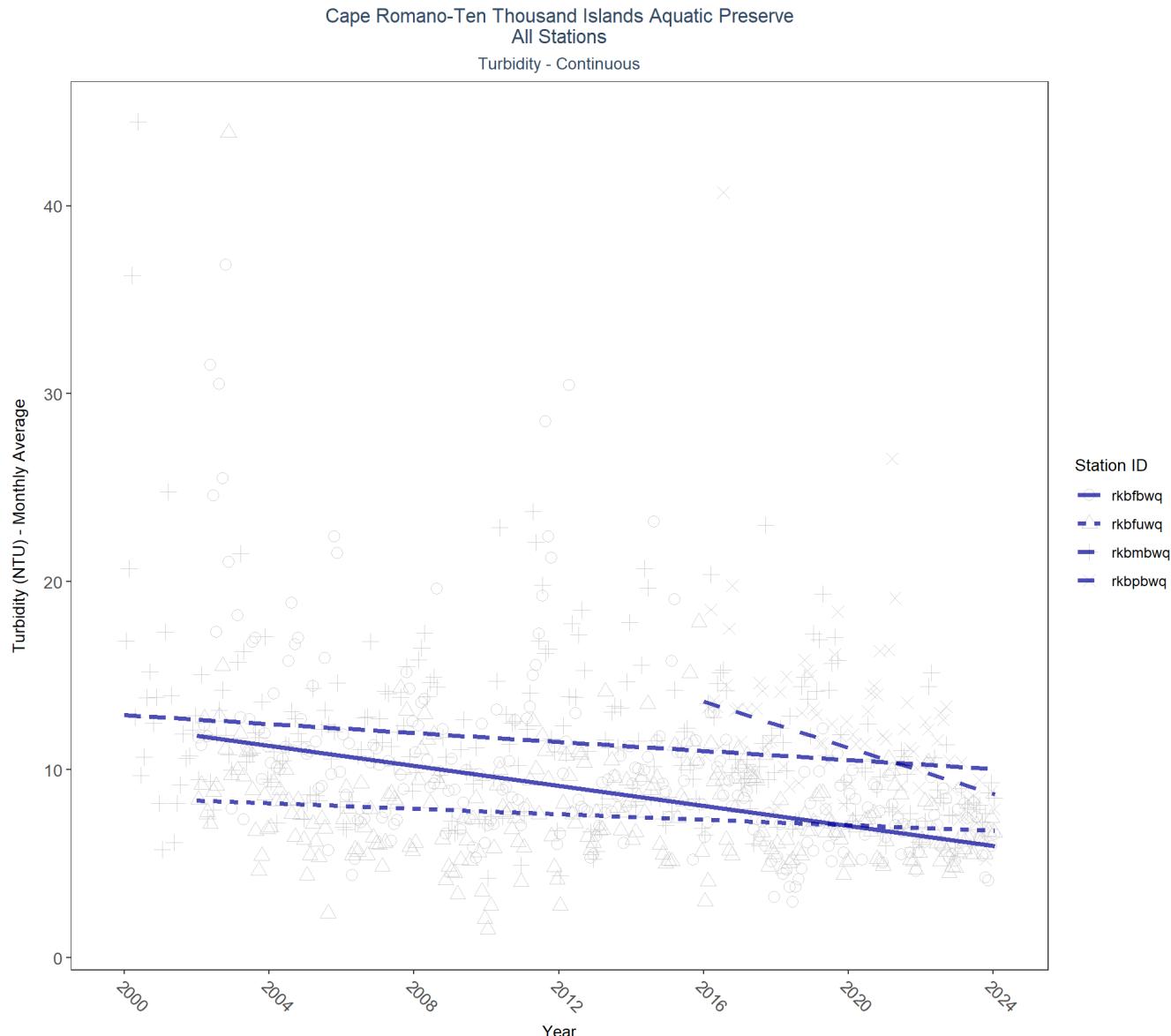


Table 24: Seasonal Kendall-Tau Results for All Stations - Turbidity

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
rkbpbwq	261955	9	2016 - 2024	10	-0.40	13.64	-0.62	0.0000
rkbmbwq	645856	25	2000 - 2024	10	-0.20	12.92	-0.12	0.0000
rkbfuwq	589837	23	2002 - 2024	6	-0.17	8.37	-0.07	0.0002
rkbfbwq	612433	23	2002 - 2024	7	-0.40	11.80	-0.27	0.0000

Water Temperature - Continuous Water Quality

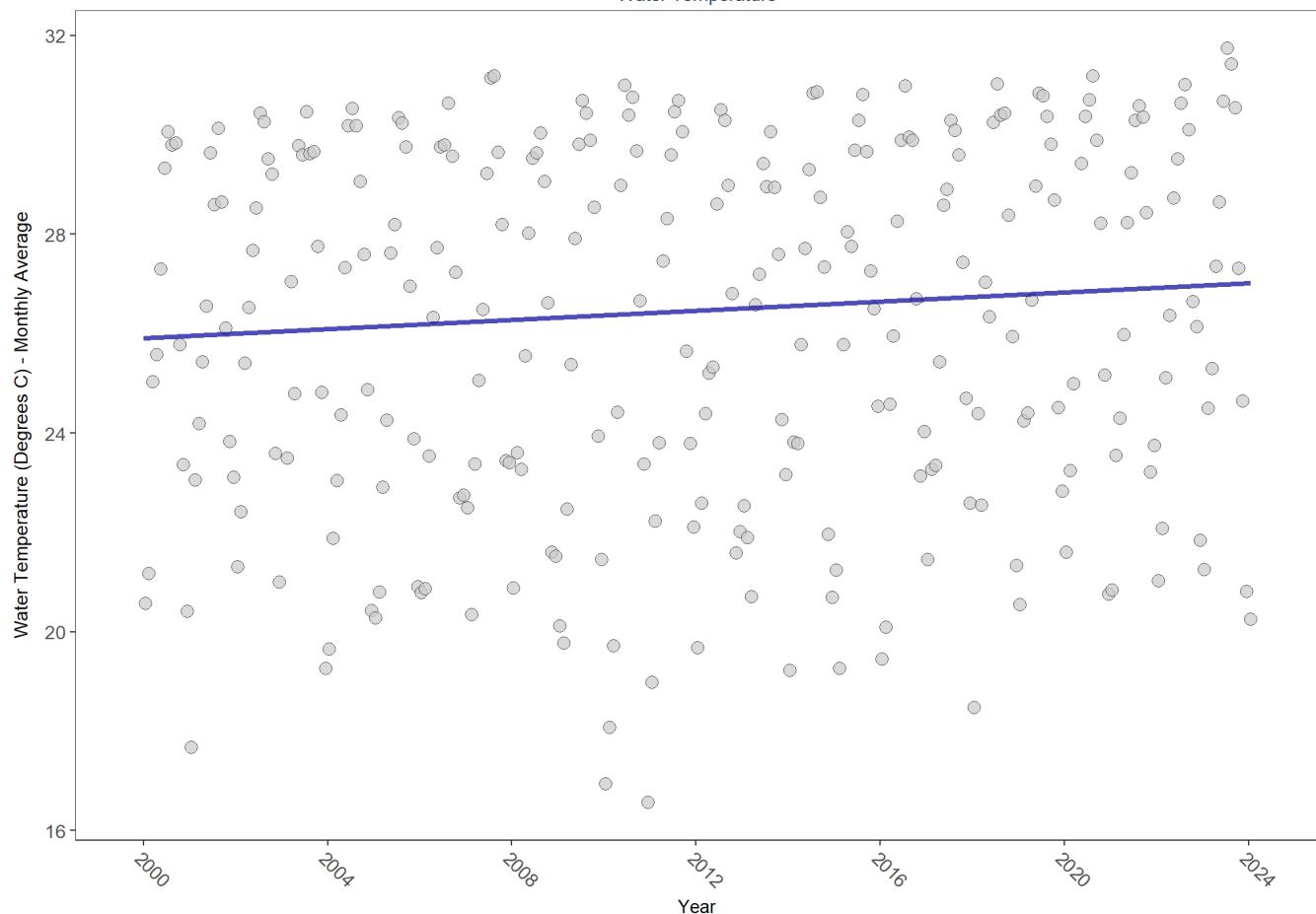
rkbmbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbmbwq

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	692233	25	26.8	TRUE	0.2506	0.0000	0.04640183	25.90599	5.3061	0.9154	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

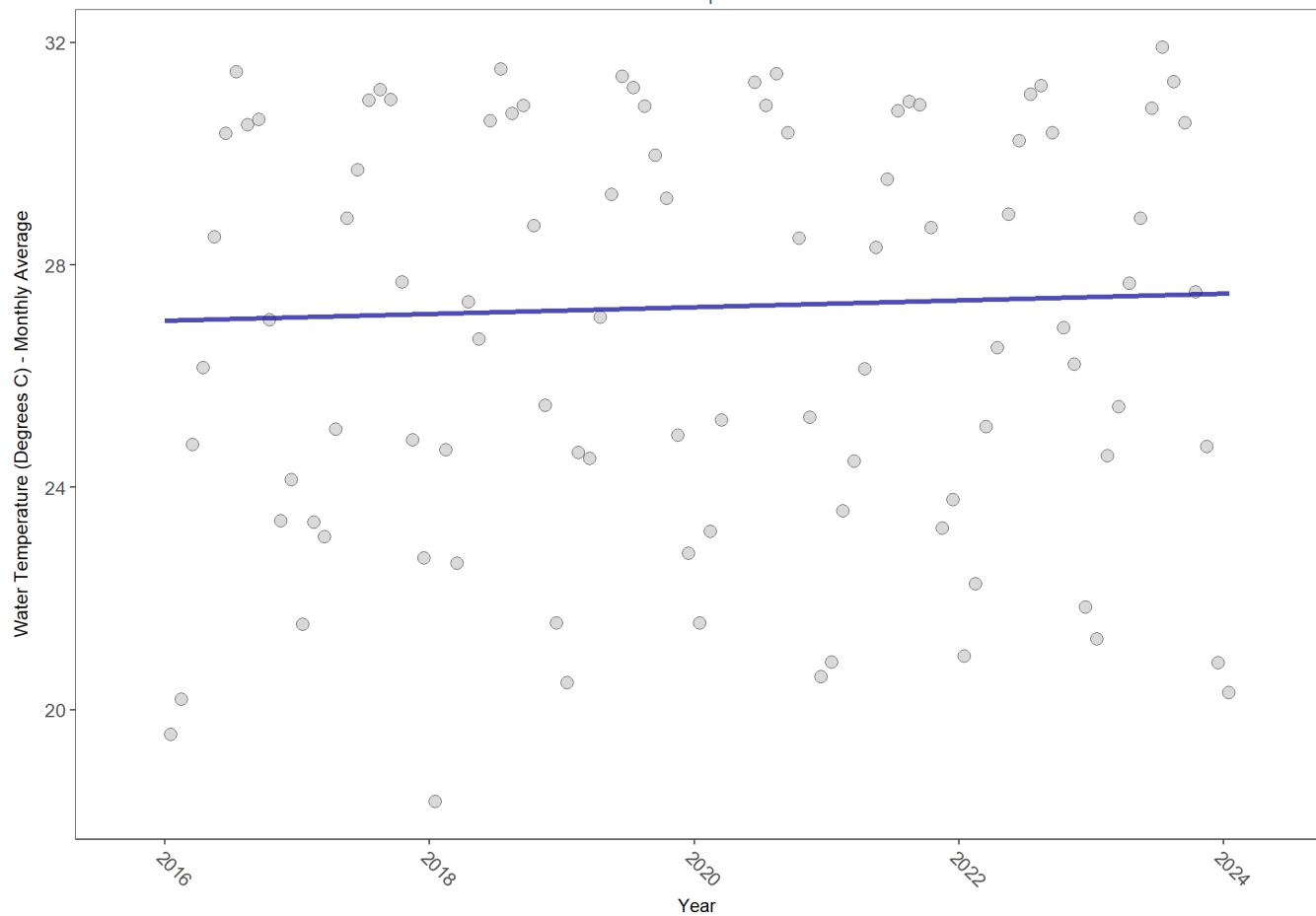
rkbpbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbpbwq

Water Temperature



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

SennIntercept is intercept value at beginning of record for monitoring location

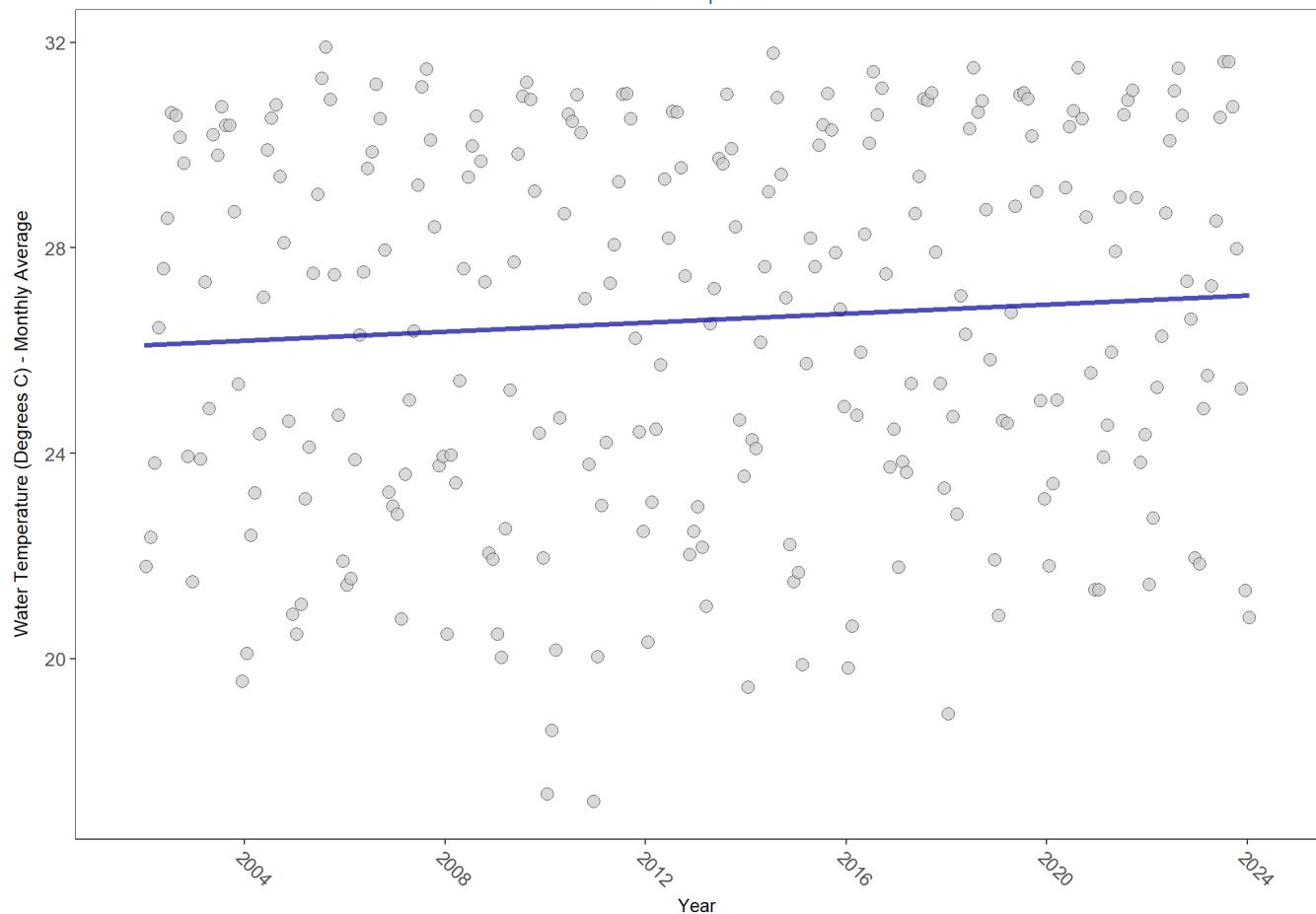
rkbfbwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbfbwq

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	648515	23	27	TRUE	0.2278	0.0000	0.04416166	26.10841	5.379	0.9114	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

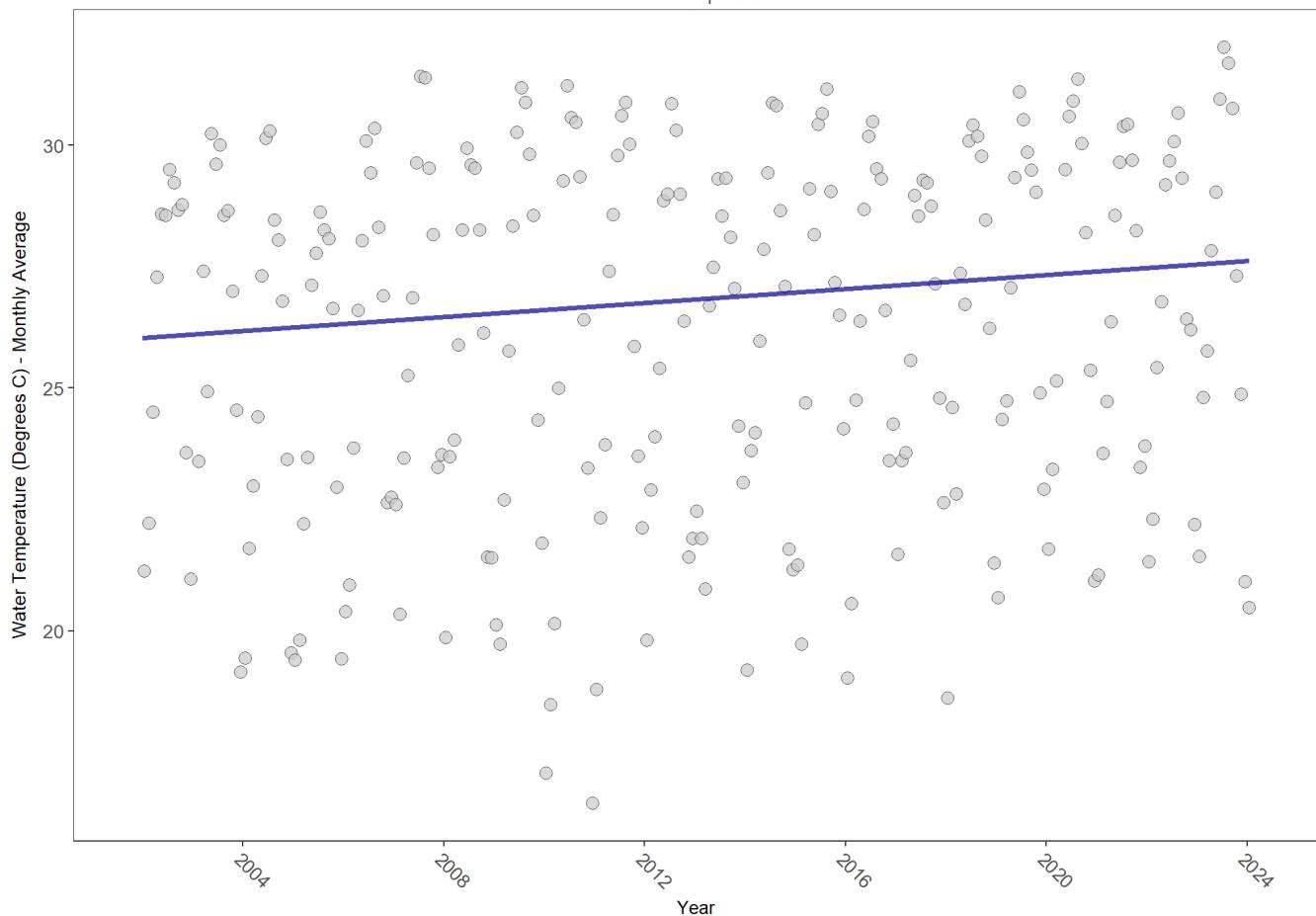
rkbftuwq

Rookery Bay National Estuarine Research Reserve System-Wide Monitoring Program (354)

Cape Romano-Ten Thousand Islands Aquatic Preserve

rkbftuwq

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	659552	23	26.9	TRUE	0.2756	0.0000	0.0722692	26.02745	3.5684	0.9809	1

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

SennIntercept is intercept value at beginning of record for monitoring location

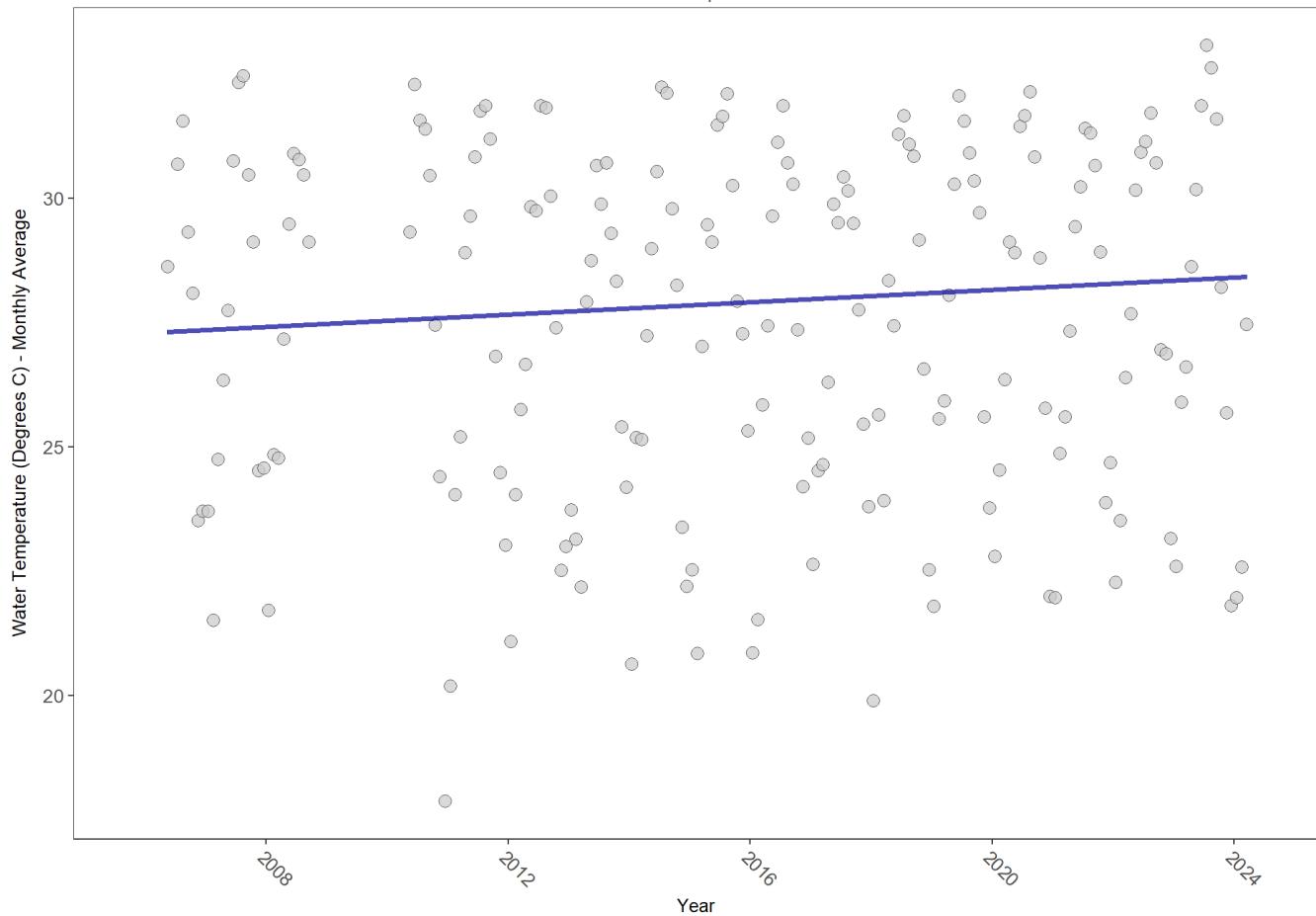
255432081303900

National Water Information System (7)

Cape Romano-Ten Thousand Islands Aquatic Preserve

255432081303900

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	6586	18	28.3	TRUE	0.2042	0.0001	0.06217804	27.2923	10.291	0.5044	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

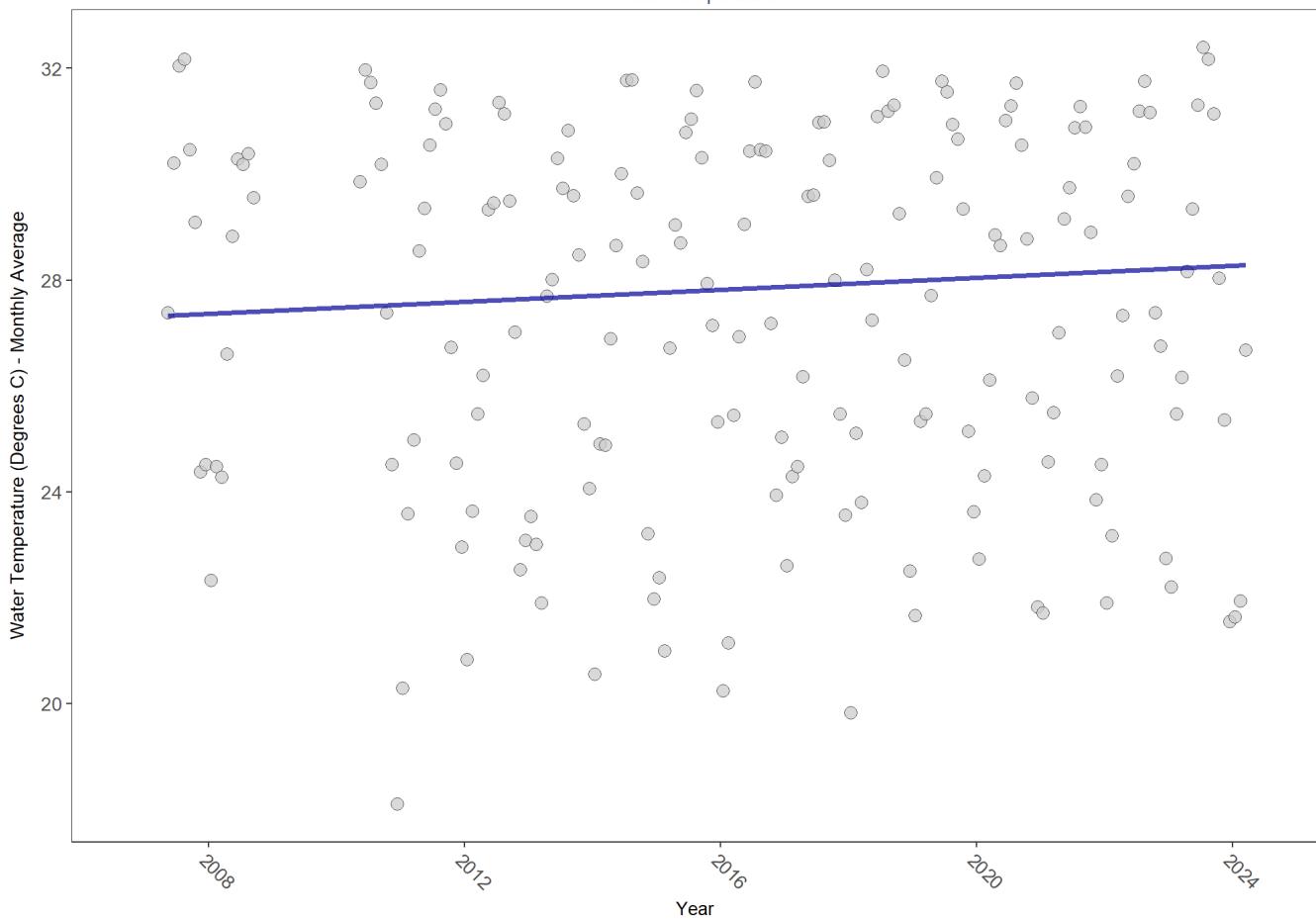
255654081350200

National Water Information System (7)

Cape Romano-Ten Thousand Islands Aquatic Preserve

255654081350200

Water Temperature



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

SennIntercept is intercept value at beginning of record for monitoring location

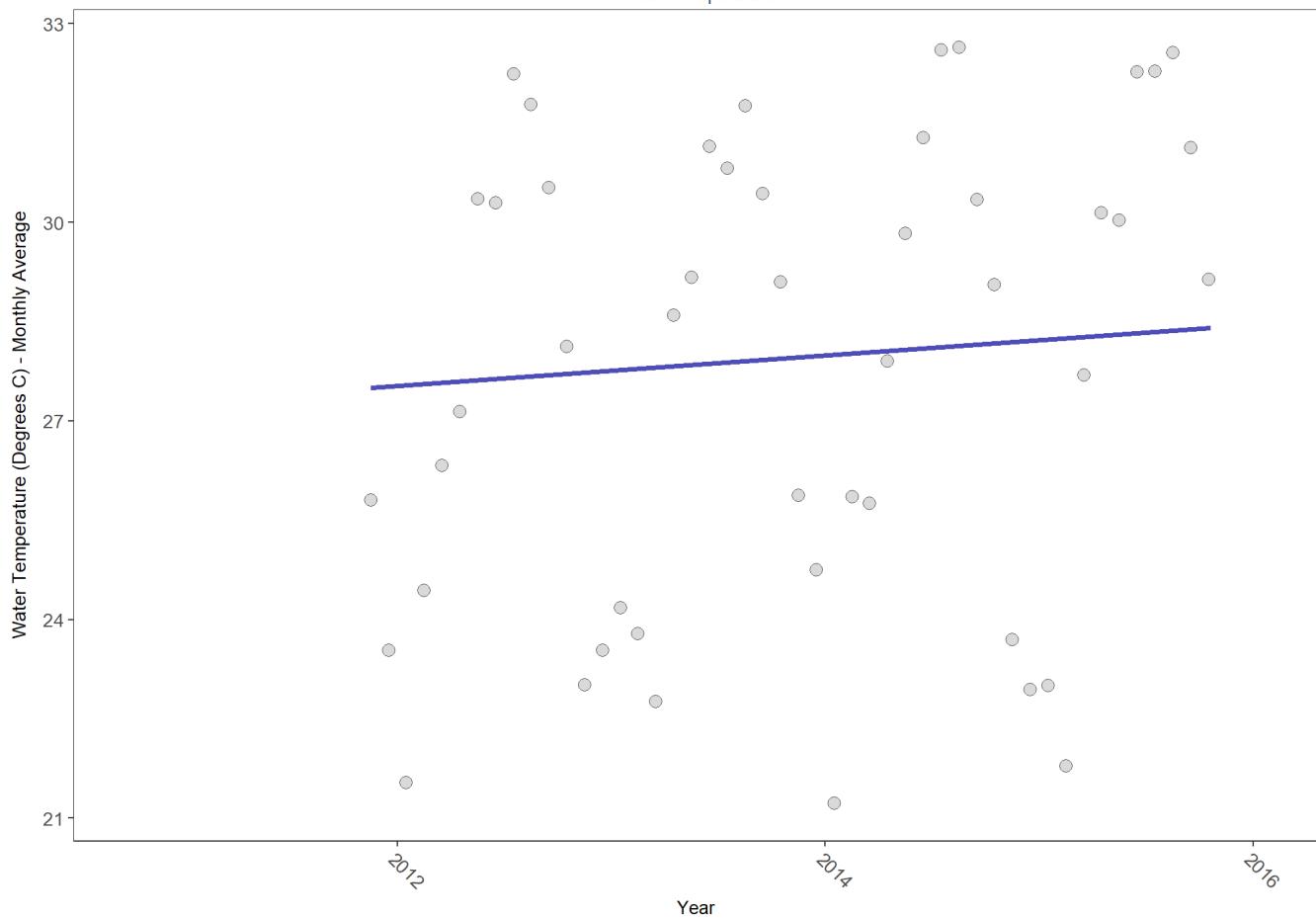
255732081363700

National Water Information System (7)

Cape Romano-Ten Thousand Islands Aquatic Preserve

255732081363700

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	1435	5	28.4	TRUE	0.2361	0.1149	0.2306452	27.2975	7.0645	0.7938	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

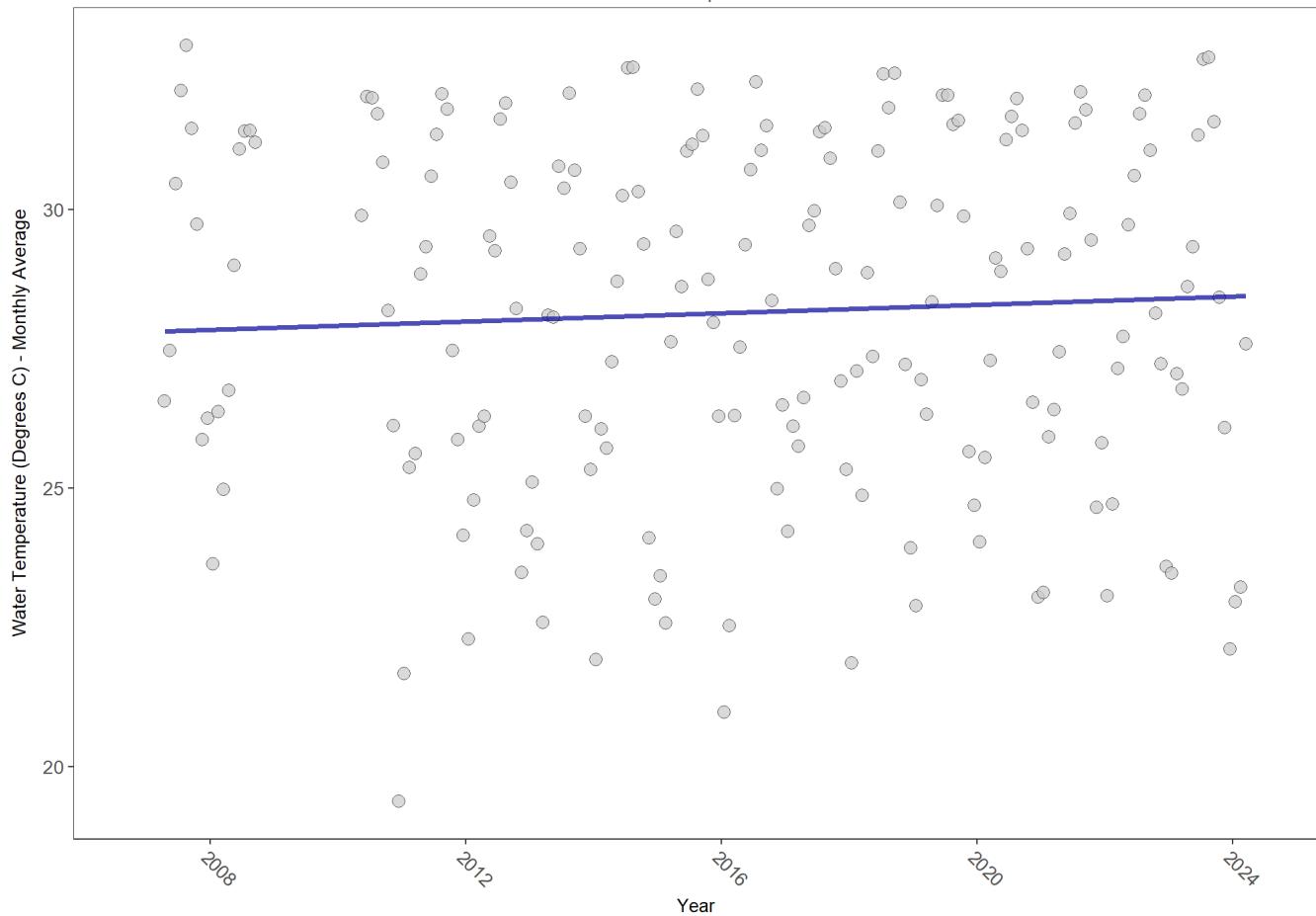
255534081324000

National Water Information System (7)

Cape Romano-Ten Thousand Islands Aquatic Preserve

255534081324000

Water Temperature



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

SennIntercept is intercept value at beginning of record for monitoring location

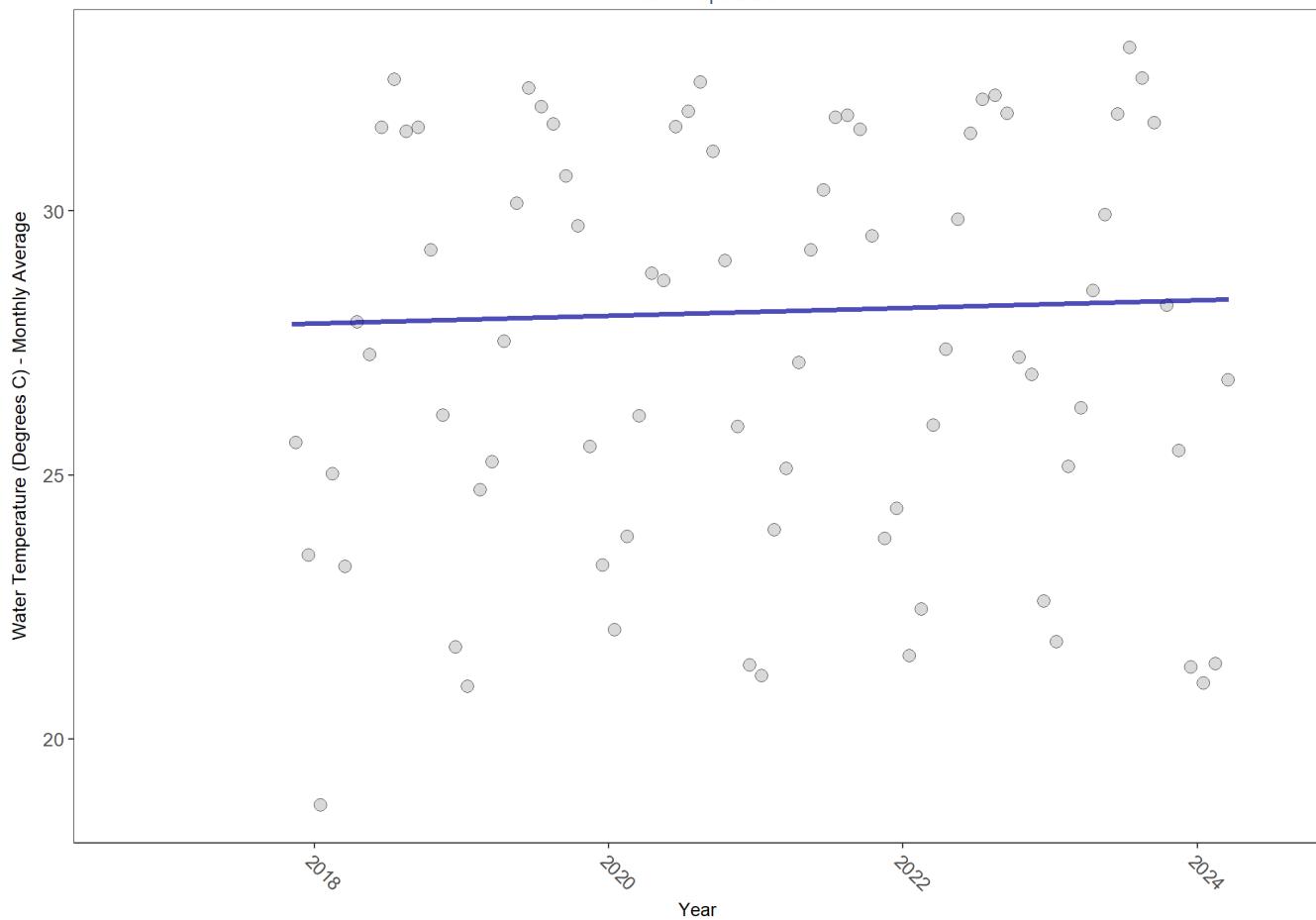
255138081321701

National Water Information System (7)

Cape Romano-Ten Thousand Islands Aquatic Preserve

255138081321701

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	2303	8	27.9	TRUE	0.1013	0.3539	0.07347073	27.79418	17.7737	0.087	0

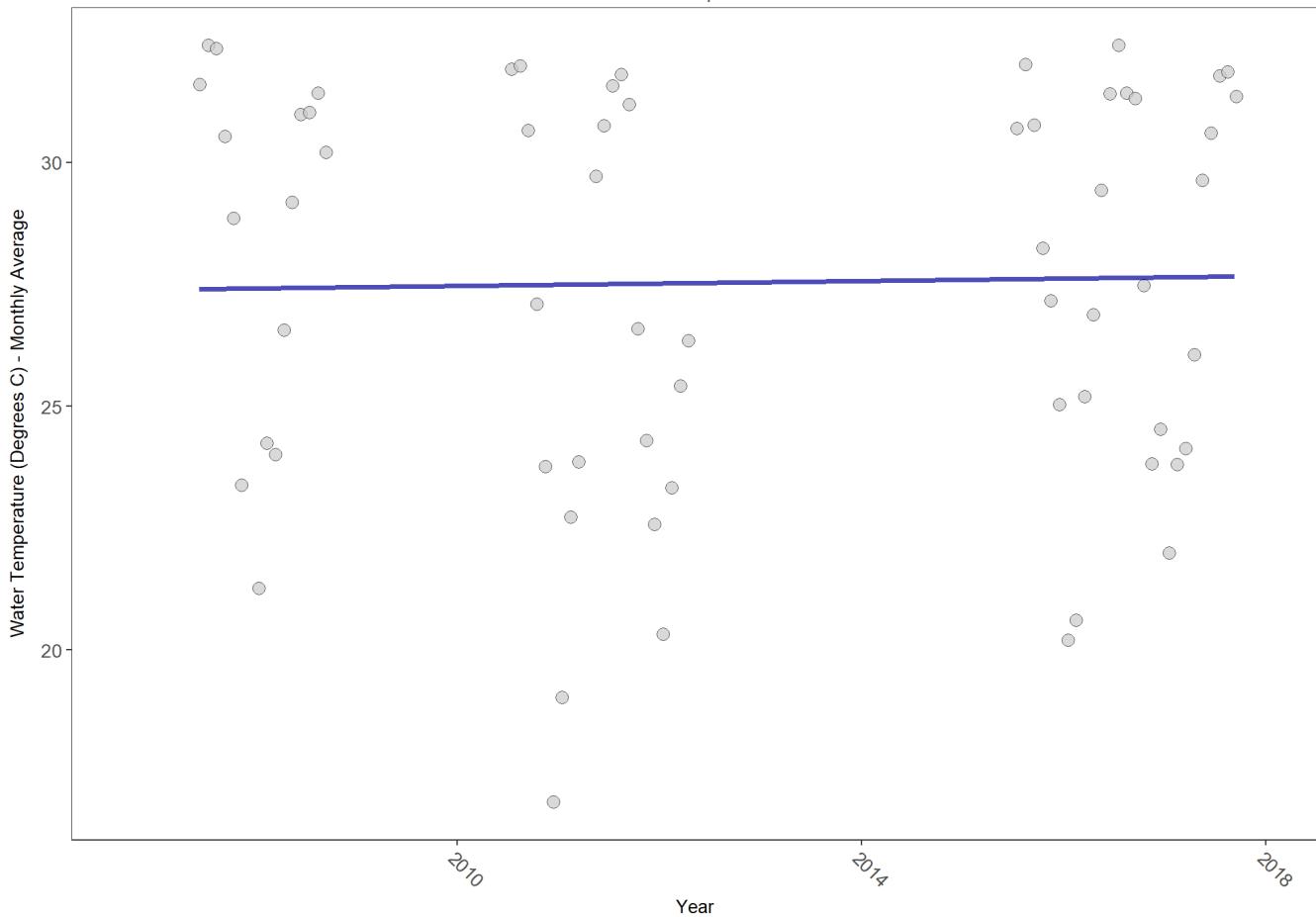
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

255123081321300

National Water Information System (7)

Cape Romano-Ten Thousand Islands Aquatic Preserve
255123081321300
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	1818	8	28.2	TRUE	0.0952	0.4183	0.0262963	27.38935	14.4616	0.2085	0

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

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

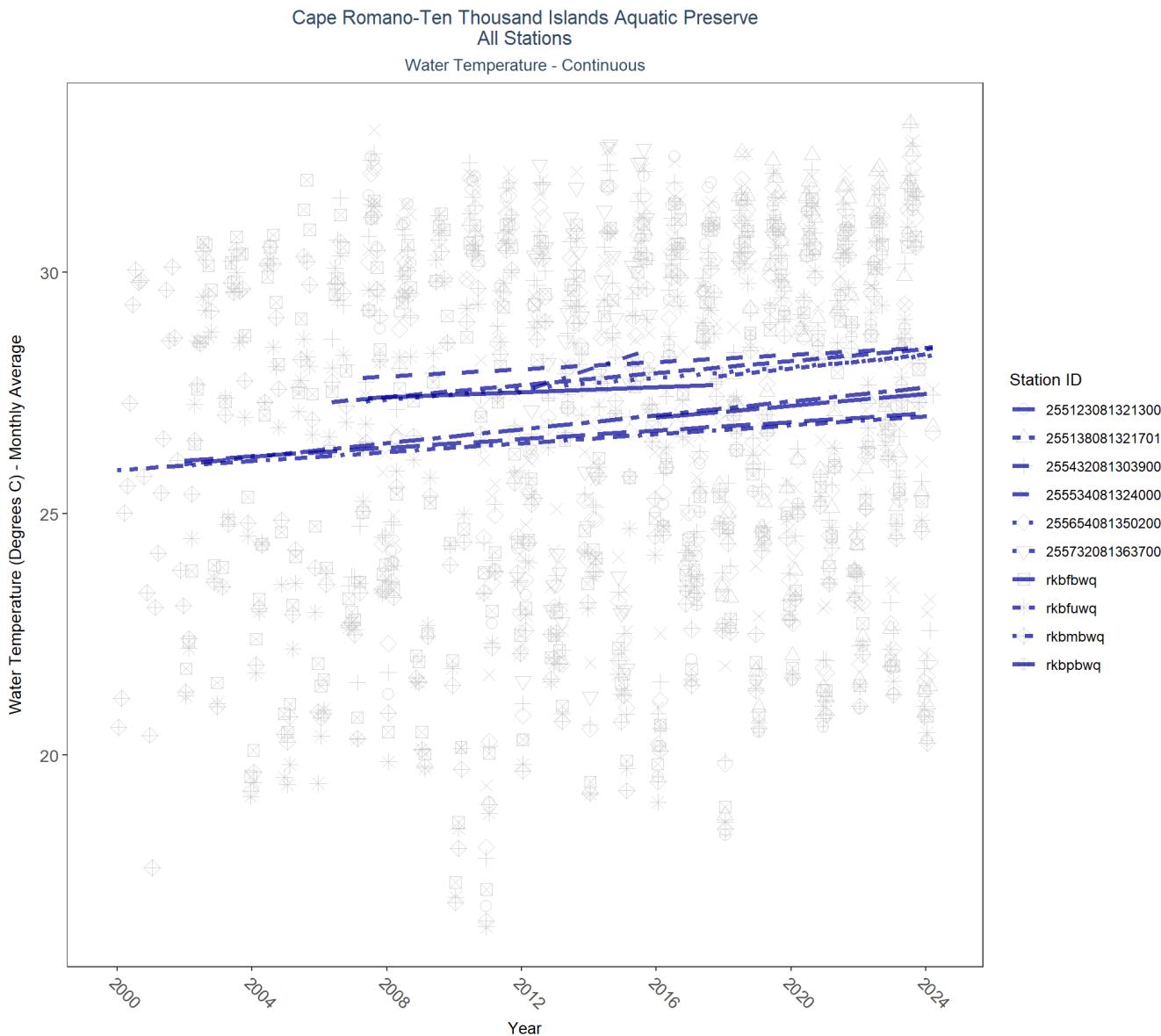


Table 25: Seasonal Kendall-Tau Results for All Stations - Water Temperature

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
rkbmbwq	692233	25	2000 - 2024	26.8	0.25	25.91	0.05	0.0000
rkbpbwq	268436	9	2016 - 2024	27.4	0.11	27	0.06	0.2068
rkbfbwq	648515	23	2002 - 2024	27.0	0.23	26.11	0.04	0.0000
rkbfuwq	659552	23	2002 - 2024	26.9	0.28	26.03	0.07	0.0000
255432081303900	6586	18	2006 - 2024	28.3	0.2	27.29	0.06	0.0001
255654081350200	6204	17	2007 - 2024	28.0	0.19	27.3	0.06	0.0007
255732081363700	1435	5	2011 - 2015	28.4	0.24	27.3	0.23	0.1149
255443081314700	2011	4	2007 - 2011	29.3	-	-	-	-
255534081324000	6351	17	2007 - 2024	28.7	0.16	27.8	0.04	0.0044
255532081314300	906	3	2009 - 2011	29.3	-	-	-	-
255138081321701	2303	8	2017 - 2024	27.9	0.1	27.79	0.07	0.3539
255123081321300	1818	8	2007 - 2017	28.2	0.1	27.39	0.03	0.4183

Nekton

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

