

Big Bend Seagrasses 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

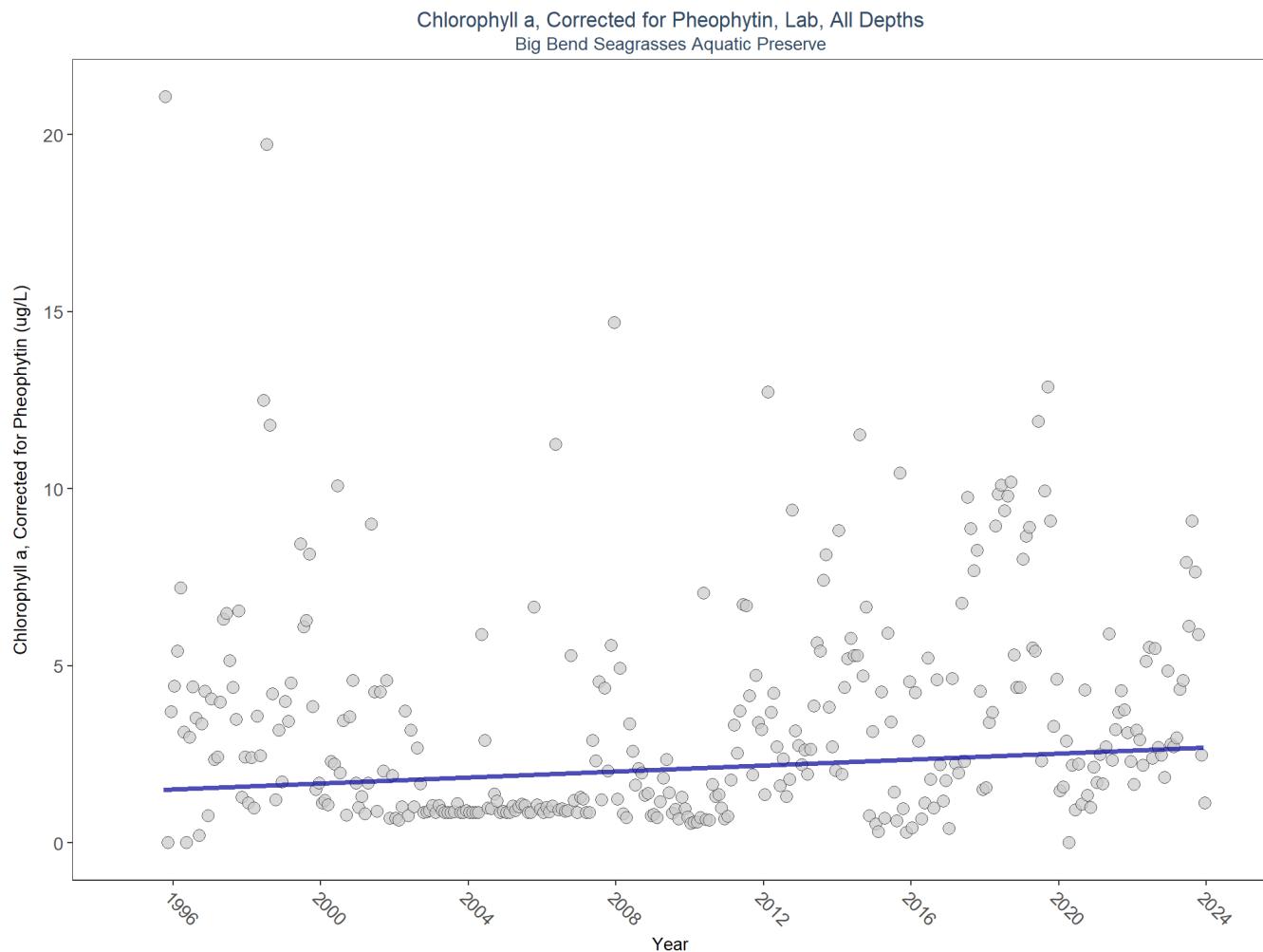
The following files were used in the discrete analysis:

- *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

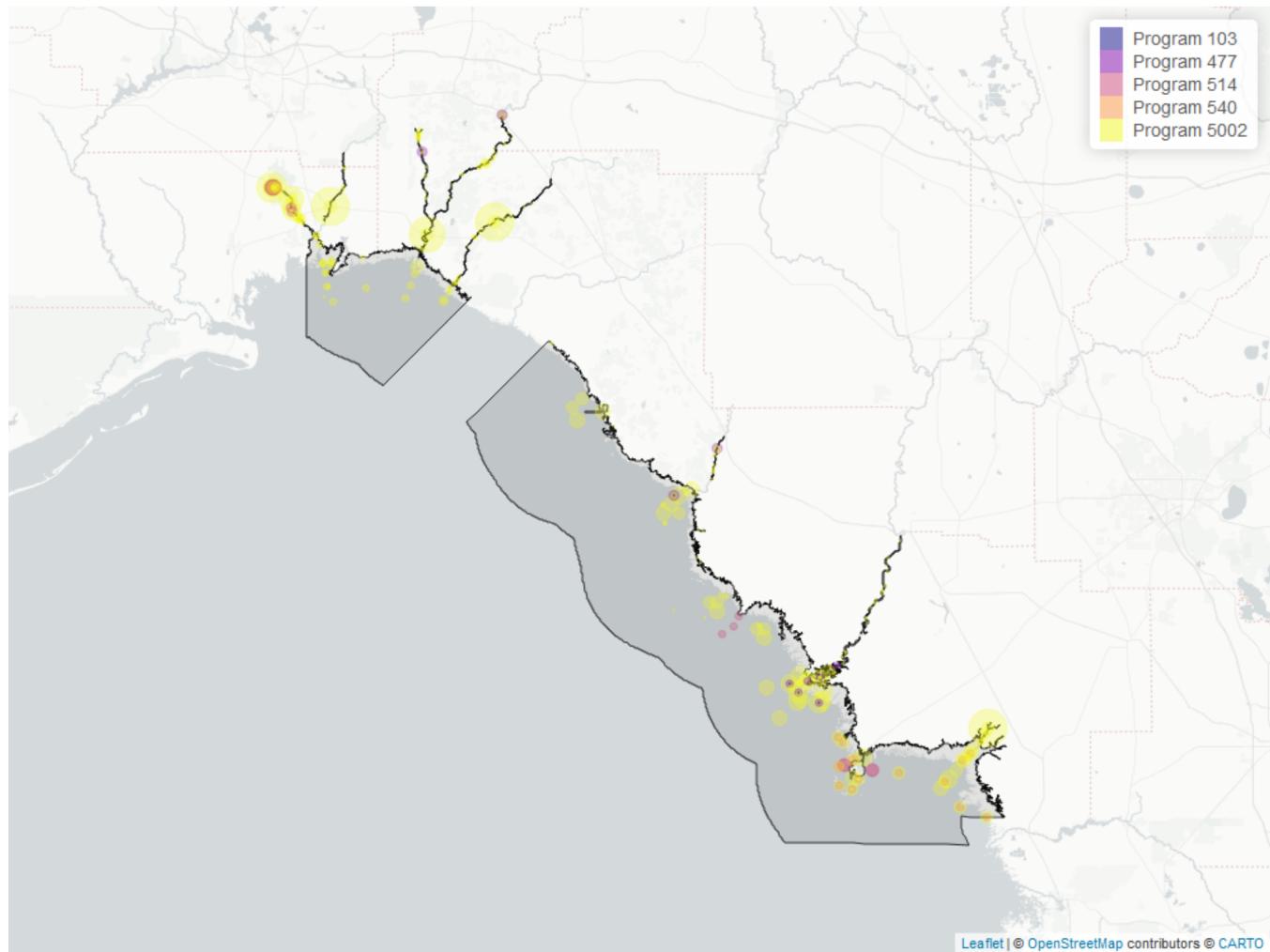


Table 6: Programs contributing data for Chlorophyll a, Corrected for Pheophytin

ProgramID	N_Data	YearMin	YearMax
5002	3918	1995	2023
514	254	2013	2023
540	131	2017	2022
477	129	2019	2022
103	10	2020	2021

Program names:

5002 - Florida STORET / WIN

514 - Florida LAKEWATCH Program

540 - Shellfish Harvest Area Classification Program

Value Qualifiers

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

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

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
1999	99	5	5.0			10	10.1
2000	93	2	2.1			46	49.5
2001	100	4	4.0	3	3.0	42	42.0
2002	121	4	3.3	8	6.6	61	50.4
2003	53	1	1.9	2	3.8	52	98.1
2004	64			6	9.4	61	95.3
2005	70	9	12.9			45	64.3
2006	81	4	4.9			73	90.1
2007	46	13	28.3			19	41.3
2008	50	27	54.0			13	26.0
2009	65	34	52.3			22	33.9
2010	82	37	45.1			35	42.7
2011	197	78	39.6			23	11.7
2012	167	60	35.9			33	19.8
2013	222	41	18.5	22	9.9	76	34.2
2014	256	43	16.8	17	6.6	82	32.0
2015	203	31	15.3	14	6.9	83	40.9
2016	253	40	15.8	13	5.1	102	40.3
2017	297	85	28.6	1	0.3	49	16.5
2018	366	88	24.0			33	9.0
2019	219	42	19.2			32	14.6
2020	228	58	25.4	18	7.9	83	36.4
2021	317	100	31.6	28	8.8	102	32.2
2022	310	78	25.2	22	7.1	131	42.3
2023	125	36	28.8	3	2.4	24	19.2

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

Programs containing Value Qualified data:

5002 - Florida STORET / WIN

514 - Florida LAKEWATCH Program

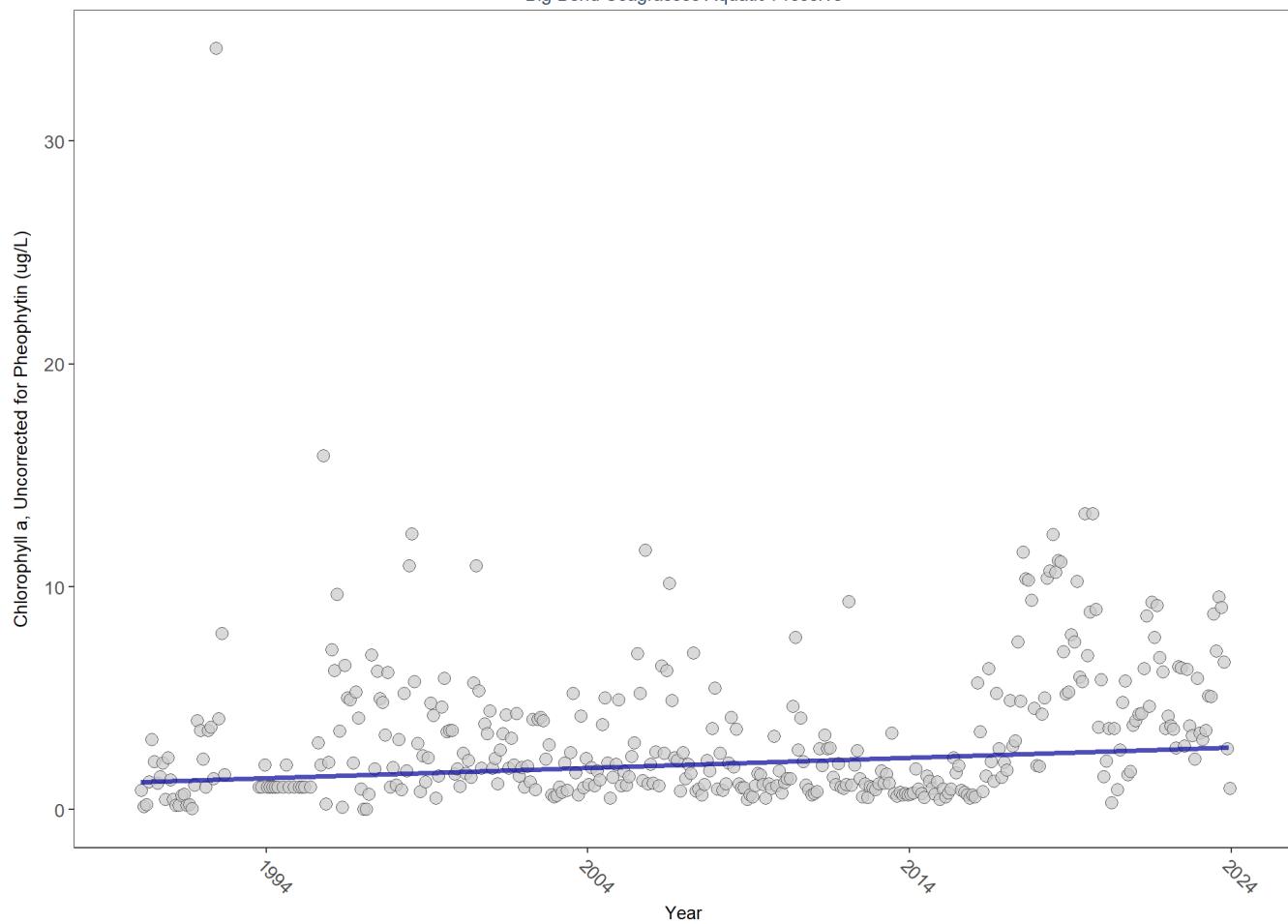
540 - Shellfish Harvest Area Classification Program

477 - Suwannee River Water Management District Water Resource Monitoring Program

Chlorophyll a, Uncorrected for Pheophytin - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

Chlorophyll a, Uncorrected for Pheophytin, Lab, All Depths
Big Bend Seagrasses Aquatic Preserve

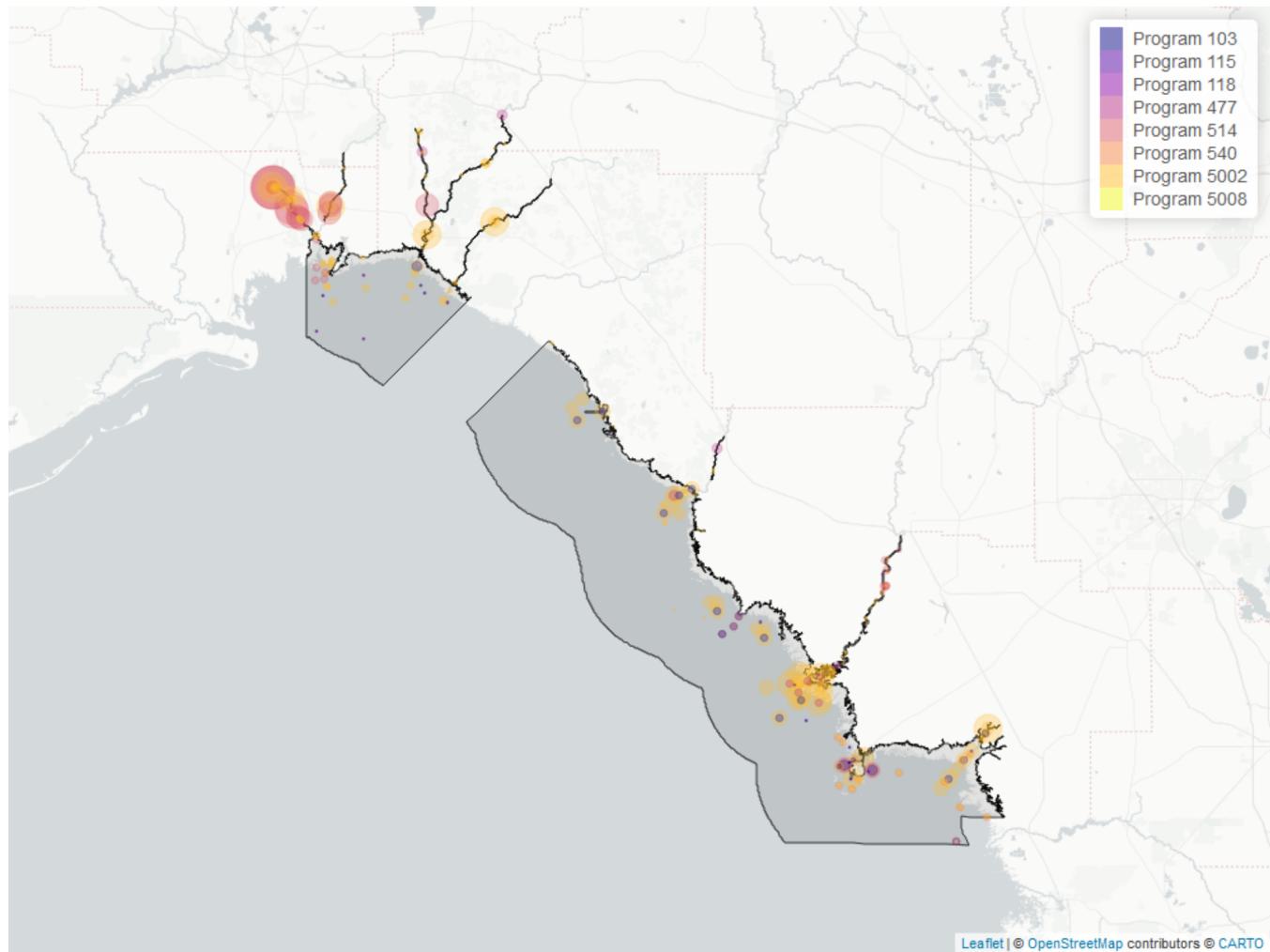


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	5925	34	1.2	TRUE	0.1716	0.0000	0.04597222	1.226257	17.5786	0.0919	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

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



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

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

ProgramID	N_Data	YearMin	YearMax
5002	3291	1990	2023
514	2126	1993	2023
103	260	2000	2021
540	131	2017	2022
477	129	2019	2022
118	8	2000	2006
115	7	2000	2004
5008	1	2021	2021

Program names:

5002 - Florida STORET / WIN
 514 - Florida LAKEWATCH Program
 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
 540 - Shellfish Harvest Area Classification Program
 477 - Suwannee River Water Management District Water Resource Monitoring Program
 118 - National Aquatic Resource Surveys, National Coastal Condition Assessment
 115 - Environmental Monitoring Assessment Program
 5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region

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	$perc_U$
2007	157					8	5.1
2008	131	1	0.8			16	12.2
2009	121	28	23.1			11	9.1
2010	211	44	20.9	1	0.5	27	12.8
2011	182	43	23.6			9	5.0
2012	127	29	22.8			10	7.9
2013	146	33	22.6			19	13.0
2014	150	36	24.0			23	15.3
2015	149	41	27.5			24	16.1
2016	250	51	20.4	1	0.4	34	13.6
2017	382	65	17.0	1	0.3	21	5.5
2018	449	63	14.0			16	3.6
2019	277	33	11.9			22	7.9
2020	237	51	21.5	15	6.3	48	20.2
2021	535	65	12.2	29	5.4	104	19.4
2022	318	77	24.2	22	6.9	115	36.2
2023	125	23	18.4	3	2.4	21	16.8

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

Programs containing Value Qualified data:

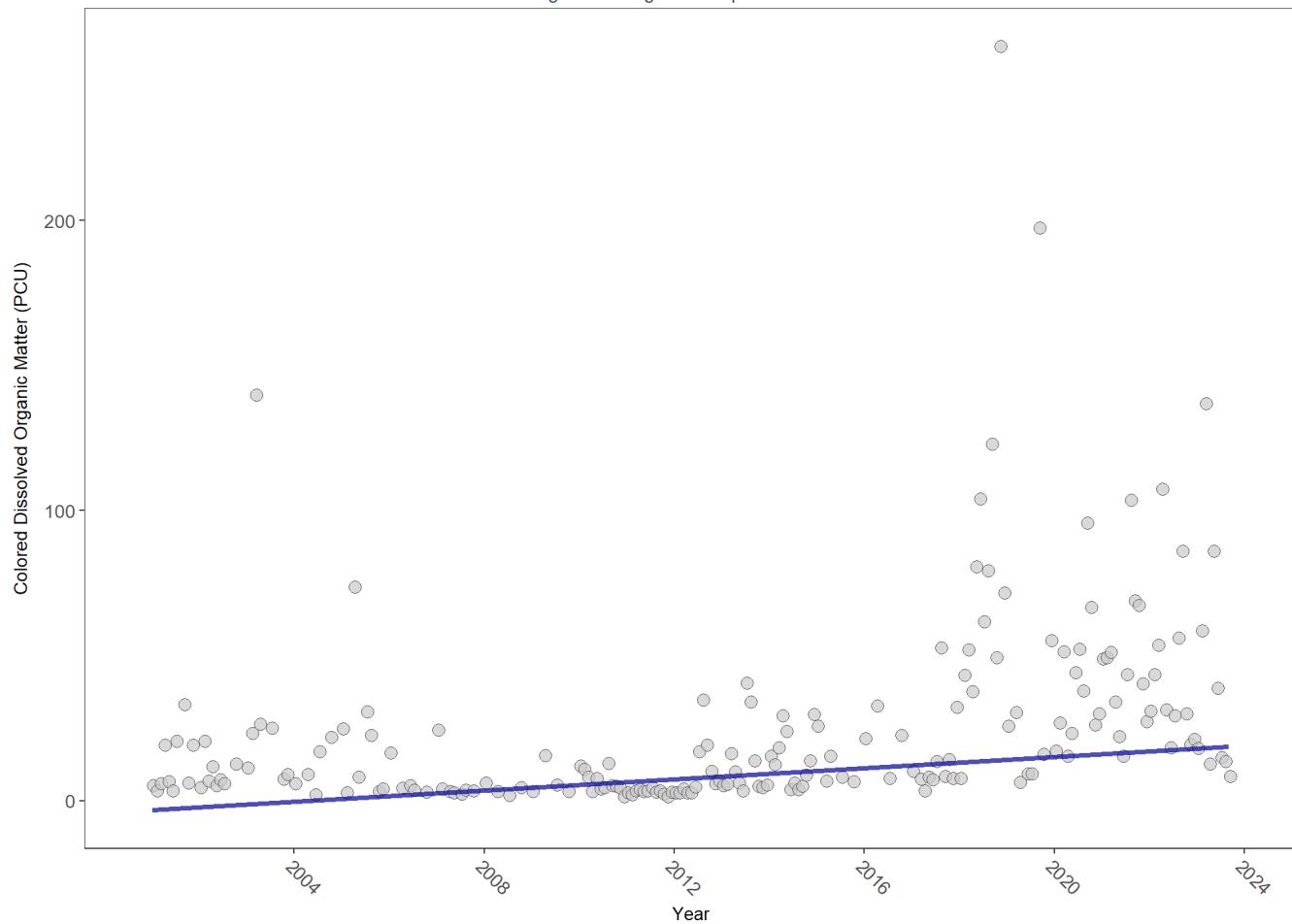
5002 - Florida STORET / WIN
 514 - Florida LAKEWATCH Program
 540 - Shellfish Harvest Area Classification Program
 477 - Suwannee River Water Management District Water Resource Monitoring Program

Colored Dissolved Organic Matter - Discrete Water Quality

Colored Dissolved Organic Matter (*CDOM*) occurs naturally in every water body. It is made up of mainly plant material, algae and bacteria. The composition is determined by its source; plants, soil, algae, and wastewater are common sources.

Seasonal Kendall-Tau Trend Analysis

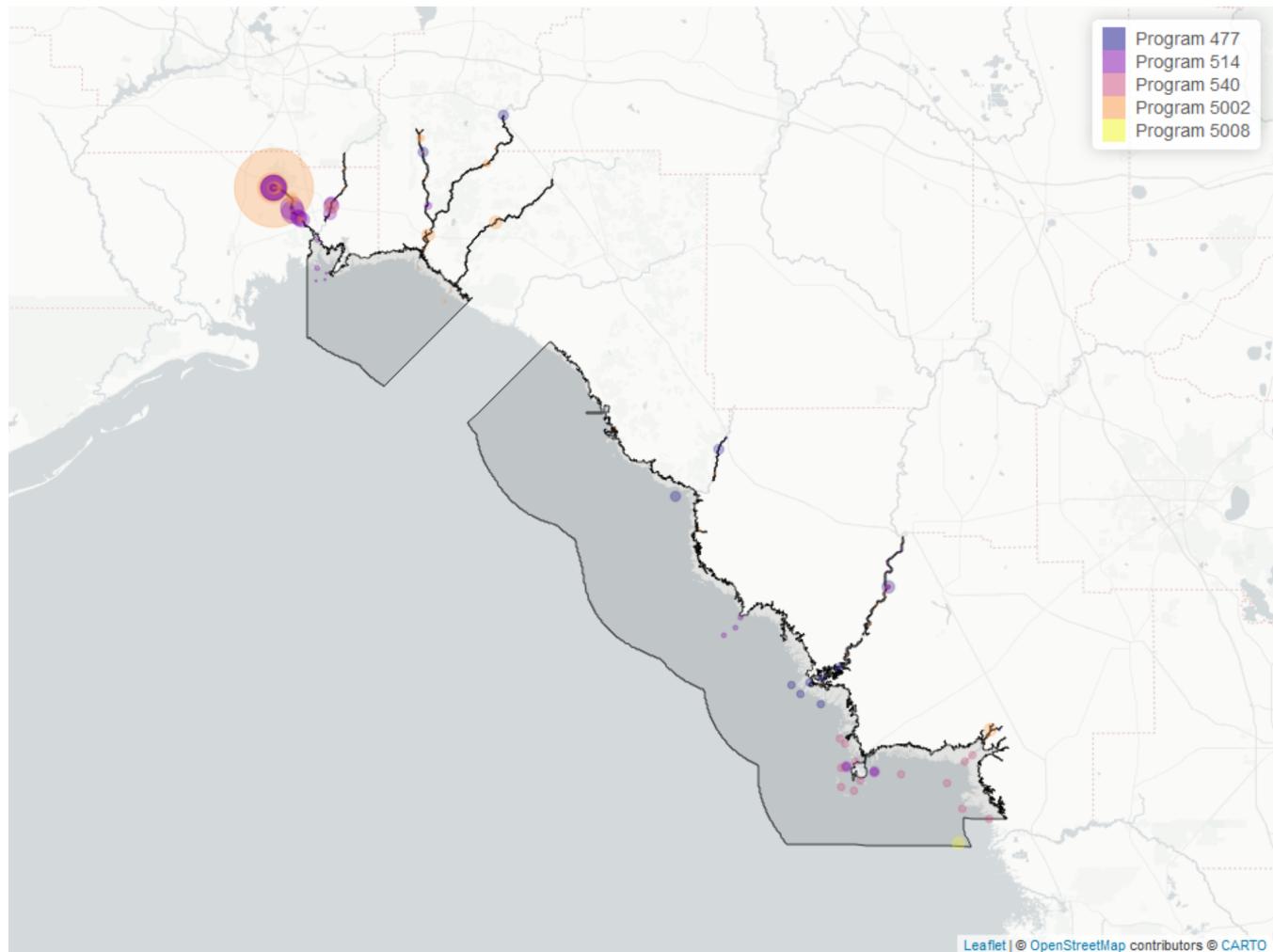
Colored Dissolved Organic Matter, Lab, All Depths
Big Bend Seagrasses Aquatic Preserve



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 Colored Dissolved Organic Matter



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

Table 10: Programs contributing data for Colored Dissolved Organic Matter

ProgramID	N_Data	YearMin	YearMax
5002	1332	2014	2023
514	828	2001	2023
477	159	2017	2023
540	99	2017	2019
5008	30	2021	2023

Program names:

5002 - Florida STORET / WIN

514 - Florida LAKEWATCH Program

477 - Suwannee River Water Management District Water Resource Monitoring Program

540 - Shellfish Harvest Area Classification Program

5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region

Value Qualifiers

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

Table 11: Value Qualifiers for Colored Dissolved Organic Matter

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
2017	74	7	9.5	1	1.4	1	1.4
2018	106	2	1.9				
2019	60	6	10.0	2	3.3	2	3.3
2020	452	6	1.3	14	3.1	8	1.8
2021	523	8	1.5	32	6.1	12	2.3
2022	503	10	2.0	11	2.2	16	3.2
2023	50	7	14.0	5	10.0	2	4.0

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:

514 - Florida LAKEWATCH Program

5002 - Florida STORET / WIN

477 - Suwannee River Water Management District Water Resource Monitoring Program

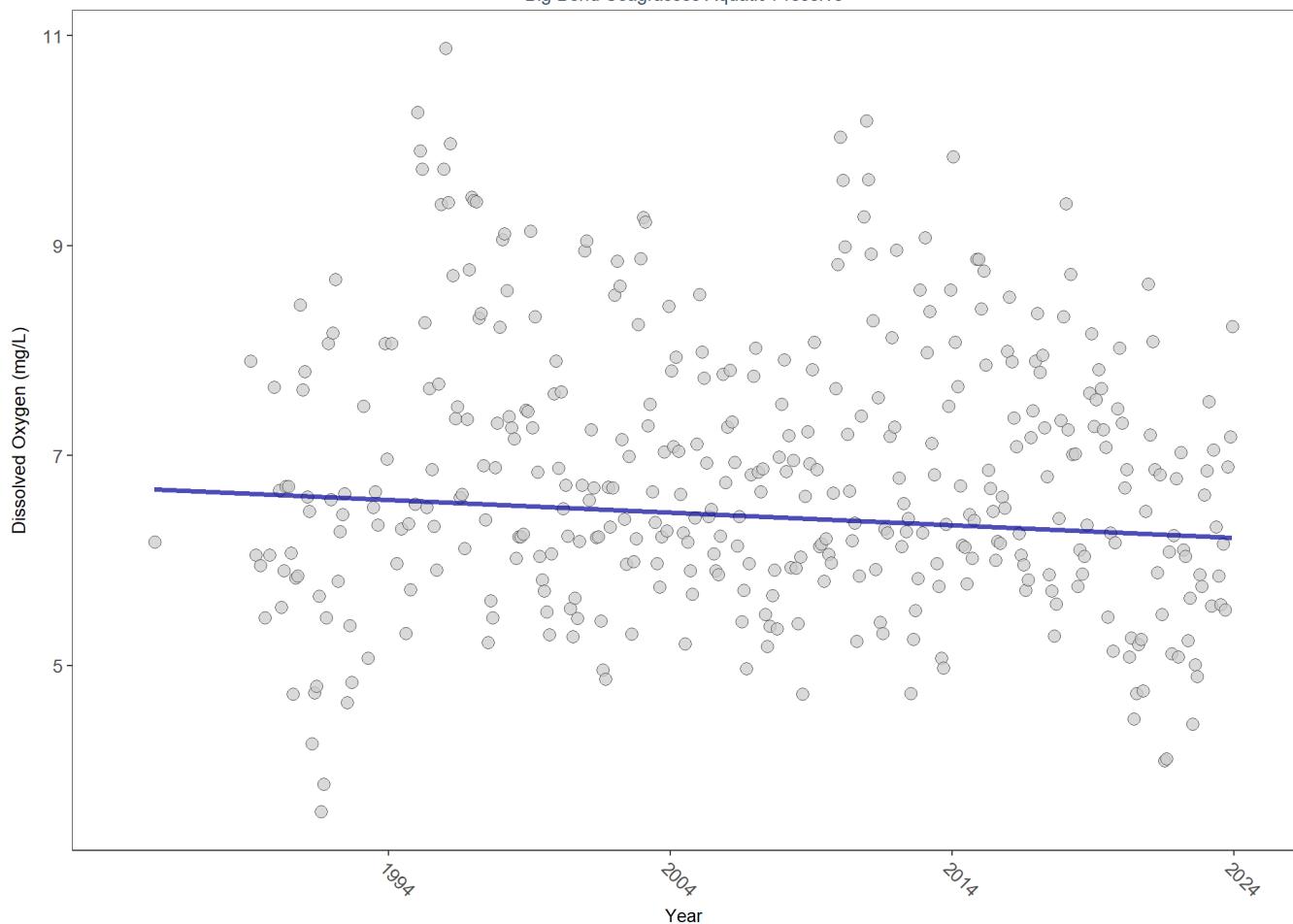
540 - Shellfish Harvest Area Classification Program

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
Big Bend Seagrasses Aquatic Preserve

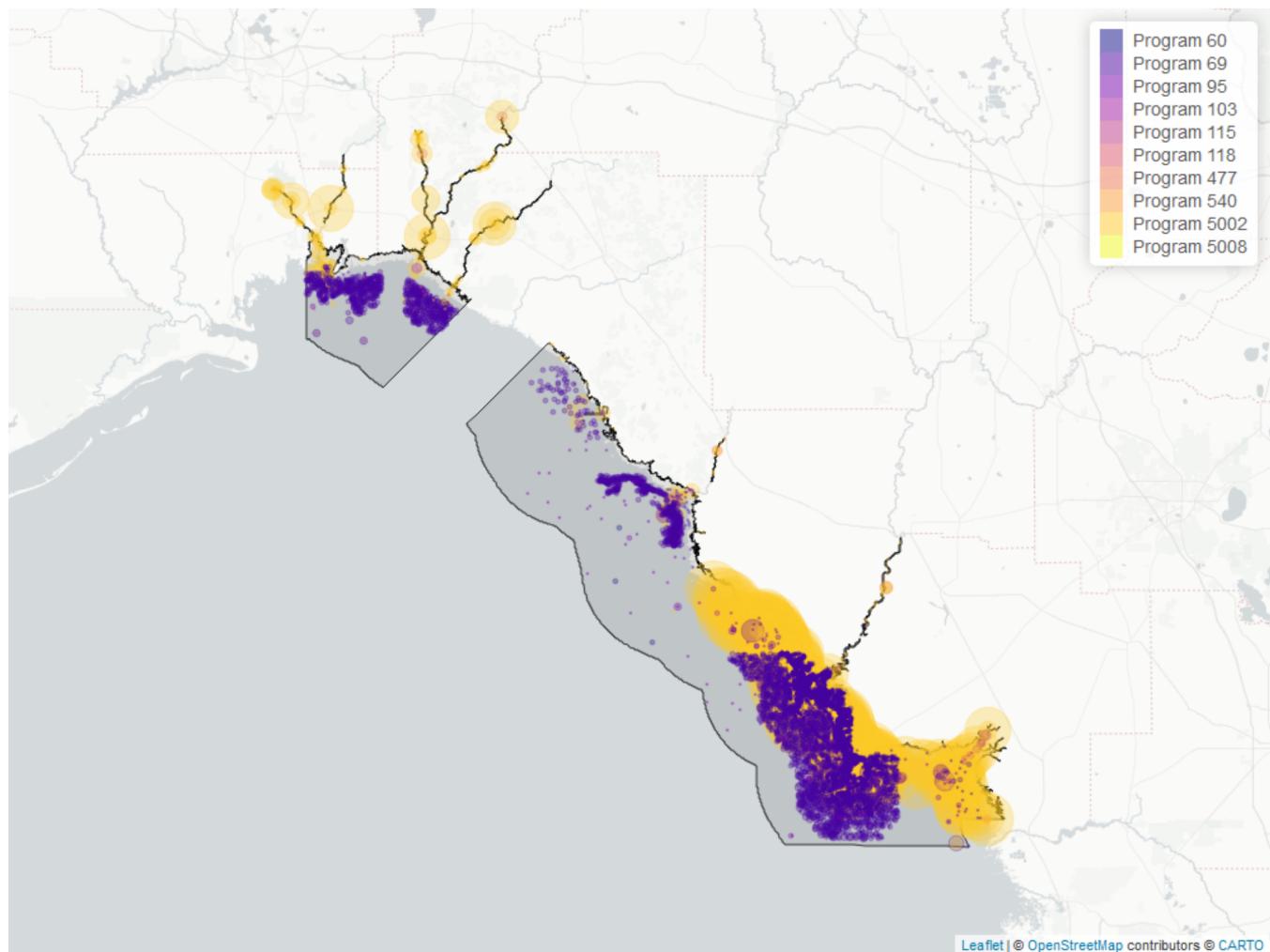


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	137502	36	6.7	TRUE	-0.099	0.0056	-0.01206881	6.688357	11.6486	0.3906	-1

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 12: Programs contributing data for Dissolved Oxygen

ProgramID	N_Data	YearMin	YearMax
5002	93356	1989	2023
69	42803	1996	2017
95	953	1985	2018
103	158	2003	2021
477	156	2019	2023
540	121	2017	2022
115	38	1991	2004
5008	30	2021	2023
60	9	2014	2015
118	7	2000	2006

Program names:

5002 - Florida STORET / WIN
 69 - Fisheries-Independent Monitoring (FIM) Program
 95 - Harmful Algal Bloom Marine Observation Network
 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
 477 - Suwannee River Water Management District Water Resource Monitoring Program
 540 - Shellfish Harvest Area Classification Program
 115 - Environmental Monitoring Assessment Program
 5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region
 60 - Southeast Area Monitoring and Assessment Program (SEAMAP) - Gulf of Mexico Fall & Summer Shrimp/Groundfish Survey
 118 - National Aquatic Resource Surveys, National Coastal Condition Assessment

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 13: Value Qualifiers for Dissolved Oxygen

Year	N_{Total}	N_Q	$perc_Q$
2014	6784	1	0

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

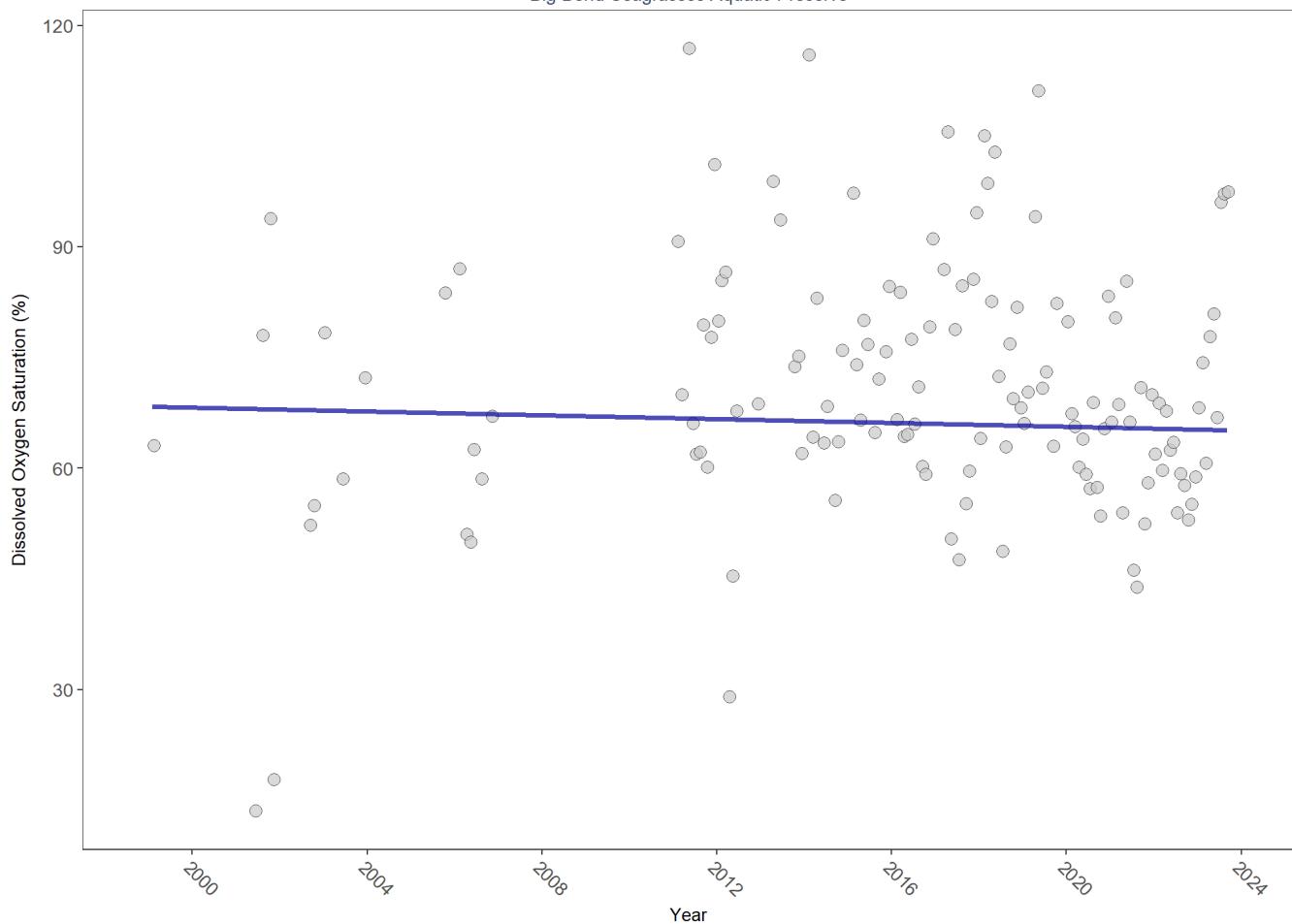
Programs containing Value Qualified data:

5002 - Florida STORET / WIN

Dissolved Oxygen Saturation - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

Dissolved Oxygen Saturation, Field, All Depths
Big Bend Seagrasses Aquatic Preserve

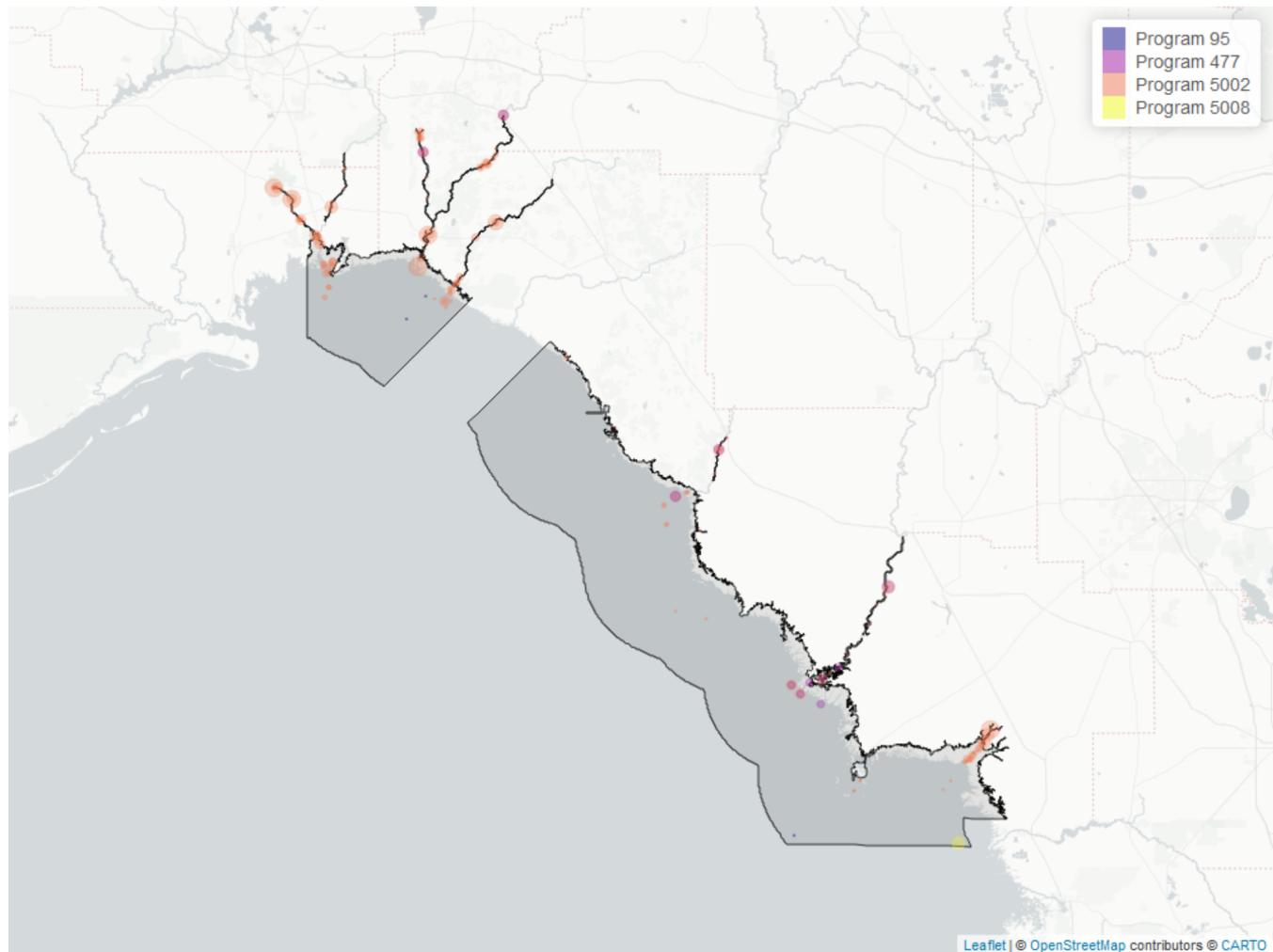


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	1239	19	71	TRUE	-0.0374	0.7106	-0.1293216	68.32973	9.2629	0.5976	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Dissolved Oxygen Saturation



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

Table 14: Programs contributing data for Dissolved Oxygen Saturation

<i>ProgramID</i>	<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>
5002	1086	1999	2023
477	156	2019	2023
5008	30	2021	2023
95	3	2016	2018

Program names:

5002 - Florida STORET / WIN

477 - Suwannee River Water Management District Water Resource Monitoring Program

5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region

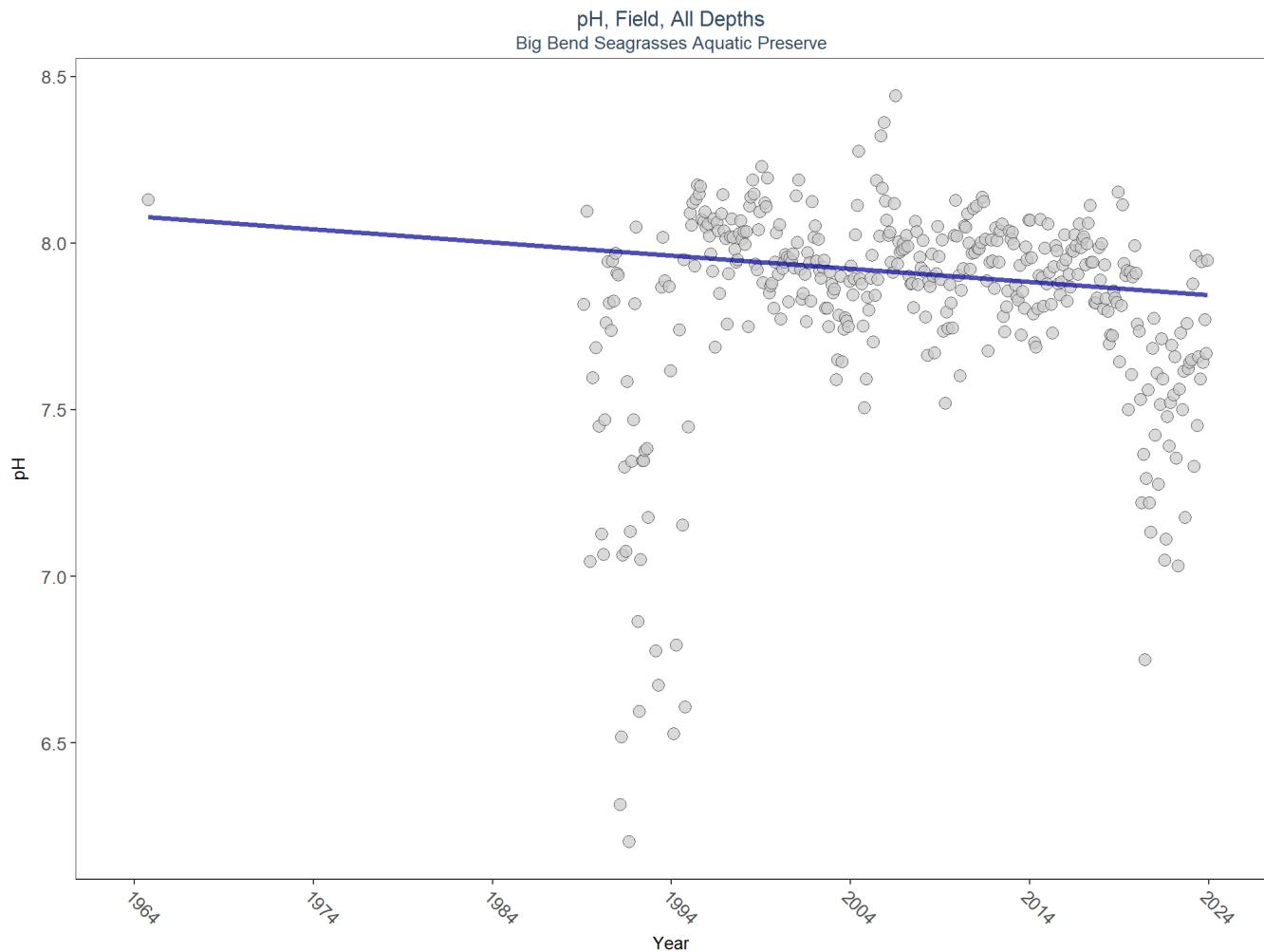
95 - Harmful Algal Bloom Marine Observation Network

There are no qualifying Value Qualifiers for Dissolved Oxygen Saturation in Big Bend Seagrasses 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	95264	36	8	TRUE	-0.1256	0.0006	-0.003957053	8.081337	12.2584	0.3445	-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

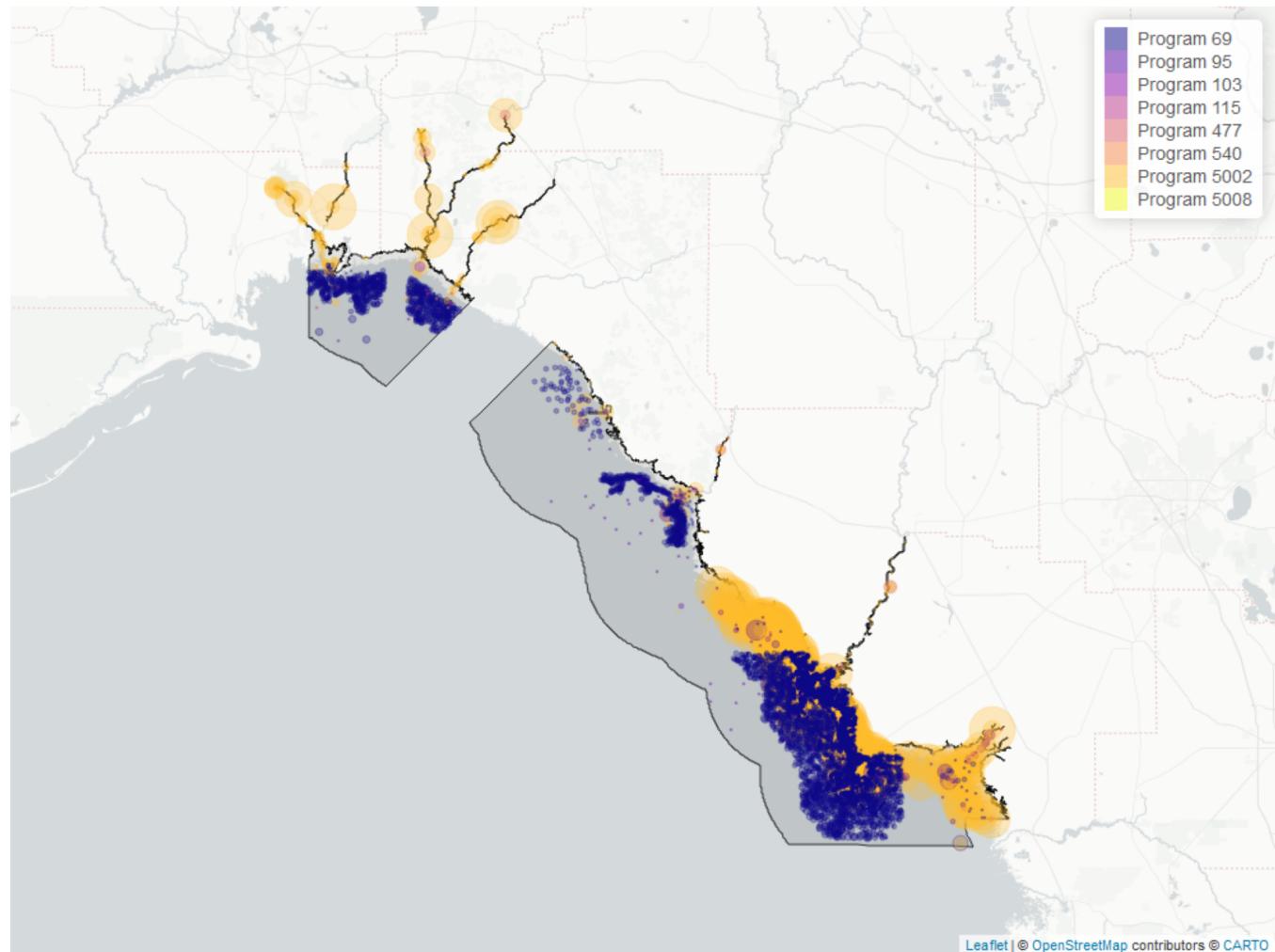


Table 15: Programs contributing data for pH

ProgramID	N_Data	YearMin	YearMax
5002	51551	1989	2023
69	42723	1996	2017
95	591	1964	2018
477	160	2012	2023
103	156	2003	2021
540	85	2017	2022
115	38	1991	2004
5008	30	2021	2023

Program names:

5002 - Florida STORET / WIN

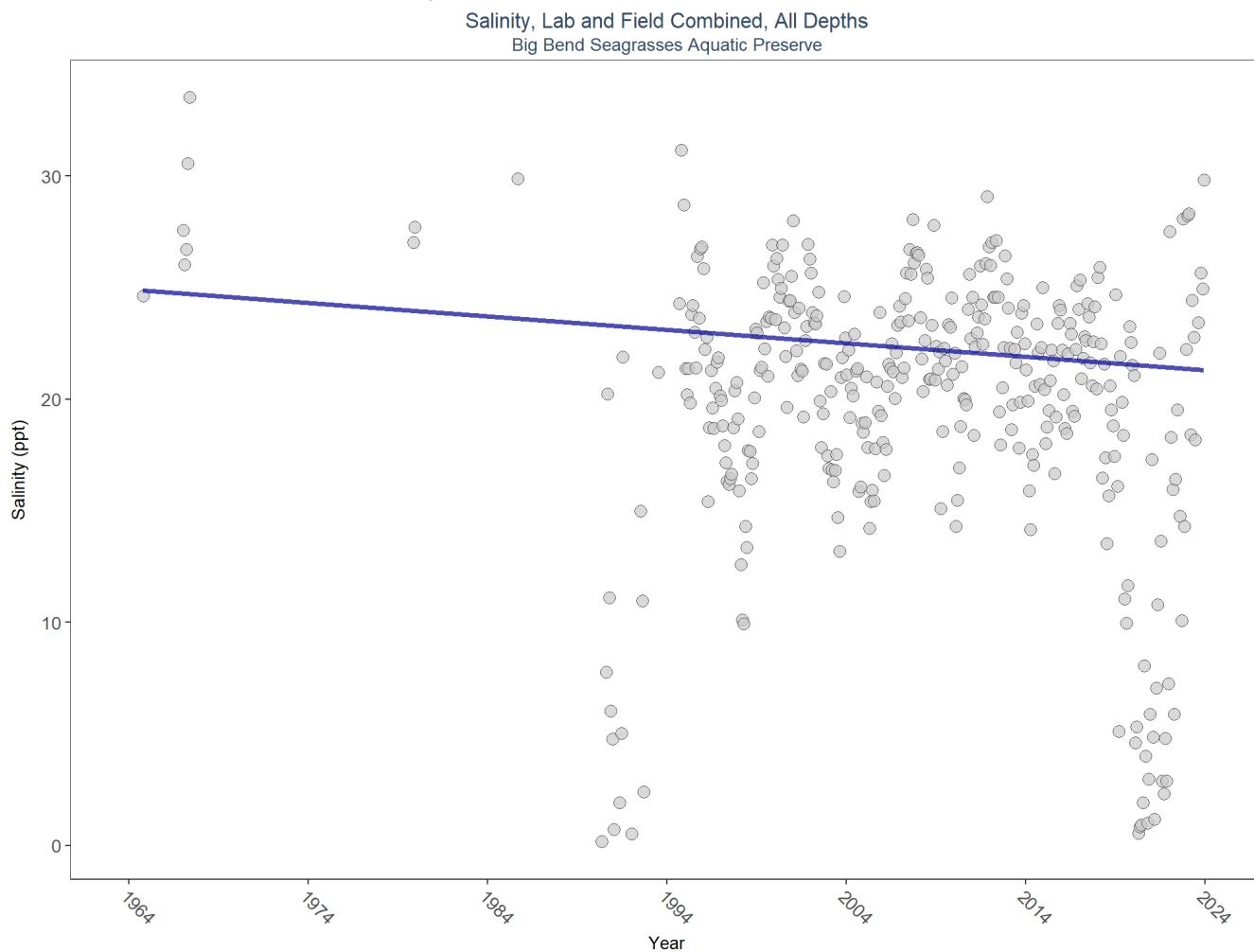
69 - Fisheries-Independent Monitoring (FIM) Program
 95 - Harmful Algal Bloom Marine Observation Network
 477 - Suwannee River Water Management District Water Resource Monitoring Program
 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
 540 - Shellfish Harvest Area Classification Program
 115 - Environmental Monitoring Assessment Program
 5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region

There are no qualifying Value Qualifiers for pH in Big Bend Seagrasses 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

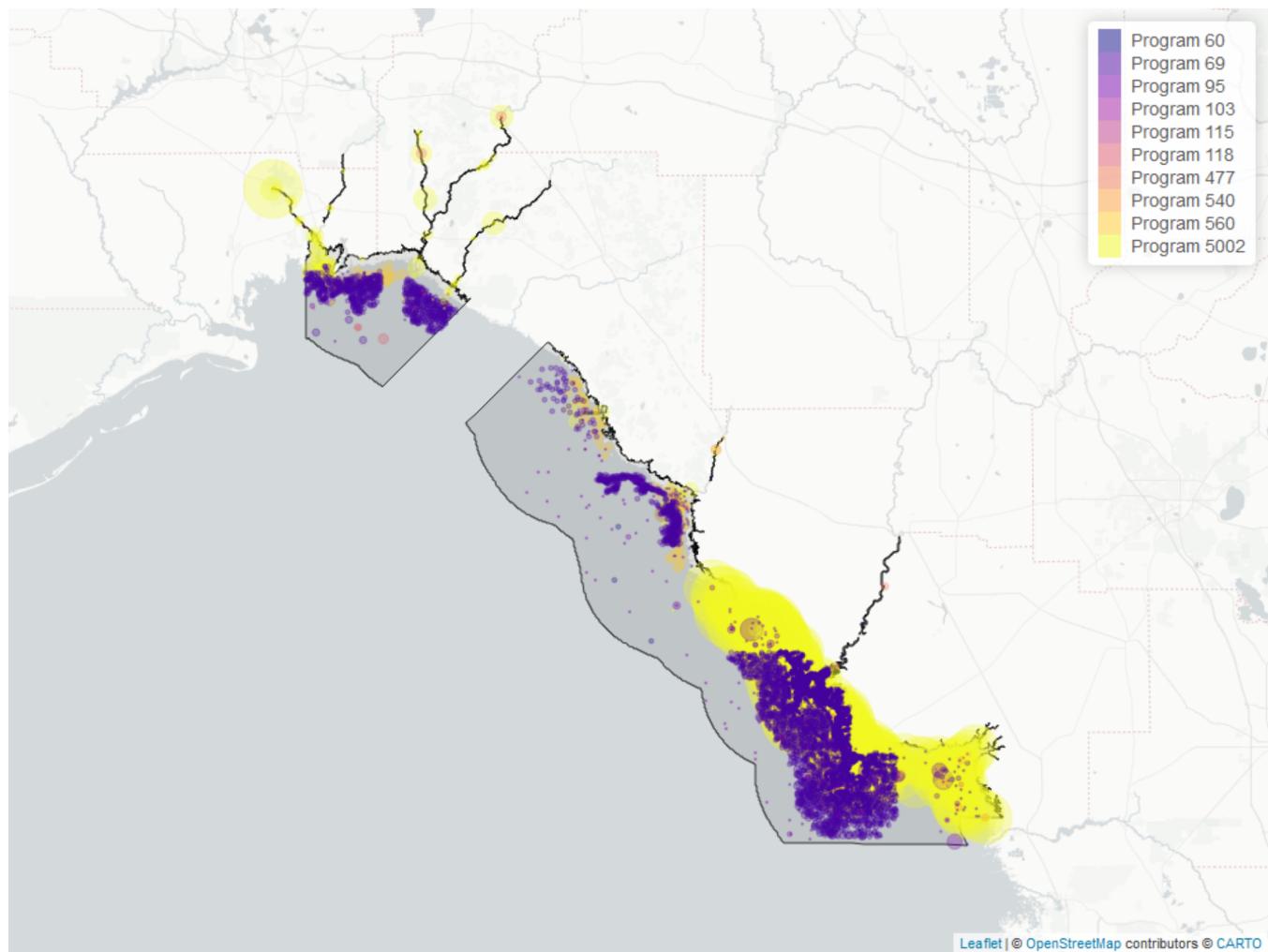


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	142979	38	23.2	TRUE	-0.0983	0.0079	-0.06017063	24.91413	11.1931	0.4272	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Salinity



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

Table 16: Programs contributing data for Salinity

ProgramID	N_Data	YearMin	YearMax
5002	97269	1990	2023
69	42940	1996	2017
560	1374	2003	2023
95	1069	1964	2018
477	137	2014	2022
540	132	2017	2022
118	51	2015	2021
115	38	1991	2004
60	18	2014	2015
103	5	2003	2004

Program names:

5002 - Florida STORET / WIN
69 - Fisheries-Independent Monitoring (FIM) Program
560 - Big Bend Seagrasses & Nature Coast Aquatic Preserves - Seagrass Monitoring
95 - Harmful Algal Bloom Marine Observation Network
477 - Suwannee River Water Management District Water Resource Monitoring Program
540 - Shellfish Harvest Area Classification Program
118 - National Aquatic Resource Surveys, National Coastal Condition Assessment
115 - Environmental Monitoring Assessment Program
60 - Southeast Area Monitoring and Assessment Program (SEAMAP) - Gulf of Mexico Fall & Summer Shrimp/Groundfish Survey
103 - EPA STOrage and RETrieval Data Warehouse (STORET)

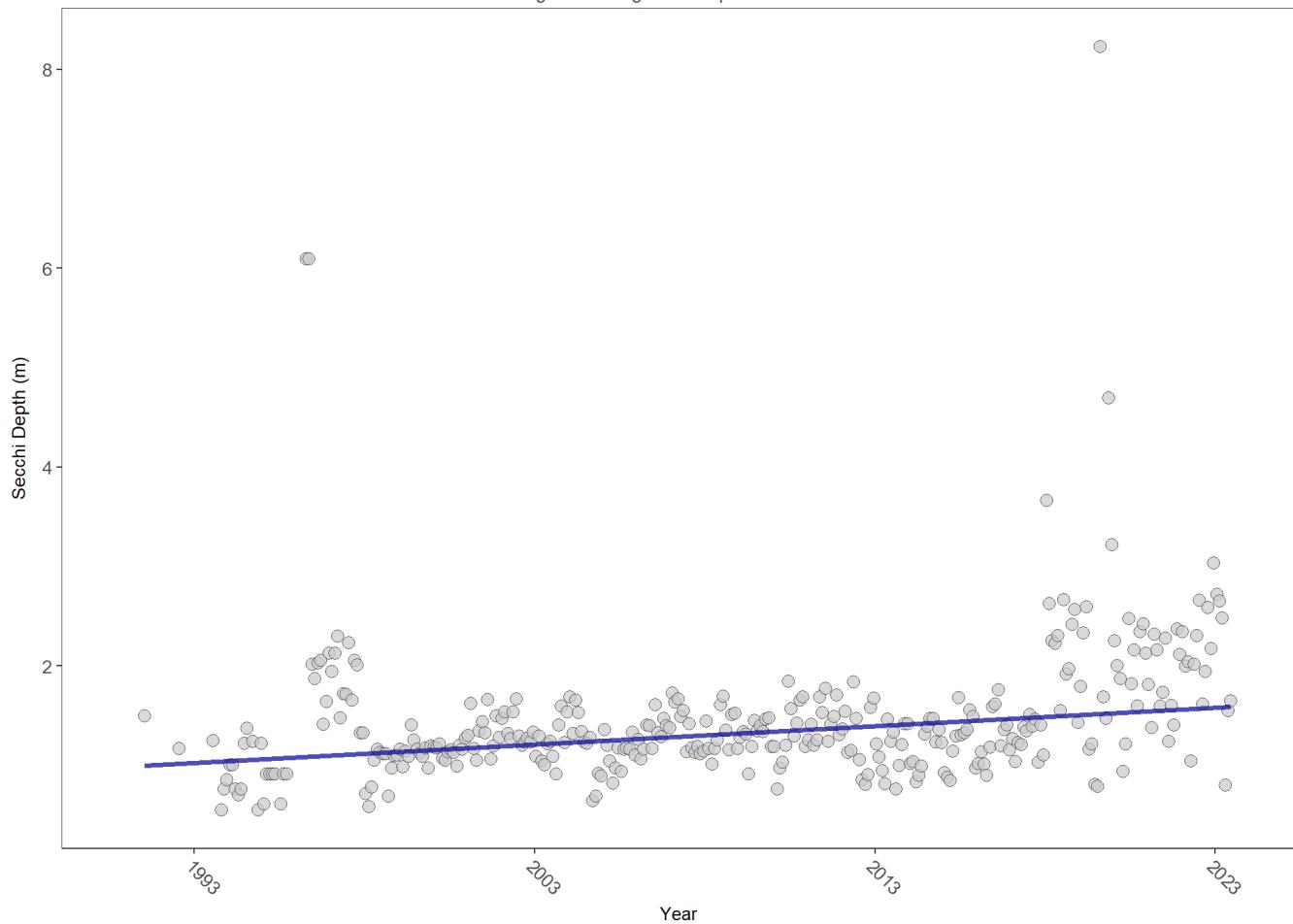
There are no qualifying Value Qualifiers for Salinity in Big Bend Seagrasses Aquatic Preserve

Secchi Depth - Discrete Water Quality

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

Seasonal Kendall-Tau Trend Analysis

Secchi Depth, Field, Surface
Big Bend Seagrasses Aquatic Preserve

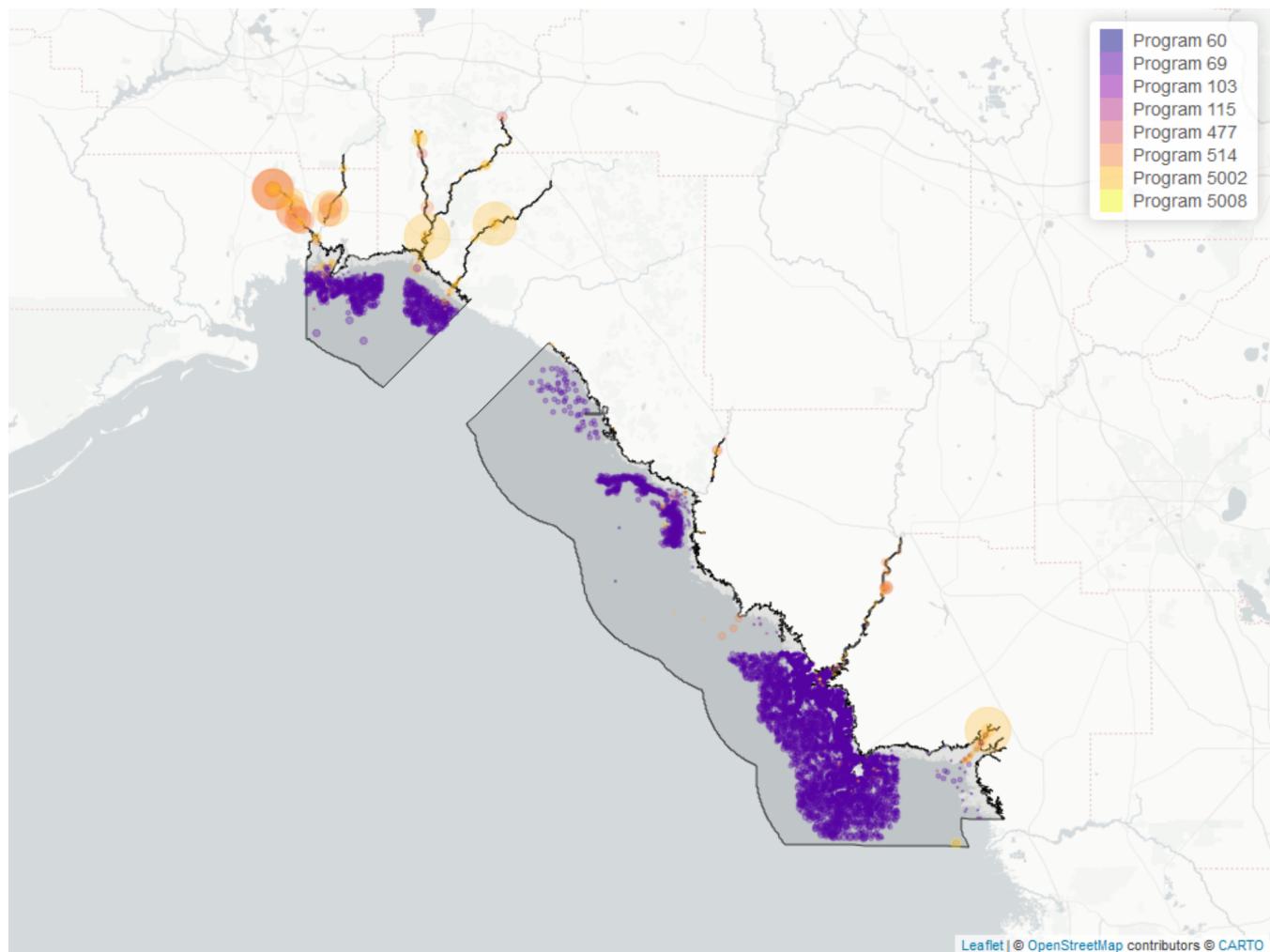


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	47287	33	0.9	TRUE	0.2754	0.0000	0.01859227	0.986987	11.8393	0.3758	1

$p < 0.00005$ 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 Secchi Depth



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

Table 17: Programs contributing data for Secchi Depth

ProgramID	N_Data	YearMin	YearMax
69	42930	1996	2017
514	2123	1993	2023
5002	1996	1999	2023
477	155	2019	2023
103	47	2020	2021
115	21	1991	2004
5008	15	2021	2022
60	2	2014	2014

Program names:

69 - Fisheries-Independent Monitoring (FIM) Program

514 - Florida LAKEWATCH Program
 5002 - Florida STORET / WIN
 477 - Suwannee River Water Management District Water Resource Monitoring Program
 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
 115 - Environmental Monitoring Assessment Program
 5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region
 60 - Southeast Area Monitoring and Assessment Program (SEAMAP) - Gulf of Mexico Fall & Summer Shrimp/Groundfish Survey

Value Qualifiers

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

Table 18: Value Qualifiers for Secchi Depth

Year	N_{Total}	N_S	$perc_S$
2013	2818	5	0.2
2014	2815	29	1.0
2015	2759	34	1.2
2016	2790	69	2.5
2017	2813	42	1.5
2018	150	17	11.3
2019	66	21	31.8
2020	178	68	38.2
2021	268	75	28.0
2022	210	100	47.6
2023	47	29	61.7

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

Programs containing Value Qualified data:

5002 - Florida STORET / WIN
 514 - Florida LAKEWATCH Program
 477 - Suwannee River Water Management District Water Resource Monitoring Program

Total Nitrogen - Discrete Water Quality

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

Total Nitrogen Calculation:

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

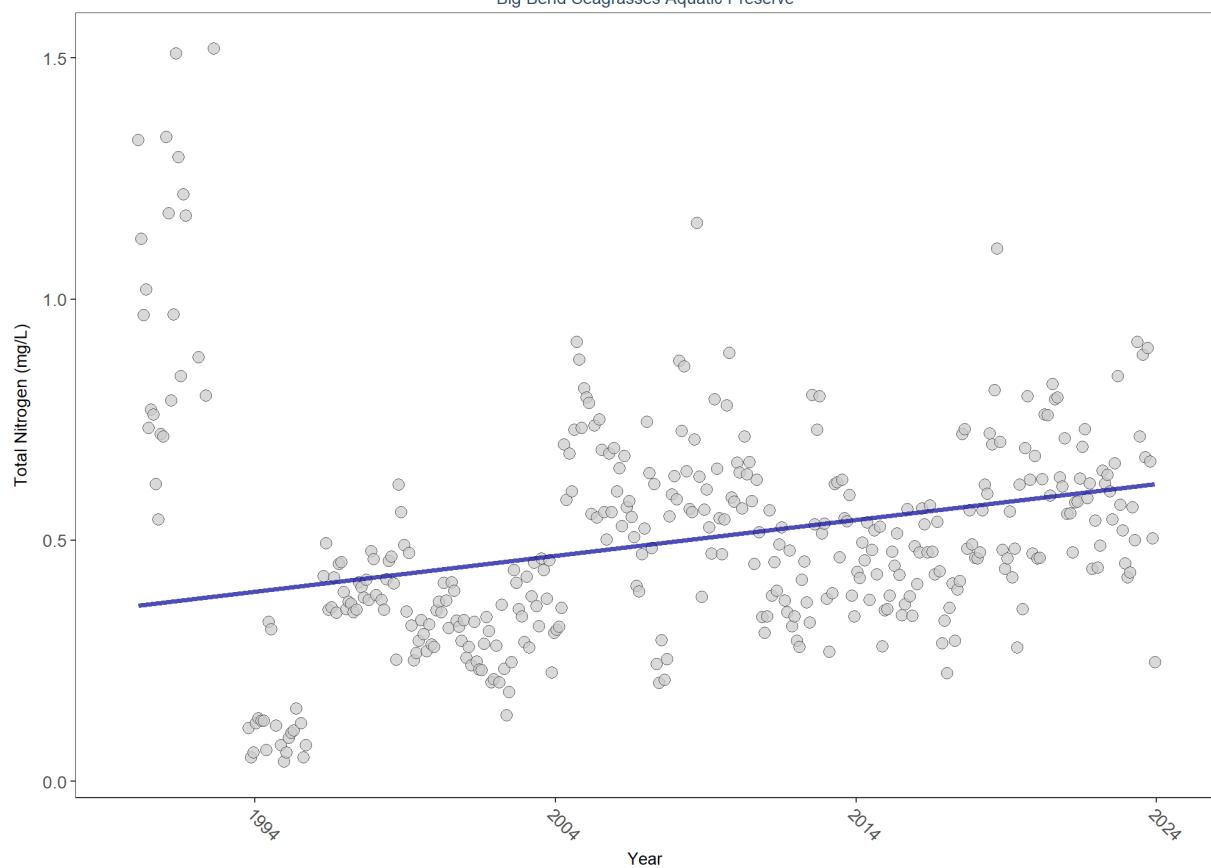
- 1) $TN = TKN + NO_3O_2;$
- 2) $TN = TKN + NO_3 + NO_2;$
- 3) $TN = ORGN + NH_4 + NO_3O_2;$
- 4) $TN = ORGN + NH_4 + NO_2 + NO_3;$
- 5) $TN = TKN + NO_3;$
- 6) $TN = ORGN + NH_4 + NO_3;$

Additional Information:

- Rules for use of sample fraction:
 - FDEP report that if both “Total” and “Dissolved” are reported, only “Total” is used. If the total is not reported, they do use dissolved as a best available replacement.
 - An analysis of all SEACAR data shows that 90% of all possible TN calculations can be done using nitrogen components with the same sample fraction, rather than use nitrogen components with mixed total/dissolved sample fractions. In other words, TN can be calculated when TKN and NO₃O₂ are both total sample fraction, or when both are dissolved sample fraction. This is important, because then the calculated TN value is not based on components with mixed sample fractions.
- Values inserted into data:
 - ParameterName = “Total Nitrogen”
 - SEACAR_QAQCFlagCode = “1Q”
 - SEACAR_QAQC_Description = “SEACAR Calculated”

Seasonal Kendall-Tau Trend Analysis

Total Nitrogen, Lab, All Depths
Big Bend Seagrasses Aquatic Preserve

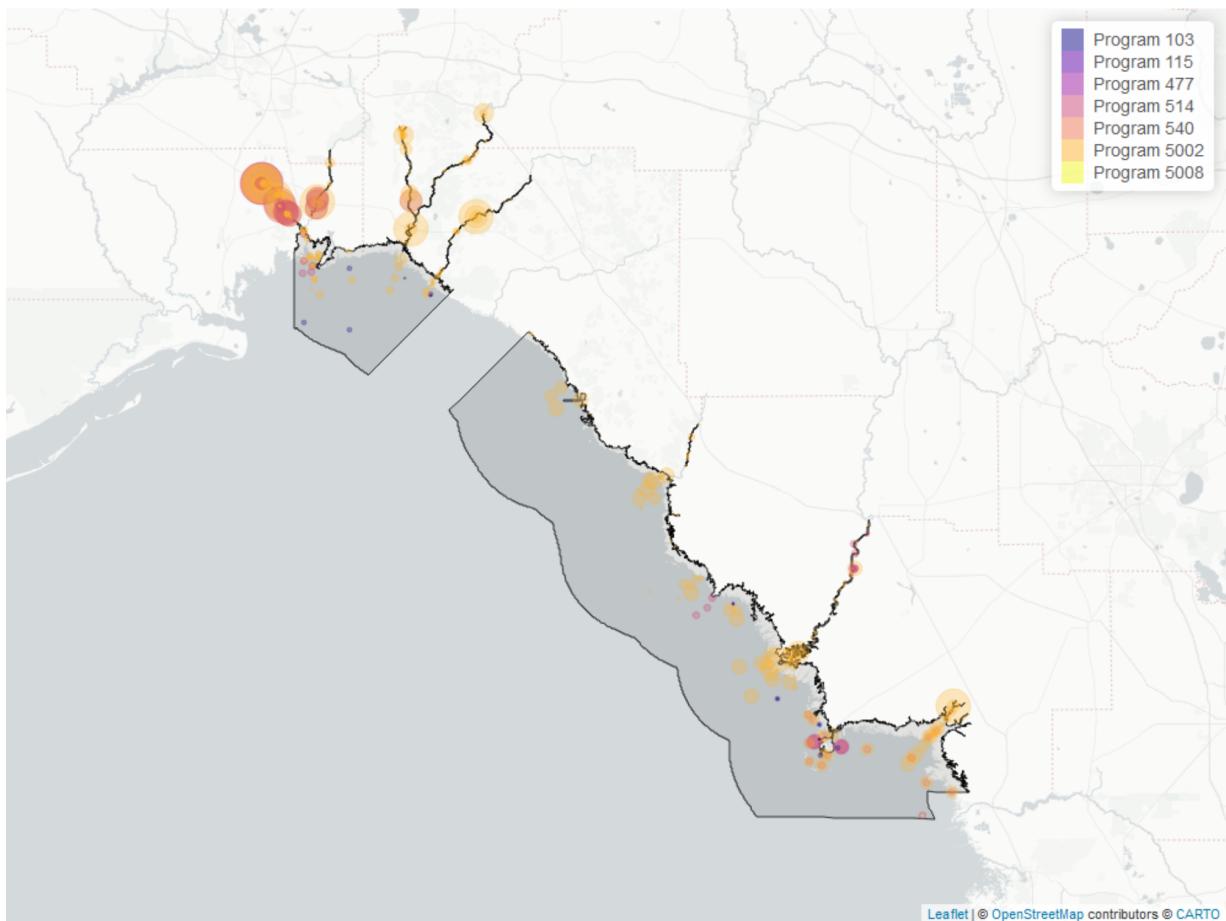


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	7766	34	0.464	TRUE	0.2211	0.0000	0.007447759	0.3631955	8.9111	0.6301	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Total Nitrogen



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

Table 19: Programs contributing data for Total Nitrogen

ProgramID	N_Data	YearMin	YearMax
5002	5379	1990	2023
514	2205	1993	2023
540	131	2017	2022
103	44	2000	2006
115	5	2000	2004
477	1	2017	2017
5008	1	2021	2021

Program names:

5002 - Florida STORET / WIN

514 - Florida LAKEWATCH Program

540 - Shellfish Harvest Area Classification Program

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

115 - Environmental Monitoring Assessment Program

477 - Suwannee River Water Management District Water Resource Monitoring Program
5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region

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 20: Value Qualifiers for Total Nitrogen

Year	N_{Total}	N_Q	$perc_Q$
2013	307	13	4.2
2014	342	28	8.2
2015	283	18	6.4
2016	310	7	2.3
2019	273	10	3.7
2020	149	25	16.8
2021	224	24	10.7
2022	210	3	1.4

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

Programs containing Value Qualified data:

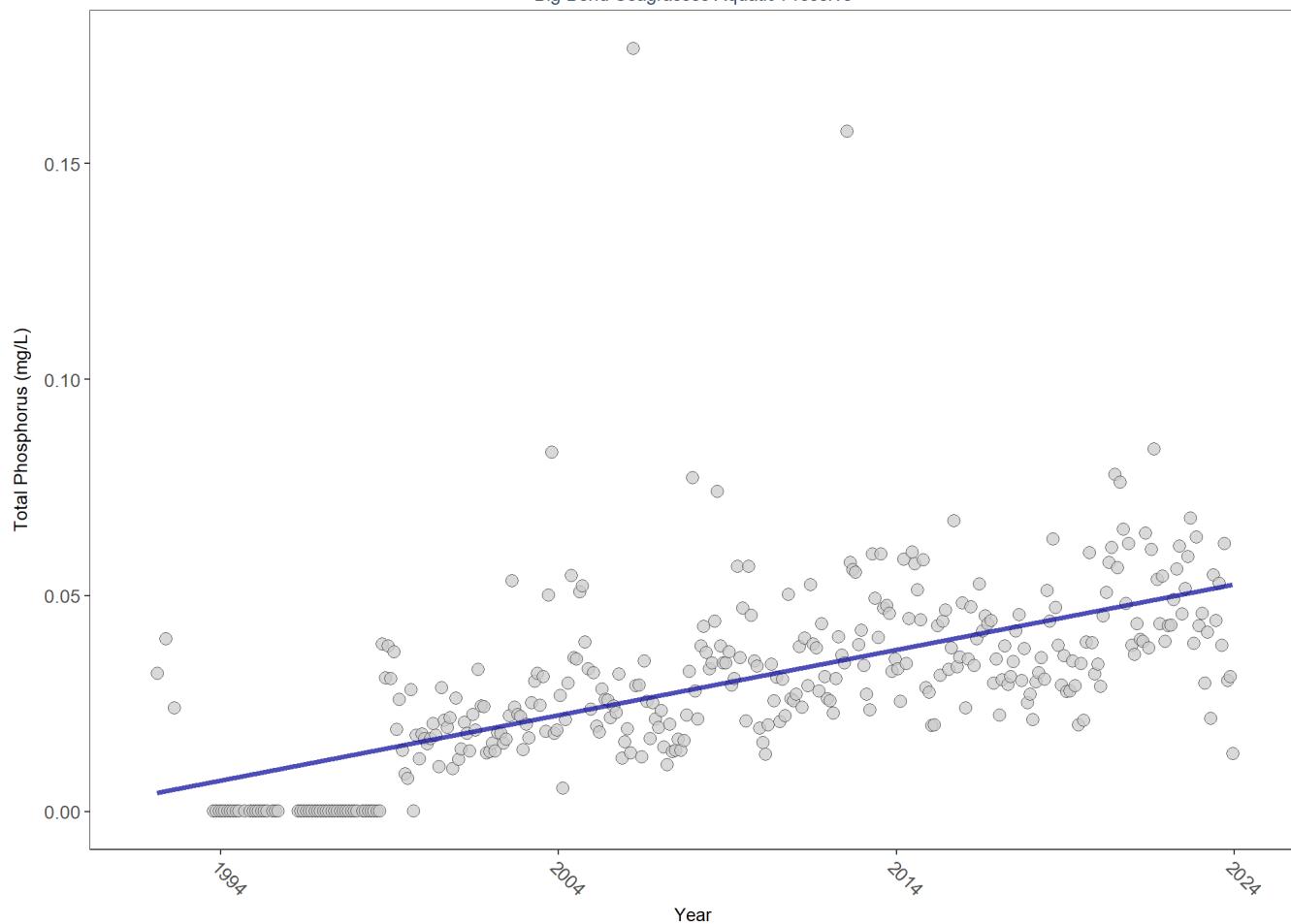
514 - Florida LAKEWATCH Program

5002 - Florida STORET / WIN

Total Phosphorus - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

Total Phosphorus, Lab, All Depths
Big Bend Seagrasses Aquatic Preserve

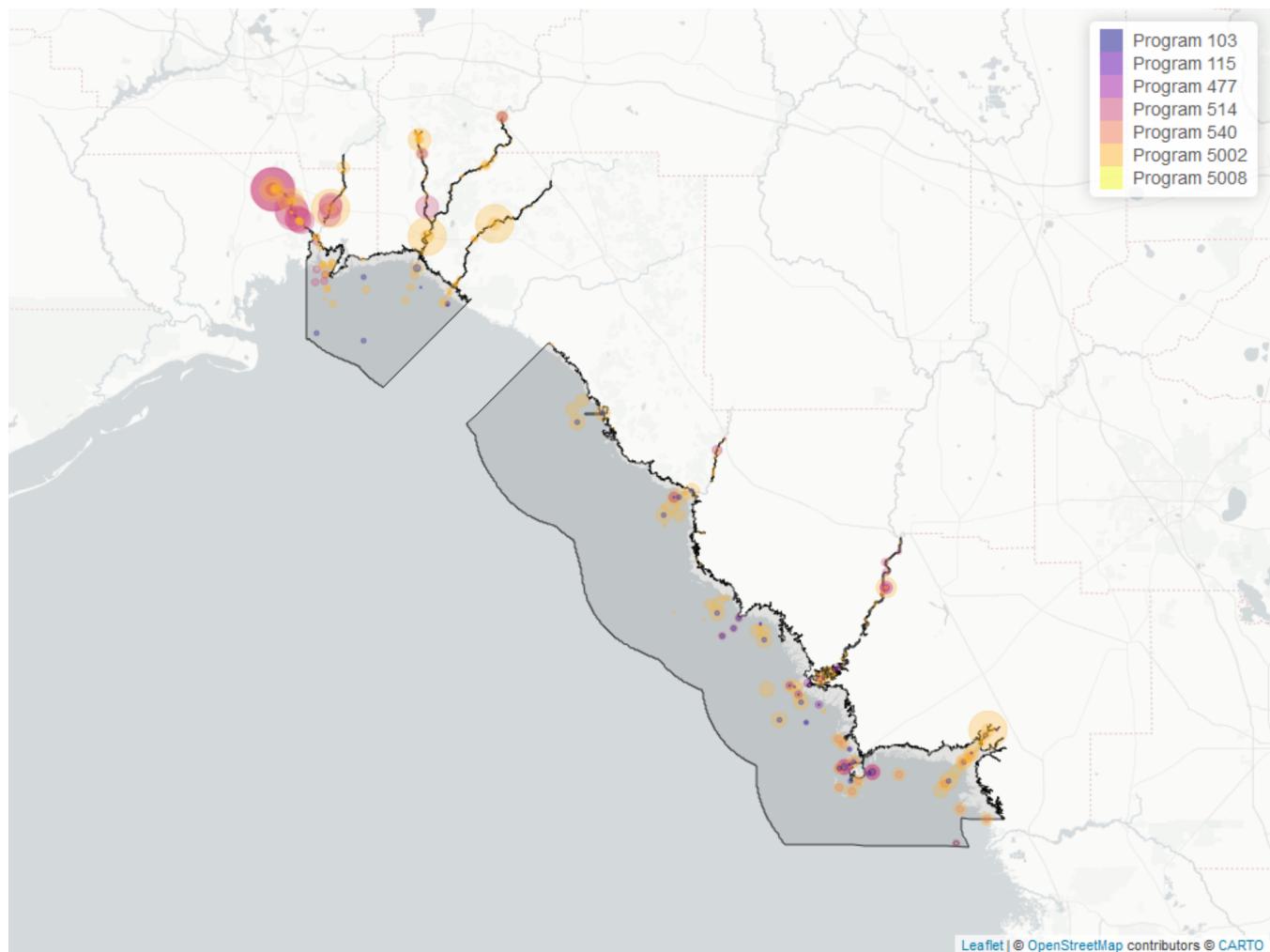


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	6019	32	0.031	TRUE	0.5453	0.0000	0.001510482	0.004210595	2.7421	0.9937	1

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 21: Programs contributing data for Total Phosphorus

ProgramID	N_Data	YearMin	YearMax
5002	3442	1992	2023
514	2211	1993	2023
103	169	2000	2021
477	159	2017	2023
540	131	2017	2022
115	5	2000	2004
5008	1	2021	2021

Program names:

5002 - Florida STORET / WIN

514 - Florida LAKEWATCH Program

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

477 - Suwannee River Water Management District Water Resource Monitoring Program

540 - Shellfish Harvest Area Classification Program

115 - Environmental Monitoring Assessment Program

5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region

Value Qualifiers

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

Table 22: Value Qualifiers for Total Phosphorus

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
1999	138			1	0.7		
2000	171	2	1.2			2	1.2
2001	222	7	3.1				
2002	248	4	1.6				
2003	187	10	5.3				
2005	223	13	5.8			1	0.4
2006	232	18	7.8			3	1.3
2007	173	3	1.7				
2010	178	11	6.2			1	0.6
2011	298	41	13.8				
2012	257	8	3.1				
2014	301	4	1.3				
2015	242	5	2.1	3	1.2		
2016	289	10	3.5				
2017	400	13	3.2				
2018	448	20	4.5			1	0.2
2019	290	13	4.5	10	3.5		
2020	222	13	5.9	30	13.5		
2021	396	13	3.3	20	5.0	1	0.2
2022	266	18	6.8	3	1.1	1	0.4
2023	128	5	3.9				

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

514 - Florida LAKEWATCH Program

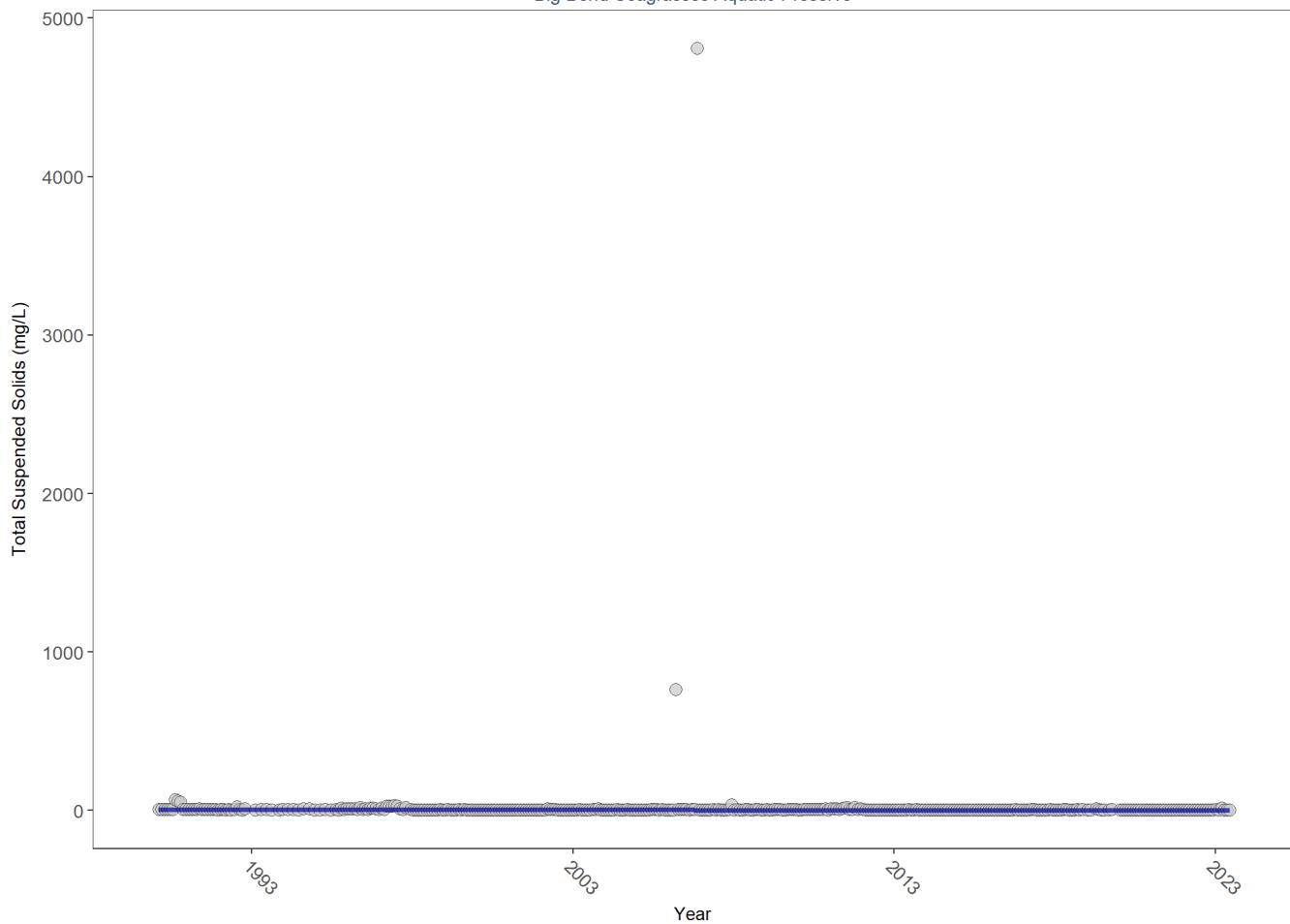
477 - Suwannee River Water Management District Water Resource Monitoring Program

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

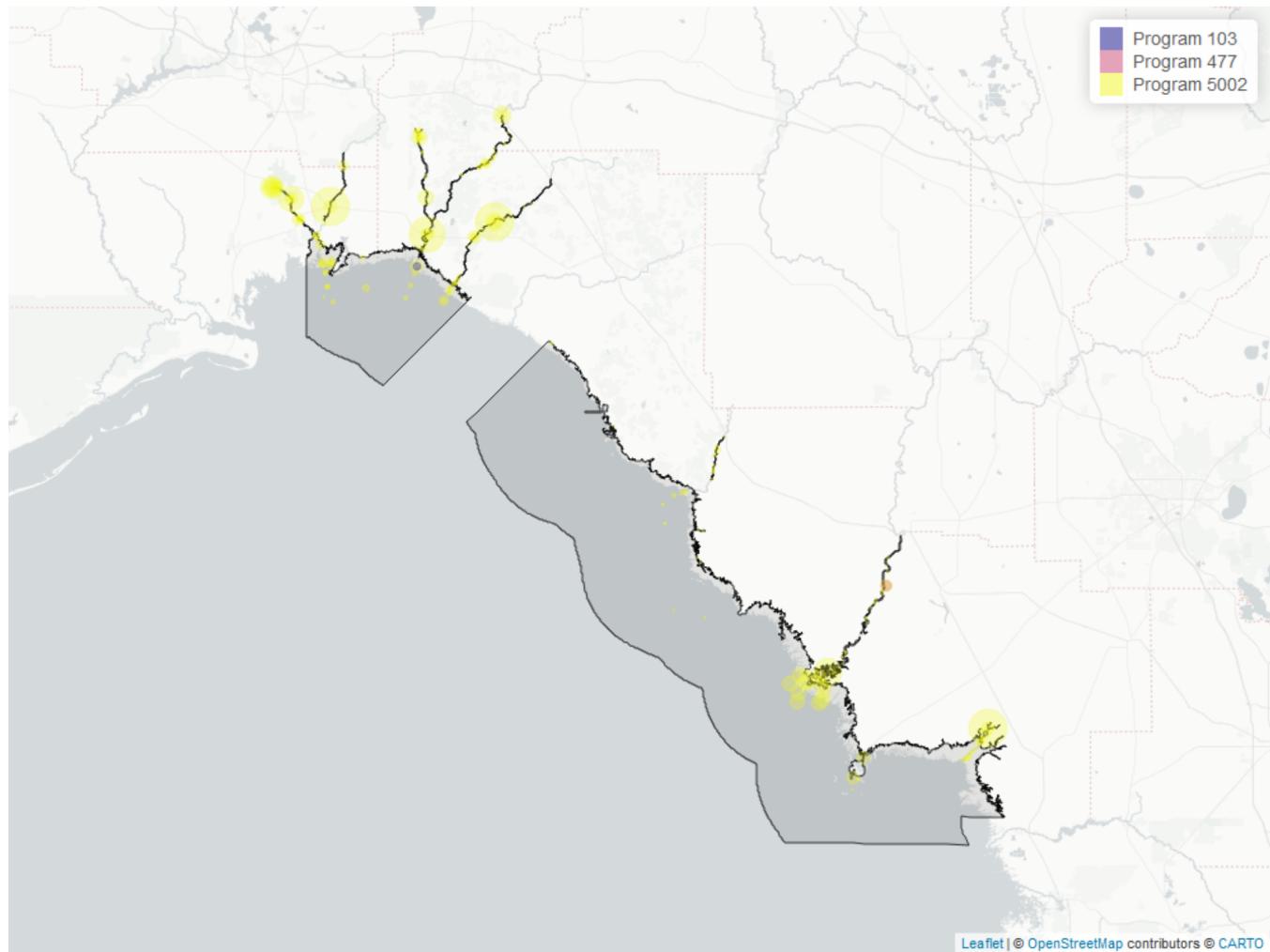
Total Suspended Solids, Lab and Field Combined, All Depths
Big Bend Seagrasses Aquatic Preserve



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 23: Programs contributing data for Total Suspended Solids

ProgramID	N_Data	YearMin	YearMax
5002	2816	1990	2023
477	20	2021	2023
103	12	2020	2021

Program names:

5002 - Florida STORET / WIN

477 - Suwannee River Water Management District Water Resource 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 24: Value Qualifiers for Total Suspended Solids

Year	$N_{_Total}$	$N_{_I}$	$perc_{_I}$	$N_{_Q}$	$perc_{_Q}$	$N_{_U}$	$perc_{_U}$
1998	44					9	20.4
1999	88			2	2.3	33	37.5
2000	149	1	0.7			63	42.3
2001	146	4	2.7			77	52.7
2002	84	11	13.1			65	77.4
2003	73	12	16.4			60	82.2
2004	63	10	15.9	1	1.6	53	84.1
2005	79	16	20.2			60	76.0
2006	101	22	21.8			67	66.3
2007	60	4	6.7			54	90.0
2008	63	9	14.3			54	85.7
2009	74	21	28.4	5	6.8	53	71.6
2010	75	34	45.3			40	53.3
2011	197	96	48.7			29	14.7
2012	83	63	75.9			18	21.7
2013	86	68	79.1			16	18.6
2014	103	58	56.3			42	40.8
2015	92	50	54.4			42	45.6
2016	147	119	81.0	1	0.7	25	17.0
2017	105	73	69.5			27	25.7
2018	53	38	71.7	1	1.9	15	28.3
2019	27	19	70.4			6	22.2
2020	50	24	48.0			20	40.0
2021	91	36	39.6	1	1.1	40	44.0
2022	141	52	36.9			87	61.7
2023	36	19	52.8			15	41.7

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

Programs containing Value Qualified data:

5002 - Florida STORET / WIN

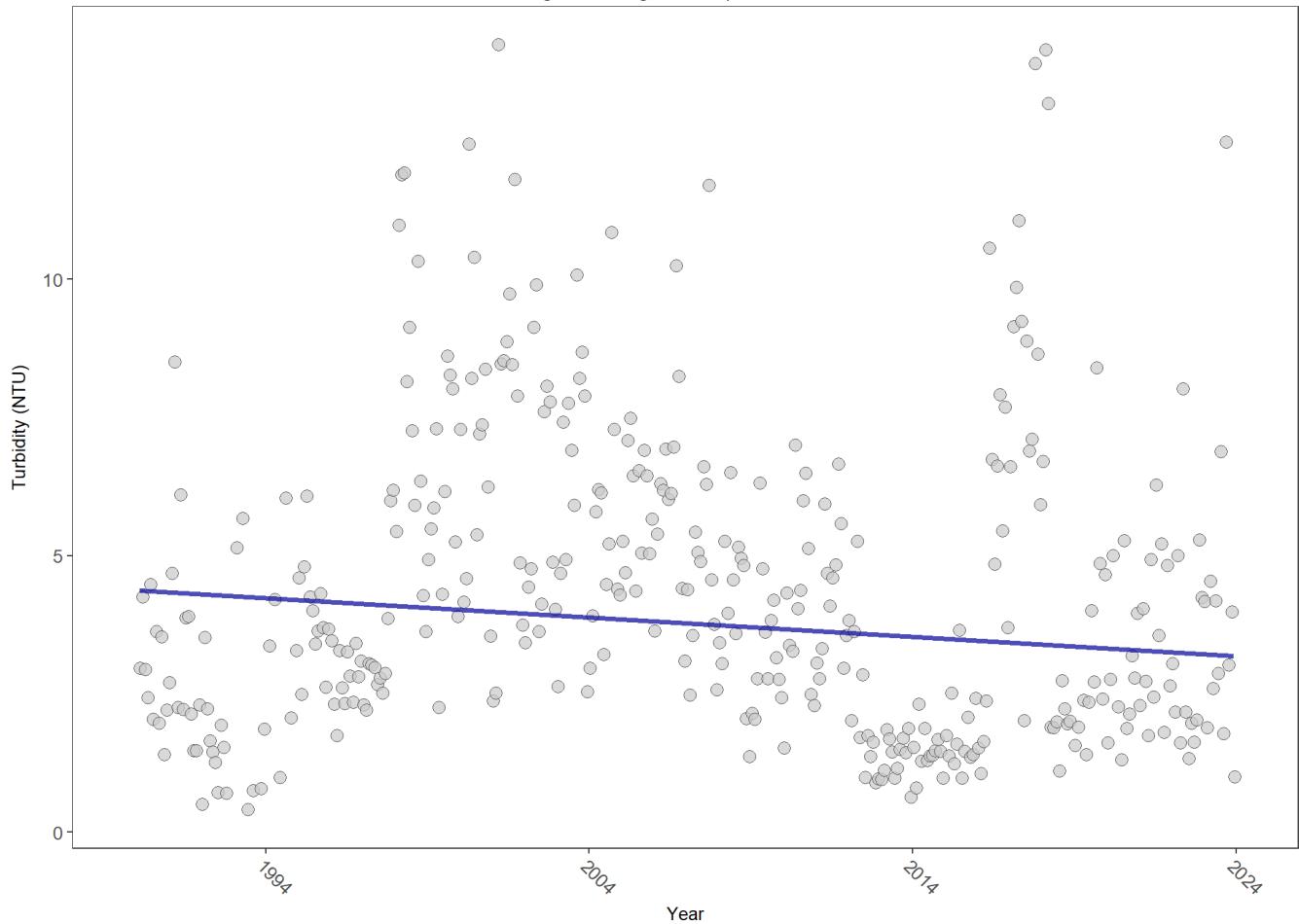
477 - Suwannee River Water Management District Water Resource Monitoring Program

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
Big Bend Seagrasses Aquatic Preserve

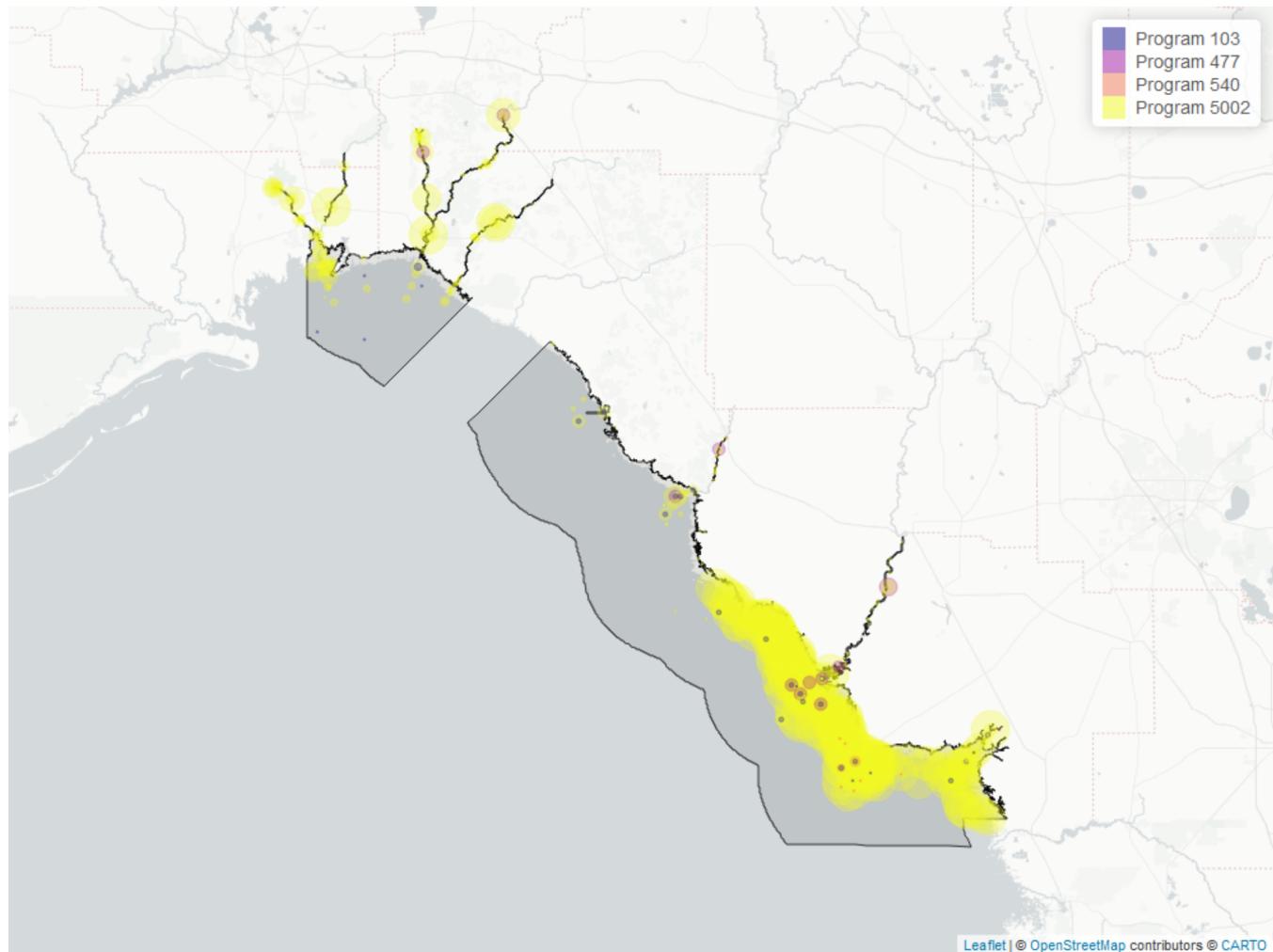


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	42807	34	3.4	TRUE	-0.0973	0.0055	-0.03505968	4.374398	6.5979	0.8307	-1

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 25: Programs contributing data for Turbidity

ProgramID	N_Data	YearMin	YearMax
5002	42389	1990	2023
477	314	2017	2023
103	116	2005	2021
540	35	2019	2022

Program names:

5002 - Florida STORET / WIN

477 - Suwannee River Water Management District Water Resource Monitoring Program

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

540 - Shellfish Harvest Area Classification Program

Value Qualifiers

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

Table 26: 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>	<i>N_U</i>	<i>perc_U</i>
1999	1704			1	0.1		
2000	1960			1	0.0		
2001	2054					1	0.0
2002	2030			2	0.1	2	0.1
2004	2199			4	0.2		
2005	1931			2	0.1		
2006	2312			2	0.1		
2007	2481			2	0.1	1	0.0
2008	2698			1	0.0		
2010	2025			5	0.2	2	0.1
2012	732					1	0.1
2013	95			1	1.0	1	1.0
2014	165	10	6.1	4	2.4		
2015	148	10	6.8	4	2.7	1	0.7
2016	1169	14	1.2	4	0.3		
2017	1503	7	0.5			2	0.1
2019	140	3	2.1	2	1.4	1	0.7
2020	202	16	7.9			13	6.4
2021	325	9	2.8			13	4.0
2022	265	61	23.0	4	1.5	18	6.8
2023	114	28	24.6			1	0.9

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

477 - Suwannee River Water Management District Water Resource Monitoring Program

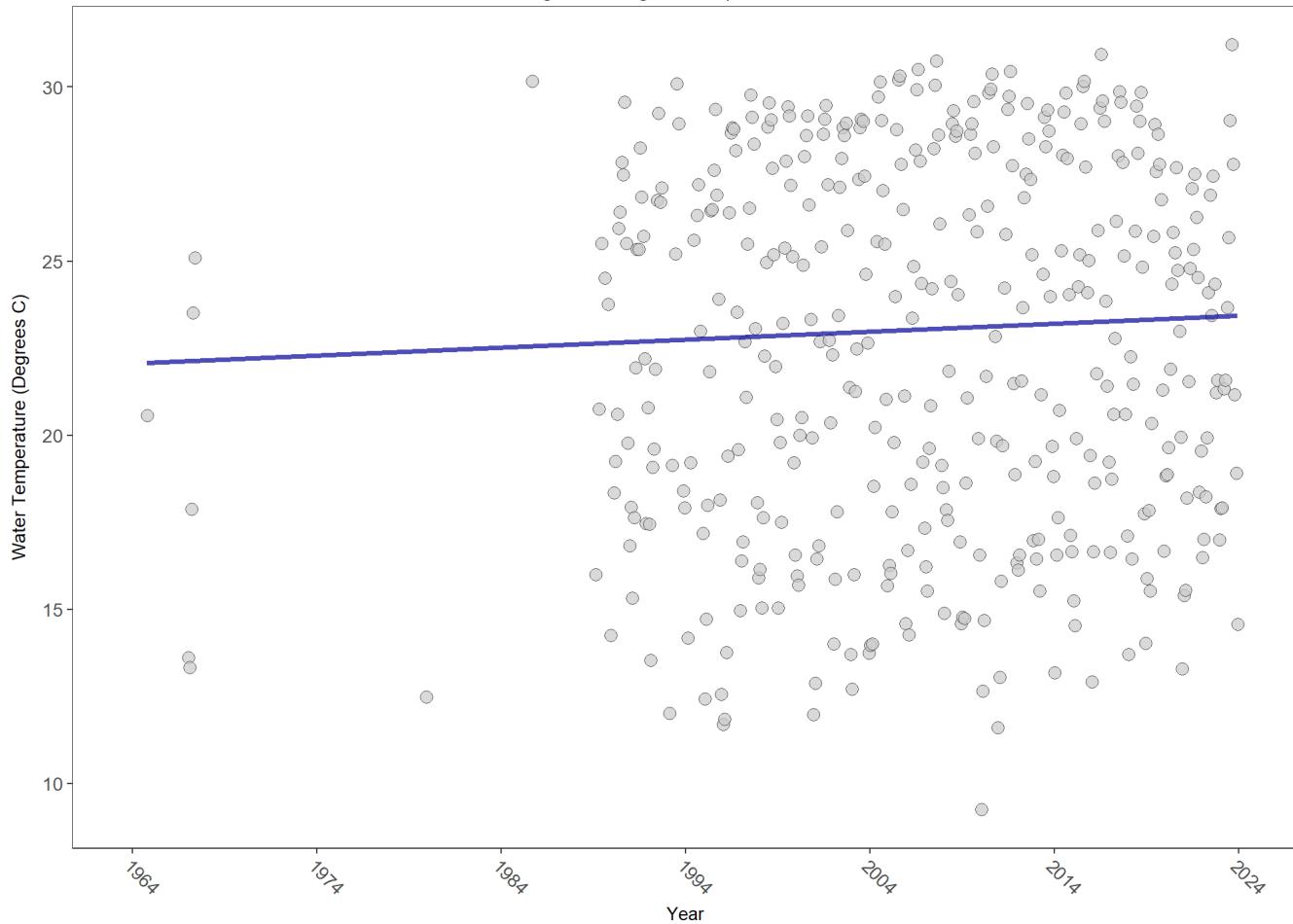
540 - Shellfish Harvest Area Classification Program

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
Big Bend Seagrasses Aquatic Preserve



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	144311	39	24	TRUE	0.1016	0.0026	0.02309996	22.05288	15.3658	0.1664	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

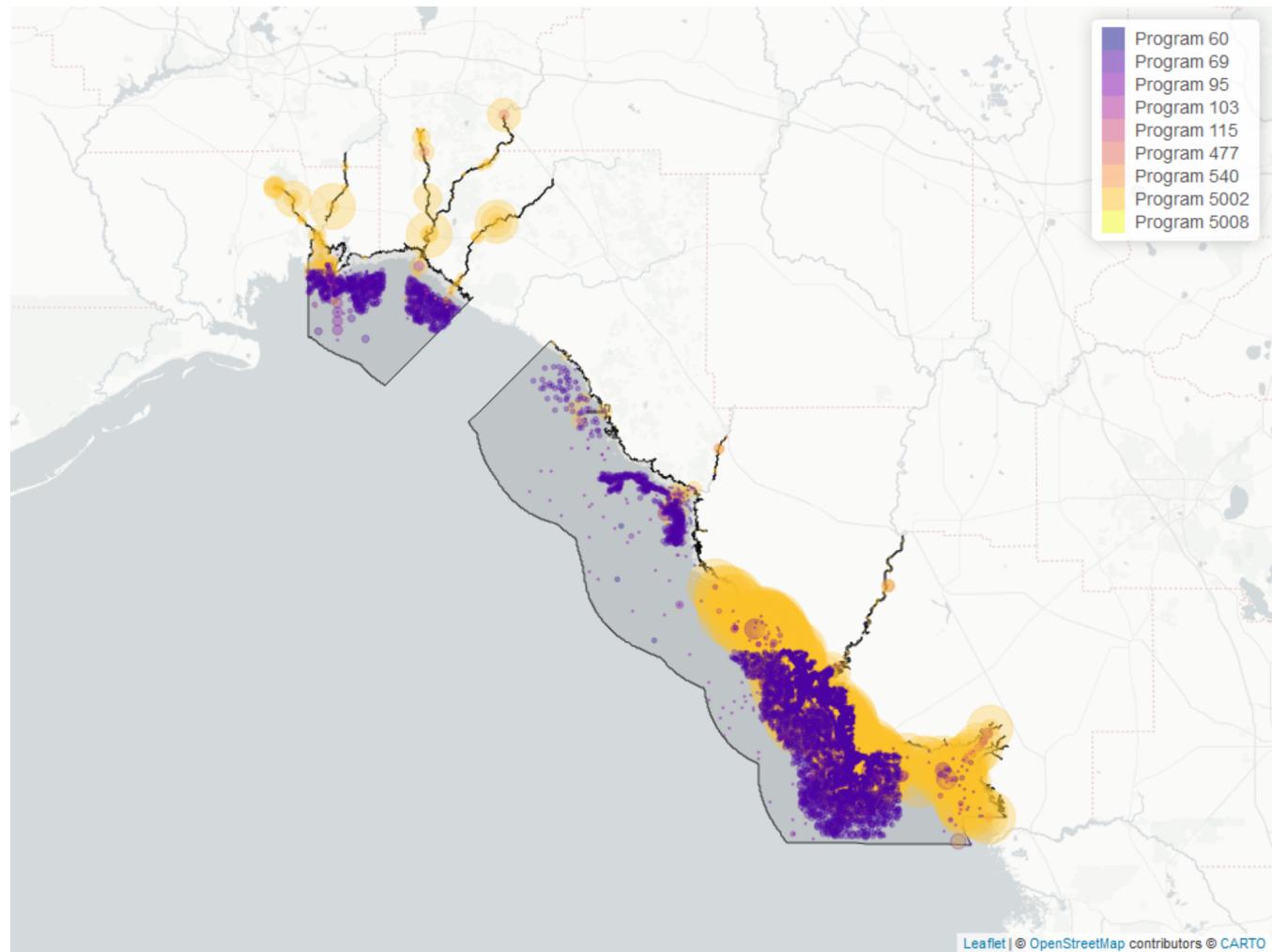


Table 27: Programs contributing data for Water Temperature

ProgramID	N_Data	YearMin	YearMax
5002	99762	1989	2023
69	42965	1996	2017
95	1164	1964	2018
103	158	2003	2021
477	156	2019	2023
540	133	2017	2022
115	38	1991	2004
5008	30	2021	2023
60	9	2014	2015

Program names:

5002 - Florida STORET / WIN
69 - Fisheries-Independent Monitoring (FIM) Program
95 - Harmful Algal Bloom Marine Observation Network
103 - EPA STOrage and RETrieval Data Warehouse (STORET)
477 - Suwannee River Water Management District Water Resource Monitoring Program
540 - Shellfish Harvest Area Classification Program
115 - Environmental Monitoring Assessment Program
5008 - Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region
60 - Southeast Area Monitoring and Assessment Program (SEAMAP) - Gulf of Mexico Fall & Summer Shrimp/Groundfish Survey

There are no qualifying Value Qualifiers for Water Temperature in Big Bend Seagrasses Aquatic Preserve

Water Quality - Continuous

The following files were used in the continuous analysis:

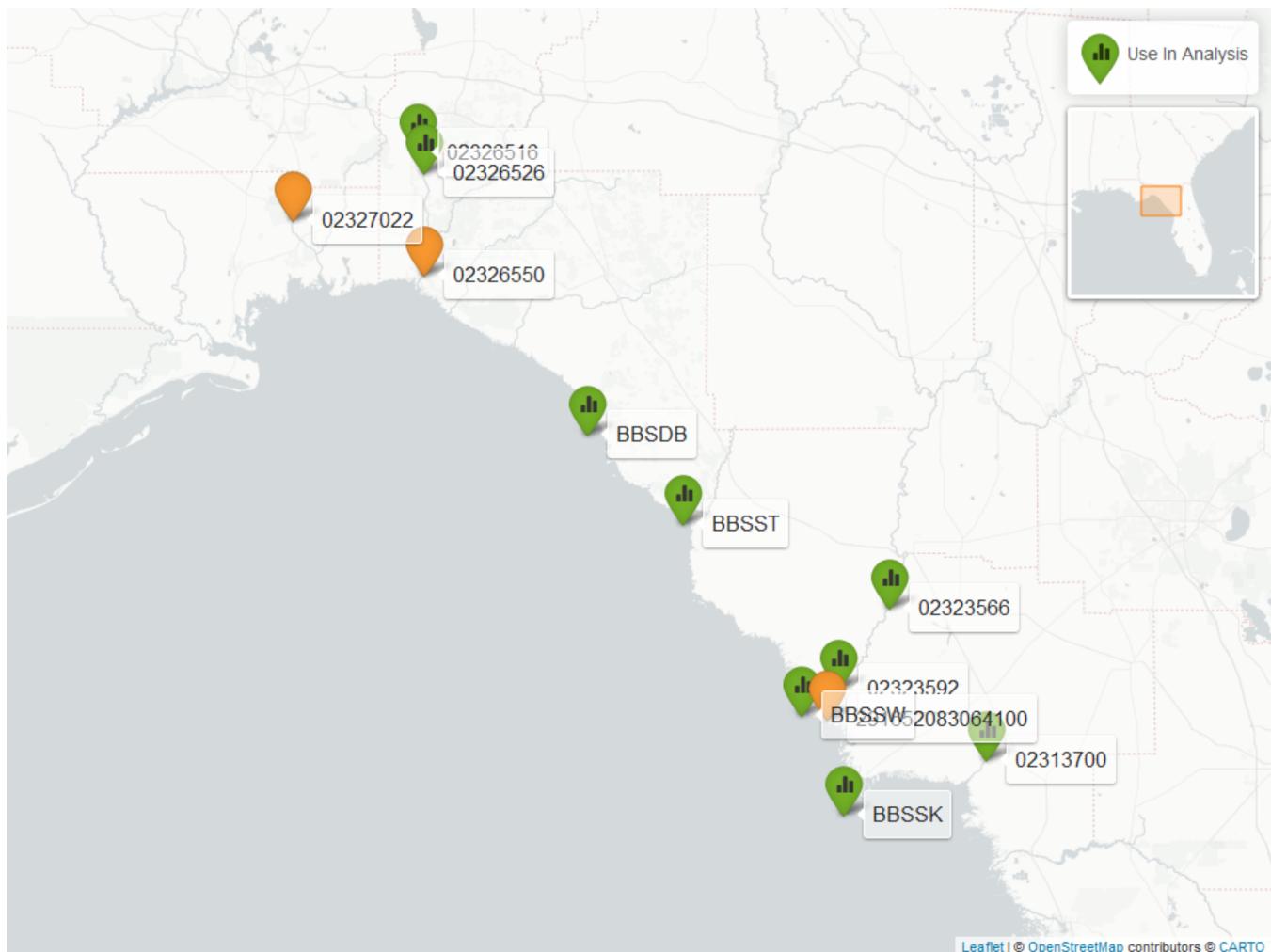
- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_NW-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_Saturation_NW-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_pH_NW-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Salinity_NW-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Turbidity_NW-2024-Mar-23.txt*
- *Combined_WQ_WC_NUT_cont_Water_Temperature_NW-2024-Mar-23.txt*

Table 28: Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
BBSDB	10	TRUE	DO , DOS , pH , Sal , Turb , TempW
BBSSK	12	TRUE	DO , DOS , pH , Sal , Turb , TempW
BBSST	5	TRUE	DO , DOS , pH , Sal , Turb , TempW
BBSSW	8	TRUE	DO , DOS , pH , Sal , Turb , TempW

Table 29: National Water Information System (7)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
02313700	7	TRUE	DO, pH
02313700	23	TRUE	TempW
02323566	11	TRUE	DO , pH , TempW
02323592	25	TRUE	TempW
02326516	5	TRUE	DO , pH , TempW
02326526	9	TRUE	DO , pH , TempW
02326550	4	FALSE	TempW
02327022	2	FALSE	TempW
291652083064100	1	FALSE	Sal , TempW



Map showing Continuous Water Quality Monitoring sampling locations within the boundaries of Big Bend Seagrasses Aquatic Preserve. Sites marked as *Use In Analysis* are featured in this report.

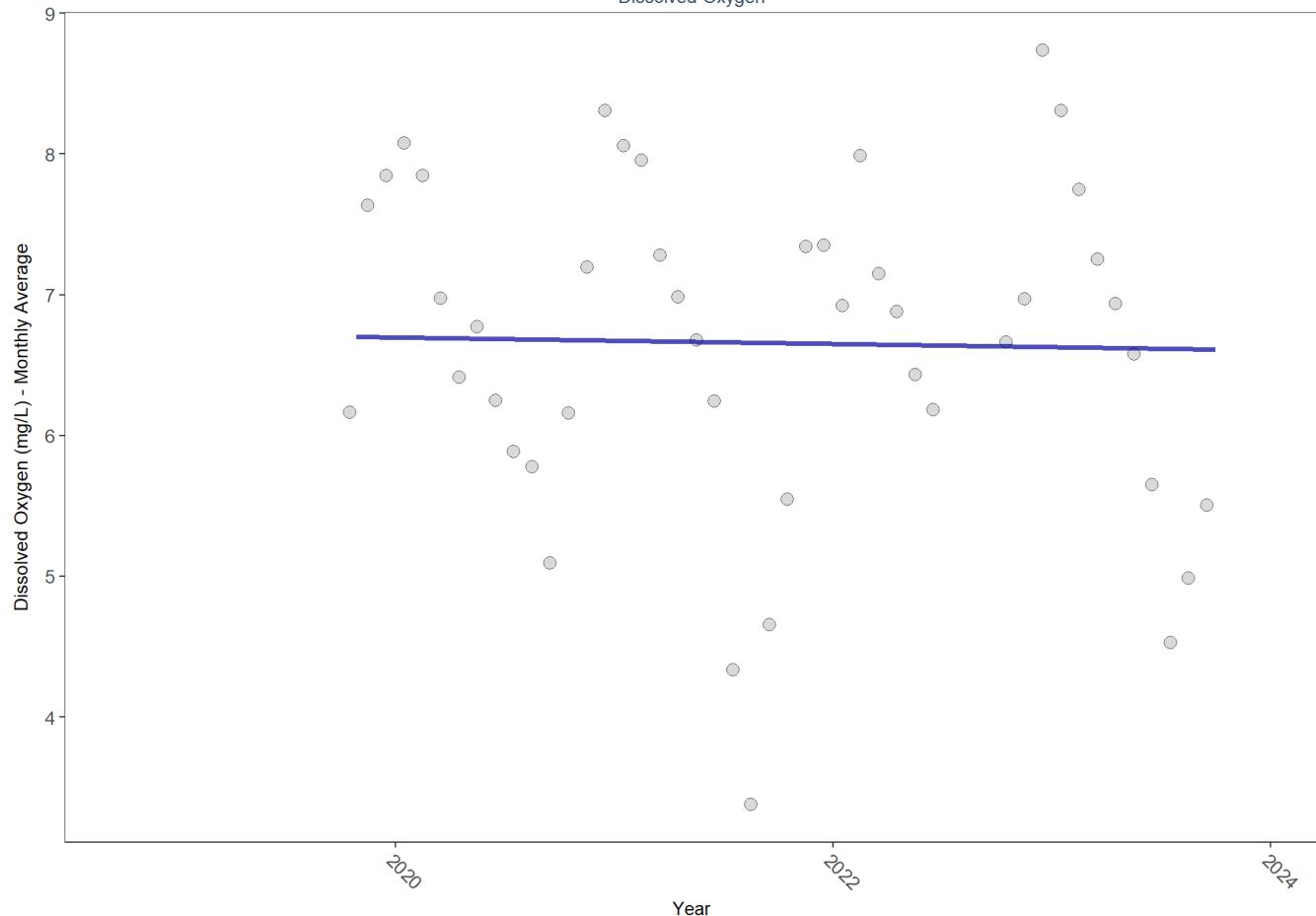
Dissolved Oxygen - Continuous Water Quality

BBSST

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve
BBSST

Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	111411	5	6.9	TRUE	-0.1407	0.3964	-0.02287538	6.719131	9.1743	0.6058	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

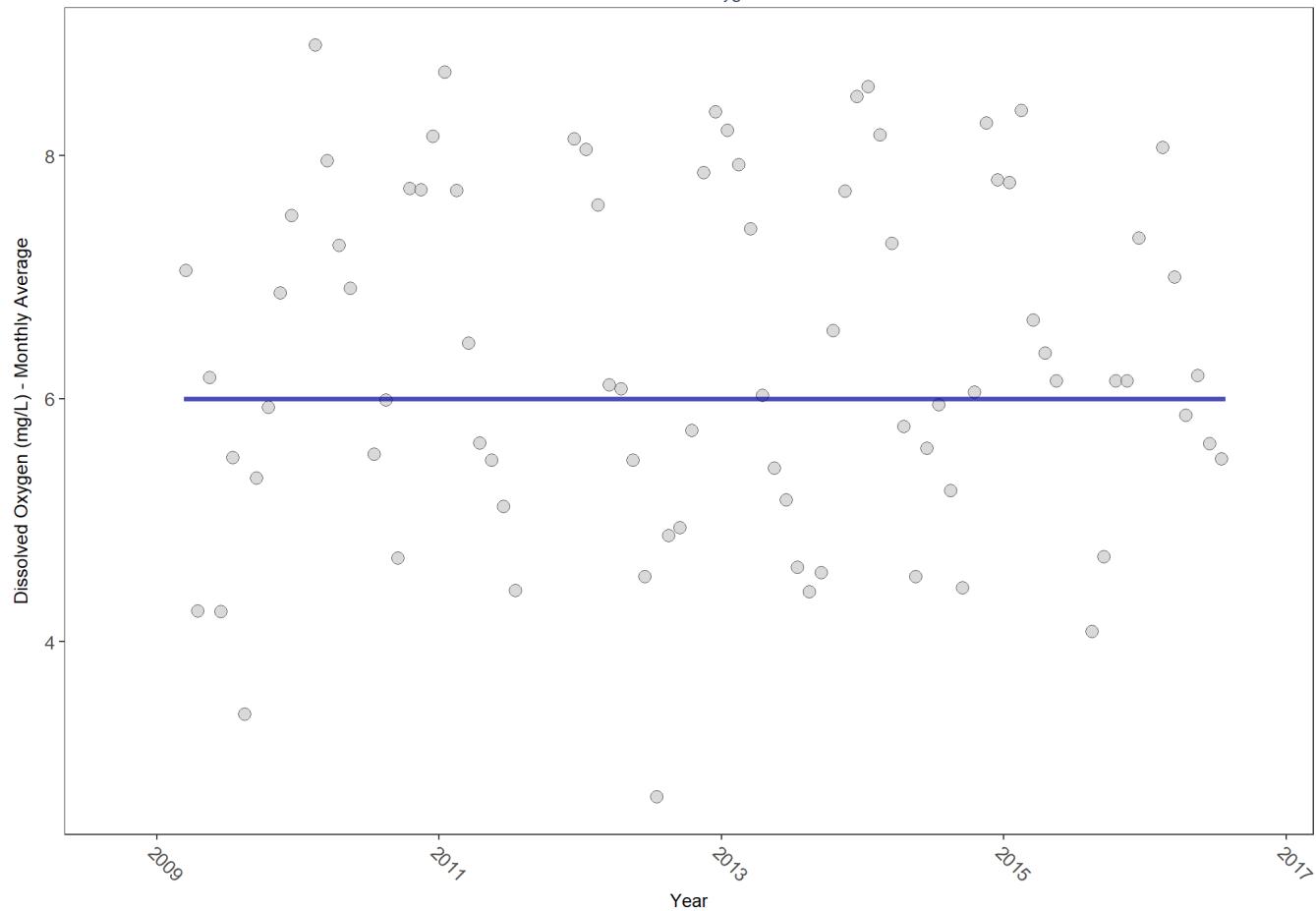
BBSSW

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve

BBSSW

Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	182327	8	6.2	TRUE	0.0011	1.0000	0.00009525337	5.996998	10.0488	0.526	0

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

SennIntercept is intercept value at beginning of record for monitoring location

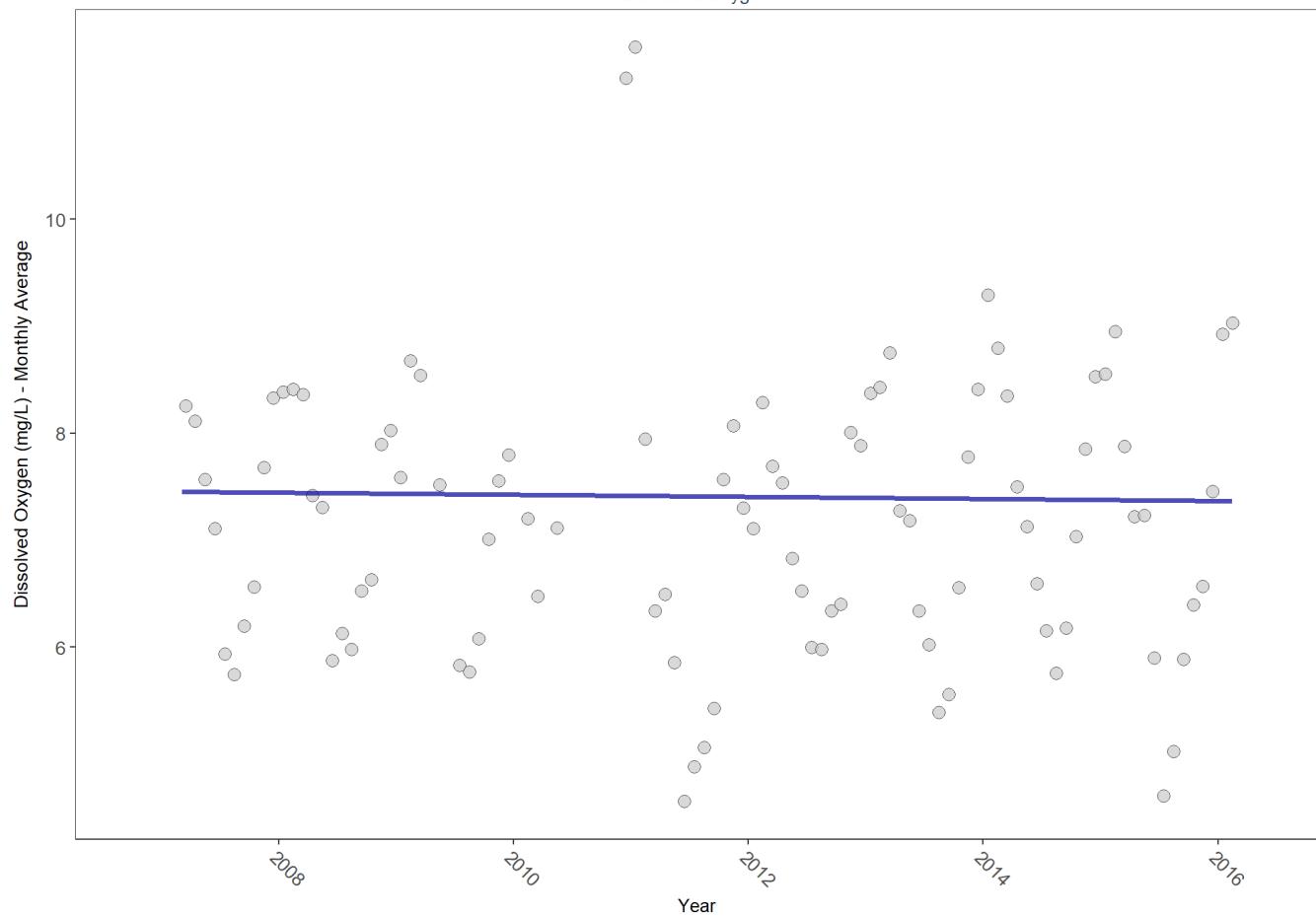
BBSDB

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve

BBSDB

Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	184327	10	7.3	TRUE	-0.0542	0.6066	-0.009609181	7.457155	10.0448	0.5264	0

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

SennIntercept is intercept value at beginning of record for monitoring location

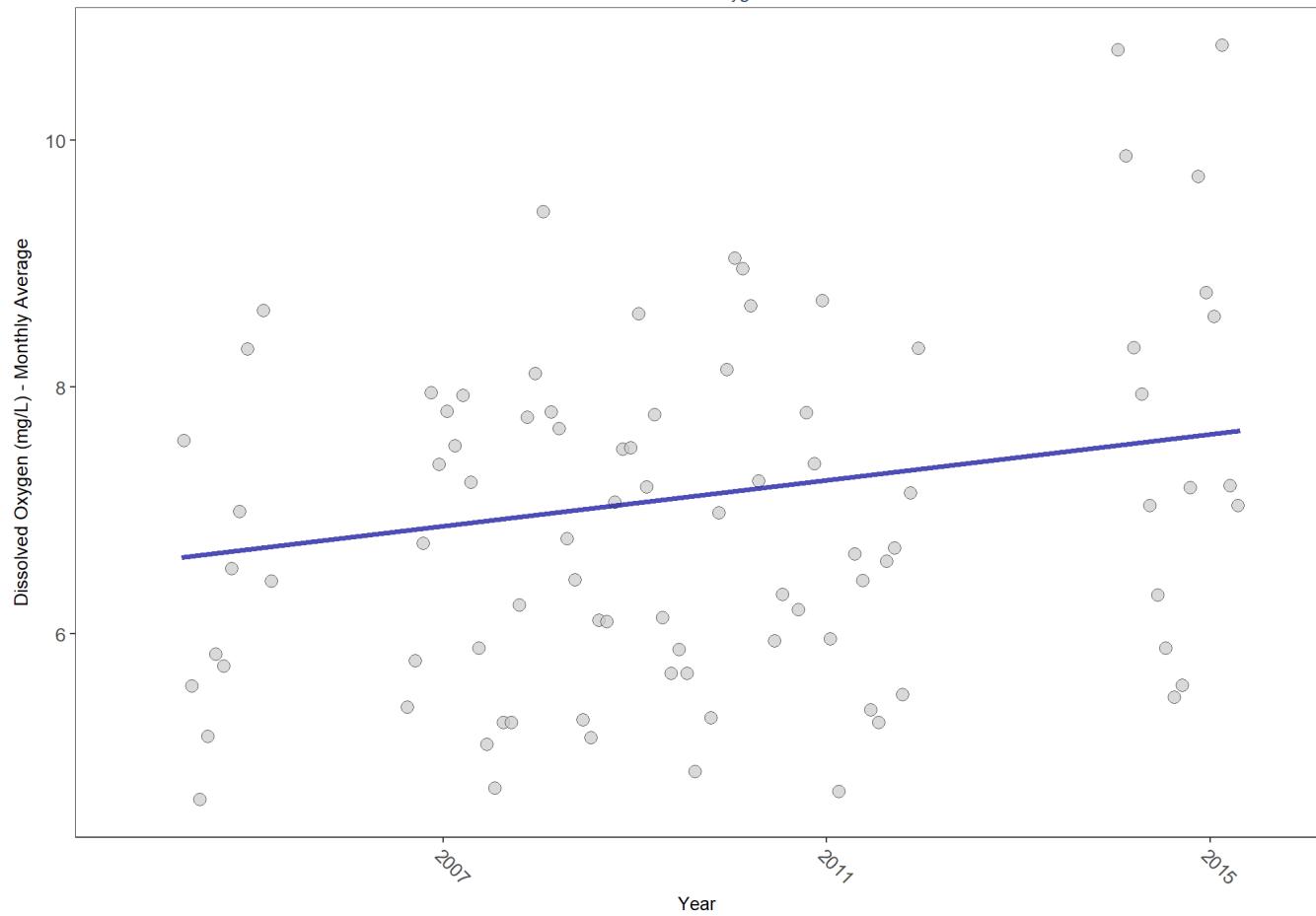
BBSSK

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve

BBSSK

Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	134287	10	7.1	TRUE	0.2844	0.0023	0.09296544	6.595156	8.5433	0.664	1

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

SennIntercept is intercept value at beginning of record for monitoring location

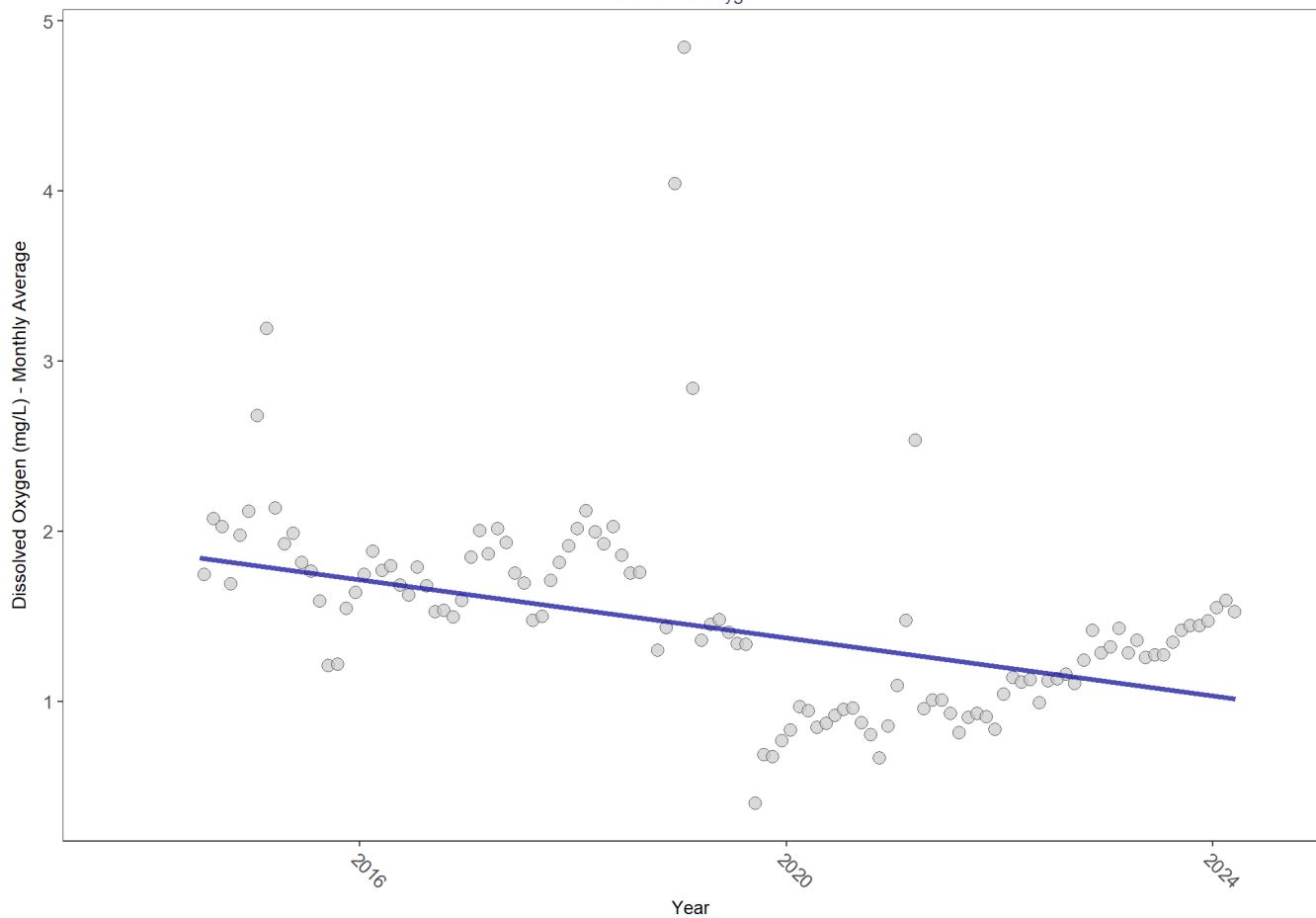
02323566

National Water Information System (7)

Big Bend Seagrasses Aquatic Preserve

02323566

Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	3363	11	1.4	TRUE	-0.3958	0.0000	-0.08522031	1.883967	2.3793	0.9967	-1

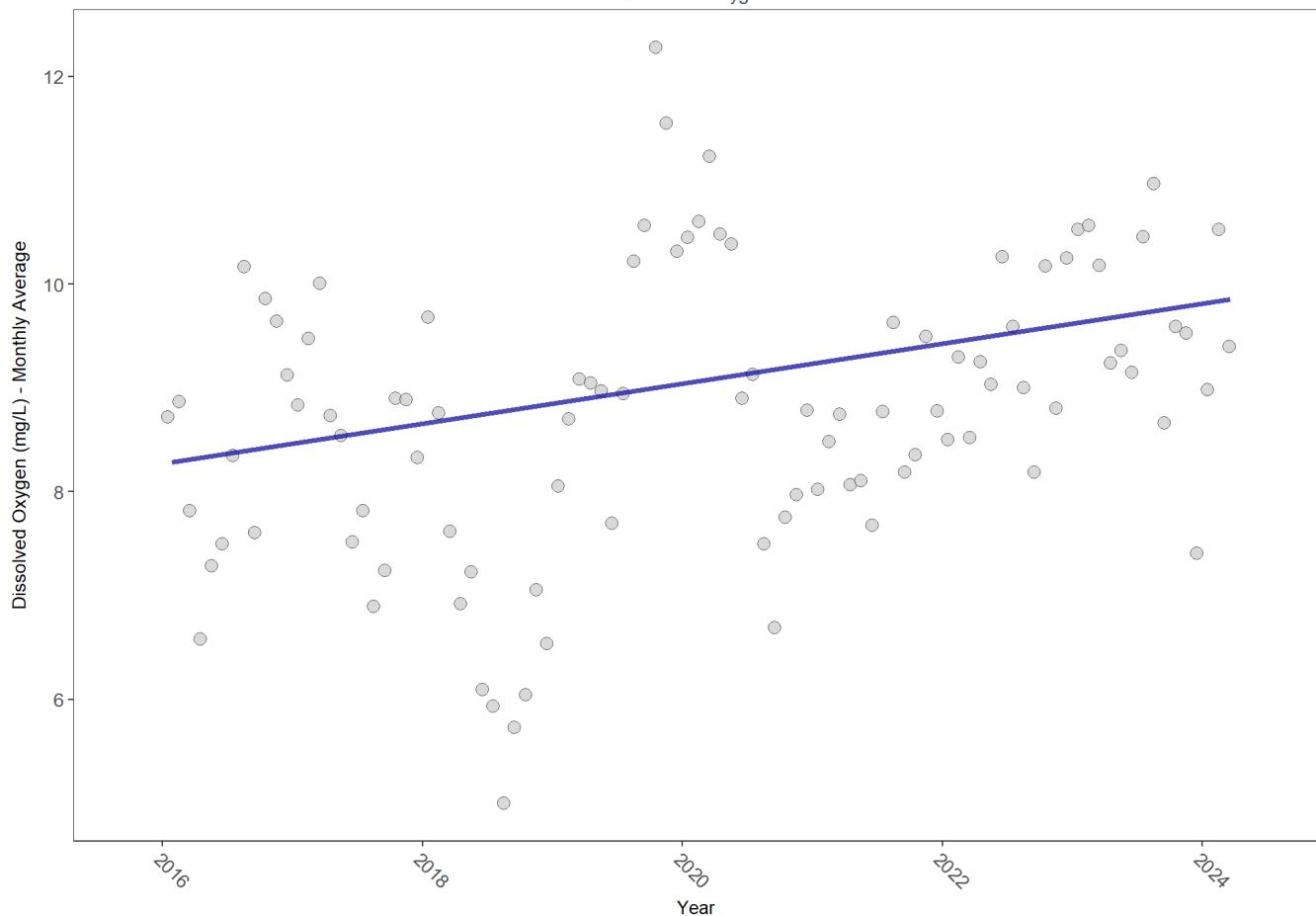
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

02326526

National Water Information System (7)

Big Bend Seagrasses Aquatic Preserve
02326526
Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	2817	9	8.9	TRUE	0.2872	0.0006	0.1928127	8.272952	7.5648	0.7517	1

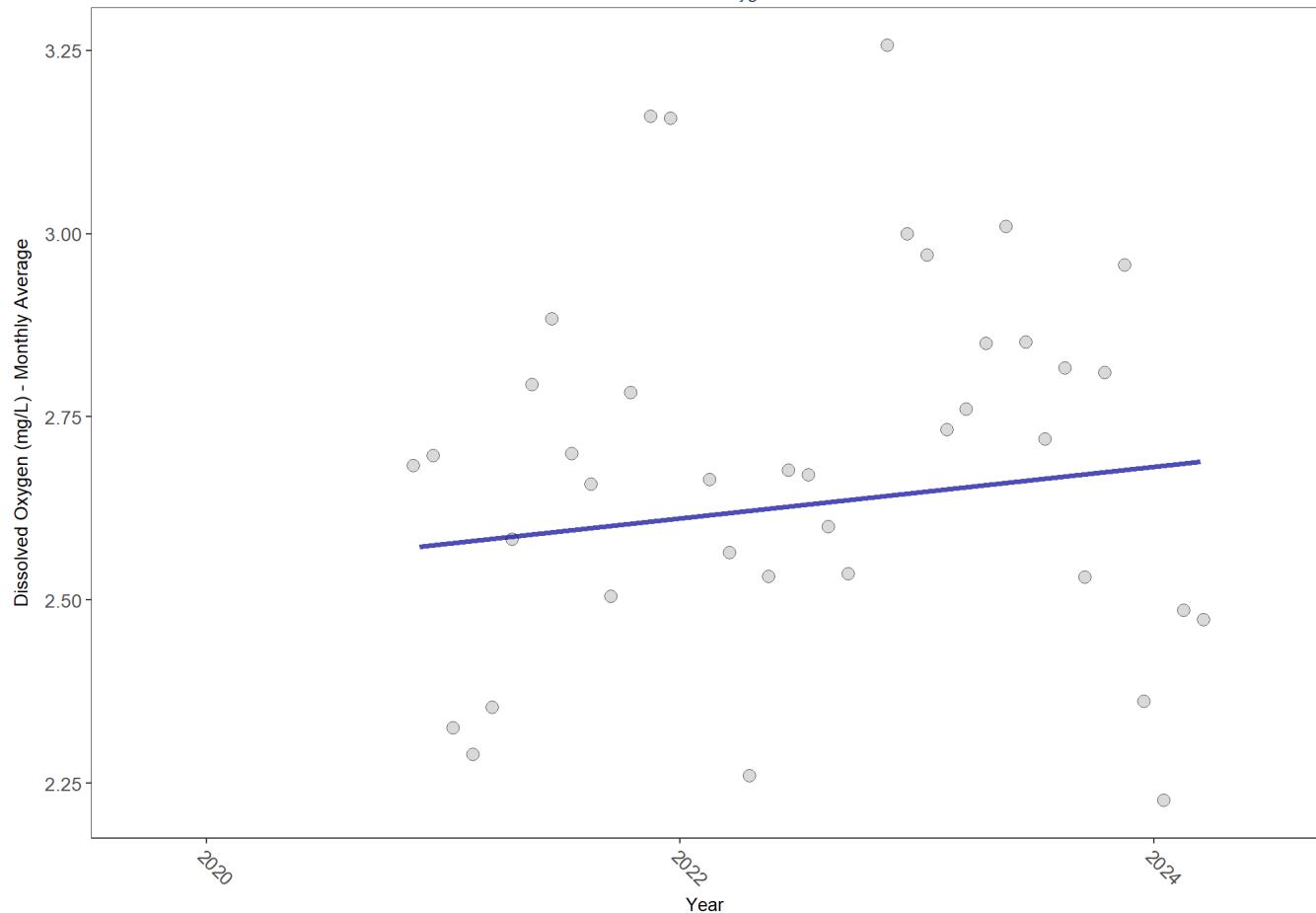
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

02326516

National Water Information System (7)

Big Bend Seagrasses Aquatic Preserve
02326516
Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	1019	5	2.7	TRUE	0.1966	0.3714	0.03527332	2.540982	3.4712	0.9829	0

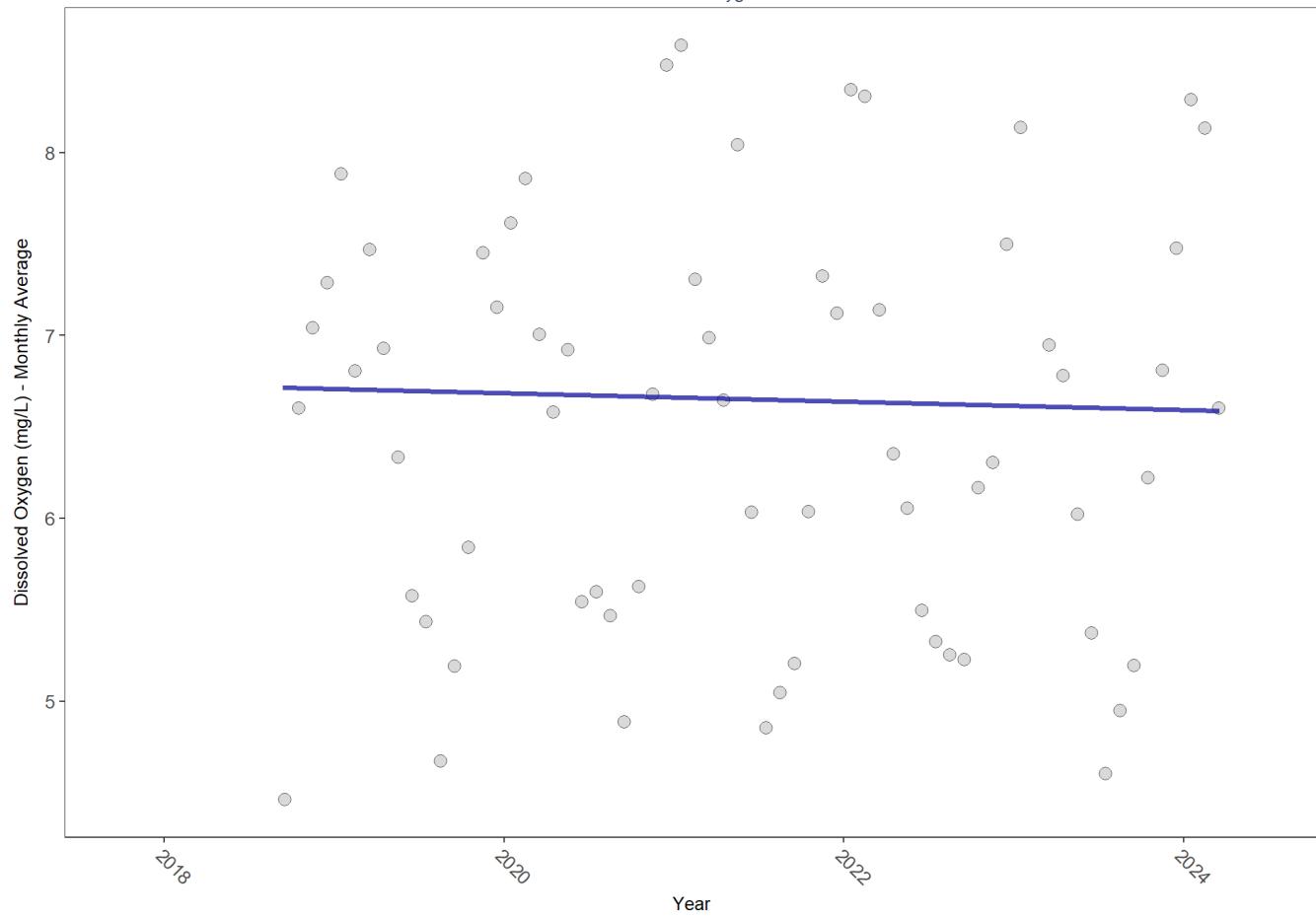
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

02313700

National Water Information System (7)

Big Bend Seagrasses Aquatic Preserve
02313700
Dissolved Oxygen



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	1933	7	6.3	TRUE	-0.0909	0.5032	-0.02304958	6.730546	15.6424	0.1549	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

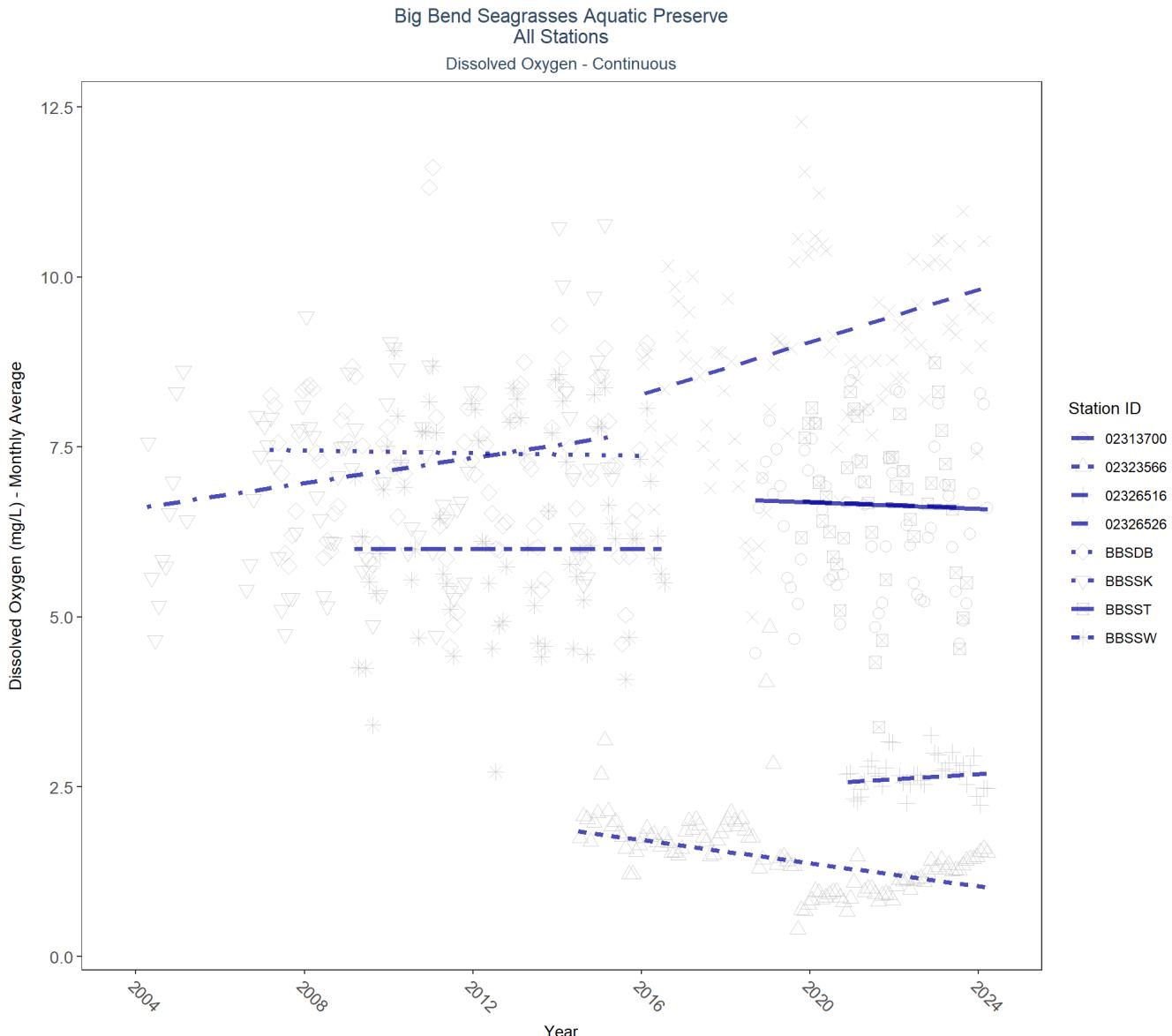


Table 30: Seasonal Kendall-Tau Results for All Stations - Dissolved Oxygen

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
BBSST	111411	5	2019 - 2023	6.9	-0.14	6.72	-0.02	0.3964
BBSSW	182327	8	2009 - 2016	6.2	0.00	6.00	0.00	1.0000
BBSDB	184327	10	2007 - 2016	7.3	-0.05	7.46	-0.01	0.6066
BBSSK	134287	10	2004 - 2015	7.1	0.28	6.60	0.09	0.0023
02323566	3363	11	2014 - 2024	1.4	-0.40	1.88	-0.09	0.0000
02326526	2817	9	2016 - 2024	8.9	0.29	8.27	0.19	0.0006
02326516	1019	5	2020 - 2024	2.7	0.20	2.54	0.04	0.3714
02313700	1933	7	2018 - 2024	6.3	-0.09	6.73	-0.02	0.5032

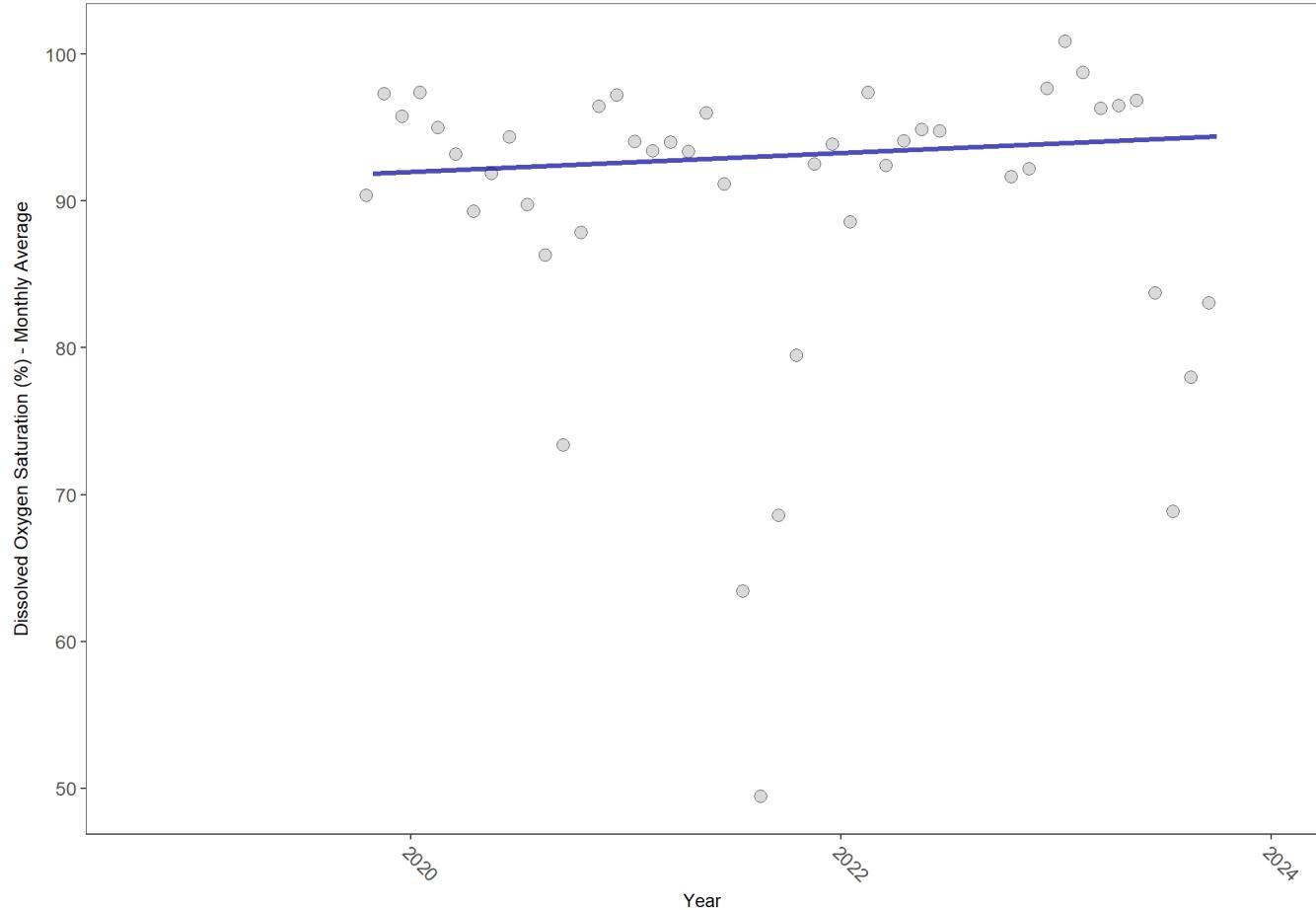
Dissolved Oxygen Saturation - Continuous Water Quality

BBSST

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve
BBSST

Dissolved Oxygen Saturation



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

SennIntercept is intercept value at beginning of record for monitoring location

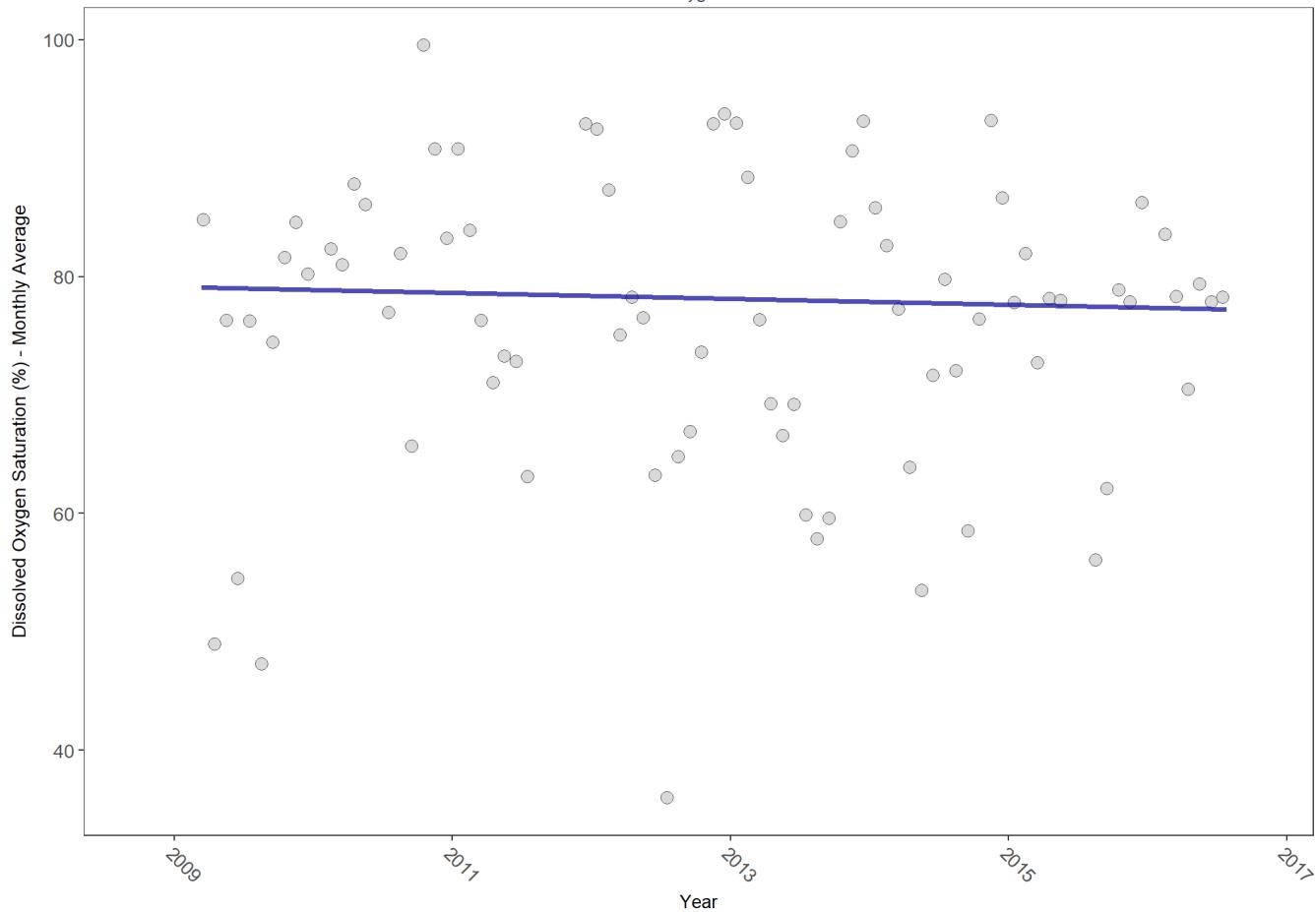
BBSSW

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve

BBSSW

Dissolved Oxygen Saturation



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	182158	8	75.8	TRUE	-0.0465	0.6835	-0.2527702	79.14209	8.647	0.6544	0

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

SennIntercept is intercept value at beginning of record for monitoring location

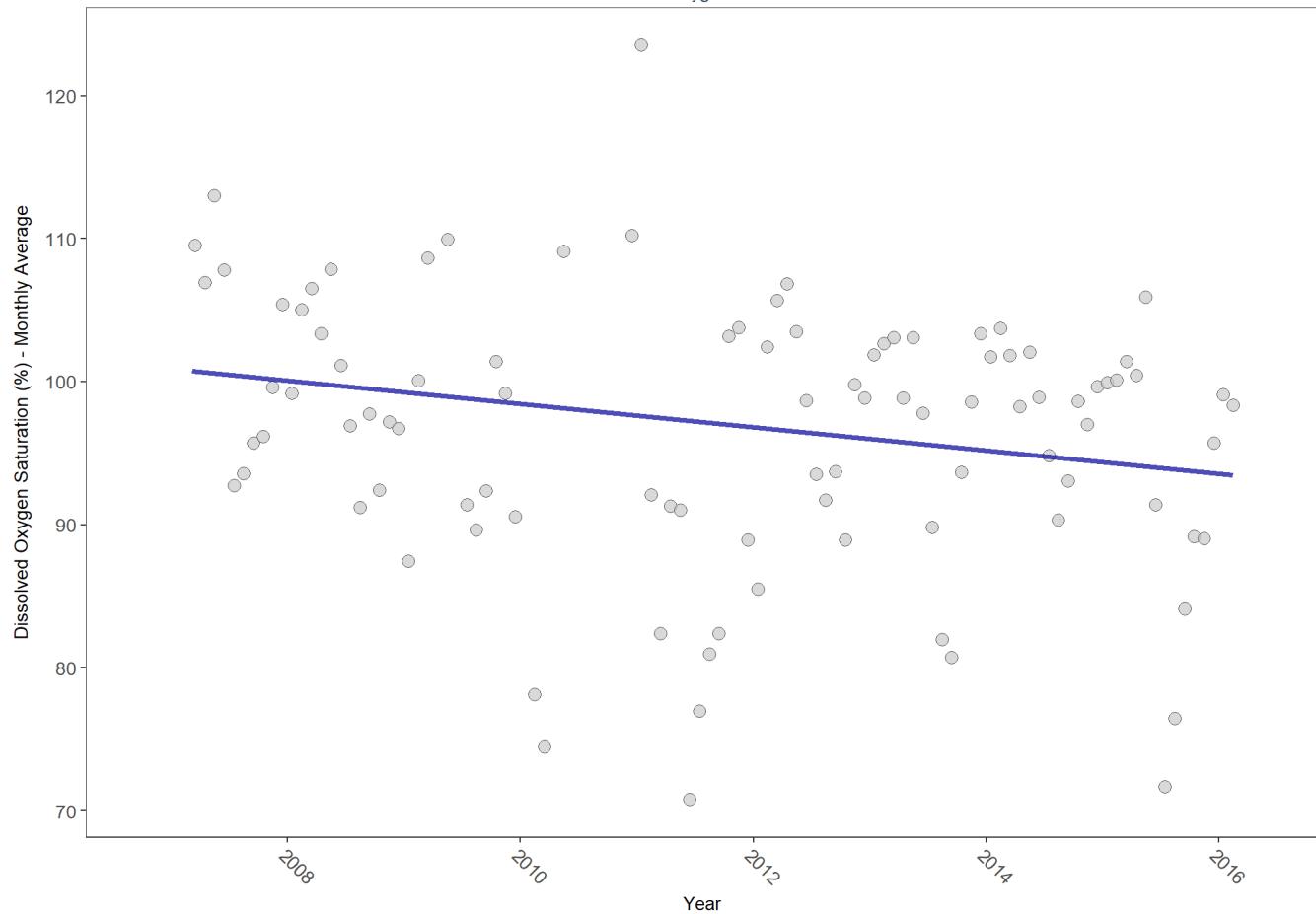
BBSDB

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve

BBSDB

Dissolved Oxygen Saturation



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	183530	10	97.6	TRUE	-0.303	0.0003	-0.8135499	100.8776	4.4552	0.9547	-1

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

SennIntercept is intercept value at beginning of record for monitoring location

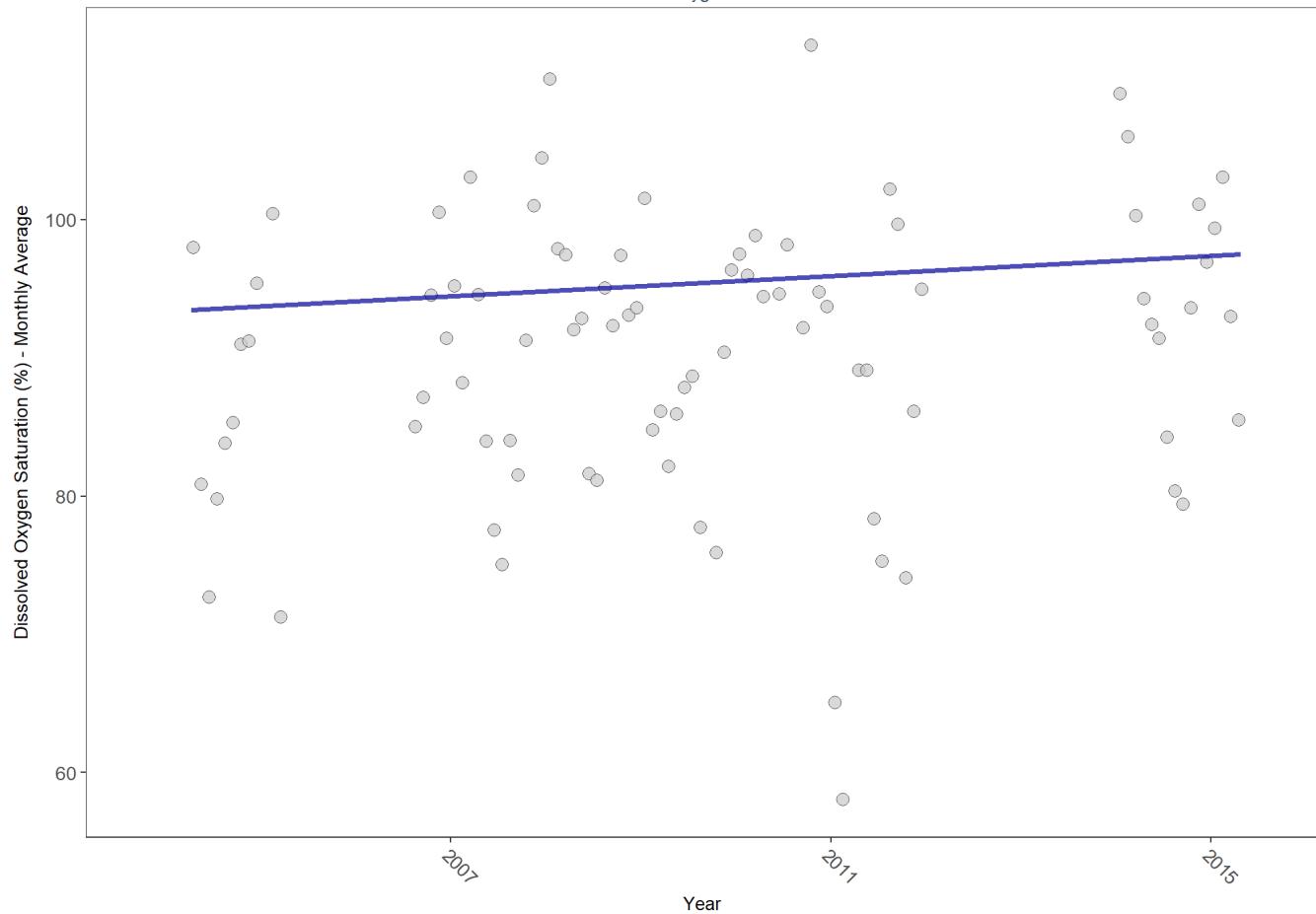
BBSSK

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve

BBSSK

Dissolved Oxygen Saturation



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	134196	10	91.8	TRUE	0.1199	0.2612	0.3637663	93.3739	9.8765	0.5415	0

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

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

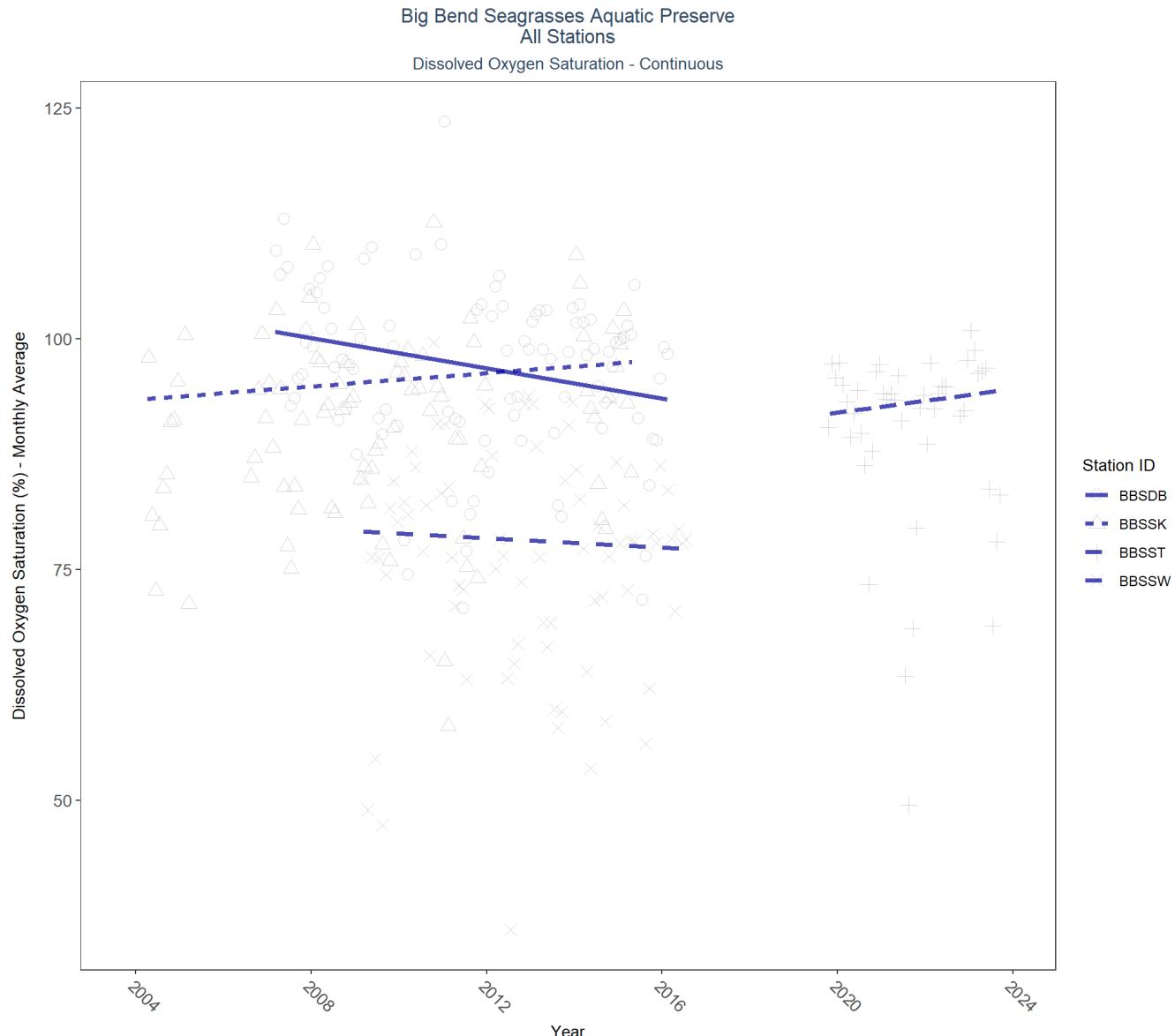


Table 31: Seasonal Kendall-Tau Results for All Stations - Dissolved Oxygen Saturation

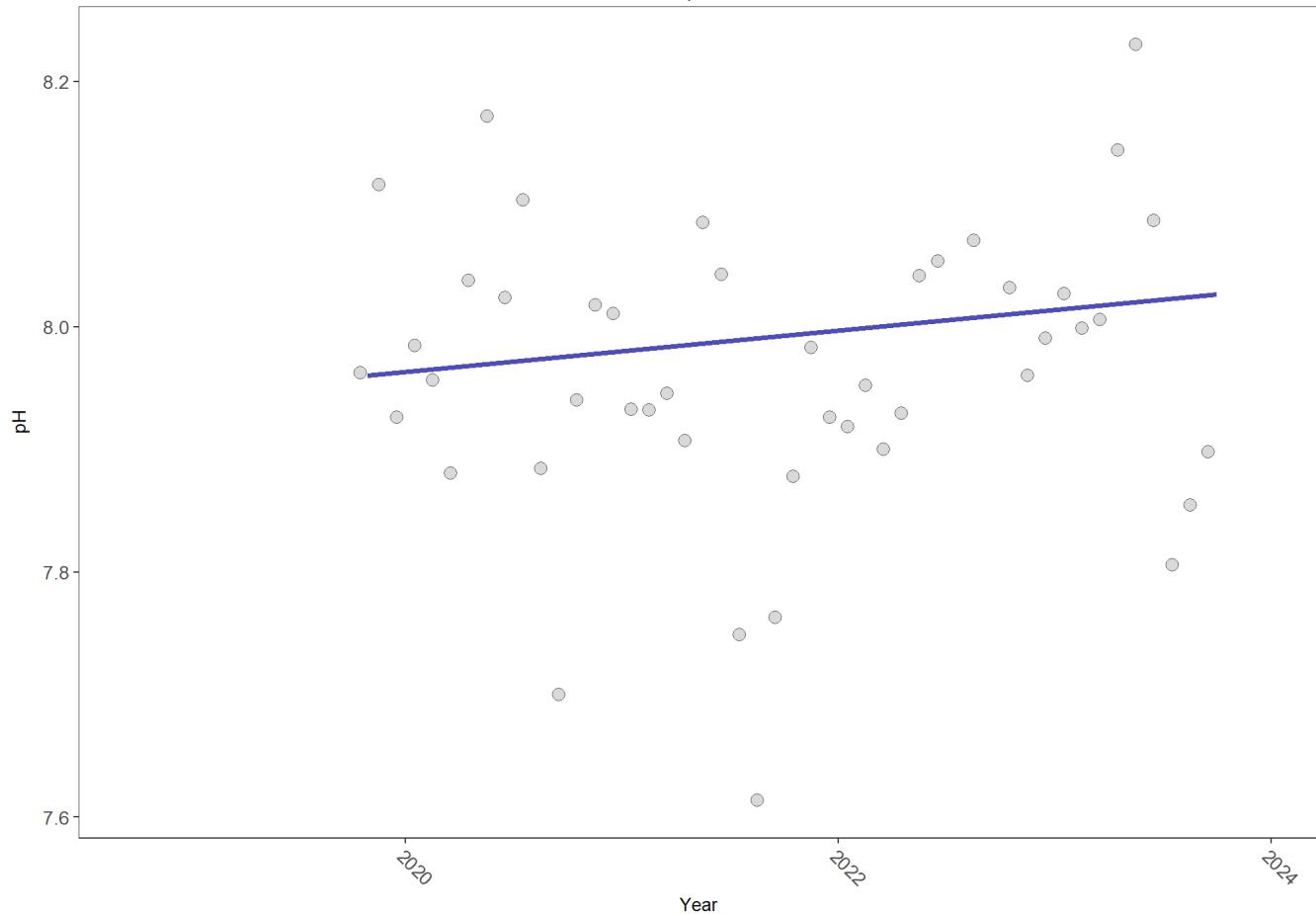
Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
BBSST	114465	5	2019 - 2023	93.3	0.13	91.37	0.64	0.3964
BBSSW	182158	8	2009 - 2016	75.8	-0.05	79.14	-0.25	0.6835
BBSDB	183530	10	2007 - 2016	97.6	-0.30	100.88	-0.81	0.0003
BBSSK	134196	10	2004 - 2015	91.8	0.12	93.37	0.36	0.2612

pH - Continuous Water Quality

BBSST

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve
BBSST
pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	121092	5	8	TRUE	0.1594	0.3533	0.01684762	7.946444	12.6249	0.3186	0

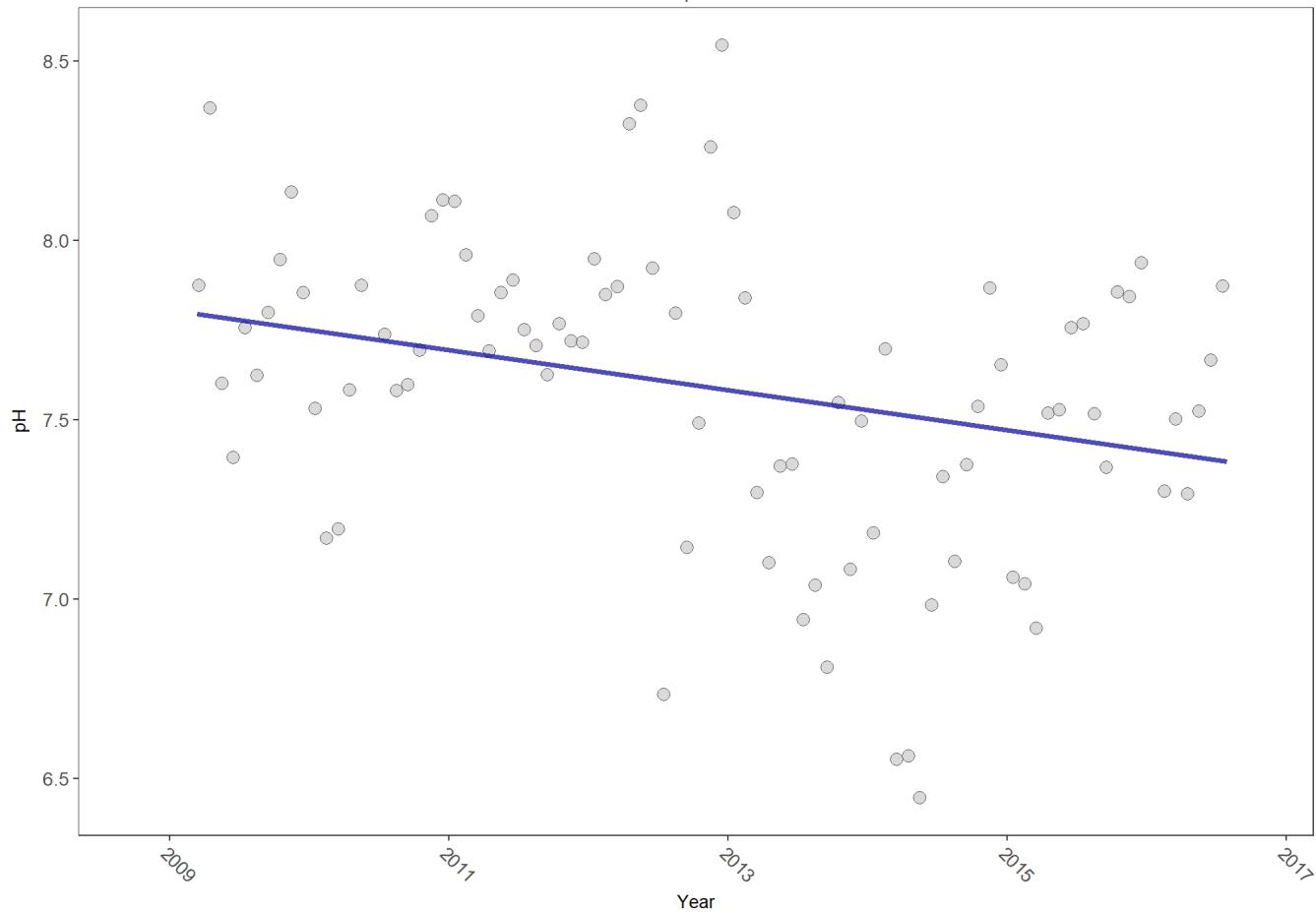
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

BBSSW

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve
BBSSW
pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	224733	8	7.6	TRUE	-0.2889	0.0017	-0.05563407	7.804655	5.0142	0.9305	-1

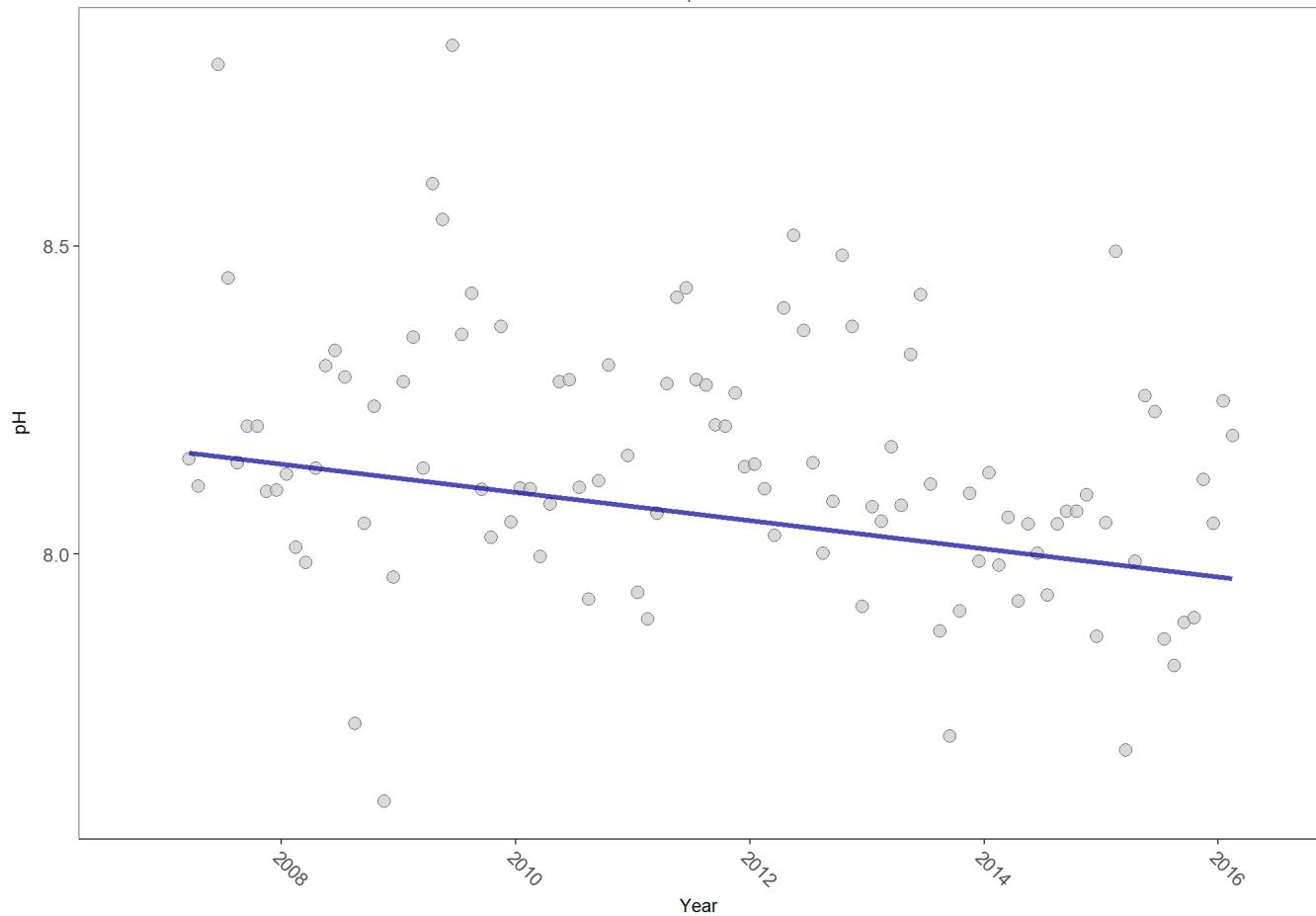
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

BBSDB

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve
BBSDB
pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	250183	10	8.1	TRUE	-0.2776	0.0004	-0.02290642	8.169405	8.6673	0.6526	-1

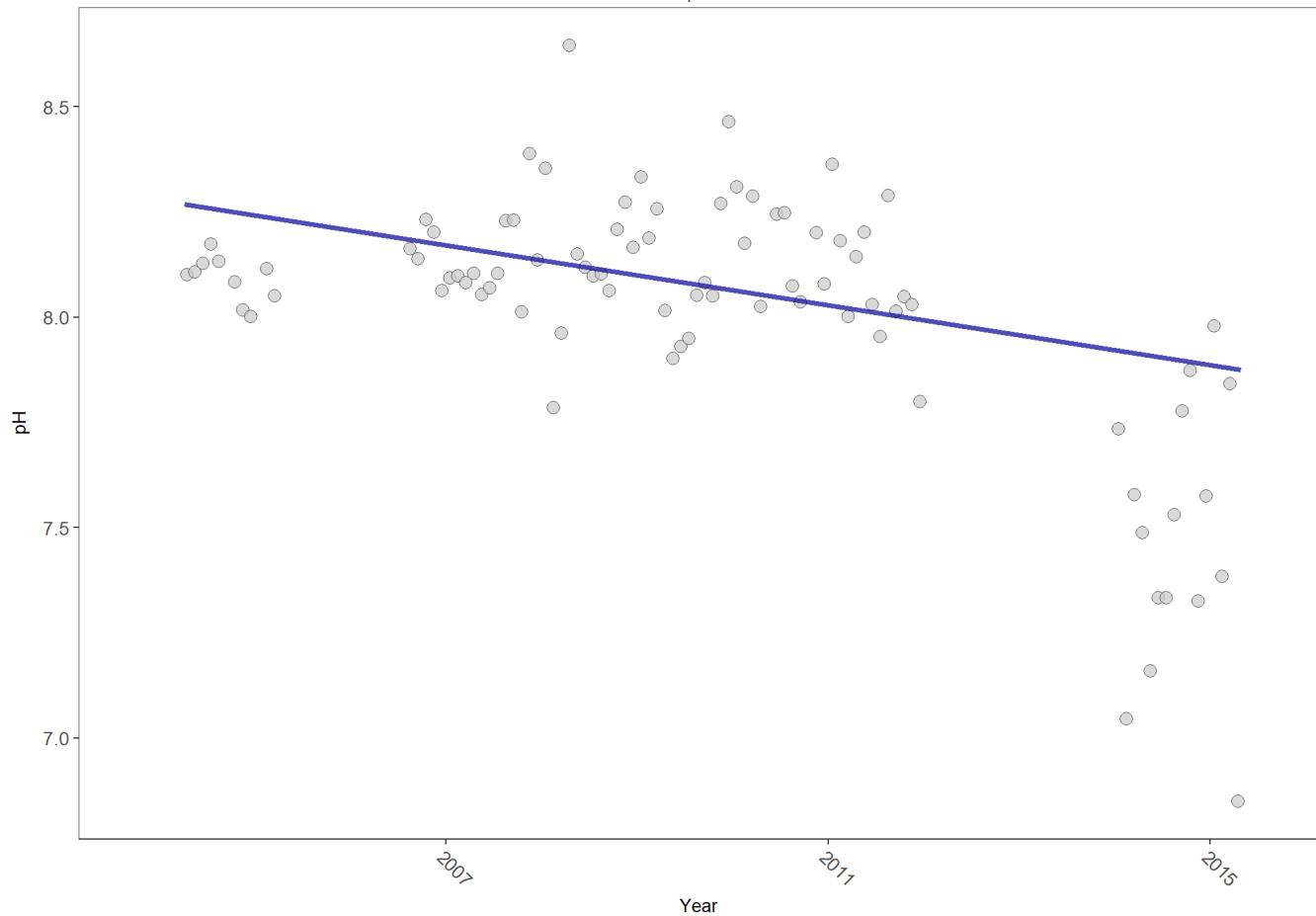
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

BBSSK

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve
BBSSK
pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	168278	10	8.1	TRUE	-0.3661	0.0000	-0.03561761	8.277547	3.7467	0.9767	-1

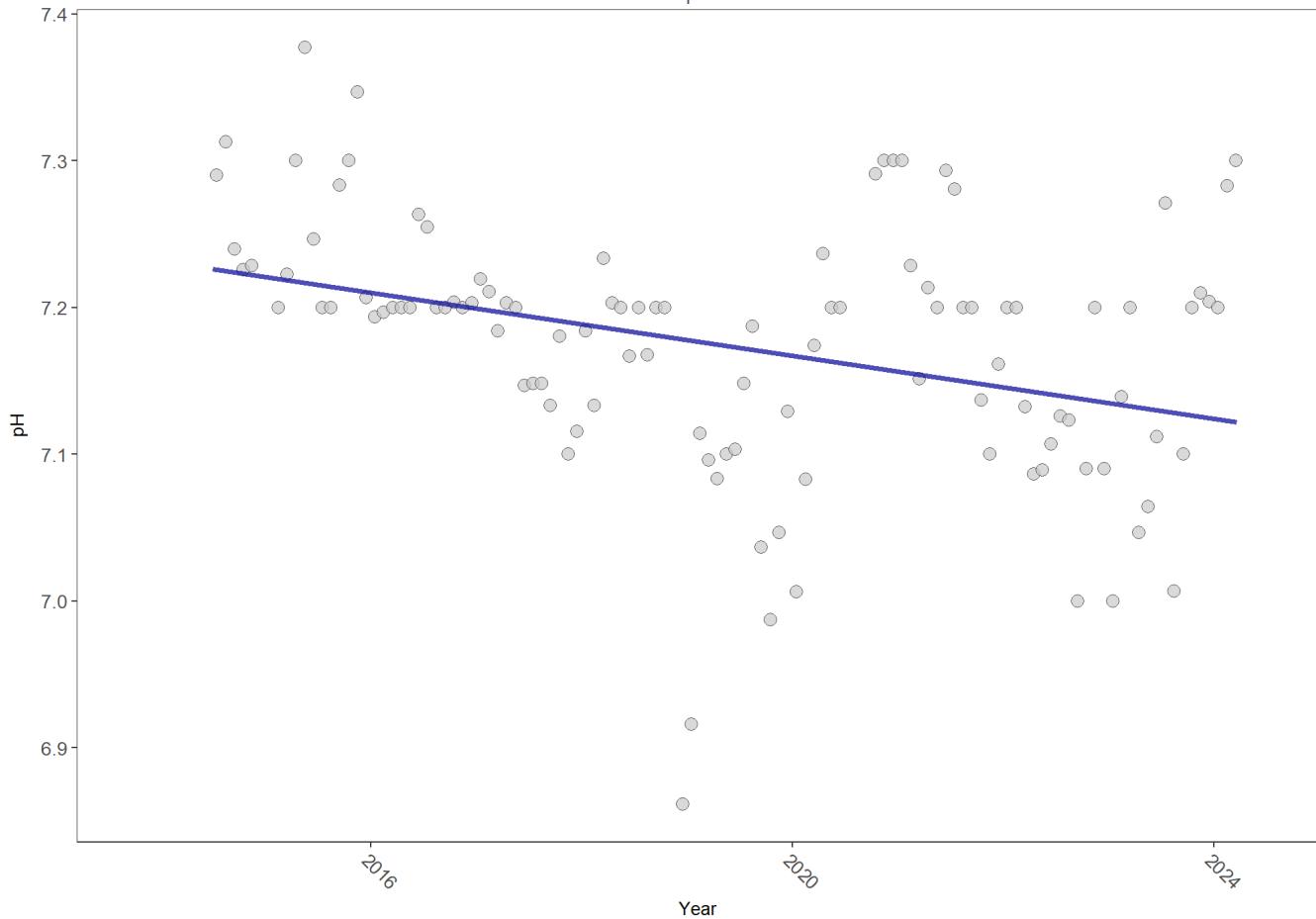
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

02323566

National Water Information System (7)

Big Bend Seagrasses Aquatic Preserve
02323566
pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	3204	11	7.2	TRUE	-0.2658	0.0005	-0.01075269	7.231809	9.7568	0.5524	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

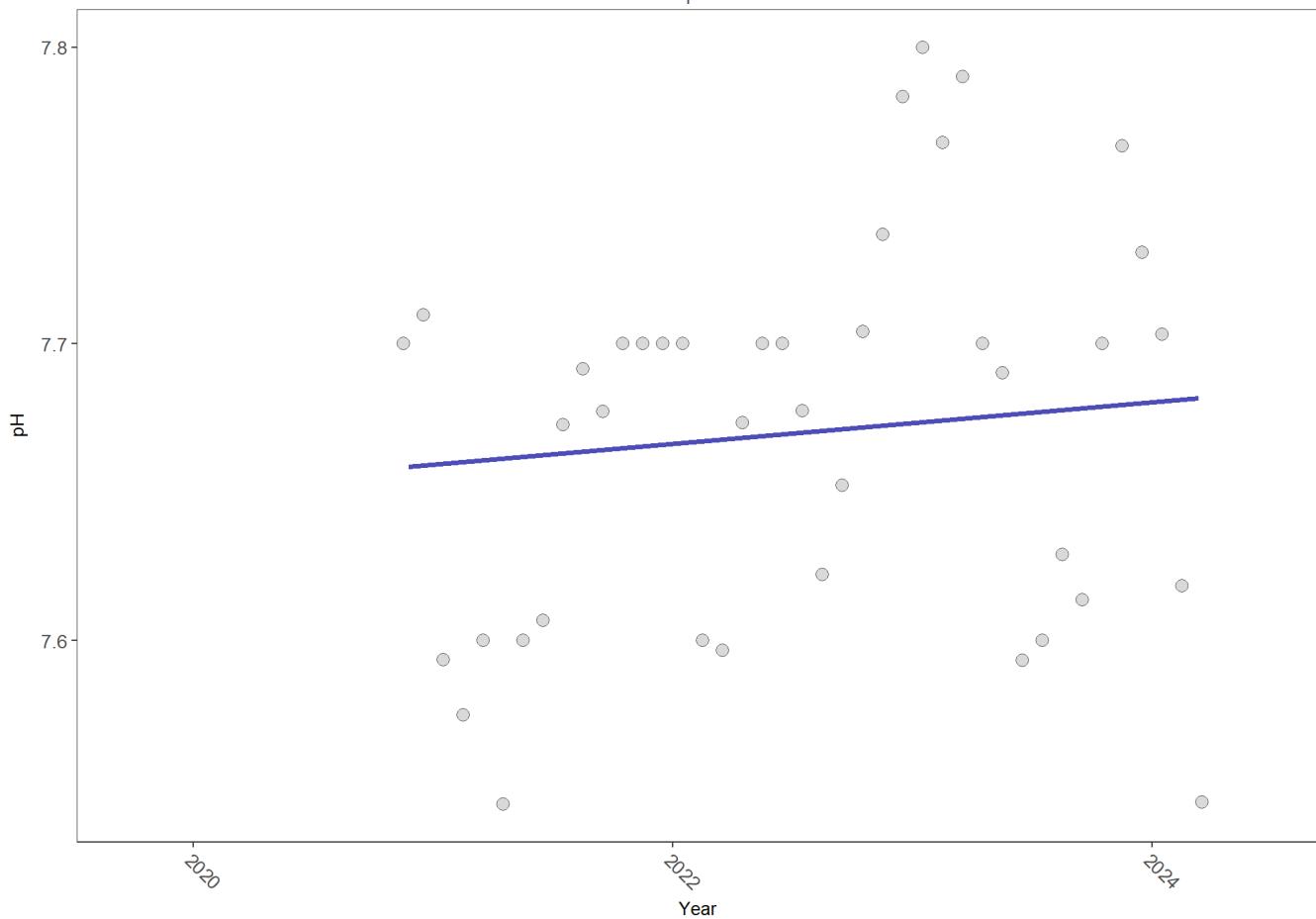
02326516

National Water Information System (7)

Big Bend Seagrasses Aquatic Preserve

02326516

pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	1080	5	7.7	TRUE	0.1626	0.2218	0.007030604	7.652266	12.8678	0.3021	0

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

SennIntercept is intercept value at beginning of record for monitoring location

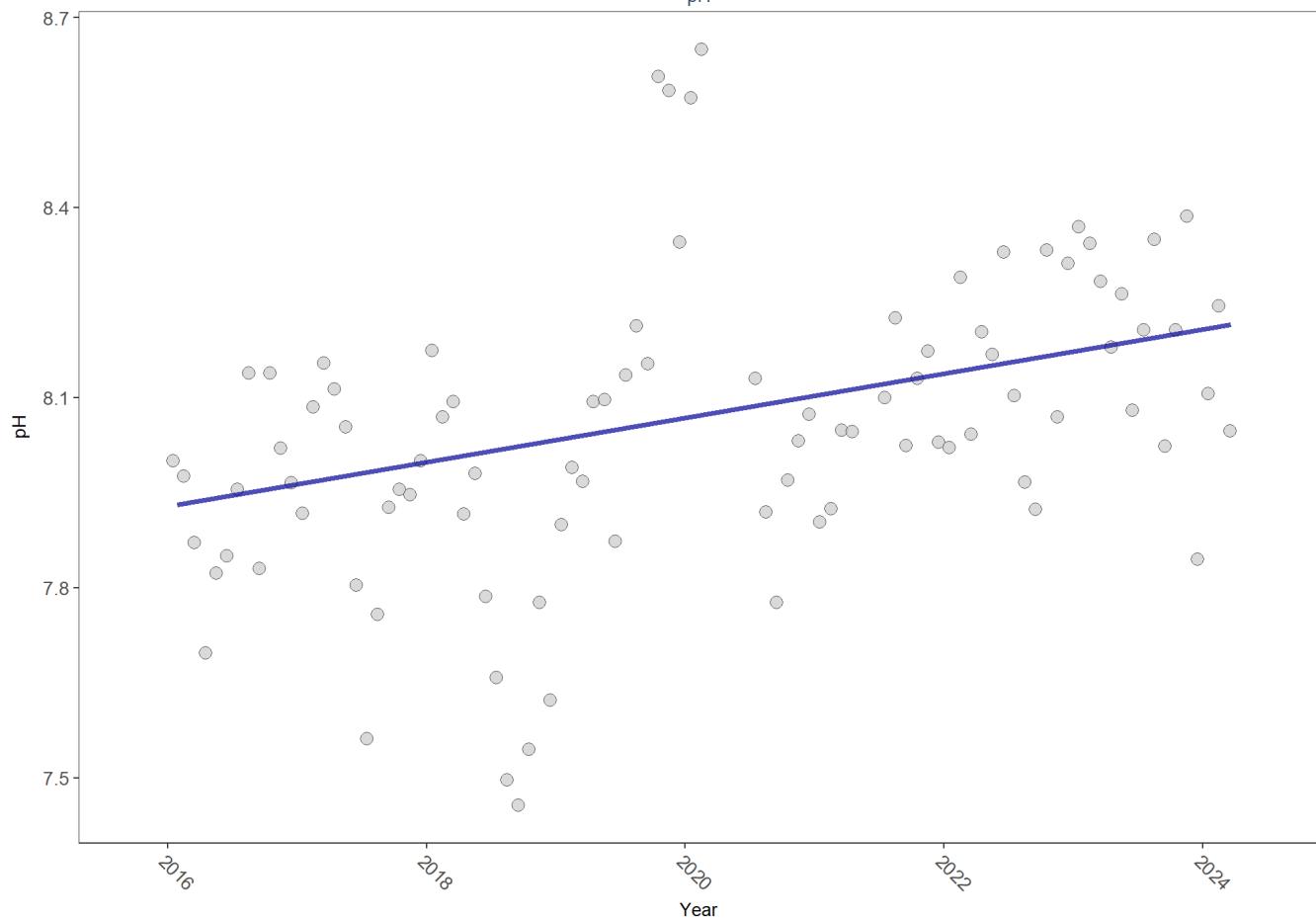
02326526

National Water Information System (7)

Big Bend Seagrasses Aquatic Preserve

02326526

pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	2629	9	8	TRUE	0.3582	0.0001	0.03501082	7.928145	3.6048	0.9801	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

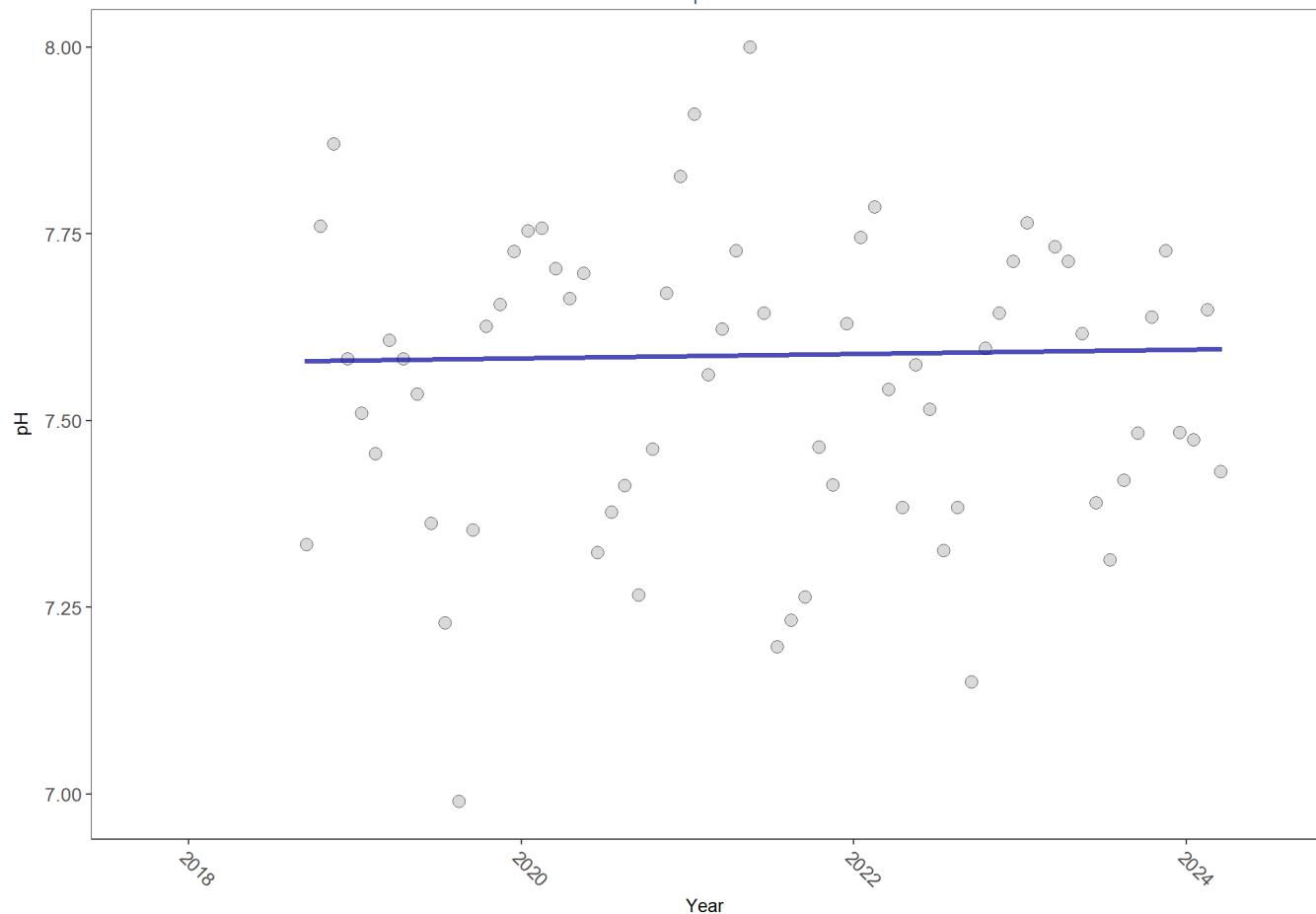
02313700

National Water Information System (7)

Big Bend Seagrasses Aquatic Preserve

02313700

pH



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	1896	7	7.6	TRUE	0.0364	0.9515	0.002795699	7.57795	5.0427	0.9291	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

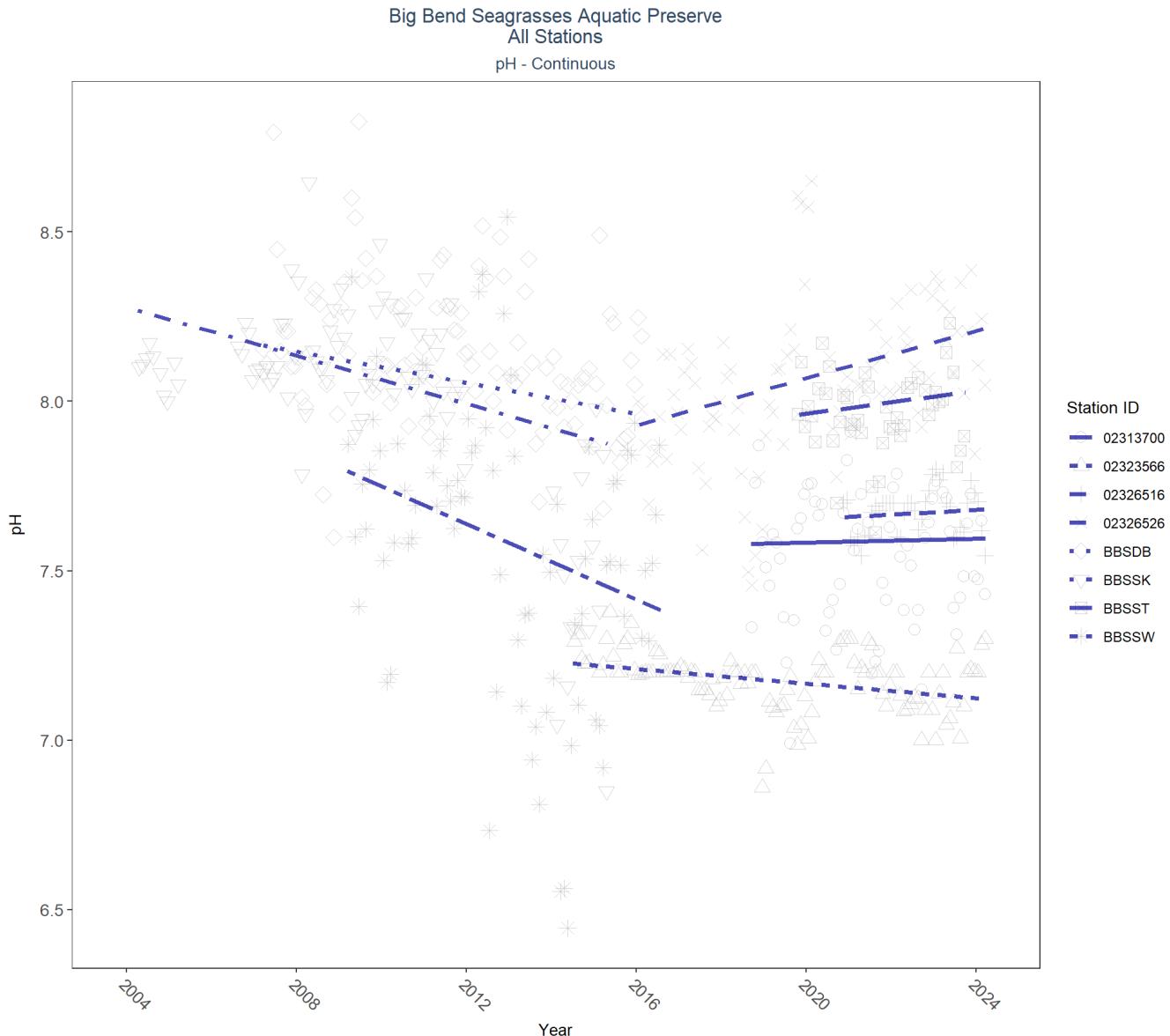


Table 32: Seasonal Kendall-Tau Results for All Stations - pH

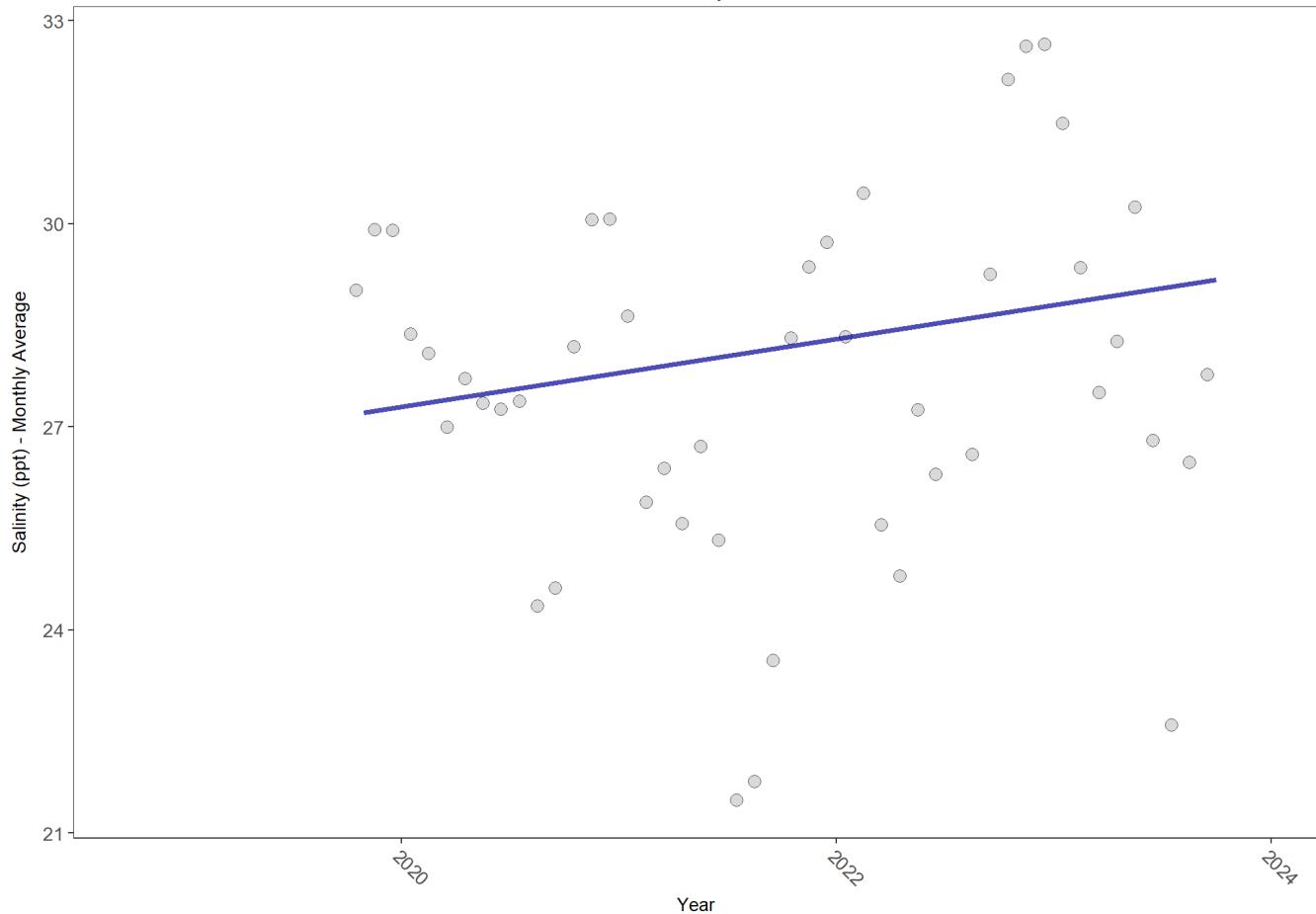
Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
BBSST	121092	5	2019 - 2023	8.0	0.16	7.95	0.02	0.3533
BBSSW	224733	8	2009 - 2016	7.6	-0.29	7.80	-0.06	0.0017
BBSDB	250183	10	2007 - 2016	8.1	-0.28	8.17	-0.02	0.0004
BBSSK	168278	10	2004 - 2015	8.1	-0.37	8.28	-0.04	0.0000
02323566	3204	11	2014 - 2024	7.2	-0.27	7.23	-0.01	0.0005
02326516	1080	5	2020 - 2024	7.7	0.16	7.65	0.01	0.2218
02326526	2629	9	2016 - 2024	8.0	0.36	7.93	0.04	0.0001
02313700	1896	7	2018 - 2024	7.6	0.04	7.58	0.00	0.9515

Salinity - Continuous Water Quality

BBSST

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve
BBSST
Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	121984	5	28.6	TRUE	0.2057	0.1594	0.5008921	26.79313	1.9538	0.9987	0

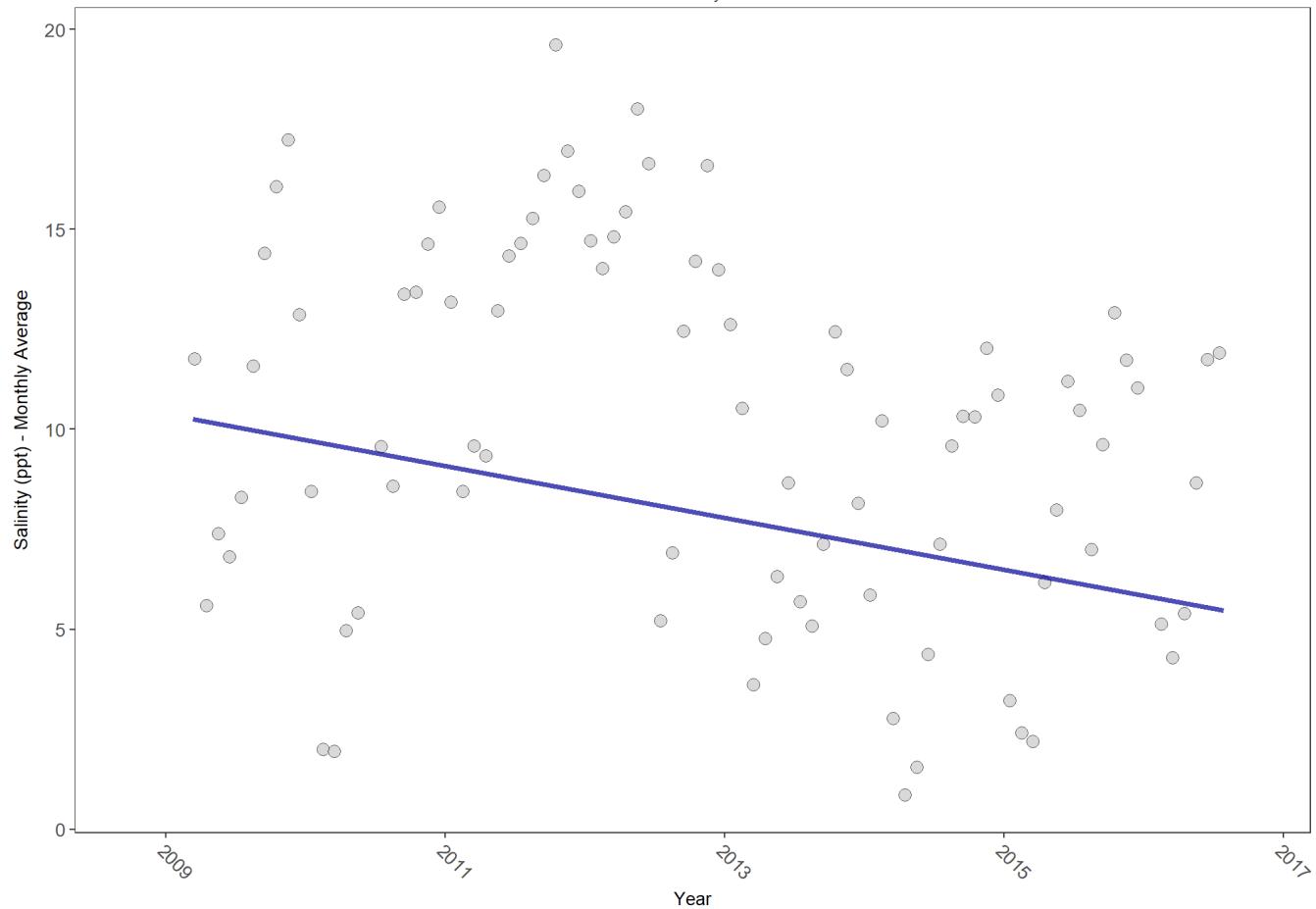
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

BBSSW

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve
BBSSW
Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	221696	8	7.5	TRUE	-0.2342	0.0160	-0.6502604	10.38696	8.6594	0.6533	-1

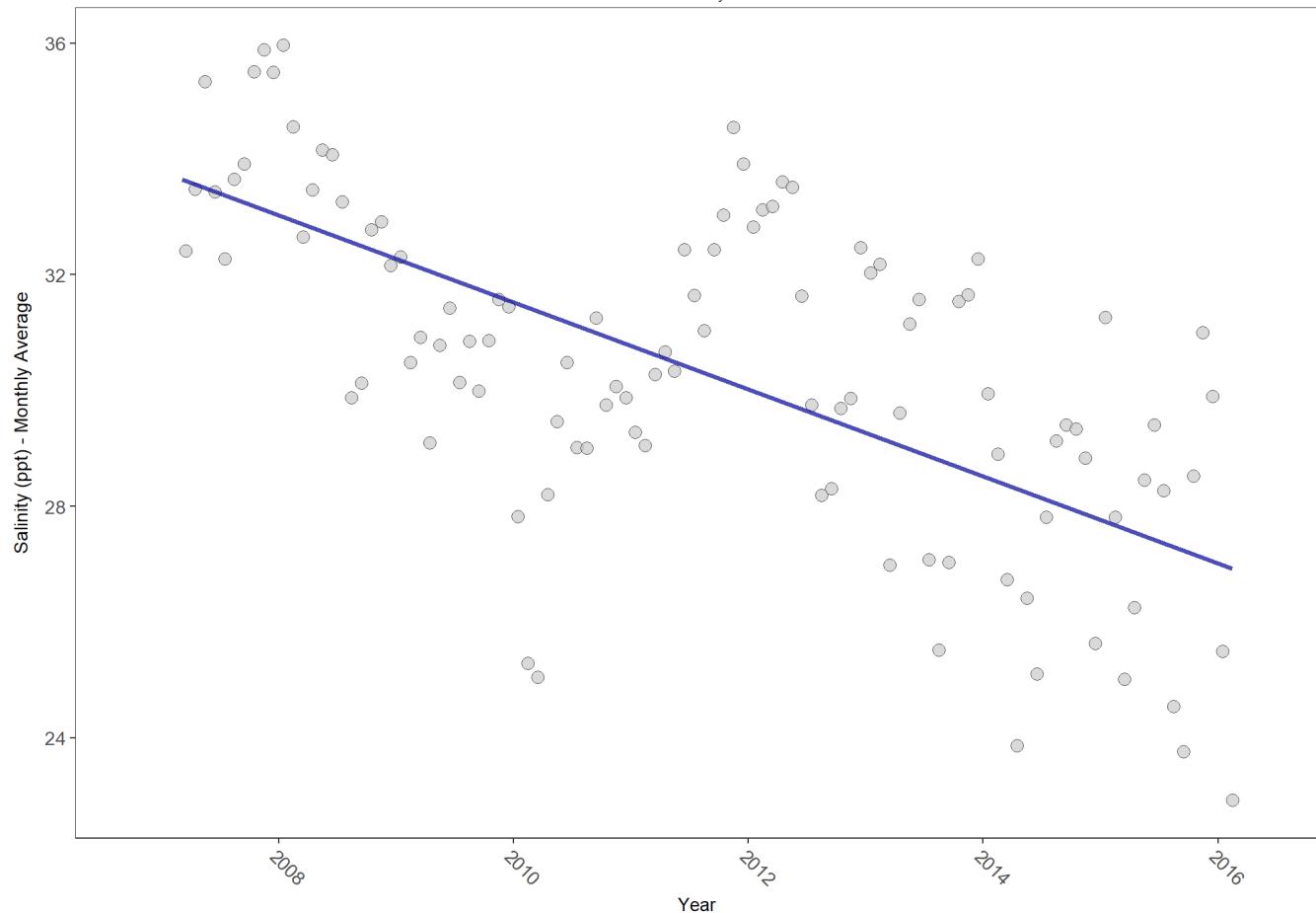
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

BBSDB

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve
BBSDB
Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	265544	10	30.6	TRUE	-0.5278	0.0000	-0.7519475	33.77929	1.2609	0.9998	-1

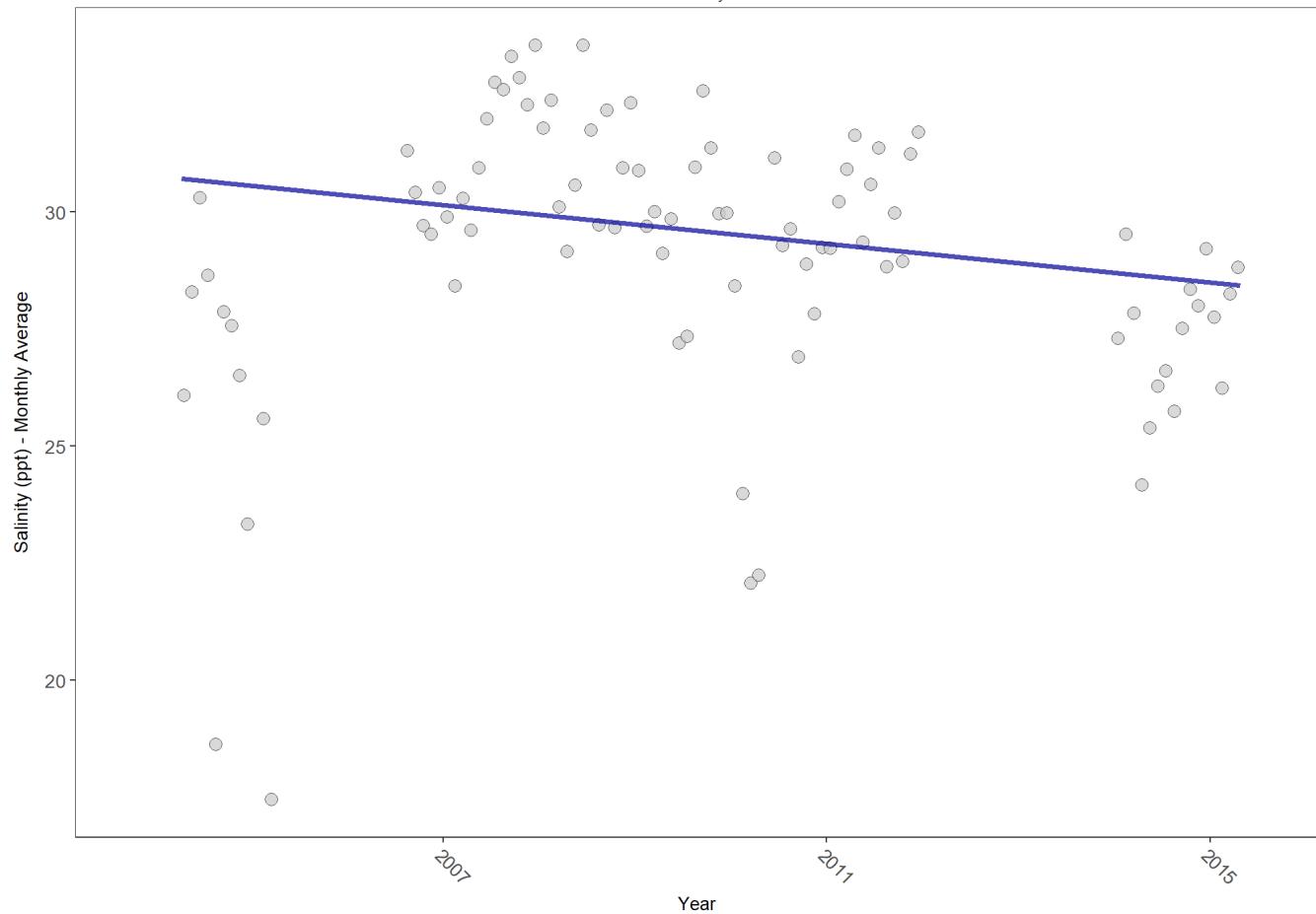
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

BBSSK

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve
BBSSK
Salinity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	178356	10	29.6	TRUE	-0.2176	0.0197	-0.2068972	30.76695	4.432	0.9555	-1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

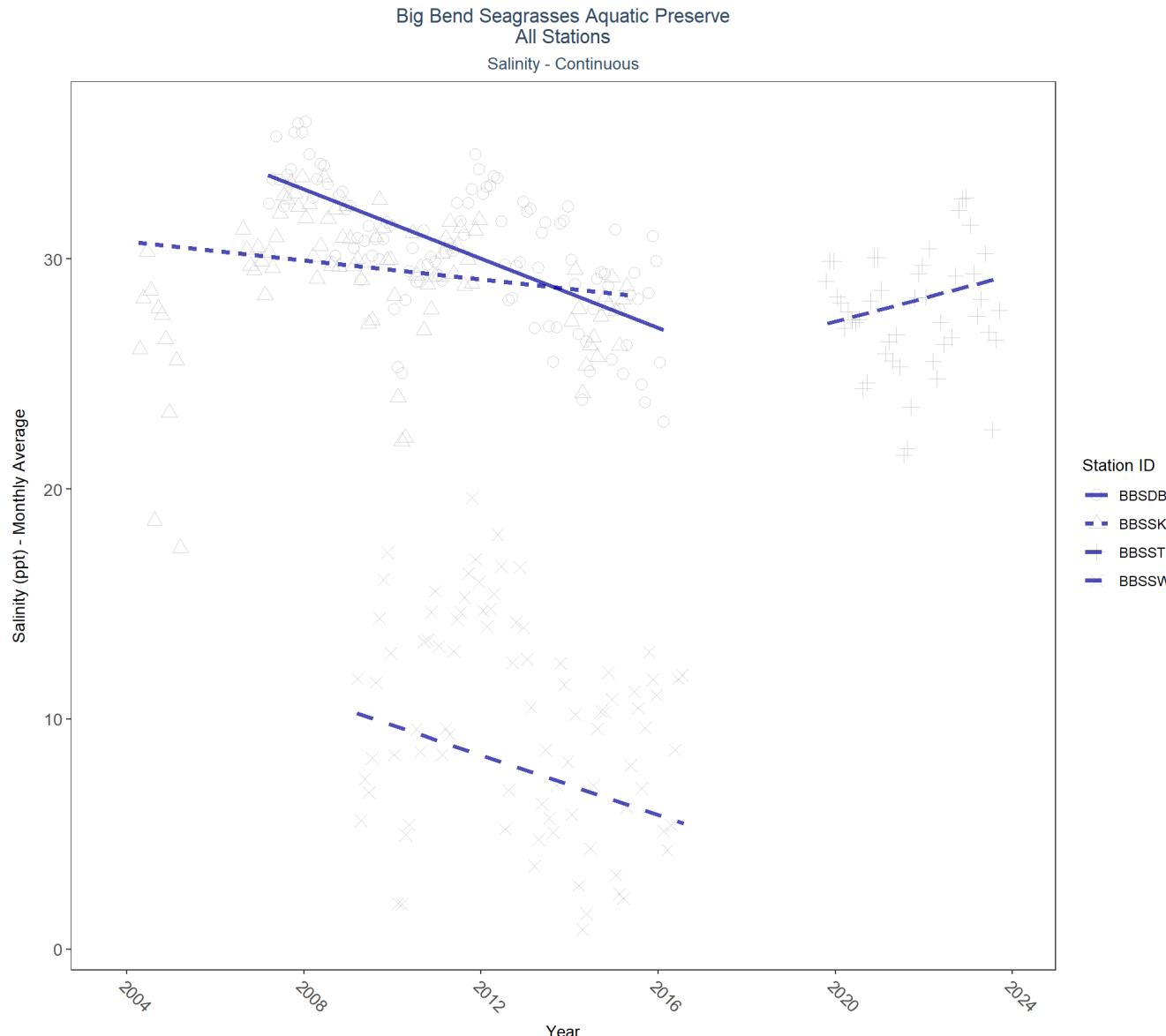


Table 33: Seasonal Kendall-Tau Results for All Stations - Salinity

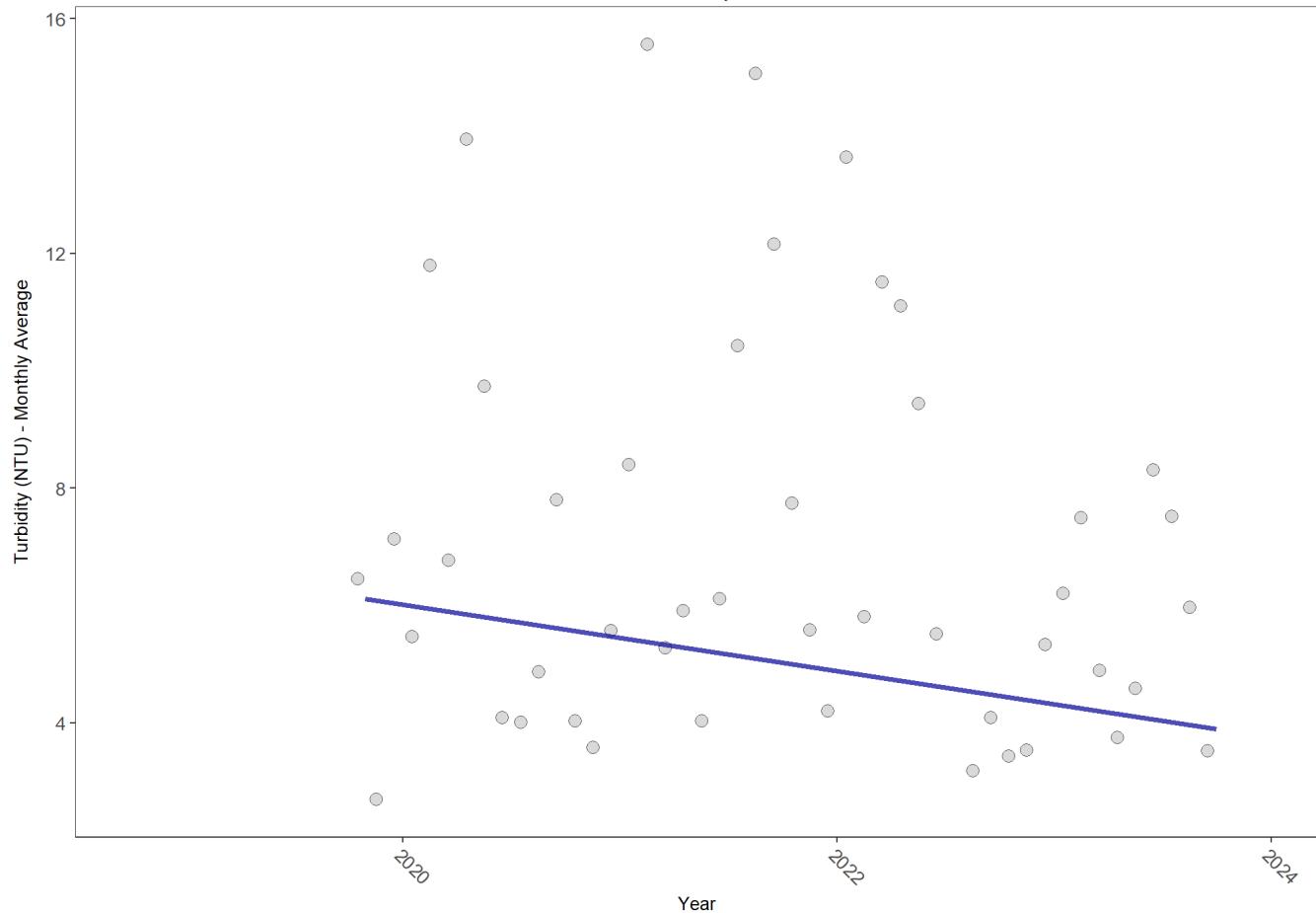
Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
BBSST	121984	5	2019 - 2023	28.6	0.21	26.79	0.5	0.1594
BBSSW	221696	8	2009 - 2016	7.5	-0.23	10.39	-0.65	0.0160
BBSDB	265544	10	2007 - 2016	30.6	-0.53	33.78	-0.75	0.0000
BBSSK	178356	10	2004 - 2015	29.6	-0.22	30.77	-0.21	0.0197
291652083064100	634	1	2000 - 2000	17.0	-	-	-	-

Turbidity - Continuous Water Quality

BBSST

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve
BBSST
Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	125246	5	4	TRUE	-0.1489	0.3149	-0.5666667	6.584708	9.374	0.5874	0

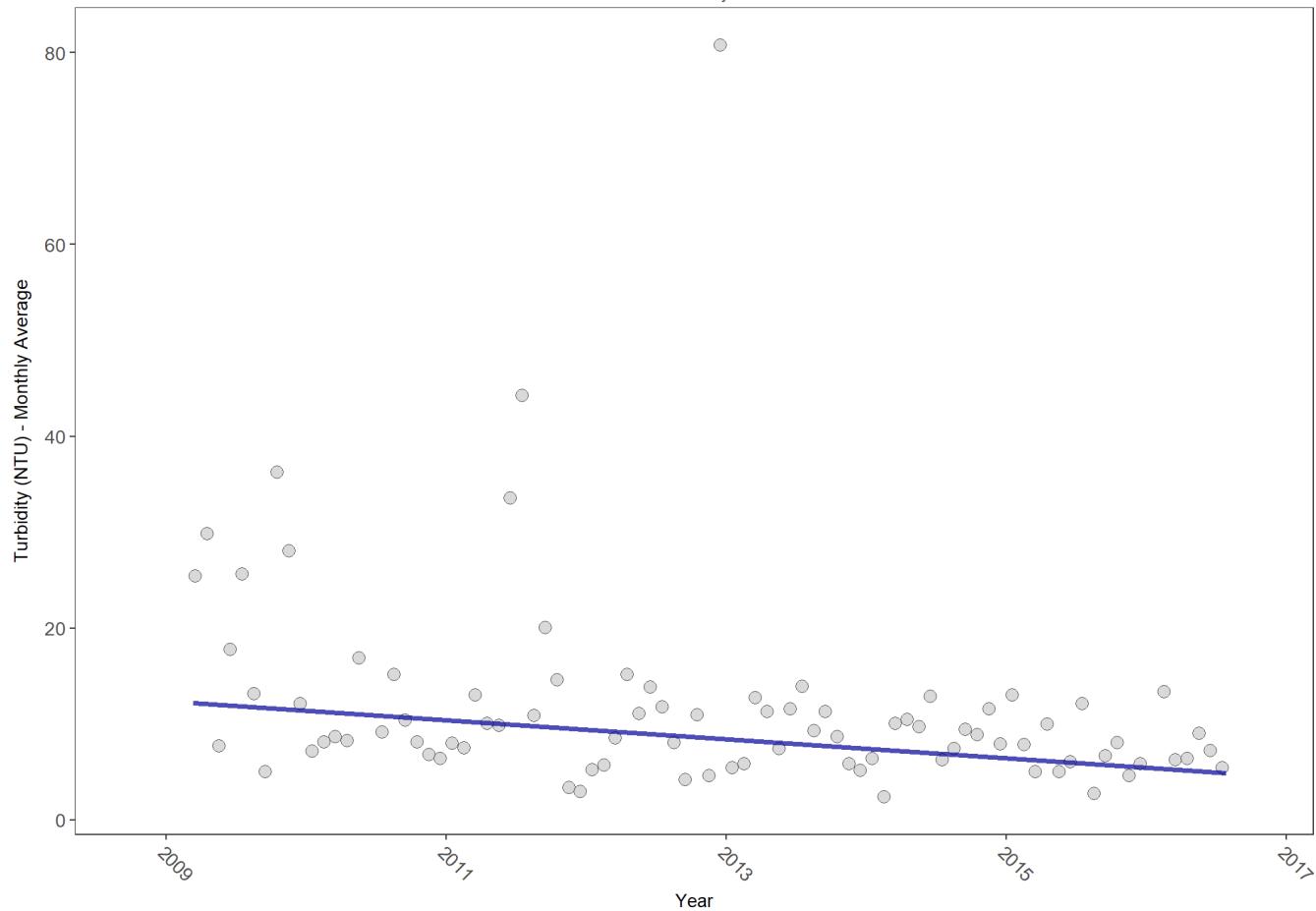
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

BBSSW

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve
BBSSW
Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	202699	8	6	TRUE	-0.3458	0.0001	-0.9891143	12.40508	10.6094	0.4765	-2

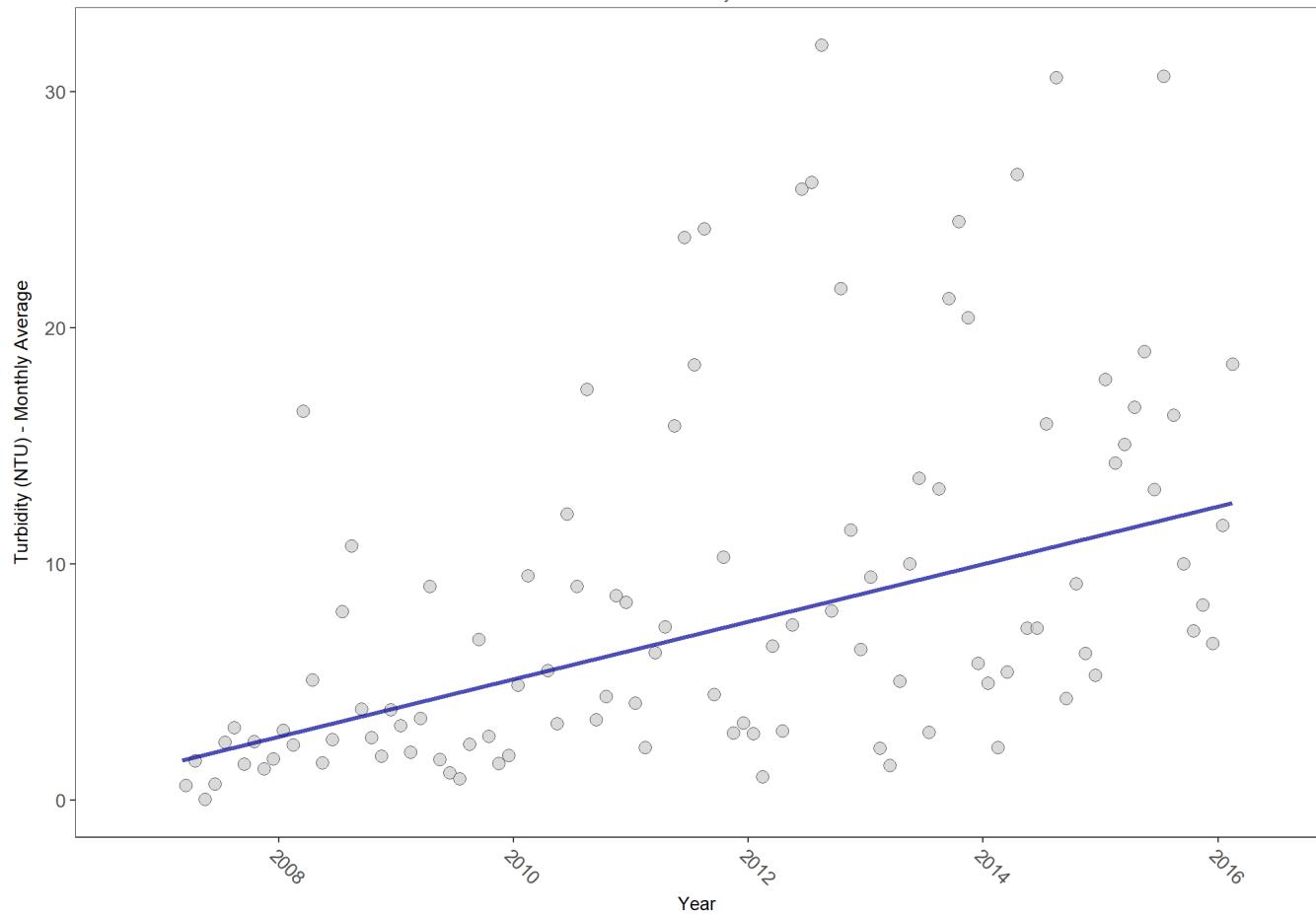
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

BBSDB

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve
BBSDB
Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	224613	10	1	TRUE	0.4927	0.0000	1.21929	1.467923	3.1347	0.9888	2

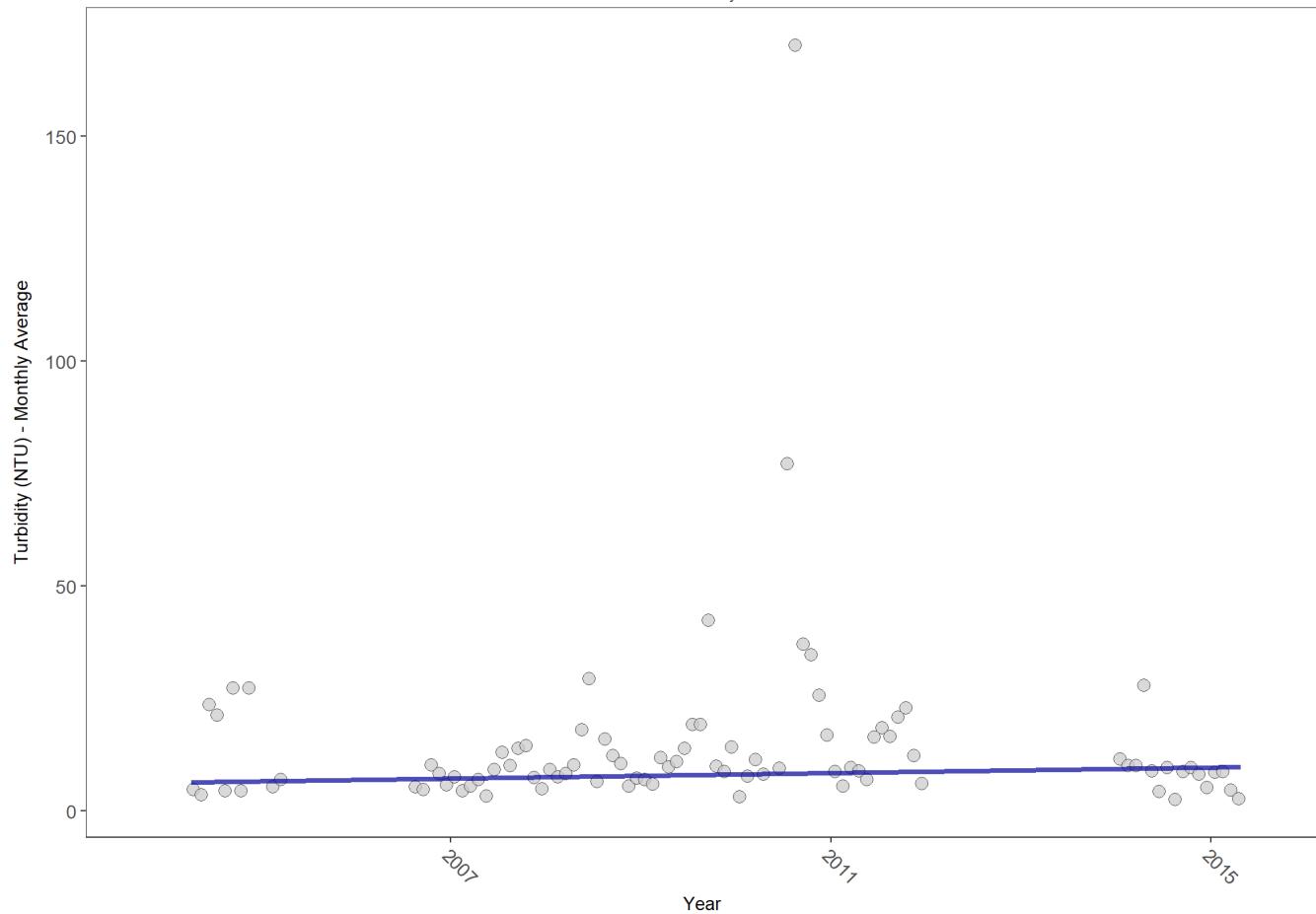
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

BBSSK

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve
BBSSK
Turbidity



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	165043	10	5	TRUE	0.1128	0.1867	0.3048269	6.345542	6.7737	0.8171	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

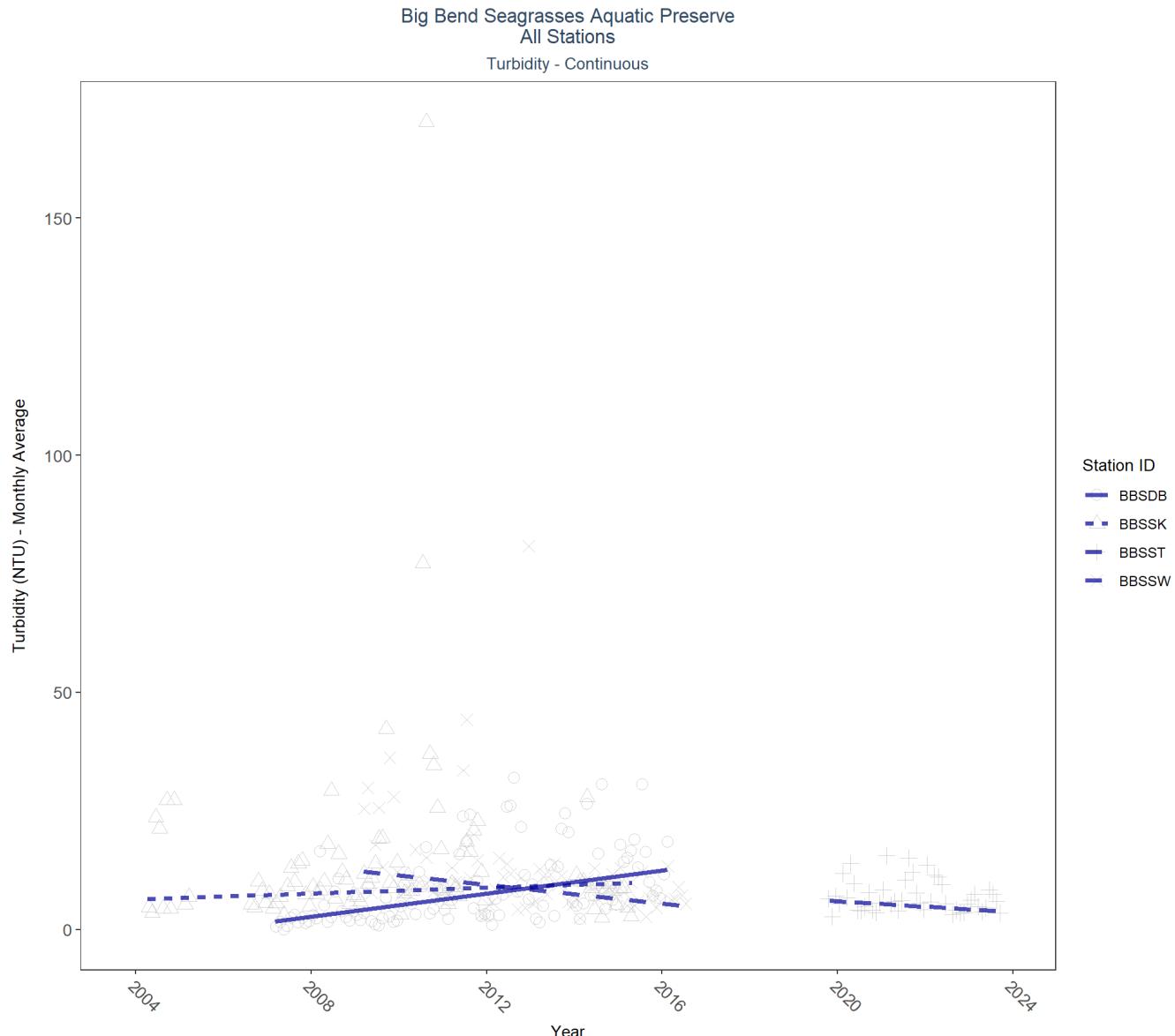


Table 34: Seasonal Kendall-Tau Results for All Stations - Turbidity

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
BBSST	125246	5	2019 - 2023	4	-0.15	6.58	-0.57	0.3149
BBSSW	202699	8	2009 - 2016	6	-0.35	12.41	-0.99	0.0001
BBSDB	224613	10	2007 - 2016	1	0.49	1.47	1.22	0.0000
BBSSK	165043	10	2004 - 2015	5	0.11	6.35	0.30	0.1867

Water Temperature - Continuous Water Quality

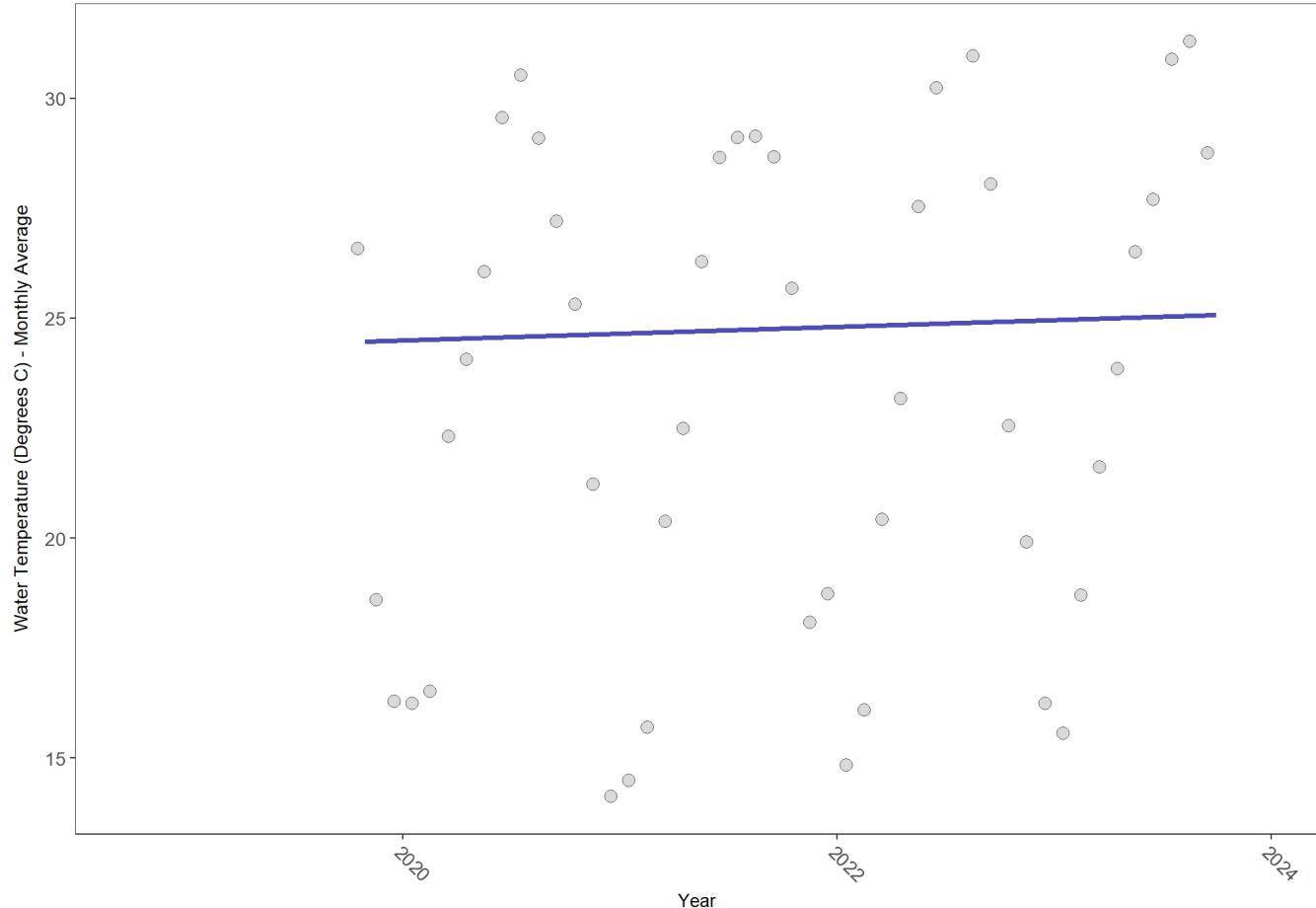
BBSST

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve

BBSST

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	128489	5	23.6	TRUE	0.1631	0.3149	0.1546272	24.34022	9.6082	0.5659	0

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

SennIntercept is intercept value at beginning of record for monitoring location

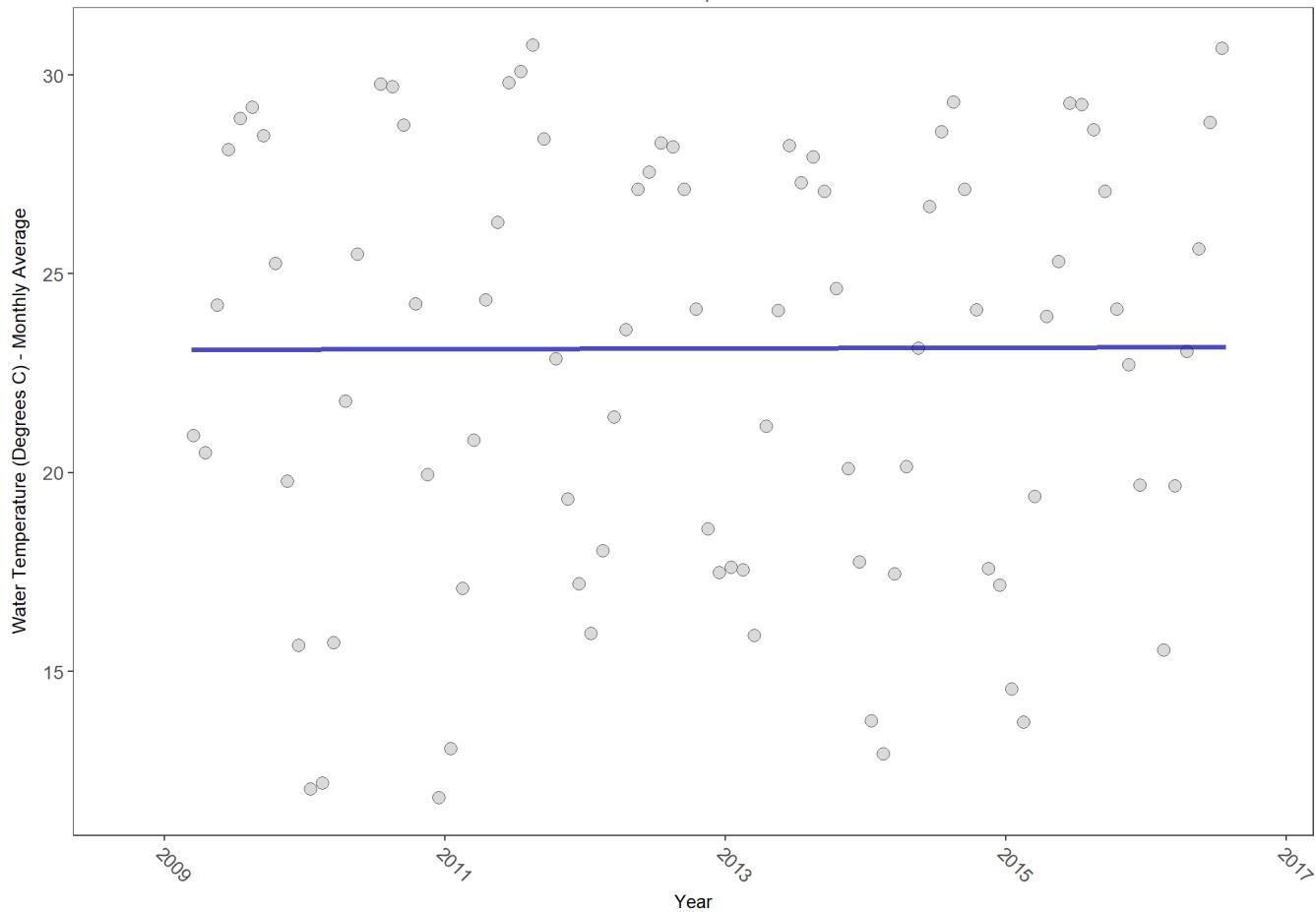
BBSSW

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve

BBSSW

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	227996	8	23.7	TRUE	0.0174	0.9025	0.009602101	23.08511	12.0767	0.3579	0

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

SennIntercept is intercept value at beginning of record for monitoring location

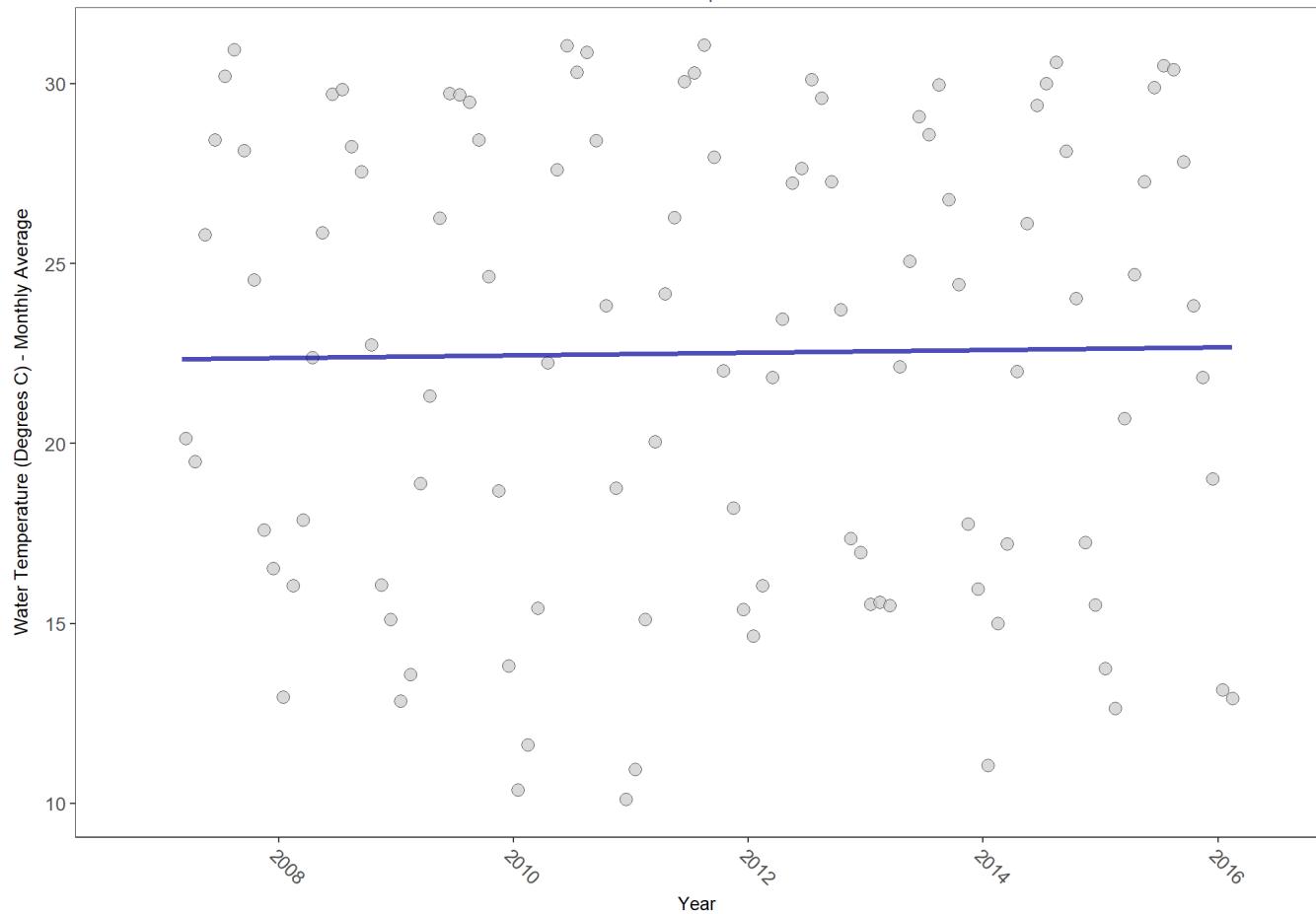
BBSDB

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve

BBSDB

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	265988	10	23.2	TRUE	0.0833	0.2922	0.03794679	22.34113	6.6522	0.8265	0

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

SennIntercept is intercept value at beginning of record for monitoring location

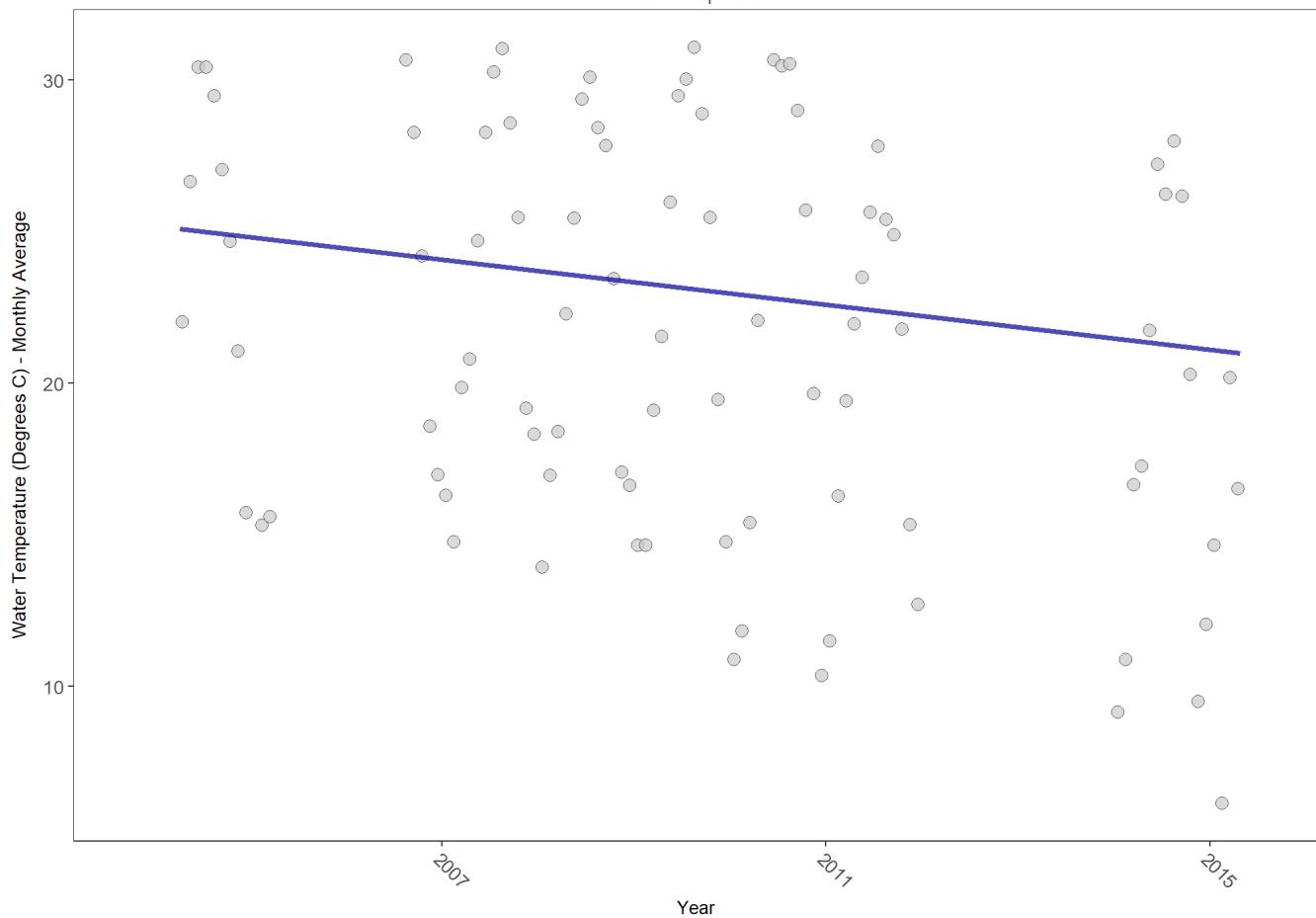
BBSSK

Big Bend Seagrasses Aquatic Preserves Continuous Water Quality Monitoring (471)

Big Bend Seagrasses Aquatic Preserve

BBSSK

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	179213	10	21.7	TRUE	-0.3321	0.0002	-0.371943	25.19238	7.7847	0.7324	-1

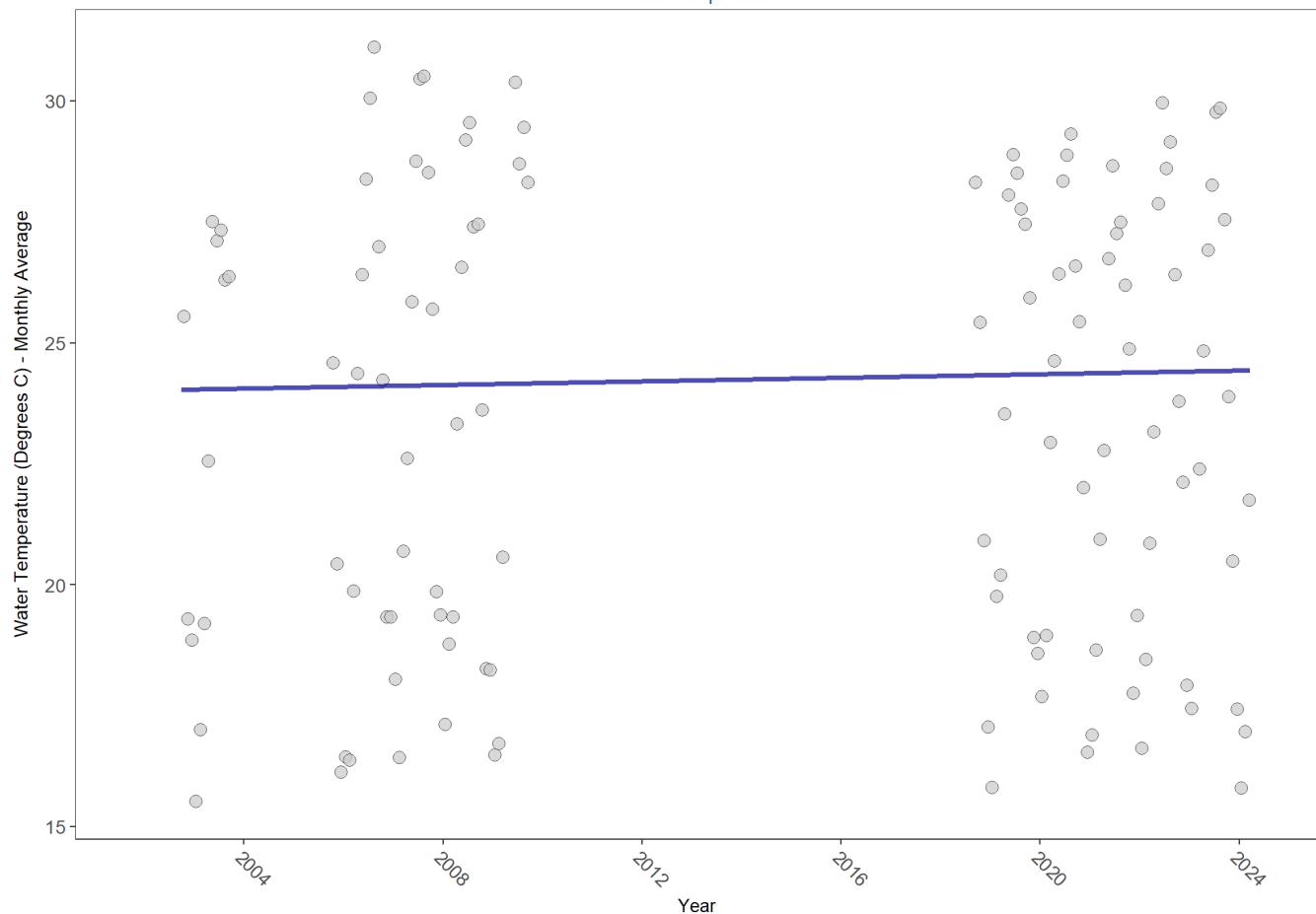
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

02313700

National Water Information System (7)

Big Bend Seagrasses Aquatic Preserve
02313700
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	3591	14	24	TRUE	0.1014	0.1789	0.01801495	24.02535	10.8794	0.4534	0

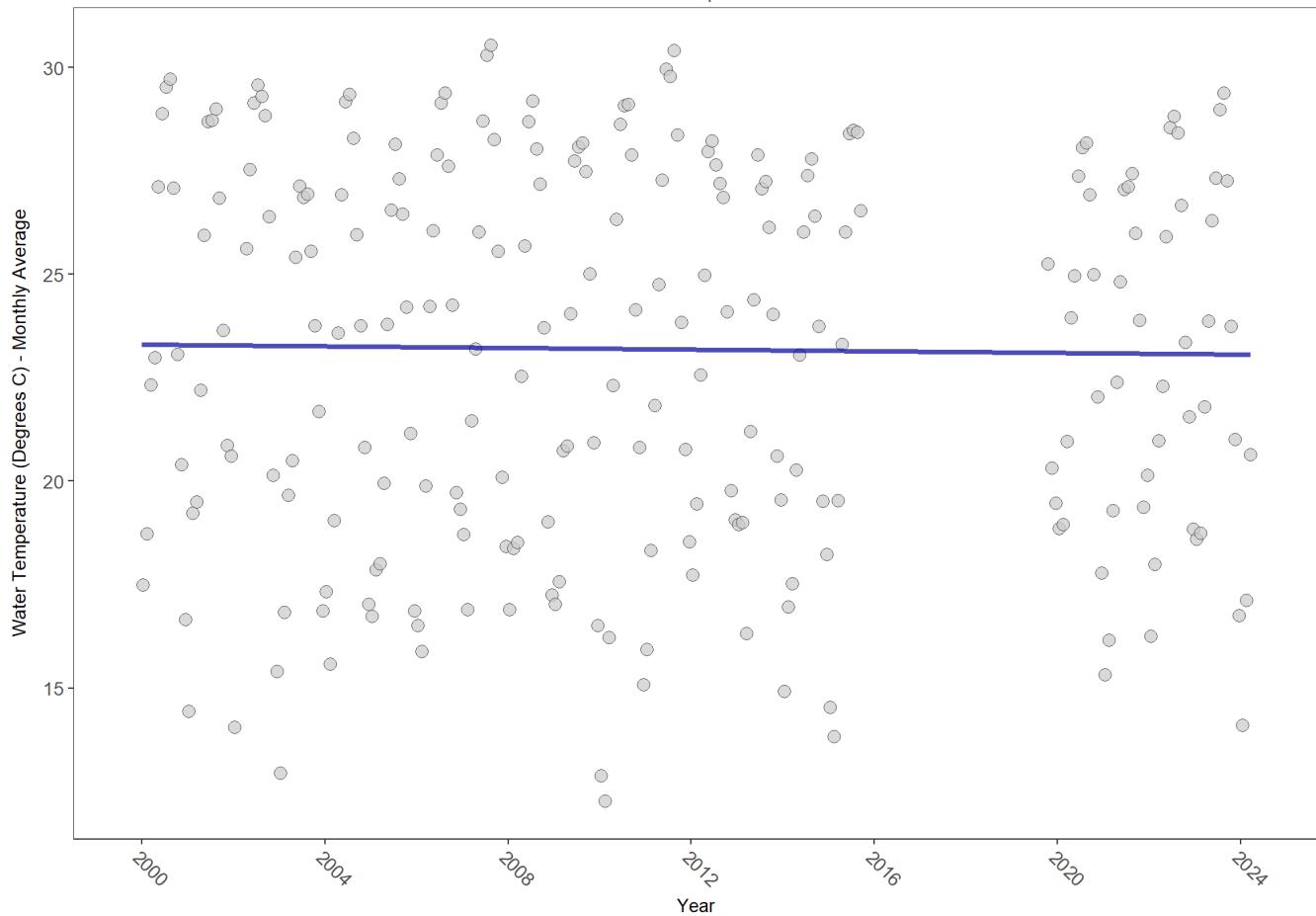
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

02323592

National Water Information System (7)

Big Bend Seagrasses Aquatic Preserve
02323592
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	11875	22	24	TRUE	-0.0396	0.4075	-0.01039773	23.30852	8.7508	0.6449	0

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

SennIntercept is intercept value at beginning of record for monitoring location

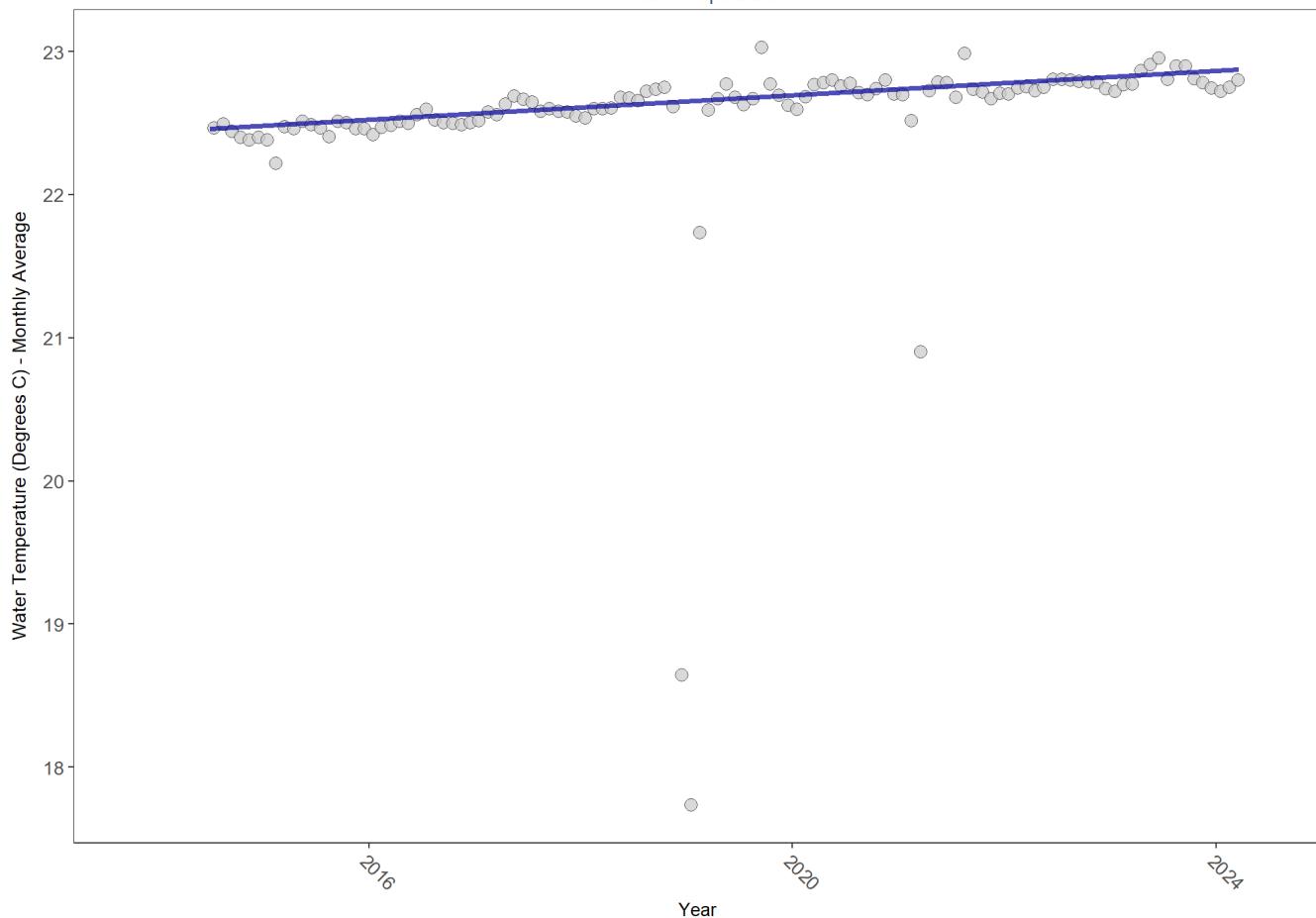
02323566

National Water Information System (7)

Big Bend Seagrasses Aquatic Preserve

02323566

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	3503	11	22.7	TRUE	0.7676	0.0000	0.04274194	22.43738	1.4592	0.9997	1

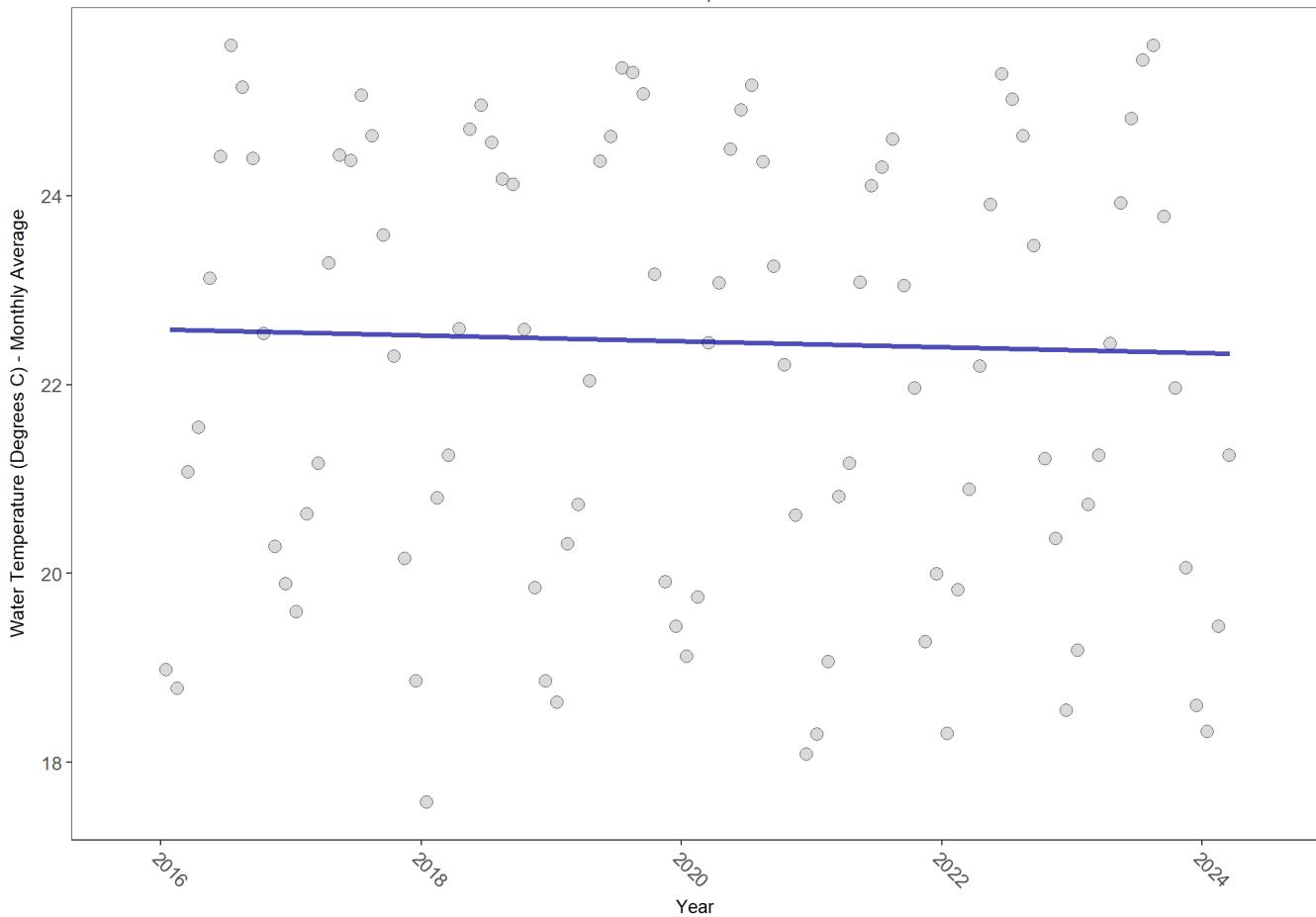
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

02326526

National Water Information System (7)

Big Bend Seagrasses Aquatic Preserve
02326526
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	2875	9	22.4	TRUE	-0.0931	0.2916	-0.031	22.58346	6.432	0.843	0

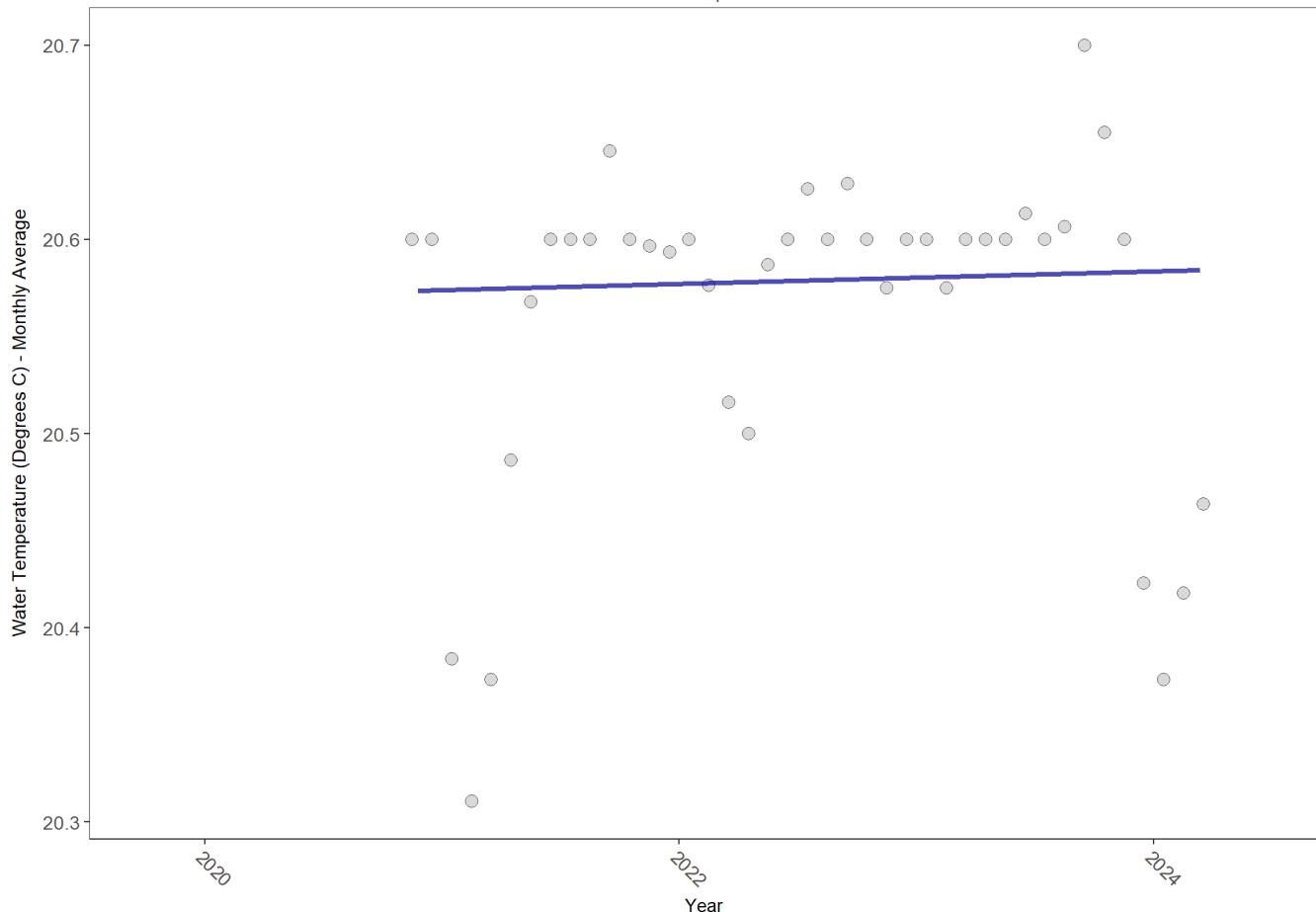
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

02326516

National Water Information System (7)

Big Bend Seagrasses Aquatic Preserve
02326516
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	1097	5	20.6	TRUE	0.2683	0.2530	0.003225806	20.57075	8.3712	0.6797	0

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

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined

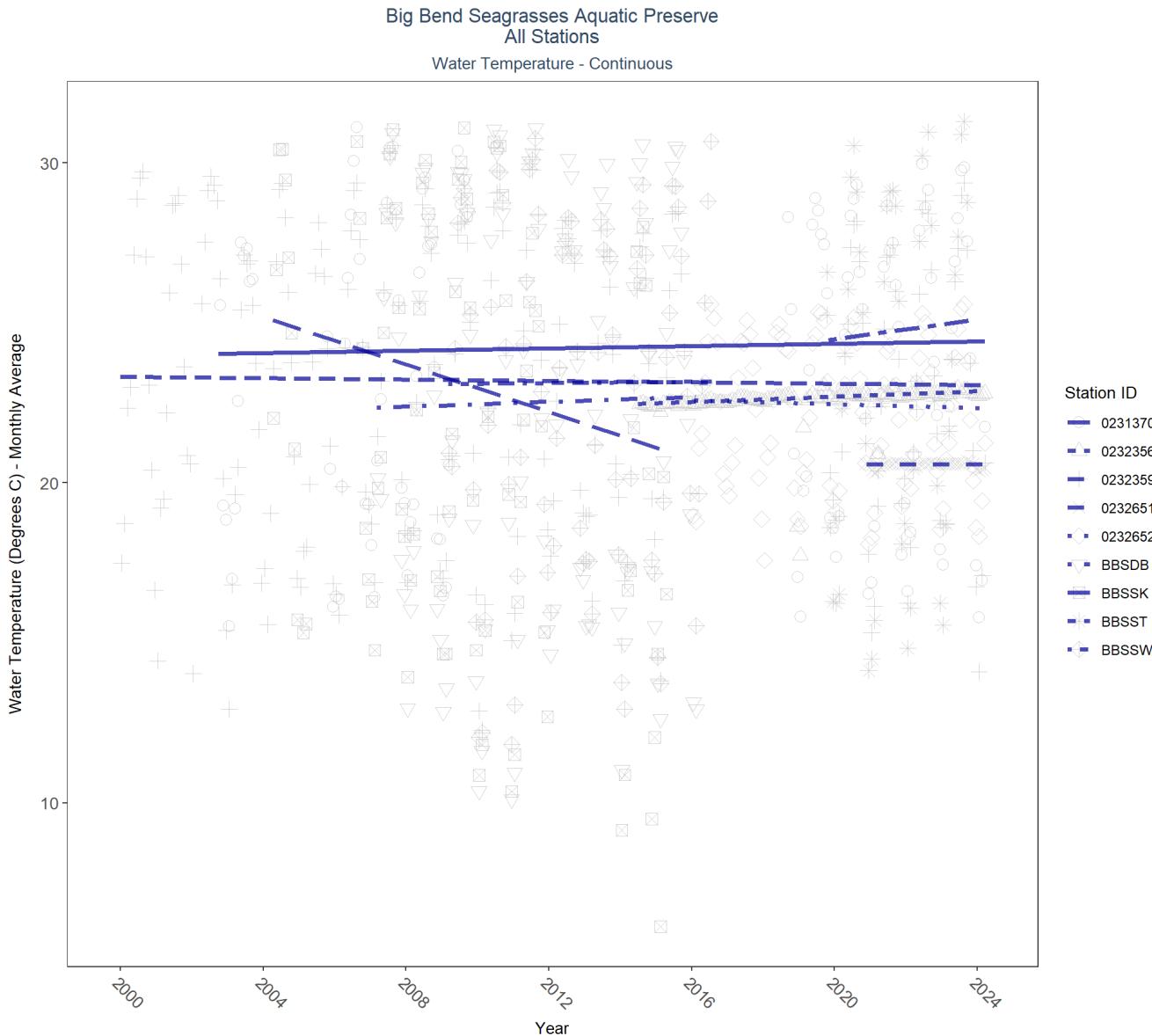


Table 35: Seasonal Kendall-Tau Results for All Stations - Water Temperature

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
BBSST	128489	5	2019 - 2023	23.60	0.16	24.34	0.15	0.3149
BBSSW	227996	8	2009 - 2016	23.70	0.02	23.09	0.01	0.9025
BBSDB	265988	10	2007 - 2016	23.20	0.08	22.34	0.04	0.2922
BBSSK	179213	10	2004 - 2015	21.70	-0.33	25.19	-0.37	0.0002
02313700	3591	14	2002 - 2024	24.00	0.1	24.03	0.02	0.1789
291652083064100	484	1	2000 - 2000	27.00	-	-	-	-
02323592	11875	22	2000 - 2024	24.00	-0.04	23.31	-0.01	0.4075
02323566	3503	11	2014 - 2024	22.70	0.77	22.44	0.04	0.0000
02326550	1521	4	2021 - 2024	23.30	-	-	-	-
02326526	2875	9	2016 - 2024	22.40	-0.09	22.58	-0.03	0.2916
02326516	1097	5	2020 - 2024	20.60	0.27	20.57	0	0.2530
02327022	144	2	2023 - 2024	21.05	-	-	-	-

Submerged Aquatic Vegetation

The data file used is: All_SAV_Parameters-2024-Mar-29.txt

Submerged aquatic vegetation (SAV) refers to plants and plant-like macroalgae species that live entirely underwater. The two primary categories of SAV inhabiting Florida estuaries are *benthic macroalgae* and *seagrasses*. They often grow together in dense beds or meadows that carpet the seafloor. *Macroalgae* include multicellular species of green, red and brown algae that often live attached to the substrate by a holdfast. They tend to grow quickly and can tolerate relatively high nutrient levels, making them a threat to seagrasses and other benthic habitats in areas with poor water quality. In contrast, *seagrasses* are grass-like, vascular, flowering plants that are attached to the seafloor by extensive root systems. *Seagrasses* occur throughout the coastal areas of Florida, including protected bays and lagoons as well as deeper offshore waters on the continental shelf. *Seagrasses* have taken advantage of the broad, shallow shelf and clear water to produce two of the most extensive seagrass beds anywhere in continental North America.

Parameters

Percent Cover measures the fraction of an area of seafloor that is covered by SAV, usually estimated by evaluating multiple small areas of seafloor. Percent cover is often estimated for total SAV, individual types of vegetation (seagrass, attached algae, drift algae) and individual species.

Frequency of Occurrence was calculated as the number of times a taxon was observed in a year divided by the number of sampling events, multiplied by 100. Analysis is conducted at the quadrat level and is inclusive of all quadrats (i.e., quadrats evaluated using Braun-Blanquet, modified Braun-Blanquet, and percent cover.)

Species

Turtle grass (*Thalassia testudinum*) is the largest of the Florida seagrasses, with longer, thicker blades and deeper root structures than any of the other seagrasses. It is considered a climax seagrass species.

Shoal grass (*Halodule wrightii*) is an early colonizer of vegetated areas and usually grows in water too shallow for other species except *widgeon grass*. It can often tolerate larger salinity ranges than other seagrass species. *Shoal grass* is characterized by thin, flat blades, that are narrower than *turtle grass* blades.

Manatee grass (*Syringodium filiforme*) is easily recognizable because its leaves are thin and cylindrical instead of the flat, ribbon-like form shared by many other seagrass species. The leaves can grow up to half a meter in length. *Manatee grass* is usually found in mixed seagrass beds or small, dense monospecific patches.

Widgeon grass (*Ruppia maritima*) grows in both fresh and salt water and is widely distributed throughout Florida's estuaries in less saline areas, particularly in inlets along the east coast. This species resembles *shoal grass* in certain environments but can be identified by the pointed tips of its leaves.

Three species of *Halophila spp.* are found in Florida - **Star grass** (*Halophila engelmannii*), **Paddle grass** (*Halophila decipiens*), and **Johnson's seagrass** (*Halophila johnsonii*). These are smaller, more fragile seagrasses than other Florida species and are considered ephemeral. They grow along a single long rhizome, with short blades. These species are not well-studied, although surveys are underway to define their ecological roles.

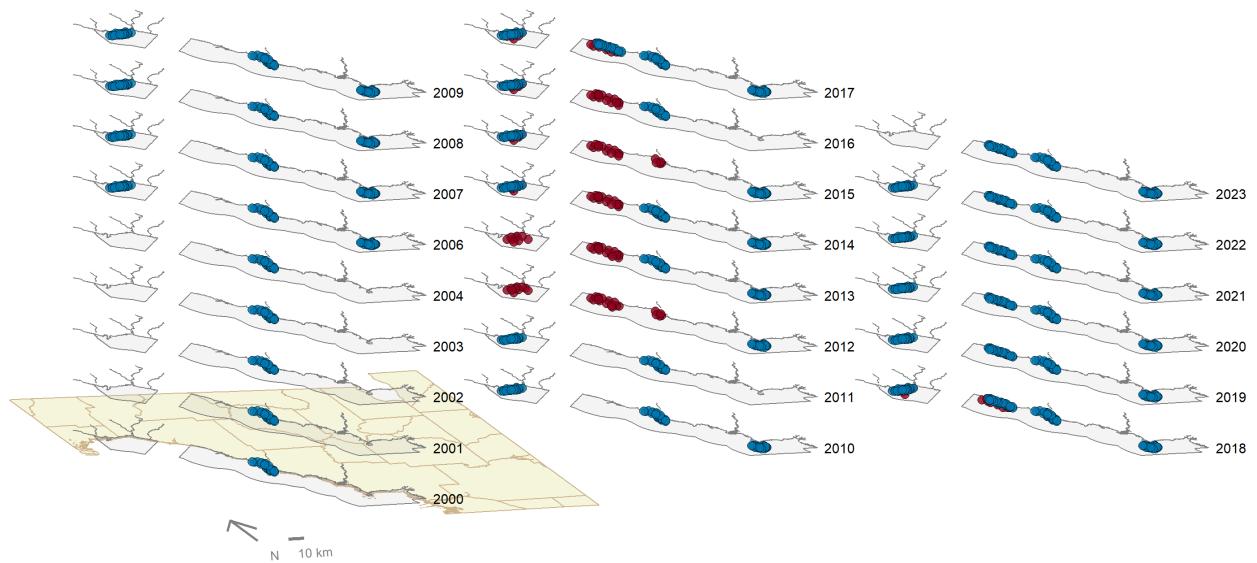
Notes

Star grass, *Paddle grass*, and *Johnson's seagrass* will be grouped together and listed as **Halophila spp.** in the following managed areas. This is because several surveys did not specify to the species level:

- Banana River Aquatic Preserve
- Indian River-Malabar to Vero Beach Aquatic Preserve
- Indian River-Vero Beach to Ft. Pierce Aquatic Preserve
- Jensen Beach to Jupiter Inlet Aquatic Preserve
- Loxahatchee River-Lake Worth Creek Aquatic Preserve
- Mosquito Lagoon Aquatic Preserve

- Biscayne Bay Aquatic Preserve
- Florida Keys National Marine Sanctuary

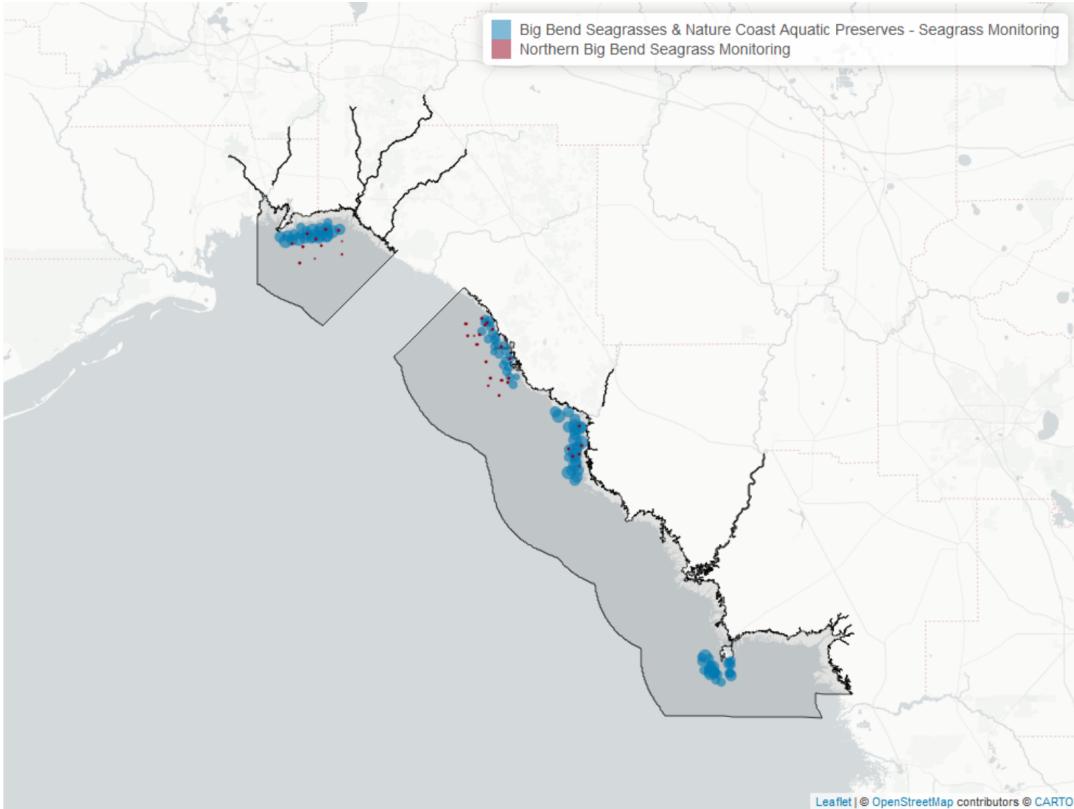
Big Bend Seagrasses Aquatic Preserve
SAV Percent Cover - Sample Locations



Program name
● Big Bend Seagrasses & Nature Coast Aquatic Preserves - Seagrass Monitoring
● Northern Big Bend Seagrass Monitoring

Maps showing the temporal scope of SAV sampling sites within the boundaries of *Big Bend Seagrasses Aquatic Preserve* by Program name.

Sampling locations by Program:



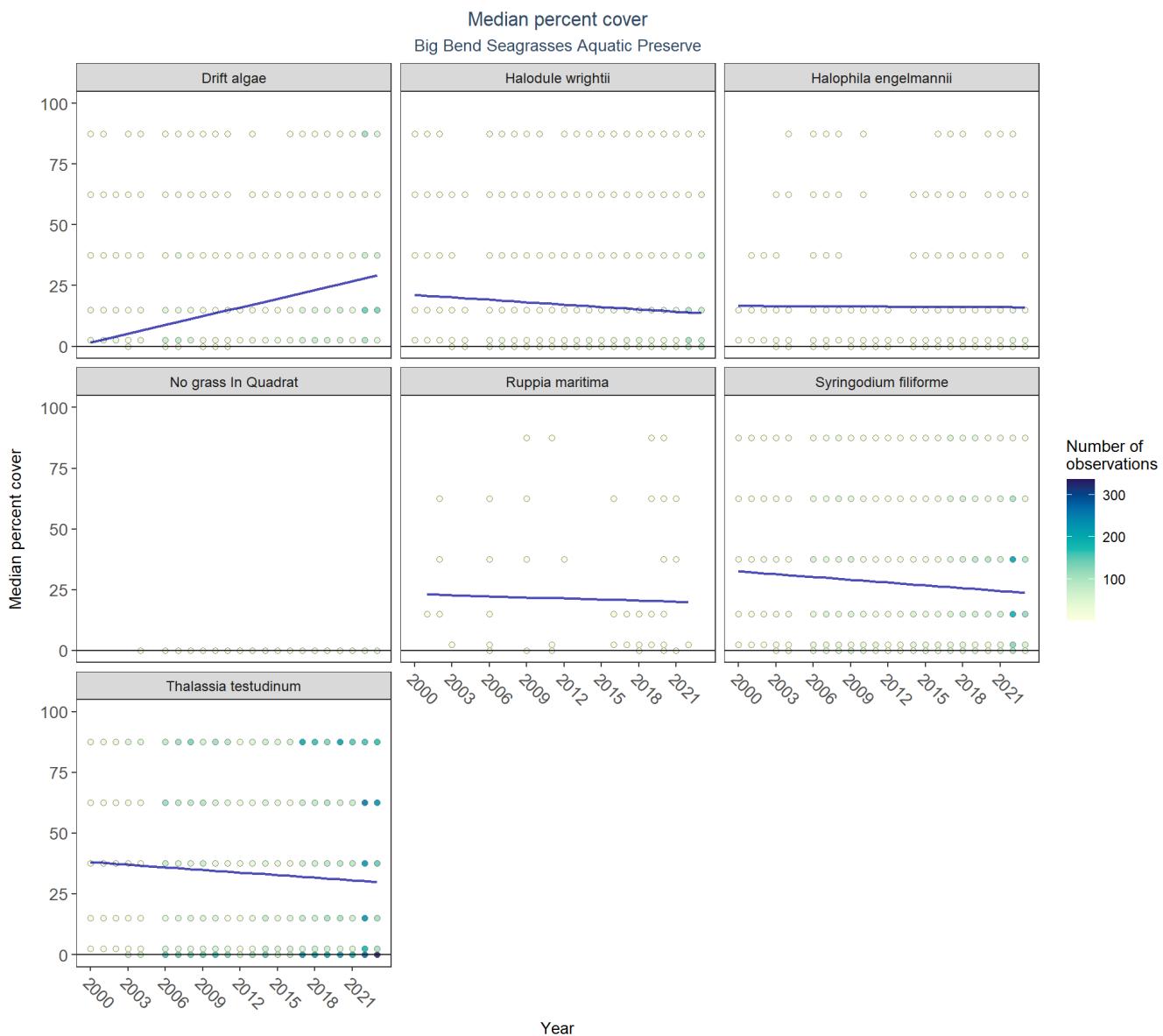
Map showing SAV sampling sites within the boundaries of *Big Bend Seagrasses Aquatic Preserve*. The point size reflects the number of samples at a given sampling site.

Table 36: Big Bend Seagrasses & Nature Coast Aquatic Preserves - Seagrass Monitoring - *Program 560*

<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>	<i>Collection Method</i>	<i>Sample Locations</i>
18335	2000	2023	Modified Braun Blanquet	100
2670	2022	2023	Percent Cover	100

Table 37: Northern Big Bend Seagrass Monitoring - *Program 559*

<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>	<i>Collection Method</i>	<i>Sample Locations</i>
537	2012	2018	Modified Braun Blanquet	195



Median percent cover by species in *Big Bend Seagrasses Aquatic Preserve*. Linear mixed-effects models are applied to each species to produce species trends. The trendlines are then isolated and reproduced below for ease of viewing. The LME results are available in table form beneath the supplemental trendplot below.

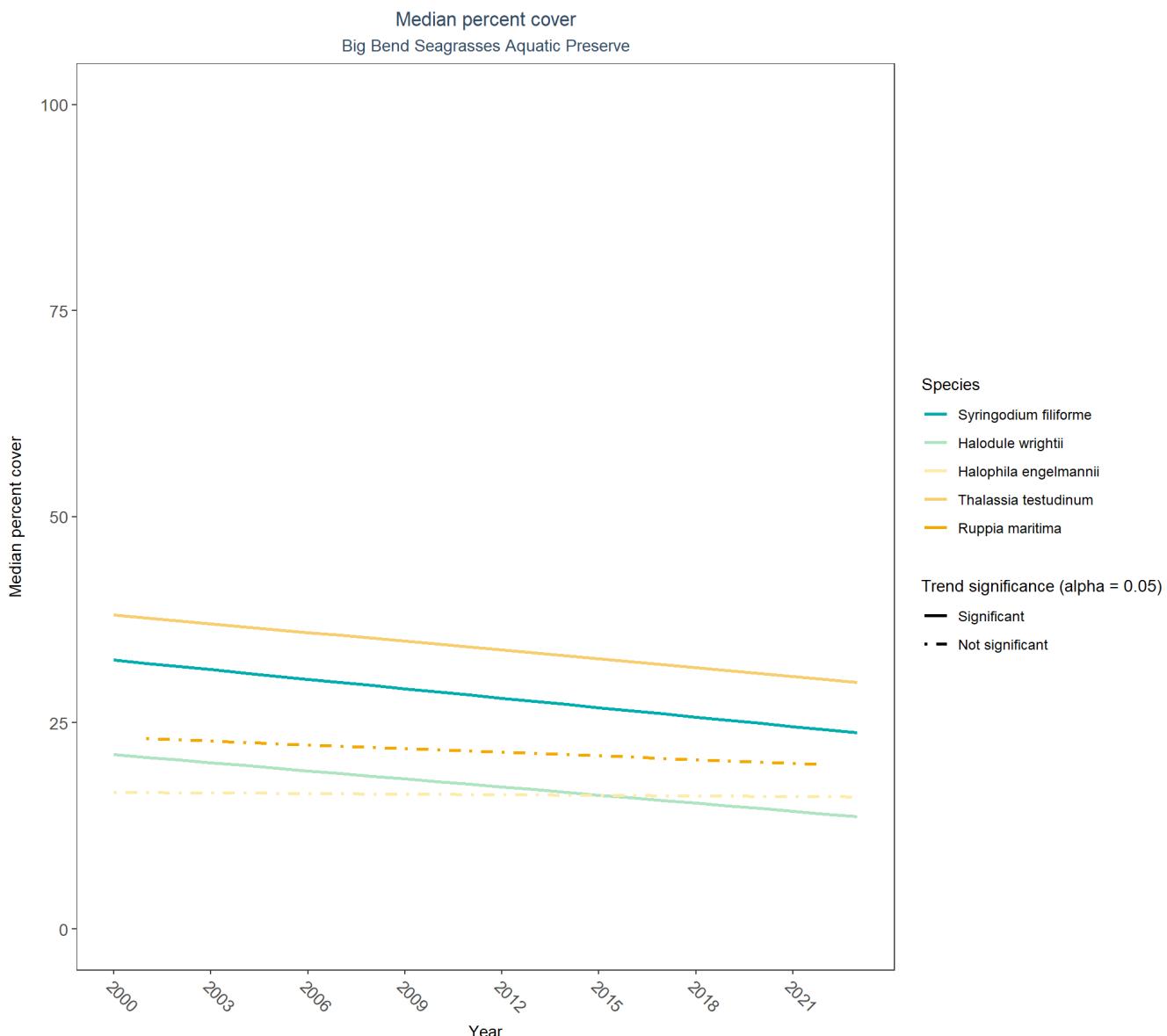
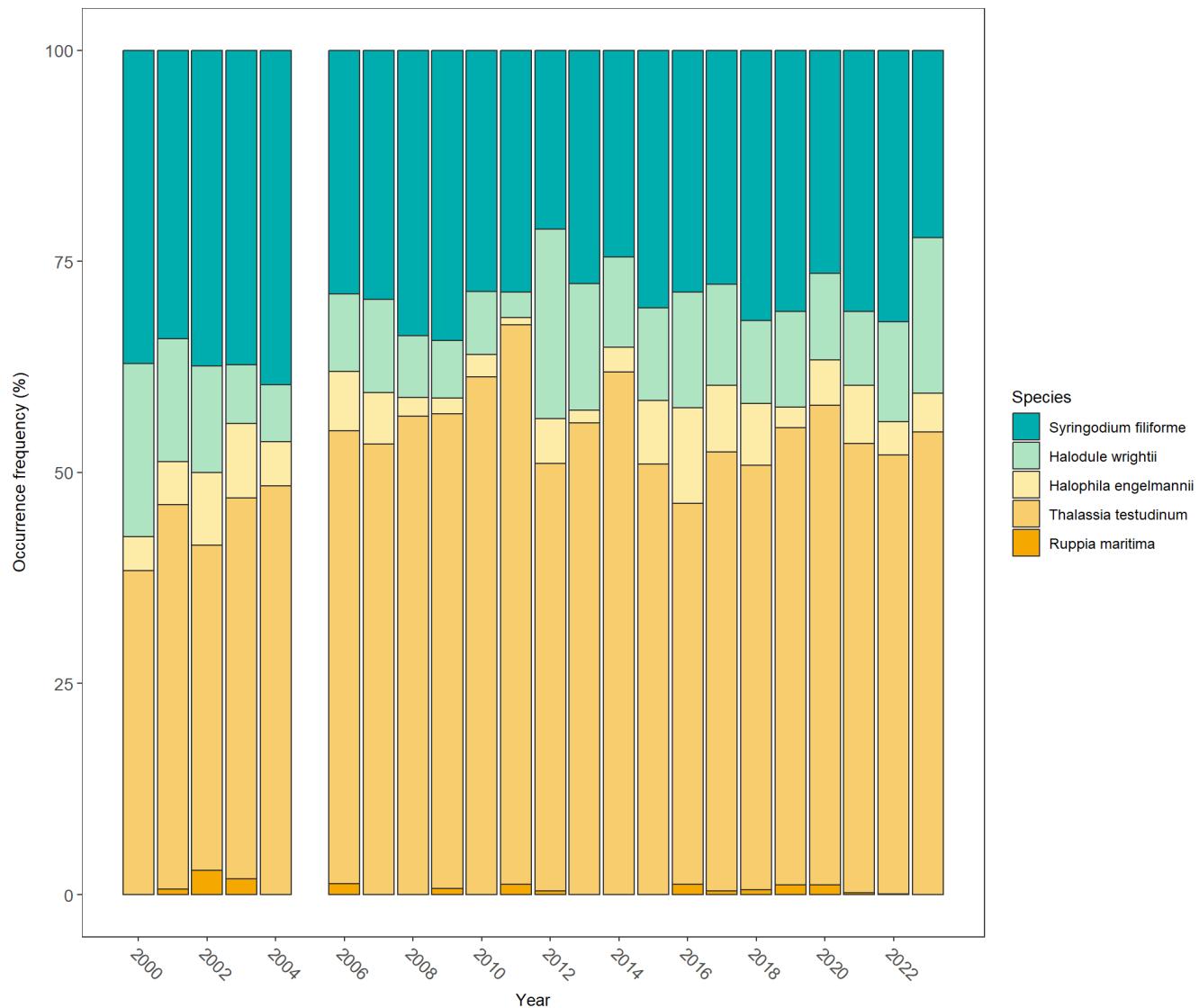
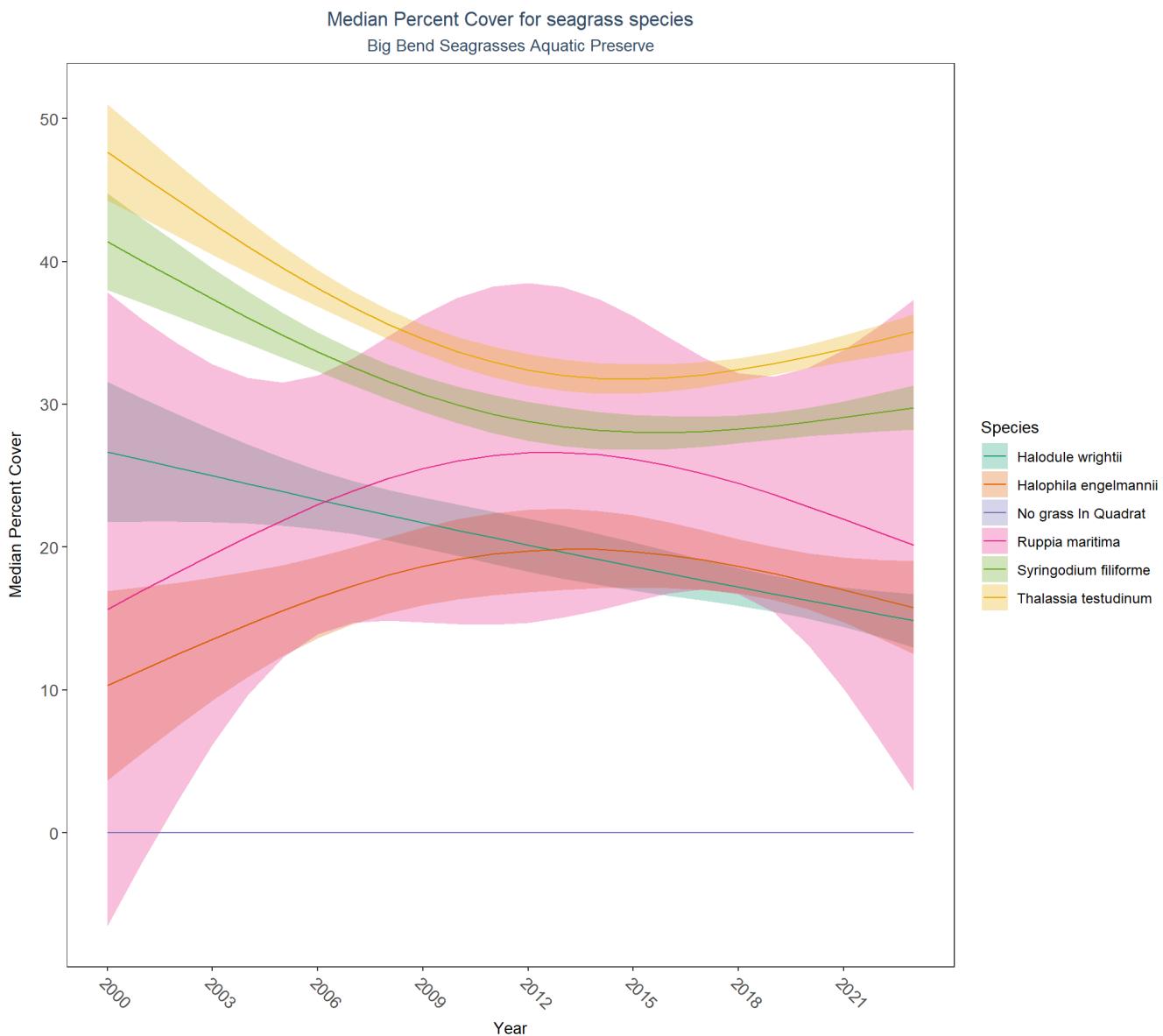


Table 38: Percent Cover Trend Analysis for Big Bend Seagrasses Aquatic Preserve

Species	Common Name	Trend Significance (0.05)	Period of Record	LME-Intercept	LME-Slope	p
Drift algae		Significantly increasing trend	2000 - 2023	-5.4681	1.1939	0.0000
Halodule wrightii	Shoal grass	Significantly decreasing trend	2000 - 2023	23.1125	-0.3273	0.0095
Halophila engelmannii	Star grass	No significant trend	2000 - 2023	16.7026	-0.0238	0.8681
No grass In Quadrat		Model did not fit the available data	2004 - 2023			
Ruppia maritima	Widgeon grass	No significant trend	2001 - 2022	24.1358	-0.1496	0.7880
Syringodium filiforme	Manatee grass	Significantly decreasing trend	2000 - 2023	34.9115	-0.3838	0.0015
Thalassia testudinum	Turtle grass	Significantly decreasing trend	2000 - 2023	40.2277	-0.3547	0.0000

Frequency of occurrence
Big Bend Seagrasses Aquatic Preserve





Generalized additive models for each species in Big Bend Seagrasses Aquatic Preserve. Species must have at least 10 years of data to be evaluated.

Drift algae, Total seagrass, Attached algae, No grass in Quadrat, and Total SAV are excluded from the analyses.