

Florida Keys National Marine Sanctuary

SEACAR Habitat Analyses

Last compiled on 03 September, 2024

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305	74
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314	76
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40	107
76	108
12	109
60	110
26	111
32	112
72	113
51	114
11	115
35	116
30	117
22	118
56	119
52	120
57	121
77	122
70	123
58	124
75	125
33	126

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81	.	132
61	.	133
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Threshold Filtering

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

Table 1: Continuous Water Quality threshold values

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

Table 2: Discrete Water Quality threshold values

<i>Parameter Name</i>	<i>Units</i>	<i>Low Threshold</i>	<i>High Threshold</i>
Dissolved Oxygen	mg/L	0.000001	22
Salinity	ppt	0	70
Water Temperature	Degrees C	3	40
pH		2	13
Dissolved Oxygen Saturation	%	0.000001	310
Specific Conductivity	mS/cm	0.005000001	100
Turbidity	NTU	0	-
Total Suspended Solids (TSS)	mg/L	0	-
Chlorophyll a uncorrected for pheophytin	ug/L	0	-
Chlorophyll a corrected for pheophytin	ug/L	0	-
Secchi Depth	m	0.000001	50
Light Extinction Coefficient	m^{-1}	0	-
Colored dissolved organic matter, CDOM	PCU	0	-
Fluorescent dissolved organic matter, FDOM	QSE	0	-
Total Nitrogen	mg/L	0	-
Total Kjeldahl Nitrogen TKN	mg/L	0	-
NO ₂ +3 Filtered	mg/L	0	-
NH ₄ Filtered	mg/L	0	-
Total Phosphorus	mg/L	0	-

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

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

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

Value Qualifiers

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

STORET and WIN value qualifier codes

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

Table 4: Value Qualifier codes excluded from analysis

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

Discrete Water Quality Value Qualifiers

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

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

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

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

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

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

Systemwide Monitoring Program (SWMP) value qualifier codes

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

Table 5: SWMP Value Qualifier codes

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

Water Column

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

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

Seasonal Kendall-Tau Analysis

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

Water Quality - Discrete

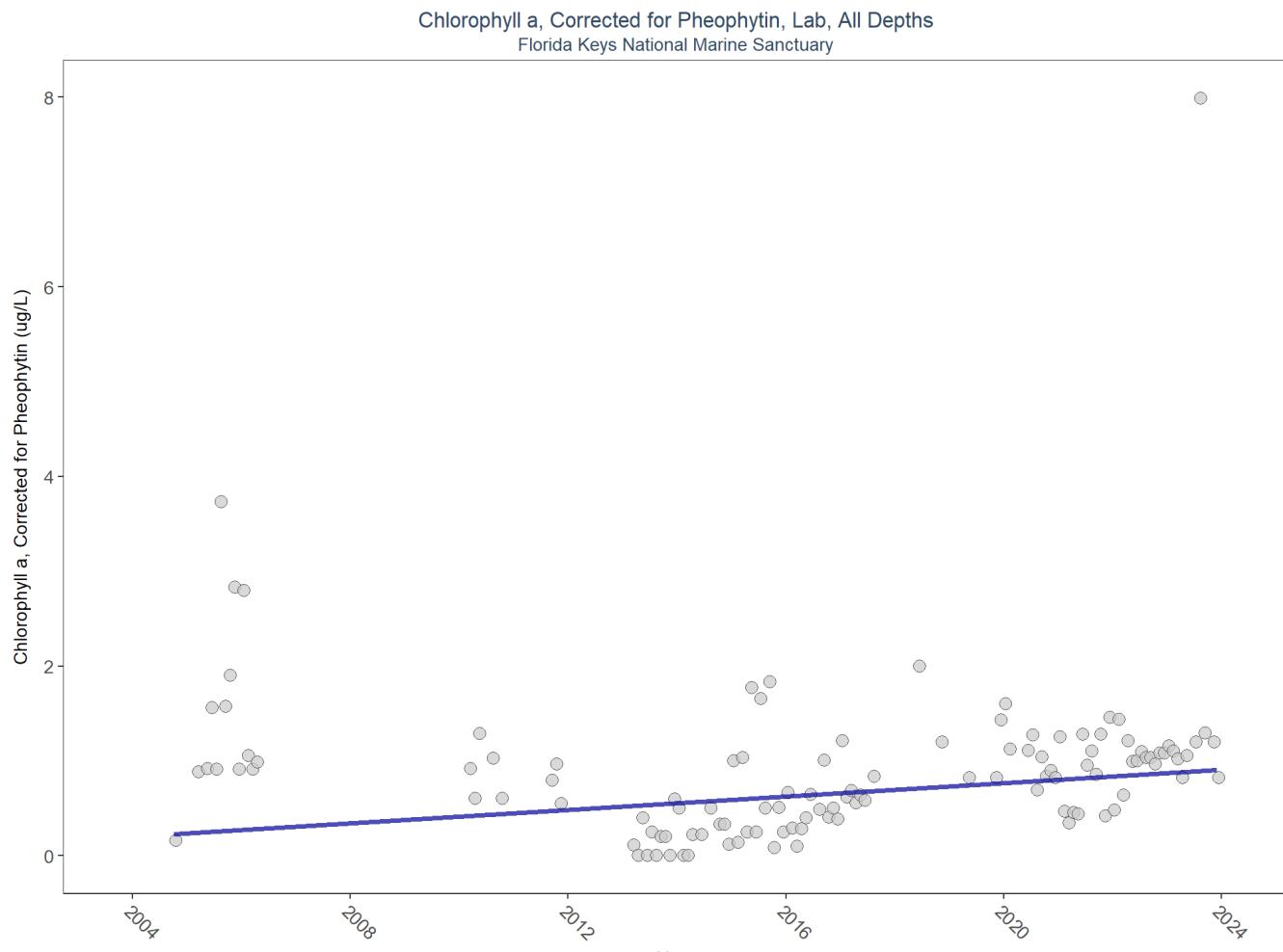
The following files were used in the discrete analysis:

- *Combined_WQ_WC_NUT_Chlorophyll_a_corrected_for_pheophytin-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Chlorophyll_a_uncorrected_for_pheophytin-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Colored_dissolved_organic_matter_CDOM-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Dissolved_Oxygen-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Dissolved_Oxygen_Saturation-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_pH-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Salinity-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Secchi_Depth-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Total_Nitrogen-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Total_Phosphorus-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Total_Suspended_Solids_TSS-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Turbidity-2024-Jul-11.txt*
- *Combined_WQ_WC_NUT_Water_Temperature-2024-Jul-11.txt*

Chlorophyll a, Corrected for Pheophytin - Discrete Water Quality

Chlorophyll-a is monitored as a measure of microalgae growing in the water. Algae are a natural part of coastal and aquatic ecosystems but in excess can cause poor water quality and clarity, and decreased levels of dissolved oxygen.

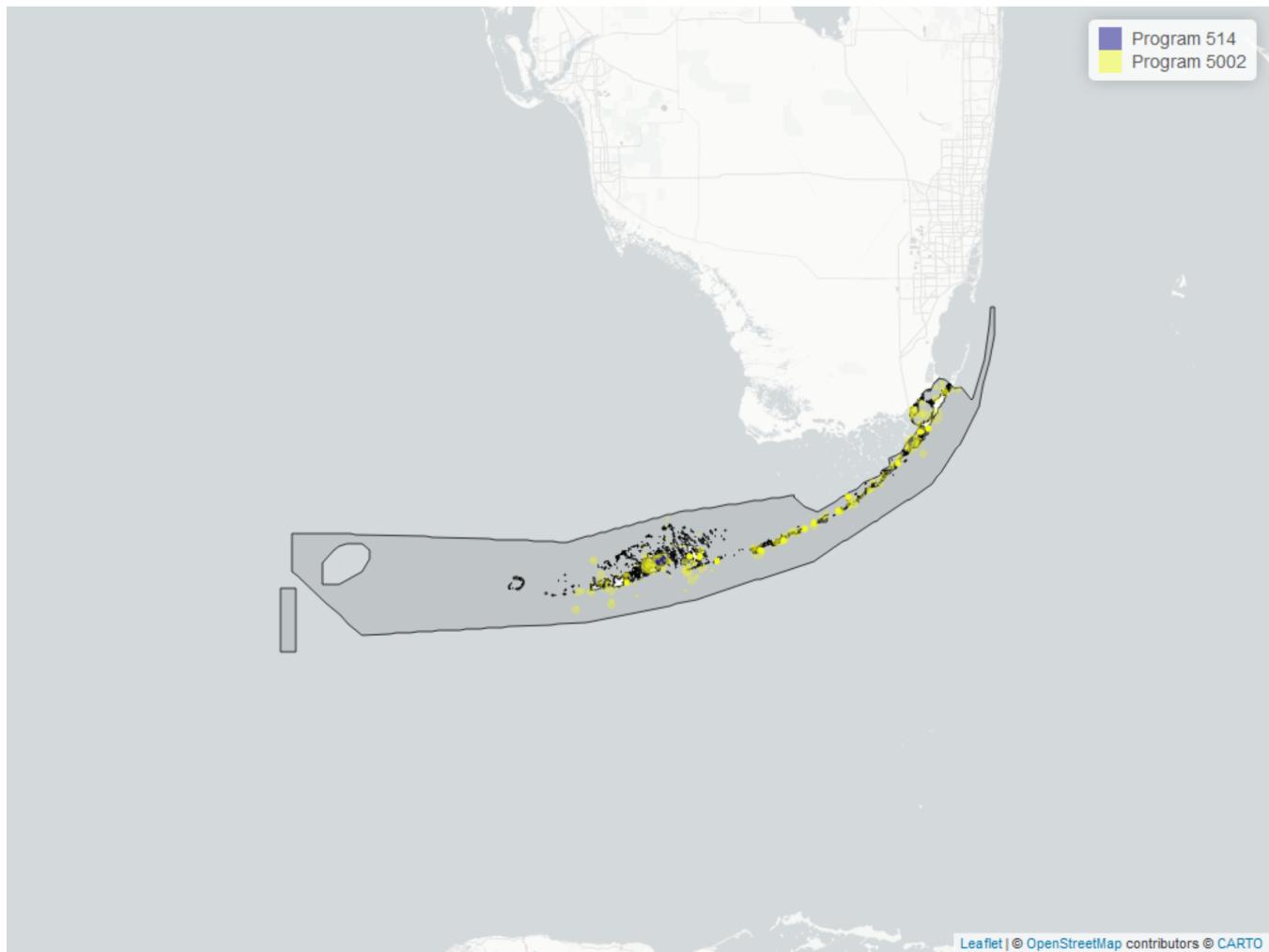
Seasonal Kendall-Tau Trend Analysis



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

SennIntercept is intercept value at beginning of record for monitoring location

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



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

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

ProgramID	N_Data	YearMin	YearMax
5002	1868	2004	2023
514	123	2020	2023

Program names:

5002 - Florida STORET / WIN

514 - Florida LAKEWATCH 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

<i>Year</i>	<i>N_Total</i>	<i>N_I</i>	<i>perc_I</i>	<i>N_Q</i>	<i>perc_Q</i>	<i>N_U</i>	<i>perc_U</i>
2004	2					2	100.0
2005	120	11	9.2	14	11.7	87	72.5
2006	62			5	8.1	61	98.4
2010	53	23	43.4	1	1.9	24	45.3
2011	21	11	52.4				
2013	67	1	1.5			54	80.6
2014	79					61	77.2
2015	110	9	8.2	7	6.4	66	60.0
2016	171	25	14.6			121	70.8
2017	89	19	21.4	2	2.2	67	75.3
2018	2	1	50.0				
2019	4	1	25.0			3	75.0
2020	544	307	56.4	7	1.3	41	7.5
2021	471	365	77.5	1	0.2	36	7.6
2022	123	30	24.4			93	75.6
2023	73	6	8.2			63	86.3

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

Programs containing Value Qualified data:

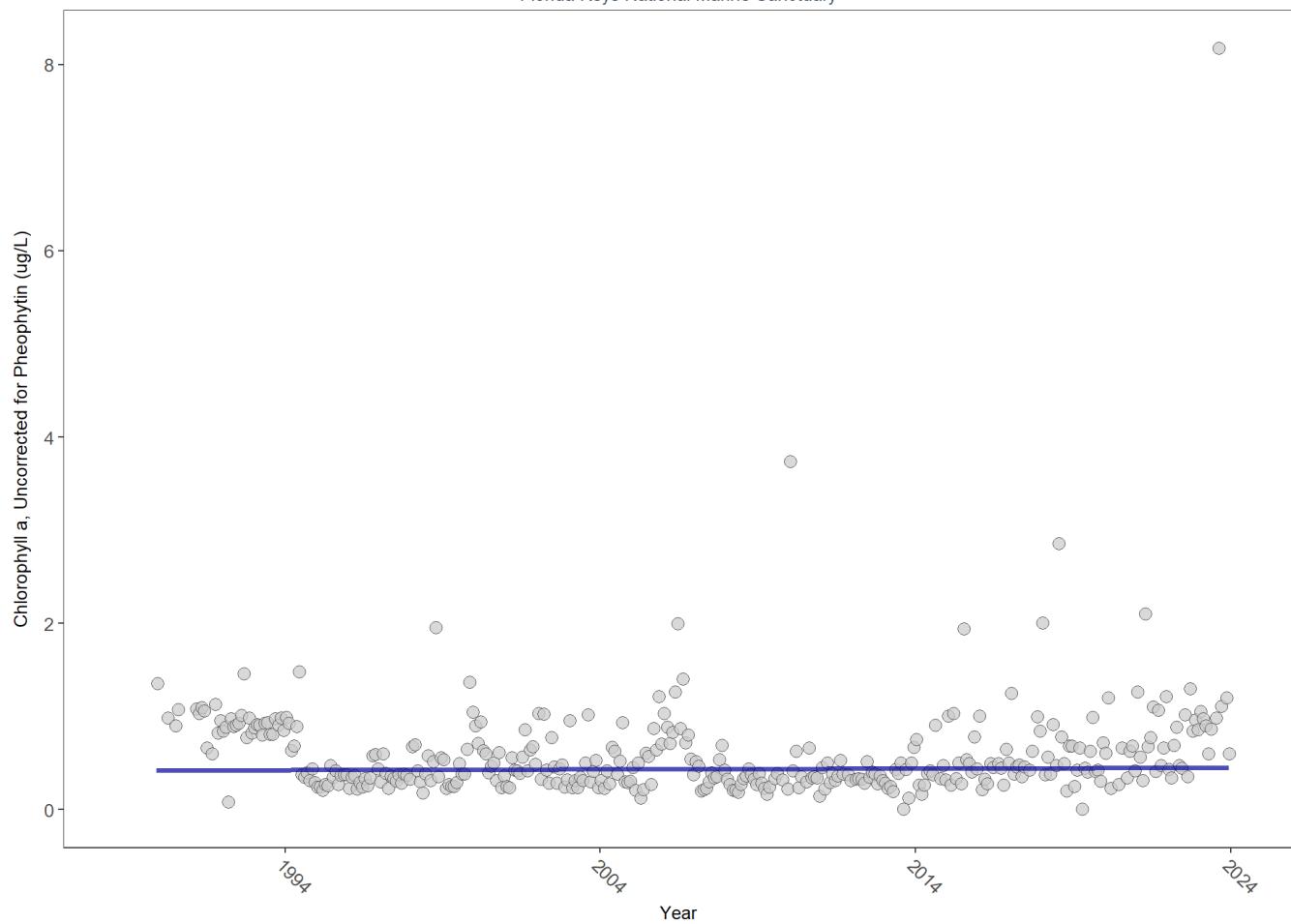
5002 - Florida STORET / WIN

514 - Florida LAKEWATCH Program

Chlorophyll a, Uncorrected for Pheophytin - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

Chlorophyll a, Uncorrected for Pheophytin, Lab, All Depths
Florida Keys National Marine Sanctuary

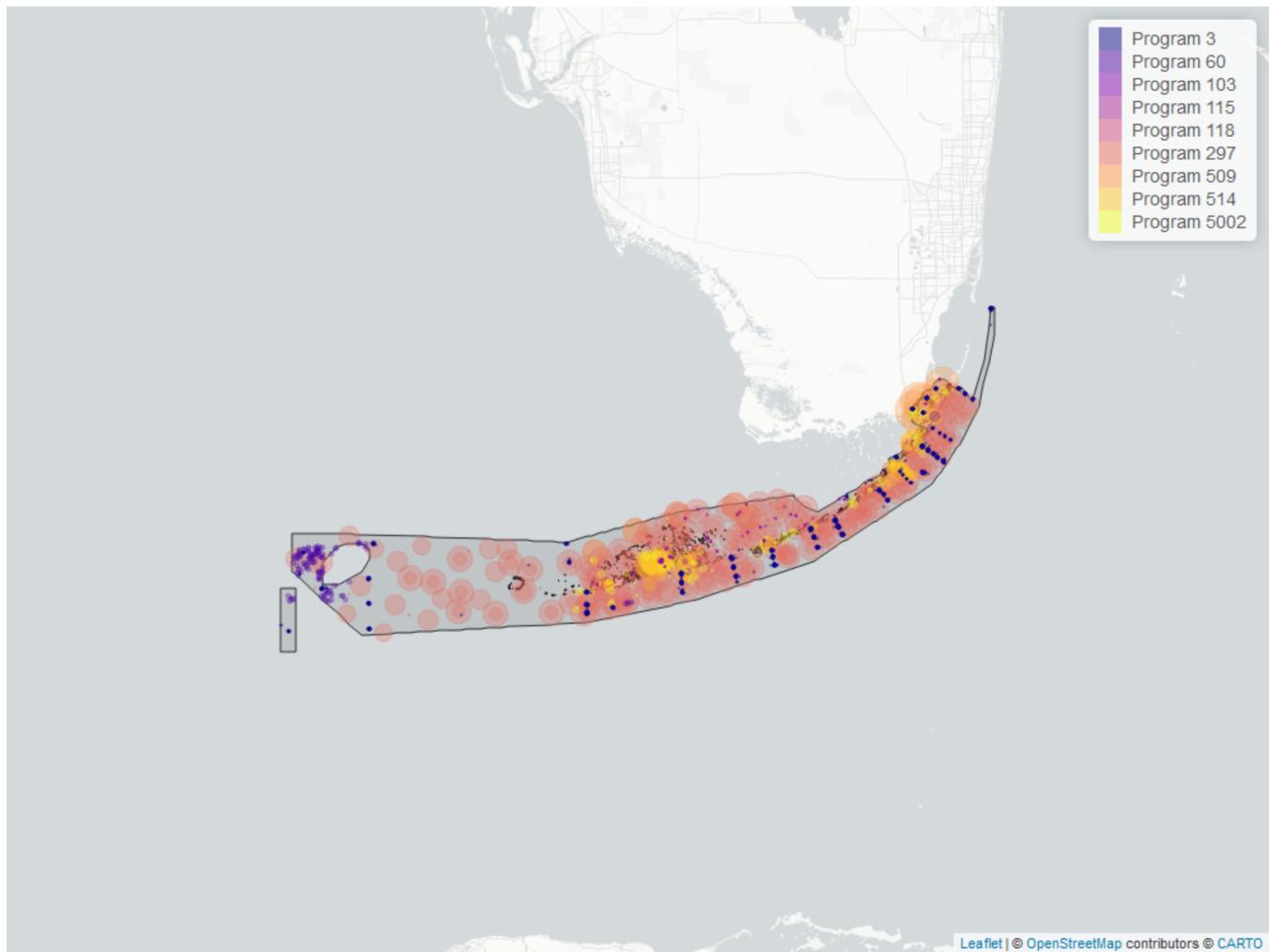


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	20642	35	0.2923	TRUE	0.0177	0.6078	0.0008053328	0.4208379	13.3089	0.2736	0

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

SennIntercept is intercept value at beginning of record for monitoring location

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



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

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

ProgramID	N_Data	YearMin	YearMax
297	15663	1995	2022
3	3701	1998	2024
514	2710	1998	2023
509	1418	1989	2008
5002	911	2001	2023
60	345	1993	2016
103	154	2000	2021
118	28	2000	2010
115	28	2000	2004

Program names:

297 - Florida Keys National Marine Sanctuary Water Quality Monitoring Project
 3 - Atlantic Oceanographic and Meteorological Laboratory (AOML) South Florida Program Synoptic Shipboard Surveys
 514 - Florida LAKEWATCH Program
 509 - SERC Water Quality Monitoring Network
 5002 - Florida STORET / WIN
 60 - Southeast Area Monitoring and Assessment Program (SEAMAP) - Gulf of Mexico Fall & Summer Shrimp/Groundfish Survey
 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
 118 - National Aquatic Resource Surveys, National Coastal Condition Assessment
 115 - Environmental Monitoring Assessment 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 9: Value Qualifiers for Chlorophyll a, Uncorrected for Pheophytin

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
2005	779			4	0.5	23	3.0
2010	724	22	3.0	1	0.1	22	3.0
2013	500					16	3.2
2014	510					16	3.1
2015	750	11	1.5			22	2.9
2016	1013	26	2.6			68	6.7
2017	969	17	1.8	4	0.4	74	7.6
2018	891					3	0.3
2019	608	3	0.5			2	0.3
2020	934	13	1.4	7	0.8	46	4.9
2021	567	28	4.9	1	0.2	40	7.0
2022	433	21	4.8	1	0.2	104	24.0
2023	73	3	4.1			63	86.3

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

Programs containing Value Qualified data:

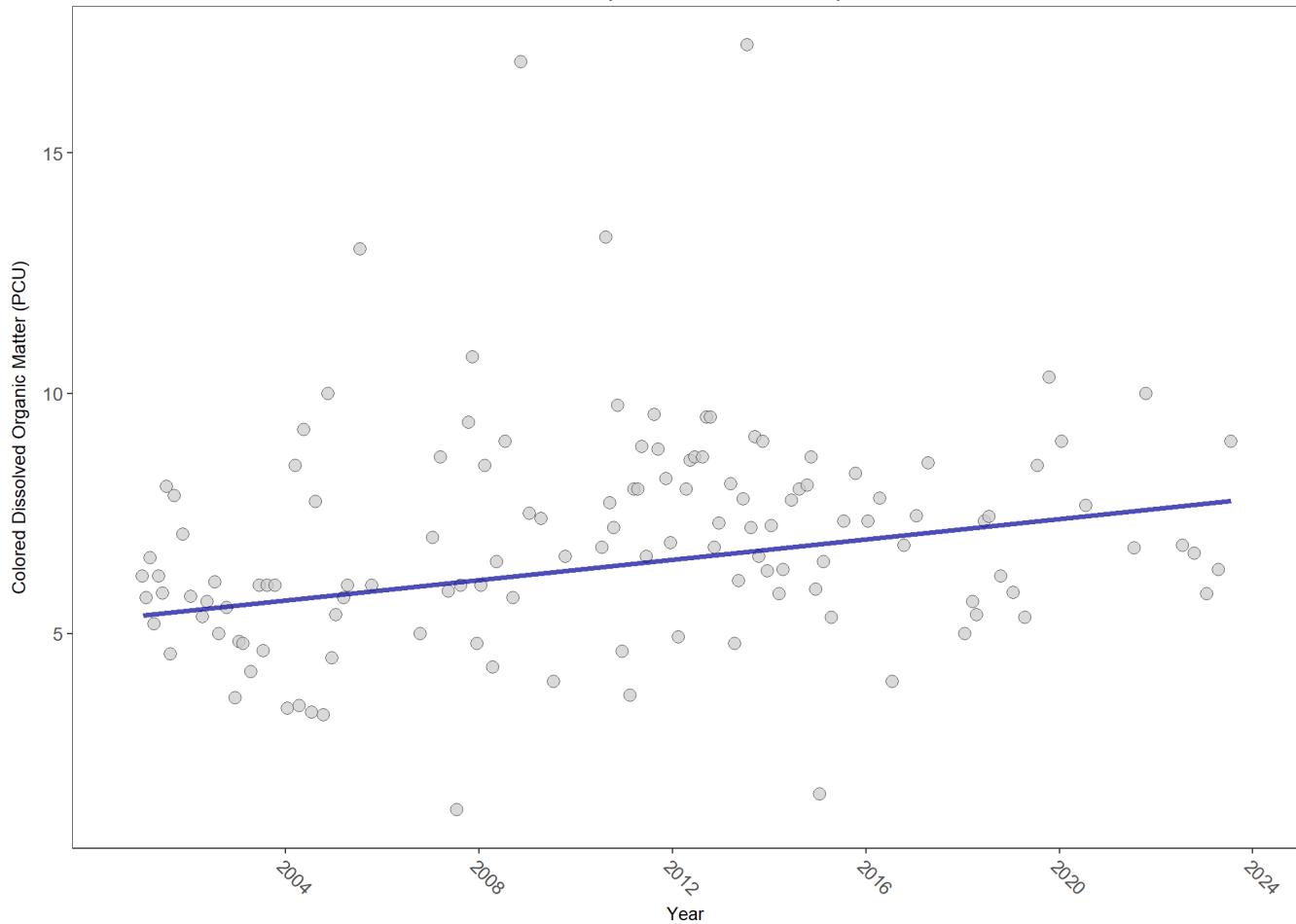
514 - Florida LAKEWATCH Program
 5002 - Florida STORET / WIN
 297 - Florida Keys National Marine Sanctuary Water Quality Monitoring Project

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
Florida Keys National Marine Sanctuary

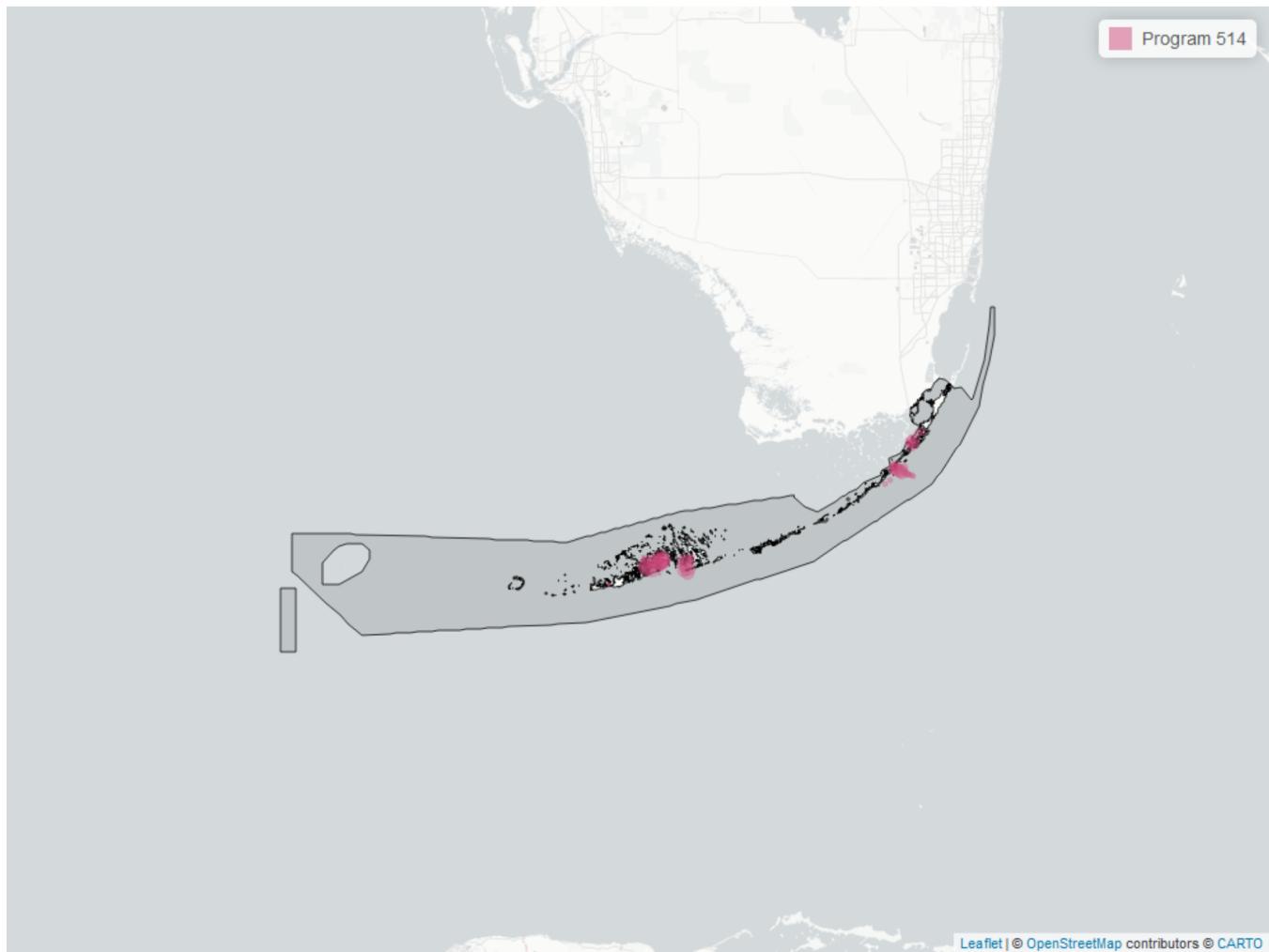


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	975	23	6	TRUE	0.2508	0.0002	0.1059524	5.378108	13.686	0.2509	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Colored Dissolved Organic Matter



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

Table 10: Programs contributing data for Colored Dissolved Organic Matter

ProgramID	N_Data	YearMin	YearMax
514	975	2001	2023

Program names:

514 - Florida LAKEWATCH Program

Value Qualifiers

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

Table 11: Value Qualifiers for Colored Dissolved Organic Matter

<i>Year</i>	<i>N_Total</i>	<i>N_Q</i>	<i>perc_Q</i>
2019	21	3	14.3
2020	9	9	100.0
2021	10	10	100.0
2022	9	9	100.0
2023	12	12	100.0

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

Programs containing Value Qualified data:

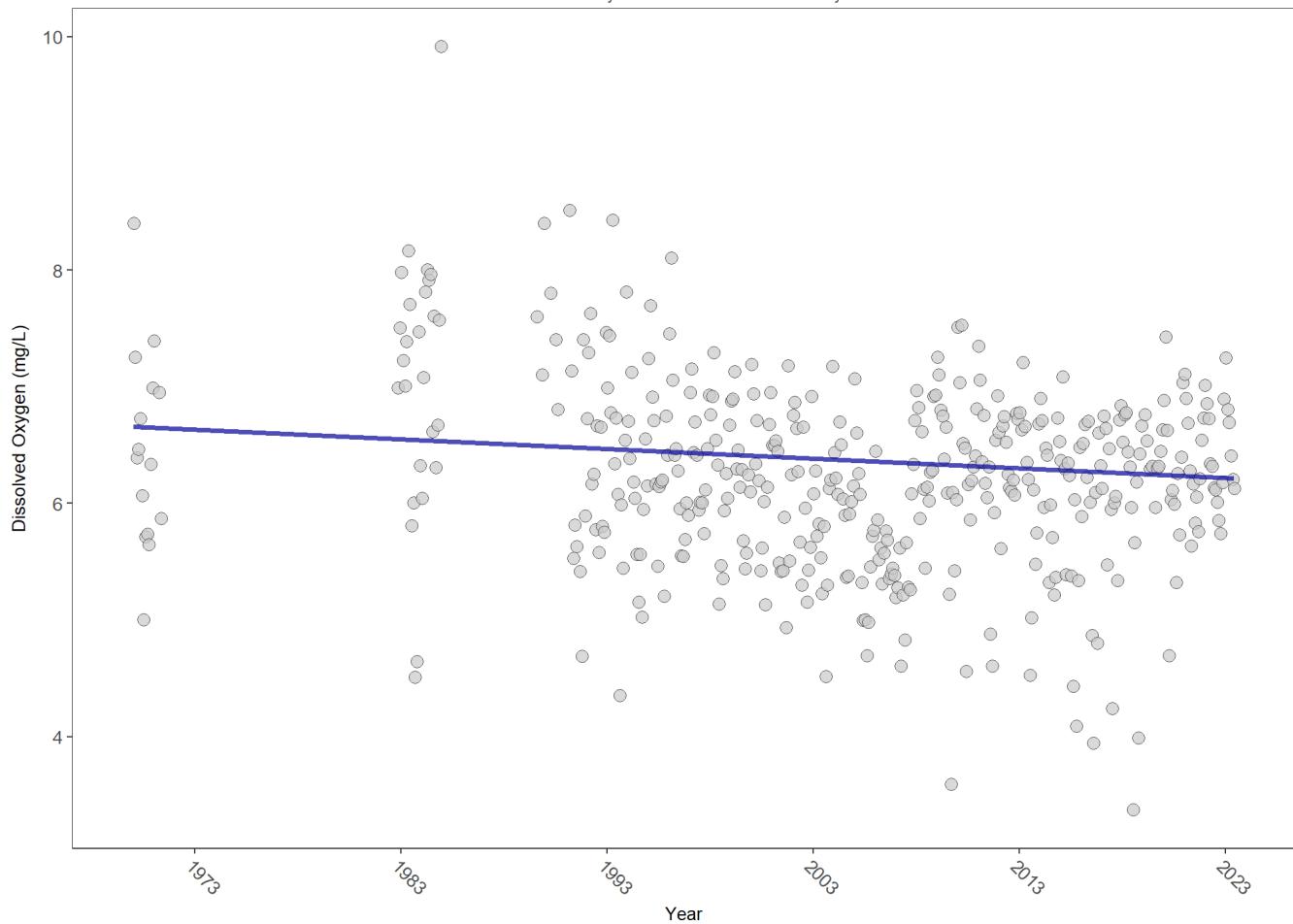
514 - Florida LAKEWATCH Program

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
Florida Keys National Marine Sanctuary

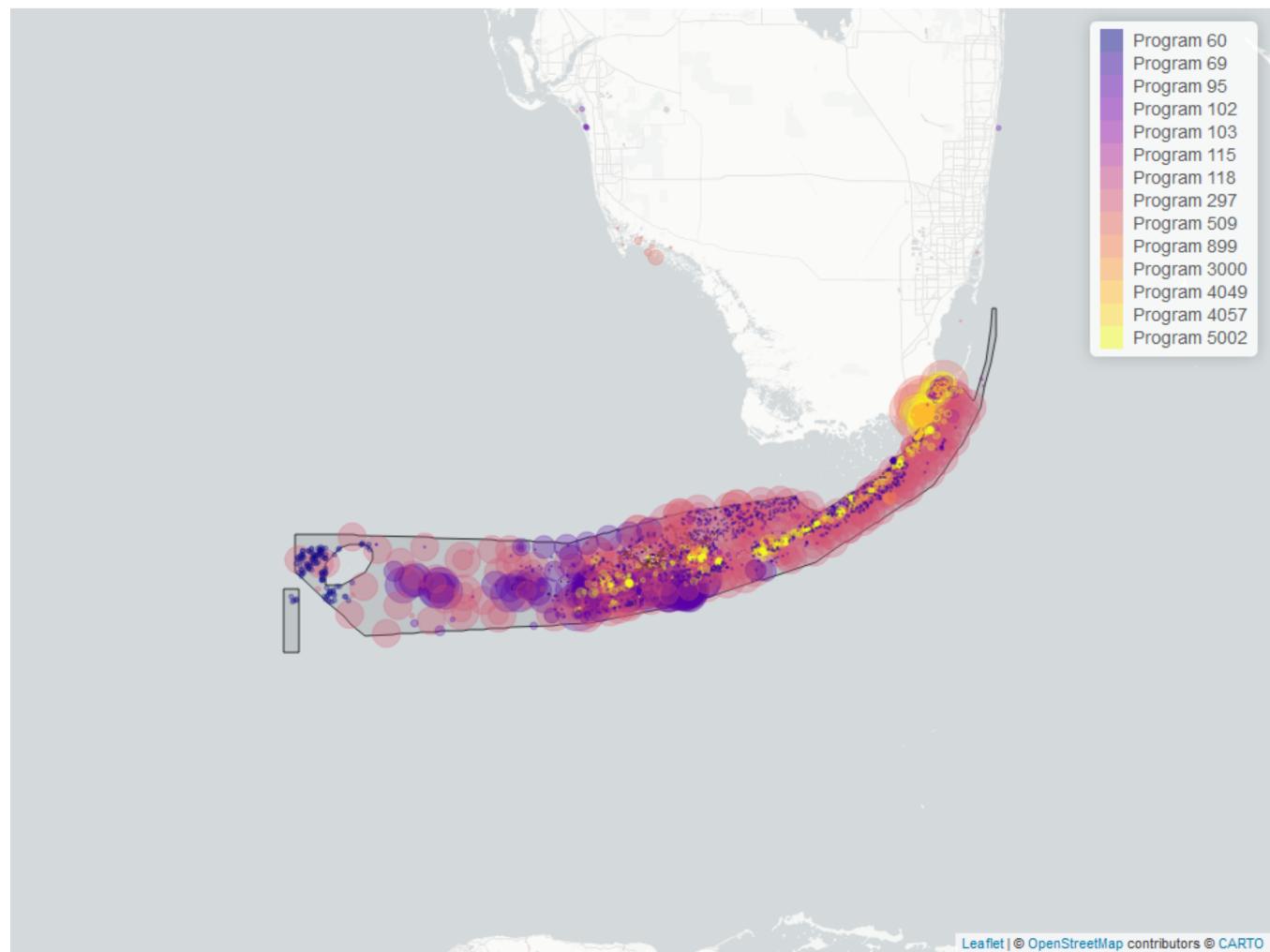


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	44881	40	6.282	TRUE	-0.1203	0.0003	-0.008310636	6.656575	11.232	0.424	-1

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
297	31753	1995	2022
5002	4504	2003	2023
509	2702	1989	2008
69	1743	1997	2022
95	1560	1994	2018
4049	1024	2006	2023
103	601	1970	2021
3000	377	2015	2018
60	372	1993	2016
899	93	2014	2015
115	89	2000	2004
4057	59	2015	2018

<i>ProgramID</i>	<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>
102	42	1996	2000
118	17	2000	2006

Program names:

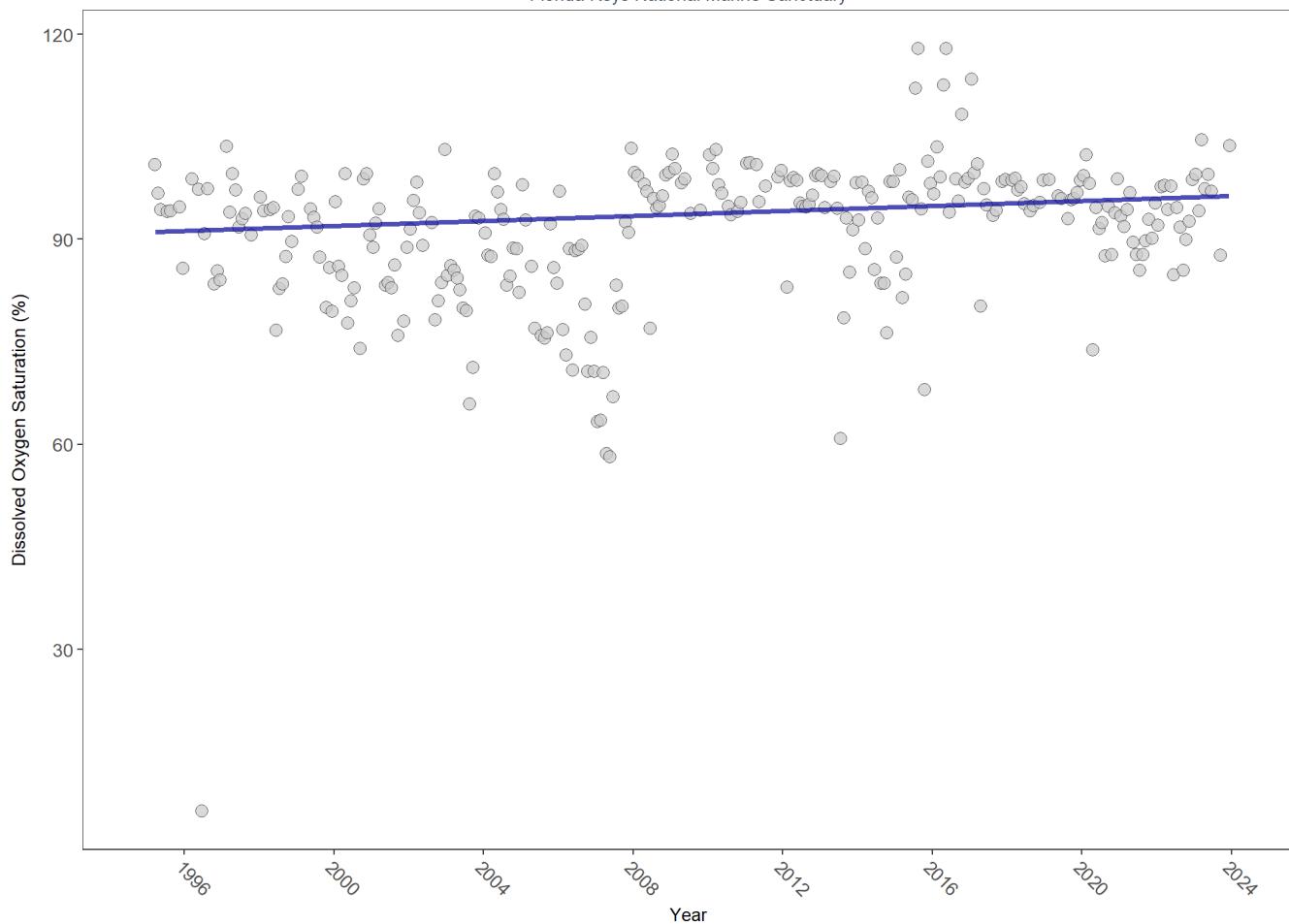
- 297 - Florida Keys National Marine Sanctuary Water Quality Monitoring Project
- 5002 - Florida STORET / WIN
- 509 - SERC Water Quality Monitoring Network
- 69 - Fisheries-Independent Monitoring (FIM) Program
- 95 - Harmful Algal Bloom Marine Observation Network
- 4049 - The South Florida Fisheries Habitat Assessment Program (FHAP)
- 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
- 3000 - Florida Keys Water Watch
- 60 - Southeast Area Monitoring and Assessment Program (SEAMAP) - Gulf of Mexico Fall & Summer Shrimp/Groundfish Survey
- 899 - USGS Coral Reef Ecosystem Studies (CREST) Project
- 115 - Environmental Monitoring Assessment Program
- 4057 - Biscayne Bay Water Watch
- 102 - National Status and Trends Mussel Watch
- 118 - National Aquatic Resource Surveys, National Coastal Condition Assessment

There are no qualifying Value Qualifiers for Dissolved Oxygen in Florida Keys National Marine Sanctuary

Dissolved Oxygen Saturation - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

Dissolved Oxygen Saturation, Field, All Depths
Florida Keys National Marine Sanctuary

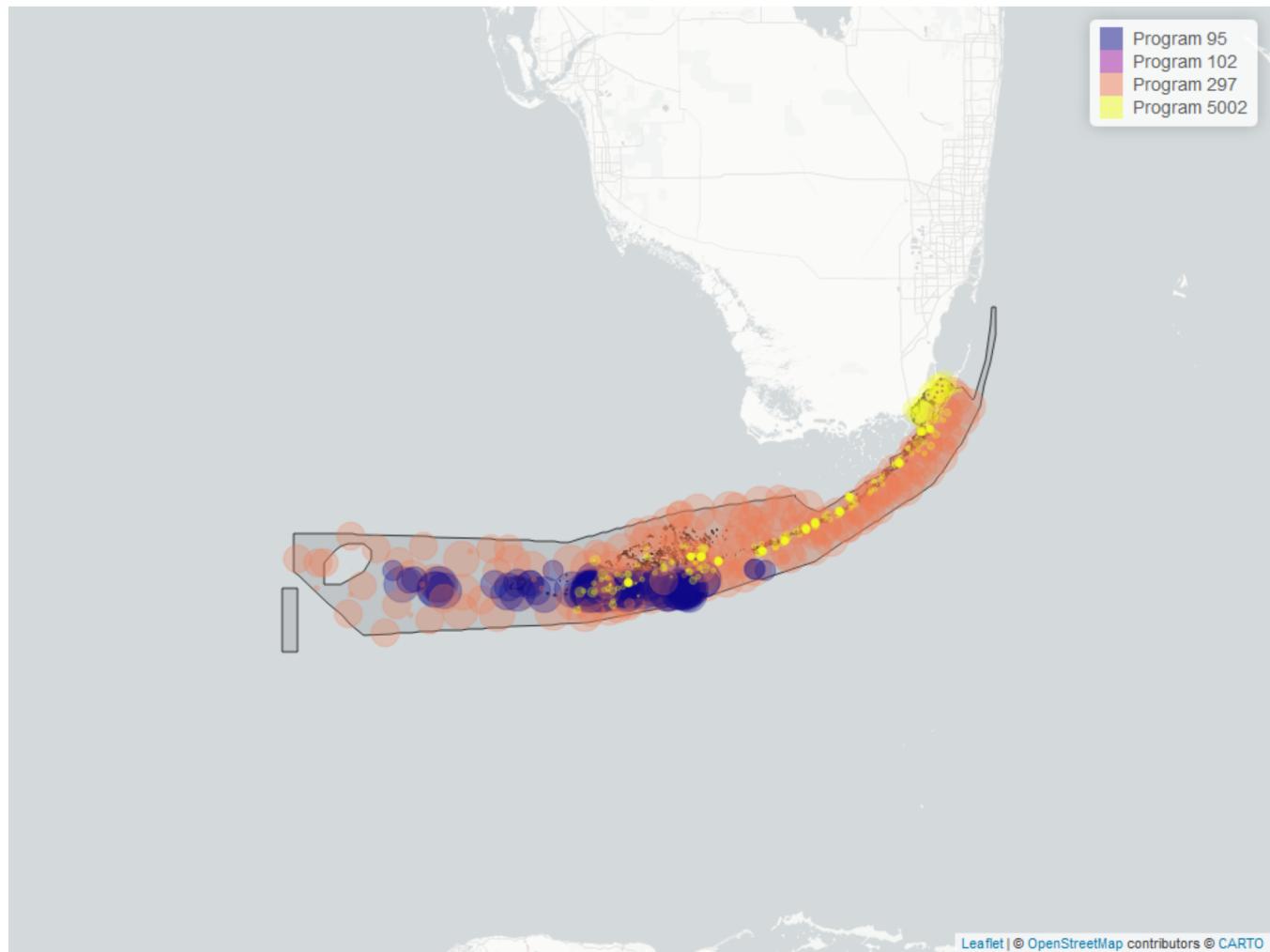


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	28622	29	94.7469	TRUE	0.1842	0.0000	0.1810544	91.07329	9.7199	0.5557	1

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 Saturation



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

Table 13: Programs contributing data for Dissolved Oxygen Saturation

ProgramID	N_Data	YearMin	YearMax
297	25419	1995	2020
5002	3223	2009	2023
102	18	1996	1996
95	1	2017	2017

Program names:

297 - Florida Keys National Marine Sanctuary Water Quality Monitoring Project

5002 - Florida STORET / WIN

102 - National Status and Trends Mussel Watch

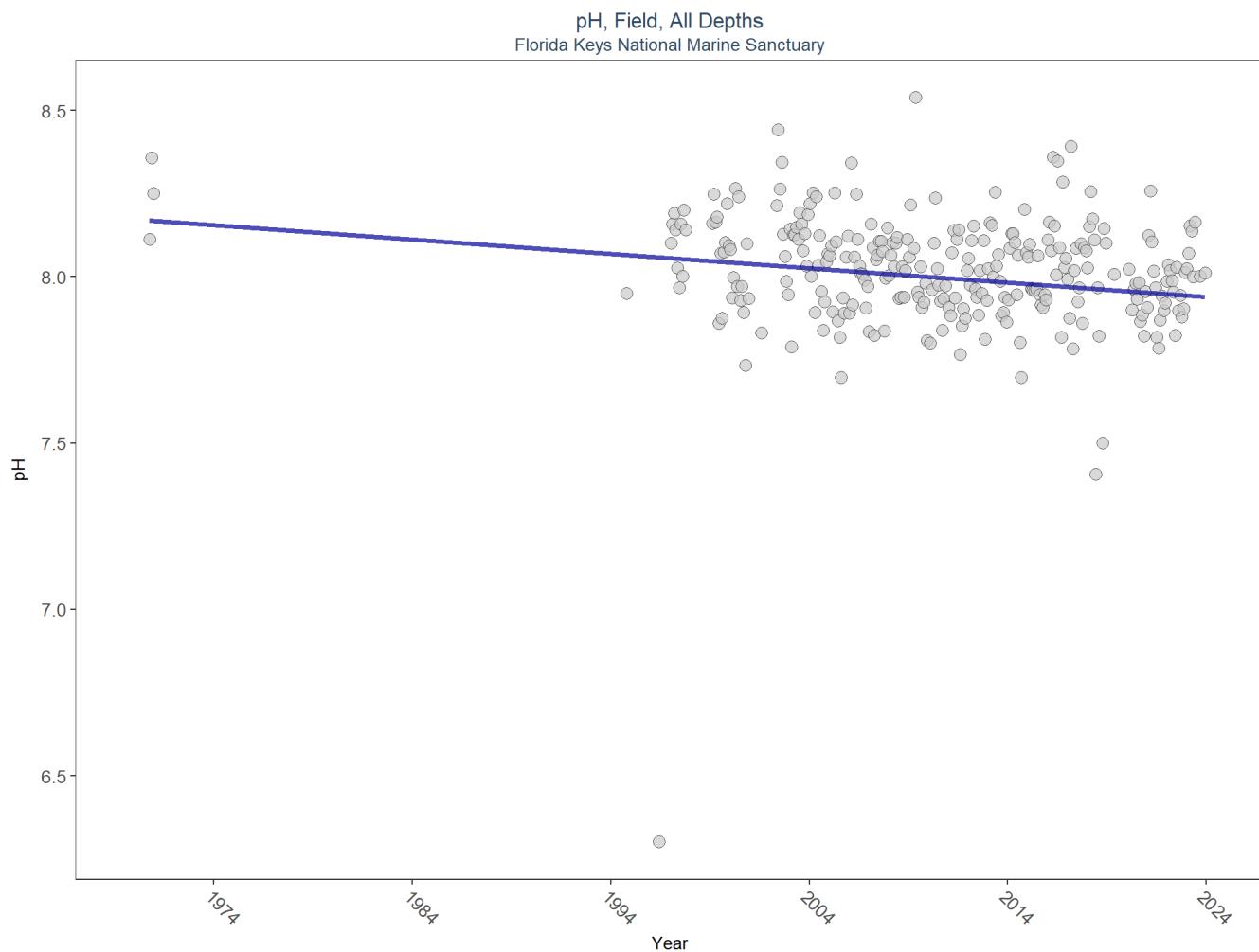
95 - Harmful Algal Bloom Marine Observation Network

There are no qualifying Value Qualifiers for Dissolved Oxygen Saturation in Florida Keys National Marine Sanctuary

pH - Discrete Water Quality

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

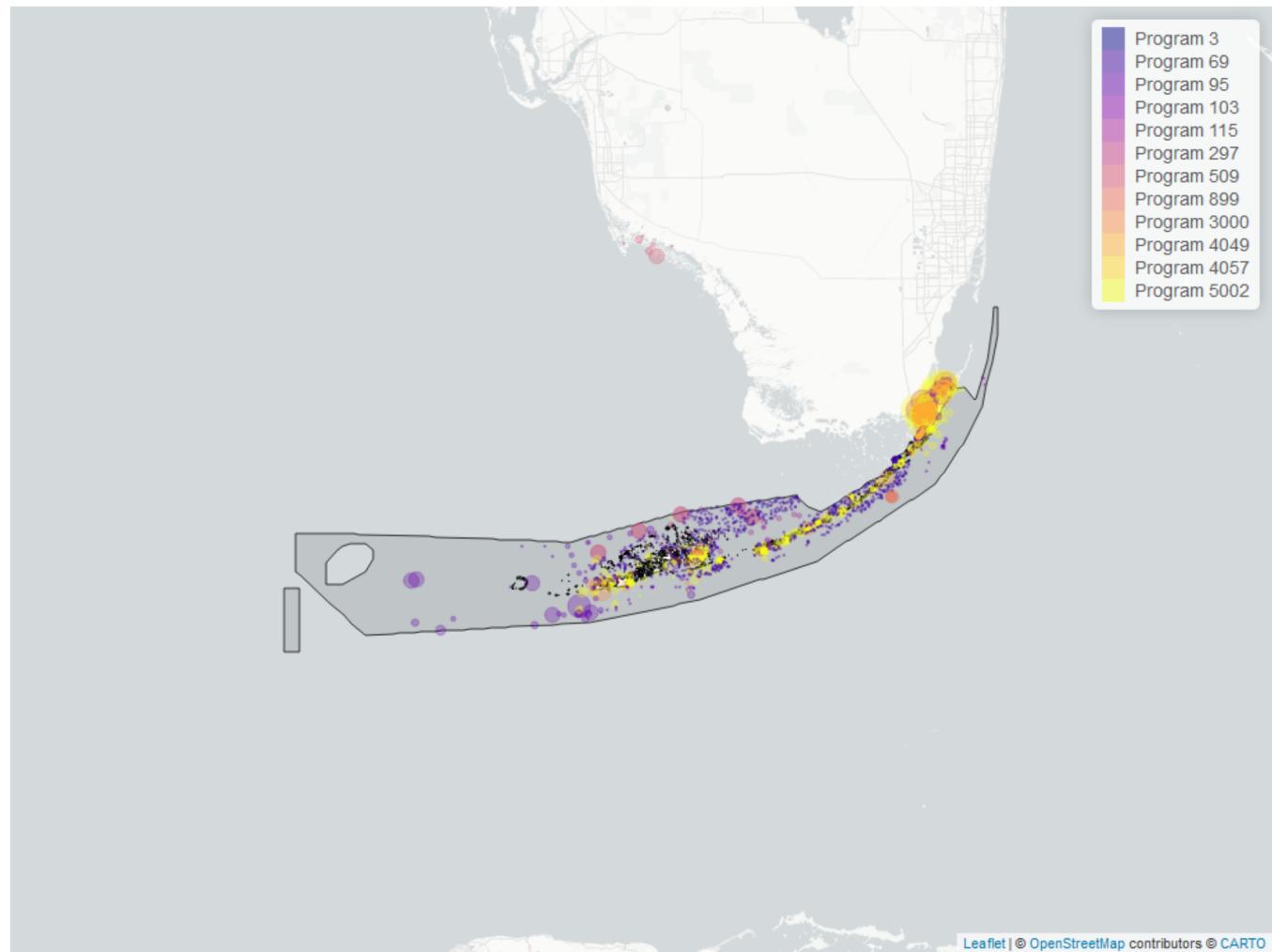
Seasonal Kendall-Tau Trend Analysis



p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for pH



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

Table 14: Programs contributing data for pH

ProgramID	N_Data	YearMin	YearMax
5002	4611	2003	2023
69	1733	1997	2022
4049	1103	2005	2023
509	545	2002	2008
3000	377	2015	2018
95	142	1994	2018
297	114	2003	2011
115	89	2000	2004
899	88	2014	2015
103	86	1970	2021
4057	59	2015	2018
3	21	2009	2012

Program names:

5002 - Florida STORET / WIN
69 - Fisheries-Independent Monitoring (FIM) Program
4049 - The South Florida Fisheries Habitat Assessment Program (FHAP)
509 - SERC Water Quality Monitoring Network
3000 - Florida Keys Water Watch
95 - Harmful Algal Bloom Marine Observation Network
297 - Florida Keys National Marine Sanctuary Water Quality Monitoring Project
115 - Environmental Monitoring Assessment Program
899 - USGS Coral Reef Ecosystem Studies (CREST) Project
103 - EPA STOrage and RETrieval Data Warehouse (STORET)
4057 - Biscayne Bay Water Watch
3 - Atlantic Oceanographic and Meteorological Laboratory (AOML) South Florida Program Synoptic Shipboard Surveys

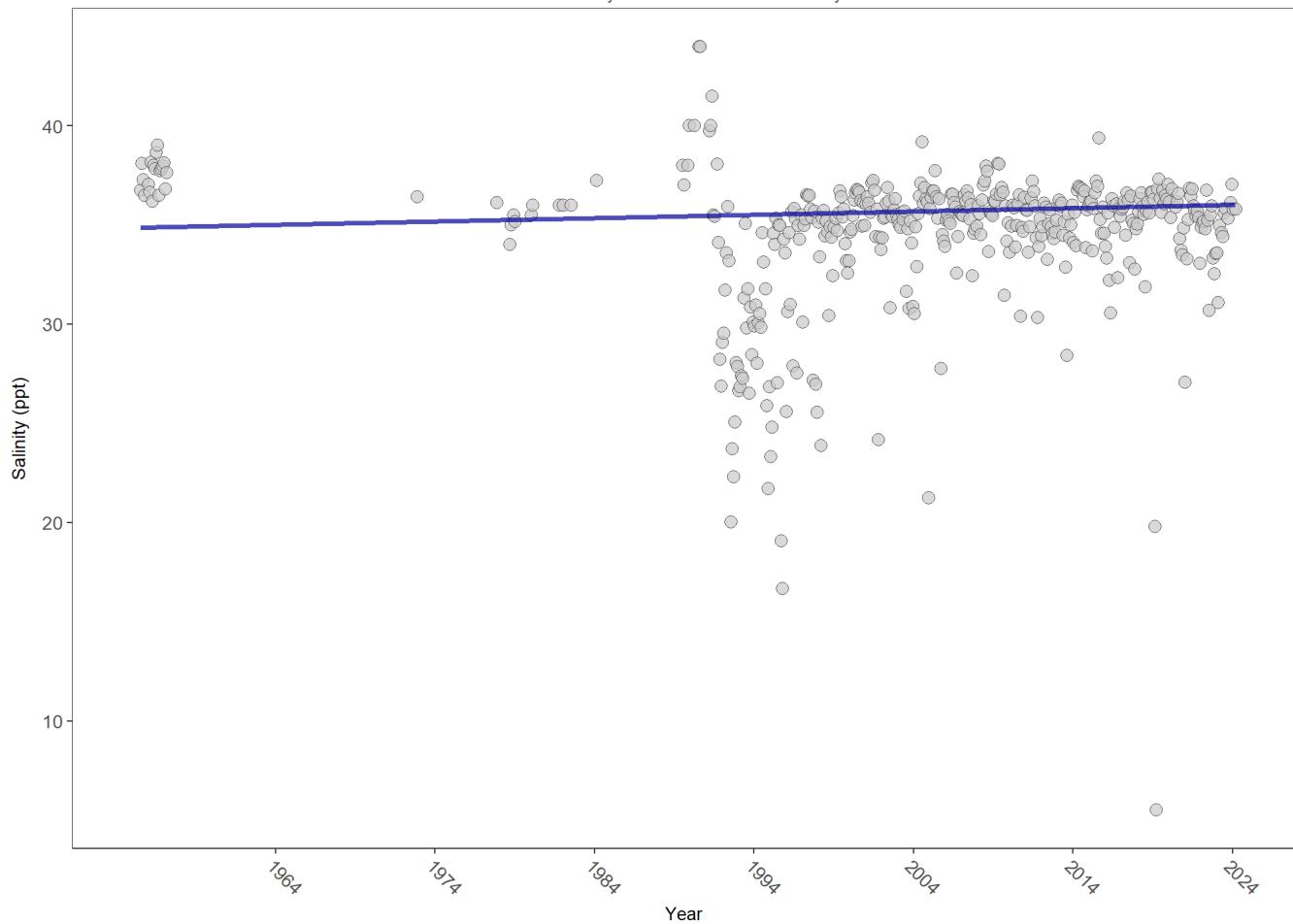
There are no qualifying Value Qualifiers for pH in Florida Keys National Marine Sanctuary

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

Salinity, Lab and Field Combined, All Depths
Florida Keys National Marine Sanctuary

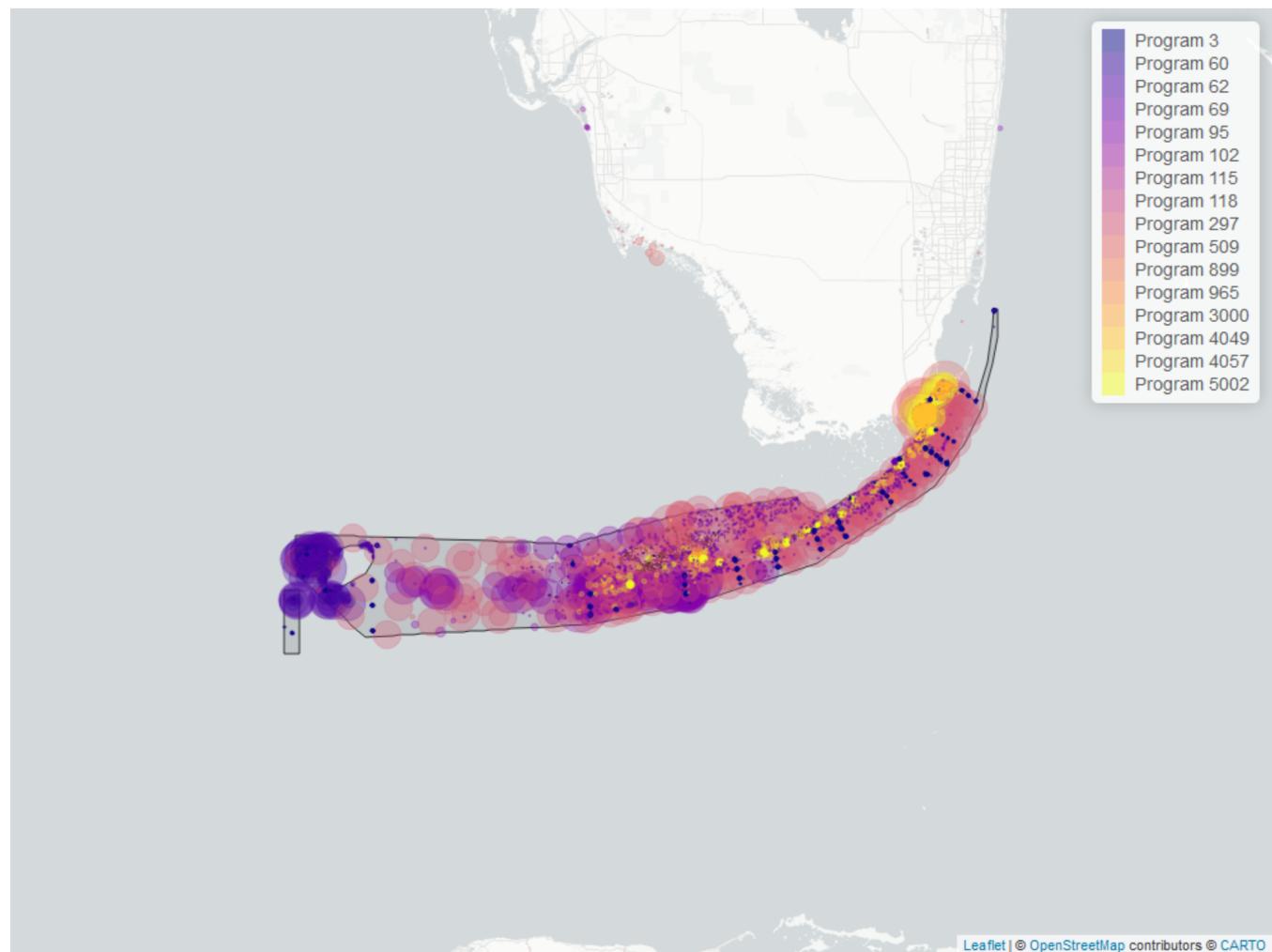


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	53301	47	36.1977	TRUE	0.0678	0.0462	0.01663394	34.87415	6.7087	0.8222	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Salinity



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

Table 15: Programs contributing data for Salinity

ProgramID	N_Data	YearMin	YearMax
297	31389	1995	2022
5002	4602	2003	2023
3	4157	1998	2024
509	2619	1989	2008
965	2317	2005	2011
95	1889	1955	2018
69	1741	1997	2022
60	1524	1993	2016
4049	1168	2005	2023
62	1142	1993	2019
3000	379	2015	2018
118	109	2015	2021

<i>ProgramID</i>	<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>
115	89	2000	2004
899	82	2014	2015
102	60	1996	2000
4057	59	2015	2018

Program names:

297 - Florida Keys National Marine Sanctuary Water Quality Monitoring Project

5002 - Florida STORET / WIN

3 - Atlantic Oceanographic and Meteorological Laboratory (AOML) South Florida Program Synoptic Shipboard Surveys

509 - SERC Water Quality Monitoring Network

965 - South Florida Seagrass Fish and Invertebrate Assessment Network

95 - Harmful Algal Bloom Marine Observation Network

69 - Fisheries-Independent Monitoring (FIM) Program

60 - Southeast Area Monitoring and Assessment Program (SEAMAP) - Gulf of Mexico Fall & Summer Shrimp/Groundfish Survey

4049 - The South Florida Fisheries Habitat Assessment Program (FHAP)

62 - Southeast Area Monitoring and Assessment Program (SEAMAP) - Gulf of Mexico Reef Fish Survey

3000 - Florida Keys Water Watch

118 - National Aquatic Resource Surveys, National Coastal Condition Assessment

115 - Environmental Monitoring Assessment Program

899 - USGS Coral Reef Ecosystem Studies (CREST) Project

102 - National Status and Trends Mussel Watch

4057 - Biscayne Bay Water Watch

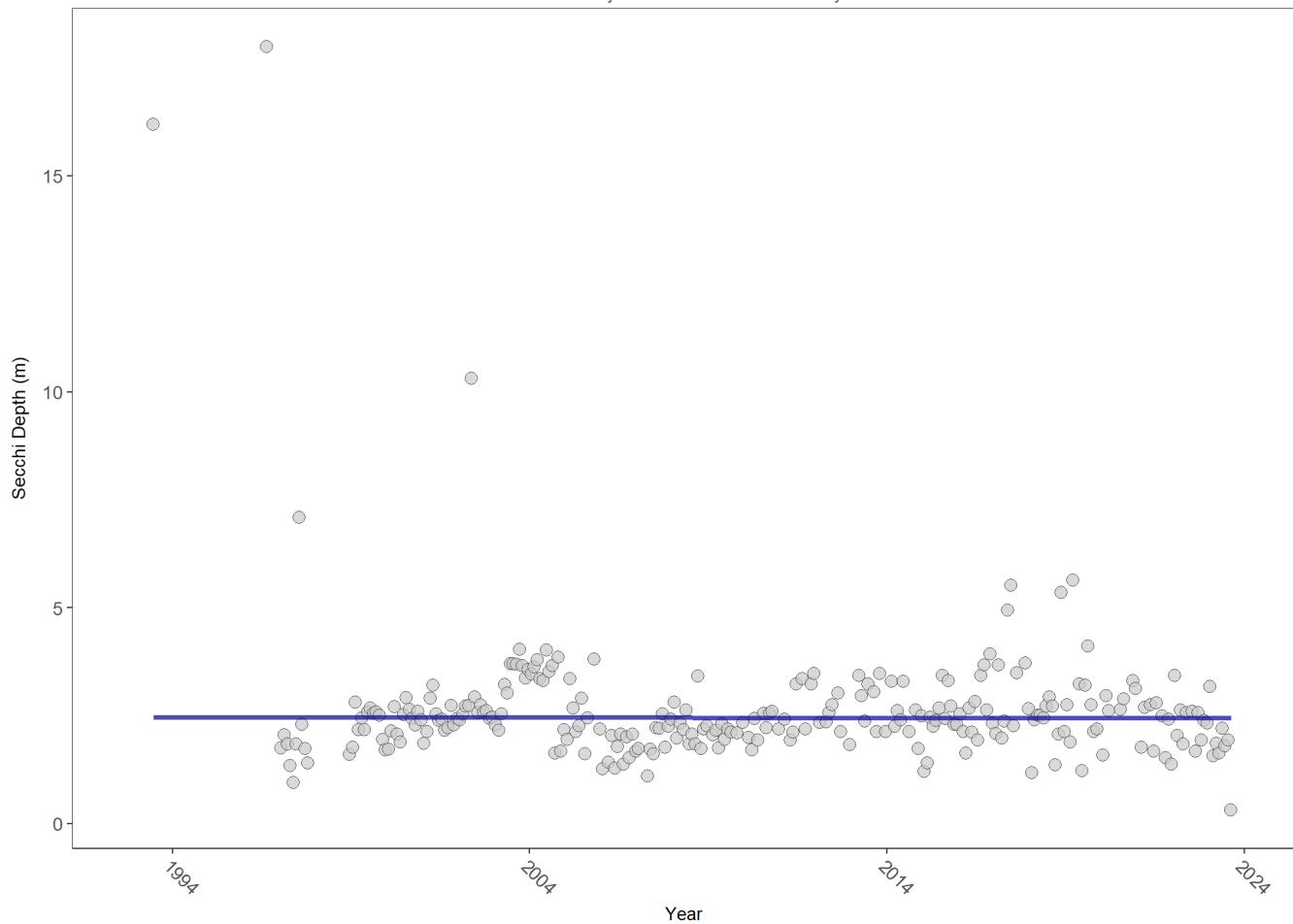
There are no qualifying Value Qualifiers for Salinity in Florida Keys National Marine Sanctuary

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

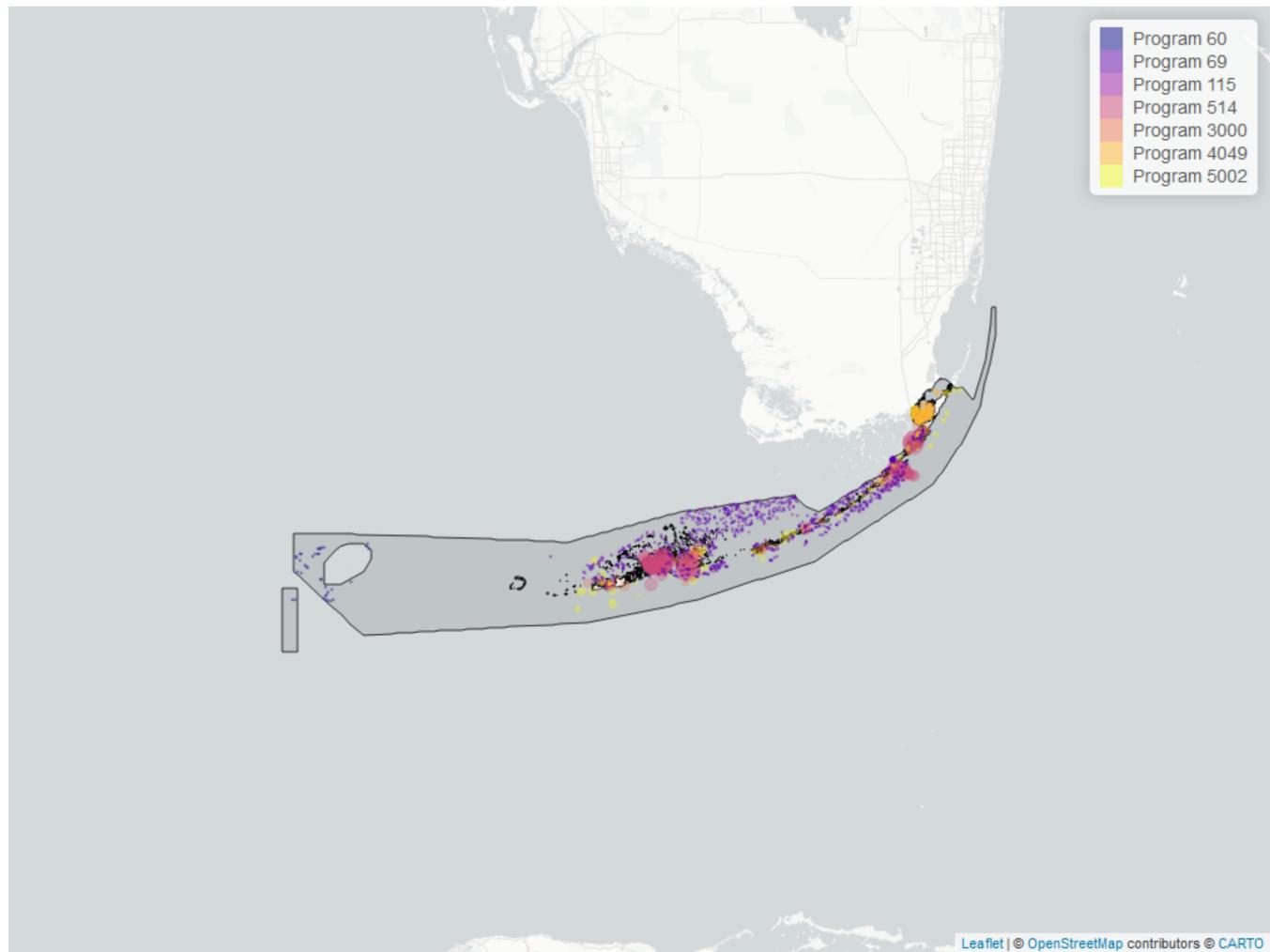
Secchi Depth, Field, Surface
Florida Keys National Marine Sanctuary



p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Secchi Depth



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

Table 16: Programs contributing data for Secchi Depth

ProgramID	N_Data	YearMin	YearMax
514	2378	1998	2023
69	1750	1997	2022
3000	373	2015	2018
5002	340	2005	2022
4049	252	2005	2023
60	37	1993	2002
115	21	2000	2004

Program names:

514 - Florida LAKEWATCH Program

69 - Fisheries-Independent Monitoring (FIM) Program

3000 - Florida Keys Water Watch

5002 - Florida STORET / WIN

4049 - The South Florida Fisheries Habitat Assessment Program (FHAP)

60 - Southeast Area Monitoring and Assessment Program (SEAMAP) - Gulf of Mexico Fall & Summer Shrimp/Groundfish Survey

115 - Environmental Monitoring Assessment Program

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 17: Value Qualifiers for Secchi Depth

Year	N_{Total}	N_{S}	perc_{S}
2015	210	27	12.9
2016	341	66	19.4
2017	214	73	34.1
2019	39	6	15.4
2020	43	18	41.9
2021	47	26	55.3
2022	97	48	49.5
2023	52	19	36.5

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

Programs containing Value Qualified data:

5002 - Florida STORET / WIN

514 - Florida LAKEWATCH 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) $\text{TN} = \text{TKN} + \text{NO}_3\text{O}_2;$
- 2) $\text{TN} = \text{TKN} + \text{NO}_3 + \text{NO}_2;$
- 3) $\text{TN} = \text{ORG}_N + \text{NH}_4 + \text{NO}_3\text{O}_2;$
- 4) $\text{TN} = \text{ORG}_N + \text{NH}_4 + \text{NO}_2 + \text{NO}_3;$
- 5) $\text{TN} = \text{TKN} + \text{NO}_3;$
- 6) $\text{TN} = \text{ORG}_N + \text{NH}_4 + \text{NO}_3;$

Additional Information:

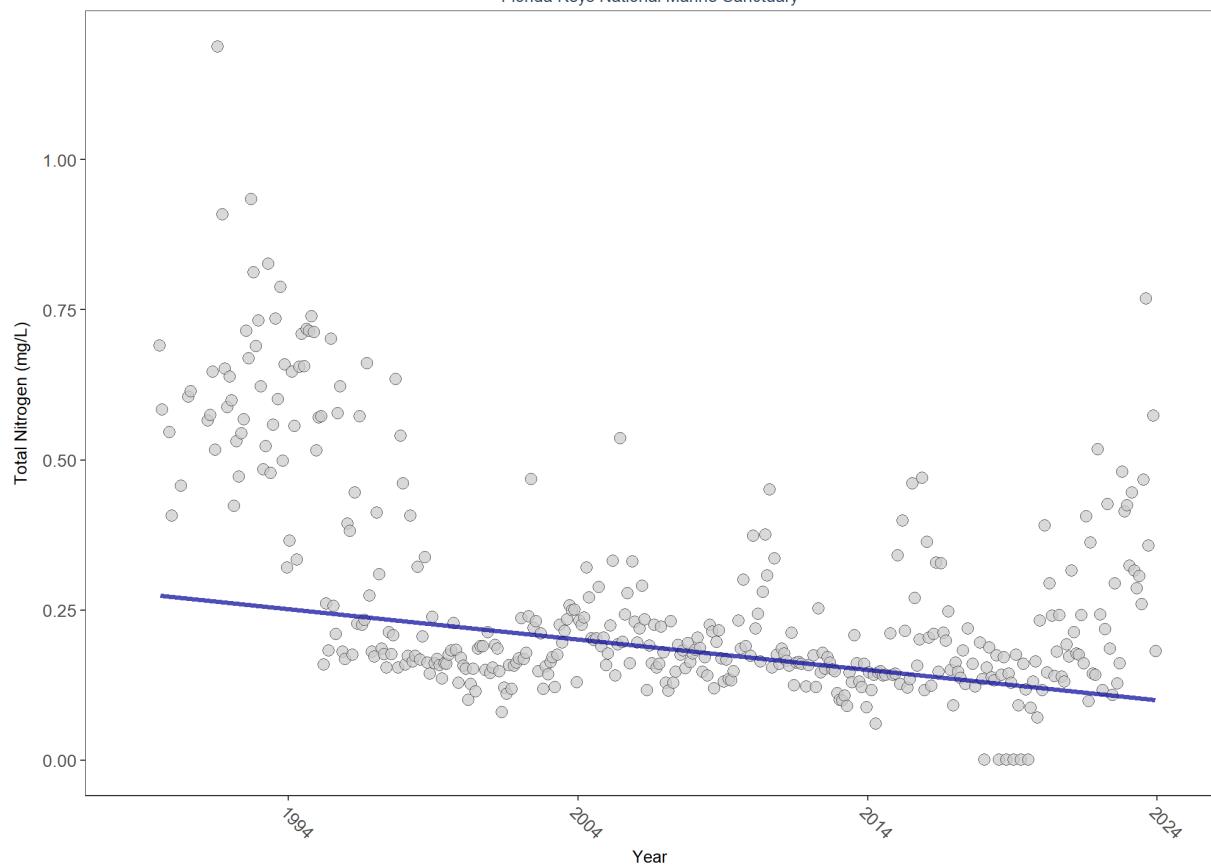
- Rules for use of sample fraction:
 - FDEP report that if both “Total” and “Dissolved” are reported, only “Total” is used. If the total is not reported, they do use dissolved as a best available replacement.
 - An analysis of all SEACAR data shows that 90% of all possible TN calculations can be done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

fraction, or when both are dissolved sample fraction. This is important, because then the calculated TN value is not based on components with mixed sample fractions.

- Values inserted into data:
 - ParameterName = “Total Nitrogen”
 - SEACAR_QAQCFlagCode = “1Q”
 - SEACAR_QAQC_Description = “SEACAR Calculated”

Seasonal Kendall-Tau Trend Analysis

Total Nitrogen, Lab, All Depths
Florida Keys National Marine Sanctuary

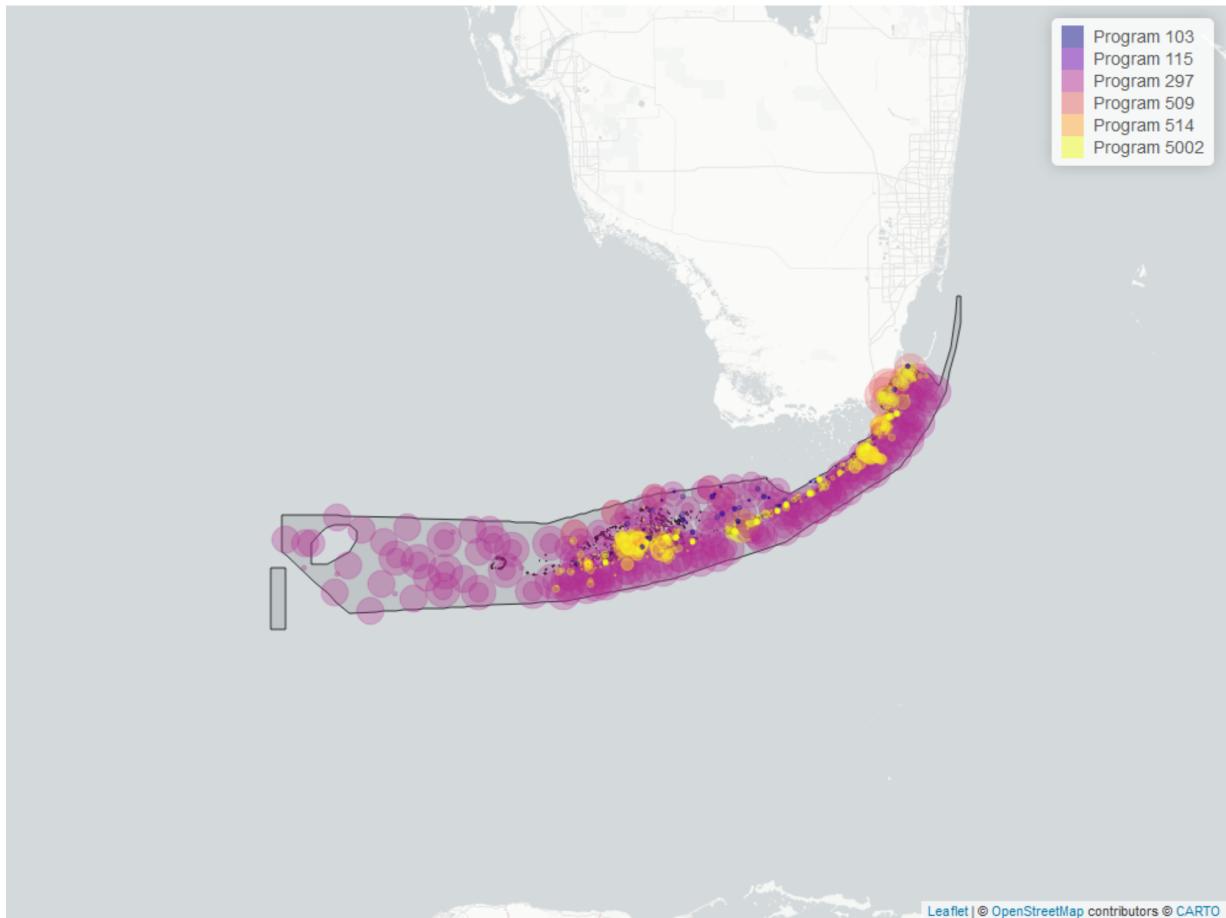


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	33673	35	0.1461656	TRUE	-0.3039	0.0000	-0.005051995	0.2770894	3.6649	0.9787	-1

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

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Total Nitrogen



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

Table 18: Programs contributing data for Total Nitrogen

ProgramID	N_Data	YearMin	YearMax
297	25484	1995	2022
5002	4601	1998	2023
514	2764	1998	2023
509	1424	1989	2008
103	149	2000	2006
115	28	2000	2004

Program names:

297 - Florida Keys National Marine Sanctuary Water Quality Monitoring Project

5002 - Florida STORET / WIN

514 - Florida LAKEWATCH Program

509 - SERC Water Quality Monitoring Network

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

115 - Environmental Monitoring Assessment 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 19: Value Qualifiers for Total Nitrogen

Year	N_{Total}	N_I	perc_I	N_Q	perc_Q	N_U	perc_U
2005	1457	26	1.8				
2006	1443	113	7.8			1	0.1
2014	832			14	1.7		
2015	1225	320	26.1	7	0.6	6	0.5
2016	1628	617	37.9	36	2.2	4	0.2
2017	1486	644	43.3	60	4.0		
2018	1419	601	42.4	31	2.2		
2019	1148	479	41.7	24	2.1	39	3.4
2020	2065	701	34.0	61	3.0	18	0.9
2021	1214	498	41.0			125	10.3
2022	708	388	54.8	10	1.4	104	14.7

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:

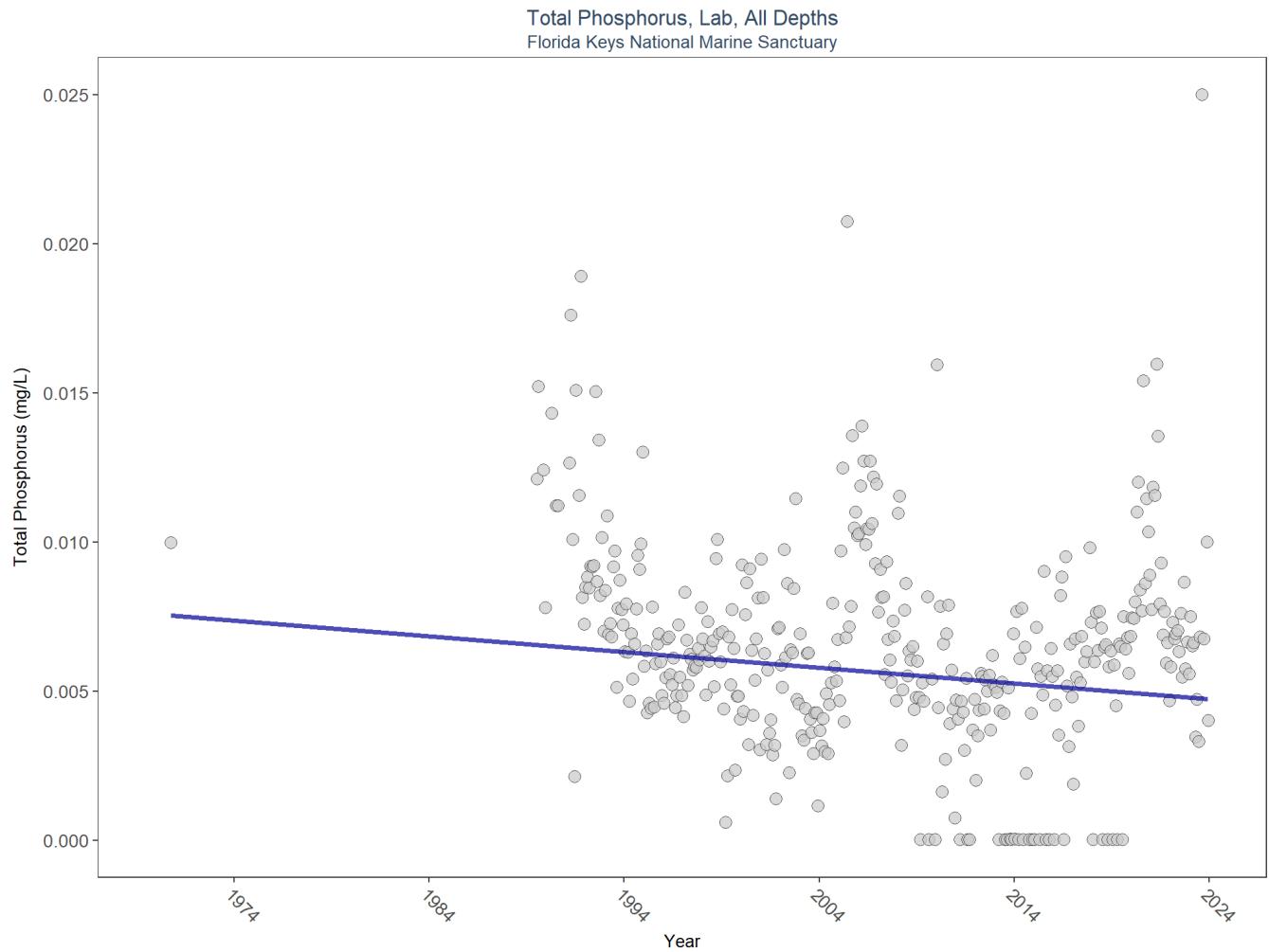
297 - Florida Keys National Marine Sanctuary Water Quality Monitoring Project

514 - Florida LAKEWATCH Program

5002 - Florida STORET / WIN

Total Phosphorus - Discrete Water Quality

Seasonal Kendall-Tau Trend Analysis

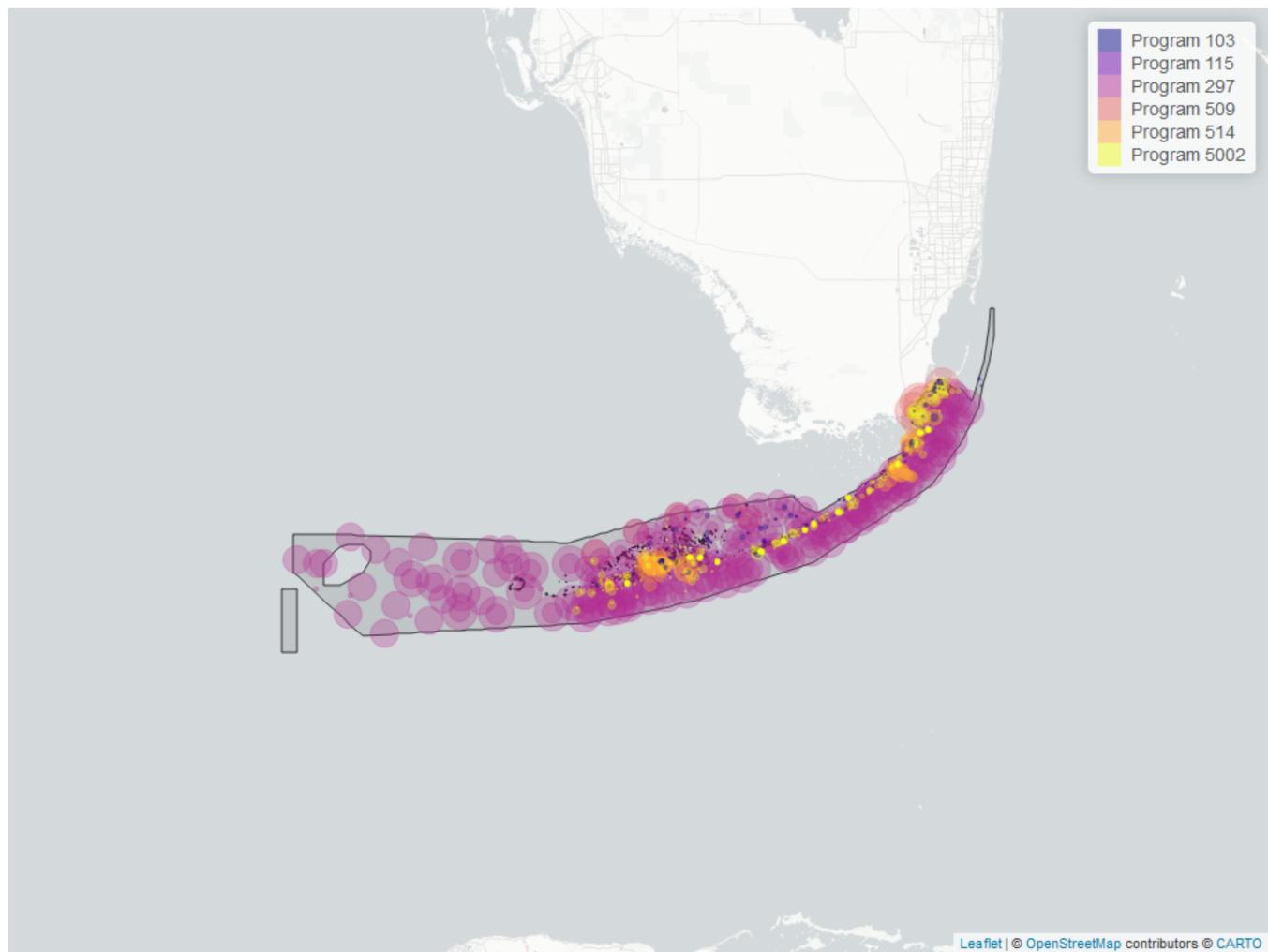


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	31347	36	0.00583	TRUE	-0.1252	0.0004	-0.00005280032	0.00757631	8.2896	0.6872	-1

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 20: Programs contributing data for Total Phosphorus

ProgramID	N_Data	YearMin	YearMax
297	25502	1995	2022
514	2772	1998	2023
5002	1917	2005	2023
509	1425	1989	2008
103	182	1970	2021
115	28	2000	2004

Program names:

297 - Florida Keys National Marine Sanctuary Water Quality Monitoring Project

514 - Florida LAKEWATCH Program

5002 - Florida STORET / WIN

- 509 - SERC Water Quality Monitoring Network
 103 - EPA STOrage and RETrieval Data Warehouse (STORET)
 115 - Environmental Monitoring Assessment 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
- $perc_{\text{Q}}$ is the percent of data flagged with the respective value qualifier as a proportion of N_{Total}

Table 21: Value Qualifiers for Total Phosphorus

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
2005	1232	28	2.3			116	9.4
2006	1134	12	1.1			48	4.2
2010	1097	76	6.9			34	3.1
2011	966	19	2.0			11	1.1
2012	764	1	0.1			20	2.6
2013	747	1	0.1			6	0.8
2015	1119	8	0.7				
2016	1515	43	2.8			3	0.2
2017	1484	71	4.8	3	0.2	1	0.1
2018	1419	1	0.1	24	1.7		
2019	1172	6	0.5	3	0.3		
2020	2164	88	4.1	30	1.4	496	22.9
2021	1271	116	9.1	2	0.2	408	32.1
2022	718	174	24.2	1	0.1	24	3.3
2023	122	55	45.1			55	45.1

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:

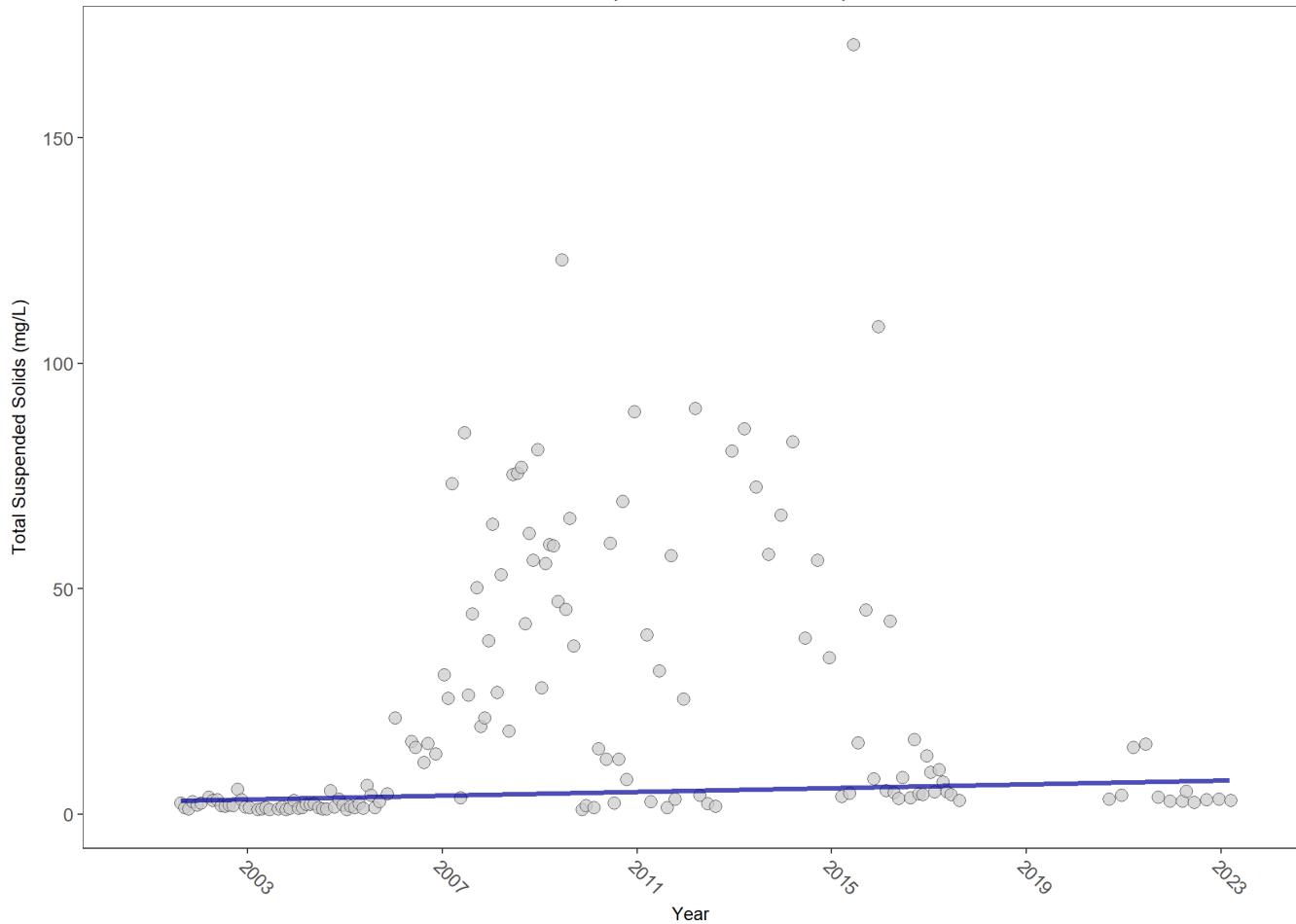
- 5002 - Florida STORET / WIN
 297 - Florida Keys National Marine Sanctuary Water Quality Monitoring Project
 514 - Florida LAKEWATCH Program

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
 Florida Keys National Marine Sanctuary

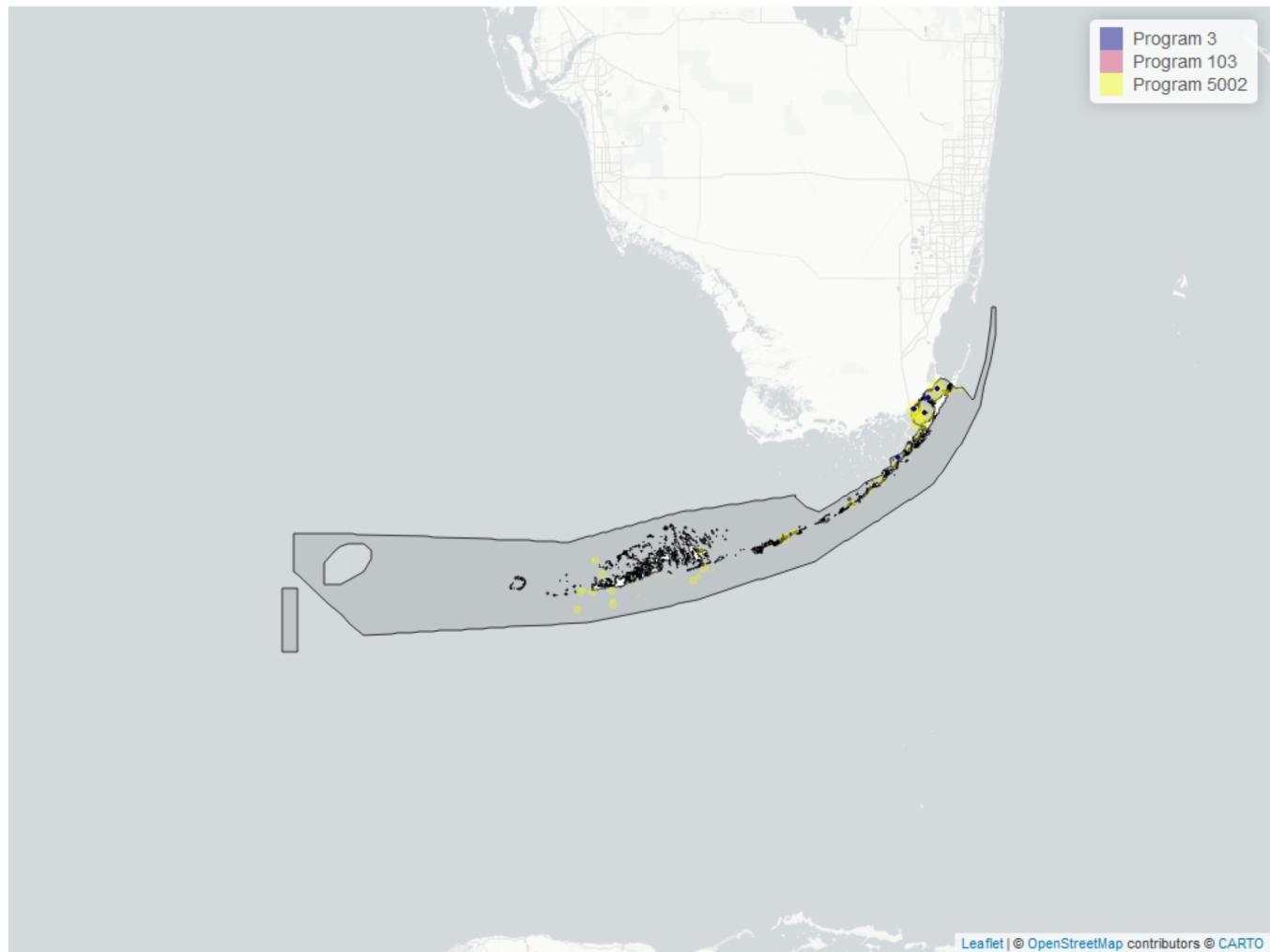


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	854	21	4	TRUE	0.2352	0.0010	0.2101786	2.857717	2.5851	0.9952	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Total Suspended Solids



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

Table 22: Programs contributing data for Total Suspended Solids

ProgramID	N_Data	YearMin	YearMax
5002	522	2007	2023
3	342	2001	2012
103	1	2020	2020

Program names:

5002 - Florida STORET / WIN

3 - Atlantic Oceanographic and Meteorological Laboratory (AOML) South Florida Program Synoptic Shipboard Surveys

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 23: Value Qualifiers for Total Suspended Solids

<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>
2007	72	5	6.9				
2008	69	1	1.4				
2010	84	30	35.7				
2014	15	2	13.3				
2015	31	13	41.9			6	19.4
2016	82	40	48.8			36	43.9
2017	88	50	56.8	1	1.1	30	34.1
2020	4	3	75.0				
2021	13	7	53.9				
2022	35	20	57.1			15	42.9
2023	6	3	50.0			3	50.0

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

Programs containing Value Qualified data:

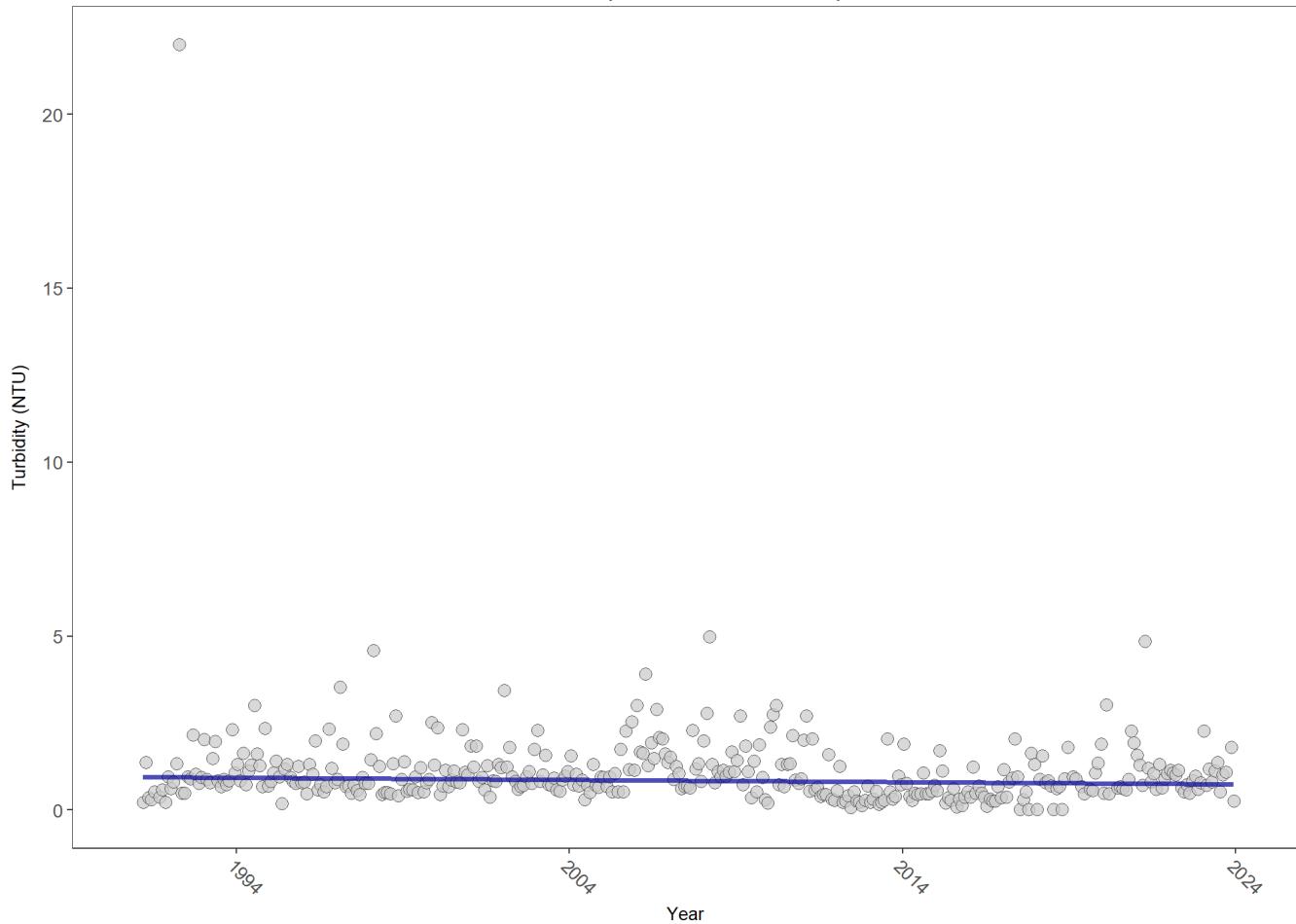
5002 - Florida STORET / WIN

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
Florida Keys National Marine Sanctuary

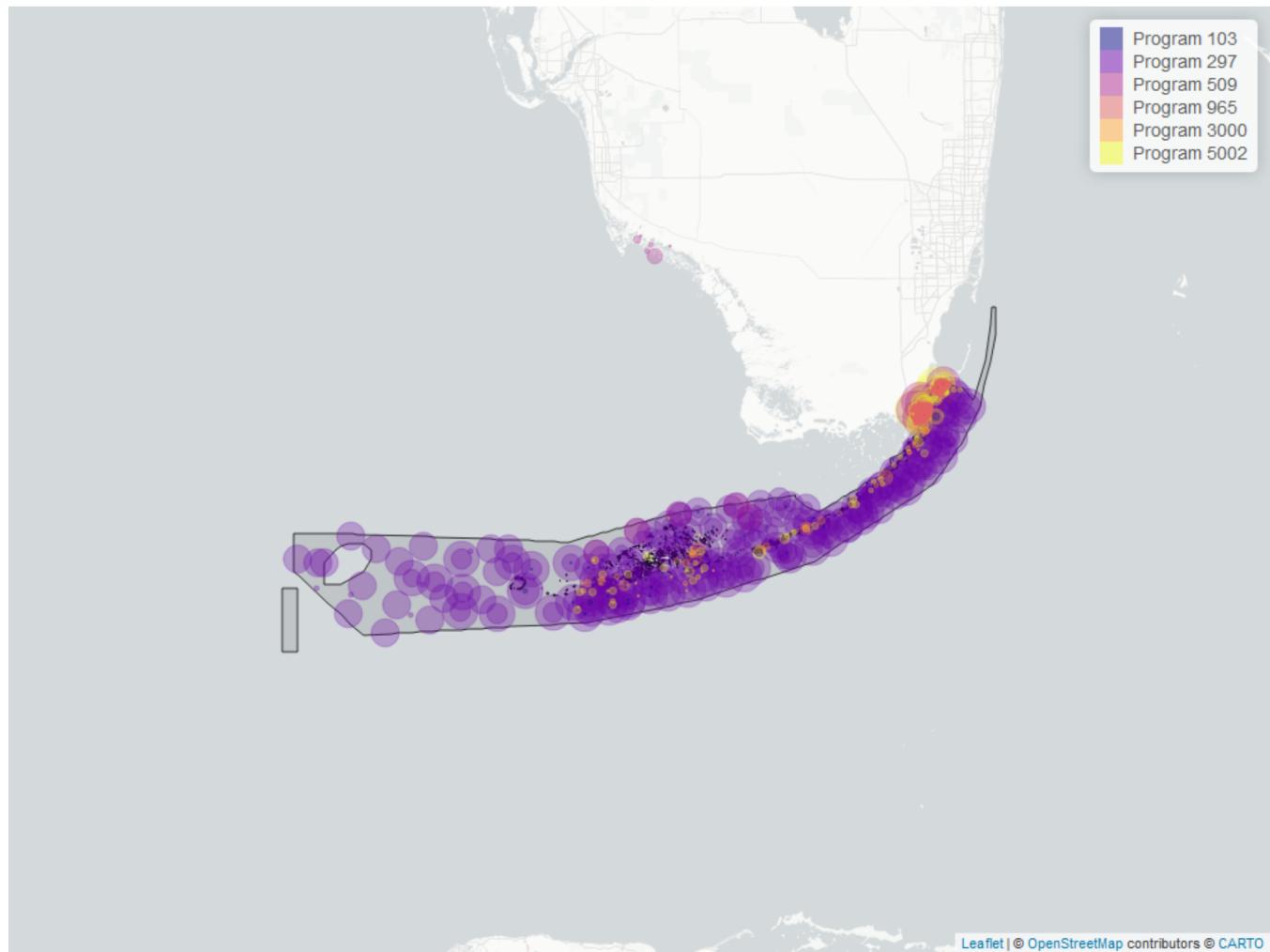


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	31346	33	0.58	TRUE	-0.0861	0.0168	-0.006407808	0.95418	5.8433	0.8836	-1

$p < 0.00005$ 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 24: Programs contributing data for Turbidity

ProgramID	N_Data	YearMin	YearMax
297	26377	1995	2022
5002	1937	1994	2023
509	1404	1991	2008
965	1157	2005	2011
3000	370	2015	2018
103	117	2005	2021

Program names:

297 - Florida Keys National Marine Sanctuary Water Quality Monitoring Project

5002 - Florida STORET / WIN

509 - SERC Water Quality Monitoring Network

965 - South Florida Seagrass Fish and Invertebrate Assessment Network

3000 - Florida Keys Water Watch

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 25: Value Qualifiers for Turbidity

Year	N_{Total}	N_I	$perc_I$	N_Q	$perc_Q$	N_U	$perc_U$
1995	743					7	0.9
1996	798					4	0.5
2003	1031	10	1.0				
2004	1028	31	3.0				
2005	1216	32	2.6				
2006	1237	4	0.3				
2007	1164	7	0.6				
2008	1320	20	1.5				
2009	1301	24	1.8				
2010	1358	26	1.9	1	0.1		
2011	1145	26	2.3				
2012	755	25	3.3				
2013	724	23	3.2			1	0.1
2014	1468	34	2.3				
2015	1347	17	1.3				
2016	1502	12	0.8				
2017	1605	2	0.1	5	0.3		
2020	1635	1	0.1	1	0.1		
2021	870	7	0.8	1	0.1	1	0.1
2022	718	57	7.9	4	0.6		
2023	93	30	32.3	2	2.1		

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:

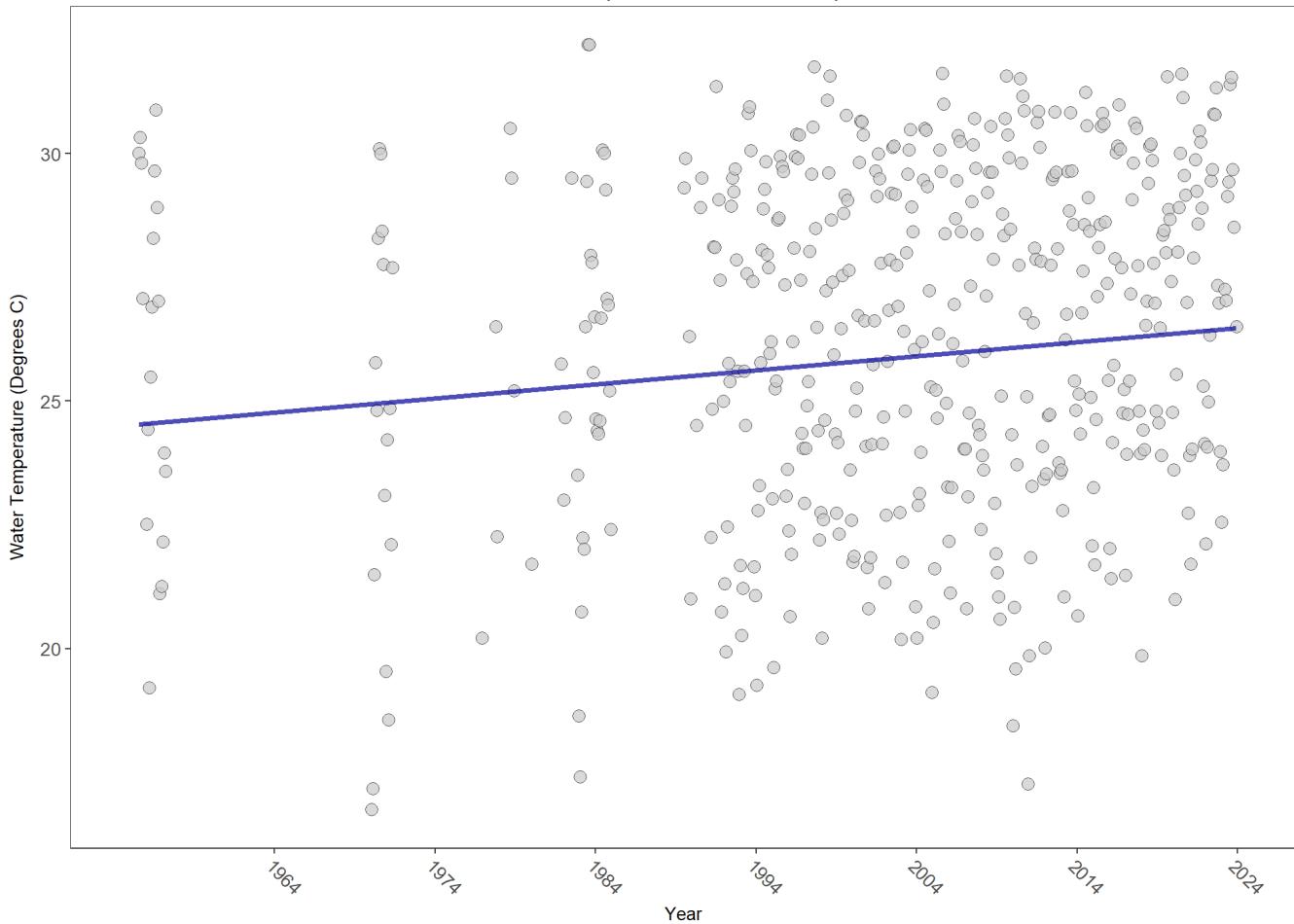
5002 - Florida STORET / WIN

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
Florida Keys National Marine Sanctuary

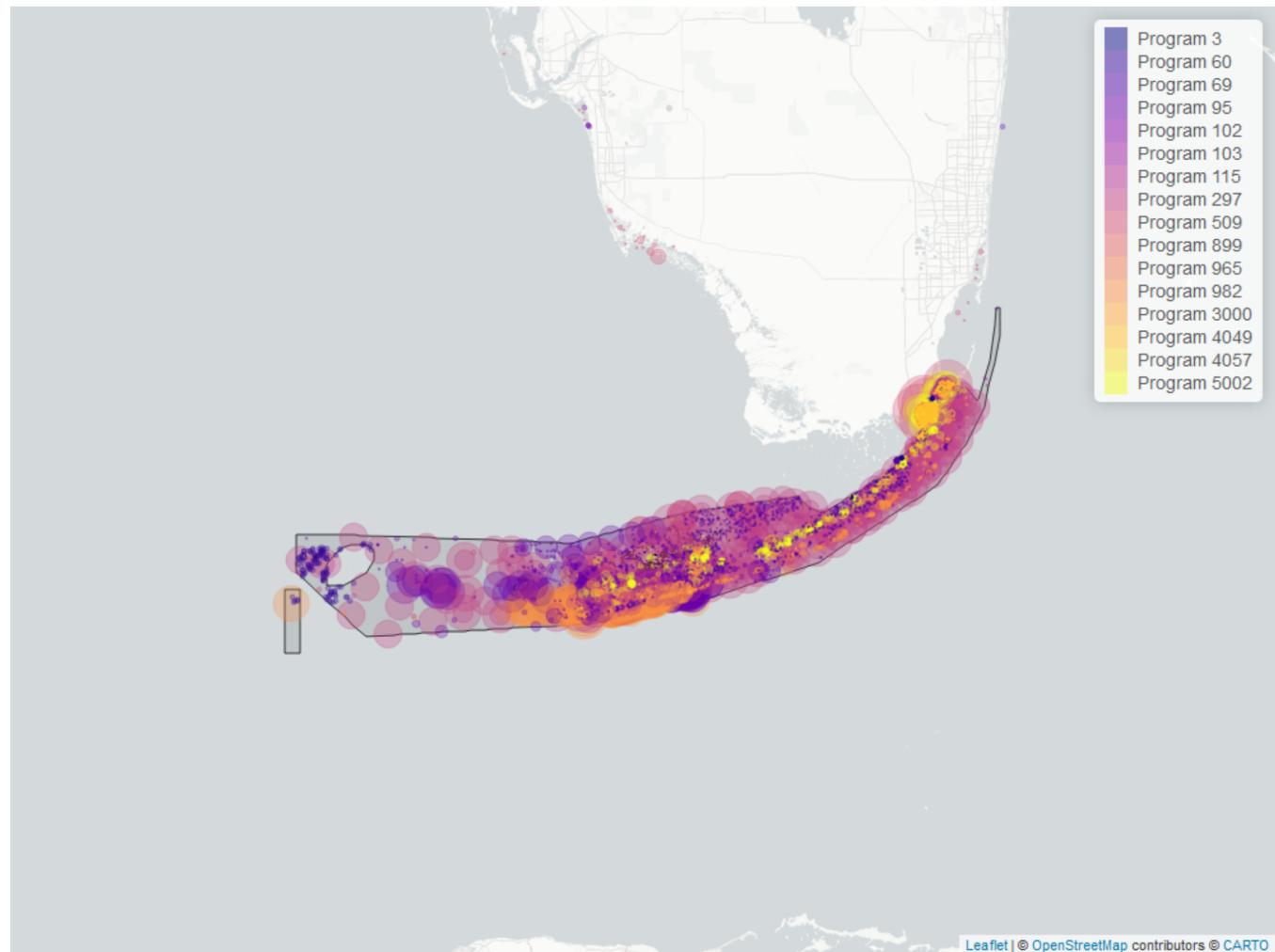


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
All	49581	48	27.17	TRUE	0.2296	0.0000	0.02836807	24.5164	12.3251	0.3397	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Map showing location of Discrete sampling sites for Water Temperature



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

Table 26: Programs contributing data for Water Temperature

ProgramID	N_Data	YearMin	YearMax
297	31378	1995	2022
5002	4985	2003	2023
509	2601	1989	2008
965	2317	2005	2011
95	1957	1955	2018
69	1776	1997	2022
4049	1168	2005	2023
982	1129	2014	2023
103	875	1970	2021
3	403	1998	2012
3000	374	2015	2018
60	372	1993	2016

<i>ProgramID</i>	<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>
115	89	2000	2004
899	85	2014	2015
4057	59	2015	2018
102	43	1996	2000

Program names:

297 - Florida Keys National Marine Sanctuary Water Quality Monitoring Project

5002 - Florida STORET / WIN

509 - SERC Water Quality Monitoring Network

965 - South Florida Seagrass Fish and Invertebrate Assessment Network

95 - Harmful Algal Bloom Marine Observation Network

69 - Fisheries-Independent Monitoring (FIM) Program

4049 - The South Florida Fisheries Habitat Assessment Program (FHAP)

982 - Florida Keys Bleach Watch

103 - EPA STOrage and RETrieval Data Warehouse (STORET)

3 - Atlantic Oceanographic and Meteorological Laboratory (AOML) South Florida Program Synoptic Shipboard Surveys

3000 - Florida Keys Water Watch

60 - Southeast Area Monitoring and Assessment Program (SEAMAP) - Gulf of Mexico Fall & Summer Shrimp/Groundfish Survey

115 - Environmental Monitoring Assessment Program

899 - USGS Coral Reef Ecosystem Studies (CREST) Project

4057 - Biscayne Bay Water Watch

102 - National Status and Trends Mussel Watch

There are no qualifying Value Qualifiers for Water Temperature in Florida Keys National Marine Sanctuary

Water Quality - Continuous

The following files were used in the continuous analysis:

- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_SE-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_Saturation_SE-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_pH_SE-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_Salinity_SE-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_Turbidity_SE-2024-Jul-02.txt*
- *Combined_WQ_WC_NUT_cont_Water_Temperature_SE-2024-Jul-02.txt*

Table 27: Atlantic Oceanographic and Meteorological Laboratory (AOML) South Florida Program Moored Instrument Array (2)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
1B	6	TRUE	Sal , TempW

Table 28: National Water Information System (7)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
245323080410100	3	FALSE	Sal , TempW
245622080364200	3	FALSE	Sal , TempW

Table 29: National Data Buoy Center (5)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
KYWF1	20	TRUE	TempW
LONF1	28	TRUE	TempW
MLRF1	33	TRUE	TempW
SANF1	15	TRUE	TempW
SMKF1	21	TRUE	TempW

Table 30: Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
214	18	TRUE	TempW
215	16	TRUE	TempW
216	17	TRUE	TempW
220	17	TRUE	TempW
223	18	TRUE	TempW
225	18	TRUE	TempW
227	17	TRUE	TempW
235	18	TRUE	TempW
237	18	TRUE	TempW
239	17	TRUE	TempW
241	18	TRUE	TempW
243	18	TRUE	TempW
248	18	TRUE	TempW
255	18	TRUE	TempW
260	18	TRUE	TempW
267	18	TRUE	TempW
269	18	TRUE	TempW
271	18	TRUE	TempW
273	18	TRUE	TempW
276	18	TRUE	TempW
284	18	TRUE	TempW
285	18	TRUE	TempW
287	18	TRUE	TempW
291	18	TRUE	TempW
294	18	TRUE	TempW
296	18	TRUE	TempW
305	18	TRUE	TempW
307	18	TRUE	TempW
309	18	TRUE	TempW
314	18	TRUE	TempW
500	8	TRUE	TempW
501	7	TRUE	TempW
502	4	FALSE	TempW
503	1	FALSE	TempW
504	1	FALSE	TempW
506	8	TRUE	TempW
507	8	TRUE	TempW
508	8	TRUE	TempW
509	8	TRUE	TempW
SB	19	TRUE	TempW

Table 31: USGS Coral Reef Ecosystem Studies (CREST) Project (899)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
Crocker	10	TRUE	TempW
Molasses	5	TRUE	TempW
Sombrero	14	TRUE	TempW

Table 32: Water Temperature on Coral Reefs in the Florida Keys (986)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
10	3	FALSE	TempW
11	20	TRUE	TempW
12	15	TRUE	TempW
14	21	TRUE	TempW
15	17	TRUE	TempW
18	7	TRUE	TempW
21	7	TRUE	TempW
22	14	TRUE	TempW
23	11	TRUE	TempW
24	13	TRUE	TempW
25	13	TRUE	TempW
26	14	TRUE	TempW
30	11	TRUE	TempW
32	20	TRUE	TempW
33	7	TRUE	TempW
34	21	TRUE	TempW
35	17	TRUE	TempW
36	16	TRUE	TempW
37	7	TRUE	TempW
38	21	TRUE	TempW
39	5	TRUE	TempW
40	21	TRUE	TempW
50	10	TRUE	TempW
51	20	TRUE	TempW
52	15	TRUE	TempW
53	15	TRUE	TempW
54	11	TRUE	TempW
55	21	TRUE	TempW
56	17	TRUE	TempW
57	15	TRUE	TempW
58	9	TRUE	TempW
59	21	TRUE	TempW
60	14	TRUE	TempW
61	7	TRUE	TempW
70	10	TRUE	TempW
72	15	TRUE	TempW
73	15	TRUE	TempW
74	11	TRUE	TempW
75	13	TRUE	TempW
76	14	TRUE	TempW
77	15	TRUE	TempW
78	9	TRUE	TempW
79	16	TRUE	TempW
80	14	TRUE	TempW
81	7	TRUE	TempW
83	17	TRUE	TempW

Table 33: Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

<i>ProgramLocationID</i>	<i>Years of Data</i>	<i>Use in Analysis</i>	<i>Parameters</i>
FKNMS_200YR_HD	12	TRUE	TempW
FKNMS_7MILE_BR	20	TRUE	TempW
FKNMS_9FT_SHOAL	21	TRUE	TempW
FKNMS_ALLIGATOR	21	TRUE	TempW
FKNMS_BHONDA_BR	22	TRUE	TempW
FKNMS_BOCA_GRND	23	TRUE	TempW
FKNMS_BULLARD	18	TRUE	TempW
FKNMS_CARD_SND	6	TRUE	TempW
FKNMS_CARYSFORT	17	TRUE	TempW
FKNMS_DIEGO_TER	5	TRUE	TempW
FKNMS_ELPIS	8	TRUE	TempW
FKNMS_GRECIAN	21	TRUE	TempW
FKNMS_HARBORKEY	6	TRUE	TempW
FKNMS_HEN&CHIX	23	TRUE	TempW
FKNMS_KW_CHANL	22	TRUE	TempW
FKNMS_LONG_KEY	21	TRUE	TempW
FKNMS_LOOE_BACK	23	TRUE	TempW
FKNMS_LOOE_BUOY5	11	TRUE	TempW
FKNMS_LOOE_ISELIN	16	TRUE	TempW
FKNMS_MAITLAND	4	FALSE	TempW
FKNMS_MOLASSES	13	TRUE	TempW
FKNMS_NEWSGROUND	15	TRUE	TempW
FKNMS_PILLAR	11	TRUE	TempW
FKNMS SAND KEY	21	TRUE	TempW
FKNMS_SMITH_SHL	15	TRUE	TempW
FKNMS_SNAKE_CRK	19	TRUE	TempW
FKNMS_SOMBRERO	15	TRUE	TempW
FKNMS_SPRIGGER	15	TRUE	TempW
FKNMS_TENN_REEF	17	TRUE	TempW
FKNMS_WELLWOOD	8	TRUE	TempW
FKNMS_WS_BUOY16	3	FALSE	TempW
FKNMS_WS_JACKYL	9	TRUE	TempW
FKNMS_W_SAMBO	6	TRUE	TempW



Map showing Continuous Water Quality Monitoring sampling locations within the boundaries of Florida Keys National Marine Sanctuary. Sites marked as *Use In Analysis* are featured in this report.

Salinity - Continuous Water Quality

1B

Atlantic Oceanographic and Meteorological Laboratory (AOML) South Florida Program Moored Instrument Array
(2)



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	86204	6	36.0726	TRUE	0.2361	0.0543	0.169579	35.68299	7.8976	0.7224	0

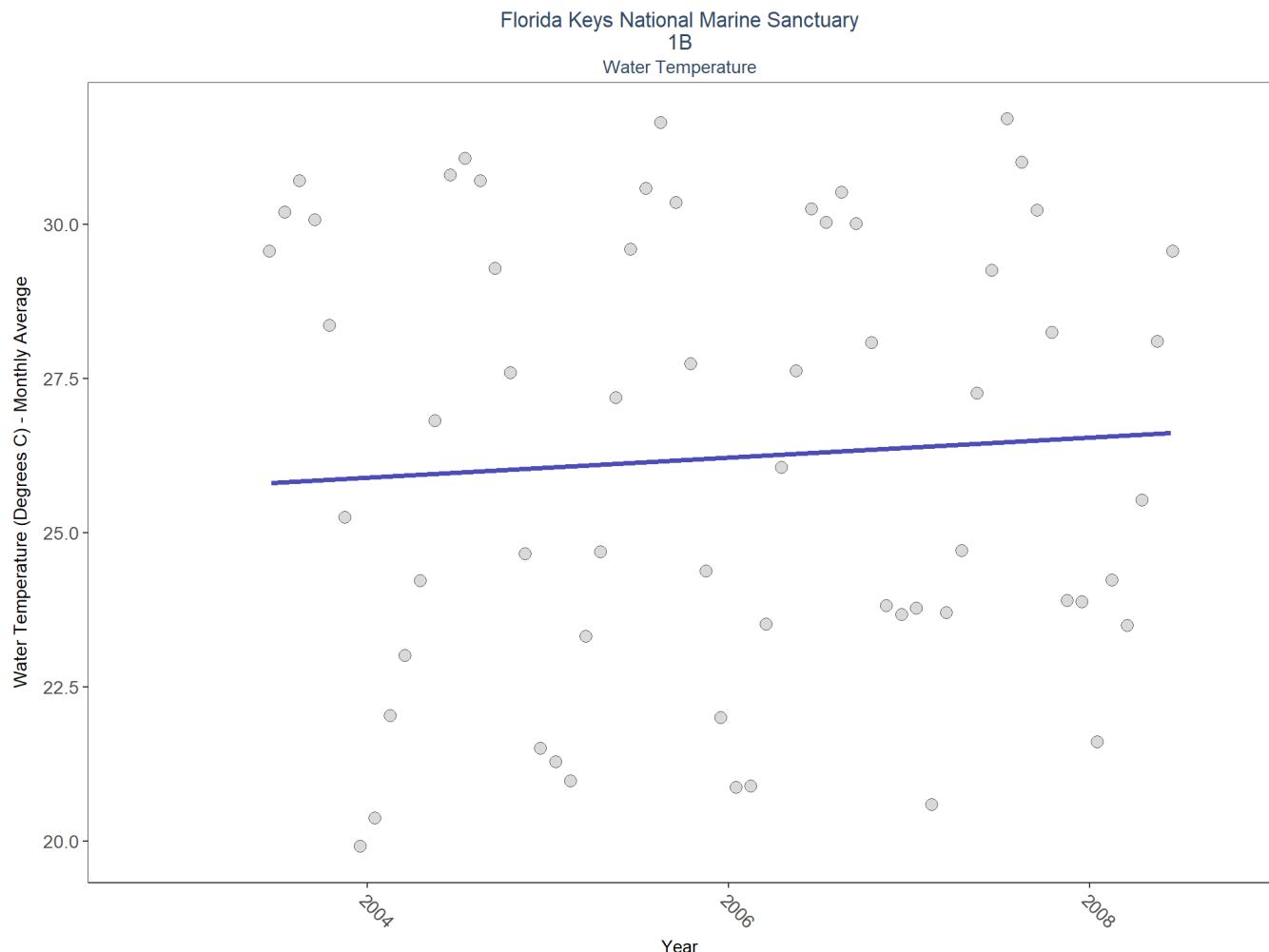
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature - Continuous Water Quality

1B

Atlantic Oceanographic and Meteorological Laboratory (AOML) South Florida Program Moored Instrument Array
(2)



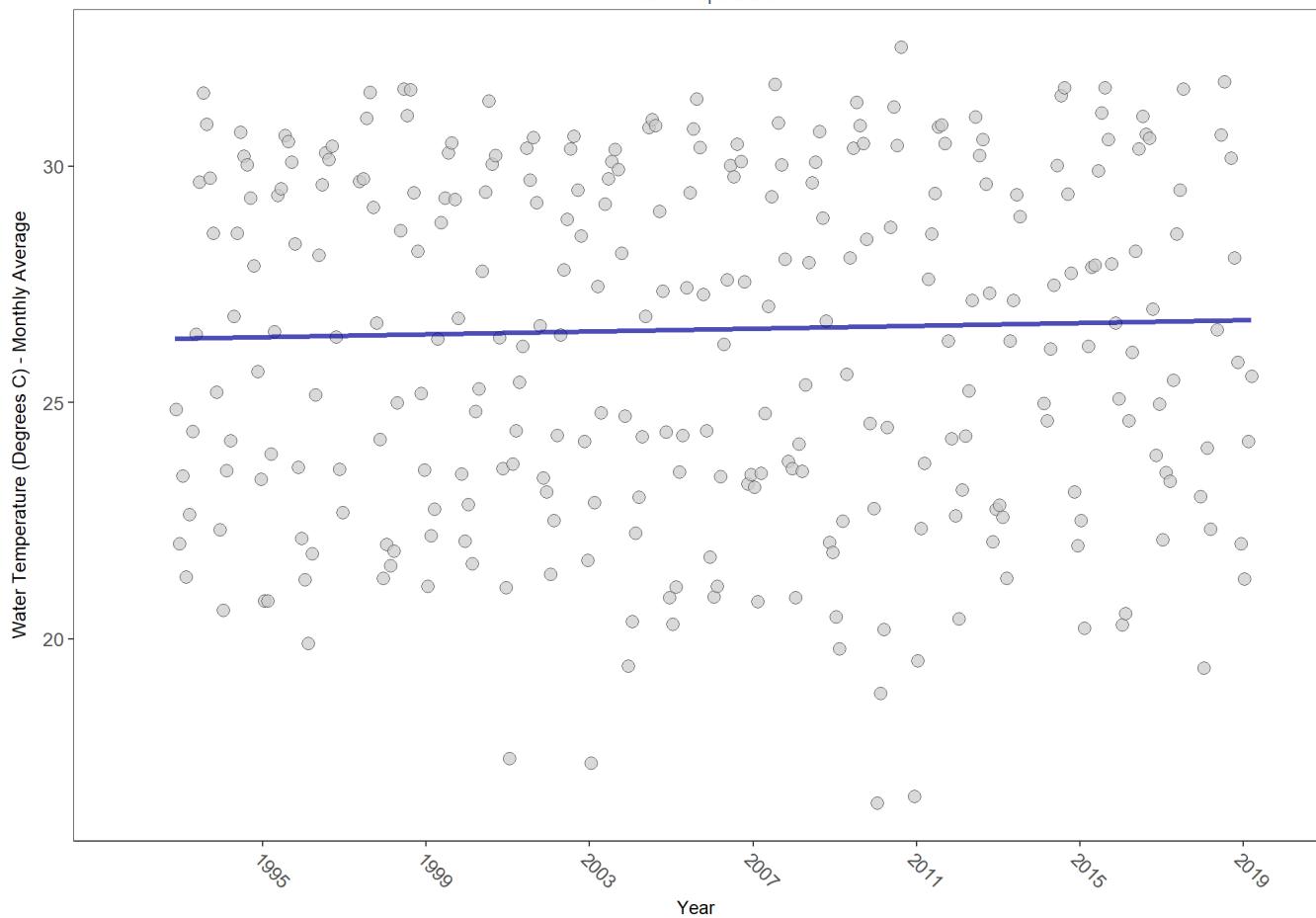
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

LONF1

National Data Buoy Center (5)

Florida Keys National Marine Sanctuary
LONF1
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	205971	28	26.6	TRUE	0.0735	0.0825	0.01488344	26.34064	11.7066	0.3861	0

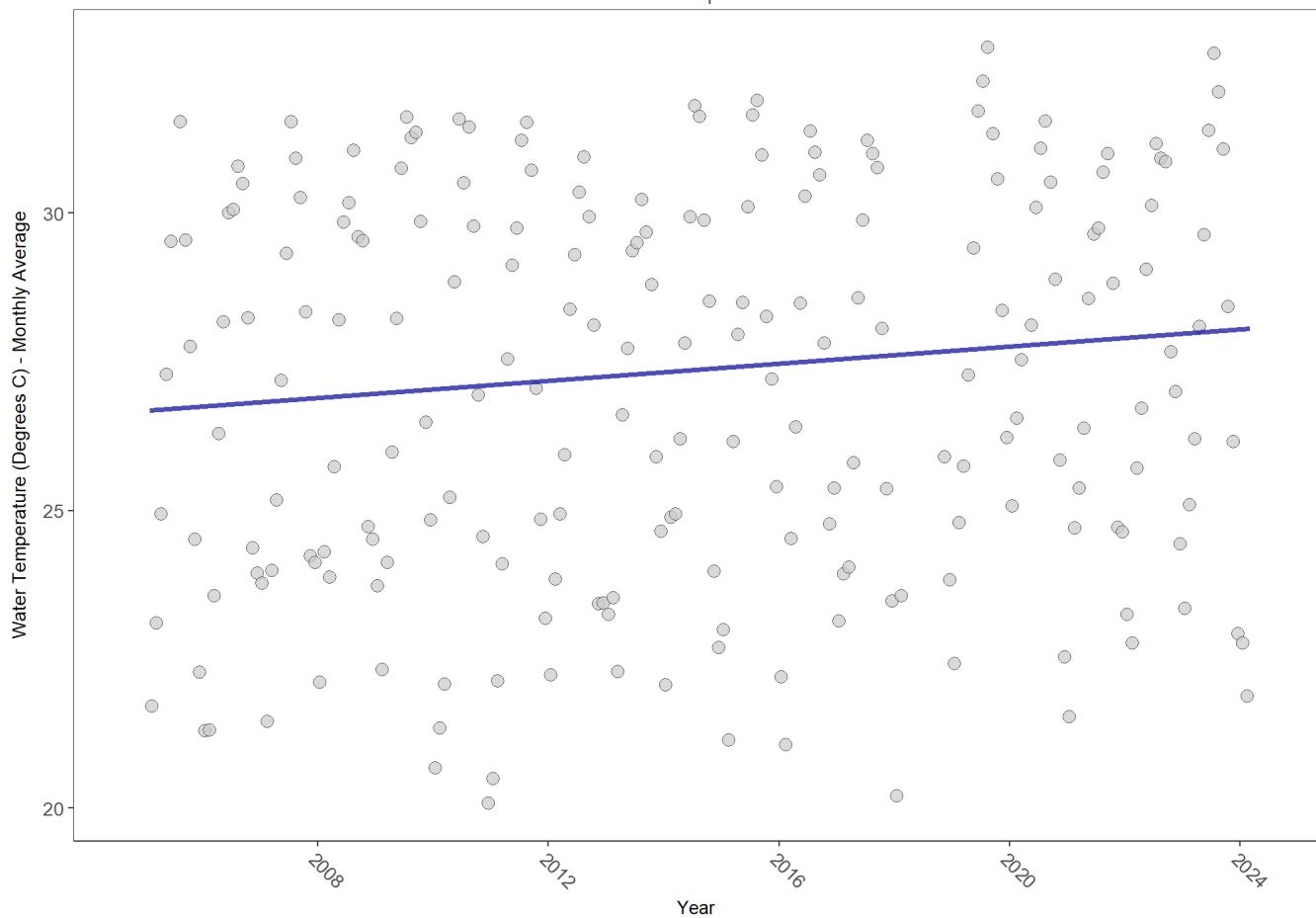
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

KYWF1

National Data Buoy Center (5)

Florida Keys National Marine Sanctuary
KYWF1
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	1412602	20	27.5	TRUE	0.3076	0.0000	0.07207221	26.67226	9.9458	0.5353	1

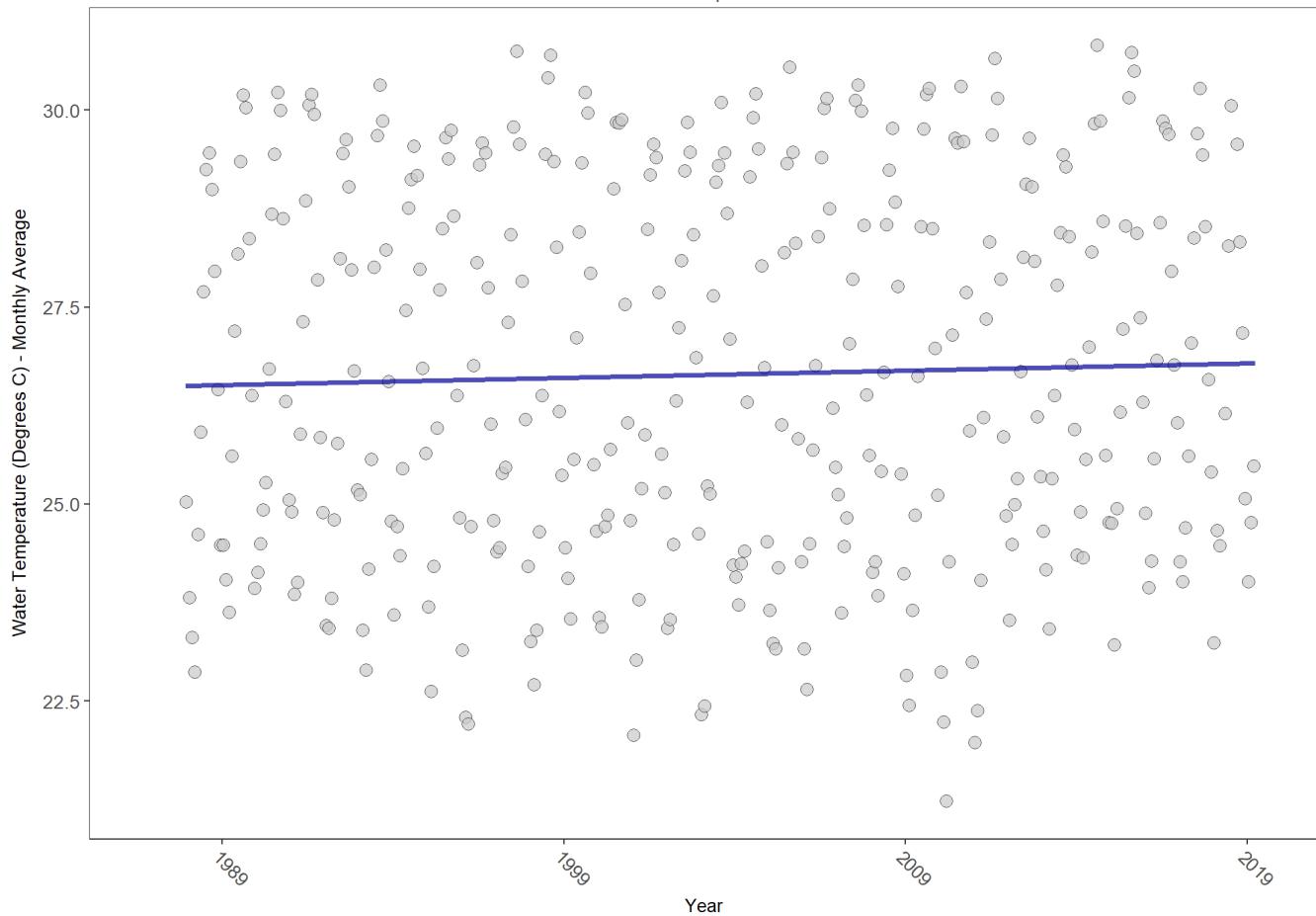
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

MLRF1

National Data Buoy Center (5)

Florida Keys National Marine Sanctuary
MLRF1
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	256798	33	26.5	TRUE	0.1044	0.0043	0.00910437	26.49442	4.4777	0.9538	1

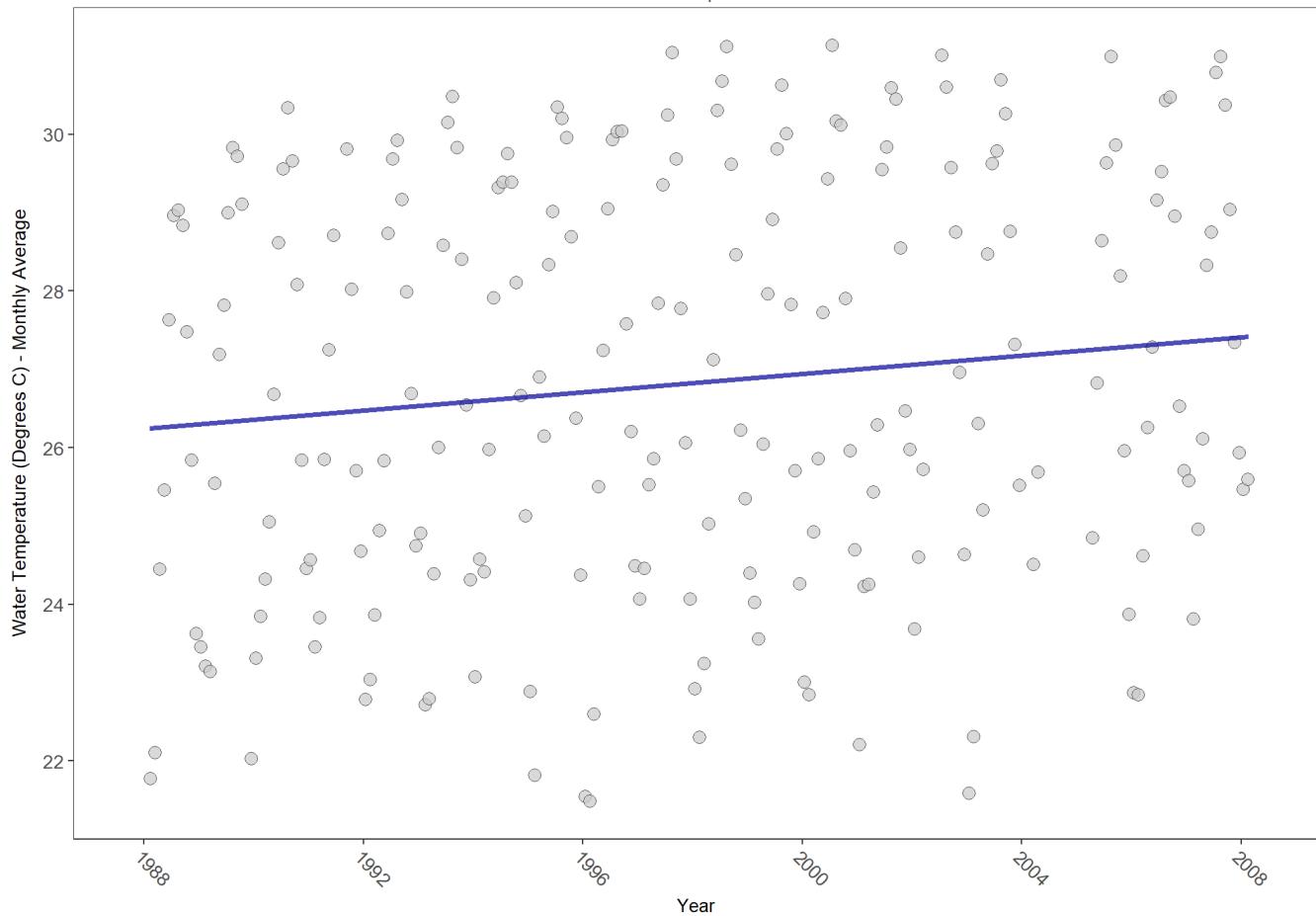
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

SMKF1

National Data Buoy Center (5)

Florida Keys National Marine Sanctuary
SMKF1
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	154326	21	26.8	TRUE	0.3357	0.0000	0.05836799	26.24157	8.3988	0.6772	1

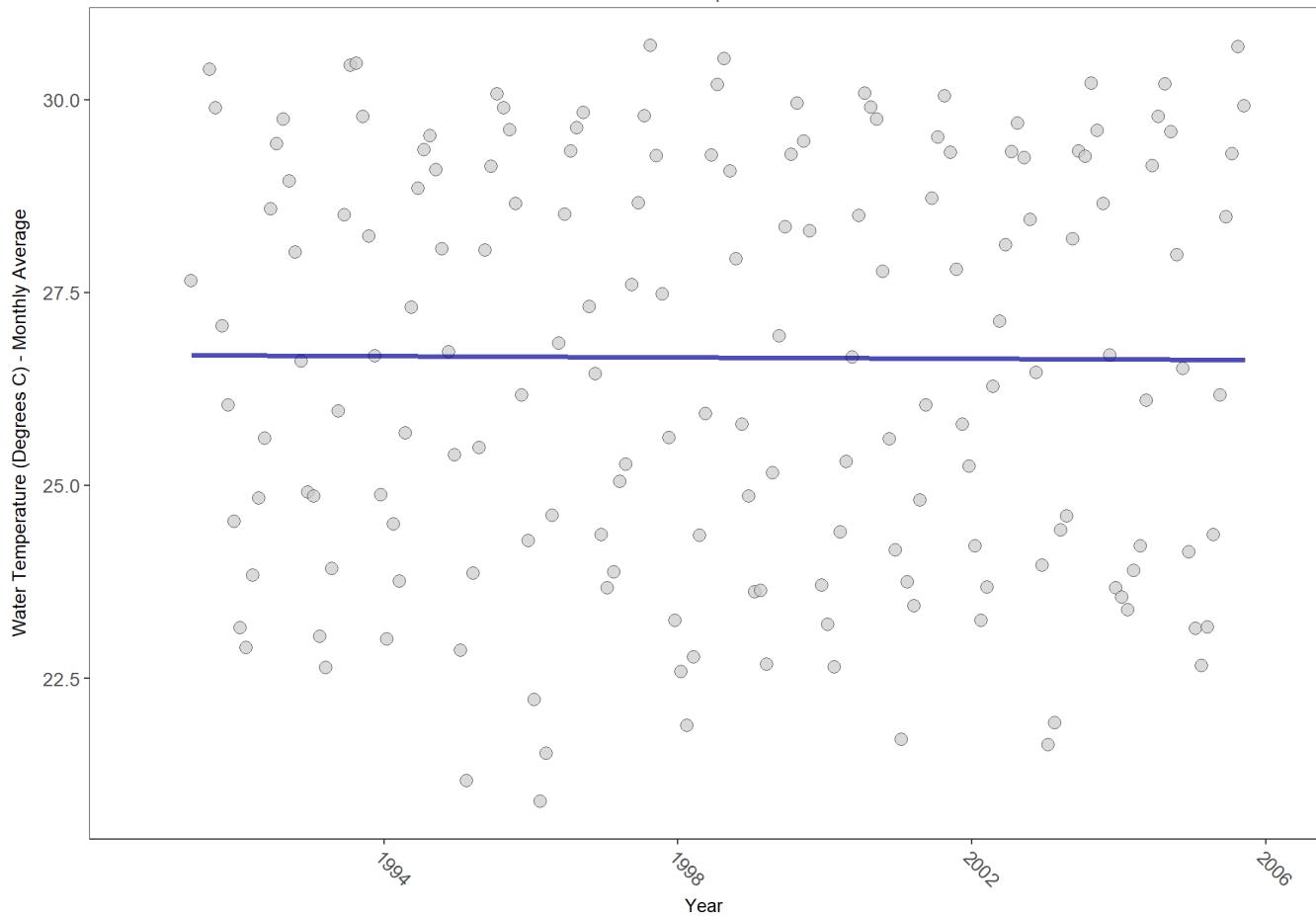
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

SANF1

National Data Buoy Center (5)

Florida Keys National Marine Sanctuary
SANF1
Water Temperature



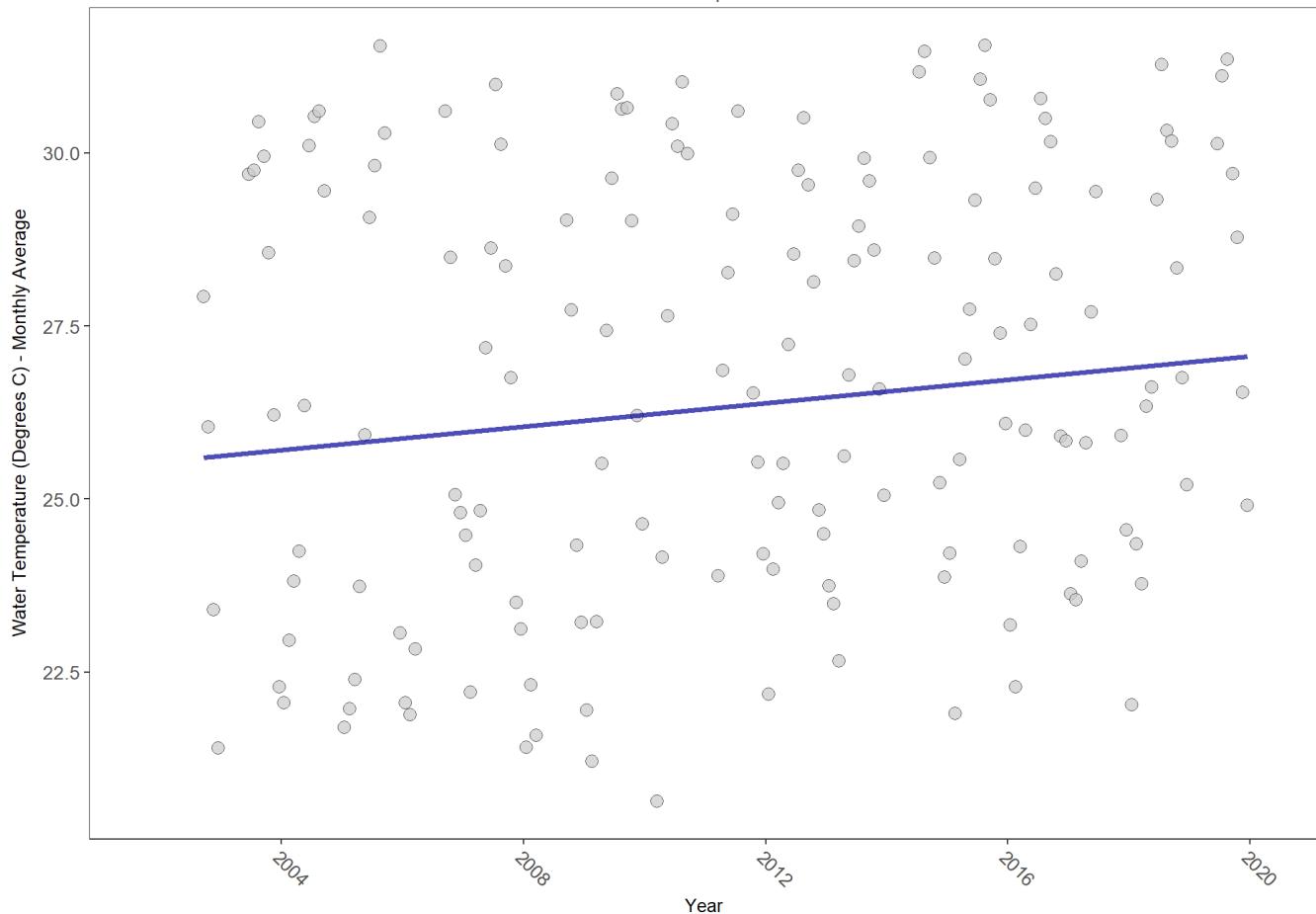
RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	117833	15	26.7	TRUE	-0.0316	0.6199	-0.004023625	26.68607	9.5036	0.5755	0

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

SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary
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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	111702	18	26.793	TRUE	0.3129	0.0000	0.08462514	25.53841	9.7659	0.5516	1

p < 0.00005 appear as 0 due to rounding.

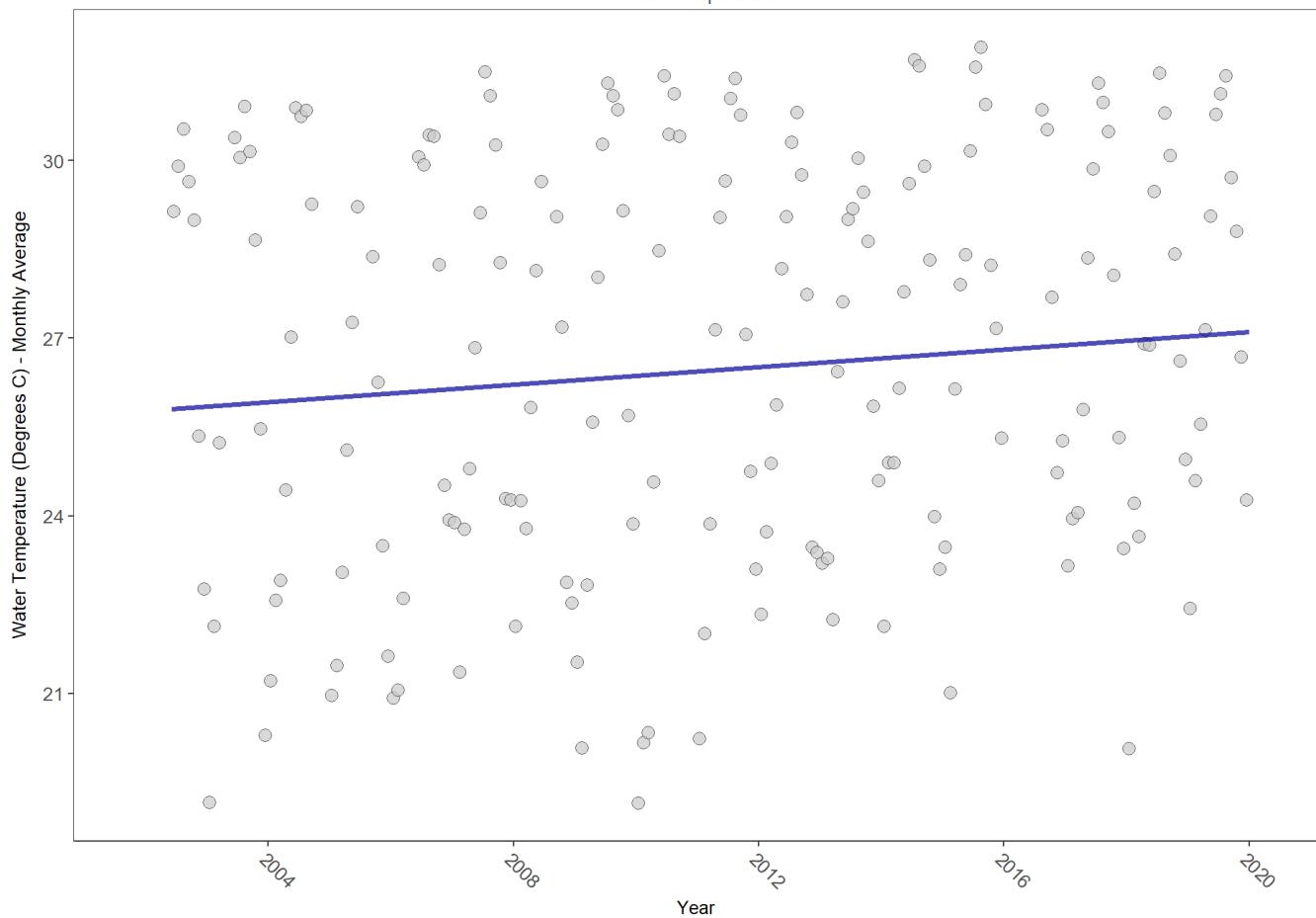
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	133627	18	26.92	TRUE	0.2648	0.0000	0.07425617	25.77095	7.2658	0.7772	1

p < 0.00005 appear as 0 due to rounding.

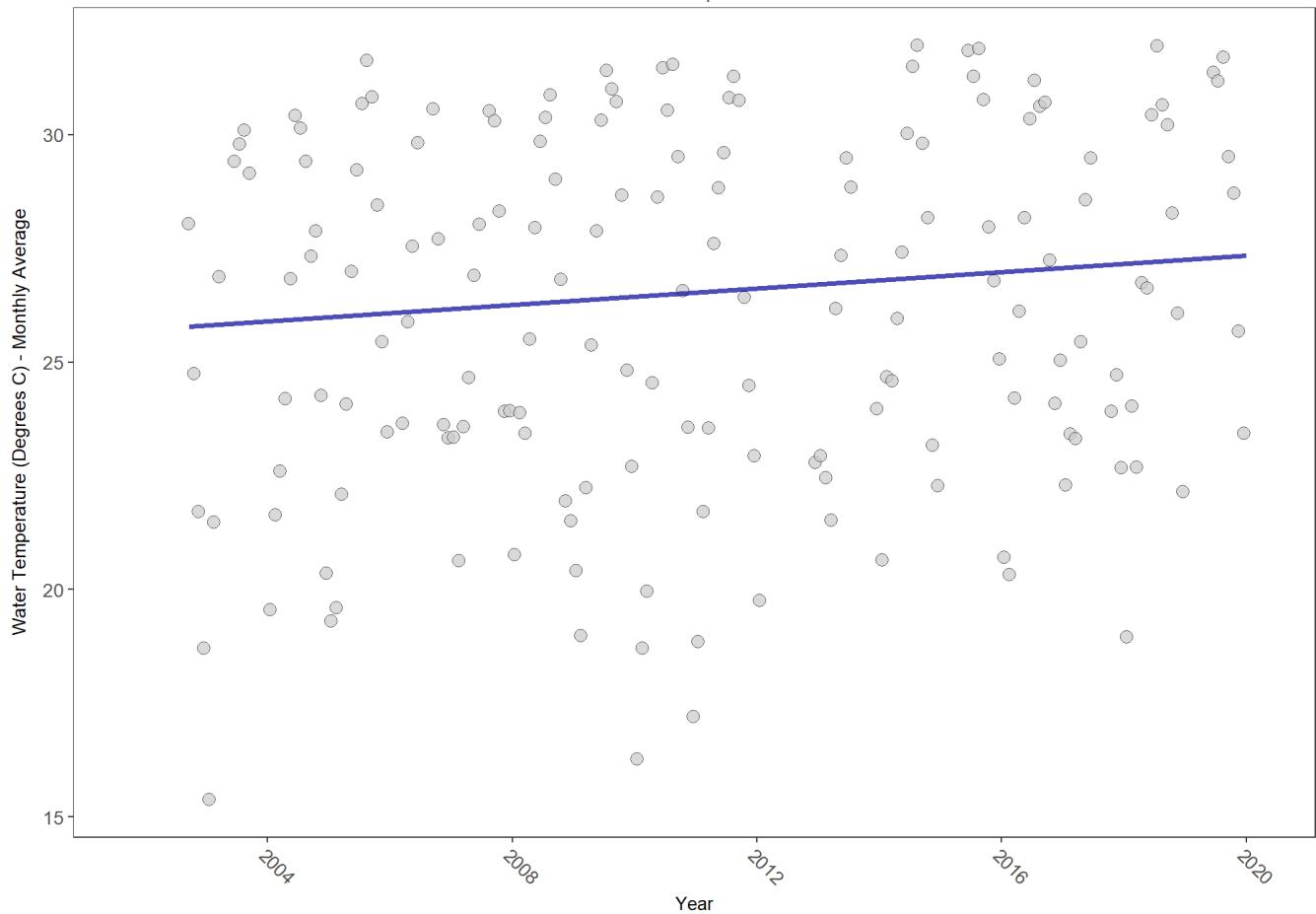
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	116240	18	26.378	TRUE	0.2605	0.0000	0.09038371	25.71649	6.787	0.8161	1

p < 0.00005 appear as 0 due to rounding.

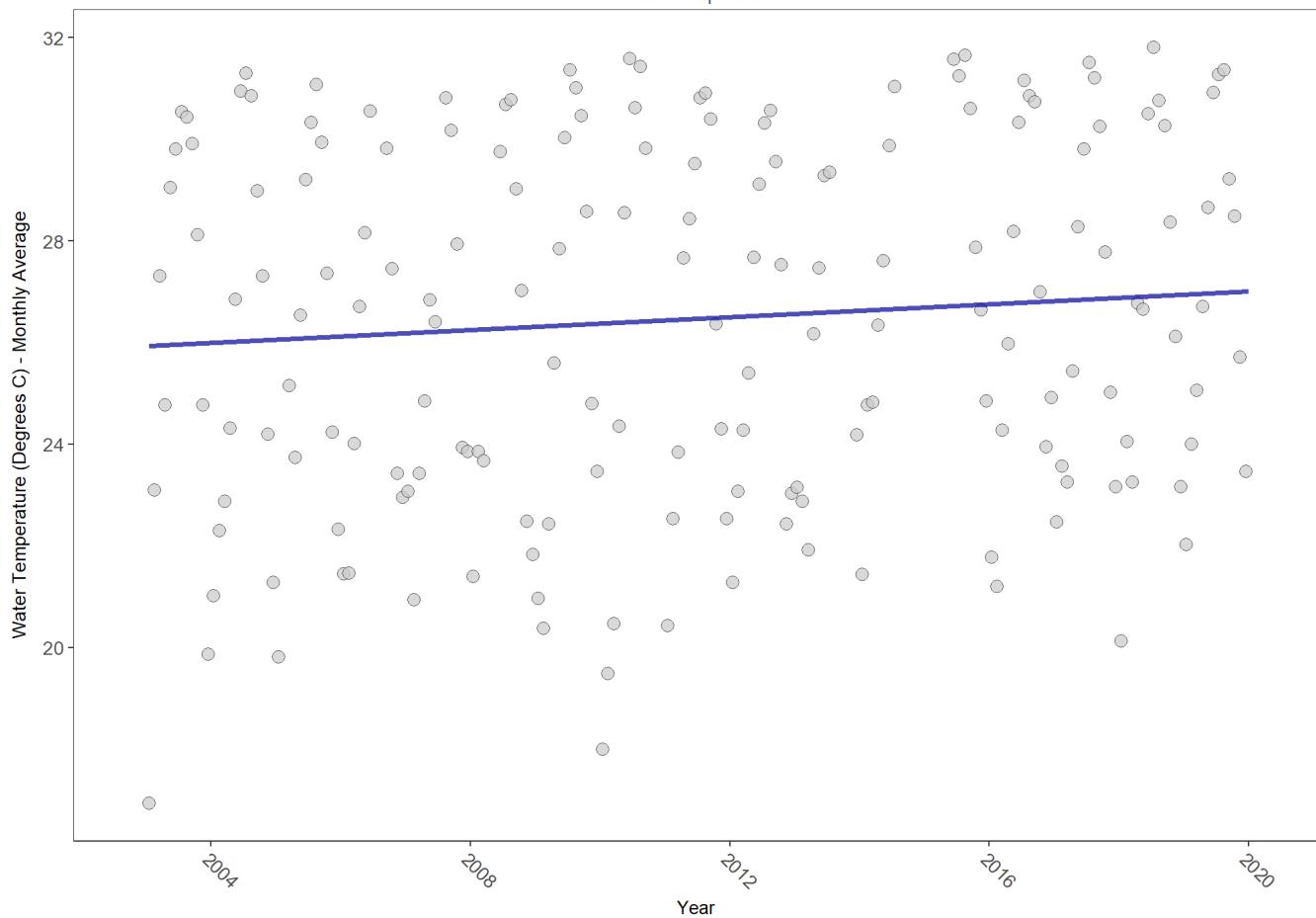
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	126033	17	26.52	TRUE	0.2548	0.0000	0.06288452	25.93605	7.3706	0.7683	1

p < 0.00005 appear as 0 due to rounding.

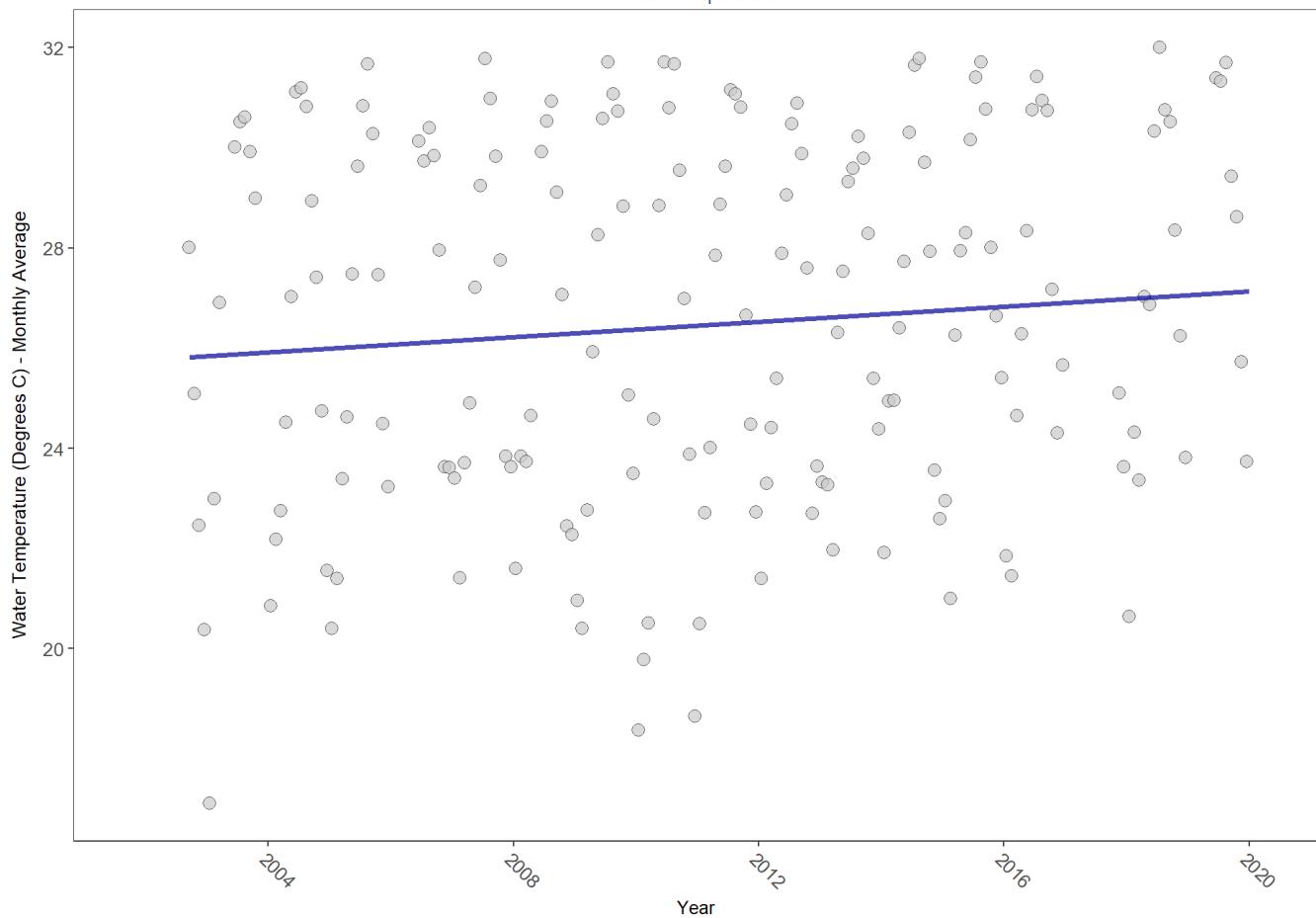
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	128499	18	27.136	TRUE	0.276	0.0000	0.07602072	25.76626	5.9659	0.8756	1

p < 0.00005 appear as 0 due to rounding.

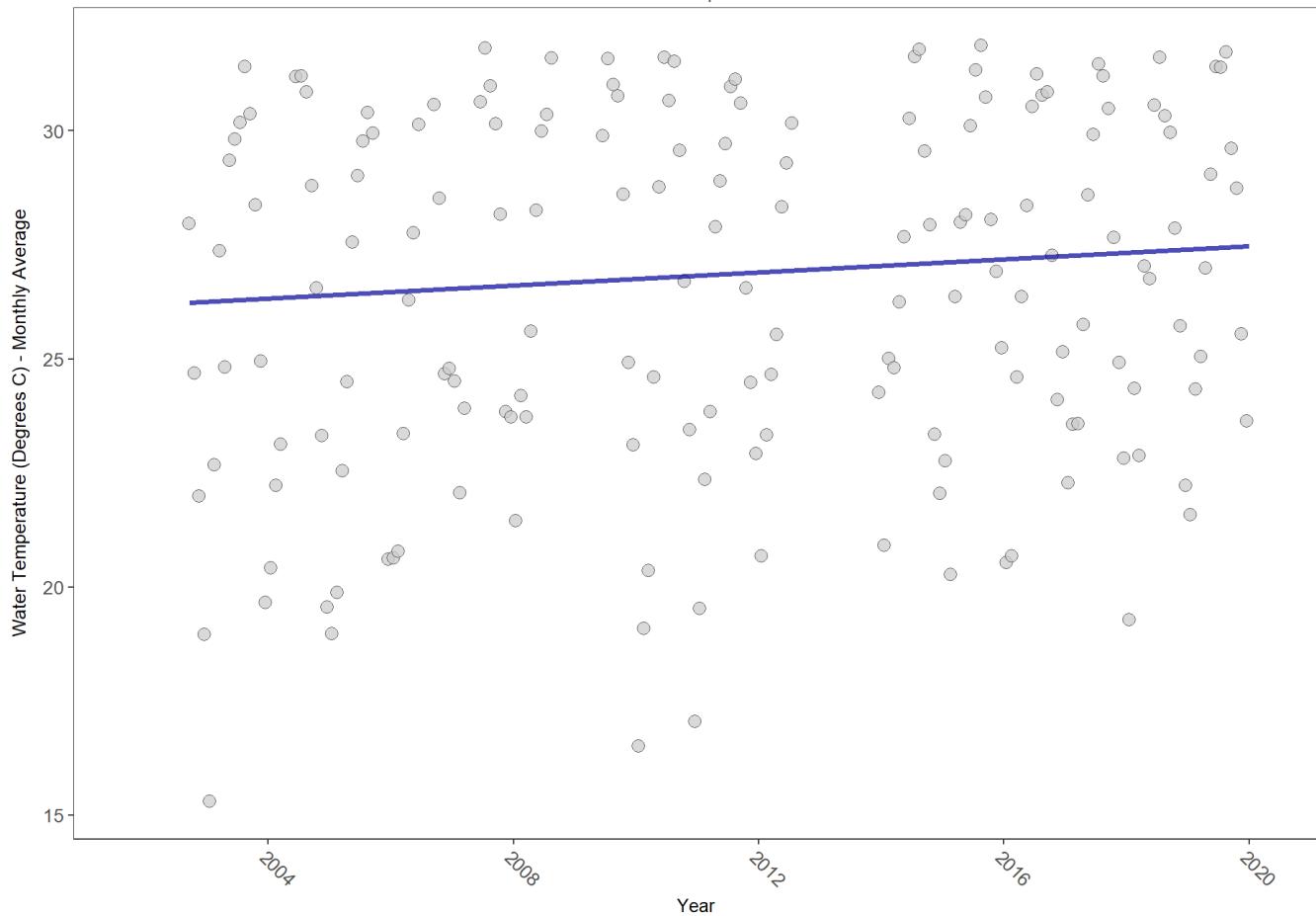
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	121423	18	26.86	TRUE	0.2491	0.0000	0.07226265	26.17465	3.3	0.9861	1

p < 0.00005 appear as 0 due to rounding.

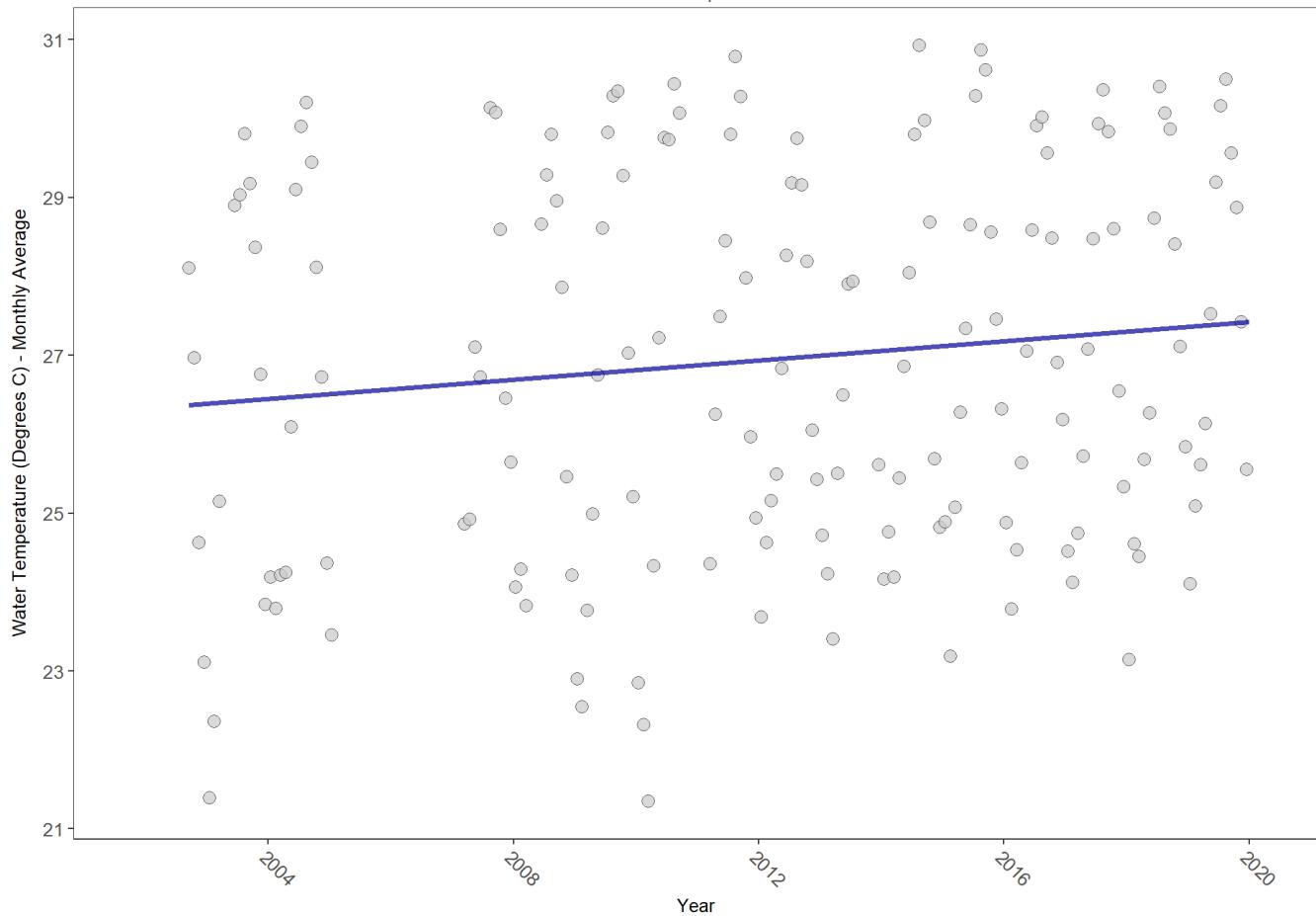
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	117692	17	26.818	TRUE	0.3151	0.0000	0.06079033	26.32495	7.6051	0.7482	1

p < 0.00005 appear as 0 due to rounding.

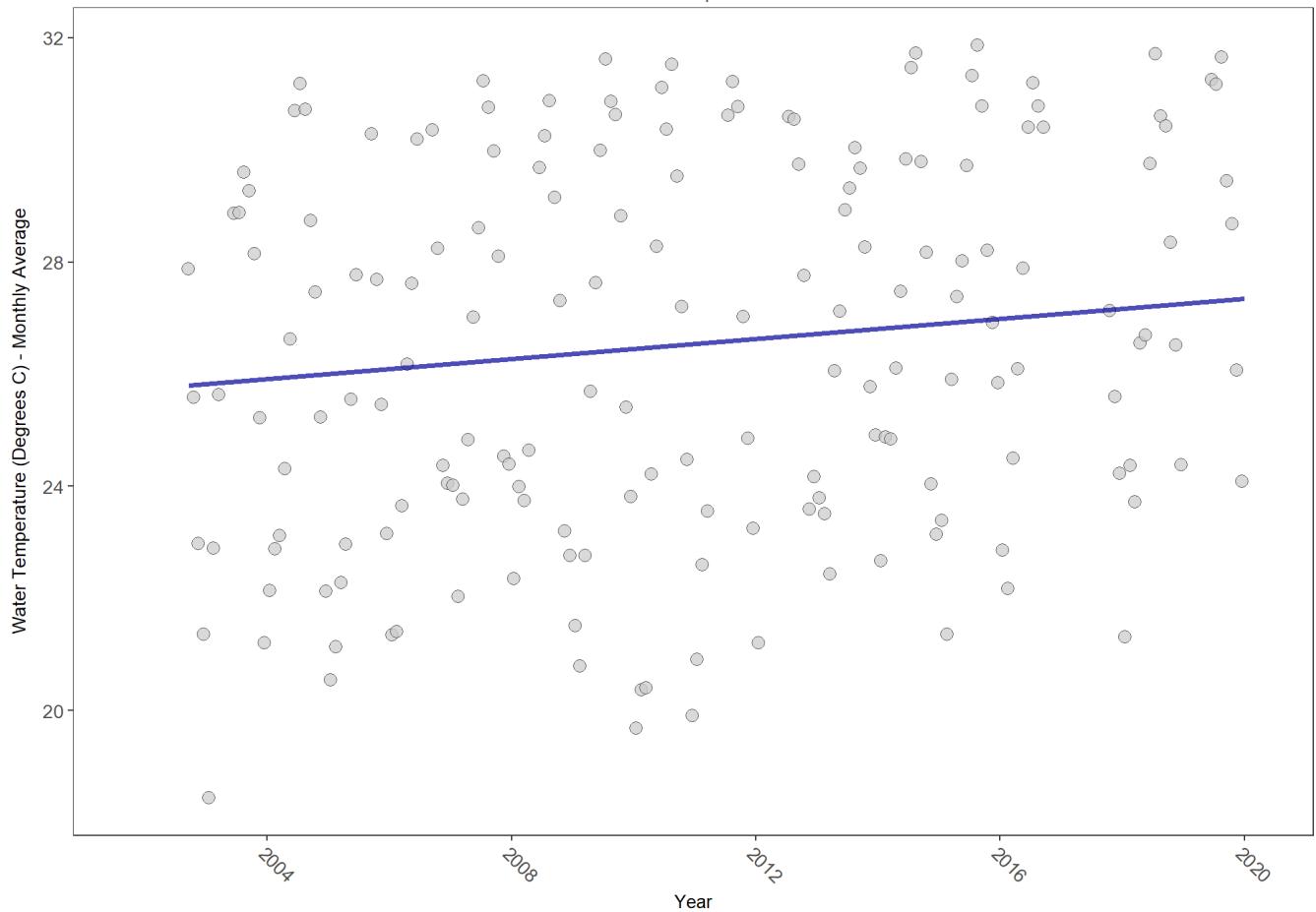
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	122250	18	26.378	TRUE	0.3056	0.0000	0.08940128	25.73751	3.738	0.977	1

p < 0.00005 appear as 0 due to rounding.

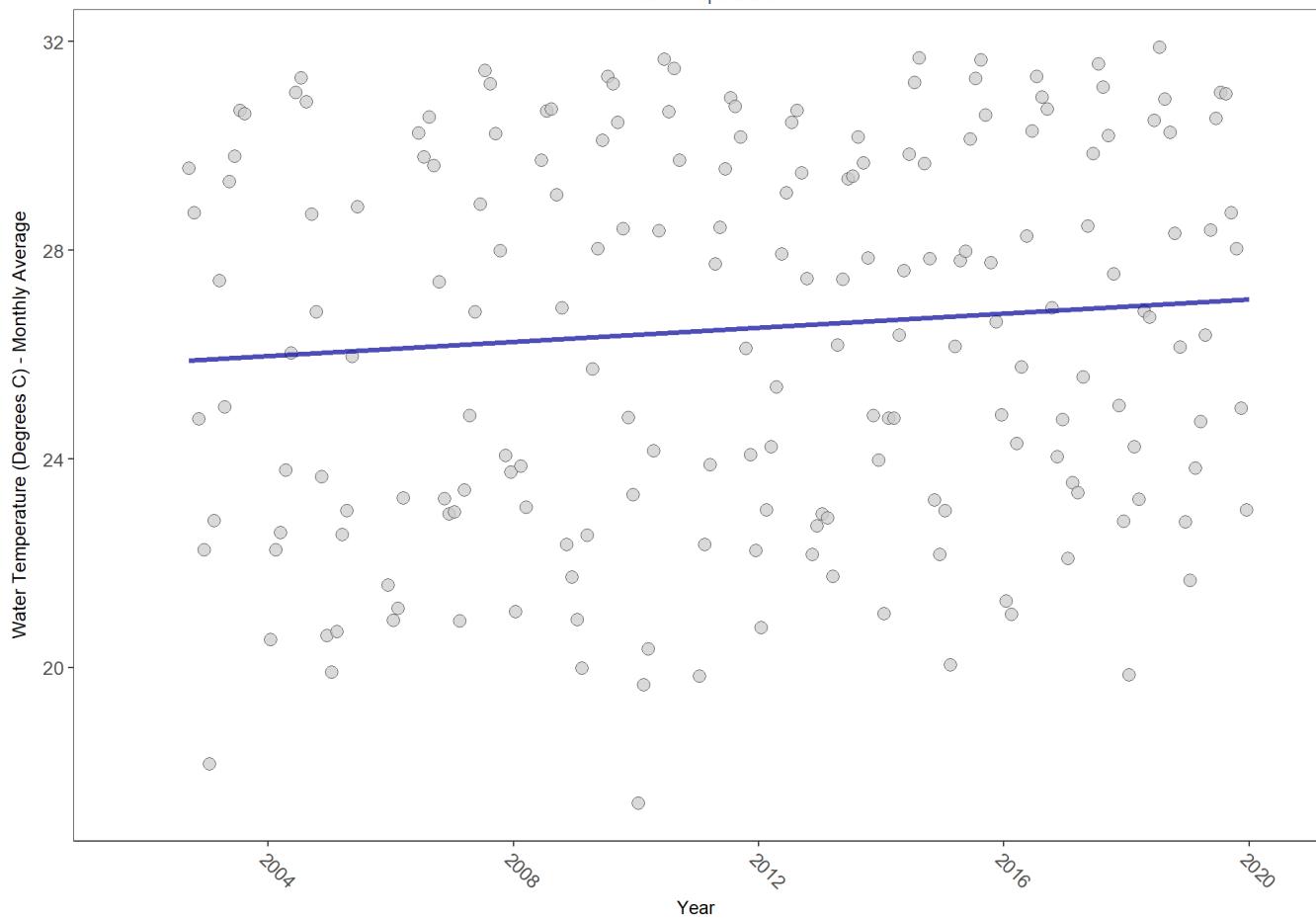
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



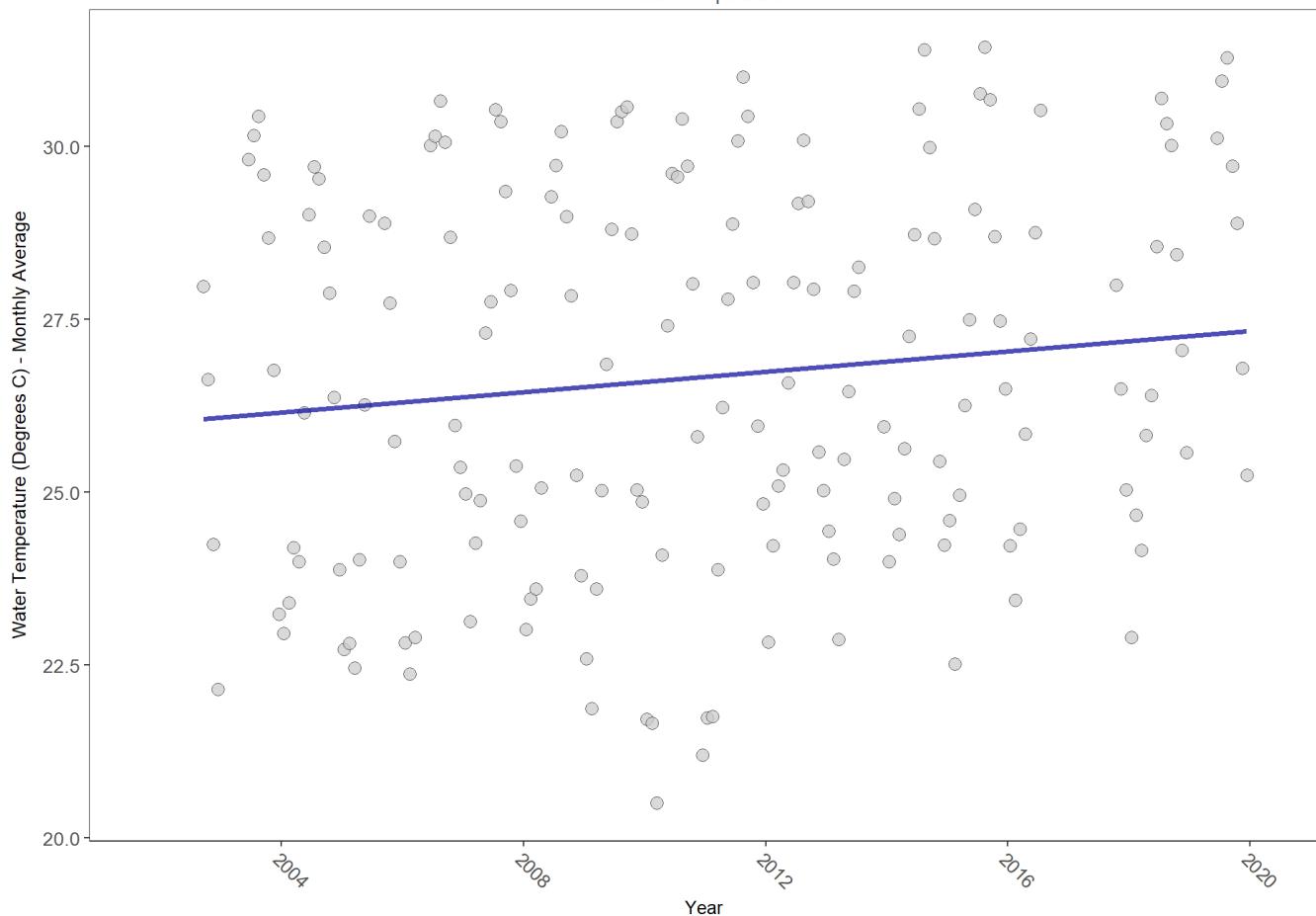
RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	136333	18	26.524	TRUE	0.2651	0.0000	0.06790575	25.84188	3.192	0.9879	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary
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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	121593	18	26.622	TRUE	0.3046	0.0000	0.07387276	26.0011	13.7133	0.2493	1

p < 0.00005 appear as 0 due to rounding.

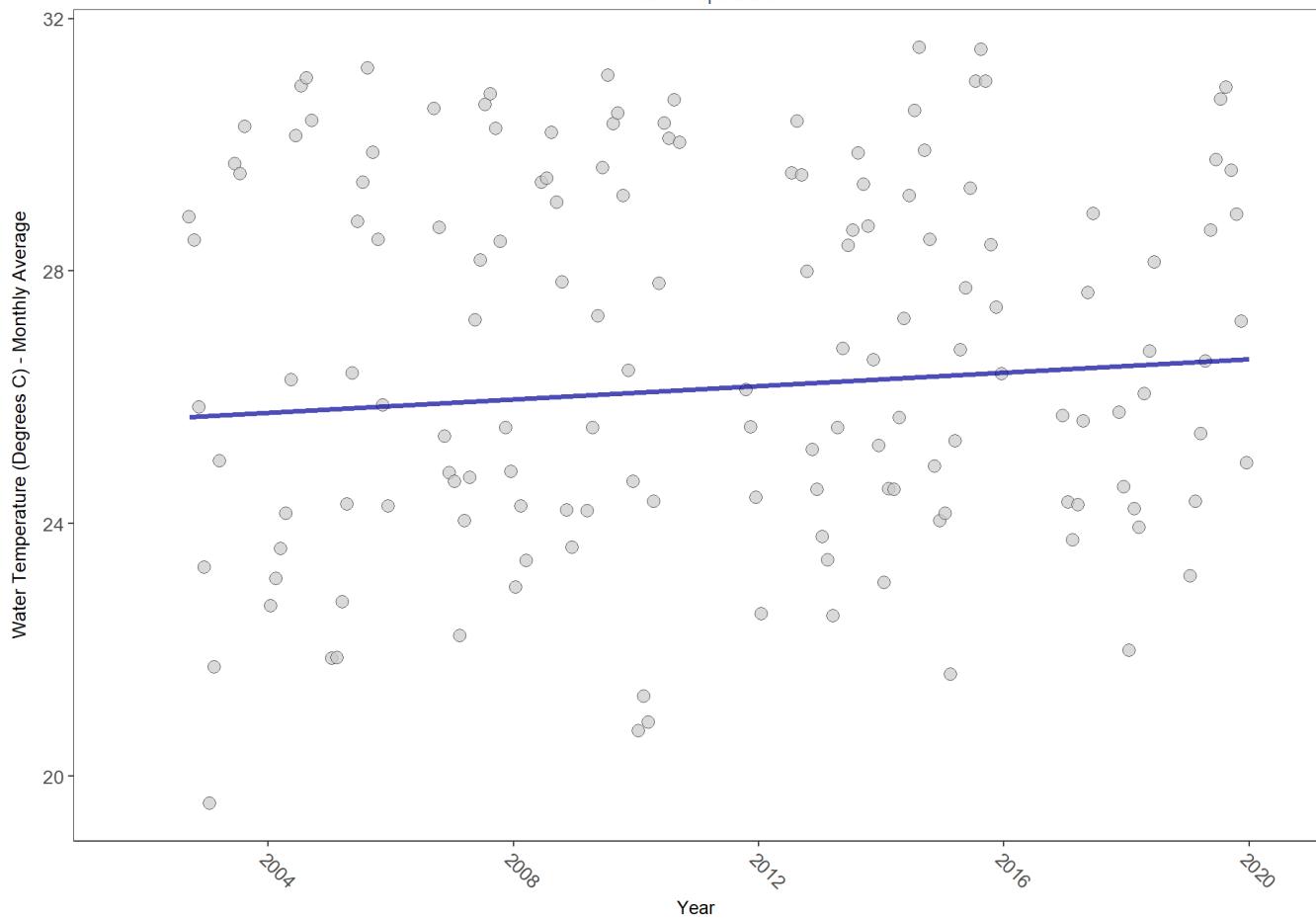
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	99735	18	26.573	TRUE	0.2419	0.0002	0.05338467	25.64436	12.6119	0.3194	1

p < 0.00005 appear as 0 due to rounding.

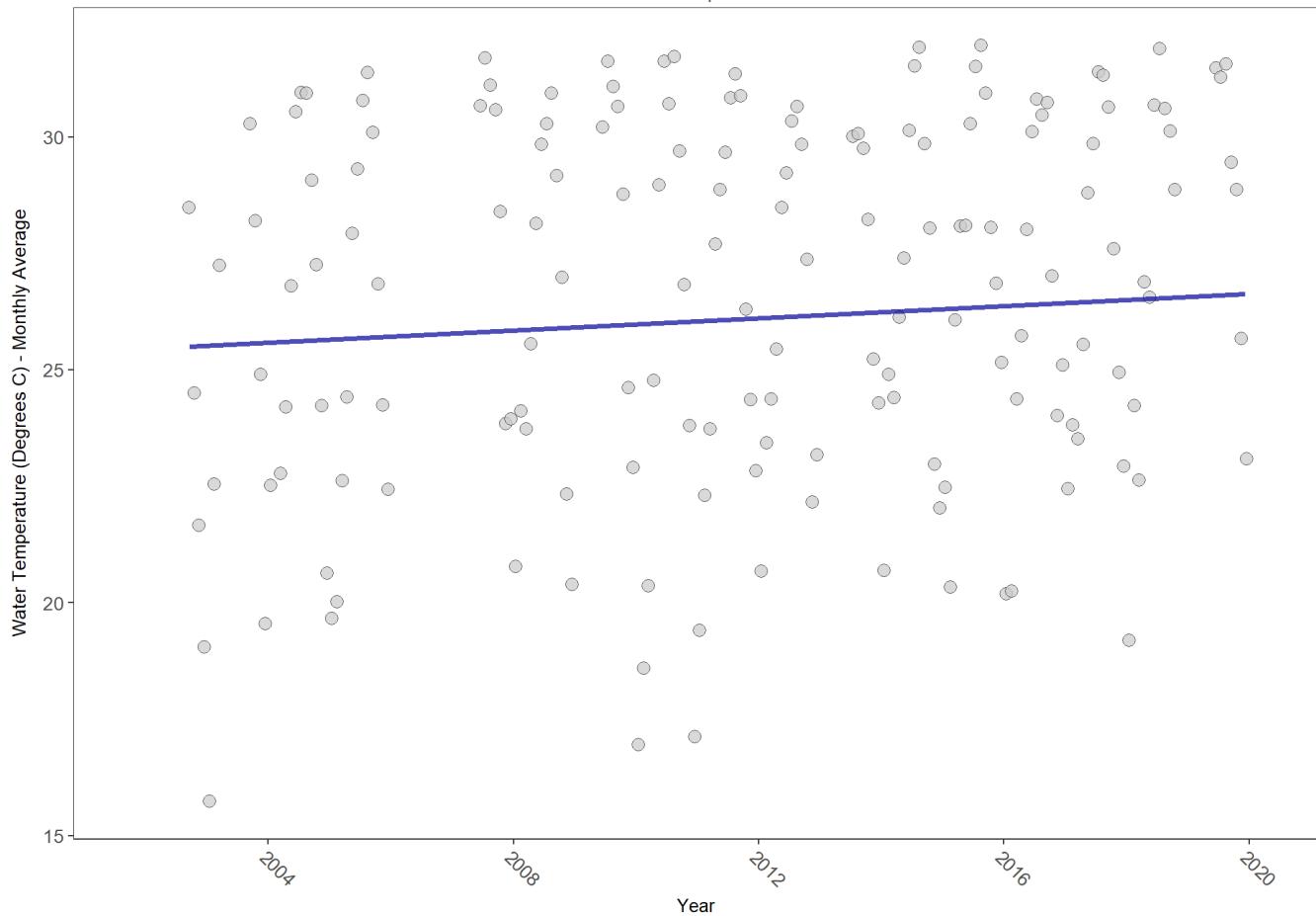
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

296

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	114497	17	27.358	TRUE	0.2115	0.0002	0.06523774	25.45089	8.3483	0.6818	1

p < 0.00005 appear as 0 due to rounding.

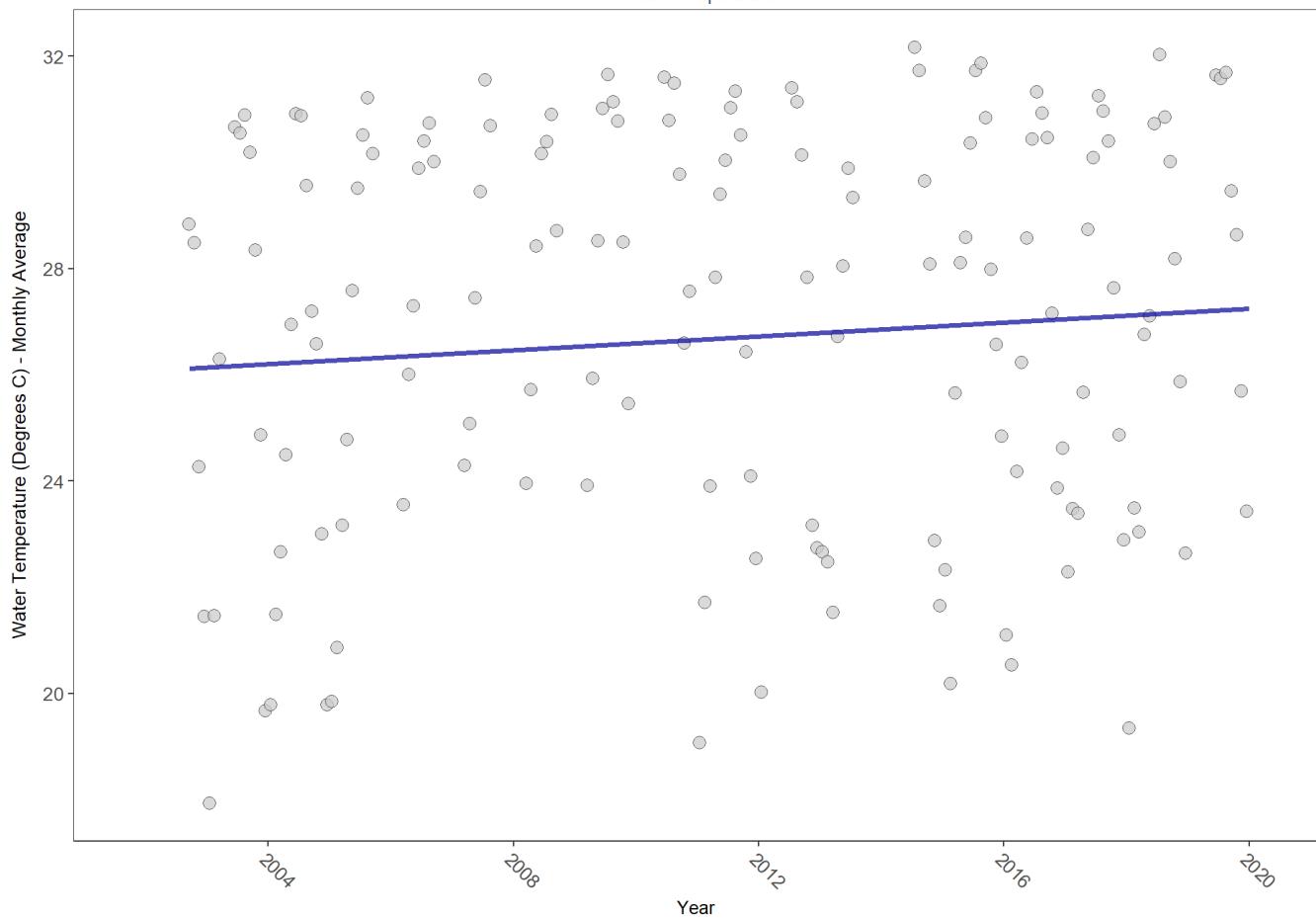
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	107410	18	27.85	TRUE	0.2706	0.0000	0.06498387	26.07065	8.1097	0.7034	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

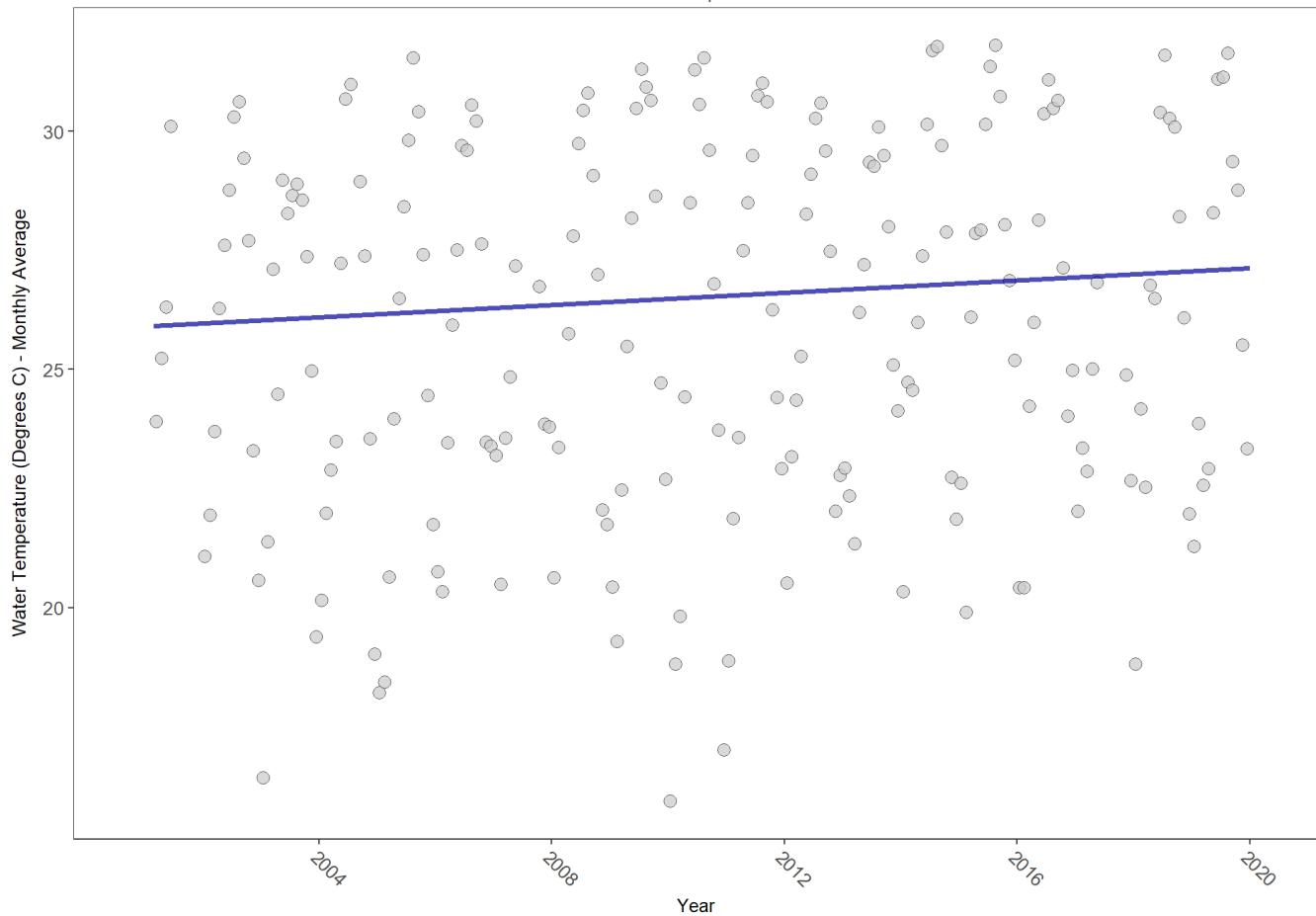
SB

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

SB

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	145514	19	26.34	TRUE	0.2279	0.0000	0.06446022	25.89885	6.6728	0.8249	1

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

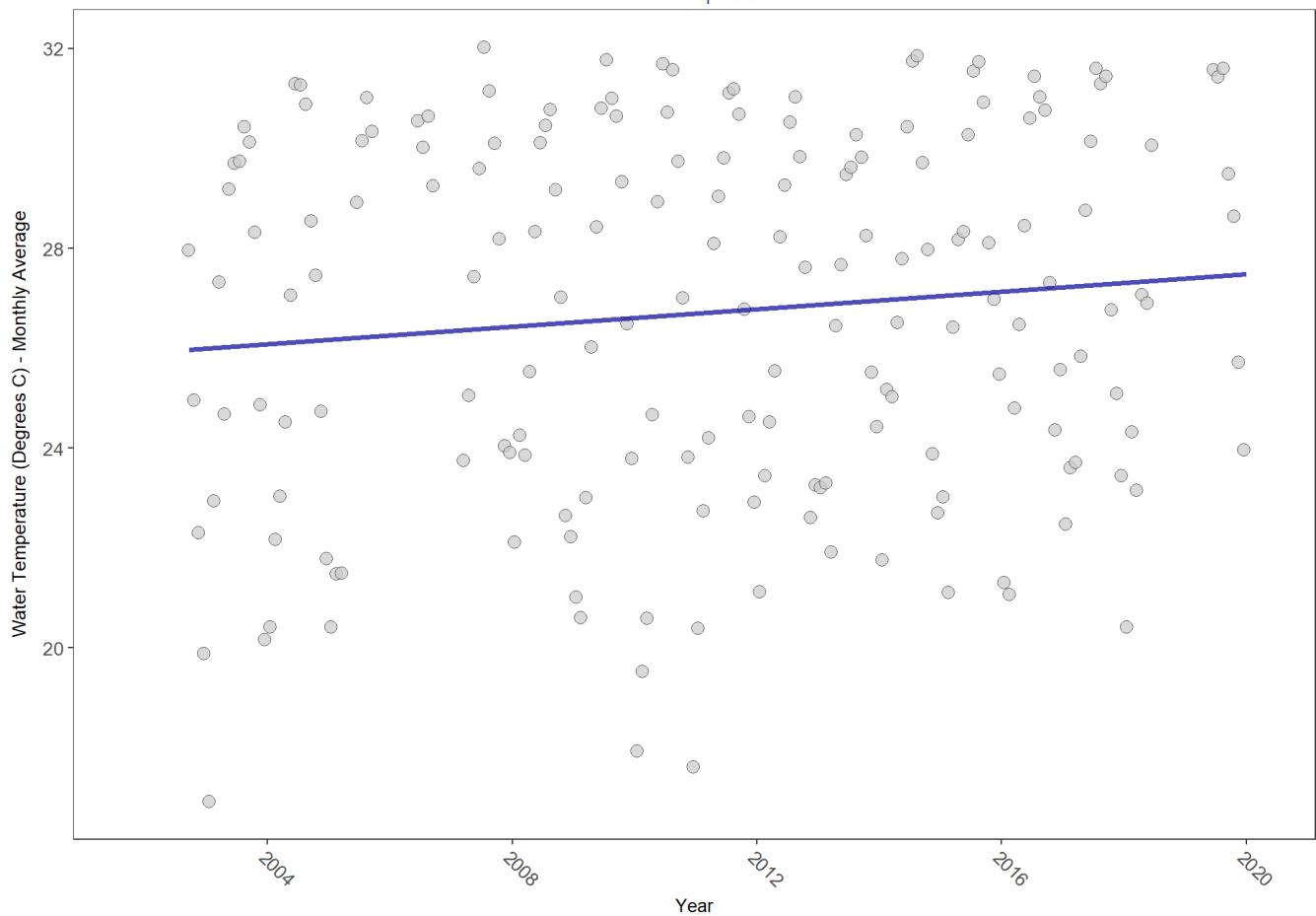
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	127914	18	27.259	TRUE	0.2701	0.0000	0.08731964	25.90535	9.8316	0.5456	1

p < 0.00005 appear as 0 due to rounding.

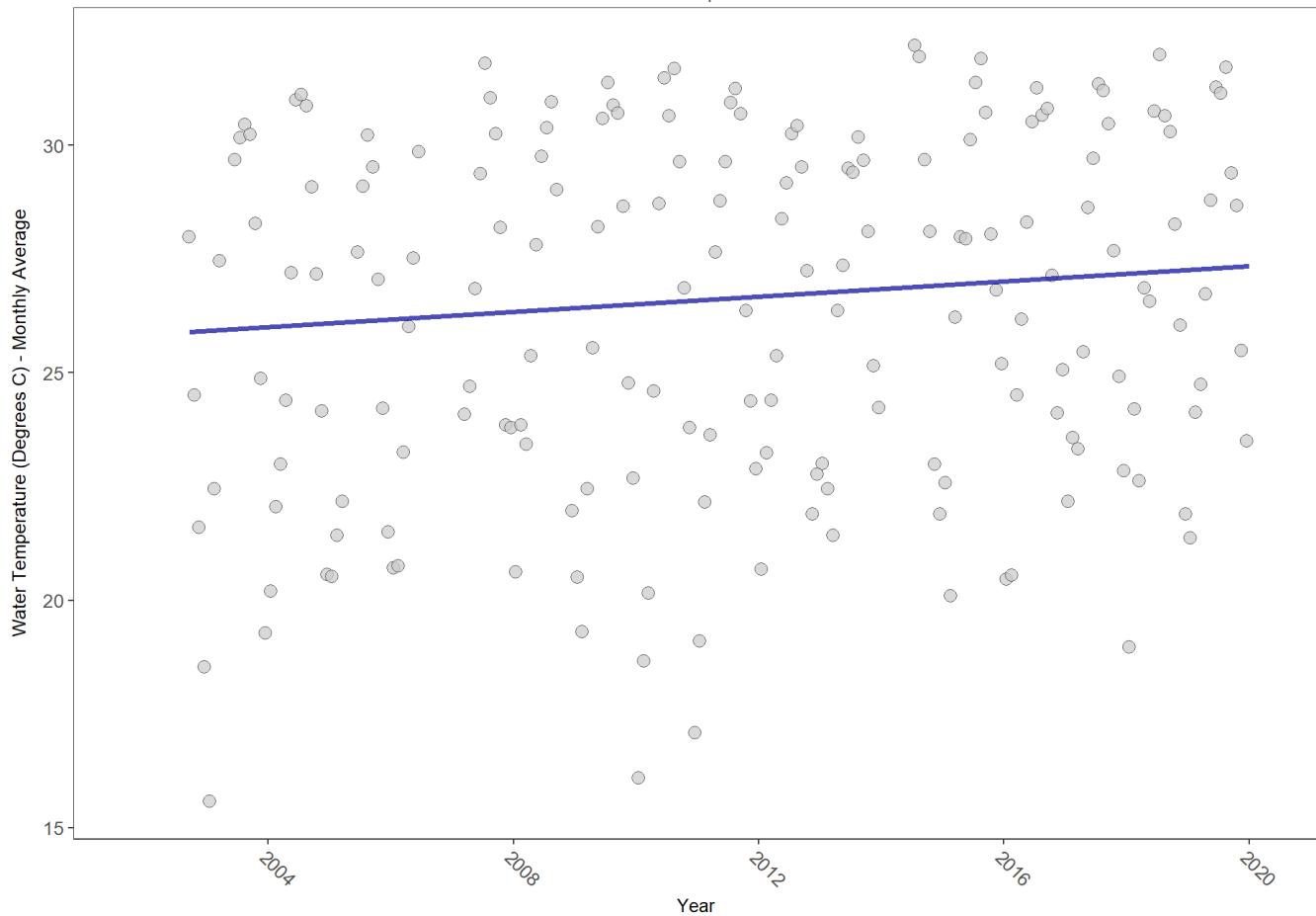
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	133008	18	26.867	TRUE	0.2861	0.0000	0.08370537	25.84179	2.8052	0.9931	1

p < 0.00005 appear as 0 due to rounding.

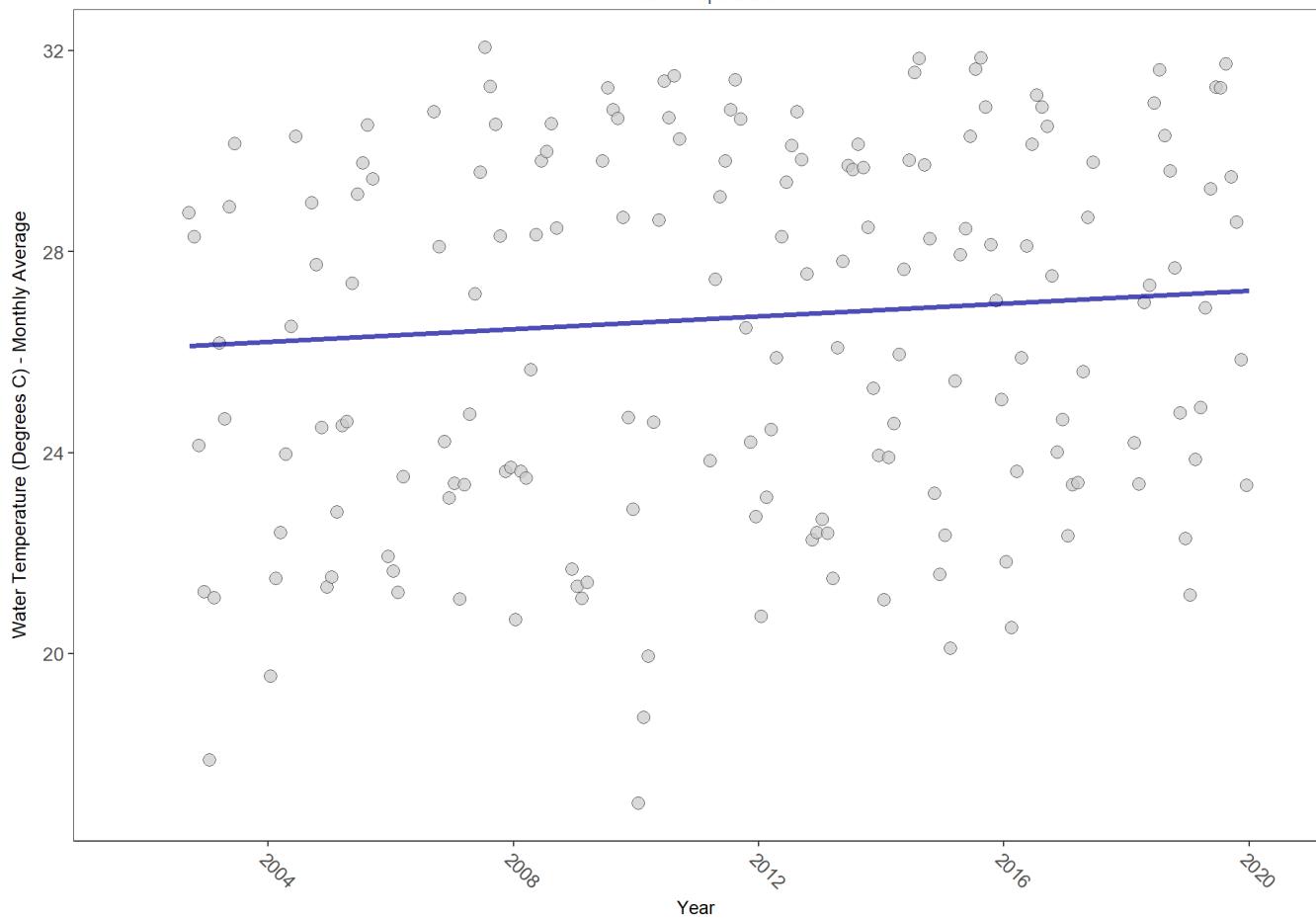
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

305

Water Temperature

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

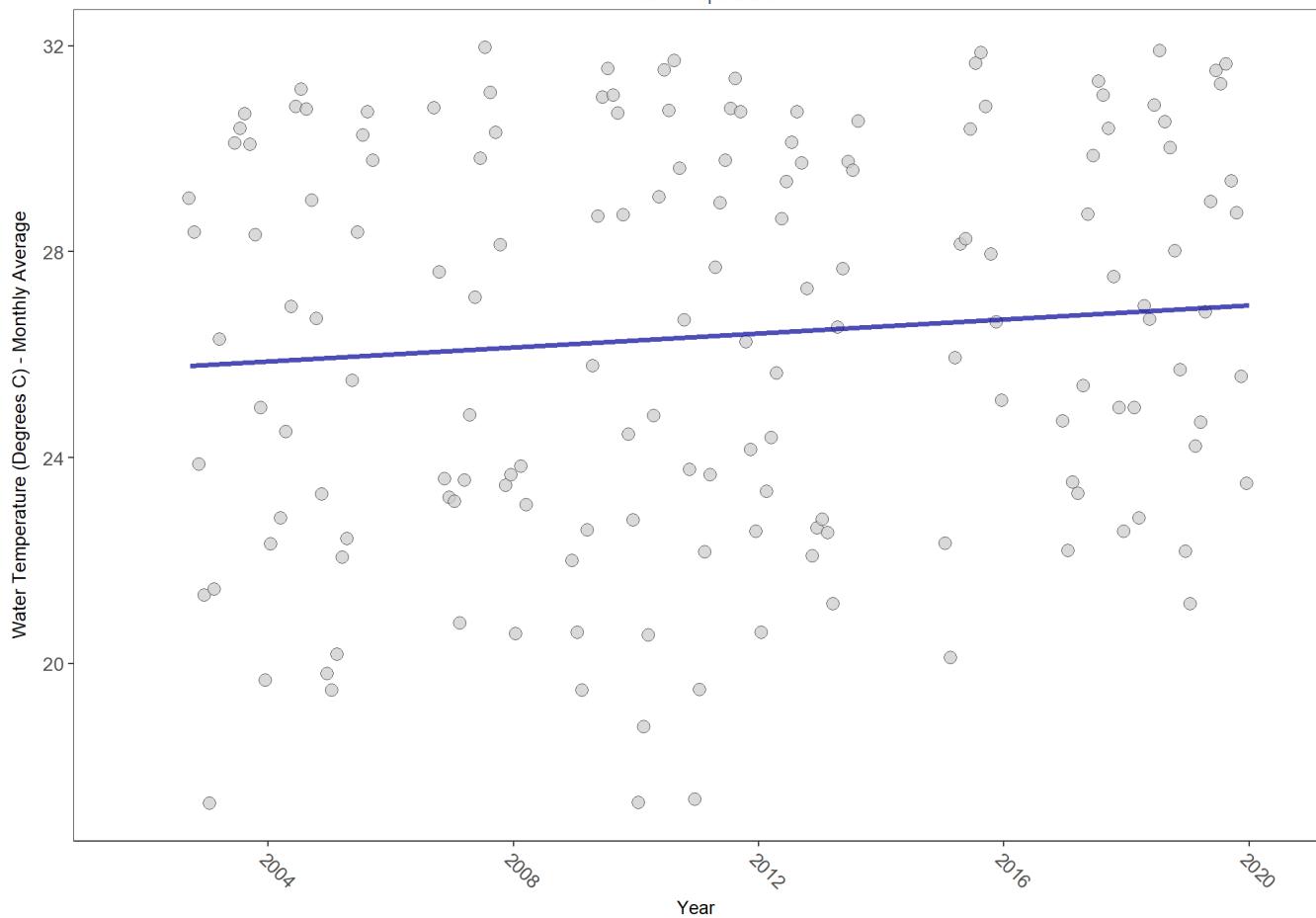
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

307

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	110802	17	26.744	TRUE	0.2233	0.0003	0.06796571	25.7301	4.7198	0.944	1

p < 0.00005 appear as 0 due to rounding.

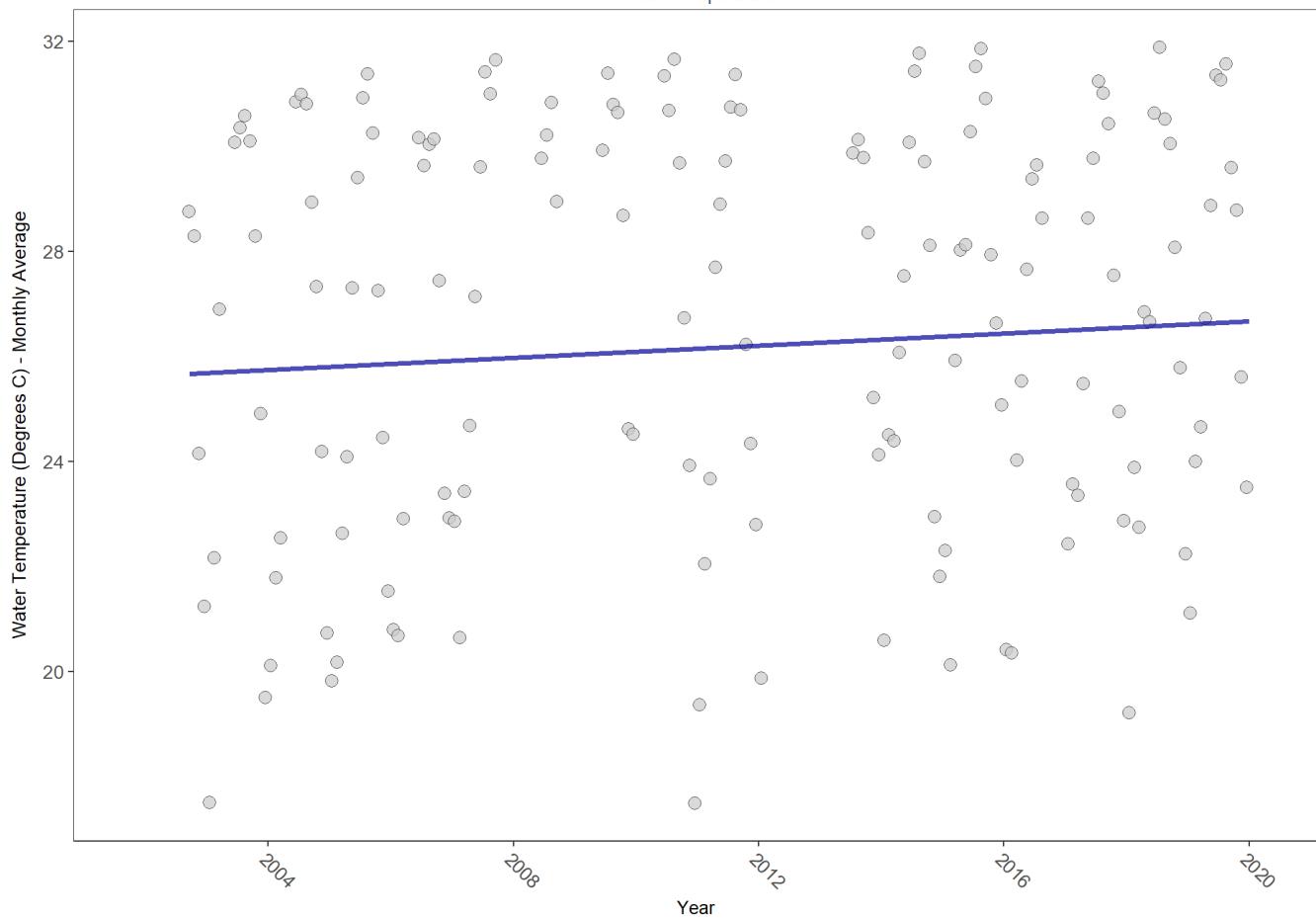
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

314

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	110686	18	27.407	TRUE	0.2273	0.0002	0.05769968	25.62588	1.9396	0.9987	1

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

SennIntercept is intercept value at beginning of record for monitoring location

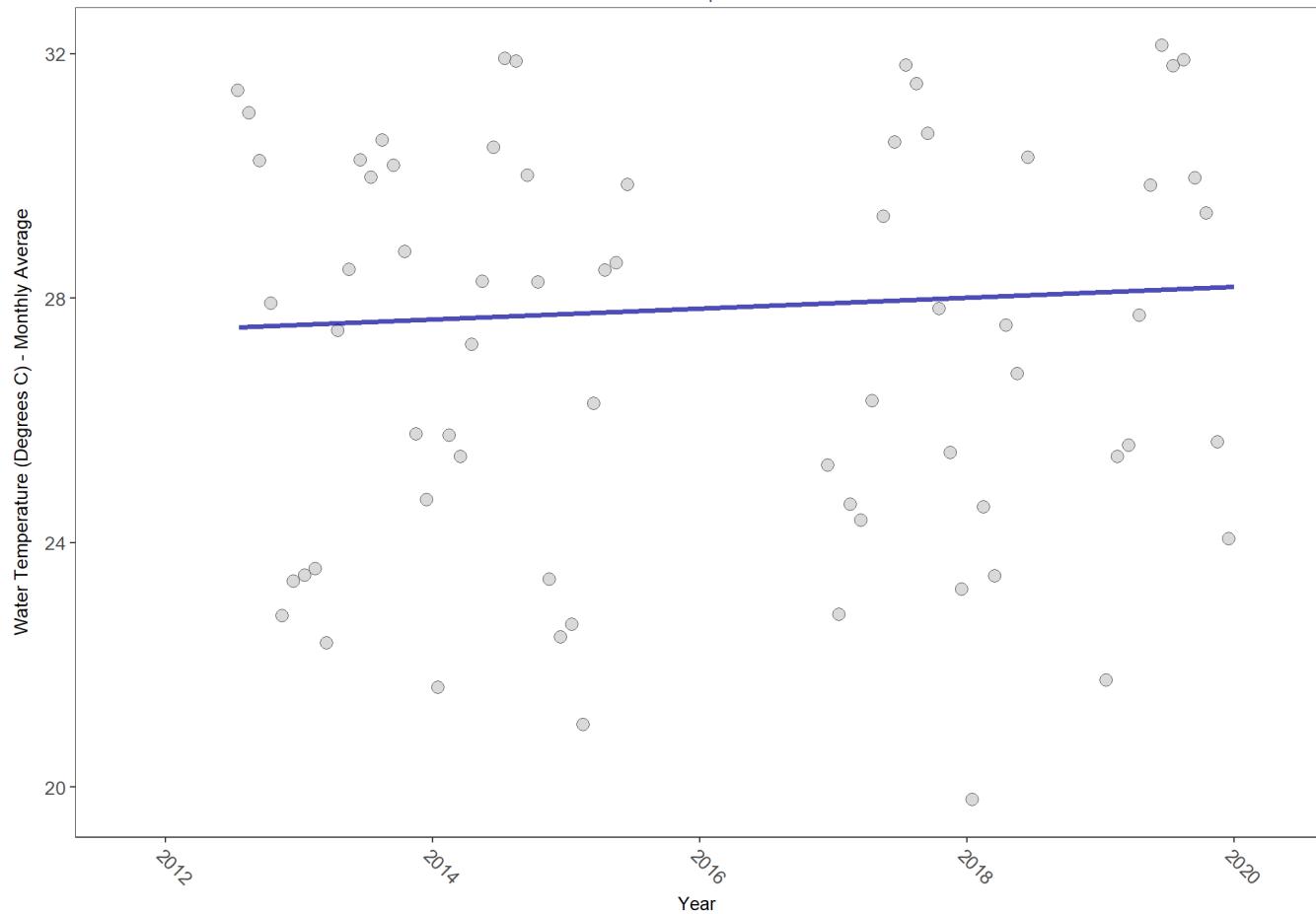
507

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

507

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	47517	8	27.358	TRUE	0.1761	0.1213	0.08753056	27.48215	6.3885	0.8462	0

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

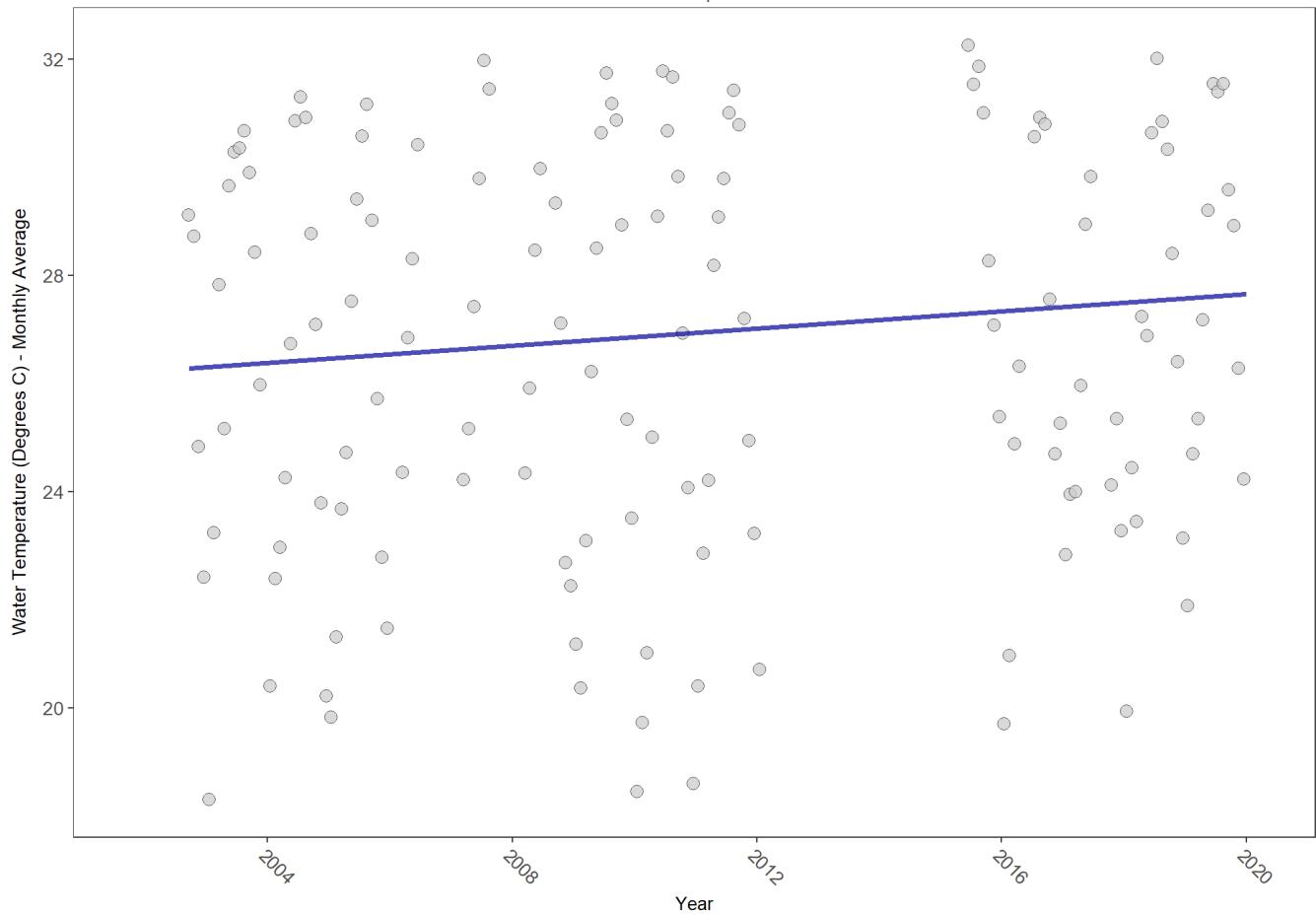
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

260

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	97832	16	27.07	TRUE	0.2835	0.0000	0.07969436	26.22474	4.7505	0.9426	1

p < 0.00005 appear as 0 due to rounding.

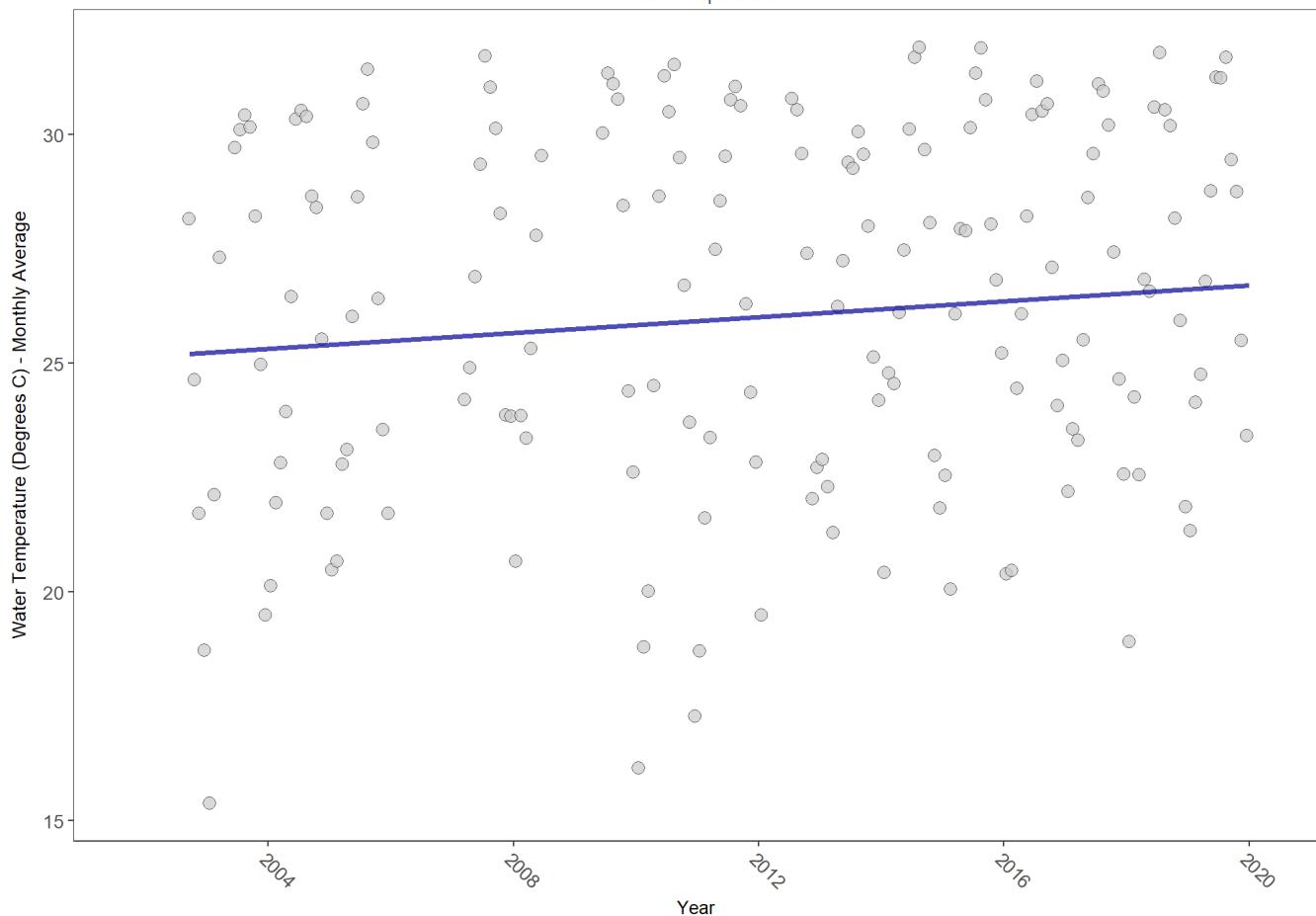
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

284

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	123977	17	26.86	TRUE	0.2841	0.0000	0.08647849	25.1442	4.5665	0.9503	1

p < 0.00005 appear as 0 due to rounding.

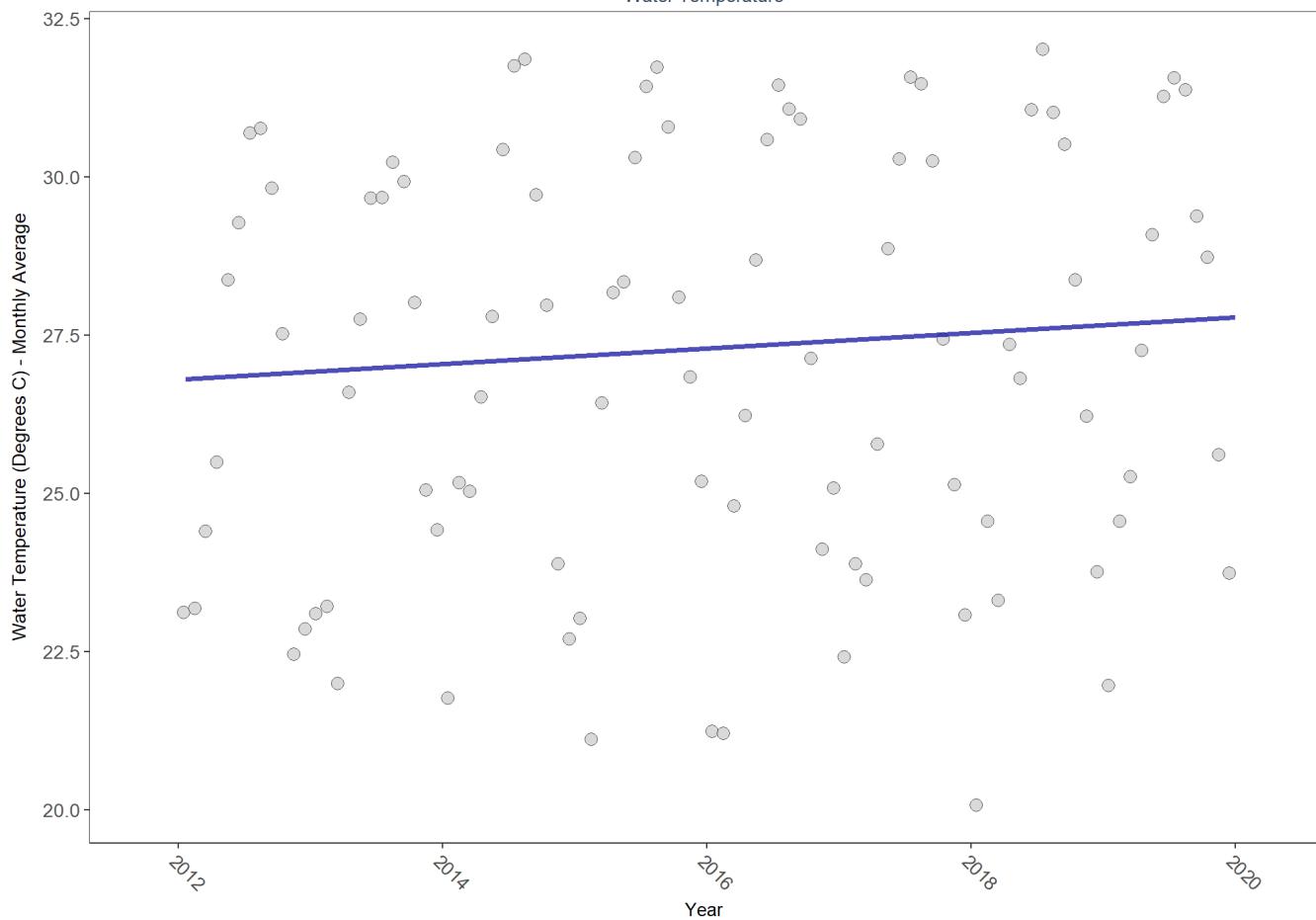
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

500

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	69048	8	27.333	TRUE	0.2262	0.0074	0.1235079	26.79371	14.0612	0.2296	1

p < 0.00005 appear as 0 due to rounding.

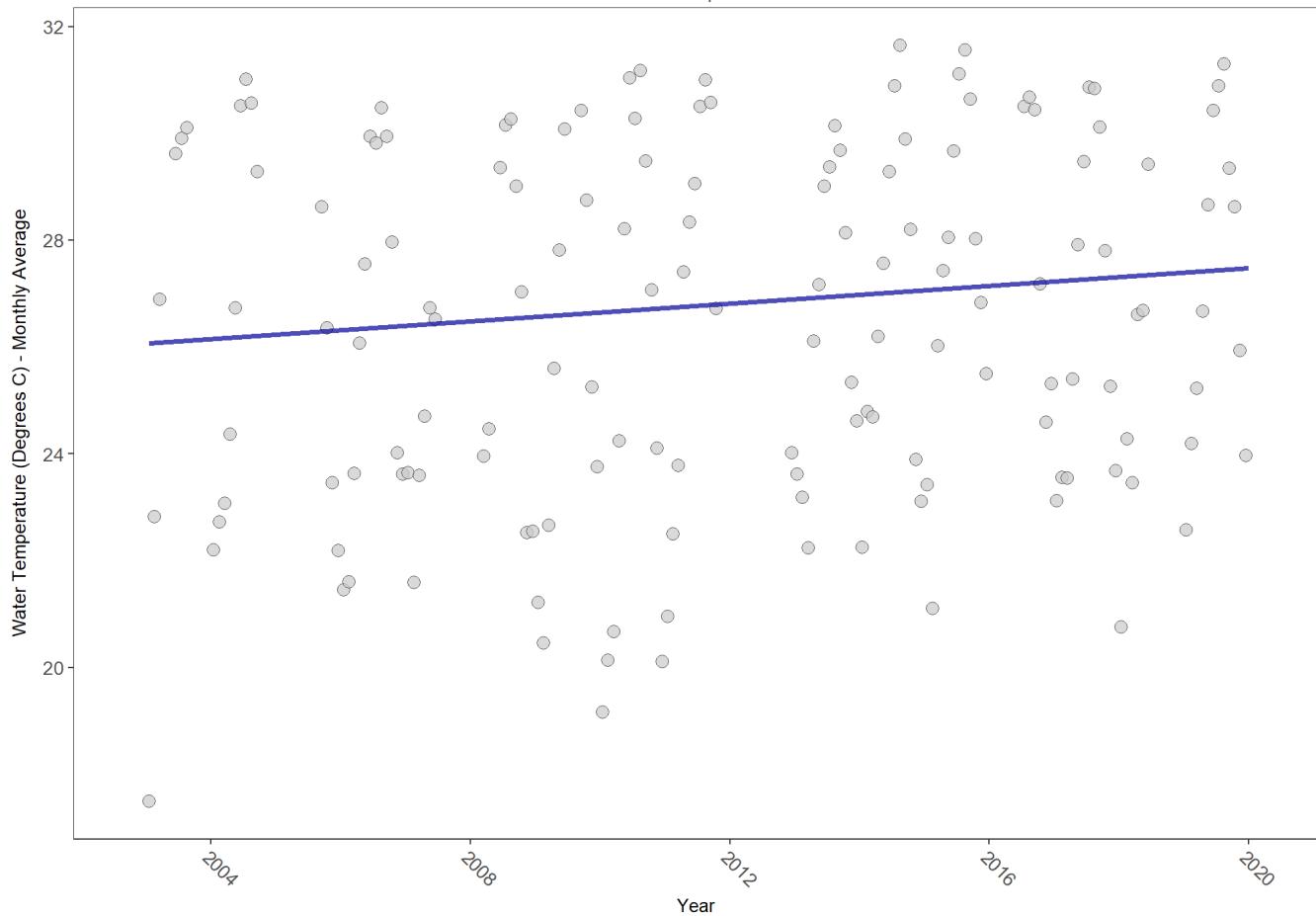
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

227

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	105351	17	26.671	TRUE	0.2885	0.0000	0.08291935	26.06209	5.9567	0.8762	1

p < 0.00005 appear as 0 due to rounding.

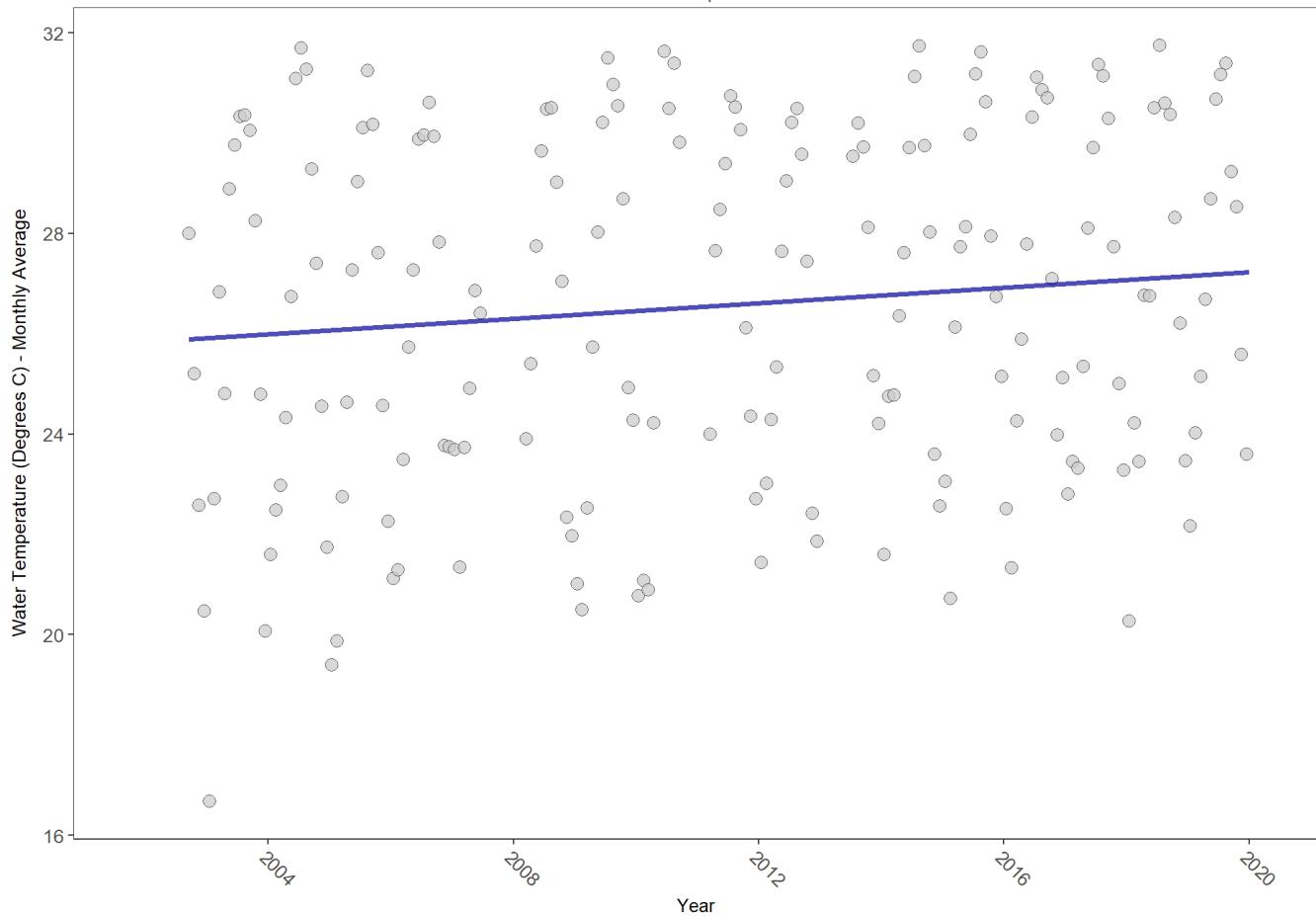
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

223

Water Temperature



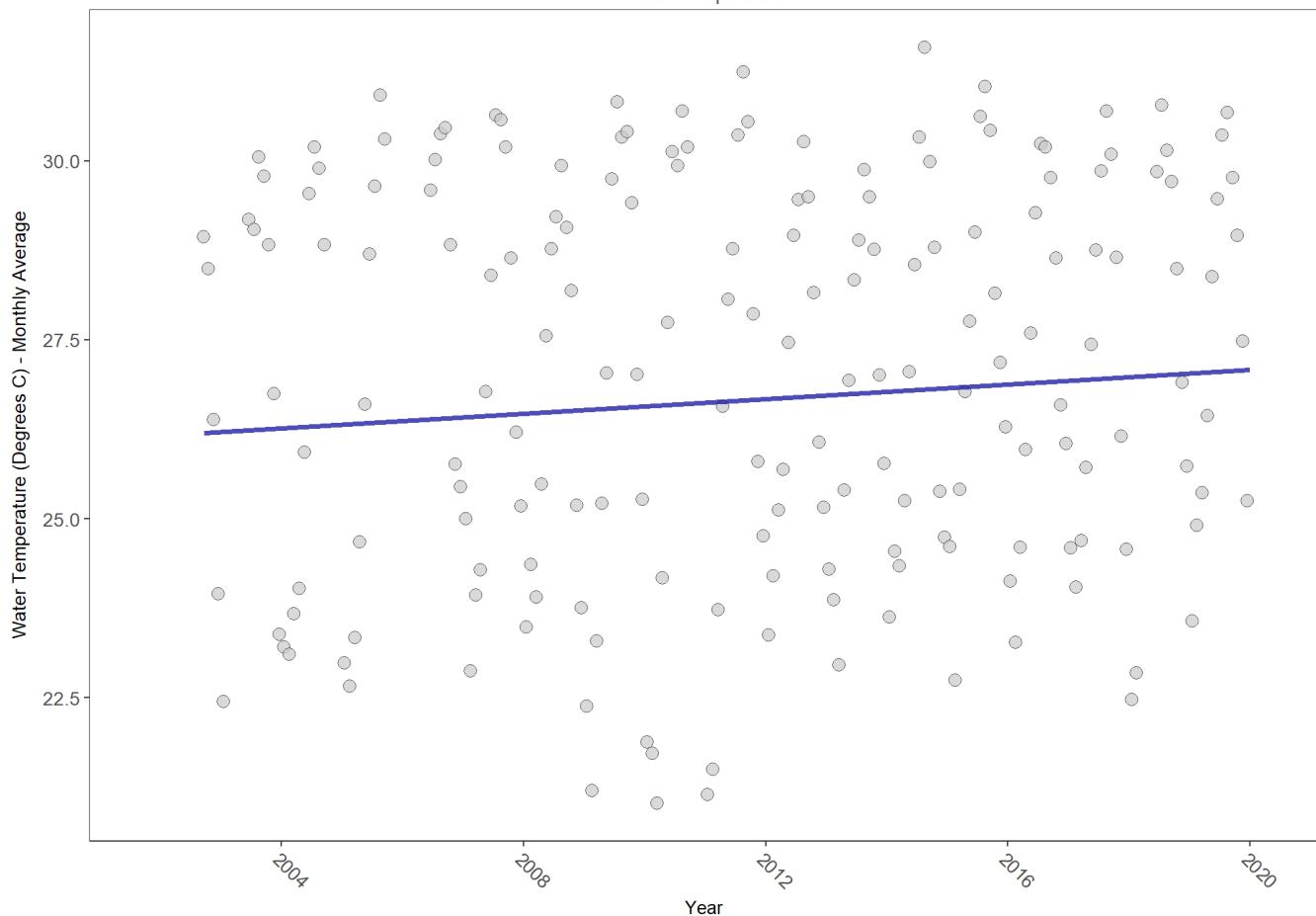
RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	133082	18	26.891	TRUE	0.2974	0.0000	0.07737063	25.84244	3.2998	0.9861	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary
273
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	129817	18	27.161	TRUE	0.2352	0.0000	0.05125701	26.16077	7.9713	0.7159	1

p < 0.00005 appear as 0 due to rounding.

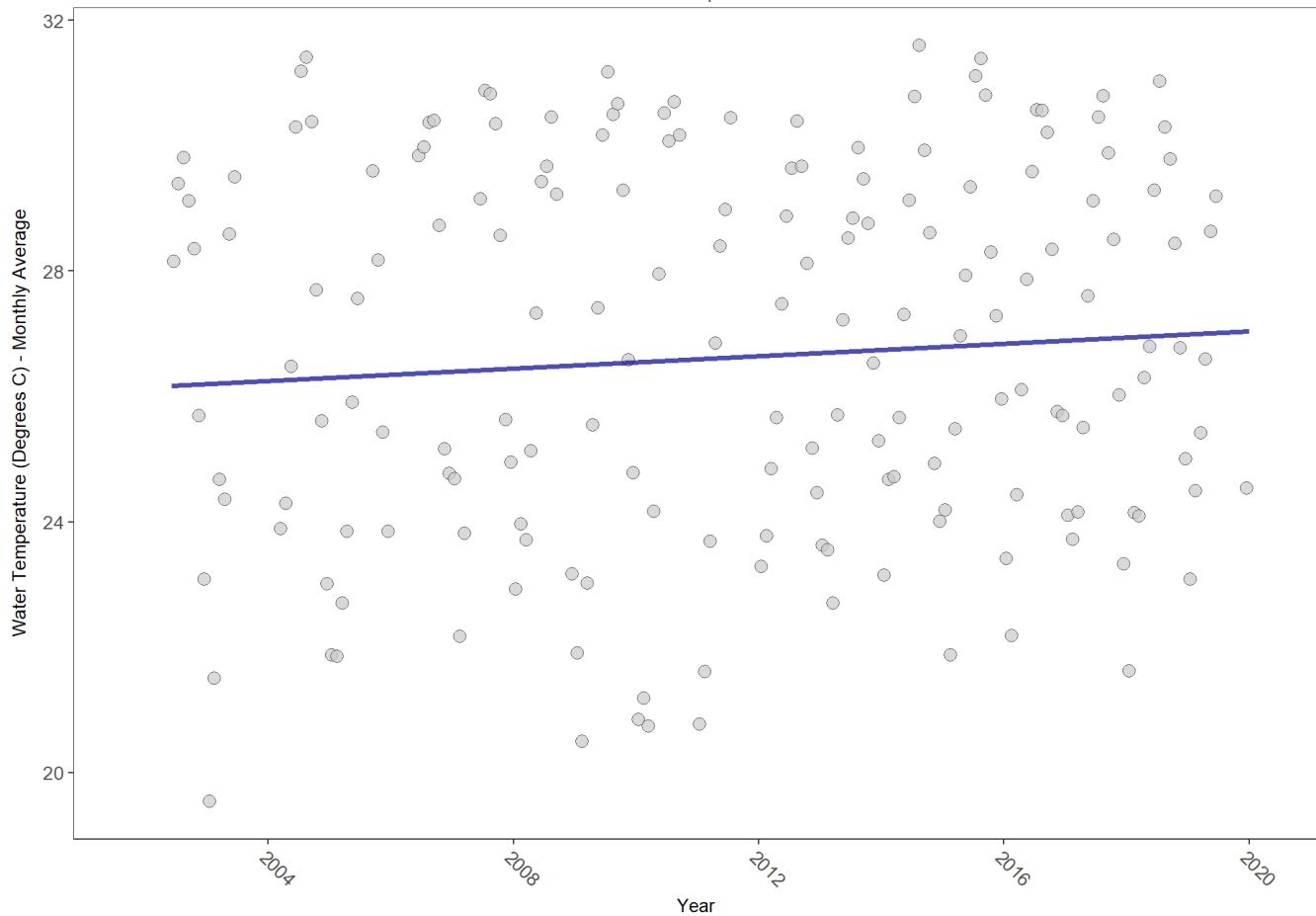
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	123833	18	26.867	TRUE	0.2119	0.0002	0.04940267	26.14803	9.2227	0.6013	1

p < 0.00005 appear as 0 due to rounding.

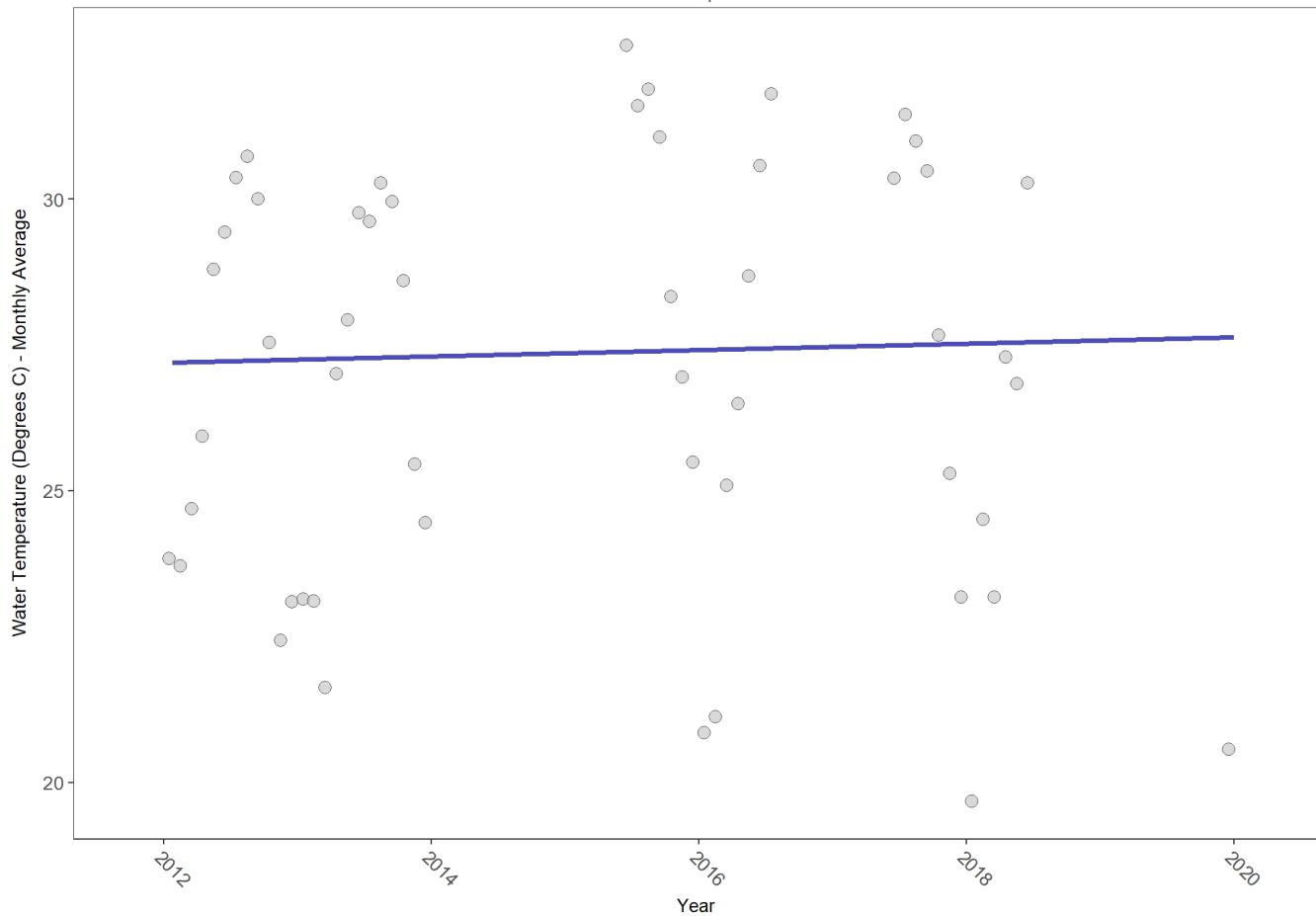
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

506

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	35198	7	27.407	TRUE	0.0423	0.7350	0.05413737	27.20107	10.6559	0.4725	0

p < 0.00005 appear as 0 due to rounding.

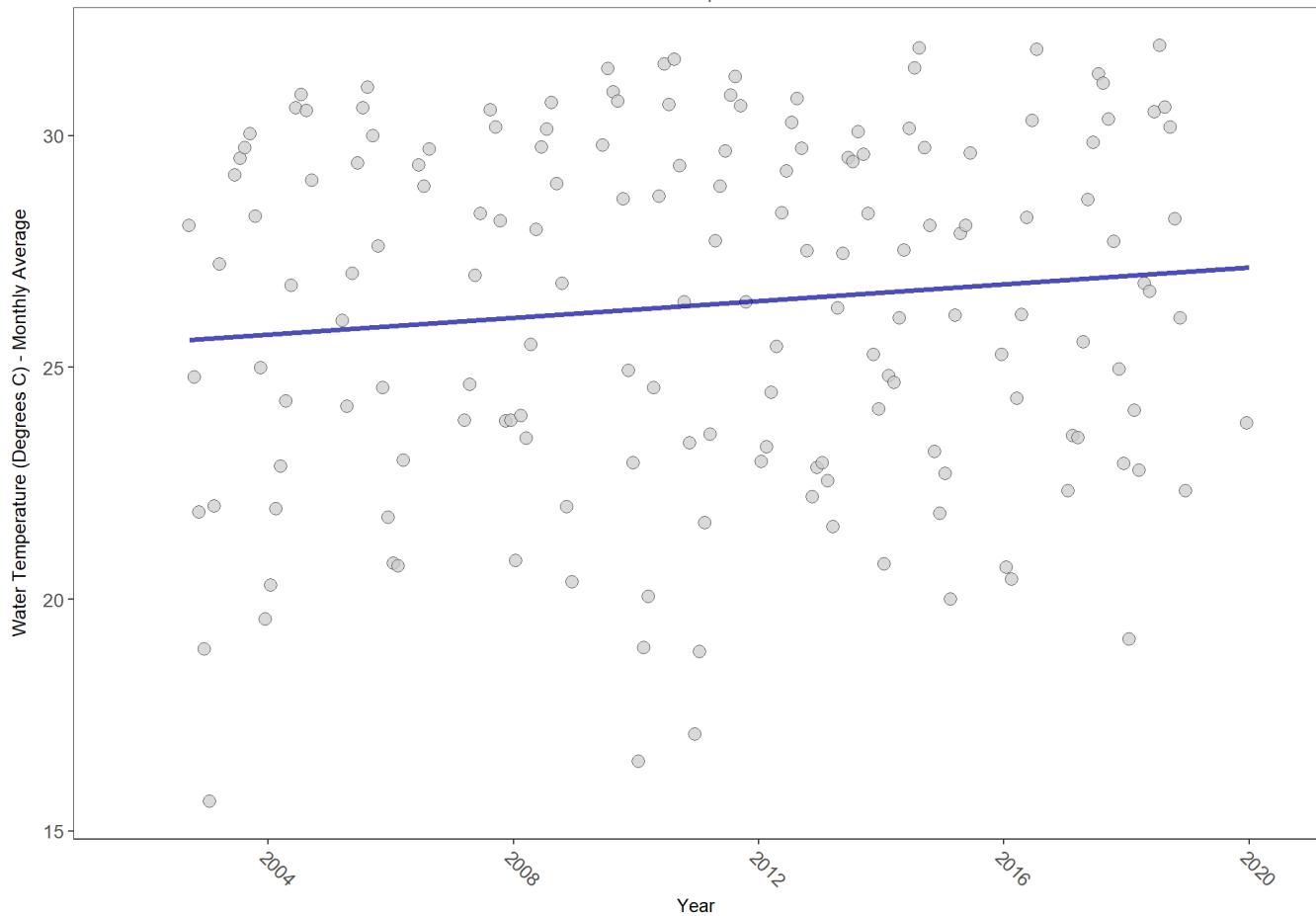
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature

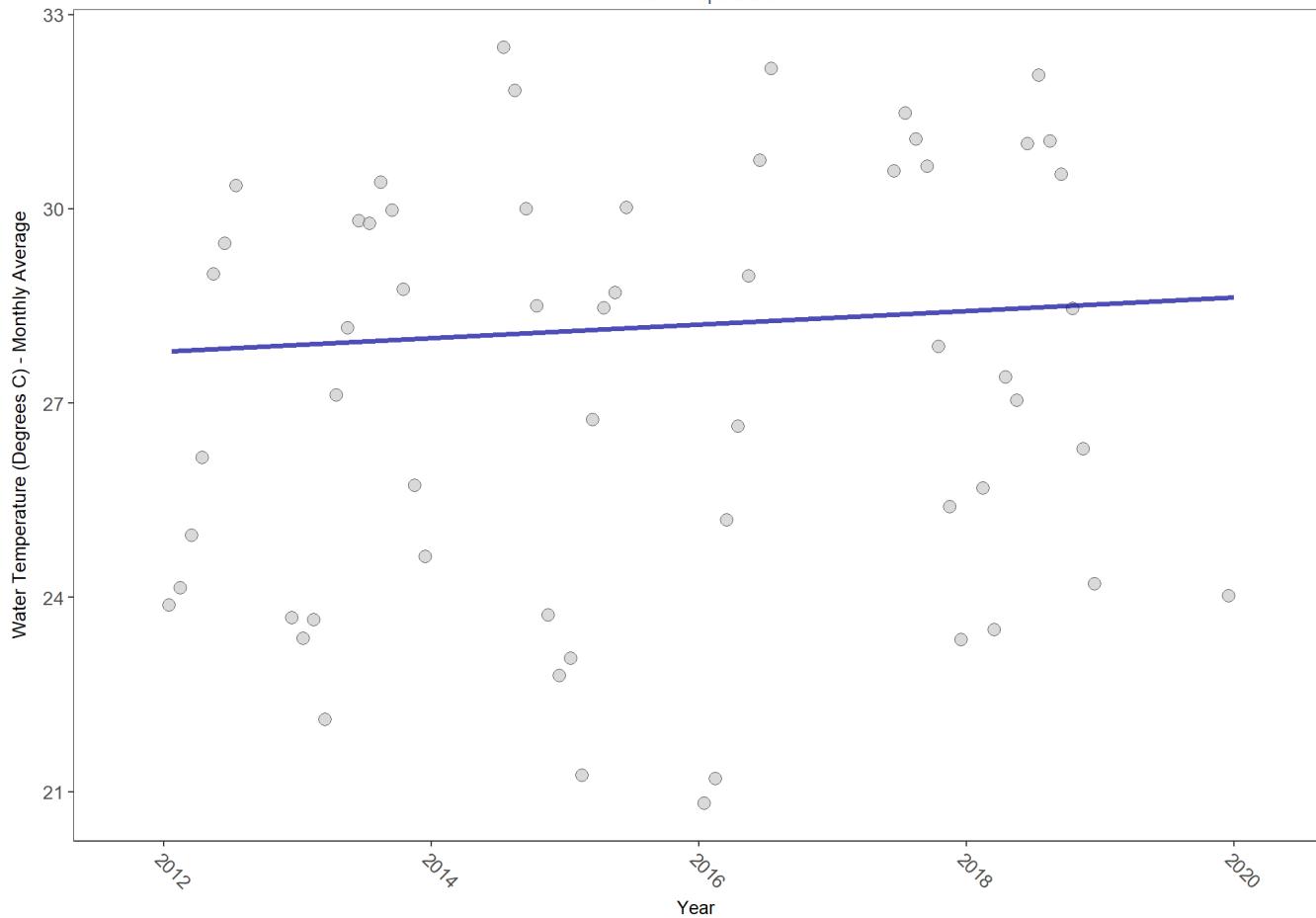


Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

509

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	38607	8	27.702	TRUE	0.054	0.4739	0.1050424	27.79451	16.6346	0.1192	0

p < 0.00005 appear as 0 due to rounding.

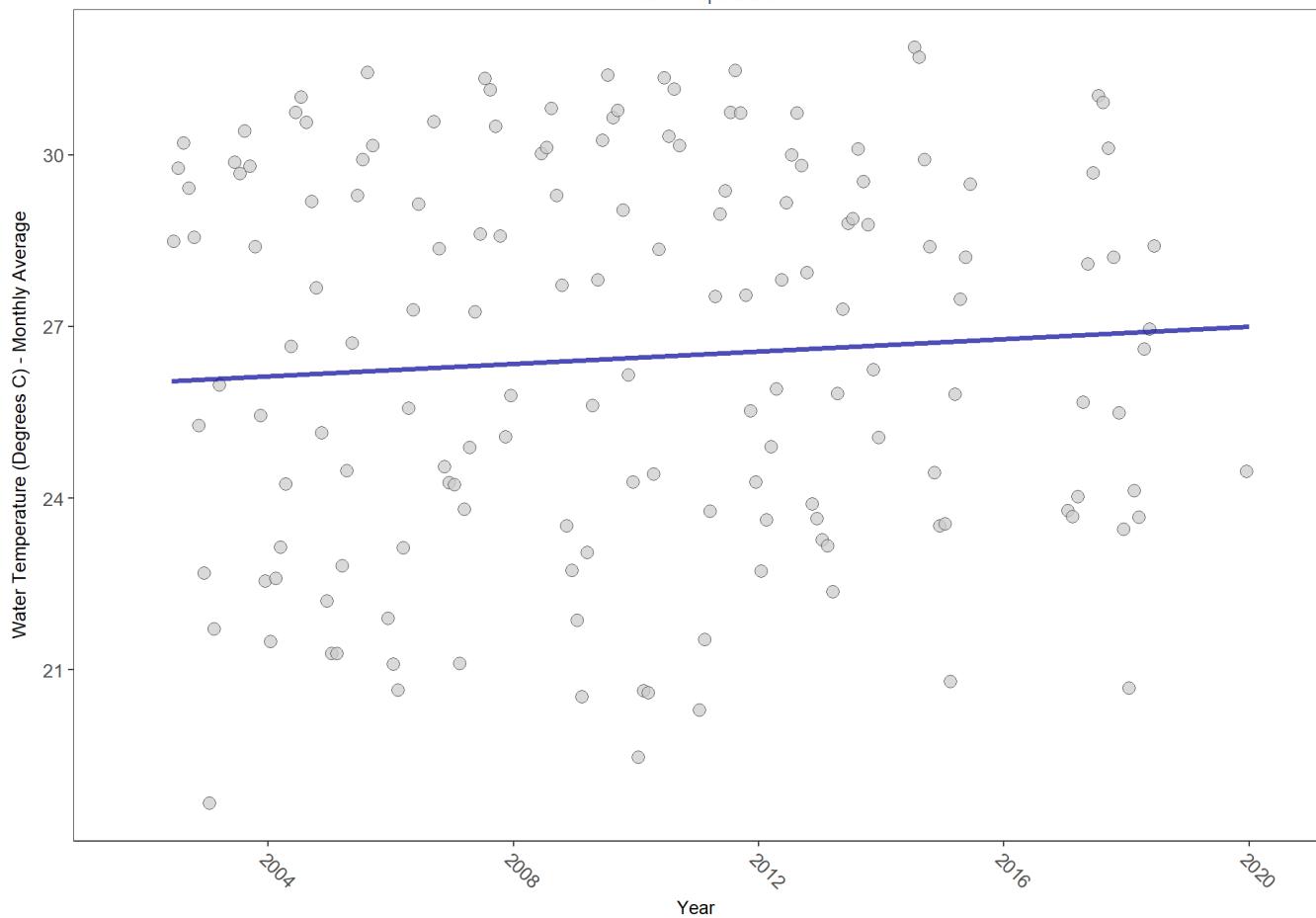
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	106458	17	26.744	TRUE	0.205	0.0010	0.05415323	26.02084	7.807	0.7305	1

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

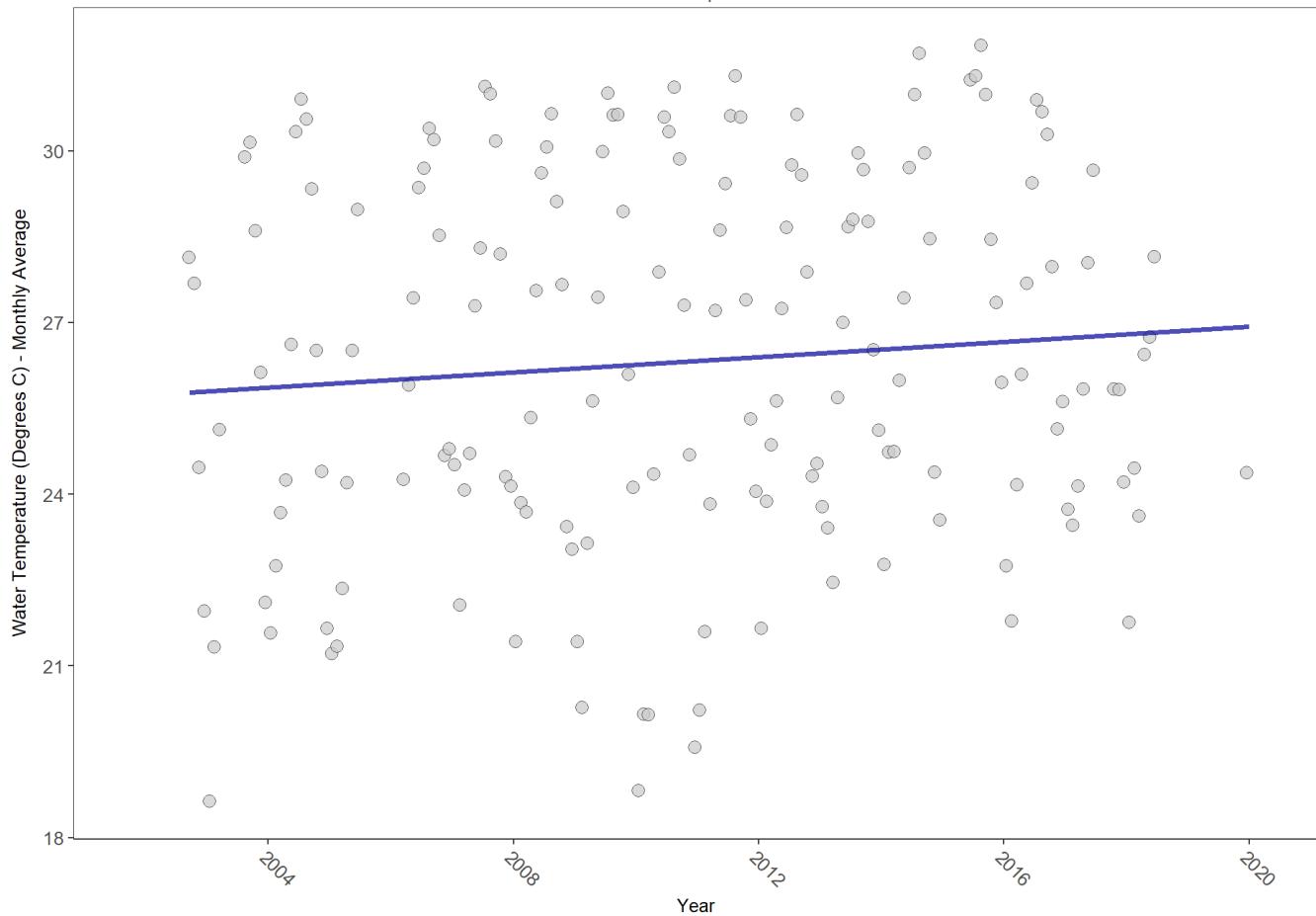
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



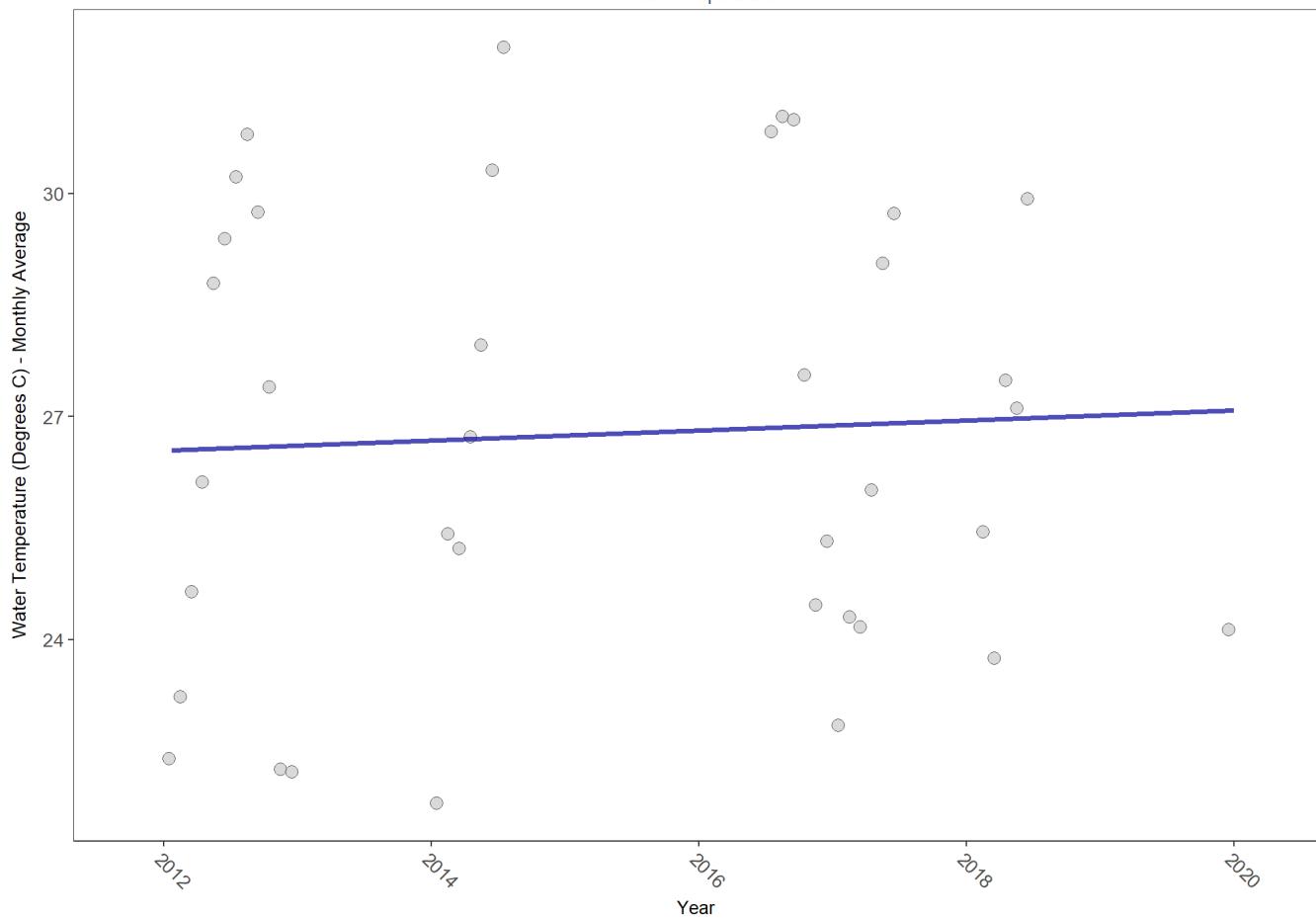
RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	119939	18	26.353	TRUE	0.2422	0.0000	0.06615269	25.73331	12.2917	0.3421	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary
508
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	24021	6	26.671	TRUE	0.3333	0.2949	0.06728857	26.54148	6.644	0.8271	0

p < 0.00005 appear as 0 due to rounding.

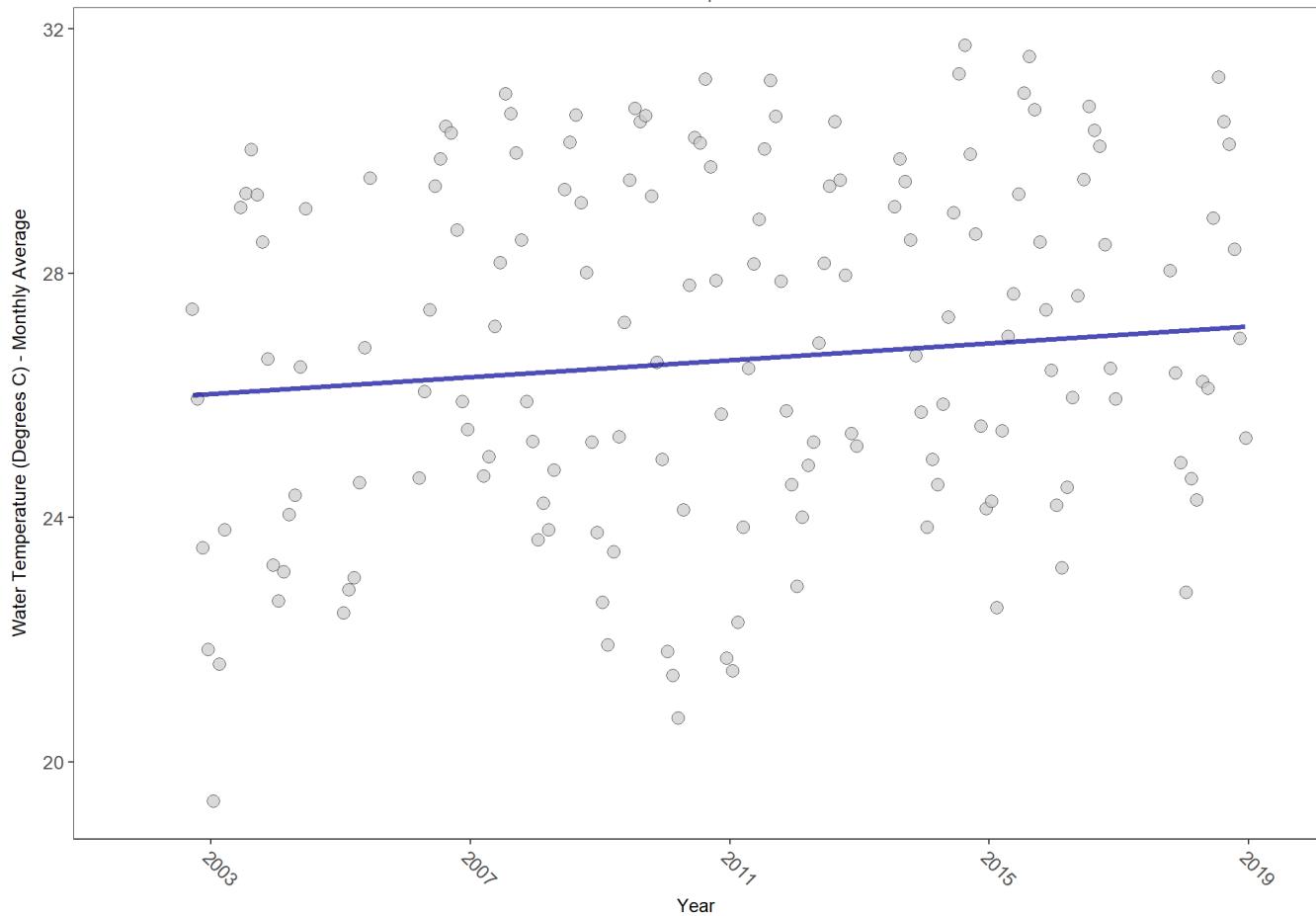
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	111523	17	26.916	TRUE	0.2436	0.0001	0.06853495	25.95916	7.1798	0.7843	1

p < 0.00005 appear as 0 due to rounding.

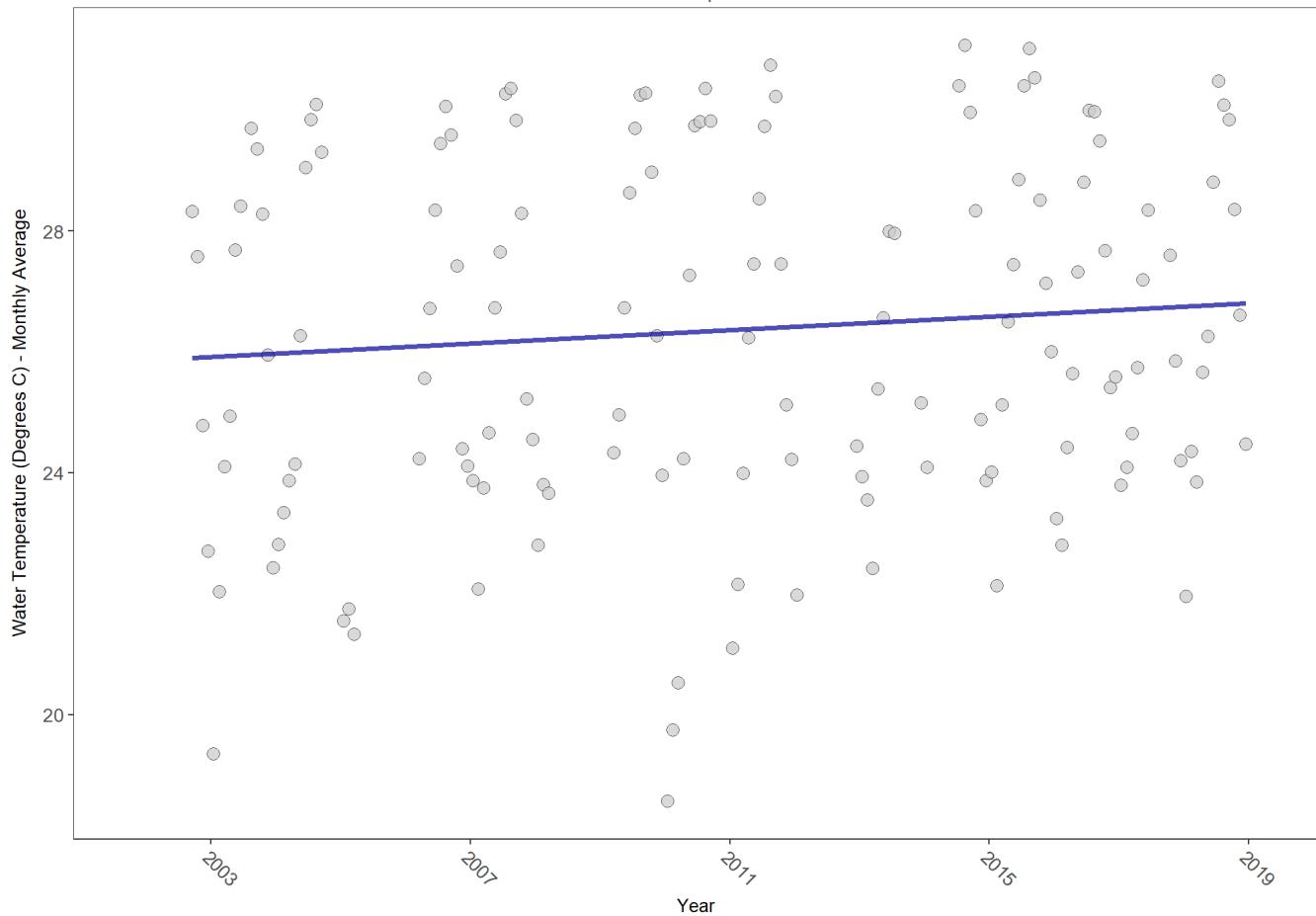
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



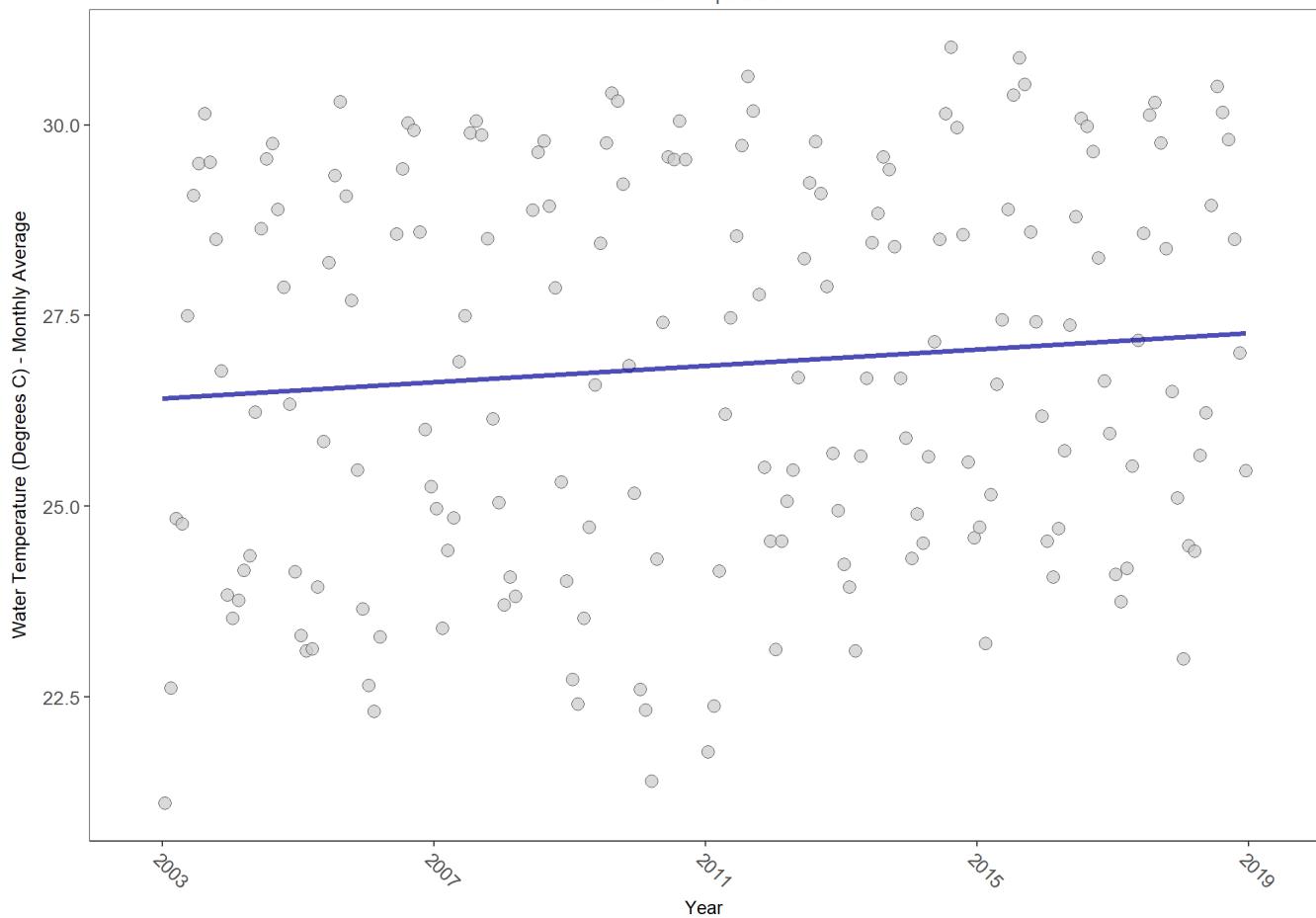
RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	98535	17	26.256	TRUE	0.3058	0.0000	0.05565638	25.8586	5.8143	0.8855	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary
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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	133286	16	26.74	TRUE	0.2618	0.0000	0.0534747	26.41753	6.0363	0.8709	1

p < 0.00005 appear as 0 due to rounding.

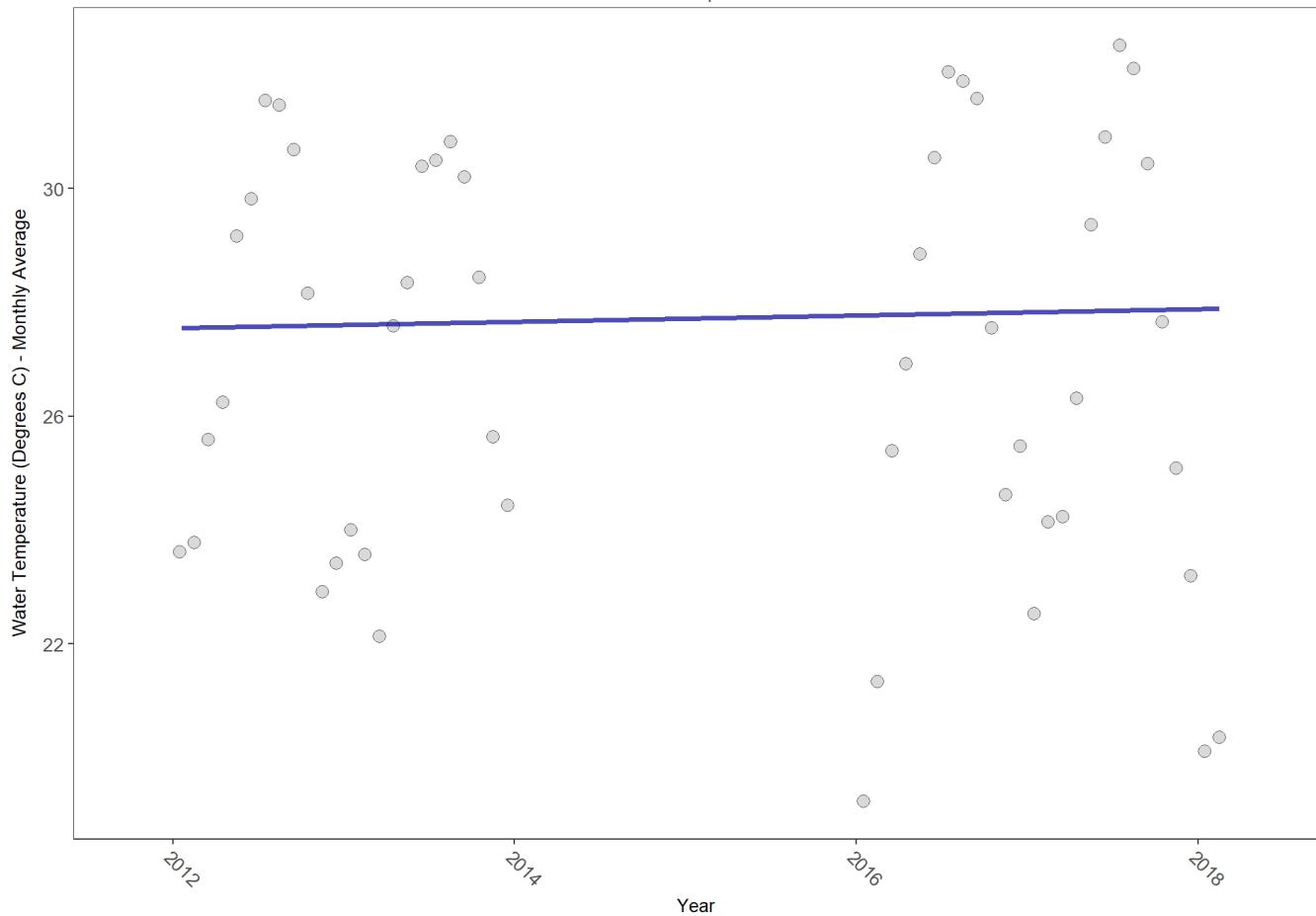
SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary Seagrass Monitoring Project (296)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	34805	5	27.481	TRUE	0.1067	0.6481	0.05455266	27.54878	10.9609	0.4465	0

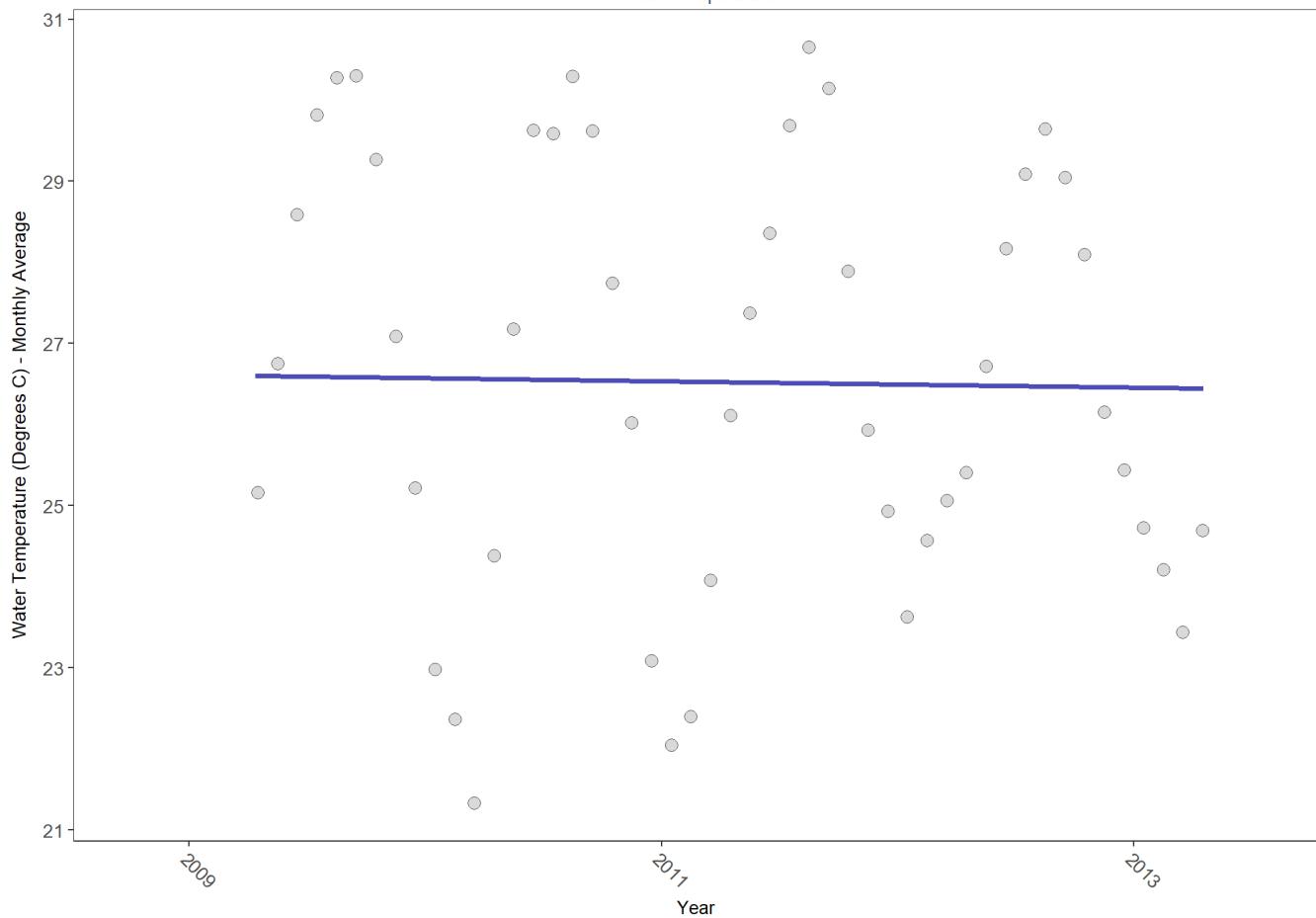
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Molasses

USGS Coral Reef Ecosystem Studies (CREST) Project (899)

Florida Keys National Marine Sanctuary
Molasses
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	140713	5	26.72	TRUE	-0.0272	0.9247	-0.03817582	26.60986	10.5769	0.4794	0

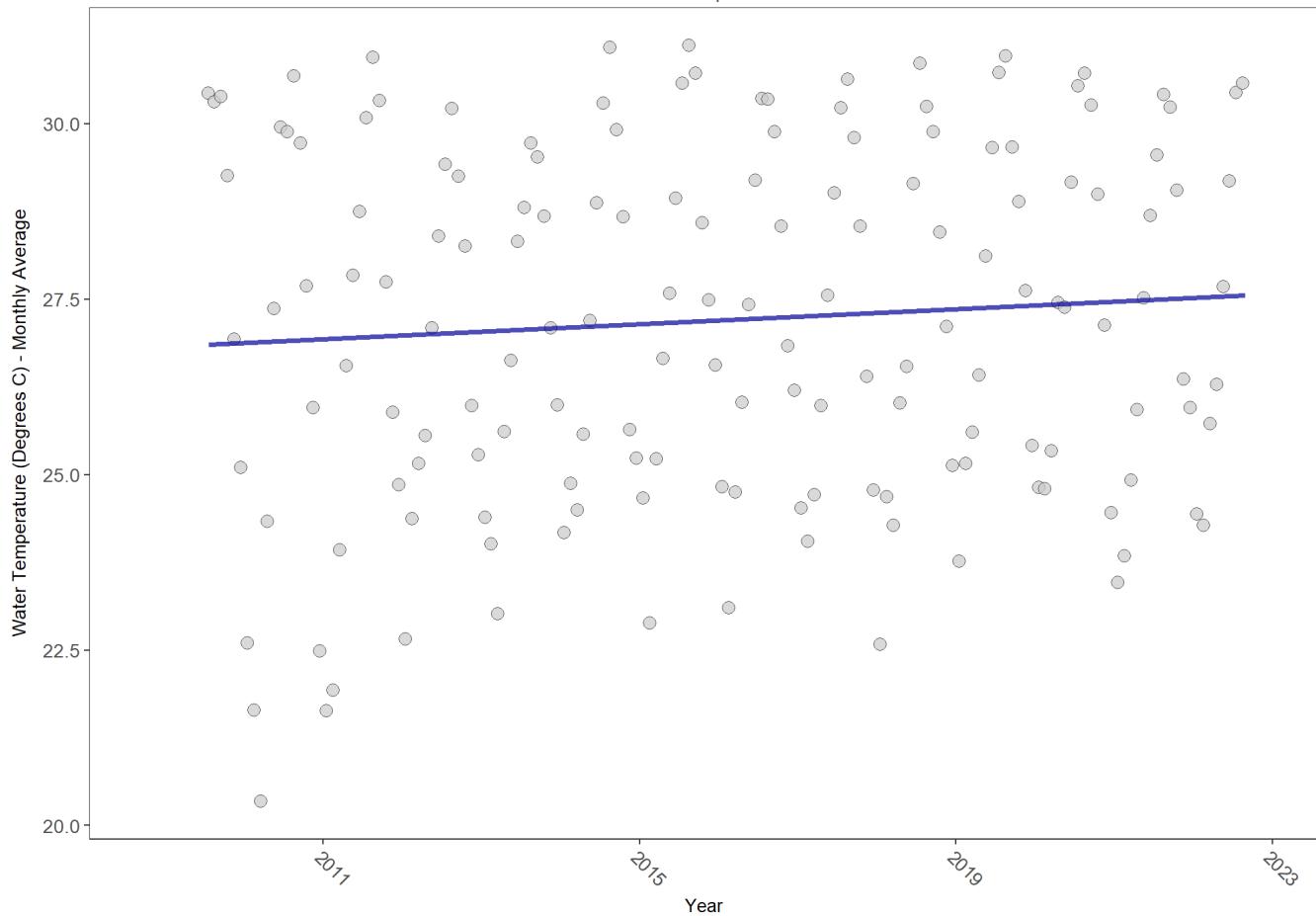
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Sombrero

USGS Coral Reef Ecosystem Studies (CREST) Project (899)

Florida Keys National Marine Sanctuary
Sombrero
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	459354	14	27.161	TRUE	0.2634	0.0000	0.05372142	26.82637	4.8014	0.9404	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

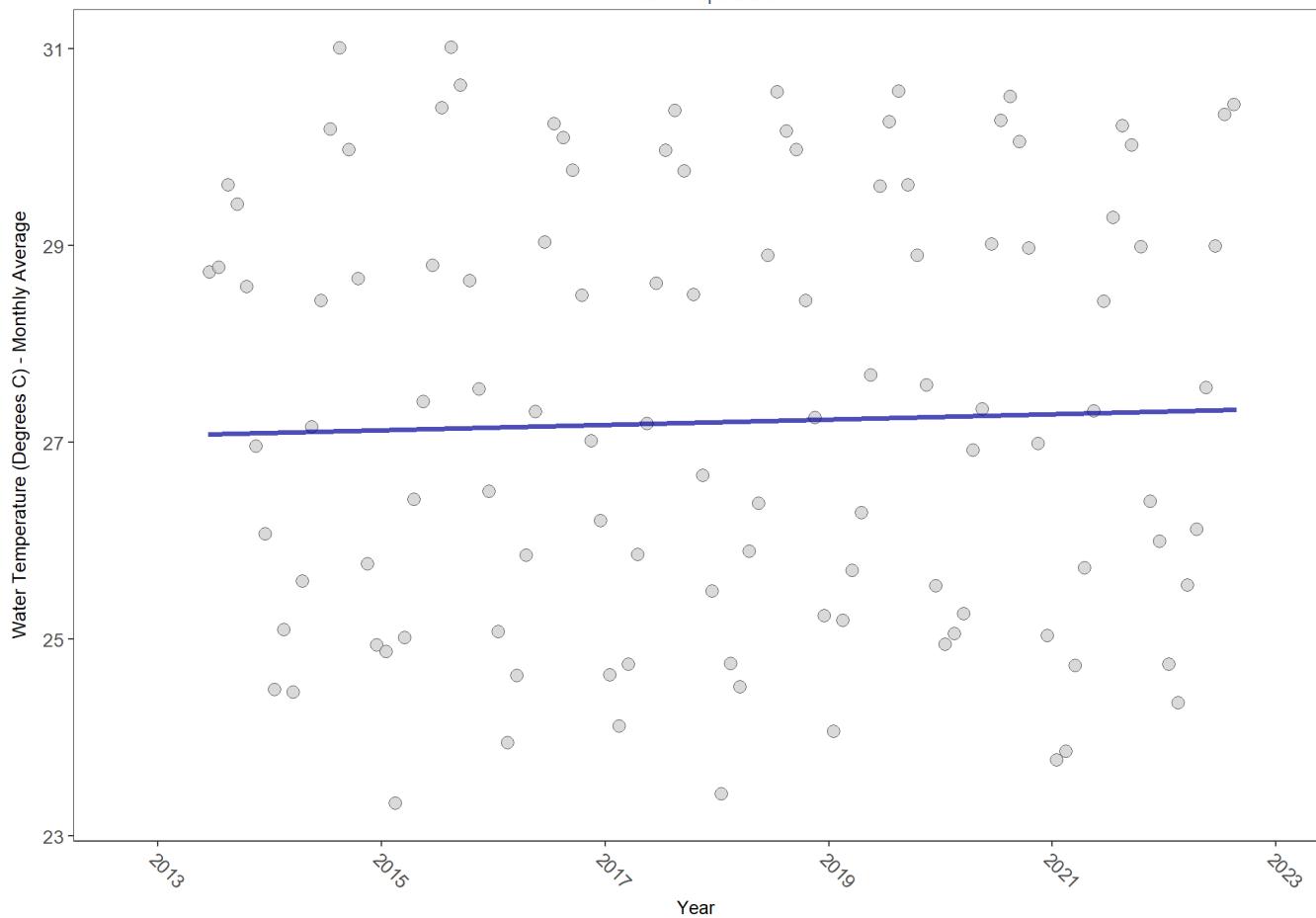
Crocker

USGS Coral Reef Ecosystem Studies (CREST) Project (899)

Florida Keys National Marine Sanctuary

Crocker

Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	322670	10	27.321	TRUE	0.1542	0.0436	0.02690323	27.07413	4.576	0.95	1

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

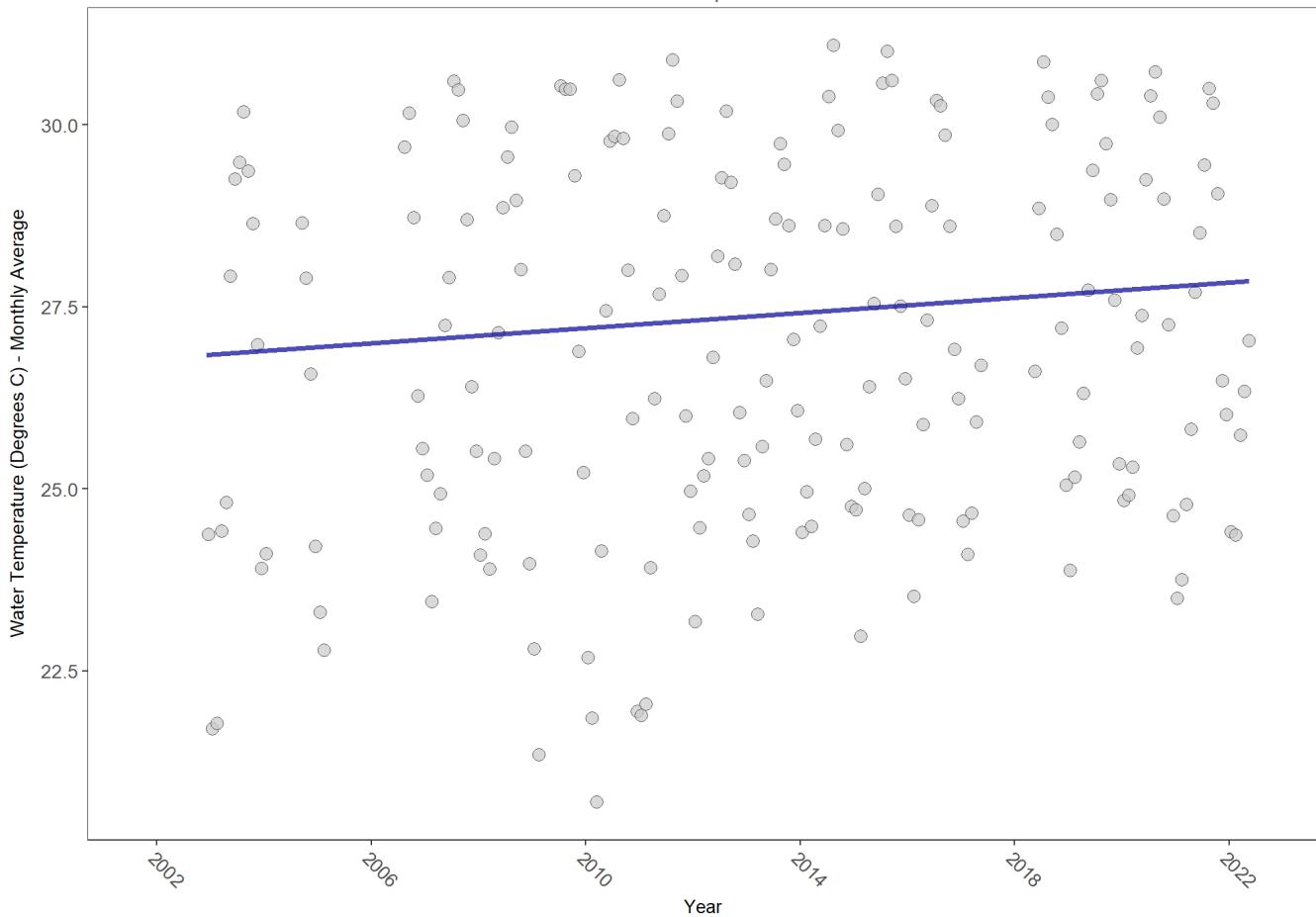
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	225636	21	26.86	TRUE	0.281	0.0000	0.05213256	26.78974	11.4937	0.4029	1

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

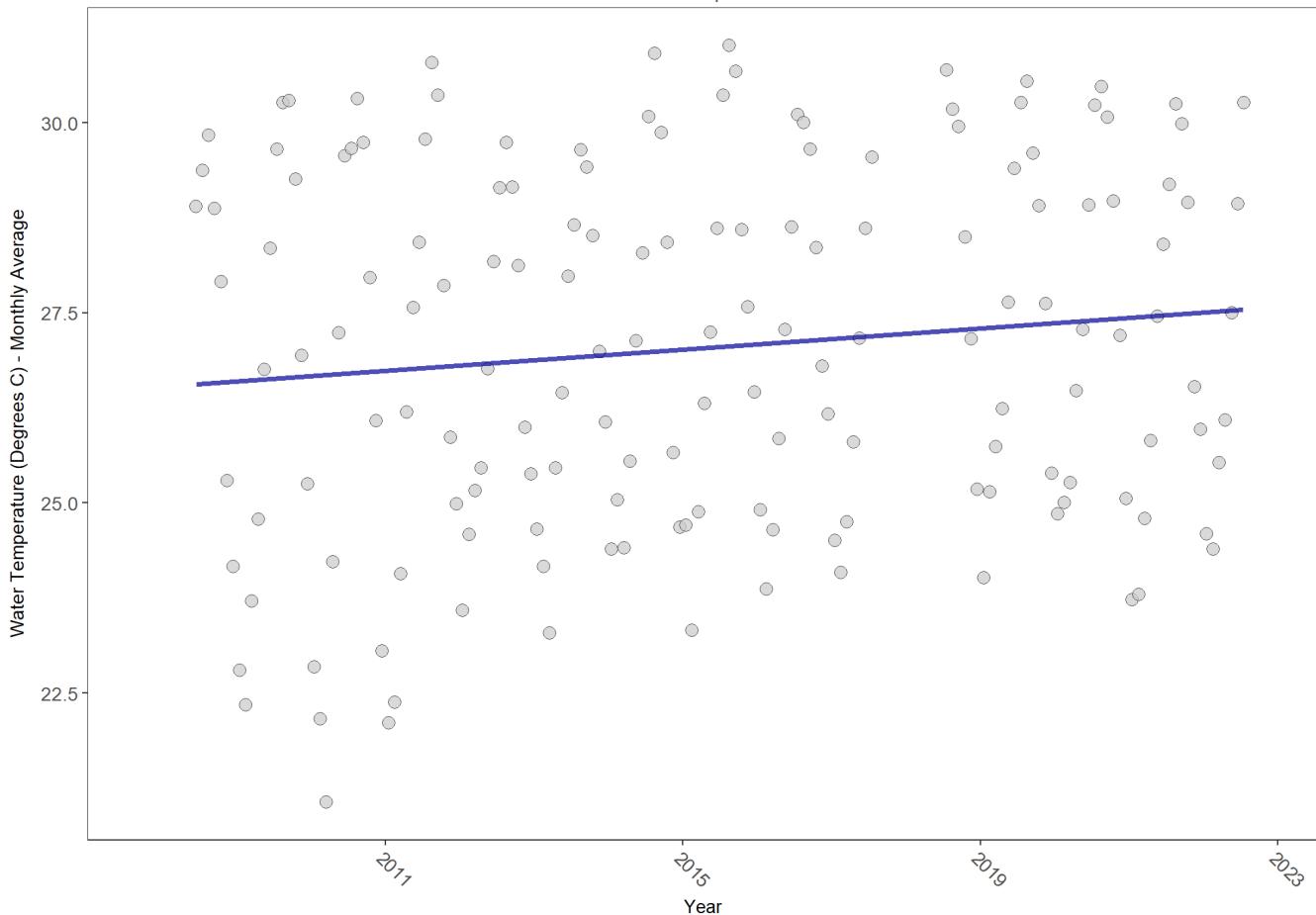
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	179447	15	26.98	TRUE	0.3724	0.0000	0.06966712	26.53272	4.1974	0.9638	1

p < 0.00005 appear as 0 due to rounding.

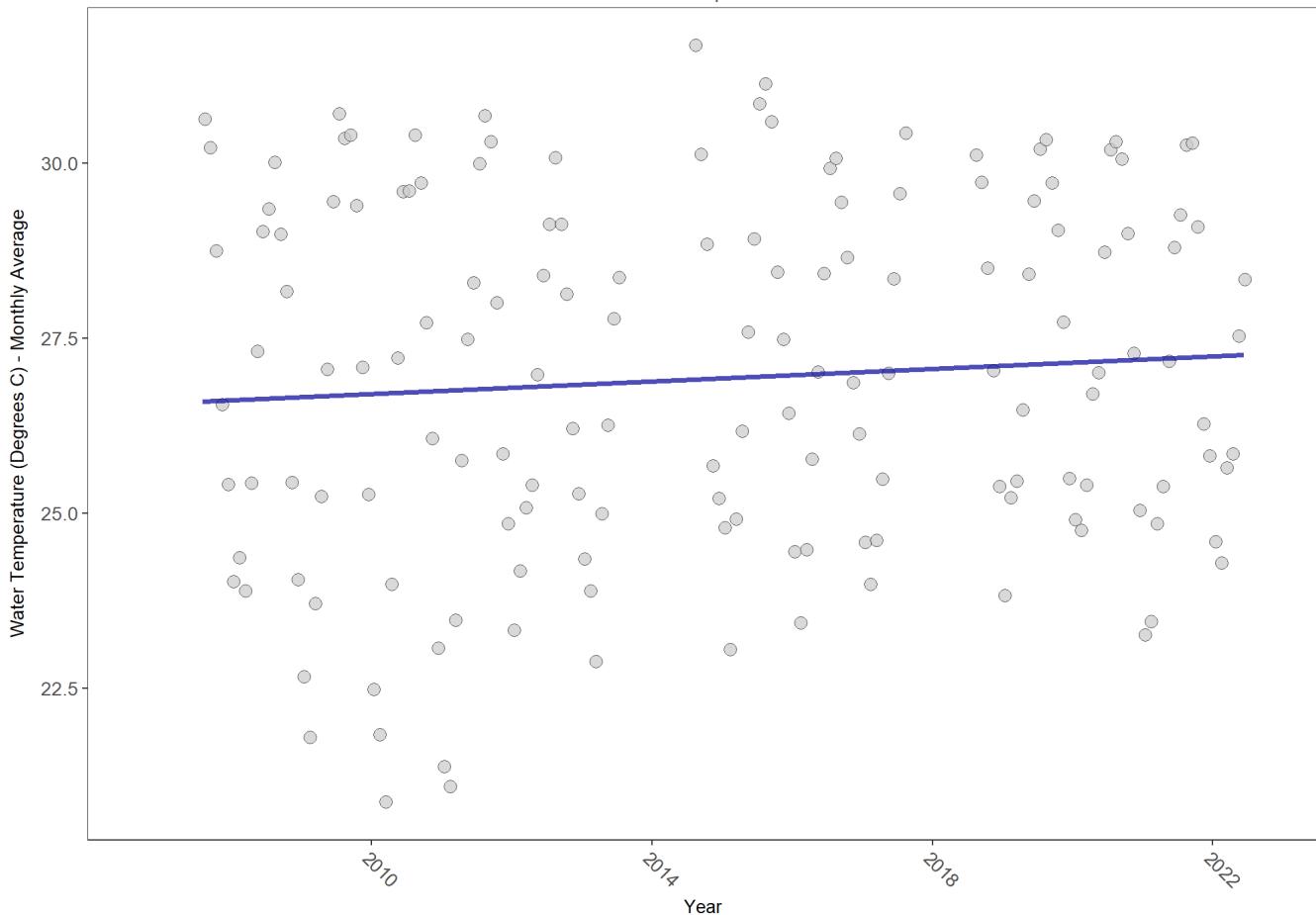
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	175394	16	26.79	TRUE	0.2091	0.0006	0.04466493	26.56449	11.8897	0.372	1

p < 0.00005 appear as 0 due to rounding.

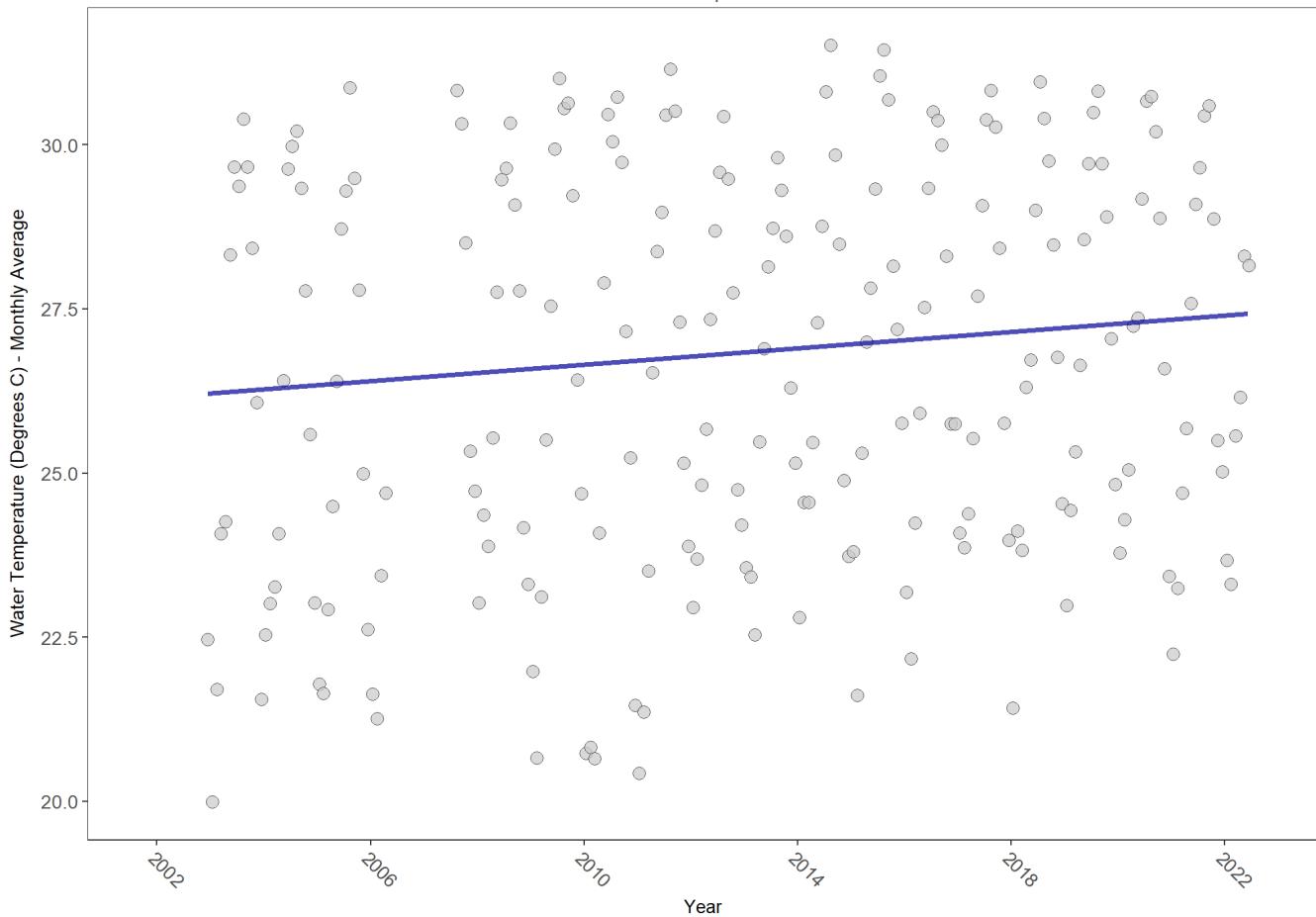
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	256177	21	26.47	TRUE	0.2753	0.0000	0.06273171	26.15199	15.4489	0.1629	1

p < 0.00005 appear as 0 due to rounding.

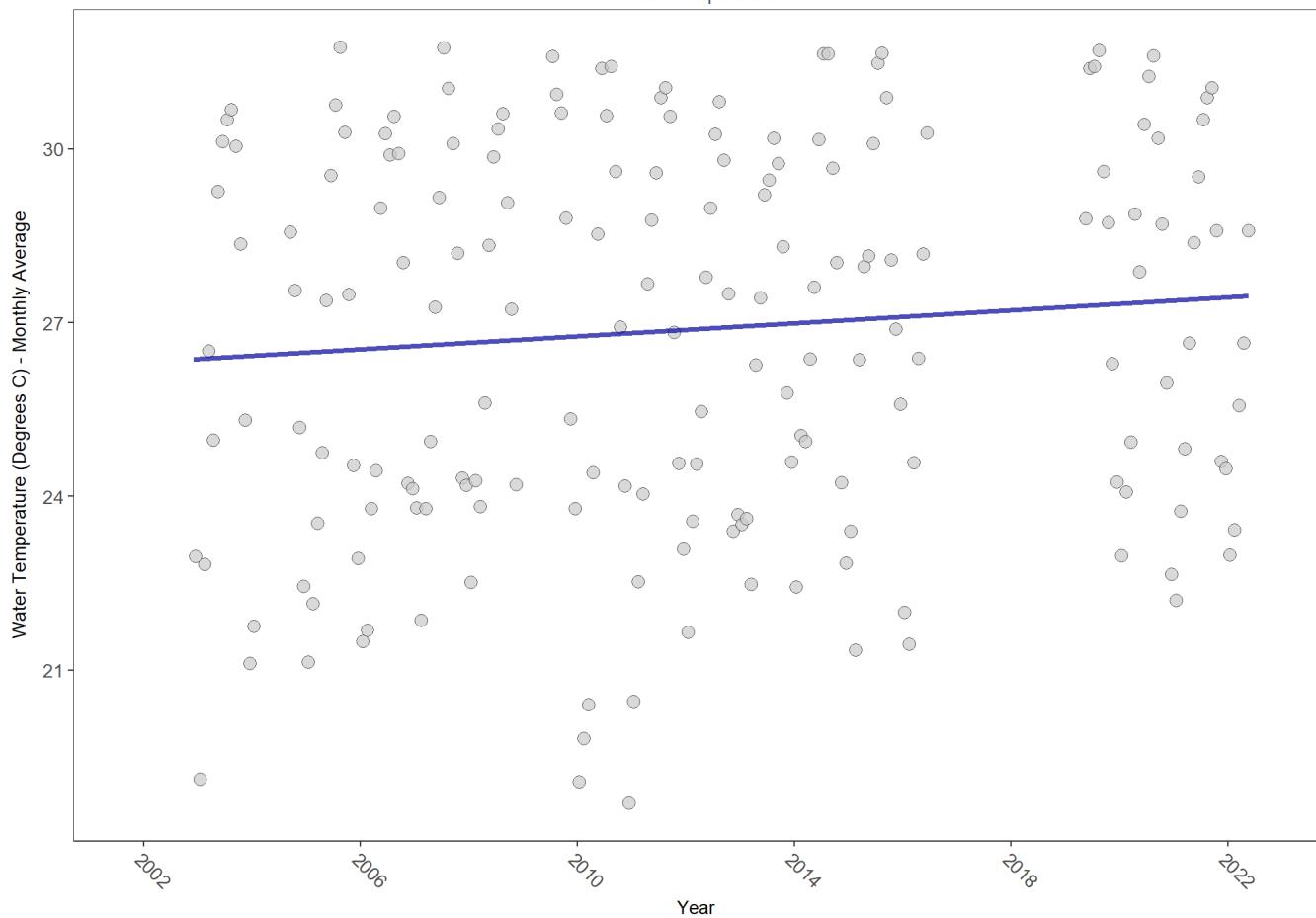
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	223851	19	26.84	TRUE	0.2395	0.0000	0.05639783	26.3123	6.8534	0.8108	1

p < 0.00005 appear as 0 due to rounding.

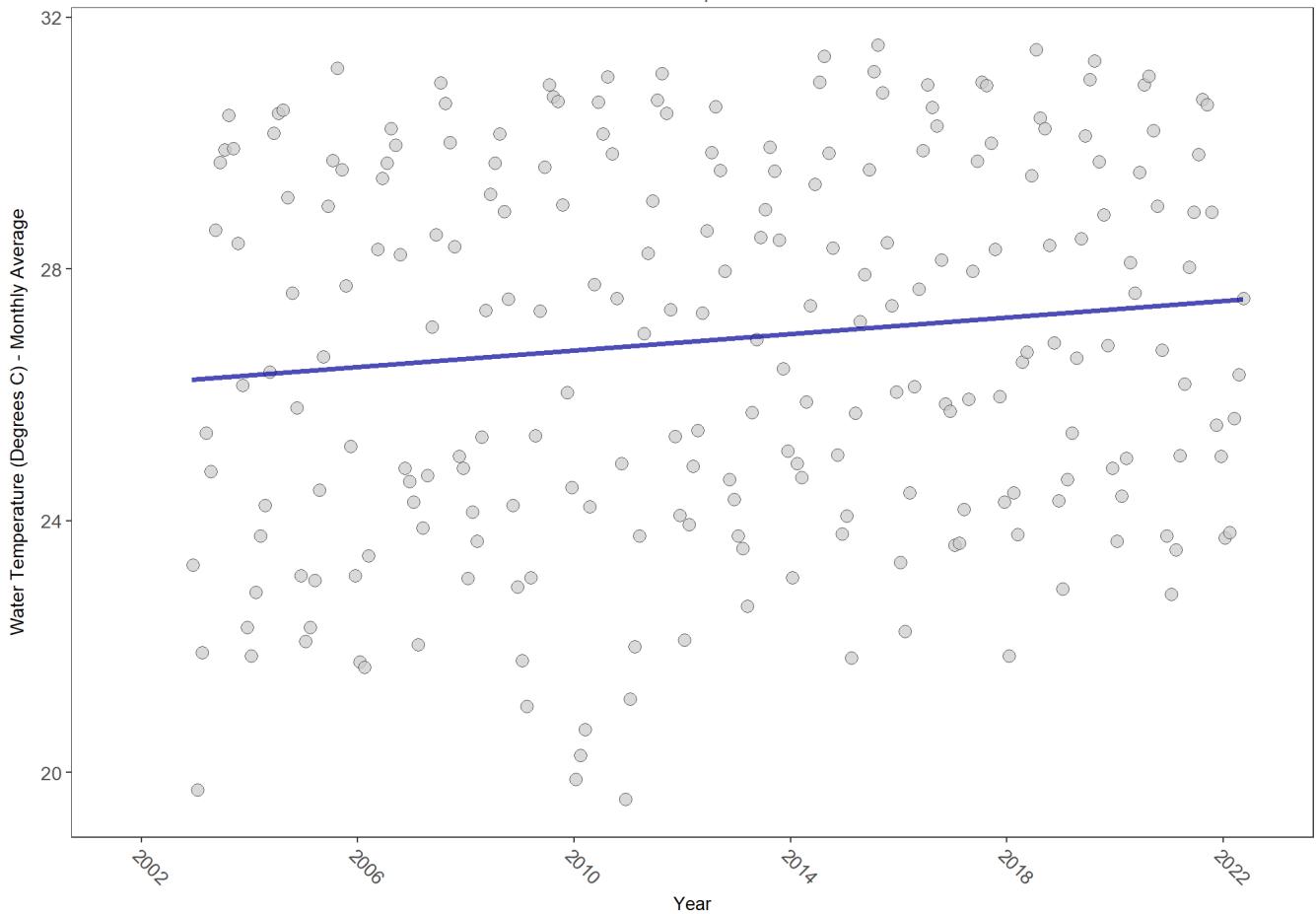
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



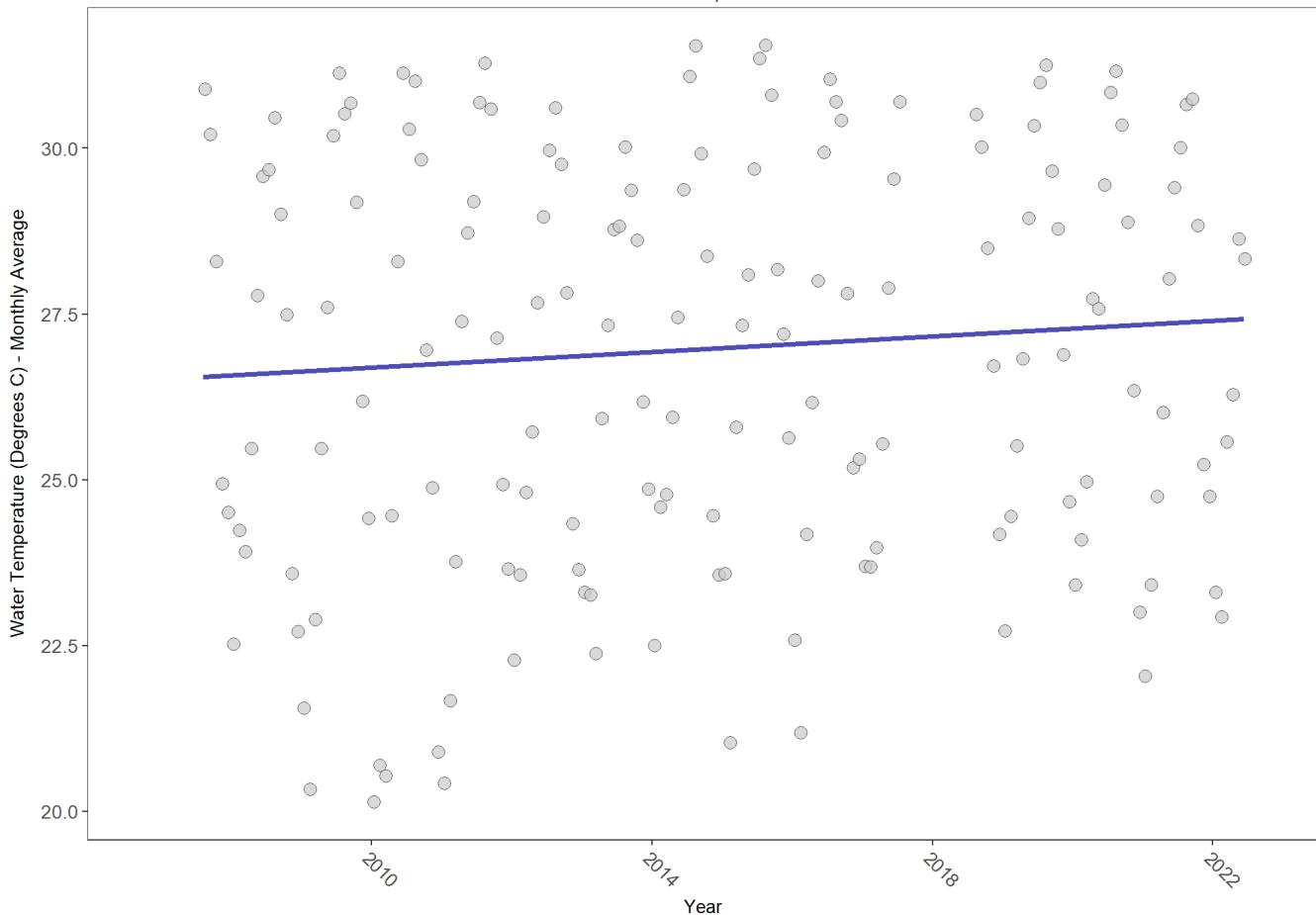
RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	274006	21	26.74	TRUE	0.305	0.0000	0.06536831	26.1852	8.1793	0.6972	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary
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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	192871	16	26.891	TRUE	0.2354	0.0001	0.0589623	26.51734	8.9183	0.6294	1

p < 0.00005 appear as 0 due to rounding.

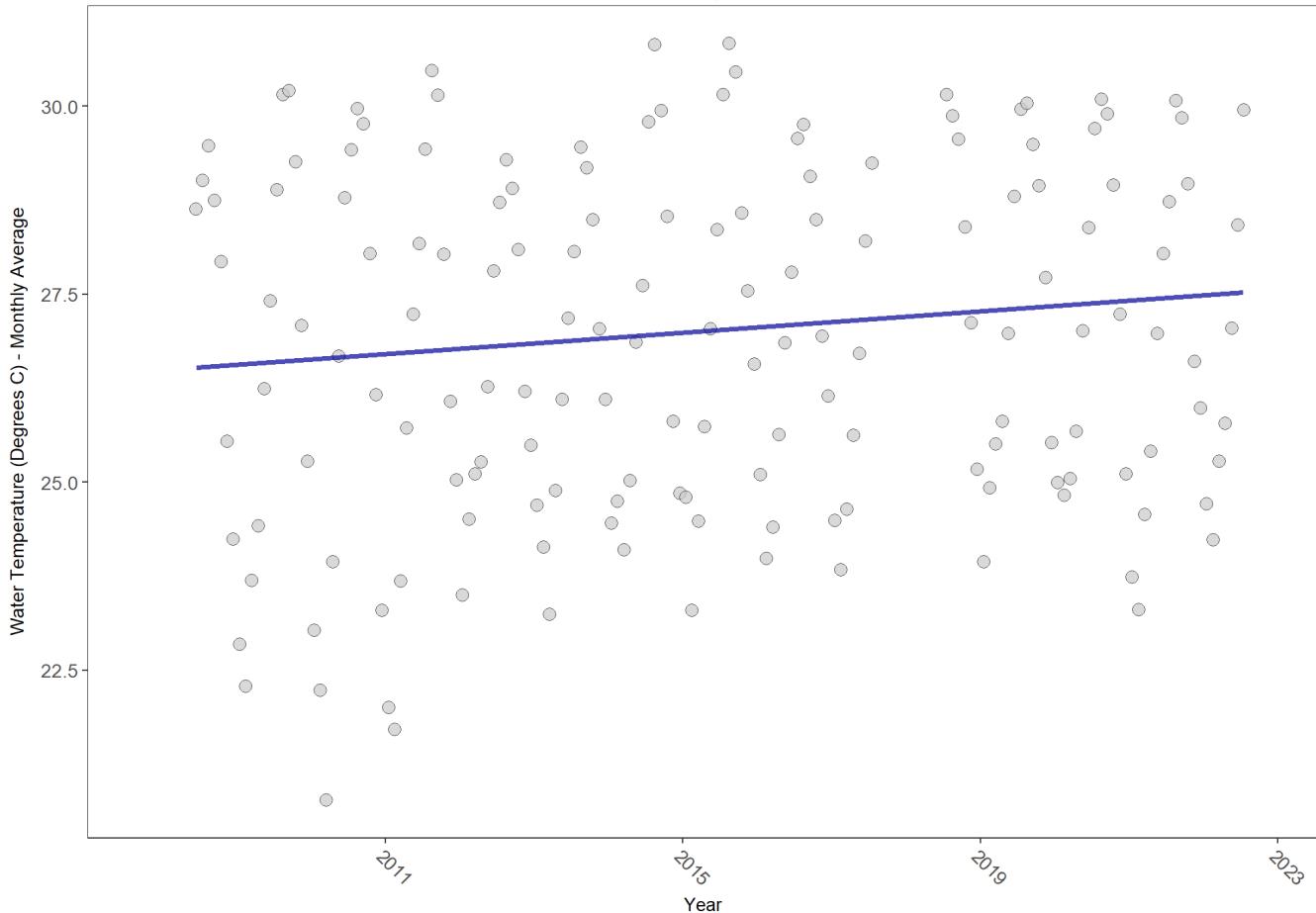
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	179435	15	26.74	TRUE	0.3463	0.0000	0.07079025	26.49134	5.4901	0.9051	1

p < 0.00005 appear as 0 due to rounding.

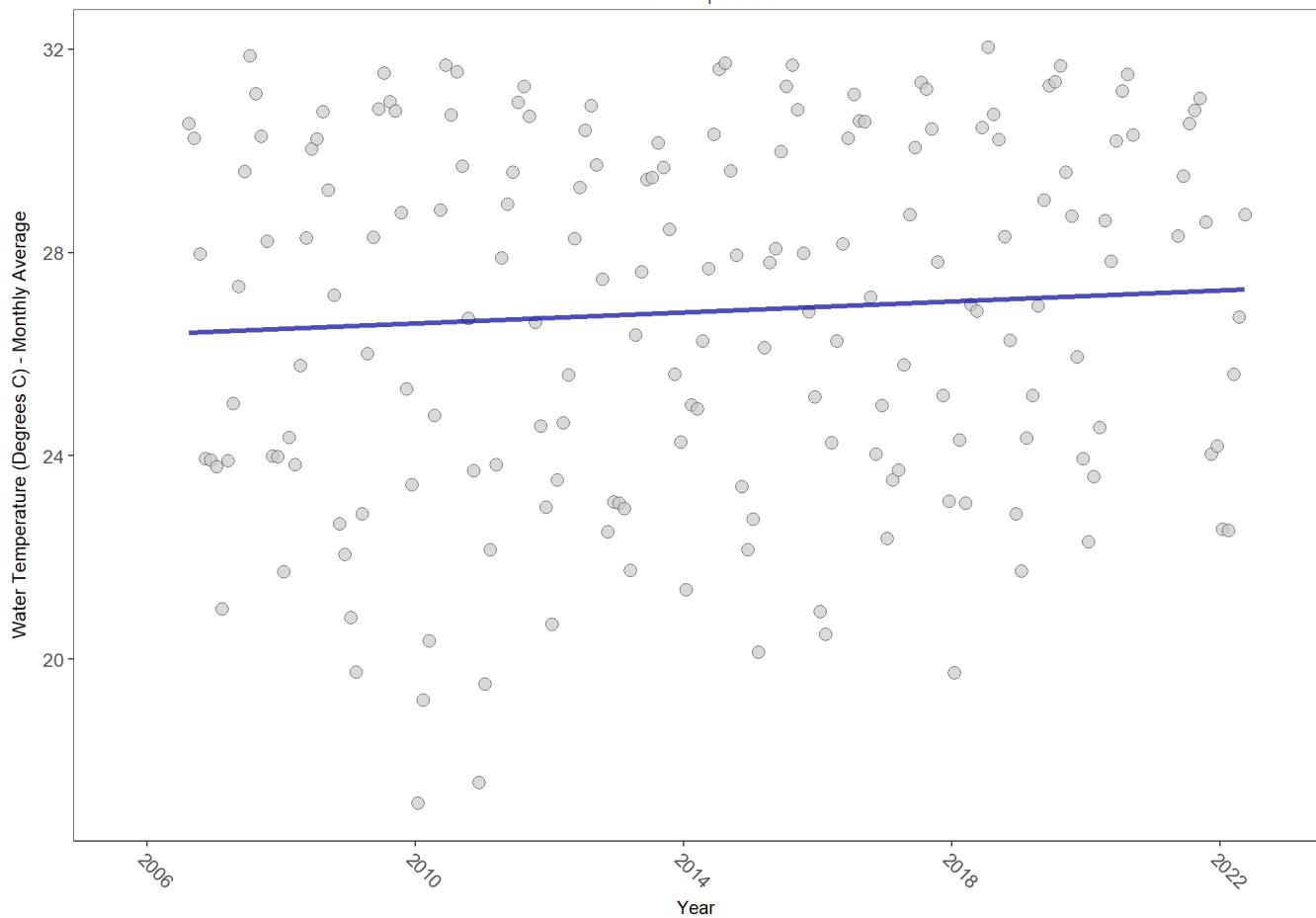
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature

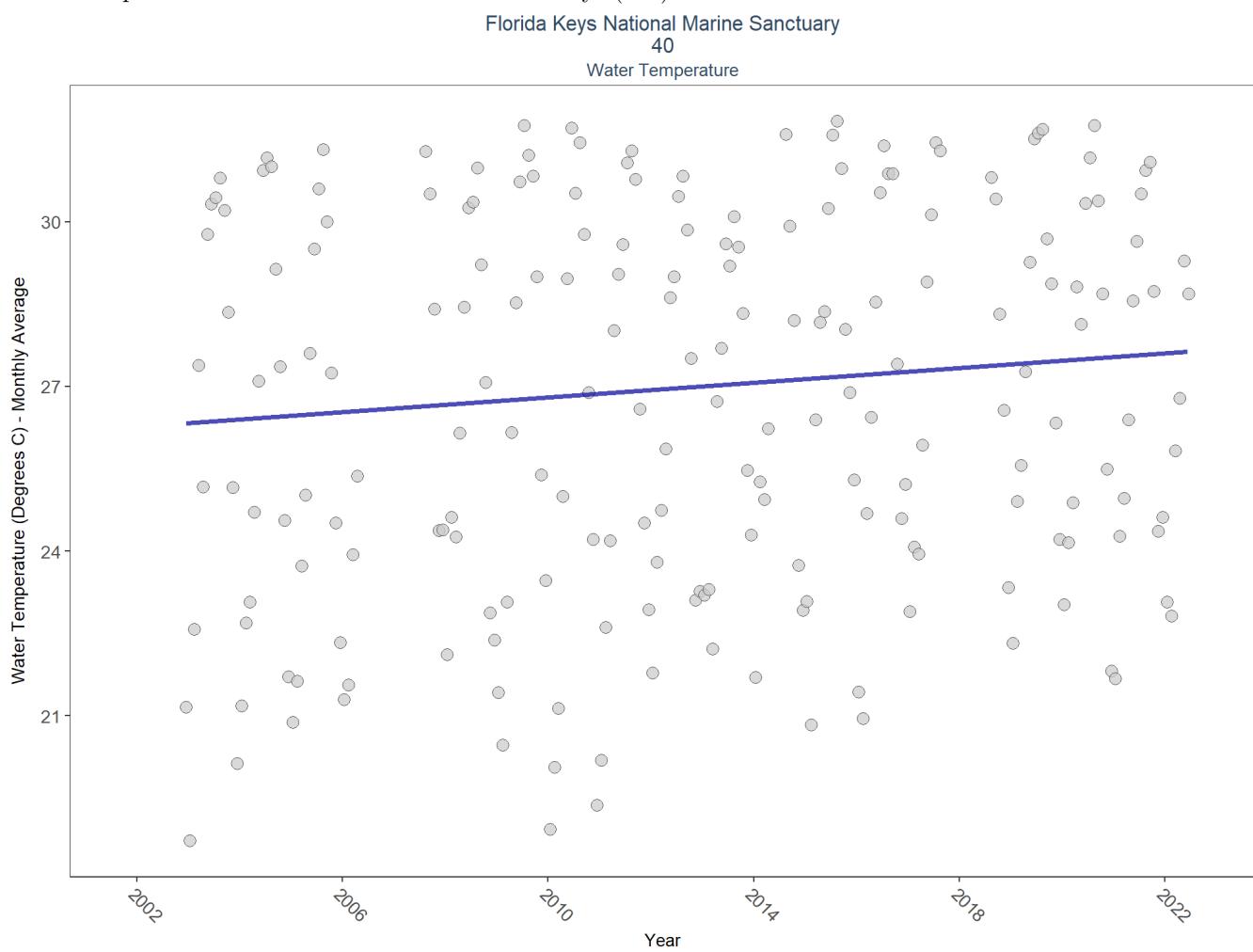


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	212659	17	26.989	TRUE	0.1907	0.0006	0.05389597	26.39766	3.7486	0.9767	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	244138	21	26.79	TRUE	0.2757	0.0000	0.06695549	26.26509	11.5513	0.3983	1

p < 0.00005 appear as 0 due to rounding.

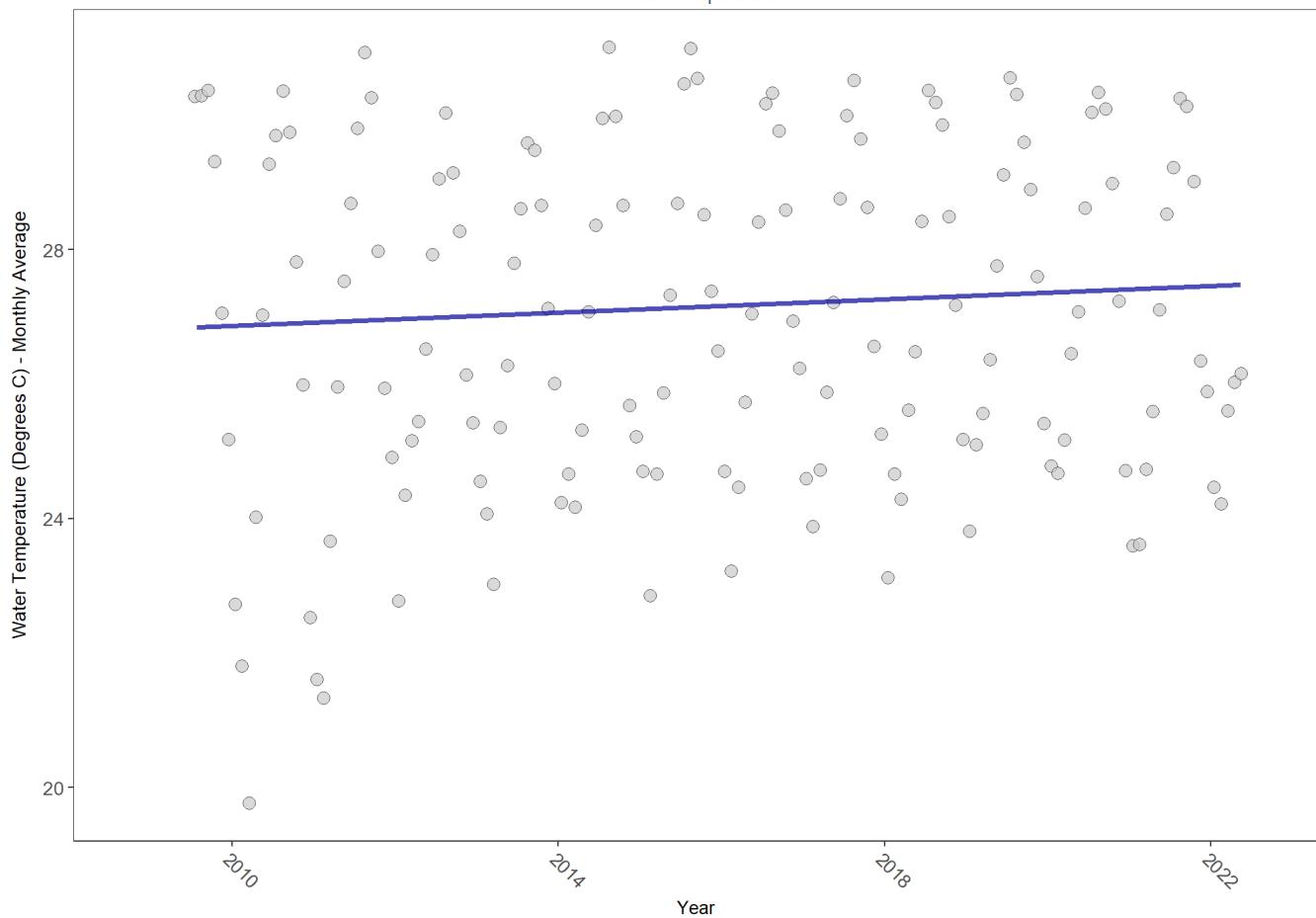
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature

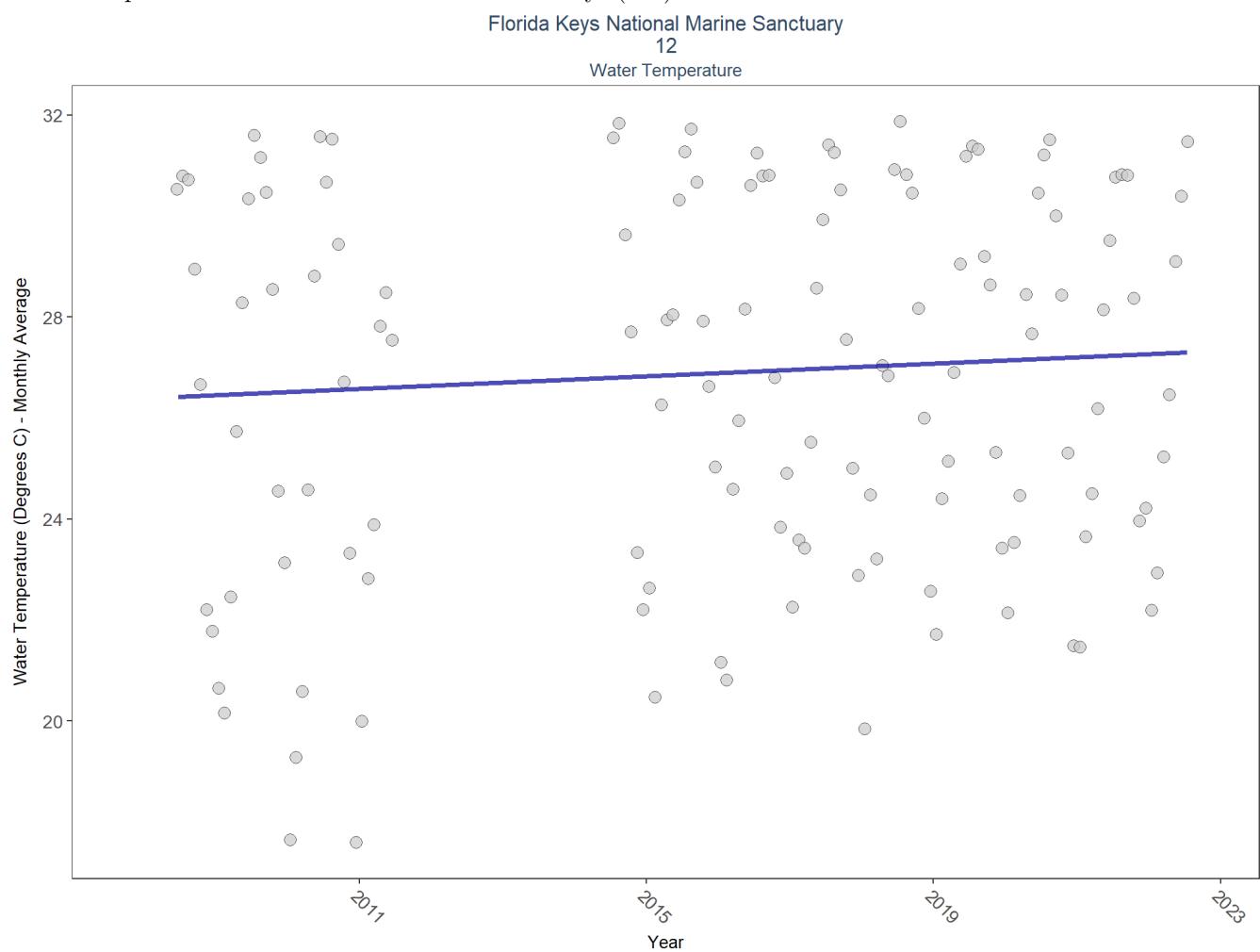


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	168914	14	26.84	TRUE	0.2307	0.0002	0.04945839	26.81841	10.4612	0.4894	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

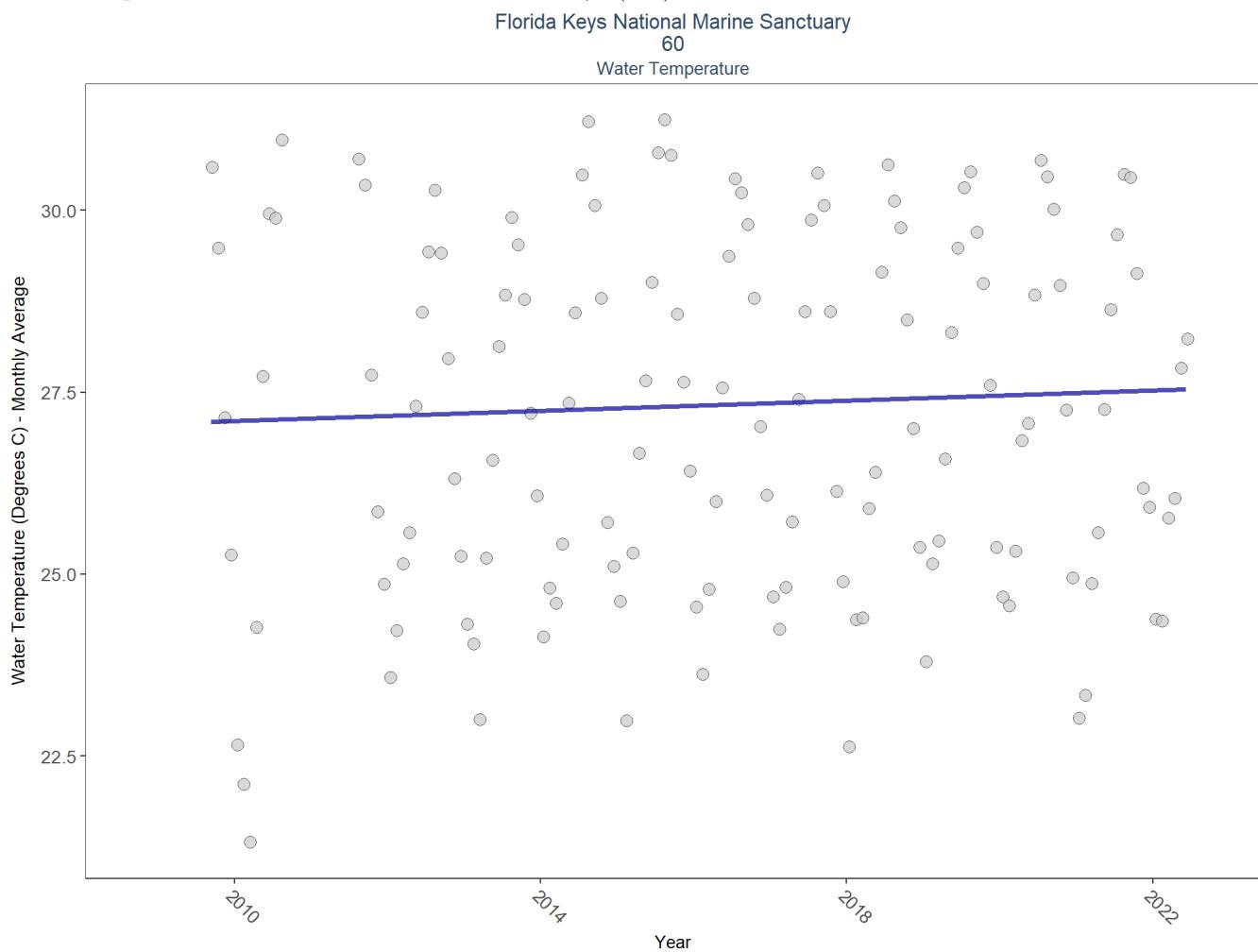
Water Temperature on Coral Reefs in the Florida Keys (986)



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

SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)



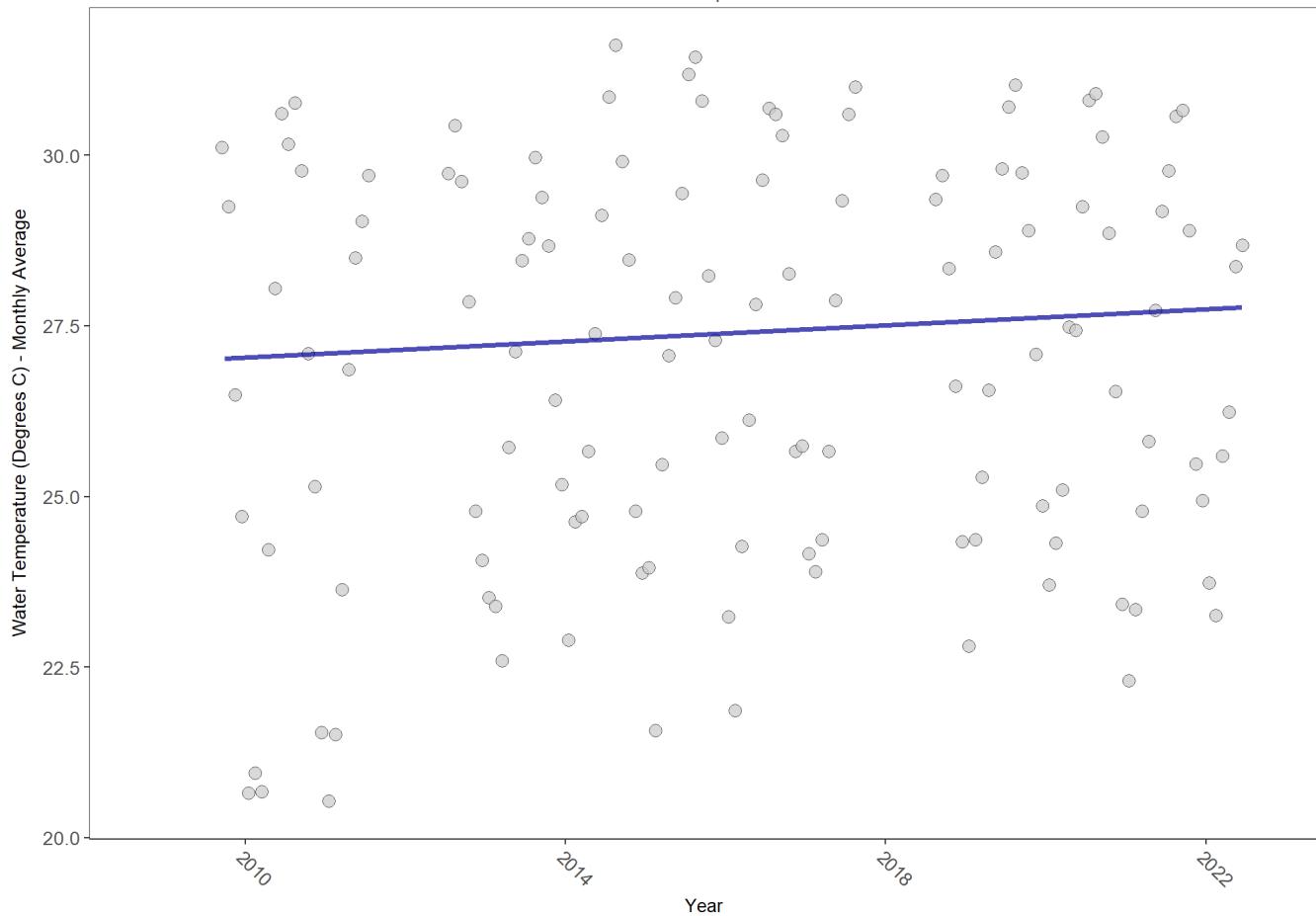
RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	150013	14	26.94	TRUE	0.1677	0.0094	0.03504626	27.06711	9.2709	0.5969	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary
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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	142040	14	26.96	TRUE	0.2061	0.0024	0.05973166	26.97227	6.8283	0.8128	1

p < 0.00005 appear as 0 due to rounding.

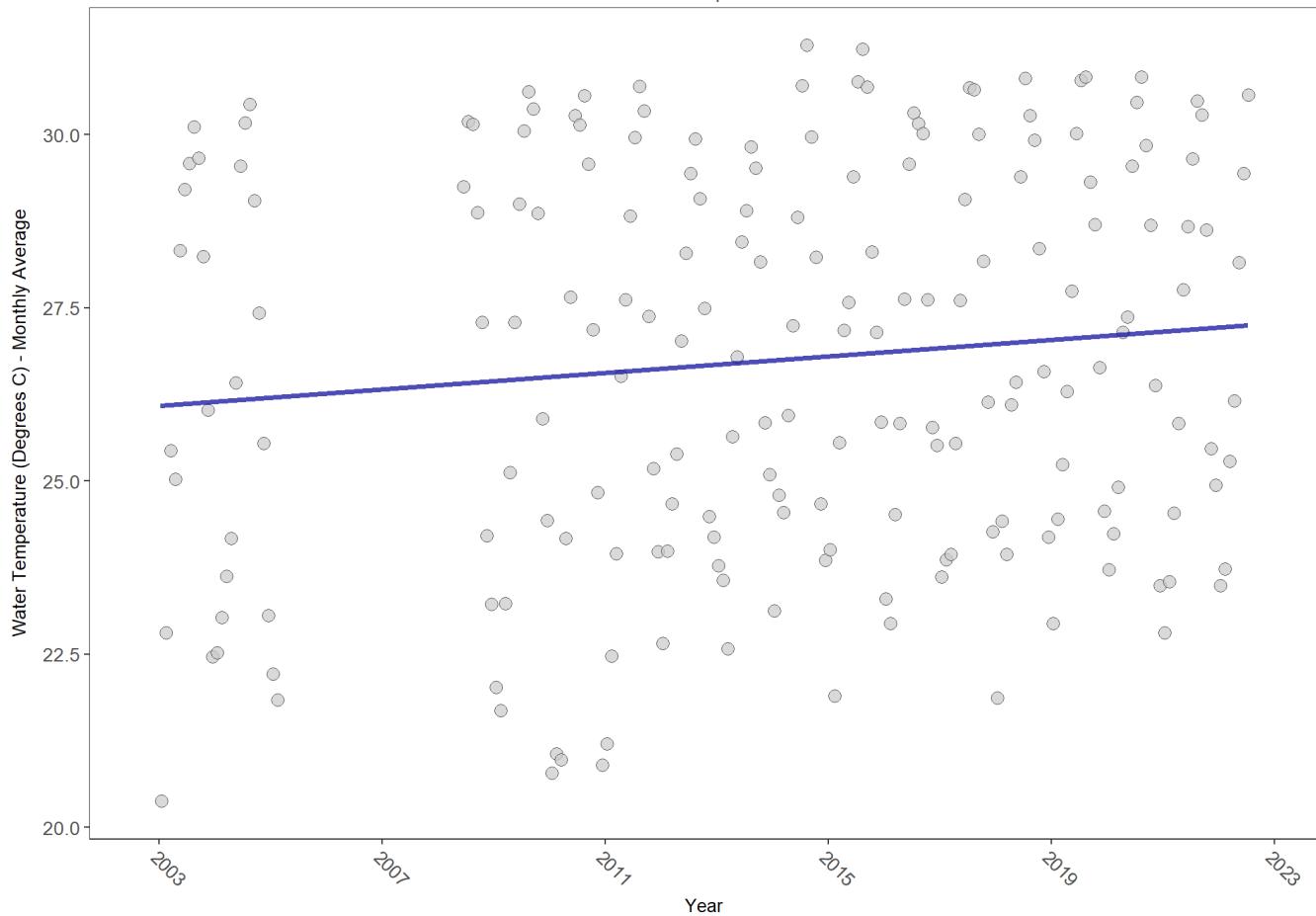
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	223104	18	26.69	TRUE	0.3089	0.0000	0.05966672	26.08665	4.4502	0.9549	1

p < 0.00005 appear as 0 due to rounding.

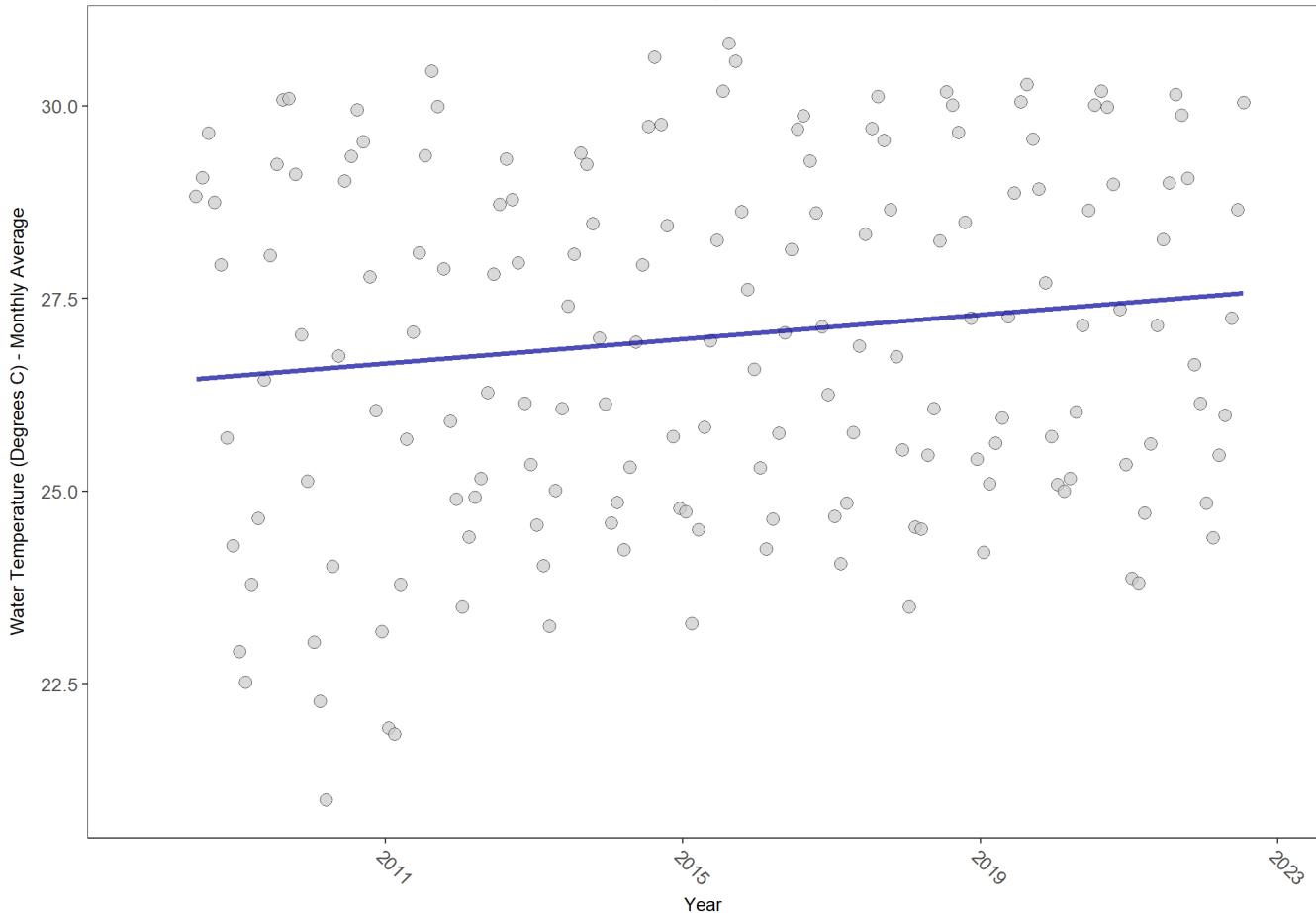
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	188119	15	26.769	TRUE	0.4175	0.0000	0.0795257	26.41893	4.607	0.9487	1

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

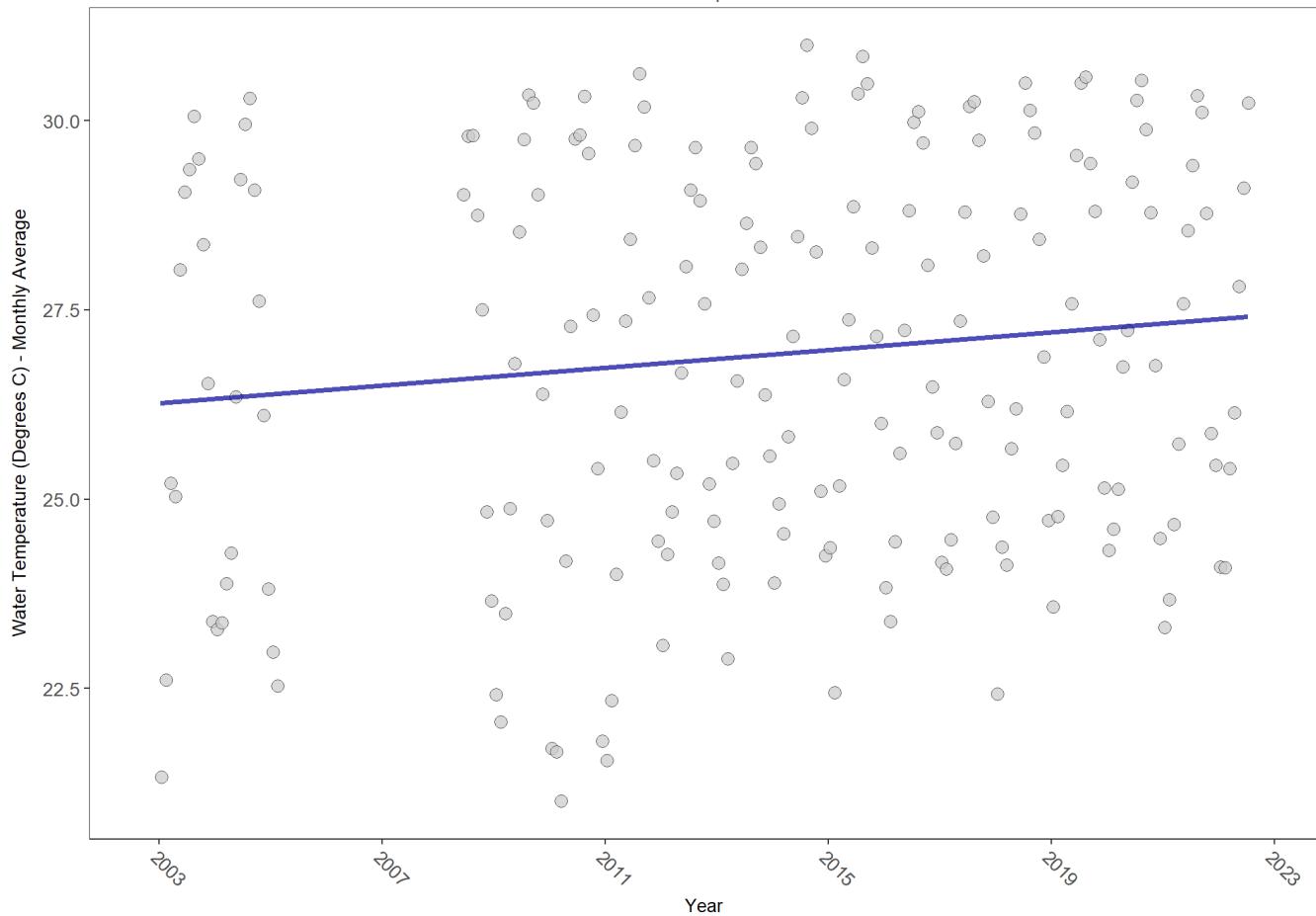
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	222780	18	26.671	TRUE	0.3146	0.0000	0.05821916	26.2706	6.042	0.8705	1

p < 0.00005 appear as 0 due to rounding.

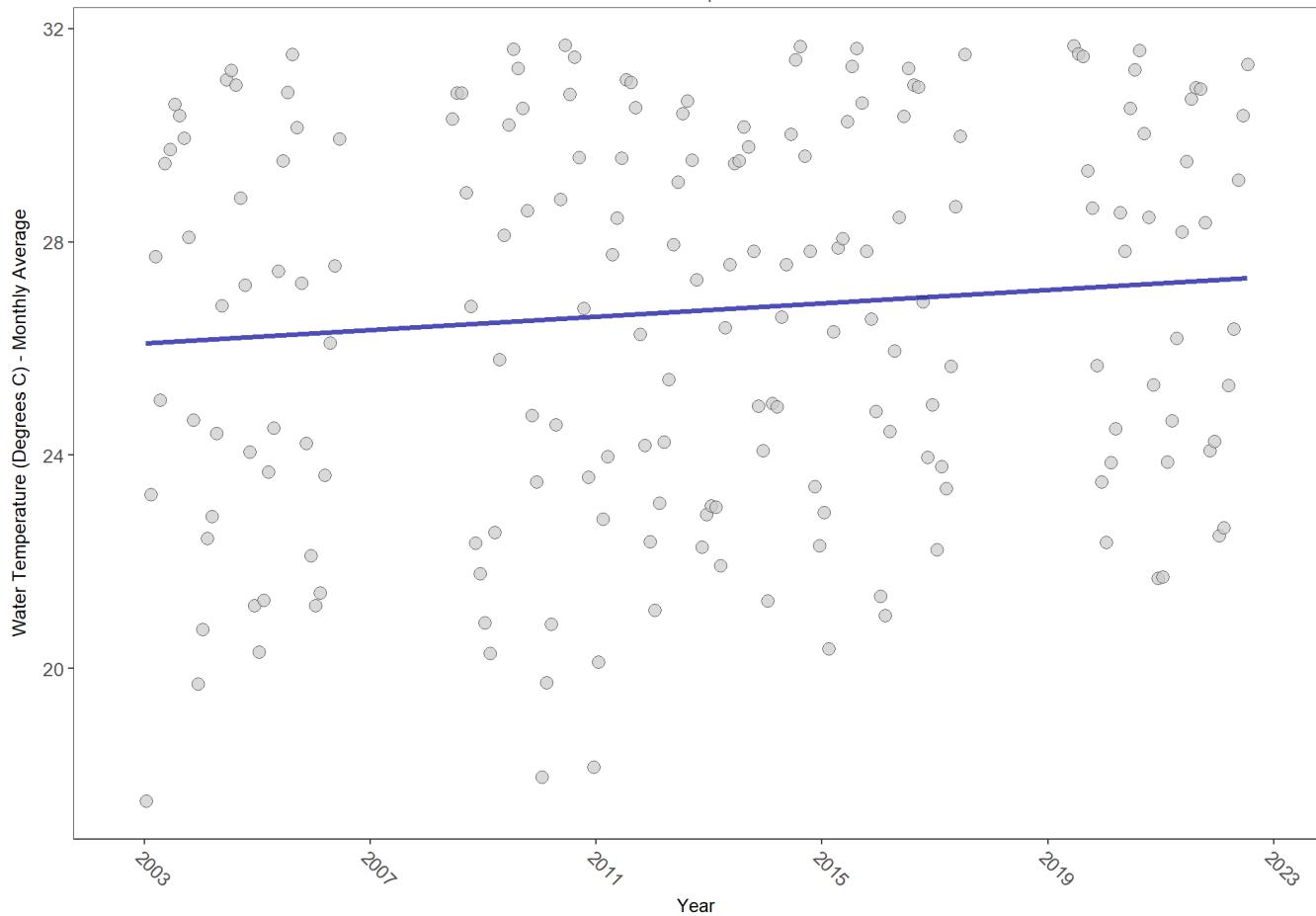
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	228643	18	26.81	TRUE	0.2992	0.0000	0.0621259	26.10486	5.9084	0.8794	1

p < 0.00005 appear as 0 due to rounding.

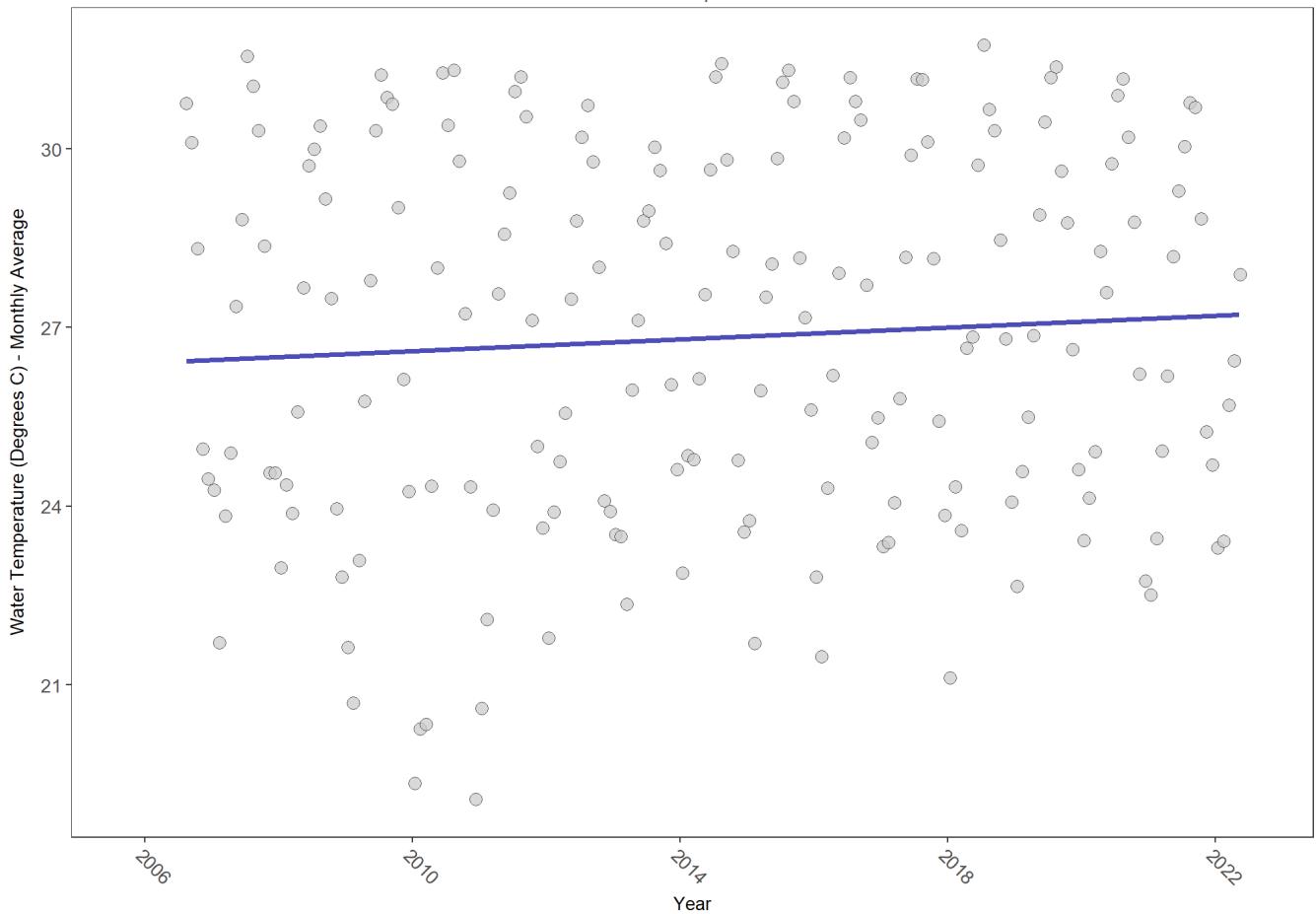
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature

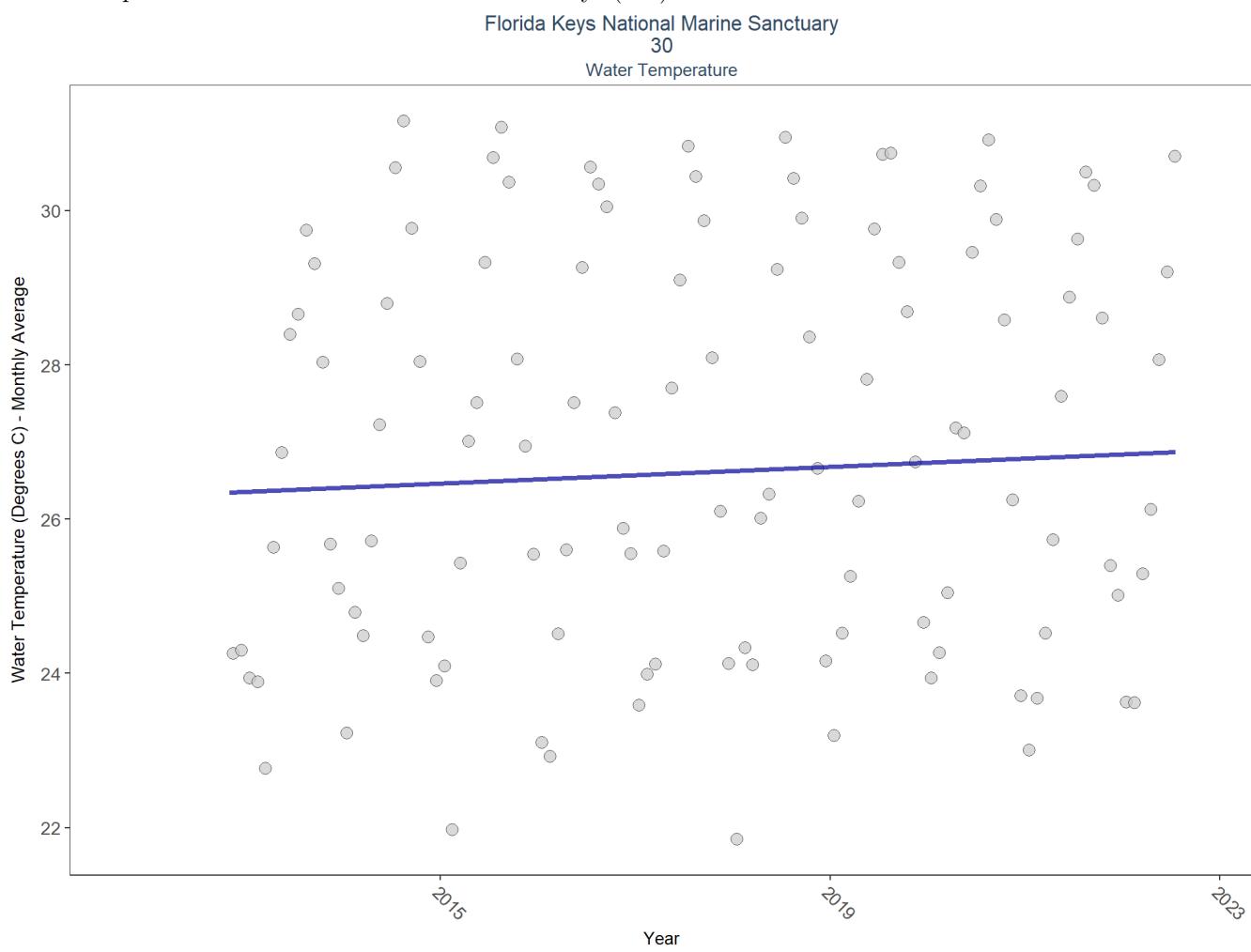


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	217666	17	26.842	TRUE	0.218	0.0000	0.04977078	26.40642	9.1528	0.6078	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	116701	11	26.62	TRUE	0.2085	0.0055	0.05403256	26.29709	9.8878	0.5405	1

p < 0.00005 appear as 0 due to rounding.

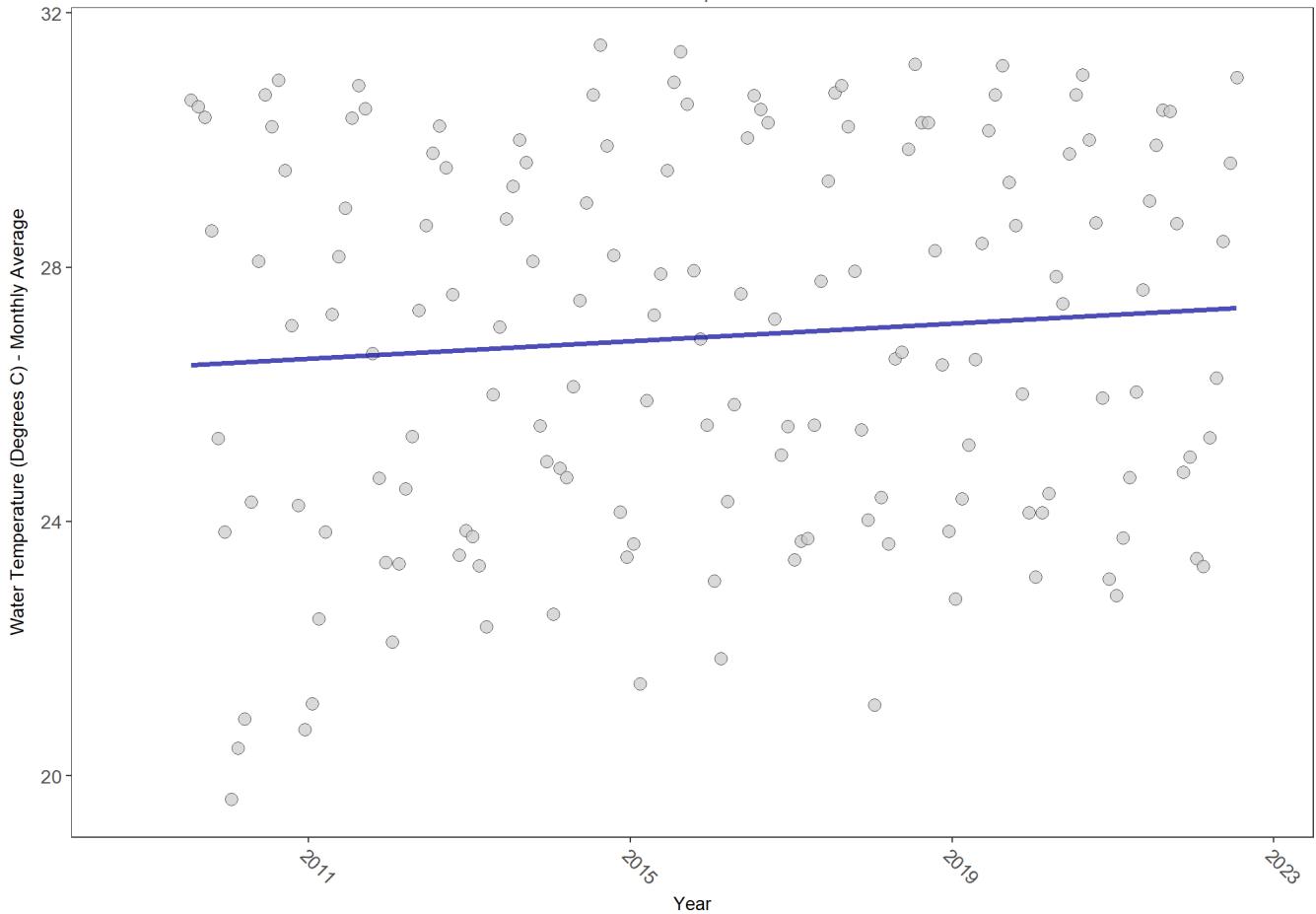
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



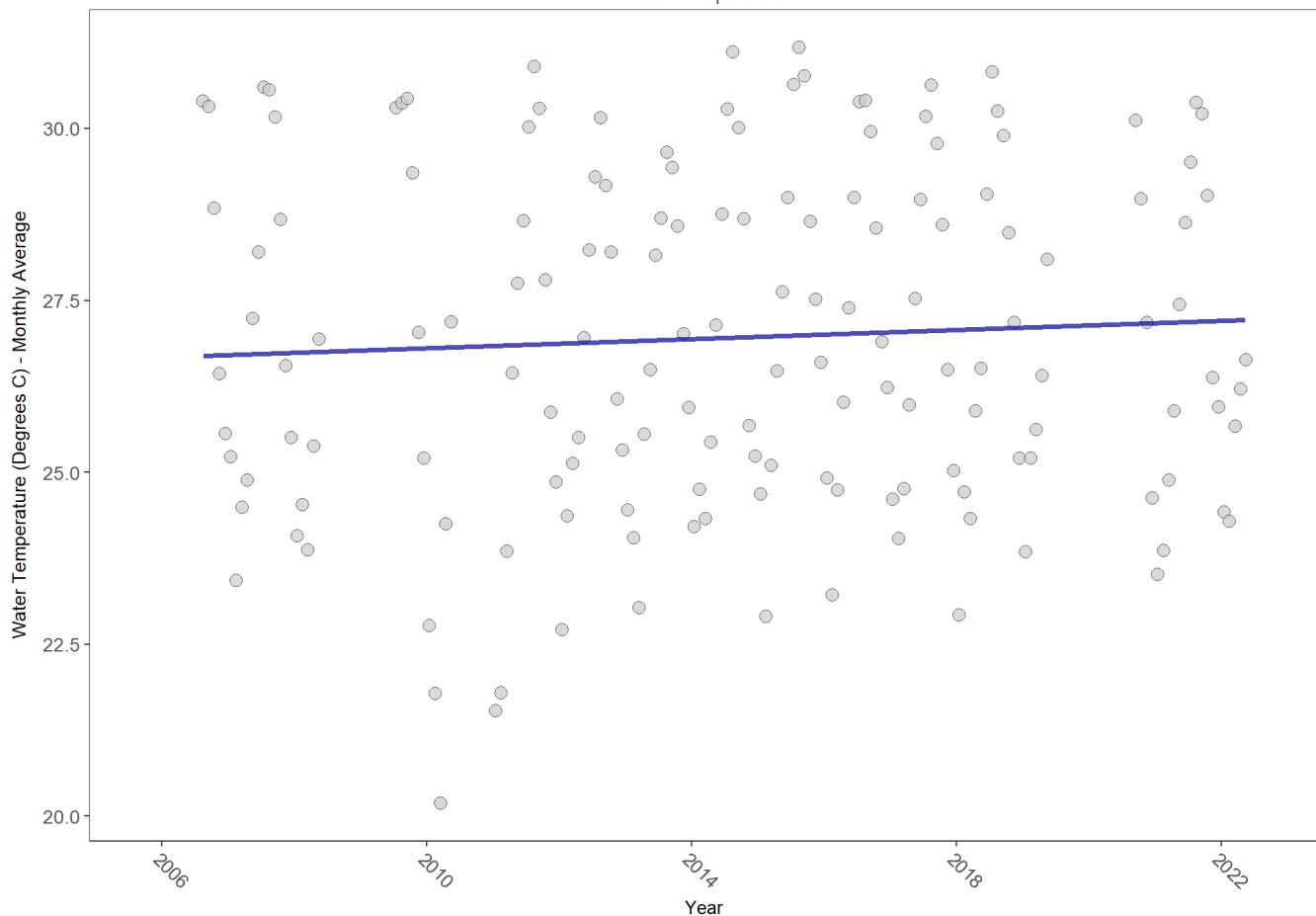
RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	171553	14	26.91	TRUE	0.2535	0.0000	0.06876538	26.42769	4.0941	0.9671	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary
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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	175648	17	26.67	TRUE	0.143	0.0187	0.03334187	26.66802	9.5502	0.5712	1

p < 0.00005 appear as 0 due to rounding.

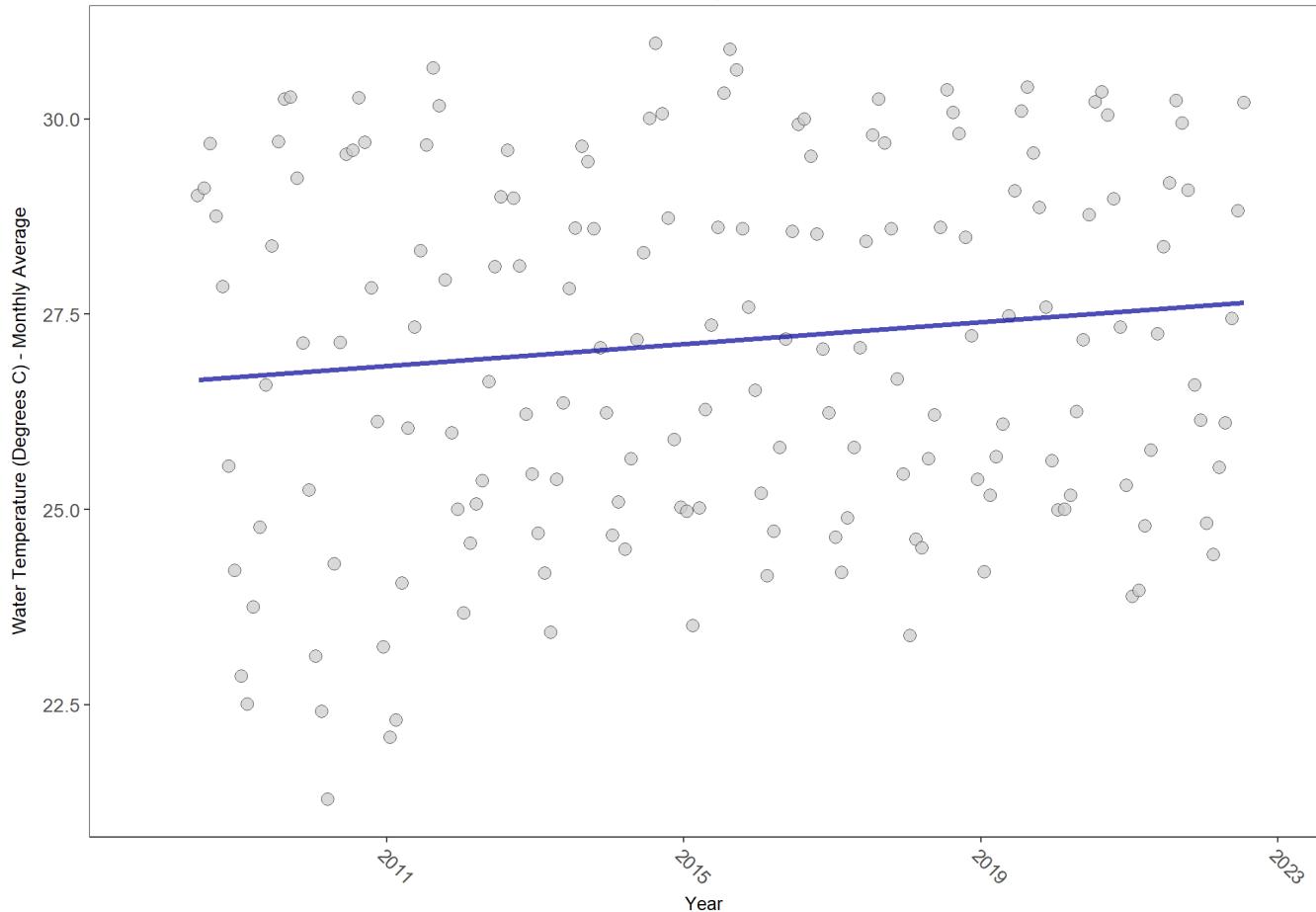
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	188237	15	26.916	TRUE	0.3385	0.0000	0.07042719	26.62736	4.7186	0.944	1

p < 0.00005 appear as 0 due to rounding.

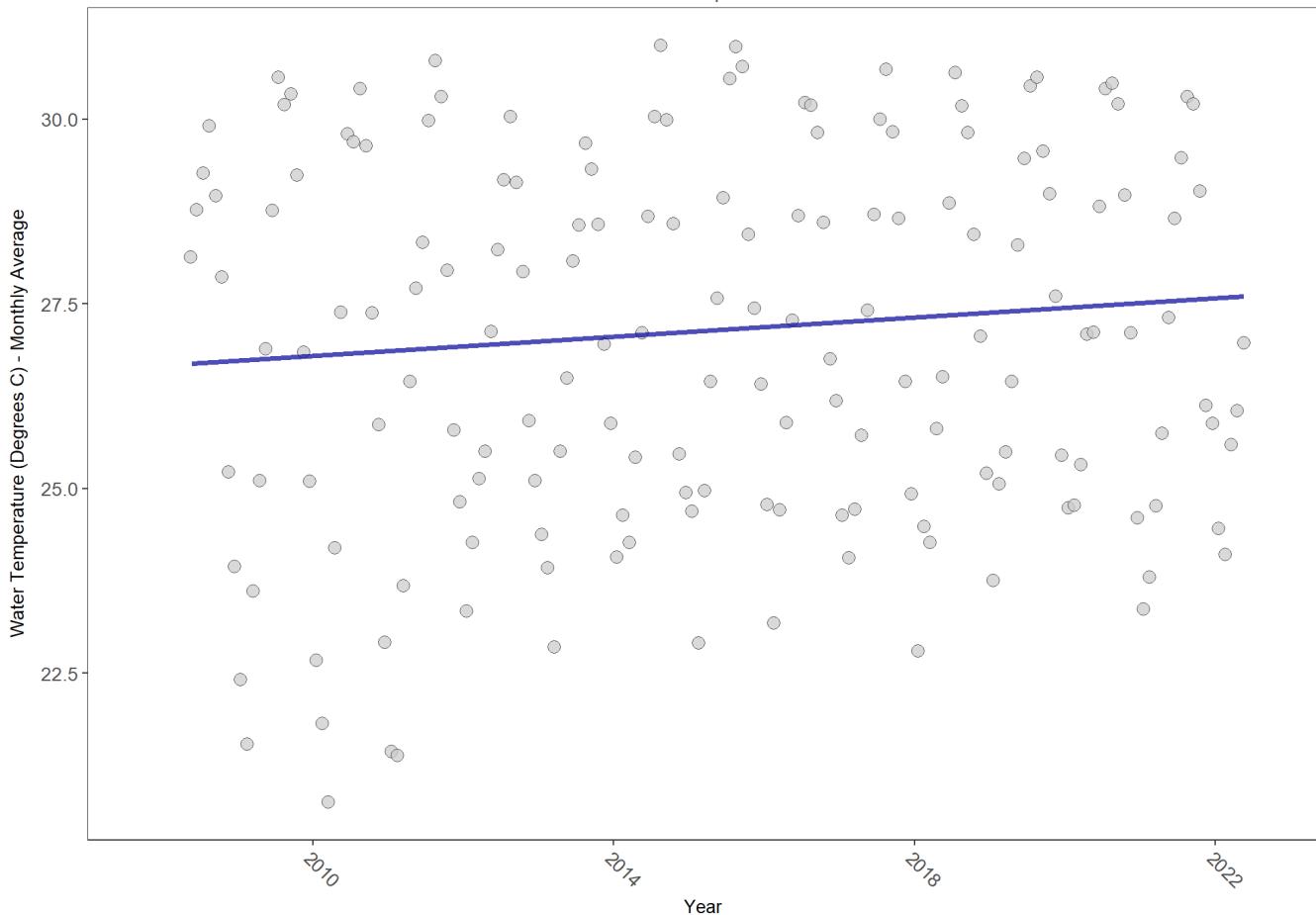
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	187914	15	26.96	TRUE	0.2957	0.0000	0.06546651	26.66314	11.6785	0.3883	1

p < 0.00005 appear as 0 due to rounding.

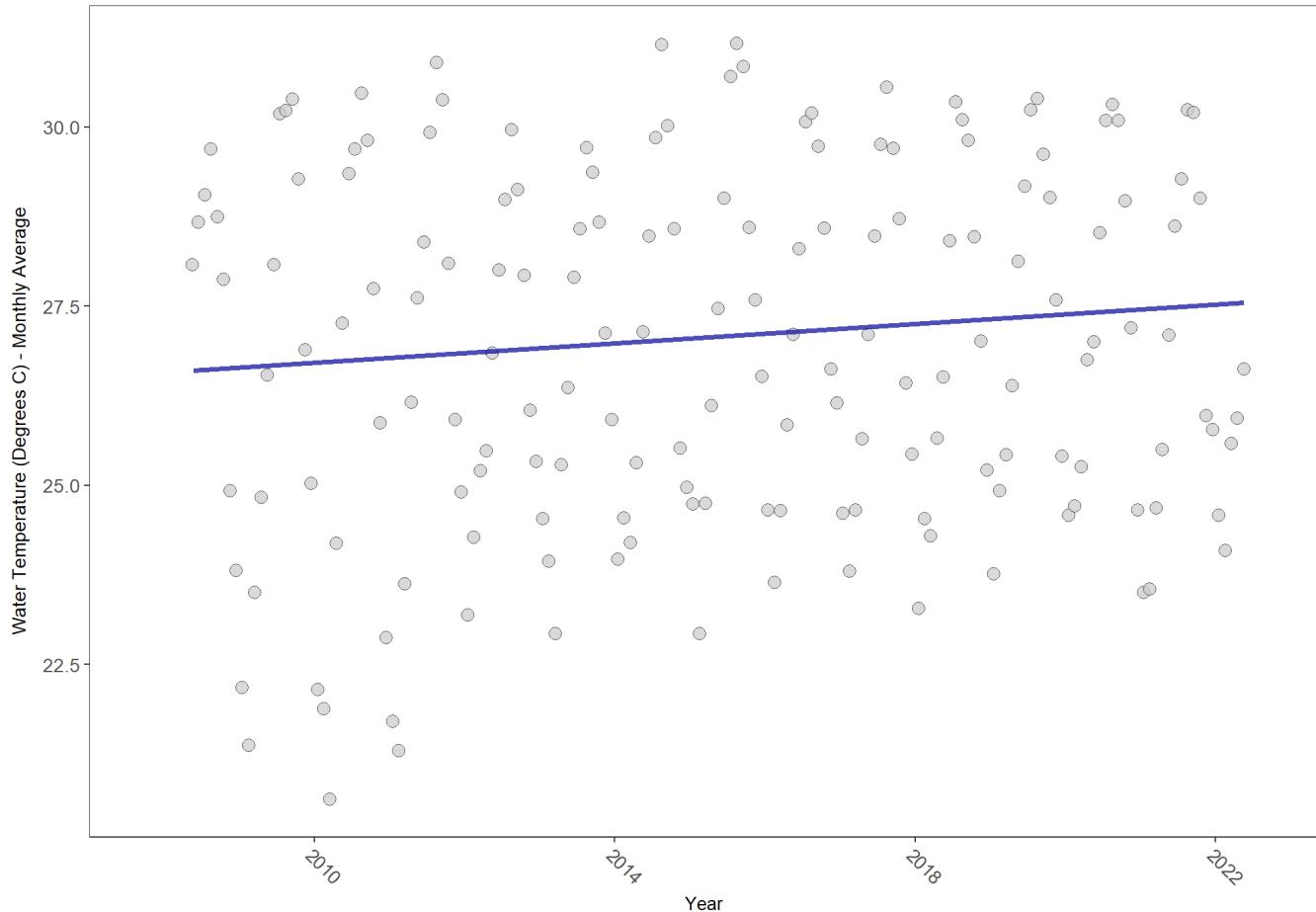
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	188336	15	26.89	TRUE	0.2726	0.0000	0.06800331	26.57265	11.9116	0.3703	1

p < 0.00005 appear as 0 due to rounding.

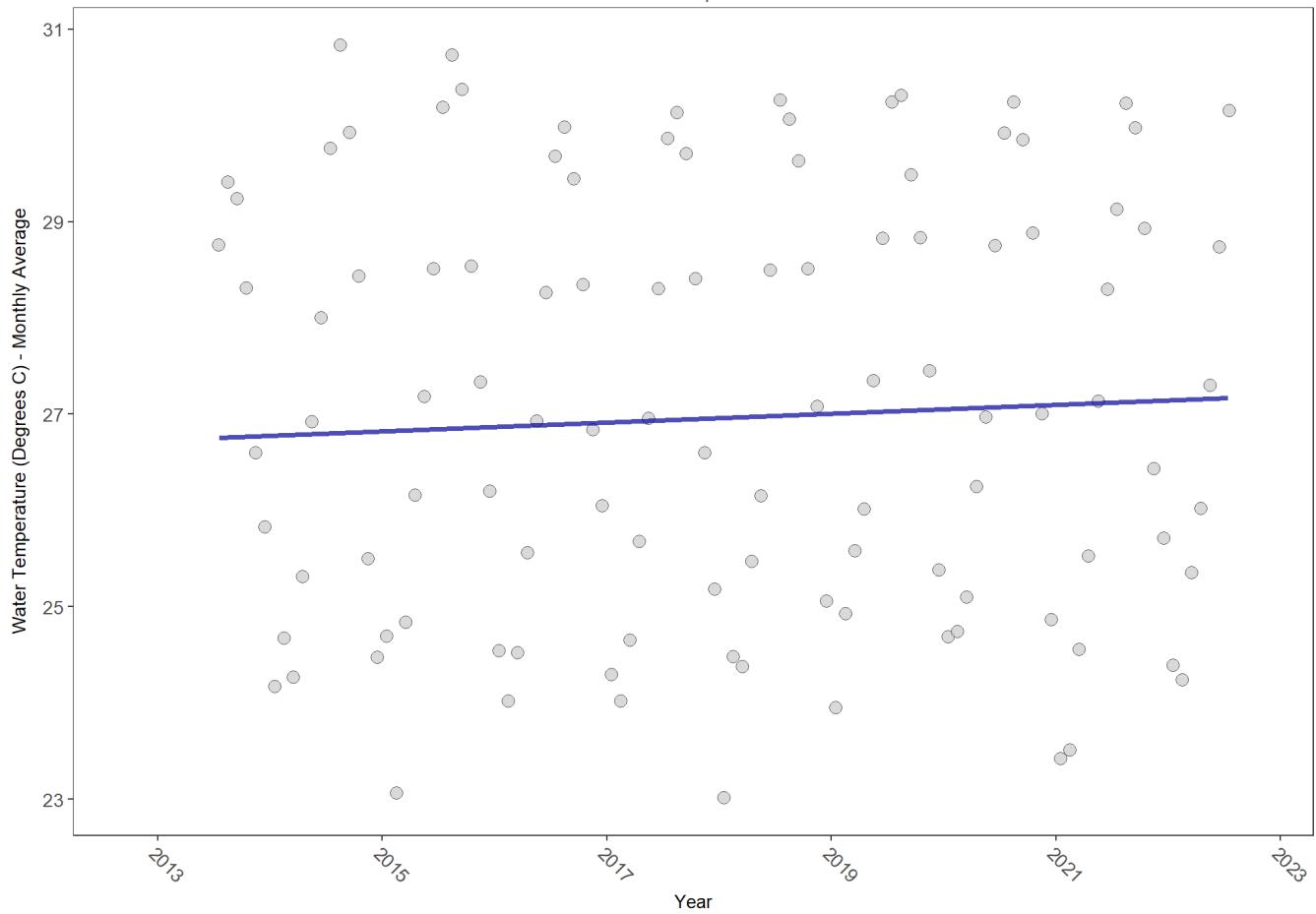
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	104819	10	26.91	TRUE	0.2197	0.0044	0.04571237	26.73356	9.6309	0.5639	1

p < 0.00005 appear as 0 due to rounding.

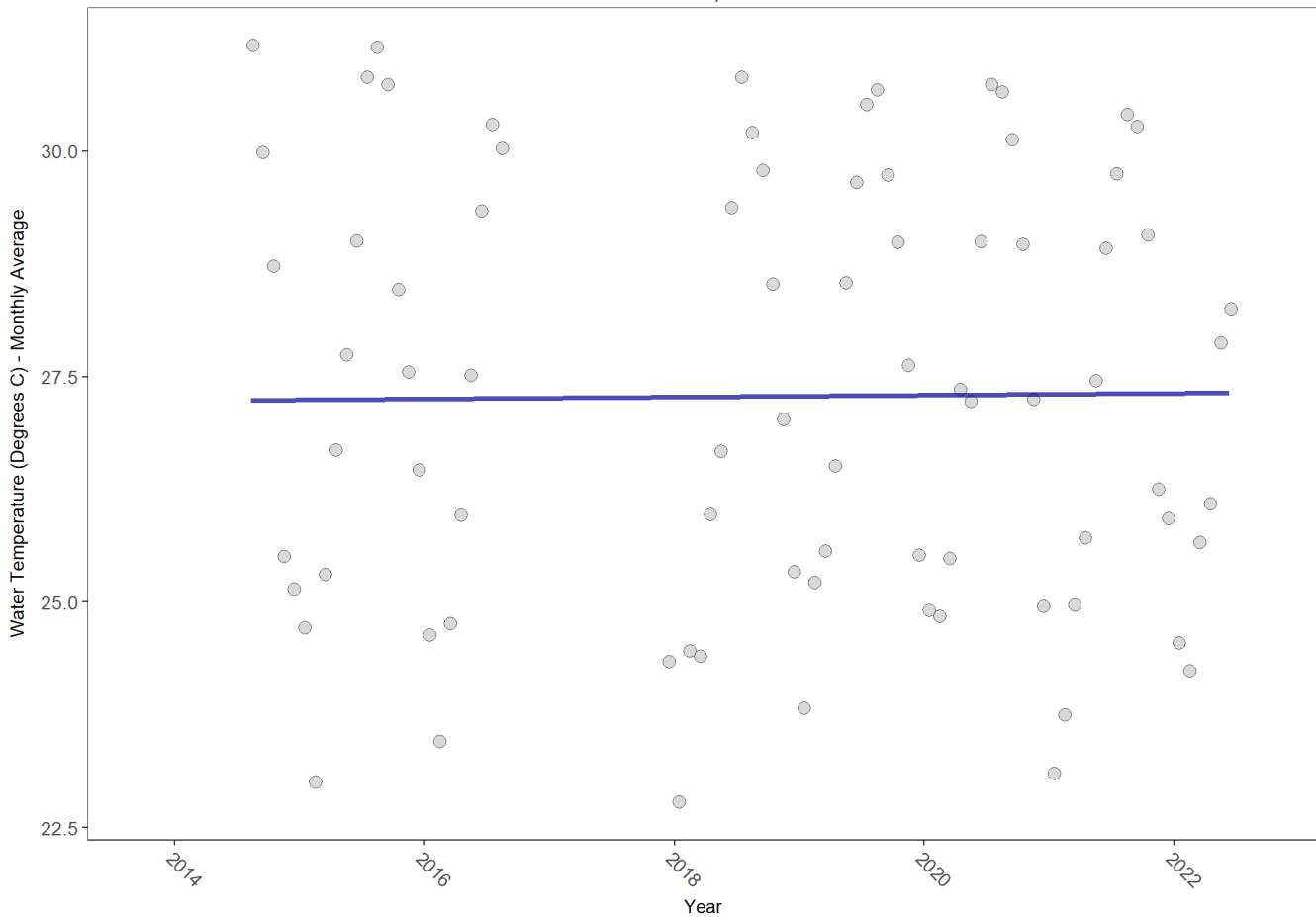
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	72230	9	27.112	TRUE	0.0117	0.9631	0.01037051	27.23271	10.2359	0.5093	0

p < 0.00005 appear as 0 due to rounding.

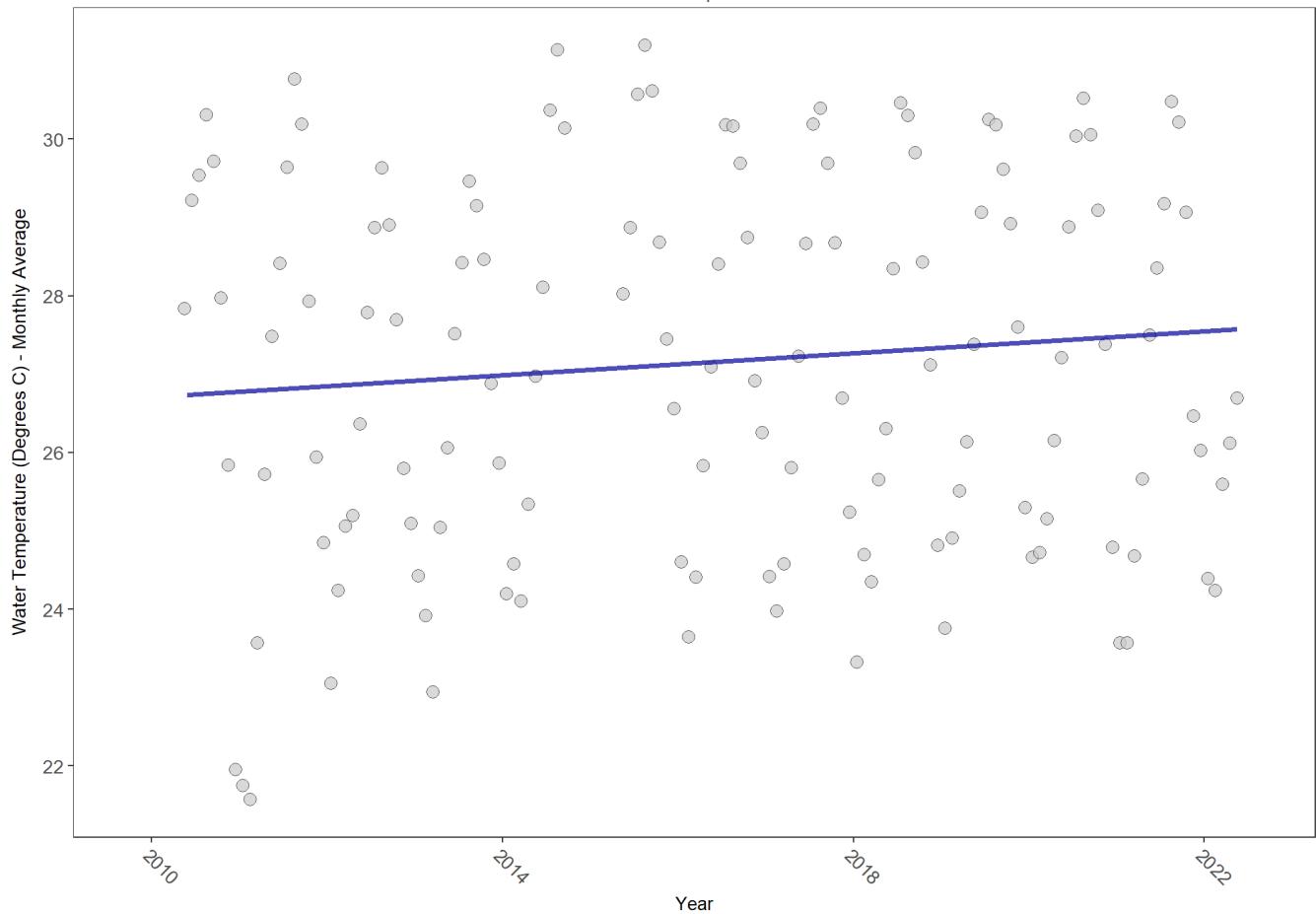
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	144589	13	27.063	TRUE	0.2668	0.0001	0.06990787	26.705	8.2015	0.6951	1

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

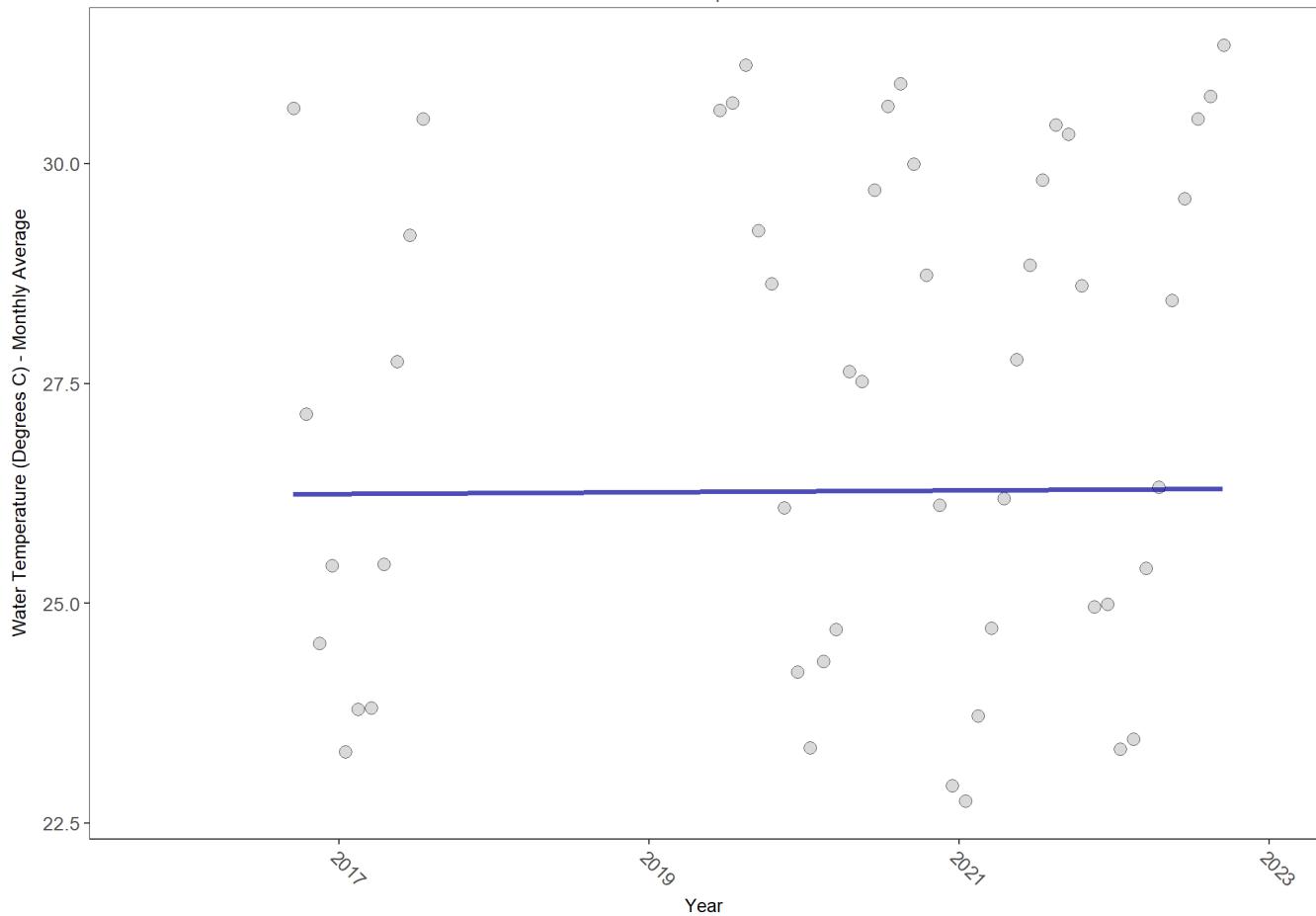
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	38112	6	27.13	TRUE	0.0784	0.6585	0.01028226	26.23033	12.6323	0.318	0

p < 0.00005 appear as 0 due to rounding.

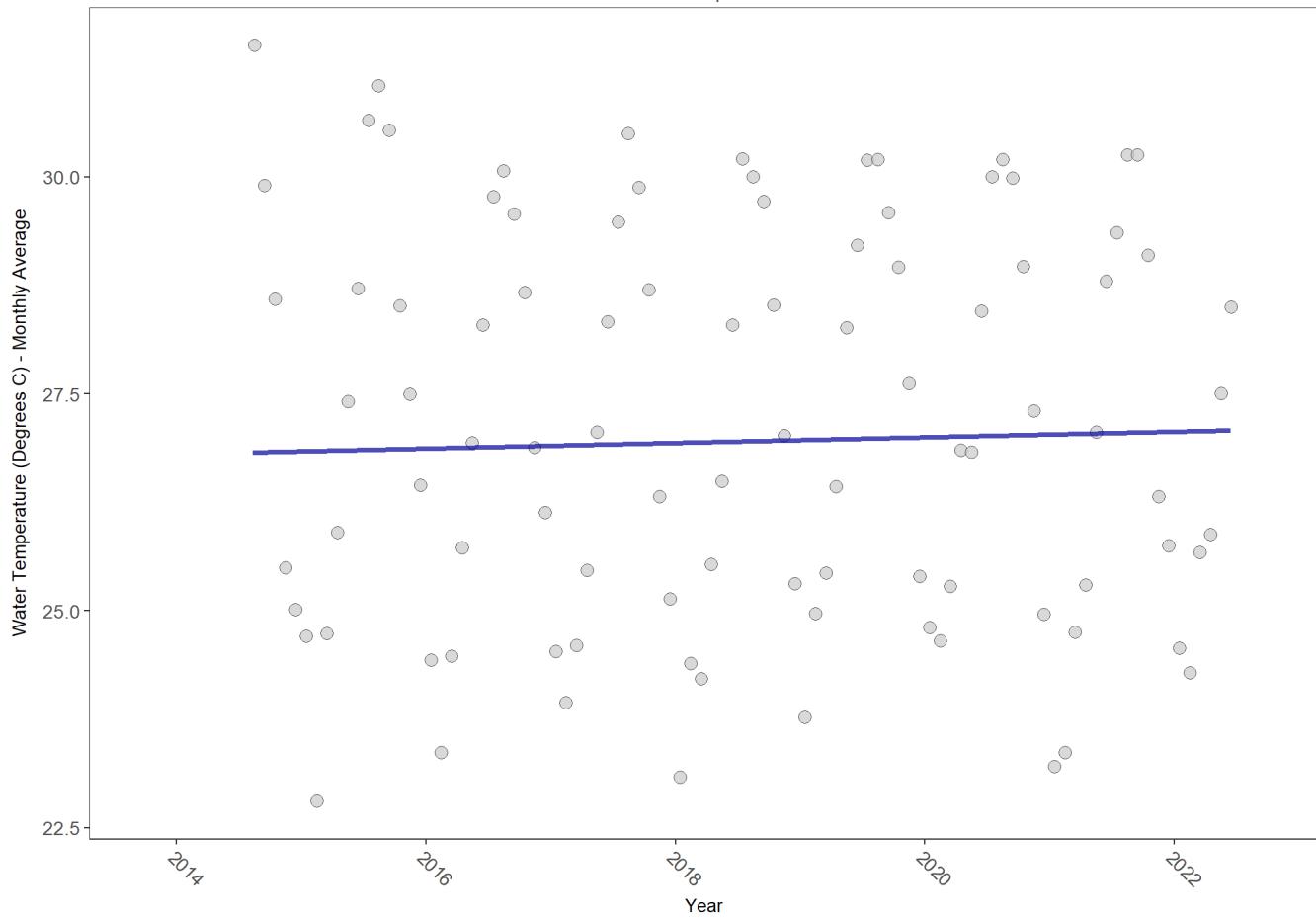
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	87924	9	26.98	TRUE	0.1068	0.1925	0.03214502	26.80912	13.5436	0.2593	0

p < 0.00005 appear as 0 due to rounding.

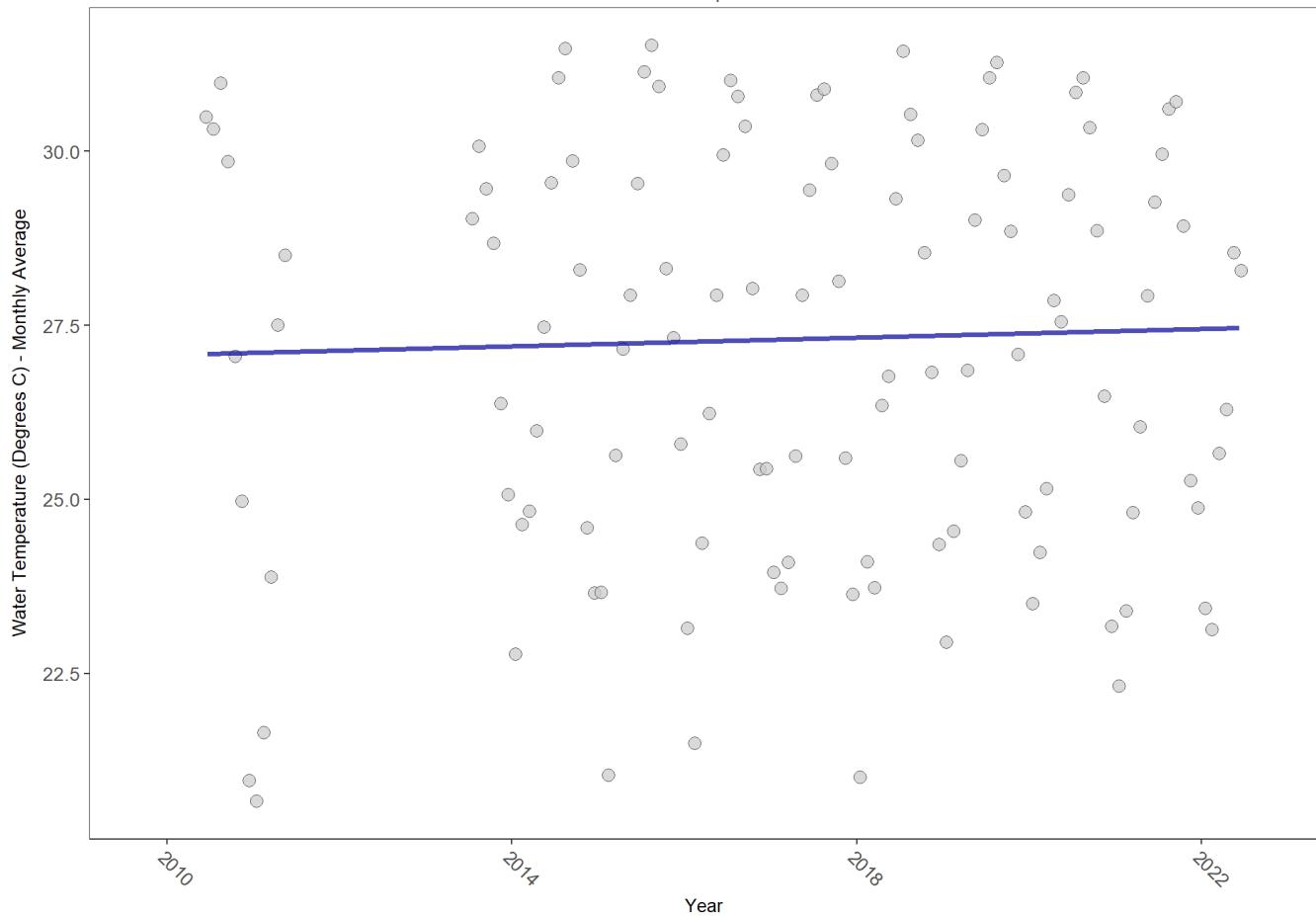
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature

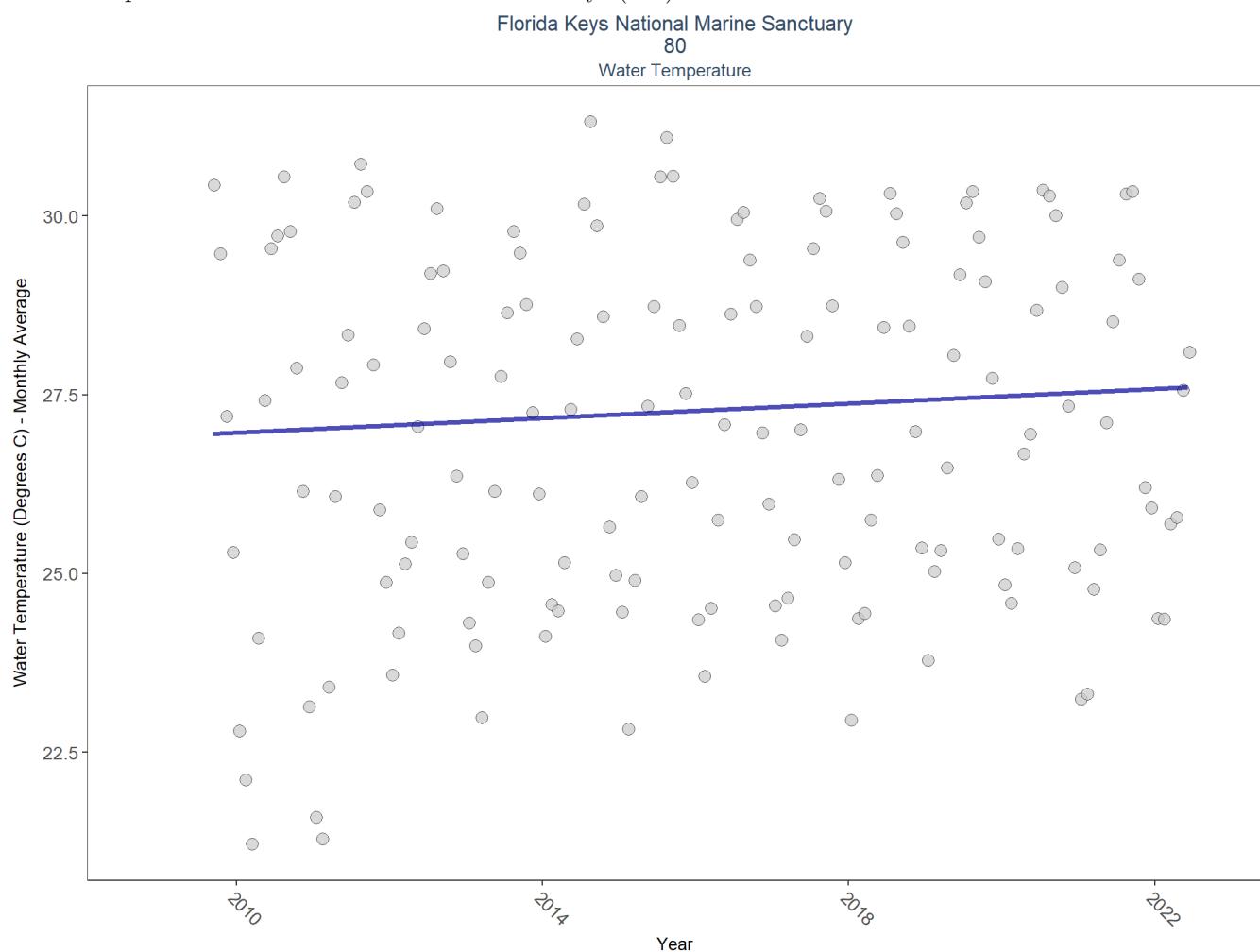


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	117274	12	27.186	TRUE	0.0815	0.2669	0.03135578	27.07152	14.6773	0.1978	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	167362	14	26.867	TRUE	0.2125	0.0005	0.05129359	26.91743	10.6982	0.4689	1

p < 0.00005 appear as 0 due to rounding.

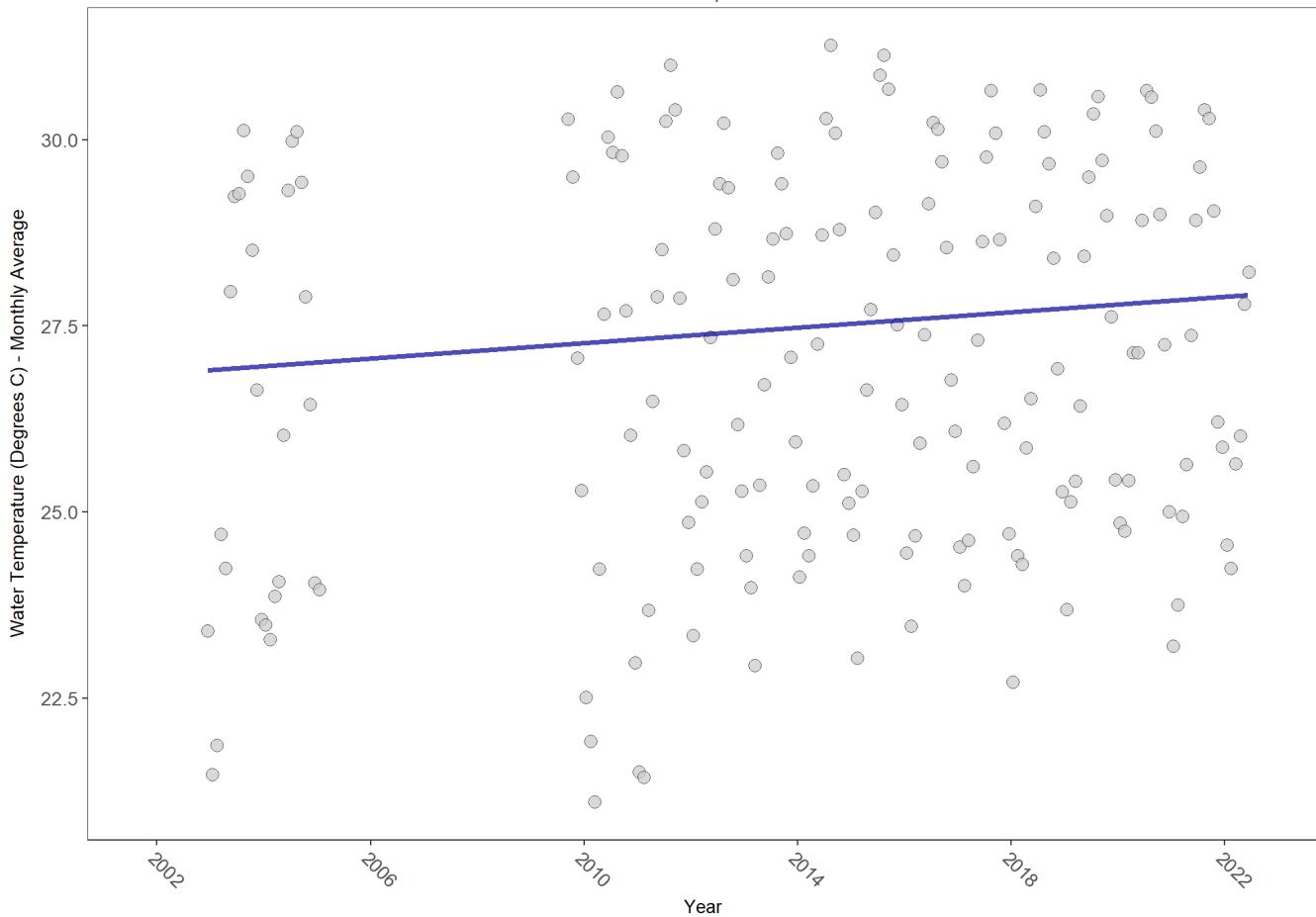
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	191677	18	26.81	TRUE	0.2712	0.0000	0.0518852	26.85191	13.4077	0.2675	1

p < 0.00005 appear as 0 due to rounding.

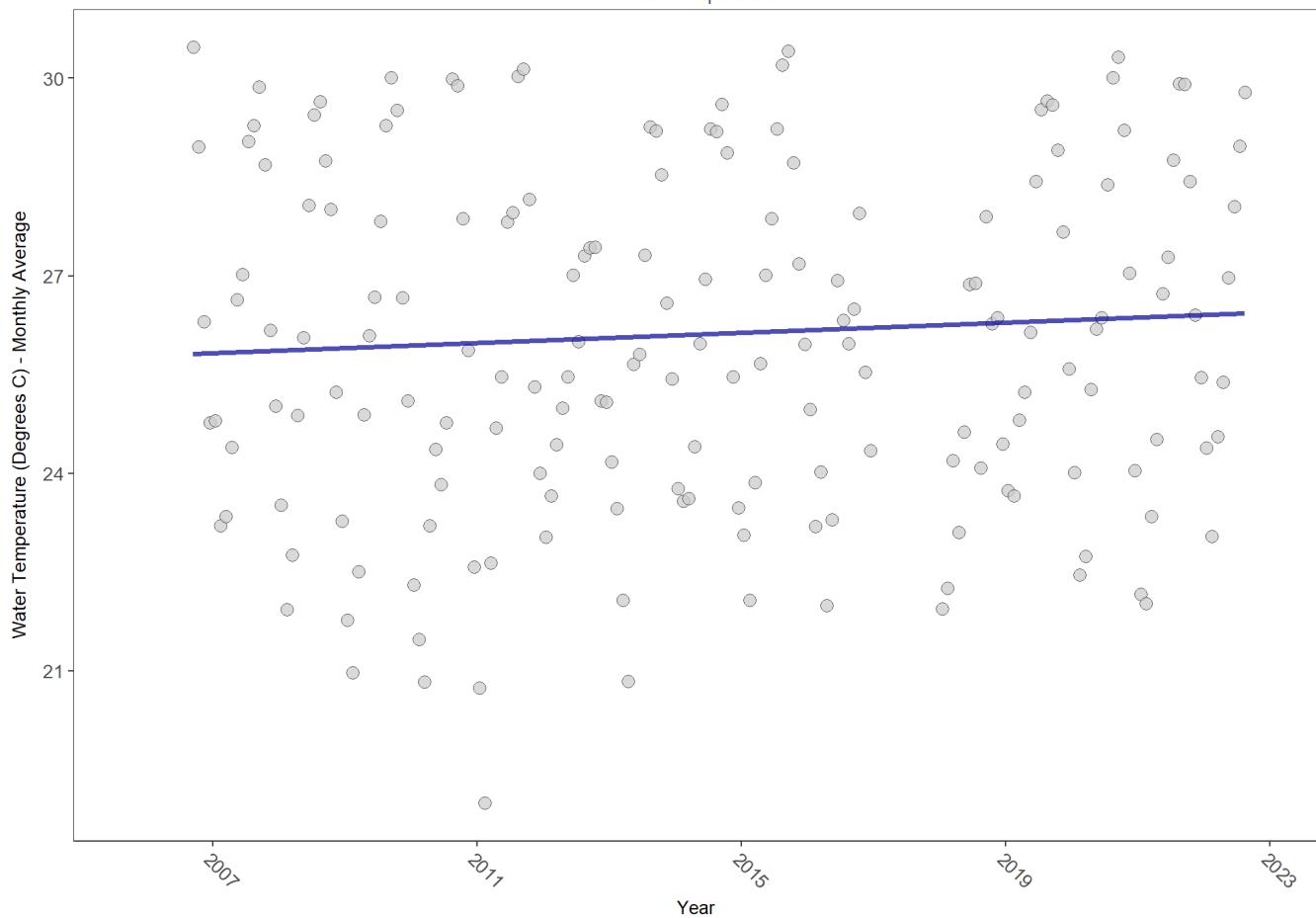
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	130599	16	25.79	TRUE	0.1429	0.0106	0.03841384	25.78902	5.231	0.9195	1

p < 0.00005 appear as 0 due to rounding.

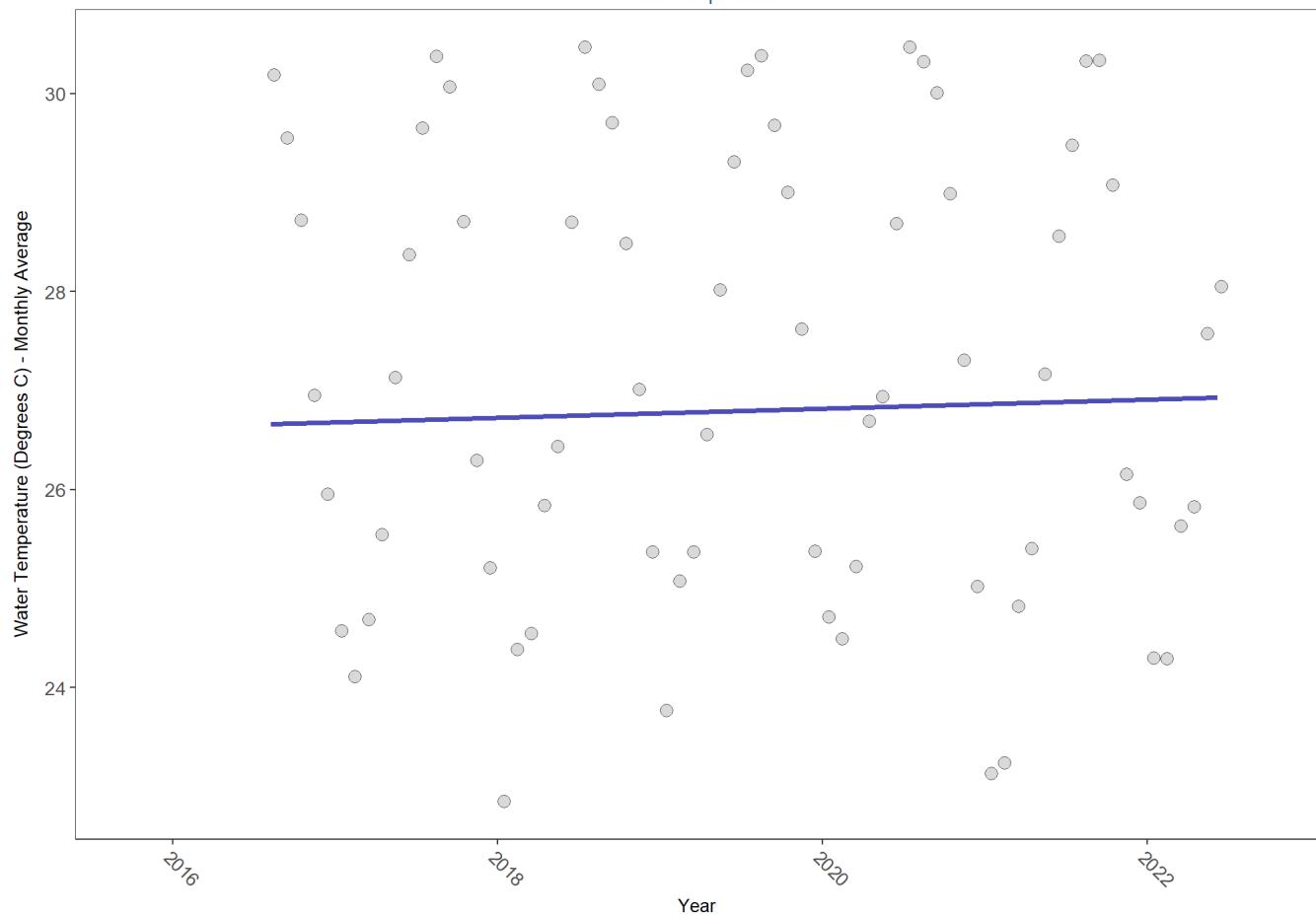
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	53957	7	27.03	TRUE	0.1268	0.2247	0.04578853	26.63254	6.2123	0.8588	0

p < 0.00005 appear as 0 due to rounding.

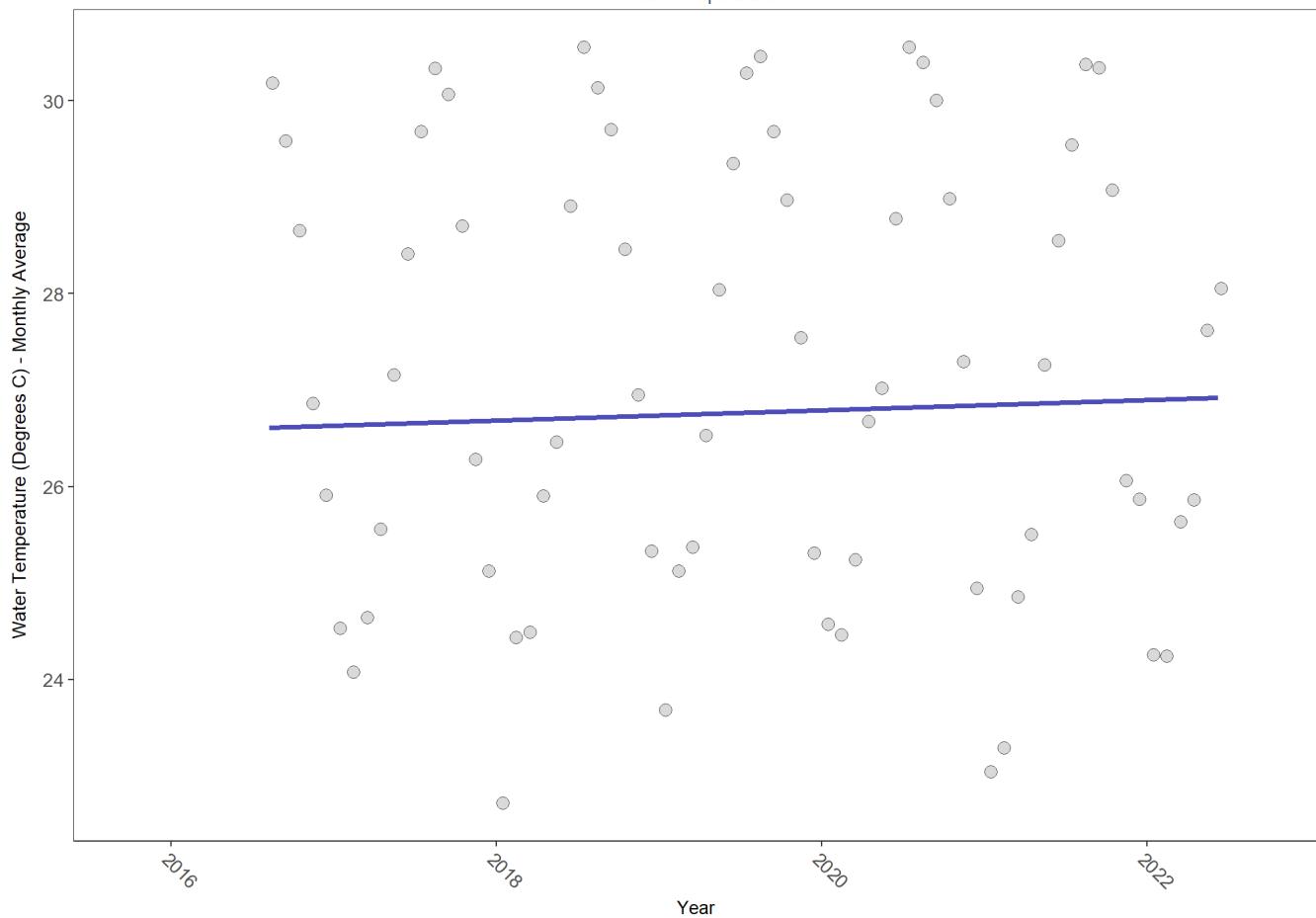
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	54044	7	27.06	TRUE	0.1493	0.1513	0.05337472	26.57988	9.0266	0.6194	0

p < 0.00005 appear as 0 due to rounding.

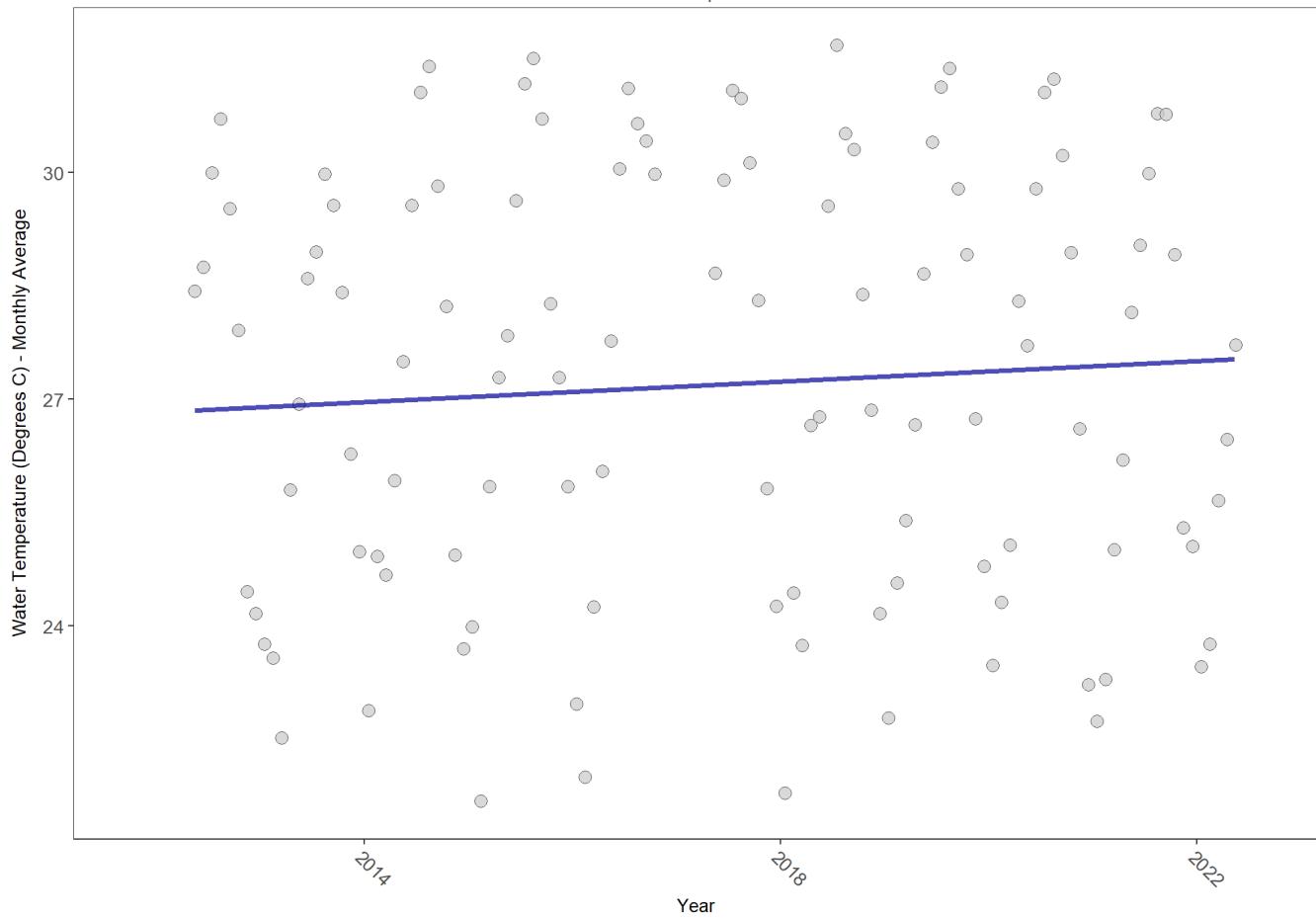
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	113161	11	27.33	TRUE	0.1873	0.0111	0.06714787	26.8315	8.0007	0.7132	1

p < 0.00005 appear as 0 due to rounding.

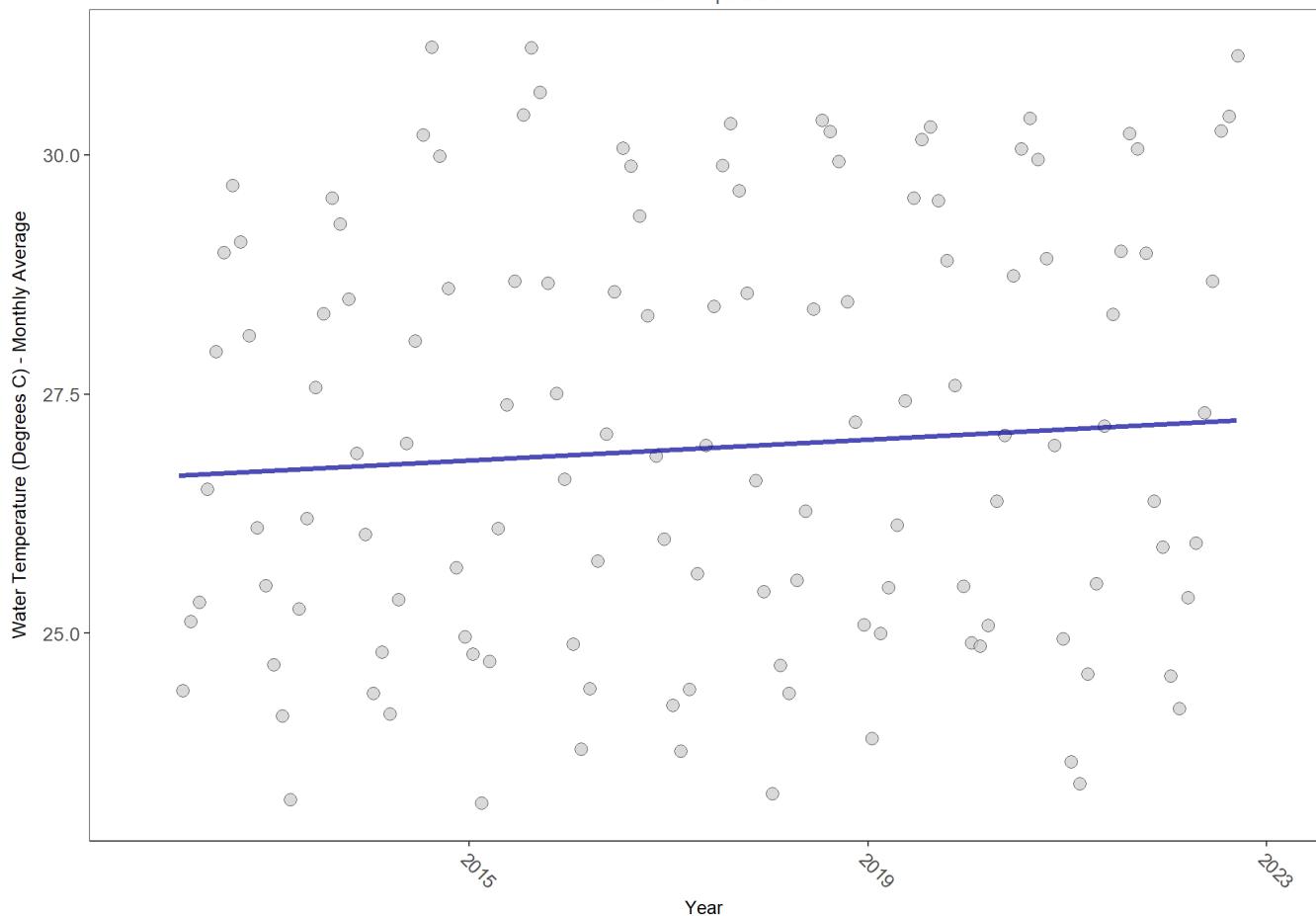
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	130333	11	26.87	TRUE	0.2375	0.0005	0.05464272	26.64356	12.5515	0.3236	1

p < 0.00005 appear as 0 due to rounding.

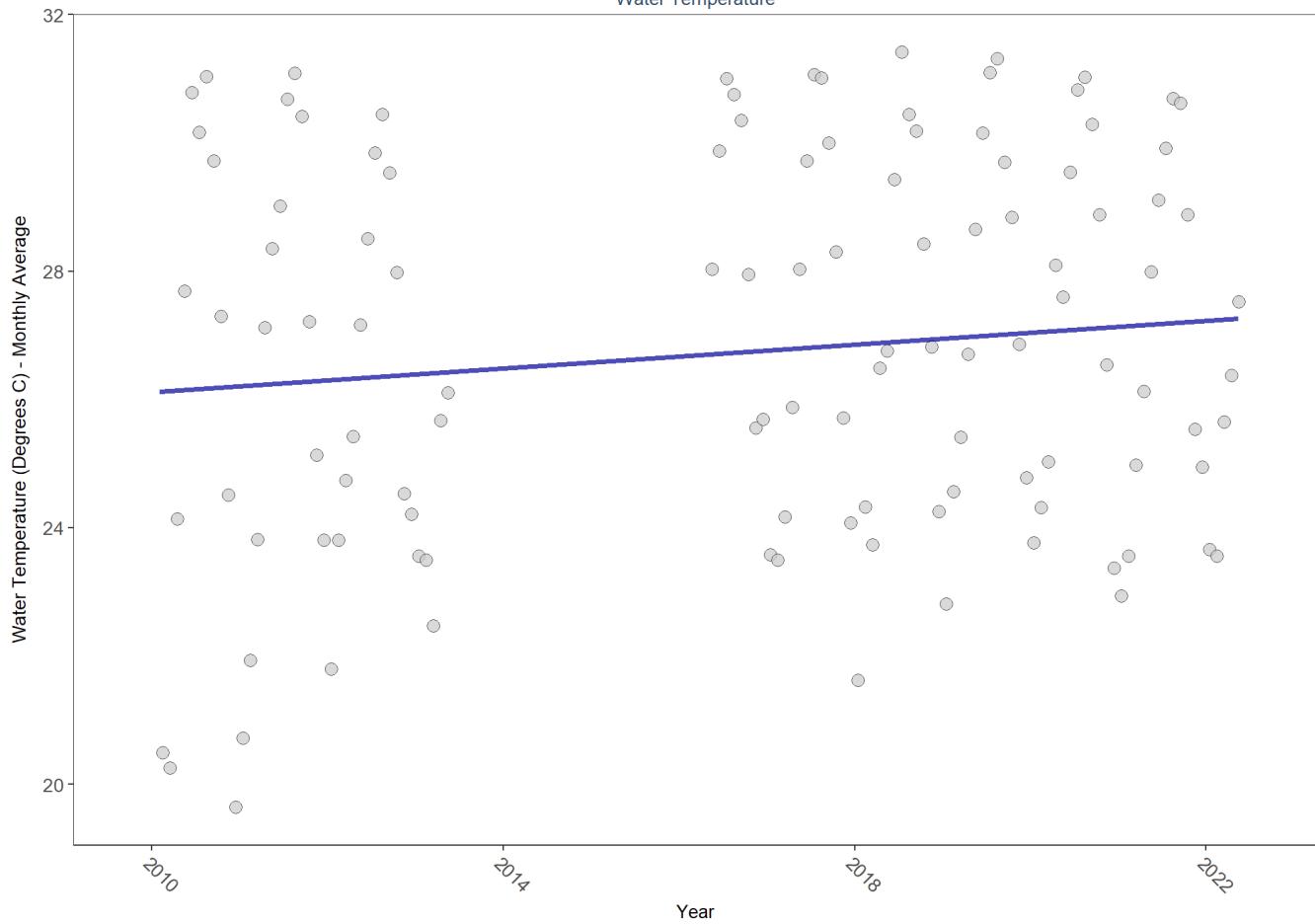
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature

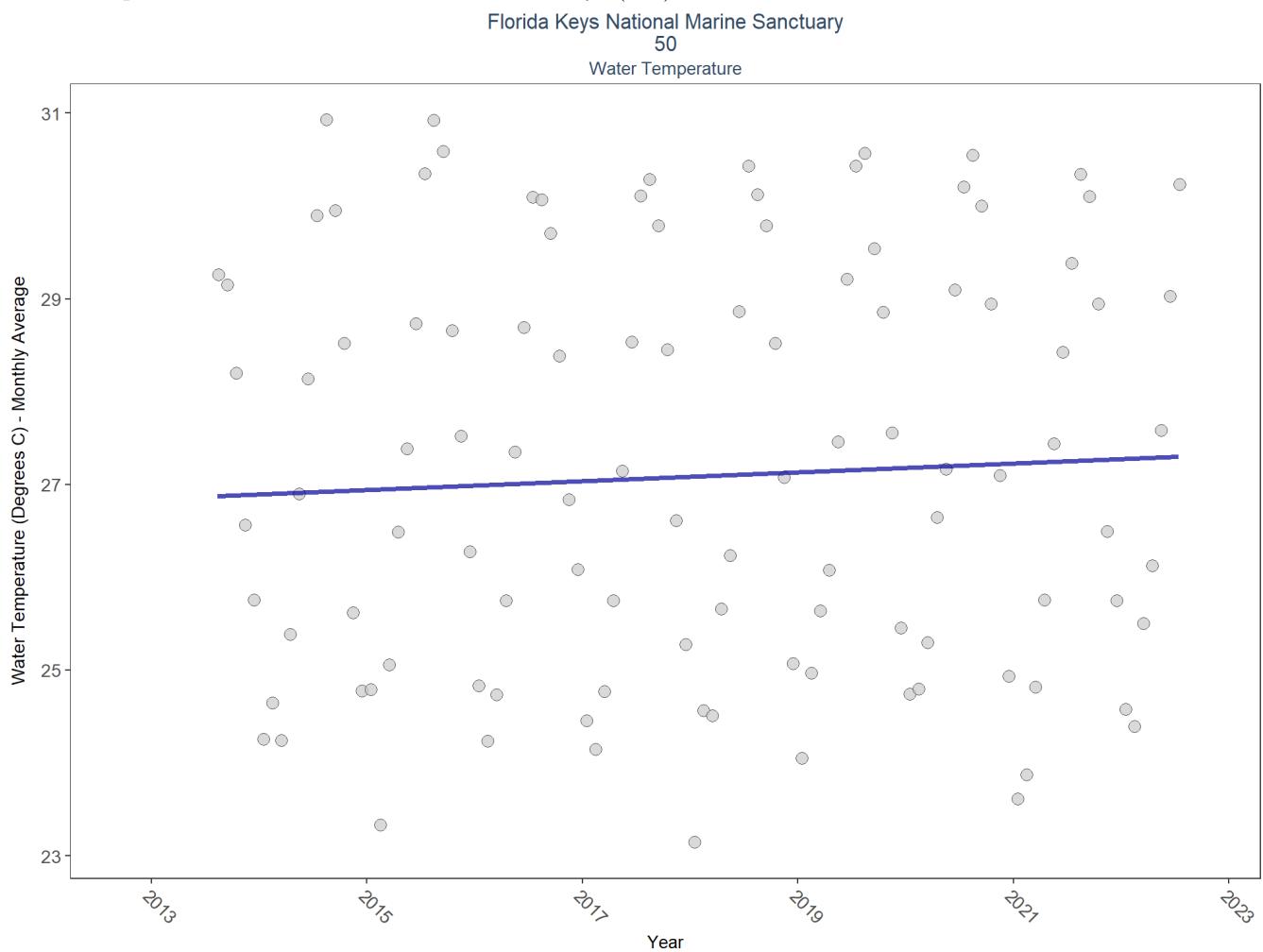


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	111388	11	26.89	TRUE	0.3252	0.0000	0.09260163	26.11624	14.0869	0.2282	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

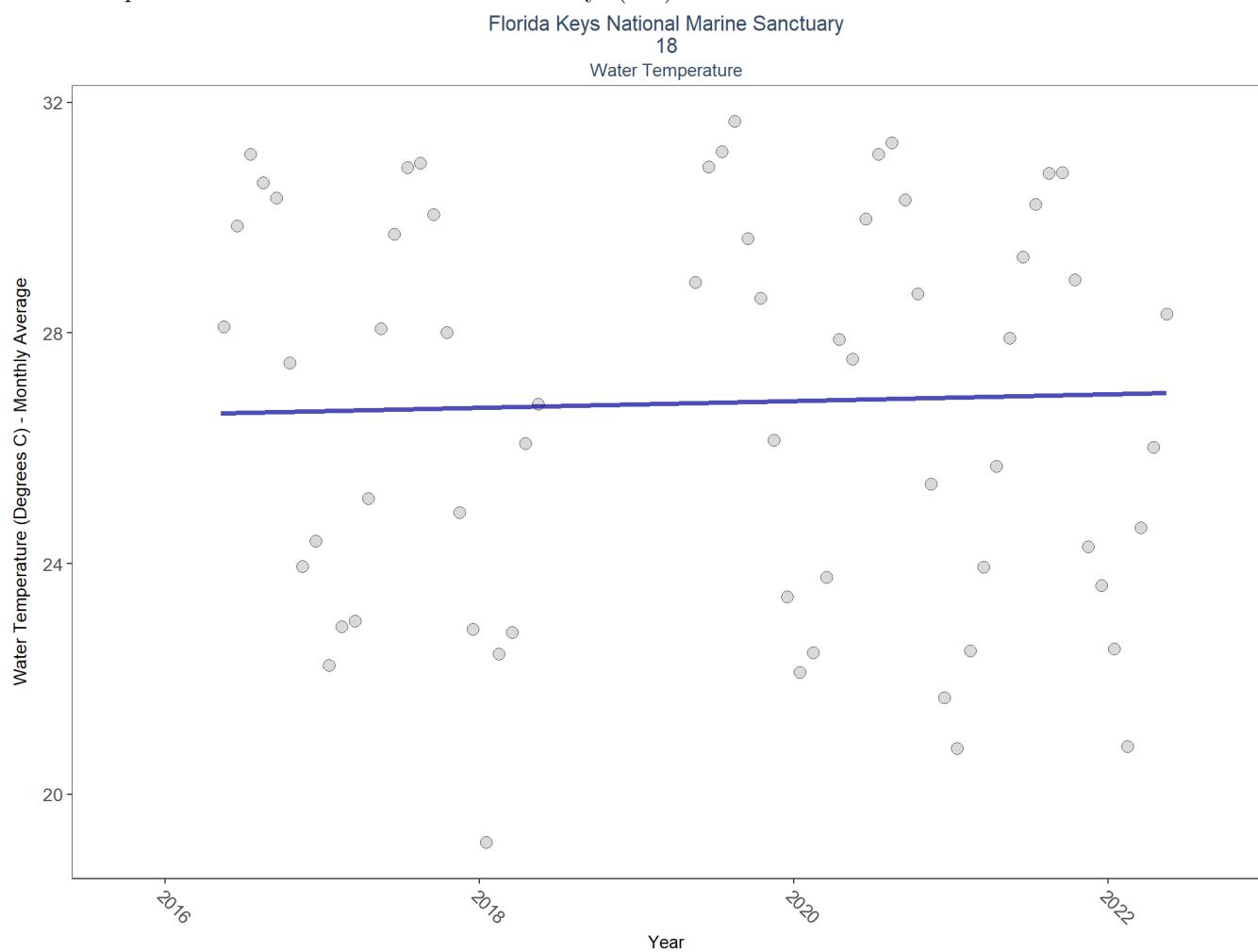


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	103998	10	27.01	TRUE	0.2269	0.0035	0.04749093	26.84591	9.8659	0.5425	1

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

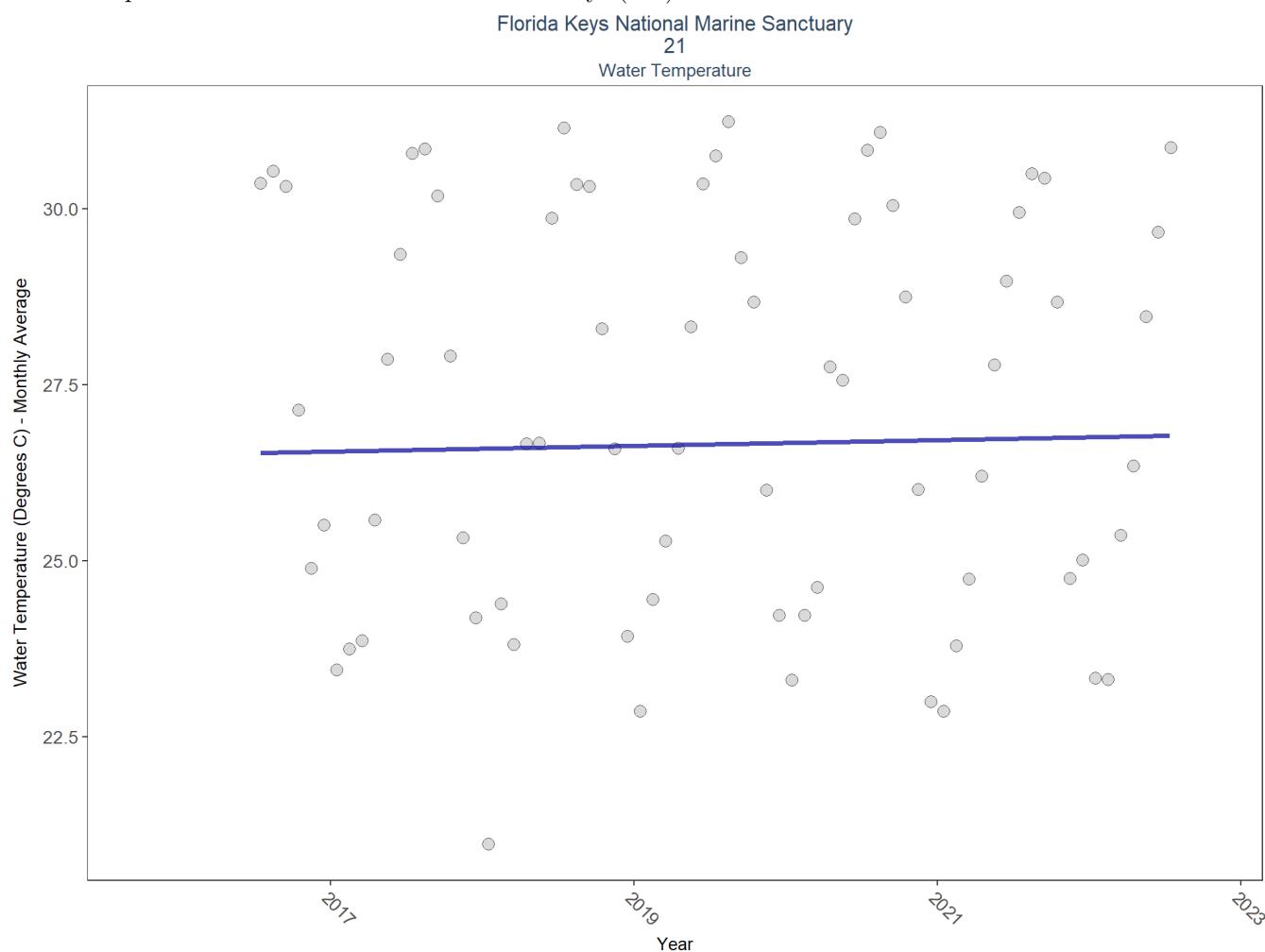


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	44119	7	27.03	TRUE	0.1344	0.2890	0.05793548	26.58809	12.0826	0.3575	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	55870	7	27.18	TRUE	0.1288	0.2228	0.03946773	26.51326	10.2751	0.5058	0

p < 0.00005 appear as 0 due to rounding.

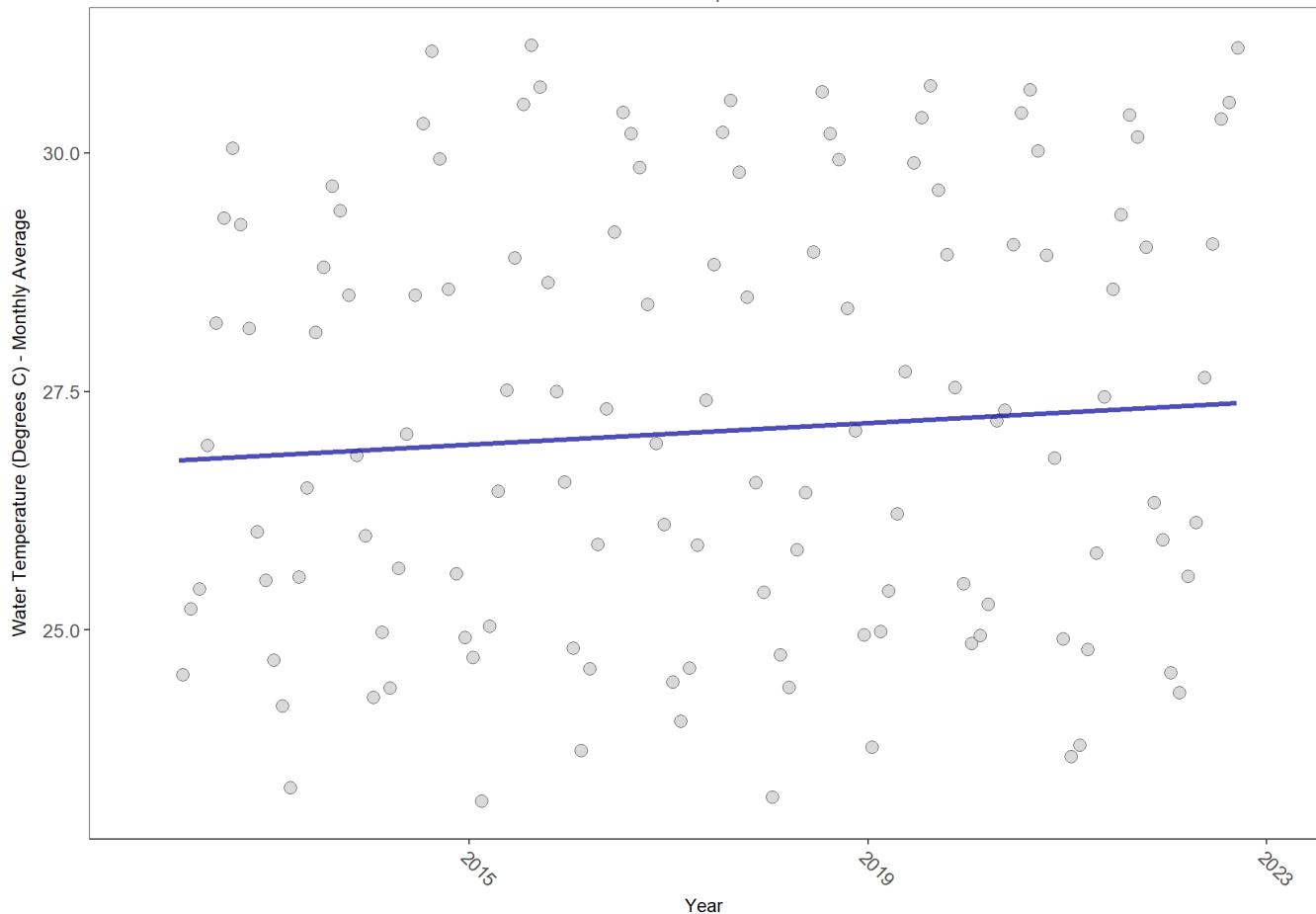
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	130399	11	27.06	TRUE	0.2524	0.0002	0.05658251	26.77119	11.0875	0.436	1

p < 0.00005 appear as 0 due to rounding.

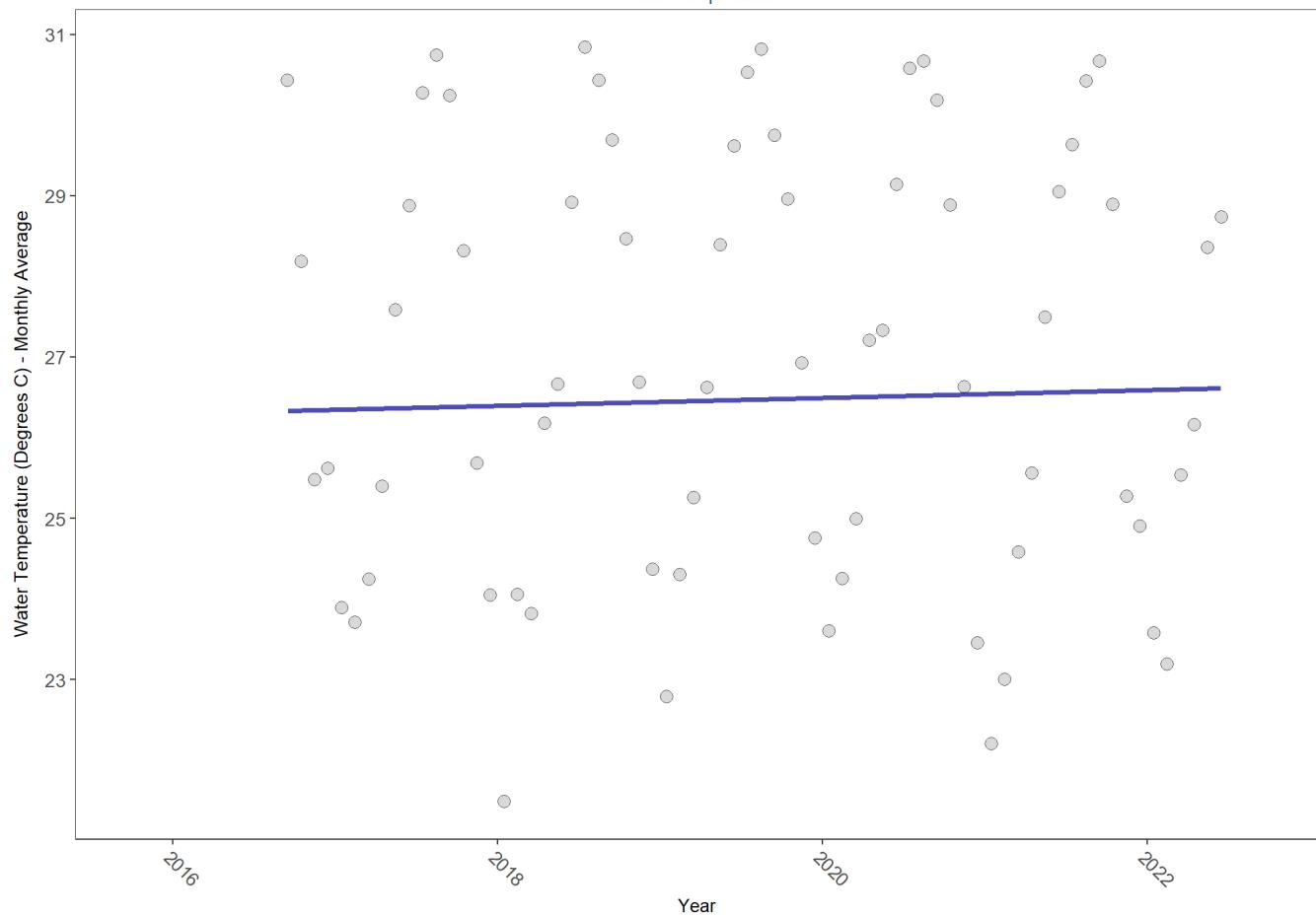
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	52521	7	26.74	TRUE	0.0714	0.4651	0.04763931	26.30294	7.8933	0.7228	0

p < 0.00005 appear as 0 due to rounding.

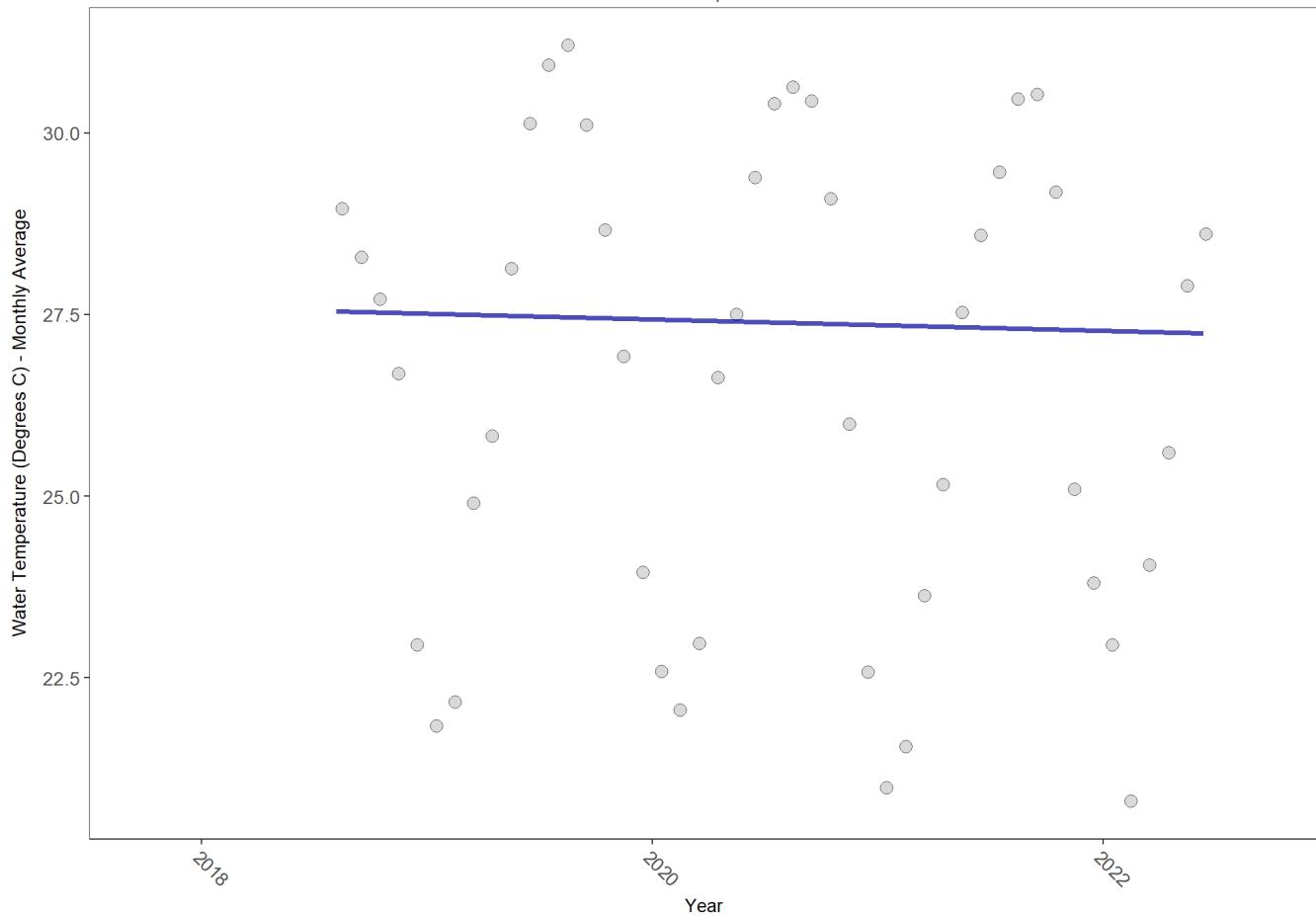
SennIntercept is intercept value at beginning of record for monitoring location

Water Temperature on Coral Reefs in the Florida Keys (986)

Florida Keys National Marine Sanctuary

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Water Temperature



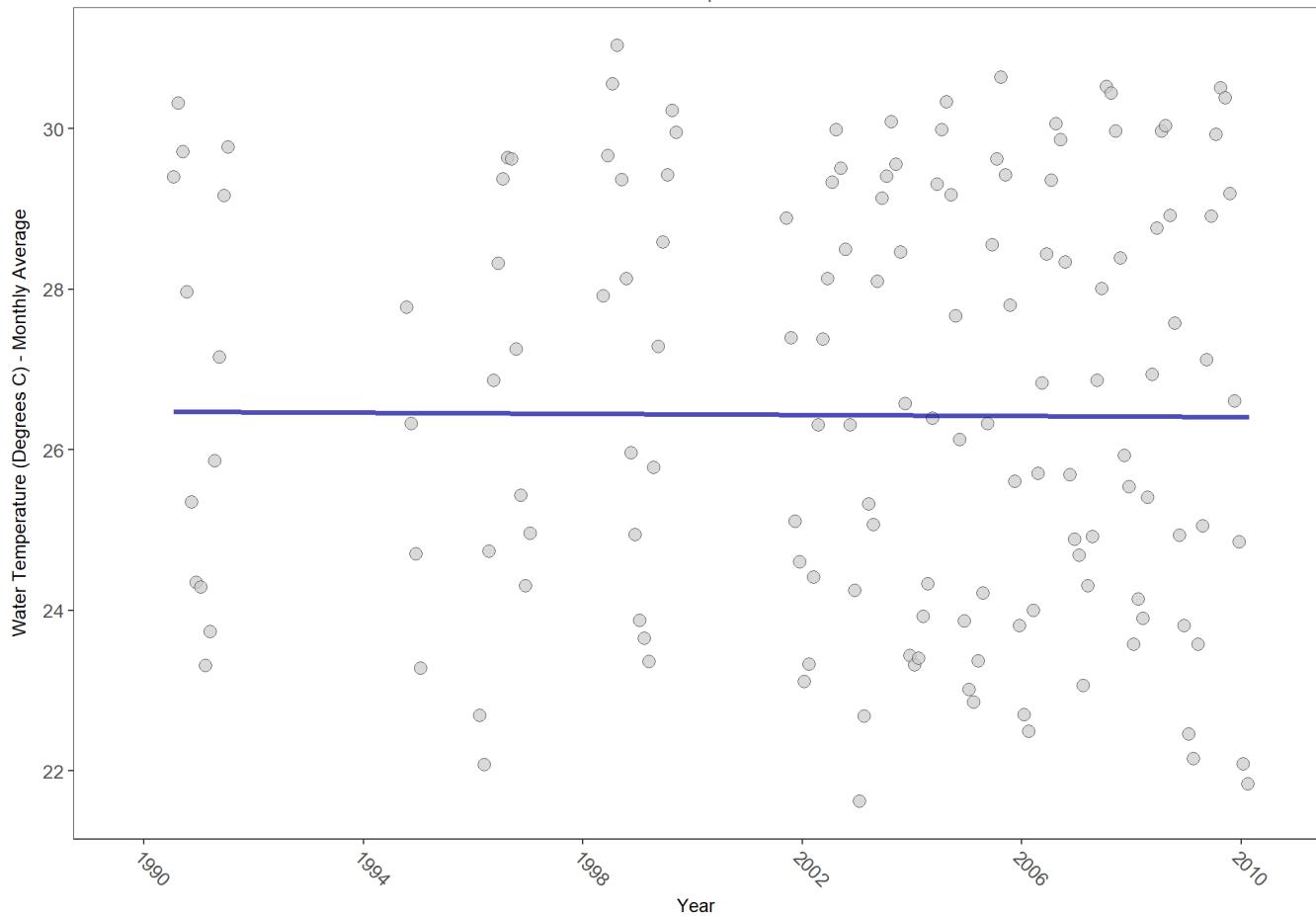
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_GRECIAN

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_GRECIAN
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	51723	18	26.6537	TRUE	-0.0317	0.6634	-0.003490323	26.47889	10.1713	0.515	0

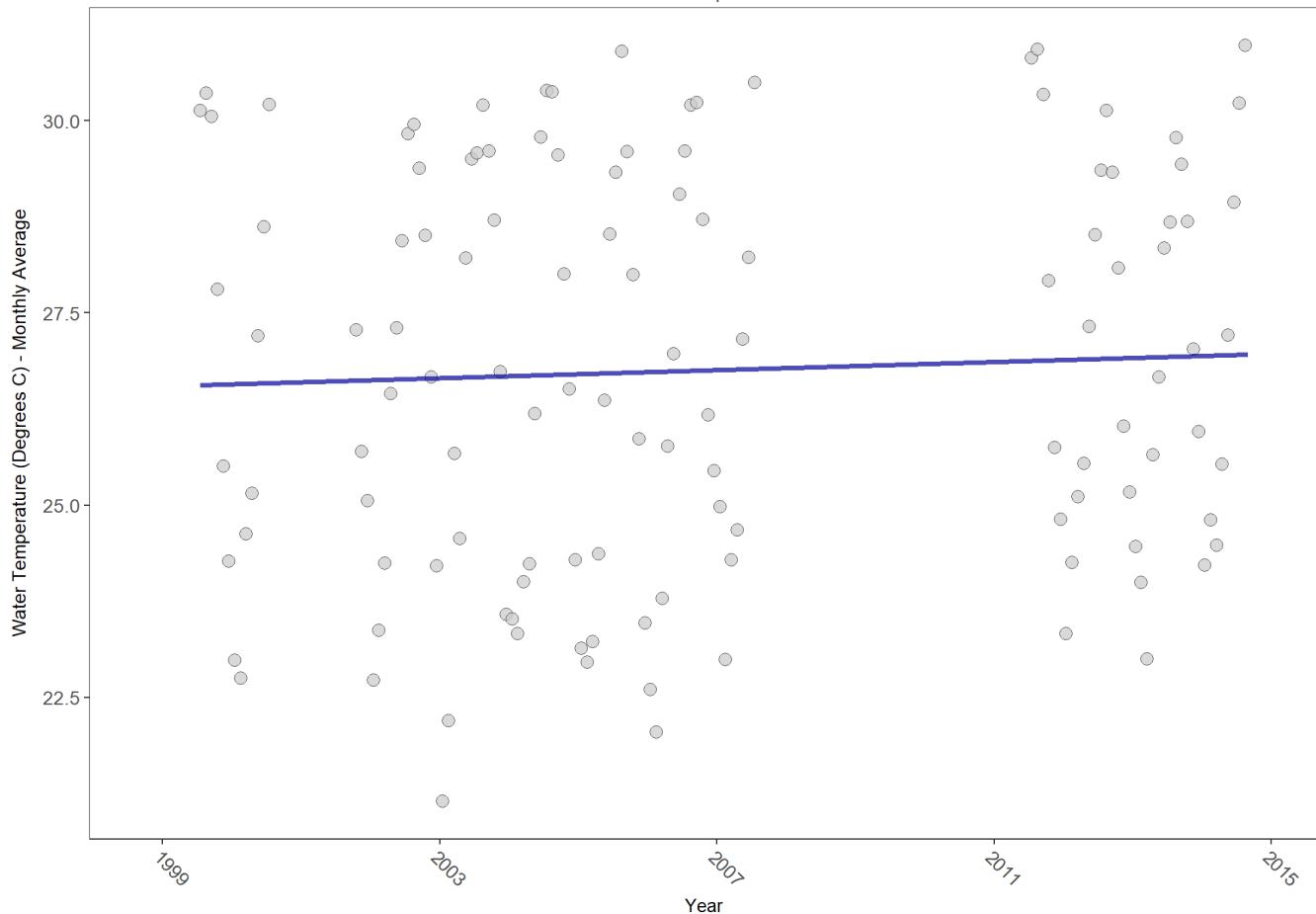
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_LOOE_ISELIN

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_LOOE_ISELIN
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	194367	13	26.8781	TRUE	0.1294	0.0801	0.02613332	26.54692	8.8436	0.6363	0

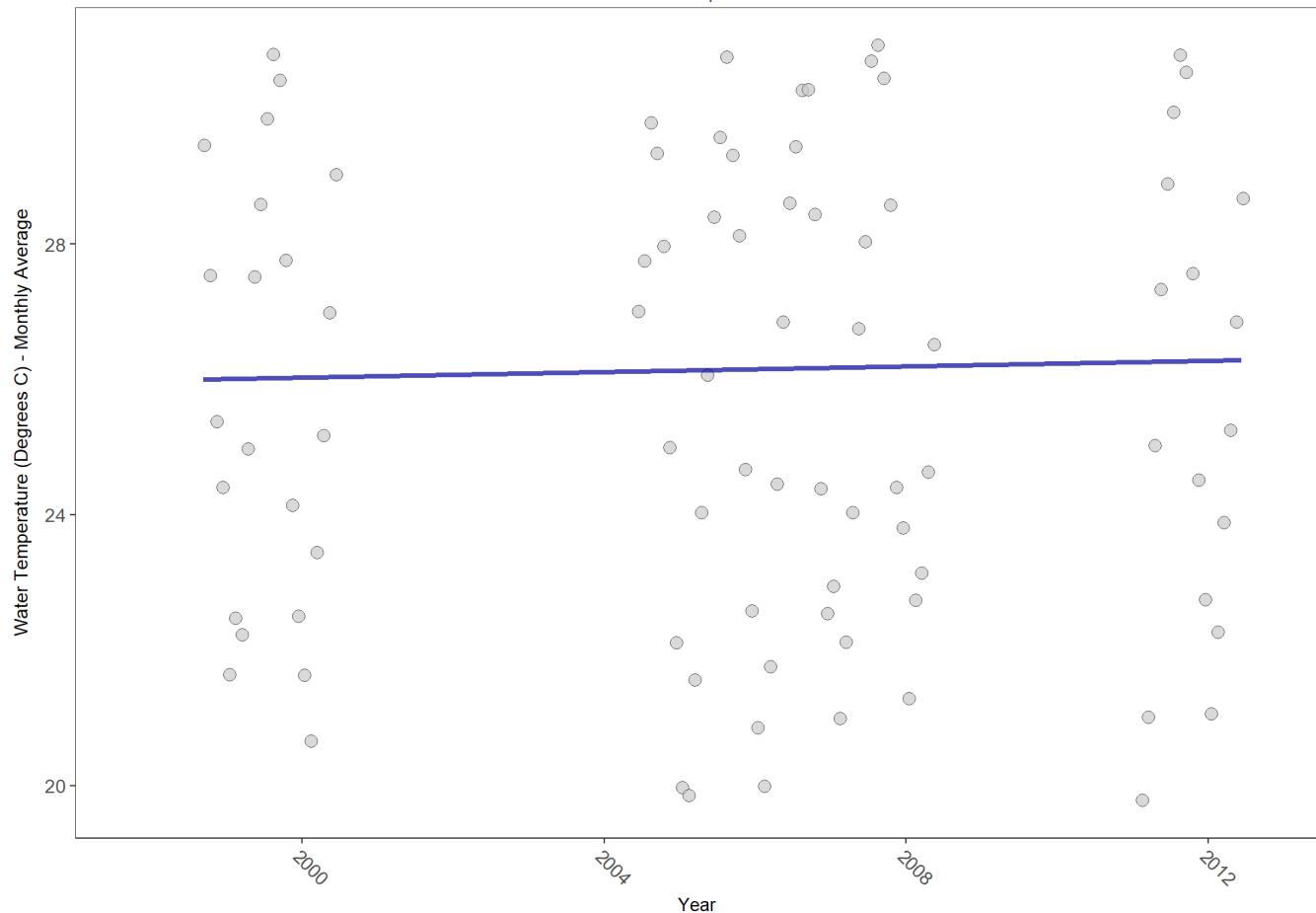
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_SMITH_SHL

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_SMITH_SHL
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	94527	10	25.4464	TRUE	0.1271	0.1933	0.02024458	25.98996	6.1795	0.8611	0

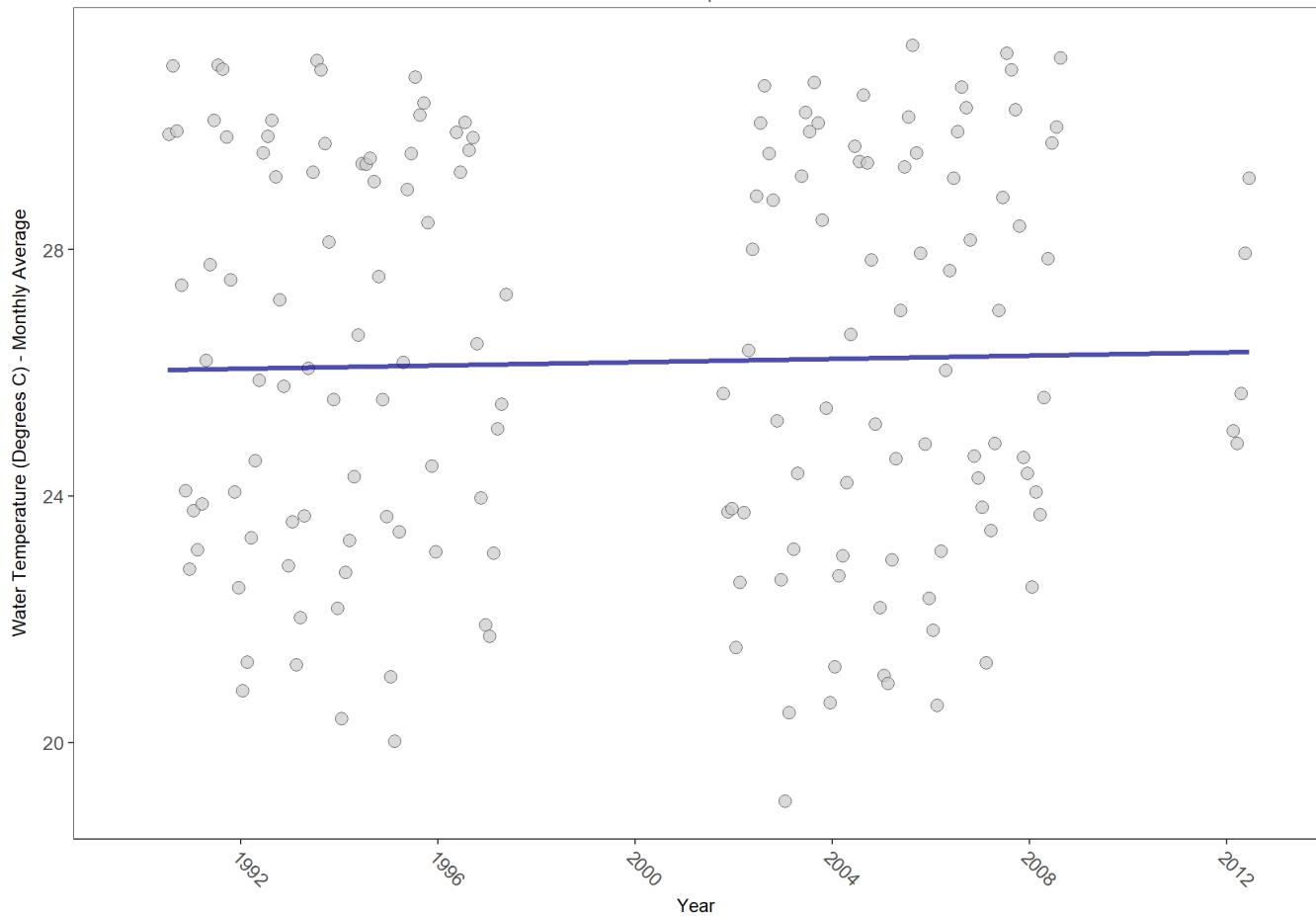
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_BOCA_GRND

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_BOCA_GRND
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	73434	17	26.14295	TRUE	0.0814	0.1662	0.01333094	26.04008	6.7244	0.8209	0

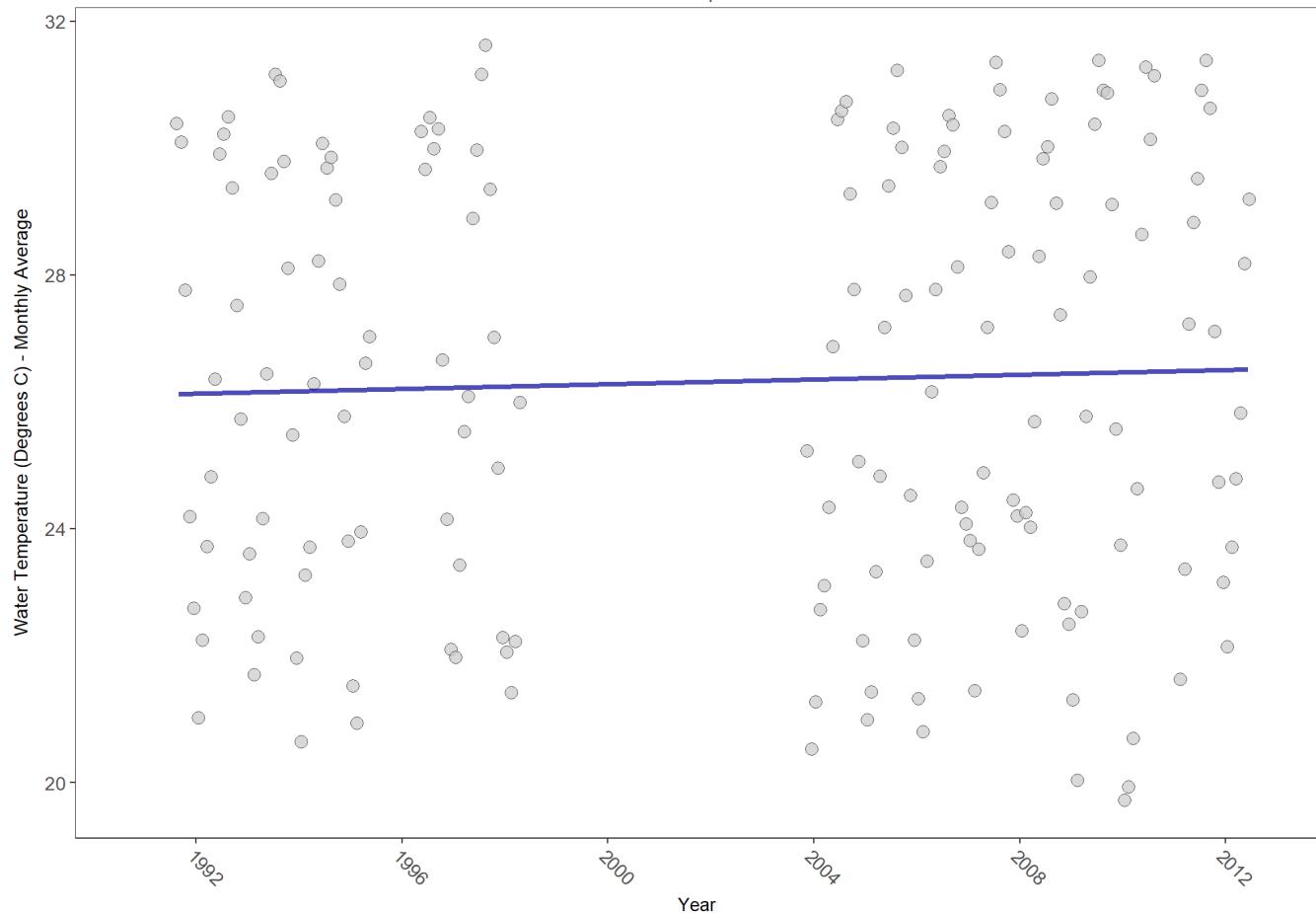
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_KW_CHANL

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_KW_CHANL
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	123578	18	26.2719	TRUE	0.1034	0.0805	0.01870402	26.10889	10.0738	0.5238	0

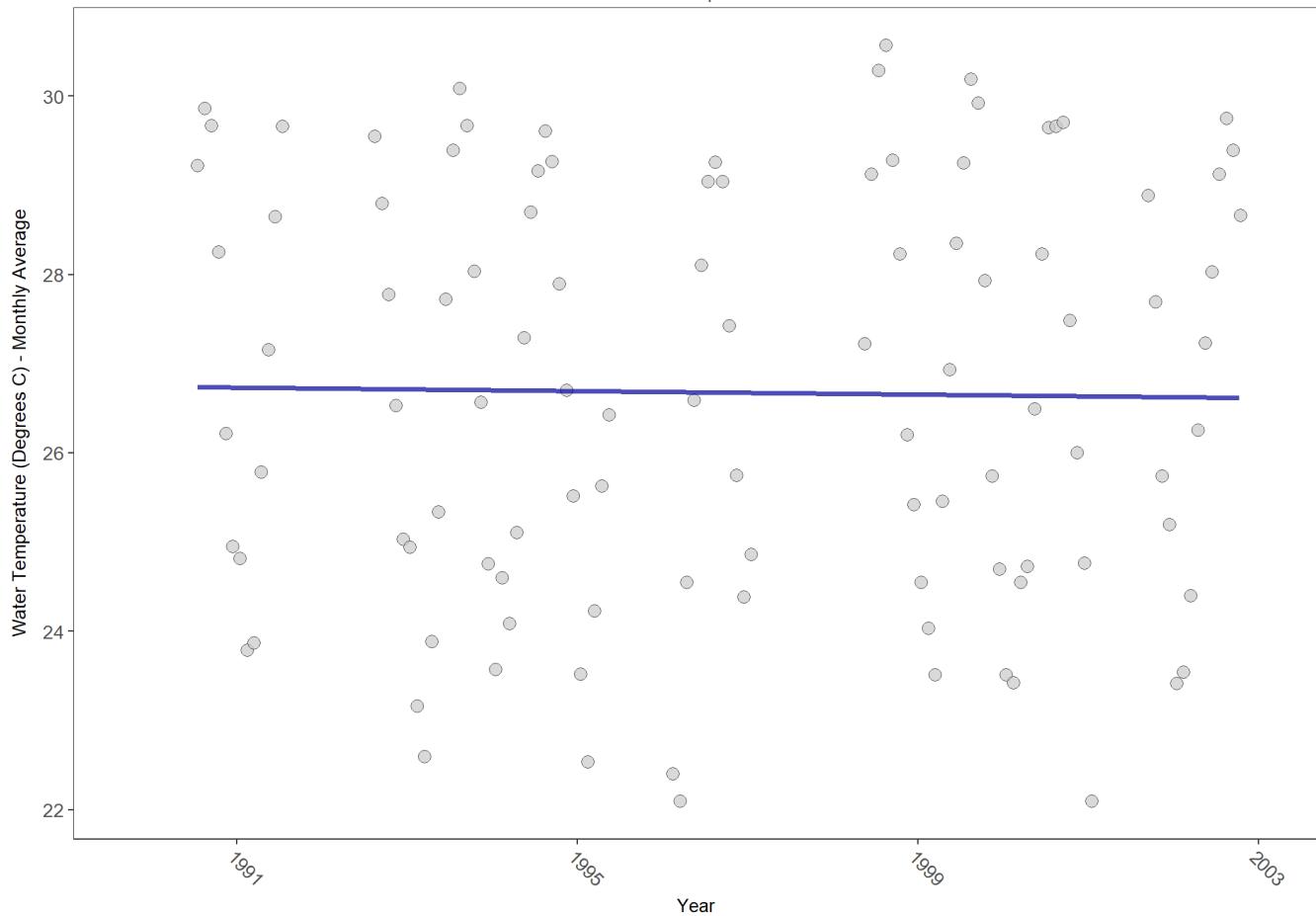
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_MOLASSES

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_MOLASSES
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	36146	13	26.7	TRUE	-0.0539	0.4806	-0.009538945	26.74323	10.5494	0.4817	0

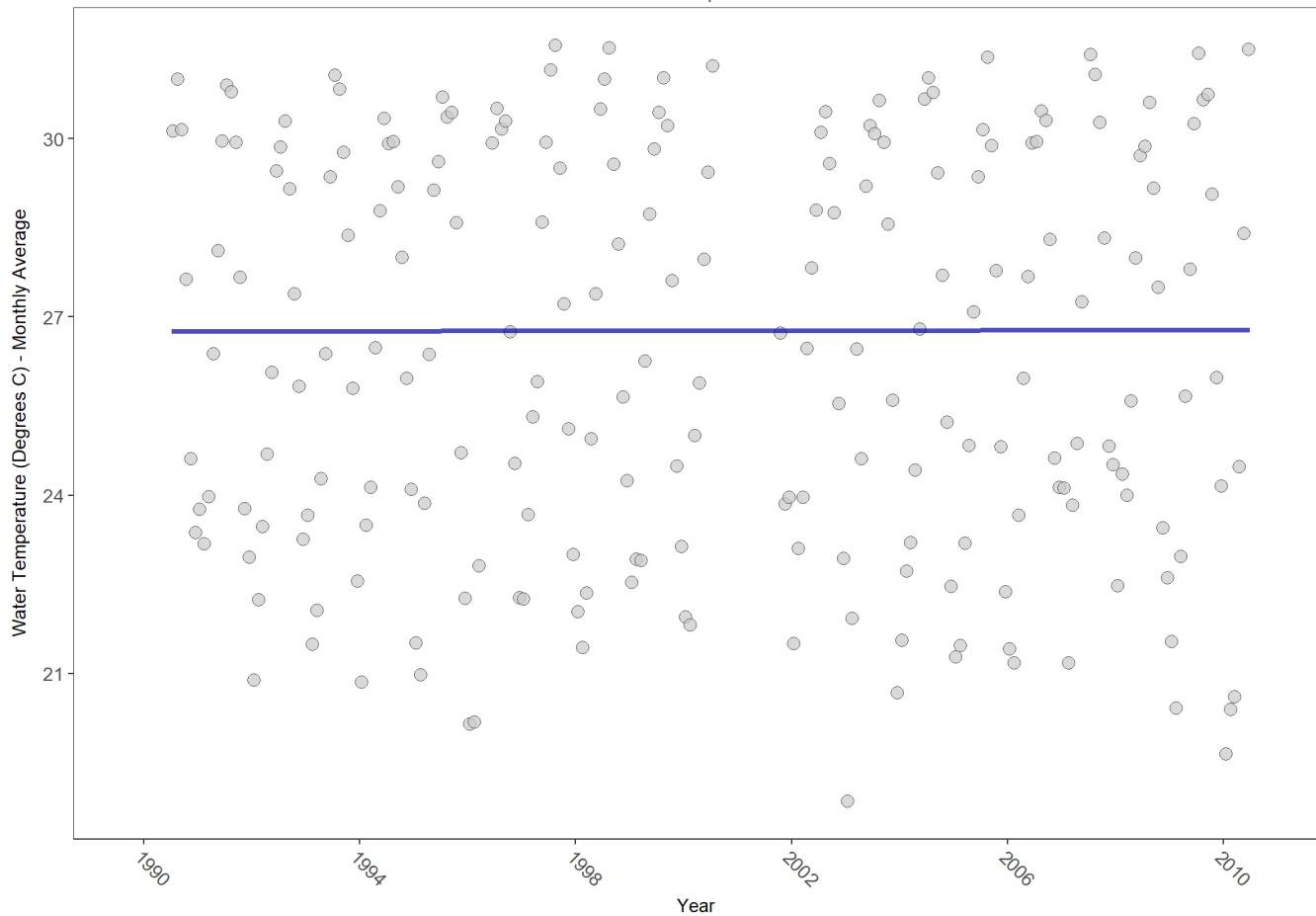
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_9FT_SHOAL

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_9FT_SHOAL
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	80299	21	26.5	TRUE	0.0016	0.9917	0.0008159053	26.76346	7.908	0.7215	0

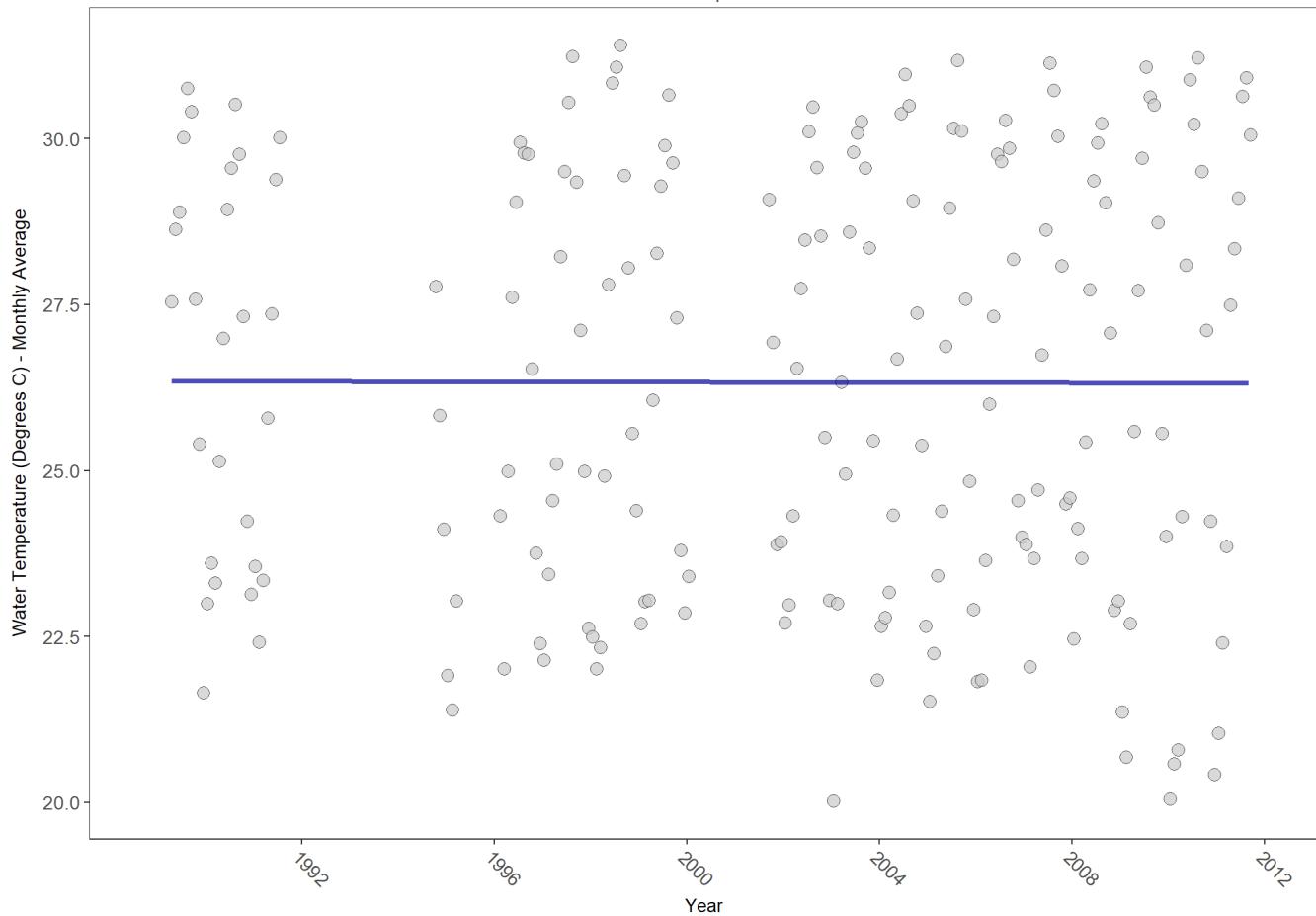
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_HEN&CHIX

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_HEN&CHIX
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	72285	21	26.5	TRUE	-0.0085	0.8763	-0.001228167	26.34774	14.6961	0.1968	0

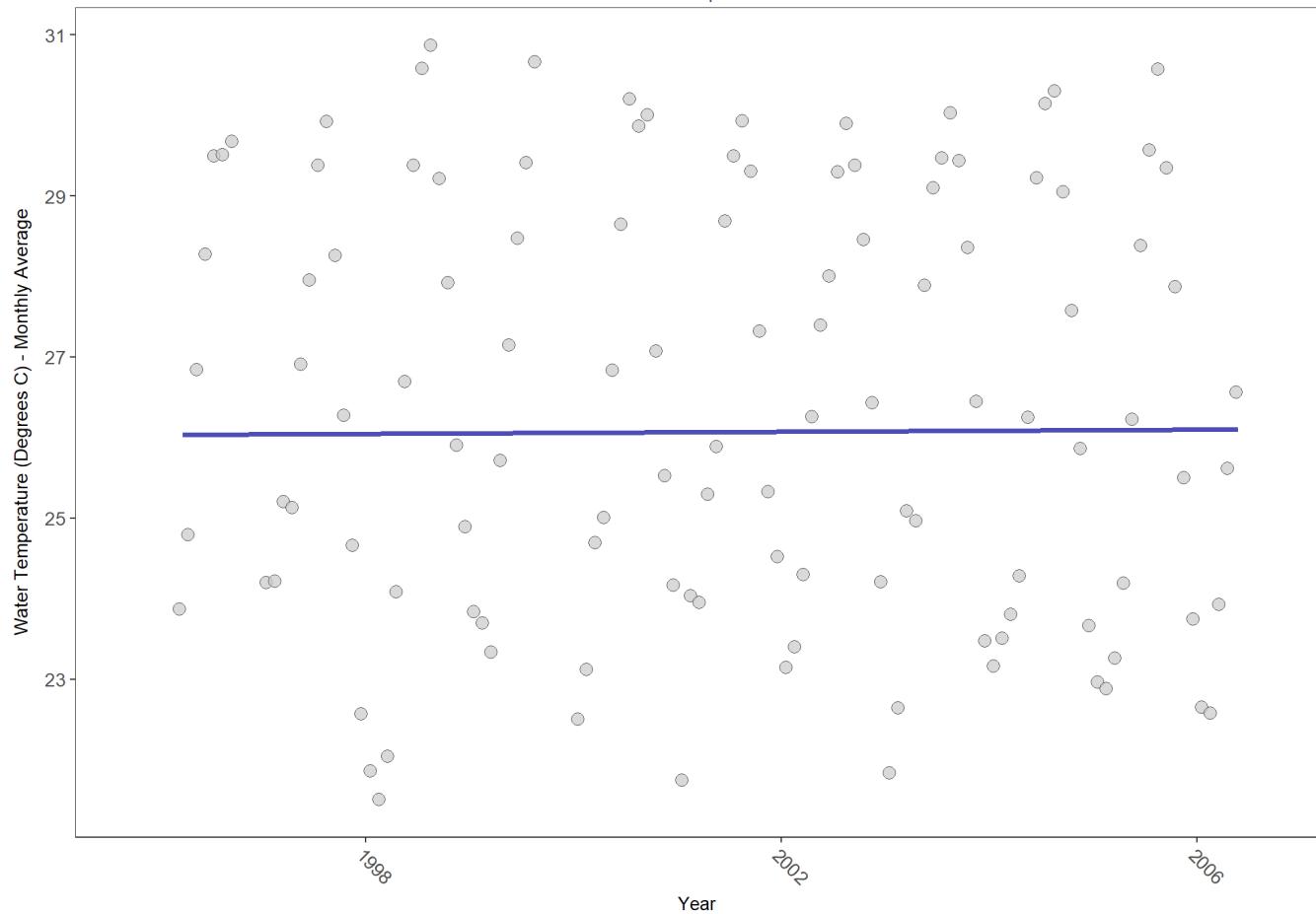
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_PILLAR

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_PILLAR
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	40805	11	26.243	TRUE	0.0163	0.9363	0.006506991	26.03793	7.3311	0.7717	0

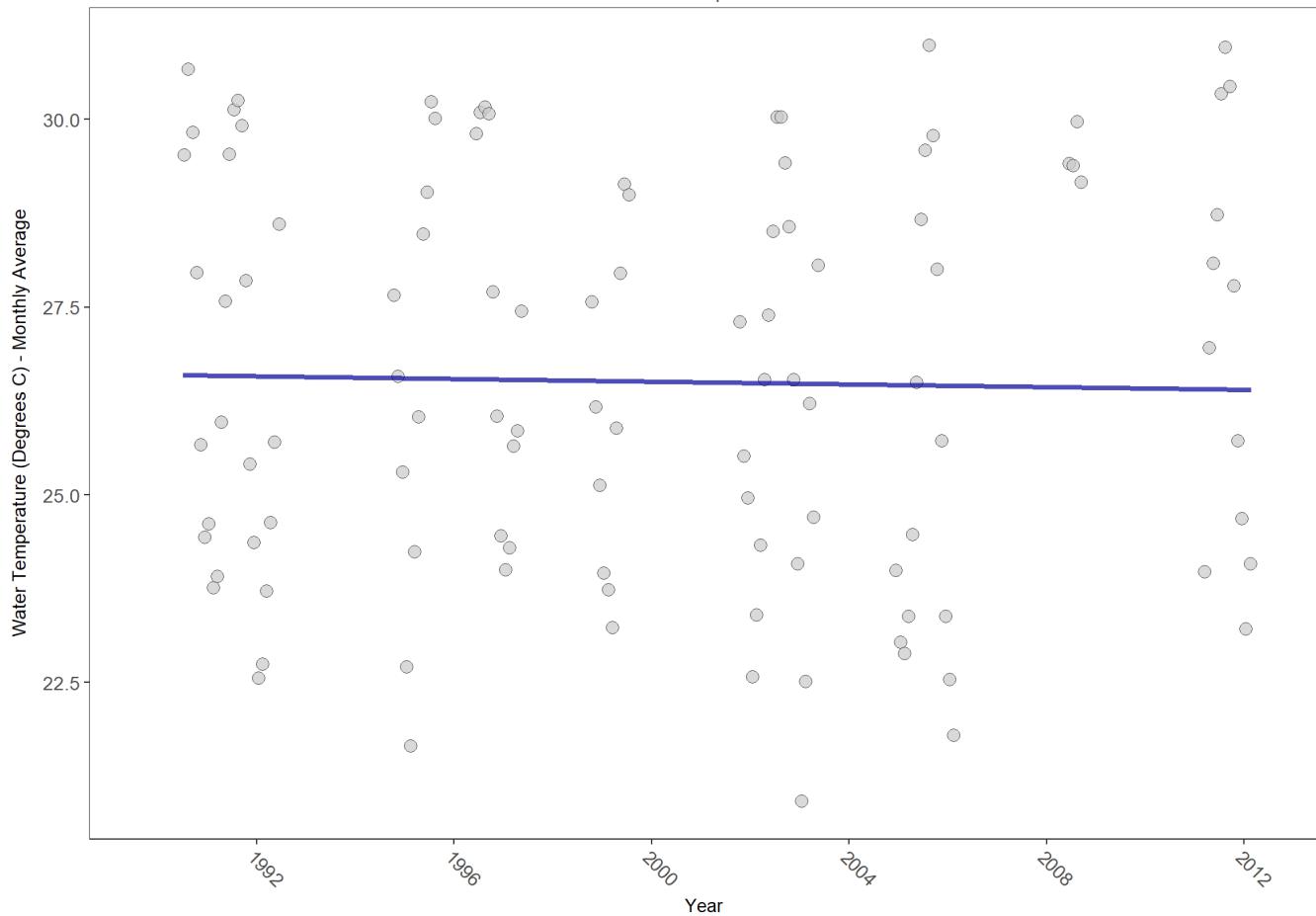
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_LOOE_BACK

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_LOOE_BACK
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	84984	18	26.8	TRUE	-0.0588	0.4216	-0.009048563	26.5961	2.7471	0.9937	0

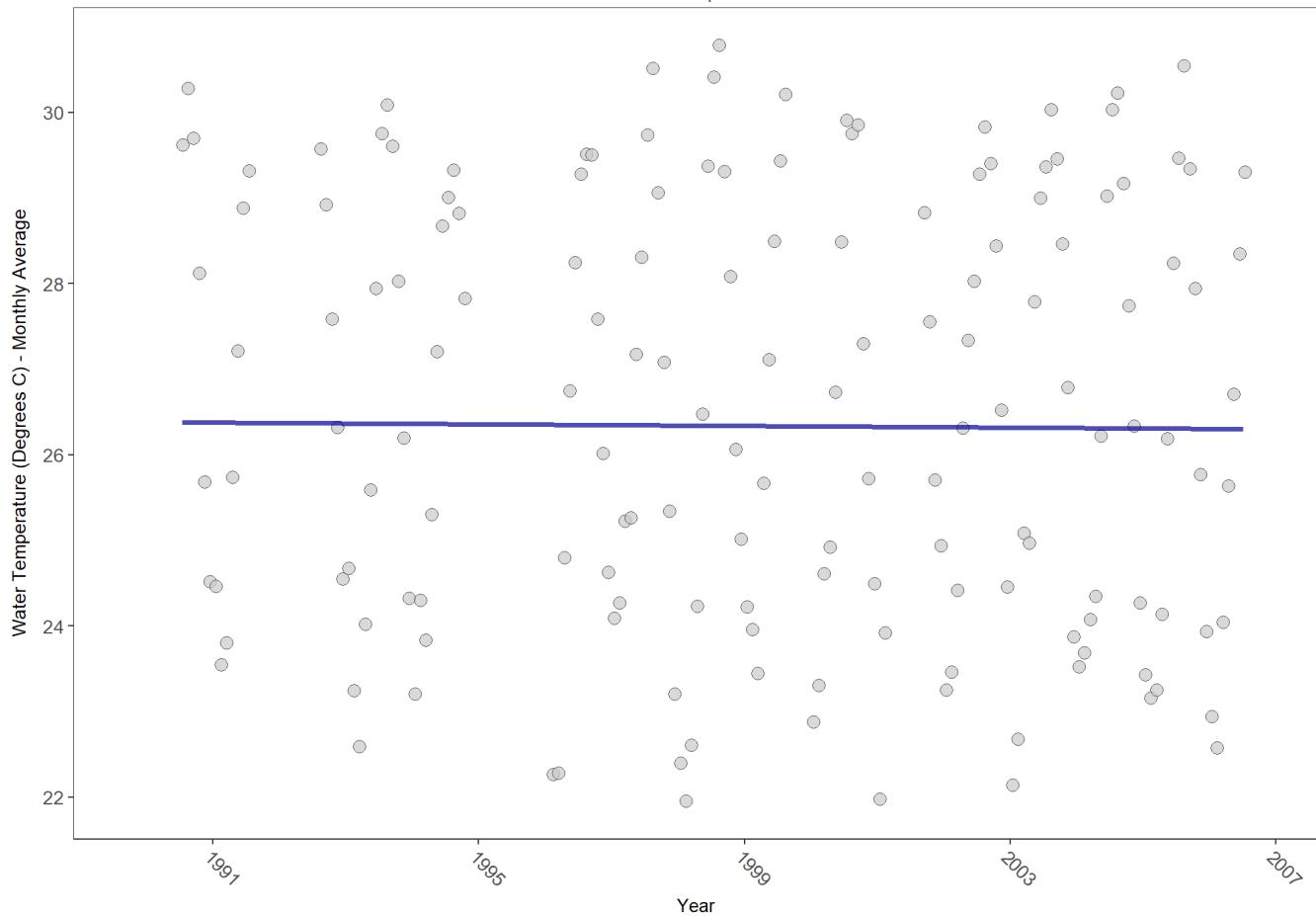
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_CARYSFORT

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_CARYSFORT
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	55001	16	26.4	TRUE	-0.029	0.6354	-0.004691132	26.37757	8.3572	0.681	0

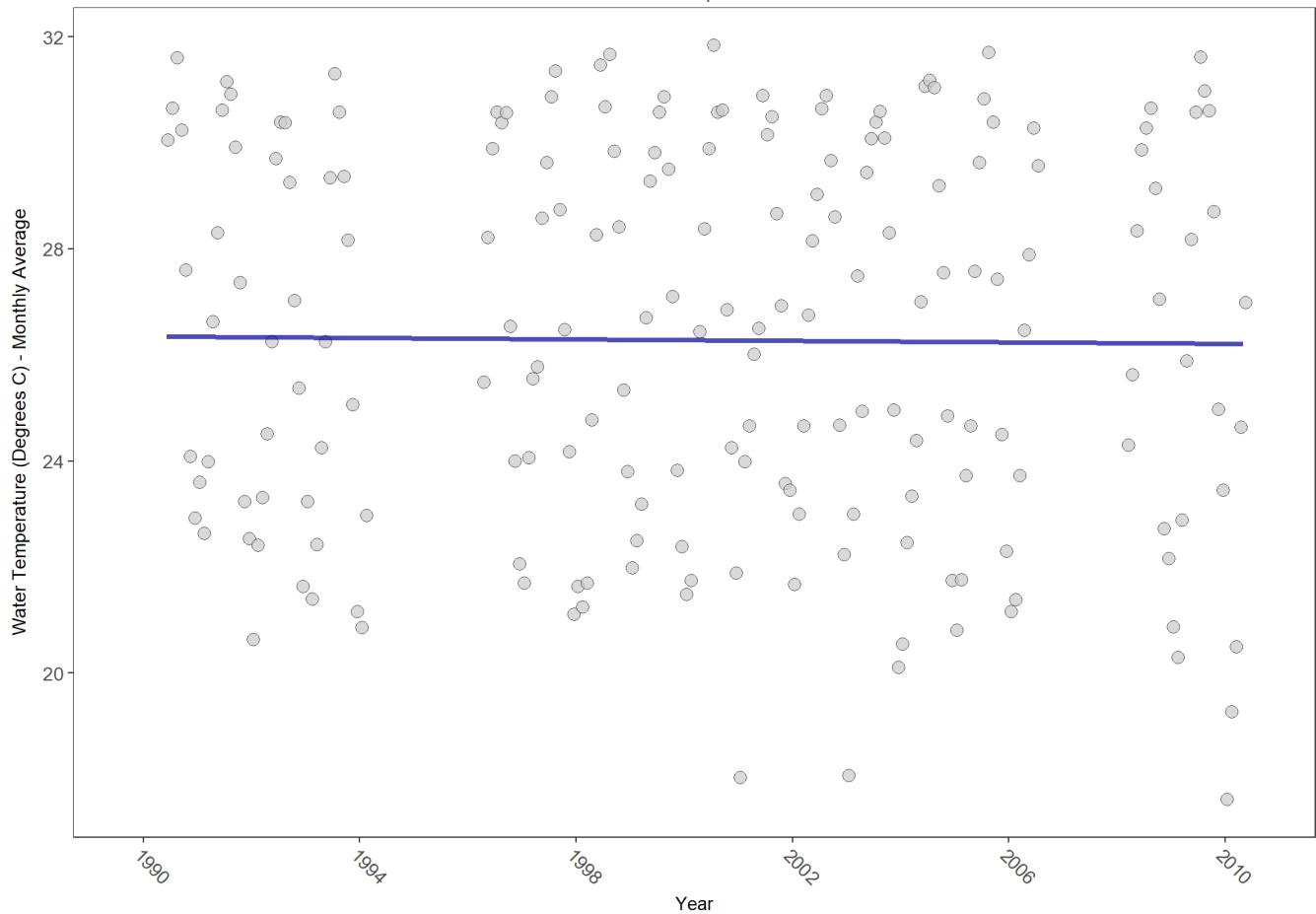
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_LONG_KEY

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_LONG_KEY
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	69656	19	26.63535	TRUE	-0.0313	0.5769	-0.006707473	26.35111	9.5462	0.5716	0

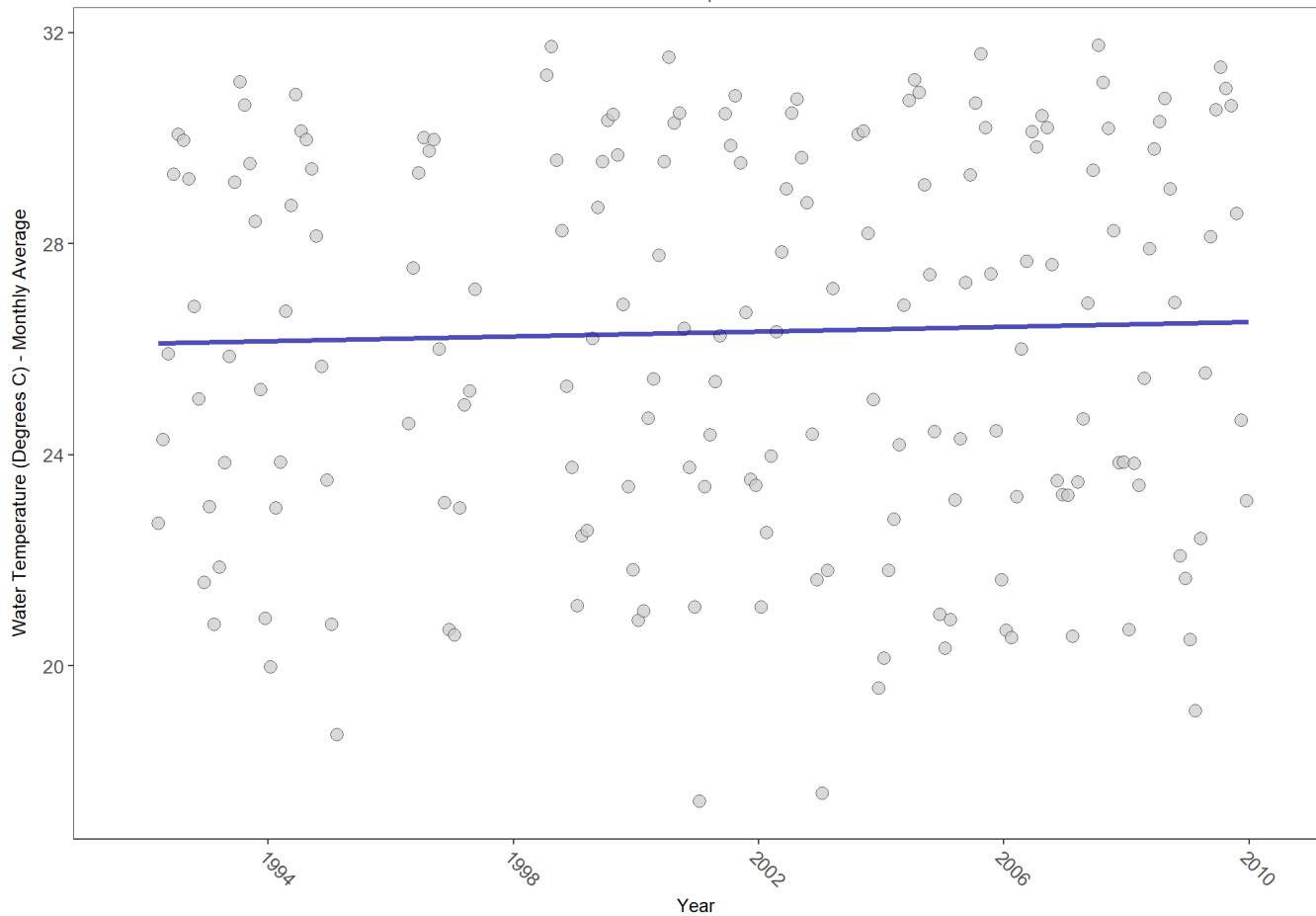
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_BULLARD

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_BULLARD
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	66230	18	26.30925	TRUE	0.1179	0.0313	0.02315278	26.10559	11.2537	0.4223	1

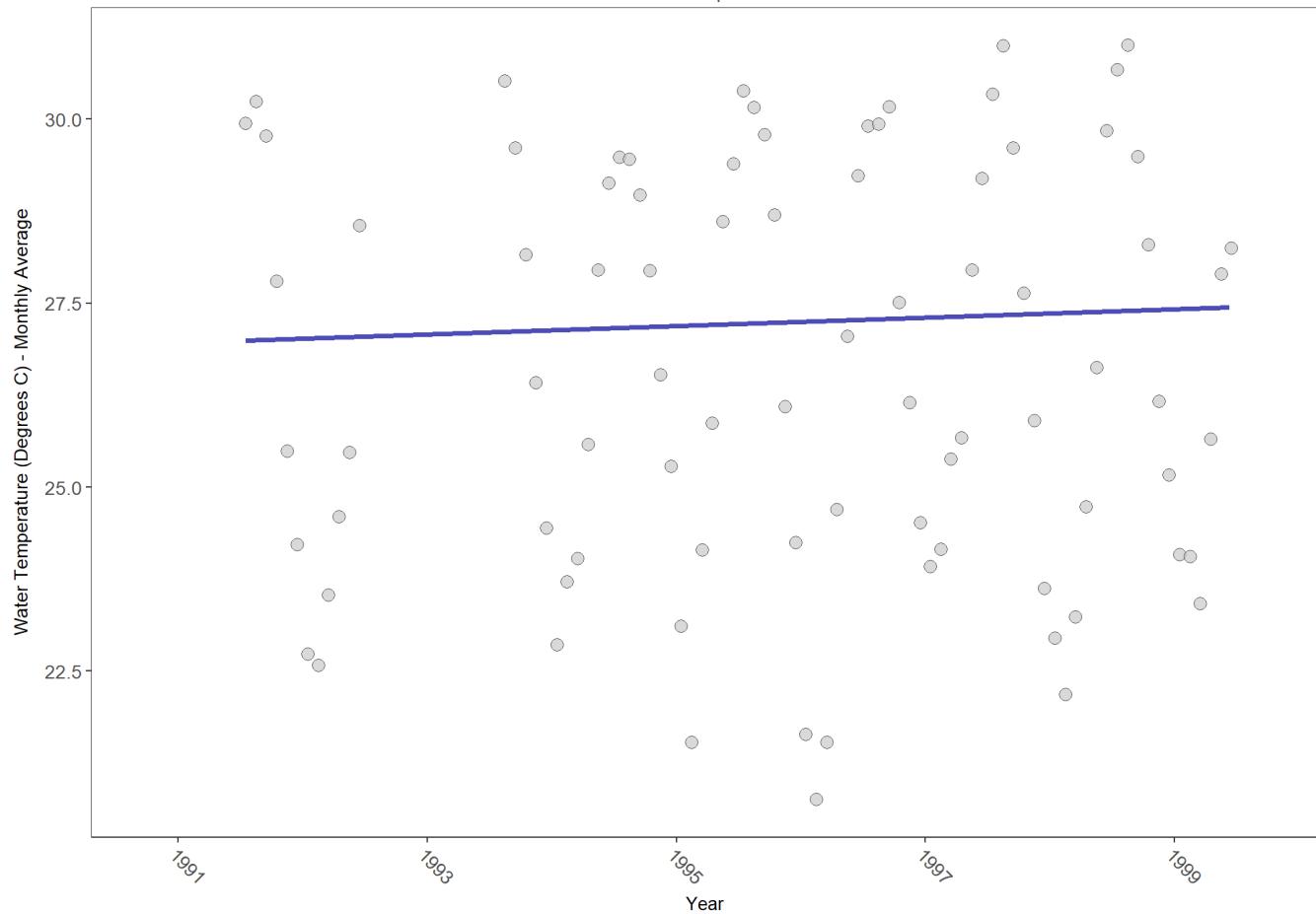
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_WS_JACKYL

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_WS_JACKYL
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	29557	9	26.4	TRUE	0.1663	0.0860	0.05625896	26.96473	3.5723	0.9808	0

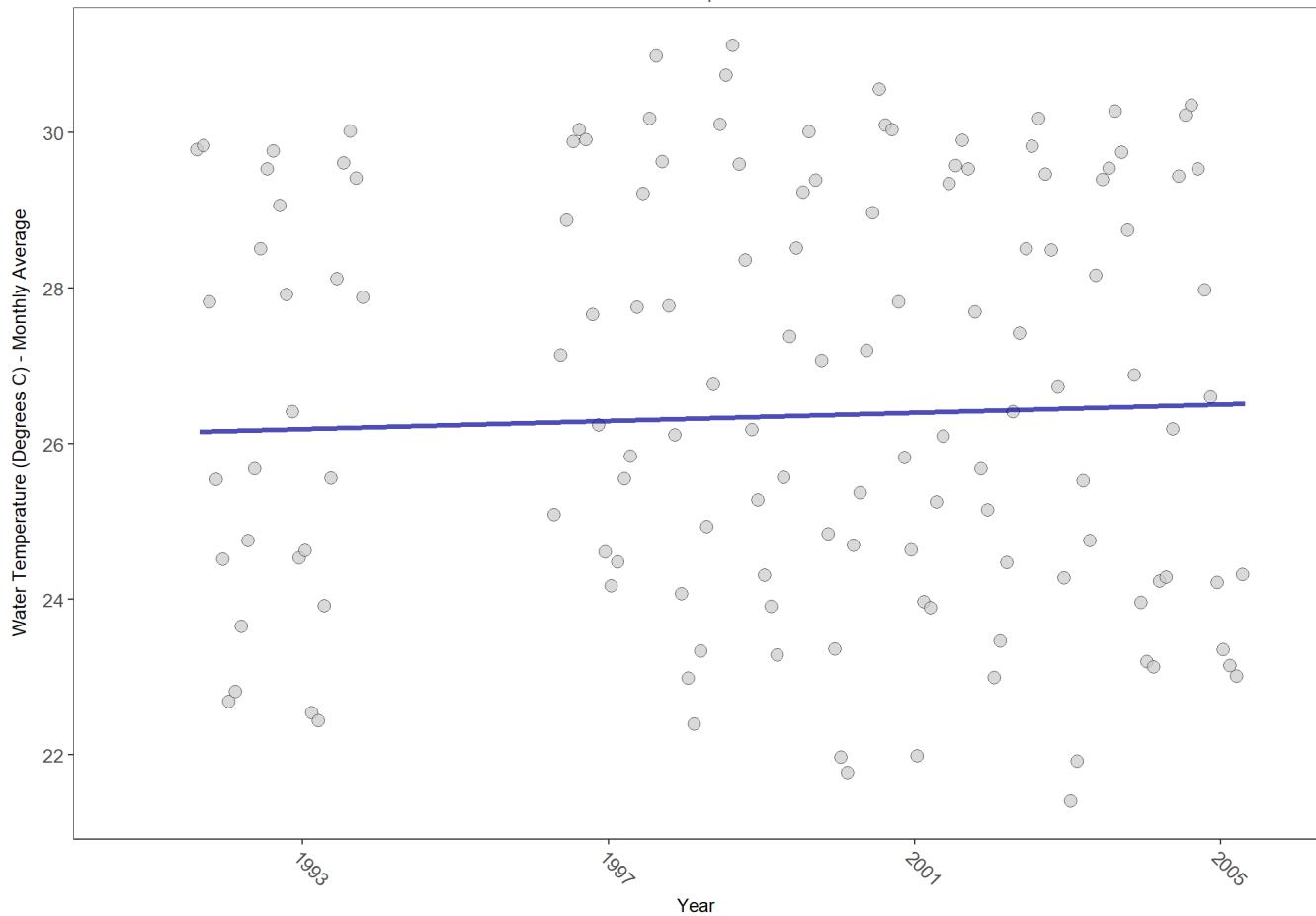
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_SOMBRERO

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_SOMBRERO
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	48974	13	26.5	TRUE	0.1297	0.0508	0.02626158	26.13611	8.8227	0.6383	0

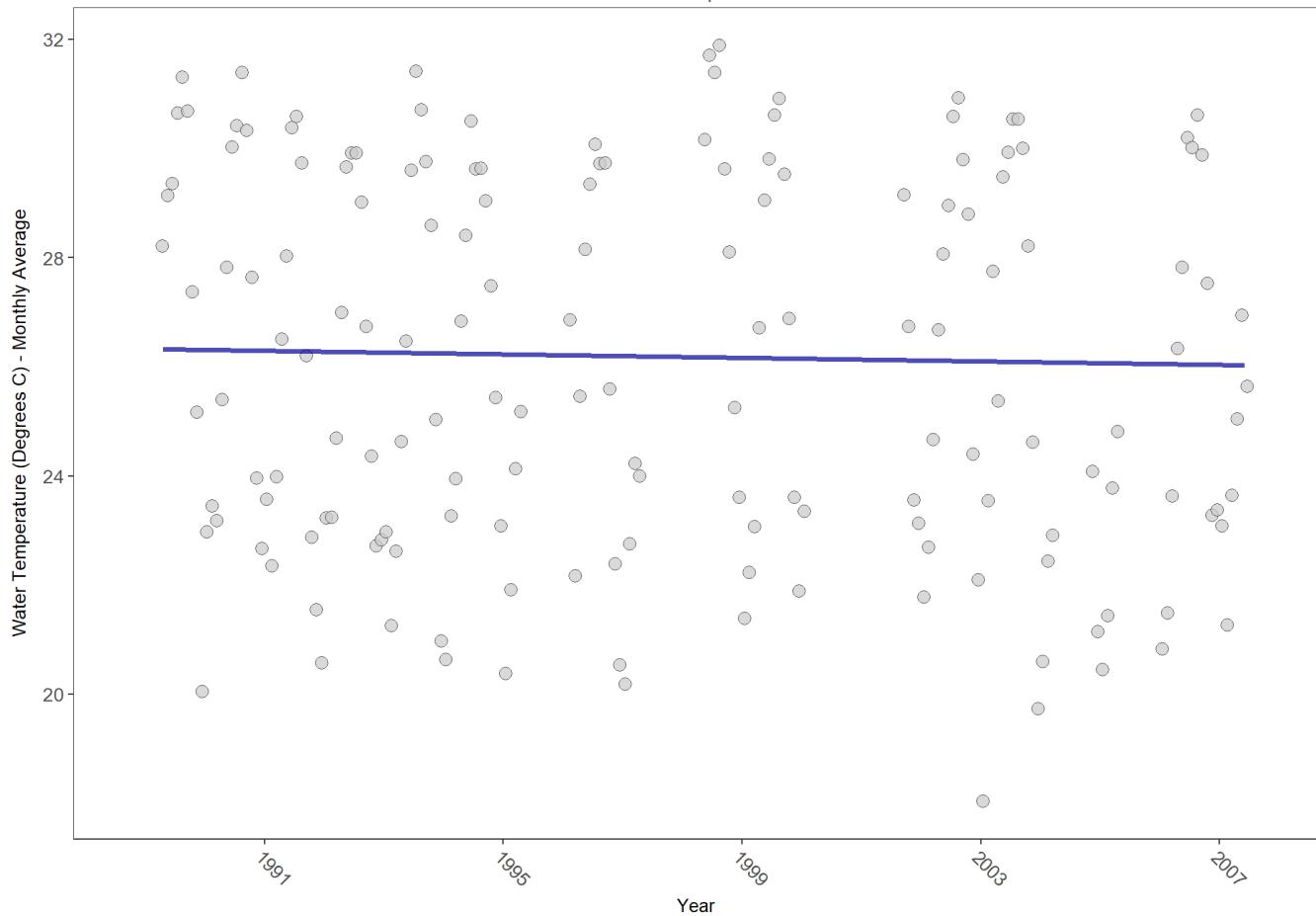
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_SNAKE_CRK

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_SNAKE_CRK
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	56777	19	26.1553	TRUE	-0.0585	0.2771	-0.01634269	26.32951	8.7565	0.6444	0

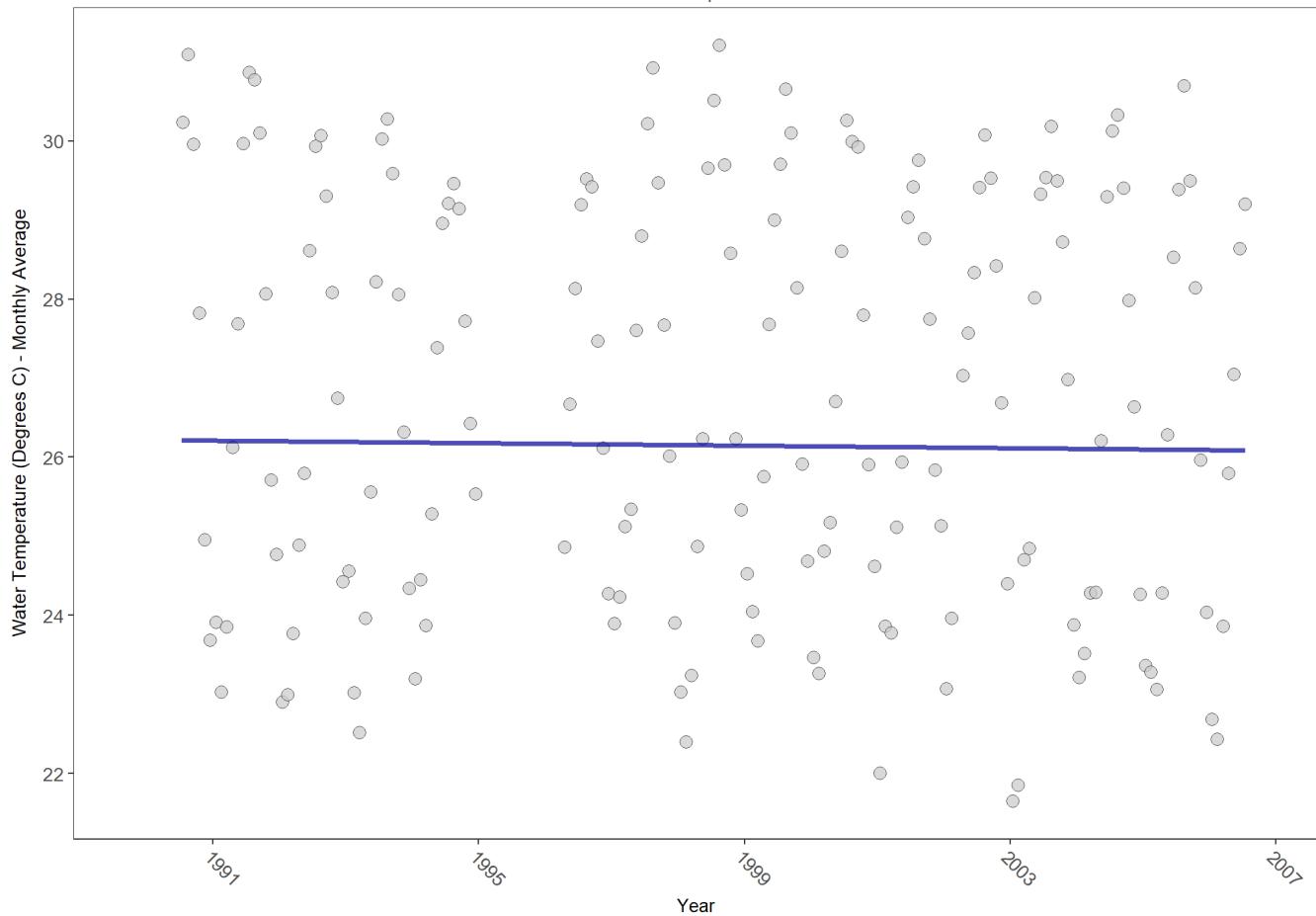
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_TENN_REEF

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_TENN_REEF
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	63260	16	26.7	TRUE	-0.0607	0.2738	-0.007926261	26.21651	8.028	0.7108	0

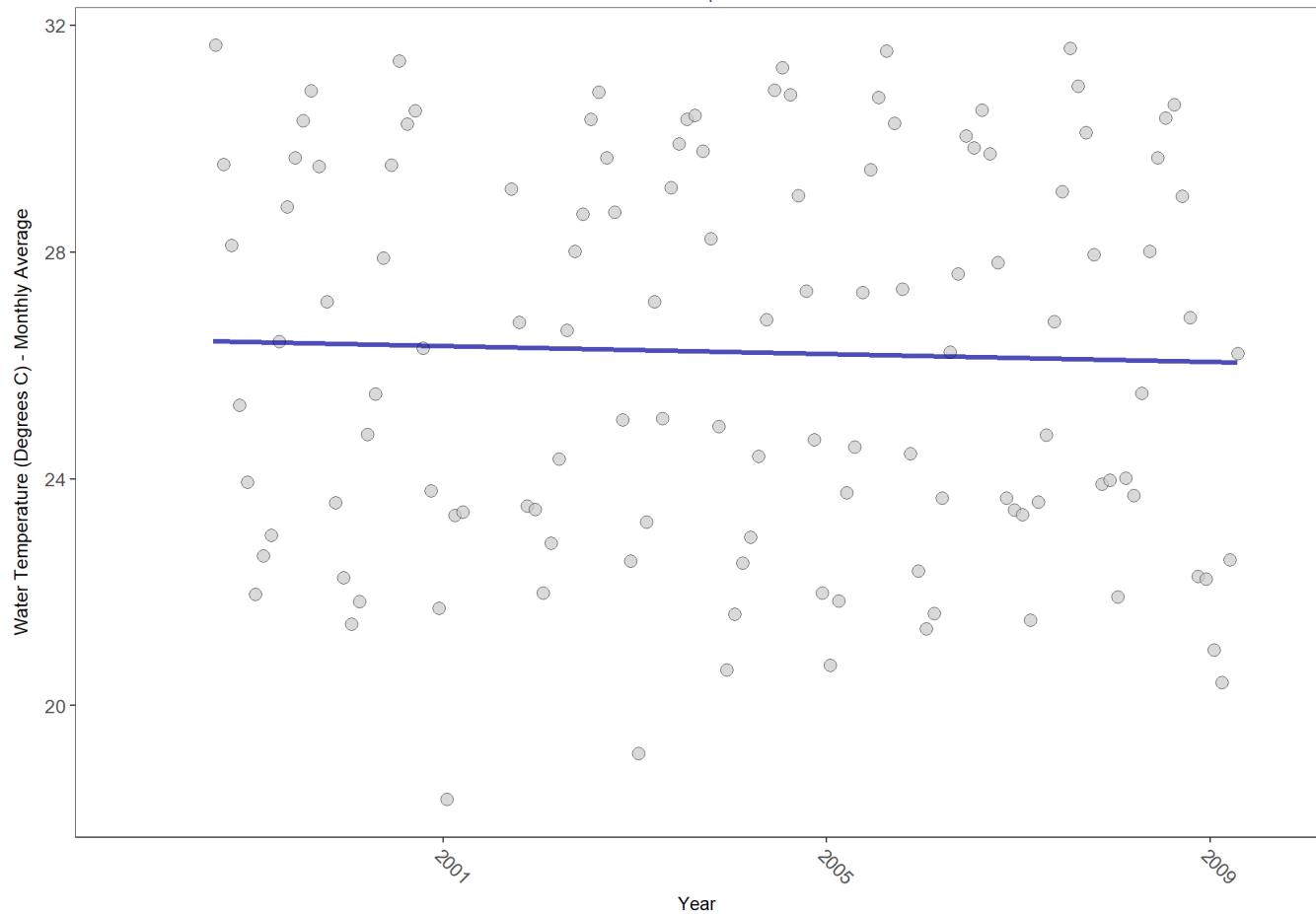
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_200YR_HD

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_200YR_HD
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	44601	12	26.1024	TRUE	-0.0961	0.1720	-0.03503859	26.44961	5.3004	0.9158	0

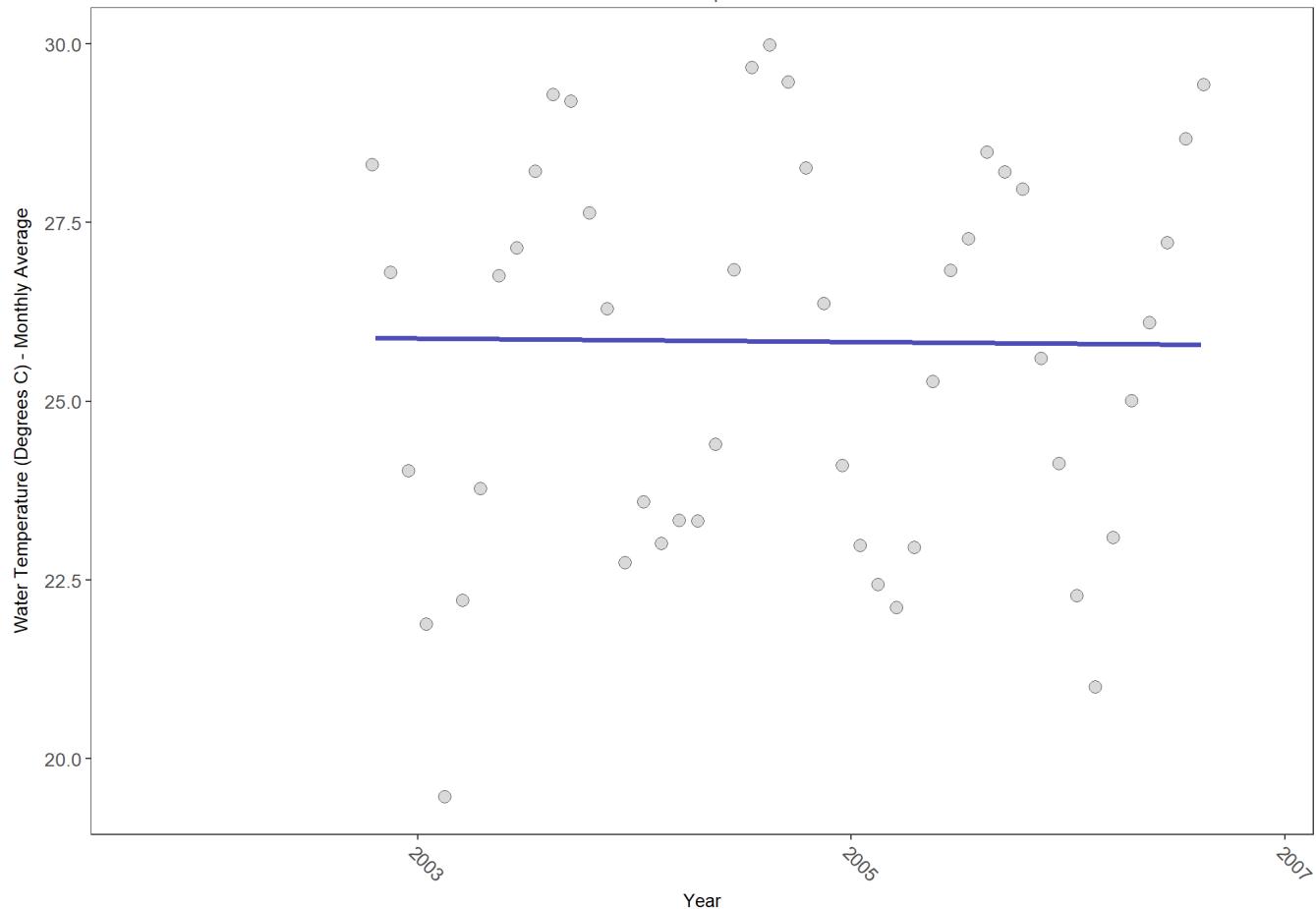
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_DIEGO_TER

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_DIEGO_TER
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	16693	5	25.5793	TRUE	-0.0496	0.8407	-0.0252168	25.91058	4.3063	0.9601	0

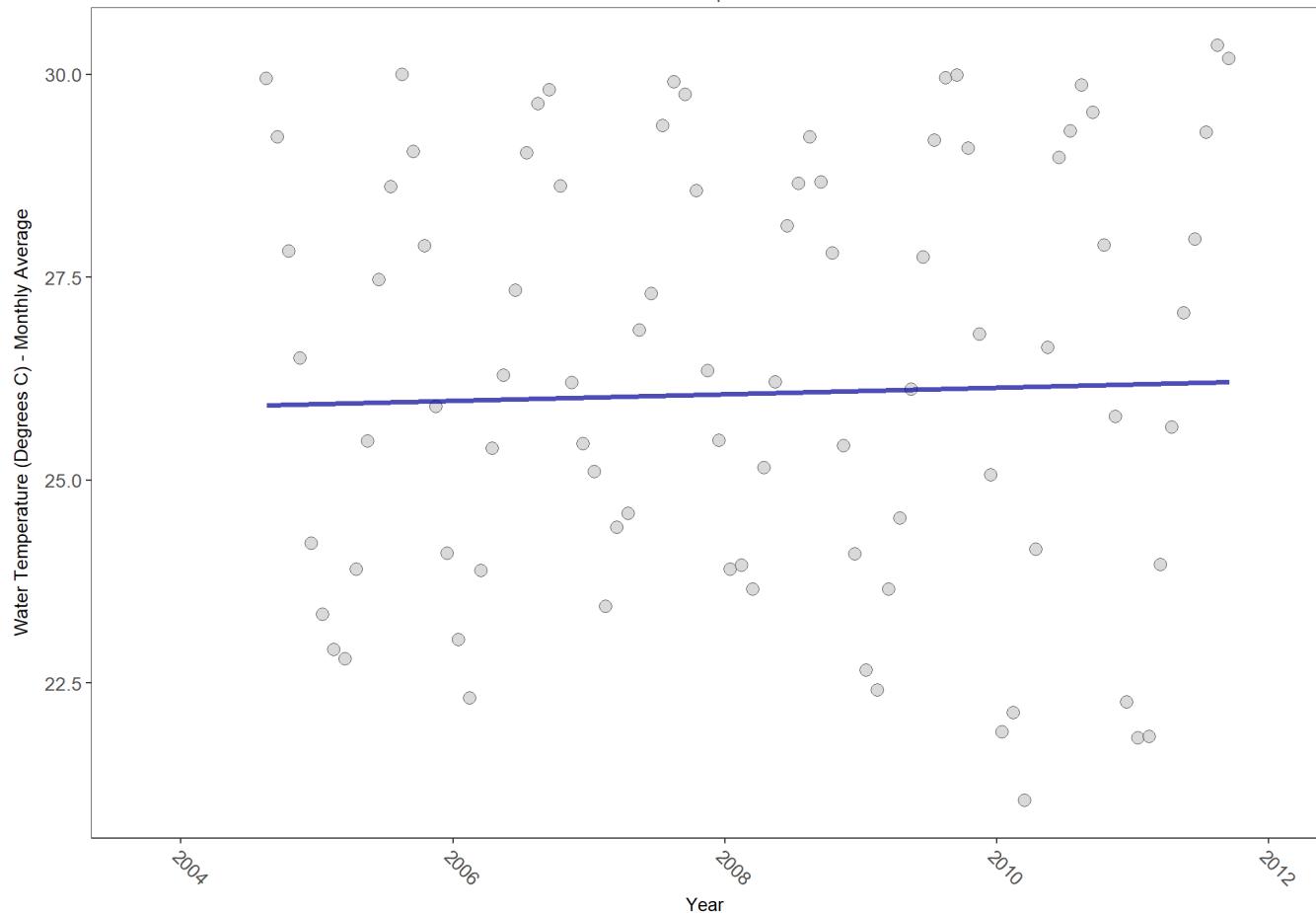
$p < 0.00005$ appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_ELPIS

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_ELPIS
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	31035	8	26.3487	TRUE	0.0554	0.5313	0.04028765	25.89604	13.9061	0.2382	0

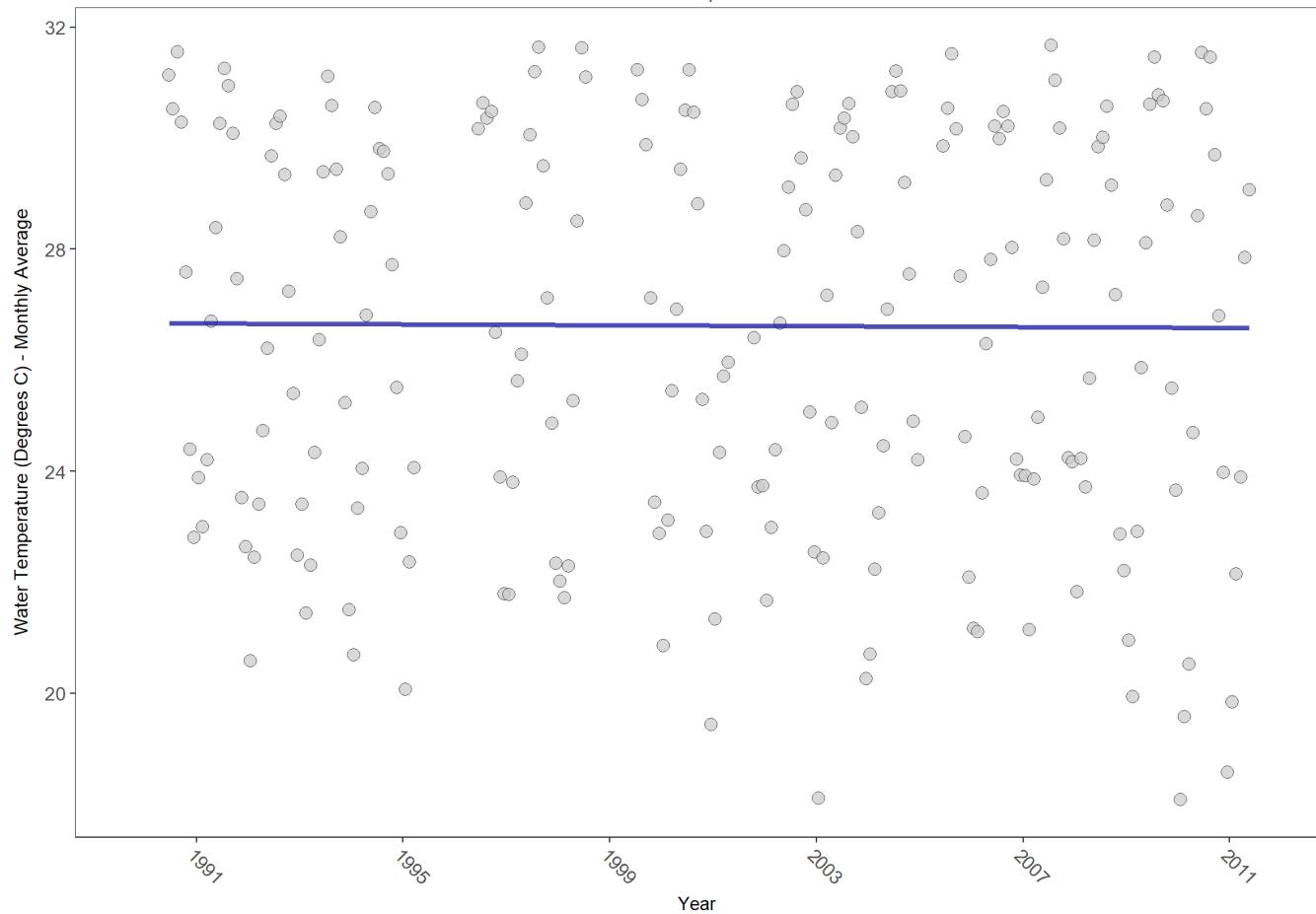
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_BHONDA_BR

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_BHONDA_BR
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	77111	22	26.6	TRUE	-0.0217	0.6571	-0.004045514	26.67081	7.3456	0.7704	0

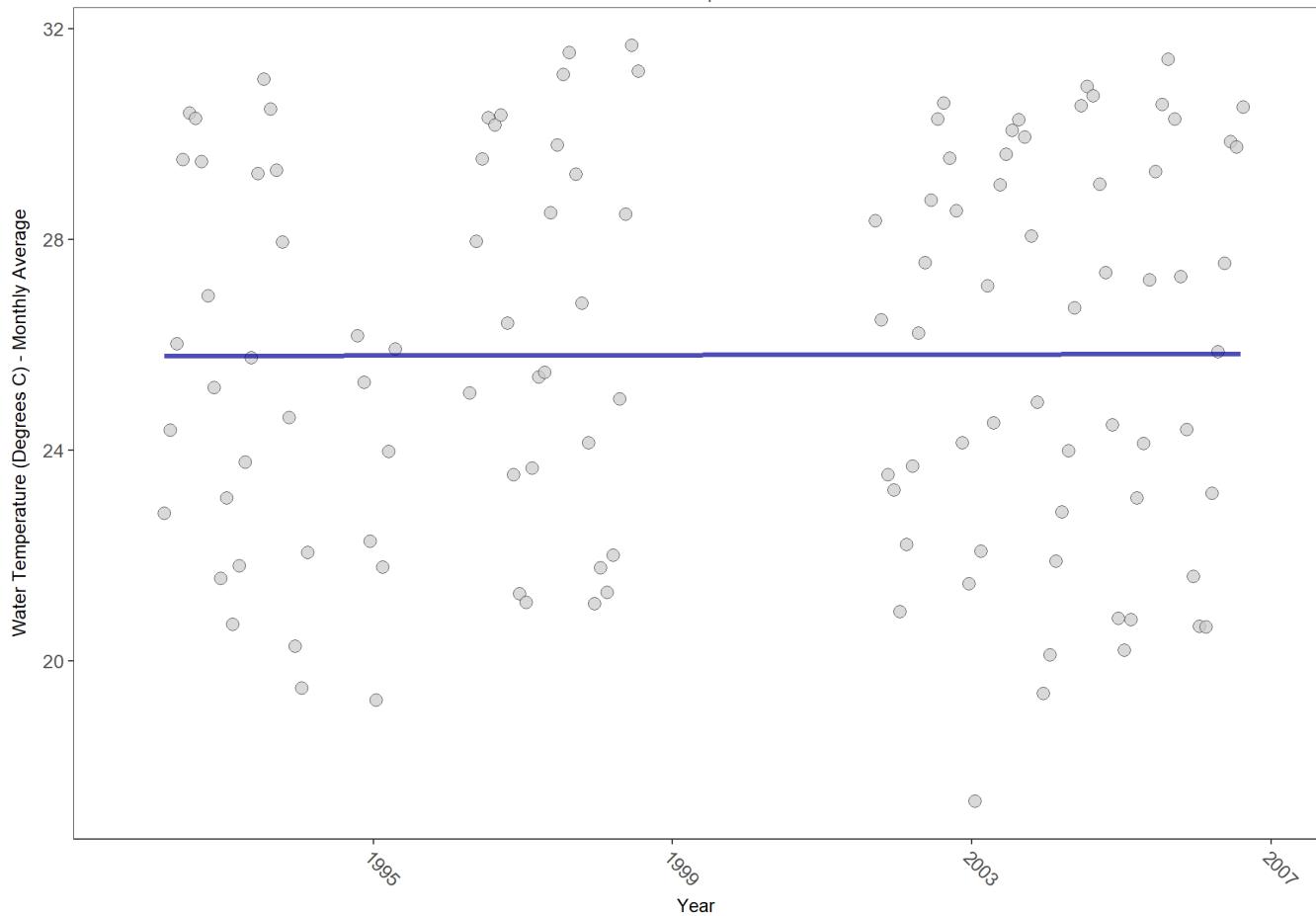
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_SPRIGGER

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_SPRIGGER
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	41834	13	26.1	TRUE	0.0176	0.8553	0.002975159	25.78396	6.9677	0.8017	0

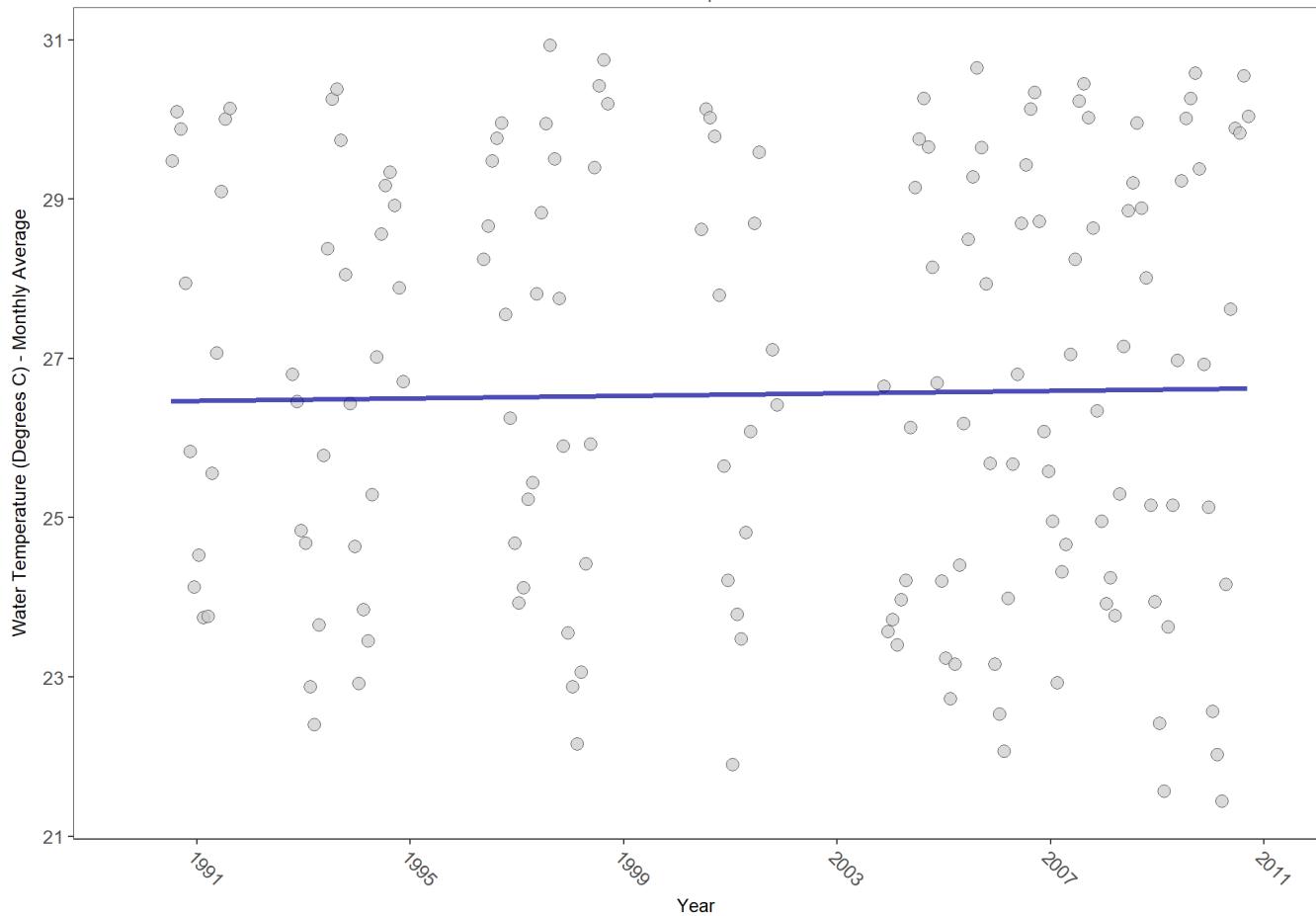
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_SAND_KEY

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_SAND_KEY
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	59287	18	26.7	TRUE	0.0532	0.3230	0.00790518	26.46411	12.8275	0.3047	0

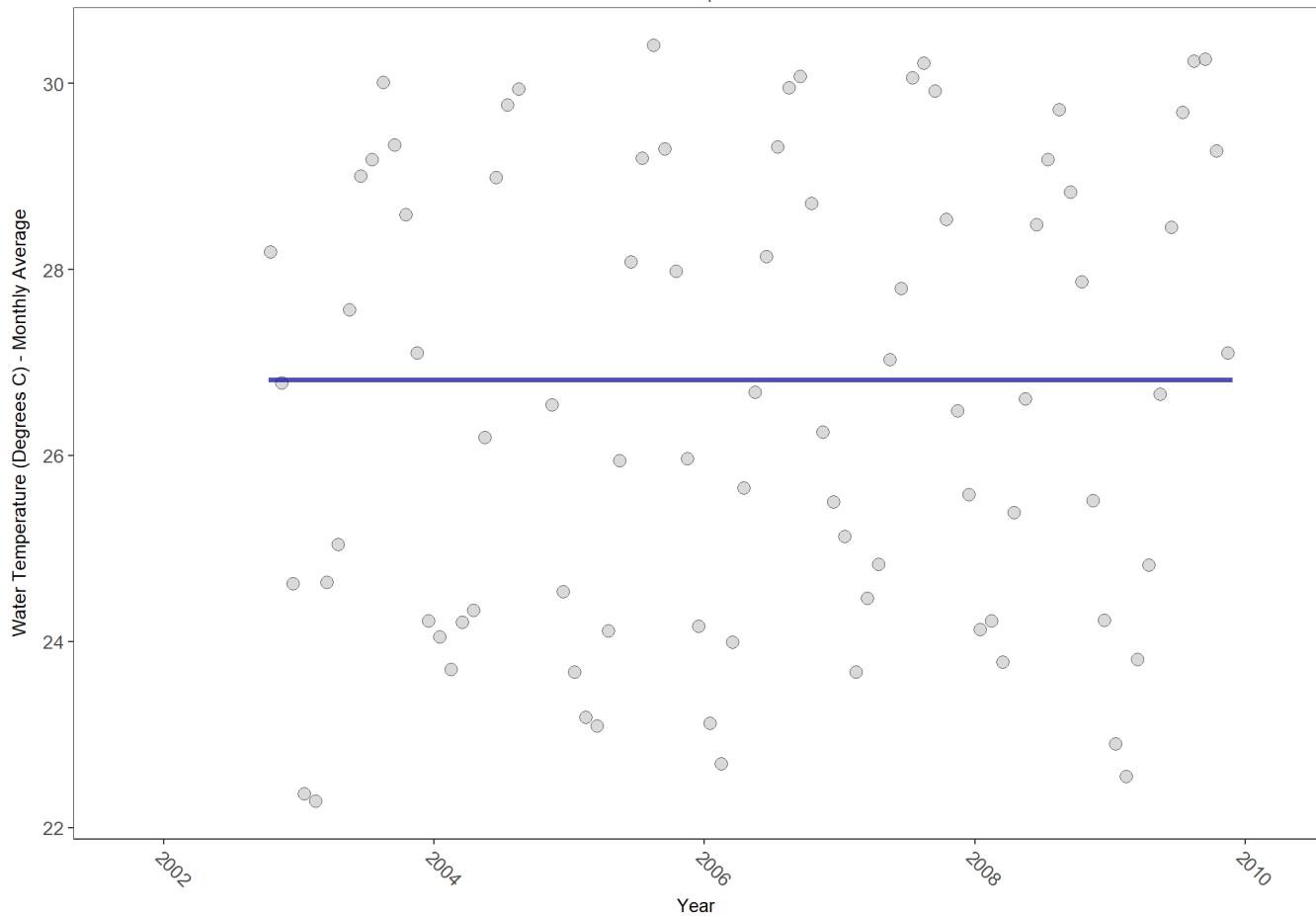
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_WELLWOOD

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_WELLWOOD
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	30427	8	26.43	TRUE	0.0018	1.0000	-0.0002133333	26.8169	4.1607	0.965	0

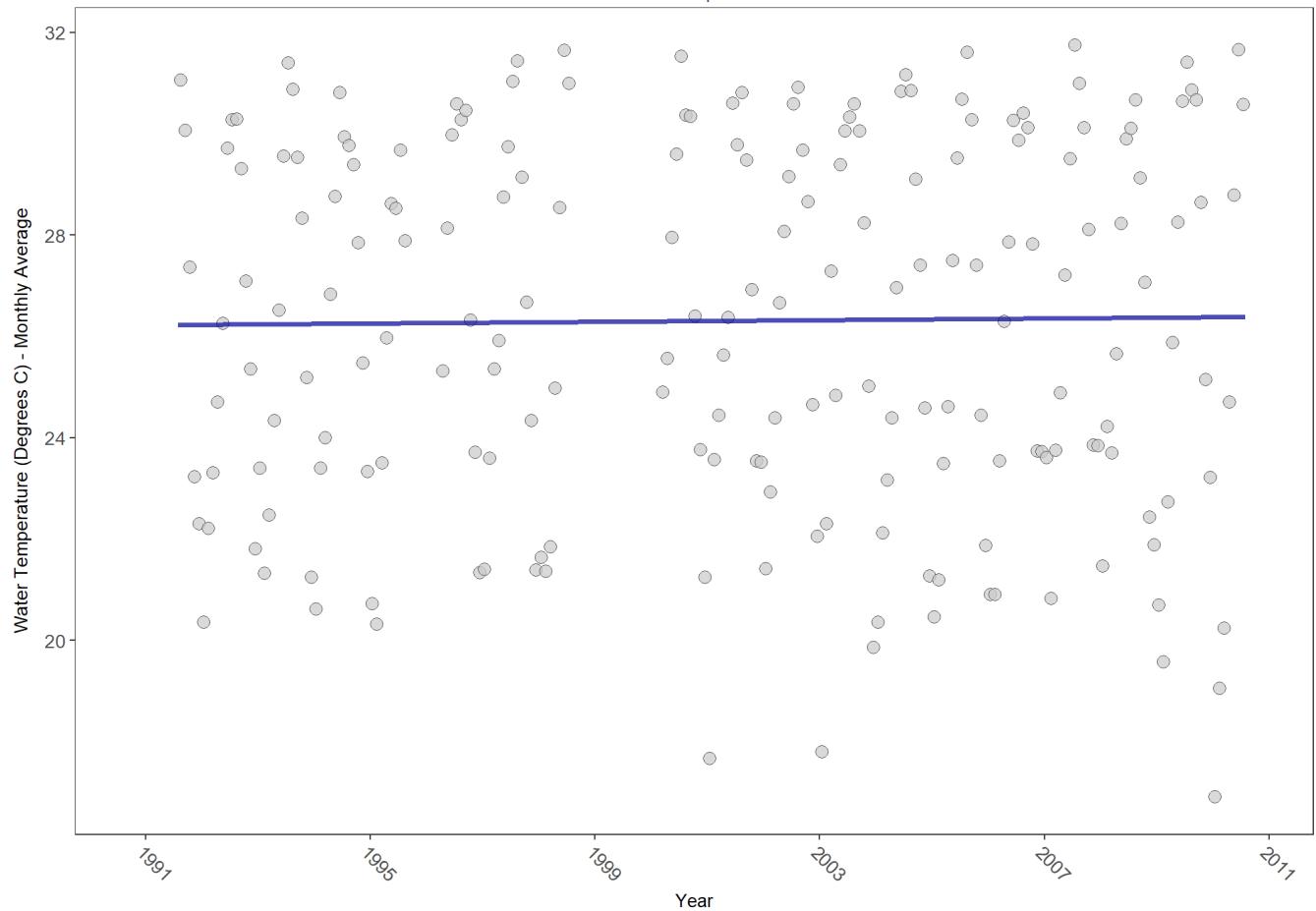
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_7MILE_BR

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_7MILE_BR
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	73055	19	26.6562	TRUE	0.0465	0.3549	0.008583988	26.2211	10.1261	0.5191	0

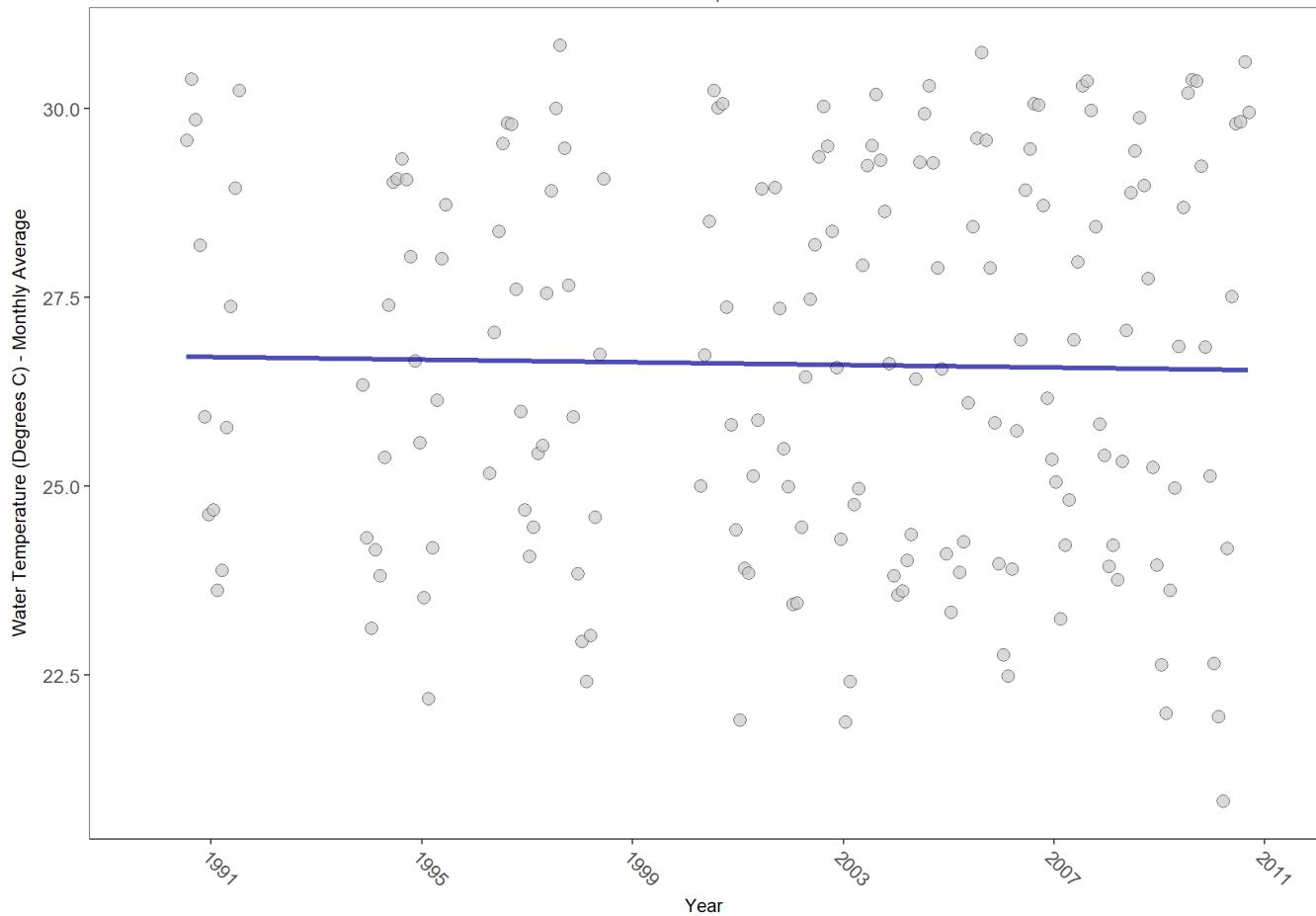
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_ALLIGATOR

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_ALLIGATOR
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	65144	19	26.54545	TRUE	-0.059	0.2339	-0.008569064	26.71909	13.8065	0.2439	0

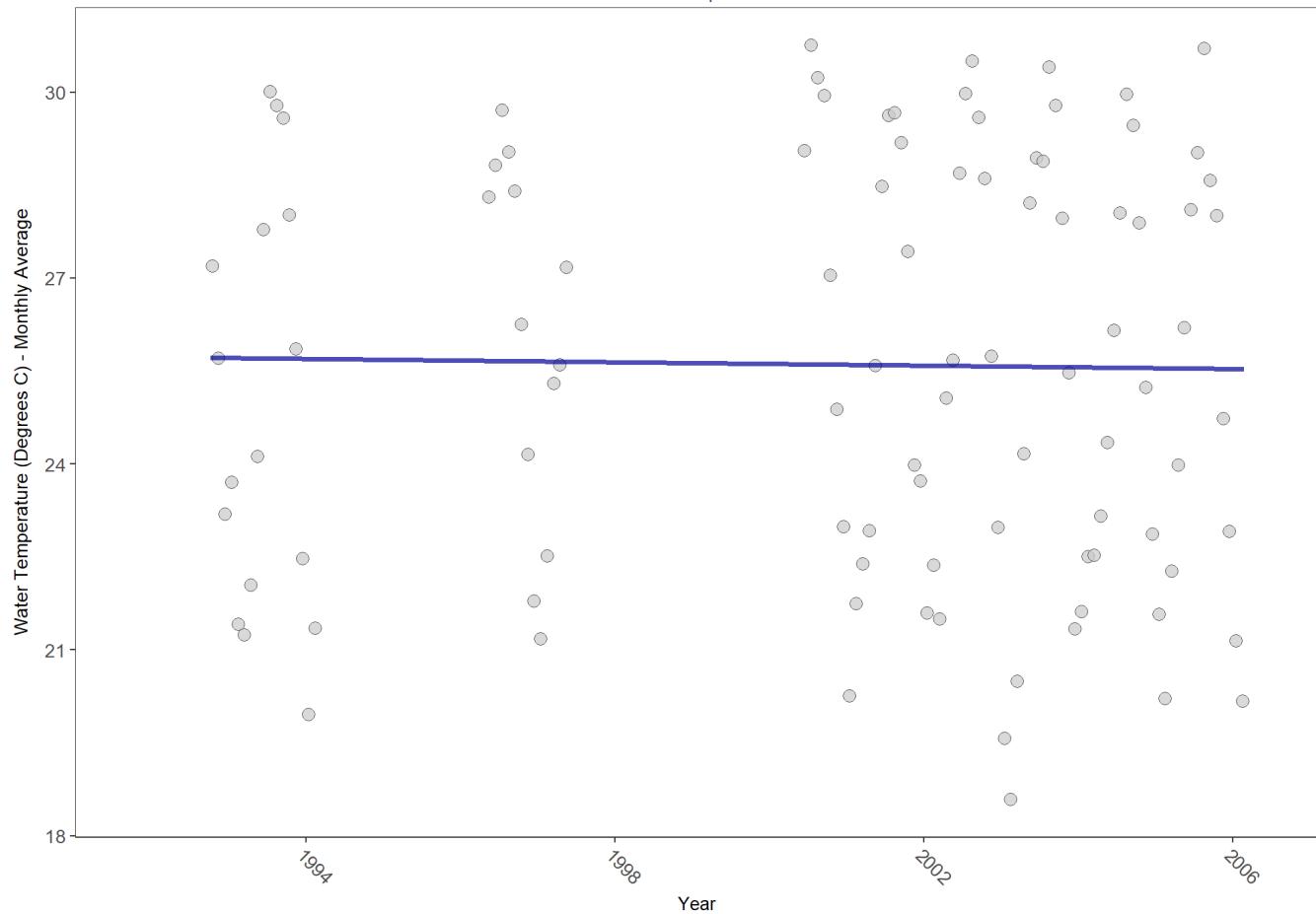
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_NEWSGROUND

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_NEWSGROUND
Water Temperature



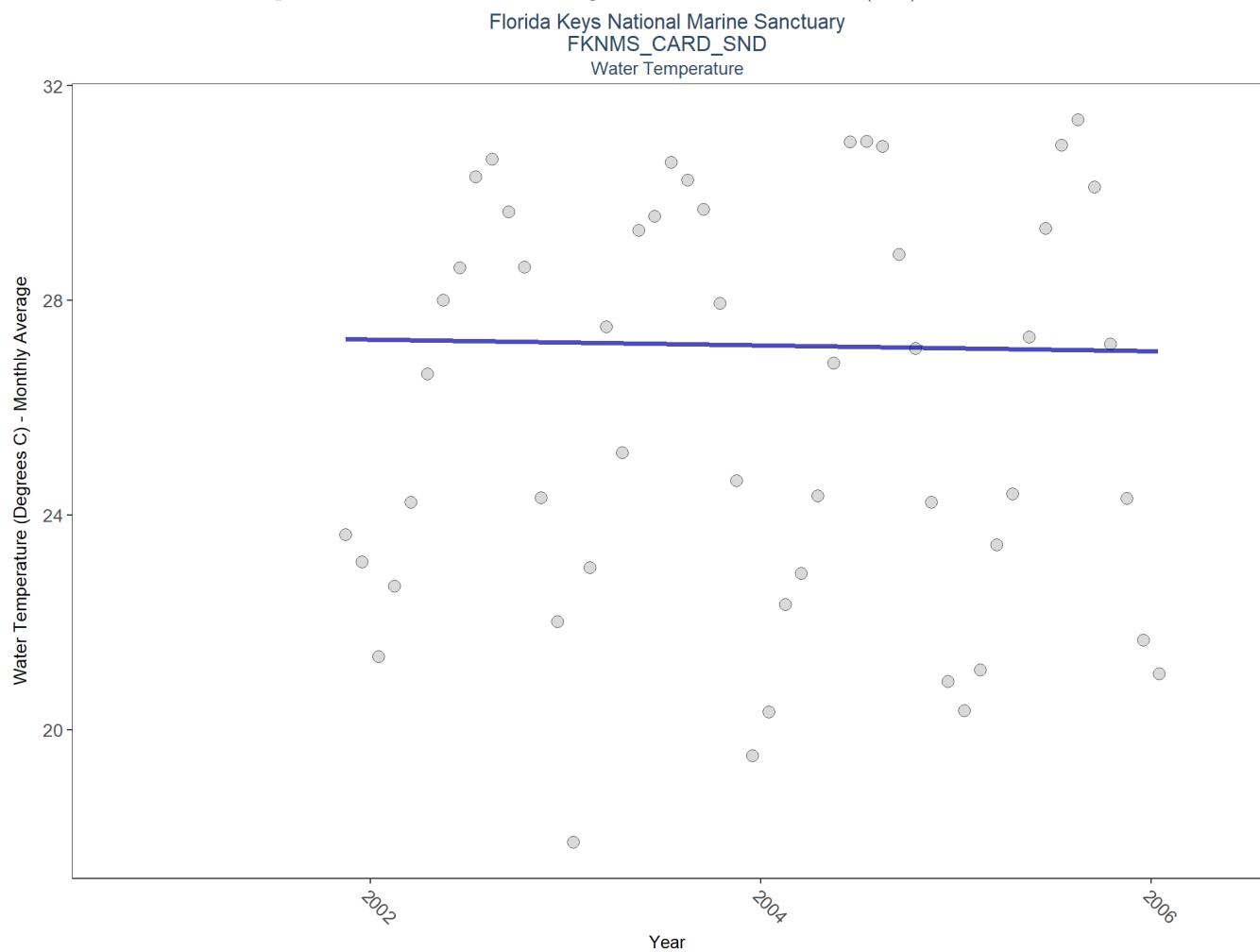
RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	35329	12	25.4929	TRUE	-0.0534	0.5207	-0.01390845	25.72914	10.2425	0.5087	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_CARD_SND

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	18249	6	26.5198	TRUE	-0.0523	0.7909	-0.05242602	27.32067	12.3631	0.337	0

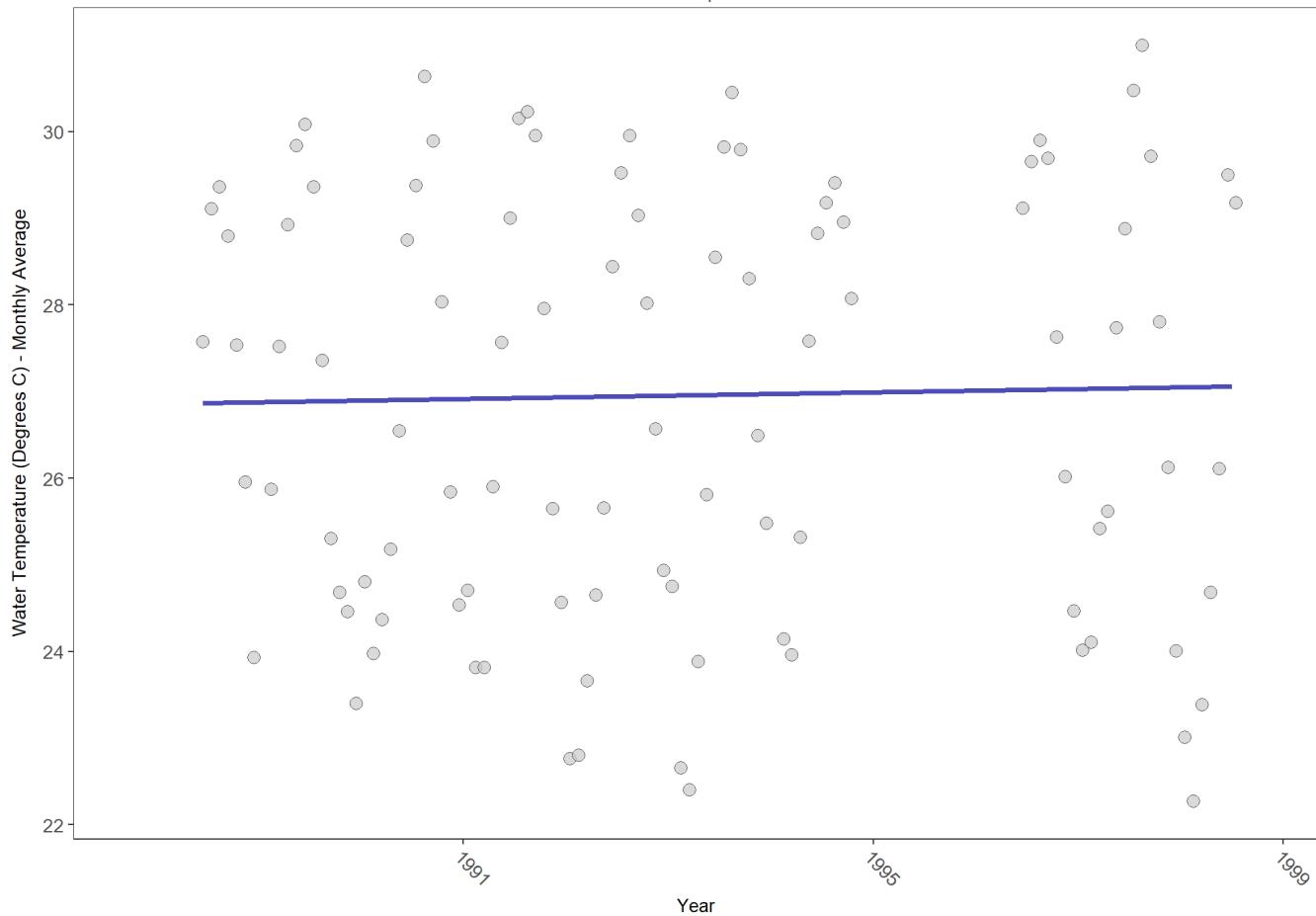
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_LOOE_BUOY5

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_LOOE_BUOY5
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	35252	10	26.9	TRUE	0.0493	0.3627	0.01930272	26.85949	13.6928	0.2505	0

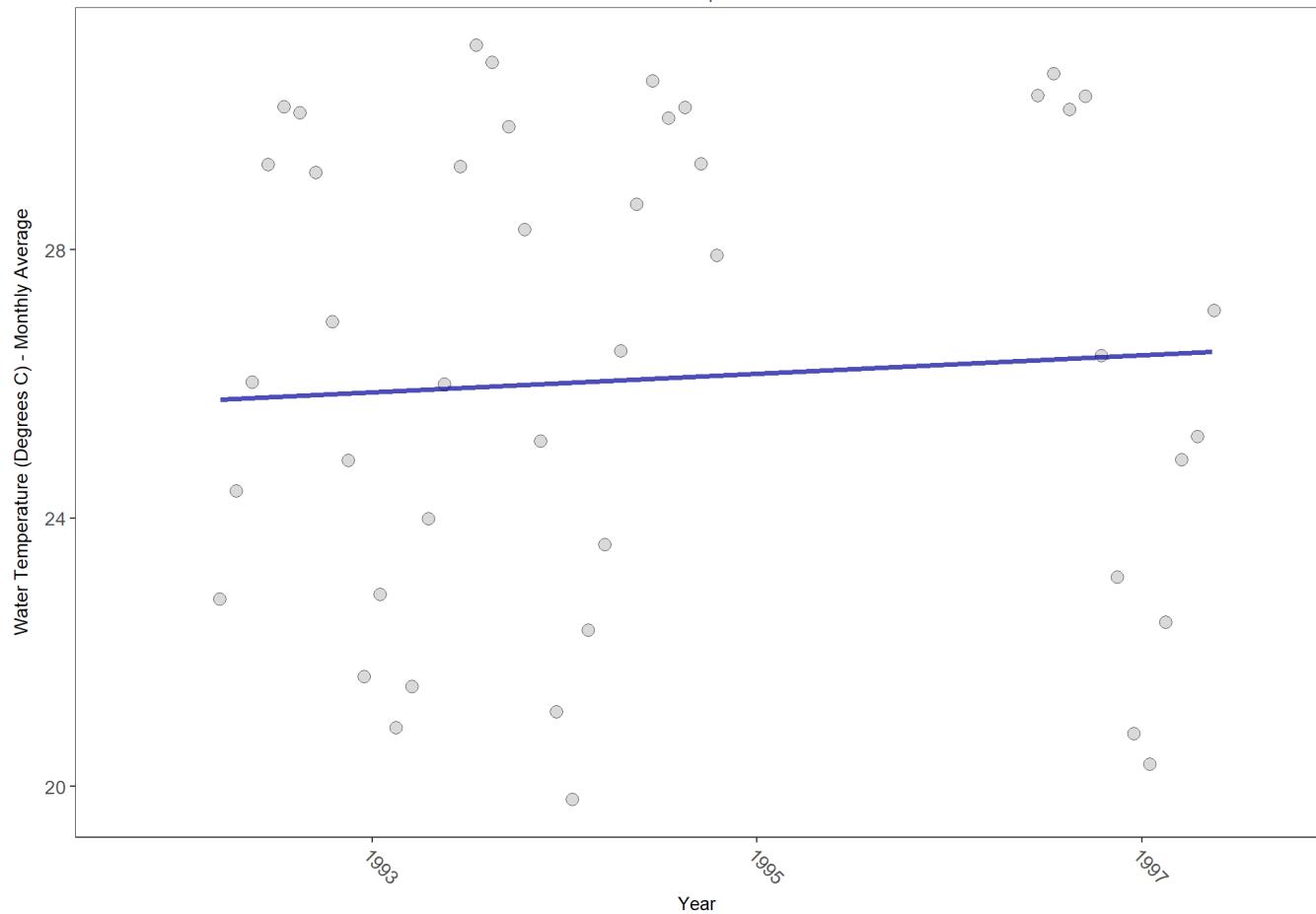
p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

FKNMS_HARBORKEY

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

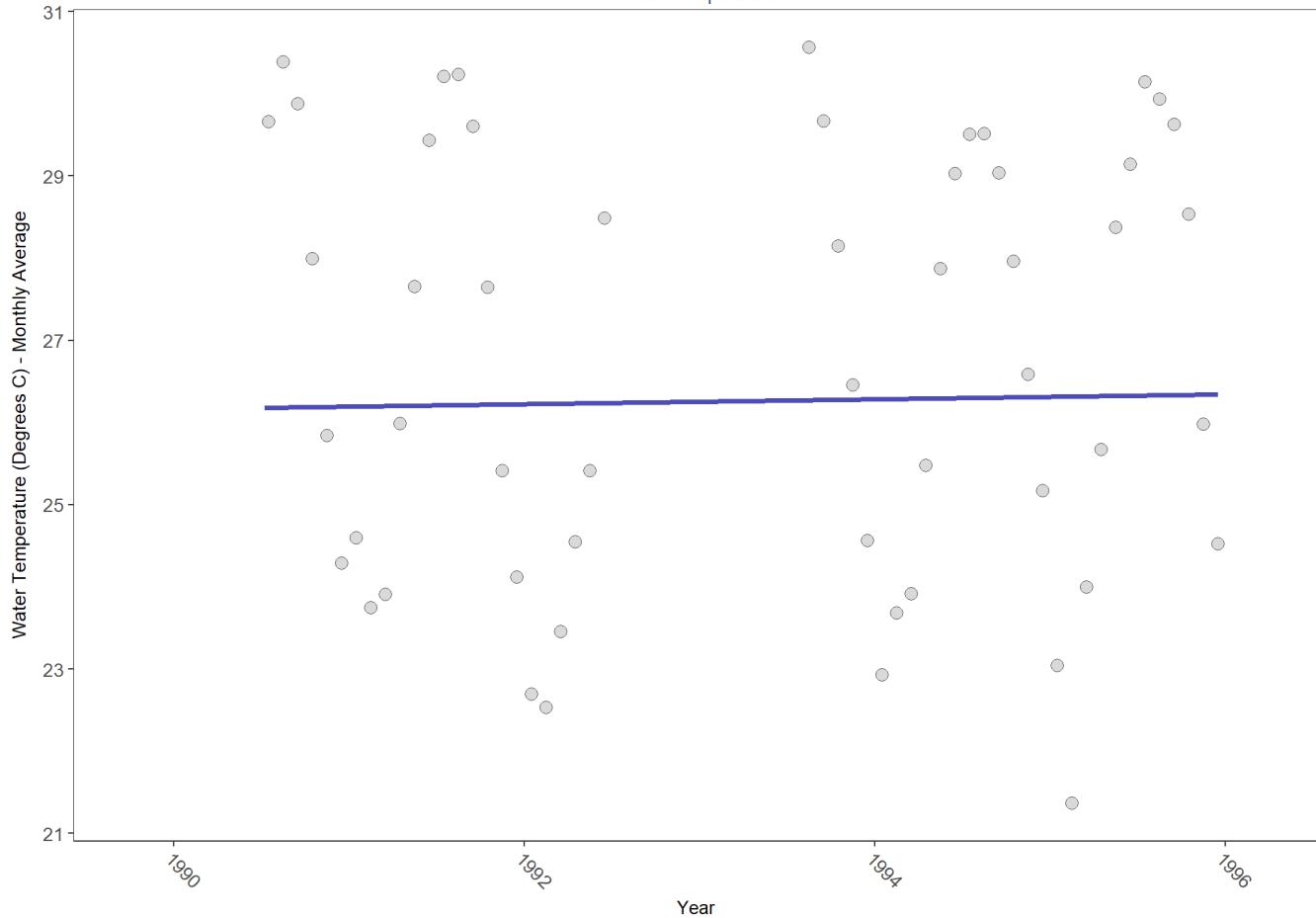
Florida Keys National Marine Sanctuary
FKNMS_HARBORKEY
Water Temperature



FKNMS_W_SAMBO

Continuous Bottom Temperature Measurements along the Florida Reef Tract (989)

Florida Keys National Marine Sanctuary
FKNMS_W_SAMBO
Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	18786	6	26.9	TRUE	0.0881	0.5597	0.03038889	26.16243	9.8827	0.541	0

p < 0.00005 appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

All Stations Combined by Program

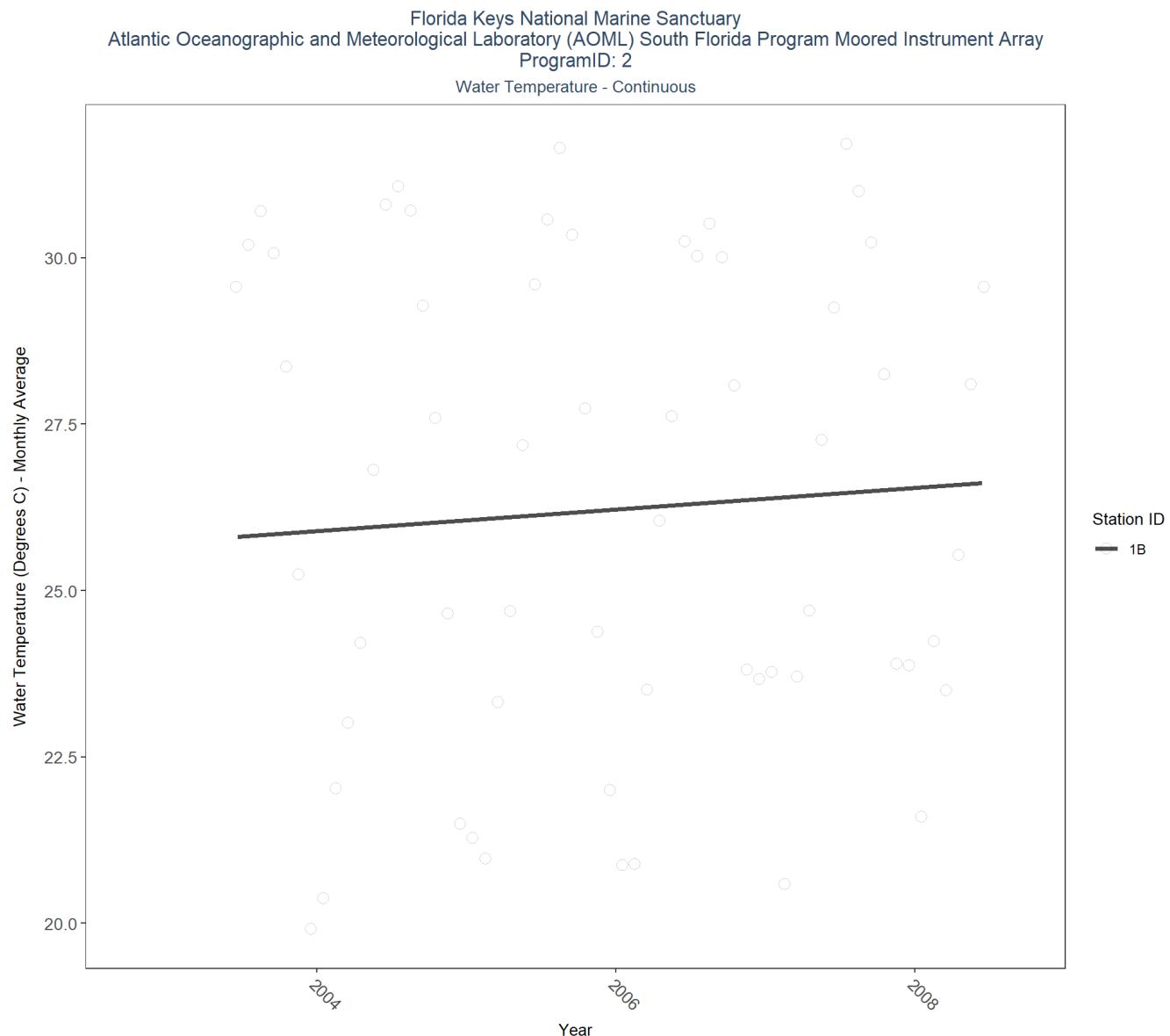


Table 34: Seasonal Kendall-Tau Results for All Stations - Water Temperature

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
1B	86204	6	2003 - 2008	26.38	0.26	25.73	0.16	0.0392

Florida Keys National Marine Sanctuary
 National Data Buoy Center
 ProgramID: 5
 Water Temperature - Continuous

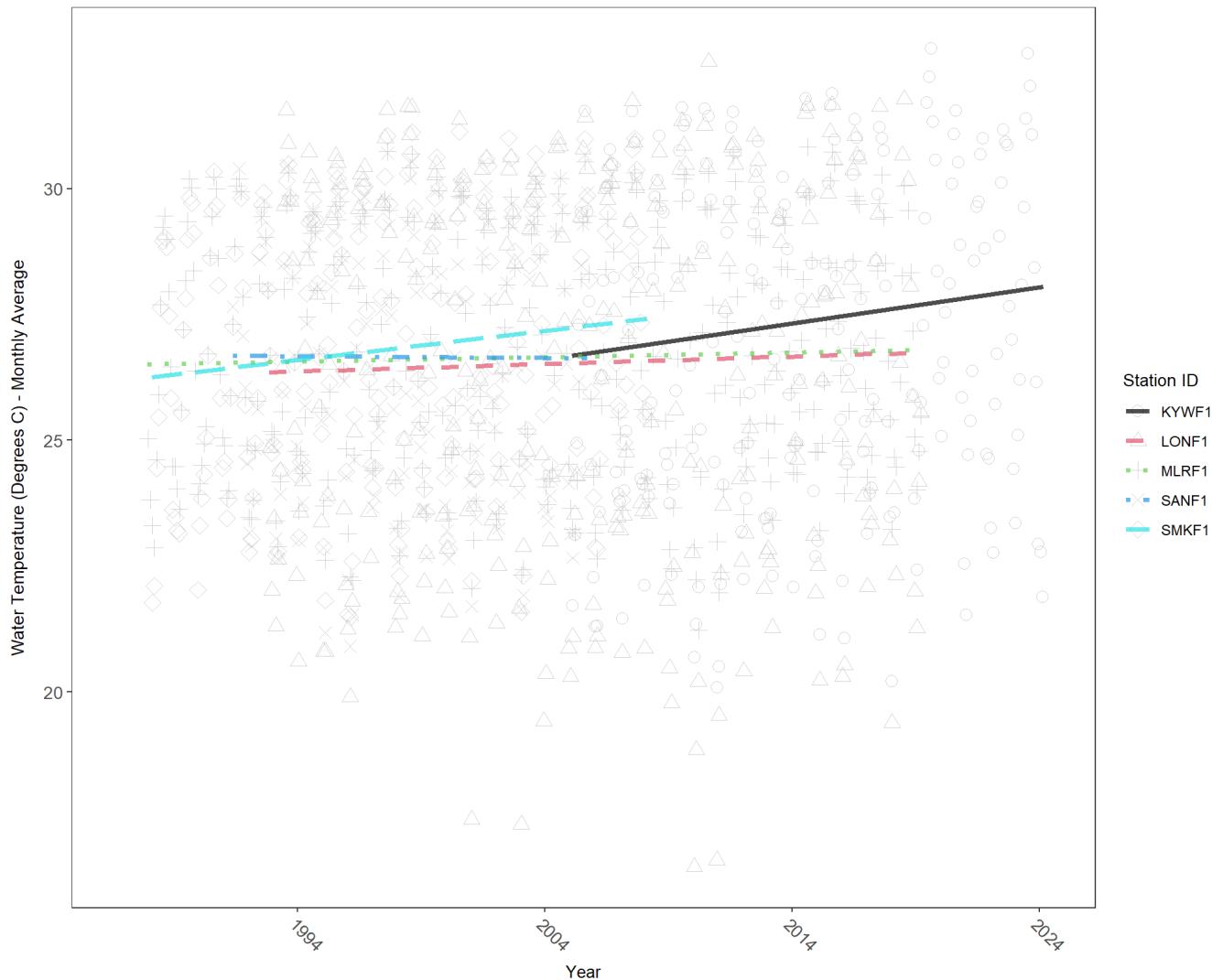


Table 35: Seasonal Kendall-Tau Results for All Stations - Water Temperature

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
LONF1	205971	28	1992 - 2019	26.6	0.07	26.34	0.01	0.0825
KYWF1	1412602	20	2005 - 2024	27.5	0.31	26.67	0.07	0.0000
MLRF1	256798	33	1987 - 2019	26.5	0.10	26.49	0.01	0.0043
SMKF1	154326	21	1988 - 2008	26.8	0.34	26.24	0.06	0.0000
SANF1	117833	15	1991 - 2005	26.7	-0.03	26.69	0.00	0.6199

Florida Keys National Marine Sanctuary
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project
 ProgramID: 296
 Water Temperature - Continuous

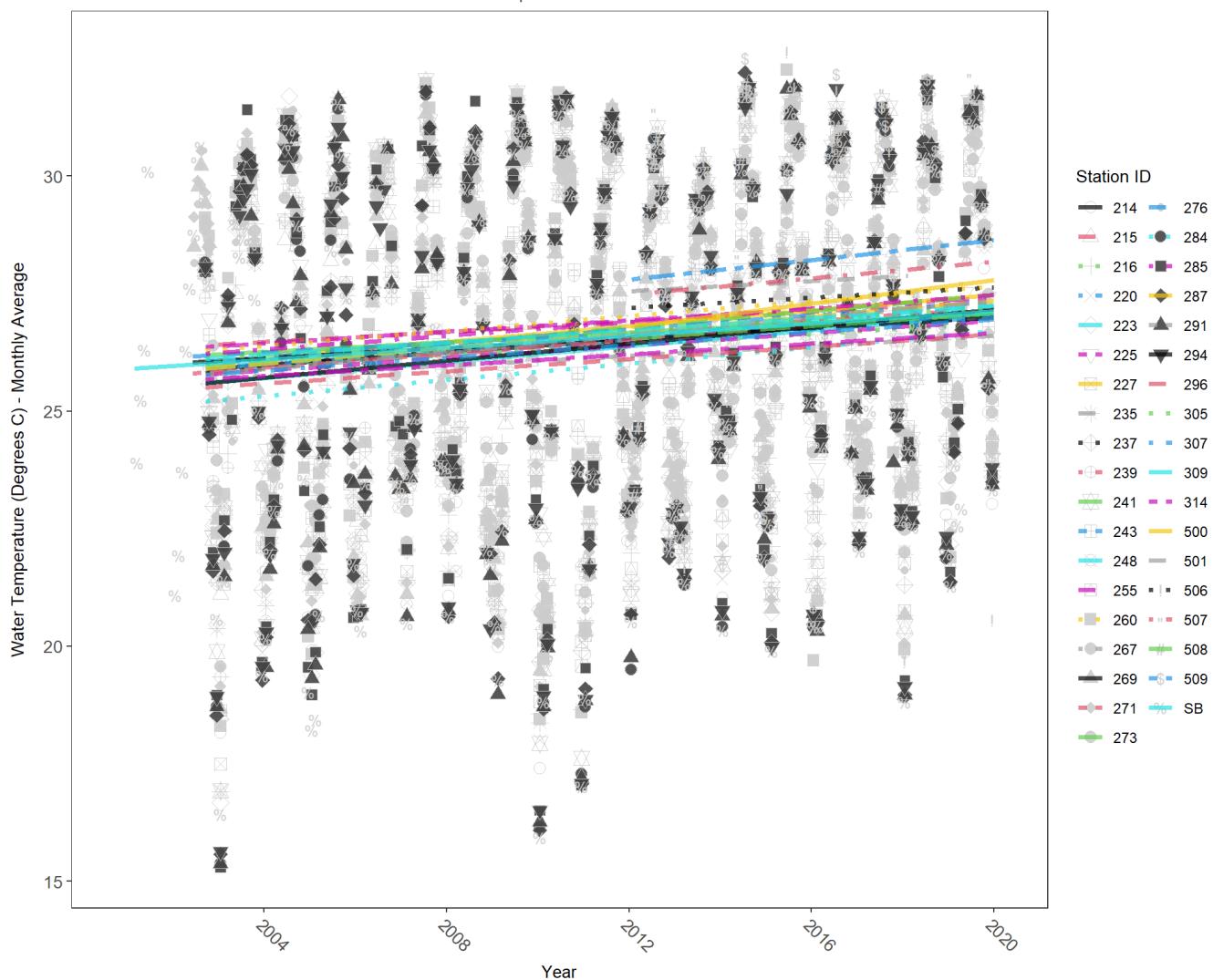


Table 36: Seasonal Kendall-Tau Results for All Stations - Water Temperature

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
248	111702	18	2002 - 2019	26.79	0.31	25.54	0.08	0.0000
271	133627	18	2002 - 2019	26.92	0.26	25.77	0.07	0.0000
291	116240	18	2002 - 2019	26.38	0.26	25.72	0.09	0.0000
220	126033	17	2003 - 2019	26.52	0.25	25.94	0.06	0.0000
235	128499	18	2002 - 2019	27.14	0.28	25.77	0.08	0.0000
285	121423	18	2002 - 2019	26.86	0.25	26.17	0.07	0.0000
225	117692	17	2002 - 2019	26.82	0.32	26.32	0.06	0.0000
237	122250	18	2002 - 2019	26.38	0.31	25.74	0.09	0.0000
214	136333	18	2002 - 2019	26.52	0.27	25.84	0.07	0.0000
243	121593	18	2002 - 2019	26.62	0.3	26	0.07	0.0000
267	99735	18	2002 - 2019	26.57	0.24	25.64	0.05	0.0002
296	114497	17	2002 - 2019	27.36	0.21	25.45	0.07	0.0002
309	107410	18	2002 - 2019	27.85	0.27	26.07	0.06	0.0000

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
SB	145514	19	2001 - 2019	26.34	0.23	25.9	0.06	0.0000
241	127914	18	2002 - 2019	27.26	0.27	25.91	0.09	0.0000
287	133008	18	2002 - 2019	26.87	0.29	25.84	0.08	0.0000
305	122296	18	2002 - 2019	26.43	0.22	26.07	0.06	0.0001
307	110802	17	2002 - 2019	26.74	0.22	25.73	0.07	0.0003
314	110686	18	2002 - 2019	27.41	0.23	25.63	0.06	0.0002
507	47517	8	2012 - 2019	27.36	0.18	27.48	0.09	0.1213
260	97832	16	2002 - 2019	27.07	0.28	26.22	0.08	0.0000
284	123977	17	2002 - 2019	26.86	0.28	25.14	0.09	0.0000
500	69048	8	2012 - 2019	27.33	0.23	26.79	0.12	0.0074
227	105351	17	2003 - 2019	26.67	0.29	26.06	0.08	0.0000
223	133082	18	2002 - 2019	26.89	0.3	25.84	0.08	0.0000
273	129817	18	2002 - 2019	27.16	0.24	26.16	0.05	0.0000
502	22765	4	2016 - 2019	26.70	-	-	-	-
276	123833	18	2002 - 2019	26.87	0.21	26.15	0.05	0.0002
506	35198	7	2012 - 2019	27.41	0.04	27.2	0.05	0.7350
294	112348	18	2002 - 2019	26.92	0.27	25.52	0.09	0.0000
509	38607	8	2012 - 2019	27.70	0.05	27.79	0.11	0.4739
269	106458	17	2002 - 2019	26.74	0.2	26.02	0.05	0.0010
255	119939	18	2002 - 2019	26.35	0.24	25.73	0.07	0.0000
508	24021	6	2012 - 2019	26.67	0.33	26.54	0.07	0.2949
239	111523	17	2002 - 2018	26.92	0.24	25.96	0.07	0.0001
216	98535	17	2002 - 2018	26.26	0.31	25.86	0.06	0.0000
215	133286	16	2003 - 2018	26.74	0.26	26.42	0.05	0.0000
501	34805	5	2012 - 2018	27.48	0.11	27.55	0.05	0.6481
503	7490	1	2016 - 2016	28.74	-	-	-	-
504	4339	1	2018 - 2018	29.84	-	-	-	-

Florida Keys National Marine Sanctuary
 USGS Coral Reef Ecosystem Studies (CREST) Project
 ProgramID: 899
 Water Temperature - Continuous

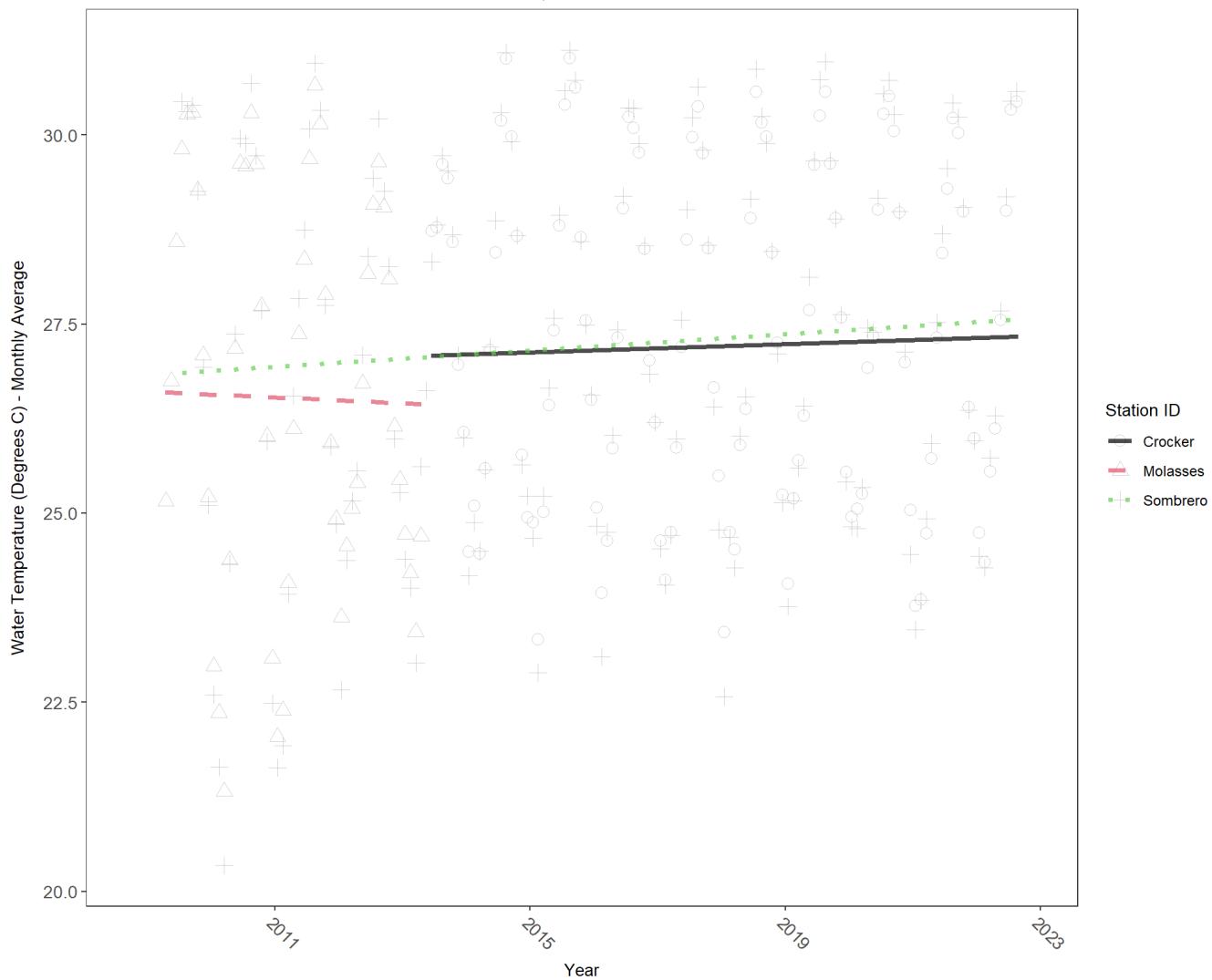


Table 37: Seasonal Kendall-Tau Results for All Stations - Water Temperature

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
Molasses	140713	5	2009 - 2013	26.72	-0.03	26.61	-0.04	0.9247
Sombrero	459354	14	2009 - 2022	27.16	0.26	26.83	0.05	0.0000
Crocker	322670	10	2013 - 2022	27.32	0.15	27.07	0.03	0.0436

Florida Keys National Marine Sanctuary
 Water Temperature on Coral Reefs in the Florida Keys
 ProgramID: 986
 Water Temperature - Continuous

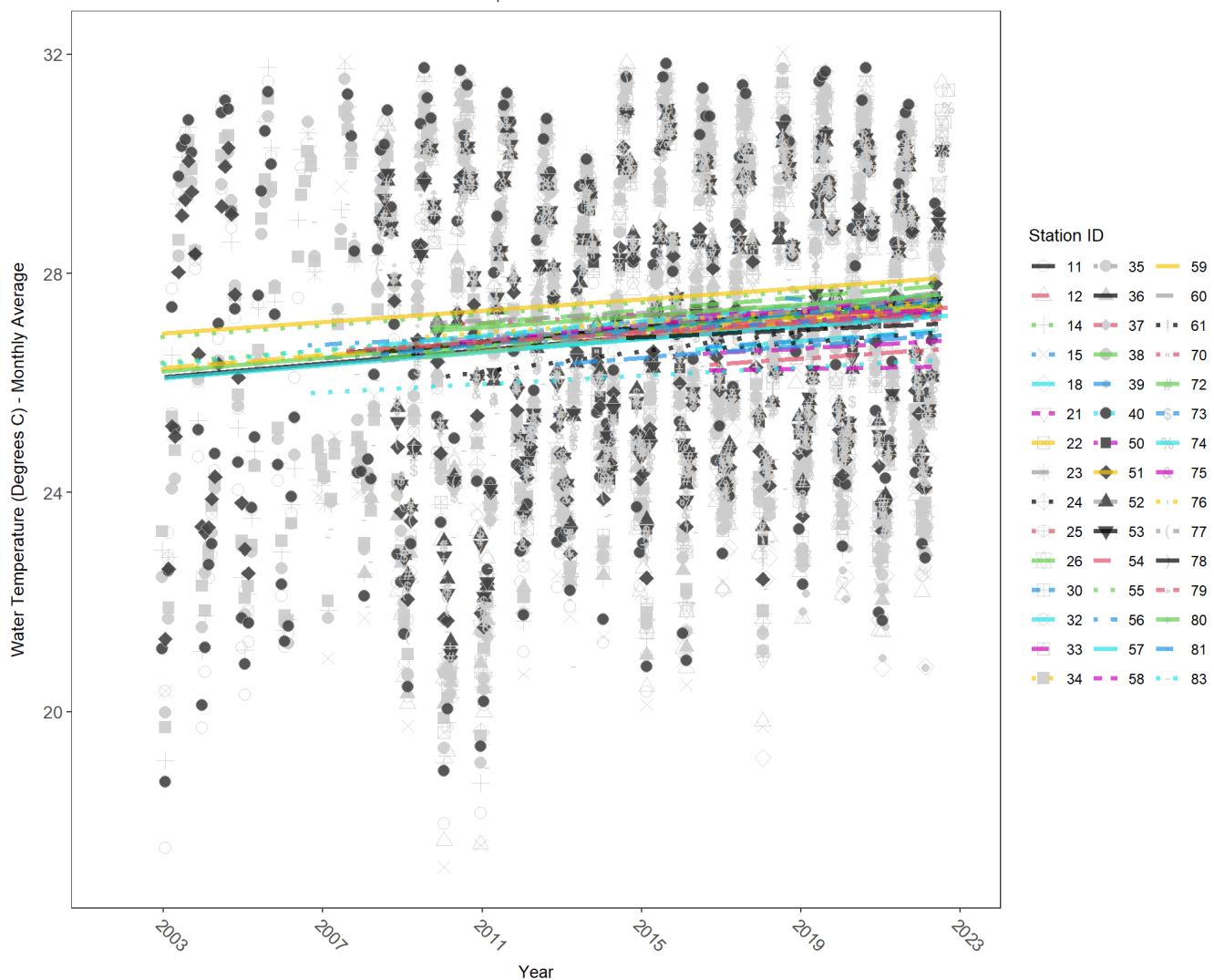


Table 38: Seasonal Kendall-Tau Results for All Stations - Water Temperature

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
55	225636	21	2002 - 2022	26.86	0.28	26.79	0.05	0.0000
53	179447	15	2008 - 2022	26.98	0.37	26.53	0.07	0.0000
79	175394	16	2007 - 2022	26.79	0.21	26.56	0.04	0.0006
38	256177	21	2002 - 2022	26.47	0.28	26.15	0.06	0.0000
14	223851	19	2002 - 2022	26.84	0.24	26.31	0.06	0.0000
34	274006	21	2002 - 2022	26.74	0.3	26.19	0.07	0.0000
36	192871	16	2007 - 2022	26.89	0.24	26.52	0.06	0.0001
73	179435	15	2008 - 2022	26.74	0.35	26.49	0.07	0.0000
15	212659	17	2006 - 2022	26.99	0.19	26.4	0.05	0.0006
40	244138	21	2002 - 2022	26.79	0.28	26.27	0.07	0.0000
76	168914	14	2009 - 2022	26.84	0.23	26.82	0.05	0.0002
12	138064	13	2008 - 2022	27.16	0.21	26.39	0.06	0.0020
60	150013	14	2009 - 2022	26.94	0.17	27.07	0.04	0.0094

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
26	142040	14	2009 - 2022	26.96	0.21	26.97	0.06	0.0024
32	223104	18	2003 - 2022	26.69	0.31	26.09	0.06	0.0000
72	188119	15	2008 - 2022	26.77	0.42	26.42	0.08	0.0000
51	222780	18	2003 - 2022	26.67	0.31	26.27	0.06	0.0000
11	228643	18	2003 - 2022	26.81	0.3	26.1	0.06	0.0000
35	217666	17	2006 - 2022	26.84	0.22	26.41	0.05	0.0000
30	116701	11	2012 - 2022	26.62	0.21	26.3	0.05	0.0055
22	171553	14	2009 - 2022	26.91	0.25	26.43	0.07	0.0000
56	175648	17	2006 - 2022	26.67	0.14	26.67	0.03	0.0187
52	188237	15	2008 - 2022	26.92	0.34	26.63	0.07	0.0000
57	187914	15	2008 - 2022	26.96	0.3	26.66	0.07	0.0000
77	188336	15	2008 - 2022	26.89	0.27	26.57	0.07	0.0000
70	104819	10	2013 - 2022	26.91	0.22	26.73	0.05	0.0044
58	72230	9	2014 - 2022	27.11	0.01	27.23	0.01	0.9631
75	144589	13	2010 - 2022	27.06	0.27	26.71	0.07	0.0001
33	38112	6	2016 - 2022	27.13	0.08	26.23	0.01	0.6585
78	87924	9	2014 - 2022	26.98	0.11	26.81	0.03	0.1925
25	117274	12	2010 - 2022	27.19	0.08	27.07	0.03	0.2669
80	167362	14	2009 - 2022	26.87	0.21	26.92	0.05	0.0005
59	191677	18	2002 - 2022	26.81	0.27	26.85	0.05	0.0000
83	130599	16	2006 - 2022	25.79	0.14	25.79	0.04	0.0106
81	53957	7	2016 - 2022	27.03	0.13	26.63	0.05	0.2247
61	54044	7	2016 - 2022	27.06	0.15	26.58	0.05	0.1513
23	113161	11	2012 - 2022	27.33	0.19	26.83	0.07	0.0111
74	130333	11	2012 - 2022	26.87	0.24	26.64	0.05	0.0005
24	111388	11	2010 - 2022	26.89	0.33	26.12	0.09	0.0000
50	103998	10	2013 - 2022	27.01	0.23	26.85	0.05	0.0035
18	44119	7	2016 - 2022	27.03	0.13	26.59	0.06	0.2890
21	55870	7	2016 - 2022	27.18	0.13	26.51	0.04	0.2228
54	130399	11	2012 - 2022	27.06	0.25	26.77	0.06	0.0002
37	52521	7	2016 - 2022	26.74	0.07	26.3	0.05	0.4651
39	33723	5	2018 - 2022	27.01	-0.09	27.6	-0.08	0.6877
10	18268	3	2020 - 2022	27.72	-	-	-	-

Florida Keys National Marine Sanctuary
Continuous Bottom Temperature Measurements along the Florida Reef Tract
ProgramID: 989

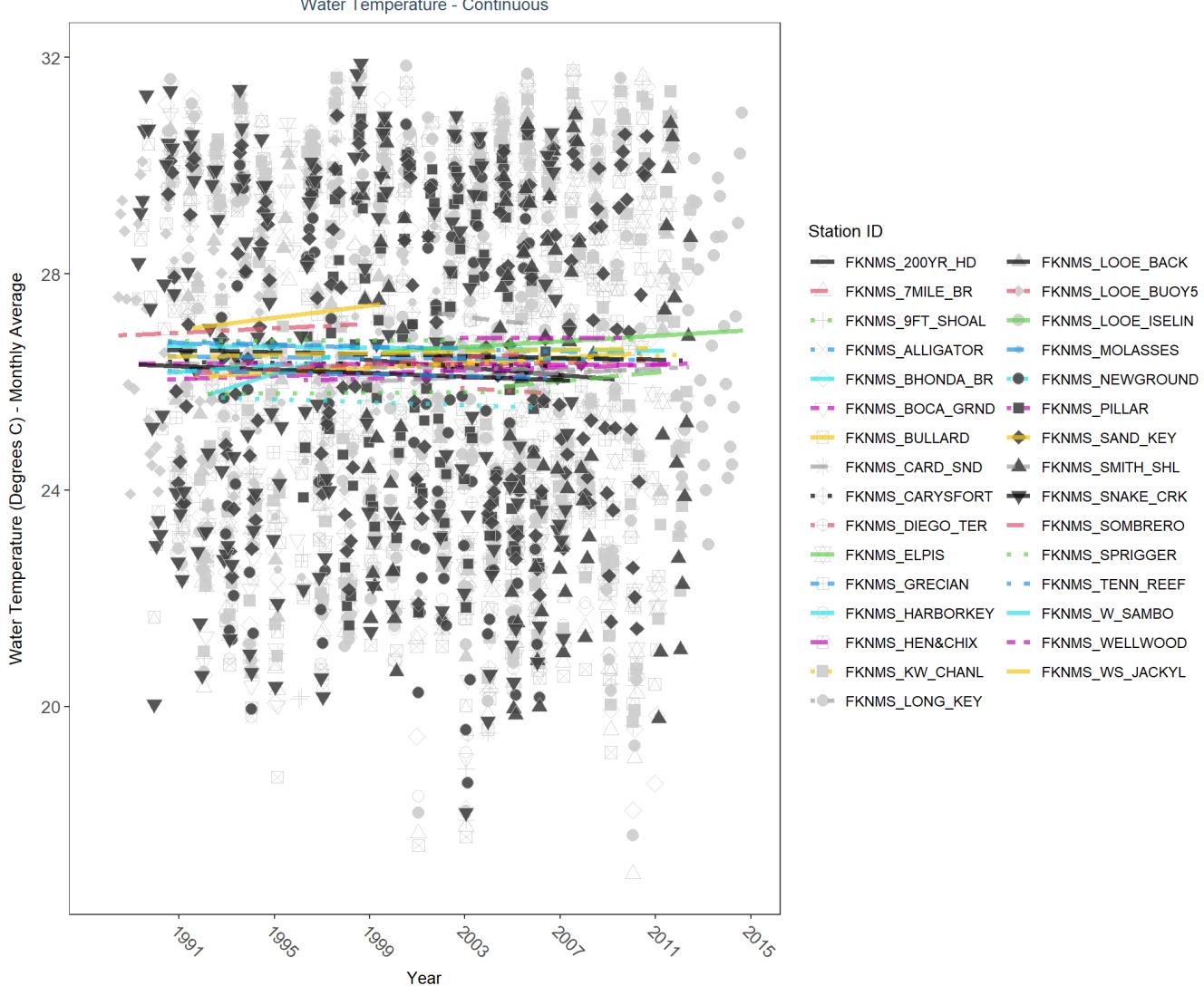


Table 39: Seasonal Kendall-Tau Results for All Stations - Water Temperature

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
FKNMS_GRECIAN	51723	18	1990 - 2010	26.65	-0.03	26.48	0	0.6634
FKNMS_LOOE_ISELIN	194367	13	1999 - 2014	26.88	0.13	26.55	0.03	0.0801
FKNMS_SMITH_SHL	94527	10	1998 - 2012	25.45	0.13	25.99	0.02	0.1933
FKNMS_BOCA_GRND	73434	17	1990 - 2012	26.14	0.08	26.04	0.01	0.1662
FKNMS_KW_CHANL	123578	18	1991 - 2012	26.27	0.1	26.11	0.02	0.0805
FKNMS_MOLASSES	36146	13	1990 - 2002	26.70	-0.05	26.74	-0.01	0.4806
FKNMS_9FT_SHOAL	80299	21	1990 - 2010	26.50	0	26.76	0	0.9917
FKNMS_HEN&CHIX	72285	21	1989 - 2011	26.50	-0.01	26.35	0	0.8763
FKNMS_PILLAR	40805	11	1996 - 2006	26.24	0.02	26.04	0.01	0.9363
FKNMS_LOOE_BACK	84984	18	1990 - 2012	26.80	-0.06	26.6	-0.01	0.4216
FKNMS_CARYSFORT	55001	16	1990 - 2006	26.40	-0.03	26.38	0	0.6354
FKNMS_LONG_KEY	69656	19	1990 - 2010	26.64	-0.03	26.35	-0.01	0.5769
FKNMS_BULLARD	66230	18	1992 - 2009	26.31	0.12	26.11	0.02	0.0313

Station	N_Data	N_Years	Period of Record	Median	tau	SennIntercept	SennSlope	p
FKNMS_WS_JACKYL	29557	9	1991 - 1999	26.40	0.17	26.96	0.06	0.0860
FKNMS_SOMBRERO	48974	13	1991 - 2005	26.50	0.13	26.14	0.03	0.0508
FKNMS_SNAKE_CRK	56777	19	1989 - 2007	26.16	-0.06	26.33	-0.02	0.2771
FKNMS_TENN_REEF	63260	16	1990 - 2006	26.70	-0.06	26.22	-0.01	0.2738
FKNMS_200YR_HD	44601	12	1998 - 2009	26.10	-0.1	26.45	-0.04	0.1720
FKNMS_DIEGO_TER	16693	5	2002 - 2006	25.58	-0.05	25.91	-0.03	0.8407
FKNMS_ELPIS	31035	8	2004 - 2011	26.35	0.06	25.9	0.04	0.5313
FKNMS_BHONDA_BR	77111	22	1990 - 2011	26.60	-0.02	26.67	0	0.6571
FKNMS_SPRIGGER	41834	13	1992 - 2006	26.10	0.02	25.78	0	0.8553
FKNMS_SAND_KEY	59287	18	1990 - 2010	26.70	0.05	26.46	0.01	0.3230
FKNMS_WELLWOOD	30427	8	2002 - 2009	26.43	0	26.82	0	1.0000
FKNMS_7MILE_BR	73055	19	1991 - 2010	26.66	0.05	26.22	0.01	0.3549
FKNMS_ALLIGATOR	65144	19	1990 - 2010	26.55	-0.06	26.72	-0.01	0.2339
FKNMS_MAITLAND	12421	4	2004 - 2007	26.07	-	-	-	-
FKNMS_NEWGROUND	35329	12	1992 - 2006	25.49	-0.05	25.73	-0.01	0.5207
FKNMS_CARD SND	18249	6	2001 - 2006	26.52	-0.05	27.32	-0.05	0.7909
FKNMS_WS_BUOY16	8123	3	2003 - 2005	25.99	-	-	-	-
FKNMS_LOOE_BUOY5	35252	10	1988 - 1998	26.90	0.05	26.86	0.02	0.3627
FKNMS_HARBORKEY	15407	5	1992 - 1997	26.50	0.14	25.74	0.14	0.3261
FKNMS_W_SAMBO	18786	6	1990 - 1995	26.90	0.09	26.16	0.03	0.5597

Submerged Aquatic Vegetation

The data file used is: All_SAV_Parameters-2024-Jul-02.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.

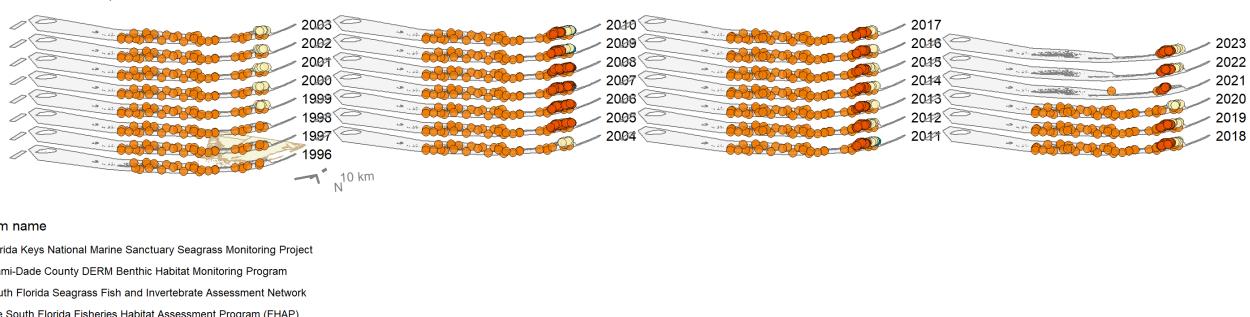
Notes

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

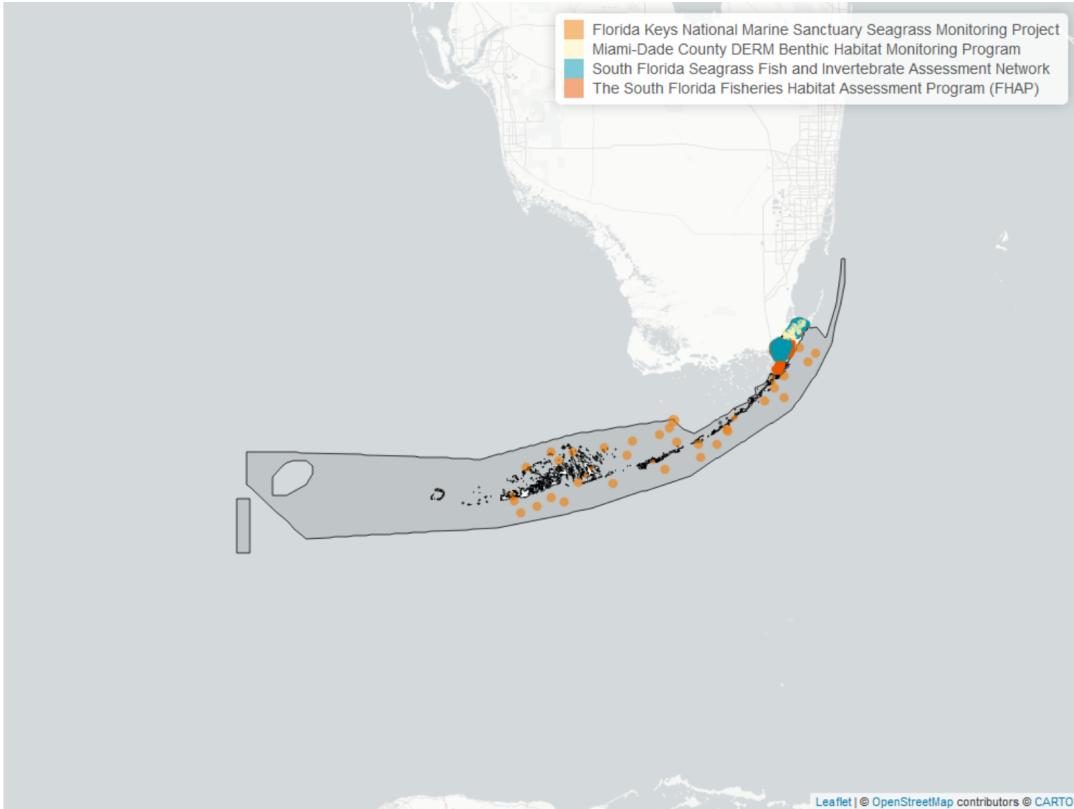
- Biscayne Bay Aquatic Preserve
- Florida Keys National Marine Sanctuary

Florida Keys National Marine Sanctuary
SAV Percent Cover - Sample Locations



Maps showing the temporal scope of SAV sampling sites within the boundaries of *Florida Keys National Marine Sanctuary* by Program name.

Sampling locations by Program:



Map showing SAV sampling sites within the boundaries of *Florida Keys National Marine Sanctuary*. The point size reflects the number of samples at a given sampling site.

Table 40: Florida Keys National Marine Sanctuary Seagrass Monitoring Project - *Program 296*

<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>	<i>Collection Method</i>	<i>Sample Locations</i>
4200	1996	2021	Braun Blanquet	40

Table 41: South Florida Seagrass Fish and Invertebrate Assessment Network - *Program 965*

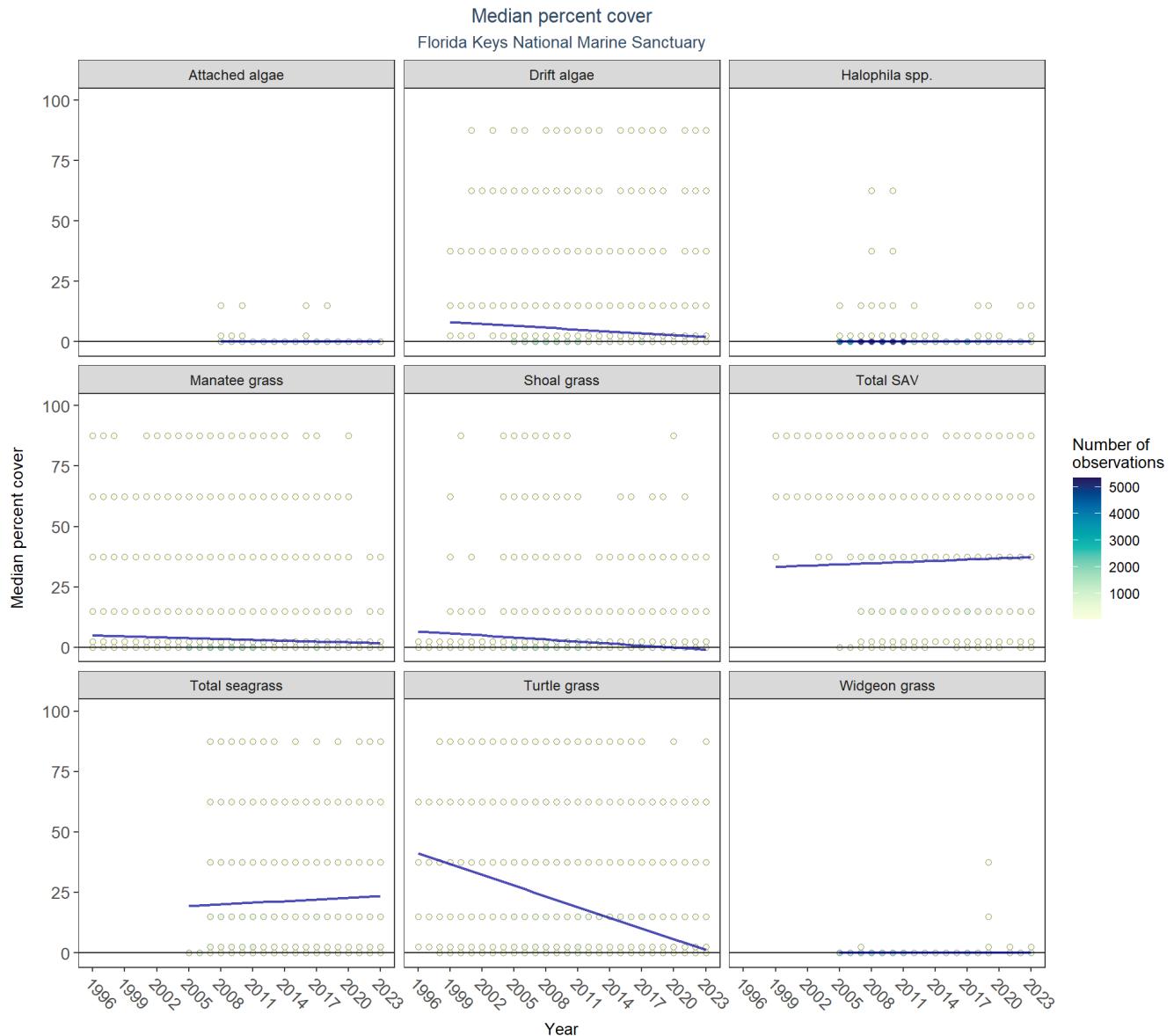
<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>	<i>Collection Method</i>	<i>Sample Locations</i>
65538	2005	2011	Braun Blanquet	87

Table 42: Miami-Dade County DERM Benthic Habitat Monitoring Program - *Program 4018*

<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>	<i>Collection Method</i>	<i>Sample Locations</i>
3925	1999	2023	Braun Blanquet	115
279	1999	2007	Percent Cover	67

Table 43: The South Florida Fisheries Habitat Assessment Program (FHAP) - *Program 4049*

<i>N_Data</i>	<i>YearMin</i>	<i>YearMax</i>	<i>Collection Method</i>	<i>Sample Locations</i>
99384	2005	2023	Braun Blanquet	1203



Median percent cover by species in *Florida Keys National Marine Sanctuary*. 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.

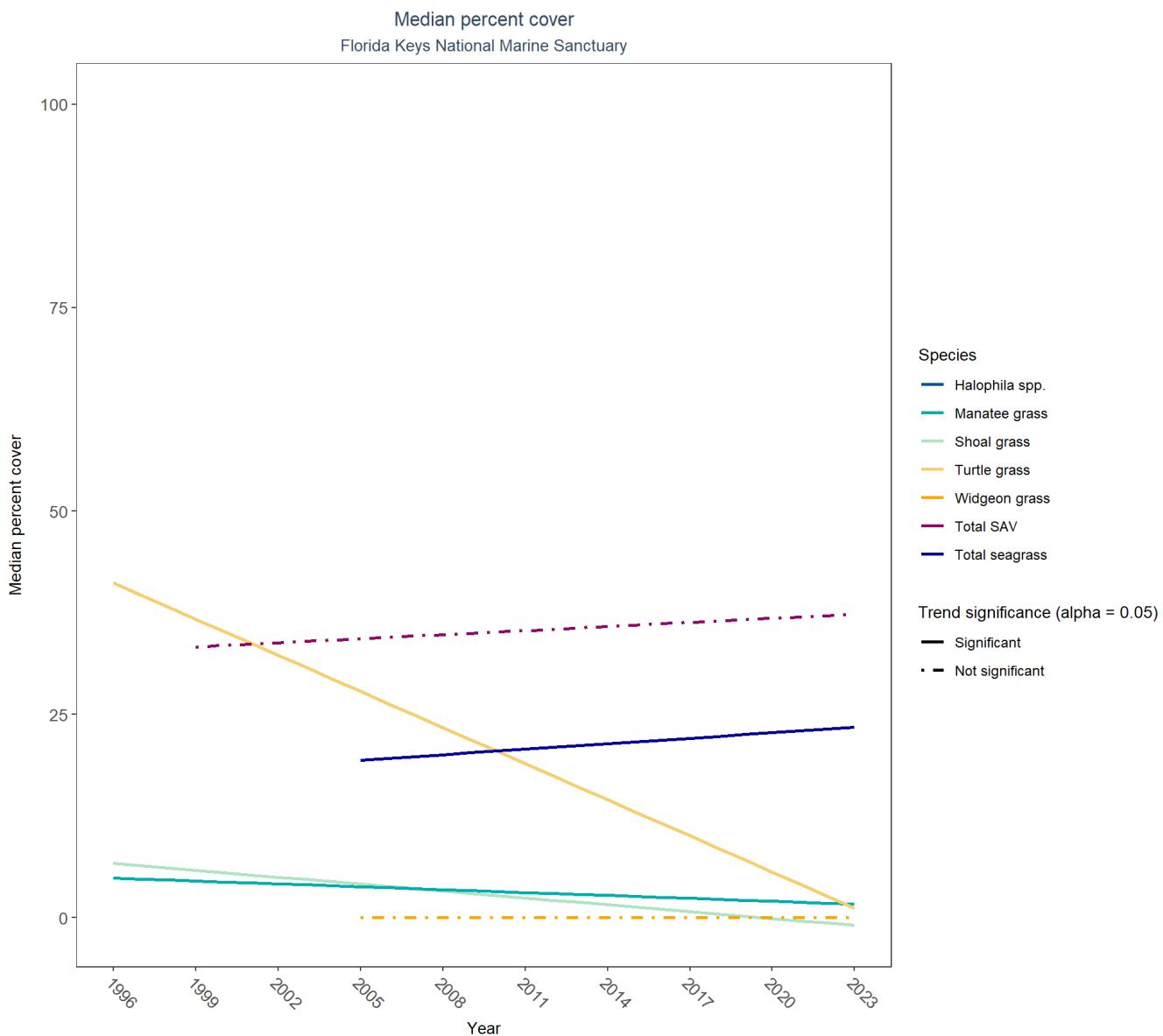
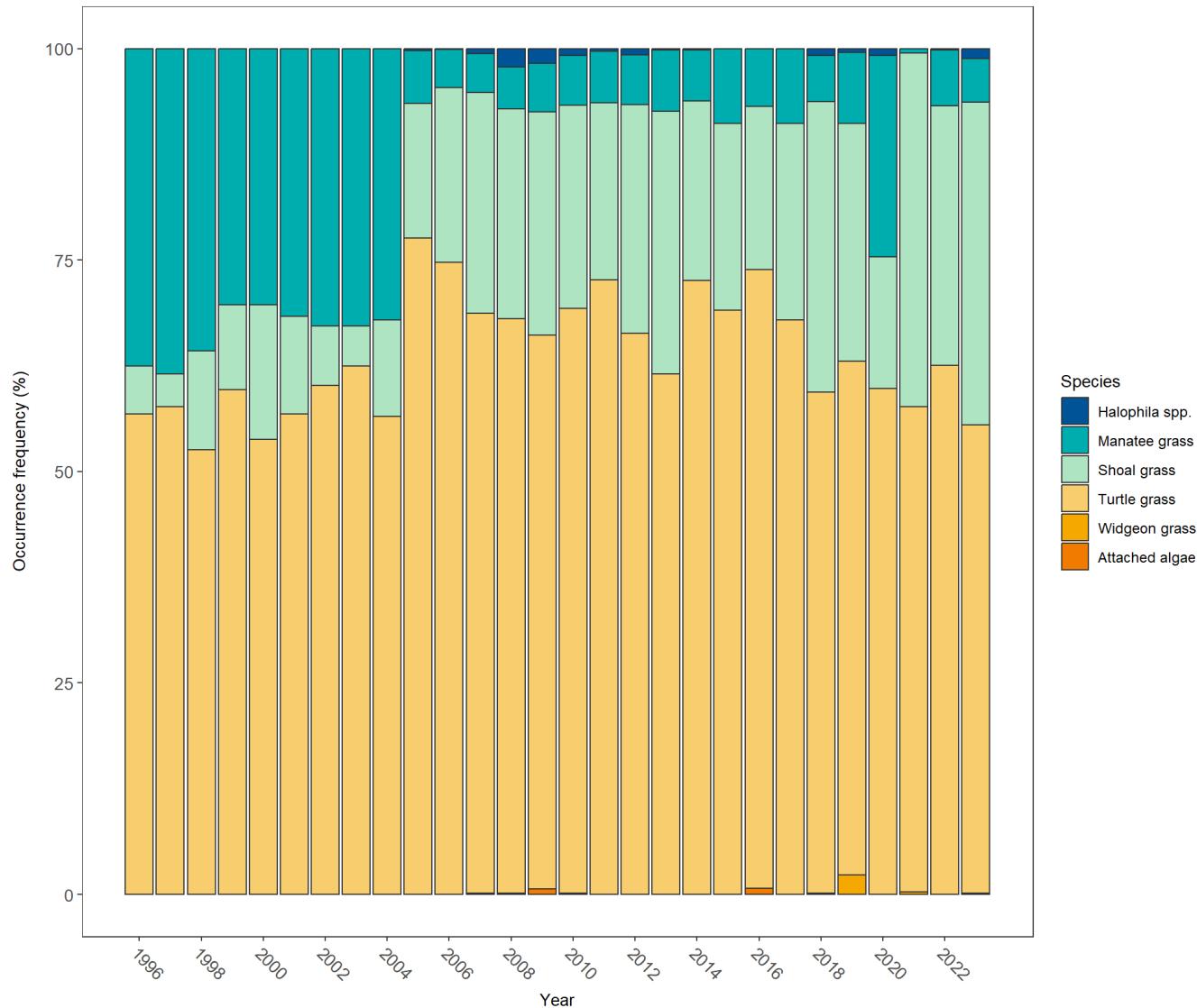
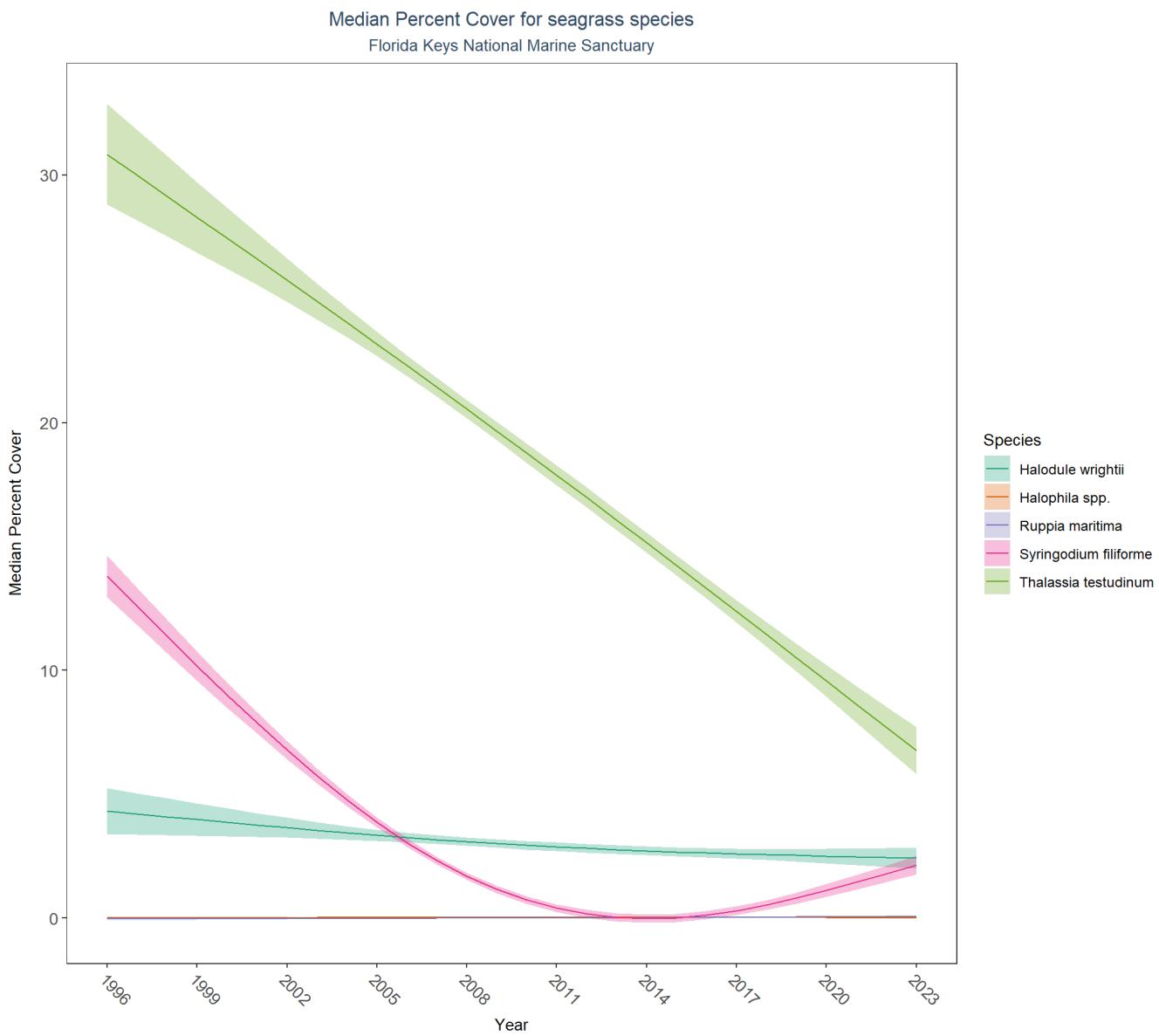


Table 44: Percent Cover Trend Analysis for Florida Keys National Marine Sanctuary

Species	CommonName	Trend Significance (0.05)	Period of Record	LME-Intercept	LME-Slope	p
Attached algae		No significant trend	2008 - 2023	0.0774	-0.0026	0.2391
Drift algae		Significantly decreasing trend	1999 - 2023	9.4384	-0.2537	0.0000
Halodule wrightii	Shoal grass	Significantly decreasing trend	1996 - 2023	7.2272	-0.2820	0.0001
Halophila spp.		No significant trend	2005 - 2023	0.0728	-0.0022	0.3770
Ruppia maritima	Widgeon grass	No significant trend	2005 - 2023	-0.0440	0.0032	0.1220
Syringodium filiforme	Manatee grass	Significantly decreasing trend	1996 - 2023	5.1053	-0.1185	0.0111
Thalassia testudinum	Turtle grass	Significantly decreasing trend	1996 - 2023	44.1032	-1.4803	0.0000
Total SAV		No significant trend	1999 - 2023	32.4574	0.1673	0.3065
Total seagrass		Significantly increasing trend	2005 - 2023	16.8991	0.2246	0.0195

Frequency of occurrence
Florida Keys National Marine Sanctuary





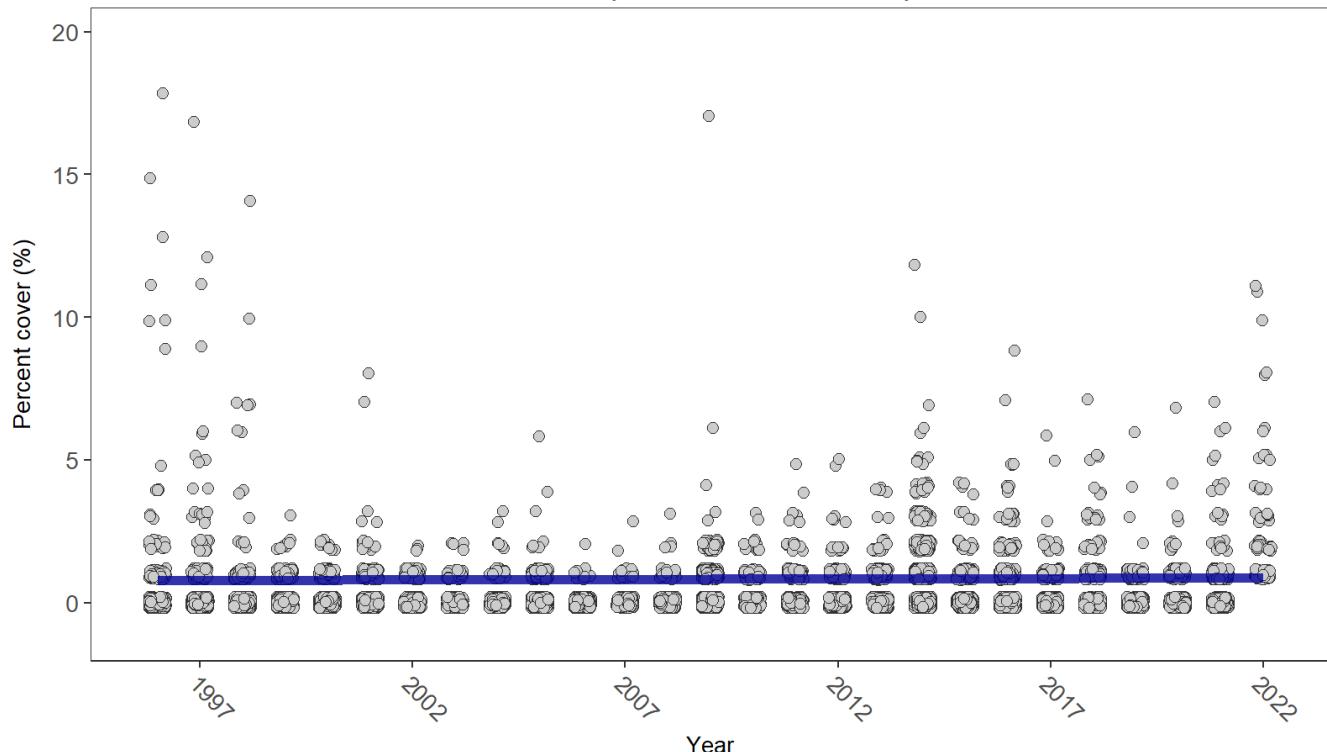
Generalized additive models for each species in Florida Keys National Marine Sanctuary. Species must have at least 10 years of data to be evaluated.

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

Coral Reef

The data file used is: All_CORAL_Parameters-2024-Jul-02.txt

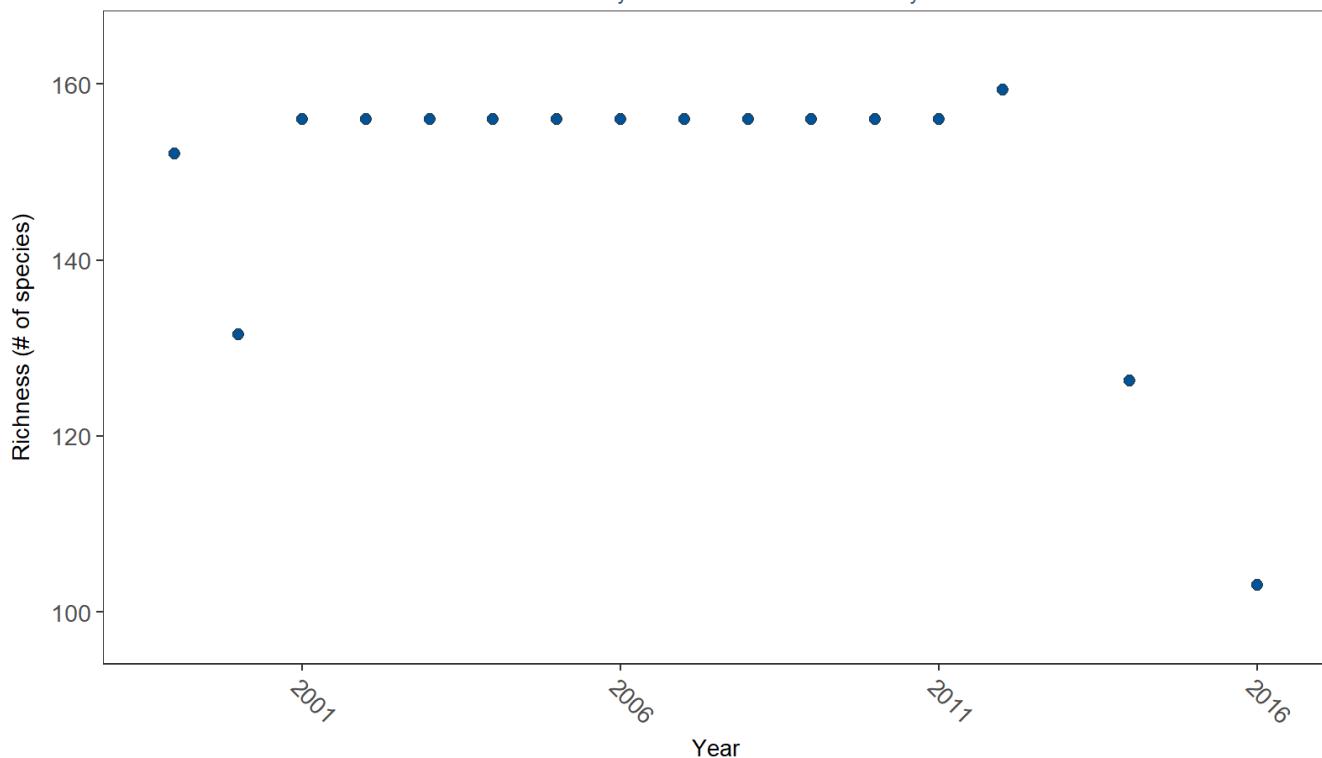
Coral Percent Cover
Florida Keys National Marine Sanctuary



N_Years	SufficientData	EarliestYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	LME_Intercept	LME_Slope	LME_p
27	1	1996	2022	8730	0	18	0	0.39	0.97	-6.23	0	0.0047

LME_p < 0.00005 appear as 0 due to rounding.

Grazers and Reef-Dependent Species Richness
Florida Keys National Marine Sanctuary



N_Years	EarliestYear	LatestYear	N_Data	Min	Max	Median	Mean	StDev	Year_MinRichness	Year_MaxRichness
16	1999	2016	9089	84	174	156	148.03	20.36	2016	2012