Guana Tolomato Matanzas National Estuarine Research Reserve

SEACAR Habitat Analyses

Last compiled on 08 October, 2025

Contents

Funding & Acknowledgements

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Threshold Filtering

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

Table 1: Continuous Water Quality threshold values

Parameter Name	*Units*	*Low Threshold*	*High Threshold*
Dissolved Oxygen	mg/L	-0.000001	50
Dissolved Oxygen Saturation	%	-0.000001	500
Salinity	ppt	-0.000001	70
Turbidity	NTU	-0.000001	4000
Water Temperature	Degrees C	-5.000000	45
pH	None	2.000000	14

Table 2: Discrete Water Quality threshold values

Parameter Name	*Units*	*Low Threshold*	*High Threshold*
Ammonia, Un-ionized (NH3)	mg/L	-	-
Ammonium, Filtered (NH4)	mg/L	-	-
Chlorophyll a, Corrected for Pheophytin	ug/L	-	-
Chlorophyll a, Uncorrected for Pheophytin	ug/L	-	-
Colored Dissolved Organic Matter	PCU	-	-

Parameter Name	*Units*	*Low Threshold*	*High Threshold*
Dissolved Oxygen	mg/L	-0.000001	25
Dissolved Oxygen Saturation	%	-0.000001	310
Fluorescent Dissolved Organic Matter	QSE	-	-
Light Extinction Coefficient	mˆ-1	-	-
NO2+3, Filtered	mg/L	-	-
Nitrate (NO3)	mg/L	-	-
Nitrite (NO2)	mg/L	-	-
Nitrogen, organic	mg/L	-	-
Phosphate, Filtered (PO4)	mg/L	-	-
Salinity	ppt	-0.000001	70
Secchi Depth	m	0.000001	50
Specific Conductivity	mS/cm	0.005000	100
Total Kjeldahl Nitrogen	mg/L	-	-
Total Nitrogen	mg/L	-	-
Total Nitrogen	mg/L	-	-
Total Phosphorus	mg/L	-	-
Total Suspended Solids	mg/L	-	-
Turbidity	NTU	-	-
Water Temperature	Degrees C	3.000000	40
pH	None	2.000000	13

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

SEACAR QAQC Description	*Include*	*SEACAR QAQCFlagCode*
Exceeds maximum threshold	0	2Q
Below minimum threshold	0	4Q
Within threshold tolerance	1	6Q
No defined thresholds for this parameter	1	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	0	0	Value based on field kit determination; results may not be accurate
STORET-WIN	J	0	0	Estimated value
STORET-WIN	V	0	0	Analyte was detected at or above method detection limit
STORET-WIN	Y	0	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 determiniation; 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

Qualifier Source	*Value Qualifier*	*Include*	*Description*
SWMP	-1	1	Optional parameter not collected
SWMP	-2	0	Missing data
SWMP	-3	0	Data rejected due to QA/QC
SWMP	-4	0	Outside low sensor range
SWMP	-5	0	Outside high sensor range
SWMP	0	1	Passed initial QA/QC checks
SWMP	1	0	Suspect data
SWMP	2	1	Reserved for future use
SWMP	3	1	Calculated data: non-vented depth/level sensor correction for changes in barometric pressure
SWMP	4	1	Historical: Pre-auto QA/QC
SWMP	5	1	Corrected data

Water Column

The water column habitat extends from the water's surface to the bottom sediments, and it's where fish, dolphins, crabs and people swim! So much life makes its home in the water column that the health of marine and coastal ecosystems, as well as human economies, depend on the condition of this vulnerable habitat. Local patterns of rainfall, temperature, winds and currents can rapidly change the condition of the water column, while global influences such as El Niño/La Niña, large-scale fluctuation in sea temperatures and climate change can have long-term effects. Inputs from the prosperity of our day-to-day lives including farming, mining and forestry, and emissions from power generation, automobiles and water treatment can also alter the health of the water column. Acting alone or together, each input can have complex and lasting effects on habitats and ecosystems.

SEACAR evaluates water column health with several essential parameters. These include nutrient surveys of nitrogen and phosphorus, and water quality assessments of salinity, dissolved oxygen, pH, and water temperature. Water clarity is evaluated with Secchi depth, turbidity, levels of chlorophyll a, total suspended solids, and colored dissolved organic matter. Additionally, the richness of nekton is indicated by the abundance of free-swimming fishes and macroinvertebrates like crabs and shrimps.

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**. The points for all Water Column plots displayed in this section are monthly averages. Trend significance will be denoted as "Significant Trend" (when $p < 0.05$), or "Non-significant Trend" (when $p >= 0.05$). Any parameters with insufficient data to perform Seasonal Kendall-Tau test will have their monthly averages plotted without a corresponding trend line.

Water Quality - Discrete

The following files were used in the discrete analysis:

- *Combined_WQ_WC_NUT_Chlorophyll_a_corrected_for_pheophytin-2025-Sep-04.txt*
- *Combined_WQ_WC_NUT_Chlorophyll_a_uncorrected_for_pheophytin-2025-Sep-04.txt*
- *Combined_WQ_WC_NUT_Colored_dissolved_organic_matter_CDOM-2025-Sep-04.txt*
- *Combined_WQ_WC_NUT_Dissolved_Oxygen-2025-Sep-04.txt*
- *Combined_WQ_WC_NUT_Dissolved_Oxygen_Saturation-2025-Sep-04.txt*
- *Combined_WQ_WC_NUT_pH-2025-Sep-04.txt*
- *Combined_WQ_WC_NUT_Salinity-2025-Sep-04.txt*
- *Combined_WQ_WC_NUT_Secchi_Depth-2025-Sep-04.txt*
- *Combined_WQ_WC_NUT_Total_Nitrogen-2025-Sep-04.txt*
- *Combined_WQ_WC_NUT_Total_Phosphorus-2025-Sep-04.txt*
- *Combined_WQ_WC_NUT_Total_Suspended_Solids_TSS-2025-Sep-04.txt*
- *Combined_WQ_WC_NUT_Turbidity-2025-Sep-04.txt*
- *Combined_WQ_WC_NUT_Water_Temperature-2025-Sep-04.txt*

Chlorophyll a, Corrected for Pheophytin - Discrete

Seasonal Kendall-Tau Trend Analysis

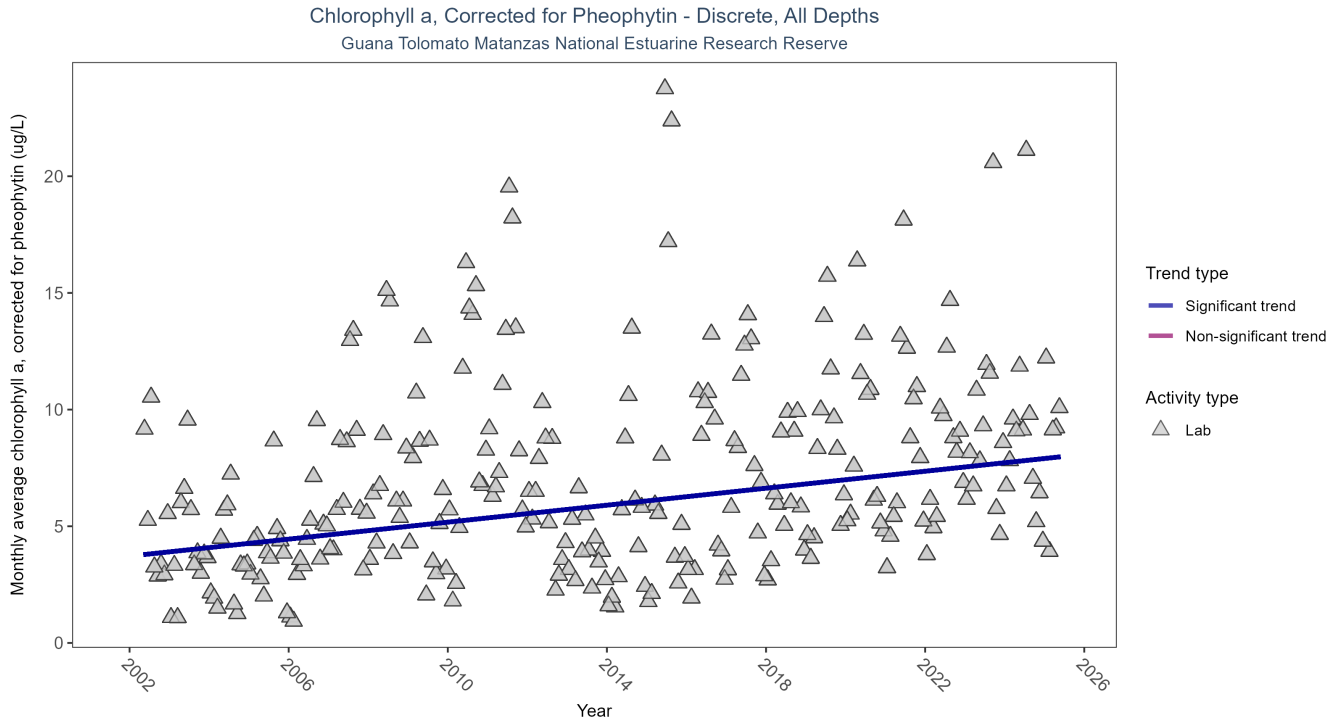

Figure 1: Scatter plot of monthly average levels of chlorophyll a, corrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) is included in the plot.

Table 6: Seasonal Kendall-Tau Trend Analysis for Chlorophyll a, Corrected for Pheophytin

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
Lab	Significantly increasing trend	8243	24	2002 - 2025	4.7	0.3187	3.7212	0.1818	0

Monthly average chlorophyll a, corrected for pheophytin, increased by 0.18 µg/L per year, indicating a decrease in water clarity.

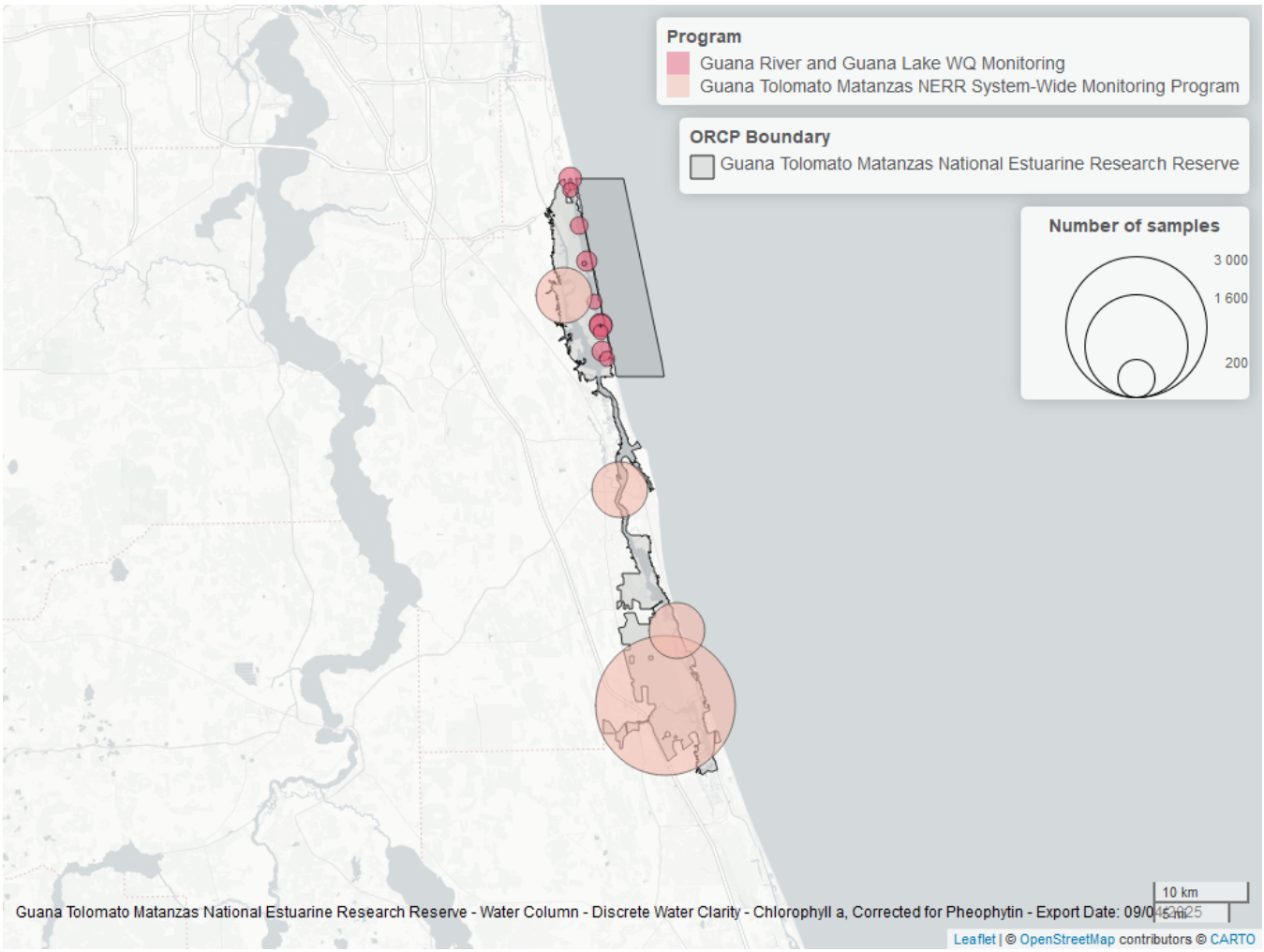

Figure 2: Map showing location of discrete water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 7: Programs contributing data for Chlorophyll a, Corrected for Pheophytin

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	7038	2002	2025
5002	938	2002	2024
5014	714	2017	2024

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]
5014 - Guana River and Guana Lake Water Quality Monitoring[3]

Chlorophyll a, Uncorrected for Pheophytin - Discrete

Seasonal Kendall-Tau Trend Analysis

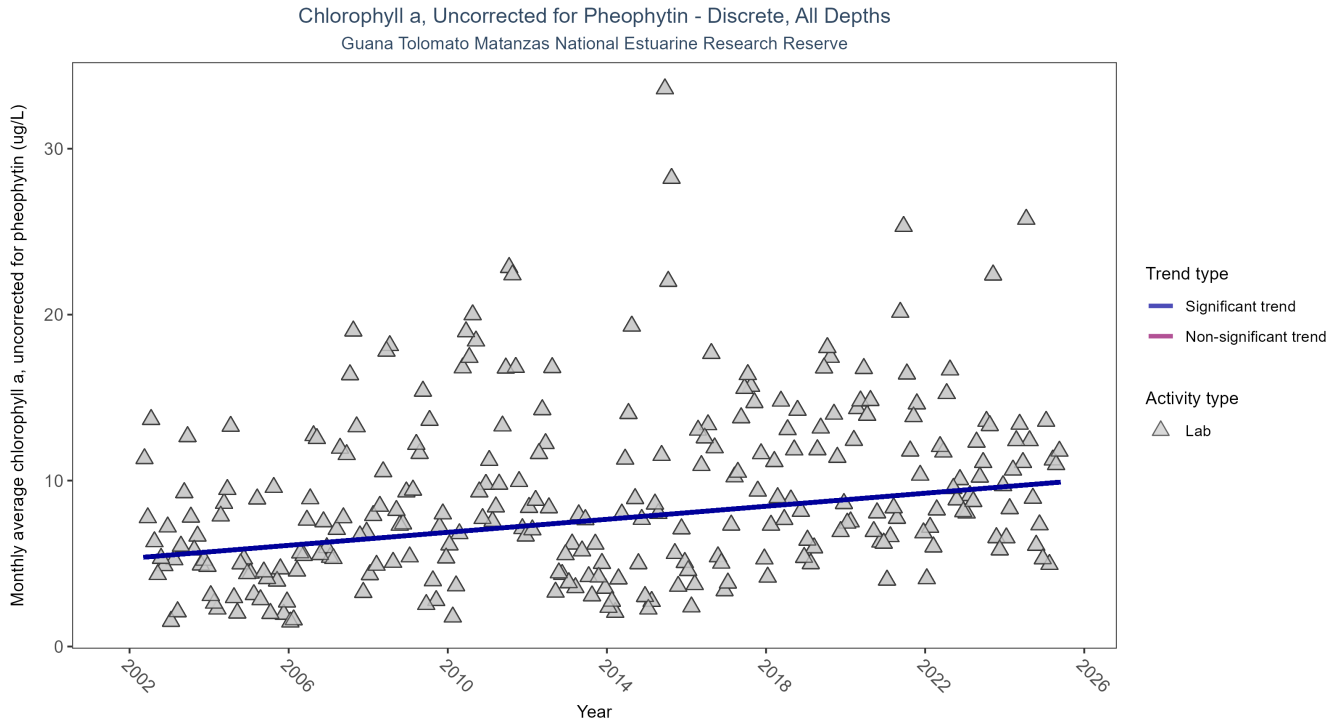

Figure 3: Scatter plot of monthly average levels of chlorophyll a, uncorrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) is included in the plot.

Table 8: Seasonal Kendall-Tau Trend Analysis for Chlorophyll a, Uncorrected for Pheophytin

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
Lab	Significantly increasing trend	6450	24	2002 - 2025	6.2	0.2617	5.3118	0.1963	0

Monthly average chlorophyll a, uncorrected for pheophytin, increased by 0.2 µg/L per year, indicating a decrease in water clarity.

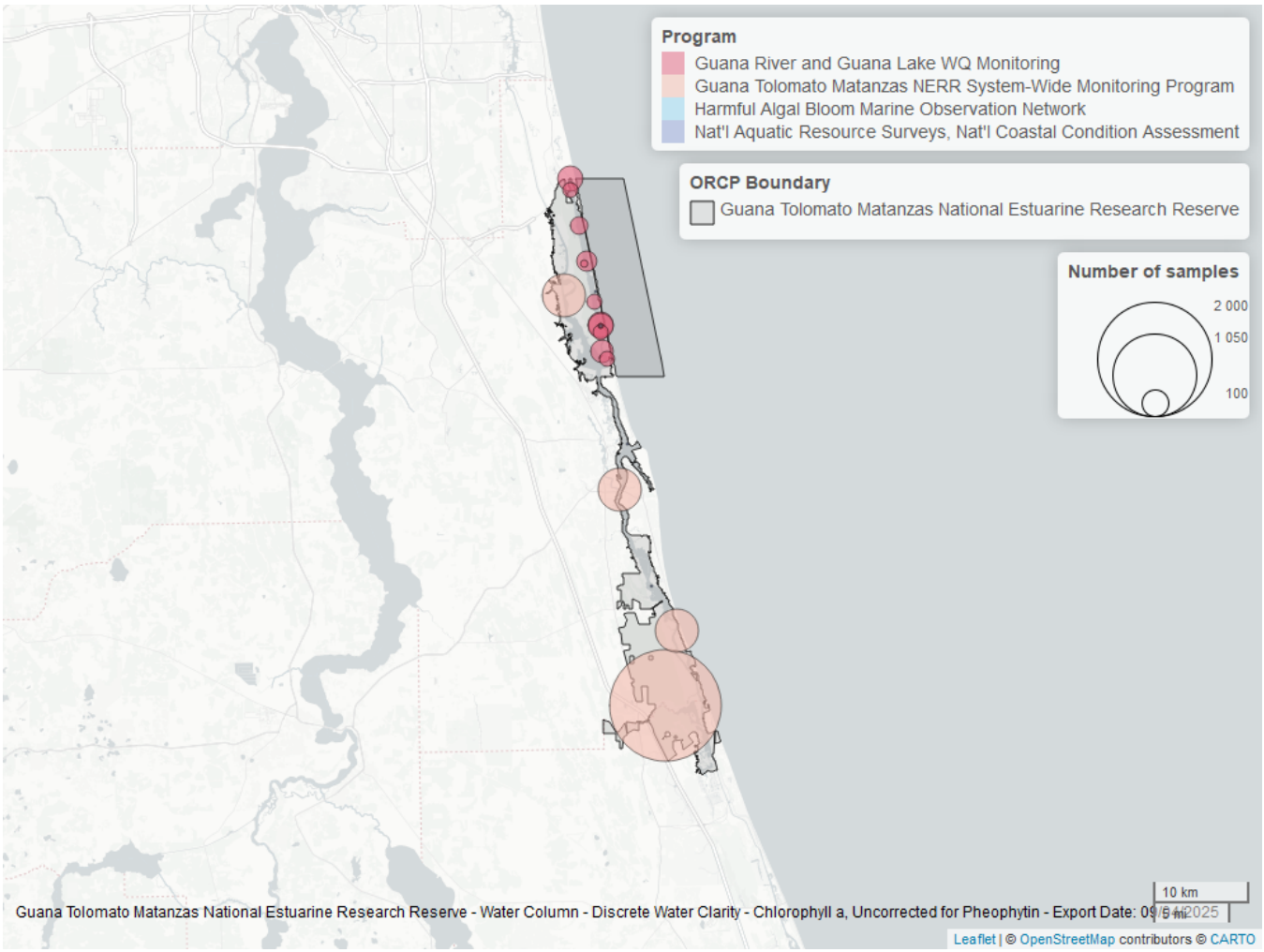

Figure 4: Map showing location of discrete water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 9: Programs contributing data for Chlorophyll a, Uncorrected for Pheophytin

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	5733	2002	2025
5014	774	2017	2024
5002	485	2008	2024
103	3	2006	2015
118	3	2006	2010
95	1	2012	2012

Program names:

95 - Harmful Algal Bloom Marine Observation Network[4]
103 - EPA STOrage and RETrieval Data Warehouse (STORET)/WQX[5]
118 - National Aquatic Resource Surveys, National Coastal Condition Assessment[6]
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]
5014 - Guana River and Guana Lake Water Quality Monitoring[3]

Colored Dissolved Organic Matter - Discrete

Seasonal Kendall-Tau Trend Analysis

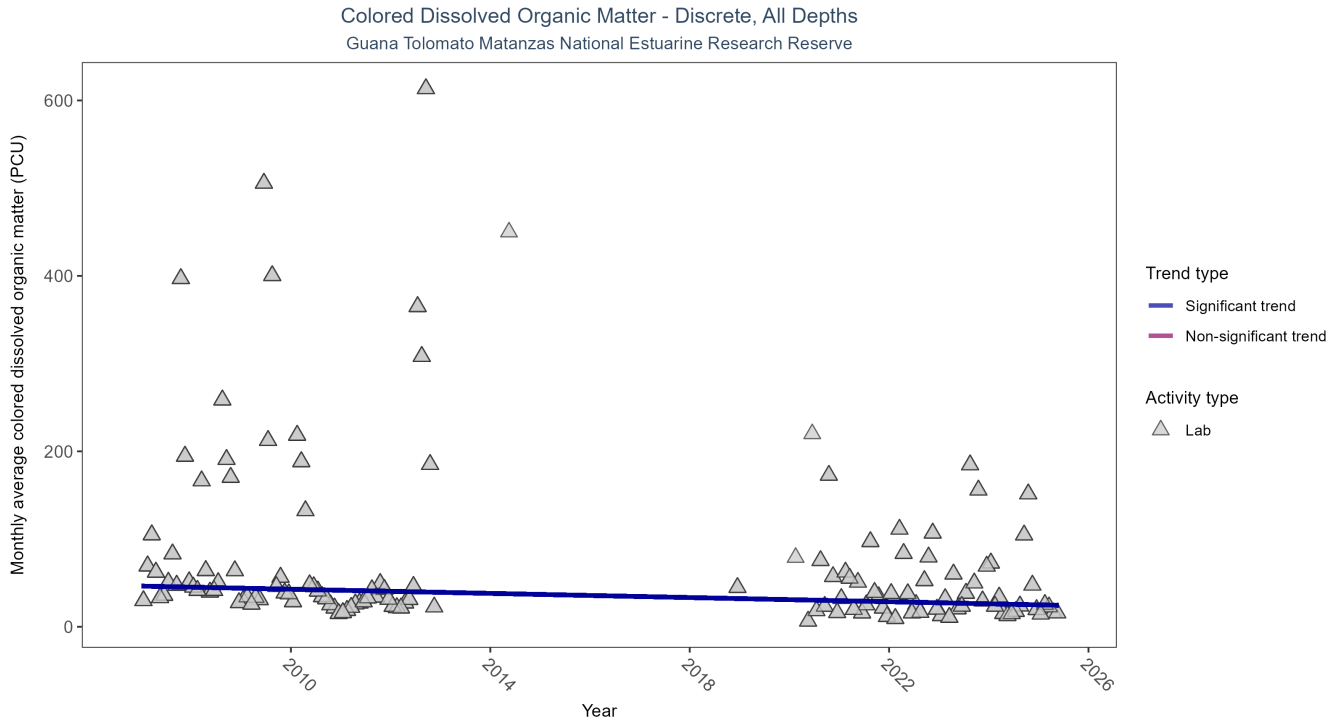

Figure 5: Scatter plot of monthly average colored dissolved organic matter (CDOM) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed CDOM (triangles) is included in the plot.

Table 10: Seasonal Kendall-Tau Trend Analysis for Colored Dissolved Organic Matter

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
Lab	Significantly decreasing trend	1939	14	2007 - 2025	33	-0.2437	46.3694	-1.1883	0.0003

Monthly average colored dissolved organic matter decreased by 1.19 PCU per year, indicating an increase in water clarity.

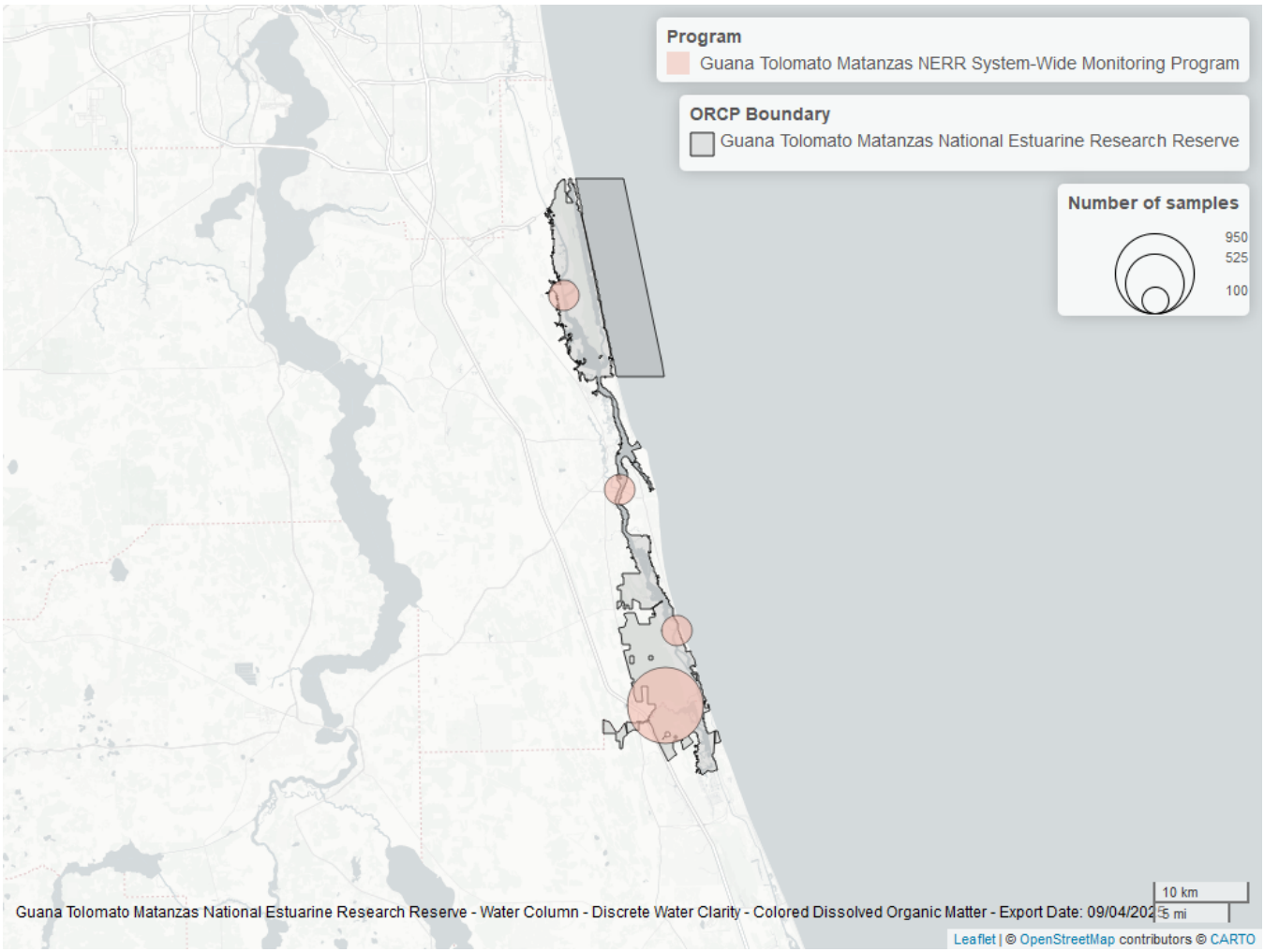

Figure 6: Map showing location of discrete water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 11: Programs contributing data for Colored Dissolved Organic Matter

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	1542	2007	2025
5002	397	2020	2024
5014	7	2018	2018
103	2	2009	2014

Program names:

103 - EPA STOrage and RETrieval Data Warehouse (STORET)/WQX[5]
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]
5014 - Guana River and Guana Lake Water Quality Monitoring[3]

Dissolved Oxygen - Discrete

Seasonal Kendall-Tau Trend Analysis

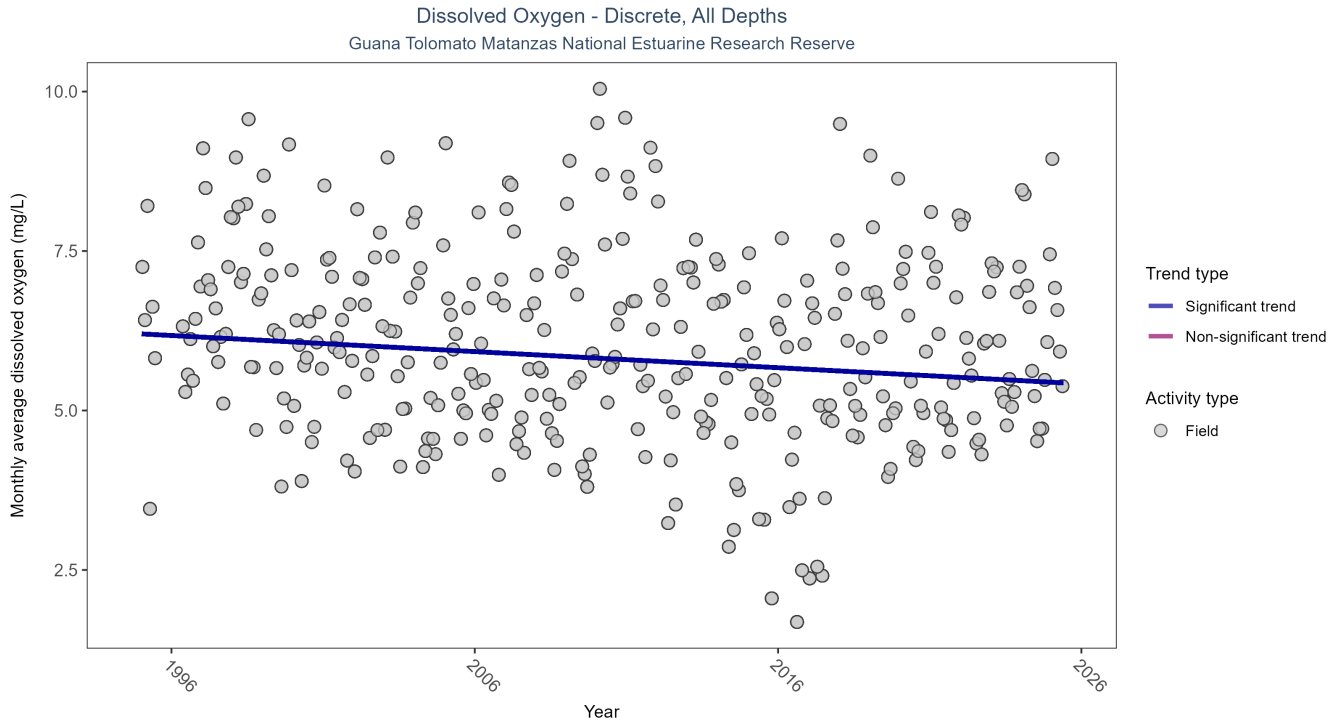

Figure 7: Scatter plot of monthly average dissolved oxygen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen values measured in the field (circles) are included in the plot.

Table 12: Seasonal Kendall-Tau Trend Analysis for Dissolved Oxygen

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
Field	Significantly decreasing trend	22598	31	1995 - 2025	6	-0.1701	6.2008	-0.0253	0

Monthly average dissolved oxygen decreased by 0.03 mg/L per year.

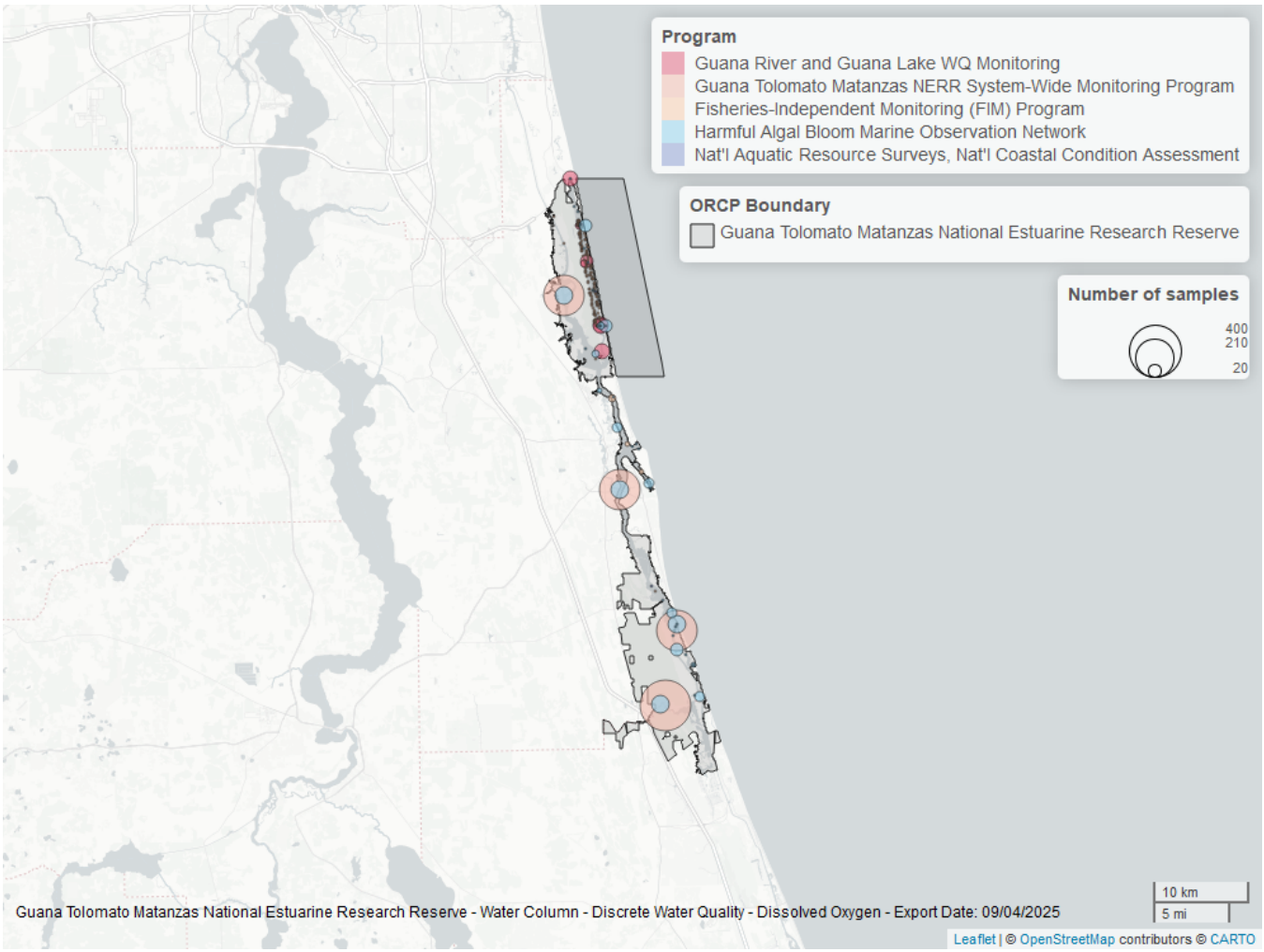

Figure 8: Map showing location of discrete water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 13: Programs contributing data for Dissolved Oxygen

ProgramID	*N_Data*	*YearMin*	*YearMax*
5002	18295	1995	2024
4054	3644	2002	2025
95	400	2007	2018
5014	328	2017	2024
69	185	2001	2010
118	2	2006	2015
103	2	2014	2015

Program names:

69 - Fisheries-Independent Monitoring (FIM) Program[7]
95 - Harmful Algal Bloom Marine Observation Network[4]
103 - EPA STOrage and RETrieval Data Warehouse (STORET)/WQX[5]
118 - National Aquatic Resource Surveys, National Coastal Condition Assessment[6]
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]

5002 - Florida STORET / WIN[2]
5014 - Guana River and Guana Lake Water Quality Monitoring[3]

Dissolved Oxygen Saturation - Discrete

Seasonal Kendall-Tau Trend Analysis

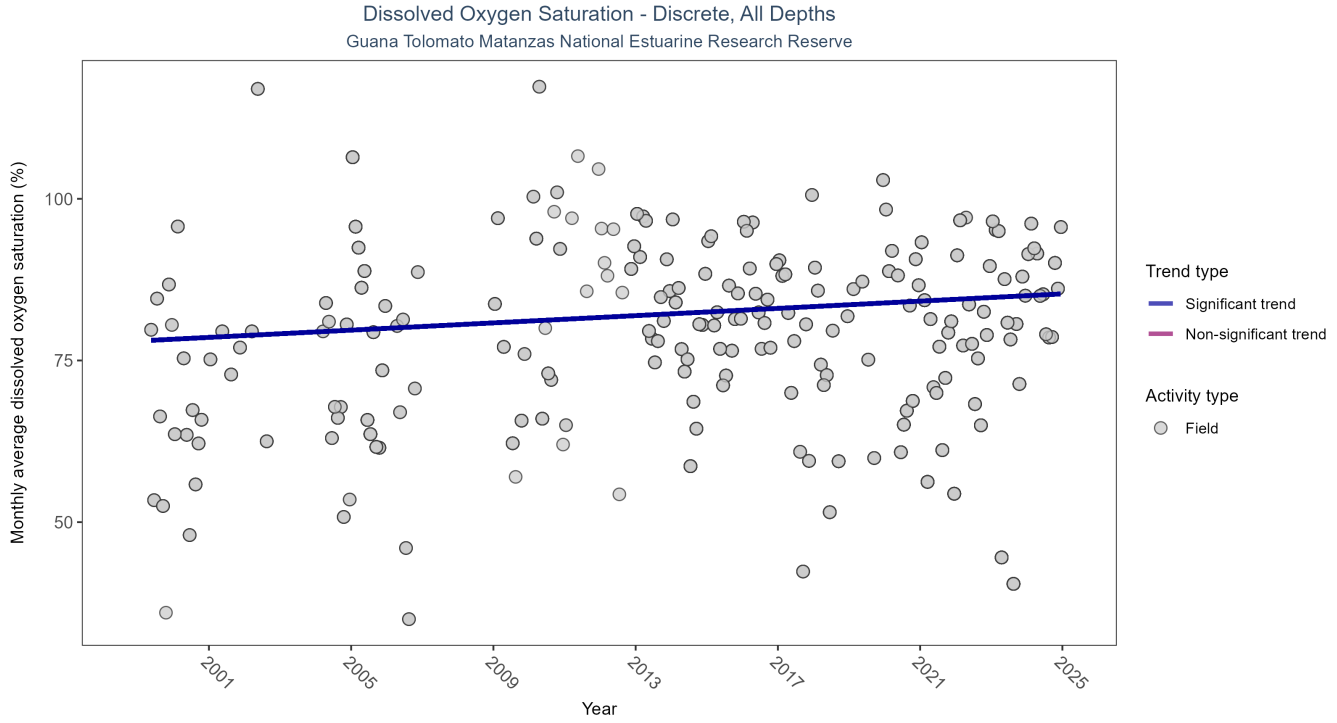

Figure 9: Scatter plot of monthly average dissolved oxygen saturation over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen saturation values measured in the field (circles) are included in the plot.

Table 14: Seasonal Kendall-Tau Trend Analysis for Dissolved Oxygen Saturation

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
Field	Significantly increasing trend	2506	23	1999 - 2024	81.6	0.1326	78.0096	0.2803	0.0083

Monthly average dissolved oxygen saturation increased by 0.28% per year.

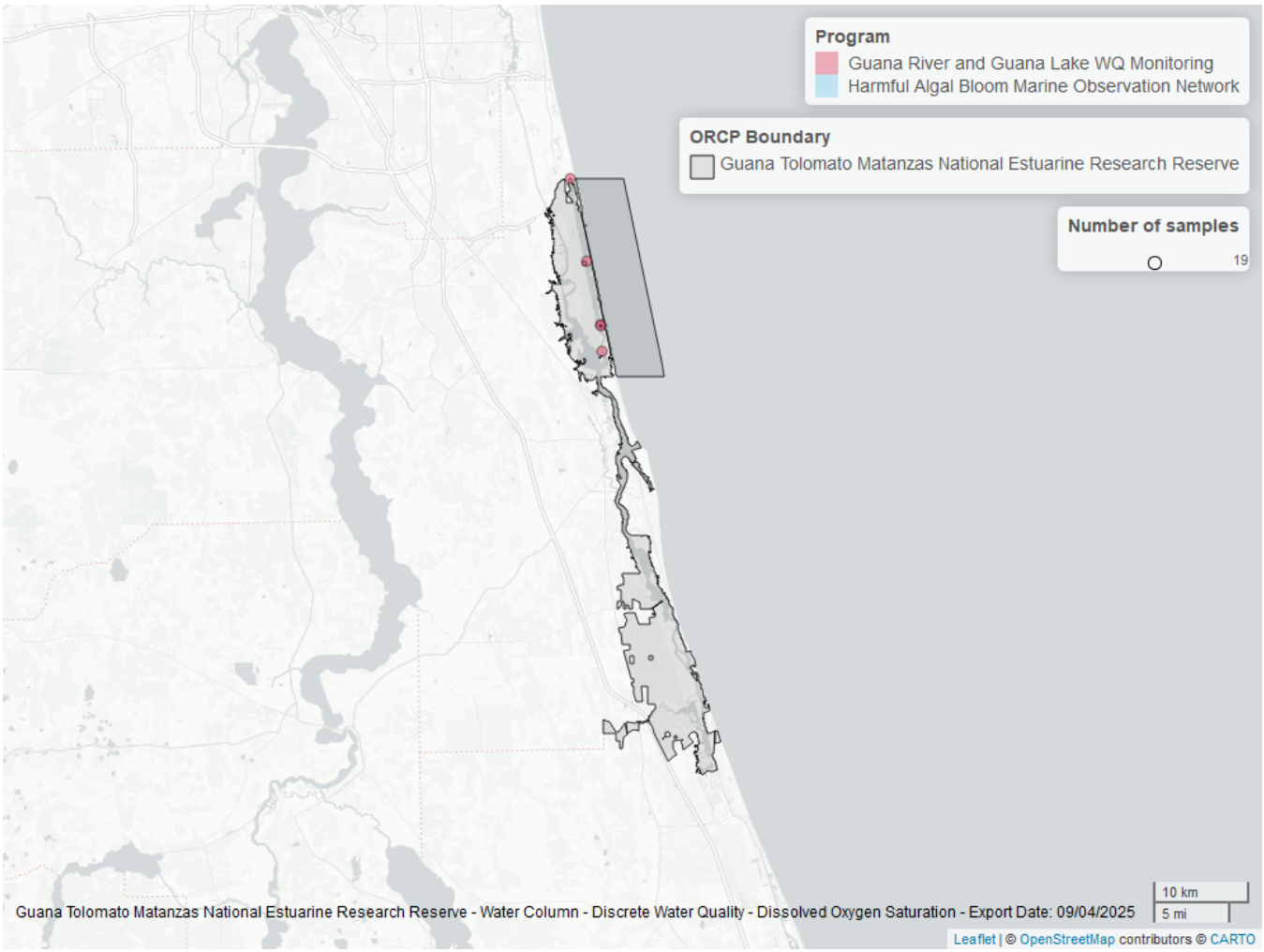

Figure 10: Map showing location of discrete water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 15: Programs contributing data for Dissolved Oxygen Saturation

ProgramID	*N_Data*	*YearMin*	*YearMax*
5002	2263	1999	2024
5014	238	2017	2022
4054	44	2021	2023
95	3	2012	2013

Program names:

95 - Harmful Algal Bloom Marine Observation Network[4]
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]
5014 - Guana River and Guana Lake Water Quality Monitoring[3]

pH - Discrete

Seasonal Kendall-Tau Trend Analysis

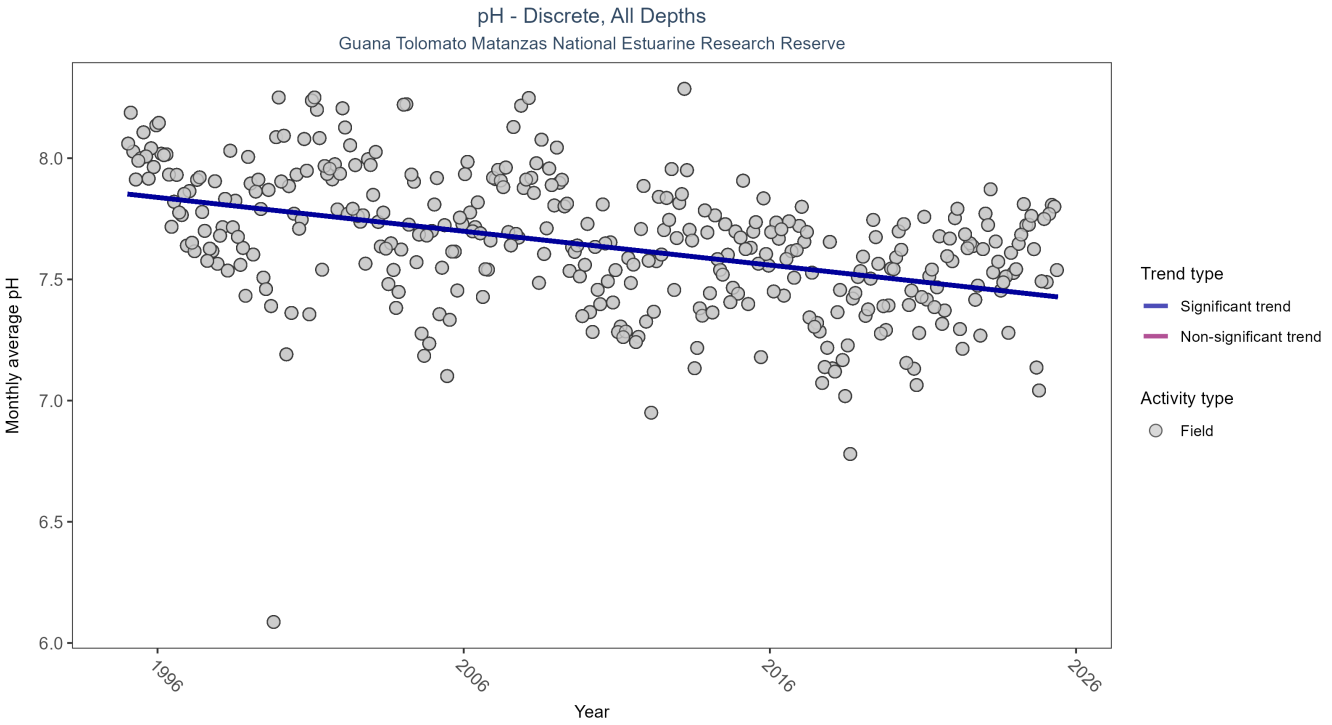

Figure 11: Scatter plot of monthly average pH over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only pH values measured in the field (circles) are included in the plot.

Table 16: Seasonal Kendall-Tau Trend Analysis for pH

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
Field	Significantly decreasing trend	18867	31	1995 - 2025	7.8	-0.3669	7.8522	-0.014	0

Monthly average pH decreased by 0.01 pH units per year.

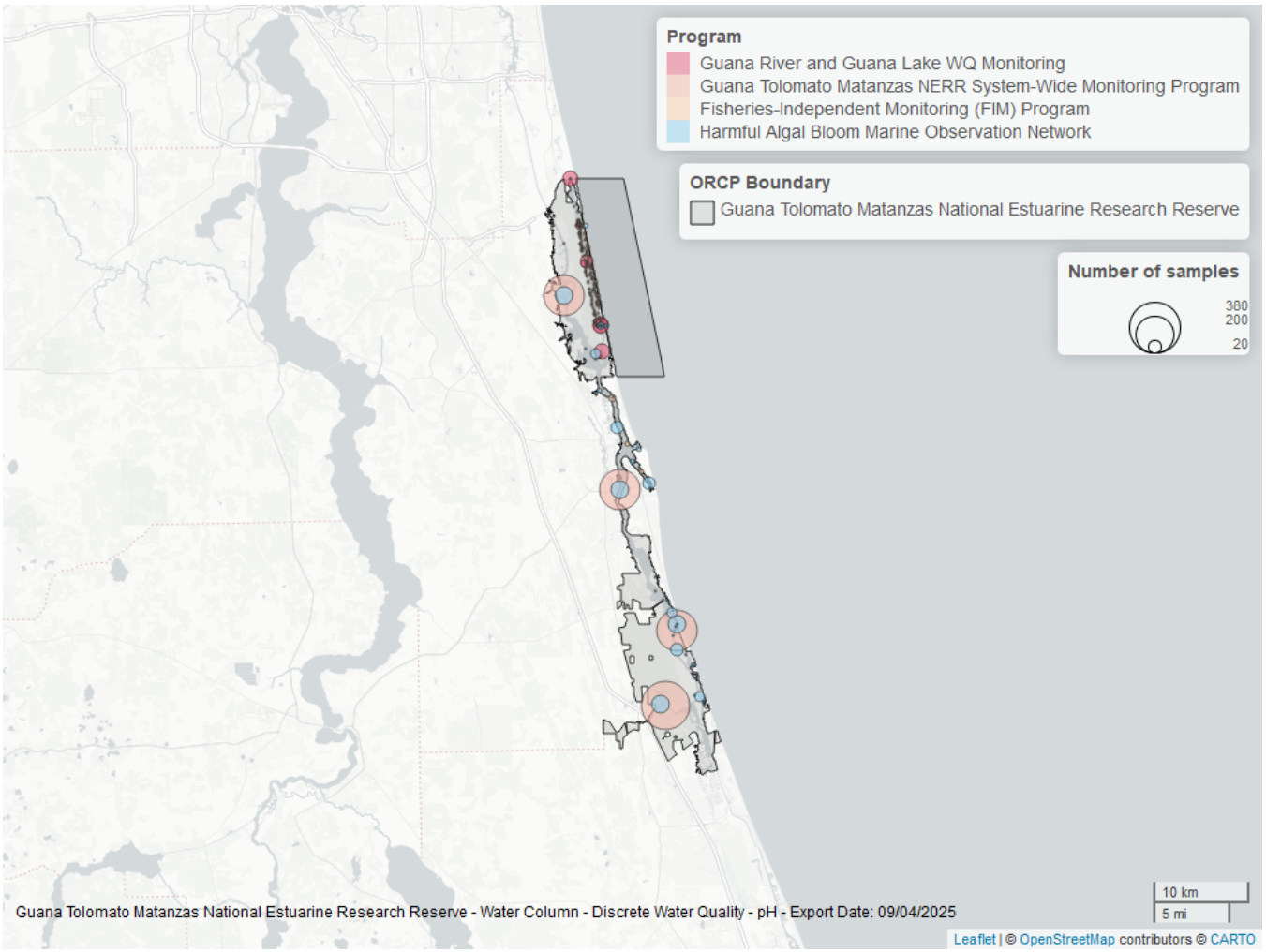

Figure 12: Map showing location of discrete water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 17: Programs contributing data for pH

ProgramID	*N_Data*	*YearMin*	*YearMax*
5002	14912	1995	2024
4054	3678	2002	2025
95	401	2007	2018
5014	335	2017	2024
69	190	2001	2010
103	4	2014	2015

Program names:

69 - Fisheries-Independent Monitoring (FIM) Program[7]
95 - Harmful Algal Bloom Marine Observation Network[4]
103 - EPA STOrage and RETrieval Data Warehouse (STORET)/WQX[5]
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]
5014 - Guana River and Guana Lake Water Quality Monitoring[3]

Salinity - Discrete

Seasonal Kendall-Tau Trend Analysis

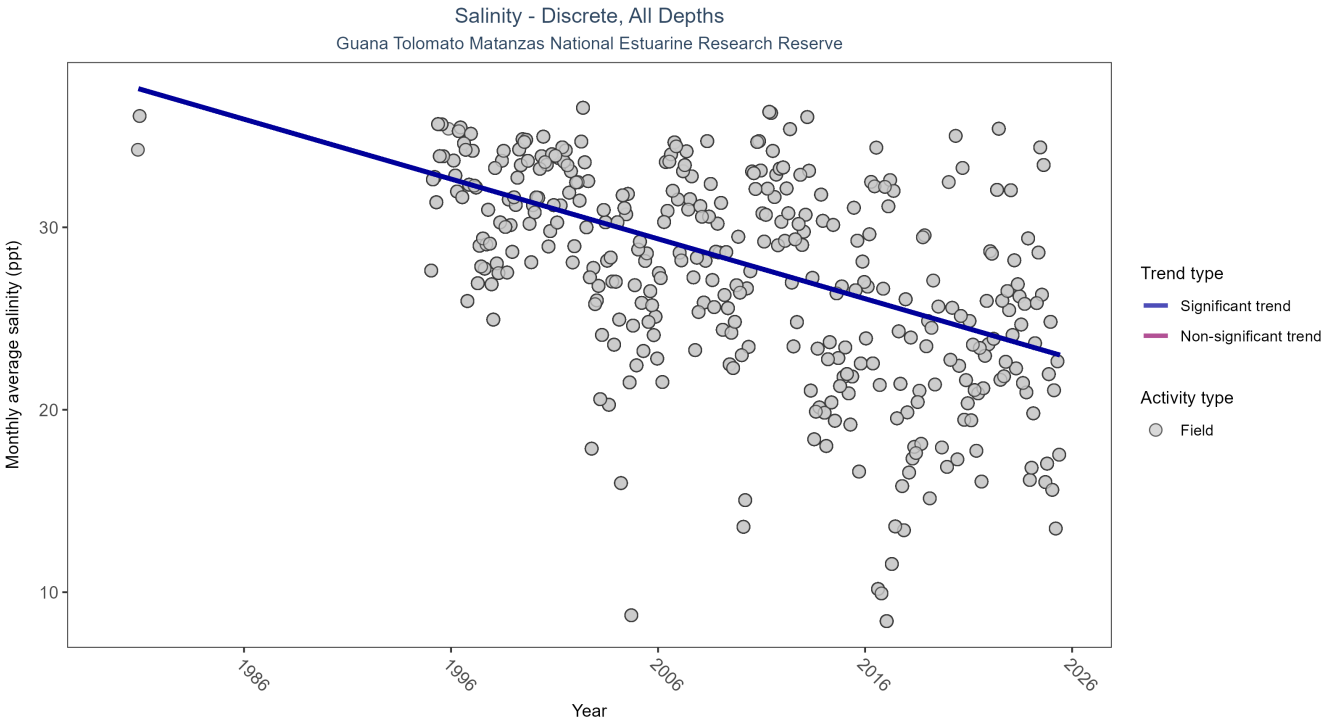

Figure 13: Scatter plot of monthly average salinity over time. If the time series included ten or more years of discrete observations, significant (blue) or non-significant (magenta) trend lines are also shown. Discrete salinity values derived from grab samples analyzed in the field (circles) or the laboratory (triangles) are both included in the plot.

Table 18: Seasonal Kendall-Tau Trend Analysis for Salinity

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
All	Significantly decreasing trend	26001	32	1980 - 2025	31.7	-0.3784	37.8941	-0.328	0

Monthly average salinity decreased by 0.33 ppt per year.

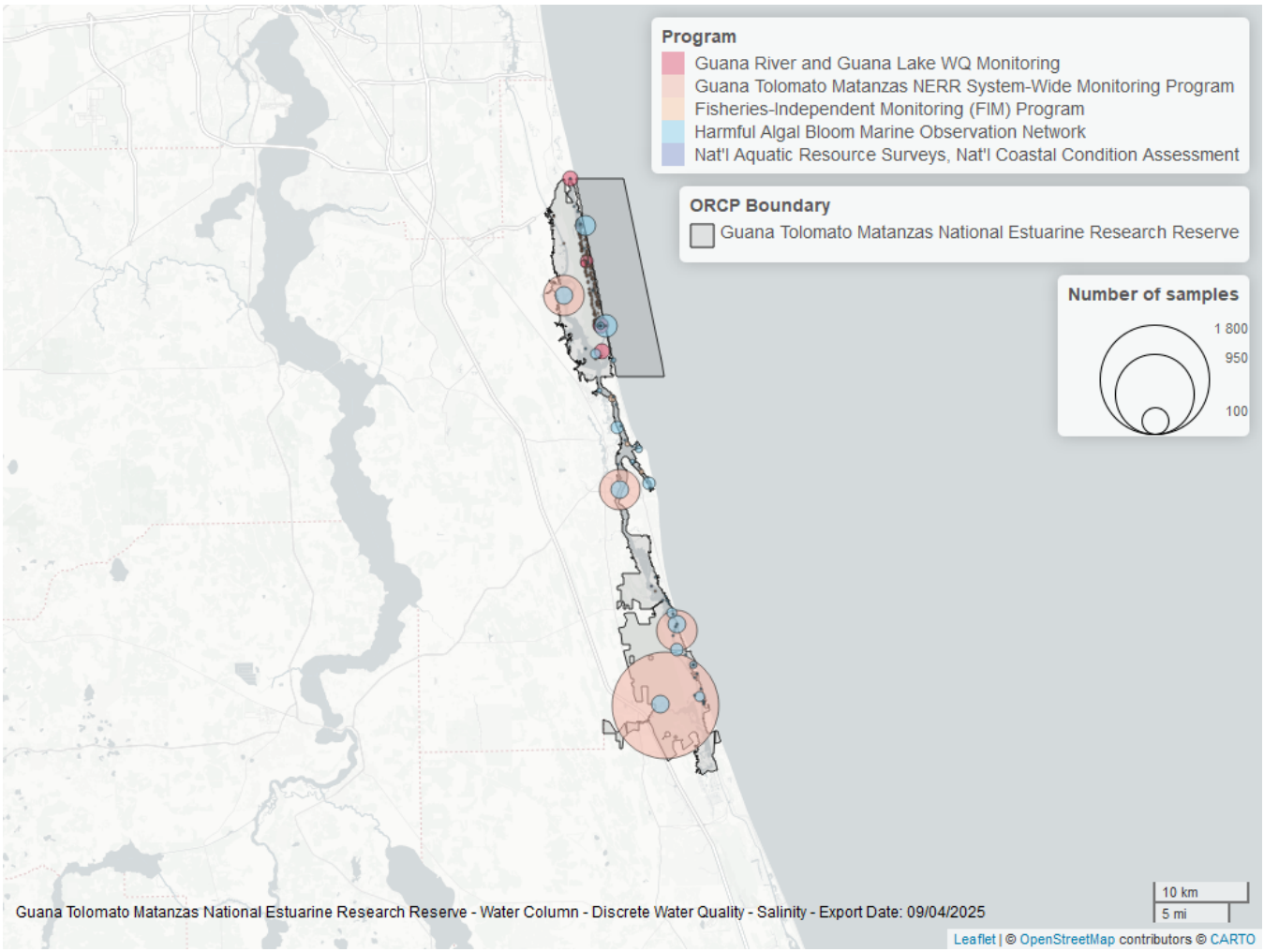

Figure 14: Map showing location of discrete water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 19: Programs contributing data for Salinity

ProgramID	*N_Data*	*YearMin*	*YearMax*
5002	20957	1995	2024
4054	4252	2002	2025
95	563	1980	2018
5014	335	2017	2024
69	190	2001	2010
118	2	2015	2015

Program names:

69 - Fisheries-Independent Monitoring (FIM) Program[7]
95 - Harmful Algal Bloom Marine Observation Network[4]
118 - National Aquatic Resource Surveys, National Coastal Condition Assessment[6]
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]
5014 - Guana River and Guana Lake Water Quality Monitoring[3]

Secchi Depth - Discrete

Seasonal Kendall-Tau Trend Analysis

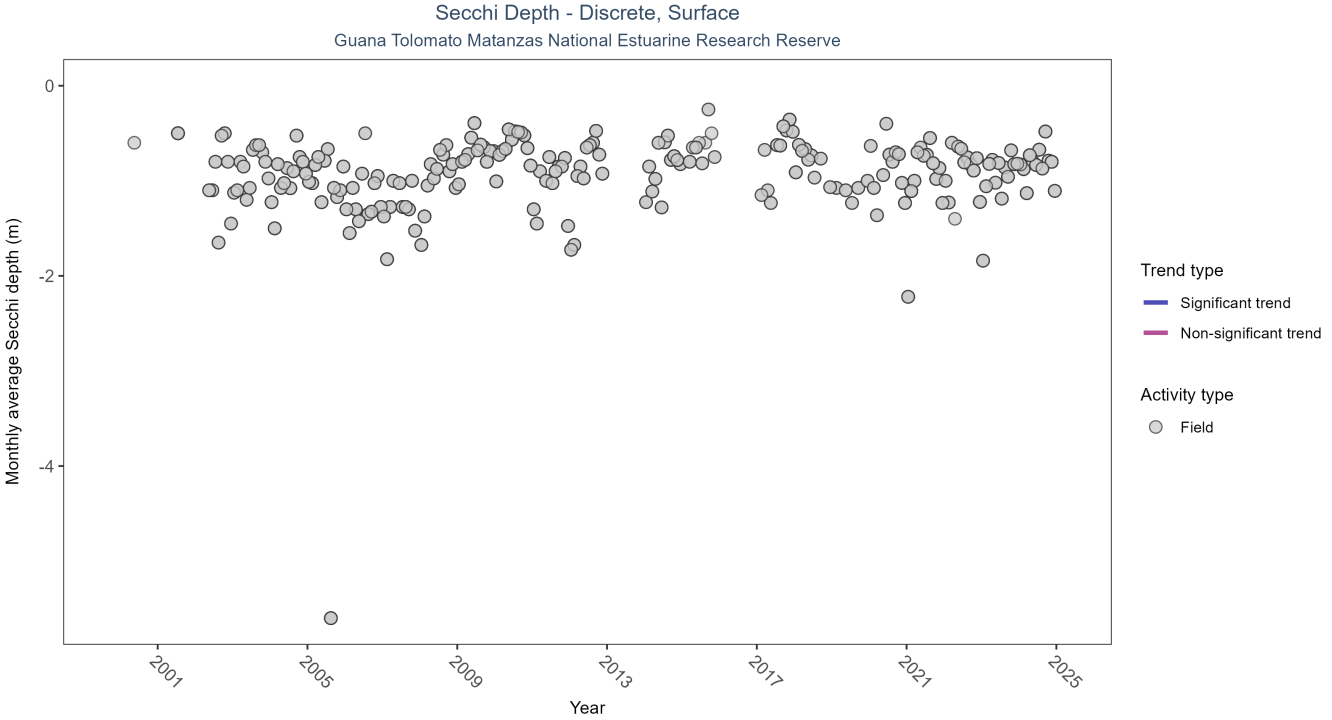

Figure 15: Scatter plot of monthly average Secchi depth over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Secchi depth is only measured in the field (circles).

Table 20: Seasonal Kendall-Tau Trend Analysis for Secchi Depth

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
Field	No significant trend	2995	25	1999 - 2024	-0.8	0.0578	-0.8596	0.0021	0.2391

Secchi depth showed no detectable trend between 1999 and 2024.

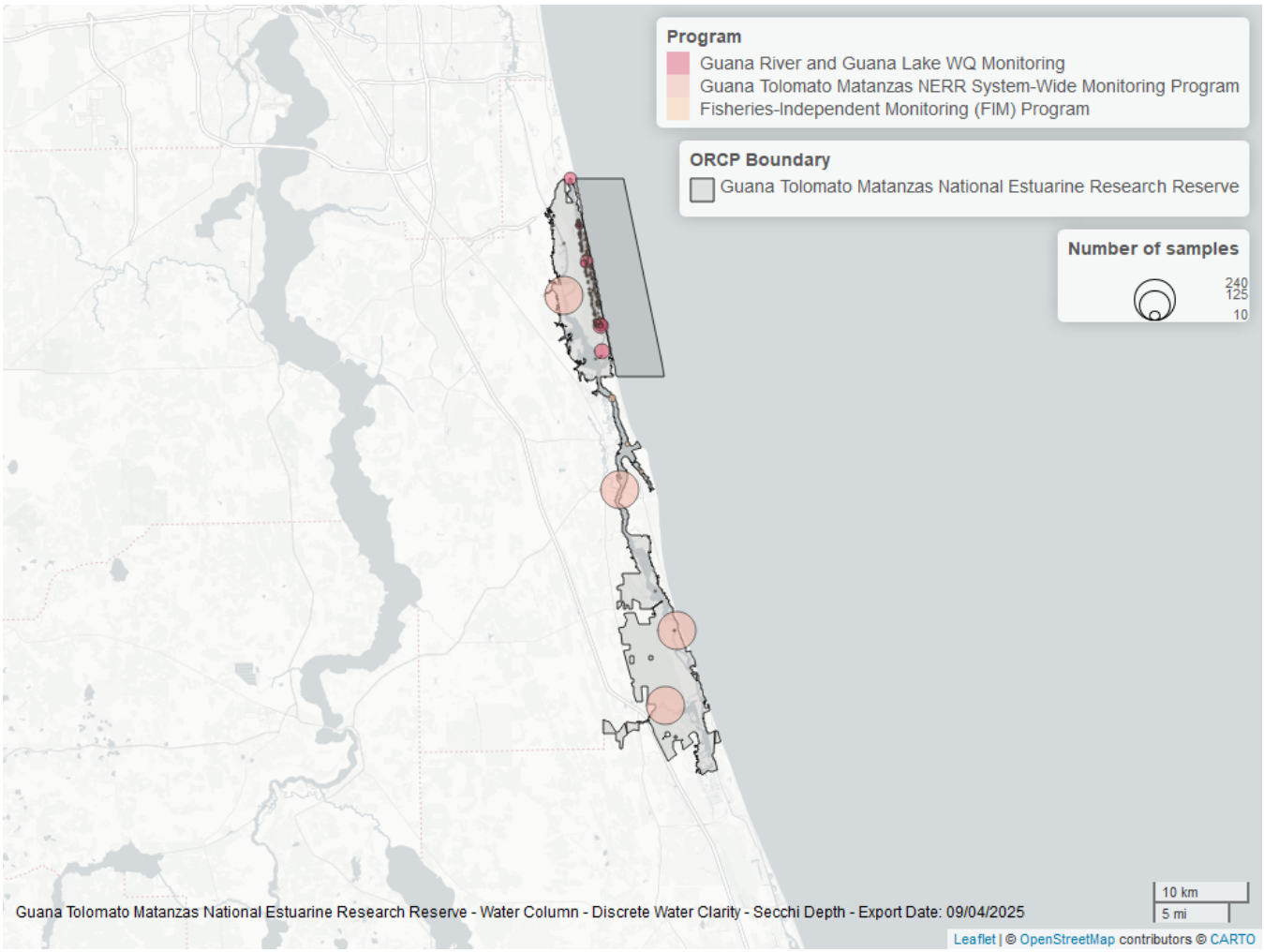

Figure 16: Map showing location of discrete water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 21: Programs contributing data for Secchi Depth

ProgramID	*N_Data*	*YearMin*	*YearMax*
5002	1574	1999	2024
4054	937	2002	2014
5014	294	2017	2024
69	190	2001	2010
103	1	2015	2015

Program names:

69 - Fisheries-Independent Monitoring (FIM) Program[7]
103 - EPA STOrage and RETrieval Data Warehouse (STORET)/WQX[5]
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]
5014 - Guana River and Guana Lake Water Quality Monitoring[3]

Total Nitrogen - Discrete

Total Nitrogen Calculation:

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

1) TN = TKN + NO3O2;
2) TN = TKN + NO3 + NO2;
3) TN = ORGN + NH4 + NO3O2;
4) TN = ORGN + NH4 + NO2 + NO3;
5) TN = TKN + NO3;
6) TN = ORGN + NH4 + NO3;

Additional Information:

- Rules for use of sample fraction:
  - Florida Department of Environmental Protection (FDEP) report that if both "Total" and "Dissolved" components are reported, only "Total" is used. If the total is not reported, then the dissolved components are used as a best available replacement.
  - Total nitrogen calculations are done using nitrogen components with the same sample fraction, nitrogen components with mixed total/dissolved sample fractions are not used. In other words, total nitrogen can be calculated when TKN and NO3O2 are both total sample fractions, or when both are dissolved sample fractions. *Future calculations of total nitrogen values may be 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

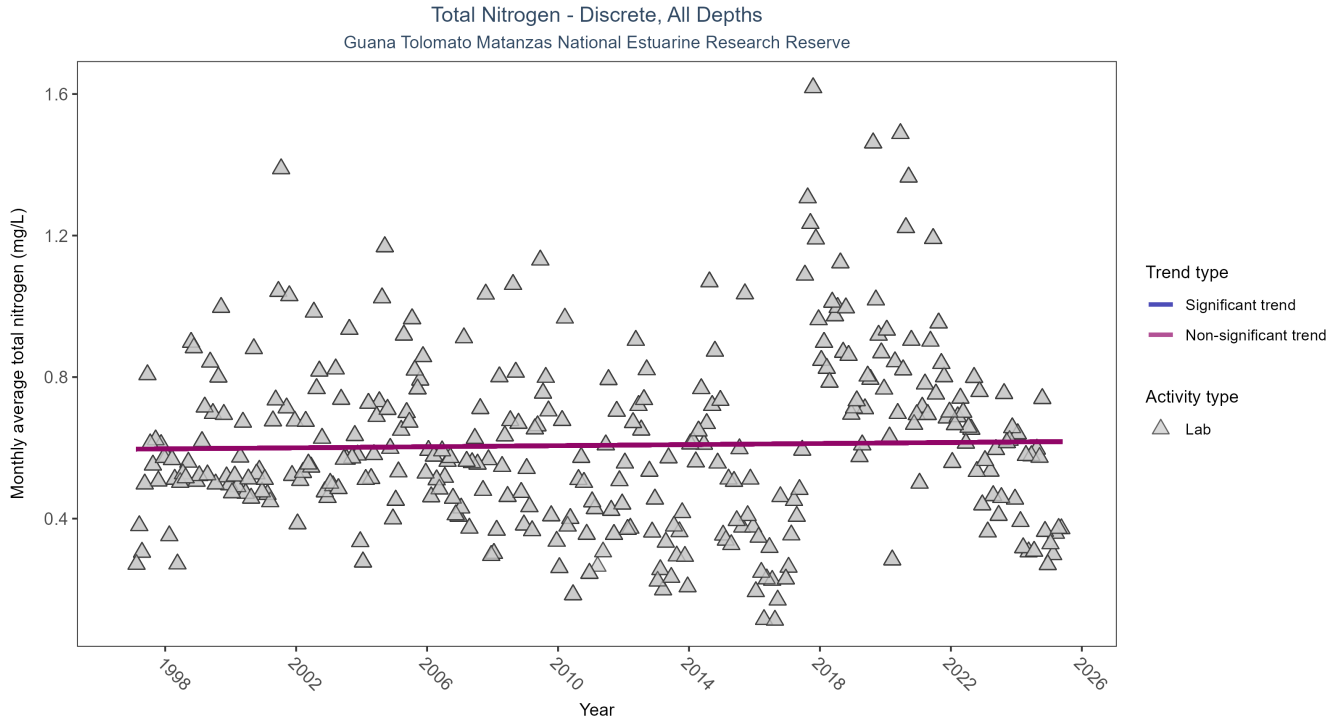

Figure 17: Scatter plot of monthly average total nitrogen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only nitrogen values obtained from laboratory analyses (triangles) are included in the plot.

Table 22: Seasonal Kendall-Tau Trend Analysis for Total Nitrogen

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
Lab	No significant trend	6084	29	1997 - 2025	0.548	0.0215	0.5963	0.0008	0.5963

Total nitrogen showed no detectable trend between 1997 and 2025.

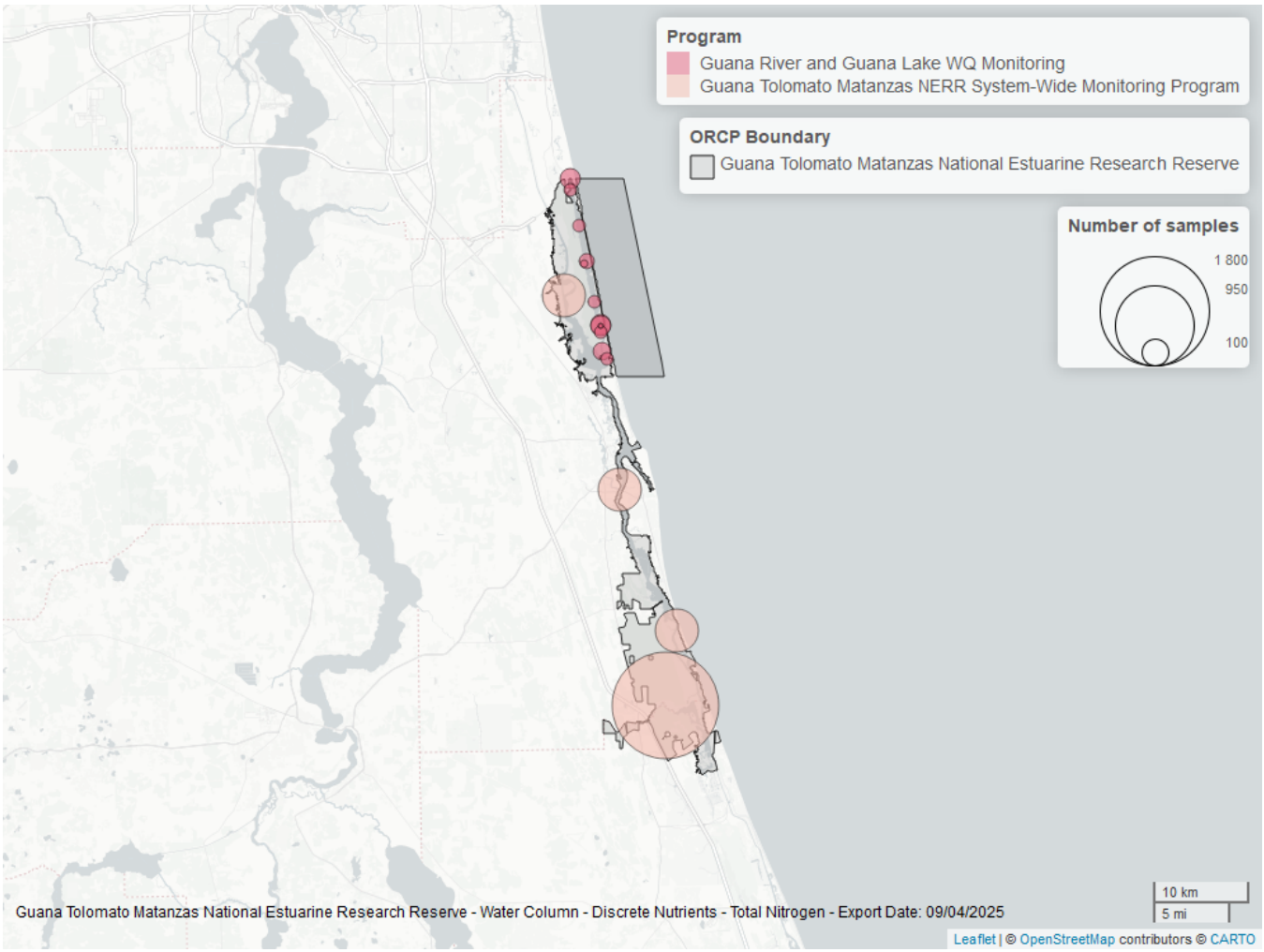

Figure 18: Map showing location of discrete water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 23: Programs contributing data for Total Nitrogen

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	3268	2002	2025
5002	2457	1997	2024
5014	537	2017	2022
103	4	2006	2006

Program names:

103 - EPA STOrage and RETrieval Data Warehouse (STORET)/WQX[5]
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]
5014 - Guana River and Guana Lake Water Quality Monitoring[3]

Total Phosphorus - Discrete

Seasonal Kendall-Tau Trend Analysis

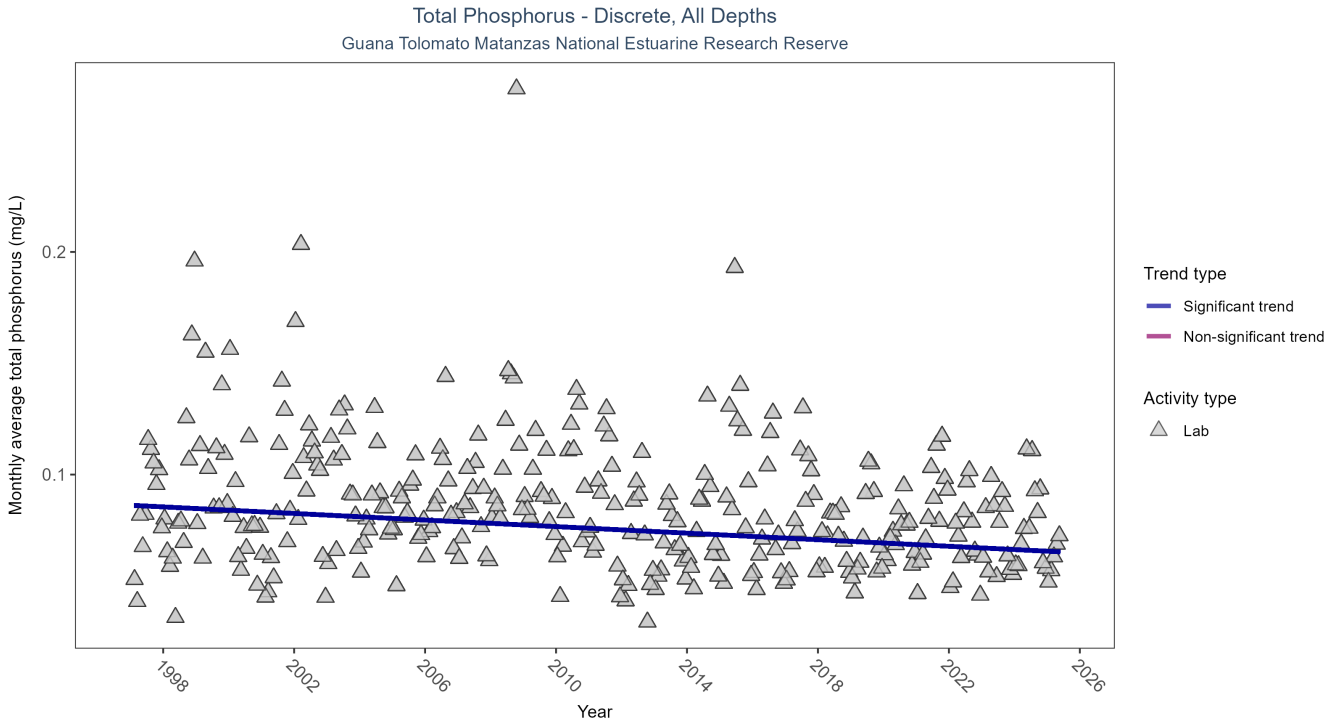

Figure 19: Scatter plot of monthly average total phosphorus over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only phosphorus values obtained from laboratory analyses (triangles) are included in the plot.

Table 24: Seasonal Kendall-Tau Trend Analysis for Total Phosphorus

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
Lab	Significantly decreasing trend	9654	29	1997 - 2025	0.071	-0.2105	0.0862	-0.0007	0

Monthly average total phosphorus decreased by less than 0.01 mg/L per year.

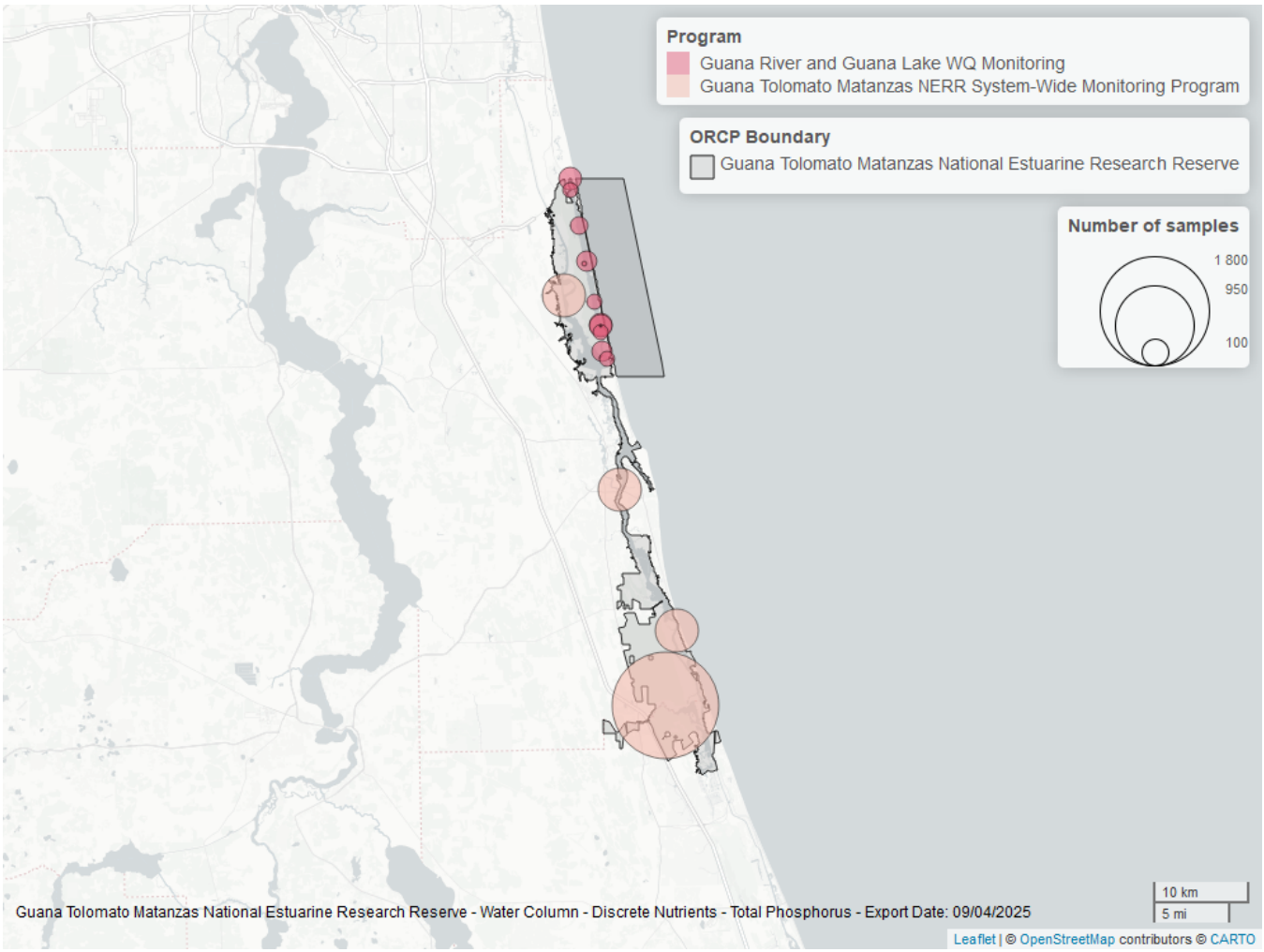

Figure 20: Map showing location of discrete water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 25: Programs contributing data for Total Phosphorus

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	5539	2002	2025
5002	3723	1997	2024
5014	715	2017	2024
103	6	2006	2015

Program names:

103 - EPA STOrage and RETrieval Data Warehouse (STORET)/WQX[5]
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]
5014 - Guana River and Guana Lake Water Quality Monitoring[3]

Total Suspended Solids - Discrete

Seasonal Kendall-Tau Trend Analysis

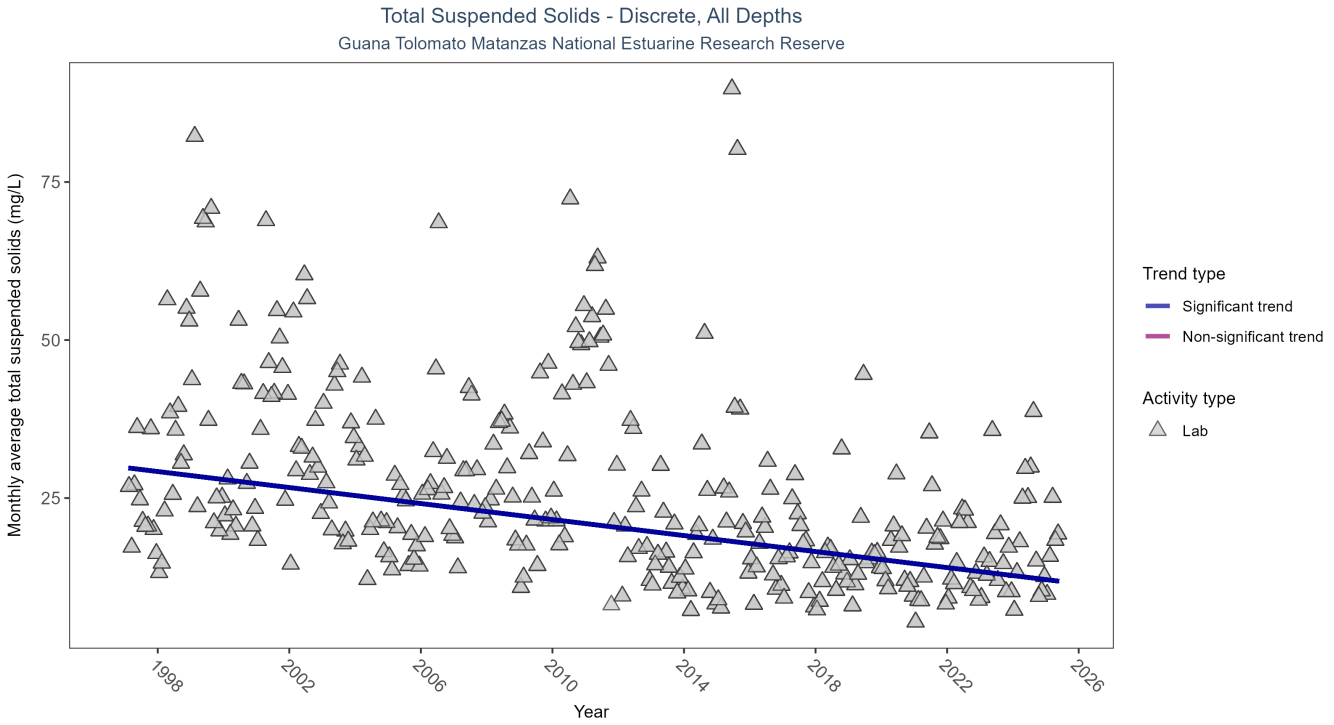

Figure 21: Scatter plot of monthly average total suspended solids (TSS) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only TSS values obtained from laboratory analyses (triangles) are included in the plot.

Table 26: Seasonal Kendall-Tau Trend Analysis for Total Suspended Solids

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
Lab	Significantly decreasing trend	5181	29	1997 - 2025	17	-0.3837	29.8329	-0.6331	0

Monthly average total suspended solids decreased by 0.63 mg/L per year, indicating an increase in water clarity.

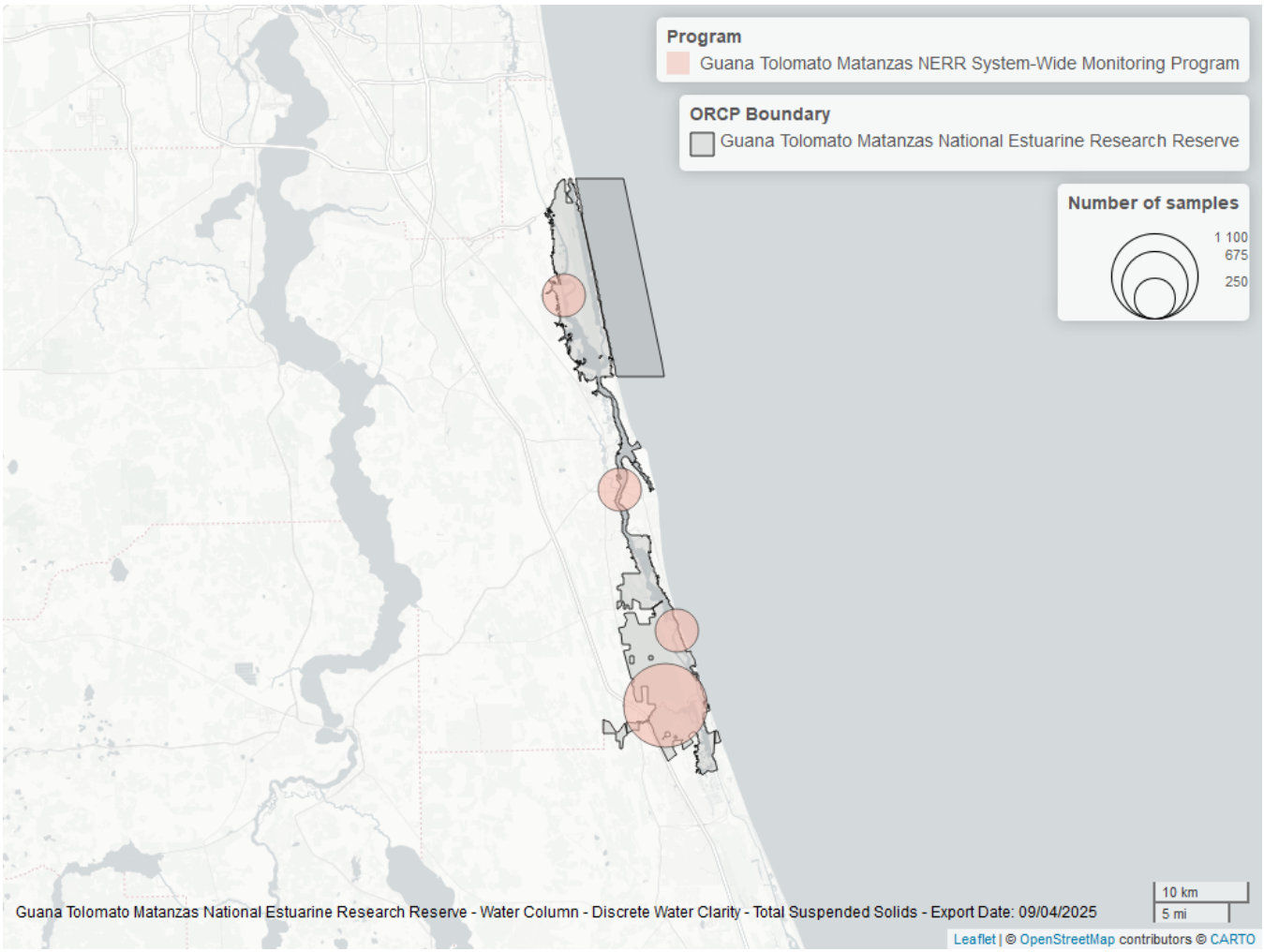

Figure 22: Map showing location of discrete water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 27: Programs contributing data for Total Suspended Solids

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	4774	2002	2025
5002	2552	1997	2024
5014	126	2018	2022
103	2	2009	2014

Program names:

103 - EPA STOrage and RETrieval Data Warehouse (STORET)/WQX[5]
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]
5014 - Guana River and Guana Lake Water Quality Monitoring[3]

Turbidity - Discrete

Seasonal Kendall-Tau Trend Analysis

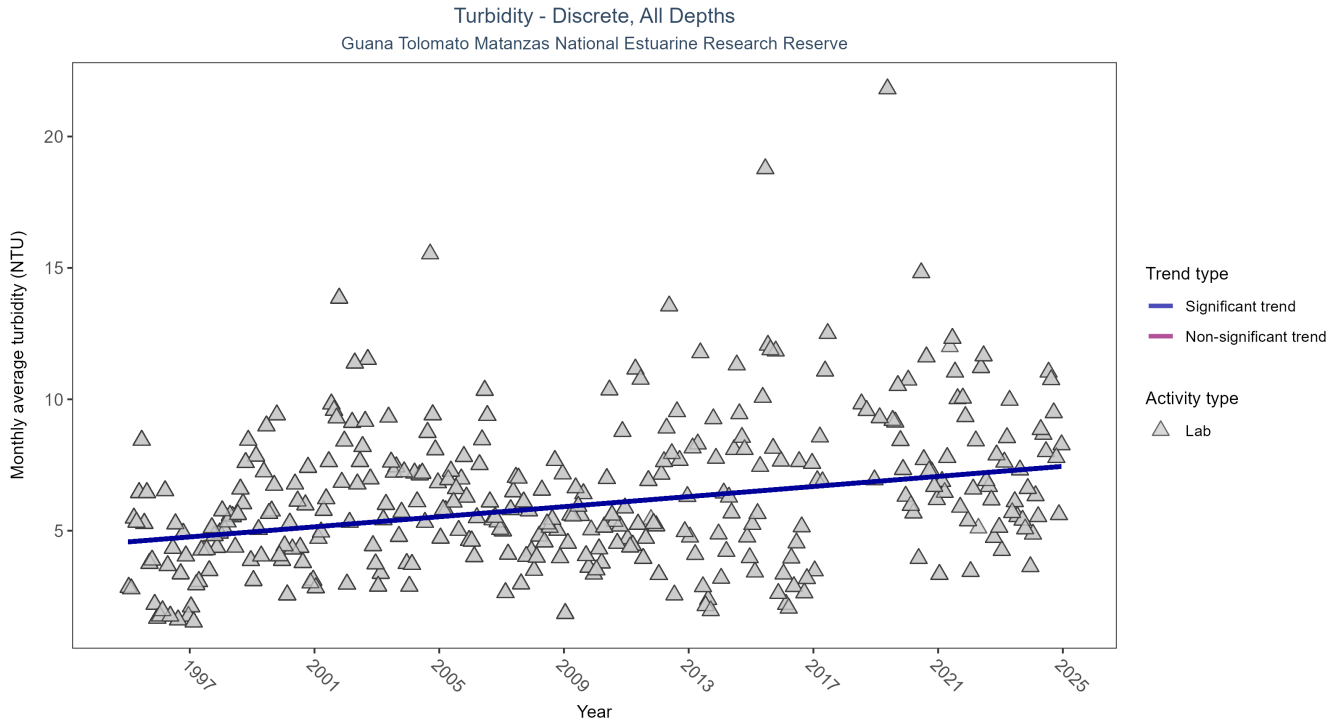

Figure 23: Scatter plot of monthly average turbidity over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only turbidity values measured in the laboratory (triangles) are included in the plot.

Table 28: Seasonal Kendall-Tau Trend Analysis for Turbidity

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
Lab	Significantly increasing trend	14877	30	1995 - 2024	4.5	0.2563	4.572	0.0959	0

Monthly average turbidity increased by 0.1 NTU per year, indicating a decrease in water clarity.

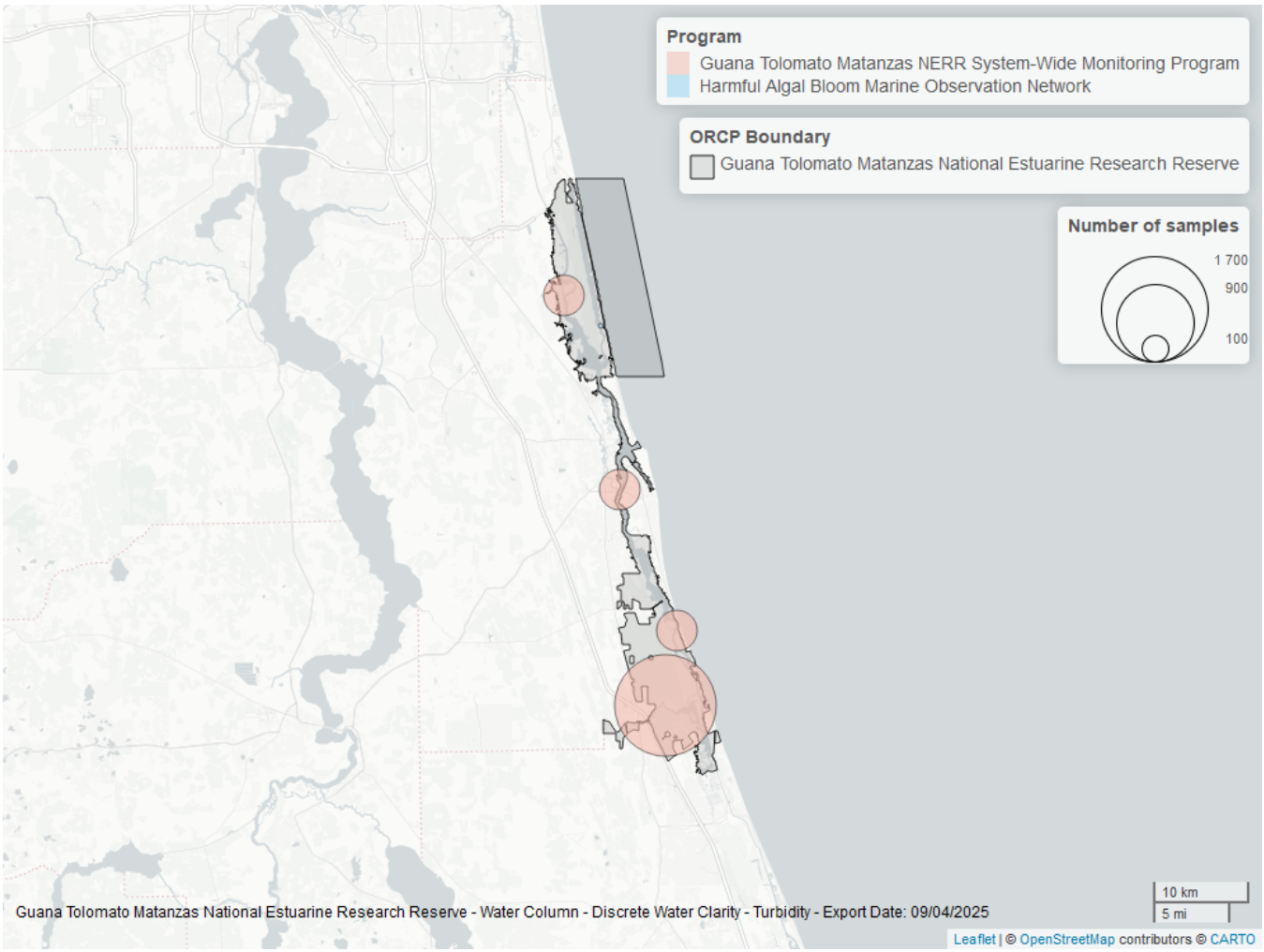

Figure 24: Map showing location of discrete water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 29: Programs contributing data for Turbidity

ProgramID	*N_Data*	*YearMin*	*YearMax*
5002	14676	1995	2024
4054	2683	2002	2021
5014	126	2018	2022
95	4	2012	2012
103	4	2006	2014

Program names:

95 - Harmful Algal Bloom Marine Observation Network[4]
103 - EPA STOrage and RETrieval Data Warehouse (STORET)/WQX[5]
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]
5014 - Guana River and Guana Lake Water Quality Monitoring[3]

Water Temperature - Discrete

Seasonal Kendall-Tau Trend Analysis

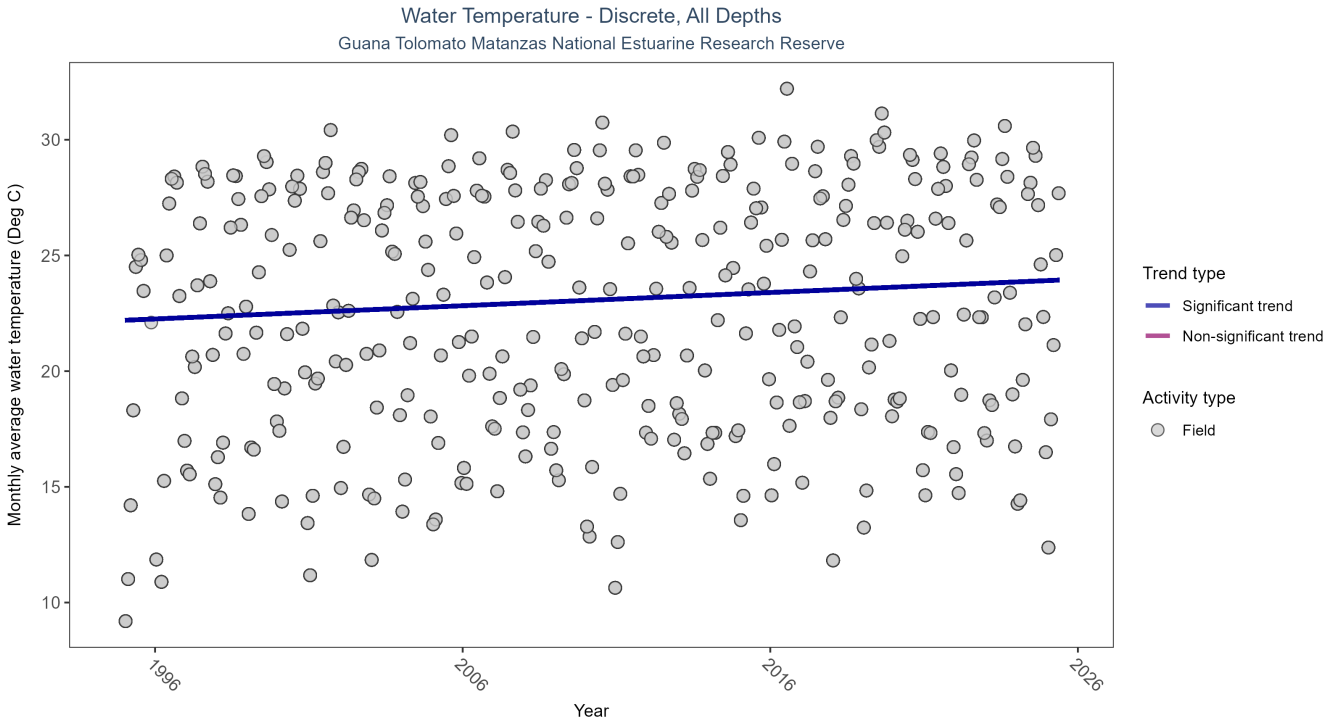

Figure 25: Scatter plot of monthly average water temperature over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only water temperature measurements taken in the field (circles) are included in the plot.

Table 30: Seasonal Kendall-Tau Trend Analysis for Water Temperature

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
Field	Significantly increasing trend	25499	31	1995 - 2025	23.3	0.2238	22.198	0.0572	0

Monthly average water temperature increased by 0.06°C per year.

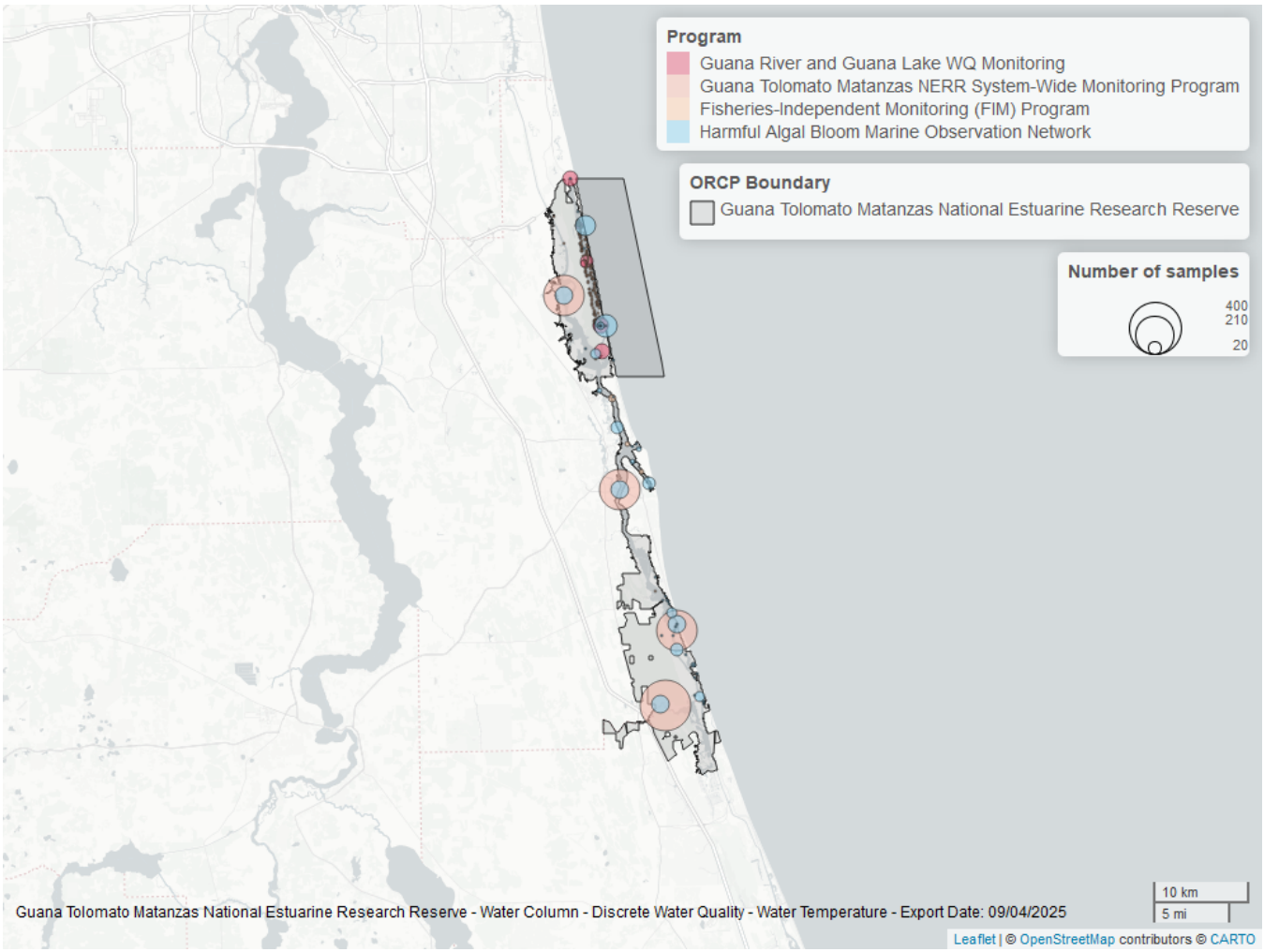

Figure 26: Map showing location of discrete water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 31: Programs contributing data for Water Temperature

ProgramID	*N_Data*	*YearMin*	*YearMax*
5002	21453	1995	2024
4054	3753	2002	2025
95	534	2007	2018
5014	335	2017	2024
69	190	2001	2010
103	1	2014	2014

Program names:

69 - Fisheries-Independent Monitoring (FIM) Program[7]
95 - Harmful Algal Bloom Marine Observation Network[4]
103 - EPA STOrage and RETrieval Data Warehouse (STORET)/WQX[5]
4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]
5014 - Guana River and Guana Lake Water Quality Monitoring[3]

Water Quality - Continuous

The following files were used in the continuous analysis:

- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_NE-2025-Sep-19.txt*
- *Combined_WQ_WC_NUT_cont_Dissolved_Oxygen_Saturation_NE-2025-Sep-19.txt*
- *Combined_WQ_WC_NUT_cont_pH_NE-2025-Sep-19.txt*
- *Combined_WQ_WC_NUT_cont_Salinity_NE-2025-Sep-19.txt*
- *Combined_WQ_WC_NUT_cont_Turbidity_NE-2025-Sep-19.txt*
- *Combined_WQ_WC_NUT_cont_Water_Temperature_NE-2025-Sep-19.txt*

Continuous monitoring locations in Guana Tolomato Matanzas National Estuarine Research Reserve

Table 32: Station overview for Continuous parameters by Program

ProgramID	*ProgramLocationID*	*Years of Data*	*Use in Analysis*	*Parameters*
4054	gtmfmwq	25	TRUE	DO , DOS , pH , Sal , Turb , TempW
4054	gtmpcwq	25	TRUE	DO , DOS , pH , Sal , Turb , TempW
4054	gtmpiwq	25	TRUE	DO , DOS , pH , Sal , Turb , TempW
4054	gtmsswq	24	TRUE	DO , DOS , pH , Sal , Turb , TempW
5062	872-0494	2	FALSE	Sal , TempW

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5062 - FDEP Bureau of Survey and Mapping Continuous Water Quality Program[8]

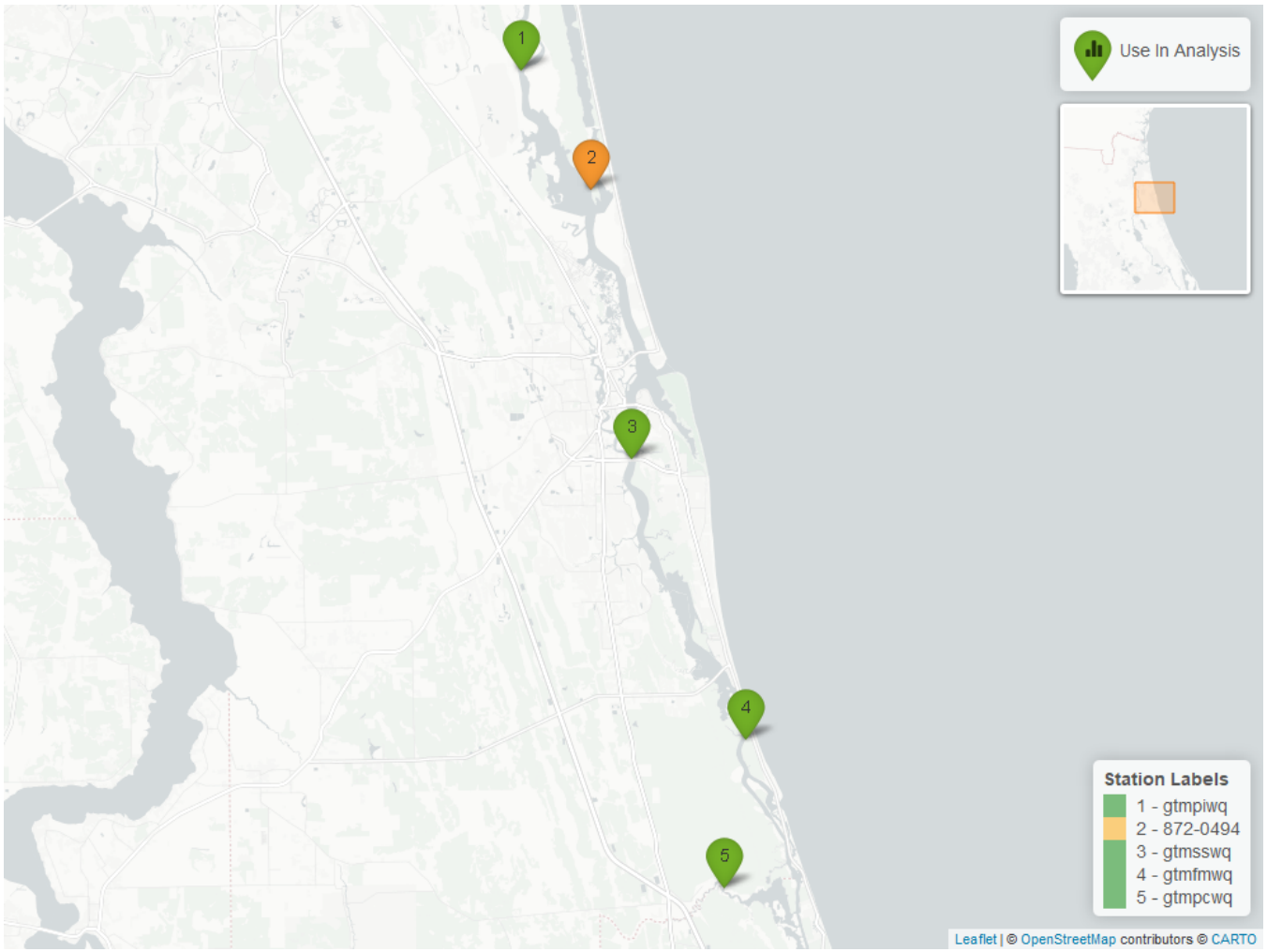

Figure 27: Map showing continuous water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. Sites marked as *Use In Analysis* (green) are featured in this report.

Dissolved Oxygen - Continuous

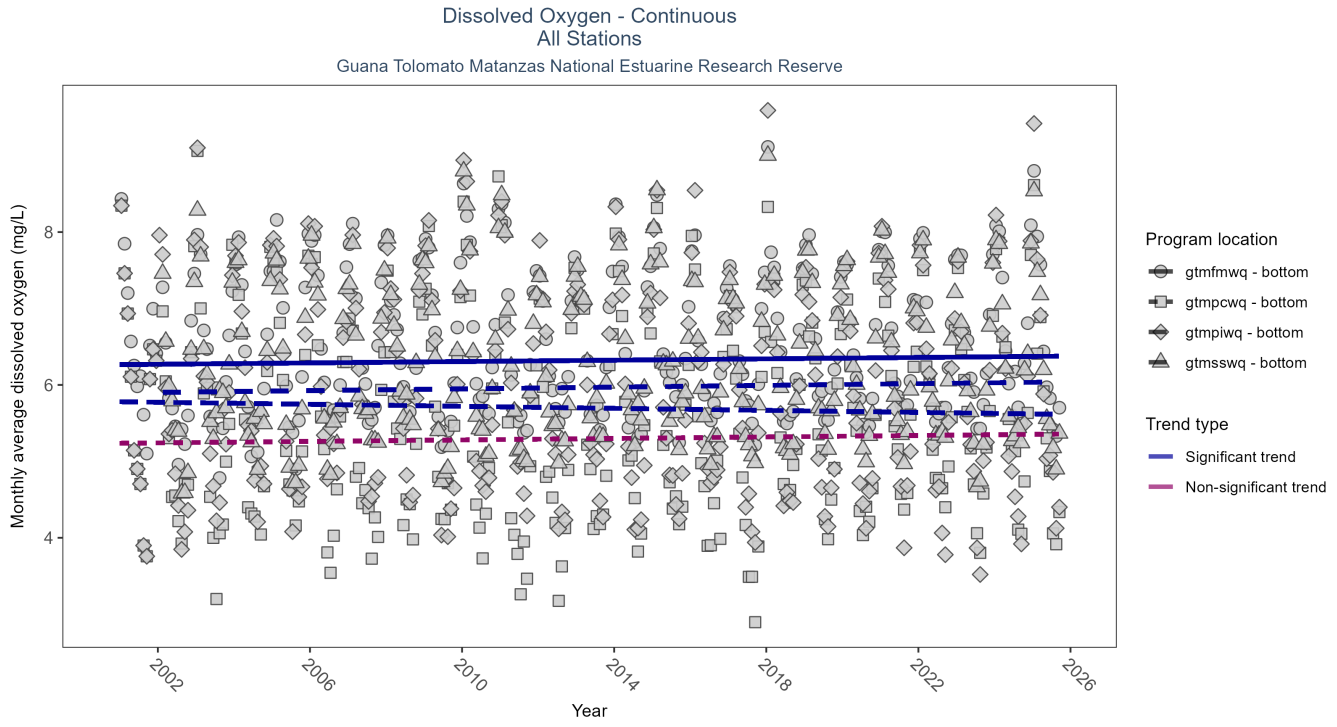

Figure 28: Scatter plot of monthly average dissolved oxygen over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

Table 33: Seasonal Kendall-Tau Results for Dissolved Oxygen - All Stations

Station	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
gtmfmwq	Significantly increasing trend	703785	25	2001 - 2025	6.4	0.09	6.27	0.00	0.03
gtmpiwq	Significantly decreasing trend	685087	25	2001 - 2025	5.8	-0.09	5.78	-0.01	0.04
gtmsswq	Significantly increasing trend	684715	24	2002 - 2025	6.3	0.09	5.90	0.01	0.04
gtmpcwq	No significant trend	721785	25	2001 - 2025	5.5	0.05	5.24	0.00	0.25

At two program locations, monthly average dissolved oxygen increased by less than 0.01 mg/L per year at one site and by 0.01 mg/L per year at the other. At one program location, monthly average dissolved oxygen decreased by 0.01 mg/L per year. No detectable change in monthly average dissolved oxygen was observed at one location.

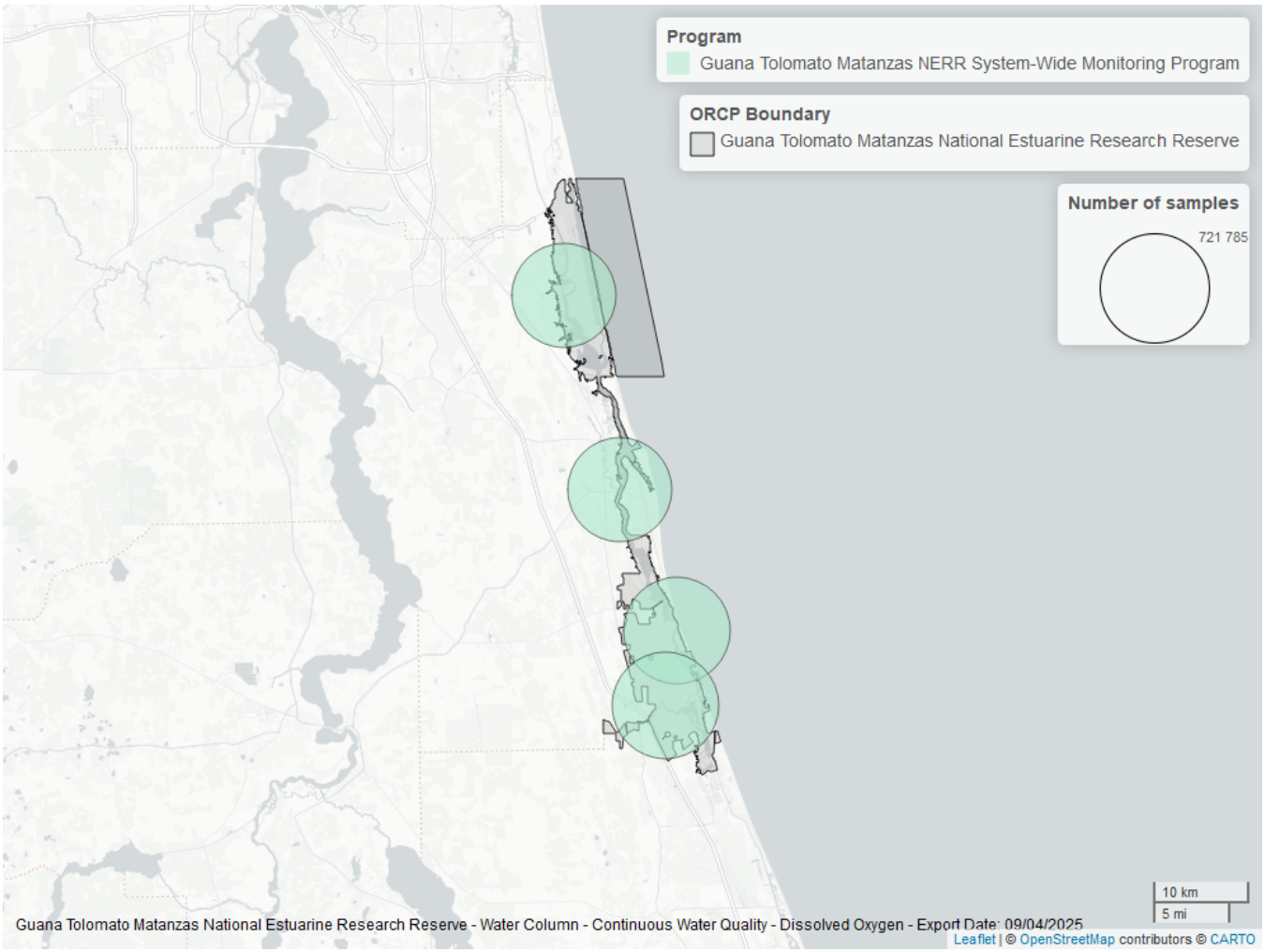

Figure 29: Map showing location of dissolved oxygen continuous water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen Saturation - Continuous

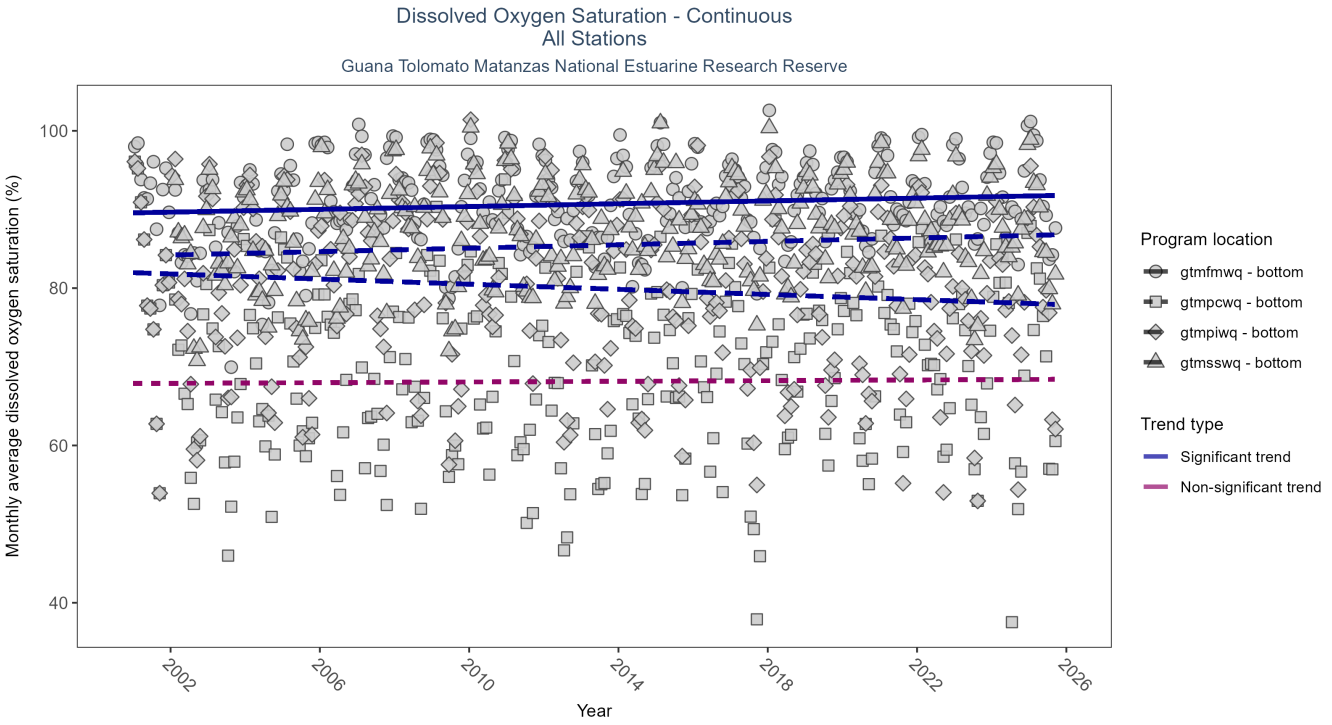

Figure 30: Scatter plot of monthly average dissolved oxygen saturation over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

Table 34: Seasonal Kendall-Tau Results for Dissolved Oxygen Saturation - All Stations

Station	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
gtmfmwq	Significantly increasing trend	716828	25	2001 - 2025	92.7	0.16	89.57	0.09	0.00
gtmsswq	Significantly increasing trend	690652	24	2002 - 2025	89.4	0.15	84.21	0.11	0.00
gtmpcwq	No significant trend	723278	25	2001 - 2025	71.4	0.01	67.88	0.02	0.69
gtmpiwq	Significantly decreasing trend	690905	25	2001 - 2025	82.2	-0.17	81.97	-0.16	0.00

At two program locations, monthly average dissolved oxygen saturation increased by 0.09% per year at one site and by 0.11% per year at the other. At one program location, monthly average dissolved oxygen saturation decreased by 0.16% per year. No detectable change in monthly average dissolved oxygen saturation was observed at one location.

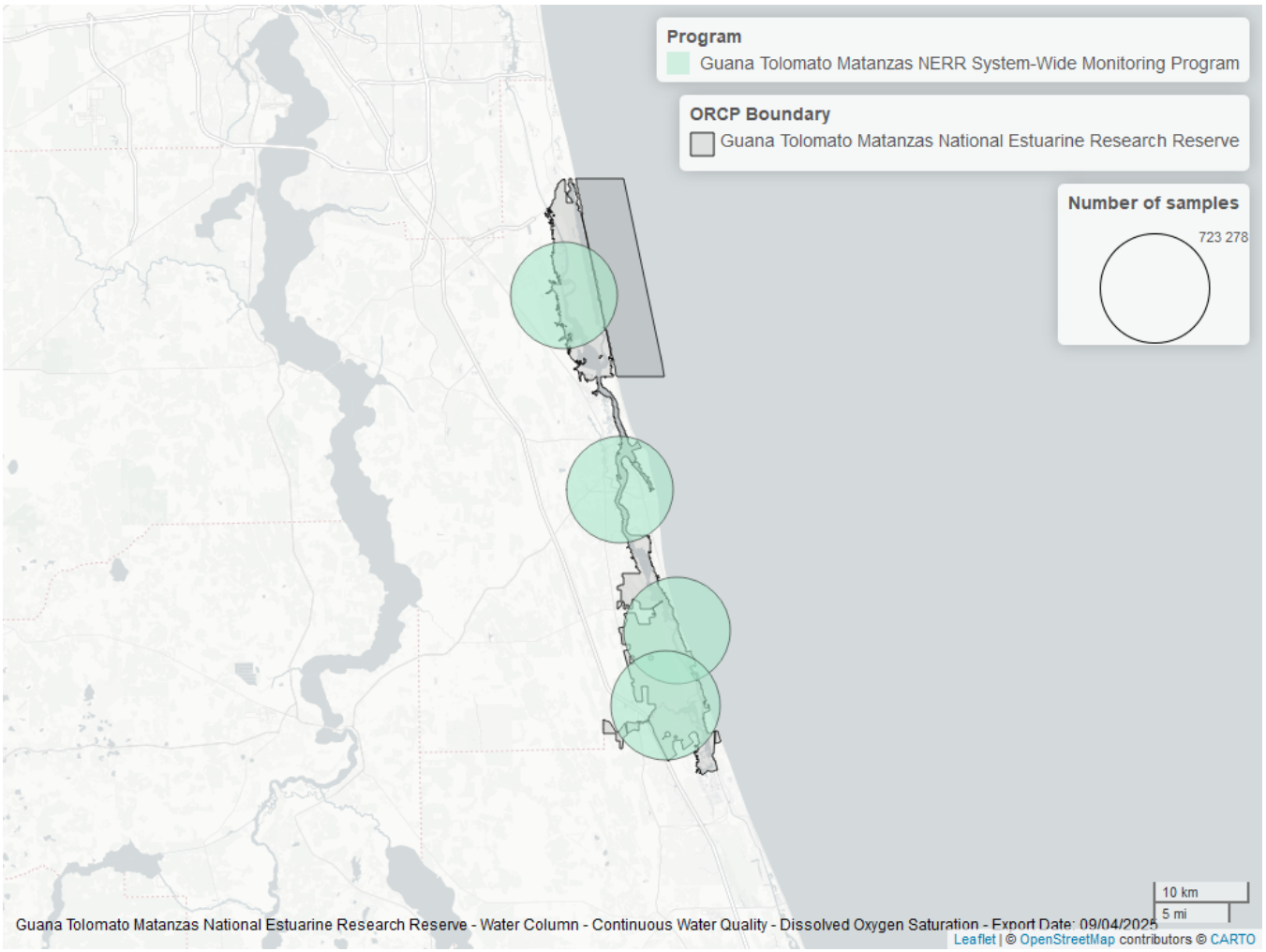

Figure 31: Map showing location of dissolved oxygen saturation continuous water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

pH - Continuous

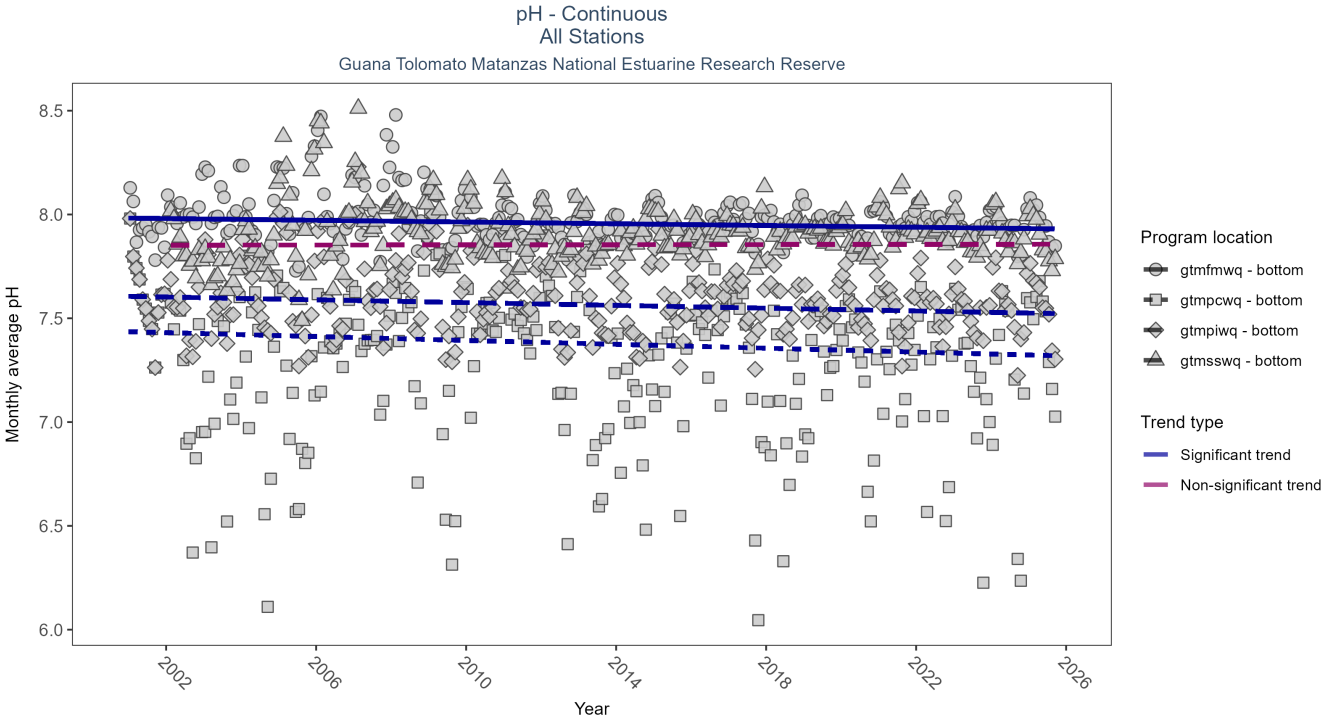

Figure 32: Scatter plot of monthly average pH over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

Table 35: Seasonal Kendall-Tau Results for pH - All Stations

Station	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
gtmfmwq	Significantly decreasing trend	687856	25	2001 - 2025	8.0	-0.15	7.98	0	0.00
gtmpiwq	Significantly decreasing trend	682135	25	2001 - 2025	7.6	-0.17	7.61	0	0.00
gtmpcwq	Significantly decreasing trend	716012	25	2001 - 2025	7.4	-0.10	7.44	0	0.02
gtmsswq	No significant trend	660421	24	2002 - 2025	7.9	0.00	7.85	0	0.84

At three program locations, monthly average pH decreased between less than 0.01 and less than 0.01 pH units per year. No detectable change in monthly average pH was observed at one location.

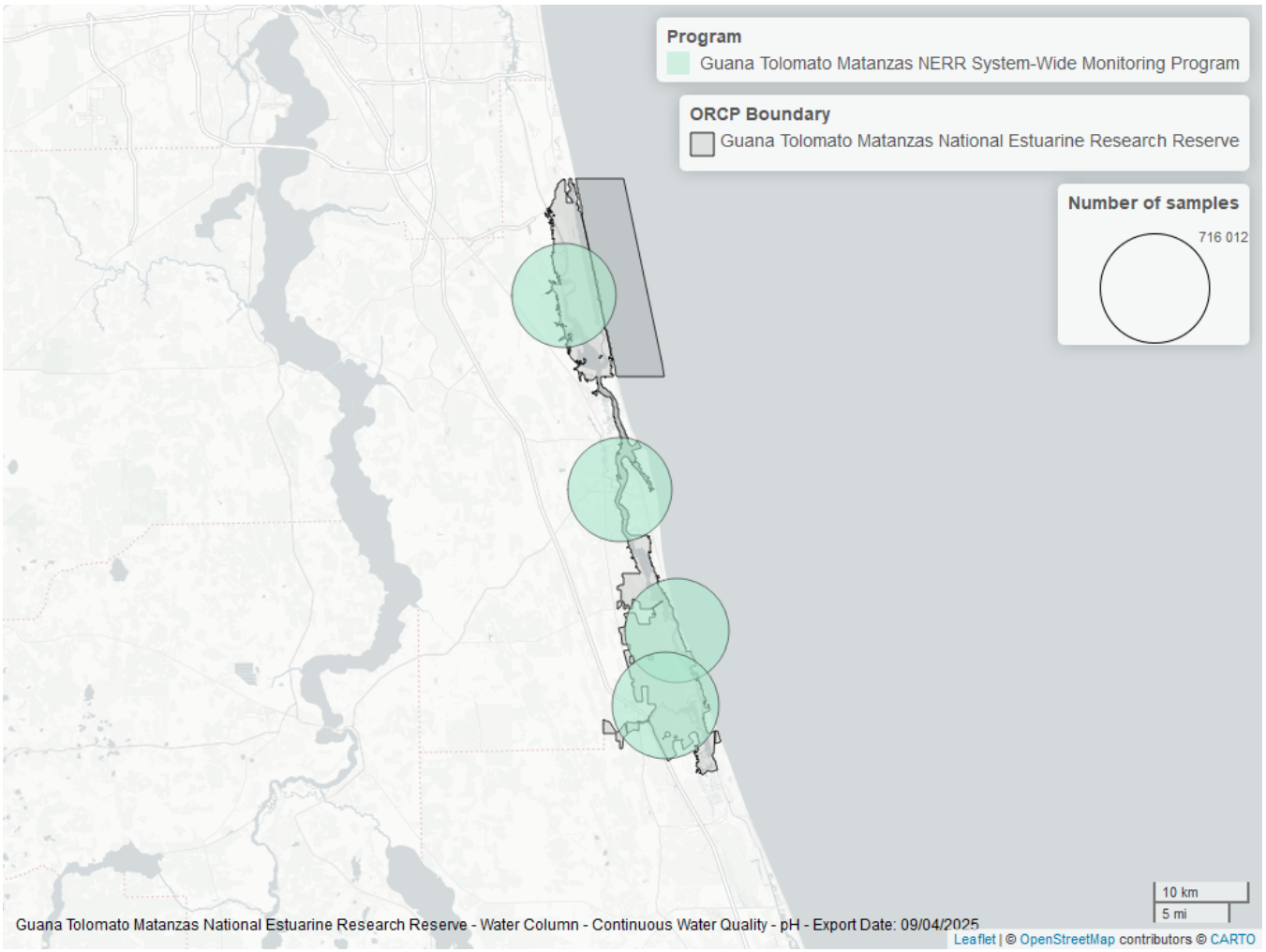

Figure 33: Map showing location of ph continuous water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Salinity - Continuous

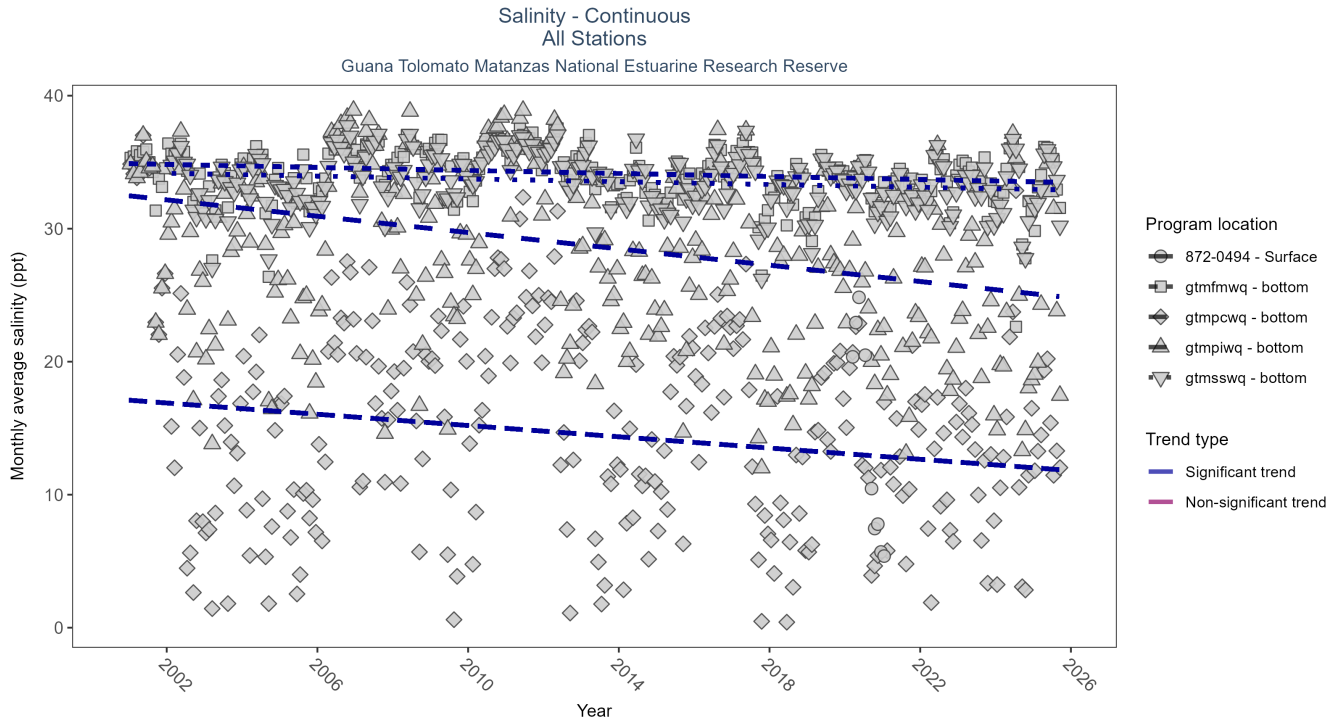

Figure 34: Scatter plot of monthly average salinity over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

Table 36: Seasonal Kendall-Tau Results for Salinity - All Stations

Station	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
gtmfmwq	Significantly decreasing trend	691675	25	2001 - 2025	34.40	-0.16	34.89	-0.06	0
gtmpcwq	Significantly decreasing trend	731565	25	2001 - 2025	16.60	-0.14	17.1	-0.21	0
gtmsswq	Significantly decreasing trend	669355	24	2002 - 2025	33.90	-0.12	34.16	-0.05	0.01
gtmpiwq	Significantly decreasing trend	689204	25	2001 - 2025	27.90	-0.26	32.47	-0.31	0
872-0494	Insufficient data to calculate trend	34918	2	2020 - 2021	8.99	-	-	-	-

At four program locations, monthly average salinity decreased between 0.05 and 0.31 ppt per year. There was insufficient data to fit a model for one location.

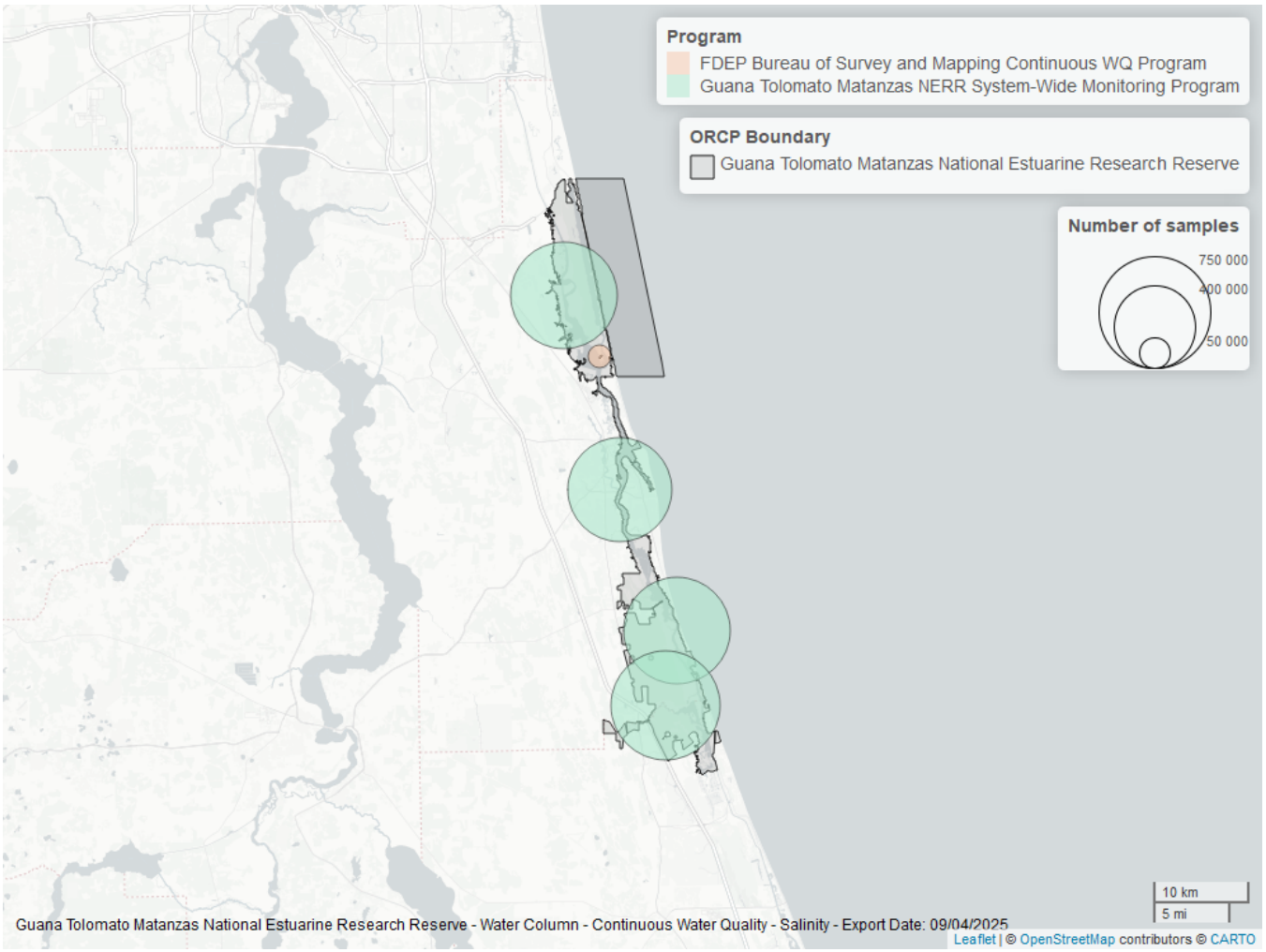

Figure 35: Map showing location of salinity continuous water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Turbidity - Continuous

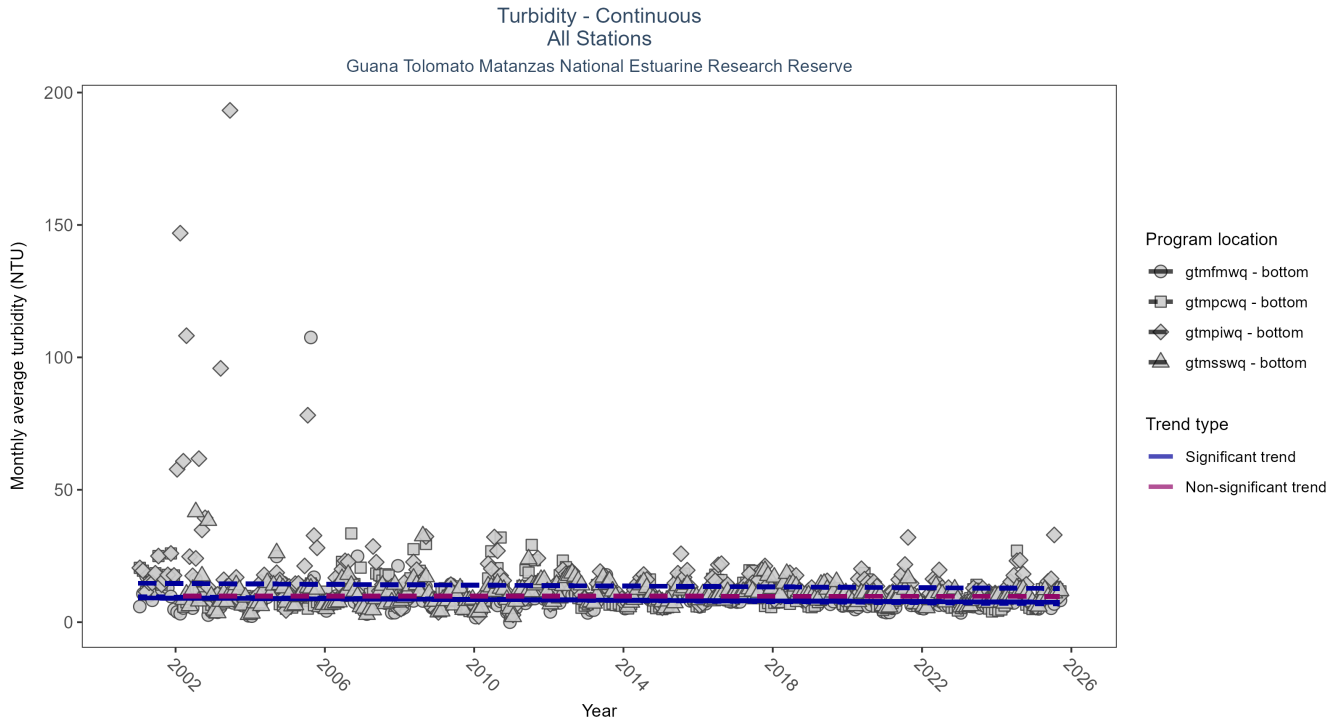

Figure 36: Scatter plot of monthly average turbidity over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

Table 37: Seasonal Kendall-Tau Results for Turbidity - All Stations

Station	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
gtmpcwq	Significantly decreasing trend	707002	25	2001 - 2025	9	-0.17	9.57	-0.11	0.00
gtmsswq	No significant trend	655978	24	2002 - 2025	9	-0.01	9.89	-0.01	0.80
gtmpiwq	Significantly decreasing trend	665212	25	2001 - 2025	10	-0.10	14.70	-0.08	0.01
gtmfmwq	Significantly decreasing trend	702940	25	2001 - 2025	7	-0.12	9.14	-0.07	0.00

At three program locations, monthly average turbidity decreased between 0.07 and 0.11 NTU per year. No detectable change in monthly average turbidity was observed at one location.

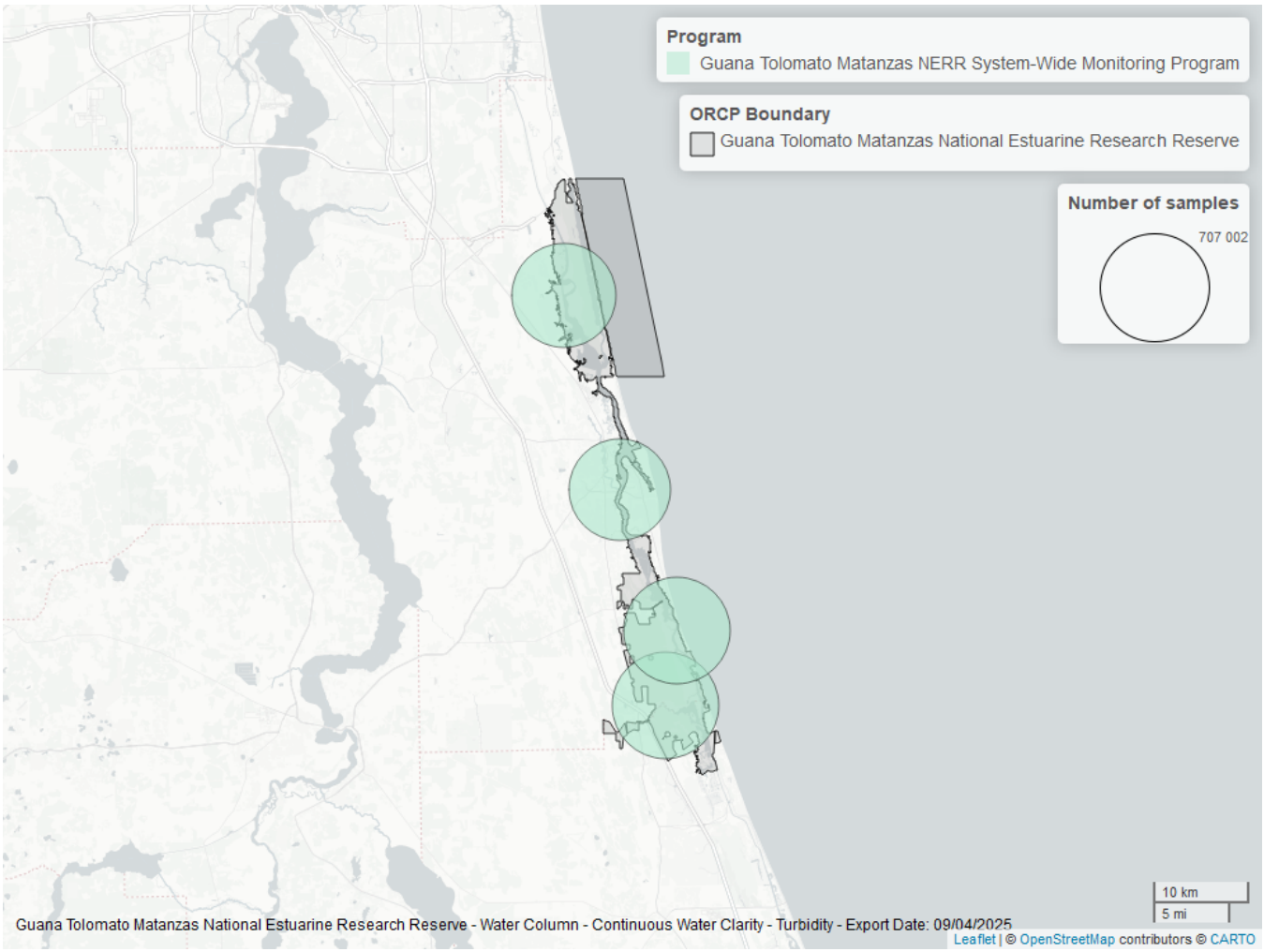

Figure 37: Map showing location of turbidity continuous water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Temperature - Continuous

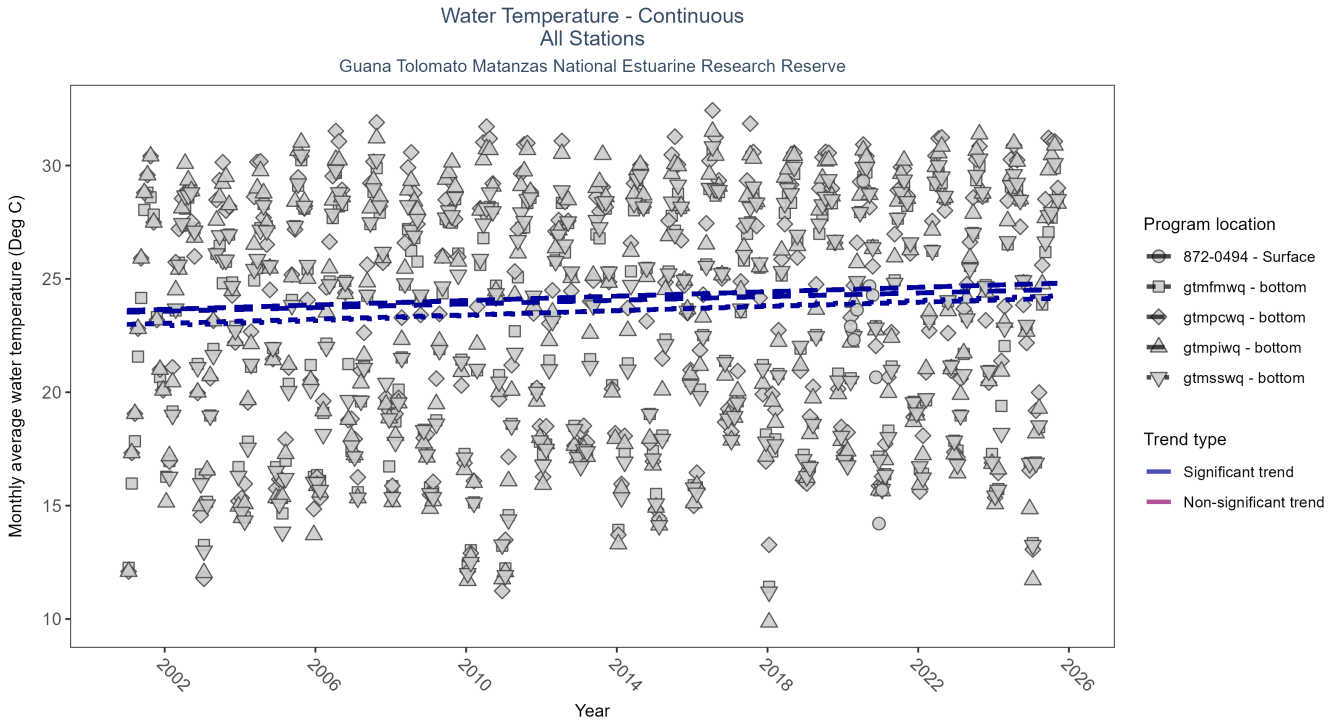

Figure 38: Scatter plot of monthly average water temperature over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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

Station	Statistical Trend	Sample Count	Years with Data	Period of Record	Median	tau	Sen Intercept	Sen Slope	p
gtmpiwq	Significantly increasing trend	739497	25	2001 - 2025	24.30	0.2	23.53	0.04	0
gtmpcwq	Significantly increasing trend	740131	25	2001 - 2025	24.40	0.17	23.61	0.05	0
gtmfmwq	Significantly increasing trend	736711	25	2001 - 2025	23.80	0.23	22.99	0.05	0
gtmsswq	Significantly increasing trend	702992	24	2002 - 2025	23.90	0.24	22.94	0.06	0
872-0494	Insufficient data to calculate trend	35473	2	2020 - 2021	22.34	-	-	-	-

At four program locations, monthly average water temperature increased between 0.04 and 0.06°C per year. There was insufficient data to fit a model for one location.

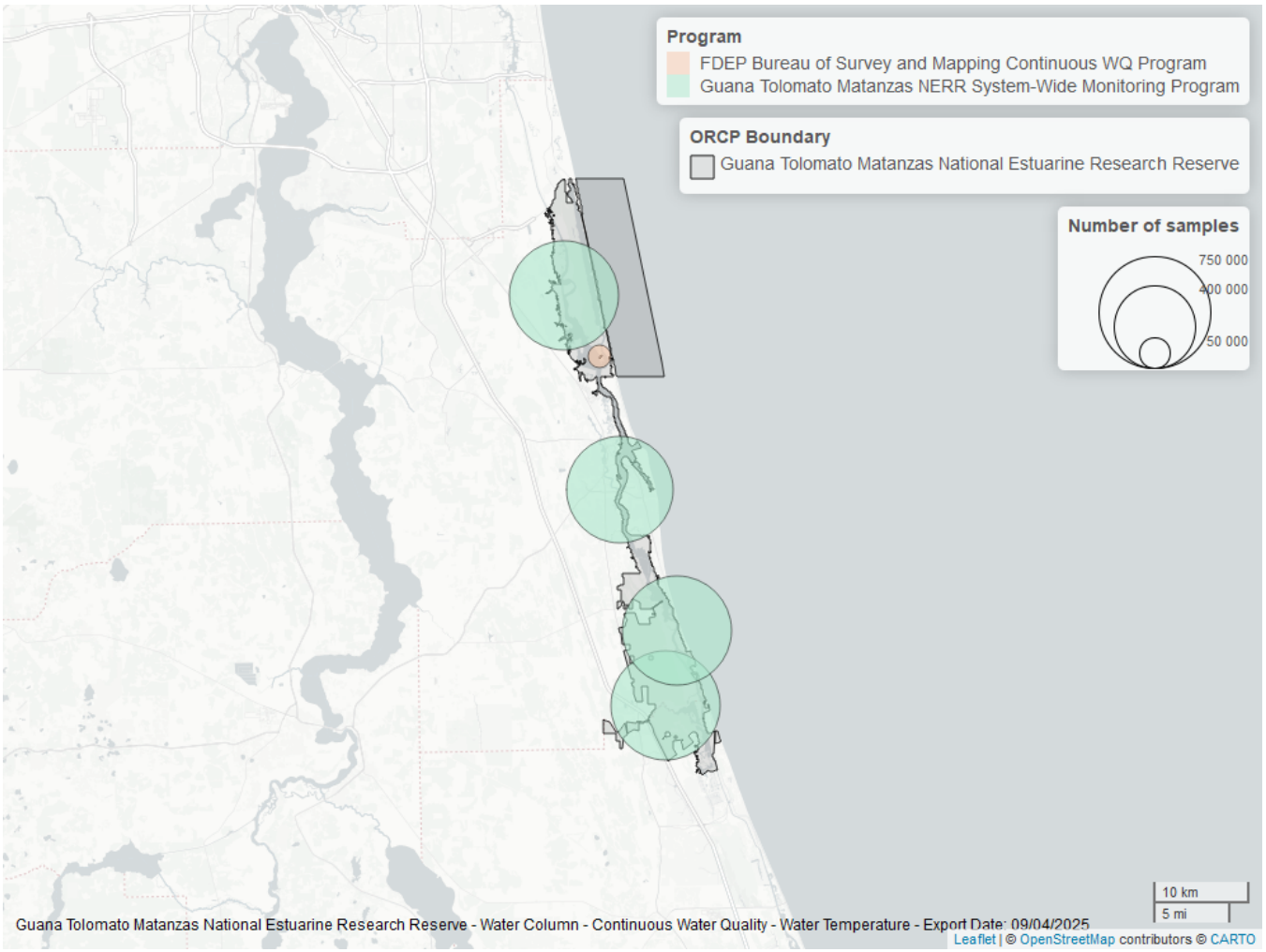

Figure 39: Map showing location of water temperature continuous water quality sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Coastal Wetlands

The data file used is: **All_CW_Parameters-2025-Sep-04.txt**

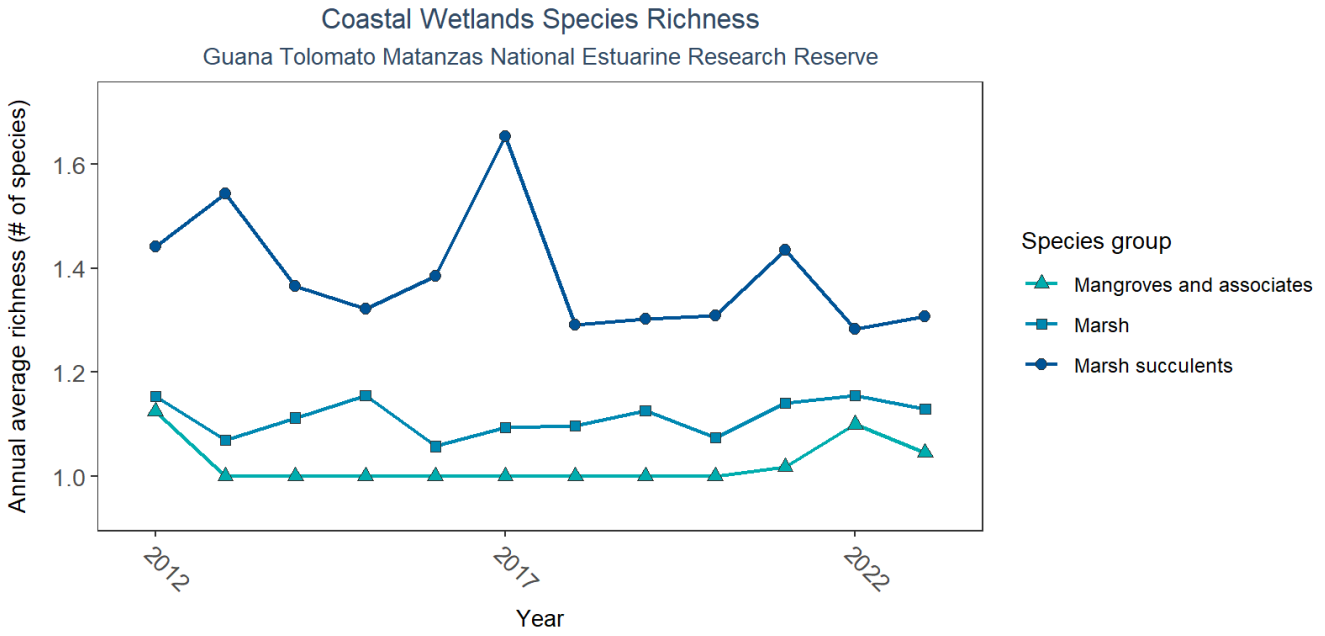

Figure 40: Line graph of annual average coastal wetlands species richness over time for mangroves and associates (triangles), marsh (squares), and marsh succulents (circles). If the time series by species group included more than one year of observations, a line connects data points for visualization.

Table 39: Coastal Wetlands Species Richness

Species Group	*Sample Count*	*Number of Years*	*Period of Record*	*Median N of Taxa*	*Mean N of Taxa*
Mangroves and associates	387	12	2012 - 2023	1	1.02
Marsh	2568	12	2012 - 2023	1	1.12
Marsh succulents	868	12	2012 - 2023	1	1.38

Between 2012 and 2023, the median annual number of species for *mangroves and associates* was 1 based on 387 observations. Between 2012 and 2023, the median annual number of species for *marsh* was 1 based on 2,568 observations. Between 2012 and 2023, the median annual number of species for *marsh succulents* was 1 based on 868 observations.

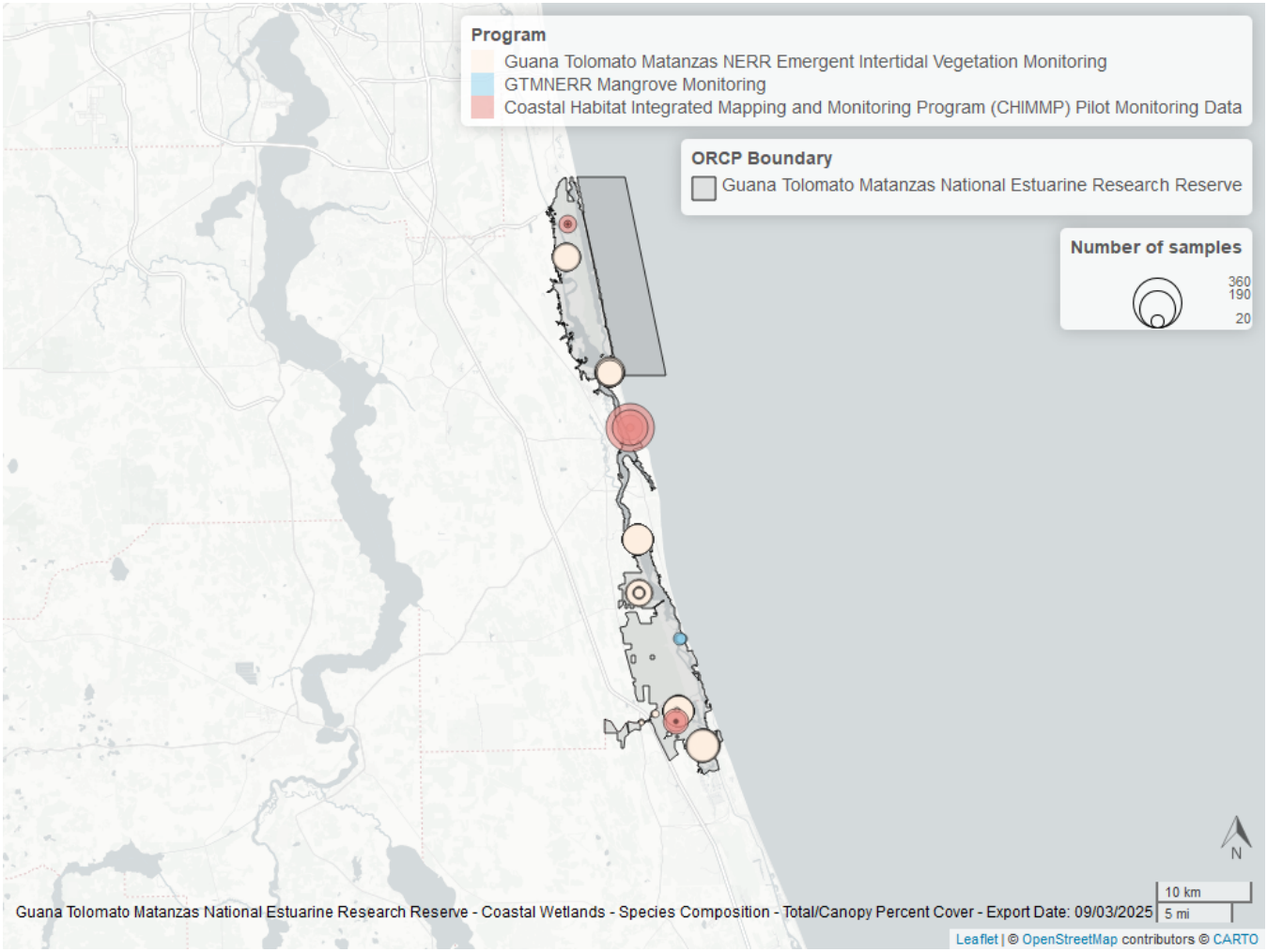

Figure 41: Map showing location of coastal wetlands sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Oyster

The data file used is: **All_OYSTER_Parameters-2025-Sep-04.txt**

Density

Natural

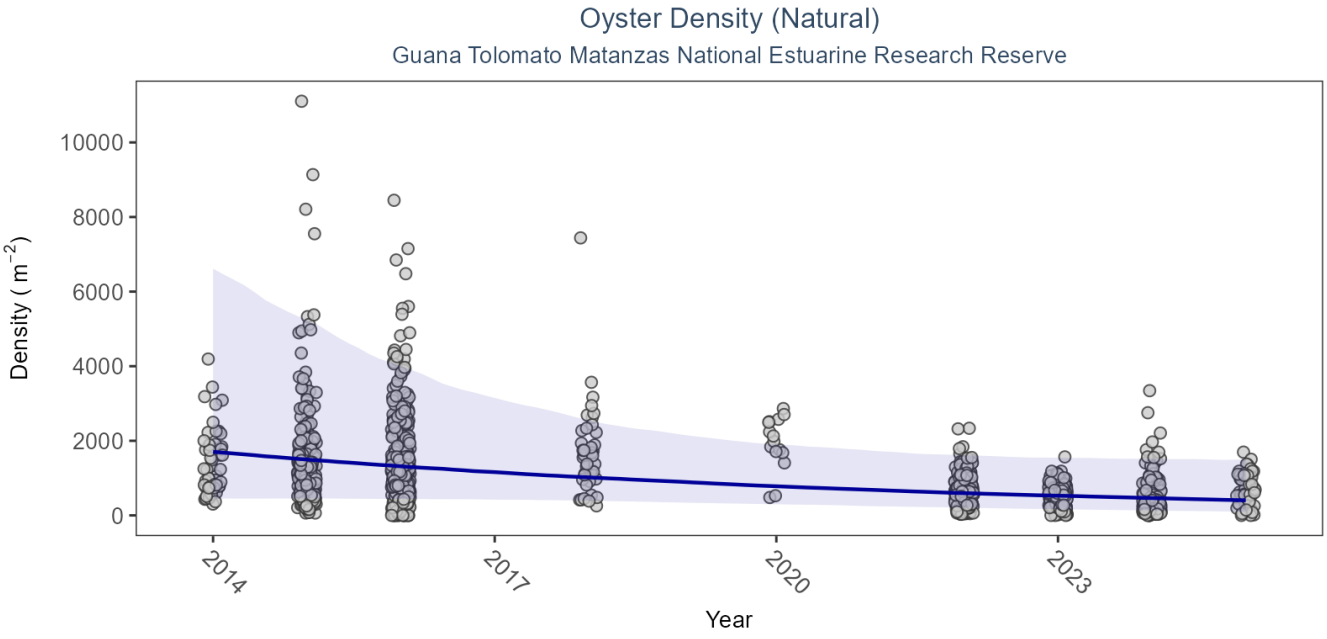

Figure 42: Scatter plot of oyster density over time. If the time series included five or more years with observations, an estimated trend (blue line) and a 95% credible interval (purple band) may also be plotted. Data points are jittered horizontally to reduce overlap.

Table 40: Model results for Oyster Density - Natural

Shell Type	*Habitat Type*	*Trend Status*	*Estimate*	*Standard Error*	*Credible Interval*
Live Oysters	Natural	Significantly decreasing trend	-115.49	465.61	-31.66 to -445.43

For natural reefs, density decreased by an average of 116.06 oysters per square meter per year.

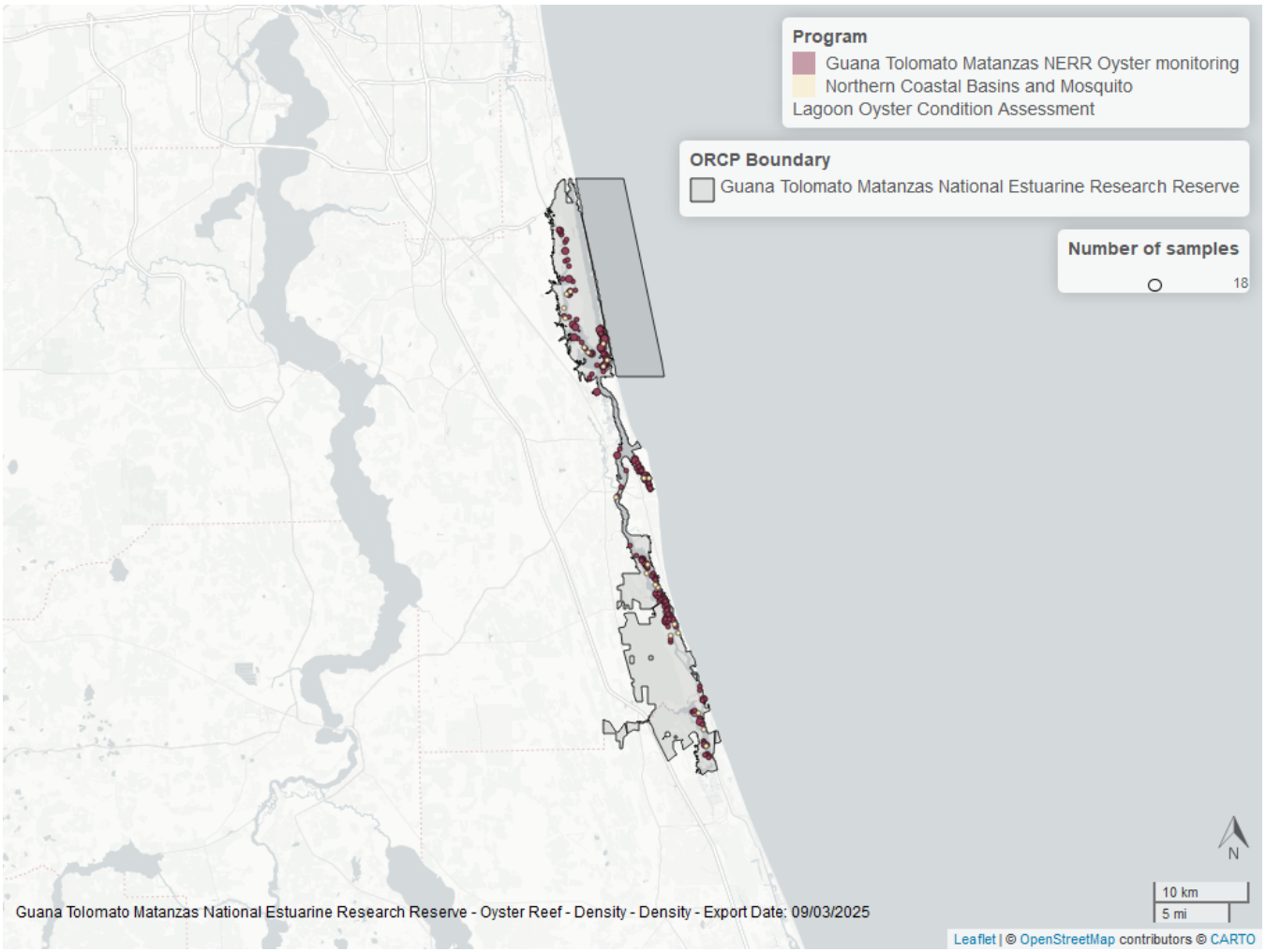

Figure 43: Map showing location of oyster density sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Percent Live

Natural

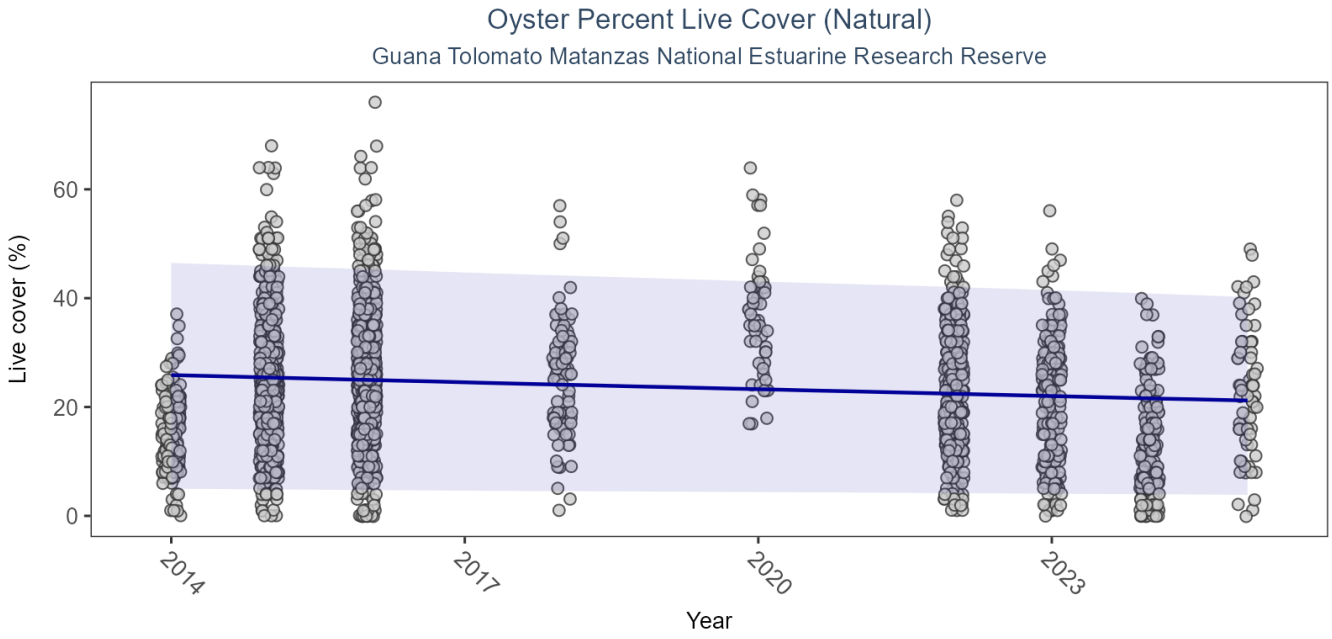

Figure 44: Scatter plot of percent live oysters over time. If the time series included five or more years with observations, an estimated trend (blue line) and a 95% credible interval (purple band) may also be plotted. Data points are jittered horizontally to reduce overlap.

Table 41: Model results for Oyster Percent Live - Natural

Shell Type	*Habitat Type*	*Trend Status*	*Estimate*	*Standard Error*	*Credible Interval*
Live Oysters	Natural	Significantly decreasing trend	-0.44	10.14	-0.1 to -0.6

For natural reefs, percent live cover decreased by an average of 0.44% per year.

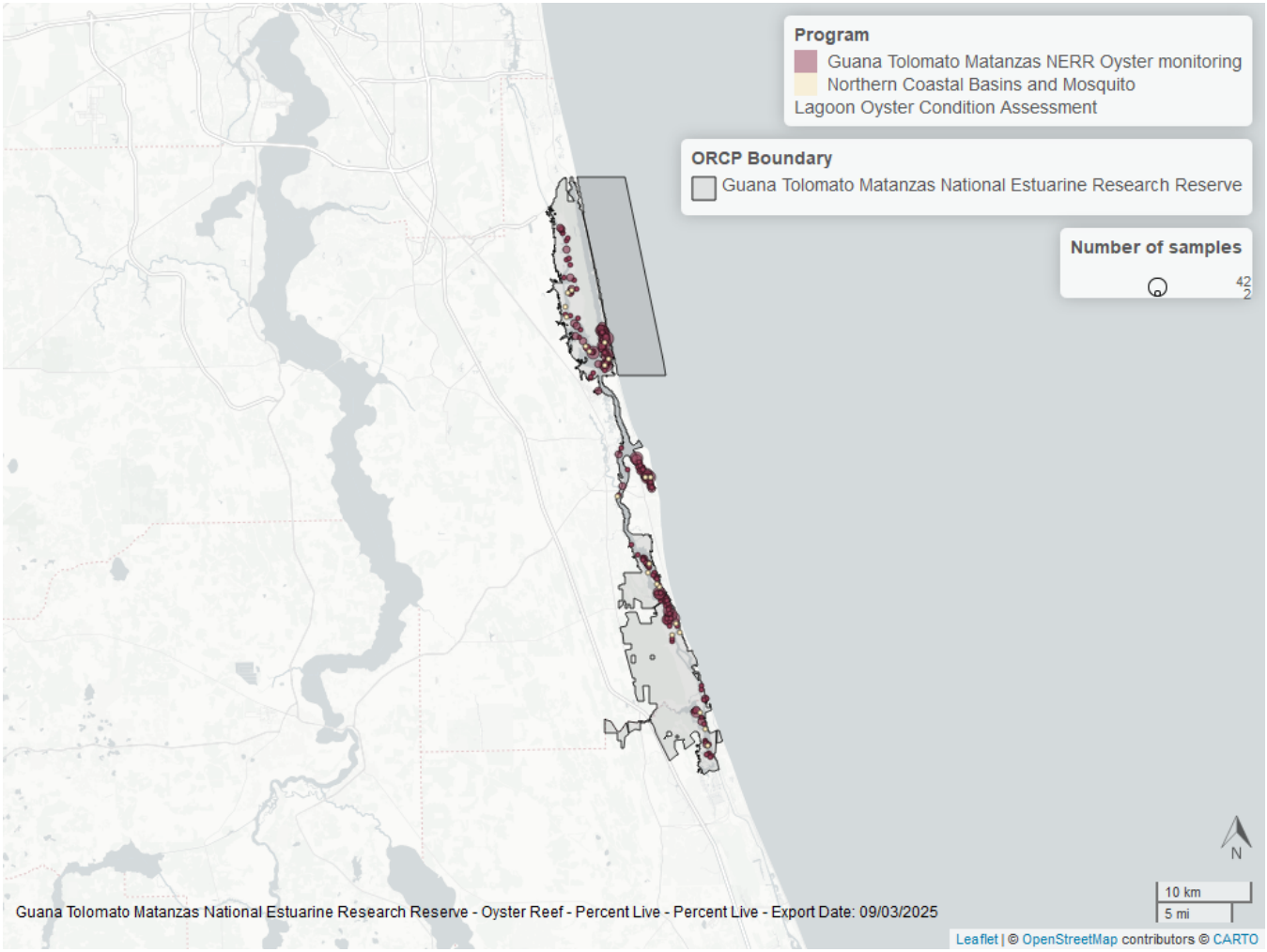

Figure 45: Map showing location of oyster percent live sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Shell Height

Natural

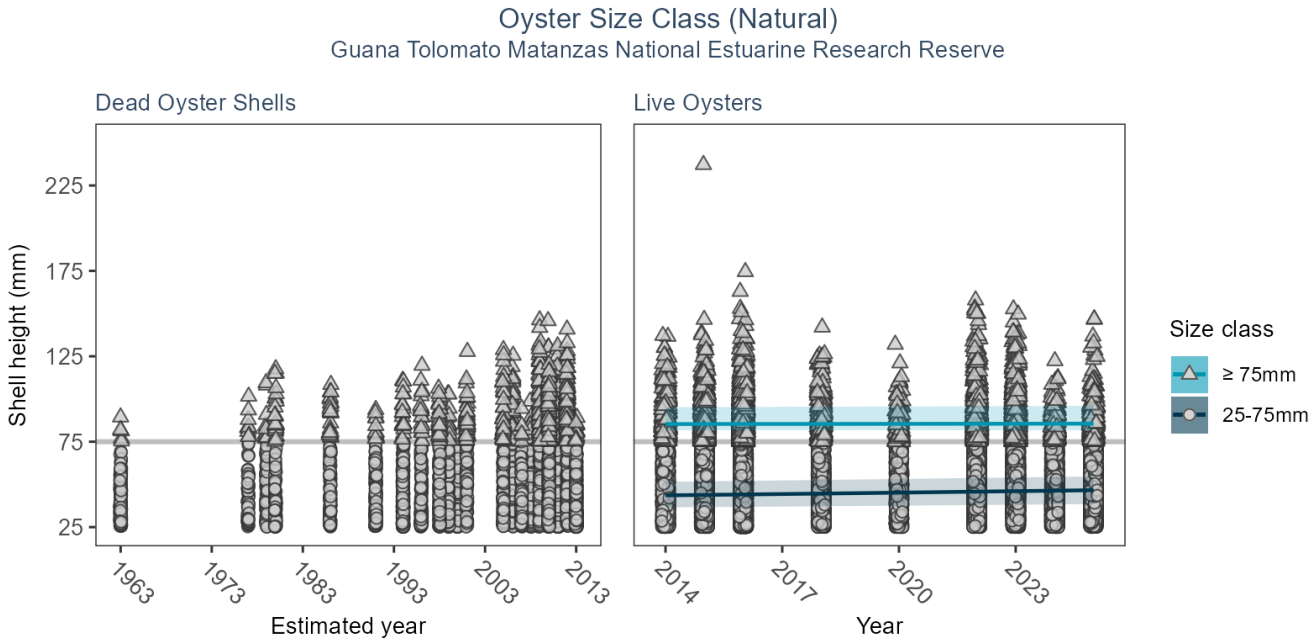

Table 42: Model results for Oyster Shell Height - Natural

Shell Type	*SizeClass*	*Habitat Type*	*Trend Status*	*Estimate*	*Standard Error*	*Credible Interval*
Dead Oyster Shells		Natural	-	-	-	-
Dead Oyster Shells	>75mm	Natural	-	-	-	-
Dead Oyster Shells	25-75mm	Natural	-	-	-	-
Live Oysters		Natural	-	-	-	-
Live Oysters	>75mm	Natural	No significant change	0.20	0.35	-0.52 to 0.87
Live Oysters	25-75mm	Natural	Significantly increasing trend	1.66	0.21	1.27 to 2.09

For natural reefs, annual average live oyster shell height in the 25-75mm and >=75mm size classes increased by 1.66 mm per year and 0.2 mm per year, respectively. Models are not run on dead oyster shell measurements.

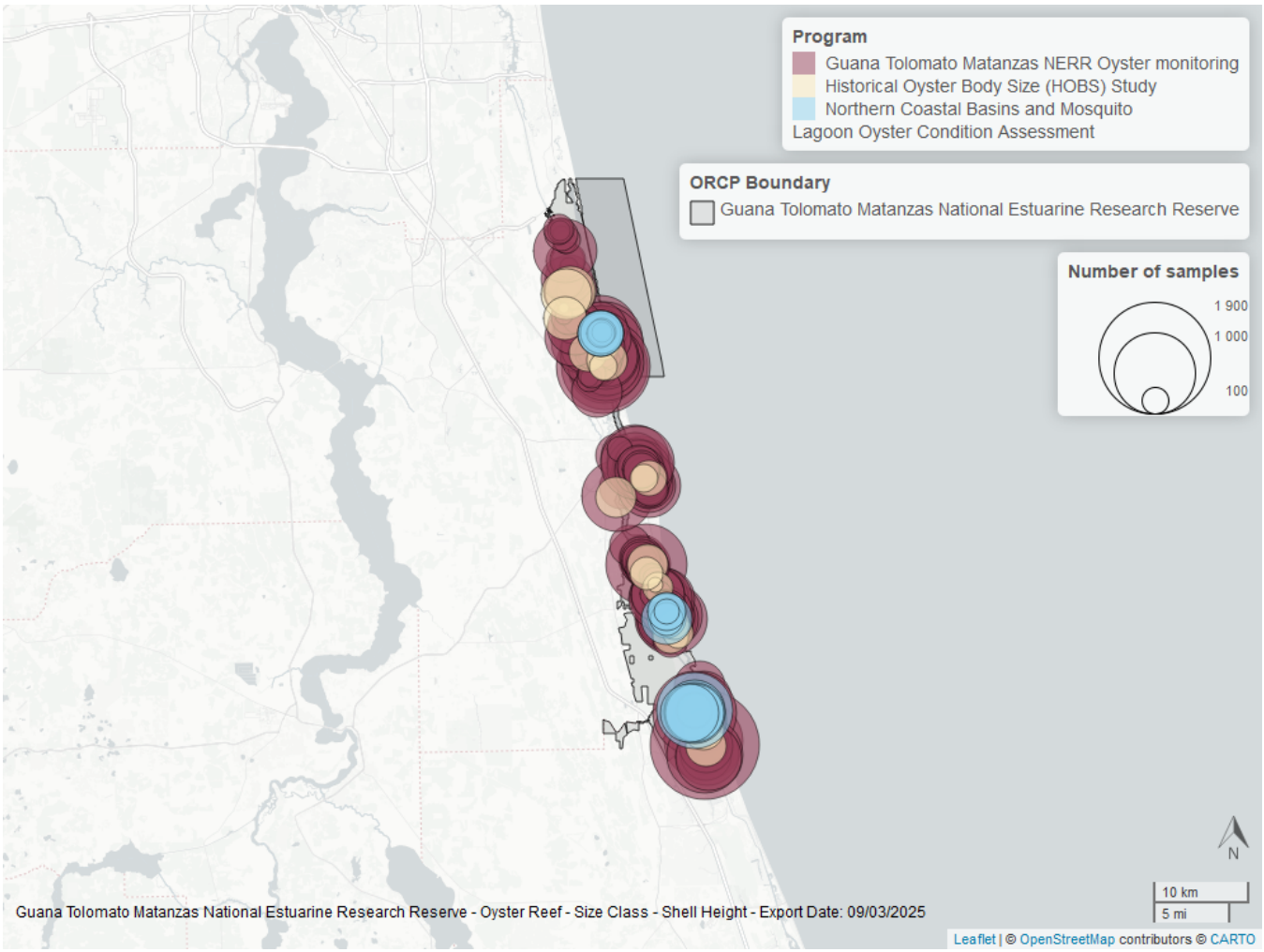

Figure 46: Map showing location of oyster shell height sampling locations within the boundaries of *Guana Tolomato Matanzas National Estuarine Research Reserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Species list

Acer rubrum	Hypericum sp.	Rhynchospora colorata
Acrostichum danaeifolium	Ilex vomitoria	Rhynchospora corniculata
Amorpha fruticosa	Ipomoea sagittata	Rhynchospora sp.
Ampelaster carolinianus	Iresine rhizomatosa	Rubus sp.
Ampelopsis arborea	Iva frutescens	Sabal palmetto
Andropogon sp.	Juncus roemerianus[1]	Sabatia calycina
Apios americana	Juniperus virginiana	Sabatia stellaris
Aristida sp.	Kosteletzkya pentacarpos	Sagittaria lancifolia
Avicennia germinans[1]	Laguncularia racemosa[1]	Sagittaria latifolia
Baccharis halimifolia	Limonium carolinianum[1]	Sagittaria subulata
Baccharis sp.	Lobelia cardinalis	Salicornia ambigua[1]
Bacopa monnieri	Ludwigia alata	Salicornia virginica[1]
Bare substrate	Ludwigia repens	Samolus ebracteatus
Batis maritima[1]	Ludwigia sp.	Samolus sp.
Blutaparon vermiculare[1]	Lygodium microphyllum	Samolus valerandi
Boehmeria cylindrica	Lythrum alatum	Serenoa repens
Borrichia frutescens	Lythrum lineare	Sesuvium portulacastrum[1]
Centella asiatica	Mikania scandens	Smilax bona-nox
Cicuta maculata	Myrica cerifera	Solidago sempervirens
Cladium mariscus	Nekemias arborea	Spartina alterniflora[1]
Coleataenia anceps	Osmunda regalis	Spartina bakeri[1]
Cyperus sp.	Osmundastrum cinnamomeum	Spartina patens[1]
Dichanthelium commutatum	Parthenocissus quinquefolia	Sporobolus virginicus[1]
Dichanthelium sp.	Pattalias palustre	Stenotaphrum secundatum
Dichondra carolinensis	Peltandra virginica	Symphyotrichum elliottii
Dichondra sp.	Persea palustris	Symphyotrichum tenuifolium
Distichlis spicata[1]	Persicaria hydropiperoides	Thelypteris kunthii
Eleocharis baldwinii	Persicaria punctata	Thelypteris palustris
Eleocharis geniculata	Persicaria sp.	Tillandsia usneoides
Eleocharis sp.	Pinus palustris	Toxicodendron radicans
Erechtites hieraciifolius	Pluchea odorata	Ulmus americana
Fabaceae	Pluchea sp.	Vigna luteola
Fimbristylis sp.	Pneumatophore	Vitis sp.
Fimbristylis spadicea	Polygonum sp.	Woody debris
Houstonia procumbens	Quercus virginiana	Acer rubrum
Hydrocotyle umbellata	Rhizophora mangle[1]	Acrostichum danaeifolium

1 - Coastal Wetlands

References

1. Florida Department of Environmental Protection (DEP); Office of Resilience and Coastal Protection (RCP); Guana Tolomato Matanzas National Estuarine Research Reserve (GTMNERR); NOAA National Estuarine Research Reserve System (NERRS). Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program. (2024).
2. Florida Department of Environmental Protection (DEP). Florida STORET / WIN. (2024).
3. Florida Department of Environmental Protection (DEP); Office of Resilience and Coastal Protection (RCP); Guana Tolomato Matanzas National Estuarine Research Reserve (GTMNERR); Friends of GTM; Florida Fish and Wildlife Conservation Commission (FWC). Guana River and Guana Lake Water Quality Monitoring . (2024).
4. Florida Fish and Wildlife Conservation Commission (FWC); Florida Fish and Wildlife Research Institute (FWRI). Harmful Algal Bloom Marine Observation Network. (2018).
5. U.S. Environmental Protection Agency (EPA). EPA STOrage and RETrieval Data Warehouse (STORET)/WQX. (2023).
6. U.S. Environmental Protection Agency (EPA); Office of Water; National Oceanic and Atmospheric Administration (NOAA); U.S. Geological Survey (USGS); U.S. Fish and Wildlife Service (USFWS); National Estuary Program (NEP); coastal states. National Aquatic Resource Surveys, National Coastal Condition Assessment. (2021).
7. Florida Fish and Wildlife Conservation Commission (FWC). Fisheries-Independent Monitoring (FIM) Program. (2022).
8. Florida Department of Environmental Protection (DEP); Division of State Lands; Bureau of Survey and Mapping. FDEP Bureau of Survey and Mapping Continuous Water Quality Program. (2021).