Pellicer Creek Aquatic Preserve

SEACAR Habitat Analyses

Last compiled on 08 October, 2025

Contents

Funding & Acknowledgements

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This report was funded in part, through a grant agreement from the Florida Department of Environmental Protection, Florida Coastal Management Program, by a grant provided by the Office for Coastal Management under the Coastal Zone Management Act of 1972, as amended, National Oceanic and Atmospheric Administration. The views, statements, findings, conclusions and recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the State of Florida, NOAA or any of their sub agencies.

Published: 2025-10-08

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

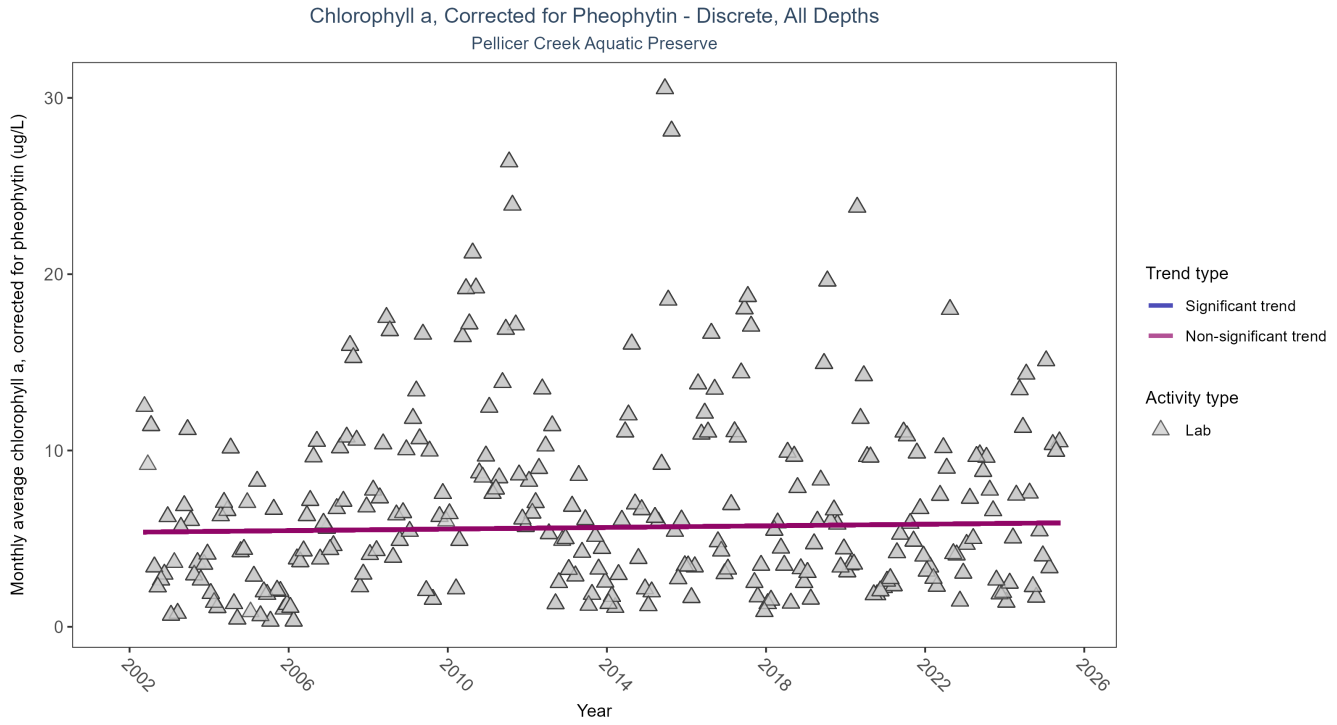

Figure 1: Scatter plot of monthly average levels of chlorophyll a, corrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) 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	No significant trend	4554	24	2002 - 2025	5.2	0.0296	5.3624	0.0227	0.4906

Chlorophyll a, corrected for pheophytin, showed no detectable trend between 2002 and 2025.

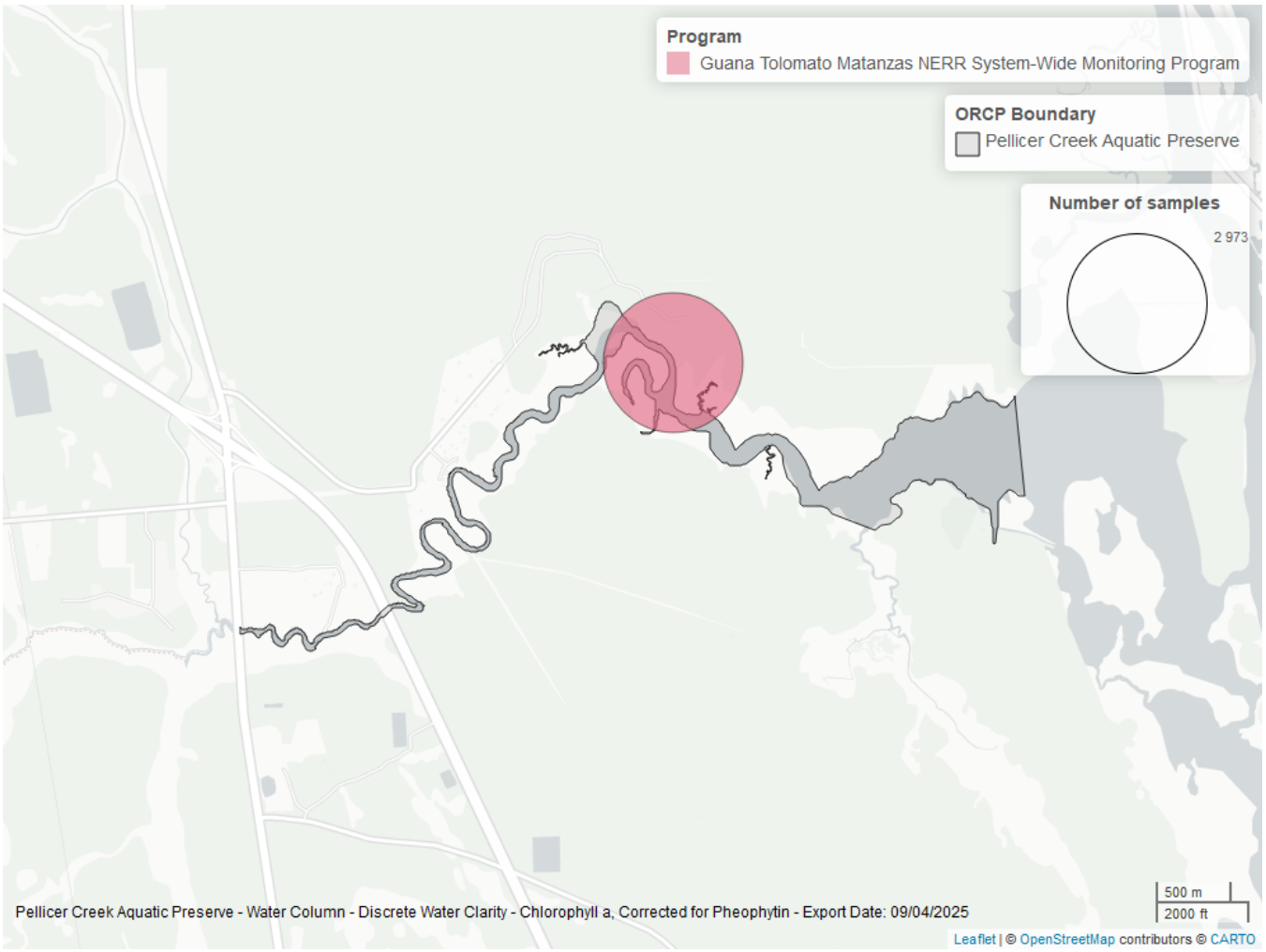

Figure 2: Map showing location of discrete water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

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

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	4853	2002	2025
5002	77	2004	2021

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]

Chlorophyll a, Uncorrected for Pheophytin - Discrete

Seasonal Kendall-Tau Trend Analysis

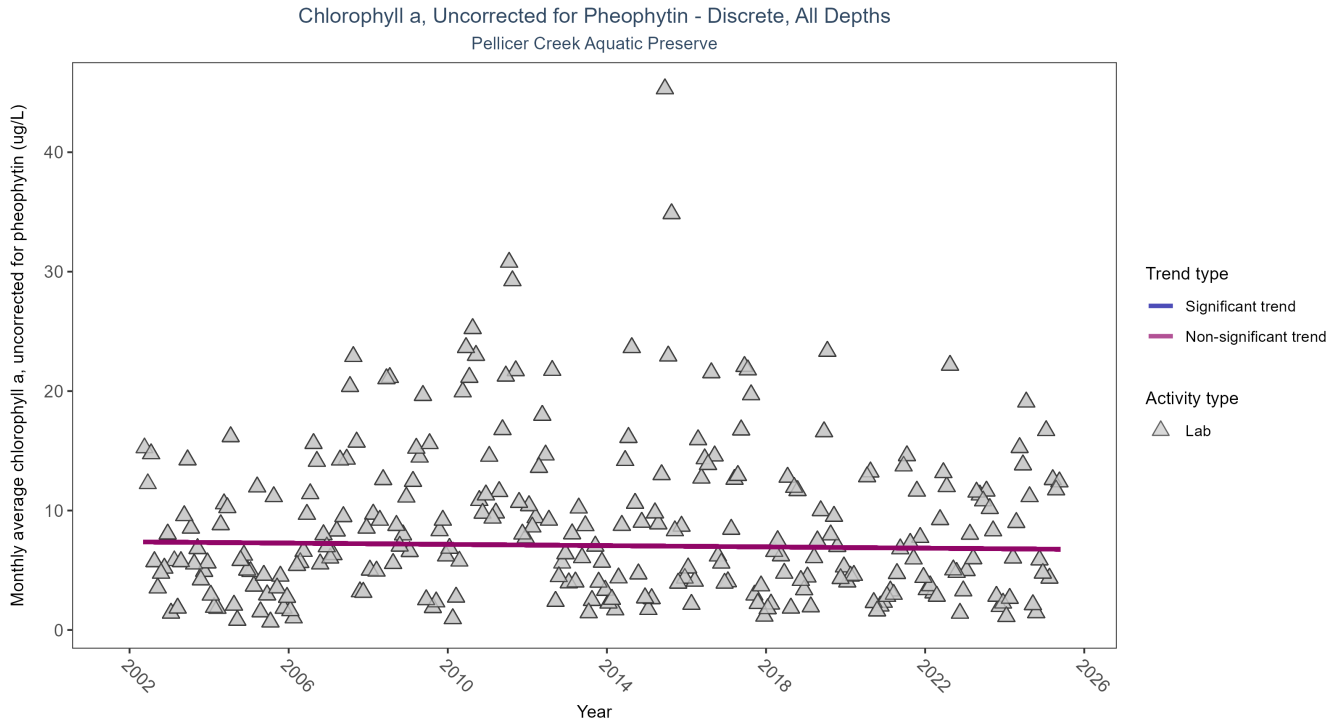

Figure 3: Scatter plot of monthly average levels of chlorophyll a, uncorrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) 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	No significant trend	3634	24	2002 - 2025	6.9	-0.0371	7.3778	-0.0265	0.3882

Chlorophyll a, uncorrected for pheophytin, showed no detectable trend between 2002 and 2025.

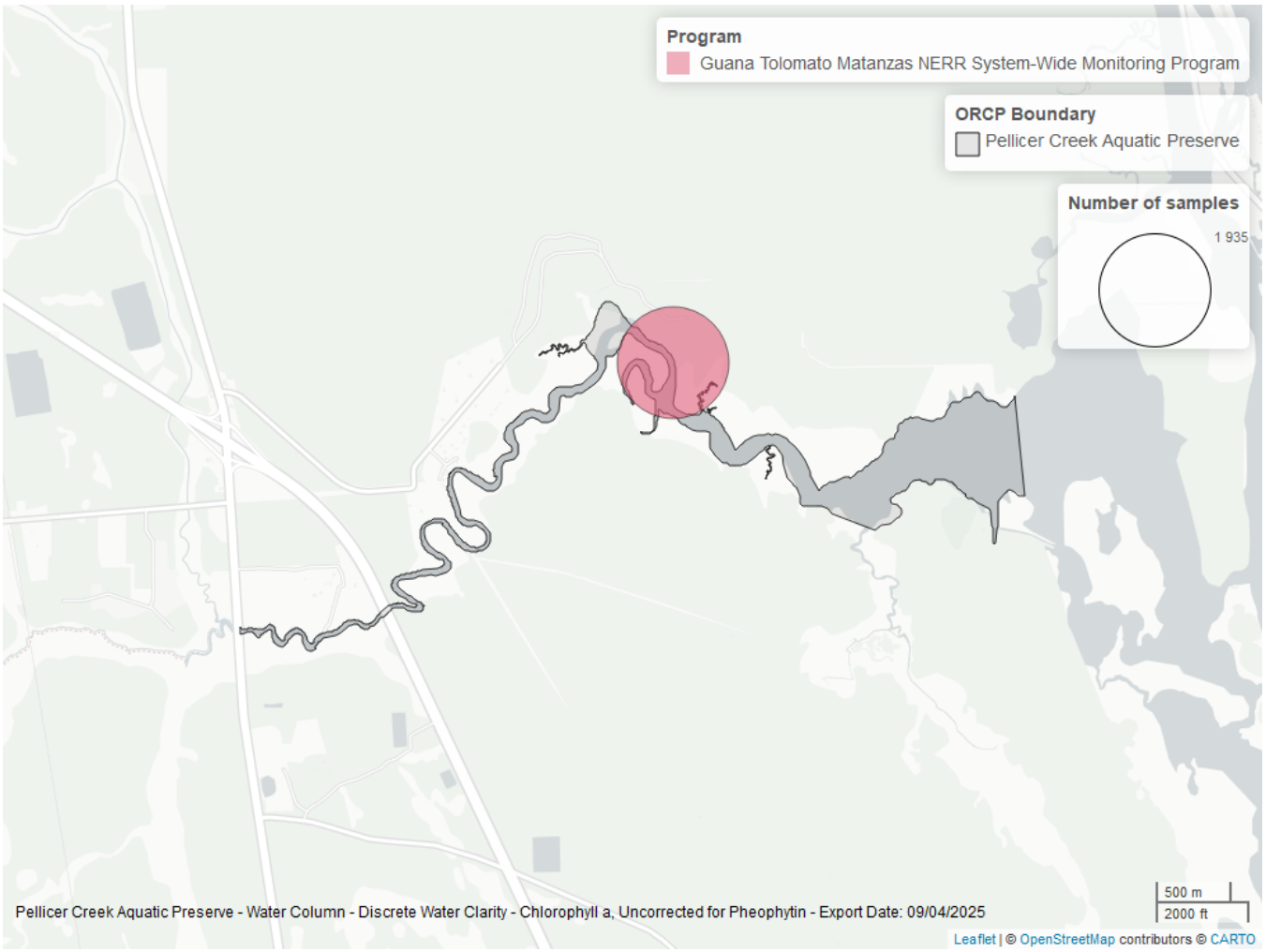

Figure 4: Map showing location of discrete water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

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

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	3912	2002	2025
5002	44	2015	2021

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]

Colored Dissolved Organic Matter - Discrete

Seasonal Kendall-Tau Trend Analysis

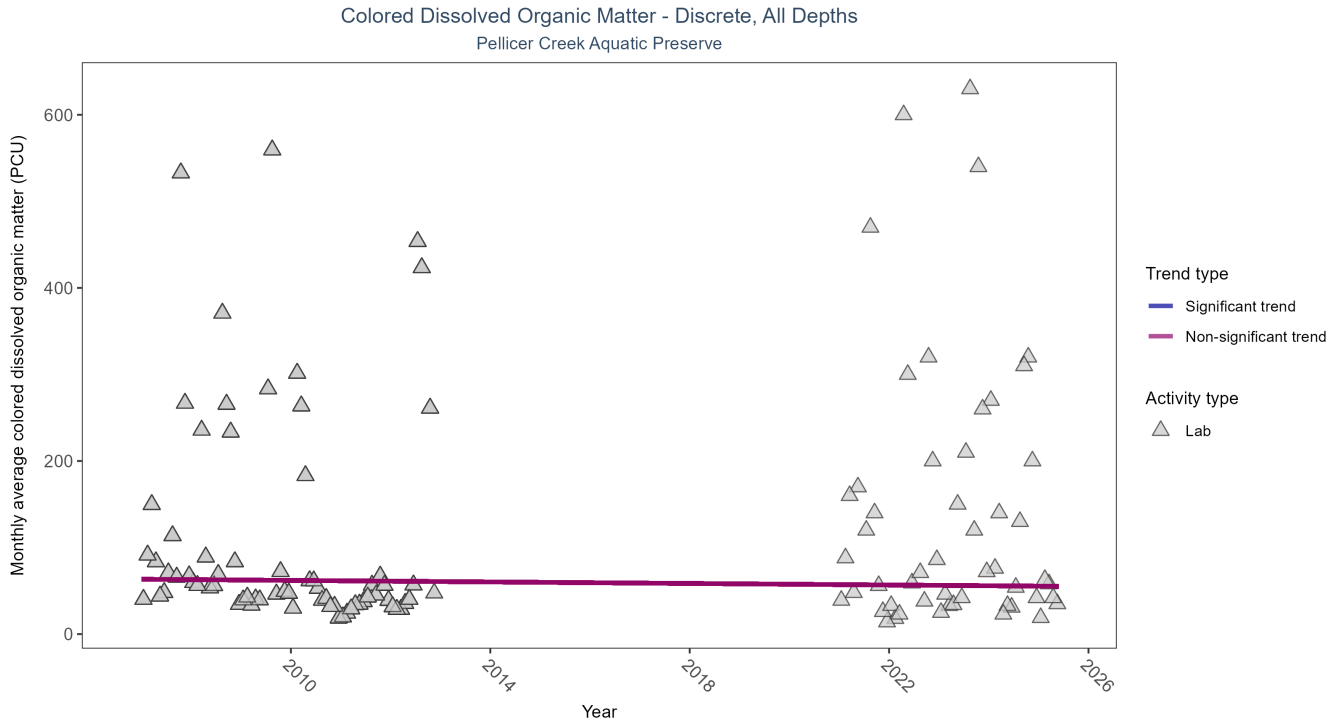

Figure 5: Scatter plot of monthly average colored dissolved organic matter (CDOM) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed CDOM (triangles) is included in the 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	No significant trend	959	11	2007 - 2025	54.6	-0.0669	63.3518	-0.4408	0.3172

Colored dissolved organic matter showed no detectable trend between 2007 and 2025.

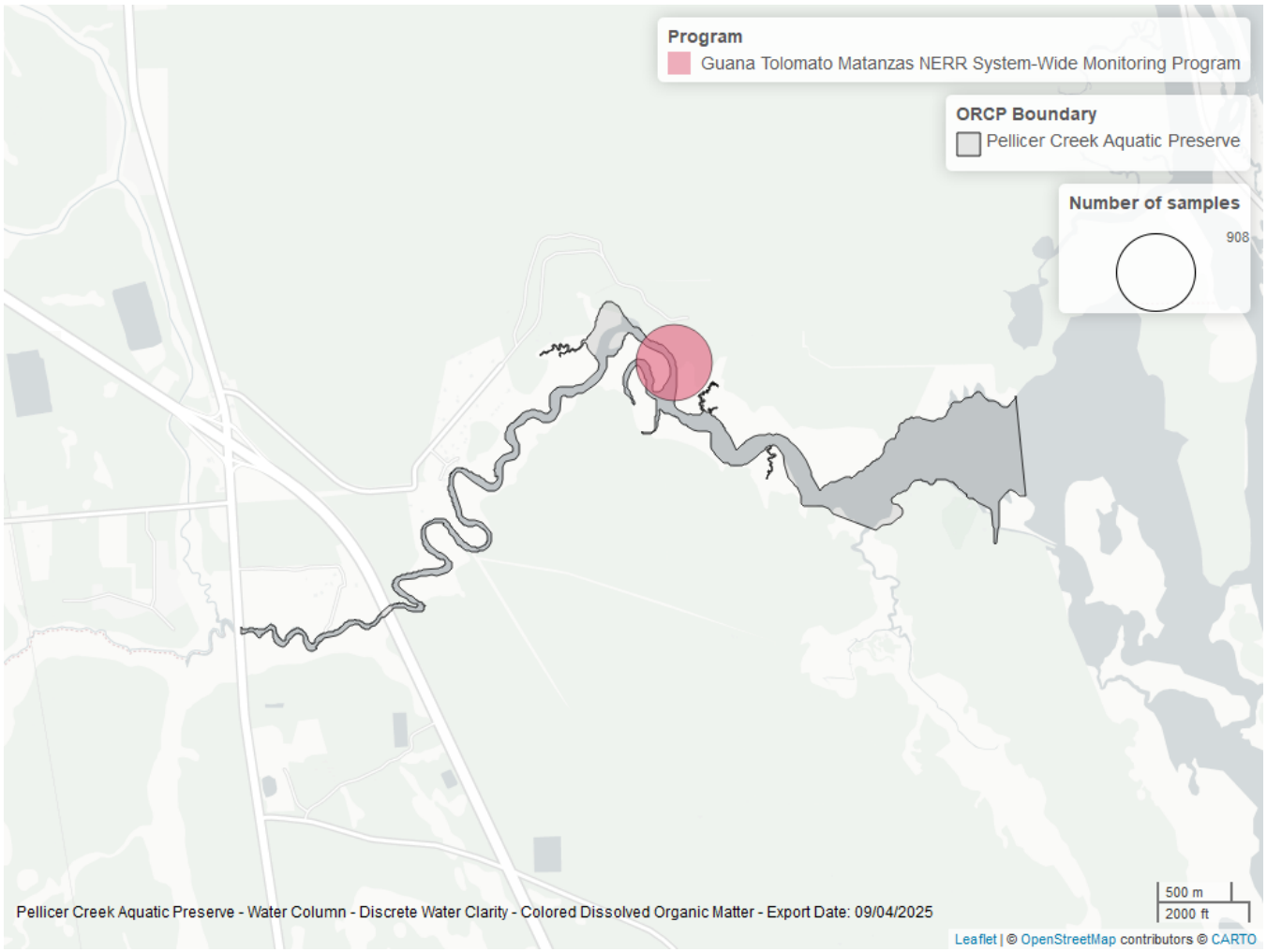

Figure 6: Map showing location of discrete water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 11: Programs contributing data for Colored Dissolved Organic Matter

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	960	2007	2025

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]

Dissolved Oxygen - Discrete

Seasonal Kendall-Tau Trend Analysis

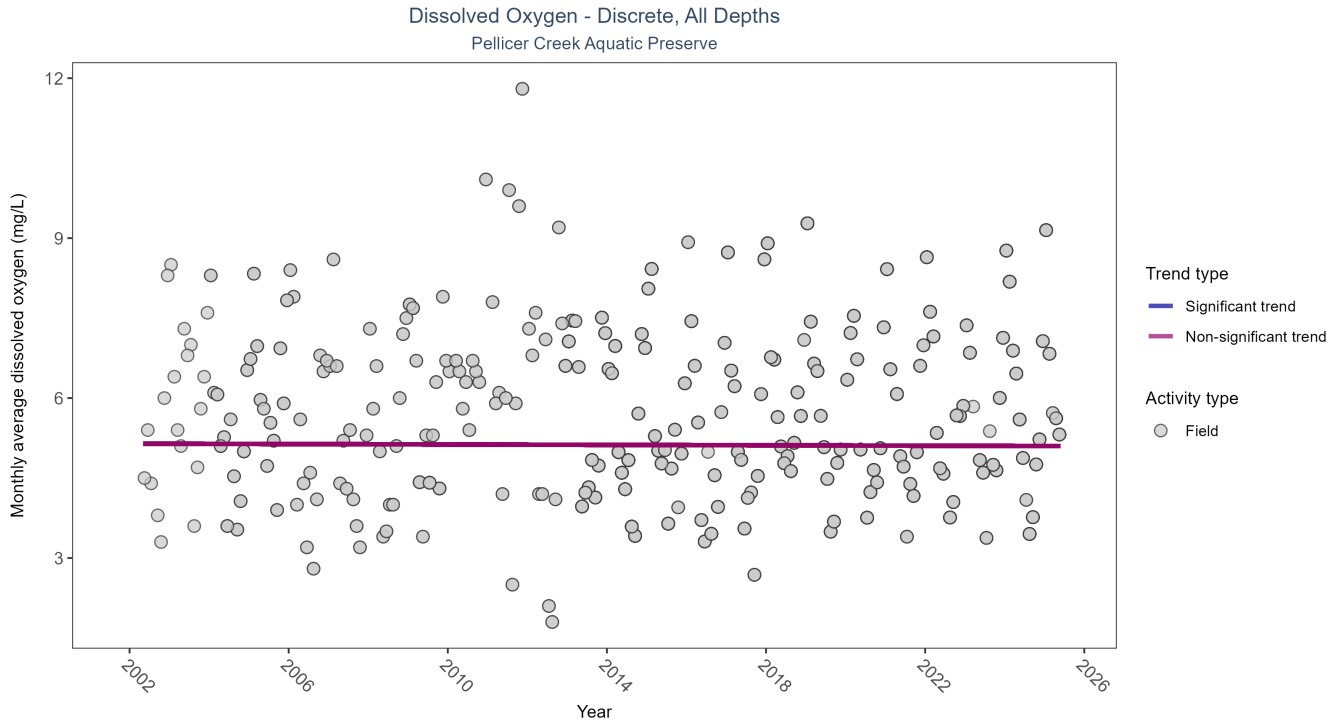

Figure 7: Scatter plot of monthly average dissolved oxygen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen values measured in the field (circles) are included in the plot.

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	No significant trend	2199	24	2002 - 2025	5.63	-0.0108	5.1449	-0.0019	0.8433

Dissolved oxygen showed no detectable trend between 2002 and 2025.

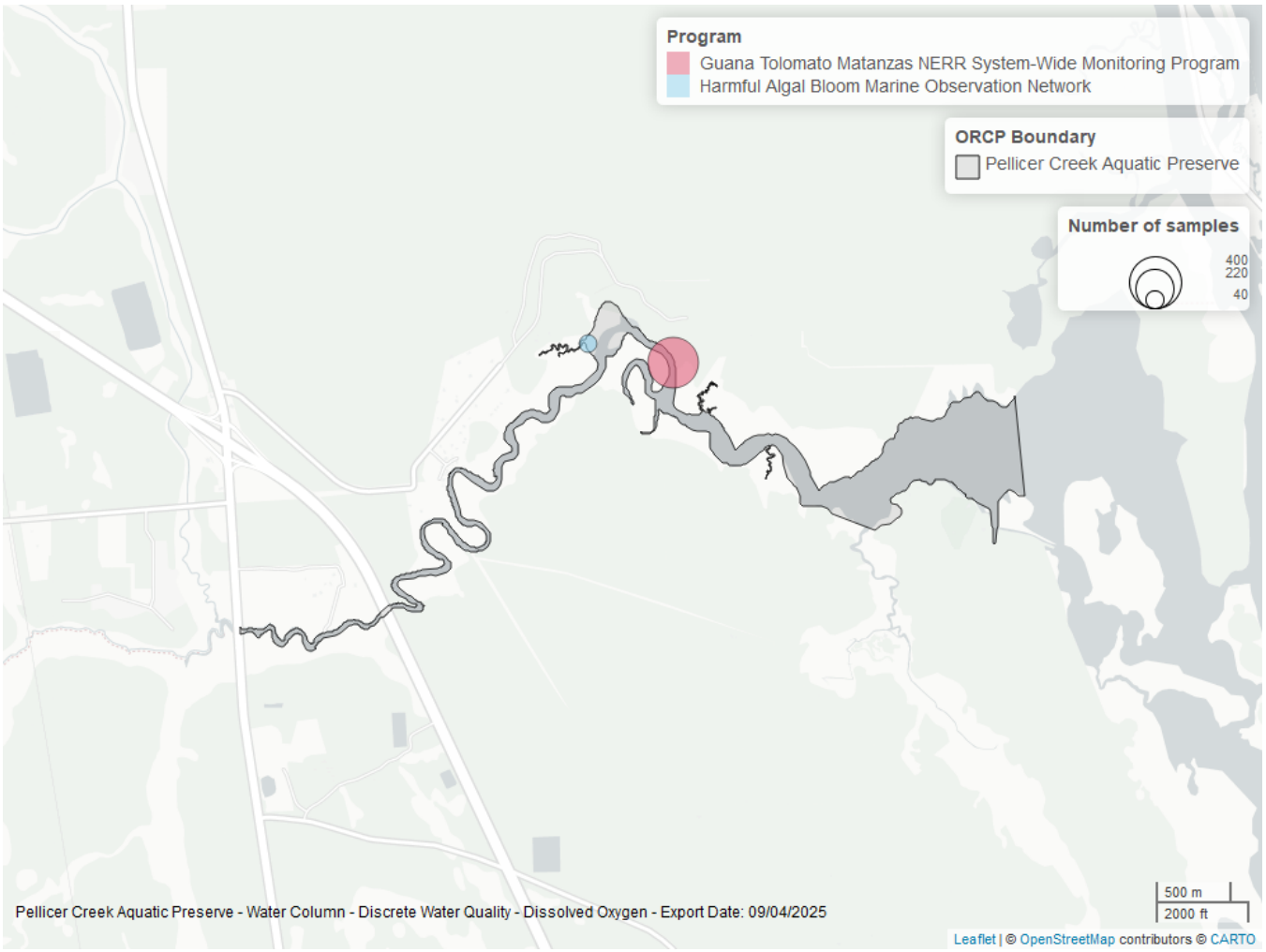

Figure 8: Map showing location of discrete water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 13: Programs contributing data for Dissolved Oxygen

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	2069	2002	2025
5002	164	2004	2022
95	51	2014	2018

Program names:

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

Dissolved Oxygen Saturation - Discrete

Seasonal Kendall-Tau Trend Analysis

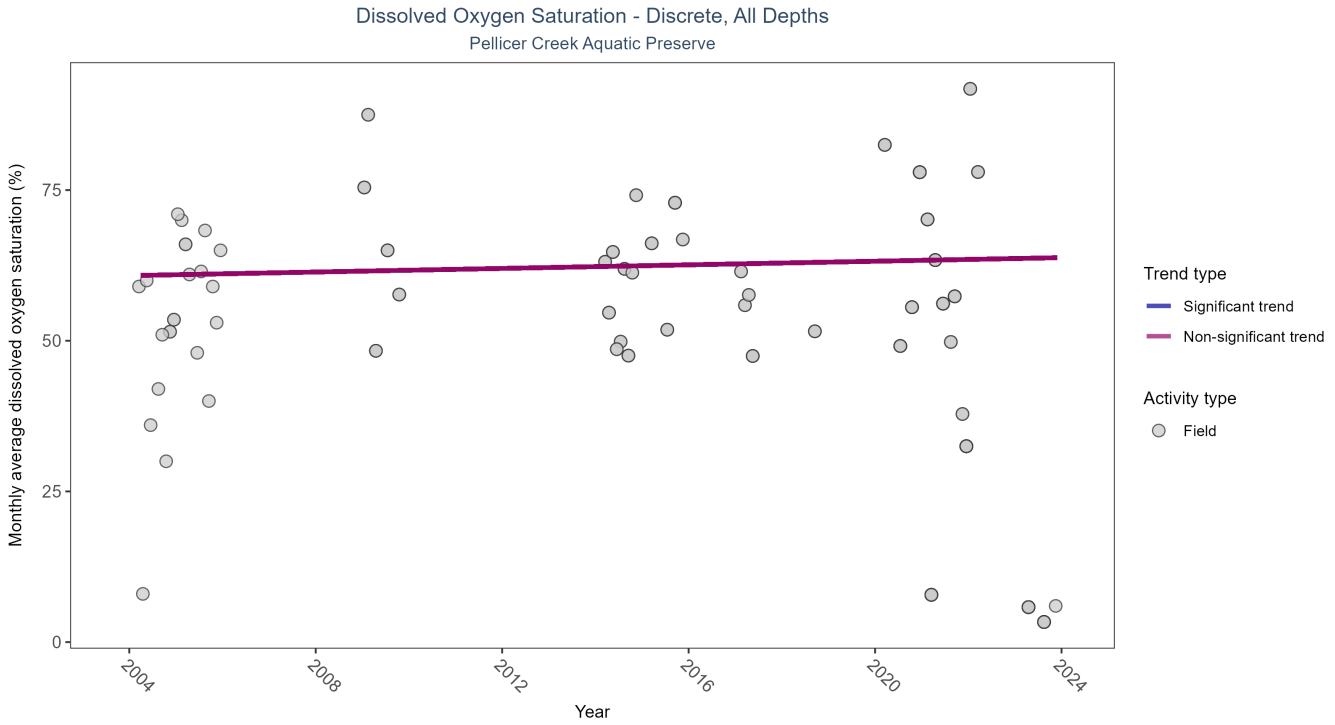

Figure 9: Scatter plot of monthly average dissolved oxygen saturation over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen saturation values measured in the field (circles) 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	No significant trend	201	11	2004 - 2023	55.5	0.0824	60.807	0.1492	0.6126

Dissolved oxygen saturation showed no detectable trend between 2004 and 2023.

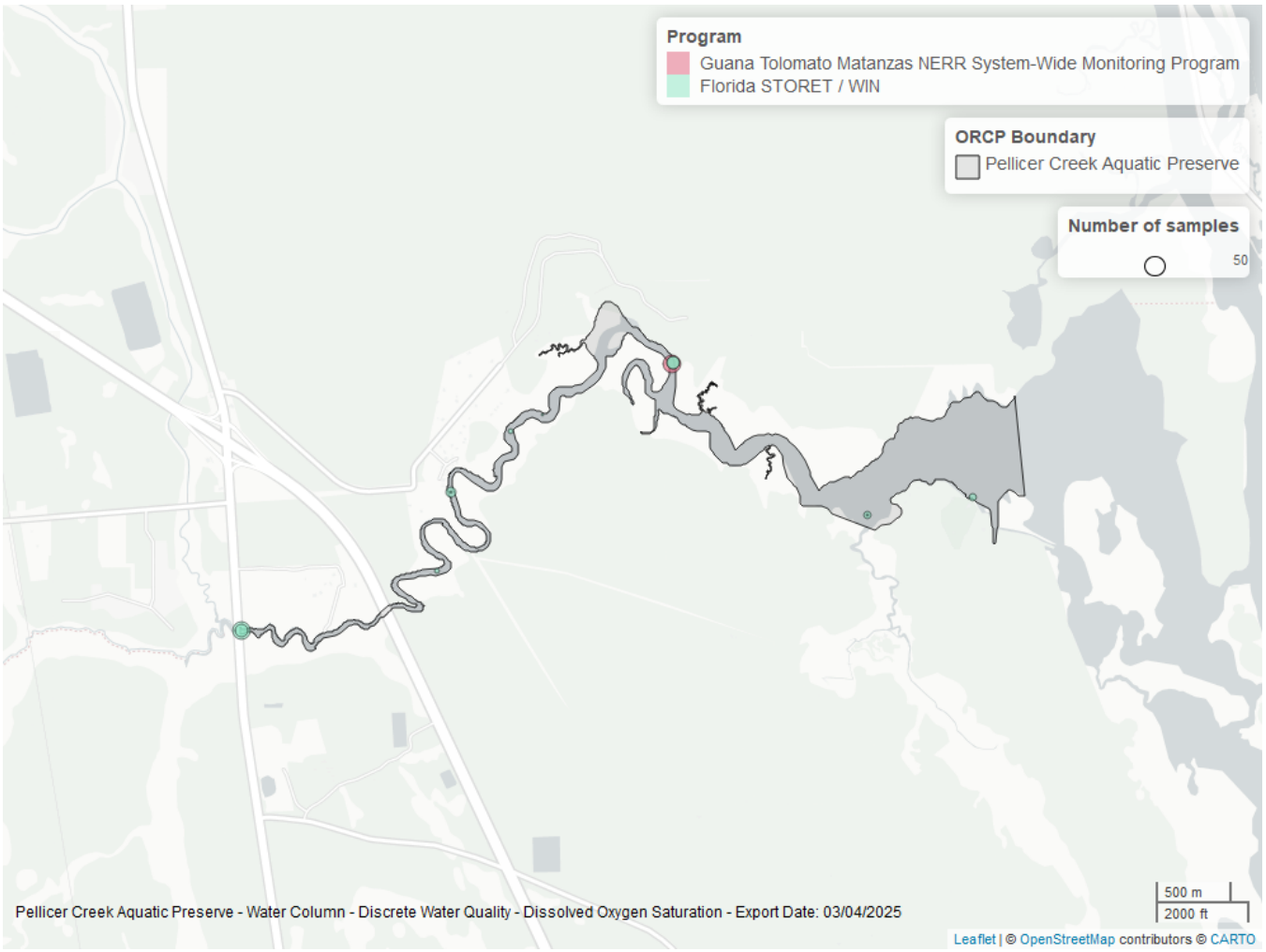

Figure 10: Map showing location of discrete water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 15: Programs contributing data for Dissolved Oxygen Saturation

ProgramID	*N_Data*	*YearMin*	*YearMax*
5002	166	2004	2022
4054	44	2021	2023

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]

pH - Discrete

Seasonal Kendall-Tau Trend Analysis

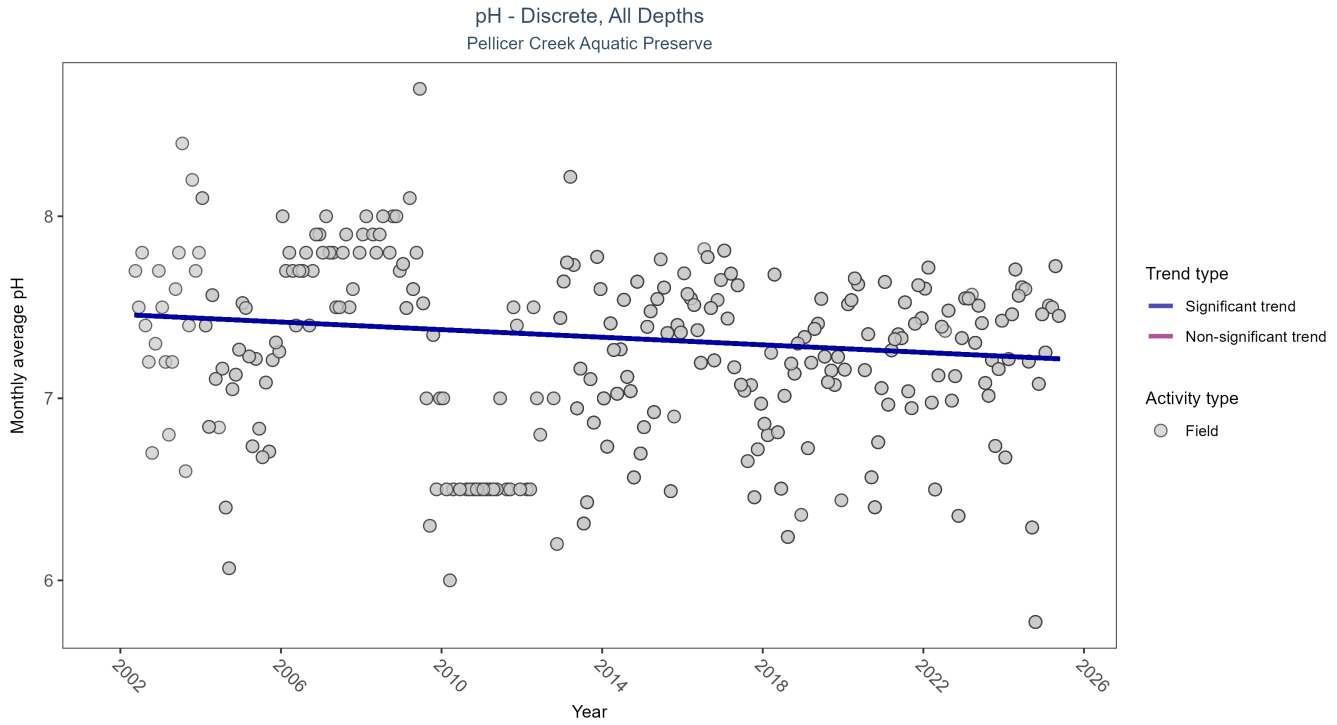

Figure 11: Scatter plot of monthly average pH over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only pH values measured in the field (circles) are included in the plot.

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	2261	24	2002 - 2025	7.29	-0.0957	7.4608	-0.0104	0.0306

Monthly average pH decreased by 0.01 pH units per year.

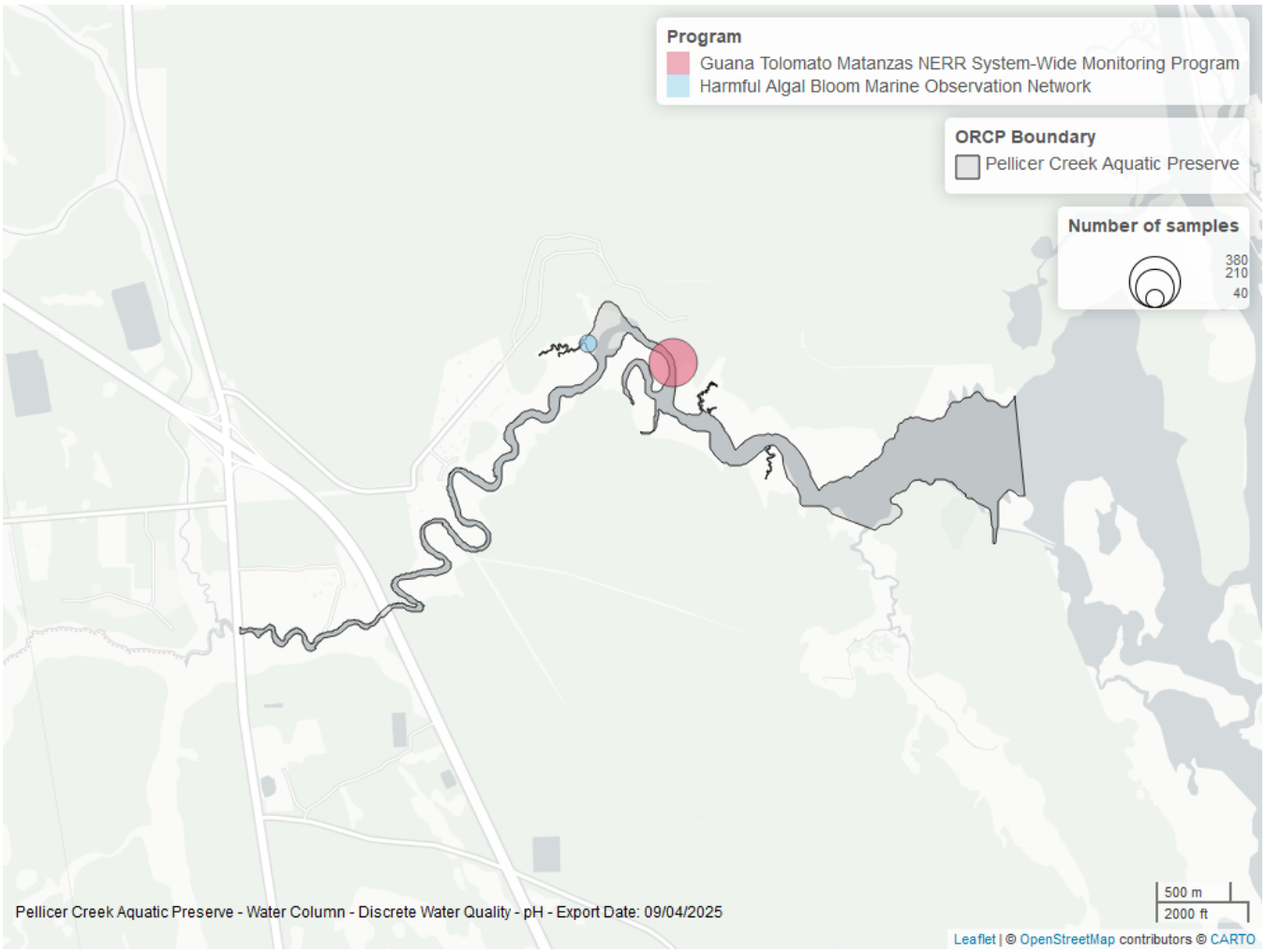

Figure 12: Map showing location of discrete water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 17: Programs contributing data for pH

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	2110	2002	2025
5002	168	2004	2022
95	51	2014	2018

Program names:

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

Salinity - Discrete

Seasonal Kendall-Tau Trend Analysis

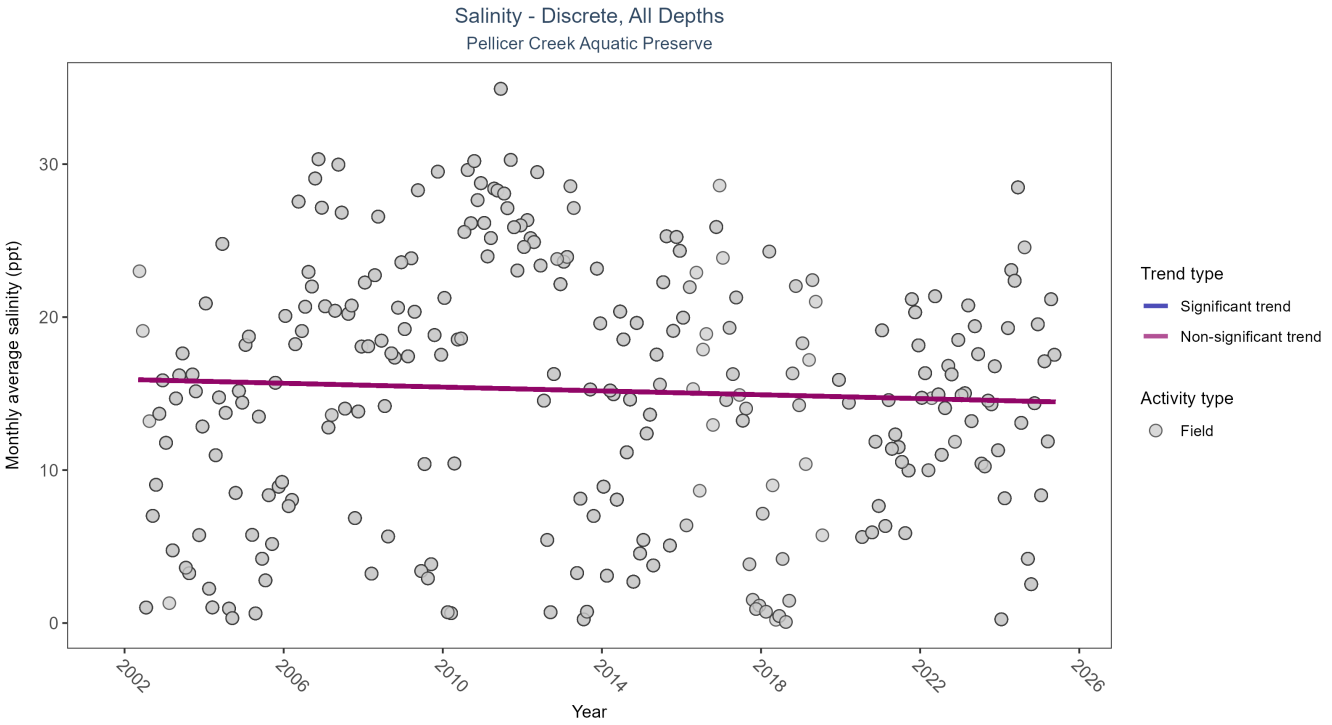

Figure 13: Scatter plot of monthly average salinity over time. If the time series included ten or more years of discrete observations, significant (blue) or non-significant (magenta) trend lines are also shown. Discrete salinity values derived from grab samples analyzed in the field (circles) or the 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	No significant trend	3012	24	2002 - 2025	16.2	-0.0362	15.9276	-0.0627	0.4357

Salinity showed no detectable trend between 2002 and 2025.

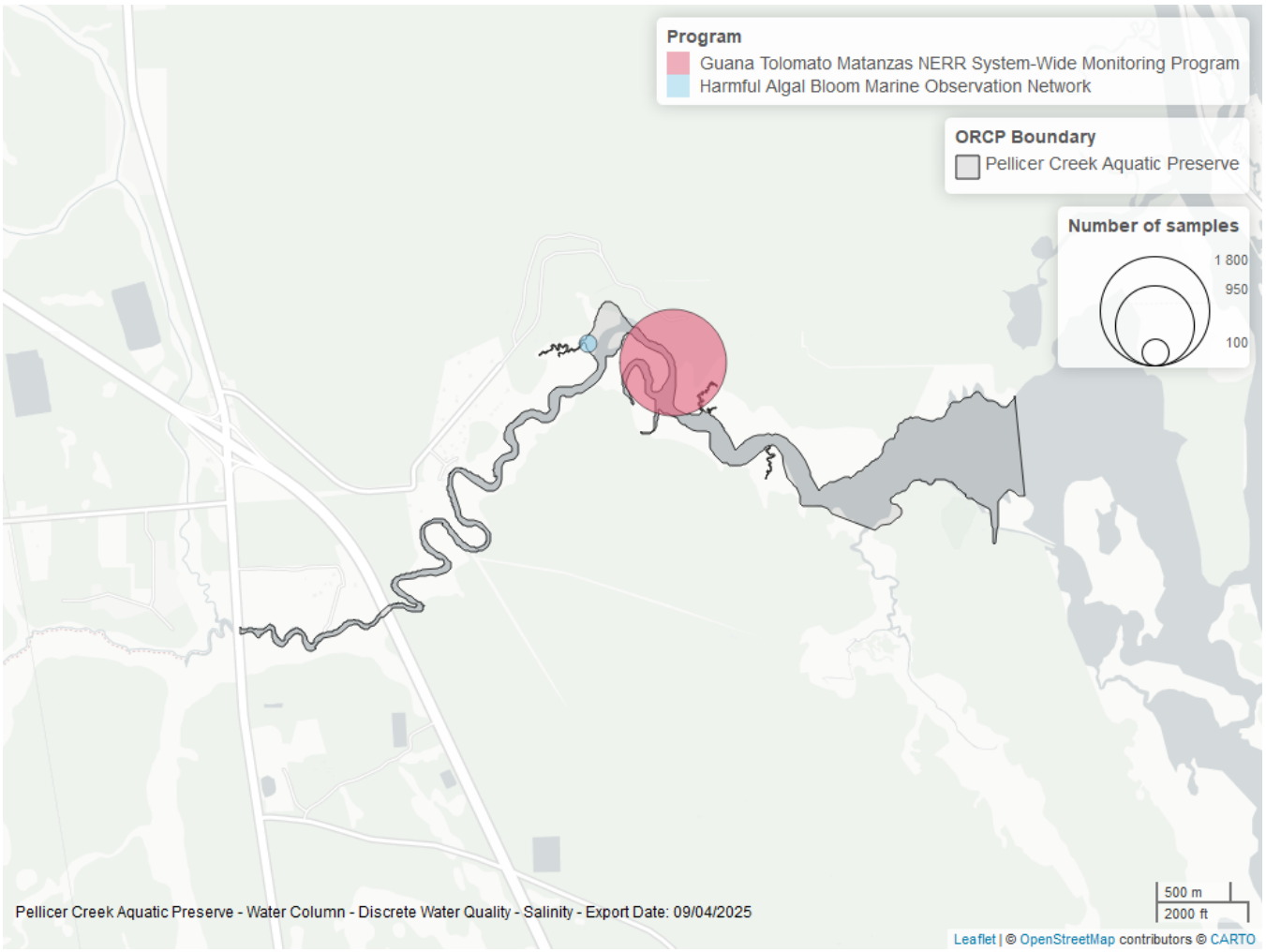

Figure 14: Map showing location of discrete water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 19: Programs contributing data for Salinity

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	2988	2002	2025
5002	159	2004	2022
95	52	2014	2018

Program names:

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

Secchi Depth - Discrete

Seasonal Kendall-Tau Trend Analysis

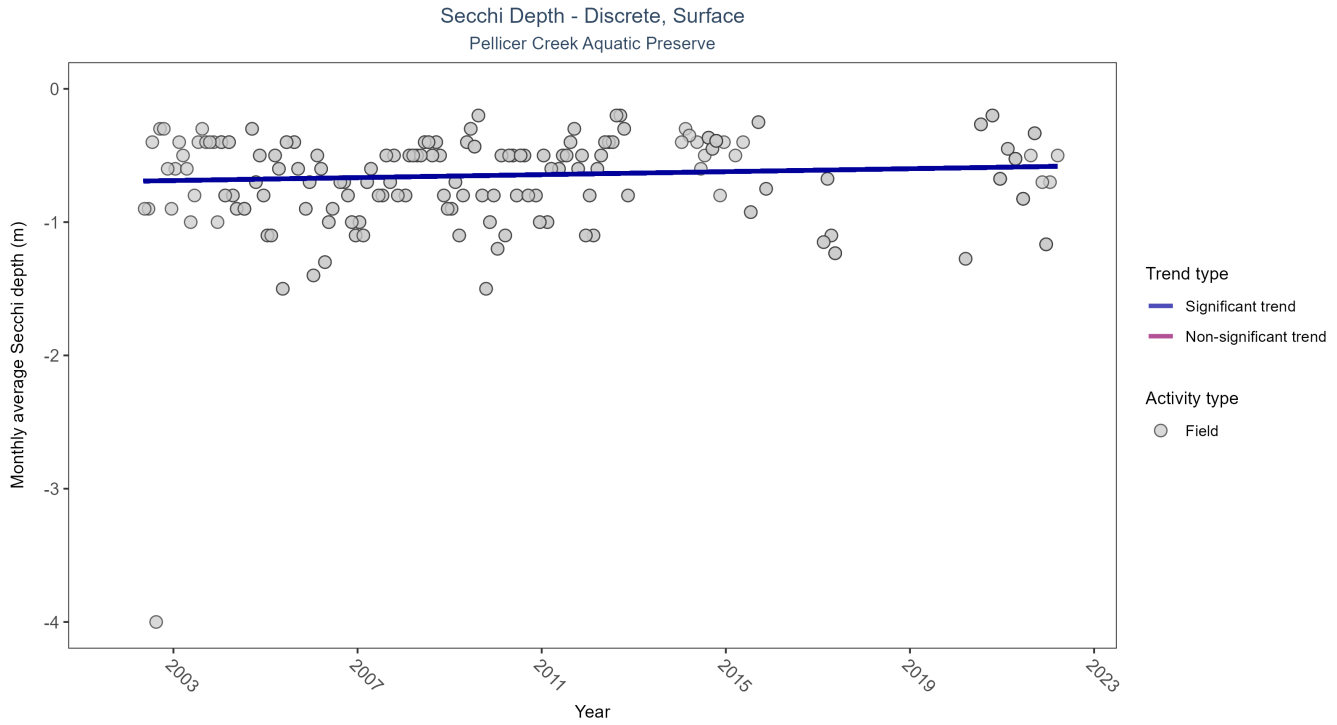

Figure 15: Scatter plot of monthly average Secchi depth over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Secchi depth is only measured in the field (circles).

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	Significantly increasing trend	359	17	2002 - 2022	-0.6	0.1251	-0.6937	0.0056	0.0435

Monthly average Secchi depth became shallower by 0.01 m per year, indicating a decrease in water clarity.

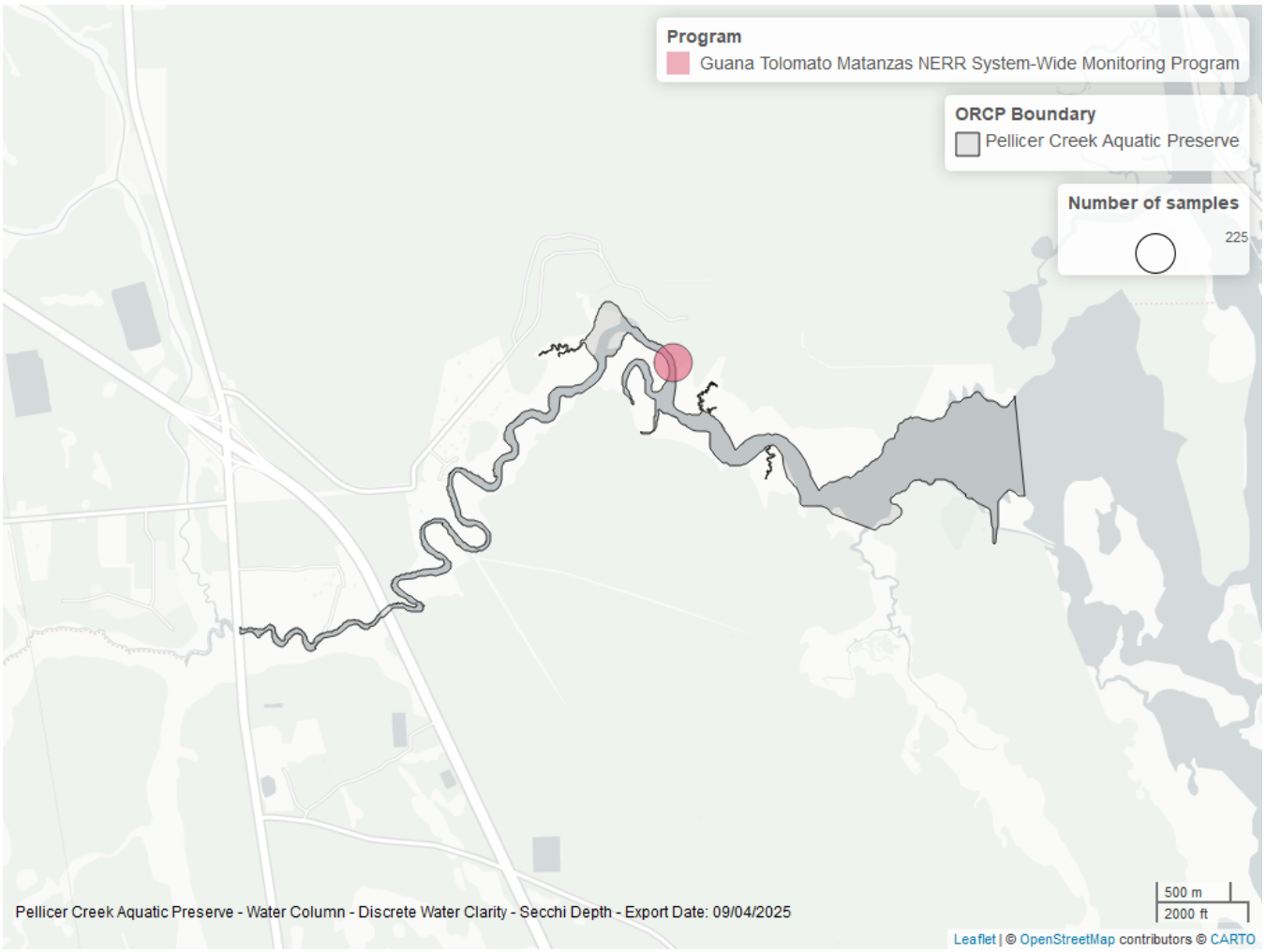

Figure 16: Map showing location of discrete water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 21: Programs contributing data for Secchi Depth

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	225	2002	2014
5002	134	2004	2022

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]

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

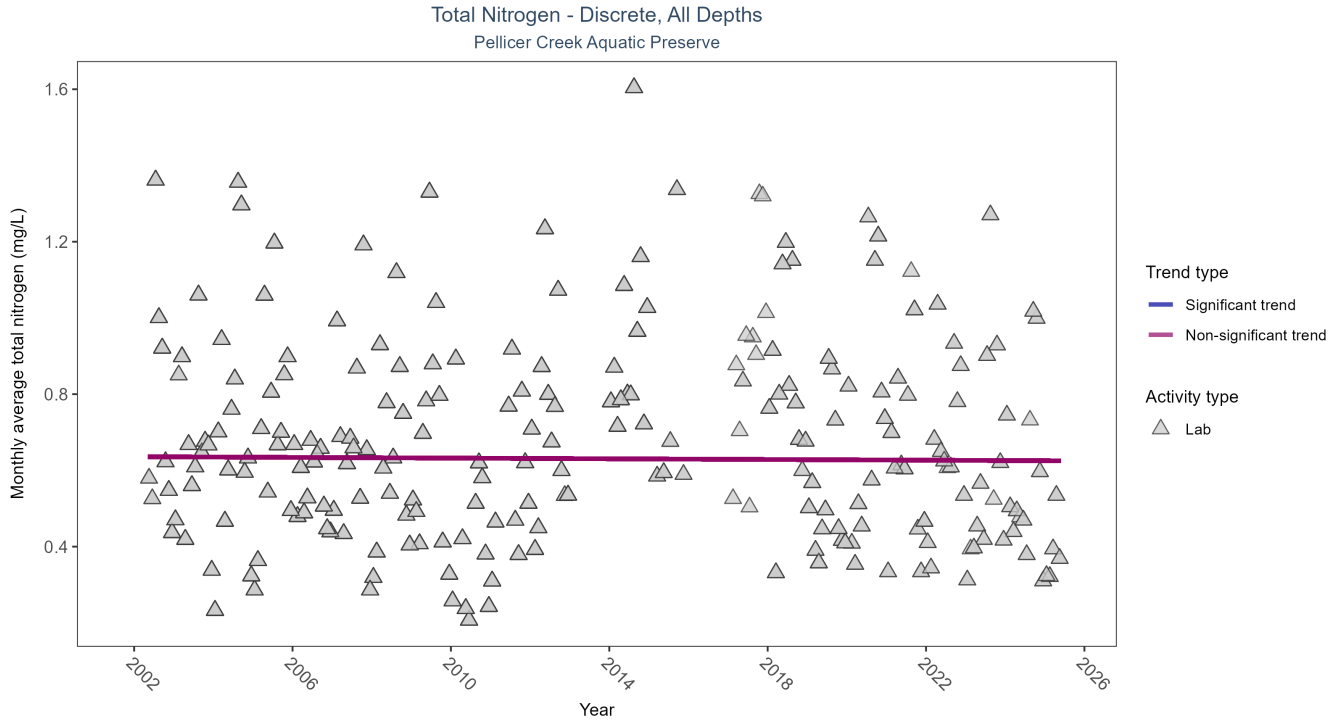

Figure 17: Scatter plot of monthly average total nitrogen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only nitrogen values obtained from laboratory analyses (triangles) are included in the 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	1971	22	2002 - 2025	0.638	-0.0086	0.6359	-0.0005	0.8722

Total nitrogen showed no detectable trend between 2002 and 2025.

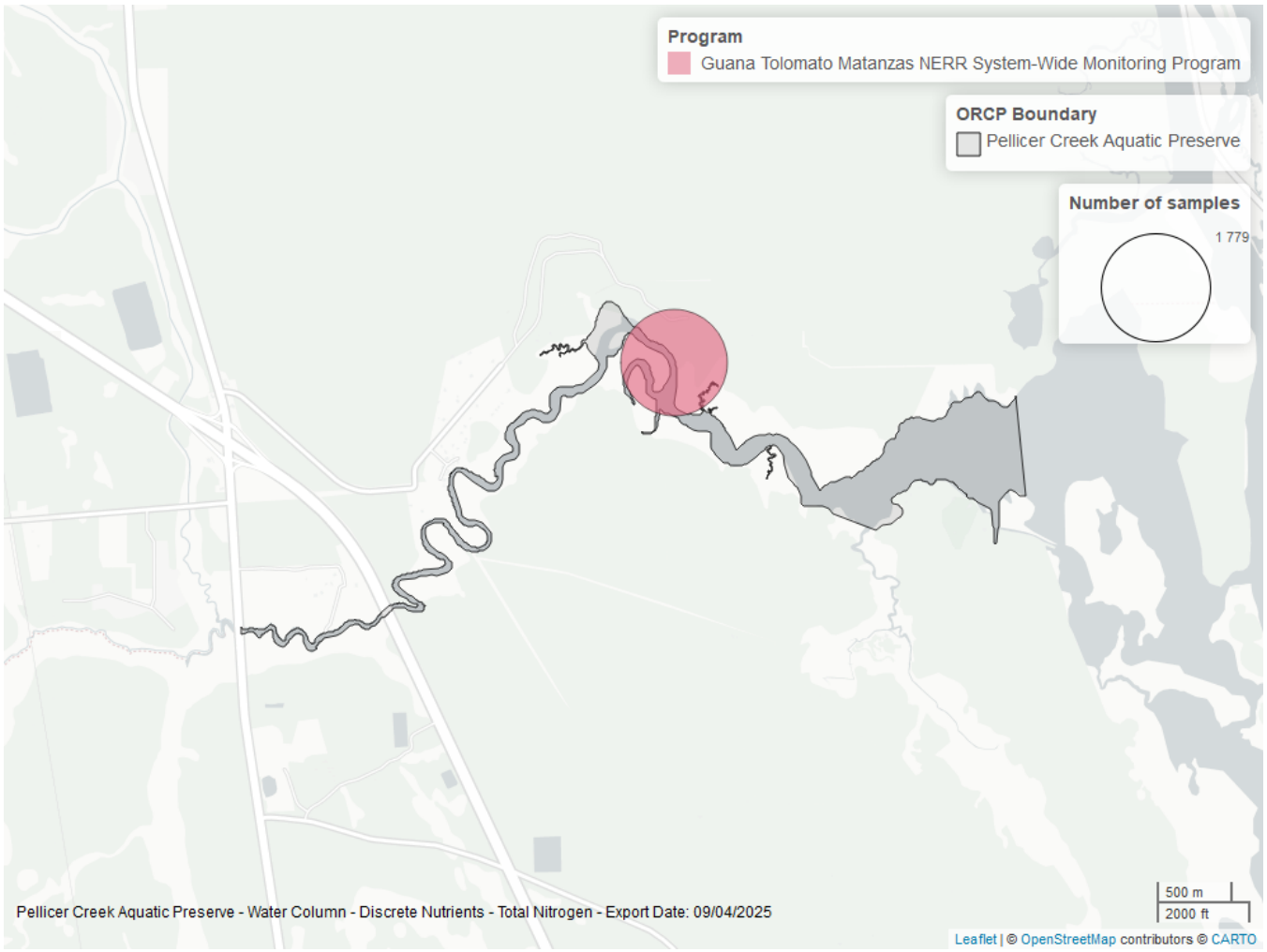

Figure 18: Map showing location of discrete water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 23: Programs contributing data for Total Nitrogen

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	2001	2002	2025
5002	73	2004	2021

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]

Total Phosphorus - Discrete

Seasonal Kendall-Tau Trend Analysis

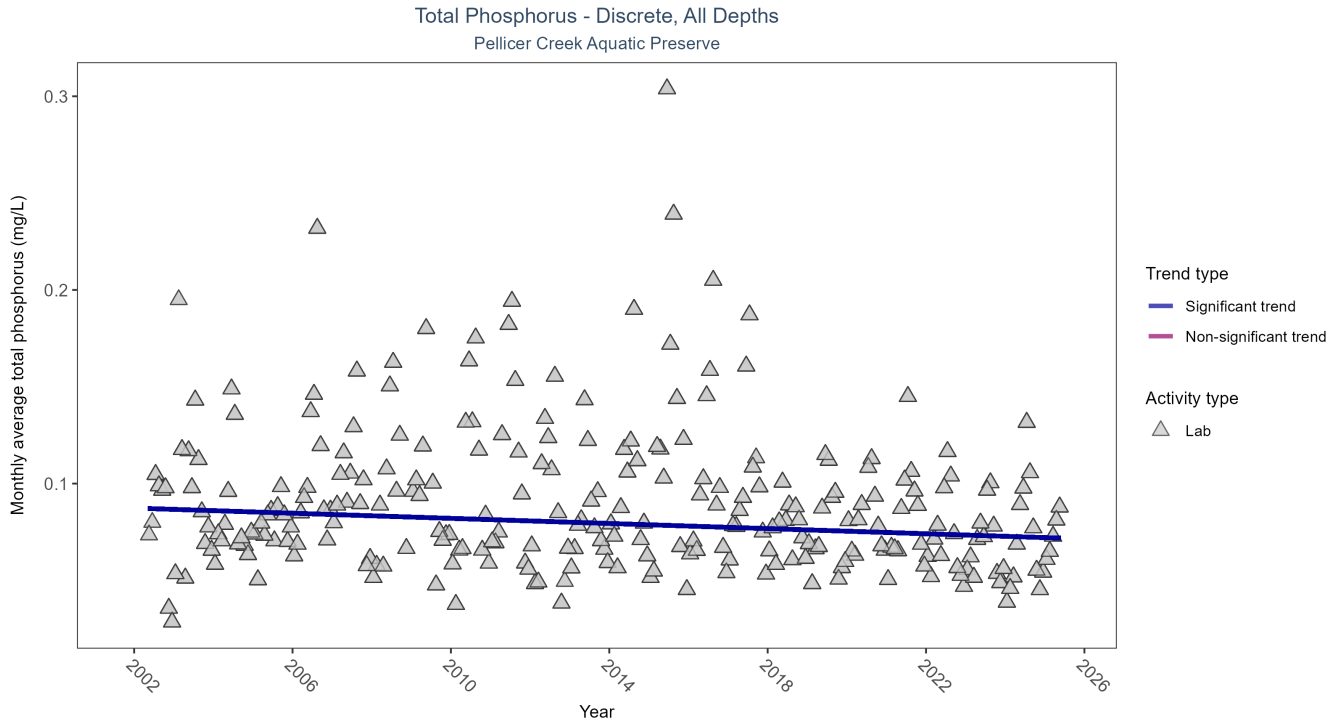

Figure 19: Scatter plot of monthly average total phosphorus over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only phosphorus values obtained from laboratory analyses (triangles) are included 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	3679	24	2002 - 2025	0.081	-0.1759	0.0873	-0.0007	0.0001

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

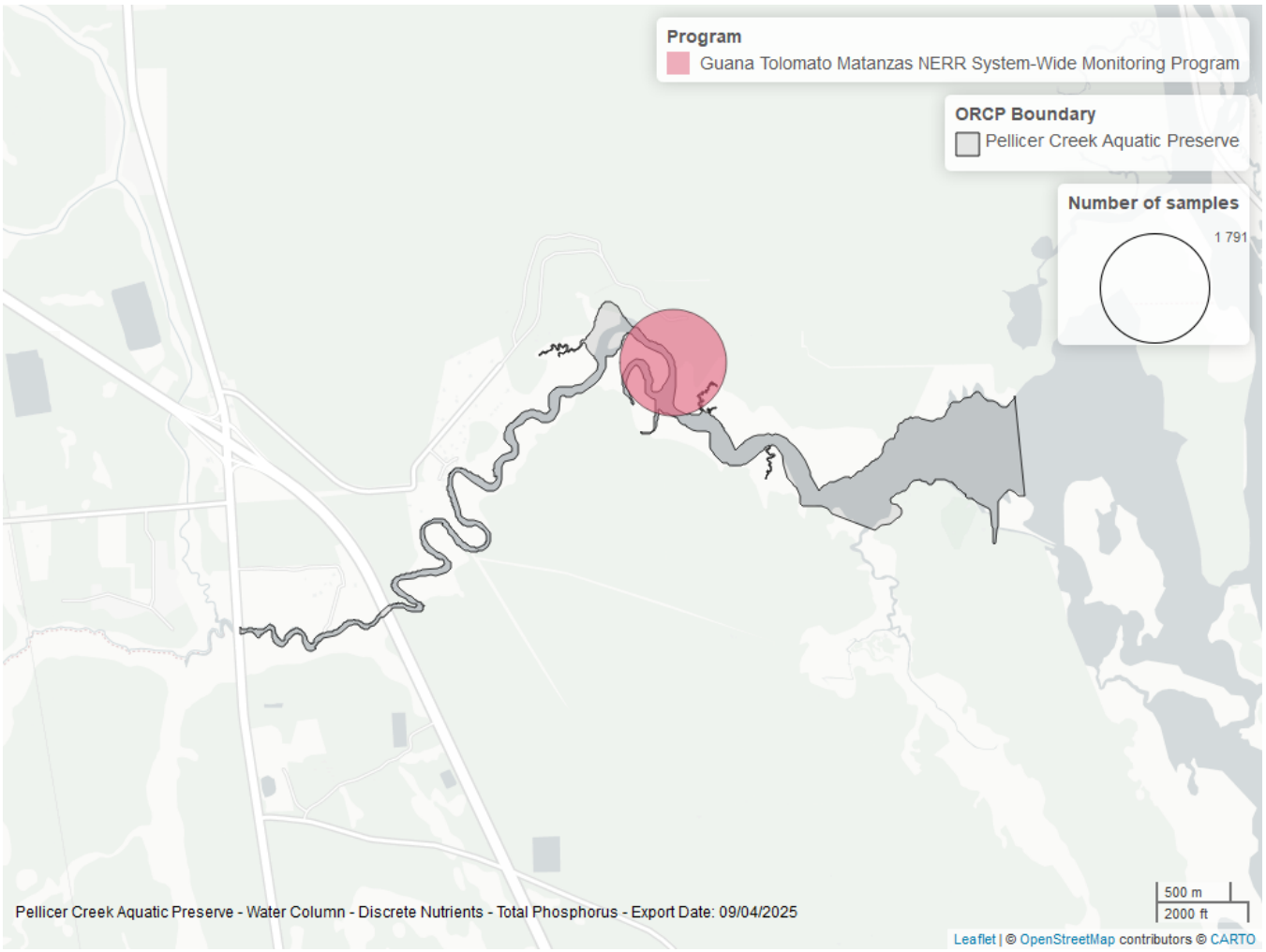

Figure 20: Map showing location of discrete water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 25: Programs contributing data for Total Phosphorus

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	3748	2002	2025
5002	76	2004	2021

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]

Total Suspended Solids - Discrete

Seasonal Kendall-Tau Trend Analysis

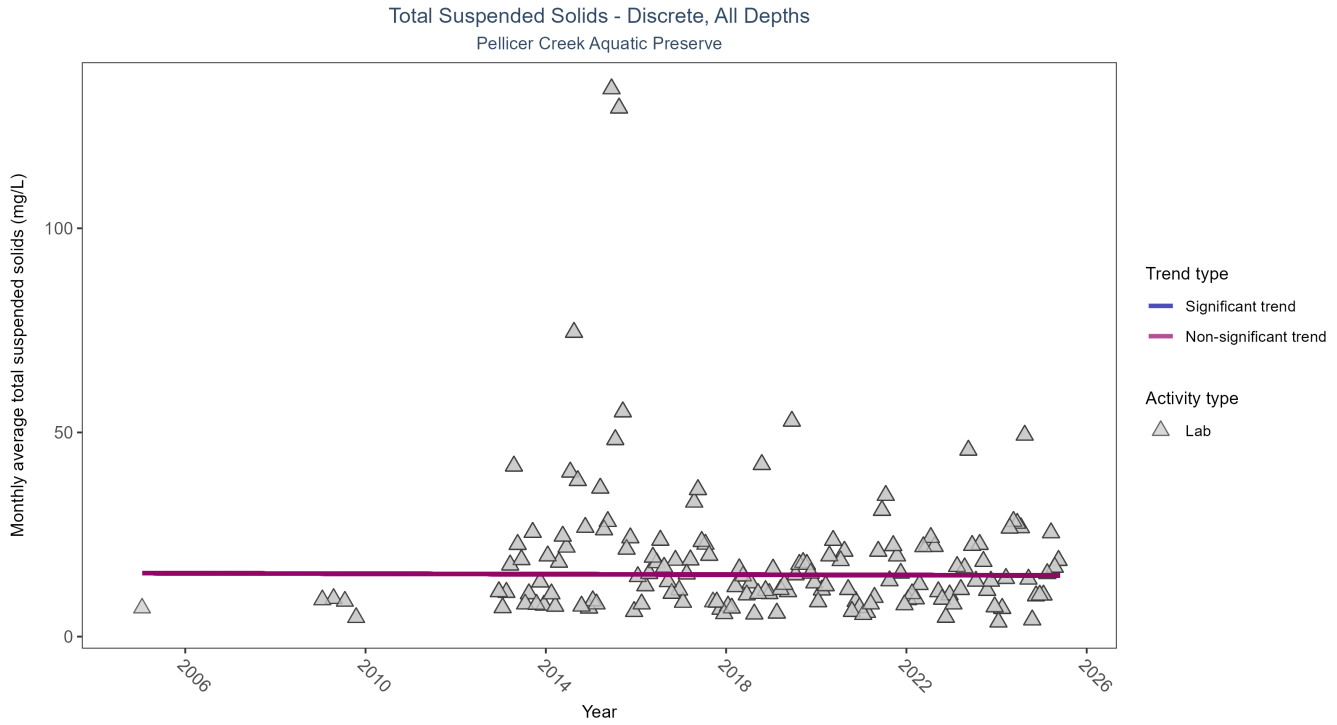

Figure 21: Scatter plot of monthly average total suspended solids (TSS) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only TSS values obtained from laboratory analyses (triangles) are included 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	No significant trend	1868	16	2005 - 2025	14	-0.0086	15.5404	-0.0278	0.8867

Total suspended solids showed no detectable trend between 2005 and 2025.

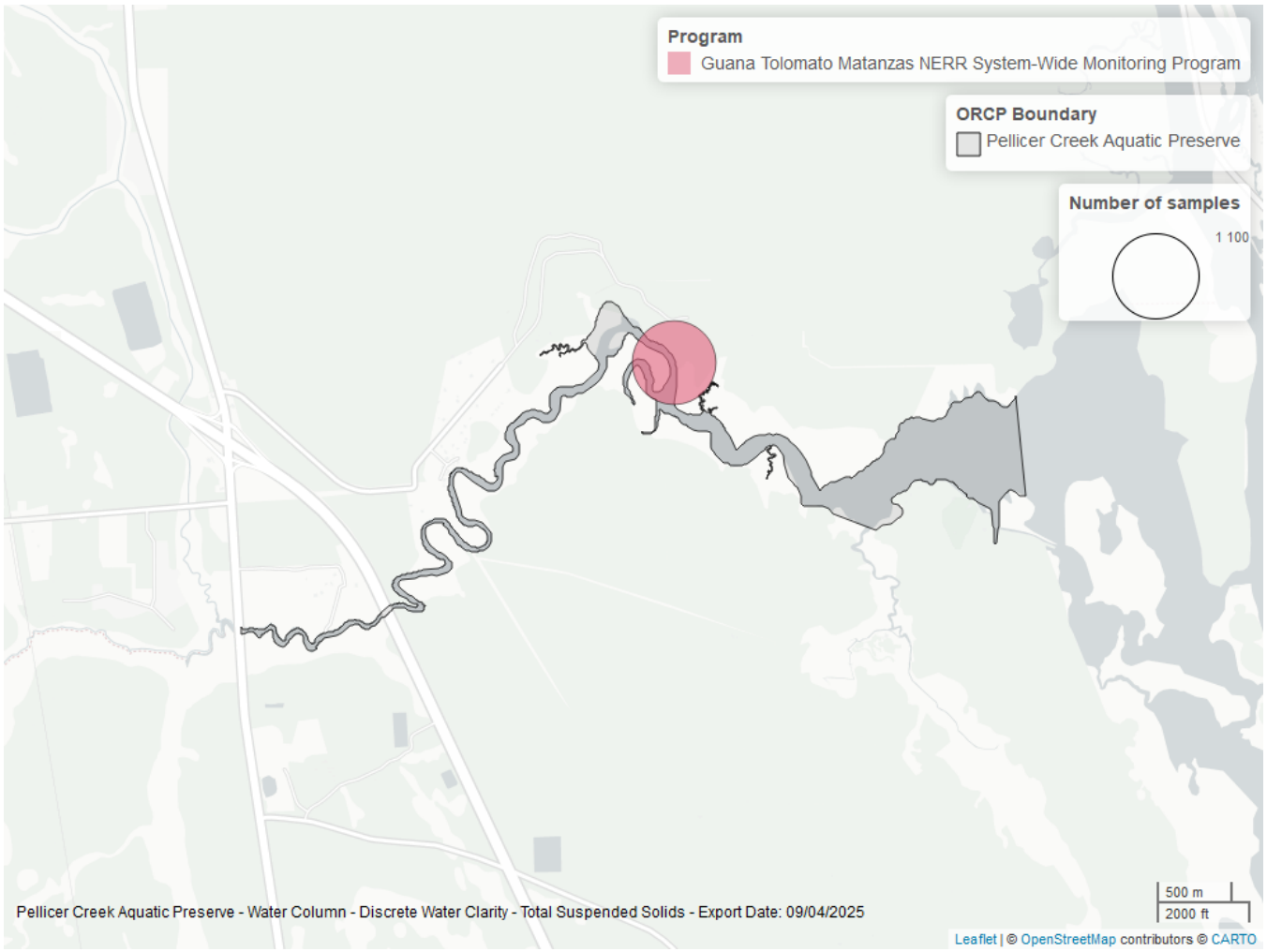

Figure 22: Map showing location of discrete water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 27: Programs contributing data for Total Suspended Solids

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	3000	2002	2025
5002	57	2005	2021

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]

Turbidity - Discrete

Seasonal Kendall-Tau Trend Analysis

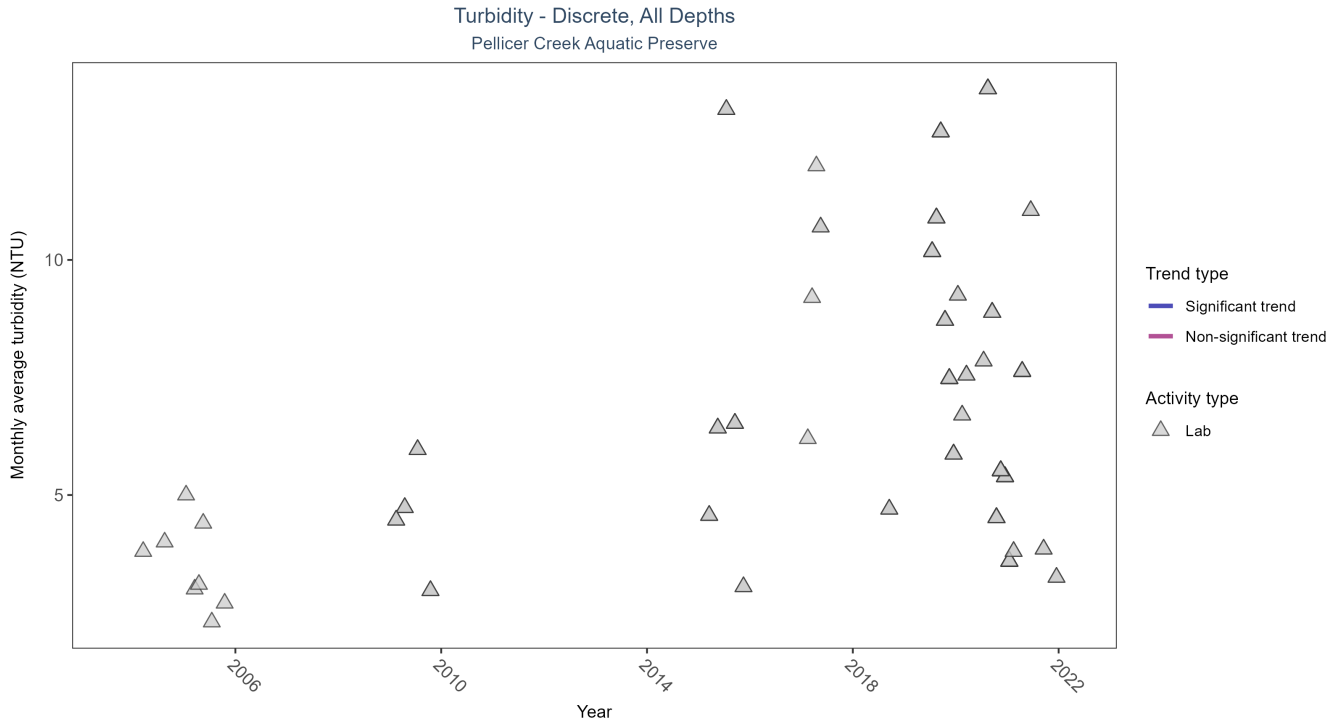

Figure 23: Scatter plot of monthly average turbidity over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only turbidity values measured in the laboratory (triangles) are included in the plot.

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	Insufficient data to calculate trend	237	9	2004 - 2021	7	-	-	-	-

There was insufficient data to fit a model for turbidity.

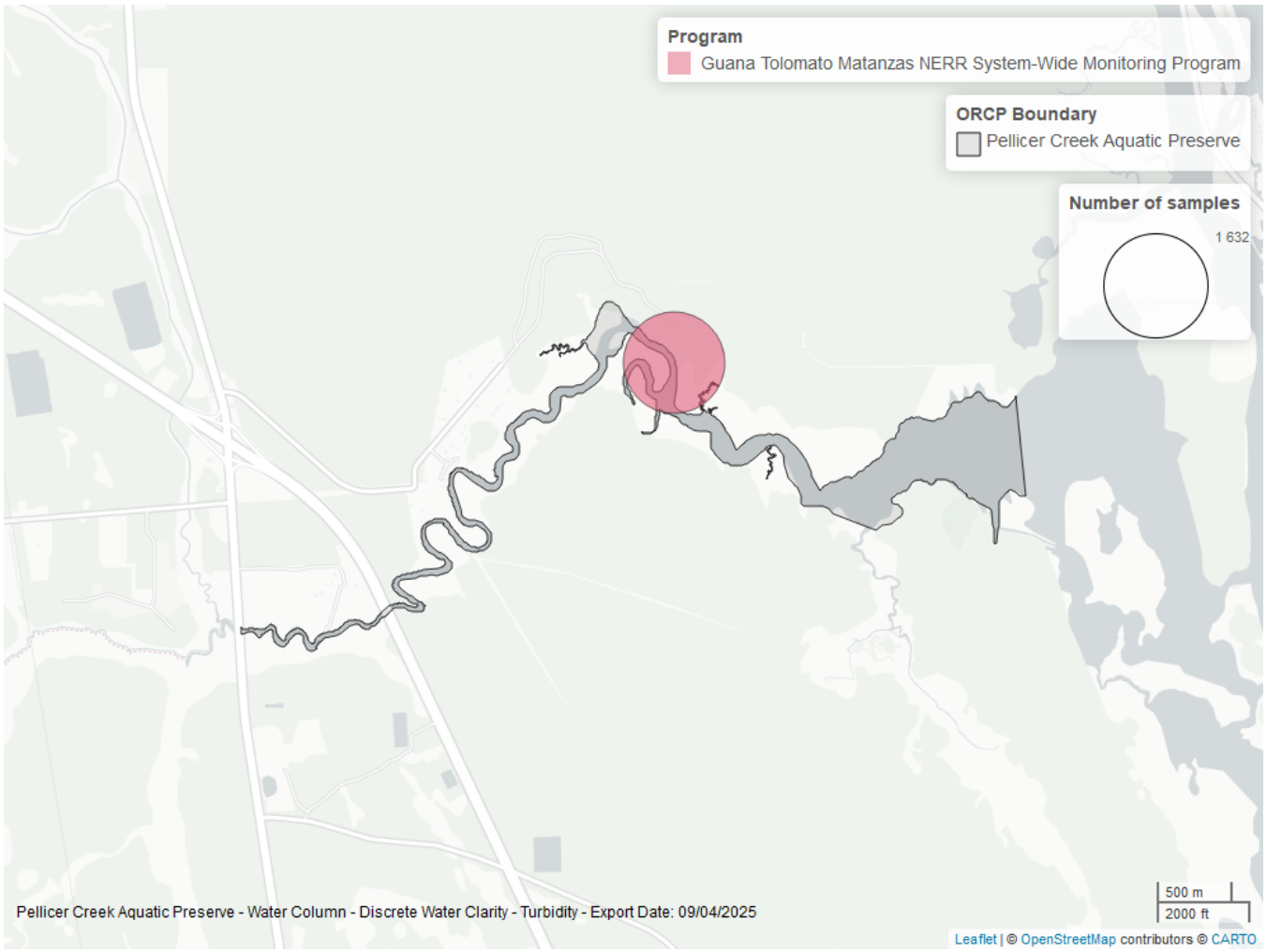

Figure 24: Map showing location of discrete water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 29: Programs contributing data for Turbidity

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	1814	2002	2021
5002	67	2004	2021

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]
5002 - Florida STORET / WIN[2]

Water Temperature - Discrete

Seasonal Kendall-Tau Trend Analysis

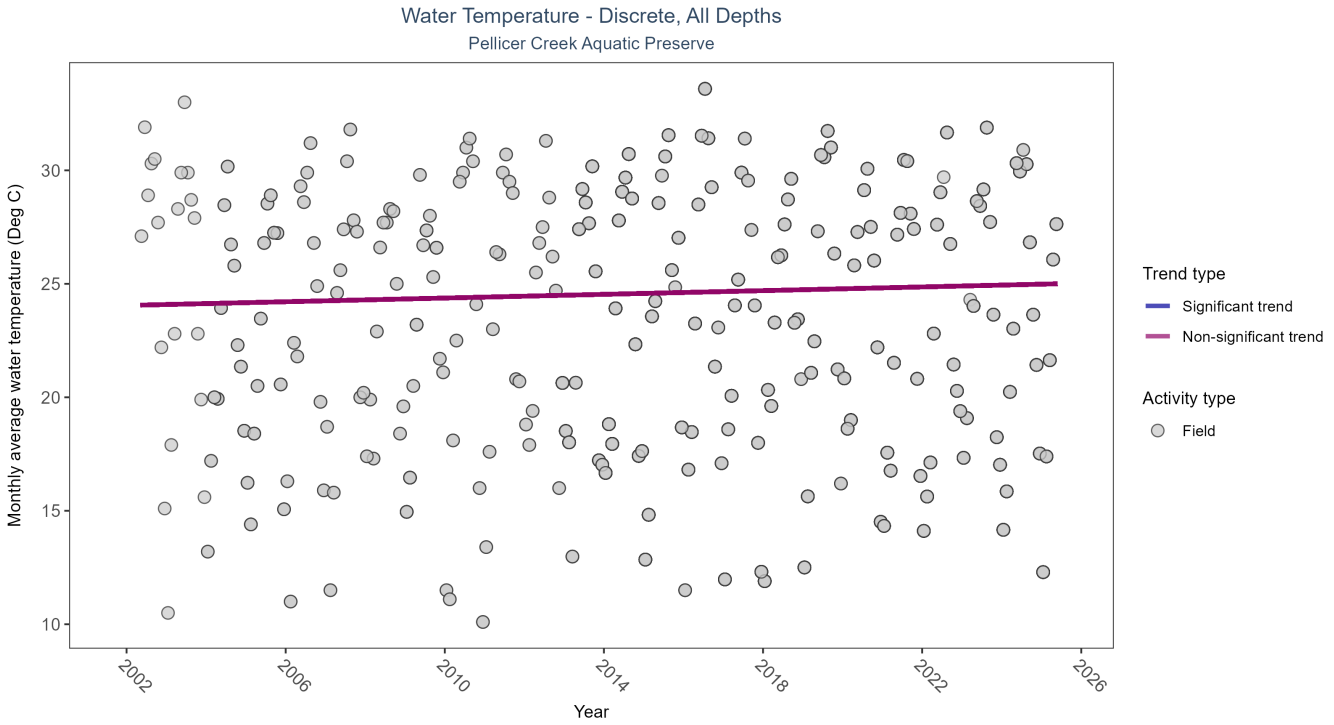

Figure 25: Scatter plot of monthly average water temperature over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only water temperature measurements taken in the field (circles) are included in 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	No significant trend	2353	24	2002 - 2025	23.8	0.0797	24.0476	0.0407	0.0648

Water temperature showed no detectable trend between 2002 and 2025.

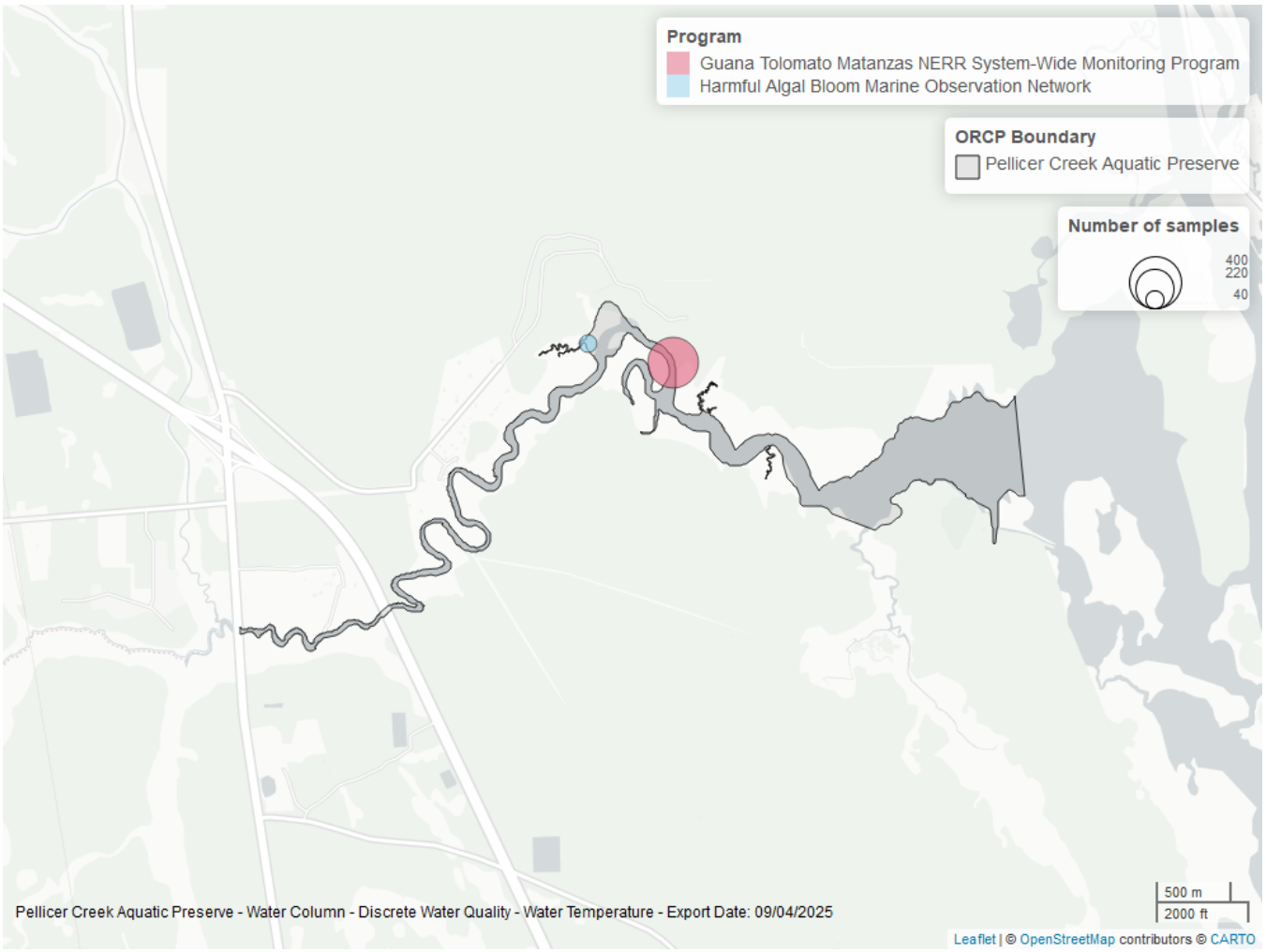

Figure 26: Map showing location of discrete water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Table 31: Programs contributing data for Water Temperature

ProgramID	*N_Data*	*YearMin*	*YearMax*
4054	2148	2002	2025
5002	168	2004	2022
95	52	2014	2018

Program names:

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

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 Pellicer Creek Aquatic Preserve

Table 32: Station overview for Continuous parameters by Program

ProgramID	*ProgramLocationID*	*Years of Data*	*Use in Analysis*	*Parameters*
4054	gtmpcwq	25	TRUE	DO , DOS , pH , Sal , Turb , TempW

Program names:

4054 - Guana Tolomato Matanzas National Estuarine Research Reserve System-Wide Monitoring Program[1]

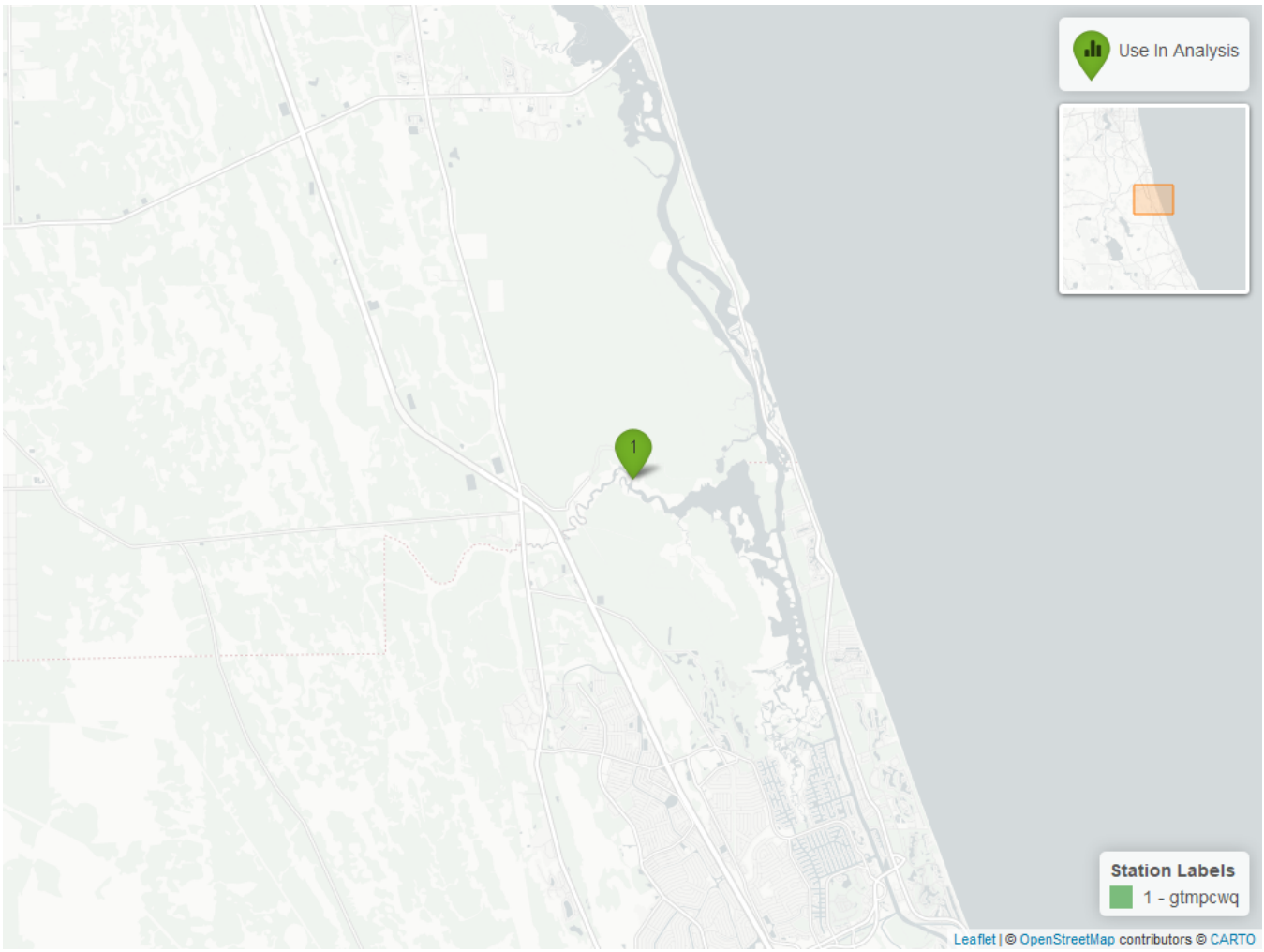

Figure 27: Map showing continuous water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. Sites marked as *Use In Analysis* (green) are featured in this report.

Dissolved Oxygen - Continuous

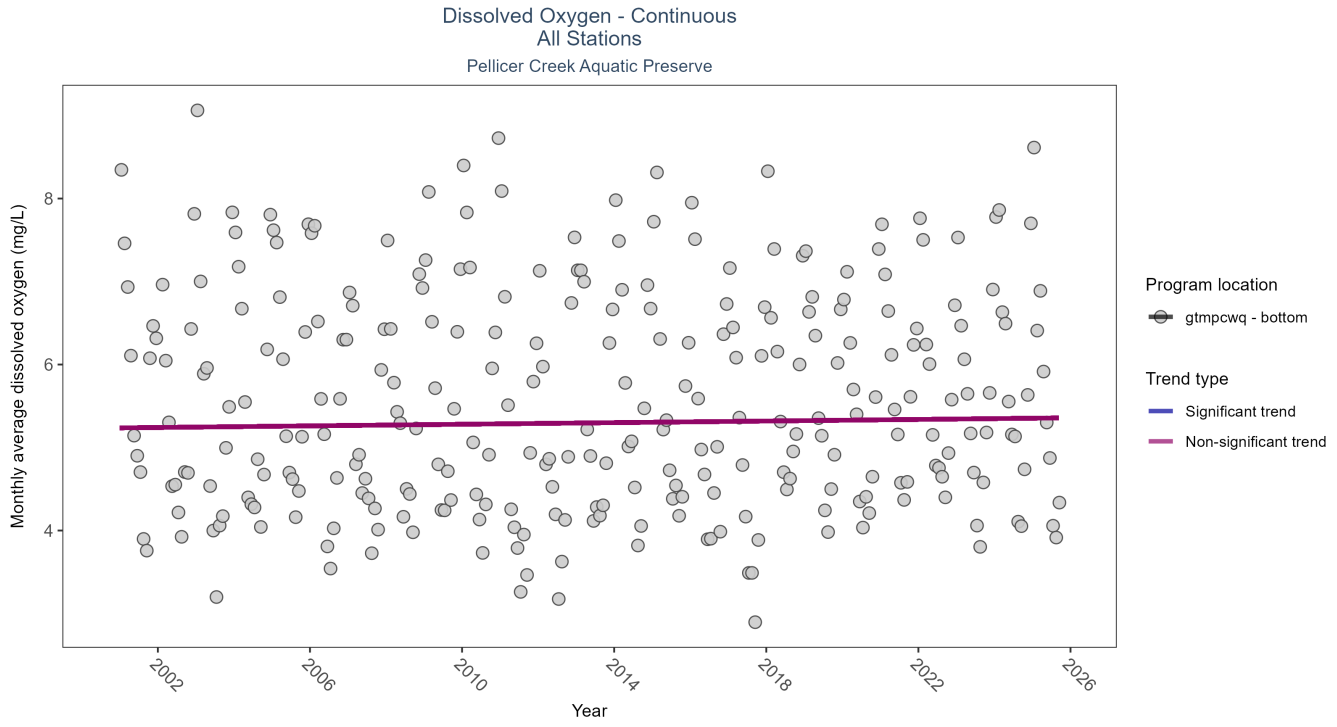

Figure 28: Scatter plot of monthly average dissolved oxygen over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
gtmpcwq	No significant trend	721785	25	2001 - 2025	5.5	0.05	5.24	0	0.25

No detectable change in monthly average dissolved oxygen was observed at one location.

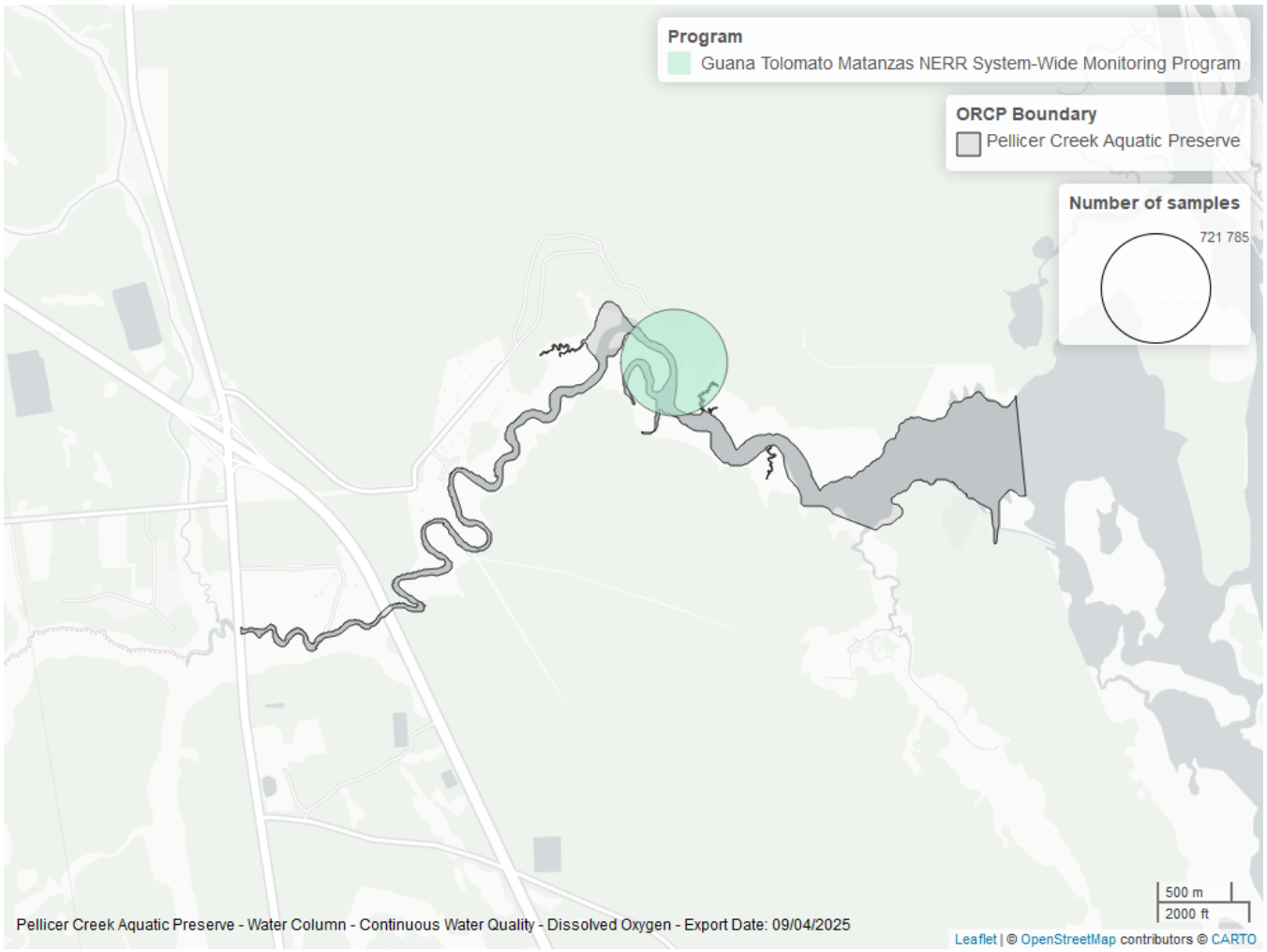

Figure 29: Map showing location of dissolved oxygen continuous water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen Saturation - Continuous

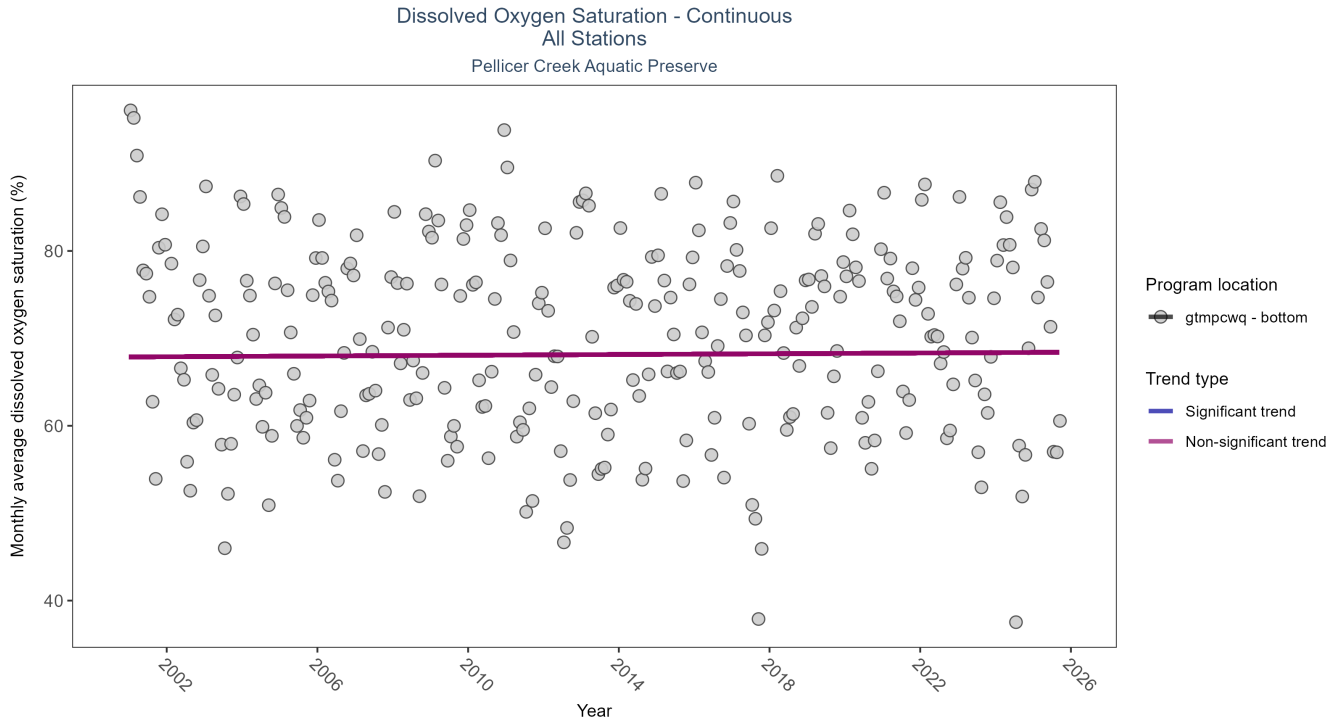

Figure 30: Scatter plot of monthly average dissolved oxygen saturation over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
gtmpcwq	No significant trend	723278	25	2001 - 2025	71.4	0.01	67.88	0.02	0.69

No detectable change in monthly average dissolved oxygen saturation was observed at one location.

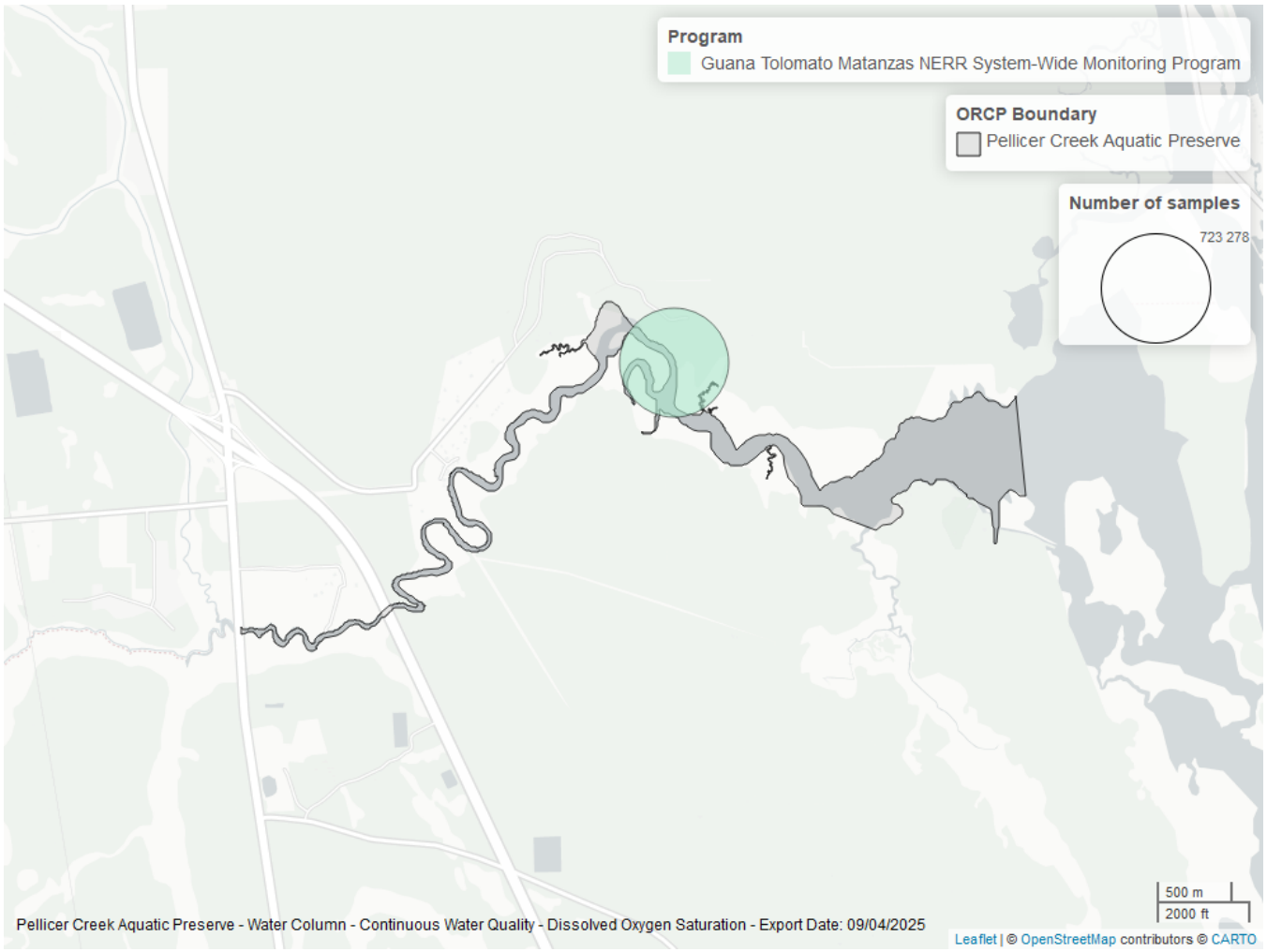

Figure 31: Map showing location of dissolved oxygen saturation continuous water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

pH - Continuous

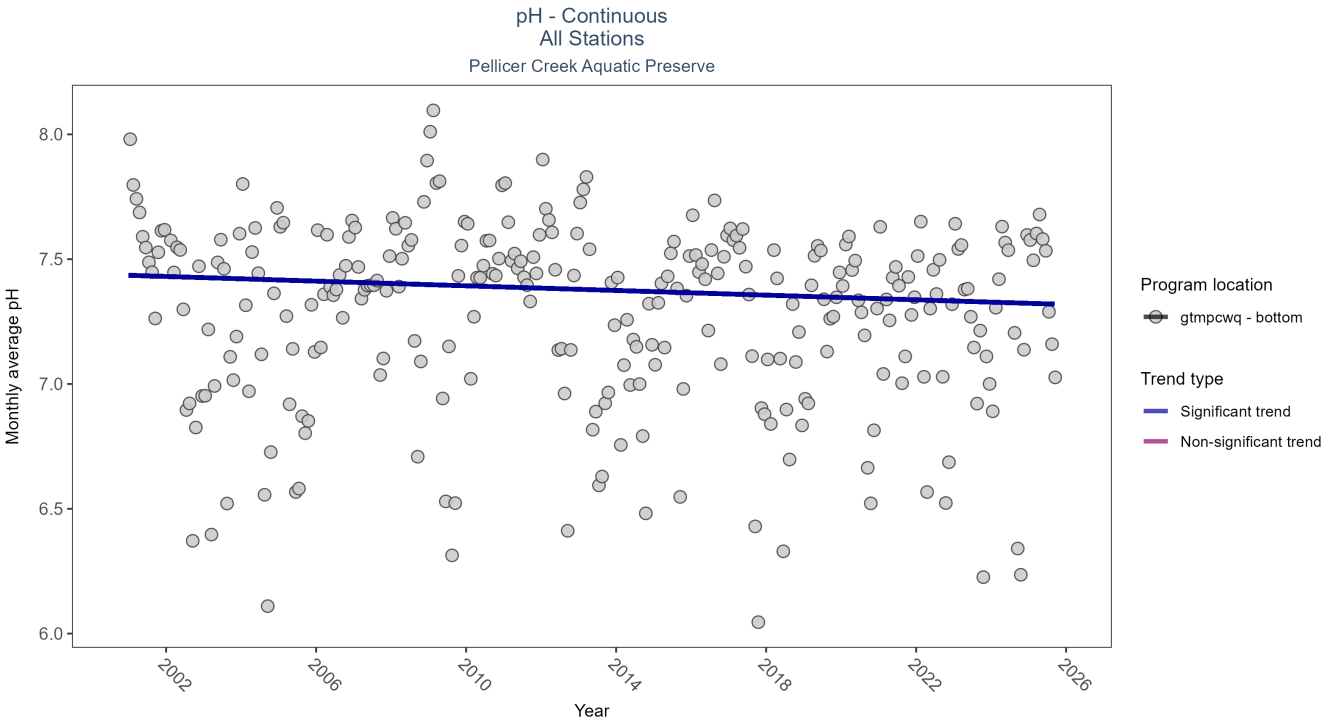

Figure 32: Scatter plot of monthly average pH over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
gtmpcwq	Significantly decreasing trend	716012	25	2001 - 2025	7.4	-0.1	7.44	0	0.02

At one program location, monthly average pH decreased by less than 0.01 pH units per year.

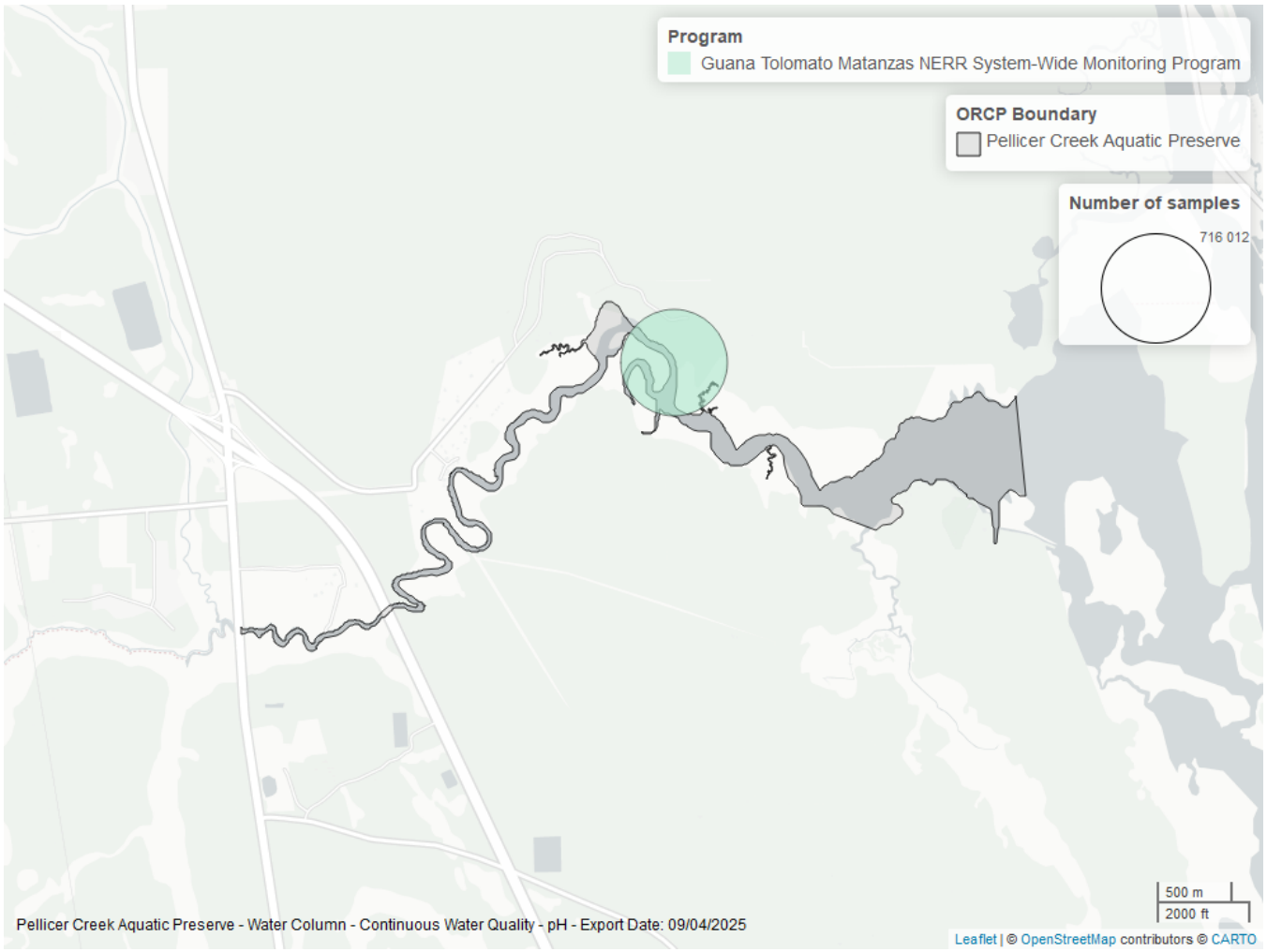

Figure 33: Map showing location of ph continuous water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Salinity - Continuous

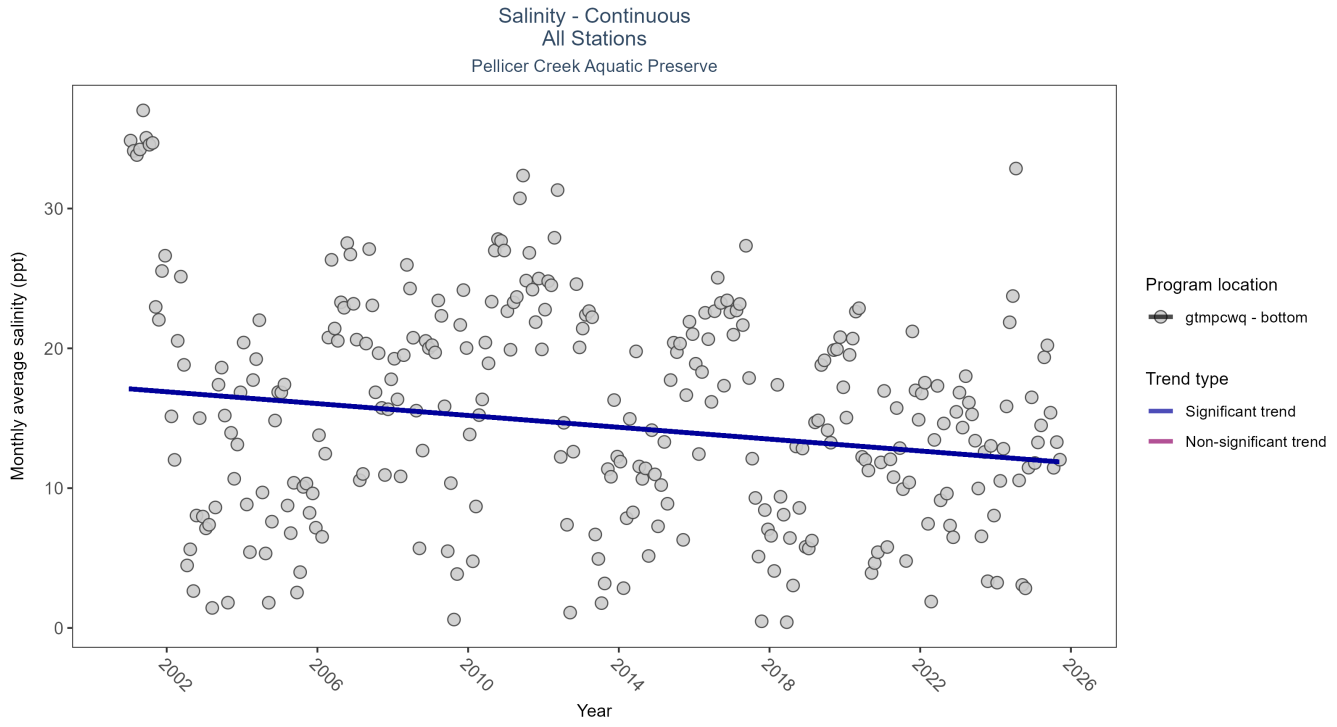

Figure 34: Scatter plot of monthly average salinity over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
gtmpcwq	Significantly decreasing trend	731565	25	2001 - 2025	16.6	-0.14	17.1	-0.21	0

At one program location, monthly average salinity decreased by 0.21 ppt per year.

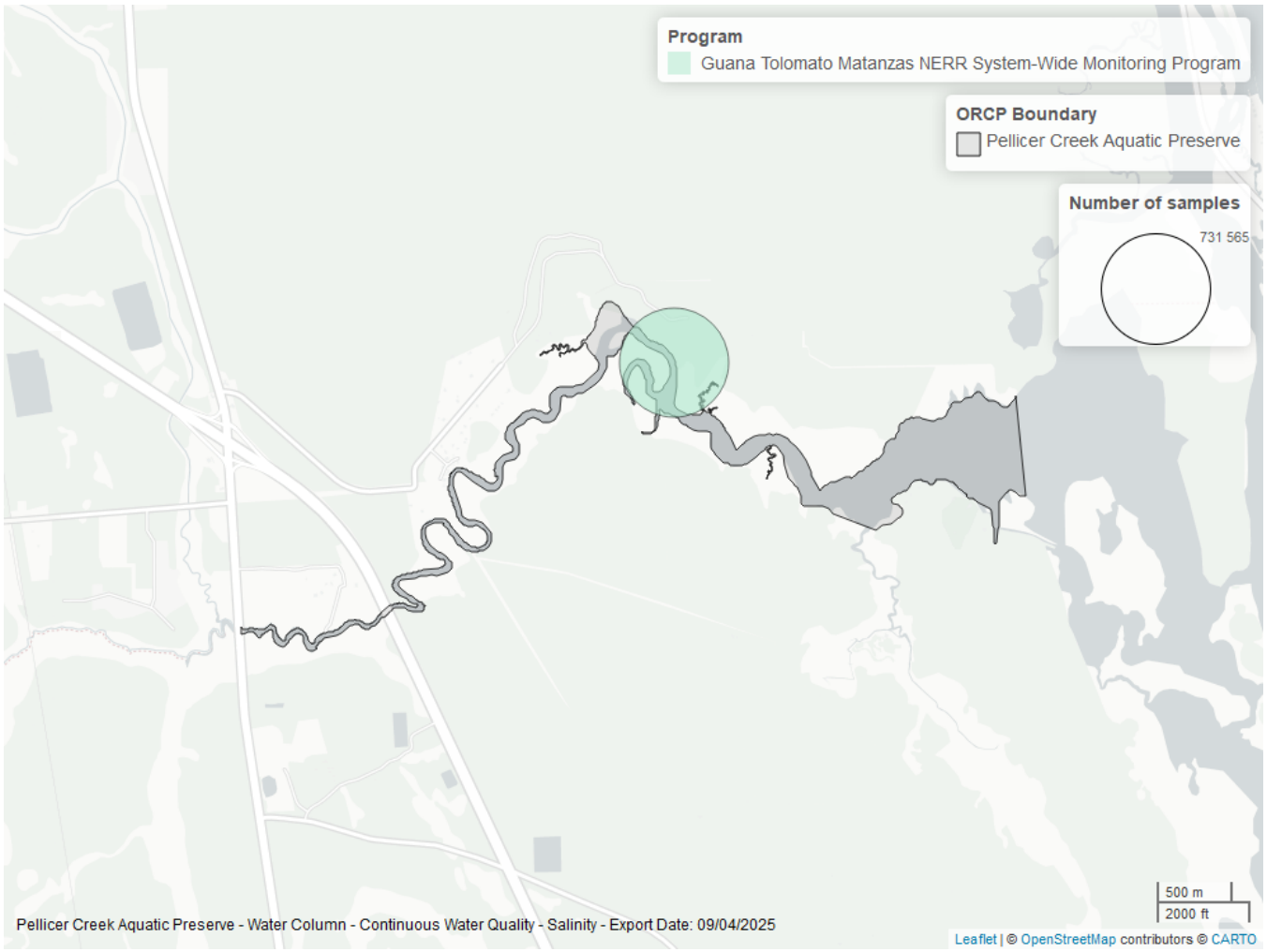

Figure 35: Map showing location of salinity continuous water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Turbidity - Continuous

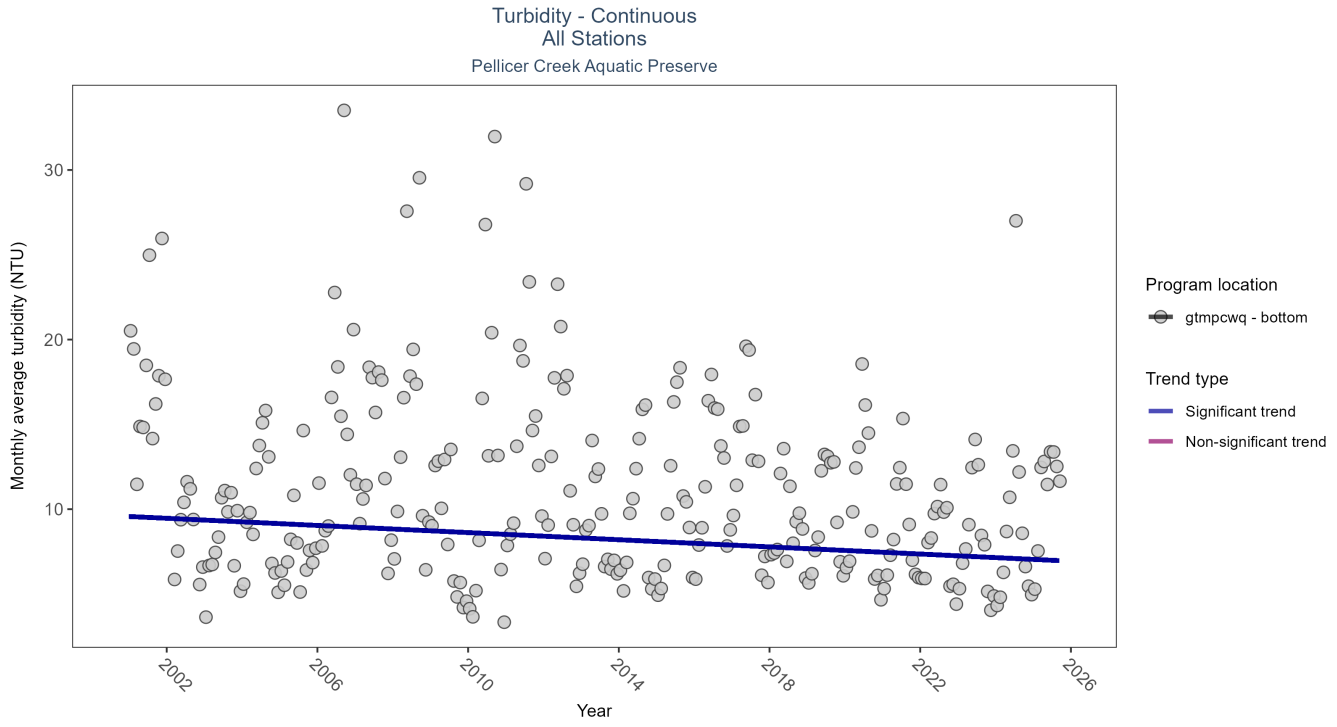

Figure 36: Scatter plot of monthly average turbidity over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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

At one program location, monthly average turbidity decreased by 0.11 NTU per year.

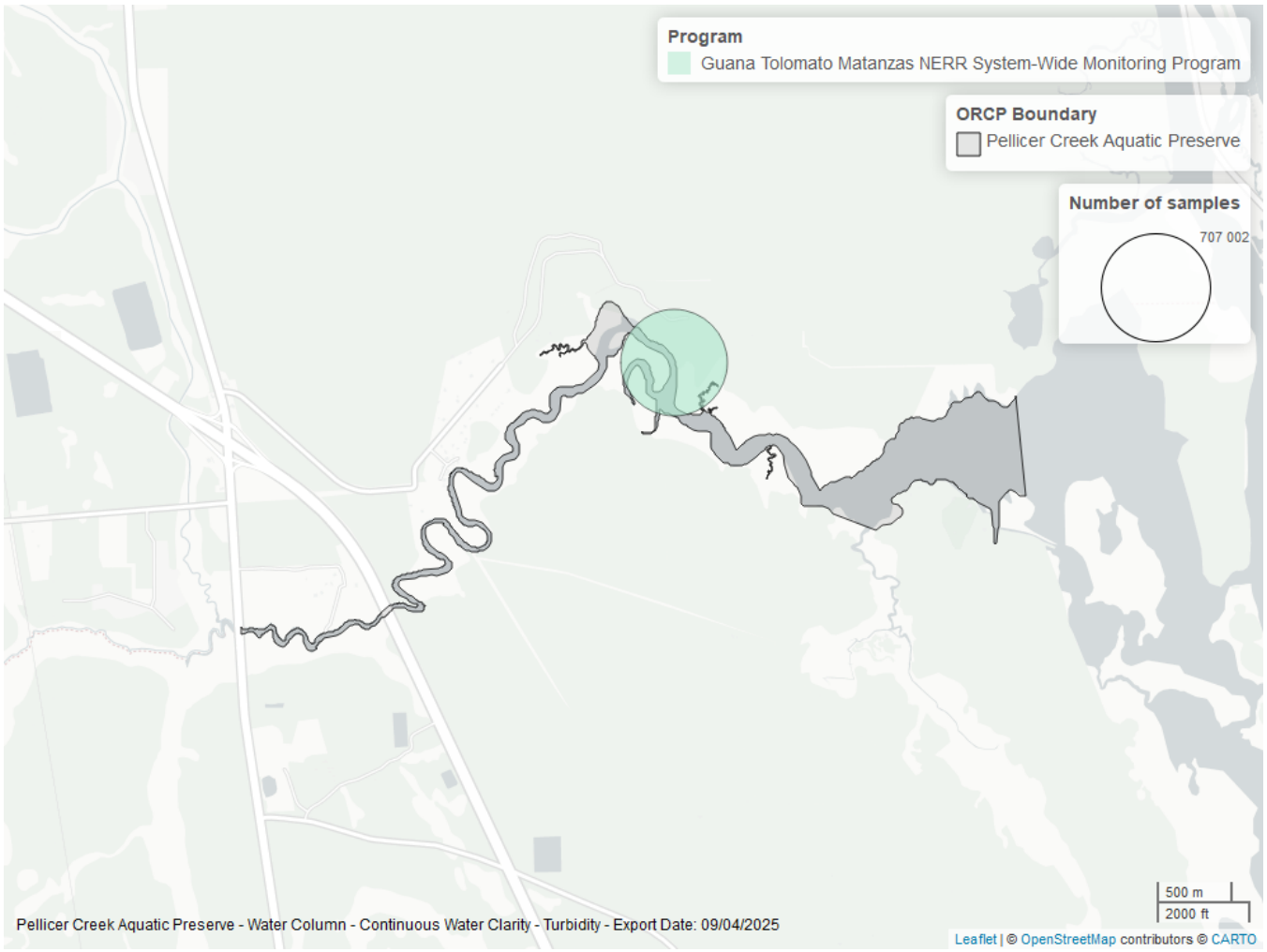

Figure 37: Map showing location of turbidity continuous water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Temperature - Continuous

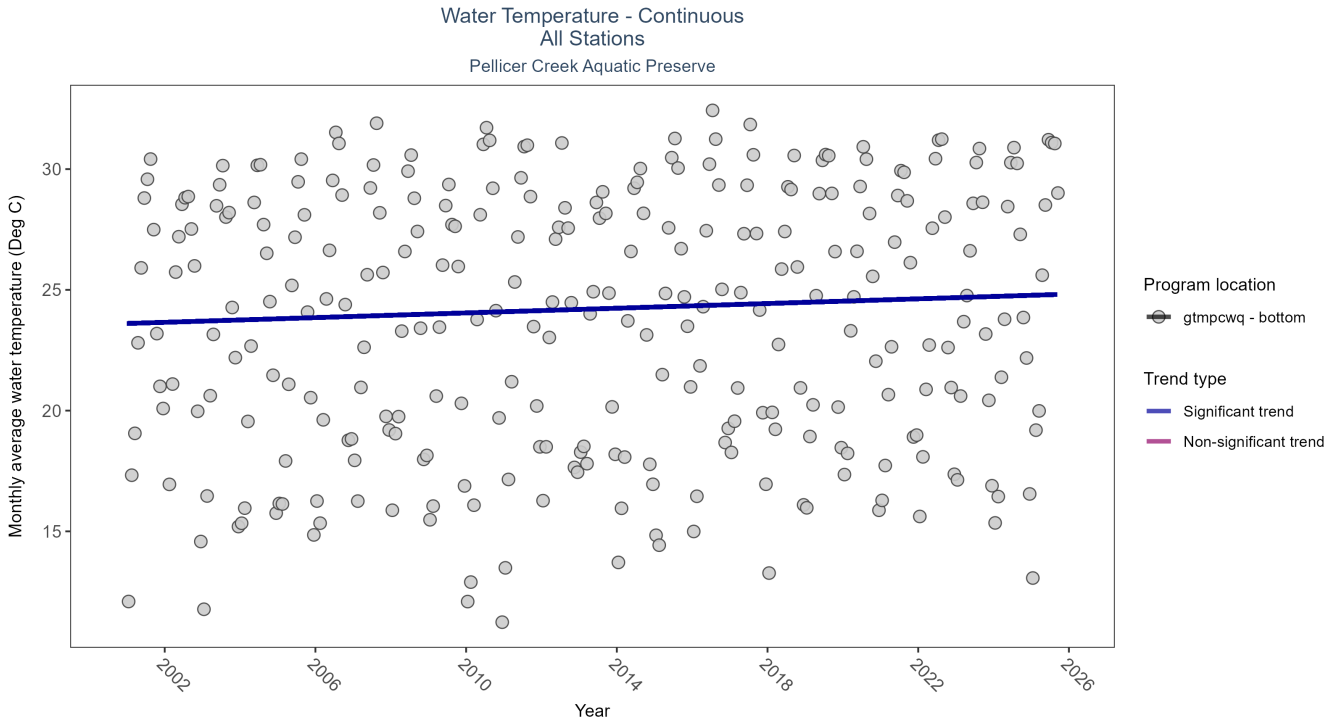

Figure 38: Scatter plot of monthly average water temperature over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
gtmpcwq	Significantly increasing trend	740131	25	2001 - 2025	24.4	0.17	23.61	0.05	0

At one program location, monthly average water temperature increased by 0.05°C per year.

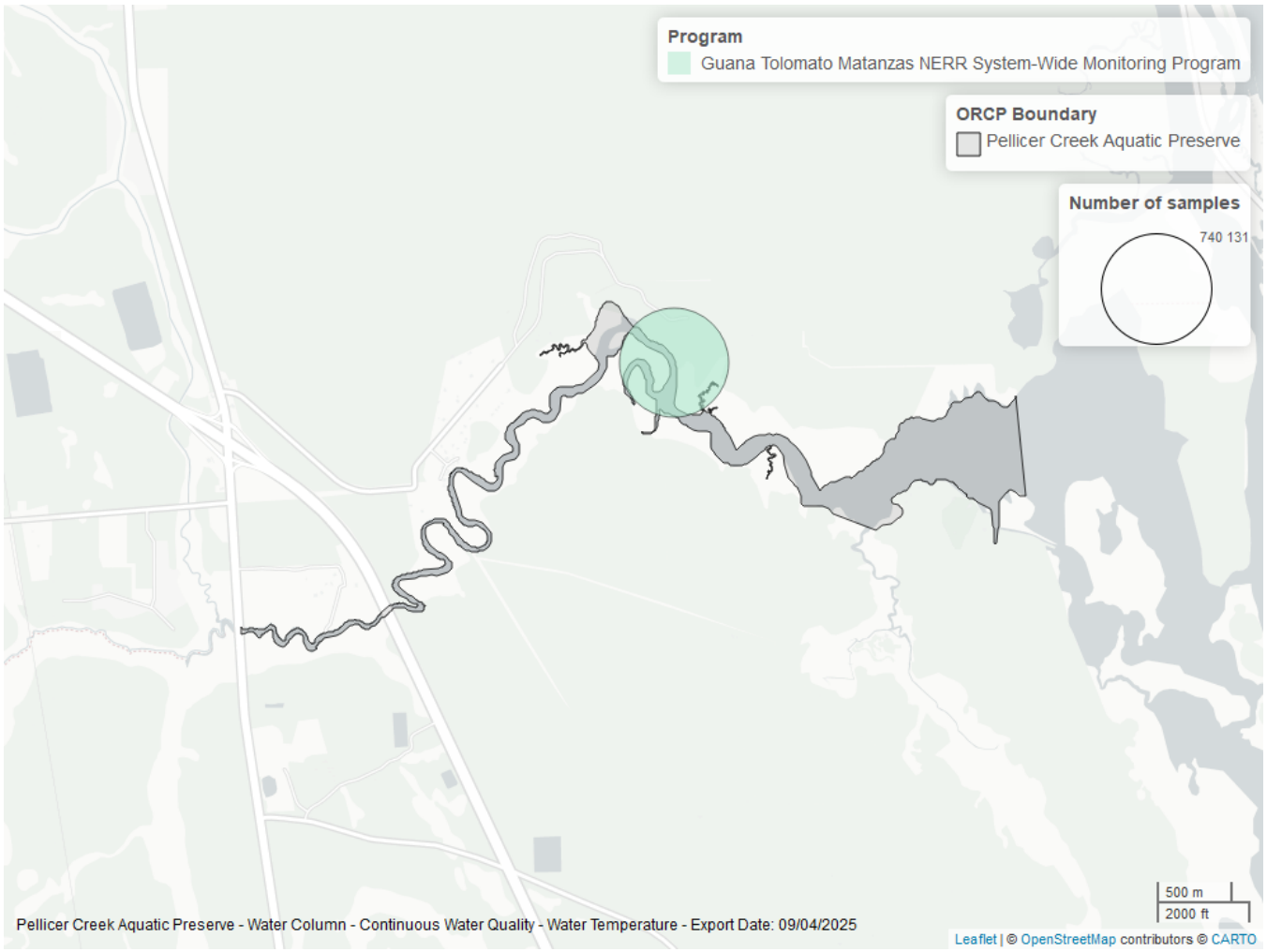

Figure 39: Map showing location of water temperature continuous water quality sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Coastal Wetlands

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

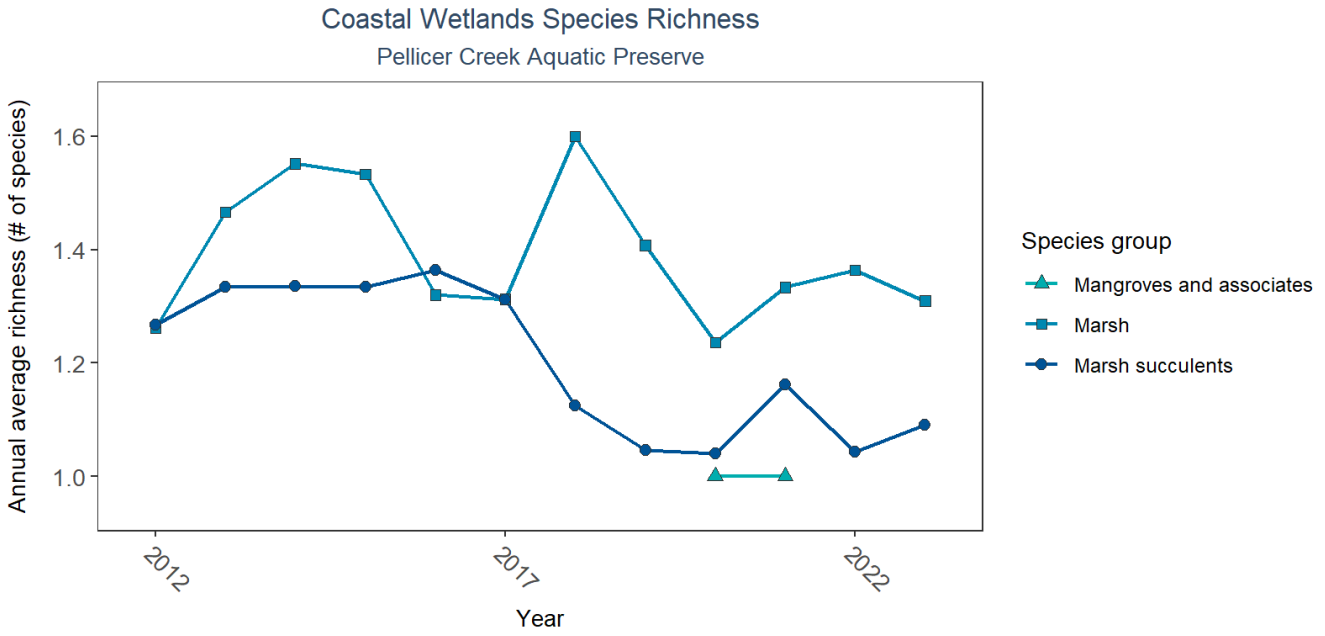

Figure 40: Line graph of annual average coastal wetlands species richness over time for mangroves and associates (triangles), marsh (squares), and marsh succulents (circles). If the time series by species group included more than one year of observations, a line connects data points for visualization.

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	2	2	2020 - 2021	1	1.00
Marsh	564	12	2012 - 2023	1	1.41
Marsh succulents	353	12	2012 - 2023	1	1.24

Between 2020 and 2021, the median annual number of species for *mangroves and associates* was 1 based on 2 observations. Between 2012 and 2023, the median annual number of species for *marsh* was 1 based on 564 observations. Between 2012 and 2023, the median annual number of species for *marsh succulents* was 1 based on 353 observations.

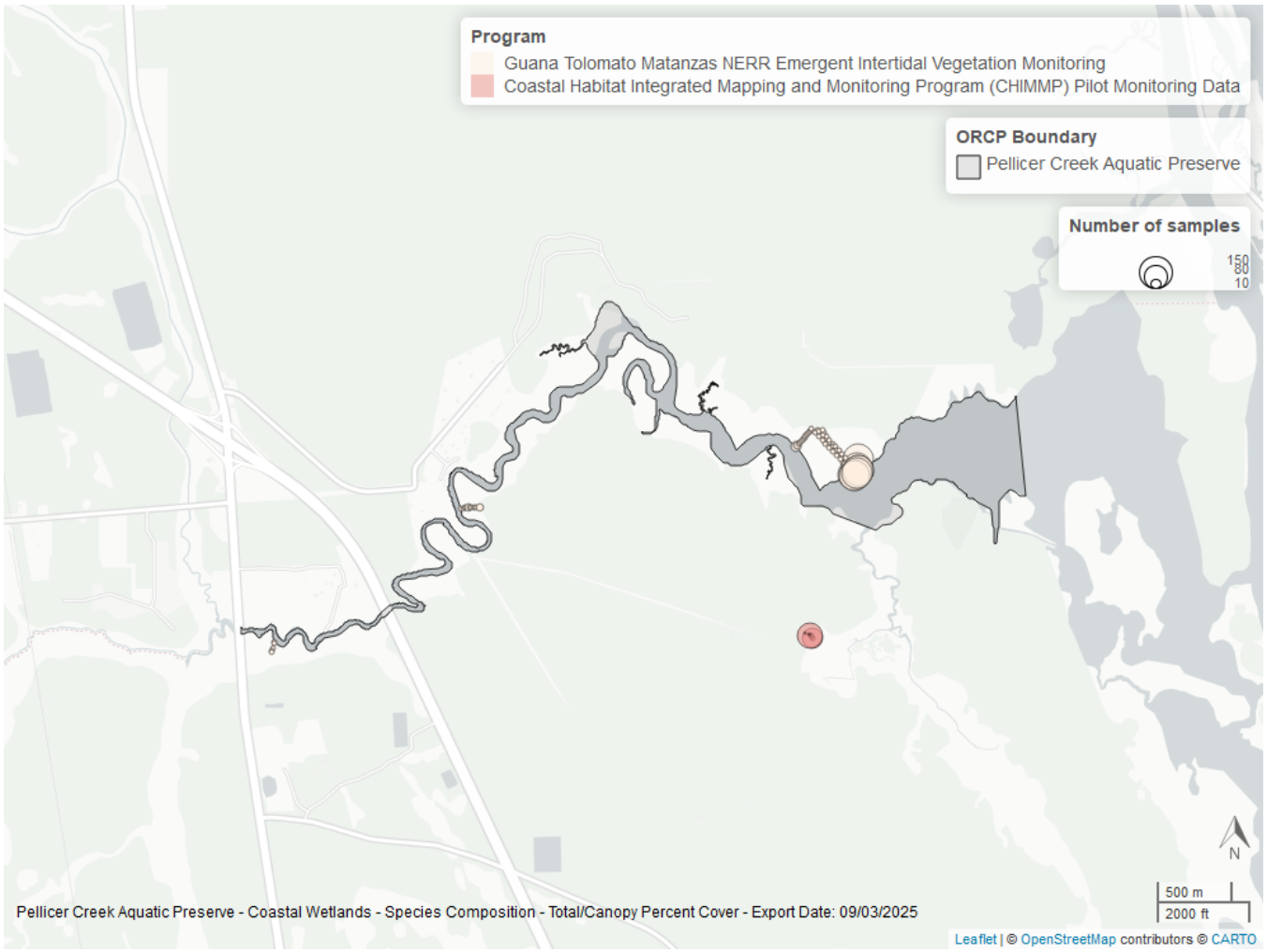

Figure 41: Map showing location of coastal wetlands sampling locations within the boundaries of *Pellicer Creek Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Species list

Acer rubrum	Fimbristylis spadicea	Polygonum sp.
Acrostichum danaeifolium	Houstonia procumbens	Quercus virginiana
Amorpha fruticosa	Hydrocotyle umbellata	Rhynchospora colorata
Ampelaster carolinianus	Ilex vomitoria	Rhynchospora corniculata
Ampelopsis arborea	Ipomoea sagittata	Rhynchospora sp.
Andropogon sp.	Iresine rhizomatosa	Rubus sp.
Apios americana	Iva frutescens	Sabal palmetto
Aristida sp.	Juncus roemerianus[1]	Sabatia calycina
Avicennia germinans[1]	Juniperus virginiana	Sabatia stellaris
Baccharis halimifolia	Kosteletzkya pentacarpos	Sagittaria lancifolia
Baccharis sp.	Limonium carolinianum[1]	Sagittaria latifolia
Bacopa monnieri	Lobelia cardinalis	Sagittaria subulata
Bare substrate	Ludwigia alata	Salicornia ambigua[1]
Batis maritima[1]	Ludwigia repens	Samolus ebracteatus
Blutaparon vermiculare[1]	Ludwigia sp.	Samolus sp.
Boehmeria cylindrica	Lygodium microphyllum	Samolus valerandi
Centella asiatica	Lythrum alatum	Serenoa repens
Cicuta maculata	Lythrum lineare	Smilax bona-nox
Cladium mariscus	Mikania scandens	Solidago sempervirens
Coleataenia anceps	Myrica cerifera	Spartina alterniflora[1]
Cyperus sp.	Nekemias arborea	Spartina bakeri[1]
Dichanthelium commutatum	Osmunda regalis	Spartina patens[1]
Dichanthelium sp.	Osmundastrum cinnamomeum	Symphyotrichum elliottii
Dichondra carolinensis	Parthenocissus quinquefolia	Thelypteris kunthii
Dichondra sp.	Peltandra virginica	Thelypteris palustris
Distichlis spicata[1]	Persea palustris	Tillandsia usneoides
Eleocharis baldwinii	Persicaria hydropiperoides	Toxicodendron radicans
Eleocharis geniculata	Persicaria punctata	Ulmus americana
Eleocharis sp.	Persicaria sp.	Vigna luteola
Erechtites hieraciifolius	Pinus palustris	Woody debris
Fabaceae	Pluchea odorata	Acer rubrum
Fimbristylis sp.	Pluchea sp.	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 Fish and Wildlife Conservation Commission (FWC); Florida Fish and Wildlife Research Institute (FWRI). Harmful Algal Bloom Marine Observation Network. (2018).