Nassau River-St. Johns River Marshes Aquatic Preserve

SEACAR Water Quality Analysis

Last compiled on 30 September, 2025

Contents

Indicators

Nutrients

Total Nitrogen - Discrete

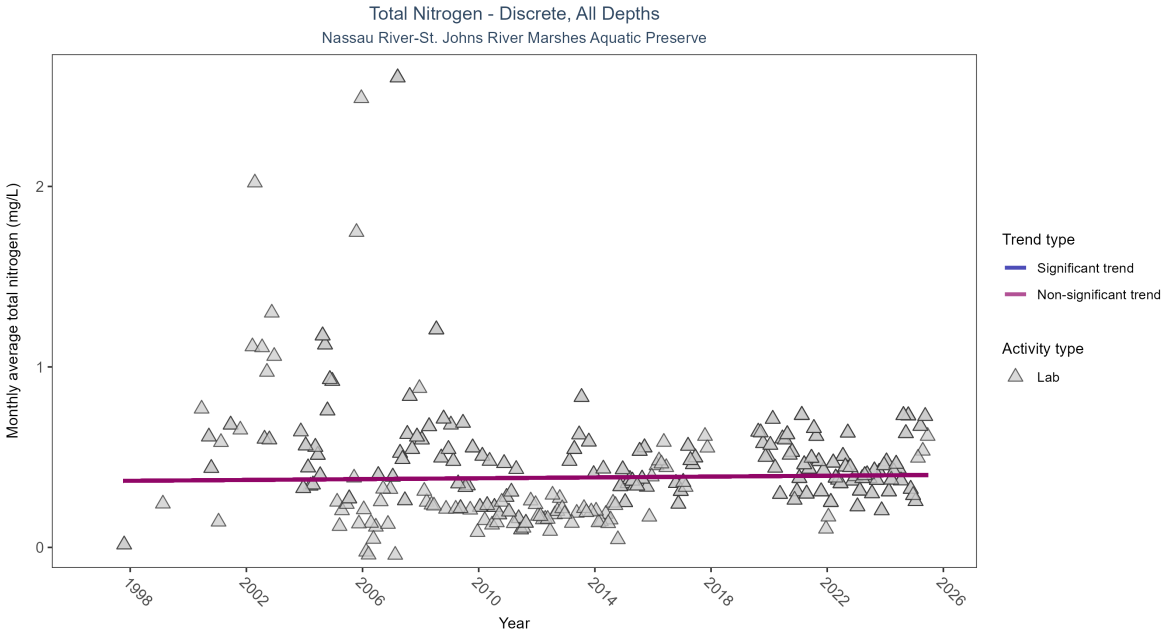

Figure 1: Scatter plot of monthly average total nitrogen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only nitrogen values obtained from laboratory analyses (triangles) are included in the plot.

Table 1: Seasonal Kendall-Tau Results for - Total Nitrogen

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
Lab	No significant trend	1022	27	1997 - 2025	0.39995	0.02537	0.36784	0.00117	0.6032

Total nitrogen showed no detectable trend between 1997 and 2025.

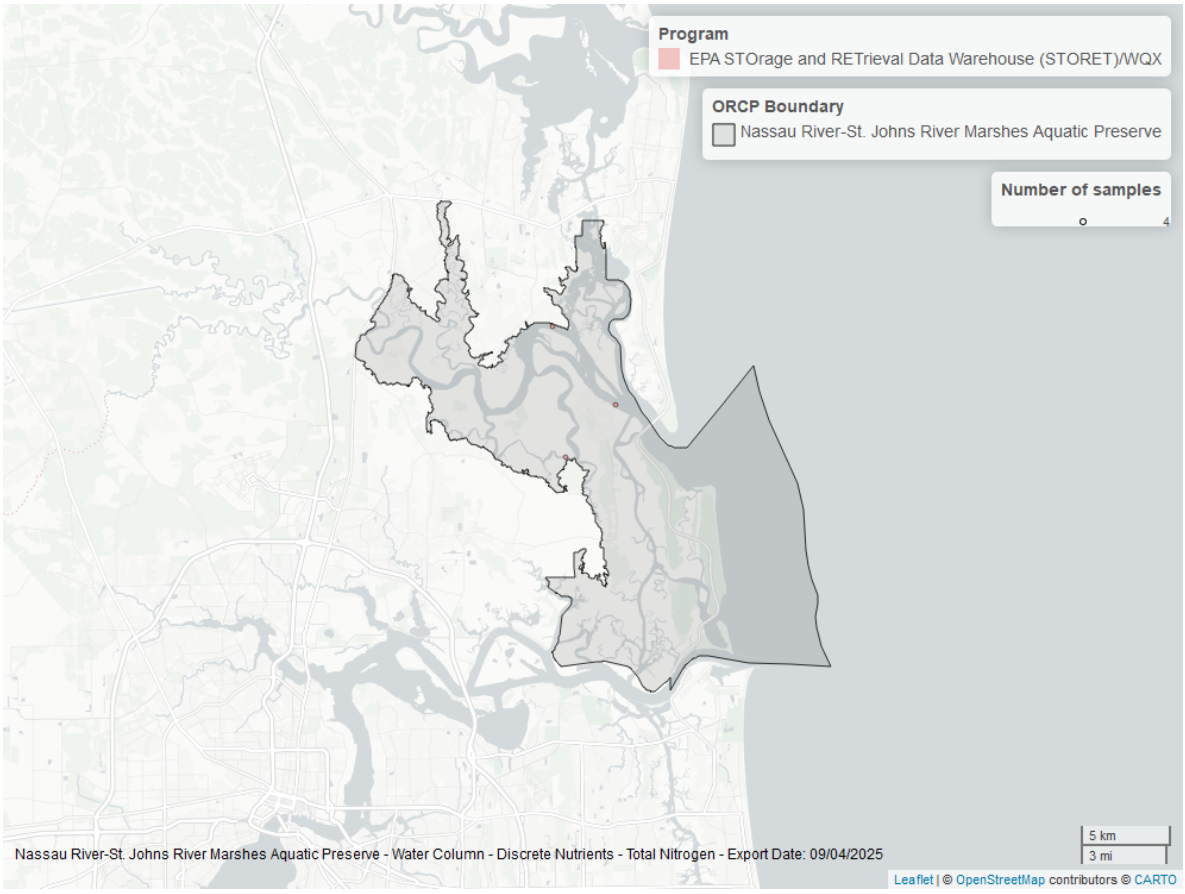

Figure 2: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Total Phosphorus - Discrete

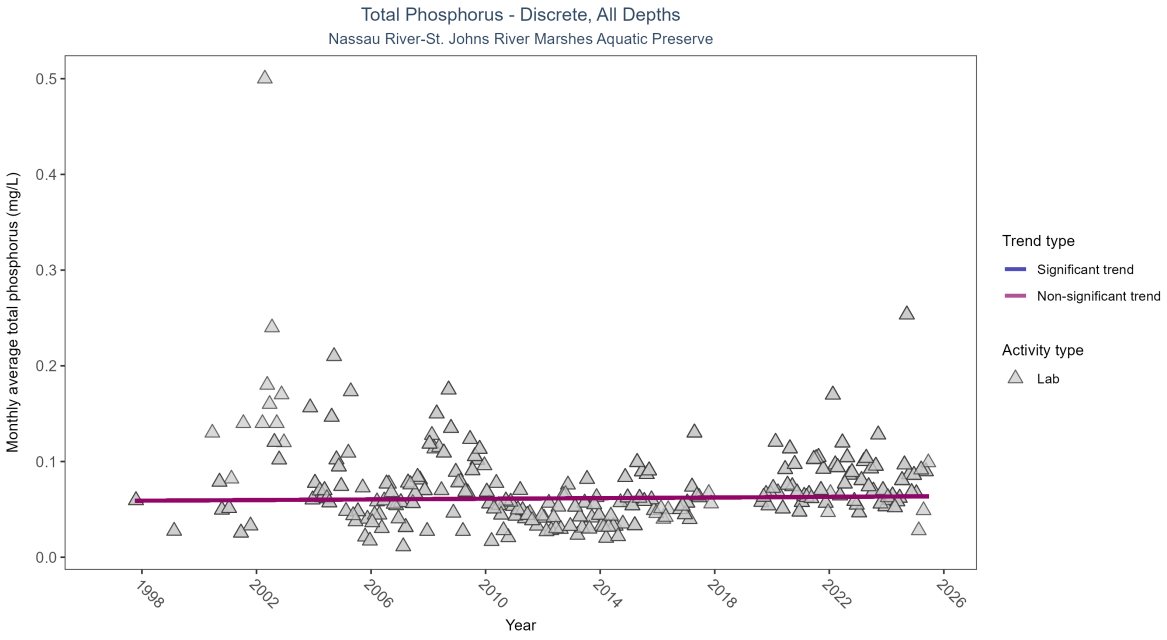

Figure 3: Scatter plot of monthly average total phosphorus over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only phosphorus values obtained from laboratory analyses (triangles) are included in the plot.

Table 2: Seasonal Kendall-Tau Results for - Total Phosphorus

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
Lab	No significant trend	1560	27	1997 - 2025	0.067	0.02256	0.0589	0.00017	0.5539

Total phosphorus showed no detectable trend between 1997 and 2025.

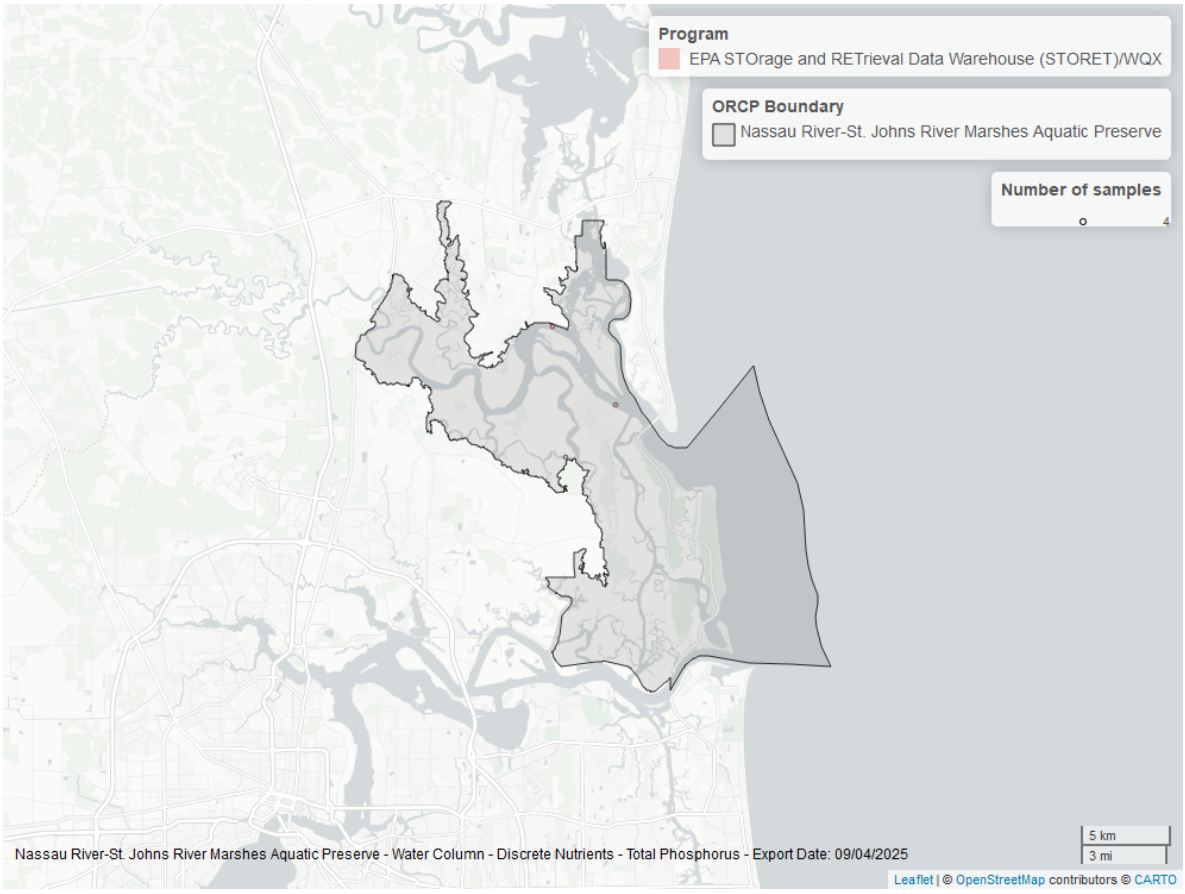

Figure 4: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Quality

Dissolved Oxygen - Discrete

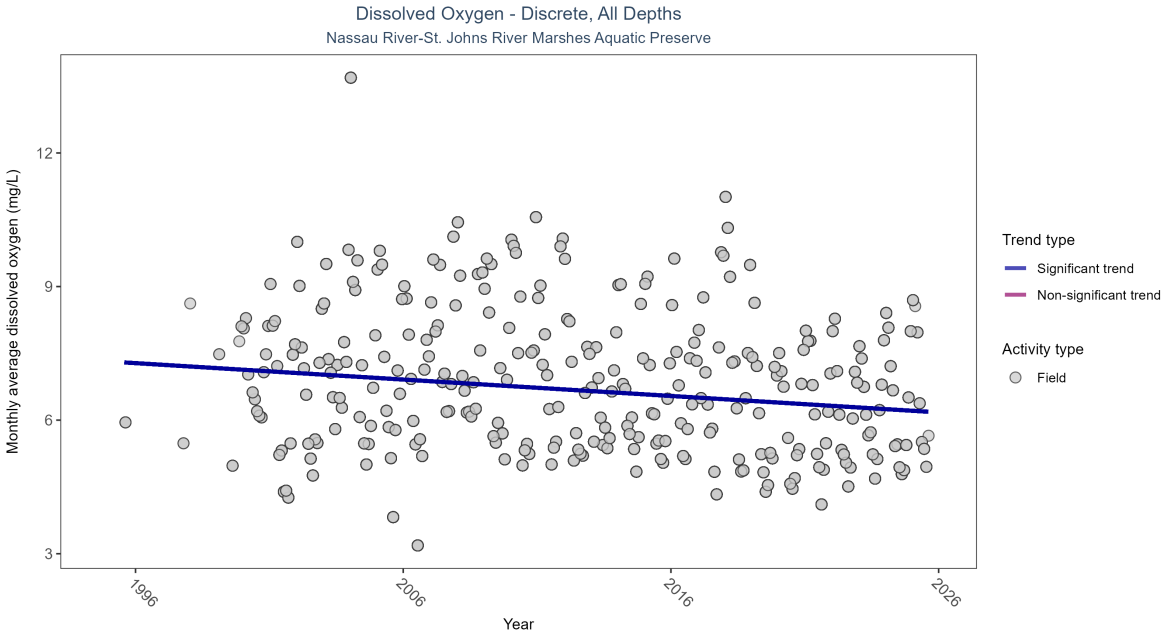

Figure 5: Scatter plot of monthly average dissolved oxygen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen values measured in the field (circles) are included in the plot.

Table 3: Seasonal Kendall-Tau Results for - Dissolved Oxygen

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
Field	Significantly decreasing trend	22657	30	1995 - 2025	6.8	-0.26925	7.31692	-0.03686	0

Monthly average dissolved oxygen decreased by 0.04 mg/L per year.

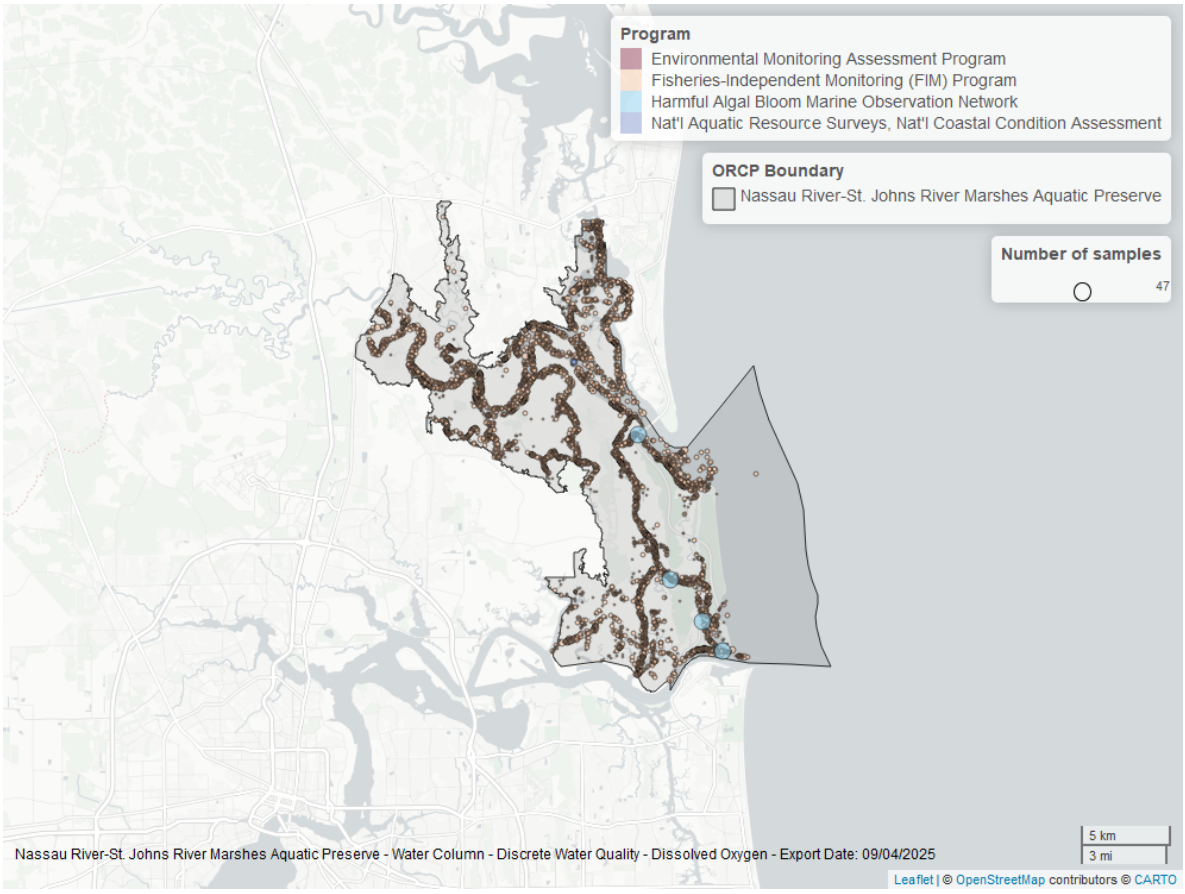

Figure 6: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen - Continuous

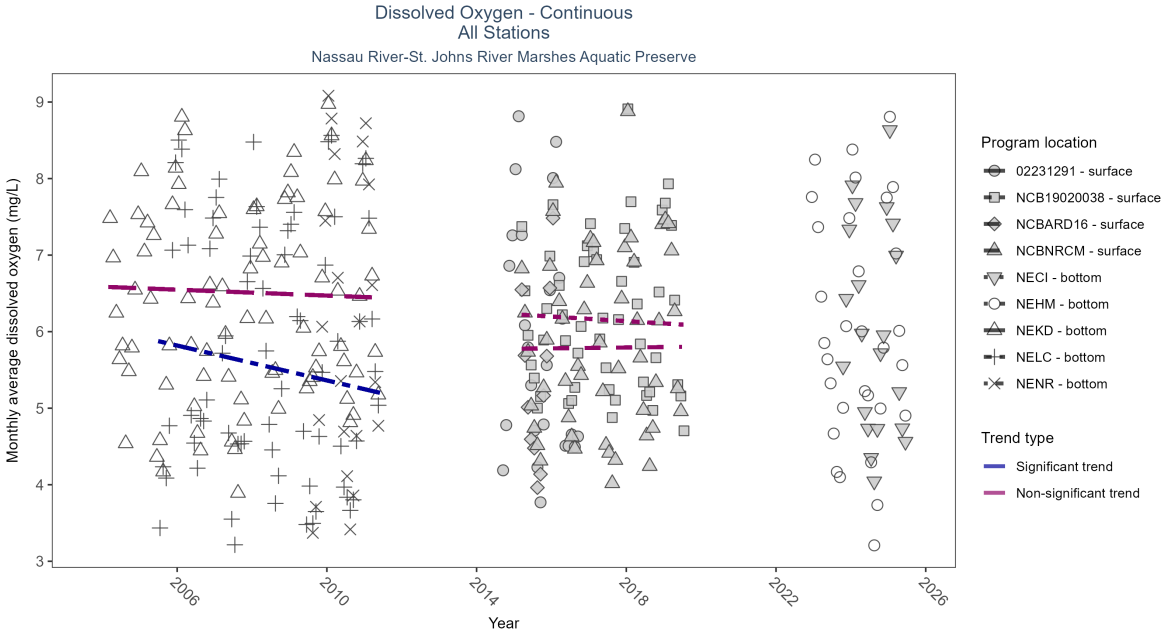

Figure 7: Scatter plot of monthly average dissolved oxygen over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

Table 4: Seasonal Kendall-Tau Results - Dissolved Oxygen

Program Location	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
02231291	Insufficient data to calculate trend	689	3	2014 - 2016	5.70	-	-	-	-
NECI	Insufficient data to calculate trend	54461	3	2023 - 2025	6.20	-	-	-	-
NEHM	Insufficient data to calculate trend	85227	4	2022 - 2025	5.90	-	-	-	-
NEKD	No significant trend	110958	8	2004 - 2011	6.40	-0.04	6.59	-0.02	0.5607
NCBNRCM	No significant trend	35477	5	2015 - 2019	5.79	0.05	5.78	0.01	0.797
NENR	Insufficient data to calculate trend	31438	3	2009 - 2011	5.80	-	-	-	-
NELC	Significantly decreasing trend	95860	7	2005 - 2011	5.60	-0.34	5.93	-0.11	0.0014
NCB19020038	No significant trend	34476	5	2015 - 2019	6.16	-0.03	6.23	-0.03	0.6108
NCBARD16	Insufficient data to calculate trend	7417	2	2015 - 2016	5.08	-	-	-	-

At one program location, monthly average dissolved oxygen decreased by 0.11 mg/L per year. No detectable change in monthly average dissolved oxygen was observed at three locations. There was insufficient data to fit a model for five locations.

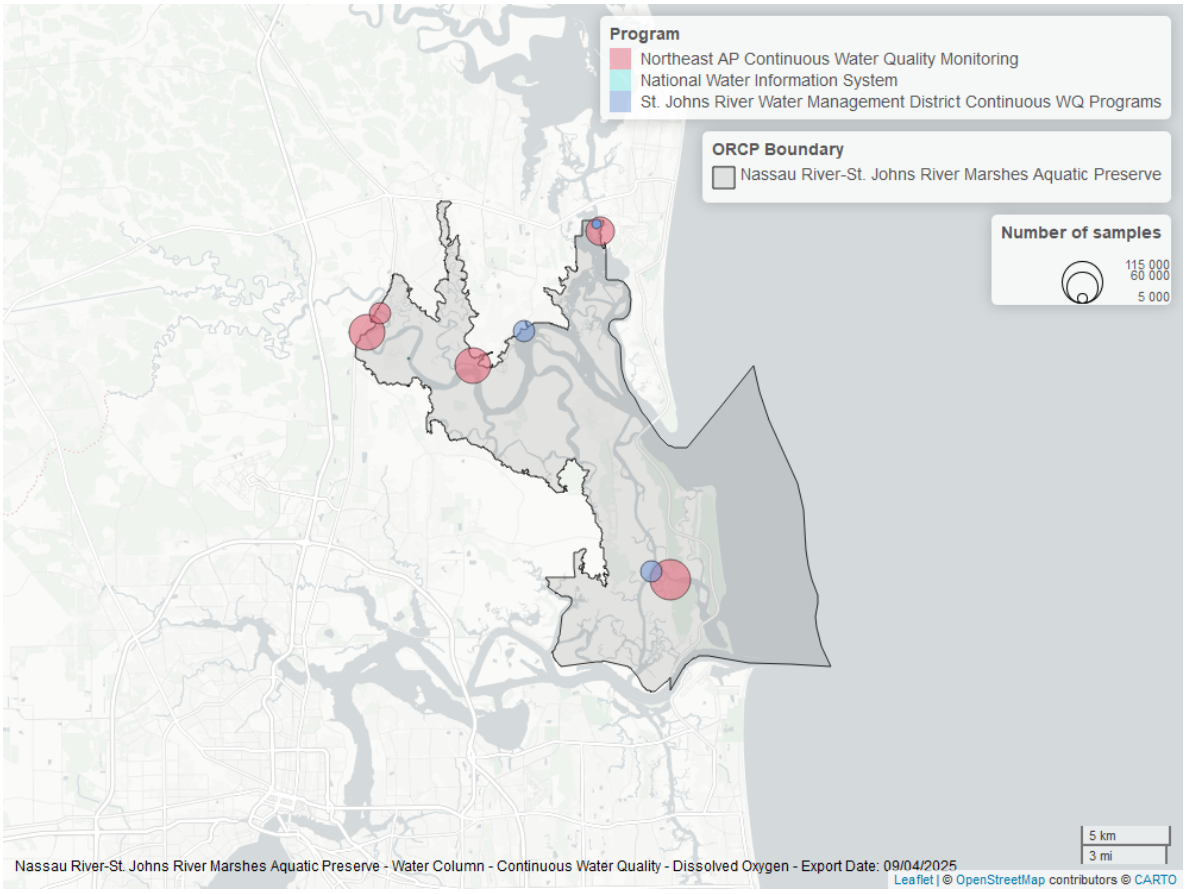

Figure 8: Map showing location of dissolved oxygen continuous water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen Saturation - Discrete

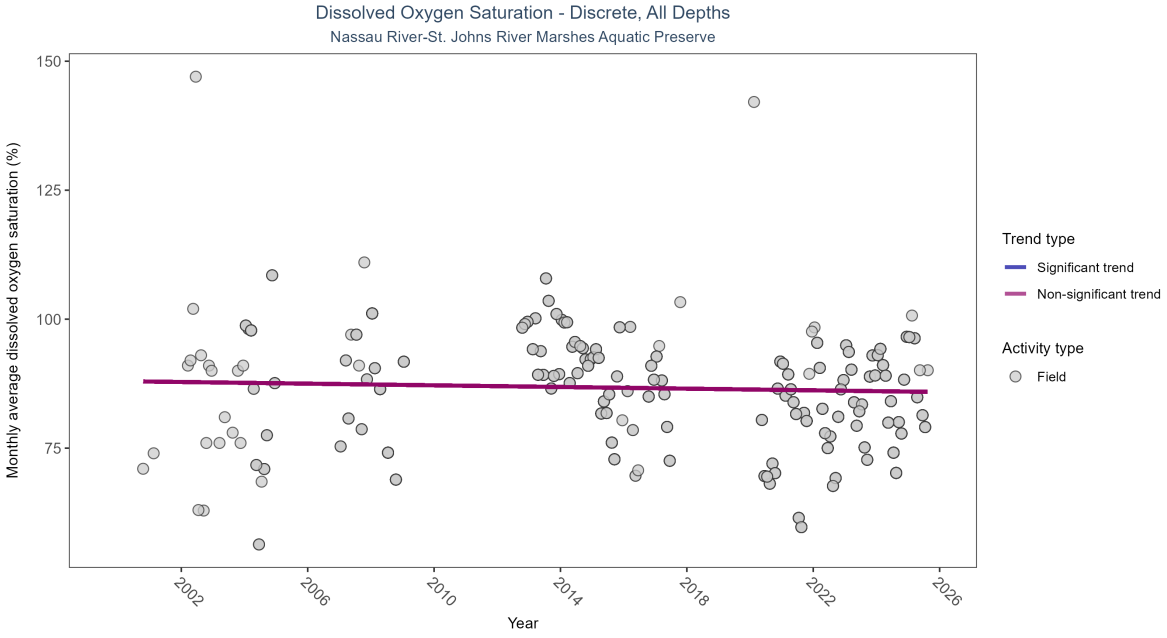

Figure 9: Scatter plot of monthly average dissolved oxygen saturation over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen saturation values measured in the field (circles)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

Table 5: Seasonal Kendall-Tau Results for - Dissolved Oxygen Saturation

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
Field	No significant trend	1431	20	2000 - 2025	88	-0.07498	87.98412	-0.08082	0.1877

Dissolved oxygen saturation showed no detectable trend between 2000 and 2025.

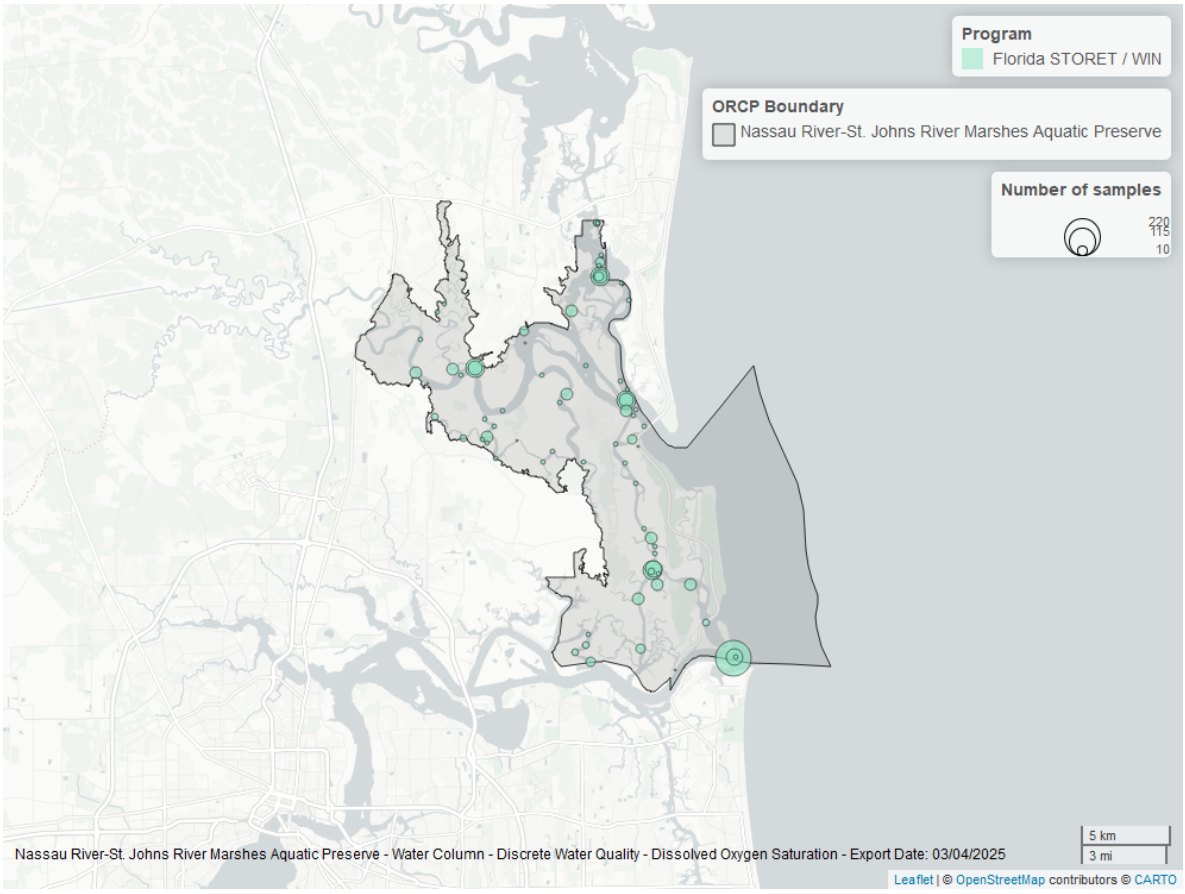

Figure 10: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen Saturation - Continuous

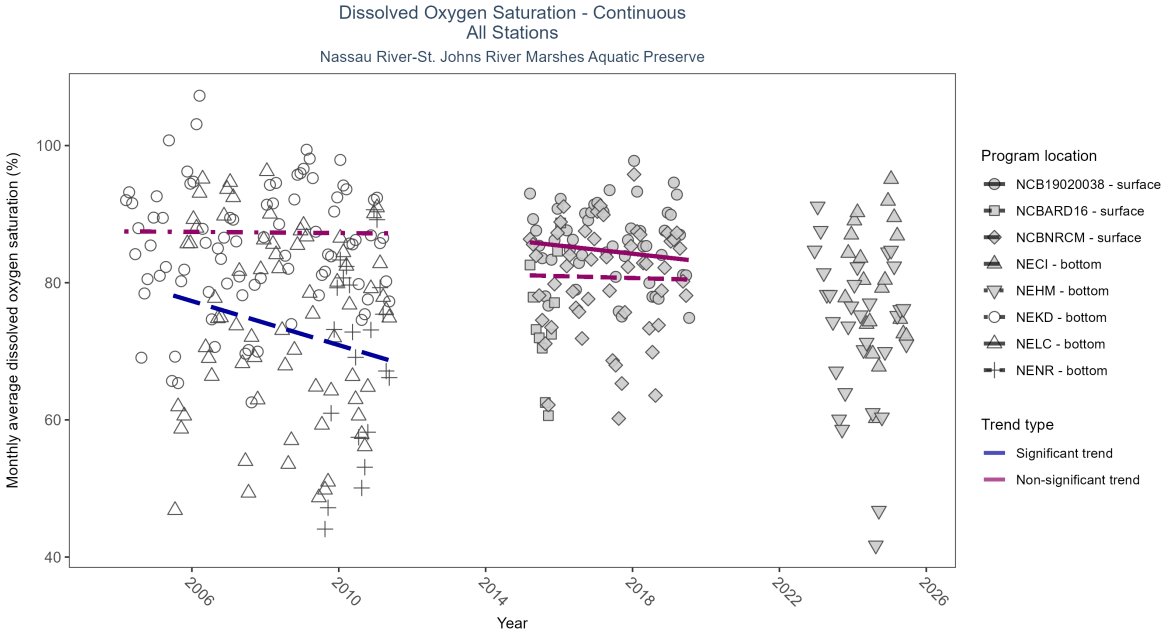

Figure 11: Scatter plot of monthly average dissolved oxygen saturation over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

Table 6: Seasonal Kendall-Tau Results - Dissolved Oxygen Saturation

Program Location	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
NEHM	Insufficient data to calculate trend	85226	4	2022 - 2025	74.60	-	-	-	-
NECI	Insufficient data to calculate trend	54808	3	2023 - 2025	82.40	-	-	-	-
NEKD	No significant trend	110983	8	2004 - 2011	89.10	0	87.49	-0.04	0.9338
NENR	Insufficient data to calculate trend	31438	3	2009 - 2011	73.20	-	-	-	-
NELC	Significantly decreasing trend	95868	7	2005 - 2011	77.90	-0.27	78.93	-1.6	0.0111
NCBNRCM	No significant trend	35240	5	2015 - 2019	82.06	-0.05	81.1	-0.14	0.797
NCB19020038	No significant trend	34438	5	2015 - 2019	87.06	-0.16	86.02	-0.6	0.1268
NCBARD16	Insufficient data to calculate trend	7417	2	2015 - 2016	74.44	-	-	-	-

At one program location, monthly average dissolved oxygen saturation decreased by 1.60% per year. No detectable change in monthly average dissolved oxygen saturation was observed at three locations. There was insufficient data to fit a model for four locations.

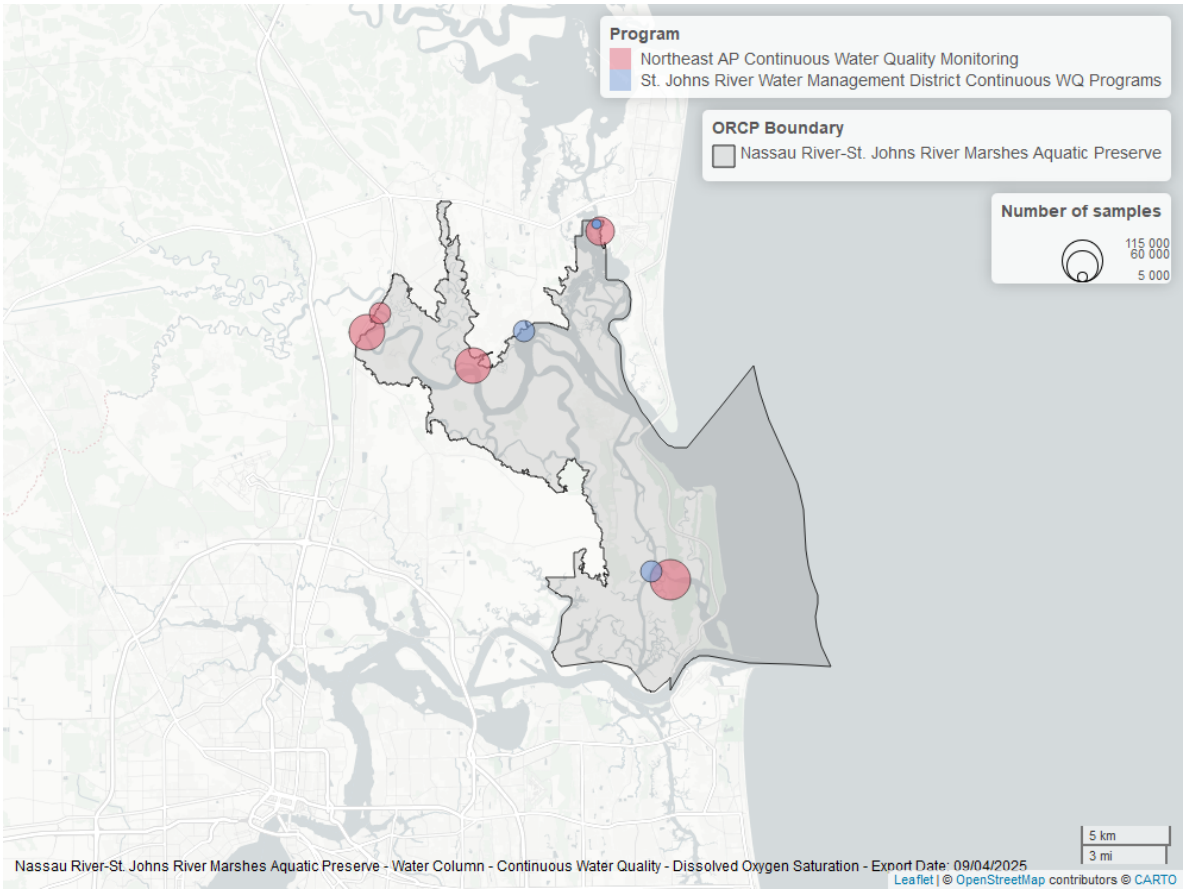

Figure 12: Map showing location of dissolved oxygen saturation continuous water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Salinity - Discrete

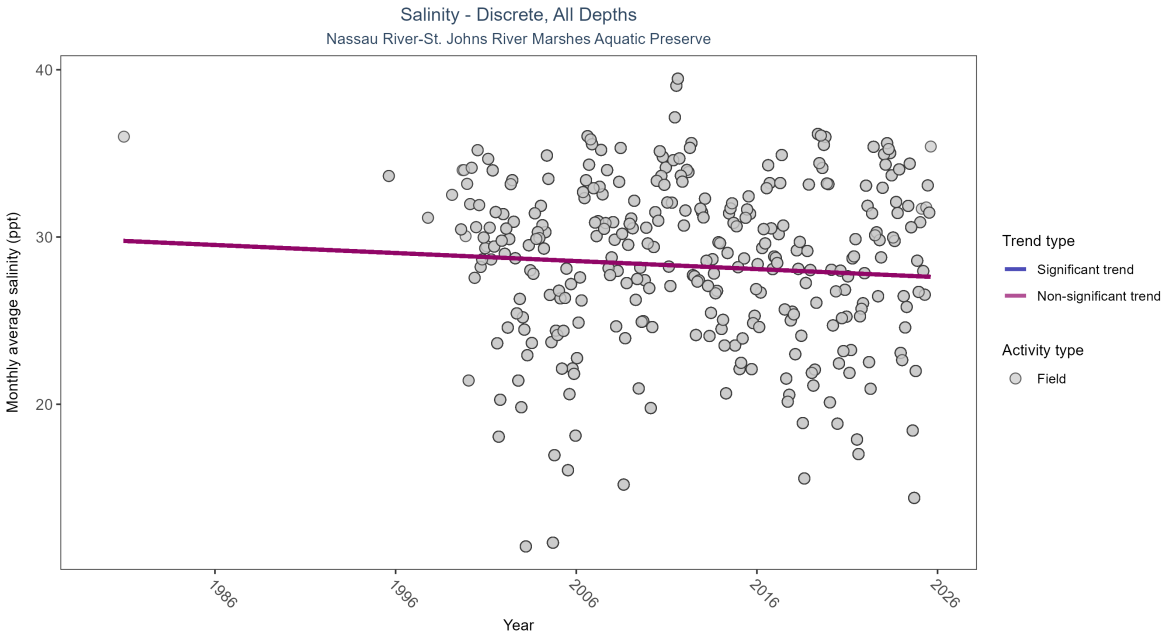

Figure 13: Scatter plot of monthly average salinity over time. If the time series included ten or more years of discrete observations, significant (blue) or non-significant (magenta) trend lines are also shown. Discrete salinity values derived from grab samples analyzed in the field (circles) or the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

Table 7: Seasonal Kendall-Tau Results for - Salinity

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
All	No significant trend	22769	30	1980 - 2025	30.5	-0.0506	29.81164	-0.04807	0.1992

Salinity showed no detectable trend between 1980 and 2025.

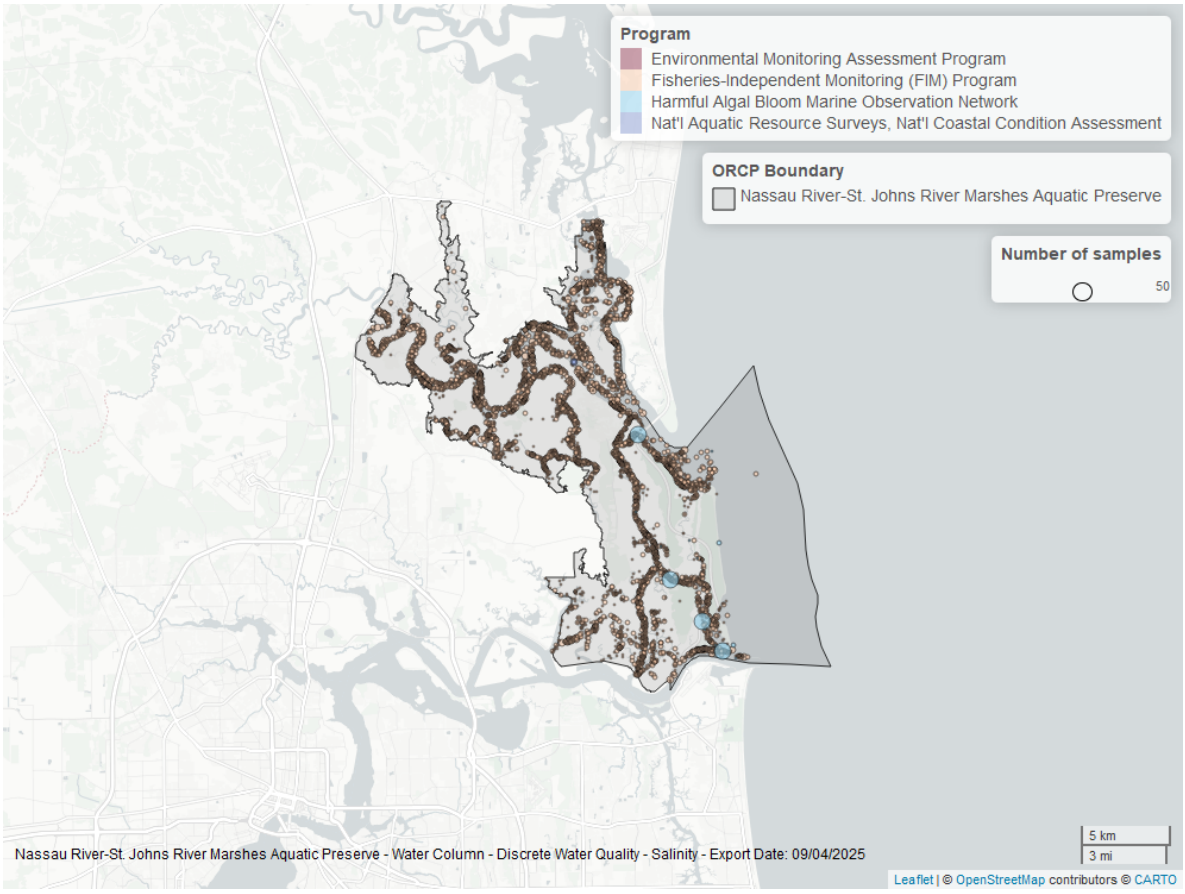

Figure 14: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Salinity - Continuous

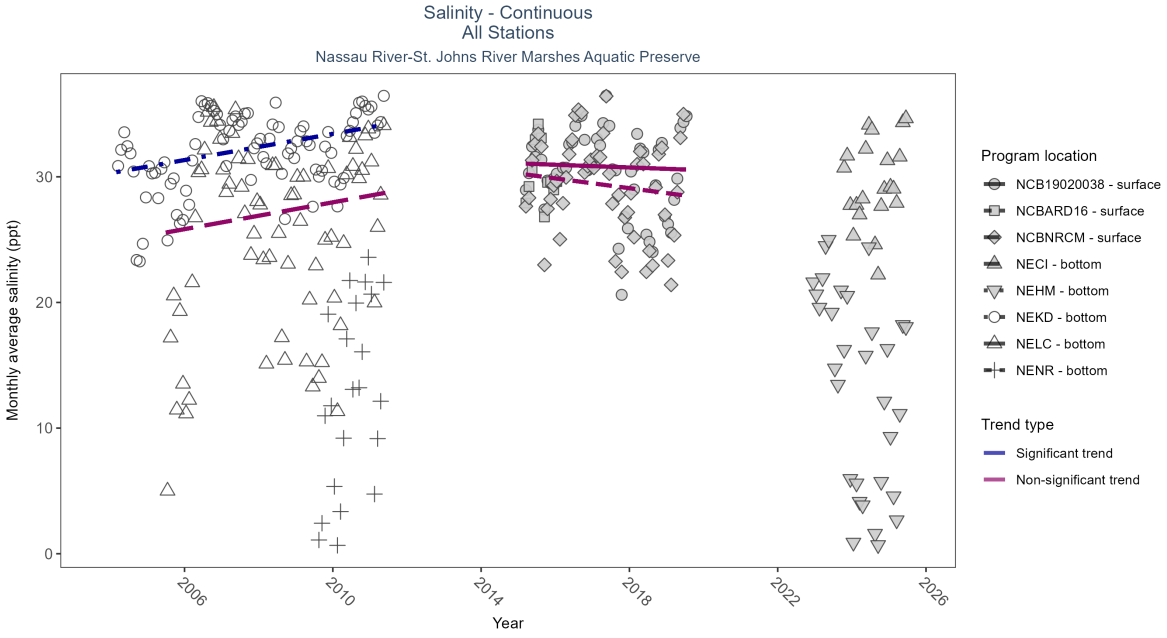

Figure 15: Scatter plot of monthly average salinity over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

Table 8: Seasonal Kendall-Tau Results - Salinity

Program Location	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
NEHM	Insufficient data to calculate trend	88721	4	2022 - 2025	14.40	-	-	-	-
NEKD	Significantly increasing trend	118328	8	2004 - 2011	33.20	0.31	30.29	0.52	6e-04
NECI	Insufficient data to calculate trend	54462	3	2023 - 2025	29.60	-	-	-	-
NCB19020038	No significant trend	34438	5	2015 - 2019	31.75	-0.06	31.07	-0.11	1
NCBNRCM	No significant trend	35411	5	2015 - 2019	30.29	-0.12	30.26	-0.39	0.5483
NENR	Insufficient data to calculate trend	31438	3	2009 - 2011	12.40	-	-	-	-
NELC	No significant trend	100339	7	2005 - 2011	27.90	0.09	25.3	0.53	0.4397
NCBARD16	Insufficient data to calculate trend	7418	2	2015 - 2016	30.07	-	-	-	-

At one program location, monthly average salinity increased by 0.52 ppt per year. No detectable change in monthly average salinity was observed at three locations. There was insufficient data to fit a model for four locations.

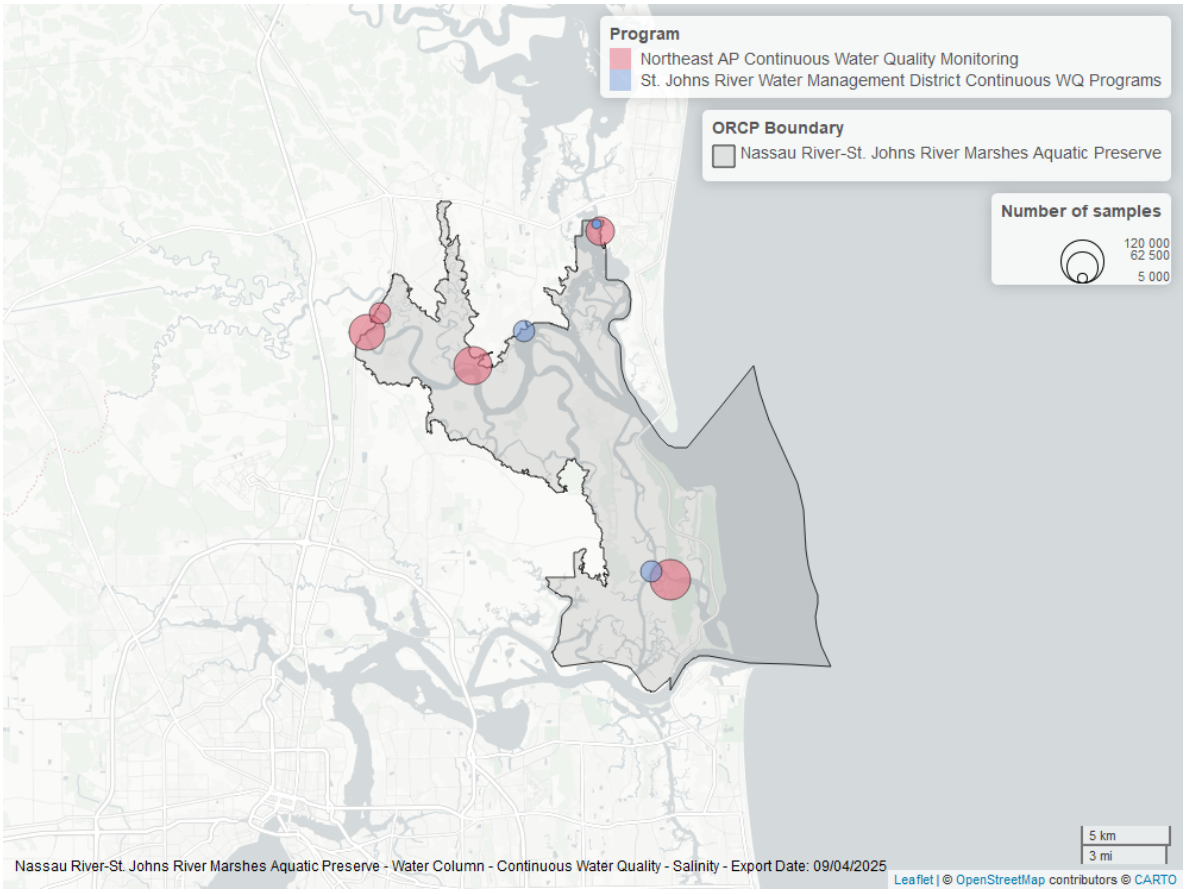

Figure 16: Map showing location of salinity continuous water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Temperature - Discrete

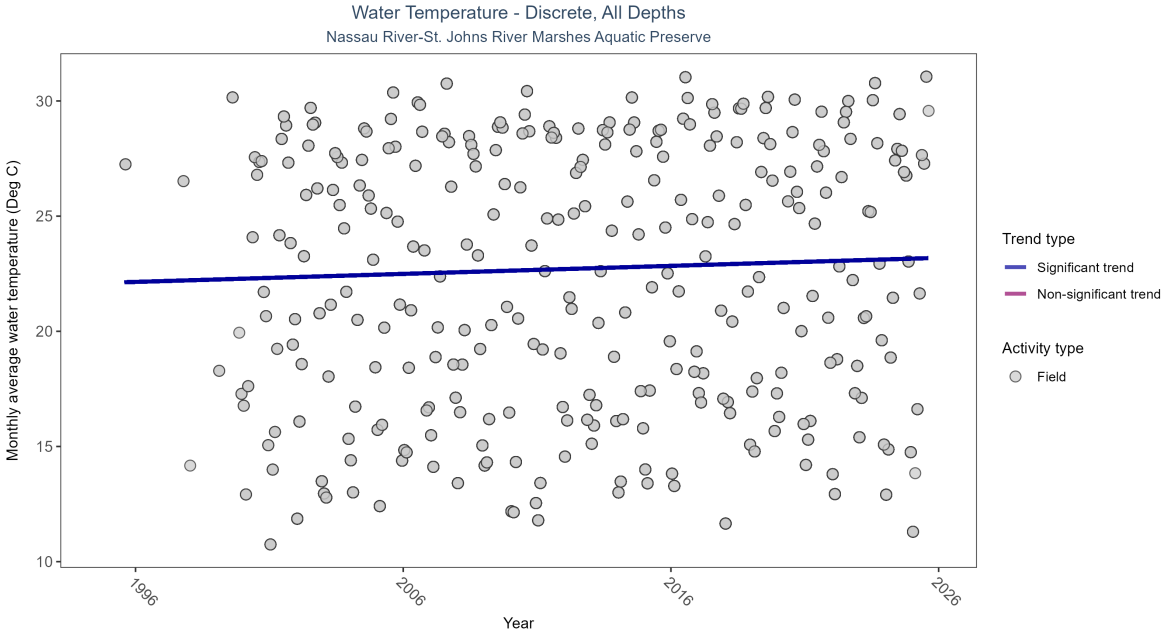

Figure 17: Scatter plot of monthly average water temperature over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only water temperature measurements taken in the field (circles) are included in the plot.

Table 9: Seasonal Kendall-Tau Results for - Water Temperature

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
Field	Significantly increasing trend	22815	30	1995 - 2025	23	0.12992	22.10918	0.03485	0.0013

Monthly average water temperature increased by 0.03°C per year.

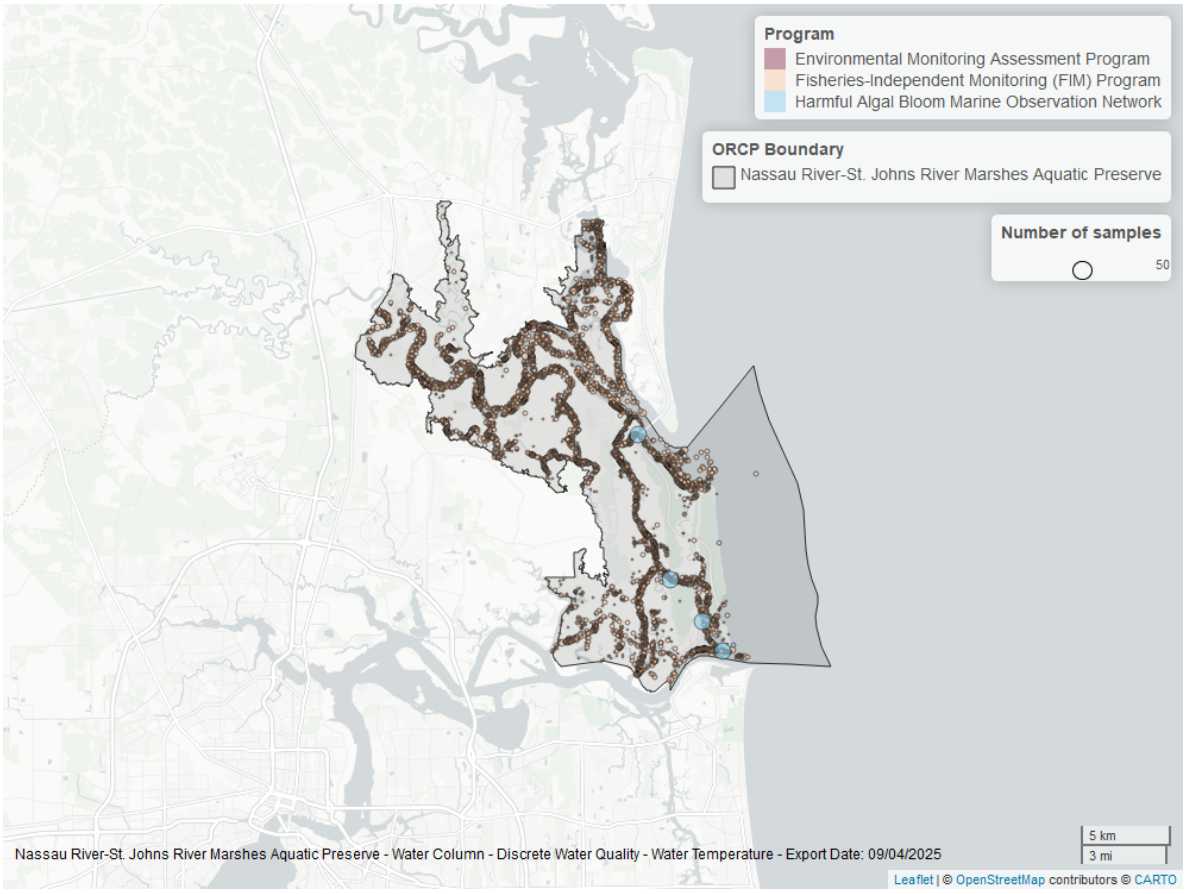

Figure 18: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Temperature - Continuous

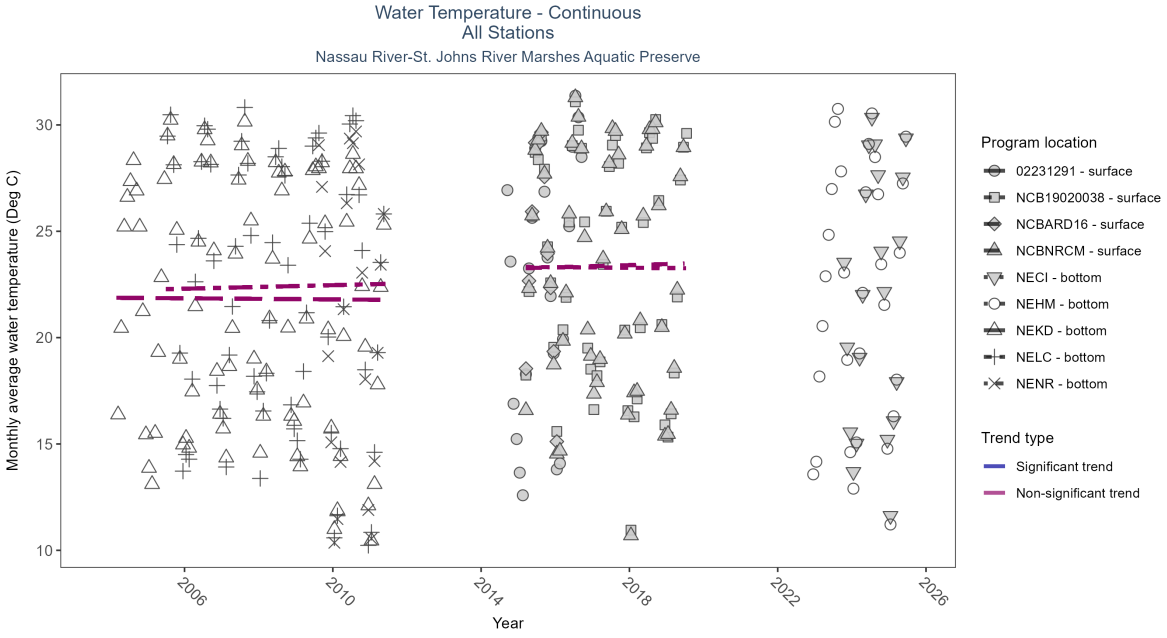

Figure 19: Scatter plot of monthly average water temperature over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

Table 10: Seasonal Kendall-Tau Results - Water Temperature

Program Location	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
02231291	Insufficient data to calculate trend	710	3	2014 - 2016	23.50	-	-	-	-
NEKD	No significant trend	118328	8	2004 - 2011	22.10	-0.04	21.88	-0.01	0.8057
NECI	Insufficient data to calculate trend	54825	3	2023 - 2025	21.00	-	-	-	-
NEHM	Insufficient data to calculate trend	89130	4	2022 - 2025	22.80	-	-	-	-
NCB19020038	No significant trend	34483	5	2015 - 2019	24.78	-0.03	23.32	-0.01	1
NENR	Insufficient data to calculate trend	31438	3	2009 - 2011	22.00	-	-	-	-
NELC	No significant trend	100343	7	2005 - 2011	22.70	0.05	22.26	0.04	0.7405
NCBNRCM	No significant trend	35817	5	2015 - 2019	24.03	0.07	23.26	0.05	0.6681
NCBARD16	Insufficient data to calculate trend	7419	2	2015 - 2016	25.08	-	-	-	-

No detectable change in monthly average water temperature was observed at four locations. There was insufficient data to fit a model for five locations.

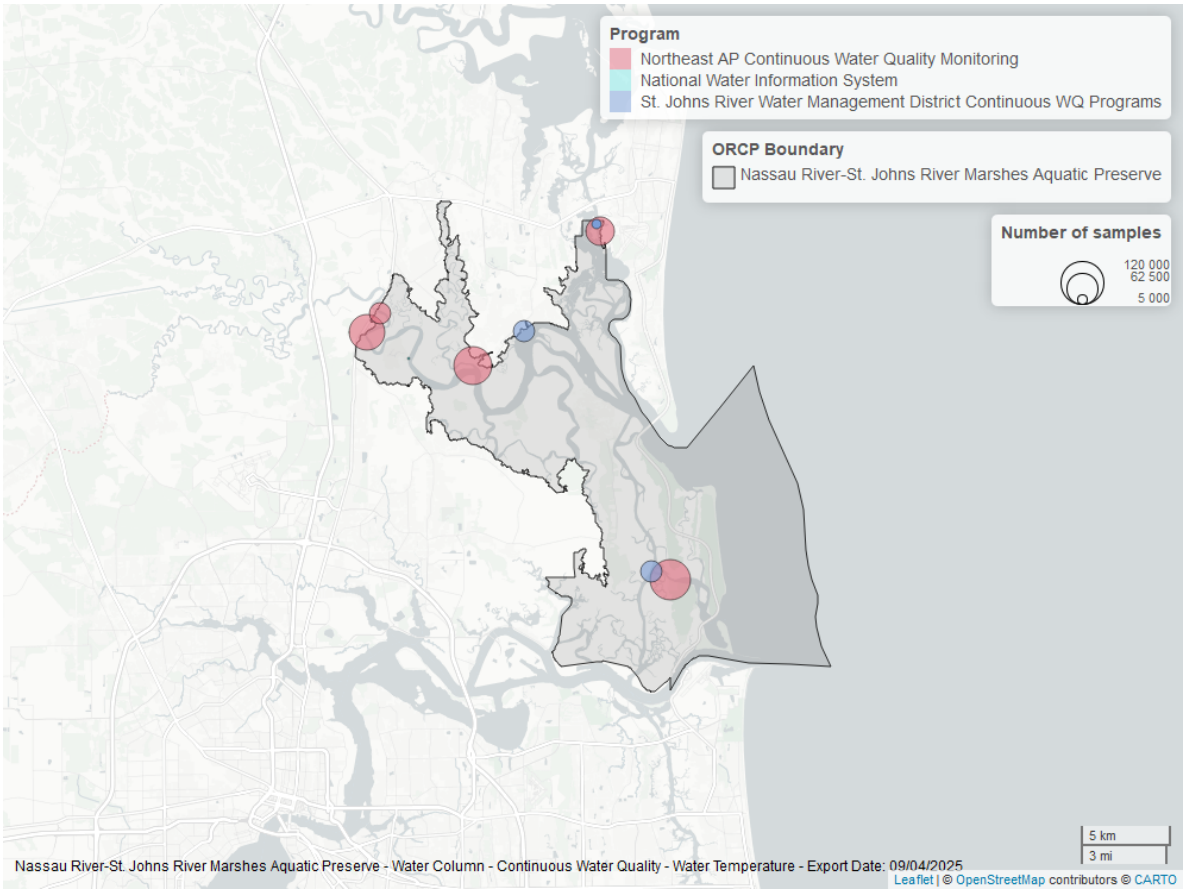

Figure 20: Map showing location of water temperature continuous water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

pH - Discrete

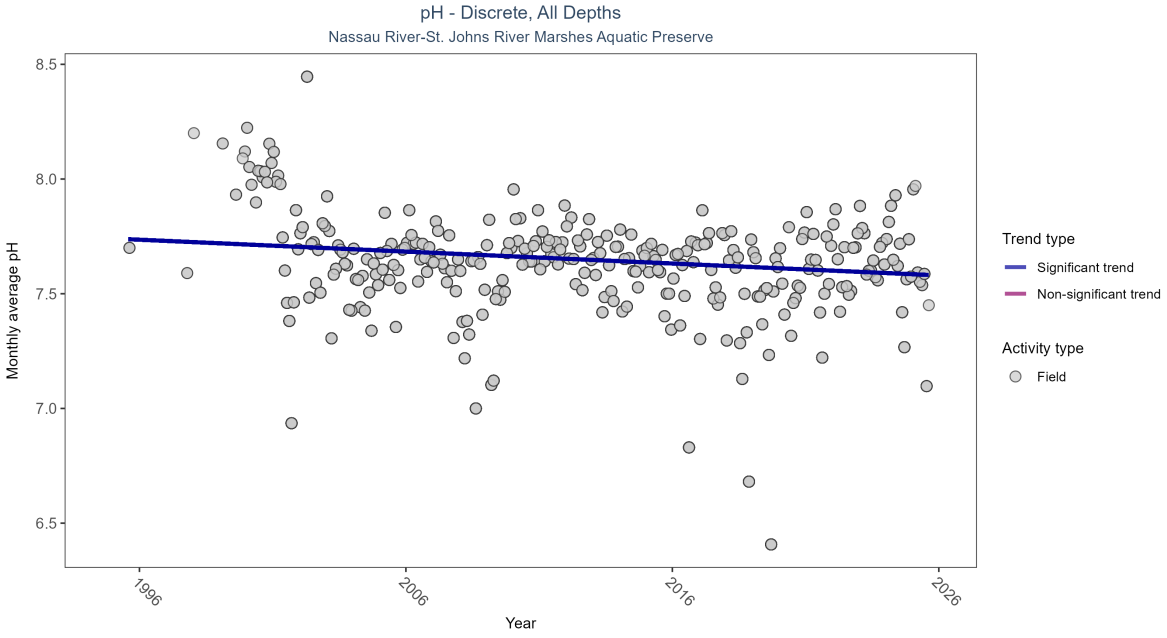

Figure 21: Scatter plot of monthly average pH over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only pH values measured in the field (circles) are included in the plot.

Table 11: Seasonal Kendall-Tau Results for - pH

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
Field	Significantly decreasing trend	22580	30	1995 - 2025	7.6	-0.14862	7.74068	-0.00518	2e-04

Monthly average pH decreased by 0.01 pH units per year.

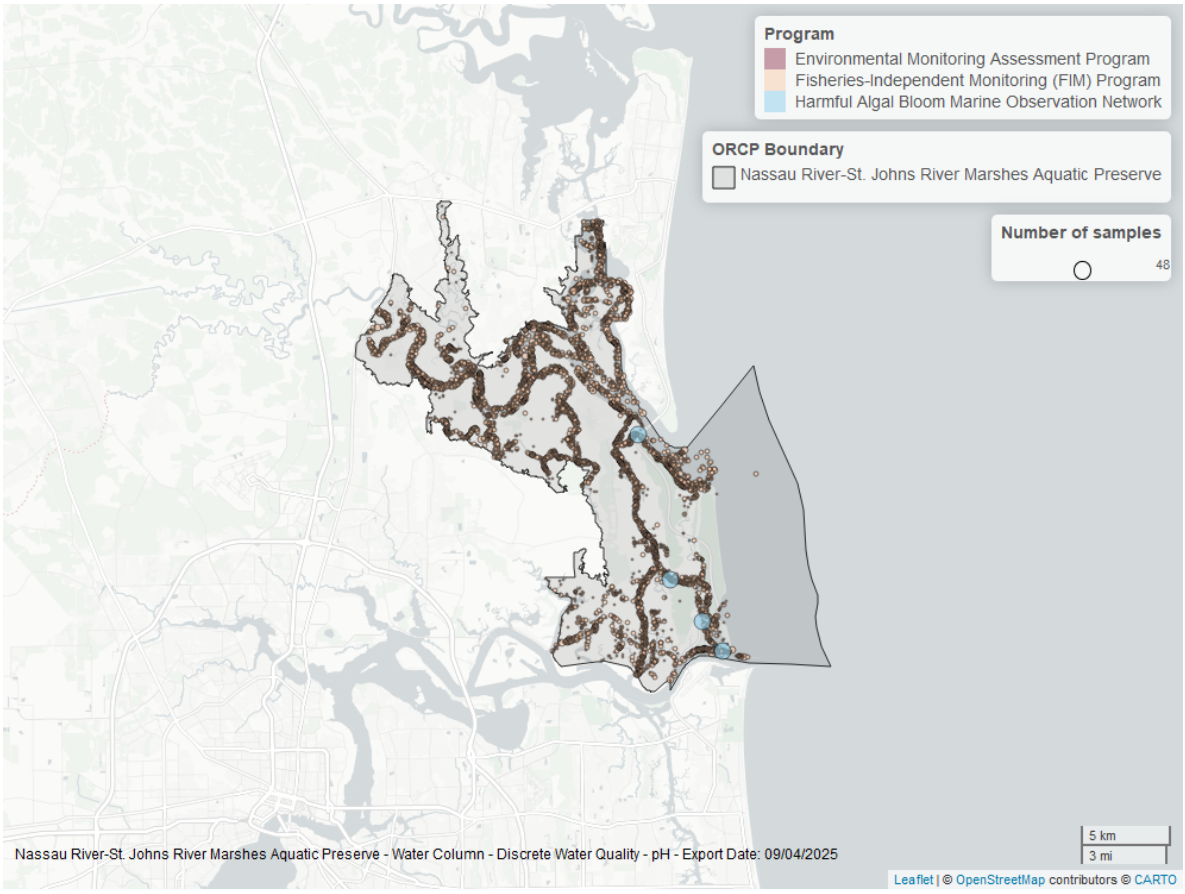

Figure 22: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

pH - Continuous

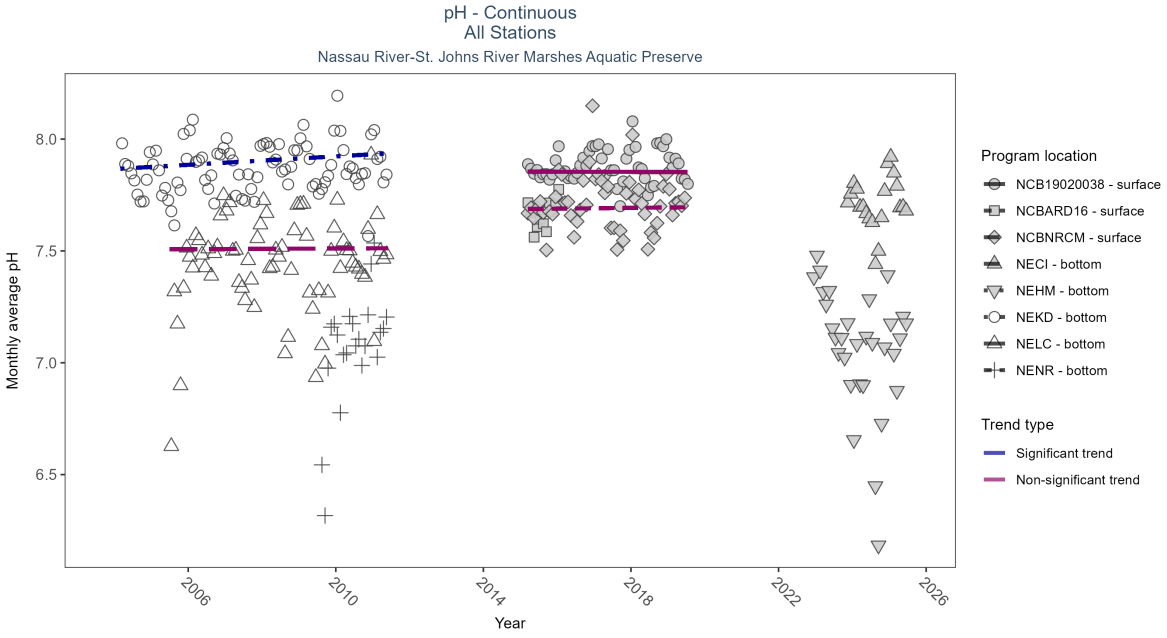

Figure 23: Scatter plot of monthly average pH over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

Table 12: Seasonal Kendall-Tau Results - pH

Program Location	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
NECI	Insufficient data to calculate trend	52513	3	2023 - 2025	7.70	-	-	-	-
NEHM	Insufficient data to calculate trend	87193	4	2022 - 2025	7.10	-	-	-	-
NEKD	Significantly increasing trend	113471	8	2004 - 2011	7.90	0.19	7.87	0.01	0.0491
NENR	Insufficient data to calculate trend	31438	3	2009 - 2011	7.10	-	-	-	-
NCB19020038	No significant trend	34405	5	2015 - 2019	7.88	-0.01	7.85	0	1
NELC	No significant trend	96488	7	2005 - 2011	7.50	0.02	7.51	0	0.9121
NCBNRCM	No significant trend	35819	5	2015 - 2019	7.72	-0.01	7.69	0	0.9317
NCBARD16	Insufficient data to calculate trend	6952	2	2015 - 2016	7.66	-	-	-	-

At one program location, monthly average pH increased by 0.01 pH units per year. No detectable change in monthly average pH was observed at three locations. There was insufficient data to fit a model for four locations.

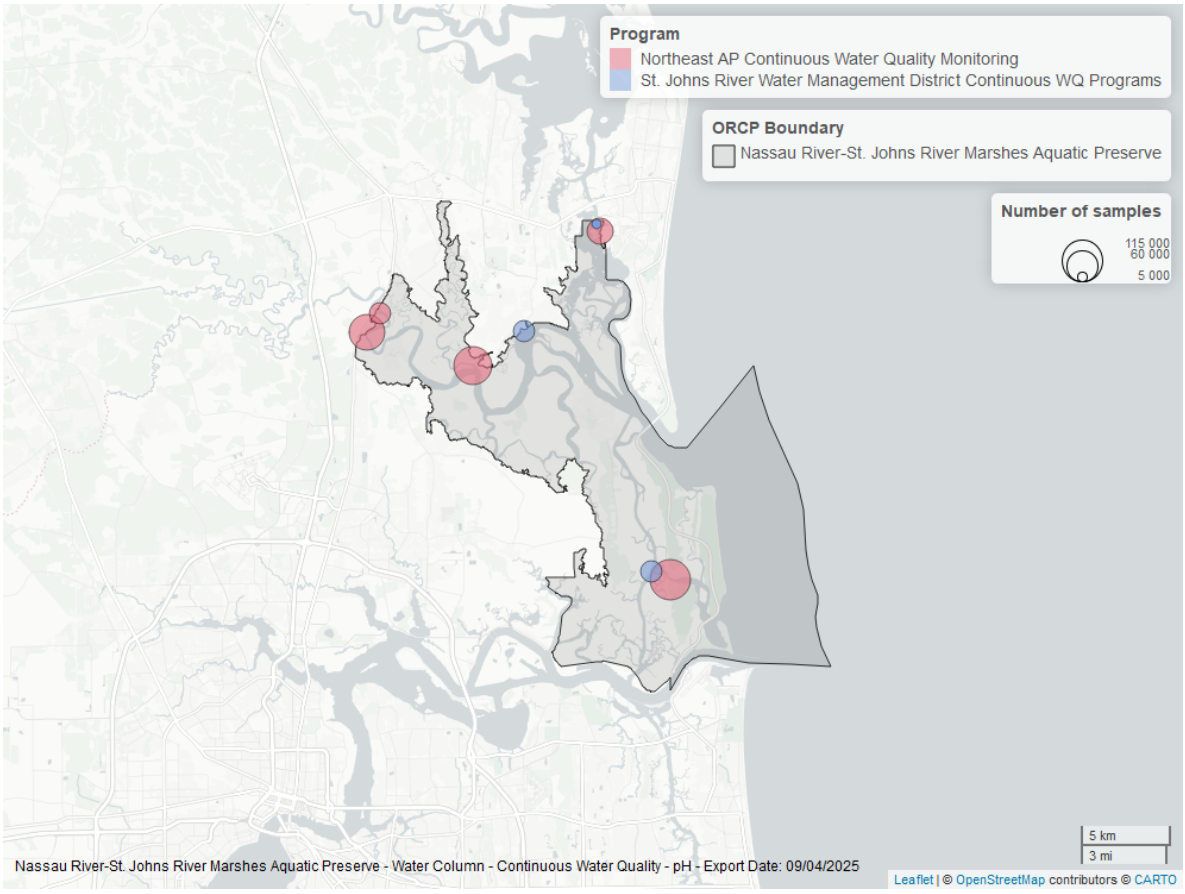

Figure 24: Map showing location of ph continuous water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Clarity

Turbidity - Discrete

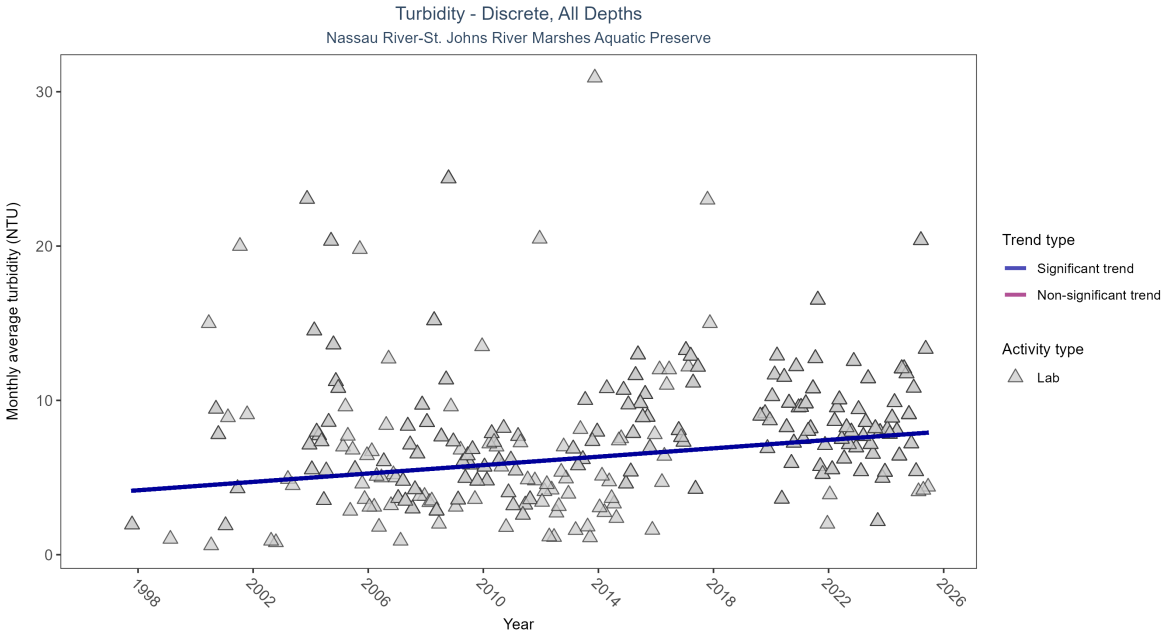

Figure 25: Scatter plot of monthly average turbidity over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only turbidity values measured in the laboratory (triangles) are included in the plot.

Table 13: Seasonal Kendall-Tau Results for - Turbidity

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
Lab	Significantly increasing trend	1042	27	1997 - 2025	7.1	0.17743	4.03799	0.136	1e-04

Monthly average turbidity increased by 0.14 NTU per year, indicating a decrease in water clarity.

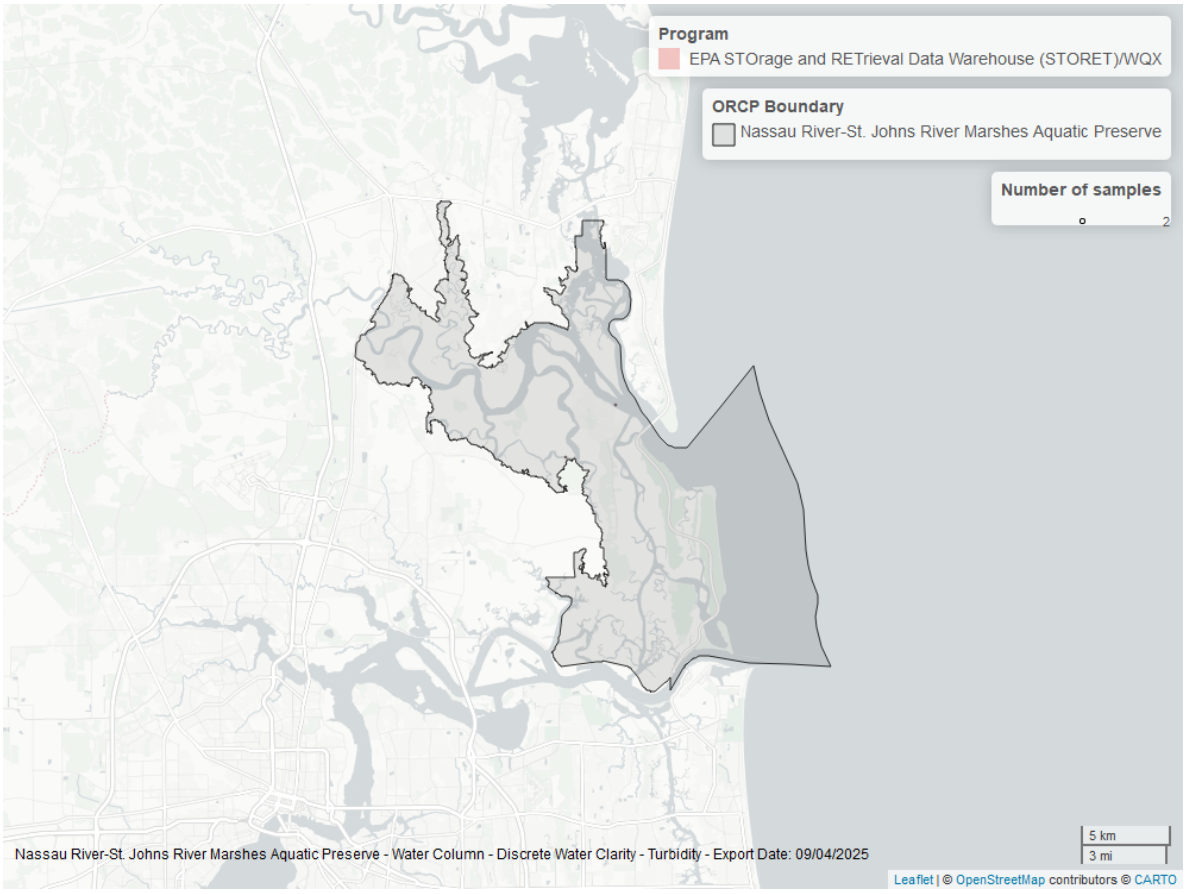

Figure 26: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Turbidity - Continuous

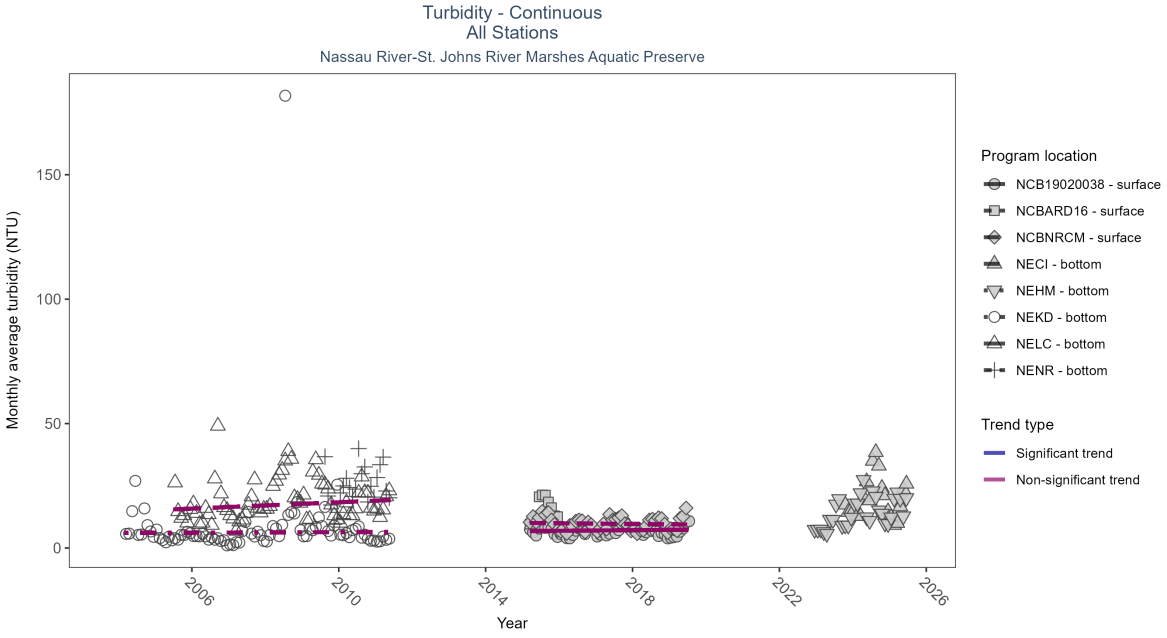

Figure 27: Scatter plot of monthly average turbidity over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

Table 14: Seasonal Kendall-Tau Results - Turbidity

Program Location	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
NEHM	Insufficient data to calculate trend	83369	4	2022 - 2025	12.00	-	-	-	-
NECI	Insufficient data to calculate trend	53689	3	2023 - 2025	14.00	-	-	-	-
NEKD	No significant trend	114181	8	2004 - 2011	4.00	0.02	6.06	0.05	0.8697
NCBNRCM	No significant trend	34696	5	2015 - 2019	8.64	-0.1	10.09	-0.14	0.6001
NCB19020038	No significant trend	31407	5	2015 - 2019	5.77	-0.01	6.79	0.12	0.7876
NENR	Insufficient data to calculate trend	31087	3	2009 - 2011	21.00	-	-	-	-
NELC	No significant trend	96153	7	2005 - 2011	15.00	0.16	15.18	0.64	0.1513
NCBARD16	Insufficient data to calculate trend	7385	2	2015 - 2016	12.89	-	-	-	-

No detectable change in monthly average turbidity was observed at four locations. There was insufficient data to fit a model for four locations.

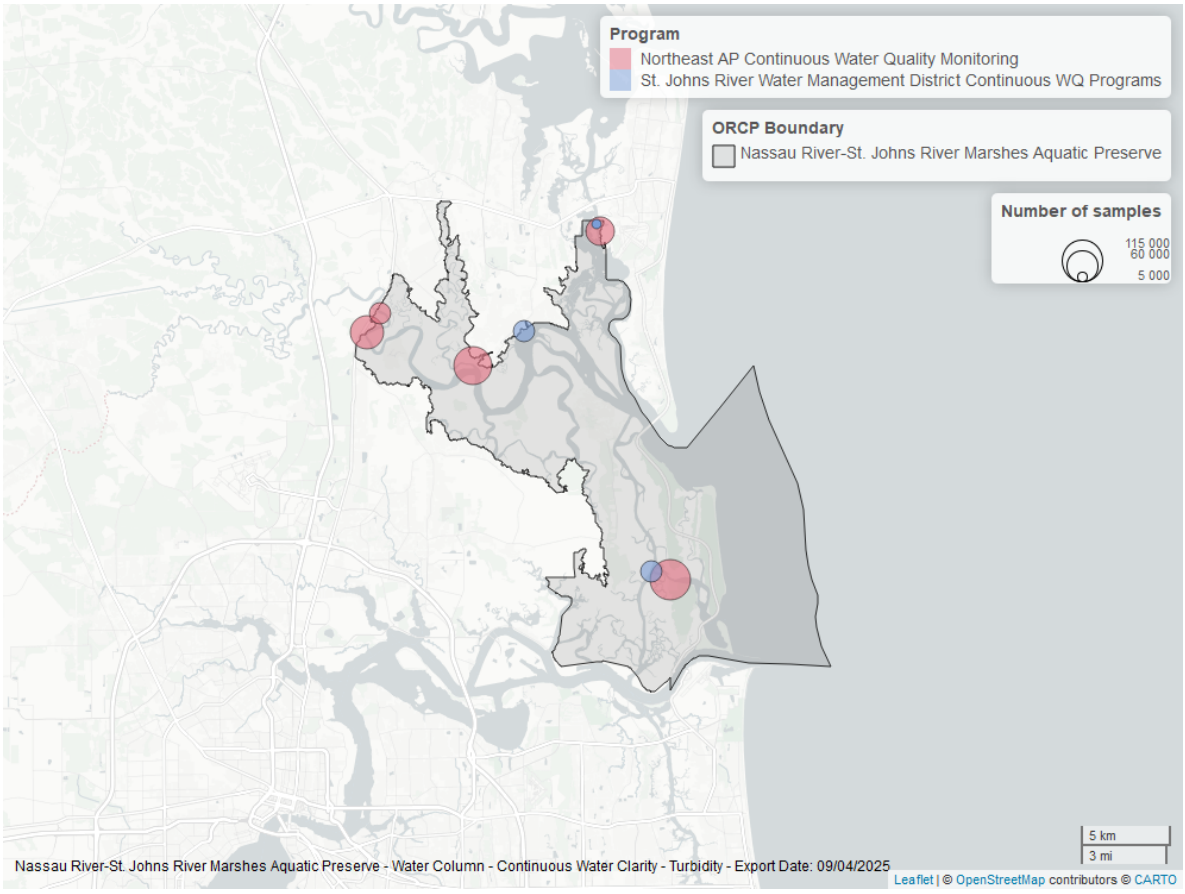

Figure 28: Map showing location of turbidity continuous water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Total Suspended Solids - Discrete

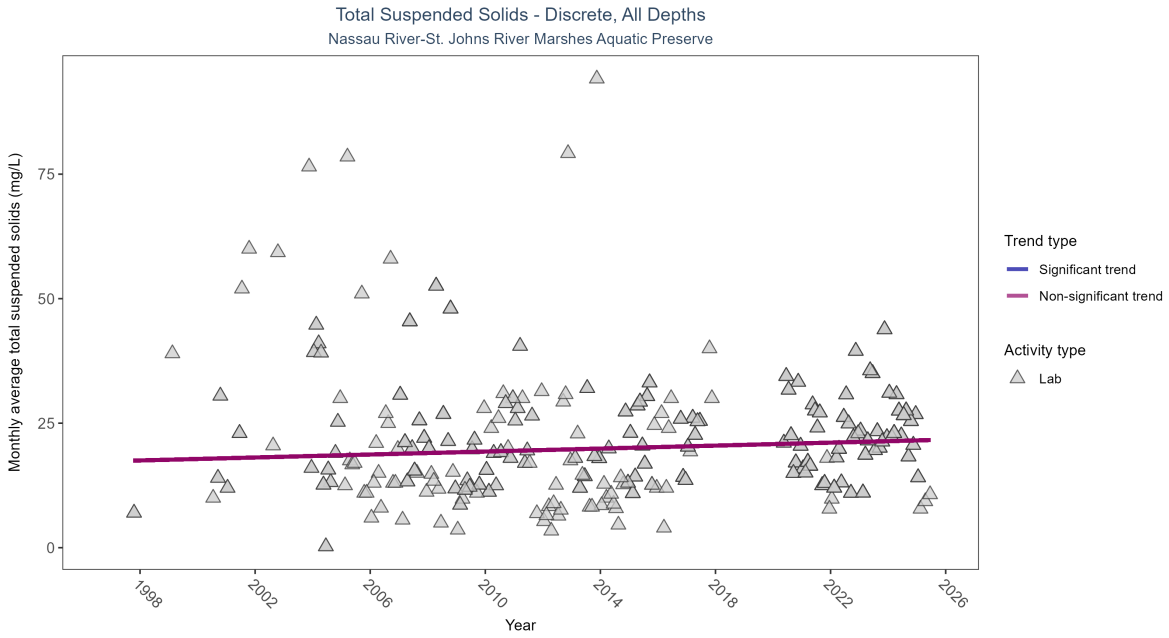

Figure 29: Scatter plot of monthly average total suspended solids (TSS) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only TSS values obtained from laboratory analyses (triangles) are included in the plot.

Table 15: Seasonal Kendall-Tau Results for - Total Suspended Solids

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
Lab	No significant trend	880	26	1997 - 2025	18	0.06226	17.36568	0.14902	0.1986

Total suspended solids showed no detectable trend between 1997 and 2025.

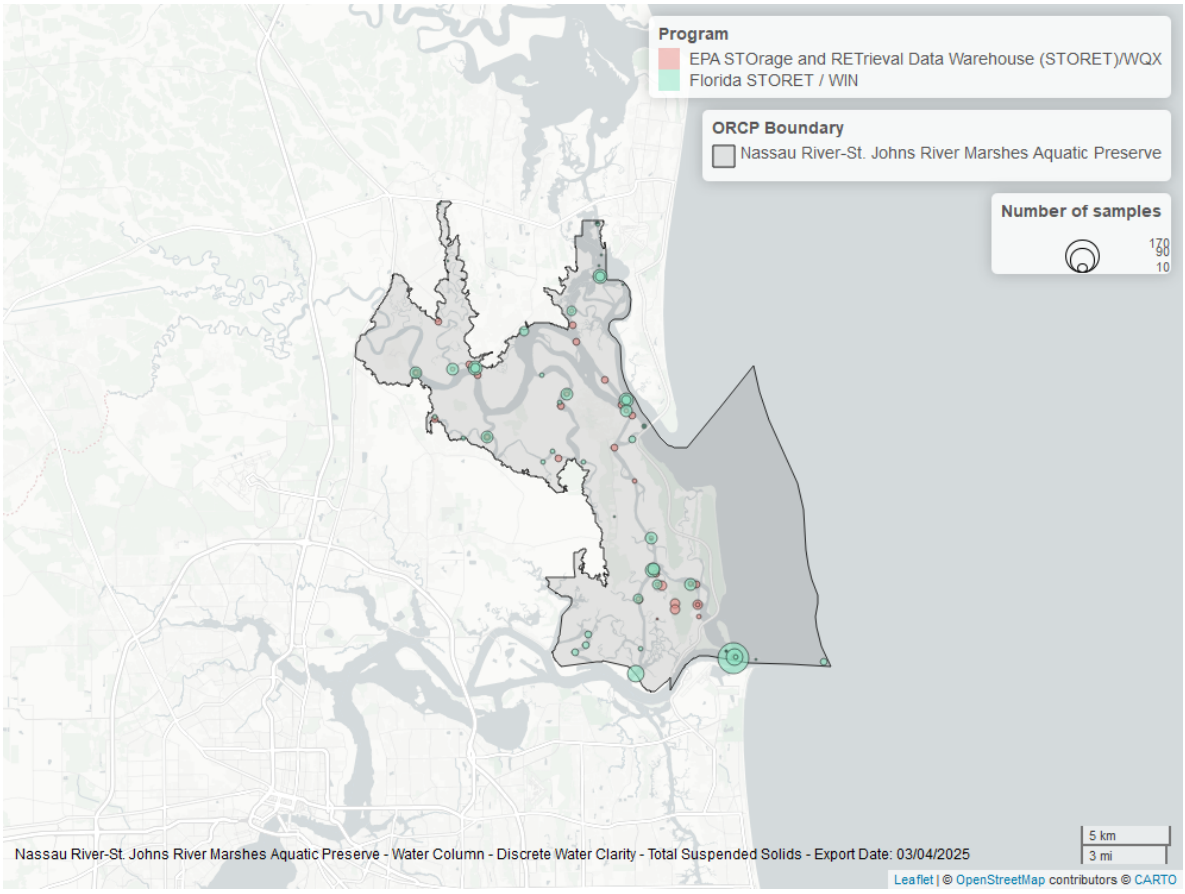

Figure 30: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Chlorophyll a, Uncorrected for Pheophytin - Discrete

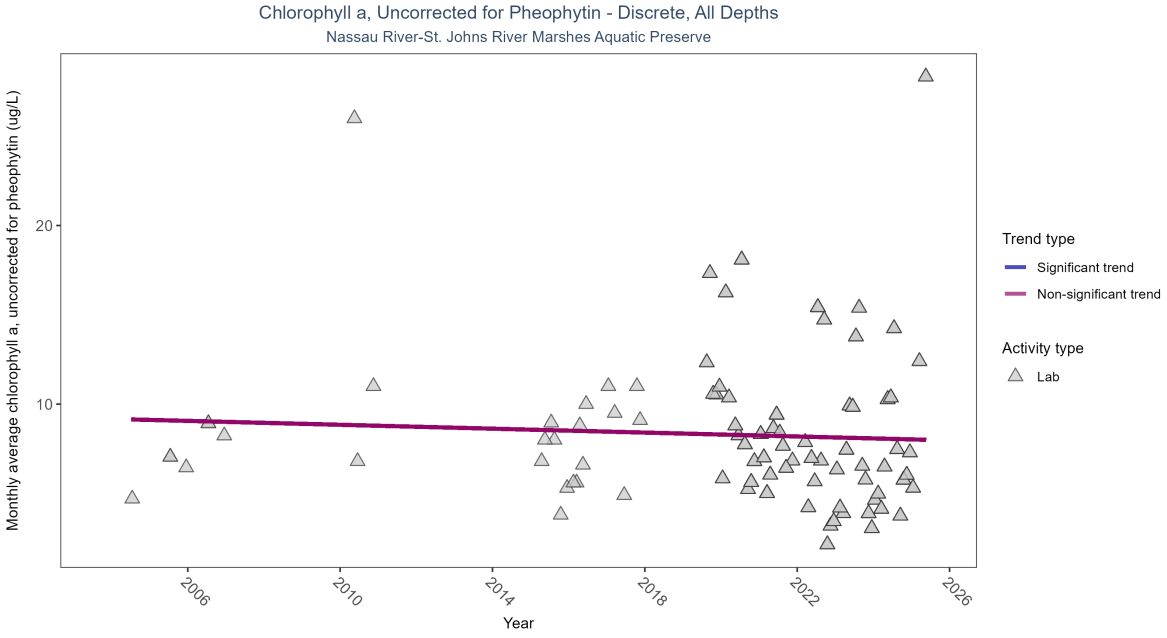

Figure 31: Scatter plot of monthly average levels of chlorophyll a, uncorrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) is included in the plot.

Table 16: Seasonal Kendall-Tau Results for - Chlorophyll a, Uncorrected for Pheophytin

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
Lab	No significant trend	379	14	2004 - 2025	6.8	-0.10066	9.16876	-0.05456	0.6

Chlorophyll a, uncorrected for pheophytin, showed no detectable trend between 2004 and 2025.

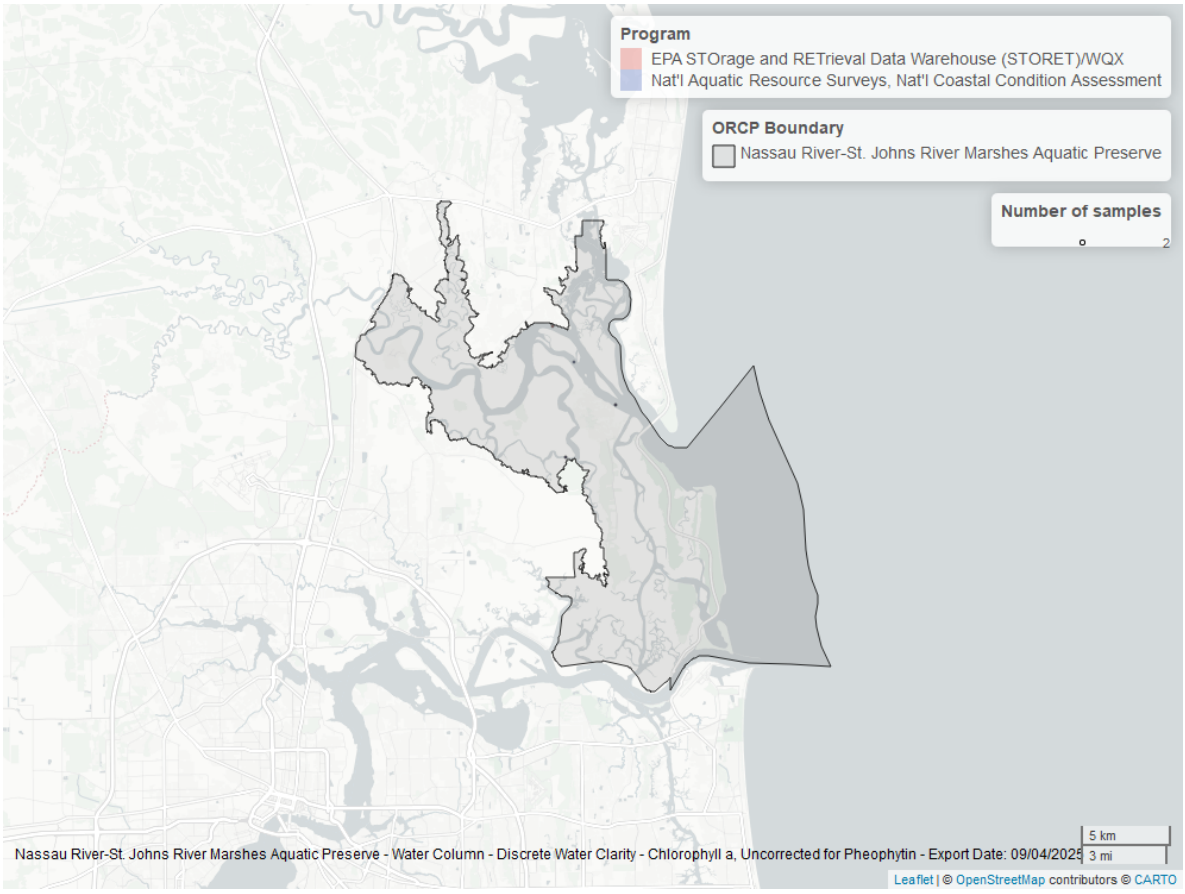

Figure 32: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Chlorophyll a, Corrected for Pheophytin - Discrete

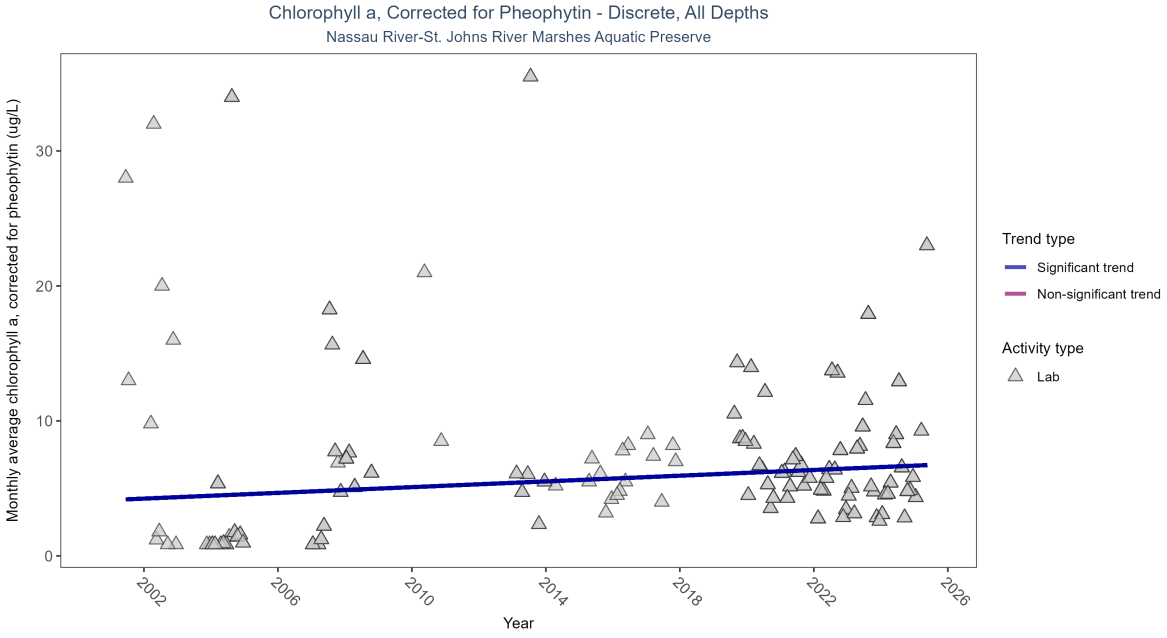

Figure 33: Scatter plot of monthly average levels of chlorophyll a, corrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) is included in the plot.

Table 17: Seasonal Kendall-Tau Results for - Chlorophyll a, Corrected for Pheophytin

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
Lab	Significantly increasing trend	699	19	2001 - 2025	5.7	0.13021	4.13929	0.10608	0.0473

Monthly average chlorophyll a, corrected for pheophytin, increased by 0.11 µg/L per year, indicating a decrease in water clarity.

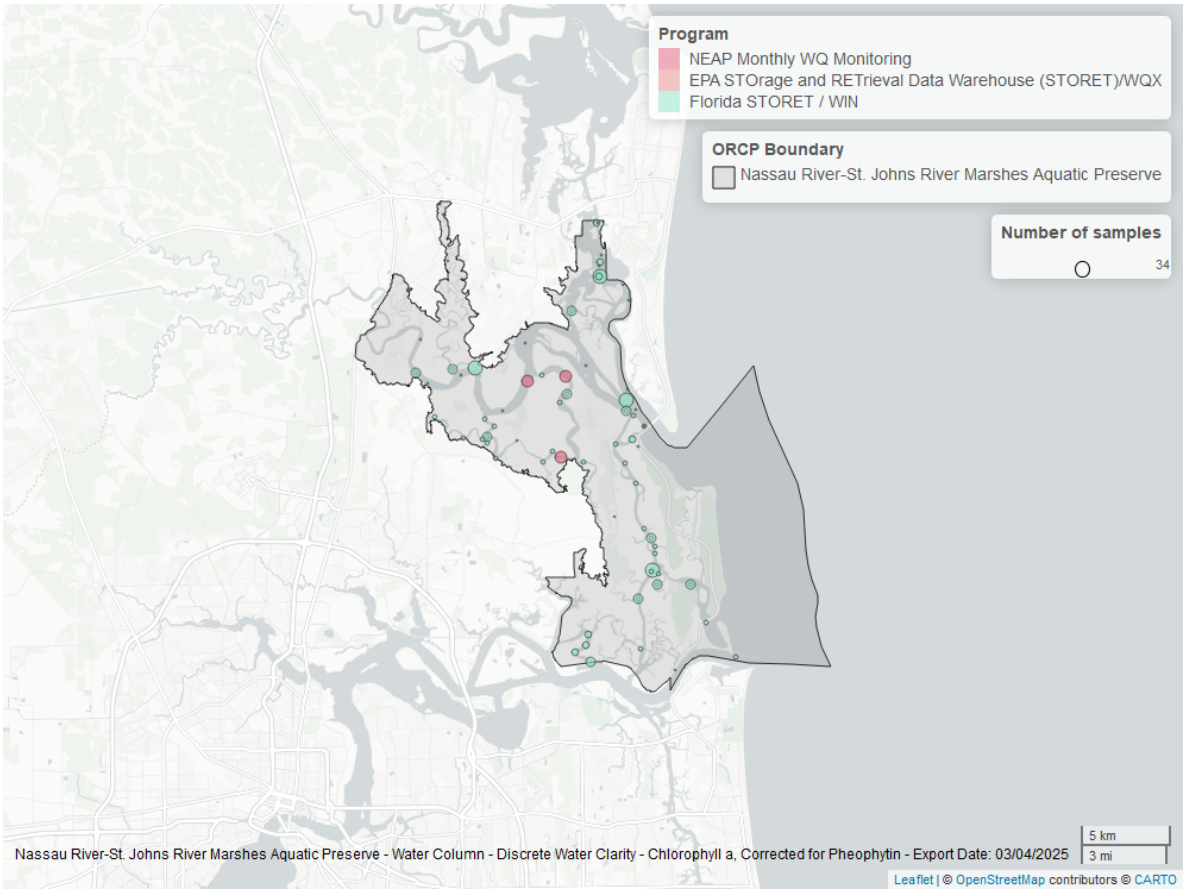

Figure 34: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Secchi Depth - Discrete

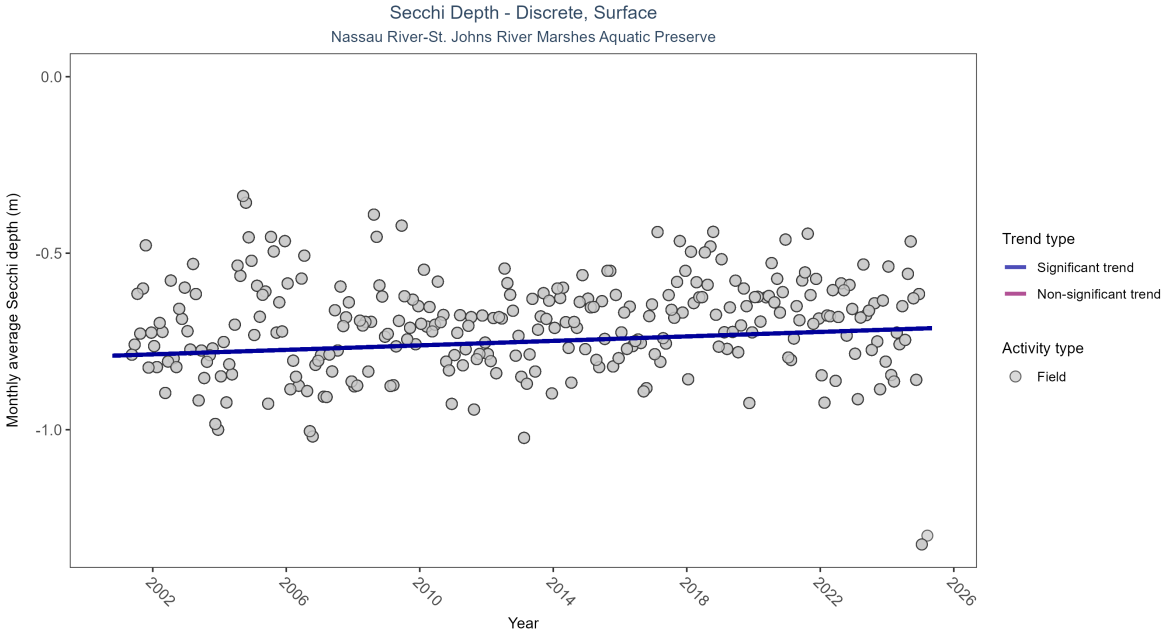

Figure 35: Scatter plot of monthly average Secchi depth over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Secchi depth is only measured in the field (circles).

Table 18: Seasonal Kendall-Tau Results for - Secchi Depth

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
Field	Significantly increasing trend	20402	26	2000 - 2025	-0.7	0.11221	-0.79285	0.00317	0.0085

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

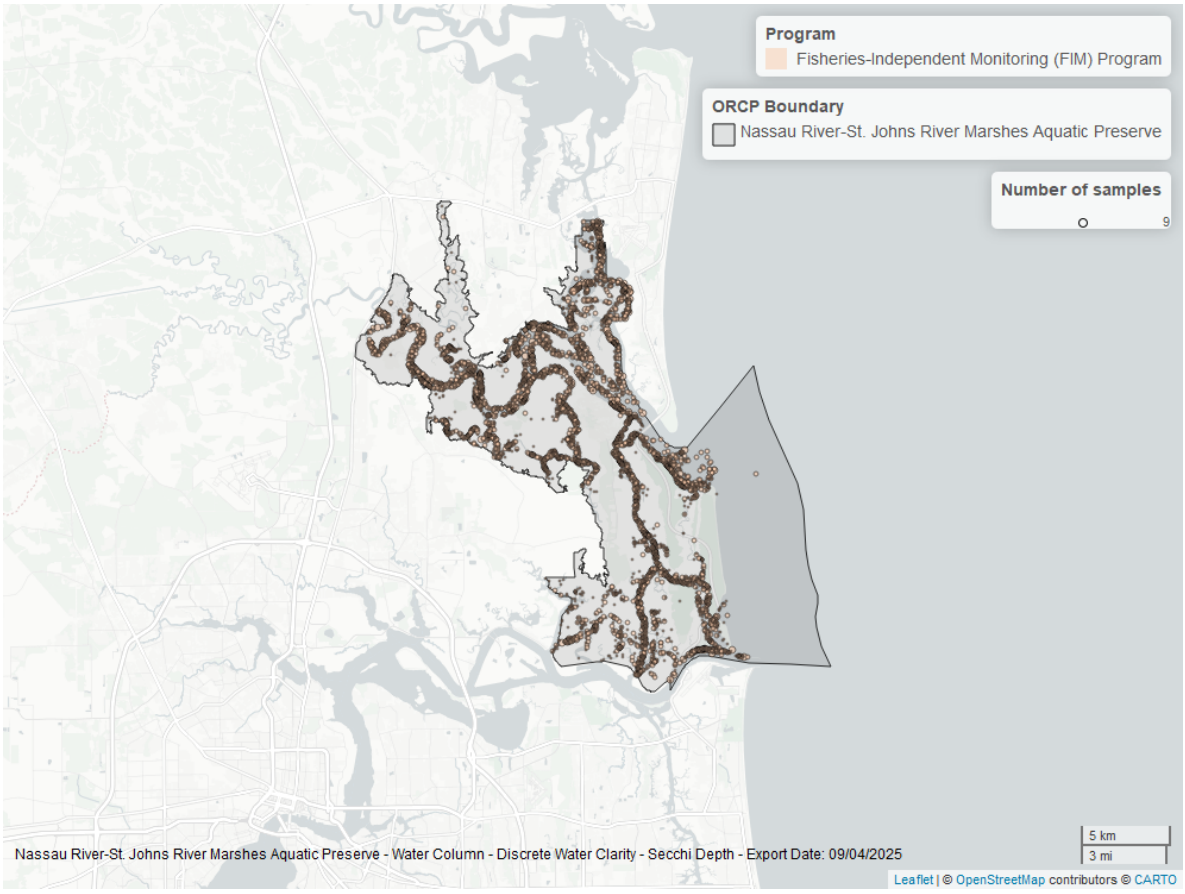

Figure 36: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Colored Dissolved Organic Matter - Discrete

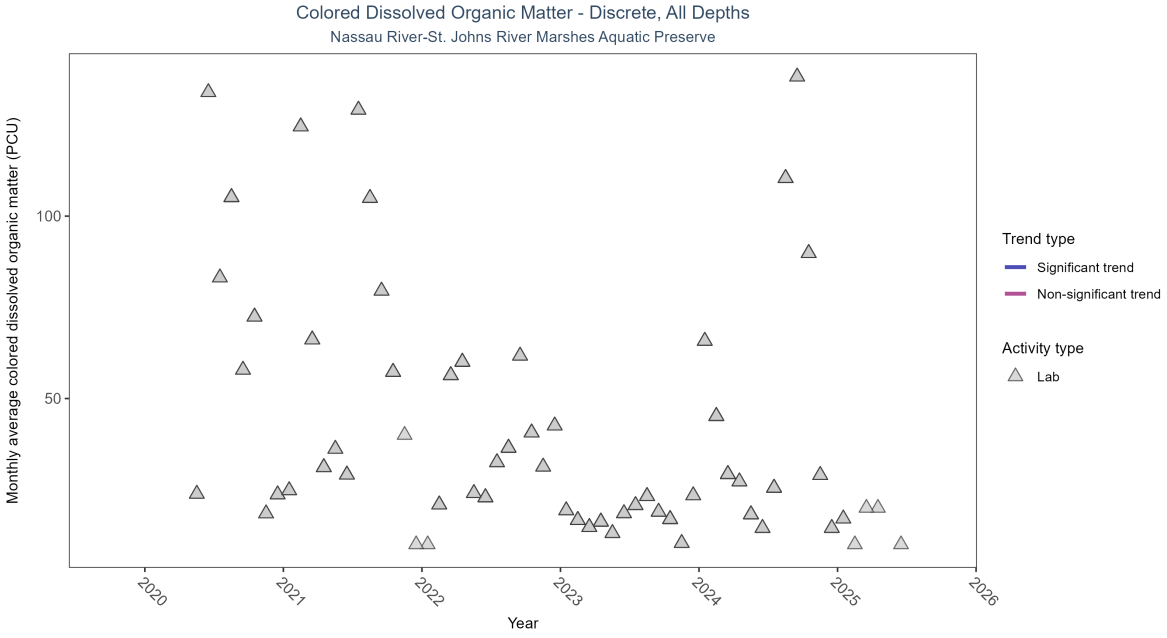

Figure 37: Scatter plot of monthly average colored dissolved organic matter (CDOM) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed CDOM (triangles) is included in the plot.

Table 19: Seasonal Kendall-Tau Results for - Colored Dissolved Organic Matter

Activity Type	Statistical Trend	Sample Count	Years with Data	Period of Record	Median Result Value	Tau	Sen Intercept	Sen Slope	P
Lab	Insufficient data to calculate trend	498	6	2020 - 2025	27.0821	-	-	-	-

There was insufficient data to fit a model for colored dissolved organic matter.

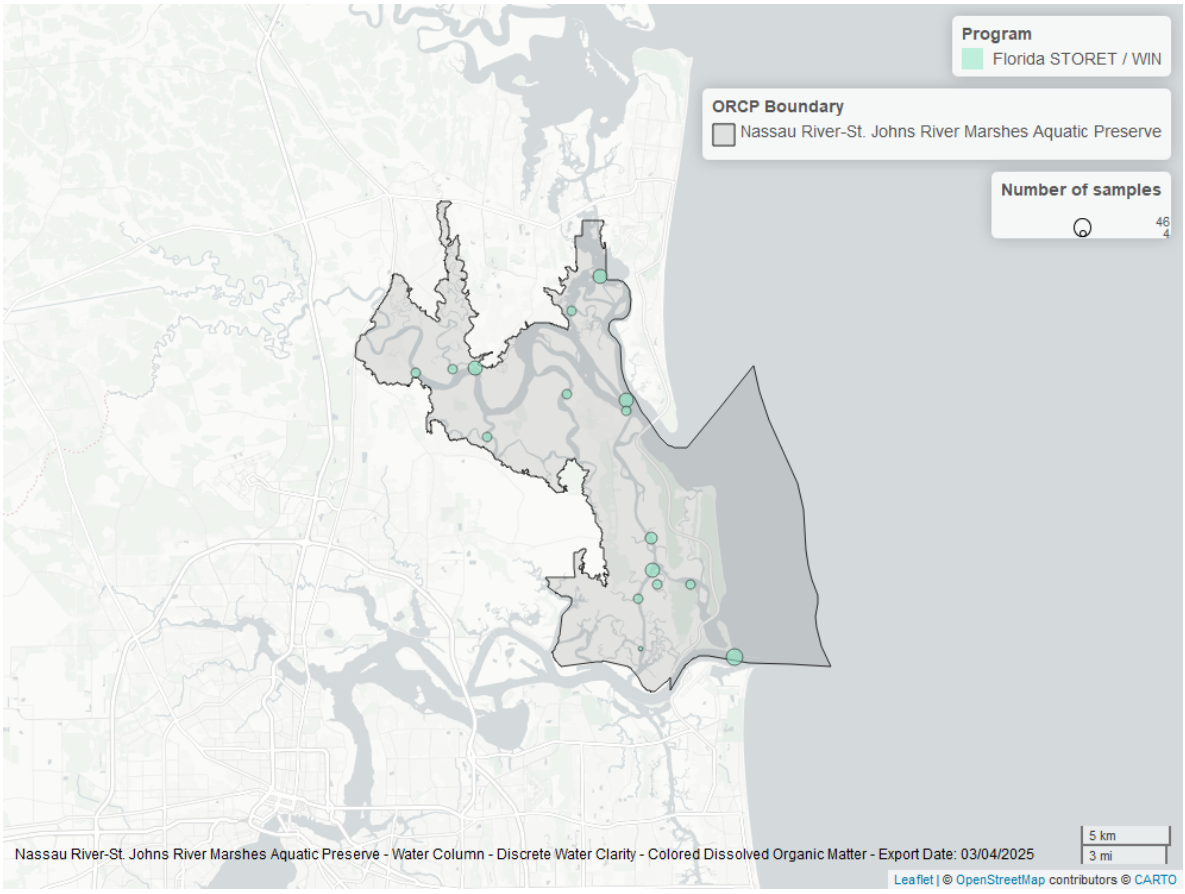

Figure 38: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.