

Nassau River-St. Johns River Marshes Aquatic Preserve

SEACAR Water Quality Analysis

Last compiled on 10 July, 2025

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Indicators

Nutrients

Total Nitrogen - Discrete

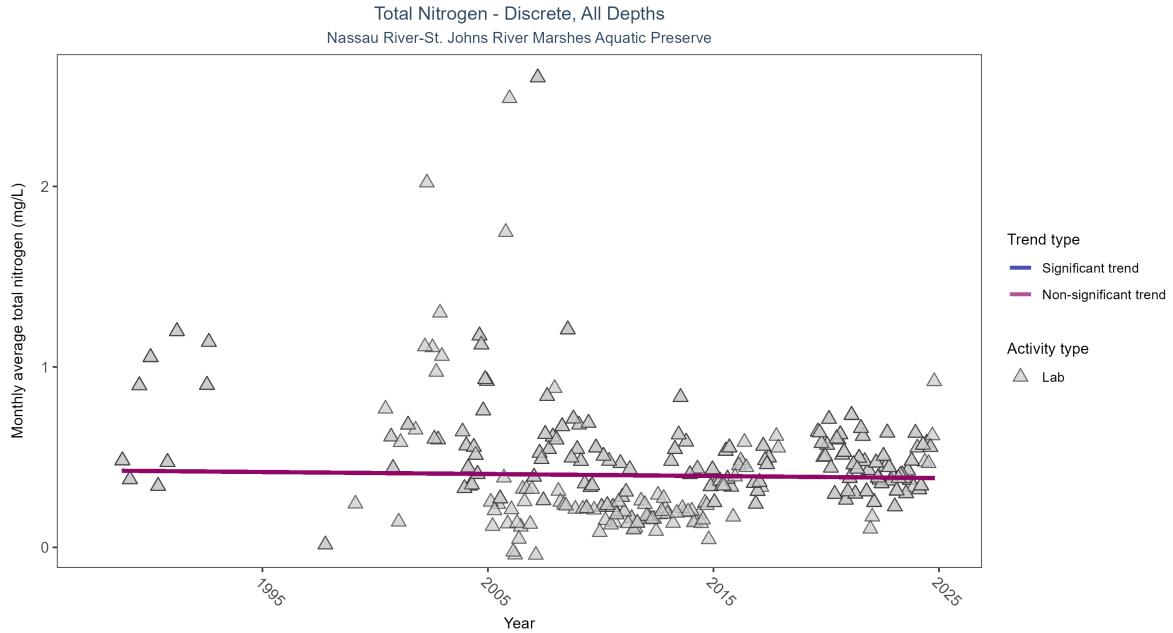


Figure 1: Scatter plot of monthly average total nitrogen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only nitrogen values obtained from laboratory analyses (triangles) are included in the 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	984	31	1988 - 2024	0.415	-0.02053	0.42556	-0.00112	0.6852

Total nitrogen showed no detectable trend between 1988 and 2024.

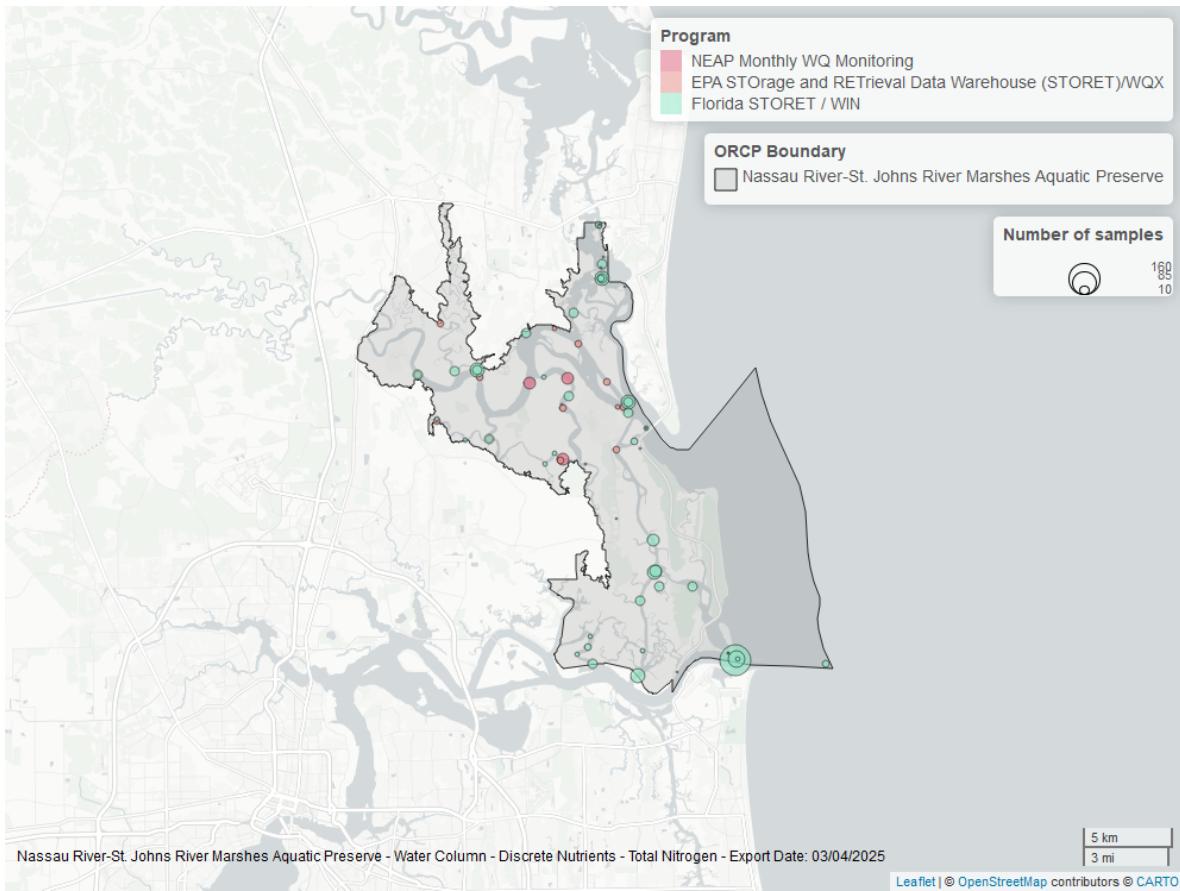


Figure 2: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Total Phosphorus - Discrete

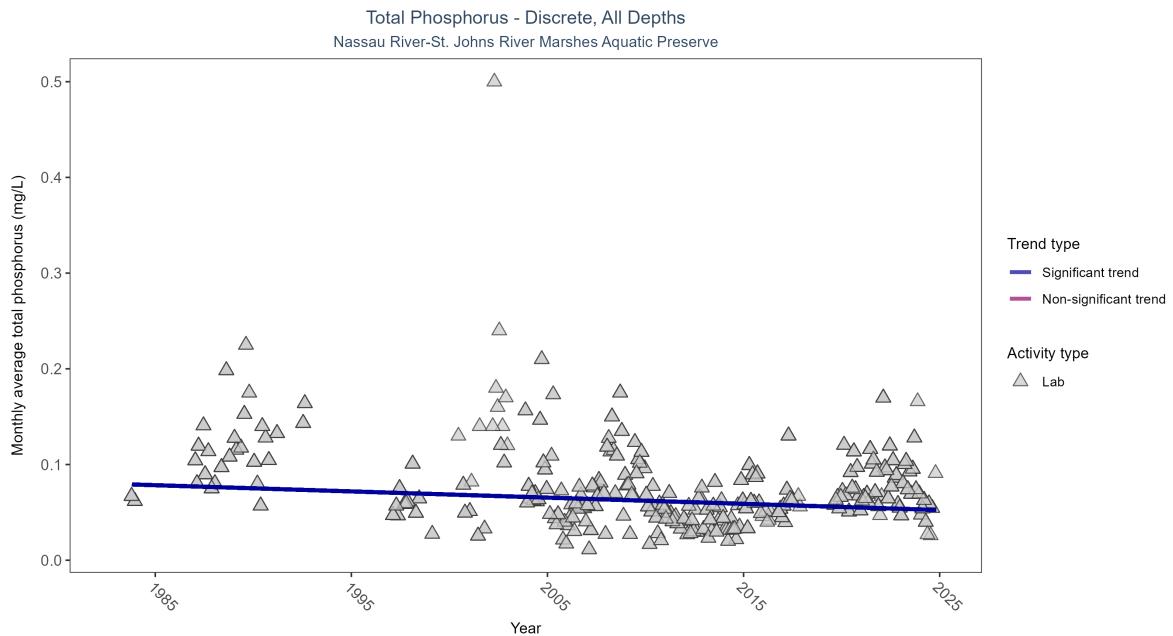


Figure 3: Scatter plot of monthly average total phosphorus over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only phosphorus values obtained from laboratory analyses (triangles) are included in 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	Significantly decreasing trend	1743	34	1983 - 2024	0.069	-0.14147	0.07969	-0.00065	0.0018

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

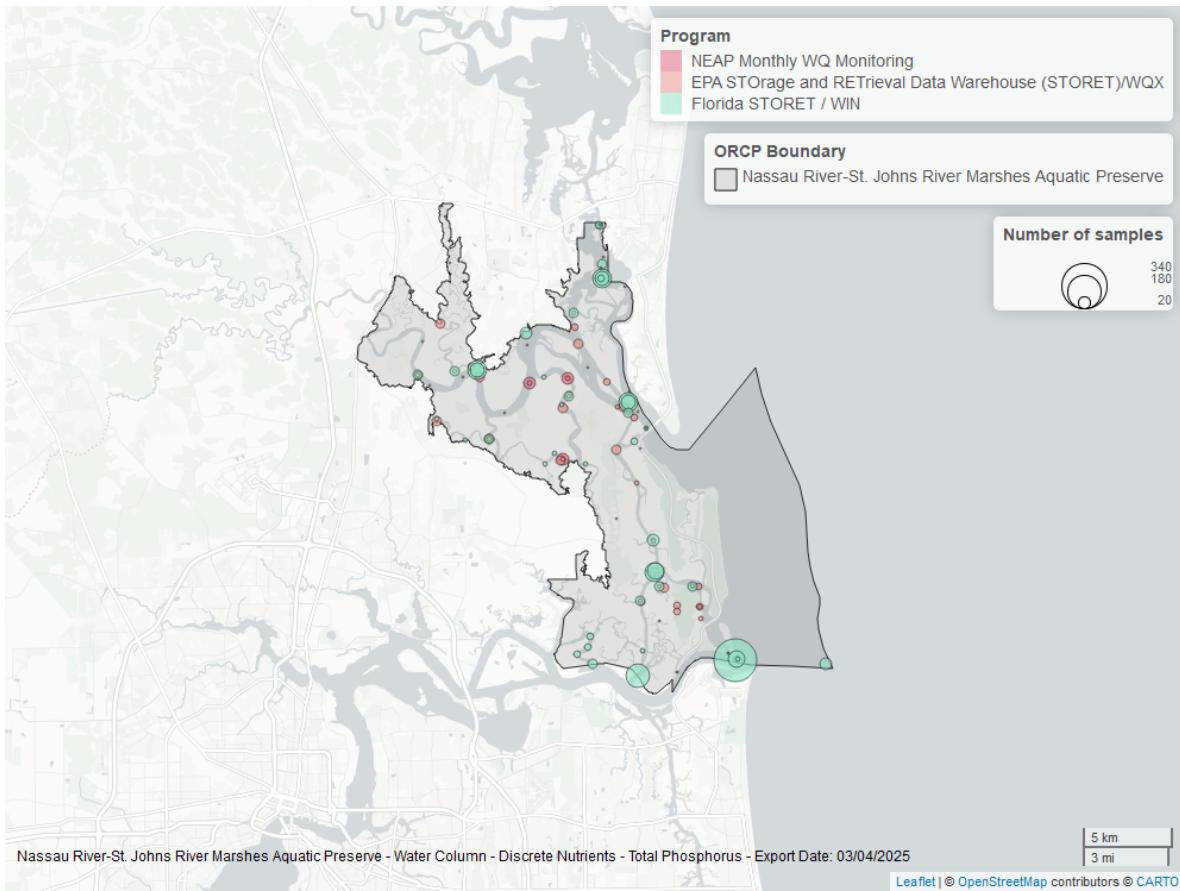


Figure 4: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Quality

Dissolved Oxygen - Discrete

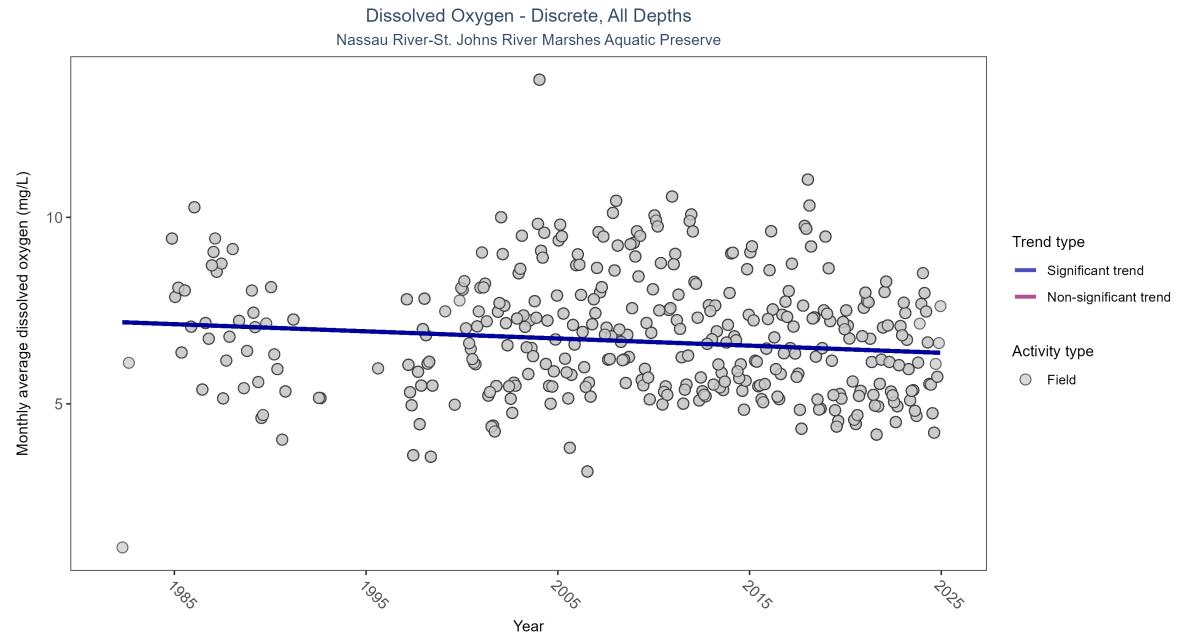


Figure 5: Scatter plot of monthly average dissolved oxygen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen values measured in the field (circles) are included in the plot.

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	39305	39	1982 - 2024	6.3	-0.15674	7.19343	-0.0192	0

Monthly average dissolved oxygen decreased by 0.02 mg/L per year.

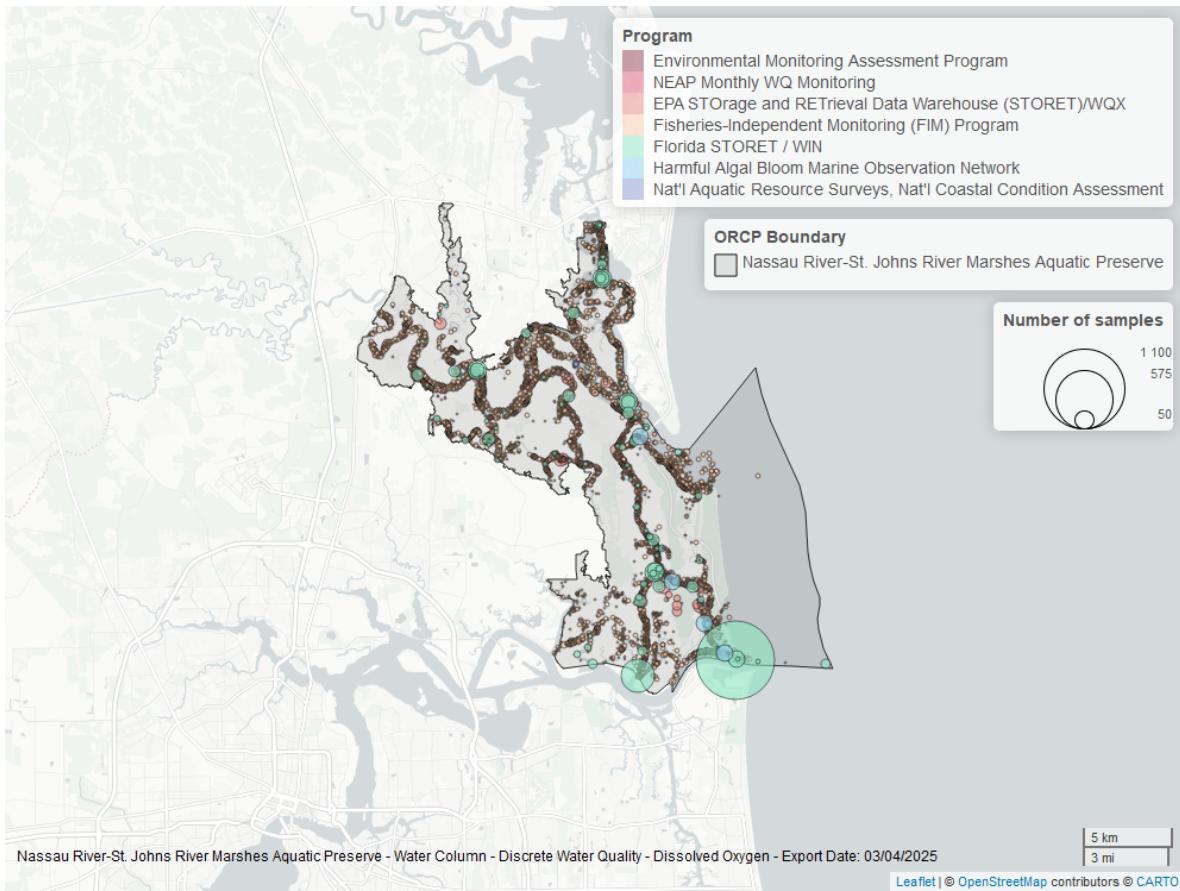


Figure 6: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen - Continuous

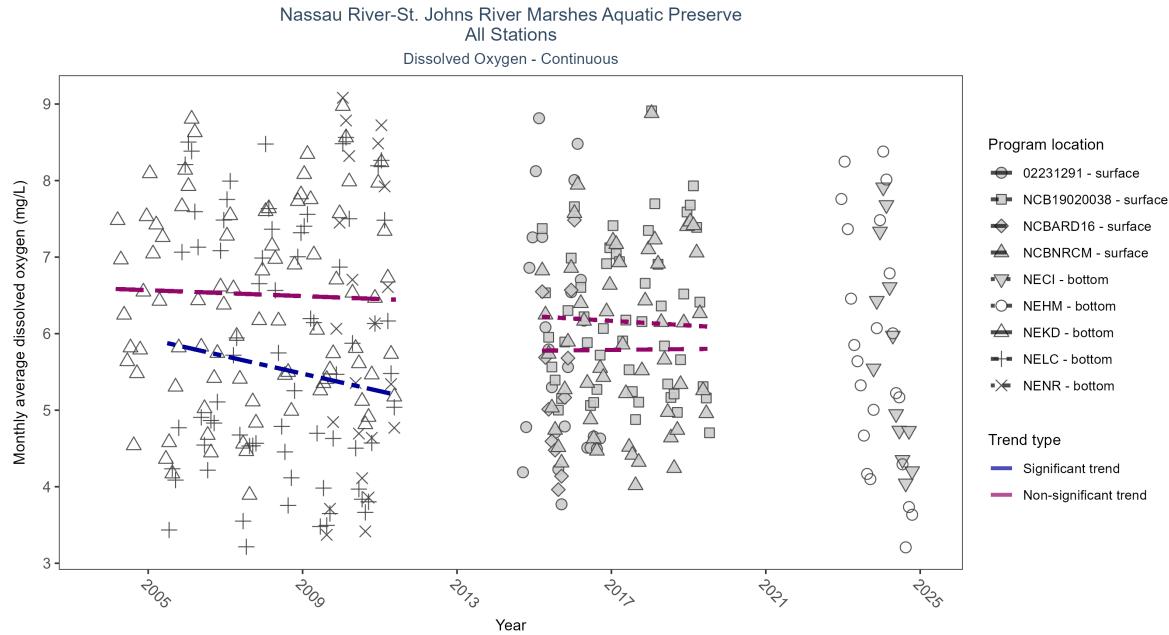


Figure 7: Scatter plot of monthly average dissolved oxygen over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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	-	-	-	-
NELC	Significantly decreasing trend	95860	7	2005 - 2011	5.60	-0.34	5.93	-0.11	0.0014
NEKD	No significant trend	110958	8	2004 - 2011	6.40	-0.04	6.59	-0.02	0.5607
NENR	Insufficient data to calculate trend	31438	3	2009 - 2011	5.80	-	-	-	-
NEHM	Insufficient data to calculate trend	60595	3	2022 - 2024	5.70	-	-	-	-
NECI	Insufficient data to calculate trend	32935	2	2023 - 2024	5.80	-	-	-	-
NCBNRCM	No significant trend	35477	5	2015 - 2019	5.79	0.05	5.78	0.01	0.797
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.

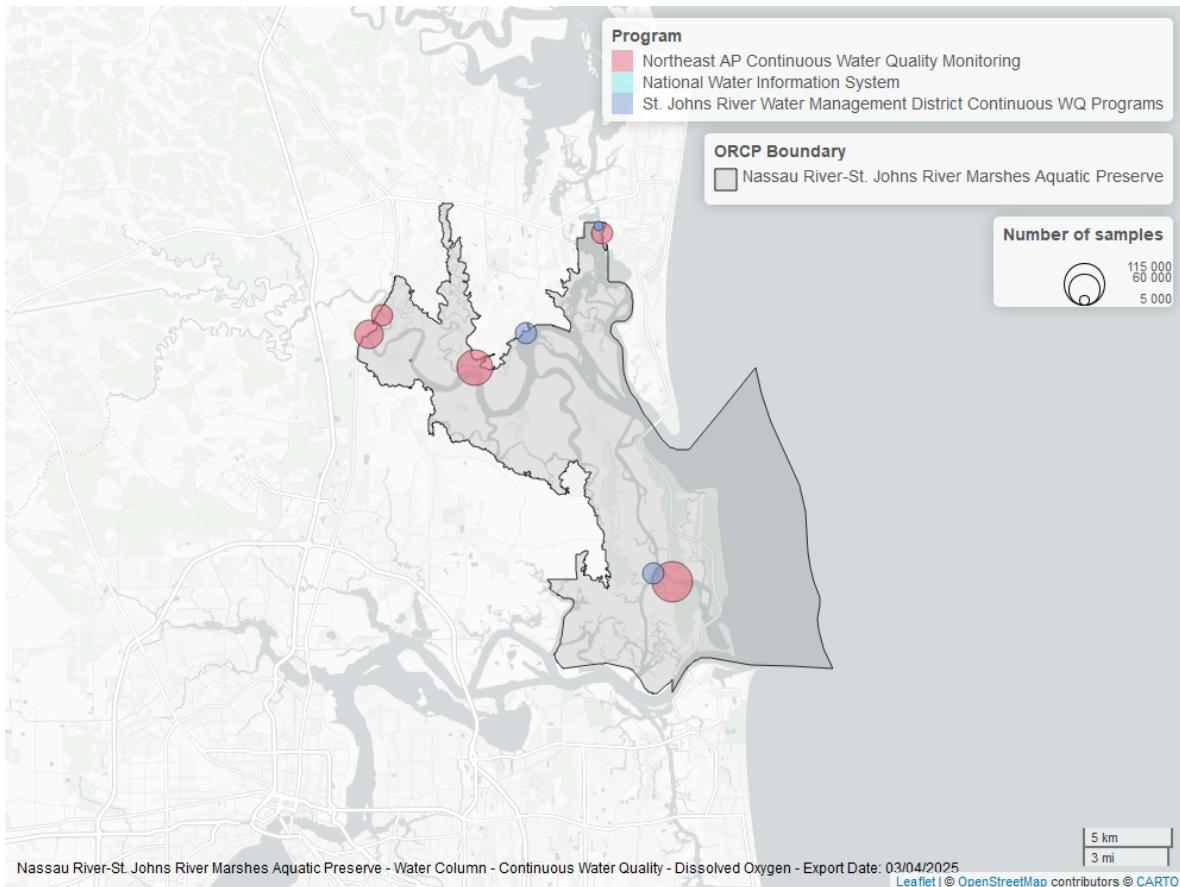


Figure 8: Map showing location of dissolved oxygen continuous water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen Saturation - Discrete

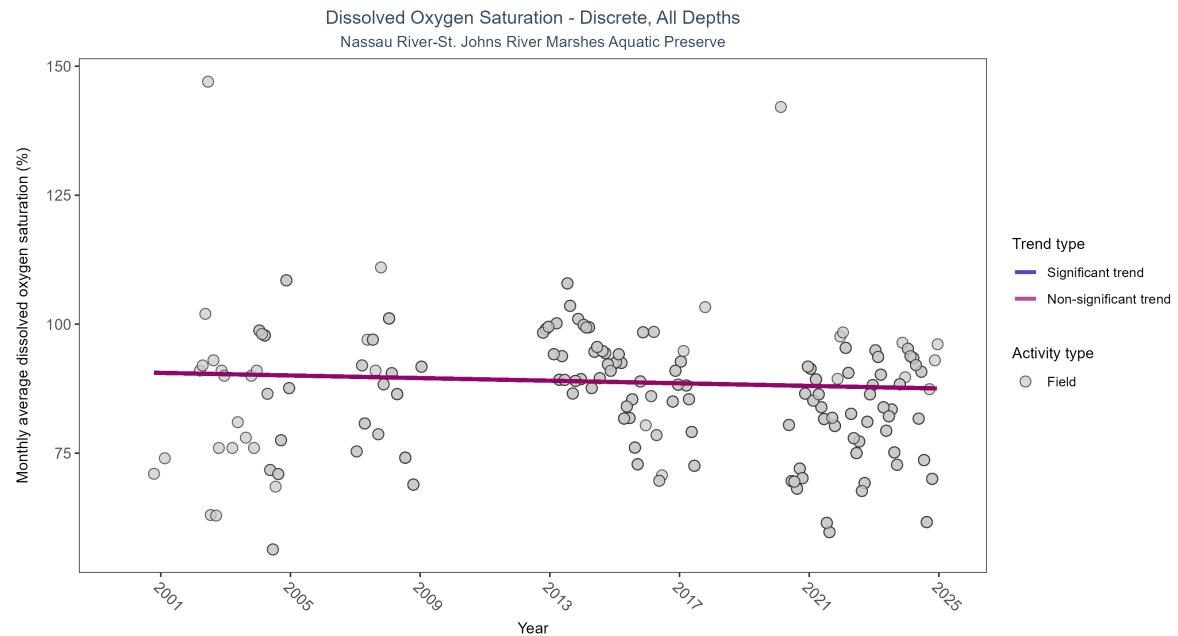


Figure 9: Scatter plot of monthly average dissolved oxygen saturation over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen saturation values measured in the field (circles) 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	1252	19	2000 - 2024	87.95	-0.09359	90.68412	-0.1261	0.1117

Dissolved oxygen saturation showed no detectable trend between 2000 and 2024.

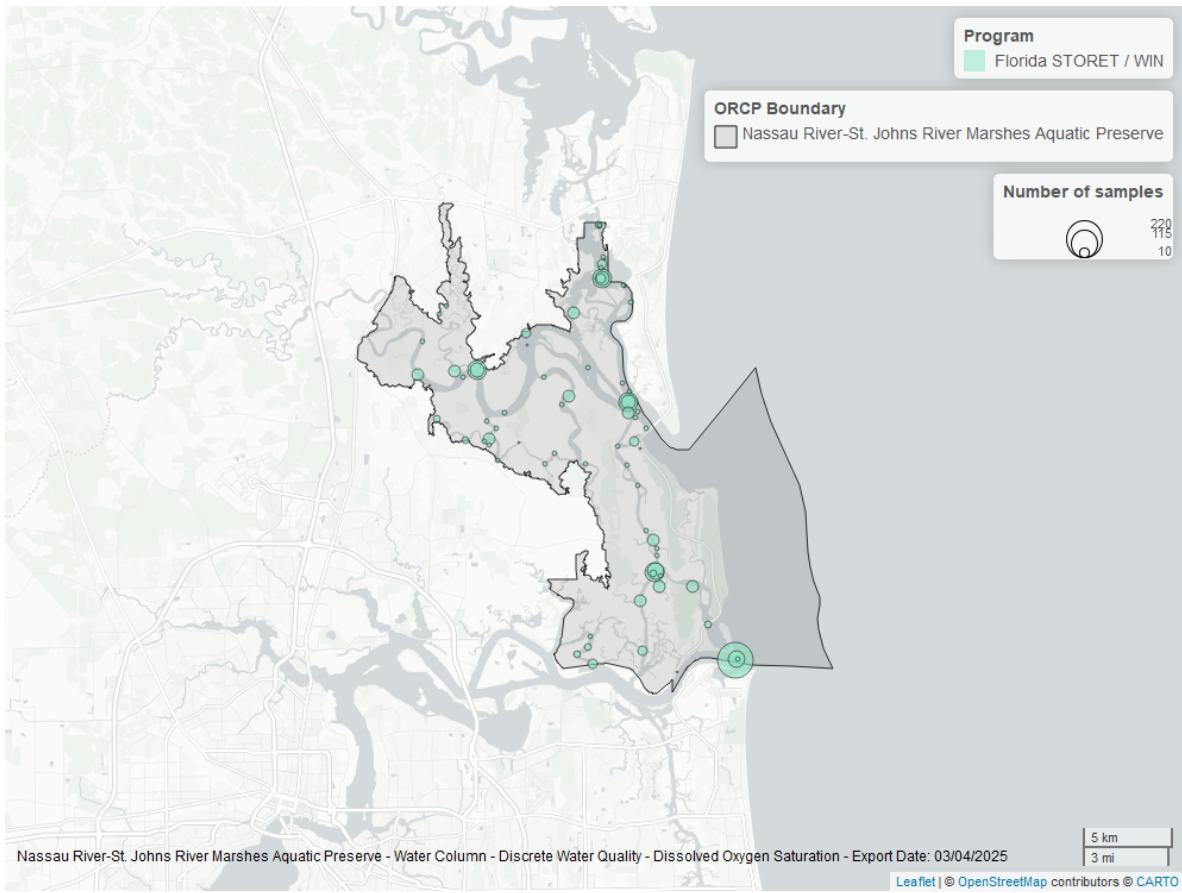


Figure 10: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen Saturation - Continuous

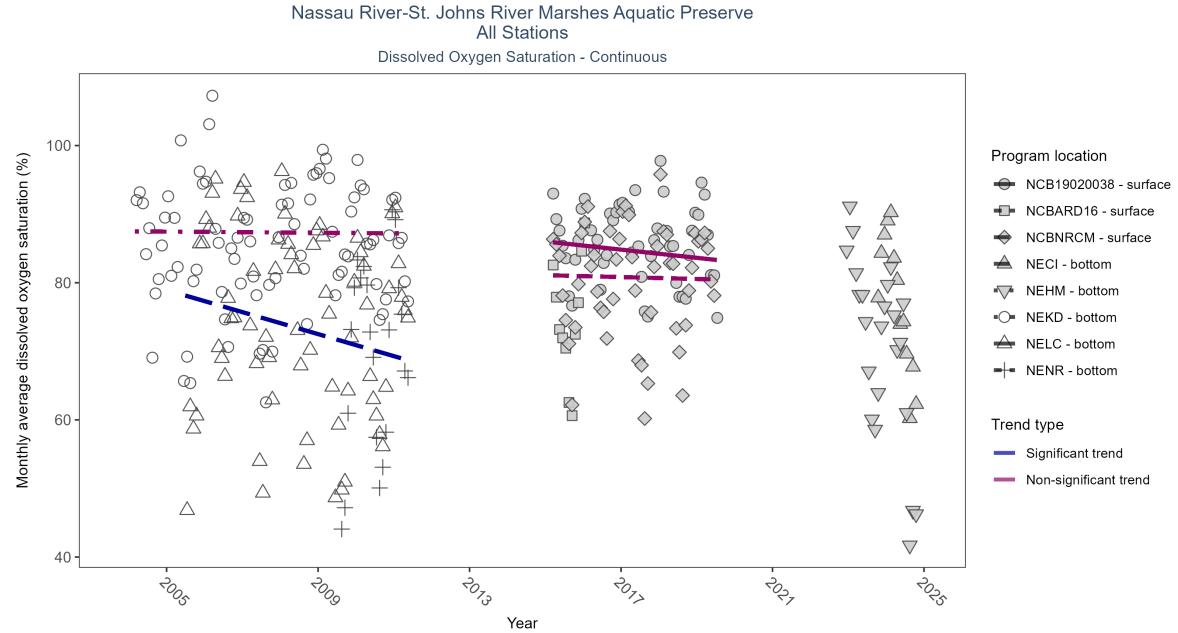


Figure 11: Scatter plot of monthly average dissolved oxygen saturation over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
NELC	Significantly decreasing trend	95868	7	2005 - 2011	77.90	-0.27	78.93	-1.6	0.0111
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	-	-	-	-
NEHM	Insufficient data to calculate trend	60595	3	2022 - 2024	73.80	-	-	-	-
NECI	Insufficient data to calculate trend	32948	2	2023 - 2024	80.10	-	-	-	-
NCB19020038	No significant trend	34438	5	2015 - 2019	87.06	-0.16	86.02	-0.6	0.1268
NCBNRCM	No significant trend	35240	5	2015 - 2019	82.06	-0.05	81.1	-0.14	0.797
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.

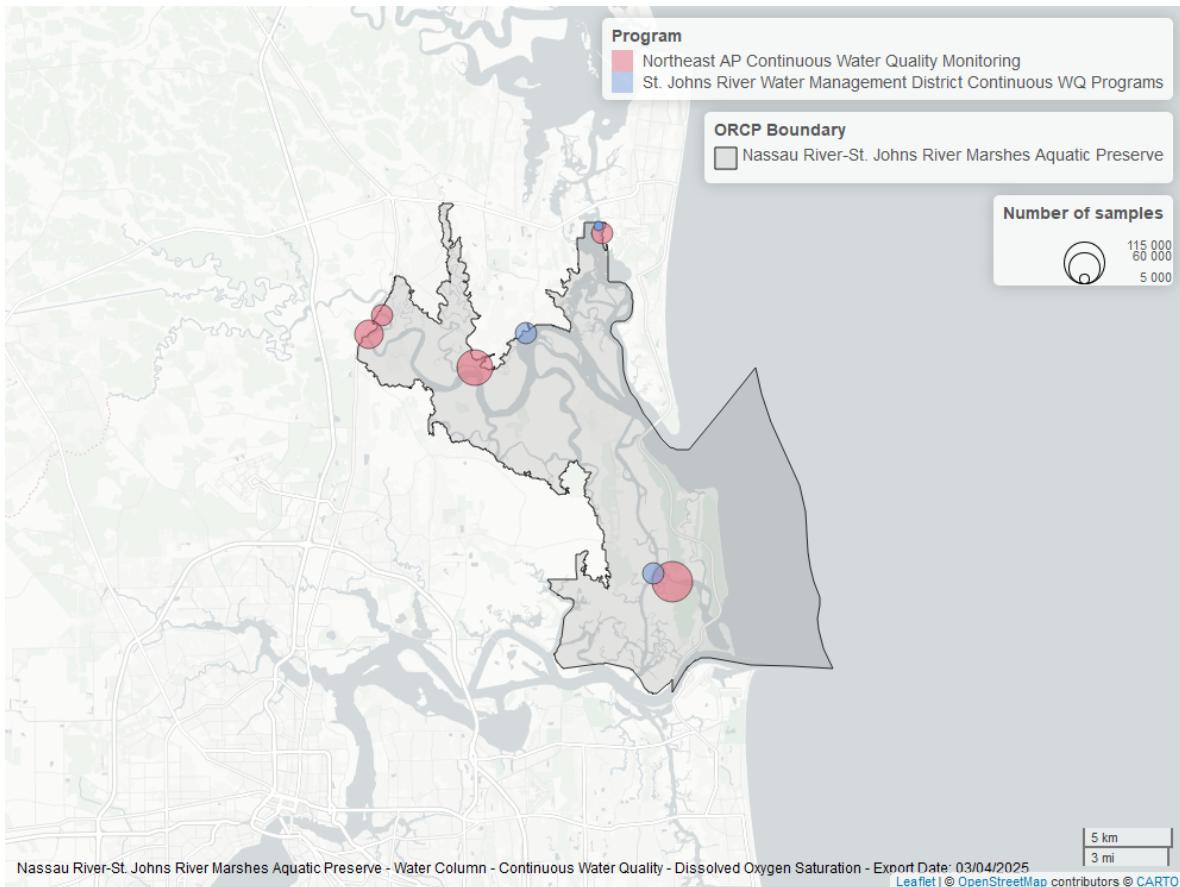


Figure 12: Map showing location of dissolved oxygen saturation continuous water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Salinity - Discrete

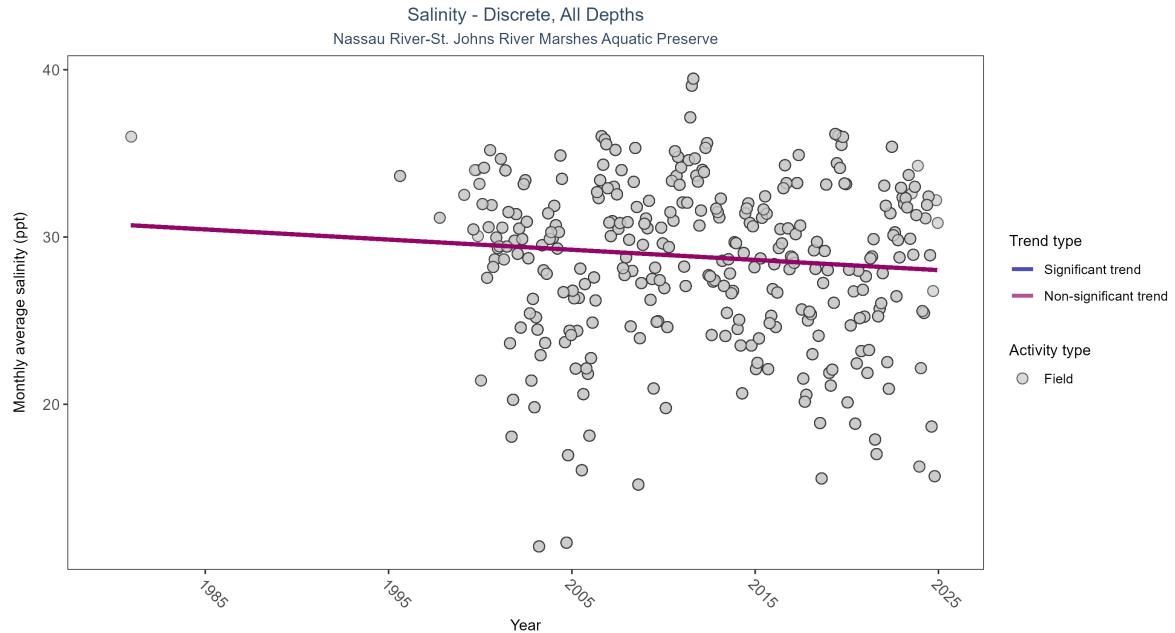


Figure 13: Scatter plot of monthly average salinity over time. If the time series included ten or more years of discrete observations, significant (blue) or non-significant (magenta) trend lines are also shown. Discrete salinity values derived from grab samples analyzed in the field (circles) or the 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	21109	29	1980 - 2024	30.5	-0.05737	30.75849	-0.06084	0.1455

Salinity showed no detectable trend between 1980 and 2024.

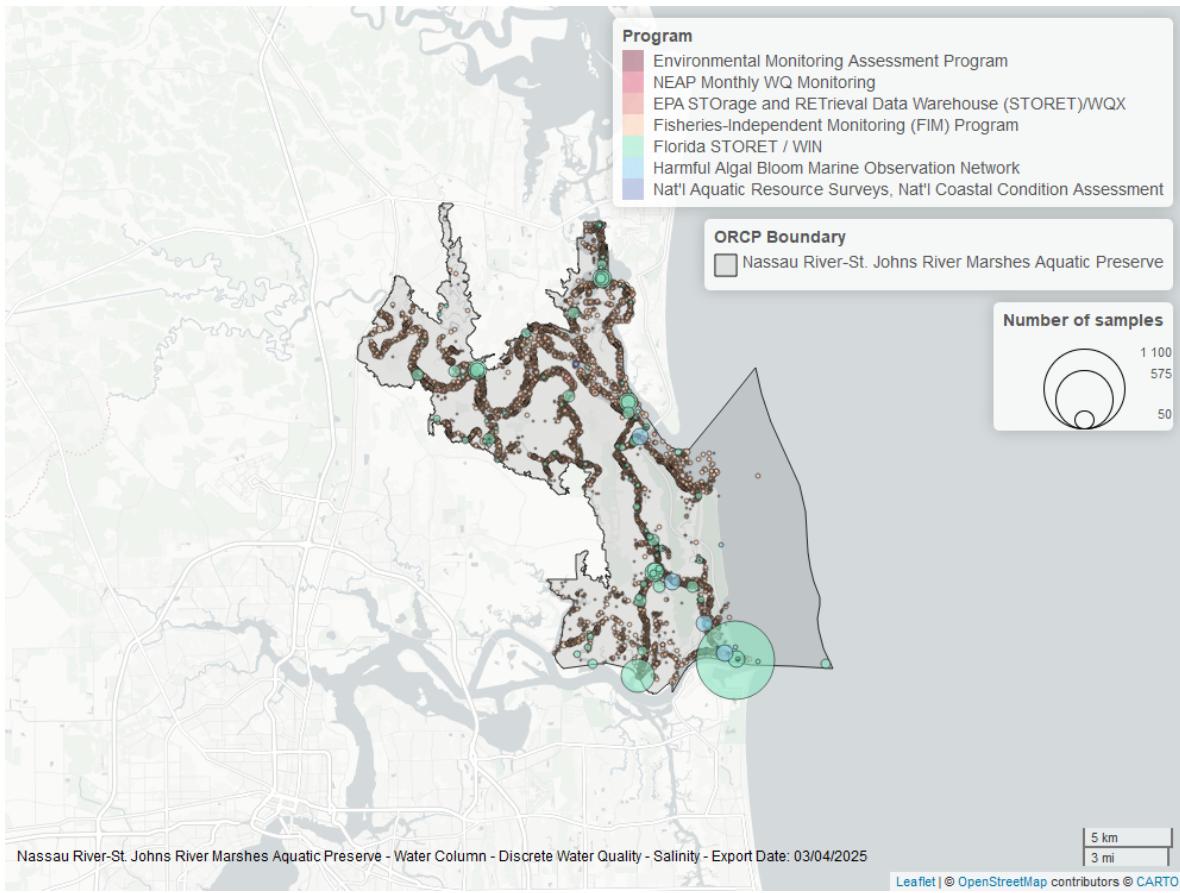


Figure 14: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Salinity - Continuous

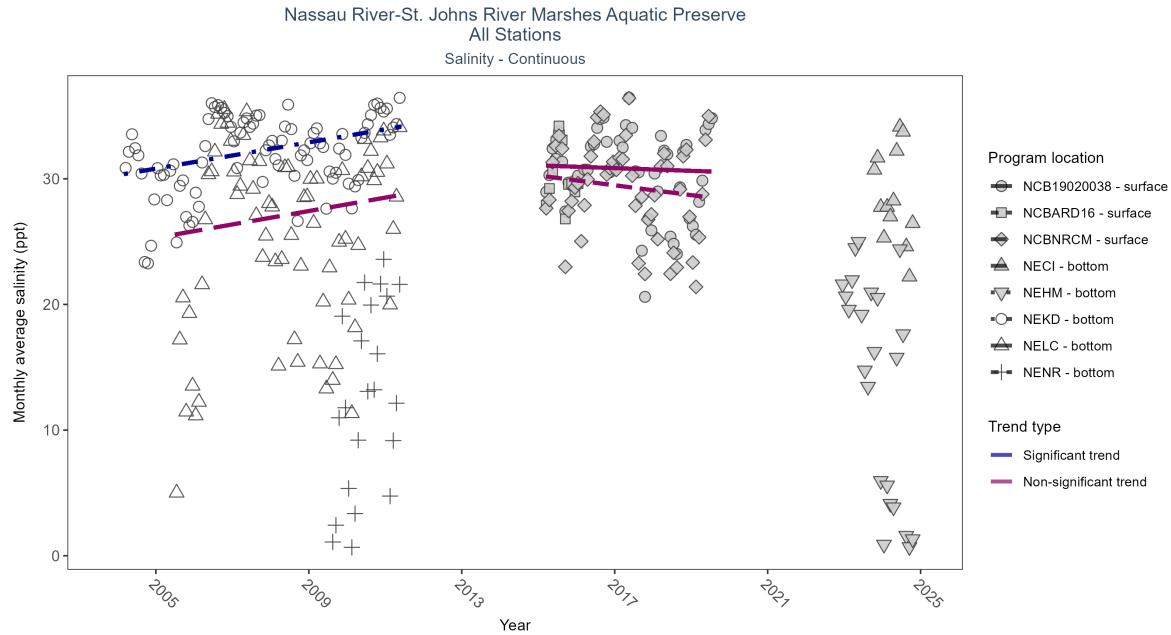


Figure 15: Scatter plot of monthly average salinity over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
NELC	No significant trend	100339	7	2005 - 2011	27.90	0.09	25.3	0.53	0.4397
NEKD	Significantly increasing trend	118328	8	2004 - 2011	33.20	0.31	30.29	0.52	0.0006
NENR	Insufficient data to calculate trend	31438	3	2009 - 2011	12.40	-	-	-	-
NEHM	Insufficient data to calculate trend	62743	3	2022 - 2024	16.20	-	-	-	-
NECI	Insufficient data to calculate trend	32935	2	2023 - 2024	28.30	-	-	-	-
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
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.

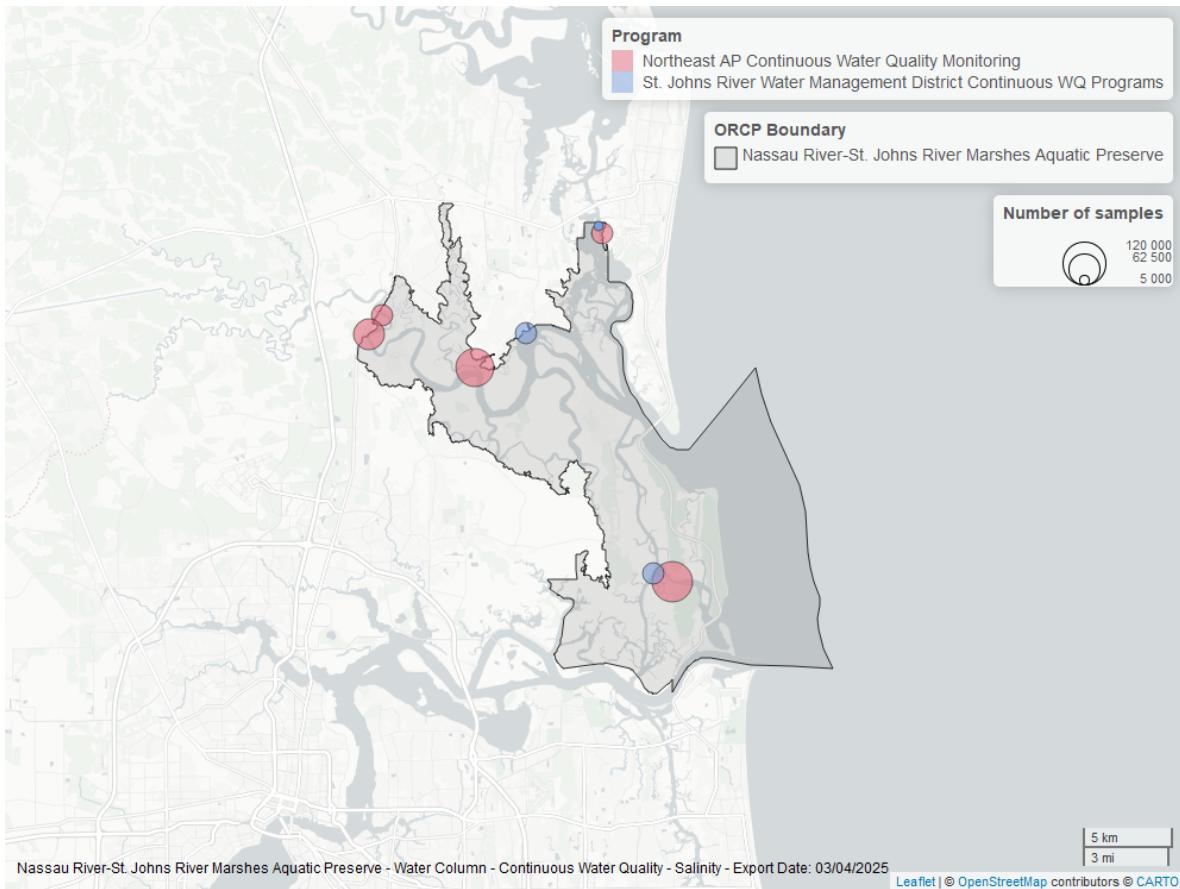


Figure 16: Map showing location of salinity continuous water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Temperature - Discrete

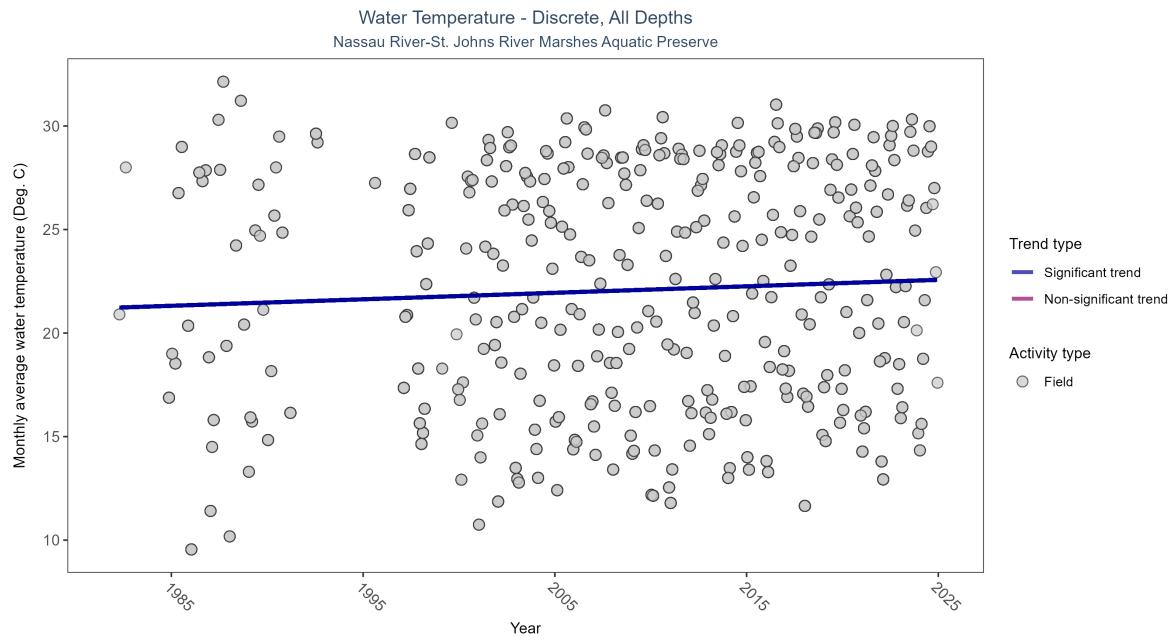


Figure 17: Scatter plot of monthly average water temperature over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only water temperature measurements taken in the field (circles) are included in 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	40864	39	1982 - 2024	21.6	0.15246	21.2231	0.03134	0

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

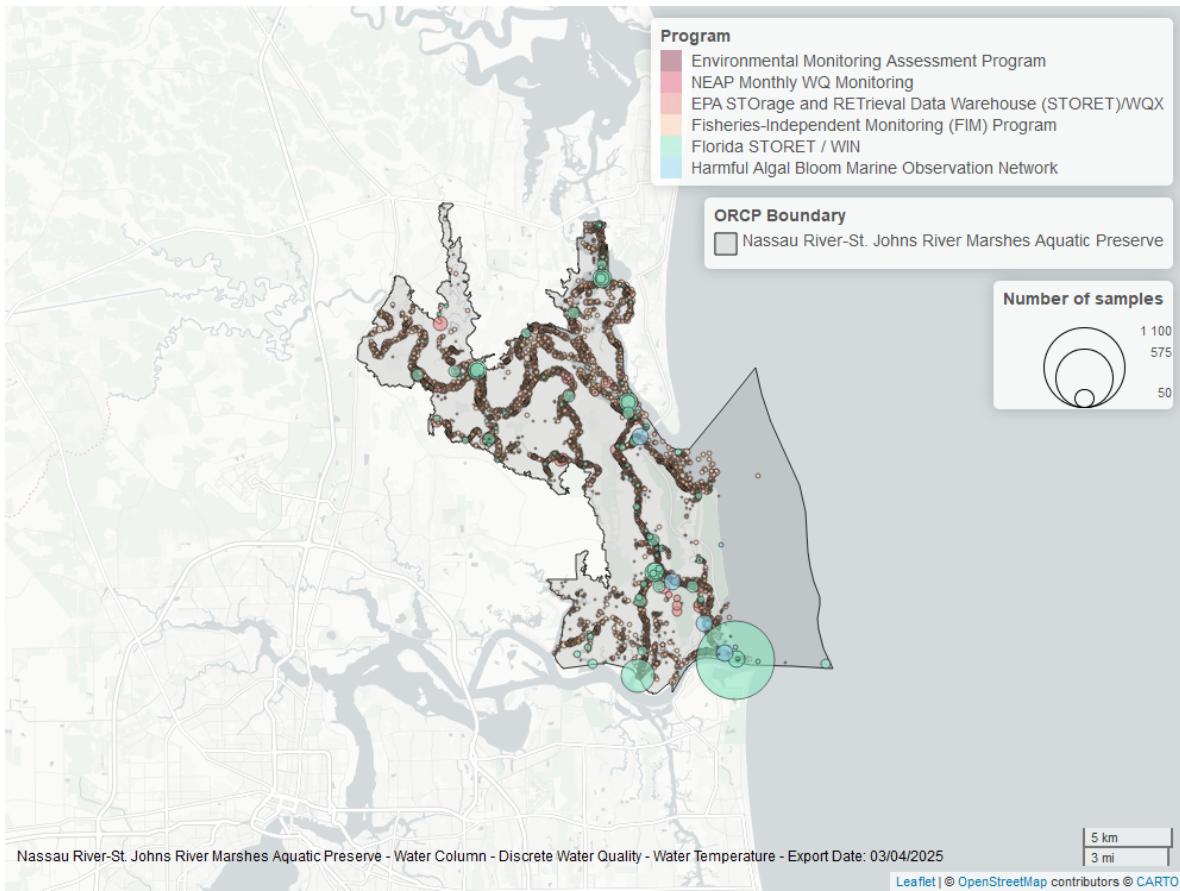


Figure 18: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Temperature - Continuous

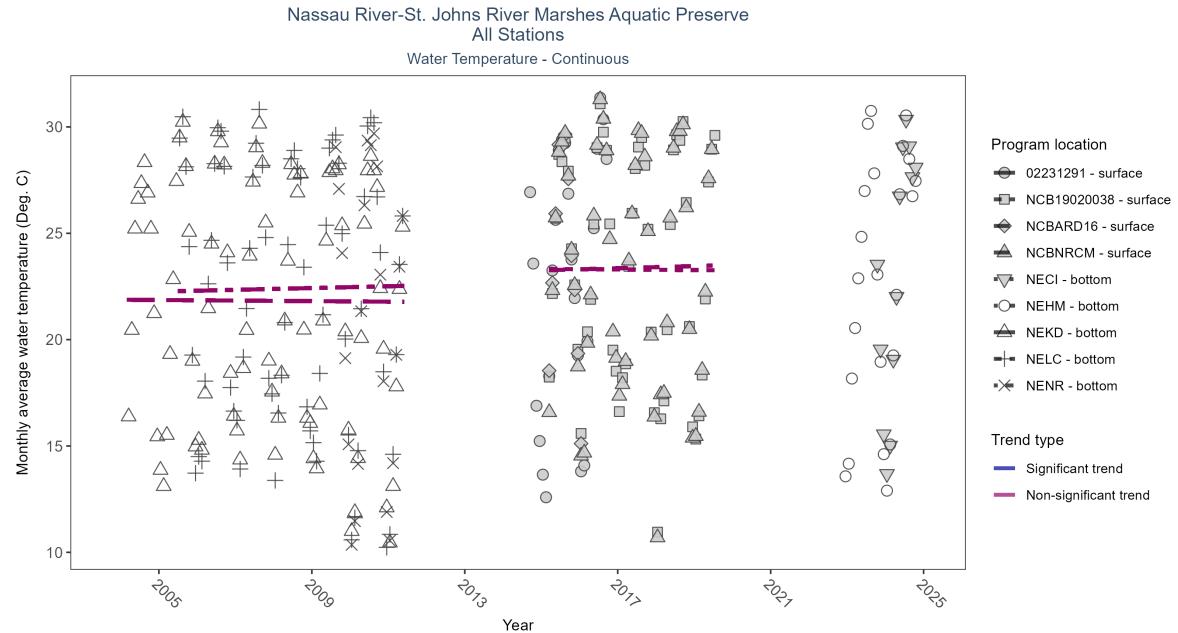


Figure 19: Scatter plot of monthly average water temperature over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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	-	-	-	-
NELC	No significant trend	100343	7	2005 - 2011	22.70	0.05	22.26	0.04	0.7405
NEKD	No significant trend	118328	8	2004 - 2011	22.10	-0.04	21.88	-0.01	0.8057
NENR	Insufficient data to calculate trend	31438	3	2009 - 2011	22.00	-	-	-	-
NEHM	Insufficient data to calculate trend	63151	3	2022 - 2024	23.40	-	-	-	-
NECI	Insufficient data to calculate trend	32959	2	2023 - 2024	22.90	-	-	-	-
NCBNRCM	No significant trend	35817	5	2015 - 2019	24.03	0.07	23.26	0.05	0.6681
NCB19020038	No significant trend	34483	5	2015 - 2019	24.78	-0.03	23.32	-0.01	1
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.

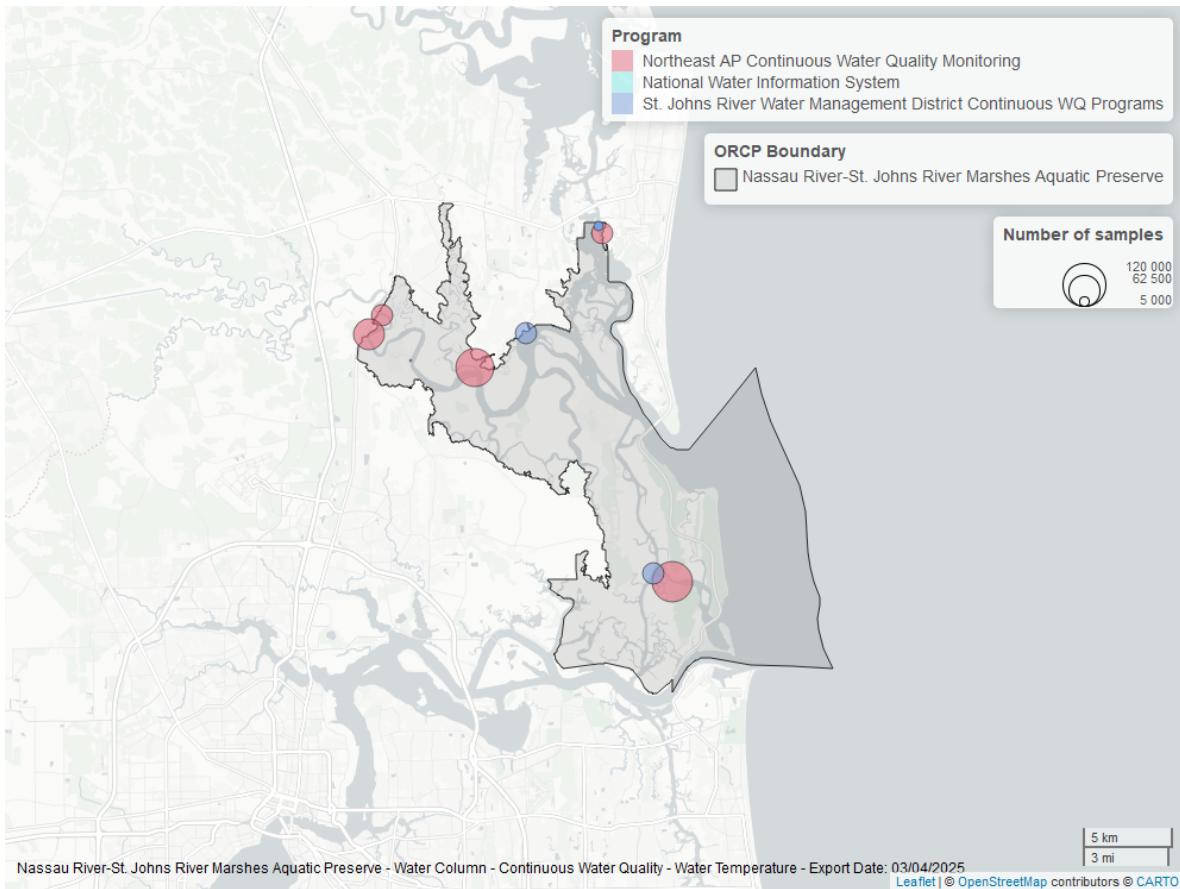


Figure 20: Map showing location of water temperature continuous water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

pH - Discrete

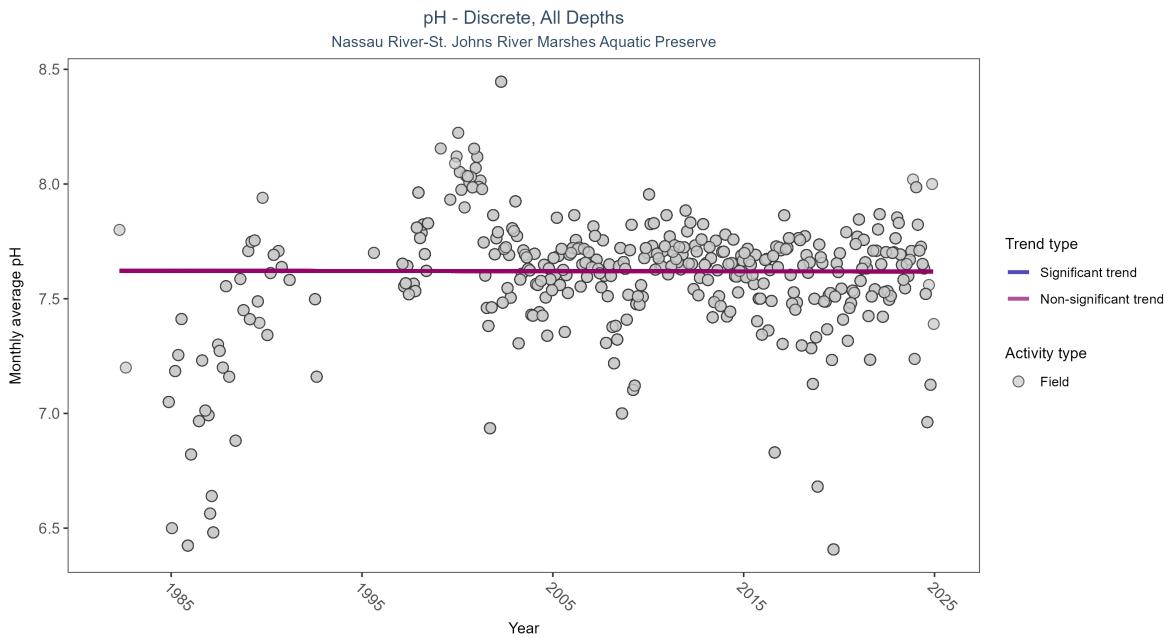


Figure 21: Scatter plot of monthly average pH over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only pH values measured in the field (circles) are included in the plot.

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	No significant trend	29665	39	1982 - 2024	7.66	-0.00471	7.62201	-0.00008	0.9669

pH showed no detectable trend between 1982 and 2024.

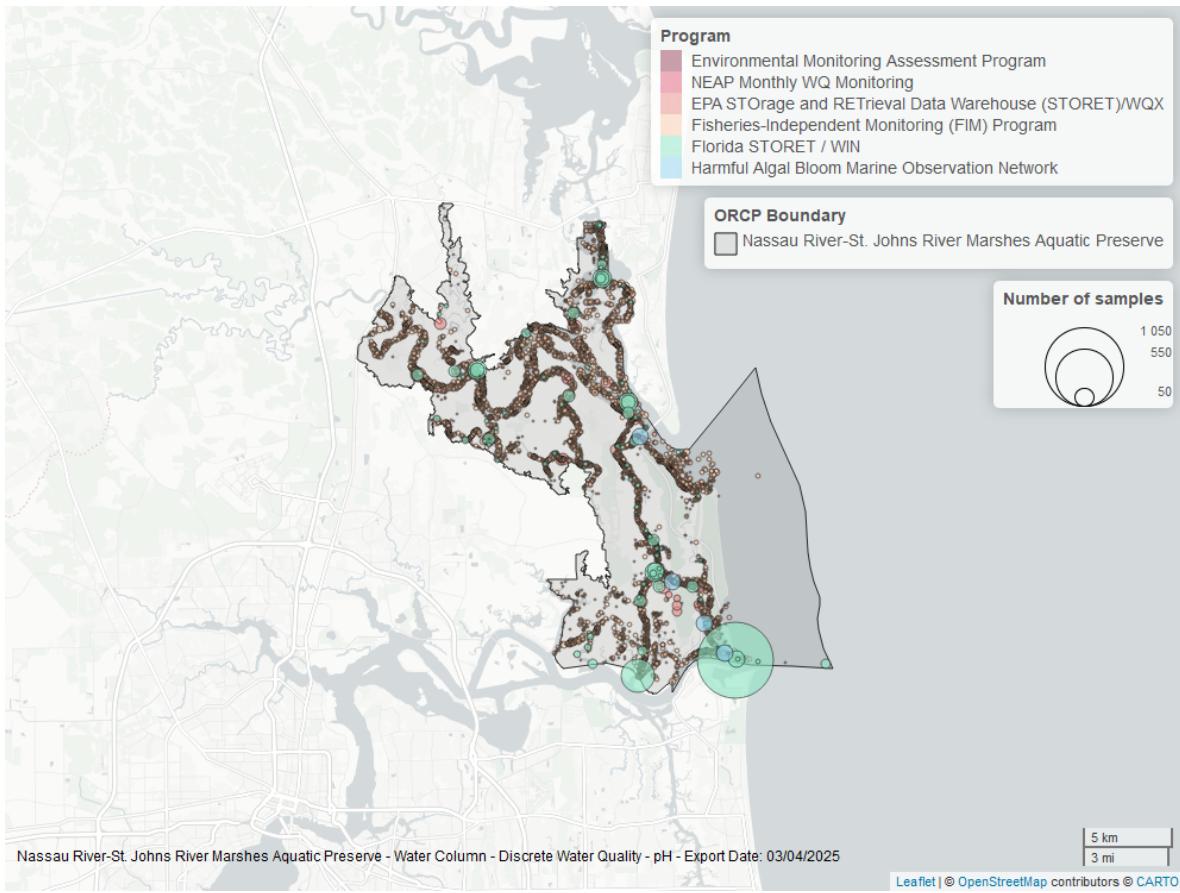


Figure 22: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

pH - Continuous

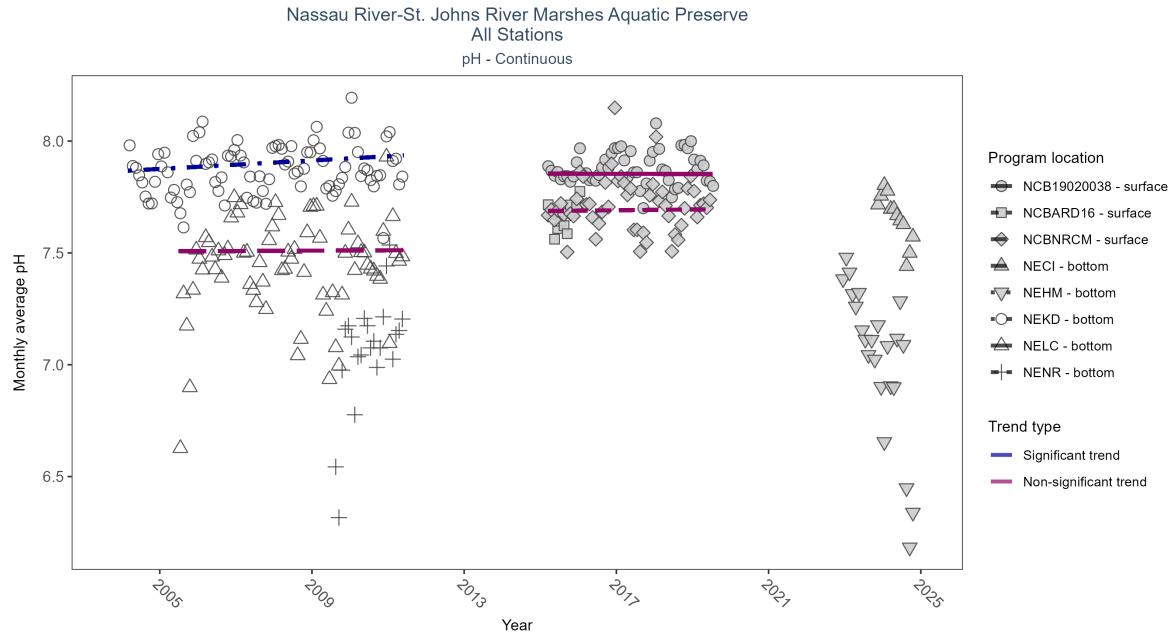


Figure 23: Scatter plot of monthly average pH over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
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	-	-	-	-
NELC	No significant trend	96488	7	2005 - 2011	7.50	0.02	7.51	0	0.9121
NEHM	Insufficient data to calculate trend	61214	3	2022 - 2024	7.10	-	-	-	-
NECI	Insufficient data to calculate trend	30647	2	2023 - 2024	7.70	-	-	-	-
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	-	-	-	-
NCB19020038	No significant trend	34405	5	2015 - 2019	7.88	-0.01	7.85	0	1

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.

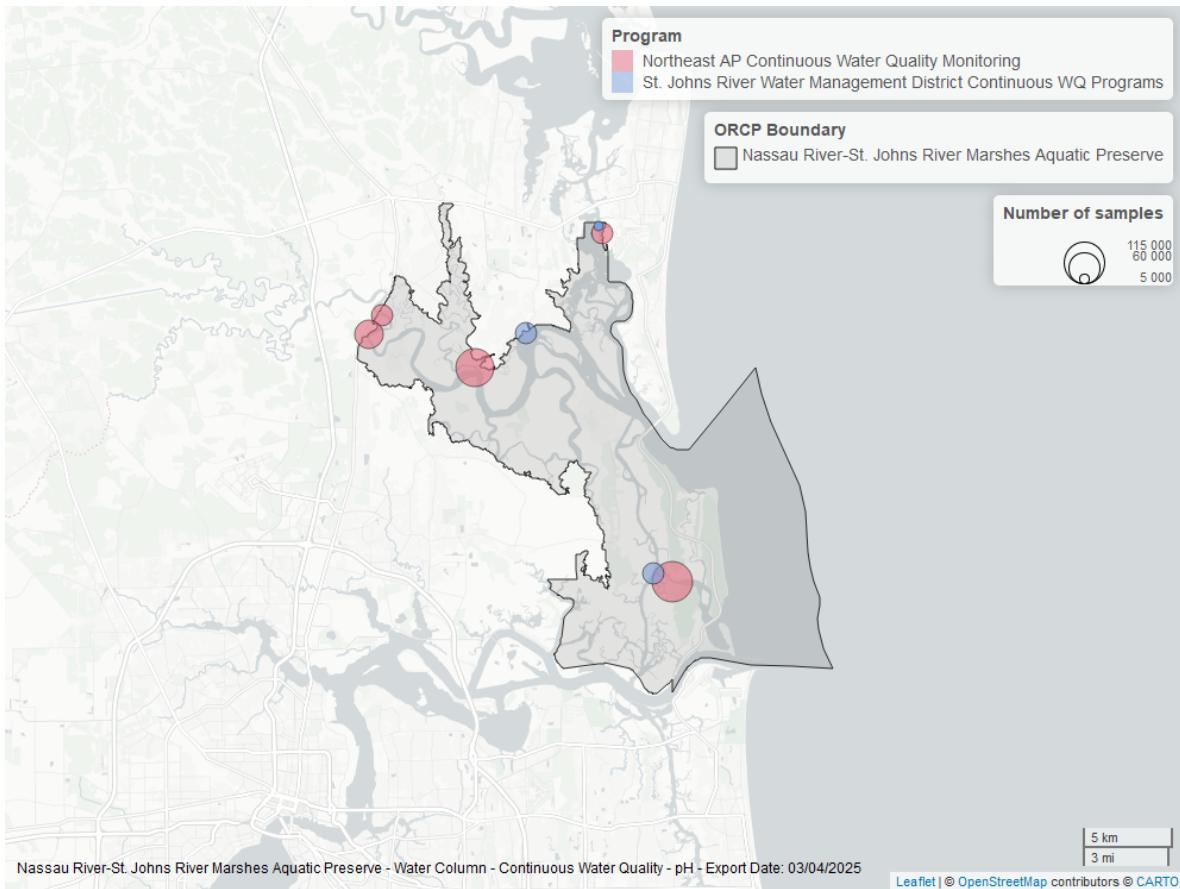


Figure 24: Map showing location of pH continuous water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Clarity

Turbidity - Discrete

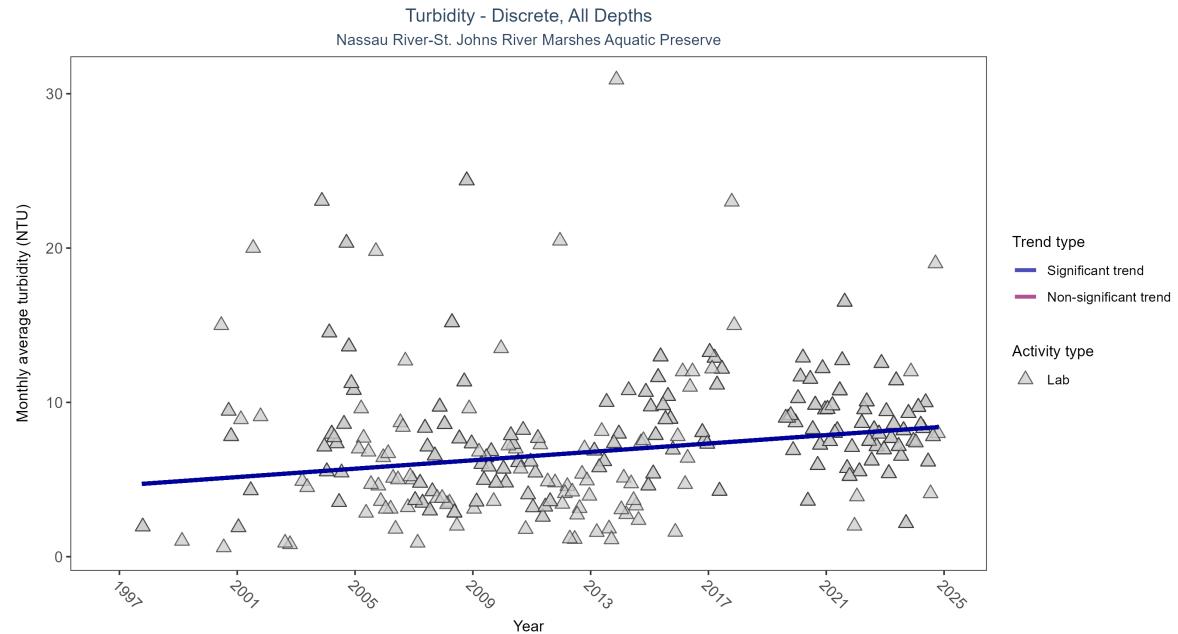


Figure 25: Scatter plot of monthly average turbidity over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only turbidity values measured in the laboratory (triangles) are included in the plot.

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	917	26	1997 - 2024		7	0.17504	4.61532	0.136 0.0002

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

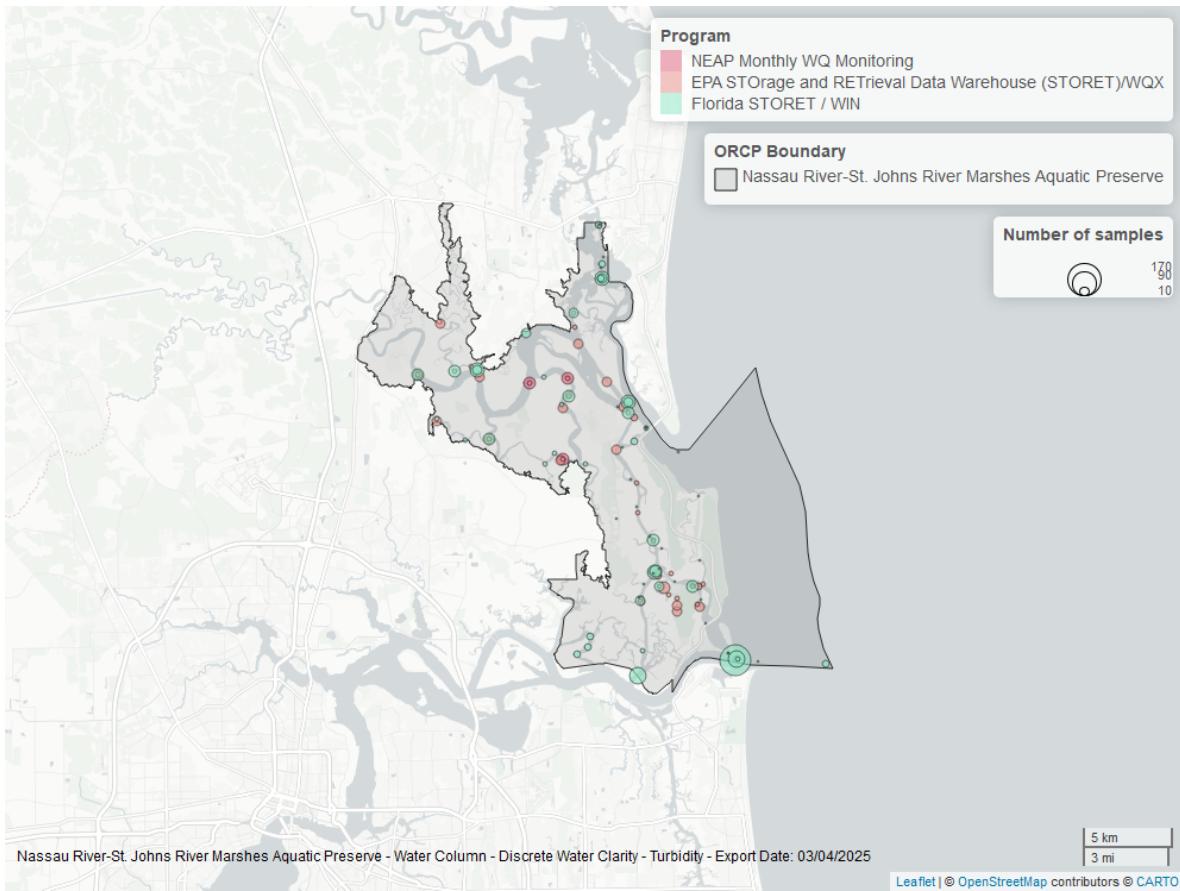


Figure 26: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Turbidity - Continuous

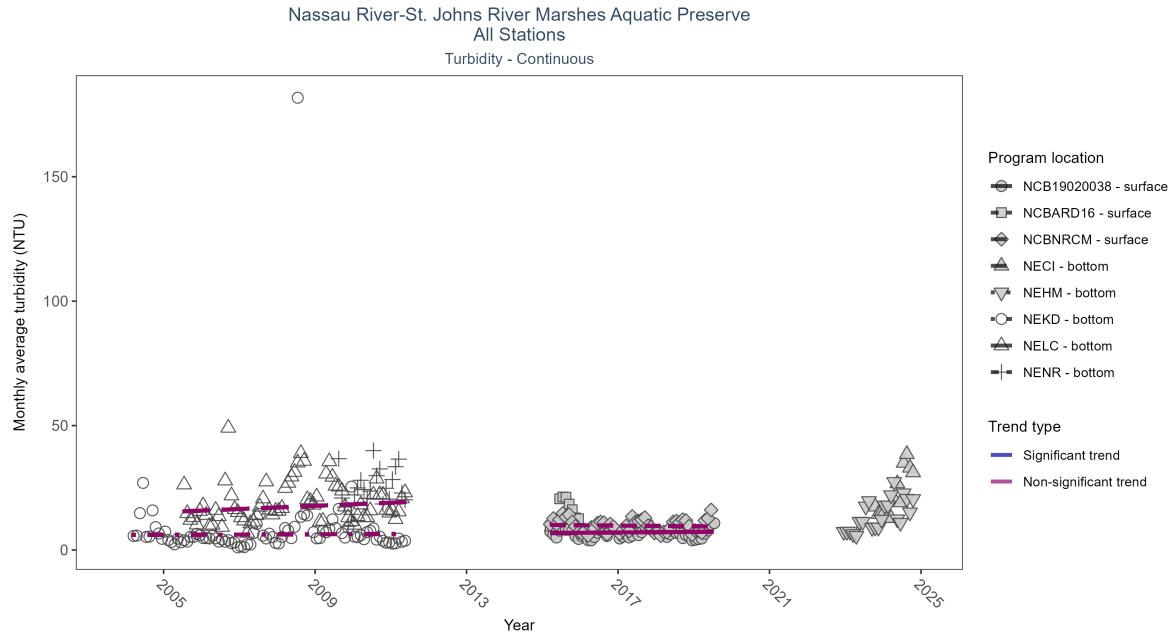


Figure 27: Scatter plot of monthly average turbidity over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
NEKD	No significant trend	114181	8	2004 - 2011	4.00	0.02	6.06	0.05	0.8697
NELC	No significant trend	96153	7	2005 - 2011	15.00	0.16	15.18	0.64	0.1513
NENR	Insufficient data to calculate trend	31087	3	2009 - 2011	21.00	-	-	-	-
NEHM	Insufficient data to calculate trend	59435	3	2022 - 2024	11.00	-	-	-	-
NECI	Insufficient data to calculate trend	29449	2	2023 - 2024	15.00	-	-	-	-
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
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.

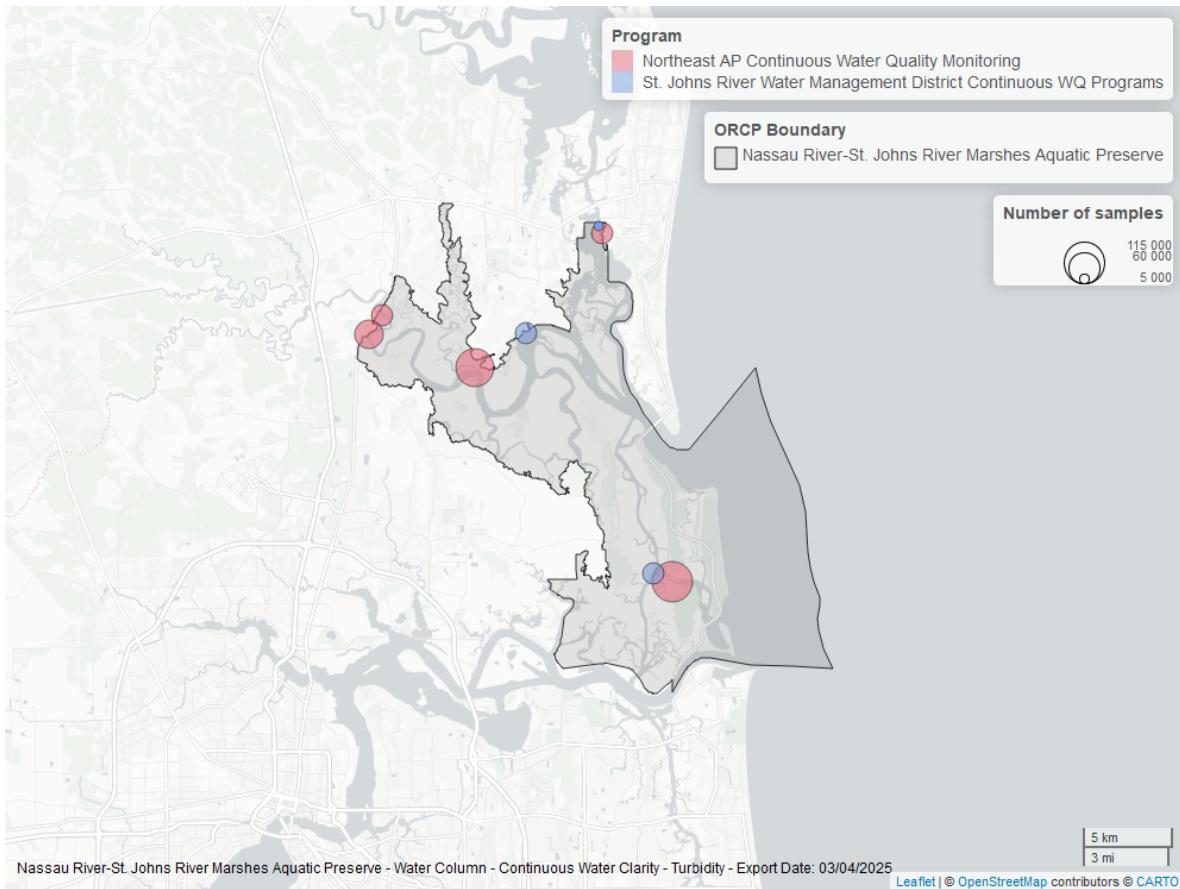


Figure 28: Map showing location of turbidity continuous water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Total Suspended Solids - Discrete

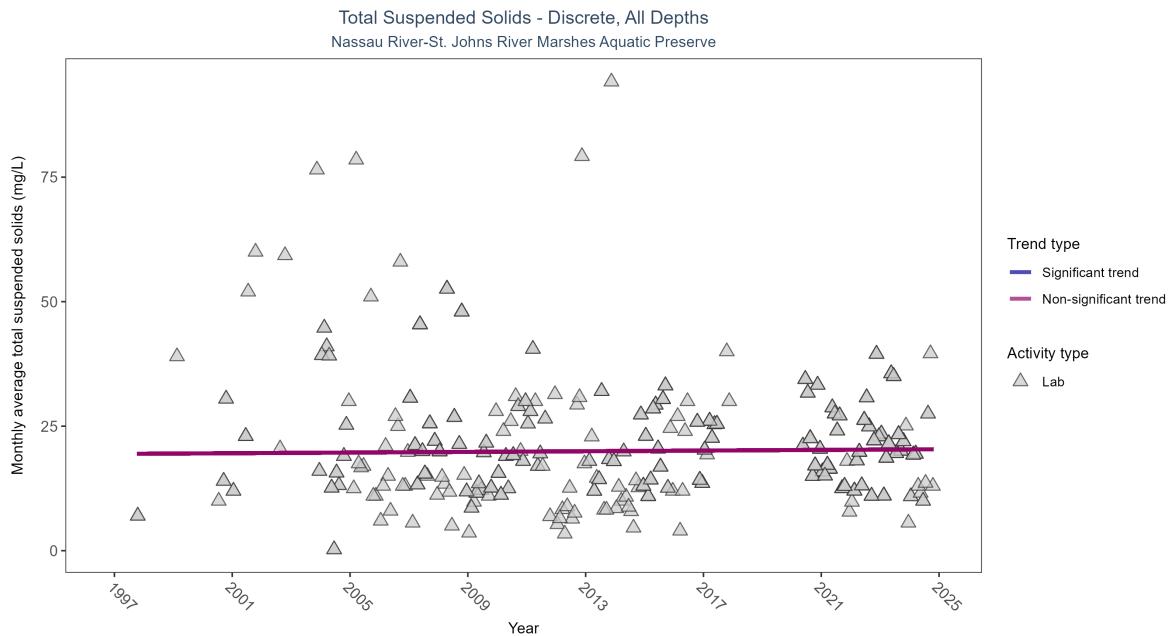


Figure 29: Scatter plot of monthly average total suspended solids (TSS) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only TSS values obtained from laboratory analyses (triangles) are included 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	783	25	1997 - 2024	17.6	0.018	19.4343	0.03333	0.7115

Total suspended solids showed no detectable trend between 1997 and 2024.

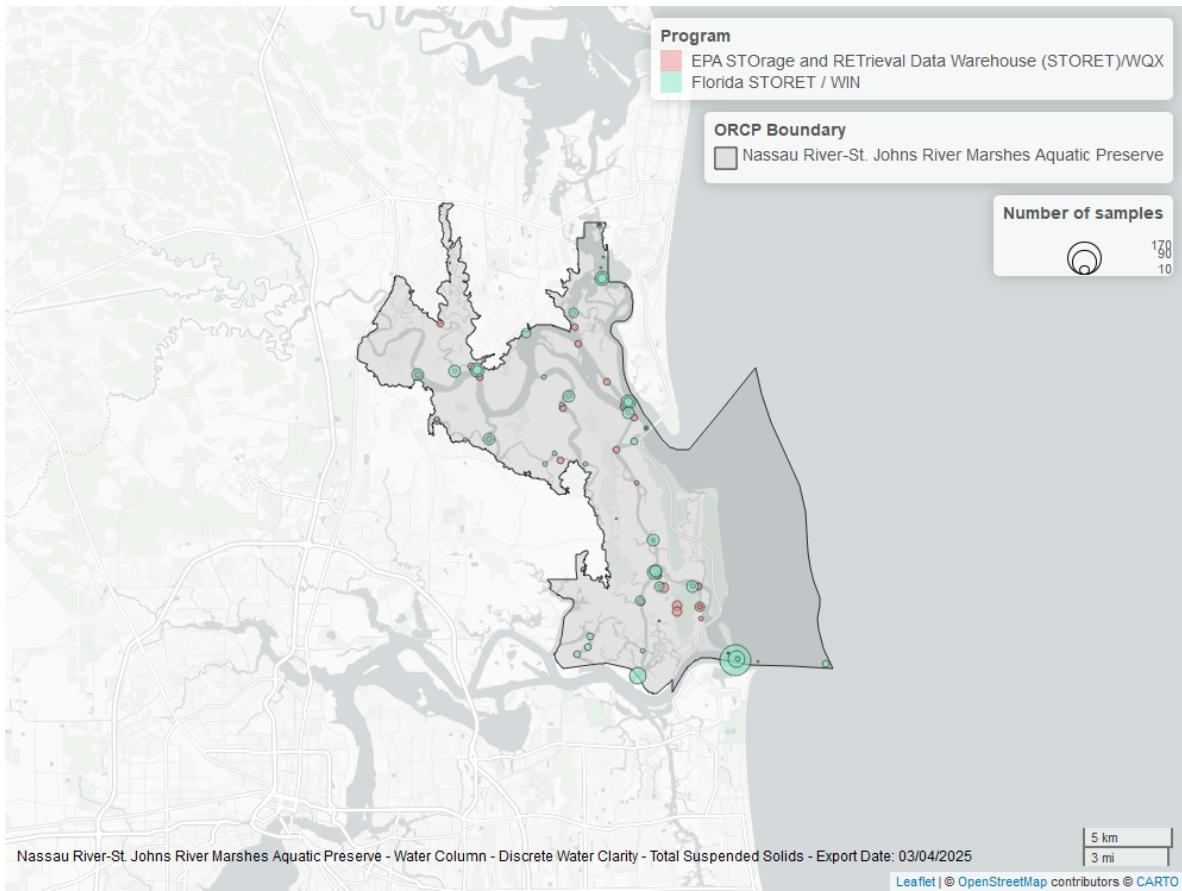


Figure 30: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Chlorophyll a, Uncorrected for Pheophytin - Discrete

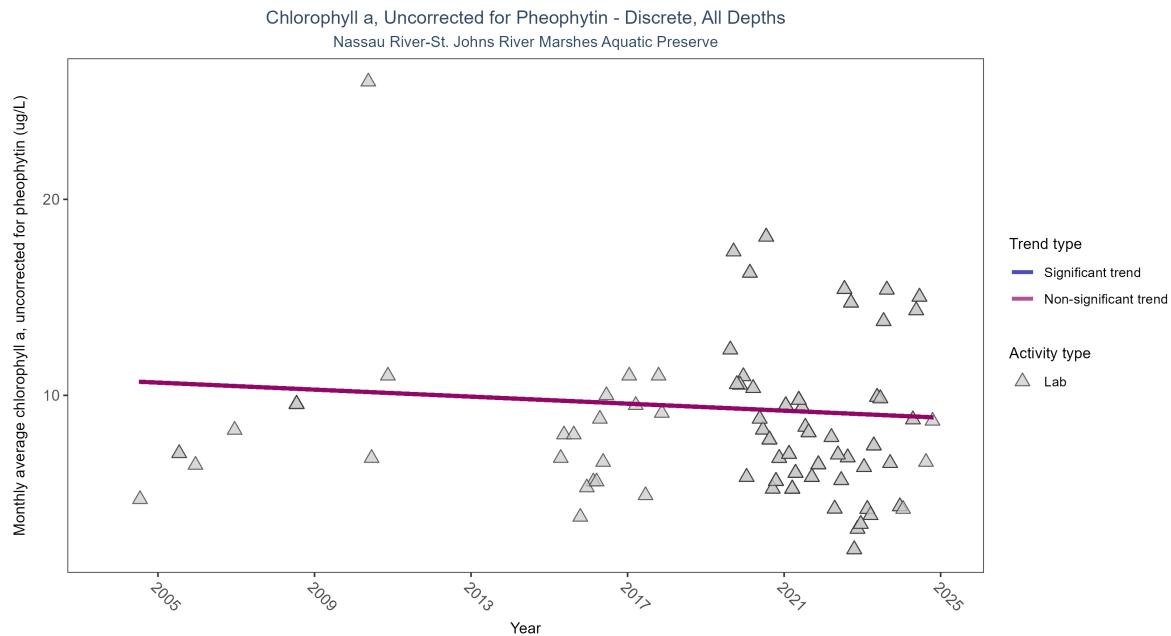


Figure 31: Scatter plot of monthly average levels of chlorophyll a, uncorrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) 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	438	14	2004 - 2024	7.76471	-0.10489	10.74049	-0.08946	0.6184

Chlorophyll a, uncorrected for pheophytin, showed no detectable trend between 2004 and 2024.

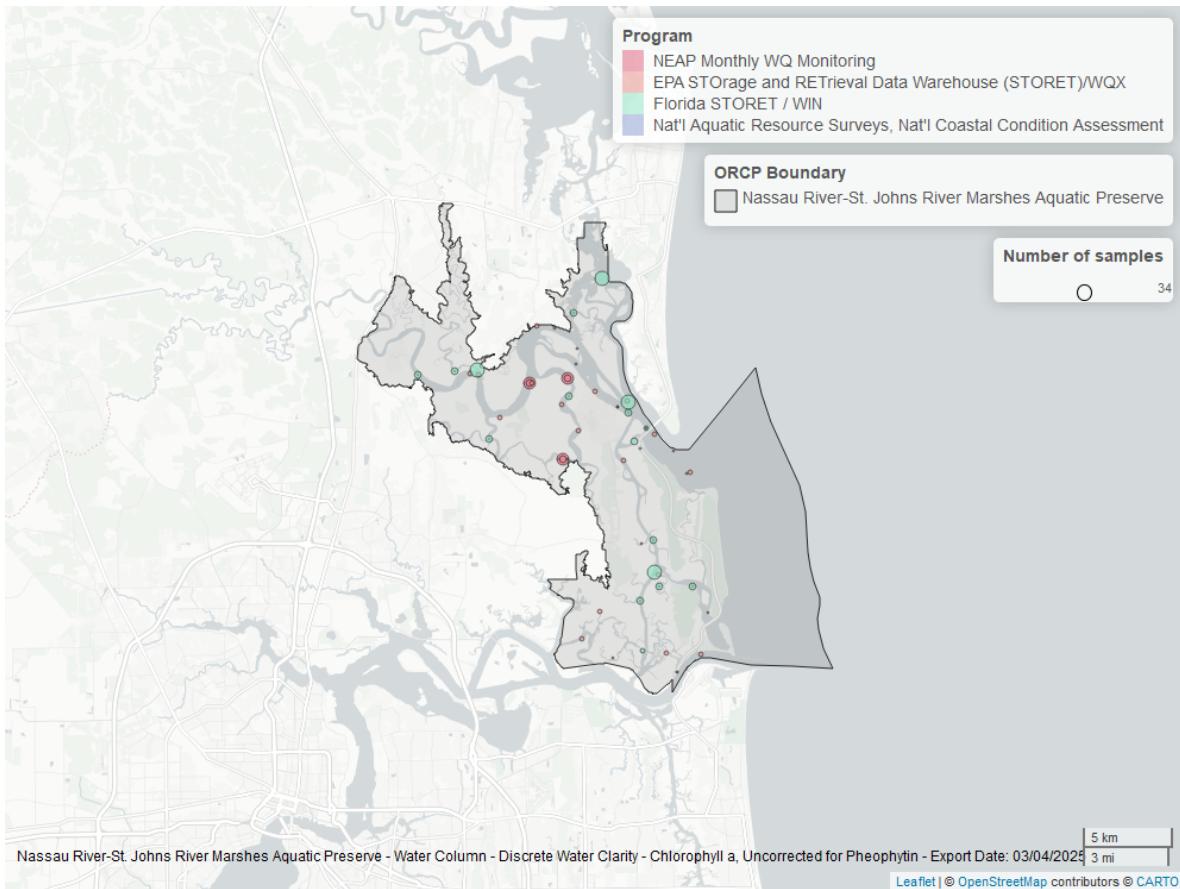


Figure 32: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Chlorophyll a, Corrected for Pheophytin - Discrete

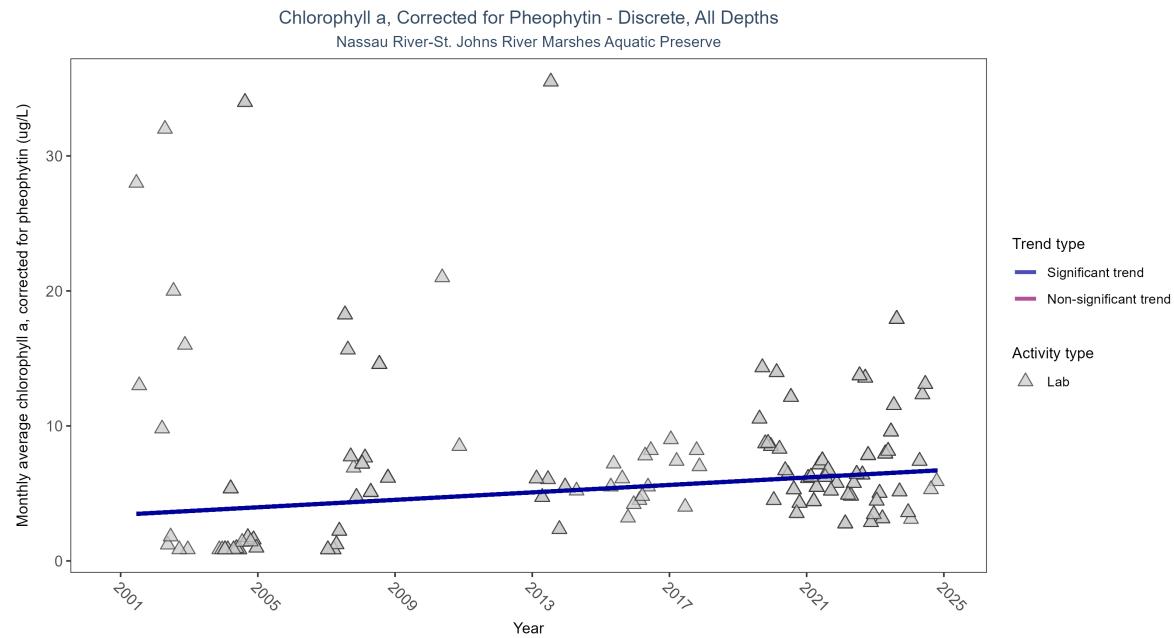


Figure 33: Scatter plot of monthly average levels of chlorophyll a, corrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) 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	604	18	2001 - 2024	5.8	0.14787	3.42086	0.13793	0.0302

Monthly average chlorophyll a, corrected for pheophytin, increased by 0.14 $\mu\text{g}/\text{L}$ per year, indicating a decrease in water clarity.

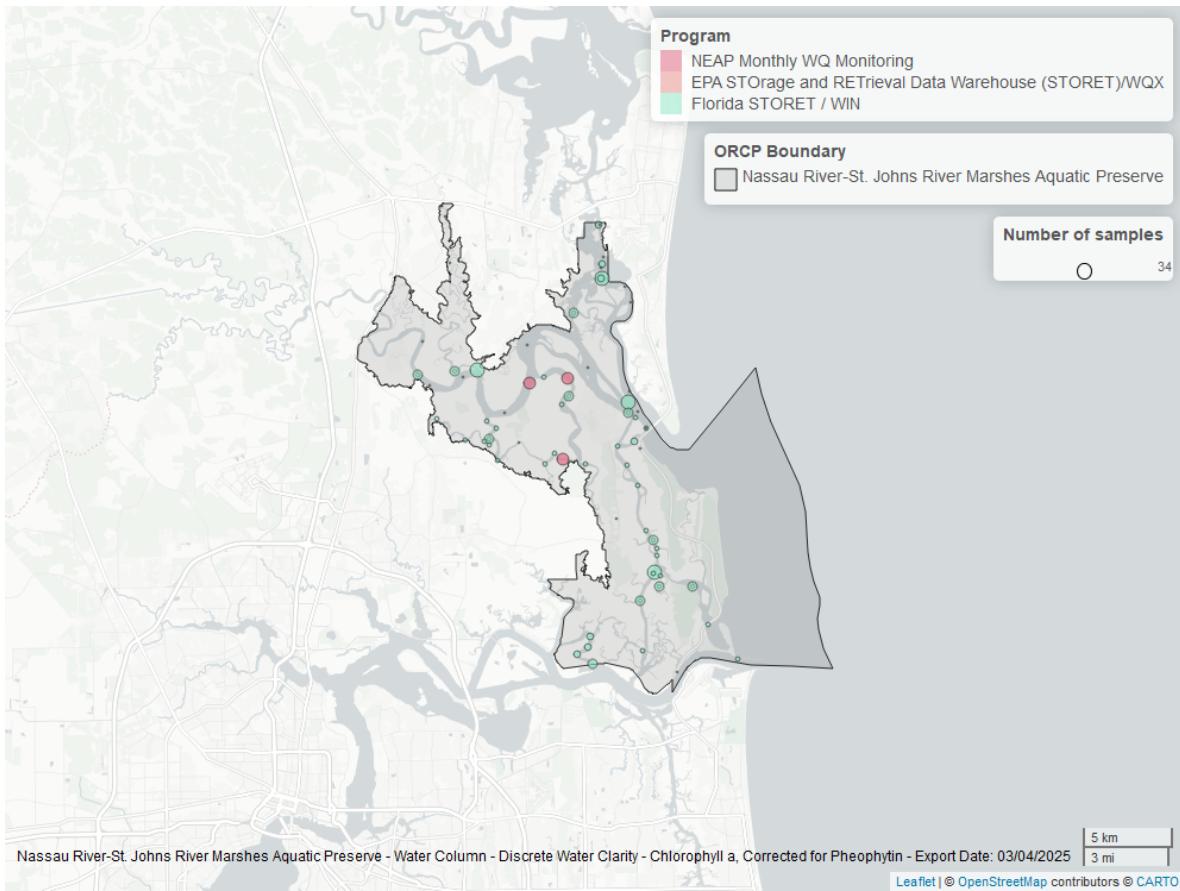


Figure 34: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Secchi Depth - Discrete

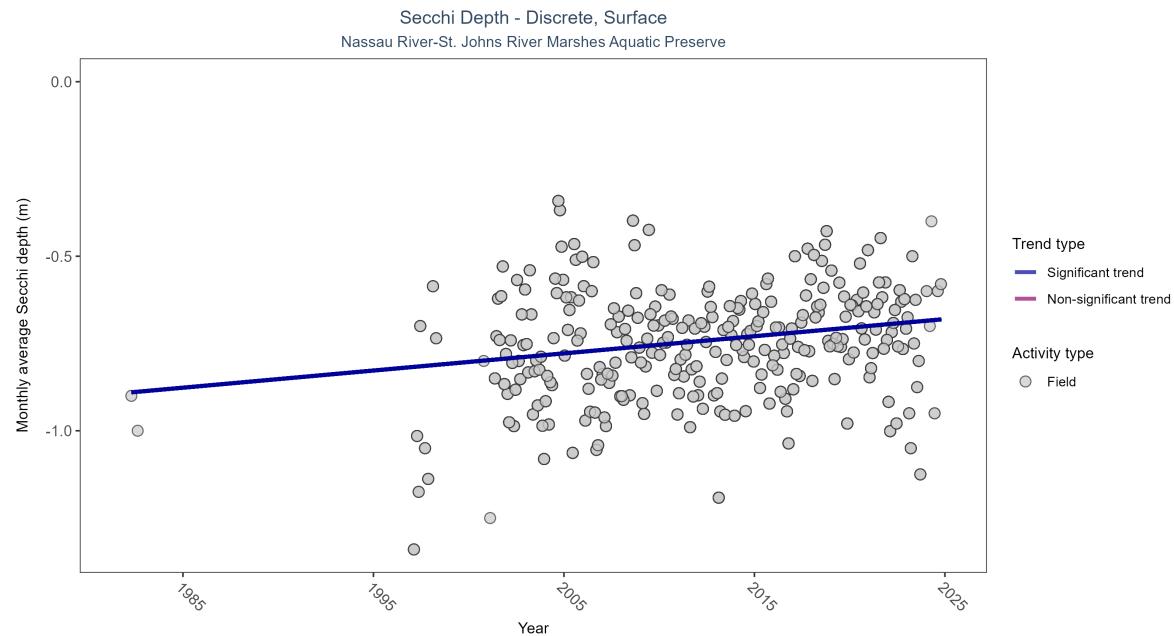


Figure 35: Scatter plot of monthly average Secchi depth over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Secchi depth is only measured in the field (circles).

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	18755	28	1982 - 2024	-0.7	0.16733	-0.89136	0.00491	0.0001

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

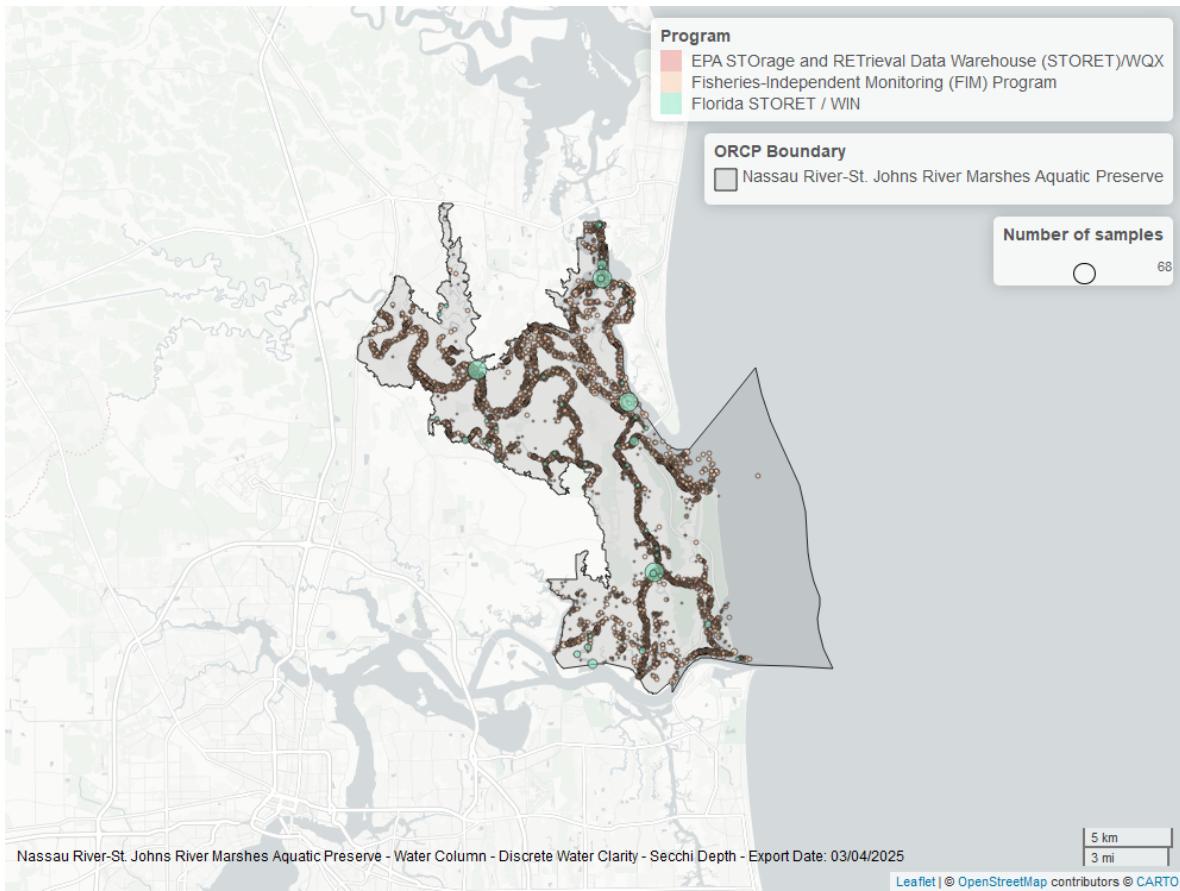


Figure 36: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Colored Dissolved Organic Matter - Discrete

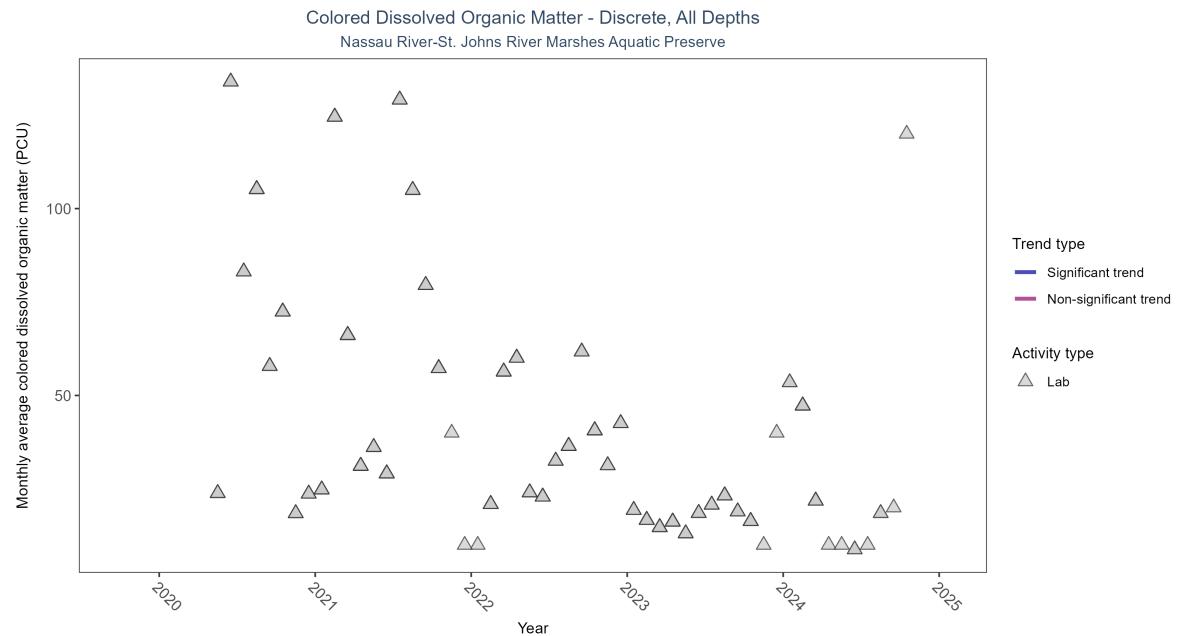


Figure 37: Scatter plot of monthly average colored dissolved organic matter (CDOM) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed CDOM (triangles) is included in the 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	386	5	2020 - 2024	27.31992	-	-	-	-

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

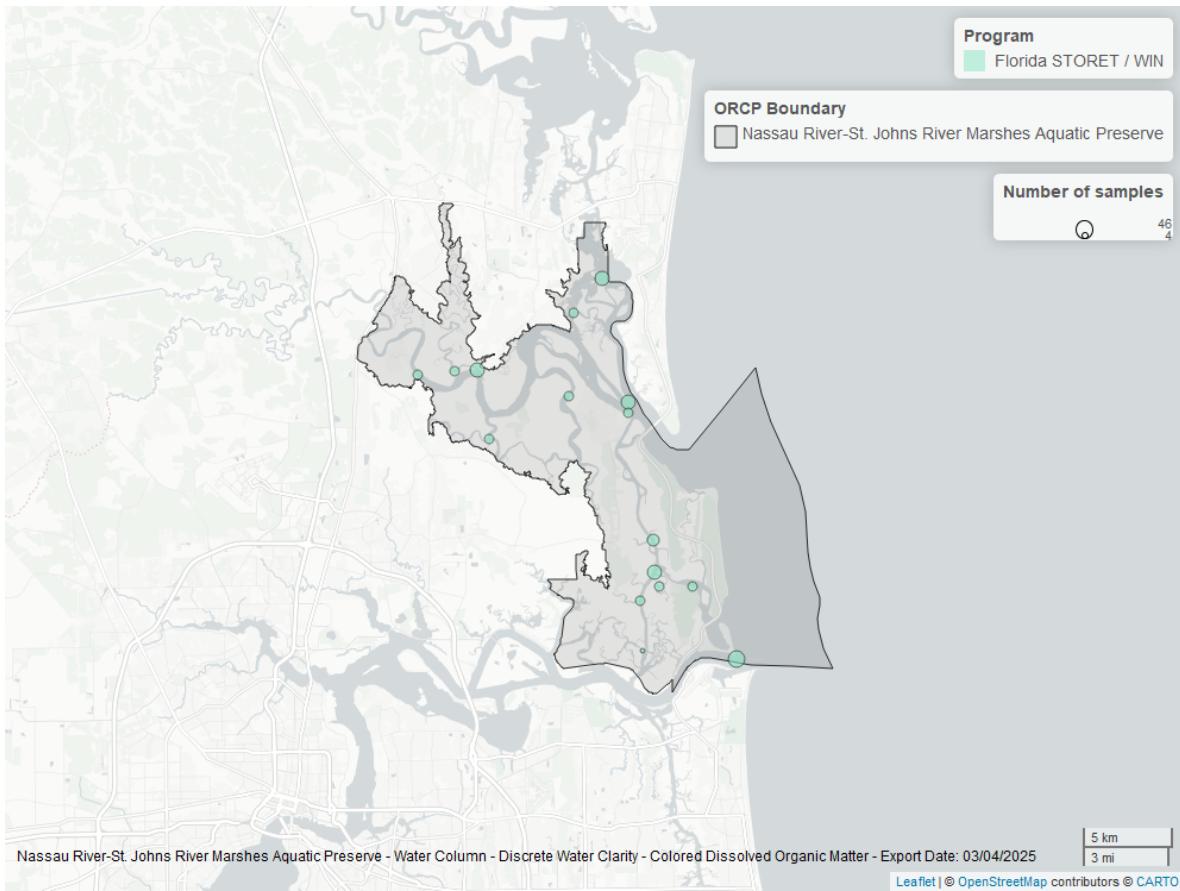


Figure 38: Map showing location of discrete water quality sampling locations within the boundaries of *Nassau River-St. Johns River Marshes Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.