

Indian River-Vero Beach to Ft. Pierce Aquatic Preserve

SEACAR Water Quality Analysis

Last compiled on 10 July, 2025

Contents

Indicators	2
Nutrients	2
Total Nitrogen - Discrete	2
Total Phosphorus - Discrete	4
Water Quality	6
Dissolved Oxygen - Discrete	6
Dissolved Oxygen Saturation - Discrete	8
Salinity - Discrete	10
Water Temperature - Discrete	12
pH - Discrete	14
Water Clarity	16
Turbidity - Discrete	16
Total Suspended Solids - Discrete	18
Chlorophyll a, Uncorrected for Pheophytin - Discrete	20
Chlorophyll a, Corrected for Pheophytin - Discrete	22
Secchi Depth - Discrete	24
Colored Dissolved Organic Matter - Discrete	26

Indicators

Nutrients

Total Nitrogen - Discrete

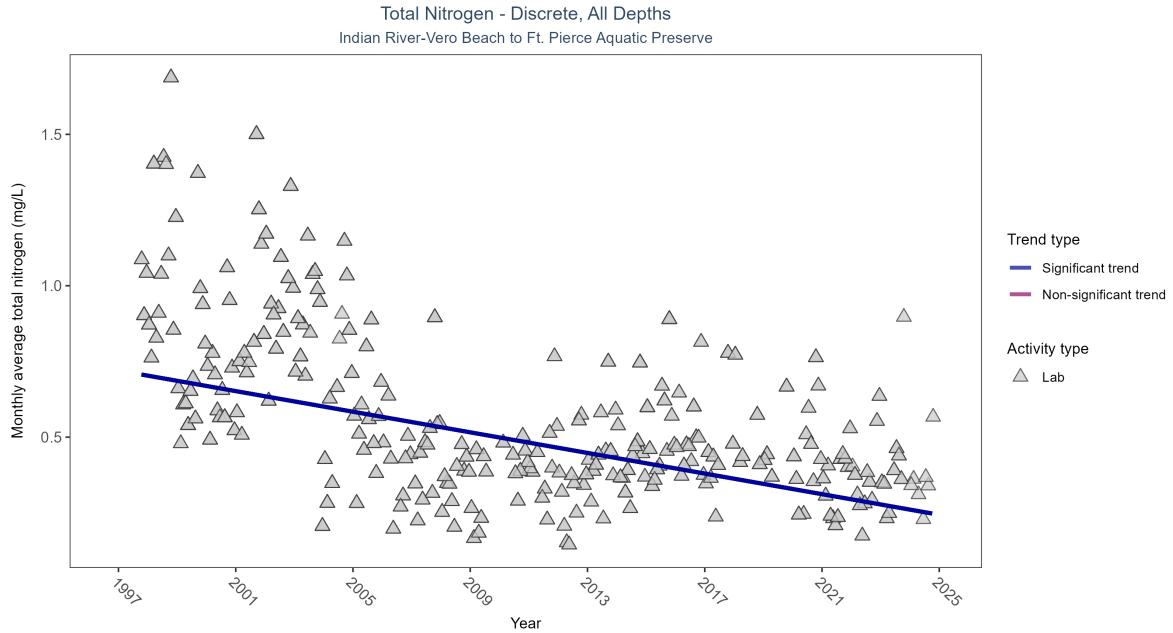


Figure 1: Scatter plot of monthly average total nitrogen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only nitrogen values obtained from laboratory analyses (triangles) are included in the 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	Significantly decreasing trend	1012	28	1997 - 2024	0.53065	-0.43064	0.72009	-0.01702	0

Monthly average total nitrogen decreased by 0.02 mg/L per year.

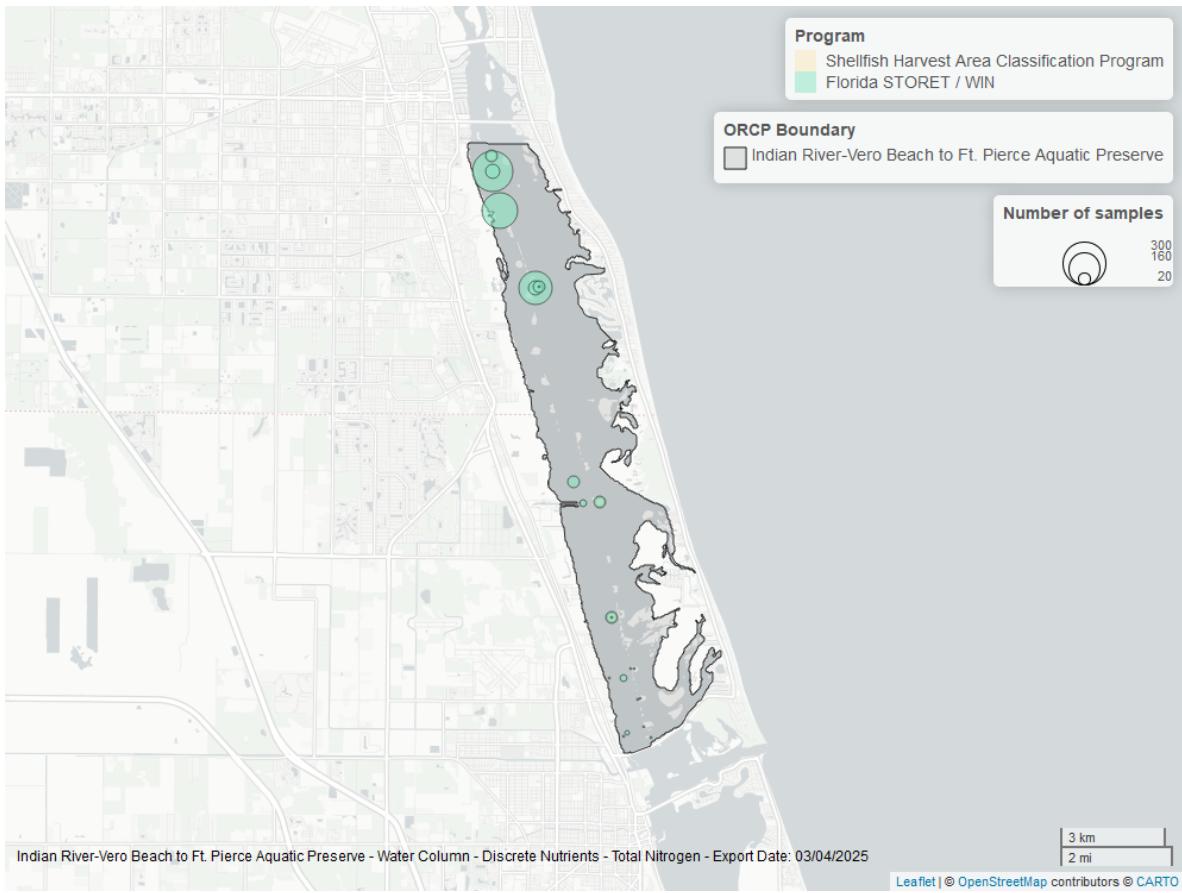


Figure 2: Map showing location of discrete water quality sampling locations within the boundaries of *Indian River-Vero Beach to Ft. Pierce Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Total Phosphorus - Discrete

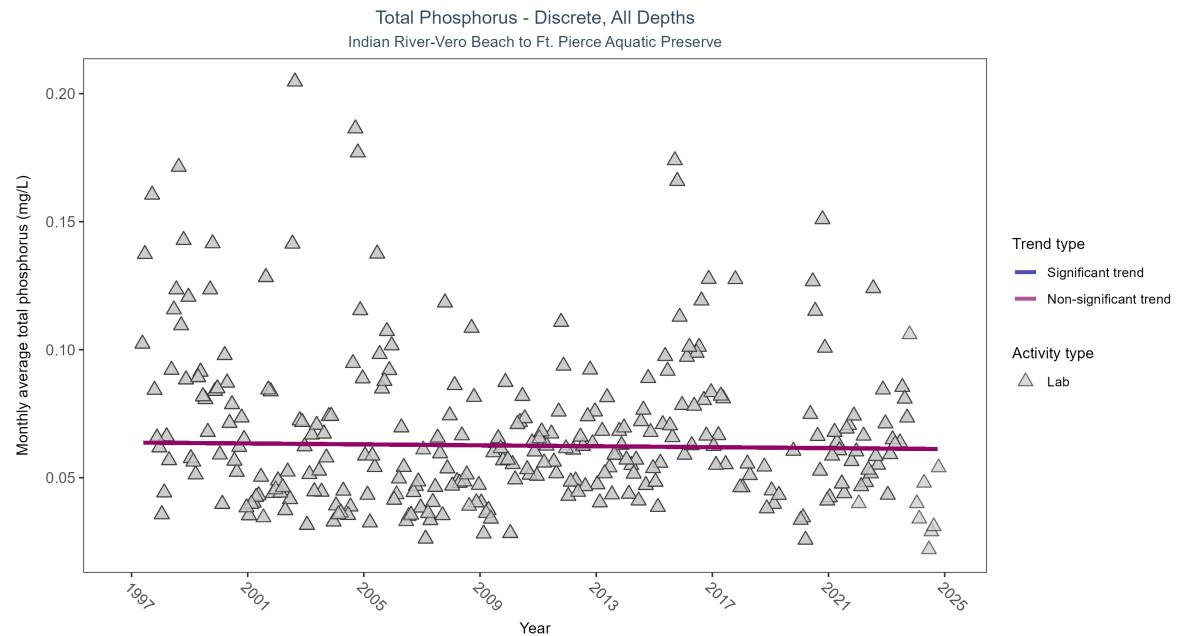


Figure 3: Scatter plot of monthly average total phosphorus over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only phosphorus values obtained from laboratory analyses (triangles) are included in 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	2088	28	1997 - 2024	0.06	-0.03466	0.06375	-0.00009	0.4125

Total phosphorus showed no detectable trend between 1997 and 2024.

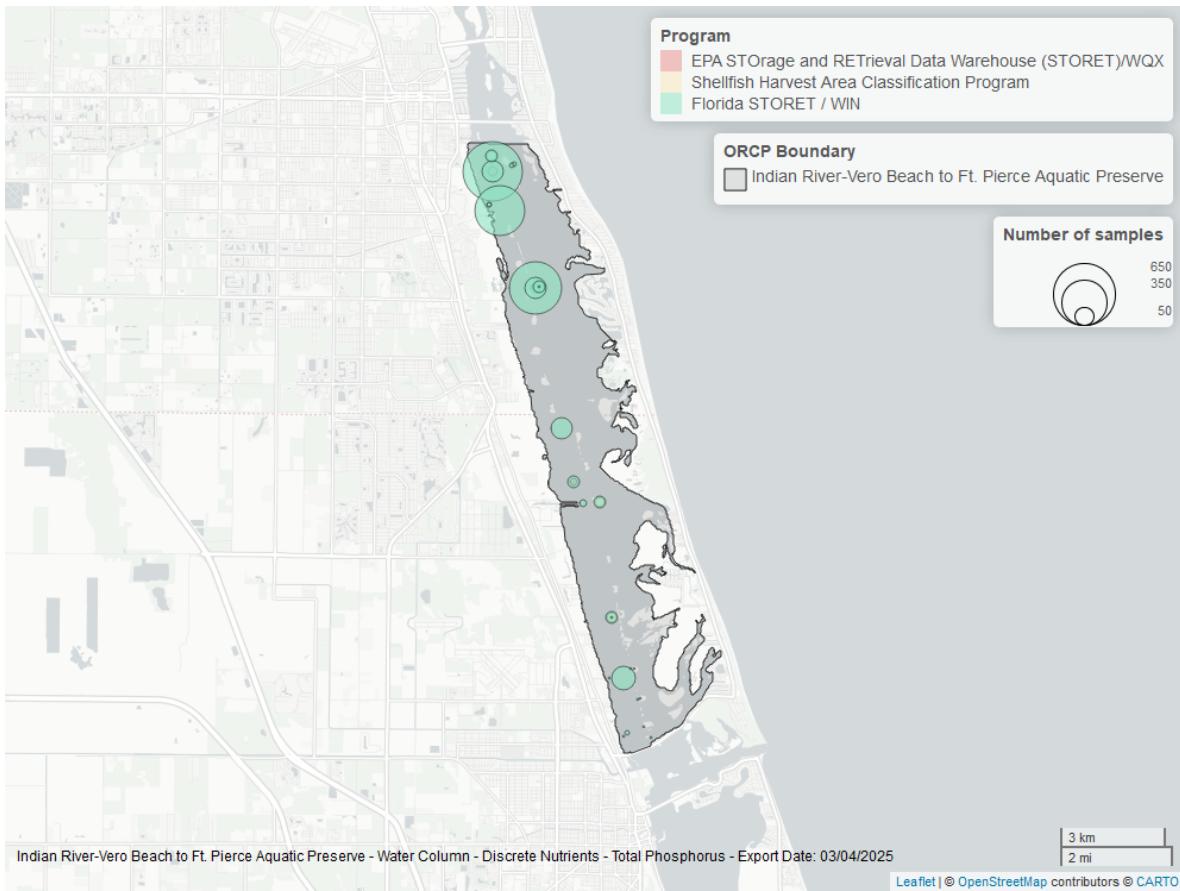


Figure 4: Map showing location of discrete water quality sampling locations within the boundaries of *Indian River-Vero Beach to Ft. Pierce Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Quality

Dissolved Oxygen - Discrete

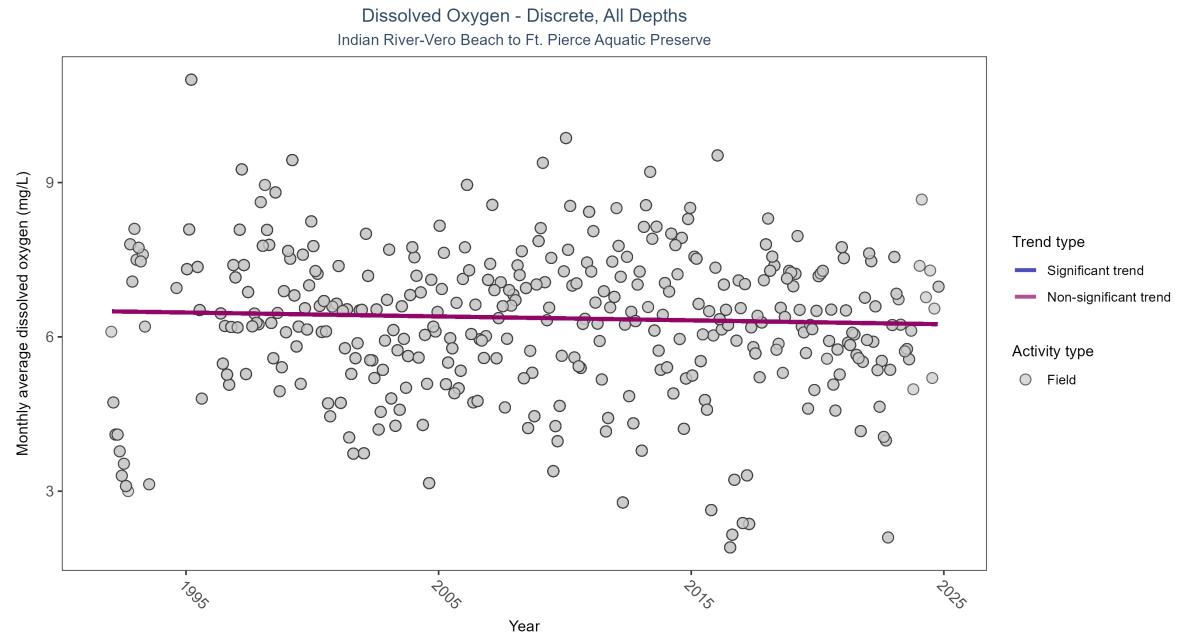


Figure 5: Scatter plot of monthly average dissolved oxygen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen values measured in the field (circles) are included in the plot.

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	No significant trend	7886	33	1992 - 2024	6.3	-0.04714	6.49624	-0.00762	0.2196

Dissolved oxygen showed no detectable trend between 1992 and 2024.

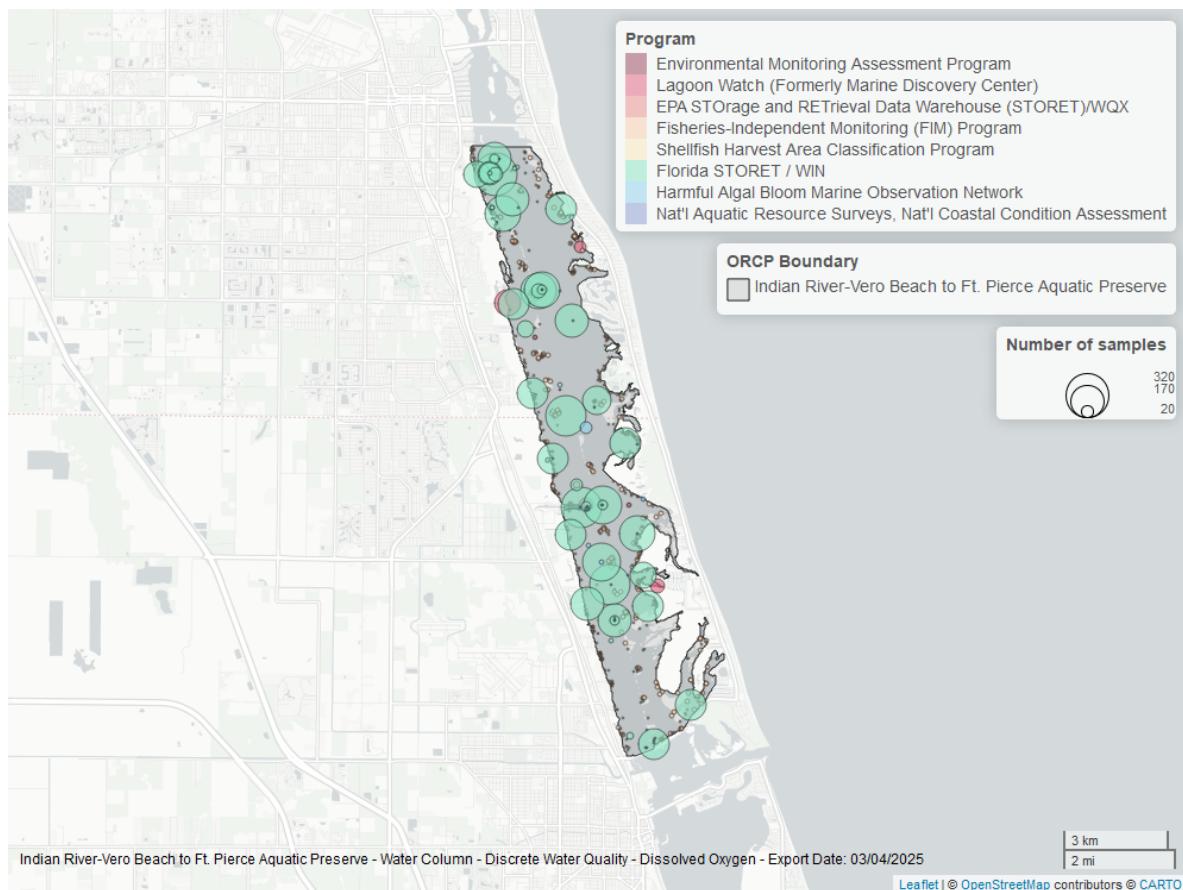


Figure 6: Map showing location of discrete water quality sampling locations within the boundaries of *Indian River-Vero Beach to Ft. Pierce Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen Saturation - Discrete

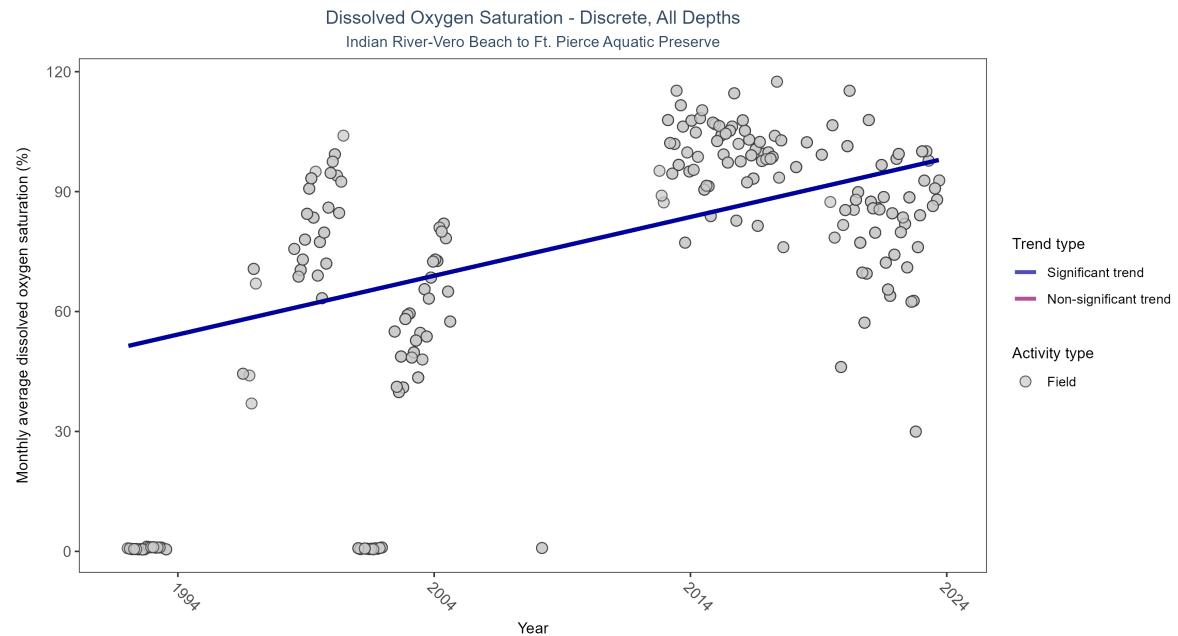


Figure 7: Scatter plot of monthly average dissolved oxygen saturation over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen saturation values measured in the field (circles)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

Table 4: 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	Significantly increasing trend	814	24	1992 - 2023	83.05	0.36132	51.30792	1.47059	0

Monthly average dissolved oxygen saturation increased by 1.47% per year.

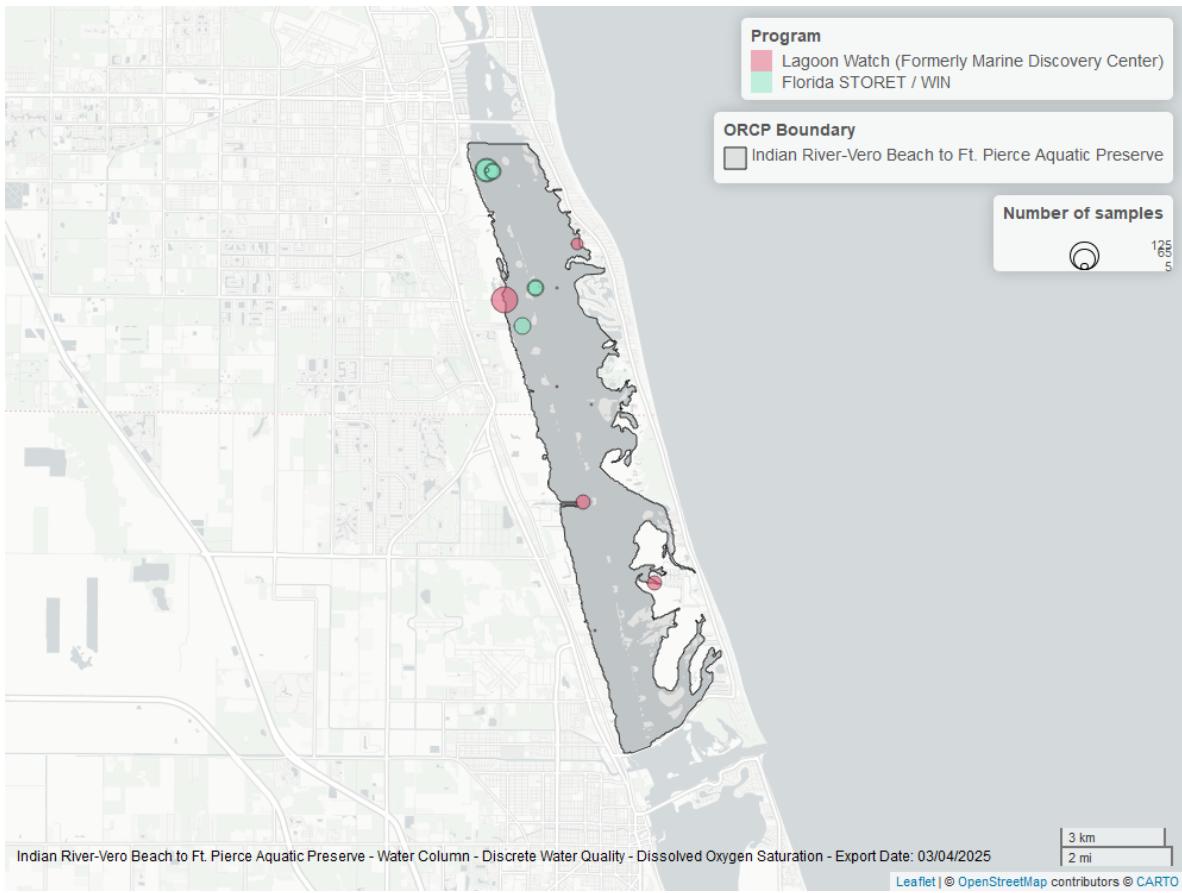


Figure 8: Map showing location of discrete water quality sampling locations within the boundaries of *Indian River-Vero Beach to Ft. Pierce Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Salinity - Discrete

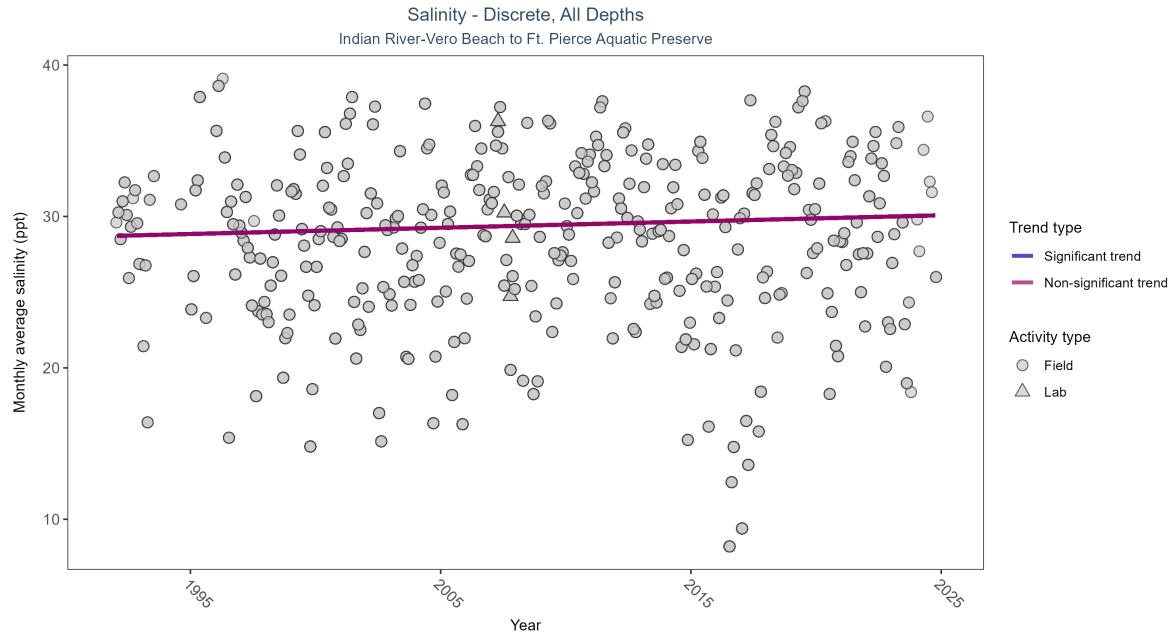


Figure 9: Scatter plot of monthly average salinity over time. If the time series included ten or more years of discrete observations, significant (blue) or non-significant (magenta) trend lines are also shown. Discrete salinity values derived from grab samples analyzed in the field (circles) or the laboratory (triangles) are both included in the plot.

Table 5: 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	8648	33	1992 - 2024	29.1	0.0561	28.71862	0.04121	0.1293

Salinity showed no detectable trend between 1992 and 2024.

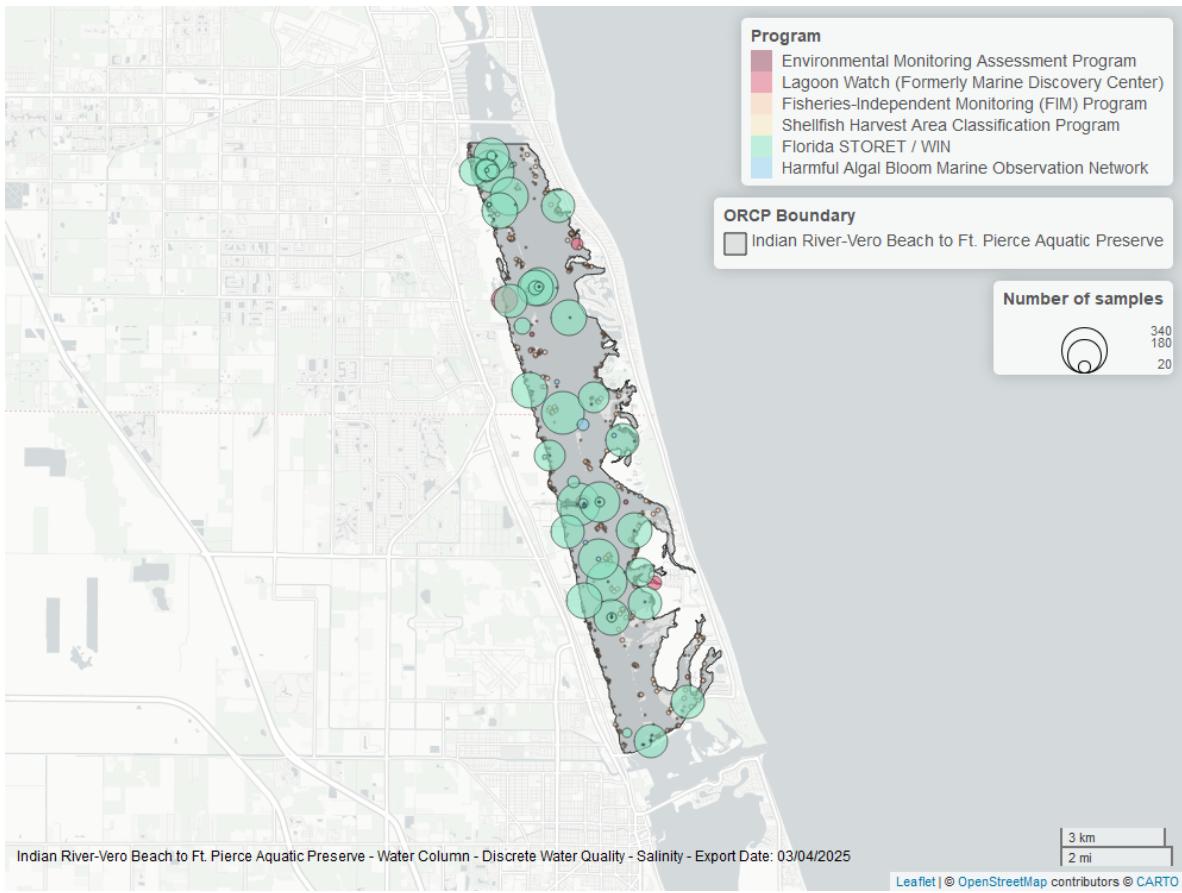


Figure 10: Map showing location of discrete water quality sampling locations within the boundaries of *Indian River-Vero Beach to Ft. Pierce Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Temperature - Discrete

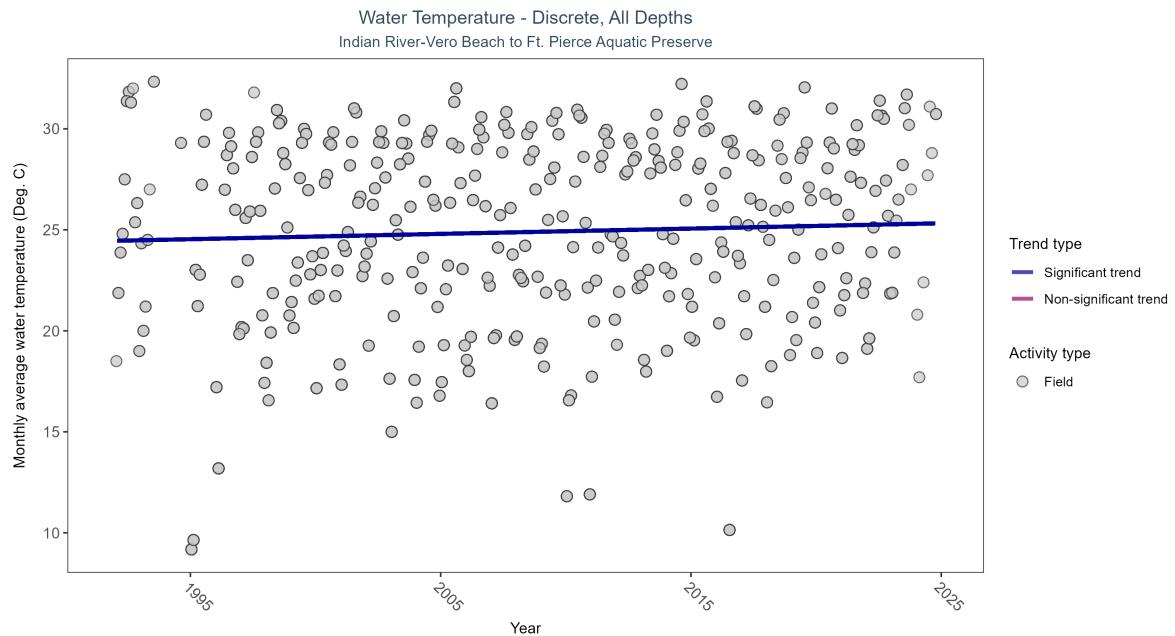


Figure 11: Scatter plot of monthly average water temperature over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only water temperature measurements taken in the field (circles) are included in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

Table 6: 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	8674	33	1992 - 2024	25.5	0.12143	24.45737	0.02628	0.0012

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

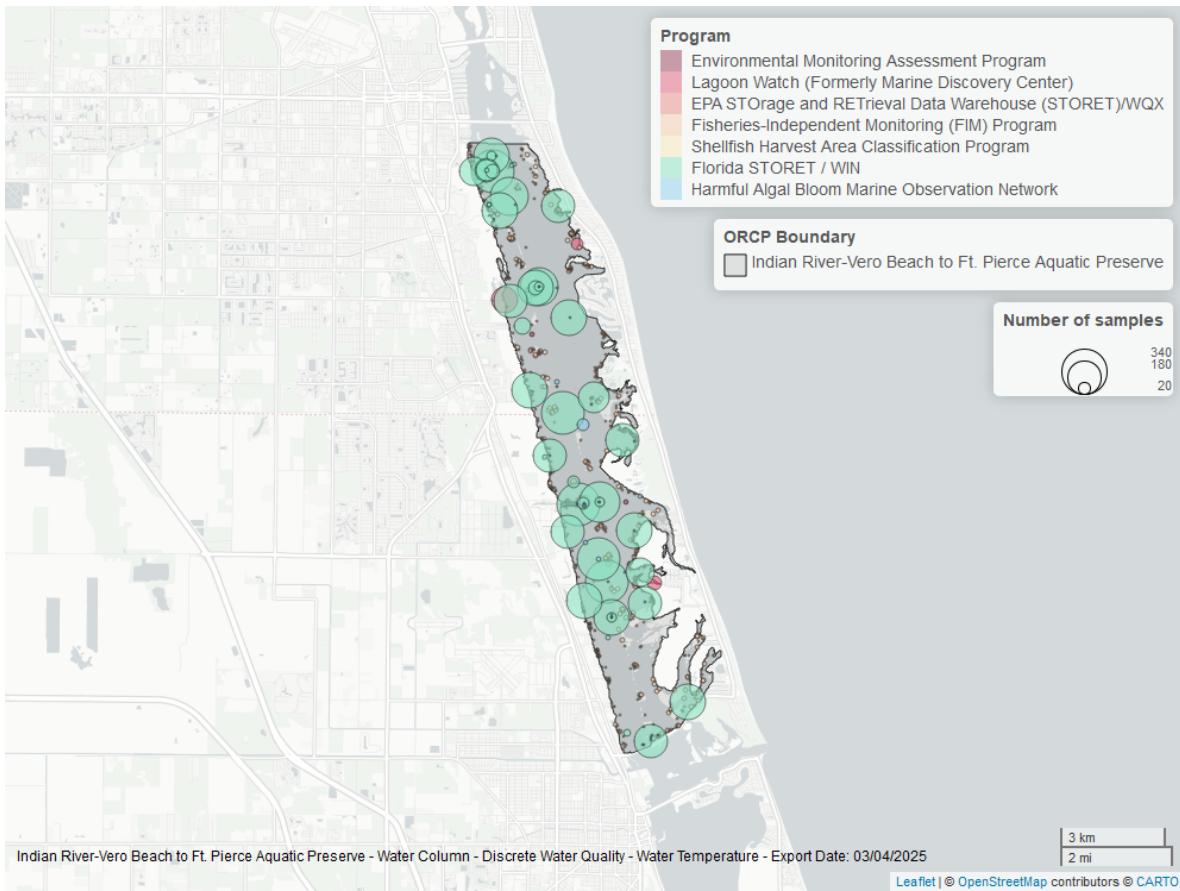


Figure 12: Map showing location of discrete water quality sampling locations within the boundaries of *Indian River-Vero Beach to Ft. Pierce Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

pH - Discrete

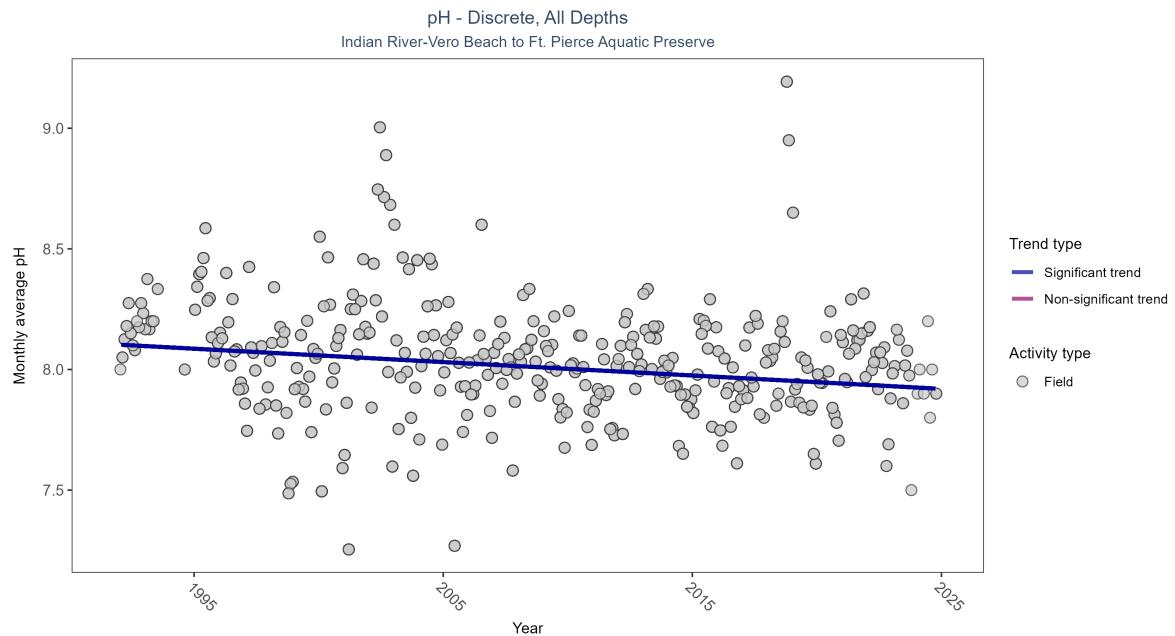


Figure 13: Scatter plot of monthly average pH over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only pH values measured in the field (circles) are included in the plot.

Table 7: 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	5925	33	1992 - 2024	8.02	-0.1652	8.10282	-0.00555	0

Monthly average pH decreased by 0.01 pH units per year.

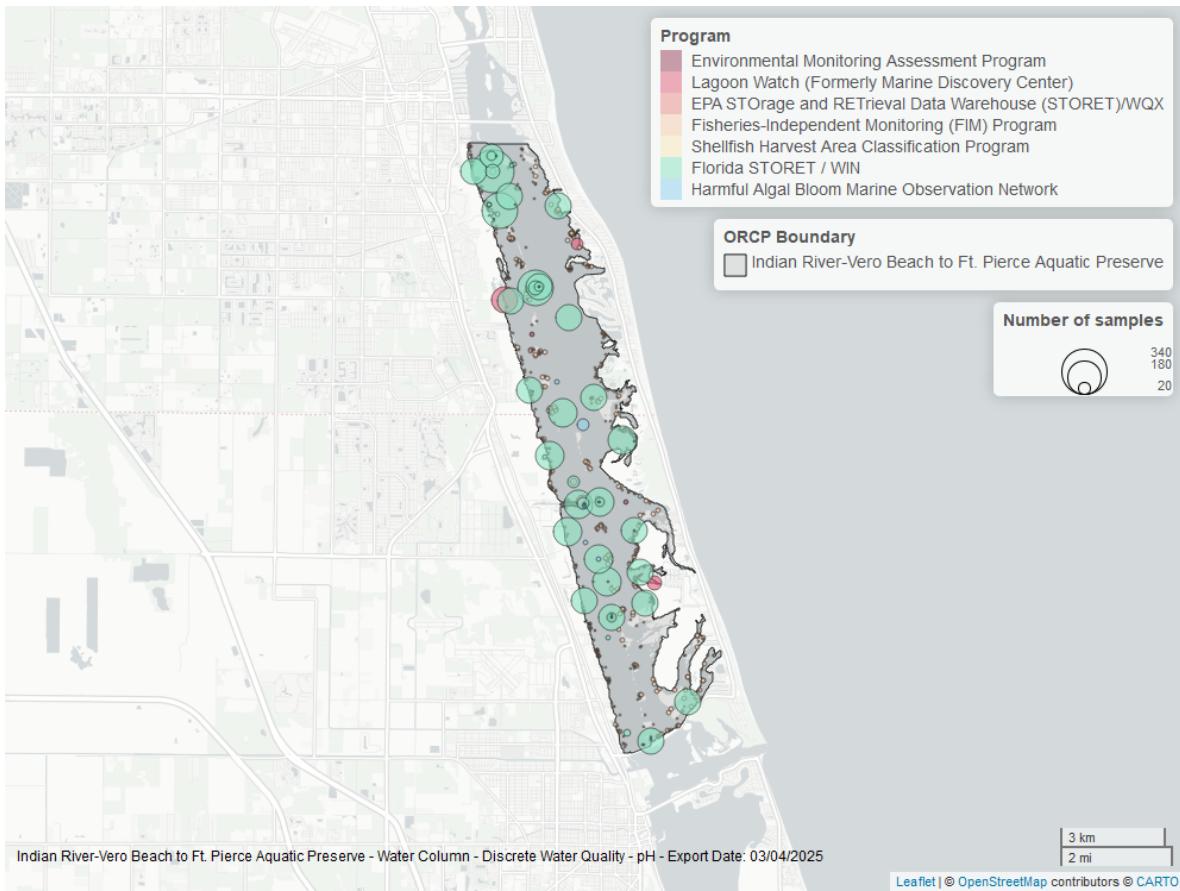


Figure 14: Map showing location of discrete water quality sampling locations within the boundaries of *Indian River-Vero Beach to Ft. Pierce Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Clarity

Turbidity - Discrete

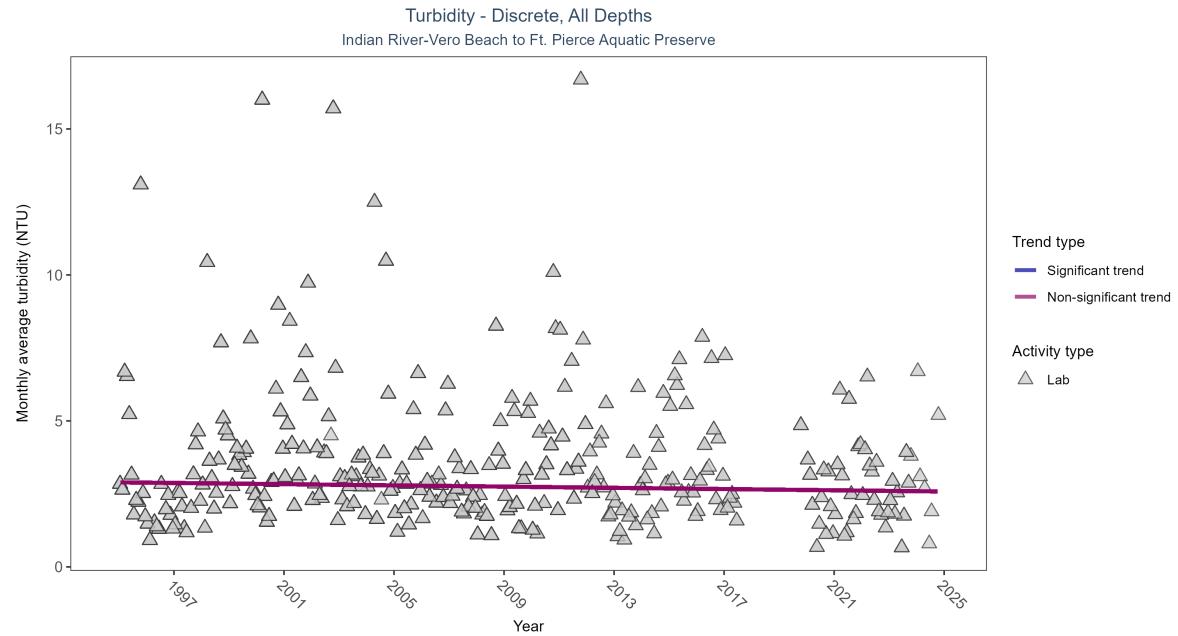


Figure 15: Scatter plot of monthly average turbidity over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only turbidity values measured in the laboratory (triangles) are included in the plot.

Table 8: 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	No significant trend	3940	29	1995 - 2024	2.6	-0.03612	2.89575	-0.01044	0.4082

Turbidity showed no detectable trend between 1995 and 2024.

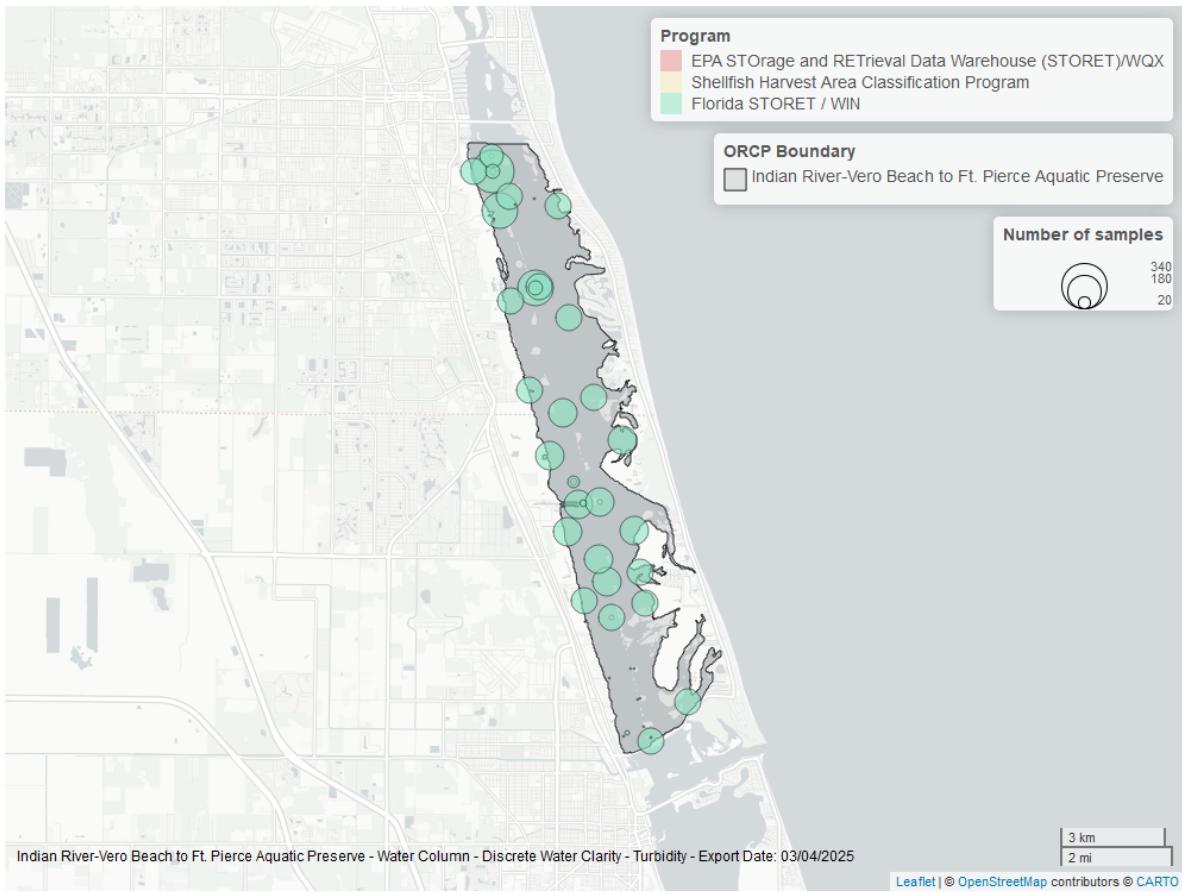


Figure 16: Map showing location of discrete water quality sampling locations within the boundaries of *Indian River-Vero Beach to Ft. Pierce Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Total Suspended Solids - Discrete

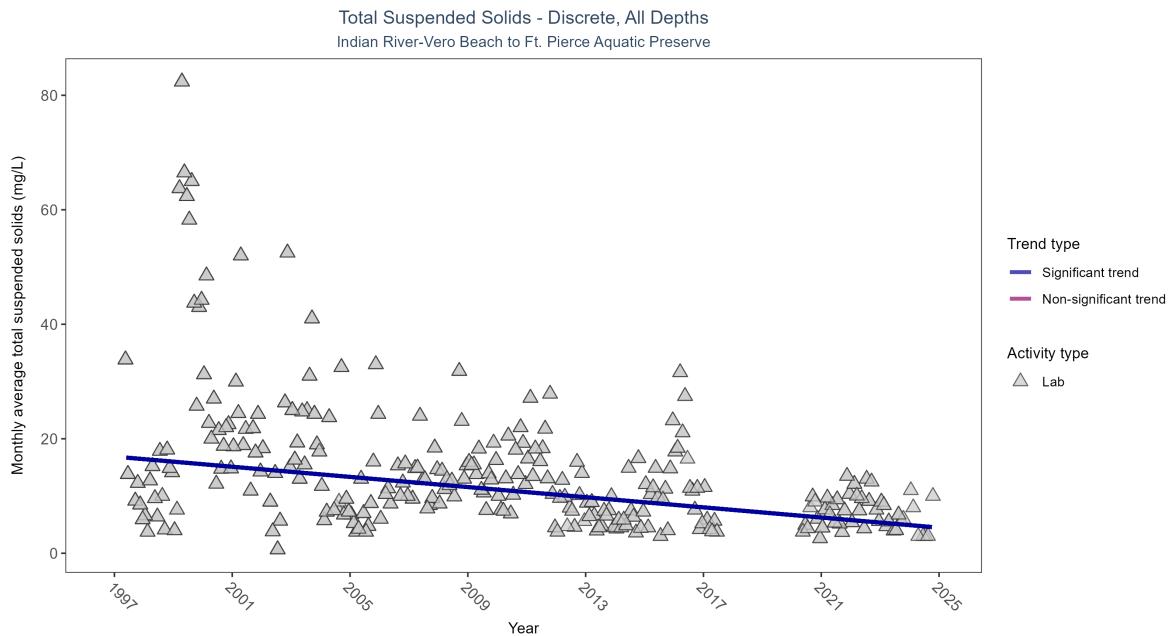


Figure 17: Scatter plot of monthly average total suspended solids (TSS) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only TSS values obtained from laboratory analyses (triangles) are included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

Table 9: 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	Significantly decreasing trend	874	26	1997 - 2024	12	-0.33047	16.88527	-0.44333	0

Monthly average total suspended solids decreased by 0.44 mg/L per year, indicating an increase in water clarity.

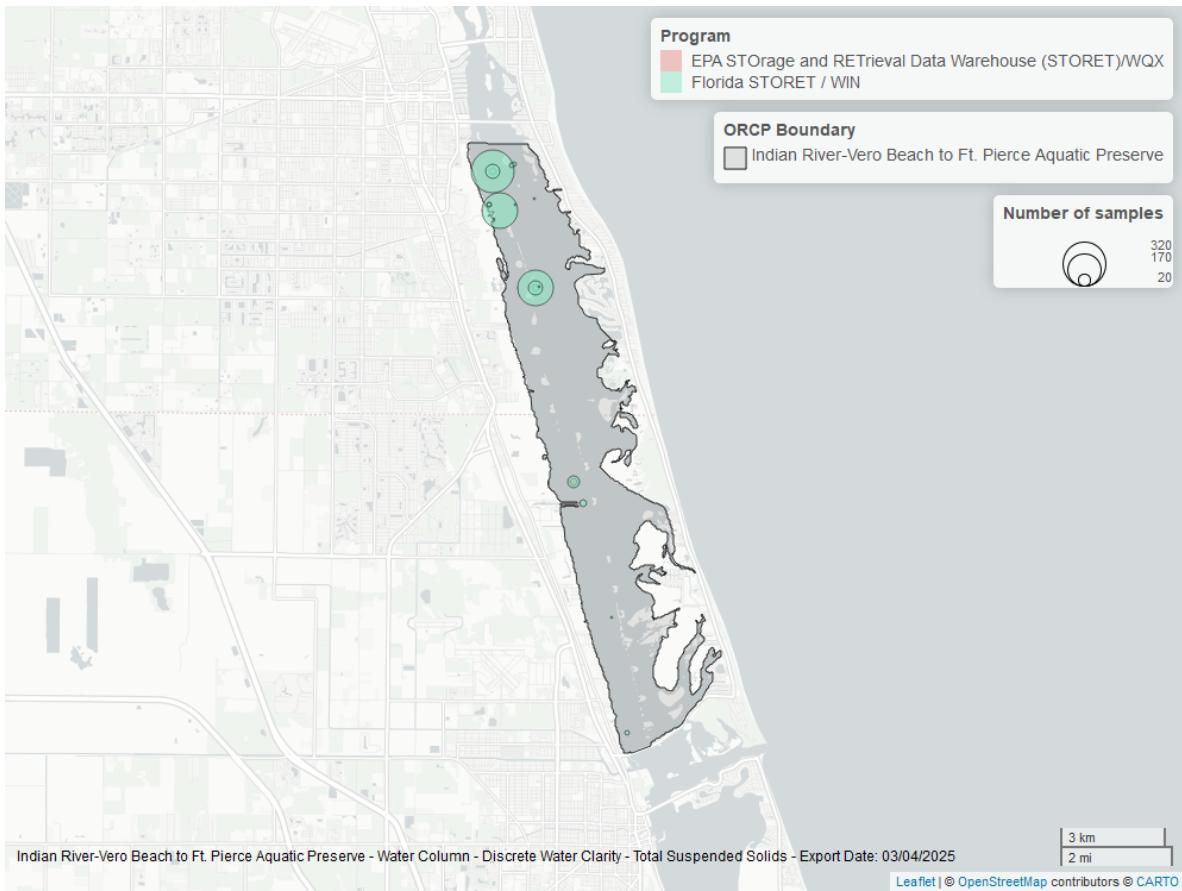


Figure 18: Map showing location of discrete water quality sampling locations within the boundaries of *Indian River-Vero Beach to Ft. Pierce Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Chlorophyll a, Uncorrected for Pheophytin - Discrete

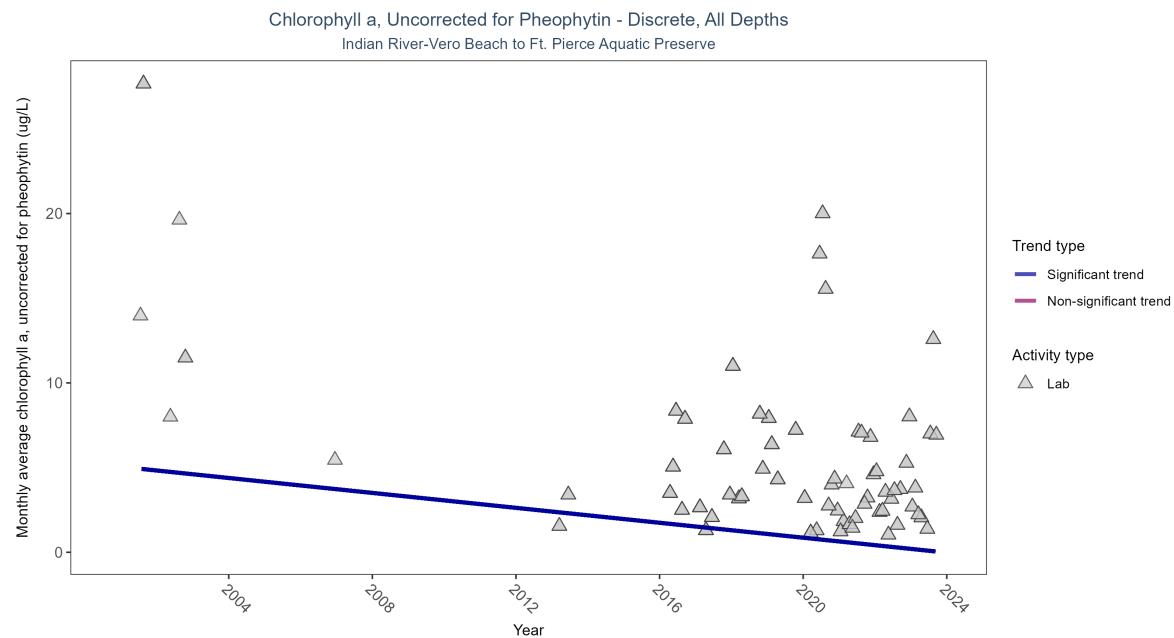


Figure 19: Scatter plot of monthly average levels of chlorophyll a, uncorrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) is included in the plot.

Table 10: 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	Significantly decreasing trend	174	12	2001 - 2023	3.8	-0.25882	5.0473	-0.22034	0.0106

Monthly average chlorophyll a, uncorrected for pheophytin, decreased by 0.22 $\mu\text{g/L}$ per year, indicating an increase in water clarity.

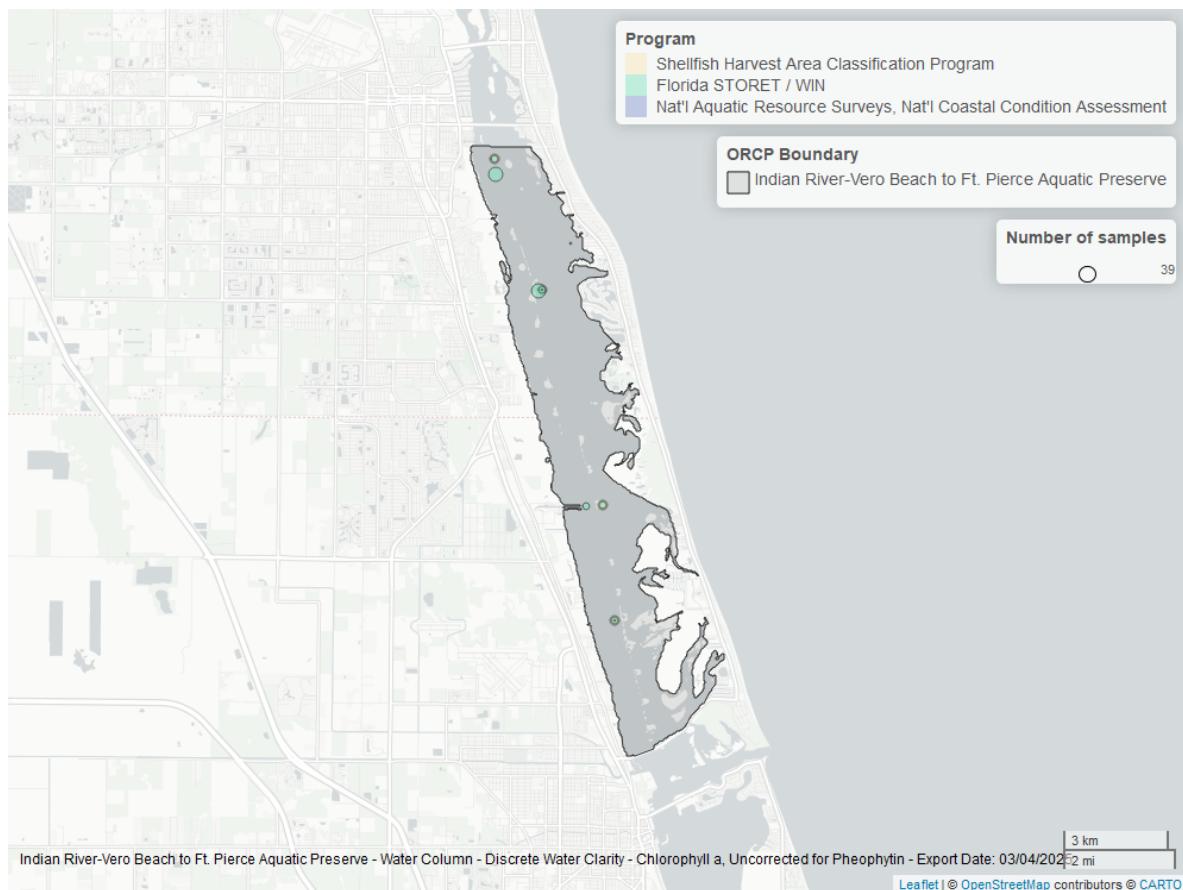


Figure 20: Map showing location of discrete water quality sampling locations within the boundaries of *Indian River-Vero Beach to Ft. Pierce Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Chlorophyll a, Corrected for Pheophytin - Discrete

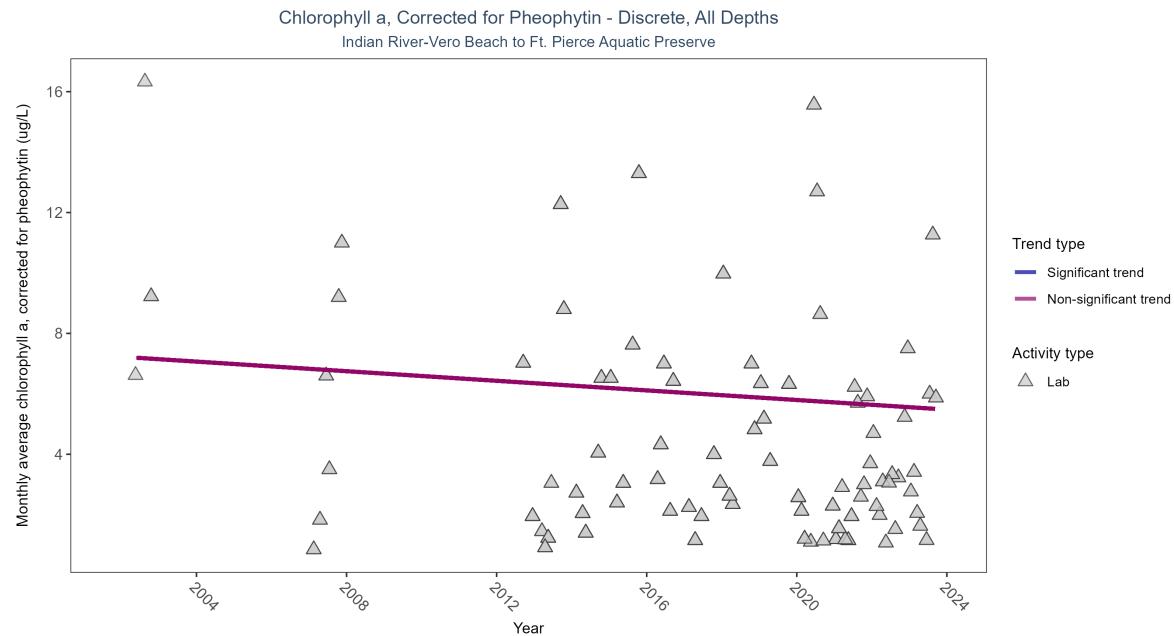


Figure 21: Scatter plot of monthly average levels of chlorophyll a, corrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) is included in the plot.

Table 11: 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	No significant trend	258	14	2002 - 2023	2.9103	-0.16473	7.22534	-0.07941	0.0552

Chlorophyll a, corrected for pheophytin, showed no detectable trend between 2002 and 2023.

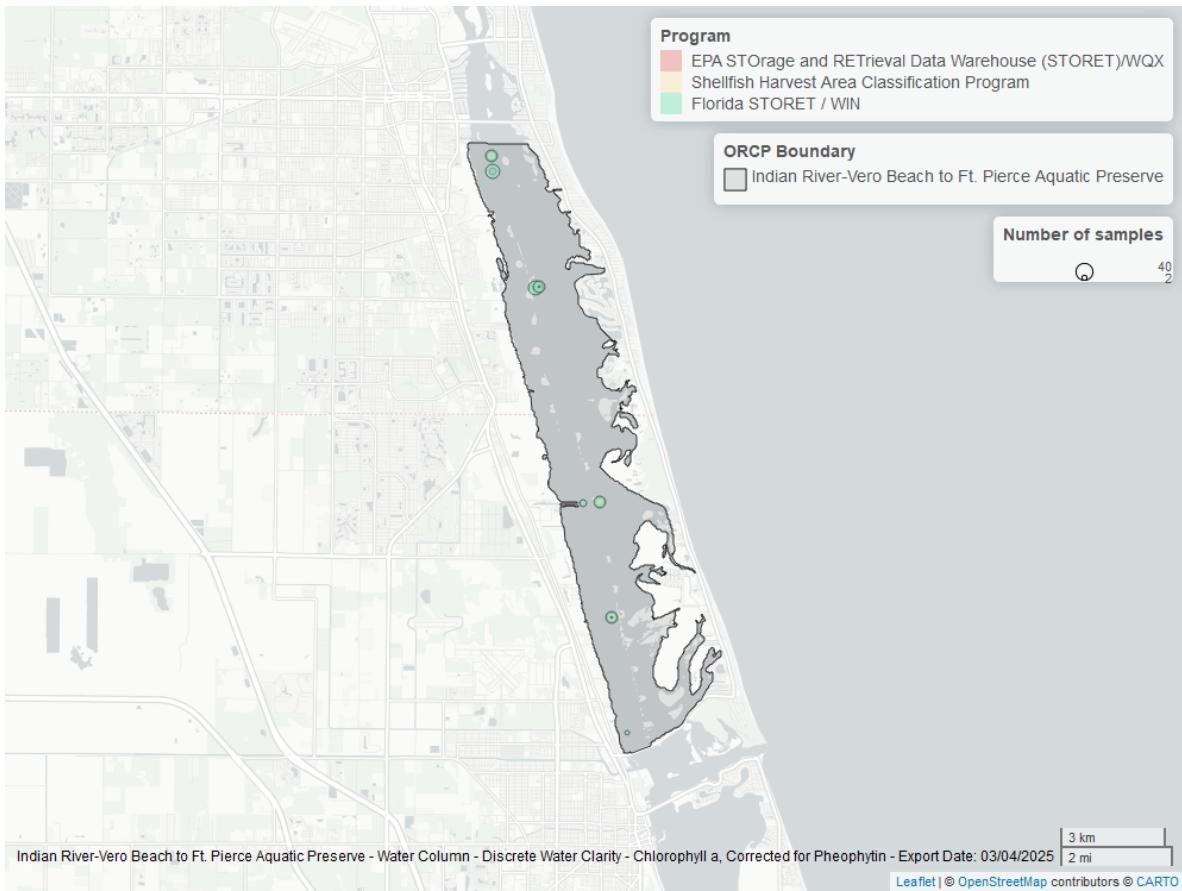


Figure 22: Map showing location of discrete water quality sampling locations within the boundaries of *Indian River-Vero Beach to Ft. Pierce Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Secchi Depth - Discrete

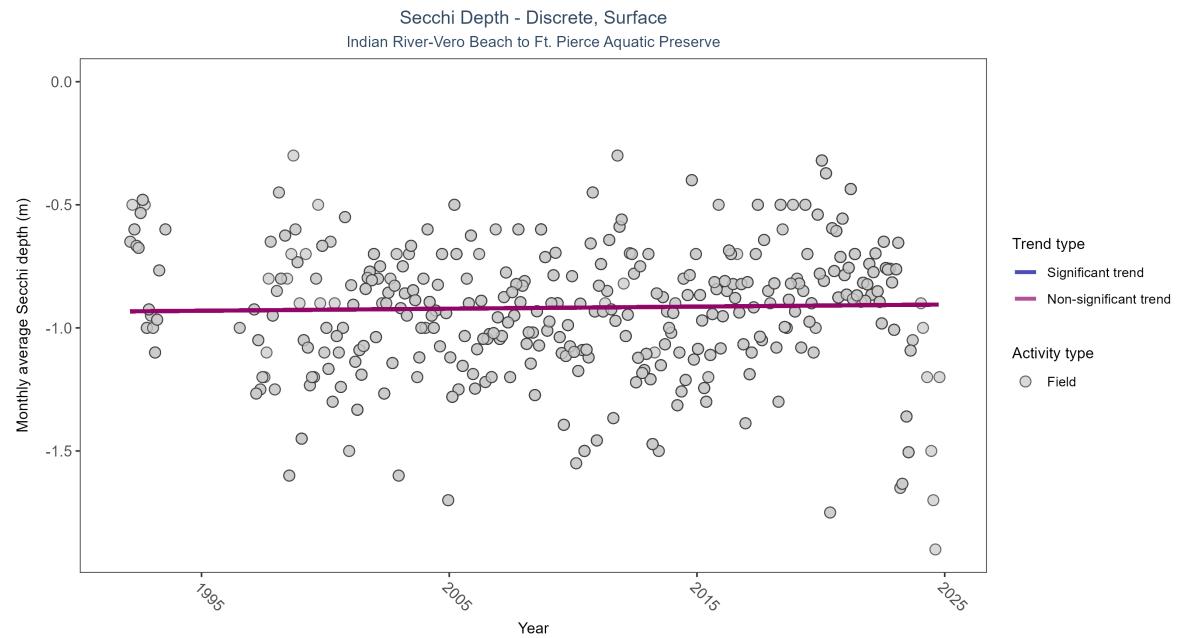


Figure 23: Scatter plot of monthly average Secchi depth over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Secchi depth is only measured in the field (circles).

Table 12: 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	No significant trend	2167	31	1992 - 2024	-0.9	0.02814	-0.93297	0.00084	0.5155

Secchi depth showed no detectable trend between 1992 and 2024.

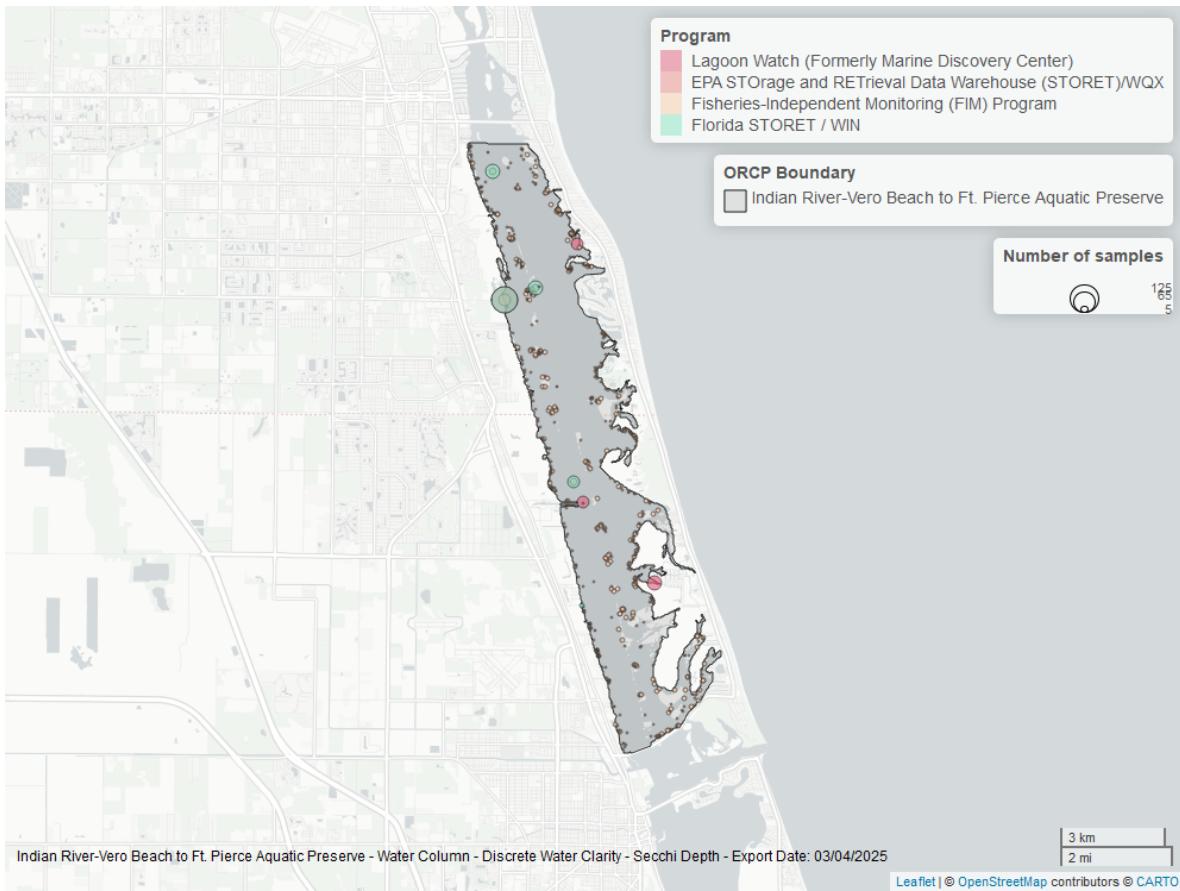


Figure 24: Map showing location of discrete water quality sampling locations within the boundaries of *Indian River-Vero Beach to Ft. Pierce Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Colored Dissolved Organic Matter - Discrete

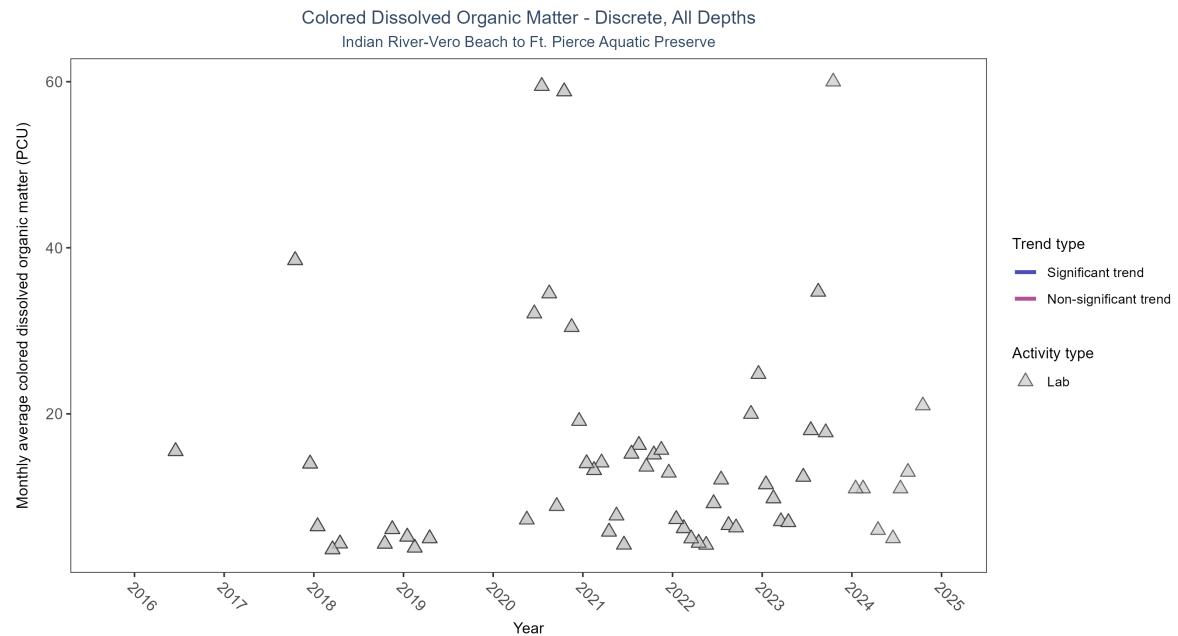


Figure 25: Scatter plot of monthly average colored dissolved organic matter (CDOM) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed CDOM (triangles) is included in the plot.

Table 13: 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	149	9	2016 - 2024	10.38859	-	-	-	-

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

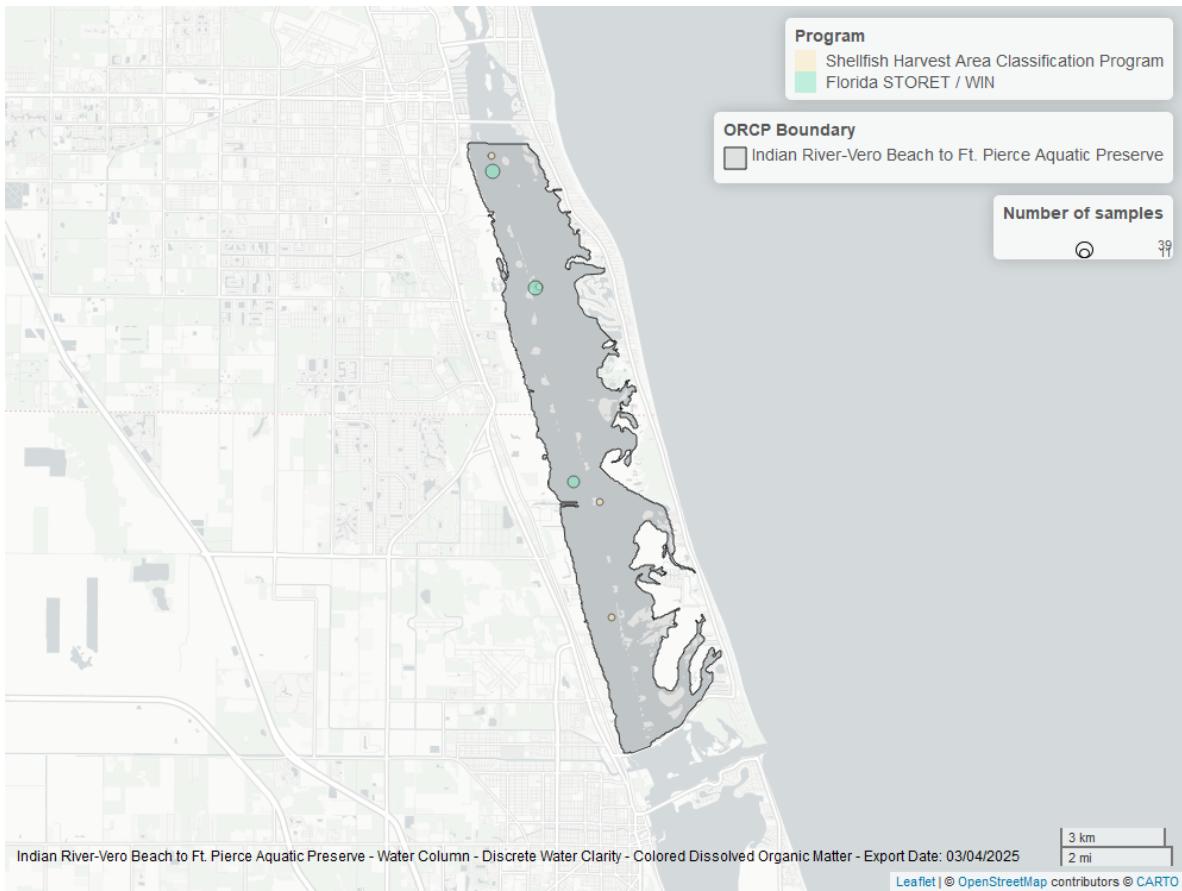


Figure 26: Map showing location of discrete water quality sampling locations within the boundaries of *Indian River-Vero Beach to Ft. Pierce Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.