Banana River Aquatic Preserve

SEACAR Water Quality Analysis

Last compiled on 30 September, 2025

Contents

Indicators

Nutrients

Total Nitrogen - Discrete

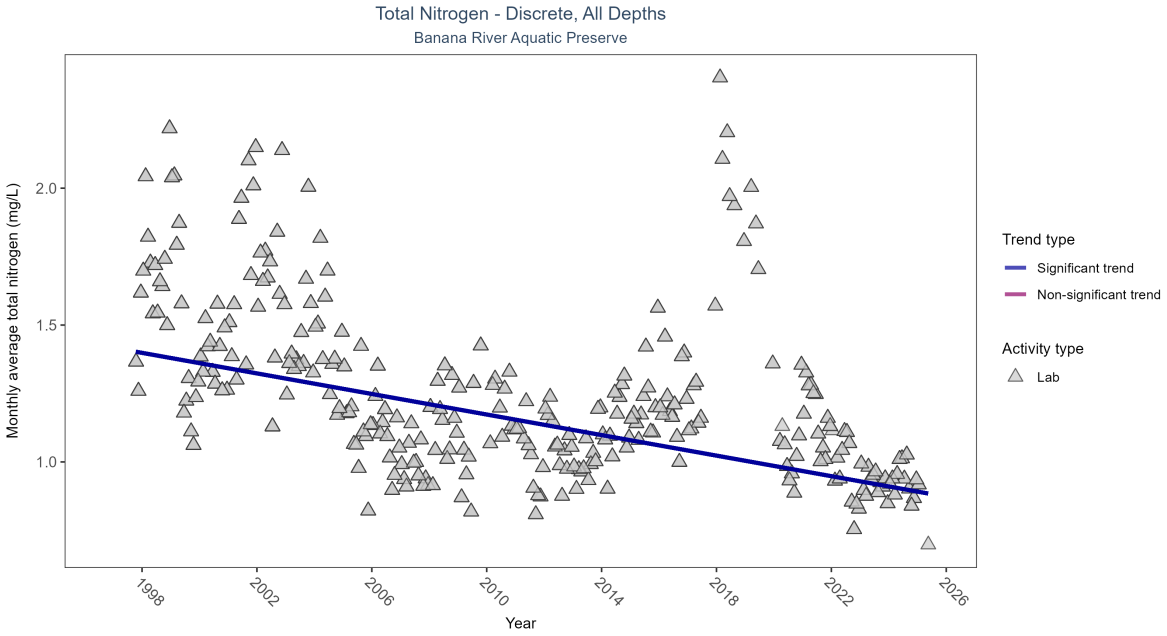

Figure 1: Scatter plot of monthly average total nitrogen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only nitrogen values obtained from laboratory analyses (triangles) are included in the 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	Significantly decreasing trend	2331	29	1997 - 2025	1.20661	-0.42177	1.41723	-0.01877	0

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

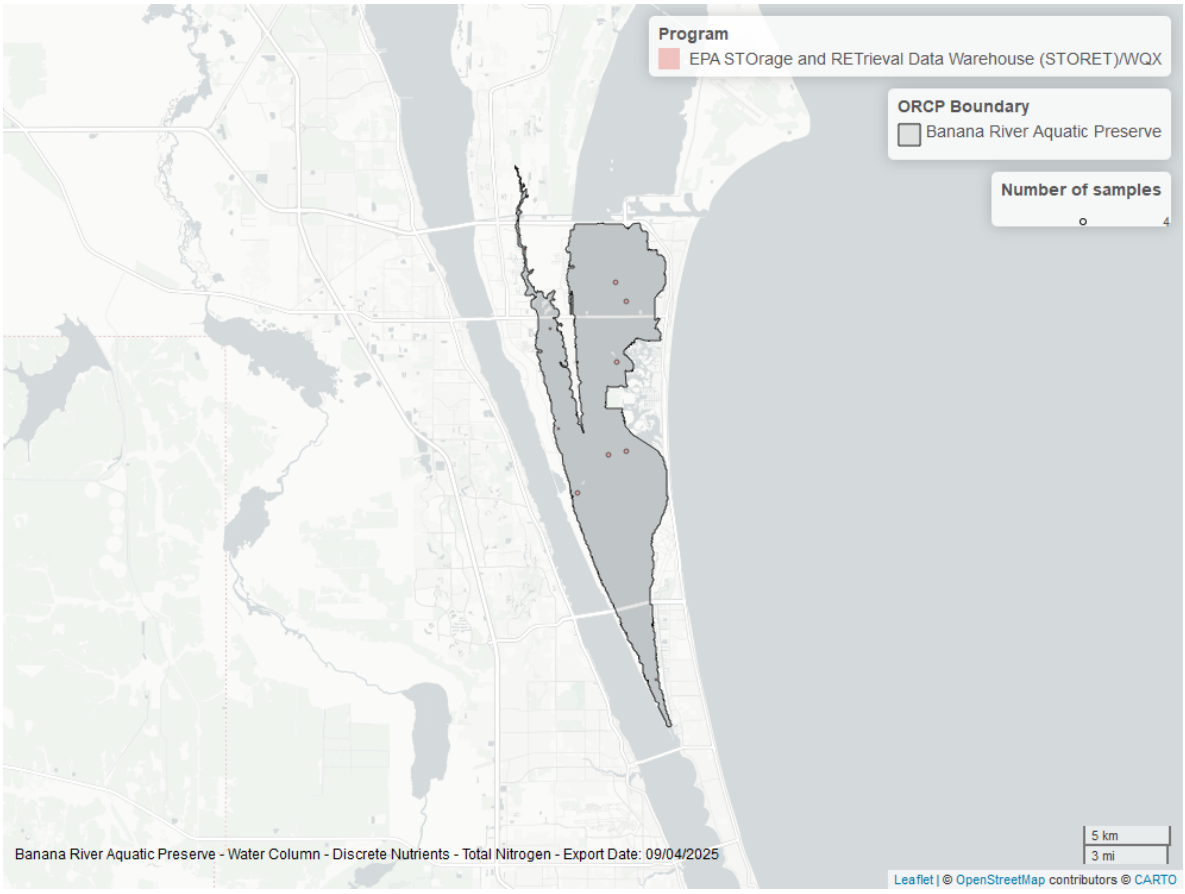

Figure 2: Map showing location of discrete water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Total Phosphorus - Discrete

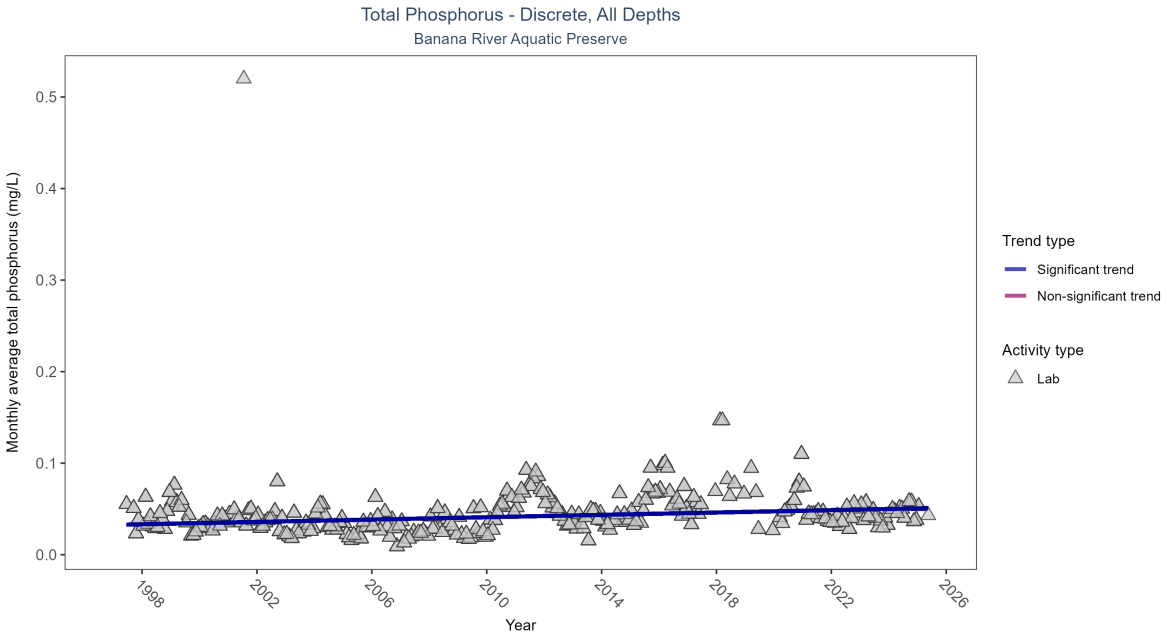

Figure 3: Scatter plot of monthly average total phosphorus over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only phosphorus values obtained from laboratory analyses (triangles) are included in 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 increasing trend	4819	29	1997 - 2025	0.0356	0.23072	0.03258	0.00064	0

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

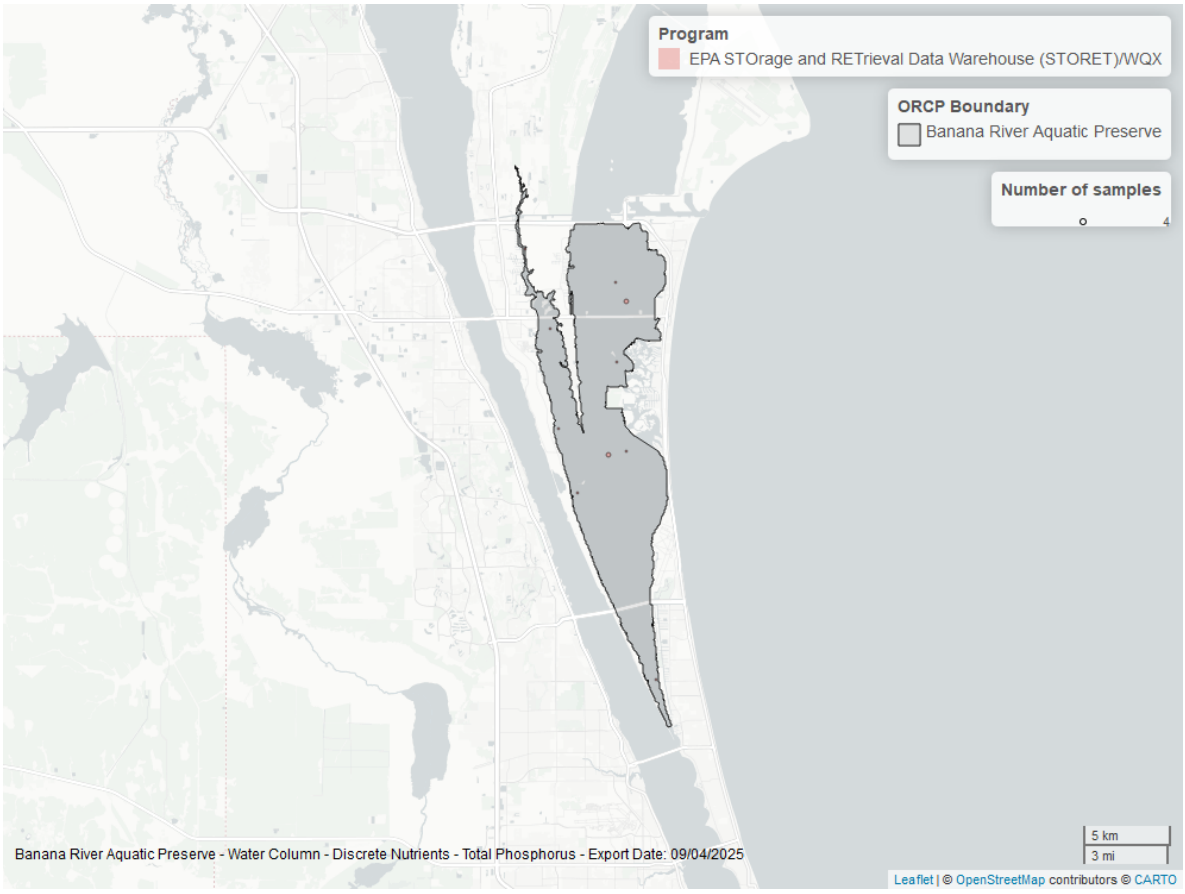

Figure 4: Map showing location of discrete water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Quality

Dissolved Oxygen - Discrete

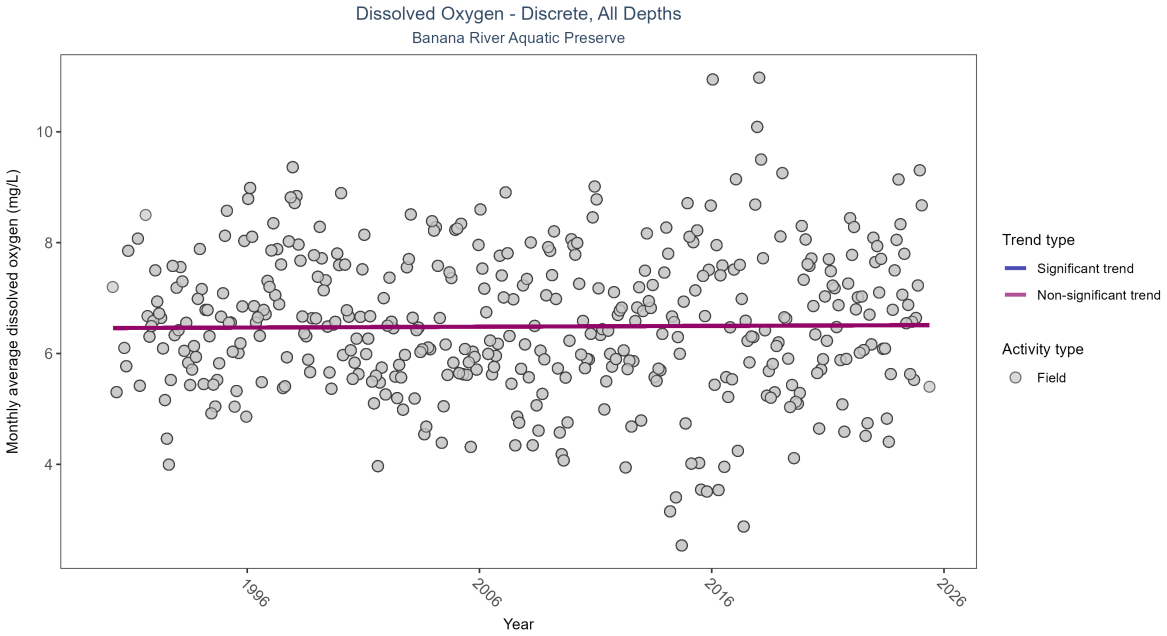

Figure 5: Scatter plot of monthly average dissolved oxygen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen values measured in the field (circles) are included in the plot.

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	30065	36	1990 - 2025	6.5	0.01212	6.45901	0.00149	0.7632

Dissolved oxygen showed no detectable trend between 1990 and 2025.

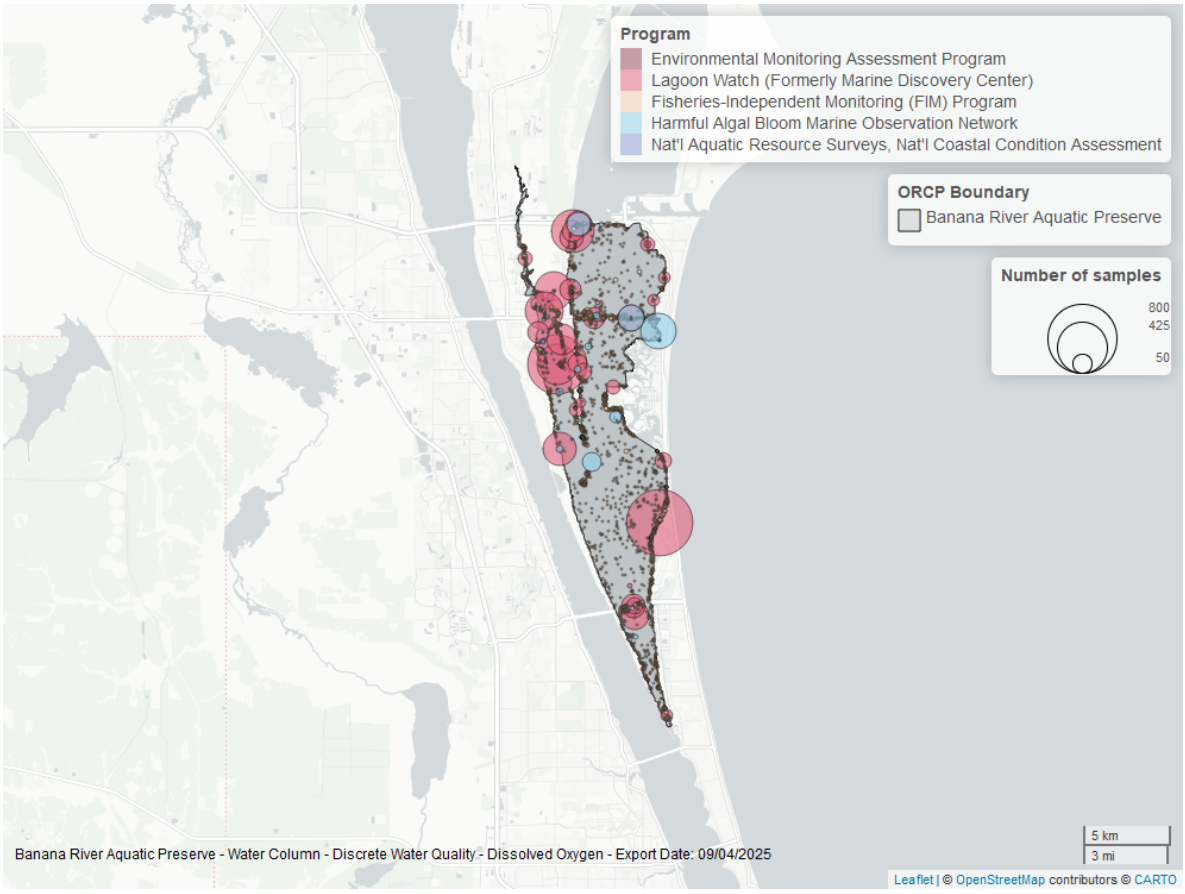

Figure 6: Map showing location of discrete water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen - Continuous

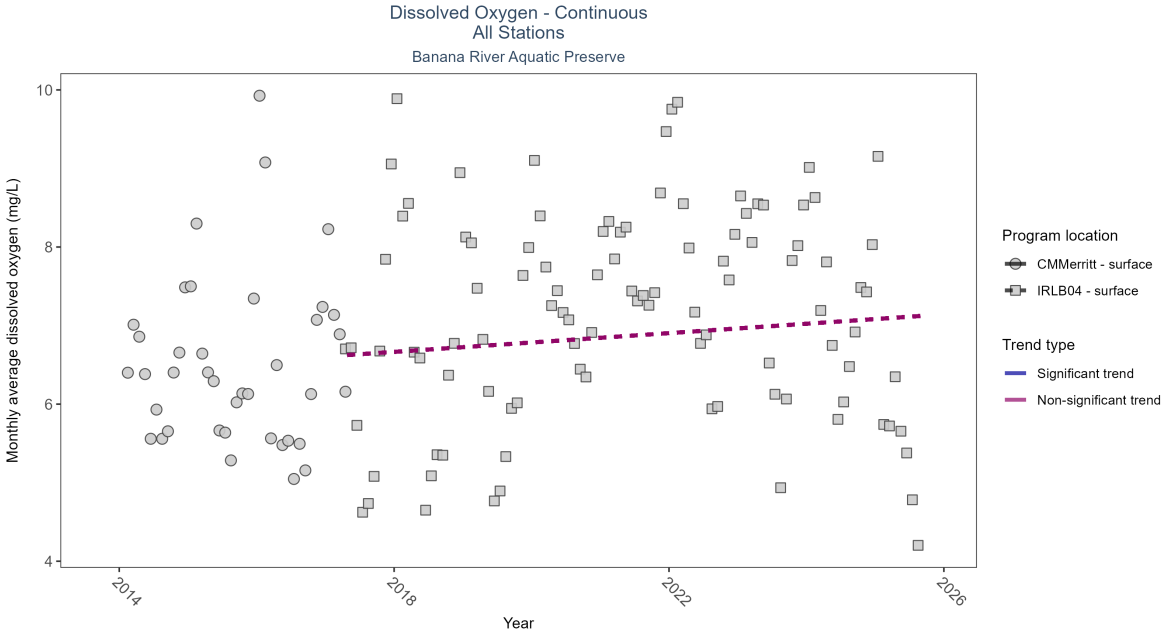

Figure 7: Scatter plot of monthly average dissolved oxygen over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
IRLB04	No significant trend	72841	9	2017 - 2025	7.21	0.11	6.61	0.06	0.1979
CMMerritt	Insufficient data to calculate trend	27378	4	2014 - 2017	6.51	-	-	-	-

No detectable change in monthly average dissolved oxygen was observed at one location. There was insufficient data to fit a model for one location.

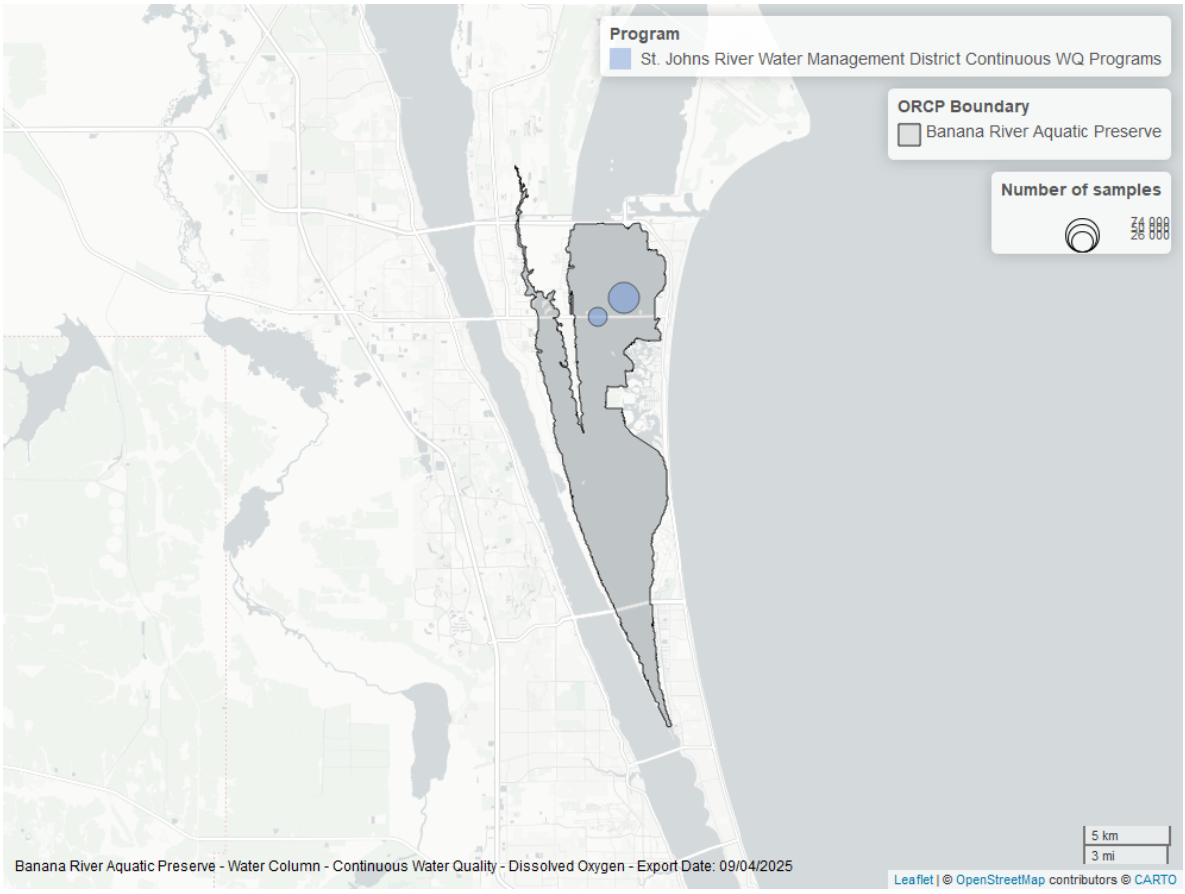

Figure 8: Map showing location of dissolved oxygen continuous water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen Saturation - Discrete

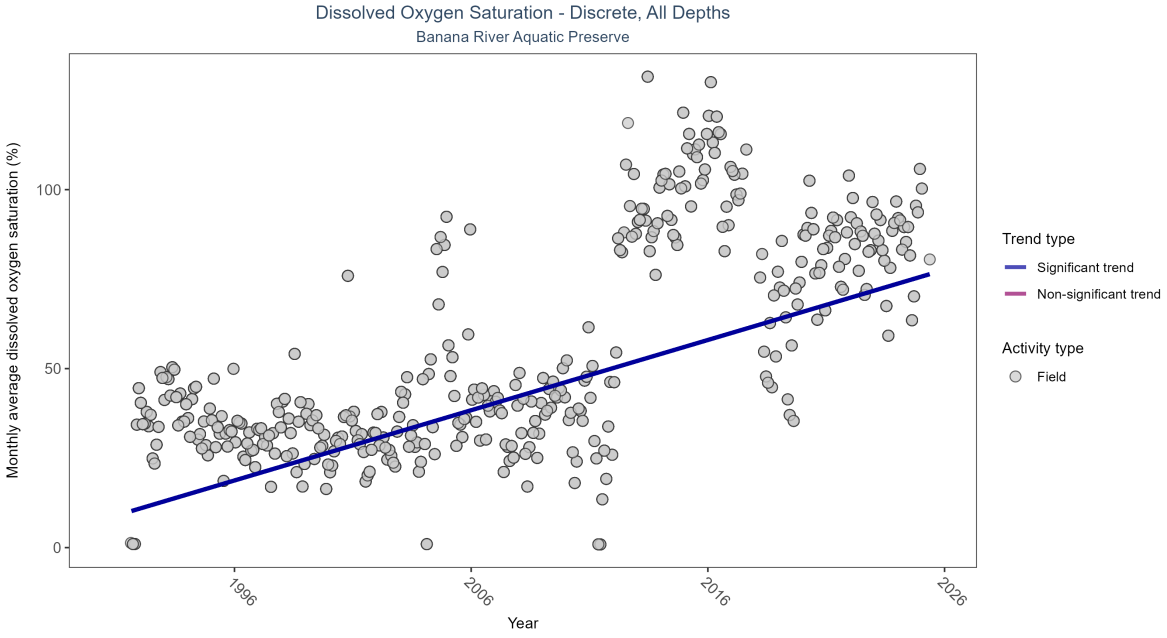

Figure 9: Scatter plot of monthly average dissolved oxygen saturation over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen saturation values measured in the field (circles) 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	Significantly increasing trend	7653	35	1991 - 2025	60	0.46098	8.94308	1.9622	0

Monthly average dissolved oxygen saturation increased by 1.96% per year.

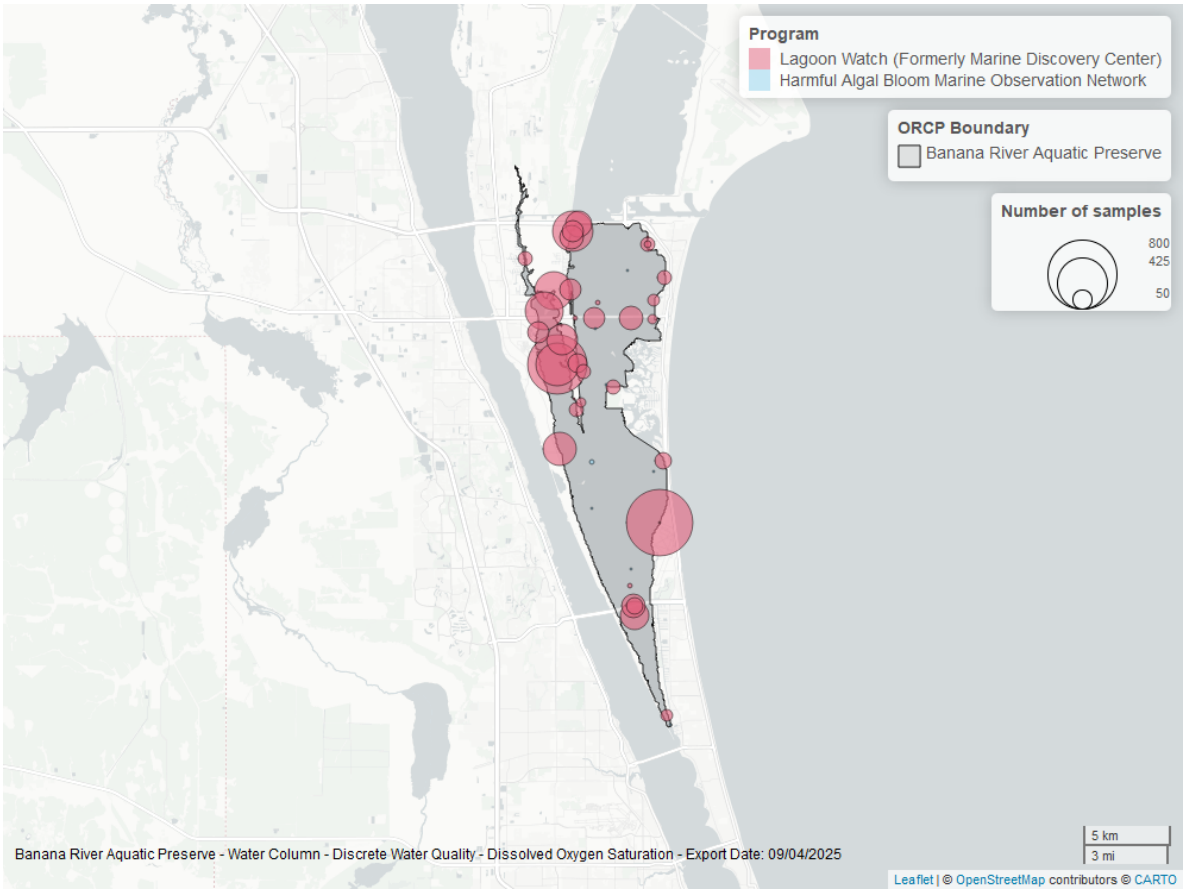

Figure 10: Map showing location of discrete water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen Saturation - Continuous

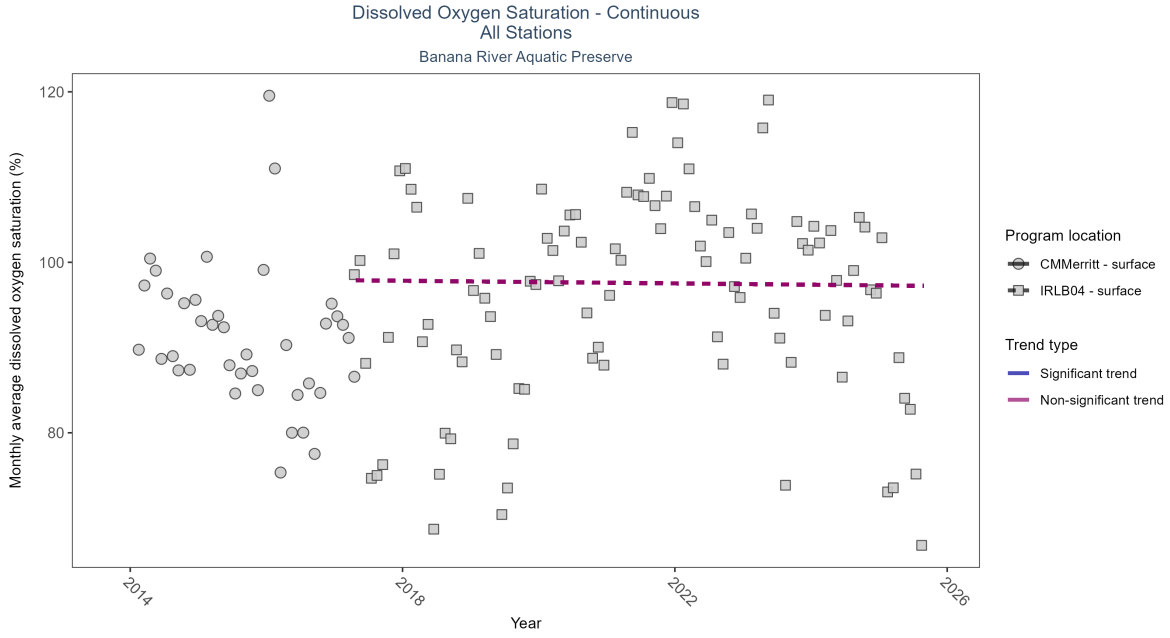

Figure 11: Scatter plot of monthly average dissolved oxygen saturation over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
IRLB04	No significant trend	85440	9	2017 - 2025	100.53	0	97.91	-0.08	0.9737
CMMerritt	Insufficient data to calculate trend	25864	4	2014 - 2017	91.03	-	-	-	-

No detectable change in monthly average dissolved oxygen saturation was observed at one location. There was insufficient data to fit a model for one location.

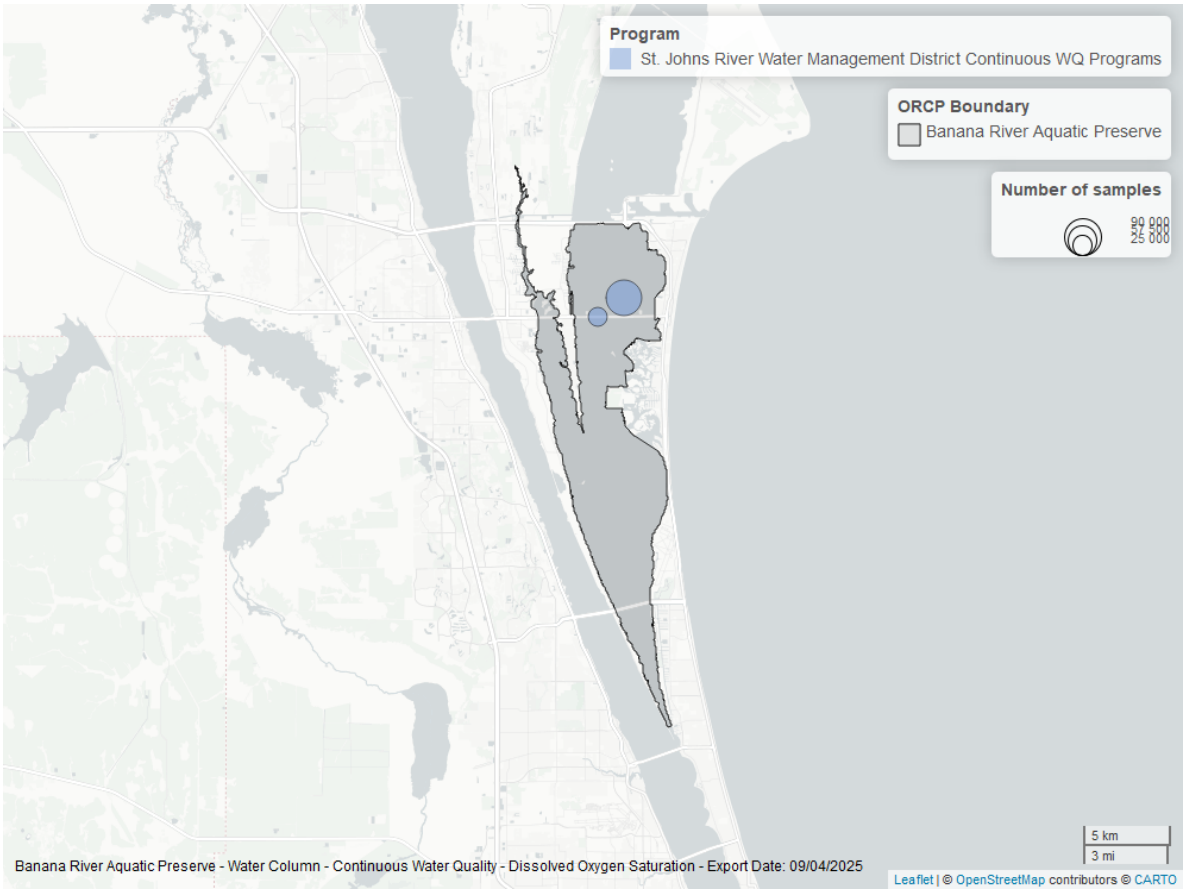

Figure 12: Map showing location of dissolved oxygen saturation continuous water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Salinity - Discrete

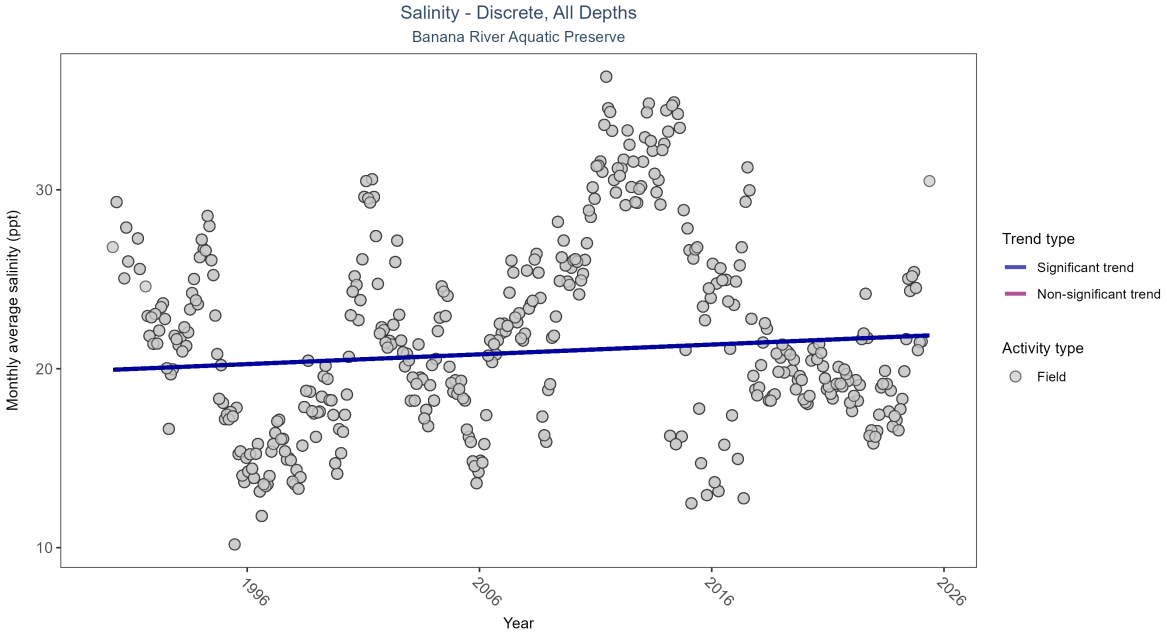

Figure 13: Scatter plot of monthly average salinity over time. If the time series included ten or more years of discrete observations, significant (blue) or non-significant (magenta) trend lines are also shown. Discrete salinity values derived from grab samples analyzed in the field (circles) or the 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	Significantly increasing trend	31759	36	1990 - 2025	19.8	0.07596	19.93101	0.0546	0.0295

Monthly average salinity increased by 0.05 ppt per year.

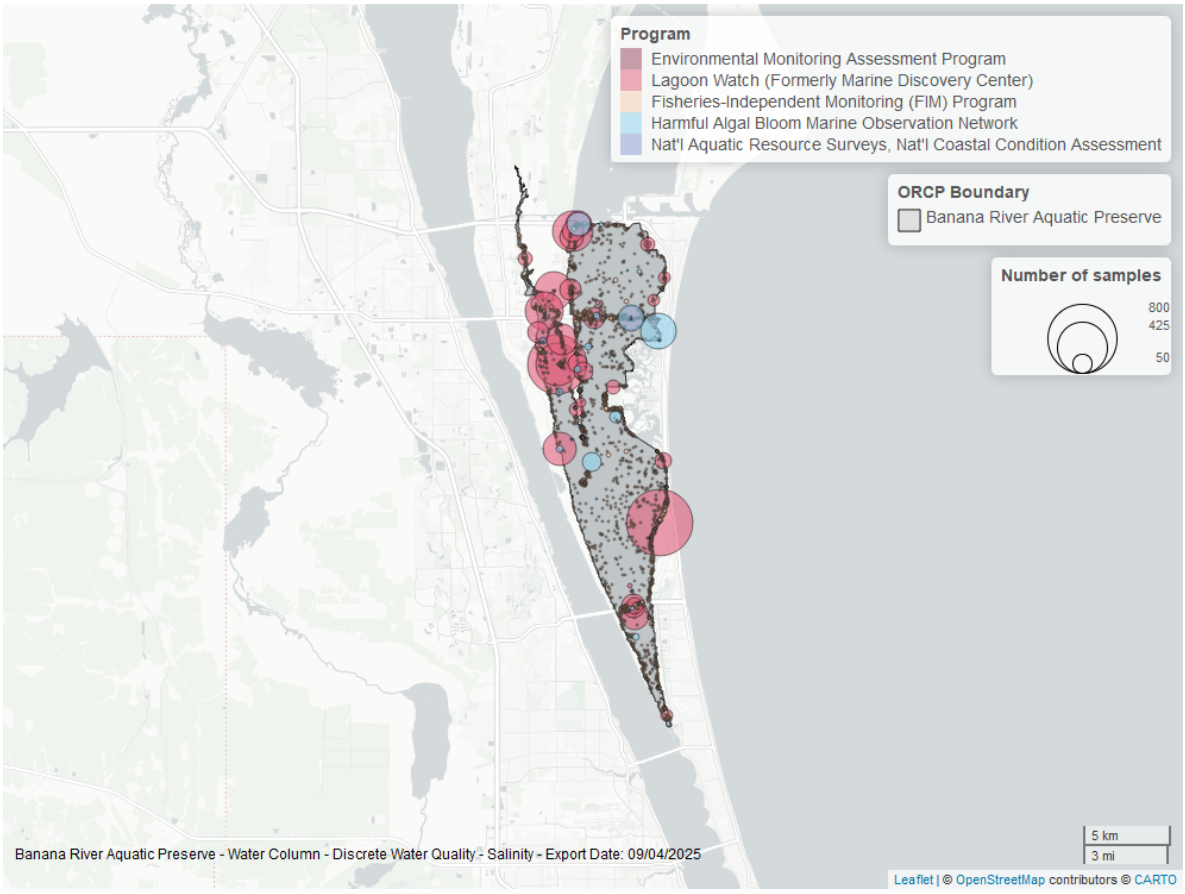

Figure 14: Map showing location of discrete water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Salinity - Continuous

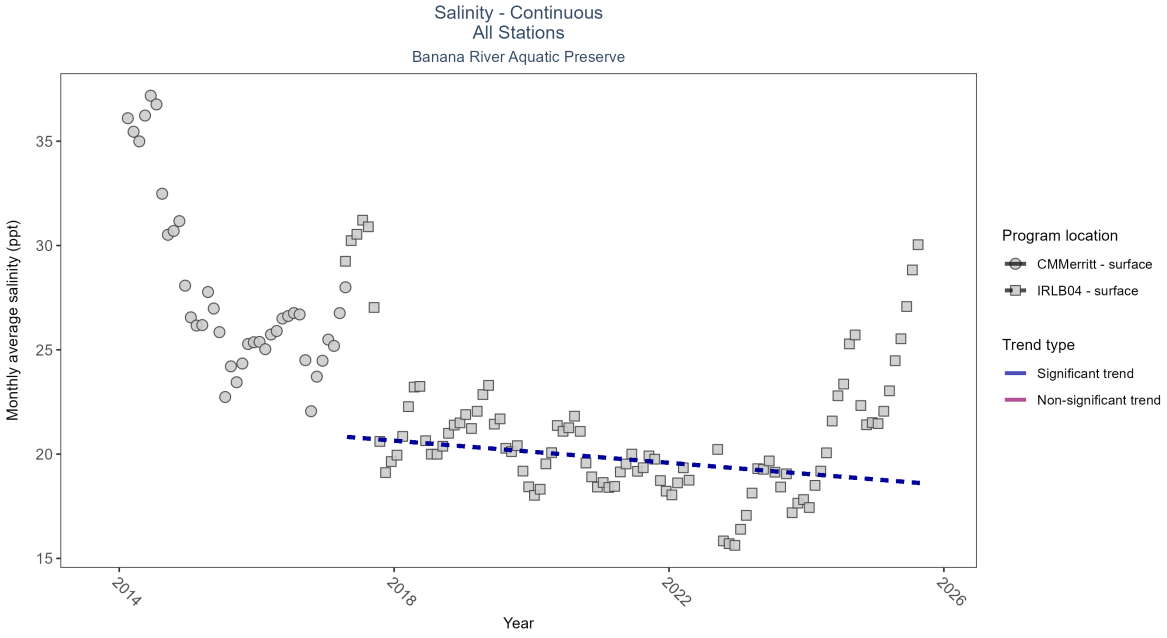

Figure 15: Scatter plot of monthly average salinity over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
IRLB04	Significantly decreasing trend	68975	9	2017 - 2025	20.12	-0.21	20.91	-0.27	0.0104
CMMerritt	Insufficient data to calculate trend	25902	4	2014 - 2017	26.40	-	-	-	-

At one program location, monthly average salinity decreased by 0.27 ppt per year. There was insufficient data to fit a model for one location.

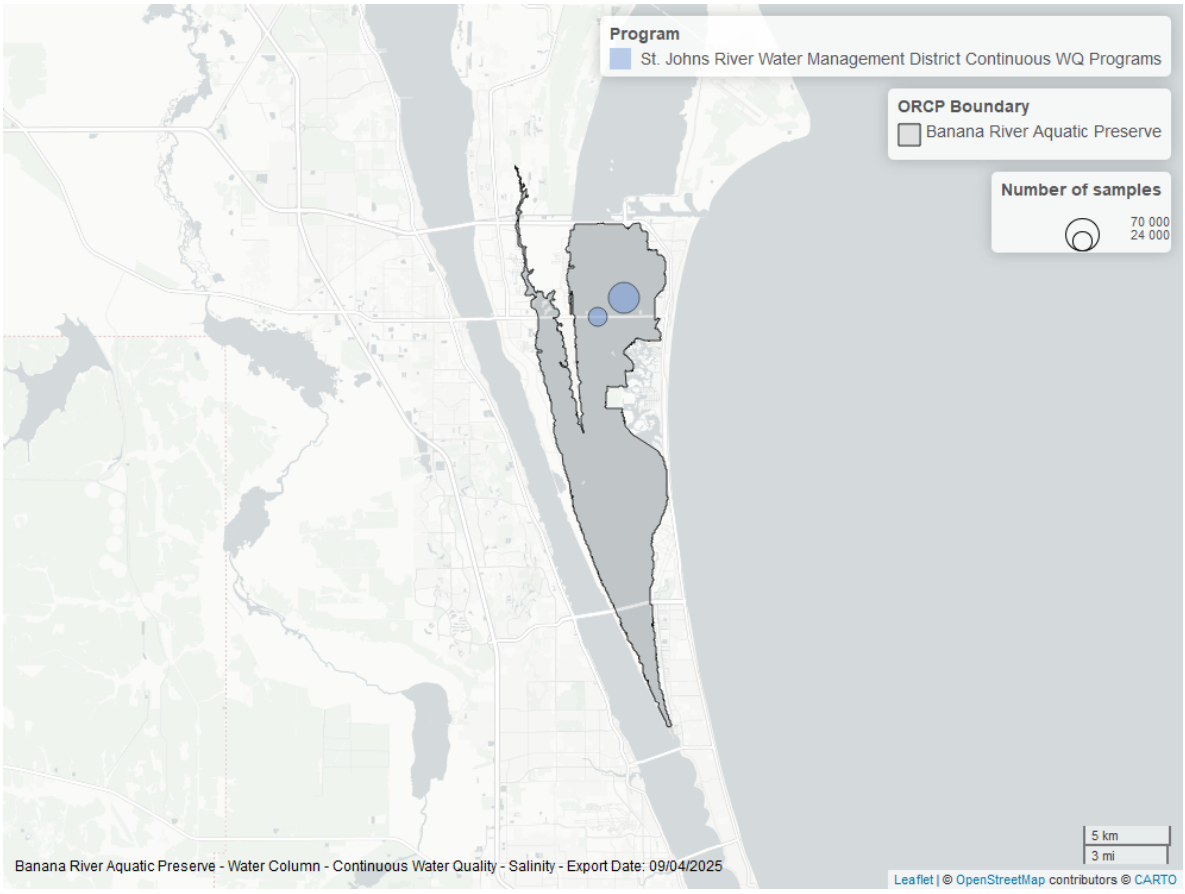

Figure 16: Map showing location of salinity continuous water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Temperature - Discrete

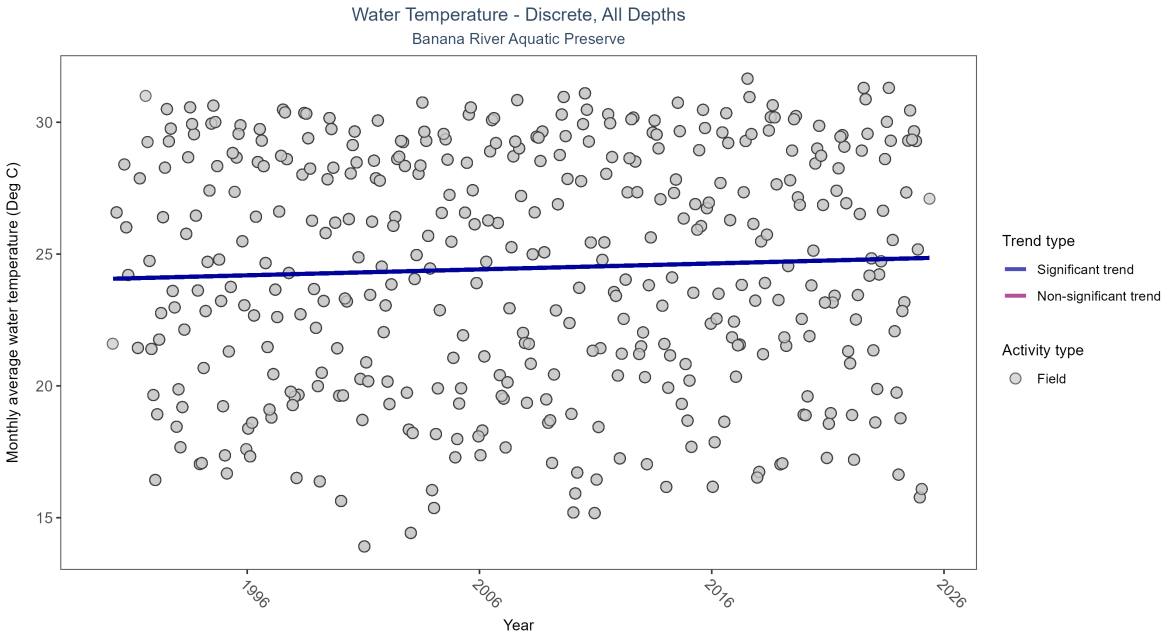

Figure 17: Scatter plot of monthly average water temperature over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only water temperature measurements taken in the field (circles) are included in 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	31598	36	1990 - 2025	25.5	0.12734	24.0598	0.02245	2e-04

Monthly average water temperature increased by 0.02°C per year.

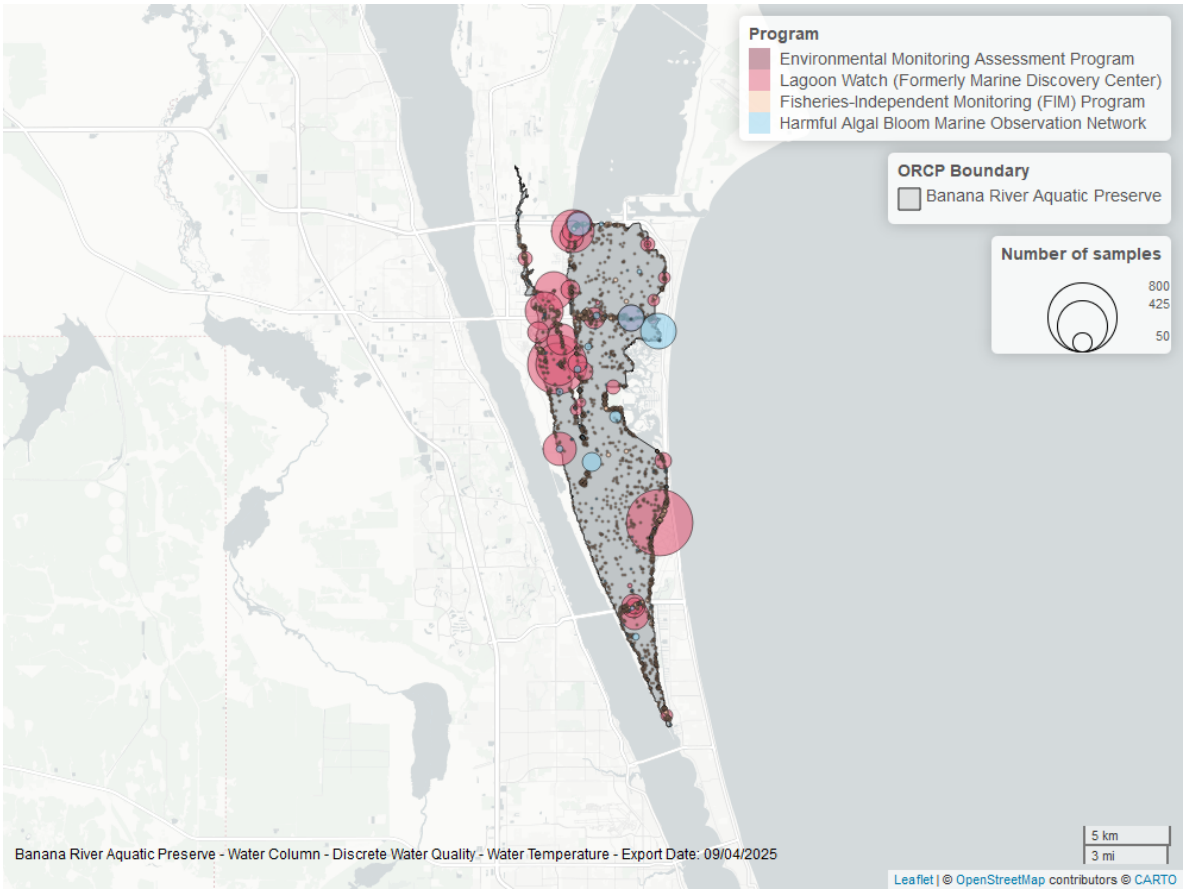

Figure 18: Map showing location of discrete water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Temperature - Continuous

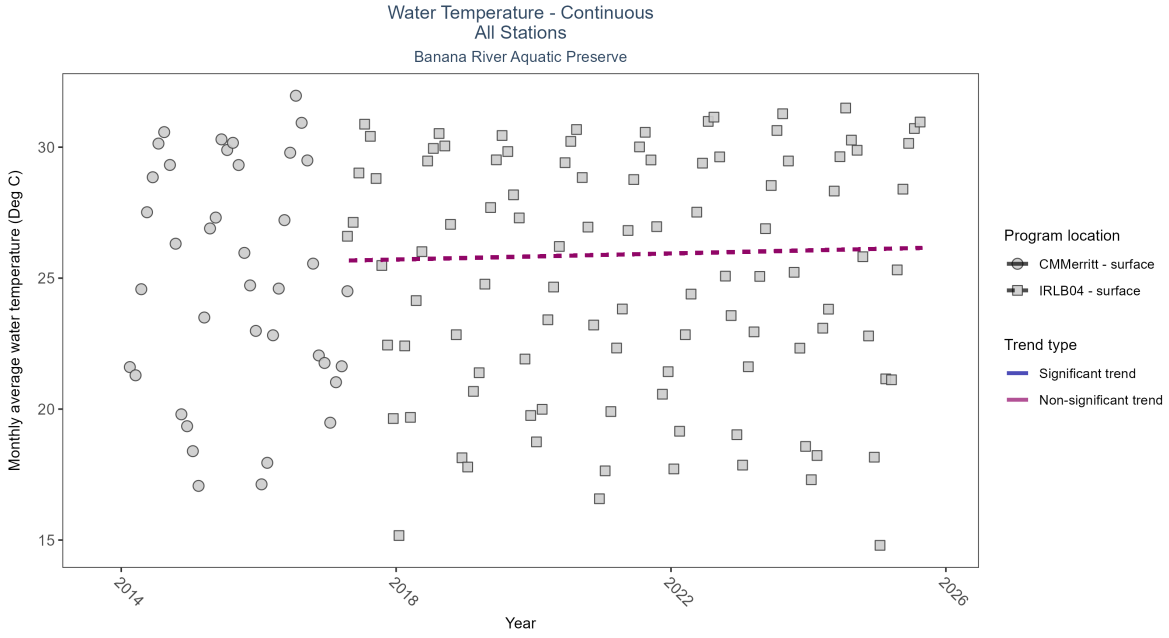

Figure 19: Scatter plot of monthly average water temperature over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
CMMerritt	Insufficient data to calculate trend	27484	4	2014 - 2017	25.43	-	-	-	-
IRLB04	No significant trend	72845	9	2017 - 2025	25.82	0.09	25.65	0.06	0.2218

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

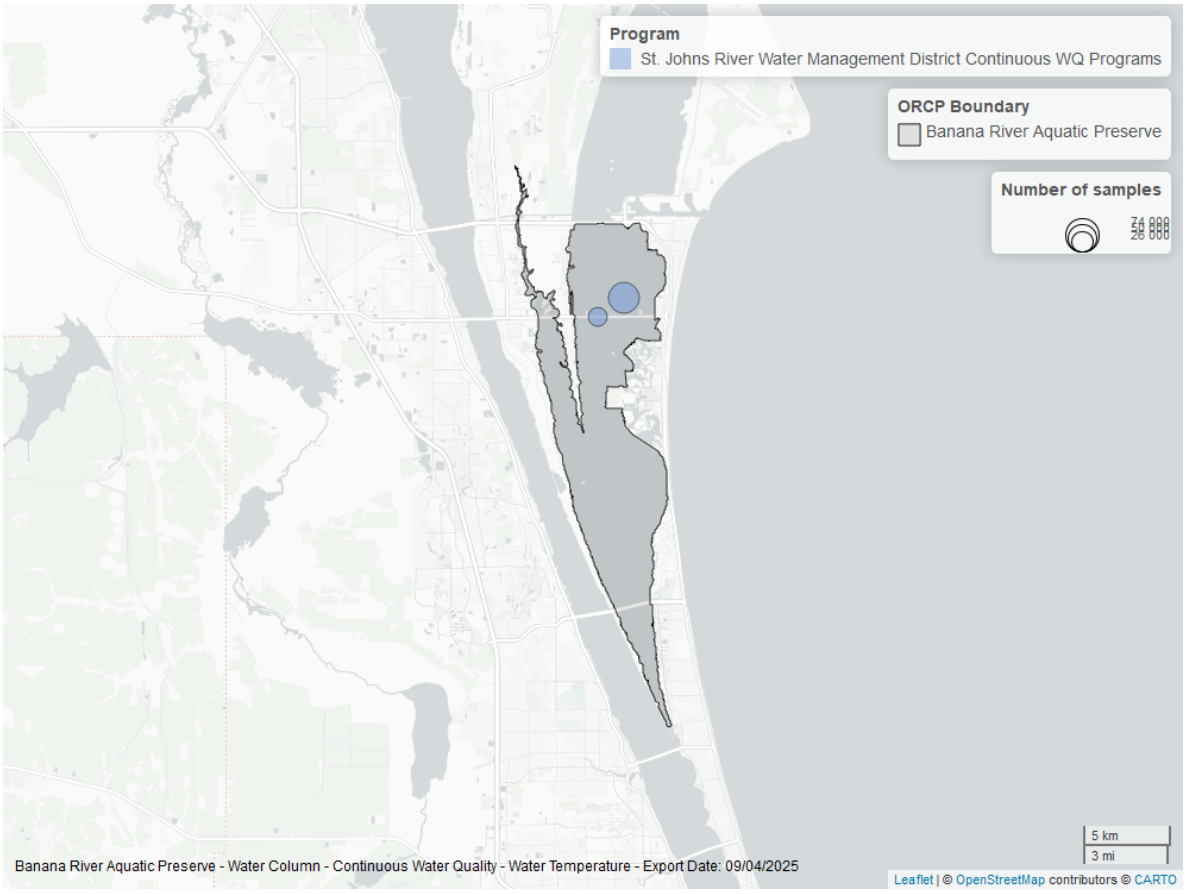

Figure 20: Map showing location of water temperature continuous water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

pH - Discrete

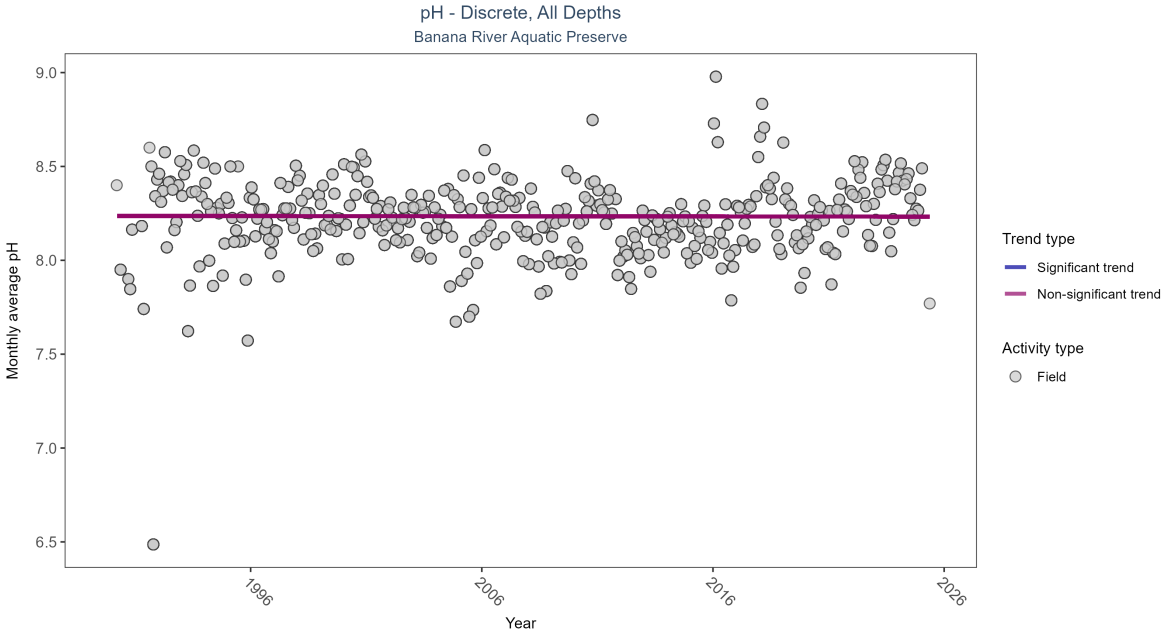

Figure 21: Scatter plot of monthly average pH over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only pH values measured in the field (circles) are included in the plot.

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	23010	36	1990 - 2025	8.2	-0.00593	8.23642	-0.00011	0.9088

pH showed no detectable trend between 1990 and 2025.

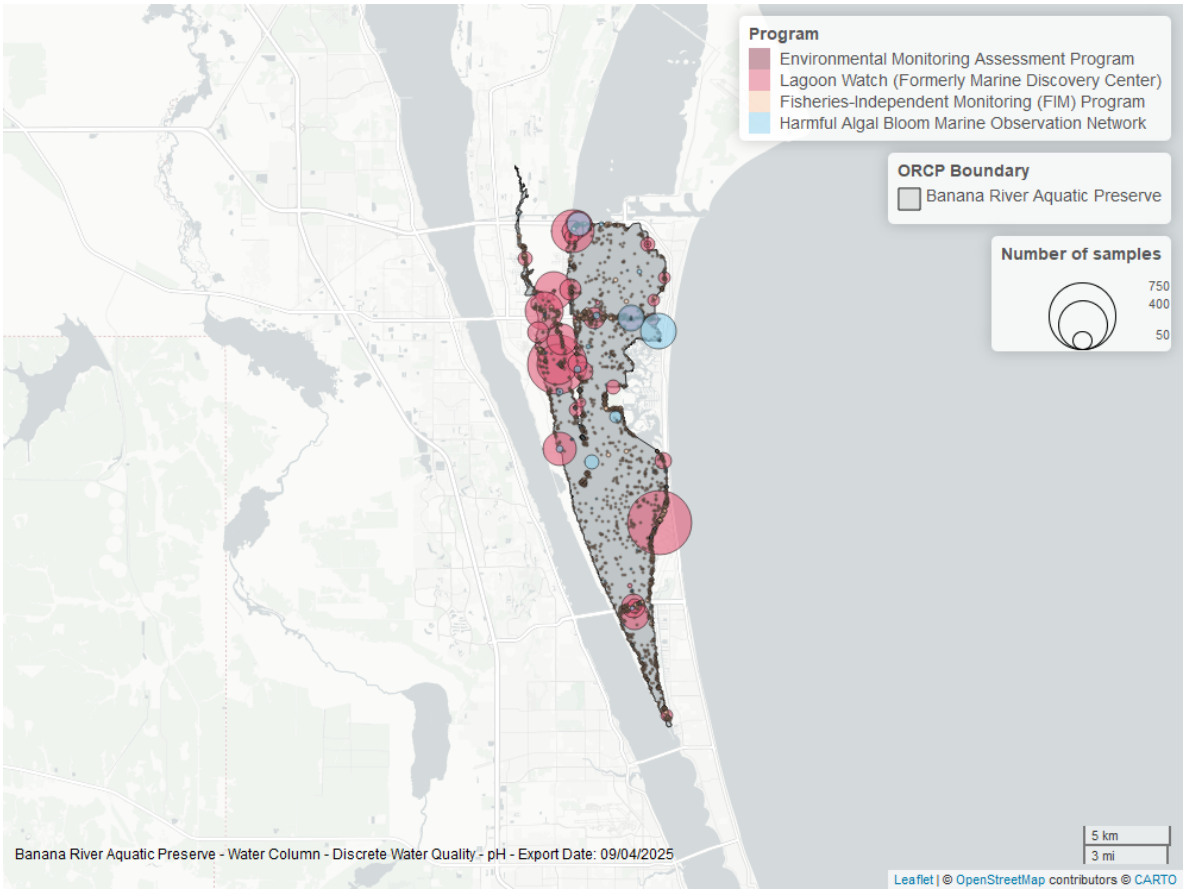

Figure 22: Map showing location of discrete water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

pH - Continuous

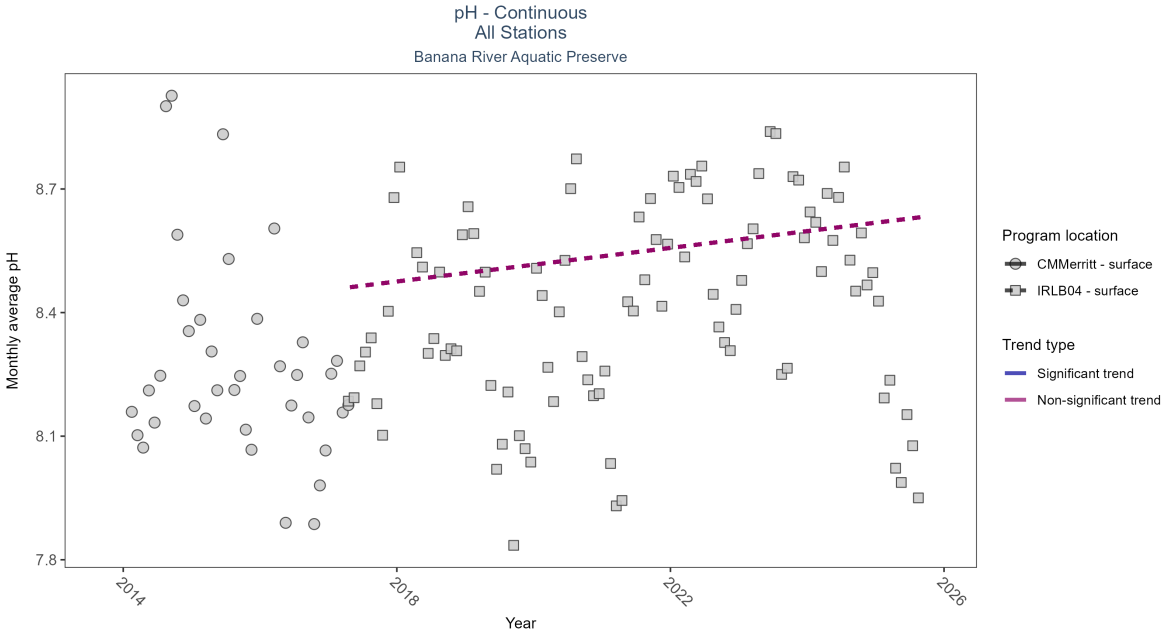

Figure 23: Scatter plot of monthly average pH over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
IRLB04	No significant trend	72757	9	2017 - 2025	8.45	0.1	8.46	0.02	0.2218
CMMerritt	Insufficient data to calculate trend	27417	4	2014 - 2017	8.22	-	-	-	-

No detectable change in monthly average pH was observed at one location. There was insufficient data to fit a model for one location.

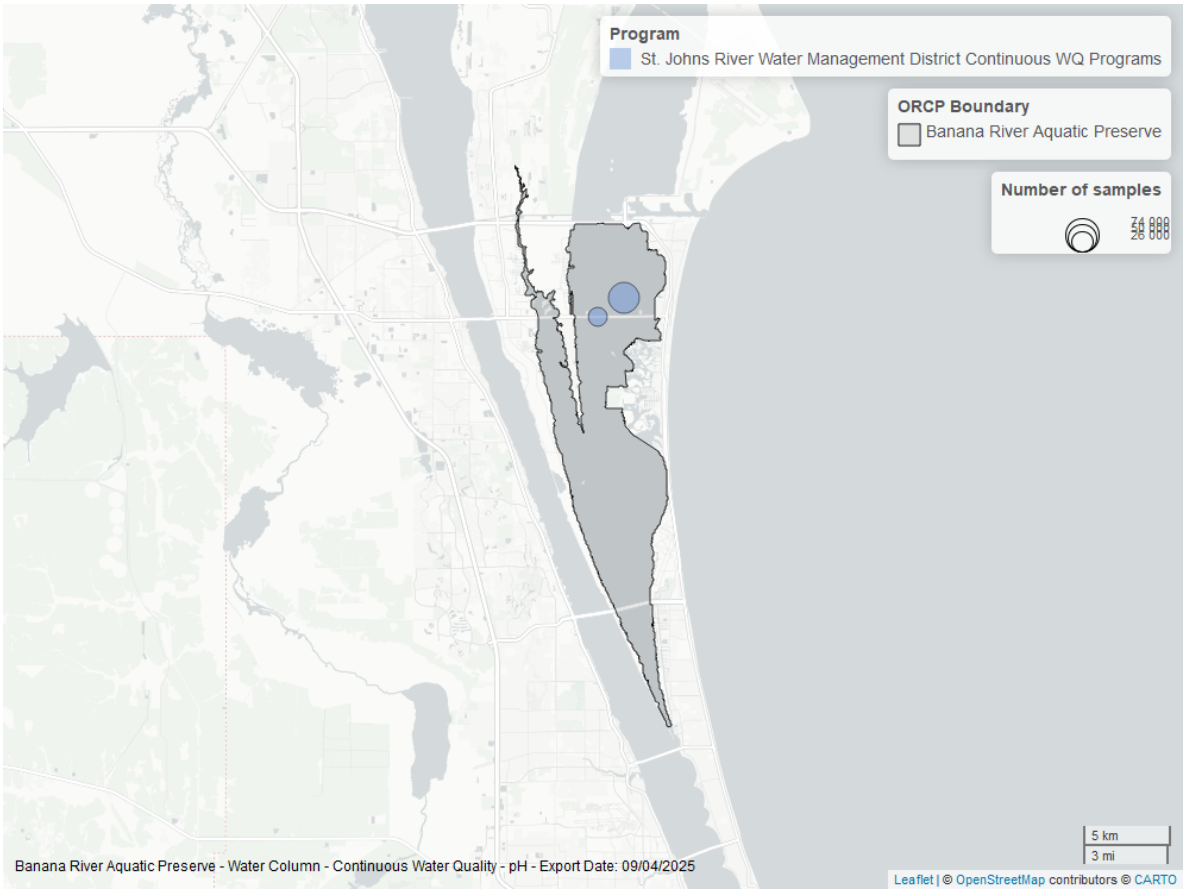

Figure 24: Map showing location of ph continuous water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Clarity

Turbidity - Discrete

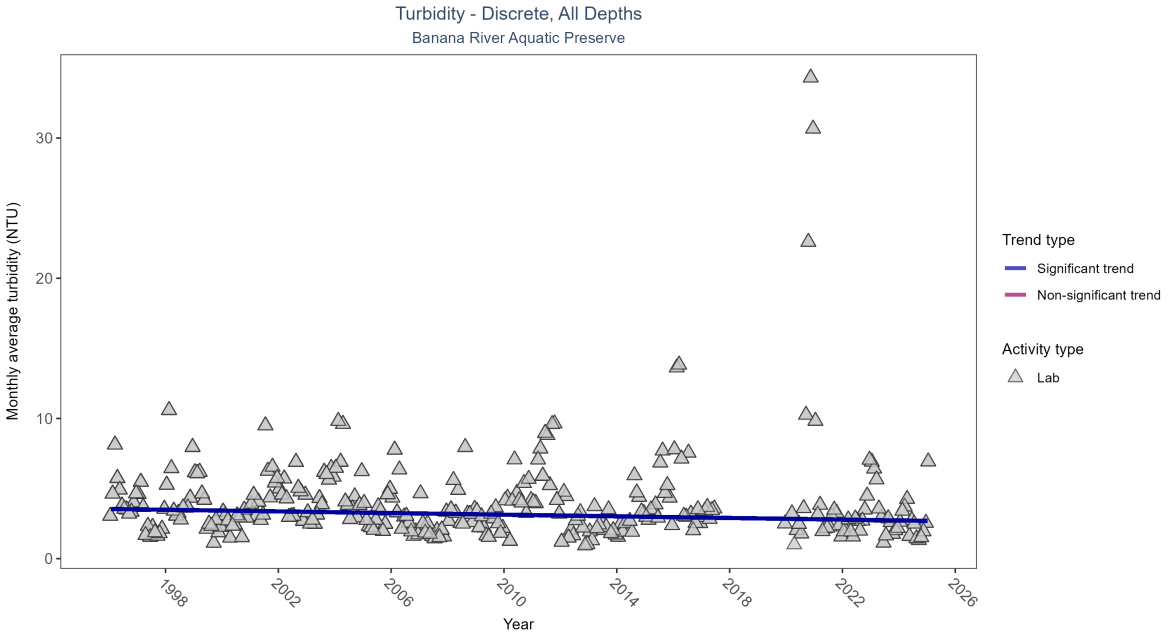

Figure 25: Scatter plot of monthly average turbidity over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only turbidity values measured in the laboratory (triangles) are included in the plot.

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 decreasing trend	13554	29	1996 - 2025	3.13495	-0.11733	3.54504	-0.0293	0.0032

Monthly average turbidity decreased by 0.03 NTU per year, indicating an increase in water clarity.

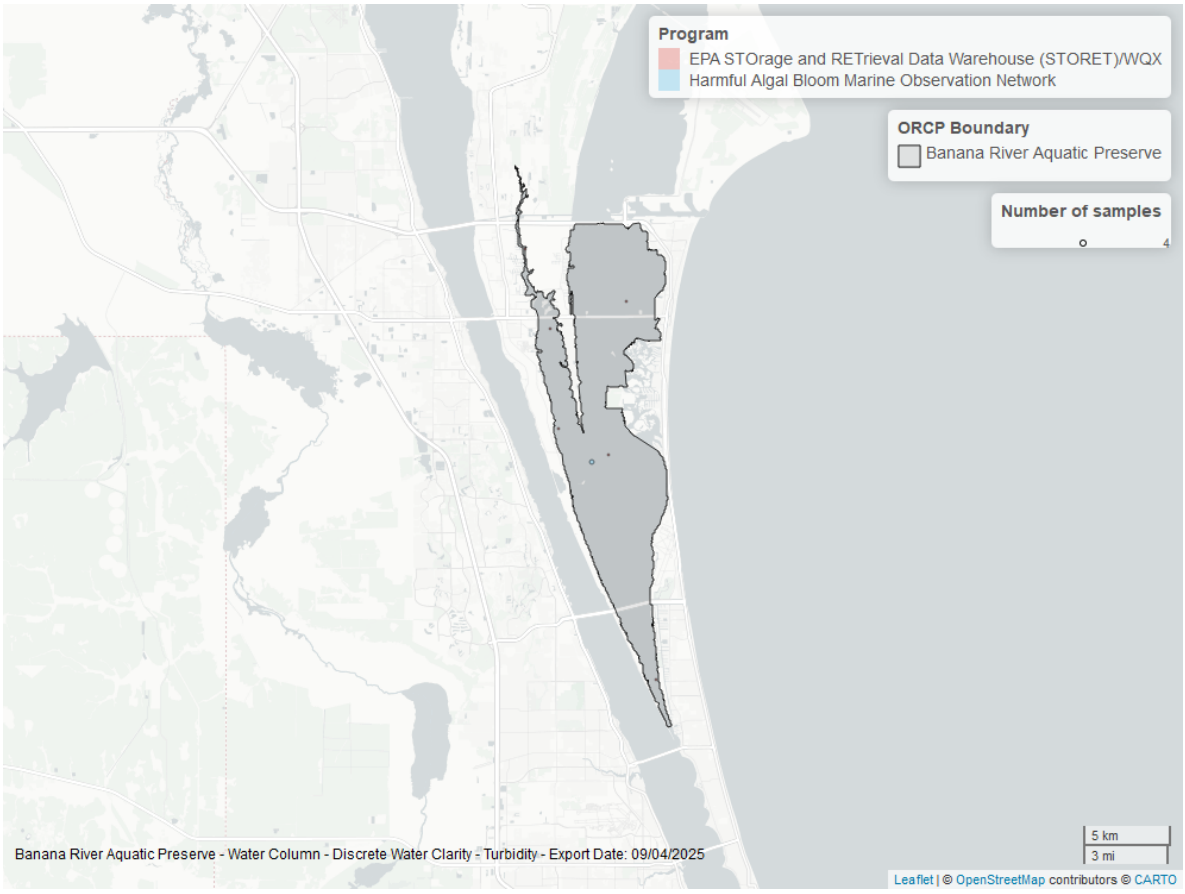

Figure 26: Map showing location of discrete water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Turbidity - Continuous

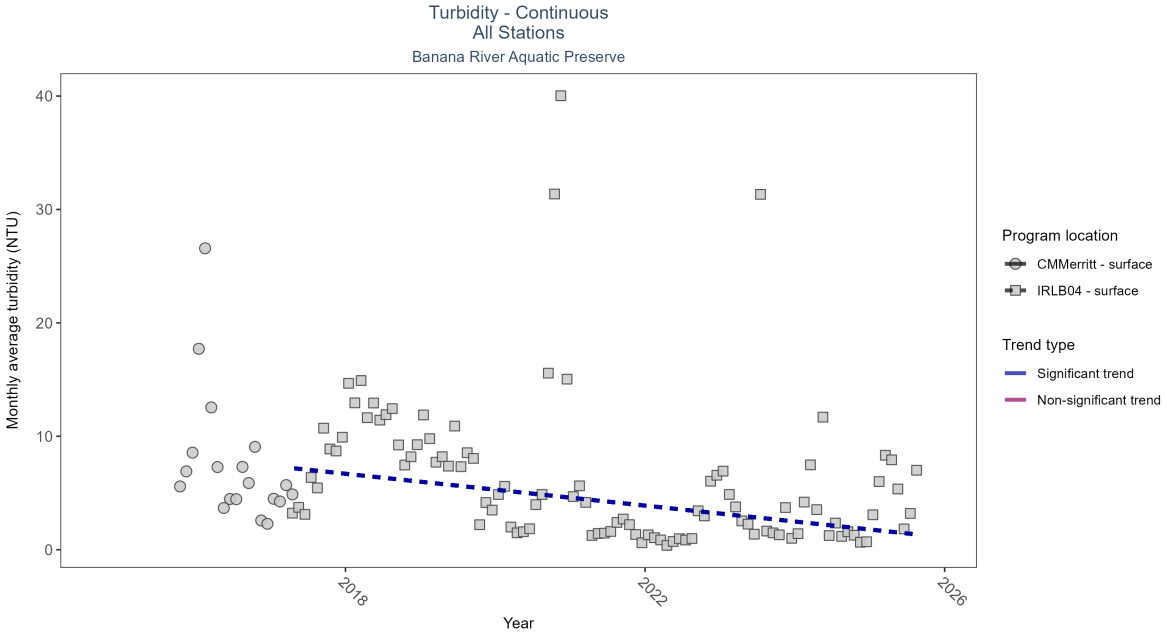

Figure 27: Scatter plot of monthly average turbidity over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
CMMerritt	Insufficient data to calculate trend	12912	3	2015 - 2017	5.29	-	-	-	-
IRLB04	Significantly decreasing trend	69928	9	2017 - 2025	3.15	-0.4	7.4	-0.7	0

At one program location, monthly average turbidity decreased by 0.70 NTU per year. There was insufficient data to fit a model for one location.

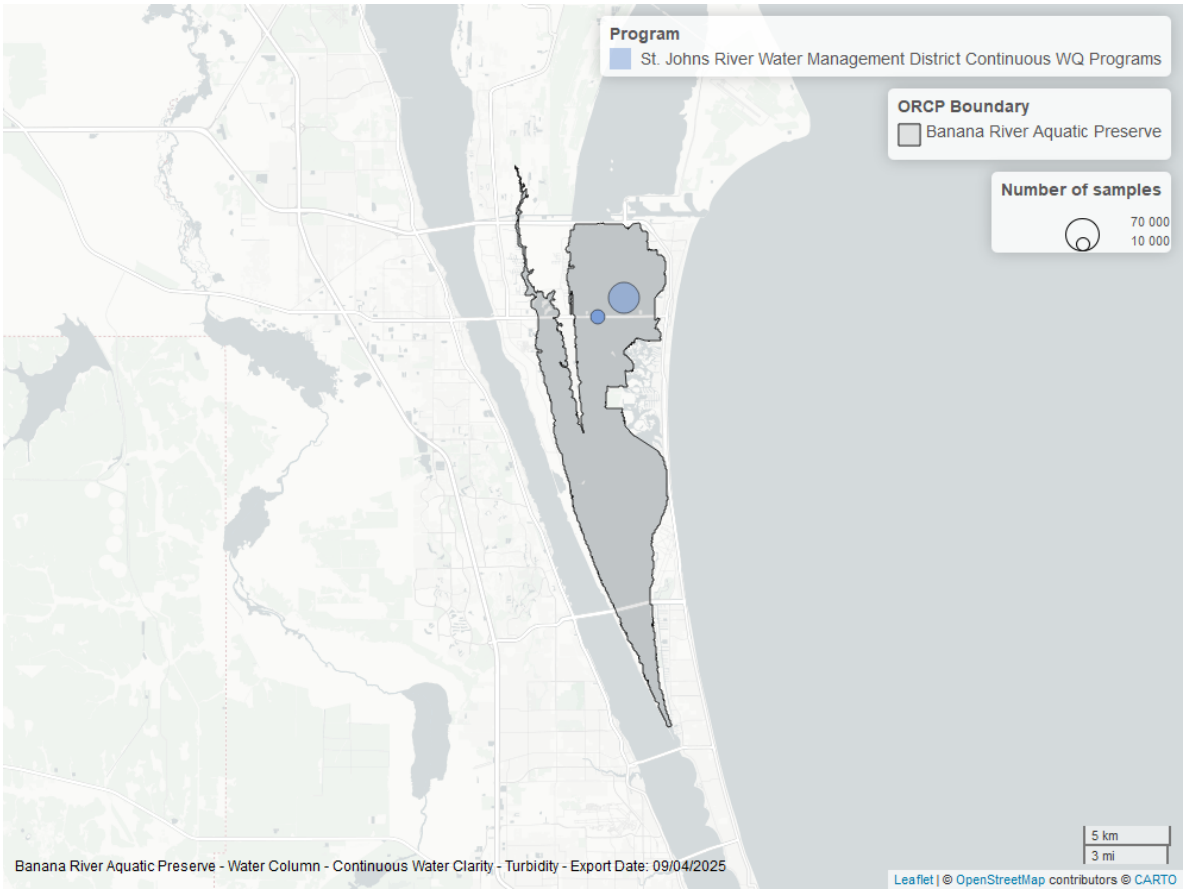

Figure 28: Map showing location of turbidity continuous water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Total Suspended Solids - Discrete

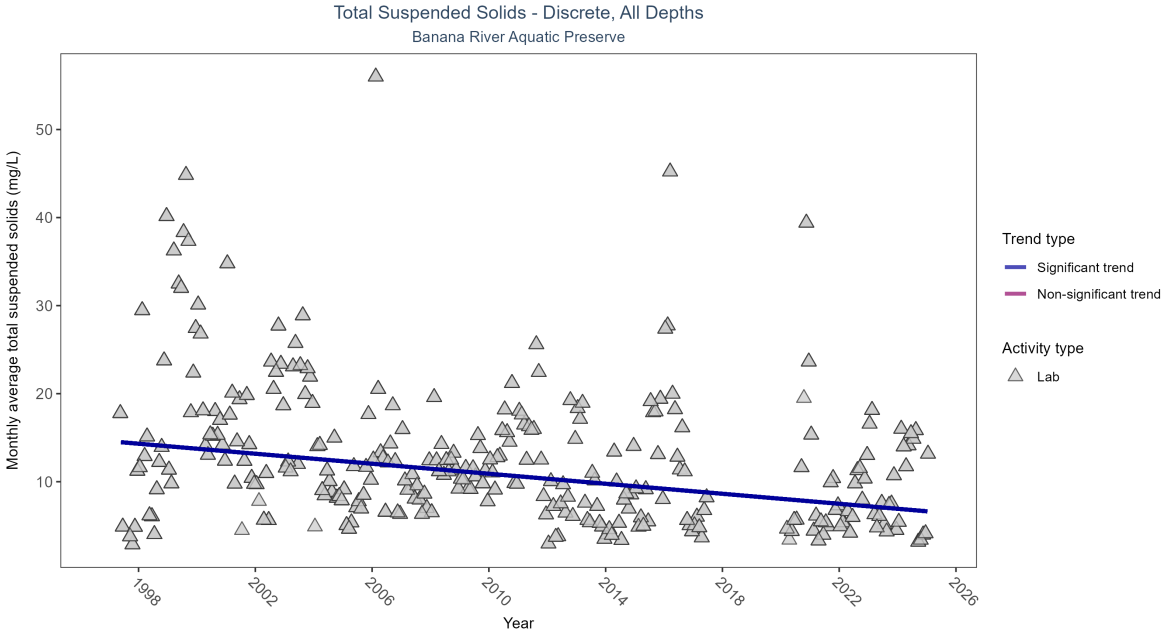

Figure 29: Scatter plot of monthly average total suspended solids (TSS) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only TSS values obtained from laboratory analyses (triangles) are included 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	Significantly decreasing trend	2535	27	1997 - 2025	10	-0.24876	14.59995	-0.28426	0

Monthly average total suspended solids decreased by 0.28 mg/L per year, indicating an increase in water clarity.

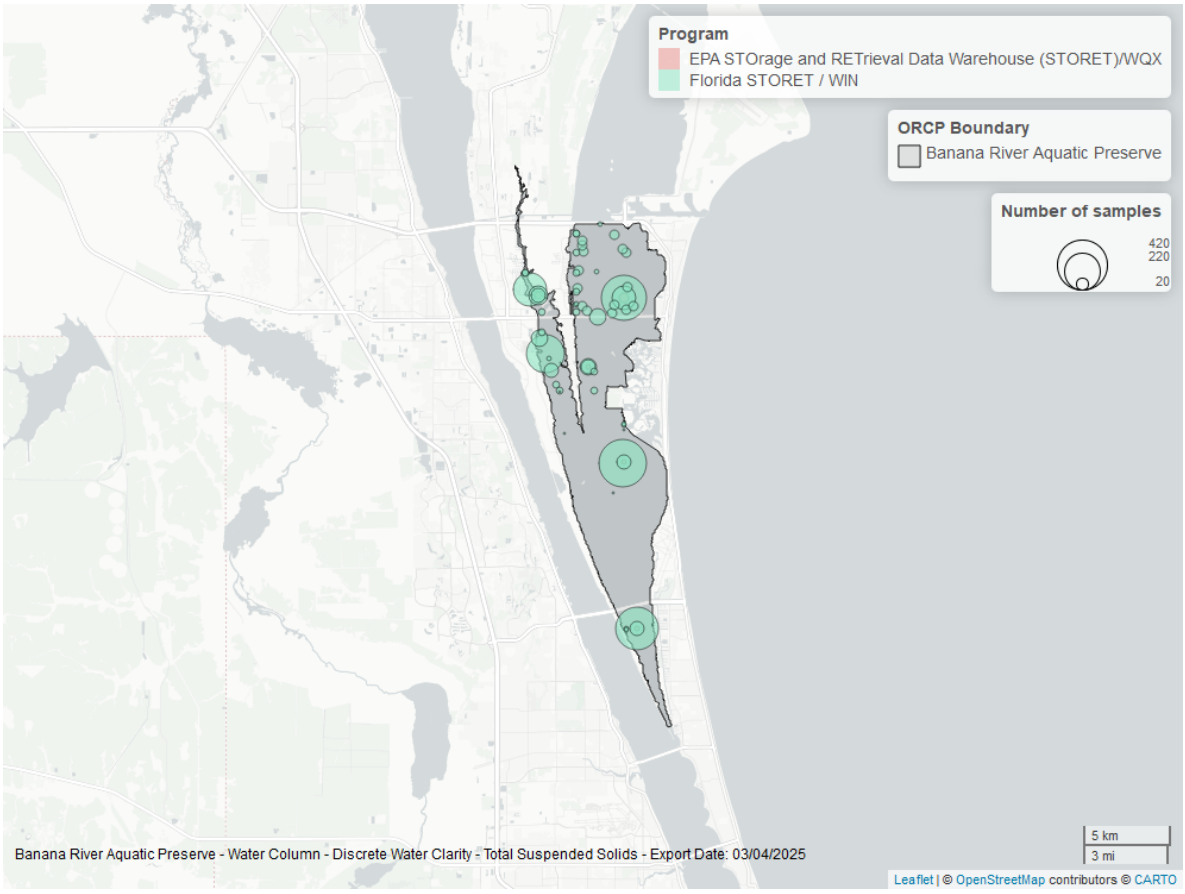

Figure 30: Map showing location of discrete water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Chlorophyll a, Uncorrected for Pheophytin - Discrete

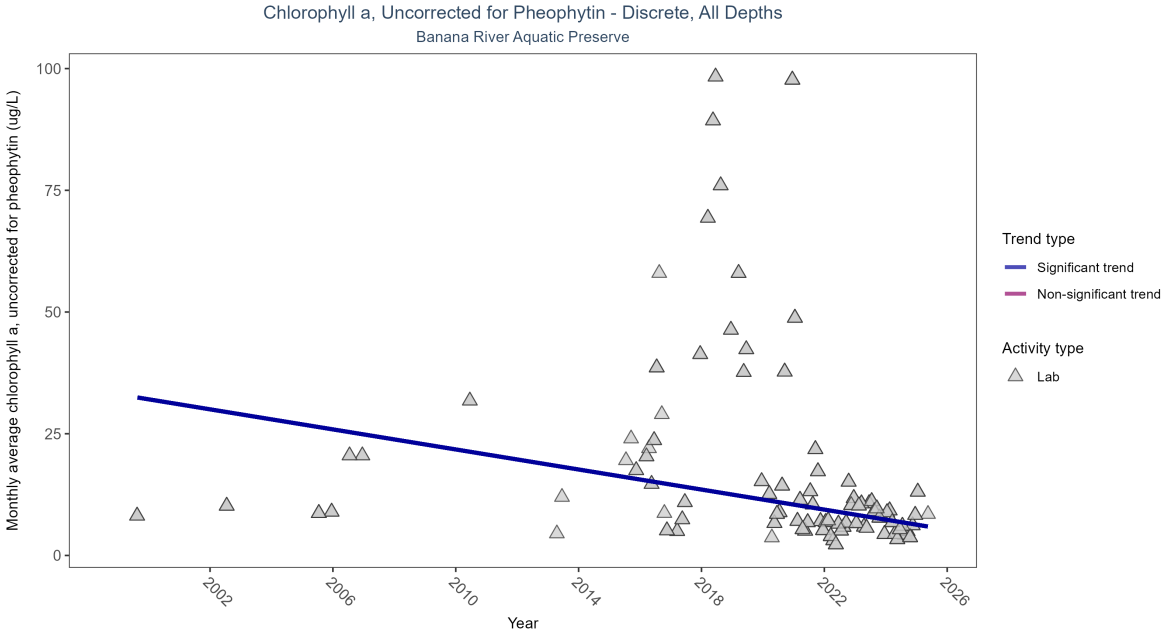

Figure 31: Scatter plot of monthly average levels of chlorophyll a, uncorrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) 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	Significantly decreasing trend	515	17	1999 - 2025	7.54771	-0.36164	33.10097	-1.02976	0

Monthly average chlorophyll a, uncorrected for pheophytin, decreased by 1.03 µg/L per year, indicating an increase in water clarity.

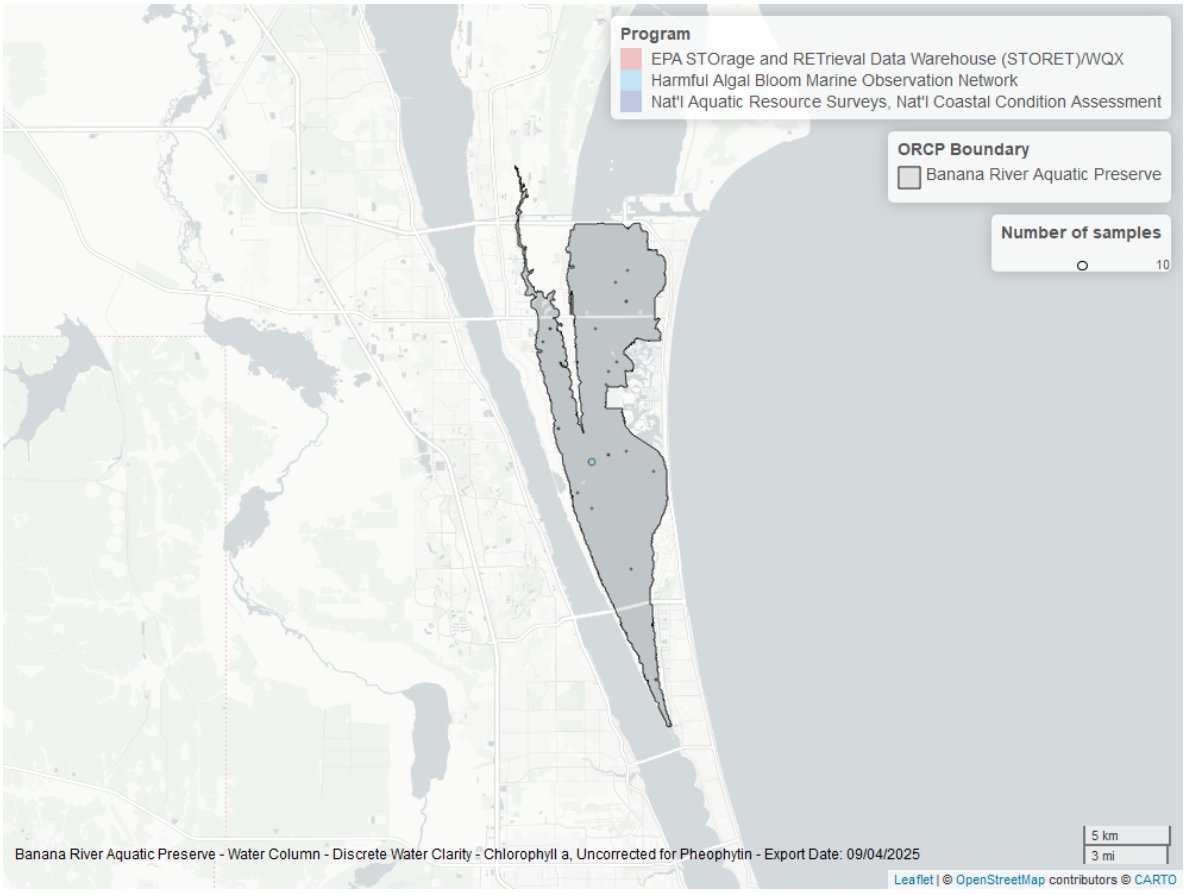

Figure 32: Map showing location of discrete water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Chlorophyll a, Corrected for Pheophytin - Discrete

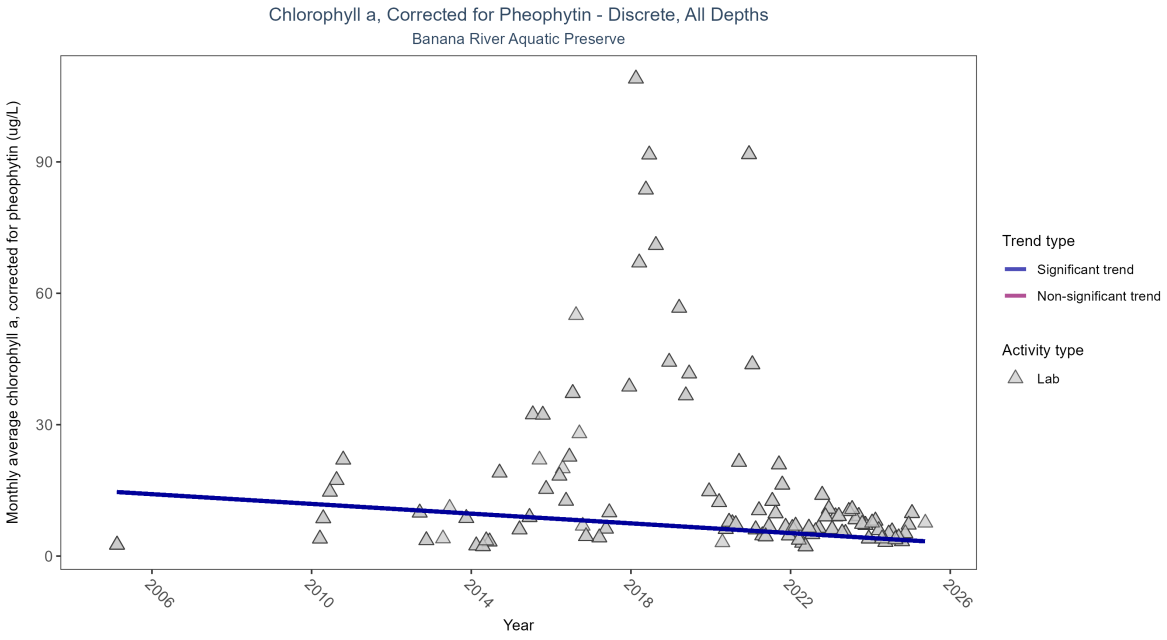

Figure 33: Scatter plot of monthly average levels of chlorophyll a, corrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) 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 decreasing trend	552	16	2005 - 2025	6.4347	-0.23722	14.68847	-0.55556	0.0035

Monthly average chlorophyll a, corrected for pheophytin, decreased by 0.56 µg/L per year, indicating an increase in water clarity.

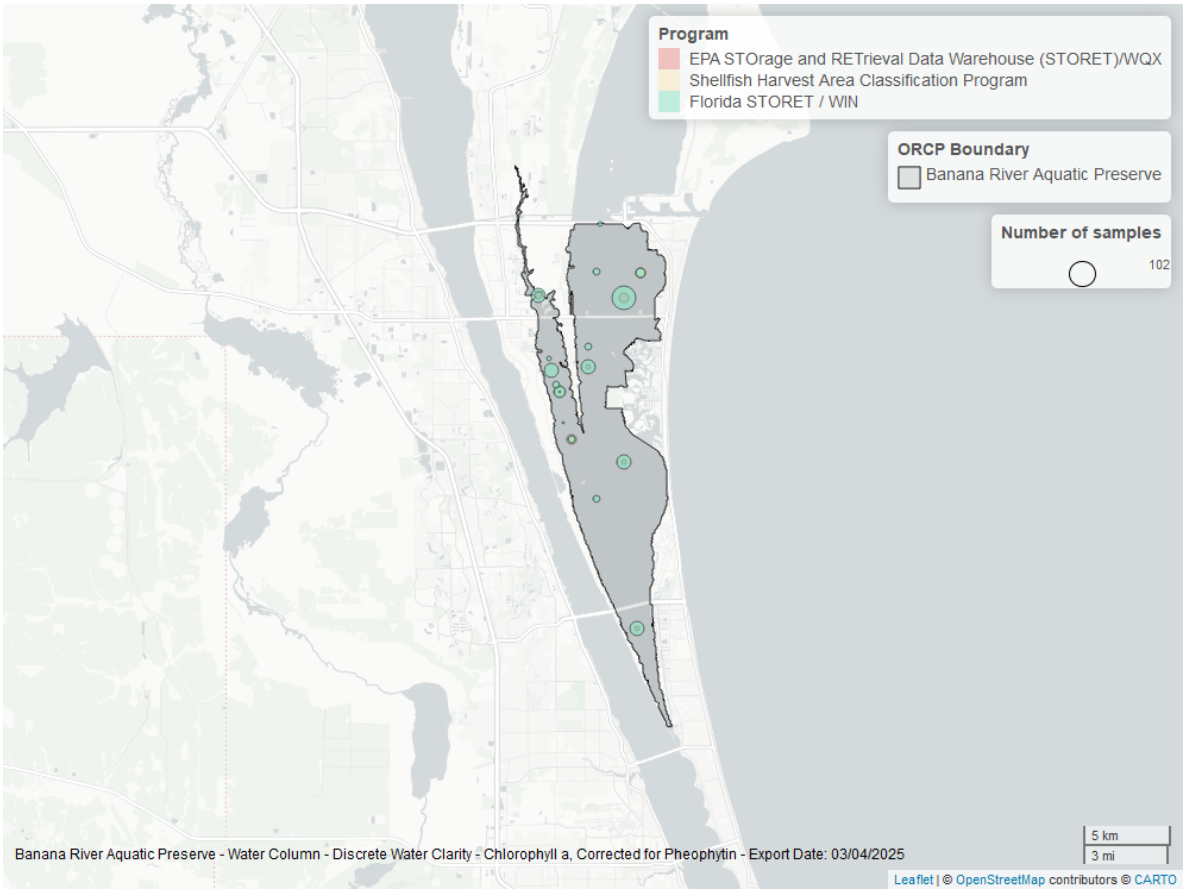

Figure 34: Map showing location of discrete water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Secchi Depth - Discrete

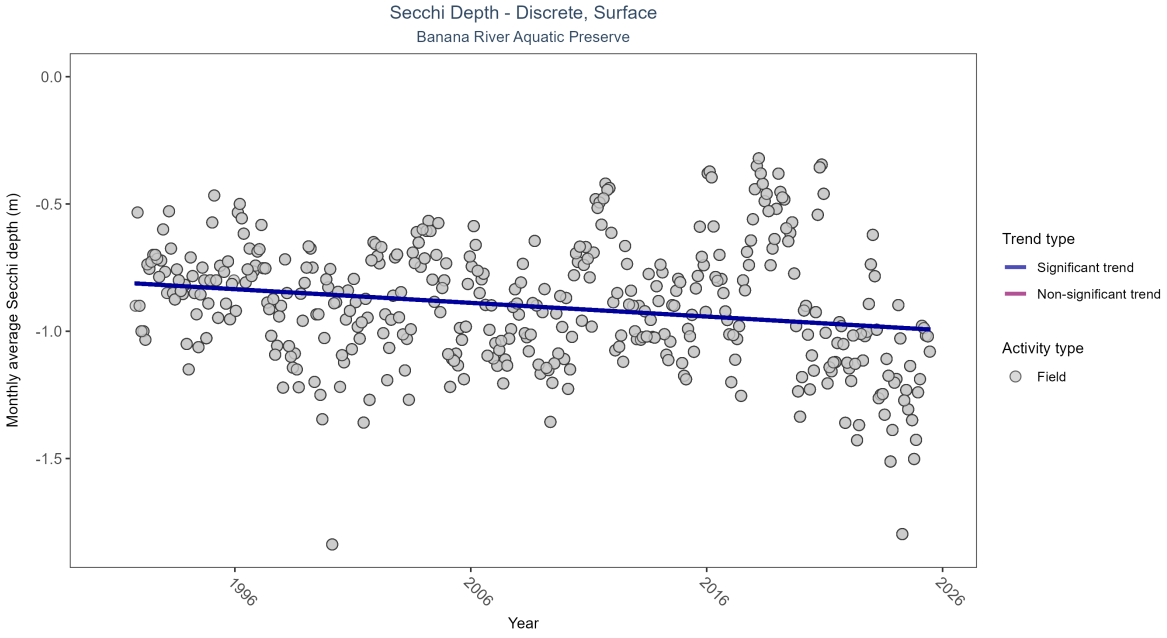

Figure 35: Scatter plot of monthly average Secchi depth over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Secchi depth is only measured in the field (circles).

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 decreasing trend	9199	35	1991 - 2025	-0.9	-0.13314	-0.80784	-0.00538	1e-04

Monthly average Secchi depth became deeper by 0.01 m per year, indicating an increase in water clarity.

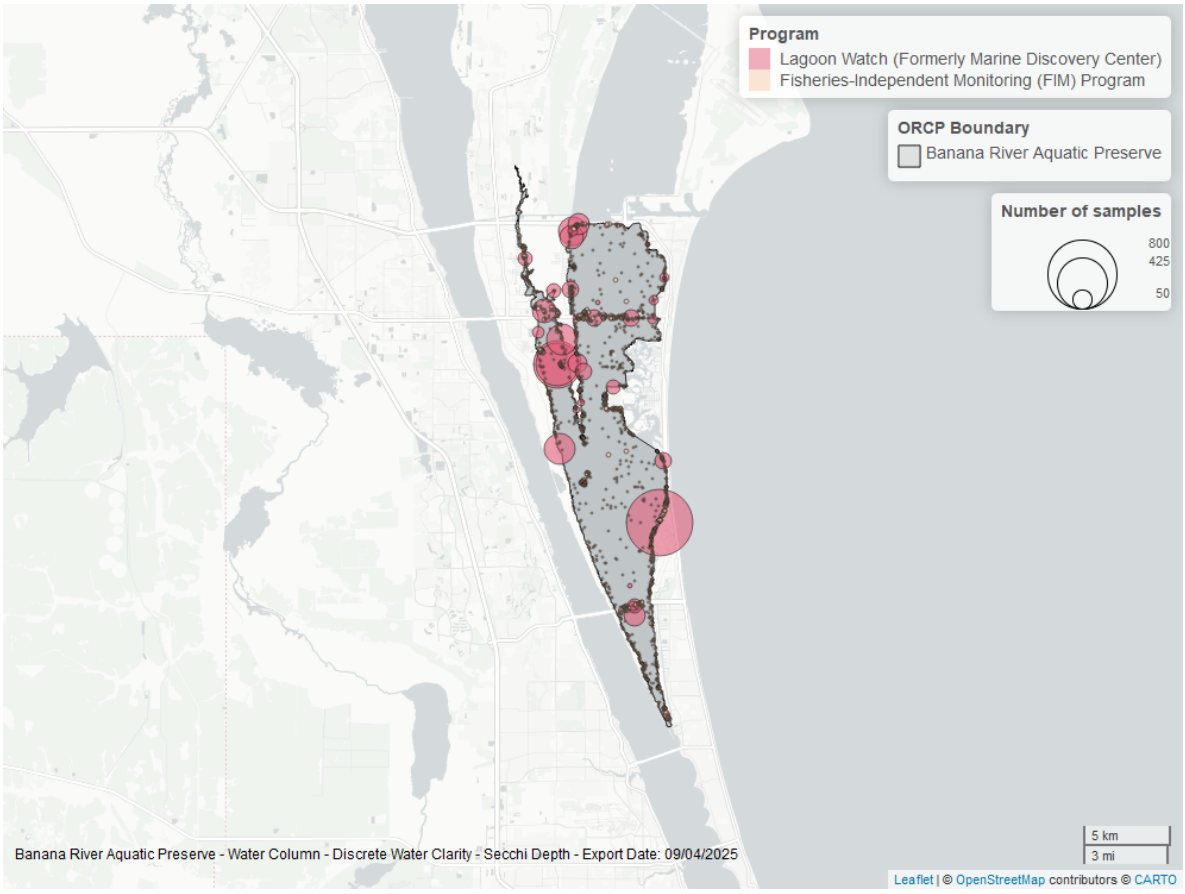

Figure 36: Map showing location of discrete water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Colored Dissolved Organic Matter - Discrete

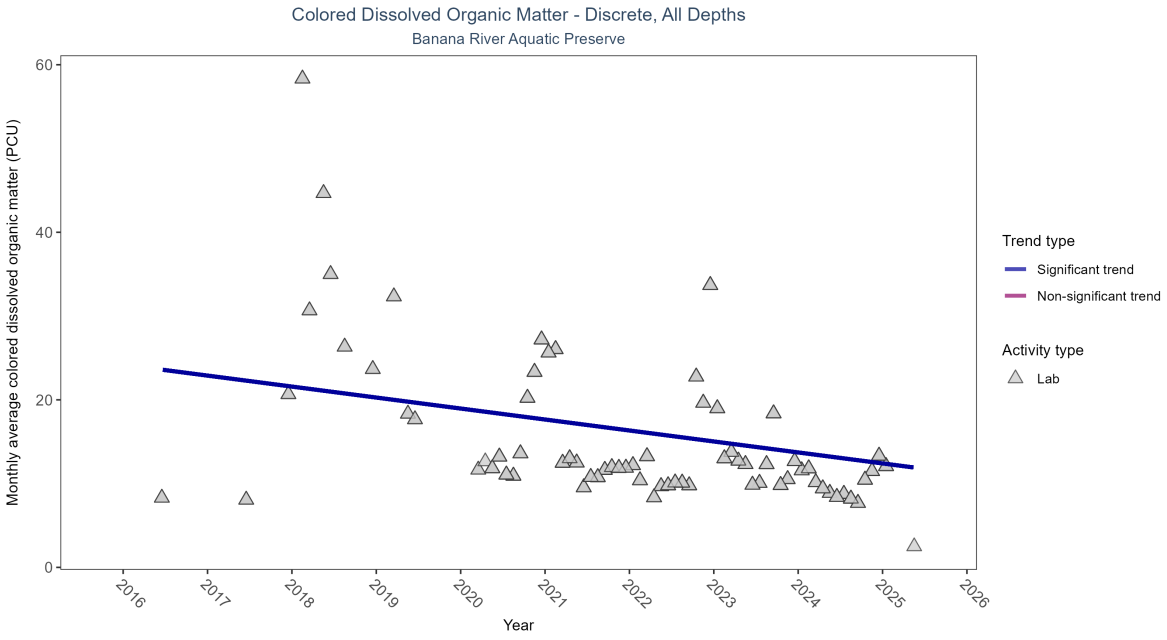

Figure 37: Scatter plot of monthly average colored dissolved organic matter (CDOM) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed CDOM (triangles) is included in the 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	Significantly decreasing trend	452	10	2016 - 2025	11.36054	-0.44517	24.20223	-1.31023	1e-04

Monthly average colored dissolved organic matter decreased by 1.31 PCU per year, indicating an increase in water clarity.

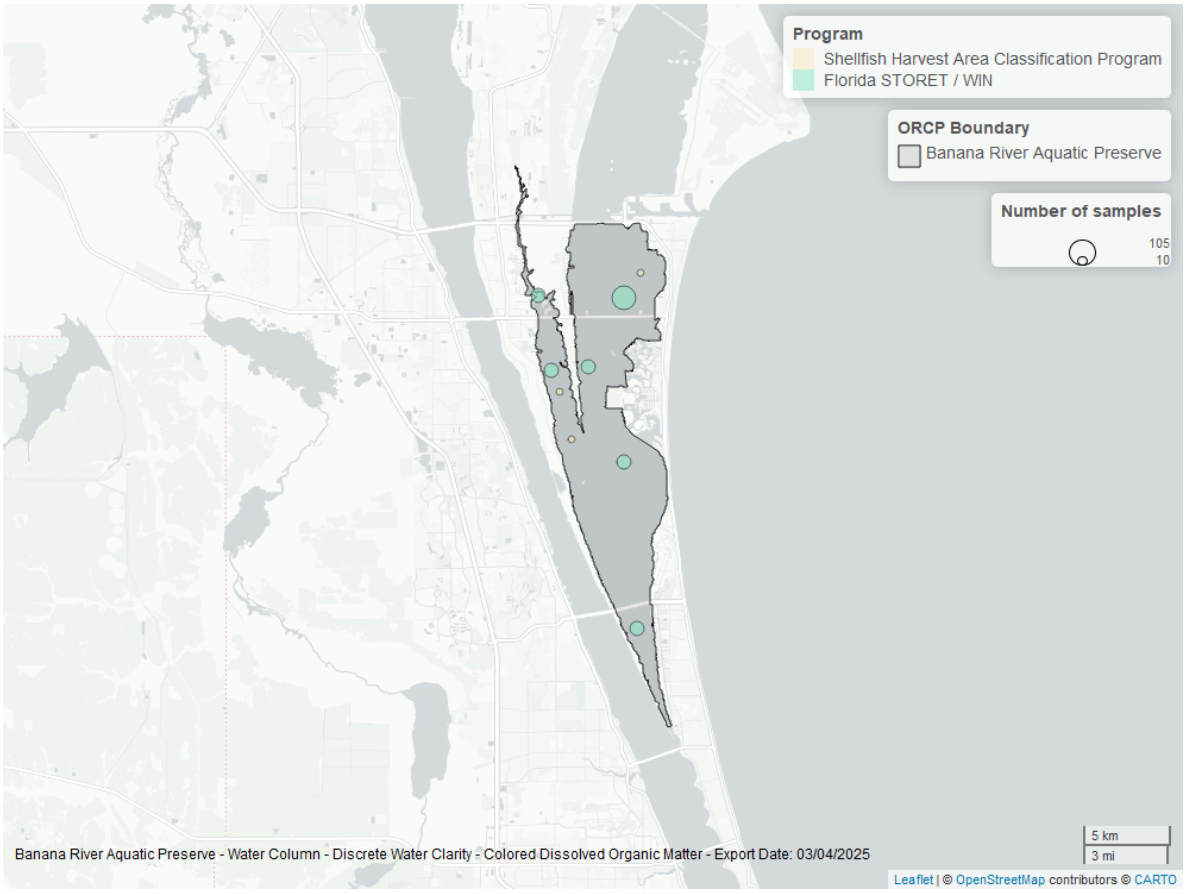

Figure 38: Map showing location of discrete water quality sampling locations within the boundaries of *Banana River Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.