Biscayne Bay Aquatic Preserve

SEACAR Water Quality Analysis

Last compiled on 30 September, 2025

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Indicators

Nutrients

Total Nitrogen - Discrete

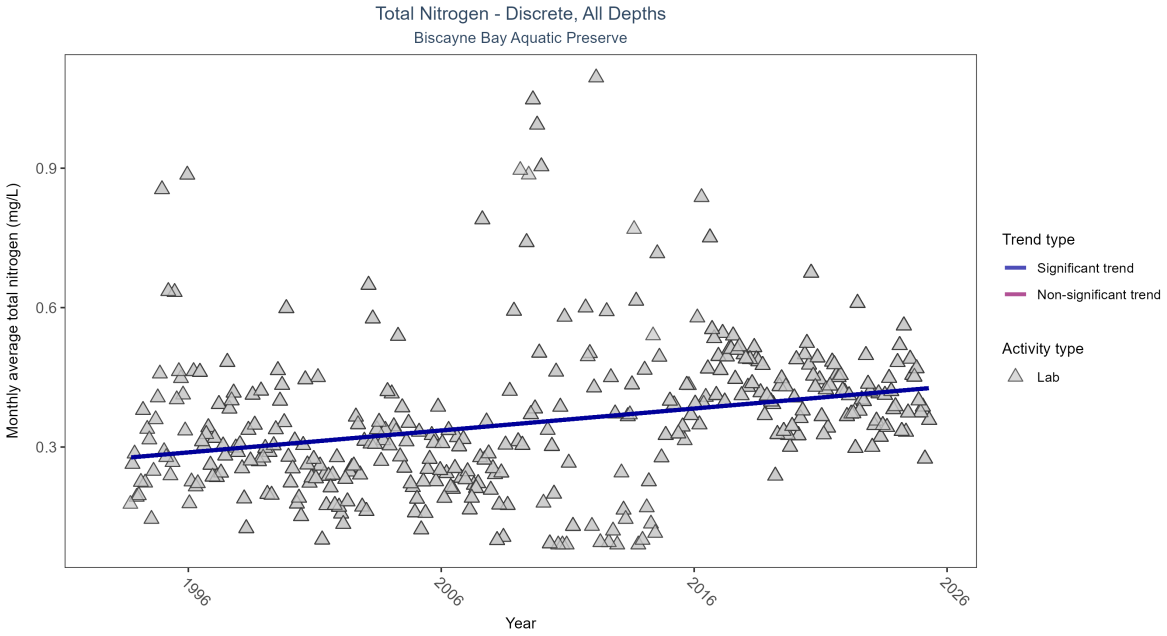

Figure 1: Scatter plot of monthly average total nitrogen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only nitrogen values obtained from laboratory analyses (triangles) are included in the 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	Significantly increasing trend	8525	33	1993 - 2025	0.333	0.23314	0.27424	0.00472	0

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

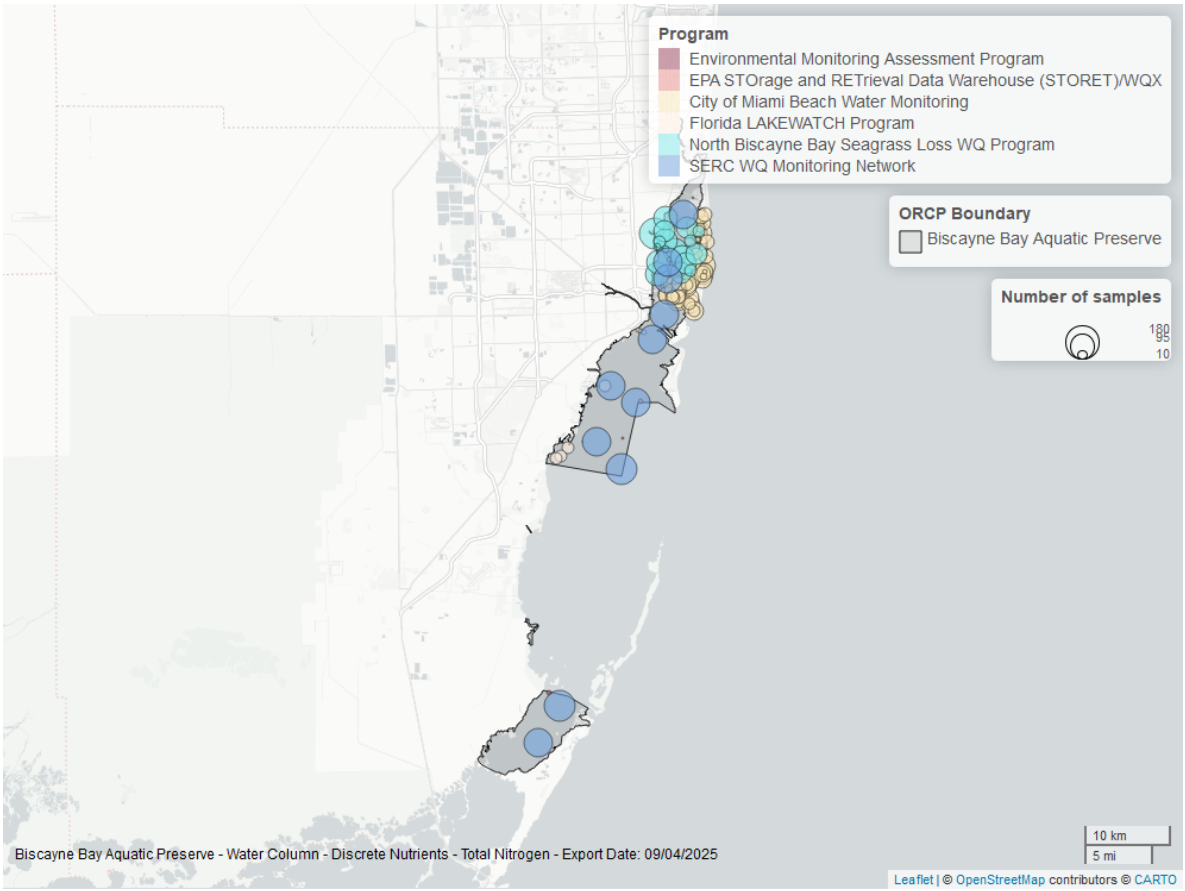

Figure 2: Map showing location of discrete water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Total Phosphorus - Discrete

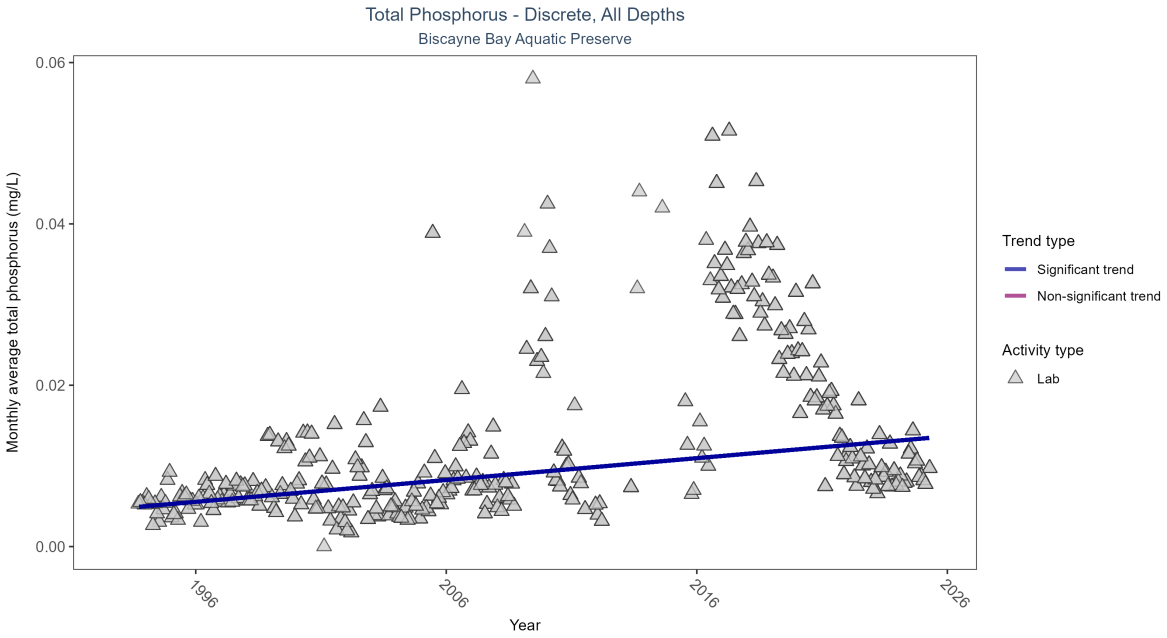

Figure 3: Scatter plot of monthly average total phosphorus over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only phosphorus values obtained from laboratory analyses (triangles) are included in 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	8640	33	1993 - 2025	0.009	0.37605	0.00473	0.00027	0

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

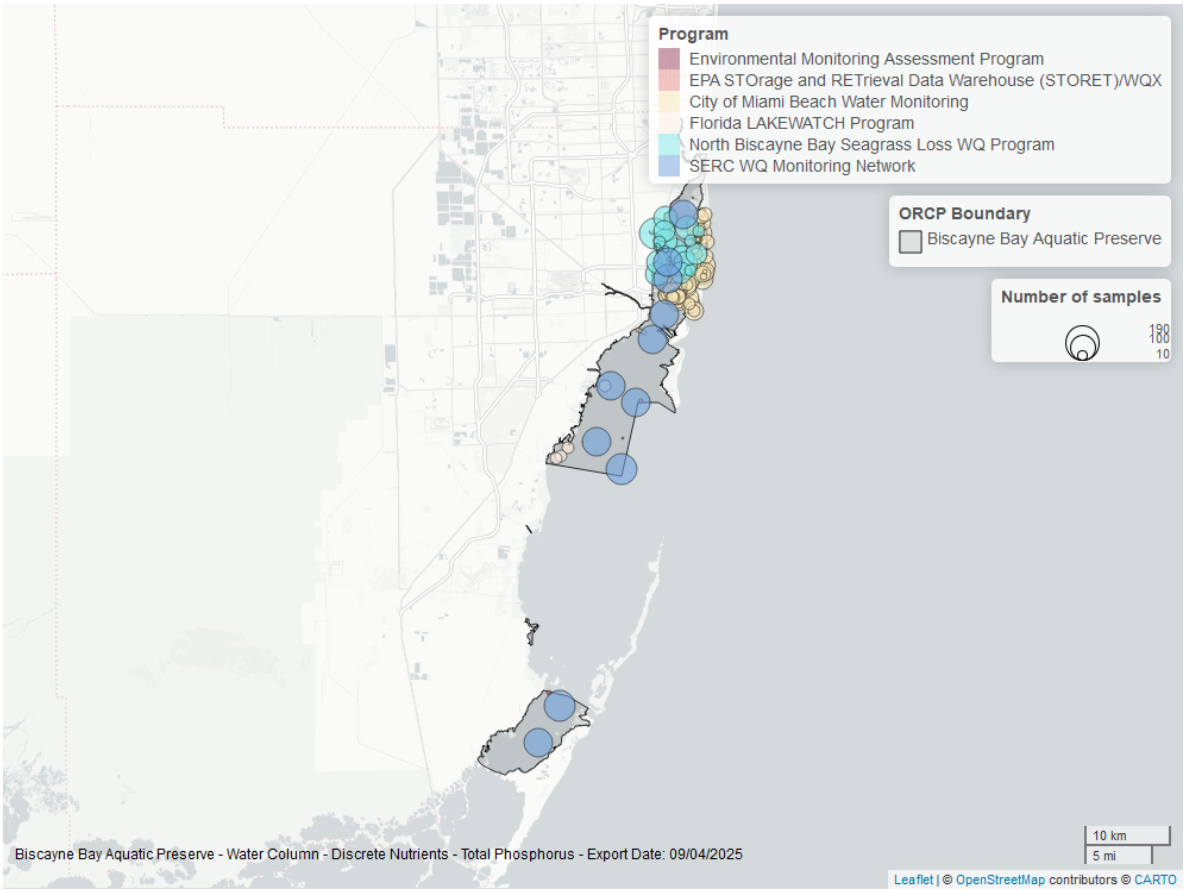

Figure 4: Map showing location of discrete water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Quality

Dissolved Oxygen - Discrete

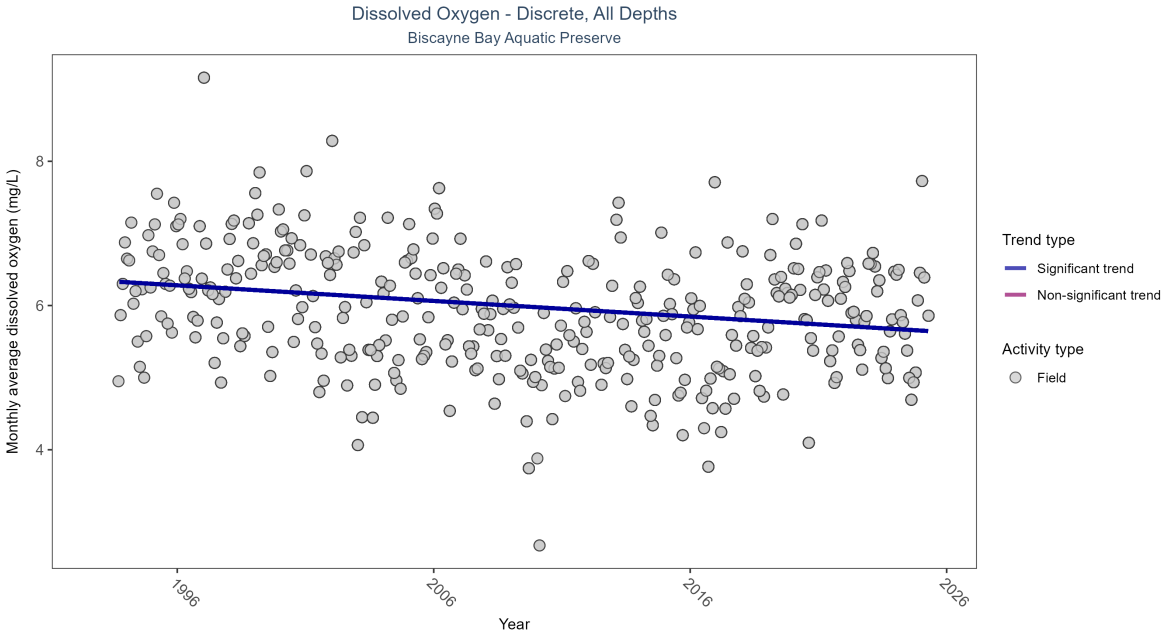

Figure 5: Scatter plot of monthly average dissolved oxygen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen values measured in the field (circles) are included in the plot.

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	21565	33	1993 - 2025	5.99	-0.25865	6.34488	-0.02164	0

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

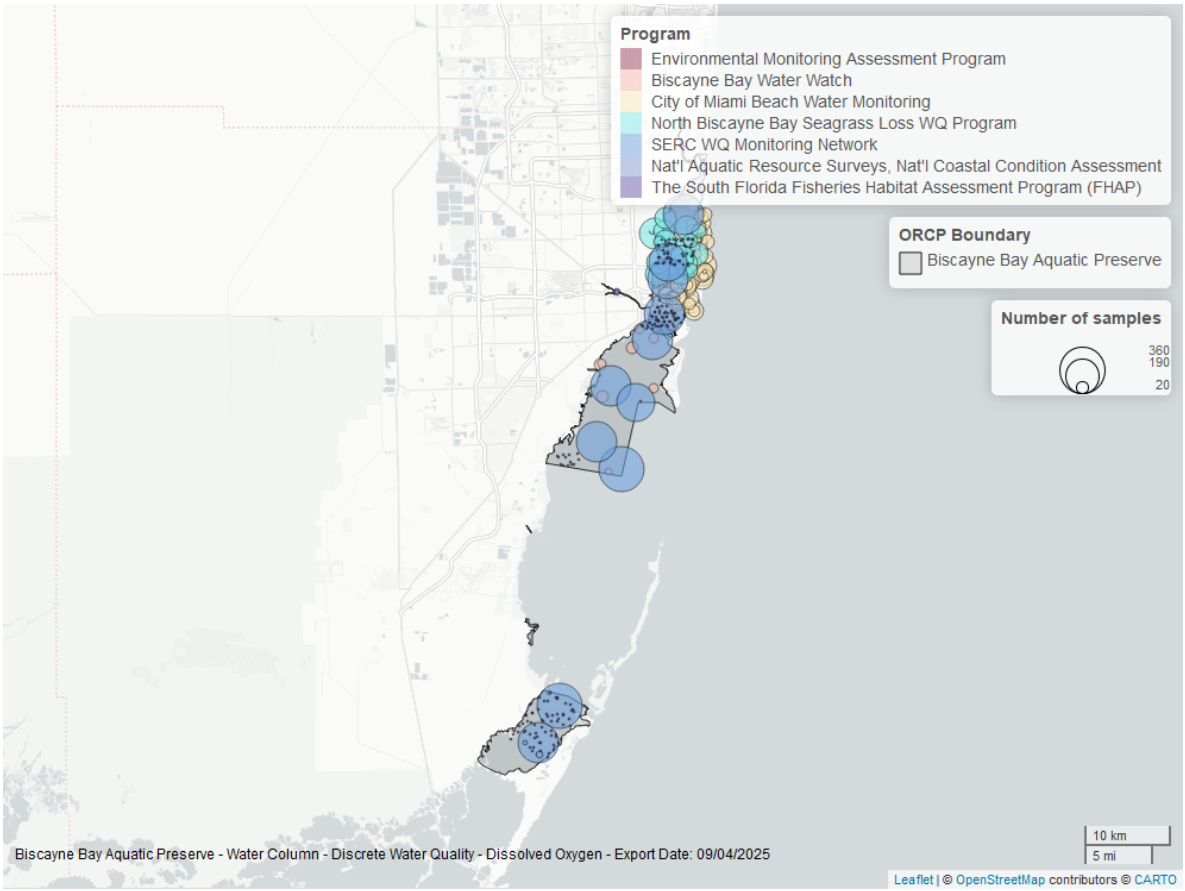

Figure 6: Map showing location of discrete water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen - Continuous

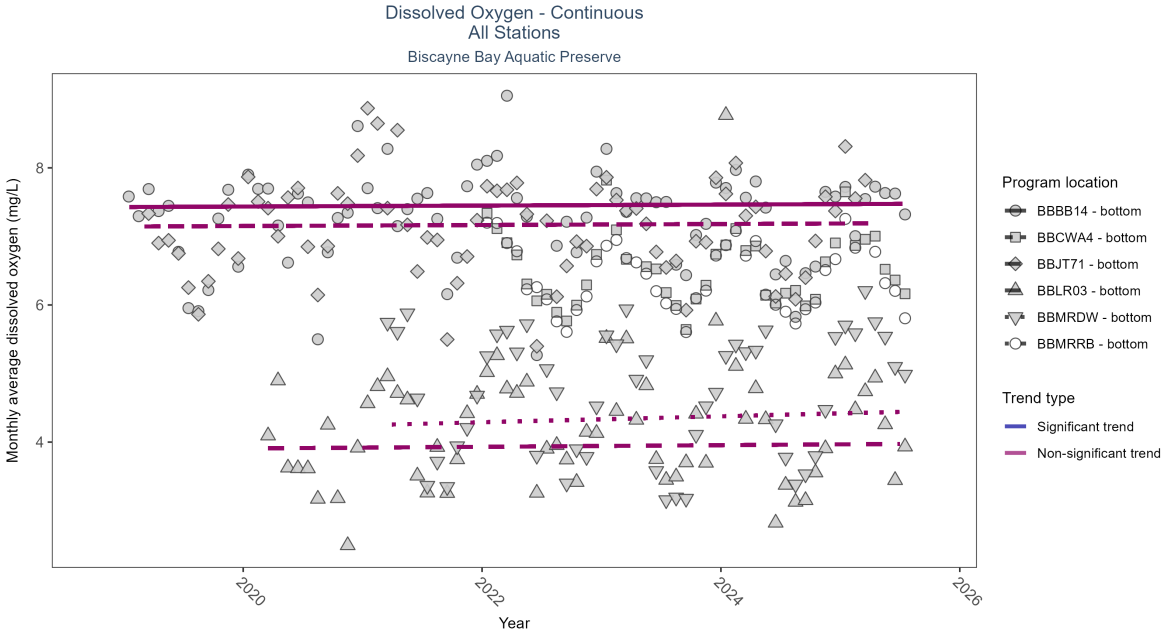

Figure 7: Scatter plot of monthly average dissolved oxygen over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
BBBB14	No significant trend	200944	7	2019 - 2025	7.2	0.03	7.43	0.01	0.6665
BBCWA4	Insufficient data to calculate trend	108422	4	2022 - 2025	6.5	-	-	-	-
BBLR03	No significant trend	171094	6	2020 - 2025	4.2	0.05	3.91	0.01	0.7089
BBJT71	No significant trend	207039	7	2019 - 2025	7.0	0.06	7.14	0.01	0.5599
BBMRRB	Insufficient data to calculate trend	112164	4	2022 - 2025	6.4	-	-	-	-
BBMRDW	No significant trend	142811	5	2021 - 2025	4.8	0.12	4.25	0.04	0.4533

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

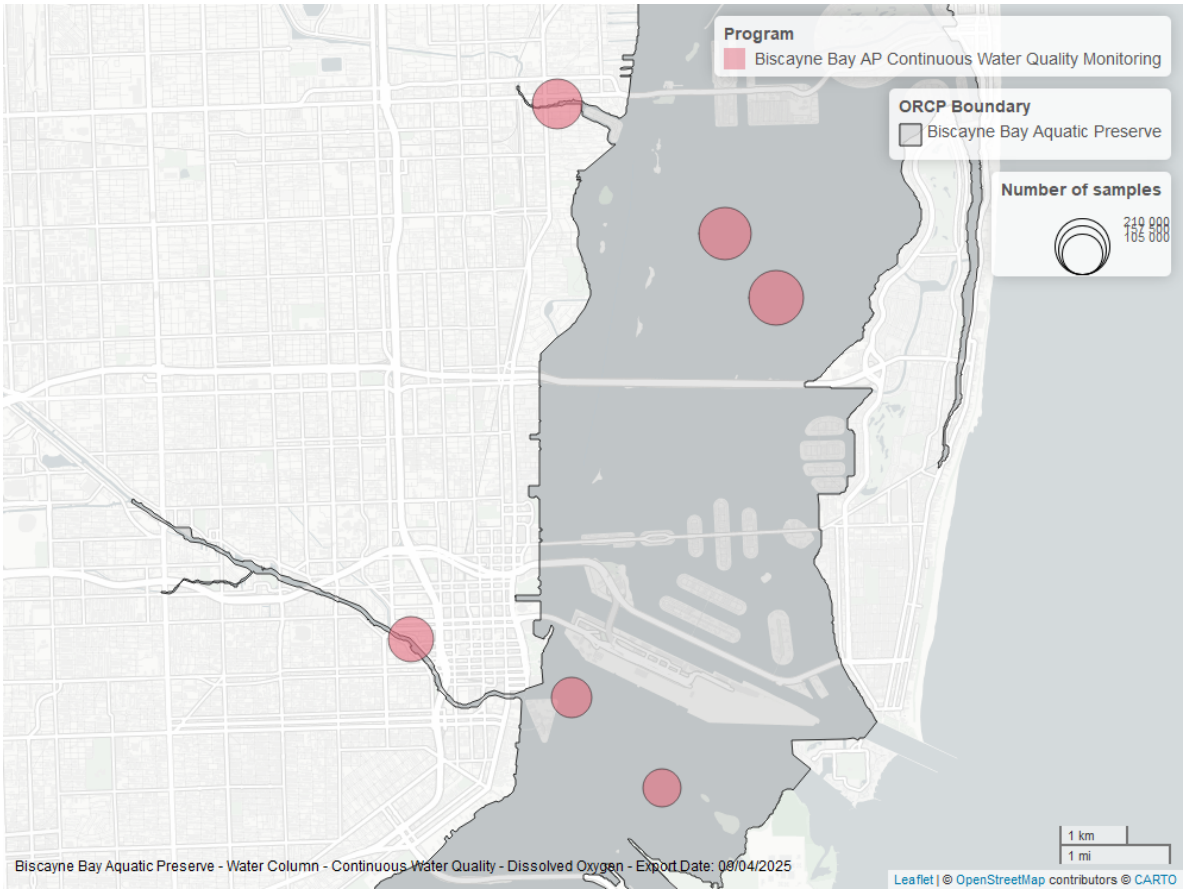

Figure 8: Map showing location of dissolved oxygen continuous water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen Saturation - Discrete

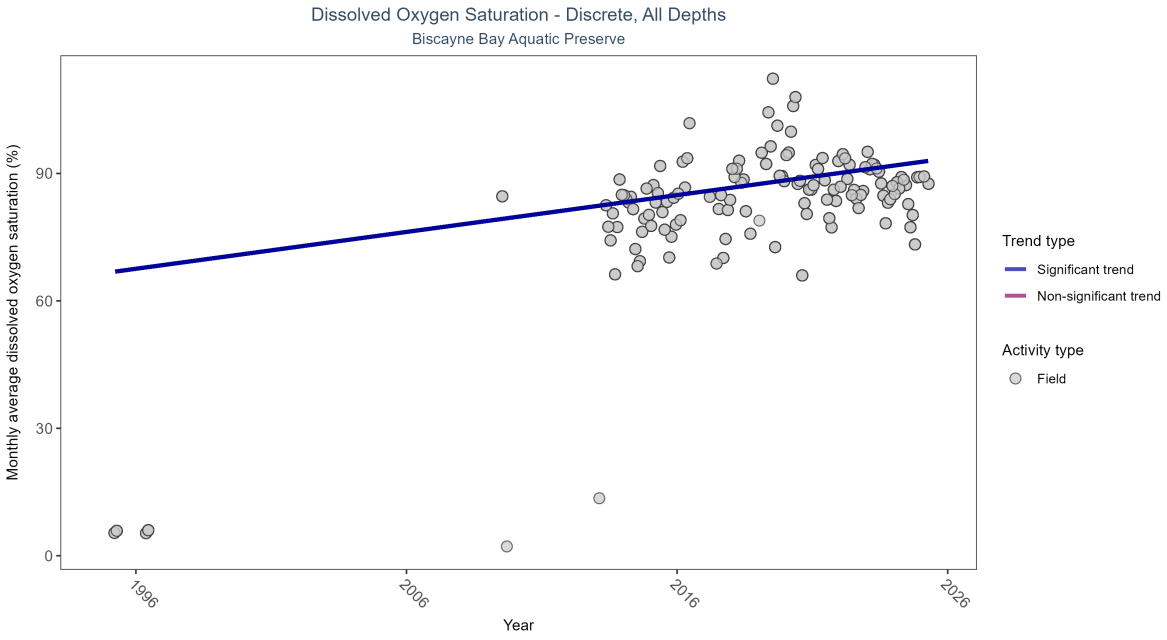

Figure 9: Scatter plot of monthly average dissolved oxygen saturation over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen saturation values measured in the field (circles) 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	10503	16	1995 - 2025	90.4	0.31216	66.69452	0.86708	0

Monthly average dissolved oxygen saturation increased by 0.87% per year.

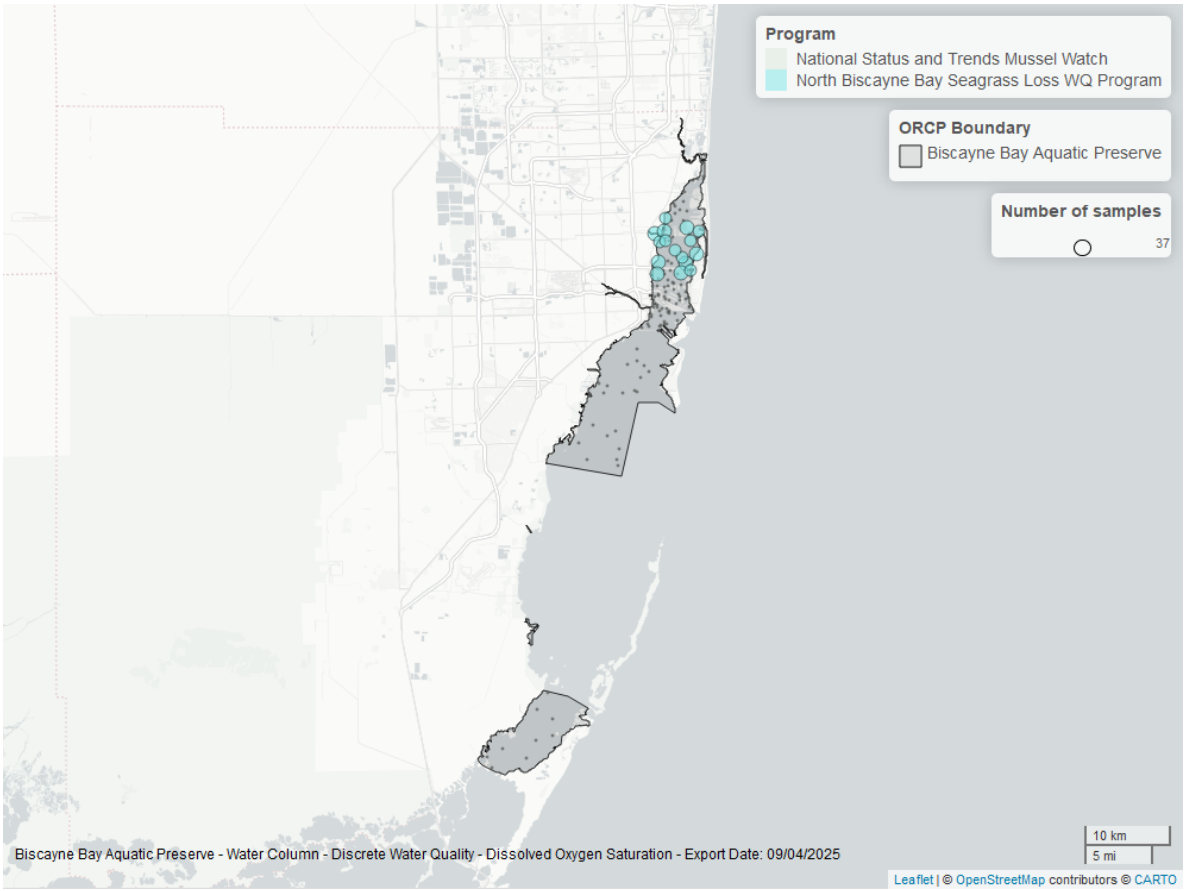

Figure 10: Map showing location of discrete water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen Saturation - Continuous

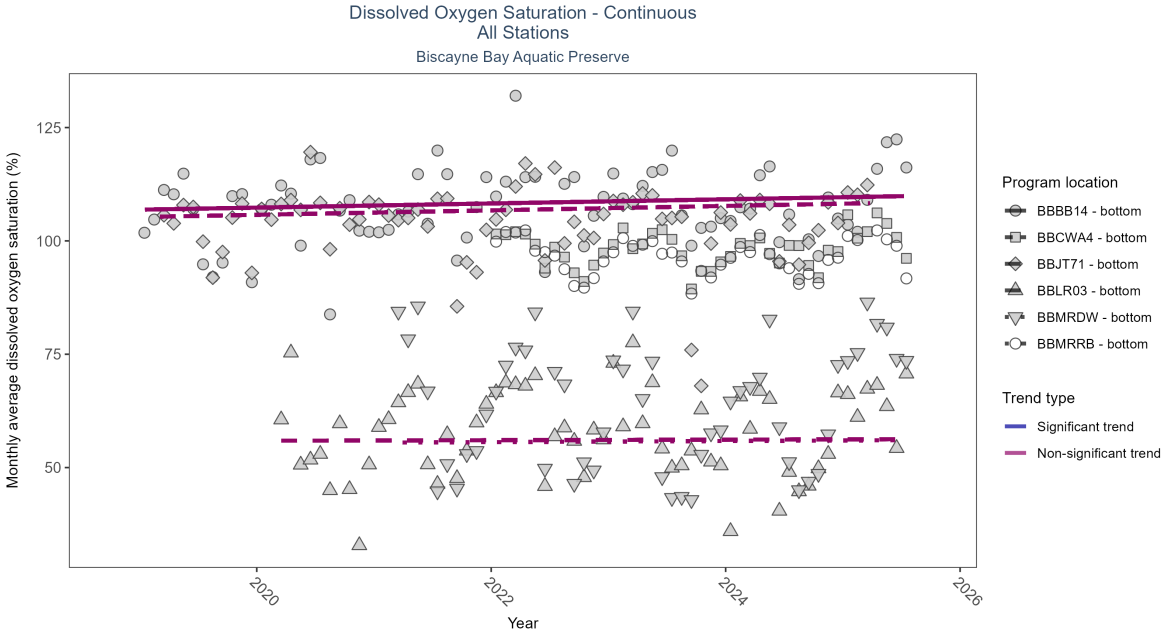

Figure 11: Scatter plot of monthly average dissolved oxygen saturation over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
BBBB14	No significant trend	200684	7	2019 - 2025	104.9	0.1	106.88	0.46	0.2707
BBCWA4	Insufficient data to calculate trend	112145	4	2022 - 2025	97.8	-	-	-	-
BBJT71	No significant trend	208190	7	2019 - 2025	102.0	0.13	105.26	0.49	0.1852
BBLR03	No significant trend	171093	6	2020 - 2025	58.0	0.02	55.91	0.06	0.901
BBMRDW	No significant trend	142812	5	2021 - 2025	62.6	0.02	55.49	0.12	0.9336
BBMRRB	Insufficient data to calculate trend	112172	4	2022 - 2025	96.0	-	-	-	-

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

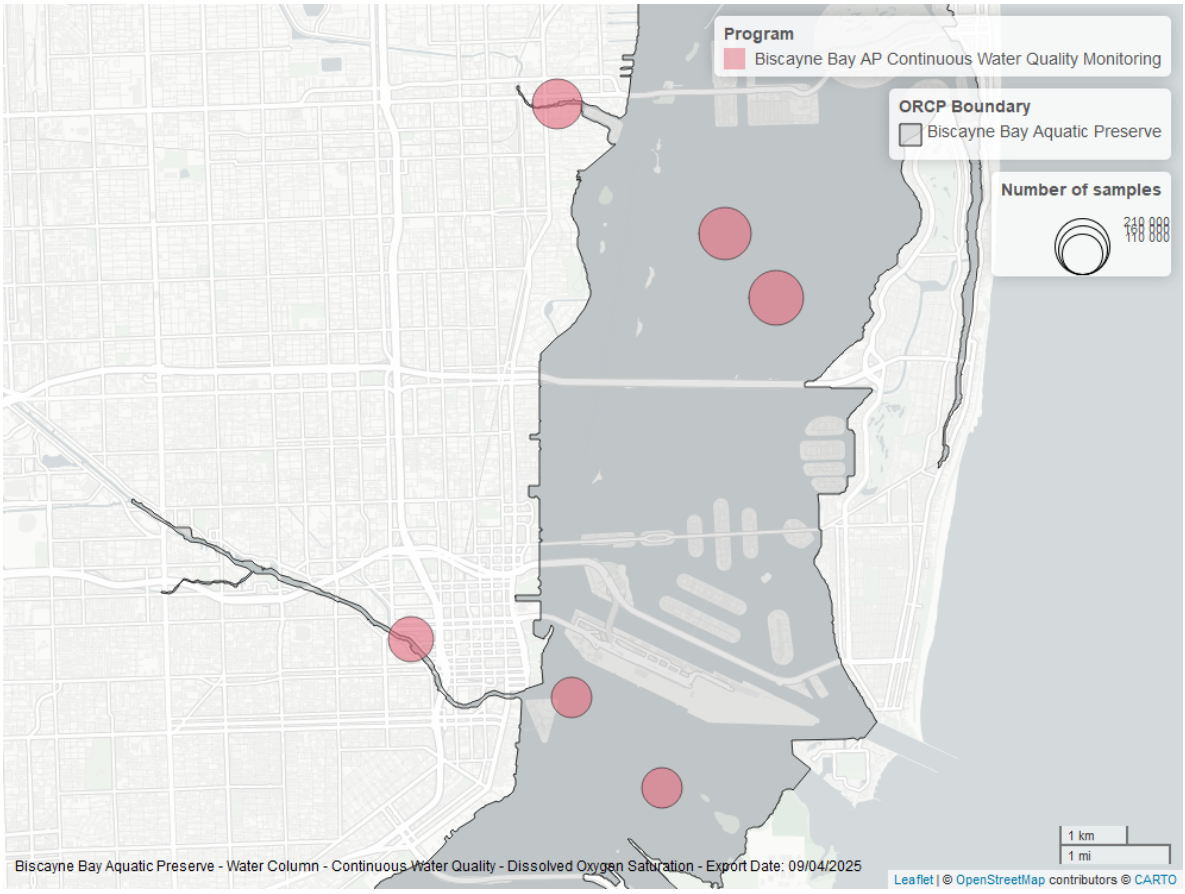

Figure 12: Map showing location of dissolved oxygen saturation continuous water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Salinity - Discrete

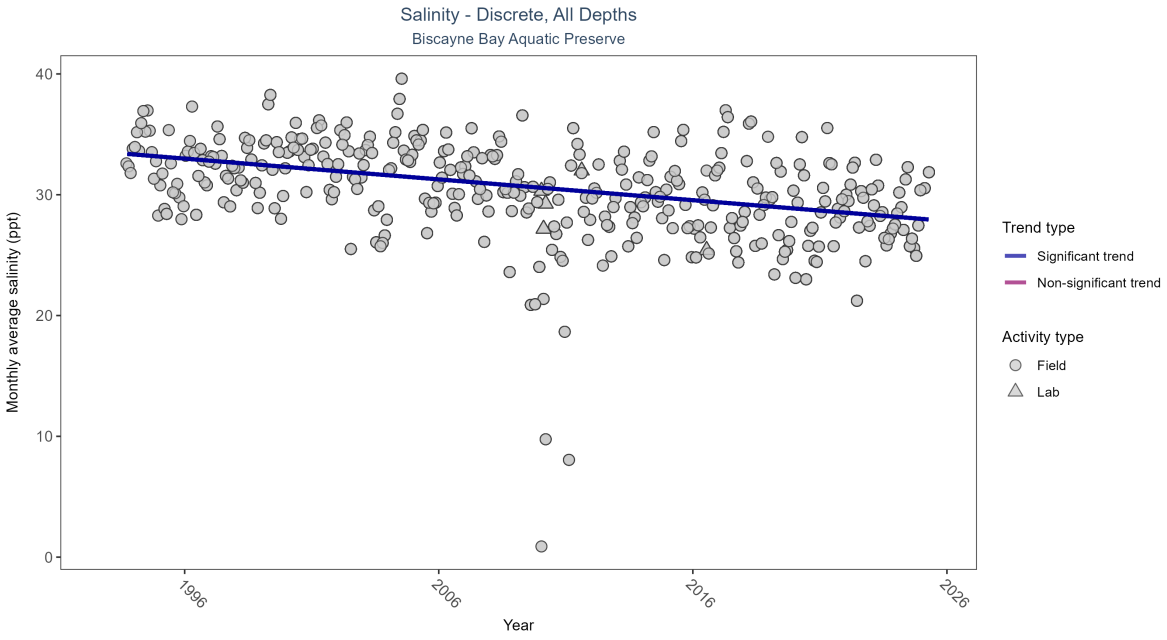

Figure 13: Scatter plot of monthly average salinity over time. If the time series included ten or more years of discrete observations, significant (blue) or non-significant (magenta) trend lines are also shown. Discrete salinity values derived from grab samples analyzed in the field (circles) or the 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 decreasing trend	24920	33	1993 - 2025	32	-0.40541	33.50715	-0.17208	0

Monthly average salinity decreased by 0.17 ppt per year.

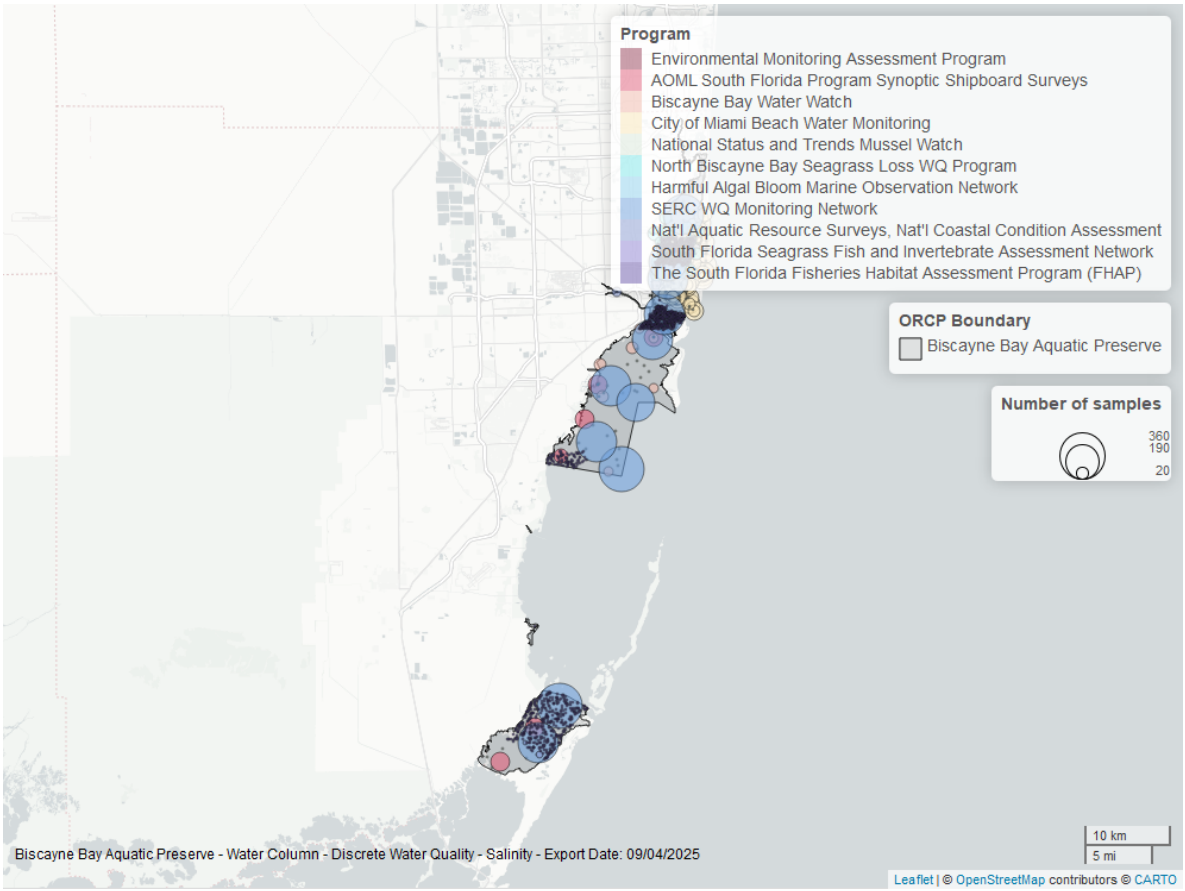

Figure 14: Map showing location of discrete water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Salinity - Continuous

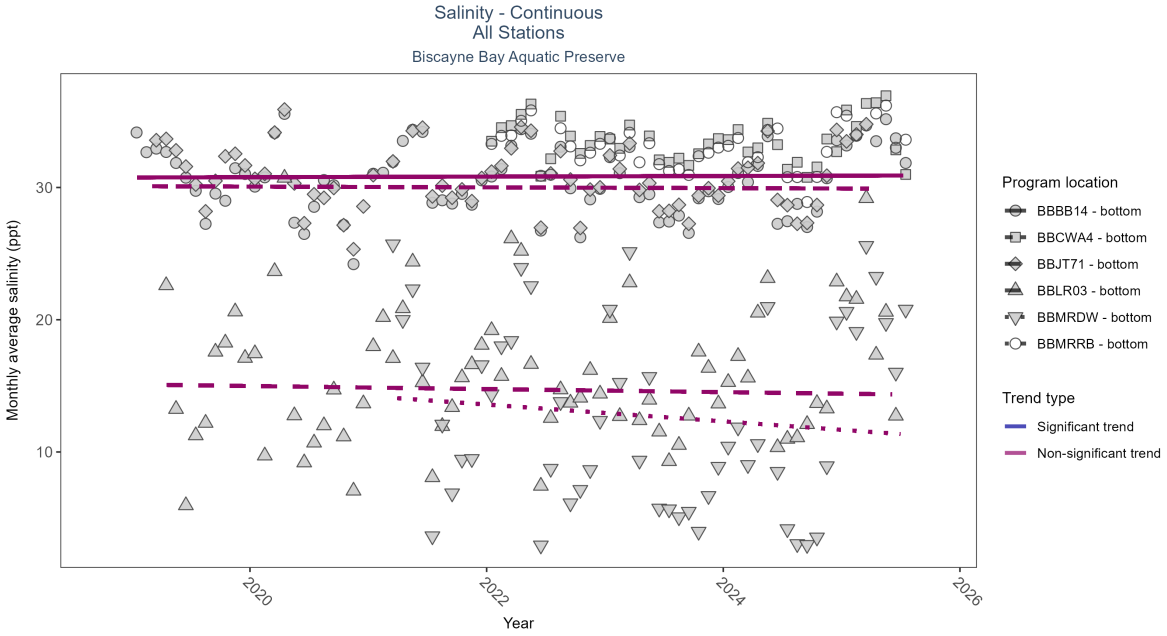

Figure 15: Scatter plot of monthly average salinity over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
BBBB14	No significant trend	190558	7	2019 - 2025	30.6	0.01	30.76	0.02	0.9227
BBCWA4	Insufficient data to calculate trend	106537	4	2022 - 2025	33.6	-	-	-	-
BBLR03	No significant trend	188602	7	2019 - 2025	18.4	-0.05	15.1	-0.12	0.7223
BBJT71	No significant trend	193275	7	2019 - 2025	31.0	-0.02	30.1	-0.03	0.8694
BBMRDW	No significant trend	140940	5	2021 - 2025	10.7	-0.23	14.22	-0.64	0.1566
BBMRRB	Insufficient data to calculate trend	112172	4	2022 - 2025	33.2	-	-	-	-

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

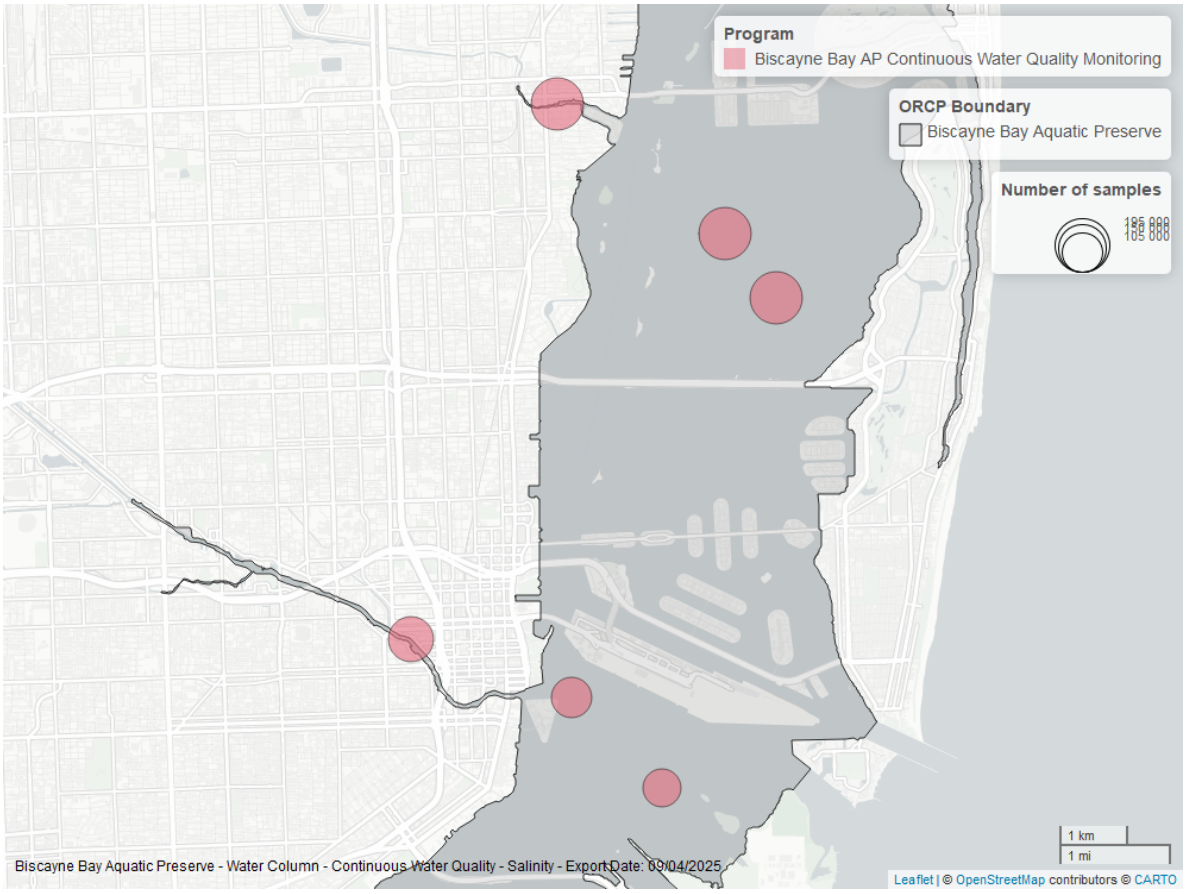

Figure 16: Map showing location of salinity continuous water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Temperature - Discrete

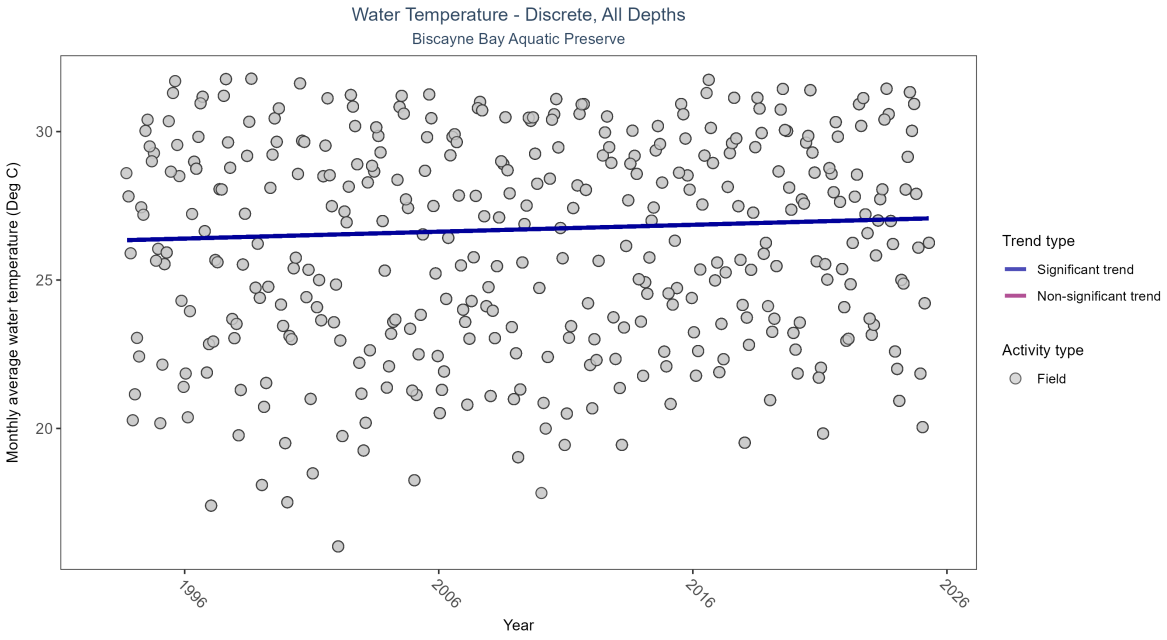

Figure 17: Scatter plot of monthly average water temperature over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only water temperature measurements taken in the field (circles) are included in 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	25176	33	1993 - 2025	27	0.11801	26.3264	0.02321	0.0012

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

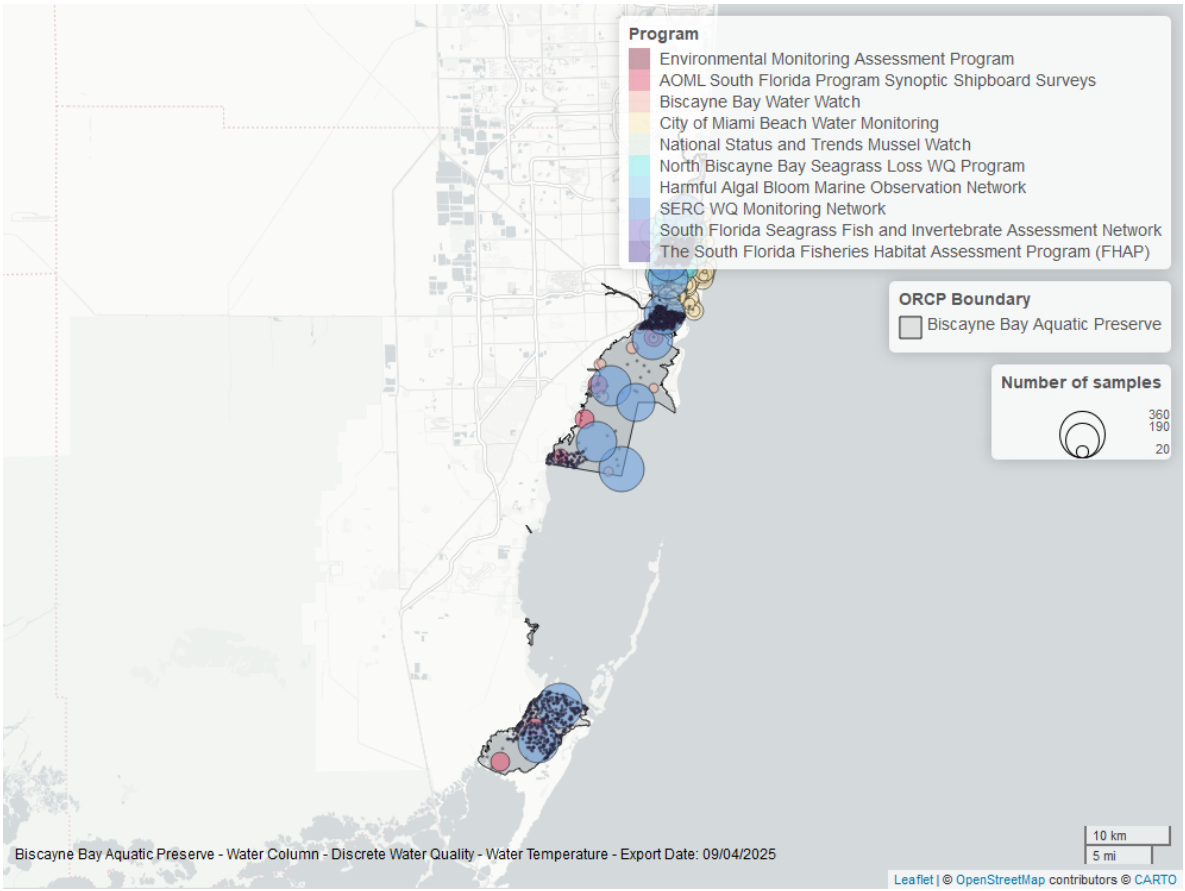

Figure 18: Map showing location of discrete water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Temperature - Continuous

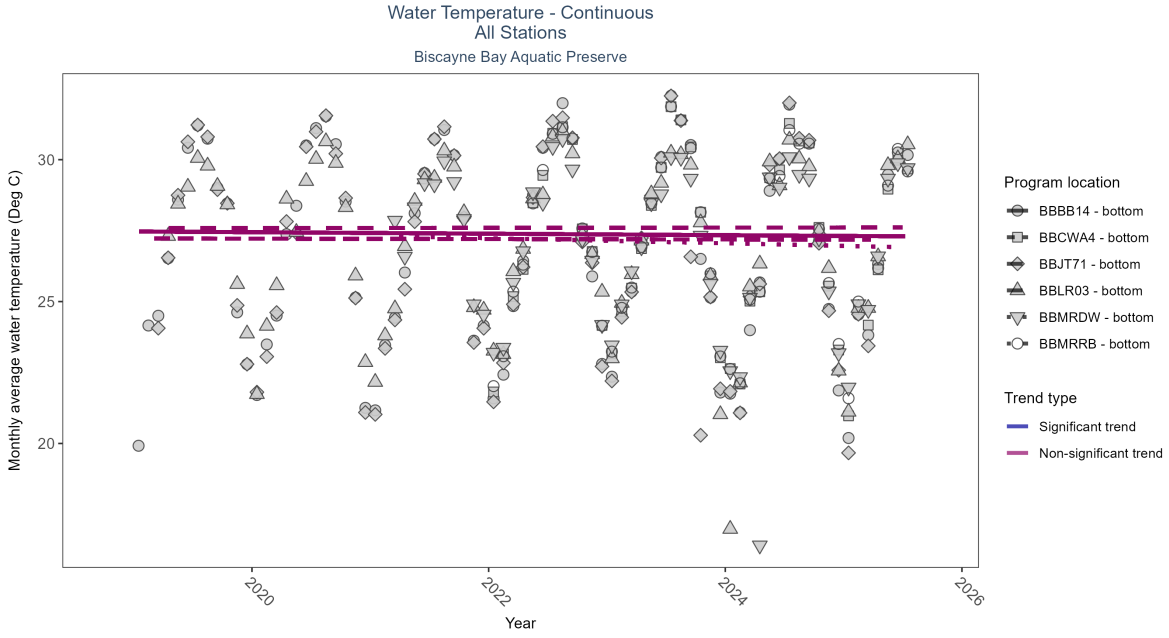

Figure 19: Scatter plot of monthly average water temperature over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
BBCWA4	Insufficient data to calculate trend	113090	4	2022 - 2025	27.1	-	-	-	-
BBBB14	No significant trend	201056	7	2019 - 2025	27.0	-0.04	27.47	-0.03	0.7374
BBLR03	No significant trend	197360	7	2019 - 2025	27.7	0	27.59	0	0.9603
BBJT71	No significant trend	208542	7	2019 - 2025	27.1	-0.03	27.22	-0.01	0.8737
BBMRDW	No significant trend	142823	5	2021 - 2025	27.3	-0.13	27.32	-0.09	0.4533
BBMRRB	Insufficient data to calculate trend	112980	4	2022 - 2025	27.1	-	-	-	-

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

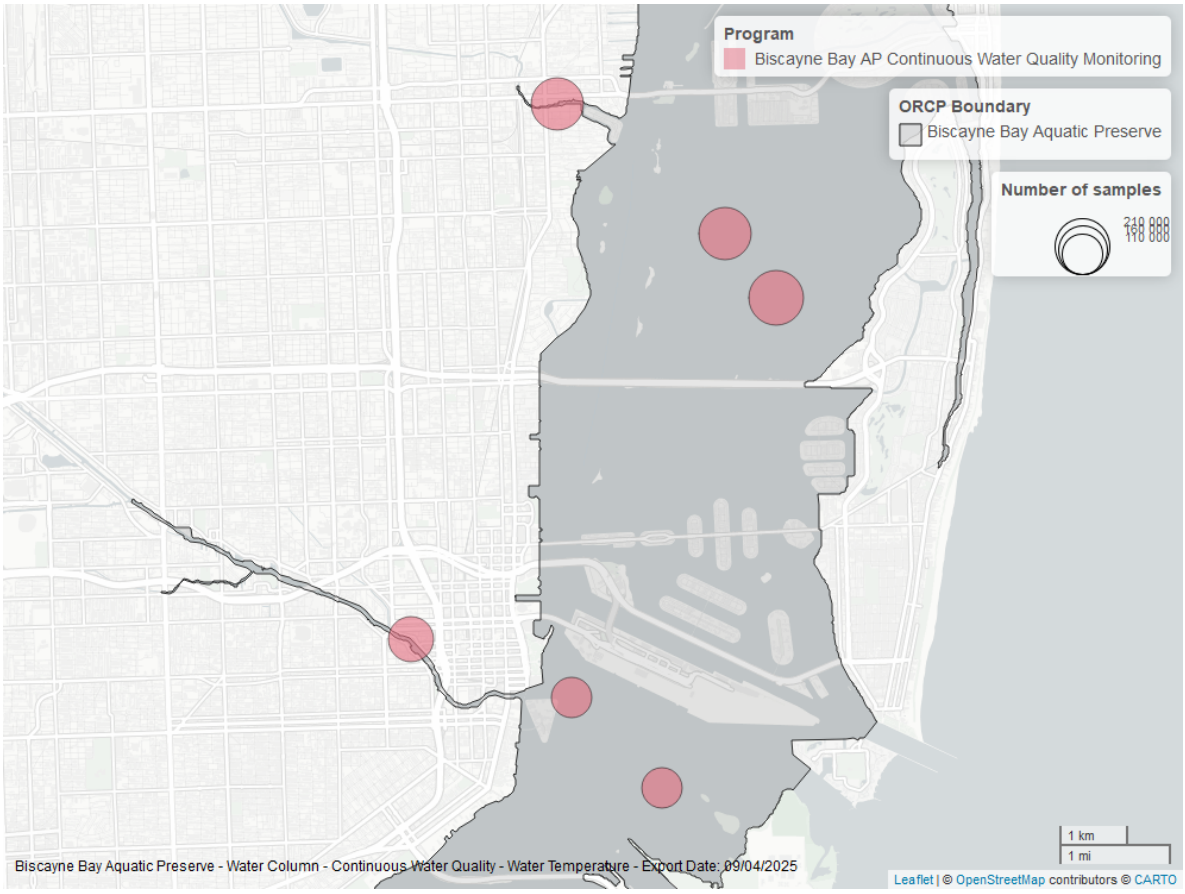

Figure 20: Map showing location of water temperature continuous water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

pH - Discrete

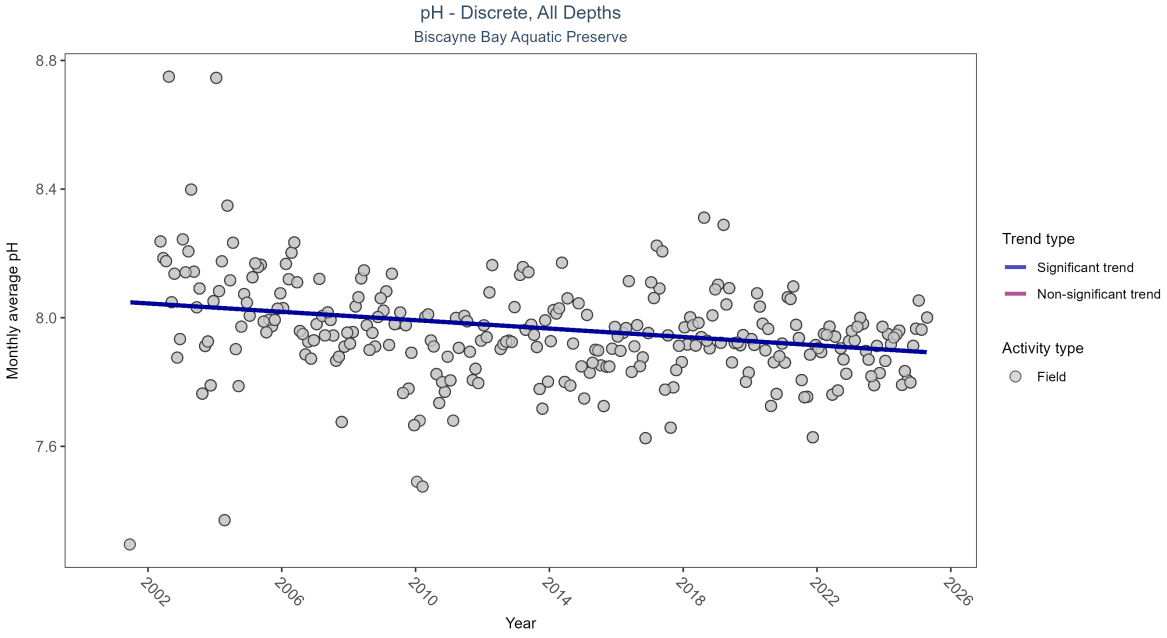

Figure 21: Scatter plot of monthly average pH over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only pH values measured in the field (circles) are included in the plot.

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	18459	25	2001 - 2025	7.96	-0.28053	8.05096	-0.00651	0

Monthly average pH decreased by 0.01 pH units per year.

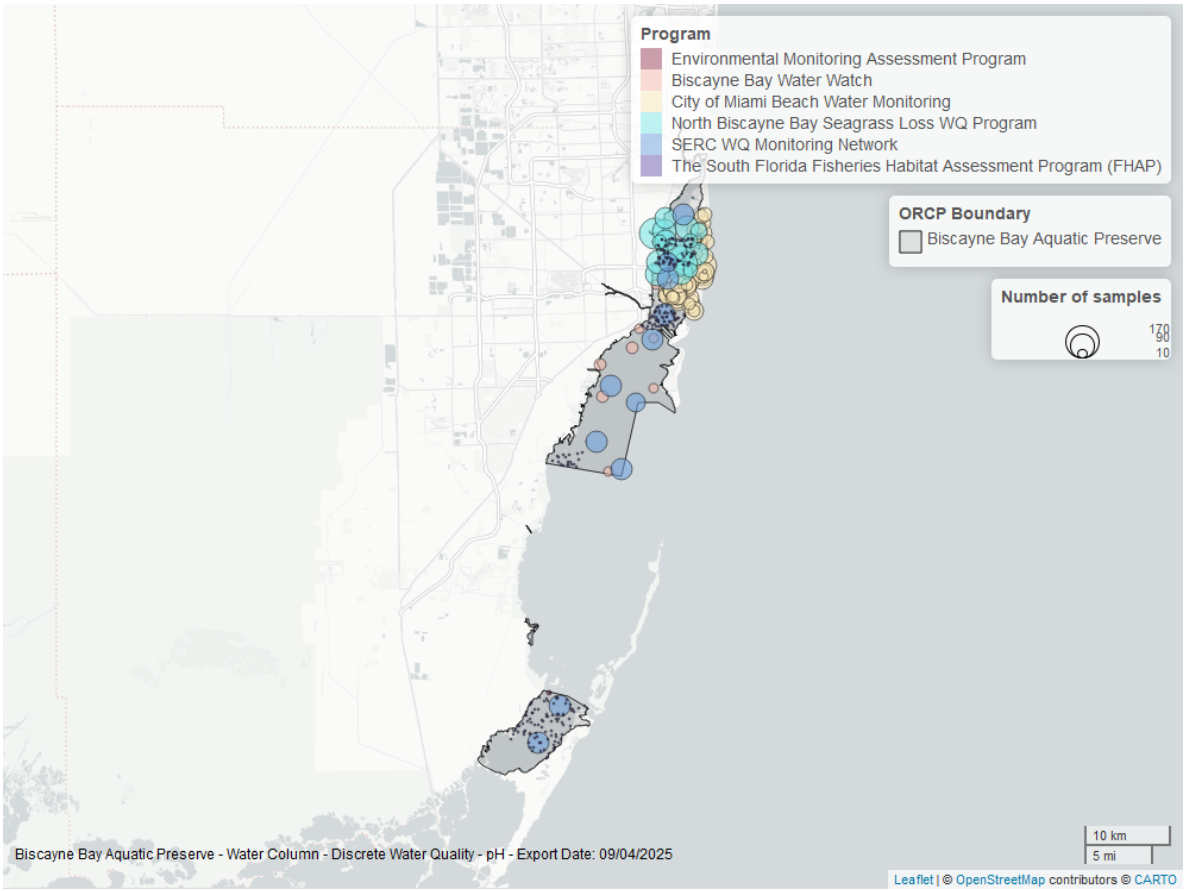

Figure 22: Map showing location of discrete water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

pH - Continuous

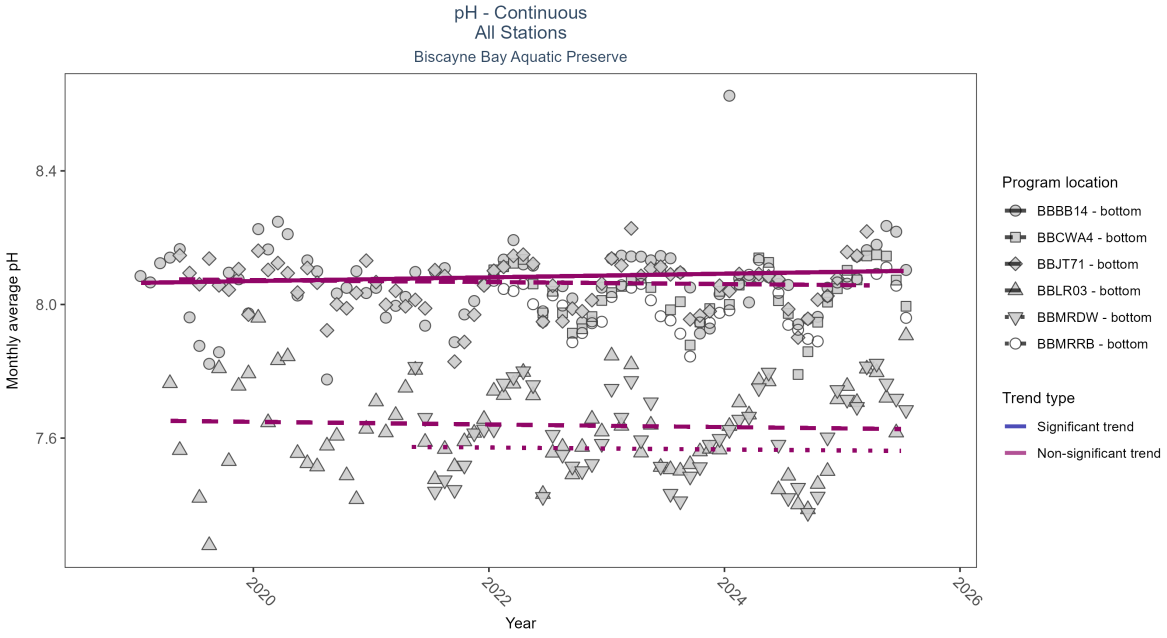

Figure 23: Scatter plot of monthly average pH over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
BBBB14	No significant trend	196871	7	2019 - 2025	8.1	0.1	8.06	0.01	0.3146
BBCWA4	Insufficient data to calculate trend	112102	4	2022 - 2025	8.0	-	-	-	-
BBLR03	No significant trend	186604	7	2019 - 2025	7.6	-0.08	7.65	0	0.5765
BBJT71	No significant trend	195449	7	2019 - 2025	8.1	-0.07	8.08	0	0.5078
BBMRRB	Insufficient data to calculate trend	112216	4	2022 - 2025	8.0	-	-	-	-
BBMRDW	No significant trend	137864	5	2021 - 2025	7.6	-0.06	7.57	0	0.7909

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

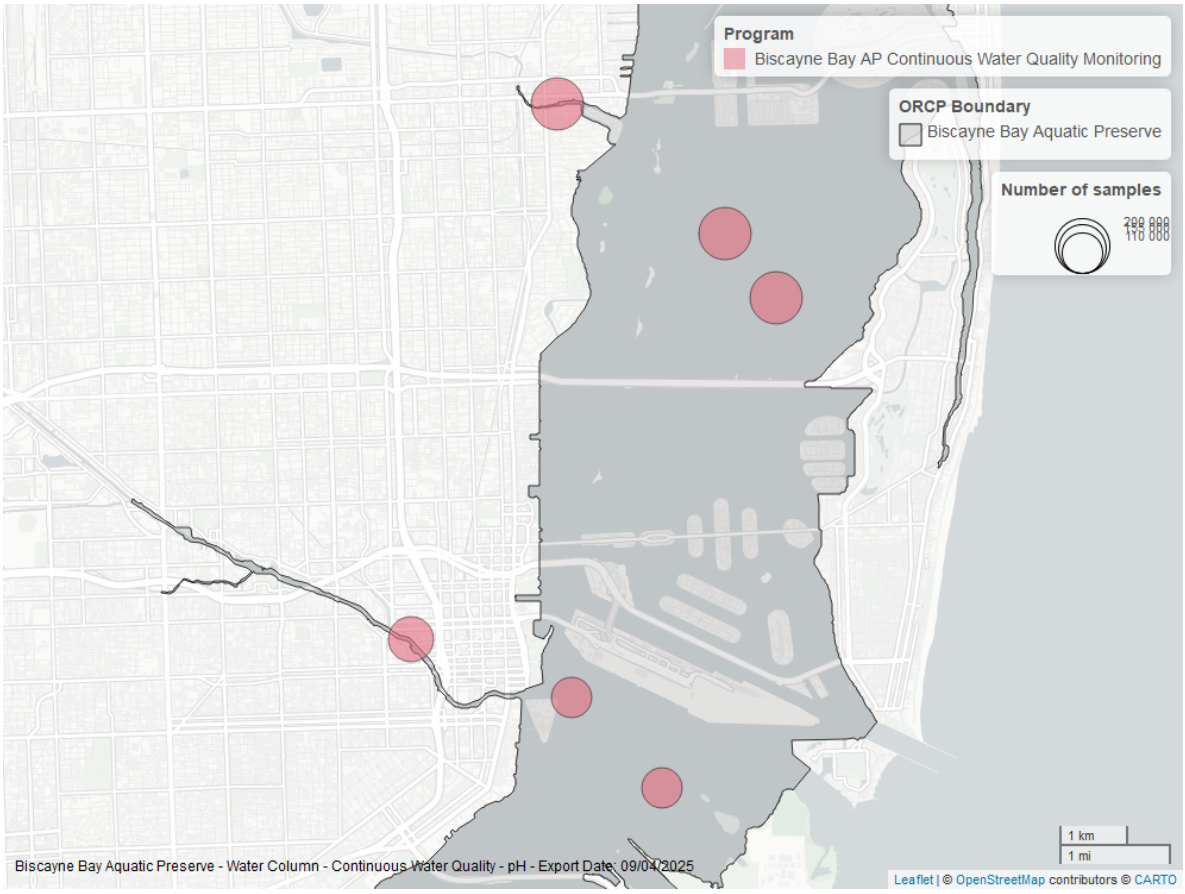

Figure 24: Map showing location of ph continuous water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Clarity

Turbidity - Discrete

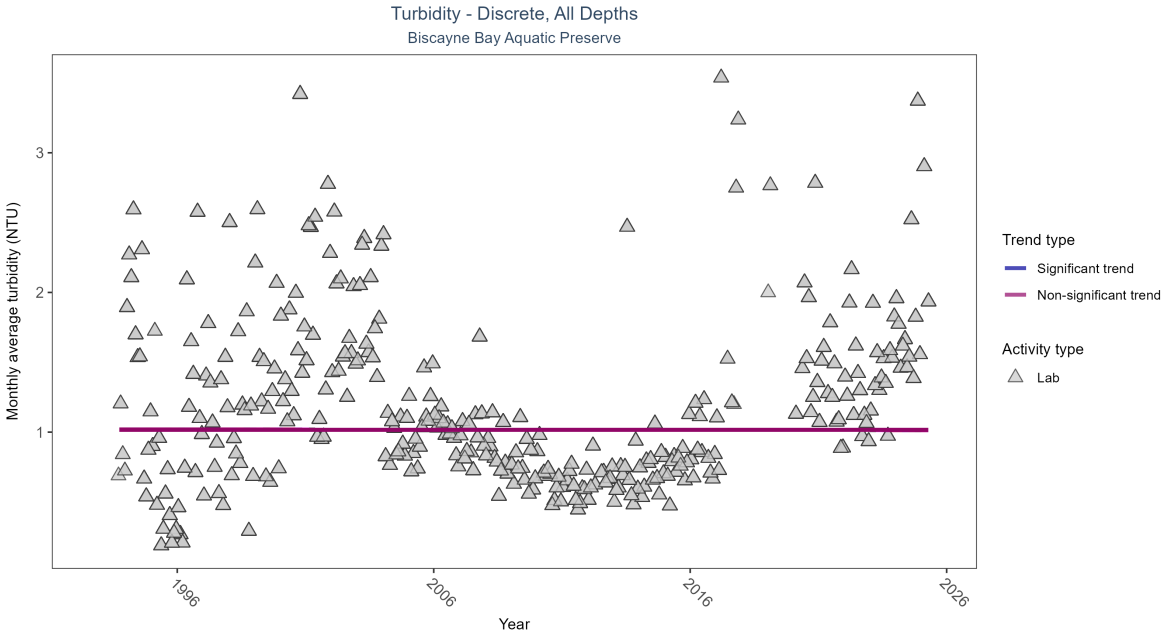

Figure 25: Scatter plot of monthly average turbidity over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only turbidity values measured in the laboratory (triangles) are included in the plot.

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	No significant trend	12092	32	1993 - 2025	0.8	-0.00114	1.01713	-0.00004	0.9956

Turbidity showed no detectable trend between 1993 and 2025.

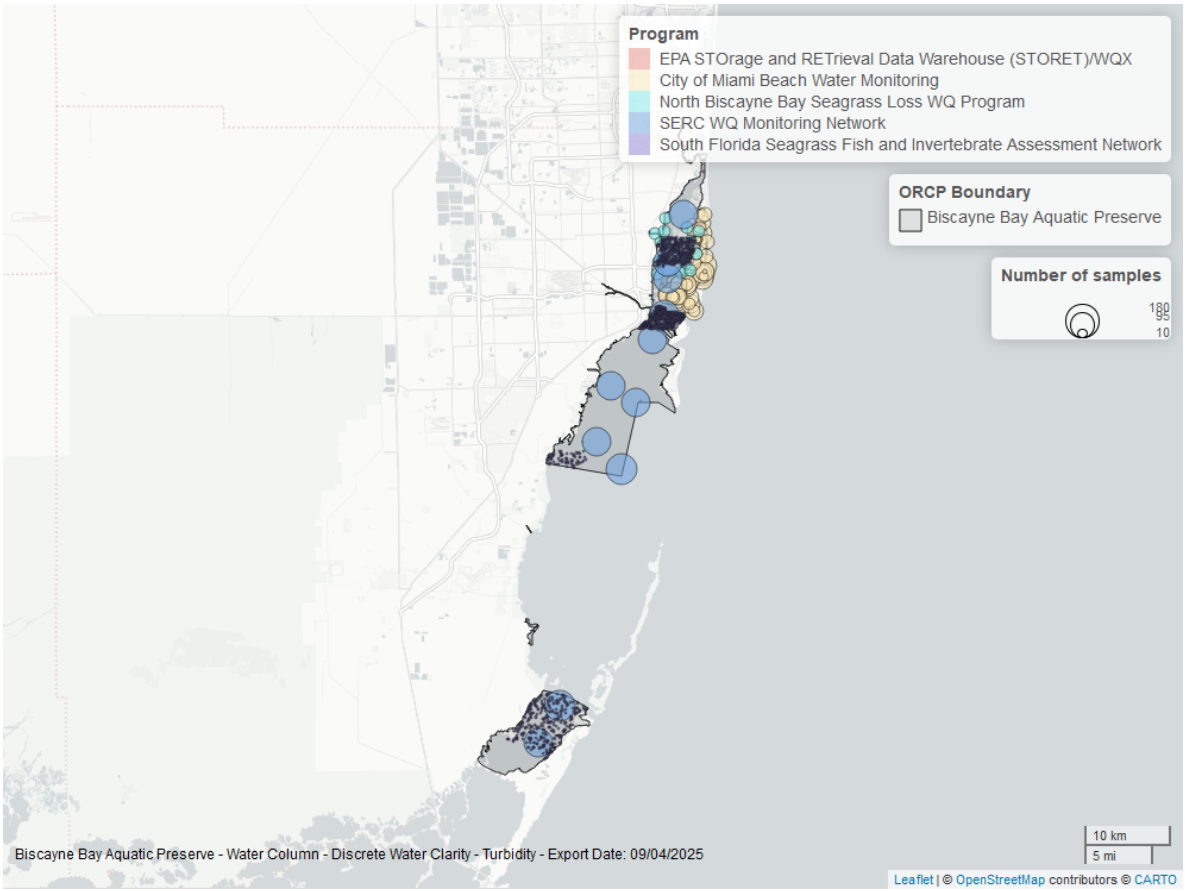

Figure 26: Map showing location of discrete water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Turbidity - Continuous

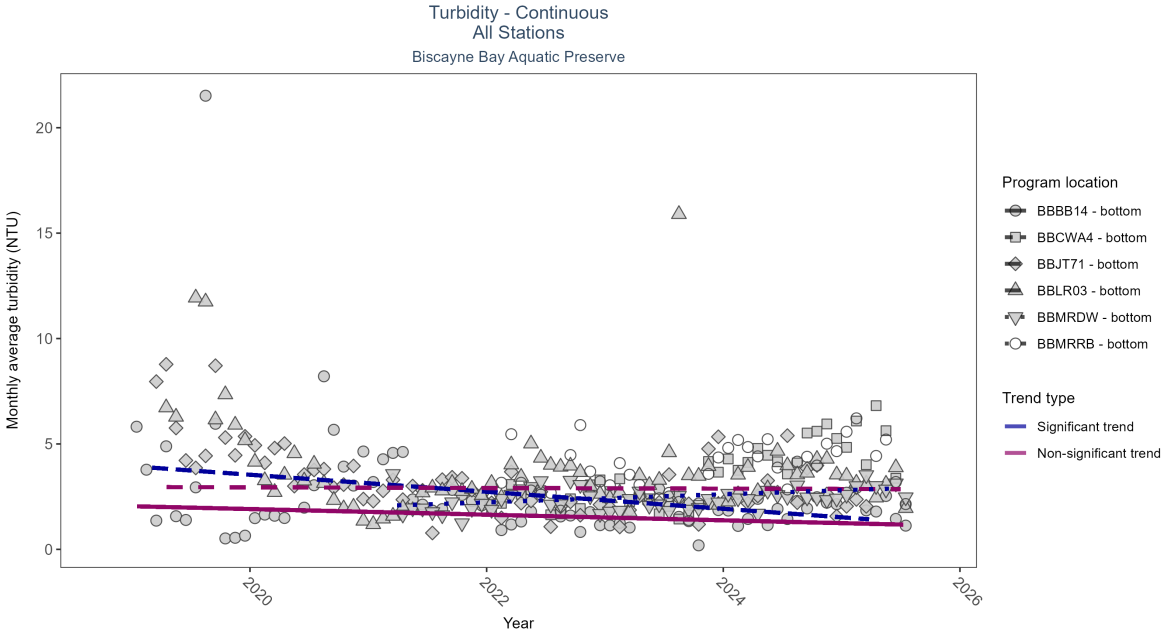

Figure 27: Scatter plot of monthly average turbidity over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
BBBB14	No significant trend	189989	7	2019 - 2025	2	-0.2	2.05	-0.13	0.057
BBCWA4	Insufficient data to calculate trend	109259	4	2022 - 2025	3	-	-	-	-
BBLR03	No significant trend	193530	7	2019 - 2025	3	0	2.96	-0.02	0.8789
BBJT71	Significantly decreasing trend	201128	7	2019 - 2025	3	-0.46	3.94	-0.4	0
BBMRDW	Significantly increasing trend	142449	5	2021 - 2025	2	0.36	2.04	0.19	0.0098
BBMRRB	Insufficient data to calculate trend	110910	4	2022 - 2025	3	-	-	-	-

At one program location, monthly average turbidity increased by 0.19 NTU per year. At one program location, monthly average turbidity decreased by 0.40 NTU per year. No detectable change in monthly average turbidity was observed at two locations. There was insufficient data to fit a model for two locations.

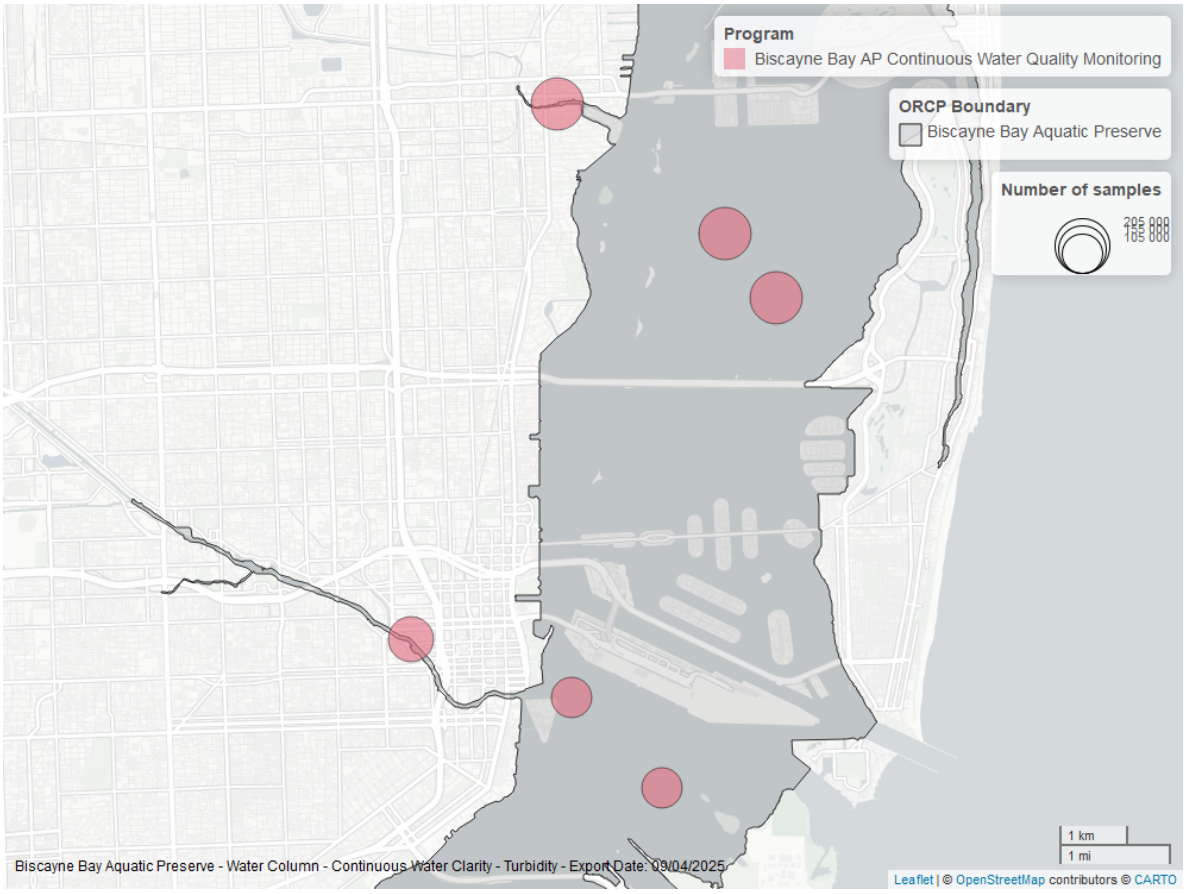

Figure 28: Map showing location of turbidity continuous water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Total Suspended Solids - Discrete

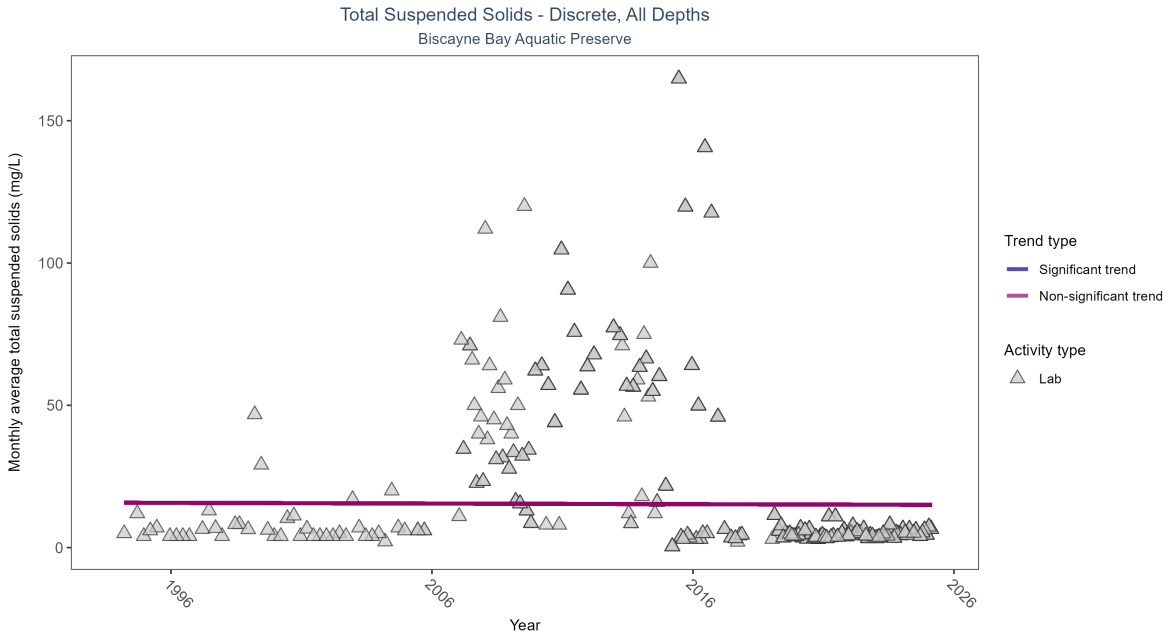

Figure 29: Scatter plot of monthly average total suspended solids (TSS) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only TSS values obtained from laboratory analyses (triangles) are included 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	2462	30	1994 - 2025	5	-0.12471	15.76858	-0.02381	0.4603

Total suspended solids showed no detectable trend between 1994 and 2025.

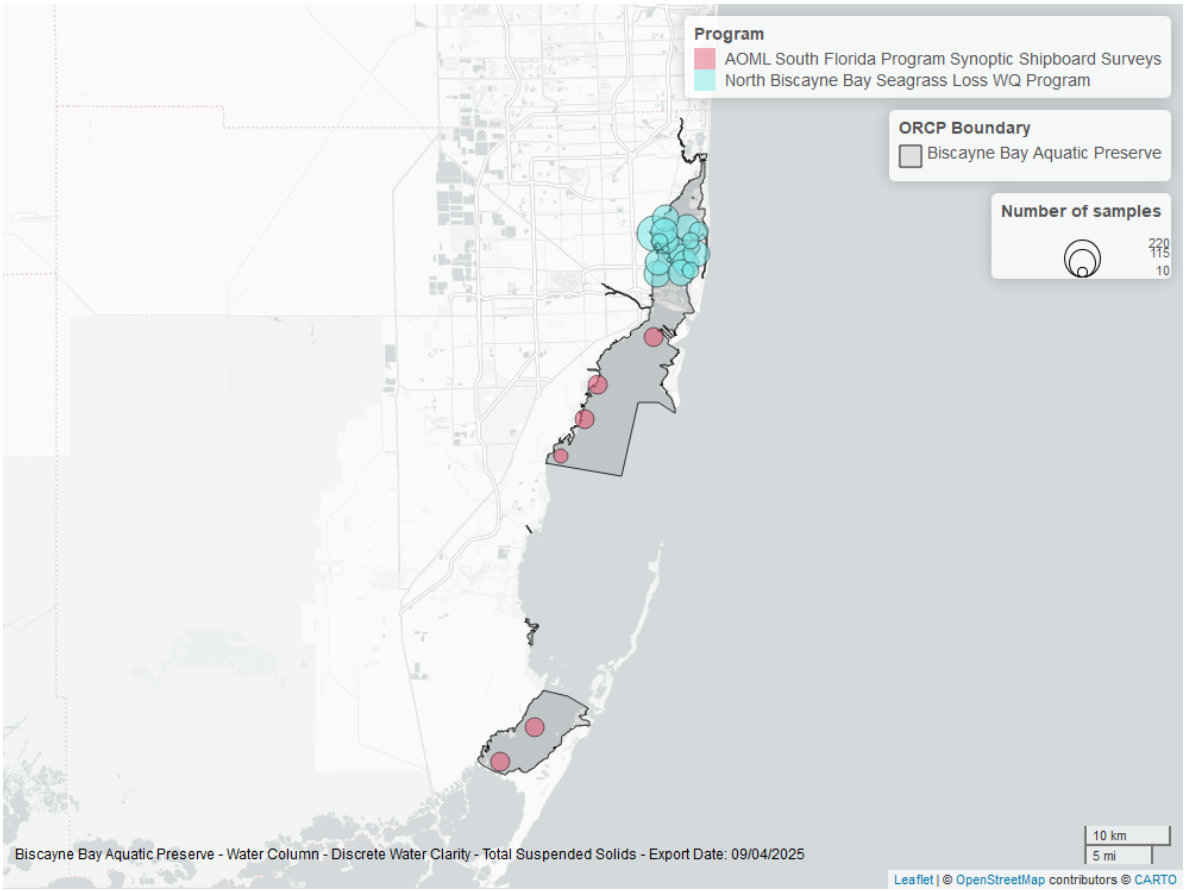

Figure 30: Map showing location of discrete water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Chlorophyll a, Uncorrected for Pheophytin - Discrete

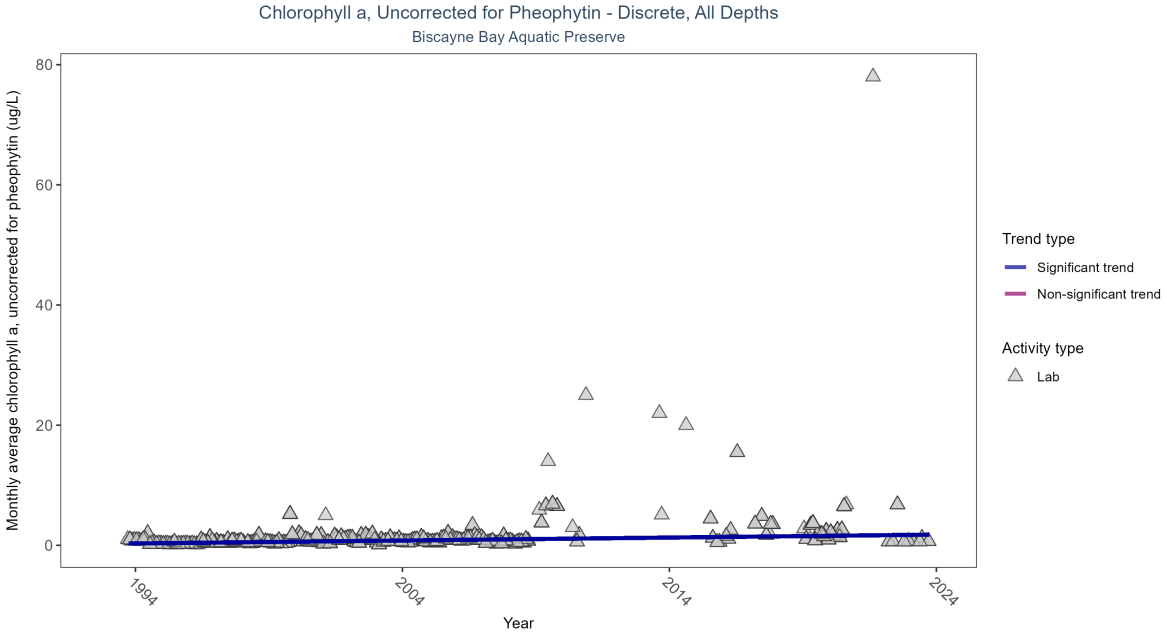

Figure 31: Scatter plot of monthly average levels of chlorophyll a, uncorrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) 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 increasing trend	2256	28	1993 - 2023	0.66765	0.39472	0.26493	0.04893	0

Monthly average chlorophyll a, uncorrected for pheophytin, increased by 0.05 µg/L per year, indicating a decrease in water clarity.

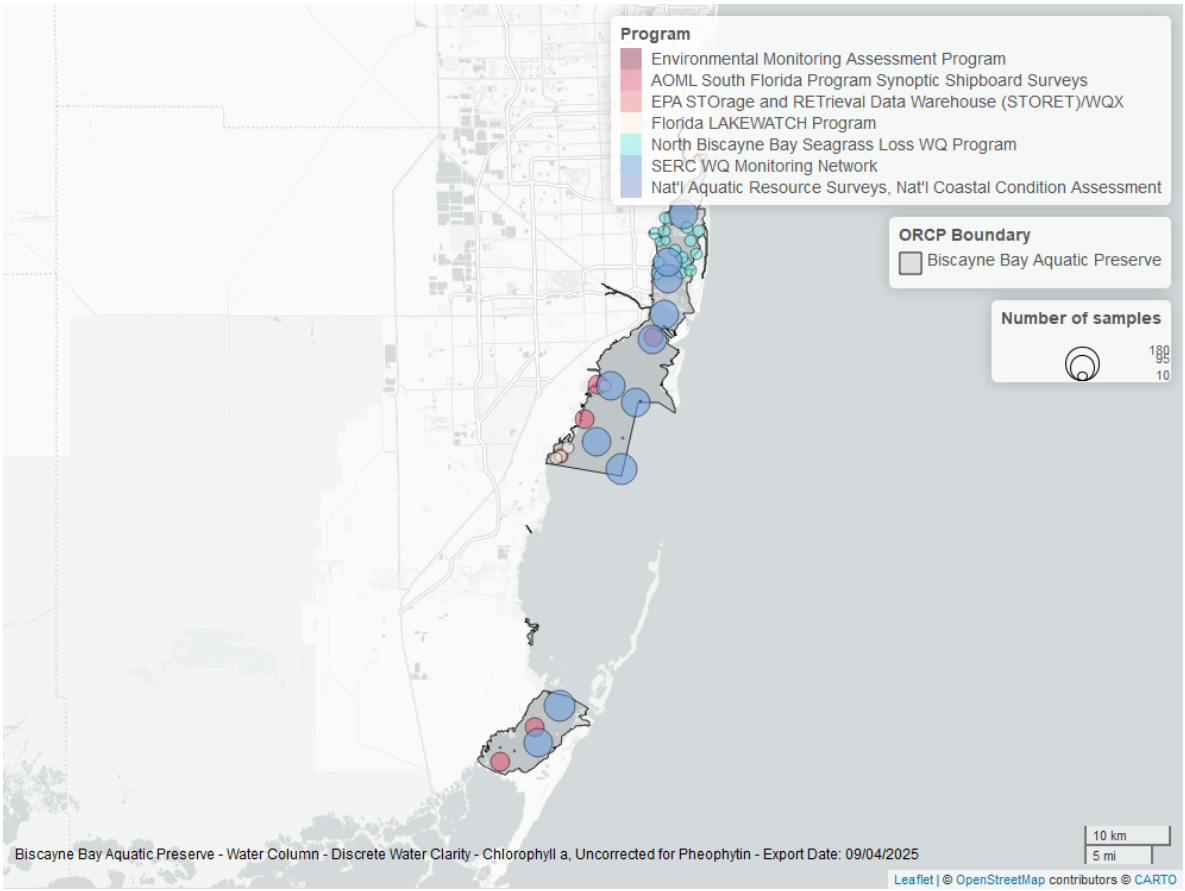

Figure 32: Map showing location of discrete water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Chlorophyll a, Corrected for Pheophytin - Discrete

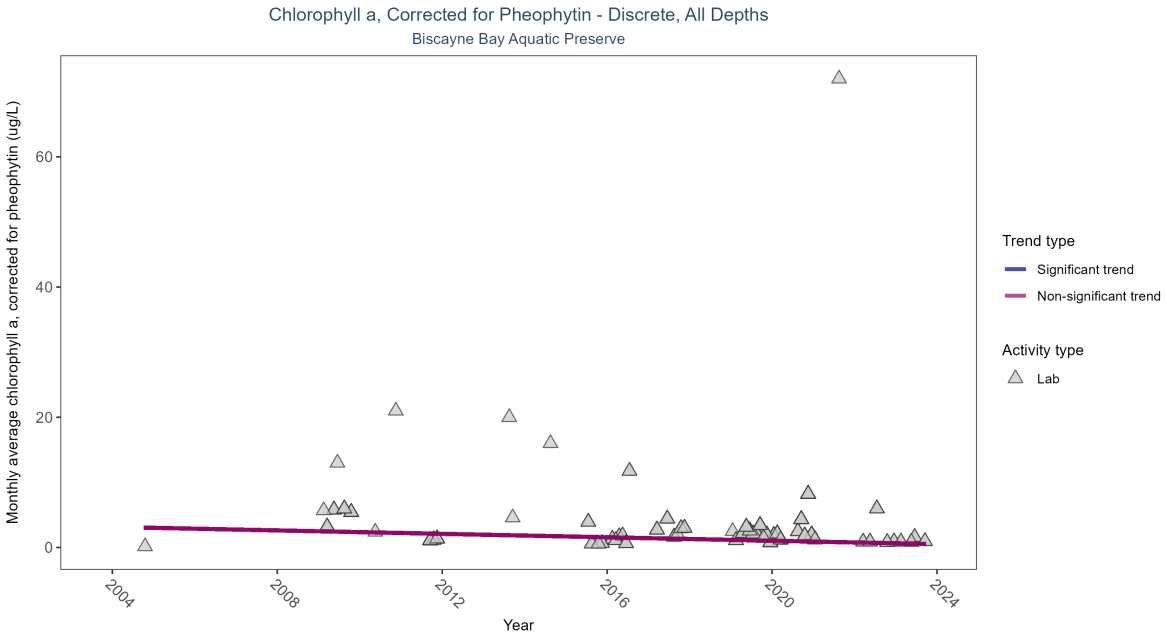

Figure 33: Scatter plot of monthly average levels of chlorophyll a, corrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) 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	No significant trend	470	14	2004 - 2023	1.4	-0.18454	3.14798	-0.13185	0.1713

Chlorophyll a, corrected for pheophytin, showed no detectable trend between 2004 and 2023.

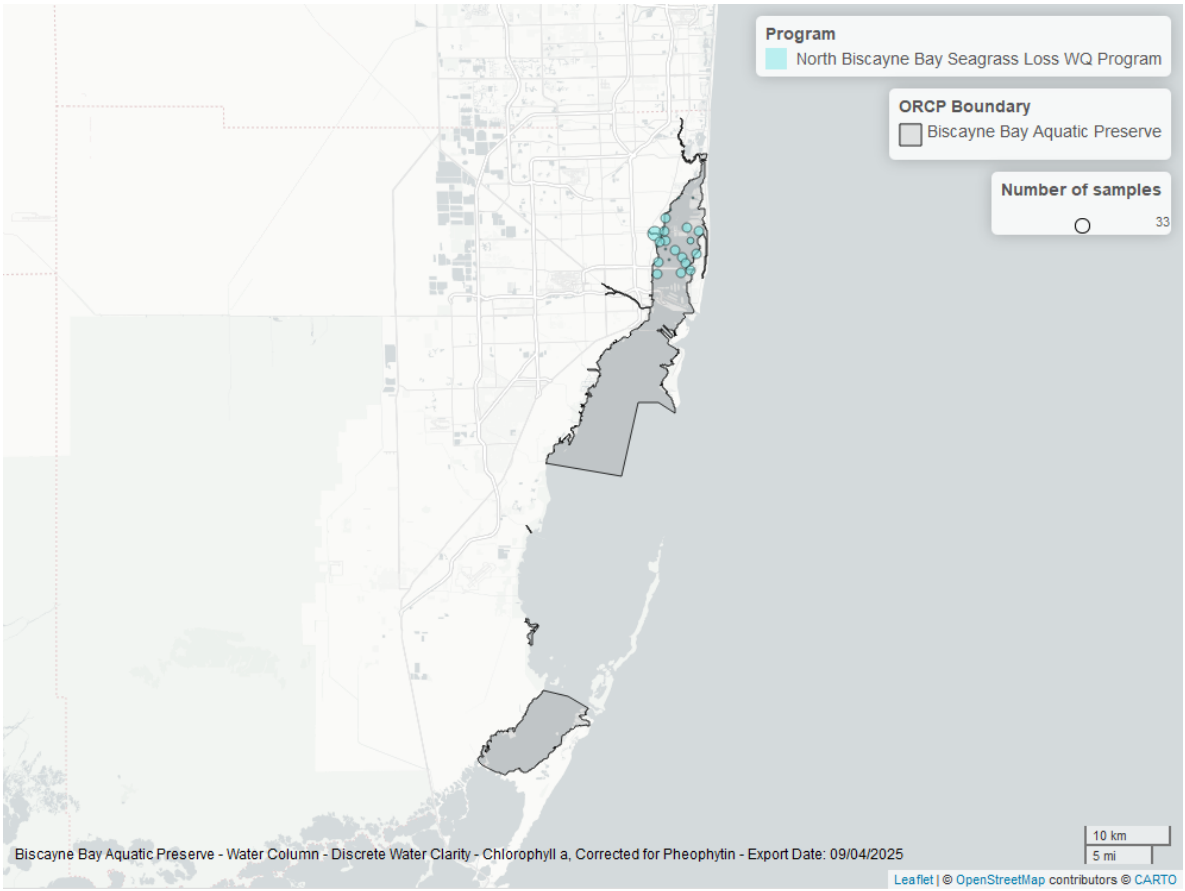

Figure 34: Map showing location of discrete water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Secchi Depth - Discrete

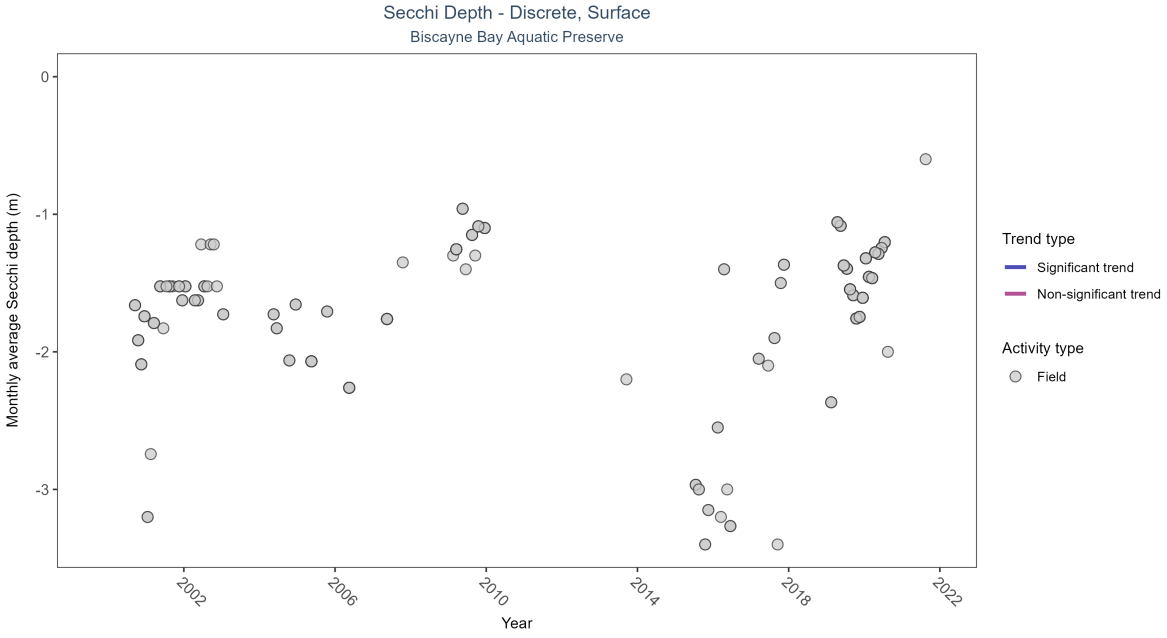

Figure 35: Scatter plot of monthly average Secchi depth over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Secchi depth is only measured in the field (circles).

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	No significant trend	687	19	2000 - 2022	-1.52402	0.11555	-1.66756	0.01256	0.3365

Secchi depth showed no detectable trend between 2000 and 2022.

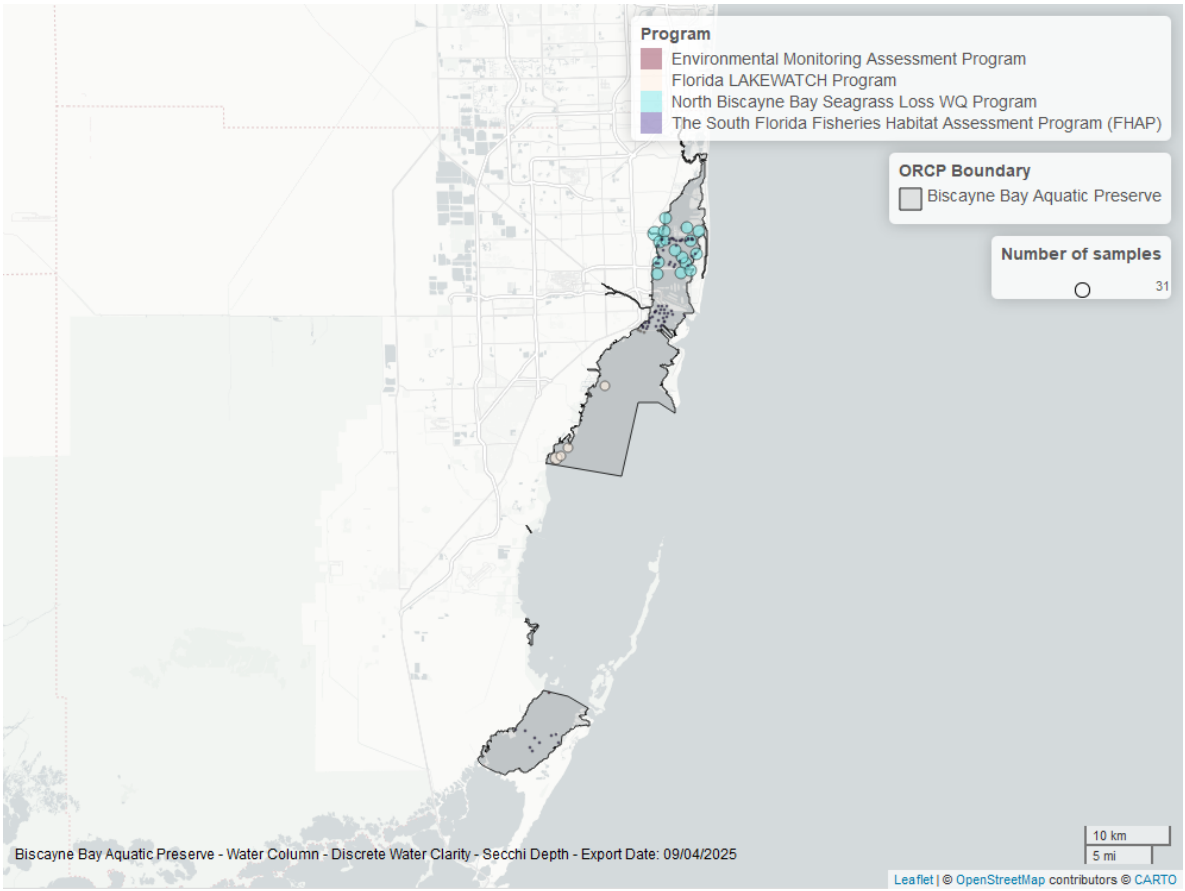

Figure 36: Map showing location of discrete water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Colored Dissolved Organic Matter - Discrete

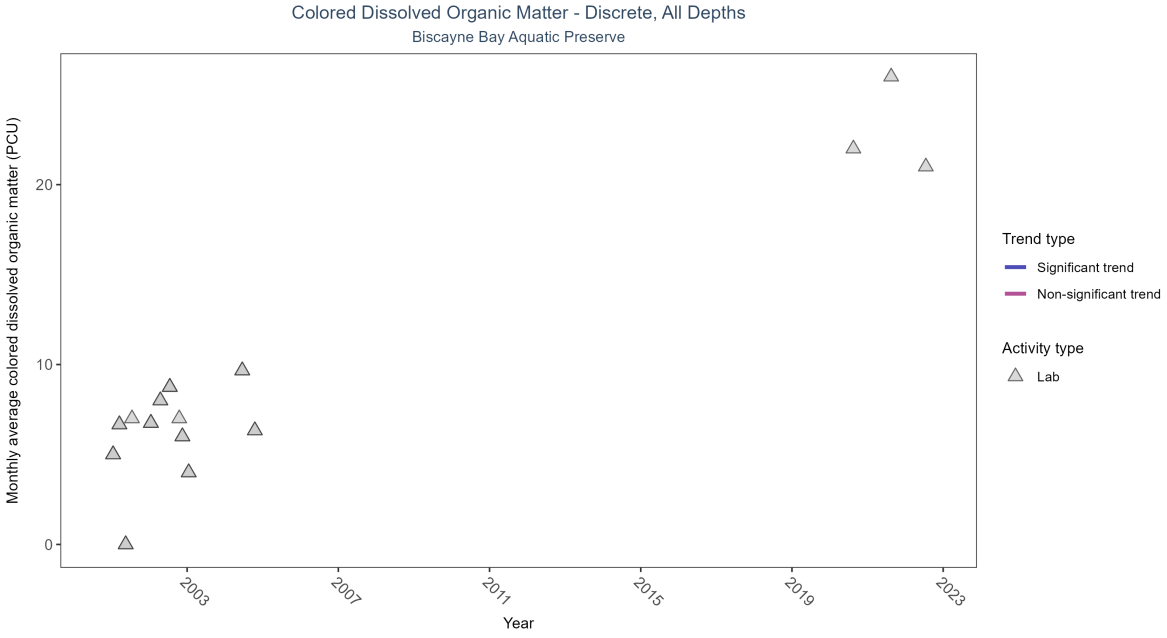

Figure 37: Scatter plot of monthly average colored dissolved organic matter (CDOM) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed CDOM (triangles) is included in the 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	38	7	2001 - 2022	7	-	-	-	-

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

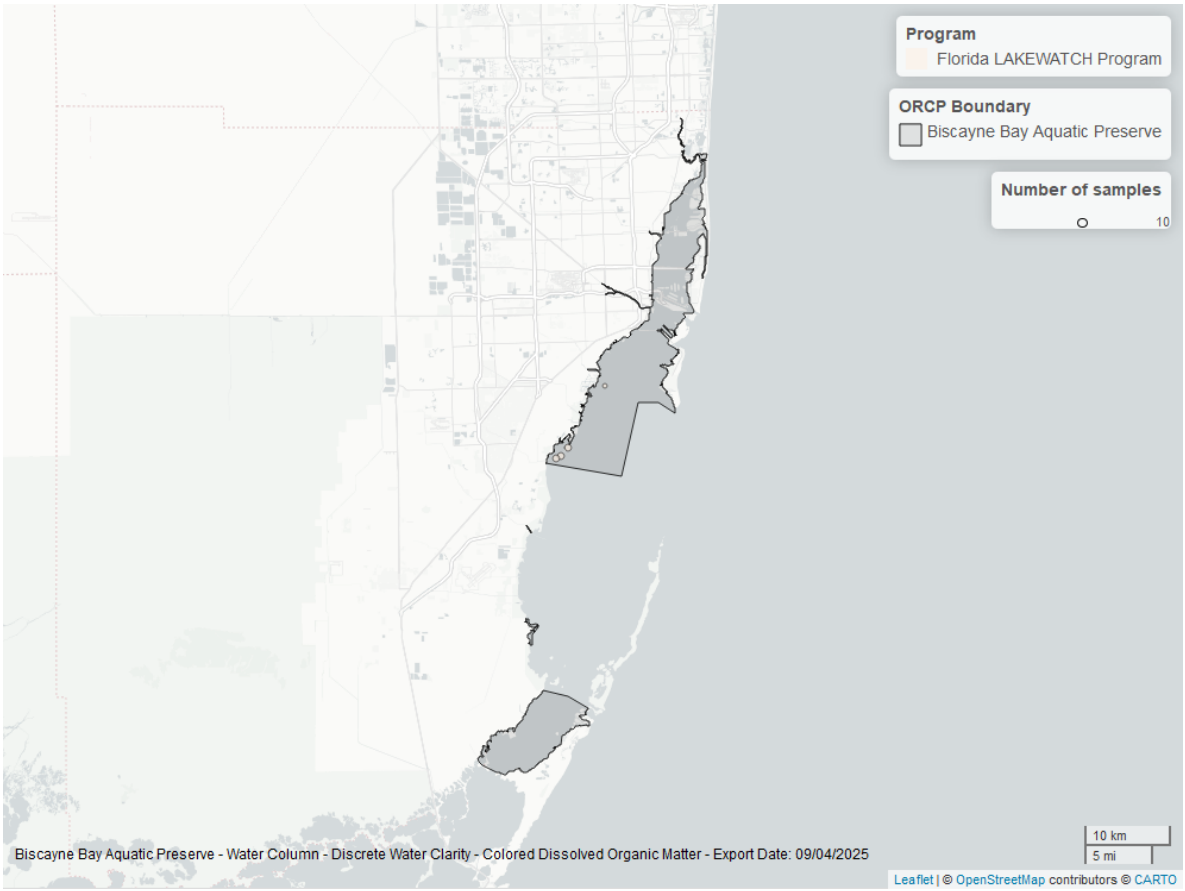

Figure 38: Map showing location of discrete water quality sampling locations within the boundaries of *Biscayne Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.