Rookery Bay Aquatic Preserve

SEACAR Water Quality Analysis

Last compiled on 30 September, 2025

Contents

Indicators

Nutrients

Total Nitrogen - Discrete

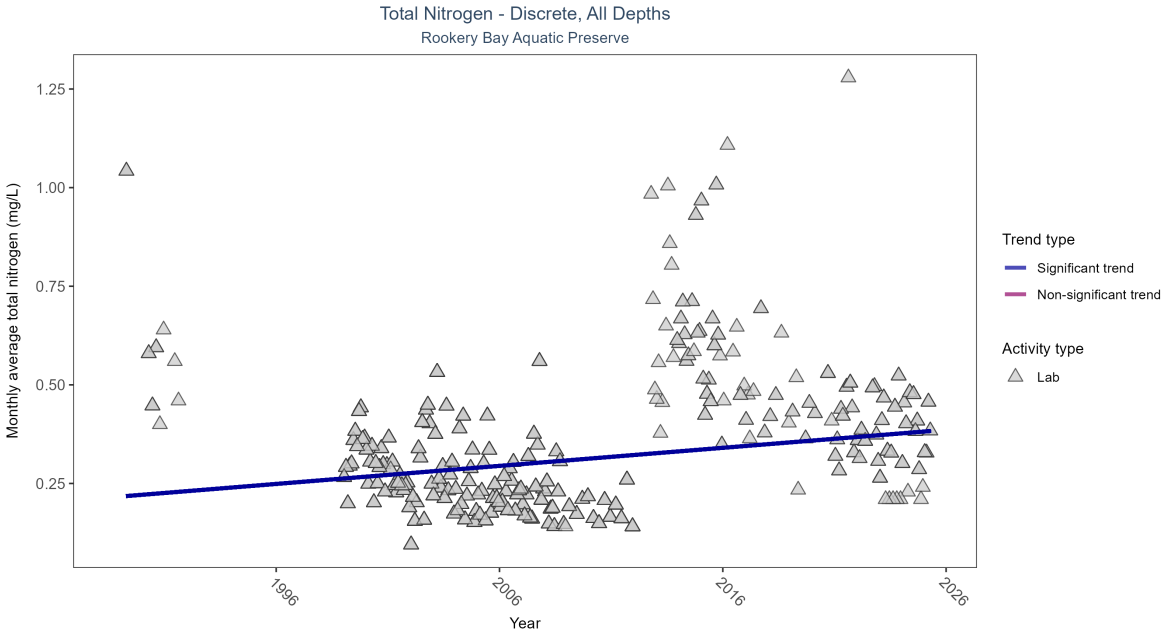

Figure 1: Scatter plot of monthly average total nitrogen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only nitrogen values obtained from laboratory analyses (triangles) are included in the 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 increasing trend	2788	30	1989 - 2025	0.26	0.15548	0.21674	0.00458	8e-04

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

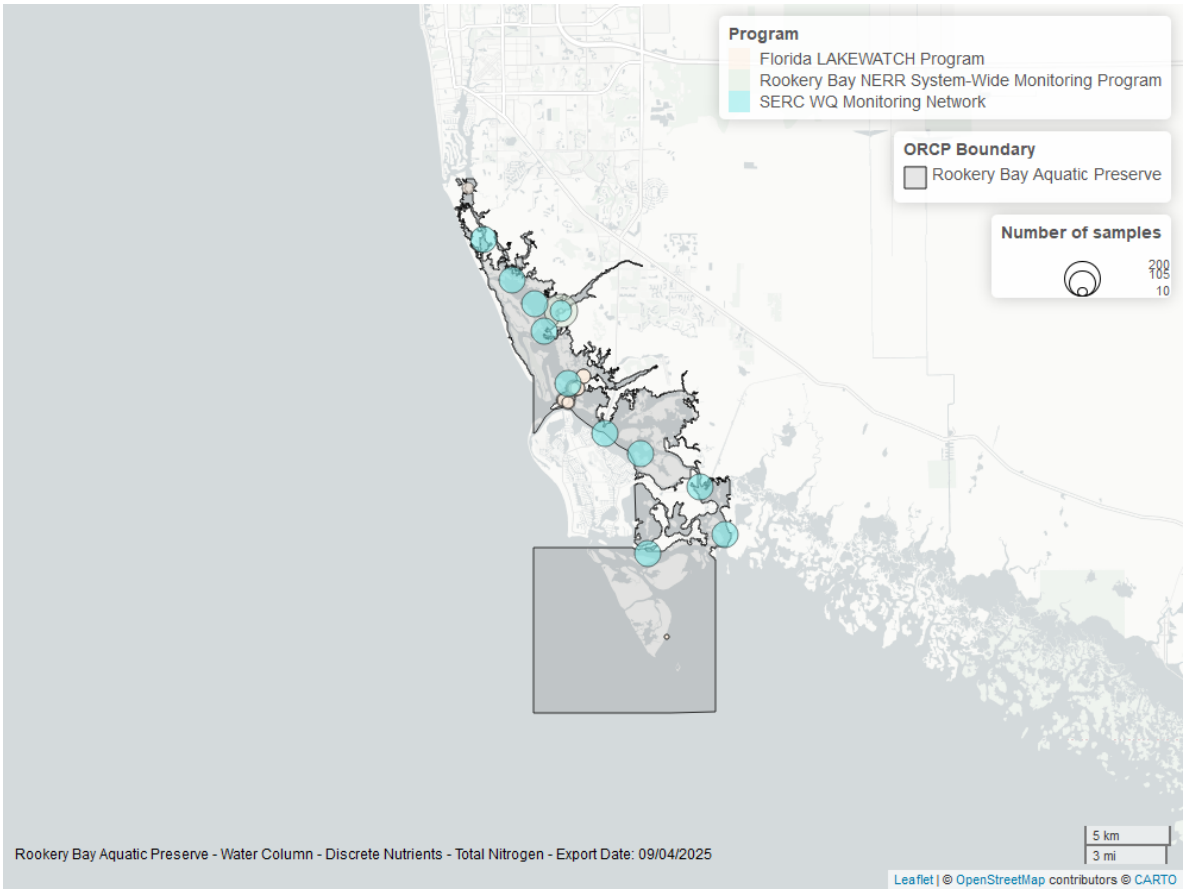

Figure 2: Map showing location of discrete water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Total Phosphorus - Discrete

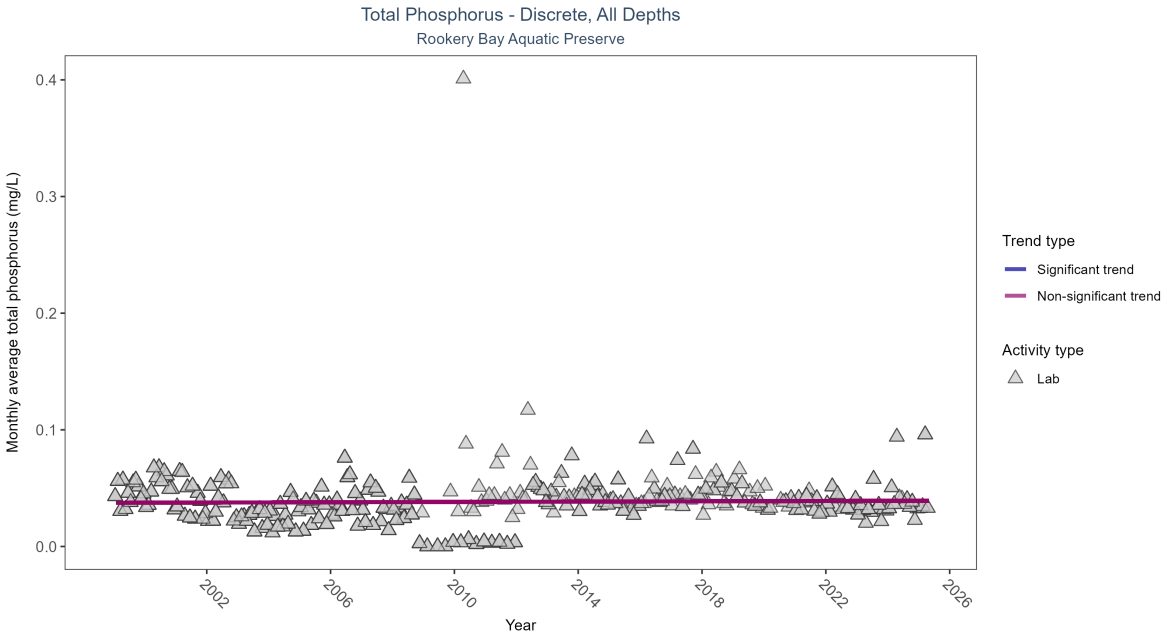

Figure 3: Scatter plot of monthly average total phosphorus over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only phosphorus values obtained from laboratory analyses (triangles) are included in 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	No significant trend	2386	27	1999 - 2025	0.034	0.02113	0.03744	0.00007	0.582

Total phosphorus showed no detectable trend between 1999 and 2025.

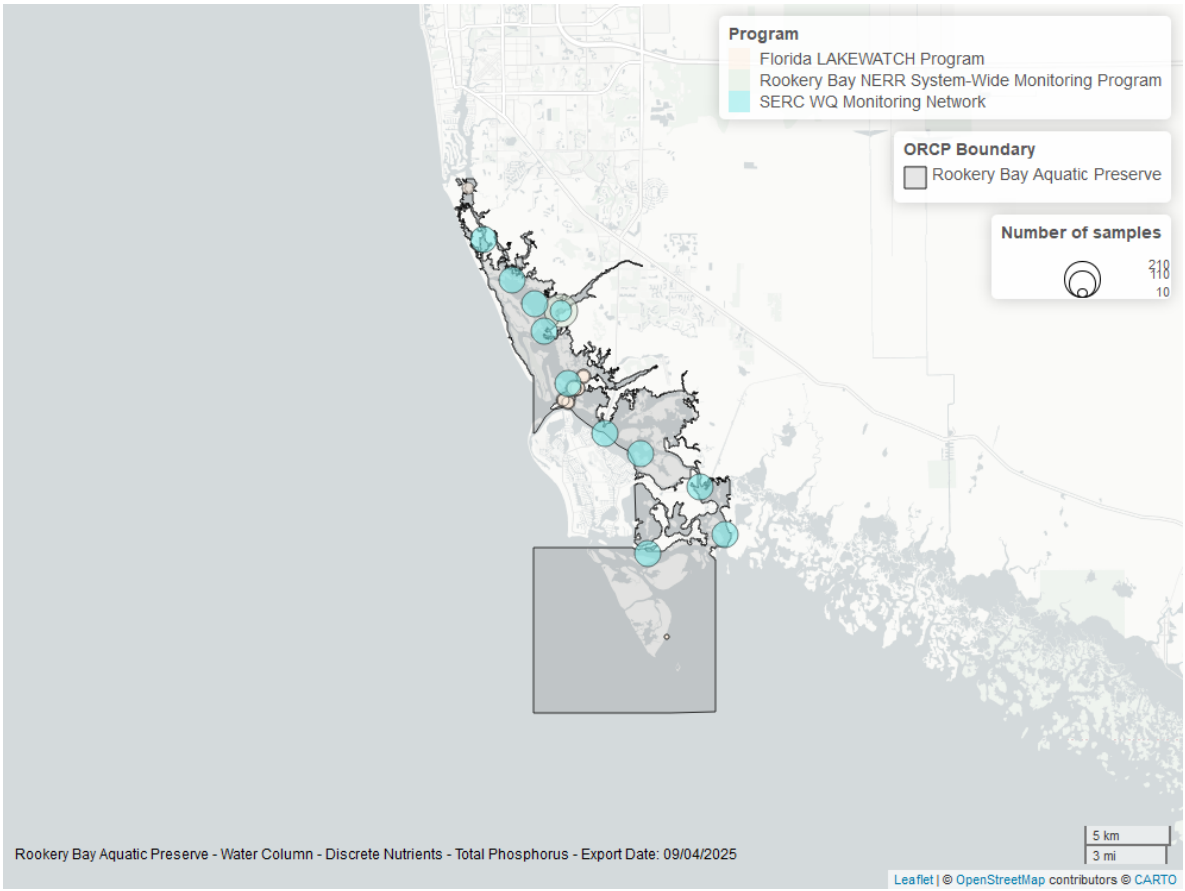

Figure 4: Map showing location of discrete water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Quality

Dissolved Oxygen - Discrete

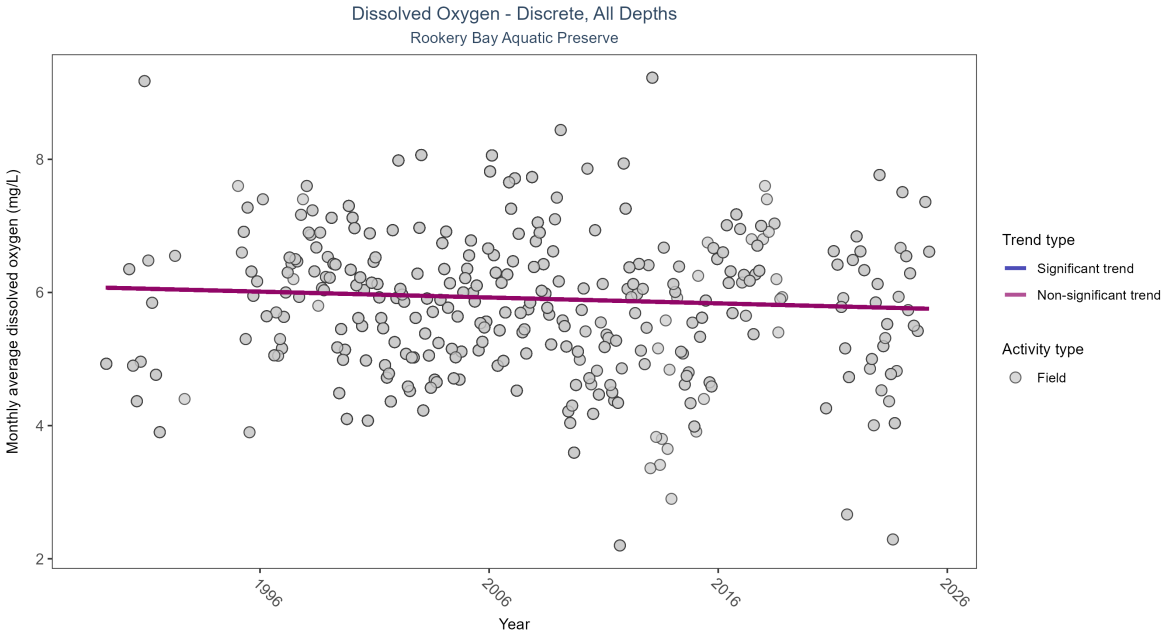

Figure 5: Scatter plot of monthly average dissolved oxygen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen values measured in the field (circles) are included in the plot.

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	No significant trend	4523	34	1989 - 2025	5.82	-0.06308	6.07406	-0.00881	0.1133

Dissolved oxygen showed no detectable trend between 1989 and 2025.

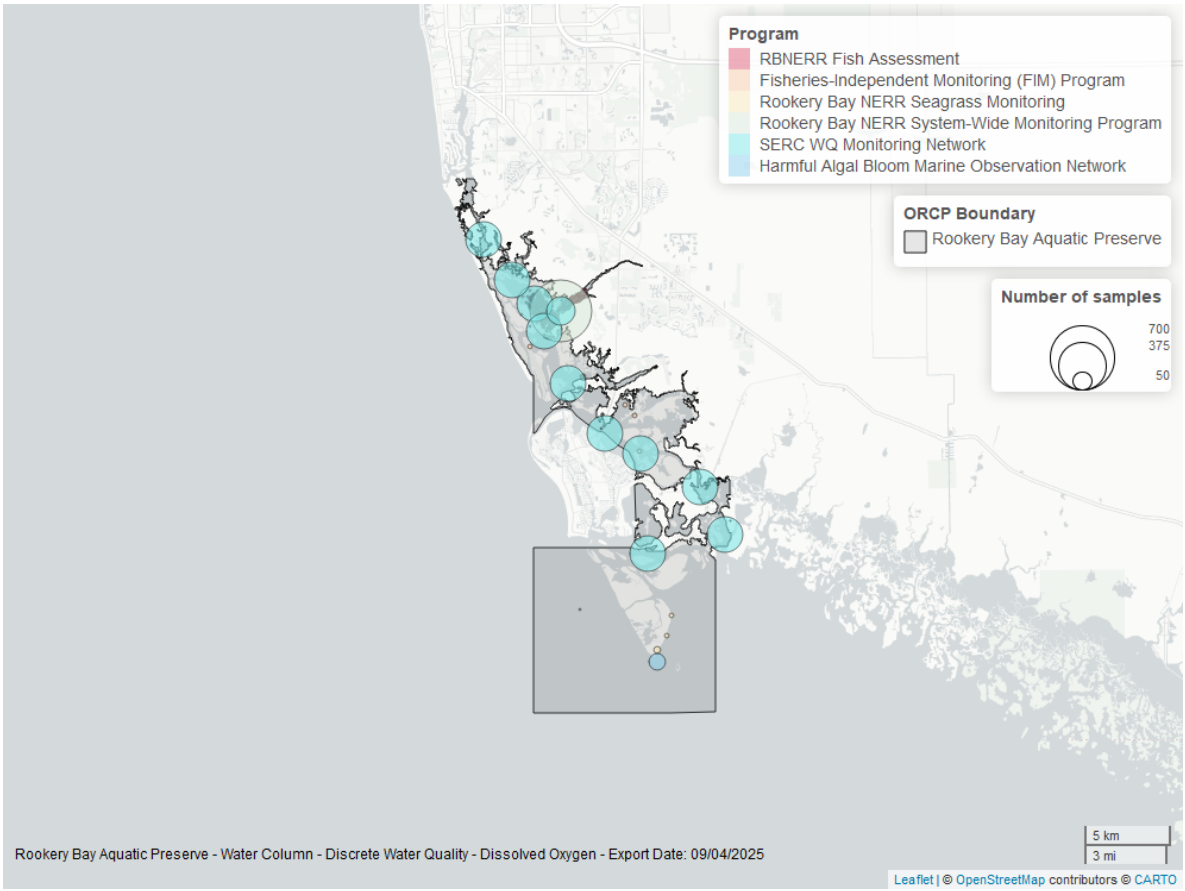

Figure 6: Map showing location of discrete water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen - Continuous

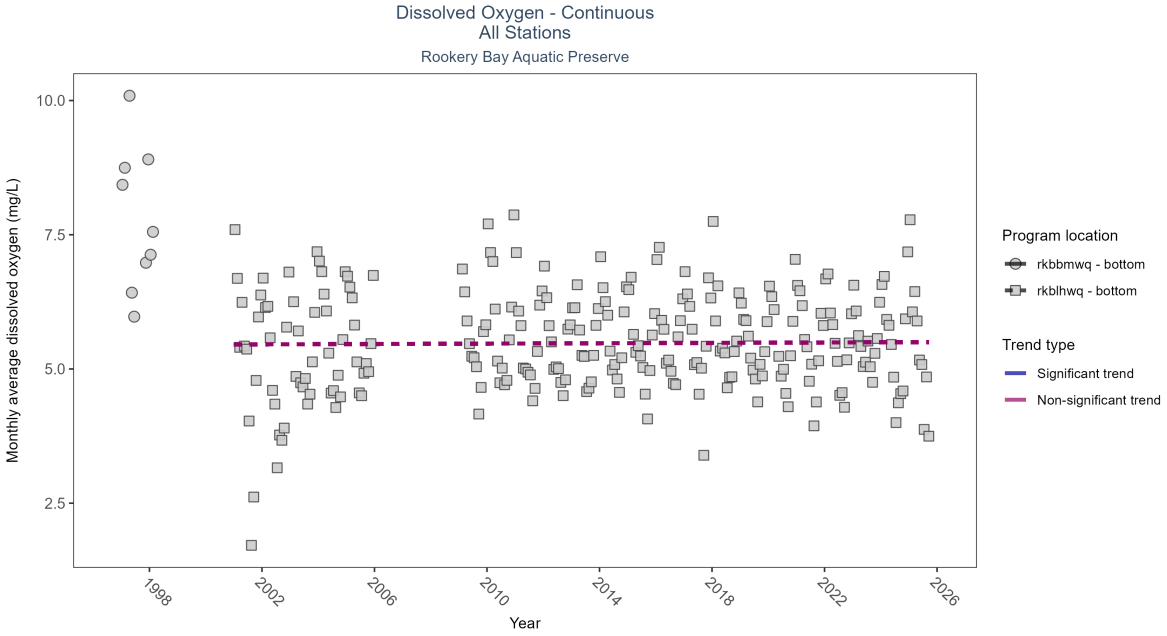

Figure 7: Scatter plot of monthly average dissolved oxygen over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
rkblhwq	No significant trend	599204	22	2001 - 2025	5.5	0.02	5.46	0	0.6741
rkbbmwq	Insufficient data to calculate trend	10441	2	1997 - 1998	7.2	-	-	-	-

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

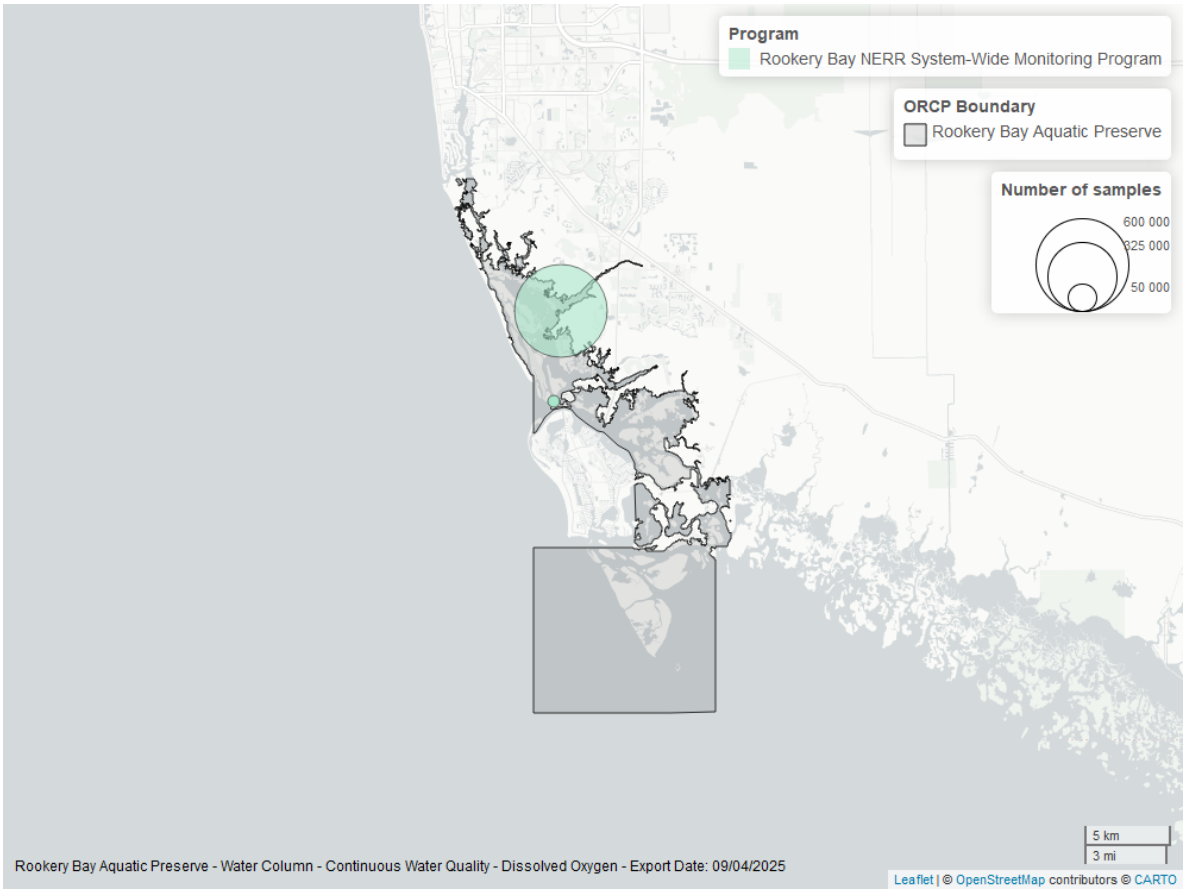

Figure 8: Map showing location of dissolved oxygen continuous water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen Saturation - Discrete

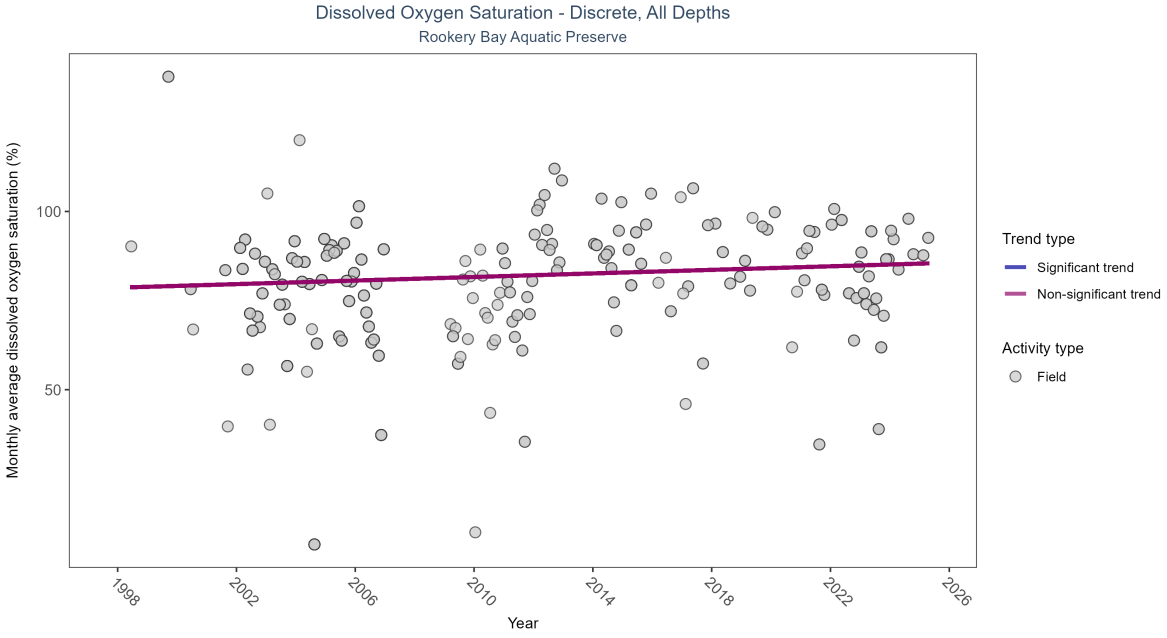

Figure 9: Scatter plot of monthly average dissolved oxygen saturation over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen saturation values measured in the field (circles) 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	No significant trend	801	25	1998 - 2025	81.1	0.08694	78.61476	0.25	0.1449

Dissolved oxygen saturation showed no detectable trend between 1998 and 2025.

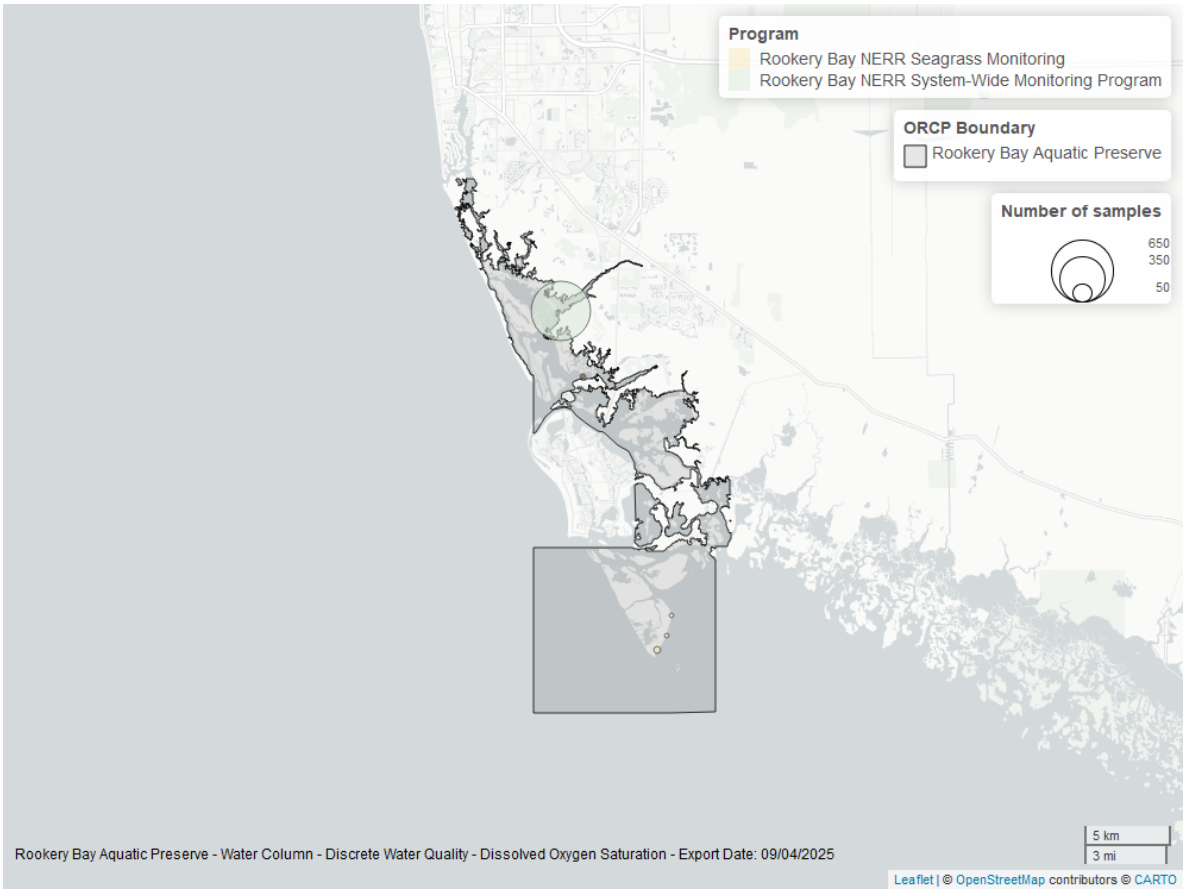

Figure 10: Map showing location of discrete water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Dissolved Oxygen Saturation - Continuous

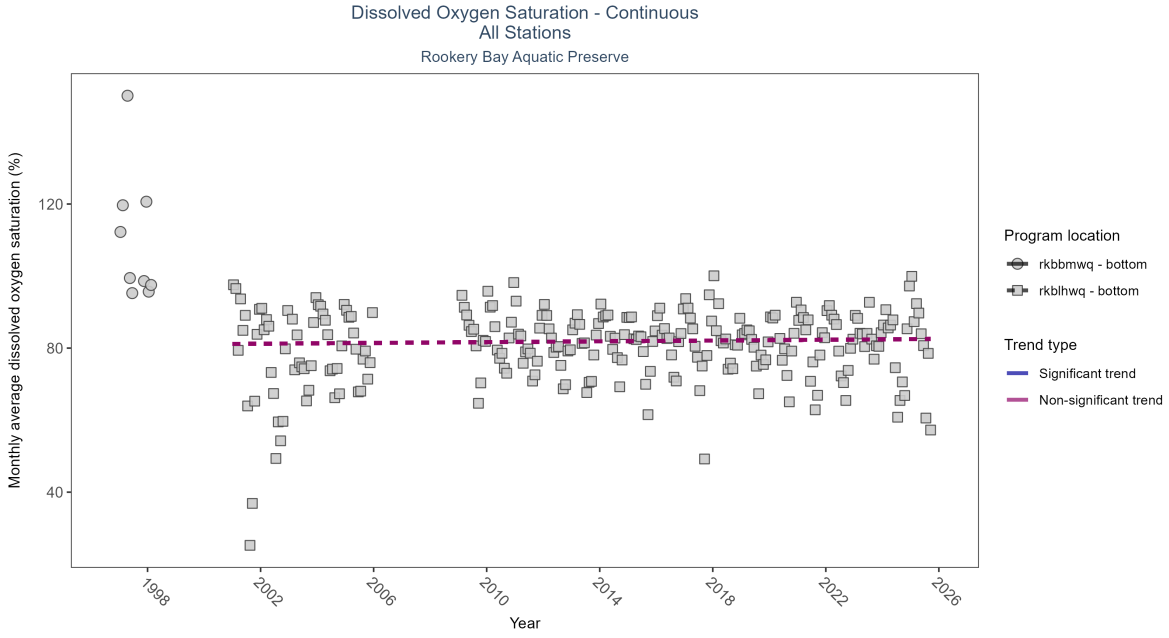

Figure 11: Scatter plot of monthly average dissolved oxygen saturation over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
rkblhwq	No significant trend	611522	22	2001 - 2025	82.0	0.05	81.16	0.06	0.2259
rkbbmwq	Insufficient data to calculate trend	10441	2	1997 - 1998	102.4	-	-	-	-

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.

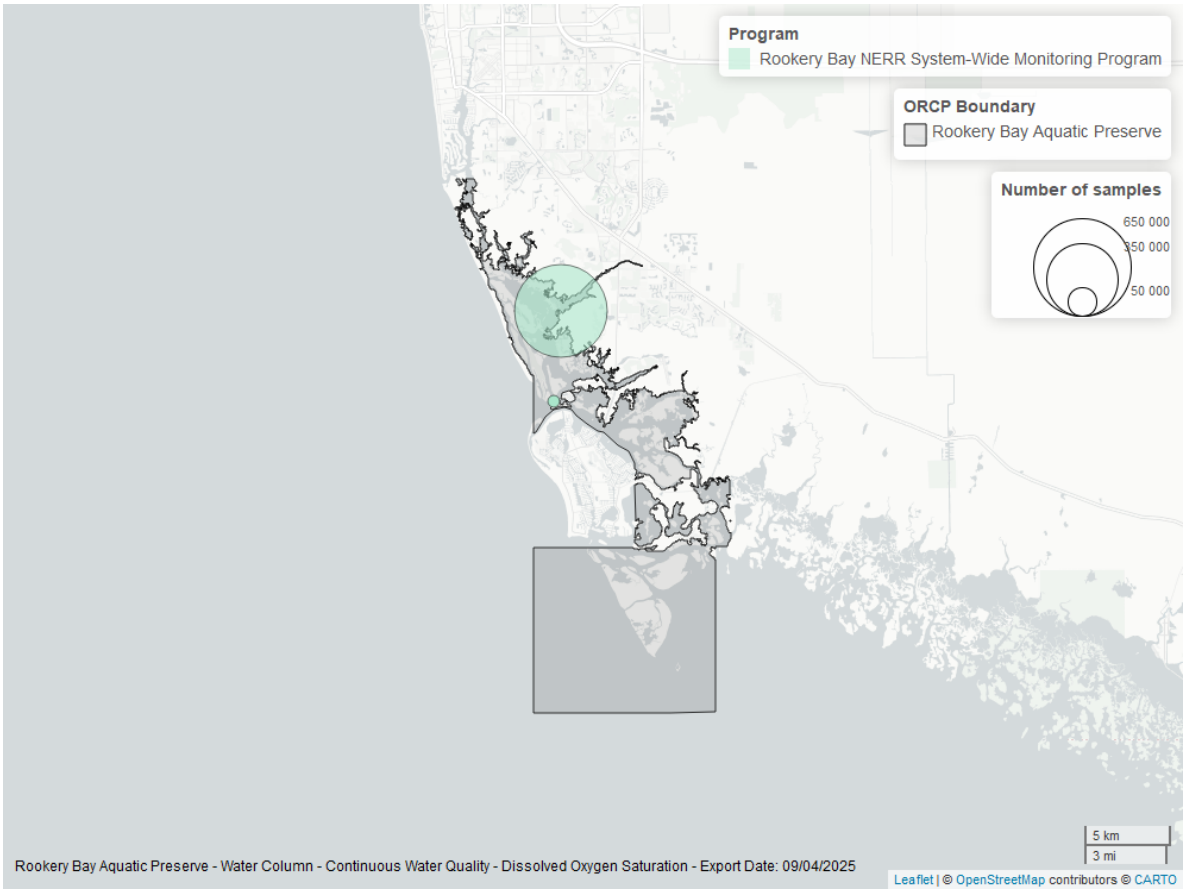

Figure 12: Map showing location of dissolved oxygen saturation continuous water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Salinity - Discrete

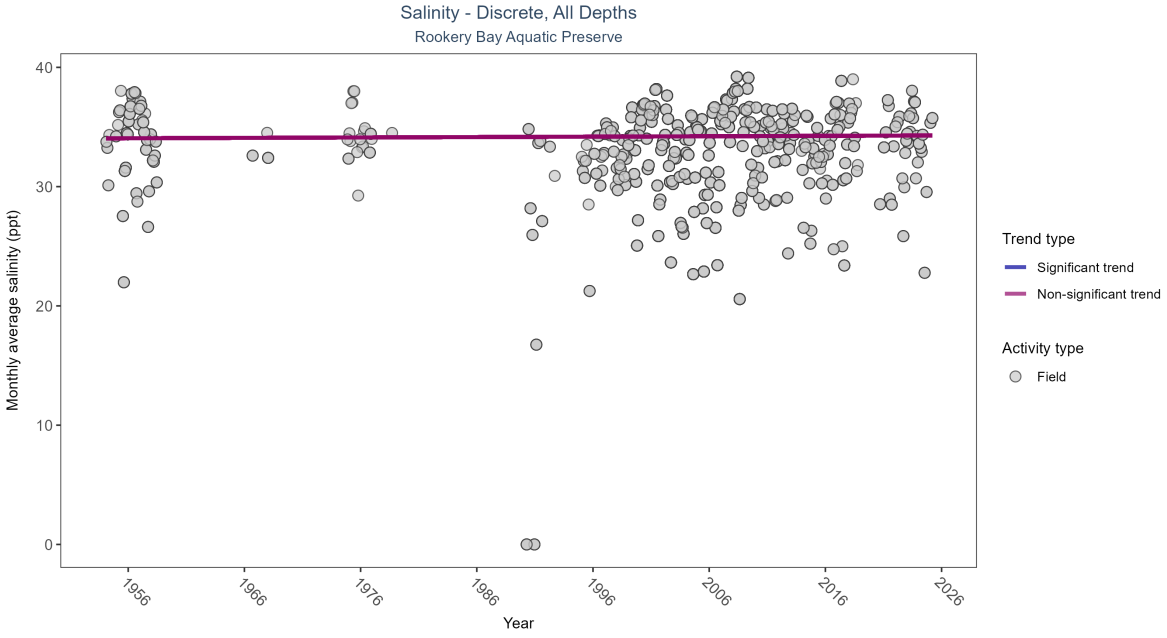

Figure 13: Scatter plot of monthly average salinity over time. If the time series included ten or more years of discrete observations, significant (blue) or non-significant (magenta) trend lines are also shown. Discrete salinity values derived from grab samples analyzed in the field (circles) or the 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	No significant trend	5289	46	1954 - 2025	34.1	0.01494	34.04589	0.00341	0.6745

Salinity showed no detectable trend between 1954 and 2025.

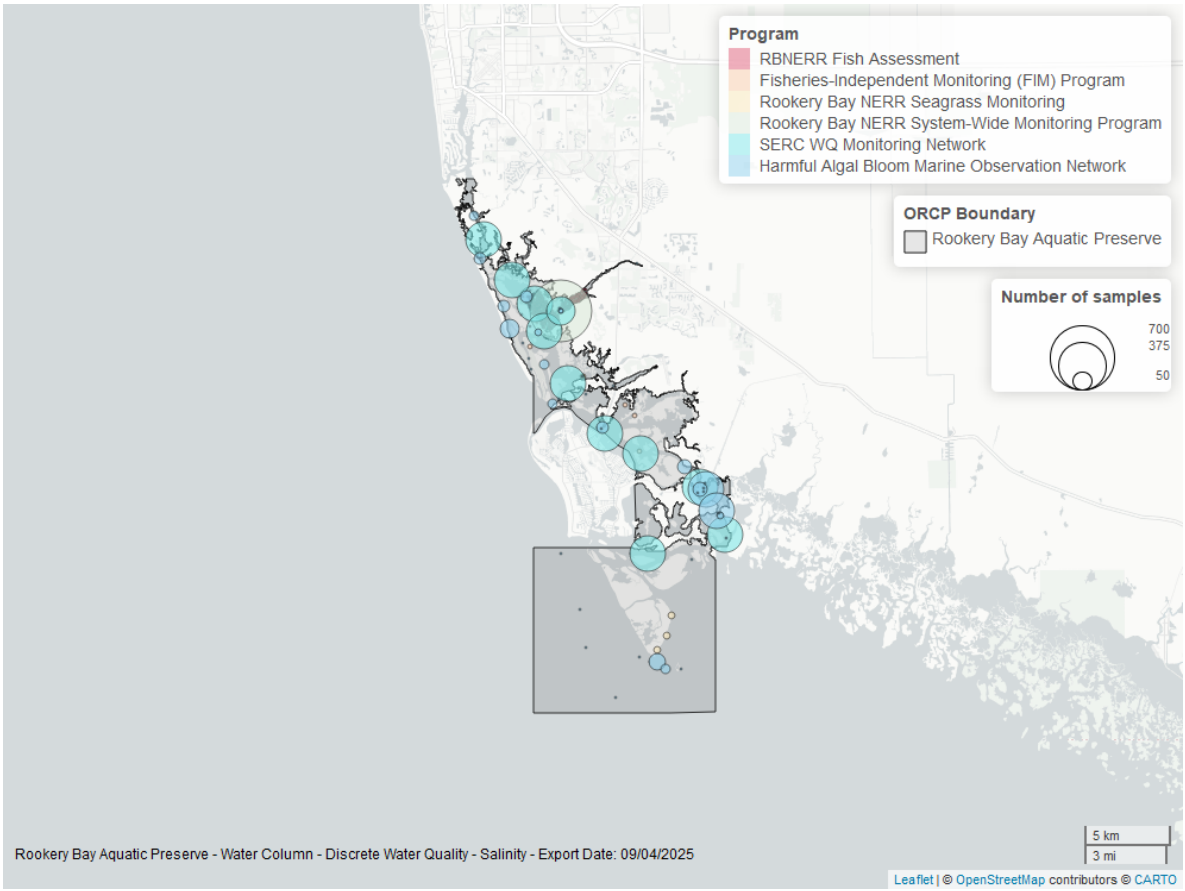

Figure 14: Map showing location of discrete water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Salinity - Continuous

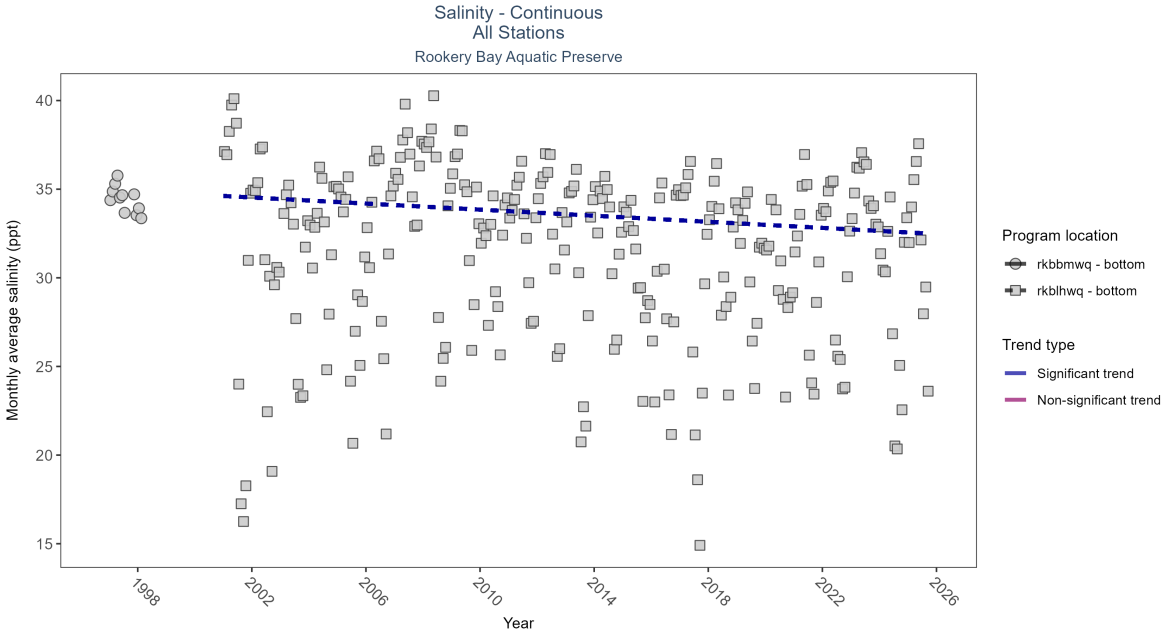

Figure 15: Scatter plot of monthly average salinity over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
rkblhwq	Significantly decreasing trend	686355	25	2001 - 2025	33.1	-0.14	34.62	-0.09	8e-04
rkbbmwq	Insufficient data to calculate trend	12256	2	1997 - 1998	34.5	-	-	-	-

At one program location, monthly average salinity decreased by 0.09 ppt per year. There was insufficient data to fit a model for one location.

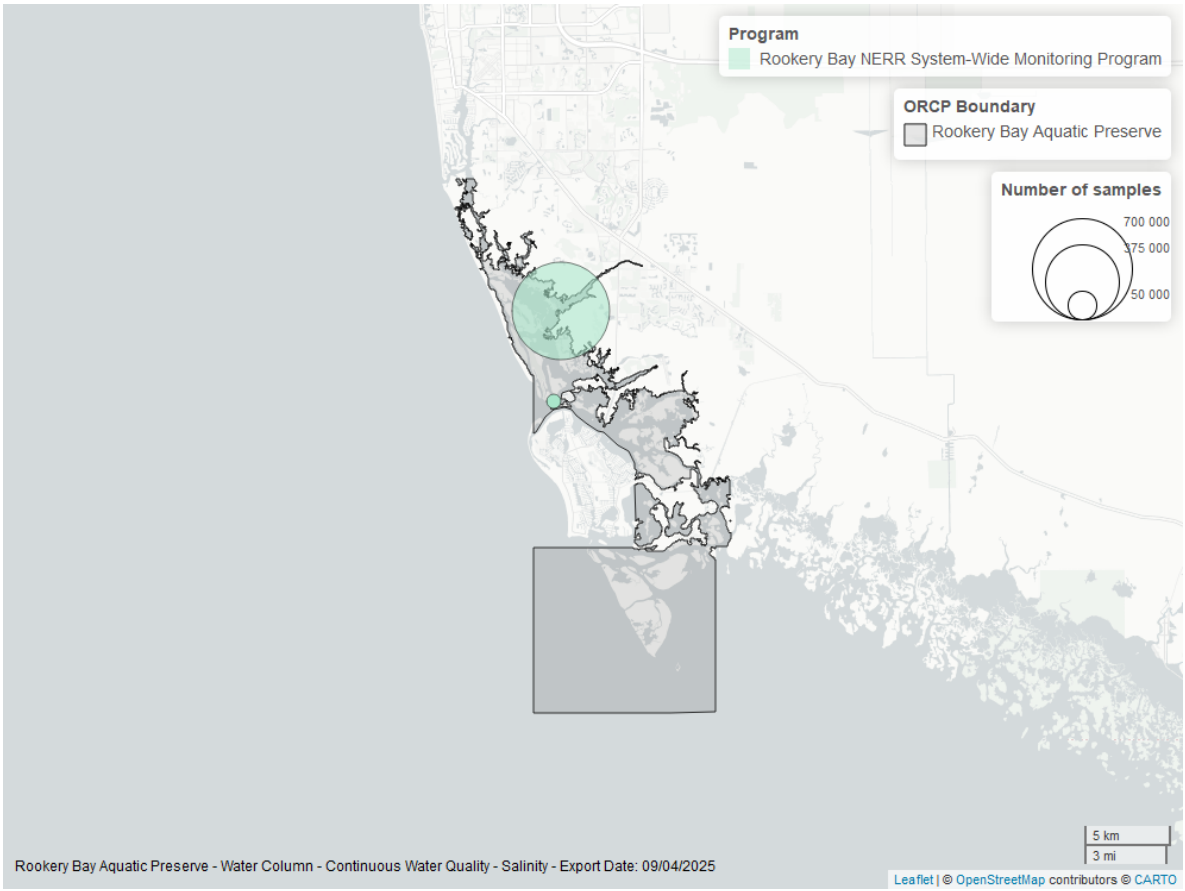

Figure 16: Map showing location of salinity continuous water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Temperature - Discrete

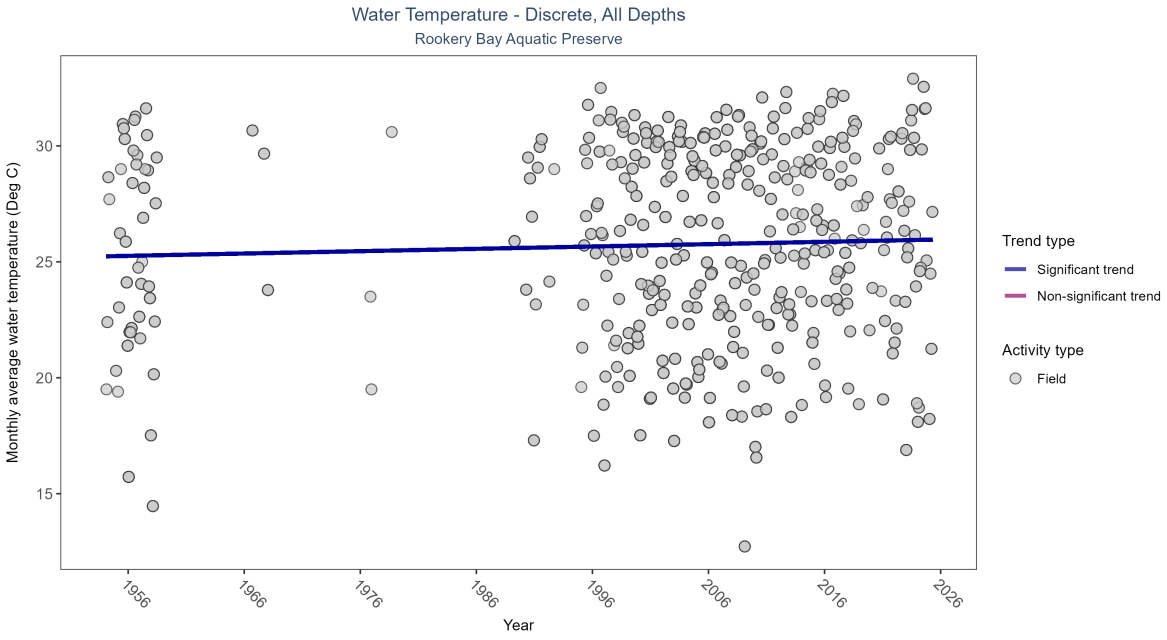

Figure 17: Scatter plot of monthly average water temperature over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only water temperature measurements taken in the field (circles) are included in 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	5207	45	1954 - 2025	26.4	0.0754	25.23799	0.0101	0.0253

Monthly average water temperature increased by 0.01°C per year.

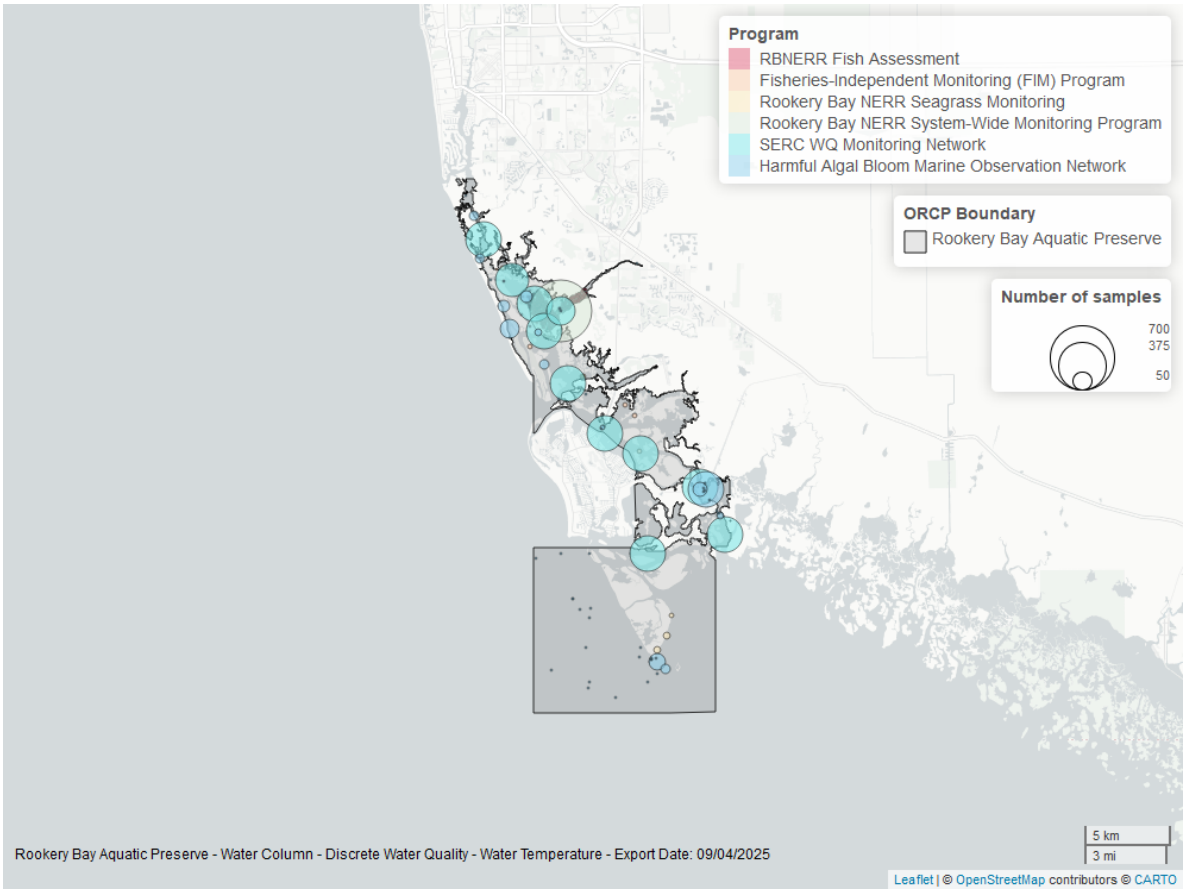

Figure 18: Map showing location of discrete water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Temperature - Continuous

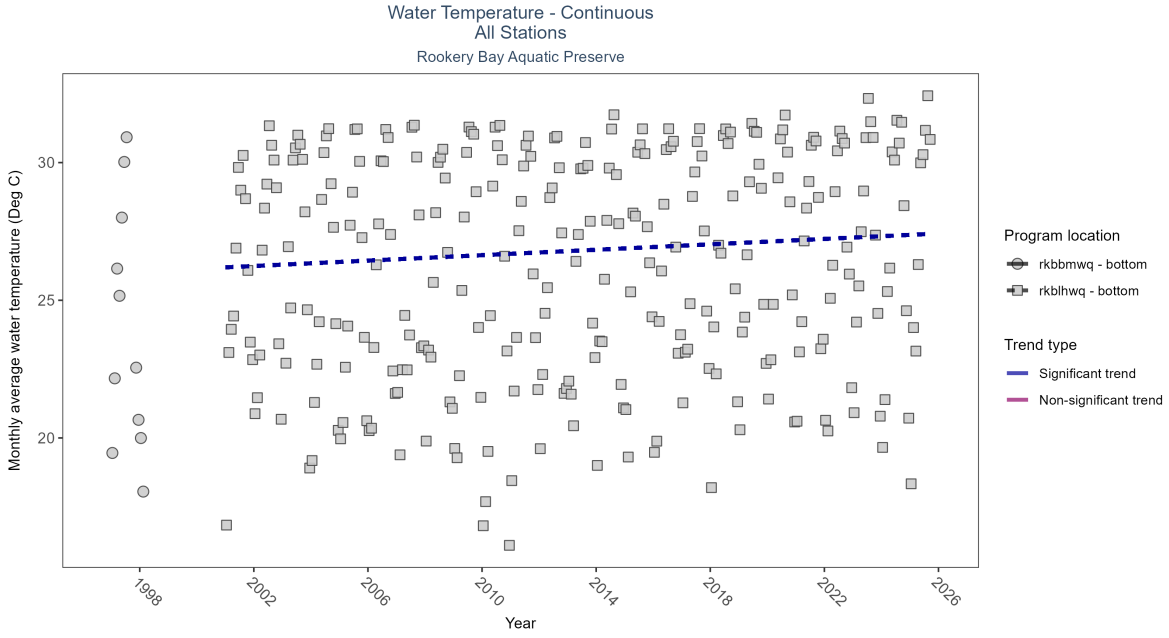

Figure 19: Scatter plot of monthly average water temperature over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
rkblhwq	Significantly increasing trend	717507	25	2001 - 2025	26.9	0.24	26.19	0.05	0
rkbbmwq	Insufficient data to calculate trend	12610	2	1997 - 1998	23.8	-	-	-	-

At one program location, monthly average water temperature increased by 0.05°C per year. There was insufficient data to fit a model for one location.

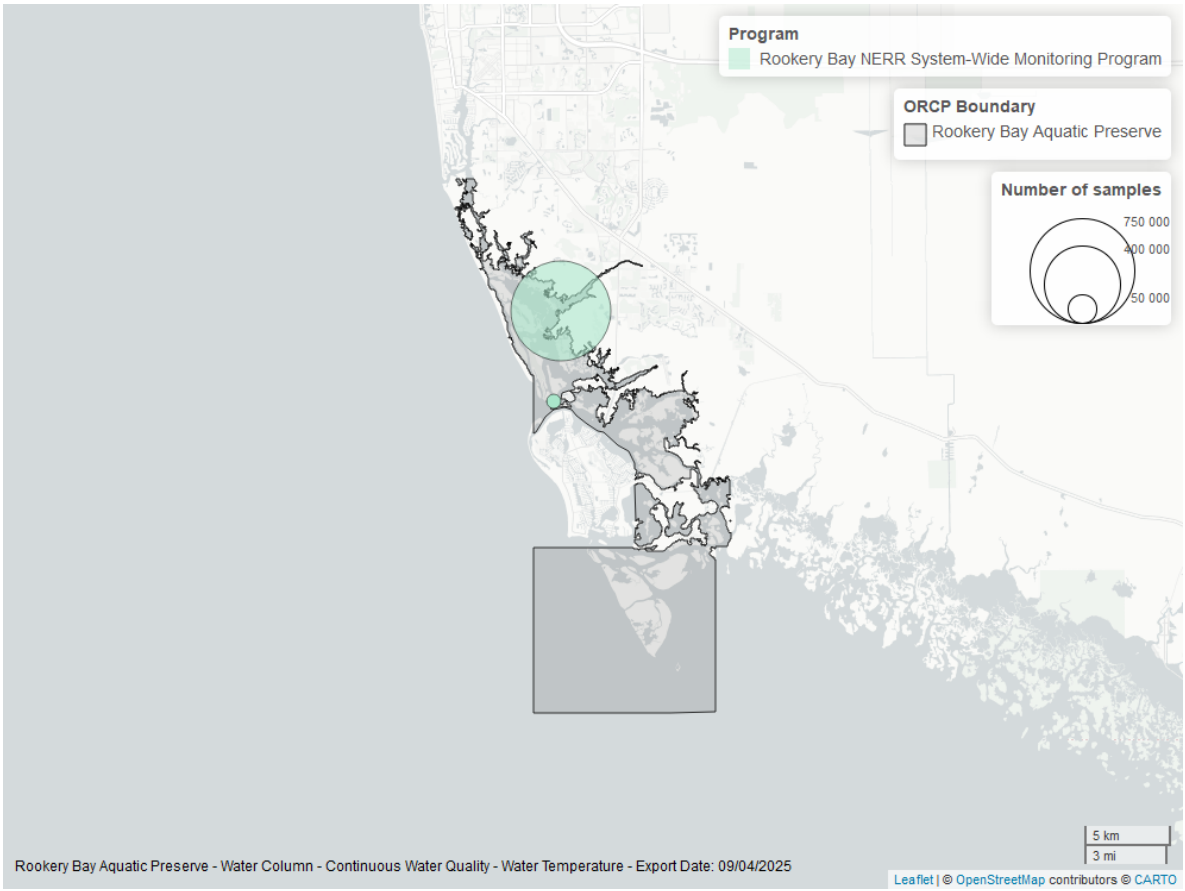

Figure 20: Map showing location of water temperature continuous water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

pH - Discrete

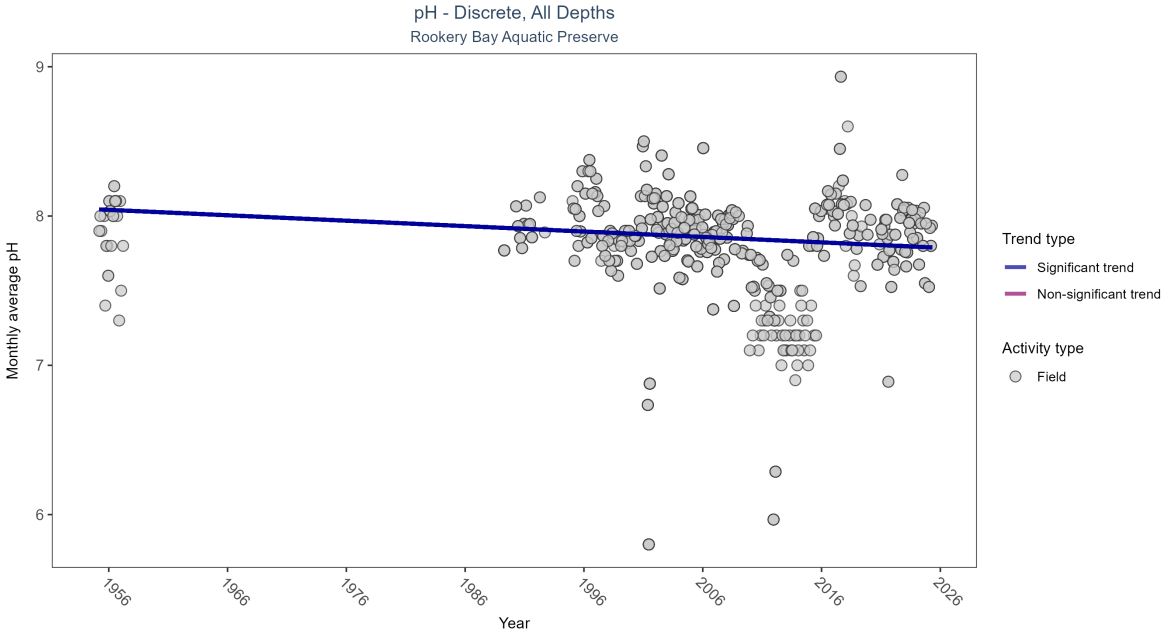

Figure 21: Scatter plot of monthly average pH over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only pH values measured in the field (circles) are included in the plot.

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	2432	38	1955 - 2025	7.9	-0.13195	8.04498	-0.00363	6e-04

Monthly average pH decreased by less than 0.01 pH units per year.

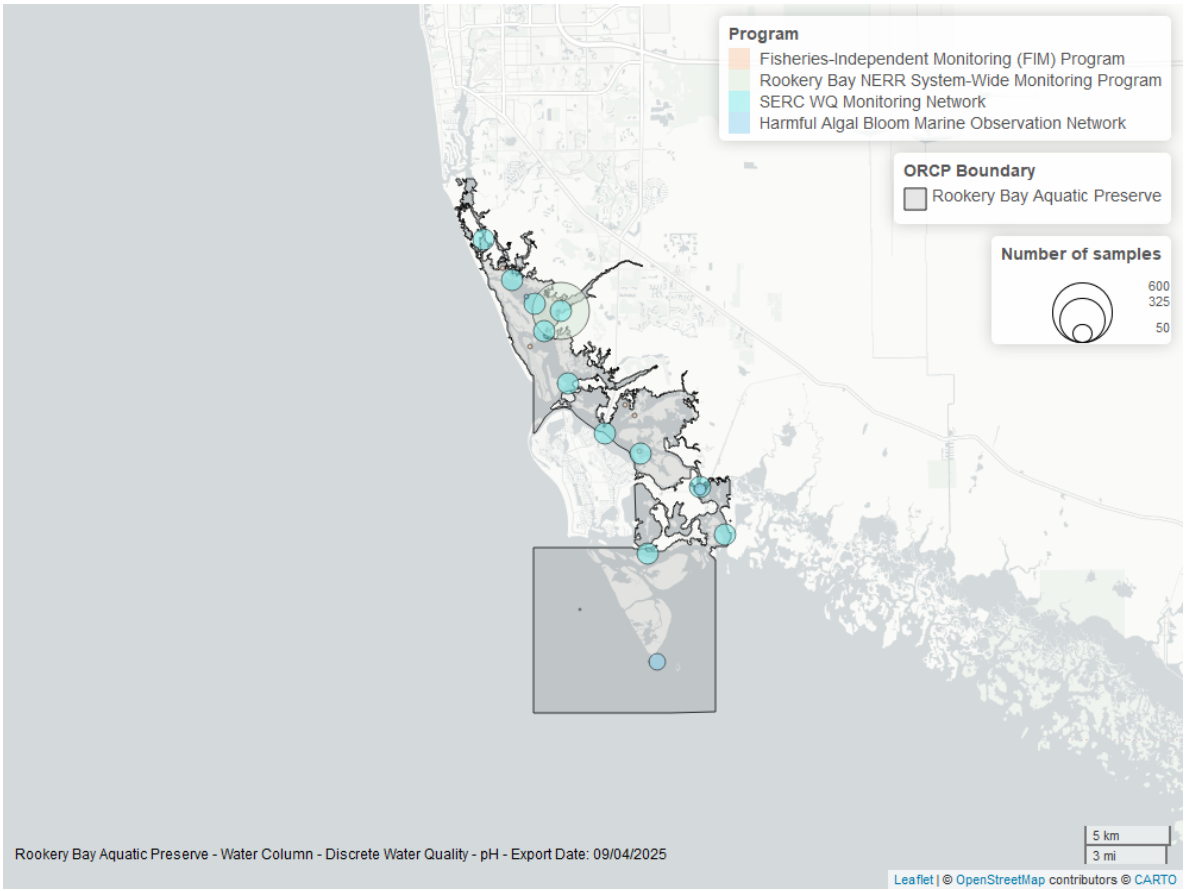

Figure 22: Map showing location of discrete water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

pH - Continuous

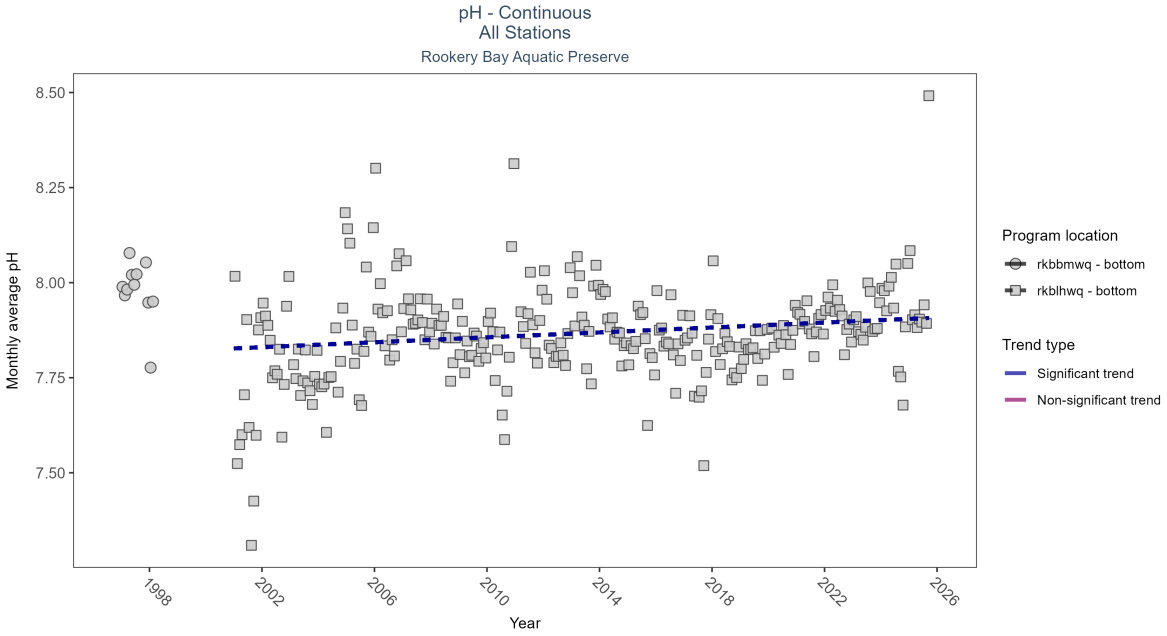

Figure 23: Scatter plot of monthly average pH over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
rkblhwq	Significantly increasing trend	658342	25	2001 - 2025	7.9	0.17	7.83	0	1e-04
rkbbmwq	Insufficient data to calculate trend	12610	2	1997 - 1998	8.0	-	-	-	-

At one program location, monthly average pH increased by less than 0.01 pH units per year. There was insufficient data to fit a model for one location.

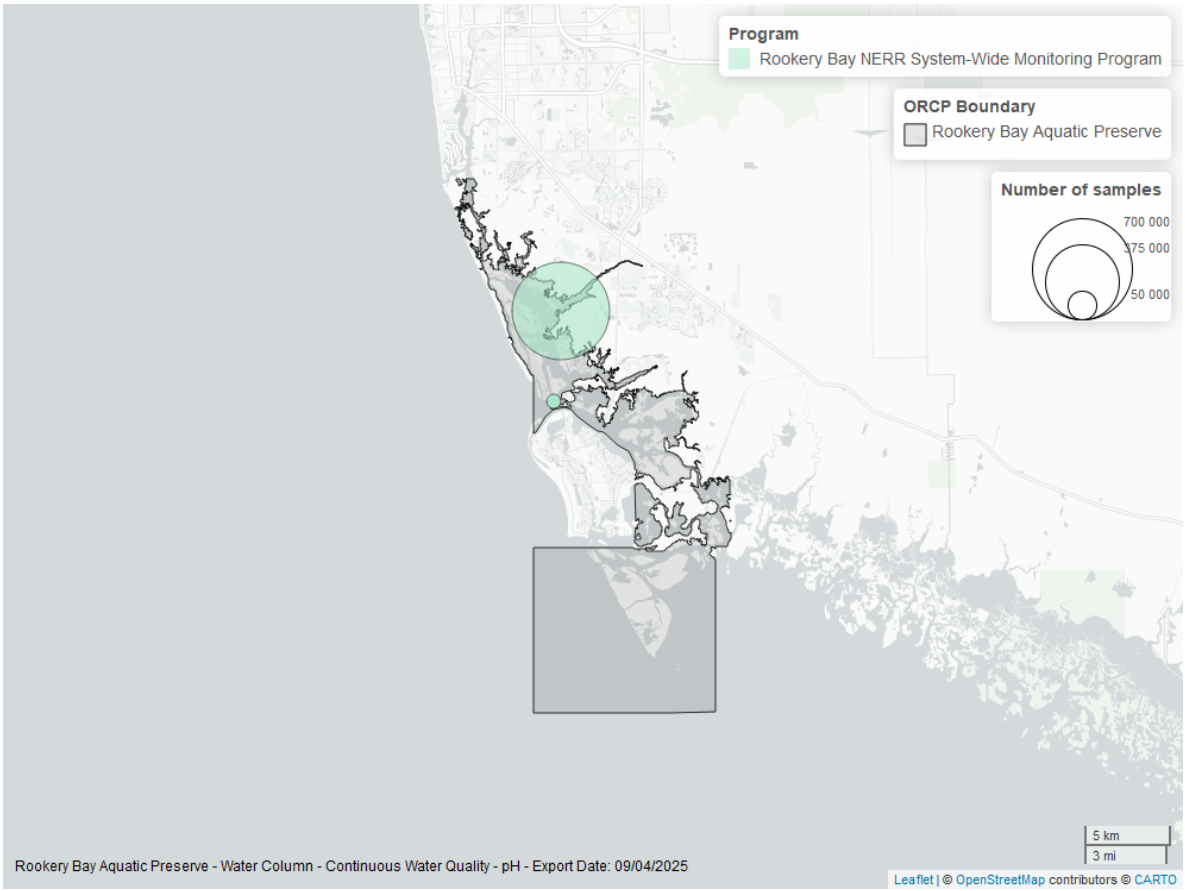

Figure 24: Map showing location of ph continuous water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Water Clarity

Turbidity - Discrete

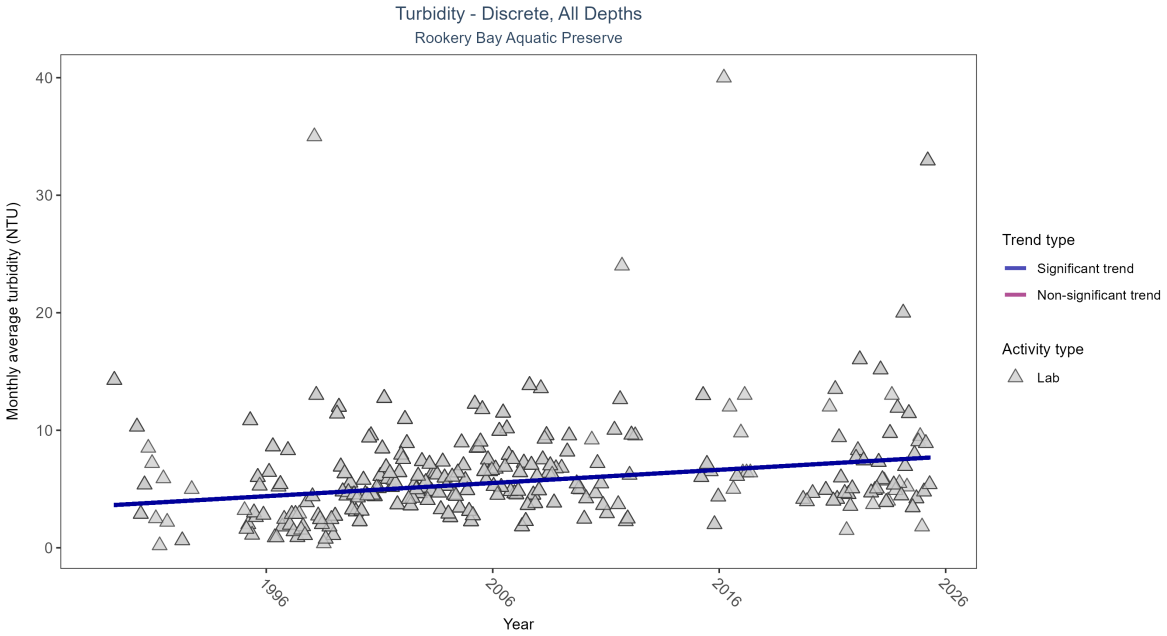

Figure 25: Scatter plot of monthly average turbidity over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only turbidity values measured in the laboratory (triangles) are included in the plot.

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	Significantly increasing trend	1867	32	1989 - 2025	5	0.23755	3.60614	0.11218	0

Monthly average turbidity increased by 0.11 NTU per year, indicating a decrease in water clarity.

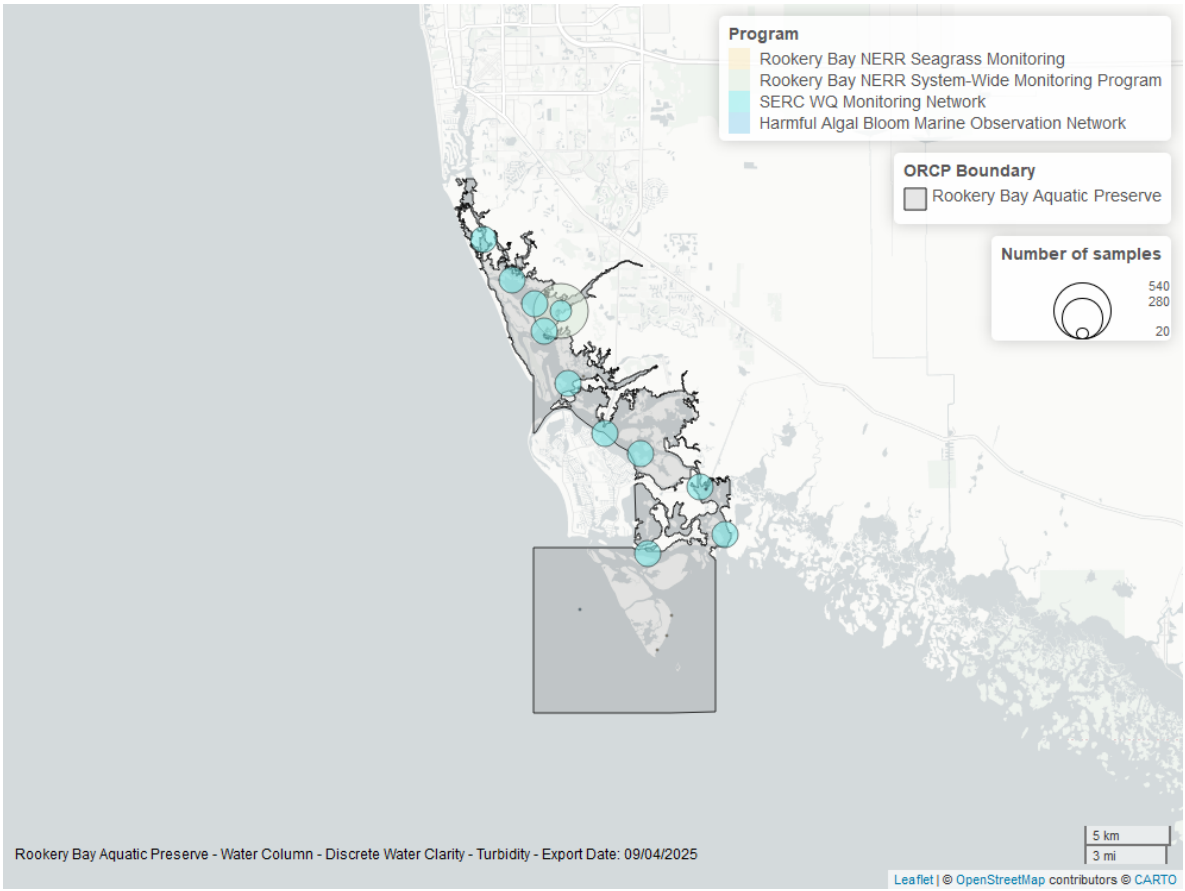

Figure 26: Map showing location of discrete water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Turbidity - Continuous

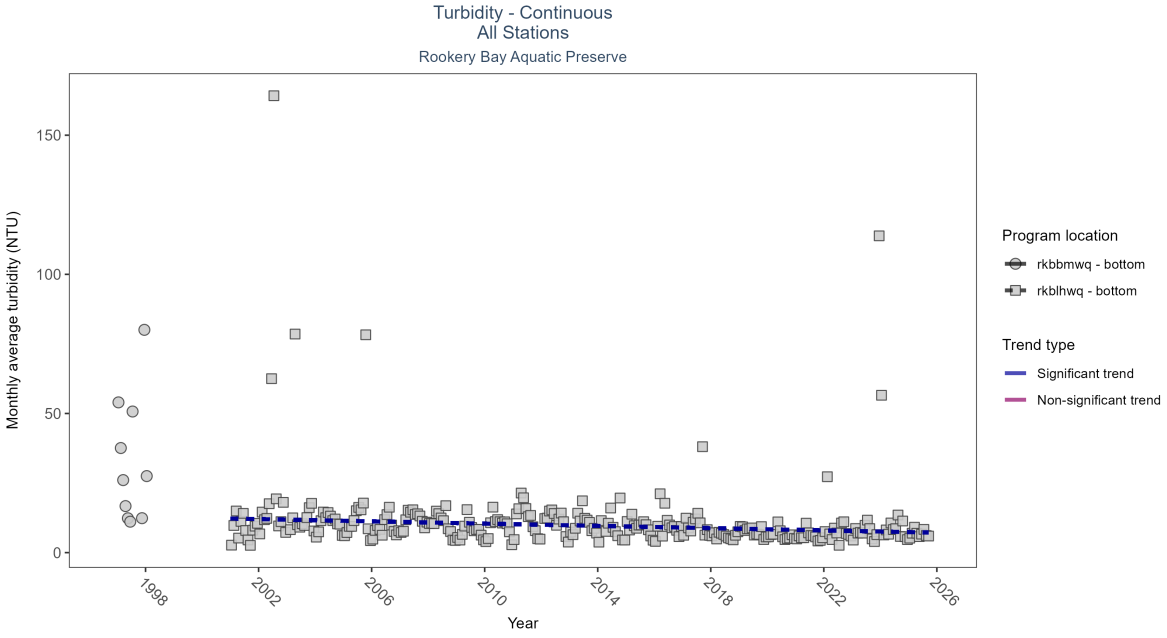

Figure 27: Scatter plot of monthly average turbidity over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

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
rkblhwq	Significantly decreasing trend	633518	25	2001 - 2025	8	-0.29	12.25	-0.2	0
rkbbmwq	Insufficient data to calculate trend	10654	2	1997 - 1998	11	-	-	-	-

At one program location, monthly average turbidity decreased by 0.20 NTU per year. There was insufficient data to fit a model for one location.

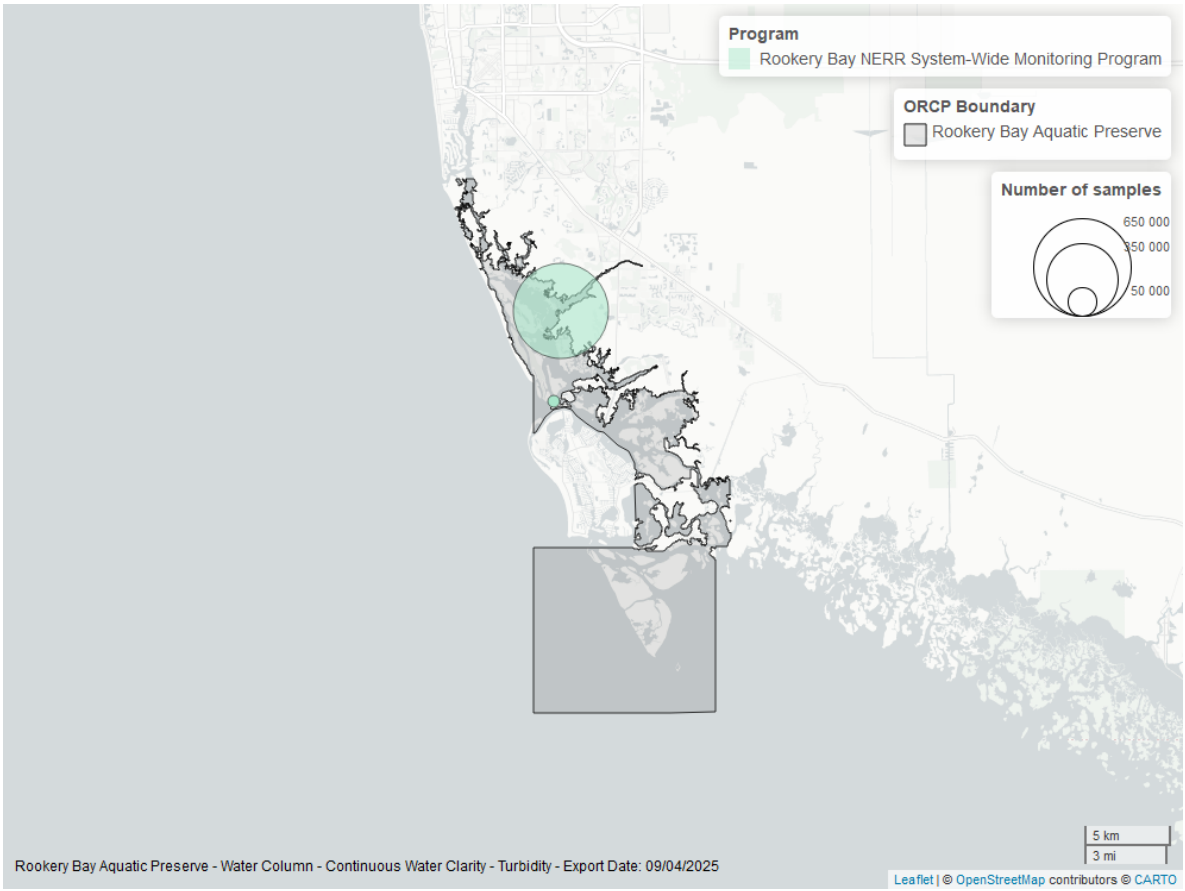

Figure 28: Map showing location of turbidity continuous water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Total Suspended Solids - Discrete

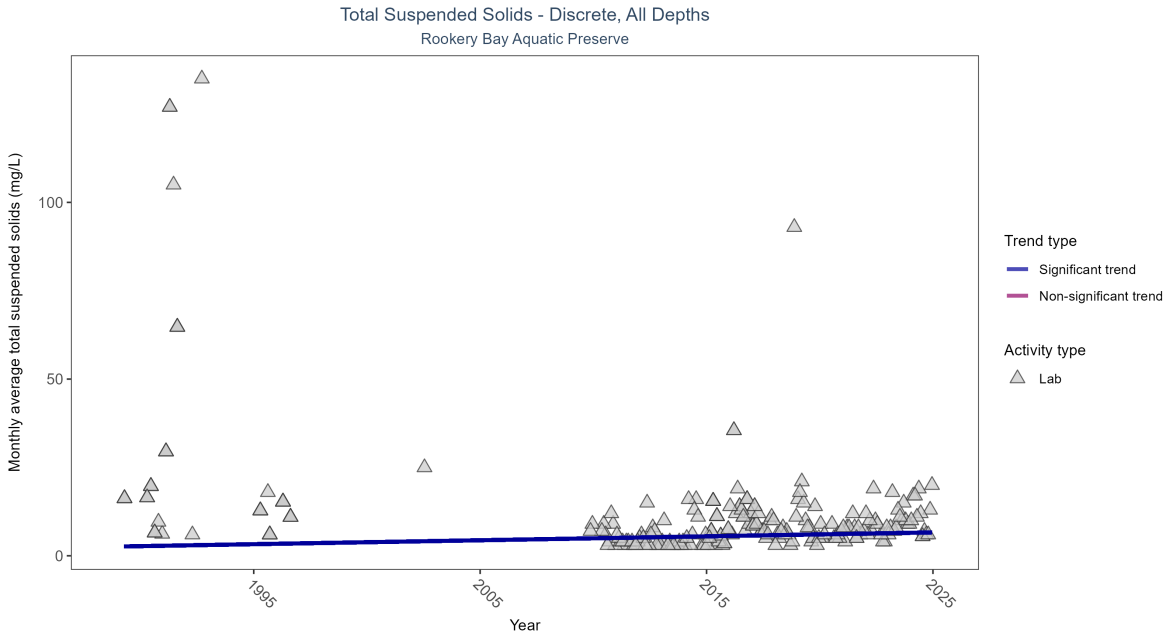

Figure 29: Scatter plot of monthly average total suspended solids (TSS) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only TSS values obtained from laboratory analyses (triangles) are included 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	Significantly increasing trend	255	23	1989 - 2024	8	0.13318	2.6125	0.11111	0.0322

Monthly average total suspended solids increased by 0.11 mg/L per year, indicating a decrease in water clarity.

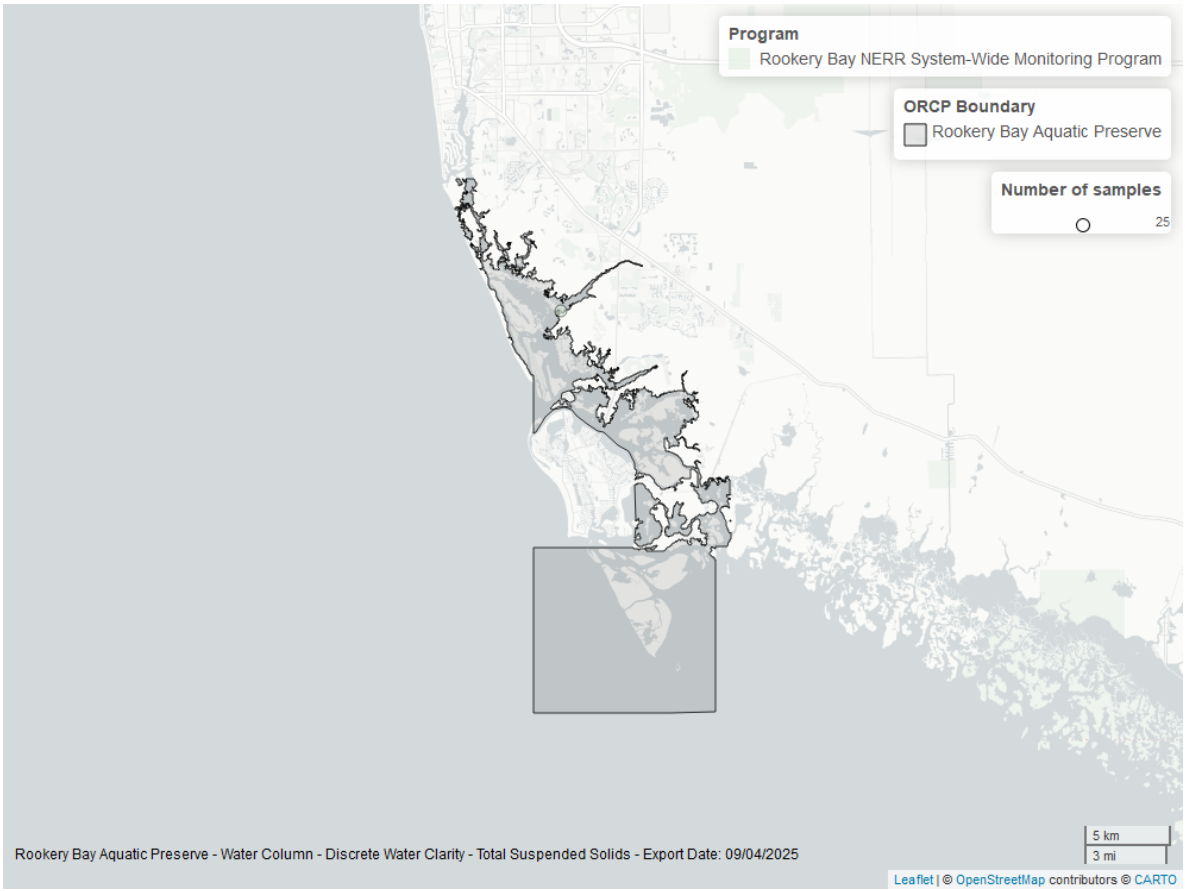

Figure 30: Map showing location of discrete water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Chlorophyll a, Uncorrected for Pheophytin - Discrete

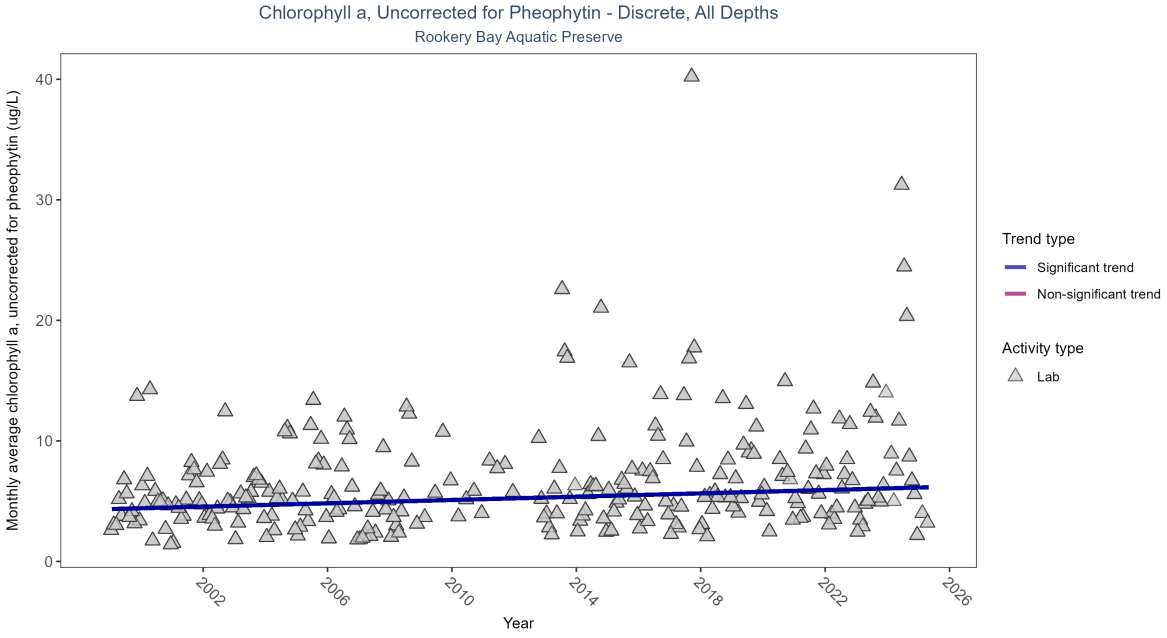

Figure 31: Scatter plot of monthly average levels of chlorophyll a, uncorrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) 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	3234	27	1999 - 2025	5	0.1985	4.34118	0.06869	0

Monthly average chlorophyll a, uncorrected for pheophytin, increased by 0.07 µg/L per year, indicating a decrease in water clarity.

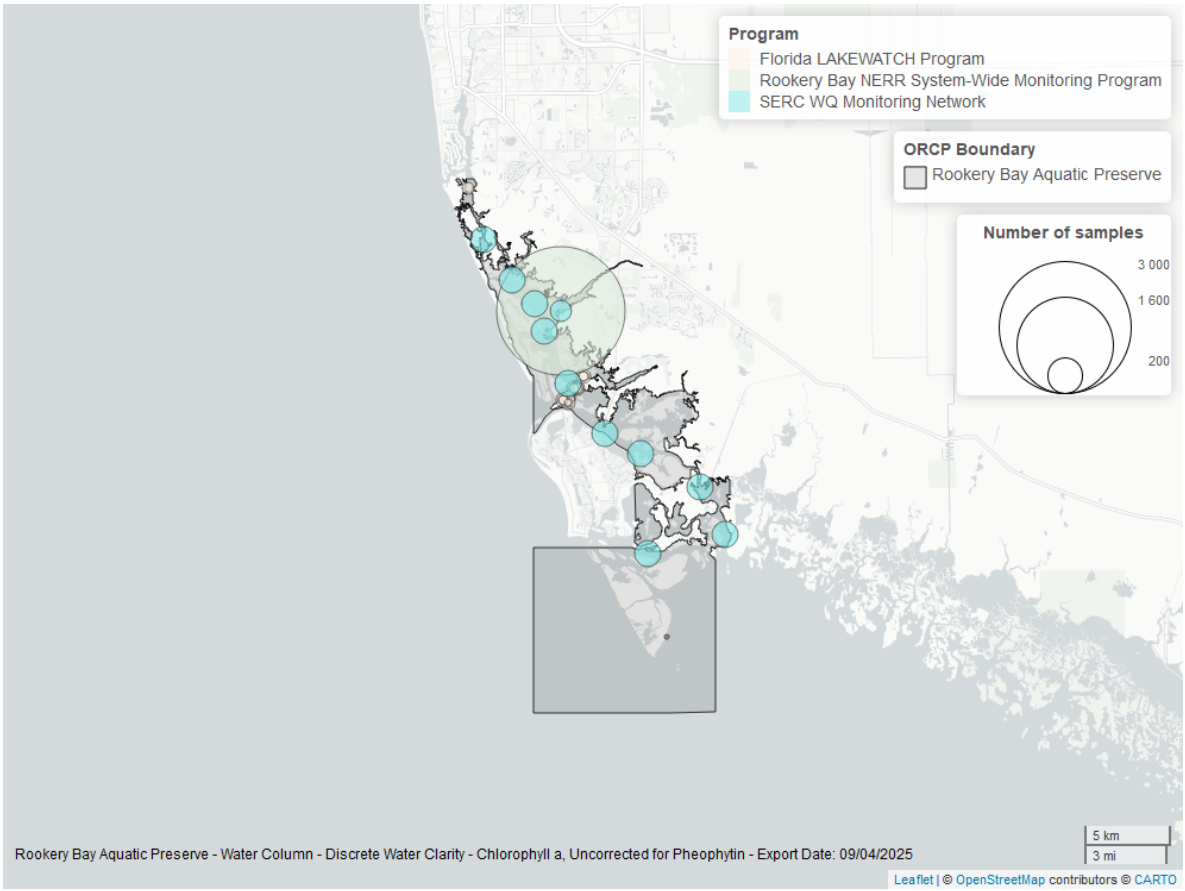

Figure 32: Map showing location of discrete water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Chlorophyll a, Corrected for Pheophytin - Discrete

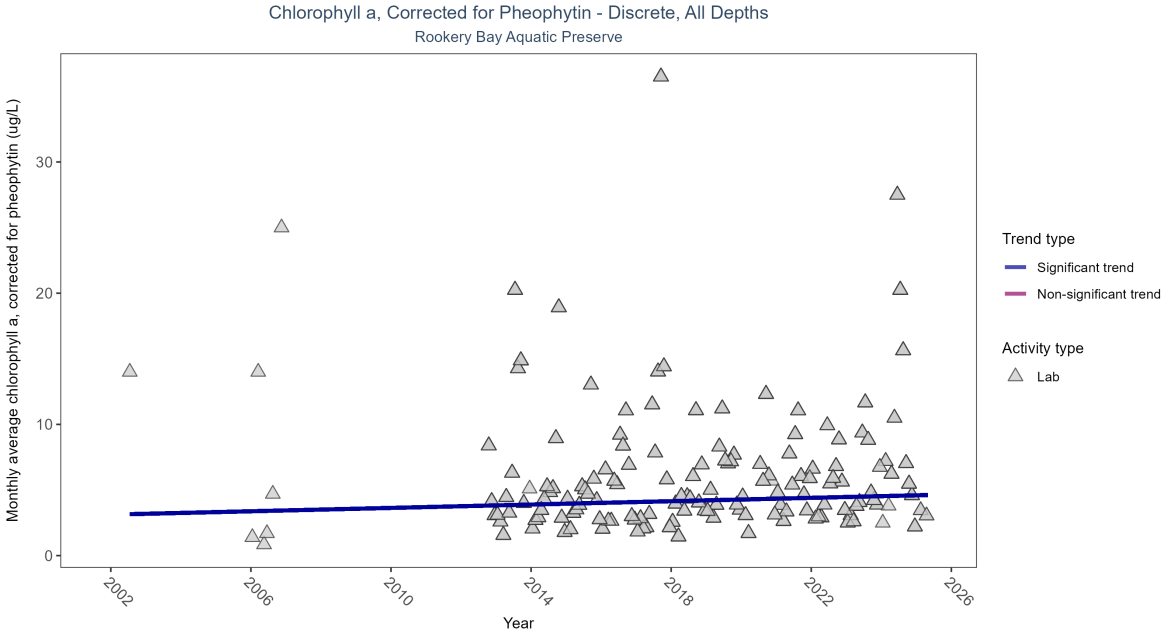

Figure 33: Scatter plot of monthly average levels of chlorophyll a, corrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) 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	Significantly increasing trend	1657	16	2002 - 2025	4.3	0.1255	3.12207	0.06397	0.0426

Monthly average chlorophyll a, corrected for pheophytin, increased by 0.06 µg/L per year, indicating a decrease in water clarity.

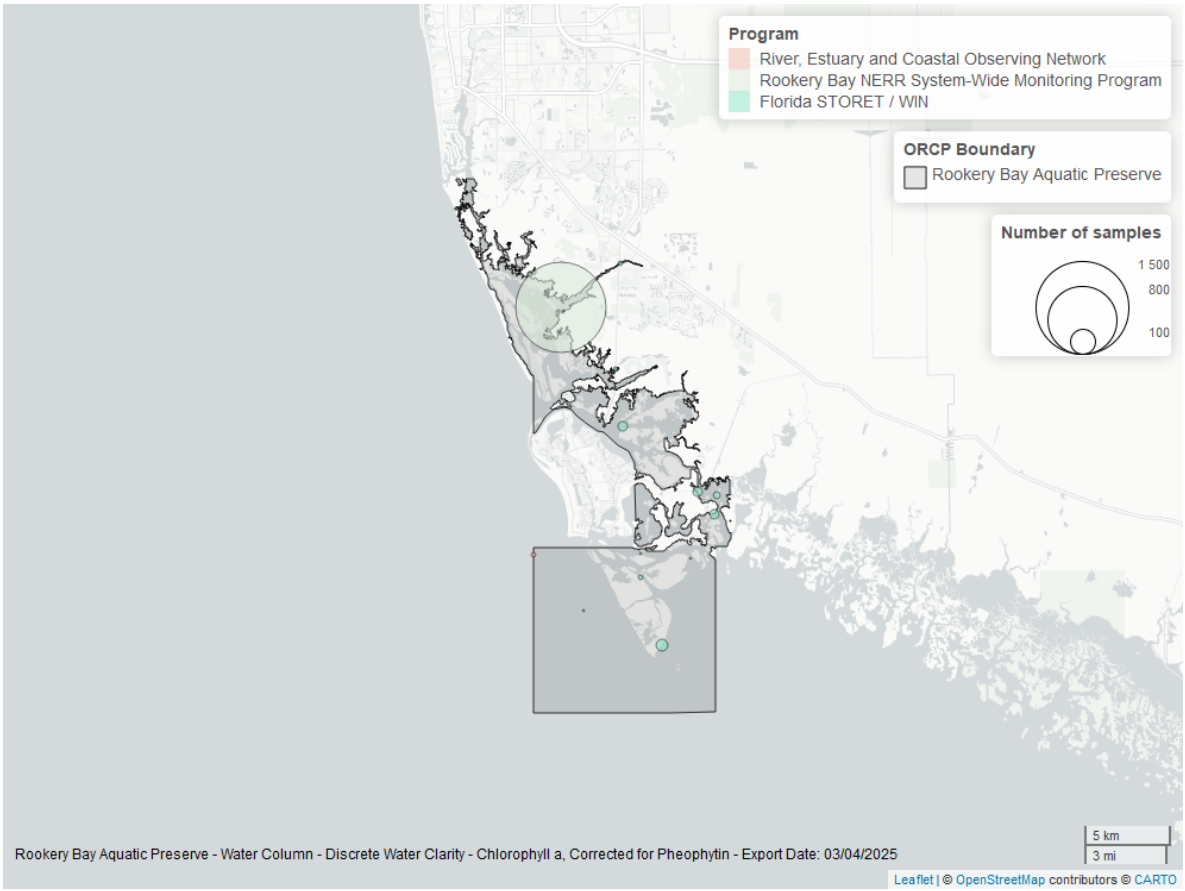

Figure 34: Map showing location of discrete water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Secchi Depth - Discrete

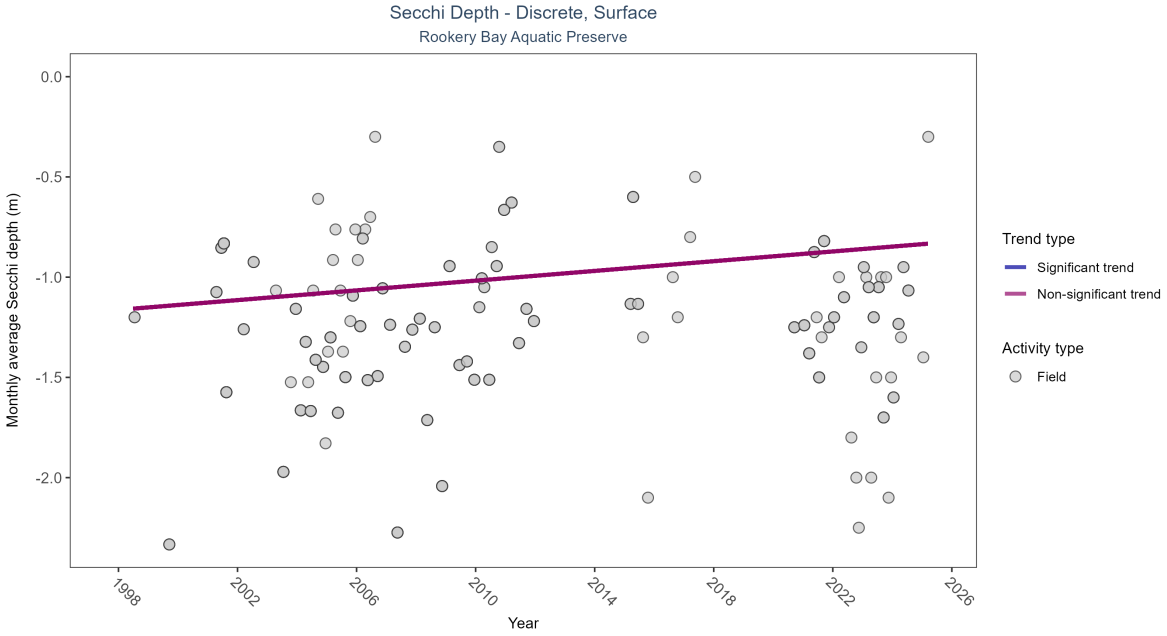

Figure 35: Scatter plot of monthly average Secchi depth over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Secchi depth is only measured in the field (circles).

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	424	22	1998 - 2025	-1.2	0.12013	-1.16309	0.01214	0.0831

Secchi depth showed no detectable trend between 1998 and 2025.

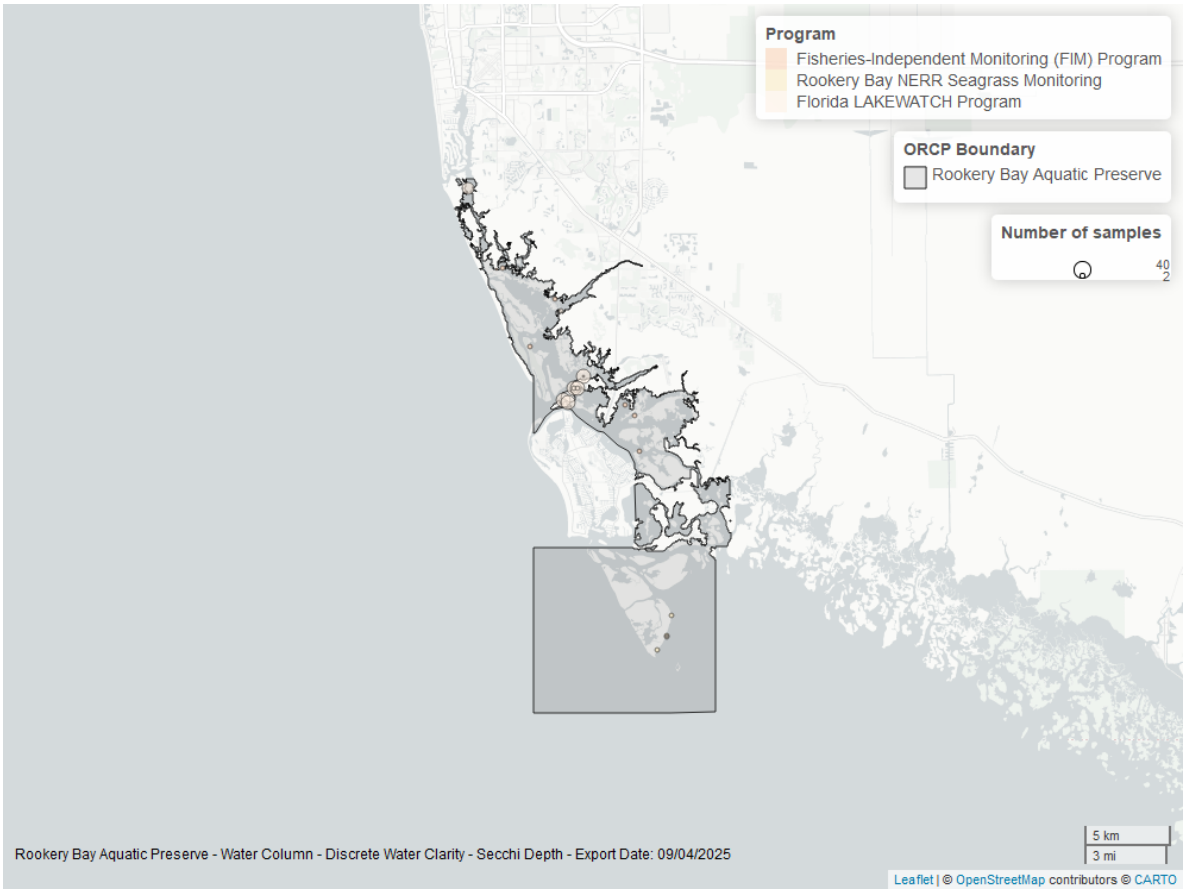

Figure 36: Map showing location of discrete water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

Colored Dissolved Organic Matter - Discrete

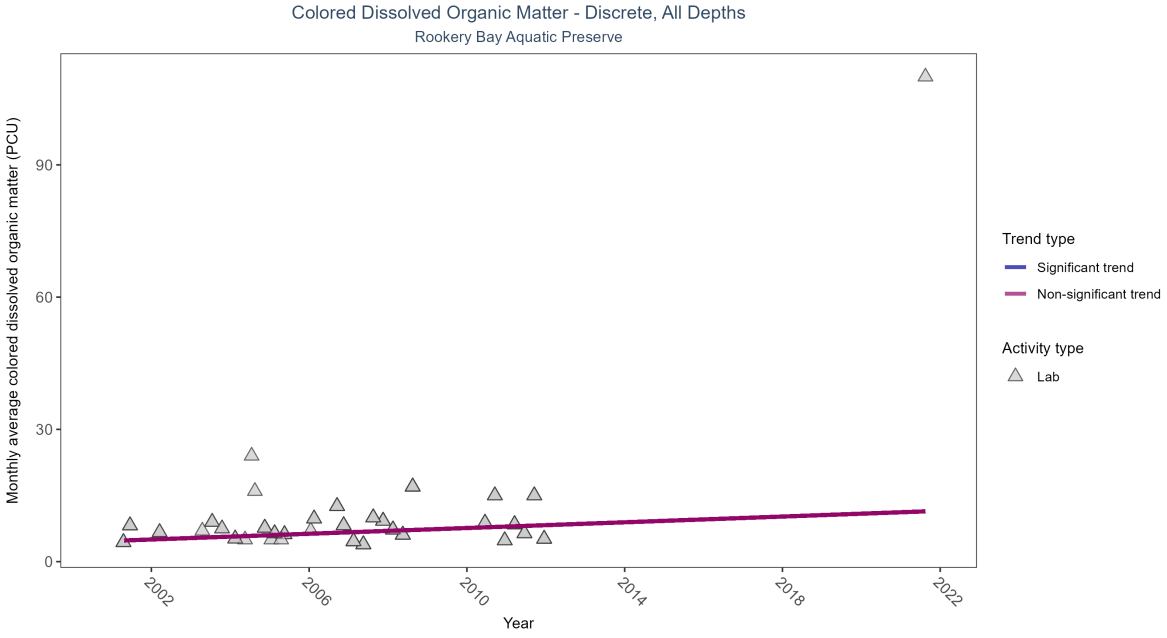

Figure 37: Scatter plot of monthly average colored dissolved organic matter (CDOM) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed CDOM (triangles) is included in the 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	No significant trend	183	11	2001 - 2021	7	0.50505	4.7	0.325	0.0515

Colored dissolved organic matter showed no detectable trend between 2001 and 2021.

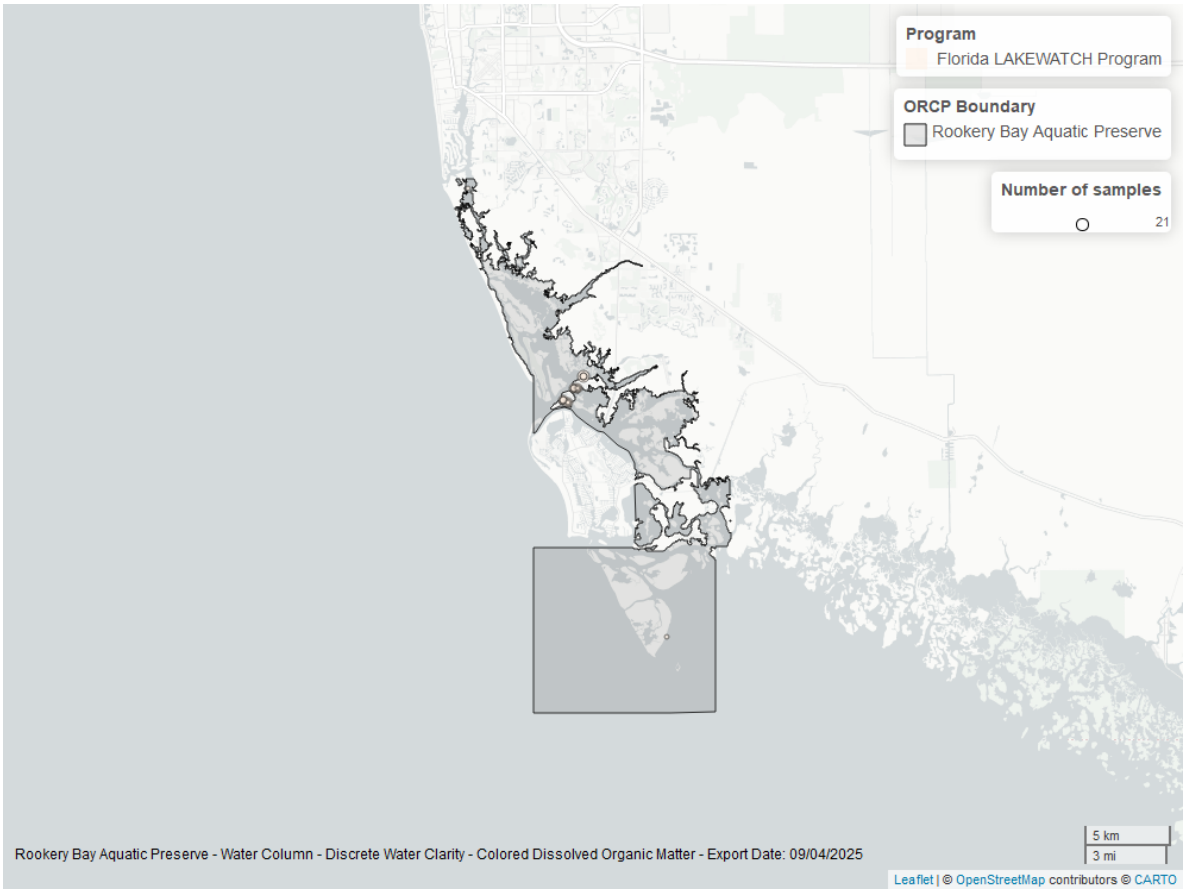

Figure 38: Map showing location of discrete water quality sampling locations within the boundaries of *Rookery Bay Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.