# Kristin Jacobs Coral Aquatic Preserve

SEACAR Water Quality Analysis

Last compiled on 30 September, 2025

## Contents

# Indicators

## Nutrients

### Total Nitrogen - Discrete

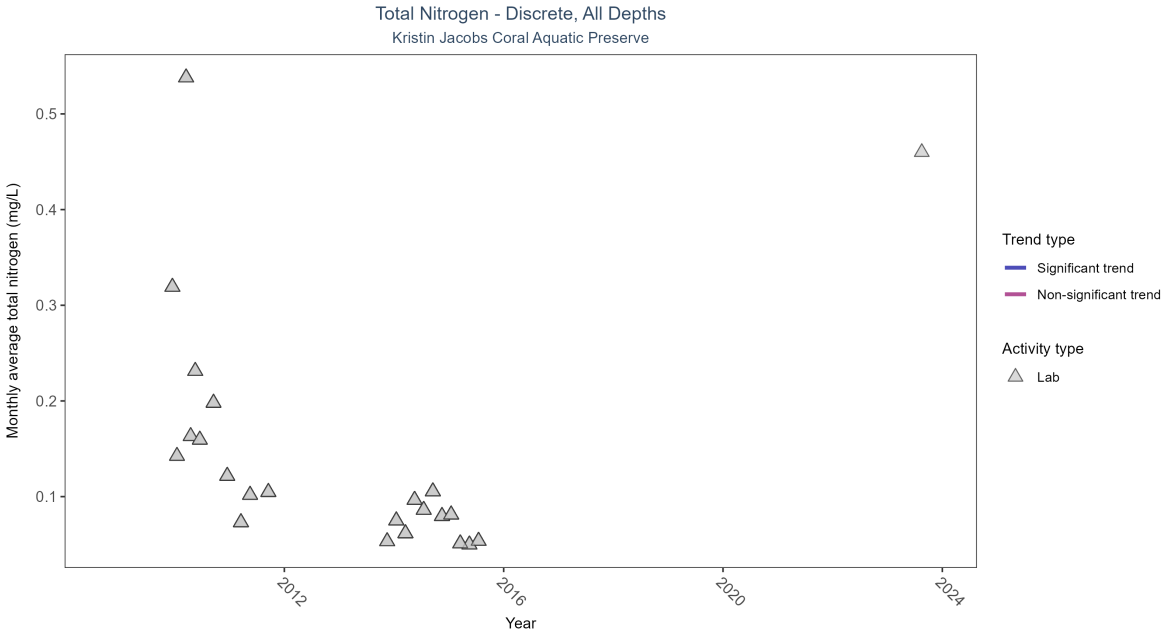


Figure 1: Scatter plot of monthly average total nitrogen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only nitrogen values obtained from laboratory analyses (triangles) are included in the 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 | Insufficient data to calculate trend | 890 | 7 | 2009 - 2023 | 0.071 | - | - | - | - |

There was insufficient data to fit a model for total nitrogen.

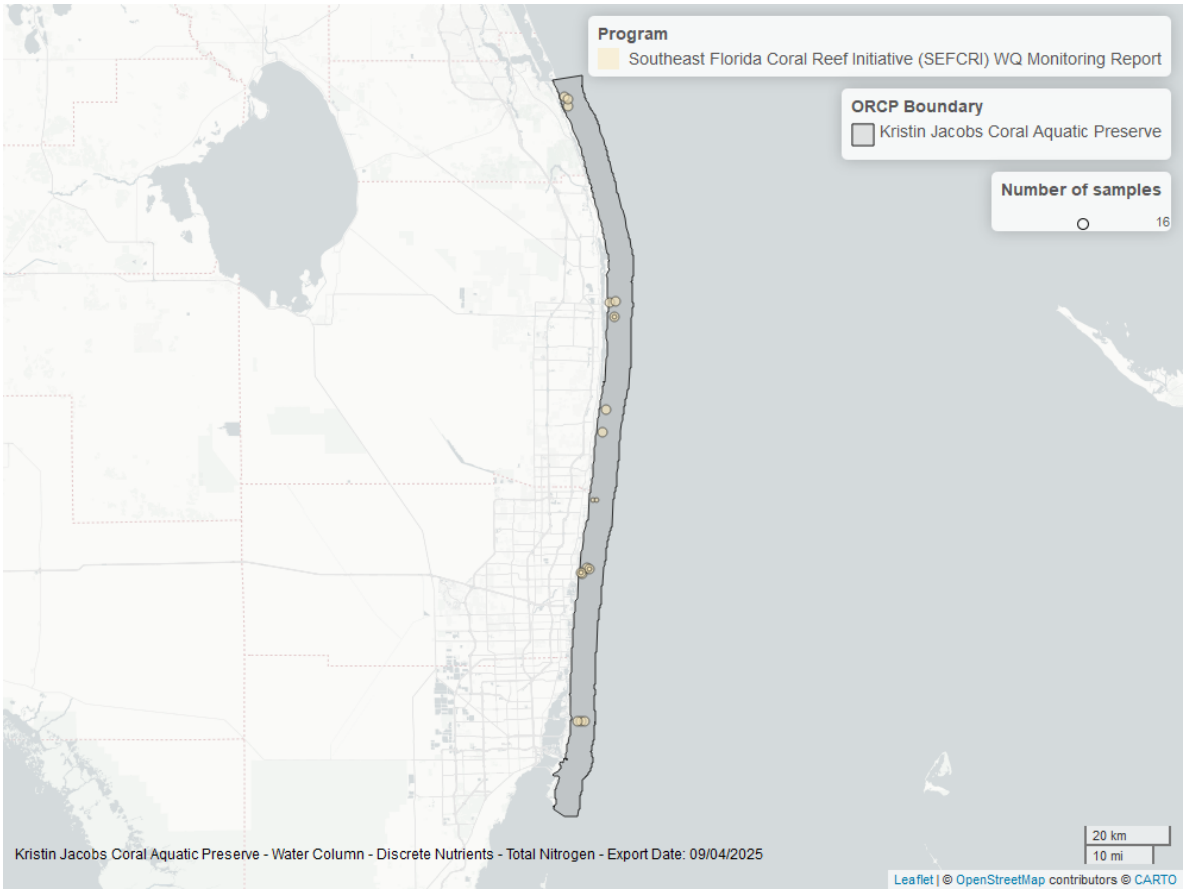


Figure 2: Map showing location of discrete water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

### Total Phosphorus - Discrete

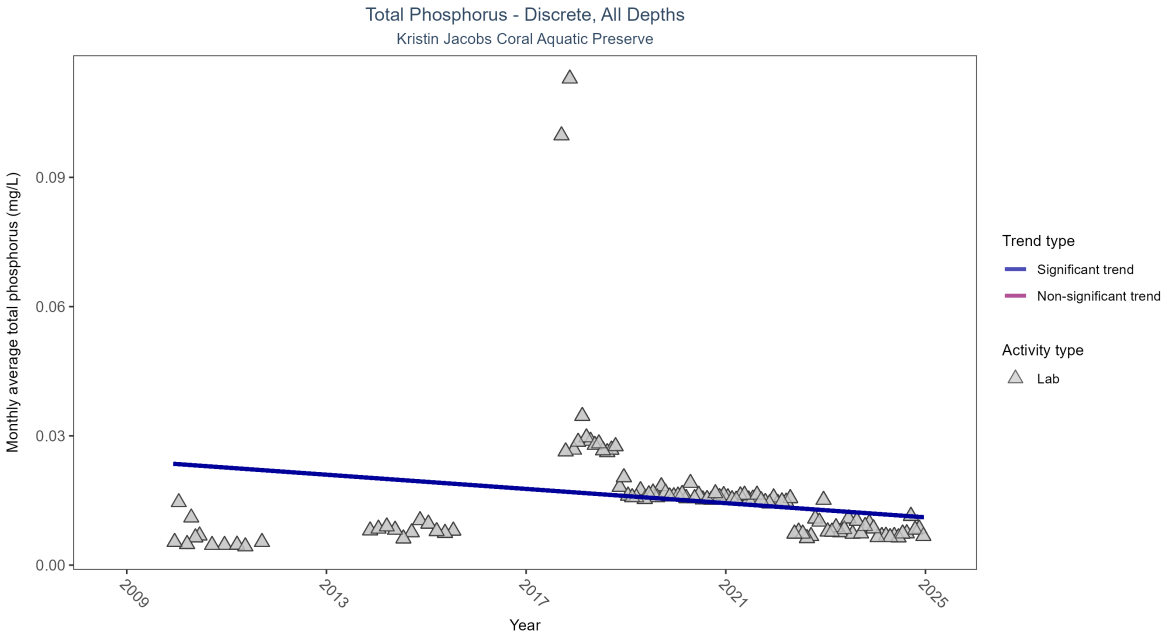


Figure 3: Scatter plot of monthly average total phosphorus over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only phosphorus values obtained from laboratory analyses (triangles) are included in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

Table 2: Seasonal Kendall-Tau Results for - Total Phosphorus

| Activity Type | Statistical Trend | Sample Count | Years with Data | Period of Record | Median Result Value | Tau | Sen Intercept | Sen Slope | P |
|---|---|---|---|---|---|---|---|---|---|
| Lab | Significantly decreasing trend | 16698 | 14 | 2009 - 2024 | 0.01448 | -0.31525 | 0.02428 | -0.00082 | 6e-04 |

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

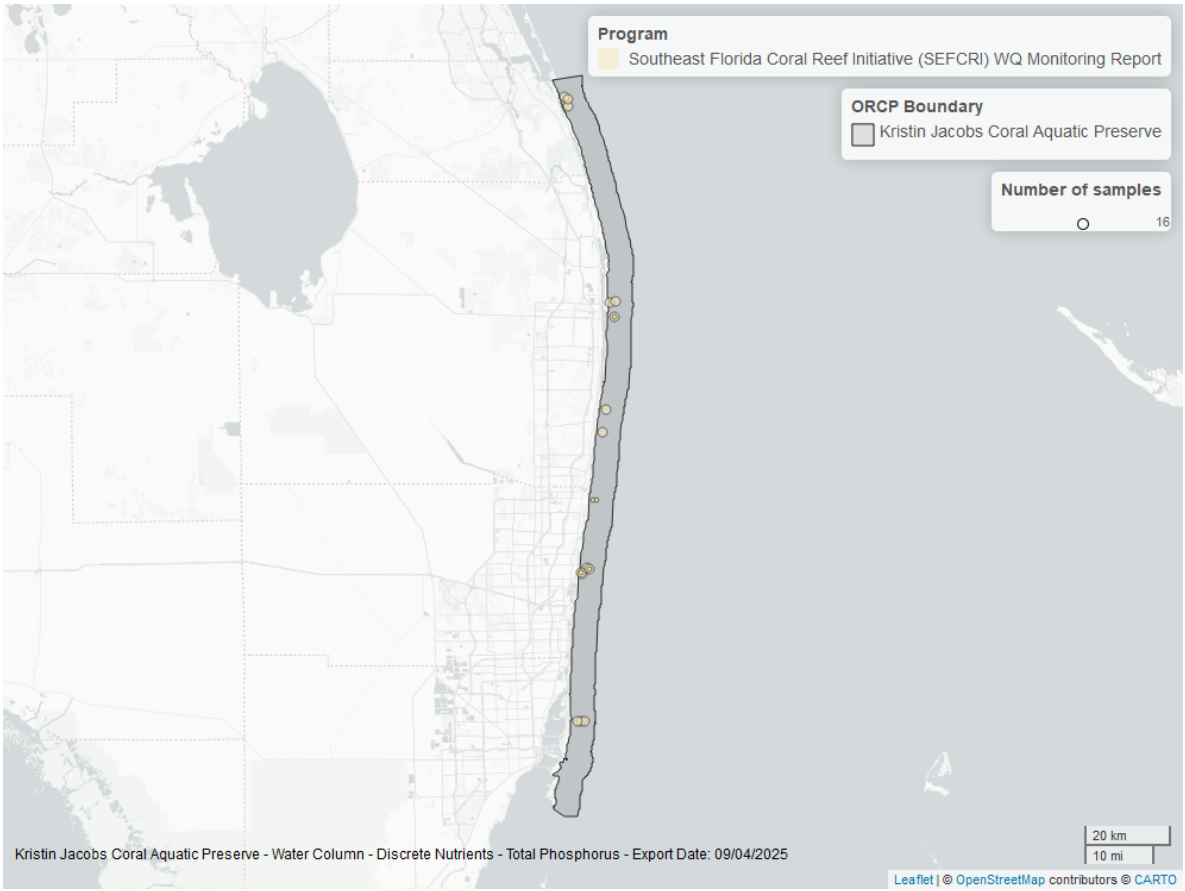


Figure 4: Map showing location of discrete water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

## Water Quality

### Dissolved Oxygen - Discrete

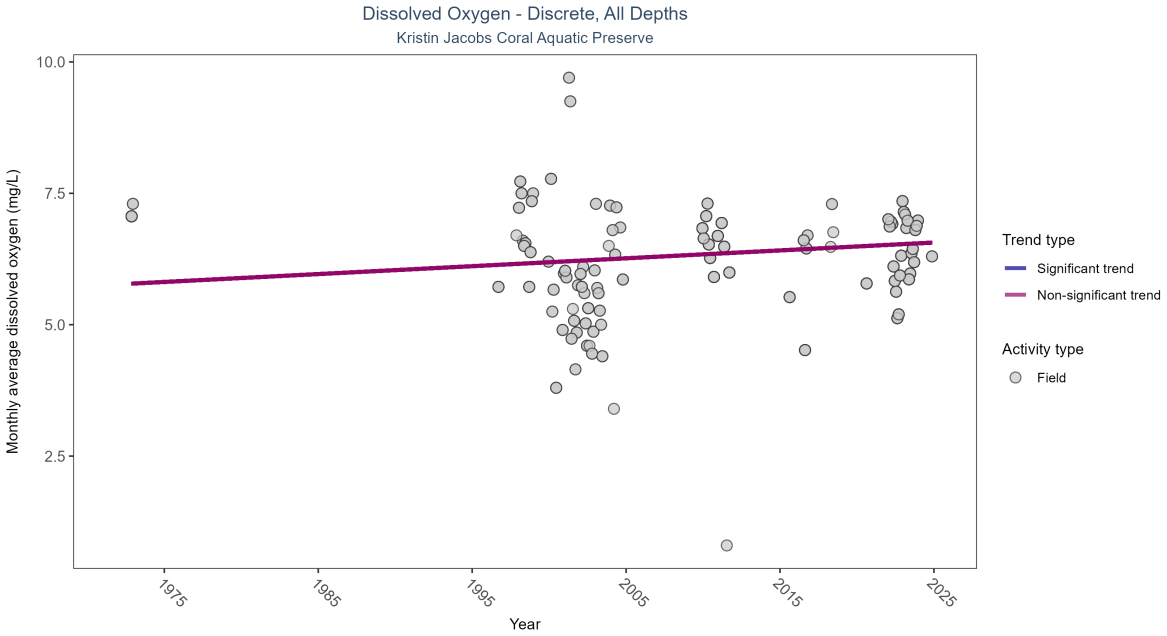


Figure 5: Scatter plot of monthly average dissolved oxygen over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen values measured in the field (circles) are included in the plot.

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 | 735 | 20 | 1972 - 2024 | 6.49 | 0.12012 | 5.76845 | 0.015 | 0.241 |

Dissolved oxygen showed no detectable trend between 1972 and 2024.

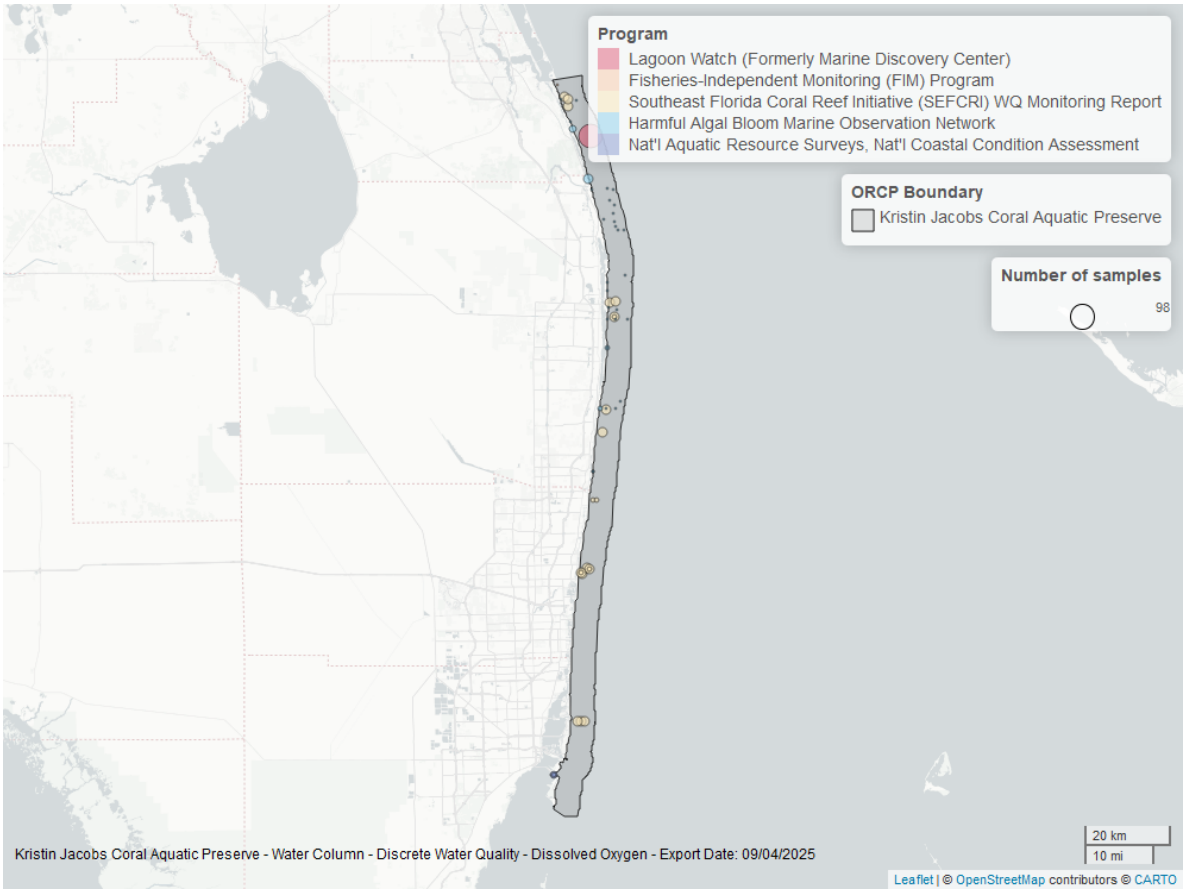


Figure 6: Map showing location of discrete water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

### Dissolved Oxygen Saturation - Discrete

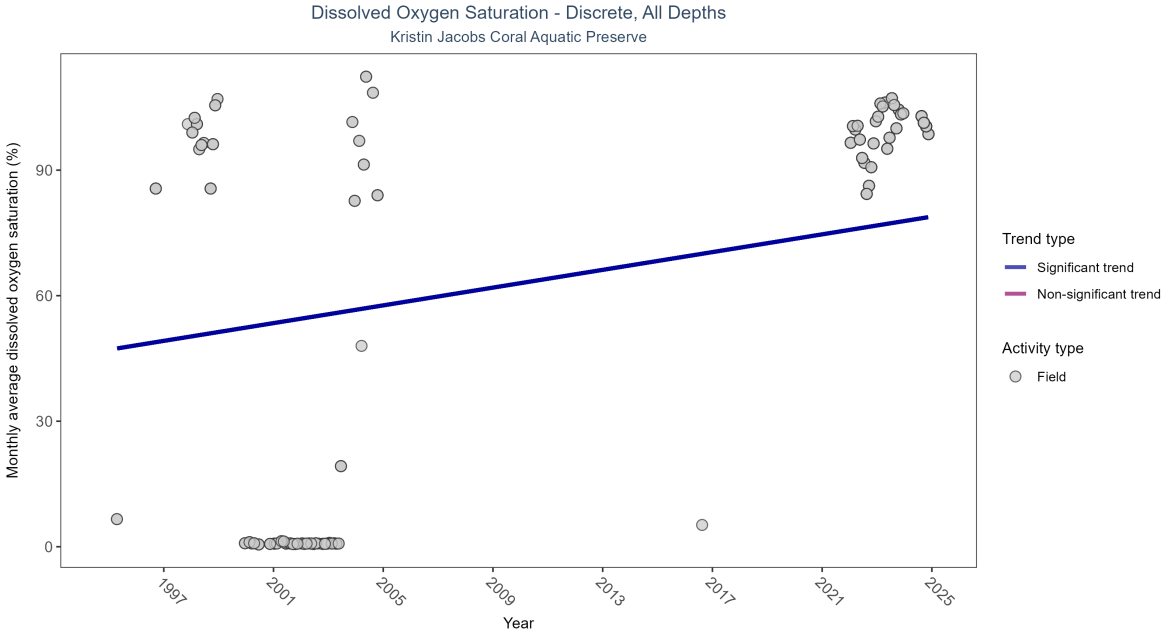


Figure 7: Scatter plot of monthly average dissolved oxygen saturation over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only dissolved oxygen saturation values measured in the field (circles) 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 | 1012 | 14 | 1995 - 2024 | 101.1 | 0.34194 | 47.07696 | 1.06075 | 8e-04 |

Monthly average dissolved oxygen saturation increased by 1.06% per year.

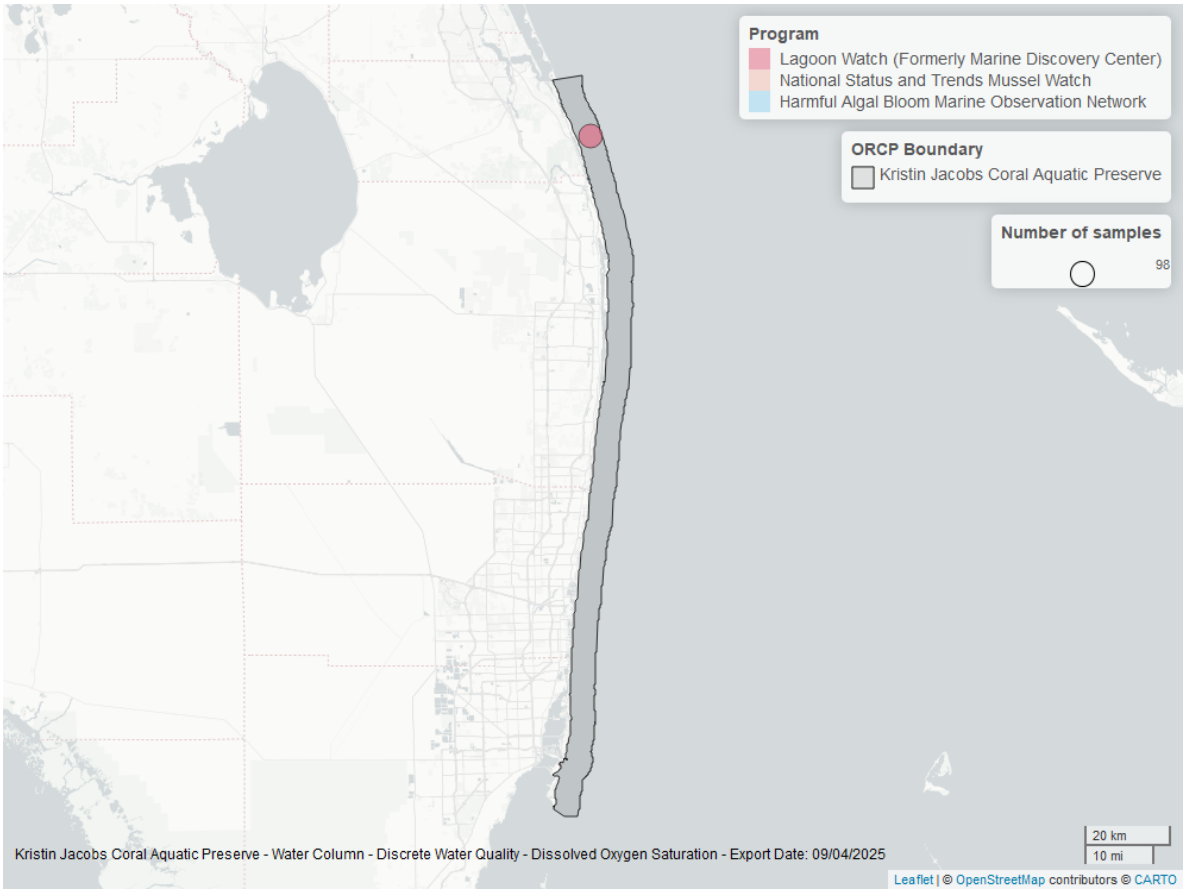


Figure 8: Map showing location of discrete water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

### Salinity - Discrete

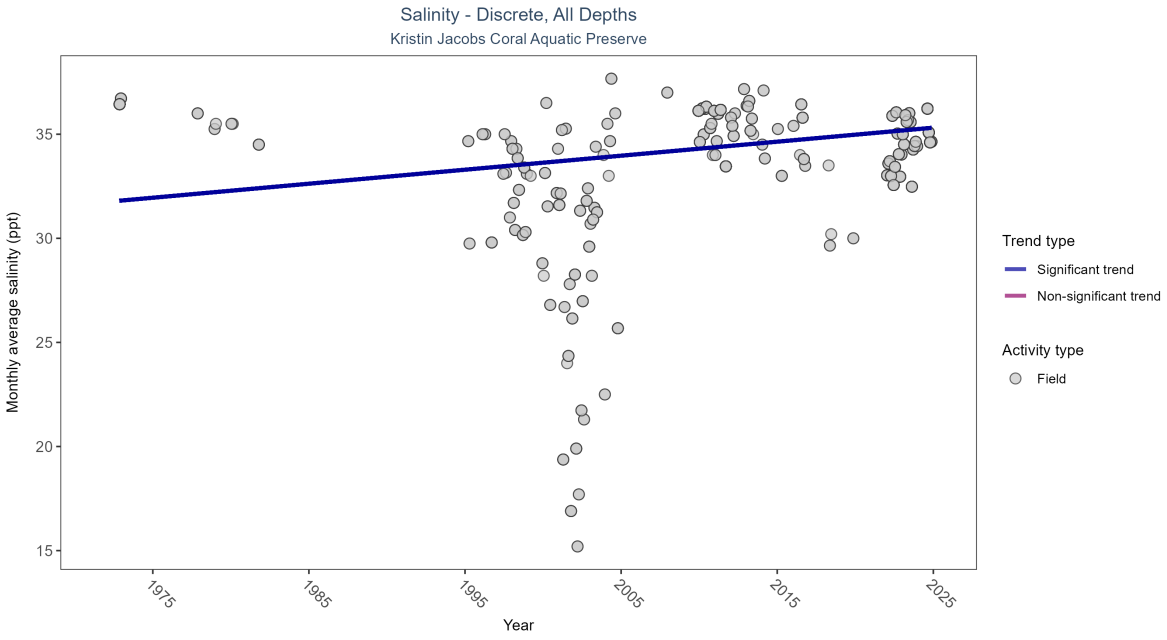


Figure 9: Scatter plot of monthly average salinity over time. If the time series included ten or more years of discrete observations, significant (blue) or non-significant (magenta) trend lines are also shown. Discrete salinity values derived from grab samples analyzed in the field (circles) or the laboratory (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 | Significantly increasing trend | 1545 | 31 | 1972 - 2024 | 35.78 | 0.19988 | 31.74735 | 0.06729 | 0.0044 |

Monthly average salinity increased by 0.07 ppt per year.

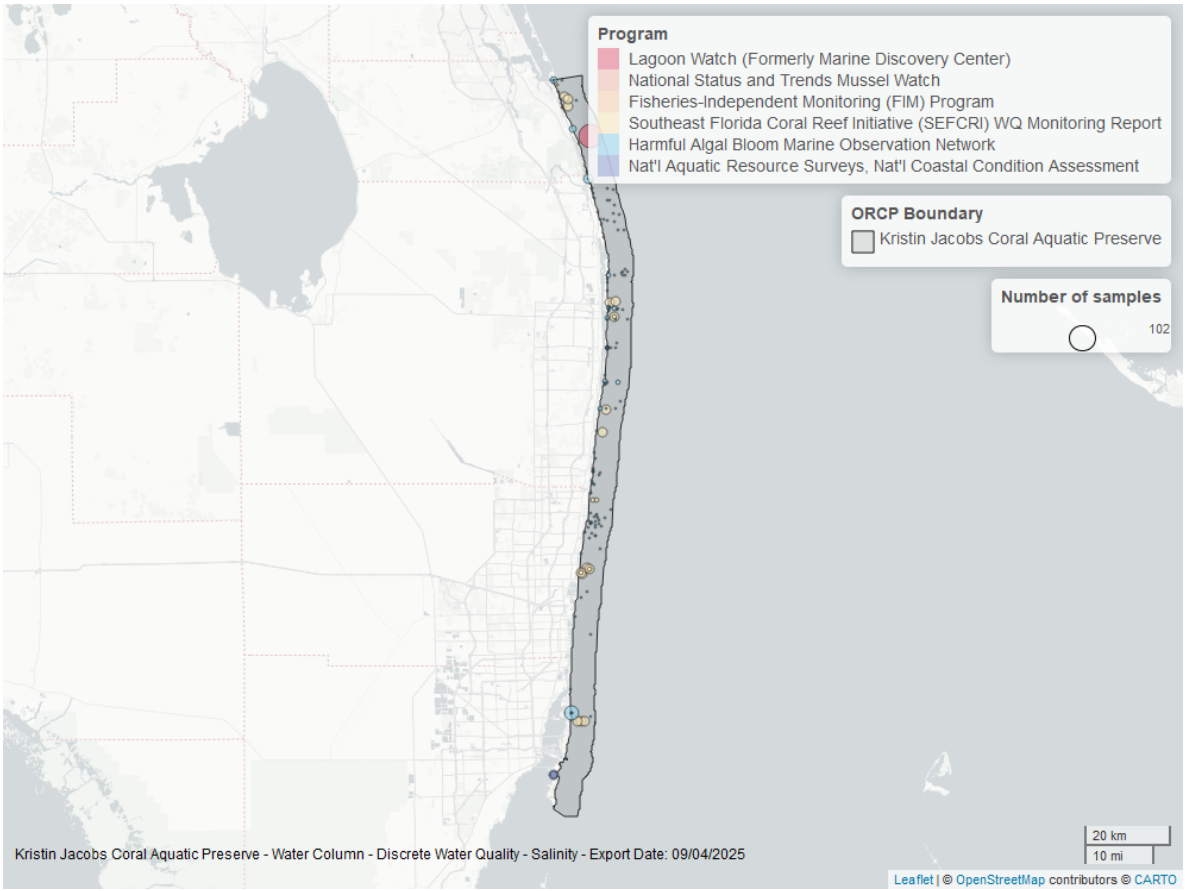


Figure 10: Map showing location of discrete water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

### Water Temperature - Discrete

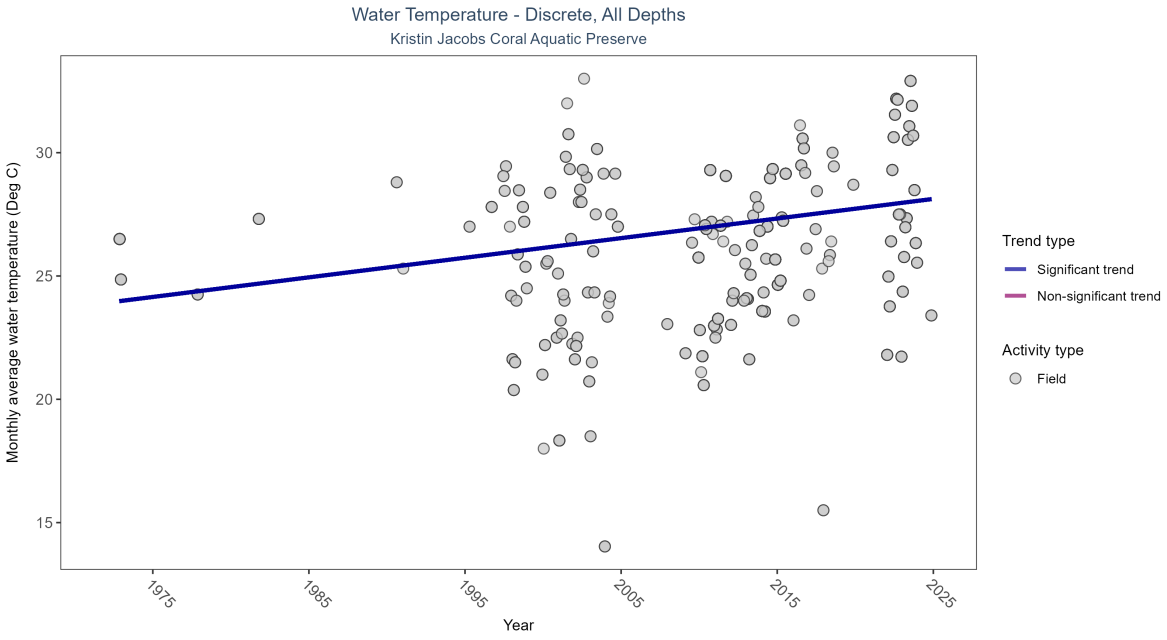


Figure 11: Scatter plot of monthly average water temperature over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only water temperature measurements taken in the field (circles) are included in 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 | 1566 | 30 | 1972 - 2024 | 26.53715 | 0.27482 | 23.91106 | 0.07952 | 0 |

Monthly average water temperature increased by 0.08°C per year.

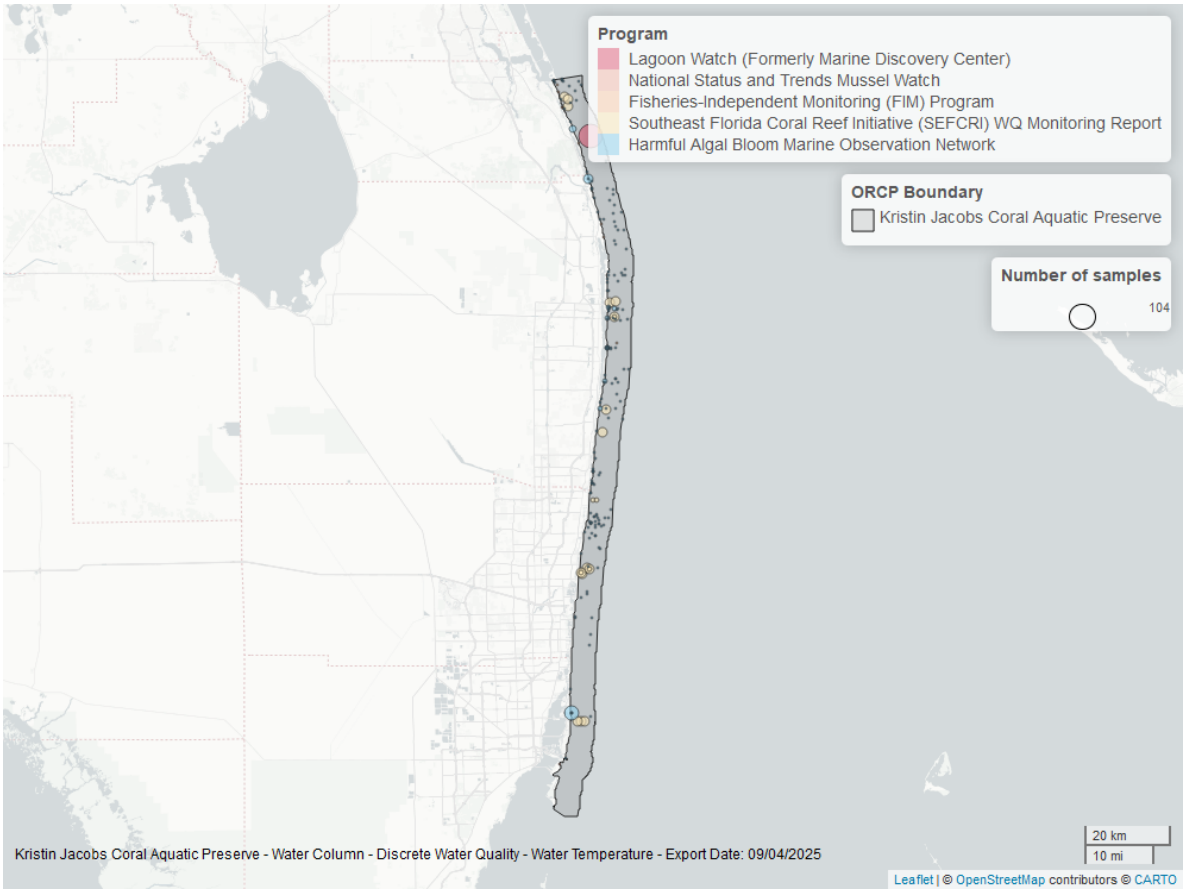


Figure 12: Map showing location of discrete water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

**Water Temperature - Continuous**

**National Data Buoy Center** - *5*

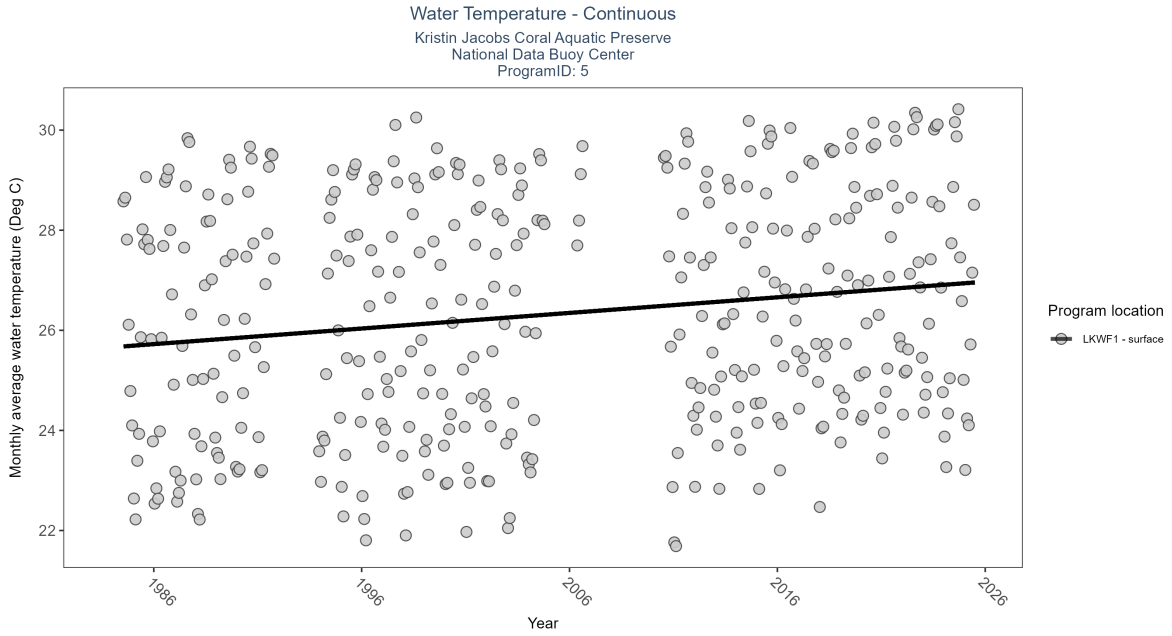


Figure 13: Scatter plot of monthly average water temperature over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

Table 7: Seasonal Kendall-Tau Results for All Stations - Water Temperature

| Program Location | Statistical Trend | Sample Count | Years with Data | Period of Record | Median Result Value | Tau | Sen Intercept | Sen Slope | P |
|---|---|---|---|---|---|---|---|---|---|
| LKWF1 | Significantly increasing trend | 1336312 | 37 | 1984 - 2025 | 26.4 | 0.42 | 25.66 | 0.03 | 0 |

At twenty-one program locations, monthly average water temperature increased between 0.03 and 0.09°C per year. No detectable change in monthly average water temperature was observed at one location.

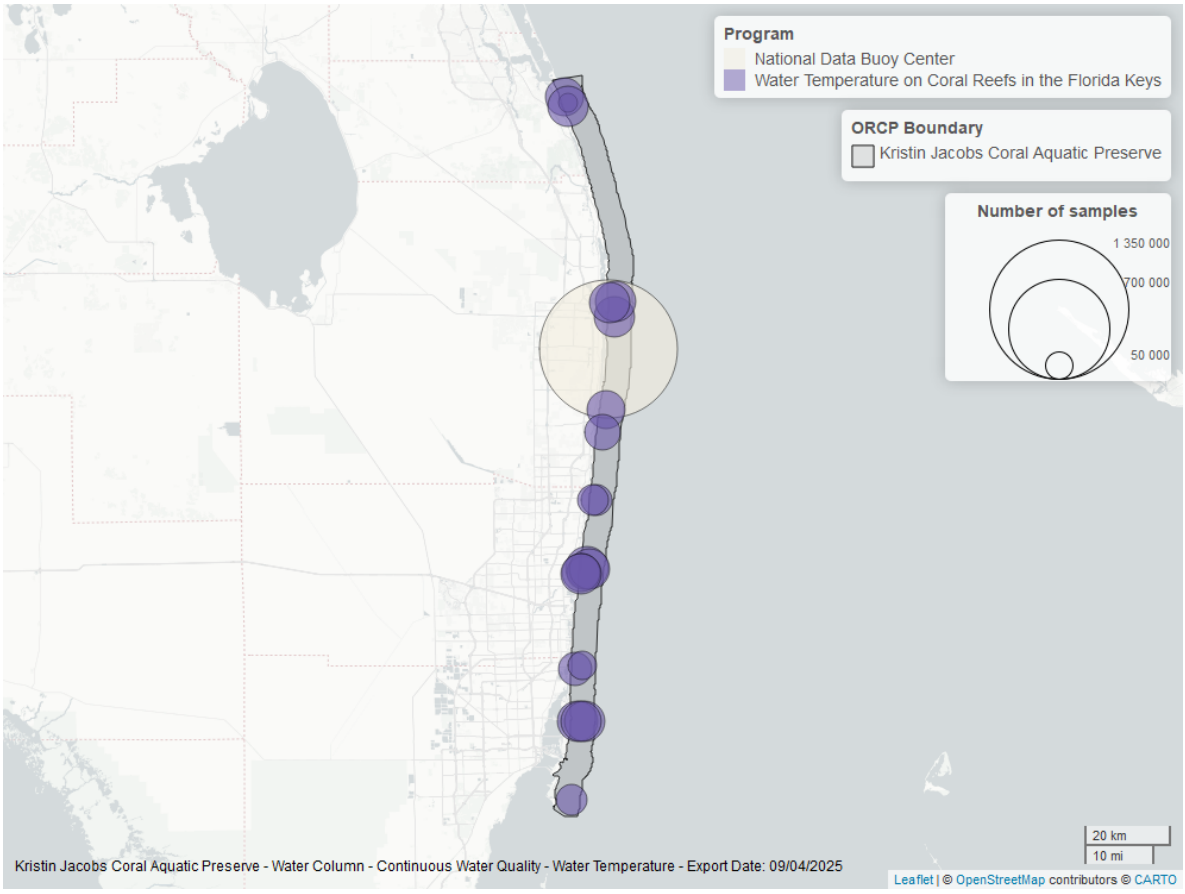


Figure 14: Map showing location of water temperature continuous water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

**Water Temperature on Coral Reefs in the Florida Keys** - *986*

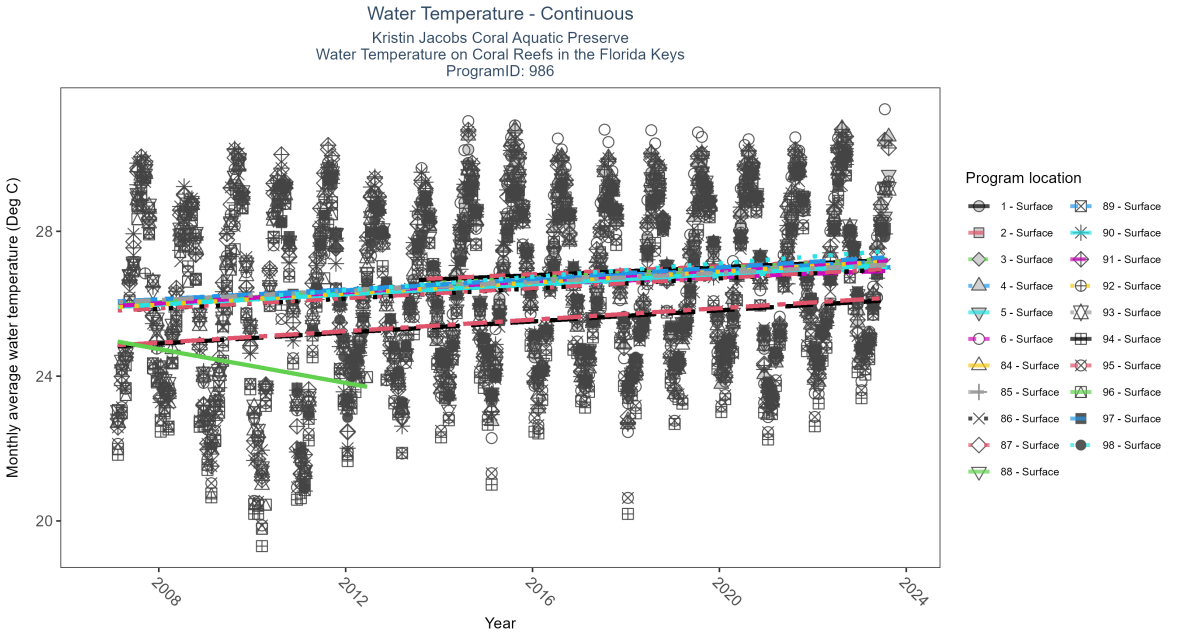


Figure 15: Scatter plot of monthly average water temperature over time at continuously monitored program locations. Each location is analyzed separately, with significant (blue) or non-significant (magenta) trend lines shown for time series that included five or more years of observations.

Table 8: Seasonal Kendall-Tau Results for All Stations - Water Temperature

| Program Location | Statistical Trend | Sample Count | Years with Data | Period of Record | Median Result Value | Tau | Sen Intercept | Sen Slope | P |
|---|---|---|---|---|---|---|---|---|---|
| 85 | Significantly increasing trend | 118414 | 17 | 2007 - 2023 | 26.29 | 0.38 | 26.03 | 0.07 | 0 |
| 86 | Significantly increasing trend | 113127 | 17 | 2007 - 2023 | 26.20 | 0.39 | 25.80 | 0.07 | 0 |
| 6 | Significantly increasing trend | 69753 | 11 | 2013 - 2023 | 26.84 | 0.19 | 26.41 | 0.05 | 0.0078 |
| 91 | Significantly increasing trend | 111048 | 17 | 2007 - 2023 | 26.60 | 0.38 | 25.93 | 0.08 | 0 |
| 88 | Significantly increasing trend | 123687 | 17 | 2007 - 2023 | 26.42 | 0.38 | 25.97 | 0.07 | 0 |
| 1 | Significantly increasing trend | 73700 | 11 | 2013 - 2023 | 26.50 | 0.23 | 26.62 | 0.06 | 0.0018 |
| 89 | Significantly increasing trend | 120476 | 17 | 2007 - 2023 | 26.32 | 0.38 | 26.06 | 0.07 | 0 |
| 90 | Significantly increasing trend | 103477 | 17 | 2007 - 2023 | 26.48 | 0.39 | 25.91 | 0.07 | 0 |
| 94 | Significantly increasing trend | 98419 | 17 | 2007 - 2023 | 25.62 | 0.34 | 24.82 | 0.08 | 0 |
| 3 | Significantly increasing trend | 69054 | 11 | 2013 - 2023 | 26.69 | 0.32 | 26.51 | 0.07 | 0 |
| 93 | Significantly increasing trend | 115688 | 17 | 2007 - 2023 | 26.56 | 0.38 | 26.04 | 0.06 | 0 |
| 92 | Significantly increasing trend | 120189 | 17 | 2007 - 2023 | 26.50 | 0.40 | 25.90 | 0.08 | 0 |
| 84 | Significantly increasing trend | 117729 | 17 | 2007 - 2023 | 26.37 | 0.40 | 25.91 | 0.07 | 0 |
| 96 | No significant trend | 25550 | 6 | 2007 - 2012 | 24.87 | -0.25 | 24.98 | -0.23 | 0.0801 |
| 97 | Significantly increasing trend | 105832 | 14 | 2010 - 2023 | 26.50 | 0.42 | 26.21 | 0.08 | 0 |
| 87 | Significantly increasing trend | 117324 | 17 | 2007 - 2023 | 26.50 | 0.37 | 25.81 | 0.07 | 0 |
| 4 | Significantly increasing trend | 77960 | 11 | 2013 - 2023 | 26.69 | 0.28 | 26.36 | 0.06 | 1e-04 |
| 2 | Significantly increasing trend | 68589 | 11 | 2013 - 2023 | 26.74 | 0.32 | 26.65 | 0.06 | 0 |
| 5 | Significantly increasing trend | 60729 | 11 | 2013 - 2023 | 26.69 | 0.28 | 26.33 | 0.06 | 1e-04 |
| 98 | Significantly increasing trend | 94894 | 14 | 2010 - 2023 | 26.45 | 0.42 | 26.18 | 0.09 | 0 |
| 95 | Significantly increasing trend | 109401 | 17 | 2007 - 2023 | 25.62 | 0.36 | 24.85 | 0.08 | 0 |

At twenty-one program locations, monthly average water temperature increased between 0.03 and 0.09°C per year. No detectable change in monthly average water temperature was observed at one location.

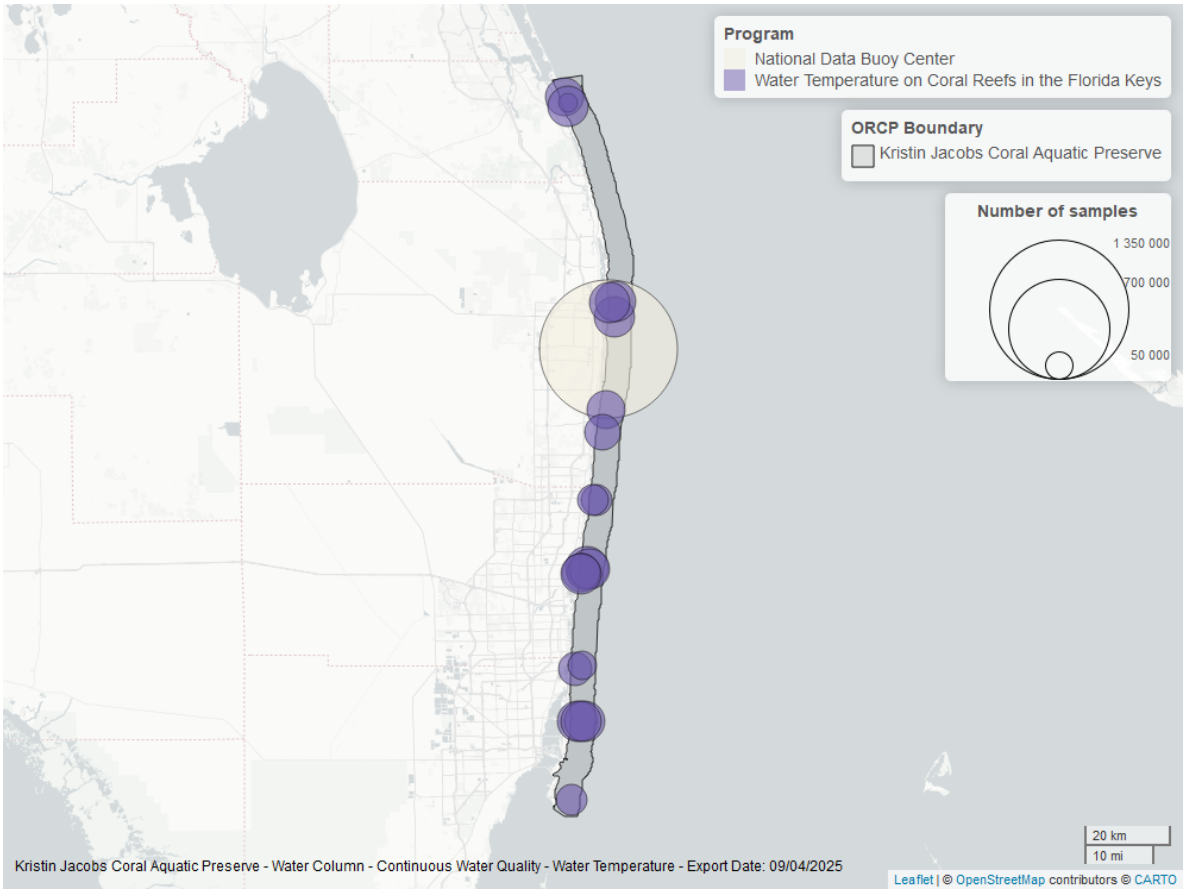


Figure 16: Map showing location of water temperature continuous water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

### pH - Discrete

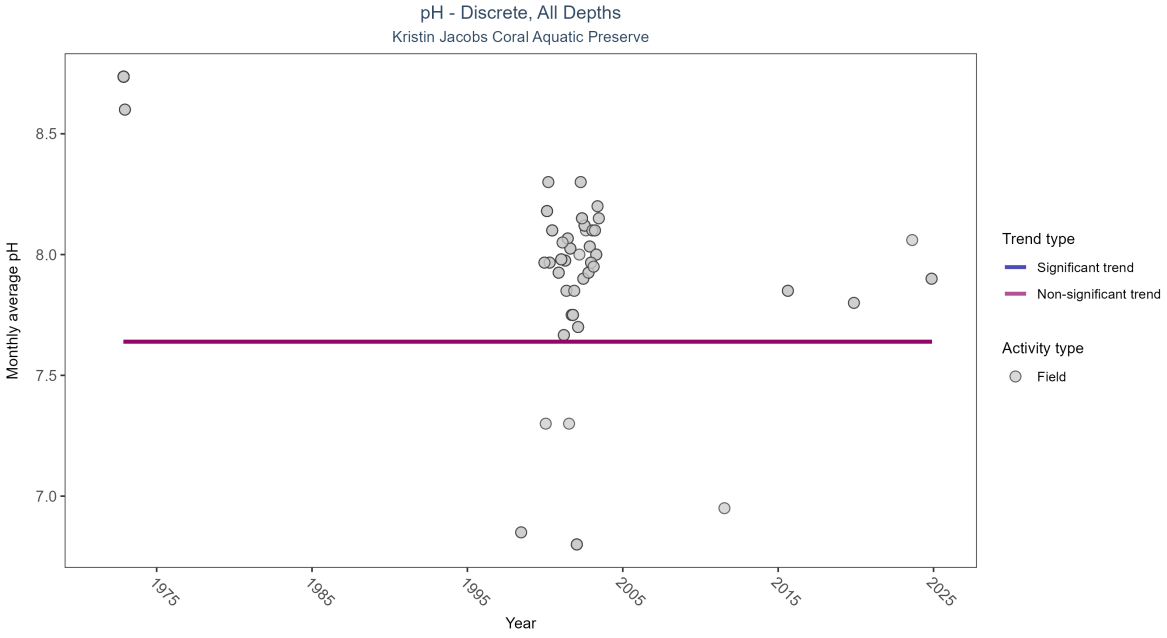


Figure 17: Scatter plot of monthly average pH over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only pH values measured in the field (circles) are included in the plot.

Table 9: 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 | 178 | 12 | 1972 - 2024 | 8.2 | 0.06032 | 7.63924 | 0 | 1 |

pH showed no detectable trend between 1972 and 2024.

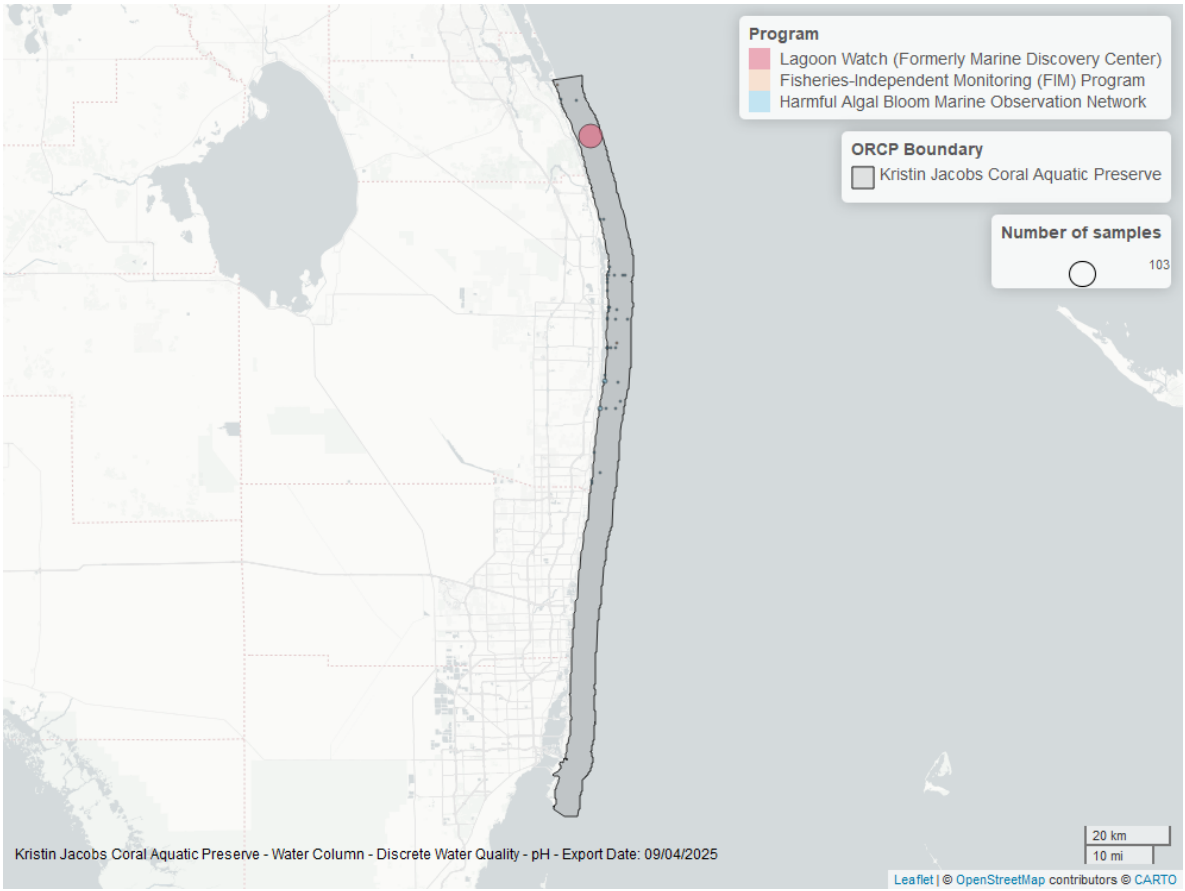


Figure 18: Map showing location of discrete water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

## Water Clarity

### Turbidity - Discrete

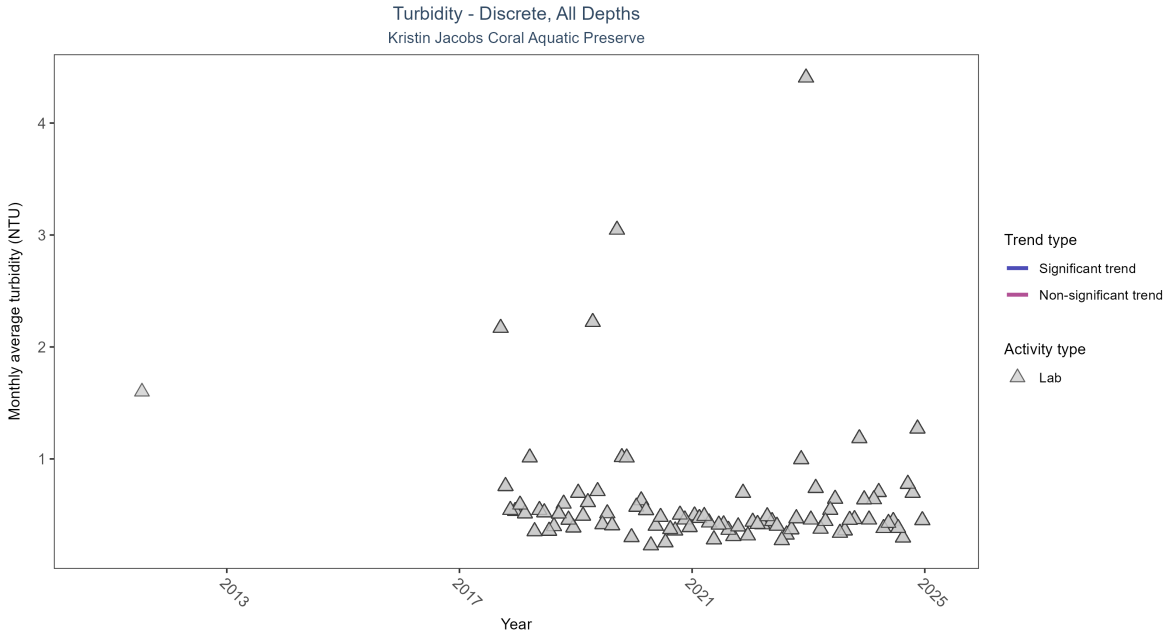


Figure 19: Scatter plot of monthly average turbidity over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only turbidity values measured in the laboratory (triangles) are included in the plot.

Table 10: 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 | Insufficient data to calculate trend | 16804 | 9 | 2011 - 2024 | 0.3 | - | - | - | - |

There was insufficient data to fit a model for turbidity.

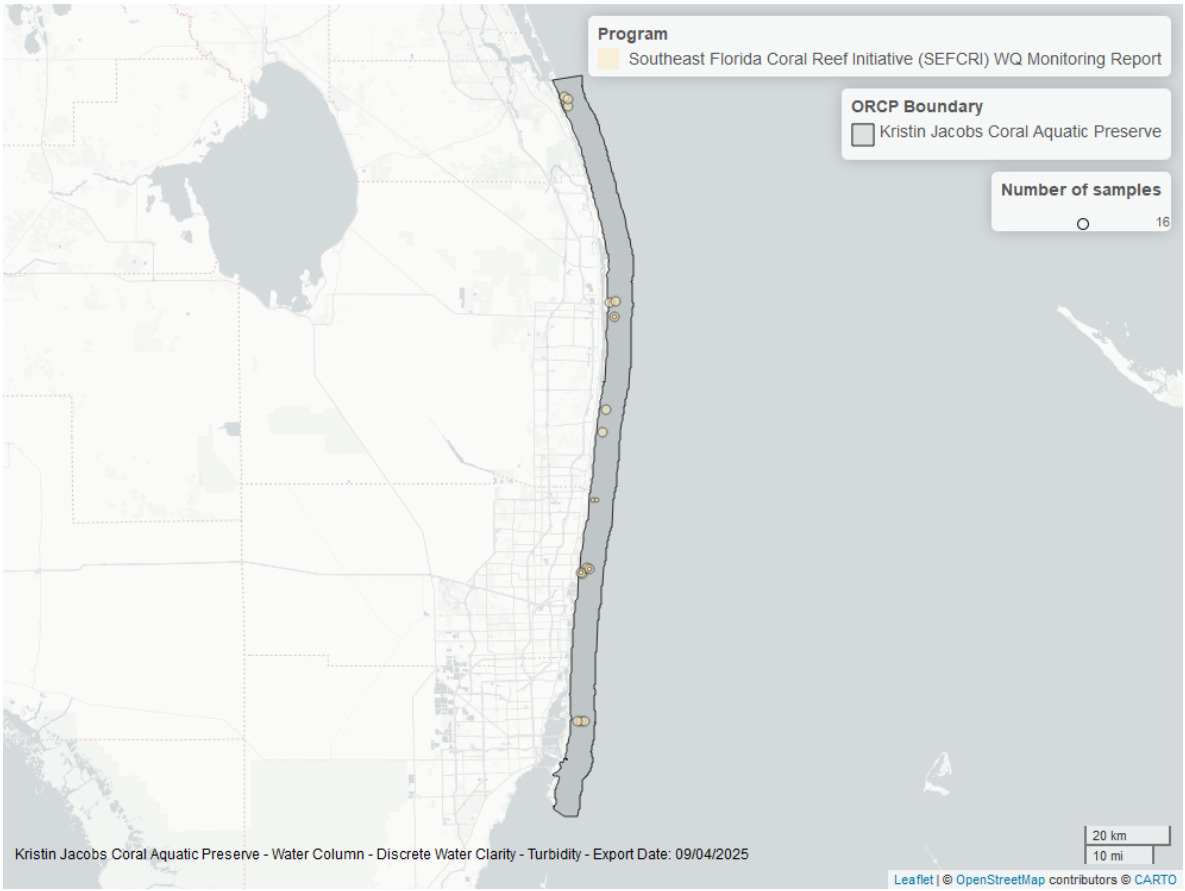


Figure 20: Map showing location of discrete water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

### Total Suspended Solids - Discrete

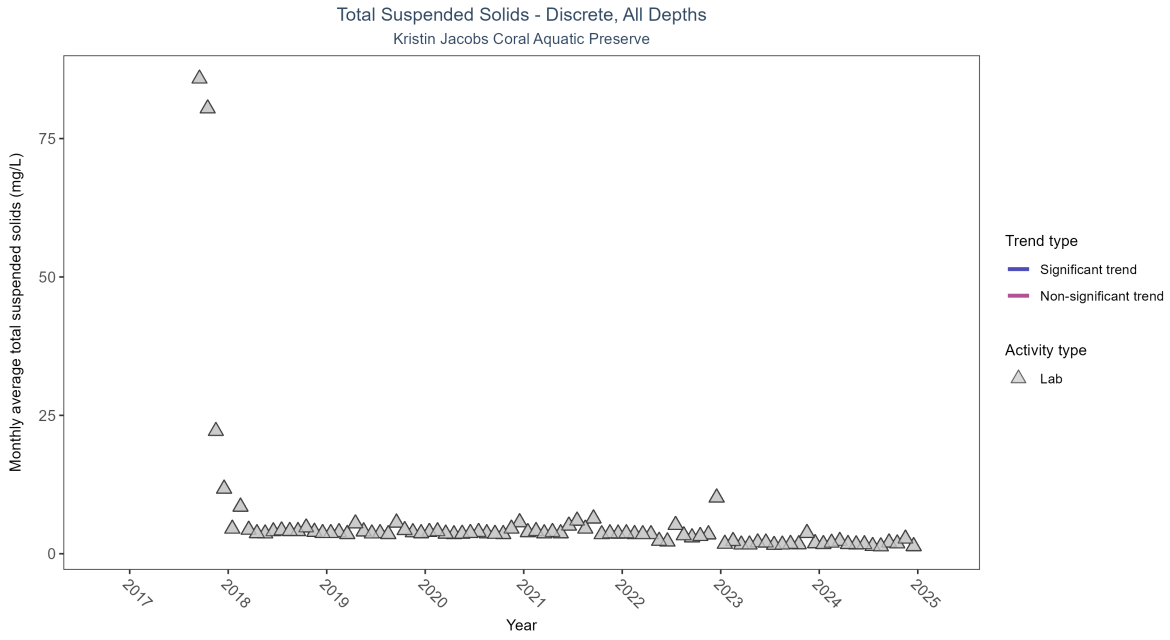


Figure 21: Scatter plot of monthly average total suspended solids (TSS) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only TSS values obtained from laboratory analyses (triangles) are included in the plot.

Table 11: 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 | Insufficient data to calculate trend | 16247 | 8 | 2017 - 2024 | 3.47 | - | - | - | - |

There was insufficient data to fit a model for total suspended solids.

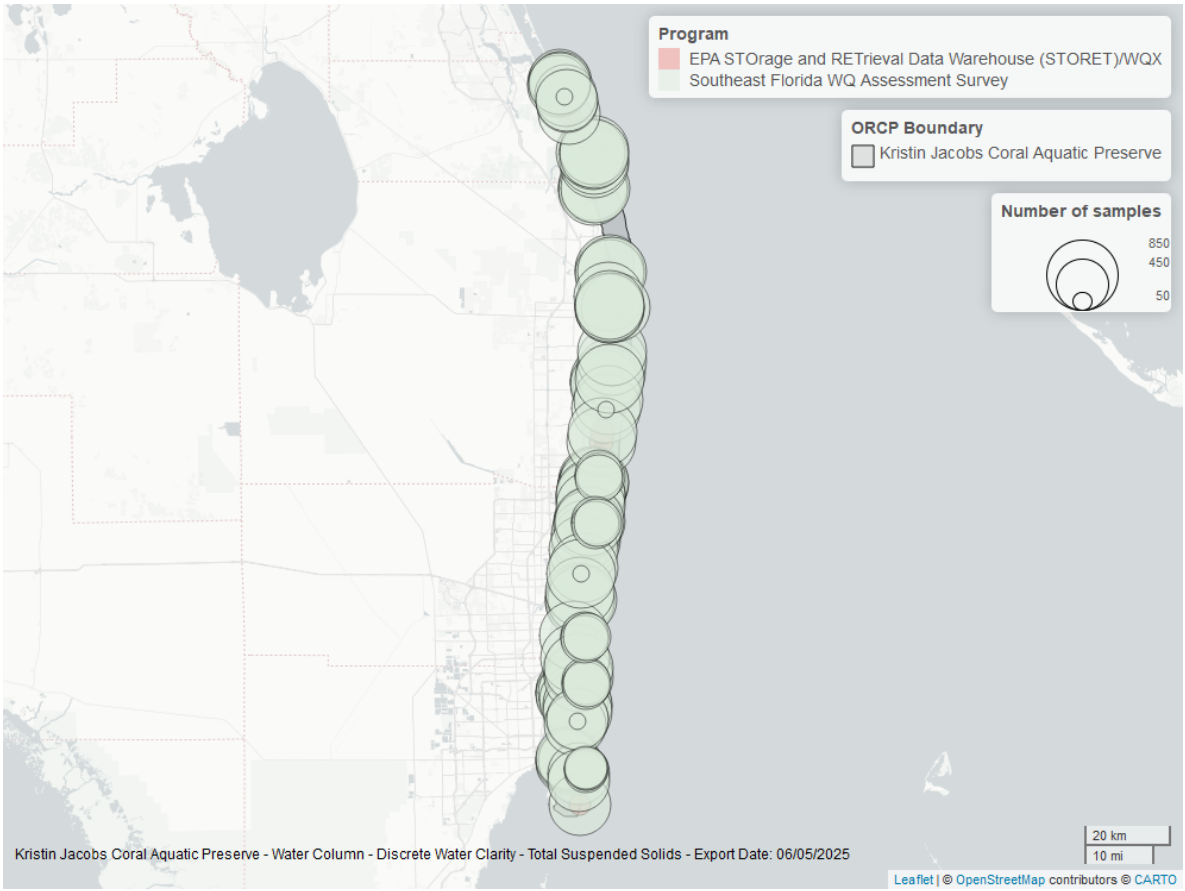


Figure 22: Map showing location of discrete water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

### Chlorophyll a, Uncorrected for Pheophytin - Discrete

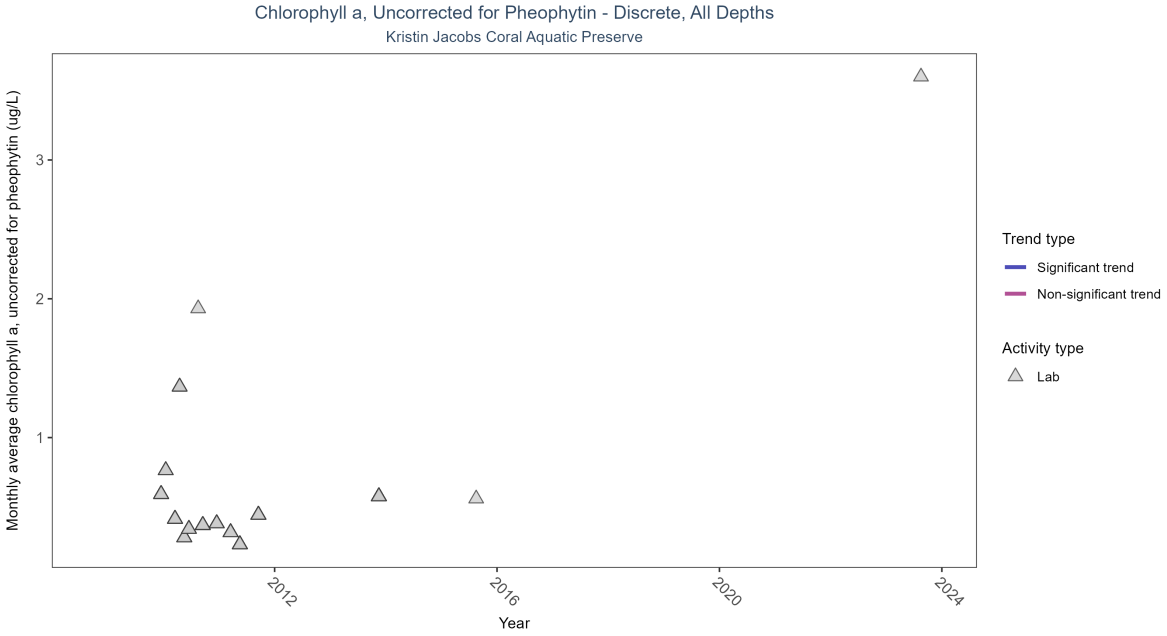


Figure 23: Scatter plot of monthly average levels of chlorophyll a, uncorrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles) is included in the plot.

Table 12: 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 | Insufficient data to calculate trend | 332 | 6 | 2009 - 2023 | 0.38875 | - | - | - | - |

There was insufficient data to fit a model for chlorophyll a, uncorrected for pheophytin.

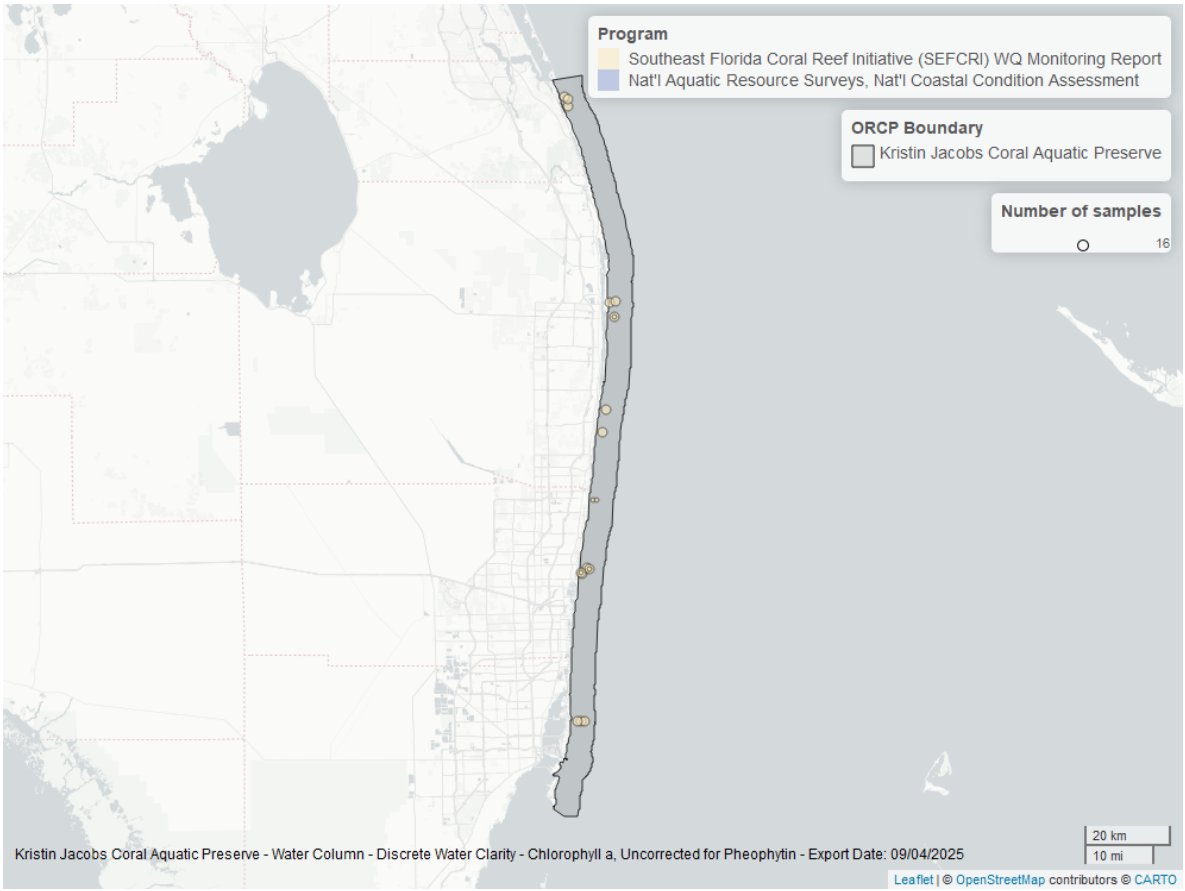


Figure 24: Map showing location of discrete water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

### Chlorophyll a, Corrected for Pheophytin - Discrete

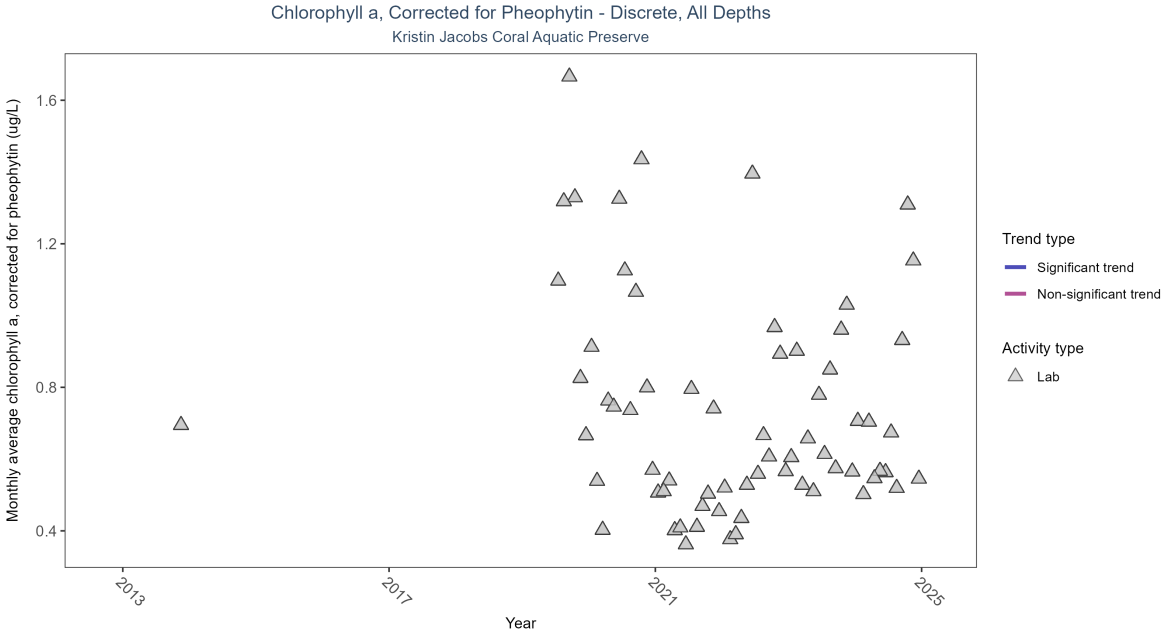


Figure 25: Scatter plot of monthly average levels of chlorophyll a, corrected for pheophytin, over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed chlorophyll a (triangles)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

Table 13: 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 | Insufficient data to calculate trend | 10987 | 7 | 2013 - 2024 | 0.47 | - | - | - | - |

There was insufficient data to fit a model for chlorophyll a, corrected for pheophytin.

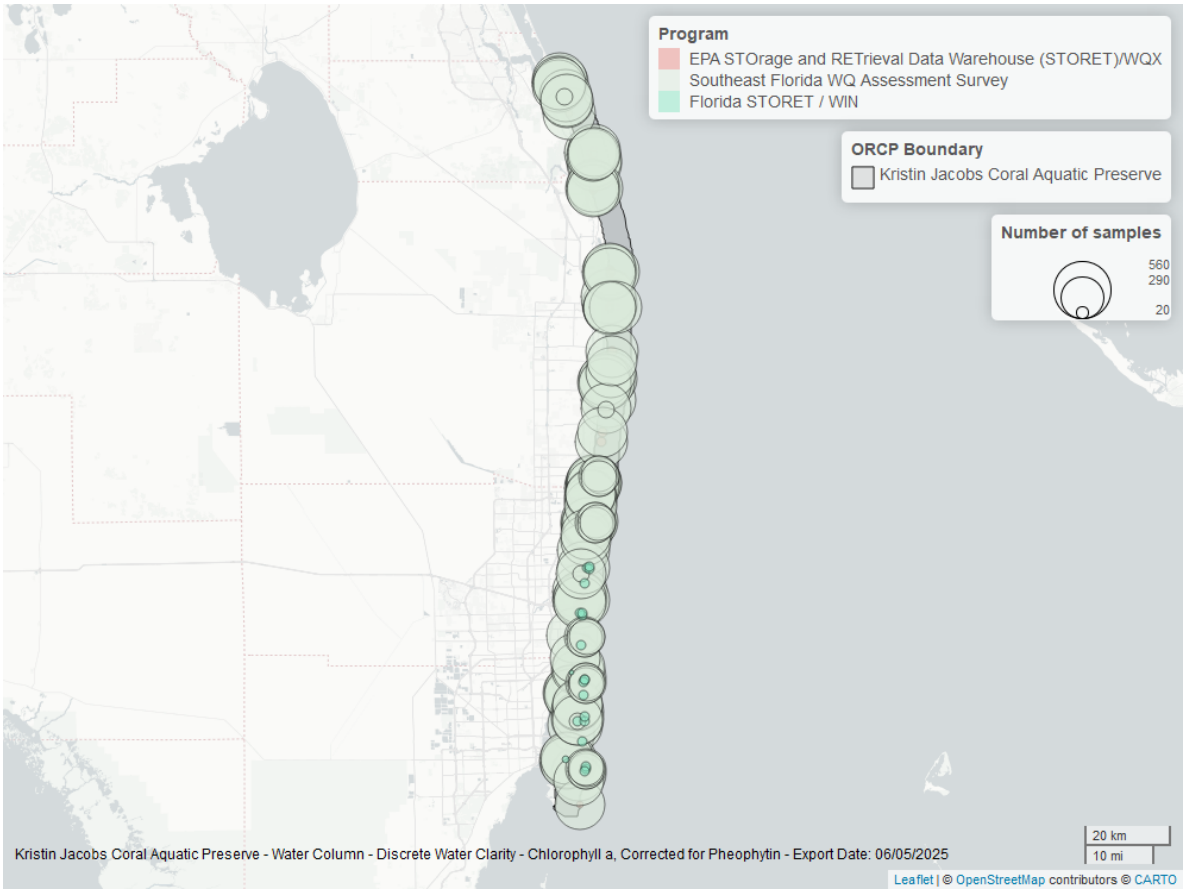


Figure 26: Map showing location of discrete water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

### Secchi Depth - Discrete

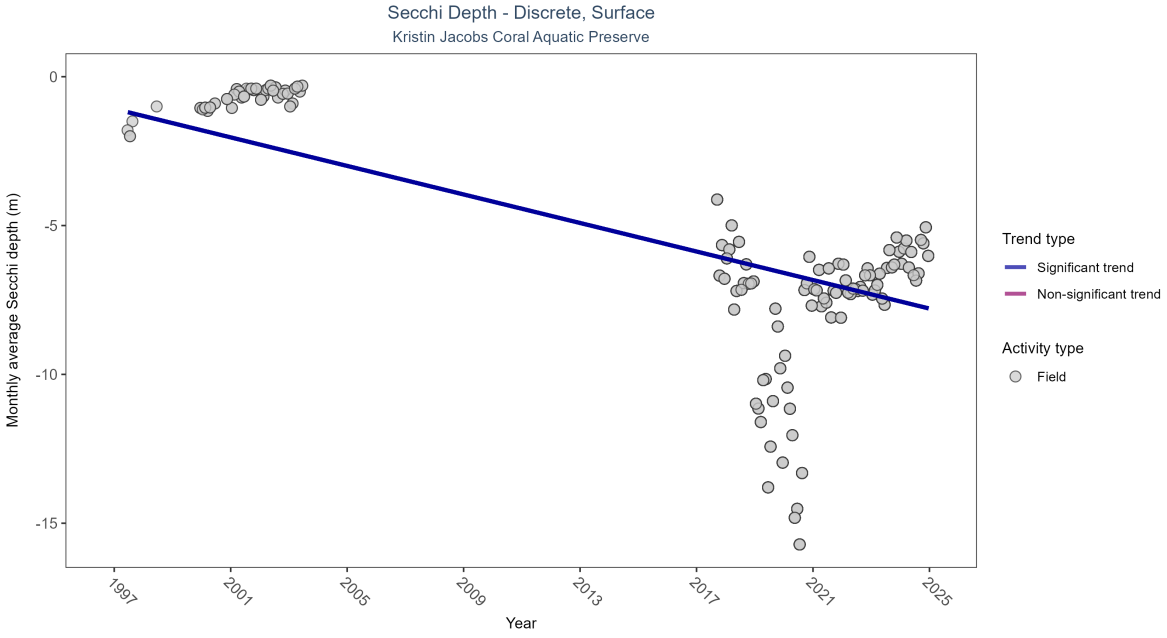


Figure 27: Scatter plot of monthly average Secchi depth over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Secchi depth is only measured in the field (circles).

Table 14: 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 | 8572 | 16 | 1997 - 2024 | -6.1 | -0.25903 | -1.07995 | -0.23963 | 2e-04 |

Monthly average Secchi depth became deeper by 0.24 m per year, indicating an increase in water clarity.

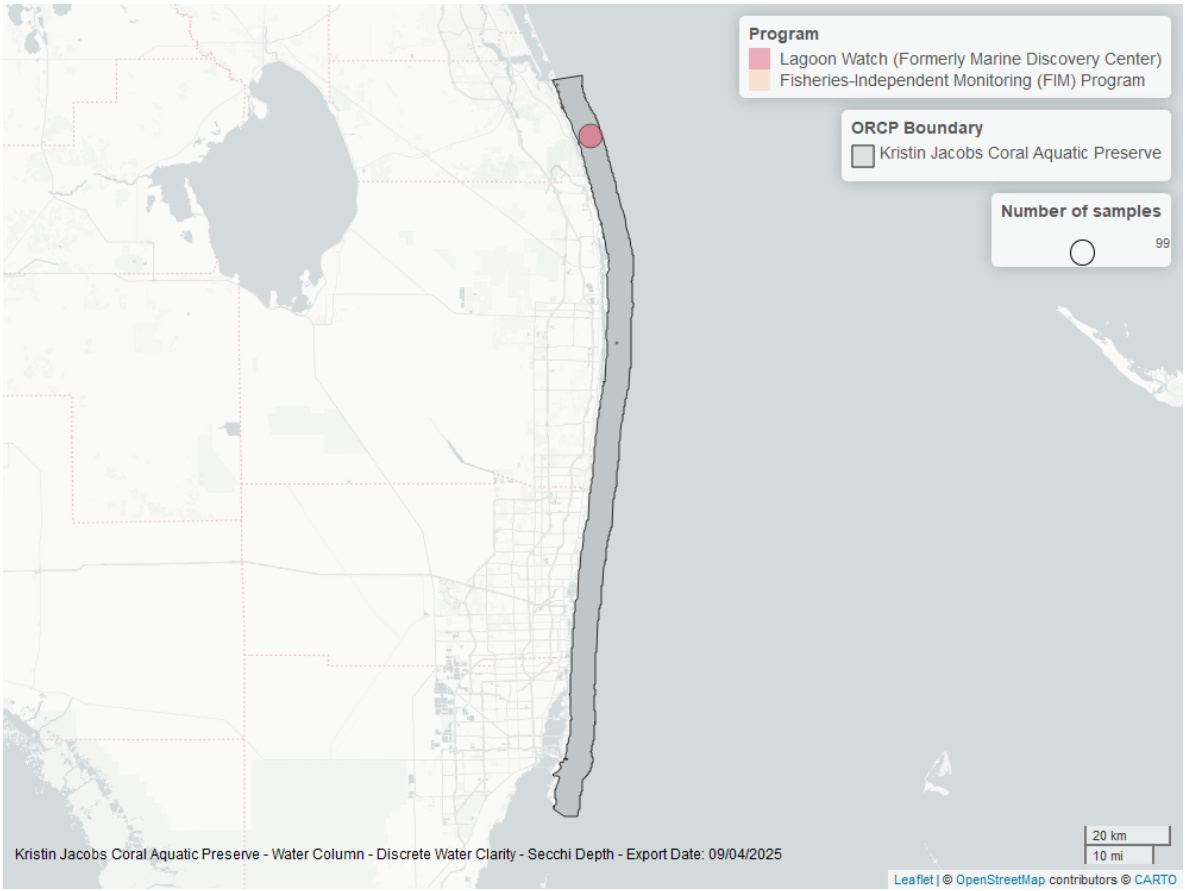


Figure 28: Map showing location of discrete water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.

### Colored Dissolved Organic Matter - Discrete

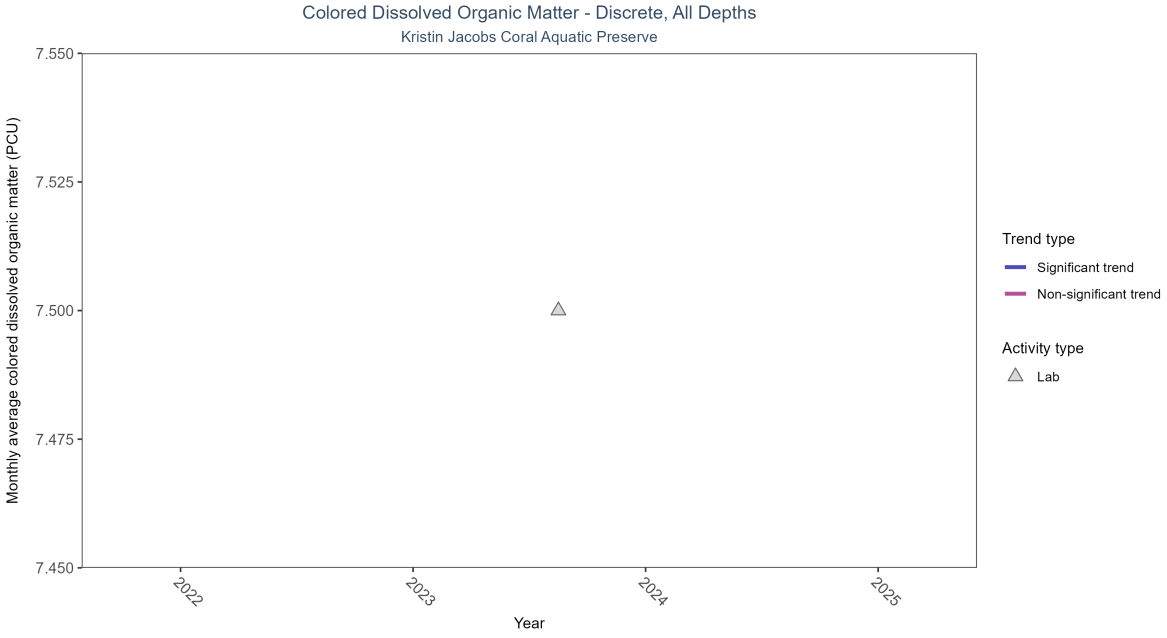


Figure 29: Scatter plot of monthly average colored dissolved organic matter (CDOM) over time. If the time series included ten or more years of discrete observations, a significant (blue) or non-significant (magenta) trend line is also shown. Only laboratory-analyzed CDOM (triangles) is included in the plot.

Table 15: 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 | 1 | 1 | 2023 - 2023 | 7.5 | - | - | - | - |

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

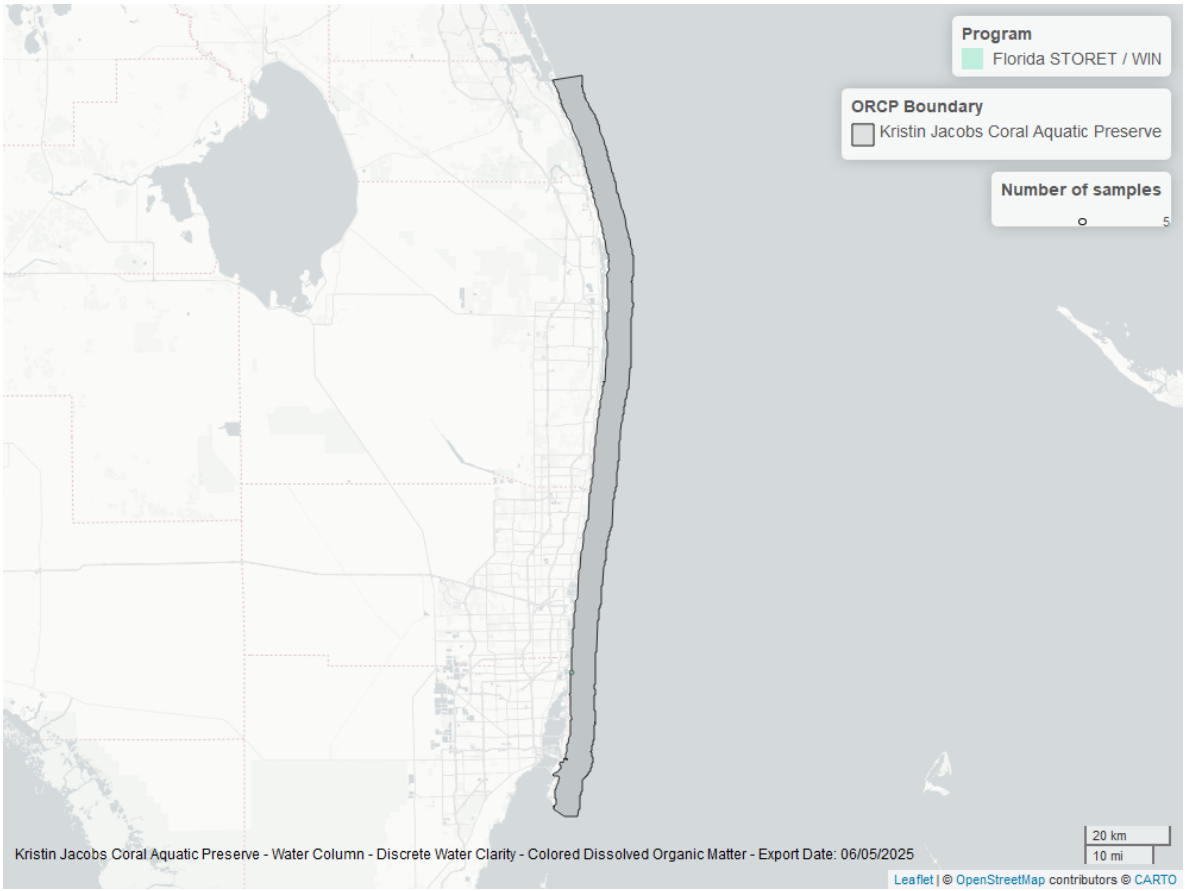


Figure 30: Map showing location of discrete water quality sampling locations within the boundaries of *Kristin Jacobs Coral Aquatic Preserve*. The bubble size on the maps above reflect the amount of data available at each sampling site.