

12. CITY MANAGER

a. Informational Items

iv. Status report on Water Quality testing results in the Sanibel River

Memorandum

To: Judie Zimomra, City Manager
From: James Evans, Environmental Biologist
Subject: Update on Sanibel River Water Quality
Date: 4/28/2011

This report provides an update on the status and trends of water quality in the Sanibel River. The period of record for this report is January 2002 through December 2010. This report includes only those stations located within the Sanibel River (San-WQ-3 through San-WQ-8) and does not include the City's estuarine monitoring sites located within Clam Bayou, Dinkins Bayou and Blind Pass (Fig. 1). All data were collected either by Natural Resource Department staff or by the City's contractor, Johnson Engineering.

A seasonal *Kendall* trend test was used to evaluate trends in the data. Station median values for each parameter were compared to the 'typical' Florida waterbody values published by Joe Hand (FDEP 2008) to evaluate their status relative to other Florida waterbodies (Table 1). Percentile distributions were grouped in the following categories: 10–30 = below average, 31–69 = average, 70–90 = above average (Duffey et al. 2007).

Overall, water quality within the Sanibel River remains relatively poor compared to other Florida Freshwater streams. Median nutrient concentrations for ammonia nitrogen, total Kjeldahl nitrogen, total nitrogen, and chlorophyll-*a*, a proxy for phytoplankton, were "above average" compared to other Florida freshwater streams. Inorganic nitrogen in the form of nitrate was relatively low and exhibited decreasing trends at all stations. Total phosphorus and ortho phosphorus were also relatively low, with total phosphorus exhibiting decreasing trends at some stations and ortho phosphorus exhibiting slight increasing trends at all stations.

Below is a brief summary of the status and trends results. At the end of the summary I have included a map showing the monitoring station locations and tables with the summary statistics and results of the status and trends analysis.

Salinity values were generally higher at the stations located near the water quality structures, with mean salinities of 5.06 psu at San-WQ-5 and mean salinities of 2.99 psu at San-WQ-8 (Fig. 1). Salinity values were "above average" compared to other Florida freshwater streams, with all stations ranking within the 80th percentile. This suggests that the Sanibel River is not a true "freshwater" body, rather it is estuarine in nature and criteria developed for freshwater streams may not be directly comparable. Salinity exhibited an increasing trend at stations San-WQ-3, 4, and 5, with salinities increasing, on average, 0.22 psu per year.

Dissolved oxygen (DO) values were relatively low compared to other Florida freshwater streams, with all stations ranking within the 10th percentile. Mean DO values ranged between 2.41–4.32 mg/l, with lower values associated with San-WQ-3 and San-WQ-6 (Tables 2 and 5). Stations San-WQ-6, 7 and 8 exhibited an increasing trend, with DO increasing 0.23 mg/l per year. Values > 4 mg/l are desired to maintain a healthy and well-balanced assemblage of fish and wildlife.

Ammonia nitrogen was relatively consistent among stations, with mean values varying less than 0.09 mg/l. Ammonia concentrations were relatively high at all stations, with median values at all stations ranking within the 90th percentile compared to other Florida freshwater streams. San-WQ-4 had the highest median values at 0.15 mg/l. Ammonia exhibited an increasing trend at station San-WQ-3, with ammonia increasing at 0.0054 mg/l per year.

Nitrate and nitrite nitrogen concentrations were relatively low compared to other Florida freshwater streams, with nitrate and nitrite at all stations ranking within the 10th percentile. Nitrate nitrogen also exhibited decreasing trends at all stations, with concentrations decreasing on average 0.003 mg/l per year.

Total Kjeldahl nitrogen (TKN) was relatively high at all stations, with median concentrations ranking within the 80th and 90th percentile compared to other Florida freshwater streams. Mean concentrations were higher at stations San-WQ-4 and 7 and lowest at stations San-WQ-3, 5, and 8. TKN exhibited increasing trends at all stations, with TKN increasing on average 0.112 mg/l per year.

Total nitrogen (TN) was relatively high, with all of the stations ranking between the 60th and 80th percentiles compared to other Florida freshwater streams. Mean concentrations were higher at stations San-WQ-4 and 7 and lowest at stations San-WQ-3, 5, and 8. Total nitrogen exhibited increasing trends at all stations, with TN increasing on average 0.112 mg/l per year. Concentrations and trends paralleled those of total Kjeldahl nitrogen suggesting that a majority of the TN pool in the Sanibel River is made up of organic nitrogen.

Ortho phosphorus was relatively low, with all stations “below average” and ranking between the 10th and 20th percentiles. Ortho phosphorus concentrations were generally higher at the eastern stations with stations San-WQ-7 and 8 having the highest mean values. All stations exhibited increasing trends, with concentrations increasing on average 0.003 mg/l per year.

Total phosphorus concentrations were relatively low and were “below average” or “average” for all stations, except for San-WQ-7. Stations San-WQ-3 and 5 had the lowest concentrations; while San-WQ-7 and 8 had the highest concentrations. Total phosphorus exhibited decreasing trends at stations San-WQ-7 and 8, with concentrations decreasing 0.007 mg/l per year.

Chlorophyll-*a* is a measure of primary productivity and can be used as a proxy for phytoplankton (microalgae). Chlorophyll-*a* was “above average” at all stations. Mean chlorophyll-*a* concentrations were greatest at the eastern stations, with San-WQ-7 and 8 having the highest values. All stations exhibited increasing trends, with concentrations increasing on average 2.89 mg/m³ per year. Increases in chlorophyll-*a* can result from increased nutrient inputs, increased light available to phytoplankton, and/or changes in the residence time. Reductions in inorganic nitrogen (nitrate) and total phosphorus may be the result of uptake by phytoplankton within the river.

Figure 1. Map of Sanibel showing water quality monitoring locations

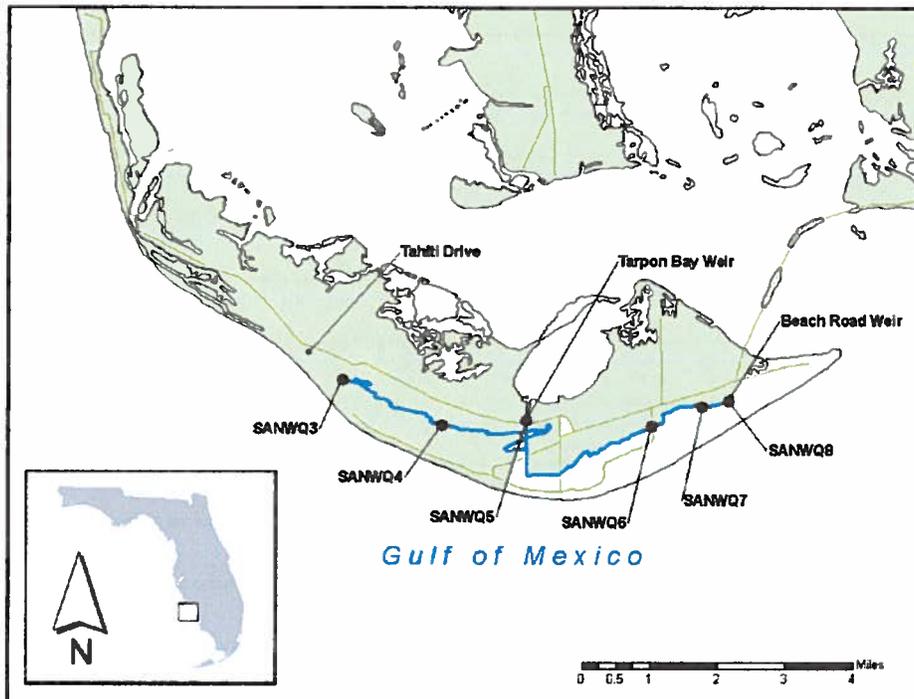


Table 1. 'Typical' Florida stream water quality percentile distributions (Hand 2008)

| Percentile | Temp (°C) | DO (mg/l) | Salinity (psu) | Spc Cond (mS/cm) | pH (units) | Ammonia (mg/l) | Nitrate (mg/l) | Nitrite (mg/l) | Nitrate + Nitrite (mg/l) | | TKN (mg/l) |
|---------------------------|-----------|-----------|----------------|------------------|------------|----------------|----------------|----------------|--------------------------|-------|------------|
| | | | | | | | | | | | |
| 10 | 21.90 | 3.11 | 0.025 | 0.04 | 5.73 | 0.0120 | 0.0141 | 0.0028 | 0.0060 | 0.308 | |
| 20 | 24.00 | 4.10 | 0.07 | 0.07 | 6.30 | 0.0182 | 0.0288 | 0.0040 | 0.0118 | 0.460 | |
| 30 | 24.93 | 4.76 | 0.10 | 0.11 | 6.68 | 0.0240 | 0.0400 | 0.0048 | 0.0200 | 0.585 | |
| 40 | 25.55 | 5.42 | 0.13 | 0.18 | 6.94 | 0.0300 | 0.0628 | 0.0060 | 0.0300 | 0.710 | |
| 50 | 26.60 | 5.82 | 0.185 | 0.25 | 7.11 | 0.0370 | 0.0944 | 0.0080 | 0.0510 | 0.825 | |
| 60 | 27.00 | 6.23 | 0.23 | 0.35 | 7.24 | 0.0440 | 0.1553 | 0.0100 | 0.0805 | 0.960 | |
| 70 | 27.70 | 6.76 | 0.32 | 0.48 | 7.37 | 0.0551 | 0.2130 | 0.0100 | 0.1400 | 1.100 | |
| 80 | 28.38 | 7.31 | 0.56 | 0.65 | 7.49 | 0.0738 | 0.3360 | 0.0110 | 0.2225 | 1.325 | |
| 90 | 29.40 | 8.04 | 6.59 | 1.26 | 7.70 | 0.1176 | 0.7910 | 0.0173 | 0.4510 | 1.706 | |
| No. of Waterbodies | 325 | 1394 | 871 | 1352 | 1397 | 1295 | 280 | 284 | 1297 | 1292 | |

| Percentile | TN (mg/l) | Ortho P (mg/l) | TP (mg/l) | Chl-a (mg/m3) | Color (CU) | Fecal Strep (CFU) | TOC (mg/l) | TSS (mg/l) | Turbidity (NTU) |
|---------------------------|-----------|----------------|-----------|---------------|------------|-------------------|------------|------------|-----------------|
| | | | | | | | | | |
| 10 | 0.470 | 0.055 | 0.015 | 1.00 | 21.25 | 16 | 3.90 | 3.00 | 1.10 |
| 20 | 0.616 | 0.064 | 0.025 | 1.00 | 40.00 | 36 | 5.70 | 4.00 | 1.60 |
| 30 | 0.760 | 0.092 | 0.040 | 1.00 | 49.80 | 62 | 8.40 | 4.00 | 2.00 |
| 40 | 0.879 | 0.148 | 0.058 | 1.20 | 57.50 | 91 | 10.40 | 4.30 | 2.54 |
| 50 | 1.004 | 0.178 | 0.076 | 1.89 | 70.00 | 150 | 12.75 | 5.00 | 3.00 |
| 60 | 1.146 | 0.224 | 0.101 | 2.90 | 80.00 | 260 | 15.20 | 5.00 | 3.84 |
| 70 | 1.312 | 0.338 | 0.138 | 4.14 | 103.50 | 390 | 17.83 | 6.50 | 4.65 |
| 80 | 1.555 | 0.546 | 0.209 | 6.30 | 150.00 | 610 | 22.00 | 9.00 | 6.00 |
| 90 | 1.978 | 1.615 | 0.395 | 15.00 | 205.00 | 1000 | 30.00 | 15.00 | 8.60 |
| No. of Waterbodies | 1313 | 67 | 1317 | 1222 | 1287 | 117 | 1111 | 1124 | 1320 |

Table 2. SAN-WQ-3 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

| SAN-WQ-3 | n | Mean | Median | Min | Max | Standard Deviation | Median compared to Typical FL Stream Percentiles (Hand 2008) | Status Relative to Typical FL Streams | Seasonal Kendall Trend Results ($\alpha=0.05$) | Slope (units/yr) |
|------------------------------------|----|-------|--------|-------|-------|--------------------|--|---------------------------------------|--|------------------|
| Water Temperature (°C) | 94 | 23.53 | 24.22 | 11.74 | 31.18 | 4.71 | 20 | Below Average | No Trend | |
| Dissolved Oxygen (mg/l) | 94 | 2.41 | 2.07 | 0.21 | 7.07 | 1.54 | 10 | Below Average | No Trend | |
| Salinity (psu) | 92 | 1.68 | 1.54 | 0 | 7.65 | 0.88 | 80 | Above Average | Increasing | 0.1274 |
| Specific Conductance (mS/cm) | 93 | 3.11 | 2.83 | 0.007 | 13.39 | 1.54 | 90 | Above Average | Increasing | 0.2187 |
| pH (units) | 94 | 7.73 | 7.69 | 6.51 | 9.21 | 0.40 | 90 | Above Average | No Trend | |
| Ammonia (mg/l) | 94 | 0.13 | 0.124 | 0.005 | 0.70 | 0.12 | 90 | Above Average | Increasing | 0.0054 |
| Nitrate (mg/l) | 94 | 0.03 | 0.007 | 0.002 | 0.35 | 0.06 | 10 | Below Average | Decreasing | -0.0031 |
| Nitrite (mg/l) | 94 | 0.01 | 0.003 | 0.002 | 0.04 | 0.01 | 10 | Below Average | No Trend | |
| Nitrate + Nitrite (mg/l) | 94 | 0.03 | 0.009 | 0.002 | 0.35 | 0.06 | 10 | Below Average | Decreasing | -0.0028 |
| Total Kjeldahl Nitrogen (mg/l) | 94 | 1.39 | 1.45 | 0.30 | 3.47 | 0.52 | 80 | Above Average | Increasing | 0.1177 |
| Total Nitrogen (mg/l) | 94 | 1.42 | 1.47 | 0.30 | 3.48 | 0.52 | 60 | Average | Increasing | 0.1166 |
| Ortho Phosphorus (mg/l) | 94 | 0.03 | 0.028 | 0.001 | 0.101 | 0.02 | 10 | Below Average | Increasing | 0.0009 |
| Total Phosphorus (mg/l) | 94 | 0.09 | 0.069 | 0.01 | 1.11 | 0.12 | 40 | Average | No Trend | |
| Chlorophyll-a (mg/m ³) | 94 | 18.96 | 10.15 | 0.02 | 161 | 25.84 | 80 | Above Average | Increasing | 1.529 |
| Color (CU)* | 36 | 61.28 | 52.00 | 12.00 | 192 | 34.00 | 30 | Below Average | No Trend | |
| Fecal Streptococci (cfu)* | 32 | 73.91 | 30.5 | 4.00 | 616 | 120 | 10 | Below Average | No Trend | |
| Total Organic Carbon (mg/l) | 94 | 28.13 | 25.3 | 0.50 | 162 | 18.46 | 80 | Above Average | Increasing | 1.241 |
| Total Suspended Solids (mg/l) | 94 | 7.78 | 5.00 | 0.25 | 75.40 | 11.27 | 40 | Average | No Trend | |
| Turbidity (NTU) | 94 | 2.90 | 1.80 | 0.26 | 50.00 | 5.43 | 20 | Below Average | Increasing | 0.2383 |

* Color and Fecal Streptococci sampling was discontinued April 27, 2005.

Table 3. SAN-WQ-4 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

| SAN-WQ-4 | n | Mean | Median | Min | Max | Standard Deviation | Median compared to Typical FL Stream Percentiles (Hand 2008) | Status Relative to Typical FL Streams | Seasonal Kendall Trend Results ($\alpha=0.05$) | Slope (units/yr) |
|------------------------------------|----------|-------------|---------------|------------|------------|---------------------------|---|--|--|-------------------------|
| Water Temperature (°C) | 93 | 24.48 | 25.39 | 13.20 | 31.93 | 4.54 | 30 | Below Average | No Trend | |
| Dissolved Oxygen (mg/l) | 93 | 4.32 | 3.80 | 0.18 | 15.47 | 2.98 | 10 | Below Average | No Trend | |
| Salinity (psu) | 91 | 2.08 | 1.86 | 0.60 | 10.14 | 1.26 | 80 | Above Average | Increasing | 0.1612 |
| Specific Conductance (mS/cm) | 92 | 3.93 | 3.54 | 1.34 | 17.19 | 2.25 | 90 | Above Average | Increasing | 0.3048 |
| pH (units) | 93 | 7.83 | 7.81 | 6.41 | 9.13 | 0.51 | 90 | Above Average | No Trend | |
| Ammonia (mg/l) | 93 | 0.22 | 0.152 | 0.01 | 2.03 | 0.29 | 90 | Above Average | No Trend | |
| Nitrate (mg/l) | 93 | 0.04 | 0.008 | 0.002 | 0.59 | 0.09 | 10 | Below Average | Decreasing | -0.0030 |
| Nitrite (mg/l) | 93 | 0.01 | 0.004 | 0.001 | 0.12 | 0.02 | 10 | Below Average | No Trend | |
| Nitrate + Nitrite (mg/l) | 93 | 0.05 | 0.011 | 0.002 | 0.59 | 0.09 | 10 | Below Average | Decreasing | -0.0030 |
| Total Kjeldahl Nitrogen (mg/l) | 93 | 1.98 | 1.83 | 0.05 | 6.36 | 1.12 | 90 | Above Average | Increasing | 0.1793 |
| Total Nitrogen (mg/l) | 93 | 2.02 | 1.86 | 0.09 | 6.37 | 1.11 | 80 | Above Average | Increasing | 0.1780 |
| Ortho Phosphorus (mg/l) | 93 | 0.04 | 0.033 | 0.001 | 0.15 | 0.03 | 10 | Below Average | Increasing | 0.0015 |
| Total Phosphorus (mg/l) | 93 | 0.11 | 0.082 | 0.006 | 0.75 | 0.11 | 50 | Average | No Trend | |
| Chlorophyll-a (mg/m ³) | 93 | 33.00 | 17.8 | 0.01 | 297 | 44.71 | 90 | Above Average | Increasing | 3.154 |
| Color (CU)* | 35 | 87.51 | 80 | 45.00 | 240 | 41.95 | 60 | Average | Increasing | 13.72 |
| Fecal Streptococci (cfu)* | 31 | 40.77 | 32 | 1.00 | 264 | 51.44 | 10 | Below Average | No Trend | |
| Total Organic Carbon (mg/l) | 93 | 34.63 | 33.65 | 0.50 | 77.10 | 13.69 | 90 | Above Average | No Trend | |
| Total Suspended Solids (mg/l) | 93 | 12.08 | 4.8 | 0.60 | 300 | 31.97 | 40 | Average | No Trend | |
| Turbidity (NTU) | 93 | 4.77 | 2.1 | 0.18 | 50 | 7.13 | 20 | Below Average | Increasing | 0.2402 |

* Color and Fecal Streptococci sampling was discontinued April 27, 2005.

Table 4. SAN-WQ-5 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

| SAN-WQ-5 | n | Mean | Median | Min | Max | Standard Deviation | Median compared to Typical FL Stream Percentiles (Hand 2008) | Status Relative to Typical FL Streams | Seasonal Kendall Trend Results ($\alpha=.05$) | Slope (units/yr) |
|------------------------------------|----|-------|--------|-------|-------|--------------------|--|---------------------------------------|---|------------------|
| Water Temperature (°C) | 92 | 24.06 | 24.18 | 11.82 | 31.02 | 4.76 | 20 | Below Average | No Trend | |
| Dissolved Oxygen (mg/l) | 92 | 3.78 | 3.57 | 0.22 | 8.80 | 2.19 | 10 | Below Average | No Trend | |
| Salinity (psu) | 90 | 5.06 | 2.59 | 0 | 28.92 | 5.38 | 80 | Above Average | Increasing | 0.3701 |
| Specific Conductance (mS/cm) | 90 | 10.05 | 4.61 | 0.007 | 98.60 | 13.65 | 90 | Above Average | Increasing | 0.6225 |
| pH (units) | 92 | 7.70 | 7.68 | 6.68 | 8.66 | 0.37 | 80 | Above Average | No Trend | |
| Ammonia (mg/l) | 92 | 0.15 | 0.111 | 0.008 | 0.59 | 0.14 | 90 | Above Average | No Trend | |
| Nitrate (mg/l) | 92 | 0.04 | 0.009 | 0.002 | 0.43 | 0.08 | 10 | Below Average | Decreasing | -0.0029 |
| Nitrite (mg/l) | 94 | 0.01 | 0.003 | 0.002 | 0.06 | 0.01 | 20 | Below Average | No Trend | |
| Nitrate + Nitrite (mg/l) | 94 | 0.04 | 0.012 | 0.002 | 0.43 | 0.08 | 10 | Below Average | Decreasing | -0.0024 |
| Total Kjeldahl Nitrogen (mg/l) | 92 | 1.49 | 1.50 | 0.20 | 3.20 | 0.54 | 90 | Above Average | Increasing | 0.0883 |
| Total Nitrogen (mg/l) | 94 | 1.49 | 1.53 | 0.03 | 3.20 | 0.57 | 70 | Above Average | Increasing | 0.0884 |
| Ortho Phosphorus (mg/l) | 92 | 0.03 | 0.027 | 0.001 | 0.12 | 0.03 | 10 | Below Average | Increasing | 0.0016 |
| Total Phosphorus (mg/l) | 92 | 0.07 | 0.059 | 0.002 | 1.26 | 0.13 | 40 | Average | No Trend | |
| Chlorophyll-a (mg/m ³) | 92 | 10.47 | 5.76 | 0.01 | 62 | 12.34 | 70 | Above Average | Increasing | 0.5515 |
| Color (CU)* | 34 | 76.38 | 70 | 28.00 | 192 | 27.85 | 50 | Average | No Trend | |
| Fecal Streptococci (cfu)* | 30 | 26.93 | 9.00 | 1.00 | 206 | 43.40 | 10 | Below Average | No Trend | |
| Total Organic Carbon (mg/l) | 92 | 43.76 | 34.00 | 0.50 | 793 | 80.25 | 90 | Above Average | No Trend | |
| Total Suspended Solids (mg/l) | 92 | 3.39 | 2.40 | 0.25 | 19.00 | 3.73 | 10 | Below Average | Decreasing | -0.1817 |
| Turbidity (NTU) | 92 | 1.71 | 0.98 | 0.09 | 13.43 | 2.05 | 20 | Below Average | No Trend | |

* Color and Fecal Streptococci sampling was discontinued April 27, 2005.

Table 5. SAN-WQ-6 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

| SAN-WQ-6 | n | Mean | Median | Min | Max | Standard Deviation | Median compared to Typical FL Stream Percentiles (Hand 2008) | Status Relative to Typical FL Streams | Seasonal Kendall Trend Results ($\alpha=.05$) | Slope (units/yr) |
|------------------------------------|----|-------|--------|-------|-------|--------------------|--|---------------------------------------|---|------------------|
| Water Temperature (°C) | 92 | 23.69 | 24.21 | 11.15 | 35.07 | 5.07 | 20 | Below Average | No Trend | |
| Dissolved Oxygen (mg/l) | 92 | 2.63 | 2.22 | 0.24 | 7.98 | 2.04 | 10 | Below Average | Increasing | 0.2634 |
| Salinity (psu) | 90 | 1.88 | 1.70 | 1.00 | 4.52 | 0.76 | 80 | Above Average | No Trend | |
| Specific Conductance (mS/cm) | 91 | 3.55 | 3.27 | 1.98 | 8.15 | 1.31 | 90 | Above Average | No trend | |
| pH (units) | 92 | 7.82 | 7.78 | 6.96 | 9.76 | 0.50 | 90 | Above Average | Increasing | 0.0398 |
| Ammonia (mg/l) | 92 | 0.17 | 0.121 | 0.02 | 1.30 | 0.20 | 90 | Above Average | No trend | |
| Nitrate (mg/l) | 92 | 0.03 | 0.006 | 0.002 | 0.44 | 0.07 | 10 | Below Average | Decreasing | -0.0032 |
| Nitrite (mg/l) | 94 | 0.01 | 0.003 | 0.002 | 0.03 | 0.01 | 10 | Below Average | No Trend | |
| Nitrate + Nitrite (mg/l) | 94 | 0.03 | 0.006 | 0.002 | 0.44 | 0.07 | 10 | Below Average | Decreasing | -0.0030 |
| Total Kjeldahl Nitrogen (mg/l) | 92 | 1.83 | 1.80 | 0.40 | 3.95 | 0.66 | 90 | Above Average | Increasing | 0.0863 |
| Total Nitrogen (mg/l) | 94 | 1.82 | 1.83 | 0.03 | 3.95 | 0.70 | 80 | Above Average | Increasing | 0.0815 |
| Ortho Phosphorus (mg/l) | 92 | 0.04 | 0.044 | 0.001 | 0.15 | 0.03 | 10 | Below Average | Increasing | 0.0037 |
| Total Phosphorus (mg/l) | 92 | 0.13 | 0.102 | 0.02 | 0.98 | 0.15 | 60 | Average | No Trend | |
| Chlorophyll-a (mg/m ³) | 92 | 34.55 | 24.3 | 0.01 | 151 | 33.06 | 90 | Above Average | Increasing | 3.703 |
| Color (CU)* | 34 | 56.09 | 52 | 18 | 144 | 23.85 | 30 | Below Average | No Trend | |
| Fecal Streptococci (cfu)* | 29 | 97.28 | 54 | 14 | 560 | 118 | 20 | Below Average | No Trend | |
| Total Organic Carbon (mg/l) | 92 | 28.92 | 27.2 | 0.50 | 74.60 | 13.99 | 80 | Above Average | No Trend | |
| Total Suspended Solids (mg/l) | 92 | 10.55 | 6.7 | 0.80 | 93.60 | 12.34 | 70 | Above Average | No Trend | |
| Turbidity (NTU) | 92 | 7.86 | 5.62 | 0.50 | 38 | 7.20 | 70 | Above Average | Increasing | 0.5583 |

* Color and Fecal Streptococci sampling was discontinued April 27, 2005.

Table 6. SAN-WQ-7 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

| SAN-WQ-7 | n | Mean | Median | Min | Max | Standard Deviation | Median compared to Typical FL Stream Percentiles (Hand 2008) | Status Relative to Typical FL Streams | Seasonal Kendall Trend Results ($\alpha=0.05$) | Slope (units/yr) |
|------------------------------------|----------|-------------|---------------|------------|------------|---------------------------|---|--|--|-------------------------|
| Water Temperature (°C) | 92 | 25.08 | 25.62 | 13.23 | 33.97 | 4.99 | 50 | Average | No Trend | |
| Dissolved Oxygen (mg/l) | 92 | 3.36 | 2.89 | 0.28 | 12.12 | 2.43 | 10 | Below Average | Increasing | 0.2325 |
| Salinity (psu) | 90 | 1.99 | 1.8 | 0 | 5.21 | 0.84 | 80 | Above Average | No Trend | |
| Specific Conductance (mS/cm) | 91 | 3.77 | 3.47 | 0.005 | 9.33 | 1.51 | 90 | Above Average | No trend | |
| pH (units) | 92 | 7.9 | 7.8 | 7.19 | 9.06 | 0.42 | 90 | Above Average | Increasing | 0.0339 |
| Ammonia (mg/l) | 92 | 0.17 | 0.121 | 0.005 | 1.32 | 0.20 | 90 | Above Average | No Trend | |
| Nitrate (mg/l) | 92 | 0.03 | 0.008 | 0.002 | 0.36 | 0.07 | 20 | Below Average | Decreasing | -0.0031 |
| Nitrite (mg/l) | 94 | 0.01 | 0.003 | 0.002 | 0.025 | 0.01 | 10 | Below Average | No Trend | |
| Nitrate + Nitrite (mg/l) | 94 | 0.04 | 0.010 | 0.002 | 0.36 | 0.07 | 10 | Below Average | Decreasing | -0.0030 |
| Total Kjeldahl Nitrogen (mg/l) | 92 | 1.97 | 2.00 | 0.05 | 4.16 | 0.76 | 90 | Above Average | Increasing | 0.1033 |
| Total Nitrogen (mg/l) | 94 | 1.95 | 2.00 | 0.03 | 4.16 | 0.80 | 80 | Above Average | Increasing | 0.1038 |
| Ortho Phosphorus (mg/l) | 92 | 0.04 | 0.40 | 0.002 | 0.13 | 0.03 | 10 | Below Average | Increasing | 0.0030 |
| Total Phosphorus (mg/l) | 92 | 0.16 | 0.139 | 0.02 | 1.07 | 0.13 | 70 | Above Average | Decreasing | -0.0077 |
| Chlorophyll-a (mg/m ³) | 92 | 44.88 | 38.7 | 0.06 | 134 | 34.76 | 90 | Above Average | Increasing | 5.836 |
| Color (CU)* | 34 | 54.82 | 50 | 20 | 108 | 19.68 | 40 | Average | No Trend | |
| Fecal Streptococci (cfu)* | 29 | 115 | 85 | 36 | 460 | 94 | 30 | Below Average | No trend | |
| Total Organic Carbon (mg/l) | 92 | 29.08 | 27.95 | 0.50 | 81.20 | 12.98 | 80 | Above Average | Decreasing | -0.9842 |
| Total Suspended Solids (mg/l) | 92 | 12.01 | 8.9 | 1.2 | 50 | 8.49 | 80 | Above Average | No Trend | |
| Turbidity (NTU) | 92 | 7.64 | 5.48 | 0.69 | 37 | 6.35 | 70 | Above Average | Increasing | 0.53 |

* Color and Fecal Streptococci sampling was discontinued April 27, 2005.

Table 7. SAN-WQ-8 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

| SAN-WQ-8 | n | Mean | Median | Min | Max | Standard Deviation | Median compared to Typical FL Stream Percentiles (Hand 2008) | Status Relative to Typical FL Streams | Seasonal Kendall Trend Results ($\alpha=0.05$) | Slope (units/yr) |
|------------------------------------|----|-------|--------|-------|-------|--------------------|--|---------------------------------------|--|------------------|
| Water Temperature (°C) | 92 | 23.90 | 24.42 | 11.24 | 32.35 | 5.18 | 20 | Below Average | No Trend | |
| Dissolved Oxygen (mg/l) | 92 | 3.06 | 2.48 | 0.13 | 13.89 | 2.22 | 10 | Below Average | Increasing | 0.195 |
| Salinity (psu) | 90 | 2.99 | 2.38 | 0 | 11.62 | 2.10 | 80 | Above Average | No Trend | |
| Specific Conductance (mS/cm) | 91 | 5.46 | 4.48 | 0.02 | 19.7 | 3.59 | 90 | Above Average | No Trend | |
| pH (units) | 92 | 7.73 | 7.71 | 7.12 | 8.86 | 0.37 | 80 | Above Average | Increasing | 0.0340 |
| Ammonia (mg/l) | 92 | 0.16 | 0.127 | 0.003 | 1.15 | 0.17 | 90 | Above Average | No Trend | |
| Nitrate (mg/l) | 92 | 0.03 | 0.006 | 0.002 | 0.30 | 0.06 | 10 | Below Average | Decreasing | -0.0025 |
| Nitrite (mg/l) | 94 | 0.01 | 0.003 | 0.002 | 0.03 | 0.01 | 10 | Below Average | No Trend | |
| Nitrate + Nitrite (mg/l) | 94 | 0.03 | 0.009 | 0.002 | 0.30 | 0.06 | 10 | Below Average | Decreasing | -0.0023 |
| Total Kjeldahl Nitrogen (mg/l) | 92 | 1.50 | 1.50 | 0.05 | 2.58 | 0.54 | 80 | Above Average | Increasing | 0.0994 |
| Total Nitrogen (mg/l) | 94 | 1.49 | 1.52 | 0.03 | 2.58 | 0.58 | 70 | Above Average | Increasing | 0.1029 |
| Ortho Phosphorus (mg/l) | 92 | 0.05 | 0.060 | 0.001 | 0.36 | 0.04 | 20 | Below Average | Increasing | 0.0045 |
| Total Phosphorus (mg/l) | 92 | 0.14 | 0.116 | 0.02 | 0.74 | 0.10 | 60 | Average | Decreasing | -0.0063 |
| Chlorophyll-a (mg/m ³) | 92 | 42.17 | 24.10 | 0.06 | 747 | 82.47 | 90 | Above Average | Increasing | 2.567 |
| Color (CU)* | 34 | 64.29 | 60 | 40 | 112 | 19.36 | 40 | Average | No Trend | |
| Fecal Streptococci (cfu)* | 30 | 79.43 | 53 | 1 | 348 | 77.9 | 20 | Below Average | No Trend | |
| Total Organic Carbon (mg/l) | 92 | 26.83 | 23.65 | 0.5 | 76.80 | 12.81 | 80 | Above Average | No Trend | |
| Total Suspended Solids (mg/l) | 92 | 7.64 | 6 | 0.50 | 43.60 | 6.98 | 60 | Above Average | No Trend | |
| Turbidity (NTU) | 92 | 3.96 | 2.67 | 0.62 | 27 | 4.33 | 50 | Average | Increasing | 0.2845 |

* Color and Fecal Streptococci sampling was discontinued April 27, 2005.