Sanibel Water Quality Monitoring Report and Recommendations 2002-2008

Report Submitted to the South Florida Water Management District by the City of Sanibel Natural Resources Department

(Grant Agreement No.: 4600001431)

July 27, 2009

Introduction

The City of Sanibel began monitoring surface water quality on Sanibel Island in 2002. The primary goal of the program was to collect data that could be used to assess the status of the island's water quality relative to other Florida water bodies and to detect trends over time.

Study Area

Sanibel Island is barrier island located in Lee County along the southwest coast of Florida. The island has a population of approximately 6,500 year-round residents. Over 68% of the entire island's land area is designated as conservation land. The island contains over 1,200 acres of interior freshwater wetlands that are distributed through the center of the island and drain into the Sanibel River.

The Sanibel River is the central stormwater collection point for the whole island. The island is divided into two drainage basins. The western basin is referred to as the Tarpon Bay weir basin and extends from its headwaters at Tahiti Drive to the Tarpon Bay weir, a water control structure located adjacent to Tarpon Bay (Fig. 1). The eastern basin is referred to as the Beach Road weir basin and begins at Tarpon Bay Road and extends east to the Beach Road weir, which empties into saltwater canals on the eastern end of the island (Fig. 1). The two basins are divided by a gate on the western side of Tarpon Bay Road. The gate remains closed a majority of the time; however it can be opened to equalize water stages between the two basins if needed for flood control. The primary purposes of the weirs are to maintain freshwater in the interior freshwater wetland system, reduce saltwater intrusion, and flood control.

Figure 1 Map of Sanibel showing water quality monitoring locations

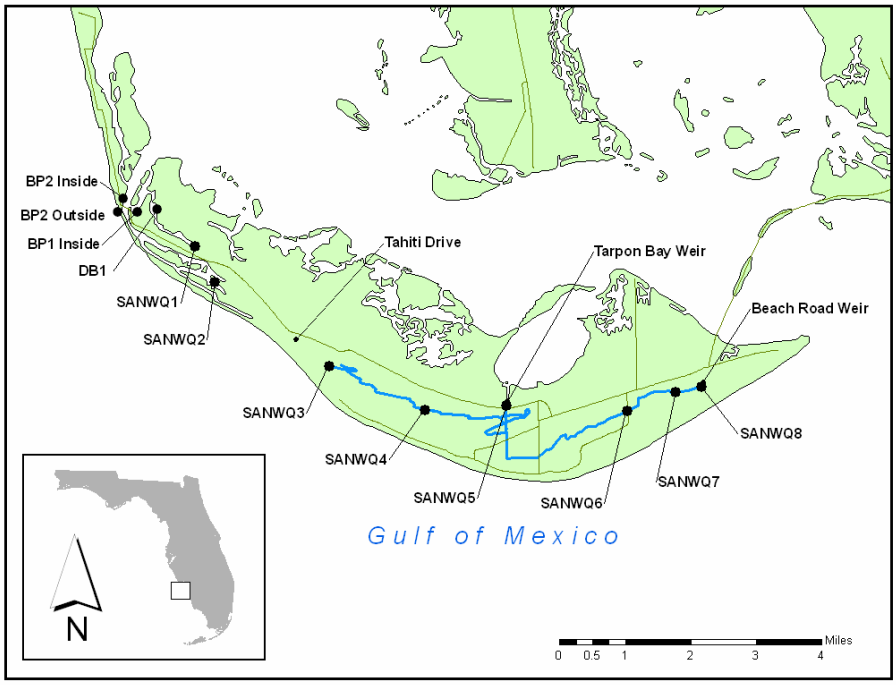


Table 1. Water quality monitoring locations

Station Name	Latitude	Longitude	Station Type
SANWQ1	N 26 28 26.54	W 82 09 54.45	Estuarine
SANWQ2	N 26 27 59.86	W 82 09 37.63	Estuarine
SANWQ3	N 26 26 50.59	W 82 07 54.30	Stream
SANWQ4	N 26 26 15.39	W 82 06 28.59	Stream
SANWQ5	N 26 26 29.19	W 82 05 16.07	Stream
SANWQ6	N 26 26 14.89	W 82 03 29.29	Stream
SANWQ7	N 26 26 30.64	W 82 02 46.42	Stream
SANWQ8	N 26 26 35.10	W 82 02 24.74	Stream
BP1 Inside	N 26 28 55.27	W 82 10 44.21	Estuarine
BP2 Inside	N 26 29 02.26	W 82 10 57.53	Estuarine
BP2 Outside	N 26 28 57.03	W 82 11 02.13	Estuarine
DB1	N 26 28 53.89	W 82 10 27.25	Estuarine

Data Collection and Analysis

The period of record for this report is January 2002 through December 2008. Samples were collected monthly from 8 sites from January 2002 to November 2005 (SANWQ1-SANWQ8). The 8 sites included two estuarine stations with SANWQ1 located in Dinkins Bayou and SANWQ2 located in Clam Bayou and the 6 remaining sites distributed along the Sanibel River (Fig 1.). In 2006, the City contracted Johnson Engineering to take over the sampling of the 8 existing stations and added four additional sites at the west end of the island in the Blind Pass/Dinkins Bayou estuarine complex.

All samples collected between 2002 and 2005 were taken by the City's Natural Resources Department staff. Samples collected between 2006 and 2008 were taken by the City's contractor, Johnson Engineering. Statistical analyses were performed by Natural Resources Department staff. In the field, samples were collected from land using a 6.2 liter Wildco® Alpha Bottle™ or similar sampling device. Water samples were collected at a depth of 0.5m from the water's surface. Field measurements were taken at a depth of 0.5m from the surface using a Hydrolab Minisonde 4a® with a Hydrolab Surveyor 4a® data logger or YSI® 600XL data sonde with a 650MDS data logger. Laboratory analyses were performed by the Cape Coral Environmental Laboratory from 2002-205 and by Benchmark Laboratory from 2006-2008.

Field parameters collected included: temperature (ºC), dissolved oxygen (mg/l), salinity (psu), specific conductance (mS/cm) and pH. Lab parameters included ammonia nitrogen (mg/l), nitrate nitrogen (mg/l), nitrite nitrogen (mg/l), total Kjeldahl nitrogen (mg/l), total nitrogen (mg/l), ortho phosphorus (mg/l), total phosphorus (mg/l), chlorophyll-*a* (µg/l), color (cu), fecal streptococci, (colonies/100ml) total organic carbon (mg/l), total suspended solids (mg/l) and turbidity (ntu). In 2006, color and fecal streptococci were dropped from the sampling protocol.

Summary statistics were run for each parameter at all 12 stations for the period of record (Tables 4 - 14). The Aitchison's method (Sanitas Technologies 2007) was used to correct for values below the minimum detection limit (MDL). This method allows for the use of various MDLs used by different labs and is more accurate than the standard practice of using half of the MDL. All equipment blanks and duplicates were excluded from statistical analysis.

Station median values for each parameter were compared to the 'typical' Florida waterbody values published by Joe Hand (2008) to evaluate their status relative to other Florida waterbodies (Tables 2 and 3). Since our water quality monitoring stations were distributed in both estuarine and freshwater bodies, we used two different sets of values for the comparison. Stations with salinity values greater than 10 psu were considered estuarine. "Estuary" values were used for comparison with SANWQ 1, SANWQ2, BP1 Inside, BP2 Inside, BP2 Outside and DB1. "Stream" values were used for comparison with SANWQ2 through SANWQ8. Percentile distributions were grouped in the following categories: 10-30 = below average, 31-69= average, 70-90= above average (Duffey et al. 2007). The values used in this study for comparison were updated values to those used in Hand (1989), *Typical Water Quality Values for Florida's Lakes, Streams, and Estuaries*.

Time series and box and whisker plots were used to look for spatial and temporal trends in the data. Dixon's outlier test was used to identify outliers in the data. Tests for seasonality were done using the methods described in *Statistical Analysis of Ground-water Monitoring Data at RCRA Facilities, Interim Final Guidance* (U.S. EPA 1989) to identify parameters that exhibited statistically significant seasonal variation. Several of the parameters exhibited seasonal variation ($p<0.05$).

A Seasonal Kendall trend test was used to evaluate trends in the data. The Seasonal Kendall test is a non-parametric test, which does not require the data to be normally distributed and removes seasonal variation prior to evaluating trends. For this test, wet season was defined as June through October and dry season was defined as November through May. Seasons were defined by averaging monthly rainfall for the study period (2002-2008). We used a 95% confidence interval and p values <0.05 were considered significant. Trend analyses were done using the entire period of record. Constituents that had a high number of non-detects (>20) (e.g. ammonia, nitrite, nitrate and ortho phosphorus) were also run using a limited dataset from 2006-2008 to determine if changes in the detection limits influenced the trend. If trends were significant ($p<0.05$) for both the whole period of record and the 2006-2008 data sets, trends were considered "real" trends. Constituents where the change in detection limits influenced the trend were disregarded. All statistical analyses were done using WQStat Plus (Sanitas Technologies 2007).

Results and Discussion

Salinity values were "above average" for both the freshwater and estuarine stations compared to typical Florida median values. This indicates that the estuarine stations are not truly estuarine, but are "marine" in nature due to their proximity to the Gulf of

Mexico and distance from freshwater sources. The elevated salinity values in the Sanibel River are likely the result of saltwater intrusion that occurs when the weir gates are open for flood control purposes or from seawater transported onto the island during tropical storm events.

Dissolved oxygen values were "below average" for all of the stations except for BP1 Inside and BP2 Outside. Median dissolved oxygen values were below 4 mg/l at all of the freshwater stations except for SANWQ4, which was only slightly higher at 4.09mg/l. All of the freshwater stations failed to meet the Florida Surface Water criteria for Class III waters for dissolved oxygen of 5mg/l (62-302.530, F.A.C).

Chlorophyll-a levels were above average at all of the sites except for BP2 Outside (Fig. 2 and 3). Elevated chlorophyll levels indicate an imbalance in the waterbodies as a result of excessive nutrient inputs (62-302, F.A.C.). Total phosphorus was average or below average at all of the stations. Since total phosphorus levels were not elevated, it is likely that the elevated chlorophyll-a levels are associated with nitrogen rather than phosphorus. However, previous work by Hale et al. (2009) indicates that phosphorus as well as nitrogen may limit phytoplankton in the Sanibel River. Ammonia concentrations were above average at all of the stations. Total Kjeldahl nitrogen concentrations, which is the sum of organic nitrogen, were above average at all of the freshwater stations and were below average at a majority of the estuarine stations. Total nitrogen concentrations were above average at SANWQ4 through SANWQ8 and were average or below average at the remaining sites (Fig. 4 and 5). A majority of the total nitrogen fraction was made up of organic nitrogen.

The freshwater sites had above average total organic carbon. Total organic carbon was highest in the central portion of the island at stations SANWQ4, SANWQ5 and SANWQ6. These stations are located within the interior freshwater wetlands and may be influenced by organic matter flushing out of the surrounding wetlands.

The estuarine stations had above average total suspended solids and turbidity concentrations. Total suspended solids and turbidity were average or below average in the western basin and above average in the eastern basin. Higher concentrations of nutrients, total suspended solids and turbidity in the eastern basin may be a result of higher density development resulting in more stormwater runoff from impervious surfaces.

Several trends were apparent at the estuarine sites. The most notable trends were increases in chlorophyll-a at SANWQ1 and SANWQ2; decreases in total phosphorus, total suspended solids, and turbidity at SANWQ1; and decreases in total Kjeldahl nitrogen, total nitrogen, total phosphorus, total organic carbon, total suspended solids and turbidity at SANWQ2.

Several trends were also identified at the freshwater stations. There were increasing trends in chlorophyll-a at all six of the freshwater stations. Total nitrogen, total Kjeldahl nitrogen and turbidity indicated increasing trends at stations SANWQ3, SANWQ6,

SANWQ7, and SANWQ8. Decreasing trends in nitrate were identified at SANWQ4 and SANWQ5.

Figure 2. Box and whisker plot of chlorophyll-a concentrations for the freshwater stations. The bottom and top horizontal lines represents the 25th and 75th percentiles. The middle line represents the median value and the plus sign represents the mean value. The vertical bars represent the minimum and maximum values. The number of observations and samples below the MDL are listed at the bottom. All values are in mg/m3.

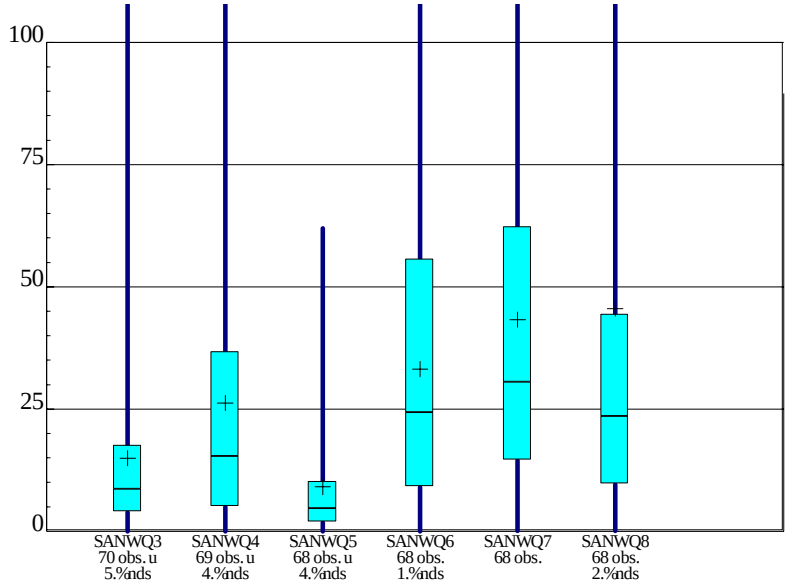


Figure 3. Box and whisker plot of chlorophyll-a concentrations for the estuarine stations. The bottom and top horizontal lines represents the 25th and 75th percentiles. The middle line represents the median value and the plus sign represents the mean value. The vertical bars represent the minimum and maximum values. The number of observations and samples below the MDL are listed at the bottom. All values are in mg/m3.

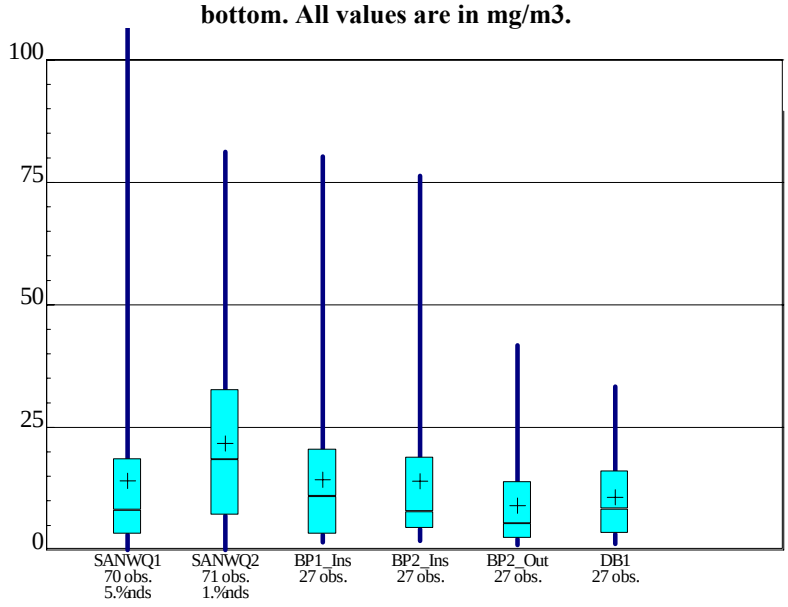


Figure 4. Box and whisker plot of total nitrogen concentrations for the freshwater stations. The bottom and top horizontal lines represents the 25th and 75th percentiles. The middle line represents the median value and the plus sign represents the mean value. The vertical bars represent the minimum and maximum values. The number of observations and samples below the MDL are listed at the bottom. All values are in mg/l.

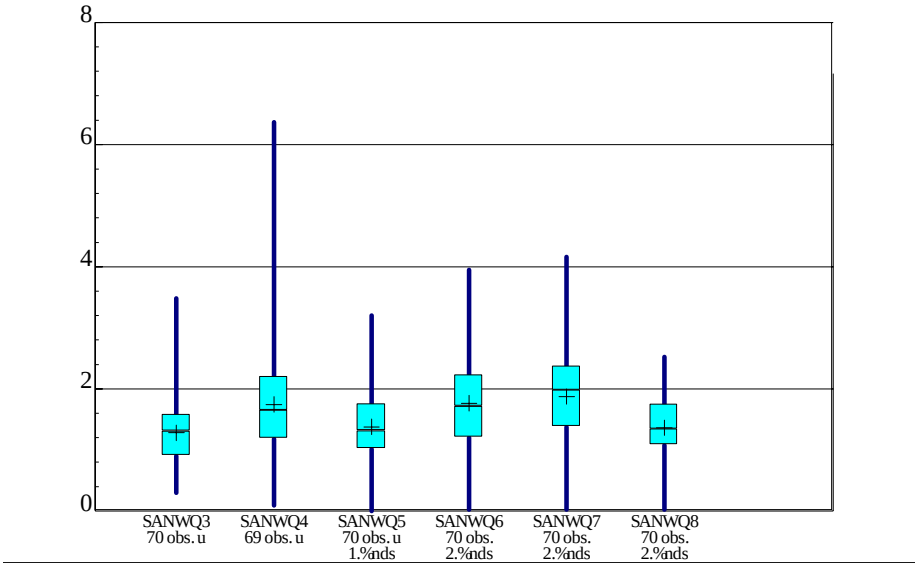
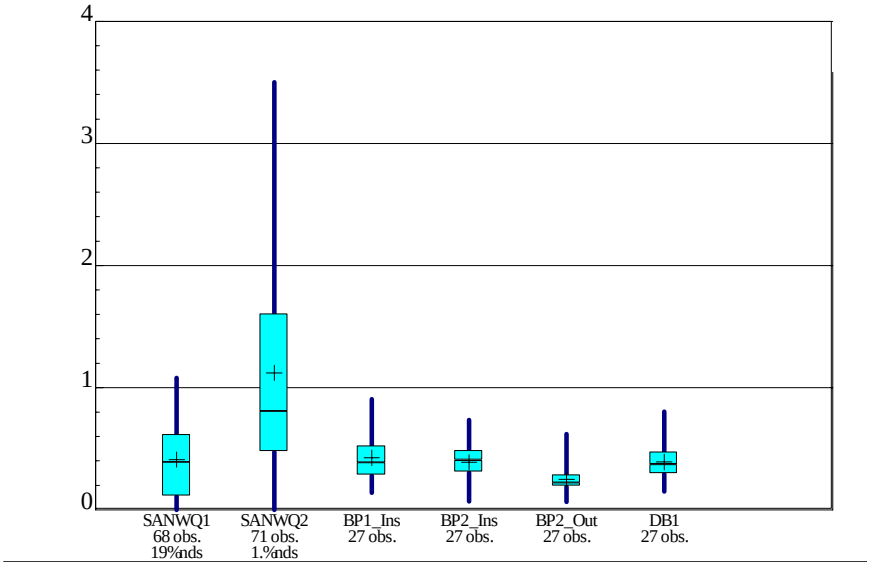


Figure 5. Box and whisker plot of total nitrogen concentrations for the estuarine stations. The bottom and top horizontal lines represents the 25th and 75th percentiles. The middle line represents the median value and the plus sign represents the mean value. The vertical bars represent the minimum and maximum values. The number of observations and samples below the MDL are listed at the bottom. All values are in mg/l.



In 2008, the City of Sanibel contracted the Charlotte Harbor Environmental Center, partnering with Mote Marine Laboratory and the Sanibel Captiva Conservation Foundation Marine Laboratory to conduct a study using stable nitrogen isotopes and phytoplankton community analysis to help identify the sources of nutrients causing the Sanibel River to be "impaired" for nutrients under the Florida Impaired Waters Rule (See attached report). They found that that nitrogen, primarily ammonia, was likely the limiting nutrient in the Sanibel River and that the sources of the nutrients include wastewater re-use water used for irrigation, septic tank effluent, pet wastes, fertilizers and decaying stream-side vegetation. During their study, they found higher concentrations of nutrients in the eastern basin compared to the western basin. Stable isotope analysis indicated that a greater proportion of the nutrients in the eastern basin originated from organic sources such as wastewater re-use water used for irrigation, septic tank effluent, or pet wastes, rather than from fertilizer. Results from the phytoplankton community analysis indicate that that the type of phytoplankton that were present (dinoflagellates and cyanophytes) assimilate more ammonia than nitrate and chlorophyll-a concentrations seem to be more closely related to total phosphorus than total nitrogen. Since phytoplankton in the Sanibel River respond to both nitrogen and phosphorus, it was recommended that both types of nutrients be reduced to help restore the system. It was also noted in the report that even after nutrient control measures are implemented, chlorophyll-a concentrations may remain high in the downstream stations of the river for some time.

Recommendations for Additional Monitoring and Restoration

Results of our water quality analyses indicate that organic nitrogen is abundant and is likely influencing chlorophyll-a concentrations. It has also been suggested by previous studies by Hale et al. (2009) that both nitrogen and phosphorus should be controlled. Our results also indicate that nutrients and suspended solids are higher in the eastern basin. This suggests that the eastern basin receives more stormwater runoff than the western basin or that wastewater reuse water used for irrigation may be entering the river. It is important to note that the Beachview Golf Course, which uses re-use water, and the Donax wastewater treatment facility are located adjacent to SANWQ7.

Over the past several years the City has been very proactive in reducing nutrients from stormwater runoff. These projects include adoption of a fertilizer ordinance and education program; installation of an island-wide central sewer system; stormwater improvement projects; and water quality monitoring and nutrient source tracking.

The City is currently working or proposes to construct several projects that will reduce stormwater runoff and nutrients entering the Sanibel River and surrounding waters:

Sanibel Ambient Water Quality Monitoring Program

This project is ongoing and the data collected from this program are summarized in this report. We propose to continue monitoring all 12 of the monitoring sites as part of our NPDES permit requirements

City of Sanibel Fertilizer Education Program
This project is ongoing and includes education and enforcement of the City's fertilizer ordinance for commercial and residential properties, as well as implementing the City's fertilizer and lake management guidelines for golf courses. In 2007, the Sanibel City Council adopted a fertilizer ordinance that limits the use of fertilizer containing nitrogen and phosphorus. Under this ordinance, fertilizer used on Sanibel is limited to 2% or less phosphorus and 20% total nitrogen, of which at least 50% must be in slow release form. In addition, the fertilizer ordinance also established a minimum setback or buffer zone of 25 feet around wetlands and waterbodies. The use of fertilizer is prohibited between July 1st and September 30th. In 2008, Sanibel City Council adopted Natural Resources Department staff recommendations for fertilizer use and lake management guidelines for the island's golf courses. These guidelines were based on the Florida Department of Environmental Protection's *Best Management Practices for the Enhancement of Environmental Quality on Florida Golf Courses* (2007). The guidelines require golf courses to limit soluble nitrogen applications to ½ lb/1000ft^2; create buffer zones around waterbodies; plant a minimum of 30% of each lake bank with littoral zone vegetation; collect water quality data and make it available to the City's Natural Resources Department; and report all fish kills to the City.

Sanibel River Vegetative Debris Clearing Project
This project is ongoing and includes the clearing of cattails and woody debris in the Sanibel River. This project requires the City's contractor to selectively remove invasive vegetation such as cattails and wood debris from the river that reduce water flow and impact flood control. The City's contractor consults with the City's Public Works and Natural Resources Department staff to selectively debris. All biomass is completely removed so that organic matter from dead vegetation does not contribute to the nutrient pool. Since cattails do have water quality benefits, only those cattails that directly impact flood control are removed.

Tarpon Bay Road Drainage Improvements Project
Tarpon Bay Road drainage improvements are currently underway. The goal of the project is to redirect stormwater from Palm Ridge Road and Sanibel-Captiva Road that currently flow into the mangrove forest to the north to a swale located on the western side of Tarpon Bay Road. The project will reduce stormwater inputs to Tarpon Bay located in the J.N. Ding Darling National Wildlife Refuge

Casa Ybel Filter Marsh
The Casa Ybel filter marsh is proposed for construction along Casa Ybel Road located in the eastern basin. The project includes piping runoff from Periwinkle Way and Dixie Beach Boulevard to a treatment structure or filter marsh prior to entering the Sanibel River. The swale piping will allow the Casa Ybel Road and shared use path runoff to be directed to grass swale for treatment prior to entering the proposed pipe through inlets. The treatment structure and/or marsh will treat the Periwinkle runoff and further treat the Casa Ybel Road runoff prior to entering the Sanibel River. Design of the piping was done several years ago and will need to be updated, while the treatment structure / filter marsh

design is/are conceptual at this time. The piping cost estimate is $250,000 while the treatment component cost estimate is $250,000 for an estimated total project cost of $500,000.

Sanibel Bayous Package Plant Restoration

In 2007, the City identified the Sanibel Bayous subdivision package plant as a source of nutrients and bacteria impacting Clam Bayou and area beaches. As a result, Sanibel City Council voted to acquire the package plant and hook all of the properties in the subdivision up to central sewer. Before the hook-ups could completed several improvements had to be done to the existing wastewater infrastructure. The City purchased the plant and did all of the necessary wastewater improvements for $200,000. In 2009, the package plant was decommissioned and the treatment ponds were drained and capped with clean fill. Before the final phase of restoration is completed the site will be left alone for a few years. The final phase of restoration will include restoring elevations to wetland grade and returning the site to mangrove wetlands. The final phase of restoration costs have not been estimated at this time.

References

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Table 2. 'Typical' Florida estuarine water quality percentile distributions (Hand 2008)

Percentile	Temp (ºC)	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	22.09	4.20	5.70	.0400	7.34	0.010	0.007	0.001	0.008	0.410
20	23.02	5.24	12.91	.0501	7.48	0.015	0.010	0.002	0.010	0.500
30	23.71	5.60	18.03	.9230	7.66	0.020	0.010	0.002	0.012	0.560
40	24.30	5.93	21.48	10.170	7.75	0.026	0.010	0.004	0.018	0.633
50	24.77	6.17	24.07	22.732	7.83	0.034	0.017	0.005	0.020	0.695
60	25.12	6.35	26.40	31.800	7.90	0.044	0.026	0.007	0.028	0.780
70	25.57	6.51	29.05	38.250	7.99	0.050	0.037	0.010	0.039	0.860
80	26.05	6.74	31.45	43.885	8.03	0.064	0.060	0.010	0.060	0.949
90	27.00	7.06	32.90	48.400	8.10	0.087	0.150	0.012	0.145	1.105
No. of Waterbodies	447	448	428	416	447	384	97	105	384	372

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	0.372	0.008	0.01	1.225	10	9	3.00	4.00	1.40
20	0.472	0.015	0.03	2.36	15	24	4.04	6.00	1.90
30	0.530	0.020	0.04	3.1	20	49	5.00	7.50	2.30
40	0.610	0.028	0.06	3.92	23.5	63	6.20	8.50	2.80
50	0.700	0.038	0.07	4.579	30	95	7.86	9.80	3.00
60	0.810	0.048	0.09	5	40	131.5	9.45	11.50	3.40
70	0.930	0.070	0.13	5.65	50	220	10.41	13.50	4.00
80	1.030	0.093	0.17	7	60	320	12.00	16.00	5.08
90	1.200	0.160	0.23	10	92.5	720	14.33	21.70	6.97
No. of Waterbodies	392	157	396	374	367	36	286	319	427

Table 3. 'Typical' Florida stream water quality percentile distributions (Hand 2008)

Percentile	Temp (ºC)	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 4. SANWQ1 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

SANWQ1	n	Mean	Median	Min	Max	Standard Deviation	Median compared to Typical FL Estuary Percentiles (Hand 2008)	Status Relative to Typical FL Estuaries	Seasonal Kendall Trend Results (α=.05)	Slope (units/yr)
Water Temperature	80	25.3	25.26	12.8	33.03	4.71	60	Average	No Trend	
Dissolved Oxygen	79	4.29	4.13	0.62	9.34	2.15	10	Below Average	Increasing	0.57
Salinity	72	31.45	31.96	17.8	41.1	5.32	80	Above Average	Increasing	0.89
Specific Conductance	71	48.19	48.99	28.88	60.90	7.51	90	Above Average	Increasing	1.33
pH	79	7.84	7.82	7.21	8.8	0.38	40	Average	Increasing	0.11
Ammonia	70	0.09	0.10	0.005	0.50	0.09	90	Above Average	No Trend	
Nitrate	70	0.05	0.004	0.003	0.33	0.08	10	Below Average	No Trend	
Nitrite	73	0.02	0.003	0.003	0.025	0.01	30	Below Average	No trend	
Nitrate + Nitrite	70	0.49	0.005	0.004	0.33	0.08	10	Below Average	No Trend	
Total Kjeldahl Nitrogen	69	0.46	0.50	0.05	1.50	0.29	20	Below Average	No Trend	
Total Nitrogen	68	0.41	0.50	0.05	1.08	0.30	20	Below Average	No Trend	
Ortho Phosphorus	70	0.02	0.014	0.002	0.11	0.02	10	Below Average	No Trend	
Total Phosphorus	70	0.08	0.087	0.002	0.28	0.04	50	Average	Decreasing	-0.009
Chlorophyll-*a*	70	14.04	8.76	0.01	174	22.68	80	Above Average	Increasing	1.799
Color	38	21.68	17.00	1.00	70	14.55	30	Below Average	Increasing	2.471
Fecal Streptococci	32	51.78	39.00	4.00	392	69.21	20	Below Average	No Trend	
Total Organic Carbon	70	11.97	9.85	0.5	79.3	11.14	60	Average	No Trend	
Total Suspended Solids	70	24.67	17.1	3.5	94	19.57	80	Above Average	Decreasing	3.059
Turbidity	70	6.06	5.75	1.2	14	3.27	80	Above Average	Increasing	0.664

Table 5. SANWQ2 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

SANWQ2	n	Mean	Median	Min	Max	Standard Deviation	Median compared to Typical FL Estuary Percentiles (Hand 2008)	Status Relative to Typical FL Estuaries	Seasonal Kendall Trend Results (α=.05)	Slope (units/yr)
Water Temperature	80	25.76	25.94	13.93	33.15	4.90	70	Above Average	No Trend	
Dissolved Oxygen	79	5.53	5.26	1.04	12.15	2.28	20	Below Average	No Trend	
Salinity	73	31.43	33.35	0.05	50.43	9.20	90	Above Average	Increasing	1.960
Specific Conductance	71	49.25	51.05	21.73	73.47	10.57	90	Above Average	Increasing	1.251
pH	80	8.13	8.10	7.40	8.95	0.32	90	Above Average	No Trend	
Ammonia	71	0.09	0.092	0.01	0.60	0.09	90	Above Average	No trend	
Nitrate	69	0.04	0.004	0.004	0.33	0.07	10	Below Average	No Trend	
Nitrite	69	0.01	0.003	0.003	0.03	0.01	30	Below Average	No Trend	
Nitrate + Nitrite	69	0.04	0.004	0.004	0.33	0.07	10	Below Average	No Trend	
Total Kjeldahl Nitrogen	71	1.09	0.80	0.05	3.50	0.87	60	Average	Decreasing	-0.0181
Total Nitrogen	71	1.12	0.80	0.05	3.50	0.88	50	Average	Decreasing	-0.0174
Ortho Phosphorus	71	0.03	0.013	0.002	0.28	0.04	40	Average	No Trend	
Total Phosphorus	72	0.14	0.099	0.004	0.58	0.12	60	Average	Decreasing	-0.0229
Chlorophyll-*a*	71	21.67	18.30	0.01	81.20	18.23	90	Above Average	Increasing	1.93
Color	37	38.35	30.00	7.00	128.00	27.52	50	Average	No Trend	
Fecal Streptococci	32	41.80	12.50	1.00	382.00	95.62	10	Below Average	No Trend	
Total Organic Carbon	71	20.81	15.00	1.2	132.70	18.92	90	Above Average	Decreasing	-2.8570
Total Suspended Solids	71	32.17	23.40	0.57	220.00	34.59	90	Above Average	Decreasing	-4.519
Turbidity	71	7.61	7.02	0.80	31.30	5.86	90	Above Average	Increasing	0.5971

Table 6. SANWQ3 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

SANWQ3	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 (α=.05)	Slope (units/yr)
Water Temperature	76	23.67	24.22	11.74	31.18	4.61	20	Below Average	No Trend	
Dissolved Oxygen	75	2.51	2.18	0.37	7.07	1.52	10	Below Average	No Trend	
Salinity	69	1.37	1.39	0.00	2.25	0.39	80	Above Average	No Trend	
Specific Conductance	69	2.58	2.65	0.007	4.121	0.67	90	Above Average	No Trend	
pH	76	7.79	7.71	7.09	9.21	0.40	90	Above Average	Increasing	0.0694
Ammonia	70	0.124	0.124	0.005	0.70	0.12	90	Above Average	No Trend	
Nitrate	70	0.39	0.007	0.004	0.35	0.07	10	Below Average	No Trend	
Nitrite	70	0.015	0.003	0.003	0.025	0.01	10	Below Average	No Trend	
Nitrate + Nitrite	70	0.039	0.0095	0.004	0.35	0.07	10	Below Average	No Trend	
Total Kjeldahl Nitrogen	70	1.246	1.265	0.30	3.47	0.51	70	Above Average	Increasing	0.1145
Total Nitrogen	70	1.275	1.30	0.30	3.48	0.51	60	Average	Increasing	0.1112
Ortho Phosphorus	70	0.022	0.013	0.002	0.066	0.01	10	Below Average	No Trend	
Total Phosphorus	70	0.091	0.071	0.012	1.11	0.14	40	Average	No Trend	
Chlorophyll-*a*	70	14.86	8.99	0.02	118.00	19.69	80	Above Average	Increasing	1.9440
Color	36	61.28	52.00	12.00	192.00	34.01	30	Below Average	No Trend	
Fecal Streptococci	32	73.91	30.50	4.00	616.00	119.7	10	Below Average	No Trend	
Total Organic Carbon	70	27.10	23.40	0.50	161.70	20.98	80	Above Average	No Trend	
Total Suspended Solids	70	6.30	4.50	0.25	48.00	7.31	40	Average	No Trend	
Turbidity	70	2.60	1.60	0.26	50.00	6.12	20	Below Average	Increasing	0.1699

Table 7. SANWQ4 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

SANWQ4	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 (α=.05)	Slope (units/yr)
Water Temperature	75	24.63	25.50	13.20	31.93	4.49	30	Below Average	No Trend	
Dissolved Oxygen	75	4.84	4.09	0.53	15.47	3.01	10	Below Average	Increasing	0.5566
Salinity	68	1.73	1.52	0.60	3.20	0.63	80	Above Average	Increasing	0.1378
Specific Conductance	68	3.25	2.90	1.34	5.93	1.13	90	Above Average	Increasing	0.2712
pH	75	7.93	7.86	6.97	9.13	0.48	90	Above Average	Increasing	0.0964
Ammonia	69	0.176	0.15	0.01	1.11	0.20	90	Above Average	No Trend	
Nitrate	69	0.054	0.0065	0.004	0.59	0.10	10	Below Average	Decreasing	-0.0041
Nitrite	69	0.015	0.003	0.003	0.03	0.01	10	Below Average	No Trend	
Nitrate + Nitrite	69	0.056	0.009	0.004	0.59	0.10	10	Below Average	Decreasing	-0.0040
Total Kjeldahl Nitrogen	69	1.696	1.64	0.05	6.36	0.98	80	Above Average	No Trend	
Total Nitrogen	69	1.741	1.64	0.09	6.37	0.98	80	Above Average	No Trend	
Ortho Phosphorus	69	0.024	0.014	0.002	0.10	0.02	10	Below Average	No Trend	
Total Phosphorus	69	0.119	0.081	0.006	0.75	0.12	50	Average	No Trend	
Chlorophyll-*a*	69	26.17	16.20	0.01	127.00	29.37	90	Above Average	Increasing	4.0790
Color	35	87.51	80.00	45.00	240.00	41.95	60	Average	Increasing	13.7200
Fecal Streptococci	31	40.77	32.00	1.00	264.00	51.44	10	Below Average	No Trend	
Total Organic Carbon	69	33.49	31.65	0.50	77.10	15.27	90	Above Average	No Trend	
Total Suspended Solids	69	12.05	4.80	0.80	300.00	36.18	40	Average	No Trend	
Turbidity	69	4.31	1.90	0.18	50.00	7.30	20	Below Average	Increasing	0.2929

Table 8. SANWQ5 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

SANWQ5	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 (α=.05)	Slope (units/yr)
Water Temperature	74	24.13	24.35	11.82	31.02	4.73	20	Below Average	No Trend	
Dissolved Oxygen	73	3.71	3.28	0.22	8.80	2.22	10	Below Average	No Trend	
Salinity	67	4.22	2.40	0.00	16.40	3.60	80	Above Average	Increasing	0.7541
Specific Conductance	66	8.79	4.17	0.007	98.60	13.42	90	Above Average	Increasing	1.348
pH	74	7.73	7.69	6.95	8.66	0.37	80	Above Average	No Trend	
Ammonia	68	0.143	0.139	0.008	0.572	0.14	90	Above Average	No Trend	
Nitrate	68	0.045	0.004	0.004	0.43	0.09	10	Below Average	Decreasing	-0.0044
Nitrite	70	0.015	0.003	0.003	0.025	0.01	20	Below Average	No Trend	
Nitrate + Nitrite	70	0.045	0.004	0.004	0.43	0.09	10	Below Average	Decreasing	-0.0043
Total Kjeldahl Nitrogen	68	1.376	1.32	0.20	3.20	0.52	80	Above Average	No Trend	
Total Nitrogen	70	1.373	1.31	0.05	3.20	0.56	70	Above Average	No Trend	
Ortho Phosphorus	68	0.02	0.015	0.002	0.065	0.01	10	Below Average	No Trend	
Total Phosphorus	68	0.07	0.051	0.002	1.26	0.15	30	Below Average	No Trend	
Chlorophyll-*a*	68	9.01	5.00	0.01	62.00	11.71	70	Above Average	Increasing	0.5331
Color	34	76.38	70.00	28.00	192.00	27.85	50	Average	No Trend	
Fecal Streptococci	30	26.93	9.00	1.00	206.00	43.40	10	Below Average	No Trend	
Total Organic Carbon	68	45.79	32.4	0.50	793.00	93.32	90	Above Average	No trend	
Total Suspended Solids	68	3.63	2.00	0.25	19.00	3.90	10	Below Average	Decreasing	-0.2081
Turbidity	68	1.615	0.77	0.09	13.43	2.17	10	Below Average	No Trend	

Table 9. SANWQ6 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

SANWQ6	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 (α=.05)	Slope (units/yr)
Water Temperature	74	23.66	24.21	11.15	31.68	4.94	20	Below Average	No Trend	
Dissolved Oxygen	73	2.59	1.99	0.24	7.98	2.02	10	Below Average	Increasing	0.4088
Salinity	67	1.92	1.70	1.00	4.52	0.86	80	Above Average	Decreasing	-0.1120
Specific Conductance	67	3.59	3.25	1.98	8.15	1.50	90	Above Average	Decreasing	-0.1626
pH	74	7.87	7.79	6.98	9.76	0.52	90	Above Average	Increasing	0.1061
Ammonia	68	0.197	0.19	0.015	1.30	0.22	90	Above Average	No Trend	
Nitrate	68	0.004	0.004	0.004	0.44	0.08	10	Below Average	No Trend	
Nitrite	70	0.015	0.003	0.003	0.025	0.01	10	Below Average	No Trend	
Nitrate + Nitrite	70	0.04	0.004	0.05	0.44	0.08	10	Below Average	No Trend	
Total Kjeldahl Nitrogen	68	1.78	1.690	0.04	3.95	0.70	80	Above Average	Increasing	0.1511
Total Nitrogen	70	1.76	1.755	0.03	3.95	0.75	80	Above Average	Increasing	0.1455
Ortho Phosphorus	68	0.03	0.024	0.002	0.15	0.03	10	Below Average	No Trend	
Total Phosphorus	68	0.14	0.102	0.024	0.98	0.17	60	Average	No Trend	
Chlorophyll-*a*	68	33.09	24.30	0.01	122.00	30.39	90	Above Average	Increasing	8.5210
Color	34	56.09	52.00	18.00	144.00	23.85	30	Below Average	No Trend	
Fecal Streptococci	29	97.28	54.00	14.00	560.00	117.50	20	Below Average	No Trend	
Total Organic Carbon	68	30.25	28.10	0.50	74.60	15.59	80	Above Average	No Trend	
Total Suspended Solids	68	10.74	6.80	1.00	93.60	13.05	70	Above Average	Increasing	1.2480
Turbidity	68	7.29	5.10	0.50	28.00	6.61	70	Above Average	Increasing	1.2260

Table 10. SANWQ7 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

SANWQ7	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 (α=.05)	Slope (units/yr)
Water Temperature	74	25.20	25.62	13.34	33.97	4.88	50	Average	No Trend	
Dissolved Oxygen	73	3.24	2.78	0.28	12.12	2.44	10	Below Average	Increasing	0.3130
Salinity	67	1.97	1.8	0.0	4.55	0.83	80	Above Average	No Trend	
Specific Conductance	67	3.69	3.479	0.005	8.14	1.47	90	Above Average	No Trend	
pH	74	7.91	7.83	7.22	9.06	0.42	90	Above Average	Increasing	0.0817
Ammonia	68	0.19	0.161	0.005	1.32	0.22	90	Above Average	No Trend	
Nitrate	68	0.04	0.004	0.003	0.36	0.08	10	Below Average	No Trend	
Nitrite	70	0.02	0.003	0.003	0.03	0.01	10	Below Average	No Trend	
Nitrate + Nitrite	70	0.04	0.0075	0.004	0.36	0.08	10	Below Average	No Trend	
Total Kjeldahl Nitrogen	68	1.89	1.950	0.05	4.16	0.83	90	Above Average	Increasing	0.1867
Total Nitrogen	70	1.87	1.975	0.025	4.16	0.87	80	Above Average	Increasing	0.1839
Ortho Phosphorus	68	0.03	0.03	0.002	0.12	0.02	10	Below Average	No Trend	
Total Phosphorus	68	0.17	0.15	0.02	1.07	0.15	60	Average	No Trend	
Chlorophyll-*a*	68	43.21	30.4	0.06	134.00	35.70	90	Above Average	Increasing	11.7200
Color	34	54.82	50	20.00	108.00	19.68	40	Average	No Trend	
Fecal Streptococci	29	115.20	85	36.00	460.00	94.37	30	Below Average	No Trend	
Total Organic Carbon	68	30.54	29.7	0.50	81.20	14.72	80	Above Average	No Trend	
Total Suspended Solids	68	11.84	10	1.20	28.00	6.98	80	Above Average	Increasing	1.1020
Turbidity	68	7.19	5.92	0.69	24.00	5.77	70	Above Average	Increasing	1.3000

Table 11. SANWQ8 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

SANWQ8	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 (α=.05)	Slope (units/yr)
Water Temperature	74	23.9	24.31	11.24	32.35	6.06	20	Below Average	No Trend	
Dissolved Oxygen	73	3.00	2.32	0.13	13.89	2.37	10	Below Average	Increasing	0.2928
Salinity	67	2.85	2.40	0.0	11.62	1.92	80	Above Average	No Trend	
Specific Conductance	67	5.18	4.48	0.02	19.70	3.29	90	Above Average	Increasing	0.2800
pH	74	7.75	7.67	7.24	8.86	0.39	80	Above Average	Increasing	0.0578
Ammonia	68	0.17	0.143	0.005	1.15	0.19	90	Above Average	No Trend	
Nitrate	68	0.04	0.004	0.004	0.30	0.07	10	Below Average	No Trend	
Nitrite	70	0.014	0.003	0.003	0.03	0.01	10	Below Average	No Trend	
Nitrate + Nitrite	70	0.04	0.004	0.004	0.31	0.07	10	Below Average	No Trend	
Total Kjeldahl Nitrogen	68	1.37	1.34	0.05	2.52	0.54	80	Above Average	Increasing	0.1210
Total Nitrogen	70	1.36	1.35	0.03	2.52	0.58	70	Above Average	Increasing	0.1216
Ortho Phosphorus	68	0.047	0.047	0.002	0.36	0.047	10	Below Average	No Trend	
Total Phosphorus	68	0.15	0.13	0.02	0.74	0.10	60	Average	No Trend	
Chlorophyll-*a*	68	45.48	23.85	0.06	747.00	94.87	90	Above Average	Increasing	5.663
Color	34	64.29	60.00	40.00	112.00	19.36	40	Average	No Trend	
Fecal Streptococci	30	79.43	53.00	1.00	348.00	77.90	20	Below Average	No Trend	
Total Organic Carbon	68	28.04	24.15	0.50	76.80	14.52	80	Above Average	No Trend	
Total Suspended Solids	68	8.00	7.00	0.50	43.60	7.28	70	Above Average	No Trend	
Turbidity	68	3.43	2.28	0.62	15.00	3.22	30	Below Average	Increasing	0.4072

Table 12. Blind Pass 1 Inside descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

BP1 Inside	n	Mean	Median	Min	Max	Standard Deviation	Median compared to Typical FL Estuary Percentiles (Hand 2008)	Status Relative to Typical FL Estuaries	Seasonal Kendall Trend Results (α=.05)	Slope (units/yr)
Water Temperature	33	25.84	25.83	17.96	33.36	4.14	70	Above Average	No Trend	
Dissolved Oxygen	32	7.28	6.51	2.67	13.45	2.71	70	Above Average	Decreasing	-1.8510
Salinity	27	34.67	35.60	26.10	40.10	3.50	90	Above Average	No Trend	
Specific Conductance	27	52.73	53.80	40.70	60.60	4.94	90	Above Average	No Trend	
pH	33	8.24	8.18	7.81	9.18	0.30	90	Above Average	No Trend	
Ammonia	27	0.12	0.112	0.008	0.401	0.09	90	Above Average	No Trend	
Nitrate	27	0.02	0.004	0.004	0.378	0.07	10	Below Average	No Trend	
Nitrite	27	0.004	0.003	0.003	0.019	0.003	30	Below Average	No Trend	
Nitrate + Nitrite	27	0.02	0.004	0.004	0.397	0.08	10	Below Average	No Trend	
Total Kjeldahl Nitrogen	27	0.41	0.376	0.14	0.78	0.18	10	Below Average	No Trend	
Total Nitrogen	27	0.42	0.381	0.14	0.91	0.20	10	Below Average	No Trend	
Ortho Phosphorus	27	0.024	0.024	0.002	0.052	0.01	30	Below Average	No Trend	
Total Phosphorus	27	0.07	0.069	0.018	0.15	0.04	40	Average	Decreasing	-0.03431
Chlorophyll-*a*	27	14.24	10.8	1.57	80.30	16.15	90	Above Average	No Trend	
Total Organic Carbon	27	6.88	6.11	1.96	11.00	2.39	30	Below Average	No Trend	
Total Suspended Solids	27	20.94	16.2	6.8	57.60	11.17	80	Above Average	No Trend	
Turbidity	27	8.25	8.2	2.2	19.40	4.11	90	Above Average	No Trend	

Table 13. Blind Pass 2 Inside descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

BP 2 Inside	n	Mean	Median	Min	Max	Standard Deviation	Median compared to Typical FL Estuary Percentiles (Hand 2008)	Status Relative to Typical FL Estuaries	Seasonal Kendall Trend Results (α=.05)	Slope (units/yr)
Water Temperature	33	24.42	24.01	15.80	32.14	4.60	30	Below Average	No Trend	
Dissolved Oxygen	32	5.91	5.48	3.35	9.78	1.96	20	Below Average	No Trend	
Salinity	27	34.84	36.1	25.9	40.8	3.67	90	Above Average	No Trend	
Specific Conductance	27	52.93	54.6	40.4	60.6	5.12	90	Above Average	No Trend	
pH	27	8.17	8.15	7.00	8.96	0.34	90	Above Average	No Trend	
Ammonia	27	0.107	0.096	0.012	0.375	0.09	90	Above Average	Decreasing	-0.0858
Nitrate	27	0.008	0.004	0.004	0.089	0.02	10	Below Average	No Trend	
Nitrite	27	0.004	0.003	0.003	0.01	0.02	30	Below Average	No Trend	
Nitrate + Nitrite	27	0.008	0.004	0.004	0.099	0.018	10	Below Average	No Trend	
Total Kjeldahl Nitrogen	27	0.382	0.387	0.067	0.74	0.14	10	Below Average	No Trend	
Total Nitrogen	27	0.387	0.401	0.067	0.74	0.14	10	Below Average	No Trend	
Ortho Phosphorus	27	0.02	0.015	0.002	0.062	0.01	20	Below Average	No Trend	
Total Phosphorus	27	0.06	0.064	0.012	0.11	0.027	40	Average	Decreasing	-0.0354
Chlorophyll-*a*	27	13.95	7.66	1.86	76.30	15.03	80	Above Average	No Trend	
Total Organic Carbon	27	7.43	6.45	4.47	13.30	2.47	40	Average	No Trend	
Total Suspended Solids	27	16.16	13.6	8.00	31.20	6.66	70	Above Average	No Trend	
Turbidity	27	8.84	9.80	3.70	20.00	3.62	90	Above Average	No Trend	

Table 14. Blind Pass 2 Outside descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

BP 2 Outside	n	Mean	Median	Min	Max	Standard Deviation	Median compared to Typical FL Estuary Percentiles (Hand 2008)	Status Relative to Typical FL Estuaries	Seasonal Kendall Trend Results (α=.05)	Slope (units/yr)
Water Temperature	33	24.50	23.67	17.91	31.13	4.22	20	Below Average	No Trend	
Dissolved Oxygen	32	7.23	6.94	4.85	9.87	1.40	80	Above Average	No Trend	
Salinity	27	36.15	36.20	33.2	38.40	1.23	90	Above Average	Increasing	1.3090
Specific Conductance	27	54.75	54.70	50.50	57.10	1.59	90	Above Average	Increasing	1.2490
pH	33	8.24	8.14	7.92	8.99	0.27	90	Above Average	No Trend	
Ammonia	27	0.089	0.09	0.005	0.261	0.06	90	Above Average	Decreasing	-0.05521
Nitrate	27	0.016	0.004	0.004	0.083	0.022	10	Below Average	Decreasing	-0.00784
Nitrite	27	0.003	0.003	0.003	0.007	0.001	30	Below Average	No Trend	
Nitrate + Nitrite	27	0.017	0.004	0.004	0.09	0.023	10	Below Average	Decreasing	-0.0101
Total Kjeldahl Nitrogen	27	0.23	0.206	0.065	0.618	0.115	10	Below Average	No Trend	
Total Nitrogen	27	0.25	0.215	0.065	0.618	0.116	10	Below Average	No Trend	
Ortho Phosphorus	27	0.01	0.013	0.002	0.035	0.0096	10	Below Average	No Trend	
Total Phosphorus	27	0.08	0.061	0.002	0.573	0.10	40	Average	Decreasing	-0.0233
Chlorophyll-*a*	27	8.96	5.21	1.01	41.70	9.37	60	Average	No Trend	
Total Organic Carbon	27	3.61	3.36	0.64	7.29	1.49	10	Below Average	No Trend	
Total Suspended Solids	27	58.97	47.00	7.00	254.00	50.22	90	Above Average	No Trend	
Turbidity	27	16.44	15.20	1.75	40.00	10.25	90	Above Average	Increasing	8.328

Table 15. Dinkins Bayou 1 descriptive statistics and percentile distributions relative to 'typical' Florida waterbodies (Hand 2008)

DB1	n	Mean	Median	Min	Max	Standard Deviation	Median compared to Typical FL Estuary Percentiles (Hand 2008)	Status Relative to Typical FL Estuaries	Seasonal Kendall Trend Results (α=.05)	Slope (units/yr)
Water Temperature	33	24.68	23.98	17.04	31.62	4.36	30	Below Average	No Trend	
Dissolved Oxygen	32	5.30	5.00	2.47	9.60	1.76	10	Below Average	No Trend	
Salinity	27	34.7	36.20	24.70	40.30	3.43	90	Above Average	No Trend	
Specific Conductance	27	52.84	54.70	38.90	60.00	5.24	90	Above Average	No Trend	
pH	33	8.16	8.08	7.61	10.02	0.41	80	Above Average	No Trend	
Ammonia	27	0.097	0.085	0.005	0.306	0.07	80	Above Average	No Trend	
Nitrate	27	0.005	0.004	0.004	0.019	0.003	10	Below Average	No Trend	
Nitrite	27	0.004	0.003	0.003	0.011	0.002	30	Below Average	No Trend	
Nitrate + Nitrite	27	0.006	0.004	0.004	0.019	0.004	10	Below Average	No Trend	
Total Kjeldahl Nitrogen	27	0.385	0.362	0.15	0.799	0.136	10	Below Average	No Trend	
Total Nitrogen	27	0.39	0.366	0.15	0.80	0.14	10	Below Average	No Trend	
Ortho Phosphorus	27	0.016	0.013	0.002	0.061	0.016	10	Below Average	No Trend	
Total Phosphorus	27	0.056	0.06	0.002	0.118	0.029	40	Average	Decreasing	-0.03457
Chlorophyll-*a*	27	10.66	8.22	1.27	33.30	8.85	80	Above Average	No Trend	
Total Organic Carbon	27	7.04	6.71	2.47	11.40	2.14	40	Average	No Trend	
Total Suspended Solids	27	20.53	18.40	6.00	43.00	7.85	80	Above Average	No Trend	
Turbidity	27	9.27	9.80	3.40	20.00	4.51	90	Above Average	No Trend	