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FY22 COLLIER COUNTY SURFACE WATER REPORT

Prepared by Collier County Pollution Control

April 2023

Executive Summary

Surface water quality monitoring is essential to evaluate the health of aquatic ecosystems and to protect human health. Collier County Pollution Control (CCPC) has been monitoring a network of fixed surface water sampling sites throughout Collier County to assess long-term trends and determine if surface waters are meeting water quality standards. The data collected from these monitoring programs provide critical information on the condition of the county's water resources, identifying areas where water quality is impaired and where pollution control measures are needed.

This report provides a summary of the surface water quality monitoring efforts conducted by CCPC in fiscal year 2022 (FY22). CCPC monitors a network of fixed surface water sampling sites throughout Collier County to determine if surface waters are meeting water quality standards. During FY22, three water quality monitoring programs that include sixty-six (66) surface water stations were sampled monthly.

The FY22 report indicates that there were some improvements in water quality in certain areas of the county. For instance, copper levels decreased, and only one Water Body Identification (WBID), Rookery Bay (Inland West Segment), had copper exceedances during FY22. Bacteria levels also improved in most WBIDs except for Corkscrew Swamp, Immokalee Basin, and Rock Creek. Although source tracking efforts revealed several sources in Rock Creek that were corrected in FY22, bacteria levels continued to exceed standards, making further source tracking necessary.

However, there were also areas where water quality worsened, as more WBIDs saw increases in the percent exceedances during FY22 (52%) compared to FY21 (41%), including Lake Trafford and Cocohatchee River. Lake Trafford had the highest percentage of exceedances during FY22 for chlorophyll, total nitrogen, and total phosphorus, indicating high levels of nutrients and consistent algal blooms. Similarly, Cocohatchee River exceeded the total nitrogen standard in 82.2% of the samples collected, an increase from 65.9% in FY21.

Overall, dissolved oxygen (DO) levels were the most common exceedance of State standards, and all WBIDs sampled exceeded the DO standard at least once. Wet season conditions were found to contribute to DO exceedances, as water temperatures are higher, and water is darker, which reduces the overall oxygen levels.

Based on the report, CCPC provides recommendations to improve water quality in the county. These include source tracking for bacteria and nutrients under different flow conditions, integrity testing of wastewater infrastructure, and continued efforts to remediate known sources of nutrients impacting waterbodies.

1. INTRODUCTION

Collier County Pollution Control (CCPC) monitors a network of fixed surface water sampling sites throughout Collier County for the purpose of assessing long-term trends and determining if surface waters are meeting water quality standards. This report provides a summary of the surface water quality monitoring efforts and a brief assessment of results for fiscal year 2022 (FY22), October 2021 through September 2022.

2. METHODS

2.1 Sampling

During FY22, three water quality monitoring programs that include sixty-six (66) surface water stations (Appendix A) were sampled monthly for the laboratory analytes listed in Appendix B. Figure 1 shows the location of the sites monitored during FY22 as well as the waterbody identification (WBID) used to define the watershed boundaries (FDEP, 2022). For an interactive map, please visit https://www.arcgis.com/home/webmap/viewer.html?webmap=62538b4691d64ff594e56f63791b98fd&extent=-81.9537,26.0644,-81.5794,26.3481.

All sample collection and in-situ meter readings were conducted in accordance with CCPC's Field Sampling Quality Manual and the Florida Department of Environmental Protection's (FDEP's) Standard Operating Procedures (SOPs). CCPC's field sampling program is accredited through The NELAC (National Environmental Laboratory Accreditation Conference) Institute's (TNI's) National Environmental Field Activities Program (Certification #4262.01).

In-situ physical measurements of pH, dissolved oxygen (DO), salinity, specific conductance, and temperature were obtained at the surface (0.3 meters below the water surface) using a Yellow Springs Instrument (YSI) ProDSS multi-probe. When total water depth exceeded 1.5 meters, these field measurements were also collected at the bottom (0.3 meters above bottom). Turbidity was measured in the field at the surface using an HF Scientific MicroTPW turbidimeter. Secchi depth and total water depth were also recorded at each station. All samples were collected in appropriate containers with proper preservation and immediately placed in wet ice for transport to the laboratory.

Tidally influenced sites were sampled on an outgoing tide.

2.2 Laboratory Analysis

All chemical parameters, with the exception of stable isotopes and DNA, were analyzed by the Collier County Pollution Control Laboratory (CCPCL) or PACE, Inc. Laboratories. Both laboratories are accredited by TNI under Chapter 64E-1, Florida Administrative Code (FAC). Stable isotopes for Boron ($\delta^{11}B$) were analyzed by Isobar Science (Beta Analytic). LuminUltra analyzed samples for human DNA. Both Isobar Science and LuminUltra are ISO (International Organization for Standardization) accredited.

2.3 Sample Station and WBID Modifications

Changes in sampling sites in FY22 included the following:

- Sites LMB00 and LMB01 located in the Rookery Bay (Inland West Segment) were added to the trend network. These two sites were monitored previously under the permit requirements for the Lely Area Stormwater Improvement Project (LASIP). Since that requirement has been completed, these two sites were added to this monitoring project to detect long-term trends.
- Site CORKS was replaced by CORK3 in the Corkscrew Swamp WBID as the CORKS site was an artificially low spot that was often cut off from flow, stagnant, and became a refuge for wildlife in the dry season. CORK3 monitors outflow from Bird Rookery Swamp and samples are only taken when flow is present.
- Site BARRON was dropped as this site is also monitored monthly by FDEP as part of their Status and Trends monitoring program.
- The Ten Thousand Island WBID was modified by the FDEP with Impaired Waters Run (IWR) Run64 (FDEP, 2022). This WBID modification created two smaller marine WBIDs between US41 and the Ten Thousand Islands WBID. These newer WBIDs are now separated at the Estuarine Nutrient Region from what was the Ten Thousand Island WBID. This provides for better assessment of newer WBIDs that are tidally influenced, but not part of the estuary proper. Site BARRIVN is now located in the new WBID called Barron River (Marine Segment). Therefore, the Ten Thousand Island WBID will not be assessed in this report as BARRIVN was the only site monitored by CCPC in that WBID.

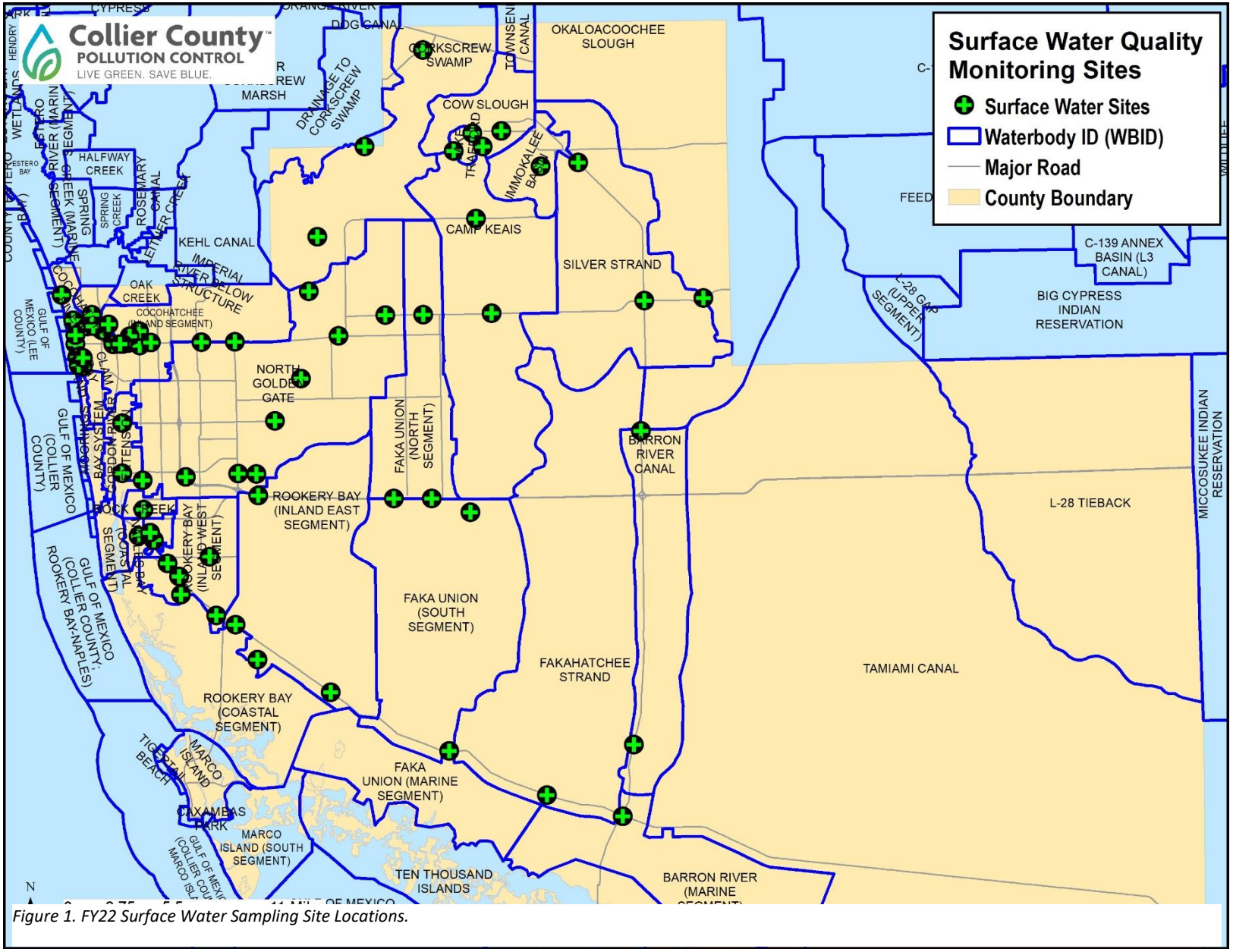

Figure 1. FY22 Surface Water Sampling Site Locations.

3. DATA QUALITY AND REDUCTION

3.1. Validity

The data used in this report have been checked for accuracy and completeness and CCPC attests to the validity of these results. All data qualifiers follow Florida Administrative Code (FAC) 62-160, Table 1. Quality control and quality assurance (QA/QC) reports are available upon request.

3.2. Quality Control Issues

Some coastal freshwater WBIDs are being affected by king tides and are experiencing periodic increases in salinity. State standards require enterococci bacteria to be used to assess predominantly marine waters (specific conductivity above 4,580 µmhos/cm) and Escherichia coli (E. coli) is used to assess freshwaters. Due to the periodic increases in salinity at some freshwater stations near the saltwater interface, both E. coli and enterococci are being analyzed at sites—ECOCORIV, EAGLECRK, FAKA, GORDONRIV, HALDUP, LELY, TAMTOM, and WINPARK. This change was made in July 2022; however, prior to this date some FY22 E. coli results at these sites may have a high biased due to increased salinity.

3.3. Data Reduction

Before data were assessed, the dataset was examined for outliers and for data that may not be of acceptable quality for the purposes of this report. Specifically, any samples that were analyzed outside of acceptable holding times; samples that were questionable due to collection or laboratory errors; or samples that may have possible contamination as indicated by the results of quality control samples were removed from the dataset. Therefore, samples that have been qualified with G, Q, V, Y, ?, or L were excluded from the assessment.

Results for some parameters are routinely below the level of detection or method detection limit (MDL), used by the laboratory. There are many ways to assess results that are reported below the MDL. For this report, results reported below the laboratory MDL were assessed using one-half of the reported MDL. For example, a result reported as 0.10 milligrams per Liter (mg/L) with a "U" qualifier indicating the value reported was below the MDL, was converted to 0.05 mg/L for use in summary statistics. This simple substitution method follows FDEP's current methodology for assessing surface waters in FAC 62-303.

4. DATA ASSESSMENT

4.1 Summary Statistics

Basic summary statistics (minimum, maximum, average, and standard deviation) are provided in Appendix C. These statistics are shown by WBID which represent the watershed boundaries used by the FDEP in their assessments of water quality under the Impaired Waters Assessment Rule (FAC 62-303). Each WBID has a varying number of water quality stations.

4.2 Basin Information & Status

Figures 24 through 44 provide a "snapshot" of each WBID showing its location, the location of sampling sites, land area, land use per South Florida Water Management District 2017-2019 Land Use Land Cover, drainage, impairments, short and long-term water quality trends, and percent number of exceedances of water quality standards or thresholds in FY22. Acronyms for parameters are provided in Appendix B.

Long-term trends were taken from Janicki (2023)—Surface Water Quality Annual Assessment and Trend Report for Collier County. Short-term trends are defined by years 2015-2020 and long-term trends are years 1999-2020. Trend analyses in this report use the Seasonal Kendall Tau method. Trend data is included in this report to give historical perspective as to the water quality conditions in each WBID.

4.3 Exceedances of Water Quality Standards

Results were compared to the State standards found in FAC 62-302 to determine if they are meeting water quality criteria. Some criteria are determined using other parameters measured at the time of sample collection, and as a result certain criterion do not have static values. For example, ammonia criteria are determined using an equation that incorporates the temperature and pH of the water at the time of sample collection, resulting in varying freshwater ammonia criterion for each result.

Lake Trafford is the only freshwater body in Collier County that has numeric nutrient criteria established by rule FAC 62-302. The Total Maximum Daily Load (TMDL) adopted in 2008 for Gordon River Extension WBID (Class III Freshwater) established criteria for total nitrogen and total phosphorus which became site-specific criteria for this WBID. The Cocohatchee River WBID, a Class II Marine waterbody, has numeric nutrient criteria for chlorophyll-a, total nitrogen, and total phosphorus. Therefore, only values in these three WBIDs that exceed established standards are true exceedances of nutrient water quality standards.

The remaining freshwater canals in Collier County do not have numeric nutrient water quality standards. The current nutrient standard for most canals in Collier County is narrative and states "*in no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna."* In an effort to provide assessment and comparison of the nutrient levels in our freshwater canals in Collier County, this report uses the nearest numeric total nitrogen (TN) and total phosphorus (TP) standard for freshwater streams and canals. Numeric nutrient criteria from the Peninsular Nutrient Watershed Region (FAC 62-302.531), which includes most of Lee County (Figure 2), were used here to assess nutrients. The Peninsular standard for TN is 1.54 mg/L and TP is 0.12 mg/L. Both values are based on the annual geometric means of the entire WBID (all stations in the WBID are averaged together). An exceedance would occur if the annual geometric mean in the WBID exceeded these values more than once in three years. Since this report is only looking at one year of data, annual geometric means were not used for assessment. Instead, each station was assessed on its own by month using the appropriate criteria. This provides more insight into which stations may have a greater frequency of exceedances.

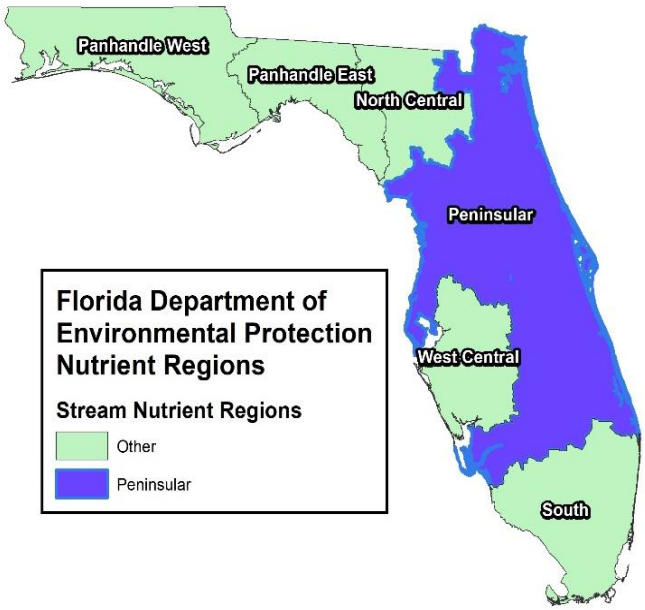

Figure 2. FDEP Nutrient Regions

In addition to TN and TP, the FDEP uses chlorophyll-a (an indicator of algae growth) as a nutrient response variable, or an "imbalance" of flora. The FDEP considers chlorophyll-a values above 20 micrograms per Liter (μg/L), to be representative of an algae bloom in freshwater. For this report, results above 20 μg/L in freshwater were included as exceedances.

FAC 62-302 uses different Fecal Indicator Bacteria (FIB) standards for marine versus freshwaters. In marine waters, enterococci are used to evaluate FIB levels. Freshwater criteria are based on levels of Escherichia coli (E. coli). Relevant to the State Water Quality Standards, enterococci are only analyzed in marine waters and E. coli is only analyzed in predominately fresh waters.

Table 1 provides a program-wide summary of water quality parameters in FY22 that exceeded State standards or screening thresholds. DO was again the most exceeded State standard. When examined for seasonality using a one-way analysis of variance (ANOVA), dissolved oxygen, iron, pH, and turbidity showed significant differences between wet (June-Sept) and dry (Oct-May) seasons. These parameters were more likely to exceed standards in the wet season during FY22.

Table 1. Surface Water Quality Exceedances in FY22

Parameter	% of Samples that Exceeded		
	Dry	Wet	Total FY22
Chlorophyll a	12.6%	17.4%	14.2%
Copper	0.0%	1.0%	0.3%
Dissolved Oxygen Saturation	24.7%	40.9%	29.9%
Enterococci	19.1%	27.5%	22.6%
Escherichia coli (E. coli)	10.2%	7.4%	9.3%
Iron	9.6%	12.9%	10.7%
Nitrogen- Total	27.3%	27.9%	27.5%
pH	3.9%	4.9%	4.3%
Phosphorus- Total	17.9%	24.1%	19.9%
Turbidity	0.39%	0.40%	0.4%

Green indicates a significant difference in seasons ($p<0.05$)

Table 2 provides the percent of samples which exceeded a standard or screening threshold by WBID. These exceedances were compared to FY21 and highlighted in red to show increases; green to show decreases; or blue to show no increase in the percent number of exceedances. This provides a visual comparison of parameters that in FY22 improved, degraded, or did not change from the previous year. More than half of the WBIDs showed an increase in the percent exceedances from FY22 to FY21. Parameters showing the most improvement (decreasing number of exceedances) were chlorophyll, enterococci, E. coli, and total nitrogen. While the parameters showing the most degradation (increases in number of exceedances) were dissolved oxygen, iron, and total phosphorus. There were no exceedances of ammonia in FY22.

Exceedances are further broken down by WBID and by station in Appendix D. It should be re-emphasized that any listed chlorophyll-a, TN, or TP exceedances outside of the Gordon River Extension, Lake Trafford, or Cocohatchee River WBIDs are not true exceedances due to the lack of established numeric nutrient criteria.

Table 2. Percent Exceedances by WBID in FY22

WBID	Total % of Sample Exceedances	Percent of Samples that Exceeded a Standard or Screening Threshold									
		Chlorophyll	Copper	Dissolved Oxygen Saturation	Enterococci	Escherichia coli	Iron	pH	Total Nitrogen	Total Phosphorus	Turbidity
Barron River (Marine Segment)*	2.6%	0.0%	0.0%	71.4%	8.3%	--	0.0%	0.0%	0.0%	0.0%	0.0%
Barron River Canal	6.5%	11.1%	0.0%	100%	--	0.0%	11.1%	0.0%	22.2%	33.3%	0.0%
Camp Keais	4.8%	7.7%	0.0%	100%	--	0.0%	0.0%	7.7%	15.4%	38.5%	0.0%
Cocohatchee (Inland Segment)	2.4%	8.6%	0.0%	27.8%	--	19.8%	2.9%	0.0%	4.8%	14.7%	0.0%
Cocohatchee River	5.6%	21.5%	0.0%	6.9%	11.9%	--	21.8%	0.0%	82.2%	7.5%	0.0%
Corkscrew Swamp	3.8%	4.2%	0.0%	50.0%	--	12.5%	33.3%	4.2%	8.3%	12.5%	4.3%
Cow Slough	7.7%	0.0%	0.0%	50.0%	--	37.5%	25.0%	25.0%	37.5%	87.5%	0.0%
Faka Union (North Segment)	1.1%	0.0%	0.0%	17.6%	--	0.0%	16.7%	0.0%	0.0%	0.0%	0.0%
Faka Union (South Segment)	1.1%	0.0%	0.0%	35.1%	--	0.0%	2.8%	0.0%	0.0%	0.0%	0.0%
Fakahatchee Strand	3.2%	16.7%	0.0%	75.0%	--	8.3%	0.0%	0.0%	8.3%	0.0%	0.0%
Gordon River Extension	5.7%	0.0%	0.0%	50.0%	--	17.4%	0.0%	0.0%	65.2%	50.0%	0.0%
Haldeman Creek (Lower)	4.1%	16.7%	0.0%	35.7%	66.7%	--	0.0%	0.0%	0.0%	16.7%	0.0%
Haldeman Creek (Upper)	2.4%	3.3%	0.0%	19.4%	--	19.4%	0.0%	0.0%	0.0%	33.3%	0.0%
Immokalee Basin	6.2%	0.0%	0.0%	100%	--	11.1%	11.1%	0.0%	11.1%	88.9%	0.0%
Lake Trafford	13.7%	100%	--	1.3%	--	--	--	39.5%	100.0%	100%	0.0%
North Golden Gate	1.4%	3.4%	0.0%	24.6%	--	1.7%	9.3%	0.7%	4.2%	0.9%	0.8%
Okaloacoochee Slough	2.9%	0.0%	0.0%	100%	--	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Rock Creek	6.4%	8.3%	0.0%	100%	100.0%	--	0.0%	0.0%	0.0%	8.3%	0.0%
Rookery Bay (Inland East Segment)	2.8%	10.6%	0.0%	34.6%	--	4.3%	10.6%	0.0%	6.4%	21.3%	2.1%
Rookery Bay (Inland West Segment)	2.0%	7.0%	4.7%	31.8%	--	14.0%	2.3%	0.0%	7.0%	0.0%	0.0%
Silver Strand	7.9%	4.3%	0.0%	91.3%	--	0.0%	65.2%	13.0%	30.4%	65.2%	0.0%
Wiggins Bay Outlet	2.1%	0.0%	0.0%	36.4%	--	9.1%	27.3%	0.0%	0.0%	0.0%	0.0%

**New WBID*

No Change from FY21 | **Increase from FY21** | **Decrease from FY21**

Figure 3 graphically represents the percent exceedances in each WBID broken down by each pollutant category; nutrients (chlorophyll-a, TN, and TP), metals (copper, iron), FIB (E. coli, enterococci), DO, pH, and turbidity. Lake Trafford had the highest number of exceedances in FY22, a majority of which were nutrients. This WBID currently has a TMDL for nutrients, DO, and unionized ammonia.

4.4 Top Ten Station Ranking

For comparative purposes, Table 3 ranks the top ten station averages for each of the parameters that were found to have exceedances in FY22. Station averages are provided for ranking purposes and do not indicate exceedances.

- Both ROCKCRK and TAMTOM had the highest average FIB levels, despite decreasing average FIB levels at ROCKCRK since FY20. FIB averages at TAMTOM have increased annually since FY19, but the increase is being skewed by episodic periods of high FIB levels. These high FIB levels directly correspond to fluxes of estuarine water entering the site typically during the driest months (March and April) when lower freshwater levels fail to hold back the king tides. As mentioned above, E. coli levels are biased high when analyzed in waters where specific conductance is above 5000 µmhos/cm.
- Lake Trafford continues to have the highest chlorophyll and total nitrogen concentrations.
- The majority of the top 10 total phosphorus sites are surrounded by agriculture except for WINPARK and WCOCORIV which have both demonstrated in previous reports to be directly impacted by reuse and/or wastewater (CCPC 2021 and 2022).
- Overall, the top ranked sites for copper averages remained the same from FY21. However, copper levels at site EAGLECRK more than doubled in FY22 ranking it highest for average copper.

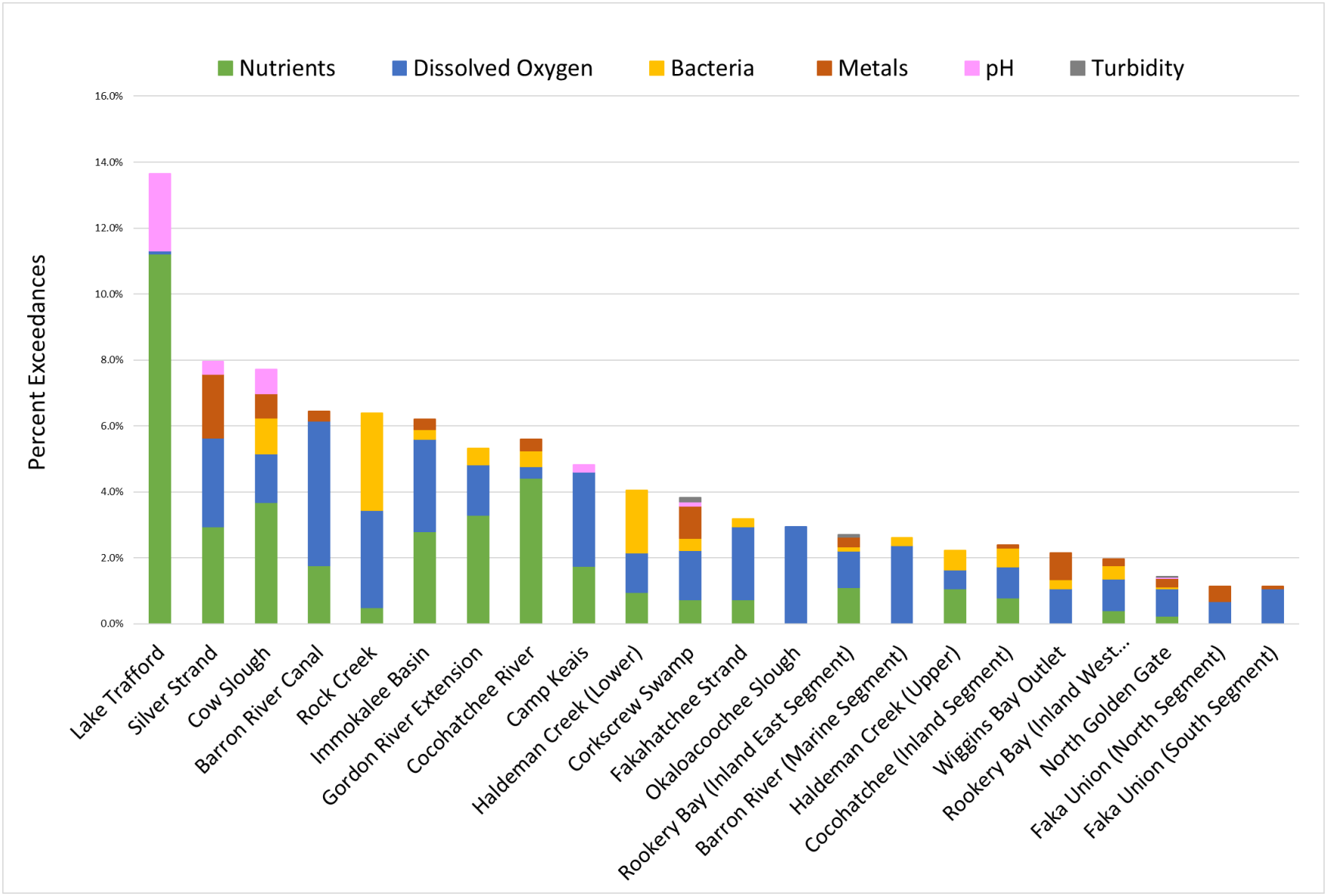

Figure 3. Percent Exceedances by WBID and Parameter.

Table 3. Station Rankings Based on Average Concentrations

Rank	Chlorophyll a (mg/m3)		Copper (µg/L)		Dissolved Oxygen Saturation (%)		Enterococci (MPN/100ml)		E. coli (MPN/100ml)	
1	LKTRAF4	72.21	EAGLECRK	11.17	OKALA858	7.55	ROCKCRK	1604	TAMTOM	2221
2	LKTRAF1	69.69	HALDUP	8.92	IMKSLGH	9.91	BC5	296	WCOCORIV	1012
3	LKTRAF8	66.61	TAMTOM	5.51	KEAISS	10.48	COCAT41	129	IMKFSHCK	694
4	ECOCORIV	32.6	WINPARK	4.33	KEAISN	11.23	COCORVW	80	COC@IBIS	642
5	COCPALM	18.68	NNAPLES	4.03	TAMTOM	11.83	COCOR2	77	ECOCORIV	518
6	HEC245	16.66	BC5	4.00	BC24	12.76	BARRIVN	64	WINPARK	459
7	NNAPLES	14.18	IMKBRN	3.42	ROCKCRK	17.03	VBILTCAN	27	COCPALM	450
8	EAGLECRK	12.75	WIGGINSBY	2.96	CORK3	22.47	COCOR1	26	GORDONRIV	404
9	BC5	12.52	LELY	2.78	IMKBRN	24.99	BLUE	22	RATTLESN	309
10	SANDPIPE	11.22	ECOCORIV	2.64	RATTLESN	25.35	BFBSP	17	CORKN	301
Rank	**Iron (µg/L)**		**Total Phosphorus (mg/L)**		**Total Nitrogen (mg/L)**		**pH (SU)**		**Turbidity (NTU)**	
1	CORKSCRD	1471	IMKBRN	0.466	LKTRAF8	2.56	IMKBRN	6.67	LKTRAF4	22.7
2	IMKBRN	1285	TAMTOM	0.446	LKTRAF4	2.52	IMKFSHCK	6.75	LKTRAF1	20.3
3	BRN	1074	IMKSLGH	0.346	LKTRAF1	2.51	KEAISN	6.81	LKTRAF8	19.4
4	GGC@858	961	WINPARK	0.241	IMKBRN	1.91	CORK3	6.94	CORKSCRD	14.4
5	IMKFSHCK	954	WCOCORIV	0.225	CORK3	1.58	IMKSLGH	7.02	CORKN	9.1
6	WIGGINSBY	878	KEAISS	0.206	IMKFSHCK	1.57	KEAISS	7.03	VBILTCAN	7.8
7	COC@IBIS	850	IMKFSHCK	0.205	GORDONRIV	1.38	ROCKCRK	7.05	TAMTOM	7.6
8	TAMTOM	718	BRN	0.164	TAMTOM	1.32	CORKSCRD	7.05	NAPLESPARK	6.6
9	LMB00	706	LKTRAF8	0.151	KEAISN	1.32	BC24	7.07	FAKA858	6.0
10	LMB01	696	KEAISN	0.151	BC24	1.32	OKALA858	7.1	IMKBRN	5.9

5. SOURCE TRACKING

Source tracking refers to a set of tools used to identify potential sources of known pollutants in a watershed. These investigative tools include review of aerial maps, infrastructure inspection and testing, land use review, permit review, and walking the watershed to look for probable sources. In addition, sampling for specific pollutants is expanded throughout the watershed, targeting specific areas, tributaries, canals, and drainage infrastructure. These expanded sampling efforts are designed with the goal of identifying and quantifying all potential inputs to a system. Source tracking of pollutants in FY22 were prioritized for FIB and nutrients.

5.1 FECAL INDICATOR BACTERIA

During FY22, the highest number of FIB exceedances occurred in the Cow Slough, Rock Creek, Haldeman Creek (Upper), Cocohatchee (Inland Segment), and Rookery Bay (Inland West Segment) WBIDs. With the exception of Rookery Bay (Inland West Segment), all of these WBIDs were previously verified as impaired for FIB during the 2019 Impaired Waters Rules (IWR) assessment and in the most recent draft IWR assessment in 2021. However, each of the WBIDs saw a decrease in the number of exceedances in FY22.

5.1.1 Cocohatchee River Watershed

In the Cocohatchee River and Cocohatchee (Inland Segment) WBIDs, there are sites that routinely exceed the corresponding FIB criterion, although the overall number of exceedances is low. Eleven of the highest ranked stations (Table 3) for E. coli and enterococci bacteria are located in these two WBIDs. While overall FIB exceedances in both WBIDs decreased from FY21 to FY22, many sites routinely exceed the State standard. Figure 4 shows the percent of exceedances in FY22 in the Cocohatchee River watershed, with most of the estuary (yellow) meeting the criterion for FIB. More FIB exceedances occurred in the tidal river (eastern portion) of the estuary. Tracking FIB sources in tidally influenced waters becomes more complicated due to the water movement during tidal exchange. To help eliminate some tidal influence, samples in the estuary are always collected on outgoing tides with sampling starting downstream and working upstream. With this sampling protocol, it becomes more evident that sources are likely originating upstream as seen in Figure 4. Several tributaries within the freshwater portion are potential sources based on the number of exceedances.

Station WCOCORIV monitors the West Branch of the Cocohatchee River and had the highest percent of exceedances in FY22 at 75.0%, which is only slightly lower than FY21 at 76.9%. This site collects stormwater runoff that includes the North Collier Water Reclamation Facility (NCWRF). Source tracking efforts in FY20 found a marker indicating human DNA was present at this site. Sewage force main integrity testing (dye testing) was performed on the 30" ductile iron force main going into the NCWRF in April 2020 by the Collier County Water-Sewer District.

No leaks were found (CCPC, 2021). Follow-up DNA testing was done in April 2022 at this site and no human DNA was found; however, this DNA sample may not have been representative as the. E. coli level recorded during sample collection was the second lowest of the year and did

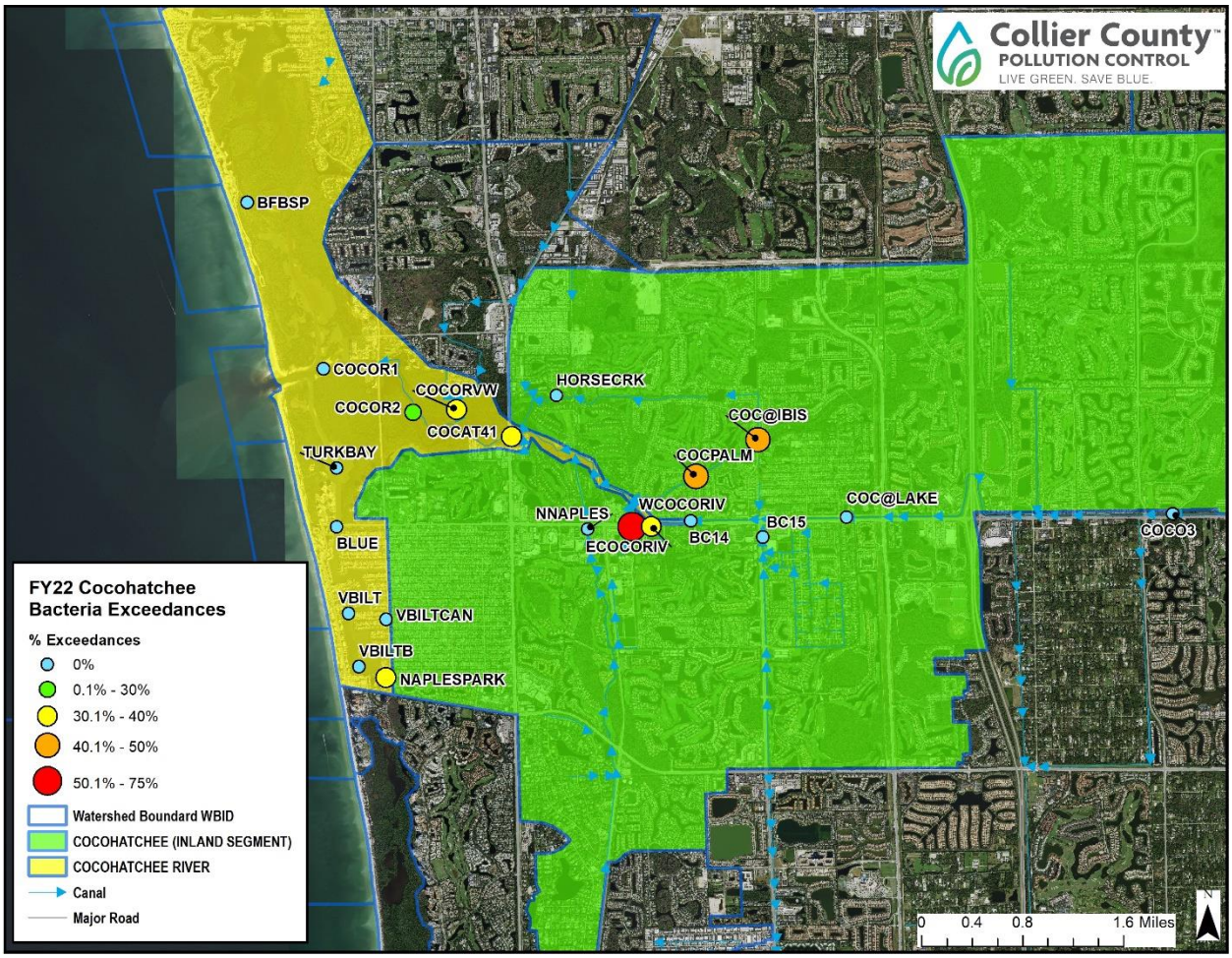

Figure 4. Percent number of bacteria exceedances in FY22 in the Cocohatchee River watershed.

not exceed State standards. Future DNA samples will be analyzed when FIB levels exceed the State standards. Exceedances of the E. Coli standard continued to occur at this site in FY22. Additional DNA testing is warranted at this site.

FIB levels at ECOCORIV saw a reduction of exceedances in FY22 with 33.3 % of the samples exceeding the standards versus 60% exceedances in FY21. This site is separated from the saltwater interface by an amil gate weir. This weir seems to be more vulnerable to high tides in the last three years causing increases in salinity on the upstream side of the weir at site ECOCORIV. Saltwater seeps around the weir during higher spring tides when water levels on the upstream side are low due to dry season. It should be noted that this weir is scheduled for replacement in two years. In the FY21 report (CCPC 2022), increases in FIB were believed to be

influence by saltwater as FIB and salinity seemed to be positively correlated. After further investigation, it was determined that matrix interference with the laboratory methodology was skewing the results in a positive direction—i.e. saltwater was interfering with the results making them higher than they actually might be. Per the manufacturer's recommendations, this was corrected by replacing method (Colilert) with method (Colilert-18) in July 2022. Additionally, at sites that are potentially influenced by tide, both E. coli and Enterococci are analyzed.

Additional snapshot watershed monitoring occurred in April and May 2022. This monitoring showed that FIB sources affecting this watershed are not originating south (upstream) of wastewater plant. Increased FIB levels are seen north (downstream) of the NCWRF (Figure 5). Elevated FIB were also seen in the Cocohatchee East Branch (816 MPN/100ml), although the overall average for FY22 at site ECOCORIV was 111 MPN/100ml. FIB levels in both the East and West Branch of the Cocohatchee River continue to be erratic and further source tracking is needed in these areas. This should include integrity testing of the public and private wastewater infrastructure in these watersheds.

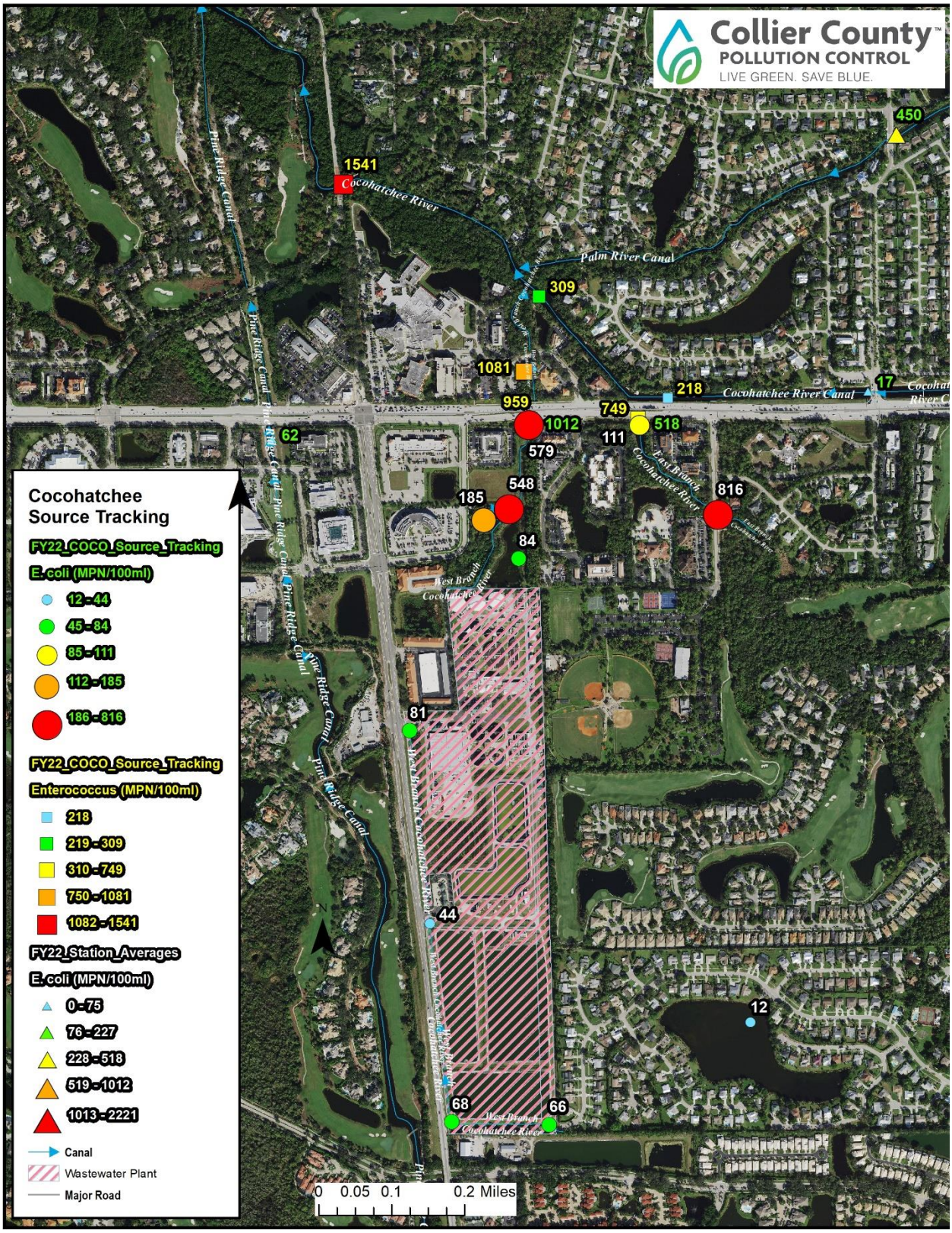

Figure 5. Bacteria source tracking in Cocohatchee River watershed in FY22

5.1.2 Cow Slough

FIB exceedances in this E. coli impaired WBID decreased from 60% in FY21 to 37.5% in FY22. In 2021, CCPC collected samples for the FDEP at this site. The FDEP analyzed these samples for several bacterial DNA markers including human, dog, bird, and cattle (ruminant). While only cattle and bird DNA were detected the continued FIB impairments in the WBID have resulted in the FDEP seeking a Total Maximum Daily Load (TMDL) which will likely occur in 2023 or 2024.

5.1.3 Gordon River Marine Segment and Extension

CCPC does not currently monitor the Gordon River (Marine Segment) WBID, which is impaired for enterococci bacteria, because this tidal waterbody does not fall under CCPC's jurisdiction. As a result, no data are presented in this report and its inclusion in this section is based on our FIB source tracking efforts.

During FY21, the Naples Zoo became part of our source tracking investigation after receiving a complaint (File PC2020-164) from the City of Naples in 2020 regarding sewage-like odors emanating from water being pumped from the Naples Zoo into the Gordon River. Results of this investigation led to actions taken by the FDEP requiring a wastewater permit through a consent order (OGC Case No. 21-1347) on July 20, 2022. The Naples Zoo requested an extension and the most recent revised consent order was issued February 2, 2023. Based on the most recent consent order, the Naples Zoo has until August 1, 2023 (180 days) to apply for a wastewater permit and until November 29, 2023 (300 days) to obtain the permit. If neither of these stipulations are met, the Naples Zoo is to cease all discharges to the Gordon River.

On October 7, 2021 an 8-inch pressurized sewage line owned by the City of Naples was found to be leaking. This sewage line, which runs east/west along the south side of Golden Gate Parkway, was discharging directly to the Gordon River just north the weir (Figure 6). The sewage line was repaired by the City of Naples and reinspected in December 2021 with no leaks found. With the exception of September 2021, the monthly bacteria counts surrounding this event at the ambient surface water site GORDONRIV just on the north side of Golden Gate

Figure 6. Sewage leak from 8" pressurized main line entering Gordon River at Golden Gate Pkwy.

Parkway, were below the 410 MPN/100ml State standard (Figure 7).

However, in May 2022, an even higher exceedance occurred at site GORDONRIV. Therefore, more intense monitoring was conducted in the following months within the Gordon River Extension tributaries and outfalls for E. coli bacteria. On April 13, 2022, a snapshot of the watershed was sampled at several outfalls and tributaries to establish a baseline for dry season. One DNA sample was collected during this event at site GORDONRIV and human DNA was found to be present. A repeat of this sampling event (with the exception of DNA) was done on May 24, 2022 after the beginning (first flush) of the wet season. At least 1.7 inches of rainfall was recorded at the rain gauge located at Freedom Park on April 23, 2022.

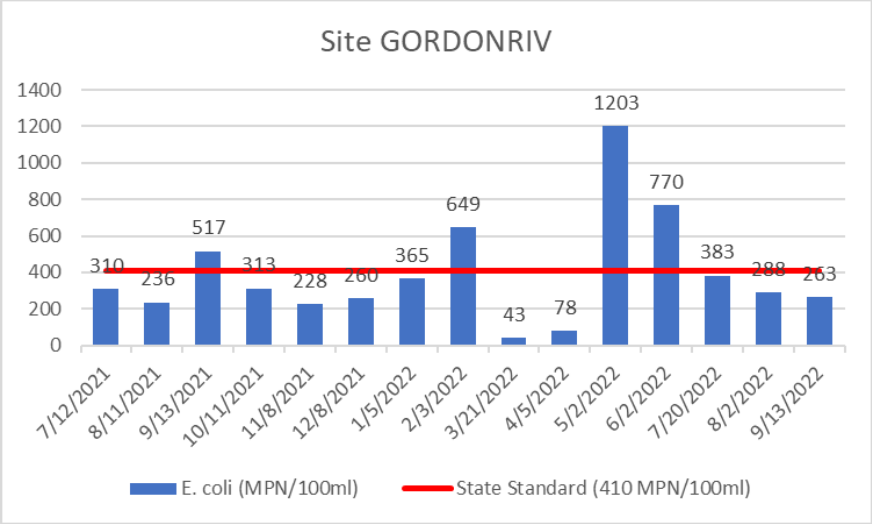

Figure 7. E. coli levels at site GORDONRIV in FY22.

The results of the dry season (April) baseline sampling show E. coli bacteria levels to be relatively low throughout the WBID with only one exceedance of the E. coli bacteria standard of (410 MPN/100ml) at site GORDONRIV (Figure 8). Of note during this dry season sampling event was the pumping of groundwater from a City of Naples public water supply well into the Freedom Park bypass ditch (Figure 9). The pumping occurred for over a week. According to City of Naples, this is routine, required flushing of the public well. There should not be any FIB in this raw groundwater discharge, but it is unclear if this pumping may have diluted the canal. There was also no discharge over the weir coming from the Goodlette Frank Rd. ditch.

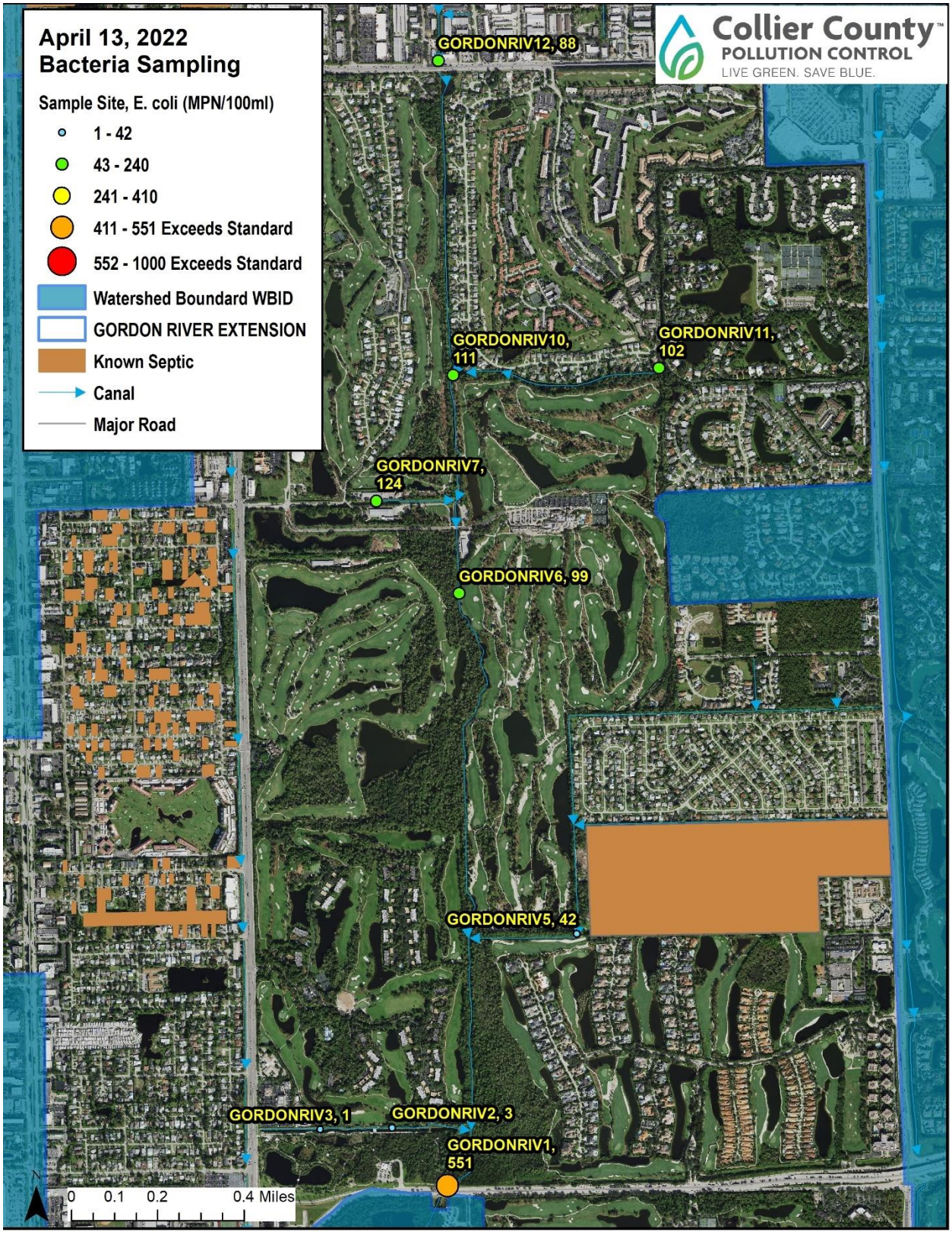

Figure 8. E. coli samples collected April 13, 2022 during dry season in Gordon River Extension.

In contrast, the May 24, 2022 samples following the first flush showed several exceedances of the FIB standard with an increase in FIB levels as water traveled south through the watershed (Figure 10). Based on E. coli levels in the upper watershed, the potential sources appear to be located mid-watershed starting at GORDONRIV6 and in the tributaries monitored by GORDONRIV4 and GORDONRIV5. There are residential areas with septic tanks bordering the canals that had the highest FIB levels in May 2022 (Figure 10).

Figure 9. City of Naples flushing raw groundwater from public well.

More DNA testing is needed in the watershed to determine if those tributaries contributing the highest FIB counts also contain human DNA. Additional E. coli testing is warranted further into the wet season to account for the influence of first flush of stormwater.

Figure 10. E. coli samples taken May 24, 2022 following first flush in Gordon River Extension.

5.1.4 Haldeman Creek (Lower)

Some improvement in enterococci bacteria levels was seen at Station BC5, the only station monitored by CCPC in this WBID. In FY21, this site had a 91.7% enterococci bacteria exceedance rate. In FY22, this exceedance rate decreased to 67% and overall enterococci averages went from 744 MPN/100ml in FY21 to 296 MPN/100ml in FY22. At least two homeless camps identified upstream of the sample site BC5 in FY21 were reported to Code Enforcement. Both code cases were closed with no further violations noted in June 2022. However, homeless camps are transient by nature and more evidence of these camps has been seen along the canal. Until these camps are removed, further source tracking will be difficult.

5.1.5 Rock Creek

The Rock Creek WBID is primarily a tidal creek with some channelized, water level-controlled tributaries. The creek drains an area serviced by septic tanks and County sewer service. The ROCKCRK station is the only station monitored by CCPC within this WBID and exceeded the FIB standard in 100% of the samples collected during FY22. This is a continued increase from FY20 (85%) and FY21 (91.7%), where the FIB samples exceeded the State standard. This site continues to have the highest annual average of Enterococci in the County.

This WBID was part of an extensive source tracking investigation in FY21 and FY22. Potential FIB sources were identified and included wastewater infrastructure (private and public), septic tanks, poultry operations, homeless camps, a recreational vehicle (RV) park, and wildlife. More intensive water quality sampling was conducted throughout the watershed including DNA sampling that showed the presence of human DNA (CCPC, 2022).

Based on those FY21 investigations and DNA results, a sewage line (Figure 11) that crosses under Rock Creek was selected to be integrity tested using traceable dye. The dye test conducted on May 3, 2022 revealed a leak in the underground privately owned pressurized sewer pipe. The dye indicated sewage was entering the nearby stormwater management system in the Avion Woods community.

Figure 11. Location of Dye Test in Rock Creek.

Figure 12 shows the green dye entering the retention area. No dye was seen in the creek itself. However, during stormwater runoff events, sewage could enter the creek from the stormwater management system.

Figure 12. Bright green tracer dye seen entering the stormwater retention pond at Avion Woods May 3, 2022.

The broken line was repaired, retested with dye, and returned to service by May 6, 2022 (Figure 13).

Figure 13. Sewage line repair at Avion Woods stormwater retention area May 6, 2022.

The Collier County Department of Health (DOH) was enlisted to perform onsite inspections of specific septic tanks along Rock Creek that were recognized as potential sources due to strategic source tracking sample results. During these inspections, a septic tank at 4185 North Road was found to be in disrepair. The DOH sent the owner a notice of violation on June 3, 2022. A follow-up inspection on June 16, 2022, revealed the violation had been corrected and no sanitary nuisance was found.

Additional sources included homeless camps (three) and a poultry enclosure that was next to the creek. These were all turned into Code Enforcement for further enforcement. By August 8, 2022, all four cases were closed after resolution was determined by Code Enforcement. The poultry enclosure was removed. The homeless camps were removed, and trash was cleaned-up. The enterococci levels decreased beginning in June 2022 but continued to exceed the Class III Marine standard of 130 MPN/100ml for the remainder of the year (Table 4). Because this is a tidal waterbody, source tracking is more difficult due to the bi-directional flows. Continued use of source tracking tools is necessary to determine existing and potentially new sources.

Table 4. FIB Levels at Site ROCKCRK

Sample Date	Enterococci (MPN/100ml)
10/11/2021 9:05	1106
11/8/2021 9:28	1187
12/8/2021 9:05	488
1/5/2022 9:07	934
2/3/2022 9:12	1291
3/21/2022 8:43	789
4/5/2022 8:33	1309
5/2/2022 9:04	9804
6/2/2022 9:07	520
7/20/2022 9:04	384
8/2/2022 11:06	842
9/13/2022 8:52	598

5.2 NUTRIENTS

5.2.1 Haldeman Creek (Upper)

During FY22, nutrient levels remained high at site WINPARK in the Haldeman Creek (Upper) WBID. Continued source tracking investigations in this WBID showed ongoing issues with reclaimed water being sprayed directly into the canal upstream of the Haldeman Creek weir and upstream of site WINPARK. Nutrient levels in the WINPARK canal were up to 4 times higher than the other tributary monitored by site HALDUP indicating more nutrients are entering the Haldeman Creek watershed via the Haldeman Glades Outfall canal (Figure 14). In previous reports (CCPC 2020, 2021), site WINPARK also had the highest sucralose levels, a wastewater tracer present in reclaimed water.

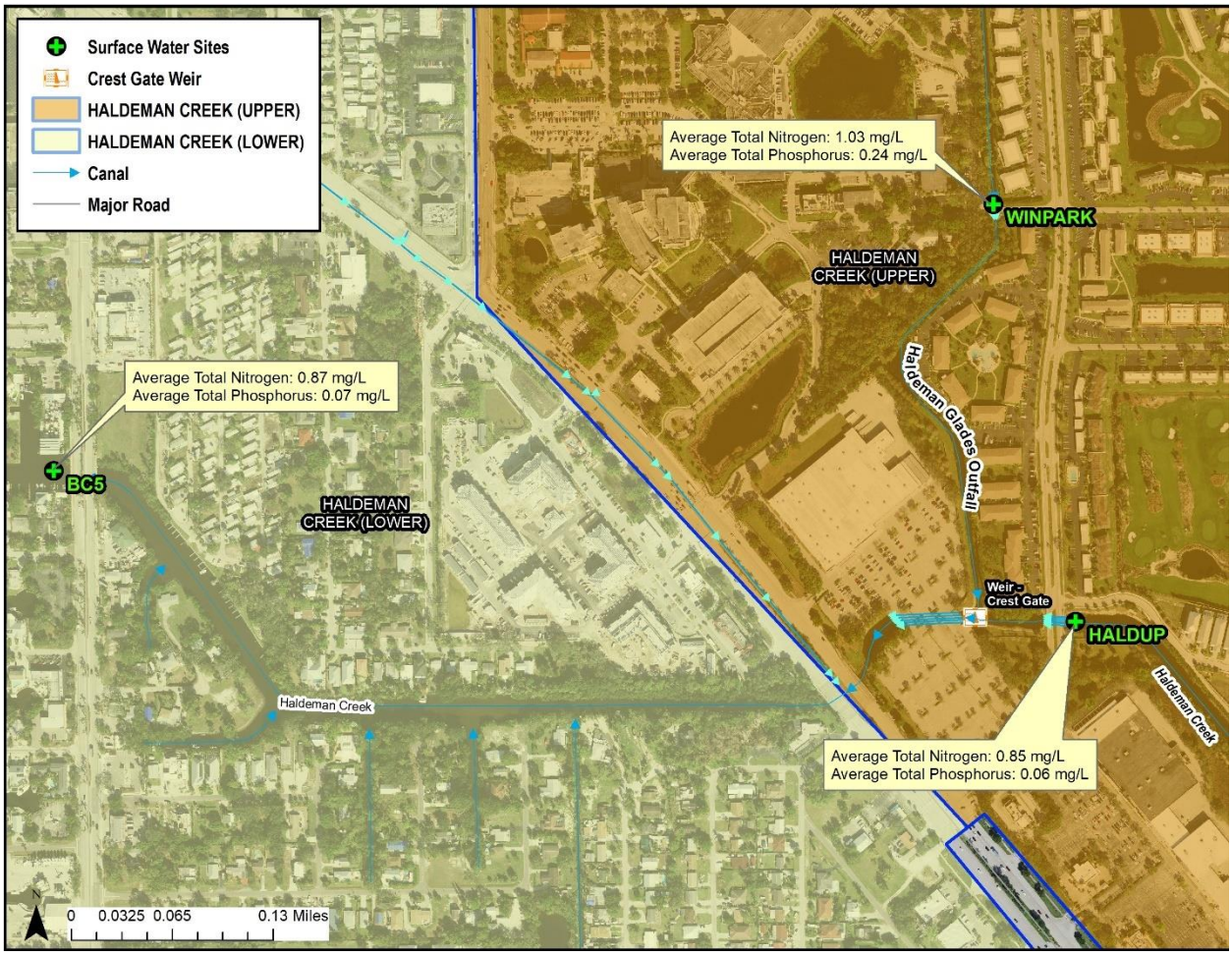

Figure 14. Average nitrogen and phosphorus levels in the Haldeman Creek (Lower) and (Upper) WBIDs during FY22.

5.2.2 Silver Strand

Site IMKBRN continues to have some of the highest total phosphorus and total nitrogen levels. In previous source tracking efforts, CCPC documented discharges from a liquid fertilizer company's secondary containment area that contains large tanks of fertilizer. CCPC notified the FDEP of the illicit discharge in August 2019 for further investigation, enforcement, and remediation. While the discharge was stopped in August 2019 elevated ammonia and total nitrogen levels at site IMKBRN continued in 2020 and 2021. CCPC conducted further monitoring upstream of site IMKBRN in November 2021 and again in January 2022 to further delineate the watershed and rule out additional sources. This monitoring revealed that the drainage canal has much lower total nitrogen and ammonia concentrations upstream of The Liquid Plant facility than samples collected at the southern end of this same canal, downstream of the facility. Sample (IMKBRN3) had total nitrogen levels that were 8 times higher than the upstream, background sample collected at site IMKBRN4 (Figure 15).

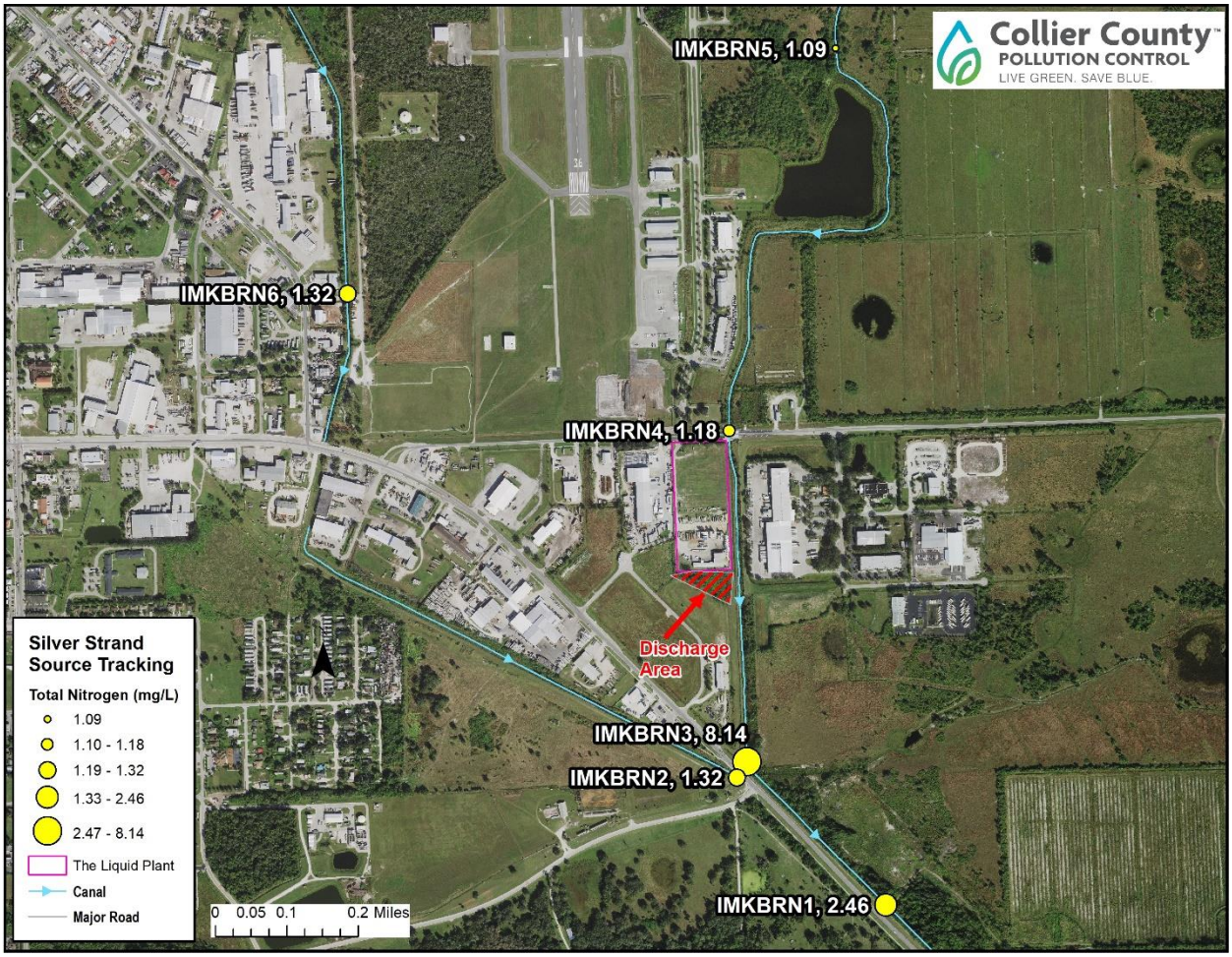

Figure 15. Total nitrogen levels upstream of site IMKBRN.

On February 1, 2022, the FDEP requested a site assessment to determine the extent of contamination caused by the discharge from The Liquid Plant facility. A site assessment report (AMRC, 2022) was submitted to the FDEP in October 2022, documenting groundwater concentrations of several contaminates in the discharge area which exceed the corresponding groundwater cleanup target levels (GCTLs) and natural attenuation default concentrations (NADCs), per chapter 62-777, FAC. Ammonia was 578 times higher than the GCTL and nitrate was 140 times higher than the GCTL (Figure 16). Below is an excerpt from this report showing groundwater analytical results collected from a well located in the discharge area which exceeds the corresponding GCTL for every constituent analyzed. Additionally, the report indicates the groundwater flow direction "with significant hydraulic gradient" is toward the drainage canal on

- MW-3 (suspected discharge area)
  - Boron – 3,500 ug/L (GCTL = 1,400 ug/L, NADC = 14,000 ug/L)
  - Cadmium – 29 ug/L (GCTL = 5 ug/L, NADC = 50 ug/L)
  - **Iron – 13,000 ug/L** (GCTL = 300 ug/L, **NADC = 3,000 ug/L**)
  - **Manganese – 31,000 ug/L** (GCTL = 50 ug/L, **NADC = 500 ug/L**)
  - Zinc – 25,000 ug/L (GCTL = 5,000 ug/L, NADC = 50,000 ug/L)
  - **Ammonia – 1,620,000 ug/L** (GCTL = 2,800 ug/L, **NADC = 28,000 ug/L**)
  - **Nitrate – 1,400,000 ug/L** (GCTL = 10,000 ug/L, **NADC = 100,000 ug/L**)
  - **Nitrate+Nitrite – 1,400,000 ug/L** (GCTL = 10,000 ug/L, **NADC = 100,000 ug/L**)
  - **Nitrite – 14,000 I ug/L** (GCTL = 1,000 ug/L, **NADC = 10,000 ug/L**)
  - Sulfate – 1,100,000 ug/L (GCTL = 250,000 ug/L, NADC = 2,500,000 ug/L)

Figure 16. Table taken from Page 7 of the Site Assessment Report (AMRC, 2022).
—Groundwater Cleanup Target Levels (GCTL)—Natural Attenuation Default Concentrations (NADC), per FAC Chapter 62-777.

the east side of the property. It's this canal that direct discharges to the Barron River Canal and to the site IMKBRN (IMKBRN1).

Discovery of the discharge and removal of the discharge hose occurred in August 2019. This should have stopped the discharge and further contamination. However, the groundwater samples taken for the assessment report in April 2022 are still showing nitrogen contaminated groundwater over 2.5 years later indicating that this is a continued source of nutrients. Impacts are still being seen at site IMKBRN. Just downstream in the Barron River WBID, the number of exceedances in total nitrogen and total phosphorus are also increasing.

5.2.3 Lake Trafford

Lake Trafford continues to have nutrient issues. All samples collected in FY22 exceeded the chlorophyll, total nitrogen and total phosphorus State standards. Source tracking for nutrients in Lake Trafford has involved multiple methods over the last few years including wastewater tracers, storm event monitoring, groundwater seepage. Analyzing stable isotopes is yet another way to fingerprint sources of nutrients. In FY22, the stable isotopes of nitrate ($\delta^{18}O$ and $\delta^{15}N$)

and boron ($\delta^{11}B$) were used to help determine the source of nitrogen (sewage, fertilizer, manure) and the source of the water (groundwater, surface water) carrying the nitrate. Additionally, boron isotopes coupled with nitrate isotopes can further distinguish between sewage and manure.

The isotope study design for Lake Trafford included samples from the lake during all four quarters as the sources of water and nitrogen could change throughout the year. Previous studies (Thomas, xxx) have shown that most of the nitrogen entering Lake Trafford comes from groundwater, the boron isotope was also monitored in all four aquifers—Water Table, Lower Tamiami, Sandstone, and Mid-Hawthorn. This would likely provide a fingerprint for boron in each aquifer that could be compared to boron isotopes in Lake Trafford. The nitrate isotope would then provide a fingerprint for the sources of nitrogen which include fertilizer, sewage, manure, soil, or atmospheric. Unfortunately, the contract laboratory requires nitrate levels above 0.04 mg/L to accurately analyze the nitrate isotopes. There were no nitrate levels above 0.04 mg/L in Lake Trafford during the study therefore, no conclusions about nitrate sources in Lake Trafford could be made. While total nitrogen in the lake is high, nitrate is typically not the largest component of the total nitrogen calculation (total Kjeldahl nitrogen + nitrate + nitrite). Additionally, nitrate is used quickly by the algae blooms that are typically present in the lake.

The boron isotope results were also inconclusive. While each aquifer and the lake showed slightly different isotopic signatures, there was significant overlap in possible isotopic signatures of potential sources. The sample results in Figure 17 show possible sources based on the isotopic signatures and as illustrated, the sources vary.

While this method of using isotopic signatures of nitrate in combination with boron has been used successfully in other studies (Briand et al., 2013, Bronders et al., 2012, Lasagna et al., 2017, Tamborski et al., 2020, Widory et al., 2005) to track sources of nitrogen pollution, this limited study done in Lake Trafford did not produce viable results. At a minimum, this study has established background boron isotopic signatures for the four groundwater aquifers and Lake Trafford during the dry season and early wet season.

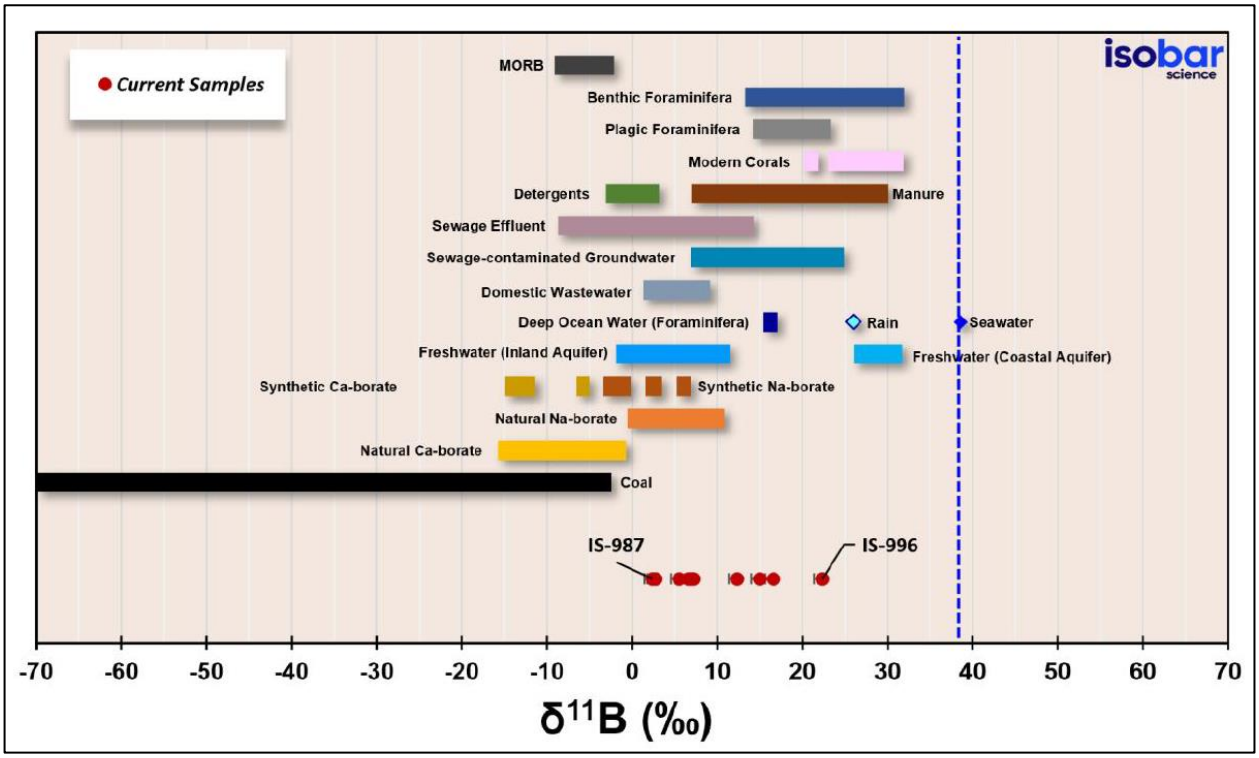

Figure 17. Boron isotope results from Lake Trafford and local groundwater aquifers.

5.2.4 Gordon River Extension

Gordon River Extension has had a TMDL for dissolved oxygen since 2008. This TMDL ties the cause of the dissolved oxygen issues to nutrients and therefore sets concentration standards for total nitrogen at 0.74 mg/L and total phosphorus at 0.04 mg/L. During the FY22 FIB source tracking in this WBID, nutrient samples were also collected. Similar to the FIB levels, the nutrient levels in the headwaters (north end) are much lower and meeting standards, but as the water progress south, more nutrients are entering the Gordon River Canal and as it exits the watershed, it no longer meets those standards. The Goodlette-Frank Rd. ditch (canal running north/south on the west side of Goodlette-Frank Rd.) and the Freedom Park bypass ditch (canal running east/west on north side of Freedom Park) have the highest concentration of both total nitrogen and total phosphorus. Figures 18 and 19 show locations in red that are not meeting the total nitrogen and total phosphorus standards set by the Gordon River Extension TMDL. While Freedom Park water quality treatment wetlands average a 44% reduction in total nitrogen concentration and a 73% reduction in total phosphorus (Johnson Engineering, 2008-2020) discharge from Freedom Park is still not meeting the TMDL standards. Additionally, Freedom Park only treats water coming down the Goodlette-Frank Rd. ditch and much of this water is diverted along the north side of the park through the Freedom Park bypass ditch. Since nutrients are increasing as the waters pass through the watershed, source reduction of nutrients and further treatment of water via Freedom Park are needed.

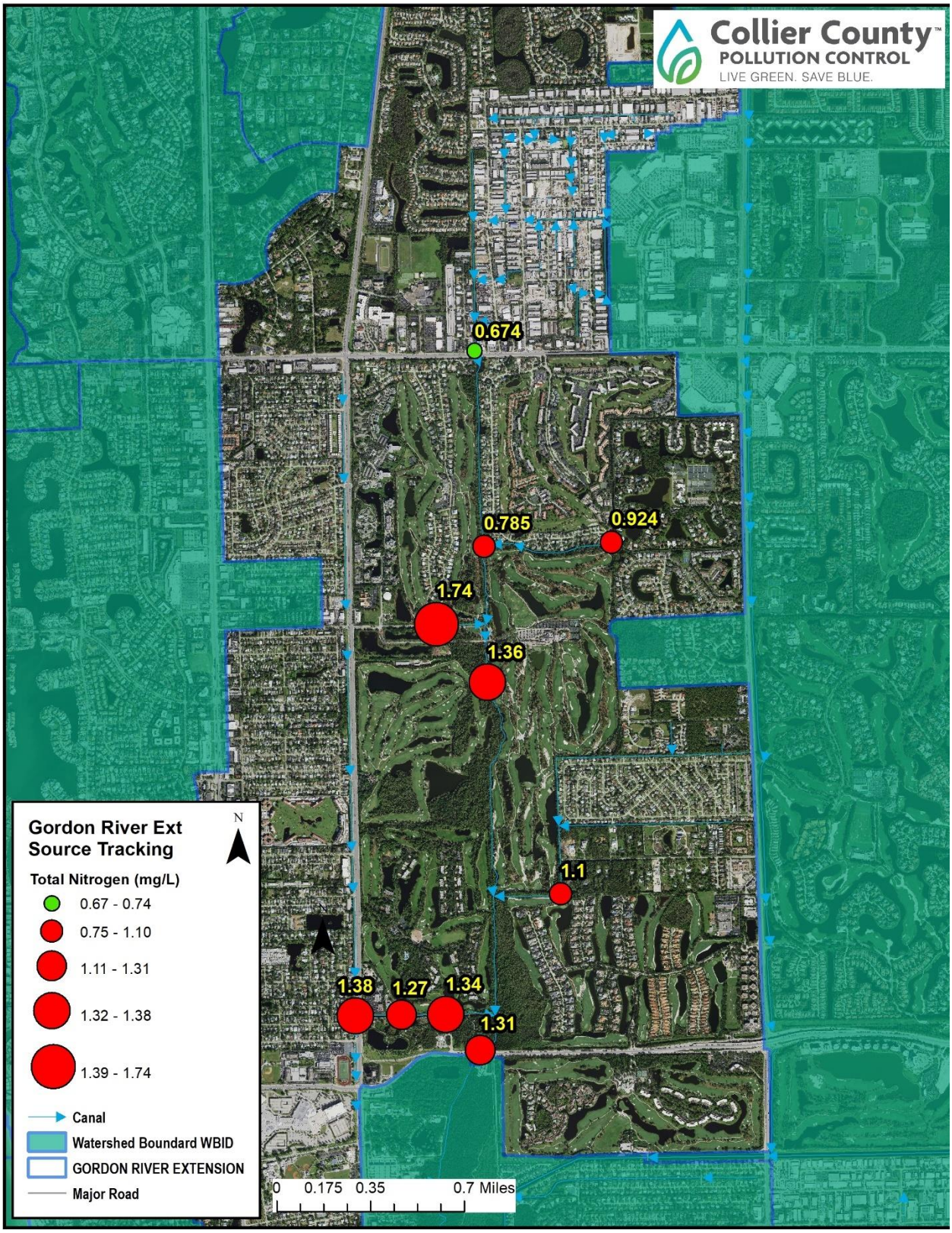

Figure 18. Total nitrogen levels May 24, 2022 during first flush. Red dots indicate levels above the TMDL standard of 0.74 mg/L.

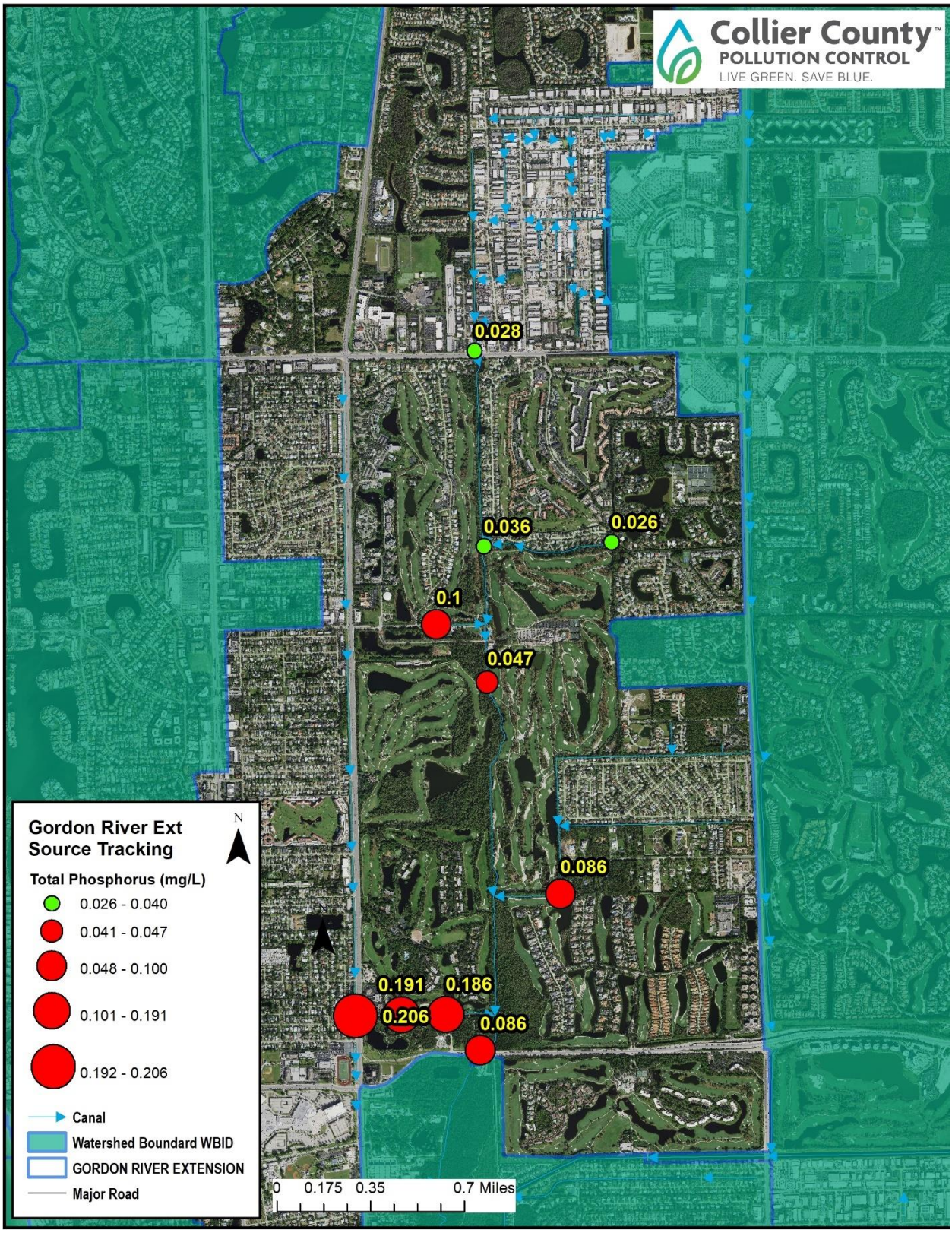

Figure 19. Total phosphorus levels May 24, 2022 during first flush. Red dots indicate levels above the TMDL standard of 0.04 mg/L.

5.2.5 Cocohatchee River and Inland Segment

The Cocohatchee River estuary is impaired for nutrients (total nitrogen and chlorophyll). Similar to the Gordon River Extension, when FIB source tracking is conducted, nutrients are also sampled. Samples taken at various locations and tributaries in the watershed in April 2022 show a similar pattern to the FIB levels discussed above. Upstream of the wastewater plant, total nitrogen levels are lower on the upstream side and increase on the downstream side (Figure 20). The outfall site WCOCORIV8 from Victoria Park is elevated but levels decrease further downstream on the west side of the wastewater treatment plant. Site WCOCORIV2 (Figure 21) had elevated total nitrogen, while the nearby stormwater retention pond (WOCORIV4) had much lower total nitrogen indicating the source of nitrogen is localized. Nitrogen levels are increasing in the canal between WCOCORIV5 and WCOCORIV2. Figure 22 also shows that total phosphorus levels follow a similar pattern.

Further investigation is needed in both the West and East Branch of the Cocohatchee River to further delineate sources.

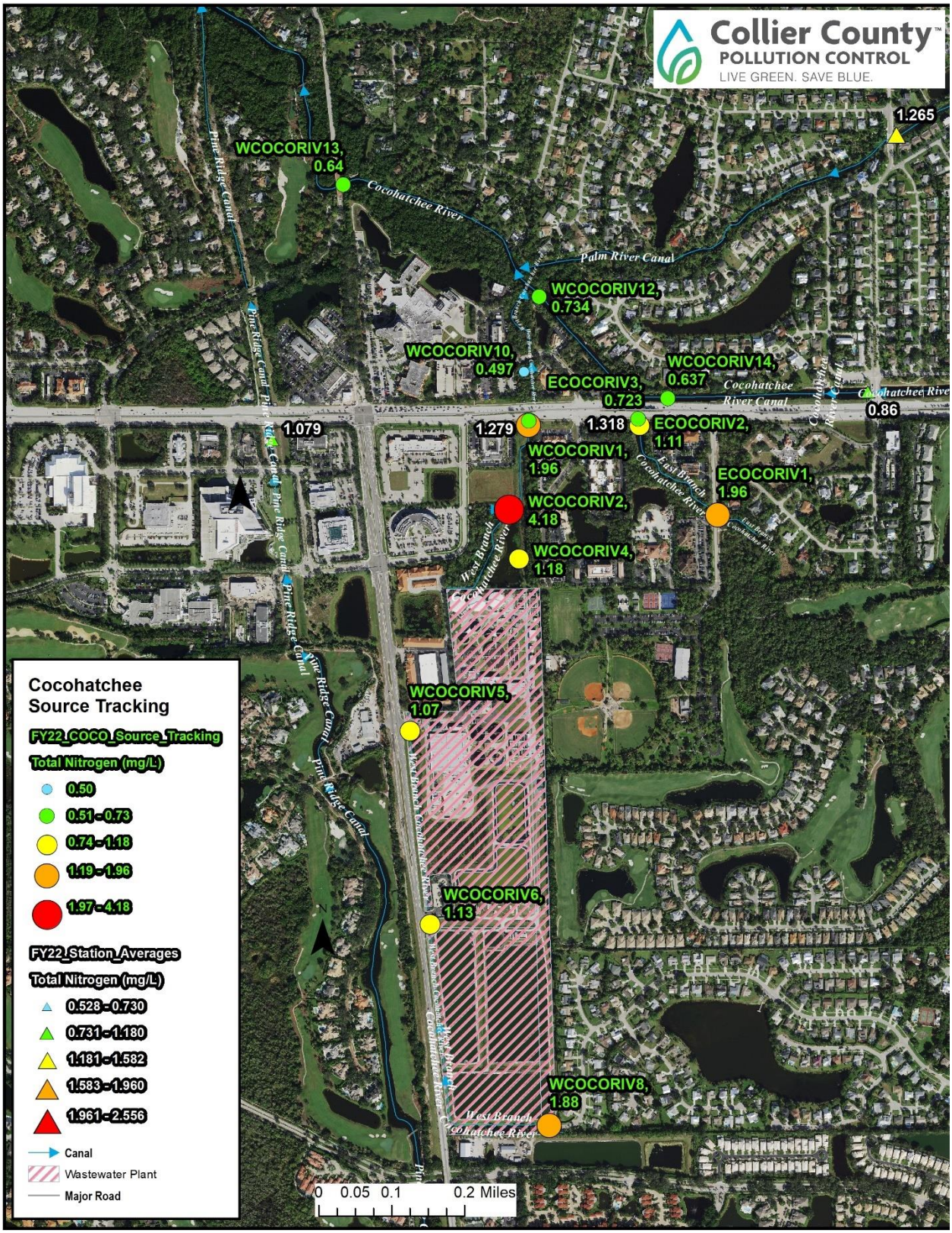

Figure 20. Total nitrogen levels in the Cocohatchee River Canal Watershed.

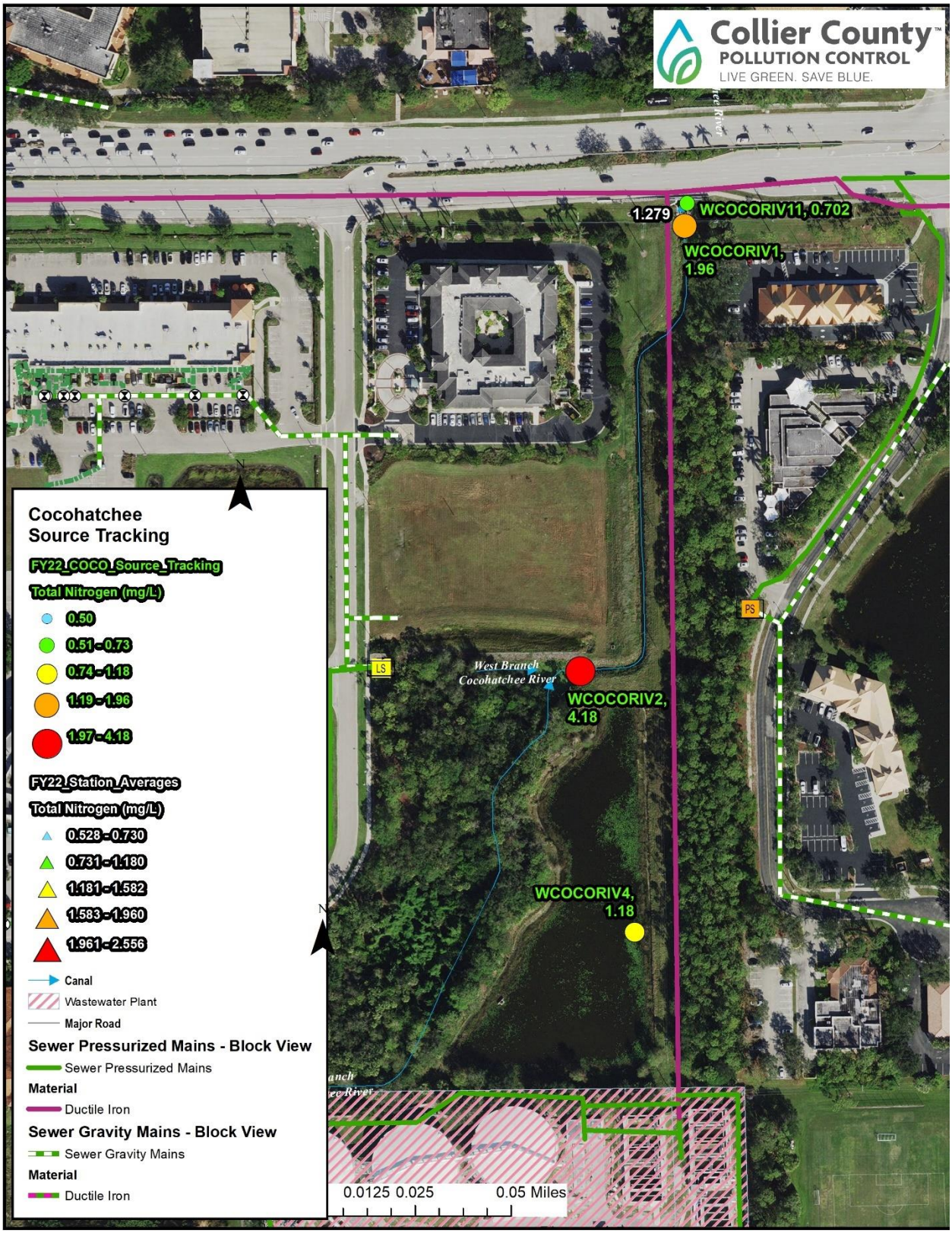

Figure 21. Total nitrogen levels in the West Branch Cocohatchee River and Stormwater Retention Pond.

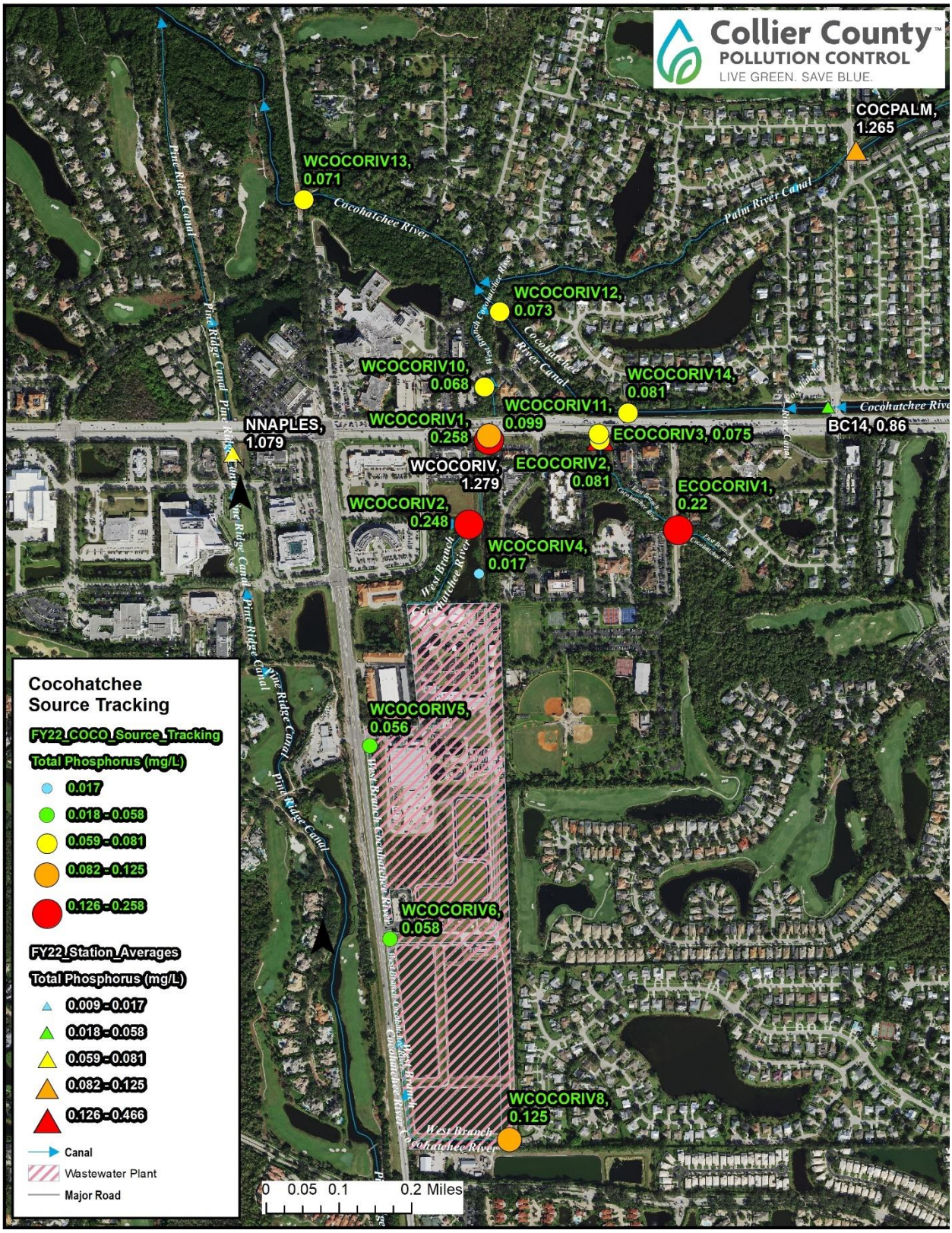

Figure 22. Total phosphorus levels in the Cocohatchee River Canal watershed.

5.3 COPPER

The most common source of copper in freshwater in Collier County is from the use of copper-based herbicides. While copper-based anti-fouling paints in marine systems are certainly another source for the coastal estuaries, discharges of freshwater containing copper are likely the biggest contributor of copper to the estuaries. It should be understood that the copper criterion for the estuaries (Class II and Class III Marine waters) is 3.7 µg/L. However, the freshwater copper criteria are determined using an equation based on hardness levels taken at the same time copper was measured. In FY22 the freshwater copper criteria ranged from 5.03 µg/L to 30.5 µg/L with an overall average of 20.8 µg/L. As such, waters meeting standards in the freshwater upstream WBID could cause an exceedance in the downstream marine WBID.

5.3.1 Rookery Bay (Inland West Segment)

In FY22 copper exceedances decreased in every watershed except for Rookery Bay (Inland West Segment) (Table 2). The increase in this WBID was only seen at one station, EAGLECRK, where 16.7% of the samples collected in FY22 exceeded the Class III Freshwater criterion. This site also had the highest copper average in FY22. The likely source of this copper is due to the use of copper-based herbicides. The community (Eagle Creek) surrounding this site maintains the waterways and Pollution Control has investigated multiple complaints regarding algae blooms in the waterways, most recently in 2021 (PC2021-117). Further education and outreach are needed in this and other upstream communities on reduction of copper-based herbicide usage as well as nutrient reduction to prevent algal blooms.

5.3.2 Haldeman Creek (Upper) and (Lower)

Sites HALDUP, WINPARK, and BC5, all located in the Haldeman Creek watershed, had increased average copper levels in FY22, but no exceedances. While the upstream WBID, Haldeman Creek (Upper) is not impaired for copper, the marine WBID immediately downstream, Haldeman Creek (Lower) is impaired for copper and will receive a TMDL for copper in 2023 or 2024.

5.3.3 Rookery Bay (Inland East Segment)

Site TAMTOM has historically had some of the highest copper values. In FY22, this site had the third highest average copper levels (Table 3), a decrease in annual averages from 15.6 µg/L (FY21) to 5.51 µg/L in FY22. Sources of copper at this site include existing copper bound in canal sediment (Gardinali, 2014) and/or direct discharges from existing agricultural operations. As part of source tracking efforts for copper in this watershed, a sample was collected while agricultural pumps were directly discharging into the US41 canal. The sample collected in the discharge plume entering the US41 canal on June 8, 2022, yielded copper levels at 17.7 µg/L. The copper standard (20.97 µg/L) calculated using the hardness value of 258 mg/L collected at the same time, showed the sample was not in exceedance of the copper criterion. Nutrients were also collected

during this sampling event and total nitrogen was 1.83 mg/L and total phosphorus was 0.624 mg/L. Both exceed the screening levels used in this report to determine exceedances, but total phosphorus is of particular concern as it was the highest total phosphorus level recorded in FY22.

Because this agriculture pumping creates flow in both directions in the US41 canal, it was impossible to get representative background samples that were not impacted by the discharge (Figure 23). However, the flow being created in the sample location was not impacted by other flows other than the agricultural pump discharge. Based on the results above, the agricultural discharge is a source of copper and nutrients to the US41 canal.

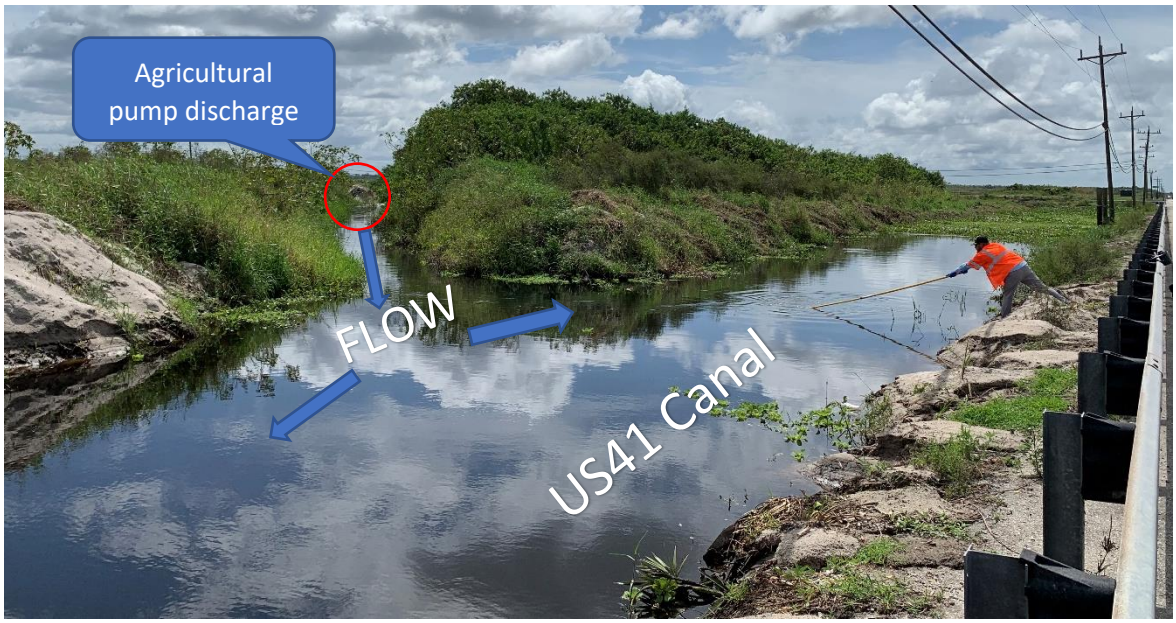

Figure 23. Sample collected June 8, 2022 in agriculture pump discharge plume.

6. CONCLUSIONS

6.1. More WBIDs saw increases in the percent exceedances during FY22 (52%) compared to FY21 (41%).

6.2. Fecal Indicator Bacteria (FIB) levels improved in almost all WBIDs except for Corkscrew Swamp, Immokalee Basin and Rock Creek. Corkscrew Swamp and Immokalee Basin are not currently impaired for FIB and further source tracking will not be a prioritized. While source tracking exposed several sources in Rock Creek that were corrected in FY22, FIB levels continued to exceed standards. ROCKCRK had the highest enterococci average. Site TAMTOM had the highest E. coli average in FY22, but this could be due to a high a biased resulting from saltwater influx.

6.3. Copper levels also improved with only one WBID, Rookery Bay (Inland West Segment), documenting exceedances during FY22. Site EAGLECRK in this WBID had the highest copper average in FY22 and increased two-fold from FY21. This site is solely responsible for all copper exceedances in FY22.

Source tracking at site TAMTOM has revealed that the agricultural pump discharge contains elevated copper levels.

Education and outreach efforts in communities located in and upstream of copper impaired WBIDs has been ongoing since 2014. Copper levels in the freshwater WBIDs has continued to improve overall. However, FDEP will still be issuing copper TMDLs in 2023 or 2024. Copper impairments in estuaries will remain difficult to rectify due to the freshwater copper criteria being insufficient in protecting the criteria assigned to downstream estuaries.

6.4. Dissolved Oxygen (DO) levels were again the most common exceedance of State standards in FY22. All WBIDs sampled exceeded the DO standard at least once. In FY22, DO was more likely to exceed the standard during the wet season as water temperatures are higher, the water is darker and less likely to hold DO in solution thus lowering the overall oxygen levels. Many of our canals and sloughs are naturally low in oxygen because they are dark in color, slow moving, warm, and fed by groundwater.

6.5. Total nitrogen was the second most frequently exceeded parameter. There was overall improvement in FY22, with many WBIDs seeing a decrease in the number of exceedances of total nitrogen. However, Lake Trafford exceeded the State standard in 100% of the samples collected. Cocohatchee River exceeded the standard in 82.2% of the samples collected, an increase from 65.9% in FY21. Source tracking upstream of this WBID showed elevated total nitrogen in two of the tributaries entering the estuary.

6.6. Total nitrogen, total phosphorus and chlorophyll were also commonly exceeded parameters in FY22. However, total nitrogen and chlorophyll levels saw an overall improvement county-wide since FY21.

6.7. There was a significant difference in wet season vs. dry season results for dissolved oxygen, iron, pH, and turbidity. Due to the seasonality in the data, these parameters are more likely to exceed standards in the wet season.

6.8. Lake Trafford had the highest percentage of exceedances during FY22. All of the FY22 samples collected for chlorophyll, total nitrogen and total phosphorus exceeded the State

standards. This lake is currently impaired for nutrients and experiences consistent algal blooms as evidenced by elevated chlorophyll levels. Consistent algal blooms also keep the DO levels elevated which accounts for the very low number of DO exceedances in Lake Trafford. Stable isotope testing was employed to help fingerprint sources of nitrogen in the lake but was unsuccessful due to the very low nitrate levels found in the lake.

6.9. Silver Strand WBID had the second highest percentage of samples that exceeded water quality standards or screening thresholds. There is a known source of nutrients impacting the waterbody from a fertilizer storage facility. The FDEP is currently engaged in remediating historic discharges from this facility.

6.11 Nutrients in Gordon River Extension are increasing as water moves south through the watershed. The Goodlette-Frank Rd. ditch discharge is a documented source of nutrients into the Gordon River. Additionally, changes in land use from industrial in the north to residential and golf courses progressing south are likely introducing additional nutrients.

7. RECOMMENDATIONS

7.1 Collier County will be receiving Fecal Indicator Bacteria (FIB) Total Maximum Daily Loads (TMDLs) for 8 WBIDs in 2023 or 2024. Those WBIDs are Cocohatchee River, Cow Slough, Gordon River Extension, Gordon River (Marine Segment), Haldeman Creek (Lower), Haldeman Creek (Upper), Naples Bay, and Rock Creek. DNA source tracking was conducted by the FDEP in Cow Slough and identified FIB sources included cattle and birds. Therefore, no further source tracking is recommended in the Cow Slough WBID. While FIB exceedances have decreased in Rock Creek, Gordon River Extension, and Cocohatchee River WBIDs, they are still not meeting standards for FIB. Continued source tracking is needed. This should include snapshot monitoring for DNA (human, canine, and avian) under different flow conditions. Integrity testing of wastewater infrastructure has been an effective tool and should continue to be used.

7.2. Further source tracking for nutrients is warranted in the Cocohatchee River, Cocohatchee River (Inland Segment), Haldeman Creek (Upper), and Gordon River Extension. This source tracking should include snapshot monitoring, sampling under varying flow conditions, stable isotopes where appropriate, and integrity testing of wastewater infrastructure.

Remediation of nutrient contaminated groundwater upstream of site IMKBRN is needed to reduce impacts to the downstream receiving waters. Pollution Control should continue to work with FDEP to supply ambient monitoring data and any further source tracking nutrient data.

7.3. As the Goodlette-Frank Rd. ditch is a source of nutrients and FIB to the Gordon River, an increased volume of water from this ditch should be routed through the Freedom Park wetlands treatment system to reduce the pollutant load. Septic to sewer conversions should continue in the Gordon River watershed to help reduce nutrient inputs. Also, education and outreach on nutrient reduction and golf course best management practices could benefit this watershed.

7.4. Due to the elevated FIB, nutrient, and copper levels at TAMTOM, source reduction should be a priority with respect to current efforts to restore flows from the Picayune Strand Restoration Project (PSRP) into Rookery Bay National Estuarine Research Reserve and Collier Seminole State Park. As part of the PSRP, flows from TAMTOM will be included in restored flows into these two Outstanding Florida Water. Discharges should meet the established numeric nutrient criteria in these sensitive receiving waters. Quality and quantity of discharges should be regulated by the State permitting agencies through existing discharge permits into this canal.

7.5. Collier County will be receiving TMDLs for copper in four WBIDs in 2023 or 2024—Rock Creek, Haldeman Creek (Lower), Clam Bay and Naples Bay. These TMDLs will require specific load reductions of copper into these WBIDs. However, due to the difference in the State standards applied to freshwaters vs. marine waters discussed above in Section 5.3, it will be difficult to regulate discharges of copper as they may meet water quality standards in the freshwater system, but then cause impairments downstream in the estuaries. Additionally, the use of copper-based herbicides is regulated by the Florida Department of Agriculture and Consumer Services and local governments are preempted from regulating herbicides. It will be the County's responsibility to somehow reduce copper loads in the freshwater WBIDs that discharge to these watersheds without the ability to regulate the use of copper-based herbicides. Education and outreach are the only tools available to the County to do this. Using source tracking, the County should target communities and land uses that have shown discharges containing elevated levels of copper that would not meet downstream copper standards.

Excess nutrients are the root cause of overuse of copper-based herbicides used to treat algae blooms. Therefore, all education and outreach regarding the reduction of copper-based herbicide use should include information on nutrient reduction best management

practices. Specific attention should be given to the Eagle Creek community and upstream Lely Resort Community as the copper levels at site EAGLECRK are increasing.

7.6. Reduction of nutrient pollution should remain a priority County-wide. Reducing nutrients at the source is more cost effective and efficient than restoring ecosystems after they have been impacted by nutrients. Source reduction strategies should be considered and include the following: require low impact development for new and redevelopment; agricultural operations (including golf courses) should be following assigned best management practices (BMPs) for their operations and verified that the BMPs being implemented are effective; permitted discharges not meeting water quality standards should be remediated; and converting existing wastewater plants to advanced wastewater treatment (AWT) technologies.

From previous source tracking efforts, reuse water was found to be a potential source of nutrients in the urbanized areas of the county. Education and outreach should continue focus on reuse irrigation to ensure overspray and runoff are eliminated to reduce nutrient impacts to surface waters. This outreach should emphasize the requirement for reuse customers to include the nutrient content of reuse irrigation in their calculations for fertilizer application rates, per Collier County's Fertilizer Ordinance (2019-18). Getting stakeholders to change their reuse irrigation practices has been challenging and requires continuous attention. Therefore, converting existing wastewater plants to technologies that are designed to lower the nutrient levels found in reuse irrigation would address this issue at the source.

All of Collier County's estuaries are currently impaired for nutrients. In the absence of criteria for nitrogen and phosphorus in the upstream watersheds, meeting the downstream numeric nutrient criteria (NNC) in the estuaries will be impossible through existing regulatory mechanisms. The FDEP has been unsuccessful at developing numeric nutrient criteria for canals in South Florida and currently has no further plan for development. FDEP has indicated that their only mechanism to establish NNC or nutrient load reductions in the freshwater WBIDs in South Florida would be to set TMDLs for the downstream nutrient impaired estuaries. This is a lengthy process that involves modeling water quality nutrient loads upstream of each estuary. The County should support these efforts as this seems to be the only path going forward that will provide some regulatory mechanism to reduce nutrient loads.

8. REFERENCES

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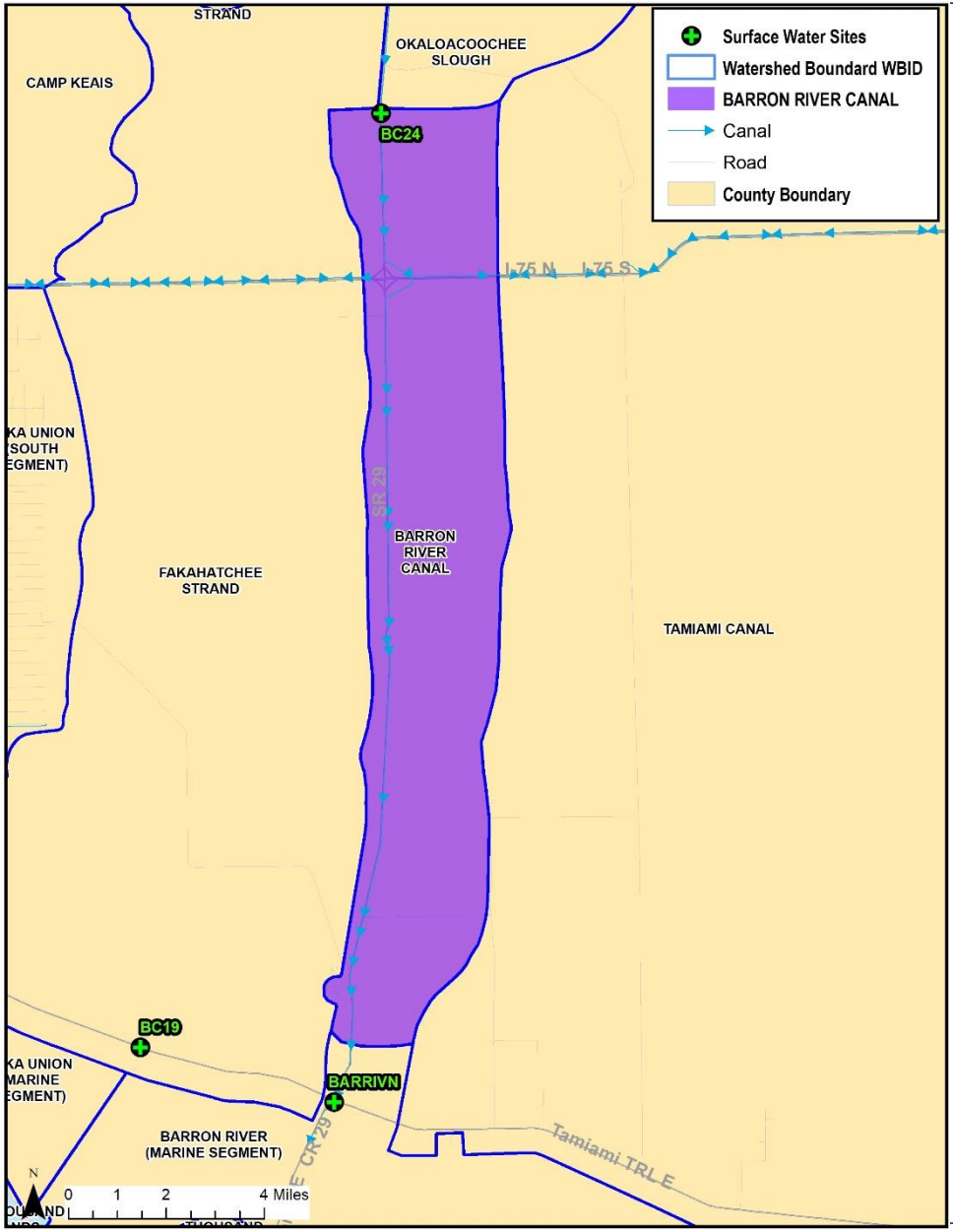


Figure 24. Barron River Snapshot

BARRON RIVER CANAL

- Size: 33,368 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Okaloacoochee Slough, Fakahatchee Strand, Silver Strand
  - Drains to: Ten Thousand Islands
- Major Land Use(s):
  - Wetlands 95%
- FDEP Impairments Draft 2021: None
- Water Quality Trends:
  - Short-term Improving: NOx, TKN, TN, TP, CHLA, Cu, Color, Temp
  - Short-term Degrading: DO, E.Coli
  - Long-term Improving: NOx, TKN, TN, TP, CHLA, Cu, Color, Temp
  - Long-term Degrading: DO
- % Samples in Exceedance: 6.5%
- Summary Statistics: Appendix C

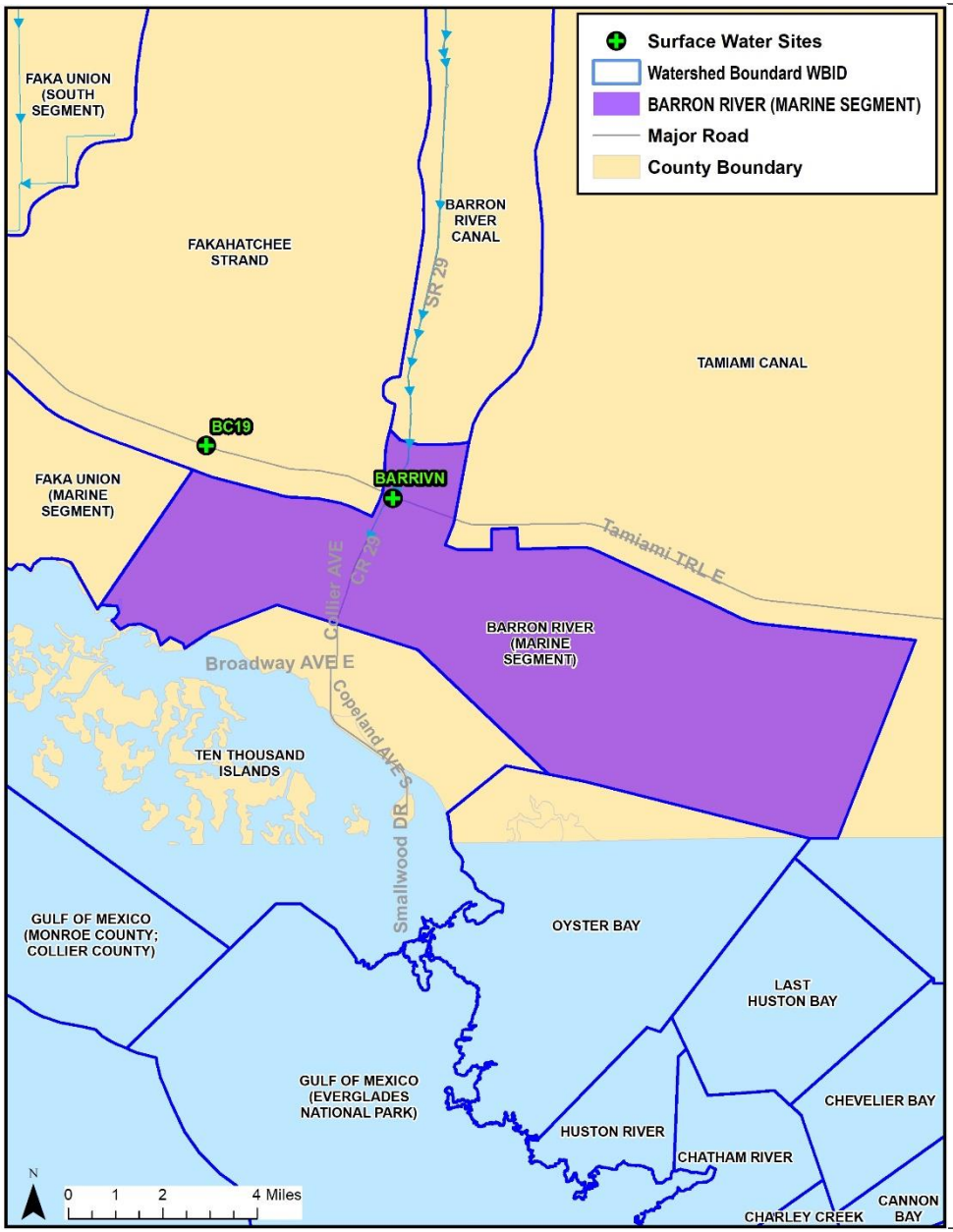


Figure 25. Barron River (Marine Segment) Snapshot

BARRON RIVER (MARINE SEGMENT)

- Size: 39,403 acres
- Classification: Class 2 Marine
- Drainage:
  - Receives from: Okaloacoochee Slough, Fakahatchee Strand, Silver Strand, Barron River
  - Drains to: Ten Thousand Islands
- Major Land Use(s):
  - Wetlands 96%
- IWR_Run64 (Draft assessment of a new WBID: Enterococci
- Water Quality Trends Based on Ten Thousand Islands WBID:
  - Short-term Improving: Chla, As, Cu, Fe
  - Short-term Degrading: DO, TKN, NH3, TN, Enterococci
  - Long-term Improving: Chla, As, Cu, Fe
  - Long-term Degrading: DO, TKN, NH3, TN, Fecal Coliform
- % Samples in Exceedance: 2.6%
- Summary Statistics: Appendix C

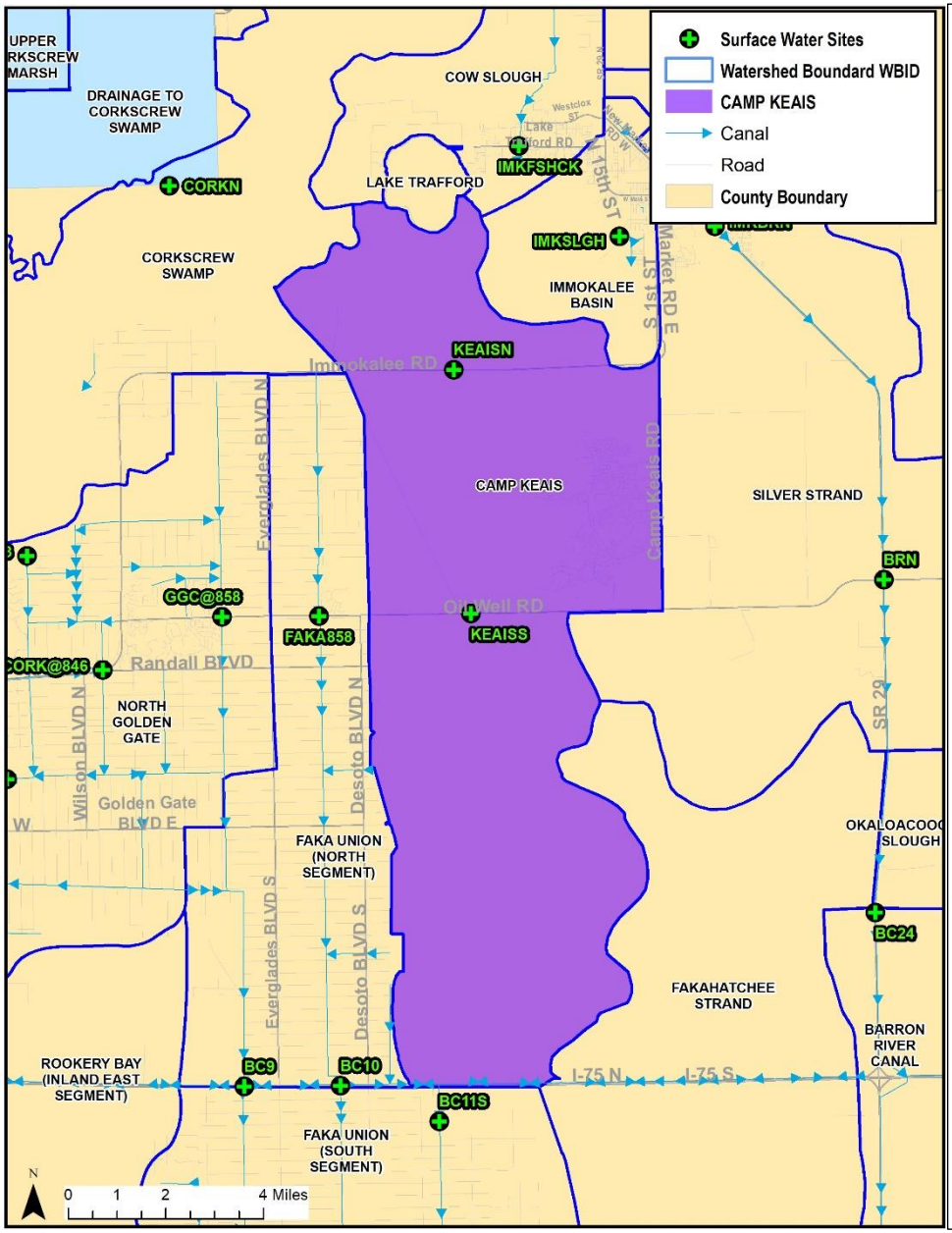
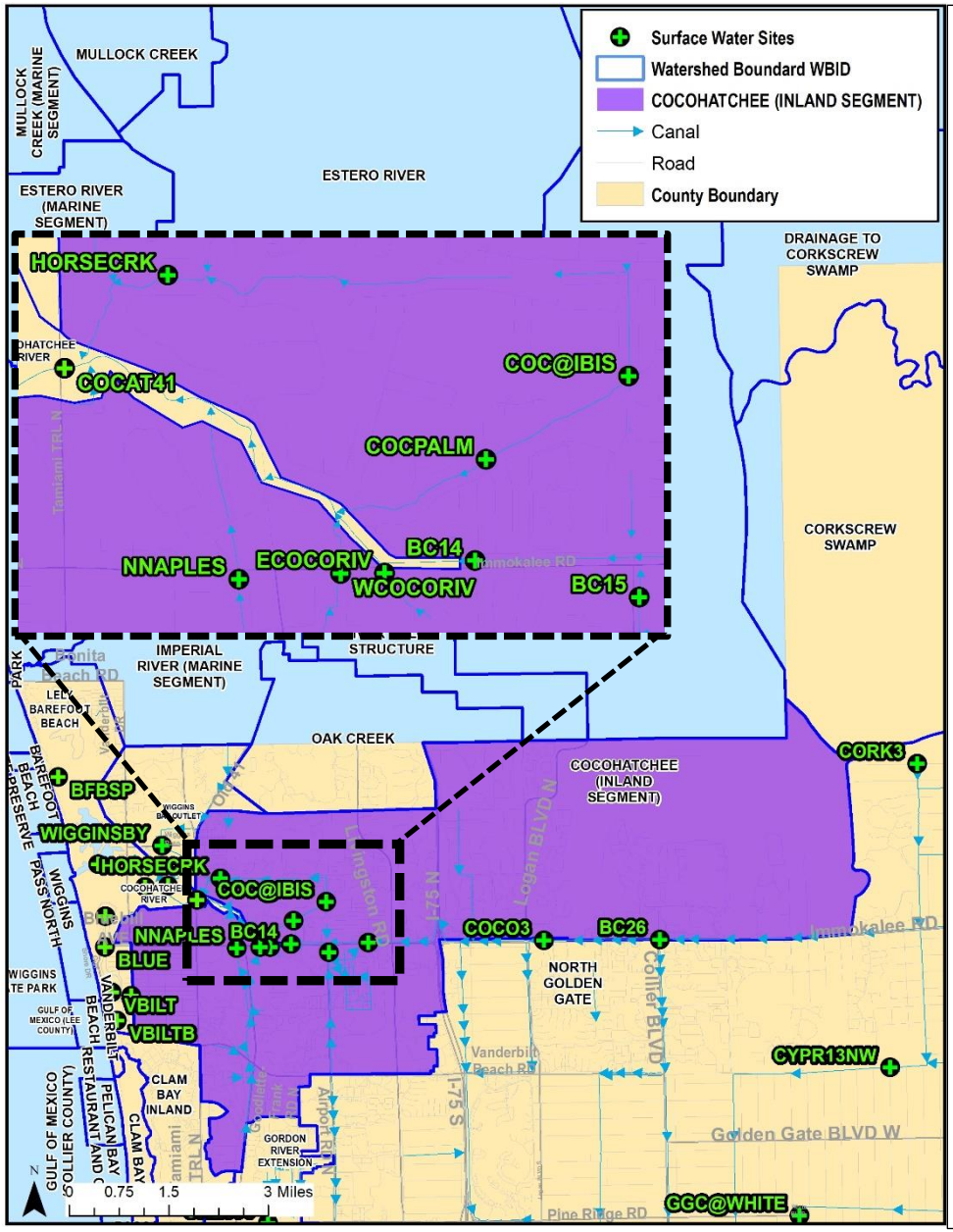


Figure 26. Camp Keais Snapshot

CAMP KEAIS

- Size: 55,646 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Immokalee Basin, Lake Trafford, Cow Slough, Corkscrew Swamp
  - Drains to: Faka Union (North Segment), Faka Union (South Segment), Fakahatchee Strand
- Major Land Use(s):
  - Wetlands 47%
  - Agriculture 36%
  - Upland Forests 9%
- FDEP Impairments Draft 2021: None
- Water Quality Trends:
  - Short-term Improving: Chla, As, Cu
  - Short-term Degrading: DO, TKN, NH3, TN, Ortho-P, TP, E. coli, Turb
  - Long-term Improving: Chla, As, Cu
  - Long-term Degrading: DO, TKN, NH3, TN, Ortho-P, TP, Turb
- % Samples in Exceedance: 4.8%
- Summary Statistics: Appendix C



COCOHATCHEE (INLAND SEGMENT)

- Size: 23,505 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Corkscrew Swamp, Wiggins Bay Outlet, North Golden Gate, Oak Creek
  - Drains to: Cocohatchee River, North Golden Gate
- Major Land Use(s):
  - Urban and Built Up 56%
  - Wetlands 29%
  - Water 10%
- FDEP Impairments Draft 2021: E. coli
- Water Quality Trends:
  - Short-term Improving: SpCond, Sal, As, Cu, Color
  - Short-term Degrading: Temp, NOx, TKN, NH3, TN, Chla, E. coli, TSS, Turb
  - Long-term Improving: SpCond, Sal, As, Cu, Color
  - Long-term Degrading: Temp, NOx, TKN, NH3, TN, Chla, TSS, Turb
- % Samples in Exceedance: 2.4%
- Summary Statistics: Appendix C

Figure 27. Cocohatchee (Inland Segment) Snapshot

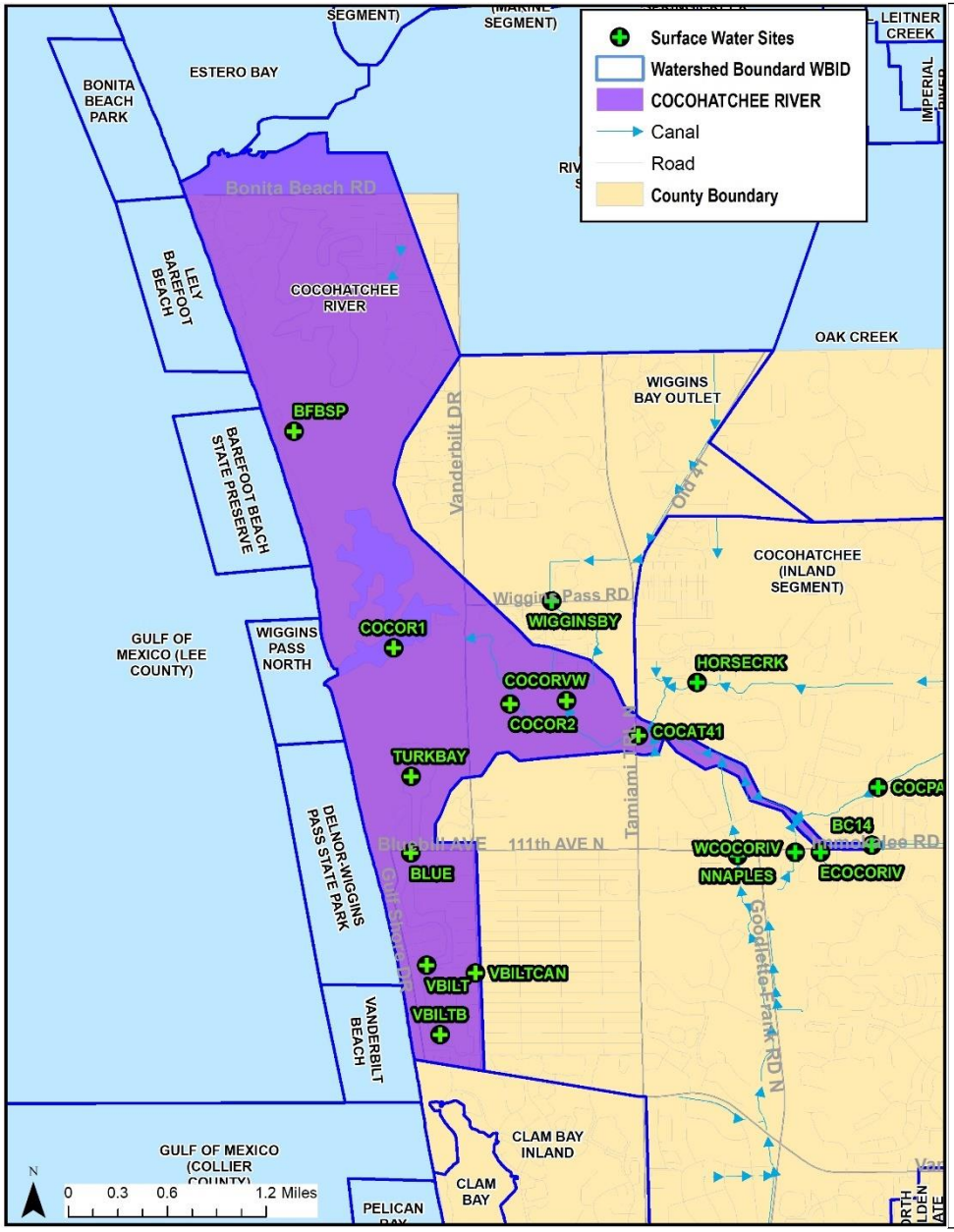


Figure 28. Cocohatchee River Snapshot

COCOHATCHEE RIVER

- Size: 3539 acres
- Classification: Class II Marine
- Drainage:
  - Receives from: Wiggins Bay Outlet, Cocohatchee (Inland Segment)
  - Drains to: Gulf of Mexico
- Major Land Use(s):
  - Wetlands 36%
  - Urban and Built Up 31%
  - Water 28%
- TMDL 2008: Fecal Coliform
- FDEP Impairments Draft 2021: Enterococci, Chlorophyll-a, Total Nitrogen
- Water Quality Trends:
  - Short-term Improving: NOx, Color, Spcond
  - Short-term Degrading: pH, Enterococci, TSS, Turb
  - Long-term Improving: NOx, Fe, Color, SpCond
  - Long-term Degrading: pH, TSS, Turb
- % Samples in Exceedance: 5.6%
- Summary Statistics: Appendix C

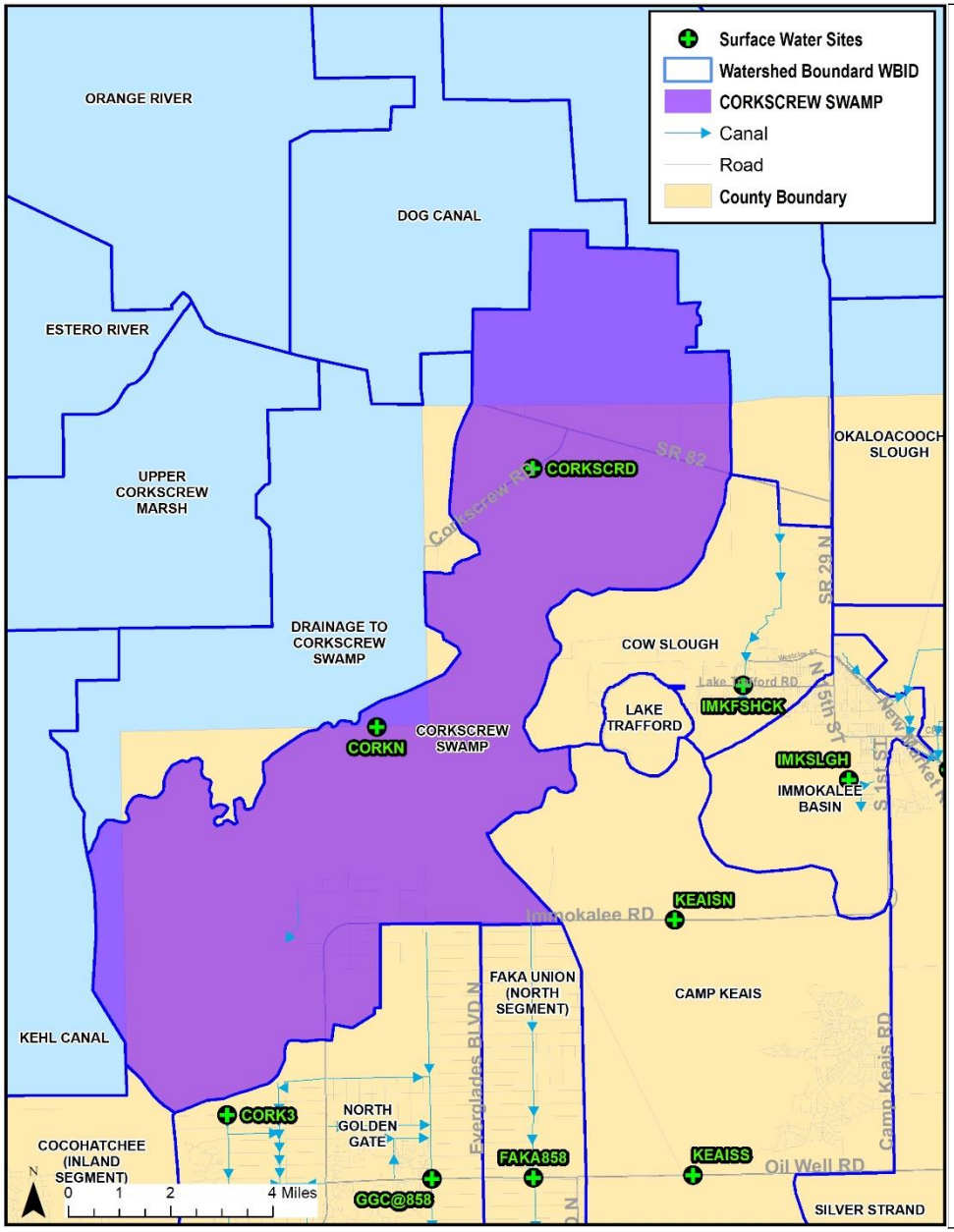


Figure 29. Corkscrew Swamp Snapshot

CORKSCREW SWAMP

- Size: 52,474 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Drainage to Corkscrew Swamp, Cow Slough, Camp Keais
  - Drains to: North Golden Gate, Cocohatchee (Inland Segment), Camp Keais
- Major Land Use(s):
  - Wetlands 60%
  - Agriculture 30%
- FDEP Impairments Draft 2021: None
- Water Quality Trends:
  - Short-term Improving: Chla
  - Short-term Degrading: Temp, SpCond, Sal, NOx, NH3, As, Fe, TSS, Turb
  - Long-term Improving: Chla
  - Long-term Degrading: Temp, SpCond, Sal, NOx, NH3, As, Fe, Fecal Coliform, TSS, Turb
- % Samples in Exceedance: 3.8%
- Summary Statistics: Appendix C

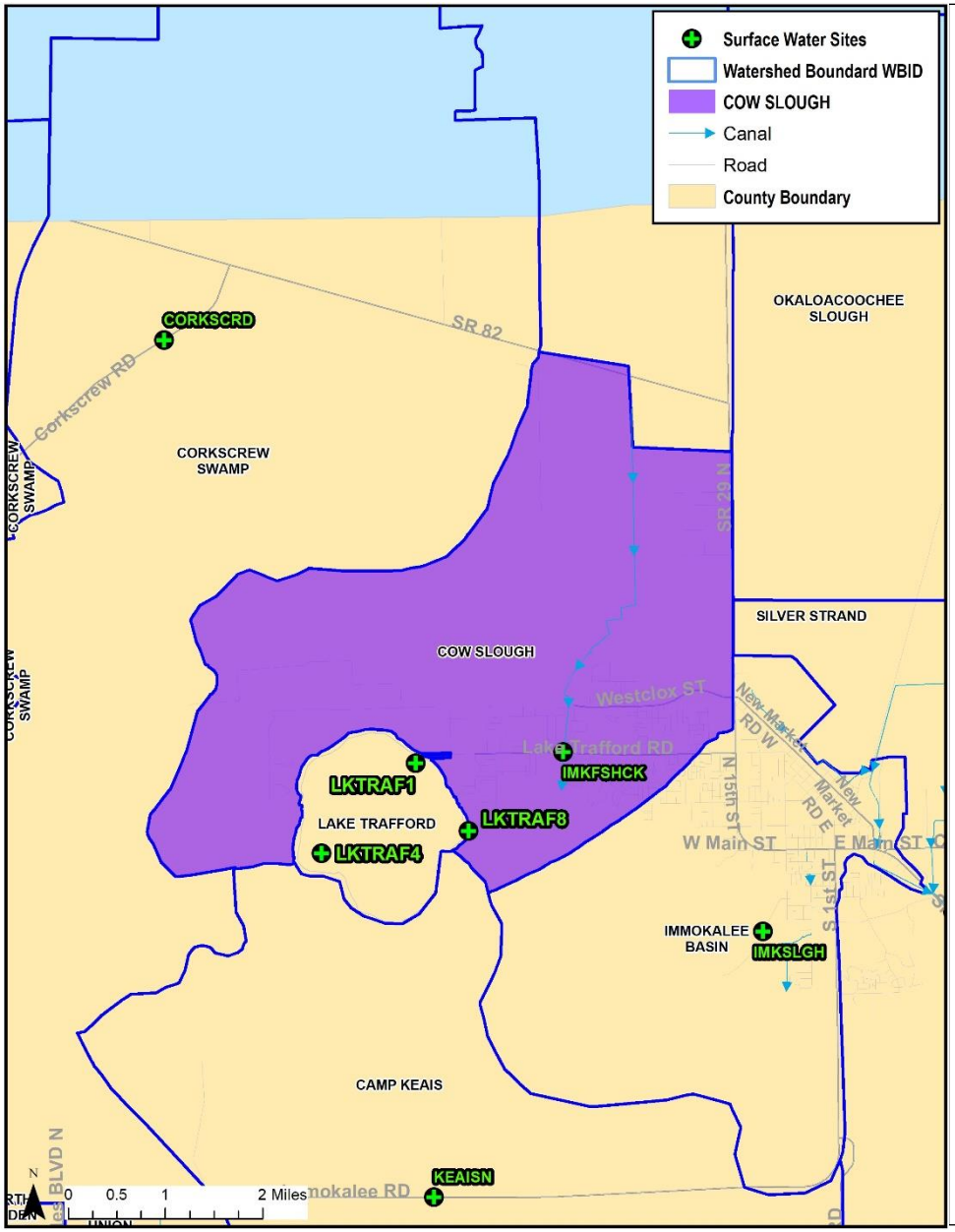


Figure 30. Cow Slough Snapshot

COW SLOUGH

- Size: 11,694 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Corkscrew Swamp, Immokalee Basin, Camp Keais, Townsend Canal
  - Drains to: Camp Keais, Corkscrew Swamp, Lake Trafford
- Major Land Use(s):
  - Agriculture 48%
  - Wetlands 25%
  - Urban and Built Up 13%
- FDEP Impairments Draft 2021: E. coli, Iron
- Water Quality Trends:
  - Short-term Improving: SpCond, Sal
  - Short-term Degrading: DO, TKN, NH3, TN, Turb
  - Long-term Improving: SpCond, Sal, As
  - Long-term Degrading: DO, TKN, NH3, TN, Fe, Turb, Color
- % Samples in Exceedance: 7.7%
- Summary Statistics: Appendix C

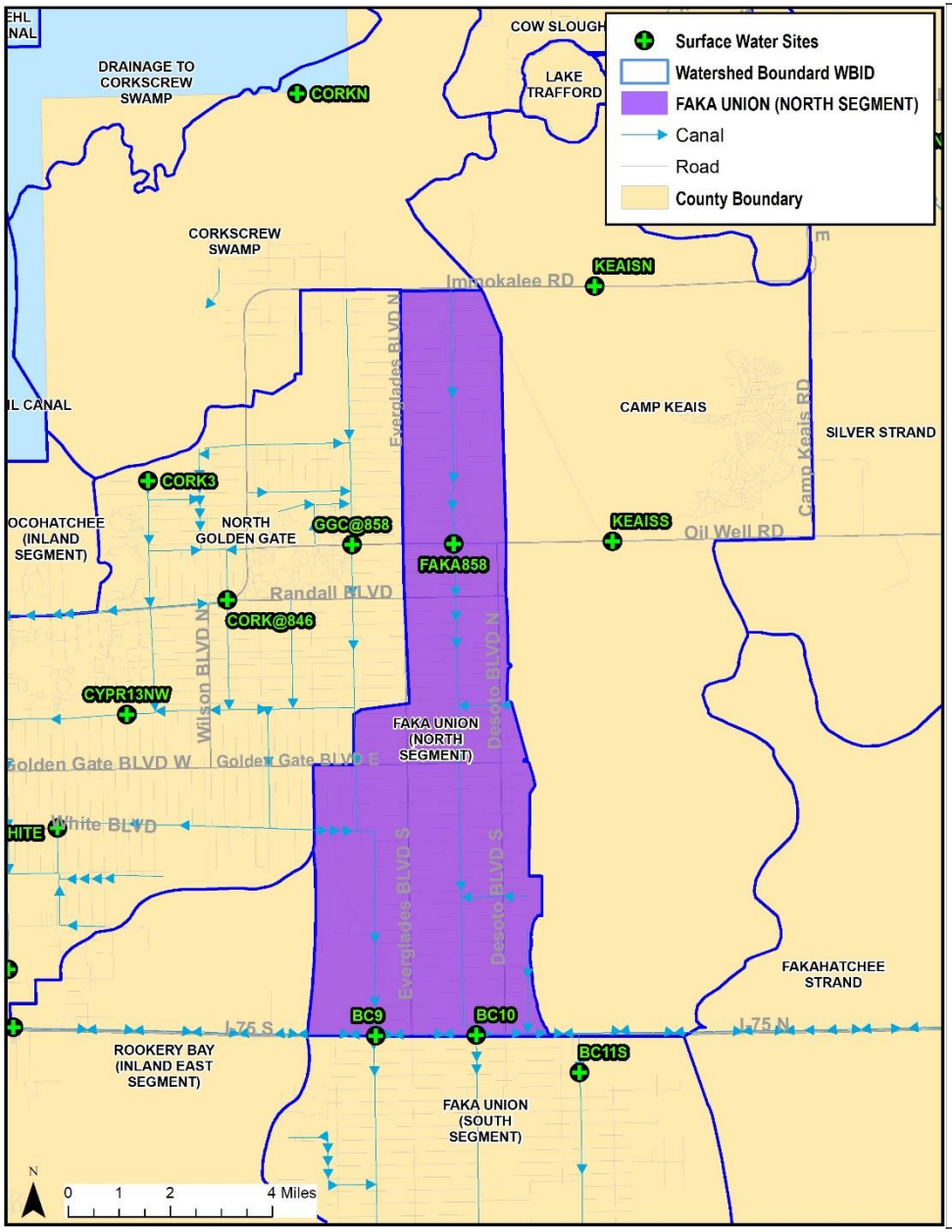


Figure 31. Faka Union (North Segment) Snapshot

FAKA UNION (NORTH SEGMENT)

- Size: 27,450 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: North Golden Gate, Camp Keais, Immokalee Basin, Lake Trafford, Cow Slough
  - Drains to: Faka Union (South Segment), Rookery Bay (Inland East Segment)
- Major Land Use(s):
  - Wetlands 37%
  - Urban and Built Up 36%
    - Rural Residential, Low Density 97%
  - Upland Non-Forested 12%
  - Upland Forests 11%
- FDEP Impairments Draft 2021: None
- Water Quality Trends:
  - Short-term Improving: As, Cu, Color
  - Short-term Degrading: TKN, Chla, TSS, Turb
  - Long-term Improving: As, Cu, Color
  - Long-term Degrading: TKN, Chla, TSS, Turb
- % Samples in Exceedance: 1.1%
- Summary Statistics: Appendix C

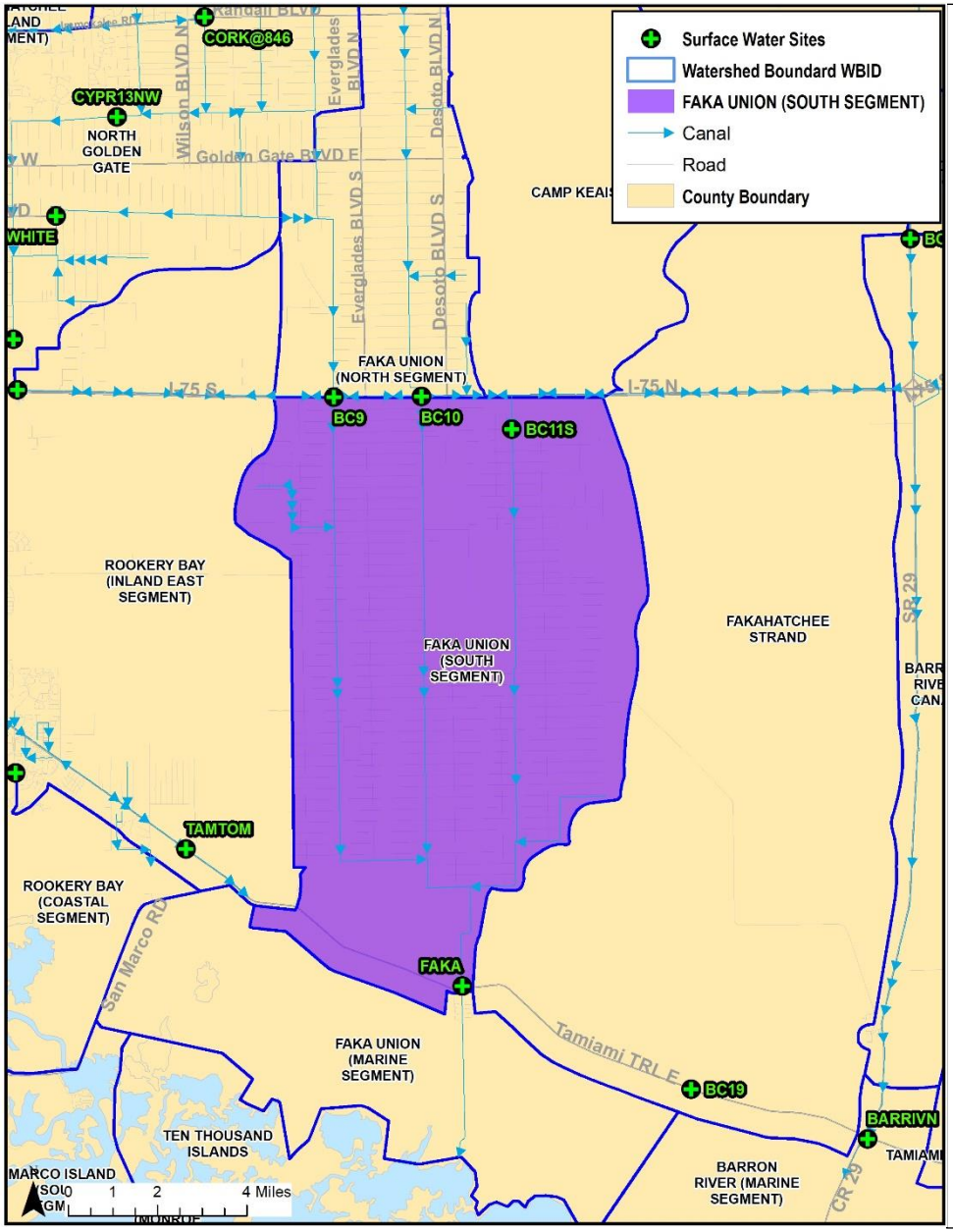


Figure 32. Faka Union (South Segment) Snapshot

FAKA UNION (SOUTH SEGMENT)

- Size: 59,452 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Faka Union (North Segment), Camp Keais, Fakahatchee Strand
  - Drains to: Ten Thousand Islands
- Major Land Use(s):
  - Wetlands 95%
- FDEP Impairments Draft 2021: None
- Water Quality Trends:
  - Short-term Improving: Chla, As, Cu
  - Short-term Degrading: DO, Turb
  - Long-term Improving: Chla, As, Cu, Fecal Coliform
  - Long-term Degrading: DO, Turb
- % Samples in Exceedance: 1.1%
- Summary Statistics: Appendix C

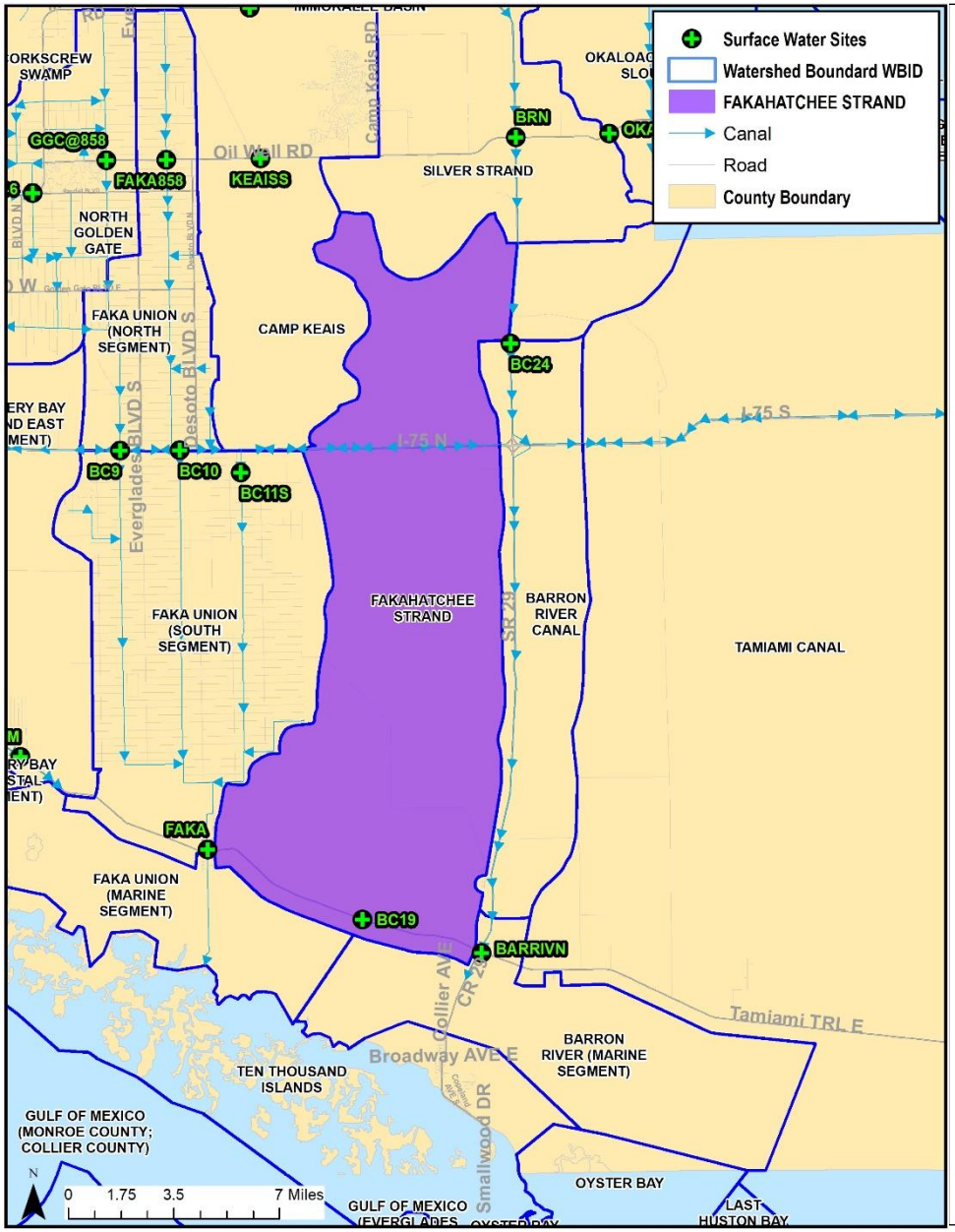


Figure 33. Fakahatchee Strand Snapshot

FAKAHATCHEE STRAND

- Size: 94,502 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Silver Strand, Okaloacoochee Slough, Camp Keais
  - Drains to: Ten Thousand Islands
- Major Land Use(s):
  - Wetlands 98%
- FDEP Impairments Draft 2021: None
- Water Quality Trends:
  - Short-term Improving: As, Cu
  - Short-term Degrading: DO, TKN, NH3, TN, TP, Turb, Color
  - Long-term Improving: As, Cu, Fecal Coliform
  - Long-term Degrading: DO, TKN, NH3, TN, TP, Turb, Color
- % Samples in Exceedance: 3.2%
- Summary Statistics: Appendix C

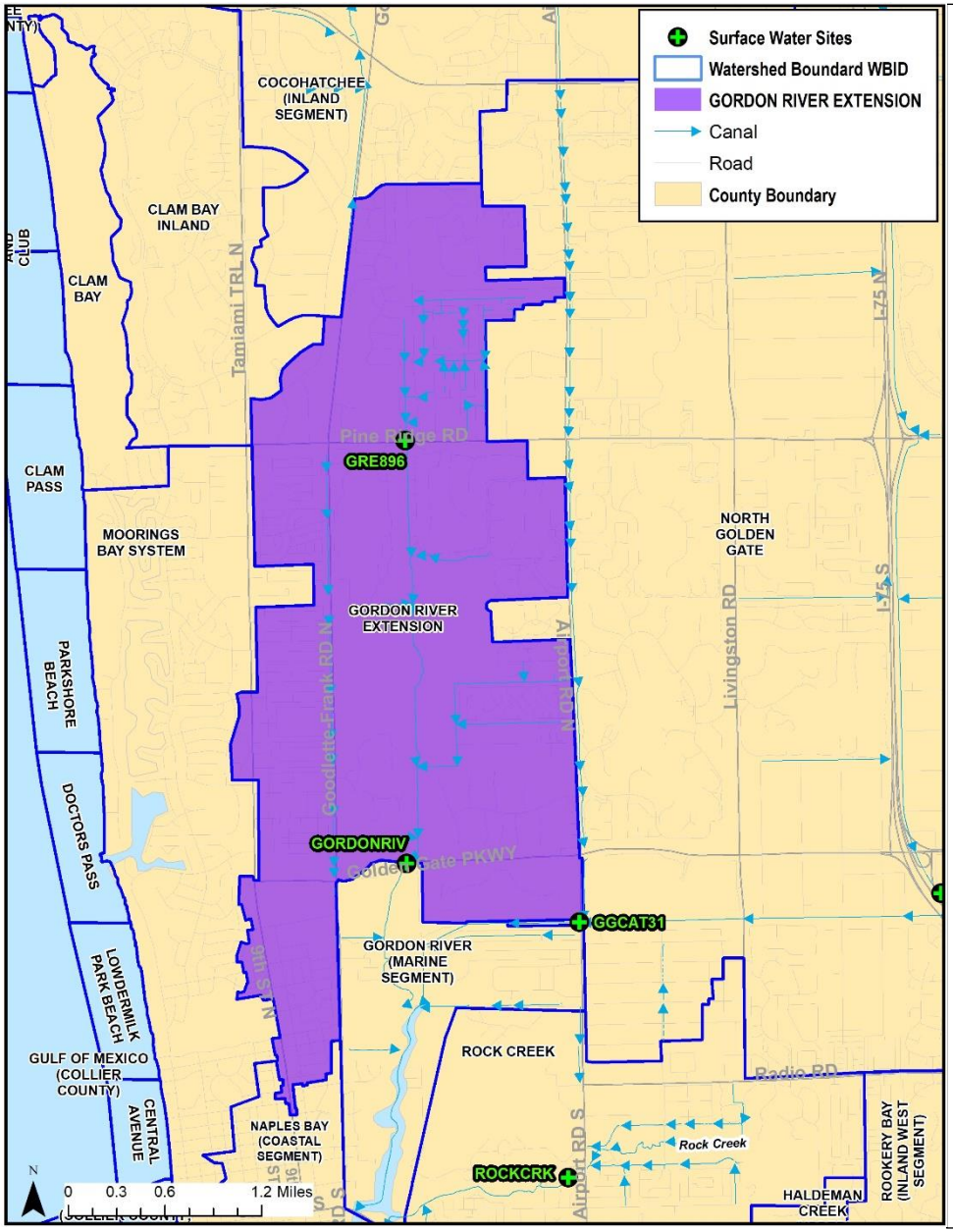


Figure 33. Gordon River Extension Snapshot

GORDON RIVER EXTENSION

- Size: 5,041 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: None
  - Drains to: Naples Bay (Coastal Segment), Moorings Bay System
- Major Land Use(s):
  - Urban and Built Up 84%
    - Residential, Medium Density 33%
    - Recreational 24%
    - Commercial and Services 18%
    - Residential, High Density 12%
    - Residential, Low Density 8%
    - Institutional 4%
    - Industrial 1%
    - Open Land 0.5%
- TMDL 2008: Dissolved Oxygen
- FDEP Impairments Draft 2021: E. coli
- Water Quality Trends:
  - Short-term Improving: SpCond, Sal, DO, NOx, TKN, TN, Ortho-P, TP, As, Cu
  - Short-term Degrading: Temp, Fe, Turb
  - Long-term Improving: SpCond, Sal, DO, NOx, TKN, TN, Ortho-P, TP, As, Cu
  - Long-term Degrading: Temp, Fe, Turb
- % Samples in Exceedance: 5.7%
- Summary Statistics: Appendix C

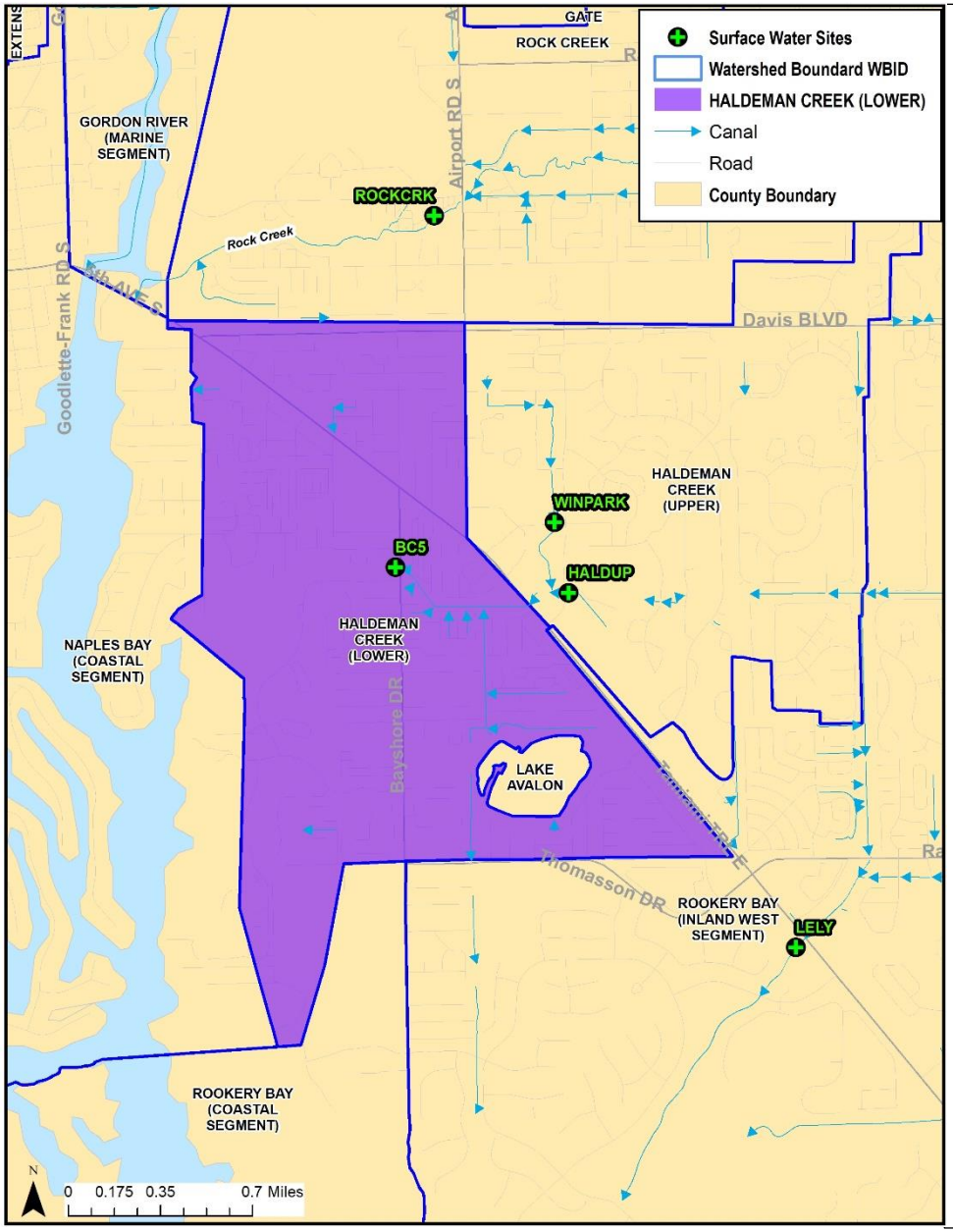


Figure 34. Haldeman Creek (Lower) Snapshot

HALDEMAN CREEK (LOWER)

- Size: 1,729 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Haldeman Creek (Upper), Rookery Bay (Inland West Segment)
  - Drains to: Naples Bay Coastal, Rookery Bay (Coastal Segment)
- Major Land Use(s):
  - Urban and Built Up 79%
    - Residential, Medium Density 41%
    - Residential, High Density 26%
    - Commercial and Services 19%
    - Recreational 10%
    - Open Land 2%
    - Institutional 2%
  - Wetlands 7%
  - Water 7%
- FDEP Impairments Draft 2021: Copper, Enterococci
- Water Quality Trends:
  - Short-term Improving: As, Cu, Fe, Color
  - Short-term Degrading: TP, Chla, Turb
  - Long-term Improving: As, Cu, Fe, Color
  - Long-term Degrading: TP, Chla, Turb
- % Samples in Exceedance: 4.1%
- Summary Statistics: Appendix C

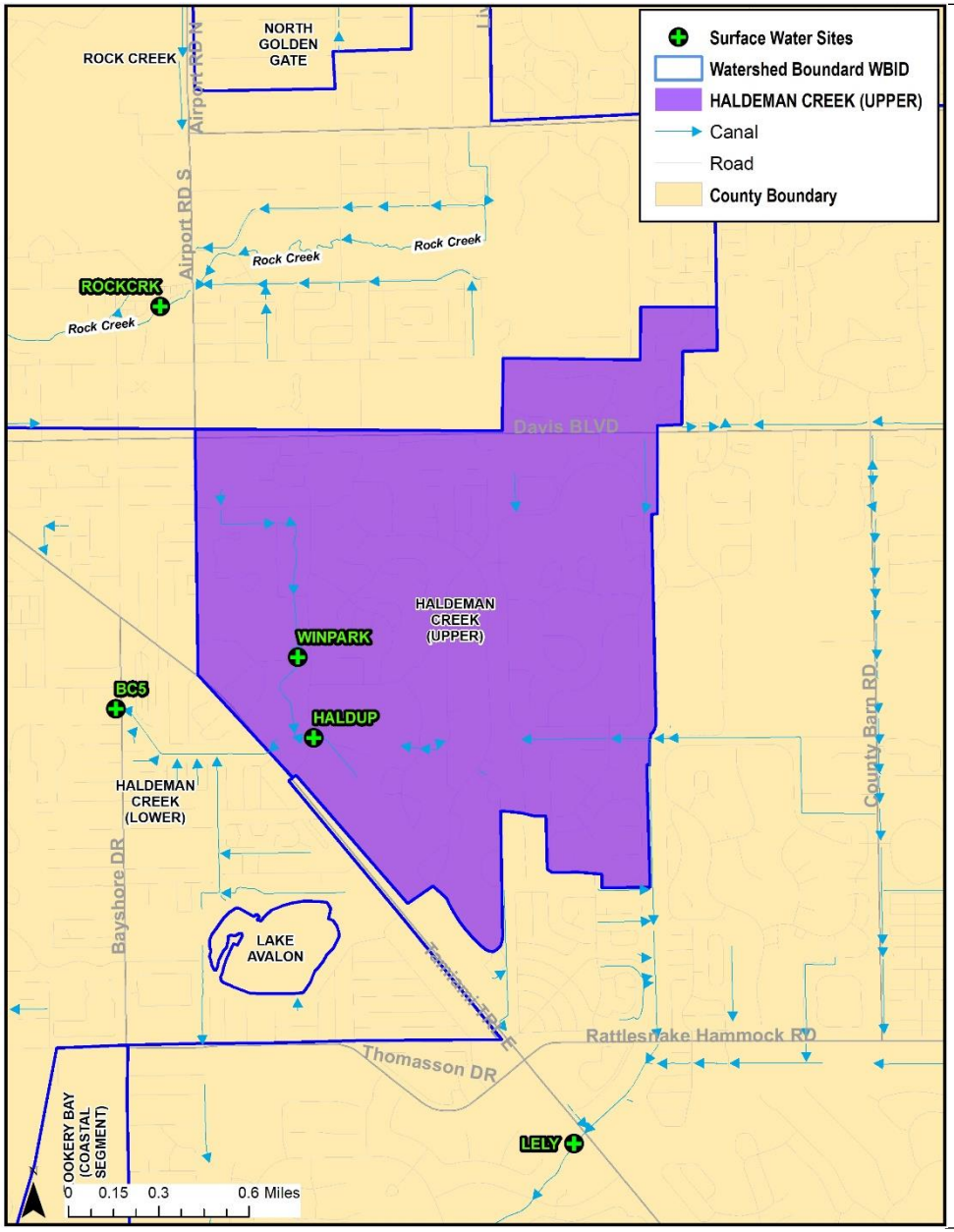


Figure 35. Haldeman Creek (Upper) Snapshot

HALDEMAN CREEK (UPPER)

- Size: 1,435 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Rookery Bay (Inland West Segment),
  - Drains to: Rookery Bay (Inland West Segment), Haldeman Creek (Lower)
- Major Land Use(s):
  - Urban and Built Up 88%
    - Residential High Density 38%
    - Residential, Medium Density 36%
    - Commercial and Services 13%
    - Recreational 13%
    - Institutional 0.3%
    - Open Land 0.3%
  - Water 7.6%
- FDEP Impairments Draft 2021: E. coli
- Water Quality Trends:
  - Short-term Improving: Cu, Fe
  - Short-term Degrading: SpCond, Sal, DO, TKN, NH3, TN, Ortho-P, TP, Chla, TSS, Turb
  - Long-term Improving: Cu, Fe
  - Long-term Degrading: SpCond, Sal, DO, TKN, NH3, TN, Ortho-P, TP, Chla, TSS, Turb
- % Samples in Exceedance: 2.4%
- Summary Statistics: Appendix C

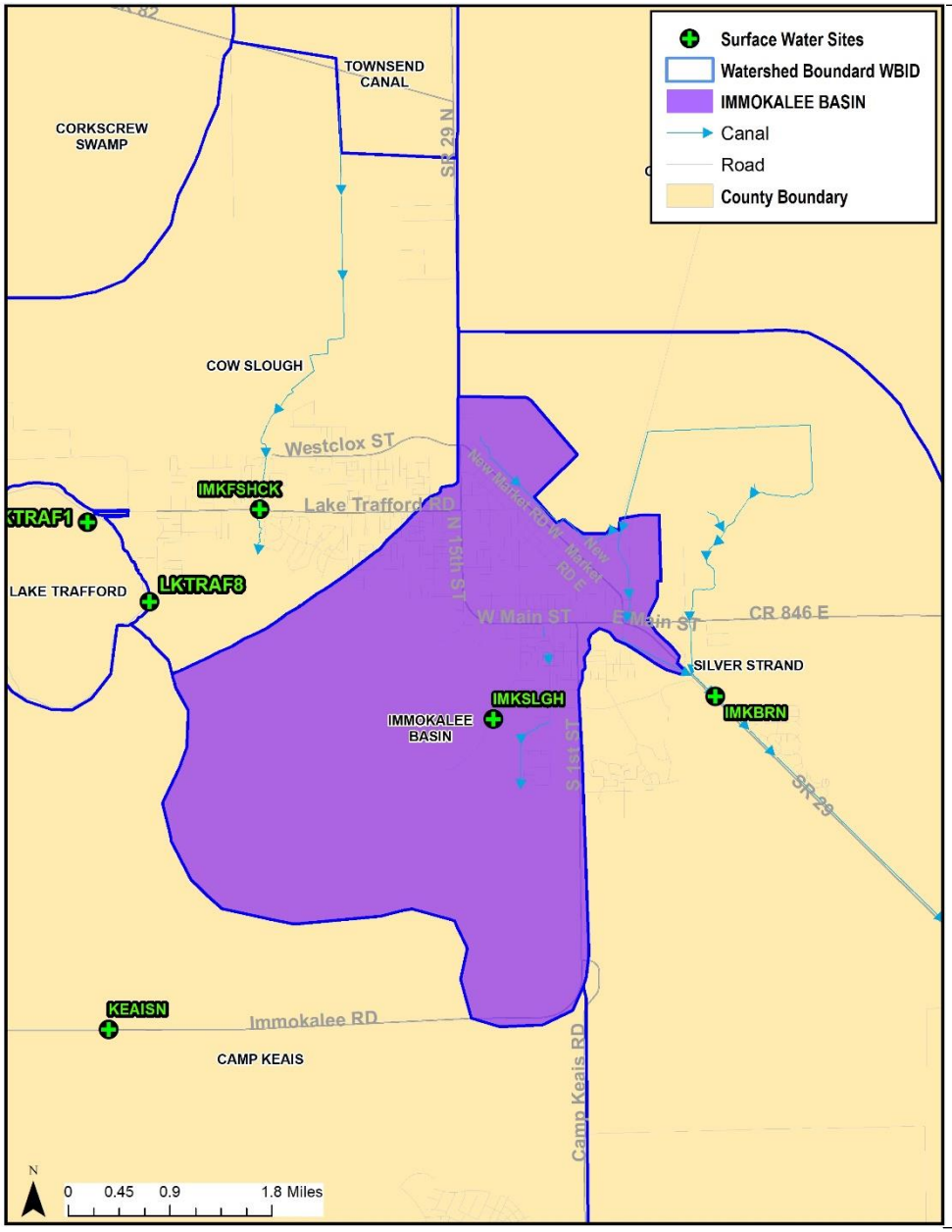
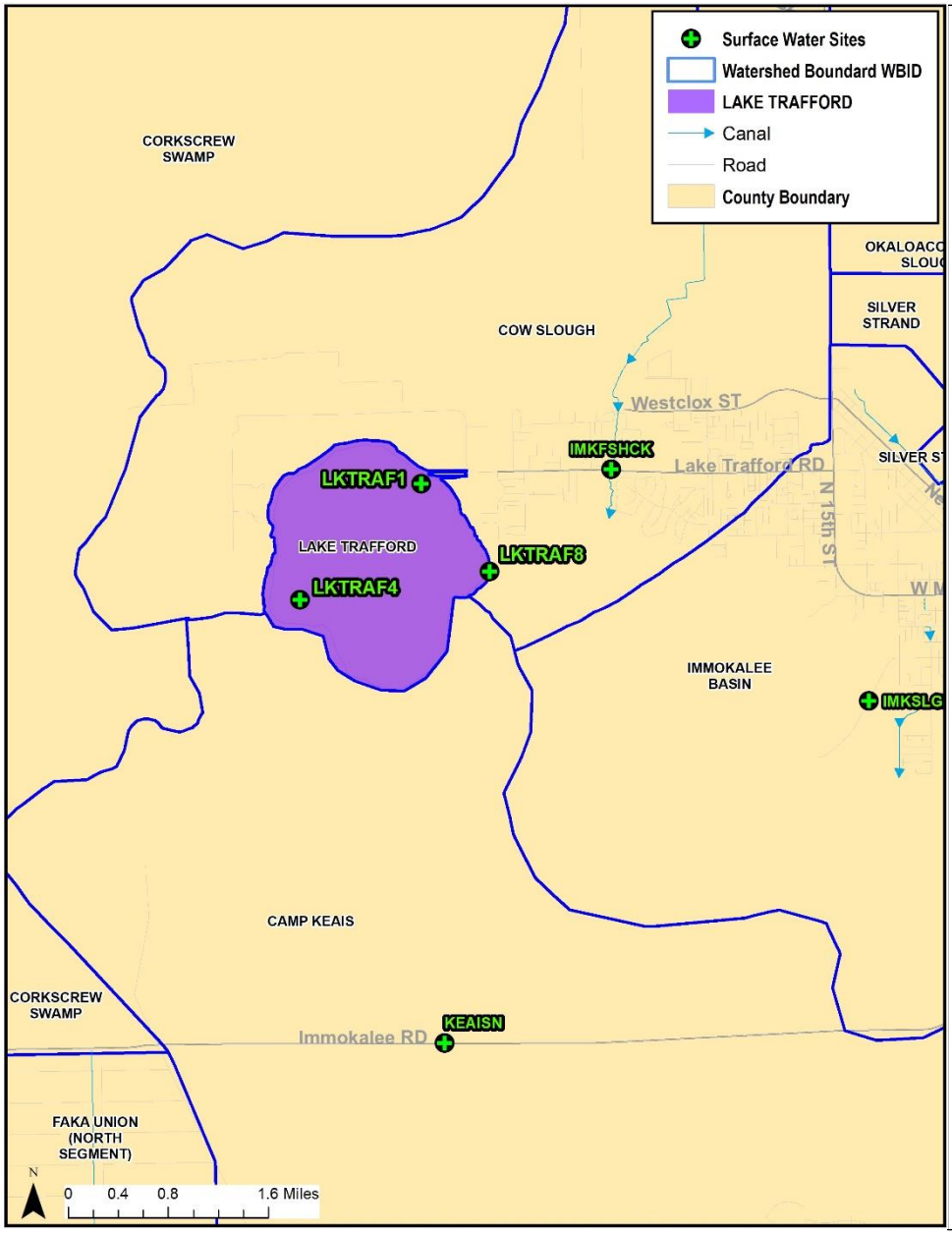


Figure 36. Immokalee Basin Snapshot

IMMOKALEE BASIN

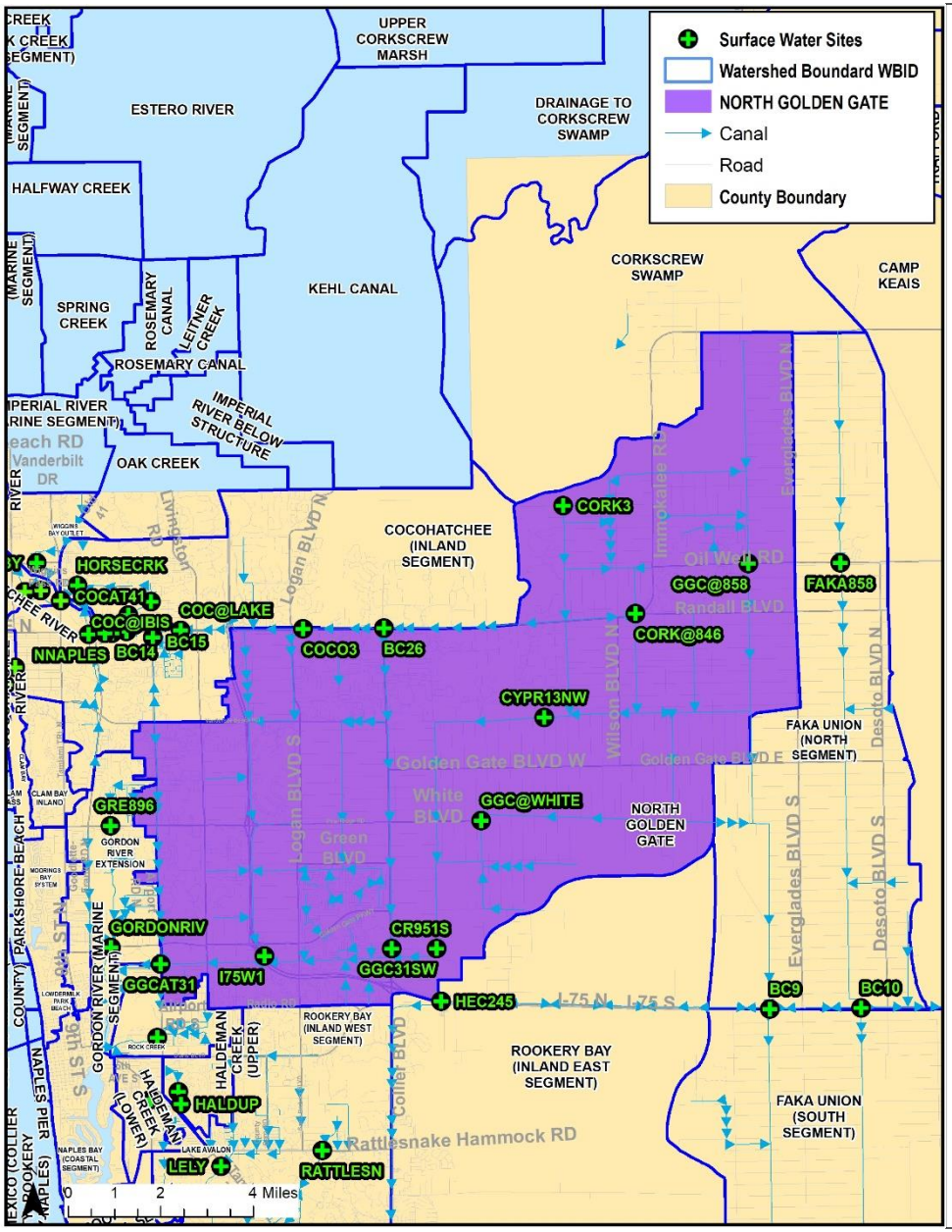
- Size: 8,745 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Silver Strand, Okaloacoochee Slough, Cow Slough, Camp Keais
  - Drains to: Camp Keais, Cow Slough
- Major Land Use(s):
  - Agriculture 49%
  - Urban and Built Up 21%
    - Residential, Medium Density 28%
    - Residential High Density 22%
    - Institutional 14%
    - Industrial 12%
    - Residential, Low Density 9%
    - Open Land 0.4%
- FDEP Impairments Draft 2021: None
- Water Quality Trends:
  - Short-term Improving: Insufficient Data
  - Short-term Degrading: Insufficient Data
  - Long-term Improving: NOx, NH3, TN, As, Cu
  - Long-term Degrading: SpCond, Sal, DO, Turb, Color
- % Samples in Exceedance: 6.2%
- Summary Statistics: Appendix C



LAKE TRAFFORD

- Size: 1,500
- Classification: Class III Fresh
- Drainage:
  - Receives from: Cow Slough, Immokalee Basin, Camp Keais, Corkscrew Swamp
  - Drains to: Cow Slough, Immokalee Basin, Camp Keais, Corkscrew Swamp
- Major Land Use(s):
  - Water 95%
  - Wetlands 5%
- TMDL 2008: Unionized Ammonia, Dissolved Oxygen, Nutrients
- FDEP Impairments Draft 2021: Chlorophyll-a, Total Nitrogen, Total Phosphorus
- Water Quality Trends:
  - Short-term Improving: NOx, Ortho-P,
  - Short-term Degrading: Chla, TSS, Turb
  - Long-term Improving: NOx, Ortho-P,
  - Long-term Degrading: Chla, TSS, Turb
- % Samples in Exceedance: 13.7%
- Summary Statistics: Appendix C

Figure 37. Lake Trafford Snapshot



NORTH GOLDEN GATE

- Size: 72,785 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Corkscrew Swamp, Cocohatchee (Inland Segment), Faka Union (North Segment)
  - Drains to: Cocohatchee (Inland Segment), Naples Bay (Coastal Segment), Faka Union (North Segment), Rookery Bay (Inland East Segment)
- Major Land Use(s):
  - Urban and Built Up 60%
    - Residential Low Density 60%
    - Residential Medium Density 15%
    - Residential High Density 7%
    - Recreational 7%
    - Institutional 3%
    - Commercial and Services 3%
    - Extractive 2.5
    - Open Land 2%
    - Industrial 0.7%
  - Wetlands 21%
- FDEP Impairments Draft 2021: Dissolved Oxygen
- Water Quality Trends:
  - Short-term Improving: As, Cu, Fe, Color
  - Short-term Degrading: Temp, Fecal Coliform
  - Long-term Improving: As, Cu, Fe, Color
  - Long-term Degrading: Temp, Fecal Coliform
- % Samples in Exceedance: 1.4%
- Summary Statistics: Appendix C

Figure 38. North Golden Gate Snapshot

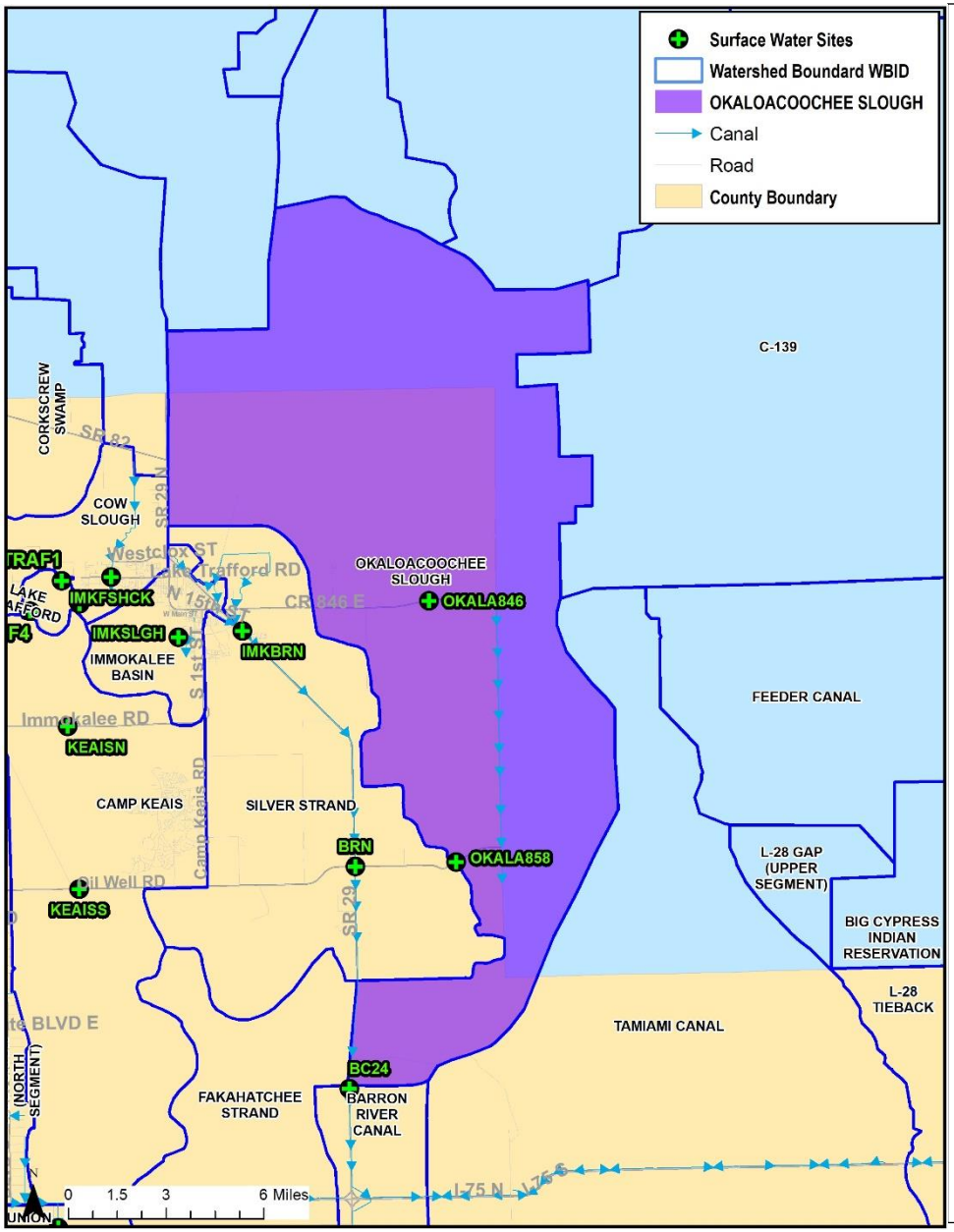


Figure 39. Okaloacoochee Slough Snapshot

OKALOACOOCHEE SLOUGH

- Size: 125,992 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: C-139
  - Drains to: Barron River Canal, Fakahatchee Strand, Silver Strand, Tamiami Canal
- Major Land Use(s):
  - Wetlands 45%
  - Agriculture 41%
  - Upland Forests 9%
- FDEP Impairments Draft 2021: None
- Water Quality Trends:
  - Short-term Improving: SpCond, Sal, Chla, As, Cu
  - Short-term Degrading: E. coli
  - Long-term Improving: SpCond, Sal, Chla, As, Cu
  - Long-term Degrading: Fecal Coliform
- % Samples in Exceedance: 2.9%
- Summary Statistics: Appendix C

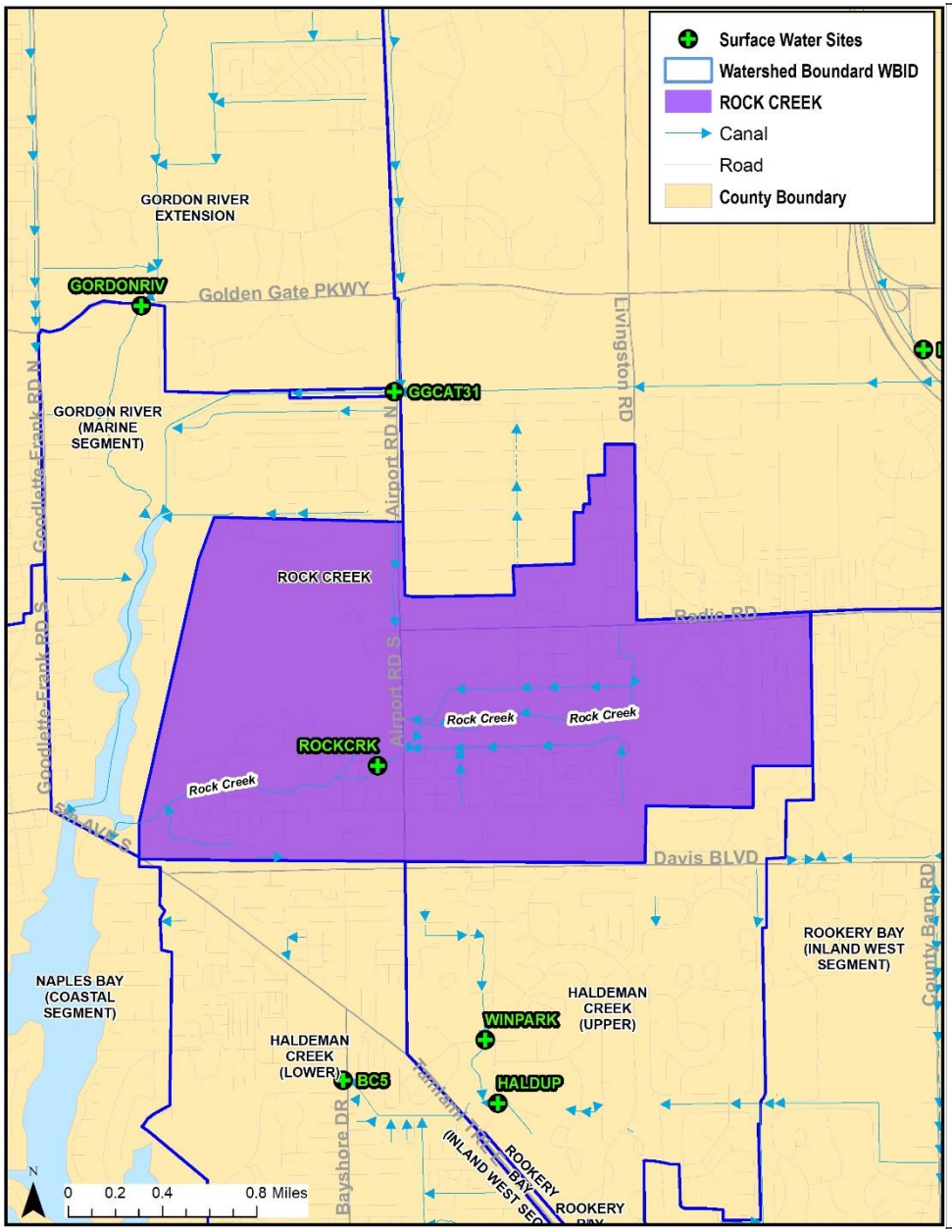


Figure 40. Rock Creek Snapshot

ROCK CREEK

- Size: 2,119 acres
- Classification: Class III Marine
- Drainage:
  - Receives from: North Golden Gate
  - Drains to: Naples Bay (Coastal Segment)
- Major Land Use (s):
  - Urban and Built Up 62%
    - Residential, Medium Density 26%
    - Commercial and Services 22%
    - Residential, High Density 15%
    - Residential, Low Density 14%
    - Recreational 12%
    - Industrial 6%
    - Institutional 4%
  - Transportation, Communication & Utilities 28%
- FDEP Impairments Draft 2021: Copper, Enterococci, Iron
- Water Quality Trends:
  - Short-term Improving: None
  - Short-term Degrading: Iron, Enterococci
  - Long-term Improving: Insufficient Data
  - Long-term Degrading: Insufficient Data
- % Samples in Exceedance: 6.4%
- Summary Statistics: Appendix C

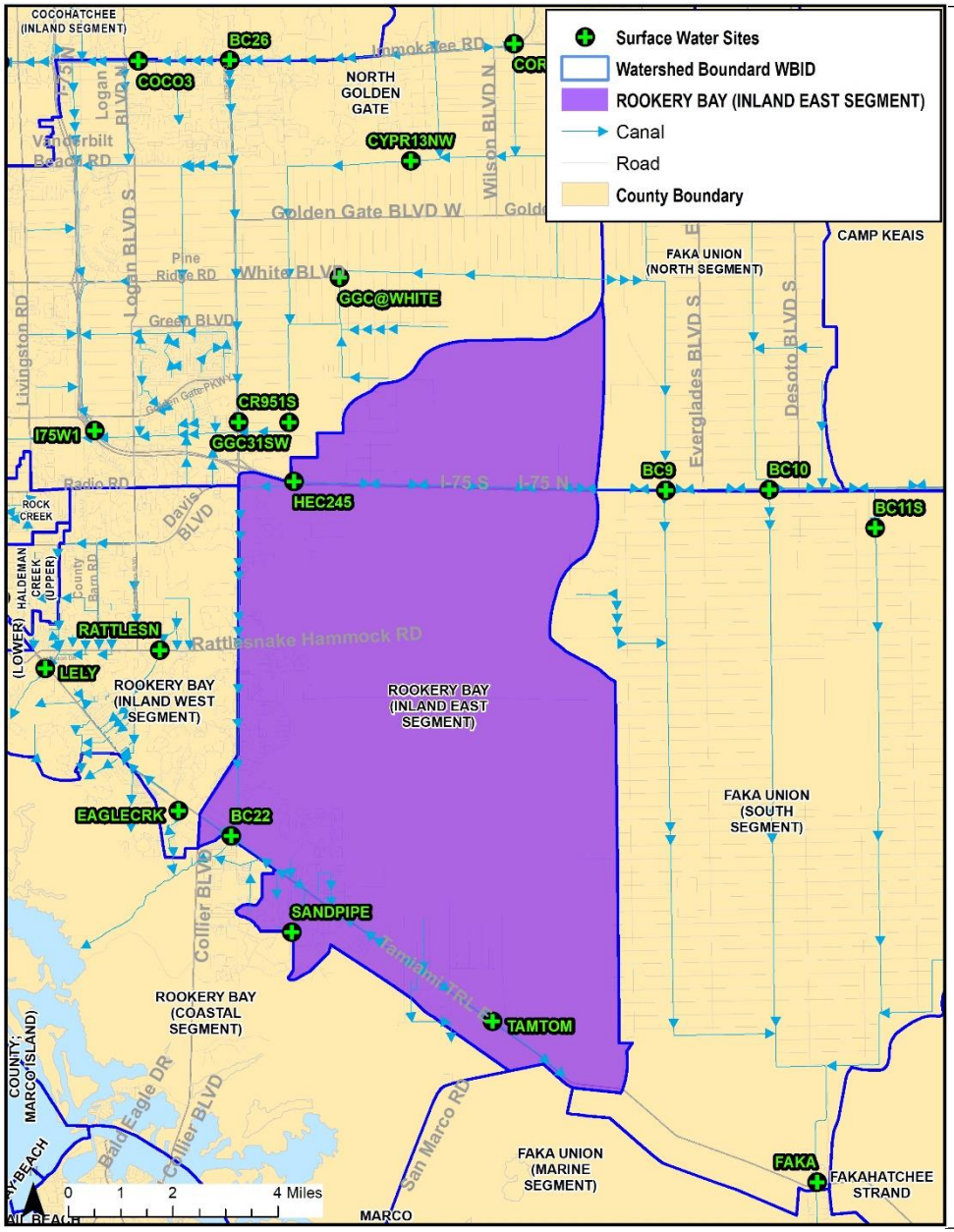
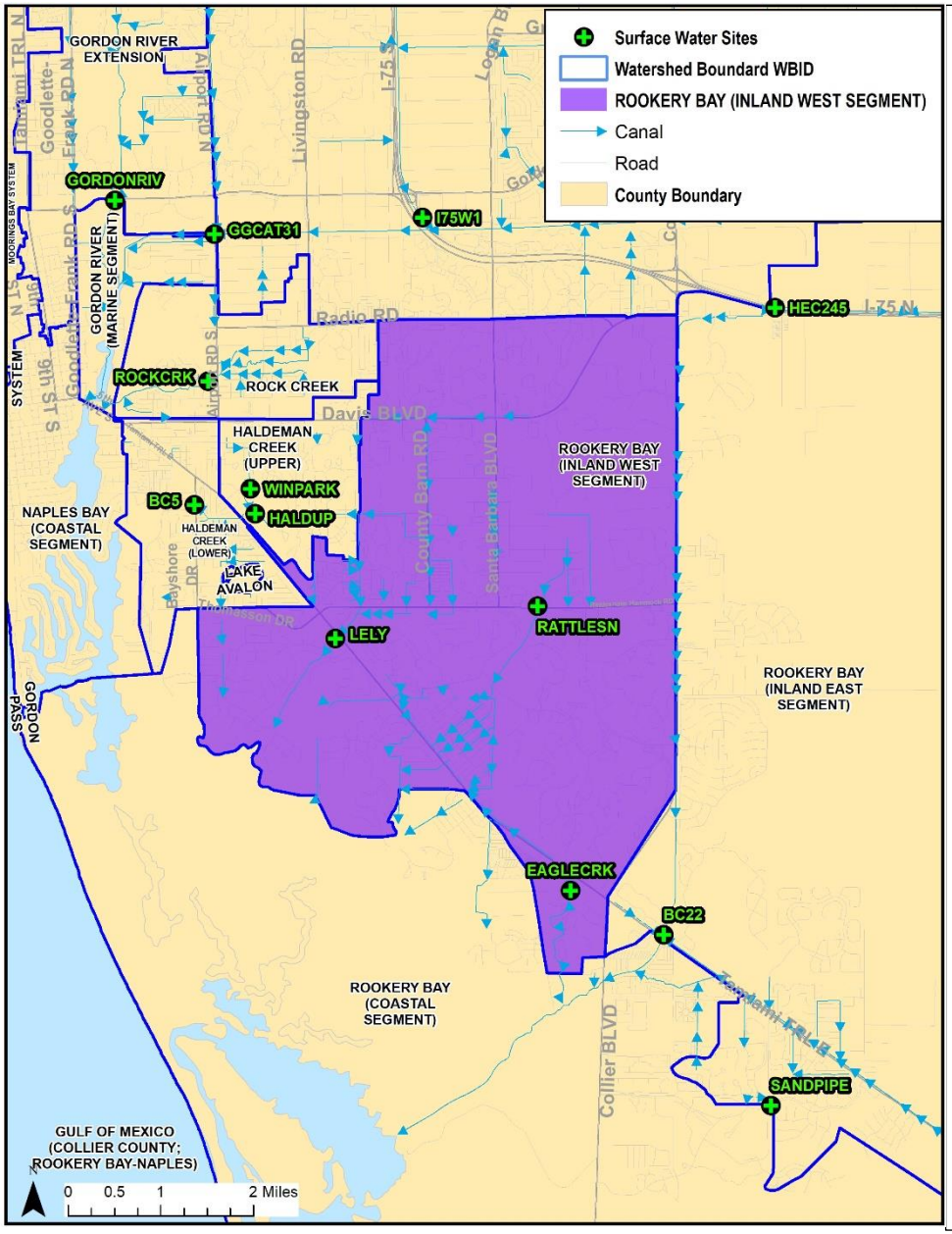


Figure 41. Rookery Bay (Inland East Segment) Snapshot

ROOKERY BAY (INLAND EAST SEGMENT)

- Size: 53,992 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Faka Union (North Segment)
  - Drains to: Rookery Bay (Coastal Segment)
- Major Land Use(s):
  - Wetlands 55%
  - Agriculture 14%
  - Upland Forests 14%
  - Urban and Built Up 9%
- FDEP Impairments Draft 2021: None
- Water Quality Trends:
  - Short-term Improving: pH
  - Short-term Degrading: DO, NOx, TKN, NH3, TN, TP, Chla, TSS, Turb
  - Long-term Improving: pH
  - Long-term Degrading: DO, NOx, TKN, NH3, TN, TP, Chla, TSS, Turb
- % Samples in Exceedance: 2.8%
- Summary Statistics: Appendix C



ROOKERY BAY (INLAND WEST SEGMENT)

- Size: 15,054 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Haldeman Creek (Upper)
  - Drains to: Haldeman Creek (Upper), Rookery Bay (Coastal Segment)
- Major Land Use(s):
  - Urban and Built up 60%
    - Residential, Medium Density 35%
    - Residential, High Density 25%
    - Recreational 22%
    - Residential, Low Density 8%
    - Commercial and Services 5%
    - Institutional 4%
    - Open Land 0.5%
  - Wetlands 15%
  - Upland Forests 11%
  - Water 9%
- FDEP Impairments Draft 2021: None
- Water Quality Trends:
  - Short-term Improving: None
  - Short-term Degrading: SpCond, Sal, TN, Chla, Cu, TSS, Turb
  - Long-term Improving: Fecal Coliform
  - Long-term Degrading: SpCond, Sal, TN, Chla, Cu, TSS, Turb
- % Samples in Exceedance: 2.0%
- Summary Statistics: Appendix C

Figure 42. Rookery Bay (Inland West Segment) Snapshot

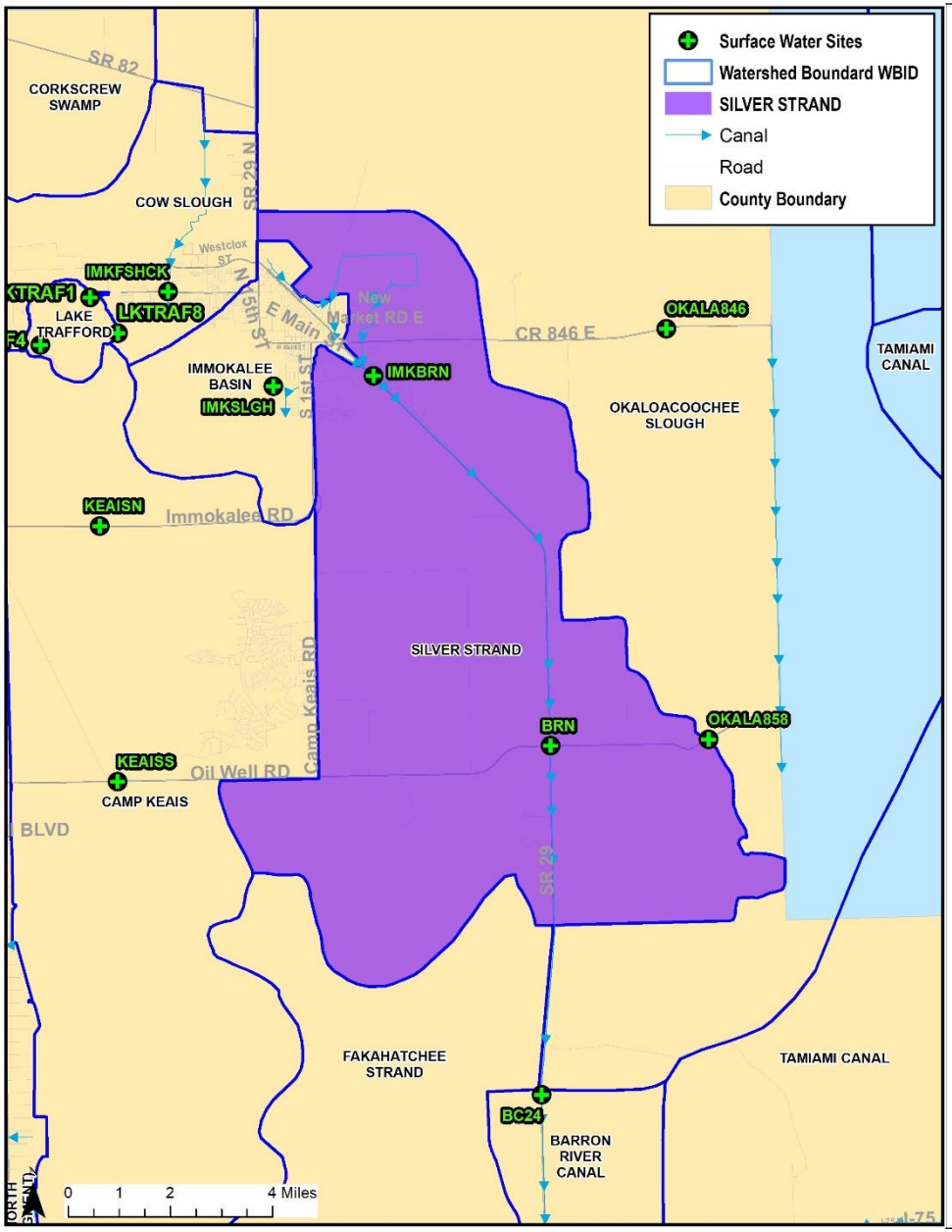


Figure 43. Silver Strand Snapshot

SILVER STRAND

- Size: 53,835 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Immokalee Basin, Okaloacoochee Slough
  - Drains to: Okaloacoochee Slough, Fakahatchee Strand
- Major Land Use(s):
  - Agriculture 65%
  - Wetlands 24%
  - Upland Forests 4%
- FDEP Impairments Draft 2021: Iron
- Water Quality Trends:
  - Short-term Improving: Ortho-P, TP, Cu, Turb
  - Short-term Degrading: SpCond, Sal, DO, TSS
  - Long-term Improving: Ortho-P, TP, Cu, Turb
  - Long-term Degrading: SpCond, Sal, DO, Fecal Coliform, TSS
- % Samples in Exceedance: 7.9%
- Summary Statistics: Appendix C

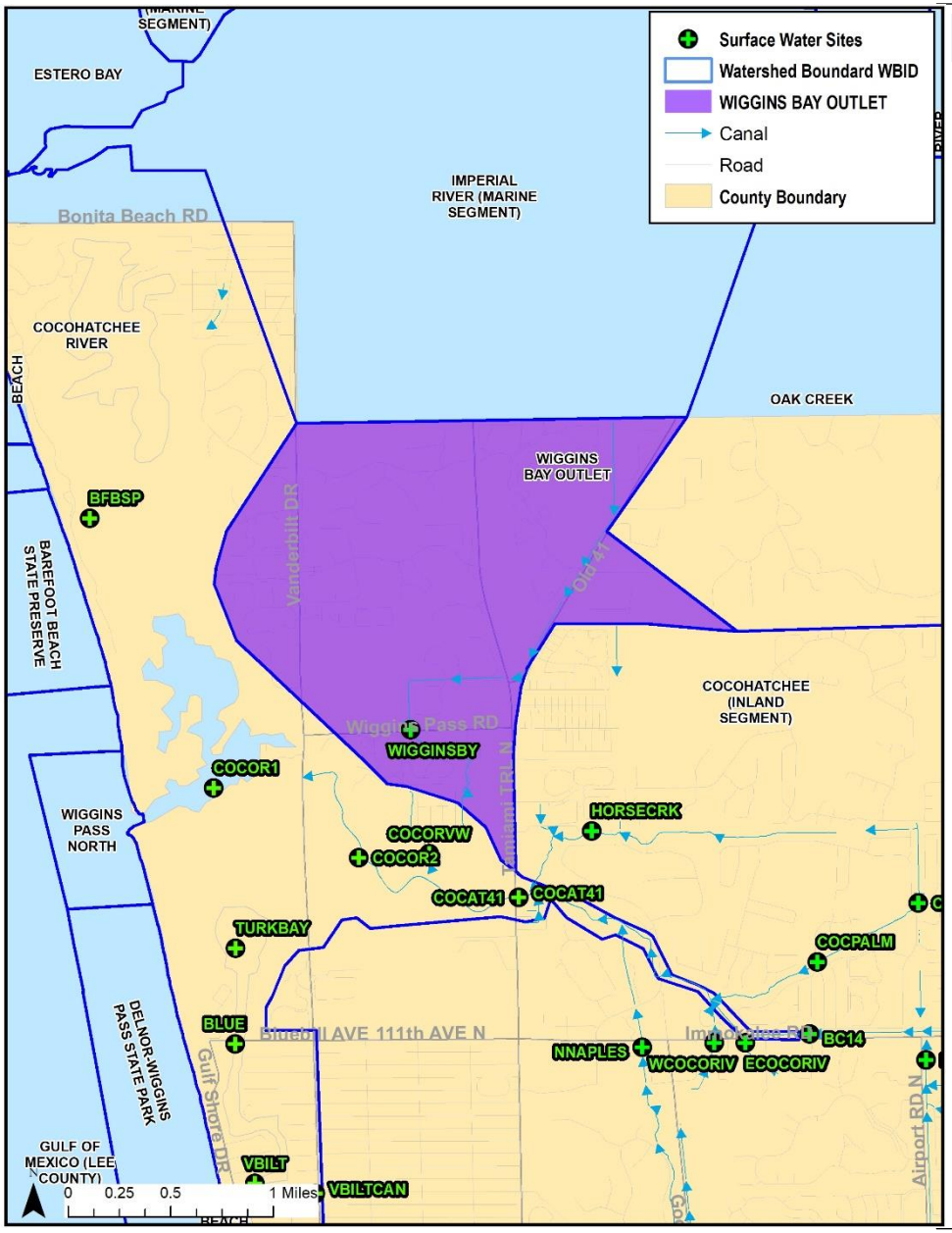


Figure 44. Wiggins Bay Outlet Snapshot

WIGGINS BAY OUTLET

- Size: 1,877 acres
- Classification: Class III Fresh
- Drainage:
  - Receives from: Oak Creek, Cocohatchee (Inland Segment)
  - Drains to: Cocohatchee River
- Major Land Use(s):
  - Urban and Built Up 57%
    - Residential, High Density 41%
    - Residential, Medium Density 22%
    - Commercial and Services 17%
    - Recreational 13%
    - Residential, Low Density 3%
    - Institutional 3%
    - Industrial 2%
  - Wetlands 27%
  - Water 6%
- FDEP Impairments Draft 2021: Iron
- Water Quality Trends:
  - Short-term Improving: None
  - Short-term Degrading: DO, NH3, TN
  - Long-term Improving: None
  - Long-term Degrading: DO, NH3, TN, Fecal Coliform
- % Samples in Exceedance: 2.1%
- Summary Statistics: Appendix C

APPENDIX A
Station List

Site	Latitude	Longitude	Location Description	Project
BARRIVN	25.90977	-81.36348	Bridge at intersection of US41 E and Barron River Canal	CCWQ
BC10	26.15330	-81.52323	Faka Union Canal at intersection of I-75	CCWQ
BC11S	26.14243	-81.49066	Merritt Canal just above pump station at end of 52nd Ave SE	CCWQ
BC14	26.27269	-81.77871	Immokalee Rd. Canal at intersection of Palm River Blvd.	CCWQ
BC15	26.27083	-81.76955	Airport Rd. Canal at entrance to Sam's Club	CCWQ
BC19	25.92638	-81.42709	Bridge #69 on US 41E	CCWQ
BC22	26.05760	-81.68938	Gauging Station North of intersection of US41 and Henderson Creek	CCWQ
BC24	26.20398	-81.34598	Bridge #30211 on SR 29, approx. 3.1 miles north of I-75	CCWQ
BC26	26.27340	-81.68899	Intersection of 951 Canal and Immokalee Rd. Canal ("COCAT951")	CCWQ
BC5	26.12543	-81.77085	Bridge at intersection of Haldeman Creek and Bayshore Dr.	CCWQ
BC9	26.15320	-81.55505	Miller Canal at intersection of I-75	CCWQ
BFBSP	26.30944	-81.83528	Near red PATON #10	COCORIVESTWQ
BLUE	26.27210	-81.82393	50' South of Bluebill Ave Bridge	COCORIVESTWQ
BRN	26.30338	-81.34246	Bridge at intersection of CR858 & SR29 N near Sunniland	CCWQ
COC@IBIS	26.28197	-81.77011	Bridge at intersection of Palm River and Ibis Way	CCWQ
COC@LAKE	26.27297	-81.75989	Bridge at intersection of Lakeland Ave. and Cocohatchee River Canal	CCWQ
COCAT41	26.28245	-81.80158	Cocohatchee River at US 41	COCORIVESTWQ
COCO3	26.27332	-81.71719	Upstream of Cocohatchee Weir #3 on Immokalee Rd.	CCWQ
COCOR1	26.29028	-81.82556	South of Pelican Isle Yacht Club between Marker 13 and old pole to the north.	COCORIVESTWQ
COCOR2	26.28528	-81.81417	Cocohatchee River in channel between Vanderbilt Dr and US41	COCORIVESTWQ
COCORVW	26.28556	-81.80861	Cocohatchee River in channel leading from Venetian Way	COCORIVESTWQ
COCPALM	26.27780	-81.77807	Bridge at intersection of Palm River Drive and Coconut Palm River	CCWQ

Site	Latitude	Longitude	Location Description	Project
CORK3	26.311769	-81.62625	Upstream of Corkscrew Canal Structure 3	CCWQ
CORK@846	26.27766	-81.60124	Bridge at intersection of Corkscrew Canal and CR846	CCWQ
CORKN	26.42202	-81.57849	Bridge just south of County line and USGS gauging station on tram road to Little Corkscrew Island in Corkscrew Swamp Sanctuary	CCWQ
CORKS	26.35321	-81.61899	Southern most bridge on tram road in Corkscrew Swamp Sanctuary	CCWQ
CORKSCRD	26.49548	-81.52877	Bridge at intersection of Corkscrew Rd. and canal northeast of Corkscrew Marsh Trailhead	CCWQ
CR951S	26.17269	-81.68664	CR951 Canal upstream of weir #1 just north of 31st Ave. SW	CCWQ
CYPR13NW	26.24514	-81.63320	East side of bridge at end of 13 St NW and Cypress Canal	CCWQ
EAGLECRK	26.06465	-81.70555	Upstream of bridge at intersection of Eagle Creek Canal and Price St.	CCWQ
ECOCORIV	26.27207	-81.78376	Upstream side of second amil gate on south side of Immokalee Rd east of Goodlette Rd.	CCWQ
FAKA	25.96050	-81.50951	Gauging station north of weir at the intersection of US41 and Faka Union Canal	CCWQ
FAKA858	26.29341	-81.52964	South side of bridge at Faka Union Canal and CR858	CCWQ
GGC@858	26.29331	-81.56175	Bridge at intersection of Golden Gate Canal and CR858	CCWQ
GGC@WHITE	26.21279	-81.65533	Bridge at intersection of Golden Gate Canal and White Blvd.	CCWQ
GGC31SW	26.17257	-81.67106	Main Golden Gate Canal at the east end of 31st Ave. SW	CCWQ
GGCAT31	26.16797	-81.76720	Bridge at intersection of Airport Rd and Golden Gate Canal	CCWQ
GORDONRIV	26.17334	-81.78451	Upstream of weir at intersection of Golden Gate Pkwy and Gordon River Extension.	CCWQ
GRE896	26.21156	-81.78450	Gordon River Extension at Pine Ridge Rd.	CCWQ
HALDUP	26.12230	-81.75810	1000' upstream from Palm Dr. on Haldeman Creek	CCWQ
HEC245	26.15609	-81.66956	Henderson Creek Canal as it passes under I-75 near White Lake Blvd.	CCWQ
HORSECRK	26.28713	-81.79581	Horse Creek along Encore Way	CCWQ

Site	Latitude	Longitude	Location Description	Project
I75W1	26.17050	-81.73096	I-75 Canal upstream of weir #1	CCWQ
IMKBRN	26.40900	-81.39777	First bridge over canal on US29 south of the convergence of northwest drainage canal and north drainage canal on southeast end of Immokalee	CCWQ
IMKFSHCK	26.43337	-81.46260	On Lake Trafford Rd. just west of elementary school at sidewalk bridge	CCWQ
IMKSLGH	26.40624	-81.42945	On Sanitation Rd. leading to Eustis Landfill on east side of road approximately half way between entrance gate at Immokalee Water & Sewer District Office and Eustis Landfill gate.	CCWQ/LKTRAFF
KEAISN	26.36667	-81.48457	Bridge on CR846, 3.5 miles east of Everglades Blvd.	CCWQ/LKTRAFF
KEAISS	26.29391	-81.47935	Bridge on CR858, 3.5 miles east of Everglades Blvd.	CCWQ
LELY	26.10434	-81.74639	Bridge at intersection of US41 and Lely Main Canal	CCWQ
LKTRAF1	26.43180	-81.48719	Northeast corner of Lake Trafford near fishing pier	LKTRAFF
LKTRAF4	26.41836	-81.50297	Southwest corner of Lake Trafford	LKTRAFF
LKTRAF8	26.42156	-81.47843	Mouth of slough on the east side of Lake Trafford	LKTRAFF
NNAPLES	26.27178	-81.79189	South side of amil gate at junction of North Naples Canal and Immokalee Rd.	CCWQ
OKALA846	26.42193	-81.30501	South side of amil gate at junction of North Naples Canal and Immokalee Rd.	CCWQ
OKALA858	26.30495	-81.29252	Okaloacoochee Slough crossing on CR858	CCWQ
RATTLESN	26.10932	-81.71111	Slough passing under Rattlesnake Hammock Rd at culvert approximately 0.4 miles East of Santa Barbara Blvd	CCWQ
ROCKCRK	26.14557	-81.76691	Rock Creek west of Airport Rd.	CCWQ
SANDPIPE	26.03073	-81.67079	Canal S1S-00 as it passes under Sandpiper Dr. in Fiddler's Creek	CCWQ
TAMTOM	26.00571	-81.60919	Gauging station near intersection of US41E and Tomato Rd.	CCWQ
TURKBAY	26.27889	-81.82389	Water Turkey Bay Marker 11	COCORIVESTWQ
VBILT	26.26218	-81.82242	Mid-channel, opposite Tradewinds Avenue	COCORIVESTWQ

Site	Latitude	Longitude	Location Description	Project
VBILTB	26.25603	-81.82112	300' due West of Palm Ct	COCORIVESTWQ
VBILTCAN	26.26147	-81.81763	End of canal between Tradewinds and Lagoon Avenues	COCORIVESTWQ
WCOCORIV	26.27207	-81.78622	Upstream side of first amil gate on south side of Immokalee Rd east of Goodlette Rd	CCWQ
WIGGINSBY	26.29436	-81.81004	In canal WBB-00-C0015 (Tarpon Bay Canal) on north side of Wiggins Pass Rd.	CCWQ
WINPARK	26.12790	-81.76110	Winter Park outfall at Harrison Rd.	CCWQ

APPENDIX B
PARAMETER LIST

Parameter	Abbreviation	PROJECT		
		CCWQ	LKTRAFF	COCORIVESTWQ
Alkalinity	Alka		X	
Ammonia (N)	NH3	X	X	X
Arsenic	As	X		analyzed quarterly
Cadmium	Cd	X		analyzed quarterly
Calcium	Ca	X		
Carbon- Organic	TOC	X	X	X
Chloride	Cl	X		
Chlorophyll a- corrected	Chla	X	X	X
Chromium	Cr	X		analyzed quarterly
Color- True	Color	X	X	X
Copper	Cu	X		analyzed quarterly
Escherichia E. coli Or Enterococci	E. coli or Entero	X		X
Hardness- Calculated	Hardness	X		
Iron	Fe	X		analyzed quarterly
Lead	Pb	X		analyzed quarterly
Magnesium	Mg	X		
Nitrate (N)	NO3	X	X	X
Nitrate-Nitrite (N)	NOx	X	X	X
Nitrite (N)	NO2	X	X	X
Total Nitrogen	TN	X	X	X
Total Nitrogen Kjeldahl	TKN	X	X	X
Orthophosphate (P)	Ortho-P	X	X	X
Pheophytin a	Pheo	X	X	X
Total Phosphorus	TP	X	X	X
Total Suspended Solids	TSS	X	X	X
Silica	Si		X	
Sulfate	SO4	X	X	X
Turbidity	Turb	X	X	X
Zinc	Zn	X		analyzed quarterly
Dissolved Oxygen	DO	X	X	X
DO Saturation	DO%	X	X	X

pH	pH	X	X	X
Salinity	Sal	X	X	X
Specific Conductance	SpCond	X	X	X
Secchi Disk Depth	Secchi	X	X	X
Temperature, Water	Temp	X	X	X

APPENDIX C
Summary Statistics

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
Barron River (Marine Segment)	Ammonia (N)	mg/L	12	0.01	0.051	0.021	0.013
	Arsenic	µg/L	12	0.699	1.12	0.856	0.134
	Cadmium	µg/L	12	0.02	0.04	0.013	0.009
	Calcium	mg/L	12	59.1	255	104.2	55.5
	Carbon- Organic	mg/L	12	11	14	12.5	1.0
	Chloride	mg/L	12	17.1	7640	1039	2351
	Chlorophyll a-corrected	µg/L	12	1	5	1.4	1.6
	Chromium	µg/L	12	0.125	0.362	0.275	0.086
	Color- True	PCU	12	50	80	63.3	10.5
	Copper	µg/L	12	0.15	0.3	0.132	0.083
	Depth, Secchi Disk Depth	m	13	0.9	1.5	1.2	0.2
	Dissolved Oxygen	mg/L	14	1.79	4.42	3.26	0.67
	Dissolved Oxygen Saturation	%	14	23.7	50.5	38.8	7.3
	Enterococci (MPN)	MPN/100 mL	12	10	305	63	81
	Hardness-Calculated (CaCO3)	mg/L	12	177	3040	588	863
	Iron	µg/L	12	48.4	174	110	33
	Lead	µg/L	12	0.038	0.111	0.057	0.021
	Magnesium	mg/L	12	3.55	584	79.7	176.55
	Nitrate (N)	mg/L	12	0.011	0.040	0.012	0.011
	Nitrate-Nitrite (N)	mg/L	12	0.011	0.040	0.012	0.011
	Nitrite (N)	mg/L	12	0.002	0.001	0.001	0.000
	Nitrogen- Total	mg/L	12	0.494	0.869	0.711	0.094
	Nitrogen- Total Kjeldahl	mg/L	12	0.494	0.869	0.702	0.092
	Orthophosphate (P)	mg/L	12	0.003	0.010	0.005	0.003
	pH	SU	14	6.7	7.45	7.16	0.20
	Pheophytin a	µg/L	12	1	3.7	0.8	0.9
	Phosphorus-Total	mg/L	12	0.008	0.023	0.013	0.006

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Residues-Nonfilterable (TSS)	mg/L	12	2	3.9	1.5	0.9
	Salinity	ppth	14	0.2	14.7	1.8	4.1
	Specific Conductance	umho/cm	14	401	24175	3129	6716
	Sulfate	mg/L	12	0.515	1040	136.8	319.4
	Temperature, Water	deg C	14	17	28.7	24.1	3.1
	Turbidity	NTU	13	0.61	1.69	0.93	0.34
	Zinc	µg/L	12	2.9	5.8	2.05	1.31
Barron River Canal	Ammonia (N)	mg/L	9	0.022	0.482	0.127	0.155
	Arsenic	µg/L	9	0.803	1.35	1.031	0.169
	Cadmium	µg/L	9	0.02	0.01	0.010	0.000
	Calcium	mg/L	9	42.5	113	77.8	27.6
	Carbon- Organic	mg/L	8	14.4	21.8	20.0	2.4
	Chloride	mg/L	9	18.2	38.5	30.0	8.1
	Chlorophyll a-corrected	µg/L	9	1	24.4	6.8	7.3
	Chromium	µg/L	9	0.122	0.83	0.495	0.254
	Color- True	PCU	9	22	180	103.6	46.8
	Copper	µg/L	9	0.15	0.728	0.423	0.221
	Depth, Secchi Disk Depth	m	9	0.7	1.7	1.1	0.4
	Dissolved Oxygen	mg/L	15	0.43	2.29	1.28	0.53
	Dissolved Oxygen Saturation	%	15	5.2	27.1	14.6	6.4
	Escherichia coli (MPN)	MPN/100 mL	9	33	358	106	101
	Hardness-Calculated (CaCO3)	mg/L	9	130	312	220	72
	Iron	µg/L	9	142	1200	502	381
	Lead	µg/L	9	0.02	0.4	0.192	0.143
	Magnesium	mg/L	9	4.05	7.54	6.21	1.16
	Nitrate (N)	mg/L	9	0.011	0.054	0.016	0.021
	Nitrate-Nitrite (N)	mg/L	9	0.011	0.058	0.017	0.023
	Nitrite (N)	mg/L	9	0.002	0.008	0.002	0.002
	Nitrogen- Total	mg/L	9	0.771	1.68	1.259	0.302
	Nitrogen- Total Kjeldahl	mg/L	9	0.76	1.68	1.244	0.300

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Orthophosphate (P)	mg/L	9	0.003	0.061	0.023	0.019
	pH	SU	15	6.7	7.29	7.08	0.19
	Pheophytin a	µg/L	9	1	15.6	2.6	5.0
	Phosphorus-Total	mg/L	9	0.014	0.171	0.078	0.063
	Residues-Nonfilterable (TSS)	mg/L	9	2	12.6	4.8	3.8
	Salinity	ppth	15	0.1	0.3	0.2	0.1
	Specific Conductance	umho/cm	15	306	681	458	126
	Sulfate	mg/L	9	0.467	12.3	4.1	3.6
	Temperature, Water	deg C	15	18.6	26.1	22.1	2.7
	Turbidity	NTU	9	0.25	9.87	3.76	3.77
	Zinc	µg/L	9	2.9	1.45	1.45	0.00
Camp Keais	Alkalinity (CaCO3)	mg/L	8	91	198	142	42.9
	Ammonia (N)	mg/L	13	0.01	0.479	0.086	0.141
	Arsenic	µg/L	13	0.346	3.12	0.977	0.769
	Cadmium	µg/L	13	0.02	0.01	0.010	0.000
	Calcium	mg/L	13	39.8	71.6	55.4	10.3
	Carbon- Organic	mg/L	12	19	30.3	22.0	2.9
	Chloride	mg/L	13	14.8	32.2	20.4	5.7
	Chlorophyll a-corrected	µg/L	13	1	49.1	6.5	13.2
	Chromium	µg/L	13	0.158	0.356	0.227	0.068
	Color- True	PCU	13	95	250	146.2	41.5
	Copper	µg/L	13	0.15	0.676	0.278	0.180
	Depth, Secchi Disk Depth	m	13	0.4	1.3	0.8	0.3
	Dissolved Oxygen	mg/L	13	0.3	2.09	0.96	0.47
	Dissolved Oxygen Saturation	%	13	3.8	25.4	10.9	5.4
	Escherichia coli (MPN)	MPN/100 mL	13	8	125	46	36
	Hardness-Calculated (CaCO3)	mg/L	13	118	216	165	32
	Iron	µg/L	13	75.5	354	207	89
	Lead	µg/L	13	0.02	0.308	0.051	0.082

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Magnesium	mg/L	13	4.39	9.14	6.55	1.60
	Nitrate (N)	mg/L	13	0.011	0.019	0.007	0.004
	Nitrate-Nitrite (N)	mg/L	13	0.011	0.023	0.007	0.005
	Nitrite (N)	mg/L	13	0.002	0.004	0.001	0.001
	Nitrogen- Total	mg/L	13	0.907	2.15	1.215	0.400
	Nitrogen- Total Kjeldahl	mg/L	13	0.907	2.13	1.213	0.396
	Orthophosphate (P)	mg/L	13	0.004	0.637	0.133	0.176
	pH	SU	13	6.46	7.34	6.90	0.25
	Pheophytin a	µg/L	13	1	12.5	1.5	3.3
	Phosphorus-Total	mg/L	13	0.013	0.738	0.172	0.191
	Residues-Nonfilterable (TSS)	mg/L	13	2	12.1	2.1	3.1
	Salinity	ppth	13	0.1	0.2	0.2	0.0
	Silica (SiO2)	mg/L	7	3.55	10.3	6.5	2.8
	Specific Conductance	umho/cm	13	264	507	376	81
	Sulfate	mg/L	13	0.96	64	10.9	17.7
	Temperature, Water	deg C	13	14.7	27.8	22.7	4.6
	Turbidity	NTU	13	0.09	7.15	1.27	1.91
	Zinc	µg/L	13	2.9	4.99	1.72	0.98
Cocohatchee (Inland Segment)	Ammonia (N)	mg/L	105	0.01	0.482	0.082	0.074
	Arsenic	µg/L	105	0.962	6.34	2.354	1.264
	Cadmium	µg/L	105	0.02	0.15	0.012	0.014
	Calcium	mg/L	105	59	258	98.4	26.0
	Carbon- Organic	mg/L	95	9.24	22.4	13.6	2.3
	Chloride	mg/L	105	22.5	8430	233.1	818.0
	Chlorophyll a-corrected	µg/L	105	1	89.6	9.4	12.3
	Chromium	µg/L	105	0.16	2.38	0.494	0.253
	Color- True	PCU	105	29	130	56.5	19.2
	Copper	µg/L	105	0.15	8.01	1.378	1.356
	Depth, Secchi Disk Depth	m	106	0.2	2.5	0.9	0.5
	Dissolved Oxygen	mg/L	126	1.15	9.03	4.80	2.04

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Dissolved Oxygen Saturation	%	126	15	101.7	57.3	23.7
	Enterococci (MPN)	MPN/100 mL	2	31	98	65	47
	Escherichia coli (MPN)	MPN/100 mL	106	2	2420	286	526
	Hardness-Calculated (CaCO3)	mg/L	105	169	2970	320	273
	Iron	µg/L	105	47	1240	292	252
	Lead	µg/L	105	0.02	0.135	0.032	0.023
	Magnesium	mg/L	105	4.3	564	17.8	54.53
	Nitrate (N)	mg/L	105	0.011	0.564	0.091	0.103
	Nitrate-Nitrite (N)	mg/L	105	0.011	0.621	0.097	0.110
	Nitrite (N)	mg/L	105	0.002	0.057	0.006	0.008
	Nitrogen- Total	mg/L	105	0.673	1.92	1.078	0.252
	Nitrogen- Total Kjeldahl	mg/L	105	0.591	1.69	0.982	0.207
	Orthophosphate (P)	mg/L	105	0.003	0.254	0.028	0.056
	pH	SU	126	6.61	8.1	7.42	0.27
	Pheophytin a	µg/L	105	1	12.5	2.7	2.8
	Phosphorus-Total	mg/L	102	0.007	0.318	0.067	0.073
	Residues-Nonfilterable (TSS)	mg/L	105	2	10.5	2.6	2.1
	Salinity	ppth	126	0.2	18.3	0.6	1.6
	Specific Conductance	umho/cm	126	404	29502	1207	2590
	Sulfate	mg/L	105	2.43	1210	60.3	119.6
	Temperature, Water	deg C	126	15.8	31.2	24.8	3.6
	Turbidity	NTU	106	0.49	11.21	2.62	2.08
	Zinc	µg/L	105	2.9	103	3.53	10.57
Cocohatchee River	Ammonia (N)	mg/L	135	0.01	0.528	0.052	0.093
	Arsenic	µg/L	55	1.25	4.07	2.469	0.638
	Cadmium	µg/L	55	0.02	0.08	0.064	0.024
	Calcium	mg/L	11	102	376	264.7	93.8
	Carbon- Organic	mg/L	134	2.2	17.6	6.5	3.9
	Chloride	mg/L	11	2480	18700	11717	5609

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Chlorophyll a-corrected	µg/L	135	1	21.4	4.3	3.5
	Chromium	µg/L	55	0.4	1.59	0.556	0.358
	Color- True	PCU	131	2	140	24.3	30.1
	Copper	µg/L	55	0.336	3.09	0.884	0.533
	Depth, Secchi Disk Depth	m	135	0.05	1.8	1.0	0.3
	Dissolved Oxygen	mg/L	175	1.74	10.19	5.01	1.35
	Dissolved Oxygen Saturation	%	175	27.3	156.2	72.7	20.3
	Enterococci (MPN)	MPN/100 mL	135	10	1500	63	173
	Hardness-Calculated (CaCO3)	mg/L	11	1110	7050	4005	2025
	Iron	µg/L	55	69.8	1640	293	355
	Lead	µg/L	55	0.02	0.316	0.091	0.057
	Magnesium	mg/L	11	182	1490	812.3	436.66
	Nitrate (N)	mg/L	11	0.011	0.234	0.090	0.073
	Nitrate-Nitrite (N)	mg/L	135	0.011	0.248	0.024	0.037
	Nitrite (N)	mg/L	11	0.002	0.014	0.006	0.005
	Nitrogen- Total	mg/L	135	0.326	1.45	0.739	0.190
	Nitrogen- Total Kjeldahl	mg/L	135	0.31	1.30	0.719	0.164
	Orthophosphate (P)	mg/L	134	0.003	0.034	0.009	0.007
	pH	SU	175	6.93	8.2	7.71	0.24
	Pheophytin a	µg/L	135	1	4.6	1.1	0.9
	Phosphorus-Total	mg/L	134	0.015	0.079	0.039	0.012
	Residues-Nonfilterable (TSS)	mg/L	135	2	25.1	8.0	4.8
	Salinity	ppth	175	0.3	36	28.4	9.4
	Specific Conductance	umho/cm	175	519	54601	43712	14024
	Sulfate	mg/L	11	363	2530	1641.3	743.9
	Temperature, Water	deg C	175	19.2	31.8	26.4	3.7
	Turbidity	NTU	136	0.66	17.33	4.97	3.32
	Zinc	µg/L	55	2.9	11.6	9.31	3.35

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
Corkscrew Swamp	Ammonia (N)	mg/L	24	0.01	1.31	0.153	0.270
	Arsenic	µg/L	24	0.413	1.53	0.747	0.264
	Cadmium	µg/L	24	0.02	0.01	0.010	0.000
	Calcium	mg/L	24	33.5	109	81.8	24.0
	Carbon- Organic	mg/L	21	7.99	26.4	14.9	5.0
	Chloride	mg/L	24	18.6	45.2	25.4	6.4
	Chlorophyll a-corrected	µg/L	24	1	51.3	5.2	10.4
	Chromium	µg/L	24	0.0947	2.99	0.867	0.840
	Color- True	PCU	24	27	200	79.2	46.0
	Copper	µg/L	23	0.15	2.62	0.570	0.609
	Depth, Secchi Disk Depth	m	24	0.2	1.1	0.7	0.3
	Dissolved Oxygen	mg/L	24	0.54	5.38	2.96	1.61
	Dissolved Oxygen Saturation	%	24	6.5	69.6	34.5	18.0
	Escherichia coli (MPN)	MPN/100 mL	24	6	1733	225	377
	Hardness-Calculated (CaCO3)	mg/L	24	102	292	227	59
	Iron	µg/L	24	77.4	2960	877	770
	Lead	µg/L	24	0.02	0.916	0.188	0.237
	Magnesium	mg/L	24	3.79	8.5	5.45	1.21
	Nitrate (N)	mg/L	24	0.011	0.545	0.098	0.124
	Nitrate-Nitrite (N)	mg/L	24	0.011	0.551	0.111	0.133
	Nitrite (N)	mg/L	24	0.002	0.106	0.013	0.028
	Nitrogen- Total	mg/L	24	0.676	3.81	1.151	0.633
	Nitrogen- Total Kjeldahl	mg/L	24	0.604	3.58	1.042	0.602
	Orthophosphate (P)	mg/L	24	0.003	0.124	0.013	0.025
	pH	SU	24	6.23	7.67	7.09	0.35
	Pheophytin a	µg/L	24	1	32.6	2.7	6.6
	Phosphorus-Total	mg/L	24	0.007	0.233	0.054	0.061
	Residues-Nonfilterable (TSS)	mg/L	23	2	90.8	13.3	20.9
	Salinity	ppth	24	0.1	0.3	0.2	0.1

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Specific Conductance	umho/cm	24	264	582	473	104
	Sulfate	mg/L	24	0.58	40.7	13.0	11.7
	Temperature, Water	deg C	24	14.8	30.7	24.1	4.4
	Turbidity	NTU	23	0.13	52.38	11.24	13.43
	Zinc	µg/L	24	2.9	9.06	2.07	2.09
Cow Slough	Ammonia (N)	mg/L	8	0.022	0.33	0.126	0.095
	Arsenic	µg/L	8	0.615	3	1.161	0.766
	Cadmium	µg/L	8	0.02	0.01	0.010	0.000
	Calcium	mg/L	8	14.6	102	41.2	29.8
	Carbon- Organic	mg/L	8	13.3	42.4	28.4	8.4
	Chloride	mg/L	8	8.37	17.4	12.2	3.4
	Chlorophyll a-corrected	µg/L	8	1	14.1	4.1	4.4
	Chromium	µg/L	8	0.337	2.33	1.247	0.547
	Color- True	PCU	8	43	460	282.9	128.1
	Copper	µg/L	8	0.205	4.19	1.526	1.204
	Depth, Secchi Disk Depth	m	8	0.2	0.5	0.3	0.1
	Dissolved Oxygen	mg/L	8	1.61	5.64	3.33	1.38
	Dissolved Oxygen Saturation	%	8	20.6	59.9	37.7	14.5
	Escherichia coli (MPN)	MPN/100 mL	8	75	2827	694	939
	Hardness-Calculated (CaCO3)	mg/L	8	48.5	280	122	80
	Iron	µg/L	8	442	2240	954	554
	Lead	µg/L	8	0.046	0.349	0.183	0.110
	Magnesium	mg/L	8	2.89	6.93	4.40	1.58
	Nitrate (N)	mg/L	8	0.011	0.090	0.041	0.032
	Nitrate-Nitrite (N)	mg/L	8	0.011	0.098	0.043	0.034
	Nitrite (N)	mg/L	8	0.002	0.008	0.002	0.002
	Nitrogen- Total	mg/L	8	1.1	2.59	1.570	0.509
	Nitrogen- Total Kjeldahl	mg/L	8	1	2.59	1.528	0.537
	Orthophosphate (P)	mg/L	8	0.013	0.428	0.128	0.126
	pH	SU	8	6.26	7.25	6.75	0.32
	Pheophytin a	µg/L	8	1	4.4	1.4	1.6

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Phosphorus-Total	mg/L	8	0.082	0.567	0.205	0.152
	Residues-Nonfilterable (TSS)	mg/L	8	2.1	8.3	3.9	2.3
	Salinity	ppth	8	0.1	0.3	0.2	0.1
	Specific Conductance	umho/cm	8	108	562	259	157
	Sulfate	mg/L	8	1.1	17	5.3	4.9
	Temperature, Water	deg C	8	15.3	29	22.5	5.3
	Turbidity	NTU	8	1.13	6.11	3.25	1.48
	Zinc	µg/L	8	2.9	7.33	4.15	2.15
Faka Union (North Segment)	Ammonia (N)	mg/L	24	0.01	0.143	0.032	0.036
	Arsenic	µg/L	24	0.552	1.79	1.165	0.333
	Cadmium	µg/L	24	0.02	0.01	0.010	0.000
	Calcium	mg/L	24	55.7	116	85.0	19.2
	Carbon- Organic	mg/L	22	5.57	20.2	13.4	4.3
	Chloride	mg/L	24	14.3	32.1	23.1	4.6
	Chlorophyll a-corrected	µg/L	24	1.6	11.7	5.1	2.6
	Chromium	µg/L	23	0.265	1.62	0.779	0.396
	Color- True	PCU	24	14	190	83.3	54.7
	Copper	µg/L	24	0.215	0.873	0.452	0.197
	Depth, Secchi Disk Depth	m	24	0.4	2.5	1.1	0.6
	Dissolved Oxygen	mg/L	34	2.28	9.13	5.50	1.95
	Dissolved Oxygen Saturation	%	34	28.8	92.6	65.4	21.2
	Escherichia coli (MPN)	MPN/100 mL	24	1	205	29	45
	Hardness-Calculated (CaCO3)	mg/L	24	157	312	237	46
	Iron	µg/L	24	84.4	1470	482	460
	Lead	µg/L	24	0.02	0.089	0.041	0.027
	Magnesium	mg/L	24	3.99	8.9	6.04	1.53
	Nitrate (N)	mg/L	24	0.011	0.107	0.017	0.026
	Nitrate-Nitrite (N)	mg/L	24	0.011	0.109	0.017	0.027
	Nitrite (N)	mg/L	24	0.002	0.007	0.001	0.001

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Nitrogen- Total	mg/L	24	0.38	1.03	0.693	0.200
	Nitrogen- Total Kjeldahl	mg/L	24	0.38	1.03	0.680	0.202
	Orthophosphate (P)	mg/L	24	0.003	0.006	0.002	0.001
	pH	SU	34	6.8	8.15	7.46	0.41
	Pheophytin a	µg/L	24	1	2.2	1.0	0.6
	Phosphorus- Total	mg/L	24	0.007	0.045	0.022	0.013
	Residues- Nonfilterable (TSS)	mg/L	24	2	7.6	2.7	1.9
	Salinity	ppth	34	0.2	0.3	0.3	0.0
	Specific Conductance	umho/cm	34	324	622	522	89
	Sulfate	mg/L	24	1.01	11.6	5.6	3.4
	Temperature, Water	deg C	34	16.3	31	25.1	3.4
	Turbidity	NTU	24	0.95	12.84	3.86	3.10
	Zinc	µg/L	24	2.9	5.33	1.71	0.91
Faka Union (South Segment)	Ammonia (N)	mg/L	36	0.01	0.186	0.043	0.046
	Arsenic	µg/L	36	0.696	2.11	1.244	0.339
	Cadmium	µg/L	36	0.02	0.02	0.010	0.002
	Calcium	mg/L	36	49.7	170	102.2	21.4
	Carbon- Organic	mg/L	33	8.11	17.9	12.2	3.1
	Chloride	mg/L	36	14.9	3600	187.1	612.0
	Chlorophyll a- corrected	µg/L	36	1	6.9	2.4	1.4
	Chromium	µg/L	36	0.27	1.36	0.593	0.275
	Color- True	PCU	36	24	140	65.6	33.5
	Copper	µg/L	36	0.15	0.448	0.144	0.107
	Depth, Secchi Disk Depth	m	36	0.5	1.4	1.0	0.2
	Dissolved Oxygen	mg/L	37	1.91	9.13	4.55	2.08
	Dissolved Oxygen Saturation	%	37	24.4	95.6	54.2	23.7
	Enterococci (MPN)	MPN/100 mL	3	10	41	21	18
	Escherichia coli (MPN)	MPN/100 mL	36	1	226	36	48

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Hardness-Calculated (CaCO3)	mg/L	36	137	1560	320	226
	Iron	µg/L	36	34.3	1240	341	272
	Lead	µg/L	36	0.02	0.091	0.033	0.023
	Magnesium	mg/L	36	3.04	276	15.7	46.24
	Nitrate (N)	mg/L	36	0.011	0.077	0.022	0.022
	Nitrate-Nitrite (N)	mg/L	36	0.011	0.077	0.022	0.022
	Nitrite (N)	mg/L	36	0.002	0.002	0.001	0.000
	Nitrogen- Total	mg/L	36	0.463	1.01	0.656	0.159
	Nitrogen- Total Kjeldahl	mg/L	36	0.463	0.956	0.636	0.149
	Orthophosphate (P)	mg/L	36	0.003	0.053	0.006	0.012
	pH	SU	37	6.67	8.18	7.30	0.43
	Pheophytin a	µg/L	36	1	1.6	0.6	0.2
	Phosphorus-Total	mg/L	35	0.007	0.075	0.018	0.016
	Residues-Nonfilterable (TSS)	mg/L	36	2	8	1.7	1.6
	Salinity	ppth	37	0.1	6.5	0.5	1.1
	Specific Conductance	umho/cm	37	286	11512	1043	1868
	Sulfate	mg/L	36	2.02	497	30.2	84.1
	Temperature, Water	deg C	37	15.9	28.4	24.7	3.1
	Turbidity	NTU	36	0.36	13.79	2.03	2.18
	Zinc	µg/L	36	2.9	2.9	1.49	0.24
Fakahatchee Strand	Ammonia (N)	mg/L	12	0.01	0.082	0.047	0.028
	Arsenic	µg/L	12	0.58	1.4	0.904	0.245
	Cadmium	µg/L	12	0.02	0.05	0.015	0.012
	Calcium	mg/L	12	73.5	296	128.6	68.1
	Carbon- Organic	mg/L	12	12.4	32.3	24.4	6.1
	Chloride	mg/L	12	41.1	9850	1310.4	2804.6
	Chlorophyll a-corrected	µg/L	12	1	27.2	5.7	9.0
	Chromium	µg/L	12	0.303	0.677	0.417	0.113
	Color- True	PCU	12	65	210	145.0	47.3
	Copper	µg/L	12	0.15	0.375	0.127	0.100

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Depth, Secchi Disk Depth	m	12	0.6	1.4	0.9	0.2
	Dissolved Oxygen	mg/L	12	0.89	6.1	2.36	1.48
	Dissolved Oxygen Saturation	%	12	11.6	57.3	27.5	14.4
	Escherichia coli (MPN)	MPN/100 mL	12	5	2602	286	739
	Hardness-Calculated (CaCO3)	mg/L	12	200	3760	786	1085
	Iron	µg/L	12	82.4	341	189	91
	Lead	µg/L	12	0.02	0.243	0.081	0.073
	Magnesium	mg/L	12	4.13	734	113.0	224.59
	Nitrate (N)	mg/L	12	0.011	0.014	0.007	0.003
	Nitrate-Nitrite (N)	mg/L	12	0.011	0.014	0.007	0.003
	Nitrite (N)	mg/L	12	0.002	0.001	0.001	0.000
	Nitrogen- Total	mg/L	12	0.736	1.89	1.179	0.296
	Nitrogen- Total Kjeldahl	mg/L	12	0.736	1.88	1.178	0.294
	Orthophosphate (P)	mg/L	12	0.003	0.025	0.006	0.008
	pH	SU	12	6.91	7.85	7.29	0.23
	Pheophytin a	µg/L	12	1	11.2	2.3	3.9
	Phosphorus-Total	mg/L	12	0.008	0.100	0.029	0.030
	Residues-Nonfilterable (TSS)	mg/L	12	2	9.2	2.5	2.9
	Salinity	ppth	12	0.2	17.2	2.9	5.3
	Specific Conductance	umho/cm	12	470	28005	4982	8599
	Sulfate	mg/L	12	1.15	1340	167.3	386.0
	Temperature, Water	deg C	12	12.6	29.5	24.2	4.8
	Turbidity	NTU	12	0.34	5.94	1.69	1.94
	Zinc	µg/L	12	2.9	7.25	2.50	2.01
Gordon River Extension	Ammonia (N)	mg/L	23	0.014	0.342	0.172	0.100
	Arsenic	µg/L	23	0.767	3.77	1.954	0.863
	Cadmium	µg/L	23	0.02	0.01	0.010	0.000
	Calcium	mg/L	23	26.3	122	92.2	22.4

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Carbon- Organic	mg/L	21	4.26	15.8	11.1	3.2
	Chloride	mg/L	23	15.4	621	173.2	178.1
	Chlorophyll a-corrected	µg/L	23	1	18.3	7.3	5.6
	Chromium	µg/L	23	0.189	0.92	0.467	0.208
	Color- True	PCU	23	21	90	51.2	18.4
	Copper	µg/L	23	0.279	3.6	0.942	0.709
	Depth, Secchi Disk Depth	m	23	0.2	1.4	1.0	0.3
	Dissolved Oxygen	mg/L	24	0.72	8.89	3.84	2.00
	Dissolved Oxygen Saturation	%	24	10.1	113.9	44.9	24.8
	Enterococci (MPN)	MPN/100 mL	3	160	368	297	119
	Escherichia coli (MPN)	MPN/100 mL	23	10	2420	345	535
	Hardness-Calculated (CaCO3)	mg/L	23	70	501	282	101
	Iron	µg/L	23	65.9	744	272	207
	Lead	µg/L	23	0.042	0.32	0.087	0.059
	Magnesium	mg/L	23	1.04	49.4	12.4	13.35
	Nitrate (N)	mg/L	23	0.011	0.260	0.113	0.079
	Nitrate-Nitrite (N)	mg/L	23	0.011	0.284	0.125	0.086
	Nitrite (N)	mg/L	23	0.002	0.024	0.012	0.008
	Nitrogen- Total	mg/L	23	0.346	2.02	1.043	0.404
	Nitrogen- Total Kjeldahl	mg/L	23	0.291	1.95	0.919	0.367
	Orthophosphate (P)	mg/L	23	0.003	0.056	0.014	0.015
	pH	SU	24	6.7	7.67	7.32	0.19
	Pheophytin a	µg/L	23	1	4.9	1.7	1.4
	Phosphorus-Total	mg/L	22	0.017	0.101	0.046	0.025
	Residues-Nonfilterable (TSS)	mg/L	23	2	7.2	2.0	1.5
	Salinity	ppth	24	0.1	25.6	1.6	5.1
	Specific Conductance	umho/cm	24	173	40096	2661	8008
	Sulfate	mg/L	23	5.43	115	40.7	31.4

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Temperature, Water	deg C	24	19.4	29.7	25.2	3.2
	Turbidity	NTU	23	0.99	3.37	1.93	0.66
	Zinc	µg/L	23	2.9	9.92	2.59	2.35
Haldeman Creek (Lower)	Ammonia (N)	mg/L	12	0.01	0.163	0.085	0.058
	Arsenic	µg/L	12	1.86	3.44	2.583	0.496
	Cadmium	µg/L	12	0.02	0.08	0.043	0.026
	Calcium	mg/L	12	103	397	231.8	111.9
	Carbon- Organic	mg/L	11	4.99	11	8.4	2.5
	Chloride	mg/L	12	1790	19000	9393.3	6838.3
	Chlorophyll a-corrected	µg/L	12	2.3	29.1	12.5	8.8
	Chromium	µg/L	12	0.492	1.77	0.586	0.391
	Color- True	PCU	12	9	60	35.3	19.9
	Copper	µg/L	12	2.38	7.18	4.003	1.496
	Depth, Secchi Disk Depth	m	12	0.7	1.1	0.9	0.1
	Dissolved Oxygen	mg/L	14	1.93	5.5	3.39	0.94
	Dissolved Oxygen Saturation	%	14	28.1	70.3	46.2	11.6
	Enterococci (MPN)	MPN/100 mL	12	31	754	296	241
	Hardness-Calculated (CaCO3)	mg/L	12	764	6920	3400	2319
	Iron	µg/L	12	122	204	155	26
	Lead	µg/L	12	0.041	0.224	0.130	0.064
	Magnesium	mg/L	12	123	1440	684.9	495.49
	Nitrate (N)	mg/L	12	0.011	0.073	0.022	0.023
	Nitrate-Nitrite (N)	mg/L	12	0.011	0.077	0.022	0.024
	Nitrite (N)	mg/L	12	0.002	0.004	0.002	0.001
	Nitrogen- Total	mg/L	12	0.55	1.13	0.869	0.152
	Nitrogen- Total Kjeldahl	mg/L	12	0.539	1.12	0.848	0.153
	Orthophosphate (P)	mg/L	12	0.003	0.064	0.025	0.021
	pH	SU	14	6.79	7.62	7.18	0.18
	Pheophytin a	µg/L	12	1	10.9	3.4	2.7
	Phosphorus-Total	mg/L	12	0.043	0.122	0.071	0.028

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Residues-Nonfilterable (TSS)	mg/L	12	2	21.6	6.1	5.4
	Salinity	ppth	14	1.7	32.9	16.7	11.0
	Specific Conductance	umho/cm	14	3316	50230	25974	16606
	Sulfate	mg/L	12	254	2770	1336.3	990.9
	Temperature, Water	deg C	14	18.7	31.5	27.0	3.7
	Turbidity	NTU	12	1.02	9.34	4.18	2.26
	Zinc	µg/L	12	3.57	19.5	7.48	5.16
Haldeman Creek (Upper)	Ammonia (N)	mg/L	30	0.01	0.202	0.049	0.061
	Arsenic	µg/L	30	2.79	13.5	5.381	2.470
	Cadmium	µg/L	30	0.02	0.01	0.010	0.000
	Calcium	mg/L	30	38	85.8	59.7	14.5
	Carbon- Organic	mg/L	28	9.04	13.9	11.0	1.3
	Chloride	mg/L	30	45.5	140	109.7	29.7
	Chlorophyll a-corrected	µg/L	30	1.2	26.6	7.1	5.5
	Chromium	µg/L	30	0.265	0.907	0.444	0.196
	Color- True	PCU	30	38	95	56.2	19.1
	Copper	µg/L	30	3.02	26.4	6.474	4.869
	Depth, Secchi Disk Depth	m	31	0.3	1.3	0.7	0.3
	Dissolved Oxygen	mg/L	31	1.7	12.36	6.20	2.74
	Dissolved Oxygen Saturation	%	31	19.5	181.3	77.5	37.2
	Enterococci (MPN)	MPN/100 mL	6	10	359	140	169
	Escherichia coli (MPN)	MPN/100 mL	31	12	2420	286	491
	Hardness-Calculated (CaCO3)	mg/L	30	116	244	177	40
	Iron	µg/L	30	15.1	258	76	62
	Lead	µg/L	30	0.02	0.115	0.044	0.032
	Magnesium	mg/L	30	3.05	8.46	6.80	1.69
	Nitrate (N)	mg/L	30	0.011	0.269	0.052	0.074
	Nitrate-Nitrite (N)	mg/L	30	0.011	0.275	0.054	0.077
	Nitrite (N)	mg/L	30	0.002	0.011	0.003	0.004

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Nitrogen- Total	mg/L	30	0.681	1.35	0.949	0.178
	Nitrogen- Total Kjeldahl	mg/L	30	0.681	1.20	0.897	0.129
	Orthophosphate (P)	mg/L	30	0.003	0.388	0.112	0.141
	pH	SU	31	6.92	8.28	7.60	0.37
	Pheophytin a	µg/L	30	1	6.9	1.7	1.6
	Phosphorus- Total	mg/L	30	0.018	0.460	0.157	0.158
	Residues- Nonfilterable (TSS)	mg/L	30	2	3.7	1.4	0.8
	Salinity	ppth	31	0.2	0.4	0.3	0.1
	Specific Conductance	umho/cm	31	408	795	671	135
	Sulfate	mg/L	30	11.9	30.7	22.4	5.2
	Temperature, Water	deg C	31	19.3	36.4	26.3	4.5
	Turbidity	NTU	32	0.39	2.48	1.19	0.59
	Zinc	µg/L	30	2.9	6.53	2.26	1.33
Immokalee Basin	Alkalinity (CaCO3)	mg/L	8	117	220	179	36.2
	Ammonia (N)	mg/L	9	0.033	0.739	0.177	0.236
	Arsenic	µg/L	9	0.591	1.64	1.056	0.318
	Cadmium	µg/L	9	0.02	0.01	0.010	0.000
	Calcium	mg/L	9	34.4	87.5	68.0	17.2
	Carbon- Organic	mg/L	9	14	26.2	17.2	3.7
	Chloride	mg/L	9	16.4	29.8	22.9	4.8
	Chlorophyll a- corrected	µg/L	9	1.1	8.6	3.4	2.3
	Chromium	µg/L	9	0.104	1.88	0.370	0.570
	Color- True	PCU	9	45	230	112.2	54.3
	Copper	µg/L	9	0.15	3.74	0.615	1.187
	Depth, Secchi Disk Depth	m	9	0.1	0.5	0.3	0.1
	Dissolved Oxygen	mg/L	9	0.62	1.63	0.89	0.37
	Dissolved Oxygen Saturation	%	9	5.9	16.3	9.9	3.6
	Escherichia coli (MPN)	MPN/100 mL	9	28	411	88	122

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Hardness-Calculated (CaCO3)	mg/L	9	104	241	190	45
	Iron	µg/L	9	109	1490	438	425
	Lead	µg/L	9	0.02	0.207	0.070	0.065
	Magnesium	mg/L	9	3.53	5.79	4.94	0.69
	Nitrate (N)	mg/L	9	0.011	0.090	0.015	0.028
	Nitrate-Nitrite (N)	mg/L	9	0.011	0.093	0.015	0.029
	Nitrite (N)	mg/L	9	0.002	0.003	0.001	0.001
	Nitrogen- Total	mg/L	9	0.676	1.99	1.052	0.415
	Nitrogen- Total Kjeldahl	mg/L	9	0.676	1.90	1.042	0.389
	Orthophosphate (P)	mg/L	9	0.083	0.729	0.283	0.197
	pH	SU	9	6.57	7.25	7.02	0.24
	Pheophytin a	µg/L	9	1	4.4	0.9	1.3
	Phosphorus-Total	mg/L	9	0.12	0.780	0.346	0.207
	Residues-Nonfilterable (TSS)	mg/L	9	2	4.5	1.4	1.2
	Salinity	ppth	9	0.1	0.3	0.2	0.1
	Silica (SiO2)	mg/L	8	3.29	12.1	8.3	3.3
	Specific Conductance	umho/cm	9	247	519	410	88
	Sulfate	mg/L	9	1.21	28	6.4	8.5
	Temperature, Water	deg C	9	12.4	28.9	21.6	5.5
	Turbidity	NTU	9	0.27	3.69	0.96	1.07
	Zinc	µg/L	9	2.9	8.32	2.75	2.63
Lake Trafford	Alkalinity (CaCO3)	mg/L	48	84	142	118	15.4
	Ammonia (N)	mg/L	48	0.01	0.253	0.019	0.036
	Carbon- Organic	mg/L	44	19.2	28.9	23.5	2.0
	Chlorophyll a-corrected	µg/L	47	36.2	132	69.5	24.9
	Color- True	PCU	48	45	150	70.0	19.0
	Depth, Secchi Disk Depth	m	48	0.2	0.5	0.3	0.1
	Dissolved Oxygen	mg/L	76	2.84	9.77	7.14	1.62

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Dissolved Oxygen Saturation	%	76	36	113.2	85.3	17.6
	Nitrate (N)	mg/L	48	0.011	0.057	0.014	0.010
	Nitrate-Nitrite (N)	mg/L	48	0.011	0.057	0.014	0.010
	Nitrite (N)	mg/L	48	0.002	0.001	0.001	0.000
	Nitrogen- Total	mg/L	48	1.38	4.50	2.529	0.745
	Nitrogen- Total Kjeldahl	mg/L	48	1.37	4.48	2.519	0.738
	Orthophosphate (P)	mg/L	48	0.003	0.055	0.004	0.009
	pH	SU	76	6.9	9.08	8.24	0.45
	Pheophytin a	µg/L	47	1	50	12.5	8.8
	Phosphorus-Total	mg/L	48	0.059	0.311	0.123	0.043
	Residues-Nonfilterable (TSS)	mg/L	48	7.2	75.4	29.9	17.6
	Salinity	ppth	76	0.1	0.2	0.1	0.0
	Silica (SiO2)	mg/L	48	0.473	6.05	2.4	1.9
	Specific Conductance	umho/cm	76	256	340	302	23
	Temperature, Water	deg C	76	18.3	30.4	25.0	4.0
	Turbidity	NTU	48	4.10	47.81	20.76	12.70
North Golden Gate	Ammonia (N)	mg/L	118	0.01	0.26	0.044	0.050
	Arsenic	µg/L	118	0.404	4.96	1.436	0.639
	Cadmium	µg/L	118	0.02	0.01	0.010	0.000
	Calcium	mg/L	118	22.9	117	76.1	20.2
	Carbon- Organic	mg/L	105	8.33	35.3	17.1	6.5
	Chloride	mg/L	118	15.2	107	39.5	18.7
	Chlorophyll a-corrected	µg/L	118	1	43.6	4.4	6.2
	Chromium	µg/L	117	0.1	2.82	0.566	0.410
	Color- True	PCU	118	2	280	99.0	60.8
	Copper	µg/L	117	0.15	2.07	0.404	0.326
	Depth, Secchi Disk Depth	m	119	0.3	2	0.9	0.3
	Dissolved Oxygen	mg/L	138	0.3	14.86	5.32	2.68
	Dissolved Oxygen Saturation	%	138	3.7	172.5	64.0	31.9

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Enterococci (MPN)	MPN/100 mL	1	52	52	52	0
	Escherichia coli (MPN)	MPN/100 mL	118	1	866	57	112
	Hardness-Calculated (CaCO3)	mg/L	118	77.4	316	210	52
	Iron	µg/L	118	24.7	1970	428	377
	Lead	µg/L	118	0.02	0.28	0.043	0.045
	Magnesium	mg/L	118	2.94	7.46	4.81	0.93
	Nitrate (N)	mg/L	118	0.011	0.332	0.042	0.051
	Nitrate-Nitrite (N)	mg/L	118	0.011	0.335	0.042	0.051
	Nitrite (N)	mg/L	118	0.002	0.014	0.002	0.002
	Nitrogen- Total	mg/L	118	0.451	2.30	0.944	0.326
	Nitrogen- Total Kjeldahl	mg/L	118	0.323	2.30	0.904	0.336
	Orthophosphate (P)	mg/L	119	0.003	0.132	0.004	0.013
	pH	SU	138	6.51	8.95	7.39	0.43
	Pheophytin a	µg/L	118	1	17.8	1.1	2.3
	Phosphorus-Total	mg/L	116	0.007	0.214	0.022	0.026
	Residues-Nonfilterable (TSS)	mg/L	118	2	17.2	1.8	2.2
	Salinity	ppth	138	0.1	0.4	0.2	0.1
	Specific Conductance	umho/cm	138	240	840	497	128
	Sulfate	mg/L	118	0.2	27.8	8.9	6.9
	Temperature, Water	deg C	138	13.7	31.6	25.1	3.6
	Turbidity	NTU	118	0.05	31.77	2.11	3.30
	Zinc	µg/L	118	2.9	10.3	1.88	1.33
Okaloacoochee Slough	Ammonia (N)	mg/L	2	0.022	0.011	0.011	0.000
	Arsenic	µg/L	2	1.06	1.18	1.120	0.085
	Cadmium	µg/L	2	0.02	0.01	0.010	0.000
	Calcium	mg/L	2	36.8	46.2	41.5	6.6
	Carbon- Organic	mg/L	2	19.1	21.8	20.5	1.9
	Chloride	mg/L	2	19.6	30.4	25.0	7.6
	Chlorophyll a-corrected	µg/L	2	1.2	1.9	1.6	0.5

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Chromium	µg/L	2	0.133	0.153	0.143	0.014
	Color- True	PCU	2	170	190	180.0	14.1
	Copper	µg/L	2	0.15	0.174	0.125	0.070
	Depth, Secchi Disk Depth	m	2	0.8	0.9	0.9	0.1
	Dissolved Oxygen	mg/L	2	0.49	0.8	0.65	0.22
	Dissolved Oxygen Saturation	%	2	6	9.1	7.6	2.2
	Escherichia coli (MPN)	MPN/100 mL	2	28	70	49	30
	Hardness-Calculated (CaCO3)	mg/L	2	114	144	129	21
	Iron	µg/L	2	142	227	185	60
	Lead	µg/L	2	0.02	0.01	0.010	0.000
	Magnesium	mg/L	2	5.42	6.92	6.17	1.06
	Nitrate (N)	mg/L	2	0.011	0.006	0.006	0.000
	Nitrate-Nitrite (N)	mg/L	2	0.011	0.006	0.006	0.000
	Nitrite (N)	mg/L	2	0.002	0.001	0.001	0.000
	Nitrogen- Total	mg/L	2	1.03	1.25	1.140	0.156
	Nitrogen- Total Kjeldahl	mg/L	2	1.03	1.25	1.140	0.156
	Orthophosphate (P)	mg/L	2	0.006	0.019	0.013	0.009
	pH	SU	2	6.99	7.2	7.10	0.15
	Pheophytin a	µg/L	2	1	0.5	0.5	0.0
	Phosphorus-Total	mg/L	2	0.021	0.038	0.030	0.012
	Residues-Nonfilterable (TSS)	mg/L	2	2	1	1.0	0.0
	Salinity	ppth	2	0.1	0.2	0.2	0.1
	Specific Conductance	umho/cm	2	271	355	313	59
	Sulfate	mg/L	2	1.51	1.68	1.6	0.1
	Temperature, Water	deg C	2	22.4	25.7	24.1	2.3
	Turbidity	NTU	2	0.14	0.40	0.27	0.18
	Zinc	µg/L	2	2.9	4.62	3.04	2.24
Rock Creek	Ammonia (N)	mg/L	12	0.14	0.343	0.243	0.070
	Arsenic	µg/L	12	1.2	1.99	1.632	0.233

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Cadmium	µg/L	12	0.02	0.06	0.030	0.020
	Calcium	mg/L	12	75.2	327	184.9	93.8
	Carbon- Organic	mg/L	11	7.95	14.5	10.8	2.2
	Chloride	mg/L	12	94.2	14100	5725.6	5269.7
	Chlorophyll a-corrected	µg/L	12	1.2	93	9.8	26.2
	Chromium	µg/L	12	0.439	0.935	0.695	0.158
	Color- True	PCU	12	45	85	67.1	11.8
	Copper	µg/L	12	0.487	2.29	0.936	0.504
	Depth, Secchi Disk Depth	m	12	0.25	1	0.6	0.2
	Dissolved Oxygen	mg/L	12	0.58	2.78	1.35	0.65
	Dissolved Oxygen Saturation	%	12	7.3	33.9	17.0	7.7
	Enterococci (MPN)	MPN/100 mL	12	384	9804	1604	2602
	Hardness-Calculated (CaCO3)	mg/L	12	276	5060	2131	1749
	Iron	µg/L	12	120	216	163	26
	Lead	µg/L	12	0.046	0.31	0.093	0.072
	Magnesium	mg/L	12	17	1030	405.5	368.16
	Nitrate (N)	mg/L	12	0.011	0.091	0.036	0.030
	Nitrate-Nitrite (N)	mg/L	12	0.011	0.096	0.041	0.031
	Nitrite (N)	mg/L	12	0.002	0.011	0.005	0.003
	Nitrogen- Total	mg/L	12	0.63	1.11	0.877	0.152
	Nitrogen- Total Kjeldahl	mg/L	12	0.619	1.09	0.838	0.145
	Orthophosphate (P)	mg/L	12	0.031	0.082	0.055	0.016
	pH	SU	12	6.71	7.26	7.05	0.15
	Pheophytin a	µg/L	12	1	13	1.8	3.6
	Phosphorus-Total	mg/L	12	0.037	0.135	0.079	0.027
	Residues-Nonfilterable (TSS)	mg/L	12	2	6.9	2.5	2.2
	Salinity	ppth	12	0.6	23.8	10.2	8.9
	Specific Conductance	umho/cm	12	1160	37485	16214	14211
	Sulfate	mg/L	12	31.3	1900	819.2	745.0

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Temperature, Water	deg C	12	19.5	28.9	24.9	2.7
	Turbidity	NTU	12	0.57	6.07	2.85	2.06
	Zinc	µg/L	12	2.9	8.7	4.35	2.97
Rookery Bay (Inland East Segment)	Ammonia (N)	mg/L	47	0.01	0.948	0.109	0.183
	Arsenic	µg/L	47	0.565	3.53	1.072	0.504
	Cadmium	µg/L	47	0.02	0.05	0.011	0.006
	Calcium	mg/L	47	38.6	490	99.0	63.6
	Carbon- Organic	mg/L	45	10.7	35.4	15.6	4.7
	Chloride	mg/L	47	15.8	9670	305.7	1398.2
	Chlorophyll a-corrected	µg/L	47	1.5	61.1	10.5	9.7
	Chromium	µg/L	47	0.255	1.86	0.614	0.349
	Color- True	PCU	47	24	230	82.0	55.0
	Copper	µg/L	47	0.157	11.6	1.708	2.835
	Depth, Secchi Disk Depth	m	47	0.1	1.6	0.9	0.4
	Dissolved Oxygen	mg/L	52	0.67	9.91	4.85	2.89
	Dissolved Oxygen Saturation	%	52	8	117.1	59.0	33.7
	Enterococci (MPN)	MPN/100 mL	3	109	1046	530	476
	Escherichia coli (MPN)	MPN/100 mL	47	1	24196	570	3523
	Hardness-Calculated (CaCO3)	mg/L	47	109	4200	346	580
	Iron	µg/L	47	34.8	1700	327	306
	Lead	µg/L	47	0.02	0.568	0.093	0.107
	Magnesium	mg/L	47	3.15	722	23.9	104.15
	Nitrate (N)	mg/L	47	0.011	0.193	0.038	0.056
	Nitrate-Nitrite (N)	mg/L	47	0.011	0.236	0.045	0.065
	Nitrite (N)	mg/L	47	0.002	0.256	0.009	0.037
	Nitrogen- Total	mg/L	47	0.626	3.49	1.062	0.446
	Nitrogen- Total Kjeldahl	mg/L	47	0.615	3.49	1.019	0.462
	Orthophosphate (P)	mg/L	47	0.003	1.424	0.079	0.270
	pH	SU	52	6.84	8.45	7.47	0.45
	Pheophytin a	µg/L	47	1	8.6	1.5	1.6

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Phosphorus-Total	mg/L	47	0.01	1.770	0.124	0.324
	Residues-Nonfilterable (TSS)	mg/L	47	2	21.4	3.6	4.0
	Salinity	ppth	52	0.1	18.3	0.7	2.5
	Specific Conductance	umho/cm	52	297	29453	1296	3994
	Sulfate	mg/L	47	3.27	1300	58.2	186.1
	Temperature, Water	deg C	52	16.9	31.2	26.2	3.3
	Turbidity	NTU	47	0.70	37.90	3.82	5.93
	Zinc	µg/L	47	2.9	7.25	1.83	1.13
Rookery Bay (Inland West Segment)	Ammonia (N)	mg/L	43	0.01	0.544	0.101	0.104
	Arsenic	µg/L	43	0.6	3.44	1.499	0.649
	Cadmium	µg/L	43	0.02	0.03	0.012	0.005
	Calcium	mg/L	43	43.1	188	104.2	34.4
	Carbon- Organic	mg/L	41	7.66	23.9	12.4	4.0
	Chloride	mg/L	43	27.3	5510	633.2	1420.6
	Chlorophyll a-corrected	µg/L	43	1	30.1	7.6	7.4
	Chromium	µg/L	43	0.188	1.27	0.422	0.199
	Color- True	PCU	43	25	140	47.4	26.7
	Copper	µg/L	43	0.15	36.7	4.124	7.601
	Depth, Secchi Disk Depth	m	44	0.5	1.4	1.0	0.2
	Dissolved Oxygen	mg/L	44	0.97	9.22	4.48	2.15
	Dissolved Oxygen Saturation	%	44	10.5	123.9	56.5	28.1
	Enterococci (MPN)	MPN/100 mL	6	6	20	13	8
	Escherichia coli (MPN)	MPN/100 mL	43	2	1733	166	324
	Hardness-Calculated (CaCO3)	mg/L	43	117	2330	452	500
	Iron	µg/L	43	30.7	1020	293	250
	Lead	µg/L	43	0.02	0.153	0.045	0.036
	Magnesium	mg/L	43	2.17	453	46.5	105.39
	Nitrate (N)	mg/L	43	0.011	0.190	0.058	0.051

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Nitrate-Nitrite (N)	mg/L	43	0.011	0.213	0.062	0.055
	Nitrite (N)	mg/L	43	0.002	0.023	0.004	0.005
	Nitrogen- Total	mg/L	43	0.604	1.71	0.974	0.264
	Nitrogen- Total Kjeldahl	mg/L	43	0.604	1.69	0.913	0.256
	Orthophosphate (P)	mg/L	43	0.003	0.024	0.004	0.005
	pH	SU	44	6.93	8.17	7.44	0.28
	Pheophytin a	µg/L	43	1	10.4	2.2	2.5
	Phosphorus- Total	mg/L	44	0.007	0.080	0.031	0.019
	Residues- Nonfilterable (TSS)	mg/L	43	2	13.5	3.1	2.6
	Salinity	ppth	44	0.1	9.5	1.4	2.6
	Specific Conductance	umho/cm	44	188	15316	2486	4135
	Sulfate	mg/L	43	1.56	780	101.2	197.1
	Temperature, Water	deg C	44	17.8	31.7	26.7	4.0
	Turbidity	NTU	44	0.63	9.88	2.65	1.88
	Zinc	µg/L	43	2.9	10.5	2.25	1.77
Silver Strand	Ammonia (N)	mg/L	23	0.03	0.872	0.230	0.195
	Arsenic	µg/L	23	0.379	1.82	1.040	0.369
	Cadmium	µg/L	23	0.02	0.01	0.010	0.000
	Calcium	mg/L	23	33.4	100	63.7	24.5
	Carbon- Organic	mg/L	22	10.3	31.8	19.5	4.3
	Chloride	mg/L	23	16	54.4	26.9	9.1
	Chlorophyll a- corrected	µg/L	23	1	22.6	7.0	5.5
	Chromium	µg/L	23	0.565	2.1	1.276	0.572
	Color- True	PCU	23	48	340	142.3	62.3
	Copper	µg/L	23	0.298	9.91	2.195	2.239
	Depth, Secchi Disk Depth	m	23	0.3	1.05	0.6	0.2
	Dissolved Oxygen	mg/L	23	0.8	6.02	2.29	1.18
	Dissolved Oxygen Saturation	%	23	10.3	64.6	26.3	11.8
	Escherichia coli (MPN)	MPN/100 mL	23	14	261	106	65

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Hardness-Calculated (CaCO3)	mg/L	23	100	275	181	63
	Iron	µg/L	23	468	1850	1175	370
	Lead	µg/L	23	0.043	0.644	0.237	0.182
	Magnesium	mg/L	23	3.82	10.3	5.26	1.33
	Nitrate (N)	mg/L	23	0.011	1.023	0.195	0.277
	Nitrate-Nitrite (N)	mg/L	23	0.011	1.140	0.206	0.297
	Nitrite (N)	mg/L	23	0.002	0.119	0.011	0.024
	Nitrogen- Total	mg/L	23	0.996	3.41	1.547	0.620
	Nitrogen- Total Kjeldahl	mg/L	23	0.685	2.54	1.343	0.427
	Orthophosphate (P)	mg/L	23	0.01	0.649	0.174	0.170
	pH	SU	23	6.08	7.33	6.90	0.36
	Pheophytin a	µg/L	23	1	7.1	2.1	2.1
	Phosphorus-Total	mg/L	23	0.04	0.927	0.308	0.238
	Residues-Nonfilterable (TSS)	mg/L	22	2	11.5	4.0	2.9
	Salinity	ppth	23	0.1	0.3	0.2	0.1
	Specific Conductance	umho/cm	23	241	610	412	128
	Sulfate	mg/L	23	4.15	29.7	10.8	6.8
	Temperature, Water	deg C	23	16.4	29.2	23.9	4.0
	Turbidity	NTU	23	1.17	13.84	4.90	3.60
	Zinc	µg/L	23	2.9	14	3.98	3.55
Wiggins Bay Outlet	Ammonia (N)	mg/L	11	0.017	0.392	0.120	0.132
	Arsenic	µg/L	11	0.57	1.41	0.875	0.293
	Cadmium	µg/L	11	0.02	0.01	0.010	0.000
	Calcium	mg/L	11	105	129	118.2	7.8
	Carbon- Organic	mg/L	10	14.8	19.6	17.3	1.6
	Chloride	mg/L	11	139	239	175.7	34.3
	Chlorophyll a-corrected	µg/L	11	1.1	3.7	2.3	0.8
	Chromium	µg/L	11	0.961	1.36	1.163	0.159
	Color- True	PCU	11	75	130	98.2	19.1
	Copper	µg/L	11	1.17	6.51	2.955	1.871

WBID	Parameter	Unit	Count	Minimum	Maximum	Average	Standard Deviation
	Depth, Secchi Disk Depth	m	11	0.15	0.8	0.4	0.2
	Dissolved Oxygen	mg/L	11	2.09	3.83	3.15	0.66
	Dissolved Oxygen Saturation	%	11	25.7	47.8	37.2	7.5
	Escherichia coli (MPN)	MPN/100 mL	11	58	649	174	167
	Hardness-Calculated (CaCO3)	mg/L	11	309	353	332	18
	Iron	µg/L	11	344	1670	878	433
	Lead	µg/L	11	0.02	0.156	0.052	0.042
	Magnesium	mg/L	11	6.98	13.5	9.07	2.46
	Nitrate (N)	mg/L	11	0.032	0.413	0.193	0.122
	Nitrate-Nitrite (N)	mg/L	11	0.035	0.425	0.215	0.132
	Nitrite (N)	mg/L	11	0.002	0.072	0.022	0.022
	Nitrogen- Total	mg/L	11	0.775	1.42	1.089	0.223
	Nitrogen- Total Kjeldahl	mg/L	11	0.732	1.12	0.872	0.118
	Orthophosphate (P)	mg/L	11	0.003	0.012	0.005	0.004
	pH	SU	11	7.24	7.76	7.47	0.18
	Pheophytin a	µg/L	11	1	1.9	1.1	0.6
	Phosphorus-Total	mg/L	10	0.011	0.041	0.025	0.010
	Residues-Nonfilterable (TSS)	mg/L	11	2	3.5	1.9	1.1
	Salinity	ppth	11	0.5	0.7	0.5	0.1
	Specific Conductance	umho/cm	11	966	1327	1109	109
	Sulfate	mg/L	11	8.68	44.6	21.0	14.1
	Temperature, Water	deg C	11	19.2	28.9	23.9	3.2
	Turbidity	NTU	12	1.11	7.94	3.20	2.04
	Zinc	µg/L	11	2.9	28.2	4.25	7.99

APPENDIX D
Water Quality Exceedances by WBID and by Station

WBID STATION Parameter	# of Exceedances	# of Samples Collected	% Samples in Exceedance
Barron River Canal	**22**	**341**	6.5%
BARRON	**2**	**40**	5.0%
Dissolved Oxygen Saturation	2	2	100.0%
BC24	**20**	**301**	6.6%
Chlorophyll a- corrected	1	8	12.5%
Dissolved Oxygen Saturation	13	13	100.0%
Iron	1	8	12.5%
Nitrogen- Total	2	8	25.0%
Phosphorus- Total	3	8	37.5%
Barron River (Marine Segment)	**11**	**422**	2.6%
BARRIVN	**11**	**422**	2.6%
Dissolved Oxygen Saturation	10	14	71.4%
Enterococci (MPN)	1	12	8.3%
Camp Keais	**22**	**456**	4.8%
KEAISN	**13**	**286**	4.5%
Chlorophyll a- corrected	1	8	12.5%
Dissolved Oxygen Saturation	8	8	100.0%
Nitrogen- Total	2	8	25.0%
pH	1	8	12.5%
Phosphorus- Total	1	8	12.5%
KEAISS	**9**	**170**	5.3%
Dissolved Oxygen Saturation	5	5	100.0%
Phosphorus- Total	4	5	80.0%
Cocohatchee (Inland Segment)	**88**	**3688**	2.4%
BC14	**3**	**427**	0.7%
Dissolved Oxygen Saturation	3	20	15.0%
BC15	**3**	**379**	0.8%
Dissolved Oxygen Saturation	3	12	25.0%
BC26	**1**	**373**	0.3%
Dissolved Oxygen Saturation	1	11	9.1%
COC@IBIS	**19**	**373**	5.1%
Chlorophyll a- corrected	1	11	9.1%
Dissolved Oxygen Saturation	10	11	90.9%
Escherichia coli (MPN)	5	11	45.5%
Iron	3	11	27.3%
COCPALM	**12**	**397**	3.0%

WBID STATION Parameter	# of Exceedances	# of Samples Collected	% Samples in Exceedance
Chlorophyll a- corrected	3	11	27.3%
Dissolved Oxygen Saturation	3	15	20.0%
Escherichia coli (MPN)	5	11	45.5%
Phosphorus- Total	1	11	9.1%
ECOCORIV	**13**	**210**	6.2%
Chlorophyll a- corrected	3	6	50.0%
Dissolved Oxygen Saturation	2	7	28.6%
Escherichia coli (MPN)	2	6	33.3%
Nitrogen- Total	2	6	33.3%
Phosphorus- Total	4	5	80.0%
HORSECRK	**10**	**372**	2.7%
Dissolved Oxygen Saturation	8	11	72.7%
Nitrogen- Total	1	11	9.1%
Phosphorus- Total	1	10	10.0%
NNAPLES	**1**	**372**	0.3%
Chlorophyll a- corrected	1	11	9.1%
WCOCORIV	**26**	**382**	6.8%
Chlorophyll a- corrected	1	11	9.1%
Dissolved Oxygen Saturation	5	12	41.7%
Escherichia coli (MPN)	9	12	75.0%
Nitrogen- Total	2	11	18.2%
Phosphorus- Total	9	11	81.8%
Cocohatchee River	**190**	**3396**	5.6%
BFBSP	**5**	**274**	1.8%
Nitrogen- Total	5	12	41.7%
BLUE	**12**	**286**	4.2%
Chlorophyll a- corrected	1	12	8.3%
Nitrogen- Total	11	12	91.7%
COCAT41	**30**	**294**	10.2%
Chlorophyll a- corrected	5	13	38.5%
Dissolved Oxygen Saturation	4	13	30.8%
Enterococci (MPN)	5	13	38.5%
Nitrogen- Total	13	13	100.0%
Phosphorus- Total	3	13	23.1%
COCOR1	**11**	**280**	3.9%
Nitrogen- Total	11	12	91.7%
COCOR2	**19**	**267**	7.1%
Chlorophyll a- corrected	1	12	8.3%

WBID STATION Parameter	# of Exceedances	# of Samples Collected	% Samples in Exceedance
Dissolved Oxygen Saturation	2	12	16.7%
Enterococci (MPN)	3	12	25.0%
Nitrogen- Total	12	12	100.0%
Phosphorus- Total	1	12	8.3%
COCORVW	**25**	**294**	8.5%
Chlorophyll a- corrected	1	13	7.7%
Dissolved Oxygen Saturation	4	13	30.8%
Enterococci (MPN)	4	13	30.8%
Iron	1	5	20.0%
Nitrogen- Total	13	13	100.0%
Phosphorus- Total	2	13	15.4%
NAPLESPARK	**14**	**373**	3.8%
Enterococci (MPN)	4	11	36.4%
Iron	10	11	90.9%
TURKBAY	**12**	**334**	3.6%
Nitrogen- Total	12	14	85.7%
VBILT	**16**	**340**	4.7%
Chlorophyll a- corrected	5	12	41.7%
Dissolved Oxygen Saturation	1	24	4.2%
Nitrogen- Total	10	12	83.3%
VBILTB	**20**	**332**	6.0%
Chlorophyll a- corrected	7	12	58.3%
Nitrogen- Total	12	12	100.0%
Phosphorus- Total	1	12	8.3%
VBILTCAN	**26**	**322**	8.1%
Chlorophyll a- corrected	9	12	75.0%
Dissolved Oxygen Saturation	1	21	4.8%
Iron	1	4	25.0%
Nitrogen- Total	12	12	100.0%
Phosphorus- Total	3	12	25.0%
Corkscrew Swamp	**31**	**810**	3.8%
CORKN	**16**	**404**	4.0%
Chlorophyll a- corrected	1	12	8.3%
Dissolved Oxygen Saturation	8	12	66.7%
Escherichia coli (MPN)	2	12	16.7%
Iron	1	12	8.3%
Nitrogen- Total	2	12	16.7%
Phosphorus- Total	1	12	8.3%

WBID STATION Parameter	# of Exceedances	# of Samples Collected	% Samples in Exceedance
Turbidity	1	11	9.1%
CORKS	**1**	**34**	2.9%
Dissolved Oxygen Saturation	1	1	100.0%
CORKSCRD	**14**	**372**	3.8%
Dissolved Oxygen Saturation	3	11	27.3%
Escherichia coli (MPN)	1	11	9.1%
Iron	7	11	63.6%
pH	1	11	9.1%
Phosphorus- Total	2	11	18.2%
Cow Slough	**21**	**272**	7.7%
IMKFSHCK	**21**	**272**	7.7%
Dissolved Oxygen Saturation	4	8	50.0%
Escherichia coli (MPN)	3	8	37.5%
Iron	2	8	25.0%
Nitrogen- Total	3	8	37.5%
pH	2	8	25.0%
Phosphorus- Total	7	8	87.5%
Faka Union (North Segment)	**10**	**873**	1.1%
BC10	**4**	**466**	0.9%
Dissolved Oxygen Saturation	4	22	18.2%
FAKA858	**6**	**407**	1.5%
Dissolved Oxygen Saturation	2	12	16.7%
Iron	4	12	33.3%
Faka Union (South Segment)	**14**	**1229**	1.1%
BC11S	**6**	**406**	1.5%
Dissolved Oxygen Saturation	6	12	50.0%
BC9	**6**	**406**	1.5%
Dissolved Oxygen Saturation	5	12	41.7%
Iron	1	12	8.3%
FAKA	**2**	**417**	0.5%
Dissolved Oxygen Saturation	2	13	15.4%
Fakahatchee Strand	**13**	**408**	3.2%
BC19	**13**	**408**	3.2%
Chlorophyll a- corrected	2	12	16.7%
Dissolved Oxygen Saturation	9	12	75.0%
Escherichia coli (MPN)	1	12	8.3%
Nitrogen- Total	1	12	8.3%
Gordon River Extension	**45**	**788**	5.7%

WBID STATION Parameter	# of Exceedances	# of Samples Collected	% Samples in Exceedance
GORDONRIV	**38**	**416**	9.1%
Dissolved Oxygen Saturation	10	13	76.9%
Enterococci (MPN)	3	3	100.0%
Escherichia coli (MPN)	3	12	25.0%
Nitrogen- Total	12	12	100.0%
Phosphorus- Total	10	12	83.3%
GRE896	**7**	**372**	1.9%
Dissolved Oxygen Saturation	2	11	18.2%
Escherichia coli (MPN)	1	11	9.1%
Nitrogen- Total	3	11	27.3%
Phosphorus- Total	1	10	10.0%
Haldeman Creek (Lower)	**17**	**419**	4.1%
BC5	**17**	**419**	4.1%
Chlorophyll a- corrected	2	12	16.7%
Dissolved Oxygen Saturation	5	14	35.7%
Enterococci (MPN)	8	12	66.7%
Phosphorus- Total	2	12	16.7%
Haldeman Creek (Upper)	**25**	**1034**	2.4%
HALDUP	**2**	**478**	0.4%
Enterococci (MPN)	1	3	33.3%
Phosphorus- Total	1	14	7.1%
WINPARK	**23**	**556**	4.1%
Chlorophyll a- corrected	1	16	6.3%
Dissolved Oxygen Saturation	6	17	35.3%
Enterococci (MPN)	1	3	33.3%
Escherichia coli (MPN)	6	17	35.3%
Phosphorus- Total	9	16	56.3%
Immokalee Basin	**20**	**322**	6.2%
IMKSLGH	**20**	**322**	6.2%
Dissolved Oxygen Saturation	9	9	100.0%
Escherichia coli (MPN)	1	9	11.1%
Iron	1	9	11.1%
Nitrogen- Total	1	9	11.1%
Phosphorus- Total	8	9	88.9%
Lake Trafford	**174**	**1274**	13.7%
LKTRAF1	**75**	**564**	13.3%
Chlorophyll a- corrected	20	20	100.0%
Nitrogen- Total	20	20	100.0%

WBID STATION Parameter	# of Exceedances	# of Samples Collected	% Samples in Exceedance
pH	15	37	40.5%
Phosphorus- Total	20	20	100.0%
LKTRAF4	**53**	**381**	13.9%
Chlorophyll a- corrected	13	13	100.0%
Nitrogen- Total	14	14	100.0%
pH	12	24	50.0%
Phosphorus- Total	14	14	100.0%
LKTRAF8	**46**	**329**	14.0%
Chlorophyll a- corrected	14	14	100.0%
Dissolved Oxygen Saturation	1	15	6.7%
Nitrogen- Total	14	14	100.0%
pH	3	15	20.0%
Phosphorus- Total	14	14	100.0%
North Golden Gate	**59**	**4118**	1.4%
CORK@846	**3**	**406**	0.7%
Dissolved Oxygen Saturation	3	12	25.0%
CORK3	**23**	**380**	6.1%
Chlorophyll a- corrected	2	11	18.2%
Dissolved Oxygen Saturation	11	12	91.7%
Escherichia coli (MPN)	1	11	9.1%
Iron	3	11	27.3%
Nitrogen- Total	5	11	45.5%
Phosphorus- Total	1	12	8.3%
CR951S	**1**	**406**	0.2%
Escherichia coli (MPN)	1	12	8.3%
CYPR13NW	**5**	**406**	1.2%
Chlorophyll a- corrected	1	12	8.3%
Dissolved Oxygen Saturation	3	12	25.0%
Iron	1	12	8.3%
GGC@858	**14**	**467**	3.0%
Chlorophyll a- corrected	1	12	8.3%
Dissolved Oxygen Saturation	7	22	31.8%
Iron	5	12	41.7%
Turbidity	1	12	8.3%
GGC@WHITE	**6**	**448**	1.3%
Dissolved Oxygen Saturation	5	19	26.3%
Iron	1	12	8.3%
GGC31SW	**3**	**406**	0.7%

WBID STATION Parameter	# of Exceedances	# of Samples Collected	% Samples in Exceedance
Dissolved Oxygen Saturation	3	12	25.0%
GGCAT31	**3**	**419**	0.7%
Dissolved Oxygen Saturation	2	14	14.3%
Iron	1	12	8.3%
I75W1	**1**	**407**	0.2%
pH	1	12	8.3%
Okaloacoochee Slough	**2**	**68**	2.9%
OKALA858	**2**	**68**	2.9%
Dissolved Oxygen Saturation	2	2	100.0%
Rock Creek	**26**	**407**	6.4%
ROCKCRK	**26**	**407**	6.4%
Chlorophyll a- corrected	1	12	8.3%
Dissolved Oxygen Saturation	12	12	100.0%
Enterococci (MPN)	12	12	100.0%
Phosphorus- Total	1	12	8.3%
Rookery Bay (Inland East Segment)	**46**	**1629**	2.8%
BC22	**4**	**438**	0.9%
Dissolved Oxygen Saturation	4	17	23.5%
HEC245	**8**	**406**	2.0%
Chlorophyll a- corrected	2	12	16.7%
Dissolved Oxygen Saturation	3	12	25.0%
Escherichia coli (MPN)	1	12	8.3%
Nitrogen- Total	2	12	16.7%
SANDPIPE	**7**	**408**	1.7%
Chlorophyll a- corrected	3	12	25.0%
Iron	4	12	33.3%
TAMTOM	**27**	**377**	7.2%
Dissolved Oxygen Saturation	11	11	100.0%
Enterococci (MPN)	2	3	66.7%
Escherichia coli (MPN)	1	11	9.1%
Iron	1	11	9.1%
Nitrogen- Total	1	11	9.1%
Phosphorus- Total	10	11	90.9%
Turbidity	1	11	9.1%
Rookery Bay (Inland West Segment)	**29**	**1475**	2.0%
EAGLECRK	**4**	**411**	1.0%

WBID STATION Parameter	# of Exceedances	# of Samples Collected	% Samples in Exceedance
Chlorophyll a- corrected	2	12	16.7%
Copper	2	12	16.7%
LELY	**3**	**419**	0.7%
Dissolved Oxygen Saturation	1	13	7.7%
Escherichia coli (MPN)	2	12	16.7%
LMB00	**4**	**136**	2.9%
Dissolved Oxygen Saturation	3	4	75.0%
Escherichia coli (MPN)	1	4	25.0%
LMB01	**2**	**136**	1.5%
Dissolved Oxygen Saturation	1	4	25.0%
Iron	1	4	25.0%
RATTLESN	**16**	**373**	4.3%
Chlorophyll a- corrected	1	11	9.1%
Dissolved Oxygen Saturation	9	11	81.8%
Escherichia coli (MPN)	3	11	27.3%
Nitrogen- Total	3	11	27.3%
Silver Strand	**62**	**780**	7.9%
BRN	**21**	**408**	5.1%
Dissolved Oxygen Saturation	11	12	91.7%
Iron	6	12	50.0%
Phosphorus- Total	4	12	33.3%
IMKBRN	**41**	**372**	11.0%
Chlorophyll a- corrected	1	11	9.1%
Dissolved Oxygen Saturation	10	11	90.9%
Iron	9	11	81.8%
Nitrogen- Total	7	11	63.6%
pH	3	11	27.3%
Phosphorus- Total	11	11	100.0%
Wiggins Bay Outlet	**8**	**373**	2.1%
WIGGINSBY	**8**	**373**	2.1%
Dissolved Oxygen Saturation	4	11	36.4%
Escherichia coli (MPN)	1	11	9.1%
Iron	3	11	27.3%