Surfacewater Quality and Biological Annual Report
2003

March 2004

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Surfacewater Quality and Biological
Annual Report
2003

SUWANNEE RIVER WATER MANAGEMENT DISTRICT

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Introduction

The Suwannee River Water Management District (SRWMD) established an ambient surfacewater quality monitoring network in 1989, as a priority project of the Surface Water Improvement and Management (SWIM) program. The network's purpose is twofold: to determine the water quality status of the priority water bodies within the District, and to identify changing conditions in water quality.

The network provides water quality data from water chemistry and aquatic biological samples. Analysis of the data identifies seasonal variations and long-term trends in water quality and helps determine if land use practices affect water quality and aquatic ecological communities.

Surfacewater Quality Network

The network includes a total of 67 stations sampled for baseline water chemistry (Figure 1). The network includes 67 water chemistry stations, 23 aquatic biology stations, and 29 bacteria stations (Table 1). Table 2 shows the network parameter list. Most stations are co-located with District or U.S. Geological Survey discharge stations.

Biological Monitoring Network

Over the past decade, the concept of water quality has expanded beyond consideration of the substances dissolved or suspended in the water. Water quality now refers to the overall ecological integrity or "health" of a river, lake or estuary, which includes hydrology, water chemistry, habitat quality and biology. An important part of the District's surfacewater monitoring program is sampling of different types of aquatic fauna and flora to evaluate the health of our surface waters. Both nationally and at a state level, it is now recognized that an effective surfacewater quality monitoring program must include biological sampling to get a true picture of "water quality".

In the District's monitoring program, two groups of aquatic organisms are sampled: benthic invertebrates and algae. These two groups of organisms have been used for many years to assess water quality. The methods used to sample them are well-established, and it has been shown scientifically that populations of these organisms exhibit characteristic responses to various kinds of pollution stress.

Benthic invertebrates are generally small, invertebrate animals which live on or in the bottom environment of a river, lake, or estuary. Benthic refers to bottom-dwelling. Examples of these animals are snails, clams, crayfish, shrimp, aquatic insects, and aquatic worms. We use several types of sampling gear to collect benthic invertebrates. The two most commonly used gear types in our program are Hester-Dendy multiplate samplers (in larger rivers such as the Suwannee and Santa Fe), and D-frame dip nets (in smaller streams which can be waded). The Hester-Dendy samplers are an artificial substrate. These are suspended in the water for 4

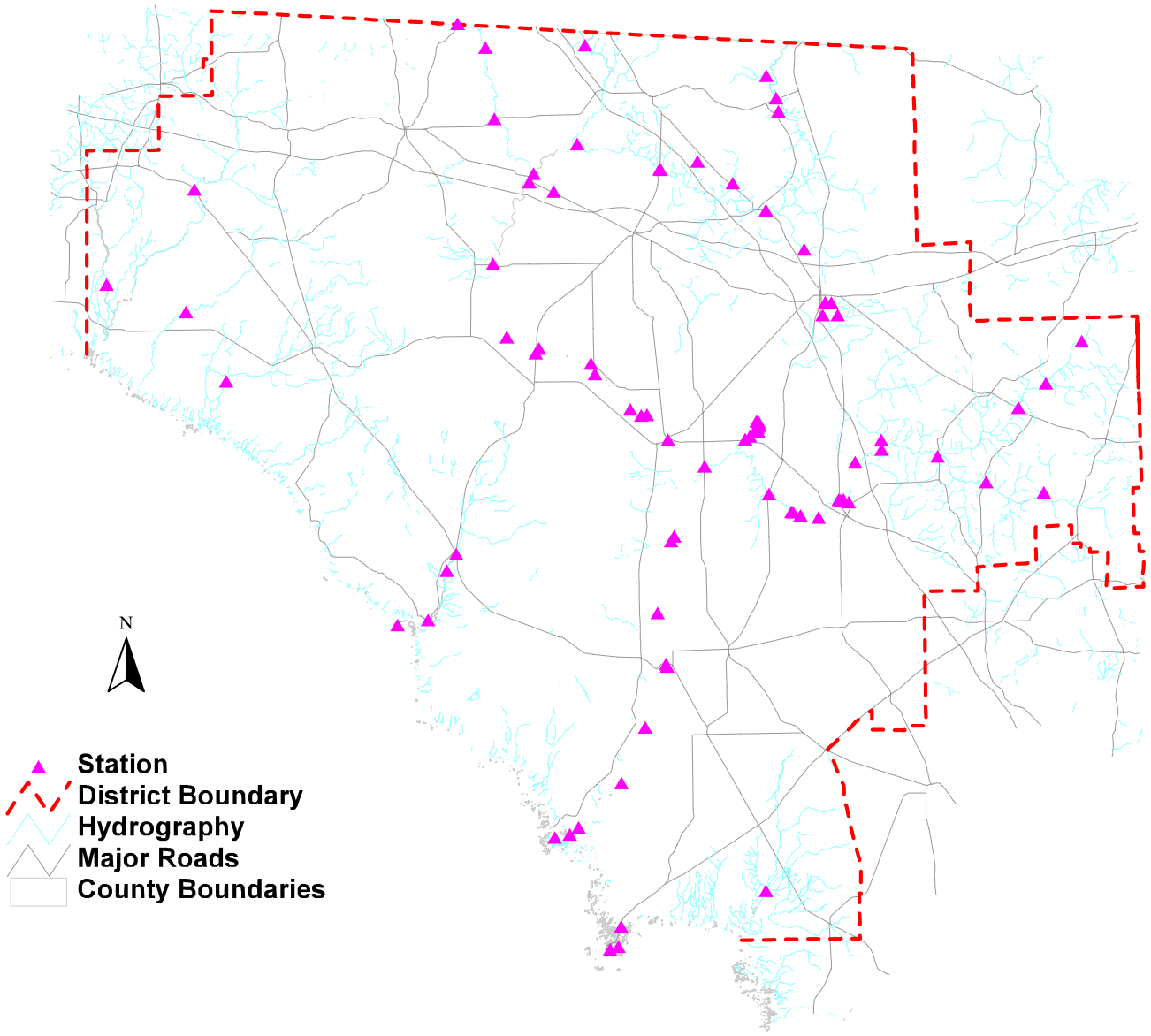

Figure 1. SRWMD surfacewater quality monitoring network.

Table 1. SRWMD combined water quality monitoring stations, sample type, and sampling event.

Station ID	Station Location	Sampling Activity			
		Chemistry	Biological	Bacteria	Discharge
Alligator Lake					
ALL010C1	Alligator Lake North Lobe	b			
ALL020C1	Alligator Lake West End	b	q		
ALL030C1	Alligator Lake South Lobe	b	q		
PRI050C1	Price Creek near Lake City	b			
Aucilla River					
AUC050C1	Aucilla River @ US 27	m	q		
WAS010C1	Wacissa River Near Wacissa	m			
Cedar Key					
CKF010C1	Channel 4 near Old Bridge	b		b	
CKF020C1	Near Fishing pier	b		b	
CKF030C1	North of pier	b		b	
Econfina River					
ECN010C1	Econfina River near Cabbage Grove	m	q		
Fenholloway River					
FEN030C1	Fenholloway River below Spring Creek	q			
Steinhatchee River					
STN030C1	Steinhatchee River near Cross City	m		m	
STN031C1	Steinhatchee River above falls	q	q		
STN040C1	Steinhatchee River @ Steinhatchee	q			
Santa Fe River					
ALA112971	Unnamed Spring	t			t
BLU010C1	Blue Springs (Gilchrist Co.)	t			t
COL010C1	Columbia Springs	t			t
GIN010C1	Ginnie Springs	t			t
HOR010C1	Hornsby Spring	m			b
ICH010C1	Ichetucknee River @ US 27	m			
NEW007C1	New River @ SR-125	b		b	
NEW008C1	New River @ SR-229 near Raiford	b		b	
NEW009C1	New River @ SR 100	b		b	
OLS010C1	Olustee Creek @ SR 18	q			
POE010C1	Poe Springs	m			b
SFR020C1	Santa Fe River @ Brooker	m	q		

Table 1. Continued.

Station ID	Station Location	Sampling Activity			
		Chemistry	Biological	Bacteria	Discharge
	Santa Fe River				
SFR030C1	Santa Fe River @ Worthington Springs	m	q		
SFR040C1	Santa Fe River @ O'leno State Park	m	q	m	
SFR050C1	Santa Fe River @ US 441	m	q	m	
SFR060C1	Santa Fe River @ SR 47	m	q	m	
SFR070C1	Santa Fe River @ US 129	m	q	m	
SMR010C1	Sampson River above Santa Fe River	b			
	Suwannee River				
ALA010C1	Alapaha River @ CR 150	m	q		
ALR010C1	Alapaha Rise	t			t
CMP010C1	Camp Branch @ C-132	q		q	q
FAL020C1	Falling Creek @ C-131	q	q	q	
FAN010C1	Fannin Springs	m			b
HAR010C1	Hart Springs	t			t
HNT010C1	Hunter Creek @ CR 135	q			
LBS010C1	Lafayette Blue Springs	m			b
LRS010C1	Little River Springs	m			b
MAN010C1	Manatee Springs	m			b
RKB010C1	Rock Bluff Springs	m			b
RLS010C1	Ruth/Little Sulfur Springs	m			b
ROK010C1	Rocky Creek @ Woodpecker Road	q			
SBL010C1	Suwannee Blue Springs	m			b
SUW010C1	Suwannee River @ SR 6	m	q	m	
SUW040C1	Suwannee River @ White Springs	m		m	
SUW070C1	Suwannee River @ Suwannee Springs	m	q	m	
SUW100C1	Suwannee River below US 90	m	q	m	
SUW120C1	Suwannee River @ Dowling Park	m		m	
SUW130C1	Suwannee River @ Luraville	m	q	m	
SUW140C1	Suwannee River @ Branford	m	q	m	
SUW150C1	Suwannee River near Rock Bluff	m	q	m	
SUW160C1	Suwannee River near Wilcox	m		m	
SUW240C1	Suwannee River @ Fowler's Bluff	m	q	m	
SUW275C1	Suwannee River @ Gopher River	m		m	

Table 1. Continued.

Station ID	Station Location	Sampling Activity			
		Chemistry	**Biological**	**Bacteria**	**Discharge**
	Suwannee River				
SUW285C1	Suwannee River in East Pass	m		m	
SUW305C1	Suwannee River in West Pass	m		m	
SWF010C1	Swift Creek @ US 41	m		m	
TEL010C1	Telford Spring	m			b
TRY010C1	Troy Spring	m			b
WIT010C1	Withlacoochee River @ CR 145	m	q	m	
WIT020C1	Withlacoochee River near Pinetta	b		b	
WIT040C1	Withlacoochee River above the Suwannee River	m	q	m	
	Waccasassa River				
WAC010C1	Waccasassa River near Gulf Hammock	m	q	m	

m = monthly monitoring

b = bimonthly monitoring

q = quarterly monitoring

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Table 2. Parameters list for the monitoring network.

PARAMETERS	UNITS	STORET	METHOD	HOLDING TIMES	PRESERVATIVE	MDL
WATER QUALITY						
Field Parameters						
Sample Depth	meters	82048				
Total Depth	meters	82903				
Water Temperature	ºC	10	170.1 EPA			
pH	su	400	150.1 EPA			
Dissolved Oxygen--Probe	mg L^{-1}	299	360.1 EPA			
Conductivity Field	µmho cm^{-1}	94	120.1 EPA			
Conductivity at 25C	µmhos cm^{-1}	95	120.1 EPA			
River Stage	ft, NGVD	65				
Discharge	cfs	61				
Secchi Disk	meters	78				
Salinity	$^0/_{00}$	480	120.1 EPA			
Physical/Biological						
Color	PCU	81	110.2 EPA	48 hrs	Cool, 4ºC	5
Turbidity	NTU	82079	180.1 EPA	48 hrs	Cool, 4ºC	0.04
TDS	mg L^{-1}	515	160.1 EPA	7 days	Cool, 4ºC	2.8
Alkalinity	mg L^{-1}	410	310.1 EPA	14 days	Cool, 4ºC	0.3
TOC	mg L^{-1}	680	415.1 EPA	28 days	4ºC, H_2SO_4	0.07
DOC	mg L-1	681	5310B SM	28 days	4ºC, Dark, H_2SO_4	0.07
Chlorophyll *a*	µg L^{-1}	32223	10200 SM	30 days	14 d in dark	0.5
Chlorophyll *b*	µg L^{-1}	70973	10200 SM	30 days	14 d in dark	0.5
Chlorophyll *c*	µg L^{-1}	32214	10200 SM	30 days	14 d in dark	0.5
Pheophytin *a*	µg L^{-1}	32218	10200 SM	30 days	14 d in dark	0.5
Major Ions						
Potassium	mg L^{-1}	937	6010EPA/258.1	6 months	HNO_3, pH<2	0.028
Sodium	mg L^{-1}	929	6010EPA/273.1	6 months	HNO_3, pH<2	0.044
Magnesium	mg L^{-1}	927	6010EPA/242.1	6 months	HNO_3, pH<2	0.028
Calcium	mg L^{-1}	916	6010EPA/215.1	6 months	HNO_3, pH<2	0.1
Chloride	mg L^{-1}	940	325.3 EPA	28 days	Cool, 4ºC	1
Fluoride	mg L^{-1}	951	300.0 EPA	28 days	Cool, 4ºC	0.02
Sulfate	mg L^{-1}	945	375.4 EPA	28 days	Cool, 4ºC	0.8
Nutrients						
Nitrate+nitrite-nitrogen	mg L^{-1}	630	353.3 EPA	28 days	4ºC, H_2SO_4	0.01
TKN	mg L^{-1}	625	351.2 EPA	28 days	4ºC, H_2SO_4	0.04
Ammonia Nitrogen	mg L^{-1}	610	350.1 EPA	28 days	4ºC, H_2SO_4	0.02
Total Phosphorus	mg L^{-1}	665	365.2 EPA	28 days	4ºC, H_2SO_4	0.004
Orthophosphate	mg L^{-1}	671	365.2 EPA	48 hrs	Cool, 4ºC	0.002
Bacteria						
Total Coliform	col/100	31503	9222B SM	24 hrs	Cool, 4ºC	1
Fecal Coliform	col/100	31616	9222D SM	24 hrs	Cool, 4ºC	1
Fecal Streptococci	col/100	31673	9230C SM	24 hrs	Cool, 4ºC	1
BIOLOGICAL						
Hester-Dendy					EtOH	
Qualitatives					EtOH	
Periphyton					Formlin	

Shaded parameters indicate parameter graphically presented in this report.

weeks. During this time, the samplers are colonized by various invertebrates. After the 4 week period, the samplers are retrieved, returned to the lab, and analyzed. Dip nets are used in shallow streams which can be waded. Our technicians spend 10 minutes with the net sampling a length of stream. Invertebrates collected in the net are picked out, and they try to collect at least 100 organisms. These are returned to the lab for identification of the animals.

The algae sampled in the District's monitoring program are microscopic plants found in all rivers, lakes and estuaries. In rivers, the District samples periphytic algae; those living attached to hard surfaces. We use floating racks of glass microscope slides to collect these periphytic algae. Similar to the Hester-Dendy samplers, these are artificial substrate samplers which are suspended in the water for 4 weeks, then retrieved and analyzed.

DEFINITIONS OF BIOLOGICAL METRICS

The data from the aquatic biological sampling are presented as various numeric scores, or metrics, which are quantitative measures of the biological communities. An analogy to how these values describe biological "health" in surface waters is the various indices (or metrics) which define the condition or health of the nation's economy. The Dow Jones Industrial Average and the Consumer Price Index are numeric measures by which the condition of the national economy is measured. In a similar way, the biological metrics describe the status or health of the biological communities in our surface waters.

The metrics presented in this report are:

Benthic Invertebrate Taxa Richness - the total number of taxa (different kinds or species) of benthic invertebrates present. Higher numbers mean more taxa present, which generally reflects a healthier benthic invertebrate community due to better water quality and habitat conditions.

Benthic Invertebrate Diversity - an index which describes the composition of the benthic invertebrate community in terms of the number of taxa present and the extent to which the community is dominated by few or many taxa. Higher numbers mean higher diversity in the invertebrate community; meaning that the community is composed of an even mix of many different taxa. Lower diversity means that fewer taxa are present or that the community is dominated by only one or a few taxa. Lower diversity is generally indicative of some type of human disturbance or pollution.

Periphytic Algal Taxa Richness - the total number of taxa (particular kinds or species) of periphytic (attached to underwater objects) algae present. Higher numbers mean more taxa present, generally indicative of better water quality.

Results and Discussion

BIOLOGICAL MONITORING

Tables showing summaries of the biological metrics for each of the active biological monitoring sites are shown in Appendices C through E. Note that at some sites (those on the Suwannee and Santa Fe), both invertebrates and algae are monitored, while at other sites (those on other rivers) only invertebrates are monitored. In general, the biological data support the conclusions derived from the water chemistry data. Sampling sites which have fair water quality also tend to have lower scores for one or more biological metrics.

HYDROLOGIC CONDITIONS DURING WATER YEAR 2003

(October 1, 2002 through September 30, 2003)

Annual streamflow for the 2003 water year in the Suwannee River basin ranged from 90 to 233 percent of the long-term mean annual flow. Highest flows in the main stem of the Suwannee occurred during mid- to late March as a result of the El Nino frontal conditions which produced significant rain events beginning in December. In the Santa Fe sub-basin, highest flows also occurred during mid-March. Rainfall for the 2003 calendar year ended up about 1 inch above the District, with significantly greater than average amounts in February and March, but with sizeable deficits in January, April, November and December. Record monthly low flows from the preceding drought conditions of 1998-2002 persisted through November 2002 at several stations on the lower Santa Fe and Suwannee Rivers.

Most stations remained above average during the remainder of the year after the March flooding, but the lower Santa Fe River dropped to below average levels again from May forward. The Suwannee River, while much lower than average, did rebound from the previous year's record low levels. Coastal rivers experienced a wet year, with near-record levels occurring in February on the Fenholloway River and with higher than normal amounts again through the summer months.

Mean monthly flow for the 2002 and 2003 water years at the Suwannee River at Branford and the Santa Fe River near Fort White, are shown on Figures 2 and 3, respectively, along with the long-term mean monthly flow at those gaging stations.

Some qualification is required for the Suwannee River near Wilcox data. As the most downstream long-term station on the river, it has served as the river's primary integrator site for the purposes of water flow and quality assessments. During low flow periods, the gaging station is subject to variable backwater due to tidal influence. Since 1951, flow has been calculated by the variable backwater method, utilizing an auxiliary slope station 9 miles downstream. In 1999, a new method of calculation, index velocity, was implemented as a result of technological advances.

A preliminary comparison of the two methods indicates that the index velocity method will compute a lower flow than the variable backwater method. Over the past water year, this difference has been as great as 1,000 cubic feet per second—a significant portion of the overall flow at Suwannee River near Wilcox.

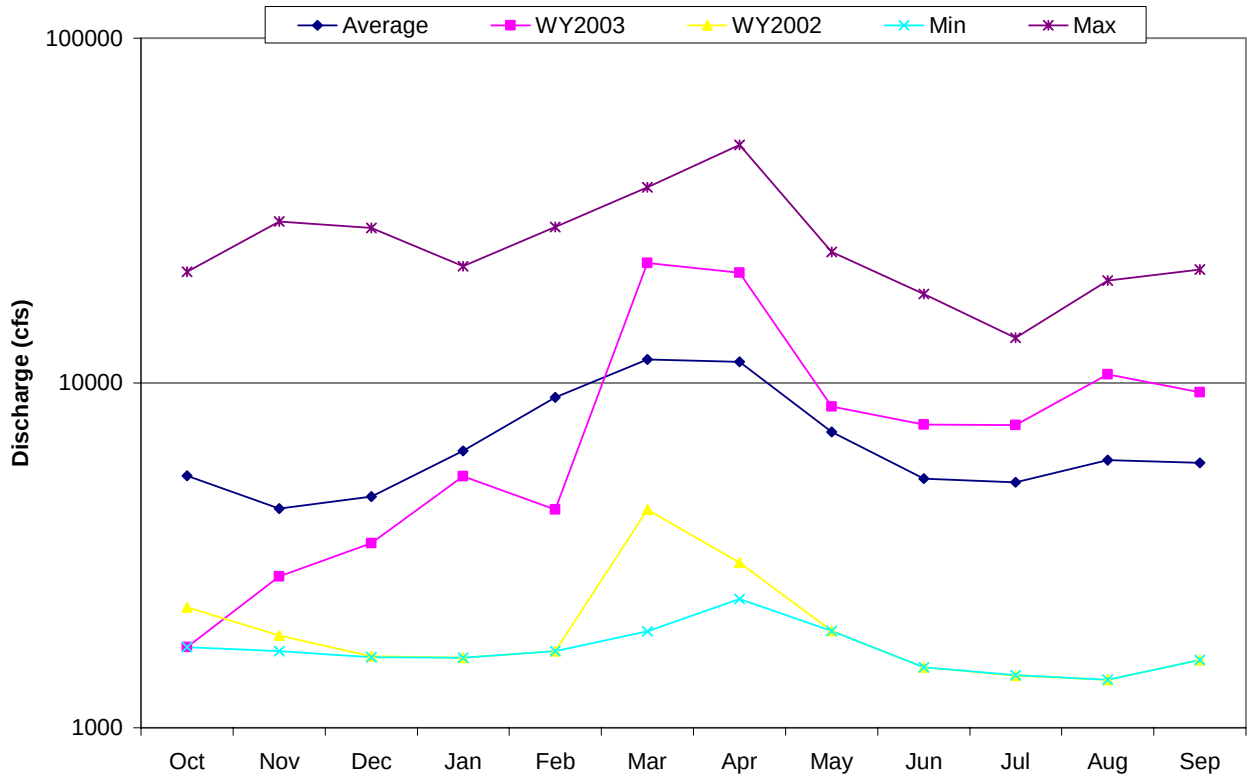

Figure 2. Monthly mean discharges for the Suwannee River at Branford for water years 2002 and 2003.

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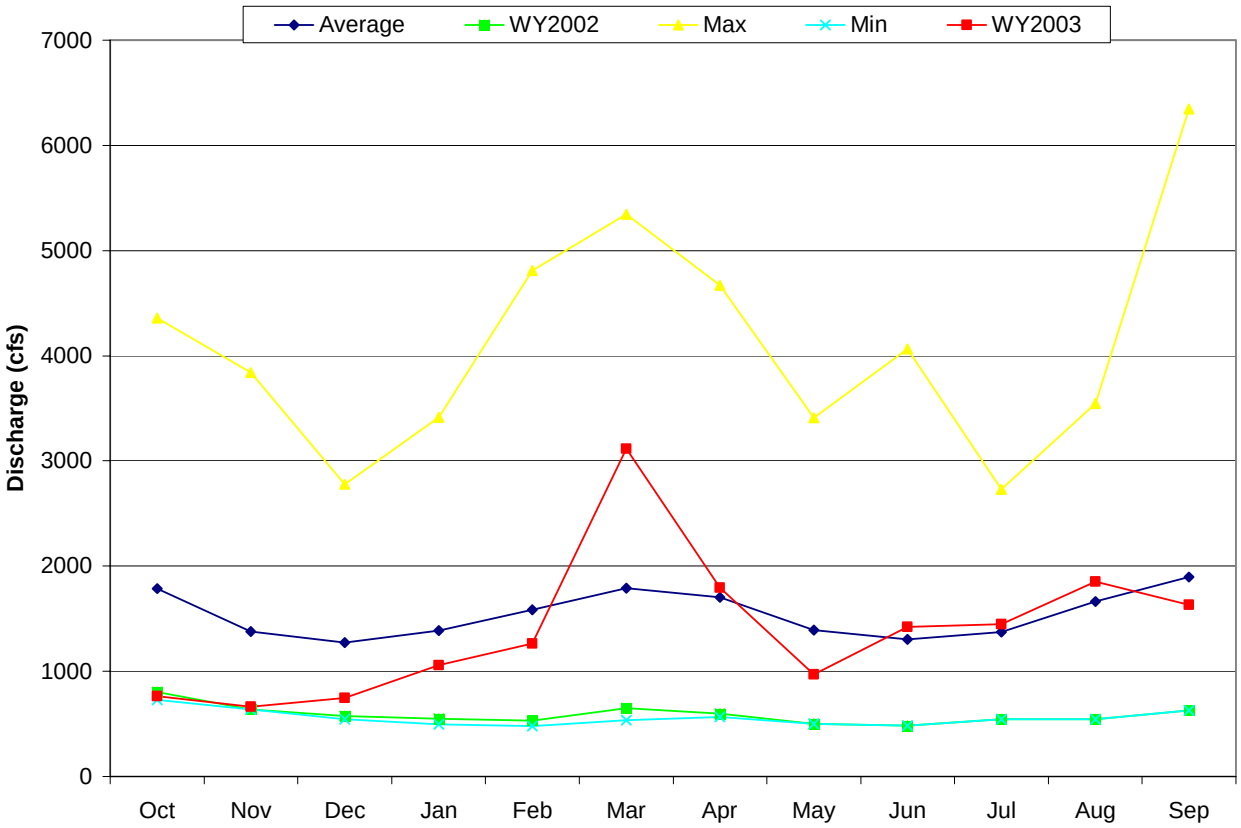

Figure 3. Monthly mean discharges for the Santa Fe River near Fort White for water years 2002 and 2003.

NUTRIENT LOADINGS FOR WATER YEAR 2003

In water year 2003, 4,591.4 tons of nitrate-nitrogen and 1,909.9 tons of total phosphorus were transported to the Gulf of Mexico by the Aucilla, Econfina, Fenholloway, Steinhatchee, Suwannee, and Waccasassa Rivers (Table 3). Of the total nitrate-nitrogen and total phosphorus that were transported to the Gulf of Mexico, the Suwannee River Basin accounted for 4,485.1 tons of nitrate-nitrogen and 1,627.2 tons of total phosphorus. The Middle Suwannee River Basin (Reach 3) covers 8.6% of the total Suwannee River Basin, and accounted for 29.3% of the annual nitrate-nitrogen load delivered to the Gulf by the Suwannee River. Reaches 5 and 6 of the Suwannee River covers 37.4% of the total Suwannee River Basin, and contributed 34.7% of the annual nitrate-nitrogen load and 31.9% of the annual total phosphorus load delivered to the Gulf by the Suwannee River (Table 4). Santa Fe River Reach 2 covers 5.7% of the total Suwannee River Basin, and accounts for 19.6% of the annual nitrate-nitrogen load delivered to the Gulf by the Suwannee River. Figure 4 provides a summary of relative nutrient loadings in the Suwannee River Basin.

The data from Water Year (WY) 2002 showed a large increase in the relative contribution of nitrate-nitrogen by the lower Suwannee reaches 5 and 6. Prior to WY2002, the District estimated the nitrate-nitrogen loadings for the Suwannee River Basin by using the nitrate-nitrogen concentration observed at the water quality station SUW275C1, located in the

Suwannee River above the confluence with Gopher River (Suwannee River above Gopher River) and the mean monthly discharge data collected at the U.S. Geological Survey (USGS) gaging station (Suwannee River near Wilcox). The discharge gaging station (Suwannee River near Wilcox) was the most downstream gaging station in the Suwannee River from October 1930 to June 1999.

As part of the District's Minimum Flows and Levels program, the District in cooperation with the USGS in June 1999, installed a discharge gaging station in the Suwannee River above Gopher River. After a calibration period (1999-2001) a flow rating was established and the District began to use the discharge data to estimate the loadings for the Suwannee River Basin in water year 2002. As a result of the new discharge data, the relative contributions of nitrate-nitrogen loads from the sub-basins of the Suwannee River changed. This change was due to an increase in discharge in the Suwannee River between the Wilcox gage (old) and the Above Gopher River gage (new). This increase in discharge between the two gages is due to previously unknown groundwater inputs into the river through the riverbed. The USGS conducted an in-stream discharge monitoring in the fall of 2002. The results of the in-stream monitoring are as follows:

Location	**Discharge**
Suwannee River near Wilcox (old station)	2,200 cfs
Fanning Springs	62 cfs
Manatee Springs	102 cfs
Suwannee River at Old Town	2,180 cfs
Suwannee River at Fowler's Bluff	3,050 cfs
Suwannee River above Gopher River (new station)	4,550 cfs

The data shows a net increase in discharge in the Suwannee River between the old and new gages of 2,350 cfs – a doubling. The change in loading is due to the previously unaccounted ground water entering the Suwannee River between the old and new gaging station containing similar nitrate-nitrogen concentration as the river.

Table 3. Nutrient loadings to the Gulf of Mexico for WY 2003 by river system.

	Annual Load (tons/yr)	
River System	**Nitrate-N**	**Total Phosphorus**
Aucilla River	8.5	57.4
Wacissa+	20.8	21.8
Econfina River	0.8	21.0
Fenholloway River	91.6	136.3
Steinhatchee River	0.9	59.7
Waccasassa River	4.5	8.3
Suwannee River	4,485.1	1,627.2
Alapaha River*	545.8	301.5
Withlacoochee River*	1,066.8	385.1
Withlacoochee - GA	890.0	374.9
Withlacoochee - FL	176.8	10.2
Santa Fe River*	725.6	240.6
Ichetucknee River#	84.8	59.7
New River#	7.1	32.9

* - Tributary of the Suwannee River
# - Tributary of the Santa Fe River
+ - Tributary of the Aucilla River

Table 4. Nutrient loadings by basin/reach in the Suwannee River Basin.

		Annual Load Contribution (tons/year)			
Contributing Basin	**Area (mi²)**	**Nitrate-N**	**% of Load**	**Total Phosphorus**	**% of Load**
Suwannee River Reach 1	2,430	34.3	0.8%	880.6	54.1%
Alapaha River	1,801	545.8	12.2%	301.5	18.5%
Withlacoochee River	2,382	1,066.8	23.8%	385.1	23.7%
Witlacoochee - GA	2,118	890.0	19.8%	374.9	23.0%
Witlacoochee - FL	264	176.8	3.9%	10.2	0.6%
Suwannee River Reach 2	443	-71.9	-1.6%	-162.1	-10.0%
Suwannee River Reach 3	824	1541.0	34.4%	176.1	10.8%
Santa Fe River Reach 1	820	29.6	0.7%	144.1	8.9%
Santa Fe River Reach 2	564	696.0	15.5%	96.5	5.9%
Suwannee River Reach 4	342	-204.6	-4.6%	-135.1	-8.3%
Suwannee River Reaches 5 & 6	344	848.0	18.9%	-59.4	-3.7%
Total	9,950	4,485.1	100%	1,627.2	100.0%

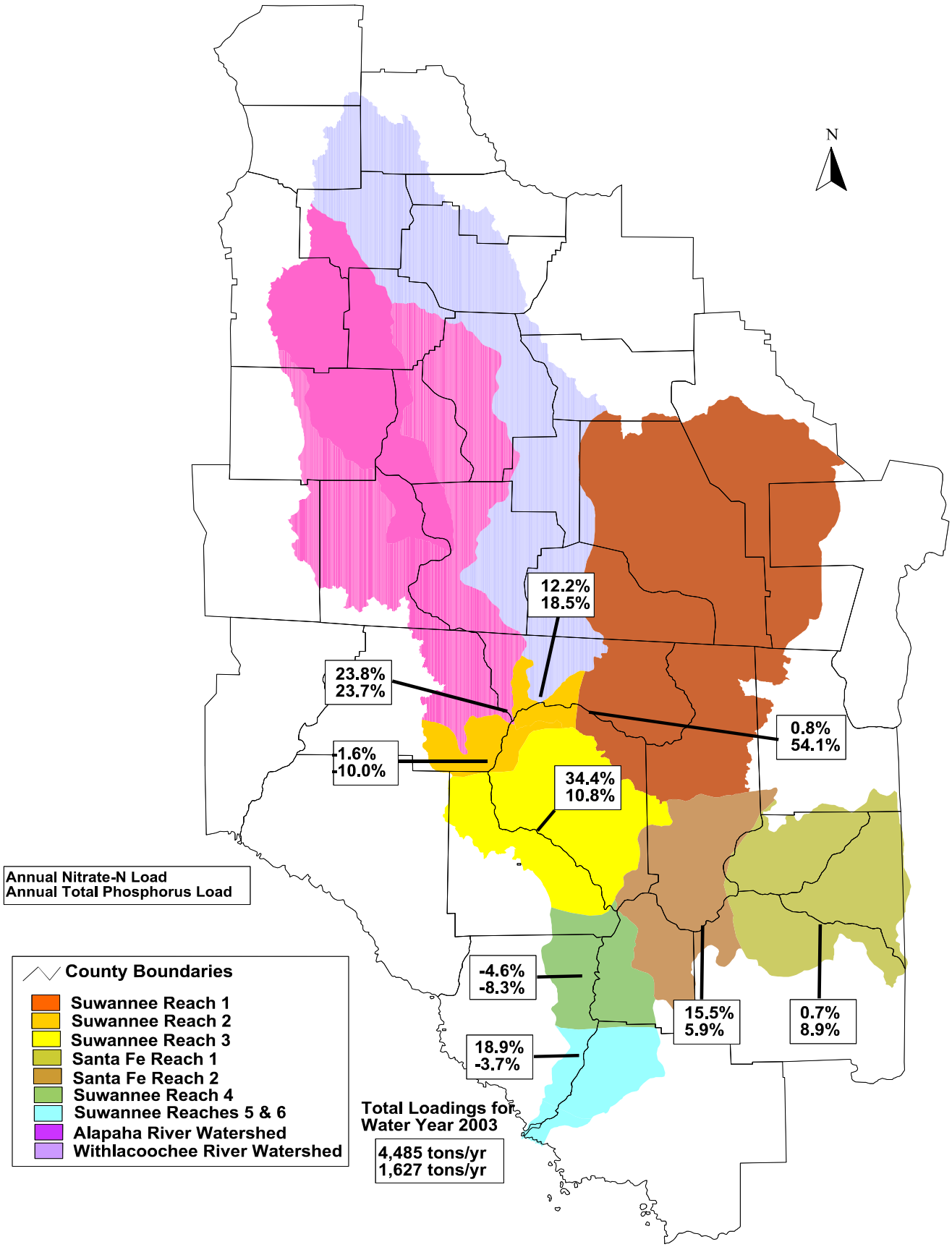

Figure 4. Nutrient loadings by basin/reach in the Suwannee River Basin.

Water Quality Ratings

Water quality conditions for each water body are qualitatively summarized with a rating of good, fair, and poor, based on water chemistry conditions. A poor or fair rating does not mean the water is unfit for human contact (swimming).

Based on the SRWMD water quality rating, sixteen water bodies, nine springs, and fourteen lakes are rated Good (Table 5). Twelve water bodies, eight springs, and eight lakes are rated Fair (Table 6). One water body, six springs, and six lakes are rated Poor (Table 7). There were two streams and rivers for which the water quality ratings improved from 2002 to 2003. One spring improved in its water quality rating from 2002 to 2003.

Reaches 3, 4, 5, and 6 of the Suwannee River are impacted by increasing nutrients (i.e., nitrate-nitrogen) [Figure 4]. Also, Reach 2 of the Santa Fe River shows nutrient enrichment similar to the Suwannee River (Figure 4).

Table 5. SRWMD rated water bodies – Good.

Rivers and Streams	***Springs***	***Lakes***
Aucilla River*	Alapaha Rise*	Altho#
Ichetucknee River*	COL61981*	Butler#
Steinhatchee River*	Columbia*	Cherry#
Price Creek*	Falmouth*	Crosby#
Econfina River*	Hornsby+	Desoto#
Santa Fe River Reach 1*	Poe*	Hampton#
Cedar Key*	Rock Bluff+	Little Santa Fe#
Sampson River*	Suwannee*	Santa Fe#
Wacissa River*	Treehouse#	Low#
Suwannee River Reach 1*		Sampson#
Suwannee River Reach 2*		Mystic#
Withlacoochee River*		Ocean Pond#
Alapaha River+		Palestine#
Olustee Creek*		Swift Creek Pond#
Wacissa River*		
Rocky Creek+		

* - Rating same as 2002
+ - Rating improved from 2002
** - Rating declined from 2002
# - Not rated in 2002

Table 6. SRWMD rated water bodies – Fair.

Rivers and Streams	***Springs***	***Lakes***
New River*	Gilchrist Blue*	Alligator*
Camp Branch*	Ginnie*	Jeffery#
Hunter Creek*	Hart*	Francis#
Suwannee River Reaches 6*	Hornsby*	Peacock#
Suwannee River Reaches 5*	Little River*	Waters#
Santa Fe River Reach 2*	Madison Blue*	Gwen#
Suwannee River Reaches 3*	Manatee*	Montgomery#
Suwannee River Reaches 4*	Troy*	Rowell#
Swift Creek*		
Suwannee Estuary*		
Falling Creek*		
Waccasassa River *		

* - Rating same as 2002
+ - Rating improved from 2002
** - Rating declined from 2002
# - Not rated in 2002

Table 7. SRWMD rated water bodies – Poor.

Rivers and Streams	***Springs***	***Lakes***
Fenholloway*	Fannin*	Hunt Pond#
	Lafayette Blue**	Snead's Smokehouse#
	Ruth*	Suwannee#
	SUW718971*	Watertown#
	Suwannee Blue*	White#
	Telford*	Watermelon Pond#

* - Rating same as 2002
+ - Rating improved from 2002
** - Rating declined from 2002
# - Not rated in 2002

Appendix A - Spring Survey

Twenty-two were monitored to assess groundwater effects on surfacewater quality. The majority of the springs are discharging ground water with nitrate-nitrogen concentrations greater than in the receiving water body. Spring discharges are typically above the background concentration of 0.05 mg L^{-1} for ground water from the Floridan aquifer system (Groundwater Quality Report 1997 [WR-98-02]). One spring had nitrate-nitrogen concentration in excess of the primary drinking water standard of 10 mg L^{-1}.

The relatively high concentrations of nitrate-nitrogen in the springs generally reflect the concentrations observed in the District's groundwater quality (Groundwater Quality Report 2003 [WR-03/04-02]).

The SRWMD environmental water quality (EWQ) rating is based on nitrate-nitrogen concentrations. The ranges and ratings were taken from "Nitrate Occurrence in U.S. Water; A Reference Summary of Published Sources from an Agricultural Perspective," published by the U.S. Department of Agriculture in 1991.

Range	**Rating**
Less than or equal to 0.6 mg L^{-1}	Good
0.6 to 1.8 mg L^{-1}	Fair
Greater than 1.8 mg L^{-1}	Poor

(Blank)

Springs Survey

STATID	Spring Name	Date	NOx-N (mg/L)	TP (mg/L)	Discharge (cfs)	NOx-N (ton/d)	TP (ton/d)	EWQ Rating
ALA112971	Treehouse	11/4/2002	0.08	0.2	18.5	0.004	0.010	Good
ALA112971	Treehouse	6/17/2003	0.04	0.27	415	0.045	0.302	Good
ALA112971	Treehouse	8/26/2003	0.06	0.318	739	0.120	0.634	Good
ALR010C1	Alapaha Rise	11/25/2002	0.21	0.1	487	0.276	0.131	Good
ALR010C1	Alapaha Rise	6/18/2003	0.24	0.16	473	0.306	0.204	Good
ALR010C1	Alapaha Rise	6/18/2003	0.25	0.15				Good
ALR010C1	Alapaha Rise	8/19/2003	0.06	0.128	656	0.106	0.226	Good
BLM010C1	Madison Blue	10/24/2002	1.11	0.06				Fair
BLM010C1	Madison Blue	11/13/2002	0.81	0.07	32.5	0.071	0.006	Fair
BLM010C1	Madison Blue	12/4/2002	0.86	0.05	100	0.232	0.013	Fair
BLM010C1	Madison Blue	12/4/2002	0.86	0.05				Fair
BLM010C1	Madison Blue	2/20/2003	1.1	0.08				Fair
BLM010C1	Madison Blue	5/21/2003	1.66	0.06	151	0.676	0.024	Fair
BLM010C1	Madison Blue	6/18/2003	1.59	0.06				Fair
BLM010C1	Madison Blue	7/14/2003	1.63	0.14				Fair
BLU010C1	Gilchrist Blue	10/30/2002	1.56	0.05	24.6	0.103	0.003	Fair
BLU010C1	Gilchrist Blue	11/20/2002	1.6	0.042				Fair
BLU010C1	Gilchrist Blue	12/10/2002	1.5	0.05	40.3	0.163	0.005	Fair
BLU010C1	Gilchrist Blue	12/10/2002	1.53	0.04		0.000	0.000	Fair
BLU010C1	Gilchrist Blue	1/14/2003	1.49	0.08				Fair
BLU010C1	Gilchrist Blue	2/24/2003	1.6	0.07				Fair
BLU010C1	Gilchrist Blue	3/10/2003	1.45	0.07				Fair
BLU010C1	Gilchrist Blue	4/9/2003	1.36	0.06	76.7	0.281	0.012	Fair
BLU010C1	Gilchrist Blue	5/22/2003	1.6	0.06	44.1	0.190	0.007	Fair
BLU010C1	Gilchrist Blue	6/23/2003	1.55	0.04	61.8	0.258	0.007	Fair
BLU010C1	Gilchrist Blue	7/1/2003	1.63	0.05				Fair
BLU010C1	Gilchrist Blue	8/25/2003	1.74	0.044	74	0.347	0.009	Fair
BLU010C1	Gilchrist Blue	9/8/2003	1.71	0.054				Fair
COL010C1	Columbia	11/4/2002	0.08	0.2	9.22	0.002	0.005	Good
COL010C1	Columbia	6/17/2003	0.02	0.29	212	0.011	0.166	Good
COL010C1	Columbia	6/17/2003	0.02	0.29				Good
COL010C1	Columbia	8/26/2003	0.09	0.316	395	0.096	0.337	Good

STATID	Spring Name	Date	NOx-N (mg/L)	TP (mg/L)	Discharge (cfs)	NOx-N (ton/d)	TP (ton/d)	EWQ Rating
COL61981	Un-Named	11/4/2002	0.07	0.15	34.2	0.006	0.014	Good
FAM010C1	Famounth	11/25/2002	0	0.22	0.37	0.000	0.000	Good
FAM010C1	Famounth	6/5/2003	0.39	0.06				Good
FAM010C1	Famounth	8/19/2003	0.56	0.071				Good
FAN010C1	Fannin	10/28/2002	4.4	0.08				Poor
FAN010C1	Fannin	11/11/2002	4.6	0.13				Poor
FAN010C1	Fannin	12/2/2002	4.8	0.06				Poor
FAN010C1	Fannin	1/13/2003	4.64	0.07				Poor
FAN010C1	Fannin	2/6/2003	4.4	0.08				Poor
FAN010C1	Fannin	2/17/2003	0	0.2				Poor
FAN010C1	Fannin	5/12/2003	3.92	0.11				Poor
FAN010C1	Fannin	6/2/2003	4.96	0.1				Poor
FAN010C1	Fannin	7/7/2003	5.2	0.08				Poor
FAN010C1	Fannin	8/4/2003	5.72	0.079				Poor
FAN010C1	Fannin	9/8/2003	5.55	0.09				Poor
GIN010C1	Ginnie	11/20/2002	1.19	0.042	40.1	0.129	0.005	Fair
GIN010C1	Ginnie	6/23/2003	1.11	0.04	33.9	0.101	0.004	Fair
GIN010C1	Ginnie	6/23/2003	1.1	0.04				Fair
GIN010C1	Ginnie	8/25/2003	1.16	0.044	38.1	0.119	0.005	Fair
HAR010C1	Hart	11/20/2002	1.28	0.06	40.8	0.141	0.007	Fair
HAR010C1	Hart	6/2/2003	0.87	0.1	66.3	0.156	0.018	Fair
HOR010C1	Hornsby	10/16/2002	0	0.26				Good
HOR010C1	Hornsby	11/20/2002	0.27	0.11				Good
HOR010C1	Hornsby	11/20/2002	0.25	0.11				Good
HOR010C1	Hornsby	4/10/2003	0.22	0.13	117	0.069	0.041	Good
HOR010C1	Hornsby	5/19/2003	0.47	0.12	63.4	0.080	0.021	Good
HOR010C1	Hornsby	6/12/2003	0.49	0.12	49.5	0.065	0.016	Good
HOR010C1	Hornsby	7/15/2003	0.37	0.17				Good
HOR010C1	Hornsby	8/18/2003	0.36	0.097	94	0.091	0.025	Good
HOR010C1	Hornsby	9/15/2003	0.39	0.107	110	0.116	0.032	Good
LBS010C1	Lafayette Blue	10/29/2002	1.89	0.06	40.8	0.208	0.007	Poor
LBS010C1	Lafayette Blue	11/5/2002	1.81	0.05				Poor
LBS010C1	Lafayette Blue	12/3/2002	1.45	0.05	53.9	0.211	0.007	Fair
LBS010C1	Lafayette Blue	2/18/2003	2.2	0.06	37.8	0.224	0.006	Poor
LBS010C1	Lafayette Blue	5/20/2003	2.36	0.09	160	1.018	0.039	Poor
LBS010C1	Lafayette Blue	5/20/2003	2.37	0.08				Poor

STATID	Spring Name	Date	NOx-N (mg/L)	TP (mg/L)	Discharge (cfs)	NOx-N (ton/d)	TP (ton/d)	EWQ Rating
LRS010C1	Little River	10/31/2002	1	0.05	25	0.067	0.003	Fair
LRS010C1	Little River	10/31/2002	1	0.05				Fair
LRS010C1	Little River	12/17/2002	1	0.04	39.1	0.105	0.004	Fair
LRS010C1	Little River	12/17/2002	0.98	0.04				Fair
LRS010C1	Little River	2/19/2003	0.99	0.04				Fair
LRS010C1	Little River	5/21/2003	0.49	0.06				Good
LRS010C1	Little River	5/21/2003	0.48	0.06				Fair
LRS010C1	Little River	6/12/2003	0.81	0.05				Fair
LRS010C1	Little River	6/12/2003	0.8	0.05				Fair
MAN010C1	Manatee	10/28/2002	1.78	0.05				Fair
MAN010C1	Manatee	11/11/2002	1.7	0.06				Fair
MAN010C1	Manatee	12/2/2002	1.52	0.04				Fair
MAN010C1	Manatee	1/14/2003	1.62	0.05				Fair
MAN010C1	Manatee	2/13/2003	1.8	0.06				Fair
MAN010C1	Manatee	3/13/2003	1.62	0.06				Fair
MAN010C1	Manatee	5/12/2003	1.46	0.06				Fair
MAN010C1	Manatee	6/2/2003	1.67	0.06				Fair
MAN010C1	Manatee	7/8/2003	1.6	0.04				Fair
MAN010C1	Manatee	8/4/2003	1.88	0.051				Poor
MAN010C1	Manatee	9/10/2003	1.64	0.045				Fair
POE010C1	Poe	10/30/2002	0.24	0.1	21	0.014	0.006	Good
POE010C1	Poe	10/30/2002	0.24	0.1				Good
POE010C1	Poe	11/20/2002	0.29	0.09				Good
POE010C1	Poe	12/2/2002	0.27	0.09	33	0.024	0.008	Good
POE010C1	Poe	1/7/2003	0.24	0.1				Good
POE010C1	Poe	2/24/2003	0.22	0.12	59.5	0.035	0.019	Good
POE010C1	Poe	4/8/2003	0.22	0.14	82.8	0.049	0.031	Good
POE010C1	Poe	5/13/2003	0.18	0.13				Good
POE010C1	Poe	6/10/2003	0.19	0.12	59.1	0.030	0.019	Good
POE010C1	Poe	7/14/2003	0.18	0.11				Good
POE010C1	Poe	7/14/2003	0.18	0.1				Good
POE010C1	Poe	8/26/2003	0.18	0.12	57.3	0.028	0.019	Good
POE010C1	Poe	8/26/2003	0.18	0.105				Good
POE010C1	Poe	9/3/2003	0.2	0.115				Good
RKB010C1	Rock Bluff	10/30/2002	0.64	0.07	12.9	0.022	0.002	Fair
RKB010C1	Rock Bluff	11/14/2002	0.6	0.07				Good

STATID	Spring Name	Date	NOx-N (mg/L)	TP (mg/L)	Discharge (cfs)	NOx-N (ton/d)	TP (ton/d)	EWQ Rating
RKB010C1	Rock Bluff	12/12/2002	0.58	0.06	19.2	0.030	0.003	Good
RKB010C1	Rock Bluff	2/13/2003	0.68	0.08	17.3	0.032	0.004	Fair
RKB010C1	Rock Bluff	2/13/2003	0.67	0.08				Fair
RKB010C1	Rock Bluff	6/10/2003	0.27	0.08				Good
RLS010C1	Ruth	10/31/2002	4.28	0.05	0.16	0.002	0.000	Poor
RLS010C1	Ruth	11/5/2002	3.91	0.08				Poor
RLS010C1	Ruth	12/17/2002	4.12	0.05				Poor
RLS010C1	Ruth	12/17/2002	4.04	0.05	3.57	0.039	0.000	Poor
RLS010C1	Ruth	2/19/2003	4.8	0.06	5.28	0.068	0.001	Poor
RLS010C1	Ruth	2/19/2003	4.8	0.06				Poor
RLS010C1	Ruth	5/21/2003	4.24	0.08				Poor
RLS010C1	Ruth	6/12/2003	7.6	0.06				Poor
SBL010C1	Suwannee Blue	10/29/2002	4.2	0.05	9.28	0.105	0.001	Poor
SBL010C1	Suwannee Blue	10/29/2002	4.2	0.05				Poor
SBL010C1	Suwannee Blue	11/5/2002	4.12	0.042				Poor
SBL010C1	Suwannee Blue	12/12/2002	5	0.04	12.4	0.167	0.001	Poor
SBL010C1	Suwannee Blue	2/20/2003	4	0.06	13.2	0.142	0.002	Poor
SBL010C1	Suwannee Blue	5/20/2003	7.2	0.06				Poor
SSS010C1	Suwannee	11/13/2002	0	0.14	1.82	0.000	0.001	Good
SSS010C1	Suwannee	6/5/2003	0	0.12	35.1	0.000	0.011	Good
SSS010C1	Suwannee	7/30/2003	0	0.143	24.1	0.000	0.009	Good
SUW718971	Un-Named	10/29/2002	15.4	0.05	3.78	0.157	0.001	Poor
SUW718971	Un-Named	11/5/2002	15.1	0.042				Poor
SUW718971	Un-Named	12/12/2002	17.2	0.04	3.63	0.168	0.000	Poor
SUW718971	Un-Named	2/20/2003	15	0.06	1.01	0.041	0.000	Poor
SUW718971	Un-Named	5/20/2003	10.9	0.06				Poor
TEL010C1	Telford	10/29/2002	2.19	0.07	20.4	0.120	0.004	Poor
TEL010C1	Telford	11/5/2002	2.13	0.06				Poor
TEL010C1	Telford	11/5/2002	2.05	0.06				Poor
TEL010C1	Telford	12/11/2002	1.69	0.05	21.1	0.096	0.003	Fair
TEL010C1	Telford	2/20/2003	2.3	0.08				Poor
TEL010C1	Telford	2/20/2003	2.3	0.08				Poor

STATID	Spring Name	Date	NOx-N (mg/L)	TP (mg/L)	Discharge (cfs)	NOx-N (ton/d)	TP (ton/d)	EWQ Rating
TEL010C1	Telford	5/20/2003	1.94	0.09				Poor
TEL010C1	Telford	6/16/2003	3.21	0.08				Poor
TRY010C1	Troy	10/31/2002	1.56	0.05	72.6	0.305	0.010	Fair
TRY010C1	Troy	11/5/2002	1.5	0.05				Fair
TRY010C1	Troy	12/17/2002	1.53	0.05				Fair
TRY010C1	Troy	2/19/2003	1.6	0.06				Fair
TRY010C1	Troy	5/21/2003	1.4	0.07				Fair

Appendix B – Station Locations

STATID	Station Location	Latitude	Longitude	County
ALA010C1	ALAPAHA RIVER NEAR JENNINGS FL AT C-150	303553	830424	Hamilton
ALA015C1	ALAPAHA RIVER @ SR6	303148	825740	Hamilton
ALA112971	UN-NAMED SPRING	295116.9	823610.6	Alachua
ALC002C1	ALIGATOR CREEK AT US301	295610	820645	Bradford
ALC005C1	ALIGATOR CREEK AT LAKE ROWELL	295507	820901	Bradford
ALC010C1	ALLIGATOR CREEK	295512	820915	Bradford
ALL010C1	ALLIGATOR LAKE NORTH LOBE EAST CORNER MID LAKE	301027	823710	Columbia
ALL020C1	ALLIGATOR LAKE N LOBE NW CORNER MID LAKE	301030	823749	Columbia
ALL030C1	ALLIGATOR LAKE S LOBE SE OF RADIO TWR MID LAKE	300916	823809	Columbia
ALN001C1	ALTON POND	300221	830826	Lafayette
ALT001C1	LAKE ALTHO	294640	820845	Alachua
ALT010C1	LAKE ALTHO AT WALDO FL	294623	820829	Alachua
AMN010C1	AMAN SINK NR WOODS CREEK	301024	833500	Taylor
AMP010C1	ALLEN MILL POND	300917.3	831417.1	Lafayette
ANS010C1	ANDERSON SPRING IN SUWANNEE RIVER	302111	831123.2	Suwannee
AUC050C1	AUCILLA RIVER AT US27	302211	834825	Jefferson
AUC100C1	AUCILLA RIVER NEAR US98	300900	835753	Taylor
BEL010C1	BELL SPRINGS IN GILCHRIST CO	293549.3	825630	Gilchrist
BET010C1	BETTY SPRINGS	295452.8	825024.6	Suwannee
BLM010C1	BLUE SPRING NR MADISON	302849	831440	Madison
BLU010C1	BLUE SPRING IN GILCHRIST COUNTY	294946.3	824059.7	Gilchrist
BON010C1	BONNET SPRINGS	300727	830818	Suwannee
BRA010C1	BRANFORD SPRINGS	295716.5	825542.8	Suwannee
BSB010C1	BLUE SPRING NEAR BRONSON	292702	824157	Levy
BSK010C1	BLUE SINK	302007.7	824830.9	Suwannee
BTS010C1	BATH TUB SPRINGS	300529.4	830554.6	Suwannee
BUT001C1	LAKE BUTLER	300158	822014	Union
CAN010C1	CANNON CREEK NEAR LAKE CITY	300735	823918	Columbia
CHN001C1	CHUNKY POND	292430	823740	Levy
CHS010C1	CHARLES SPRINGS	301000.8	831353	Suwannee
CHY001C1	CHERRY LAKE	303659	832447	Madison
CKF010C1	CHANNEL 4 NEAR OLD BRIDGE	290958	830136	Levy
CKF020C1	CEDAR KEY NEAR FISHING PIER	290801	830155	Levy
CKF030C1	CEDAR KEY NORTH OF PIER	290745	830252	Levy
CKS010C1	CORNER OF SR24 AND 3RD STREET	290808	830202	Levy
CKS020C1	CORNER OF 5TH STREET AND E STREET	290813	830208	Levy
CKS030C1	CORNER OF 1ST STREET AND B STREET	290809	830154	Levy
CMP010C1	CAMP BRANCH AT SR-132	302425	825154	Hamilton
COL010C1	COLUMBIA SPRINGS	295113.9	823643.1	Columbia
CON010C1	CONVICT SPRING	300517.6	830545.7	Lafayette
COP010C1	COPPER SPRINGS	293649.7	825826.1	Dixie
COW010C1	COW SPRINGS	300612.7	830654.4	Suwannee
CRS001C1	LAKE CROSBY	295630	820925	Bradford
CRS005C1	LAKE CROSBY	295656	820911	Bradford
CRS010C1	LAKE CROSBY	295633	820929	Bradford
CRS015C1	LAKE CROSBY	295625	820950	Bradford
DAR010C1	DARBY SPRINGS	295108.4	823622.4	Alachua
DEE010C1	DEER SPRINGS	295026.9	824227.3	Gilchrist

STATID	Station Location	Latitude	Longitude	County
DEP010C1	DEEP CREEK AT US 441	302155	823712	Columbia
DER010C1	DEVILS EAR	295006.3	824148.5	Gilchrist
DES001C1	LAKE DESOTO	301128	823801	Columbia
DOG010C1	DOGWOOD SPRINGS	295016.4	824207.2	Gilchrist
DSF003C1	COW CREEK NR FORT WHITE AT C-138	295120	824524	Gilchrist
DSF028C1	PARENERS BRANCH AT C-1491	295425	823206	Alachua
DSF901C1	ROCKY CREEK NR LACROSSE AT C-235	295023	822235	Alachua
DSU008C1	BETHEL CREEK AT SR-53	301518	831700	Lafayette
DSU010C1	LITTLE SUWANNEE CK AT US 441 IN GEORGIA	303712	823725	G102
DSU031C1	LITTLE CREEK AT US 441	302457	823814	Columbia
DSU035C1	SURGAR CREEK AT BRIDGE ON OLD US129	302351	825602	Hamilton
DYE010C1	DEVILs EYE	295005.7	824148.4	Gilchrist
ECN005C1	ECONFINA RIVER AT US27	301416	834209	Taylor
ECN015C1	ECONFINA RIVER AT US98	300833	835158	Taylor
ELL010C1	ELLAVILLE SPRINGS	302302.4	831021	Suwannee
FAL010C1	FALLING CREEK AT C-250	301422	823316	Columbia
FAL015C1	FALLING CREEK BRANCH AT DOUBLE RUN ROAD	301308	823753	Columbia
FAL020C1	FALLING CREEK AT C-131	301540	824007	Columbia
FAM010C1	FALMOUTH SPRINGS	302139.7	830806.2	Suwannee
FAN010C1	FANNING SPRINGS	293514.3	825607.7	Levy
FEN010C1	FENHOLLOWAY RIVER NEAR FOLEY AT US 27	300554	832819	Taylor
FEN020C1	FENHOLLOWAY RIVER AT FOLEY AT US 27	300357	833329	Taylor
FEN030C1	FENHOLLOWAY BELOW SPRING CK OFF C-136	300328	834458	Taylor
FRA001C1	LAKE FRANCIS	302757	832419	Madison
GIN010C1	GINNIE SPRINGS	295008.9	824200	Gilchrist
GUA010C1	GUARANTO SPRINGS	294645.1	825622.6	Dixie
GWN001C1	LAKE GWEN	301129	823909	Columbia
HAM001C1	LAKE HAMPTON	295120	821005	Bradford
HAM010C1	HAMPTON SPRING	300450	833945	Taylor
HAR010C1	HART SPRINGS	294028.9	825705.8	Gilchrist
HMP010C1	HAMPTON LAKE	295134	821010	Bradford
HNT010C1	HUNTER CREEK AT C-135 OR NEAR BELMONT	302909	824245	Hamilton
HOL010C1	HOLTON CREEK RISE	302614.1	830330	Hamilton
HOR010C1	HORNSBY SPRING NR HIGH SPRINGS	295100.4	823536	Alachua
HTC010C1	HAMILTON TURPENTINE CREEK NR GOV. CABIN	303342	830210	Hamilton
HTS010C1	HAMILTON TURPENTINE CREEK	303439	830347	Hamilton
HUN001C1	HUNT POND	300207	830855	Lafayette
ICH001C1	ICHETUCKNEE HEAD SPRING	295902.4	824543.3	Columbia
ICH002C1	BLUE HOLE SPRING VENT	295849.4	824531.2	Columbia
ICH003C1	MISSION SPRING VENT	295833.5	824528.2	Columbia
ICH004C1	DEVILS EYE SPRING VENT	295824.3	824537.1	Columbia
ICH005C1	MILL POND SPRING VENT	295759.1	824536.1	Columbia
ICH006C1	CEDAR HEAD SPRING	295860	824532.4	Columbia
ICH007C1	GRASSY HOLE	295805	824535.4	Columbia
ICH008C1	COFFEE SPRINGS	295733.5	824631.6	Suwannee
ICH010C1	ICHETUCKNEE RIVER .2 MI NORTH OF BRIDGE	295716	824703	Columbia
IRO010C1	IRON SPRINGS	294025	825727.3	Dixie
JAM010C1	JAMISON SPRINGS	295533	824612.4	Columbia

STATID	Station Location	Latitude	Longitude	County
JER010C1	JERRY BRANCH ABOVE I-75	302230	825148	Hamilton
JUL010C1	JULY SPRING	295009.8	824150	Columbia
LBS010C1	BLUE SPRINGS NR MAYO	300731.2	831332.1	Lafayette
LCP010C1	LITTLE COPPER	293756.9	825802.1	Dixie
LDS010C1	LITTLE DEVILS	295003.6	824149.8	Gilchrist
LFN010C1	LITTLE FANNING SPRINGS	293509.2	825604.4	Levy
LIL010C1	LILLY SPRINGS	294946	823941.2	Gilchrist
LIM010C1	LIME SPRINGS	302327.8	831010	Suwannee
LLS001C1	LITTLE LAKE SANTA FE	294620	820630	Alachua
LOU010C1	LOUISE SPRINGS	302047.4	824954.2	Hamilton
LRP010C1	LITTLE RIVER AT C-137	301123	824955	Suwannee
LRP020C1	LITTLE RIVER AT C-252	301001	825216	Suwannee
LRP030C1	LITTLE RIVER AT C-49	300938	825316	Suwannee
LRP040C1	LITTLE RIVER AT McALPIN ROAD (180TH STREET)	300723	825419	Suwannee
LRP050C1	LITTLE RIVER AT Mt. PISGAH ROAD (81 ROAD)	300606	825352	Suwannee
LRS010C1	LITTLE RIVER SPRINGS	295947.5	825758.6	Suwannee
LSF001C1	LAKE SANTA FE	294410	820440	Alachua
LSF010C1	SANTA FE LAKE NEAR KEYSTONE HEIGHTS	294450	820450	Alachua
LSM001C1	LAKE SAMPSON	295545	821120	Bradford
LSP010C1	PASS BETWEEN LITTLE SANTA FE AND SANTA FE LAKE	294537	820525	Alachua
LSR010C1	LIME RUN SINK	302319.4	830943.7	Suwannee
LUR010C1	LURAVILLE SPRINGS	300616.9	830837.2	Suwannee
MAN010C1	MANATEE SPRINGS	292921.3	825837.4	Levy
MAT010C1	MATTAIR SPRINGS	302241.1	825328	Suwannee
MCC010C1	McCRABB SPRINGS	294106.9	825737.7	Dixie
MEA010C1	MEARSON SPRINGS	300228	830130.9	Lafayette
MON001C1	LAKE MONTGOMERY	301102	823840	Columbia
MOR010C1	MORGAN SPRING	302511.9	831225.9	Hamilton
MYS001C1	MYSTIC LAKE	302855	832640	Madison
NEW007C1	NEW RIVER AT SR-125	300614	820913	Union
NEW008C1	NEW RIVER AT SR-229 NEAR RAIFORD	300213	821319	Union
NEW009C1	NEW RIVER NEAR LAKE BUTLER FL AT SR-100	295953	821627	Union
NEW010C1	NEW RIVER NEAR WORTHINGTON SPRINGS AT C-18	295535	822440	Union
OAS010C1	OASIS SPRINGS	295531.7	824649.5	Gilchrist
OCP001C1	OCEAN POND	301329	822611	Baker
OCP010C1	OCEAN POND AT OLUSTEE FL	301255	822631	Baker
OKE010C1	CANE CREEK	305654.7	823023.8	G068
OKE020C1	SUWANNEE CREEK	305715.1	822739.1	G299
OKE030C1	GUM SLOUGH	310036.5	820922.8	G299
OKE040C1	SUWANNEE SILL	304812.6	822504.4	G299
OLS010C1	OLUSTEE CREEK AT CR-18	295700	823149	Columbia
ORG010C1	ORANGE GROVE SPRING	300737.6	830751.3	Suwannee
OTT010C1	OTTER SPRINGS CAMPGROUND	293839.1	825638.3	Gilchrist
OWN010C1	OWENS SPRINGS	300244.8	830228.6	Lafayette
PAL001C1	LAKE PALESTINE	300712	822433	Union
PEA010C1	PEACOCK SPRING	300720.3	830757	Suwannee
PER010C1	PERRY SPRINGS	300546.8	831117.5	Lafayette
PIC010C1	PICKARD SPRINGS	294948.9	823943.5	Gilchrist

STATID	Station Location	Latitude	Longitude	County
PKL001C1	PEACOCK LAKE	301410	825355	Suwannee
PKS010C1	PEACOCK SLOUGH	300924	830956	Suwannee
POE010C1	POE SPRINGS IN ALACHUA COUNTY	294933.1	823859.9	Alachua
POT010C1	POTHOLE SPRING	294837.8	825609.8	Dixie
PRI050C1	PRICE CREEK AT C-133	300914	823629	Columbia
PTS010C1	POT SPRING	302814.4	831404	Hamilton
RKB010C1	ROCK BLUFF SPRING	294755.8	825507.3	Gilchrist
RKS010C1	ROCK SINK SPRING	294340.4	825657.4	Dixie
RLS010C1	RUTH/LITTLE SULFUR SPRINGS	295944.1	825837.2	Lafayette
ROB010C1	ROBINSON BRANCH AT C-246	301856	823841	Columbia
ROK010C1	ROCKY CREEK NEAR BELMONT	303240	824402	Hamilton
ROR010C1	ROARING CREEK AT C-135	302544	824105	Hamilton
ROS010C1	ROSE CREEK SINK HOLE	300409	824148	Columbia
ROW001C1	LAKE ROWELL	295515	820930	Bradford
ROW005C1	LAKE ROWELL NEAR ALLIGATOR CREEK	295508	820918	Bradford
ROW010C1	LAKE ROWELL	295522	820934	Bradford
ROW025C1	LAKE ROWELL NEAR OUTFALL TO LAKE SAMPSON	295516	820959	Bradford
ROY010C1	ROYAL SPRINGS	300500.6	830429.7	Suwannee
RUM010C1	RUM ISLAND SPRING	294959.1	824047.5	Columbia
RUN010C1	RUNNING SPRINGS	300614.9	830657	Suwannee
SAW010C1	SAWDUST SPRING	295023.5	824213.4	Columbia
SBL010C1	SUWANNEE BLUE SPRINGS	300452.6	830409.1	Suwannee
SCP001C1	SWIFT CREEK POND	300723	821753	Union
SCS010C1	SUWANACOOCHEE SPRINGS	302311.2	831018.6	Madison
SFR005C1	SANTA FE RIVER AT US 301	295021	820950	Bradford
SFR010C1	SANTA FE RIVER NEAR GRAHAM	295046	821311	Alachua
SFR020C1	SANTA FE RIVER NEAR BROOKER AT SR-231	295243	822012	Bradford
SFR030C1	SANTA FE RIVER AT WORTHINGTON SPRING	295518	822534	Alachua
SFR040C1	SANTA FE RIVER AT OLENO ST PARK	295451	823448	Columbia
SFR045C1	SANTA FE RISE	295225.4	823530.5	Columbia
SFR050C1	SANTA FE RIVER AT US-441 BRIDGE	295110	823631	Columbia
SFR060C1	SANTA FE RIVER AT SR 47 NEAR FORT WHITE	295153	824428	Columbia
SFR070C1	SANTA FE RIVER NEAR HILDRETH AT US 129	295441	825137	Gilchrist
SHN010C1	SHINGLE SPRINGS	295603	825514.5	Suwannee
SHY010C1	SHIRLEY SPRINGS	301237.9	831441.8	Suwannee
SMR010C1	SAMPSON RIVER AT CR18	295136	821347	Bradford
SRE010C1	SUWANNEE ESTUARY NEAR BULL CK	291725	830638	Levy
SRE020C1	MOUTH OF EAST PASS (SUWANNEE ESTUARY)	291632	830656	Levy
SRE030C1	EAST PASS CHANNEL @ 4TH MARKER	291611	830726	Levy
SRE040C1	ALLIGATOR PASS @ MARKER 11	291619	831005	Dixie
SRE050C1	ALLIGATOR PAS @ MARKER 21	291720	830955	Dixie
SRE060C1	ALLIGATOR PASS ABOVE SPLIT WITH WADLEY PASS	291839	830849	Levy
SRE070C1	WADLEY PASS @ MARKER 7	291819	831108	Dixie
SRE080C1	SALT CREEK @ MARKER 20	291924	830947	Dixie
SSL001C1	SNEAD'S SMOKEHOUSE LAKE	303543	834316	Jefferson
SSS010C1	SUWANNEE SPRINGS	302338.9	825604.2	Suwannee
STN010C1	STEINHATCHEE RIVER AT BEE POND	295743	831407	Lafayette
STN015C1	STEINHATCHEE SPRING	295030	831828	Lafayette

STATID	Station Location	Latitude	Longitude	County
STN020C1	STEINHATCHEE RIVER NEAR STEINHATCHEE SPRINGS	294948	831830	Lafayette
STN030C1	STEINHATCHEE RIV. NR. CROSS CITY, QW	294627	831927	Taylor
STN031C1	STEINHATCHEE RIVER ABOVE STEINHATCHEE FALLS	294449	832032	Dixie
STN040C1	STEINHATCHEE RIVER AT STEINHATCHEE	294004	832240	Taylor
STN050C1	STEINHATCHEE RIVER MOUTH	293949	832507	Dixie
STN060C1	STEINHATCHEE RIVER SOUND	293935	832604	Dixie
SUB010C1	SUNBEAM SPRINGS	295539.9	824612	Columbia
SUN010C1	SUN SPRINGS	294217.9	825601.8	Gilchrist
SUW010C1	SUWANNEE RIVER NEAR BENTON FL	303028	824300	Columbia
SUW020C1	SUW RIVER BELOW HUNTER CREEK	302858	824210	Hamilton
SUW030C1	SUW RIVER ABOVE WHITE SPRGS & US 441 ABOVE STP	301936	824417	Hamilton
SUW040C1	SUWANNEE RIVER AT WHITE SPR (US 41)	301933	824419	Columbia
SUW050C1	SUWANNEE RIVER ABOVE SWIFT CREEK	302028	824912	Suwannee
SUW060C1	SUWANNEE RIVER ABOVE I-75 BELOW SWIFT CREEK	302045	824948	Suwannee
SUW070C1	SUWANNEE RIVER AT SUW SPR AT OLD BRIDGE	302342	825610	Suwannee
SUW080C1	SUWANNEE RIVER ABOVE ALAPAHA RISE	302615	830515	Hamilton
SUW085C1	SUWANNEE RIVER BELOW ALAPAHA RIVER	302606	830607	Suwannee
SUW090C1	SUWANNEE RIVER ABOVE WITHLACOOCHEE RIVER	302329	831007	Suwannee
SUW100C1	SUWANNEE RIVER AT ELLAVILLE BELOW US 90	302237	831049	Suwannee
SUW110C1	SUWANNEE RIVER BELOW GOLD KIST DISCHARGE	302131	831137	Suwannee
SUW120C1	SUWANNEE RIVER AT DOWLING PARK	301441	831459	Suwannee
SUW130C1	SUWANNEE RIVER AT LURAVILLE FL	300556	831019	Suwannee
SUW140C1	SUWANNEE RIVER AT BRANFORD	295720	825540	Suwannee
SUW150C1	SUWANNEE RIVER NEAR ROCK BLUFF	294728	825528	Gilchrist
SUW160C1	SUWANNEE RIVER NEAR WILCOX	293529	825614	Gilchrist
SUW240C1	SUWANNEE RIVER AT FOWLER BLUFF	292357	830122	Levy
SUW275C1	SUWANNEE RIVER AT GOPHER RIVER	291941	830611	Dixie
SUW305C1	SUWANNEE RIVER IN WEST PASS	291844	830850	Dixie
SUW410C1	SUWANNEE RIVER IN EAST PASS	291802	830652	Levy
SWF010C1	SWIFT CREEK AT FACIL AT US 41	302214	824800	Hamilton
SWL001C1	SUWANNEE LAKE	301805	825550	Suwannee
TEL010C1	TELFORD SPRINGS	300623.5	830956.4	Suwannee
TEN010C1	TENMILE CREEK AT LEBANON STATION FL AT US 19	290940	823819	Levy
TOW001C1	TOWNSEND POND	300216	830708	Lafayette
TRA010C1	TRAIL SPRING GROUP	295353.4	825200.9	Gilchrist
TRY010C1	TROY SPRINGS	300021.1	825951.4	Lafayette
TUR010C1	TURTLE SPRINGS	295019.5	825325.6	Lafayette
TWN010C1	TWIN SPRINGS	295025	824221.4	Gilchrist
WAC005C1	WACCASASSA RIVER AT SR24	292115	824406	Levy
WAC010C1	WACCASASSA RIVER NR GULF HAMMOCK ON SR-326	291315	824529	Levy
WAL001C1	WATERS LAKE	294210	824400	Gilchrist
WAS001C1	WASH POND	300210	830801	Lafayette
WAS010C1	WACISSA RIVER NEAR WACISSA	301257	835818	Levy
WAT001C1	WATERTOWN LAKE	301136	823602	Columbia
WEK010C1	WEKIVA SPRINGS NEAR GULF HAMMOCK	291649	823923	Levy
WHL001C1	WHITE LAKE	301529	825428	Suwannee
WHS010C1	WHITE SPRINGS AT WHITE SPRINGS	301946.9	824540.1	Hamilton
WIL010C1	WILSON SPRINGS	295358.8	824531.4	Columbia

STATID	Station Location	Latitude	Longitude	County
WIN010C1	KARST WINDOW IN PEACOCK ST. PARK	300748	830807	Suwannee
WIT010C1	WITHLACOOCHEE RIVER AT STATE LINE AT C-145	303806	831842	Madison
WIT020C1	WITHLACOOCHEE RIVER NEAR PINETTA AT C-150	303545	831535	Madison
WIT030C1	WITHLACOOCHEE RIVER AT SR 6	302934	831430	Hamilton
WIT040C1	WITHLACOOCHEE RIVER ABOVE SUWANNEE RIVER	302324	831020	Hamilton
WMN001C1	WATERMELON POND	293240	823635	Alachua

Appendix C. Biological Data

DEFINITIONS OF BIOLOGICAL METRICS

The data from the aquatic biological sampling are presented as various numeric scores, or metrics, which are quantitative measures of the biological communities. An analogy to how these values describe biological "health" in surface waters is the various indices (or metrics), which define the condition or health of the nation's economy. The Dow Jones Industrial Average and the Consumer Price Index are numeric measures by which the condition of the national economy is measured. In a similar way, the biological metrics describe the status or health of the biological communities in our surface waters.

The metrics presented in this report are:

Benthic Invertebrate Taxa Richness - the total number of taxa (different kinds or species) of benthic invertebrates present. Higher numbers mean more taxa present, which generally reflects a healthier benthic invertebrate community due to better water quality and habitat conditions.

Benthic Invertebrate Diversity - an index which describes the composition of the benthic invertebrate community in terms of the number of taxa present and the extent to which the community is dominated by few or many taxa. Higher numbers mean higher diversity in the invertebrate community; meaning that the community is composed of an even mix of many different taxa. Lower diversity means that fewer taxa are present or that the community is dominated by only one or a few taxa. Lower diversity is generally indicative of some type of human disturbance or pollution.

Periphytic Algal Taxa Richness - the total number of taxa (particular kinds or species) of periphytic (attached to underwater objects) algae present. Higher numbers mean more taxa present, generally indicative of better water quality.

Suwannee River									
	SUW010	**SUW070**	**SUW100**	**SUW130**	**SUW140**	**SUW150**	**SUW240**	**SUW285**	**SUW305**
Fall 2002									
Invertebrate Taxa Richness	26.33	16.67	30.67	30.67	26.67	32.33	29.33	27.00	18.33
Invertebrate Diversity	3.91	2.70	4.32	3.84	3.18	3.22	3.94	3.85	3.01
Algal Taxa Richness	15	NS	13	7	18	21	20	16	21
Winter 2003									
Invertebrate Taxa Richness	23.00	LOST	LOST	31.67	26.67	31.00	28.67	16.00	18.33
Invertebrate Diversity	3.40	LOST	LOST	4.09	4.07	3.87	4.31	2.88	2.85
Algal Taxa Richness	LOST	NS	LOST	6	24	26	24	24	16
Spring 2003									
Invertebrate Taxa Richness	23.00	LOST	LOST	31.67	26.67	31.00	28.67	16.00	18.33
Invertebrate Diversity	3.40	LOST	LOST	4.09	4.07	3.87	4.31	2.88	2.85
Algal Taxa Richness	7	NS	LOST	19	25	22	11	13	LOST
Summer 2003									
Invertebrate Taxa Richness	18.33	18.50	21.67	18.50	22.33	22.33	18.00	16.33	20.33
Invertebrate Diversity	3.17	3.11	3.11	3.31	3.39	3.21	2.98	3.38	3.43
Algal Taxa Richness	10	NS	20	17	28	16	18	LOST	LOST
NS = No Samples collected at this site									
LOST = Sampler lost this quarter									

Santa Fe River						
	SFR020	**SFR030**	**SFR040**	**SFR050**	**SFR060**	**SFR070**
Fall 2002						
Invertebrate Taxa Richness	26.67	27.00	NS	19.67	NS	32.00
Invertebrate Diversity	3.99	4.16	NS	3.56	NS	4.29
Algal Taxa Richness	29	NS	23	NS	LOST	21
Winter 2003						
Invertebrate Taxa Richness	26.33	27.50	NS	25.67	NS	33.00
Invertebrate Diversity	3.69	3.54	NS	3.70	NS	4.12
Algal Taxa Richness	19	NS	LOST	NS	19	32
Spring 2003						
Invertebrate Taxa Richness	21.50	22.33	NS	28.00	NS	30.50
Invertebrate Diversity	3.21	3.49	NS	3.74	NS	3.77
Algal Taxa Richness	LOST	NS	10	NS	LOST	19
Summer 2003						
Invertebrate Taxa Richness	23.33	31.00	NS	26.67	NS	26.67
Invertebrate Diversity	3.34	4.16	NS	3.47	NS	3.41
Algal Taxa Richness	8	NS	11	NS	18	27
NS = No Samples collected at this site						
LOST = Sampler lost this quarter						

Withlacoochee River		
	WIT010	**WIT040**
Fall 2002		
Invertebrate Taxa Richness	33.00	25.50
Invertebrate Diversity	4.41	3.74
Winter 2003		
Invertebrate Taxa Richness	25.00	LOST
Invertebrate Diversity	2.82	LOST
Spring 2003		
Invertebrate Taxa Richness	26.67	29.00
Invertebrate Diversity	4.32	3.22
Summer 2003		
Invertebrate Taxa Richness	19.33	21.00
Invertebrate Diversity	3.11	3.47
NS = No Samples collected at this site		
LOST = Sampler lost this quarter		

Appendix D. Petite Ponar Data

Suwannee River		
	SUW285	**SUW305**
Fall 2002		
Invertebrate Taxa Richness	24.00	11.75
Invertebrate Diversity	3.37	2.73
Winter 2003		
Invertebrate Taxa Richness	13.67	15.00
Invertebrate Diversity	2.89	2.87
Spring 2003		
Invertebrate Taxa Richness	13.00	7.50
Invertebrate Diversity	3.29	2.46
Summer 2003		
Invertebrate Taxa Richness	12.33	10.25
Invertebrate Diversity	2.98	2.78

Santa Fe River Basin - Alligator Lake		
	ALL020	**ALL030**
Fall 2002		
Invertebrate Taxa Richness	NS	9.00
Invertebrate Diversity	NS	2.04
Winter 2003		
Invertebrate Taxa Richness	16.33	19.33
Invertebrate Diversity	2.76	3.70
Spring 2003		
Invertebrate Taxa Richness	2.50	8.00
Invertebrate Diversity	0.89	2.43
Summer 2003		
Invertebrate Taxa Richness	4.75	6.25
Invertebrate Diversity	0.86	1.82
NS = Not Sampled (lake inaccessible due to low water)		

Appendix E. Dip Net Data

Suwannee River			
	SUW010	**ALA010**	**FAL020**
Fall 2002			
Invertebrate Taxa Richness	24	19	NS
Invertebrate Diversity	3.61	3.52	NS
Winter 2003			
Invertebrate Taxa Richness	32	39	NS2
Invertebrate Diversity	3.91	4.76	NS2
Spring 2003			
Invertebrate Taxa Richness	53	38	19.00
Invertebrate Diversity	5.24	4.34	1.55
Summer 2003			
Invertebrate Taxa Richness	18	NS2	18
Invertebrate Diversity	2.77	NS2	2.98
NS = Not Sampled (creek bed dry)			
NS2 = Not Sampled (creek in flood)			

Santa Fe River				
	SFR020	**NEW009**	**SFR040**	**SFR050**
Fall 2002				
Invertebrate Taxa Richness	36	23	38	29
Invertebrate Diversity	4.12	4.01	4.4	3.66
Winter 2003				
Invertebrate Taxa Richness	34	NS	35	33
Invertebrate Diversity	4.3	NS	4.64	4.09
Spring 2003				
Invertebrate Taxa Richness	40	32	47	14
Invertebrate Diversity	4.73	4.22	4.72	2.81
Summer 2003				
Invertebrate Taxa Richness	33	45	41	39
Invertebrate Diversity	4.33	4.62	4.63	4.73
NS = Not Sampled (river at flood stage)				

Coastal Rivers Basin				Aucilla River Basin			Waccasassa River Basin	
	ECN010	**STN031**			**AUC050**			**WAC010**
Fall 2002				Fall 2002			Fall 2002	
Invertebrate Taxa Richness	36	24		Invertebrate Taxa Richness	17		Invertebrate Taxa Richness	10
Invertebrate Diversity	4.8	3.2		Invertebrate Diversity	3.57		Invertebrate Diversity	3.09
Winter 2003				Winter 2002			Winter 2003	
Invertebrate Taxa Richness	42	35		Invertebrate Taxa Richness	44		Invertebrate Taxa Richness	10
Invertebrate Diversity	4.59	2.91		Invertebrate Diversity	4.74		Invertebrate Diversity	1.44
Spring 2003				Spring 2002			Spring 2003	
Invertebrate Taxa Richness	25	28		Invertebrate Taxa Richness	46		Invertebrate Taxa Richness	18
Invertebrate Diversity	3.6	3.97		Invertebrate Diversity	5.29		Invertebrate Diversity	3.89
Summer 2003				Summer 2002			Summer 2003	
Invertebrate Taxa Richness	NS2	NS2		Invertebrate Taxa Richness	NS2		Invertebrate Taxa Richness	9
Invertebrate Diversity	NS2	NS2		Invertebrate Diversity	NS2		Invertebrate Diversity	2.85
NS2 = Not Sampled river in flood)								