Introduction

The Santa Fe River is designated as an Outstanding Florida Water (OFW) due to its natural attributes which are worthy of special protection. Encompassing approximately 1,400 square miles in North Florida, the river's basin features more than 60 named springs. Alachua County has two first magnitude springs (Treehouse and Hornsby Spring), and several second magnitude springs, including Poe Spring (Appendix A). The river and its associated springs offer extraordinary ecosystems and remarkable karst geology. Collectively, billions of gallons of water discharge from the Floridan aquifer daily, making them vital natural resources in Florida that require safeguarding.

Previous studies conducted by the U.S. Geological Survey (USGS) and the Florida Department of Environmental Protection (FDEP) reported that Poe and Hornsby springs have lower nitrate, lower dissolved oxygen, and higher organic carbon values than many other springs along the Santa Fe River in neighboring Columbia and Gilchrist counties (Chasar et al., 2005; FDEP, 2012). However, springs further downstream exhibit higher nitrate values. For instance, in Gilchrist County, Ginnie and Gilchrist Blue springs regularly record nitrate concentrations ranging from 1 to 2 milligrams per liter (mg/L). A nitrate source evaluation using land use mapping and groundwater travel time modeling indicated agricultural fertilizer as the primary source of nitrogen in the Santa Fe River Basin in Alachua County and surrounding areas (AMEC, 2012). The USGS, Karst Environmental Services Inc. (KES), and AMEC studies concluded that travel time to these springs was relatively short (25-year groundwater travel time is shown in Appendix A). This was further corroborated by flow responses observed at these springs during both extreme dry and wet conditions before and after tropical storm Debbie in June 2012. In many instances, shorter groundwater travel times imply a smaller contributing area and a more rapid response to rainfall.

While historical water quality data for surface water at the springs are available, there is a lack of information regarding groundwater quality within the Lower Santa Fe River Basin. Alachua County Environmental Protection Department (ACEPD) conducted a temporal assessment of groundwater in contributing areas to Poe and Hornsby springs in January and June 2014. This initiative aimed to complement the larger FDEP Santa Fe Springs Priority Focus Area monitoring. However, additional groundwater quality data are needed to better understand potential sources and spatial variability of nitrate in the Floridan aquifer system.

In support of these goals, ACEPD received a Protect Florida Springs Tag Grant from the Fish & Wildlife Foundation of Florida for Fiscal Year 2019-2020. This grant funded the project titled "Nitrate Concentrations in Groundwater of the Santa Fe River Basin and Outreach." Funding was utilized to conduct a temporal assessment of groundwater in the Lower Santa Fe River Basin, encompassing portions of four counties: Alachua, Columbia, Gilchrist, and Union. The proposed study area included part of the Priority Focus Area identified in the Santa Fe River Basin Management Action Plan, which includes the Ginnie and Gilchrist Blue springs areas selected for focused implementation of agricultural best management practices. Numerous studies have concluded that groundwater residence or travel time to the Santa Fe River springs is relatively short (less than 25 years); indicating that land use and homeowner practices can have a direct impact on springs water quality. In November 2020, a total of 84 wells and three springs were sampled, and in May 2021 a total of 78 wells and three springs were sampled to provide a seasonal snapshot of nitrate levels in the basin. Samples were collected by ACEPD staff and AquiferWatch volunteers. Analyses for the samples were conducted by the ALS Group laboratory. ACEPD provided data for samples collected to the well owners.

Another key component to the project was public outreach and personal involvement in educating citizens. Originally, ACEPD planned to complete outreach activities at local festivals in 2021 to provide area residents with information on springs protection and water conservation. However, unanticipated changes arose due to the COVID-19 pandemic, which necessitated changes to the project. ACEPD staff was forced to cease non-essential activities that required interaction with the public. Instead, packages related to the project and protecting springs were distributed to homeowners.

Sampling Site Selection

This project focused on conducting synoptic nitrate sampling to provide an overall view of nitrate concentrations in groundwater within the Lower Santa Fe River Basin, encompassing portions of four counties: Alachua, Columbia, Gilchrist, and Union. In addition, three springs (Poe, Hornsby and Rum Island) were also sampled for comparison. Poe and Hornsby springs are located in the upper reaches of the Lower Santa Fe River in Alachua County, downstream of Santa Fe River Rise (Appendix A). These two springs are some of the springs on the Lower Santa Fe River closest to the edge of the Cody Scarp (escarpment). Springs in this region are typically more influenced by surface waters than those further downstream, such as Ginnie, Rum Island, and Gilchrist Blue springs. ACEPD identified groundwater sampling sites from a pre-existing network of wells, for which the County had obtained permission through prior groundwater sampling initiatives (Floridan aquifer system potentiometric surfacing mapping and springshed delineation projects). ACEPD staff, in collaboration with AquiferWatch volunteers, completed two comprehensive sampling events. The first event occurred between November 7th to December 1st in 2020, and the second event took place from May 15th to May 25th, 2021 (Table 1). During the initial event, a total of 83 wells and three springs were sampled, and in the subsequent event, 78 wells and three springs were sampled.

Table 1. Summary of Groundwater Wells Sampling Locations

	November/December 2020	May 2021
Alachua	33	31
Columbia	27	26
Gilchrist	24	19
Union	0	0
Total	**83**	**81**

PROCEDURES

The synoptic sampling project was a collaborative effort between ACEPD and AquiferWatch conducted over a three-week period in November-December 2020 (winter sampling) and a two-week period in May 2021 (summer sampling). AquiferWatch staff sampled 25 wells in 2020 and 25 wells in 2021. ACEPD sampled a total of 62 wells (including some springs) in 2020 and 56 wells/springs in 2021.

Samples were collected from private wells at the spigot closes to the wellhead and prior to any filter or treatment systems. Prior to sampling, the wells were purged for 15 minutes. Grab samples were collected 1-2 feet below the water surface at each of the spring locations. Samples were collected approximately 100 feet downstream of the main boil at Poe and Hornsby springs and from the stairs leading to the spring at Rum Island. All sample collection followed FDEP standard operating procedures in place at the time (FDEP, 2008; FDEP, 2014b). AquiferWatch volunteers designated a drop off location, and ACEPD staff picked up and transported to a courier who then delivered the samples to ALS laboratory in Jacksonville, Florida. All samples were analyzed by ALS laboratory in Jacksonville, Florida. Samples were analyzed for nutrients (nitrate + nitrite as nitrogen (N), total nitrogen, total phosphorus), potassium, and chloride.

Statistical analysis was performed on paired sets of wells, comparing winter and summer seasons of 2014/2015 with those of 2020/2021. Thirty-four paired samples were considered for winter seasons (November 2014 and November 2020), and 29 paired samples for summer seasons (May 2015 and May 2021). Differences between samples were computed and graphed. The normality of differences was assessed using a Shapiro-Wilks Normality Test, revealing non-normal distribution. Subsequently, a Wilcoxon Signed Rank Test was conducted as an alternative to the paired t-test to identify statistical differences.

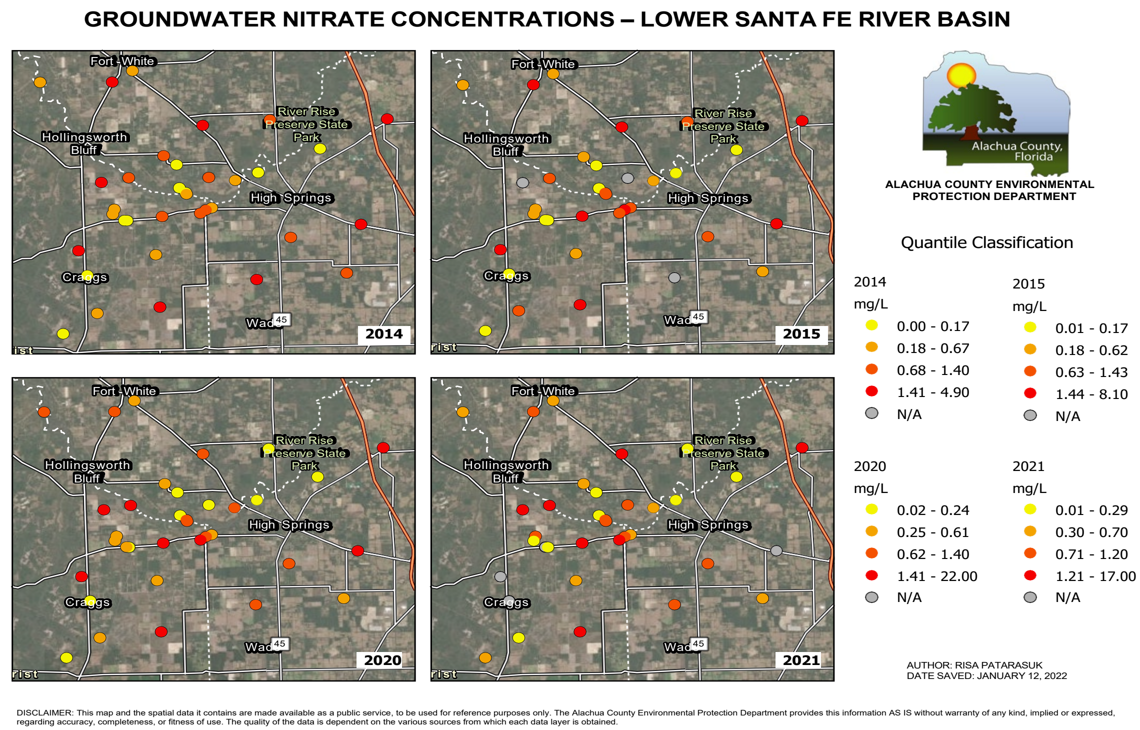
RESULTS

The groundwater samples were analyzed by ALS laboratory for a total of 86 sites during November 2020 (Appendix D-1) and 81 sites in May 2021 (Appendix D-2). In addition to nitrate, samples were also analyzed for total phosphorous, chloride, and potassium. The nitrate + nitrite as N values ranged from undetected to 22.0 mg/L during the November-December 2020 sampling event, with a median value of 0.55 mg/L and an average value of 1.36 mg/L (Table 2). During the May 2021 sampling, the nitrate + nitrite as N values ranged from undetected to 17.0 mg/L, with a median value of 0.59 and an average value of 1.33 mg/L. Total phosphorus values ranged between undetected and 0.24 mg/L in November-December

2020 and undetected and 0.6 mg/L during the May 2021. Two wells tested extremely high for nitrate + nitrite as N during both sampling events. Well, AAJ3890, sample results for November 2020 were 18.2 mg/L and 15 mg/L in May 2021, while well ANN3565 showed values of 22 mg/L and 17 mg/L for the respective periods. These outliers are excluded from the statistical analysis, but the Alachua County Health Department was promptly notified of these elevated values, exceeding drinking water criteria. Chloride and potassium, although not typically posing primary drinking water concerns, were also analyzed. These elements are often found in higher concentrations with nitrate, thus aiding in tracing and understanding sources of nitrate in groundwater. Potassium is commonly found in fertilizers and wastewater, while chloride is associated with wastewater.

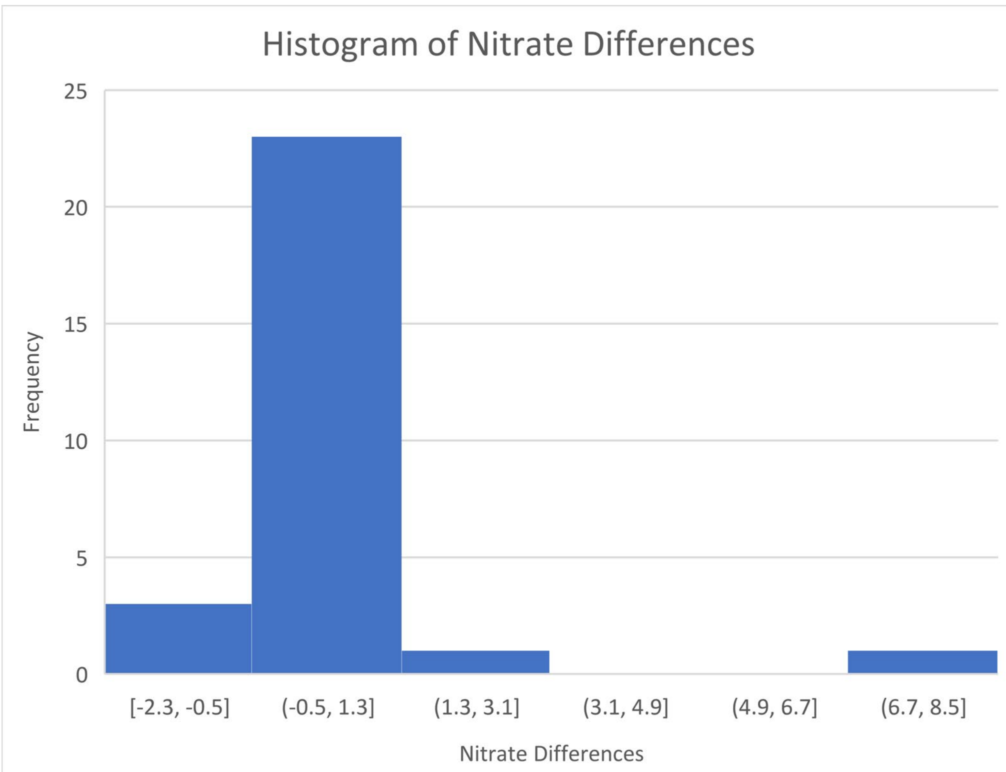
Table 2. Summary of Selected Groundwater Parameters Analyzed by Advance Environmental Laboratories.

	November 2020				MAY 2021			
	$NO_2 + NO_3$ (mg/L)	TP (mg/L)	Cl (mg/L)	K (mg/L)	$NO_2 + NO_3$ (mg/L)	TP (mg/L)	Cl (mg/L)	K (mg/L)
Median	0.55	0.041	0.30	9	0.59	0.047	0.4	9.1
Average	1.36	0.040	0.75	17.75	1.33	0.07	0.72	20.78
Minimum	0.012	0.017	0.083	0.2	0.012	0.032	0.16	2.8
Maximum	22	0.24	11	290	17	0.6	11	280
Count	86	86	86	86	81	81	81	81

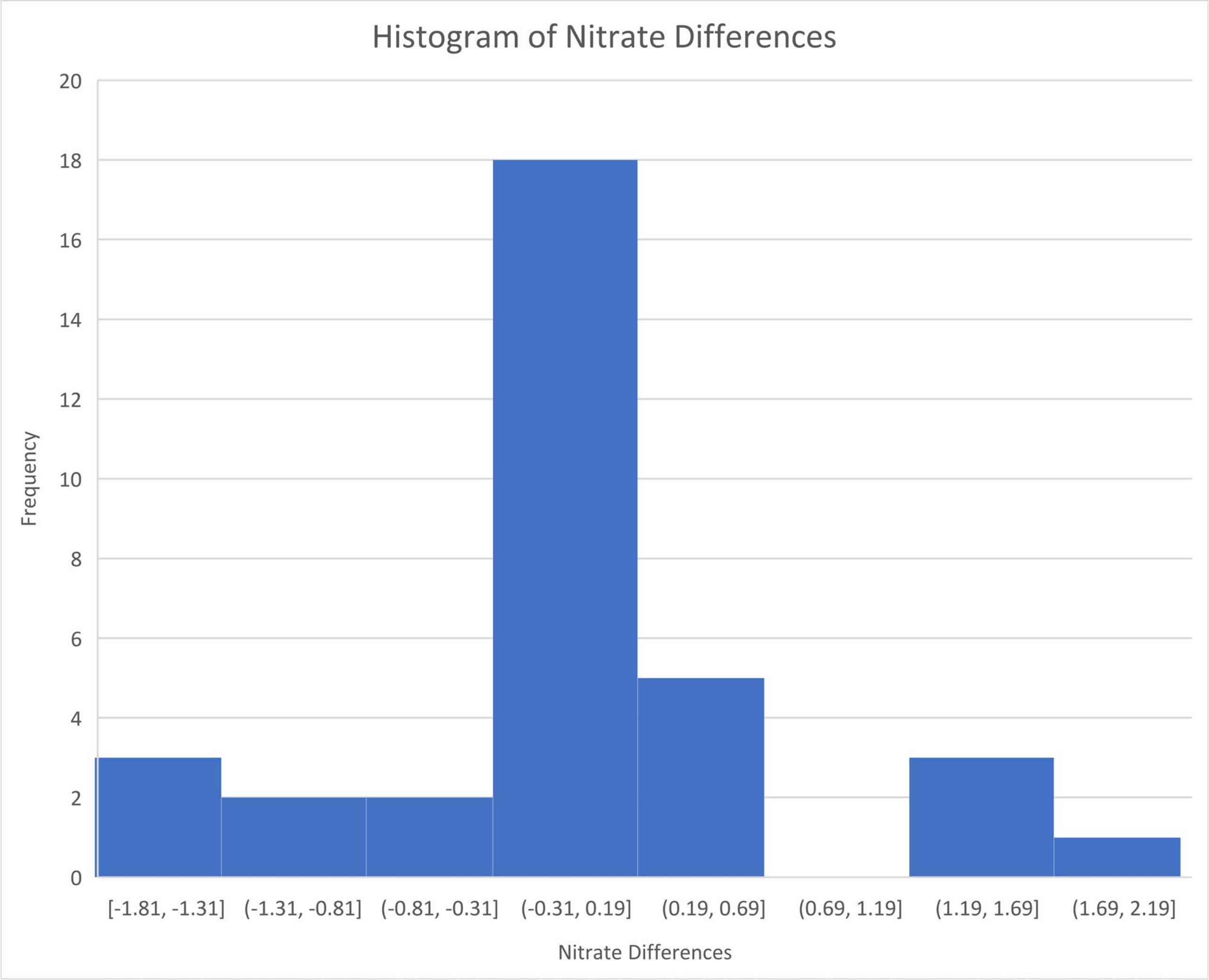


The paired t-test results indicated no significant change in nitrate levels for either the winter or summer seasons. The p-value representing the probability of observing the data if there were no true effect, was calculated as 0.8845 for the winter seasons and 0.9292 for the summer season. In statistical terms, a p-value higher than the commonly used significance level of 0.05 suggests we can confidently reject the hypothesis that nitrate concentrations differ between seasons and years within this dataset. Therefore, any variations observed in nitrate concentrations are likely due to normal fluctuations rather than indicative of a systematic change.

Graph 1. Histogram graph showing differences in nitrate results between years 2015 and 2021 during the spring season.



Graph 2. Histogram graph showing differences in nitrate results between years 2014 and 2020 during the fall season.



Primary Objectives and Outcomes

The primary objective of this project was to evaluate groundwater quality in terms of nitrate concentrations throughout the Santa Fe River Basin and draw comparisons with data obtained from the 2014-2015 sampling initiative. Additionally, the project provided outreach information to private well owners whose wells were sampled. The Florida Department of Environmental Protection has established a numeric criterion of 0.35 mg/L to limit algal growth in springs and spring runs. Forty-six wells surpassed this threshold for nitrate concentration, emphasizing the prevalence of elevated nitrate levels. Notably, three wells exceeded the 10 mg/L Florida Department of Health drinking water criteria for nitrate.

After comparing data between the 2014-2015 project and 2020-2021 project we found there was no significant change in the nitrate concentrations. It is important to note that groundwater trends are best analyzed over a long period of time given that shifts in water quality typically occur slowly. Continued monitoring of wells is essential for identifying trends in the lower Santa Fe River Springshed. While Nitrate was the primary constituent analyzed for this report, water chemistry samples for potassium, total phosphorus, and chloride will be uploaded to the Alachua County Groundwater Database. These additional datasets will contribute to future analyses of water quality trends broadening the scope of understanding groundwater dynamics in the region.

DESCRIPTIONS OF ANALYTES

Water quality of groundwater was determined by collecting and analyzing water samples from wells and springs. A series of field measurements were taken on site during sample collection. When combined, field and analytical data give a snapshot of water quality at that point in time. Comparing similar data over time can yield information about water quality changes and what may be causing these changes.

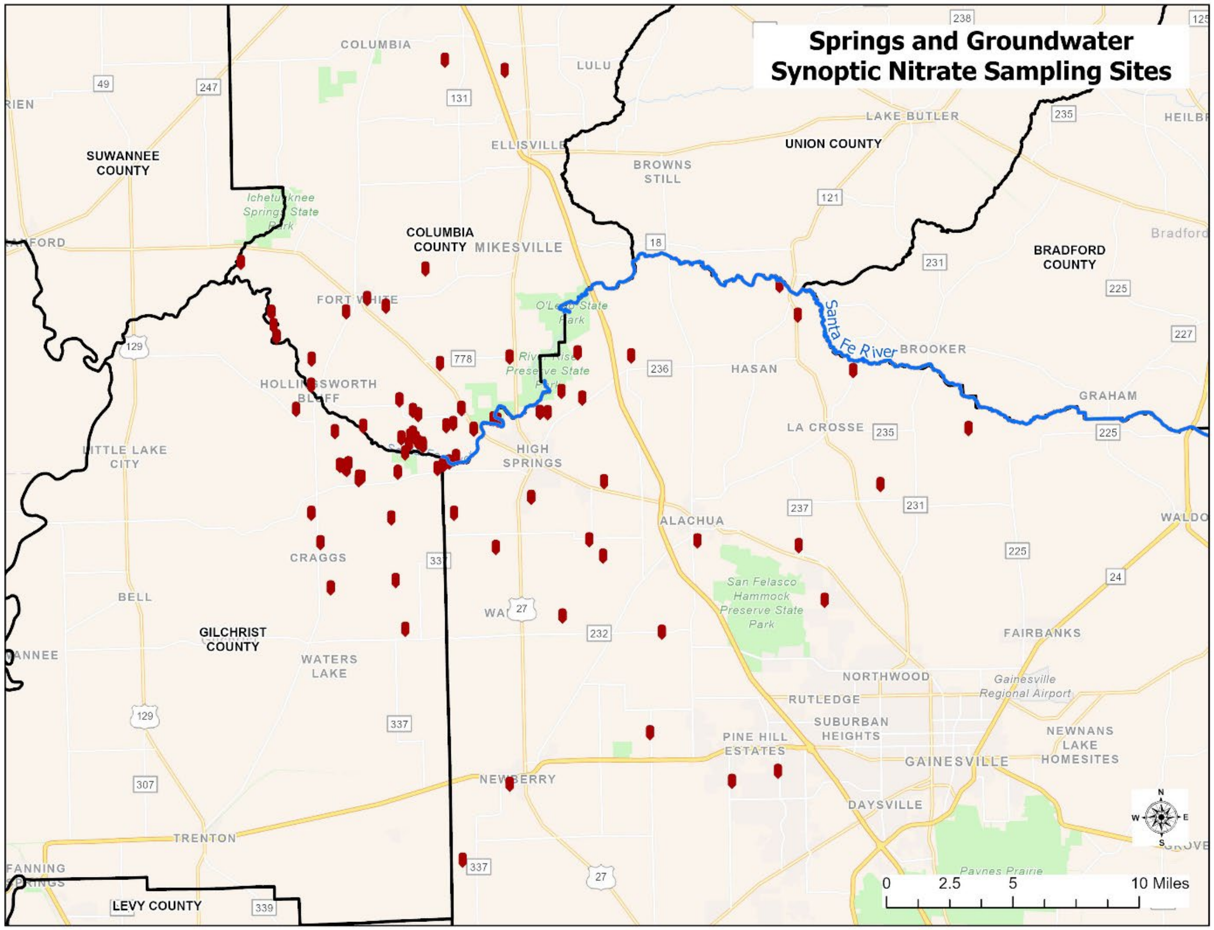
Nitrate + Nitrite ($NO_3^- + NO_2^-$) as N - Nitrate and nitrite are both found in groundwater in Florida. Nitrate contamination recently has become a problem in Florida's springs. Nitrate found in groundwater originates from fertilizers, septic tanks, and animal waste that enter the aquifer in recharge areas. Nitrate, being a nutrient, encourages algal and aquatic plant growth in surface water, which may lead to eutrophication of the springs and the associated water bodies. Nitrite, which is much less of a problem, can originate from sewage and other organic waste products. FDEP regulates nitrogen, in the form of nitrates and nitrites, in drinking water in Florida. The maximum contaminant level for nitrate is 10 mg/L, nitrite is 1 mg/L, and the combined total for nitrate + nitrite is 10 mg/L.

Chloride (Cl^-) - Chloride is the most abundant constituent in seawater. Groundwater that is tidally influenced may have high chloride concentrations. Chloride is added to the atmosphere via marine aerosols from the ocean. Other sources are weathering of rock, agriculture fertilization, wastewater, and water softeners. The state of Florida has set a secondary drinking water standard for chloride at 250 mg/L.

Total Phosphorus (TP) - Phosphorus is one of the primary nutrients that regulates the growth of algae and larger aquatic plants, particularly in fresh water. Total phosphorus measurements include all forms of phosphorus found in water, including both organic and inorganic forms. Natural processes transport phosphorus to water through atmospheric deposition, ground water percolation, and terrestrial runoff. Municipal treatment plants, septic tanks, industries, agriculture, and domestic activities also contribute to phosphorus loading through direct discharge and natural transport mechanisms.

Potassium (K^+) - Potassium occurs in trace amounts in Florida's groundwater and is derived primarily from seawater. Therefore, it occurs in higher concentration along the coast. The weathering of mica, feldspar and clay minerals can contribute potassium to groundwater. In addition, because potassium is an essential nutrient, it is a component of fertilizers.

APPENDIX B: Sample Location Map


Springs and Groundwater Synoptic Nitrate Sampling Sites
COLUMBIA
LULU
LAKE BUTLER
ELLISVILLE
UNION COUNTY
SUWANNEE COUNTY
BROWNS STILL
Ichetucknee Springs State Park
COLUMBIA COUNTY
MIKESVILLE
BRADFORD COUNTY
FORT WHITE
O'Leno State Park
Santa Fe River
BROOKER
HASAN
HOLLINGSWORTH BLUFF
River Rise Preserve State Park
GRAHAM
LA CROSSE
LITTLE LAKE CITY
HIGH SPRINGS
ALACHUA
WALDO
CRAGGS
BELL
San Felasco Hammock Preserve State Park
GILCHRIST COUNTY
FAIRBANKS
WATERS LAKE
NORTHWOOD
Gainesville Regional Airport
RUTLEDGE
SUBURBAN HEIGHTS
NEWNANS LAKE HOMESITES
PINE HILL ESTATES
GAINESVILLE
NEWBERRY
DAYSVILLE
TRENTON
FANNING SPRINGS
LEVY COUNTY
Paynes Prairie
0 2.5 5 10 Miles

APPENDIX

Station ID	NO2+NO3 (mg/L) November 2020	NO2+NO3 (mg/L) May 2021	Chloride (mg/L) November 2020	Chloride (mg/L) May 2021	TP (mg/L) November 2020	TP (mg/L) May 2021	K (mg/L) November 2020	K (mg/L) May 2021
AAN3516	0.91	0.77	9.6	7.7	0.057	0.42	0.44	0.24
AAA6137	0.02	0.039	9.9	11	0.12	0.1	0.46	0.29
AAC1215	0.61	0.7	8	6.3	0.064	0.047	0.28	0.21
AAC2505	1.1	-	4.7	-	0.056	-	0.16	-
AAE1404	0.016	0.012	10	11	0.032	0.032	0.41	0.33
AAE1405	-	2	-	3.4	-	0.6	-	0.42
AAE1415	0.099	0.13	25.5	26	0.071	0.056	1.5	1.5
AAE1420	0.89	1.1	11.4	13	0.017	0.083	0.73	0.51
AAE9759	2.9	3.6	7.4	7.3	0.062	0.047	0.77	1.1
AAF3108	0.49	0.34	10.9	11	0.017	0.032	0.58	0.44
AAF3145	0.24	0.24	25.2	26	0.04	0.032	2	2
AAF3146	1.4	2.4	30	39	0.071	0.056	0.53	0.62
AAF9758	0.18	0.26	3.2	3.9	0.058	0.032	0.16	0.16
AAG7792	0.096	0.084	11	40	0.032	0.032	0.49	0.54
AAJ3890	18.2	15	33.8	36	0.017	0.046	0.95	0.79
AAK7004	0.7	0.77	10.8	10	0.048	0.035	0.52	0.69
AAK7010	-	0.3	-	8.6	-	0.032	-	0.53
AAK7011	0.55	0.53	9.4	10	0.017	0.032	0.64	0.36
AAK7013	2.4	2.6	4.4	5.1	0.048	0.035	0.16	0.16
AAK7014	3.7	4	6.5	9.1	0.032	0.032	0.38	0.34
AAK7015	3.1	3.5	14.9	17	0.071	0.053	1.2	1.3
AAK7018	1.27	1.2	26.6	21	0.017	0.035	1.8	1.6
AAK7020	1.68	-	5.3	-	0.017	-	0.083	-
AAK7027	2.07	-	5.7	-	0.017	-	1.1	-
AAK7028	0.098	0.11	2.5	2.8	0.043	0.032	0.16	0.16
AAK7031	2	2.3	5.7	6.5	0.065	0.042	0.16	0.17
AAK7033	1.57	1.5	3.8	4.7	0.017	0.032	0.083	0.16

Station ID	NO2+NO3 (mg/L) November 2020	NO2+NO3 (mg/L) May 2021	Chloride (mg/L) November 2020	Chloride (mg/L) May 2021	TP (mg/L) November 2020	TP (mg/L) May 2021	K (mg/L) November 2020	K (mg/L) May 2021
AAK7035	0.012	0.013	7	6.5	0.074	0.048	0.71	0.68
AAK7037	0.079	0.012	7.7	7.4	0.11	0.095	0.54	0.48
AAM0869	0.02	-	5.2	-	0.017	-	0.083	-
AAM0870	0.65	0.78	12.6	11	0.077	0.073	0.35	0.39
AAM0873	0.048	0.054	3.4	3.8	0.048	0.039	0.16	0.16
AAM0899	0.04	0.012	4.8	5.4	0.032	0.032	0.46	0.58
AAN3345	-	2.8	-	97	-	0.035	-	0.19
AAN3516	-	0.77	-	7.7	-	0.42	-	0.24
AAN3517	0.52	0.51	8.2	7.2	0.044	0.048	0.16	0.16
AAN3518	0.86	-	8	-	0.047	-	0.35	-
AAN3523	0.57	0.49	11	9.6	0.045	0.06	0.5	0.42
AAN3533	0.35	0.093	12	14	0.051	0.055	0.57	0.6
AAN3535	0.38	0.35	3.1	3.3	0.032	0.033	0.16	0.16
AAN3545	2.8	-	92	-	0.032	-	0.31	-
AAN3548	0.57	0.55	4.1	3.2	0.082	0.07	0.19	0.16
AAN3553	0.016	0.47	4.2	5.3	0.11	0.075	0.48	0.16
AAN3556	0.49	0.012	4.2	3.8	0.045	0.11	0.17	0.42
AAN3558	0.74	0.68	290	250	0.24	0.19	0.77	0.4
AAN3561	0.57	0.84	4.4	5	0.032	0.04	0.29	0.27
AAN3562	2.9	3	19	22	0.032	0.035	0.52	0.51
AAN3564	1.9	2	6	6.9	0.034	0.037	0.38	0.36
AAN3565	22	17	9.3	7.1	0.032	0.038	11	11
AAN3566	0.3	0.31	3.8	4.4	0.032	0.04	0.16	0.16
AAN3567	3.7	4	6.4	7	0.033	0.042	0.44	0.39
AAN3569	0.046	0.13	6.5	7.3	0.045	0.05	0.31	0.25
AAN3570	0.64	0.67	14	15	0.076	0.079	1.2	1.2
AAN3571	0.72	0.71	10	12	0.077	0.085	0.68	0.65
AAN3573	0.81	0.94	2.6	3.1	0.046	0.06	0.16	0.16
AAN3574	0.29	0.29	9.6	8.1	0.032	0.035	0.16	0.16

Station ID	NO2+NO3 (mg/L) November 2020	NO2+NO3 (mg/L) May 2021	Chloride (mg/L) November 2020	Chloride (mg/L) May 2021	TP (mg/L) November 2020	TP (mg/L) May 2021	K (mg/L) November 2020	K (mg/L) May 2021
AAN3576	0.026	0.012	9.9	11	0.043	0.051	0.26	0.17
AAN3577	0.68	0.75	8	10	0.051	0.073	0.16	0.64
AAN3579	0.038	1.1	4.7	23	0.11	0.045	0.91	0.49
AAP6000	-	0.59	-	6.2	-	0.047	-	0.19
AAP6001	-	1.4	-	9.6	-	0.056	-	0.57
PWCA	0.012	-	10	-	0.12	-	0.16	-
PWBB	0.34	0.35	25.5	13	0.017	0.032	0.083	0.16
PWAB	9.4	9.5	11.4	9.2	0.059	0.038	9.2	9.5
PWDB	0.98	0.93	7.4	9.5	0.017	0.07	0.64	0.37
PWGB	0.02	0.054	10.9	29	0.017	0.032	0.31	0.16
PWJD	0.02	0.012	25.2	3.9	0.017	0.077	0.083	0.16
PWJDS	0.18	0.1	30	3.9	0.017	0.062	0.32	0.16
PWDL	0.96	0.66	3.2	10	0.017	0.04	0.48	0.39
PWKE1435	0.77	0.75	11	5	0.017	0.032	0.38	0.16
PWKEI	0.02	0.015	33.8	6.7	0.017	0.1	0.65	0.54
PWKE	0.02	0.1	10.8	6.7	0.11	0.073	0.7	0.57
PWSG	0.02	0.012	9.4	280	0.16	0.27	0.53	0.28
PWBH	0.88	1.3	4.4	5.5	0.017	0.032	0.083	0.16
PWMH	0.02	0.012	6.5	240	0.11	0.071	0.8	0.58
Hornsby	0.84	0.79	14.9	13	0.017	0.09	1.1	1.2
Kulaqua	0.63	0.71	26.6	18	0.017	0.06	1.4	1.4
PWLJ	1.38	1.1	5.3	9.5	0.017	0.042	0.76	0.53
PWMM	0.012	0.018	5.7	4.2	0.041	0.032	0.16	0.16
PWMB	0.54	-	2.5	-	0.068	-	0.56	-
PWNM	0.27	-	5.7	-	0.041	-	0.52	-
PWTP	0.53	0.52	3.8	6.2	0.017	0.056	0.083	0.16
Poe Spring	0.26	0.32	7	13	0.11	0.087	0.69	0.76
PWRF	3.99	1.4	7.7	17	0.017	0.059	0.86	0.52
PWKR	0.02	0.012	5.2	8.6	0.017	0.12	0.81	0.55

Station ID	NO2+NO3 (mg/L) November 2020	NO2+NO3 (mg/L) May 2021	Chloride (mg/L) November 2020	Chloride (mg/L) May 2021	TP (mg/L) November 2020	TP (mg/L) May 2021	K (mg/L) November 2020	K (mg/L) May 2021
Rum Island	1.78	1.6	12.6	12	0.017	0.068	0.93	0.53
PWSR	0.02	0.012	3.4	7.9	0.017	0.043	1.1	0.94
PWDS	3.35	-	4.8	-	0.017	-	1.3	-
PWPS	1.56	1.4	8.2	9.2	0.017	0.042	0.79	0.29
PWTS	0.22	0.17	11	4.6	0.074	0.065	0.16	0.16
PWAT	0.21	0.34	12	11	0.08	0.068	0.36	0.4

APPENDIX C: Land Use Surrounding Sampling Locations (% Contributing Area)

Station ID	Natural/Recreational									Residential		Agricultural	
	Major Springs	Streams and Waterways	Wetland Hardwood Forest	Wetland Forested Mixed	Recreational	Upland Hardwood Forest	Upland Mixed Forest	Herbaceous	Other Open Lands (Rural)	Residential Low Density	Residential Medium Density	Cropland and Pastureland	Tree Plantations
AAC1215	0.00	0.00	0.00	0.00	43.44	56.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AAE1415	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	0.00	0.00	64.88
AAE9759	0.00	18.64	32.70	0.00	0.00	0.00	24.16	10.38	0.00	14.12	0.00	0.00	0.00
AAF3108	0.00	0.00	0.00	0.00	0.00	0.00	32.84	0.00	0.00	67.16	0.00	0.00	0.00
AAF3145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00
AAF3146	0.00	0.00	0.00	0.00	0.00	0.00	34.05	6.14	0.00	59.81	0.00	0.00	0.00
AAF3147	0.00	0.00	0.00	0.00	0.00	0.00	33.94	0.00	0.00	55.12	10.93	0.00	0.00
AAF3150	0.00	0.00	0.00	0.00	0.00	0.00	5.52	38.43	0.00	21.70	0.00	34.35	0.00
AAF3153	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.00	0.00	99.56	0.00	0.00	0.00
AAJ7000	0.00	0.00	0.00	0.00	0.00	81.48	0.00	0.00	0.00	18.52	0.00	0.00	0.00
AAJ7001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.67	0.00	61.33	0.00
AAJ7002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.32	0.00	22.21	0.00	0.00	70.47
AAJ7003	0.00	0.00	0.00	0.00	0.00	0.00	40.30	0.00	0.00	59.70	0.00	0.00	0.00
AAJ7004	0.00	0.00	0.00	0.00	0.00	0.00	29.62	0.00	0.00	0.00	63.93	6.45	0.00
AAJ7005	0.00	0.00	0.00	0.00	0.00	0.00	20.22	0.00	0.00	79.03	0.00	0.00	0.75
AAK7000	0.00	0.00	0.00	0.00	0.00	26.18	0.05	0.00	0.00	46.00	0.00	27.77	0.00
AAK7001	0.00	0.00	0.00	0.00	0.00	0.00	2.14	0.00	0.00	36.42	0.00	0.00	61.44
AAK7004	0.00	0.00	0.00	0.00	0.00	72.44	0.00	2.40	0.00	17.14	0.00	8.02	0.00
AAK7008	0.00	0.00	0.00	0.00	83.09	0.00	16.91	0.00	0.00	0.00	0.00	0.00	0.00
AAK7010	0.00	0.00	0.00	0.00	0.00	23.80	0.19	0.00	0.00	76.01	0.00	0.00	0.00
AAK7014	0.00	0.00	0.00	0.00	0.00	0.00	37.64	0.00	0.00	21.14	0.00	0.00	41.22
AAK7018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.07	0.00	40.93	0.00
AAK7021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.47	58.54
AAK7022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	76.65	0.00	0.00	23.35	0.00	0.00
AAK7027	0.00	0.00	0.00	0.00	0.00	0.00	3.27	0.00	0.00	34.96	0.00	61.77	0.00

Station ID	Natural/Recreational									Residential		Agricultural	
	Major Springs	Streams and Waterways	Wetland Hardwood Forest	Wetland Forested Mixed	Recreational	Upland Hardwood Forest	Upland Mixed Forest	Herbaceous	Other Open Lands (Rural)	Residential Low Density	Residential Medium Density	Cropland and Pastureland	Tree Plantations
AAK7028	0.00	0.00	0.00	0.00	0.00	0.00	13.70	0.00	0.00	72.31	0.00	0.00	13.99
AAK7030	0.00	0.00	0.00	0.00	0.00	11.58	0.00	0.00	0.00	85.34	0.00	0.00	3.08
AAM0869	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.38	61.62	0.00	0.00
AAM0870	0.00	0.00	0.00	0.00	0.00	0.00	32.99	0.00	0.00	67.01	0.00	0.00	0.00
AAM0871	0.00	0.00	0.00	0.00	0.00	26.18	0.05	0.00	0.00	46.00	0.00	27.77	0.00
AAM0872	0.00	0.00	5.91	0.00	0.00	0.00	0.00	0.00	0.00	94.09	0.00	0.00	0.00
AAM0873	0.00	0.00	0.00	0.00	0.00	11.06	2.96	0.00	0.00	85.98	0.00	0.00	0.00
AAN3520	0.00	0.00	0.00	0.00	0.00	11.08	60.53	0.00	0.00	28.39	0.00	0.00	0.00
AAN3521	0.00	0.00	1.44	0.00	0.00	38.66	0.00	29.06	0.00	19.99	0.00	10.86	0.00
AAN3522	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.98	0.00	7.35	0.00	0.00	66.67
AAN3523	0.00	0.00	0.00	0.00	0.00	0.00	56.82	12.34	0.00	13.21	0.00	17.62	0.00
AAN3524	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.45	0.00	4.00	74.55
AAN3525	0.00	0.00	0.00	0.00	0.00	0.00	41.40	0.00	0.00	58.60	0.00	0.00	0.00
AAN3526	0.00	0.00	0.00	0.00	0.00	33.31	0.97	26.17	0.00	39.55	0.00	0.00	0.00
AAN3527	0.00	0.00	0.00	0.00	0.00	0.00	23.96	0.00	0.00	0.00	0.00	76.04	0.00
AAN3528	0.00	0.00	0.00	0.00	0.00	71.95	0.00	0.00	0.00	16.99	0.00	11.06	0.00
AAN3529	0.00	0.00	0.00	0.00	0.00	0.00	42.01	0.00	0.00	11.99	0.00	0.00	46.01
AAN3530	0.00	0.00	0.00	0.00	0.00	0.00	8.48	0.00	0.00	70.53	0.00	6.68	14.31
AAN3531	0.00	0.00	0.00	0.00	0.00	0.00	11.06	0.00	0.00	0.00	1.61	0.00	87.33
AAN3533	0.00	0.00	0.00	0.00	0.00	0.00	29.05	26.47	0.00	44.48	0.00	0.00	0.00
AAN3534	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00
AAN3535	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.32	0.00	14.04	0.00	0.00	81.65
AAN3537	0.00	0.00	0.00	0.00	0.00	0.00	2.17	0.00	0.00	0.00	0.00	97.83	0.00
AAN3541	0.00	0.00	0.00	0.00	0.00	0.00	52.22	0.00	0.00	45.20	0.00	0.00	2.58
AAN3544	0.00	0.00	0.00	0.00	0.00	0.00	72.19	0.00	0.00	27.81	0.00	0.00	0.00
AAN3545	0.00	0.00	0.00	0.00	0.00	0.00	67.84	0.00	0.00	27.96	4.19	0.00	0.00
AAN3548	0.00	0.00	0.00	0.00	0.00	1.41	19.79	0.00	0.00	78.80	0.00	0.00	0.00
AAN3549	0.00	0.00	0.00	0.00	0.00	0.00	74.36	0.00	0.00	25.64	0.00	0.00	0.00
AAN3550	0.00	0.00	0.00	0.00	0.00	0.00	1.13	0.00	0.00	98.87	0.00	0.00	0.00

Station ID	Natural/Recreational									Residential		Agricultural	
	Major Springs	Streams and Waterways	Wetland Hardwood Forest	Wetland Forested Mixed	Recreational	Upland Hardwood Forest	Upland Mixed Forest	Herbaceous	Other Open Lands (Rural)	Residential Low Density	Residential Medium Density	Cropland and Pastureland	Tree Plantations
AAN3552	0.00	0.00	0.00	0.00	0.00	0.00	20.18	0.00	0.00	79.82	0.00	0.00	0.00
AAN3553	0.00	0.00	0.00	4.65	0.00	0.00	10.56	0.00	0.17	35.35	0.00	40.73	8.54
AAN3555	0.00	0.00	0.00	61.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.46
AAN3556	0.00	0.00	0.00	0.00	0.00	41.55	24.20	0.00	0.00	34.25	0.00	0.00	0.00
AAN3557	0.00	0.00	0.00	0.00	0.00	0.00	4.19	0.00	0.00	95.81	0.00	0.00	0.00
AAN3558	0.00	26.30	0.33	0.00	0.00	0.00	2.84	0.00	0.00	70.53	0.00	0.00	0.00
AAN3561	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.52	0.00	41.48	0.00
AAN3562	0.00	0.00	0.00	0.00	0.00	0.00	15.11	0.00	0.00	79.63	0.00	0.00	5.26
AAN3564	0.00	0.00	0.00	0.00	0.00	58.43	4.82	0.00	0.00	35.42	0.00	0.00	1.33
AAN3565	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	97.24	0.00	0.62	2.14
AAN3566	0.00	0.00	0.00	0.00	0.00	36.36	0.00	0.00	0.00	51.33	0.00	0.00	12.31
AAN3567	0.00	0.00	0.00	0.00	0.00	18.92	0.00	18.55	0.00	62.27	0.00	0.25	0.00
AAN3568	0.00	0.00	0.00	0.00	0.00	0.00	58.70	0.00	0.00	41.30	0.00	0.00	0.00
AAN3569	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.44	0.00	0.00	67.56
AAN3570	0.00	0.00	0.00	35.67	0.00	0.00	0.00	57.45	0.00	6.88	0.00	0.00	0.00
AAN3571	0.00	0.00	0.00	0.00	0.00	0.00	95.43	0.00	0.00	4.57	0.00	0.00	0.00
AAN3573	0.00	0.00	0.00	0.00	0.00	27.01	0.00	39.22	0.00	33.77	0.00	0.00	0.00
AAN3574	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00
AAN3575	0.00	0.00	0.00	0.00	0.00	0.00	2.03	11.63	0.00	42.72	0.00	0.00	43.62
AAN3576	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.00	97.66	0.00	0.00	1.94
AAN3577	0.00	10.18	17.90	0.00	0.00	39.46	0.00	0.00	0.00	32.46	0.00	0.00	0.00
AAN3579	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.42	0.00	48.58	0.00
Blue	10.06	0.82	61.12	0.00	27.51	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00
Devil's Eye	0.00	35.17	64.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dogwood	0.00	23.67	76.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ginnie	26.80	9.64	21.65	0.00	41.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hornsby	7.75	0.00	28.92	0.00	62.93	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00
Poe	22.65	8.30	0.00	69.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: Suwannee River Water Management District (SRWMD) 2010-2011 land use coverage (as provided by FDEP 06/12/2015).

Land use values are percent of the contributing area, delineated using a 300’ radius.

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