APPENDIX D

EVALUATION OF THE POTENTIAL FOR GROUNDWATER QUALITY DEGRADATION DUE TO SALTWATER INTRUSION

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Introduction

The purpose of this evaluation was to identify wells within the Central Springs/East Coast (CSEC) Regional Water Supply Plan (RWSP) area where degradation of groundwater quality due to saltwater intrusion has occurred or is projected to occur. The CSEC RWSP area encompasses all or part of six counties under the jurisdiction of the St. Johns River Water Management District (SJRWMD); Volusia, Marion, North Lake[1], Brevard, Indian River, and Okeechobee. Groundwater quality degradation due to saltwater intrusion is a consideration for the CSEC RWSP since degrading water quality can affect productivity of existing infrastructure and dictate back plugging, well inactivation and replacement, withdrawal point relocation, and conversion to alternative water supplies, all of which result in increased costs. Although groundwater quality degradation poses a challenge for all affected water users, the issue is particularly acute for smaller utilities and water users that may have fewer options for infrastructure modifications.

Since statistically significant trends in chloride concentration can be an indicator of groundwater degradation due to saltwater intrusion, the focus of this evaluation was on chloride time series data. Chloride concentration is a useful chemical indicator because it is one of the principal chemical constituents in seawater and is unaffected by ion exchange (unlike sodium, the other principal component). Trends in time series chloride concentration data were quantified and interpreted based upon the results of nonparametric statistical tests described in the following section. In order to understand the meaning of these trends, consideration of the actual chloride concentration in relation to the Florida Department of Environmental Protection Secondary Drinking Water Standard (SDWS) of 250 milligrams per liter (mg/L) for chloride was also evaluated.

This analysis explored chloride concentrations in two categories of Upper Floridan aquifer (UFA) and Surficial Aquifer System (SAS) wells located within the CSEC RWSP area; district observation well network (DOWN) monitoring wells and permitted wells (public supply and agricultural) that support consumptive use permit (CUP) groundwater quality monitoring requirements. One purpose of the DOWN monitoring well network is to obtain a picture of regional groundwater quality throughout SJRWMD and identify areas where groundwater quality is changing, in some cases, due to saltwater intrusion. Other DOWN

[1] North Lake County is defined throughout the CSEC RWSP as that portion of Lake County that is not located in the Central Florida Water Initiative planning region.

wells may monitor water quality changes near specific water bodies of concern, such as first- and second-magnitude springs. Several considerations are involved in siting or selecting wells for inclusion in a monitoring network such as the open hole interval, adequate overall spatial coverage, and well location as it relates to pumping centers or water bodies of concern. Water quality data from monitoring wells is preferred for detecting changes in ambient groundwater quality since these wells are dedicated for monitoring (i.e., they are not pumped to supply water).

The second type of wells included in the water quality analysis are permitted wells, both public supply and agricultural. Most monitored public supply and agricultural wells are production wells associated with a single entity, although some entities also have dedicated monitoring wells. Monitoring of production wells informs water quality changes at a smaller scale; either by well or well cluster. In many cases, groundwater quality changes in production wells indicate saltwater intrusion from the upconing of relict seawater from below the freshwater, which can result from the pumping of individual or multiple wells. Where upconing occurs, groundwater withdrawals can often be managed to minimize or reduce upconing. Since production well water quality can be impacted by pumping, these wells are often not the best indicators of lateral saltwater intrusion. However, water quality degradation in production wells from upconing can be significant and can necessitate well modifications, well abandonment, enhanced wellfield management plans, and development of alternative water supplies.

Water quality degradation in both monitoring wells and production wells is important in planning for future water supplies, therefore, water quality data from both well types was included in the CSEC water quality analysis. Groundwater samples from analyzed wells were submitted for laboratory chemical analyses of selected or, in some instances, all major ions (calcium, magnesium, potassium, sodium, bicarbonate, chloride, and sulfate). Sampling frequencies varied from monthly and quarterly to biannual and annual schedules. At some wells, groundwater quality has been monitored for several decades over the period of record.

Methods

Chloride water quality data was compiled for DOWN wells and monitored public supply and agricultural wells located within the CSEC RWSP area. Permitted wells with ten or more data points and DOWN wells with data covering each of the past 10 years were selected for statistical trend analysis. The requirements for the two well types differed slightly as a result of the DOWN well analysis being completed in accordance with established procedures for the SJRWMD Status and Trends Network.

For time series data, it is useful to determine if a monotonic (consistently increasing or decreasing) trend exists within the data. Therefore, trends in chloride concentration were quantified using the Mann-Kendall trend test and related Theil-Sen trend line and slope (aka Sen slope). These nonparametric statistical tests do not depend on assumptions of normality and are robust methods that are resistant to outliers, missing data, and non-detects. Test statistics generated using these methods include the Mann-Kendall

correlation coefficient (τ) and the median slope of the trend (the Sen slope) in mg/L/yr. Trends were considered statistically significant for median slopes with a p value less than or equal to 0.05[2].

To categorize the potential for saltwater intrusion or continued saltwater intrusion in wells with a statistically significant trend in chloride concentration, a rate was assigned as follows:

≥ +3.0 mg/L/yr — high rate

< +3.0 mg/L/yr, ≥ +1.0 mg/L/yr — medium rate

< +1.0 mg/L/yr, > 0 mg/L/yr — low rate

< 0 mg/L/yr — decreasing rate

For the permitted wells with significant trends at the high and medium rates, a linear equation was developed using the Theil-Sen trend line coefficients. This equation was used to estimate the year at which the chloride concentration is projected to exceed the 250 mg/L SDWS assuming anthropogenic and meteorological stressors influencing hydrologic conditions remain relatively unchanged. For the DOWN wells with significant trends, a linear equation was not developed since only the statistical results were available. For these wells, the median slope was applied to the median chloride concentration and projected out to 2040. Chloride concentrations were not projected forward for wells with trends at the low and decreasing rates since chloride concentrations were generally low, and the estimated rates of change were very small or decreasing (becoming more fresh).

Results

Time series chemical data for 389 wells was evaluated for trends in chloride concentration (Table D-1; Figure D-1)). Three hundred of these wells — representing 14 public supply utilities and 6 agricultural operations — are monitored for groundwater quality as a conditional requirement of a CUP. Of the 300 permitted wells, 199 were constructed in the UFA and 101 in the SAS. Eighty-nine DOWN wells were analyzed, all of which were constructed in the UFA. The SAS DOWN wells lacked sufficient data for analysis. Results are summarized by well type for each sub-region of the CSEC RWSP area.

[2] A p value is a predetermined statistical threshold that indicates the probability of obtaining the same test result randomly. When p values are small (e.g., less than or equal to 0.05 or 5%), there is evidence that the test result is not random (and one can reject the null hypothesis that there is no trend).

Table D-1: Summary of Analyzed Wells within the CSEC RWSP Area

Area	Upper Floridan Aquifer DOWN Wells	Surficial Aquifer Public Supply Wells	Upper Floridan Aquifer Public Supply Wells	Upper Floridan Aquifer Agricultural Wells
Volusia County	35	0	144	2
Total	**35**	**0**	**144**	**2**
Marion County	17	0	0	0
North Lake County	15	0	0	0
Total	**32**	**0**	**0**	**0**
Brevard County	15	97	19	9
Indian River County	7	4	16	9
Okeechobee County	0	0	0	0
Total	**22**	**101**	**35**	**18**
CSEC RWSP Total	**89**	**101**	**179**	**20**

Figures D-2 through D-9, located after the references, show the spatial distribution of the analysis results by sub-region, well type (public supply, agricultural, and DOWN), aquifer (for Brevard and Indian River counties), and by chloride concentration rate of change (high, medium, low, decreasing, not significant). Tables D-10 through D-19, provided at the end of this document, show the statistical results for all the analyzed wells by well type and by chloride concentration rate of change.

Volusia County

DOWN Wells

Three DOWN wells showed increasing chloride concentrations at rates ≥ 3 milligrams per liter per year (mg/L/yr)(high rate of change), and one DOWN well showed increasing chloride concentrations at rates within the range ≥ 1 and < 3 mg/L/yr (medium rate of change)(Table D-2). Three of the four wells with high and medium rates of chloride change currently exceed the chloride SDWS and are generally located near the St. Johns River (Figure D-2). Eight DOWN wells showed an increasing chloride concentration rate less than 1 mg/L/yr (low rate of change). Finally, of the four DOWN wells that showed a statistically significant decreasing rate of change, two have chloride concentrations that currently exceed the SDWS. All the DOWN wells analyzed in Volusia County were constructed in the UFA.

Table D-2: Analyzed UFA DOWN Wells with Statistically Significant Trends in Chloride Concentration in Volusia County

Chloride Trend Category	Number of Wells Currently Exceeding 250 mg/L	Number of Additional Wells Projected to Exceed 250 mg/L by 2040
High Rate of Change (3 wells)	3	---
Medium Rate of Change (1 wells)	0	0
Low Rate of Change (8 wells)	0	NA
Decreasing Rate of Change (4 wells)	2	NA

Note: mg/L = milligrams per liter

Public Supply Wells

Fourteen public supply wells showed increasing chloride concentrations at rates ≥ 3 milligrams per liter per year (mg/L/yr)(high rate of change), and three public supply wells showed increasing chloride concentrations at rates within the range ≥ 1 and < 3 mg/L/yr (medium rate of change)(Table D-3). These 17 wells with high and medium rates of chloride change were generally located near the St. Johns River and the Atlantic coastline (Figure D-3). None of these 17 wells currently exceed the chloride SDWS; however, 10 wells are projected to exceed the SDWS by 2040. Twenty-one public supply wells showed an increasing chloride concentration rate less than 1 mg/L/yr (low rate of change). Finally, of the 70 public supply wells that showed a statistically significant decreasing rate of change, only one has a chloride concentration that currently exceeds the SDWS. All the public supply wells analyzed in Volusia County were constructed in the UFA.

Table D-3: Analyzed UFA Public Supply Wells with Statistically Significant Trends in Chloride Concentration in Volusia County

Chloride Trend Category	Number of Wells Currently Exceeding 250 mg/L	Number of Additional Wells Projected to Exceed 250 mg/L by 2040
High Rate of Change (14 wells)	0	10
Medium Rate of Change (3 wells)	0	0
Low Rate of Change (21 wells)	0	NA
Decreasing Rate of Change (70 wells)	1	NA

Note: mg/L = milligrams per liter

Agricultural Wells

Both agricultural wells analyzed in Volusia County showed a statistically significant increasing chloride concentration trend; one at a rate ≥ 3 milligrams per liter per year (mg/L/yr)(high rate of change) and the other at a rate < 1 mg/L/yr (low rate of change)(Table D-4). The well displaying a high rate of change currently exceeds the chloride SDWS. Both of these wells are Upper Floridan aquifer monitor wells associated with a single agricultural permit in southern Volusia County (Figure D-4).

Table D-4: Analyzed UFA Agricultural Wells with Statistically Significant Trends in Chloride Concentration in Volusia County

Chloride Trend Category	Number of Wells Currently Exceeding 250 mg/L	Number of Additional Wells Projected to Exceed 250 mg/L by 2040
High Rate of Change (1 well)	1	---
Medium Rate of Change (0 wells)	---	---
Low Rate of Change (1 well)	0	NA
Decreasing Rate of Change (0 wells)	---	NA

Note: mg/L = milligrams per liter

Marion and North Lake Counties

DOWN Wells

Saltwater intrusion is unlikely in the central areas of the state and, therefore, CUPs in Marion and North Lake counties typically do not require chloride monitoring. All 32 analyzed wells in Marion and North Lake counties were DOWN wells constructed in the UFA. None of these wells showed a statistically significant high (≥ 3 mg/L/yr) or medium (between the range ≥ 1 and < 3 mg/L/yr) rate of chloride change (Table D-5). Seven wells showed a statistically significant low rate of change (< 1 mg/L/yr), while one well showed a decreasing rate of change (Figure D-5). Although not shown on Figure D-5 since neither showed a statistically significant rate of change in chloride concentration, two DOWN wells in North Lake County currently exceed the chloride SDWS.

Table D-5: Analyzed UFA DOWN Wells with Statistically Significant Trends in Chloride Concentration in Marion and North Lake Counties

Chloride Trend Category	Number of Wells Currently Exceeding 250 mg/L	Number of Additional Wells Projected to Exceed 250 mg/L by 2040
High Rate of Change (0 wells)	---	---
Medium Rate of Change (0 wells)	---	---
Low Rate of Change (7 wells)	0	NA
Decreasing Rate of Change (1 well)	0	NA

Note: mg/L = milligrams per liter

Brevard, Indian River, and Okeechobee Counties

DOWN Wells

Of the 22 UFA DOWN wells evaluated in Brevard and Indian River counties, six showed increasing chloride concentrations at rates ≥ 3 mg/L/yr (high rate of change), and one showed increasing chloride concentrations at a rate within the range ≥ 1 and < 3 mg/L/yr (medium rate of change)(Table D-6). Each of these wells currently exceeds the chloride SDWS and is generally located along the Indian River Lagoon or the Atlantic coastline (Figure D-6). One DOWN well showed an increasing chloride concentration rate less than 1 mg/L/yr (low rate of change). Finally, the one DOWN well that showed a statistically significant decreasing rate of change has a current chloride concentration that exceeds the SDWS. There were no DOWN wells monitored for chloride in the limited portion of Okeechobee County that is under the jurisdiction of SJRWMD.

Although there was insufficient data to perform a statistical analysis on the SAS DOWN wells in this area, it is worth noting that six of the 18 actively monitored SAS DOWN wells in Brevard and Indian River counties currently exceed the chloride SDWS and one well shows a maximum concentration just below the SDWS.

Table D-6: Analyzed UFA DOWN Wells with Statistically Significant Trends in Chloride Concentration in Brevard and Indian River Counties

Chloride Trend Category	Number of Wells Currently Exceeding 250 mg/L	Number of Additional Wells Projected to Exceed 250 mg/L by 2040
High Rate of Change (6 wells)	6	---
Medium Rate of Change (1 well)	1	---
Low Rate of Change (1 well)	0	NA
Decreasing Rate of Change (1 well)	1	NA

Note: mg/L = milligrams per liter

Public Supply Wells (Upper Floridan Aquifer)

Of the 35 UFA public supply wells evaluated in Brevard and Indian River counties, 15 showed increasing chloride concentrations at rates ≥ 3 mg/L/yr (high rate of change) (Table D-7). Each of these 15 wells currently exceeds the chloride SDWS and is generally located along the Indian River Lagoon or Atlantic coastline (Figure D-7). None of the UFA public supply wells showed increasing chloride concentrations at a rate within the range ≥ 1 and < 3 mg/L/yr (medium rate of change) or less than 1 mg/L/yr (low rate of change). Finally, of the five public supply wells that showed a statistically significant decreasing rate of change, one currently exceeds the chloride SWDS. There were no UFA public supply wells monitored for chloride in Okeechobee County.

Table D-7: Analyzed UFA Public Supply Wells with Statistically Significant Trends in Chloride Concentration in Brevard and Indian River Counties

Chloride Trend Category	Number of Wells Currently Exceeding 250 mg/L	Number of Additional Wells Projected to Exceed 250 mg/L by 2040
High Rate of Change (15 UFA wells)	15	---
Medium Rate of Change (0 UFA wells)	---	---
Low Rate of Change (0 UFA wells)	---	NA
Decreasing Rate of Change (5 UFA wells)	1	NA

Note: mg/L = milligrams per liter

Public Supply Wells (Surficial Aquifer System)

SJRWMD evaluated 101 SAS public supply wells in Brevard and Indian River counties. Twenty-two wells showed an increasing chloride rate change of ≥ 3 mg/L/yr (high rate of change) and nine wells showed an increasing chloride rate within the range ≥ 1 and < 3 mg/L/yr (medium rate of change)(Table D-8). Of the 31 wells showing a high or medium rate of change, eight currently exceed the chloride SDWS and 13 additional wells are projected to exceed the SDWS by 2040. All 31 wells are located just west of the Indian River Lagoon with the majority occurring in Brevard County (Figure D-8). None of the SAS wells showed increasing chloride concentrations within the low rate of change (< 1mg/L/yr). Finally, of the 34 SAS wells that showed a statistically significant decreasing rate of change, four currently exceed the chloride SDWS. There were no SAS public supply wells monitored for chloride in Okeechobee County.

Table D-8: Analyzed SAS Public Supply Wells with Statistically Significant Trends in Chloride Concentration in Brevard and Indian River Counties

Chloride Trend Category	Number of SAS Wells Currently Exceeding 250 mg/L	Number of Additional SAS Wells Projected to Exceed 250 mg/L by 2040
High Rate of Change (22 SAS wells)	8	12
Medium Rate of Change (9 SAS wells)	0	1
Low Rate of Change (0 SAS wells)	---	NA
Decreasing Rate of Change (34 SAS wells)	4	NA

Note: mg/L = milligrams per liter

Agricultural Wells

None of the 18 agricultural wells evaluated in Brevard and Indian River counties showed an increasing rate of chloride concentration, however, two wells did show a statistically significant decreasing rate of chloride change (Table D-9). These two wells currently exceed the SDWS and are both associated with the same CUP in central Indian River County (Figure D-9). All of the analyzed wells in Brevard and Indian River counties were constructed into the UFA. There were no agricultural wells monitored for chloride in Okeechobee County.

Table D-9: Analyzed UFA Agricultural Wells with Statistically Significant Trends in Chloride Concentration in Brevard and Indian River Counties

Chloride Trend Category	Number of UFA Wells Currently Exceeding 250 mg/L	Number of Additional UFA Wells Projected to Exceed 250 mg/L by 2040
High Rate of Change (0 wells)	---	---
Medium Rate of Change (0 wells)	---	---
Low Rate of Change (0 wells)	---	NA
Decreasing Rate of Change (2 wells)	2	NA

Note: mg/L = milligrams per liter

Conclusions

Of the 75 wells identified as having increasing chloride trends greater than 1 mg/L/yr, 76 percent are currently not meeting the chloride SDWS or are projected to not meet it by 2040. The conclusion of this analysis is that groundwater quality may constrain the availability of groundwater sources in certain geographic regions within the CSEC RWSP area, specifically near the St. Johns River in Volusia County and in coastal areas of Volusia, Brevard, and Indian River counties. Detailed conclusions for each sub-region of the CSEC RWSP are provided below.

Volusia County

Eleven percent of the analyzed DOWN wells in Volusia County displayed increasing chloride concentrations at the high or medium rate of change. The three wells with a high rate of change were located near the St. Johns River within the St. Johns River valley (Figure D-2). This area is characterized as a groundwater discharge zone where hydraulic conditions allow relict sea water from the Lower Floridan to mix with fresh-water from the UFA through upward leakage or direct flow through fractures or faults (Boniol 2002). Here, the UFA freshwater lens can be thin, and the open hole interval of monitoring wells may extend beneath this lens within a zone of lower quality water. It is possible that saltwater intrusion via upconing is occurring in a small group of analyzed DOWN wells, specifically those located close to pumping centers. However, the upconing appears to be localized as other monitoring wells in the area did not show increasing chloride concentration trends.

Twelve percent of the analyzed public supply wells in Volusia County showed high or medium rates of increasing chlorides. Approximately half are located in the St. Johns River valley with the remaining located in eastern Volusia County (Figure D-3). The DOWN well analysis did not show signs of lateral saltwater intrusion, therefore it is possible that the public supply wells are experiencing water quality changes as a result of upconing. Current, or potentially enhanced, wellfield management strategies implemented by the affected utilities may decrease or reverse these increasing chloride trends.

Both of the analyzed agricultural wells in Volusia County are Upper Floridan aquifer monitor wells associated with a proposed agricultural operation in the southern part of the county. The deeper of the two wells showed a high rate of increasing chlorides. Although the agricultural facility is not yet in operation, it is possible that upconing from other withdrawals in the area are influencing this well. Despite having sufficient samples for statistical analysis, the water quality data for the agricultural monitor well spans only four years. A nearby public supply monitor well with a six-year period of record shows a similar trend during the same four-year period, however, no apparent trend exists when including data for the two previous years. SJRWMD will re-evaluate the chloride trends in the agricultural monitor wells during the next CSEC RWSP update when the period of record extends an additional five years.

Results of the water quality analysis show that saltwater intrusion in Volusia County appears to be localized due to upconing in response to withdrawals of groundwater from a single well and/or combined withdrawals from a wellfield. When viewed in total, the conclusion of this analysis is that groundwater quality may constrain the availability of fresh groundwater in a limited area within Volusia County, specifically along the coast and near the St. Johns River.

It should be noted that the major public supply utilities in coastal Volusia County have developed additional wellfields further inland. New wellfields were necessary to meet increased water demand of growing populations while avoiding wetland impacts and water quality degradation in the thin freshwater lens of the UFA near the coast. The continued shift of UFA withdrawals to the west may be of concern in the future as utilities in western Volusia County shift withdrawals east to mitigate impacts to water bodies with adopted minimum flows and minimum levels. Additional alternative water supplies may be necessary in the future as utilities continue to shift withdrawals toward central Volusia County to reduce water resource impacts.

Marion and North Lake Counties

The results of the water quality analysis confirm that saltwater intrusion is not a significant issue in Marion and North Lake counties. There are areas of the UFA near the St. Johns River with high chloride concentrations relating to naturally occurring upwelling of water from the Lower Floridan aquifer; however, this hydrogeologic zone typically can be avoided by drilling into the shallower zones of the UFA.

Brevard, Indian River, and Okeechobee Counties

Thirty-two percent of the analyzed DOWN wells in Brevard and Indian River counties displayed increasing chloride concentrations at the high or medium rate of change. Two of these wells are located on the Atlantic coast, four just west of the Indian River Lagoon, and one in central Indian River County. These DOWN wells, along with 77 percent of all analyzed DOWN wells in Brevard and Indian River counties, currently exceed the SDWS for chlorides as the UFA is mostly brackish (>250 mg/L chlorides) in the region. Water quality

changes in two of the seven DOWN wells with high and medium rates of chloride change may be indicative of lateral saltwater intrusion as both are located on coastal barrier islands. Water quality changes in the remaining five DOWN wells with high and medium rates of chloride increase may be the result of upconing from the influence of nearby wells.

Approximately 43 percent of analyzed UFA public supply wells in Brevard and Indian River counties showed a high or medium rate of increasing chloride concentration, all of which currently exceed the SDWS. Most of these wells are located in clusters, with some showing increasing trends while others in the cluster did not. Therefore, it is possible that water quality changes in these wells are from upconing resulting from individual or cumulative groundwater withdrawals. Public supply utilities that currently utilize reverse osmosis for treatment of brackish UFA water, generally, would not be impacted by increasing chloride concentrations. However, in this region, agricultural users rely, in part, on the UFA for irrigation. Increasing chloride concentrations within agricultural irrigation wells can potentially exceed the tolerance of historically grown crops, requiring significant investment by farmers to convert to crops that can survive higher concentrations.

The agricultural community has expressed concerns regarding anecdotal increases in chloride concentrations within their UFA wells. However, none of the 18 analyzed agricultural wells in Brevard and Indian River counties showed increasing chloride trends. Agricultural water quality data was limited to wells from four farming operations in Brevard County and one in Indian River County. Two of the agricultural wells in Indian River County showed a decreasing chloride trend, possibly due to implementation of water conservation measures and expansion of alternative water supplies by the permittee.

Thirty-one percent of public supply SAS production wells showed increasing rates of chloride concentration in the high and medium category with 21 currently exceeding, or projected by 2040 to exceed, the chloride SDWS. Eighty-seven percent of these wells belong to one utility in Brevard County. Water quality degradation in the SAS tends to be an issue for communities near the Atlantic coast. Utilities that have historically relied on the SAS have needed to replace SAS withdrawals with an alternate source, often of a lower quality, to halt impacts. Although surficial aquifer withdrawals have generally decreased over the years, additional water quality impacts are projected based on current withdrawals. It is estimated that approximately 70 percent of the 2040 projected domestic self-supply (DSS) demand in Brevard and Indian River counties will come from the SAS (CFWI 2020). Increasing chloride concentrations beyond the SDWS could present a financial hardship to DSS users if additional treatment is needed to render the water potable. Adherence to surficial aquifer wellfield management plans by utilities can help to lessen the chloride trend increases in some cases, as evidenced by the 34 SAS production wells that showed a decreasing trend. However, where there is a significant cluster of wells with current and projected impacts, additional strategies may be required, including increasing use of alternative water supplies.

Results of the water quality analysis show that UFA saltwater intrusion in Brevard and Indian River counties may result mostly from upconing in response to groundwater withdrawals from a single well and/or combined withdrawals. However, water quality

changes in two DOWN UFA wells on barrier islands may be the result of lateral saltwater intrusion. In addition, the water quality analysis shows current and projected impacts to the surficial aquifer indicative of a potentially strained and limited fresh water supply. When viewed together, the conclusion is that groundwater quality may constrain the availability of groundwater sources in Brevard and Indian River counties.

References

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Central Florida Water Initiative (CFWI). 2020. *2020 Central Florida Water Initiative (CFWI) Regional Water Supply Plan (RWSP): Volume I*. Available from: http://cfwiwater.com/

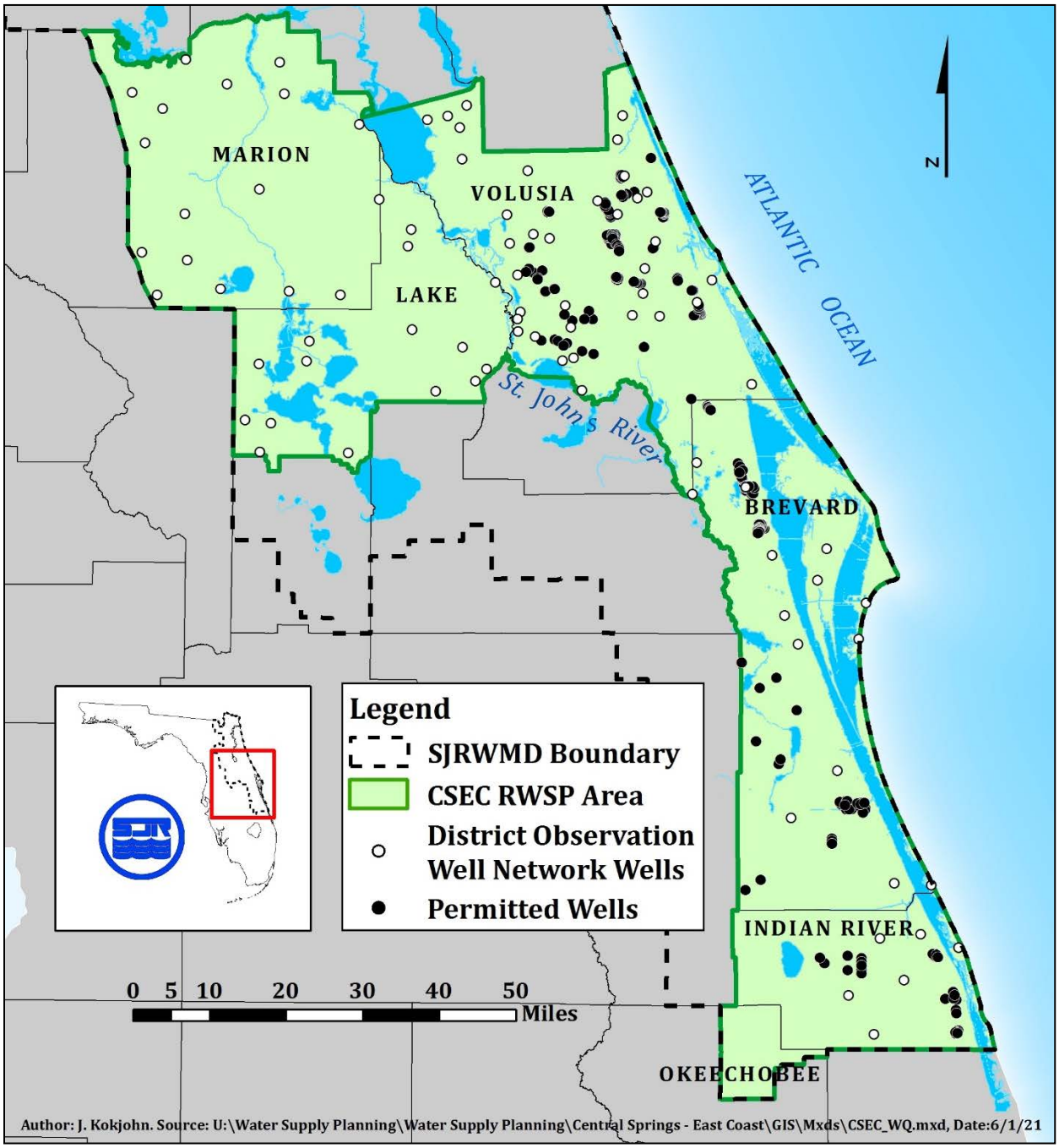

Figure D-1: Location of DOWN and Permitted Wells Analyzed for the CSEC RWSP Groundwater Quality Analysis

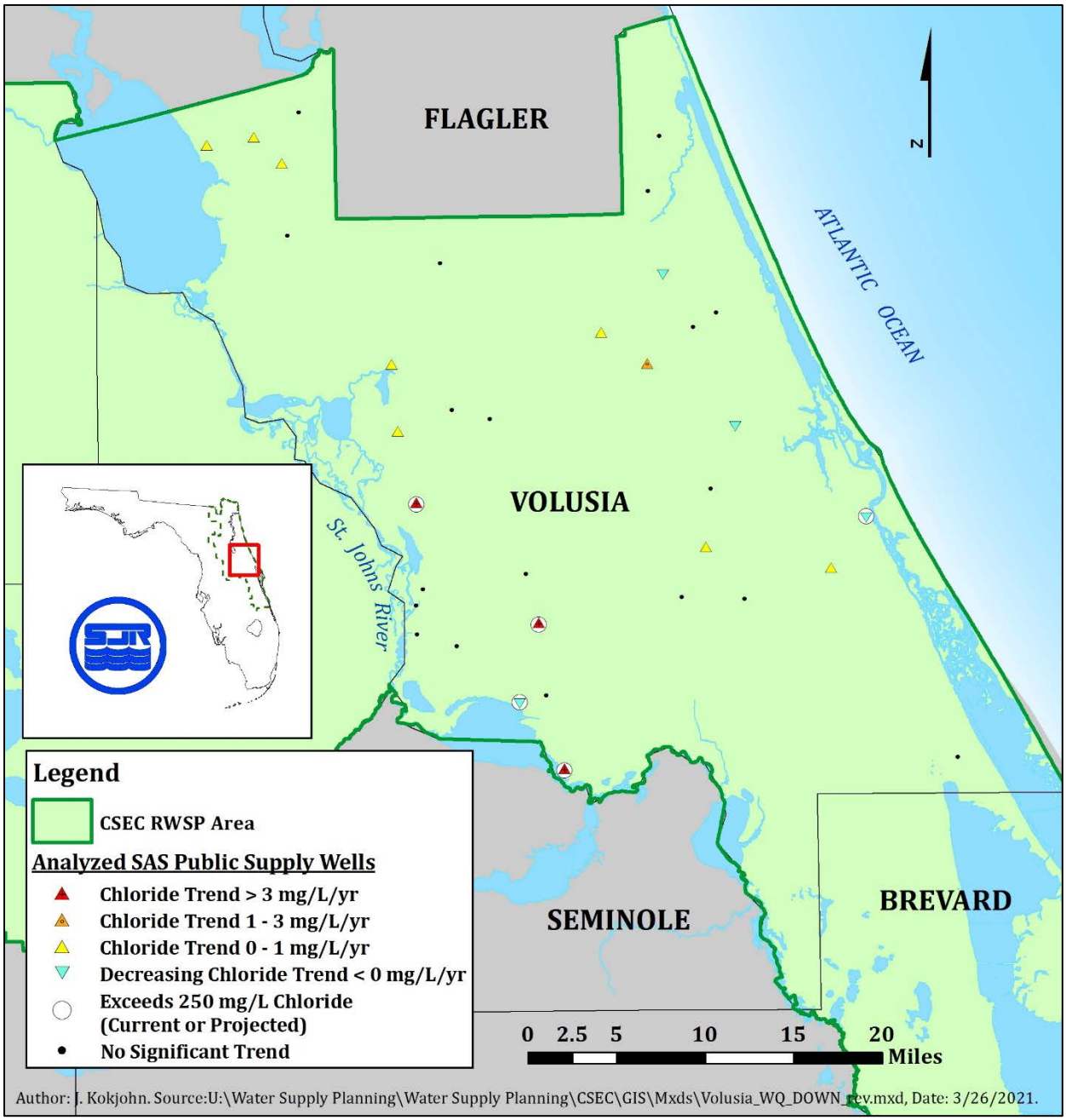

Figure D-2: Spatial Summary of UFA DOWN Well Chloride Trend Analysis in Volusia County

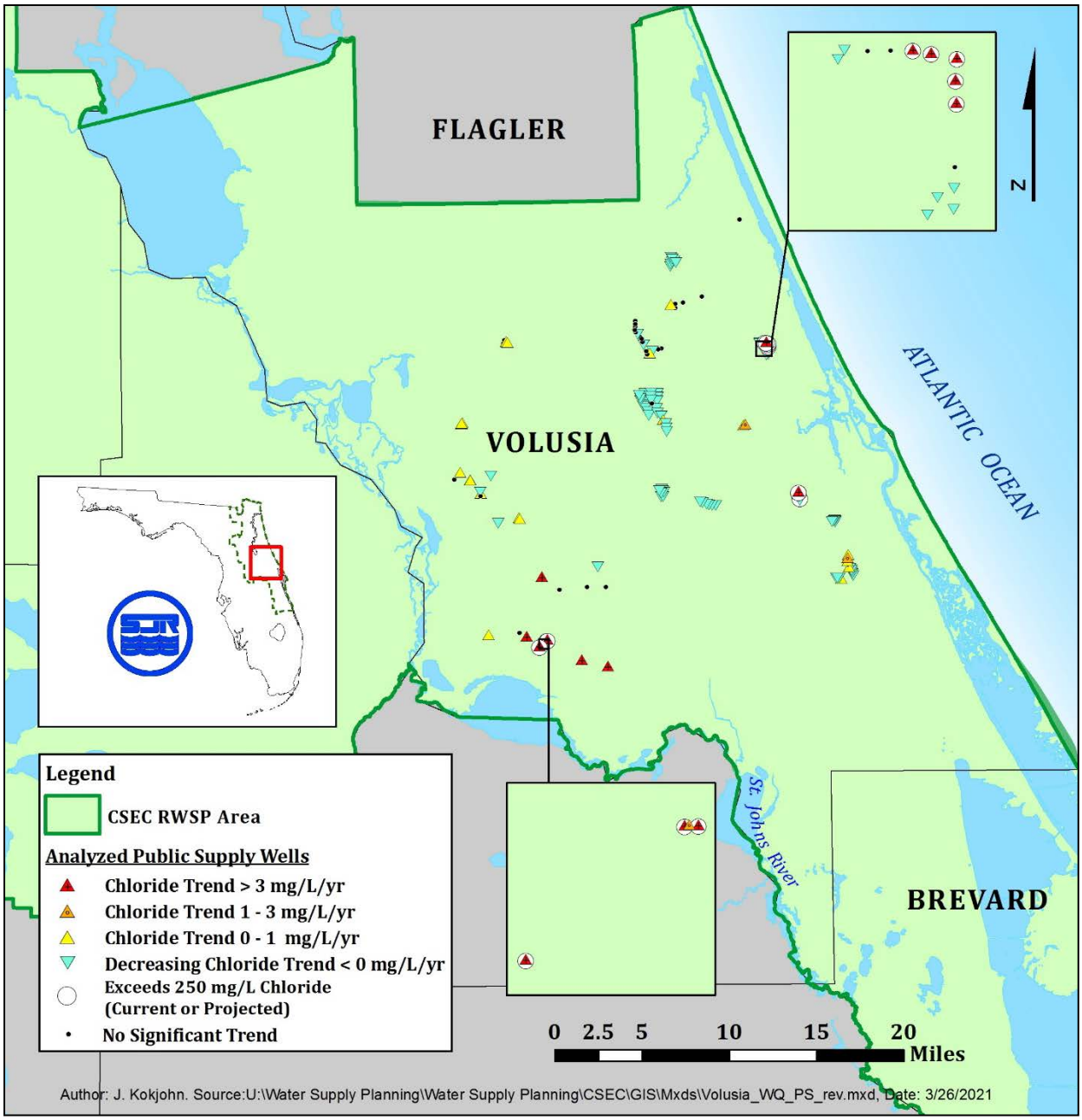

Figure D-3: Spatial Summary of UFA Public Supply Well Chloride Trend Analysis in Volusia County

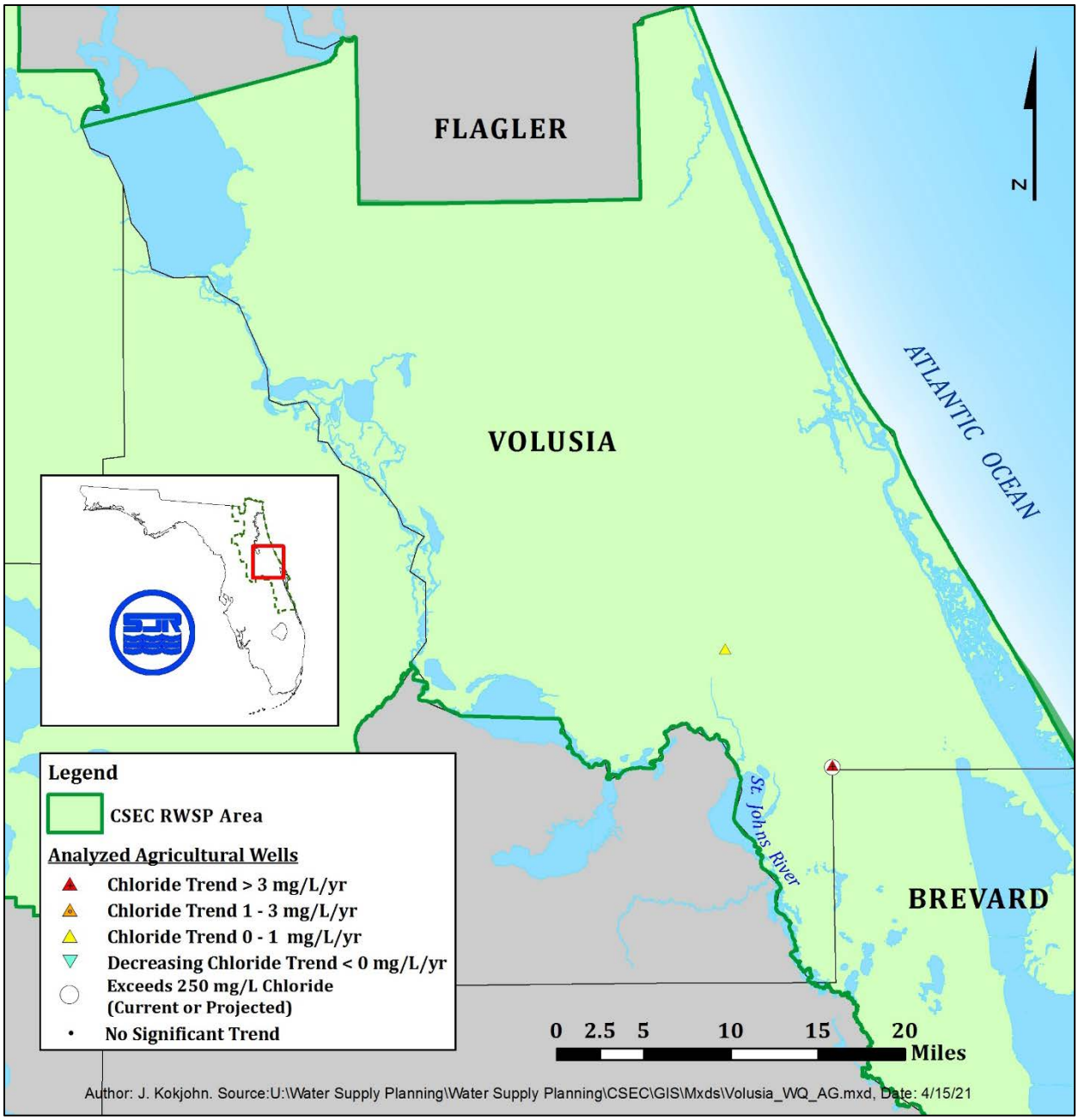

Figure D-4: Spatial Summary of UFA Agricultural Well Chloride Trend Analysis in Volusia County

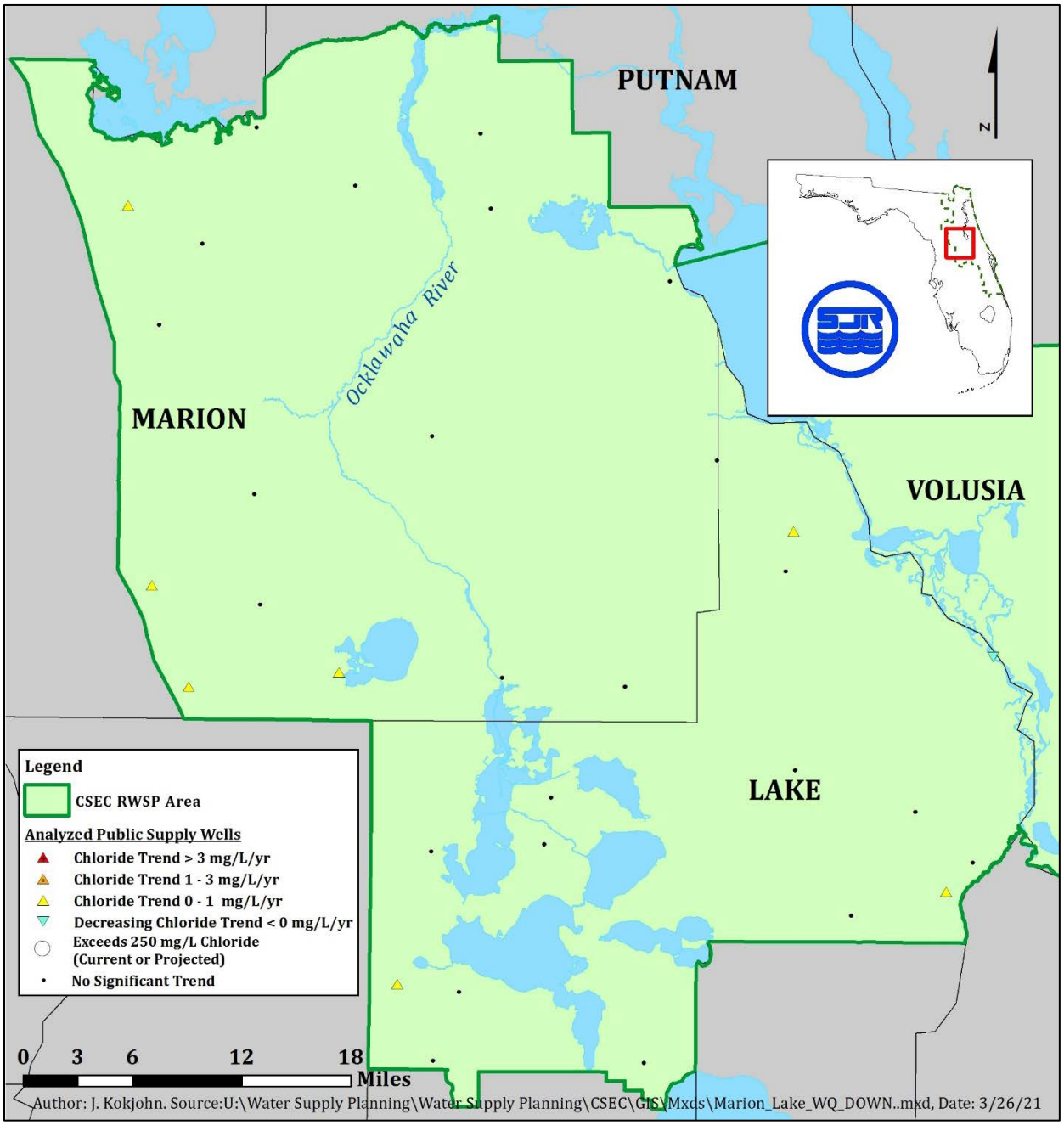

Figure D-5: Spatial Summary of UFA DOWN Well Chloride Trend Analysis in Marion and North Lake Counties

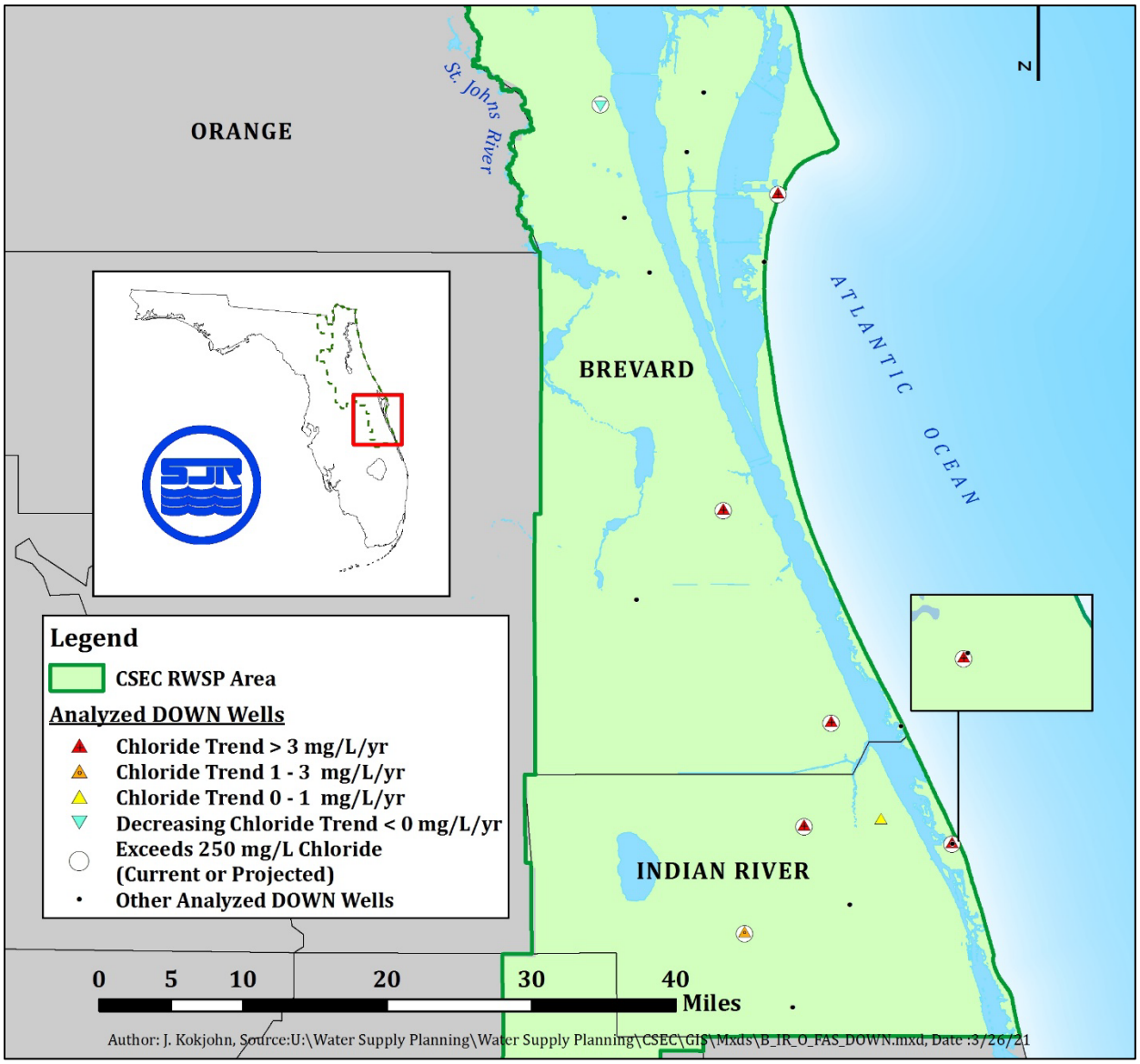

Figure D-6: Spatial Summary of UFA DOWN Well Chloride Trend Analysis in Brevard and Indian River Counties

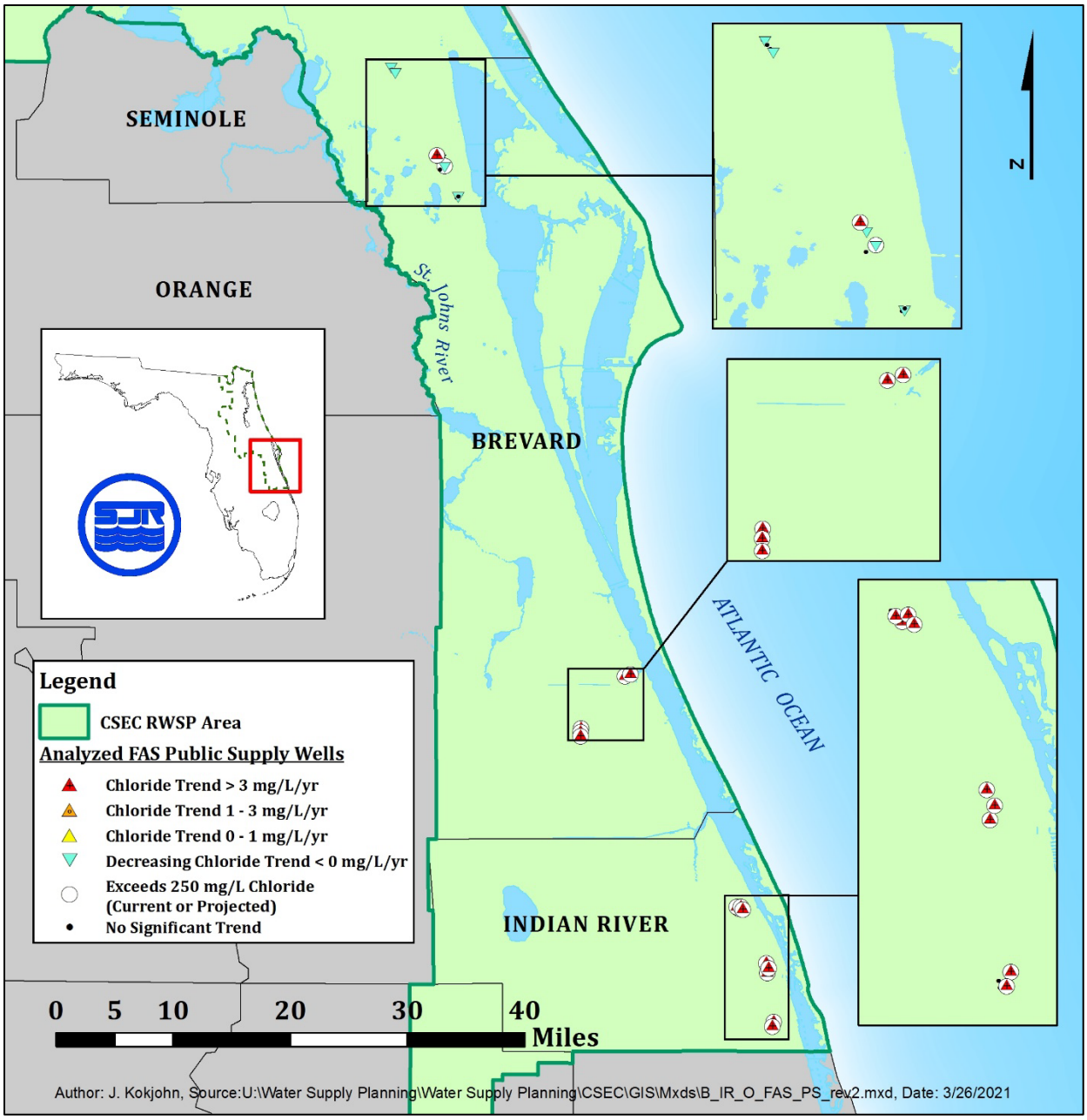

Figure D-7: Spatial Summary of UFA Public Supply Well Chloride Trend Analysis in Brevard and Indian River Counties

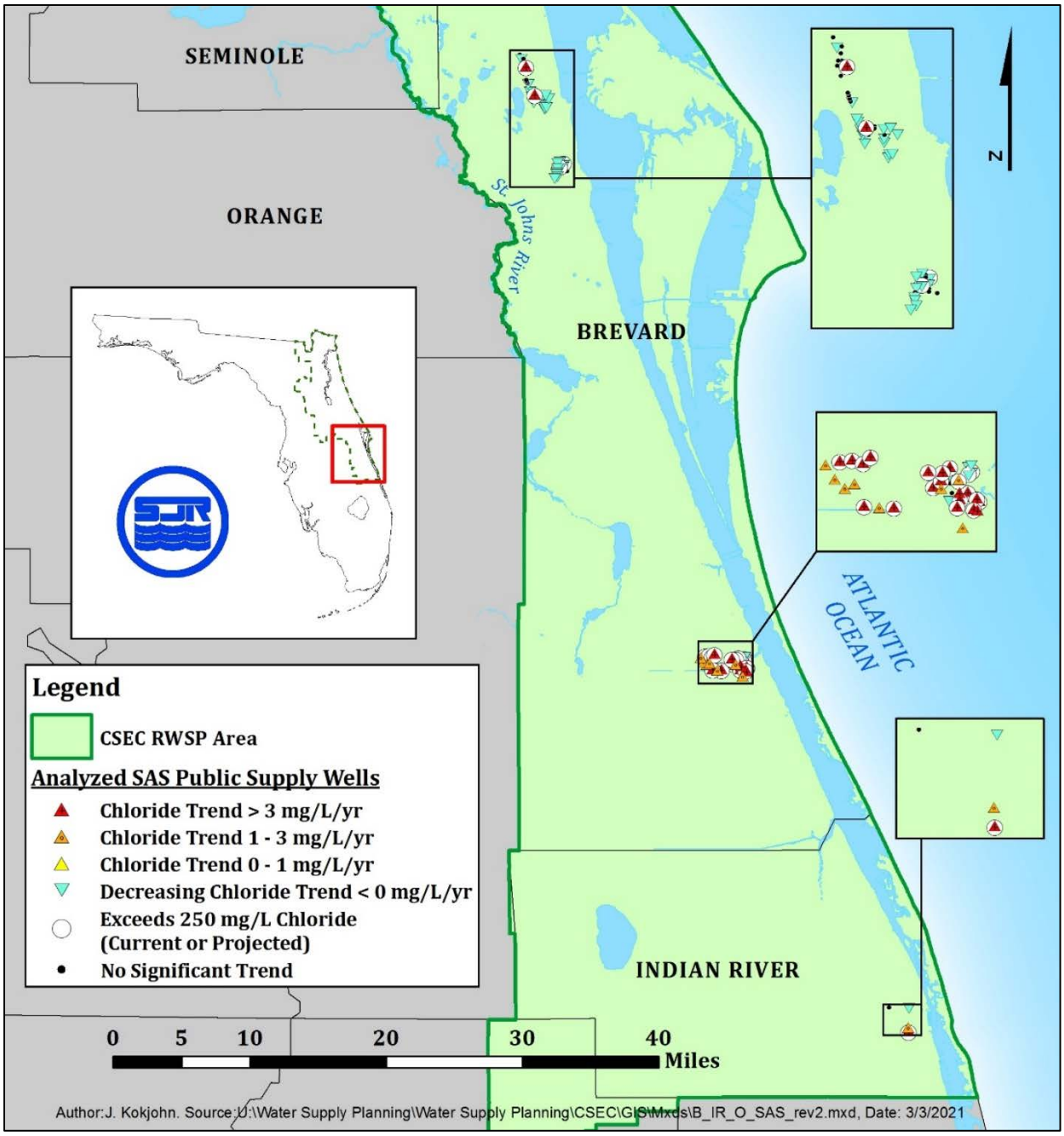

Figure D-8: Spatial Summary of SAS Public Supply Well Chloride Trend Analysis in Brevard and Indian River Counties

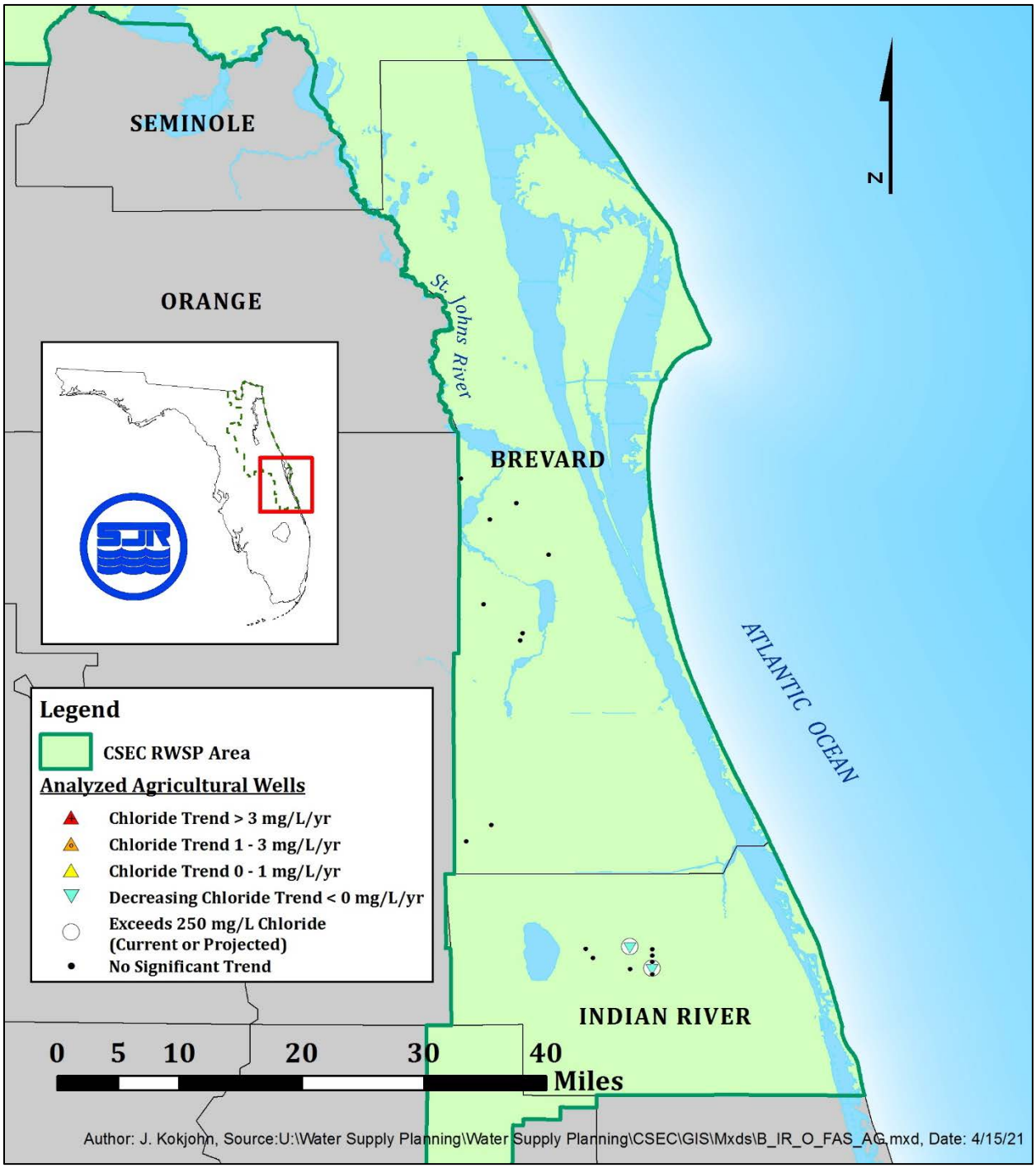

Figure D-9: Spatial Summary of UFA Agicultural Well Chloride Trend Analysis in Brevard and Indian River Counties

Table D-10: Groundwater Quality Analysis Results for CSEC Public Supply and Agricultural Wells Demonstrating an Increasing Chloride Trend of ≥3 mg/L/year

County	Permit Type[1]	Permit Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?	Year at SDWS[2]
Brevard	PS	202	Palm Bay	4216	SAS	Jan-2008	Dec-2019	120	235	463	339	0.448	6.2	<0.0001	Yes	<2019
Brevard	PS	202	Palm Bay	4237	SAS	Jan-2008	Dec-2019	122	140	398	187	0.603	5.8	<0.0001	Yes	2025
Brevard	PS	202	Palm Bay	4238	SAS	Feb-2008	Dec-2019	105	121	316	188	0.570	6.0	<0.0001	Yes	2024
Brevard	PS	202	Palm Bay	4239	SAS	Feb-2008	Dec-2019	126	121	374	178	0.352	3.1	<0.0001	Yes	2039
Brevard	PS	202	Palm Bay	4244	SAS	Jan-2008	Dec-2019	130	79	290	132	0.706	8.5	<0.0001	Yes	2028
Brevard	PS	202	Palm Bay	4245	SAS	Jan-2008	Dec-2019	133	106	279	180	0.600	4.3	<0.0001	Yes	2030
Brevard	PS	202	Palm Bay	4247	SAS	Jan-2008	Dec-2019	118	100	279	144	0.541	5.3	<0.0001	Yes	2032
Brevard	PS	202	Palm Bay	4248	SAS	Jan-2008	May-2019	121	114	285	150	0.542	4.6	<0.0001	Yes	2036
Brevard	PS	202	Palm Bay	4257	SAS	Jan-2008	Dec-2019	122	159	391	255	0.348	4.3	<0.0001	Yes	<2019
Brevard	PS	202	Palm Bay	4258	SAS	Jan-2008	Dec-2017	110	125	274	146	0.521	3.1	<0.0001	Yes	>2040
Brevard	PS	202	Palm Bay	4260	SAS	Jan-2008	Dec-2019	126	138	1109	327	0.652	29.9	<0.0001	Yes	<2019
Brevard	PS	202	Palm Bay	4261	SAS	Jan-2008	Dec-2019	130	132	376	188	0.698	11.3	<0.0001	Yes	<2019
Brevard	PS	202	Palm Bay	4265	SAS	Jan-2008	Nov-2016	104	154	355	184	0.228	3.2	0.0007	Yes	2033
Brevard	PS	202	Palm Bay	4268	SAS	Feb-2008	Dec-2019	129	211	464	286	0.384	4.4	<0.0001	Yes	<2019

County	Permit Type[1]	Permit Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?	Year at SDWS[2]
Brevard	PS	202	Palm Bay	4270	SAS	Jan-2008	Dec-2019	129	148	338	233	0.310	4.9	<0.0001	Yes	<2019
Brevard	PS	202	Palm Bay	4271	SAS	Feb-2008	Dec-2019	128	196	368	255	0.505	6.5	<0.0001	Yes	<2019
Brevard	PS	202	Palm Bay	4272	SAS	Jan-2008	Oct-2019	113	50	208	73	0.398	4.2	<0.0001	Yes	>2040
Brevard	PS	202	Palm Bay	4273	SAS	Jan-2008	Dec-2019	123	100	849	391	0.470	24.7	<0.0001	Yes	<2019
Brevard	PS	202	Palm Bay	4274	SAS	Jan-2008	Dec-2019	134	72	440	111	0.749	10.6	<0.0001	Yes	2026
Brevard	PS	202	Palm Bay	21954	UFA	Jan-2008	Oct-2019	53	857	3220	2595	0.291	66.8	0.0022	Yes	<2019
Brevard	PS	202	Palm Bay	21955	UFA	Jan-2008	Oct-2019	56	182	1970	888	0.494	26.1	<0.0001	Yes	<2019
Brevard	PS	202	Palm Bay	23854	UFA	Jan-2008	Dec-2019	81	630	8007	780	0.361	12.5	<0.0001	Yes	<2019
Brevard	PS	202	Palm Bay	23855	UFA	Jan-2008	Dec-2019	103	698	1080	840	0.329	11.2	<0.0001	Yes	<2019
Brevard	PS	202	Palm Bay	23856	UFA	Feb-2008	Oct-2019	94	718	1076	899	0.435	17.1	<0.0001	Yes	<2019
Brevard	PS	233	Brevard County	4316	SAS	Jun-2011	May-2019	13	36.9	215	96	0.667	14.9	0.0019	Yes	2025
Brevard	PS	233	Brevard County	409482	UFA	Jun-2011	May-2019	13	3620	4720	4130	0.513	121.3	0.0173	Yes	<2019
Brevard	PS	10647	Titusville	36354	SAS	Dec-2013	Sep-2019	21	91.5	282	174	0.740	25.5	<0.0001	Yes	2020
Indian River	PS	10524	Indian River County	7309	UFA	Jan-2015	Oct-2019	18	343	595	508	0.420	21.3	0.0169	Yes	<2019

County	Permit Type[1]	Permit Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?	Year at SDWS[2]
Indian River	PS	10524	Indian River County	7318	UFA	Nov-2015	Oct-2019	16	255	306	277	0.527	8.4	0.0052	Yes	<2019
Indian River	PS	10524	Indian River County	35333	UFA	Oct-2015	Apr-2019	15	263	302	287	0.483	5.8	0.0149	Yes	<2019
Indian River	PS	10524	Indian River County	40143	UFA	Nov-2015	Oct-2019	14	268	307	289	0.469	6.0	0.0242	Yes	<2019
Indian River	PS	10524	Indian River County	181224	UFA	Nov-2015	Oct-2019	16	259	324	293	0.644	12.9	0.0006	Yes	<2019
Indian River	PS	10524	Indian River County	181225	UFA	Nov-2015	Nov-2019	15	285	398	345	0.625	16.2	0.0015	Yes	<2019
Indian River	PS	10705	Vero Beach	7221	SAS	Mar-2003	Sep-2019	46	119	248	148	0.339	4.2	0.0010	Yes	2031
Indian River	PS	10705	Vero Beach	7222	UFA	Jun-2003	Sep-2019	25	622	773	703	0.667	6.6	<0.0001	Yes	<2019
Indian River	PS	10705	Vero Beach	7230	UFA	Mar-2003	Mar-2019	50	405	612	516	0.796	11.7	<0.0001	Yes	<2019
Indian River	PS	10705	Vero Beach	7231	UFA	Mar-2003	Sep-2019	27	628	857	747	0.532	9.2	0.0001	Yes	<2019
Volusia	PS	8595	Port Orange	16517	UFA	Apr-2003	Jun-2019	53	100	444	200	0.521	15.6	<0.0001	Yes	2020
Volusia	PS	8595	Port Orange	16536	UFA	Sep-2002	Jun-2019	58	83	287	117	0.790	7.8	<0.0001	Yes	2026
Volusia	PS	8595	Port Orange	16537	UFA	Sep-2002	Jun-2019	56	96	446	248	0.762	20.7	<0.0001	Yes	2020
Volusia	PS	8595	Port Orange	16538	UFA	Dec-2002	Jun-2019	52	107	518	200	0.619	12.4	<0.0001	Yes	2020
Volusia	PS	8595	Port Orange	16539	UFA	Sep-2002	Jun-2019	51	131	558	250	0.803	23.8	<0.0001	Yes	2020

County	Permit Type[1]	Permit Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?	Year at SDWS[2]
Volusia	PS	8658	Deltona	16557	UFA	Jan-1998	Jul-2019	42	12	163	52	0.551	5.0	<0.0001	Yes	>2040
Volusia	PS	8658	Deltona	16566	UFA	May-1994	Jul-2019	47	12	200	48	0.274	3.3	0.0070	Yes	>2040
Volusia	PS	8658	Deltona	16567	UFA	May-1994	Jul-2019	47	12	250	85	0.370	6.6	0.0003	Yes	2030
Volusia	PS	8658	Deltona	16571	UFA	May-1994	Jul-2019	36	75.8	231	150	0.305	3.3	0.0108	Yes	2037
Volusia	PS	8658	Deltona	26948	UFA	May-1994	Jul-2019	44	12	157.5	50	0.370	4.2	0.0005	Yes	>2040
Volusia	PS	8658	Deltona	26949	UFA	Jan-1998	Jul-2019	44	12	230	145	0.321	6.5	0.0030	Yes	2022
Volusia	PS	8747	New Smyrna Beach	38424	UFA	Mar-2016	Dec-2019	16	140	170	160	0.650	6.7	0.0009	Yes	2031
Volusia	PS	8747	New Smyrna Beach	38425	UFA	Mar-2016	Dec-2019	16	160	210	195	0.821	10.8	<0.0001	Yes	2023
Volusia	PS	50157	Volusia County	33673	UFA	Jul-2003	Oct-2019	29	22	140	101	0.488	3.6	0.0002	Yes	>2040
Volusia	AG	127579	Farmton Services LLC	447581	UFA	May-2017	Feb-2020	16	492	619	556.5	0.639	31.8	0.0007	Yes	<2019

[1] PS = public supply; AG = agricultural

[2] SDWS = Secondary Drinking Water Standard. The SDWS for chloride is 250 milligrams per liter (mg/L).

Table D-11: Groundwater Quality Analysis Results for SJRWMD DOWN Wells Demonstrating an Increasing Chloride Trend of ≥3 mg/L/year

County	Well ID	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?	Year at SDWS[1]
Brevard	BR1572	UFA	Apr-2004	Nov-2018	24	2,960	10,900	3,760	0.341	33.2	0.0211	Yes	<2019
Brevard	BR1935	UFA	Aug-2006	Oct-2018	23	370	470	412	0.565	4.4	0.0002	Yes	<2019
Brevard	BR1983	UFA	Sep-2007	Oct-2018	20	573	710	634	0.326	3.5	0.0478	Yes	<2019
Brevard	BR1990	UFA	Apr-2008	Dec-2018	18	157	825	788	0.542	6.9	0.0019	Yes	<2019
Indian River	IR0916	UFA	Mar-2008	Oct-2018	19	402	550	441	0.380	5.2	0.0250	Yes	<2019
Indian River	IR1058	UFA	Jan-2007	Oct-2018	21	283	620	531	0.429	7.3	0.0071	Yes	<2019
Volusia	V-0115	UFA	Feb-2004	Mar-2018	39	239	435	286	0.491	9.5	0.0000	Yes	<2019
Volusia	V-0772	UFA	Jan-2004	Apr-2018	21	246	795	532	0.581	23.0	0.0003	Yes	<2019
Volusia	V-0818	UFA	Jan-2004	Apr-2018	22	37	1,121	659	0.420	4.6	0.0068	Yes	<2019

[1] SDWS = Secondary Drinking Water Standard. The SDWS for chloride is 250 milligrams per liter (mg/L).

Table D-12: Groundwater Quality Analysis Results for CSEC Public Supply and Agricultural Wells Demonstrating an Increasing Chloride Trend of <3 mg/L/year and ≥1 mg/L/year

County	Permit Type[1]	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?	Year at SDWS[2]
Brevard	PS	202	Palm Bay	4235	SAS	Feb-2008	Dec-2019	130	61	237	108	0.397	1.9	<0.0001	Yes	>2040
Brevard	PS	202	Palm Bay	4240	SAS	Feb-2008	Dec-2019	122	74	221	99	0.468	1.8	<0.0001	Yes	>2040
Brevard	PS	202	Palm Bay	4243	SAS	Feb-2008	Aug-2019	111	98	311	155	0.381	1.9	<0.0001	Yes	>2040
Brevard	PS	202	Palm Bay	4249	SAS	Jan-2008	Sep-2019	122	158	479	174	0.311	1.8	<0.0001	Yes	>2040
Brevard	PS	202	Palm Bay	4250	SAS	Jan-2008	Dec-2019	129	70	260	103	0.483	2.4	<0.0001	Yes	>2040
Brevard	PS	202	Palm Bay	4263	SAS	Jan-2008	Dec-2019	118	112	314	192	0.404	2.6	<0.0001	Yes	2035
Brevard	PS	202	Palm Bay	4266	SAS	Jan-2008	Dec-2019	121	116	380	171	0.261	1.6	<0.0001	Yes	>2040
Brevard	PS	202	Palm Bay	4275	SAS	Jan-2008	Dec-2019	127	78	234	121	0.375	2.2	<0.0001	Yes	>2040
Indian River	PS	10705	Vero Beach	7220	SAS	Mar-2003	Sep-2019	46	123	371	133	0.698	1.7	<0.0001	Yes	>2040
Volusia	PS	8658	Deltona	16569	UFA	May-1994	Jul-2019	46	12	170	63.5	0.267	2.5	0.0094	Yes	>2040
Volusia	PS	9157	Edgewater	38565	UFA	Apr-2011	Dec-2019	55	56	75	61	0.524	1.2	<0.0001	Yes	>2040
Volusia	PS	50157	Volusia County	33667	UFA	Jun-2003	Oct-2019	55	51	107	86	0.314	1.7	0.0008	Yes	>2040

[1] PS = public supply; AG = agricultural

[2] SDWS = Secondary Drinking Water Standard. The SDWS for chloride is 250 milligrams per liter (mg/L).

Table D-13: Groundwater Quality Analysis Results for SJRWMD DOWN Wells Demonstrating an Increasing Chloride Trend of <3 mg/L/year to ≥1 mg/L/year

County	Well ID	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?	Year at SDWS[1]
Indian River	IR0955	UFA	Jan-2004	Nov-2018	24	257	330	287	0.460	1.9	0.0018	Yes	<2019
Volusia	V-0188	UFA	Feb-2004	Jan-2018	41	19	62	27	0.395	1.3	0.0003	Yes	>2040

[1] SDWS = Secondary Drinking Water Standard. The SDWS for chloride is 250 milligrams per liter (mg/L).

Table D-14: Groundwater Quality Analysis Results for CSEC Public Supply and Agricultural Wells Demonstrating an Increasing Chloride Trend of <1 mg/L/year

County	Permit Type[1]	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Volusia	PS	8595	Port Orange	23899	UFA	Oct-2006	Jun-2019	34	10	15	12	0.348	0.2	0.0048	Yes
Volusia	PS	8834	Daytona Beach	17168	UFA	Nov-2013	Nov-2019	25	27	33	29	0.442	0.6	0.0022	Yes
Volusia	PS	8834	Daytona Beach	17173	UFA	Nov-2013	Nov-2019	25	26	29	27	0.422	0.2	0.0039	Yes
Volusia	PS	9157	Edgewater	17617	UFA	Oct-1989	Dec-2019	68	52	71	58	0.348	0.2	<0.0001	Yes
Volusia	PS	9157	Edgewater	17626	UFA	May-1994	Dec-2019	62	51	72	58	0.364	0.4	<0.0001	Yes
Volusia	PS	9157	Edgewater	38564	UFA	Apr-2011	Dec-2019	55	60	79	66	0.388	0.8	<0.0001	Yes
Volusia	PS	9157	Edgewater	38566	UFA	Apr-2011	Dec-2019	55	56	74	61	0.312	0.6	0.0013	Yes
Volusia	PS	50116	DeLand	395	UFA	Jan-2006	Nov-2019	63	6	20	12	0.440	0.2	<0.0001	Yes
Volusia	PS	50116	DeLand	396	UFA	Jan-2006	Nov-2019	63	11	19	14	0.596	0.3	<0.0001	Yes
Volusia	PS	50116	DeLand	397	UFA	Jan-2006	Nov-2019	63	10	17	14	0.329	0.1	0.0002	Yes
Volusia	PS	50116	DeLand	409	UFA	Jan-2006	Nov-2019	65	11	36	27	0.310	0.3	0.0003	Yes
Volusia	PS	50116	DeLand	410	UFA	Jan-2006	Nov-2019	64	23	39	29	0.424	0.4	<0.0001	Yes

County	Permit Type[1]	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Volusia	PS	50116	DeLand	411	UFA	Jan-2006	Nov-2019	62	12	18	15	0.628	0.3	<0.0001	Yes
Volusia	PS	50116	DeLand	414	UFA	Jan-2006	Nov-2019	63	12	32	17	0.611	0.9	<0.0001	Yes
Volusia	PS	50116	DeLand	36209	UFA	May-2008	Nov-2019	41	5	7	5	0.398	0.1	0.0003	Yes
Volusia	PS	50116	DeLand	36210	UFA	May-2008	Nov-2019	45	4	6	5	0.514	0.1	<0.0001	Yes
Volusia	PS	50116	DeLand	36215	UFA	Aug-2013	Nov-2019	23	9	12	11	0.432	0.3	0.0049	Yes
Volusia	PS	50116	DeLand	36218	UFA	Aug-2013	Nov-2019	25	10	13	12	0.387	0.3	0.0081	Yes
Volusia	PS	50116	DeLand	38469	UFA	Jan-2006	Nov-2019	62	14	26	20	0.741	0.6	<0.0001	Yes
Volusia	PS	50157	Volusia County	33666	UFA	Apr-2002	Oct-2019	41	27	88	44	0.223	0.9	0.0419	Yes
Volusia	PS	50157	Volusia County	33686	UFA	Jul-2003	Oct-2019	33	12	26	18	0.503	0.4	<0.0001	Yes
Volusia	AG	127579	Farmton Services LLC	447577	UFA	Nov-2016	Feb-2021	18	29.6	35.1	31.3	0.452	0.8	0.0108	Yes

[1] PS = public supply; AG = agricultural

Table D-15: Groundwater Quality Analysis Results for SJRWMD DOWN Wells Demonstrating an Increasing Chloride Trend of <1 mg/L/year

County	Well ID	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Indian River	IR1183	UFA	Aug-2008	Oct-2018	22	112	130	120	0.351	0.8	0.0235	Yes
Lake	L-0038	UFA	May-2004	Apr-2018	23	5	15	10	0.360	0.4	0.0175	Yes
Lake	L-0040	UFA	Nov-2004	Jun-2018	13	7	19	8	0.564	0.2	0.0087	Yes
Lake	L-0924	UFA	May-2007	Dec-2018	20	9	26	13	0.737	0.9	0.0000	Yes
Marion	M-0031	UFA	Sep-2004	May-2018	20	2	11	5	0.374	0.3	0.0231	Yes
Marion	M-0041	UFA	Sep-2004	May-2018	19	6	13	9	0.450	0.2	0.0078	Yes
Marion	M-0467	UFA	Mar-2004	May-2018	20	5	13	8	0.563	0.3	0.0006	Yes
Marion	M-0527	UFA	Mar-2009	May-2018	22	8	18	14	0.450	0.6	0.0037	Yes
Volusia	V-0064	UFA	May-2004	Apr-2018	14	10	19	13	0.637	0.2	0.0017	Yes
Volusia	V-0086	UFA	Feb-2004	Jan-2018	23	18	24	19	0.482	0.2	0.0013	Yes
Volusia	V-0110	UFA	Apr-2004	Jan-2018	24	10	25	12	0.493	0.3	0.0008	Yes
Volusia	V-0156	UFA	Sep-2004	Mar-2018	15	29	42	32	0.438	0.6	0.0258	Yes
Volusia	V-0184	UFA	Jun-2004	Apr-2018	14	17	29	20	0.692	0.5	0.0007	Yes

County	Well ID	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Volusia	V-0435	UFA	Jan-2004	Jan-2018	23	32	58	53	0.455	0.6	0.0026	Yes
Volusia	V-1030	UFA	Mar-2004	Mar-2018	25	14	20	16	0.567	0.3	0.0001	Yes
Volusia	V-4033	UFA	May-2004	Apr-2018	22	12	17	12	0.320	0.1	0.0391	Yes

Table D-16: Groundwater Quality Analysis Results for CSEC Public Supply and Agricultural Wells Demonstrating a Decreasing Chloride Trend

County	Permit Type[1]	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Brevard	PS	202	Palm Bay	4218	SAS	Jan-2008	Dec-2019	134	124	267	144	-0.138	-0.7	0.0203	Yes
Brevard	PS	202	Palm Bay	4242	SAS	Jan-2008	Dec-2019	140	97	253	176	-0.121	-0.8	0.0364	Yes
Brevard	PS	202	Palm Bay	4252	SAS	Jan-2008	Dec-2019	125	218	435	288	-0.539	-10.9	<0.0001	Yes
Brevard	PS	202	Palm Bay	4253	SAS	Jan-2008	Dec-2019	135	150	397	310	-0.368	-9.2	<0.0001	Yes
Brevard	PS	202	Palm Bay	4256	SAS	Jan-2008	Dec-2019	136	92	354	220	-0.633	-12.1	<0.0001	Yes
Brevard	PS	202	Palm Bay	4264	SAS	Feb-2008	Dec-2019	115	151	372	194	-0.188	-1.8	0.0032	Yes
Brevard	PS	233	Brevard County	4315	SAS	Jun-2011	May-2018	12	30	53	35	-0.485	-1.8	0.0335	Yes
Brevard	PS	233	Brevard County	409483	UFA	Jun-2011	May-2018	12	43	88	72	-0.515	-6.0	0.0236	Yes
Brevard	PS	233	Brevard County	409484	UFA	Jun-2011	May-2018	12	530	859	644	-0.636	-39.6	0.0049	Yes
Brevard	PS	10647	Titusville	3841	SAS	Dec-2013	Sep-2017	13	6	17	12	-0.520	-1.8	0.0169	Yes
Brevard	PS	10647	Titusville	3843	SAS	Dec-2013	Oct-2019	20	17	282	158	-0.375	-10.5	0.0231	Yes
Brevard	PS	10647	Titusville	3844	SAS	Sep-2013	Oct-2019	22	14	68	24	-0.503	-8.2	0.0012	Yes
Brevard	PS	10647	Titusville	3845	SAS	Sep-2013	Oct-2019	24	22	120	47	-0.735	-17.0	<0.0001	Yes

County	Permit Type[1]	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Brevard	PS	10647	Titusville	3846	SAS	Dec-2013	Oct-2019	21	25	89	41	-0.574	-6.7	0.0003	Yes
Brevard	PS	10647	Titusville	3849	SAS	Dec-2013	Oct-2019	21	27	111	46	-0.486	-5.2	0.0023	Yes
Brevard	PS	10647	Titusville	3850	SAS	Dec-2013	May-2019	20	38	61	49	-0.328	-1.6	0.0476	Yes
Brevard	PS	10647	Titusville	3856	SAS	Dec-2013	Oct-2019	20	8	89	35	-0.396	-2.4	0.0163	Yes
Brevard	PS	10647	Titusville	3865	SAS	Dec-2013	Sep-2019	19	266	536	405	-0.771	-30.0	<0.0001	Yes
Brevard	PS	10647	Titusville	3867	SAS	Dec-2013	Oct-2019	19	71	363	100	-0.340	-8.6	0.0460	Yes
Brevard	PS	10647	Titusville	3873	SAS	Dec-2013	Oct-2019	22	42	145	71	-0.460	-5.9	0.0031	Yes
Brevard	PS	10647	Titusville	3882	SAS	Sep-2014	Oct-2019	19	57	410	252	-0.591	-62.4	0.0005	Yes
Brevard	PS	10647	Titusville	3884	SAS	Dec-2013	Oct-2019	21	84	340	198	-0.711	-48.2	<0.0001	Yes
Brevard	PS	10647	Titusville	3887	SAS	Sep-2013	Oct-2019	20	5	391	119	-0.642	-38.5	<0.0001	Yes
Brevard	PS	10647	Titusville	3891	SAS	Sep-2013	Oct-2019	22	30	81	63	-0.723	-4.3	<0.0001	Yes
Brevard	PS	10647	Titusville	3892	SAS	Sep-2013	Oct-2019	21	7	34	20	-0.511	-2.2	0.0014	Yes
Brevard	PS	10647	Titusville	3893	SAS	Dec-2013	May-2019	19	30	68	42	-0.406	-4.2	0.0172	Yes
Brevard	PS	10647	Titusville	3895	SAS	Sep-2013	May-2019	16	15	172	45	-0.717	-14.9	0.0001	Yes

County	Permit Type[1]	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Brevard	PS	10647	Titusville	3897	SAS	Dec-2013	May-2019	17	25	254	34	-0.735	-12.1	<0.0001	Yes
Brevard	PS	10647	Titusville	3898	SAS	Sep-2013	Oct-2019	23	27	92	68	-0.671	-4.3	<0.0001	Yes
Brevard	PS	10647	Titusville	3900	SAS	Sep-2013	Oct-2019	22	5	64	51	-0.700	-3.3	<0.0001	Yes
Brevard	PS	10647	Titusville	3902	UFA	Dec-2014	Oct-2019	19	32	99	48	-0.727	-10.5	<0.0001	Yes
Brevard	PS	10647	Titusville	3910	SAS	Dec-2013	Oct-2019	21	82	253	140	-0.895	-25.9	<0.0001	Yes
Brevard	PS	10647	Titusville	3911	SAS	Dec-2013	Oct-2019	22	67	204	77	-0.668	-3.9	<0.0001	Yes
Brevard	PS	10647	Titusville	3912	SAS	Sep-2013	Dec-2017	17	80	150	123	-0.756	-15.5	<0.0001	Yes
Brevard	PS	10647	Titusville	3914	SAS	Sep-2014	Sep-2017	12	66	303	156	-0.546	-81.0	0.0164	Yes
Brevard	PS	10647	Titusville	3918	SAS	Dec-2013	Mar-2017	13	95	184	167	-0.736	-26.0	0.0006	Yes
Brevard	PS	99052	Titusville	38774	UFA	Oct-2013	May-2019	12	53	66	59	-0.455	-1.2	0.0467	Yes
Brevard	PS	99052	Titusville	38779	UFA	Oct-2013	May-2019	12	46	62	55	-0.727	-2.3	0.0013	Yes
Indian River	AG	2186	Sun Ag LLC	7173	UFA	Feb-2001	May-2020	15	377	722	473	-0.695	-11.2	0.0004	Yes
Indian River	AG	2186	Sun AG LLC	8028	UFA	Jun-2005	May-2019	15	228	921	352	-0.479	-23.5	0.0152	Yes
Indian River	PS	10705	Vero Beach	7218	SAS	Mar-2003	Sep-2019	49	58	129	112	-0.247	-1.1	0.0133	Yes

County	Permit Type[1]	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Volusia	PS	8528	Holly Hill	16365	UFA	Apr-1985	Nov-2018	53	19	40	22	-0.490	-0.3	<0.0001	Yes
Volusia	PS	8528	Holly Hill	16366	UFA	Apr-1985	Nov-2018	51	20	42	24	-0.421	-0.3	<0.0001	Yes
Volusia	PS	8528	Holly Hill	16367	UFA	Apr-1985	Nov-2018	54	21	109	26	-0.345	-0.2	0.0003	Yes
Volusia	PS	8528	Holly Hill	16368	UFA	Apr-1985	Jun-2019	55	21	65	24	-0.347	-0.2	0.0002	Yes
Volusia	PS	8528	Holly Hill	16369	UFA	Apr-1985	Nov-2018	53	19	44	25	-0.407	-0.3	<0.0001	Yes
Volusia	PS	8528	Holly Hill	16370	UFA	Apr-1985	Nov-2018	51	20	40	23	-0.376	-0.2	0.0001	Yes
Volusia	PS	8528	Holly Hill	16371	UFA	Apr-1985	Nov-2018	54	20	38	25	-0.391	-0.3	<0.0001	Yes
Volusia	PS	8595	Port Orange	16518	UFA	Sep-2002	Jun-2019	57	31	54	44	-0.239	-0.6	0.0105	Yes
Volusia	PS	8595	Port Orange	16520	UFA	Sep-2002	Jun-2019	58	32	65	42	-0.262	-0.4	0.0052	Yes
Volusia	PS	8595	Port Orange	16521	UFA	Mar-2003	Jun-2019	57	33	56	46	-0.305	-0.5	0.0011	Yes
Volusia	PS	8595	Port Orange	16522	UFA	Sep-2002	Jun-2019	59	34	66	47	-0.334	-0.5	0.0003	Yes
Volusia	PS	8595	Port Orange	16523	UFA	Sep-2002	Jun-2019	60	34	75	56	-0.324	-0.5	0.0004	Yes
Volusia	PS	8595	Port Orange	16524	UFA	Sep-2002	Jun-2019	60	30	68	54	-0.354	-0.8	<0.0001	Yes
Volusia	PS	8595	Port Orange	16525	UFA	Sep-2002	Jun-2019	60	44	64	54	-0.291	-0.4	0.0014	Yes

County	Permit Type[1]	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Volusia	PS	8595	Port Orange	16526	UFA	Sep-2002	Jun-2019	56	43	67	56	-0.207	-0.3	0.0294	Yes
Volusia	PS	8595	Port Orange	16527	UFA	Sep-2002	Jun-2019	60	30	75	48	-0.367	-0.6	<0.0001	Yes
Volusia	PS	8595	Port Orange	16528	UFA	Sep-2002	Jun-2019	58	40	75	62	-0.228	-0.4	0.0133	Yes
Volusia	PS	8595	Port Orange	16531	UFA	Sep-2002	Jun-2019	57	51	112	79	-0.472	-2.3	<0.0001	Yes
Volusia	PS	8595	Port Orange	16532	UFA	Sep-2002	Jun-2019	59	61	126	88	-0.570	-2.2	<0.0001	Yes
Volusia	PS	8595	Port Orange	16534	UFA	Feb-2004	Jun-2019	55	116	225	159	-0.628	-2.2	<0.0001	Yes
Volusia	PS	8595	Port Orange	16535	UFA	Feb-2004	Jun-2019	53	149	250	172	-0.374	-0.9	0.0001	Yes
Volusia	PS	8595	Port Orange	16542	UFA	Sep-2002	Jun-2019	53	51	100	62	-0.243	-0.4	0.0123	Yes
Volusia	PS	8595	Port Orange	16543	UFA	Sep-2002	Jun-2019	58	11	50	23	-0.304	-0.6	0.0010	Yes
Volusia	PS	8595	Port Orange	16544	UFA	Sep-2002	Jun-2019	59	14	50	23	-0.213	-0.2	0.0206	Yes
Volusia	PS	8595	Port Orange	16545	UFA	Apr-2003	Jun-2019	56	13	45	24	-0.414	-0.6	<0.0001	Yes
Volusia	PS	8595	Port Orange	16547	UFA	May-2004	Jun-2019	51	17	65	28	-0.230	-0.5	0.0202	Yes
Volusia	PS	8595	Port Orange	16548	UFA	Sep-2002	Jun-2019	52	17	50	26	-0.306	-0.4	0.0019	Yes
Volusia	PS	8595	Port Orange	16549	UFA	Sep-2002	Jun-2019	54	14	50	27	-0.269	-0.6	0.0050	Yes

County	Permit Type[1]	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Volusia	PS	8595	Port Orange	16550	UFA	Sep-2002	Jun-2019	59	14	50	26	-0.281	-0.4	0.0022	Yes
Volusia	PS	8595	Port Orange	16551	UFA	Sep-2002	Jun-2019	57	16	42	28	-0.192	-0.3	0.0391	Yes
Volusia	PS	8595	Port Orange	23897	UFA	Sep-2006	Jun-2019	36	18	45	26	-0.372	-0.6	0.0019	Yes
Volusia	PS	8595	Port Orange	23898	UFA	Sep-2006	Jun-2019	45	10	35	20	-0.449	-0.9	<0.0001	Yes
Volusia	PS	8595	Port Orange	23900	UFA	Sep-2006	Mar-2019	44	9	35	20	-0.333	-0.8	0.0019	Yes
Volusia	PS	8595	Port Orange	23901	UFA	Sep-2006	Jun-2019	45	11	54	22	-0.435	-0.9	<0.0001	Yes
Volusia	PS	8595	Port Orange	23902	UFA	Sep-2006	Jun-2019	44	0	58	23	-0.408	-0.8	0.0001	Yes
Volusia	PS	8658	Deltona	26943	UFA	May-1994	Jul-2019	40	6	20	10	-0.223	-0.1	0.0471	Yes
Volusia	PS	8747	New Smyrna Beach	16836	UFA	Sep-2003	Dec-2019	59	68	140	110	-0.310	-1.3	0.0007	Yes
Volusia	PS	8747	New Smyrna Beach	16837	UFA	Sep-2003	Dec-2019	57	62	136	74	-0.247	-0.6	0.0087	Yes
Volusia	PS	8747	New Smyrna Beach	16839	UFA	Sep-2003	Dec-2019	58	120	148	130	-0.456	-1.1	<0.0001	Yes
Volusia	PS	8747	New Smyrna Beach	16840	UFA	Sep-2003	Dec-2019	56	70	102	90	-0.293	-0.5	0.0022	Yes
Volusia	PS	8747	New Smyrna Beach	16841	UFA	Sep-2003	Dec-2019	57	66	86	76	-0.449	-0.5	<0.0001	Yes
Volusia	PS	8747	New Smyrna Beach	16842	UFA	Sep-2003	Dec-2019	58	38	68	56	-0.238	-0.3	0.0125	Yes

County	Permit Type[1]	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Volusia	PS	8747	New Smyrna Beach	16843	UFA	Sep-2003	Dec-2019	68	12	32	17	-0.471	-0.3	<0.0001	Yes
Volusia	PS	8747	New Smyrna Beach	16844	UFA	Sep-2003	Dec-2019	56	12	21	16	-0.427	-0.2	<0.0001	Yes
Volusia	PS	8747	New Smyrna Beach	16845	UFA	Sep-2003	Dec-2019	55	12	21	16	-0.464	-0.2	<0.0001	Yes
Volusia	PS	8747	New Smyrna Beach	16846	UFA	Sep-2003	Dec-2019	55	10	24	16	-0.357	-0.2	0.0003	Yes
Volusia	PS	8747	New Smyrna Beach	16847	UFA	Sep-2003	Dec-2019	56	8	22	17	-0.456	-0.2	<0.0001	Yes
Volusia	PS	8747	New Smyrna Beach	16848	UFA	Sep-2003	Dec-2019	54	10	21	16	-0.306	-0.1	0.0024	Yes
Volusia	PS	8747	New Smyrna Beach	22238	UFA	Sep-2003	Dec-2019	56	32	50	40	-0.680	-0.8	<0.0001	Yes
Volusia	PS	8747	New Smyrna Beach	22239	UFA	Sep-2003	Dec-2019	59	26	50	36	-0.301	-0.5	0.0012	Yes
Volusia	PS	8747	New Smyrna Beach	22240	UFA	Sep-2003	Dec-2019	69	21	59	44	-0.462	-0.6	<0.0001	Yes
Volusia	PS	8747	New Smyrna Beach	22241	UFA	Sep-2003	Dec-2019	55	28	66	48	-0.431	-0.5	<0.0001	Yes
Volusia	PS	8747	New Smyrna Beach	22242	UFA	Sep-2003	Dec-2019	59	44	78	64	-0.422	-0.8	<0.0001	Yes
Volusia	PS	8747	New Smyrna Beach	22243	UFA	Sep-2003	Sep-2019	57	36	54	46	-0.412	-0.4	<0.0001	Yes
Volusia	PS	8747	New Smyrna Beach	38426	UFA	Mar-2016	Dec-2019	16	166	187	175	-0.423	-2.5	0.0396	Yes
Volusia	PS	8747	New Smyrna Beach	406433	UFA	Dec-2007	Dec-2019	39	310	605	425	-0.600	-8.4	<0.0001	Yes

County	Permit Type[1]	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Volusia	PS	8834	Daytona Beach	17151	UFA	Nov-2013	Nov-2019	25	63	92	74	-0.484	-2.2	0.0008	Yes
Volusia	PS	8834	Daytona Beach	17172	UFA	Nov-2013	Nov-2019	23	24	28	25	-0.317	-0.2	0.0408	Yes
Volusia	PS	8834	Daytona Beach	17177	UFA	Nov-2013	Nov-2019	24	34	52	41	-0.358	-1.3	0.0160	Yes
Volusia	PS	9157	Edgewater	17618	UFA	Jan-2006	Dec-2019	98	54	82	65	-0.374	-0.6	<0.0001	Yes
Volusia	PS	9157	Edgewater	17619	UFA	Jan-2006	Dec-2019	98	61	84	68	-0.405	-0.5	<0.0001	Yes
Volusia	PS	9157	Edgewater	17621	UFA	Jan-2006	Dec-2019	98	72	97	84	-0.438	-0.9	<0.0001	Yes
Volusia	PS	9157	Edgewater	17622	UFA	Jan-2006	Dec-2019	95	73	96	84	-0.412	-0.8	<0.0001	Yes
Volusia	PS	9157	Edgewater	17623	UFA	Jan-2006	Dec-2019	98	74	97	83	-0.464	-0.8	<0.0001	Yes
Volusia	PS	9157	Edgewater	17624	UFA	Jan-2006	Dec-2019	98	72	95	82	-0.400	-0.7	<0.0001	Yes
Volusia	PS	9157	Edgewater	17625	UFA	Jan-2006	Dec-2019	98	71	91	80	-0.377	-0.6	<0.0001	Yes
Volusia	PS	9157	Edgewater	17628	UFA	Jan-2006	Dec-2019	94	58	80	65	-0.217	-0.3	0.0029	Yes
Volusia	PS	50116	DeLand	404	UFA	Jan-2006	Nov-2019	63	11	96	37	-0.423	-2.9	<0.0001	Yes
Volusia	PS	50116	DeLand	412	UFA	Jan-2006	Nov-2019	64	10	20	13	-0.284	-0.1	0.0011	Yes
Volusia	PS	50116	DeLand	415	UFA	Jan-2006	Nov-2019	65	13	22	19	-0.351	-0.3	<0.0001	Yes

[1] PS = public supply; AG = agricultural

Table D-37: Groundwater Quality Analysis Results for SJRWMD DOWN Wells Demonstrating a Decreasing Chloride Trend

County	Well ID	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Brevard	BR0586	UFA	Apr-2004	Dec-2018	25	227	576	476	-0.300	-7.71	0.0377	Yes
Lake	L-0059	UFA	Mar-2004	Mar-2018	26	114	179	154	-0.394	-1.19	0.0050	Yes
Volusia	V-0127	UFA	Oct-2004	Jan-2018	13	5	70	19	-0.487	-1.78	0.0240	Yes
Volusia	V-0240	UFA	Apr-2004	Apr-2018	14	296	533	474	-0.473	-13.18	0.0215	Yes
Volusia	V-0508	UFA	Apr-2004	Jan-2018	22	4972	5660	5200	-0.372	-20.33	0.0164	Yes
Volusia	V-1161	UFA	Jul-2009	Jan-2018	18	104	1200	116	-0.712	-20.26	0.0000	Yes

Table D-48: Groundwater Quality Analysis Results for CSEC Public Supply and Agricultural Wells Not Showing Statistically Significant Trends

County	Permit Type	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Brevard	PS	202	Palm Bay	4251	UFA	Jan-2008	Dec-2019	101	138	874	643	0.009	0.1	0.9019	No
Brevard	PS	202	Palm Bay	4259	SAS	Jan-2008	Dec-2019	134	142	347	196	-0.082	-0.7	0.1660	No
Brevard	PS	202	Palm Bay	4262	SAS	Feb-2008	Dec-2019	22	112	170	152	0.189	0.7	0.2352	No
Brevard	PS	233	Brevard County	4304	SAS	Jun-2011	May-2019	13	61	154	118	-0.103	-2.9	0.6693	No
Brevard	PS	233	Brevard County	4312	SAS	Jan-2013	May-2018	11	29	34	33	-0.150	-0.2	0.5823	No
Brevard	PS	233	Brevard County	4313	SAS	Jan-2013	May-2018	10	33	65	44	0.225	2.8	0.4190	No
Brevard	PS	233	Brevard County	4317	SAS	Jun-2011	May-2018	10	42	61	54	0.090	0.0	0.7876	No
Brevard	PS	233	Brevard County	4318	SAS	Jun-2011	May-2018	11	37	46	43	-0.257	-0.6	0.3100	No
Brevard	PS	233	Brevard County	4319	SAS	Jun-2011	May-2018	11	33	42	35	0.346	0.5	0.1611	No
Brevard	PS	233	Brevard County	4320	SAS	Jun-2011	May-2018	12	24	84	44	-0.303	-5.8	0.1926	No
Brevard	PS	233	Brevard County	4321	SAS	Jun-2011	May-2018	11	46	75	63	0.273	1.7	0.2758	No
Brevard	PS	233	Brevard County	409485	UFA	Jan-2013	May-2018	11	10	13	11	0.150	0.1	0.5816	No
Brevard	AG	3249	S Duda & Sons Inc	4090	UFA	Jun-1998	Jun-2019	14	372	685	597	0.044	0.3	0.8694	No

County	Permit Type	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Brevard	AG	3249	S Duda & Sons Inc	4112	UFA	Jun-1998	Jun-2019	14	587	758	641	-0.177	-2.1	0.4108	No
Brevard	AG	3249	S Duda & Sons Inc	4117	UFA	Jun-1998	Jun-2019	14	579	894	704	-0.077	-0.9	0.7426	No
Brevard	AG	3426	East Central Florida Services Inc	13074	UFA	Jun-2006	May-2019	11	545	749	653	0.187	3.8	0.4786	No
Brevard	AG	3426	East Central Florida Services Inc	13184	UFA	Jun-2006	May-2019	10	489	674	585	-0.045	-1.4	0.9284	No
Brevard	AG	3426	East Central Florida Services Inc	13217	UFA	Jun-2006	May-2019	10	296	444	344	0.090	3.5	0.7876	No
Brevard	AG	3426	East Central Florida Services Inc	13219	UFA	Jun-2006	May-2019	11	307	497	360	0.346	5.1	0.1611	No
Brevard	AG	10662	Robert A Tucker	4403	UFA	May-2008	Jul-2020	13	206	291	233	0.065	0.7	0.8069	No
Brevard	PS	10647	Titusville	3842	SAS	Sep-2013	Oct-2019	20	23	131	69	-0.242	-8.3	0.1443	No
Brevard	PS	10647	Titusville	3847	SAS	Sep-2013	Oct-2019	20	19	187	28	-0.307	-1.5	0.0641	No
Brevard	PS	10647	Titusville	3848	SAS	Sep-2013	Oct-2019	26	26	403	137	-0.259	-32.0	0.0673	No
Brevard	PS	10647	Titusville	3857	SAS	Dec-2013	Oct-2019	19	10	35	20	-0.053	-0.4	0.7796	No
Brevard	PS	10647	Titusville	3858	SAS	Dec-2013	Nov-2019	21	27	56	39	-0.191	-1.6	0.2389	No

County	Permit Type	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Brevard	PS	10647	Titusville	3859	SAS	Dec-2013	Oct-2019	19	32	86	52	0.229	2.1	0.1832	No
Brevard	PS	10647	Titusville	3860	SAS	Sep-2013	Oct-2019	23	32	97	51	0.063	0.9	0.6919	No
Brevard	PS	10647	Titusville	3861	SAS	Mar-2012	Oct-2019	14	56	178	85	-0.209	-8.3	0.3244	No
Brevard	PS	10647	Titusville	3863	SAS	Sep-2013	Sep-2019	22	11	435	307	0.070	4.8	0.6719	No
Brevard	PS	10647	Titusville	3864	UFA	Mar-2015	Oct-2019	18	6	17	12	-0.262	-0.8	0.1393	No
Brevard	PS	10647	Titusville	3866	SAS	Dec-2013	Oct-2019	19	5	175	35	-0.170	-4.6	0.3273	No
Brevard	PS	10647	Titusville	3868	SAS	Sep-2013	Oct-2019	21	15	76	42	-0.152	-1.6	0.3492	No
Brevard	PS	10647	Titusville	3869	SAS	Sep-2013	May-2019	21	14	33	26	-0.110	-0.2	0.5059	No
Brevard	PS	10647	Titusville	3870	SAS	Dec-2015	Oct-2019	14	40	130	54	-0.385	-5.3	0.0627	No
Brevard	PS	10647	Titusville	3871	SAS	Dec-2015	Oct-2019	14	35	266	120	0.385	26.4	0.0627	No
Brevard	PS	10647	Titusville	3872	SAS	Dec-2015	Sep-2019	15	42	449	89	0.352	22.8	0.0748	No
Brevard	PS	10647	Titusville	3877	SAS	Sep-2013	Oct-2019	18	10	108	49	0.033	0.9	0.8796	No
Brevard	PS	10647	Titusville	3883	SAS	Sep-2013	Nov-2019	22	10	200	175	-0.284	-5.6	0.0707	No

County	Permit Type	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Brevard	PS	10647	Titusville	3888	SAS	Sep-2013	Jun-2019	19	6	356	124	-0.205	-14.0	0.2342	No
Brevard	PS	10647	Titusville	3889	SAS	Sep-2013	Jun-2018	18	7	401	43	-0.105	-3.6	0.5696	No
Brevard	PS	10647	Titusville	3890	SAS	Mar-2014	Oct-2019	20	14	63	23	0.238	1.7	0.1532	No
Brevard	PS	10647	Titusville	3894	SAS	Dec-2013	May-2019	19	29	51	37	-0.158	-0.6	0.3630	No
Brevard	PS	10647	Titusville	3899	SAS	Dec-2013	Oct-2019	23	20	105	95	-0.135	-0.8	0.3833	No
Brevard	PS	10647	Titusville	3903	UFA	Dec-2014	Oct-2019	18	13	110	101	-0.172	-1.0	0.3426	No
Brevard	PS	10647	Titusville	36353	SAS	Dec-2013	Oct-2019	21	23	77	29	0.033	0.1	0.8562	No
Brevard	PS	10647	Titusville	36355	SAS	Sep-2013	Oct-2019	22	19	51	41	-0.230	-0.9	0.1423	No
Brevard	PS	10647	Titusville	36357	SAS	Sep-2013	Oct-2019	22	28	64	43	-0.191	-0.9	0.2251	No
Brevard	AG	50196	AgReserves, Inc.	605	UFA	May-2007	May-2019	10	209	263	245	0.180	1.3	0.5296	No
Brevard	PS	99052	Titusville	38773	UFA	Oct-2013	May-2019	12	53	63	57	-0.273	-0.7	0.2437	No
Brevard	PS	99052	Titusville	38775	UFA	Oct-2013	Nov-2019	13	51	62	55	-0.333	-1.0	0.1272	No
Brevard	PS	99052	Titusville	38777	UFA	Oct-2013	Oct-2019	13	51	63	56	-0.231	-0.6	0.2997	No

County	Permit Type	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Brevard	PS	99052	Titusville	38778	UFA	Oct-2013	Oct-2019	13	54	62	56	-0.090	-0.2	0.7138	No
Indian River	AG	2186	Sun Ag LLC	7182	UFA	Feb-2001	May-2020	14	81.9	463	325	-0.121	-1.2	0.5841	No
Indian River	AG	2186	Sun Ag LLC	7193	UFA	Feb-2001	May-2020	15	480	724	531	-0.048	-1.3	0.8431	No
Indian River	AG	2186	Sun Ag LLC	7202	UFA	Feb-2001	May-2020	15	788	1110	910	-0.257	-6.1	0.1982	No
Indian River	AG	2186	Sun Ag LLC	7211	UFA	Feb-2001	May-2020	15	760	1390	1070	-0.200	-7.8	0.3223	No
Indian River	AG	2186	Sun Ag LLC	7976	UFA	Jun-2005	May-2020	16	456	714	614	-0.245	-4.9	0.2057	No
Indian River	AG	2186	Sun Ag LLC	8002	UFA	Jun-2005	May-2020	15	326	921	642	0.295	12.5	0.1376	No
Indian River	AG	2186	Sun Ag LLC	8041	UFA	Jun-2006	May-2020	15	369	909	470	0.105	3.8	0.6207	No
Indian River	PS	10524	Indian River County	7310	UFA	Jan-2015	Oct-2019	18	307	405	361	0.333	11.0	0.0582	No
Indian River	PS	10524	Indian River County	7313	UFA	Jan-2015	Oct-2019	18	256	299	274	0.264	2.7	0.1386	No
Indian River	PS	10524	Indian River County	7314	UFA	Jan-2015	Oct-2019	18	265	309	294	0.079	1.8	0.6763	No
Indian River	PS	10524	Indian River County	7316	UFA	Jun-2015	Oct-2019	19	252	355	275	0.189	3.9	0.2772	No
Indian River	PS	10524	Indian River County	7317	UFA	Nov-2015	Oct-2019	15	251	297	281	0.345	5.8	0.0829	No

County	Permit Type	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Indian River	PS	10524	Indian River County	40142	UFA	Nov-2015	Oct-2019	15	264	298	281	0.232	4.0	0.2533	No
Indian River	PS	10524	Indian River County	181223	UFA	Nov-2015	Oct-2019	12	265	293	278	0.308	2.1	0.1905	No
Indian River	PS	10705	Vero Beach	7224	SAS	Mar-2003	Sep-2019	44	63	89	72	-0.167	-0.4	0.1144	No
Volusia	PS	8528	Holly Hill	16364	UFA	May-2002	Jun-2019	22	21	280	108	-0.290	-4.3	0.0627	No
Volusia	PS	8595	Port Orange	16519	UFA	Oct-2006	Jun-2019	34	30	44	34	0.223	0.3	0.0678	No
Volusia	PS	8595	Port Orange	16533	UFA	Sep-2002	Mar-2019	56	80	184	107	-0.143	-0.3	0.1294	No
Volusia	PS	8595	Port Orange	16540	UFA	Sep-2002	Jun-2019	50	54	176	86	0.164	0.9	0.0989	No
Volusia	PS	8595	Port Orange	16541	UFA	Sep-2002	Jun-2019	58	43	115	66	-0.073	-0.2	0.4280	No
Volusia	PS	8595	Port Orange	16546	UFA	Sep-2002	Jun-2019	59	16	50	25	-0.177	-0.3	0.0535	No
Volusia	PS	8595	Port Orange	16552	UFA	Sep-2002	Jun-2019	58	25	62	34	-0.057	-0.1	0.5407	No
Volusia	PS	8658	Deltona	16561	UFA	May-1994	Jul-2019	35	9	148	44	-0.044	-0.3	0.7224	No
Volusia	PS	8658	Deltona	16572	UFA	May-1994	Jul-2019	37	7	17	13	0.089	0.0	0.4656	No
Volusia	PS	8658	Deltona	26941	UFA	May-1994	Jul-2019	38	30	110	52	0.178	1.5	0.1217	No

County	Permit Type	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Volusia	PS	8658	Deltona	26942	UFA	May-1994	Jul-2019	39	12	34	22	0.179	0.1	0.1222	No
Volusia	PS	8658	Deltona	26946	UFA	May-1994	May-2018	40	6	17	10	0.021	0.0	0.8606	No
Volusia	PS	8747	New Smyrna Beach	16835	UFA	Dec-2003	Dec-2019	68	76	118	103	-0.034	0.0	0.6903	No
Volusia	PS	8747	New Smyrna Beach	38427	UFA	Dec-2009	Dec-2019	28	160	190	174	-0.229	-0.7	0.1041	No
Volusia	PS	8834	Daytona Beach	17149	UFA	Nov-2013	Nov-2019	24	20	32	26	-0.113	-0.3	0.4564	No
Volusia	PS	8834	Daytona Beach	17152	UFA	Nov-2013	Nov-2019	25	14	28	21	0.222	0.4	0.1283	No
Volusia	PS	8834	Daytona Beach	17153	UFA	Nov-2013	Nov-2019	25	29	47	32	0.000	0.0	1.0000	No
Volusia	PS	8834	Daytona Beach	17154	UFA	Nov-2013	Nov-2019	25	14	21	16	0.275	0.2	0.0582	No
Volusia	PS	8834	Daytona Beach	17163	UFA	Nov-2013	May-2019	22	34	72	36	0.022	0.0	0.9099	No
Volusia	PS	8834	Daytona Beach	17165	UFA	Nov-2013	Nov-2019	25	31	33	31	-0.027	0.0	0.8696	No
Volusia	PS	8834	Daytona Beach	17166	UFA	Nov-2013	Nov-2019	24	29	31	30	0.026	0.0	0.8813	No
Volusia	PS	8834	Daytona Beach	17167	UFA	Nov-2013	Nov-2019	25	26	39	27	-0.031	0.0	0.8512	No
Volusia	PS	8834	Daytona Beach	17169	UFA	Nov-2013	Nov-2019	22	21	52	26	0.026	0.1	0.8877	No

County	Permit Type	CUP Number	Permittee	Station Number	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Volusia	PS	8834	Daytona Beach	17170	UFA	Nov-2013	Nov-2019	25	19	25	21	0.108	0.1	0.4680	No
Volusia	PS	8834	Daytona Beach	17174	UFA	Nov-2013	Nov-2019	25	28	33	30	0.282	0.2	0.0545	No
Volusia	PS	8834	Daytona Beach	17175	UFA	Nov-2013	Nov-2019	25	26	35	29	0.209	0.3	0.1536	No
Volusia	PS	8834	Daytona Beach	17178	UFA	Nov-2013	Nov-2019	22	19	21	20	0.105	0.1	0.5158	No
Volusia	PS	8834	Daytona Beach	17179	UFA	Nov-2013	Nov-2019	24	26	43	30	-0.105	-0.5	0.4872	No
Volusia	PS	8834	Daytona Beach	23860	UFA	Nov-2013	Nov-2019	24	22	47	24	0.265	0.6	0.0774	No
Volusia	PS	8834	Daytona Beach	23861	UFA	Nov-2013	Nov-2019	25	23	36	25	0.084	0.1	0.5748	No
Volusia	PS	9157	Edgewater	35638	UFA	Apr-2011	Dec-2019	55	57	68	61	0.016	0.0	0.8812	No
Volusia	PS	50116	DeLand	413	UFA	Jan-2006	Nov-2019	62	12	19	15	0.165	0.1	0.0627	No
Volusia	PS	50116	DeLand	35446	UFA	Jan-2006	Nov-2019	58	12	23	17	0.090	0.0	0.3268	No
Volusia	PS	50116	DeLand	36213	UFA	Aug-2013	Nov-2019	25	9	14	12	-0.158	-0.4	0.2819	No
Volusia	PS	50116	DeLand	36214	UFA	Aug-2013	Nov-2019	25	8	11	10	0.174	0.1	0.2334	No
Volusia	PS	50157	Volusia County	33668	UFA	Jun-2003	Oct-2019	57	21	93	53	-0.145	-0.9	0.1132	No

[1] PS = public supply; AG = agricultural

Table D-19: Groundwater Quality Analysis Results for SJRWMD DOWN Wells Not Showing Statistically Significant Trends

County	Well ID	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Brevard	BR0585	UFA	Apr-2004	Nov-2018	24	12	231	88	-0.065	-1.69	0.6733	No
Brevard	BR0624	UFA	Apr-2004	Oct-2018	27	134	170	153	0.211	0.69	0.1276	No
Brevard	BR1526	UFA	Apr-2004	Nov-2018	16	166	2428	1662	0.033	0.65	0.8926	No
Brevard	BR1557	UFA	Jan-2004	Dec-2018	15	195	2009	1930	0.095	1.38	0.6556	No
Brevard	BR1558	UFA	May-2005	Dec-2018	15	906	1030	949	-0.248	-1.68	0.2155	No
Brevard	BR1748	UFA	Jan-2004	Dec-2018	16	1250	1448	1344	-0.300	-6.72	0.1151	No
Brevard	BR1914	UFA	Oct-2006	Nov-2018	19	1770	6893	5586	0.251	25.82	0.1417	No
Brevard	BR1995	UFA	Mar-2008	Oct-2018	19	351	430	371	-0.058	-0.59	0.7527	No
Brevard	BR2115	UFA	Aug-2008	Dec-2018	18	197	1159	1049	0.229	5.66	0.1972	No
Brevard	BR2125	UFA	Dec-2008	Dec-2018	17	573	622	601	0.044	0.47	0.8368	No
Indian River	IR0954	UFA	Jan-2004	Nov-2018	27	91	110	96	0.142	0.20	0.3069	No
Indian River	IR0963	UFA	Jan-2004	Oct-2018	23	462	575	505	0.292	1.50	0.0538	No

County	Well ID	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Indian River	IR0988	UFA	Sep-2006	Oct-2018	23	90	110	99	0.123	0.29	0.4282	No
Lake	L-0032	UFA	May-2004	Apr-2018	23	655	824	741	0.249	2.10	0.1013	No
Lake	L-0066	UFA	Nov-2004	Jun-2018	13	245	397	276	-0.141	-1.11	0.5410	No
Lake	L-0095	UFA	Jan-2004	Dec-2018	22	10	16	12	0.229	0.14	0.1418	No
Lake	L-0290	UFA	Aug-2004	May-2018	13	6	19	7	0.410	0.21	0.0586	No
Lake	L-0620	UFA	Feb-2004	May-2018	19	6	20	8	0.251	0.11	0.1417	No
Lake	L-0816	UFA	Feb-2004	Apr-2018	20	6	12	7	0.116	0.05	0.4957	No
Lake	L-0902	UFA	Sep-2005	Dec-2018	25	4	11	7	0.237	0.13	0.1020	No
Lake	L-0927	UFA	Sep-2006	May-2018	23	4	10	5	0.237	0.13	0.1191	No
Lake	L-0935	UFA	Nov-2007	May-2018	19	8	13	10	0.281	0.11	0.0999	No
Lake	L-1020	UFA	Aug-2008	Apr-2018	19	4	9	5	0.263	0.19	0.1233	No
Lake	L-1023	UFA	Oct-2008	Dec-2018	19	5	10	6	0.076	0.04	0.6742	No
Marion	M-0021	UFA	Feb-2004	Jun-2018	24	156	187	170	-0.094	-0.21	0.5340	No

County	Well ID	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Marion	M-0024	UFA	Aug-2004	Jun-2018	15	5	10	6	0.324	0.11	0.1020	No
Marion	M-0044	UFA	Aug-2004	May-2018	21	3	11	7	0.186	0.07	0.2510	No
Marion	M-0063	UFA	Mar-2004	May-2018	21	3	12	5	0.271	0.14	0.0907	No
Marion	M-0419	UFA	Mar-2004	May-2018	22	3	11	6	-0.048	-0.04	0.7780	No
Marion	M-0443	UFA	Mar-2004	May-2018	23	5	11	6	0.063	0.04	0.6916	No
Marion	M-0463	UFA	Mar-2004	Jun-2018	15	5	11	6	0.086	0.06	0.6922	No
Marion	M-0465	UFA	Mar-2004	May-2018	20	5	12	8	0.200	0.10	0.2300	No
Marion	M-0471	UFA	Jan-2004	Jun-2018	18	5	273	37	0.111	0.60	0.5445	No
Marion	M-0483	UFA	Feb-2004	May-2018	24	8	14	10	0.123	0.04	0.4130	No
Marion	M-0501	UFA	Oct-2007	Oct-2018	24	19	27	20	0.174	0.07	0.2427	No
Marion	M-0528	UFA	Apr-2008	May-2018	22	11	17	13	0.294	0.22	0.0588	No
Marion	M-0612	UFA	Nov-2008	Jun-2018	17	15	26	17	0.309	0.19	0.0907	No
Volusia	V-0083	UFA	Feb-2004	Mar-2018	24	1542	3600	3215	-0.069	-6.45	0.6552	No

County	Well ID	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Volusia	V-0099	UFA	Feb-2004	Jan-2018	40	36	51	45	-0.003	0.00	0.9907	No
Volusia	V-0101	UFA	Apr-2004	Jan-2018	15	22	29	24	0.295	0.23	0.1367	No
Volusia	V-0113	UFA	Oct-2004	Jan-2018	13	12	18	14	0.269	0.09	0.2215	No
Volusia	V-0117	UFA	Oct-2004	Jan-2018	21	10	19	16	0.200	0.20	0.2147	No
Volusia	V-0196	UFA	Jan-2004	Mar-2018	19	5	13	8	0.146	0.05	0.4011	No
Volusia	V-0446	UFA	Jan-2005	Jan-2018	35	138	170	150	-0.193	-0.43	0.1044	No
Volusia	V-0531	UFA	Sep-2004	Apr-2018	14	7	13	11	-0.044	-0.01	0.8694	No
Volusia	V-0742	UFA	Feb-2005	Apr-2018	14	10	17	12	0.231	0.07	0.2736	No
Volusia	V-0769	UFA	Apr-2004	Apr-2018	15	19	26	22	0.210	0.10	0.2981	No
Volusia	V-0777	UFA	Mar-2004	Mar-2018	24	6	12	8	0.076	0.05	0.6197	No
Volusia	V-0808	UFA	Jun-2004	Mar-2018	19	11	24	14	-0.018	-0.01	0.9441	No
Volusia	V-0810	UFA	Feb-2004	Apr-2018	24	658	1250	1016	-0.130	-6.33	0.3850	No
Volusia	V-0840	UFA	Apr-2004	Jan-2018	14	13400	16000	14237	-0.132	-9.22	0.5464	No

County	Well ID	Source	Period of Record Start	Period of Record End	Sample Size	Cl^- Min (mg/L)	Cl^- Max (mg/L)	Cl^- Median (mg/L)	Mann-Kendall τ	Cl^- Median Slope (mg/L/yr) aka Sen Slope	Sen Slope p-value	Significant?
Volusia	V-0924	UFA	Apr-2008	Apr-2018	17	12	136	13	-0.007	0.00	1.0000	No
Volusia	V-1091	UFA	Jan-2004	Mar-2018	24	613	1641	673	0.199	2.73	0.1803	No
Volusia	V-1094	UFA	Jan-2004	Jan-2018	25	84	208	92	0.133	0.31	0.3624	No
Volusia	V-1150	UFA	Sep-2008	Jan-2018	14	44	122	54	-0.297	-1.54	0.1546	No
Volusia	V-1152	UFA	Nov-2008	Mar-2018	21	12	17	14	0.171	0.09	0.2895	No