# Operational Project Monitoring Plan for Regional Floridan Groundwater (RFGW) Network Monitoring Program

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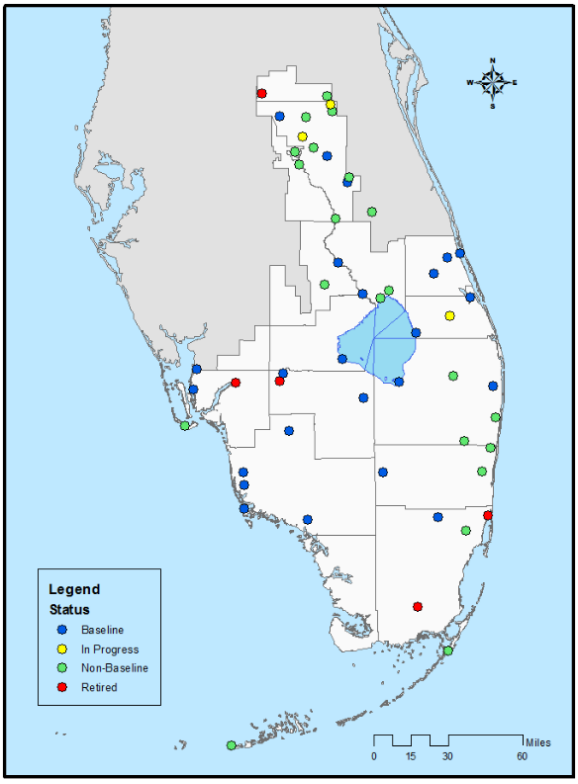


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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| APPZ | Avon Park Permeable Zone |
| ASR | aquifer storage and recovery |
| CFWI | Central Florida Water Initiative |
| CLQM | Chemistry Laboratory Quality Manual |
| District | South Florida Water Management District |
| DO | dissolved oxygen |
| DQO | data quality objective |
| F.A.C. | Florida Administrative Code |
| FAS | Floridan aquifer system |
| FDEP | Florida Department of Environmental Protection |
| FSQM | Field Sampling Quality Manual |
| LFA | Lower Floridan aquifer |
| QA | quality assurance |
| QC | quality control |
| RFGW | Regional Floridan Groundwater (monitoring network) |
| SFWMD | South Florida Water Management District |
| SOP | standard operating procedure |
| TDS | total dissolved solids |
| UFA | Upper Floridan aquifer |
| USACE | United States Army Corps of Engineers |
| WQM | Water Quality Monitoring (section) |

# 1.0 PROJECT ORGANIZATION

Overall project organization and responsibilities are detailed in the South Florida Water Management District (SFWMD or District) Applied Sciences and Water Quality bureaus' Quality Management Plans. Field activity responsibilities are detailed in the Water Quality Monitoring (WQM) section's Field Sampling Quality Manual (FSQM) and the Florida Department of Environmental Protection's (FDEP's) standard operating procedures (SOPs; DEP-SOP-001/01). Laboratory analysis and data validation responsibilities are detailed in the District's Chemistry Laboratory Quality Manual (CLQM). These documents define the procedures used by SFWMD personnel to meet the FDEP's Quality Assurance (QA) Rule [Chapter 62-160, Florida Administrative Code (F.A.C.)]. This sampling plan will outline any areas where deviations from that common standard are required.

# 2.0 PROJECT DESCRIPTION

## 2.1 Project Introduction and Background

The Regional Floridan Groundwater (RFGW) monitoring network was established to evaluate water quality and water level trends in the Floridan aquifer system (FAS) for water supply planning and to assist in development of groundwater models within the SFWMD and Central Florida Water Initiative (CFWI) boundaries. Water supply planners use RFGW monitoring data and groundwater models to determine the long-term viability of the FAS as a water supply source and to track the impacts of increasing water use. In addition, the United States Army Corps of Engineers (USACE, 2015) recently used RFGW data to model aquifer storage and recovery (ASR) options as part of the Comprehensive Everglades Restoration Plan (CERP).

The FAS is composed of three aquifers—Upper Floridan aquifer (UFA), Avon Park Permeable Zone (APPZ), and Lower Floridan aquifer (LFA)—that are utilized throughout the District as primary or alternative water supply sources for public water supply, agriculture, industrial uses, and ASR. Within the RFGW network, there are 58 monitoring wells completed in the UFA, 22 monitoring wells completed in the APPZ, and 25 monitoring wells completed in the LFA (**Table 1**).

Table 1. RFGW monitoring wells completed in each aquifer, by planning region, in 2018.

| Planning Region | Upper Floridan Aquifer Wells | Avon Park Permeable Zone Wells | Lower Floridan Aquifer Wells | **Total** |
|---|---|---|---|---|
| Central Florida Water Initiative (Upper Kissimmee Basin only) | 17 | 5 | 13 | **35** |
| Lower East Coast | 14 | 6 | 4 | **24** |
| Lower Kissimmee Basin | 7 | 3 | 2 | **12** |
| Lower West Coast | 14 | 5 | 3 | **22** |
| Upper East Coast | 6 | 3 | 3 | **12** |
| **Total** | **58** | **22** | **25** | **105** |

As central and southern Florida's population and water demands grow, use of the UFA, APPZ, and LFA are projected to increase substantially. Increased use of the FAS will cause water levels to change (through withdrawal and injection), which can impact water quality. Justification for the necessity of monitoring in each of the District's five water supply planning regions is provided below:

a. The *2014 Lower Kissimmee Basin Water Supply Plan Update* (SFWMD, 2014) identified concerns regarding the sustainability of the FAS and called for continued monitoring of water levels and water quality in the region.

b. The population in the CFWI Planning Area is projected to increase 49 percent between 2010 and 2035, and a corresponding water supply deficit of 250 million gallons per day has been predicted (CFWI, 2015a,b). Within the SFWMD's portion of the CFWI Planning Area, UFA groundwater levels are expected to drop between 1 and 10 feet over the same 25-year planning horizon. The *2015 CFWI Regional Water Supply Plan* concluded that "…traditional groundwater resources alone cannot meet projected future demands or current permit allocations without resulting in unacceptable impacts to water resources and related natural systems."

c. The *2016 Upper East Coast Water Supply Plan Update* (SFWMD, 2016) included results from the East Coast Floridan Model, highlighting an expected 10 to 25 percent increase in total dissolved solids (TDS) concentrations in some wells by 2040 as a result of well pumpage.

d. The *2017 Lower West Coast Water Supply Plan Update* (SFWMD, 2017) noted almost all utilities withdrawing from the UFA have seen degradation in water quality. An additional 51.5 million gallons per day of brackish water development has been proposed by utilities in the region through 2040. This water will be treated using reverse osmosis. The *2017 Lower West Coast Water Supply Plan Update* recommended identifying FAS monitoring well locations that are critical to long-term monitoring for modeling purposes and continuity of the data set.

e. The Lower East Coast Planning Area relies on the UFA as an alternative water supply source. Given the projected increase in population to 7.5 million people by 2040, the Lower East Coast Planning Area is anticipated to expand use of the UFA through reverse osmosis treatment and ASR projects. The *2018 Lower East Coast Water Supply Plan Update* (SFWMD, 2018) calls for continued long-term water quality and water level data collection and analyses, which also will be used to update the East Coast Floridan Model, which was used to evaluate the FAS as an alternative water supply source.

## 2.2 Mandates and Permits

Water supply plan updates are completed every 5 years for each planning area, as required by Chapters 373 and 187, Florida Statutes. Water level and water quality data are needed to support these planning efforts and make the plans technically justifiable.

## 2.3 Project Objectives

Water level and water quality data from the RFGW monitoring network were used in the development of numerous groundwater models (e.g., East Coast Floridan Transient Model, East Coast Floridan Model) supporting the *2015 CFWI Regional Water Supply Plan* and now are being used to calibrate the expanded East Coast Floridan Transient Model. This ongoing data collection effort will support future groundwater model calibration and analysis of the LFA as an alternative water supply source. Specific objectives include:

a. Continue ongoing water quality sampling of the RFGW monitoring wells. Due to workload constraints, hydrogeology staff sample RFGW wells corresponding to the upcoming 5-year water supply plan update, enabling the most recent data to be used by water supply planners. The next water supply plan update will be for the Lower Kissimmee Basin in 2019; therefore, RFGW monitoring wells in that region are being sampled in 2018.

b. Continue ongoing water level data collection and review in collaboration with the SFWMD's Hydro Data Management staff for quality assurance and quality control (QA/QC) corrections.

c. Develop and execute a strategy to close the gaps in water quality data to facilitate statistical analysis. Five sampling events for each well station are ideal for establishing baseline conditions over the period of record for each well. Unfortunately, approximately half of the RFGW monitoring stations have four or fewer sampling events.

d. Develop a statistically robust method for ionic water quality trend analysis.

e. Create interactive maps showing regional water quality trends.

## 2.4 Duration

### *2.4.1 Initiation Conditions*

FAS monitoring began in the mid-1970s on a well-by-well basis or by regional planning area. The RFGW monitoring network became more formalized in 2004 as projected FAS withdrawals increased. More recently, as permittees began using deeper portions of the FAS, the need for the RFGW data has increased; therefore, a more formal project is being implemented.

### *2.4.2 Modification or Termination Conditions*

The water quality monitoring component of the RFGW network has no projected end date at this time.

# 3.0 GEOGRAPHIC LOCATION

## 3.1 Regional Area

The RFGW groundwater monitoring effort includes all 16 counties within the SFWMD boundaries.

## 3.2 Access and Authority

The gates on roadways into the RFGW monitoring locations are secured with District Kissimmee, or "K", locks. A "K" key can be obtained from the Field Project Manager and/or Field Supervisor.

## 3.3 Sampling Locations

There are 105 stations currently included in the RFGW monitoring network. New wells are being drilled as part of the CFWI, which will be included in the RFGW network once construction is complete. Wells will be sampled a minimum of once every 5 years. Some wells require more frequent sampling. A maximum of 50 wells with 1 sample per well, will be sampled each fiscal year.

**Table 2** lists the 59 RFGW monitoring wells completed in the UFA, and **Figure 1** shows the location and status of these wells. Active well stations are given baseline status when five or more water quality sampling events have occurred, and non-baseline status when four or fewer sampling events have occurred. "In Progress" wells are in the process of being built or were recently constructed but water quality data are not yet available. Retired wells are no longer being sampled as part of the program. These are shown as placeholders because suitable replacements are being identified to maintain continuity of the data sets. The sampling events column shows the number of times the well has been sampled over the period of record.

Table 2. RFGW monitoring wells completed in the Upper Floridan aquifer.

| Well | Status* | Sampling Events | Baseline | Date Range for Sampling Events | County | Owner |
|---|---|---|---|---|---|---|
| BF-4S | Active | 3 | No | 2010 – 2017 | Broward | SFWMD |
| BF-6 | Active | 1 | No | 2016 | Broward | Deerfield Beach |
| BICY-MZ2 | Active | 17 | Yes | 2004 – 2015 | Collier | SFWMD |
| BOYRO_EPXU | Active | 4 | No | 2007 – 2010 | Palm Beach | Boynton Beach East Plant |
| BRY-MW | Retired | 7 | Yes | 2006 – 2016 | Hendry | Berry Groves |
| BSU-MZU | Active | 13 | Yes | 1999 – 2016 | Charlotte | Burnt Store Road Utilities |
| DF-4 | Active | 17 | Yes | 2004 – 2017 | Miami Dade | SFWMD |
| ENP-100 | Retired | 13 | Yes | 2004 – 2009 | Maimi Dade | Everglades National Park |
| EXKR-MW19 | Active | 0 | No | 2018 | Okeechobee | SFWMD |
| FPL-MW | Retired | 8 | Yes | 2006 – 2009 | Lee | Florida Power & Light |
| FPU-MZU | Active | 10 | Yes | 2000 – 2008 | St. Lucie | Fort Pierce Utilities |
| G-2618 | Active | 18 | Yes | 2005 – 2016 | Broward | USGS |
| G-3061 | Active | 2 | No | 2014 – 2017 | Miami Dade | USGS |
| GLF-6 | Active | 5 | Yes | 2001 – 2014 | Glades | SFWMD |
| HIF-40 | Active | 1 | No | 2014 | Highlands | SFWMD |
| HIF-42U | Active | 5 | Yes | 2008 – 2017 | Okeechobee | SFWMD |
| I75-MZ2 | Active | 16 | Yes | 1995 – 2016 | Collier | SFWMD |
| IWA-MZU | Active | 3 | No | 2000 – 2016 | Lee | Island Water Authority |
| IWSD-MZ2 | Active | 15 | Yes | 2004 – 2016 | Collier | Immokalee Water & Sewer District |
| KW-MZL | Active | 1 | No | 2000 | Monroe | Key West WWTF |
| L2-PW2 | Active | 16 | Yes | 1999 – 2016 | Hendry | SFWMD |
| L-6436 | Active | 7 | Yes | 2005 – 2016 | Lee | SFWMD |
| LAB-MZ1 | Active | 15 | Yes | 1997 – 2016 | Hendry | SFWMD |
| MF-37U | Active | 6 | Yes | 20047 – 2011 | Martin | USACE |
| MF-52 | Retired | 1 | No | 2005 | Martin | SFWMD |
| MF-52RU | In Progress | 0 | No | None | Martin | SFWMD |
| MIU-MZ1 | Active | 13 | Yes | 2004 – 2015 | Collier | Marco Island Utilities |
| MOSSPK_D | Active | 1 | No | 2005 | Orange | SFWMD |
| OKF-101 | Retired | 1 | No | 2005 | Okeechobee | Okeechobee Utility Authority |

| Well | Status* | Sampling Events | Baseline | Date Range for Sampling Events | County | Owner |
|---|---|---|---|---|---|---|
| OKF-105U | Active | 2 | No | 2013 – 2015 | Okeechobee | SFWMD |
| OKF-106 | Active | 1 | No | 2014 | Okeechobee | SFWMD |
| OKF-42 | Active | 21 | Yes | 1984 – 2006 | Okeechobee | SFWMD |
| ORF-29 | Retired | 3 | No | 2005 – 2007 | Orange | SFWMD |
| OSF-100** | Active | 9 | Yes | 2005 – 2012 | Osceola | SFWMD |
| OSF-110 | Active | 0 | No | None | Osceola | SFWMD |
| OSF-104U | Active | 3 | No | 2009 – 2014 | Osceola | SFWMD |
| OSF-22 | Active | 1 | No | 1985 | Osceola | USGS |
| OSF-3 | Active | 6 | Yes | 1979 – 2006 | Osceola | SFWMD |
| OSF-53R** | In Progress | 0 | No | None | Osceola | SFWMD |
| OSF-60 | Active | 4 | No | 1992 – 2008 | Osceola | SFWMD |
| OSF-62 | Active | 2 | No | 2005 – 2006 | Osceola | SFWMD |
| OSF-64 | Active | 3 | No | 2005 – 2007 | Osceola | SFWMD |
| OSF-66 | Active | 10 | Yes | 2004 – 2006 | Osceola | SFWMD |
| OSF-70R | Active | 2 | No | 2011 – 2012 | Osceola | SFWMD |
| PBF-10R | Active | 1 | No | 2009 | Palm Beach | SFWMD |
| PBF-15U | Active | 2 | No | 2011 – 2014 | Palm Beach | SFWMD |
| PBF-3 | Active | 21 | Yes | 1996 – 2017 | Palm Beach | SFWMD |
| PBF-7U | Active | 18 | Yes | 2000 – 2016 | Palm Beach | SFWMD |
| POF-20R | Active | 3 | No | 2006 – 2016 | Osceola | SFWMD |
| POF-22 | Active | 1 | No | 2007 | Polk | SFWMD |
| POF-27U | Active | 1 | No | 2015 | Polk | SFWMD |
| SCC-MZU | Active | 15 | Yes | 1999 – 2009 | Collier | South County Regional WWTF |
| SLF-21 | Active | 9 | Yes | 1985 – 2014 | St. Lucie | Fort Pierce Ag. Experiment Station |
| SLF-75 | Active | 16 | Yes | 2001 – 2016 | St. Lucie | SFWMD |
| SLF-76 | Active | 16 | Yes | 2004 – 2016 | St. Lucie | SFWMD |
| STU-MZU** | Active | 10 | Yes | 1999 – 2008 | Martin | Stuart WWTF |
| W-7362** | Active | 1 | No | 2016 | Monroe | John Pennekamp Coral Reef State Park |
| WASANMZ1 | Retired | 6 | Yes | 2004 – 2005 | Miami-Dade | Miami-Dade Water & Sewer Department |

SFWMD = South Florida Water Management District; USACE = United States Army Corps of Engineers; USGS = United States Geological Survey; WWTF = wastewater treatment facility.

* Retired wells are placeholders for replacement wells, once identified.

** No water level data.

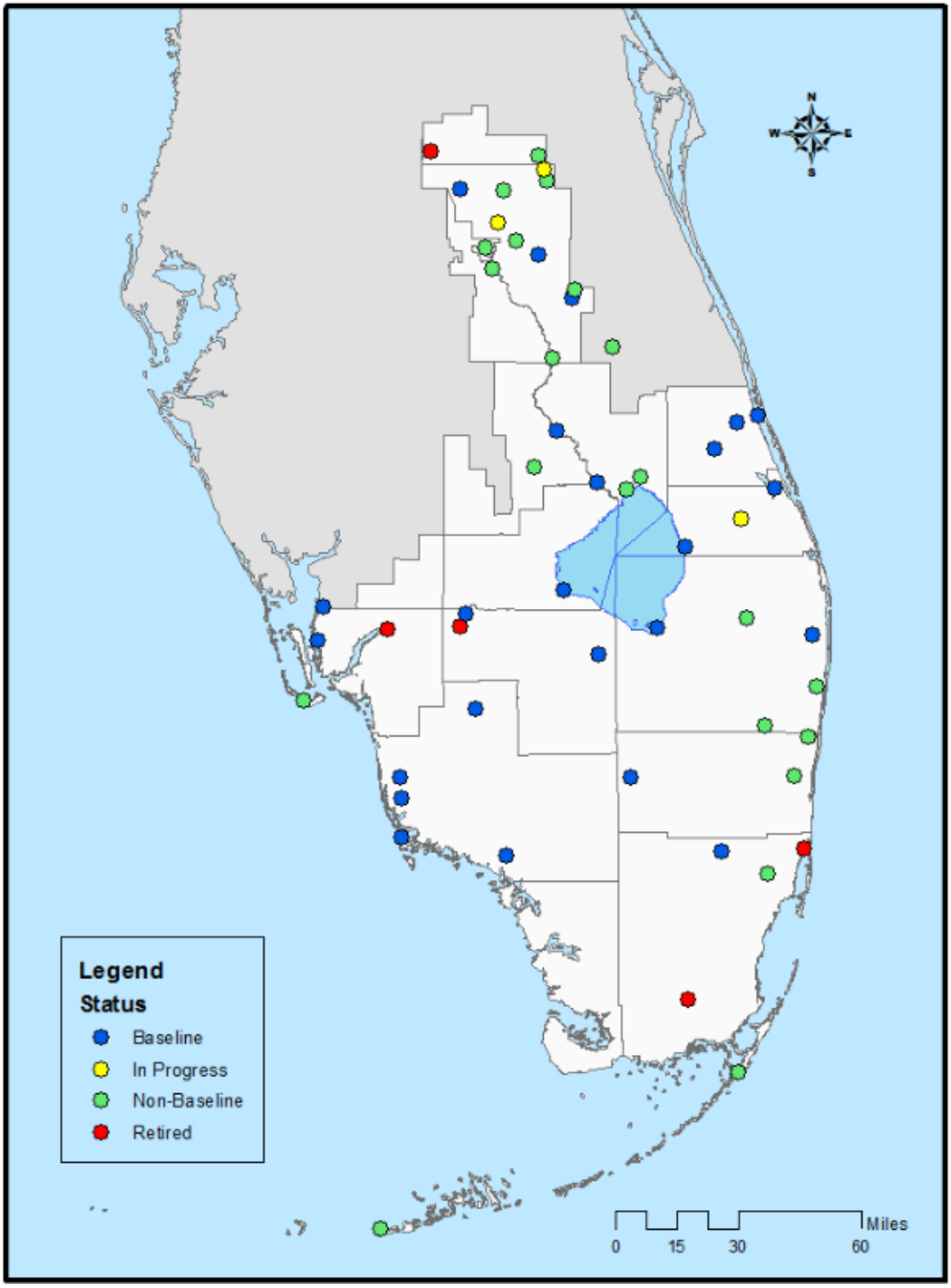


Figure 1. Location and status of RFGW monitoring wells completed in the Upper Floridan aquifer.

**Table 3** lists the 22 RFGW monitoring wells completed in the APPZ, and **Figure 2** shows the location and status of these wells.

Table 3. RFGW monitoring wells completed in the Avon Park Permeable Zone.

| Well | Status* | Sampling Events | Baseline | Date Range for Sampline Events | County | Owner |
|---|---|---|---|---|---|---|
| BF-4M | Active | 8 | Yes | 2007 – 2014 | Broward | SFWMD |
| BOYRO_EPXL | Active | 7 | Yes | 2007 – 2017 | Palm Beach | Boynton Beach East Plant |
| BSU-MZL | Active | 16 | Yes | 1999 – 2016 | Charlotte | Burnt Store Road |
| G-2617 | Active | 21 | Yes | 1994 – 2016 | Broward | USGS |
| HIF-42L | Active | 5 | Yes | 2008 – 2017 | Okeechobee | SFWMD |
| IWA-MZL | Active | 3 | No | 2000 – 2016 | Lee | Island Water Authority |
| L2-PW1 | Active | 13 | Yes | 2005 – 2011 | Hendry | SFWMD |
| LAB-MZ3 | Active | 10 | Yes | 2004 – 2016 | Hendry | SFWMD |
| LAB-PW2 | Active | 1 | No | 2015 | Hendry | SFWMD |
| MF-37L | Active | 6 | Yes | 2007 – 2015 | Martin | SFWMD |
| MF-40L | Active | 3 | No | 2009 – 2014 | Martin | SFWMD |
| MF-52RL | In Progress | 0 | No | None | Martin | SFWMD |
| OKF-100L | Active | 3 | No | 2007 – 2008 | Okeechobee | SFWMD |
| OKF-105M | Active | 4 | No | 2009 – 2015 | Okeechobee | SFWMD |
| OSF-104M | Active | 2 | No | 2007 – 2014 | Osceola | SFWMD |
| OSF-112** | In Progress | 0 | No | None | Osceola | SFWMD |
| OSF-82U | Active | 1 | No | 2012 | Osceola | SFWMD |
| OSF-99 | Active | 3 | No | 2006 – 2015 | Osceola | SFWMD |
| PBF-11 | Active | 15 | Yes | 2003 – 2009 | Palm Beach | SFWMD |
| PBF-15M | Active | 2 | No | 2008 – 2010 | Palm Beach | SFWMD |
| PBF-4 | Active | 16 | Yes | 1997 – 2010 | Palm Beach | SFWMD |
| POF-27L | Active | 2 | No | 2011 – 2013 | Polk | SFWMD |
| SLF-74 | Active | 13 | Yes | 2005 – 2016 | St. Lucie | SFWMD |
| WASANMZ2 | Retired | 8 | Yes | 2005 – 2006 | Miami-Dade | Miami-Dade Water & Sewer Department |

SFWMD = South Florida Water Management District; USGS = United States Geological Survey.

* In Progress wells were recently constructed and have not been sampled yet. Retired wells are placeholders for replacement wells, once identified.

** No water level data.

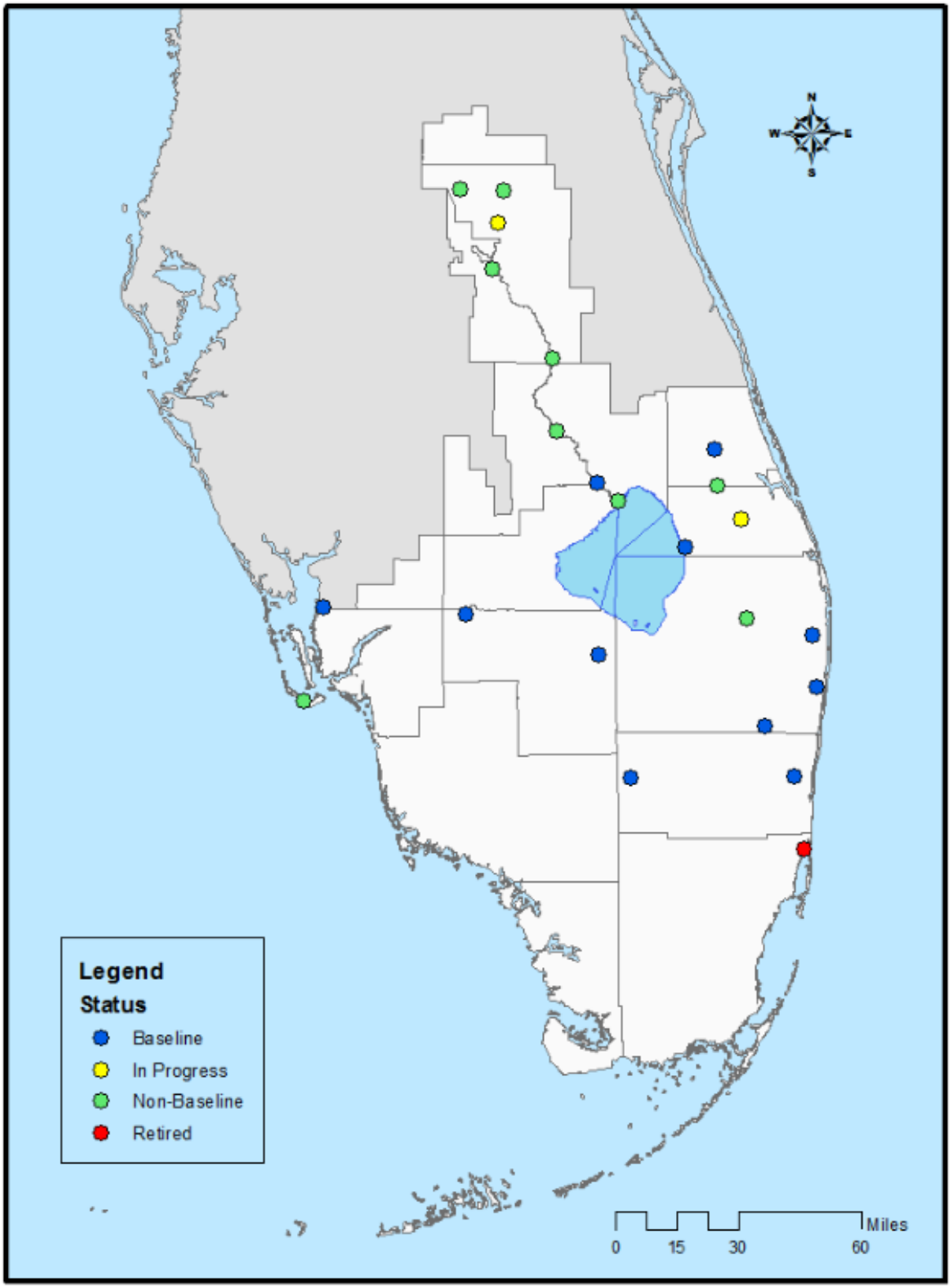


Figure 2. Location and status of RFGW monitoring wells completed in the Avon Park Permeable Zone.

The LFA is an important groundwater resource, especially in central Florida. As such, the CFWI Data Monitoring and Investigations Team is constructing additional monitoring wells in the region. **Table 4** lists the 25 RFGW monitoring wells completed in the LFA within the SFWMD's jurisdiction, and **Figure 3** shows the location and status of these wells.

Table 4. RFGW monitoring wells completed in the Lower Floridan aquifer.

| Well | Status* | Sampling Events | Baseline | Date Range for Sampling Events | County | Owner |
|---|---|---|---|---|---|---|
| BF-1 | Active | 6 | Yes | 1993 – 2014 | Broward | SFWMD |
| BICY-MZ4 | Active | 16 | Yes | 2004 – 2015 | Collier | SFWMD |
| FPU-MZL | Active | 10 | Yes | 2000 – 2008 | St. Luice | SFWMD |
| I75-MZ3 | Active | 17 | Yes | 2004 – 2016 | Collier | SFWMD |
| IWSD-MZ4** | Retired | 3 | No | 2000 – 2007 | Collier | Immokalee Water & Sewer District |
| NMC-MZL** | Active | 7 | Yes | 2002 – 2008 | Martin | North Martin County WWTF |
| OKF-105** | Retired | 1 | No | 2009 | Okeechobee | SFWMD |
| OKF-105L | Active | 1 | No | 2009 | Okeechobee | SFWMD |
| ORF-60 | Active | 2 | No | 2010 – 2011 | Orange | Reedy Creek Improvement District |
| OSF-104L | Active | 5 | Yes | 2006 – 2014 | Osceola | SFWMD |
| OSF-109L | Active | 1 | No | 2015 | Osceola | SFWMD |
| OSF-109U | Active | 1 | No | 2012 | Osceola | SFWMD |
| OSF-111L** | In Progress | 0 | No | None | Osceola | SFWMD |
| OSF-111U** | In Progress | 0 | No | None | Osceola | SFWMD |
| OSF-82L | Active | 3 | No | 2007 – 2012 | Osceola | SFWMD |
| OSF-97 | Active | 4 | No | 2006 – 2007 | Osceola | SFWMD |
| OSF-98 | Active | 4 | No | 2006 – 2010 | Osceola | SFWMD |
| PBF-12 | Active | 18 | Yes | 1999 – 2017 | Palm Beach | SFWMD |
| PBF-15L | Active | 6 | Yes | 2008 – 2014 | Palm Beach | SFWMD |
| PBF-5 | Active | 17 | Yes | 1996 – 2010 | Palm Beach | SFWMD |
| POF-28L | Active | 3 | No | 2012 – 2016 | Polk | SFWMD |
| POF28U | Retired | 1 | No | 2012 | Polk | SFWMD |
| POF-28UR | Active | 2 | No | 2013 – 2015 | Polk | SFWMD |
| POF-29 | Active | 4 | No | 2011 – 2015 | Polk | SFWMD |
| STU-MZL** | Active | 13 | Yes | 1999 – 2008 | Martin | Stuart WWTF |

SFWMD = South Florida Water Management District; WWTF = wastewater treatment facility.

* In Progress wells were recently constructed and have not been sampled yet. Retired wells are placeholders for replacement wells, once identified.

**No water level data.

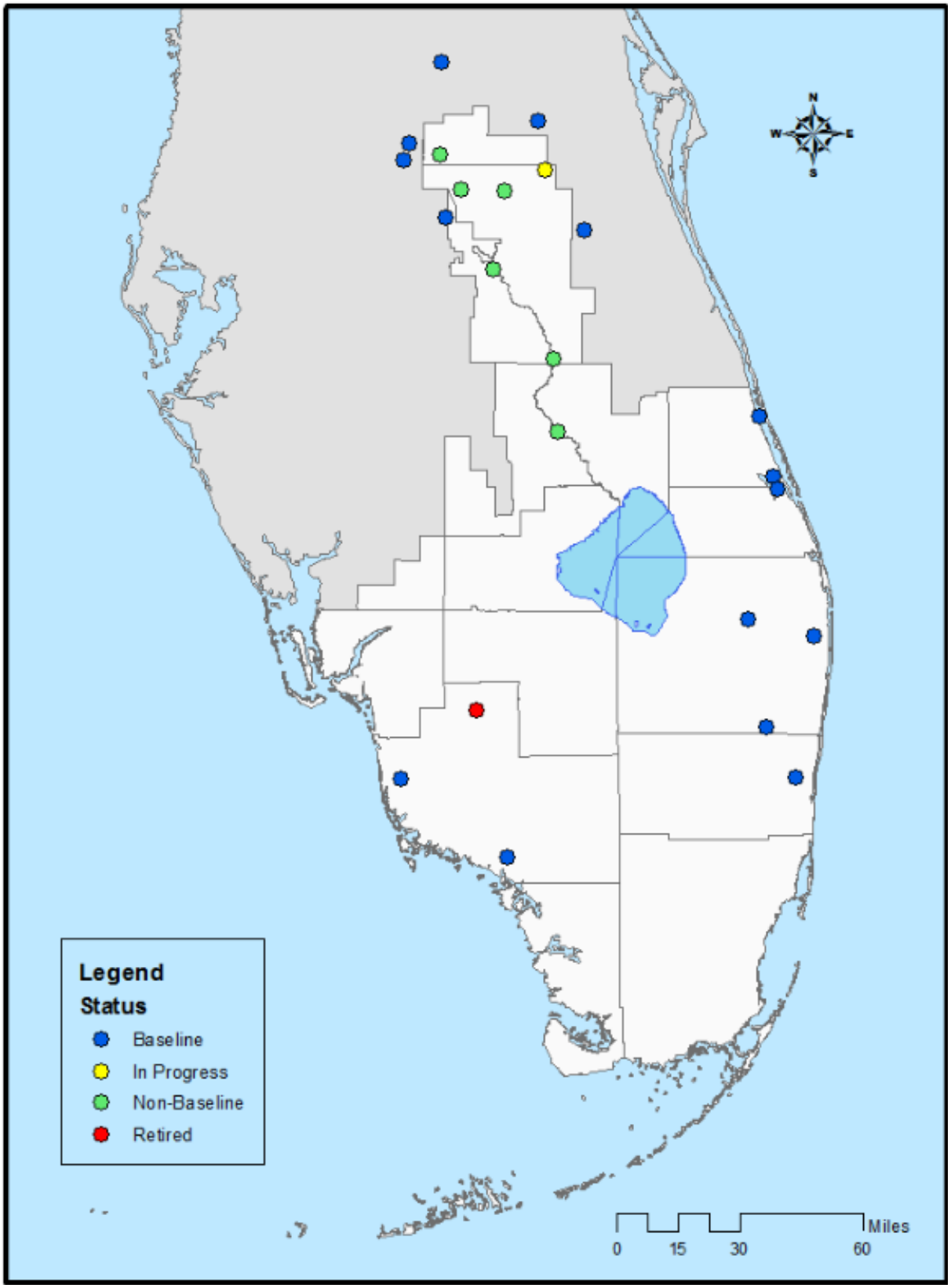


Figure 3. Location and status of RFGW monitoring wells completed in the Lower Floridan aquifer.

# 4.0 FIELD ACTIVITIES

## 4.1 Station Monitoring Frequencies and Parameters Collected

Most RFGW monitoring wells have Supervisory Control and Data Acquisition (SCADA) equipment installed for water level monitoring. Annual water quality sampling is conducted by SFWMD hydrogeology staff in a subset of the RFGW monitoring network, and the SFWMD lab processes the samples and uploads the results to DBHYDRO. **Appendix A** lists the requirements, by station and planning region, for sampling over the next 5 years. A portion of the data collected by the FDEP (primarily ions and physical parameters; **Appendix B**) also is uploaded to DBHYDRO. Water quality sampling involves substantial staff time and logistical planning (e.g., pumps, generators, travel, occasional overnight stays for long purge times, fleet vehicles). Wellhead repairs are carried out as needed.

Water quality sampling is conducted annually by planning region; therefore, the number of samples processed by the lab varies year to year. A maximum of 50 wells, with 1 sample per well, will be collected in any fiscal year. Each well is purged for three well volumes to stabilize background water quality parameters before samples are collected (**Table 5**).

Table 5. Water quality parameters sampled at each RFGW monitoring well.

| Station | Collection Method | Frequency | Parameter ACODES |
|---|---|---|---|
| 125 stations + QC<br>* Maximum of 50 samples will be collected per fiscal year.<br><br>(Please see **Figures 1** to **3** and **Tables 1** to **4**.) | Grab-Pump | A minimum of once every 5 years on a continual basis. | Alkalinity (ALKA)<br>Calcium (Ca)<br>Chloride (Cl)<br>Magnesium (Mg)<br>Sodium (Na)<br>Potassium (K)<br>Sulfate ($SO_4$)<br>Total Dissolved Solids (TDS)<br>Strontium (TDSSR)<br><br><u>Field Parameters</u>:<br>• pH<br>• Specific conductance (SCOND)<br>• Temperature (TEMP) |

## 4.2 Project Specific Guidelines

The SFWMD's hydrogeology staff coordinates with SCADA staff to remove and reinstall sensors when water quality sampling is conducted. Water level data are collected at 15-minute intervals where data loggers are installed.

## 4.3 Grab Sampling Procedures

Sample collection for this project shall follow the procedures and requirements found in the FDEP's SOP FS2200.

## 4.4 Field Parameters

Collection of field parameters for grab samples follows the procedures and requirements outlined in the WQM FSQM, with one exception.

FDEP purging criteria will be evaluated as applicable to wells sampled for the RFGW monitoring effort. The dissolved oxygen (DO) purging criterion will be assessed for the RFGW monitoring wells, and a project-specific DO criterion and/or measuring requirement based on well specifications will be specified if necessary. The WQM Quality Assurance Officer will communicate with the FDEP QA Officer, if necessary, to adjust the language in the FDEP SOPs to address the constraints of the project.

This project focuses on the confined portions of FAS, which are high-pressure and high-reducing environments. As FAS water is pumped from depth and into a flow-through cell on the surface, it undergoes chemical change (e.g., pH fluctuations, gas exchanges associated with partial pressures as water passes to lower atmospheric pressure). Previous FAS sampling efforts have shown that the DO content often is highly unstable (as a result of off-gassing), with little resemblance to *in situ* concentrations. Therefore, DO stability is not considered an appropriate criterion on which to evaluate the quality of FAS samples and will be omitted for the RFGW monitoring effort.

## 4.5 Field QC Requirements

Where possible, field QC requirements will follow the procedures found in the *Field Quality Control Measurements and Requirements* section of the WQM FSQM. However, it is not possible for this project to comply with the equipment blanks requirement. The WQM FSQM is primarily for low-volume sampling; some RFGW monitoring wells require high-volume sampling equipment (e.g., high-capacity submersible pumps, tens of feet of drop pipe). Equipment blanks will be collected when possible; however, in some cases, it is not reasonably practical to produce a single equipment blank (i.e., it would require a large tank of distilled water). Given no organics or volatiles will be collected for the RFGW monitoring effort, the likelihood of equipment contamination at a level that would affect results is very low.

## 4.6 Autosampler Collection

The RFGW monitoring effort does not require autosamplers.

## 4.7 Sample Submission

Following completion of sample collection each day, water quality samples will be stored in local refrigeration, then transported (in accordance with requirements specified in the WQM FSQM) to the SFWMD laboratory once or twice per week for analyses. Samples are submitted to the SFWMD laboratory as soon as possible, considering sample hold times and preservations. Samples are submitted according to the WQM FSQM requirements.

# 5.0 DATA QUALITY OBJECTIVES

## 5.1 Data Usage

The results of the RFGW monitoring effort can be used for other projects. While the monitoring network primarily supports groundwater modeling and water supply planning, the historical water quality data set recently was used by the USACE (2015) as part of the Comprehensive Everglades Restoration Plan (CERP) ASR Regional Study.

The RFGW monitoring network was used in the development and calibration of groundwater models (e.g., East Coast Floridan Transient Model, East Coast Floridan Model) supporting the *2015 CFWI Regional Water Supply Plan* and is now being used to calibrate the expanded East Coast Floridan Transient Model. This ongoing water level and water quality data collection effort will support future groundwater model calibration and analysis of the LFA as an alternative water supply source. Another initiative that may use these data sets is the proposed ASR and deep injection well program being explored at the direction of the District's Governing Board.

## 5.2 Data Quality

The SFWMD has adopted a uniform set of data quality objectives (DQOs) following criteria detailed in the *Analytical Methods and Default QA/QC Targets* table of the CLQM.

Field parameter DQOs are described in the *Field Quality Assurance Objectives* table found in the *Field Testing* section of the FSQM. The most recent version of the FSQM outlines the specific field testing DQOs at the time of sample collection.

Samples sent to the SFWMD laboratory, which is certified through the National Environmental Laboratory Accreditation Program (NELAP), are analyzed according to the provisions within the FDEP QA Rule [Chapter 62-160, F.A.C.] and the CLQM. The most recent version of the CLQM specifies DQOs at the time of sample collection for each laboratory analysis. Data are qualified in accordance with the FSQM, CLQM, and applicable data validation SOPs.

# 6.0 DATA AND RECORDS MANAGEMENT

The SFWMD evaluates data in accordance with the DQOs defined in the FSQM and/or CLQM. Validation is performed in accordance with applicable WQM and/or Analytical Services Section SOPs. All data submittals will conform with existing District guidelines.

## 6.1 Contract Deliverables

Contract laboratory and/or field data and documentation are submitted to the SFWMD in the ADaPT format or another format as requested by the DBHYDRO Data Steward. The contract laboratory will evaluate the data in accordance with the DQOs defined in the FSQM and/or CLQM. All contract field and laboratory data and documentation submittals will conform with the FSQM, CLQM, applicable SOPs, and/or other forms as requested by the SFWMD.

### 6.2 Data and Record Storage

Following the data validation process, all data and records are maintained so end users can retrieve and review information from a sampling event. Field records are maintained in accordance with the Archive Records Storage and Retention SOP (SFWMD-FIELD-SOP-022). Corrections of field data or records must follow the applicable WQM SOPs and FSQM. All analytical data and specified metadata are sent to the DBHYDRO database for long-term storage and retrieval. Corrections to data in DBHYDRO must follow *Data Investigations and Corrections* (SFWMD-DVS-SOP-010).

The SFWMD will maintain master copies of field and laboratory generated records. In addition, the SFWMD is responsible for maintaining records of current and historical methodologies and SOPs so the conditions applied to a sampling event can be evaluated at any given time.

## 7.0 REFERENCES

CFWI. 2015a. *Central Florida Water Initiative: Planning Document, Volume 1*. Available at: https://www.cfwiwater.com/pdfs/plans/CFWI_RWSP_VolI_Final_2015-12-16.pdf.

CFWI. 2015b. *Central Florida Water Initiative: Appendices, Volume 1A*. Available at: https://www.cfwiwater.com/pdfs/plans/CFWI_RWSP_VolIA_Final_2015-12-16.pdf.

South Florida Water Management District. 2014. *2014 Lower Kissimmee Basin Water Supply Plan*. South Florida Water Management District, West Palm Beach, FL.

South Florida Water Management District. 2016. *2016 Upper East Coast Water Supply Plan Update*. South Florida Water Management District, West Palm Beach, FL.

South Florida Water Management District. 2017. *2017 Lower West Coast Water Supply Plan Update*. South Florida Water Management District, West Palm Beach, FL.

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USACE. 2015. *Central and Southern Florida Project Comprehensive Everglades Restoration Plan: Aquifer Storage and Recovery Regional Study*. Final Technical Report. U.S. Army Corps of Engineers, Jacksonville, FL.

# 8.0 REVISIONS AND MODIFICATIONS

| Revision Number | Date | Section/Page | Change/Reason |
|---|---|---|---|
| | | | |
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# SIGNATURE PAGE

Operational Project Monitoring Plan

for

Regional Floridan Groundwater (RFGW) Network Monitorng Program

Brian Collins, Project Manager
Hydrogeologist

10/1/18
Date

Steve Krupa, P.G.
Section Leader, Hydrogeology

10/1/18
Date

Pete Kwiatkowski, P.G.
Section Administrator, Resource Evaluation

10/1/18
Date

# APPENDIX A: REQUIREMENTS BY STATION

| Station | Mandate | Collection Method | Frequency | Parameter ACODES |
|---|---|---|---|---|
| All | Chapters 373 and 187, F.A.C. | Grab/Pump | Once every 5 years on a continual basis:<br>FY 18 – Lower Kissimmee - 12 wells<br>FY 19 – CFWI (Upper Kissimmee) - 35 wells<br>FY 20 – Upper East Coast - 12 wells<br>FY 21 – Lower West Coast - 22 wells<br>FY 22 – Lower East Coast - 24 wells | Alkalinity (ALKA)<br>Calcium (Ca)<br>Chloride (Cl)<br>Magnesium (Mg)<br>Sodium (Na)<br>Potassium (K)<br>Sulfate ($SO_4$)<br>Total Dissolved Solids (TDS)<br>Strontium (TDSSR)<br><u>Field Parameters</u>:<br>• pH<br>• Specific conductance (SCOND)<br>• Temperature (TEMP) |

CFWI = Central Florida Water Initiative; F.A.C. = Florida Administrative Code; FY = Fiscal Year.

# APPENDIX B: FDEP PARAMETERS FOR LOADING

| Storet Code | Parameter |
|---|---|
| 410 | Alkalinity, Total (as $CaCO_3$) |
| 1105 | Aluminum, Total |
| 1002 | Arsenic, Total |
| 1027 | Cadmium, Total |
| 916 | Calcium, Total |
| 940 | Chloride, Total |
| 1034 | Chromium, Total |
| 31616 | Coliform, Fecal |
| 1042 | Copper, Total |
| 72109 | Depth to Water |
| 951 | Fluoride, Total |
| 46570 | Hardness, calculated as $CaCO_3$ |
| 1045 | Iron, Total |
| 1051 | Lead, Total |
| 927 | Magnesium, Total |
| 1055 | Manganese, Total |
| 1062 | Molybdenum, total |
| 630 | Nitrate+Nitrite, Total (as N) |
| 680 | Organic Carbon, Total |
| 299 | Oxygen, Dissolved, Field |
| 406 | pH, Field |
| 665 | Phosphorus, Total (as P) |
| 937 | Potassium, Total |
| 73675 | Purge Volume |
| 929 | Sodium, Total |
| 95 | Specific Conductance |
| 94 | Specific Conductance, Field |
| 946 | Sulfate, Dissolved |
| 945 | Sulfate, Total |
| 70300 | Total Dissolved Solids (measured) |
| 76 | Turbidity |
| 82078 | Turbidity, Field |
| 99994 | Water Column Height |
| 10 | Water Temperature |
| 1092 | Zinc, Total |