Guide to District Hydrologic Data

October 31

2017

A comprehensive inventory of data types collected and maintained by the Hydrologic Data Section of the Data Collection Bureau, including availability and format, update frequency, data access, and how to get help.

Southwest Florida Water Management District

Guide to District Hydrologic Data

The purpose of this document is to provide a comprehensive inventory of historical and current time-series data types collected and maintained by the Hydrologic Data Section of the District's Data Collection Bureau (DCB). A description of each data type is provided below, along with information on availability, format, data start date, update frequency, data access, special instructions for interpreting and using the data appropriately, and whom to contact with questions. Also included is information about counterpart datasets that may be available from other agencies for both District and external users. Please note that the exact beginning and ending dates for each data type are approximate and may vary by site and specific parameter. General assistance with locating and obtaining hydrologic data is available by sending your inquiry to HydroDataSubmittals@swfwmd.state.fl.us. For general information about the Hydrologic Data Section and its activities, please review the Section Work Plan.

This guide assumes that the user is familiar with the District's *Water Management Information System* for Resource Data applications (WMIS/RD). If you are a District employee and need assistance navigating WMIS, please take a few minutes to view this instructional video on the District's Intranet. Internal and external users may also request additional assistance directly from Hydrologic Data Section staff.

A. Rainfall Data

1. **District gauge rainfall**: Available for download through the Resource Data section of WMIS (WMIS/RD), gauge rainfall data are stored in 15-minute, hourly, daily, and event-based (rainfall amount was recorded when accumulation reached 0.10-inch, or at least every 12 hours if less) frequencies depending on the site and time period. The period of record ranges from the 1960s to present; there are currently approximately 170 active sites. All District rainfall sites are currently instrumented with 15-minute recorders, of which approximately 130 report rainfall amounts on an hourly basis (near-real-time) through the District's SCADA system. Sites that are not on the SCADA system are visited once per month and the data downloaded from the site recorder for subsequent upload to WMIS. Update occurs daily for sites on SCADA and approximately monthly for download sites. For a comprehensive listing of sites by type, parameter, and data-collection frequency, please see Appendix A.

Access:	WMIS/RD
Date range:	1962 (derived from unknown source, likely volunteer/observer)
Update frequency:	Ongoing
Internal availability:	No restrictions
External availability:	Daily values through WMIS; 15-minute data upon request.
Special instructions:	None
Contact for questions:	Margit.Crowell@WaterMatters.org

2. **District rainfall summary files:** Available in Microsoft Excel format from the SWFWMD Internet *Data & Maps* page. Summaries are produced for several geographic areas (counties, District regions, and USGS primary drainage basins, for that portion of the area within SWFWMD boundaries) and show average total monthly, calendar-year, water-year, wet-season, and dry-season rainfall by year from 1915 to present. The methodology used to produce these summary values is available in Appendix B of this document. Excel files are available as 'tabbed' worksheets (each month's data from 1915-present is on a separate page) or in a single worksheet as a month/year matrix of rainfall values.

Access:	www.swfwmd.state.fl.us/data/hydrologic/rainfall_data_summaries/
Date range:	1915 - present
Update frequency:	Monthly
Internal availability:	No restrictions
External availability:	No restrictions
Special instructions:	None
Contact for questions:	Margit.Crowell@WaterMatters.org

3. **NexRad RADAR rainfall estimates**: Available in text format on the District ftp site at ftp.swfwmd.state.fl.us/pub/radar_rainfall in 15-minute, hourly, daily, monthly, and annual aggregations for 17450 2-km-square cells in the District and up to 30 miles outside District interior boundary. A shapefile of the grid is also available on the ftp site for visualizing and summarizing the data using ArcGIS.

Access:	ftp.swfwmd.state.fl.us/pub/radar_rainfall
Date range:	January 1995 - present
Update frequency:	Monthly
Internal availability:	No restrictions
External availability:	No restrictions
Special instructions:	Select aggregation level by folder name in main directory; download compressed file(s) by year within aggregation-level folder.
Contact for questions:	Margit.Crowell@WaterMatters.org

4. **NOAA/National Weather Service (NWS) daily gauge rainfall data** are available for internal users for approximately 50 sites within and near the District boundaries, updated from National Weather Service *Global Historical Climatology Network*-Daily (GHCND) records. The National Centers for Environmental Information (formerly the National Climatic Data Center/NCDC) have additional data in various formats, levels of resolution, and for many more sites across the United States.

Access:	WMIS/RD
Date range:	January 1892 - present
Update frequency:	Semi-annual
Internal availability:	No restrictions
External availability:	www.ncdc.noaa.gov/cdo-web/search?datasetid=GHCND
Special instructions:	None
Contact for questions:	Margit.Crowell@WaterMatters.org

5. **NWS rainfall infill data** is a dataset produced in 2008 by Intera, Inc. to fill the gaps in NWS rainfall records by estimating rainfall values for periods of missing data. There are two parameters for each NWS rainfall site: *estimated daily rainfall* and *estimated daily rainfall error*. These data are intended to be used in conjunction with the daily NWS rainfall values to form a temporally complete dataset. There are no plans to update this dataset at this time. More information on the methodology used to produce these data is available from the Hydrologic Data Section.

Access:	WMIS/RD
Date range:	January 1901 – December 2006
Update frequency:	Not updated
Internal availability:	No restrictions
External availability:	Available upon request
Special instructions:	Used with NOAA daily rainfall data as in-fill for missing NOAA values
Contact for questions:	Margit.Crowell@WaterMatters.org

B. Evapotranspiration/Other Atmospheric Data

1. **District ET (weather) stations** were discontinued by the end of 2013 due to the availability of similar and more comprehensive data from other sources (see Appendix C). However, several ET-related parameters with hourly or daily historical data are available from the WMIS database for approximately 30 stations, including calculated reference ET, air temperature, relative humidity, wind speed/direction, solar radiation, and pan water temperature. Actual (pan) evaporation data are available for 20 of these sites. Two District special-purpose weather stations remain in operation today (DV-1 Dover, 18298 and Saddle Creek at P-11, 838153).

   Access: WMIS/RD
   Date range: May 1977 - 2014; 2010 – present for 2 special-purpose sites
   Update frequency: Daily, for two sites noted above only
   Internal availability: No restrictions
   External availability: Daily data through WMIS; hourly upon request.
   Special instructions: None
   Contact for questions: Asmita.Shukla@WaterMatters.org

2. **USGS historical ET data** are available for several (6) sites across the District on a daily basis. Those sites that were part of this special cooperative data collection program with the District will be in WMIS. The specific parameters collected will vary by site, and the time series is generally short (2-3 years). The sites were chosen to represent a variety of ground conditions for estimating ET. Additional (non-cooperative program) USGS ET data may be available on the USGS' NWISWeb application.

   Access: WMIS/RD; NWISWeb
   Date range: October 2000 – September 2010
   Update frequency: Not applicable
   Internal availability: No restrictions
   External availability: Available from NWISWeb
   Special instructions: None
   Contact for questions: Margit.Crowell@WaterMatters.org

3. **Grid-based ET estimates** are potential (PET) and reference (RET) evapotranspiration estimates generated using solar radiation obtained from Geostationary Operational Environmental Satellites (GOES). The data are produced by University of New Hampshire and University of Alabama-Huntsville researchers, and are distributed by the US Geological Survey in tab-delimited text format for each Water Management District and also by Florida county. These data are based on the same 2-km-square vector grid used for the display and interpretation of the NexRad RADAR rainfall estimates (section A.3, above). The dataset also includes daily solar radiation (insolation in MJ/m^2), minimum and maximum daily humidity (%), minimum and maximum daily temperatures, and daily wind speed (m/s).

   Access: WMIS database (Oracle)
   Date range: 1995 – 2014
   Update frequency: Annual (June/July)
   Internal availability: No restrictions
   External availability: fl.water.usgs.gov/et/ (by county and state boundaries)
   Special instructions: Each year of data has its own quality code file, which should be downloaded and used to interpret the parameter values for each year. The complete project report provides detailed information about how the data were generated; please review prior to using the data.

Contact for questions: Margit.Crowell@WaterMatters.org

4. **Historical air temperature** data in degrees F are available for a small number (~8) of ROMP well sites in the southern part of the District for frost-freeze monitoring purposes, as well as at historical ET (weather) stations. Air-temperature monitoring at these sites was discontinued in March 2015. Current hourly and daily air temperature data are only available at two District special-purpose weather stations (DV-1 Dover, 18298 and Saddle Creek at P-11, 838153).

Access:	WMIS/RD
Date range:	May 1977 – March 2015
Update frequency:	Daily, for two sites noted above only
Internal availability:	No restrictions
External availability:	Daily values through WMIS; hourly upon request.
Special instructions:	None
Contact for questions:	Asmita.Shukla@WaterMatters.org

C. Surface-Water Level and Flow Data

1. **Static and flowing water sites:** The District collects water levels at approximately 800 sites. Water levels are available in feet relative to NGVD29 for all sites, and relative to NAVD88 for approximately 600 sites. Discharge data are available in gallons/minute (gpm) for 1 operational site, and in cubic feet/second for 8 special-project sites.

Access:	WMIS/RD
Date range:	November 1981 - present
Update frequency:	Daily to monthly, depending on site.
Internal availability:	No restrictions
External availability:	Daily (or less frequently) through WMIS; hourly upon request.
Special instructions:	Daily values are calculated *means* of top-of-the-hour readings on recorder sites; hourly values (internal only) are top-of-the-hour values; all manual values are instantaneous, point-in-time readings. See Appendix D for quality codes. There are differences in how water levels are recorded as 'dry' or 'below staff gauge' depending on site type (wetland vs. lake/river staff gauge). Please see the *Minimum Requirements for the Collection and Management of Hydrologic and Meteorologic Data* document from the Hydrologic Data Section for more information.
Contact for questions:	Margit.Crowell@WaterMatters.org

2. **The District contracts with the USGS** as part of the annual Cooperative Data Collection Program to collect continuous and monthly levels and discharge at approximately 124 surface-water sites. Water levels are available as gauge heights, NAVD29, and/or NAVD88 levels, in feet, depending on site. Discharge data are available in cubic feet/second (cfs) only.

Access:	WMIS/RD
Date range:	July 1923 - present (District-sponsored begins 1961)
Update frequency:	Daily to semi-annually, depending on site
Internal availability:	Daily only through WMIS; higher-frequency data available through NWISWeb, or USGS ADAPS system (contact Hydrologic Data Section)
External availability:	Available from NWISWeb
Special instructions:	Daily mean values unless otherwise noted
Contact for questions:	Granville.Kinsman@WaterMatters.org (Program questions)

Margit.Crowell@WaterMatters.org (Data questions)

D. Ground-Water Level Data

1. The District has an extensive long-term ground water monitoring network, collecting 15-minute (generally only for special/time-limited projects), hourly, daily, or monthly water levels at over 1500 wells. Many of these wells are also sampled for water-quality data (see Appendix A).

Access:	WMIS/RD
Date range:	October 1965
Update frequency:	Daily
Internal availability:	No restrictions
External availability:	Daily maximum values through WMIS; hourly upon request.
Special instructions:	Daily values are calculated *maxima* of top-of-the-hour readings on recorder sites; hourly values (internal only) are top-of-the-hour values; all manual values are instantaneous, point-in-time readings. See Appendix D for quality codes.
Contact for questions:	Margit.Crowell@WaterMatters.org

2. **The District contracts with the USGS** to collect continuous and monthly levels at approximately 15 ground-water sites through the District through the annual Cooperative Data-Collection Program. USGS data from program sites (and additional non-program sites, upon request) are loaded to WMIS for the convenience of District users, but are not available to the outside public through the District's external WMIS portal, at the request of the source agency (see below for public access link). Some periodic or field measurements may not be available from WMIS at this time; please contact the Hydrologic Data Section for more assistance on obtaining these data.

Access:	WMIS/RD
Date range:	November 1963 - present
Update frequency:	Daily
Internal availability:	Daily only through WMIS; higher-frequency data available through NWISWeb, or USGS ADAPS system (contact Hydrologic Data Section).
External availability:	Available from NWISWeb
Special instructions:	Daily maximum values unless otherwise noted in parameter description.
Contact for questions:	Granville.Kinsman@WaterMatters.org (Program questions) Margit.Crowell@WaterMatters.org (Data questions)

E. Reports and Web Content

The Hydrologic Data Section produces or contributes to several reports and map products on an ongoing basis. A few of the most widely used are described here.

1. Hydrologic Conditions Report

Access:	www.swfwmd.state.fl.us/waterres/hydro/
Date range:	January 2009 – last month (see contact below for earlier print versions)
Update frequency:	Monthly, for previous month
Internal availability:	District Internet
External availability:	District Internet
Special instructions:	None

Contact for questions: Steve.DeSmith@WaterMatters.org

2. Aquifer Resource Updates

These monthly and weekly updates are compiled and published by the District's Public Affairs Bureau from data provided by the Hydrologic Data Section. Percentile rankings of current regional aquifer conditions in comparison to historical conditions for the previous month and year are presented for the District's northern, central, and southern regions.

Access: www.swfwmd.state.fl.us/news/ (see link in right margin)
Date range: January 2005 – last week/month
Update frequency: Weekly or monthly
Internal availability: District Internet
External availability: District Internet
Special instructions: None
Contact for questions: Steve.DeSmith@WaterMatters.org

3. Daily Hydrologic Conditions

Daily hydrologic conditions reports are available from the District's Internet site. These reports summarize daily and month-to-date rainfall, USGS river flow, and surface-water elevations at a variety of key monitoring sites throughout the District. The rainfall and river flow report pages also show maps of the monitoring locations, and feature links to graphs and more detailed reports for individual District regions.

Access: www.swfwmd.state.fl.us/data/hydrologic/daily_rainfall/
Date range: Current data only
Update frequency: Daily
Internal availability: District Internet
External availability: District internet
Special instructions: None
Contact for questions: Steve.DeSmith@WaterMatters.org

4. **District rainfall summary files**

These tables are available in Microsoft Excel format from the District's external web site. Please see section A.2., above, and Appendix B for more information.

5. **Performance Metrics**

The Hydrologic Data Section produces monthly and quarterly reports to document data-collection tasks. The purpose of these reports is to track the acquisition and quality of data values from active monitor sites, and indicate where they may be gaps or errors in data collection, problems with equipment, or other issues that prevent the timely and accurate data reporting.

Access: http://www.swfwmd.state.fl.us/files/database/site_file_sets/2683/FY14_Performance_Metrics.pdf
Date range: September 2013 - present
Update frequency: Monthly and quarterly
Internal availability: Upon request
External availability: Upon request
Special instructions: None
Contact for questions: Steve.DeSmith@WaterMatters.org

F. Geospatial Data & Maps

Designed for use with Esri's *ArcGIS* (© Esri, Redlands, CA) software, the Hydrologic Data Section maintains several popular spatial data products for mapping and analyzing hydrologic data.

1. Data Collection Site Shapefiles

There are several shapefiles available showing the locations of resource monitoring sites throughout the District. These layers include all historical and current hydrologic, water-quality, and geohydrologic monitors, organized by site type (ground water, surface water, atmospheric). Note that there is also a file available for internal users for only currently active (included in data collection component of a District-sponsored program or project) sites as well.

Access:	SWFWMD Spatial Data Library
Date range:	Current
Update frequency:	Ongoing
Internal availability:	No restrictions; access through *SWFWMD Feature Selector* tool in ArcMap.
External availability:	www.swfwmd.state.fl.us/data/gis/layer_library/category/data_collection
Special instructions:	External users will need to subset layer(s) based on value of DCS_SITE_STATUS_DESC to view sites by current data-collection status.
Contact for questions:	Margit.Crowell@WaterMatters.org Data.Maps@swfwmd.state.fl.us

2. Semi-Annual Upper Floridan Potentiometric Surface Map

Semi-annual (May and September of each year) interpretations of the potentiometric surface of the Upper Floridan Aquifer in Florida are available in Portable Document Format (PDF) and electronic (shapefile) format. The PDF editions cover the areal extent of the SWFWMD only; shapefiles after September 2011 cover the areal extent of the entire state. Please see all three "Source Agency" sections below to determine the correct date range for and file location of your maps.

a.

Source agency:	United States Geological Survey (USGS)
Access:	ArcMap shapefiles
Date range:	1975, 1978 – 1982, 1984 – May 2011
Update frequency:	None
Internal availability:	Available via ArcMap
External availability:	a. Shapefiles: www.swfwmd.state.fl.us/data/gis/layer_library/category/potmaps b. PDF maps: www.swfwmd.state.fl.us/data/gis/layer_library/category/potmaps c. Pre-September 2011: http://pubs.er.usgs.gov/search?q=florida+potentiometric
Special instructions:	None
Contact for questions:	Margit.Crowell@WaterMatters.org

b.

Source agency:	Southwest Florida Water Management District and USGS
Access:	ArcMap shapefiles
Date range:	September 2011
Update frequency:	None
Internal availability:	Available via ArcMap
External availability:	a. Shapefiles: www.swfwmd.state.fl.us/data/gis/layer_library/category/potmaps b. PDF maps:

www.swfwmd.state.fl.us/data/gis/layer_library/category/potmaps

Special instructions: None
Contact for questions: Margit.Crowell@WaterMatters.org

c. **Source agency:** Florida Geological Survey (Florida Department of Environmental Protection)
Access: FDEP Online Map Gallery (*Upper Floridan Aquifer Potentiometric Surface*)
Date range: May 2012 – present
Update frequency: Ongoing
Internal availability: Available via ArcGIS Online
External availability: http://fdep.maps.arcgis.com/home/

Special instructions: None
Contact for questions: James.Cichon@dep.state.fl.us

3. Gauge-Adjusted RADAR Rainfall/GOES ET Grid Shapefile

This shapefile contains 17450 2-km-by-2-km cells (contiguous polygons), each having a unique FEATURE_ID (cell number) that links the GARR or USGS GOES ET data to the shapefile features. The same shapefile is used to visualize both data sets in ArcMap.

Access: a. Internal: *SWFWMD Feature Selector* tool in ArcMap
b. External: SWFWMD ftp site
ftp://ftp.swfwmd.state.fl.us/pub/radar_rainfall/gisdata/
Date range: Current
Update frequency: Not applicable
Internal availability: No restrictions
External availability: No restrictions
Special instructions: Shapefile extends 30 miles outside of District interior boundary. See section A.3. for information on time-series data used with this shapefile.
NOTE: There are known issues with 2004 data, as there were problems with the National Weather Service NexRad RADARs that year that affected the imagery and any data derived using that information.
Contact for questions: Margit.Crowell@WaterMatters.org

(End of catalog)

Appendices

Appendix A

Comprehensive Listing of Active (Sponsored) Data Collection Sites by Agency, Parameter, and Frequency (as of August 2016)

Agency	Resource Type	Site Type	Instrumentation	Discharge/Flow	Other Meteorologic	Rainfall	Water Level	Water Quality
Polk County Natural Resources Division	Surface Water	Lake	Grab					1
Southwest Florida Water Management District	Atmospheric	Rainfall	Continuous Recorder			41		
Southwest Florida Water Management District	Atmospheric	Rainfall	SCADA			130		
Southwest Florida Water Management District	Atmospheric	Weather Station	SCADA		2	2		
Southwest Florida Water Management District	Ground Water/Geologic	Spring at Vent	Flowmeter	1				
Southwest Florida Water Management District	Ground Water/Geologic	Spring at Vent	Grab					64
Southwest Florida Water Management District	Ground Water/Geologic	Well	Grab					1
Southwest Florida Water Management District	Ground Water/Geologic	Well	Continuous Recorder				403	
Southwest Florida Water Management District	Ground Water/Geologic	Well	Grab					473
Southwest Florida Water Management District	Ground Water/Geologic	Well	SCADA				410	
Southwest Florida Water Management District	Ground Water/Geologic	Well	Tape				767	
Southwest Florida Water Management District	Surface Water	Bay/Harbor	Grab					1
Southwest Florida Water Management District	Surface Water	Borrow Pit	Continuous Recorder				1	
Southwest Florida Water Management District	Surface Water	Borrow Pit	Staff Gauge				1	
Southwest Florida Water Management District	Surface Water	Canal	Grab					4
Southwest Florida Water Management District	Surface Water	Canal	Continuous Recorder				2	1
Southwest Florida Water Management District	Surface Water	Canal	Grab					26
Southwest Florida Water Management District	Surface Water	Canal	SCADA				44	
Southwest Florida Water Management District	Surface Water	Canal	Staff Gauge				11	
Southwest Florida Water Management District	Surface Water	Estuary	Grab					2
Southwest Florida Water Management District	Surface Water	Estuary	Continuous Recorder				5	5

Southwest Florida Water Management District	Surface Water	Estuary	Grab					53
Southwest Florida Water Management District	Surface Water	Estuary	SCADA					1
Southwest Florida Water Management District	Surface Water	Lake	Continuous Recorder				4	
Southwest Florida Water Management District	Surface Water	Lake	Grab					51
Southwest Florida Water Management District	Surface Water	Lake	SCADA				26	
Southwest Florida Water Management District	Surface Water	Lake	Staff Gauge				405	
Southwest Florida Water Management District	Surface Water	Lake Outflow	Grab					1
Southwest Florida Water Management District	Surface Water	Lake Outflow	SCADA	1			15	
Southwest Florida Water Management District	Surface Water	Lake Outflow	Staff Gauge				1	
Southwest Florida Water Management District	Surface Water	Pond	SCADA				1	
Southwest Florida Water Management District	Surface Water	Pond	Staff Gauge				3	
Southwest Florida Water Management District	Surface Water	Reservoir	SCADA				1	
Southwest Florida Water Management District	Surface Water	Retention Pond	Staff Gauge				1	
Southwest Florida Water Management District	Surface Water	River/Stream	Continuous Recorder				4	2
Southwest Florida Water Management District	Surface Water	River/Stream	Flowmeter	7				
Southwest Florida Water Management District	Surface Water	River/Stream	Grab				1	263
Southwest Florida Water Management District	Surface Water	River/Stream	SCADA				31	2
Southwest Florida Water Management District	Surface Water	River/Stream	Staff Gauge				17	
Southwest Florida Water Management District	Surface Water	Sinkhole	Continuous Recorder				3	
Southwest Florida Water Management District	Surface Water	Sinkhole	Grab					1
Southwest Florida Water Management District	Surface Water	Sinkhole	SCADA		1		3	
Southwest Florida Water Management District	Surface Water	Sinkhole	Staff Gauge				2	
Southwest Florida Water Management District	Surface Water	Spring not in Vent	Continuous Recorder				1	
Southwest Florida Water Management District	Surface Water	Spring not in Vent	Flowmeter	1				
Southwest Florida Water Management District	Surface Water	Spring not in Vent	Grab					7
Southwest Florida Water Management District	Surface Water	Spring not in Vent	SCADA					2
Southwest Florida Water Management District	Surface Water	Spring not in Vent	Staff Gauge				2	
Southwest Florida Water Management District	Surface Water	Storm Sewer	Grab					3

Southwest Florida Water Management District	Surface Water	Surface Water Facility	Grab					1
Southwest Florida Water Management District	Surface Water	Wetland	Continuous Recorder				4	
Southwest Florida Water Management District	Surface Water	Wetland	Grab					8
Southwest Florida Water Management District	Surface Water	Wetland	SCADA				2	
Southwest Florida Water Management District	Surface Water	Wetland	Staff Gauge				216	
St Johns River Water Management District	Ground Water/Geologic	Well	Continuous Recorder				2	
St Johns River Water Management District	Ground Water/Geologic	Well	SCADA				2	
Suwannee River Water Management District	Ground Water/Geologic	Well	Continuous Recorder				1	
Tampa Bay Estuary Program	Surface Water	Canal	Grab					4
Tampa Bay Water	Ground Water/Geologic	Spring at Vent	Flowmeter	1				
Tampa Bay Water	Ground Water/Geologic	Well	Continuous Recorder				7	
Tampa Bay Water	Ground Water/Geologic	Well	Tape				2	
Tampa Bay Water	Surface Water	Spring not in Vent	Flowmeter	1				
US Geological Survey	Atmospheric	Weather Station	Continuous Recorder		1			
US Geological Survey	Ground Water/Geologic	Spring at Vent	Continuous Recorder				1	
US Geological Survey	Ground Water/Geologic	Well	Continuous Recorder				2	
US Geological Survey	Ground Water/Geologic	Well	DCP				15	
US Geological Survey	Surface Water	Bay/Harbor	DCP	1			1	1
US Geological Survey	Surface Water	Canal	DCP	5			5	1
US Geological Survey	Surface Water	Canal	Flowmeter	1				
US Geological Survey	Surface Water	Lake Outflow	DCP				1	
US Geological Survey	Surface Water	Mine/Mine Discharge	Continuous Recorder	1			1	
US Geological Survey	Surface Water	Ocean	Continuous Recorder				1	
US Geological Survey	Surface Water	River/Stream	Computed	1				
US Geological Survey	Surface Water	River/Stream	Continuous Recorder	12			13	1
US Geological Survey	Surface Water	River/Stream	Crest-stage Indicator				5	

US Geological Survey	Surface Water	River/Stream	DCP	96			113	25
US Geological Survey	Surface Water	River/Stream	Flowmeter	7				
US Geological Survey	Surface Water	River/Stream	Grab					1
US Geological Survey	Surface Water	River/Stream	Staff Gauge				1	
US Geological Survey	Surface Water	Sinkhole	Continuous Recorder				1	
US Geological Survey	Surface Water	Spring not in Vent	Computed	1				
US Geological Survey	Surface Water	Spring not in Vent	DCP	4			5	3
US Geological Survey	Surface Water	Spring not in Vent	Flowmeter	2				
US Geological Survey	Surface Water	Spring not in Vent	Grab					1
US Geological Survey	Surface Water	Spring not in Vent	Staff Gauge				2	
US Geological Survey	Surface Water	Wetland	DCP				1	1

(Crosstab Site_Type_Agency_Count)

Appendix B

Methodology for Calculation of Rainfall Summary Statistics

To aid the management of water resources in the Southwest Florida Water Management District (District), a number of reports are produced at daily, weekly, monthly, and annual intervals that characterize present-day rainfall over the District in relation to historical rainfall amounts. District staff has drawn upon all of the available data to develop estimates of historical rainfall occurring within the counties encompassed by the District. For the period between 1915 and 1970, most rainfall data were from observer sites and data recorder sites, operated and/or maintained by the National Oceanic and Atmospheric Administration (NOAA). After 1970, the District also became active in its rainfall data collection efforts, greatly increasing the number of monitored rainfall sites within the 16-county region. The District's SCADA system for near-real-time electronic data collection also became an important tool for collecting rainfall data beginning in 1989. Thus, the number of rainfall sites used for the calculation of rainfall summary statistics between 1915 and 2000 varied greatly from year to year throughout the Start date, depending upon the number of available sites with complete data in a given year.

To estimate rainfall totals for the District's counties, data were screened to ensure that they were complete for each year of the Start date. Any years with fewer than 365 days of data were not included in the data set. Selected data were then used to construct Thiessen polygons, a method in which polygons are constructed around each rainfall site, such that the area within the polygon is closer to the central rainfall site than to any other rainfall site. Rainfall anywhere within the polygon area is assumed to be the same as the rainfall at the site central to the polygon. Using a geographical information system (GIS), the polygons were intersected with counties so that each county contained only the area of each polygon that fell within the basin. The sum of the polygon area and rainfall products for all of the polygons within the county, divided by the county total area, yielded an area-weighted estimate of rainfall within the county. Thiessen polygons were recalculated for each year based on the number of sites with complete data that were available. Thus, the final estimates of annual rainfall were always based upon the best available data for each subject year.

Since December 1999, the county rainfall totals have been calculated from data acquired from OneRain, Inc. (through October 2007) and Vieux, Inc. (from September 2007 to present). Digital rainfall data were acquired from the NexRad weather radar. By comparing these rainfall data with District supplied SCADA rainfall data, the radar data are calibrated to estimate rainfall amounts over the SWFWMD. Daily rainfall estimates derived from the calibrated radar data are provided to the District in a 2-kilometer square grid resolution. Each grid cell is then associated with a county, and the rainfall totals are calculated.

When the data from these two sources are combined, they provide a complete record for the period from 1915 to the present. These data are used primarily for comparisons, so the statistics used are typically the means, medians, interquartile ranges, period-of-record minima and maxima, and percentiles. Using the same methods described, rainfall totals and statistics are also calculated by USGS primary drainage basin, by District region, and by county boundary.

Appendix C

Links to Externally Available Hydrologic & Meteorologic Data

Florida Department of Environmental Protection *GeoData Directory*:
www.dep.state.fl.us/gis/datadir.htm

Florida Geographic Data Library *FGDL Metadata Explorer*:
http://www.fgdl.org/metadataexplorer/explorer.jsp

National Water Quality Monitoring Council (NWQMC) *Water Quality Portal*:
waterqualitydata.us/

NOAA/National Centers for Environmental Information (NCEI) *Climate at a Glance*:
www.ncdc.noaa.gov/cag/

NOAA/NCEI *Quick Links*:
www.ncdc.noaa.gov/data-access/quick-links

South Florida Water Management District (SFWMD) *DBHYDRO*:
www.sfwmd.gov/dbhydroplsql/show_dbkey_info.main_menu

Southwest Florida Water Management District (SWFWMD) *Water Management Information System*:
www18.swfwmd.state.fl.us/ResData/Search/ExtDefault.aspx

SWFWMD GIS Shapefile Library:
www.swfwmd.state.fl.us/data/gis/layer_library/

St. Johns River Water Management District (SJRWMD) *Hydrologic Data*:
webapub.sjrwmd.com/agws10/hdsnew/map.html

Suwannee River Water Management District (SRWMD) *Water Data Portal*:
www.srwmd.state.fl.us/index.aspx?NID=345

University of Florida Institute of Food & Agricultural Sciences *FAWN*:
fawn.ifas.ufl.edu/

University of South Florida Water Institute *wateratlas.org*:
www.wateratlas.usf.edu/

United States Geological Survey (USGS) *NWISWeb*:
waterdata.usgs.gov/nwis

USGS *Evapotranspiration Information and Data*:
fl.water.usgs.gov/et/

Appendix D

Quality Codes for District Hydrologic Data

QUALITY CODE	QUALITY DESCRIPTION
1	Good continuous records
2	Good-quality edited data
26	Good daily-read records
30	Irregular time-rate data
76	Reliable interpolation
77	Correlation with other station
79	Fewer than 24 values in daily aggregate
80	Accumulated
81	Wet day w/i accumulated rainfall period
82	Linear interpolation across record gap
83	Verification value
84	Could not locate site
85	Canker alert -- no site access
86	Site destroyed
87	Weeds too high to read gage
88	No access to site
89	Gage missing
90	Less than
91	Greater than
93	Unknown date
95	Estimated
96	Override
97	Surveyed
98	Below gauge or sensor
99	Value not verifiable
140	Data unchecked
149	Trace
150	Rating table extrapolated
151	Data missing
153	Above staff gauge
154	Out of service
201	Data not recorded
254	Rating table exceeded
255	No data exist