MEMORANDUM

TO: Governing Board

FROM: Megan Wetherington, P.E., Senior Professional Engineer

THRU: Ann B. Shortelle, Ph.D., Executive Director
Erich Marzolf, Ph.D., Division Director, Water Resources

DATE: January 8, 2014

RE: December 2013 Hydrologic Conditions Report for the District

RAINFALL

- December rainfall was normal compared to the last 80 years of records, with an average of 3.14" across the District (Table 1, Figure 1). However, storm tracks favored the northwestern and southeastern counties leaving a wide swath in the central part of the District with only 1-2" (Figure 2). Accumulations ranged from 58% of normal in Dixie County to 171% of normal in Levy County.
- The lowest gaged total was 1.21" at Governor Hill Lake in northeast Dixie County. The highest was 8.33" at Goethe State Forest in Levy County. Most of the rain recorded at the Goethe gage fell during one storm on the 18th. Seven inches fell in 6 hours, exceeding the 2% (50-year) storm. The 24-hour total of 7.87" exceeded any one-day December total at the nearby Usher Tower gage, with records going back to 1957.
- The Suwannee River's tributary basins in southern Georgia also saw variable rainfall. The upper Alapaha and Withlacoochee basins were 1-2" below normal, while areas farther downstream were 1-2" above normal (Figure 3).
- Average rainfall for the 12 months ending December 31 was 0.85" higher than the long-term average of 54.61" (Figure 4). Deficits up to 15" persisted in the upper Aucilla, Suwannee, and Santa Fe basins. Average rainfall for the 3 months ending December 31 was 1.1" lower than the long-term average of 8.4" (Figure 5).

SURFACEWATER

- **Rivers:** Most river gages reported normal flows with levels that rose gradually throughout the month. The Waccasassa River rose 5.5' in response to the extreme rainfall in Levy County, the highest levels on the Waccasassa since August. Only the Santa Fe River near Fort White remained below normal, with flows less than the 25th percentile of its historic December flows. Statistics for a number of rivers are presented graphically in Figure 6, and conditions relative to historic conditions are in Figure 7.

- **Lakes**: District lake levels were stable and generally remained slightly below their long-term average. Sneads Smokehouse Lake, in the upper Aucilla basin in Jefferson County, fell to at least 6" below its lowest recorded level. In November the Florida Fish and Wildlife Conservation Commission completed a hydrologic restoration project there by removing a dam that had separated the lake from a sinkhole since the 1960s. It is not known at this time how future fluctuations will compare to past behavior based on 37 years of records, but statistics will be updated annually to account for changes in the lake's hydrology. Figure 8 shows levels relative to the long-term average, minimum, and maximum levels for a number of monitored lakes.

- **Springs**: Flows at springs in the middle Suwannee River fell in December after reaching near-record highs in September. Springflow was generally near median at all measured springs including Madison Blue, Little River, and Suwannee Blue. Statistics for these springs and others are shown in Figure 9.

GROUNDWATER

Levels fell at nearly half of monitored upper Floridan aquifer wells. Falling levels occurred in the drier central part of the District, while levels improved in Levy County. Conditions in the northeastern confined upper Floridan generally remained stable. Overall, conditions remained above the 50^{th} percentile of records beginning in the 1970s. One quarter of the wells had levels below their long-term median, and one well, in northern Jefferson County, remained below the 25^{th} percentile. Statistics for a representative sample of wells are shown in Figure 11, and statistics for a number of regional long-term wells are shown in Figure 12 along with a description of aquifer characteristics.

HYDROLOGICAL/METEOROLOGICAL/WATER USE INFORMATION

- The Palmer Drought Severity Index (PDSI), a climatological tool produced by the National Climatic Data Center, evaluates the severity and frequency of abnormally dry or wet weather using precipitation, temperature, and soil moisture data. The PDSI values for the week ending January 4 indicated normal conditions in north Florida and southeast Georgia with slightly wet conditions in south central Georgia.
- The National Weather Service Climate Prediction Center (CPC) three-month outlook showed a potential for below-normal precipitation through March. Neutral El Niño/Southern Oscillation conditions are expected into summer 2014, with no tendency toward either El Niño (cooler and wetter) or La Niña (warmer and drier) conditions caused by Pacific Ocean temperatures.
- The U.S. Drought Monitor indicated abnormally dry conditions in the upper Suwannee basin near the Georgia border, including eastern Hamilton County and northern Columbia County.

CONSERVATION

A Phase I Water Shortage Advisory remains in effect. Users are urged to eliminate unnecessary uses. Landscape irrigation is limited to once per week between November and March based on a water conservation rule that applies to residential landscaping, public or commercial recreation areas, and public and commercial businesses that aren't regulated by a District-issued permit.

This report is compiled in compliance with Chapter 40B-21.211, Florida Administrative Code, using rainfall (radar-derived estimate), groundwater (105 wells), surfacewater (35 stations), and general information such as drought indices and forecasts. Data are provisional and are updated as revised data become available. Data are available at www.mysuwanneeriver.com or by request.

Table 1: Estimated Rainfall Totals (inches)

County	Dec 2013	December Average	Month % of Normal	Last 12 Months	Annual % of Normal
Alachua	3.79	2.77	137%	50.64	99%
Baker	1.57	2.77	57%	48.92	98%
Bradford	2.72	2.95	92%	48.05	95%
Columbia	1.96	3.08	64%	51.46	100%
Dixie	1.85	3.17	58%	55.84	95%
Gilchrist	2.17	3.07	71%	54.17	94%
Hamilton	3.30	2.98	111%	52.23	100%
Jefferson	3.40	4.25	80%	55.19	91%
Lafayette	2.26	3.33	68%	60.27	107%
Levy	5.43	3.18	171%	58.84	99%
Madison	3.66	3.79	97%	58.91	105%
Suwannee	2.87	2.79	103%	58.35	110%
Taylor	3.54	3.39	104%	61.99	104%
Union	1.92	2.86	67%	49.25	91%

December 2013 Average:	3.14
December Average (1932-2012):	3.13
Historical 12-month Average (1932-2012):	54.61
Past 12-Month Total:	55.46
12-Month Rainfall Surplus:	0.85

Figure 1: Comparison of District Monthly Rainfall

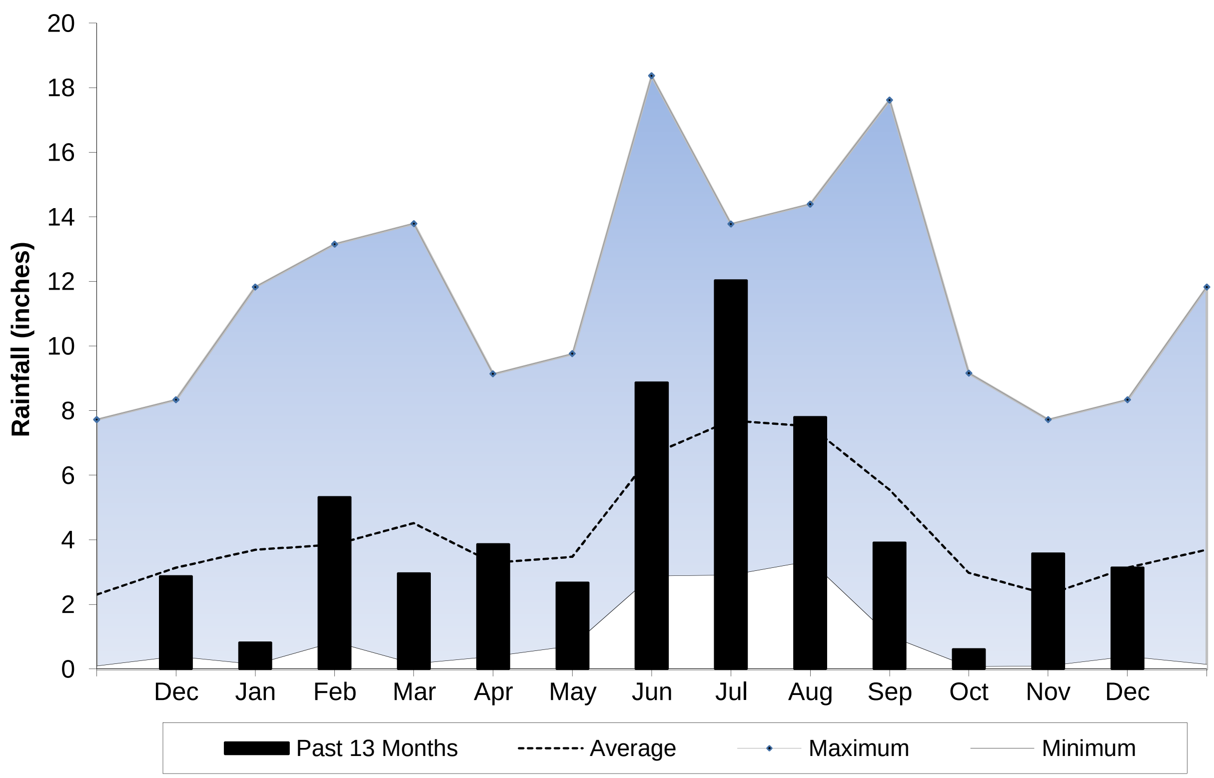


Figure 2: December 2013 Rainfall Estimate

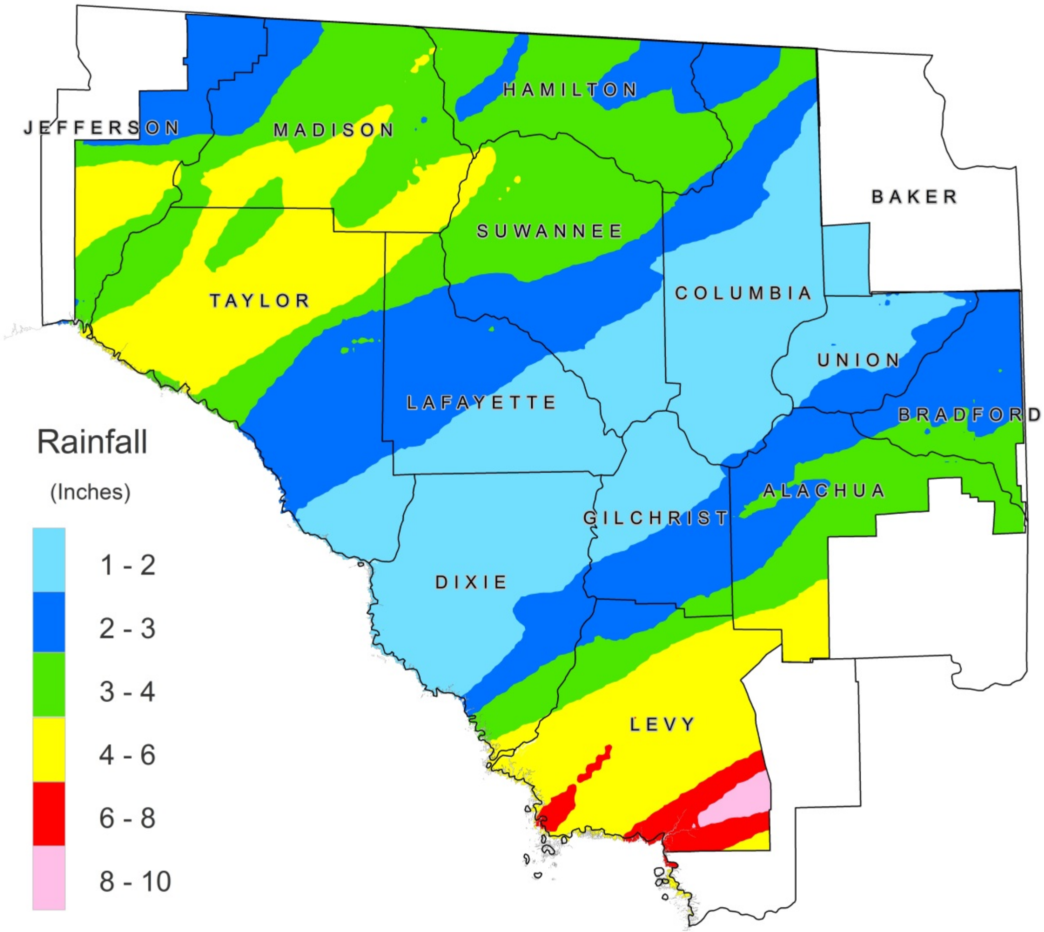


Figure 3: December 2013 Percent of Normal Rainfall

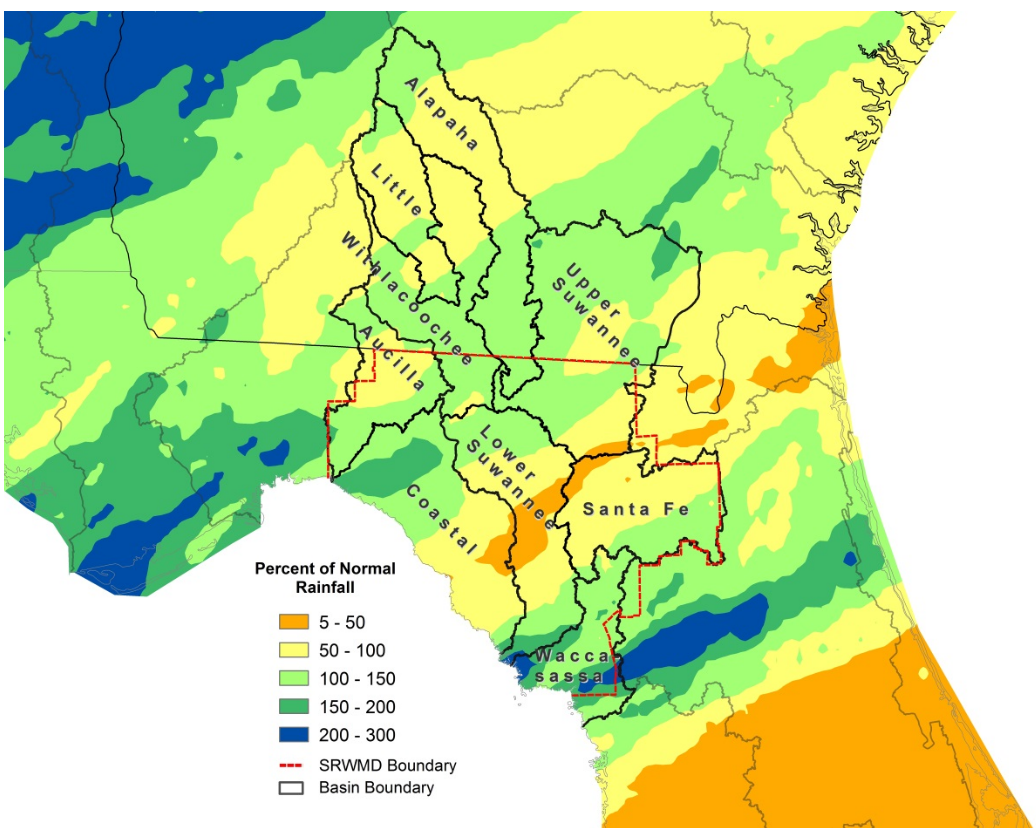
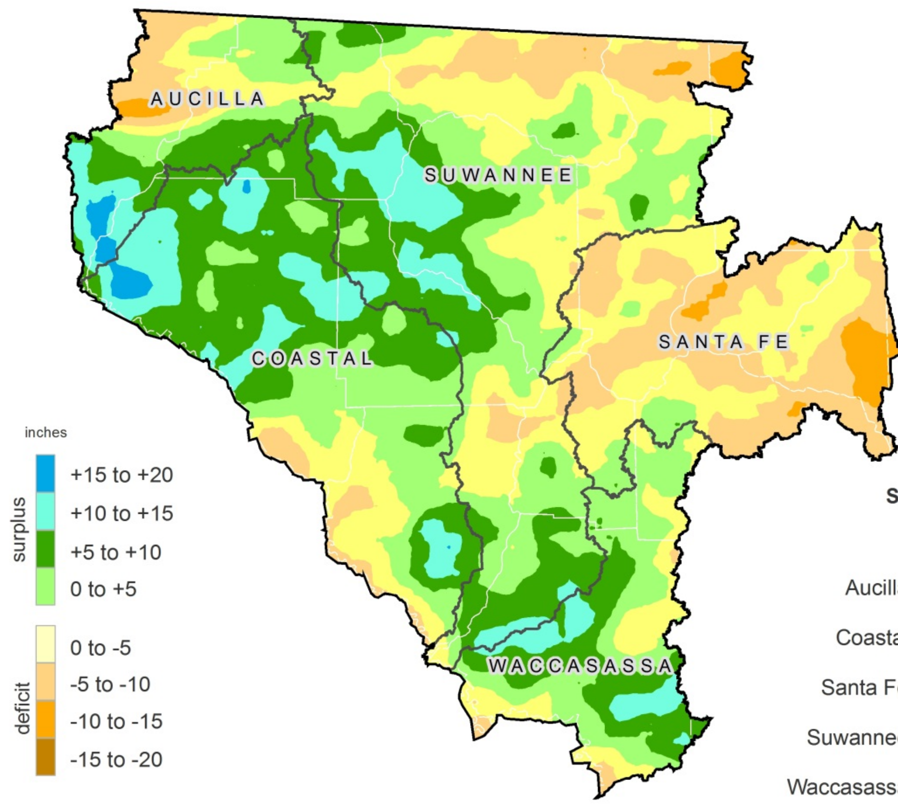


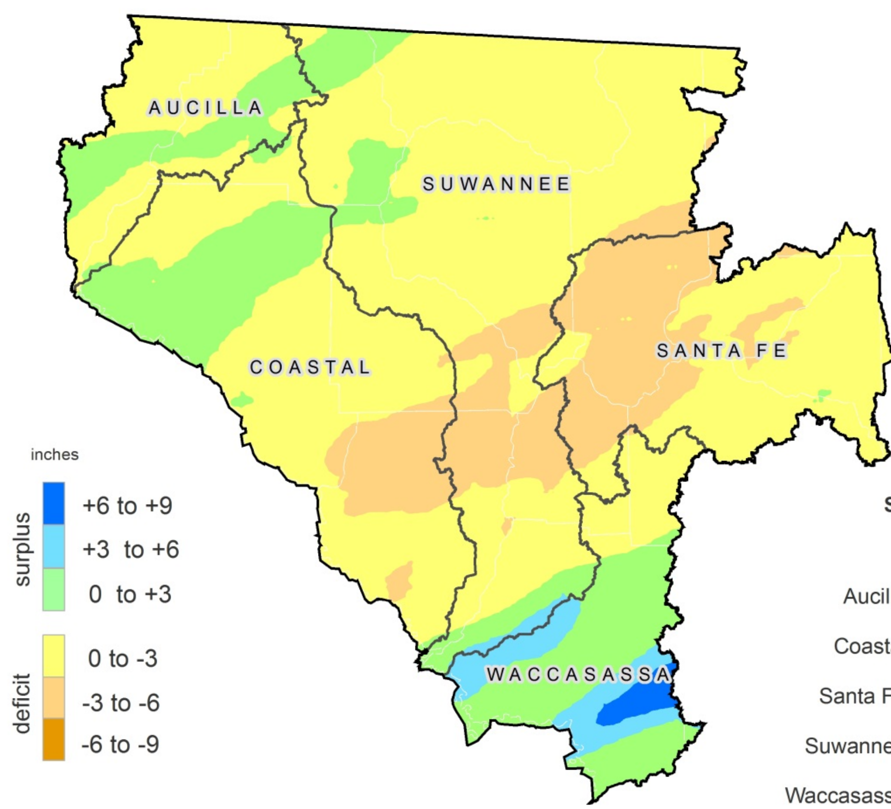
Figure 4: 12-Month Rainfall Surplus/Deficit by River Basin
Through December 31, 2013



12-Month
Surplus (+) or Deficit (-)
By Basin

	Dec -13	Nov -13
Aucilla	+1.8	+1.0
Coastal	+5.4	+4.8
Santa Fe	-5.1	-4.0
Suwannee	+1.8	+1.4
Waccasassa	+4.2	+3.2

Figure 5: 3-Month Rainfall Surplus/Deficit by River Basin
Through December 31, 2013

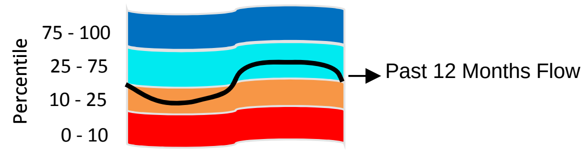


3-Month
Surplus (+) or Deficit (-)
By Basin

	Dec -13	Nov -13
Aucilla	-0.6	-4.4
Coastal	-1.3	-1.7
Santa Fe	-2.7	-4.2
Suwannee	-1.5	-3.6
Waccasassa	+1.8	+1.2

Figure 6: Daily River Flow Statistics

January 1, 2013 through December 31, 2013



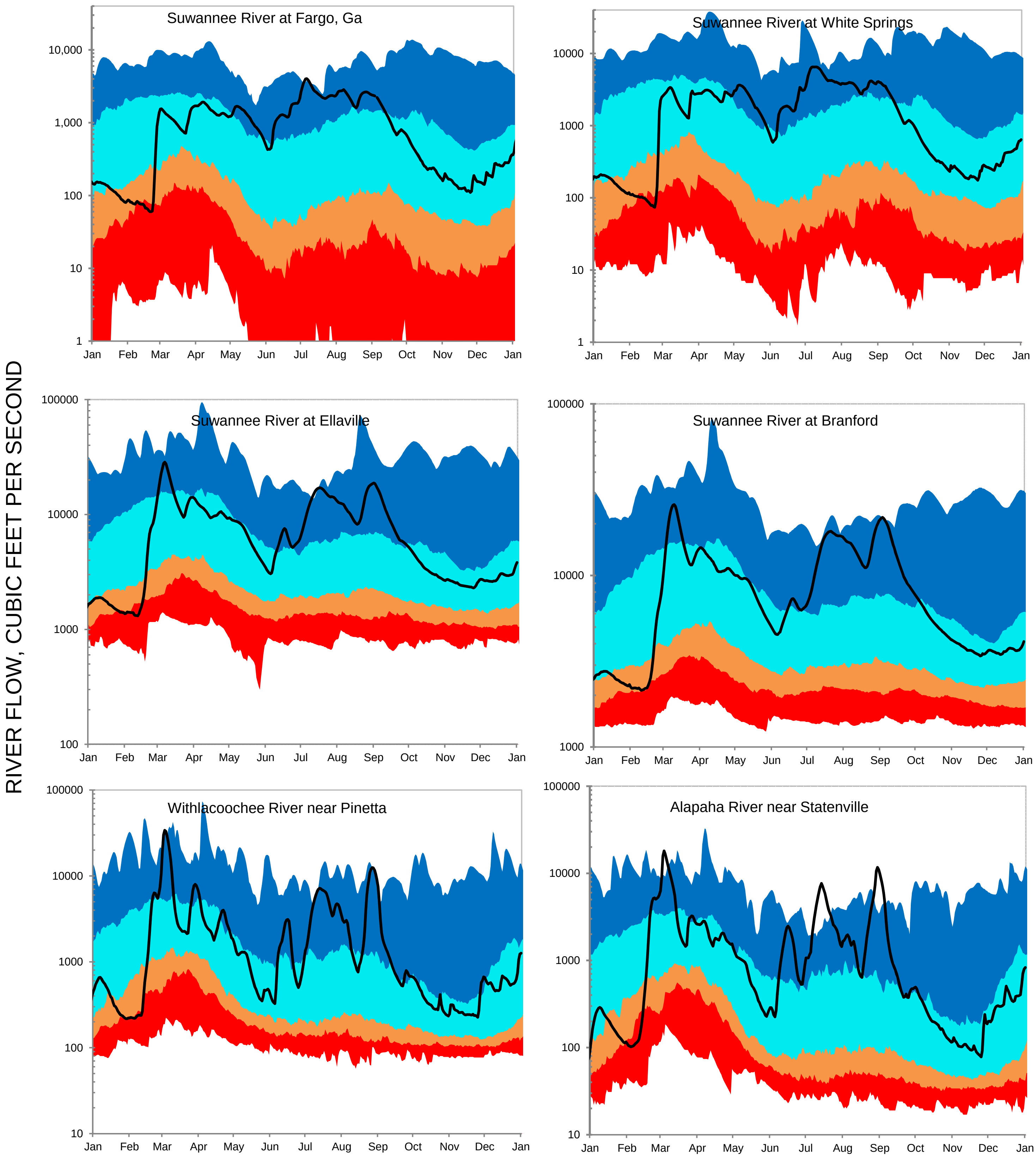
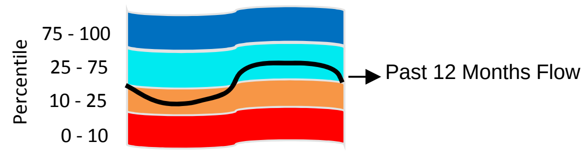
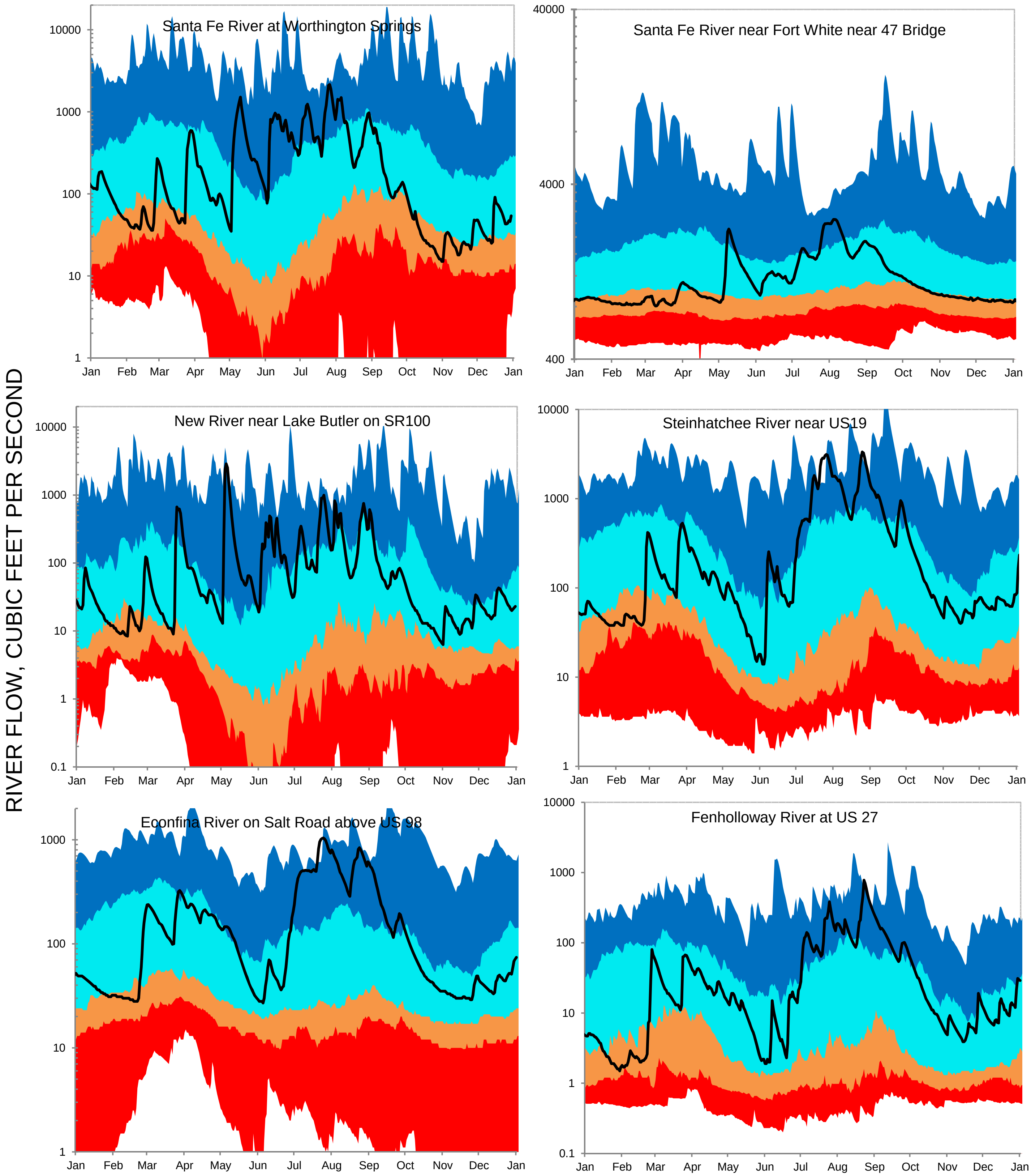


Figure 6, cont: Daily River Flow Statistics

January 1, 2013 through December 31, 2013





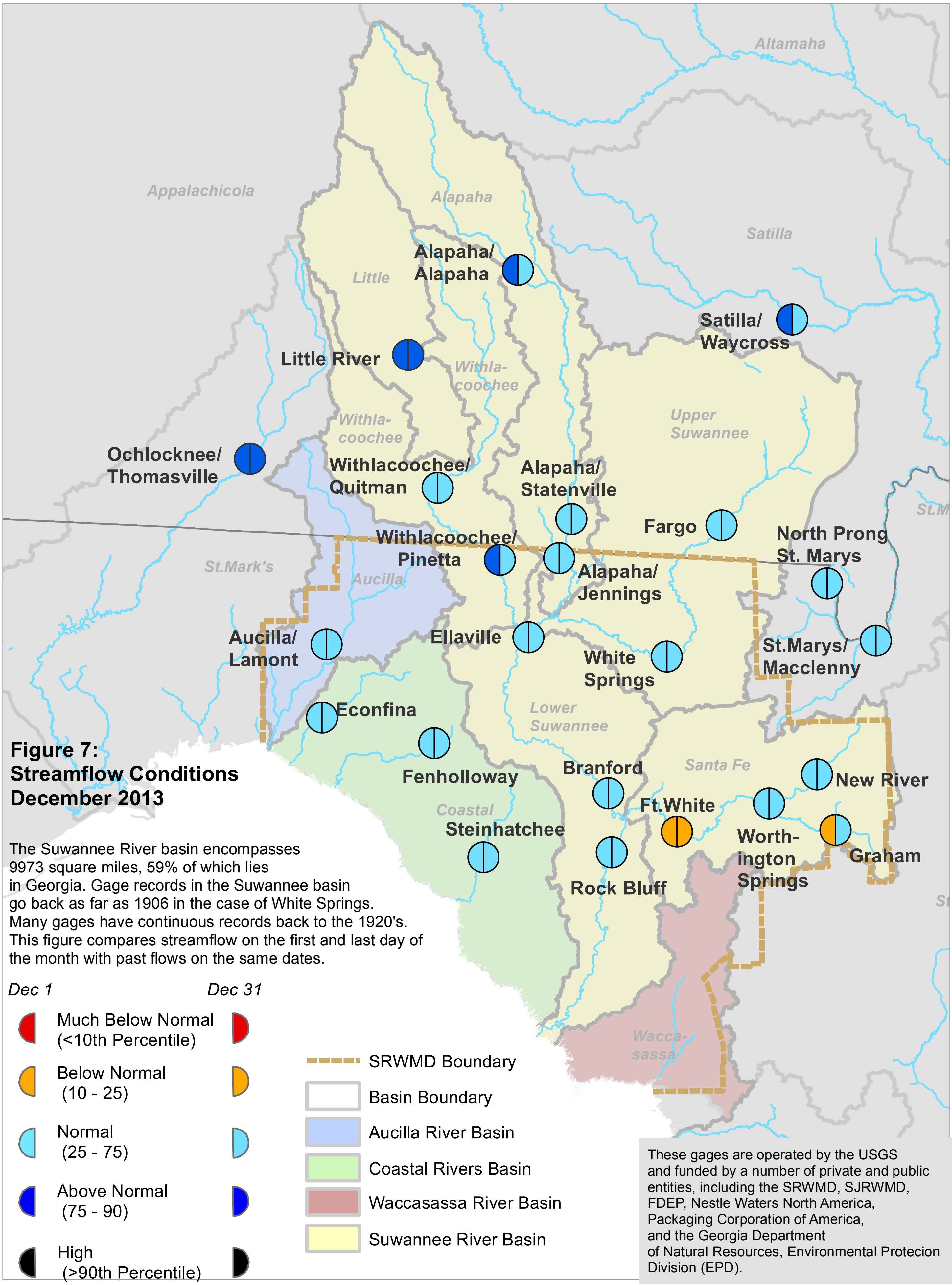
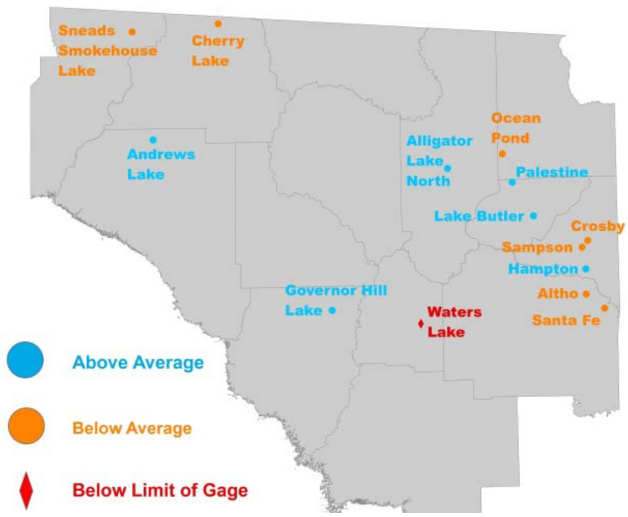


Figure 7:
Streamflow Conditions
December 2013

The Suwannee River basin encompasses 9973 square miles, 59% of which lies in Georgia. Gage records in the Suwannee basin go back as far as 1906 in the case of White Springs. Many gages have continuous records back to the 1920's. This figure compares streamflow on the first and last day of the month with past flows on the same dates.

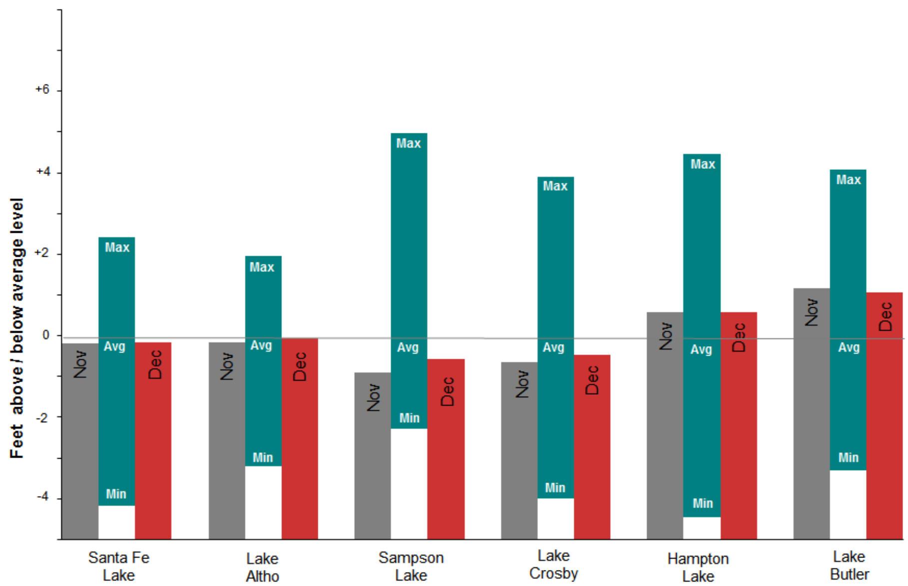
These gages are operated by the USGS and funded by a number of private and public entities, including the SRWMD, SJRWMD, FDEP, Nestle Waters North America, Packaging Corporation of America, and the Georgia Department of Natural Resources, Environmental Protecion Division (EPD).

Figure 8: December 2013 Lake Levels



SRWMD lakes react differently to climatic changes depending on their location in the landscape. Some lakes, in particular ones in the eastern part of the District, are embedded in a surficial or intermediate aquifer over relatively impermeable clay deposits. These lakes rise and fall according to local rainfall and surface runoff. They retain water during severe droughts since most losses occur from evaporation. Other lakes, such as Governor Hill and Waters Lake, have porous or "leaky" bottoms that interact with the Floridan aquifer. These lakes depend on groundwater levels to stay high. If aquifer levels are low, these lakes go dry even if rainfall is normal.

The District monitors 14 lakes with much of the data provided by volunteer observers. Most records go back to the 1970s, although the Sampson Lake record starts in 1957.



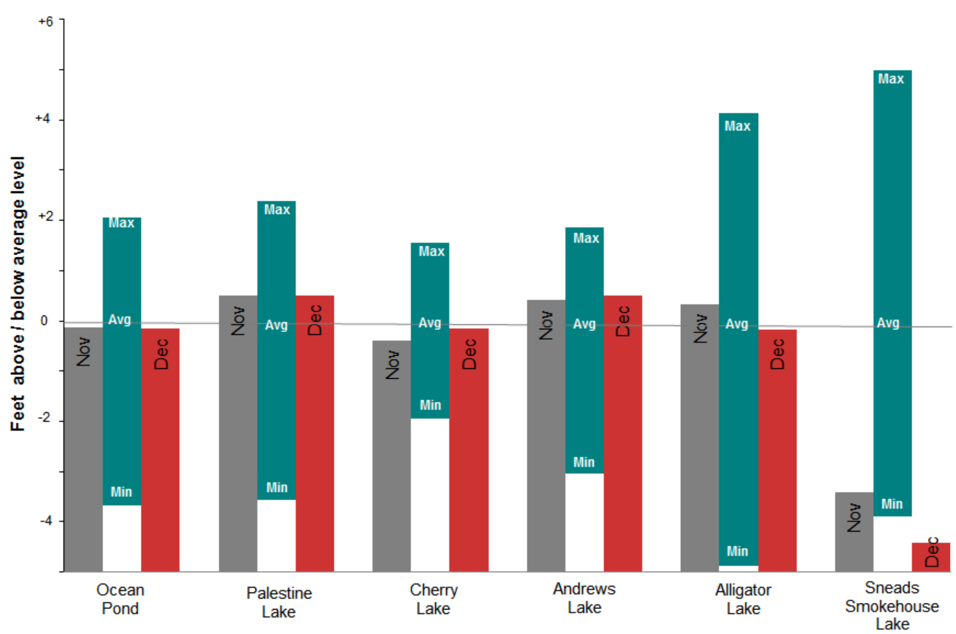


Figure 9: Quarterly Springflow Measurements

The SRWMD monitors water quality at 30 springs. Flow is measured at the time of the sampling. The springs below were measured in December 2013, with the last measurement marked in red. Flow is given in million gallons per day (MGD).

Spring flow is greatly affected by river levels. Rising river levels or high tides can slow spring flow or even reverse it, resulting in negative flow rates as river water enters the spring. Some low flows in this data may not be representative of drought conditions.

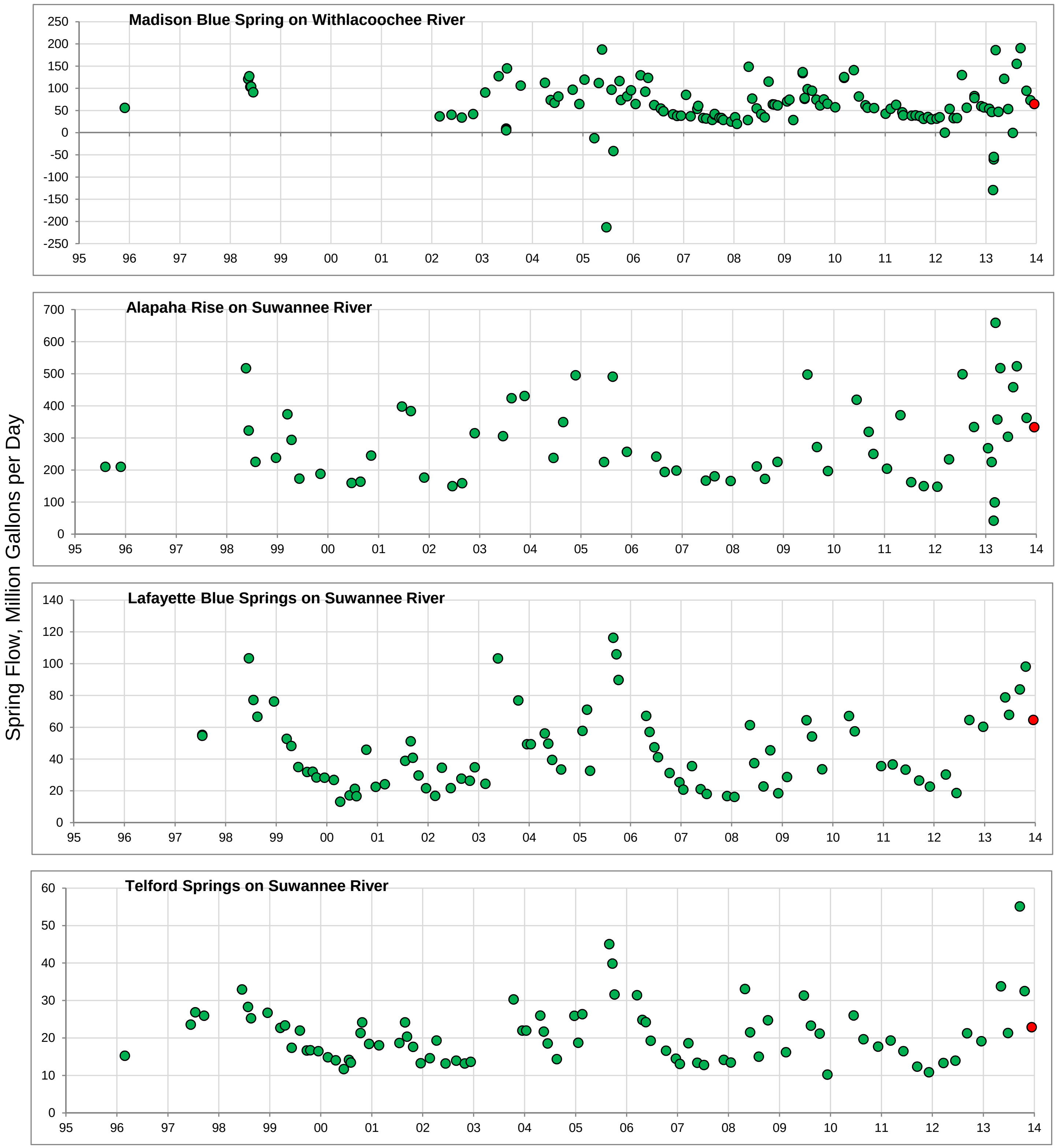


Figure 9: Quarterly Springflow Measurements, continued

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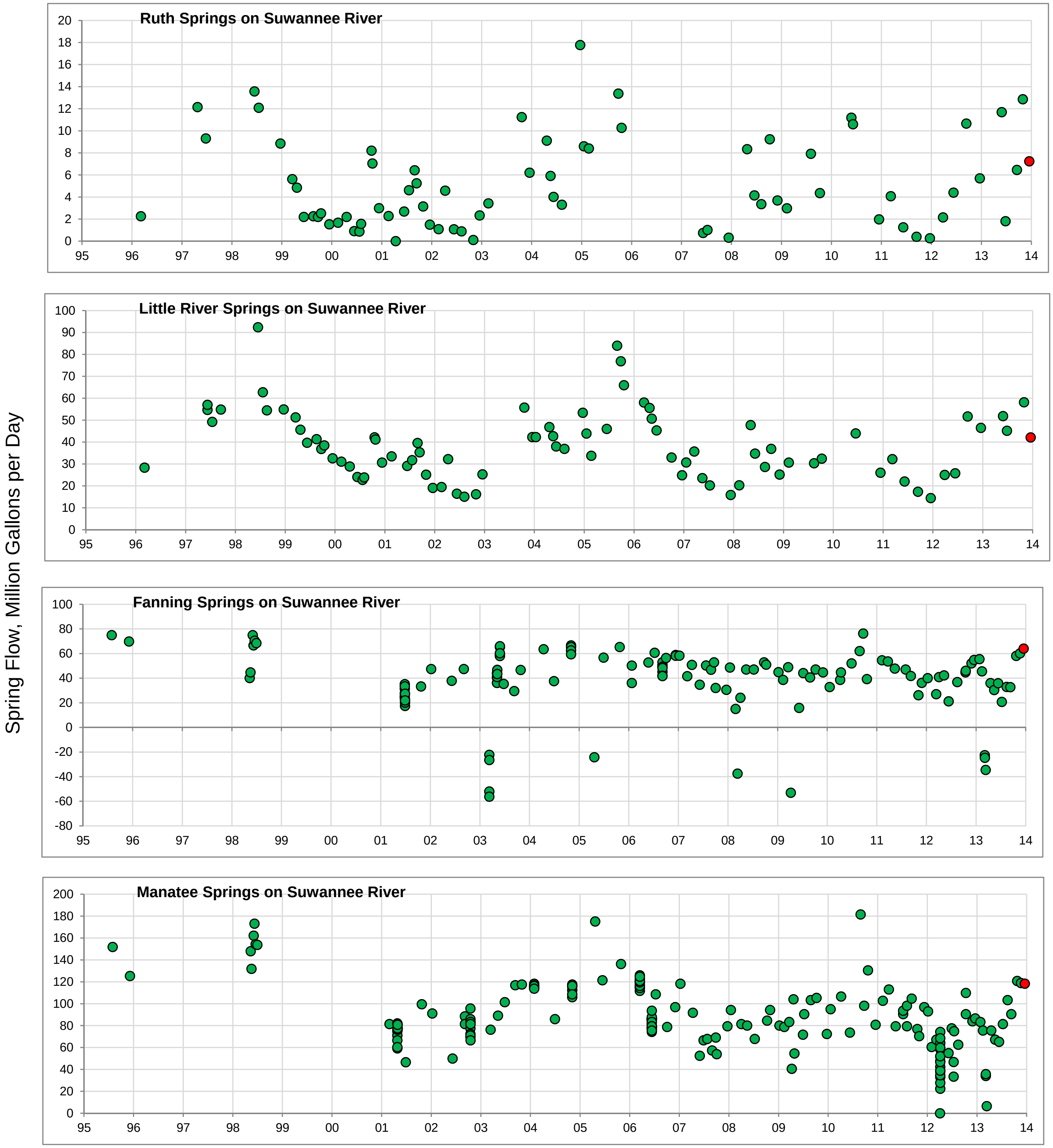


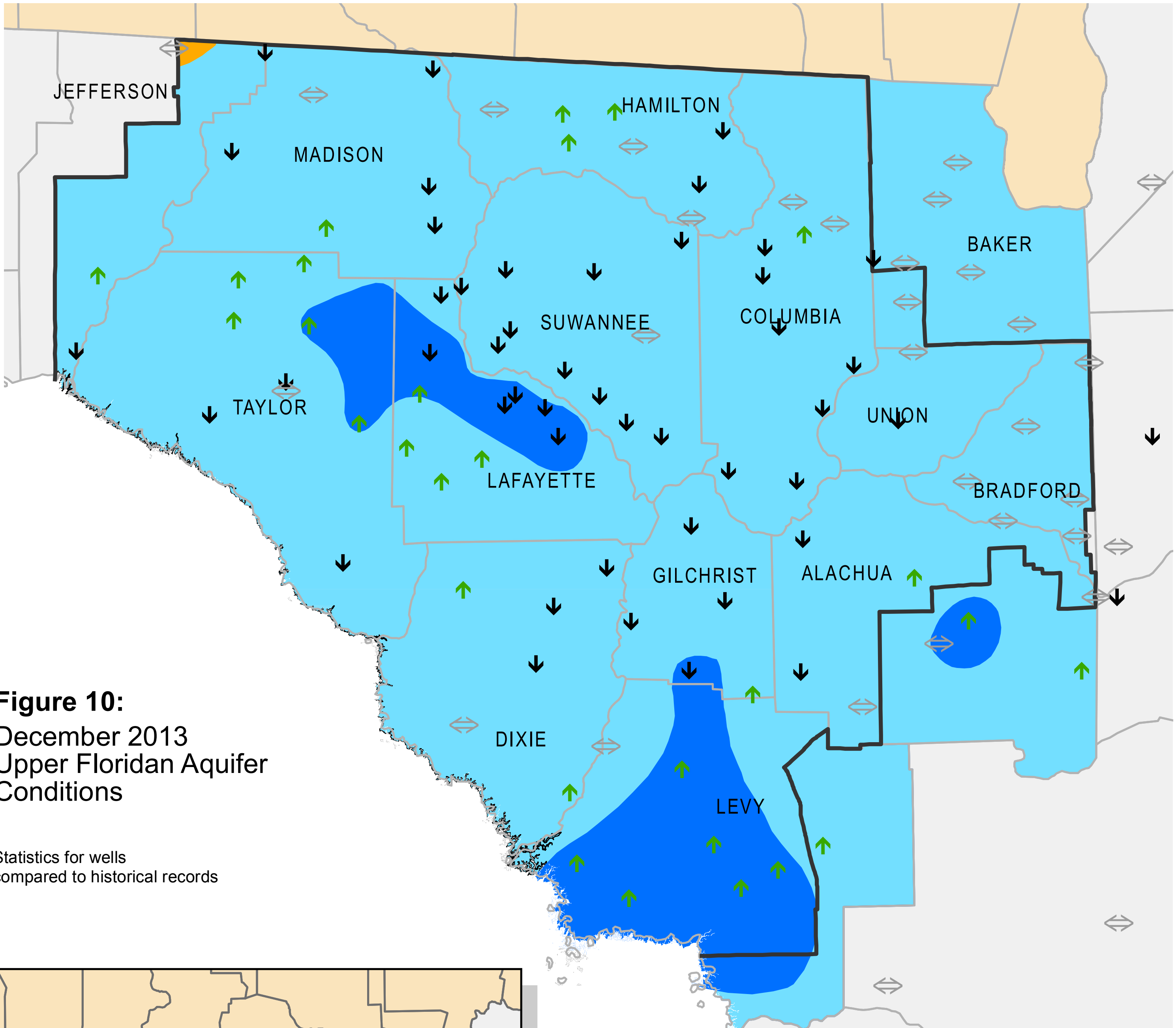
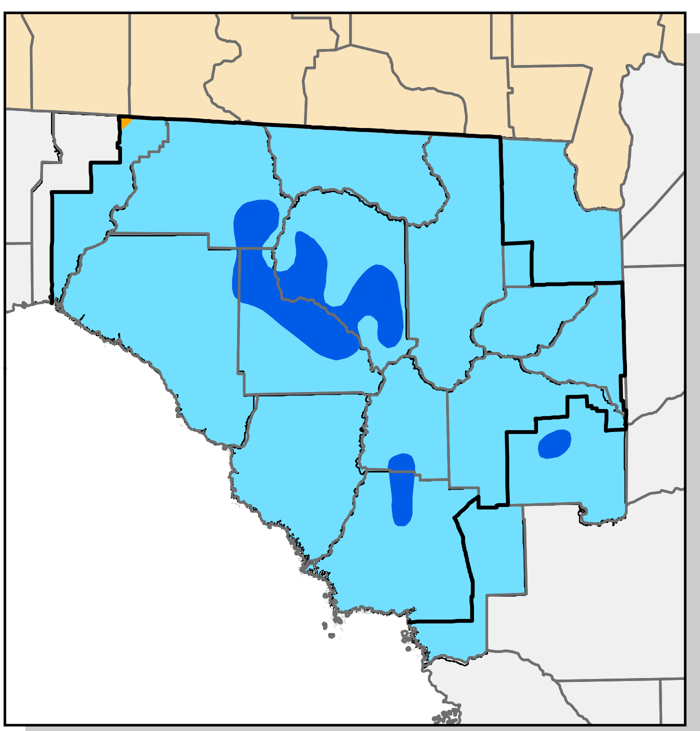


Figure 10:
December 2013
Upper Floridan Aquifer
Conditions

Statistics for wells
compared to historical records



Inset: November 2013 Groundwater Levels

High
(Greater than 75th Percentile)

Normal
(25th to 75th Percentile)

Low
(10th to 25th Percentile)

Extremely Low
(Less than 10th Percentile)

Increase/decrease in level since last month

Increase/decrease since last month
less than one percent of historic range

District Boundary

Figure 11: Monthly Groundwater Level Statistics
Levels January 1, 2013 through December 31, 2013
Period of Record Beginning 1978

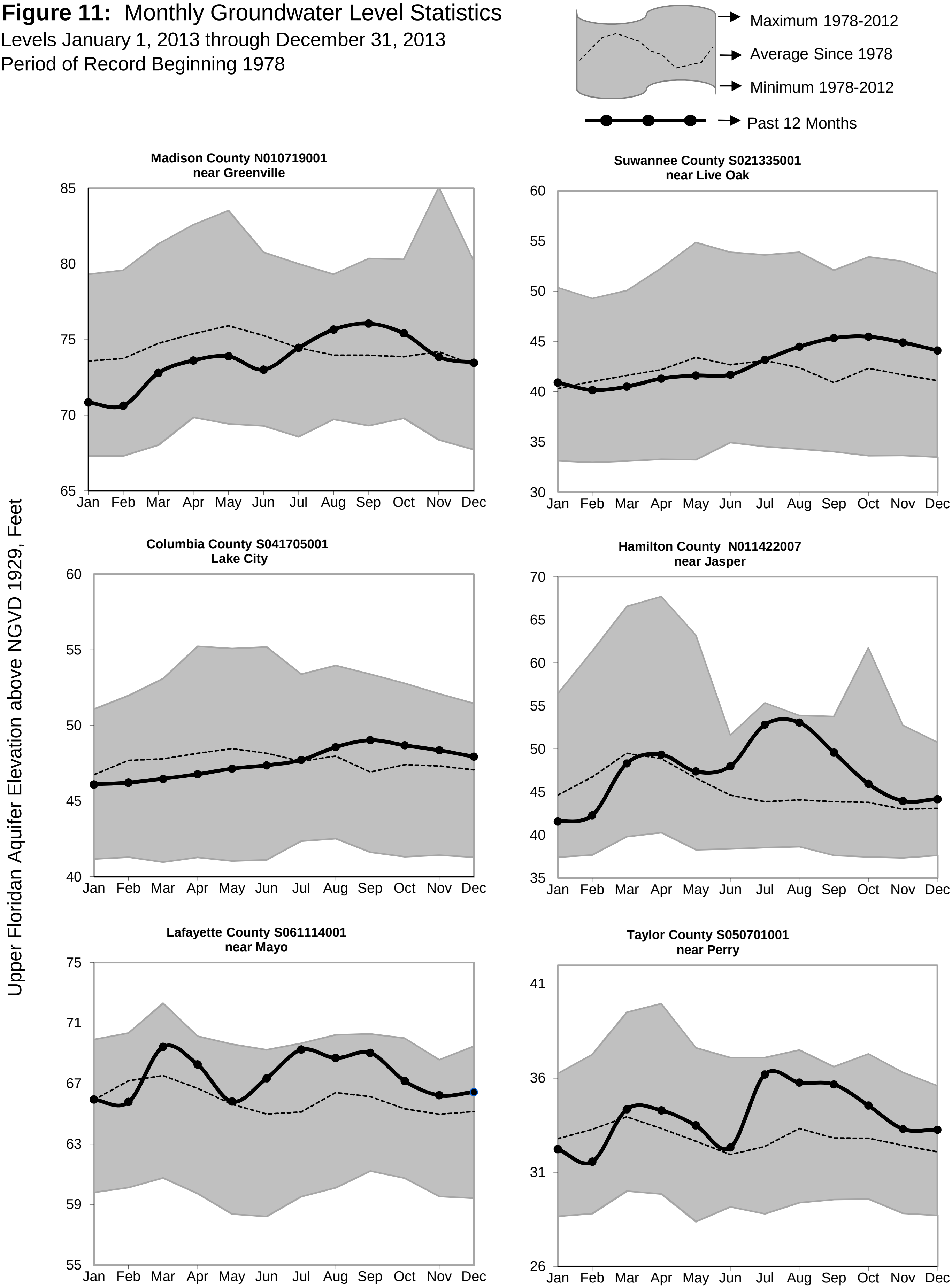
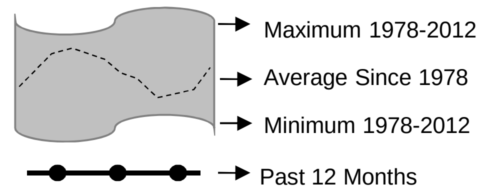
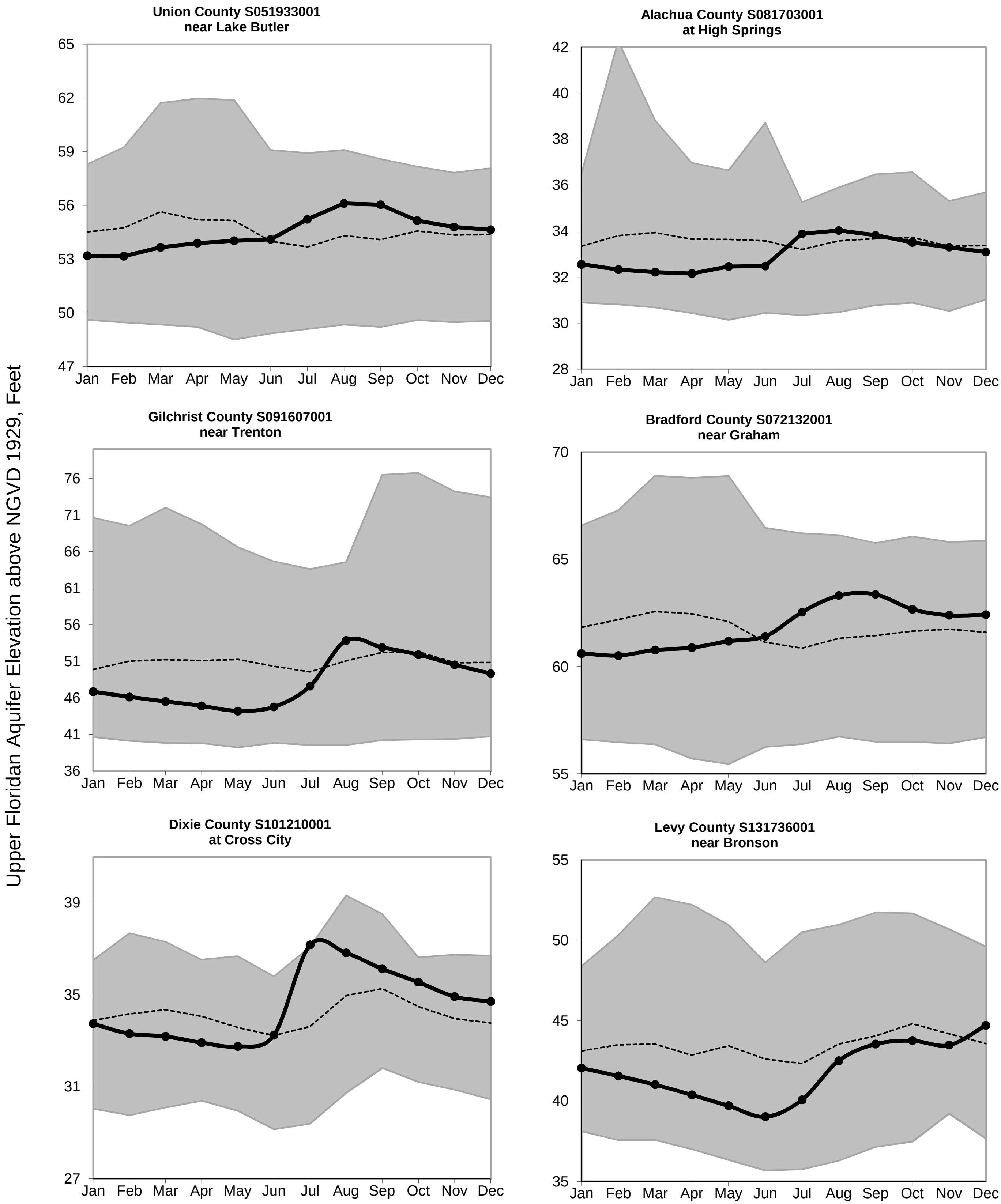


Figure 11, cont.: Groundwater Level Statistics
Levels January 1, 2013 through December 31, 2013
Period of Record Beginning 1978





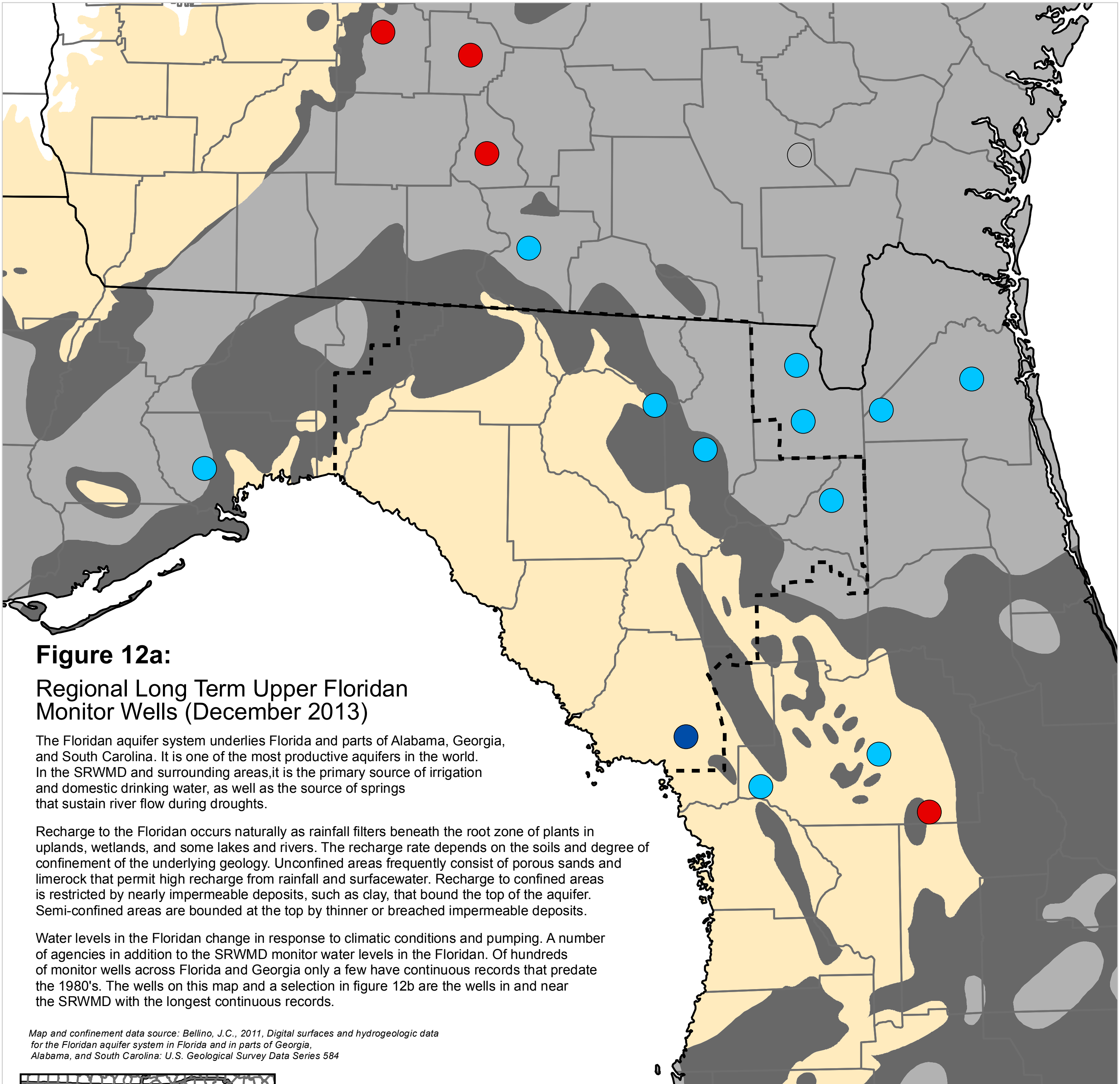


Figure 12a:

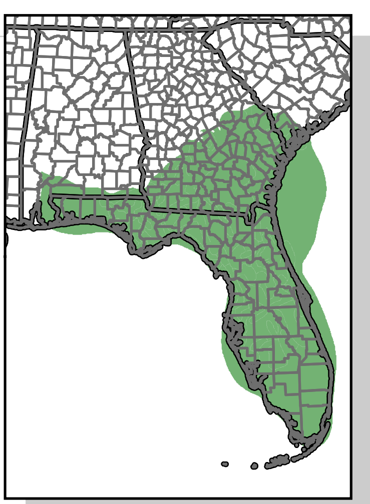
Regional Long Term Upper Floridan Monitor Wells (December 2013)

The Floridan aquifer system underlies Florida and parts of Alabama, Georgia, and South Carolina. It is one of the most productive aquifers in the world. In the SRWMD and surrounding areas,it is the primary source of irrigation and domestic drinking water, as well as the source of springs that sustain river flow during droughts.

Recharge to the Floridan occurs naturally as rainfall filters beneath the root zone of plants in uplands, wetlands, and some lakes and rivers. The recharge rate depends on the soils and degree of confinement of the underlying geology. Unconfined areas frequently consist of porous sands and limerock that permit high recharge from rainfall and surfacewater. Recharge to confined areas is restricted by nearly impermeable deposits, such as clay, that bound the top of the aquifer. Semi-confined areas are bounded at the top by thinner or breached impermeable deposits.

Water levels in the Floridan change in response to climatic conditions and pumping. A number of agencies in addition to the SRWMD monitor water levels in the Floridan. Of hundreds of monitor wells across Florida and Georgia only a few have continuous records that predate the 1980's. The wells on this map and a selection in figure 12b are the wells in and near the SRWMD with the longest continuous records.

Map and confinement data source: Bellino, J.C., 2011, Digital surfaces and hydrogeologic data for the Floridan aquifer system in Florida and in parts of Georgia, Alabama, and South Carolina: U.S. Geological Survey Data Series 584



Inset: Extent of Floridan Aquifer

Occurence of Confined and Unconfined Conditions in the Upper Floridan Aquifer

Confined: Upper confining unit is generally greater than 100 feet thick and unbreached. Recharge is low.

Semi-confined: Upper confining unit is generally less than 100 feet thick, breached, or both. Recharge is moderate.

Unconfined: Upper confining unit is absent or very thin. Recharge is high.

Percentile of Most Recent Water Level Relative to Entire Record

High (Greater than 75th Percentile)

Normal (25th to 75th Percentile)

Low (10th to 25th Percentile)

Extremely Low (Less than 10th Percentile)

Not Available

SRWMD Boundary

Figure 12b: Regional Long Term Upper Floridan Levels

December 2013