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: November 7, 2014

RE: October 2014 Hydrologic Conditions Report for the District

RAINFALL

- District-wide rainfall in October was 1.51", about half of average based on records beginning in 1932. The month's rainfall was the result of two cold fronts on the 3rd and 14th. County totals were well below normal (Table 1, Figure 1). Jefferson County had the highest average rainfall with nearly 75% of normal with a localized accumulation of almost 6" near the coast (Figure 2). Watersheds in Georgia that contribute to the Suwannee River were also below normal (Figure 3).
- The lowest gaged monthly total was 0.59" at O'Leno State Park in southern Columbia County. The highest gaged monthly total was 3.15" at the Wacissa Tower in Jefferson County, which also had the highest 24-hour total of 2.82". While still below normal, the Jefferson rainfall was an improvement after a dry summer. The 6-month rainfall total of 19.63" at Wacissa approached the 1-in-20 (20-year) drought according to statistics from the National Drought Atlas.
- Average rainfall for the 12 months ending October 31 was nearly 7" higher than the long-term average of 54.63". Twelve-month departures of up to 10" below normal persisted in the upper Aucilla and Santa Fe basins, but the rest of the District was above normal (Figure 4).
- Average rainfall for the 3 months ending October 31 was only 0.5" lower than the long-term average of 16". Three-month deficits of up to 12" persisted in the Aucilla basin (Figure 5).

SURFACEWATER

- **Rivers:** Levels at most gages rose slightly during the first week of the month before falling steadily. Flows remained typical of the season for most rivers. The Alapaha River at Statenville fell below the 10th percentile, considered very low, while downstream the river at Jennings fell below the 25th percentile. Flow statistics for a number of rivers are presented graphically in Figure 6, and conditions relative to historic conditions in Figure 7.
- **Lakes**: Lake levels fell in October, but most remained higher than average. Sneads Smokehouse Lake remained near its record low level. Figure 8 shows levels relative to the long-term average, minimum, and maximum levels for a number of monitored lakes.
- **Springs**: Twenty-two springs or spring groups were measured by the USGS, District staff, and District contractors in October. Spring flows continued to fall after peaking in the summer, but flows were generally above median. One exception was the Wacissa River, which was measured with a flow of 215 million gallons per day, about 10% lower than its median flow. Statistics for a number of springs are shown in Figure 9.

GROUNDWATER

Upper Floridan aquifer levels fell in October after rising briefly in response to heavy rainfall in September. Overall, by the end of October levels fell to the 75^{th} percentile from the 78^{th} percentile in September based on records beginning no earlier than the 1970s (Figure 10). Eighty-five percent of the monitored wells had levels above median, while half were above the 75^{th} percentile, considered high. Wells in the driest parts of Jefferson, Taylor, and Madison counties were below the 25^{th} percentile, considered low. 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 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 November 1 indicated near-normal conditions in north Florida and south Georgia.
- The National Weather Service Climate Prediction Center (CPC) three-month outlook showed a potential for above-average precipitation through January. The El Niño watch issued by the CPC in March remained in effect. Their November 6 report gave a 58% chance that El Niño will develop by December and last into spring 2015. The model consensus was for a weak event. According to the National Weather Service, El Niño effects, including enhanced precipitation and severe weather in the southeast, are strongest in the fall, winter, and spring.
- The U.S. Drought Monitor report of October 28 showed moderate drought in Jefferson County and in most of the Aucilla, Alapaha, and Withlacoochee watersheds in Georgia. Madison County and northwest Taylor County were abnormally dry.
- The USGS characterized conditions in the Alapaha River basin in Georgia as moderate hydrologic drought.

CONSERVATION

Water conservation is necessary to sustain healthy flows in springs and rivers. All users are urged to eliminate unnecessary uses. Landscape irrigation is limited to once per week during Eastern Standard Time (between November 2, 2014 and March 8, 2015) 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. More information about the SRWMD's year-round lawn and landscape irrigation measures is available at www.mysuwanneeriver.com.

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	October 2014	October Average	Month % of Normal	Last 12 Months	Annual % of Normal
Alachua	1.60	3.05	52%	61.26	120%
Baker	1.60	3.31	48%	59.21	119%
Bradford	1.89	2.76	68%	54.02	106%
Columbia	1.21	3.06	39%	63.88	124%
Dixie	1.59	3.07	52%	59.02	100%
Gilchrist	1.30	2.98	44%	62.24	109%
Hamilton	1.06	3.01	35%	62.02	119%
Jefferson	2.29	3.07	75%	53.86	89%
Lafayette	1.13	3.09	37%	66.44	117%
Levy	2.07	3.14	66%	65.14	109%
Madison	1.16	3.24	36%	56.11	100%
Suwannee	0.98	3.22	31%	65.89	124%
Taylor	1.46	3.17	46%	64.74	109%
Union	1.51	3.27	46%	59.57	110%

October 2014 Average:	1.51
October Average (1932-2013):	3.10
Historical 12-month Average (1932-2013):	54.63
Past 12-Month Total:	61.60
12-Month Rainfall Surplus:	6.97

Figure 1: Comparison of District Monthly Rainfall

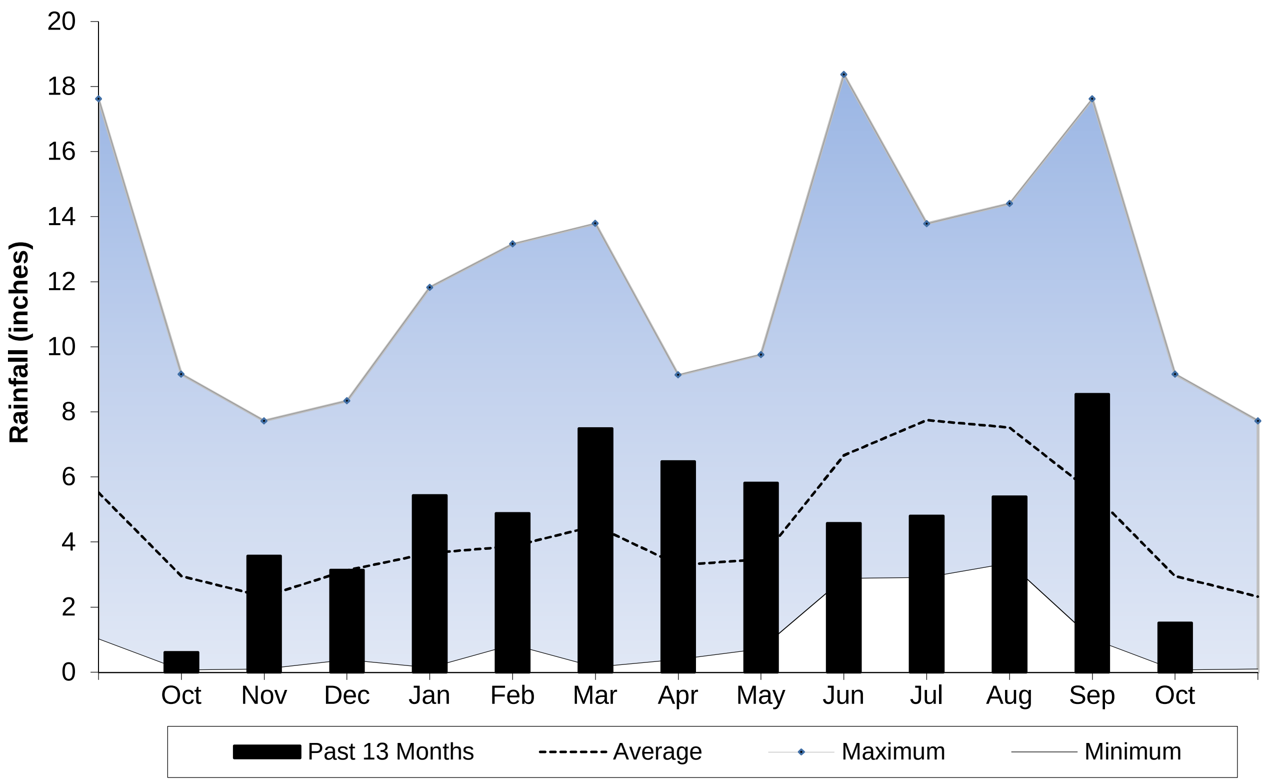


Figure 2: October 2014 Rainfall Estimate

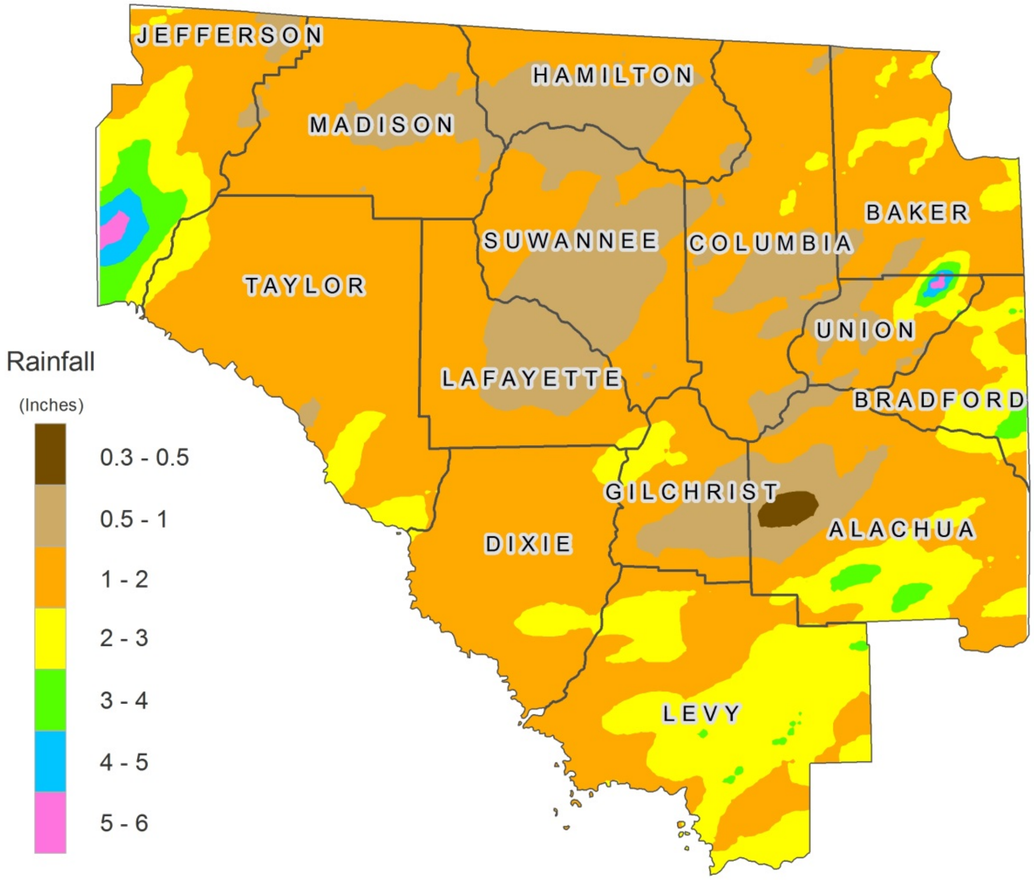


Figure 3: October 2014 Percent of Normal Rainfall

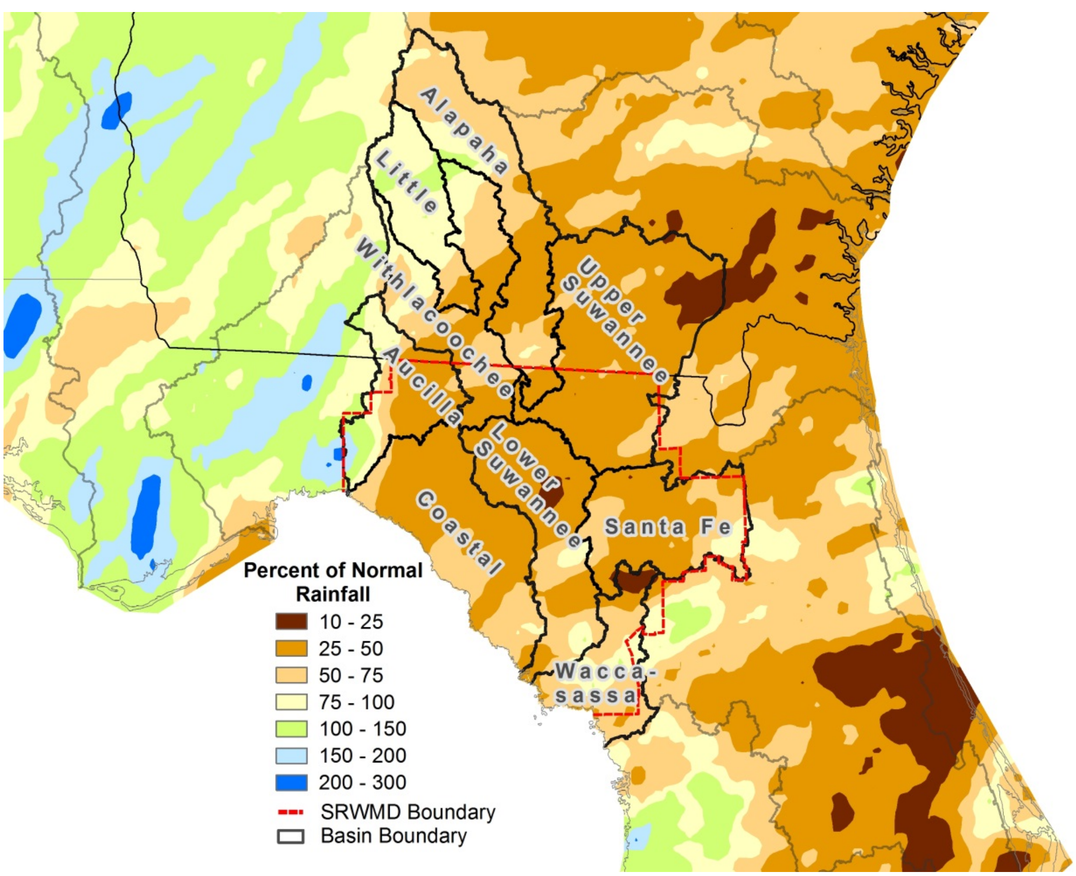
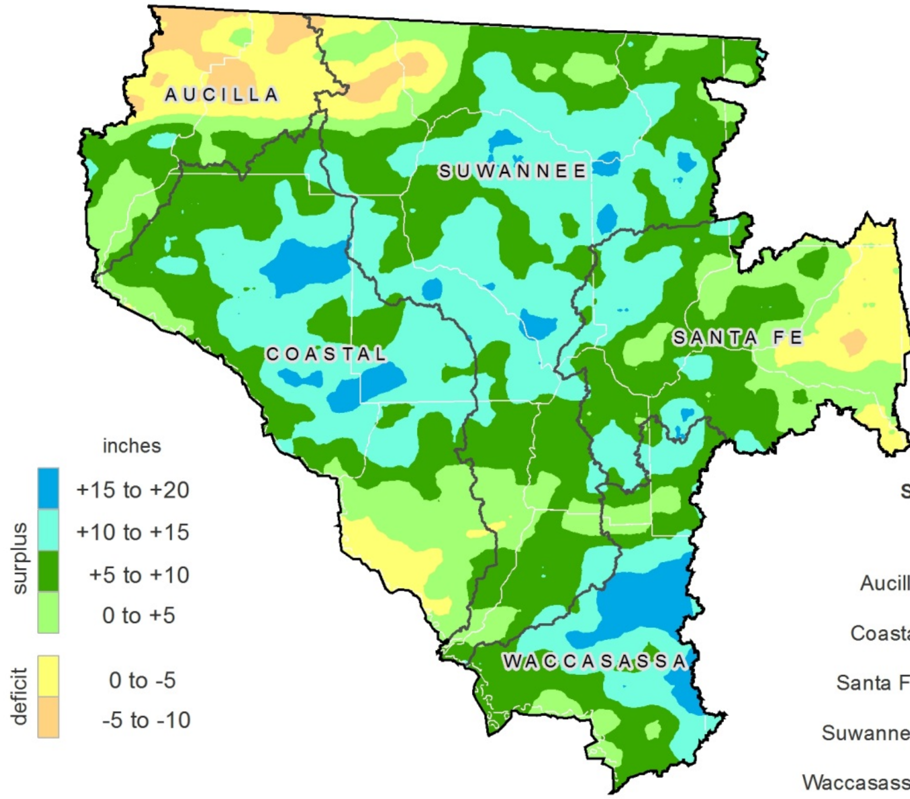


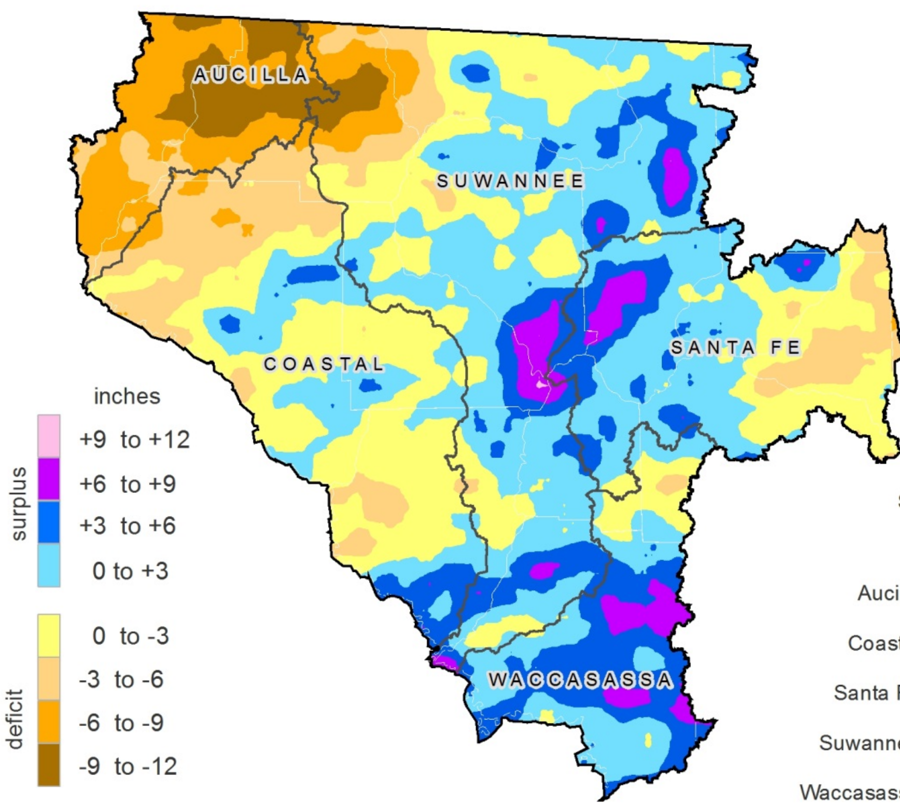
Figure 4: 12-Month Rainfall Surplus/Deficit by River Basin
Through October 31, 2014



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

	Oct -14	Sep -14
Aucilla	-0.3	-1.2
Coastal	+8.9	+8.2
Santa Fe	+5.4	+4.3
Suwannee	+8.5	+7.8
Waccasassa	+10.9	+9.9

Figure 5: 3-Month Rainfall Surplus/Deficit by River Basin
Through October 31, 2014

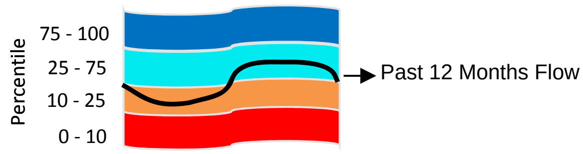


3-Month Surplus (+) or Deficit (-) By Basin

	Oct -14	Sep -14
Aucilla	-8.2	-10.5
Coastal	-1.4	-3.8
Santa Fe	+0.6	+0.4
Suwannee	+0.3	-1.6
Waccasassa	+3.0	+2.5

Figure 6: Daily River Flow Statistics

November 1, 2013 through October 31, 2014



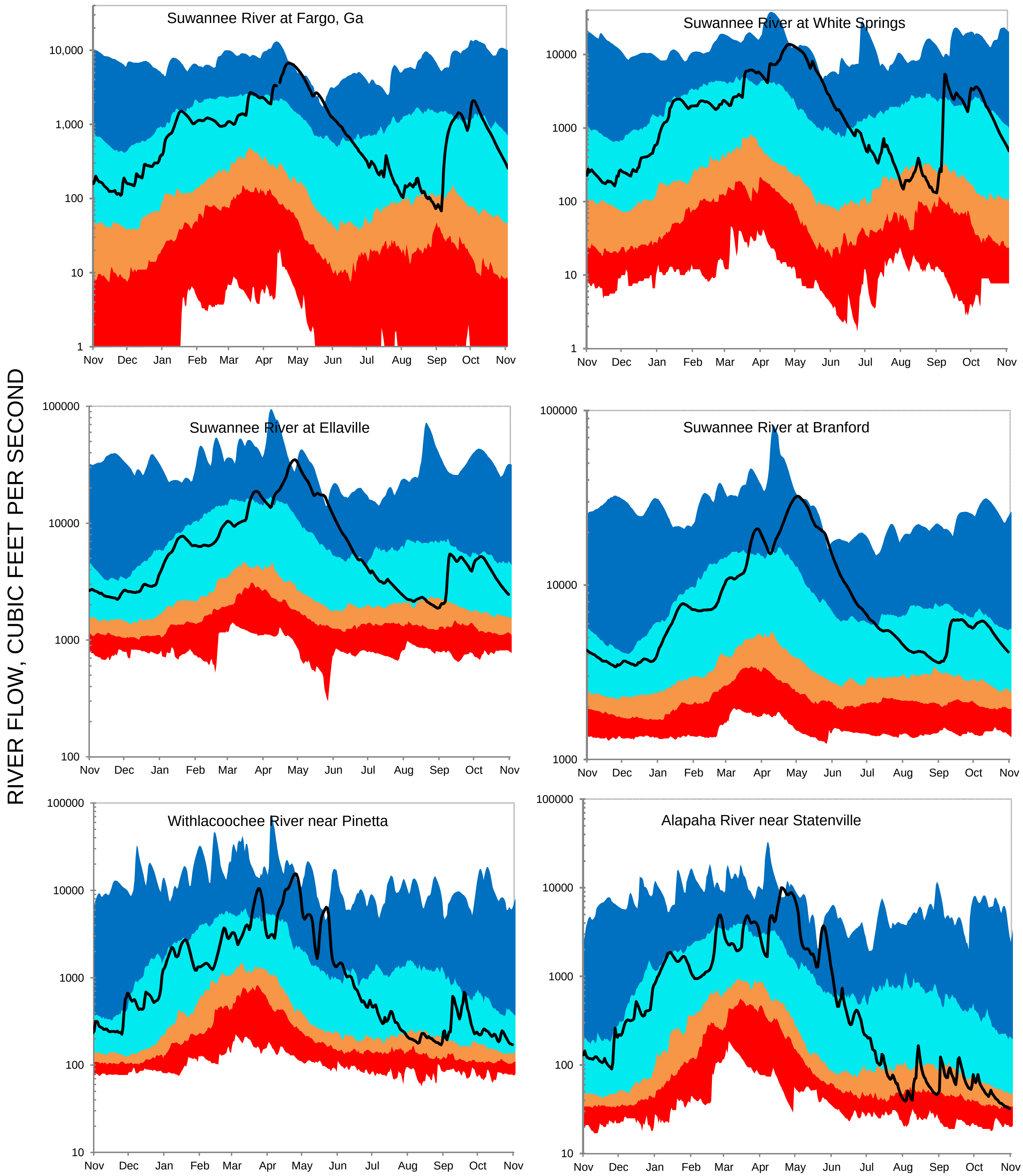
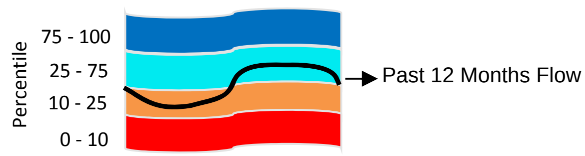
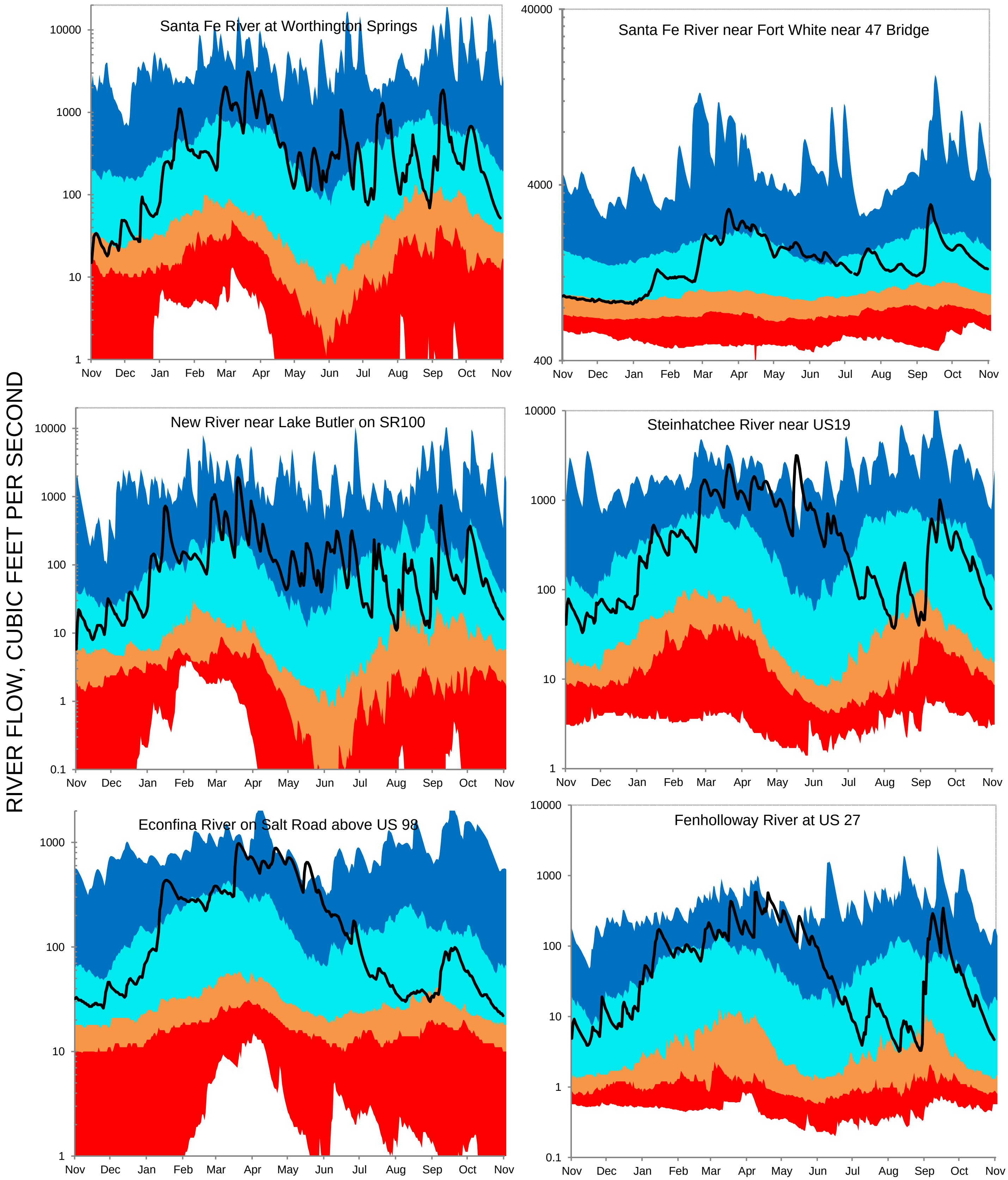


Figure 6, cont: Daily River Flow Statistics
November 1, 2013 through October 31, 2014





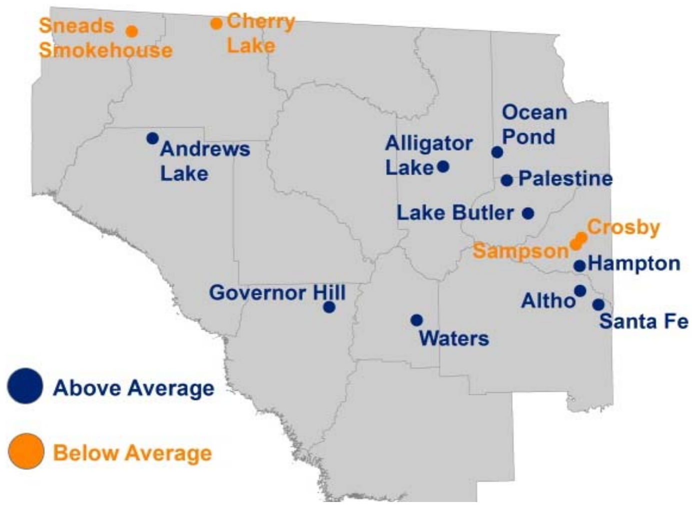
The Cody Scarp (or Escarpment) is an area of relatively steep topographical change that runs across north Florida. The geology above the Scarp consists of sandy soils over thick layers of mostly impermeable sediments such as clay. Streams are well-developed with dendritic (tree-like) drainage patterns. Because of the impermeable sediments, rainfall is collected in ever-growing surface streams as the land elevation falls. Below the Scarp, sandy soils overlay porous limestone. These areas are internally drained, meaning rainfall runs directly into the ground or into sinkholes instead of forming streams. In these areas, rainfall directly recharges the aquifer, which in turn discharges into rivers via springs and river bed seepage. The Scarp is important to the area's hydrology because it demarcates areas where streamflow is dependent almost entirely on recent rainfall and areas where streamflow is heavily influenced by groundwater.

Figure 7: Streamflow Conditions October 2014

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: October 2014 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.

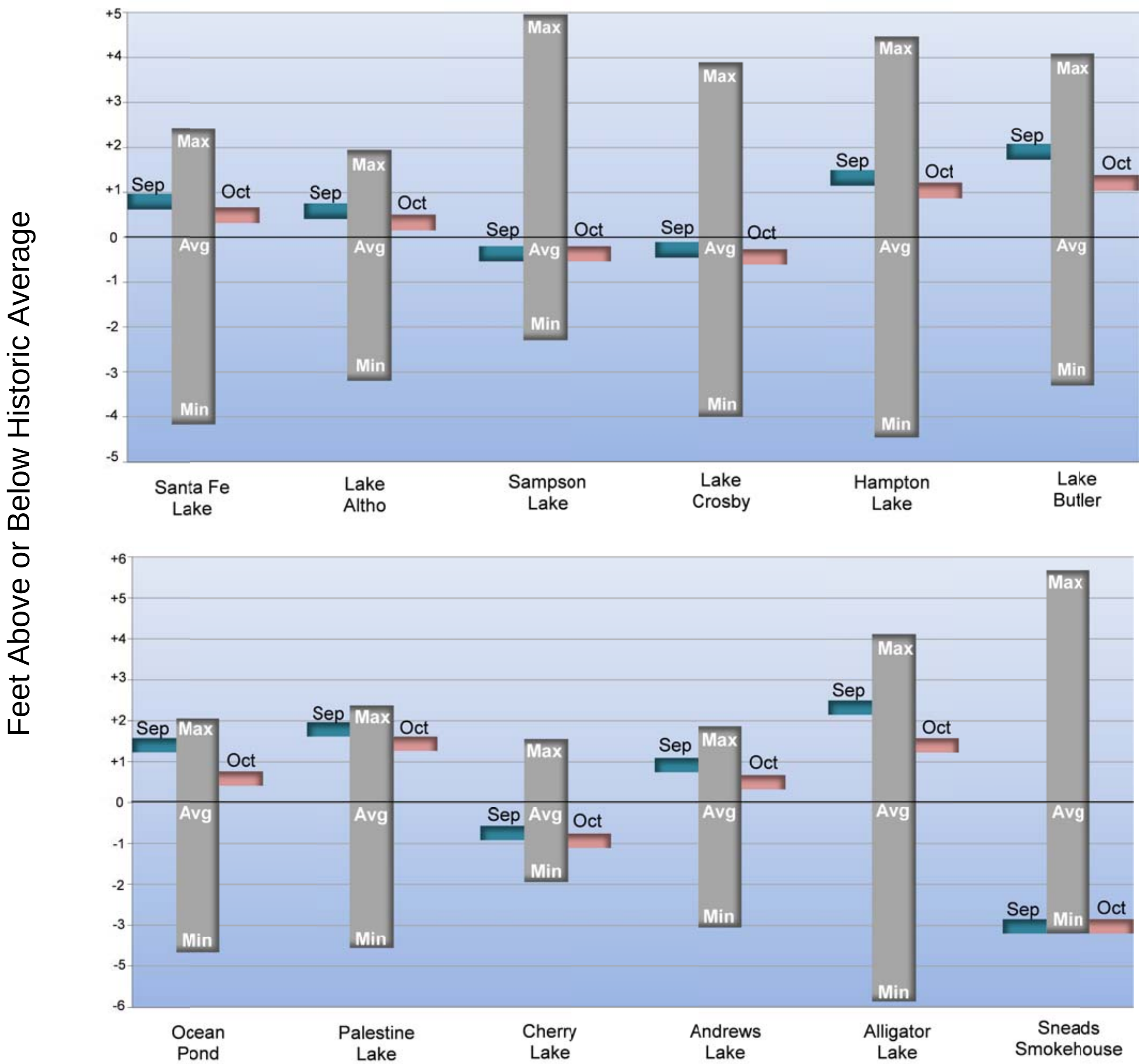


Figure 9: Quarterly Springflow Measurements

The SRWMD monitors water quality at 38 springs. Flow is usually measured at the time of the sampling. The springs below were measured in October 2014 by SRWMD staff or by the USGS with the last measurement marked in red. Flow is given in MGD (million gallons per day--a million gallons would fill a football field about 3' deep). With the exception of the Ichetucknee River and the Alapaha Rise, springs in the SRWMD were measured infrequently prior to the late 1990s. Springs with long records were rarely measured more than once per decade.

A spring's flow can be greatly affected by the level of the river it runs into. Rising river levels can act like a dam and slow spring flow causing what is known as a backwater effect. A river can flood a spring completely, known colloquially as a "brown-out". If the river levels are high enough, river water can flow back into the spring vent and thus into the aquifer, resulting in a negative flow rate. Because of the interaction between a spring and

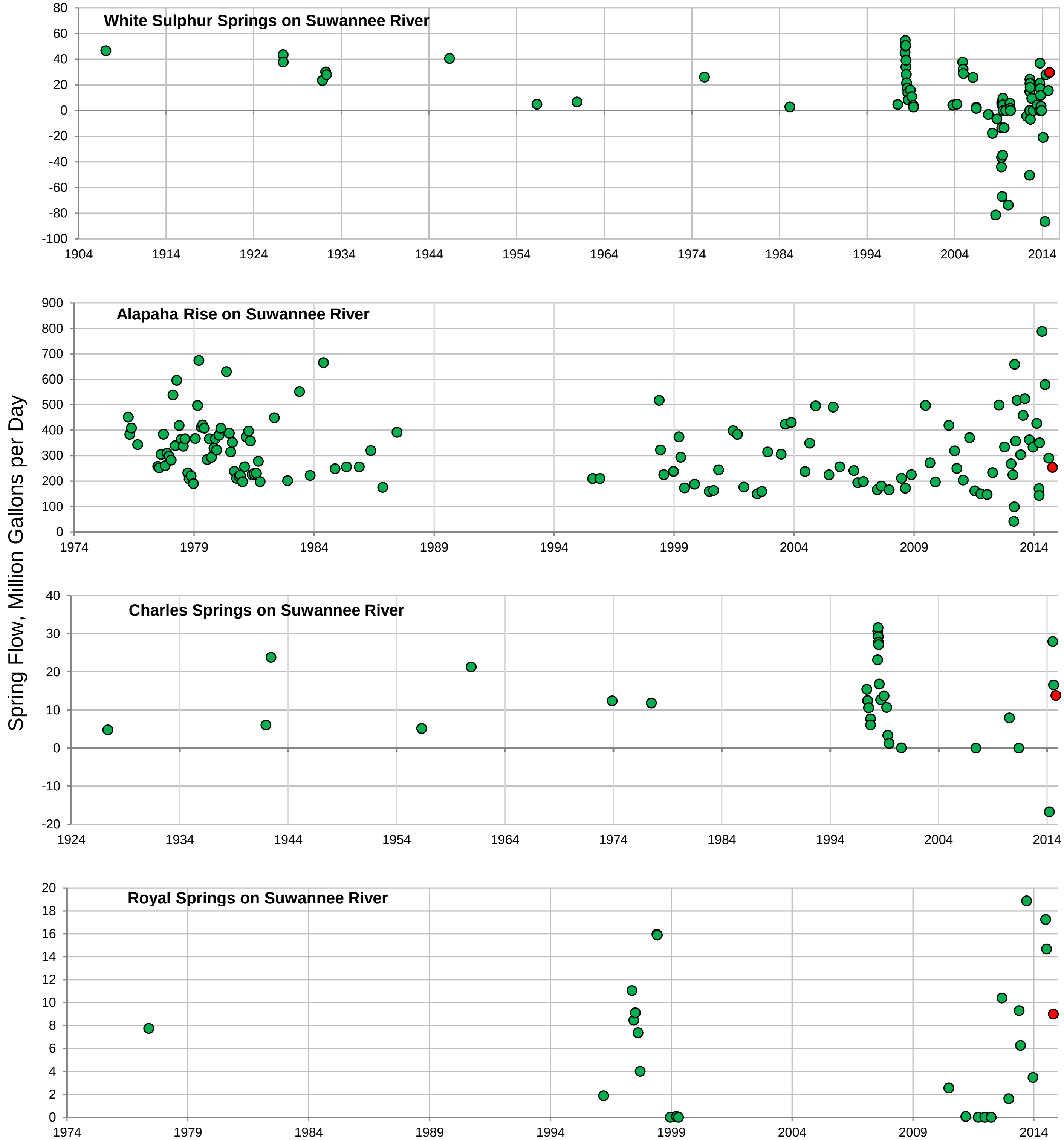


Figure 9: Quarterly Springflow Measurements, continued

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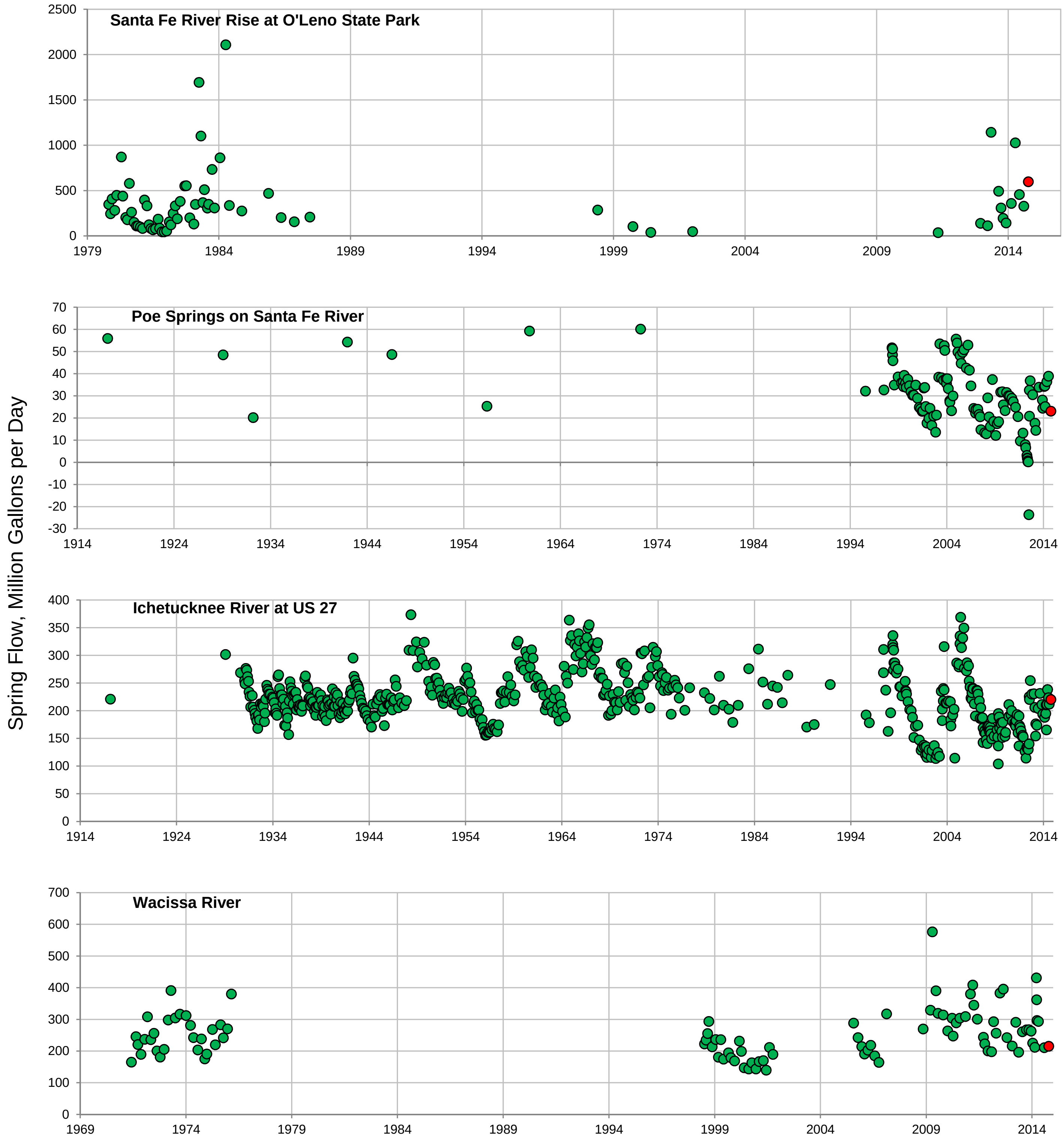


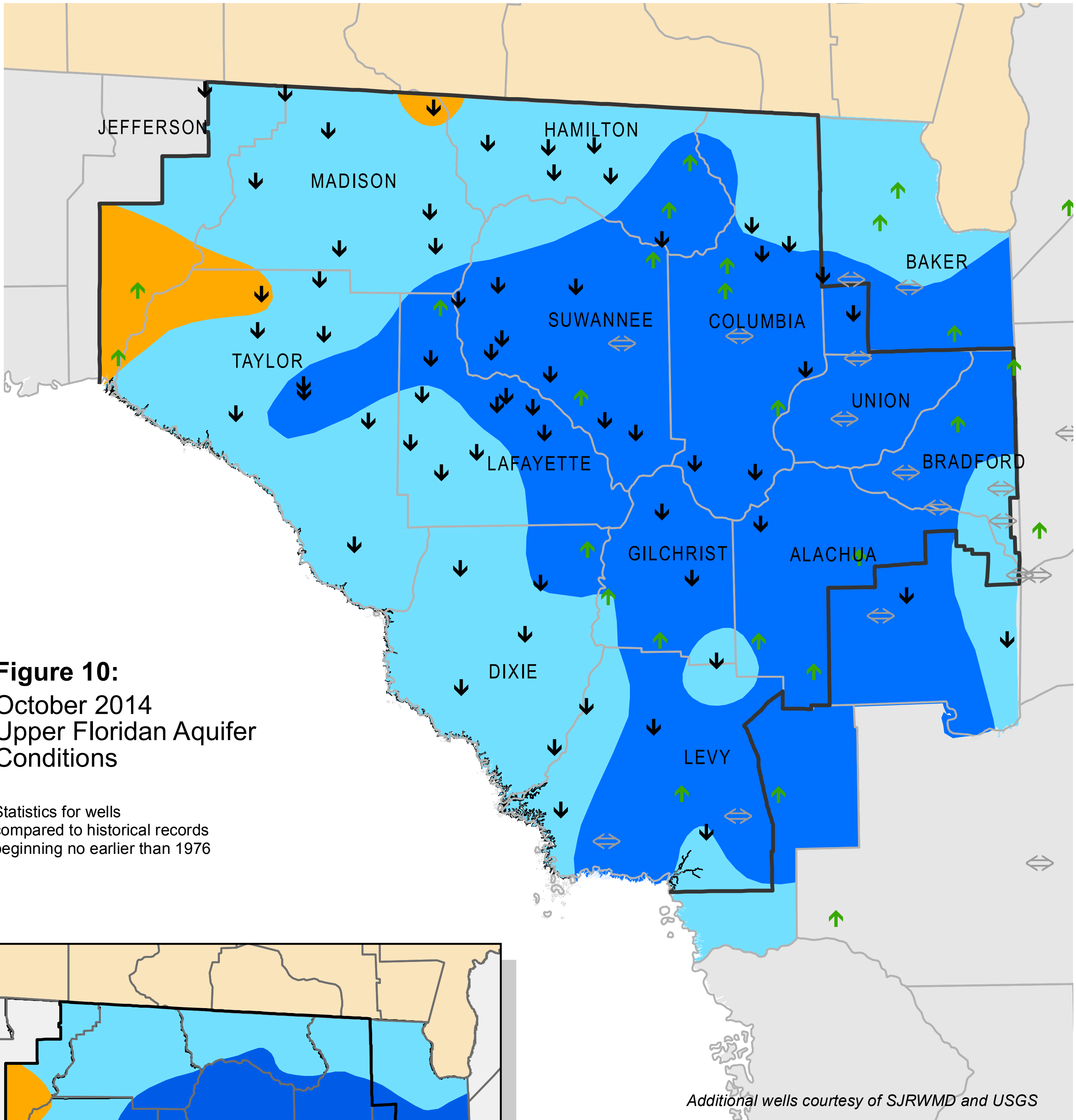
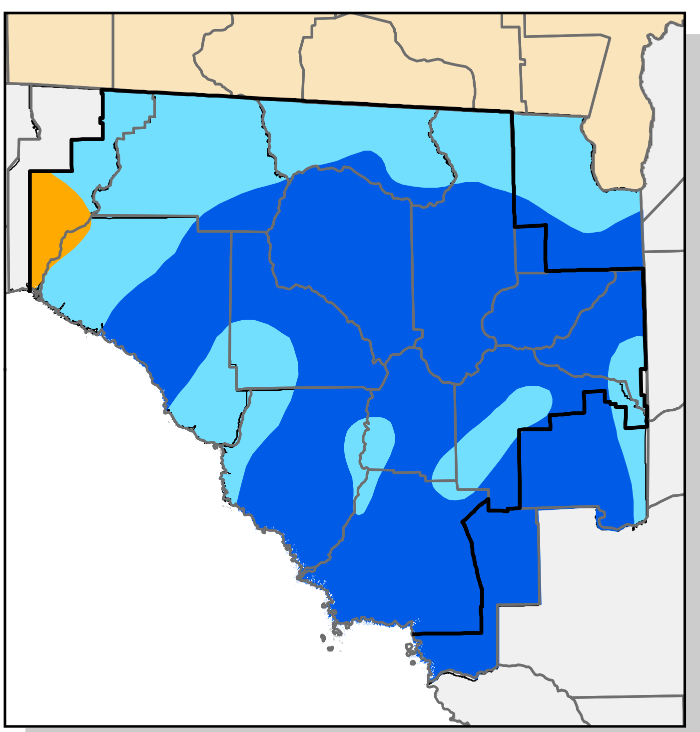


Figure 10:
October 2014
Upper Floridan Aquifer
Conditions

Statistics for wells
compared to historical records
beginning no earlier than 1976



Inset: September 2014 Groundwater Levels

High
(Greater than 75th Percentile)

Normal
(25th to 75th Percentile)

Low
(10th to 25th Percentile)

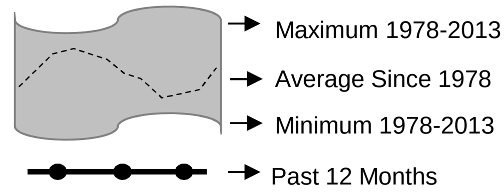
Extremely Low
(Less than 10th Percentile)

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 November 1, 2013 through October 31, 2014
Period of Record Beginning 1978



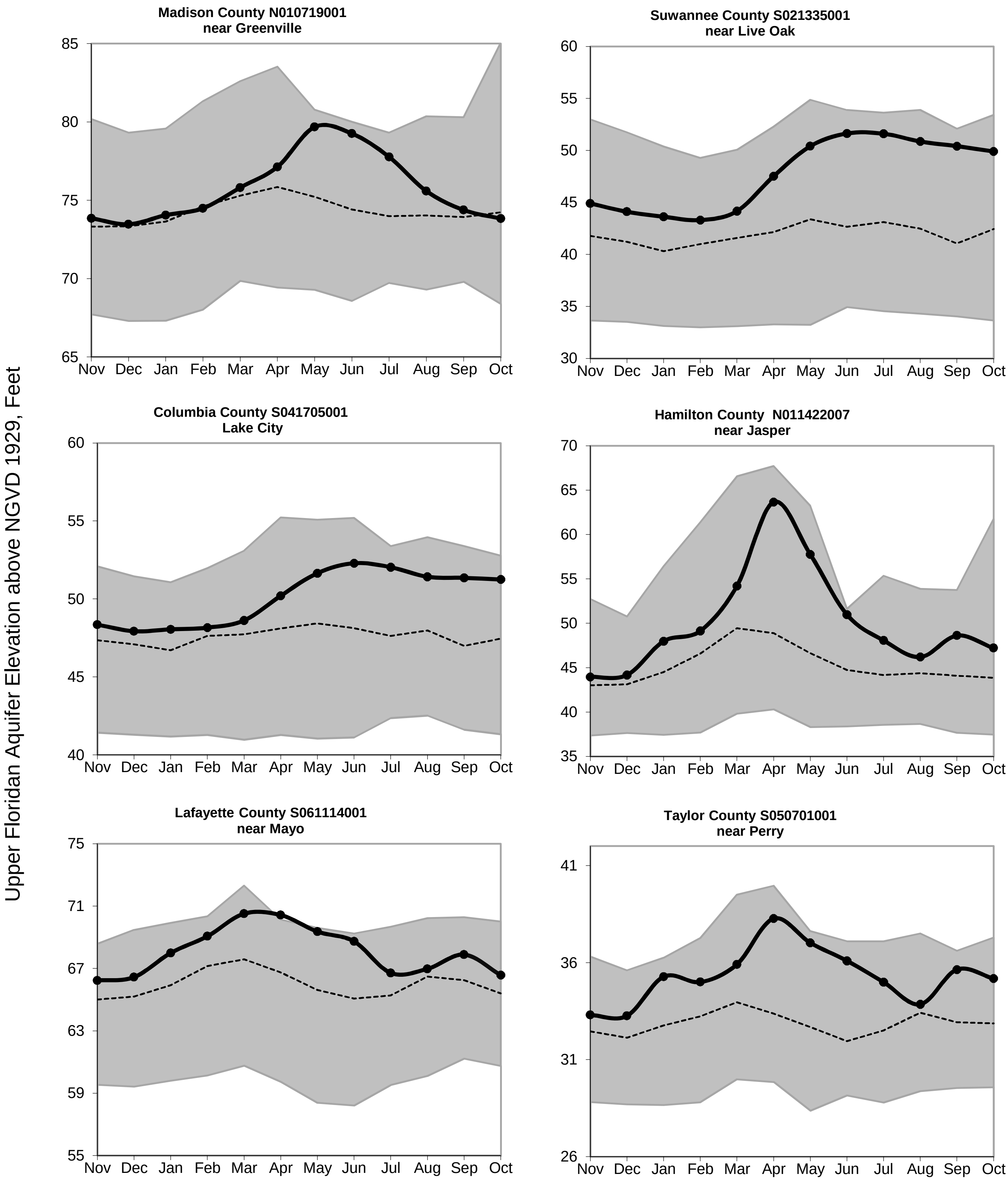
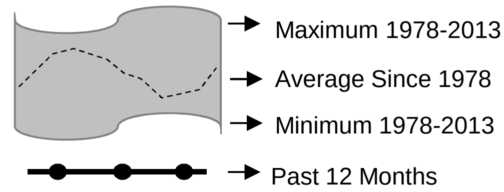
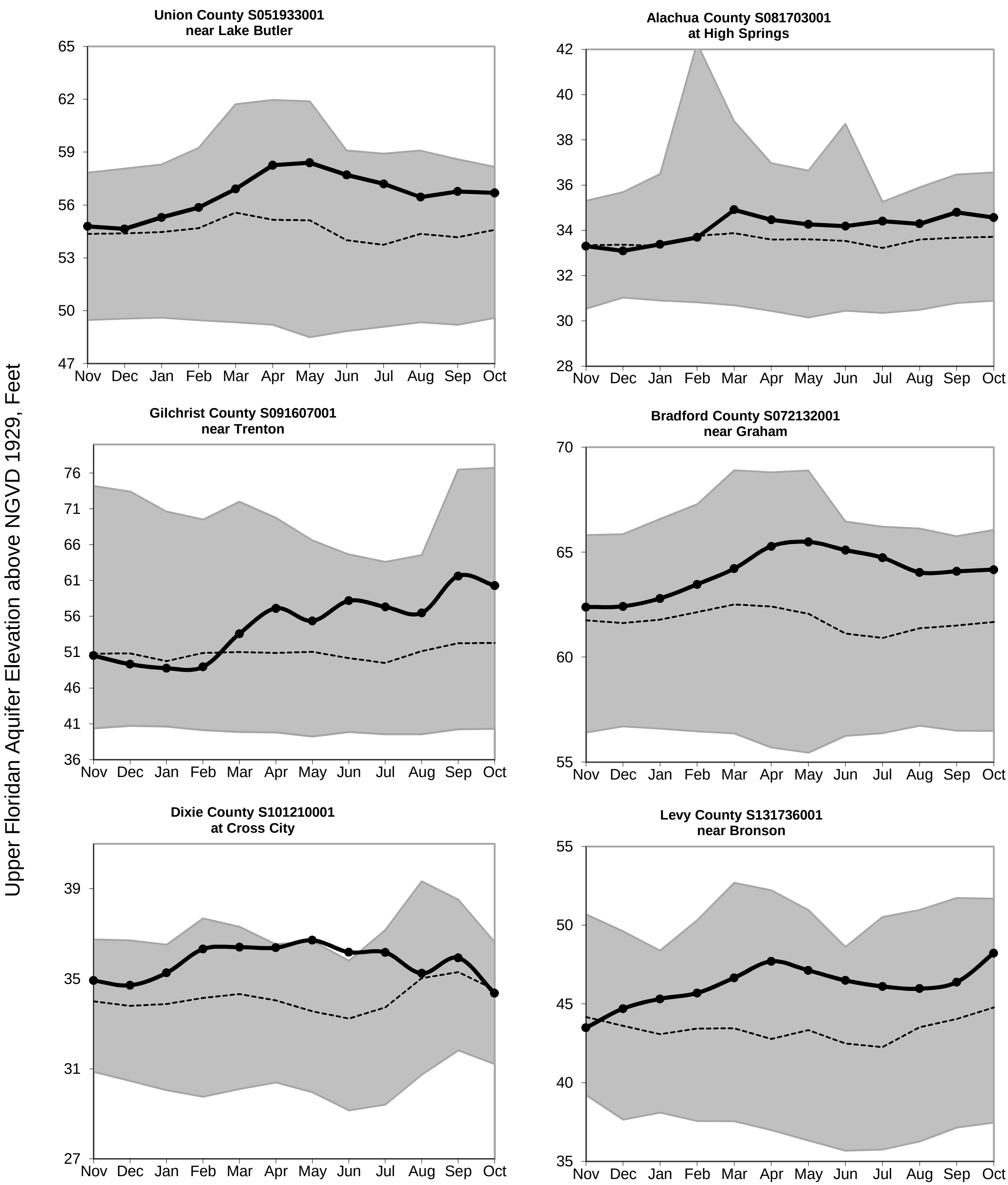


Figure 11, cont.: Groundwater Level Statistics
Levels November 1, 2013 through October 31, 2014
Period of Record Beginning 1978





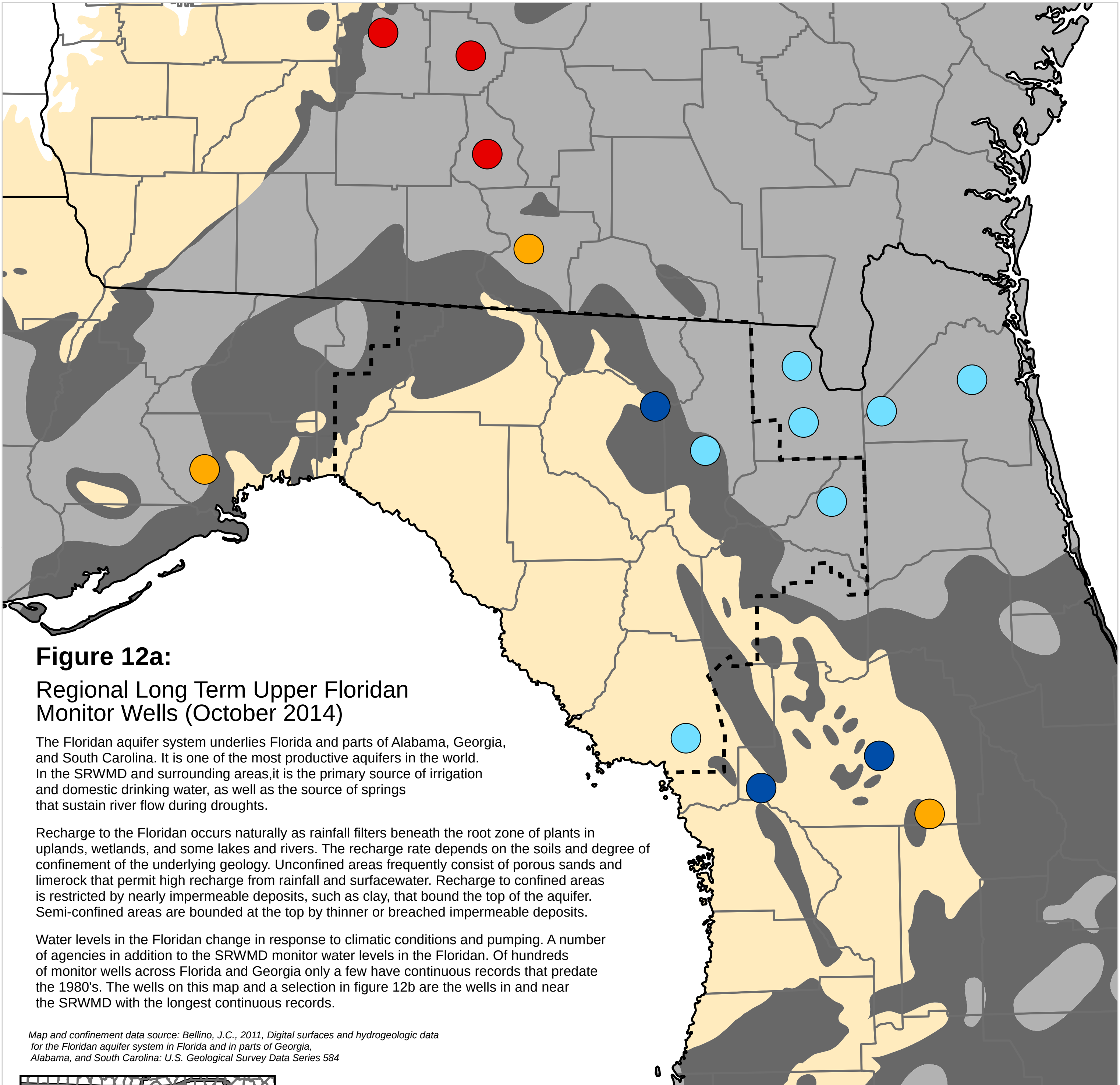


Figure 12a:

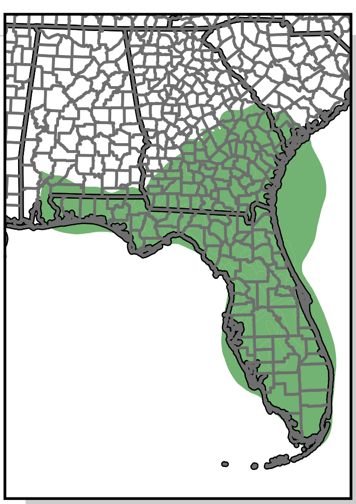
Regional Long Term Upper Floridan Monitor Wells (October 2014)

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

October 2014