MEMORANDUM

TO: Governing Board

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

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

DATE: December 6, 2013

RE: November 2013 Hydrologic Conditions Report for the District

RAINFALL

- Average November rainfall was 3.57”, which is 50% higher than the long-term average of 2.31” (Table 1, Figure 1). Up to 6” fell in parts of Levy County, which overall had 170% of normal November rainfall. Gilchrist County had the lowest monthly average with 84% of normal (Figure 2). The lowest gaged monthly total was 1.78” at Governor Hill Lake in northeastern Dixie County, while the highest was 5.28” at Goethe State Forest in Levy County.
- On average, almost half of the month’s total fell as the result of one frontal system on November 26th. The highest gaged daily total from this event was 2.43” at Clyattville, in Lowndes County, Georgia.
- The Suwannee River’s tributary basins in southern Georgia saw similar conditions, with most areas receiving above-normal rainfall (Figure 3). The USGS gage at Fargo reported 3.75” for the month.
- Average rainfall for the 12 months ending November 30 was 0.58” higher than the long-term average of 54.61" (Figure 4). Average rainfall for the 3 months ending November 30 was 2.8” lower than the long-term average of 10.8” (Figure 5). In both cases, the highest deficits remained in the upper Suwannee, Santa Fe, and Aucilla basins. Parts of Hamilton County were up to 9” below the long-term three-month average.

SURFACEWATER

- **Rivers:** Coastal rivers, including the Fenholloway and Steinhatchee, responded to the wetter weather with stable or improved flows in a normal- to above-normal range. Levels on the Suwannee and its tributaries fell steadily, with only modest rises in the upper reaches after the November 26th storms. Flows generally remained in a range considered normal. An exception was the Santa Fe River near Fort White, which remained below the 25th percentile of its historic November flows, considered low. Statistics for a number of rivers are presented graphically in Figure 6, and conditions relative to historic conditions are in Figure 7.

- **Lakes**: At the end of October, the Florida Fish and Wildlife Conservation Commission (FWC) began a hydrologic restoration project at Sneads Smokehouse Lake on the Aucilla River in Jefferson County. The FWC removed a dam that had separated the lake from a sinkhole since the 1960s. The lake level fell throughout the month, ending at 6” above its historic 2011 low. Levels at other lakes in the District remained stable, but most were slightly below their long-term average. Figure 8 shows levels relative to the long-term average, minimum, and maximum levels for a number of monitored lakes.

- **Springs**: Hart Springs in Gilchrist County was measured flowing at 66 MGD (million gallons per day), the highest flow measured there since 1997. The highest flow recorded at Hart was 98 MGD in November 1960. Otter Springs, two miles downstream of Hart, was measured at 12.6 MGD, its highest recorded flow since 1998. White Sulphur Springs stopped flowing mid-month after discharging into the Suwannee River for almost 10 weeks. The spring remained tannic throughout the duration of flow. Statistics for these springs and others are shown in Figure 9.

GROUNDWATER

Levels fell at 95% of monitored upper Floridan aquifer levels in November, with an overall decline to the 55th percentile from the 65th in October. One quarter of the wells had levels below their long-term median, and one well, in northern Jefferson County, fell below the 25th 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 value for the week ending November 30 indicated incipient dry spell conditions in north Florida and slightly wet conditions in South Georgia.
- The National Weather Service Climate Prediction Center (CPC) three-month outlook showed a potential for below-normal precipitation through February. 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 southeast Georgia and northeast Florida, including Hamilton, Columbia, Union, and Bradford counties.

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	Nov 2013	November Average	Month % of Normal	Last 12 Months	Annual % of Normal
Alachua	3.46	2.35	147%	51.90	102%
Baker	3.43	2.22	155%	49.26	99%
Bradford	3.41	2.32	147%	49.69	98%
Columbia	3.49	2.44	143%	51.55	100%
Dixie	2.52	2.50	101%	56.70	96%
Gilchrist	2.28	2.72	84%	55.36	97%
Hamilton	3.56	2.72	131%	51.24	98%
Jefferson	3.53	3.44	103%	54.27	90%
Lafayette	3.57	2.78	128%	59.96	106%
Levy	4.33	2.55	170%	57.56	97%
Madison	3.97	3.12	127%	57.75	103%
Suwannee	3.69	2.53	146%	57.53	109%
Taylor	3.94	2.85	138%	60.56	102%
Union	3.26	2.55	128%	49.72	92%

November 2013 Average:	3.57
November Average (1932-2012):	2.31
Historical 12-month Average (1932-2012):	54.61
Past 12-Month Total:	55.19
12-Month Rainfall Surplus:	0.58

Figure 1: Comparison of District Monthly Rainfall

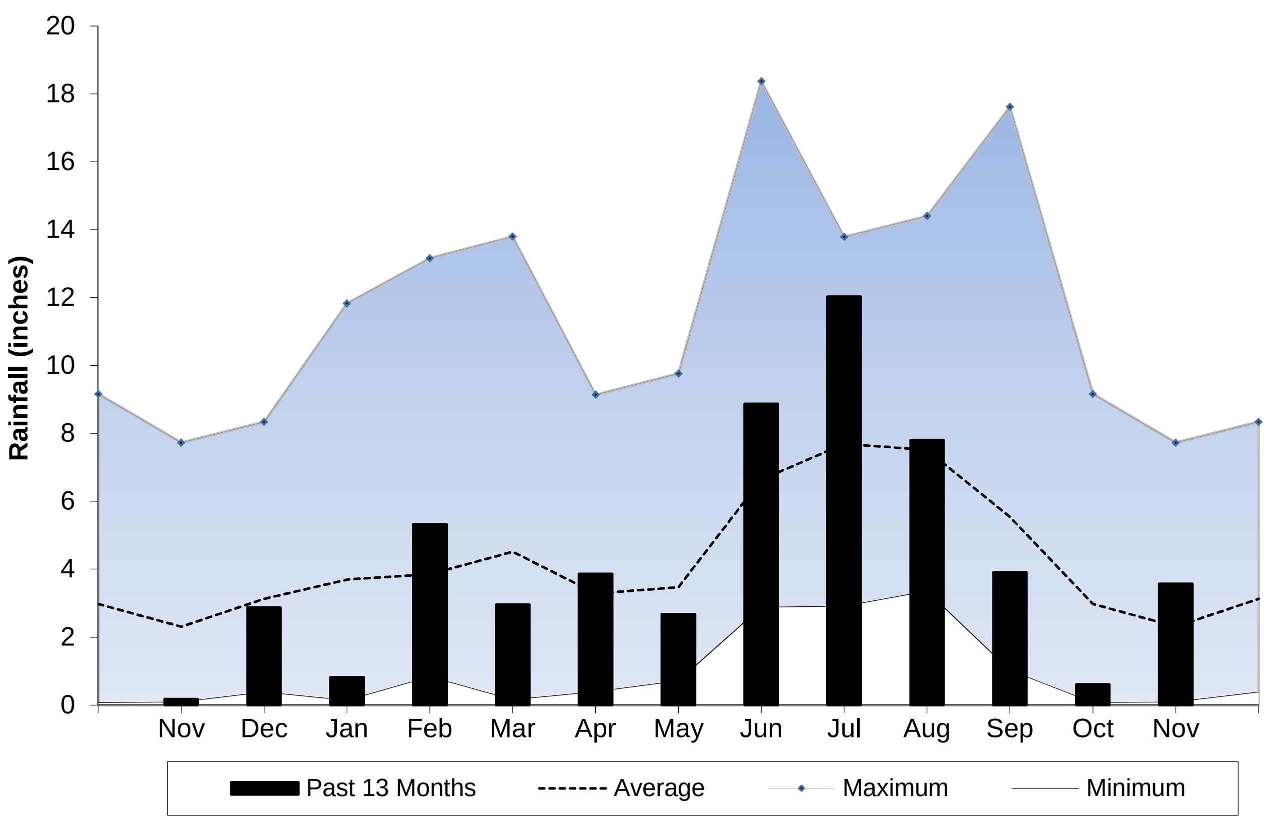


Figure 2: November 2013 Rainfall Estimate

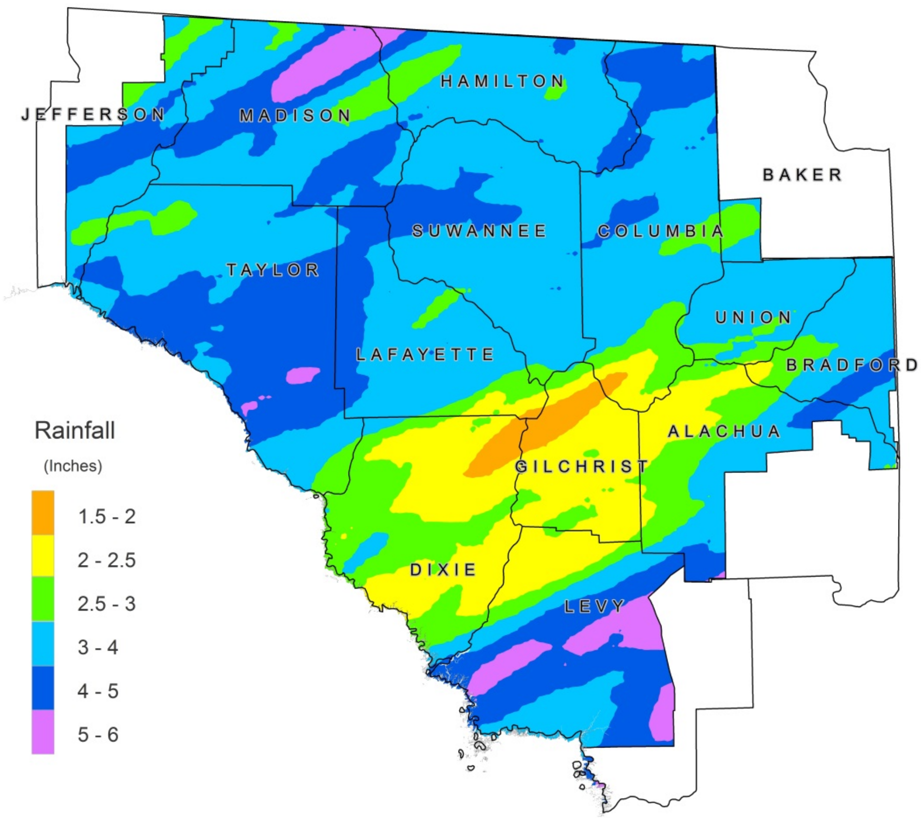


Figure 3: November 2013 Percent of Normal Rainfall

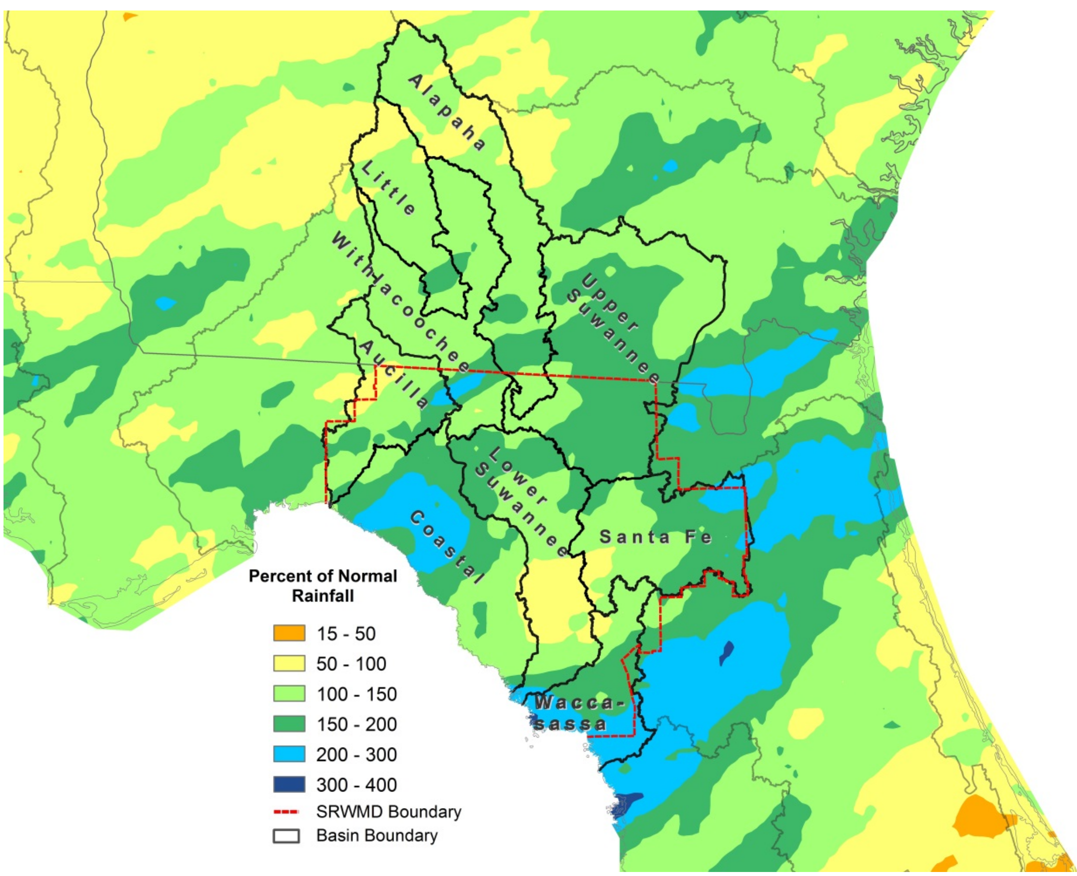
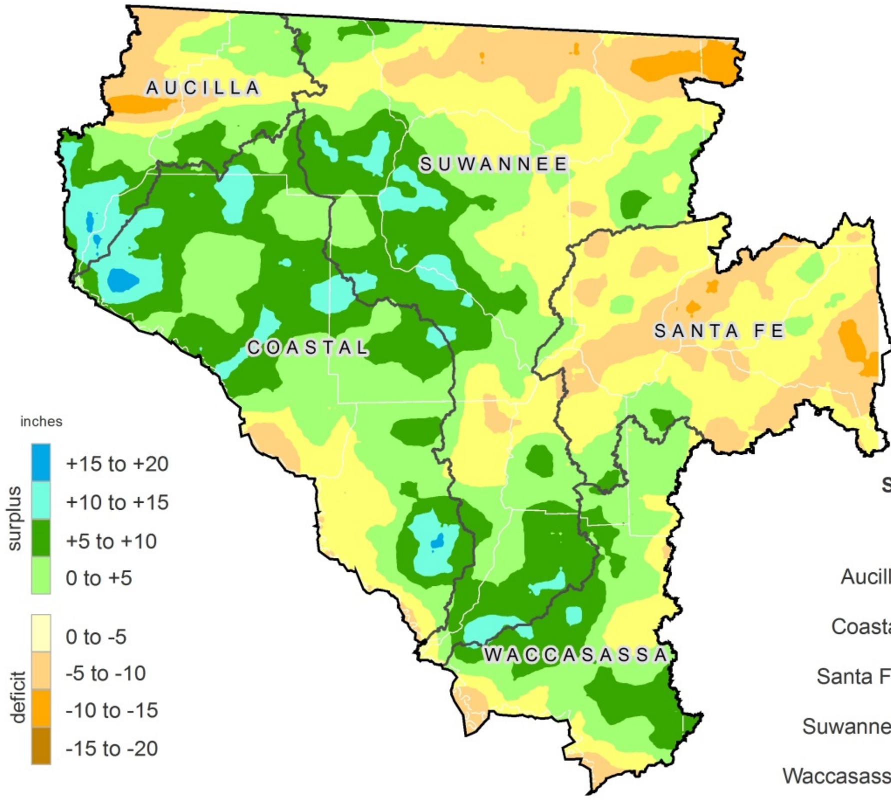


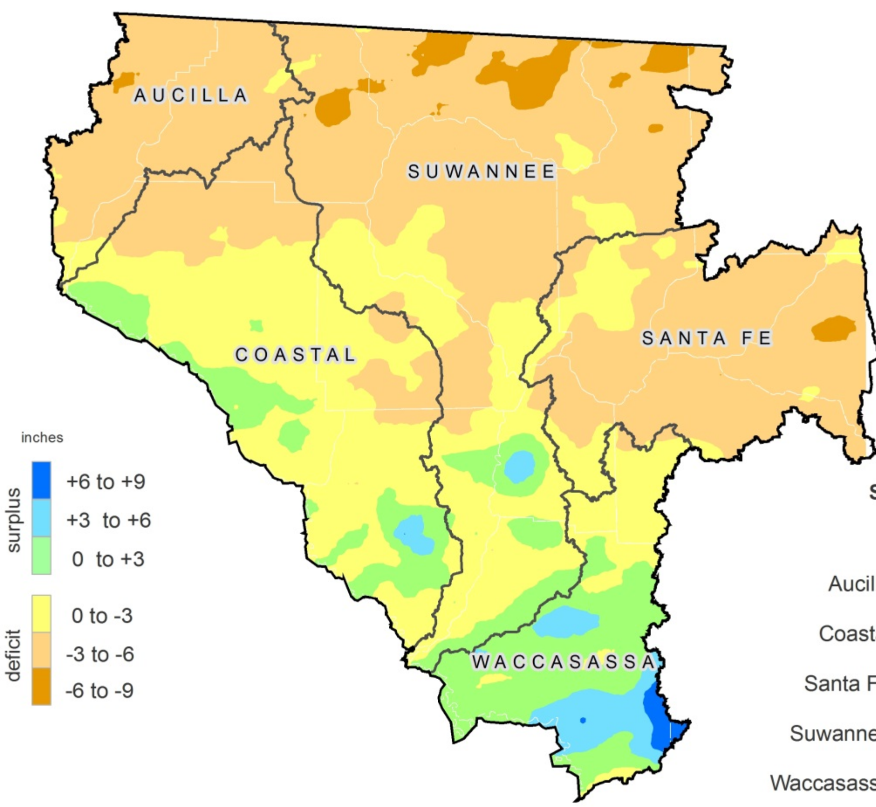
Figure 4: 12-Month Rainfall Surplus/Deficit by River Basin
Through November 30, 2013



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

	Nov -13	Oct -13
Aucilla	+1.0	-2.6
Coastal	+4.8	+1.4
Santa Fe	-4.0	-6.9
Suwannee	+1.4	-1.9
Waccasassa	+3.2	-0.7

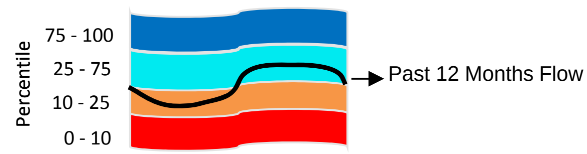
Figure 5: 3-Month Rainfall Surplus/Deficit by River Basin
Through November 30, 2013



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

	Nov -13	Oct -13
Aucilla	-4.4	-5.8
Coastal	-1.7	-1.8
Santa Fe	-4.2	-5.6
Suwannee	-3.6	-4.6
Waccasassa	+1.2	+1.6

Figure 6: Daily River Flow Statistics
December 1, 2012 through November 30, 2013



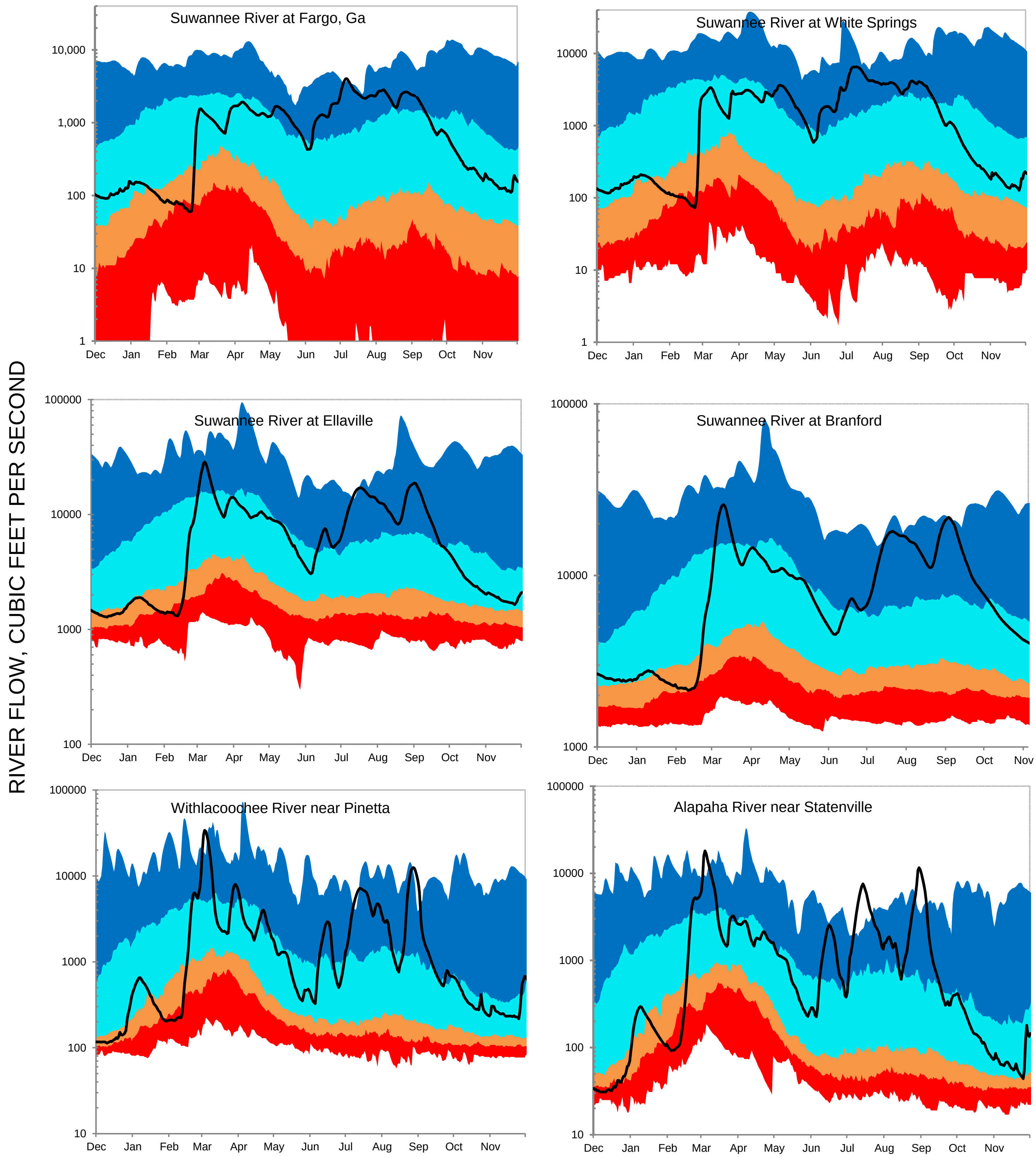
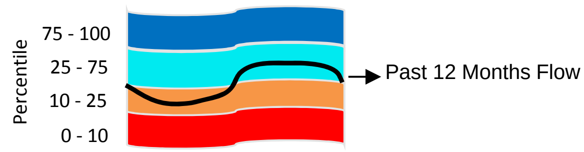
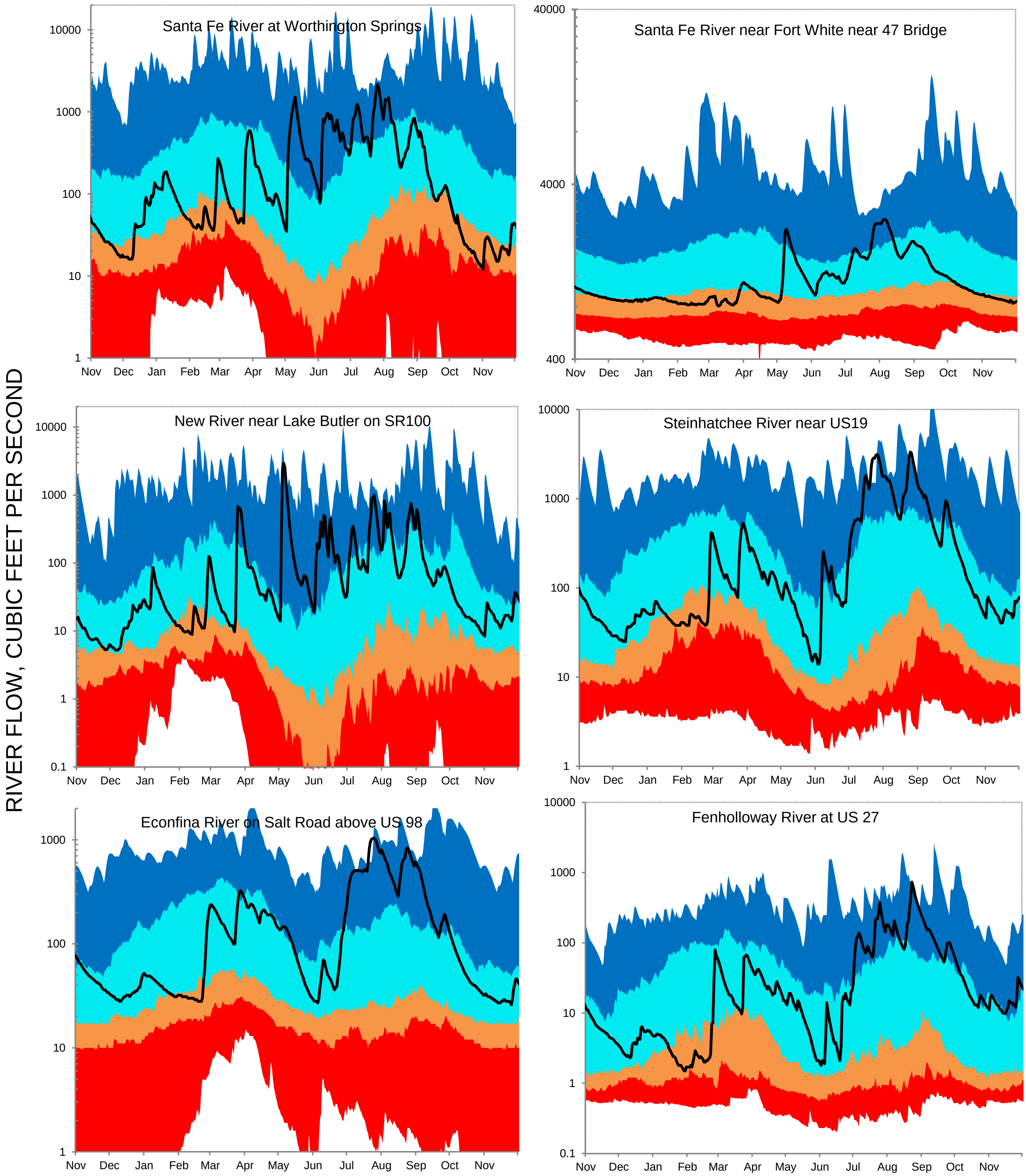


Figure 6, cont: Daily River Flow Statistics

December 1, 2012 through November 30, 2013





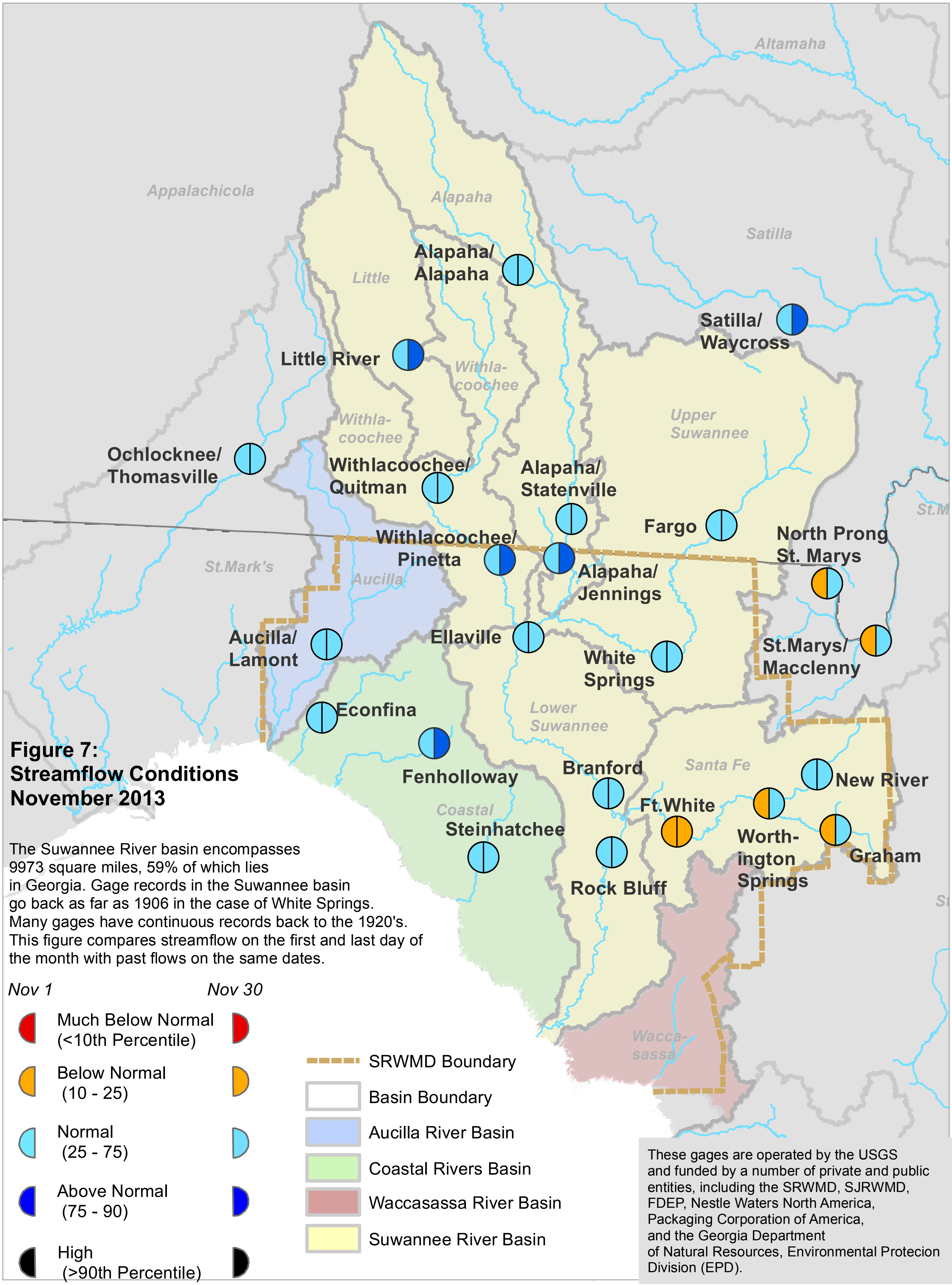
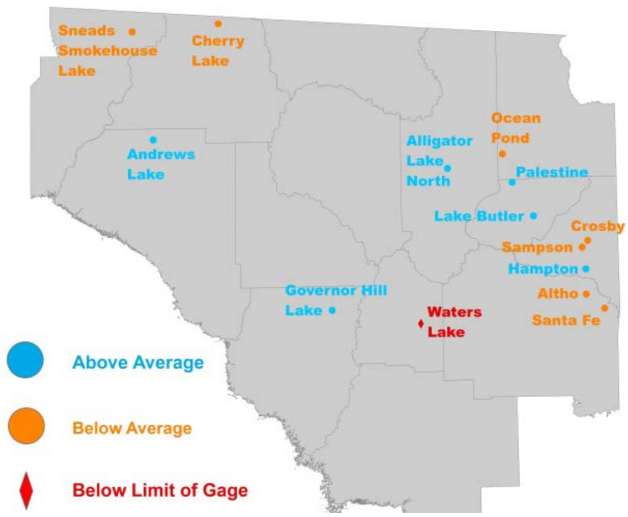


Figure 7: Streamflow Conditions November 2013

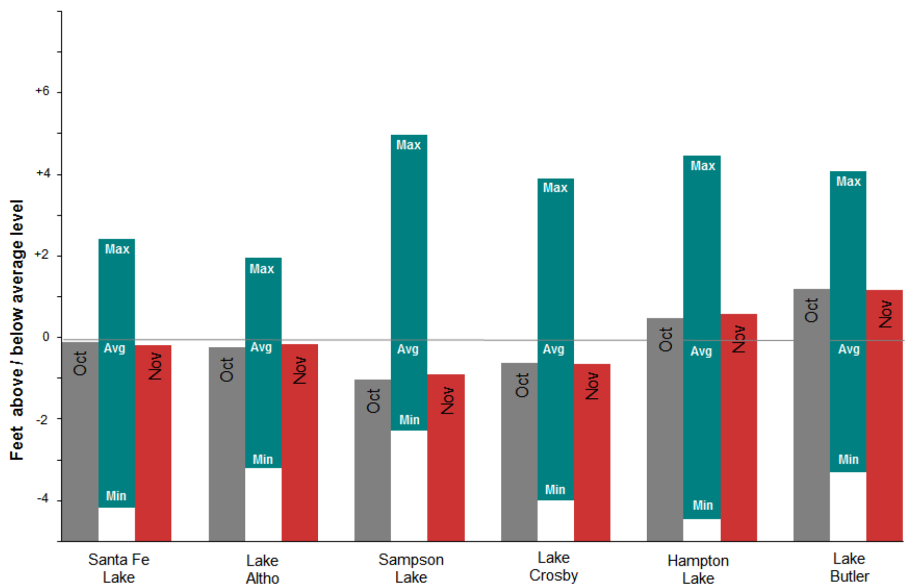
The Suwannee River basin encompasses 9973 square miles, 59% of which lies in Georgia. Gage records in the Suwannee basin go back as far as 1906 in the case of White Springs. Many gages have continuous records back to the 1920's. This figure compares streamflow on the first and last day of the month with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

Figure 8: November 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.



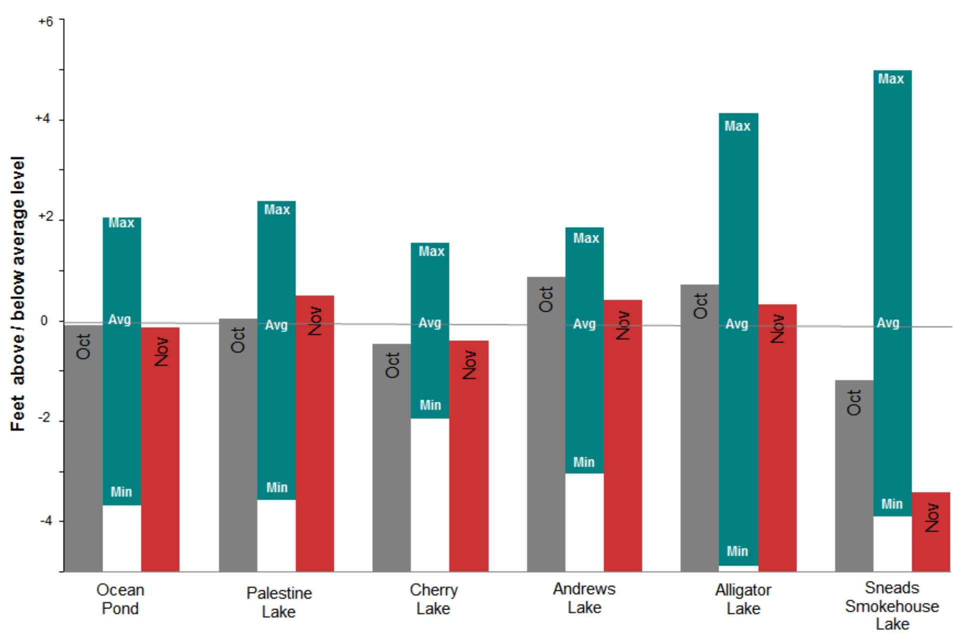


Figure 9: Quarterly Springflow Measurements

The SRWMD monitors water quality at 30 springs. Flow is measured at the time of the sampling. The springs below were measured in November 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.

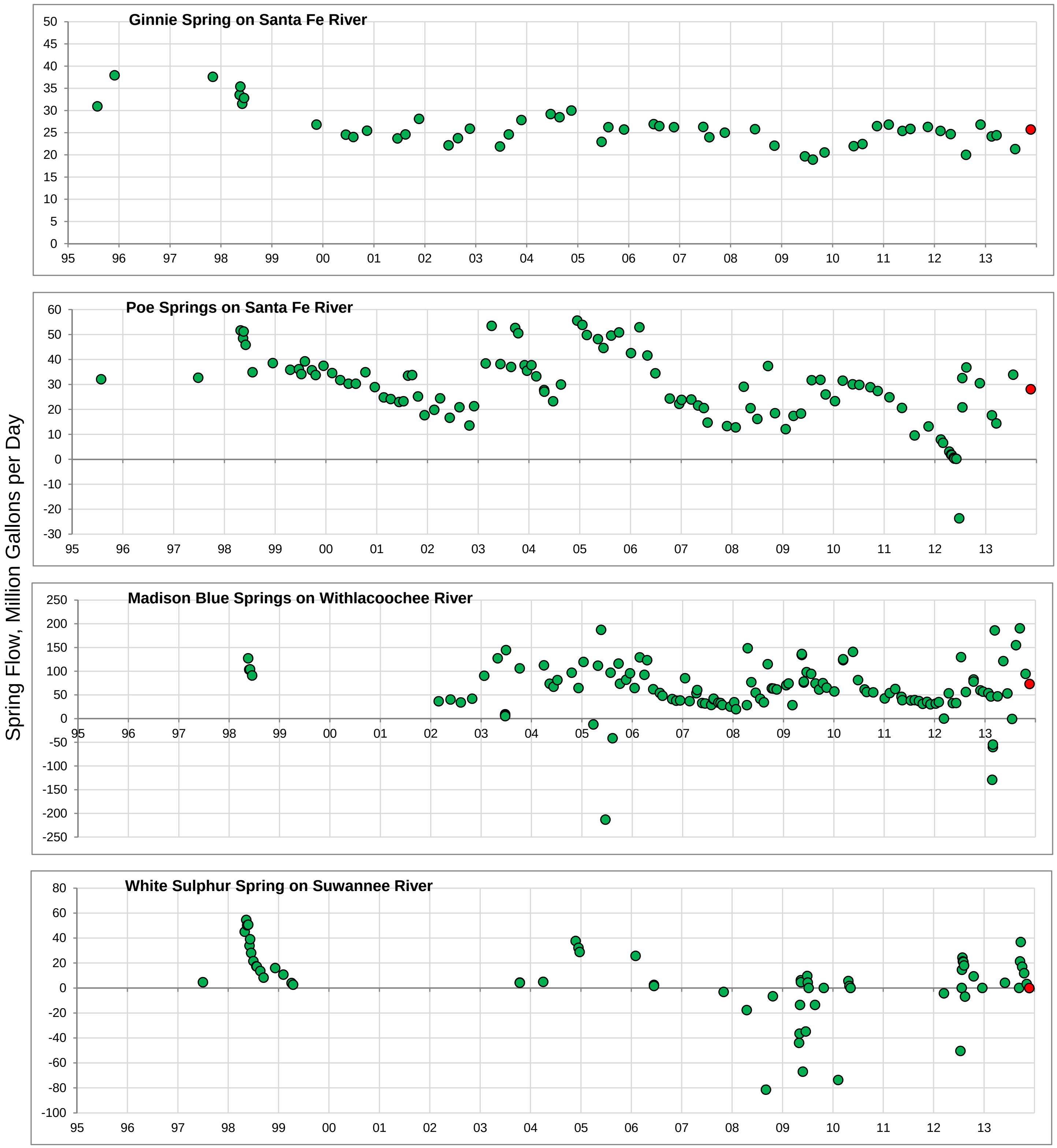


Figure 9: Quarterly Springflow Measurements, continued

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

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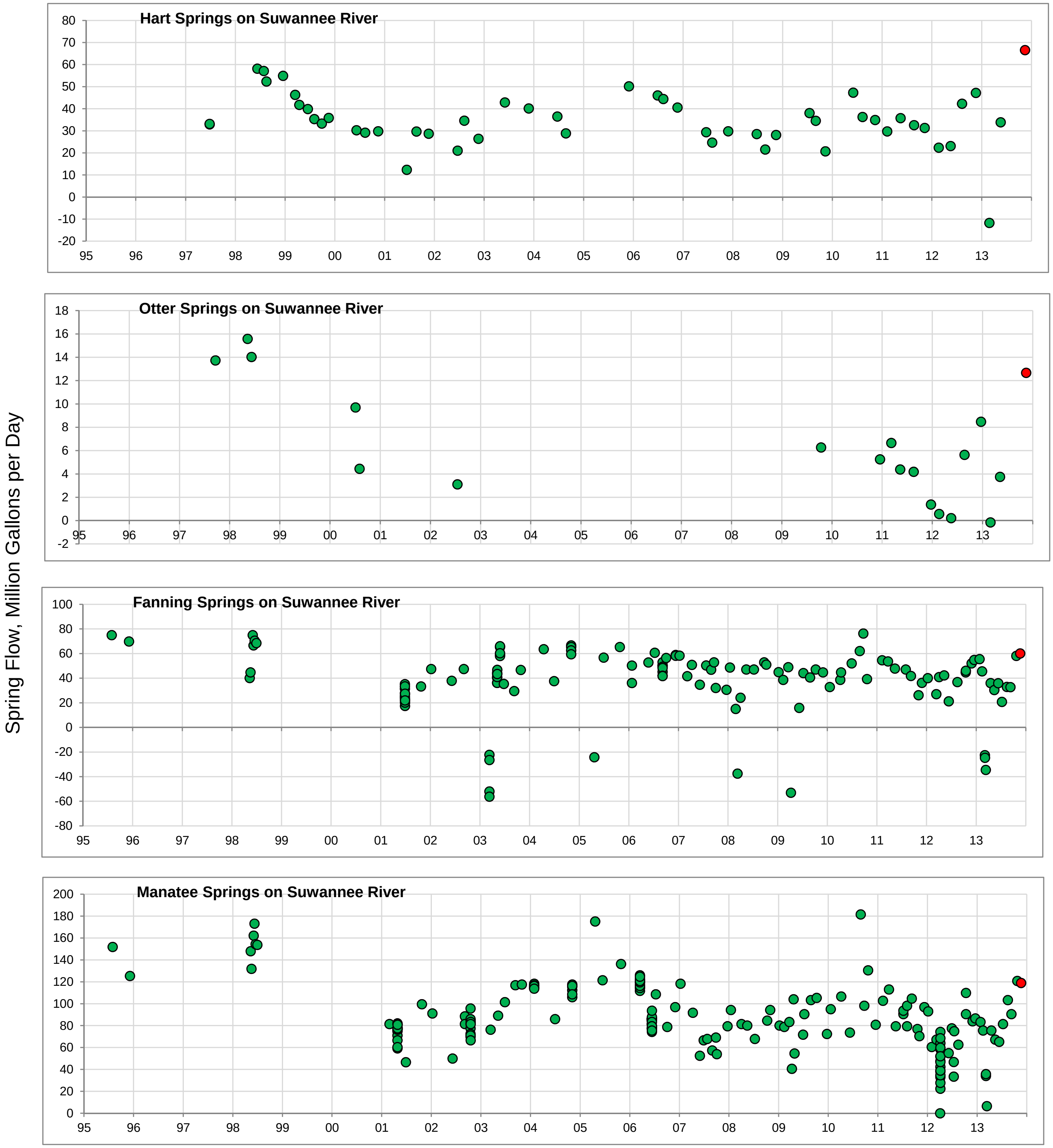


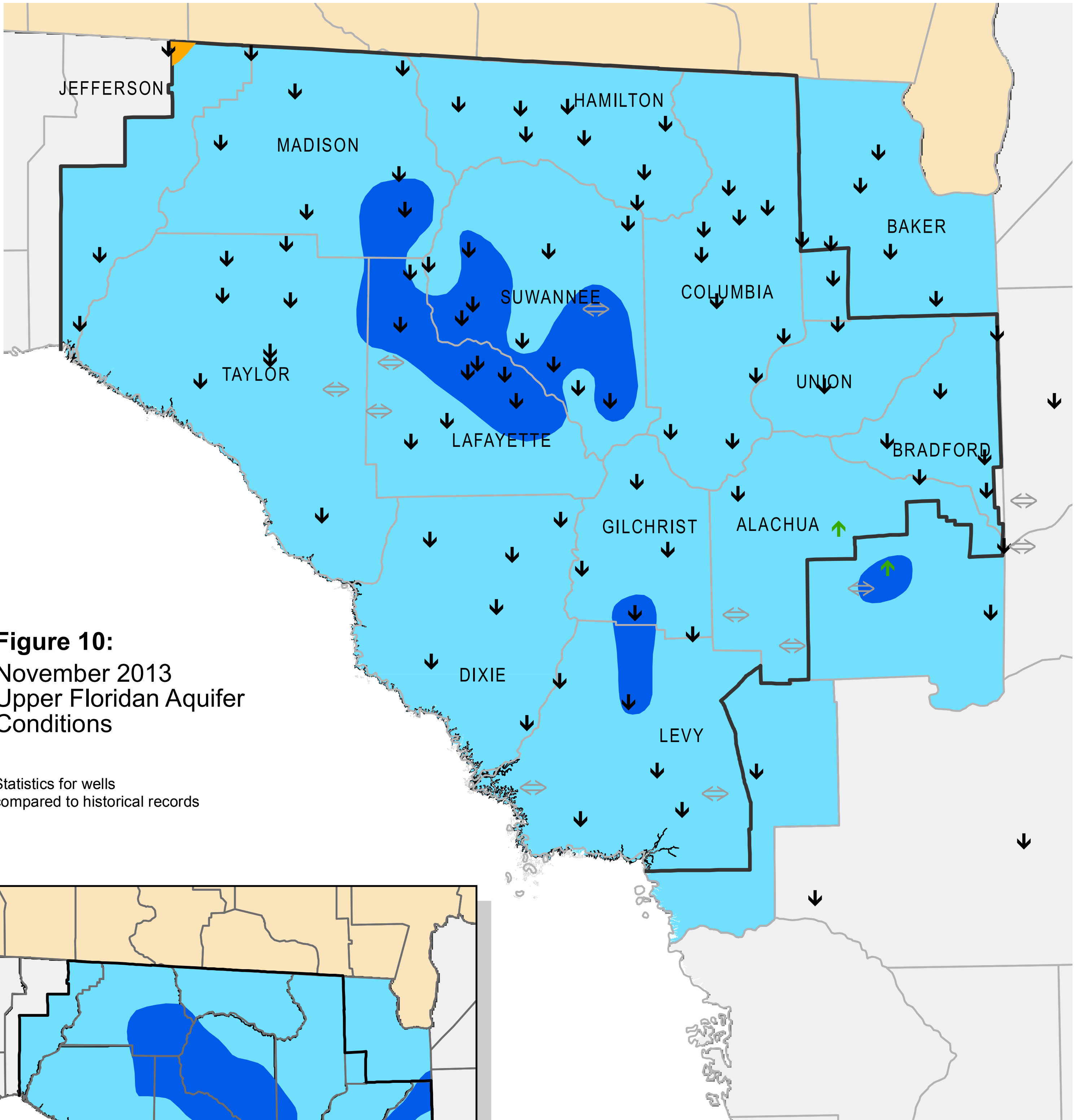
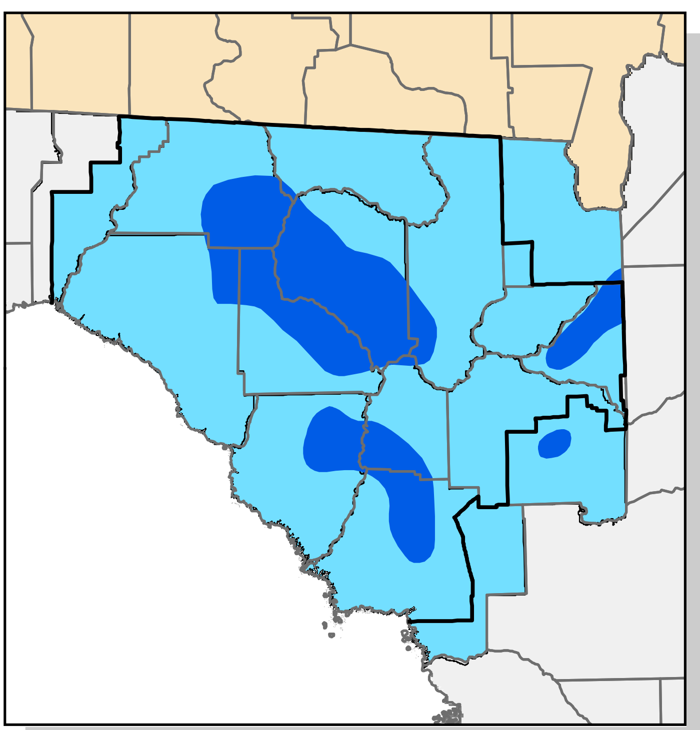


Figure 10:
November 2013
Upper Floridan Aquifer
Conditions

Statistics for wells
compared to historical records



Inset: October 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

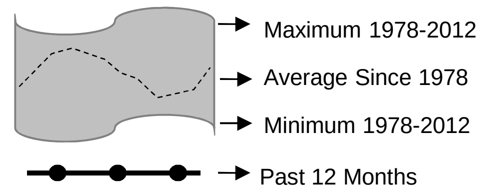
Increase/decrease since last month
less than one percent of historic range

District Boundary

Figure 11: Monthly Groundwater Level Statistics

Levels December 1, 2012 through November 30, 2013

Period of Record Beginning 1978



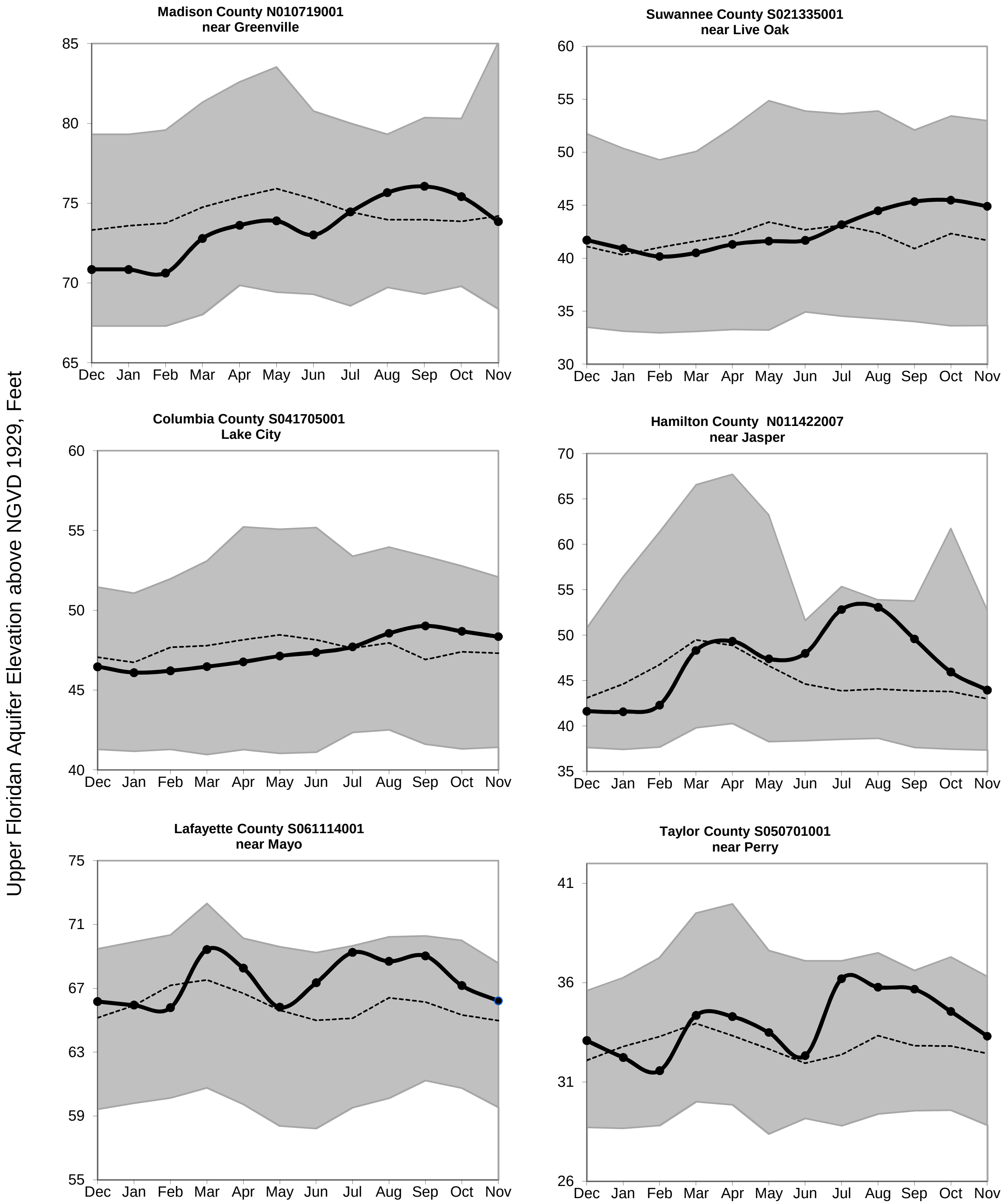
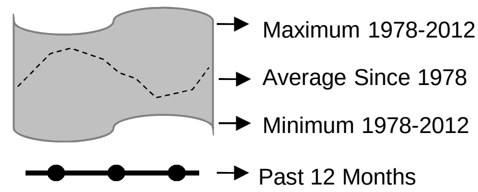
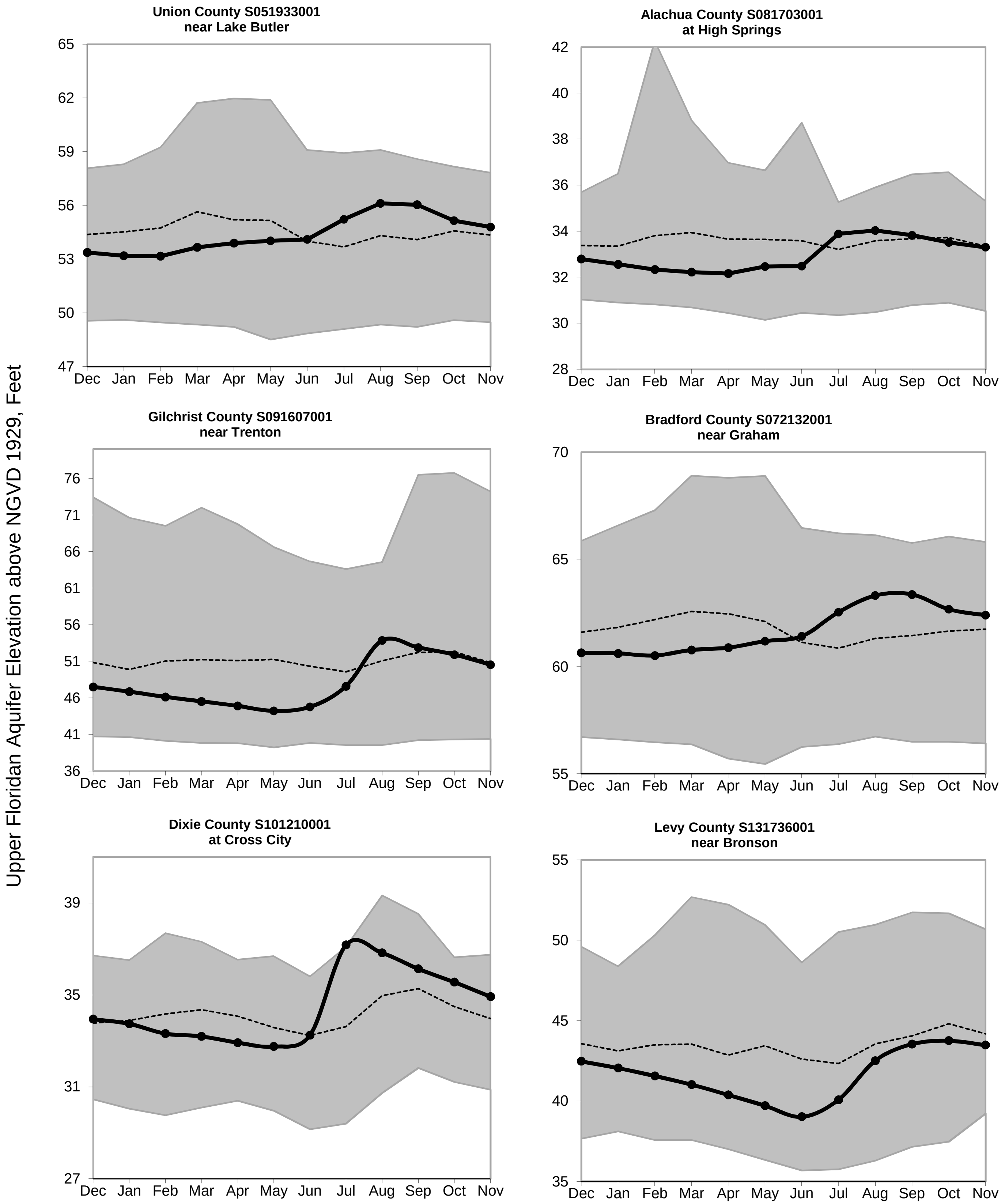


Figure 11, cont.: Groundwater Level Statistics
Levels December 1, 2012 through November 30, 2013
Period of Record Beginning 1978





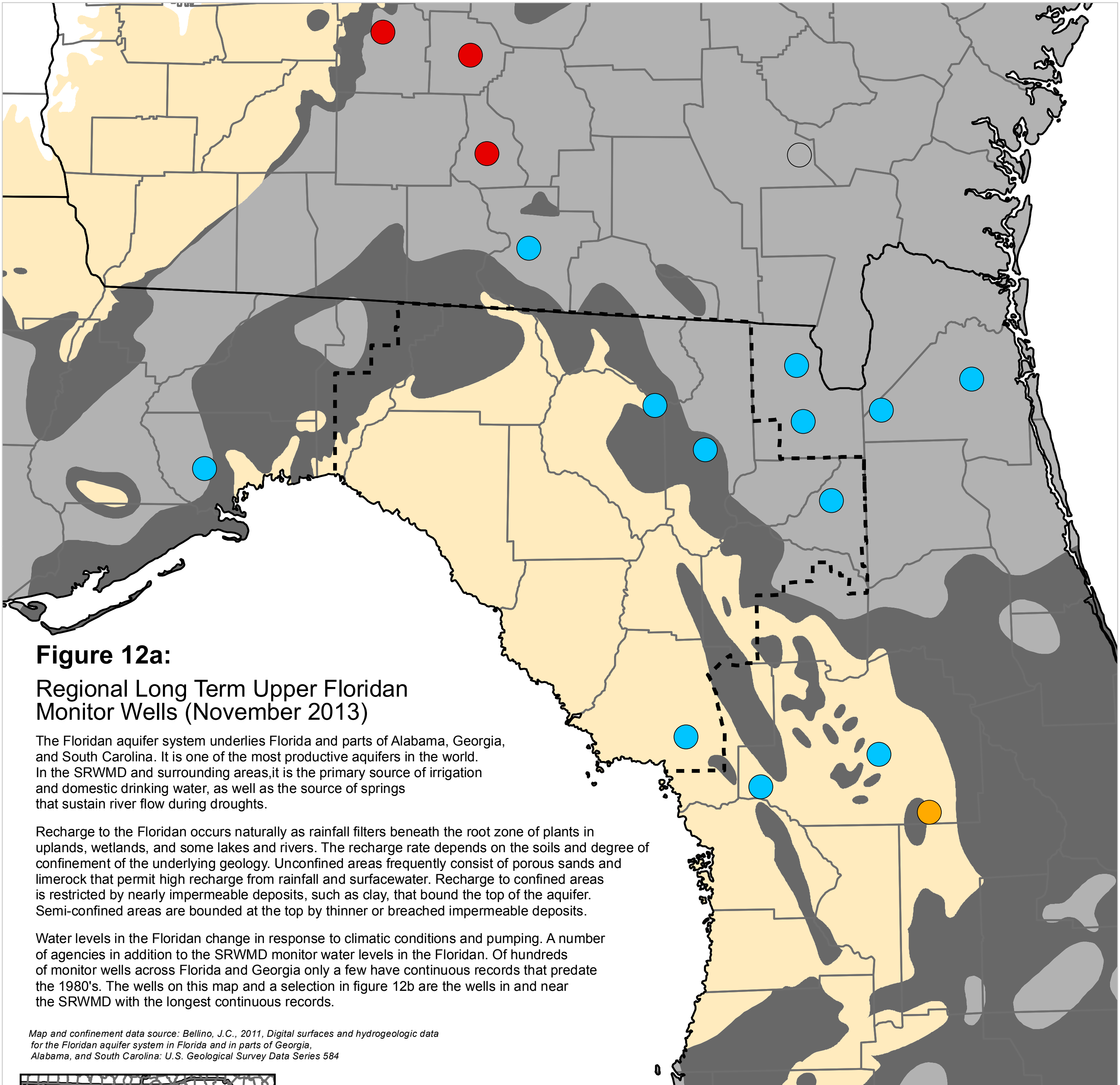


Figure 12a:

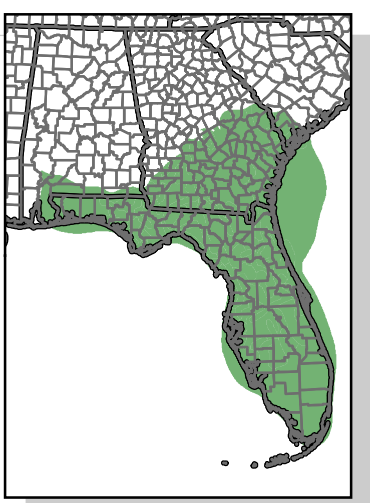
Regional Long Term Upper Floridan Monitor Wells (November 2013)

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

November 2013