

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, 2012

RE: November 2012 Hydrologic Conditions Report for the District

RAINFALL

- Average rainfall was 0.18", which is 8% of the long-term November average of 2.33". This was the driest November since 1936, and the sixth driest of any month since District records began in 1932. Hamilton County had the most rainfall with 11% of normal, while Union County had the least with 4% (Table 1, Figure 1). The highest gaged monthly total was 0.49" at Snead's Smokehouse Lake in northern Jefferson County, and the lowest was 0.05" at Santa Fe Lake, the headwaters of the Santa Fe River. Watersheds in South Georgia that contribute to the Suwannee River fared better, with the upper Withlacoochee and Alapaha basins seeing almost half of normal rainfall (Figure 3).
- Average SRWMD rainfall for the 12 months ending November 30 was 3.46" higher than the long-term average of 54.56". This surplus is the result of a wide range of accumulation, with areas in the central part of the District seeing 30"-40" more than the northern and southern areas in the last year (Figure 4). Figure 5 shows the history of rainfall deficits beginning in 1932. The last three months' precipitation was 95% of the long-term average, based on records beginning in 1932.

SURFACEWATER

- **Rivers:** Stages at all District gages fell steadily. By the end of the month, most Suwannee River and coastal river gages remained in a range considered normal, but the Santa Fe River and the lower Withlacoochee and Alapaha rivers fell below normal. Statistics for a number of rivers are presented graphically in Figure 6 and conditions relative to historic conditions for the time of year in Figure 7.
- **Lakes:** Levels fell at all monitored lakes, dropping by an average of 4". Nine of 15 lakes were lower than average. Figure 8 shows levels relative to the long-term average, minimum, and maximum levels for lakes where the gages were accessible.

SPRINGS

Spring response was varied in November, but in general flows either remained stable or declined. Exceptions were Hornsby Springs on the Santa Fe and Hart Springs on the Suwannee, where measured flows were the highest in 6 years. Statistics for a representative sample of springs are shown in Figures 9a and 9b.

GROUNDWATER

Upper Floridan aquifer levels dropped by an average of one foot. Levels district-wide fell from the 50th percentile to the 40th percentile (based on records beginning no earlier than 1978). Three-quarters of the wells had levels considered normal, while 12% were below normal. Statistics for a representative sample of wells are shown in Figure 11. 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 December 1 indicated normal conditions in north Florida and mild drought in south central Georgia.
- The National Weather Service Climate Prediction Center (CPC) three-month outlook showed equal chances of above-normal, below-normal, or normal precipitation through February.
- Figure 13 shows overhead irrigation application at a number of farms in the District during November. The average daily application rate was 0.04", the highest rate since July.

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), agricultural water use (up to 106 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

County	Nov 2012	November Average	Month % of Normal	Last 12 Months	Annual % of Normal
Alachua	0.21	2.35	9%	55.21	108%
Baker	0.21	2.22	9%	58.20	117%
Bradford	0.14	2.32	6%	55.82	110%
Columbia	0.18	2.44	7%	62.47	122%
Dixie	0.21	2.50	8%	55.87	95%
Gilchrist	0.14	2.72	5%	55.82	97%
Hamilton	0.29	2.72	11%	53.76	103%
Jefferson	0.21	3.44	6%	49.89	82%
Lafayette	0.19	2.78	7%	70.25	124%
Levy	0.17	2.55	6%	52.97	89%
Madison	0.19	3.12	6%	55.49	99%
Suwannee	0.16	2.53	6%	68.88	130%
Taylor	0.14	2.85	5%	60.61	102%
Union	0.11	2.55	4%	55.58	103%

November 2012 Average: 0.18
 November Average (1932-2011): 2.33
 Historical 12-month Average (1932-2011): 54.56
 Past 12-Month Total: 58.02
 12-Month Rainfall Surplus: 3.46

Figure 1: Comparison of District Monthly Rainfall

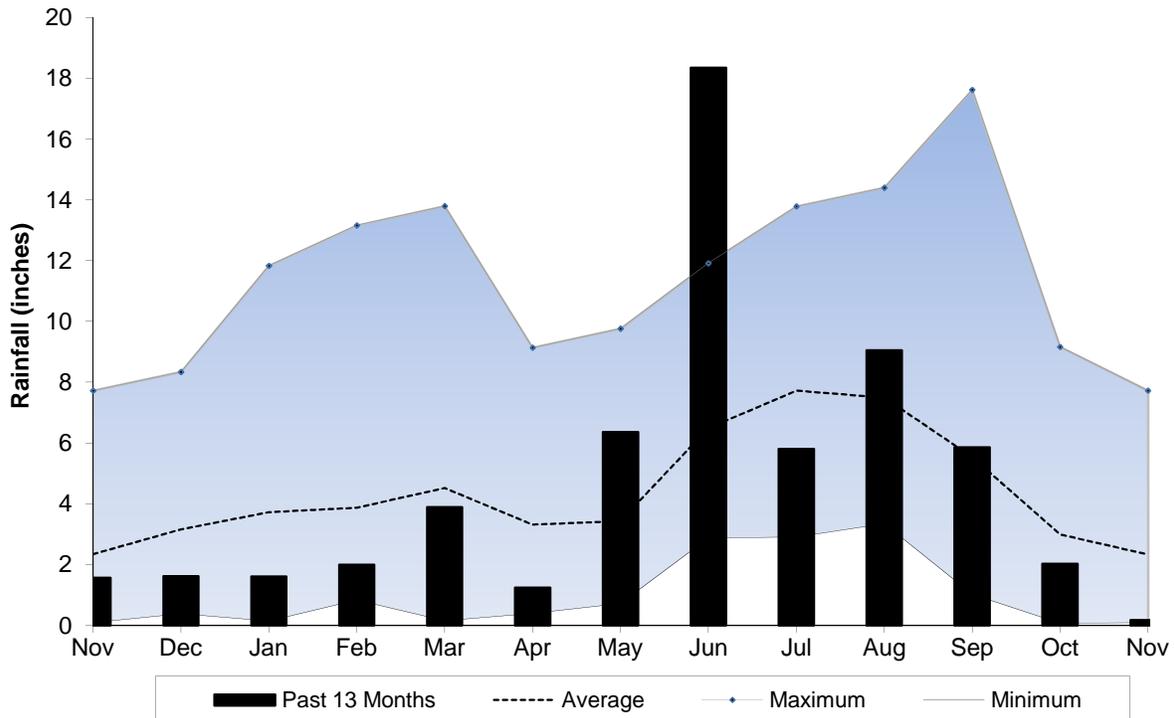


Figure 2: November 2012 Rainfall Estimate

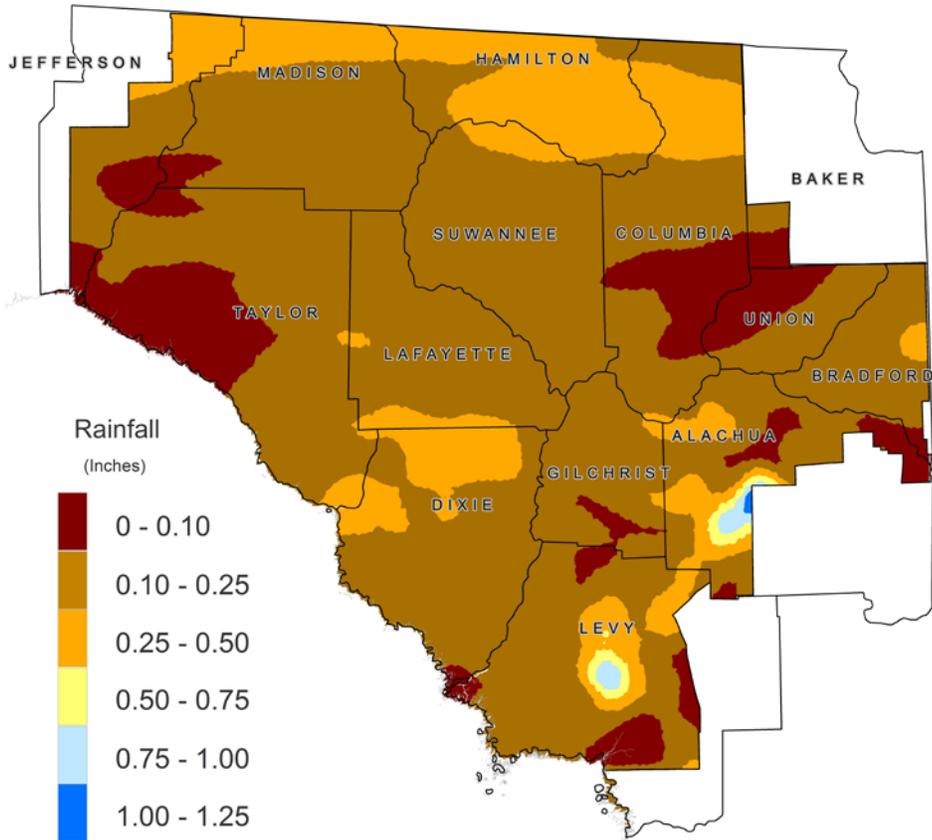


Figure 3: November 2012 Percent of Normal Rainfall

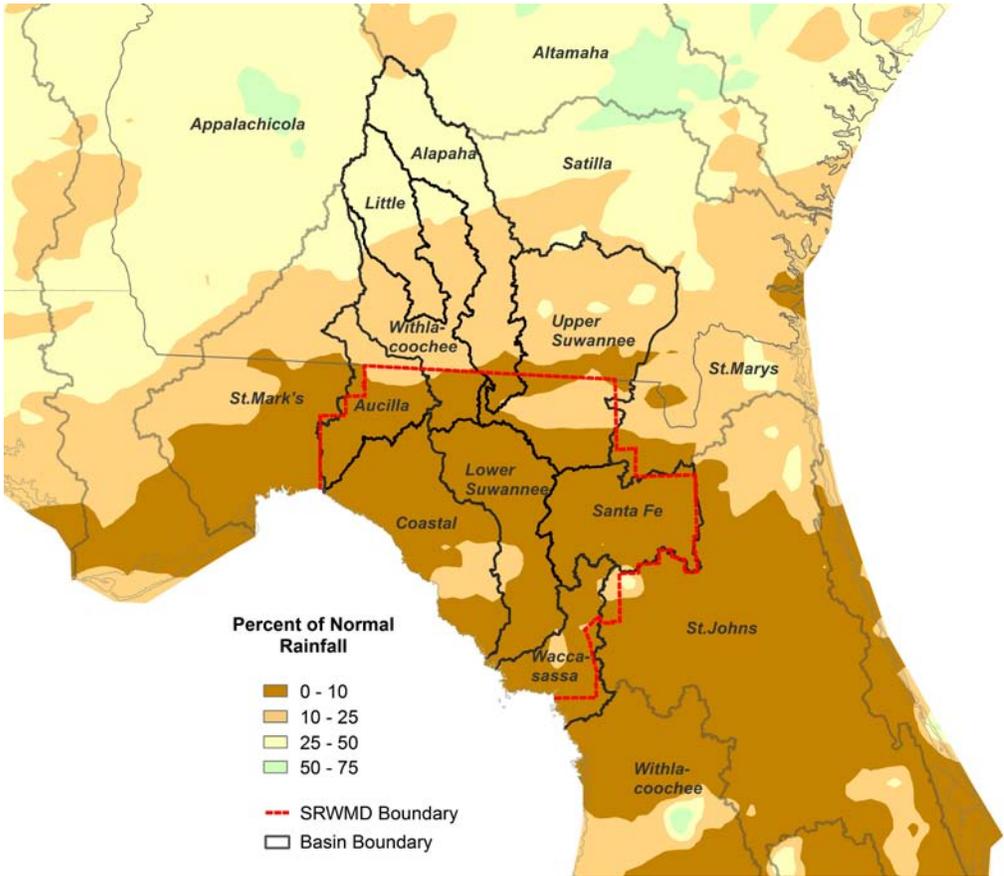


Figure 4: 12-Month Rainfall Surplus/Deficit by River Basin Ending November 30, 2012

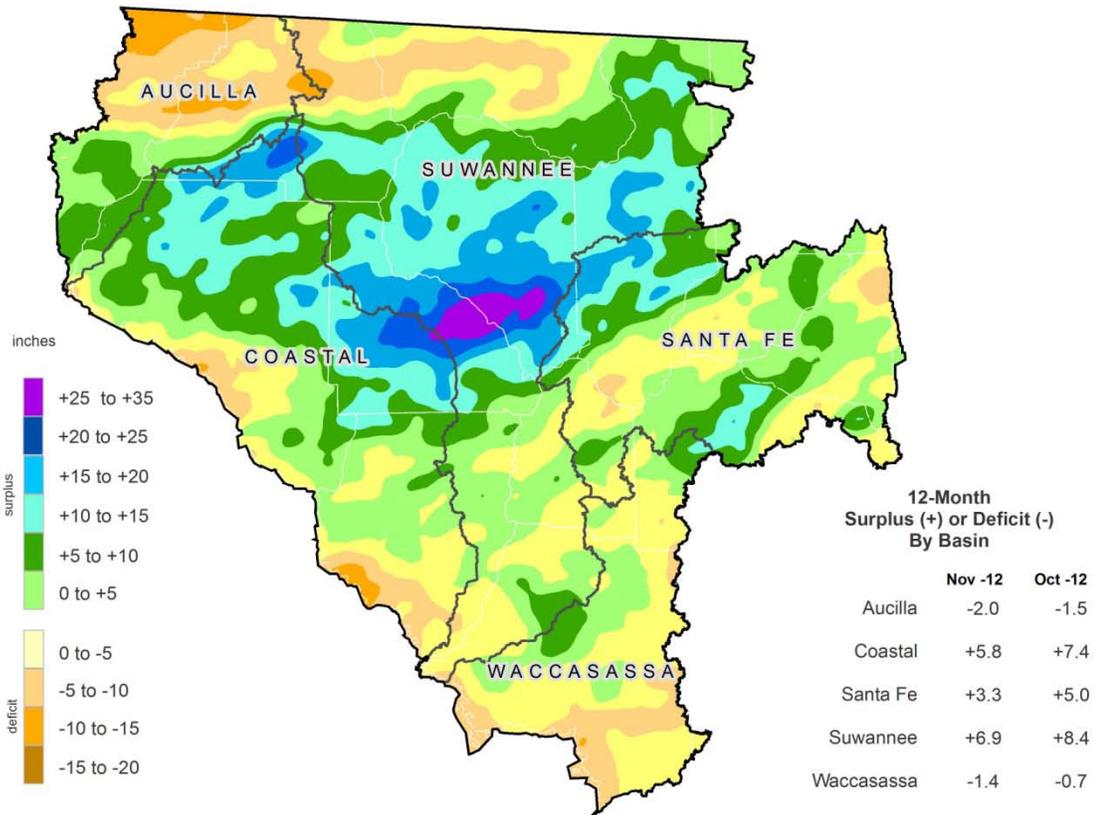


Figure 5: 12-Month Rolling Rainfall Deficit Since 1932

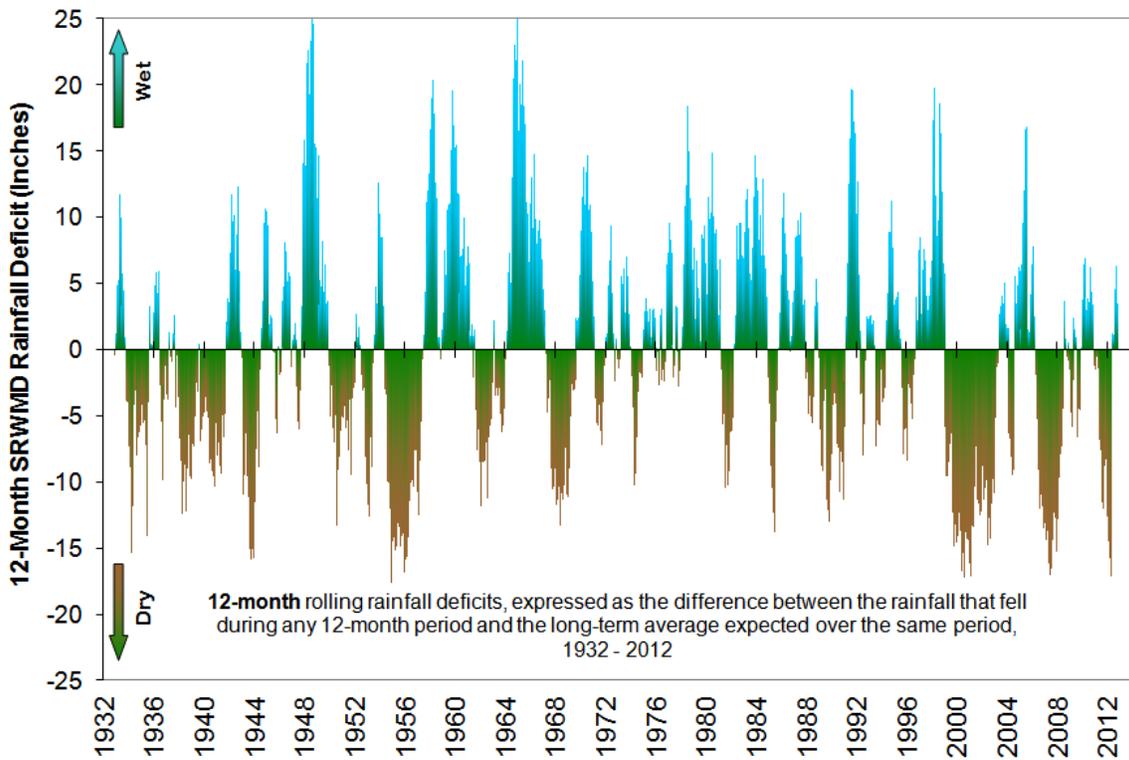
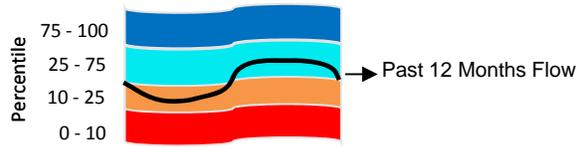


Figure 6: Daily River Flow Statistics
 December 1, 2011 through November 30, 2012



RIVER FLOW, CUBIC FEET PER SECOND

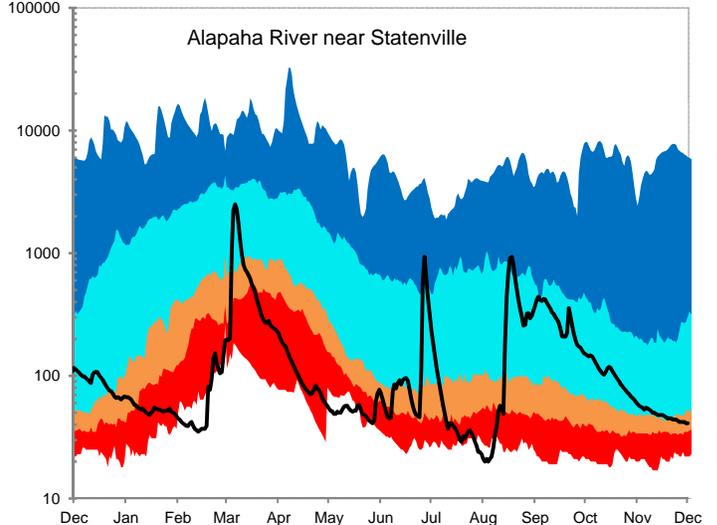
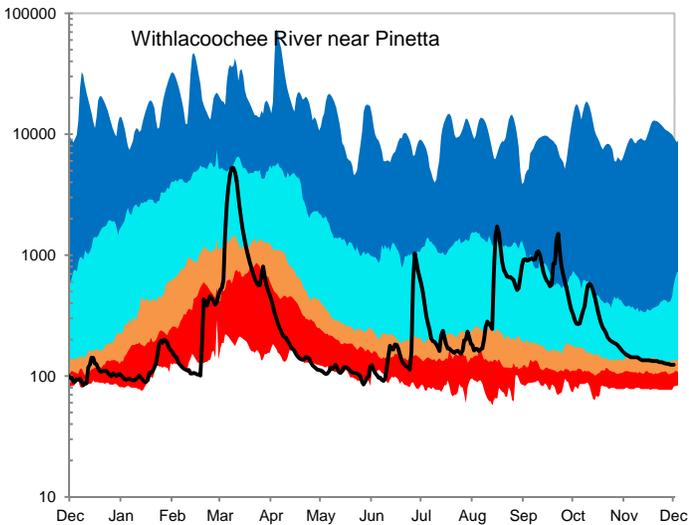
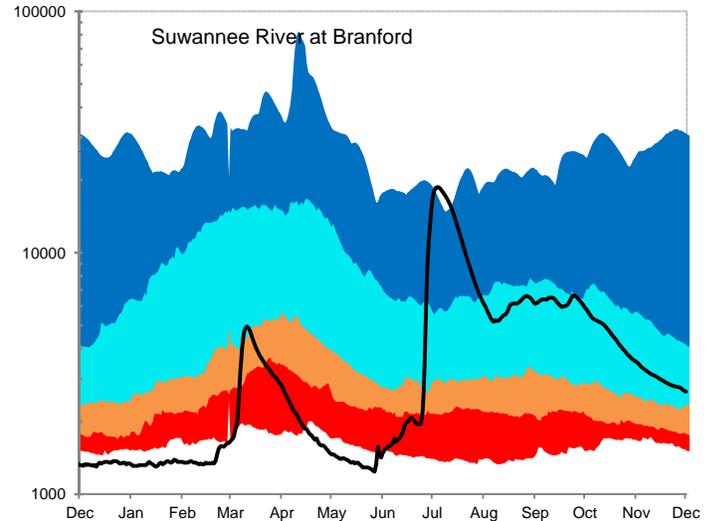
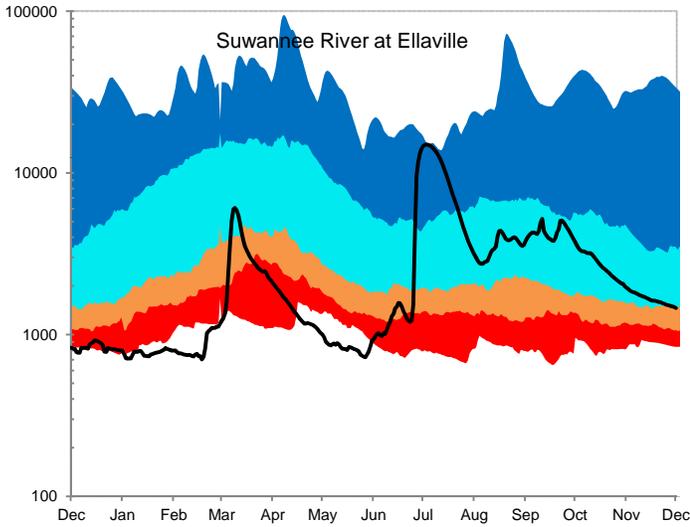
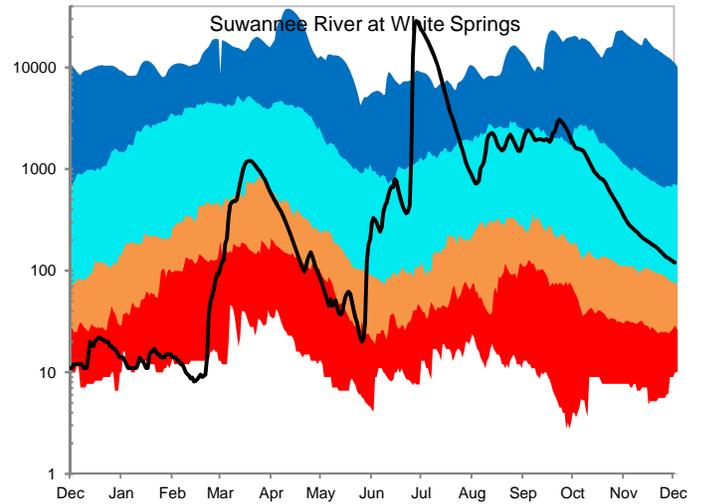
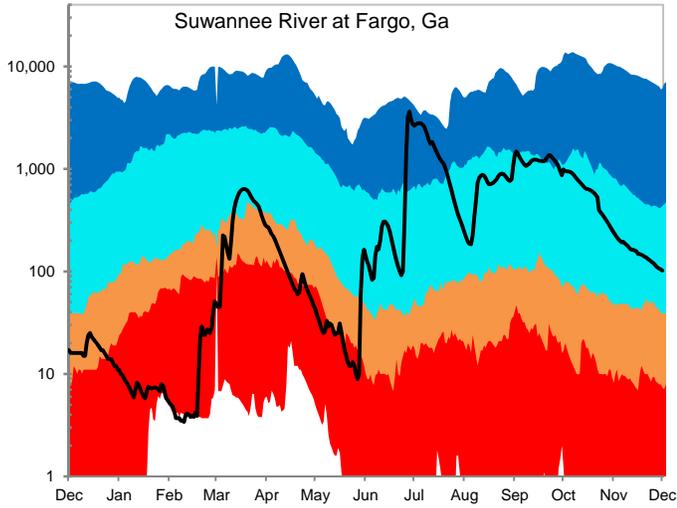
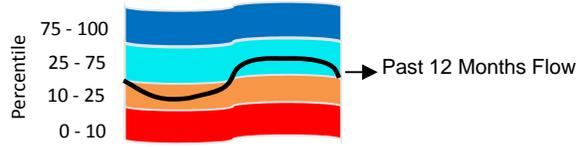


Figure 6, cont: Daily River Flow Statistics
 December 1, 2011 through November 30, 2012



RIVER FLOW, CUBIC FEET PER SECOND

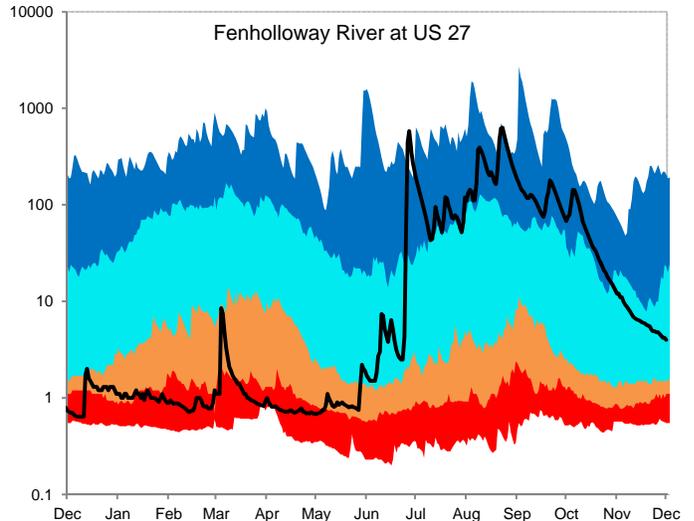
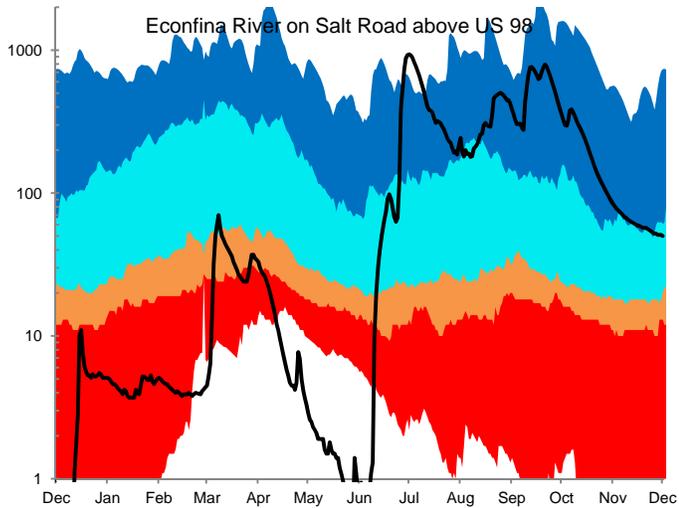
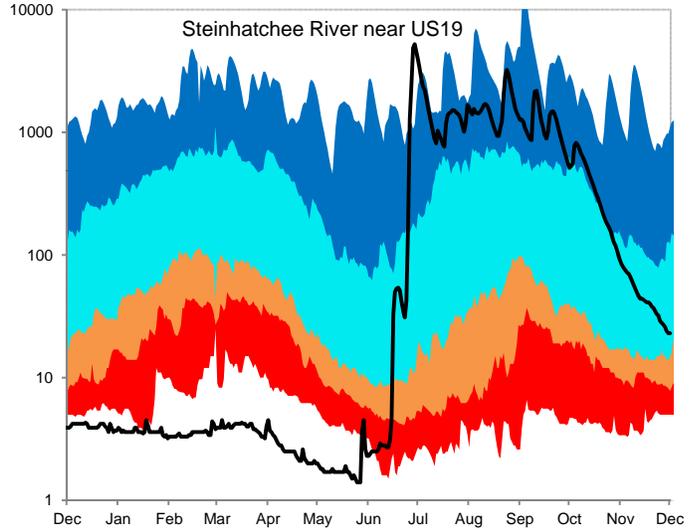
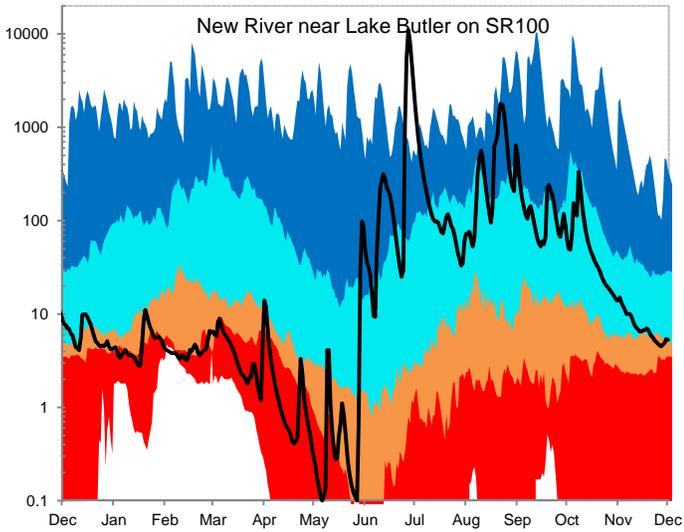
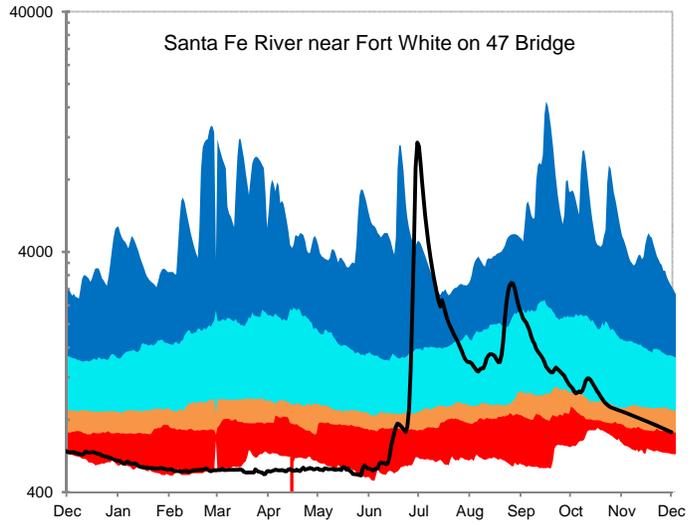
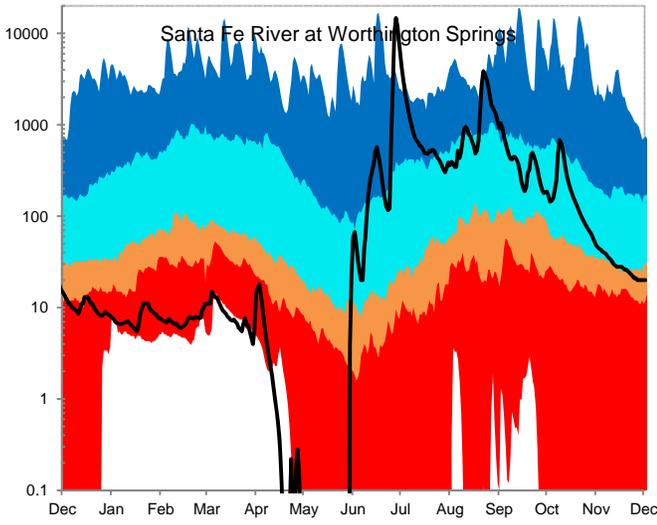




Figure 7: Streamflow Conditions November 2012

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.

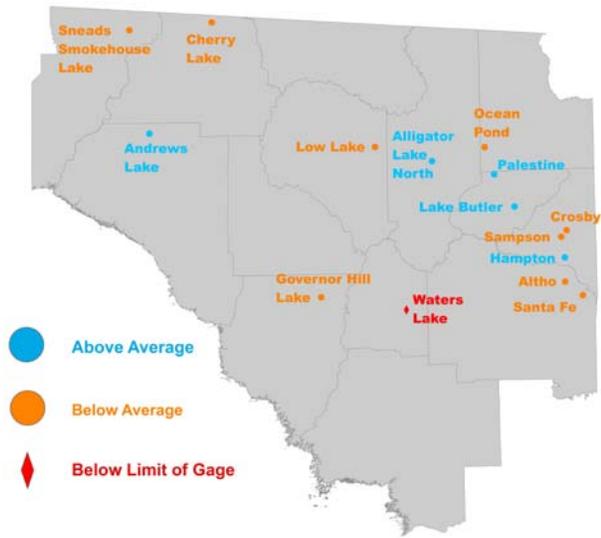
Nov 1 Nov 30

- Much Below Normal (<10th Percentile)
- Below Normal (10 - 24)
- Normal (25 - 75)
- Above Normal (>76th Percentile)

- SRWMD Boundary
- Basin Boundary
- Aucilla River Basin
- Coastal Rivers Basin
- Waccasassa River Basin
- Suwannee River Basin

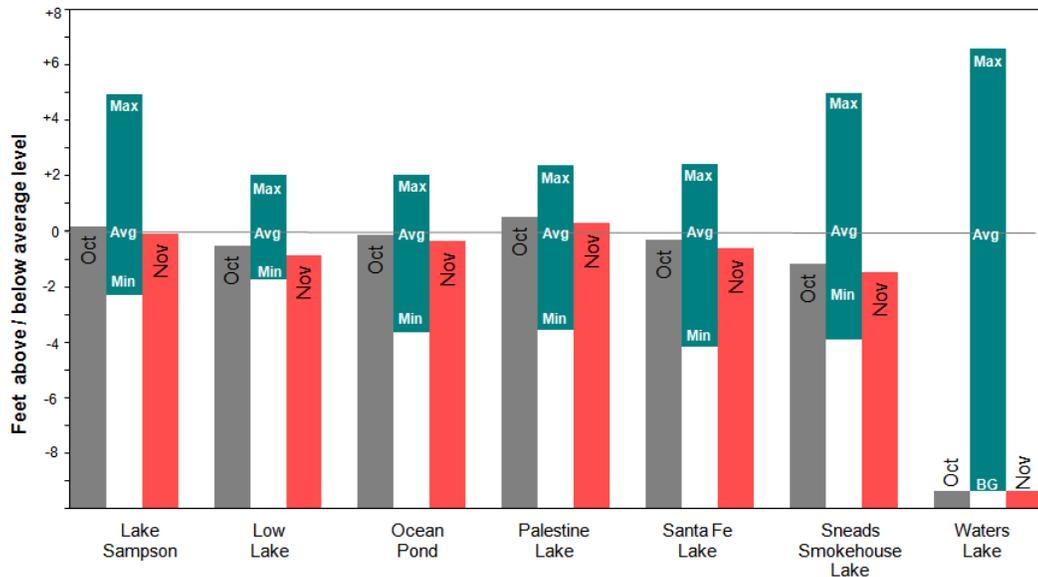
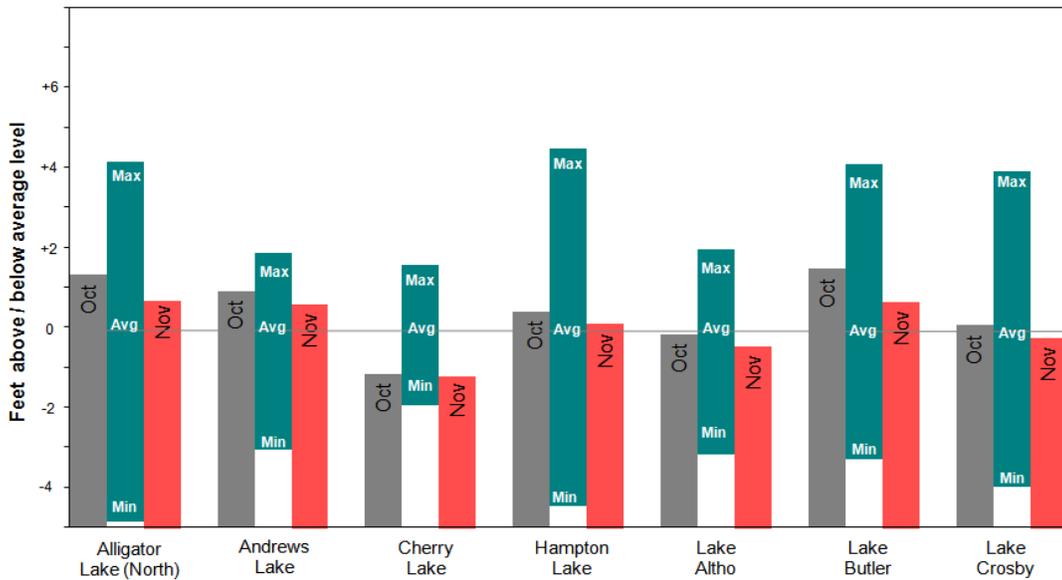
These gages are operated by the USGS and funded by a number of private and public entities, including the SRWMD, SJRWMD, FDEP, Nestle Waters North America, Packaging Corporation of America, and the Georgia Department of Natural Resources, Environmental Protection Division (EPD).

Figure 8: November 2012 Lake Levels



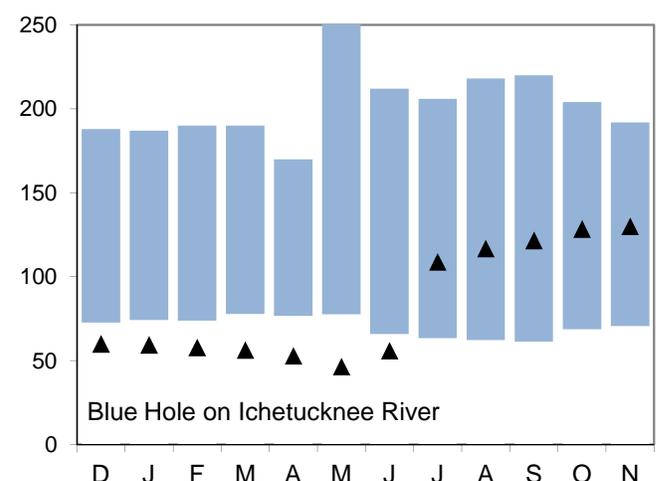
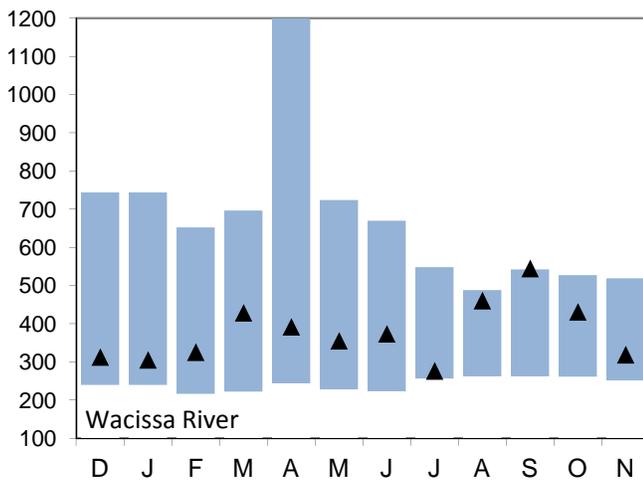
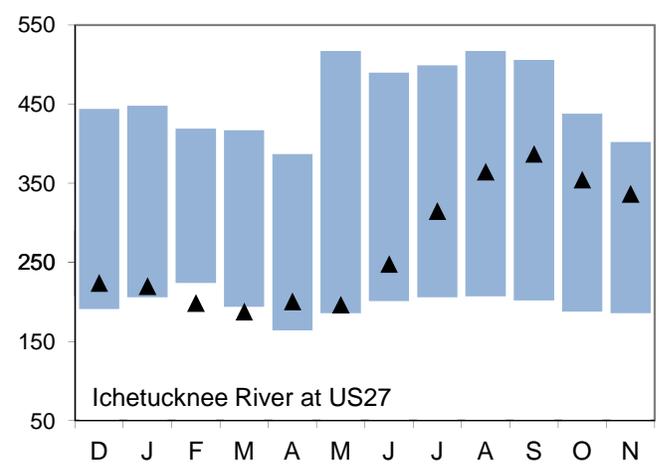
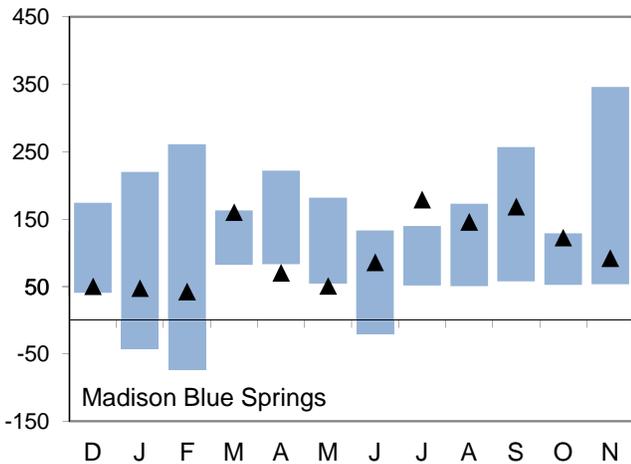
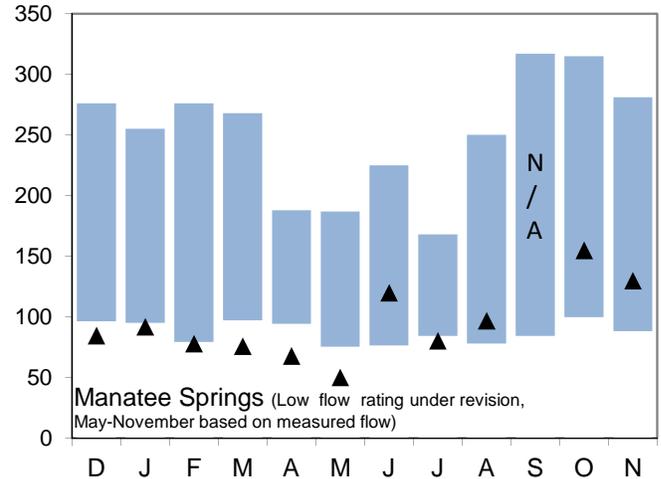
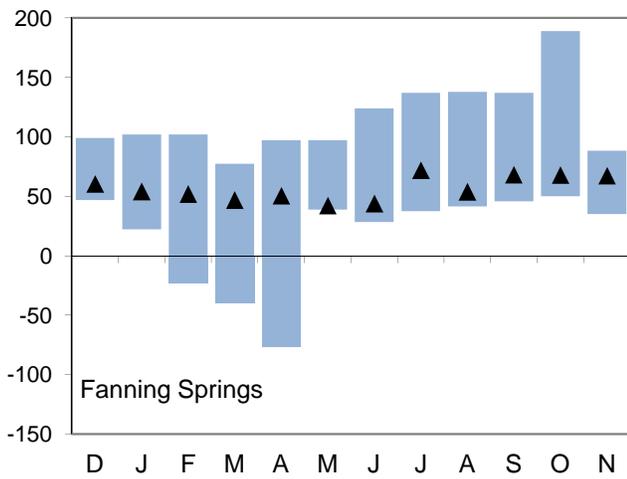
SRWMD lakes react differently to climatic changes depending on their location in the landscape. Some lakes, in particular ones in the eastern part of the District, are embedded in a surficial or intermediate aquifer over relatively impermeable clay deposits. These lakes rise and fall according to local 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 full. If aquifer levels are low, these lakes go dry even if rainfall is normal.

The District monitors 15 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.



BG = Below Lowest Limit of Gage

Figure 9a: Monthly Springflow Statistics
 Flows December 1, 2011 through November 30, 2012
 Springflow data are given in cubic feet per second.
 Statistics based on 2002-2011 data.
Data are provisional.

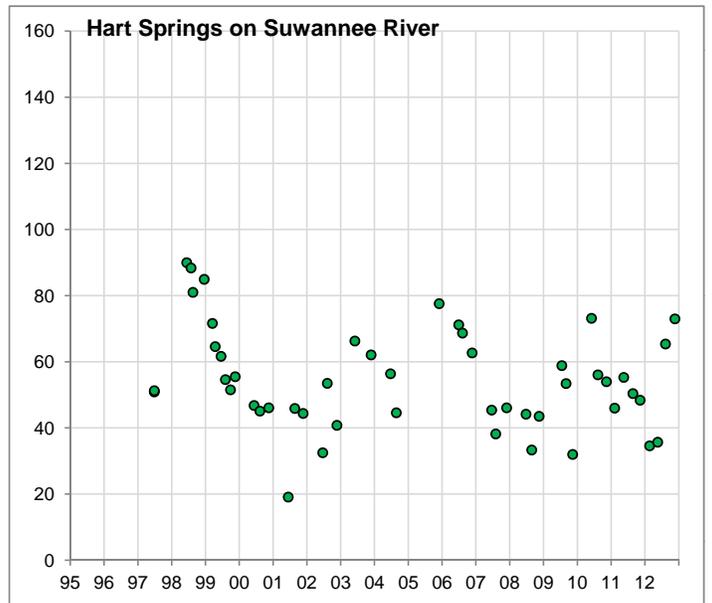
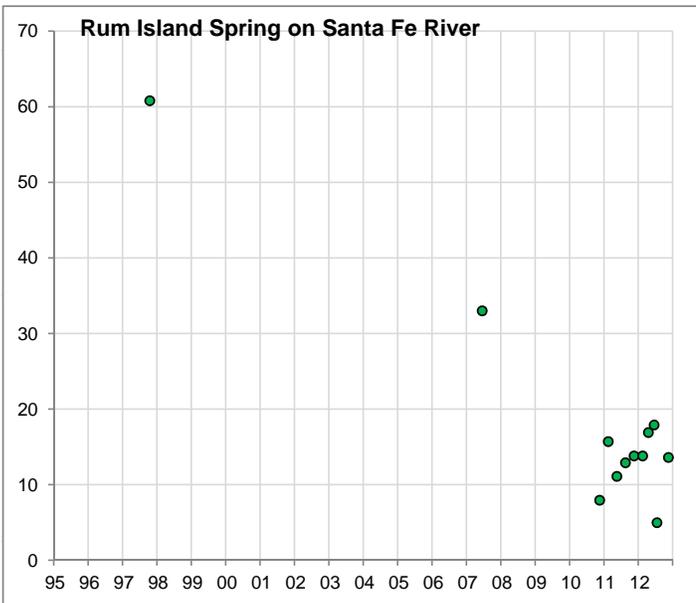
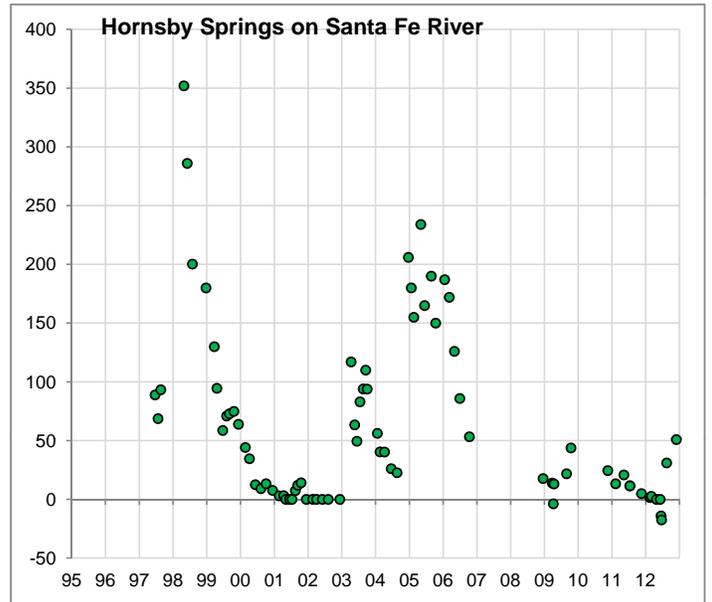
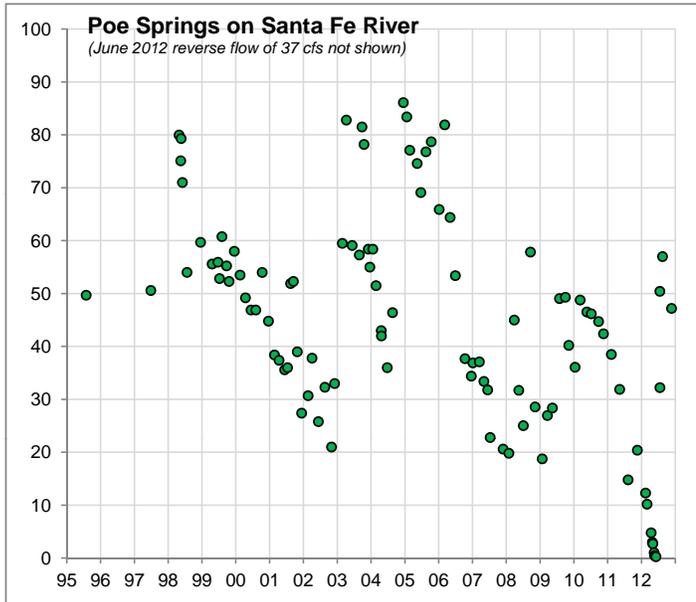


Note: Rising river levels caused by high tides or flooding can cause springflow to slow or reverse. Springflow for months marked by an asterisk (*) was strongly affected by river conditions. Data will be revised once approved and published by the U.S. Geological Survey.

Figure 9b: Quarterly Springflow Measurements

The SRWMD monitors water quality at 30 springs. Flow is measured at the time of the sampling. The springs below were sampled in November 2012. Flow is given in cubic feet per second.

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



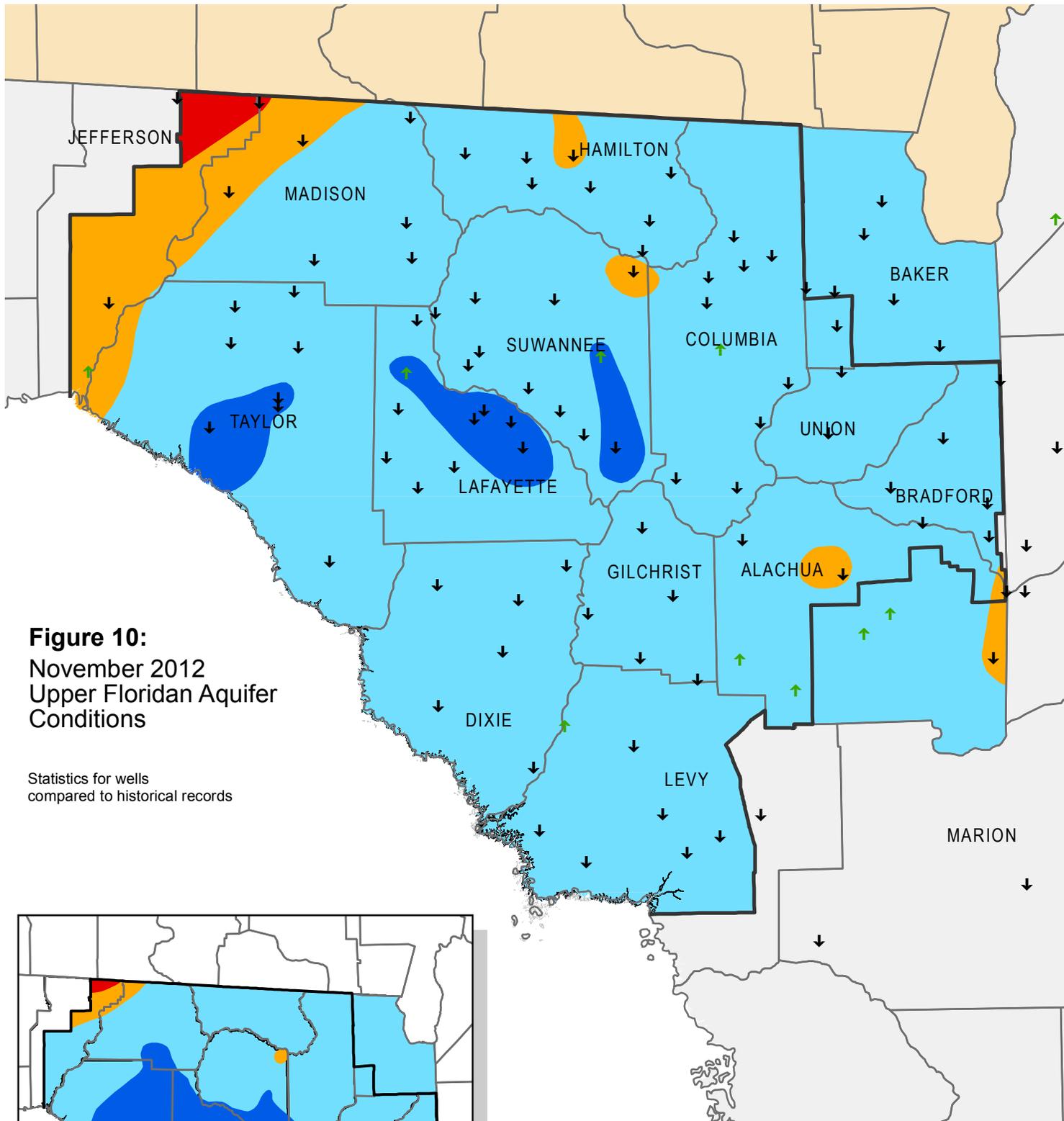
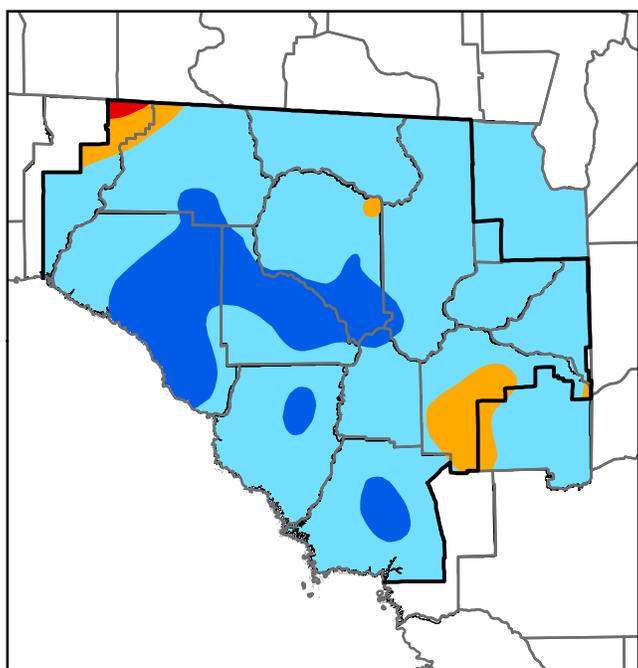


Figure 10:
November 2012
Upper Floridan Aquifer
Conditions

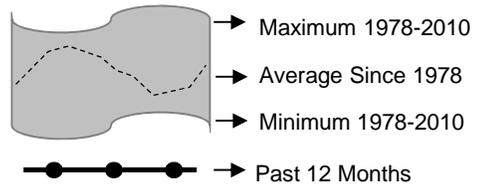
Statistics for wells
compared to historical records



Inset: October 2012 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
- District Boundary

Figure 11: Monthly Groundwater Level Statistics
 Levels December 1, 2011 through November 30, 2012
 Period of Record Beginning 1978
 Datum is NGVD 1929



Historic Low

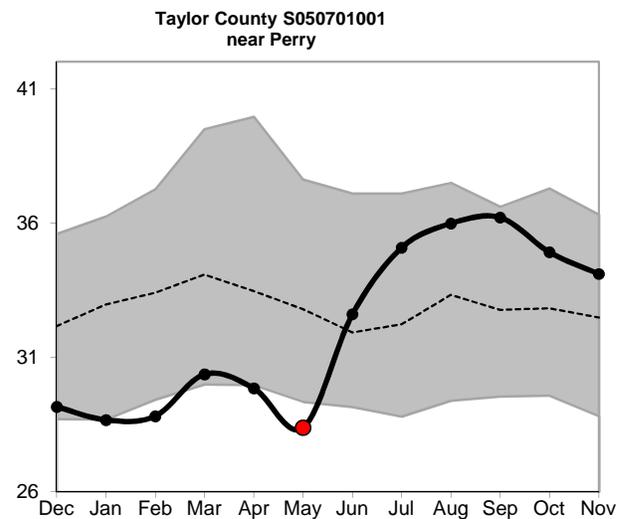
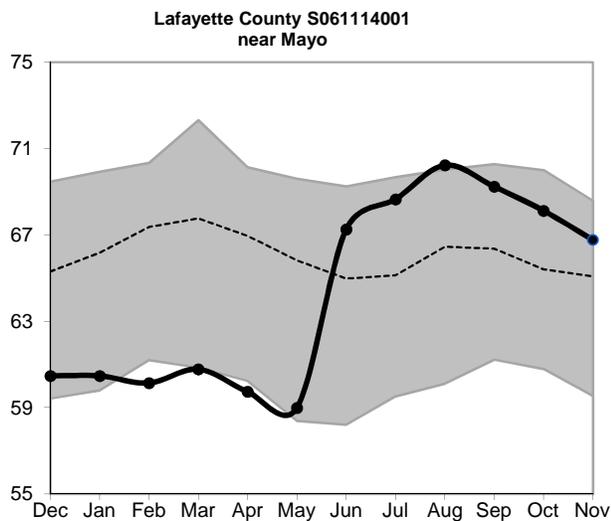
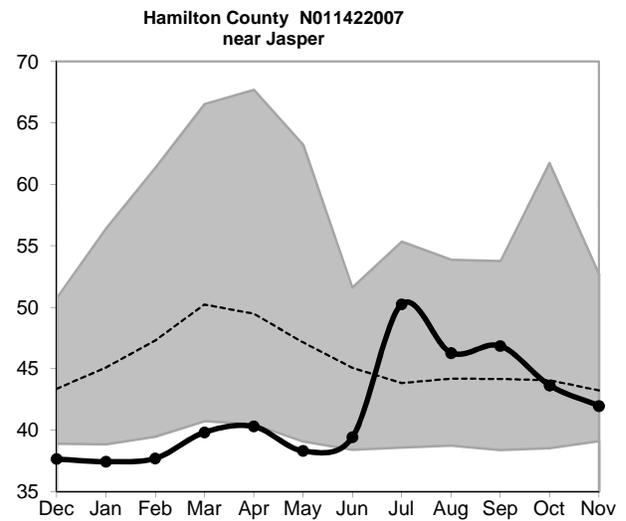
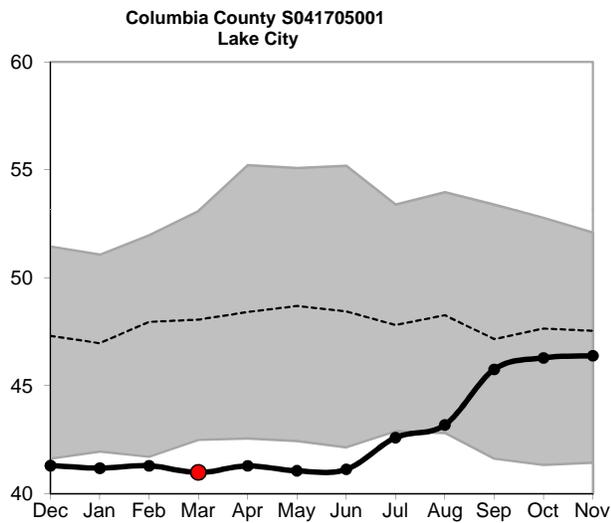
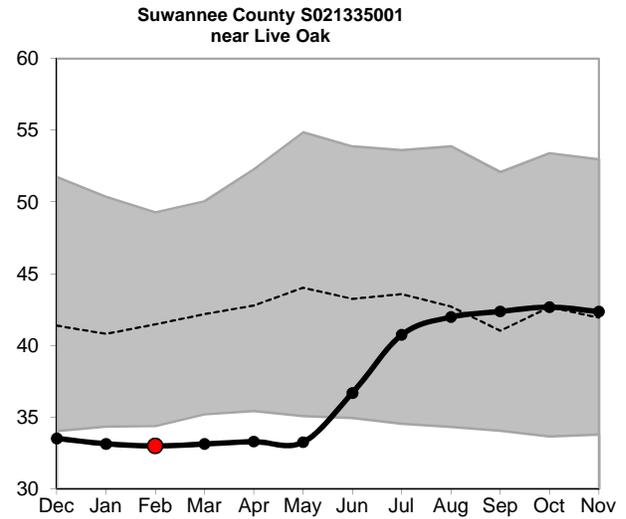
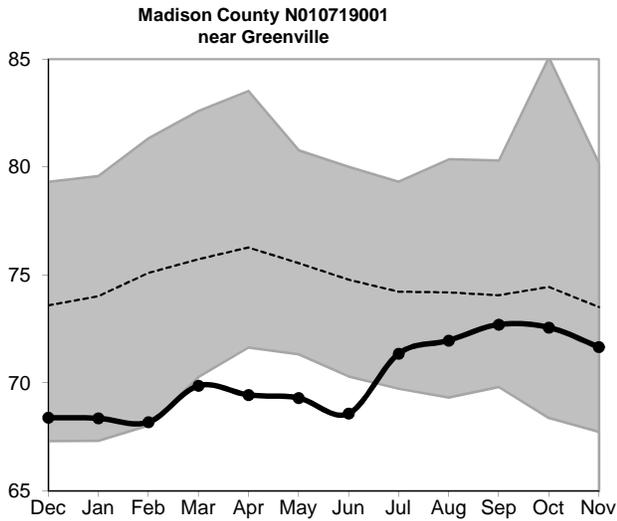
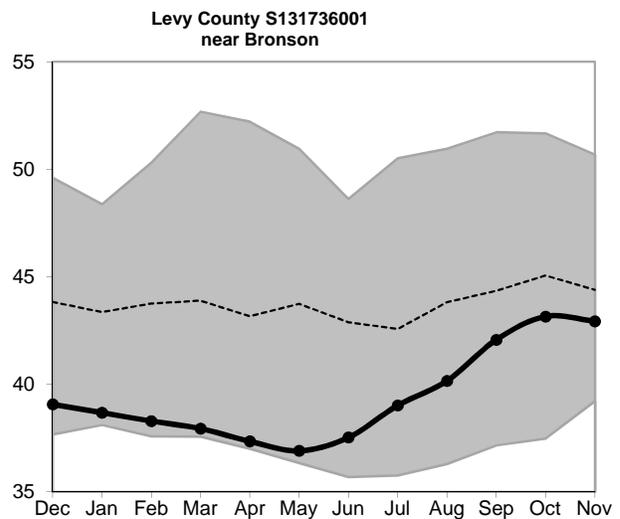
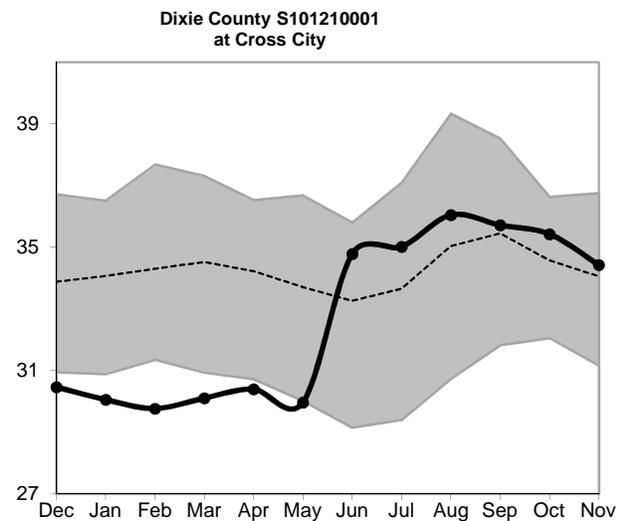
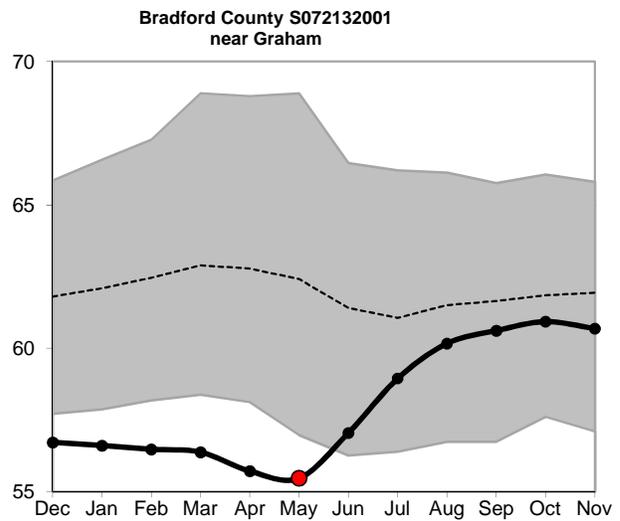
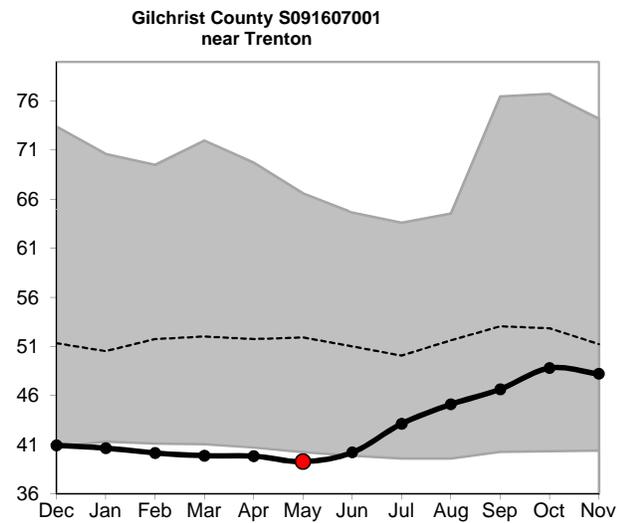
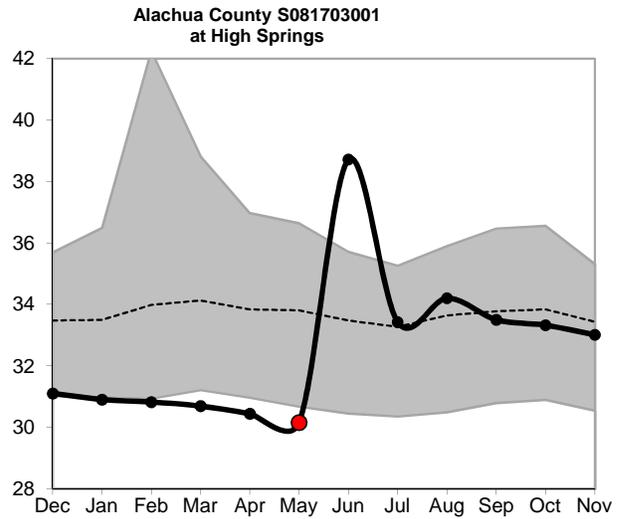
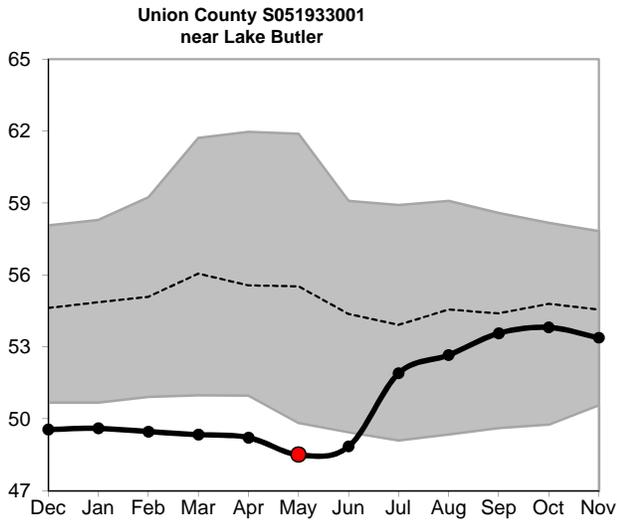
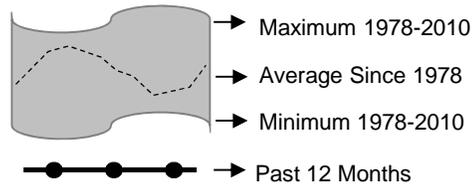


Figure 11, cont.: Groundwater Level Statistics
 Levels December 1, 2011 through November 30, 2012
 Period of Record Beginning 1978
 Datum is NGVD 1929



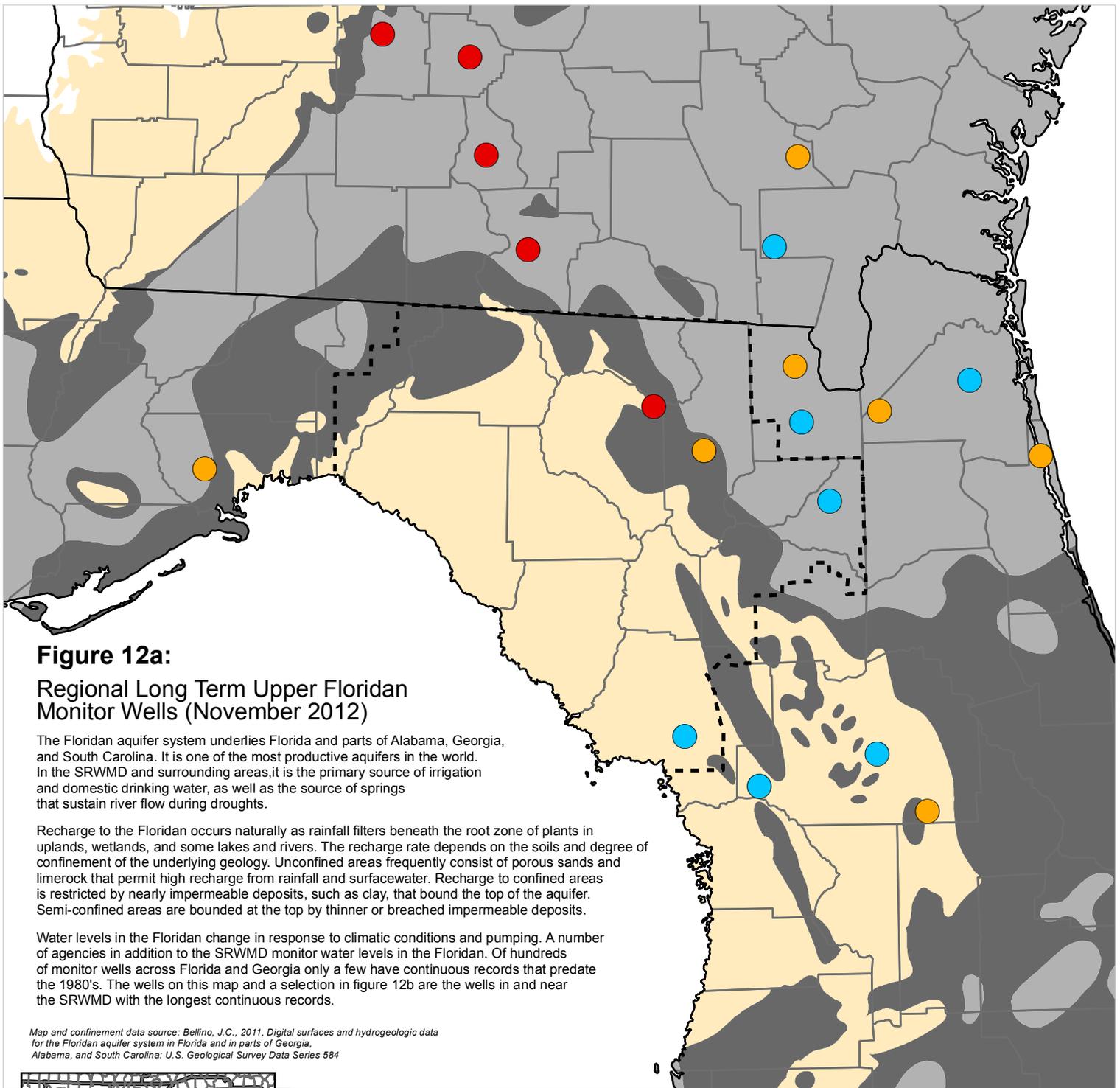


Figure 12a:

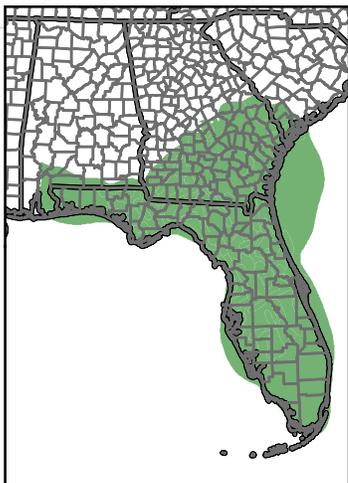
Regional Long Term Upper Floridan Monitor Wells (November 2012)

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

Occurrence 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 2012

Upper Floridan Aquifer levels in feet above mean sea level
Taylor and Sanderson wells courtesy of SJRWMD

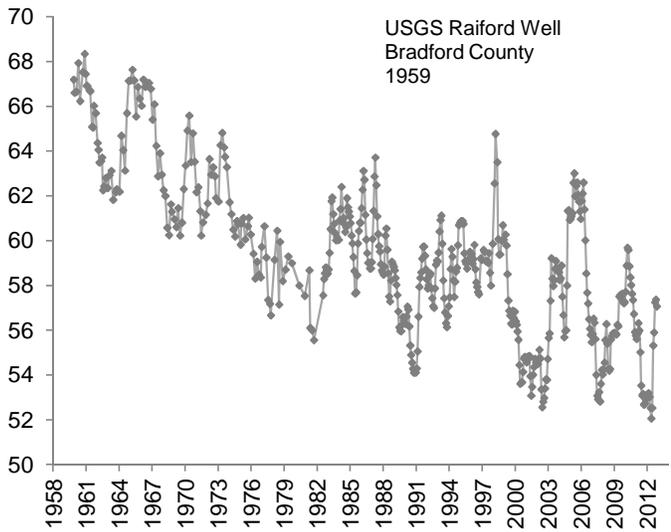
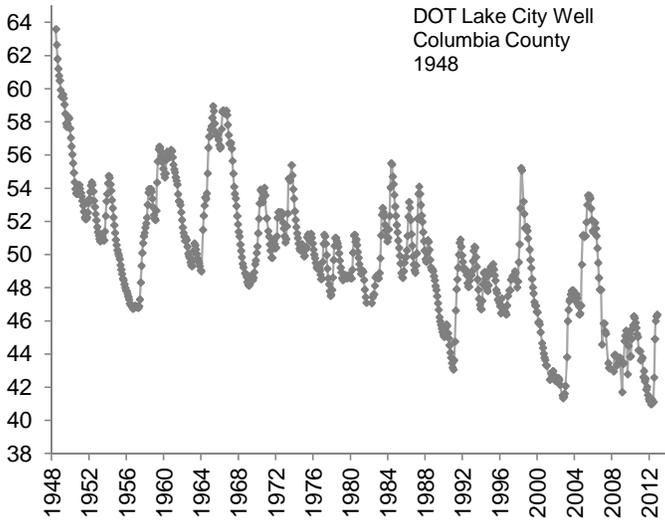
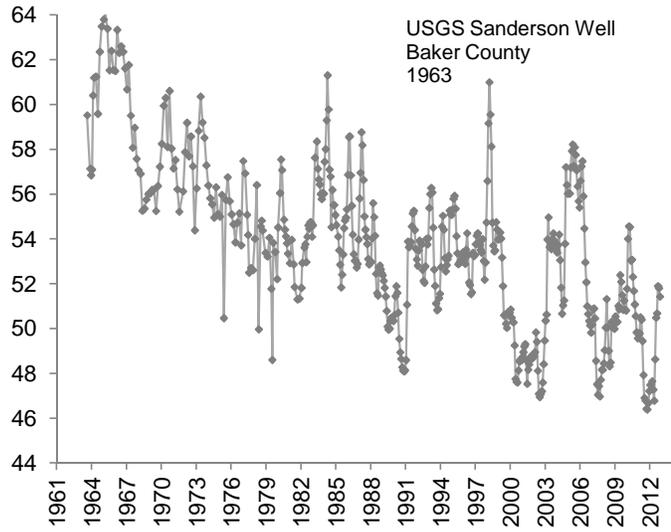
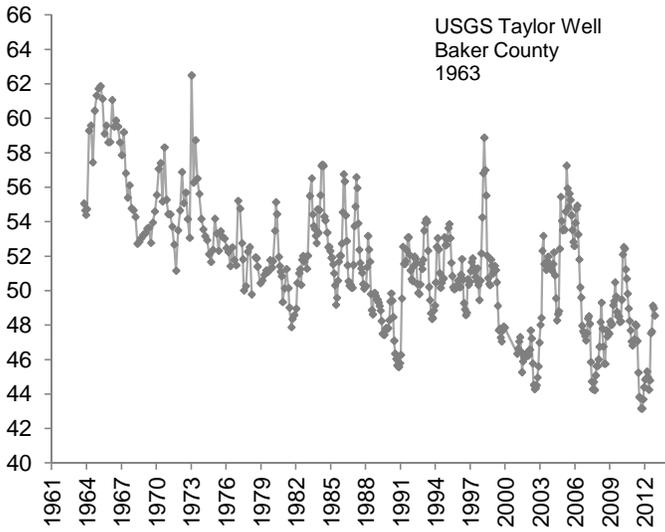
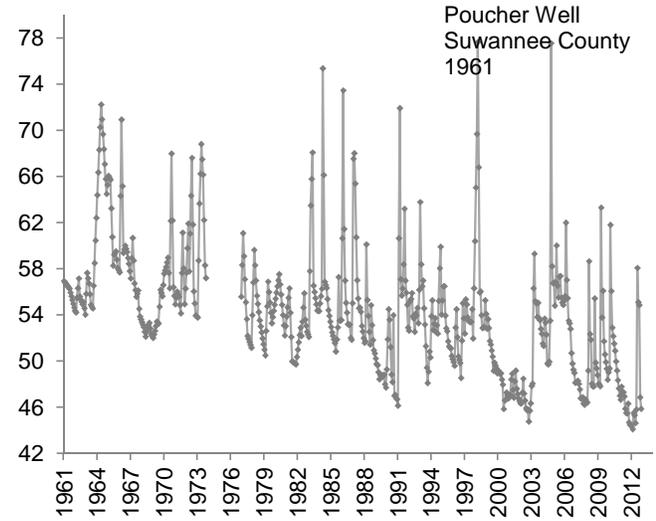
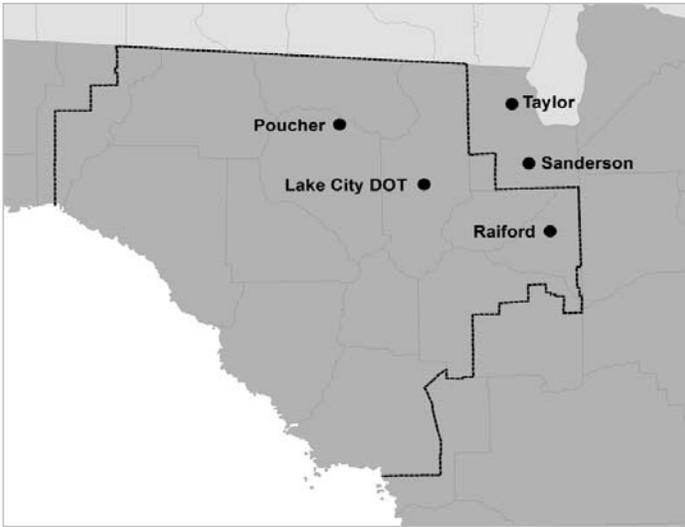


Figure 13: Agricultural Water Use

Daily evapotranspiration (loss of water by evaporation and plant transpiration) and irrigation based on usage reported by up to 106 overhead irrigation systems (12,250 acres total) on a variety of crops throughout the District. These units are part of a network of 164 units installed at 48 agricultural operations by permission of the owners. Evapotranspiration data courtesy of University of Florida IFAS Extension.

