MEMORANDUM

TO: Governing Board

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

THRU: Charles Houder, Acting Executive Director CH.
Jon Dinges, Department Director JMD

DATE: April 5, 2012

RE: March 2012 Hydrologic Conditions Report for the District

RAINFALL

- Average rainfall in March was 3.89", which is 86% of the long-term March average based on records starting in 1932 (Table 1, Figure 1). Most of the accumulation occurred during three frontal systems on March 3-4, the 24th, and the 31st. The first system dropped up to 8" in parts of the Withlacoochee, Alapaha, and upper Suwannee basins in Georgia. All three systems favored the District's northern counties, with the highest accumulations along the I-10 corridor in Madison and Suwannee counties (Figure 2). The storms on the 31st brought up to four inches in the upper Santa Fe basin, but most gaged totals were 2" or less for the event. Except for localized inland areas, accumulations in Taylor, Dixie and Levy counties were less than half of normal (Figure 3). The lowest gaged total in the District was 1.3" in Goethe State Forest in Levy County.
- With 38.82" of rainfall, the 12 months from April 2011 through March 2012 were the driest of all April-March periods since 1932, and the 14th driest of all 12-month periods (May 2006 through June 2007 with 36.28" is the lowest in the record). The 12-month deficit increased by 1.4" to 15.7". Deficits improved slightly in the upper Suwannee and Santa Fe basins, but the overall deficit increased in each river basin with the exception of the Santa Fe (Figure 4). Figure 5 shows the change in annual deficits beginning in 1998. The average 3-month deficit was 4.6", the 9th lowest January-March total since 1932.

SURFACEWATER

- **Rivers**: The storm in Georgia on March 3-4 brought the Withlacoochee near Pinetta up by 9' and the Alapaha near Jennings up by 13'. Peak flows at these gages were between the 50th and 75th percentile for the time of year. The Suwannee at Branford rose by nearly 6'. By the end of the month, flow at most Suwannee gages fell back to below the 10th percentile, but Branford was still 2' higher than the nearly record-low stages seen in February. The system that caused the Suwannee to rise did not affect the Santa Fe basin, so gages

from Graham to Fort White remained extremely low throughout the month. Gages closer to the Suwannee confluence saw higher stages caused by the rising Suwannee. The Santa Fe River near Fort White has been below the 7-day, 10-year low flow for a year, and in mid-month set an apparent new low 365-day flow (based on provisional data), falling below the previous low observed in late 2002. The Steinhatchee River remained below the 5th percentile of daily flows throughout the month. Heavy rain improved conditions on the Aucilla and Econfina rivers by mid-month, but flows fell back to below normal. Daily discharge statistics for six river stations are presented in Figure 6 and streamflow conditions for major gages are shown in Figure 7.

- **Lakes**: All monitored lakes were below their long-term average levels at the end of the month. Sneads Smokehouse Lake, which is part of the Aucilla River in northern Jefferson County, crested at its highest level since March 2010 after several months of record-breaking low levels. Figure 8 shows levels relative to the long-term average, minimum, and maximum levels for 14 lakes.
- **Springs:** Average March flow relative to historical flows is shown for 6 spring systems in Figure 9. Daily flow rates at the spring-fed Ichetucknee River were approximately 10% higher than record drought-induced lows observed in 2002. The Wacissa River saw flows improve by 10% from February. The relatively modest rise on the Suwannee River caused springs to backflow or become inundated with brown river water, including White Sulphur Springs which backflowed for 12 days. Alachua County staff recorded the lowest flow in the record at Poe Springs on February 29. The lowest stage in its 15-year record was recorded at Wekiva Springs in Levy County. Levy County staff reported the lowest stage in the 15-year record at Levy Blue Spring near Bronson, a popular county park. The flow at Levy Blue dropped so low that county staff reported tannic water from downstream wetlands flowing back into the pool, causing the spring to turn brown. Manatee Springs flow continued to decline below rates observed in other droughts. Verification of the Manatee Springs stage-velocity-discharge relationship under conditions not previously observed is ongoing by the U.S. Geological Survey.

GROUNDWATER

Floridan aquifer monitor wells in Jefferson County, Madison County, northern Taylor County, and along the river corridors in Hamilton and Suwannee counties reported rising levels after the heavy rains in early March, but the improved levels were still below normal for this time of year. Groundwater levels influenced by the Suwannee and Alapaha rivers fell as the rivers receded in the second half of the month. Wells in other parts of the District remained extremely low. Seventy-one wells reported record low levels for March, and 9 wells had all-time lows (Figure 10). Overall, levels improved in 55% of the monitored wells, with an average rise of 0.6'. Conditions averaged across the District compared to all historic levels rose to the 9th percentile

from the 5th percentile the previous month (based on records beginning no earlier than 1978) due to the higher levels in the northern counties and along the Suwannee River. In the northeast part of the District, levels that had crept up slowly during the winter appeared to plateau, with levels in the lowest 5% of readings. Wells in the eastern part of Bradford County continued to fall below previous records. Levels also trended down in most of Levy, Gilchrist, and Alachua counties. Seventy-nine percent of the wells were in the bottom 10% of all recorded levels compared to 88% the previous month, and 60% were in the bottom 5%. Statistics for a representative sample of wells are shown in Figure 11, and Figure 12 shows graphs of Floridan aquifer wells in or near the District with the longest continuous records.

HYDROLOGICAL/METEOROLOGICAL/WATER USE INFORMATION

- The District monitors agricultural water use on 106 overhead irrigation systems. The average daily application rate in March was 0.04". Figure 13 shows average daily application and evapotranspiration since 2008.
- 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 indicated severe drought during the last week of March in the District and moderate drought in south central Georgia.
- Based on 7-day average streamflow ending April 4, the U.S. Geological Survey categorized the Suwannee River basin including the Georgia tributaries as experiencing severe hydrologic drought, and the Waccasassa, Steinhatchee, Fenholloway, Econfina, and Aucilla basins under moderate hydrologic drought.
- A La Niña advisory remains in effect from the National Weather Service Climate Prediction Center, although the Pacific Ocean cooling anomaly responsible for the La Niña effect has peaked and is expected to transition to neutral conditions in April. The precipitation probability for April is below normal, and the 3-month outlook through June is for equal chances of above or below normal precipitation. Above-normal temperatures are expected through June.

CONSERVATION

A Water Shortage Advisory is in effect. Users are urged to eliminate unnecessary uses. Landscape irrigation is limited to two days per week between March and November based on a 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 (109 wells), surfacewater (35 stations), agricultural water use (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	Mar-2012	March Average	Last 3 Months	Last 12 Months
Alachua	3.69	4.21	6.38	37.67
Baker	3.94	4.36	6.53	36.29
Bradford	2.98	4.29	4.85	35.24
Columbia	4.47	4.62	7.38	38.42
Dixie	2.54	4.79	6.33	41.32
Gilchrist	3.45	4.84	6.58	41.60
Hamilton	5.32	5.17	9.64	37.14
Jefferson	3.89	5.80	8.97	34.79
Lafayette	4.07	5.03	7.43	38.46
Levy	2.13	5.03	5.82	39.46
Madison	5.76	5.72	11.32	42.12
Suwannee	5.10	5.17	9.01	42.15
Taylor	3.99	5.34	7.65	36.46
Union	3.79	4.85	6.33	40.21

March 2012 Average:	3.89
Historical March Average (1932-2011):	4.52
Historical 12-month Average (1932-2011):	54.56
Past 12-Month Total:	38.82
12-month Rainfall Deficit:	-15.74

(Rainfall reported in inches)

Figure 1: Comparison of District Monthly Rainfall

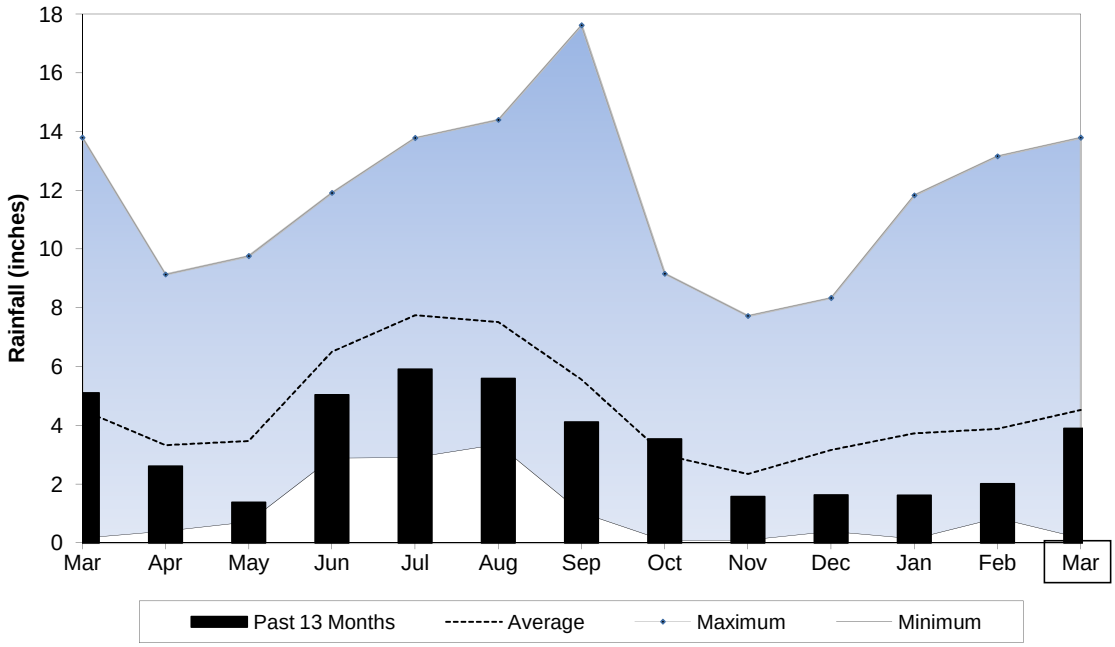


Figure 2: March 2012 Rainfall Estimate

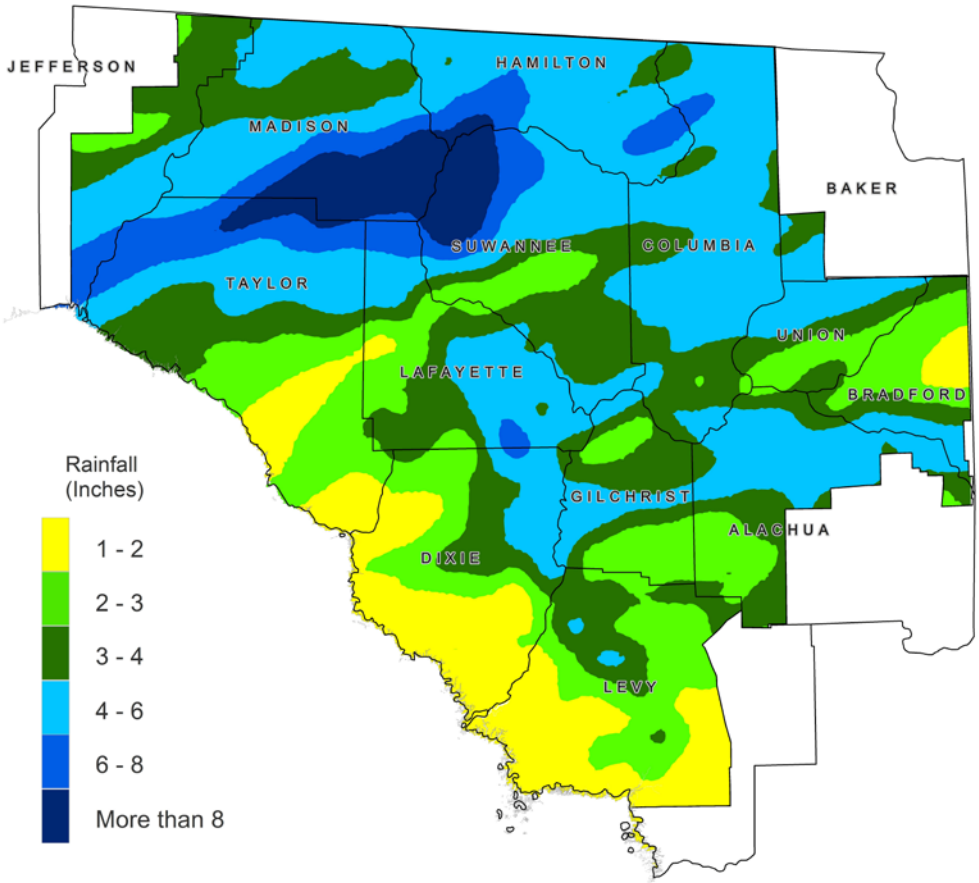


Figure 3: March 2012 Regional Percent of Normal Rainfall

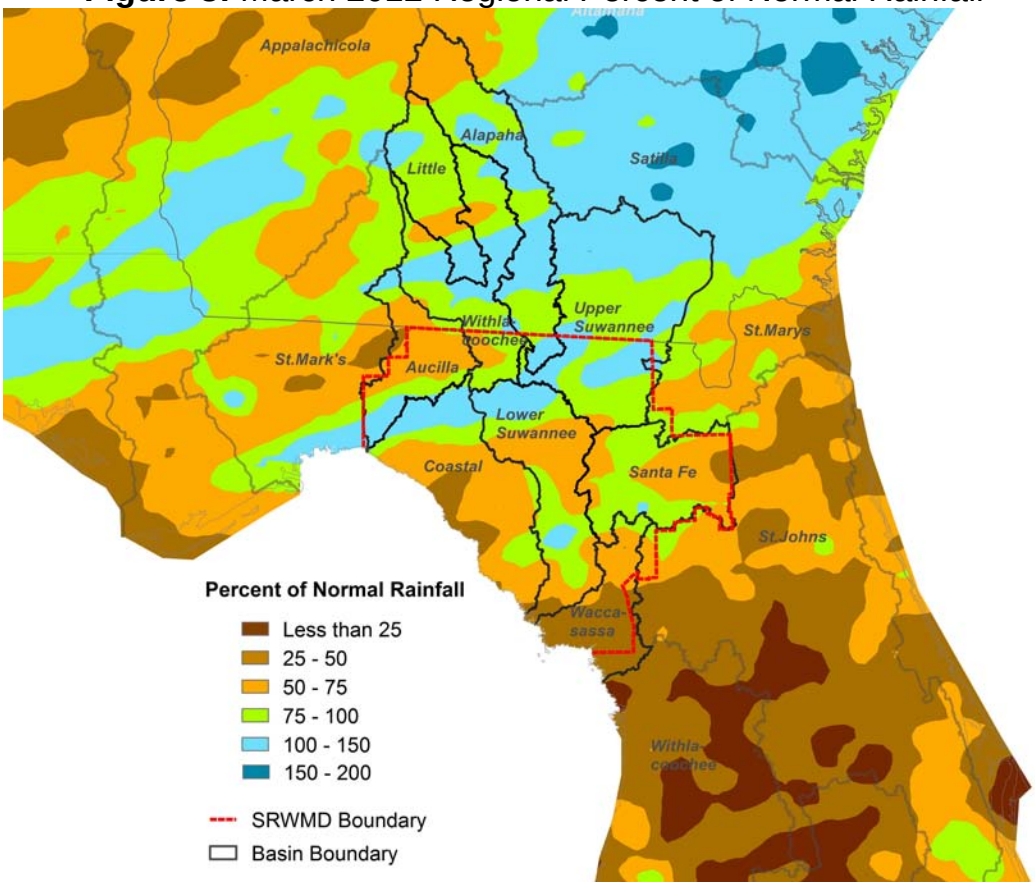


Figure 4: 12-Month Rainfall Surplus/Deficit by River Basin
Ending March 31, 2012

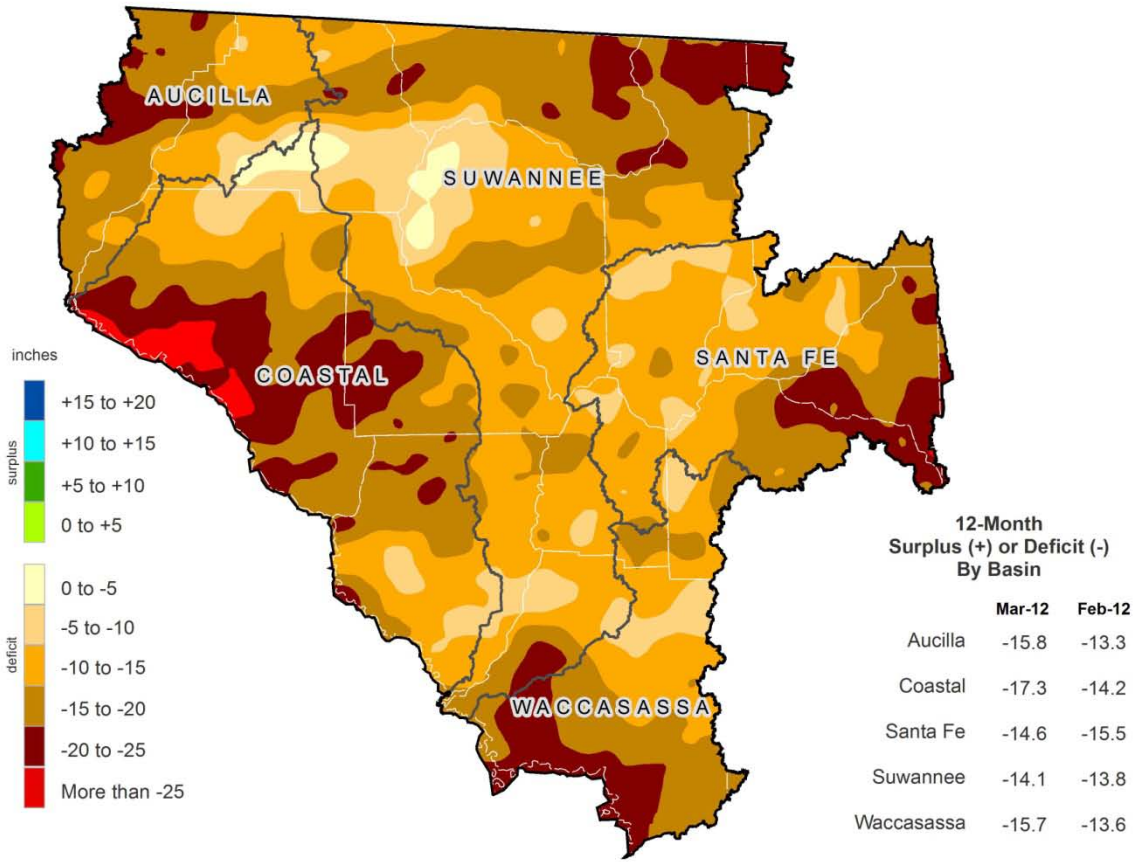


Figure 5: 12-Month Rolling Rainfall Deficit Since 1998
Difference between observed 12-month rainfall and the long-term average over the same period

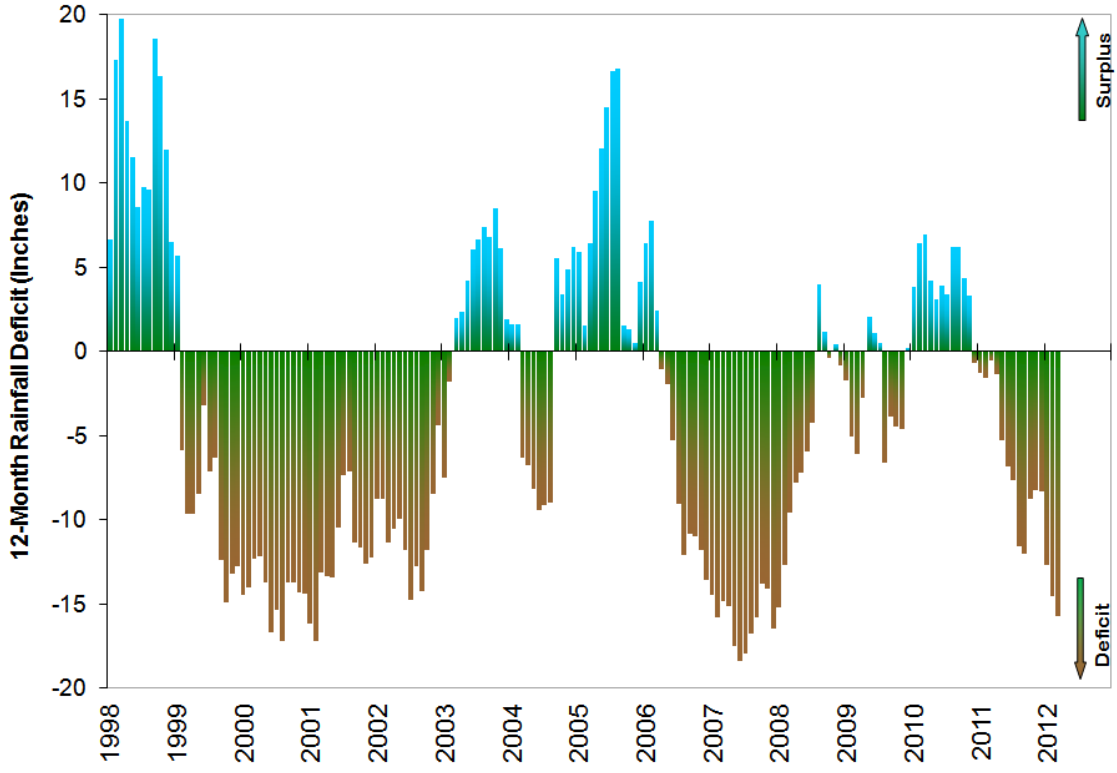
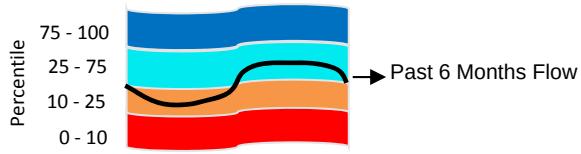
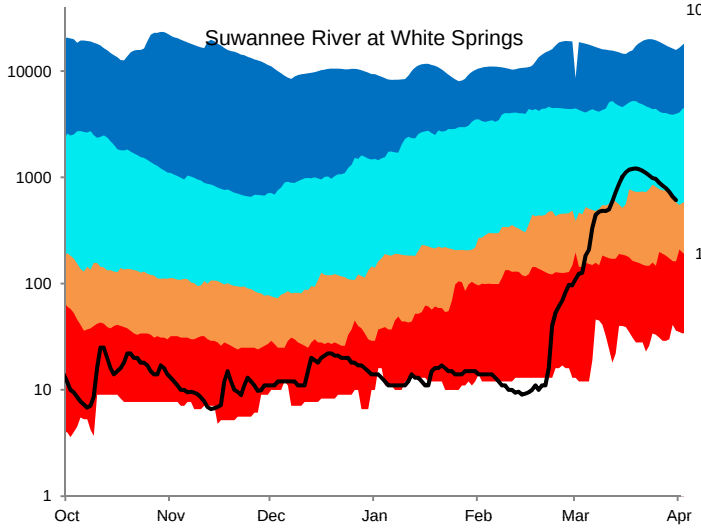


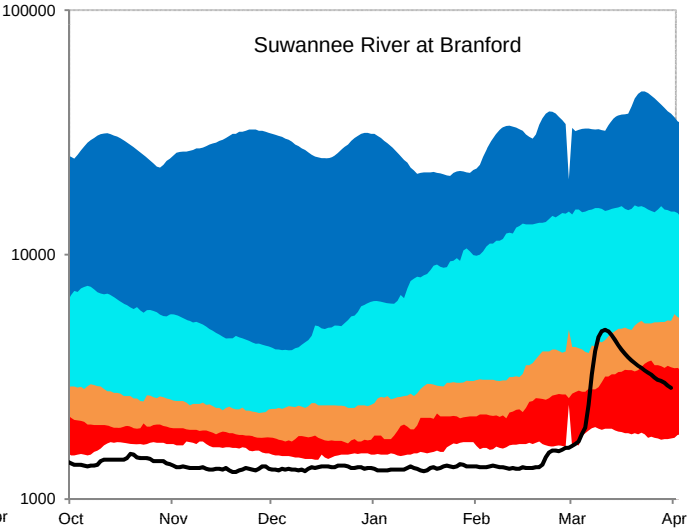
Figure 6: Daily River Flow Statistics

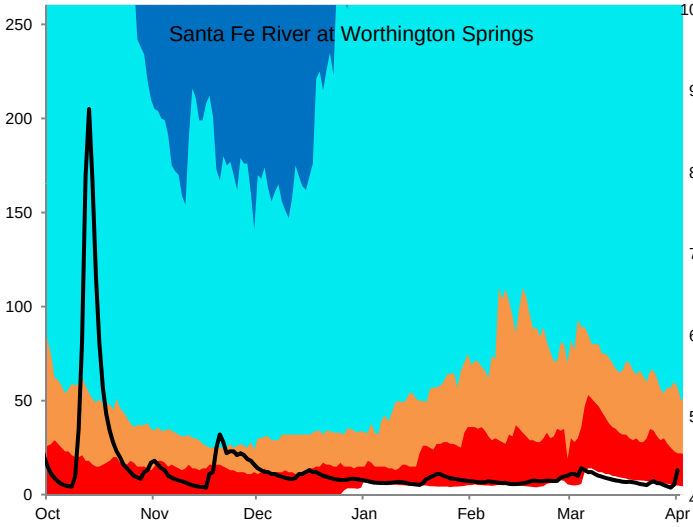
October 1, 2011 through March 31, 2012

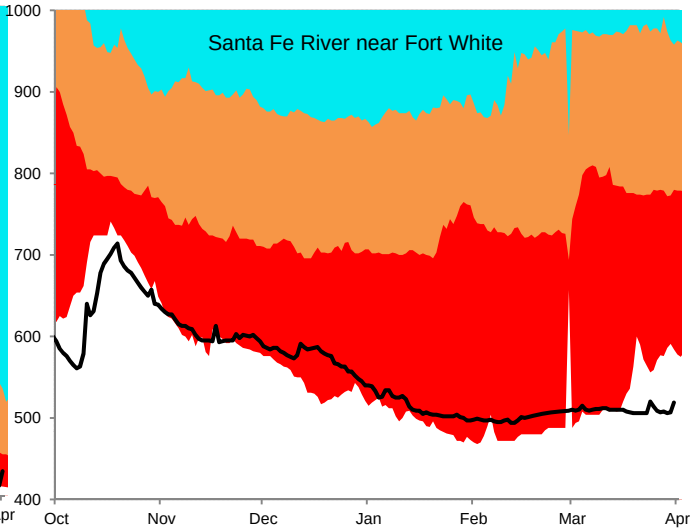


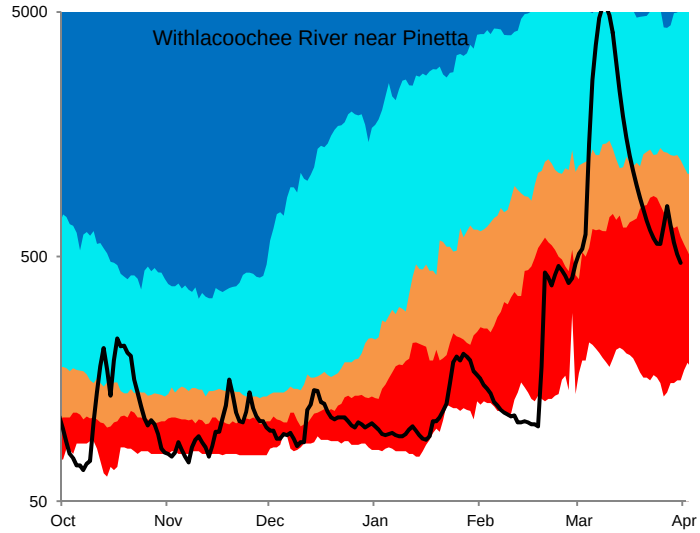
RIVER FLOW, CUBIC FEET PER SECOND

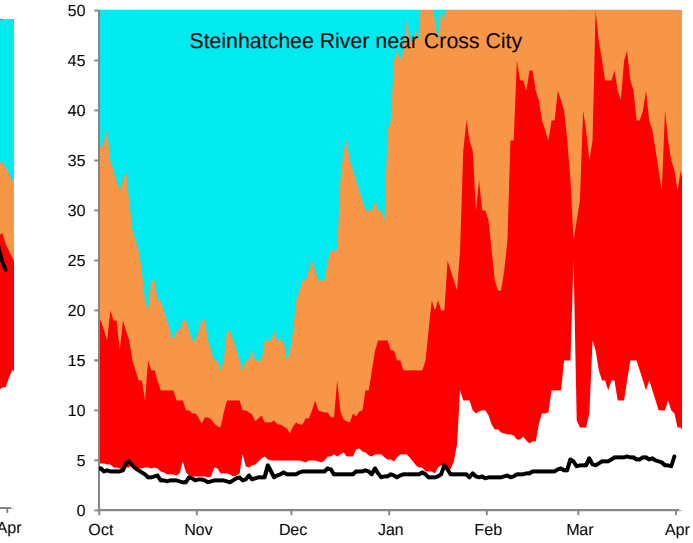












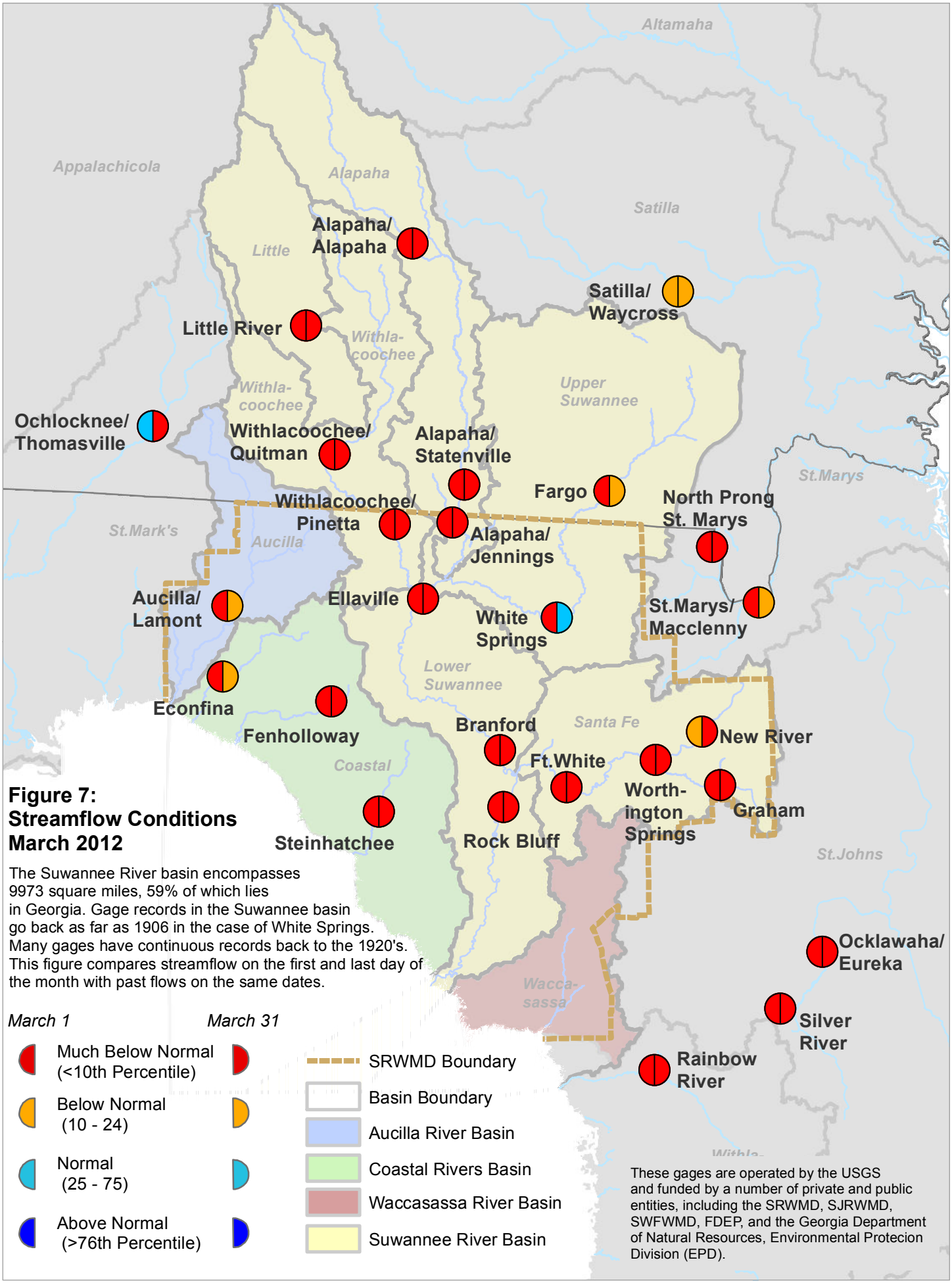


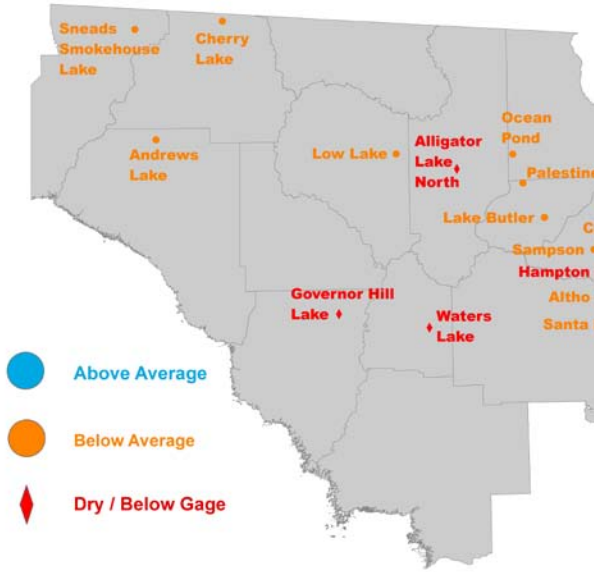
Figure 7:
Streamflow Conditions
March 2012

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.

March 1	*March 31*	
Much Below Normal (<10th Percentile)		
Below Normal (10 - 24)		
Normal (25 - 75)		
Above Normal (>76th Percentile)		

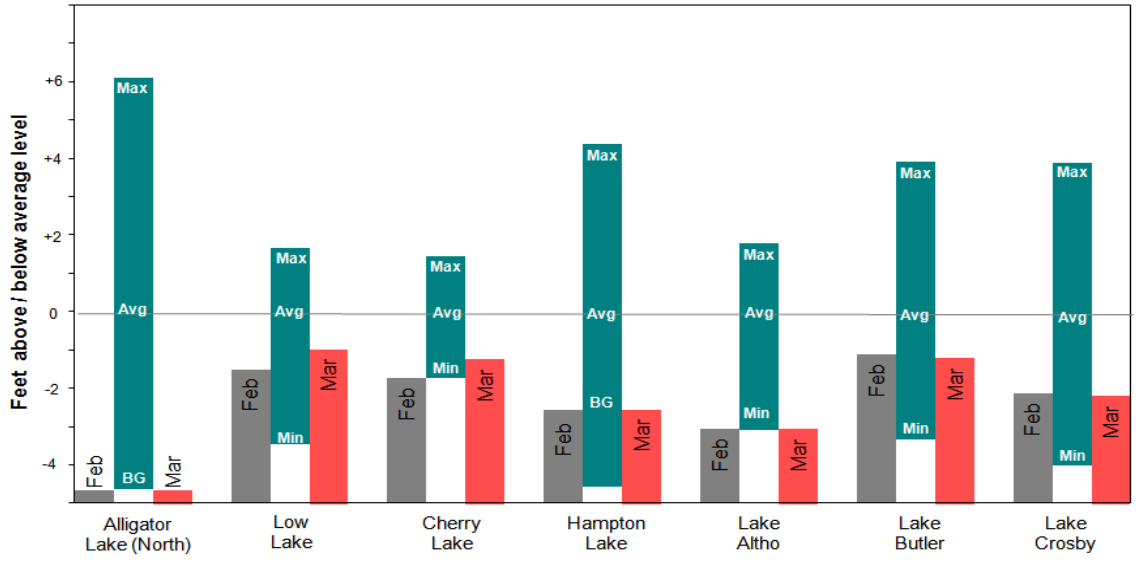
These gages are operated by the USGS and funded by a number of private and public entities, including the SRWMD, SJRWMD, SWFWMD, FDEP, and the Georgia Department of Natural Resources, Environmental Protecion Division (EPD).

Figure 8: March 2012 Lake Levels

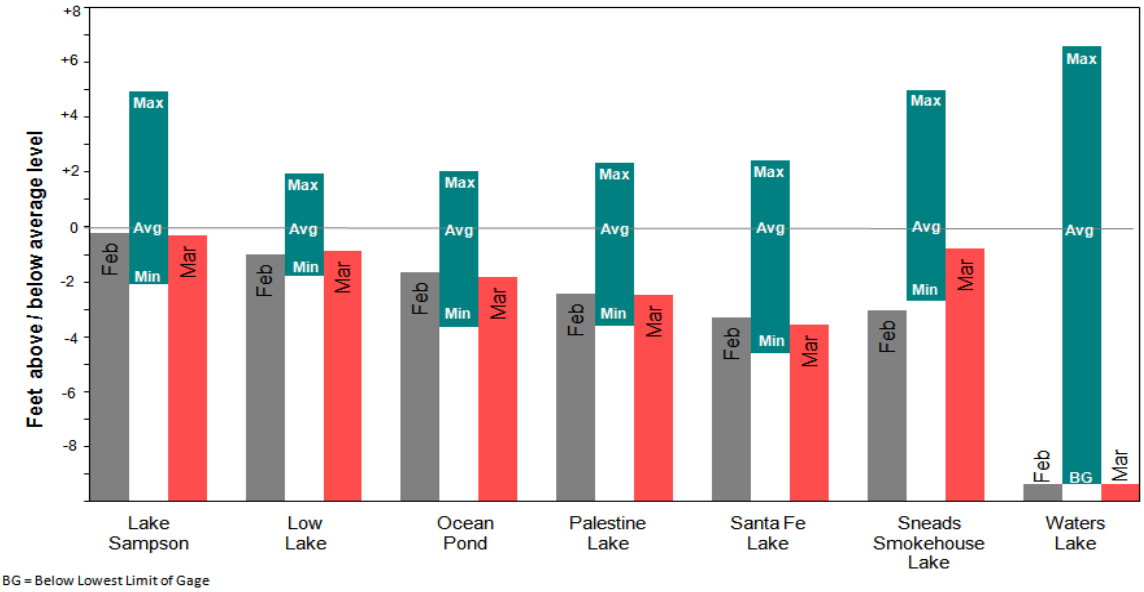


SRWMD lakes react differently to climatic changes depending on their location in the landscape. Some lakes, in particular ones in the eastern part of the District, are embedded in a surficial or intermediate aquifer over relatively impermeable clay deposits. These lakes rise and fall according to local 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 1970's, although the Sampson Lake record starts in 1957.



BG = Below Lowest Limit of Gage



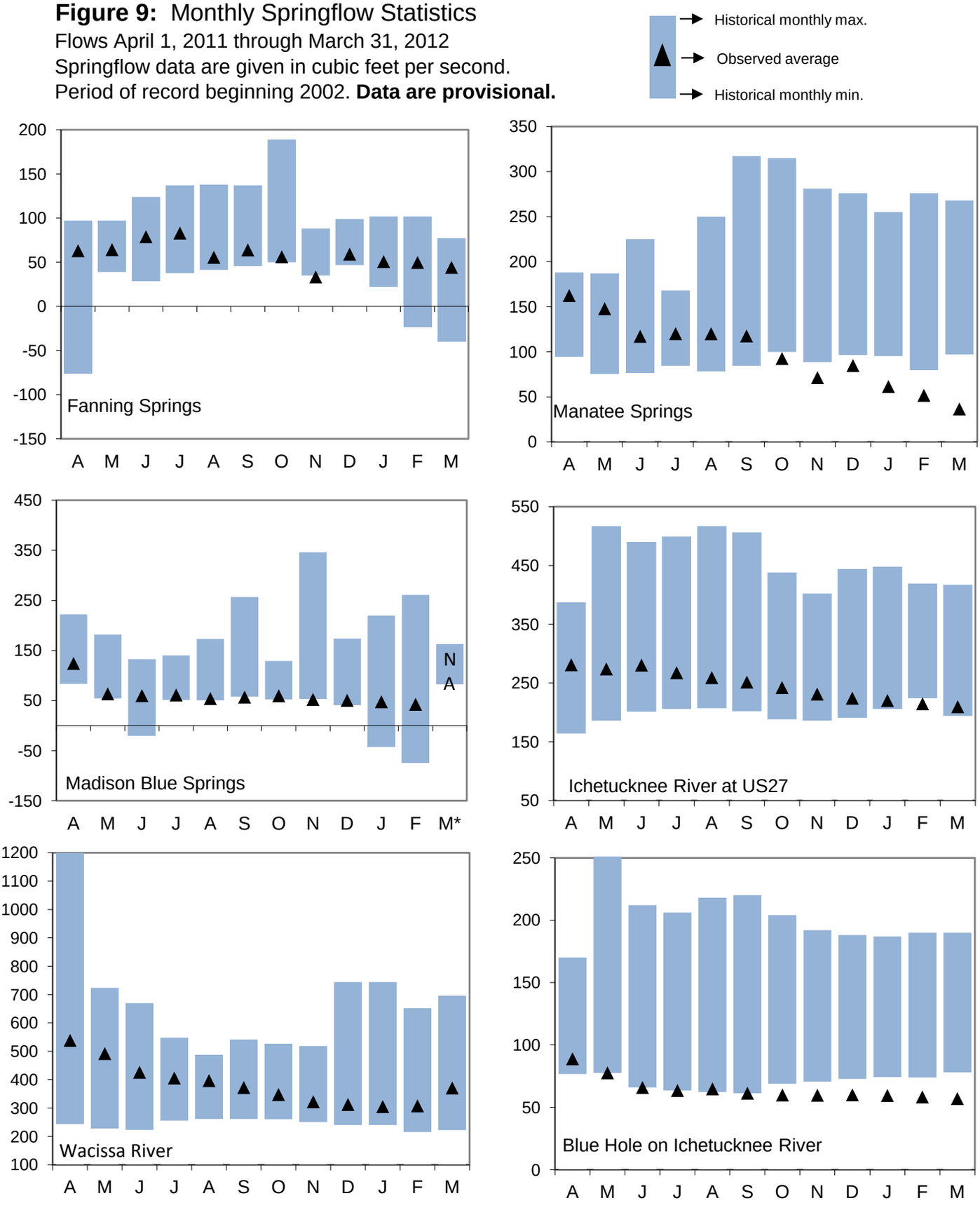
BG = Below Lowest Limit of Gage

Figure 9: Monthly Springflow Statistics

Flows April 1, 2011 through March 31, 2012

Springflow data are given in cubic feet per second.

Period of record beginning 2002. **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.

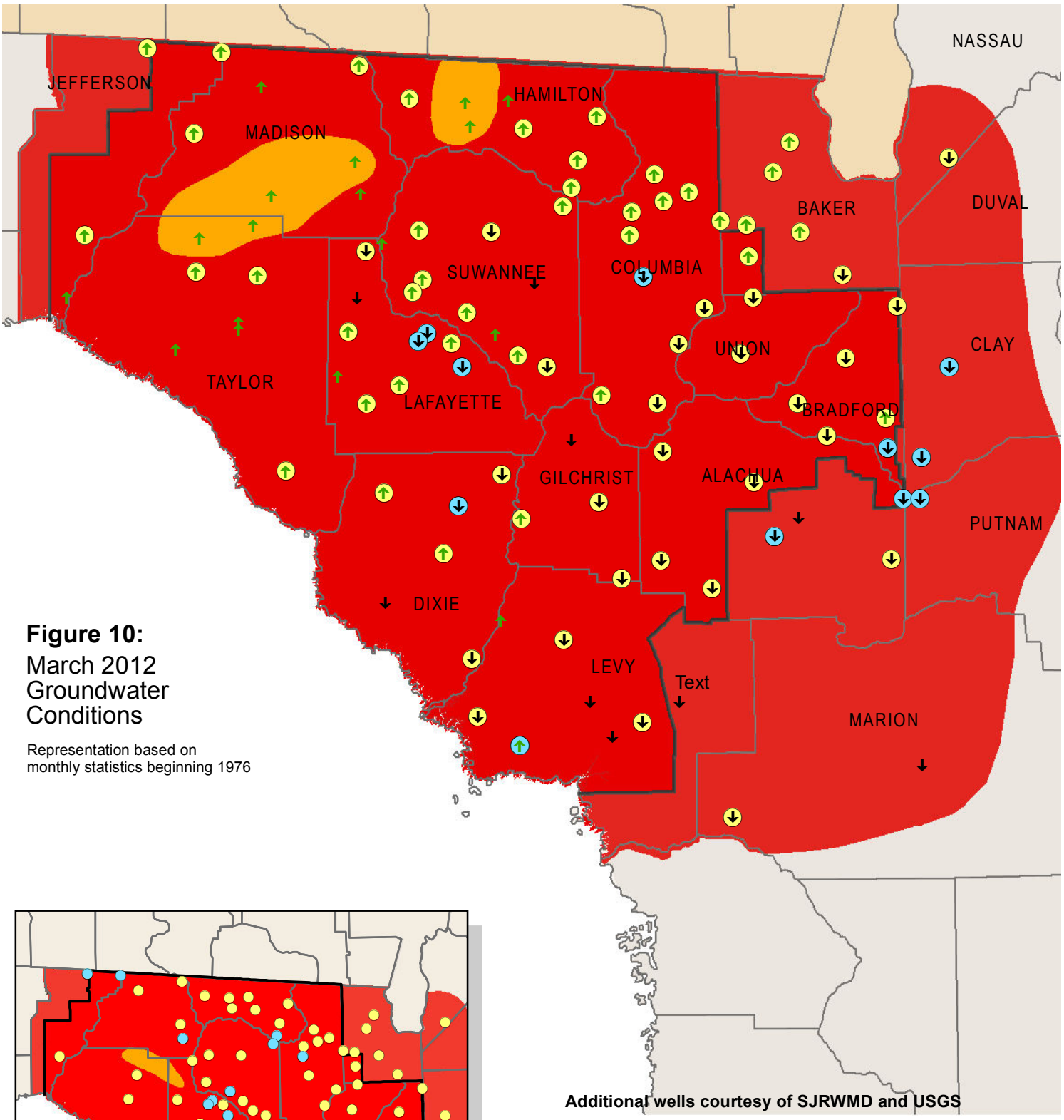
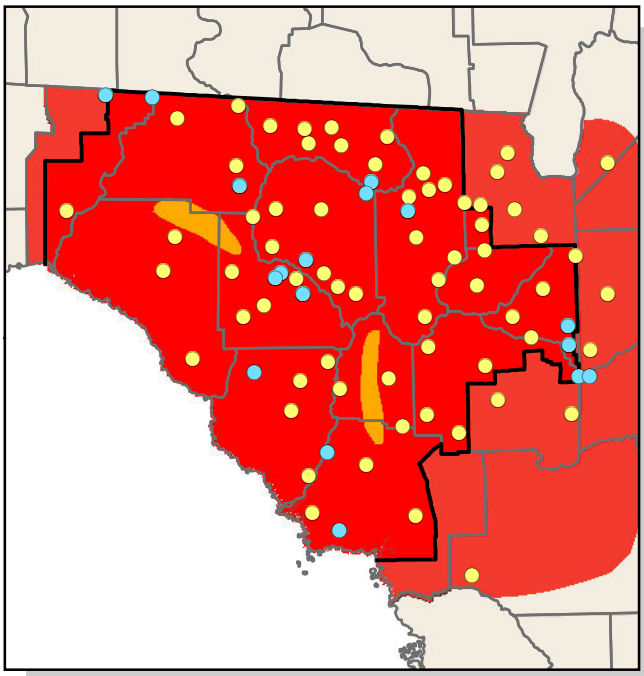


Figure 10:
March 2012
Groundwater
Conditions

Representation based on
monthly statistics beginning 1976



Inset: February 2012 Groundwater Levels

Additional wells courtesy of SJRWMD and USGS

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

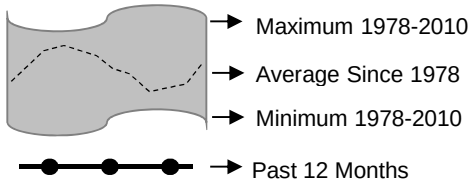
District Boundary

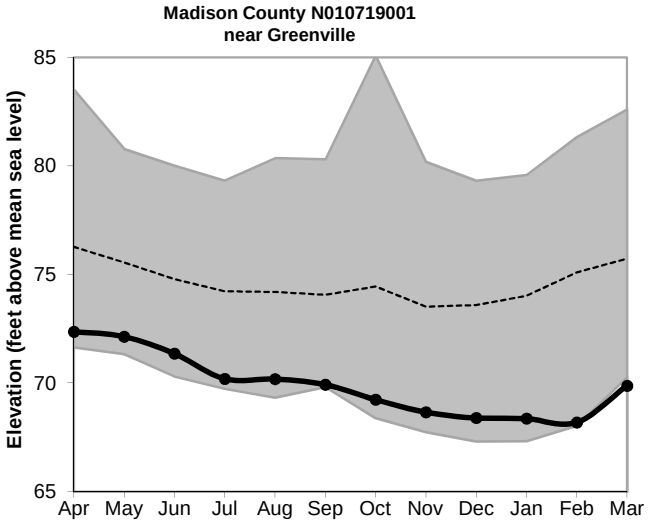
Record Low for Month

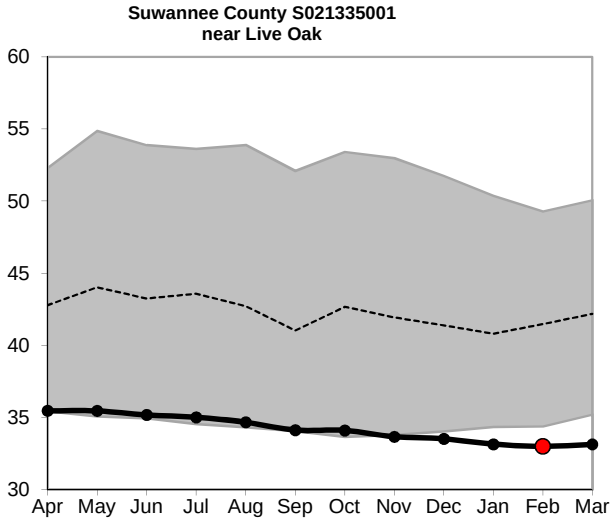
Historic Low

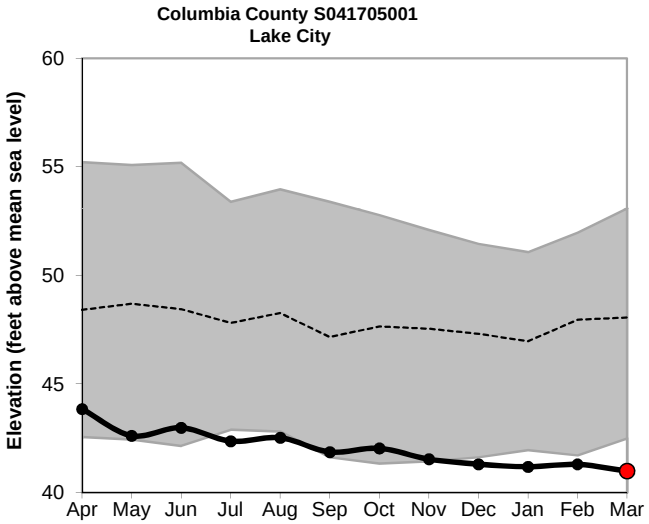
Figure 11: Monthly Groundwater Level Statistics

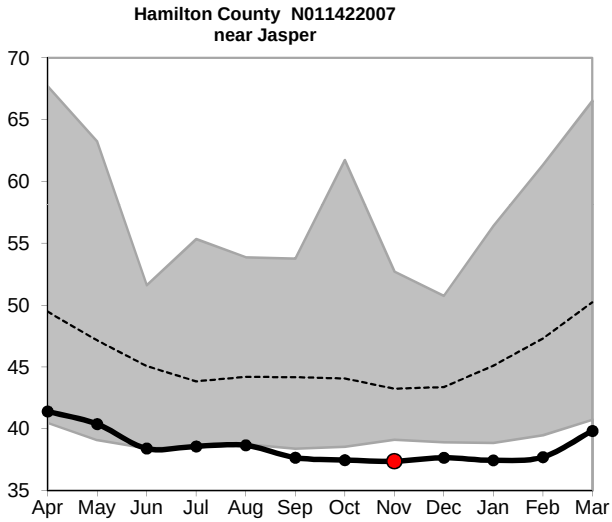
Levels April 1, 2011 through March 31, 2012
Period of Record Beginning 1978

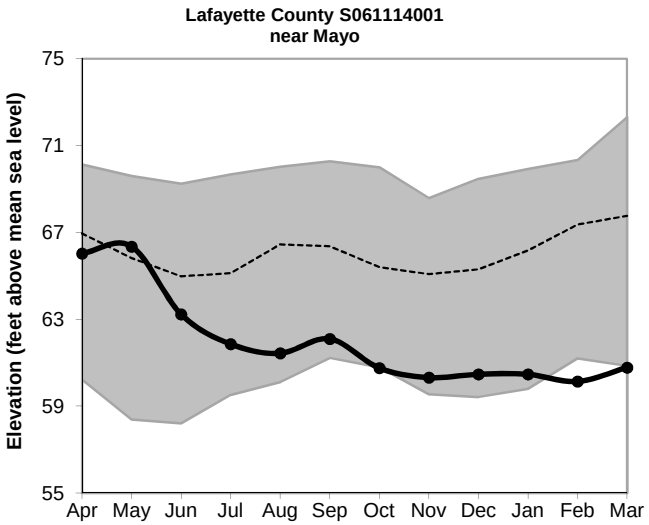












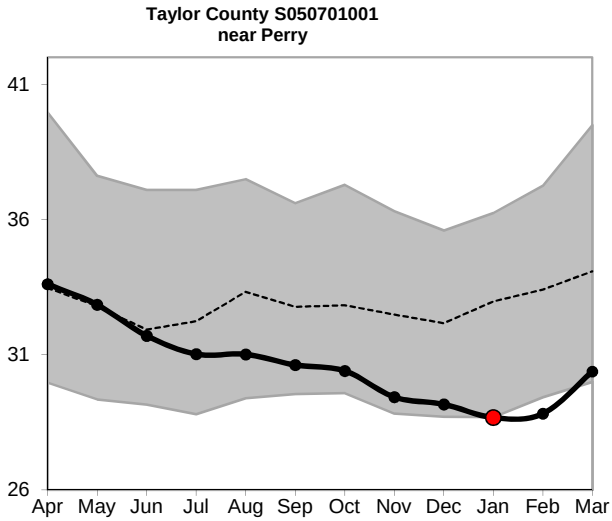
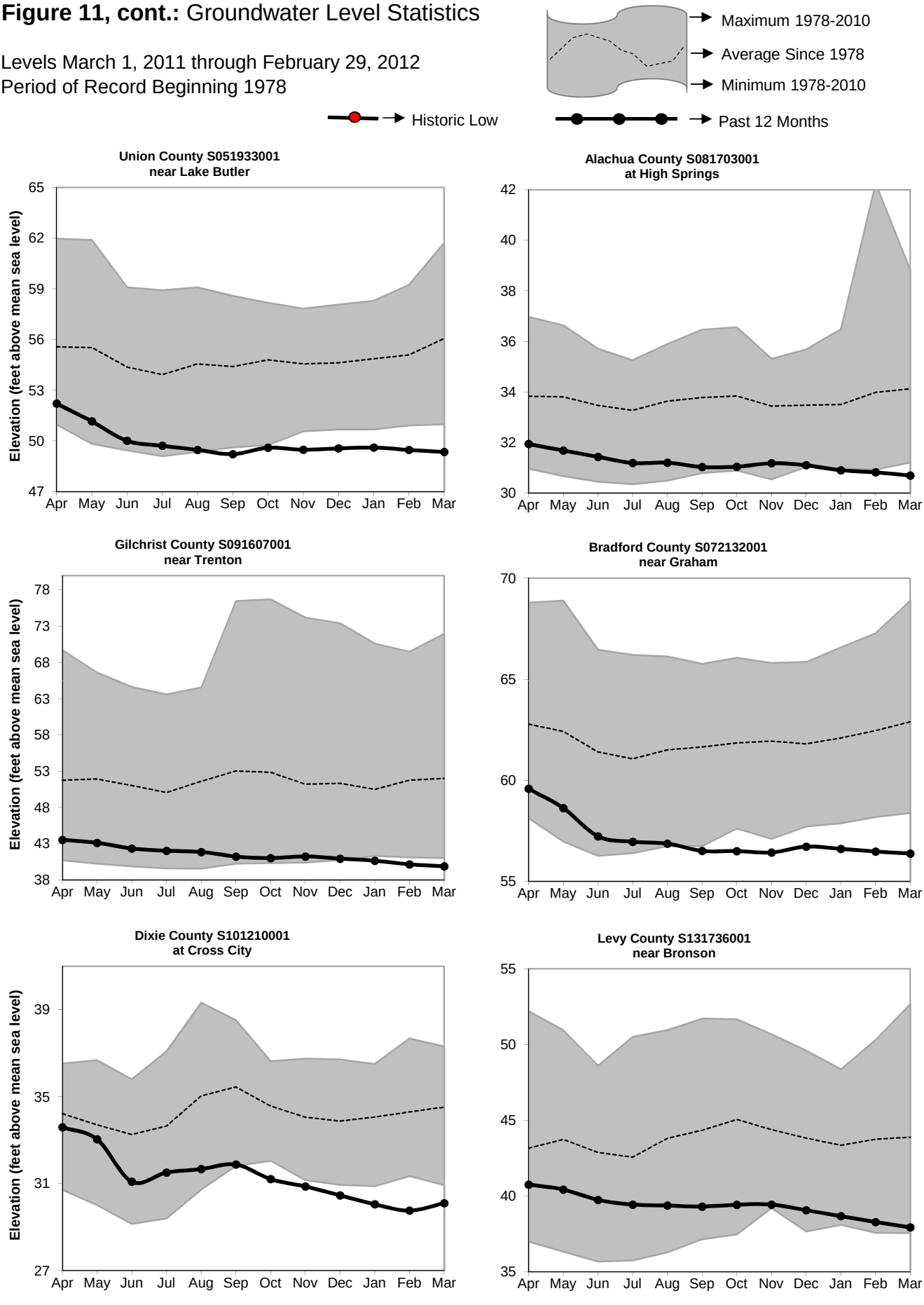


Figure 11, cont.: Groundwater Level Statistics

Levels March 1, 2011 through February 29, 2012
Period of Record Beginning 1978



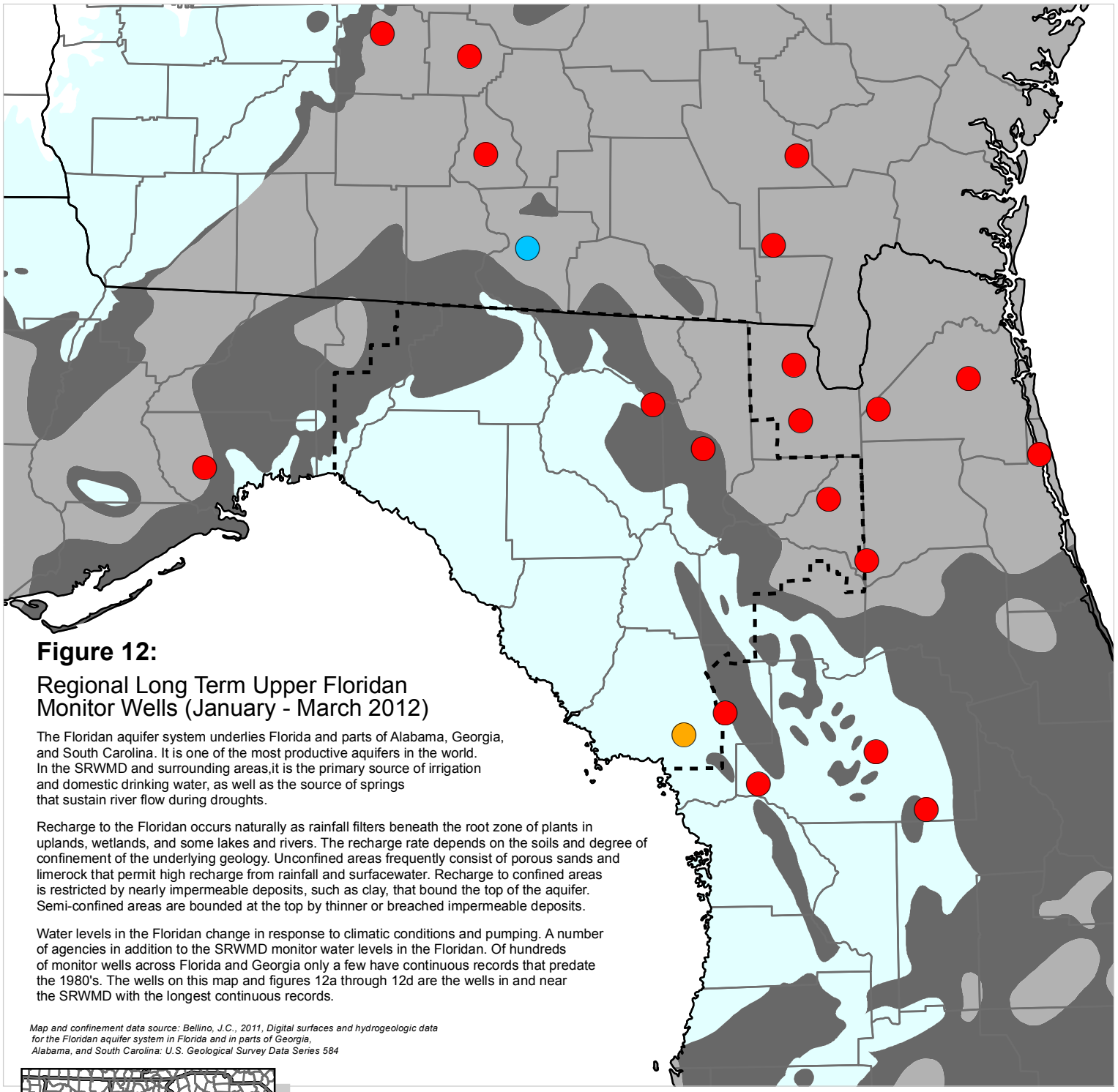


Figure 12:

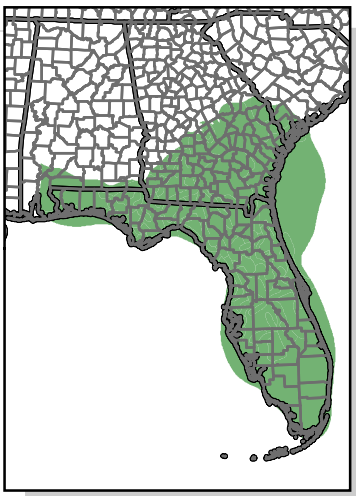
Regional Long Term Upper Floridan Monitor Wells (January - March 2012)

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 figures 12a through 12d 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

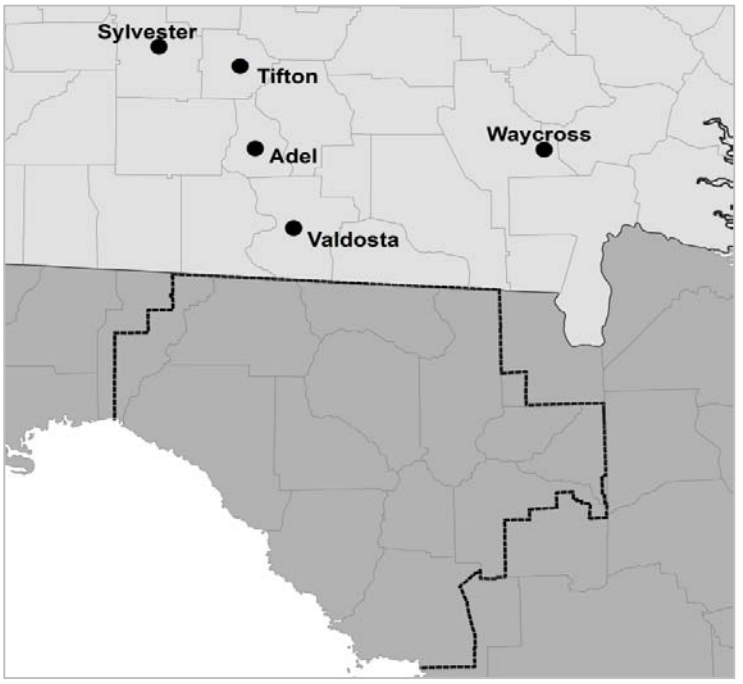
- Confined: Upper confining unit is generally greater than 100 feet thick and unbreached. Recharge is low.
- Semi-confined: Upper confining unit is generally less than 100 feet thick, breached, or both. Recharge is moderate.
- Unconfined: Upper confining unit is absent or very thin. Recharge is high.

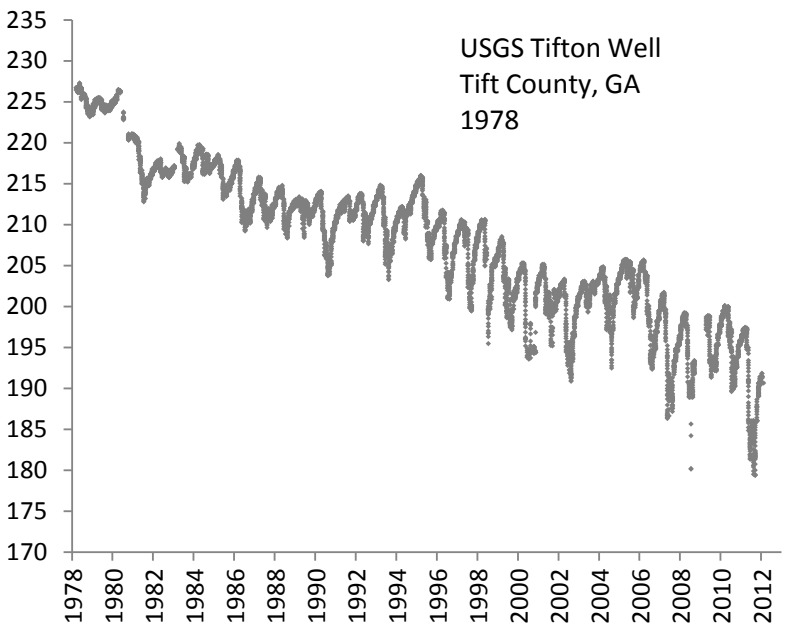
Percentile of Most Recent Water Level Relative to Entire Record

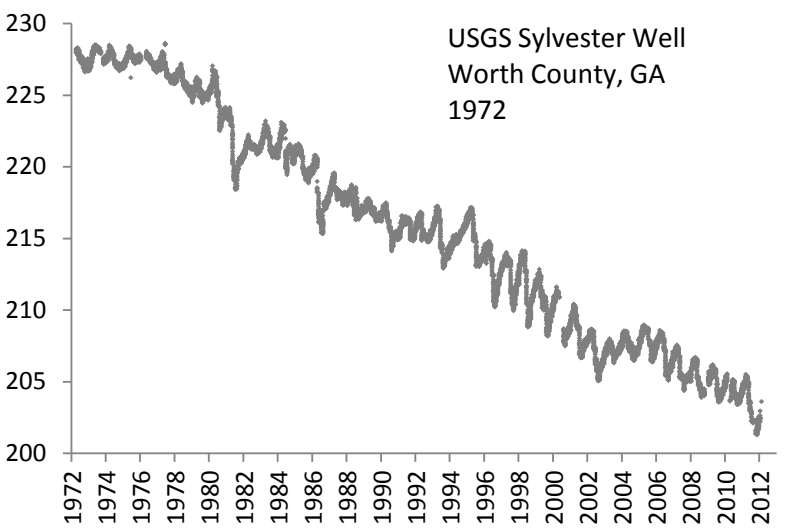
- High (Greater than 75th Percentile)
- Normal (25th to 75th Percentile)
- Low (10th to 25th Percentile)
- Extremely Low (Less than 10th Percentile)
- Not Available
- SRWMD Boundary

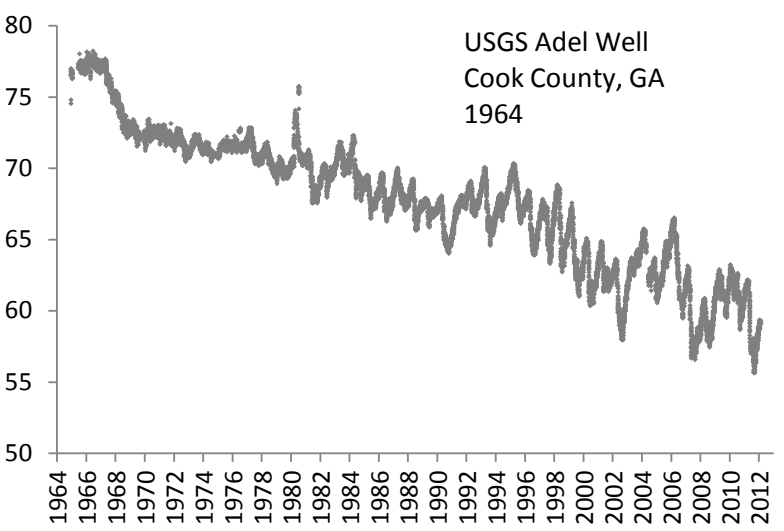
Figure 12a: Regional Long Term Upper Floridan Levels

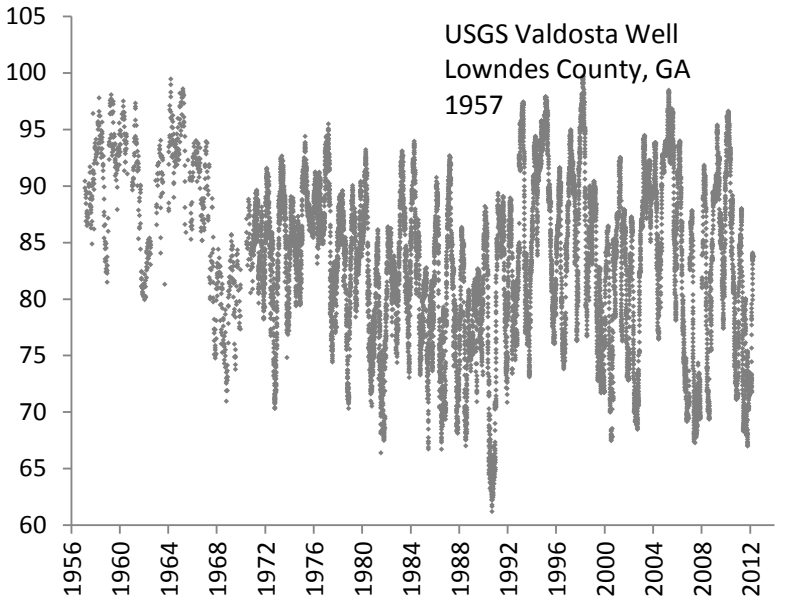
Ending January-March 2012
Upper Floridan Aquifer levels in feet above mean sea level
Courtesy of USGS and Georgia EPD











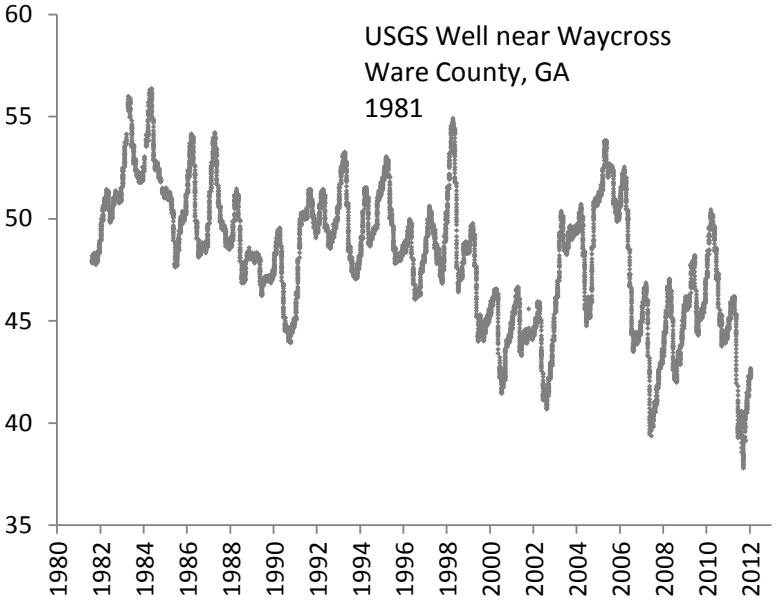
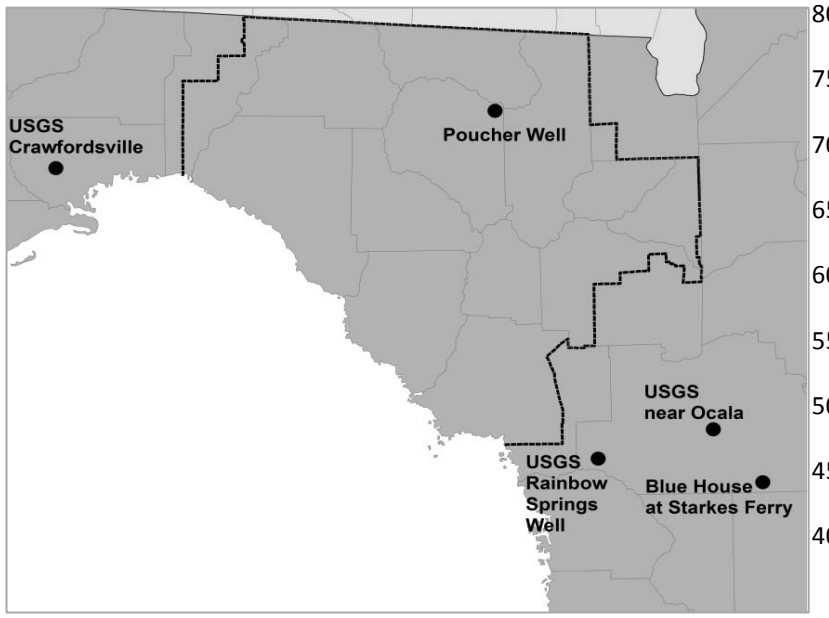
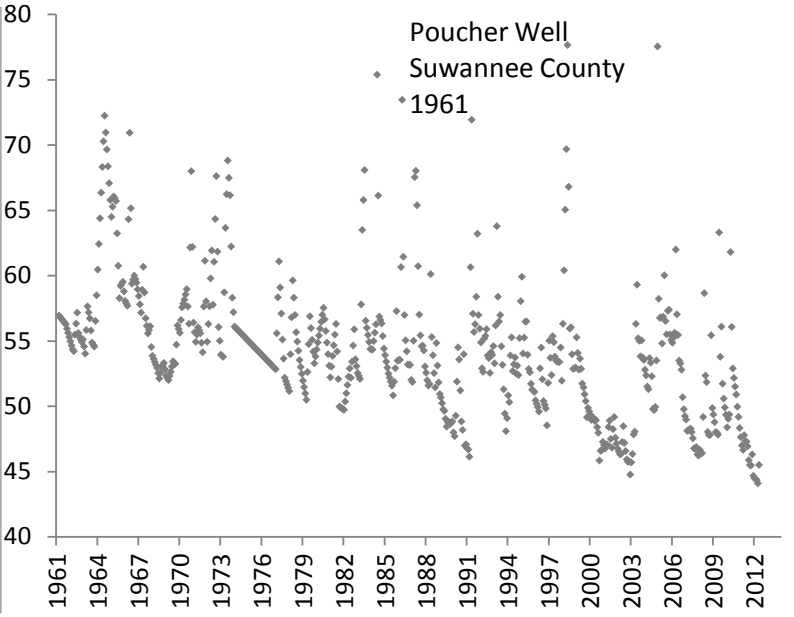
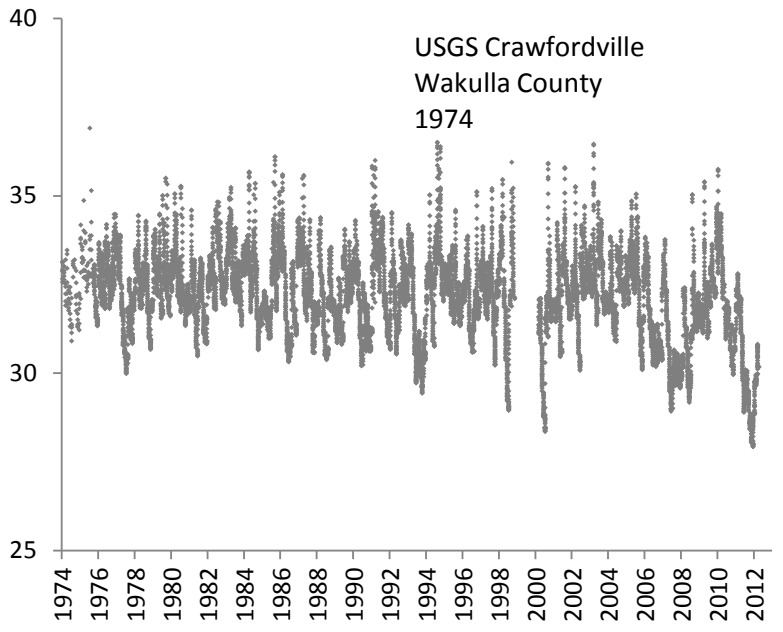


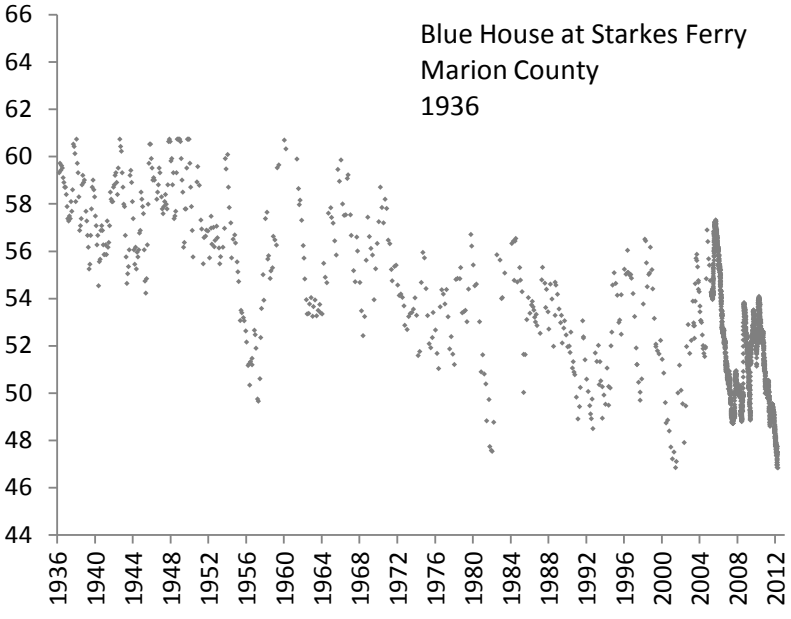
Figure 12b: Regional Long Term Upper Floridan Levels

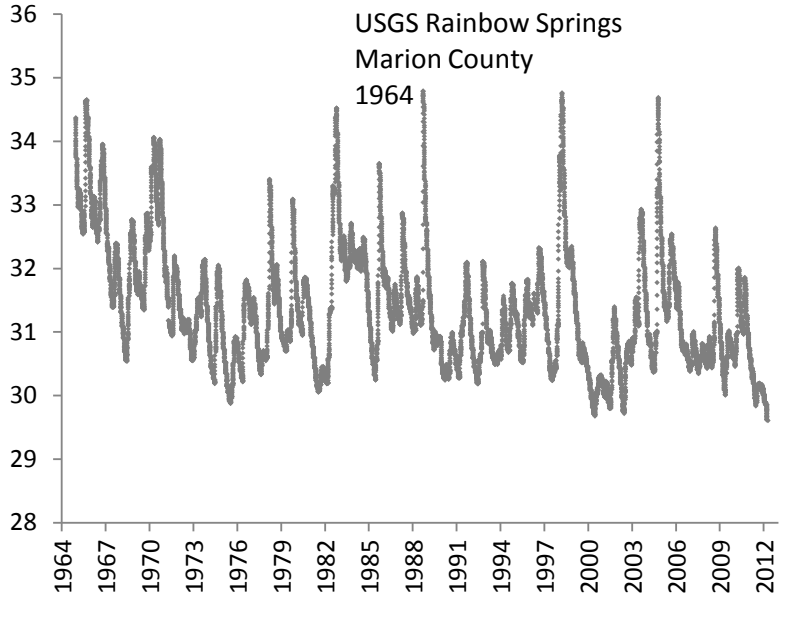
Ending March 31, 2012
Upper Floridan Aquifer levels in feet above mean sea level
Courtesy of USGS, SWFWMD, and SJRWMD











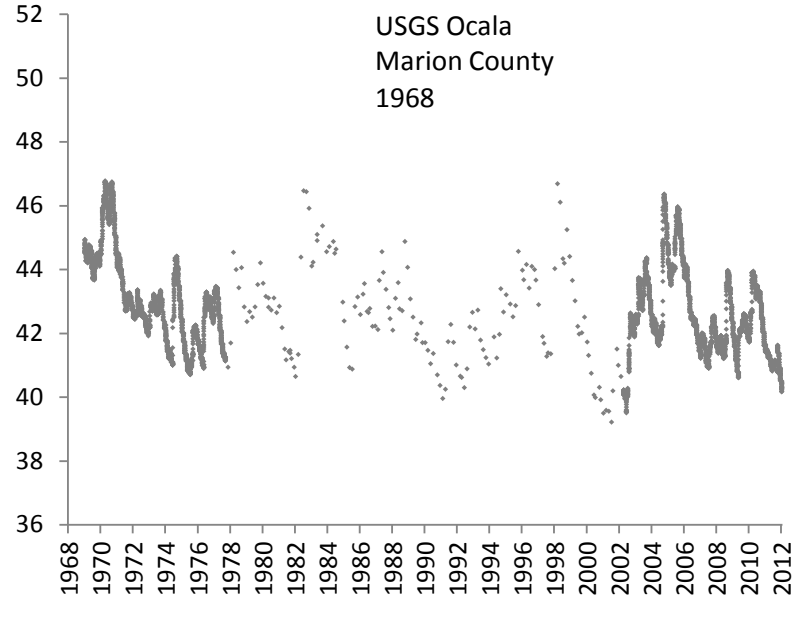
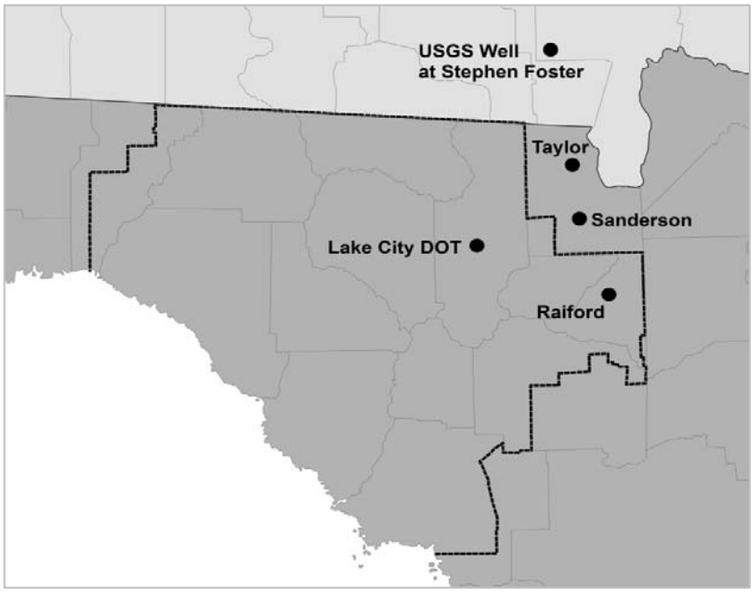
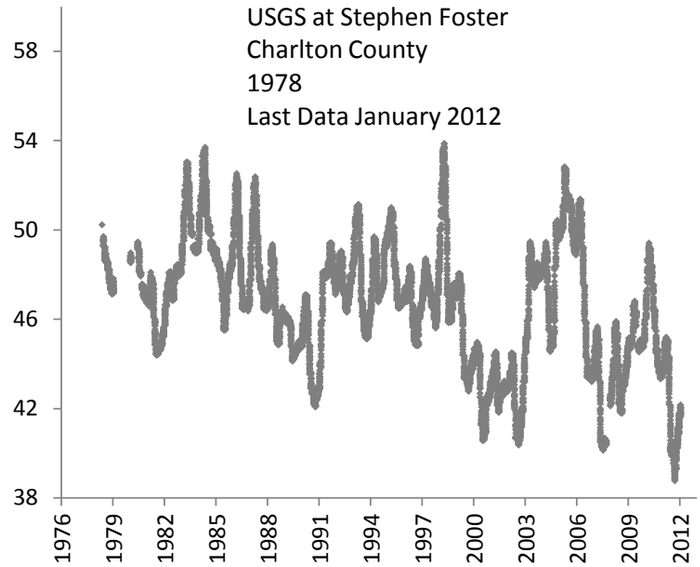
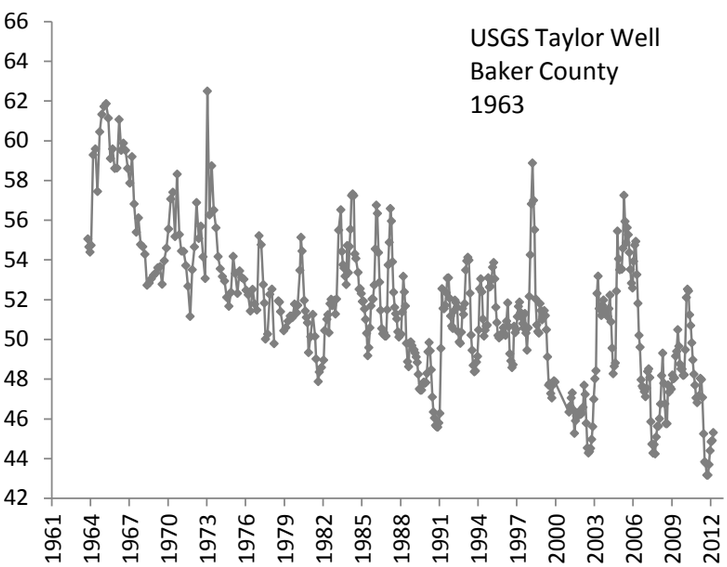


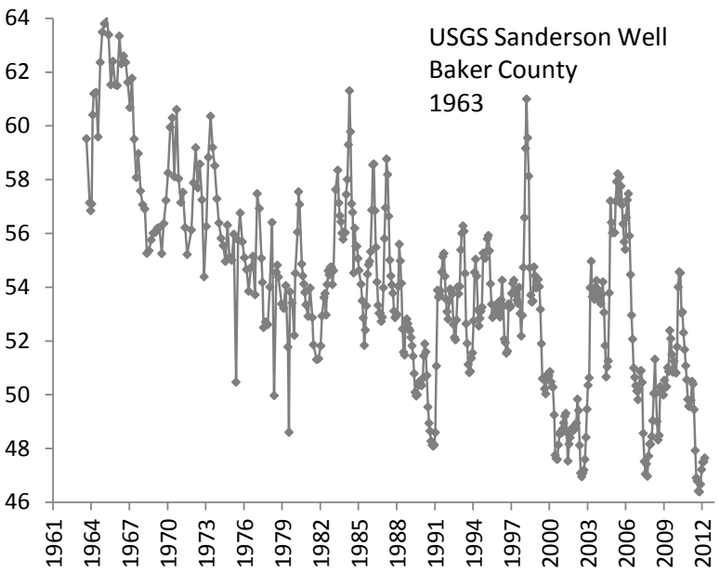
Figure 12c: Regional Long Term Upper Floridan Levels

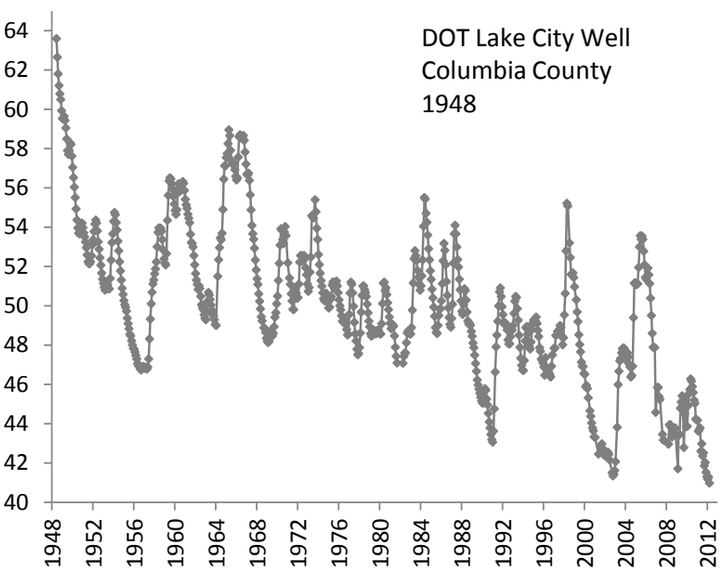
Ending January 2012-March 2012
Upper Floridan Aquifer levels in feet above mean sea level
Courtesy of USGS and SJRWMD











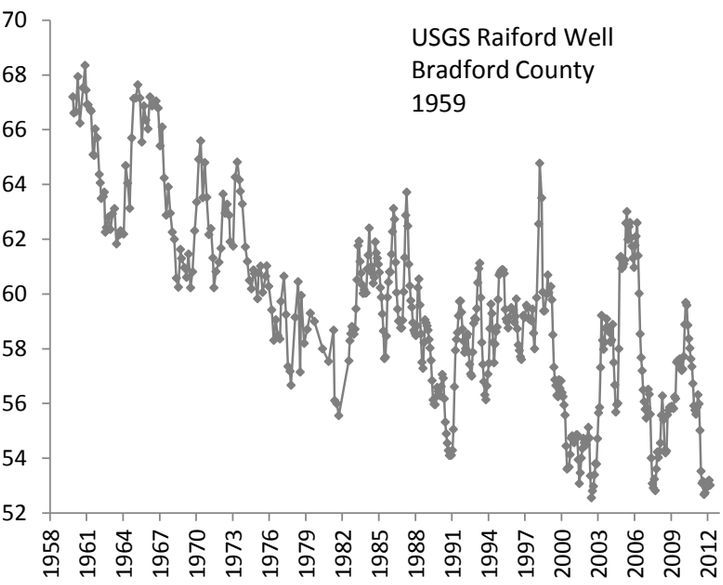
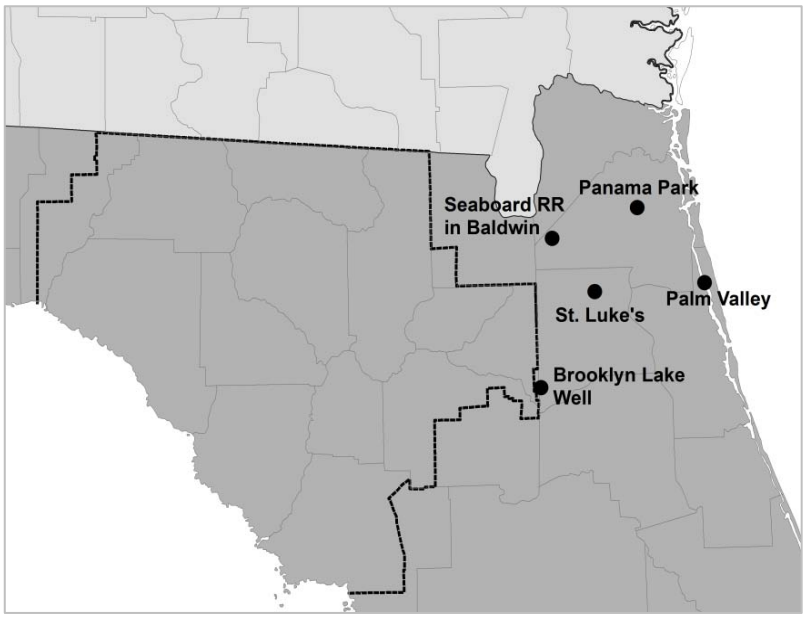
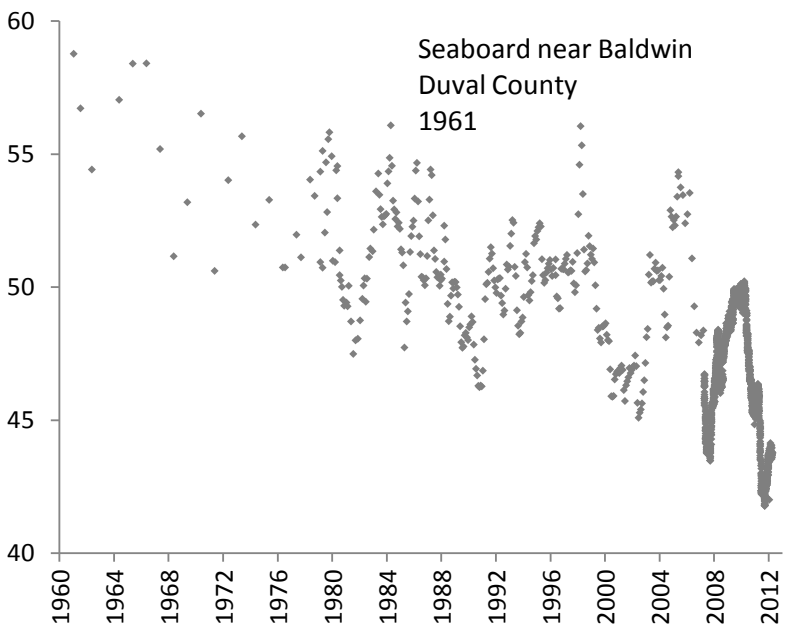
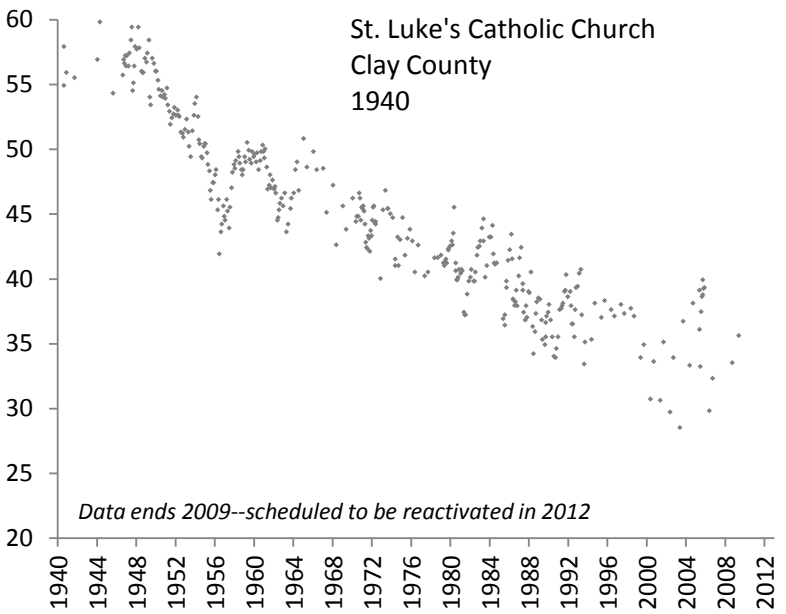


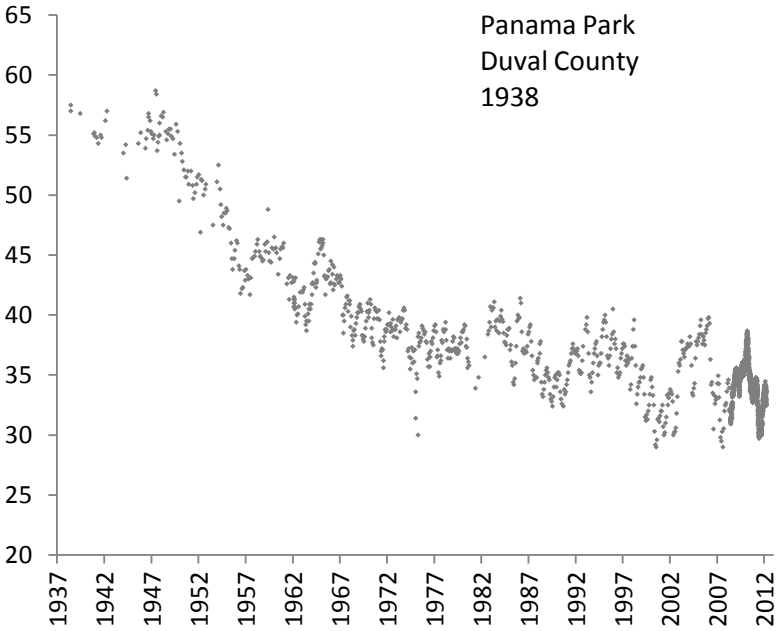
Figure 12d: Regional Long Term Upper Floridan Levels

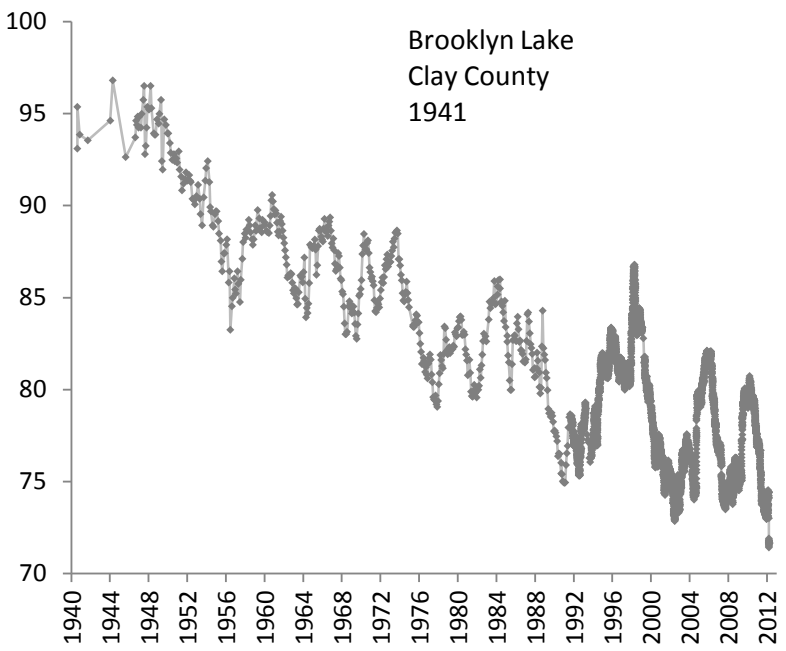
Ending March 2012
Upper Floridan Aquifer levels in feet above mean sea level
Courtesy of SJRWMD











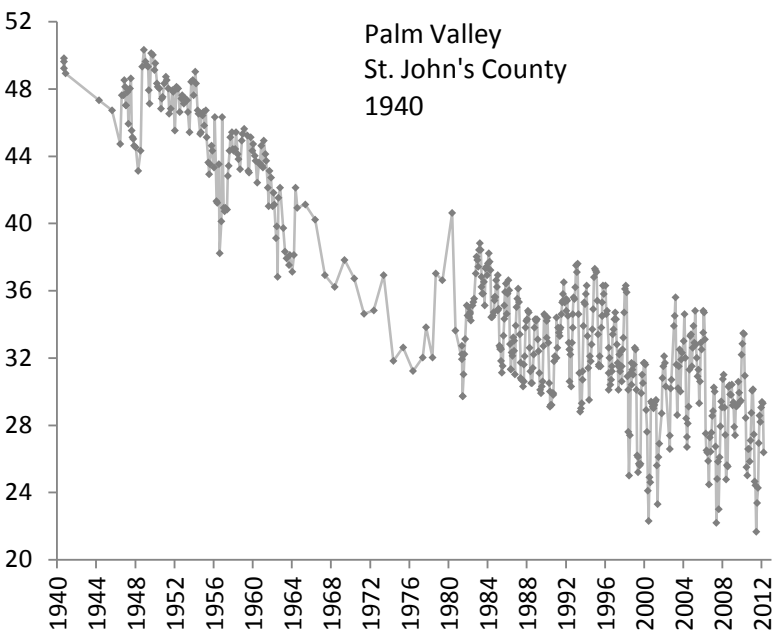


Figure 13: Agricultural Water Use

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 190 units installed at 48 agricultural operations by permission of the owners. Evapotranspiration data courtesy of University of Florida IFAS Extension.