MEMORANDUM

TO: Governing Board

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

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

DATE: June 6, 2012

RE: May 2012 Hydrologic Conditions Report for the District

RAINFALL

- Tropical Storm Beryl developed on May 26 and made landfall near Jacksonville Beach on the 28th. The center of circulation passed over Columbia and Hamilton counties before turning to the northeast and exiting the state near Valdosta as a tropical depression. Prior to the storm, average rainfall across the District was 1.95". Average rainfall from the storm was 4.22". With some significant convective storms occurring on the last days of the month, the total for May was 6.36", which is 185% of the average May rainfall based on records starting in 1932 (Table 1, Figure 1). The highest totals for the month (based on radar estimates) were in central Lafayette County, southern Suwannee County, and west-central Columbia County, with localized areas in excess of 14" (Figure 2). The highest gaged total was 14.76" at Midway Tower near Mayo. The highest 24-hour total was also at Midway, with 12.61", an amount in excess of the 25-year event. The highest one-hour total was 2.8" at Midway, followed by 1.99" at Fanning Springs. The storm delivered significantly less rain to Madison, Jefferson, western Hamilton, and Levy counties. Madison and Jefferson counties had totals less than the long-term May average (Figure 3).
- Average rainfall from Beryl in the Santa Fe Basin was 5.7". The last tropical system to affect that area was Tropical Depression Fay in August 2008. The average rainfall from Fay in the Santa Fe Basin was 5.6".
- The 12 months ending May 31 had a deficit of 12.1" (Figure 4). This was an improvement, on average, of 5" since April 30. Figure 5 shows the change in annual deficits beginning in 1932.

SURFACEWATER

- **Rivers**: Record dry conditions prior to the storm eliminated most of Beryl's runoff potential. Average rainfall in the 350 square-mile Steinhatchee basin was 8", but the Steinhatchee River peaked with a daily average flow of 4.5 cubic feet per second (cfs), in the lowest 10% of all records, after which the flow dropped and set a new daily low flow on the 31st. The Suwannee River at White Springs on the upper Suwannee River crested on June 2 with a 2.25' rise and a flow considered normal for the time of year. The Withlacoochee and Alapaha basins, which received normal to below-normal rainfall, maintained conditions considered low for the time of year. Farther downstream on the Suwannee, the Branford gage rose 1.2' after large areas of the middle Suwannee Basin received rainfall in excess of 10", but lost half of that gain by the 31st. Prior to the storm, the Branford gage was setting new historic low flows and stages. The Santa Fe at Worthington Springs rose 3.5' from a nearly dry streambed, a stark contrast to the 13' rise after Tropical Depression Fay. The improved flow caused a 1.1' rise at the gage upstream of Oleno State Park. Park staff reported water flowing through the park for the first time in almost a year. The Fort White gage on the lower Santa Fe registered a gain of 36 cfs before slowly falling again. Prior to the storm, flow at the gage was 462 cfs, only 16 cfs higher than the lowest drought-related flow in the record. 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 before Beryl. Four lakes with levels read after the storm were also below their long-term average. Cherry Lake in Madison County fell to a new record low. Figure 8 shows levels relative to the long-term average, minimum, and maximum levels for 14 lakes.
- **Springs:** Average May flow relative to historical flows based on computed daily values is shown for 5 spring systems in Figure 9a, and flow measurements for 8 additional springs are shown in Figure 9b. Loss of flow from the Santa Fe to groundwater was reported at Santa Fe Spring upstream of I-75. The reverse flow was measured on June 4 at 4.9 cfs. Ichetucknee River flow at US27 rose quickly by 25% over its previous rate, but dropped back to conditions seen before the storm. Poe Springs flow continued to drop throughout the month. A measurement made after Beryl on June 4 was the lowest in the record at 0.26 cfs. Treehouse Spring in Alachua County, a first-magnitude spring that is a resurgence of the Santa Fe River, had no observable flow for the second month in a row. Most other springs on the Santa Fe River were near or below previous drought-induced low flows. The Wacissa River fell steadily throughout the month, but remained above the record low flow observed in 2002.

GROUNDWATER

Levels in 92% of the District's upper Floridan aquifer monitor wells were in the bottom 10 percent of all records, considered extremely low. Ninety percent had levels in the bottom 5 percent of all records. Thirty wells had record-setting lows (Figure 10). Conditions averaged across the District compared to all historic levels fell to the 3rd percentile from the 5th percentile the previous month (based on records beginning no earlier than 1978). If available, levels taken on May 30th or 31st after the storm were used in this report. 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 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 June 2 was -1.96 in North Florida, indicating mild drought, and -3.34 in South Central Georgia, indicating severe drought.
- The U.S. Geological Survey categorized coastal rivers and the middle- and lower-Suwannee basins as experiencing severe hydrologic drought, and the upper-Suwannee and Santa Fe basins as moderate hydrologic drought, based on 7-day average streamflow.
- The 3-month precipitation outlook issued by the Climate Prediction Center is for equal chances of above-normal, normal, or below-normal precipitation through August. Above-normal temperatures are expected through August.

CONSERVATION

A Water Shortage Advisory is in effect. On June 13, a Water Shortage Order will be implemented. All users are strongly urged to eliminate unnecessary uses. Details of the restrictions contained in the order are available on the District's webpage (www.mysuwanneeriver.com).

This report is compiled in compliance with Chapter 40B-21.211, Florida Administrative Code, using rainfall (radar-derived estimate), groundwater (106 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	May-2012	May Average	Last 3 Months	Last 12 Months
Alachua	7.24	2.27	12.22	42.03
Baker	8.23	1.89	13.84	43.27
Bradford	8.85	2.22	13.34	42.01
Columbia	9.32	3.21	14.95	45.34
Dixie	4.35	3.43	7.90	42.85
Gilchrist	5.50	3.36	10.14	44.11
Hamilton	5.62	3.16	12.08	39.63
Jefferson	4.08	5.88	9.40	36.26
Lafayette	9.62	3.33	14.45	44.44
Levy	3.75	2.67	7.38	40.77
Madison	4.22	4.73	11.08	43.63
Suwannee	8.91	3.24	15.34	47.50
Taylor	5.45	4.16	10.55	39.46
Union	7.82	2.21	12.53	45.24

May 2012 Average:	6.36
Historical May Average (1932-2011):	3.43
Historical 12-month Average (1932-2011):	54.56
Past 12-Month Total:	42.45
12-month Rainfall Deficit:	-12.11

(Rainfall reported in inches)

Figure 1: Comparison of District Monthly Rainfall

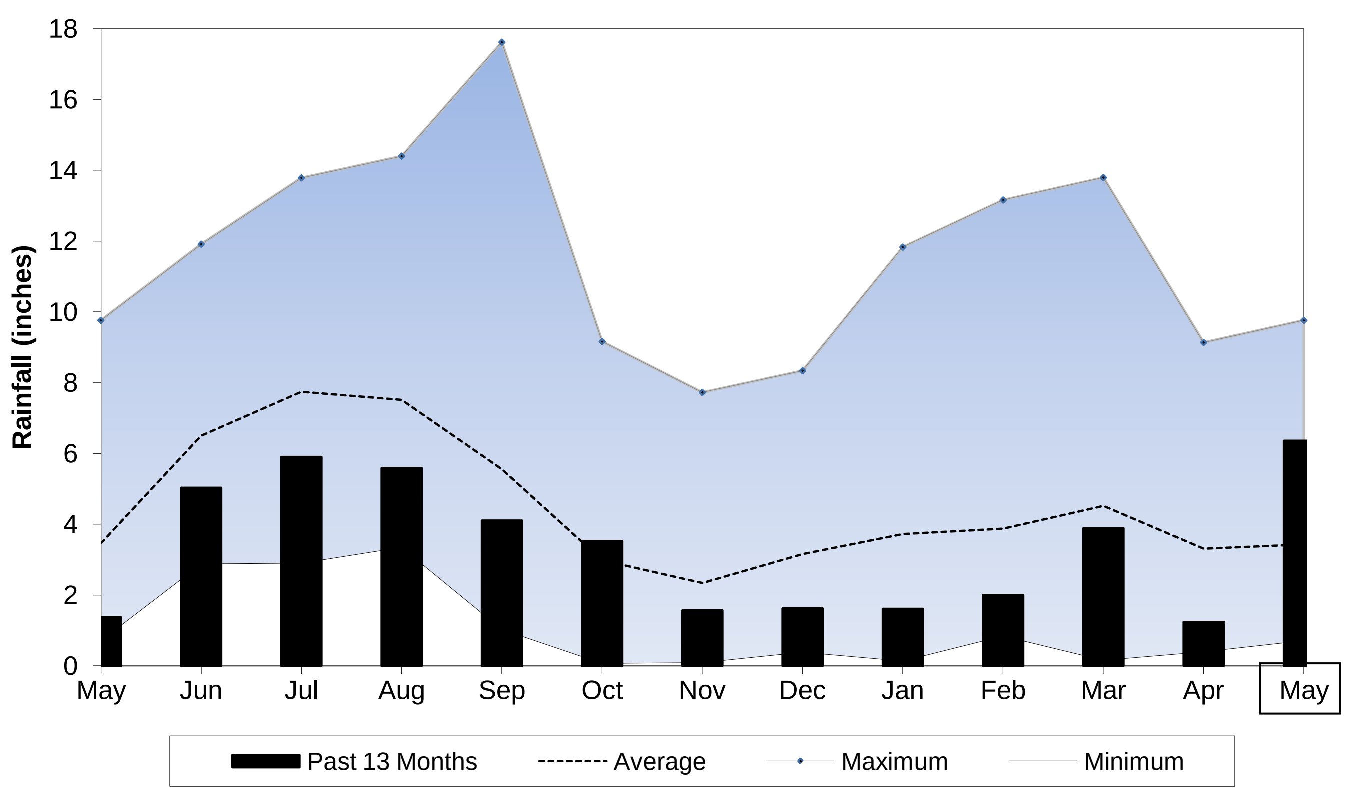


Figure 2: May 2012 Rainfall Estimate

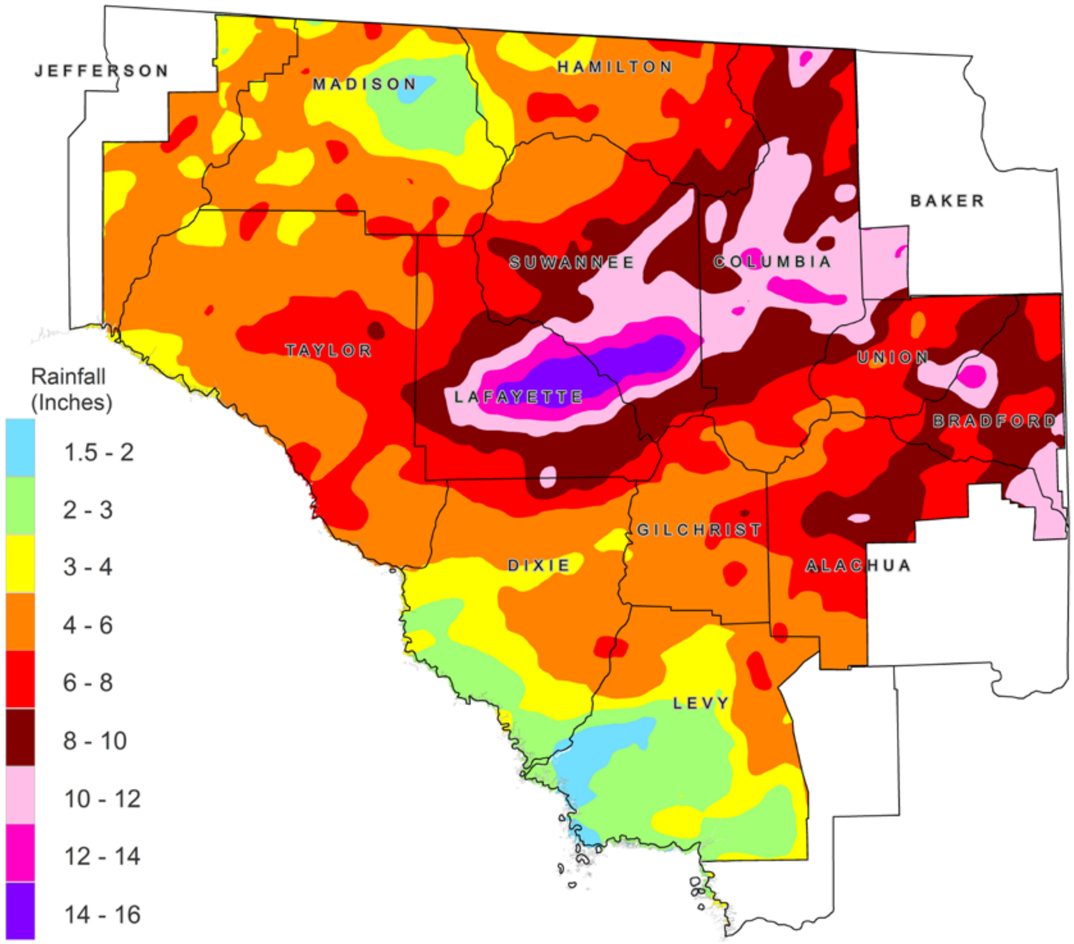


Figure 3: May 2012 Regional Percent of Normal Rainfall

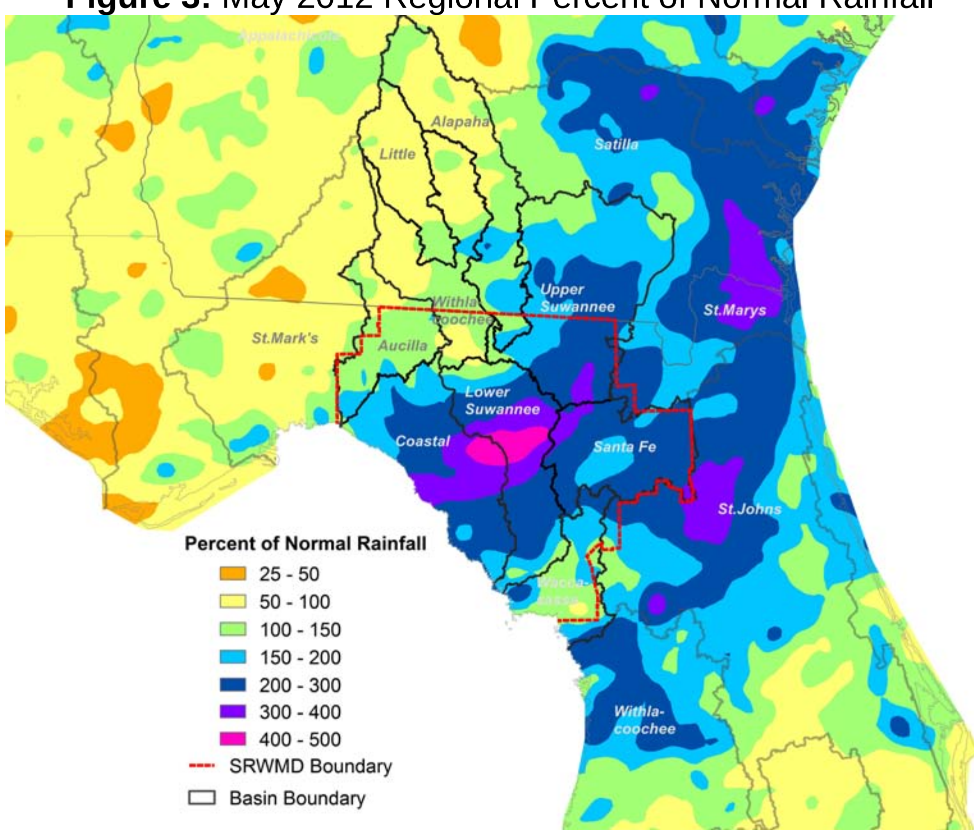


Figure 4: 12-Month Rainfall Surplus/Deficit by River Basin
Ending May 31, 2012

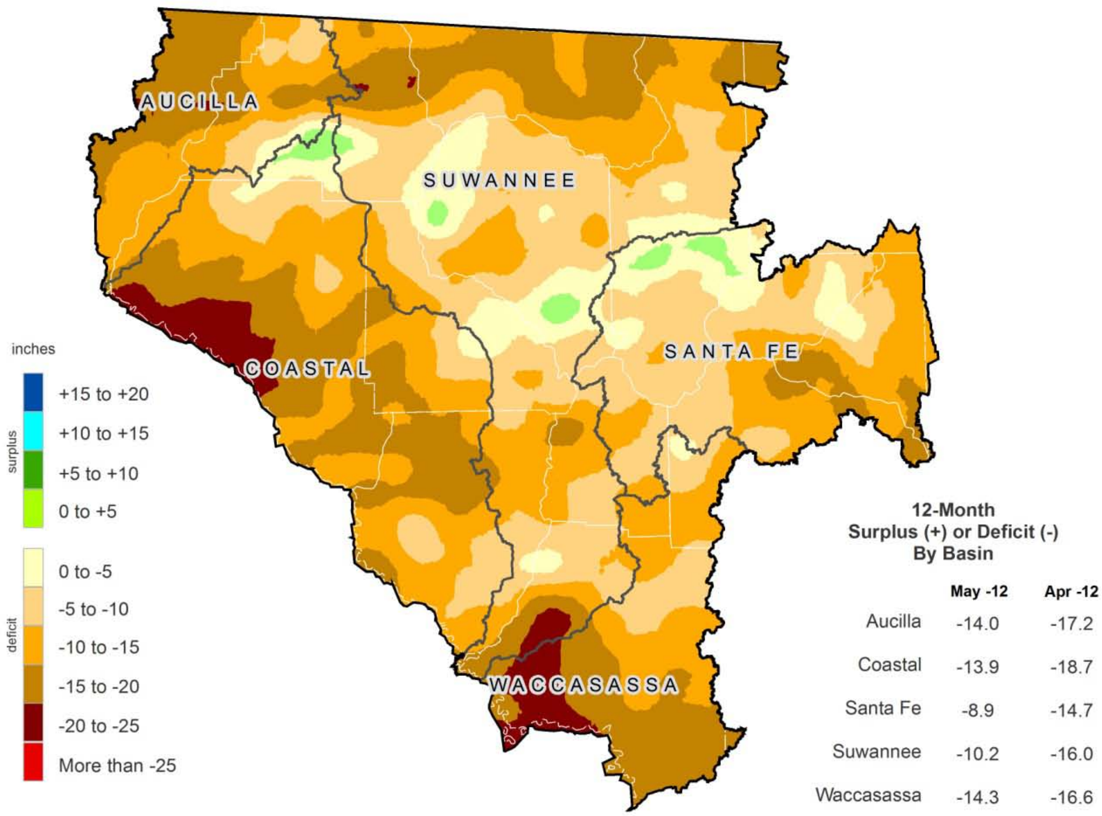


Figure 5: 12-Month Rolling Rainfall Deficit Since 1932
Difference between observed 12-month rainfall and the long-term average over the same period

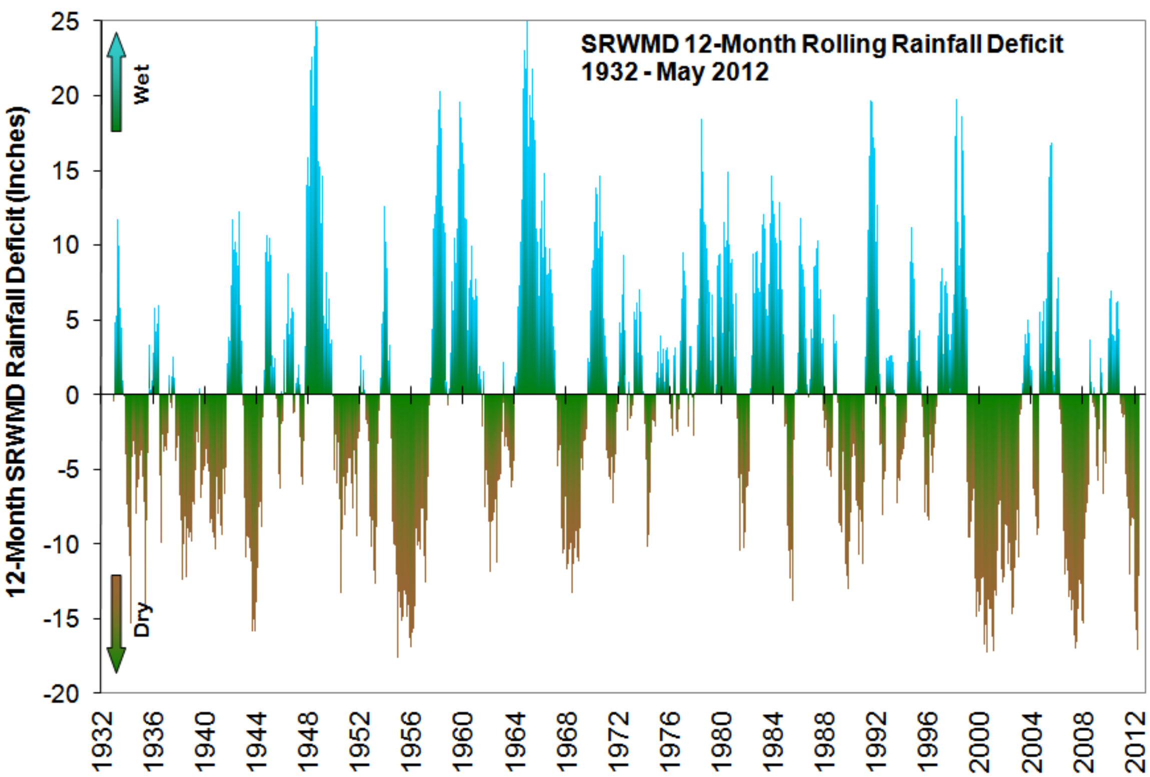
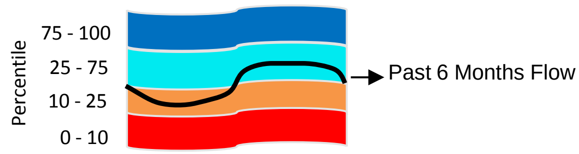
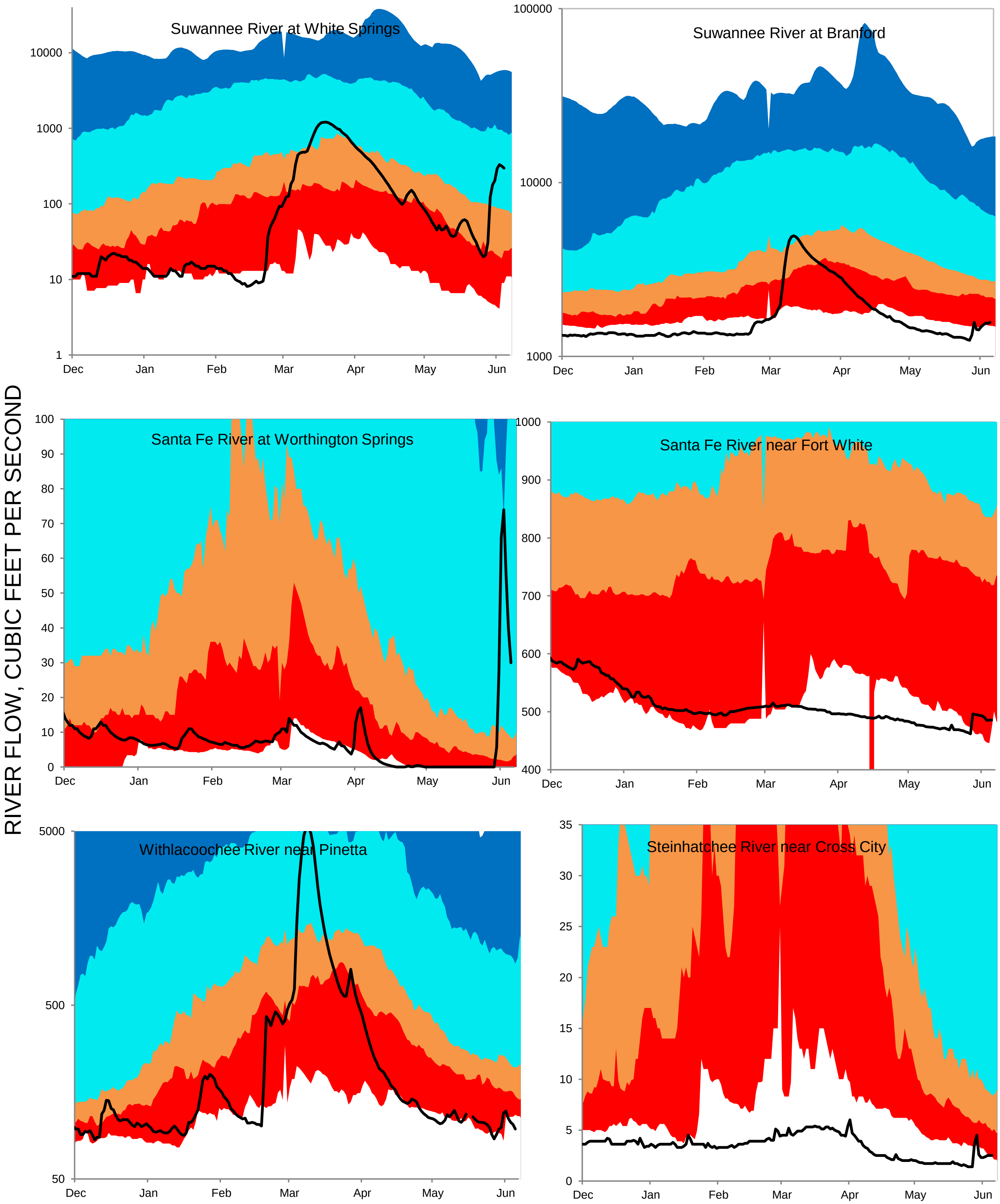


Figure 6: Daily River Flow Statistics

December 1, 2011 through June 5, 2012





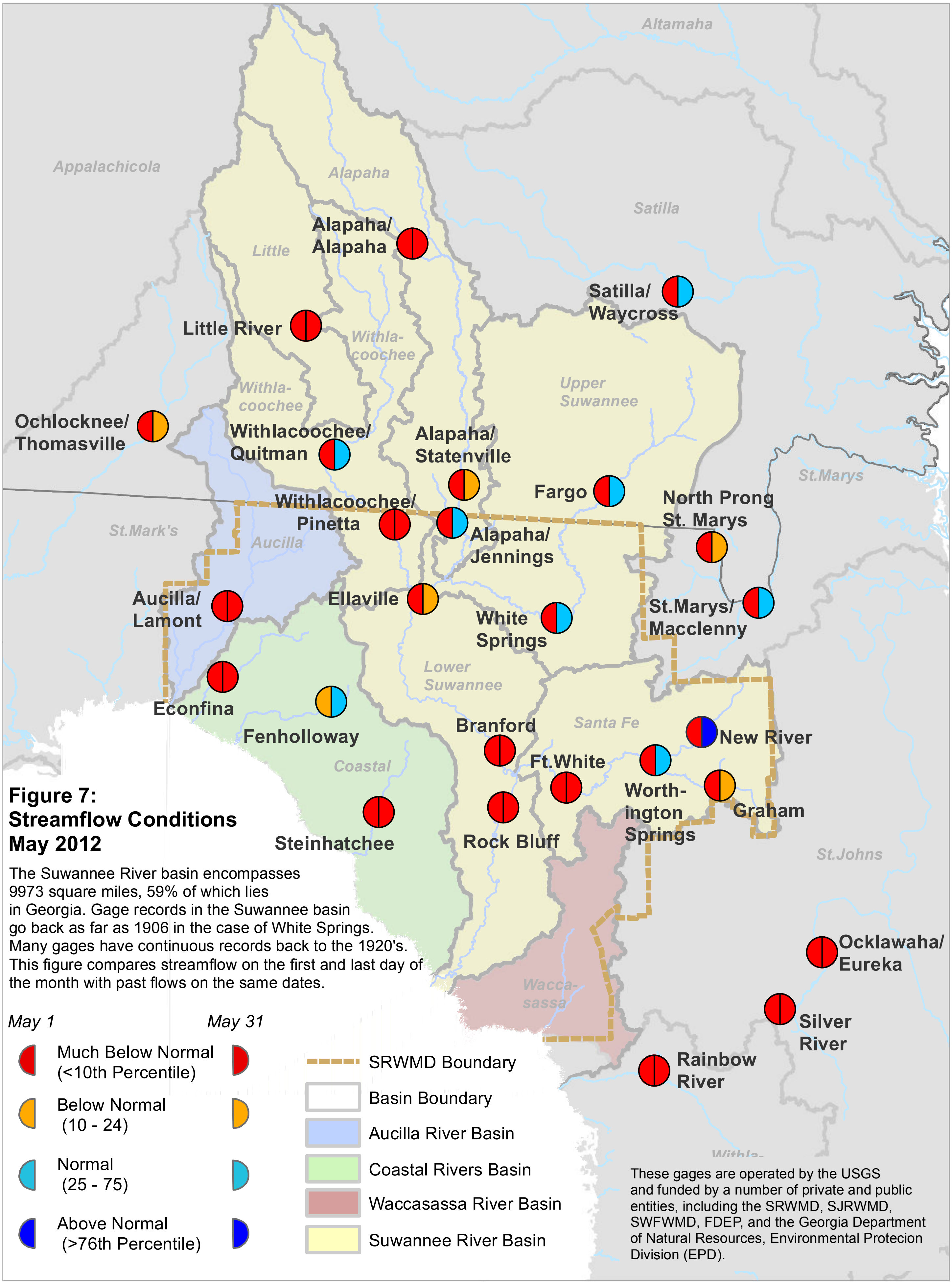
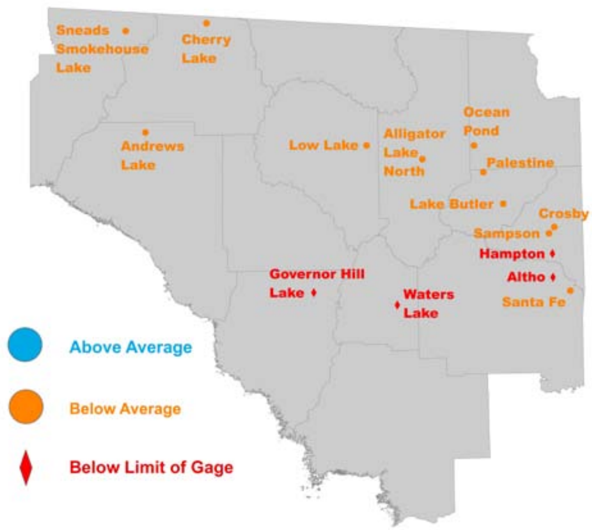


Figure 7:
Streamflow Conditions
May 2012

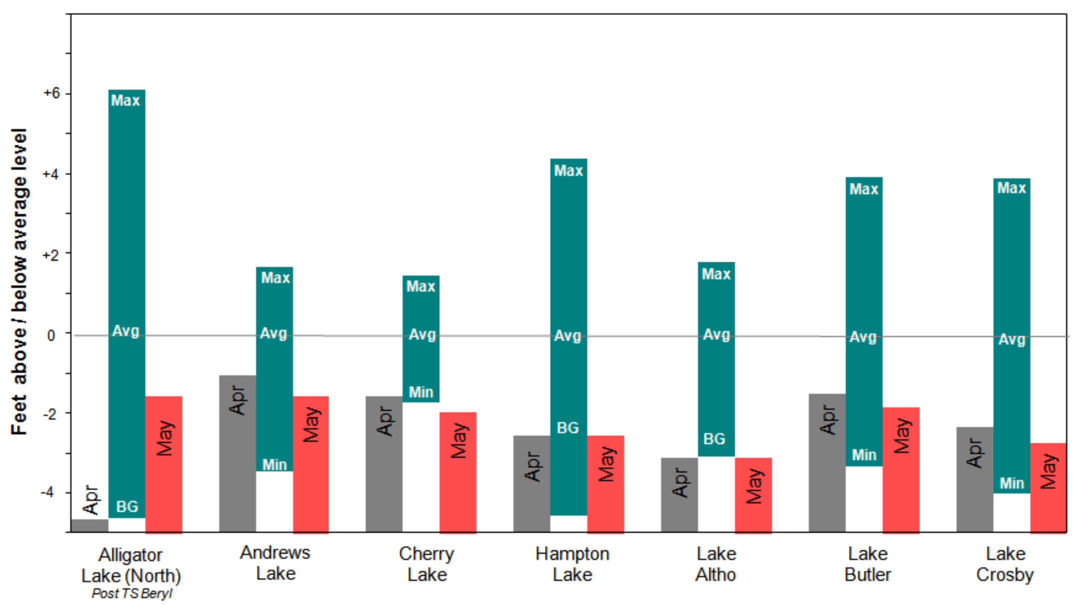
The Suwannee River basin encompasses 9973 square miles, 59% of which lies in Georgia. Gage records in the Suwannee basin go back as far as 1906 in the case of White Springs. Many gages have continuous records back to the 1920's. This figure compares streamflow on the first and last day of the month with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

Figure 8: May 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.



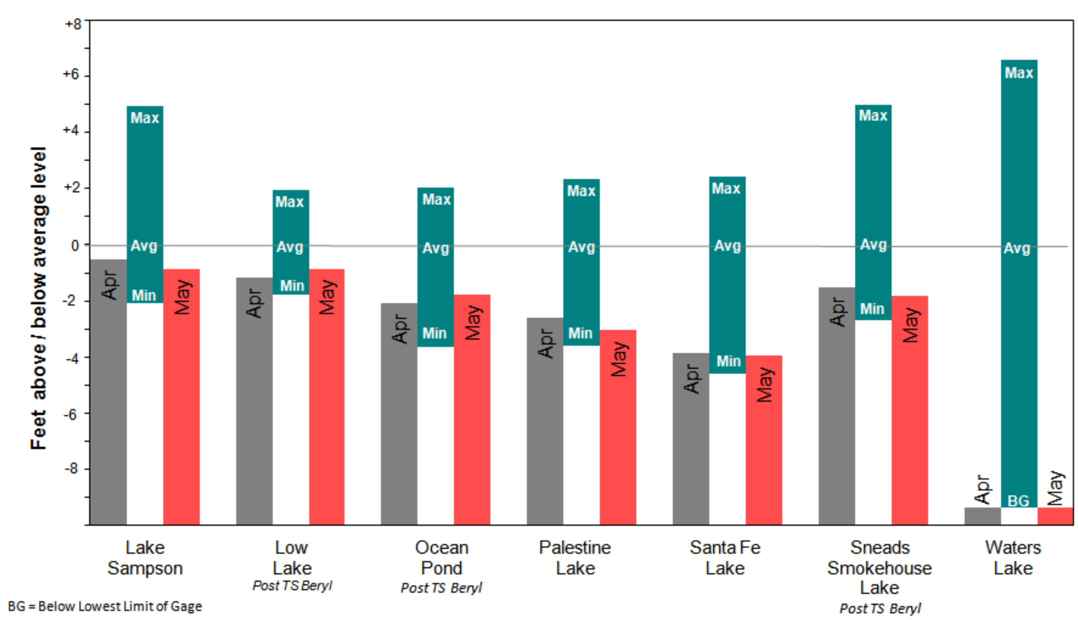
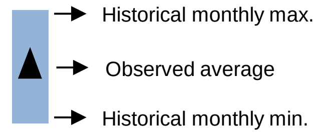


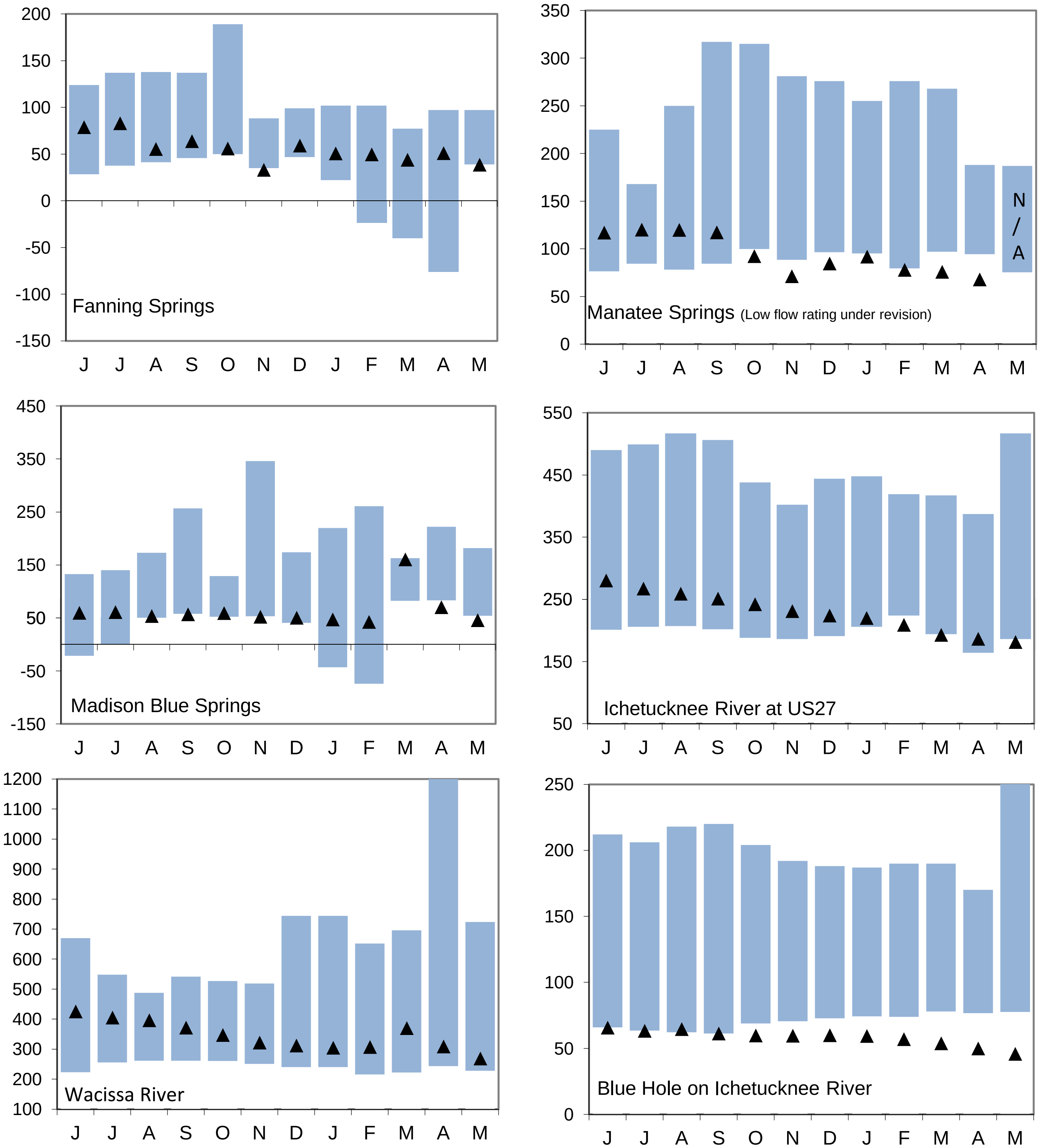
Figure 9a: Monthly Springflow Statistics

Flows June 1, 2011 through May 31, 2012

Springflow data are given in cubic feet per second.

Period of record beginning 2002. **Data are provisional.**



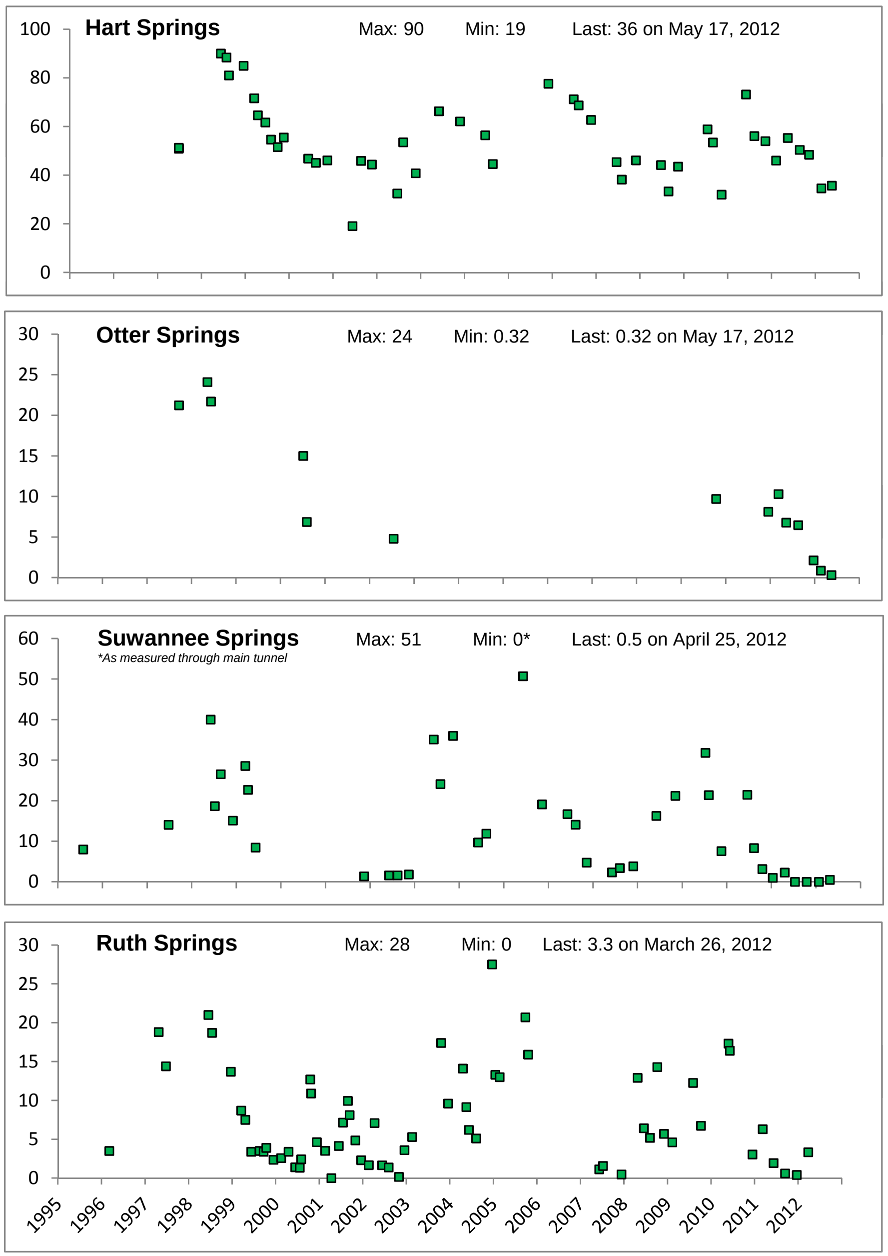


Note: Rising river levels caused by high tides or flooding can cause springflow to slow or reverse.
Springflow for months marked by an asterisk (*) was strongly affected by river conditions.
Data will be revised once approved and published by the U.S. Geological Survey.

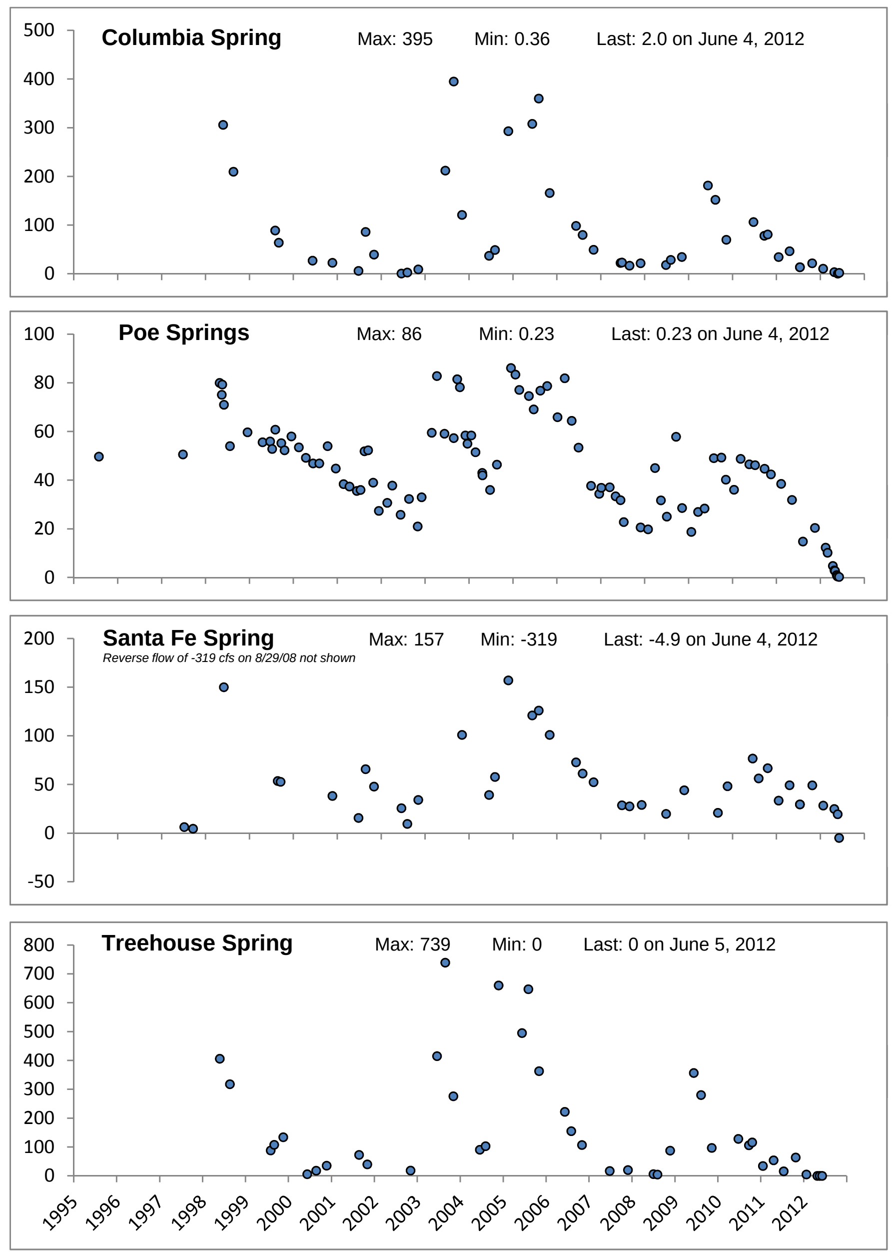
Figure 9b: Quarterly Springflow Measurements
These springs are measured at least once per quarter.
Springflow data are given in cubic feet per second.

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.

Springs on Suwannee River



Springs on Santa Fe River



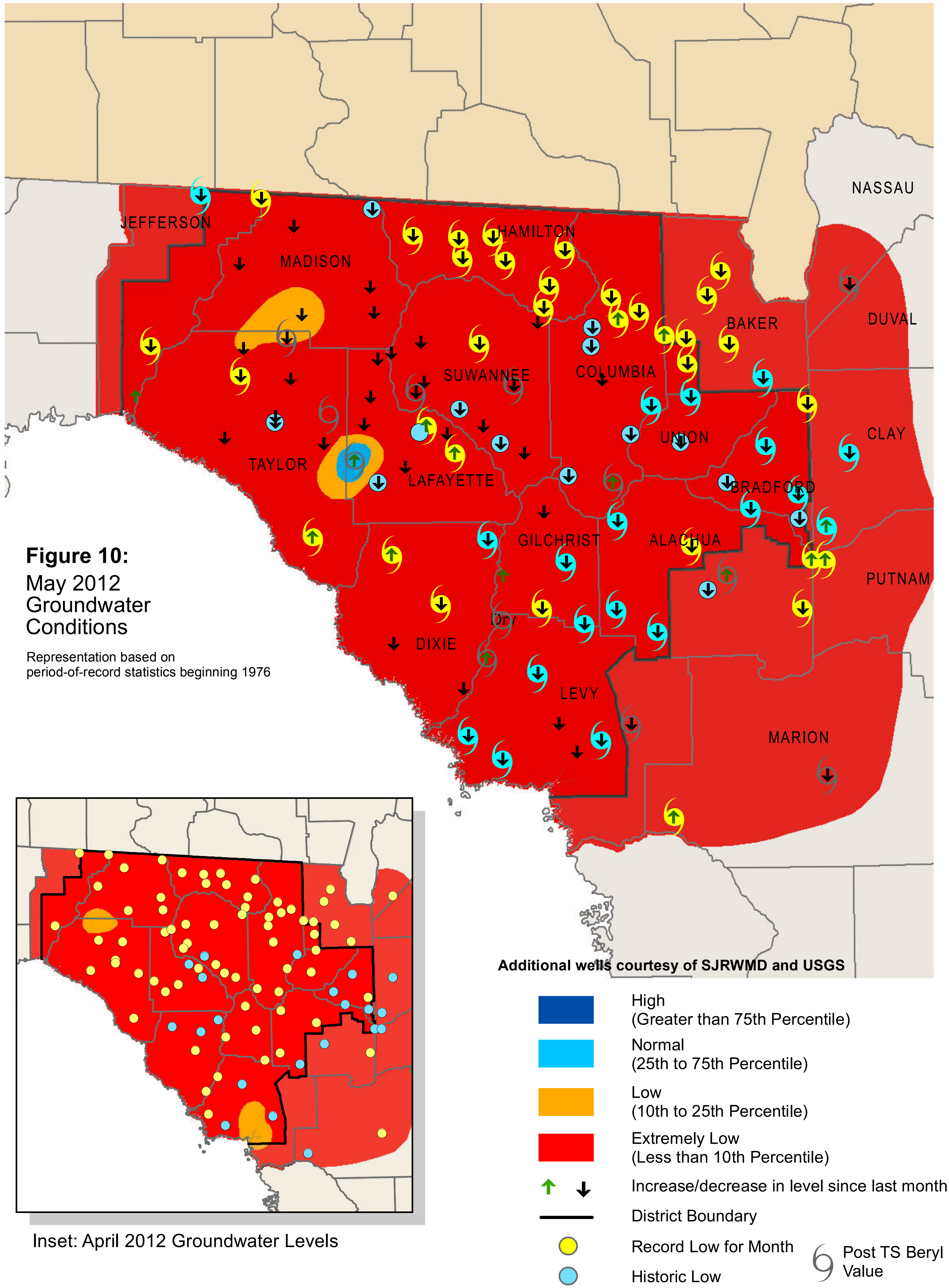
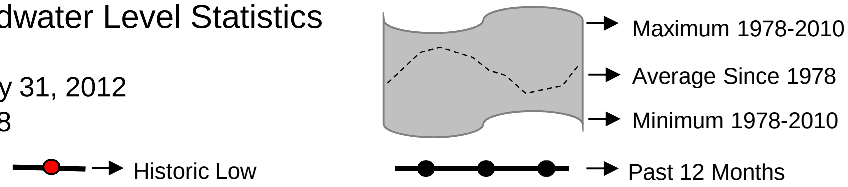


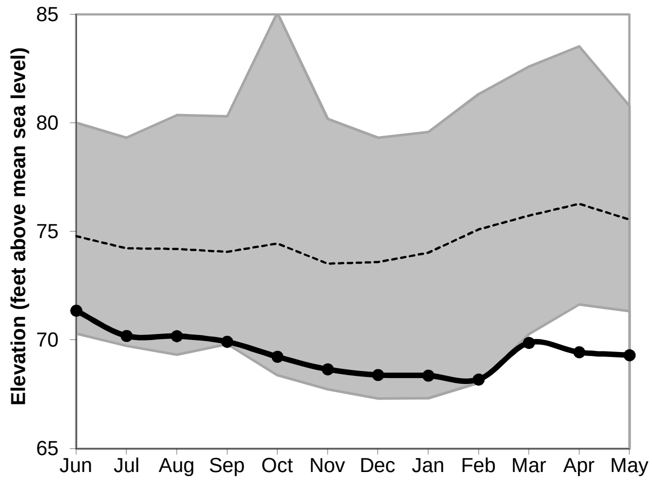
Figure 10: May 2012 Groundwater Conditions

Figure 11: Monthly Groundwater Level Statistics

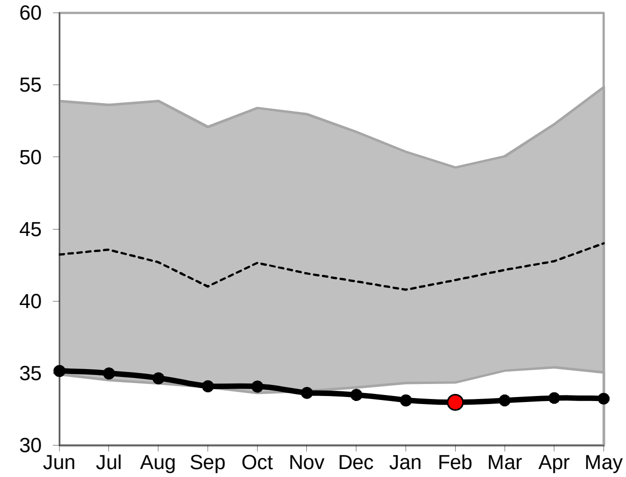
Levels June 1, 2011 through May 31, 2012
Period of Record Beginning 1978



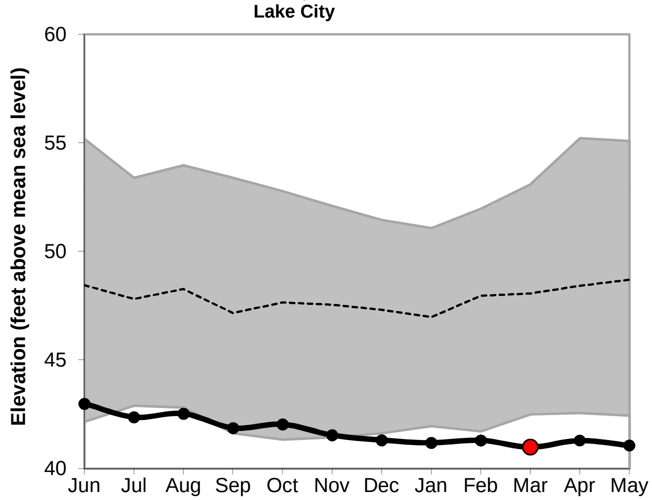
Madison County N010719001
near Greenville



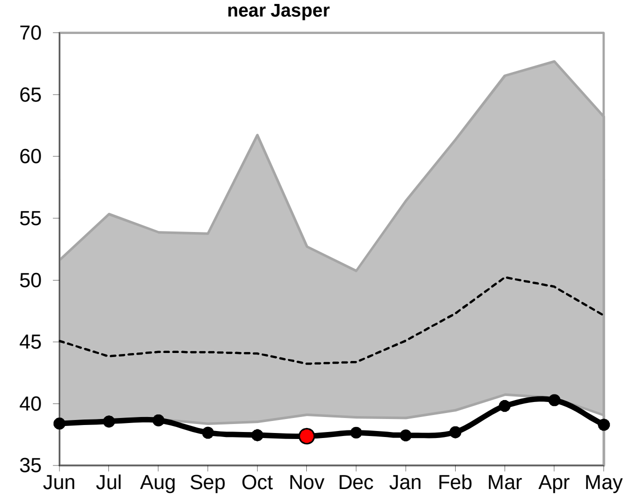
Suwannee County S021335001
near Live Oak



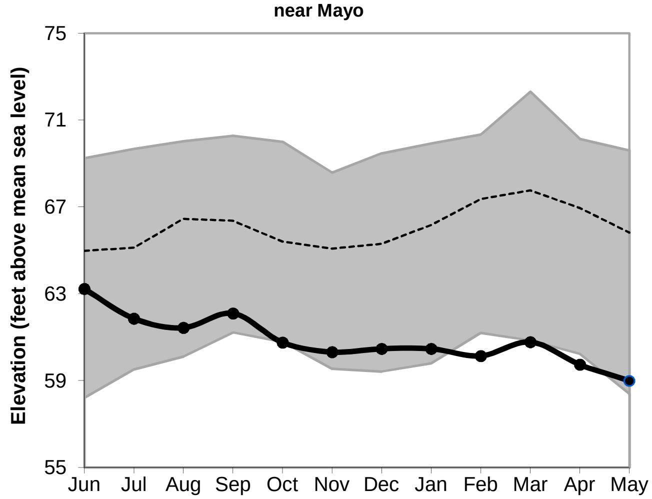
Columbia County S041705001
Lake City



Hamilton County N011422007
near Jasper



Lafayette County S061114001
near Mayo



Taylor County S050701001
near Perry

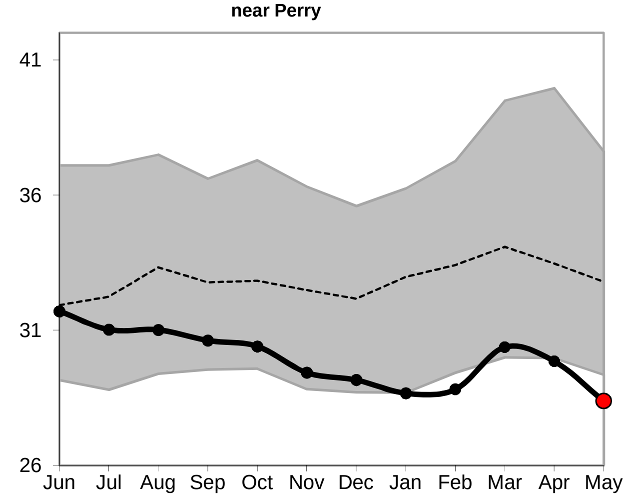
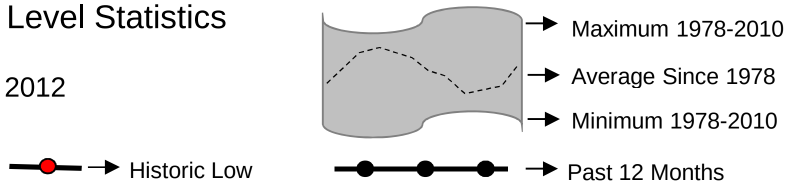
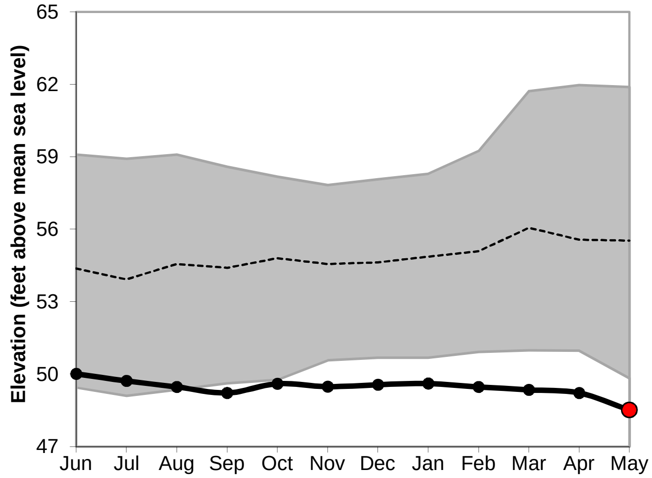


Figure 11, cont.: Groundwater Level Statistics

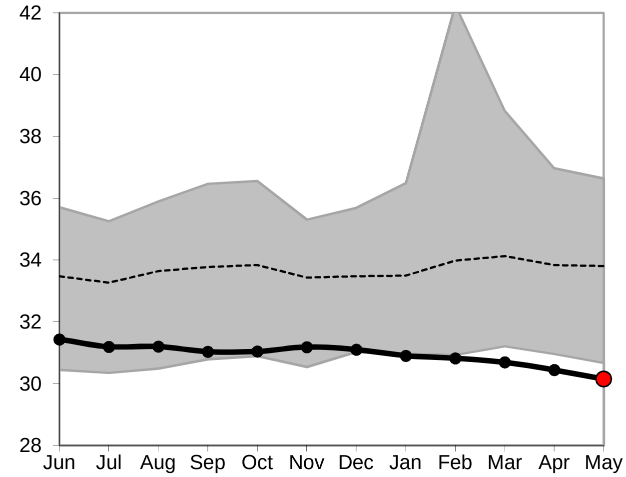
Levels June 1, 2011 through May 31, 2012
Period of Record Beginning 1978



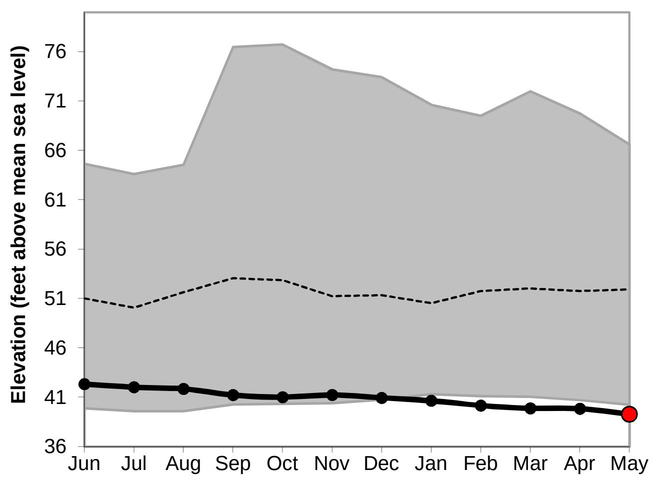
Union County S051933001
near Lake Butler



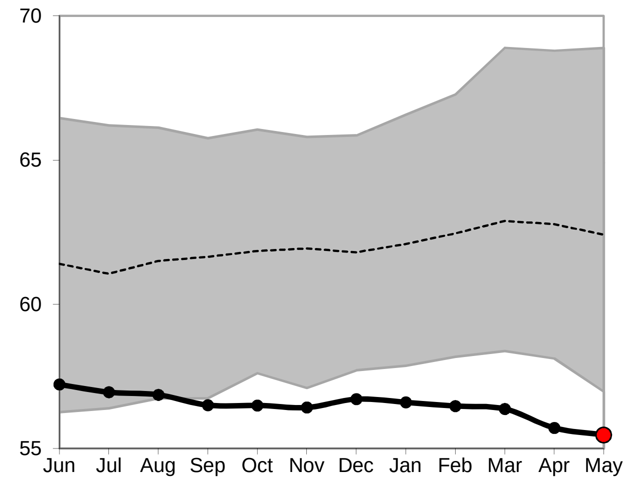
Alachua County S081703001
at High Springs



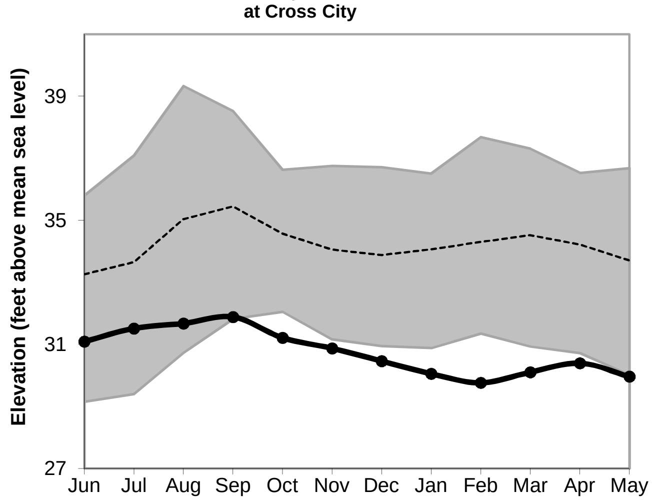
Gilchrist County S091607001
near Trenton



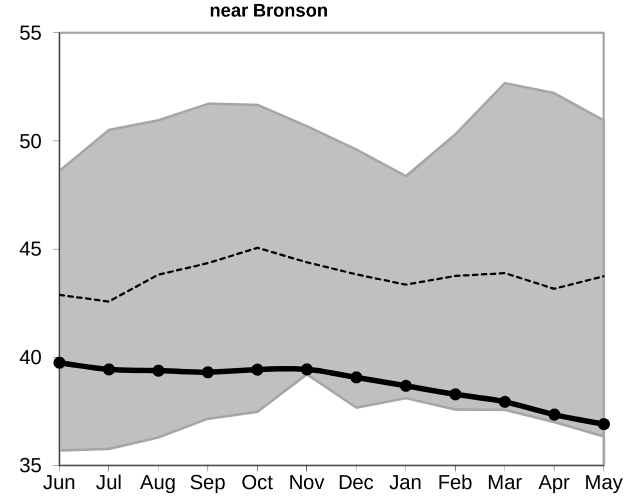
Bradford County S072132001
near Graham



Dixie County S101210001
at Cross City



Levy County S131736001
near Bronson



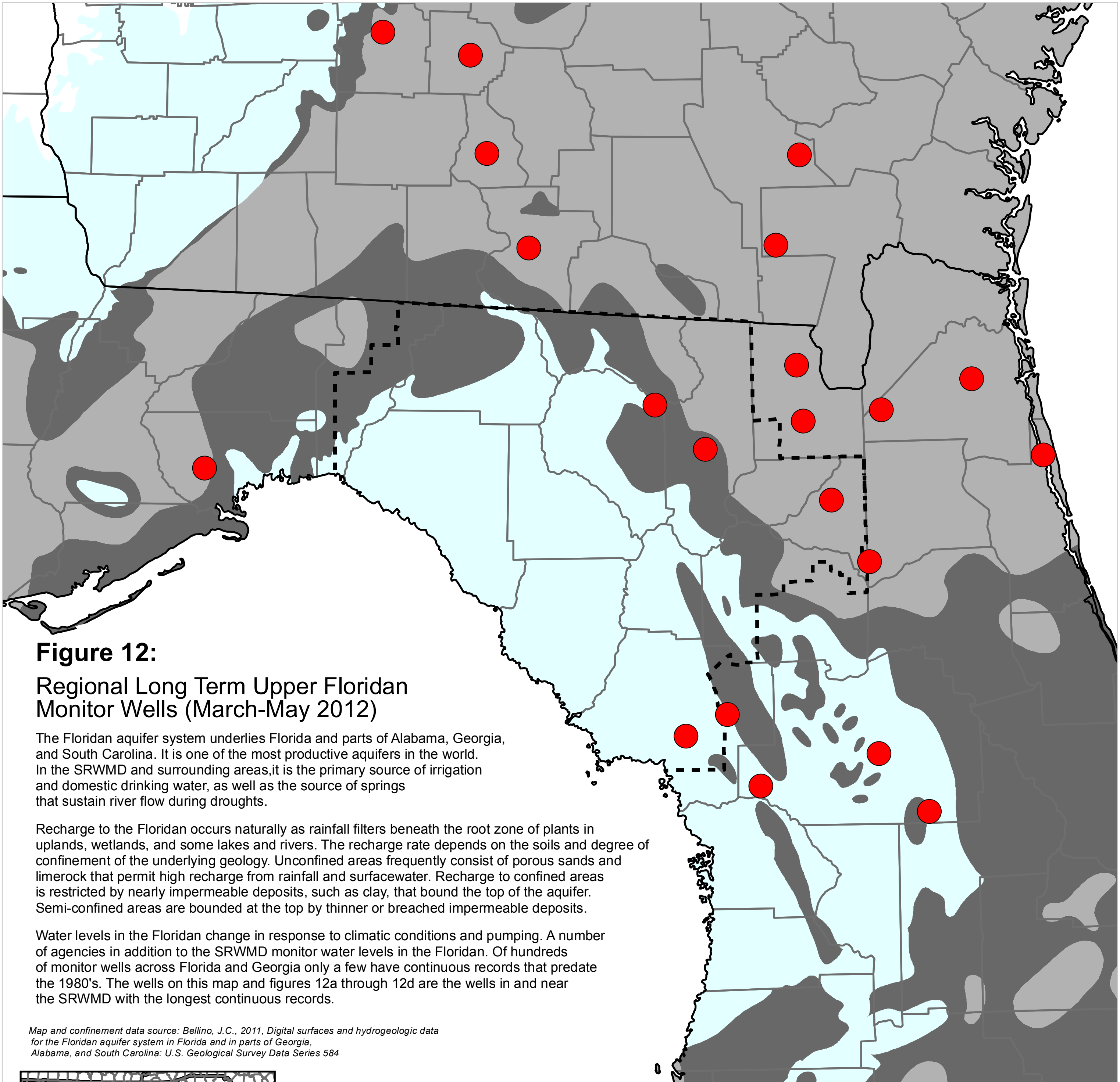


Figure 12:

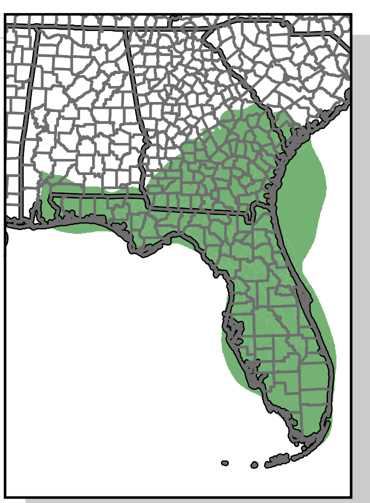
Regional Long Term Upper Floridan Monitor Wells (March-May 2012)

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 March-May 2012

Upper Floridan Aquifer levels in feet above mean sea level

Courtesy of USGS and Georgia EPD

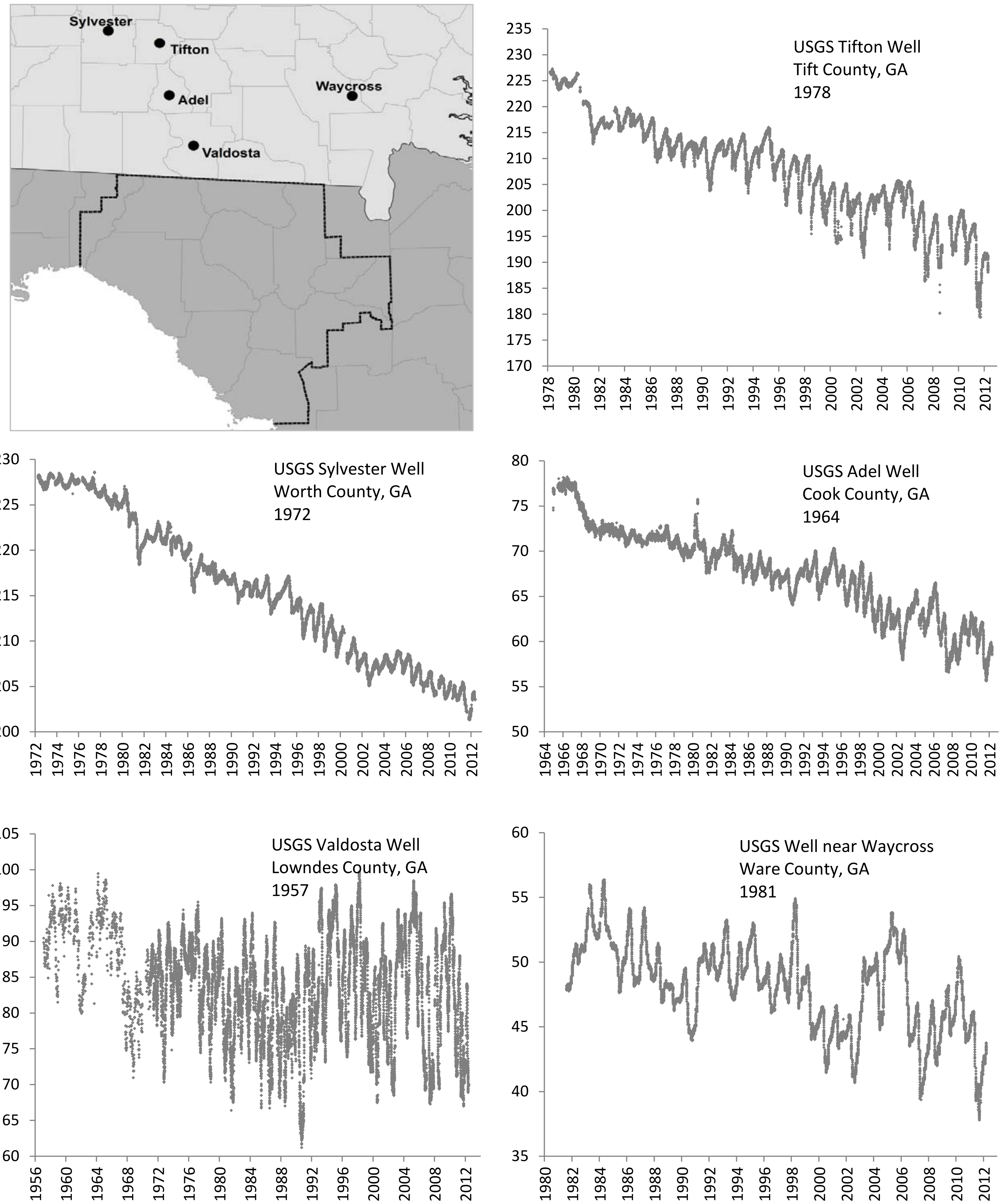


Figure 12b: Regional Long Term Upper Floridan Levels

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

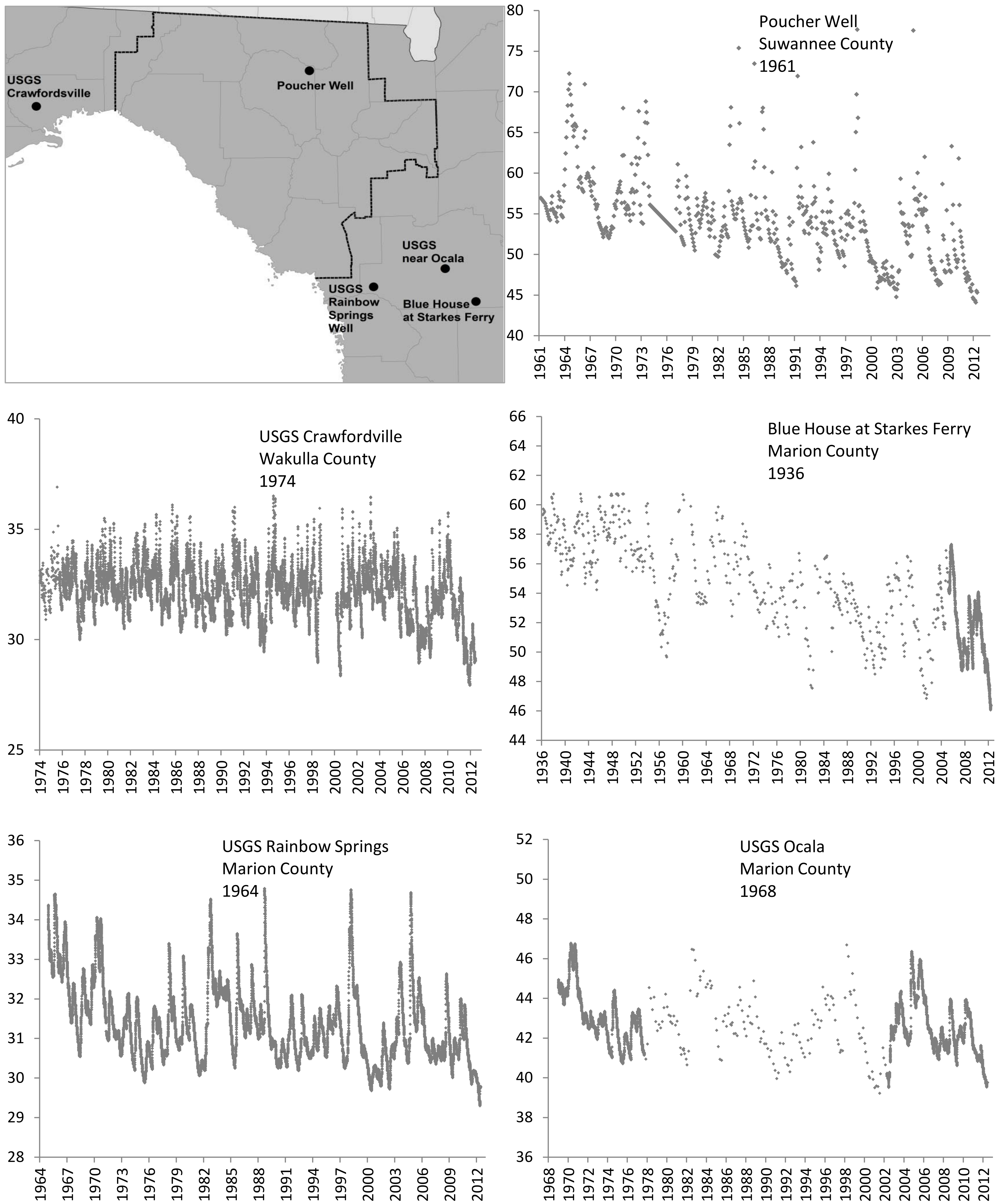
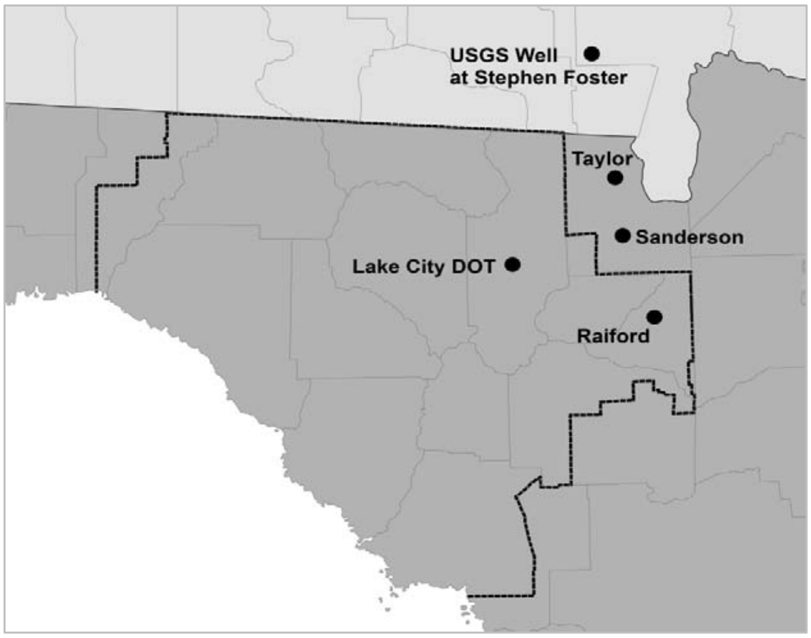
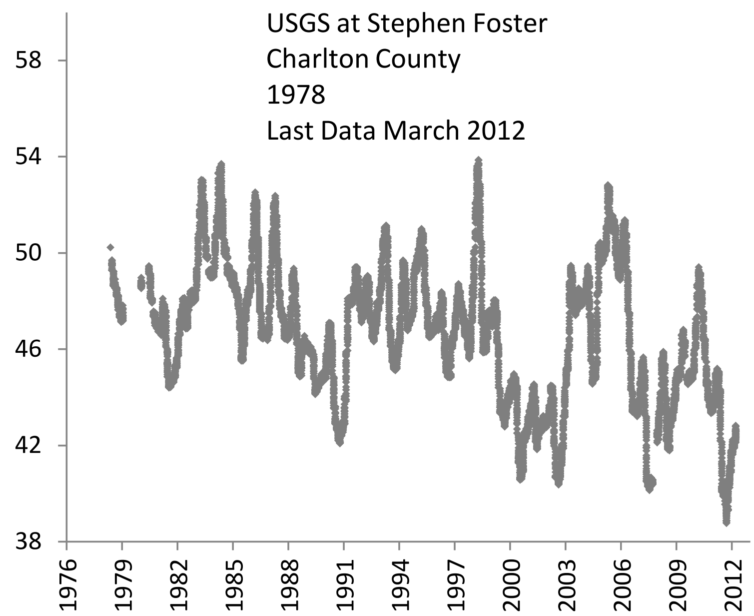
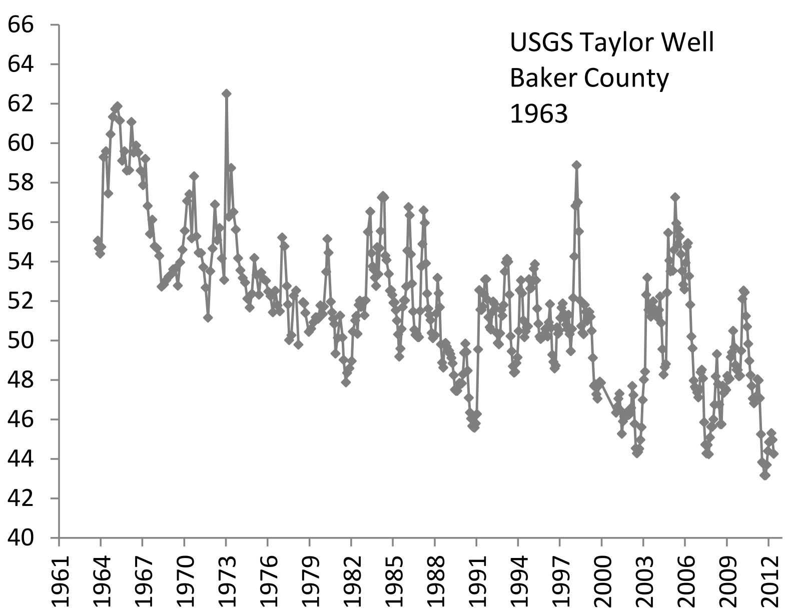


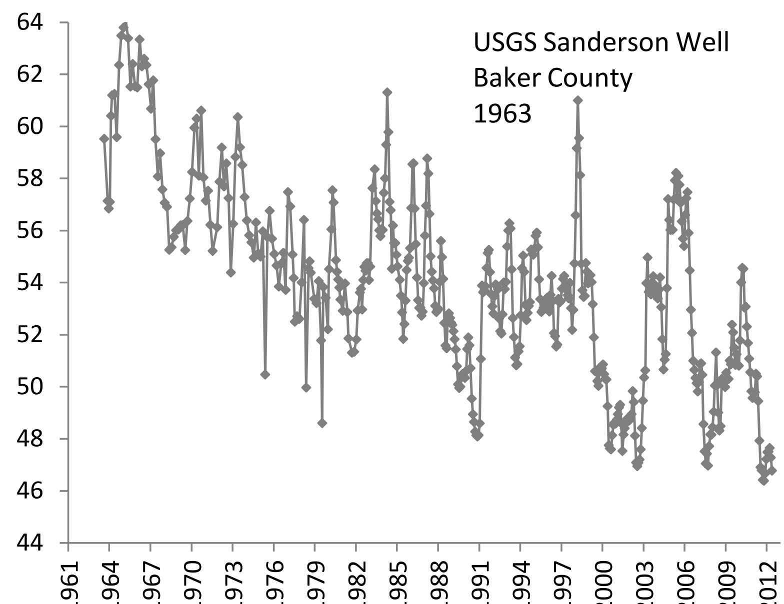
Figure 12c: Regional Long Term Upper Floridan Levels

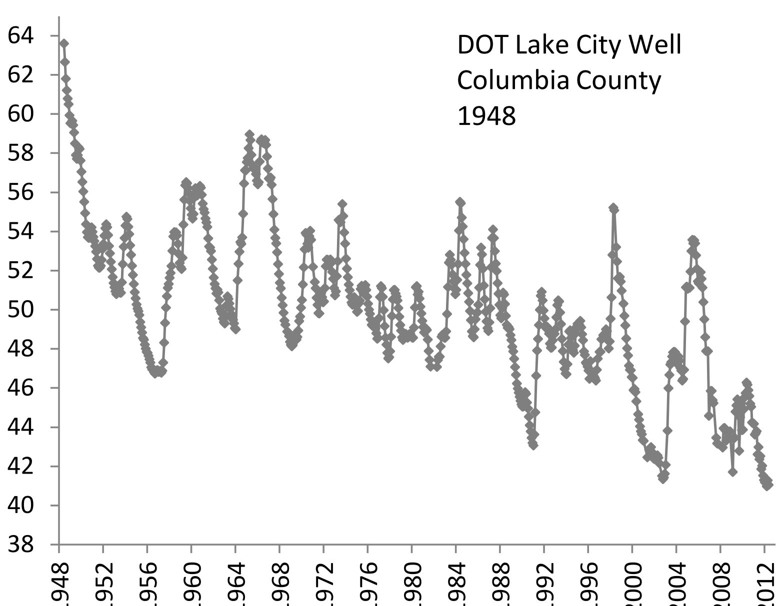
Ending March - May 2012
Upper Floridan Aquifer levels in feet above mean sea level
Courtesy of USGS and SJRWMD











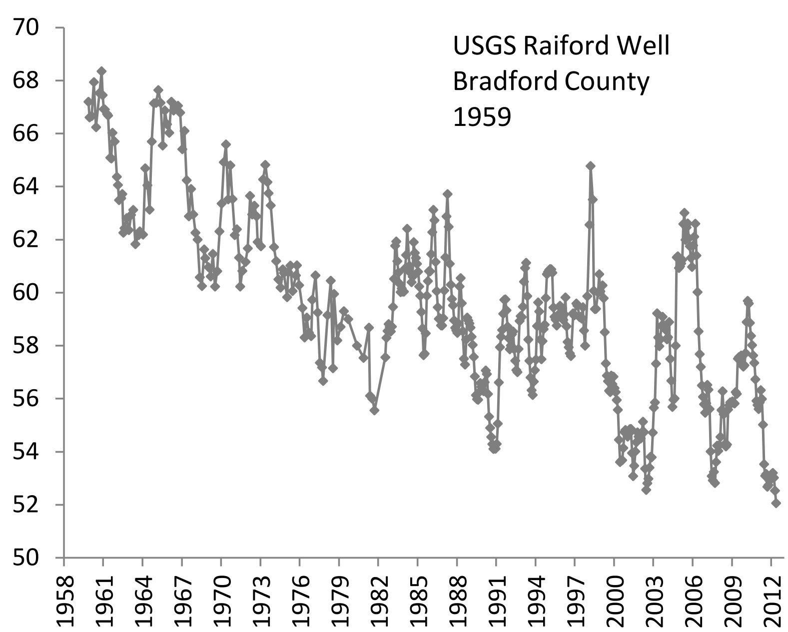


Figure 12d: Regional Long Term Upper Floridan Levels

Ending May 2012

Upper Floridan Aquifer levels in feet above mean sea level

Courtesy of SJRWMD

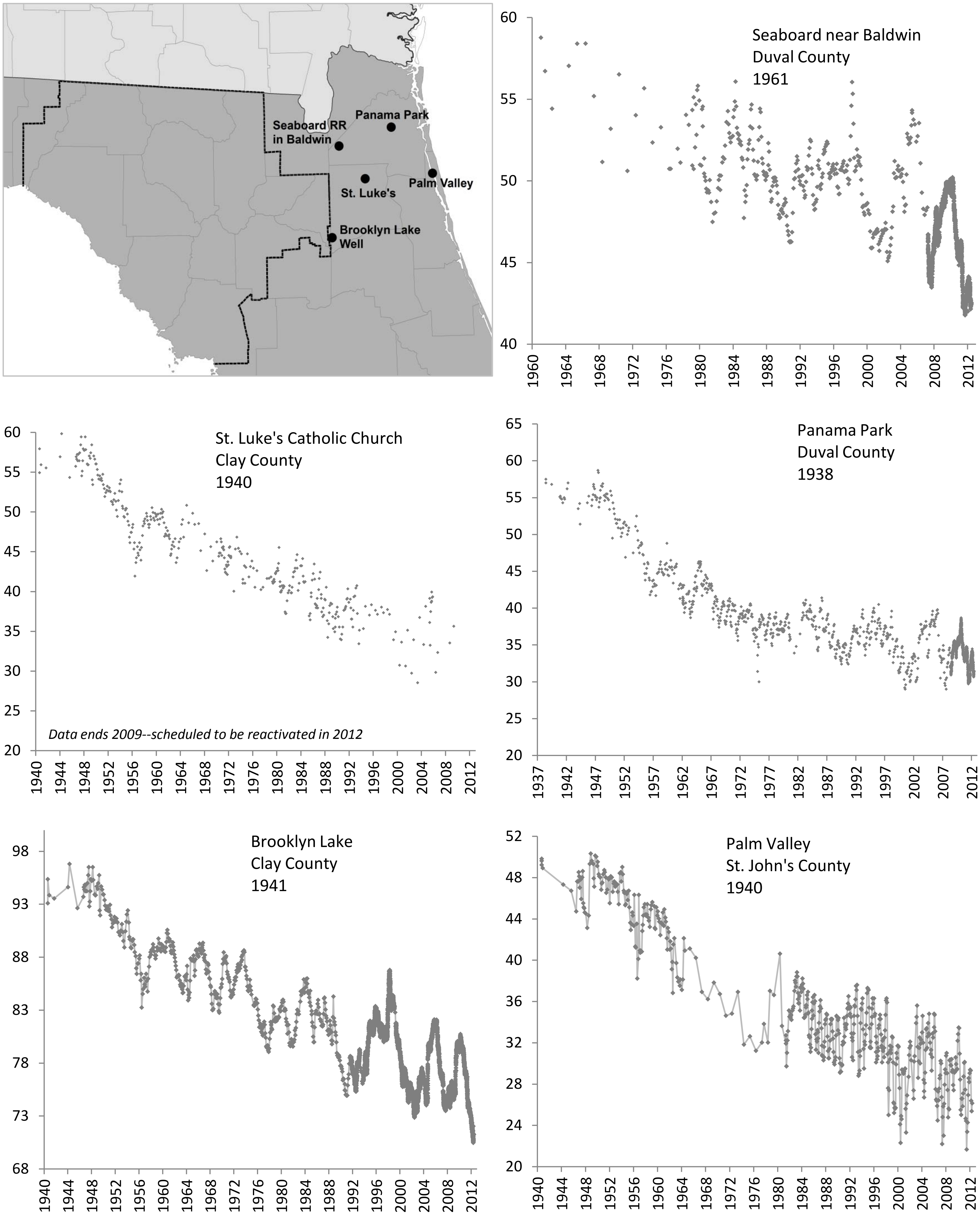


Figure 13: Agricultural Water Use

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.