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: August 9, 2013

RE: July 2013 Hydrologic Conditions Report for the District

RAINFALL

- With an average of 7.7", July is typically the wettest month of the year in north Florida. Rainfall this July was 12.03", one and a half times the long-term average (since 1932). This was the wettest July since 1980 and the fifth wettest since 1932. The weather patterns during the month were driven largely by a series of stalled fronts caused by a persistent trough of low pressure over the southeast U.S.
- The average for Dixie County (17.15") was nearly double its long-term average (Table 1, Figure 1). Accumulations of up to 24" (a one-in-25-year event) fell in southeastern Dixie and western Levy counties (Figure 2). The highest gaged monthly total was 21.01" at the Cross City NOAA gage, a new record for July since monitoring began there in 1948. The month's total was only 1" less than what was recorded during the preceding six months. The second-highest gaged total was 19.56" at Wacissa Tower in Jefferson County, while the NOAA gage at Usher Tower near Chiefland had 16.72", its third highest July rainfall since 1956. The highest gaged daily total was 3.74" at Cabbage Grove in Taylor County. The lowest gaged monthly rainfall was 6.14" at PCS near White Springs, slightly less than a typical July. The drier conditions in this area reduced flooding potential after more than 15" fell in June. Rainfall in the Georgia tributary basins was also mostly above normal but less extreme than farther south (Figure 3).
- Average rainfall for the 12 months ending July 31 was 1.81" higher than the long-term average of 54.61" (Figure 4). Average rainfall for the 3 months ending July 31 was 6" higher than the long-term average of 17.8" (Figure 5).

SURFACEWATER

- **Rivers:**
  - Coastal rivers were the most impacted by the July rains. The Steinhatchee River rose 11' during the month, causing minor flooding on nearby roads and properties. Its crest at 22.75' was near the 20% flood (a flood that has a 1-in-5 chance of being exceeded in any year). The Econfina crested at its highest stage in 10 years, also causing minor flooding. The Aucilla River crested at 1' above flood stage and stayed above flood stage for three weeks.
  - Alapaha and upper Suwannee gages rose to unseasonably high levels during the first half of the month in response to locally heavy rain in June. The Alapaha at Statenville crested one foot above flood stage on July 14. While this was considered a minor flood, it was the first time the Alapaha reached flood stage in July since record-keeping began in 1921, and only the second time it reached flood stage during any summer month. The Suwannee at White Springs crested 10' below flood stage. Gages farther down the Suwannee crested 10-14 days later and began to fall by the last week of the month. The Santa Fe River at Three Rivers Estates stayed at 3" above flood stage for 2 weeks, caused initially by the rising Suwannee then sustained by increased flows from the upper Santa Fe. Statistics for a number of

rivers are presented graphically in Figure 6, and conditions relative to historic conditions are in Figure 7.

- **Lakes**: Most lakes rose in response to local rainfall and remained above their long-term average levels. Figure 8 shows levels relative to the long-term average, minimum, and maximum levels for a number of monitored lakes.

- **Springs**: Most springs on the Suwannee River were inundated by tannic water, and those on public lands generally stayed closed to swimming and diving during July. Despite the high river levels that can cause spring flow to be reduced, two springs were measured at their highest flows in the record—Holton Creek Rise in Hamilton County with 490 MGD (million gallons per day), and Convict Springs in Lafayette County with 26 MGD. Both springs have short records, but the flows exceeded those measured in 1998 when groundwater levels were also high in the springsheds. The flow at Poe Springs on the Santa Fe River was 34 MGD, about 20% higher than its median flow based on records starting in 1998. Statistics for a representative sample of springs are shown in Figure 9.

GROUNDWATER

Levels in upper Floridan aquifer monitor wells rose in July, climbing by an average of 2.5'. Wells at Horseshoe Tower in Dixie County and Cooks Hammock in Lafayette County reached new record highs based on records that began in the late 1980s. A Cross City well saw its highest level since the 2004 hurricanes. Levels in the areas of heaviest rainfall in coastal counties generally peaked by mid-month before starting to fall. Only 4 District wells remained below the 25th percentile (considered below normal), but their levels continued to climb through the end of the month. Eighty-five percent of the wells had levels above the 50th percentile (Figure 10). 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 August 3 indicated moderately wet conditions in both north Florida and south central Georgia.
- The National Weather Service Climate Prediction Center (CPC) three-month outlook showed a potential for above-normal rainfall through the peak of hurricane season and into October. Neutral El Niño/Southern Oscillation conditions are expected into the fall, with no tendency toward either El Niño (cooler and wetter) or La Niña (warmer and drier) conditions.

CONSERVATION

A Phase I Water Shortage Advisory remains in effect. Users are urged to eliminate unnecessary uses. Landscape irrigation is limited to twice per week between March and November 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

County	July 2013	July Average	Month % of Normal	Last 12 Months	Annual % of Normal
Alachua	11.33	7.01	162%	56.85	111%
Baker	8.60	7.06	122%	49.90	100%
Bradford	8.11	6.92	117%	53.42	105%
Columbia	8.59	7.01	123%	53.12	103%
Dixie	17.15	9.14	188%	58.27	99%
Gilchrist	12.68	8.03	158%	58.75	102%
Hamilton	8.04	6.79	118%	52.44	100%
Jefferson	11.95	7.23	165%	54.74	90%
Lafayette	15.16	8.21	185%	61.31	108%
Levy	14.11	8.98	157%	55.58	93%
Madison	11.21	7.29	154%	58.38	104%
Suwannee	12.30	7.17	172%	58.23	110%
Taylor	13.79	8.62	160%	60.88	102%
Union	9.64	7.49	129%	52.78	98%

July 2013 Average:	12.03
July Average (1932-2012):	7.70
Historical 12-month Average (1932-2012):	54.61
Past 12-Month Total:	56.42
12-Month Rainfall Surplus:	1.81

Figure 1: Comparison of District Monthly Rainfall

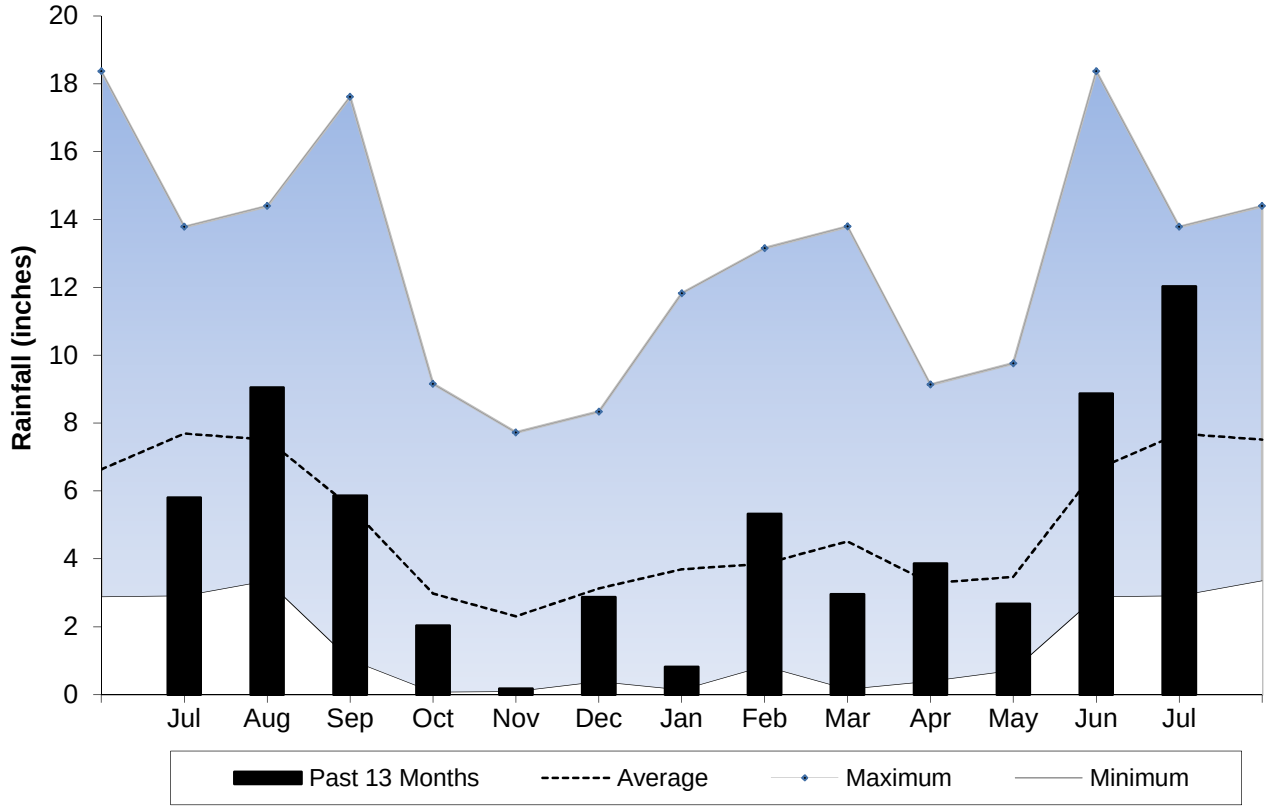


Figure 2: July 2013 Rainfall Estimate

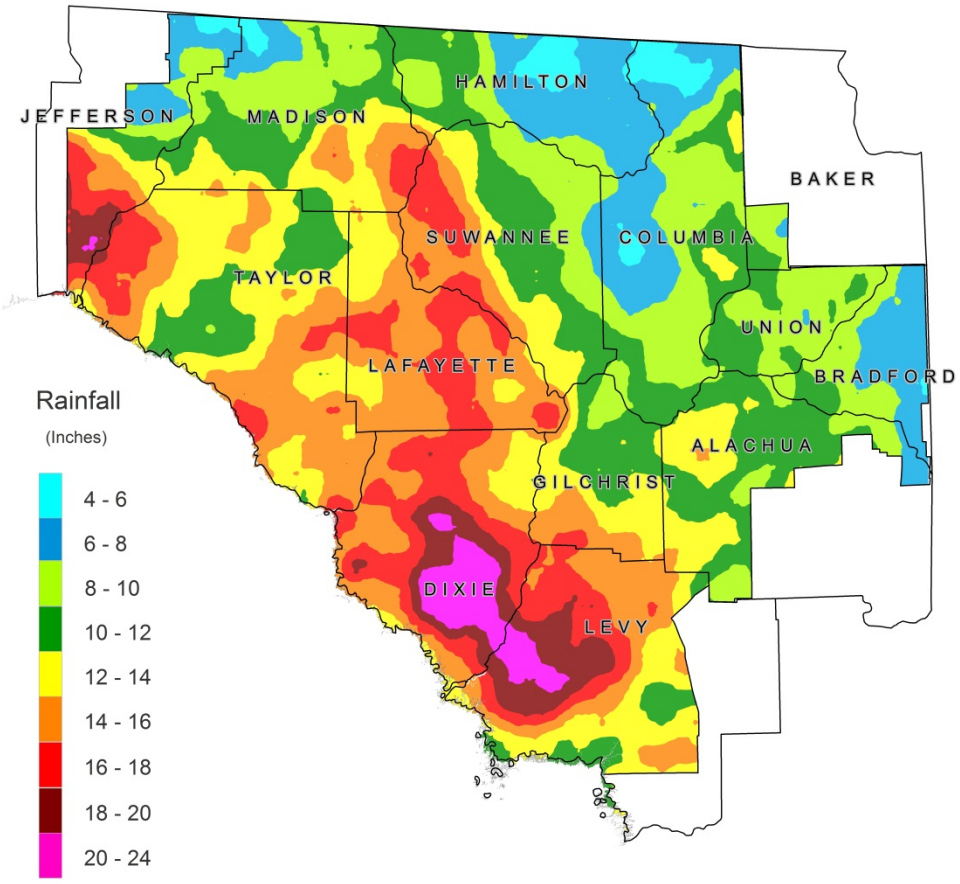


Figure 3: July 2013 Percent of Normal Rainfall

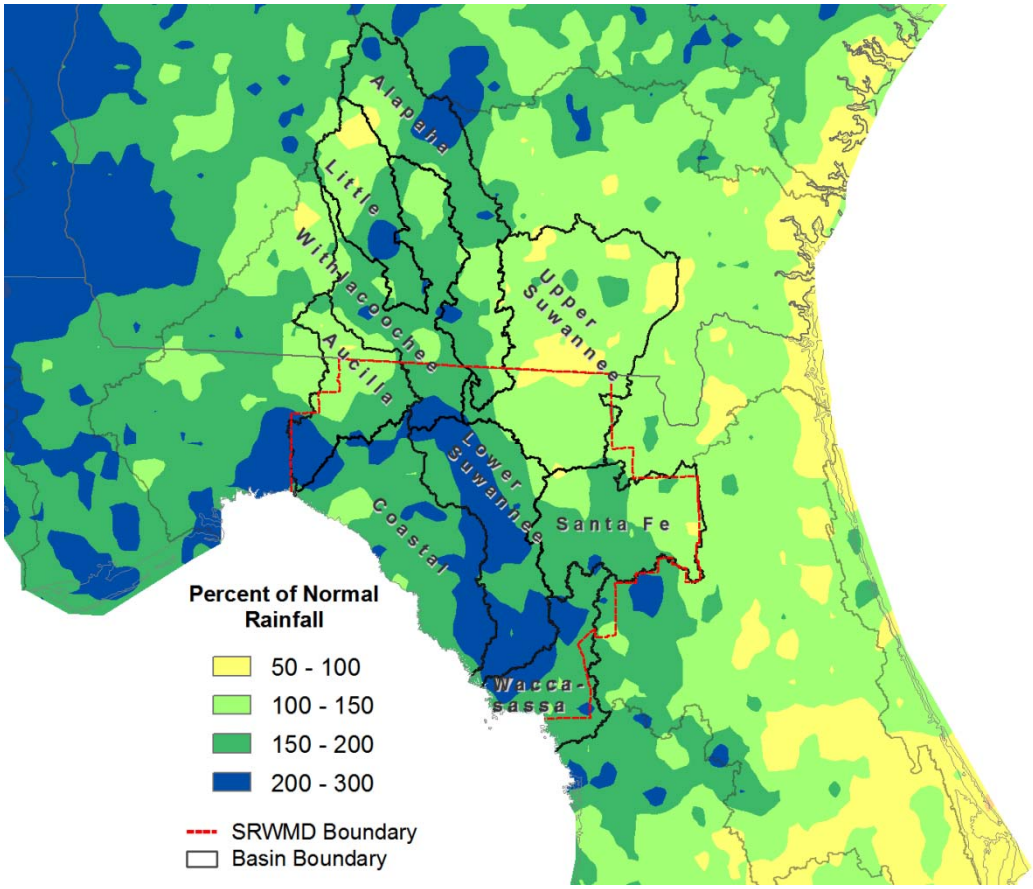


Figure 4: 12-Month Rainfall Surplus/Deficit by River Basin
Through July 31, 2013

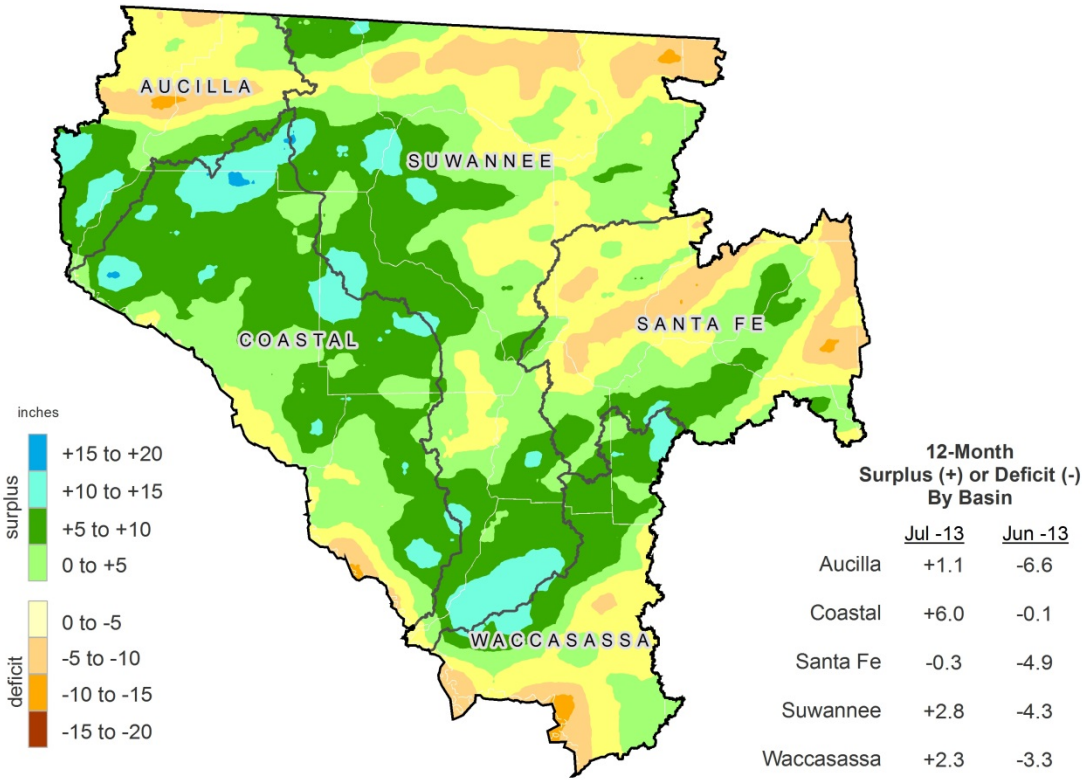


Figure 5: 3-Month Rainfall Surplus/Deficit by River Basin
Through July 31, 2013

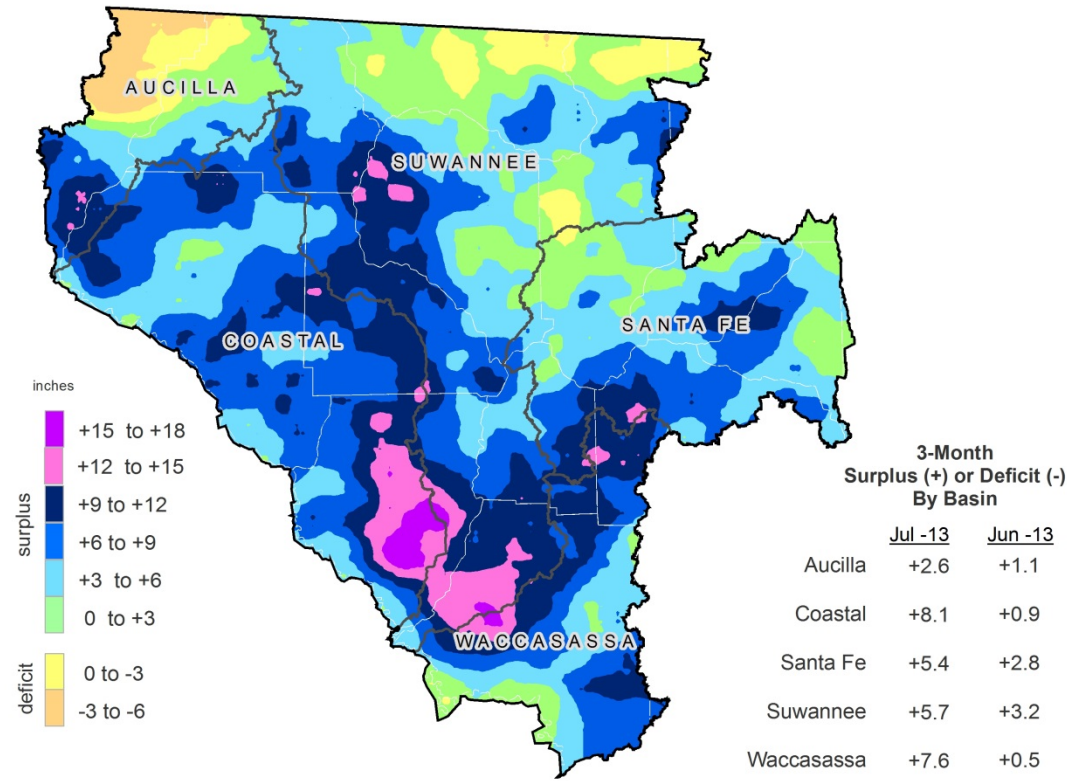


Figure 6: Daily River Flow Statistics

August 1, 2012 through August 1, 2013

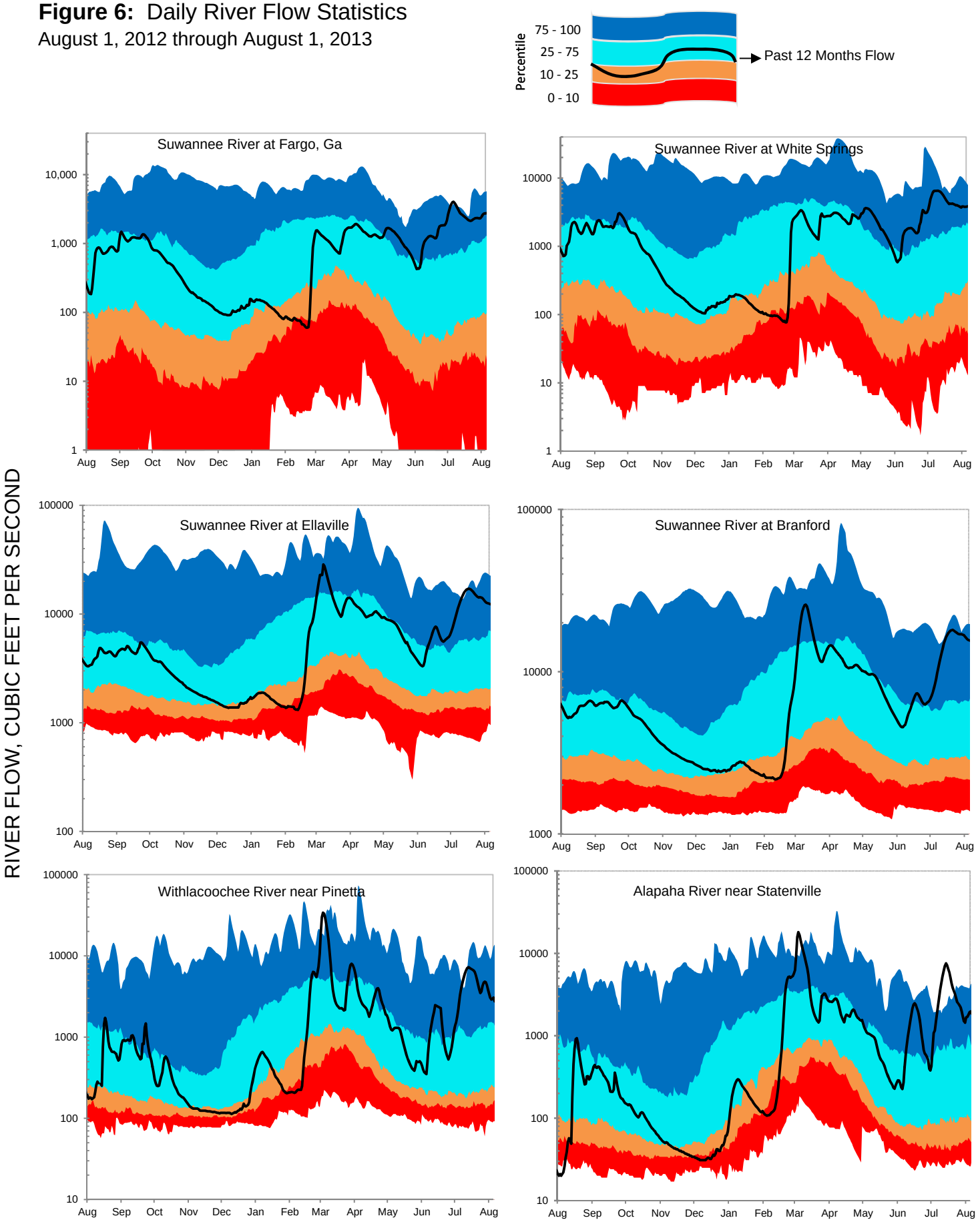
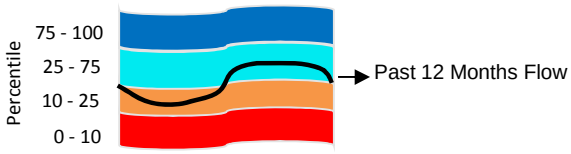
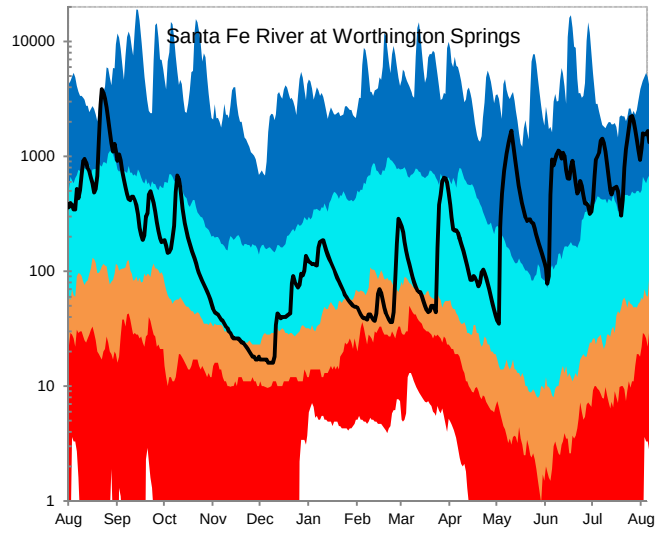
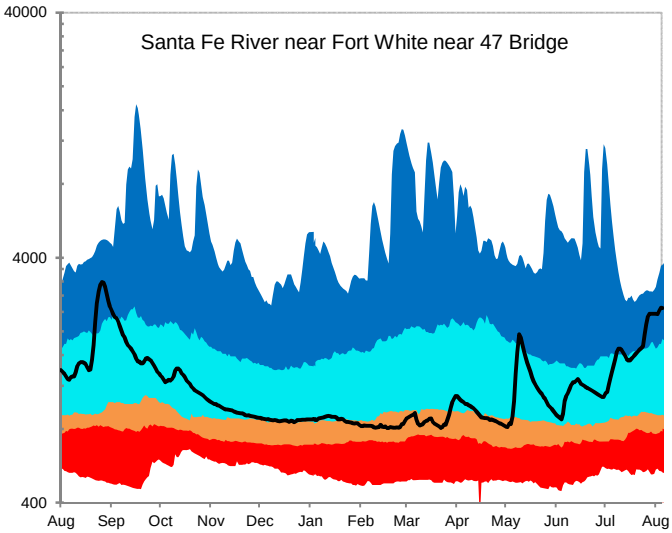


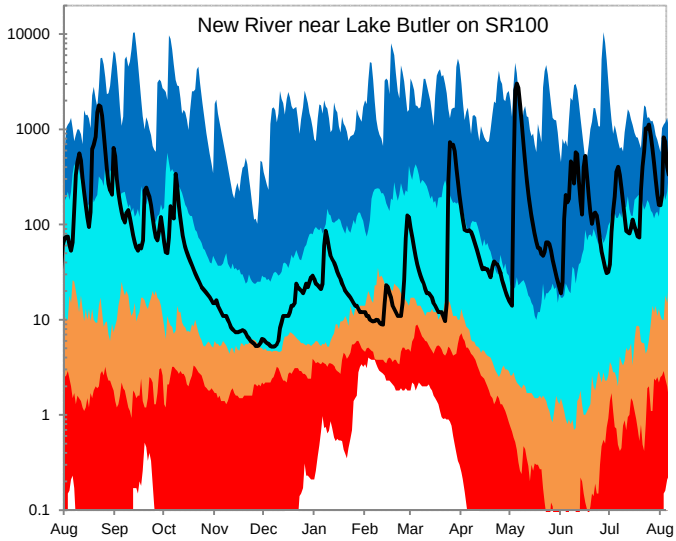
Figure 6, cont: Daily River Flow Statistics
August 1, 2012 through August 1, 2013

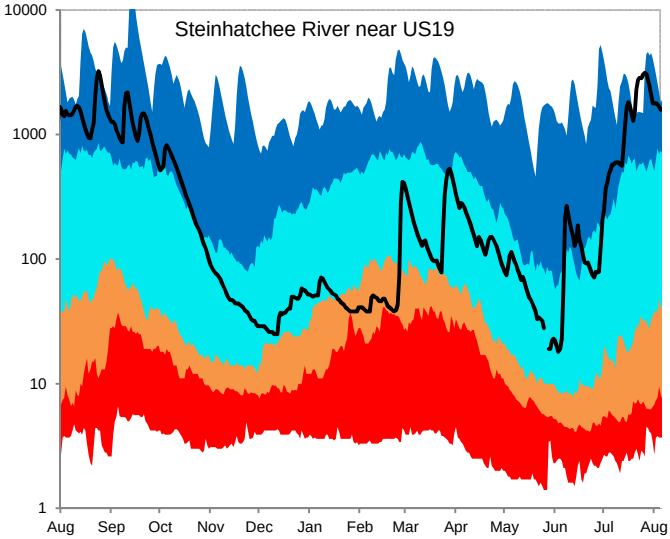


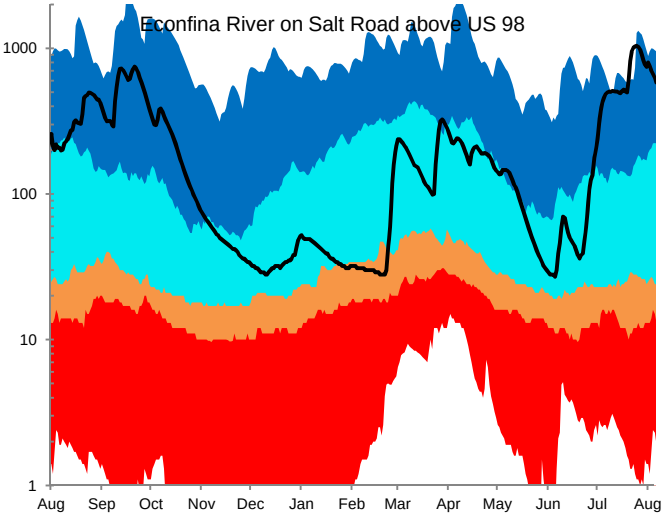
RIVER FLOW, CUBIC FEET PER SECOND

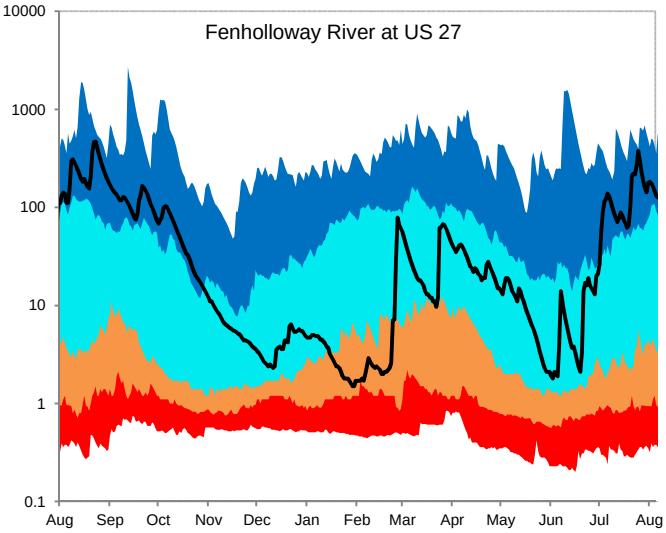












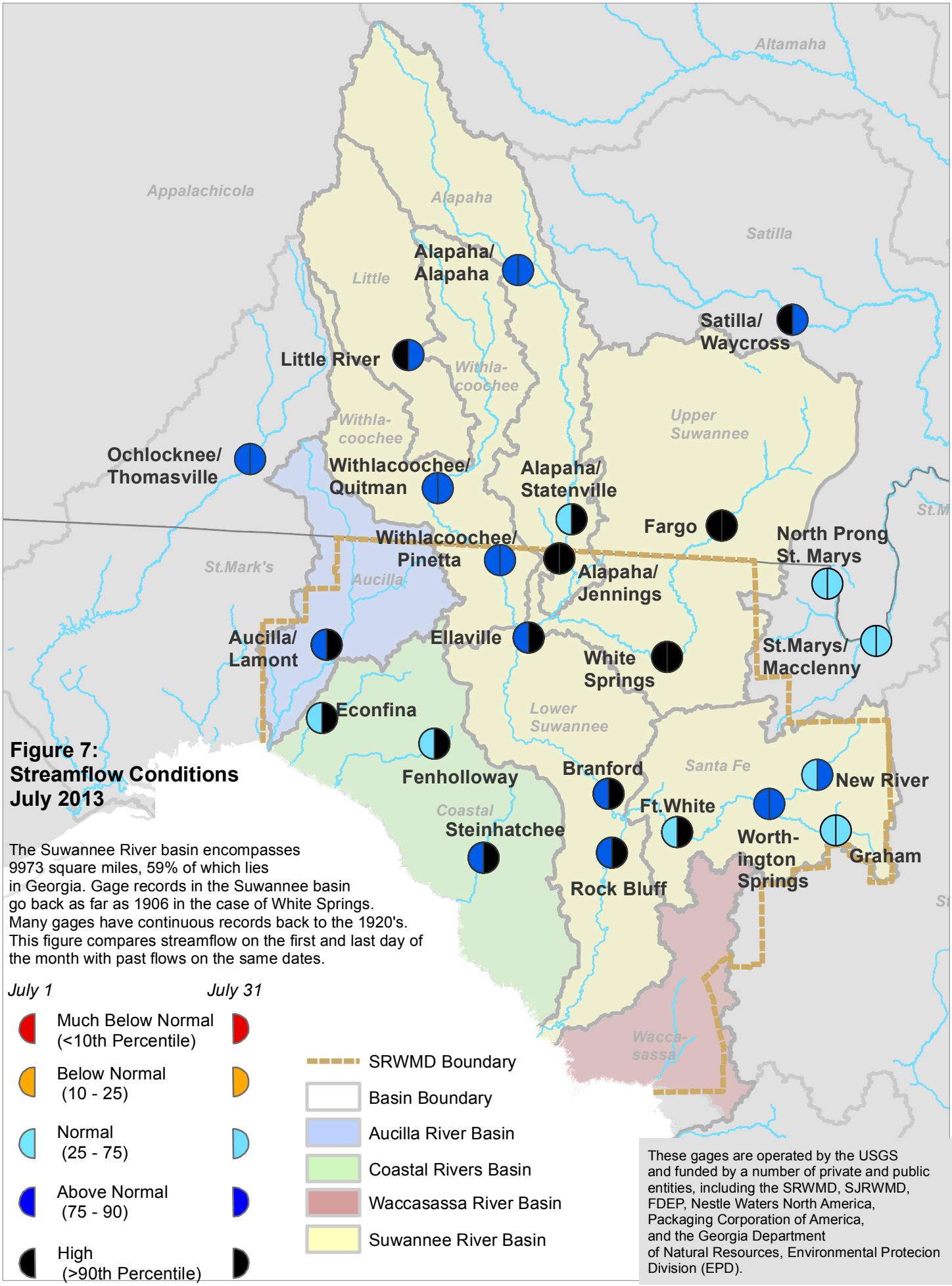


Figure 7:
Streamflow Conditions
July 2013

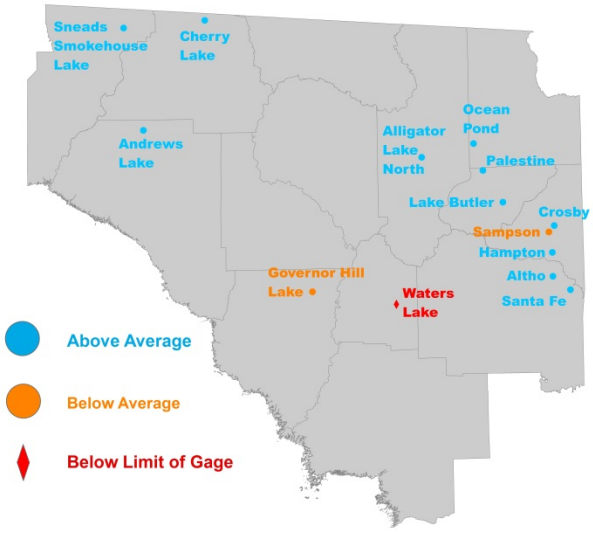
The Suwannee River basin encompasses 9973 square miles, 59% of which lies in Georgia. Gage records in the Suwannee basin go back as far as 1906 in the case of White Springs. Many gages have continuous records back to the 1920's. This figure compares streamflow on the first and last day of the month with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

July 1 *July 31*

- Much Below Normal (<10th Percentile)
- Below Normal (10 - 25)
- Normal (25 - 75)
- Above Normal (75 - 90)
- High (>90th Percentile)

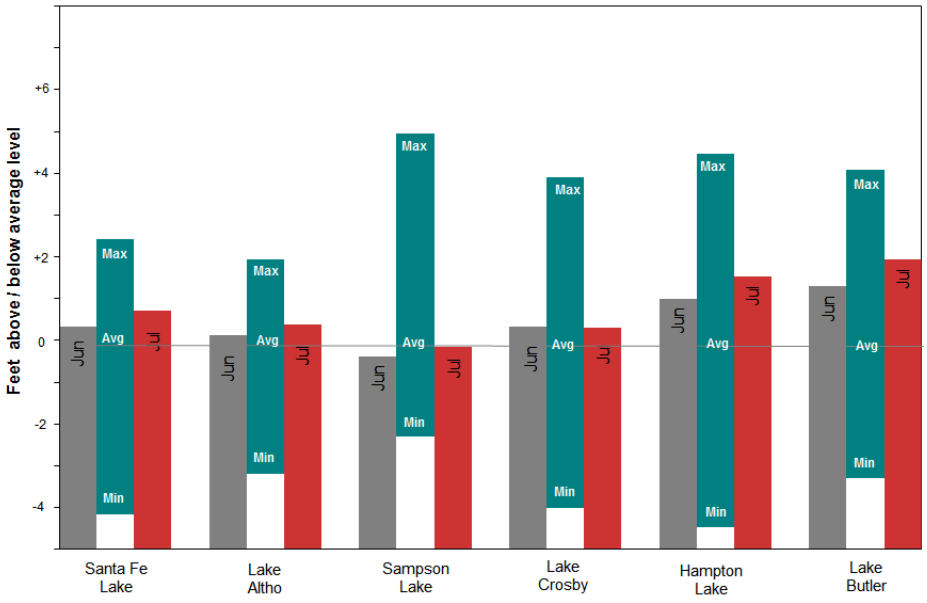
These gages are operated by the USGS and funded by a number of private and public entities, including the SRWMD, SJRWMD, FDEP, Nestle Waters North America, Packaging Corporation of America, and the Georgia Department of Natural Resources, Environmental Protecion Division (EPD).

Figure 8: July 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.



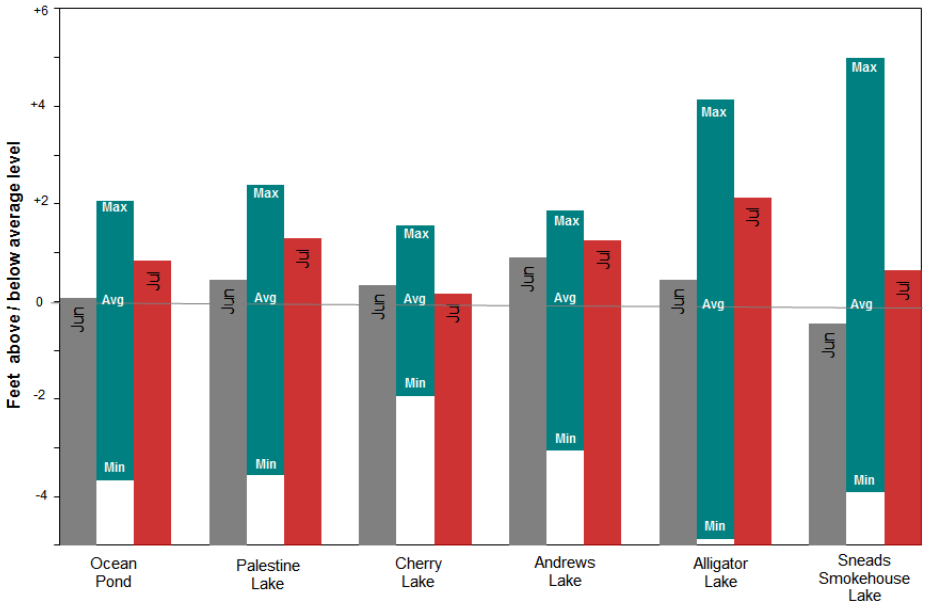
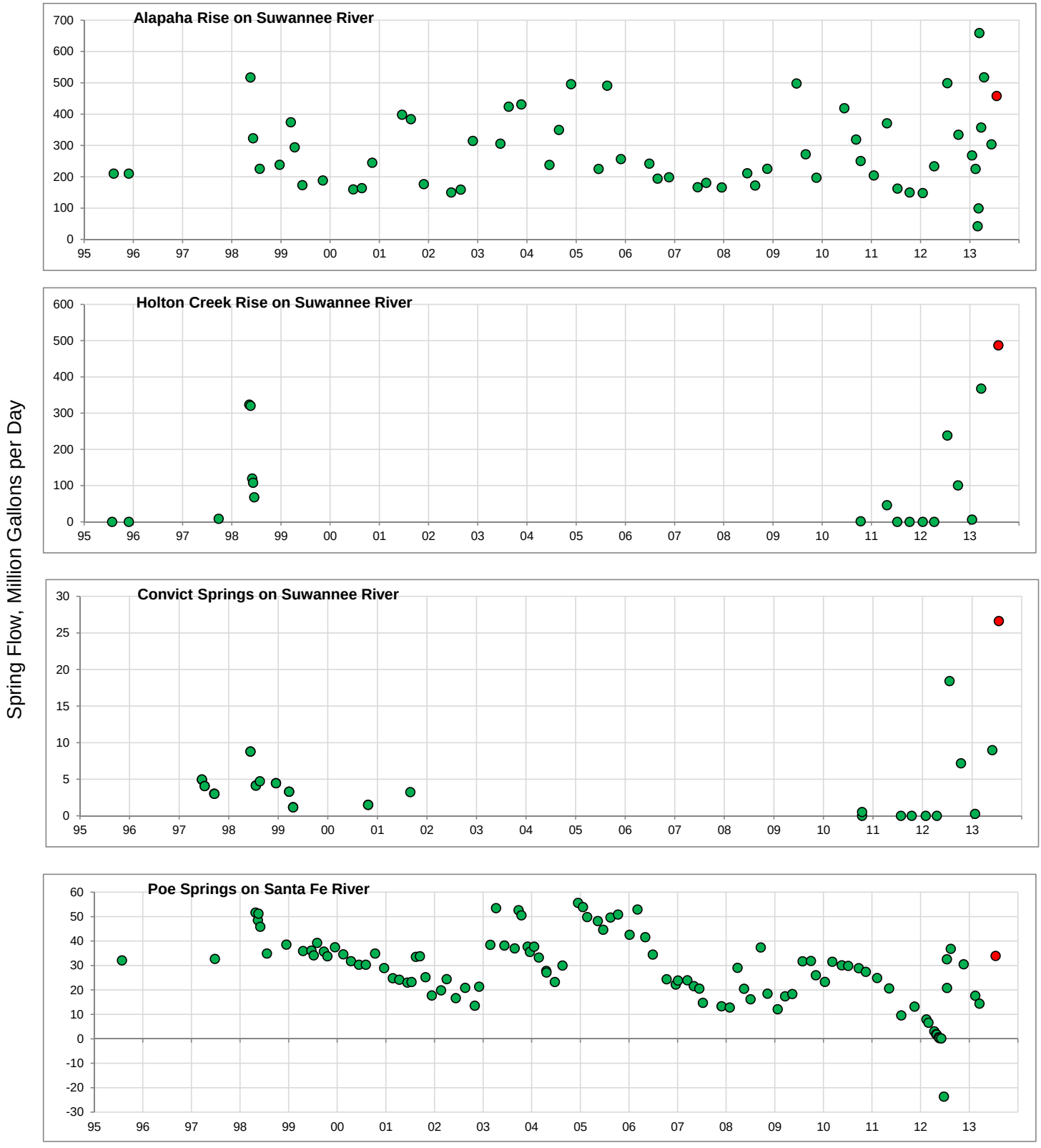


Figure 9: Quarterly Springflow Measurements

The SRWMD monitors water quality at 30 springs. Flow is measured at the time of the sampling. The springs below were measured in July 2013, with the latest 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.



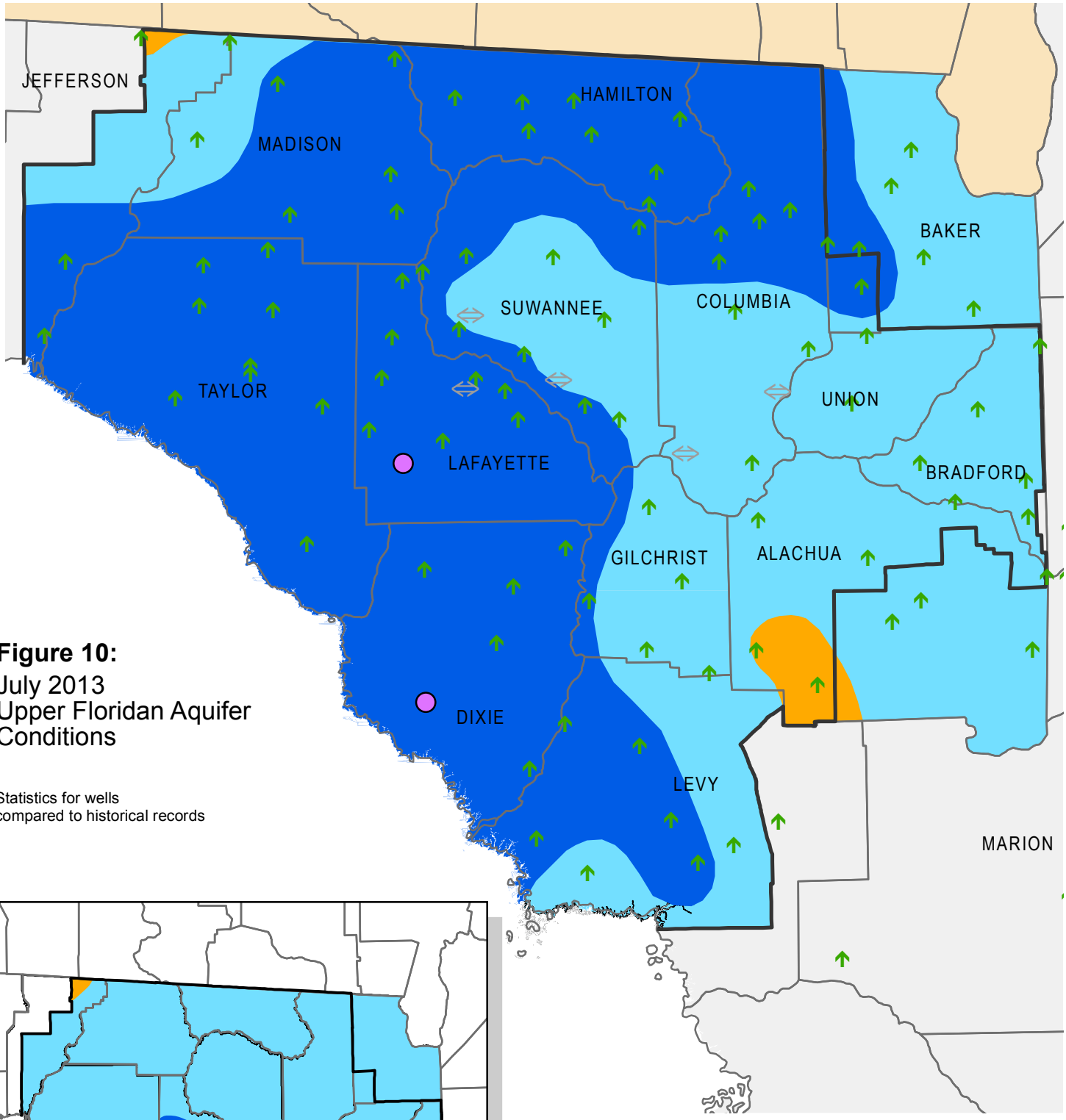
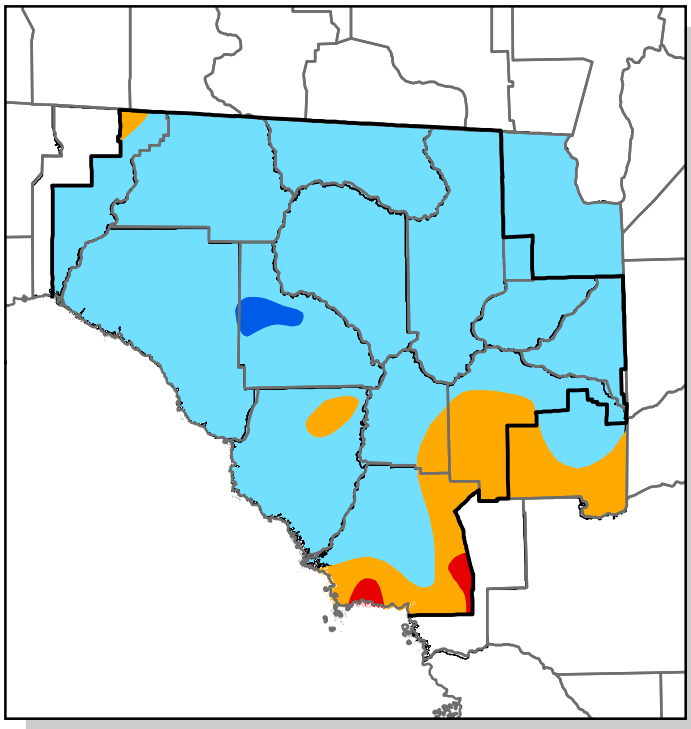


Figure 10:
July 2013
Upper Floridan Aquifer
Conditions

Statistics for wells
compared to historical records



Inset: June 2013 Groundwater Levels

Historical High Level

High
(Greater than 75th Percentile)

Normal
(25th to 75th Percentile)

Low
(10th to 25th Percentile)

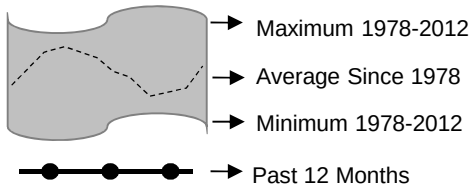
Extremely Low
(Less than 10th Percentile)

Increase/decrease in level since last month

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

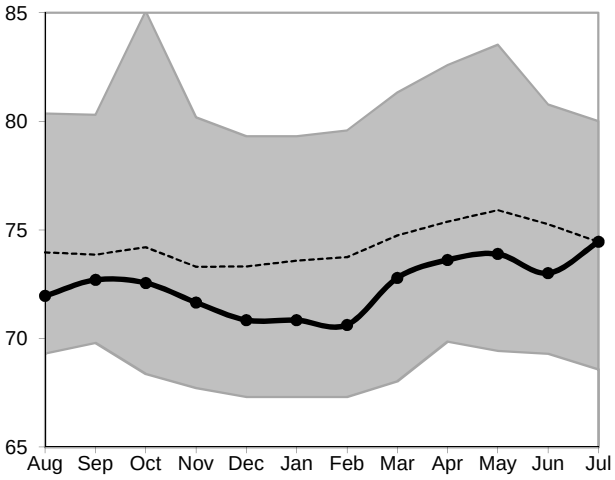
District Boundary

Figure 11: Monthly Groundwater Level Statistics
Levels August 1, 2012 through July 31, 2013
Period of Record Beginning 1978

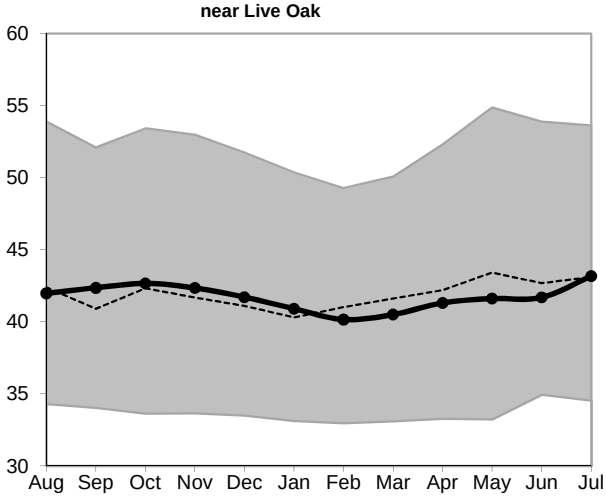


Upper Floridan Aquifer Elevation above NGVD 1929, Feet

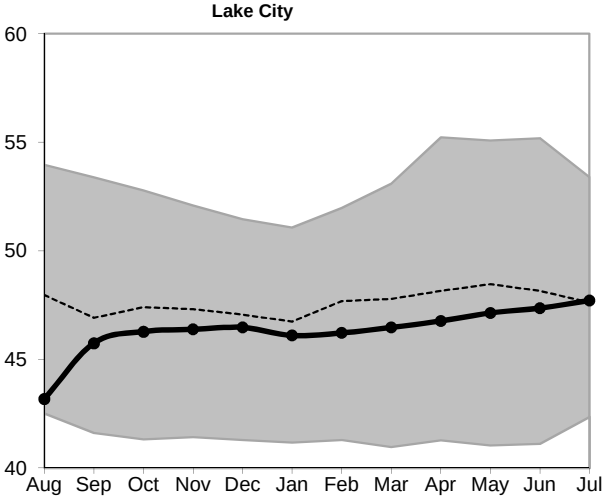
Madison County N010719001
near Greenville



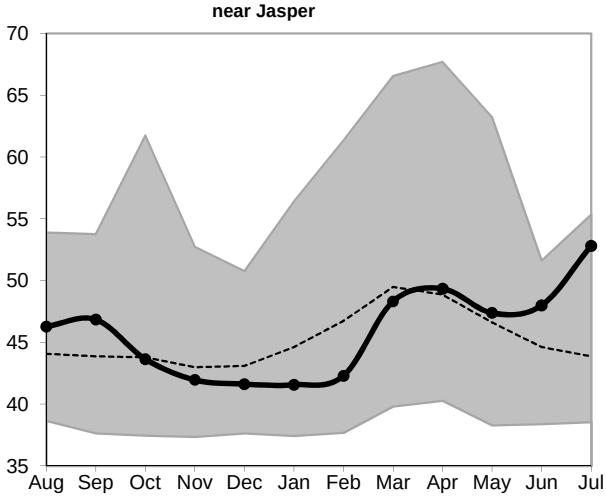
Suwannee County S021335001
near Live Oak



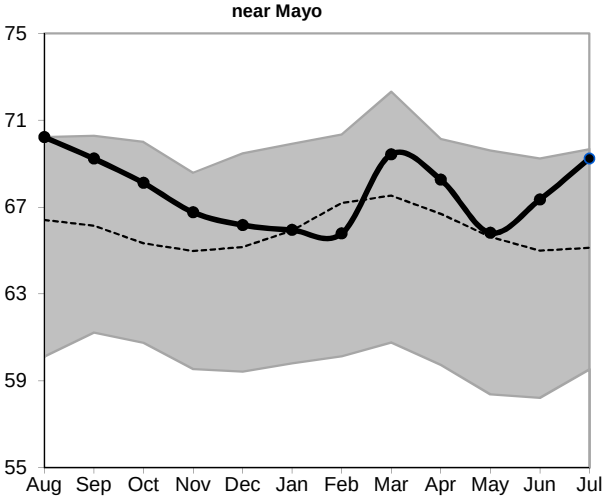
Columbia County S041705001
Lake City



Hamilton County N011422007
near Jasper



Lafayette County S061114001
near Mayo



Taylor County S050701001
near Perry

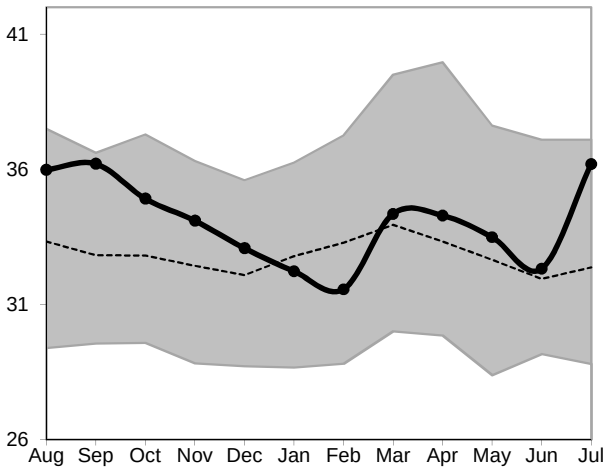
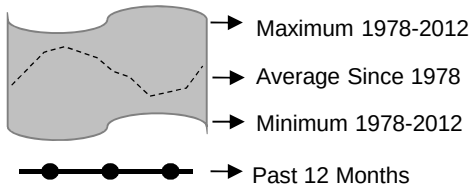
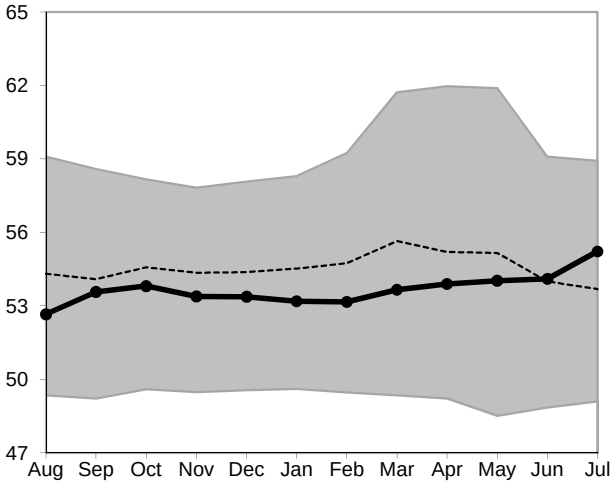


Figure 11, cont.: Groundwater Level Statistics
Levels August 1, 2012 through July 31, 2013
Period of Record Beginning 1978

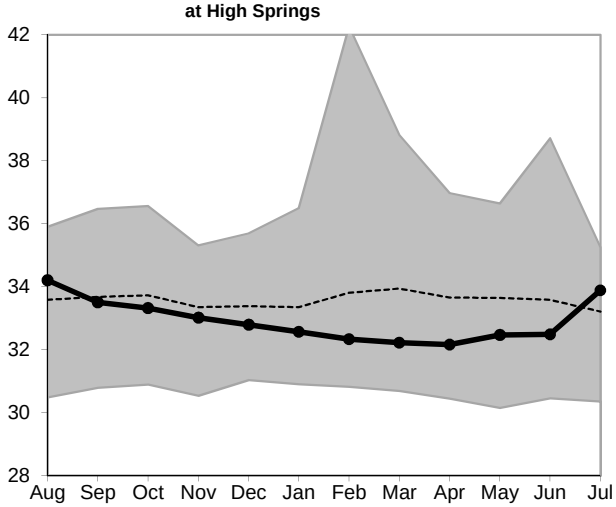


Upper Floridan Aquifer Elevation above NGVD 1929, Feet

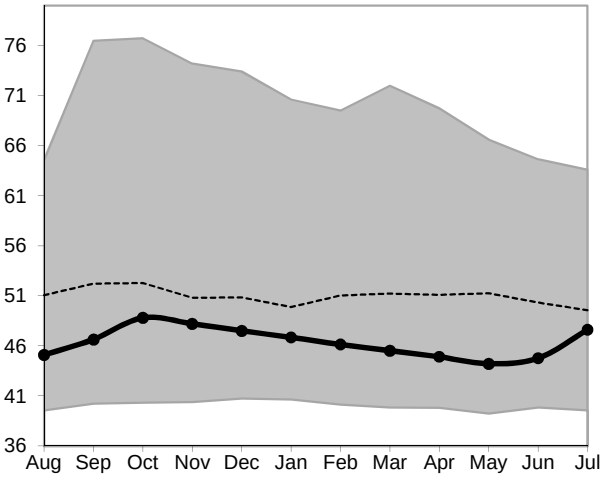
Union County S051933001
near Lake Butler



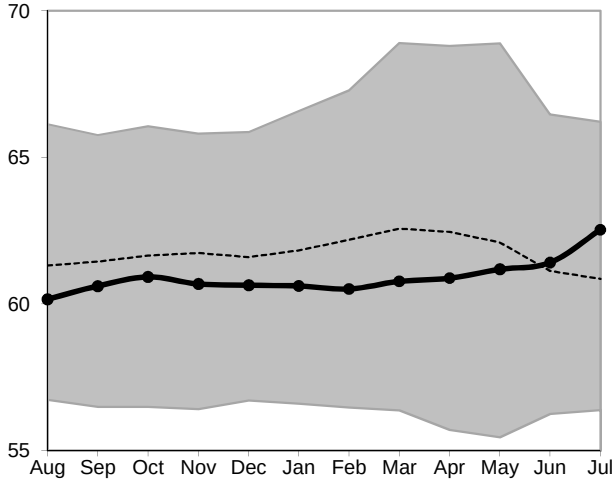
Alachua County S081703001
at High Springs



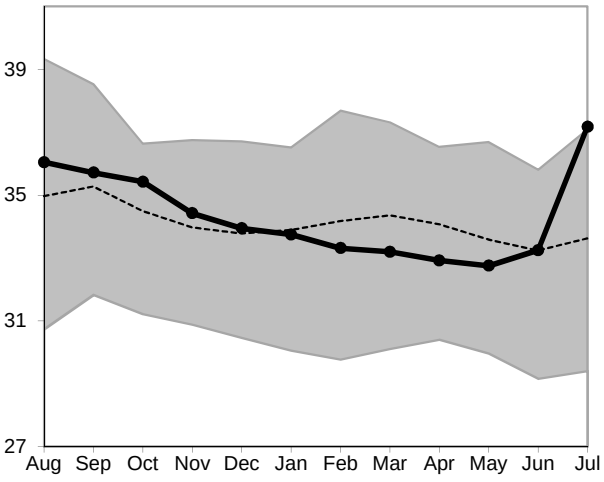
Gilchrist County S091607001
near Trenton



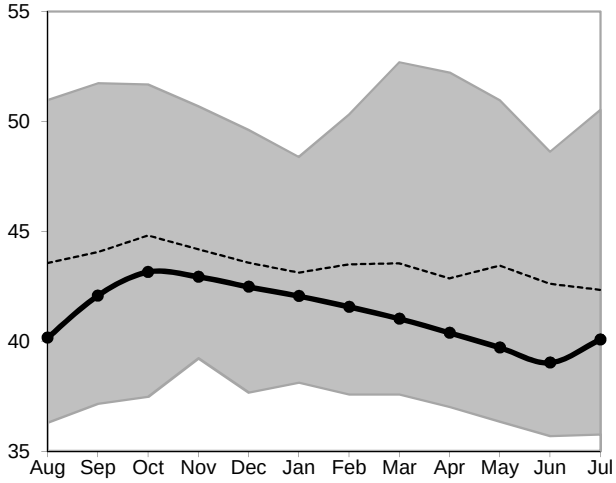
Bradford County S072132001
near Graham



Dixie County S101210001
at Cross City



Levy County S131736001
near Bronson



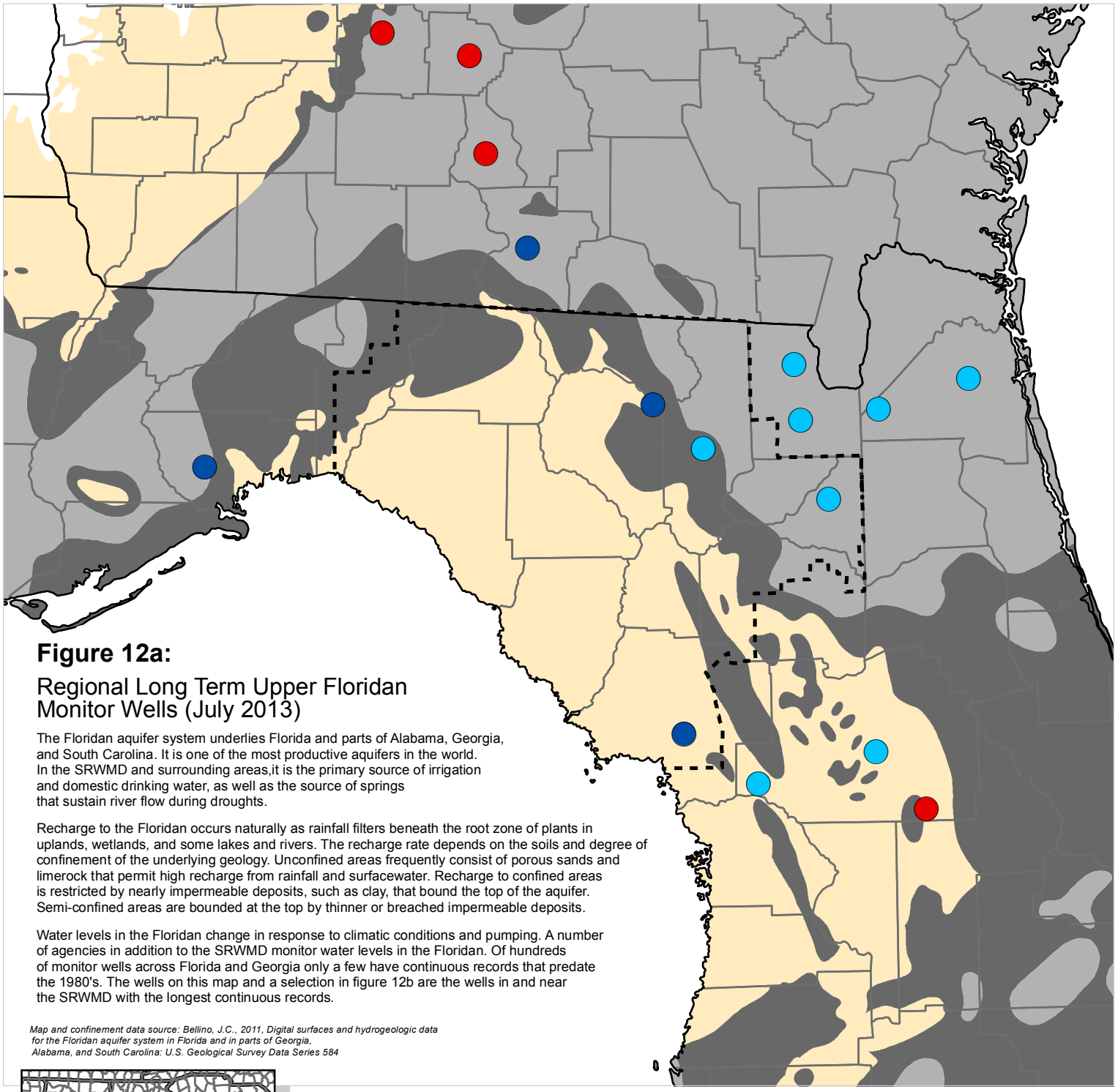


Figure 12a:

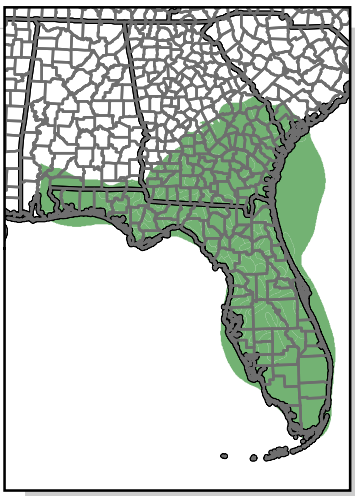
Regional Long Term Upper Floridan Monitor Wells (July 2013)

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

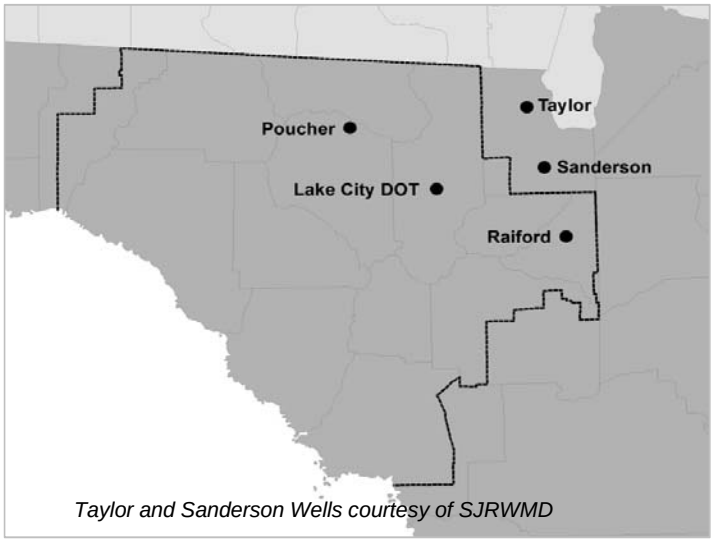
- Confined: Upper confining unit is generally greater than 100 feet thick and unbreached. Recharge is low.
- Semi-confined: Upper confining unit is generally less than 100 feet thick, breached, or both. Recharge is moderate.
- Unconfined: Upper confining unit is absent or very thin. Recharge is high.

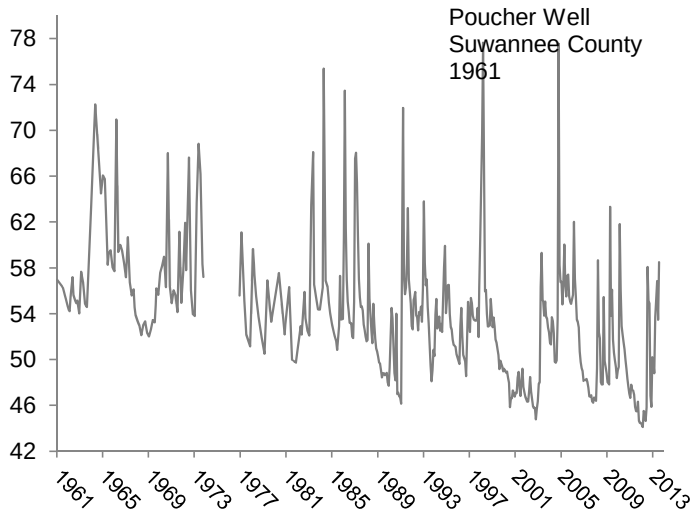
Percentile of Most Recent Water Level Relative to Entire Record

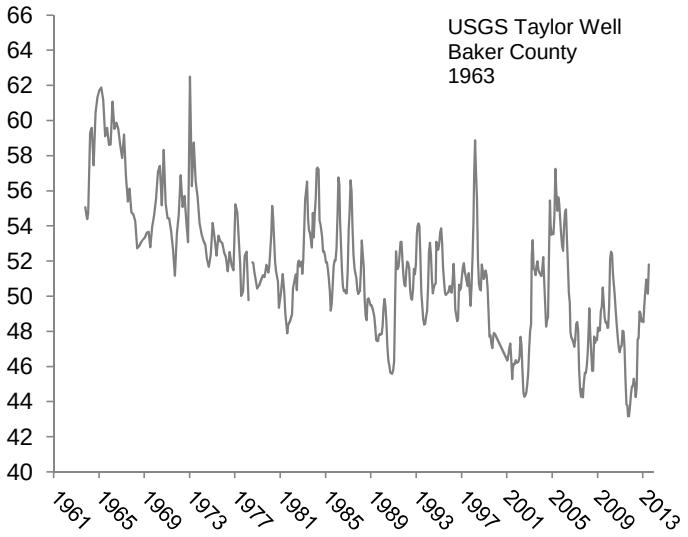
- High (Greater than 75th Percentile)
- Normal (25th to 75th Percentile)
- Low (10th to 25th Percentile)
- Extremely Low (Less than 10th Percentile)
- Not Available
- SRWMD Boundary

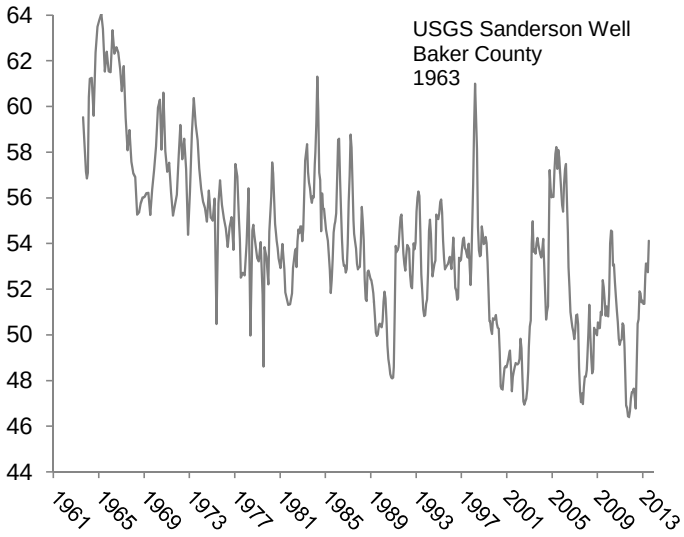
Figure 12b: Regional Long Term Upper Floridan Levels

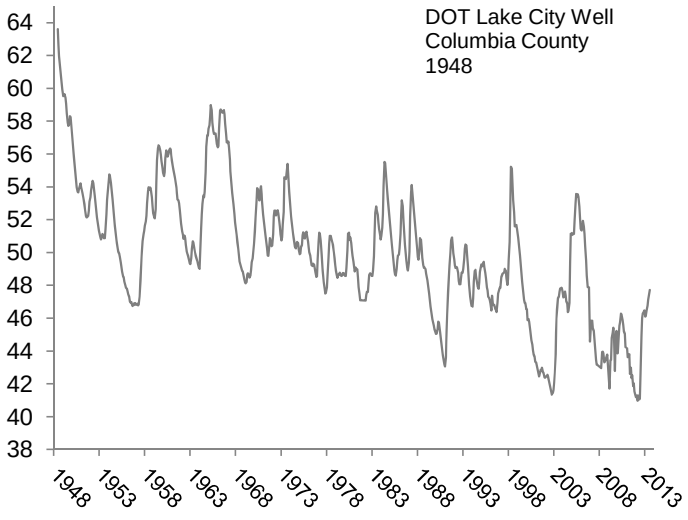
July 2013

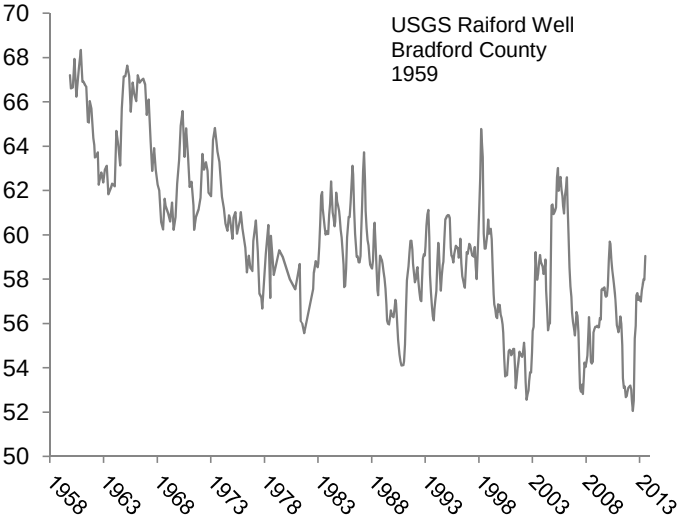












Upper Floridan Aquifer Elevation above NGVD 1929, Feet