MEMORANDUM

TO: Governing Board

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

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

DATE: October 7, 2013

RE: September 2013 Hydrologic Conditions Report for the District

RAINFALL

- September rainfall was 3.91", which is about 70% of the long-term average of 5.54" (Figure 1, Table 1). Northern counties were significantly drier than southern and coastal areas (Figure 2), with parts of Hamilton and northern Columbia counties receiving as little as 0.25". Dixie, Levy, and Gilchrist counties fared better with near-normal rainfall overall and localized areas above 10". The lowest gaged monthly total was 1.23" at New River Tower in Bradford County, and the highest was 8.97" at Goethe State Forest in Levy County.
- South Georgia tributary watersheds were much below normal, with large areas seeing less than half of typical September rainfall (Figure 3).
- Average rainfall for the 12 months ending September 30 was 1.4" lower than the long-term average of 54.61" (Figure 4). Average rainfall for the 3 months ending September 30 was 3.5" higher than the long-term average of 20.75" (Figure 5). Three-month rainfall ranged from a deficit of nearly 9" in the upper Suwannee basin to almost 20" of surplus in parts of Dixie and Levy counties.

SURFACEWATER

- **Rivers:** Suwannee and Santa Fe River levels fell steadily throughout the month as drier conditions in the upper basins prevailed after an unusually wet summer. Conditions at most gages were near-normal, with the exception of the Suwannee River at Branford which remained above normal. Coastal rivers including the Steinhatchee and Econfina also fell after three months of above-normal flows.

- **Lakes**: Lake levels fell in September. Sampson and Crosby in Bradford County ended the month with below-average levels, along with Cherry Lake (Madison County) and Sneads Smokehouse Lake (Jefferson County). Figure 8 shows levels relative to the long-term average, minimum, and maximum levels for a number of monitored lakes.

- **Springs**: Telford Springs near Luraville was recorded flowing at 55 million gallons per day (MGD), 10 MGD higher than the previous high measurement in 2005. Lafayette Blue Springs was measured at 84 MGD, its highest flow since 2005. High groundwater levels and lower river levels caused White Sulphur Springs to discharge into the Suwannee River after 6 months of reverse flow into the spring. The water flowing out of the spring was tannic from the river influence, but the flow of 37 MGD on September 23 was strongly sulfurous and was the highest recorded flow since 2004. The flow was almost 6% of the total flow of the Suwannee at White Springs. Statistics for White Sulphur Springs and others are shown in Figure 9.

GROUNDWATER

Fifty-two percent of monitored upper Floridan aquifer levels dropped in September. Falling levels were typical in coastal counties after three months of near record-breaking high groundwater. Overall, levels remained above normal, with almost three-quarters of wells reporting levels above the 75$^{th}$ percentile. Only 10% of the wells had levels lower than their long-term median. 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 October 5 indicated near-normal conditions in north Florida and slightly wet conditions in south central Georgia.
- The National Weather Service Climate Prediction Center (CPC) three-month outlook showed equal chances of above- or below-normal precipitation through December. Neutral El Niño/Southern Oscillation conditions are expected into spring 2014, 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 (inches)

| County | Sep 2013 | September Average | Month % of Normal | Last 12 Months | Annual % of Normal |
|---|---|---|---|---|---|
| Alachua | 4.40 | 5.36 | 82% | 50.67 | 99% |
| Baker | 2.38 | 5.44 | 44% | 47.51 | 95% |
| Bradford | 2.29 | 6.13 | 37% | 48.59 | 96% |
| Columbia | 2.81 | 4.85 | 58% | 49.66 | 97% |
| Dixie | 6.35 | 6.58 | 96% | 56.22 | 95% |
| Gilchrist | 6.26 | 5.75 | 109% | 55.40 | 97% |
| Hamilton | 1.68 | 4.63 | 36% | 48.99 | 94% |
| Jefferson | 2.13 | 5.31 | 40% | 50.80 | 84% |
| Lafayette | 4.01 | 5.46 | 73% | 58.36 | 103% |
| Levy | 6.85 | 6.70 | 102% | 54.35 | 91% |
| Madison | 1.80 | 4.62 | 39% | 54.55 | 97% |
| Suwannee | 3.03 | 5.08 | 60% | 55.76 | 105% |
| Taylor | 4.54 | 5.61 | 81% | 58.49 | 98% |
| Union | 2.59 | 4.94 | 52% | 48.23 | 89% |

| | |
|---|---|
| September 2013 Average: | 3.91 |
| September Average (1932-2012): | 5.54 |
| Historical 12-month Average (1932-2012): | 54.61 |
| Past 12-Month Total: | 53.22 |
| 12-Month Rainfall Surplus: | -1.39 |

**Figure 1:** Comparison of District Monthly Rainfall

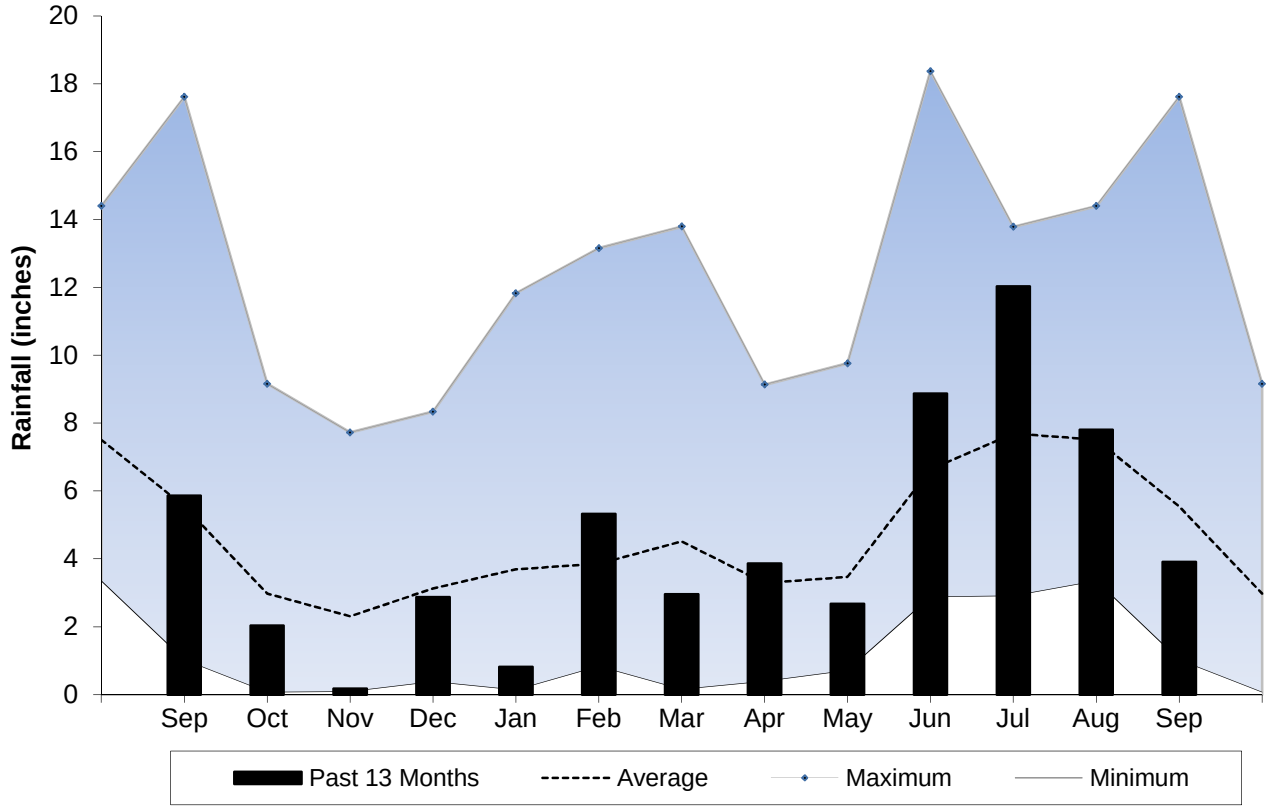


**Figure 2:** September 2013 Rainfall Estimate

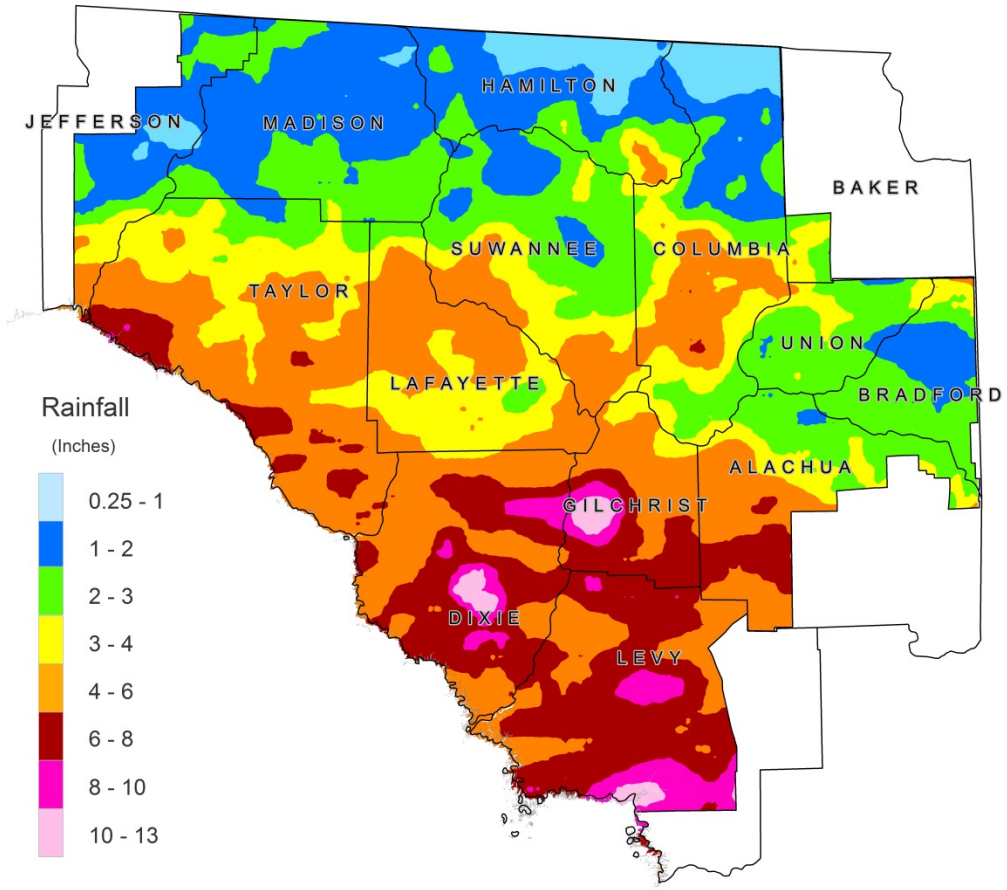



**Figure 3:** September 2013 Percent of Normal Rainfall

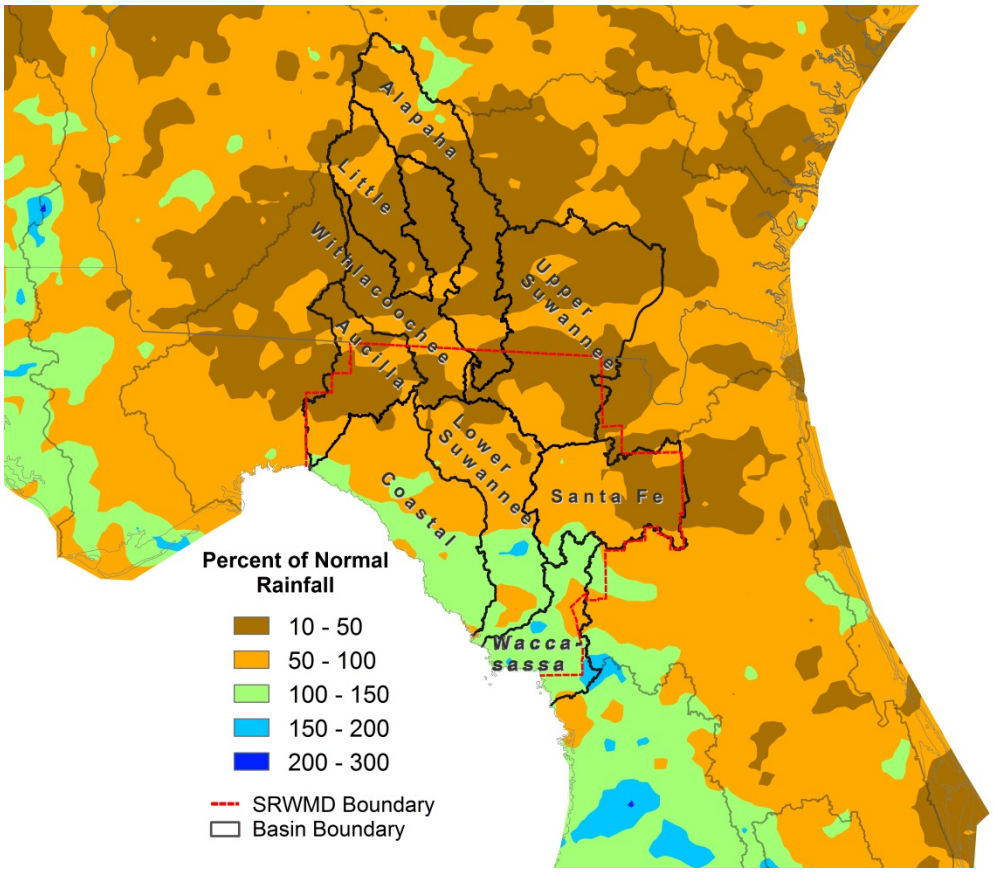


**Figure 4:** 12-Month Rainfall Surplus/Deficit by River Basin
Through September 30, 2013

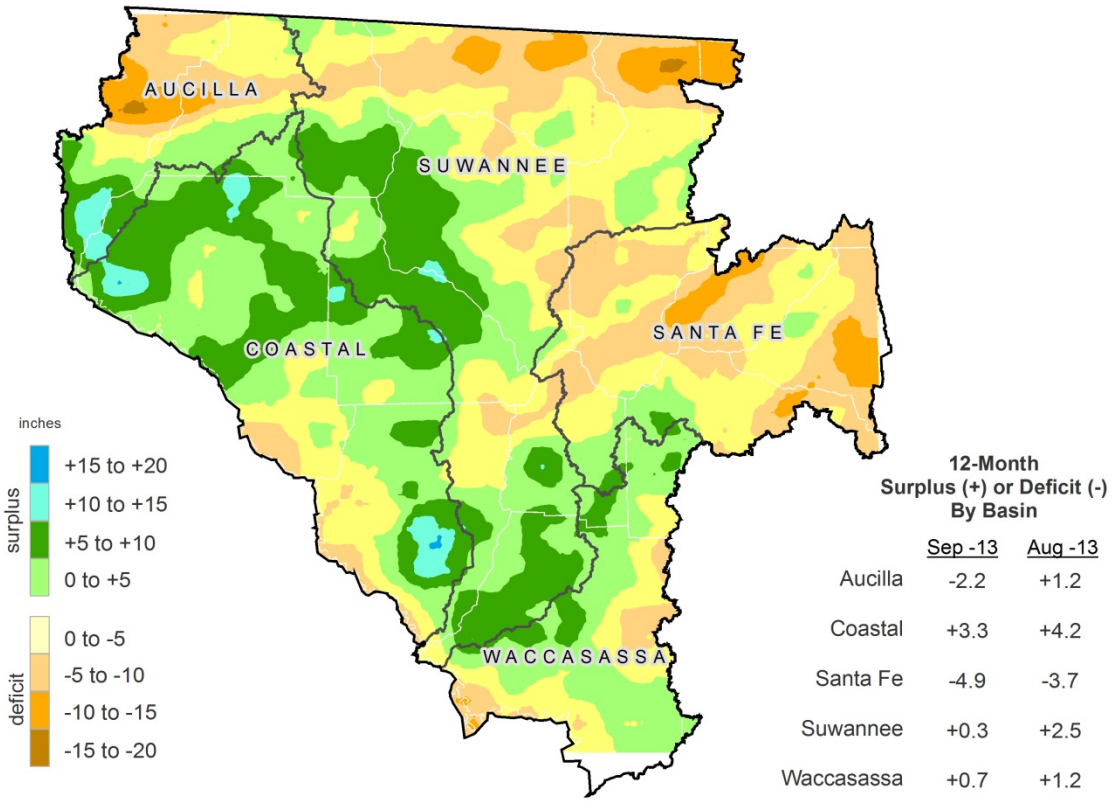



**Figure 5:** 3-Month Rainfall Surplus/Deficit by River Basin
Through September 30, 2013

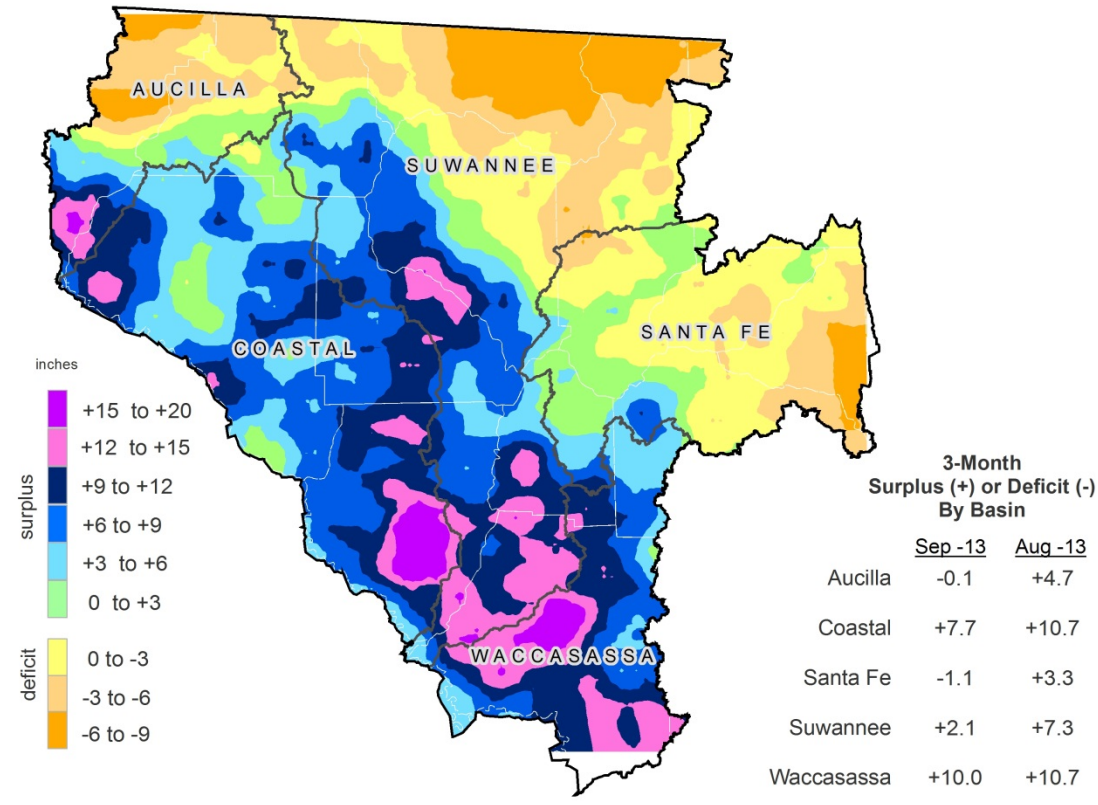


**Figure 6:** Daily River Flow Statistics
October 1, 2012 through September 30, 2013

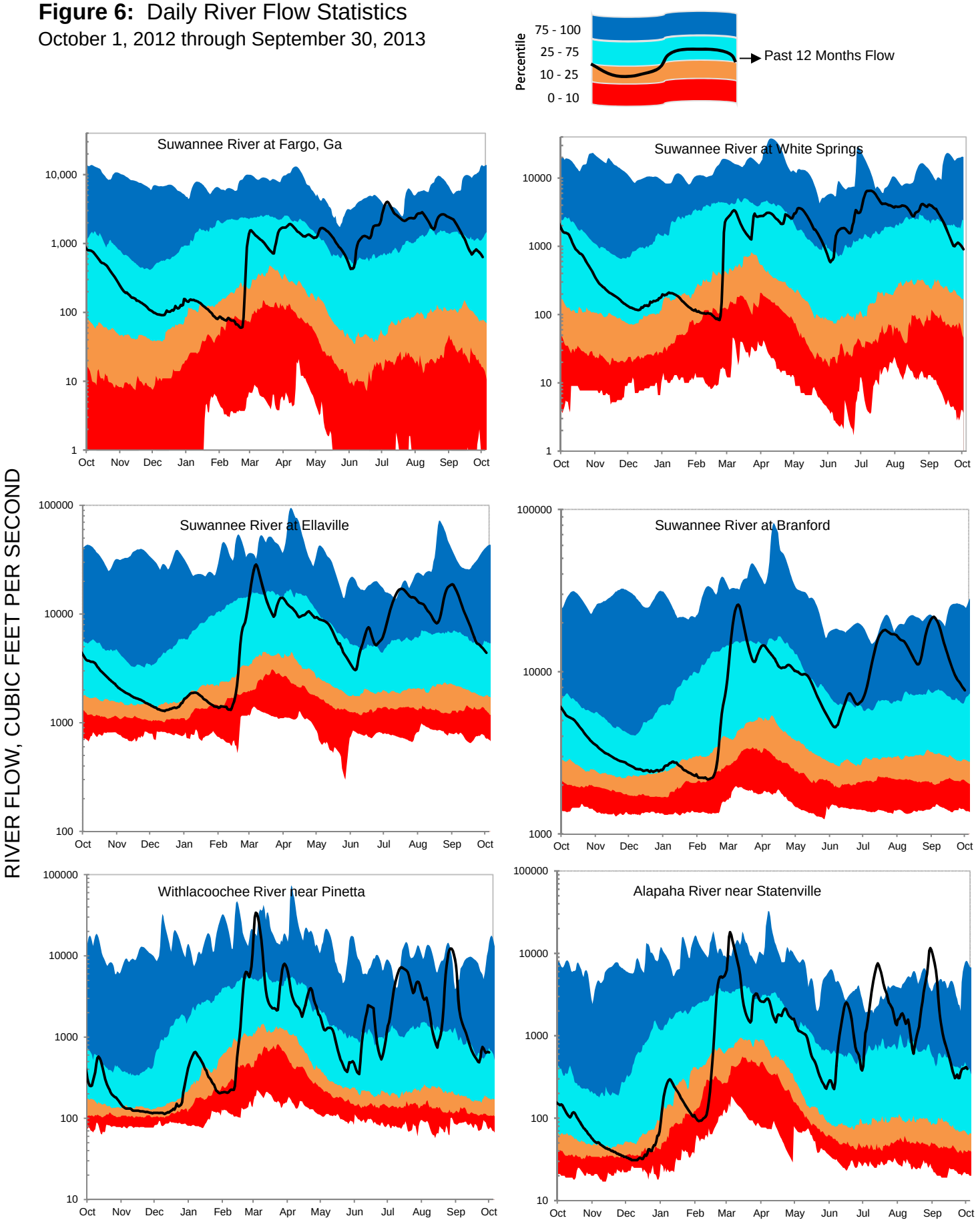
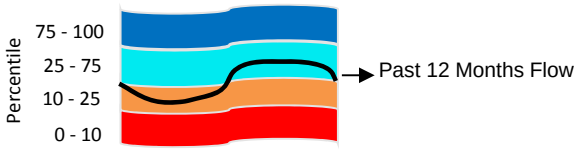
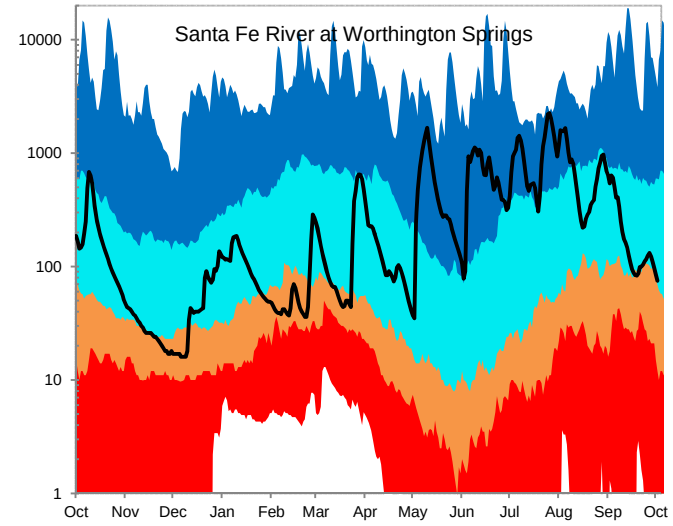
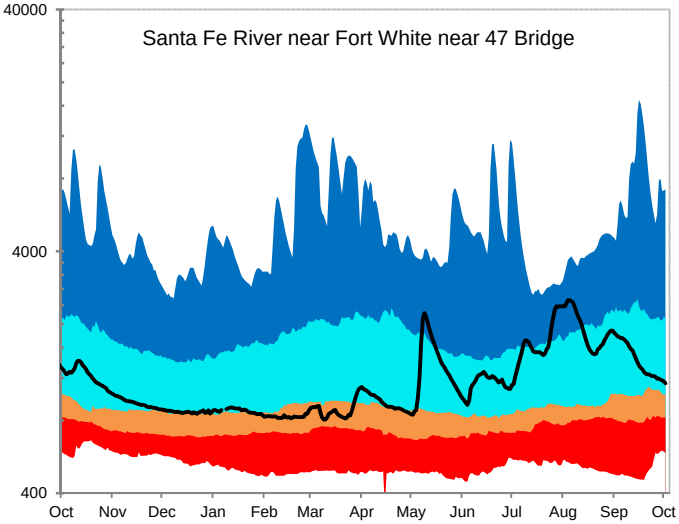


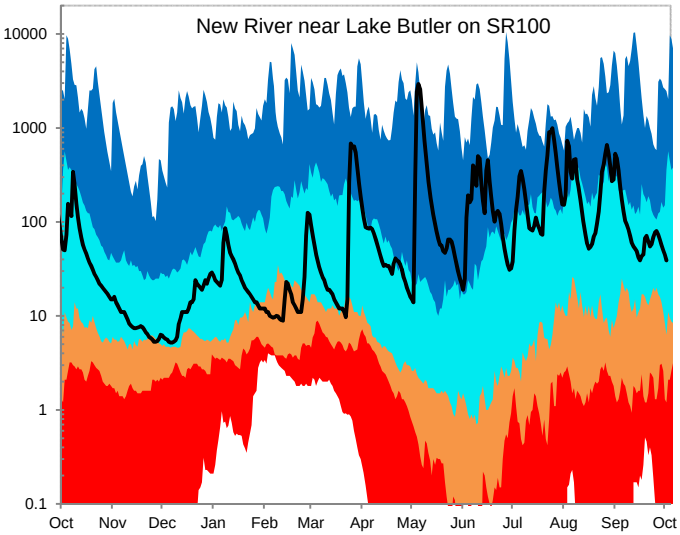
**Figure 6, cont:** Daily River Flow Statistics
October 1, 2012 through September 30, 2013

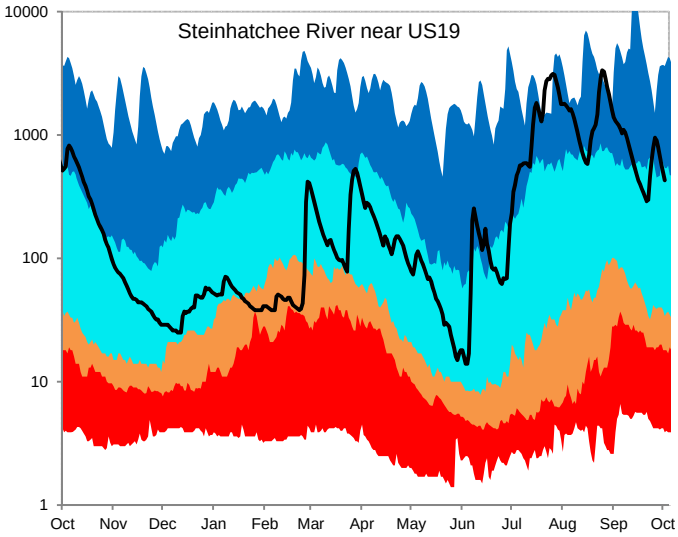


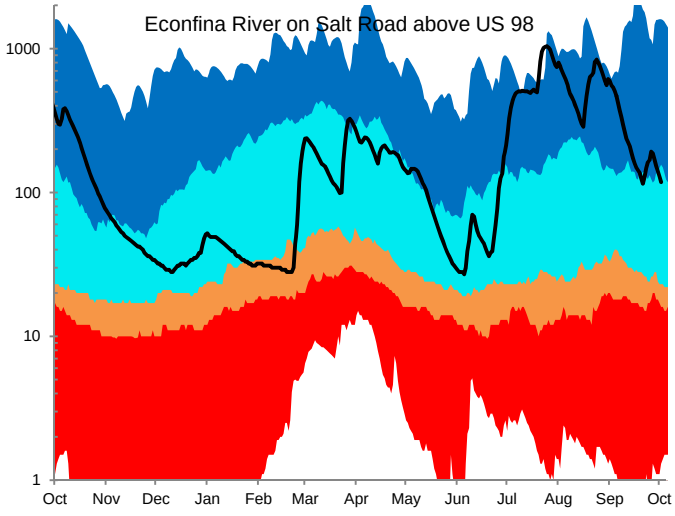

RIVER FLOW, CUBIC FEET PER SECOND

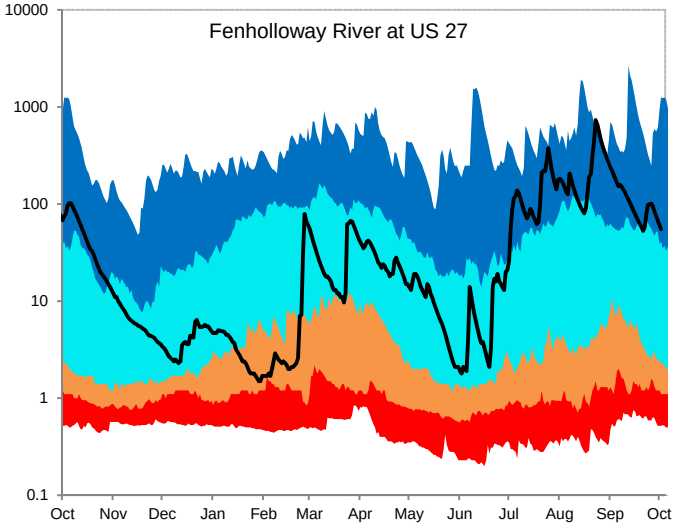


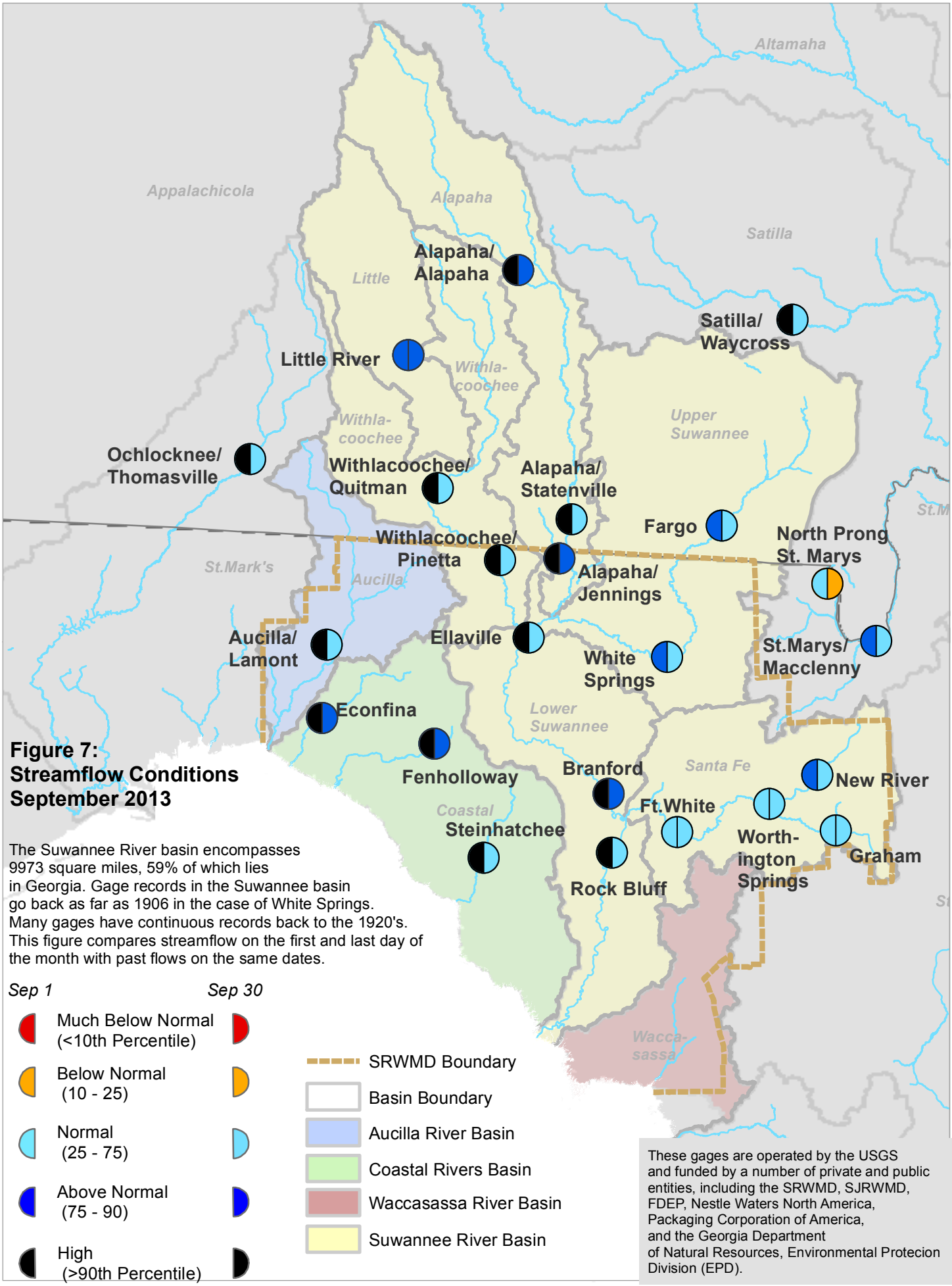



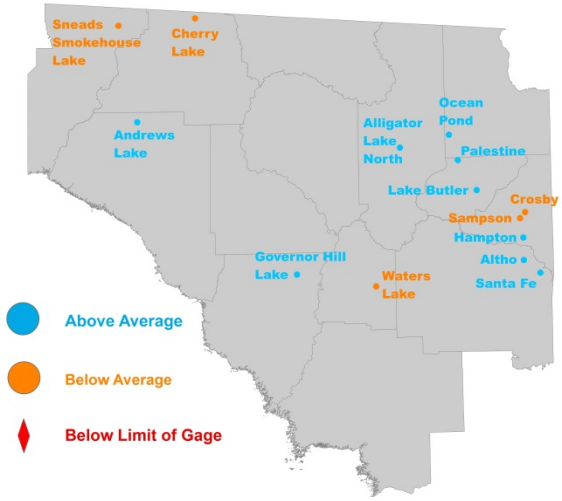



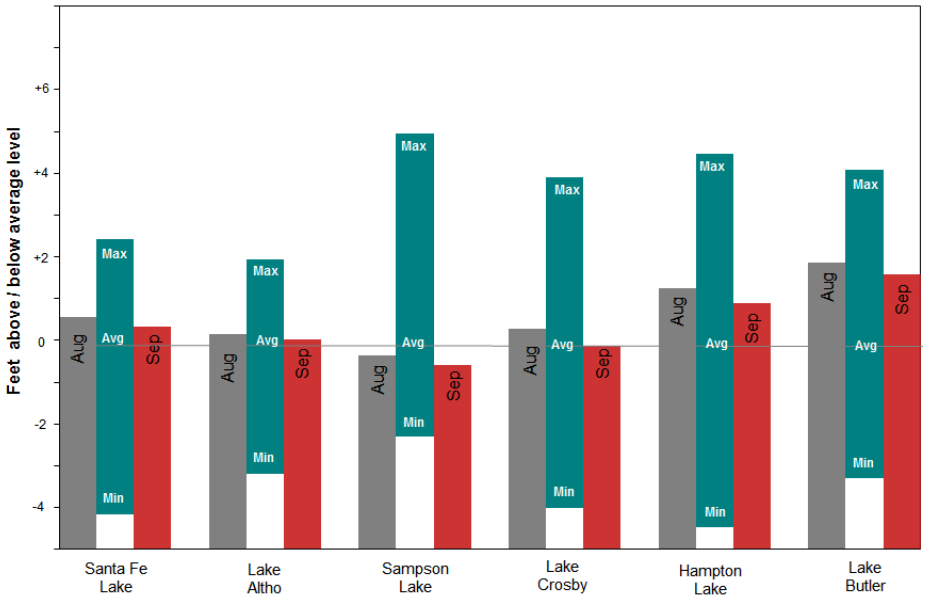

Altamaha
Appalachicola
Alapaha
Satilla
Little
Alapaha/
Alapaha
Satilla/
Waycross
Little River
Withla-
coochee
Withla-
coochee
Upper
Suwannee
Ochlocknee/
Thomasville
Withlacoochee/
Quitman
Alapaha/
Statenville
Fargo
North Prong
St. Marys
St.Mark's
Withlacoochee/
Pinetta
Aucilla
Alapaha/
Jennings
Aucilla/
Lamont
Ellaville
White
Springs
St.Marys/
Macclenny
Econfina
Lower
Suwannee
Fenholloway
Branford
Santa Fe
New River
Ft.White
Coastal
Steinhatchee
Worth-
ington
Springs
Graham
Rock Bluff
Wacca-
sassa
Figure 7:
Streamflow Conditions
September 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.
Sep 1
Sep 30
Much Below Normal
(<10th Percentile)
Below Normal
(10 - 25)
Normal
(25 - 75)
Above Normal
(75 - 90)
High
(>90th 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 Protecion
Division (EPD).

## **Figure 8**: September 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.



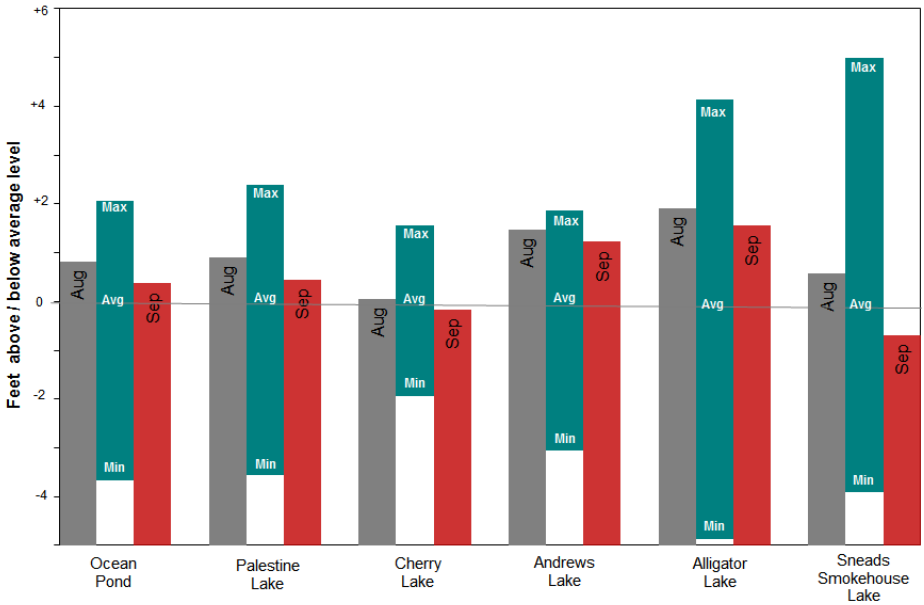
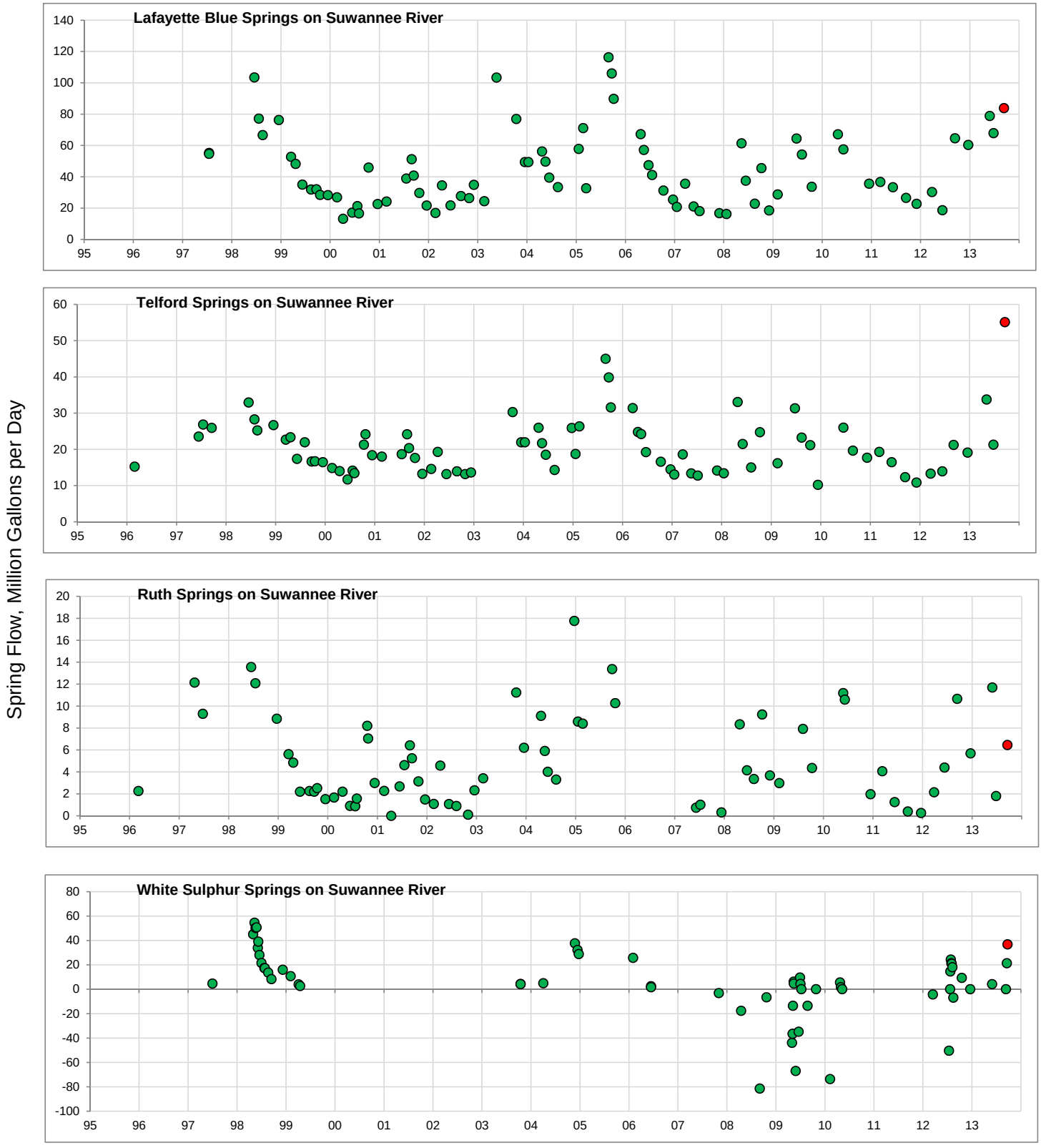



**Figure 9:** Quarterly Springflow Measurements

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

*Spring flow is greatly affected by river levels. Rising river levels or high tides can slow spring flow or even reverse it, resulting in negative flow rates as river water enters the spring. Some low flows in this data may not be representative of drought conditions.*



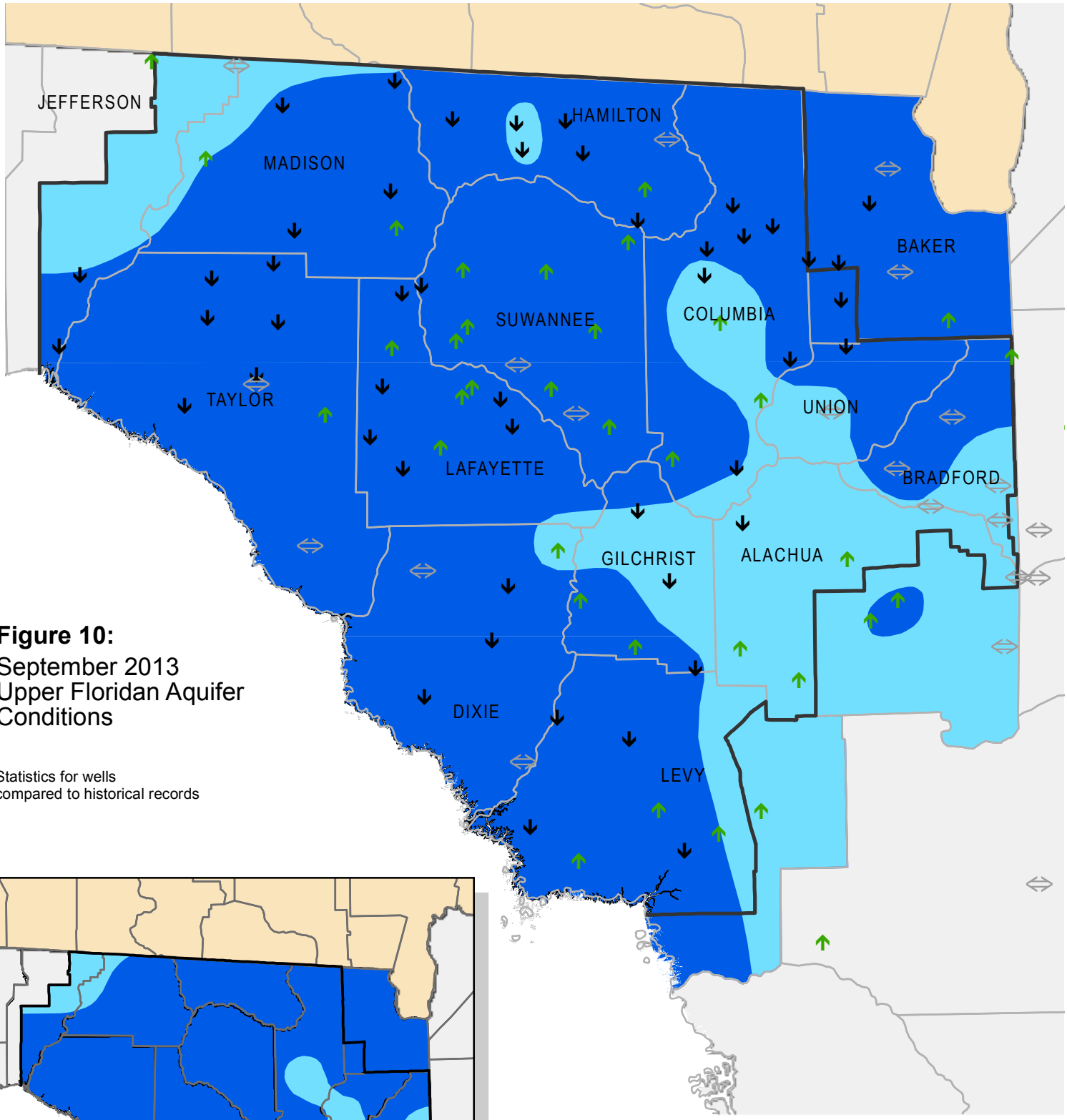
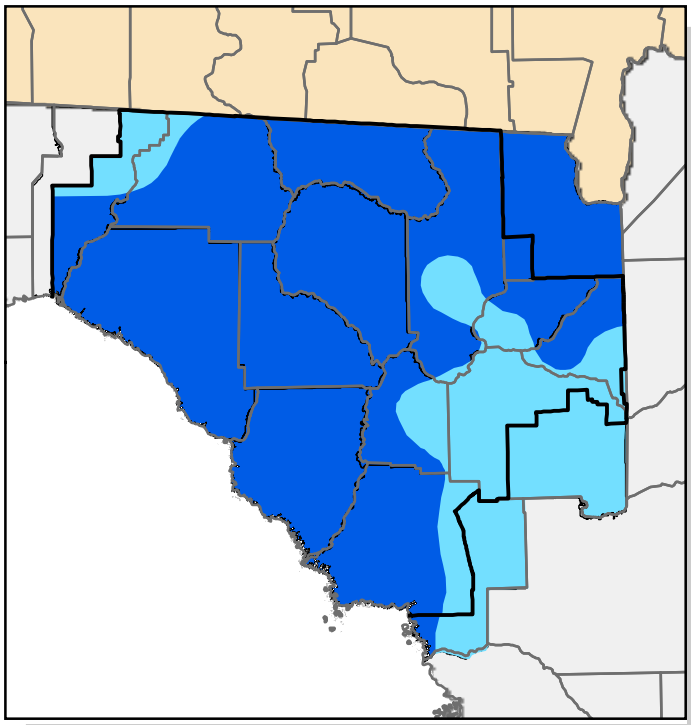



**Figure 10:**
September 2013
Upper Floridan Aquifer
Conditions

Statistics for wells
compared to historical records



Inset: August 2013 Groundwater Levels

High
(Greater than 75th Percentile)

Normal
(25th to 75th Percentile)

Low
(10th to 25th Percentile)

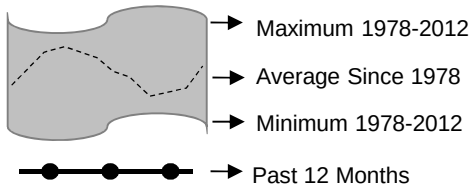
Extremely Low
(Less than 10th Percentile)

Increase/decrease in level since last month

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

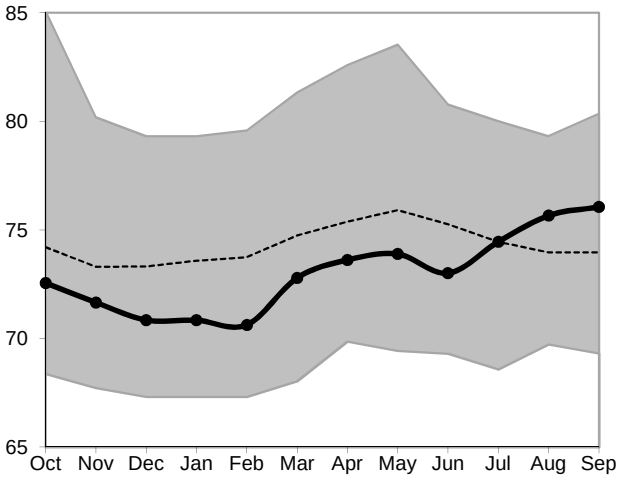
District Boundary

**Figure 11:** Monthly Groundwater Level Statistics
Levels October 1, 2012 through September 30, 2013
Period of Record Beginning 1978

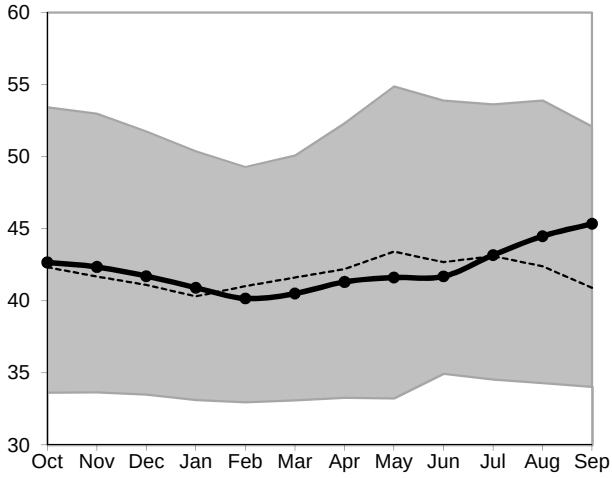



Upper Floridan Aquifer Elevation above NGVD 1929, Feet

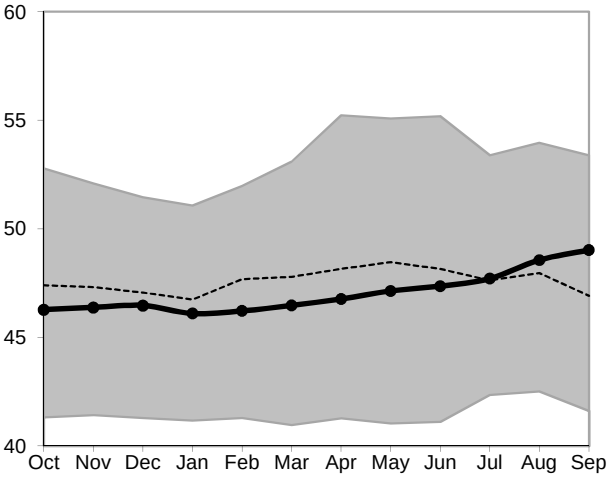
**Madison County N010719001**
**near Greenville**



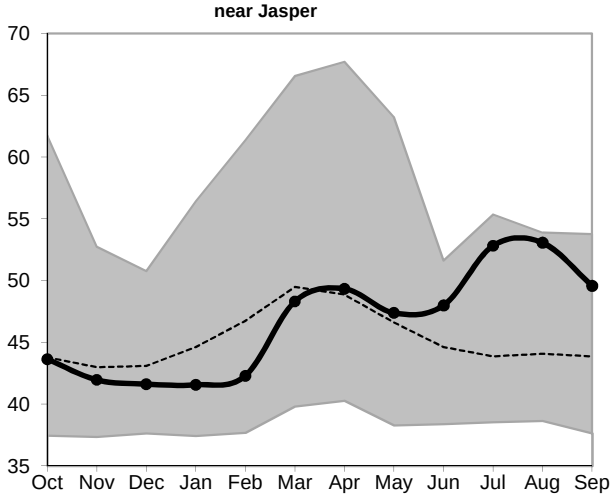

**Suwannee County S021335001**
**near Live Oak**



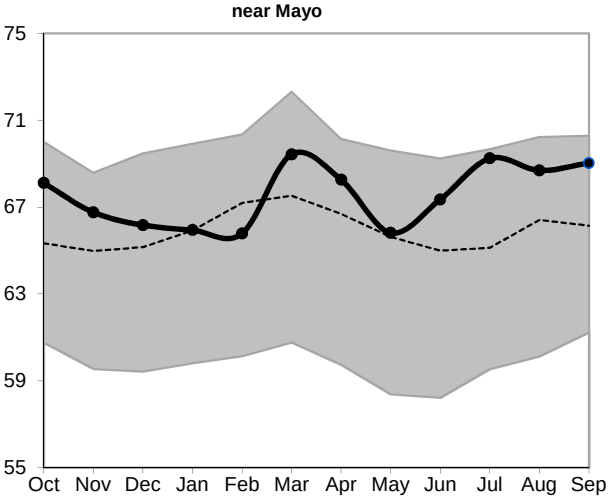

**Columbia County S041705001**
**Lake City**




**Hamilton County N011422007**
**near Jasper**




**Lafayette County S061114001**
**near Mayo**




**Taylor County S050701001**
**near Perry**

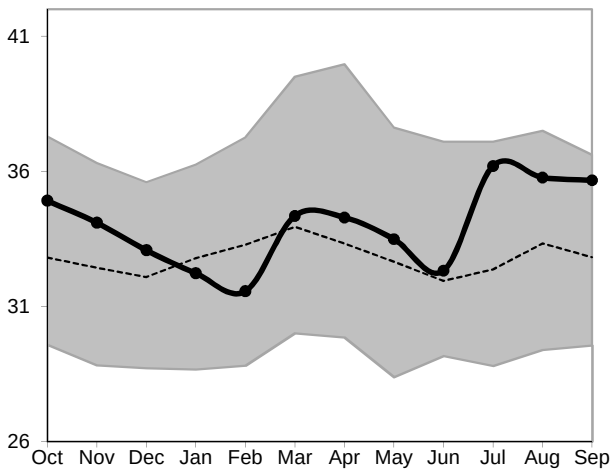
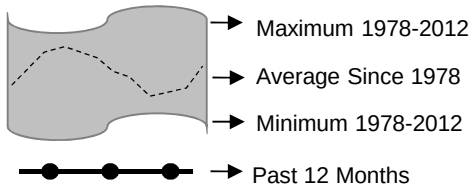
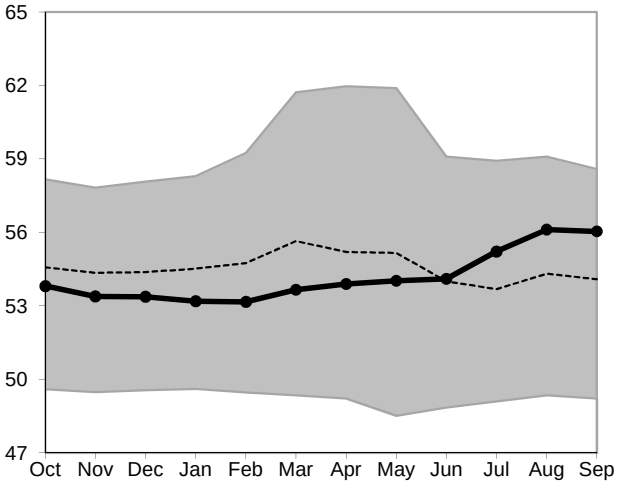


**Figure 11, cont.:** Groundwater Level Statistics
Levels October 1, 2012 through September 30, 2013
Period of Record Beginning 1978

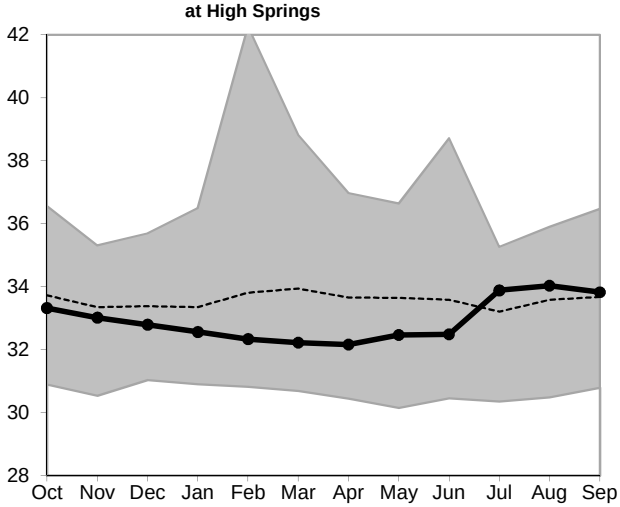



Upper Floridan Aquifer Elevation above NGVD 1929, Feet

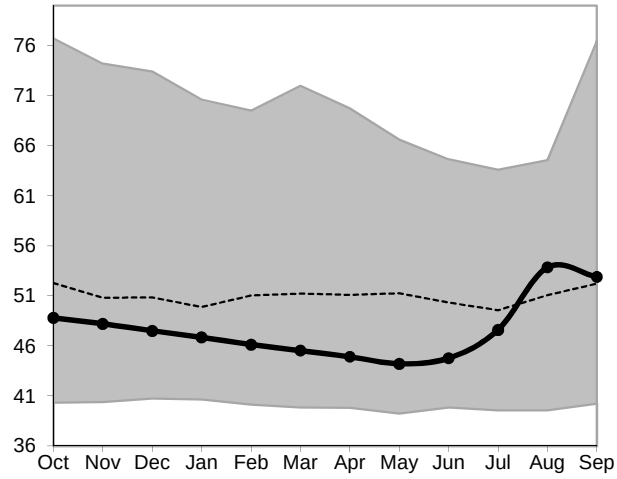
**Union County S051933001**
**near Lake Butler**



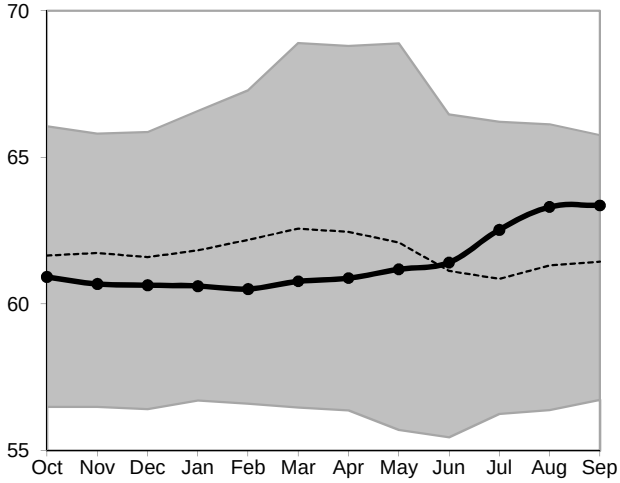

**Alachua County S081703001**
**at High Springs**



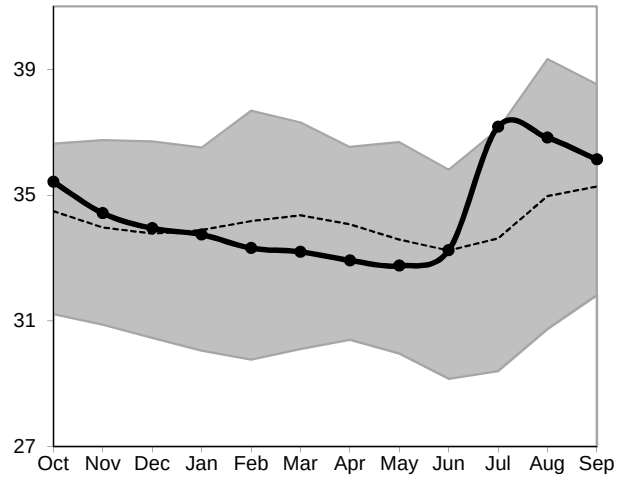

**Gilchrist County S091607001**
**near Trenton**



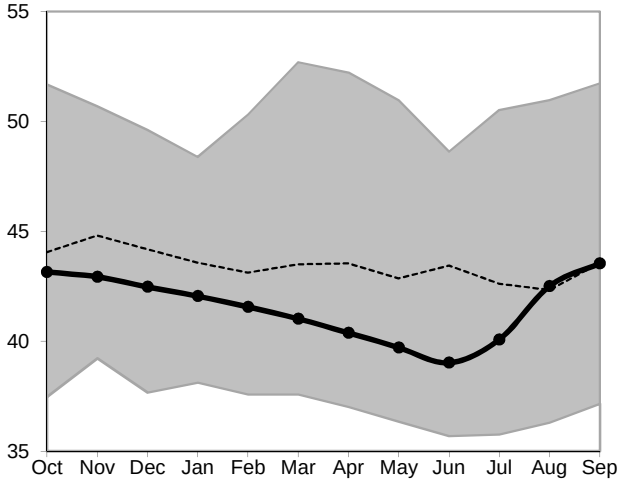

**Bradford County S072132001**
**near Graham**

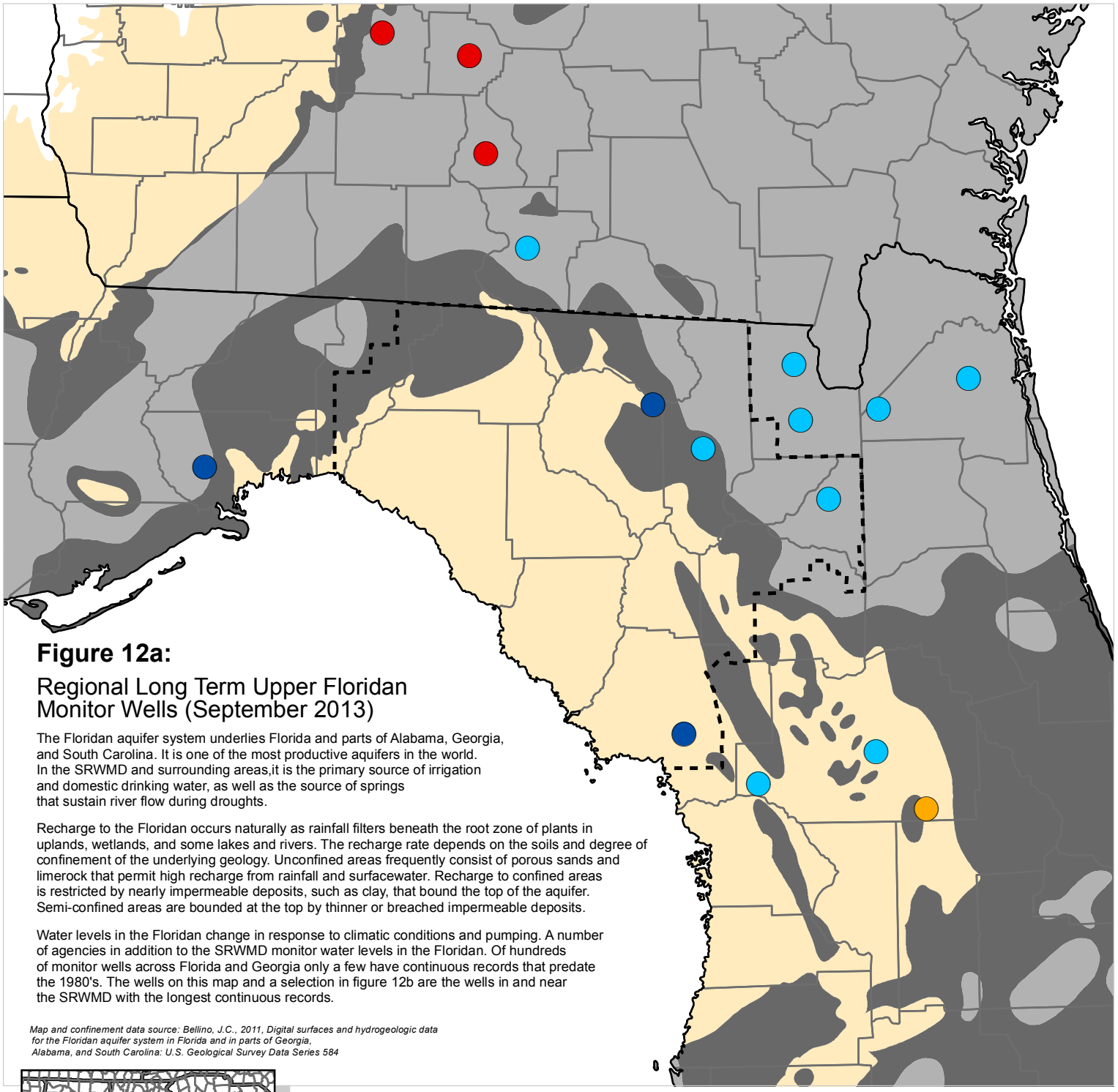



**Dixie County S101210001**
**at Cross City**




**Levy County S131736001**
**near Bronson**





## Figure 12a:

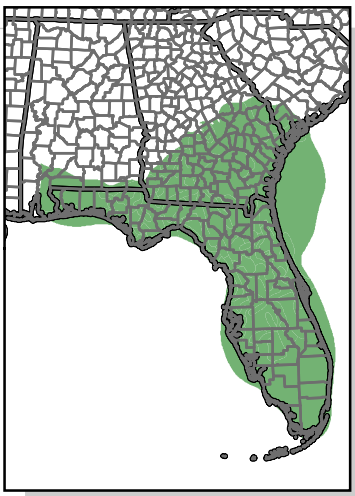
### Regional Long Term Upper Floridan Monitor Wells (September 2013)

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**

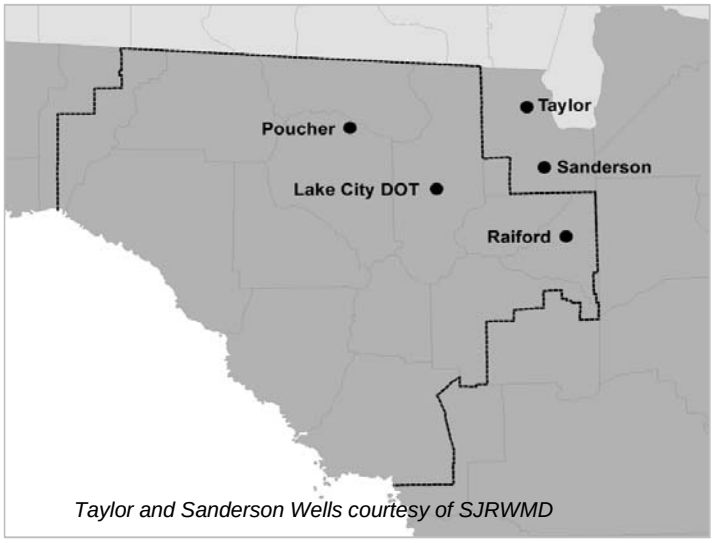
- Confined: Upper confining unit is generally greater than 100 feet thick and unbreached. Recharge is low.
- Semi-confined: Upper confining unit is generally less than 100 feet thick, breached, or both. Recharge is moderate.
- Unconfined: Upper confining unit is absent or very thin. Recharge is high.

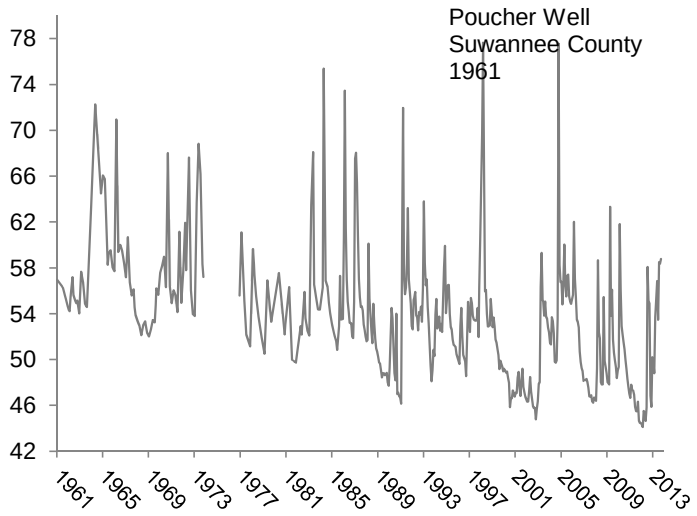
**Percentile of Most Recent Water Level Relative to Entire Record**

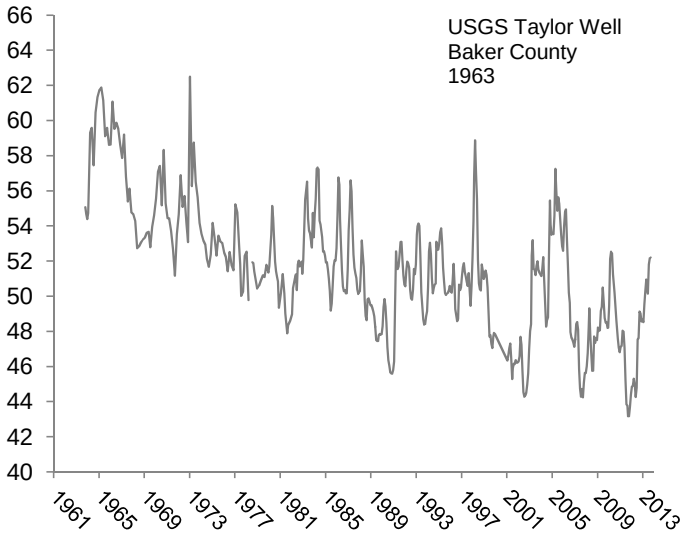
- High (Greater than 75th Percentile)
- Normal (25th to 75th Percentile)
- Low (10th to 25th Percentile)
- Extremely Low (Less than 10th Percentile)
- Not Available
- SRWMD Boundary

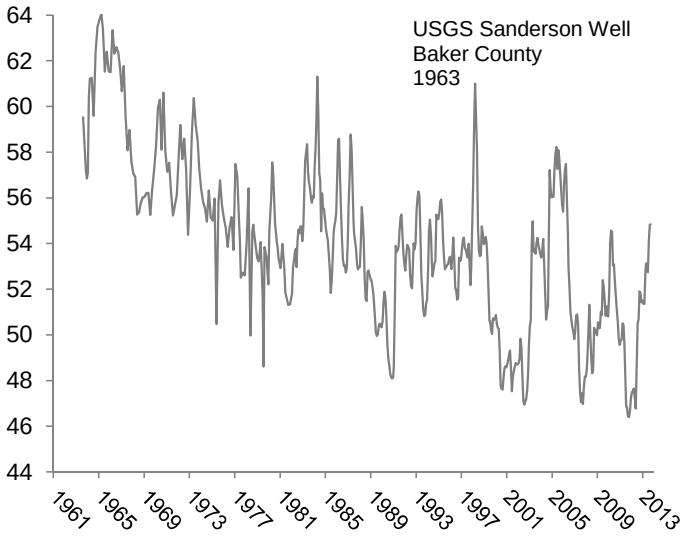
**Figure 12b: Regional Long Term Upper Floridan Levels**

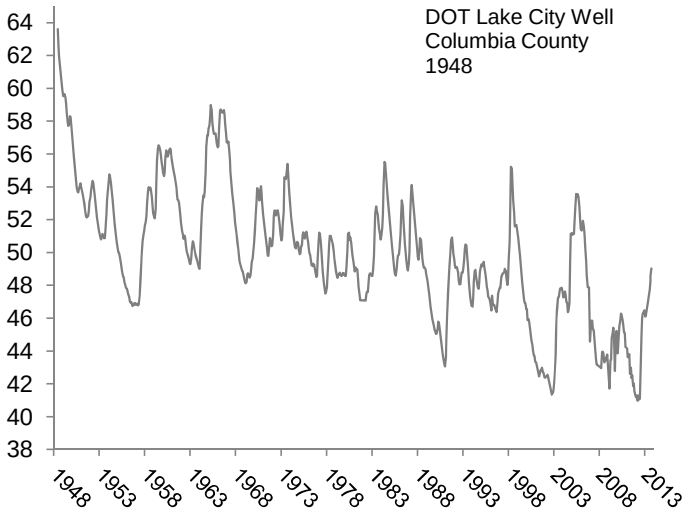
September 2013

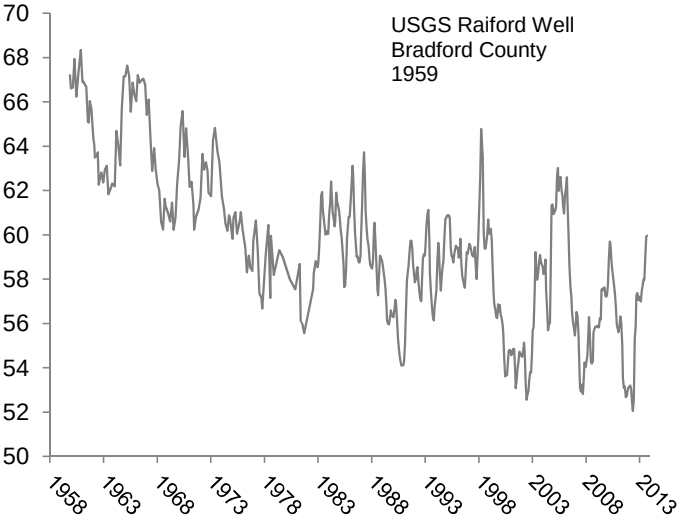



Upper Floridan Aquifer Elevation above NGVD 1929, Feet