MEMORANDUM

TO: Governing Board

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

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

DATE: May 9, 2014

RE: April 2014 Hydrologic Conditions Report for the District

RAINFALL

- District-wide rainfall in April was 6.47", almost double the historic average based on records beginning in 1932 (Table 1, Figure 1). Overall this was the wettest April since 1997, and the 9th wettest in 82 years of record-keeping. However, accumulations varied significantly across the District from the northwest to the southeast, from nearly 14" in parts of Jefferson County to only 1" in the upper Santa Fe basin in Bradford and Alachua counties (Figure 2).
- The heaviest rains fell during three separate systems: a cold front around the 8th, another around the 14th, and a low pressure system from the Gulf around the 18th. Each system dropped 2-4" in the Withlacoochee, Alapaha, and upper Suwannee basins, along with the Aucilla, Econfina, and Steinhatchee basins closer to the coast. A fourth cold front on the 29th and 30th caused historic rainfall in the Panhandle, but fortunately the District saw totals of generally less than an inch from that event.
- The highest gaged monthly total was 11.47" at Sneads Smokehouse Lake, part of the Aucilla River in northern Jefferson County. The highest daily total was 4.59" at the Foley gage near Perry. The lowest gaged monthly total was 0.99" at Santa Fe Lake, the headwaters of the Santa Fe River.
- Rainfall totals were much above normal over the Suwannee River's Georgia tributaries, with localized areas in the southern reaches receiving up to 15" or nearly 500% of normal April rainfall (Figure 3). The highest gaged total was nearly 14" at Fargo. Accumulations were lower farther north in the Little, Withlacoochee, and Alapaha basins. The USGS gage near Alapaha reported 7", about 200% of normal rainfall.
- Average rainfall for the 12 months ending April 30 was 12.1" higher than the long-term average of 54.63" (Figure 4), the highest annual surplus since 2005. Average rainfall for the 3 months ending April 30 was 7.1" higher than the long-term average of 11.7" (Figure 5). Rainfall between January 1 and April 30 was 24.3", the wettest such period since 1998.
- The 2-year total ending April 30 at the long-term NOAA gage in Mayo was 156.8", the wettest 2 years since record-keeping began there in 1949. This 2-year total is 285% of normal at that gage, or nearly an extra year's worth of rain in the last 2 years.

SURFACEWATER

- **Rivers:**
  - Suwannee, Alapaha, and Withlacoochee gages were falling during the first week of April, with flows above the 75th percentile at most stations when the first cold front passed. Upper gages were cresting or falling the following week when the second cold front and the Gulf system dumped another 4-6" of rain over counties near the Florida-Georgia border, resulting in the highest stages since 2012 at White Springs and Suwannee Springs on the Suwannee River and the highest since March 2013 on the Alapaha River by month's end. Flooding conditions at these gages were categorized as moderate by the National Weather Service. Lesser impacts were seen on the Withlacoochee River, with a crest 2.5' lower than flood stage.

- Farther downstream on the middle- and lower-Suwannee River, gages did not have time to crest after the first storm and rose steadily the rest of the month. Moderate flooding occurred at Luraville and minor flooding at Ellaville, Branford, Wilcox, and Fowler's Bluff. Branford crested on May 1, about 2' lower than the 2009 flood and 1.6' above flood stage. The lower gages crested by May 3 between 6-12" lower than the 2009 flood. The last occurrence of a spring flood with a Branford crest later in the season than this one was in 1964, with a crest a foot above flood stage on May 15.
- Santa Fe River gages were also falling in early April after minor flooding in March. Gages at Worthington Springs and the New River saw small rises and falls throughout the month as the heaviest rains missed the upper Santa Fe basin. The rising Suwannee, however, dammed up the lower Santa Fe where it flows into the Suwannee. This is known as a backwater flood, where a downstream waterbody (in this case the Suwannee) keeps a contributing stream from flowing freely, causing it to rise even though its upstream conditions are not conducive to flooding. The USGS performed a series of flow measurements at the Fort White gage showing the flows decreasing as the level crept up to nearly two feet above flood stage, considered moderate flooding. Three Rivers Estates experienced major flooding as the river rose to its highest level since April 2009, which was also a backwater flood. As of May 6, Three Rivers had been above flood stage for 46 days, approaching the durations seen in 2004 (60 days) and 2005 (50 days).
- The backwater effects were seen at least as far upstream as the Fort White gage, which reached a level only 4" higher than the simultaneous level at Three Rivers Estates eleven miles downstream. In the June 2012 flood, Fort White crested 9' higher than Three Rivers because the floodwaters came from upstream instead of downstream.
- The Aucilla at Lamont rose above flood stage on the 18th and crested 1.3' higher the following week, considered minor flooding. The Steinhatchee River also crested above flood stage for the eighth time in two years.
- On April 18th, the Florida Department of Health issued a notice advising minimal contact with the Withlacoochee River after the City of Valdosta reported spills involving stormwater and sewage into the Withlacoochee River. Subsequent testing of the Withlacoochee and Suwannee rivers by Florida officials showed fecal coliform totals lower than the state's water quality threshold, causing the advisory to be lifted on the 21st.
- Flow statistics for a number of rivers are presented graphically in Figure 6, and conditions relative to historic conditions in Figure 7. Figure 7a contains a summary of the highest flood categories reached by area rivers in April.

- **Lakes**: Levels at lakes in the eastern part of the District fell in April. All remained above their historic mean levels except for Lake Sampson. Sneads Smokehouse Lake rose to its highest level since Tropical Storm Fay in August 2008. Figure 8 shows levels relative to the long-term average, minimum, and maximum levels for a number of monitored lakes.

- **Springs**: Troy Springs, Lafayette Blue Springs, Madison Blue Springs, Manatee Springs, and Fanning Springs either closed or remained closed to swimming and diving due to inundation from river water. Early in the month, the USGS measured Blue Hole Spring on the Ichetucknee River at 75 MGD (million gallons per day), about 14% higher than its median flow based on records beginning in 2002. The Ichetucknee River later rose with the Santa Fe, resulting in a 2' rise as far upstream as the Ichetucknee head spring. The Suwannee River continued to flow into White Sulphur Springs for the fourth month in a row. The flow into the aquifer was measured at 86 MGD on April 16th just before the springhouse became inaccessible due to flooding. Statistics for White Springs and others are shown in Figure 9.

GROUNDWATER

Upper Floridan aquifer levels continued to improve in the northern half of the District and along the Suwannee River corridor, but started to fall along the coast. Overall, levels increased from the 90th percentile in March to the 95th percentile in April based on records beginning no earlier than the 1970s. The last month when overall conditions were higher was April 2005, when levels peaked after the September 2004 hurricanes and a spring flood. Ninety-two percent of monitor wells were above the 75th percentile, considered high. Sixty-two percent were above the 90th percentile, considered very high. All the wells had levels higher than their long-term median. The Midway Tower monitor well near Mayo reported its highest level since monitoring began in 1993. 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 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 values for the week ending March 29 indicated moist conditions in north Florida and southeast Georgia.
- The National Weather Service Climate Prediction Center (CPC) three-month outlook showed equal chances of above- or below-normal precipitation through July. The CPC issued an El Niño watch on March 6 giving a 50% chance of El Niño developing in the summer or fall. In its April 10 report, the CPC said there is greater model consensus favoring the development of an El Niño after the spring of 2014, but there is still uncertainty as to when it will develop and how strong it will be. According to the National Weather Service, El Niño effects, including enhanced precipitation and severe weather in the southeast, are strongest in the fall, winter, and spring. In the summer, El Niño can reduce the formation of tropical cyclones in the Atlantic by causing increased wind shear.
- The U.S. Drought Monitor report of May 6 showed no drought conditions in north Florida or south Georgia.

CONSERVATION

A Phase I Water Shortage Advisory remains in effect. Water conservation is as important in wet times as in dry to sustain healthy flows in springs and rivers. All users are urged to eliminate unnecessary uses. Landscape irrigation is limited to twice per week during Daylight Savings Time (between March 9 and November 2, 2014) 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. More information about the SRWMD's year-round lawn and landscape irrigation measures is available at www.mysuwanneeriver.com.

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	April 2014	April Average	Month % of Normal	Last 12 Months	Annual % of Normal
Alachua	2.03	3.35	61%	61.51	121%
Baker	6.82	3.07	222%	58.43	117%
Bradford	2.15	3.16	68%	56.22	111%
Columbia	7.09	3.10	229%	61.21	119%
Dixie	4.45	3.35	133%	69.66	118%
Gilchrist	4.26	3.58	119%	67.65	118%
Hamilton	9.72	3.21	303%	60.68	116%
Jefferson	11.10	4.04	275%	63.38	105%
Lafayette	7.78	3.24	240%	74.75	132%
Levy	2.60	3.11	84%	71.79	120%
Madison	10.06	3.23	312%	68.17	121%
Suwannee	8.78	3.24	271%	69.41	131%
Taylor	9.08	3.35	271%	76.13	128%
Union	3.73	3.65	102%	58.64	109%

April 2014 Average:	6.47
April Average (1932-2013):	3.29
Historical 12-month Average (1932-2013):	54.63
Past 12-Month Total:	66.77
12-Month Rainfall Surplus:	12.14

Figure 1: Comparison of District Monthly Rainfall

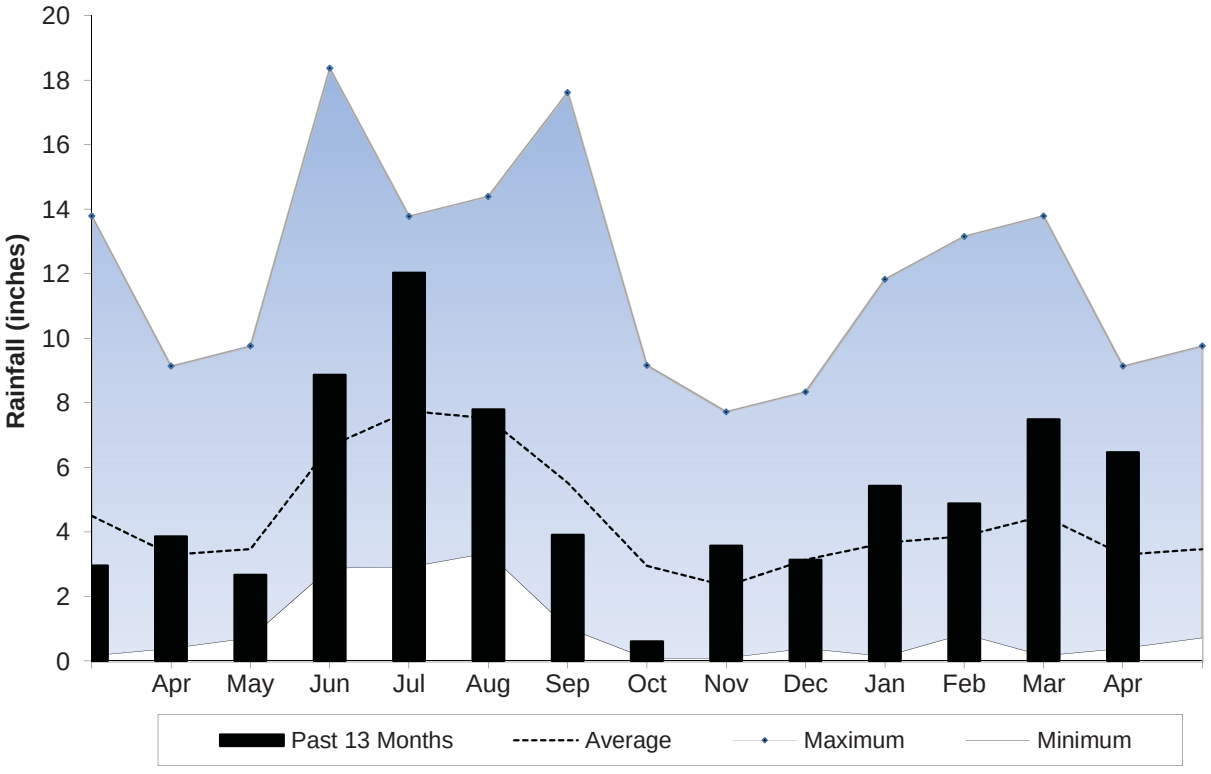


Figure 2: April 2014 Rainfall Estimate

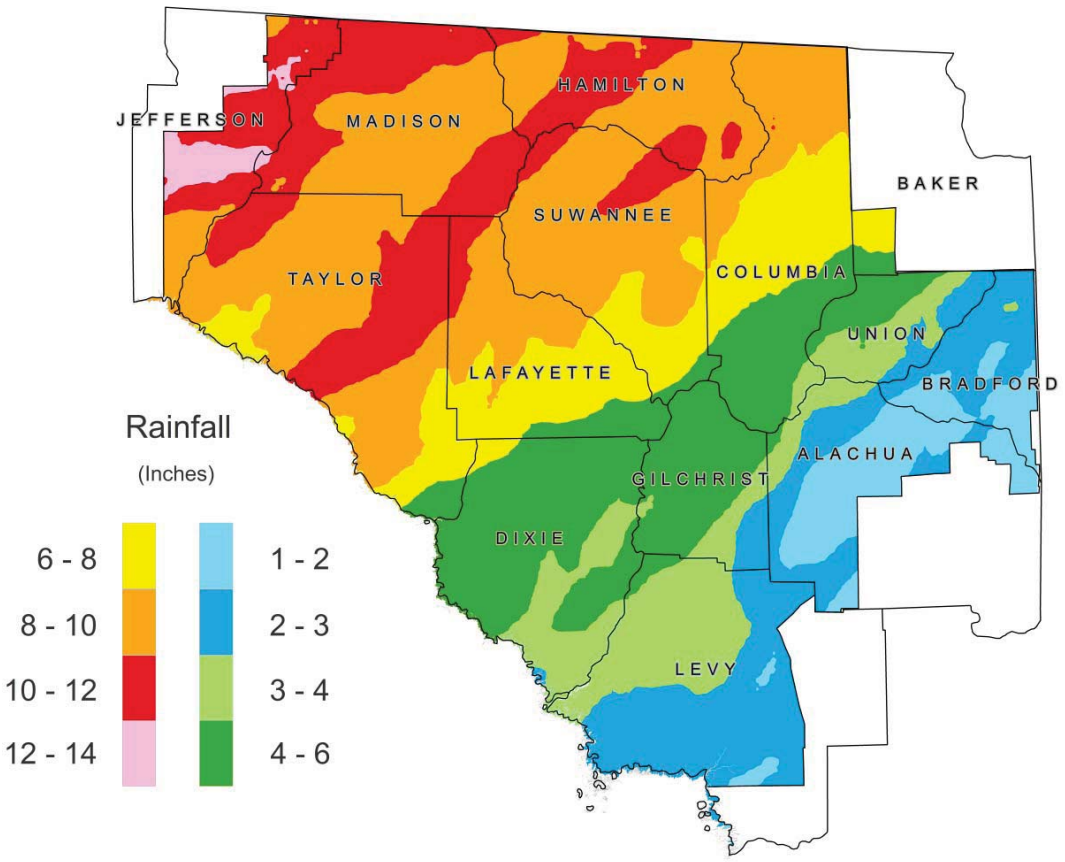


Figure 3: April 2014 Percent of Normal Rainfall

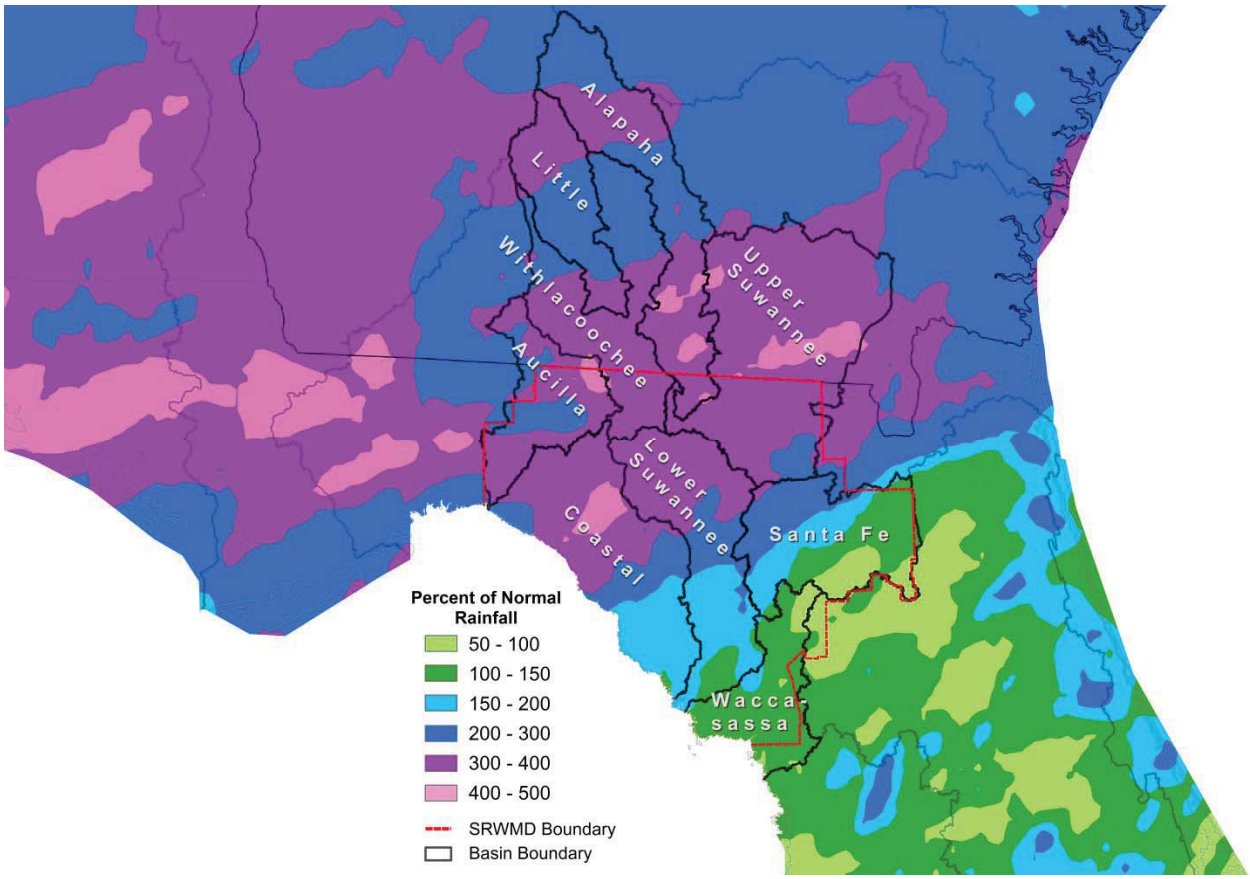
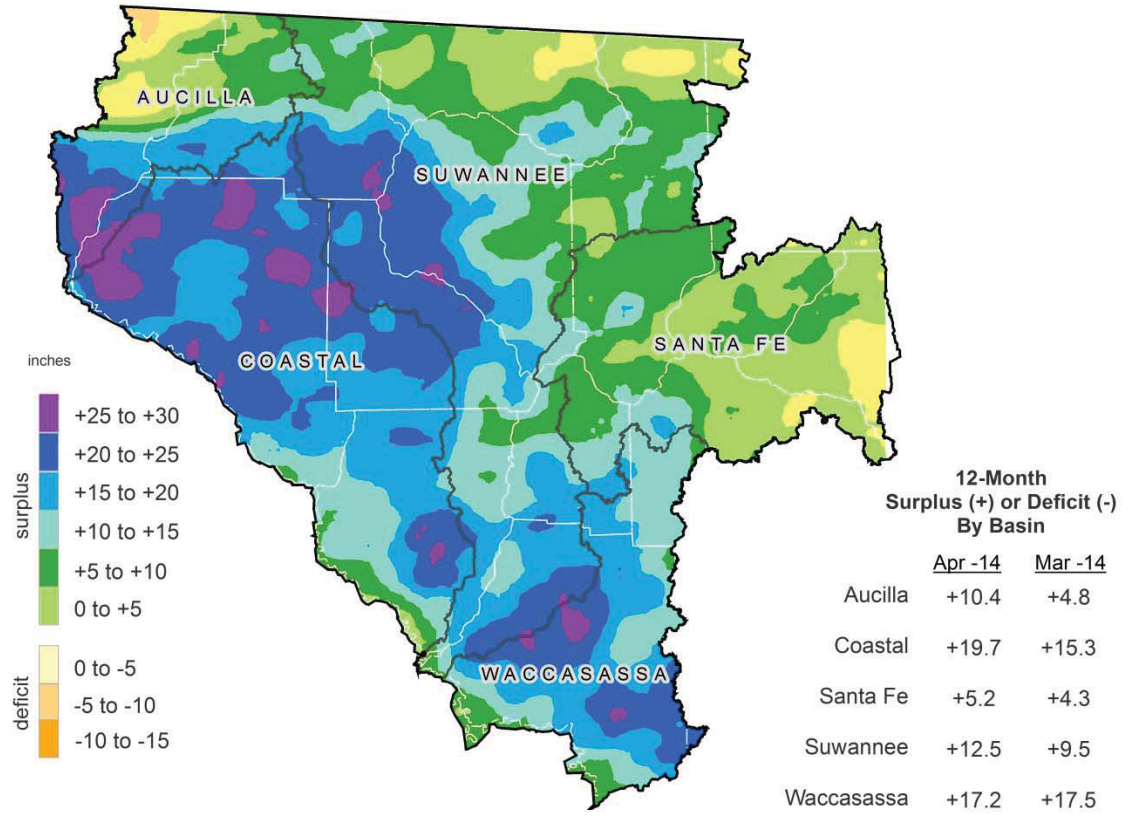


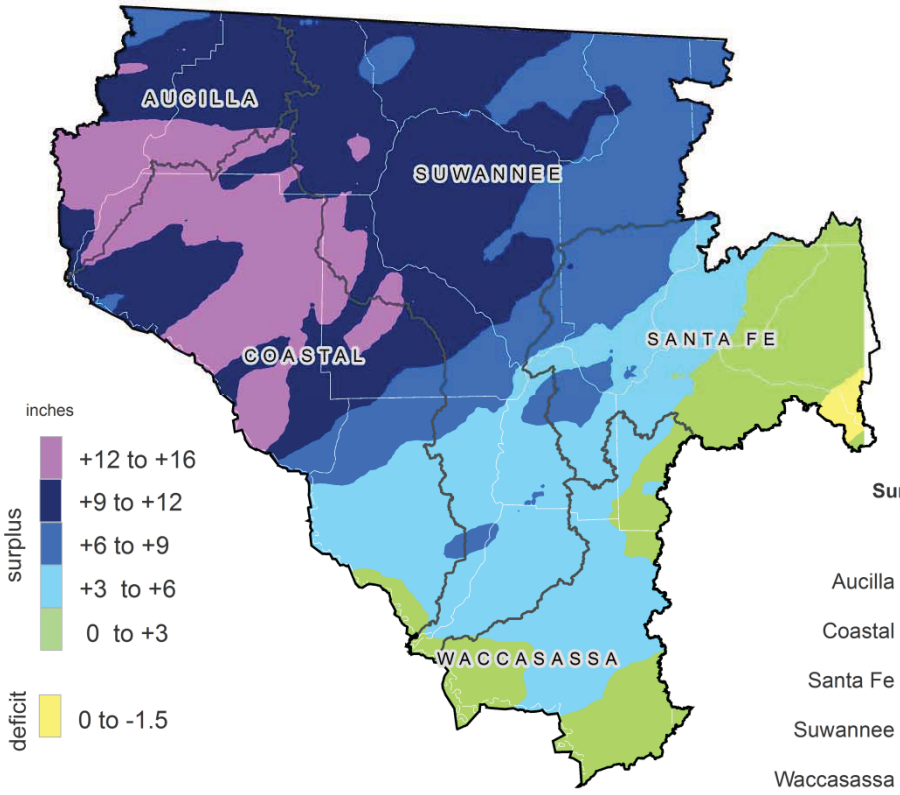
Figure 4: 12-Month Rainfall Surplus/Deficit by River Basin
Through April 30, 2014



12-Month Surplus (+) or Deficit (-) By Basin

	Apr -14	Mar -14
Aucilla	+10.4	+4.8
Coastal	+19.7	+15.3
Santa Fe	+5.2	+4.3
Suwannee	+12.5	+9.5
Waccasassa	+17.2	+17.5

Figure 5: 3-Month Rainfall Surplus/Deficit by River Basin
Through April 30, 2014

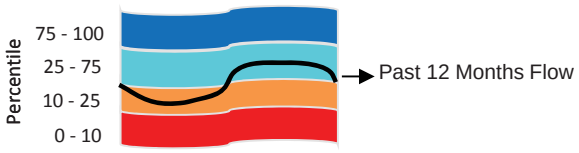


3-Month Surplus (+) or Deficit (-) By Basin

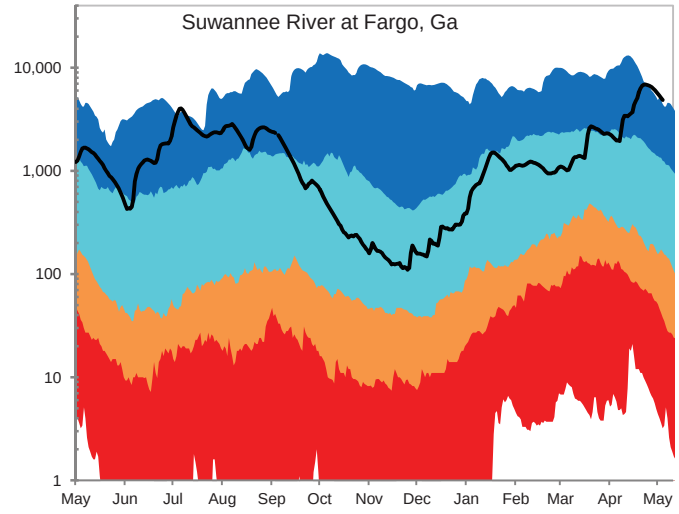
	Apr -14	Mar -14
Aucilla	+11.6	+4.9
Coastal	+10.1	+8.0
Santa Fe	+3.7	+5.3
Suwannee	+8.7	+5.8
Waccasassa	+3.1	+5.2

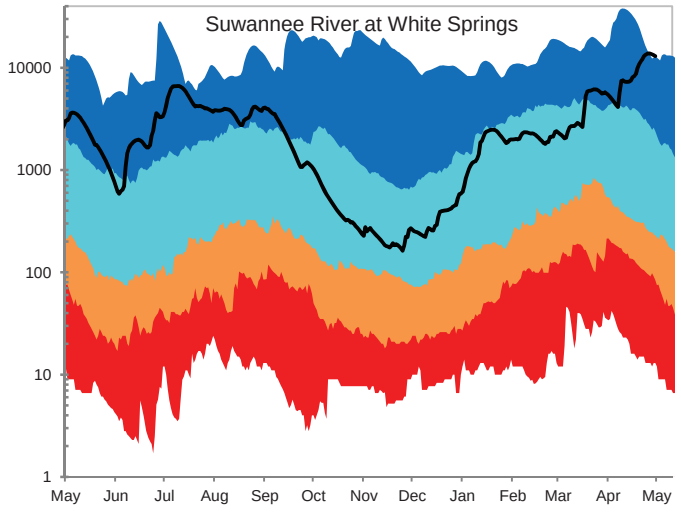
Figure 6: Daily River Flow Statistics

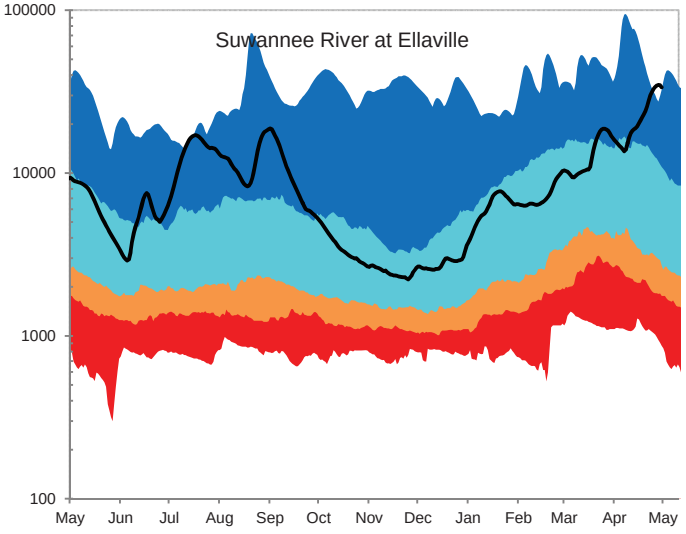
May 1, 2013 through April 30, 2014

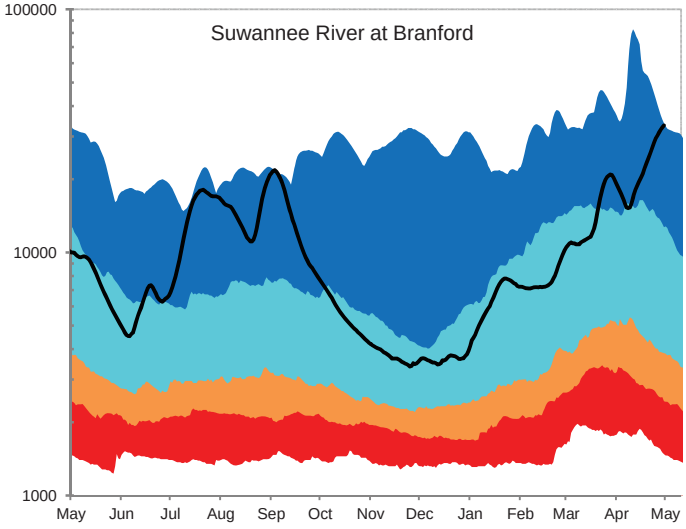


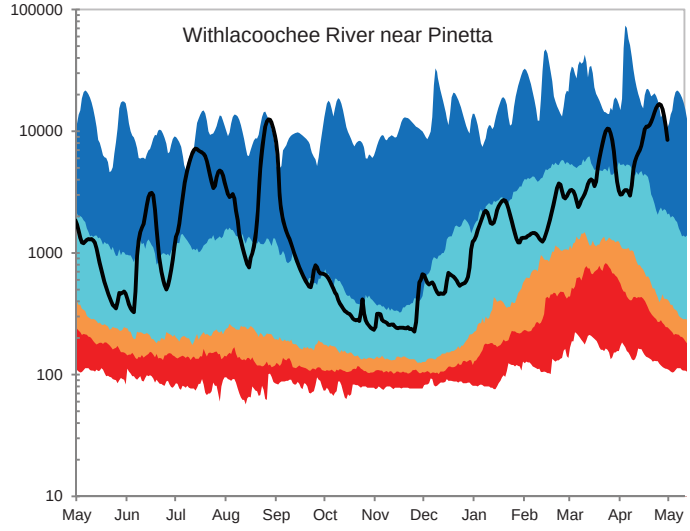
RIVER FLOW, CUBIC FEET PER SECOND











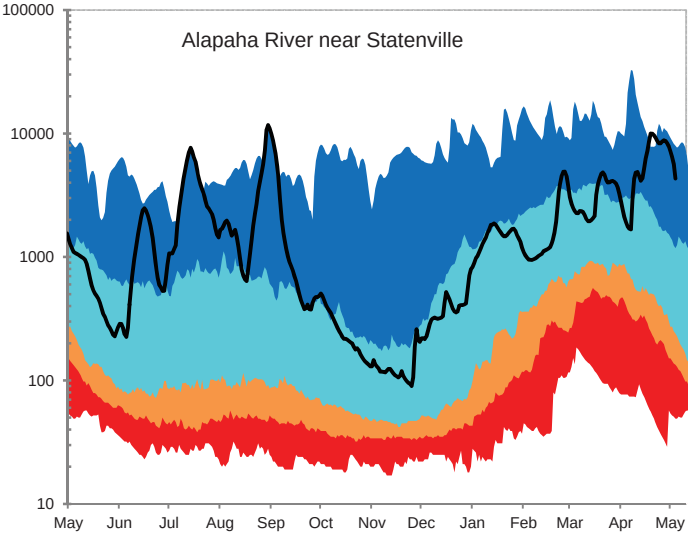
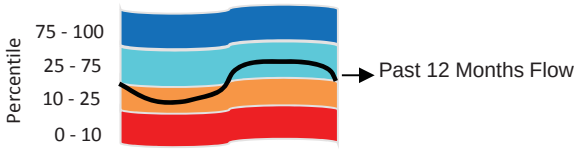
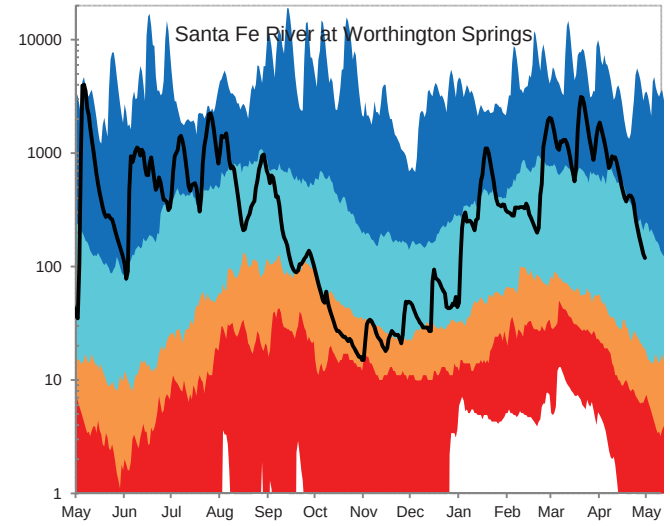


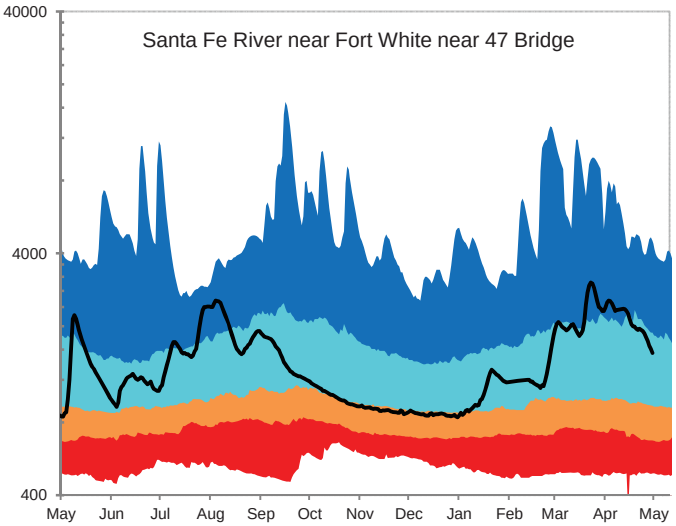
Figure 6, cont: Daily River Flow Statistics

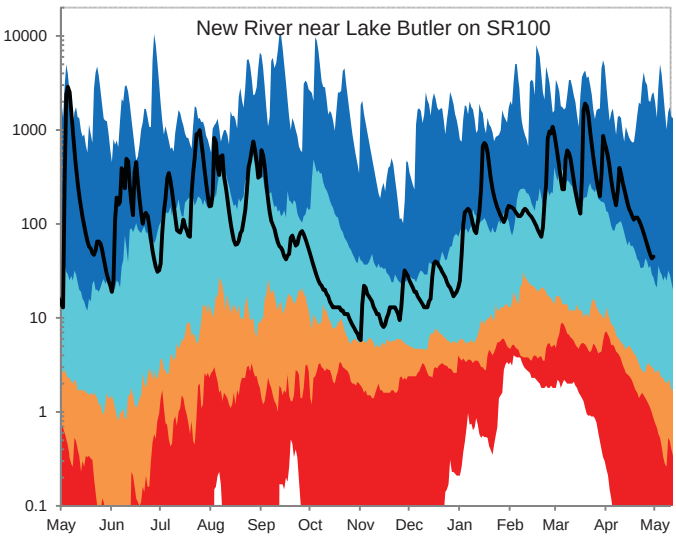
May 1, 2013 through April 30, 2014

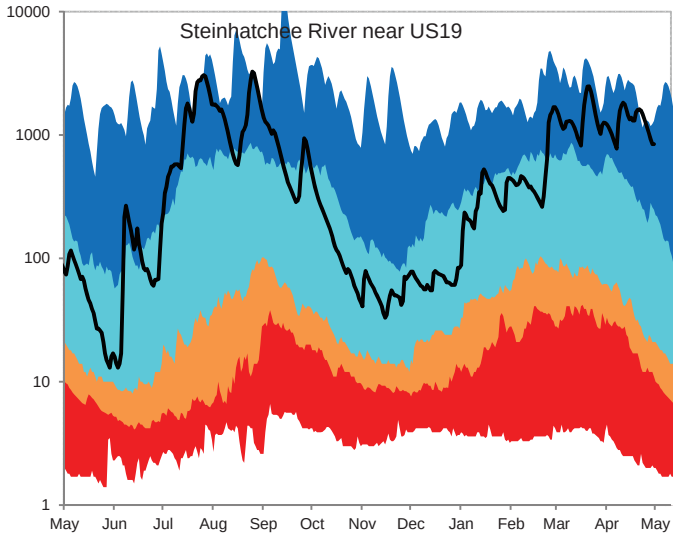


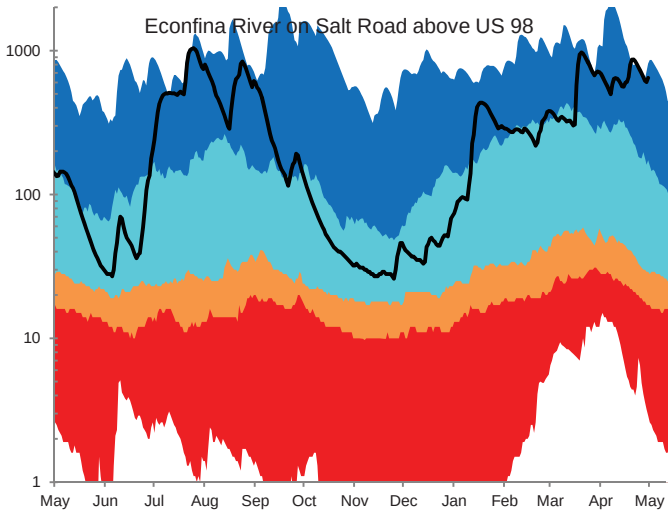
RIVER FLOW, CUBIC FEET PER SECOND

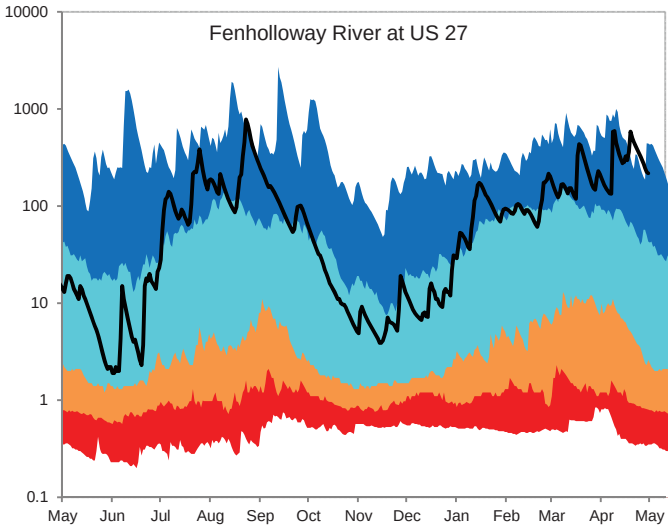


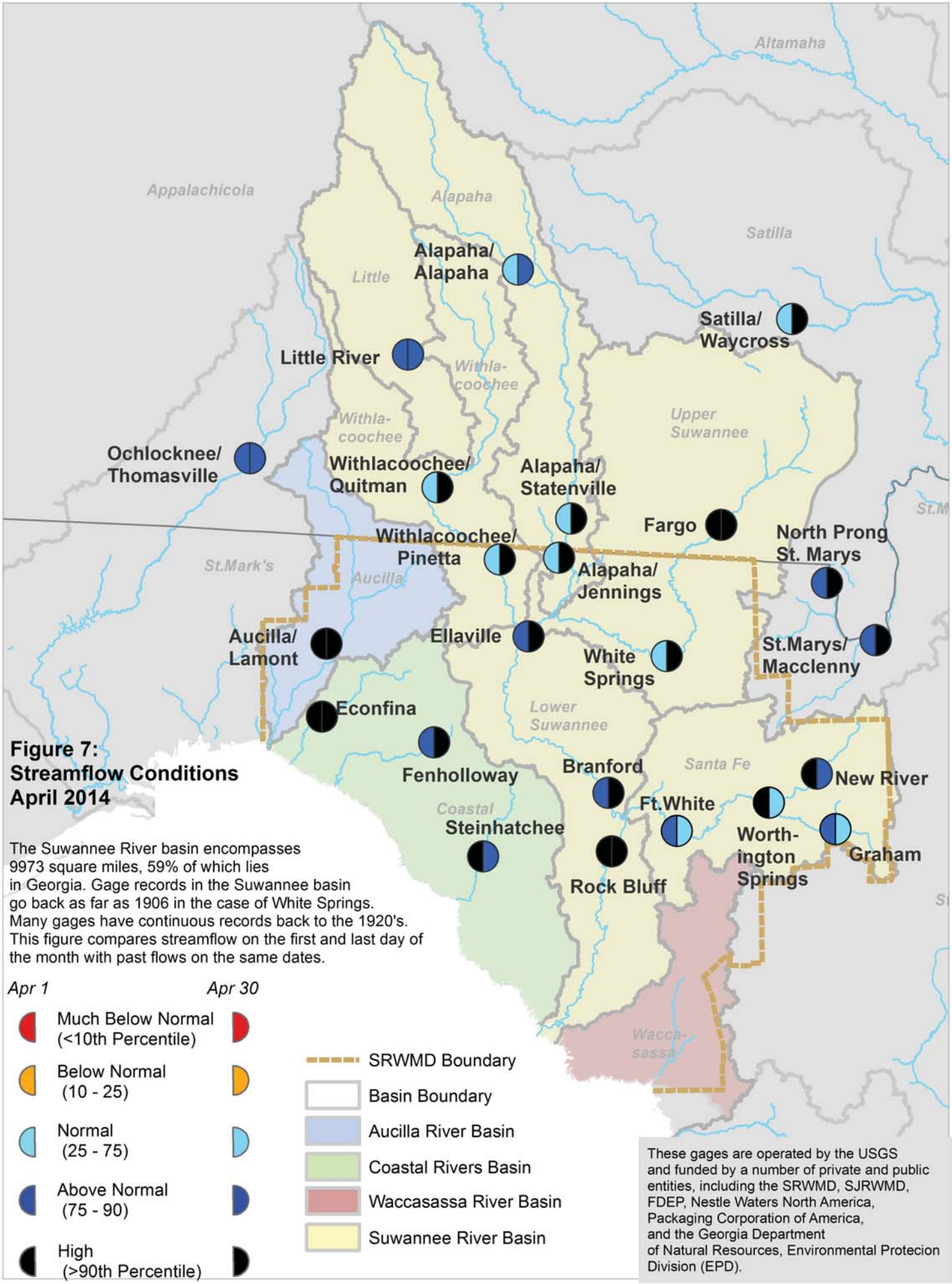











Altamaha
Appalachicola
Alapaha
Satilla
Alapaha/
Alapaha
Little
Satilla/
Waycross
Little River
Withla-
coochee
Withla-
coochee
Upper
Suwannee
Ochlocknee/
Thomasville
Withlacoochee/
Quitman
Alapaha/
Statenville
Fargo
North Prong
St. Marys
St.Mark's
Withlacoochee/
Pinetta
Aucilla
Alapaha/
Jennings
Aucilla/
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
April 2014
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.
Apr 1
Apr 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).

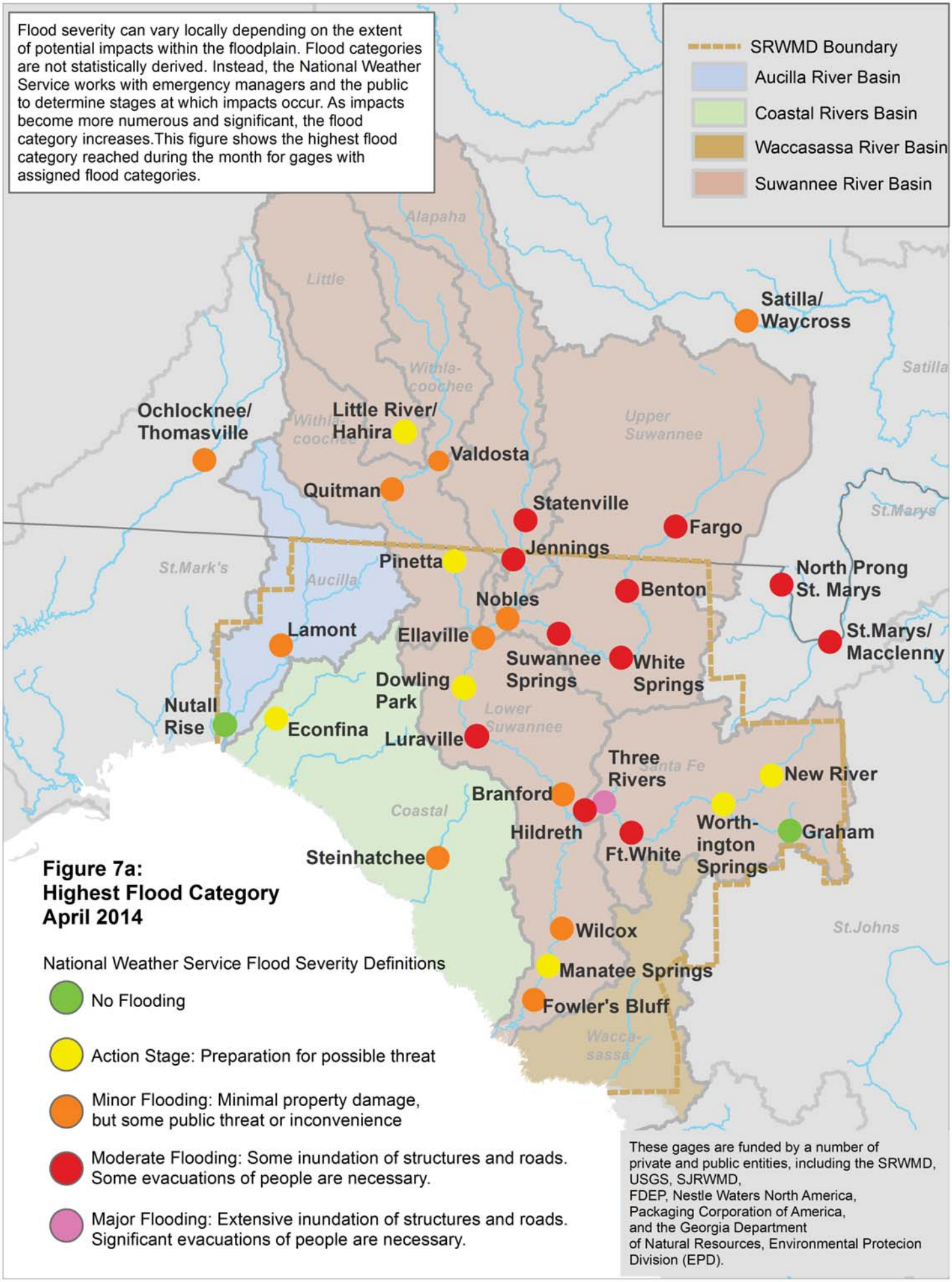
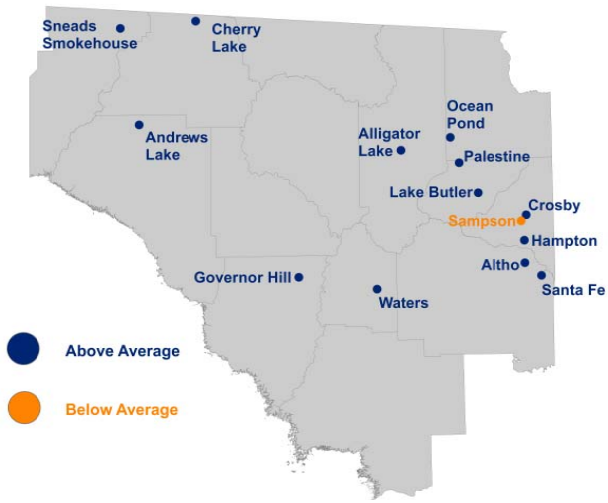

Flood severity can vary locally depending on the extent of potential impacts within the floodplain. Flood categories are not statistically derived. Instead, the National Weather Service works with emergency managers and the public to determine stages at which impacts occur. As impacts become more numerous and significant, the flood category increases.This figure shows the highest flood category reached during the month for gages with assigned flood categories.
SRWMD Boundary
Aucilla River Basin
Coastal Rivers Basin
Waccasassa River Basin
Suwannee River Basin
Alapaha
Little
Withla-coochee
Upper Suwannee
Satilla
St.Marys
St.Mark's
Aucilla
Lower Suwannee
Santa Fe
Coastal
Wacca-sassa
St.Johns
Satilla/ Waycross
Ochlocknee/ Thomasville
Little River/ Hahira
Valdosta
Quitman
Statenville
Fargo
Jennings
Pinetta
North Prong St. Marys
Benton
Nobles
Lamont
Ellaville
St.Marys/ Macclenny
Suwannee Springs
White Springs
Dowling Park
Nutall Rise
Econfina
Luraville
Three Rivers
New River
Branford
Hildreth
Worth-ington Springs
Graham
Ft.White
Steinhatchee
Wilcox
Manatee Springs
Fowler's Bluff
Figure 7a:
Highest Flood Category
April 2014
National Weather Service Flood Severity Definitions
No Flooding
Action Stage: Preparation for possible threat
Minor Flooding: Minimal property damage, but some public threat or inconvenience
Moderate Flooding: Some inundation of structures and roads. Some evacuations of people are necessary.
Major Flooding: Extensive inundation of structures and roads. Significant evacuations of people are necessary.
These gages are funded by a number of private and public entities, including the SRWMD, USGS, SJRWMD, FDEP, Nestle Waters North America, Packaging Corporation of America, and the Georgia Department of Natural Resources, Environmental Protecion Division (EPD).

Figure 8: April 2014 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.

Note: Levels at Sampson Lake and Lake Crosby are affected by the operation of a control structure where Sampson flows into the Sampson River. Cherry Lake levels can be affected by the occasional maintenance of an old drainage path east of the lake.

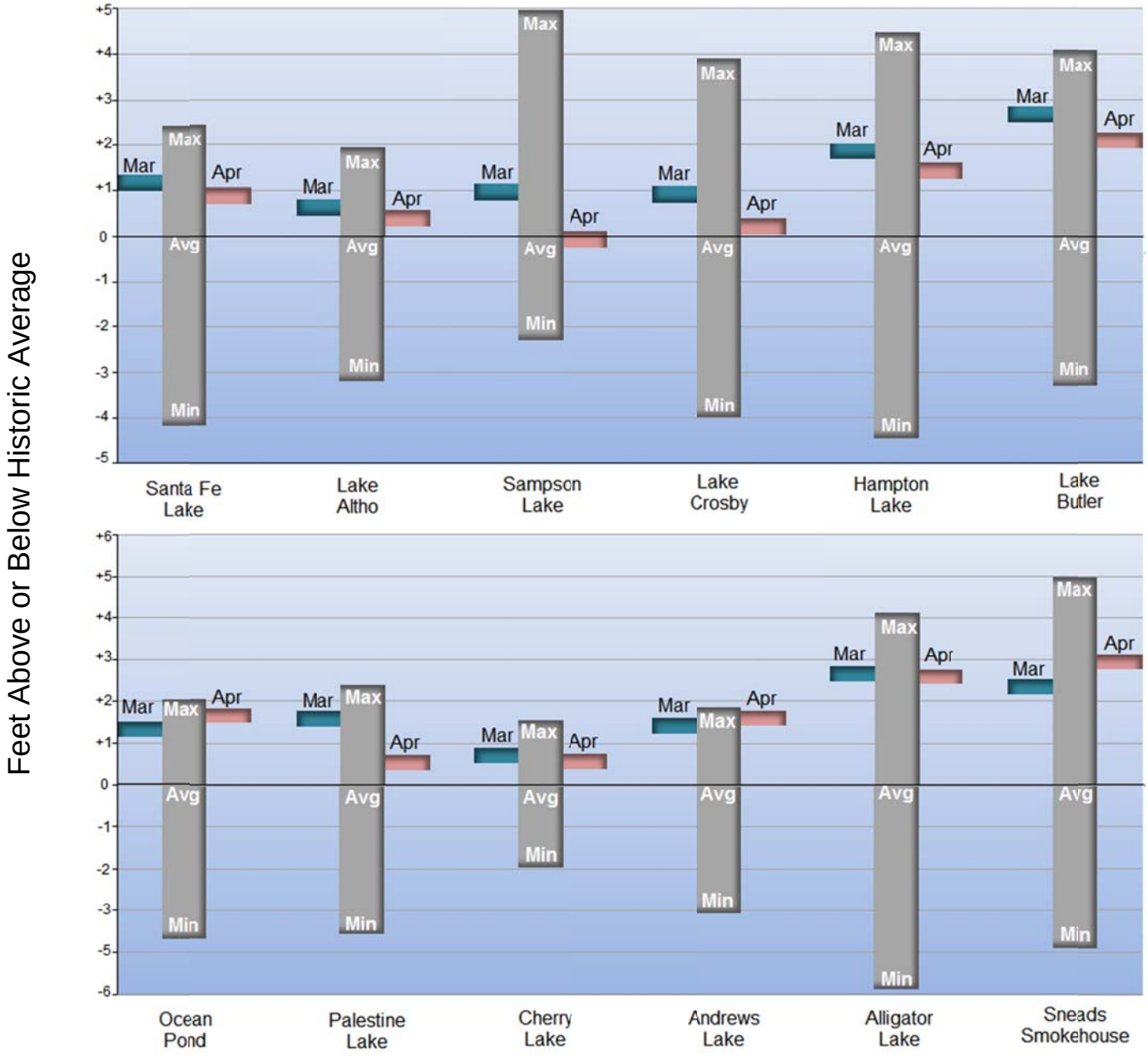
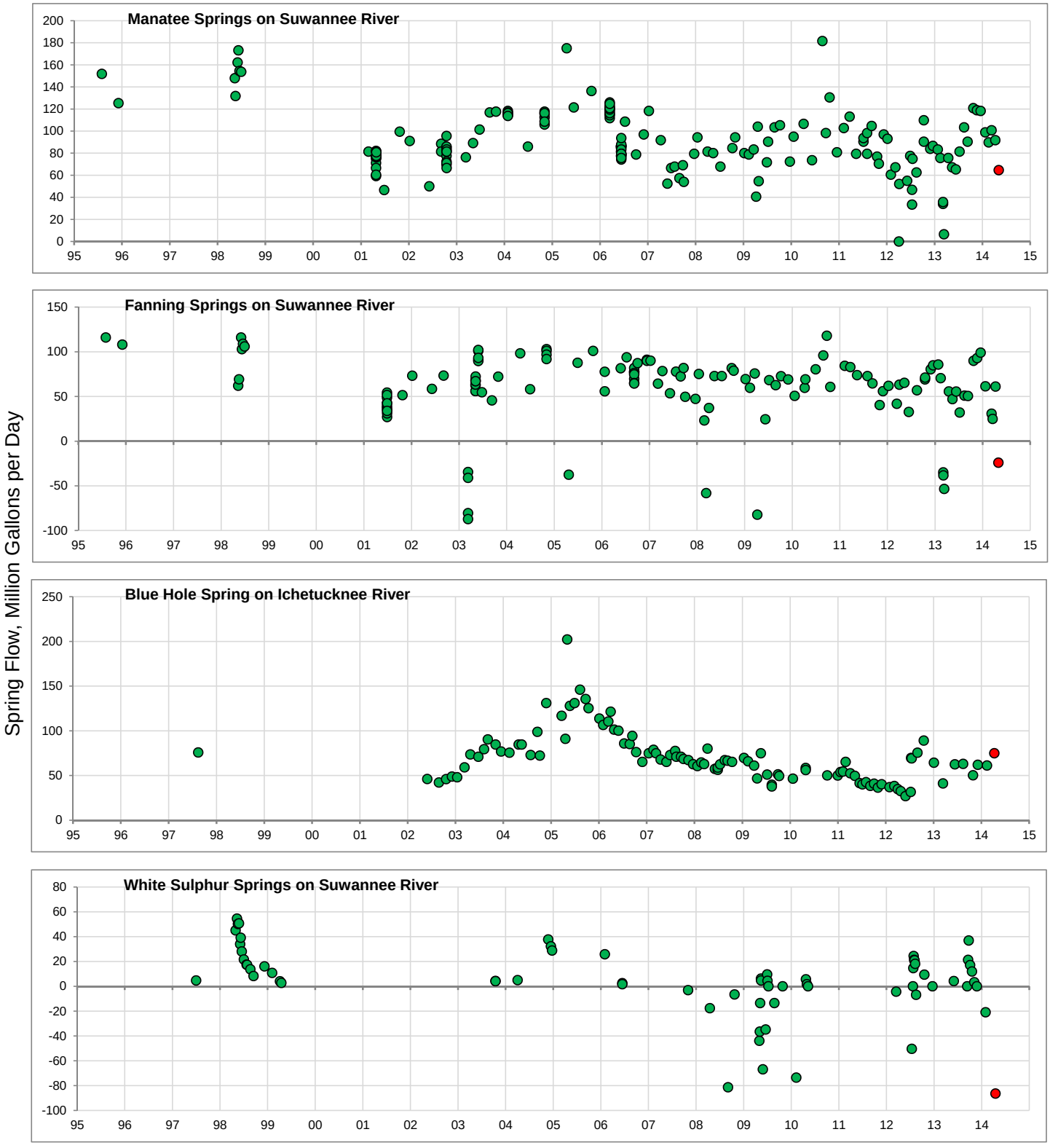


Figure 9: Quarterly Springflow Measurements

The SRWMD monitors water quality at 38 springs. Flow is measured at the time of the sampling. The springs below were measured in April 2014, with the last measurement marked in red. Flow is given in million gallons per day (MGD).

A spring's flow can be greatly affected by the level of the river it runs into. Rising river levels can act like a dam and slow spring flow causing what is known as a backwater effect. A river can flood a spring completely, known colloquially as a "brown-out". If the river levels are high enough, river water can flow back into the spring vent and thus into the aquifer, resulting in a negative flow rate. Because of the interaction between a spring and its receiving water body, some low flows in this data are the result of flooding and not necessarily drought conditions.



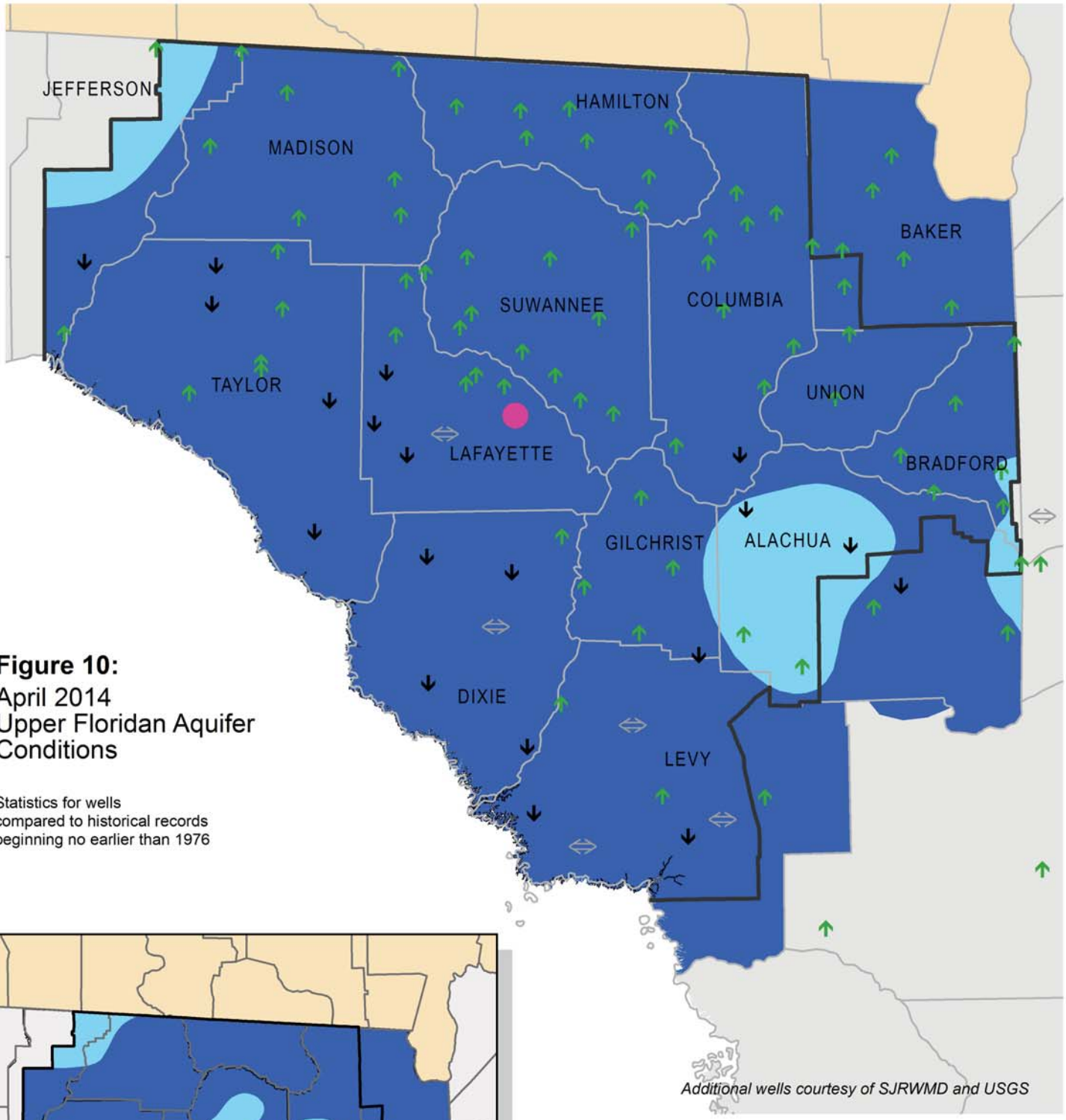
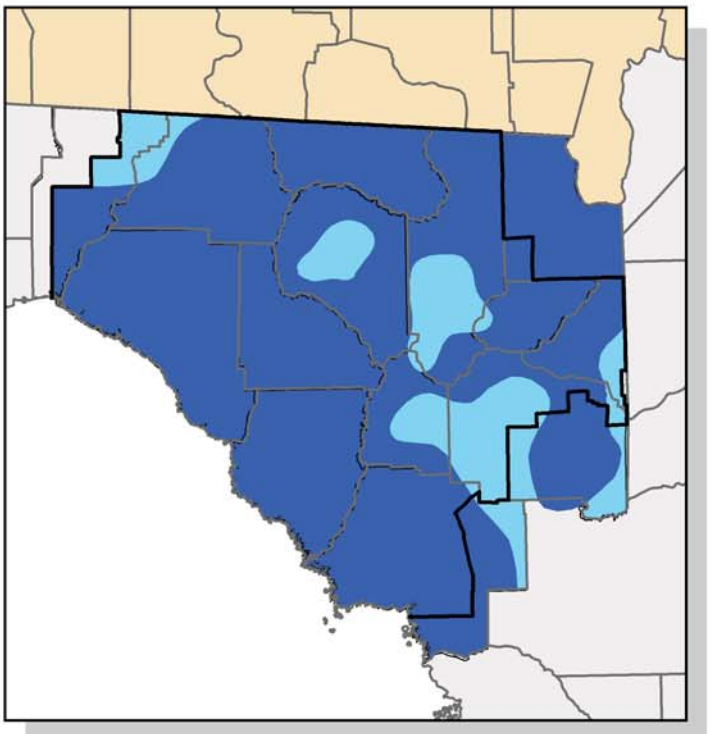


Figure 10:
April 2014
Upper Floridan Aquifer
Conditions

Statistics for wells
compared to historical records
beginning no earlier than 1976

Additional wells courtesy of SJRWMD and USGS



Inset: March 2014 Groundwater Levels

High
(Greater than 75th Percentile)

Normal
(25th to 75th Percentile)

Low
(10th to 25th Percentile)

Extremely Low
(Less than 10th Percentile)

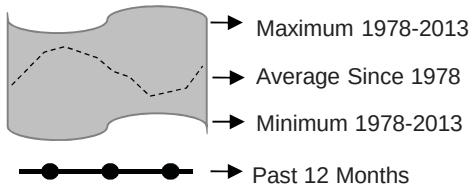
Increase/decrease in level since last month

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

Record High Level

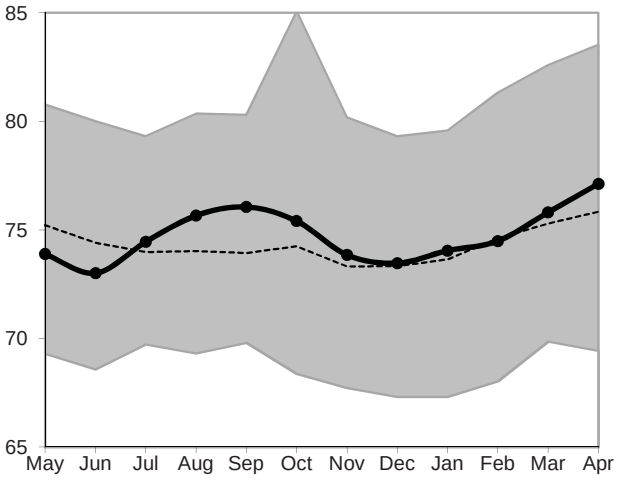
District Boundary

Figure 11: Monthly Groundwater Level Statistics
Levels May 1, 2013 through April 30, 2014
Period of Record Beginning 1978

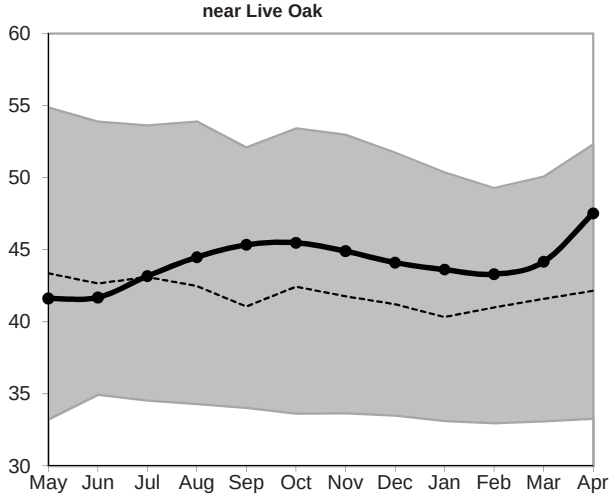


Upper Floridan Aquifer Elevation above NGVD 1929, Feet

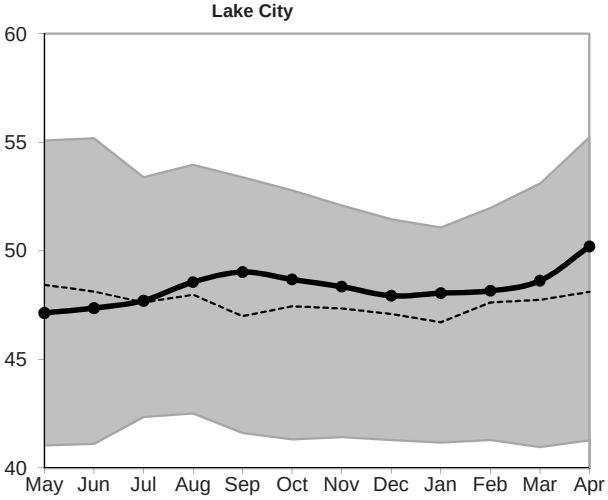
Madison County N010719001
near Greenville



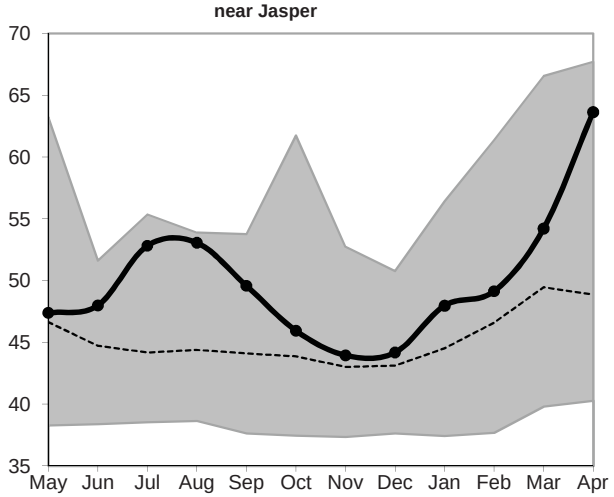
Suwannee County S021335001
near Live Oak



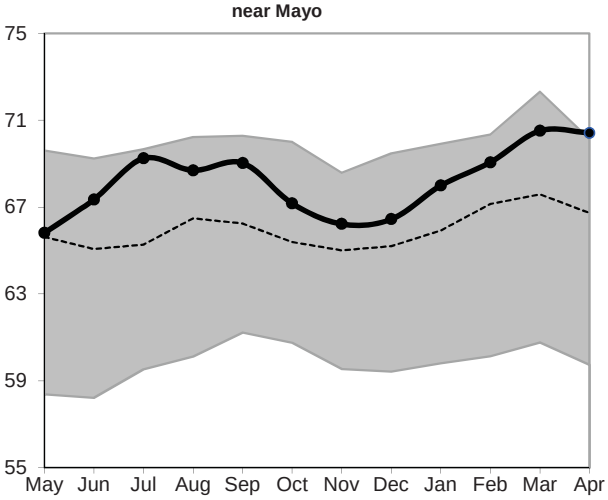
Columbia County S041705001
Lake City



Hamilton County N011422007
near Jasper



Lafayette County S061114001
near Mayo



Taylor County S050701001
near Perry

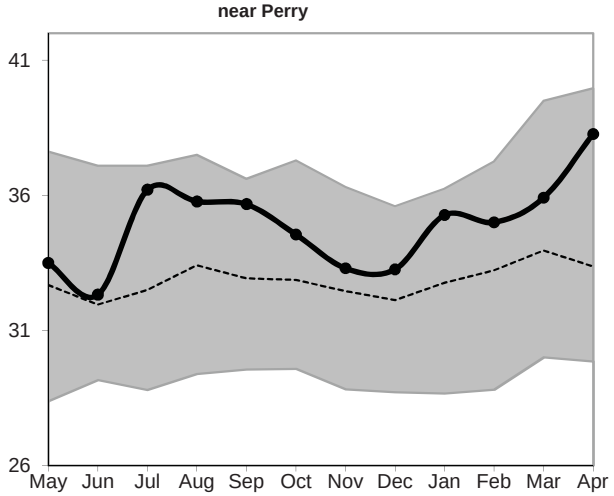
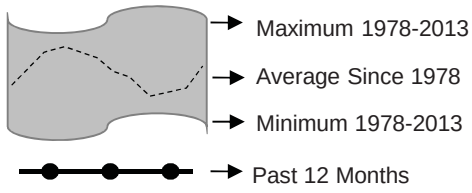
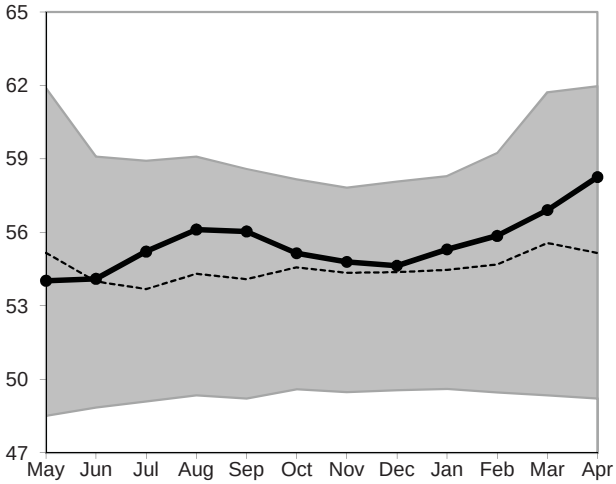


Figure 11, cont.: Groundwater Level Statistics
Levels May 1, 2013 through April 30, 2014
Period of Record Beginning 1978

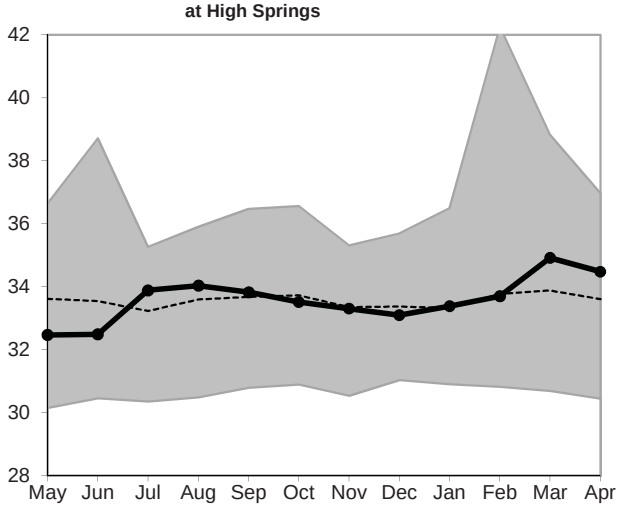


Upper Floridan Aquifer Elevation above NGVD 1929, Feet

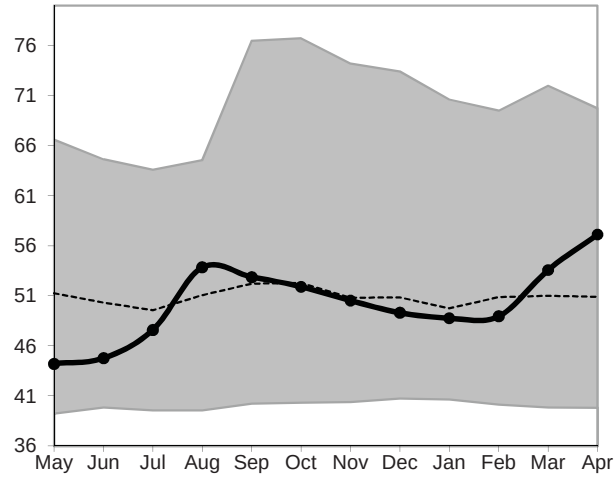
Union County S051933001
near Lake Butler



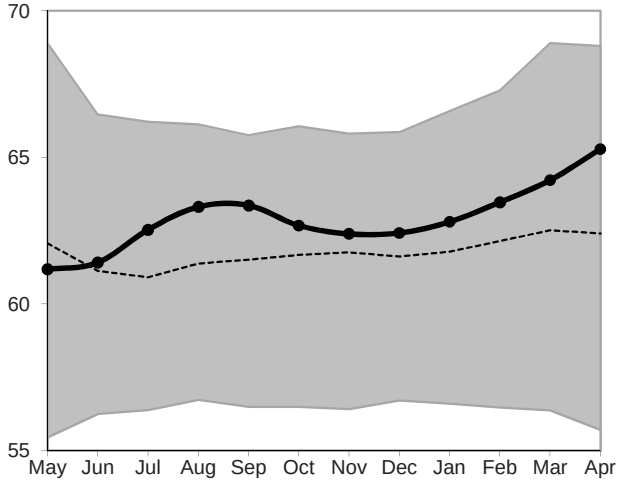
Alachua County S081703001
at High Springs



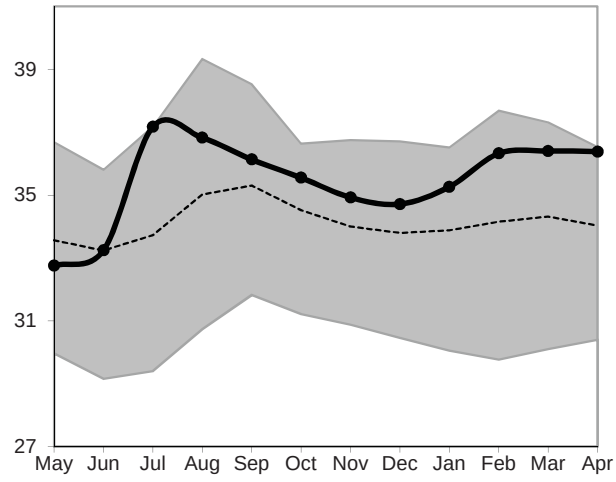
Gilchrist County S091607001
near Trenton



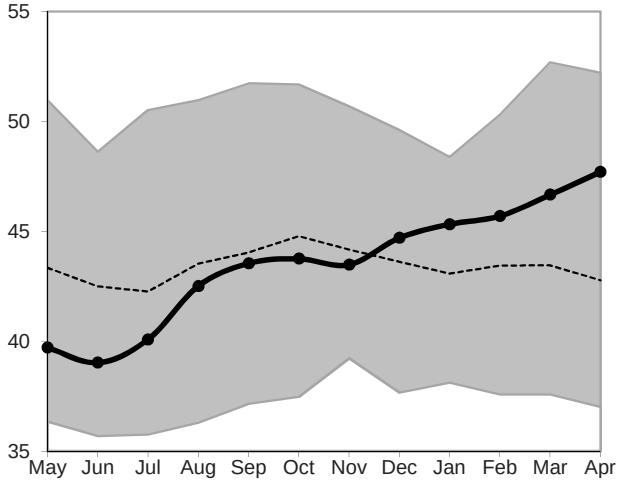
Bradford County S072132001
near Graham



Dixie County S101210001
at Cross City



Levy County S131736001
near Bronson



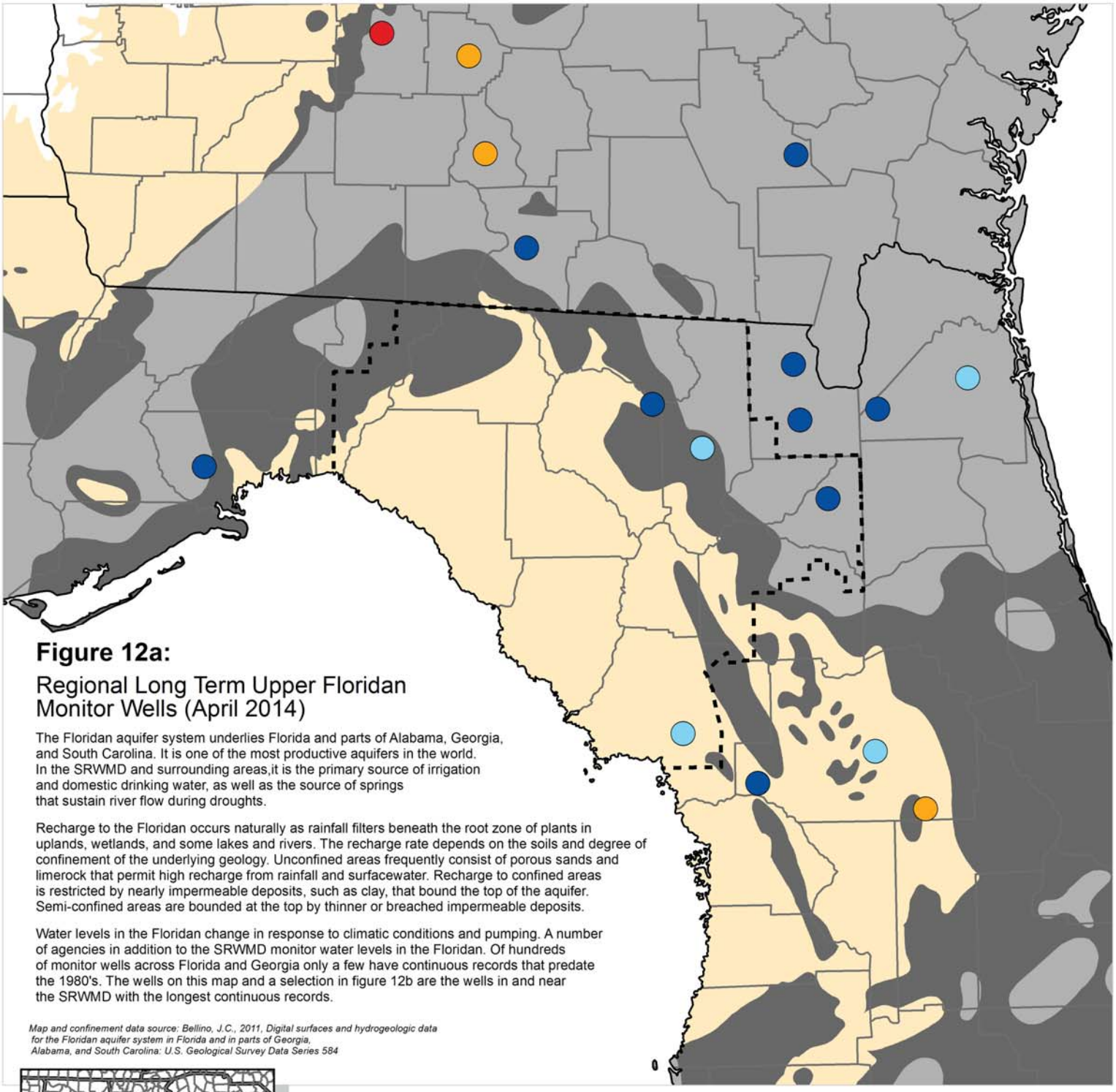


Figure 12a:

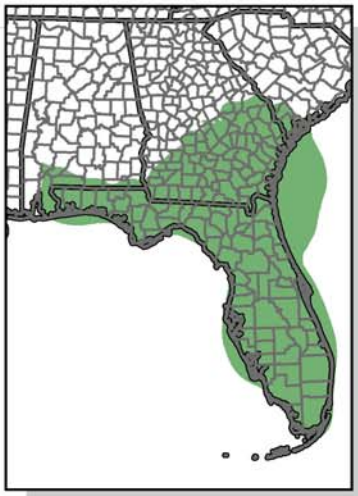
Regional Long Term Upper Floridan Monitor Wells (April 2014)

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

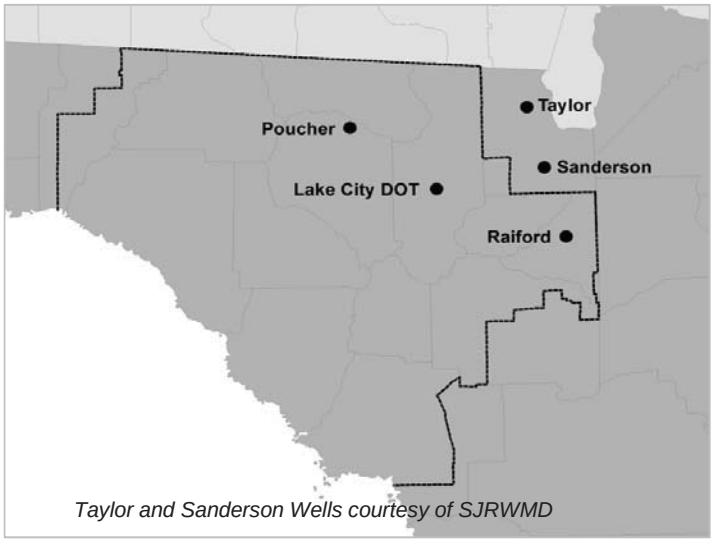
- Confined: Upper confining unit is generally greater than 100 feet thick and unbreached. Recharge is low.
- Semi-confined: Upper confining unit is generally less than 100 feet thick, breached, or both. Recharge is moderate.
- Unconfined: Upper confining unit is absent or very thin. Recharge is high.

Percentile of Most Recent Water Level Relative to Entire Record

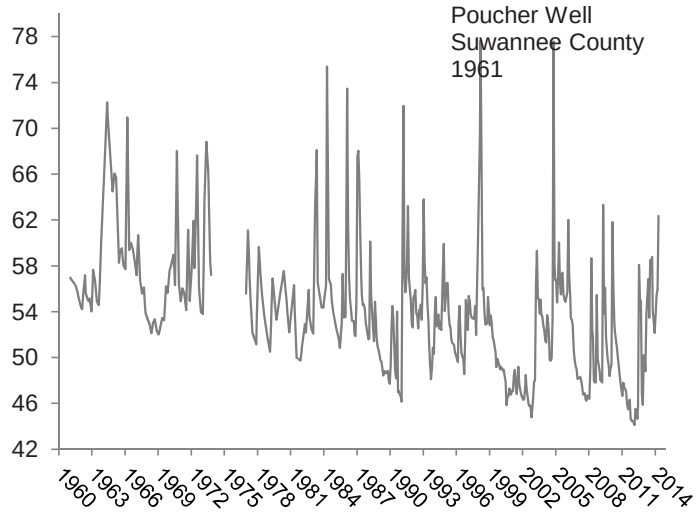
- High (Greater than 75th Percentile)
- Normal (25th to 75th Percentile)
- Low (10th to 25th Percentile)
- Extremely Low (Less than 10th Percentile)
- Not Available
- SRWMD Boundary

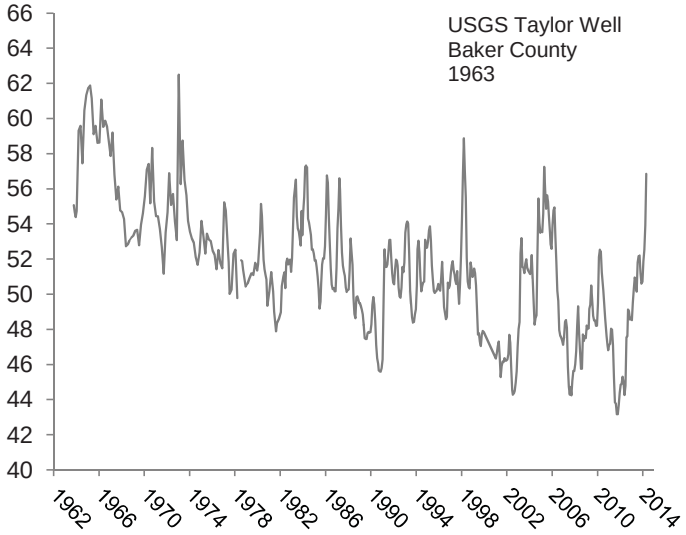
Figure 12b: Regional Long Term Upper Floridan Levels

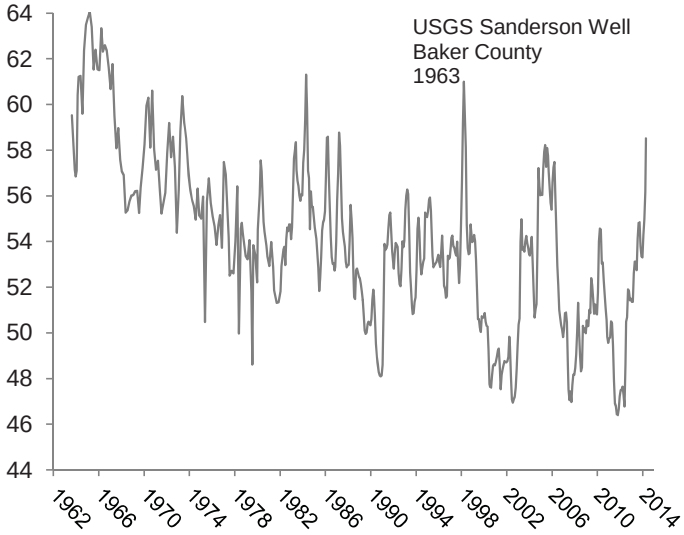
April 2014

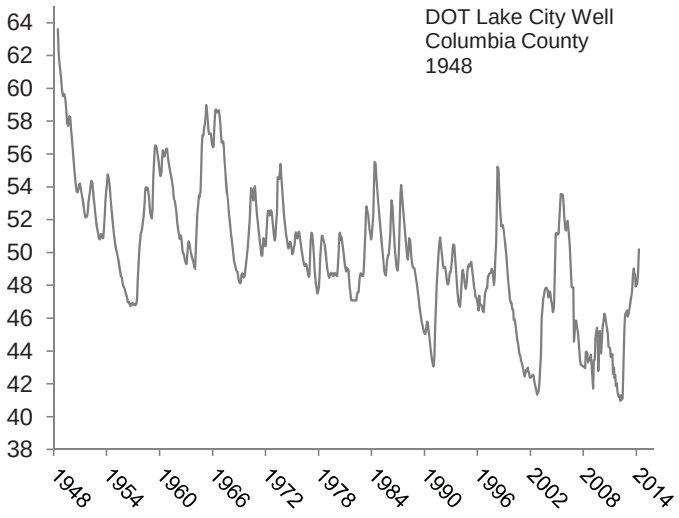


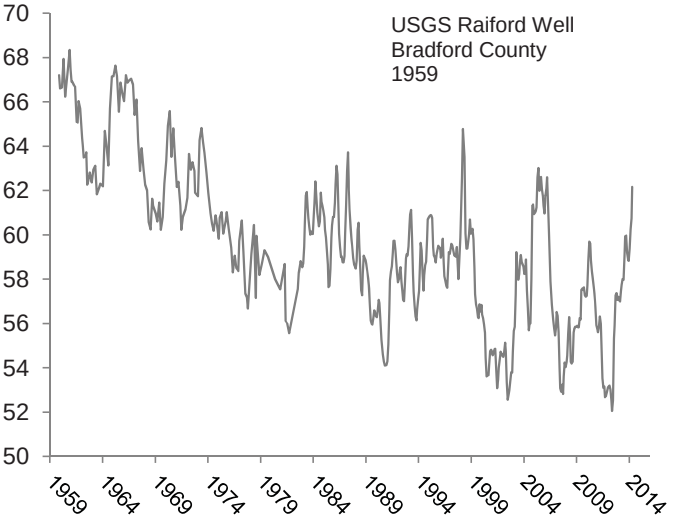
Taylor and Sanderson Wells courtesy of SJRWMD











Upper Floridan Aquifer Elevation above NGVD 1929, Feet