MEMORANDUM

TO: SRWMD Governing Board

FROM: Tom Mirti, Chief, Bureau of Hydrologic Data Services

THRU: Carlos Herd, P.G., Interim Executive Director
Erich R. Marzolf, Ph.D., Division Director, Water Resources

DATE: June 5, 2015

RE: May 2015 Hydrologic Conditions Report for the Suwannee River Water Management District

RAINFALL

- District-wide rainfall in May was 2.50", about 25% less than the long-term average May rainfall of 3.27". Dixie and Levy counties each received on average about 3.5 inches of rainfall during the month while the Santa Fe River counties of Alachua, Bradford and Union all received less than 2 inches of rain (Table 1). Highest rainfall amounts during the month tended to follow the Suwannee River corridor from White Springs downstream, with monthly accumulations over 4 inches common. A seabreeze-induced rainfall deficit in coastal Jefferson, Taylor and Dixie counties was evident, as were lesser rainfall accumulations in San Pedro Bay and Mallory Swamp (Figure 2). Rainfall amounts in the Suwannee River basin in Florida generally were below, though near, average for the month, but the Georgia portion of the basin was well below average, particularly in the Little River sub-basin (Figure 3).
- The highest gaged monthly total (4.70") was recorded at the Cooks Hammock rainfall gage in southwest Lafayette County, and the highest daily total (2.89" on May 26) was also recorded in Lafayette County at Midway Tower. The lowest gaged monthly total was 0.70" at the Wacissa Tower in Jefferson County.
- The rainfall average across the District for the 12-month period ending April 30 was 47.6", compared to the long-term average of 54.6", which doubled the annual deficit from the beginning of the month to 7.1". All major river basins now carry annual deficits in excess of 5 inches, and the Santa Fe and Coastal Rivers basins are each approaching a 9" shortfall. Bradford County and southwest Dixie County continue to show large annual rainfall deficits, with areas in each county, near Starke and Horseshoe Beach respectively, between 25 and 30 percent below normal (Figure 4).
- Average District rainfall for the 3 months ending May 31 was about 3" below the long-term average of 11.5". The Aucilla River Basin dropped into deficit status along with all other basins for the period, although the Waccasassa Basin's deficit did improve by about 1 inch as a result of the relatively high rainfall in Levy County (Figure 5).

SURFACEWATER

- **Rivers:** River level stations in the northwest of the District (Aucilla, Econfina, Withlacoochee) began the month at higher-than-normal states, while levels along the Suwannee and Santa Fe rivers were in the normal range. By month's end, the Steinhatchee and upper Santa Fe rivers had declined to low levels for the season and other locations throughout the District were all in the normal range. Suwannee River stations in Georgia declined steadily throughout the month, and the Little River near Adel dropped to well below normal levels. Flow statistics for major river stations are presented graphically in Figure 6, and river level conditions relative to historic conditions are provided in Figure 7.
- **Lakes**: All 14 monitored lakes showed water level declines during May. Sneads Smokehouse Lake in northern Jefferson County declined about 1.5 feet to 79.1 feet,

while Lake Alto in northeastern Alachua County declined just 0.2 feet. Seven monitored lakes dipped below average levels during the month. Figure 8 shows lake levels relative to their respective long-term average, minimum, and maximum levels.

- **Springs**: Eleven springs or spring groups were measured by the USGS, District staff, and District contractors in May. With river levels declining across the District, backwater conditions were lessened and springs began flowing strongly. White Sulphur Spring in the Upper Suwannee River Basin was measured at 20 million gallons per day during the month. Historical flow data for several major springs are provided in Figure 9.

GROUNDWATER

Levels in all upper Floridan aquifer monitor wells declined during May, and the District ended the month at the 67th percentile aquifer level. High water levels in the aquifer (those above the 75th percentile) shrank significantly, roughly retreating to the Cody Scarp in the northeast, and to a small zone near the headwaters of the Aucilla River in the northwest. The area of low groundwater levels in coastal Dixie County extended during the month to all coastal regions of Dixie and Levy counties; the remainder of the District is in the normal range (Figure 10). Twenty-five percent of the monitor wells have dropped below their respective median levels, and about the same percent remain in the high category. Floridan aquifer levels for a representative sample of wells are provided in Figure 11 along with summary statistics, and regional long-term well information is provided 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, assesses the severity and frequency of abnormally dry or wet weather using rainfall, temperature, and soil moisture data. PDSI values for the week ending May 30 showed near-normal conditions in north Florida and south Georgia.
- The National Weather Service Climate Prediction Center (CPC) is maintaining a higher than normal rainfall projection for north central Florida through the end of August, and normal rainfall conditions until December. At that time the projected ongoing weak El Niño conditions are expected to result in increased precipitation in Florida and the southeastern United States through the early spring.
- The U.S. Drought Monitor report of June 2 showed an intrusion of abnormally dry conditions in northern Hamilton, Columbia and Baker counties, with normal conditions elsewhere across the District and in the contributing drainage areas of Georgia.

CONSERVATION

Water conservation is necessary 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 October 31, 2015) 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	May 2015	May Average	Month % of Normal	Last 12 Months	Annual % of Normal
Alachua	1.93	2.27	85%	47.99	94%
Baker	1.92	1.89	102%	45.58	91%
Bradford	1.47	2.22	66%	41.27	81%
Columbia	3.02	3.21	94%	48.30	94%
Dixie	3.53	3.43	103%	44.89	76%
Gilchrist	2.80	3.36	83%	47.56	83%
Hamilton	2.69	3.16	85%	51.07	98%
Jefferson	2.00	5.88	34%	48.81	81%
Lafayette	2.46	3.33	74%	47.52	84%
Levy	3.62	2.67	136%	49.90	84%
Madison	2.35	4.73	50%	47.15	84%
Suwannee	3.10	3.24	96%	49.51	93%
Taylor	2.23	4.16	54%	47.08	79%
Union	1.95	2.21	88%	46.66	86%

May 2015 Average:	2.50
May Average (1932-2013):	3.27
Historical 12-month Average (1932-2013):	54.63
Past 12-Month Total:	47.58
12-Month Rainfall Surplus/Deficit:	-7.05

Figure 1: Comparison of District Monthly Rainfall

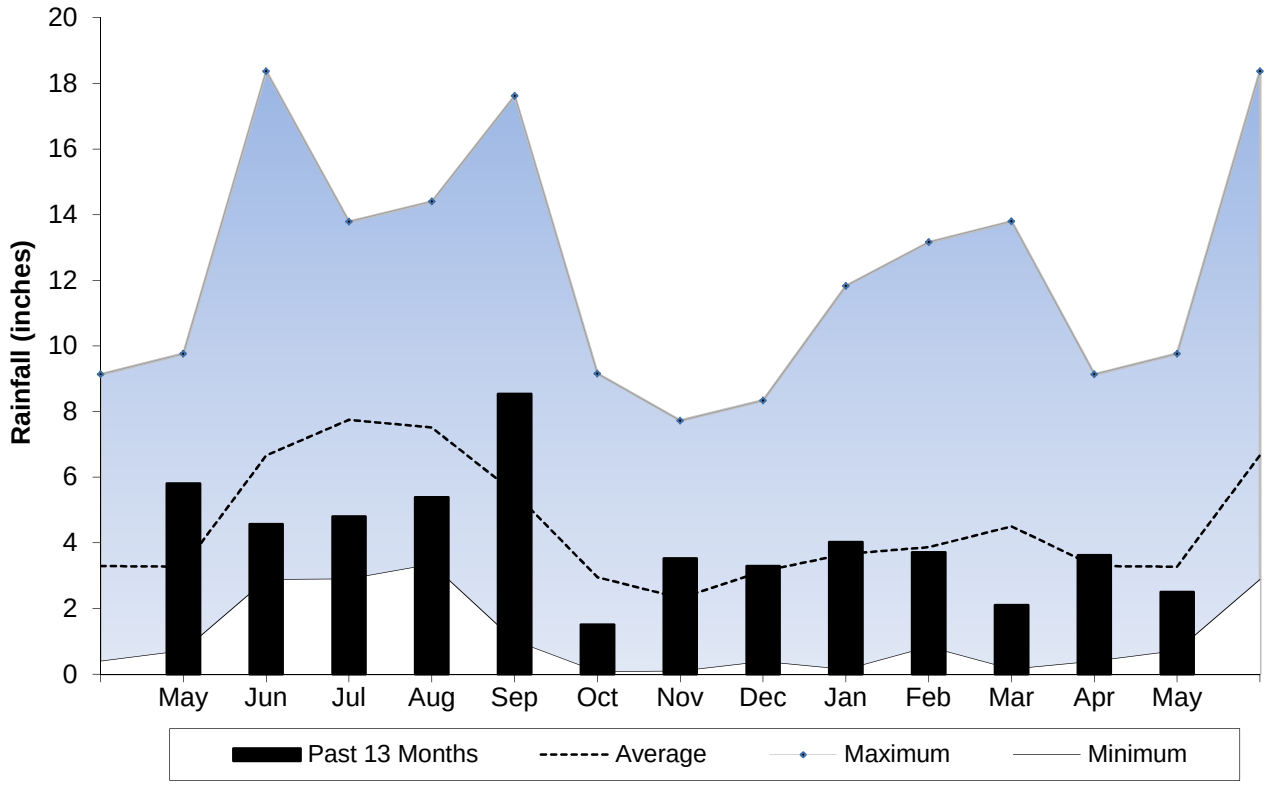


Figure 2: May 2015 Rainfall Estimate

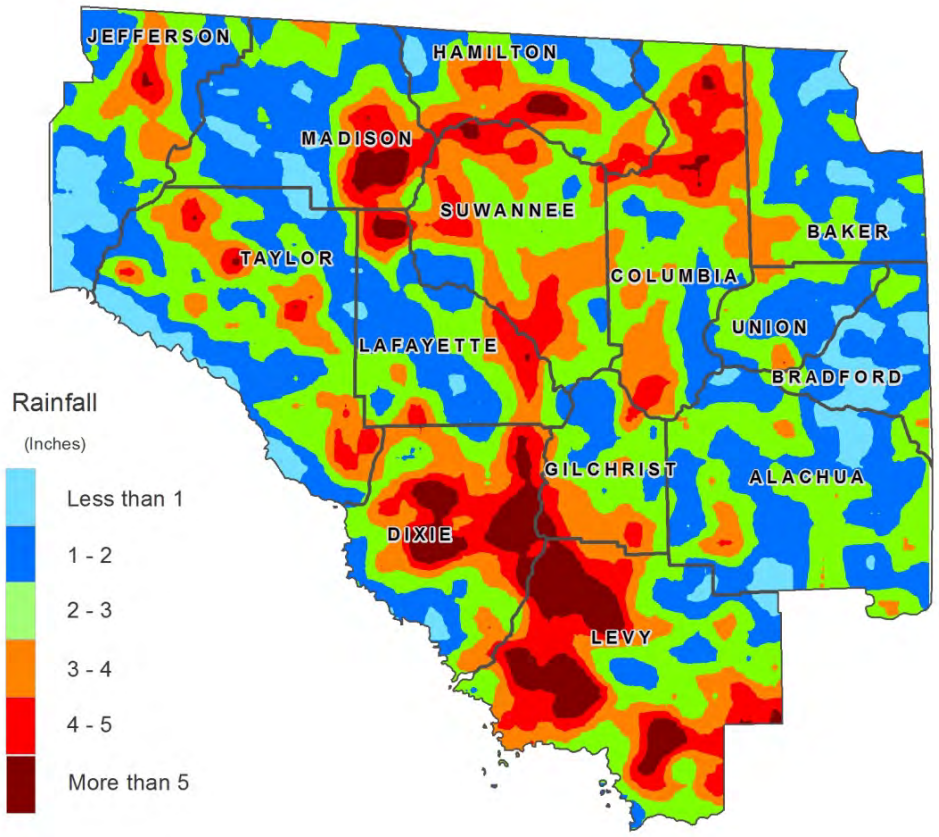


Figure 3: May 2015 Percent of Normal Rainfall

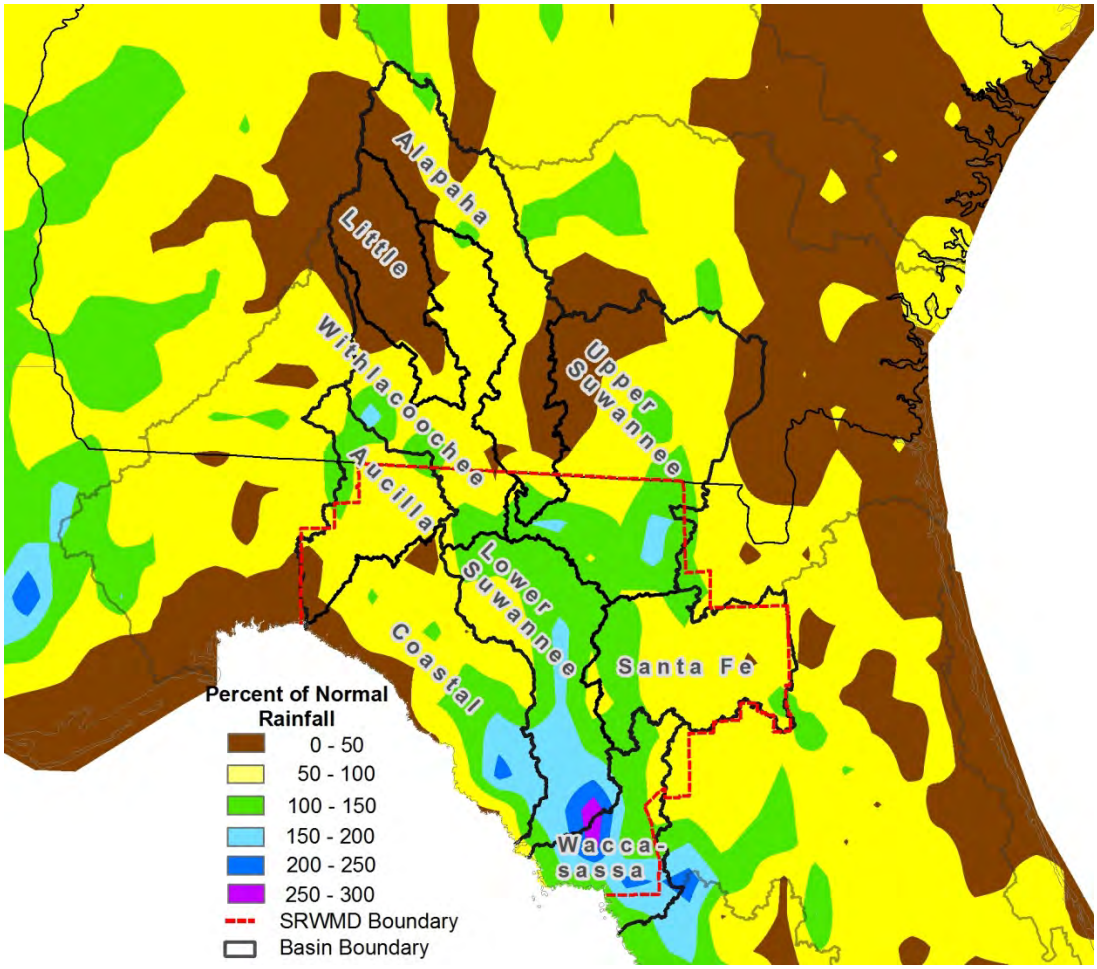


Figure 4: 12-Month Rainfall Surplus/Deficit by River Basin Through May 31, 2015

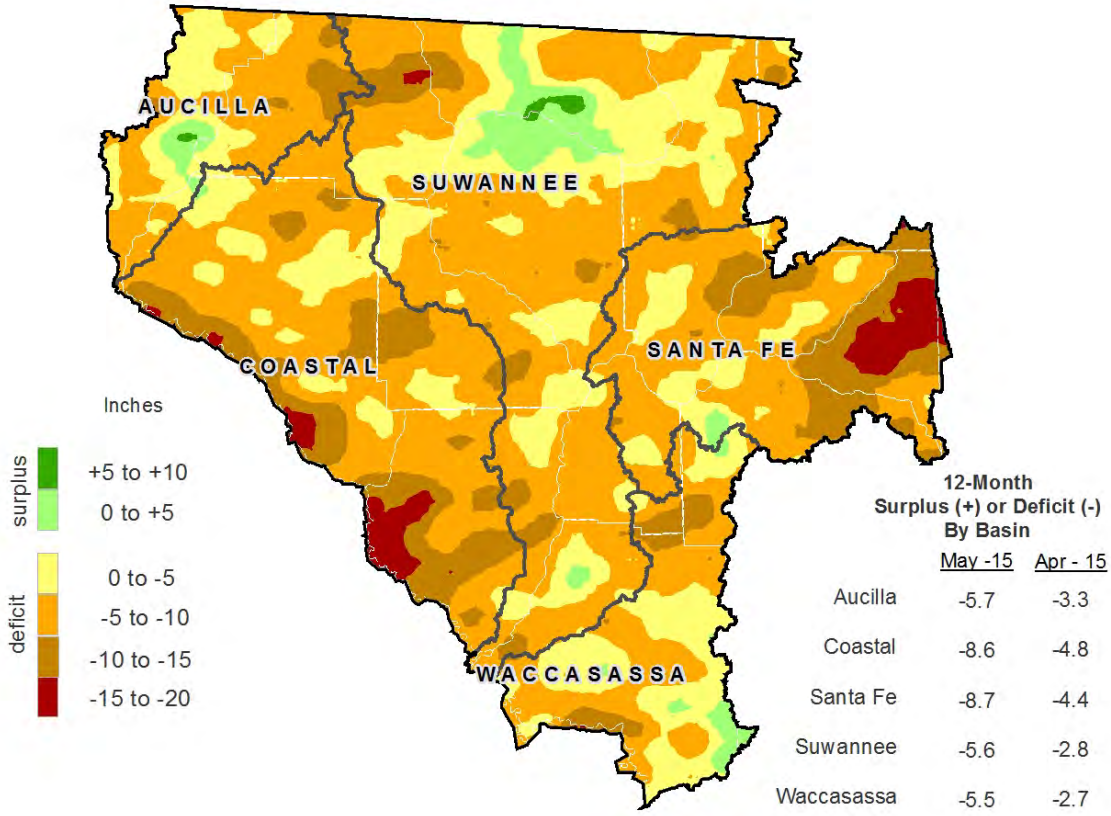


Figure 5: 3-Month Rainfall Surplus/Deficit by River Basin Through May 31, 2015

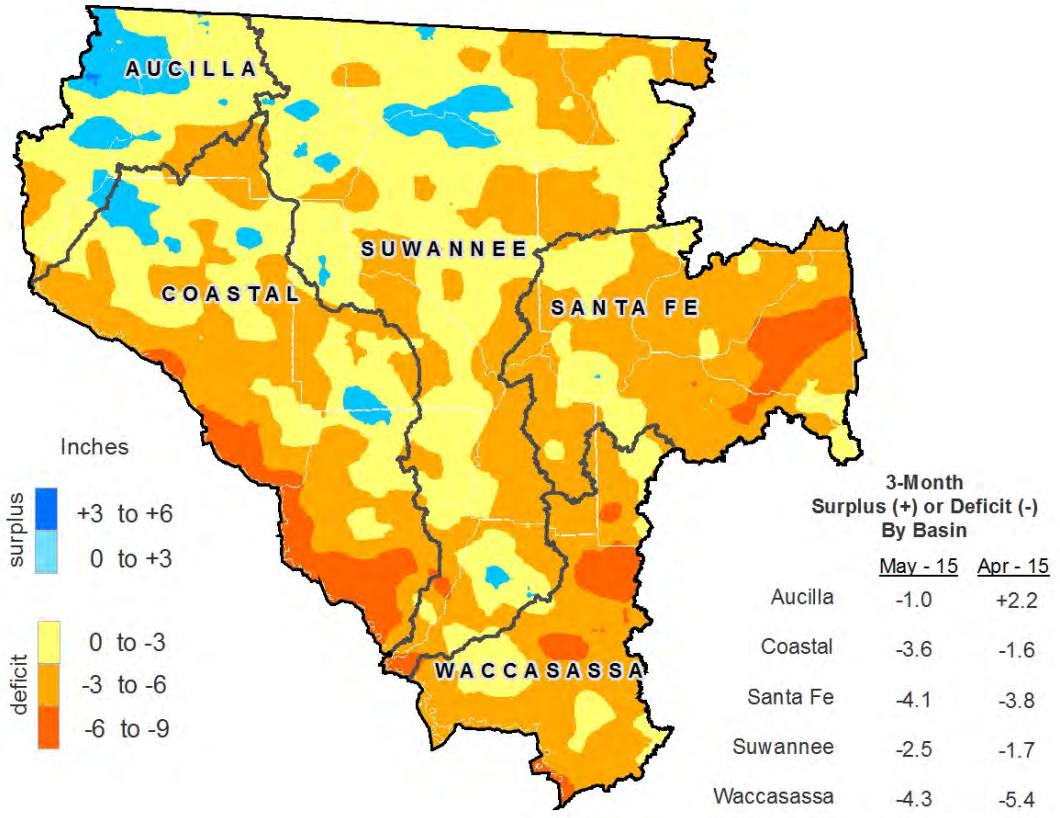
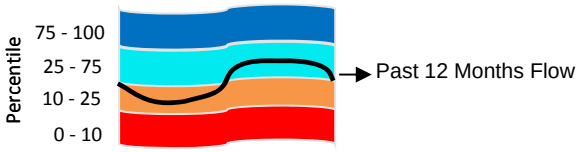
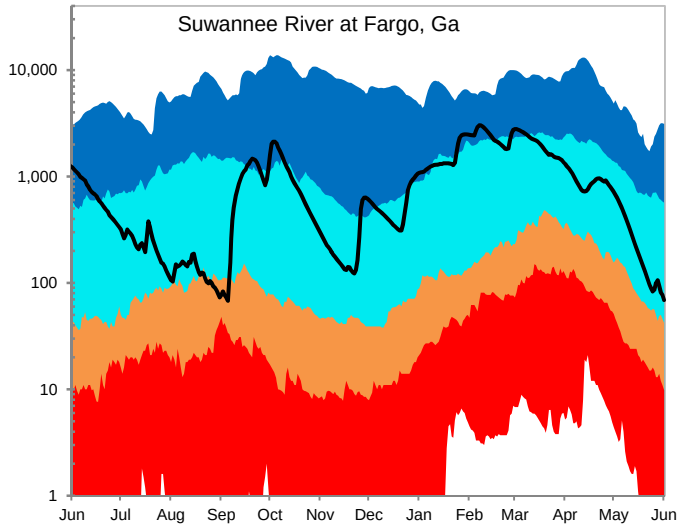
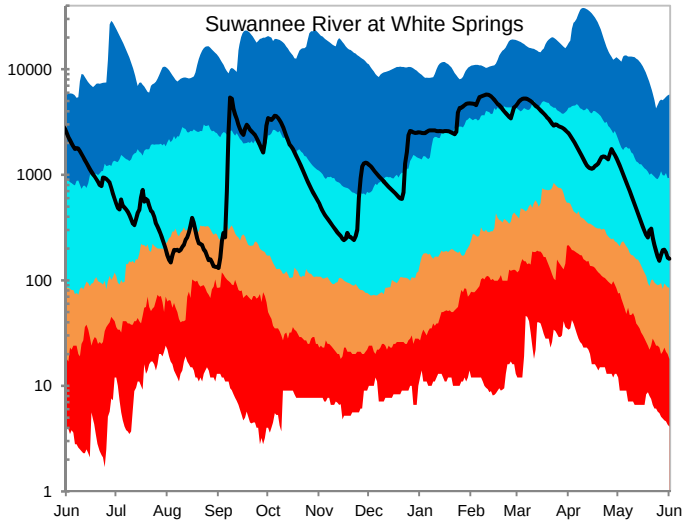


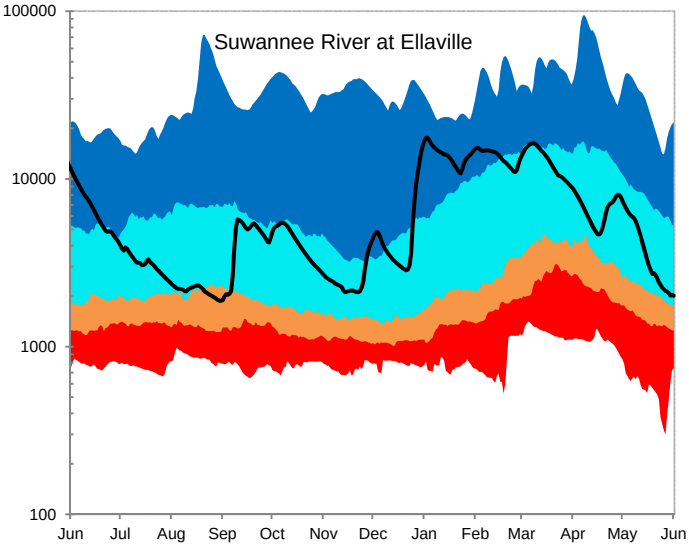
Figure 6: Daily River Flow Statistics
June 1, 2014 through May 31, 2015

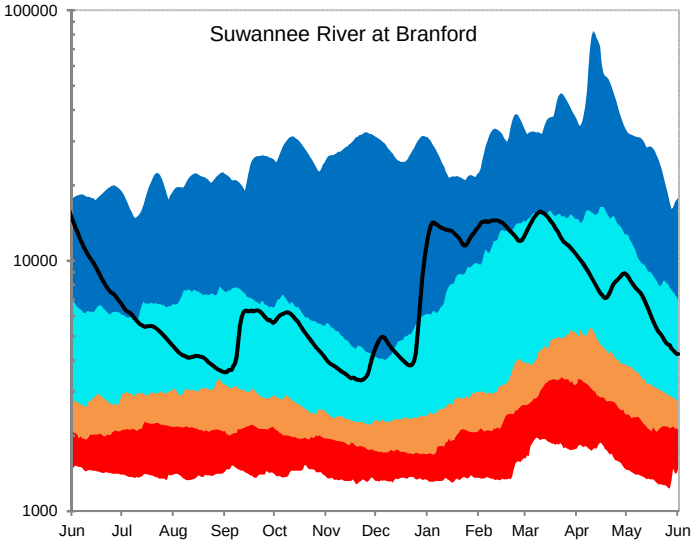


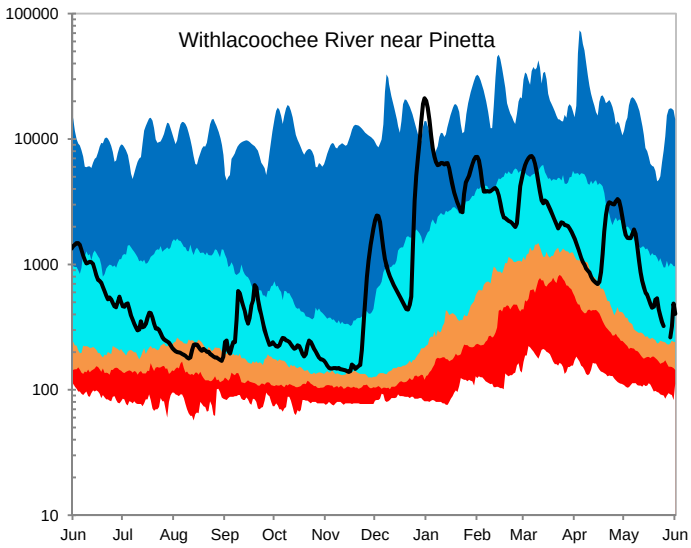
RIVER FLOW, CUBIC FEET PER SECOND











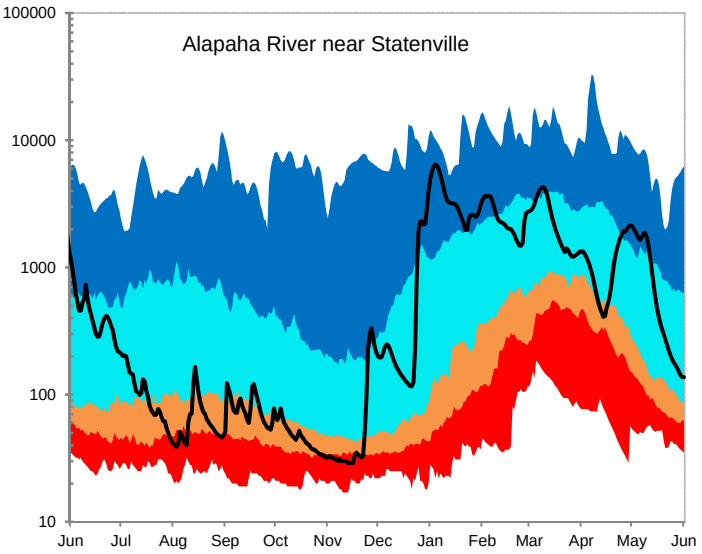
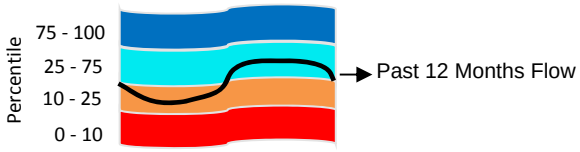
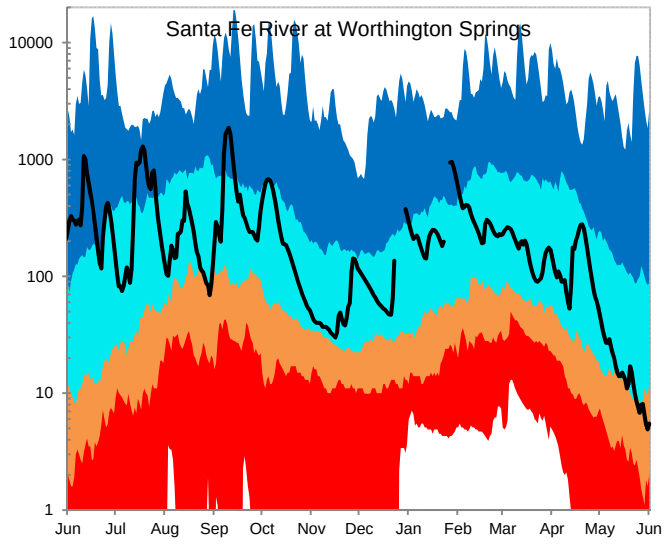
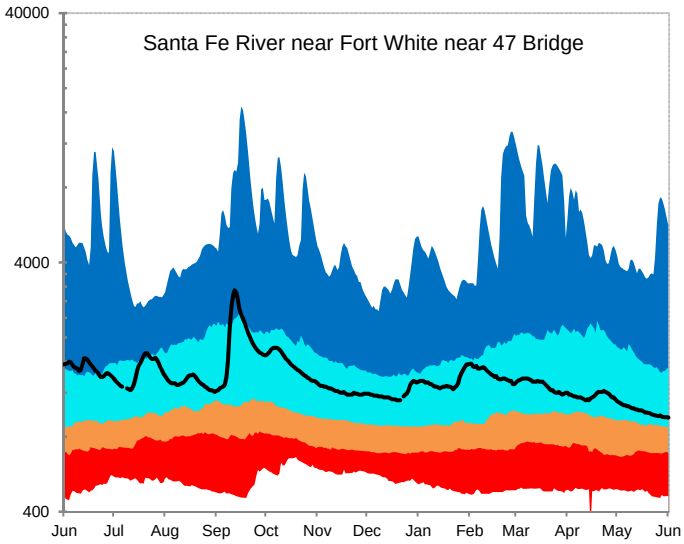


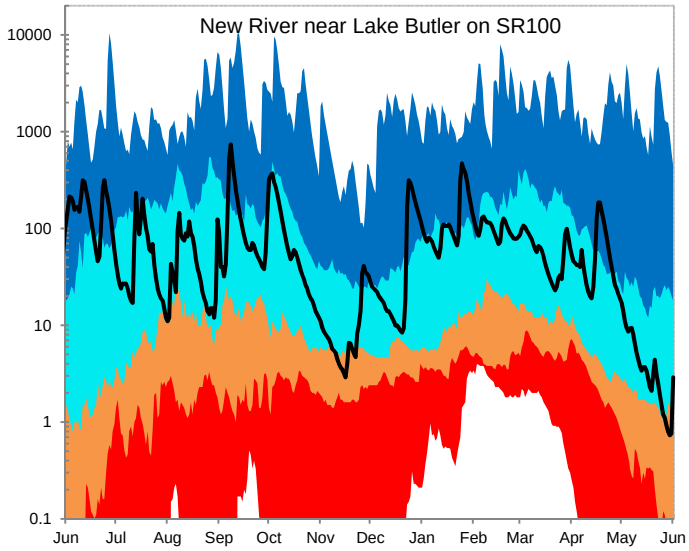
Figure 6, cont: Daily River Flow Statistics
June 1, 2014 through May 31, 2015

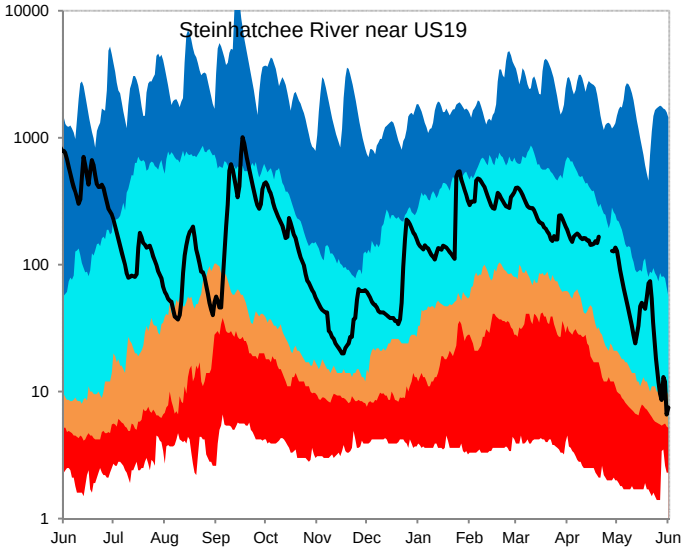


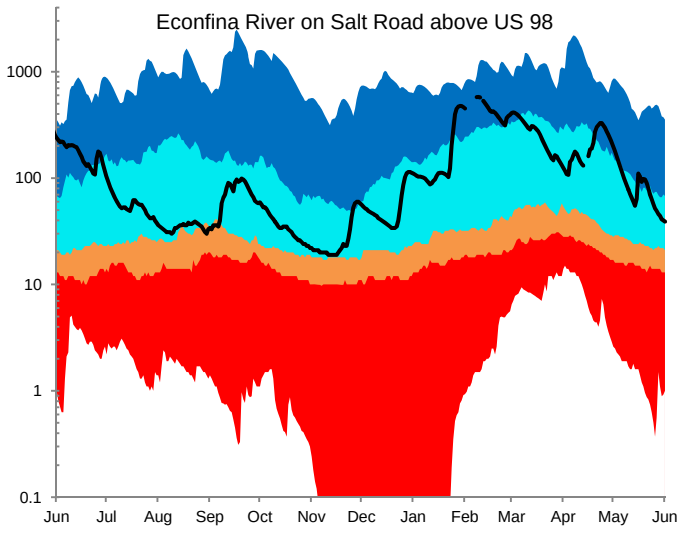
RIVER FLOW, CUBIC FEET PER SECOND

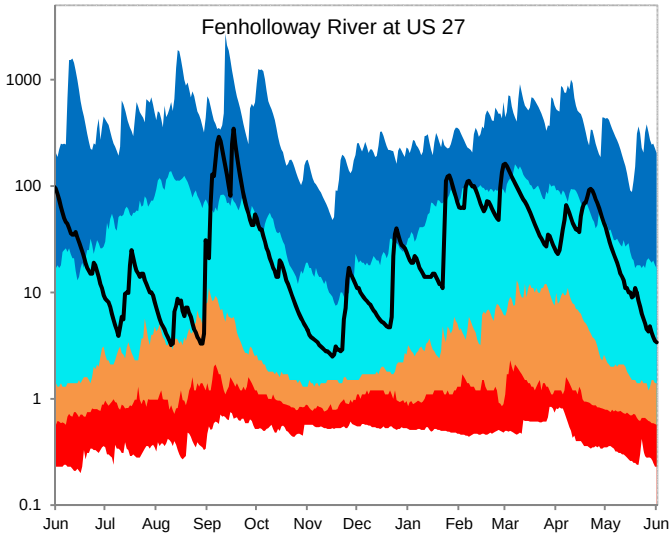












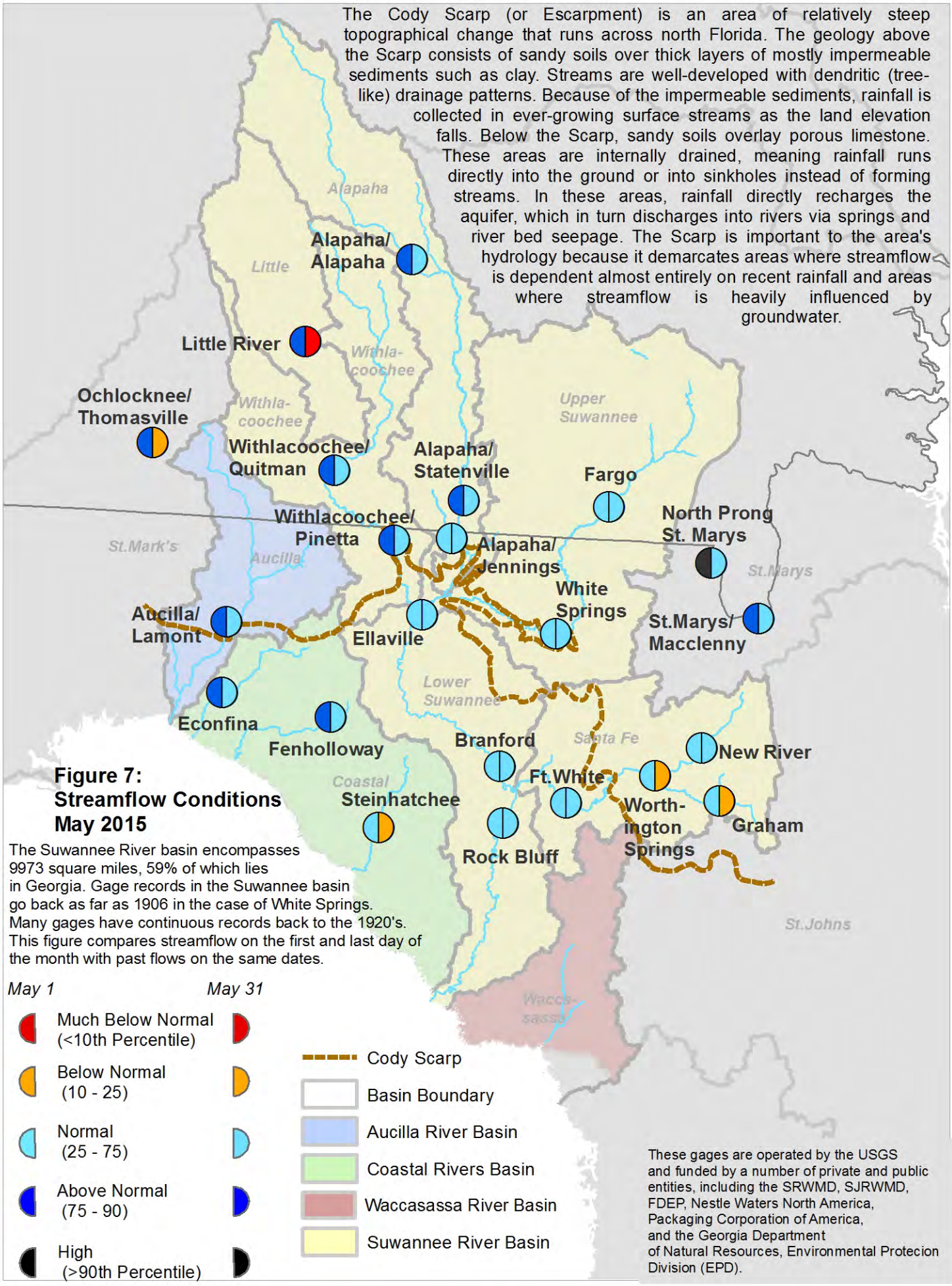
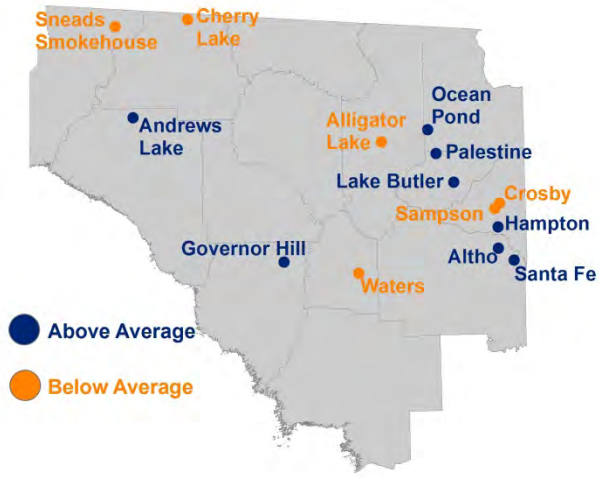

The Cody Scarp (or Escarpment) is an area of relatively steep topographical change that runs across north Florida. The geology above the Scarp consists of sandy soils over thick layers of mostly impermeable sediments such as clay. Streams are well-developed with dendritic (tree-like) drainage patterns. Because of the impermeable sediments, rainfall is collected in ever-growing surface streams as the land elevation falls. Below the Scarp, sandy soils overlay porous limestone. These areas are internally drained, meaning rainfall runs directly into the ground or into sinkholes instead of forming streams. In these areas, rainfall directly recharges the aquifer, which in turn discharges into rivers via springs and river bed seepage. The Scarp is important to the area's hydrology because it demarcates areas where streamflow is dependent almost entirely on recent rainfall and areas where streamflow is heavily influenced by groundwater.
Alapaha
Alapaha/ Alapaha
Little
Little River
Withla-coochee
Ochlocknee/ Thomasville
Withla-coochee
Upper Suwannee
Withlacoochee/ Quitman
Alapaha/ Statenville
Fargo
North Prong St. Marys
Withlacoochee/ Pinetta
Alapaha/ Jennings
St.Mark's
Aucilla
St.Marys
White Springs
Aucilla/ Lamont
Ellaville
St.Marys/ Macclenny
Lower Suwannee
Econfina
Fenholloway
Branford
Santa Fe
New River
Ft.White
Coastal
Steinhatchee
Worth-ington Springs
Graham
Rock Bluff
St.Johns
Waccasassa
Figure 7:
Streamflow Conditions
May 2015
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.
May 1
May 31
Much Below Normal (<10th Percentile)
Below Normal (10 - 25)
Normal (25 - 75)
Above Normal (75 - 90)
High (>90th Percentile)
Cody Scarp
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: May 2015 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 monitoring records begin in the 1970s, although the Sampson Lake record starts in 1957.

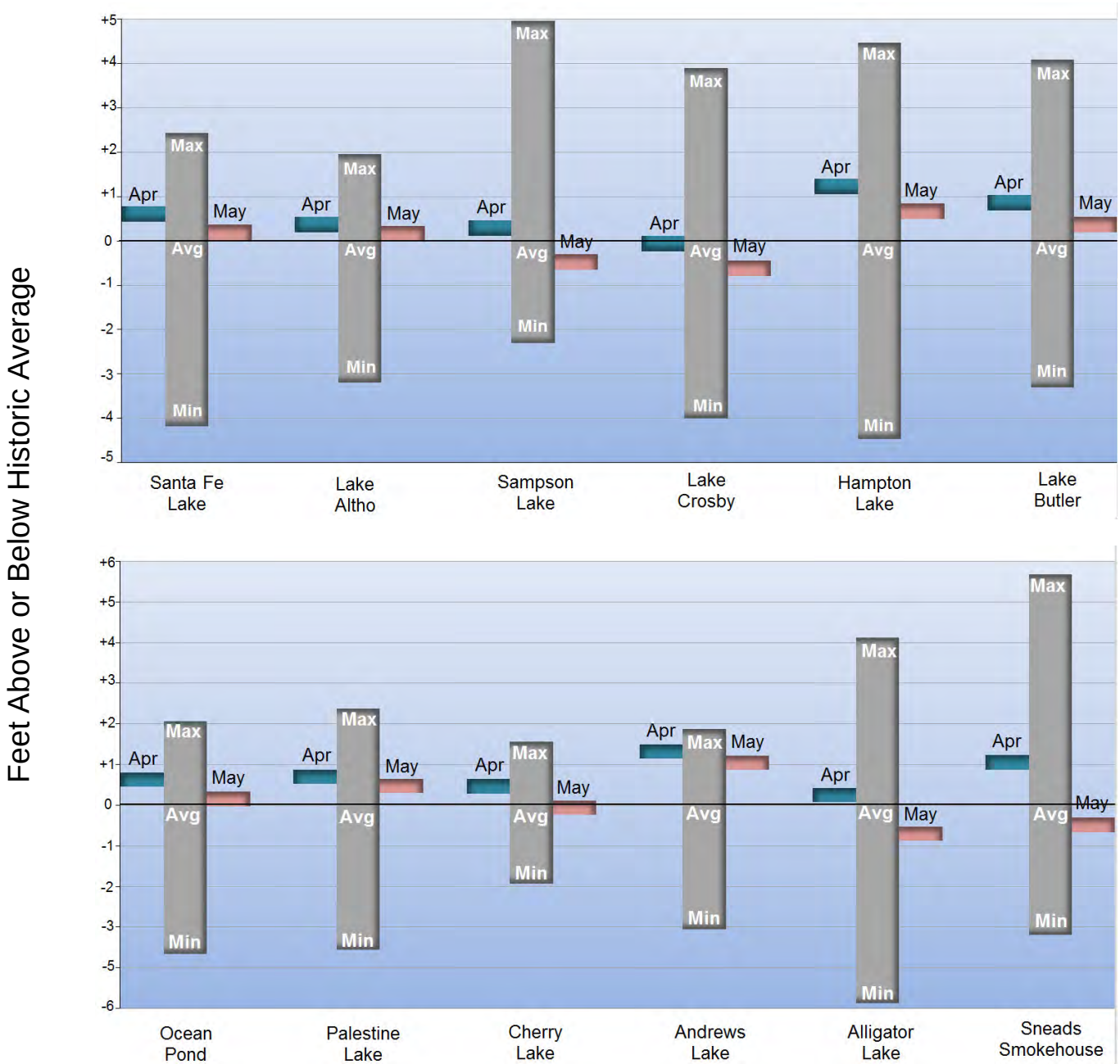
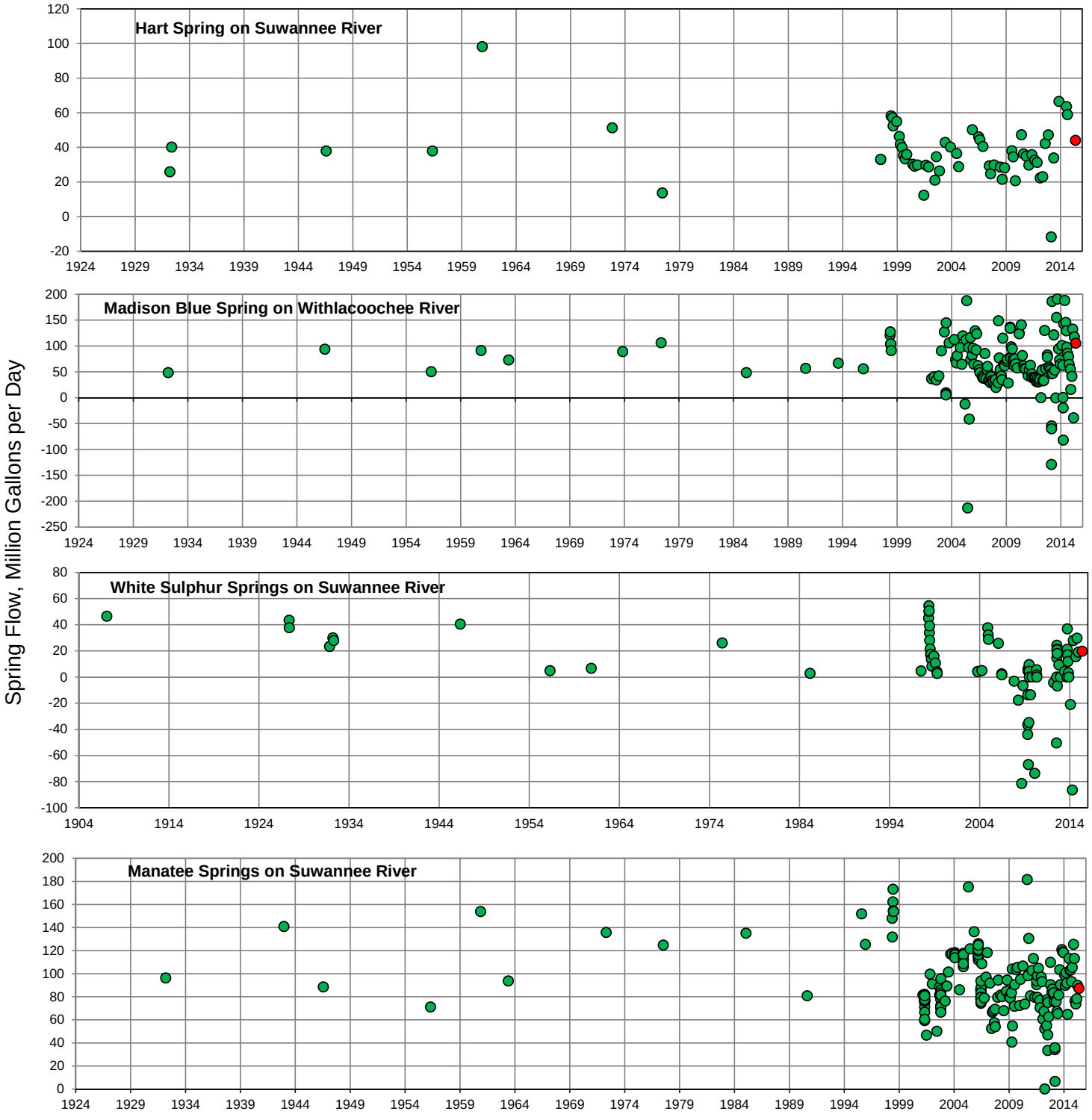


Figure 9: Monthly Springflow Measurements

The SRWMD monitors water quality at 38 springs. Flow is usually measured at the time of the sampling. The springs below were measured in May 2015 by SRWMD staff or by the USGS with the last measurement marked in red. Flow is given in MGD (million gallons per day--a million gallons would fill a football field about 3' deep). With the exception of the Ichetucknee River, Santa Fe Rise and the Alapaha Rise, springs in the SRWMD were measured infrequently prior to the late 1990's. Springs with long records were rarely measured more than once per decade; 'reverse' flow measurements have only been conducted during the past 10 years.

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 flow measurements recorded are the result of river flooding and not necessarily drought conditions.



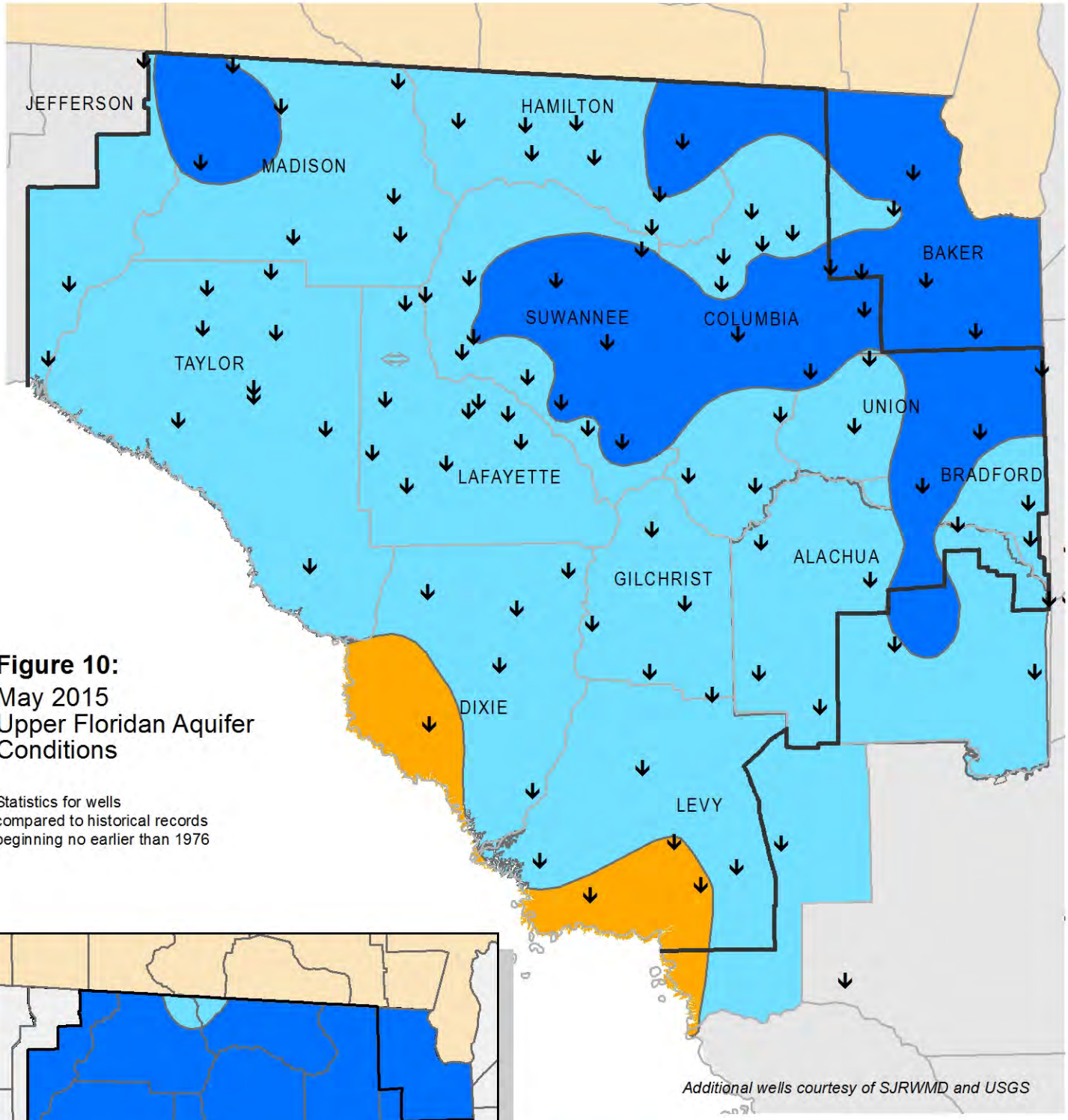
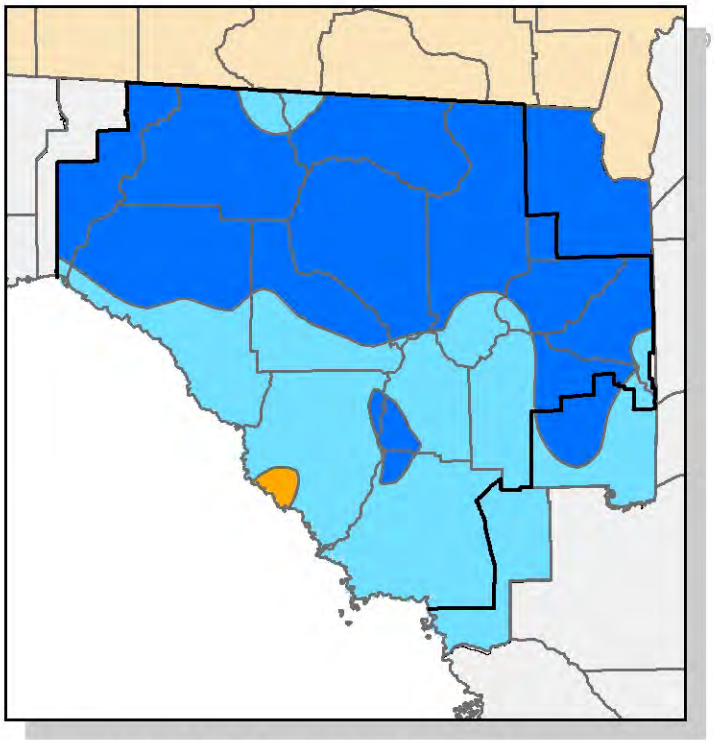


Figure 10:
May 2015
Upper Floridan Aquifer
Conditions

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



Inset: April 2015 Groundwater Levels

High
(Greater than 75th Percentile)

Normal
(25th to 75th Percentile)

Low
(10th to 25th Percentile)

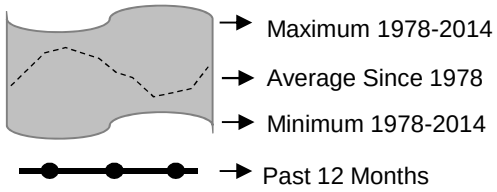
Extremely Low
(Less than 10th Percentile)

Increase/decrease in level since last month

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

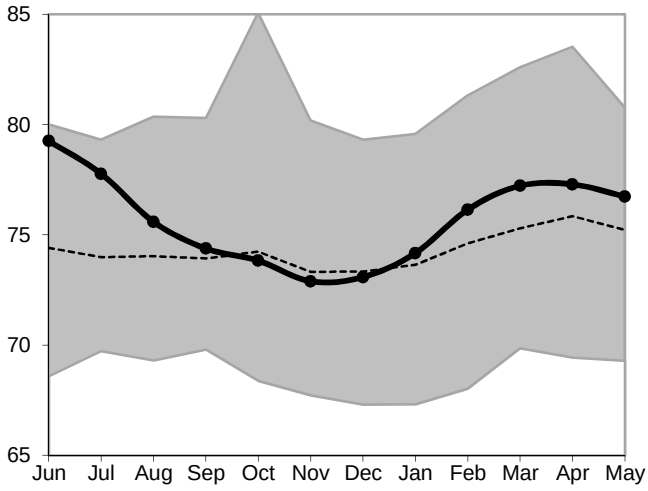
District Boundary

Figure 11: Monthly Groundwater Level Statistics
Levels June 1, 2014 through May 31, 2015
Period of Record Beginning 1978

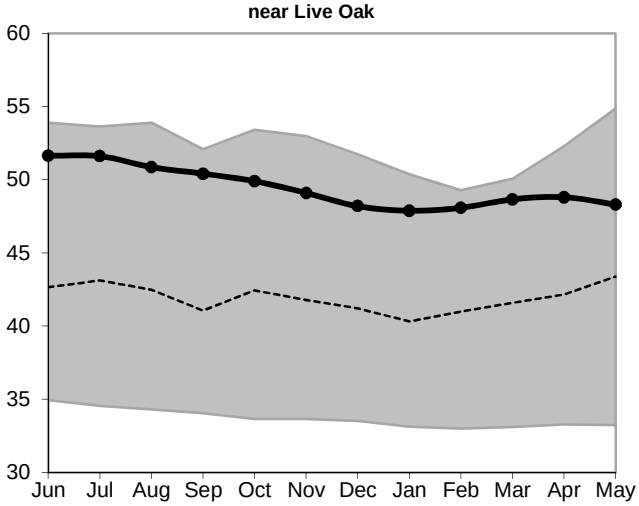


Upper Floridan Aquifer Elevation above NGVD 1929, Feet

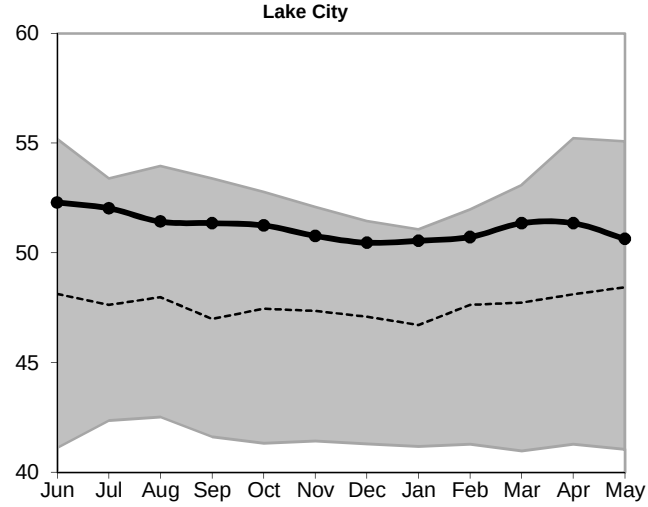
Madison County N010719001
near Greenville



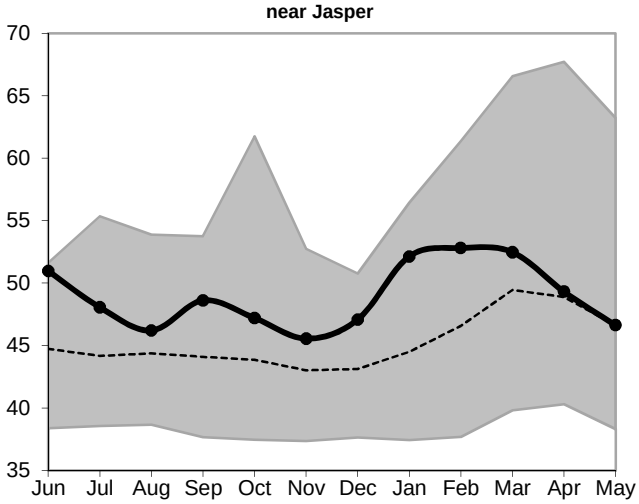
Suwannee County S021335001
near Live Oak



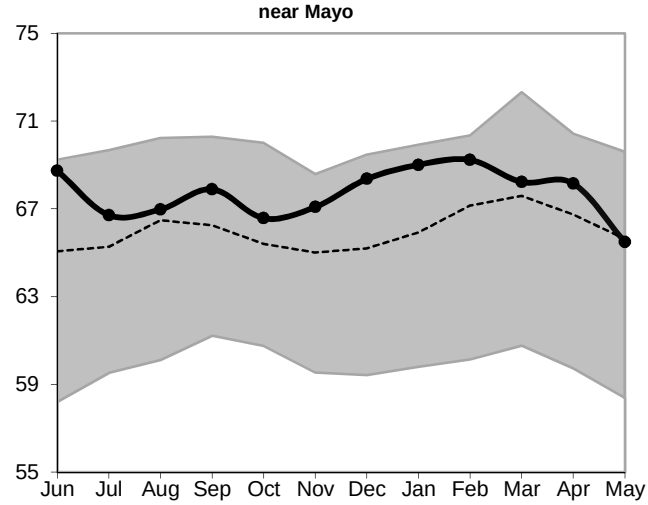
Columbia County S041705001
Lake City



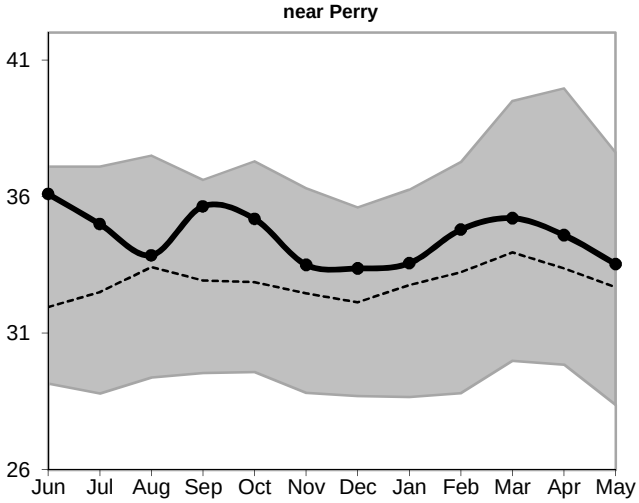
Hamilton County N011422007
near Jasper



Lafayette County S061114001
near Mayo



Taylor County S050701001
near Perry



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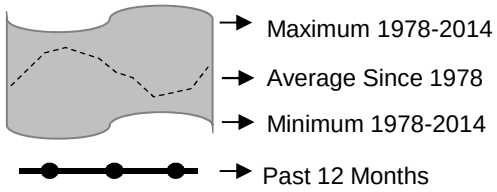
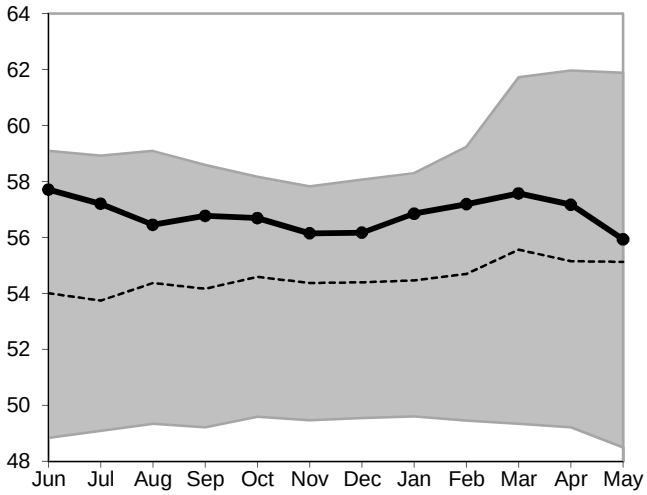
Period of Record Beginning 1978

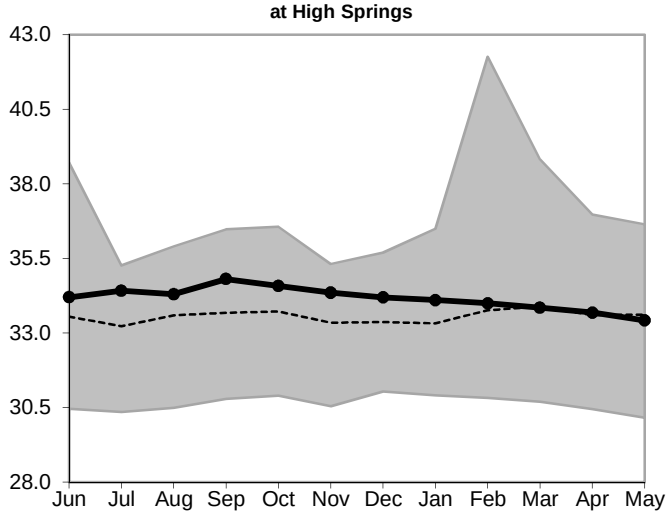


Upper Floridan Aquifer Elevation above NGVD 1929, Feet

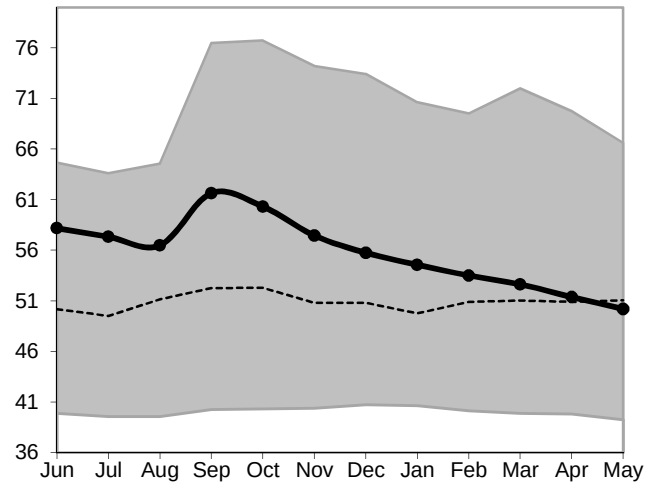
Union County S051933001
near Lake Butler



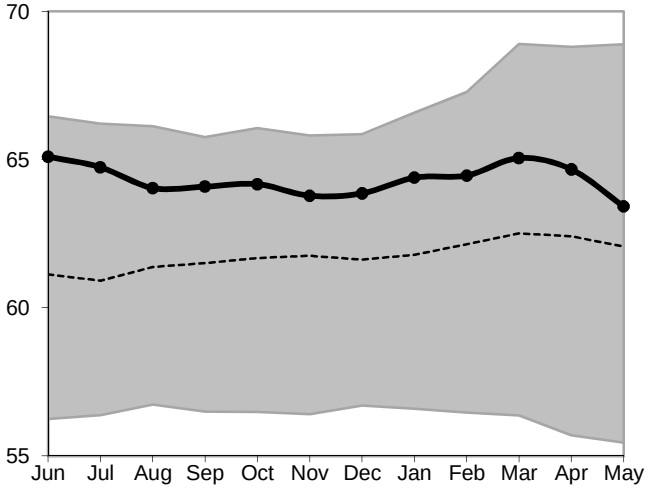
Alachua County S081703001
at High Springs



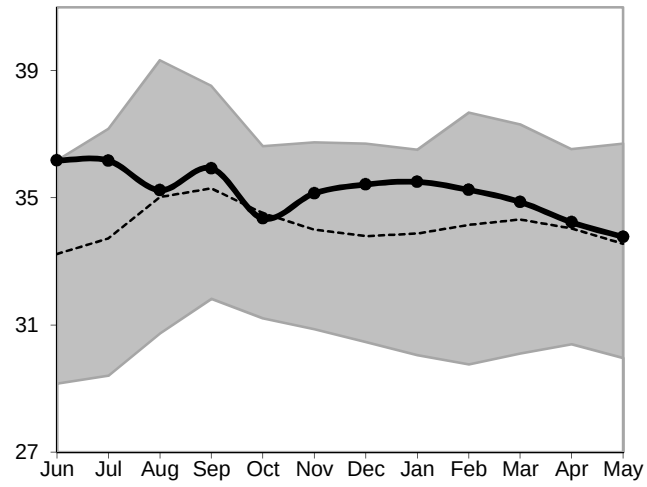
Gilchrist County S091607001
near Trenton



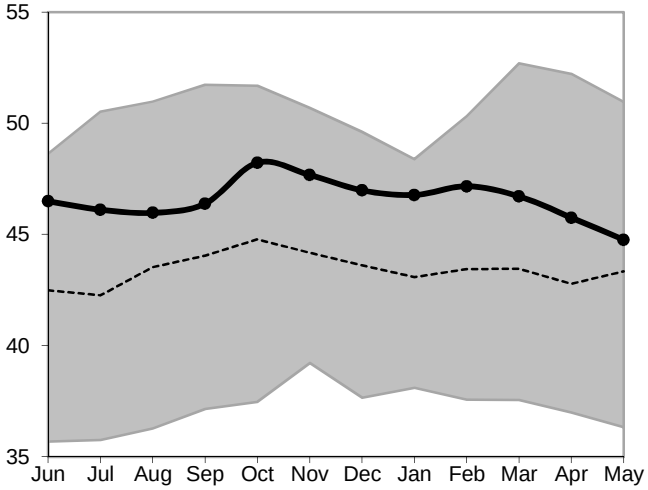
Bradford County S072132001
near Graham



Dixie County S101210001
at Cross City



Levy County S131736001
near Bronson



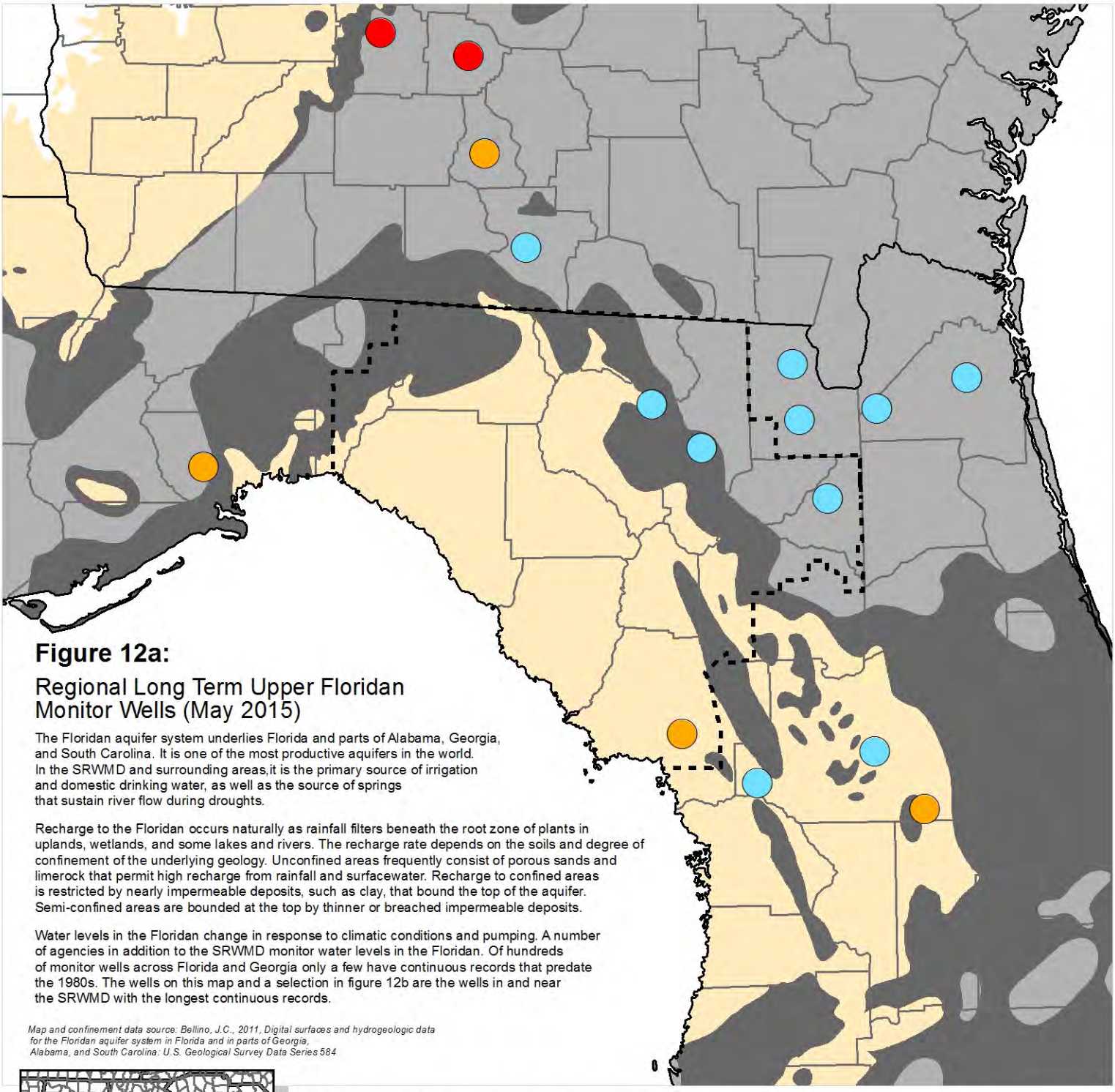


Figure 12a:

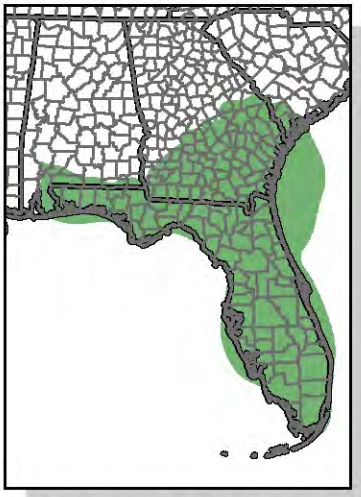
Regional Long Term Upper Floridan Monitor Wells (May 2015)

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 1980s. 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

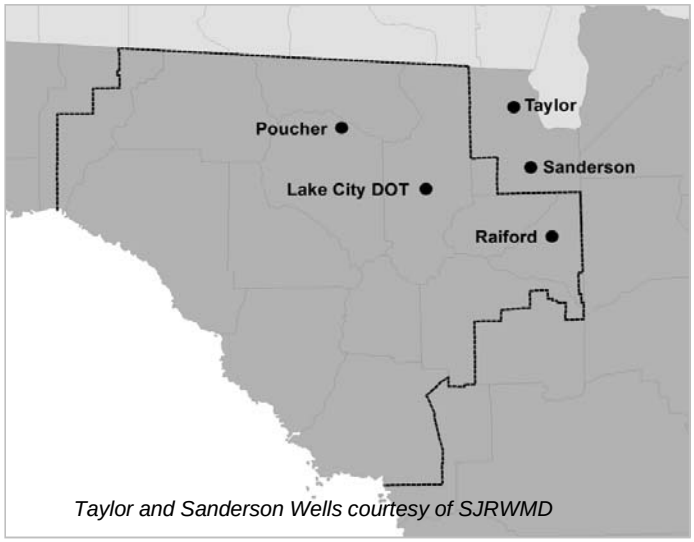
- Confined: Upper confining unit is generally greater than 100 feet thick and unbreached. Recharge is low.
- Semi-confined: Upper confining unit is generally less than 100 feet thick, breached, or both. Recharge is moderate.
- Unconfined: Upper confining unit is absent or very thin. Recharge is high.

Percentile of Most Recent Water Level Relative to Entire Record

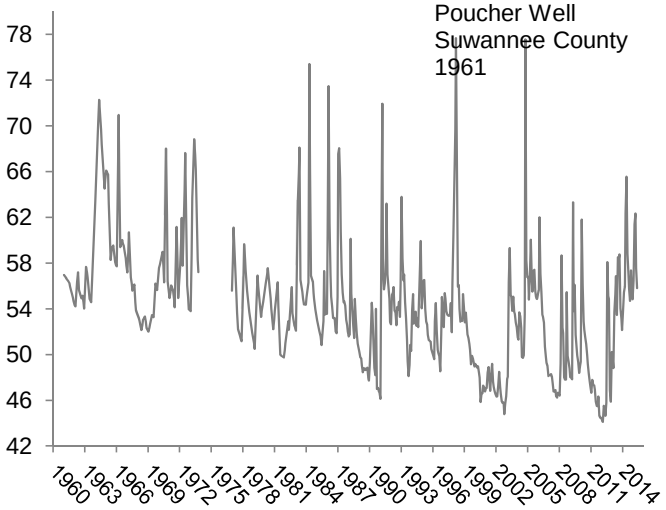
- High (Greater than 75th Percentile)
- Normal (25th to 75th Percentile)
- Low (10th to 25th Percentile)
- Extremely Low (Less than 10th Percentile)
- Not Available
- SRWMD Boundary

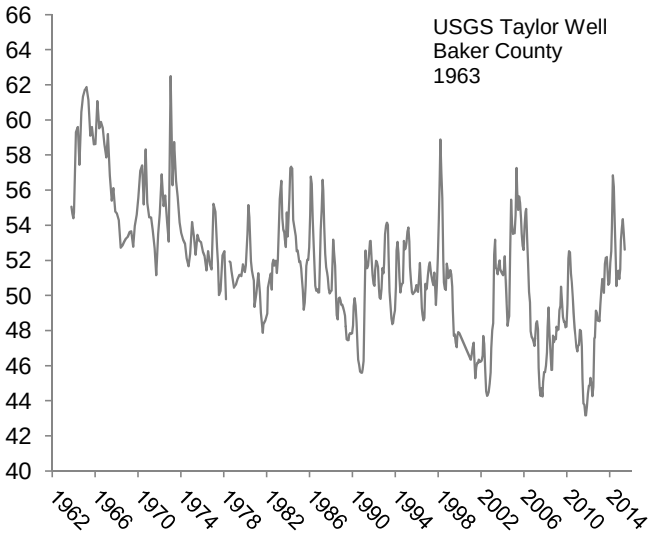
Figure 12b: Regional Long Term Upper Floridan Levels

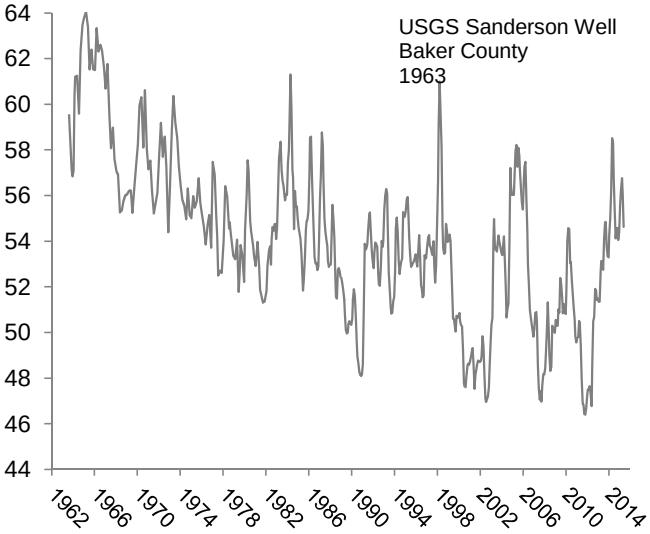
May 2015

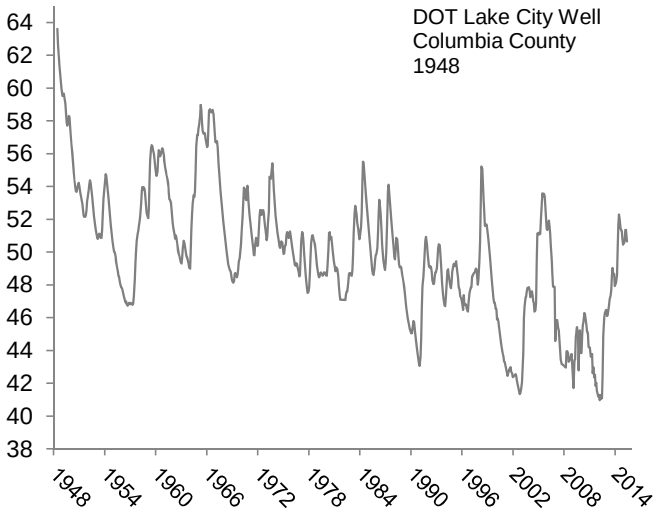


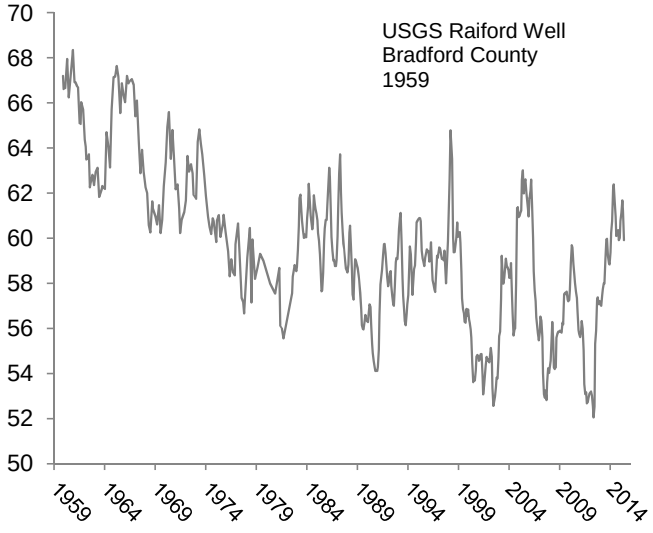
Taylor and Sanderson Wells courtesy of SJRWMD











Upper Floridan Aquifer Elevation above NGVD 1929, Feet