MEMORANDUM

TO: Governing Board

FROM: Tom Mirti, Bureau Chief, Hydrologic Data Services

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

DATE: January 9, 2015

RE: December 2014 Hydrologic Conditions Report for the District

RAINFALL

- District-wide rainfall in December was 3.29", slightly above the long-term December average based on records beginning in 1932. Accumulations were primarily the result of a single rainfall event, the pre-Christmas cold front on the 23rd and 24th. Prior to that event, most gages were without appreciable rain during the first three weeks of the month. Northern counties in the District ended the month with above-average rainfall amounts, while southern counties tended to be below average (Table 1, Figure 1). The highest totals this month again fell in Jefferson and Madison counties (Figure 2) where rainfall had been much below normal since June. Watersheds in Georgia that contribute to the Suwannee River again experienced 200-300% of normal rainfall (Figure 3).
- The highest gaged monthly total (7.19") was recorded at the Sneads Smokehouse Lake rainfall gage in northern Jefferson County, and the highest daily total (1.16") near Sanderson in southern Baker County. The lowest gaged monthly total was 1.51" at Forest Grove near High Springs.
- The total rainfall average across the District for Calendar Year 2014 was 61.7", about 12 percent higher than the long-term average of 54.63". Twelve-month rainfall departures improved significantly in the Aucilla River basin while most other District basins maintained a surplus. Bradford County is the largest area showing deficit annual rainfall (Figure 4).
- Average District rainfall for the 3 months ending December 31 was virtually identical to the long-term average of 8.3" (Figure 5).

SURFACEWATER

- **Rivers:** After the late November increases, river levels across the District fell steadily during the first three weeks of the month, but then rebounded with the onset of the Christmas week rains, particularly in Georgia and the northern portion of the District. Many gages approached or surpassed minor flood stages; Alapaha and Withlacoochee gages in Georgia all ended the month above the 90th percentile, considered high, and the Withlacoochee River near Pinetta crested just above flood stage on the 31st. Storm totals this month were again lower in the Santa Fe Basin, but sufficient to bring the lower Santa Fe gages to near flood stage by the end of the month. The Aucilla River rose to one foot above flood stage, but other coastal basin rivers remained typical of the season. Flow statistics for a number of rivers are presented graphically in Figure 6, and conditions relative to historic conditions in Figure 7.
- **Lakes**: Most lake levels rose slightly by the end of the month, with the exception of Alligator Lake in Lake City. Sneads Smokehouse Lake recovered from near record low levels to a slightly above average level following the higher amounts of rainfall received in Jefferson County as well as stream inflows from Georgia. Figure 8 shows levels

relative to the long-term average, minimum, and maximum levels for a number of monitored lakes.

- **Springs**: Twenty-four springs or spring groups were measured by the United States Geological Survey, District staff, and District contractors in December. Flows generally remained stable with most above their long-term median. Flow records for a number of springs are shown in Figure 9.

GROUNDWATER

Levels in upper Floridan aquifer monitor wells on average ended the month at the 69th percentile, the same overall level at which the month began. Overall, roughly half of the wells showed an increase, with those wells predominantly in the north and west of the District (Figure 10). Ninety percent of the wells had levels above their respective median levels, while 35 percent remained above the 75th percentile, considered high. No wells in the District were below the 25th percentile. 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 January 3 indicated continued near-normal conditions in north Florida and south Georgia.
- The National Weather Service Climate Prediction Center (CPC) three-month outlook showed a higher potential for above-average precipitation through March. The El Niño watch issued by the CPC in March remained in effect. Their January 2 report gave a 50-60% chance that El Niño conditions would be present during the winter and last into spring. An decrease in equatorial Pacific sea surface temperature anomalies during December reduced the potential for such conditions, but atmospheric anomalies associated with El Niño may yet develop. The model consensus is for a weak event if El Niño fully emerges. 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.
- The U.S. Drought Monitor report of January 6 showed normal conditions across the District and in the contributing drainage areas of southeast 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 once per week during Eastern Standard Time (between November 2, 2014 and March 8, 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	December 2014	December Average	Month % of Normal	Last 12 Months	Annual % of Normal
Alachua	2.42	2.77	87%	59.35	116%
Baker	3.42	2.77	123%	60.87	122%
Bradford	2.18	2.95	74%	52.93	104%
Columbia	3.16	3.08	103%	64.96	126%
Dixie	2.75	3.17	87%	60.03	102%
Gilchrist	2.63	3.07	86%	63.24	110%
Hamilton	4.13	2.98	139%	63.72	122%
Jefferson	6.00	4.25	141%	58.63	97%
Lafayette	3.30	3.33	99%	66.75	118%
Levy	2.28	3.18	72%	60.68	102%
Madison	4.60	3.79	121%	58.24	104%
Suwannee	3.51	2.79	126%	66.29	125%
Taylor	3.12	3.39	92%	64.07	108%
Union	3.23	2.86	113%	60.48	112%

December 2014 Average:	3.29
December Average (1932-2013):	3.13
Historical 12-month Average (1932-2013):	54.63
Past 12-Month Total:	61.71
12-Month Rainfall Surplus:	7.08

Figure 1: Comparison of District Monthly Rainfall

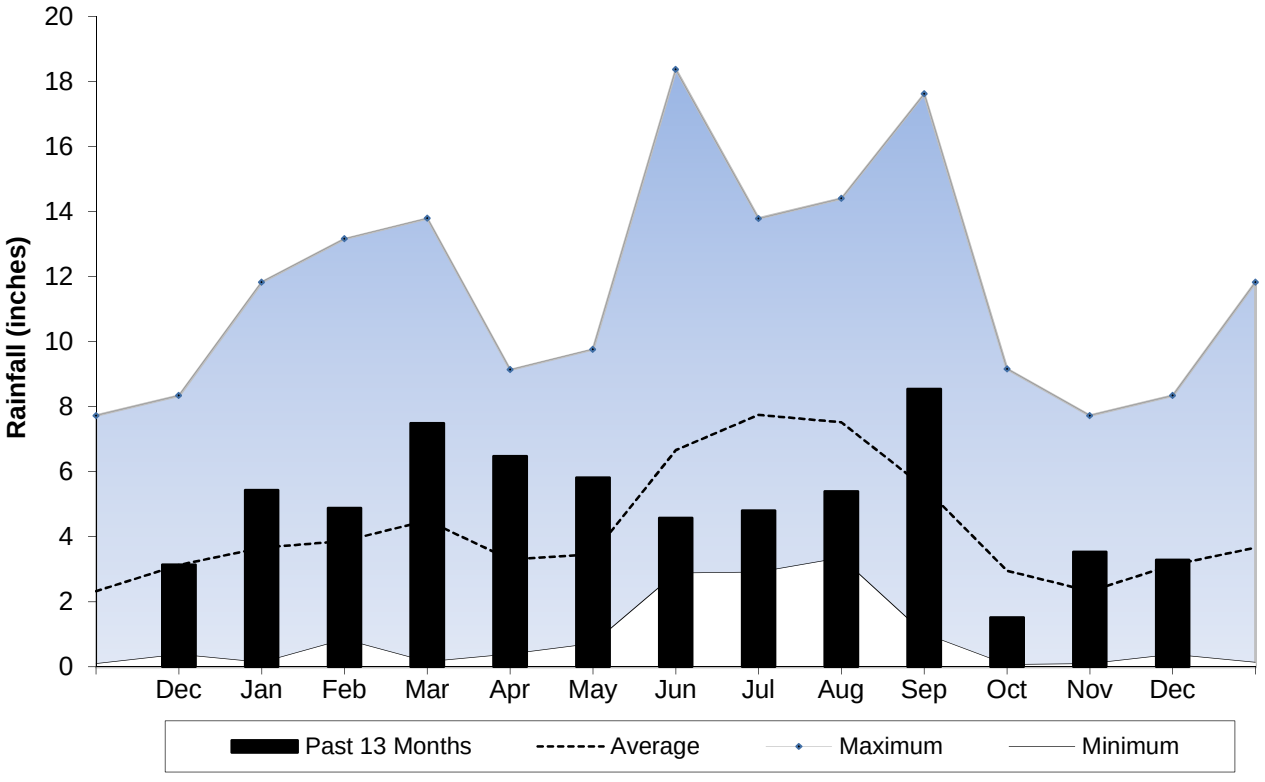


Figure 2: December 2014 Rainfall Estimate

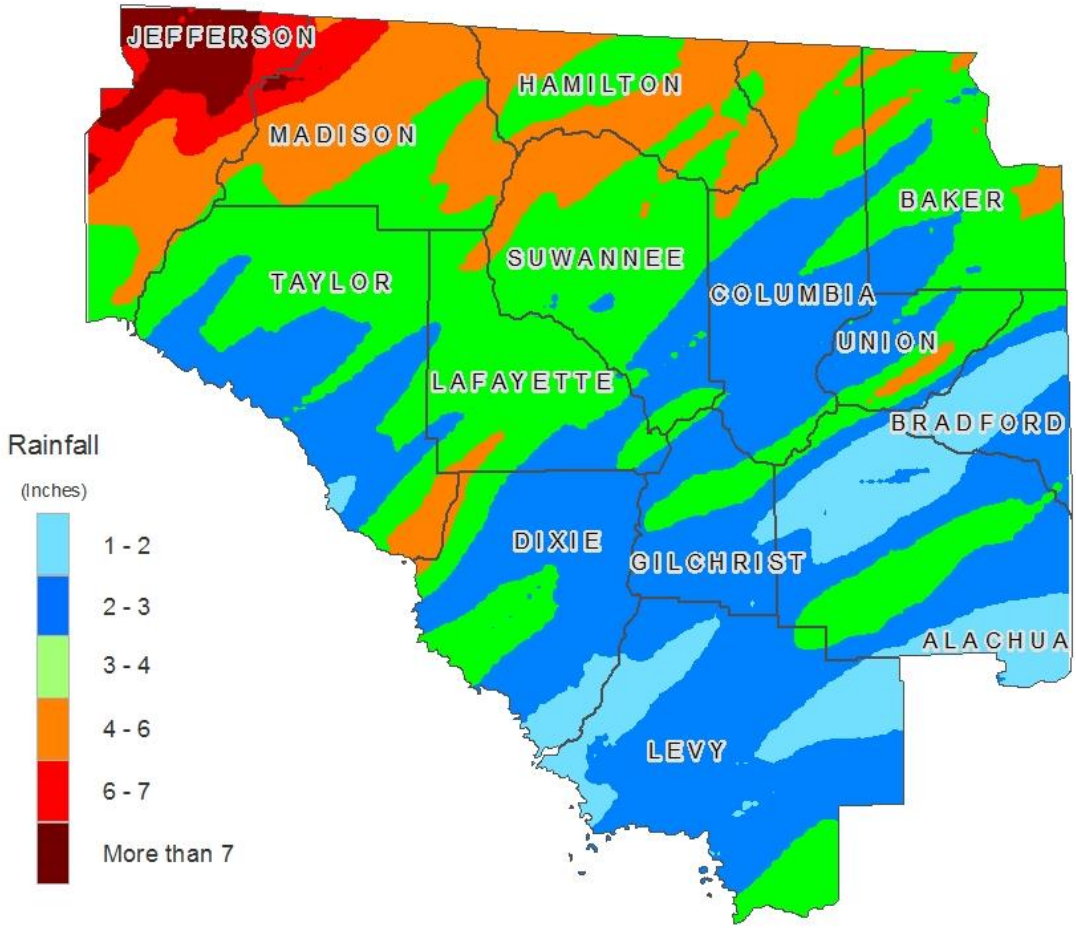


Figure 3: December 2014 Percent of Normal Rainfall

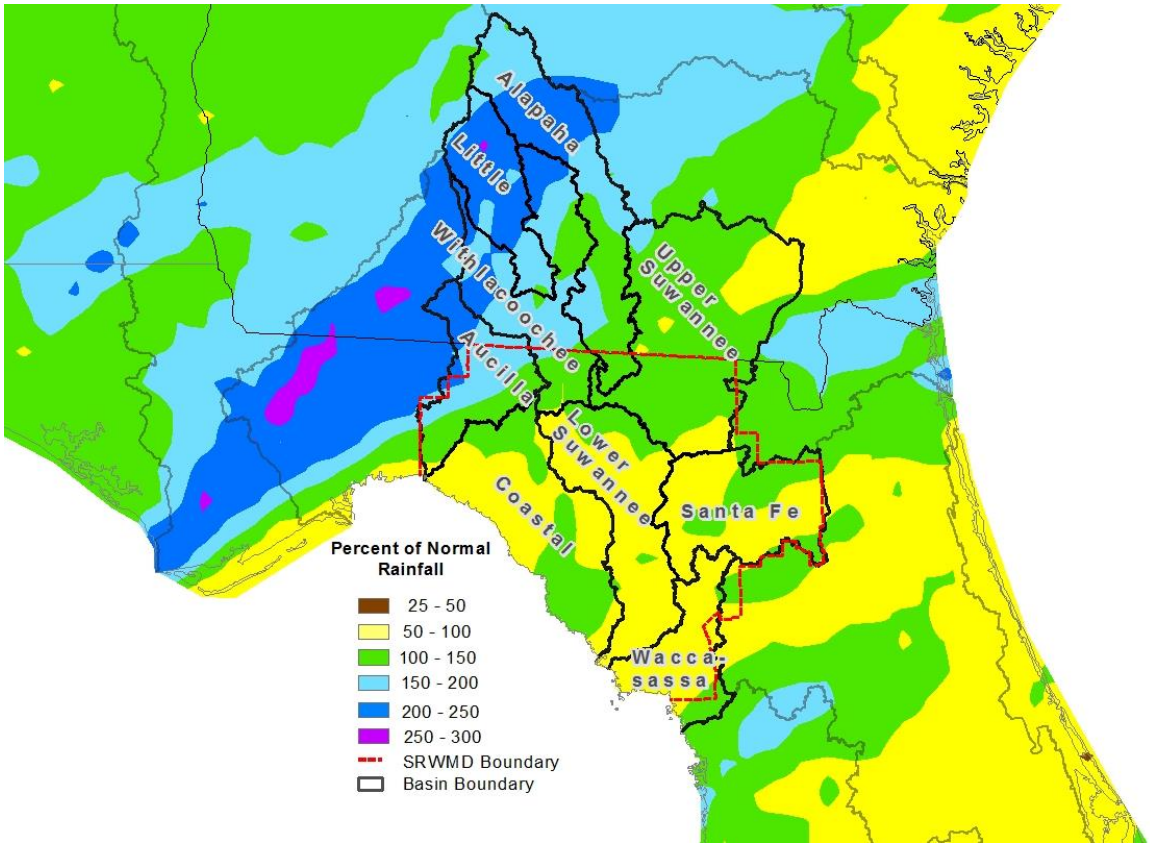


Figure 4: 12-Month Rainfall Surplus/Deficit by River Basin
Through December 31, 2014

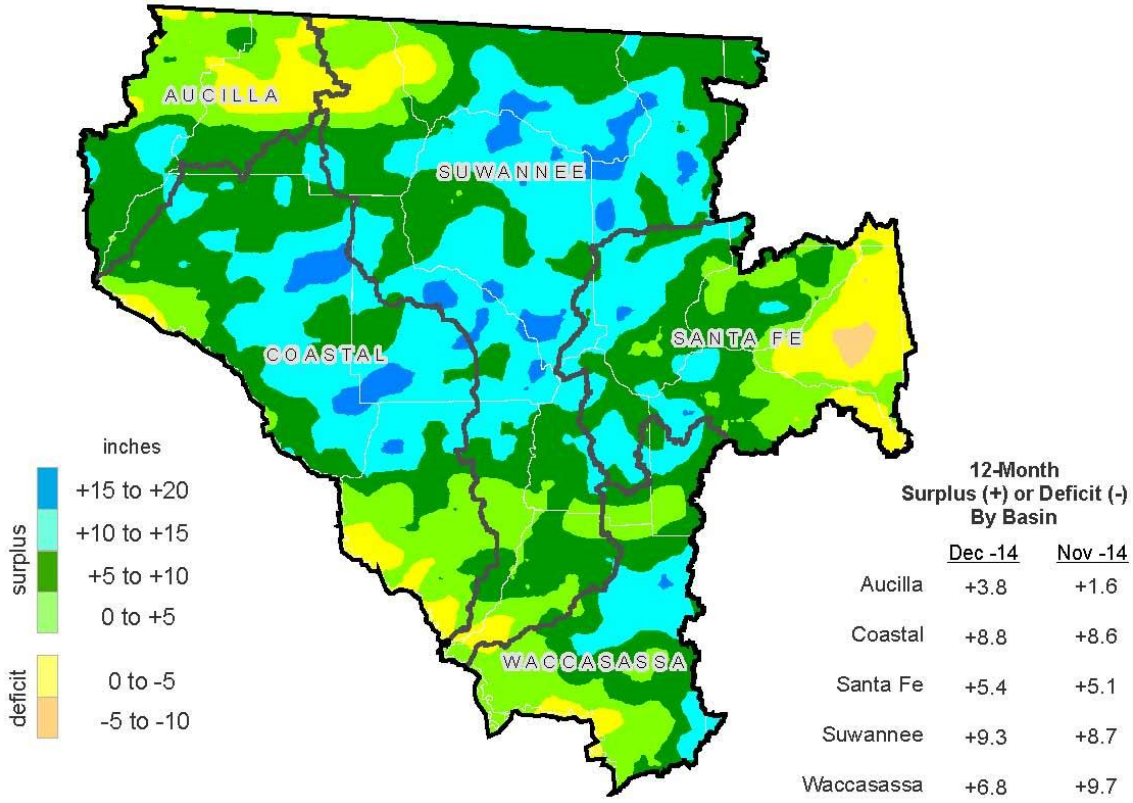


Figure 5: 3-Month Rainfall Surplus/Deficit by River Basin
Through December 30, 2014

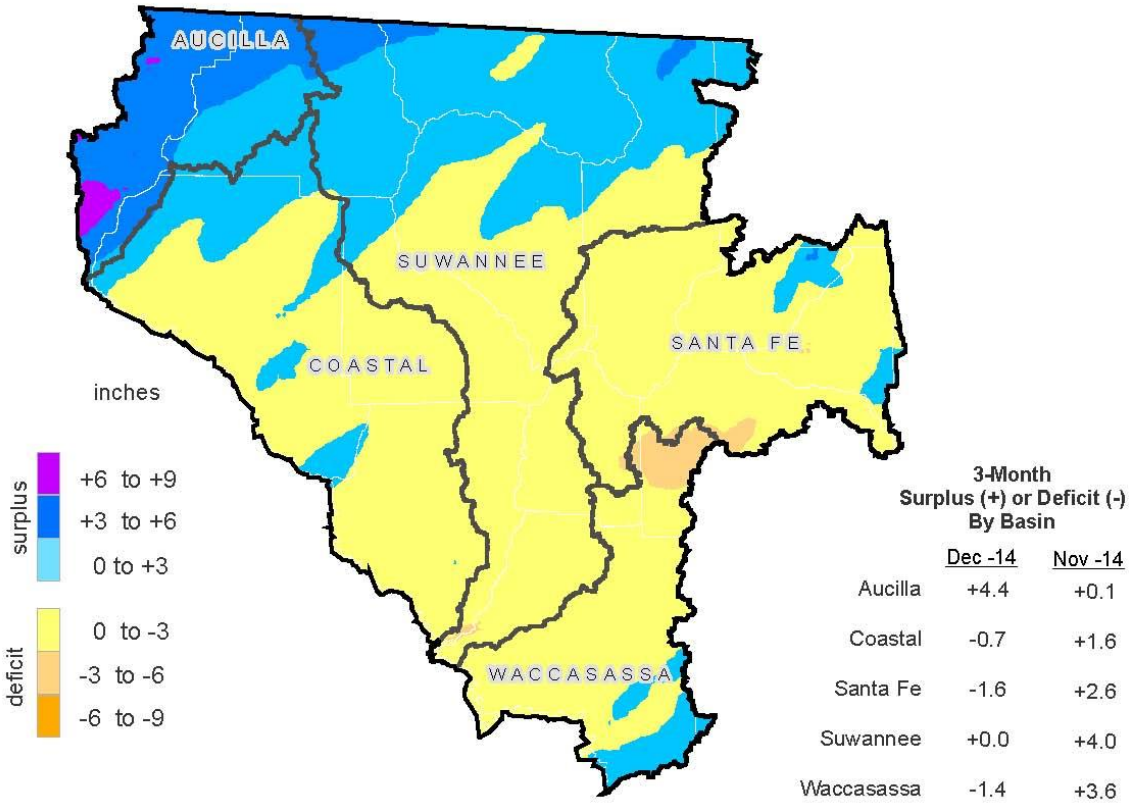
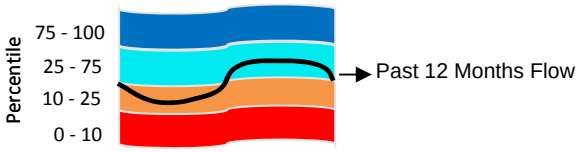
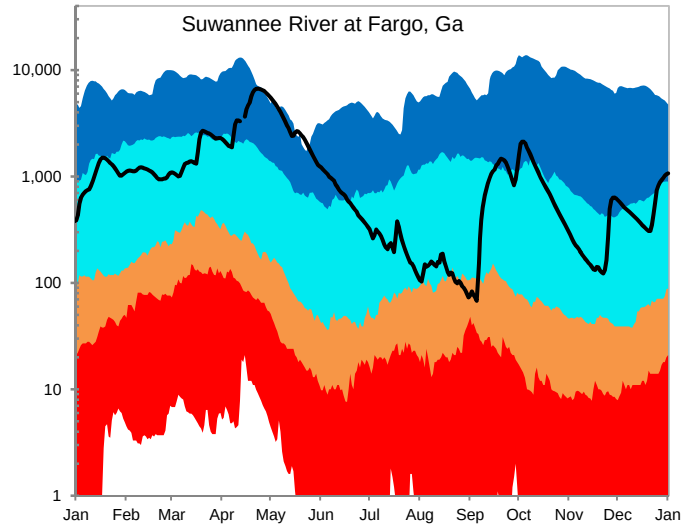
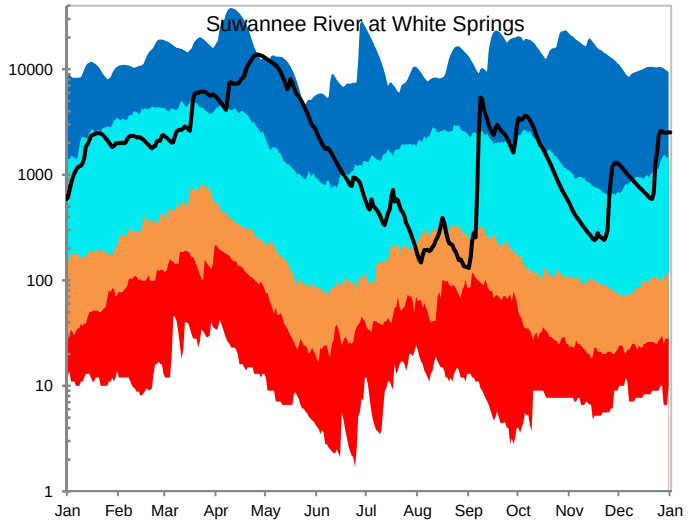


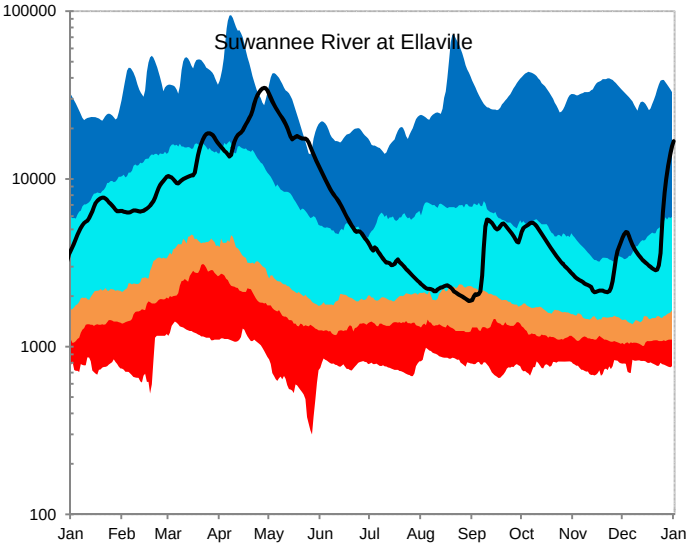
Figure 6: Daily River Flow Statistics
January 1, 2014 through December 31, 2014

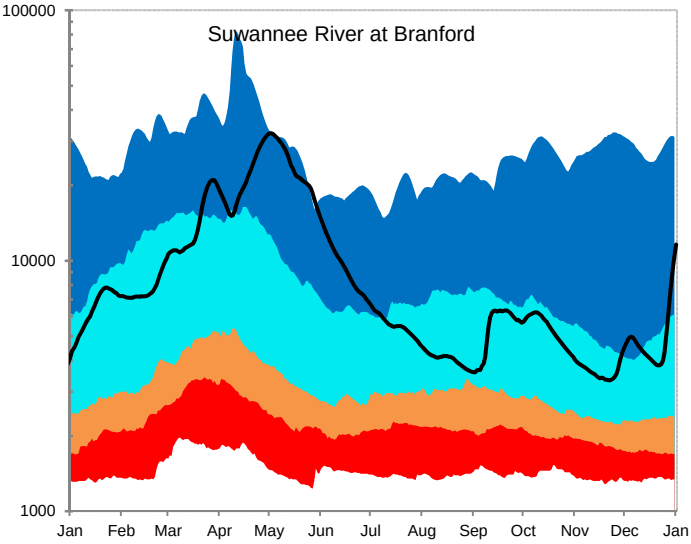


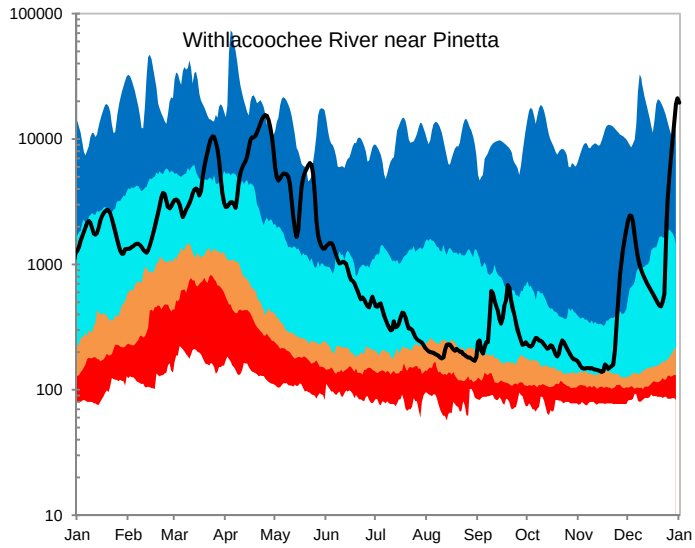
RIVER FLOW, CUBIC FEET PER SECOND











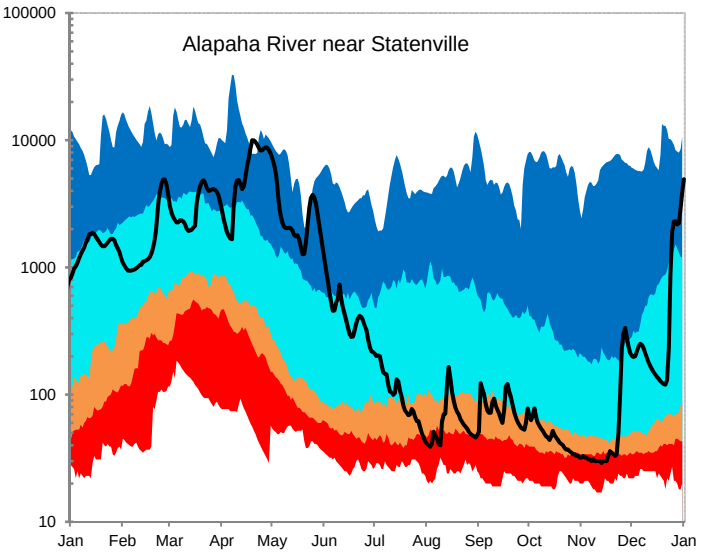
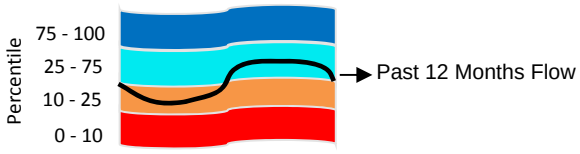
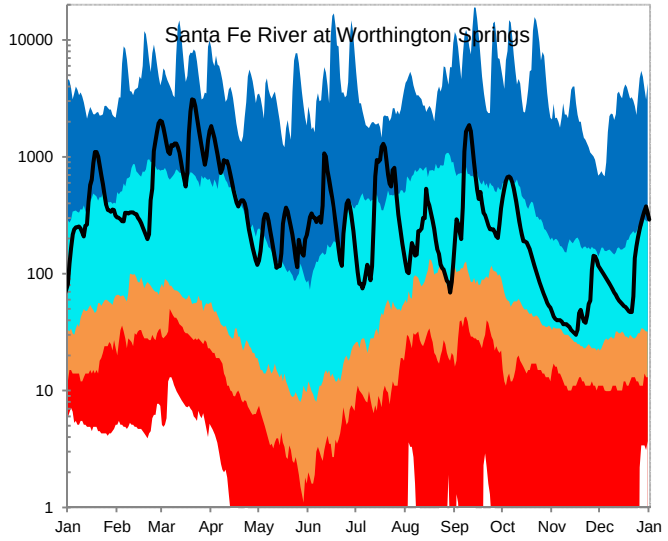
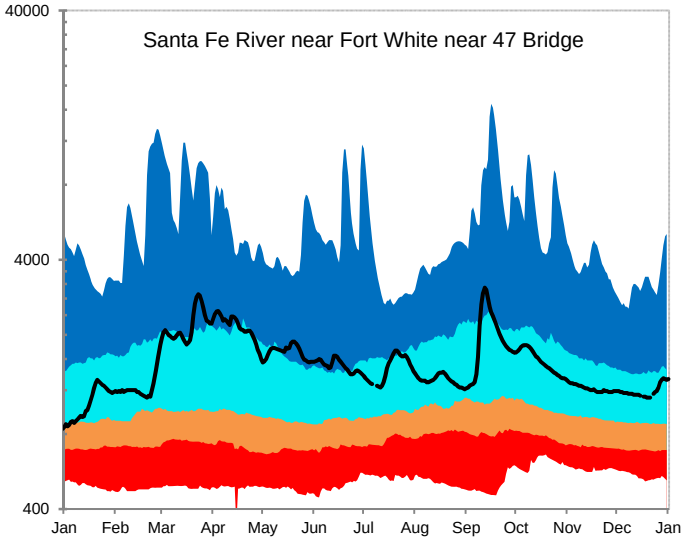


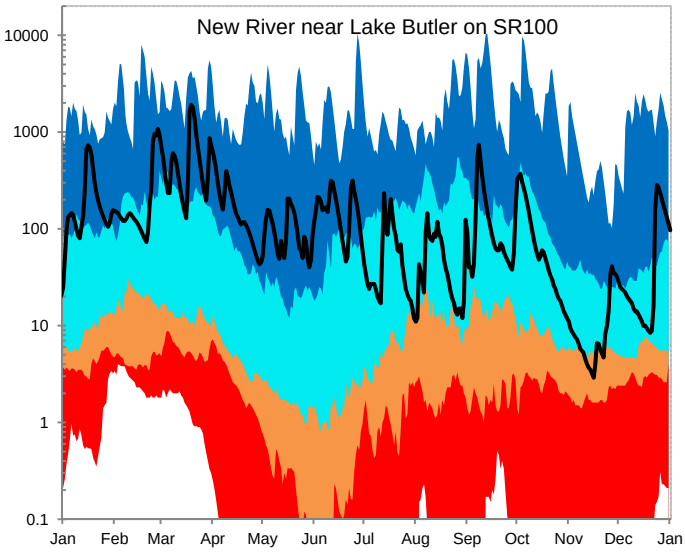
Figure 6, cont: Daily River Flow Statistics
January 1, 2014 through December 31, 2014

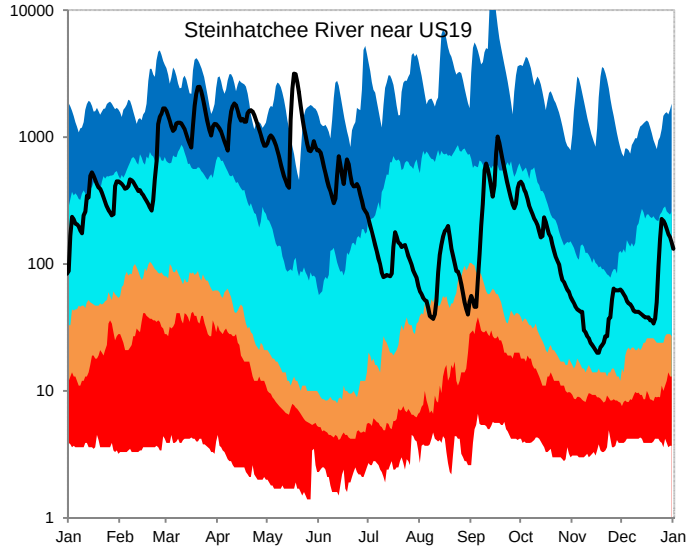


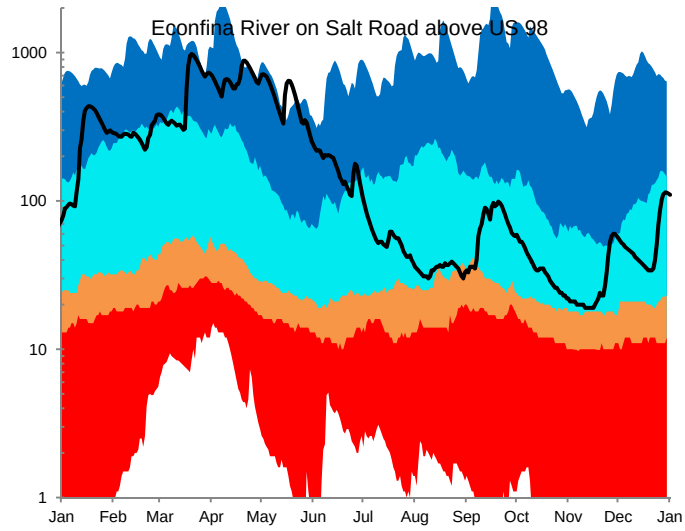
RIVER FLOW, CUBIC FEET PER SECOND

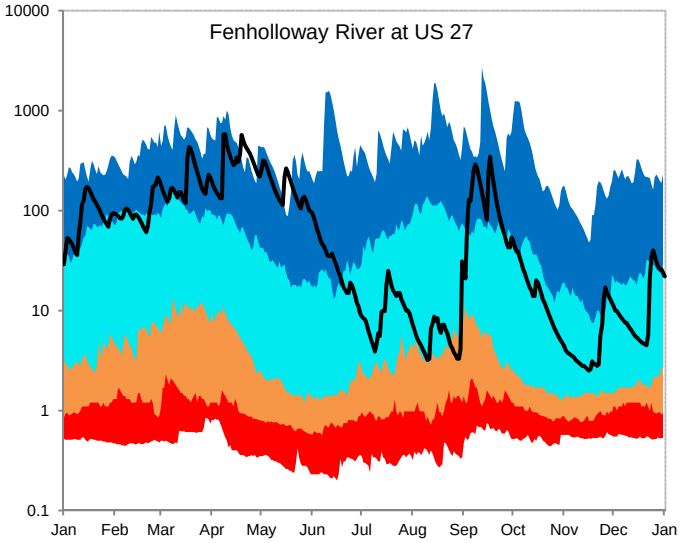












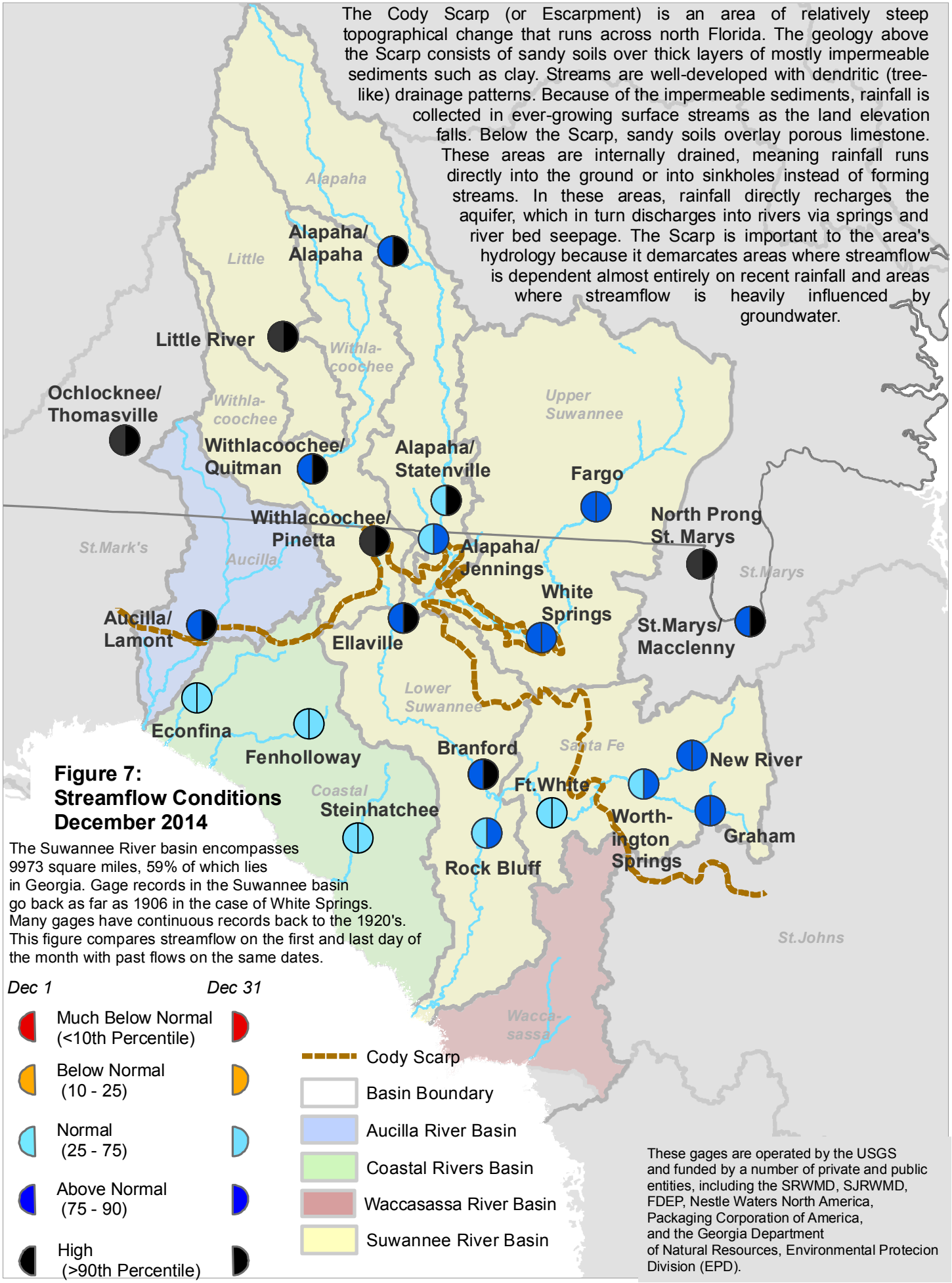
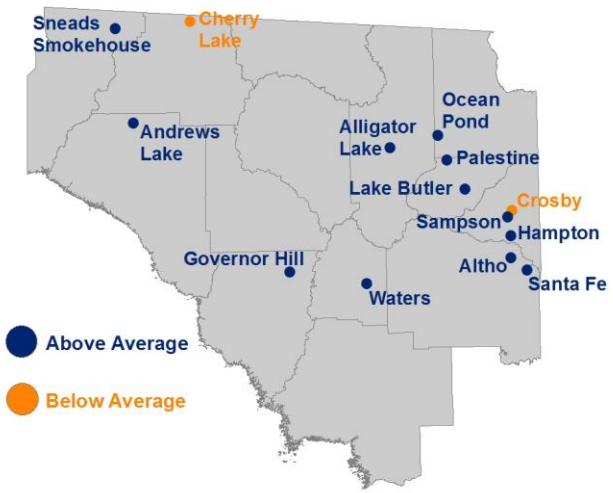

The Cody Scarp (or Escarpment) is an area of relatively steep topographical change that runs across north Florida. The geology above the Scarp consists of sandy soils over thick layers of mostly impermeable sediments such as clay. Streams are well-developed with dendritic (tree-like) drainage patterns. 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
Withlacoochee/ Pinetta
Alapaha/ Jennings
North Prong St. Marys
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
Wacca-sassa
Figure 7: Streamflow Conditions December 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.
Dec 1
Dec 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: December 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.

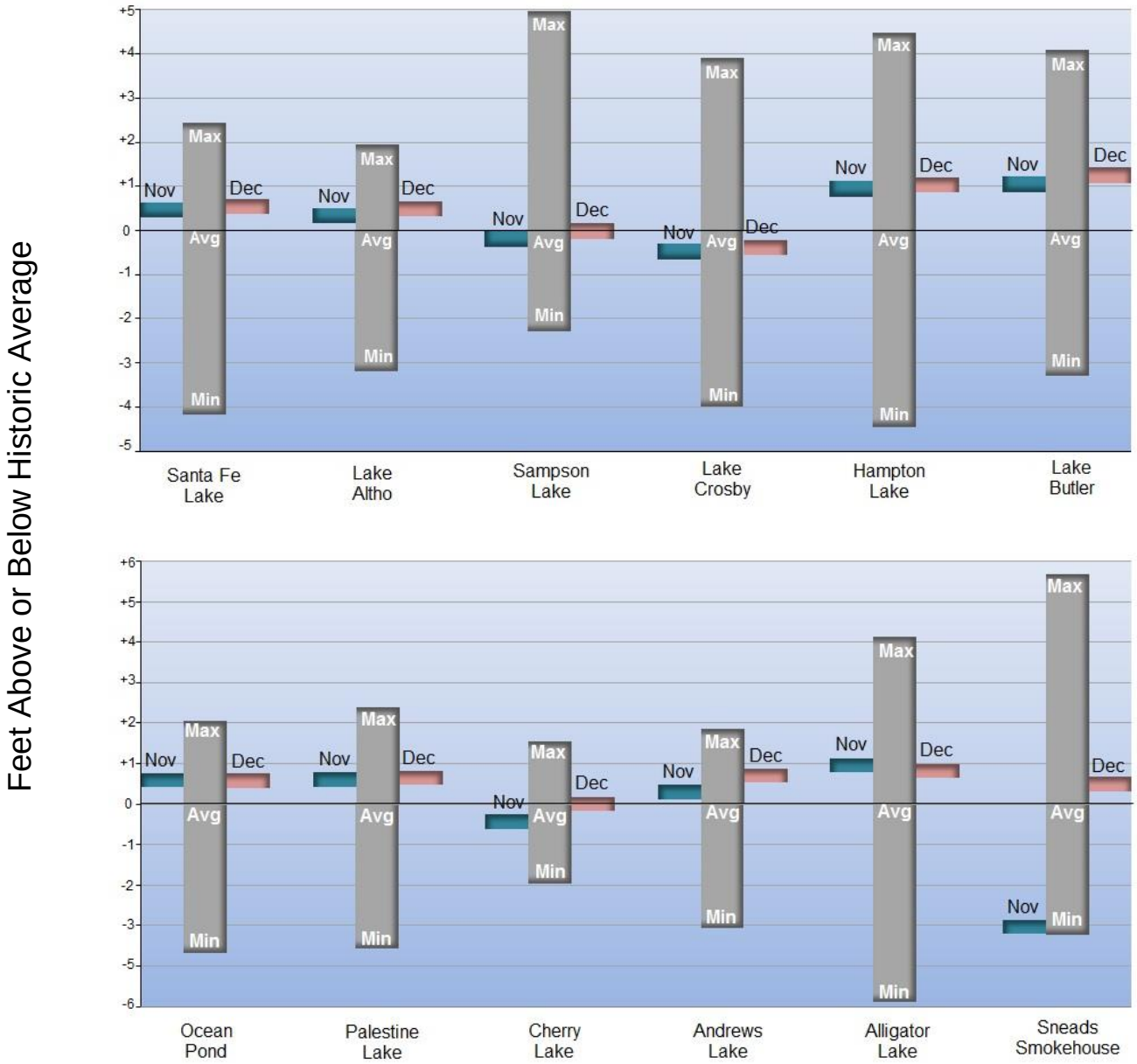
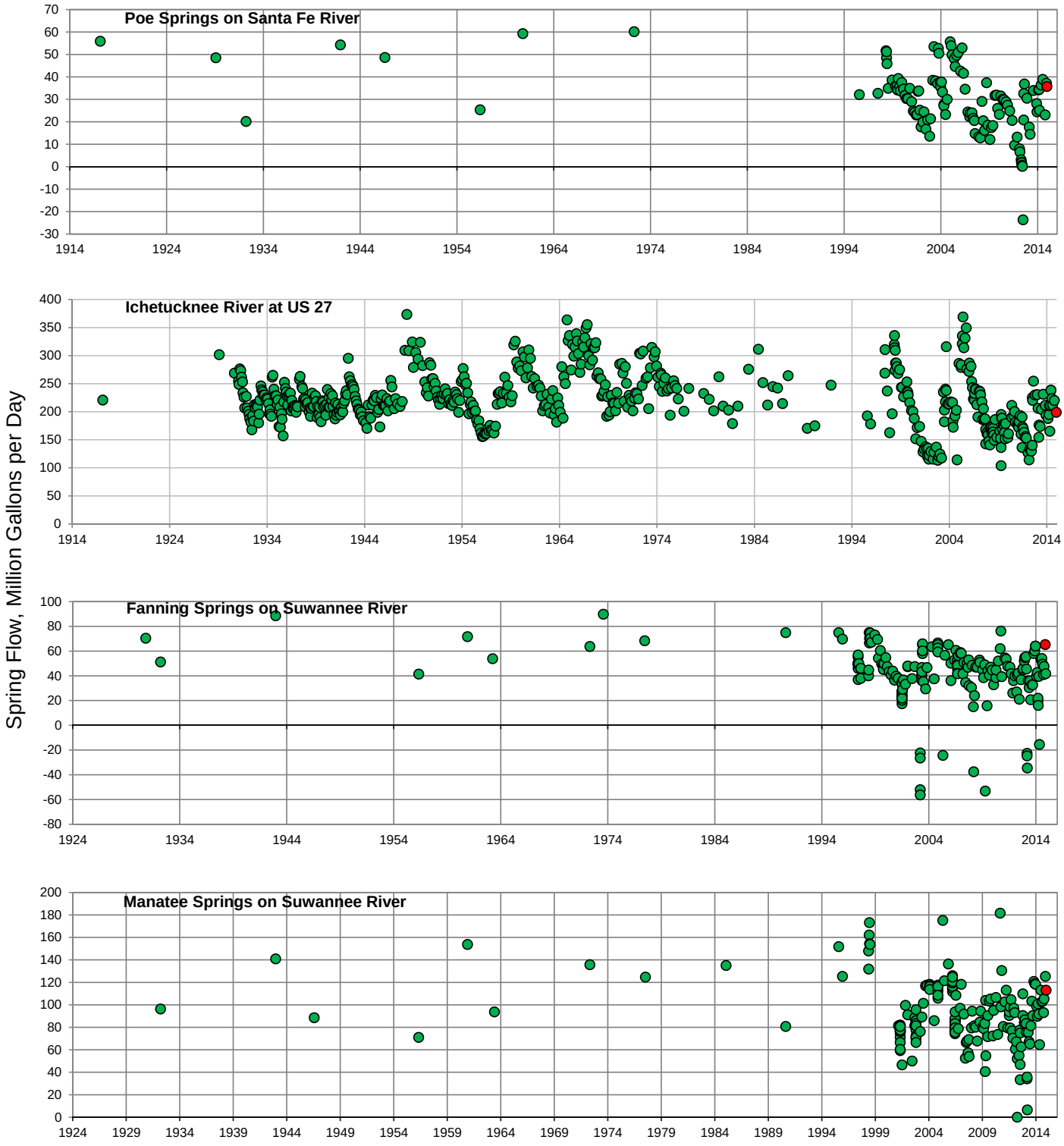


Figure 9: Quarterly Springflow Measurements

The SRWMD monitors water quality at 38 springs. Flow is usually measured at the time of the sampling. The springs below were measured in December 2014 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 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.

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



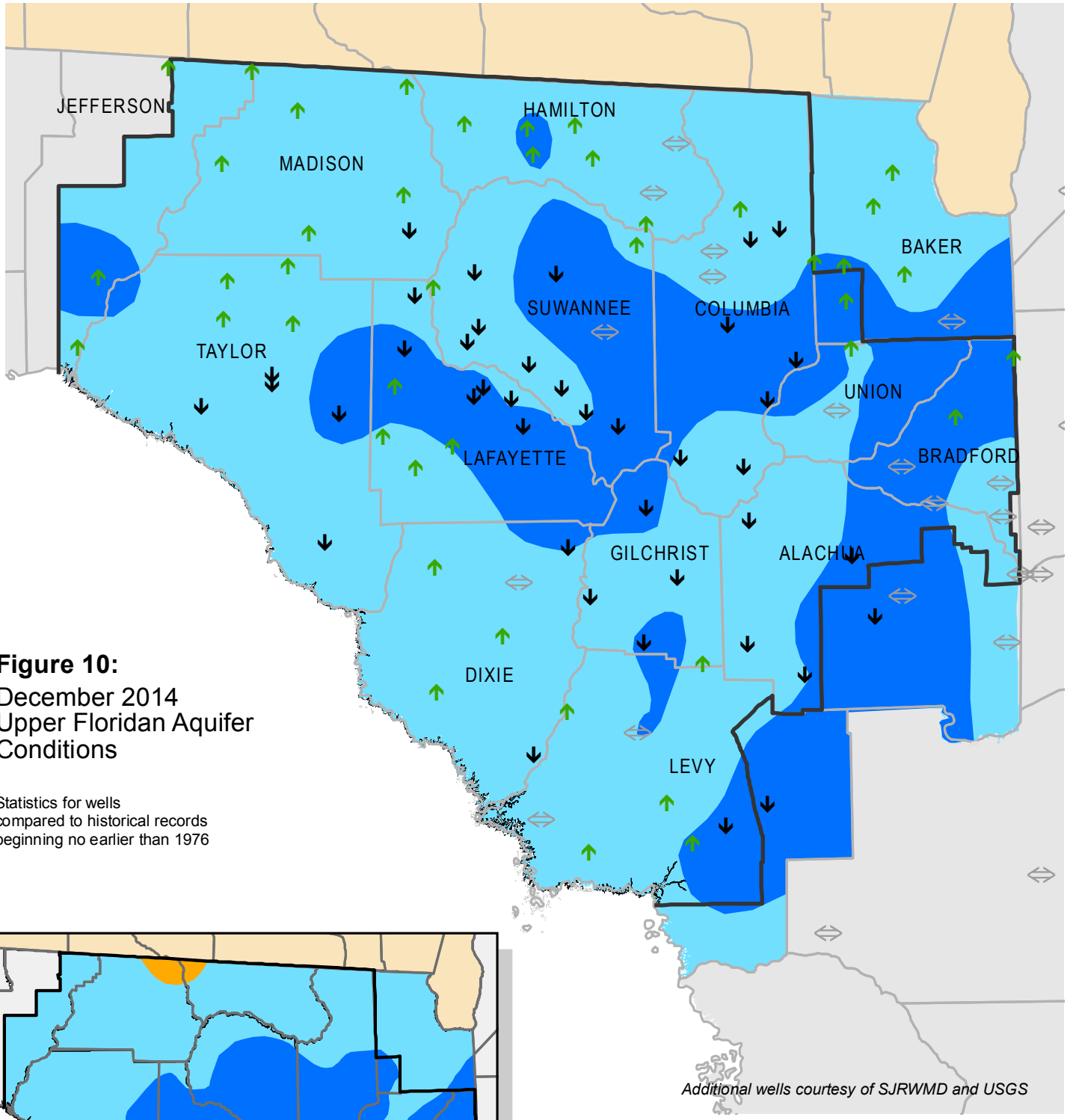
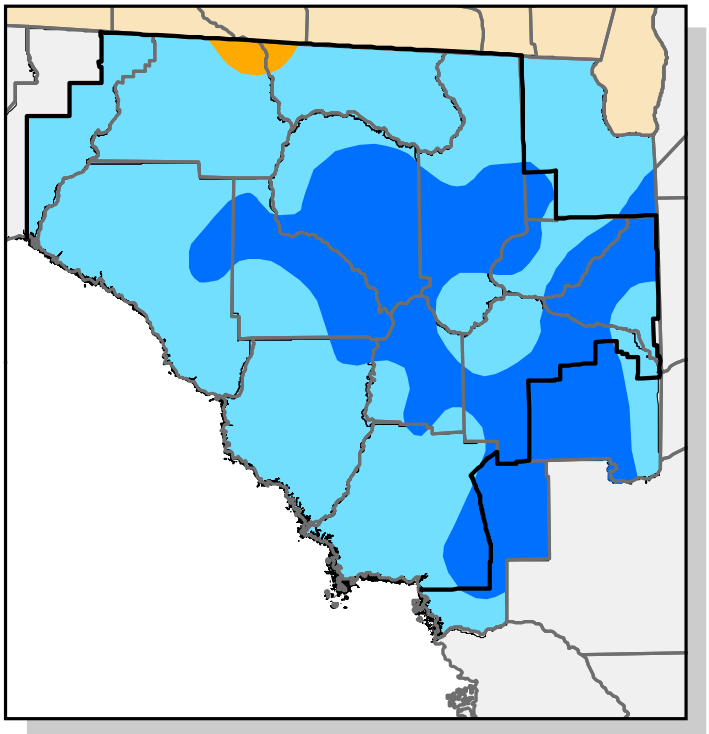


Figure 10:
December 2014
Upper Floridan Aquifer
Conditions

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

Additional wells courtesy of SJRWMD and USGS



Inset: November 2014 Groundwater Levels

High
(Greater than 75th Percentile)

Normal
(25th to 75th Percentile)

Low
(10th to 25th Percentile)

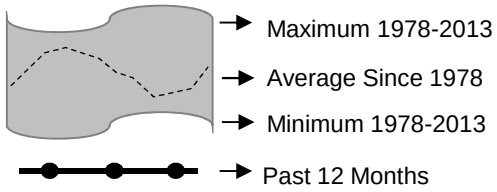
Extremely Low
(Less than 10th Percentile)

Increase/decrease in level since last month

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

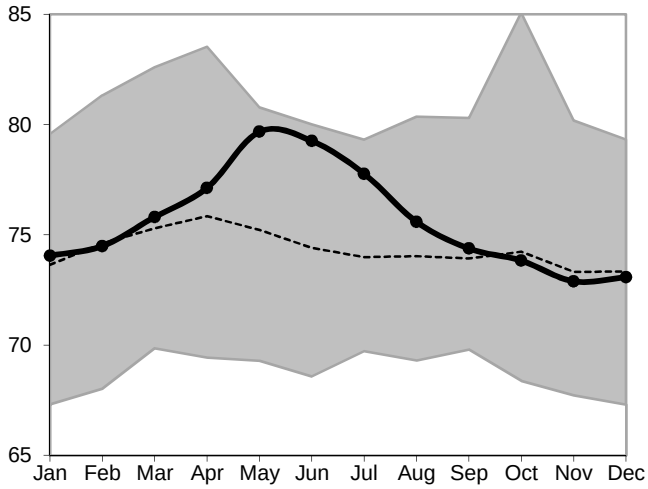
District Boundary

Figure 11: Monthly Groundwater Level Statistics
Levels January 1, 2014 through December 31, 2014
Period of Record Beginning 1978

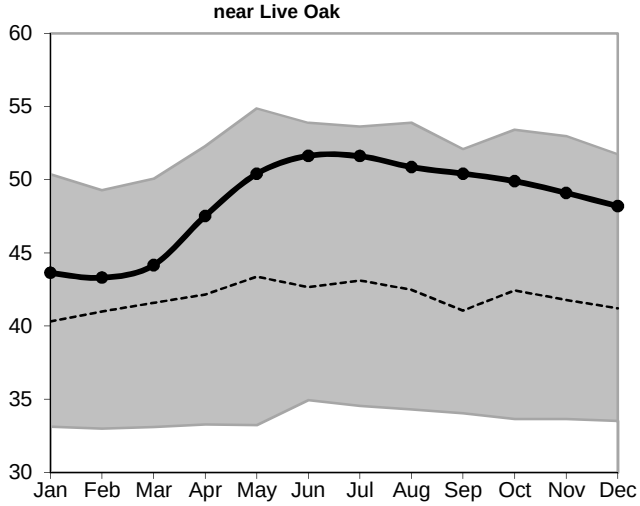


Upper Floridan Aquifer Elevation above NGVD 1929, Feet

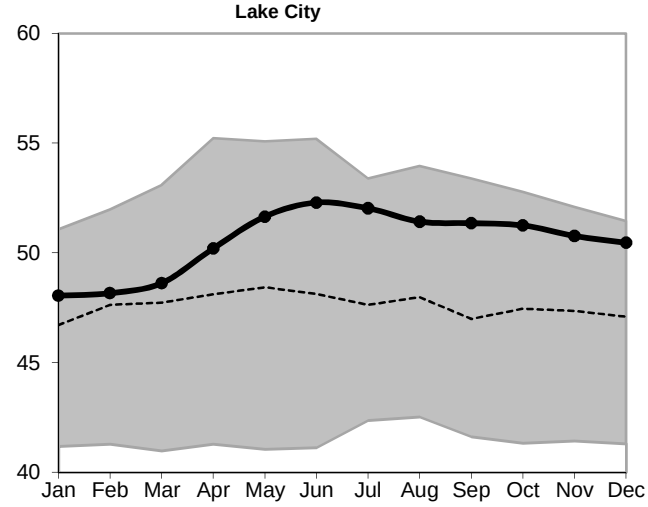
Madison County N010719001
near Greenville



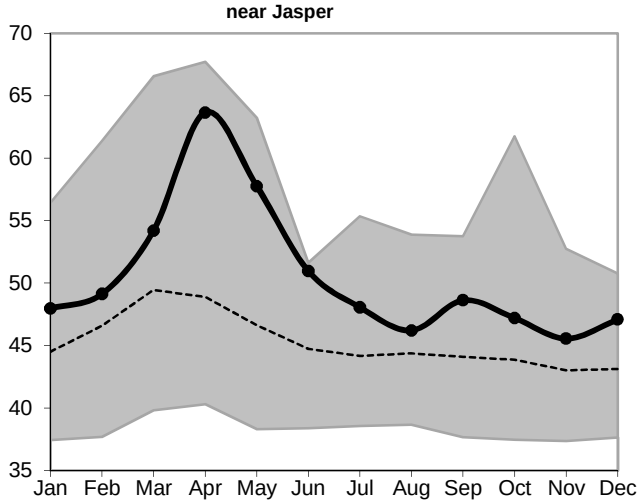
Suwannee County S021335001
near Live Oak



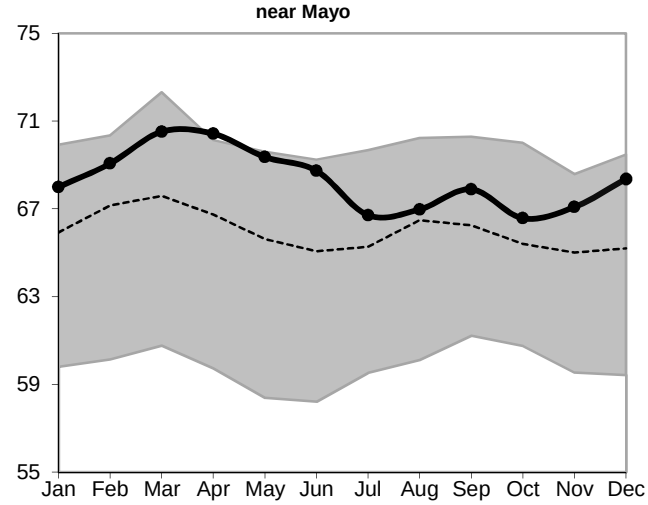
Columbia County S041705001
Lake City



Hamilton County N011422007
near Jasper



Lafayette County S061114001
near Mayo



Taylor County S050701001
near Perry

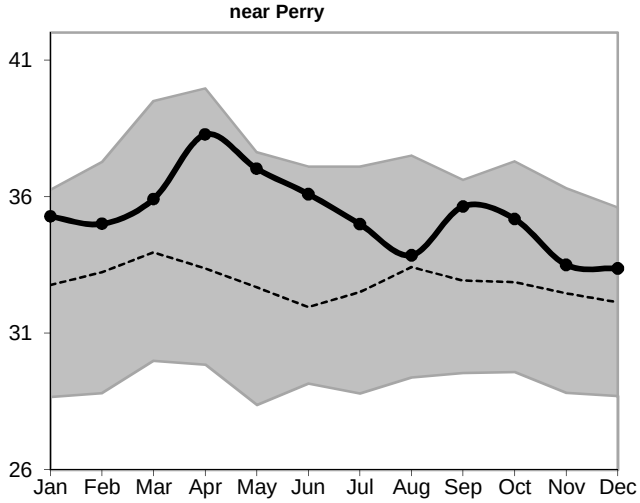
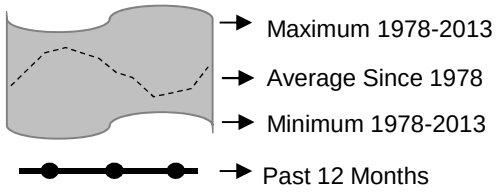
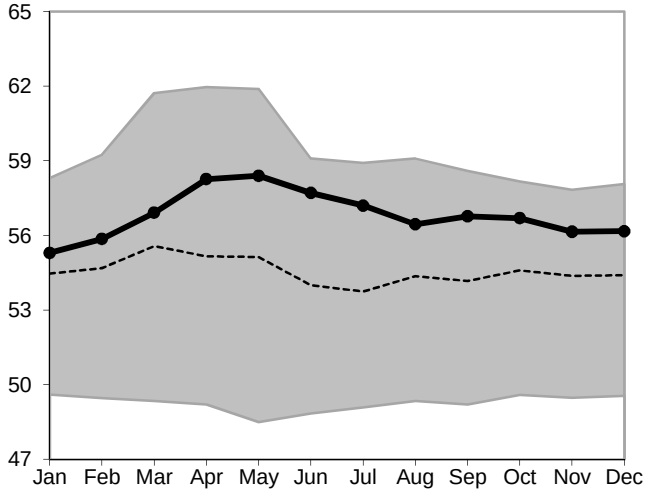


Figure 11, cont.: Groundwater Level Statistics
Levels January 1, 2014 through December 31, 2014
Period of Record Beginning 1978

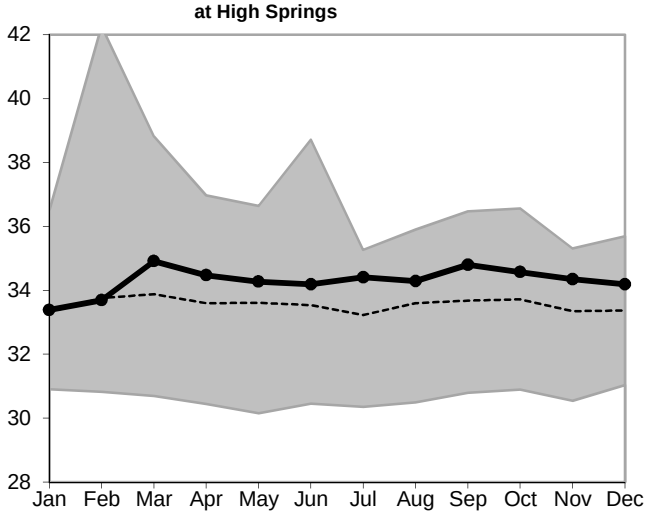


Upper Floridan Aquifer Elevation above NGVD 1929, Feet

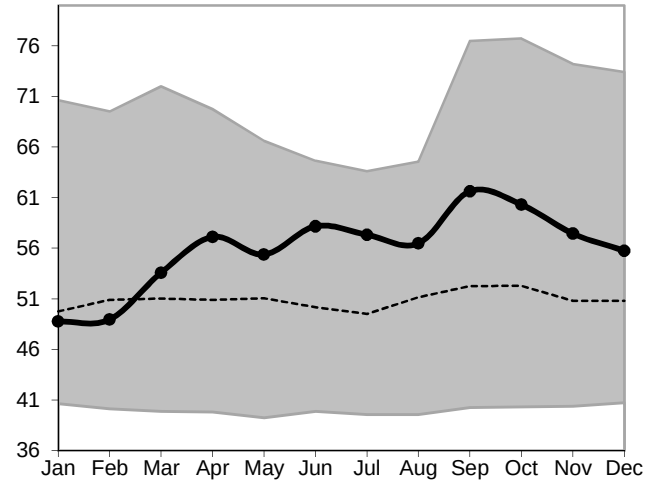
Union County S051933001 near Lake Butler



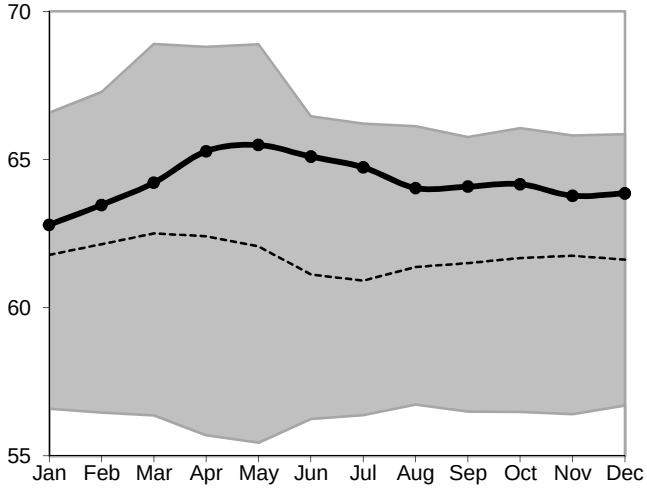
Alachua County S081703001 at High Springs



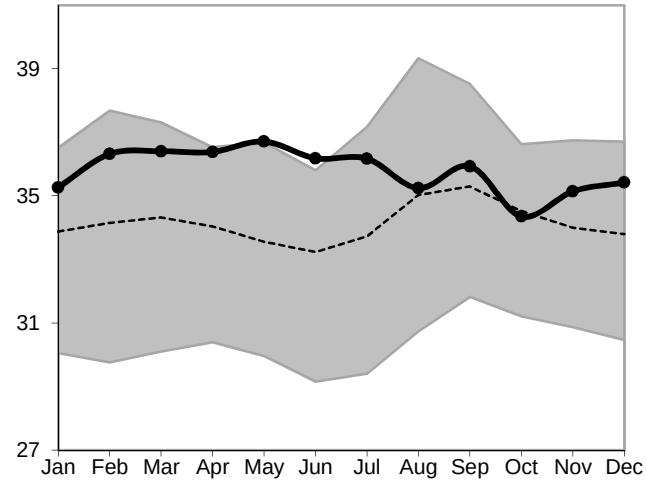
Gilchrist County S091607001 near Trenton



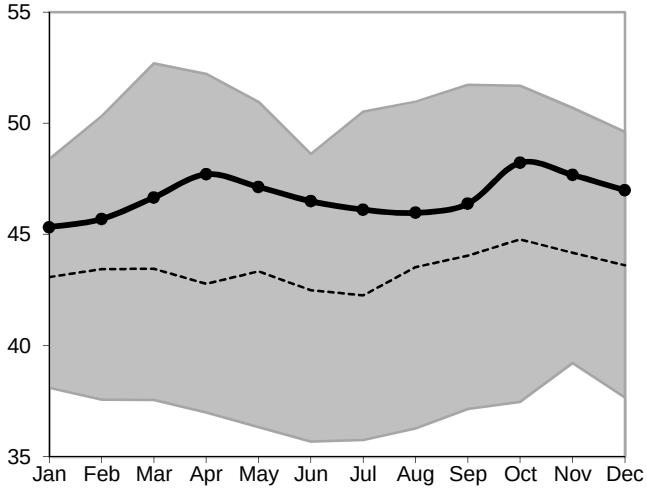
Bradford County S072132001 near Graham



Dixie County S101210001 at Cross City



Levy County S131736001 near Bronson



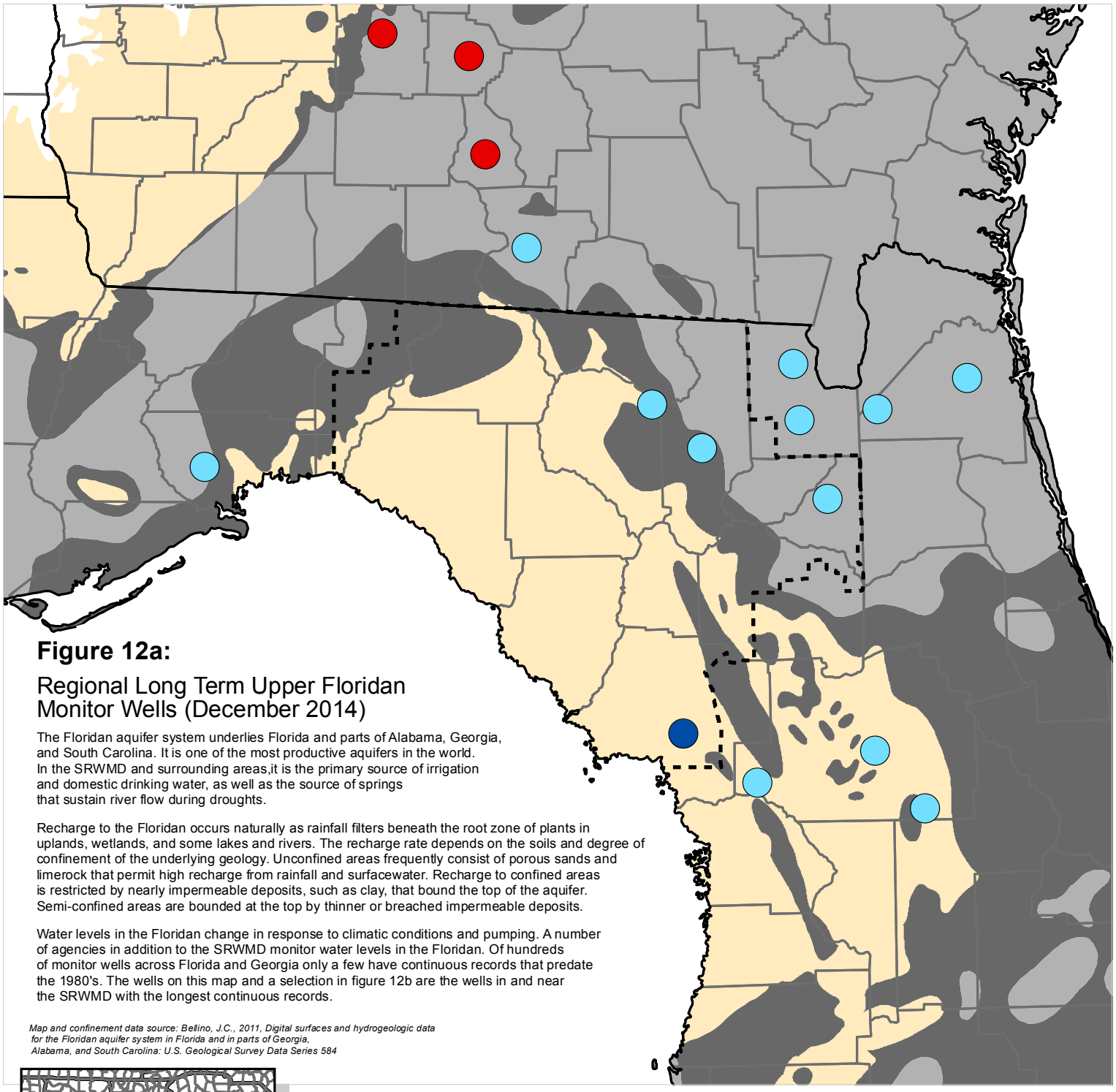


Figure 12a:

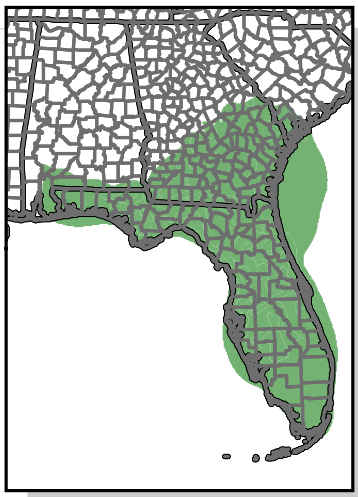
Regional Long Term Upper Floridan Monitor Wells (December 2014)

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

December 2014