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Subject Request for Correction of Information submitted under USGS Information Quality G

Associate Director,
Office of Science Quality and Integrity (OSQI),
U.S. Geological Survey,
MS 911 National Center, Reston VA 20192

A written statement that the person is seeking correction of information disseminated by the USGS and the specific reasons for believing the information is in error for failure to meet information quality standards, along with supporting documentation.

The following three recent USGS publications deal with water resources in northeast Florida.

Grubbs, J.W., and Crandall, C.A., 2007, Exchanges of Water between the Upper Floridan Aquifer and the Lower Suwannee and Lower Santa Fe Rivers, Florida: U.S. Geological Survey Professional Paper 1656-C, 83 p.

Planert, Michael, 2007, Simulation of Regional Ground-Water Flow in the Suwannee River Basin, Northern Florida and Southern Georgia: U.S. Geological Survey Scientific Investigations Report 2007-5031, 50 p.

Grubbs, Jack W., 2011. Analysis of Long-Term Trends in Flow from a Large Spring Complex in Northern Florida. In: U.S. Geological Survey Karst Interest Group Proceedings, Fayetteville, Arkansas, April 26-29, 2011; pp. 160-167

All 3 papers use a similar process of using potentiometric surface maps with 10 foot contour lines to draw an artificial line on the map called a flow-line. The papers then draw conclusions based on this artificial flow-line about the impacts of withdrawals in Jacksonville and Fernandina Beach areas on the groundwater levels in the Suwannee River Water Management District.

I believe the method used to draw those flow lines was faulty and as a result erroneous conclusions have been made. These misleading and incorrect conclusions have resulted in the Suwannee River Water Management District and others incorrectly identifying the cause of reductions in groundwater levels in northeast Florida. Figure 2 of Grubbs, 2011, was included in the Strategic Work Plan for the Suwannee River Water Management District adopted on 1/8/2013. When I pointed out there may be a problem with the information in Figure 2 the Suwannee River Water Management District Governing Board Chair said that he had seen this information from the Feds implying it must be correct.

Below are excerpts from the 3 papers.

Planert, 2007 states on page 8:
"A comparison of the 1990 potentiometric surface (fig. 7) with historic ground-water level data and estimated predevelopment potentiometric surface (fig. 8 modified from Bush and Johnston 1988) indicates that the location of the eastern no-flow boundary has migrated southwestward over the last century. Before substantial withdrawals occurred from the Upper Floridan aquifer the study area was completely enclosed by the bounding flowlines that originate at the highest points of the Valdosta and Keystone Heights highs (fig. 8). Large ground-water withdrawals from the Upper Floridan aquifer in the Jacksonville and Fernandina Beach areas of northeastern Florida however began during the late 1800s and have increased since then. These ground-water withdrawals have caused large regional drawdowns in the Upper Floridan aquifer in the northeastern part of the study area resulting in the southwestward migration of the northeastern ground-water divide. Movement of the northeastern ground-water divide has reduced the area of the Upper Floridan aquifer that contributes water to the study area (fig. 7) and has increased the area of the Upper Floridan aquifer that flows toward the pumping centers near Jacksonville and Fernandina Beach. Historic water-level data from long-term observation wells along the northeastern boundary indicate that the rate of drawdown has slowed and perhaps stopped in recent years and that the movement of this boundary has also slowed or that the boundary may have reached a new equilibrium (fig. 9)."

Grubbs and Crandall, 2007, states on pages 24&25:
"Historic ground-water level data and the estimated predevelopment potentiometric surface of the Upper Floridan aquifer indicate that the location of the northeastern lateral flow boundary has migrated to the southeast over the last century (figs. 18 and 19). Before substantial withdrawals occurred from the Upper Floridan aquifer, the SRWMD was almost completely enclosed by the bounding flow lines that originate at the highest points of the Valdosta and Keystone Heights highs (fig. 19). Large ground-water withdrawals from the Upper Floridan aquifer began in the Jacksonville and Fernandina Beach areas of Florida during the late 1800s and have increased in these and other areas northeast of the regional study area. These withdrawals have caused large regional drawdowns in the Upper Floridan aquifer in the northeastern part of the regional study area and the concurrent westward migration of the northeastern part of the flow line boundary. This has resulted in the reduction of the area of the Upper Floridan aquifer that contributes water to the SRWMD and the diversion of water from the SRWMD to the pump≠ing (pumping)centers near Jacksonville and Fernandina Beach. Historic water-level data from long-term observation wells (fig. 20) along the northeastern lateral flow boundary indicate that: (1) the rate of drawdown has slowed, and perhaps stopped, in recent times; and (2) movement of this boundary has slowed or the boundary may have reached a new equilibrium location (fig. 18).

Grubbs, 2011, states on page 163 beginning at the bottom of column 1:
This geographic pattern of groundwater-level decline and groundwater withdrawals suggest that larger withdrawals, by lowering groundwater levels over a larger area, shift the northeastern flow-line boundary and create a larger contributing area to capture greater amounts of groundwater recharge. Westward migration of the boundary has also resulted in a contraction of the area of westward-flowing groundwater toward the Suwannee, Ichetucknee and Lower Santa

Fe Rivers (fig. 2). It should be noted that this area where the groundwater contributing area has changed (fig. 2) was originally delineated in figure 18 in Grubbs and Crandall (2007). The area shown in figure 2 differs from that originally shown in figure 18 in Grubbs and Crandall (2007) because it reflects corrections that were made to the contour lines that were shown in the original figure.

The reasons I feel the approach was flawed is presented below.

The authors of the papers seem to be equating the term "historic" ground-water levels with the estimated "predevelopment" groundwater levels. They are not equivalent. There is no historic ground-water level data that predates the drainage systems that were installed in NE Florida and SW Georgia. These drainage projects would have caused a major reduction in aquifer recharge since heads in lakes and wetlands would have been reduced and water that would have been internally drained was converted to surface runoff. No date is given for the predevelopment map but it would clearly not go back a century as the Planert, 2007, seems to indicate.

The use of the term flow-line is very misleading. Rather than a line there is likely a zone that may be 5 to 10 miles or more in width where water on any given day would flow to the southwest or to the northeast. That zone would fluctuate with rain events.

I would question the use of the Johnston et al 1980 map with estimated potentiometric surfaces to produce a flow-line. That map was derived from a number of deferent maps and times. The authors even state, "The map is intended to show the best estimate that can be made with available data of the configuration of the average potentiometric surface as it existed prior to the development: it is not intended to show precise water level data at specific sites." Because there is less than a 10 foot difference in water levels over a distance of up to 40 miles predicting the actual location of a flow-line from the 1980 estimated predevelopment seems to be contrary to this statement.

To use the Johnston et al 1980 map to draw flow-line for predevelopment conditions and then to calculate the area lost to groundwater recharge or springsheds is clearly not an appropriate use of the map.

It was noted that the predevelopment flow-line of Planert, 2007, Figure 8 differed significantly from the predevelopment flow-line in Figure 2 of Grubbs, 2011. Indicating drawing flow-lines may be more of an art rather than a science.

The method used to draw the flow-lines is major concern. The area where the flow-lines are drawn have limited current groundwater level data and very limited long term data. The distance between the eastern and western potentiometric lines of the same level are measured in 10s of miles. The lack of data and the distance between potentiometric surface lines creates a great deal of uncertainty about the location of a flow-line or flow-zone.

It is possible to move the flow-line essentially anywhere you want between two lines of equal levels by choosing selected wells and selected dates.

In Grubbs and Crandall, 2007, Figure 23 shows conditions for March 1998 and has a flow-line

based on those condition. March 1998 ground-water levels were being impacted by a major rain event and flooding and as such would not be representative of normal conditions. Even then the flow line does not seem to match conditions during March 1998. I used the Suwannee River Water Management District well data and numbers to look at wells near the March 1998 flow-line. The flow-line is near well SO51933001 USGS Near Lake Butler that had a reported level of 61.72 feet on 3/30/98. Well number S031923004 Olustee Tower Floridan had a reported level of 63.27 feet on 3/27/98. Well number S02193001 USGS ONF 7A had a reported level of 66.85 on 3/25/98. These wells are north northeast of the flow-line so I would expect them to have lower not higher readings.

The most compelling evidence that there has been no shift in a flow-zone can be derived by looking at groundwater levels for individual wells for the month of May for the period of 1988 to 2010 when data from more ground water wells was available. The pattern indicates that wells close to the eastern side of the Johnston 1980 map high contour line have higher levels than wells to the west for the most part but in some years a well to the west can be higher than a well to the east.
When I look at ground water levels in individual Upper Florida wells for a 31 day period on either side of May 31 for the period of 1988 to 2005, I see no indication that there has been a shift over that period in the groundwater divide or that a clear line can be drawn that would represent a groundwater divide. The well data was taken from the SRWMD and SJRWMD websites.

Eight wells will be used to illustrate my concerns about the Groundwater Divide Theory. The map below shows the approximate location of 7 of wells. The Lake City DOT well is in Lake City and is not shown on the map.

ONF 7 ONF 8 Sanderson Macclenny 301&I 10

Olustee Manning

The table below has the water levels in the 8 wells that run along US Highway 90 and I 10 between 301 & I 10 in the east and Lake City in the west.
Upper Floridan Levels on recorded on the date closest to May 31 in each year.

	Lake City DOT	ONF 7A	ONF 8A	Olustee	Sanderson	McClenny	Manning	301& I 10
1988	50.52	56.82	54.78	55.68	54.33		56.02	51.66
1989	46.71	52.56	50.92	51.87	50.8		53.02	49.51
1990	45.50	52.61	50.94	51.72	50.71		52.83	48.82
1991	48.30	58.12	54.87	55.7	53.97	53.41	55.64	51.14
1992	48.85	55.13	53.11	53.98	52.81	52.69	55.05	50.66
1993	50.37	56.59	54.52	55.37	54.13	54.06	56.36	51.4
1994	48.77	55.45	53.35	54.17	52.94	52.55	54.84	50.68
1995	49.10	55.8	54.1	54.99	53.91	53.95	55.64	52.03
1996	46.80	54.47	52.98	53.9	52.92	52.88	55.99	51.43
1997	48.70	56.05	53.93	54.92	53.58	53.64	56.14	51.56
1998	55.08	60.55	57.82	58.89	57.22	56.82	59.67	52.39
1999	49.20	53.96	51.95	52.96	51.79	51.33	54.46	50.17
2000	45.32	51.07	49.39	50.3	49.1	48.58	51.7	47.89
2001	42.46	48.93	47.55	48.45	47.5	47.84	50.76	47.11
2002	42.44	48.75	47.31	48.49	47.31	47.75	50.18	46.63
2003	46.67	55.78	54.14	54.23	53.88	53.62	55.65	51.15
2004	46.89	53.72	52.12	52.26	50.86	51.33	54.2	49.95
2005	53.57	61.75	59.06	59.13		57.51	59.76	55.15

In the east, Levels in the 301 & I 10 well are always lower by around 4 to 5 feet than the well in Manning. This would indicate a flow to the east. In the west, the well at ONF 7A in the Osceola National Forest is always around 4 to 7 feet higher than the well in Lake City. This would indicate a flow to the west. The wells between Manning and ONF 7A show much less change in level in any one year with changes between 1 and 3 feet. The small level change over a much wider area would seem to indicate there may not be a clear directional flow in the area between

Manning and ONF 7A.

The level of the Upper Floridan Aquifer in Bradford, Union, Baker and Columbia Counties would be more accurately depicted as a lake rather than a stream that would have a clear directional divide. The levels in the groundwater lake fluctuate up and down and water flows out from all the edges of the lake. The underground lake however has a property that you could not have on the surface. In parts of the groundwater lake mounds, occur where the water is higher than the surrounding parts of the lake. These mounds can be long term or a temporary condition caused by local recharge conditions or geology. This mounding is seen in some years in levels of well ONF 7A and Manning in the table. The higher levels in ONF 7A do not extend eastward to ONF 8A and the higher levels in the Manning well do not move westward.

The important point is I see no clear evidence based on the wells in the above table that a shift in a groundwater divide occurred between 1988 and 2005. If a shift had occurred as shown on the maps used by the SRWMD, then the levels in the wells to the east of the 1990 groundwater divide would have become lower than the wells to the west. The information in the table shows that the levels in the wells east of ONF 8A and Olustee were not consistently lower. In 8 out of the 18 years, the level at ONF 7A were higher than the Manning level. The level in the Olustee well was never higher than the Manning Well.

If there is no indication that a clear flow-line existed between 1988 and 2005 it is unlikely that a distinct flow line existed in 1980 or predevelopment. The flow lines shown in the 3 papers in questions seem to be clearly an artifact created by limited data, well selection and selection of the date on which the well data was collected.

The name, mailing address, telephone number, email address individual making the correction request

A detailed description of the specific information in question, including where the information is located.

Grubbs, J.W., and Crandall, C.A., 2007, Exchanges of Water between the Upper Floridan Aquifer and the Lower Suwannee and Lower Santa Fe Rivers, Florida: U.S. Geological Survey Professional Paper 1656-C, 83 p.

Planert, Michael, 2007, Simulation of Regional Ground-Water Flow in the Suwannee River

Basin, Northern Florida and Southern Georgia: U.S. Geological Survey Scientific Investigations Report 2007-5031, 50 p.

Grubbs, Jack W., 2011. Analysis of Long-Term Trends in Flow from a Large Spring Complex in Northern Florida. In: U.S. Geological Survey Karst Interest Group Proceedings, Fayetteville, Arkansas, April 26-29, 2011; pp. 160-167

The information that is being questioned is the flow-lines depicted in the Figures in each of the 3 publications.

In additon, in Figures 18, 19, and 23 in Grubbs and Crandall, 2007, that Olustee Creek is mistakenly labeled as Ichetucknee River and in Figures 1 and 2, of Grubbs 2011 Grubbs and Crandall 2005 is cited but no citation for 2005 is included in the references. The error may be in the citation date in the figures.

A description of how the person submitting the correction request is affected by the USGS information believed to be in error.

The following figure and text is included in the Suwannee River Water Supply Assessment 2010.

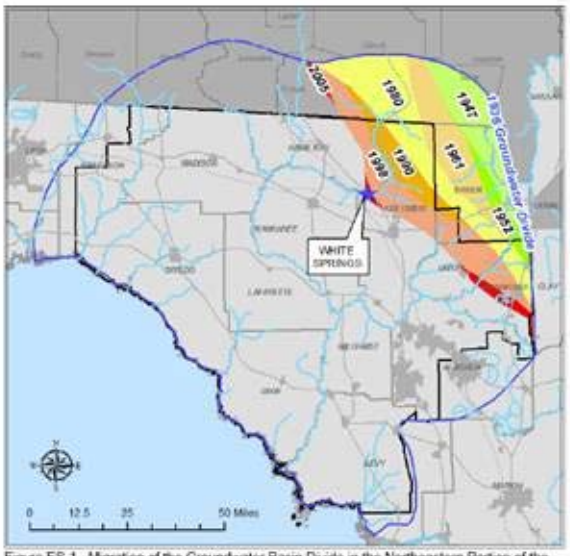


Figure ES-1. Migration of the Groundwater Basin Divide in the Northeastern Portion of the District.

Figure ES-1 illustrates the southwestward migration of the groundwater basin divide resulting from the potentiometric decline that occurred from pre-development through 2005. The divide has migrated more than 35 miles to the southwest over the past 75 years. The result of this migration is a decrease in the size of the groundwater contributing area to the northeastern District by more than 20 percent or 1,900 square miles. This decrease is apparently a result of groundwater withdrawals originating in the District, the St. John's River Water Management District, and the State of Georgia .

The text of the document does not include citations but the list of references includes.

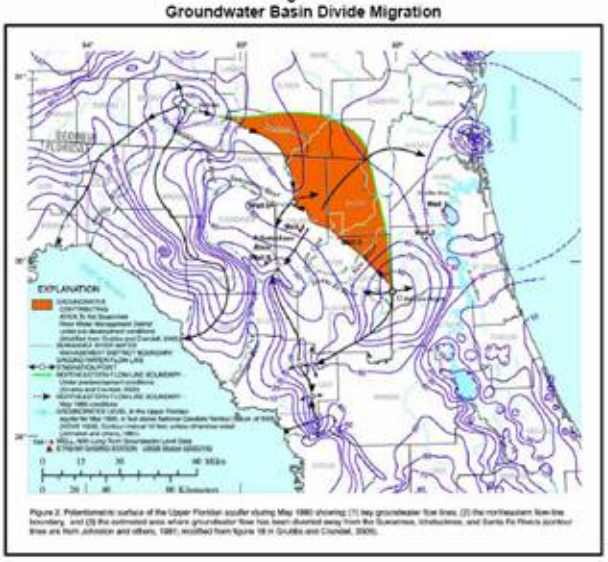
Grubbs, J.W. and Crandall, C.A., 2007. Exchanges of Water between the Upper Floridan Aquifer and the

Lower Suwannee and Lower Santa Fe Rivers, Florida. U.S. Geological Survey Professional Paper 1656-C, 93 pages.

The following text and Figure is found in the Suwannee River Water Management District Five Year Strategic Plan.

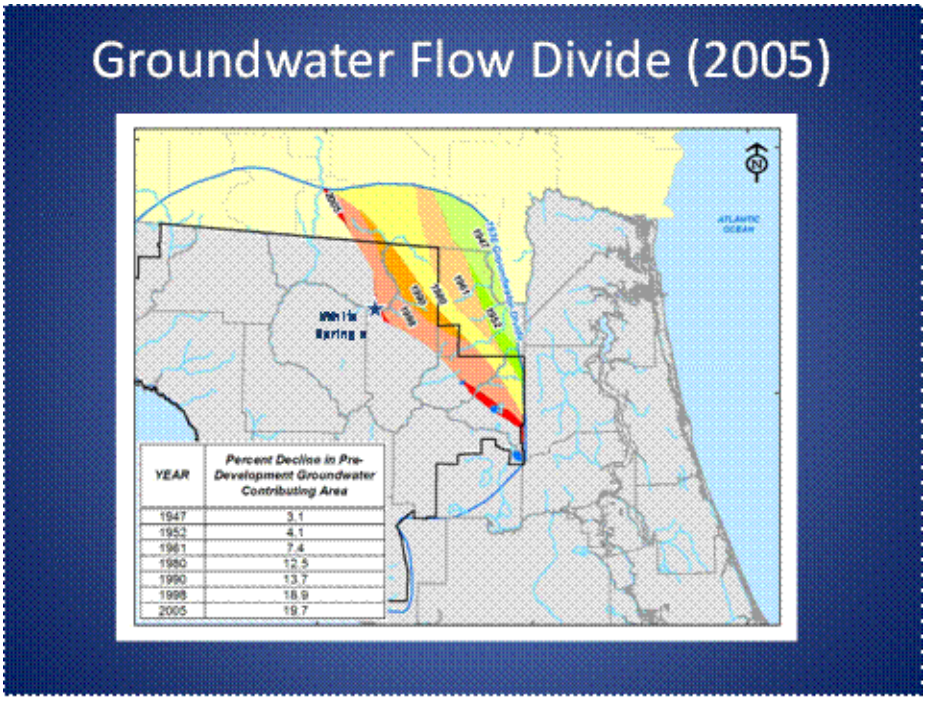
Figure 2 shows that the groundwater basin divide in the northeastern District has migrated southwestward more than 35 miles in 70 years as a result of the potentiometric surface decline that occurred from pre-development through 1980. As a consequence of this migration, the size of the groundwater contributing area to the eastern District has decreased by more than 20 percent or 1,900 square miles. The decrease is apparently a result of regional groundwater withdrawals from the Floridan Aquifer system.

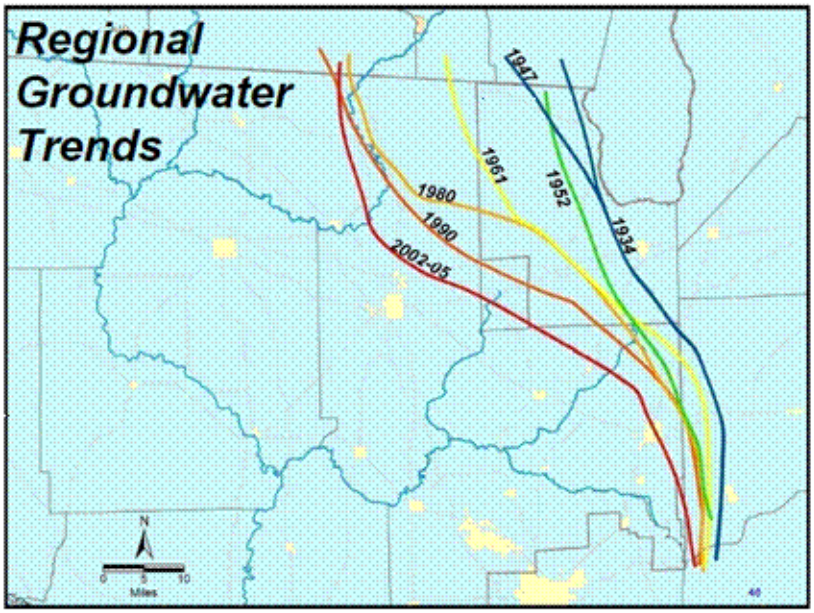
Figure 2
Groundwater Basin Divide Migration



Grubbs, Jack W., 2011. Analysis of Long-Term Trends in Flow from a Large Spring Complex in Northern Florida. In: U.S. Geological Survey Karst Interest Group Proceedings, Fayetteville, Arkansas, April 26-29, 2011; pp. 160-167

The SRWMD staff has presented charts showing the migration of a Northeast Florida Ground Water Divide at public meetings and to the SRWMD Governing Board. Two of these charts are shown below. These charts were used to support the SRWMD's position that JEA withdrawals were impacting ground water levels in the SRWMD.





Clearly the concepts of distinct flow-lines have impacted planning in the Suwannee River Water Management District.

If there has been no shift in the flow-line/flow-zone, then the conclusion drawn in the 3 papers based on that shift would be incorrect and the conclusions presented in the SRWMD planning documents and presentations would also be erroneous and misleading.

The use of the questionable conclusions drawn from those papers regarding the impacts of

withdrawals in the Jacksonville and Fernandina Beach areas on groundwater levels in the Suwannee River Water Management District have resulted in faulty ground water planning that could have significant long term implications with respect to the areas water supply. Failure to correctly identify the reason for groundwater level declines will delay the development of approaches that can address water supply constraints.

Because a Minimum Flow and Levels (MFLs) have been set on the Uppers Santa Fe River and these MFLs are or may not be met a Water Use Caution Area has been declared for Bradford County. For property owners like me property values can be impacted because water use permits can be restricted. The restriction can limit water use for agricultural water use.

The specific recommendations for corrective action.

Retract the 3 papers.