Leon County Science Advisory Committee
William Landing, PhD., President
Environmental Services Division
Development Support and Environmental Management Office
435 N. Macomb Street
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It would have been nice if the parties that were aware of the new version of the NSILT Wakulla Final Report-Draft, which was only a few days old, had told us about it before the meeting or at least told us at the meeting that there were no significant changes. The authors of the newer version of the NSILT Wakulla Final Report-Draft said "We did make a few changes to the methods utilized to calculate the input and loadings attributed to sinking streams, but in the end there was a very small change to the final result." I have attached an updated copy of their report and included both versions of the charts, the relative nitrogen loads to the UFA from the nitrogen source categories evaluated for the Wakulla Spring and River BMAP. Both graphs are nearly identical (NSILT Wakulla Final Report-Draft, Dec 2013 and July 2014 versions)

The only changes I found, between the Dec-2013 and July-2014 Reports were due to changes in the concentrations of nitrogen in the sinking stream category, and these were minor changes, they changed the initial concentration of Munson Slough, from their original value of 0.17 mg/L N to 0.87 mg/L N, which is still less than the county value of 1.65 mg/L N. FDEPs new numbers had higher concentrations of N than their previous numbers.

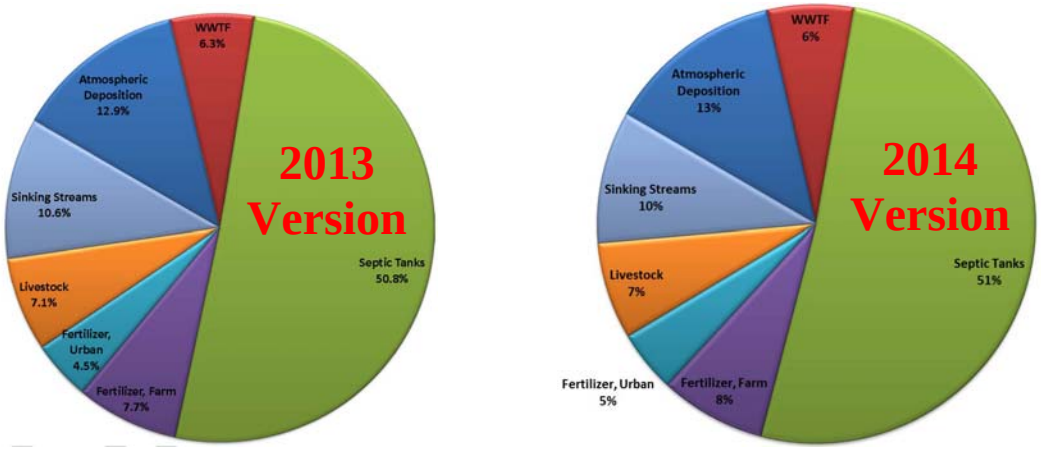

Figure 10: Relative nitrogen loads to the UFA from the nitrogen source categories evaluated for the Wakulla Spring and River BMAP area are virtually identical (NSILT Wakulla Final Report-Draft, Dec 2013 and July 2014 versions)

I used arithmetic means for the most recent year of complete data, 2013, which were calculated by Johnny Richardson, of Leon County and these were presented as arithmetic means in a discrete table in my power point presentation. Apparently some data is missing and geometric means cannot be calculated for all waterbodies. FDEP seems to be favoring an annual average of

all of the historical data from each site and the use of a geometric mean which all ten to lower concentration values. The committee is welcome to substitute any data they want to use, that was not the emphasis of my report. Both sets of tables, FDEP's and mine, show N-loading to the earth surface and have no attenuation factors applied because they depict loading to the earth's surface to the aquifer, before it goes into the ground. When necessary I used the same attenuation factors used be FDEP, but that was not the emphasis of my report and the committee can pick any attenuation factor they choose. The pie charts that I used, as well as the similar charts that were used by FDEP, are in percent, not absolute concentrations so the application of their uniform attenuation factor has no effect on the results presented. This also was not the subject of my report.

I appreciated the comments of committee member Skip Cook who suggested that the real purpose of my talk was to 'clean up the lakes.' That would be a good goal, but what I presented was a tool to calculate water loss, from either seepage or sinkholes, lost from these lakes to the ground. I wanted to discuss the implications and significance of water loss from our karst lakes to the aquifer. FDEP recognized the significance of 'sinking streams' in their N-SILT report, calling Lake Munson a sinking stream too, but FDEP also left out other 'sinking lakes.' These sinking lakes, particularly the Lake Lafayette watershed area should be added as a nitrogen source for Wakulla Springs. My proposed 'hydrological water budget calculations' provide a new tool to assess the inputs of these karst lakes to the groundwater. I do not think the focus of my talk should have been shifted to attenuation factors since I presented no information on this or used any results other than loading to the groundwater or the aquifer. My results were displayed in percent loading from various karst lakes compared on their individual seepage rate and concentration of pollutants in their waters.

I have included some maps from the draft 'Wakulla Spring Restoration Plan,' prepared by the Howard T. Odum Florida Springs Institute, July 2014. They are showing the Lake Lafayette Watershed as an extremely vulnerable part of the Wakulla Springshed. They call this region the 'lakes' region, our data too showed much higher seepage rates in the Lake Lafayette Watershed except that we have limited data for this system. I have also included the 'Final Report, Analysis of Historical Groundwater Nitrate Data in Leon County, Florida With Comparison To Proposed Total Maximum Daily Loads (TMDL) Limits,' by William Leseman, Water Quality Consulting, November 18, 2011, which claims that the groundwater in Tallahassee, north of the sprayfield, does not meet the Wakulla Springs nitrate reduction goal levels of 0.35 mg/L as N. I have also included the new and old NSILT draft reports, which are not significantly different from each other.

My objective, for talking and discussing this topic was you was the use of this new technique to determine groundwater seepage in karst lakes and the consideration for other waterbodies in the NSILT Wakulla Final Report, I had no desire to talk about attenuation factors, which were not altered from the ones used by FDEP. Maybe that should be included as a comment, that the City staff that attended the meeting did not like them very much. They were not mine and were rather insignificant regarding the material I presented.

Summary Questions, NSILT Wakulla Final Report-Draft_Dec2013

- There is no specific category for the nitrogen loading for domestic animals in the proposed NSILT
- It appeared to some committee members that there were elevated estimates for the loading of septic systems in the areas where the aquaifer is semi-confined cosidering that the Lombardo Report considered the loading from this area unimportant.
- Some membersof the audience did not agree with the use of attenuation or recharge factors and have evidently been discussing this previously with FDEP..
- For this study flows were calculated, from areas of the data which seemd to represent typical conditions for the waterbody. Due to constraints with the extent of gagiung data available from the NWfWMD, some data periods were for 90 days and some for 900 days. No attempt was made to measure the flow to the aquifer all the time. We took typical periods where were typical to the waterbodey and calculated the flow to the aquifer for that period, which likely is an underestimate because the flows would be higher at atypically high water levels..
- More flows need to be calculated from area lakes. It should be noted that there are atipical periods, which cannot be calculated with this method, when alluvial lakes are filled with water flowing into them from rivers, such as the most of the lakes in the lake Lafayette Drainage basin and Lake Iamonia.
- The only guaging data for from the Lafayette Watershed are the Kilearn Lakes. We need guaging data from the other lakes in the drainage basin. Judging from the extremely high seepage rates found in the Killean Chain of Lakes these lakes would have considerabe seepage in the rest of that watershed that needs to be evaluated.
- For Upper Lake Lafayette we used flows from the sinkhole, at minimal lake volume, which should greatly underestimate the flow since the seepage areas of the lake were dry and the head of water over the sink was low. We used measured values between 100 and 200 cfs at the sink, using this undersestimate, the seepage from Upper lake Lafayette was the largest in the semiconfined area.

I will be meeting with the authors of NSILT Wakulla Final Report-Draft before the end of this month and would be happy to report any results back to your committee.

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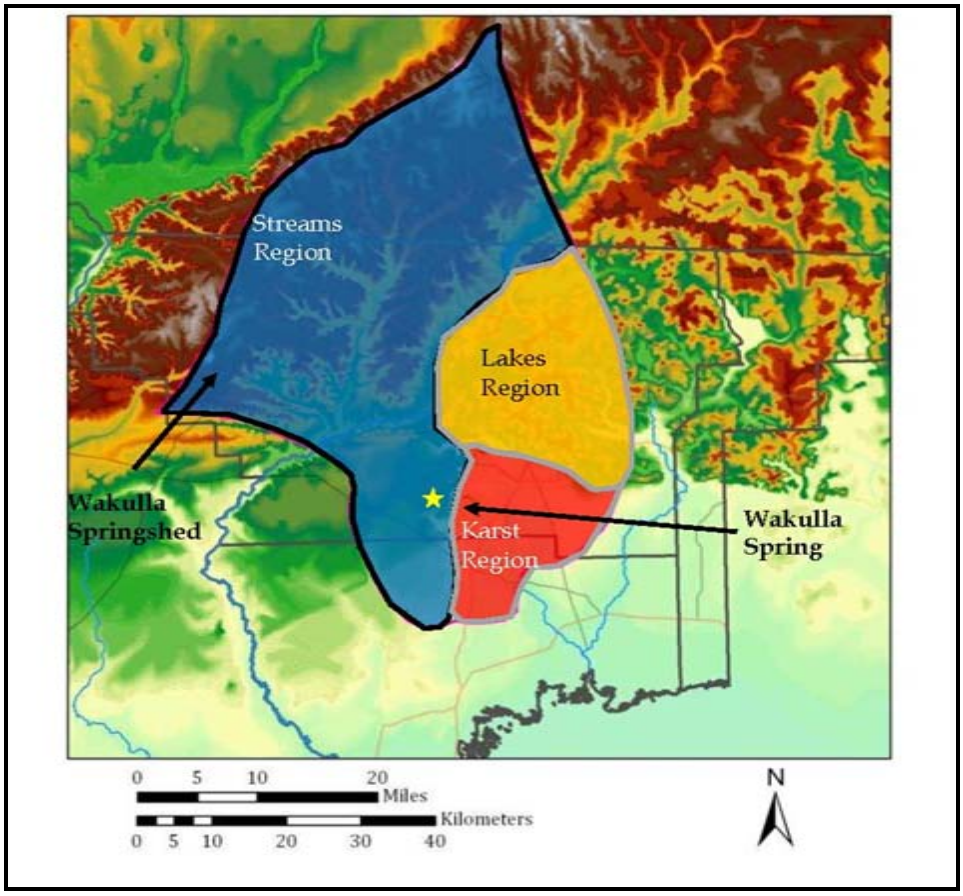

Figure 2-8. Conceptual diagram of the Wakulla Springshed with three areas of differing recharge potential highlighted: the Streams Region with low infiltration (about 1 inch/year), the Lakes Region with higher groundwater recharge (about 8 inches/year), and the Karst Plain Region with lowest confinement between the ground surface and the Floridan Aquifer (recharge about 18 inches/year).
Adapted from Kris Barrios, NWFWMD, Hydrology 101" Power Point presentation (no date). This figure is from the Wakulla Spring Restoration Plan, prepared by the Howard T. Odum Florida Springs Institute, July 2014.

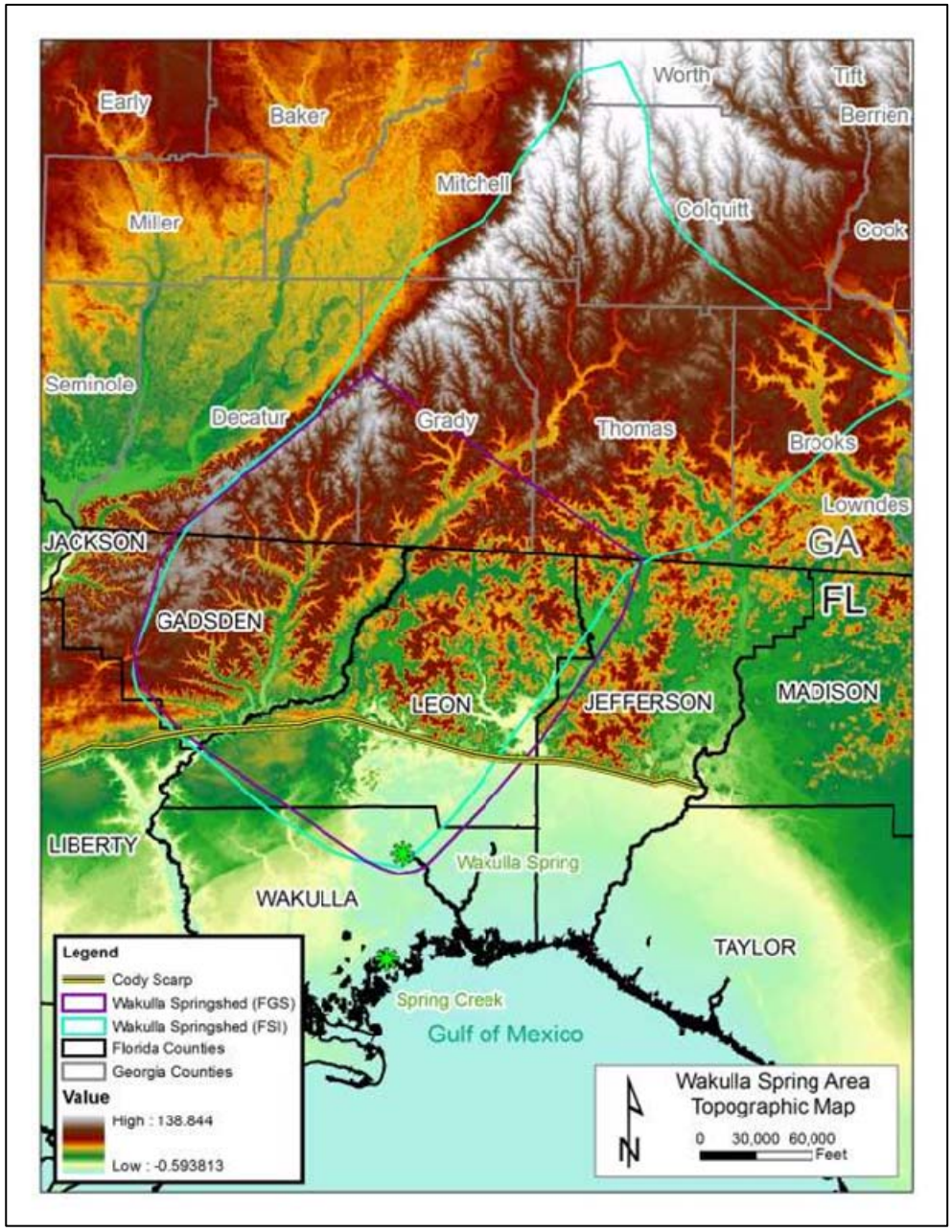

Figure 2-11. This is a topographic landform map of the Wakulla Springshed (springshed delineations from the Florida Geological Survey [FGS] and the Florida Springs Institute [FSI]). This figure is from the Wakulla Spring Restoration Plan, prepared by the Howard T. Odum Florida Springs Institute, July 2014.

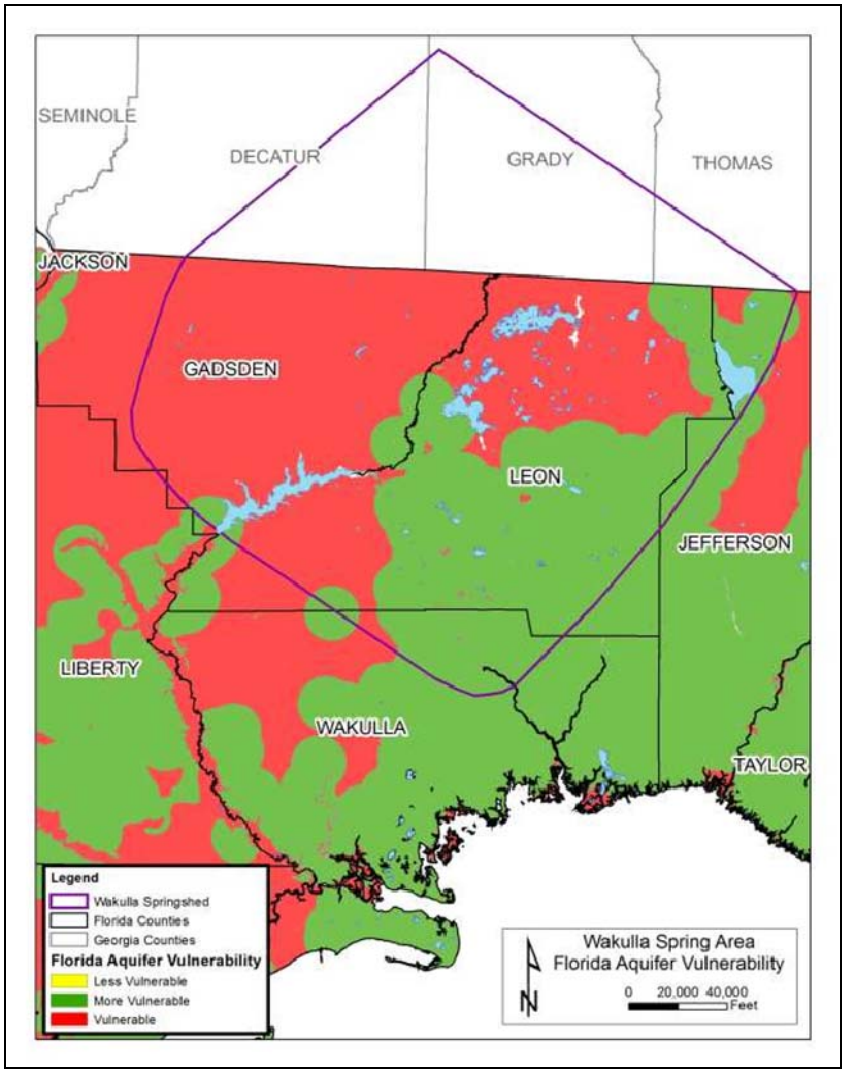

Figure 2-13. Floridan aquifer vulnerability map for the Florida portion of the Wakulla Springshed area (Arthur et al. 2005). This figure is from the Wakulla Spring Restoration Plan, prepared by the Howard T. Odum Florida Springs Institute, July 2014.

Sincerely,

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