

Silver Springs Basin Management Action Plan Meeting

April 23, 2014

Marion County Growth Services, Training and Meeting Room

2710 East Silver Springs Blvd, Ocala, FL 34479

Meeting Notes

Opening Remarks & Project Data Collection Status – Shane Williams

A discussion on the collection of project data. Any parties that have not yet turned in their project data need to do so. If there are any new projects that they have not yet submitted, they need to do so.

Final Nitrogen Source Inventory – Kirstin Eller/Brian Katz, FDEP

- The process to estimate Nitrogen loads a multistep process. The first step involves estimating inputs to the land surface from multiple sources: atmospheric deposition, septic tanks, land application of treated wastewater, fertilizers (farm and non-farm), animal wastes, and stormwater runoff. Other steps include accounting for nitrogen attenuation and recharge to the aquifer.
- Attenuation factors are based on various environmental processes such as denitrification, nitrification of ammonia and others.
 - Sources are input on a map and the proximity to springs is determined.
- Leaching of Nitrogen to the groundwater is the ultimate concern and is variable depending on multiple factors.
 - Non-attenuated nitrogen is quantified based upon the recharge rate of the groundwater. High recharge areas get factor of 0.9. Medium areas get factor of 0.5. Low recharge areas get a factor of 0.1. Recharge rates are weighted to estimate potential for each source to move to groundwater.
- Atmospheric deposition data comes from three locations.
 - Wet deposition data comes from Bradford Forest and Orlando NADP monitoring stations.
 - Dry data is retrieved from Indian River Lagoon CASTNET monitoring station.
- Wastewater treatment facilities were evaluated.
 - Actual TN and flow data were used to calculate the total nitrogen input from each facility based on the DMR data provided by the facilities
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 - A reading of 8.97 mg/L TN was used if no data was available for a facility based on a FDEP study
 - If flow data was unavailable, 50% of the design capacity was used
- Graphic showing the location of septic tanks within the County.

- The 2010 population census was used to determine the number of people per occupied household.
- The number of people using septic tanks was estimated based on the people per occupied household and the number of tanks in the BMAP boundary
- An input factor of 9.92 lb-N/yr per person was used to estimate nitrogen contribution from septic tanks
- The number of livestock in the county was derived from the 2007 census of agriculture. New data for this is actually expected within the next week or so.
 - Displayed is the waste factor for each animal (pounds of nitrogen per animal per day).
 - Land use percentages were calculated to estimate the number of animals within the BMAP boundary.
- The land use percentages were calculated by determining the percentage of livestock within each recharge area compared to the entire county. Marion County has 68,845 acres of horse farms. Displayed are the areas of horse lands on the BMAP map.
 - 35.1% of them are in high recharge area,
 - 5.5% are in the medium recharge area,
 - 0.8% are in the low recharge area.
- Horse farms are a special category.
 - Using data calculated from farm visits, we were able to determine that only 62% of the horse population is contributing nitrogen to the BMAP area, the rest of the waste is collected, removed from the BMAP boundary or composted
 - We were able to use this data to determine that there are 8,818 horses contributing nitrogen. We then multiplied this by the average waste factor.
 - Horse farms have a fertilized component as well
 - Within the high recharge of Marion County, there are 56,412 acres of livestock lands. 24,173 acres are horse farms so of all the livestock lands 43% are utilized for horse activities. This percentage is used to estimate pasture acreage.
 - The property appraiser land use data does not differentiate between horse farm lands and cattle lands, so the horse farm percentages were used to estimate the area of land devoted to each type of livestock.
 - Property appraiser pasture land data was used to estimate the amount of nitrogen attributed to horse farms. Fertilization rates for those farms are displayed.
- Using land use percentages, we estimated that there are 21,180 cows and 14,752 calves in the BMAP area.
 - These populations were used to estimate the nitrogen contribution based on the listed waste factors.
 - While a cow will spend the entire year within the BMAP boundary, the calves will not. We estimated that calves only spend about 6 months in the BMAP boundary.
 - The pasture and hay acreage estimated for cattle use is 81.561 acres from the property appraiser data. The average application rate is 17 lb-N/ac based on information provided by cattle producers.

- Displayed are the miscellaneous livestock waste from other animals (chicken, sheep, etc.) and the estimated amount of nitrogen added to the system from them.
 - Populations were estimated based on land use percentages
- Based on property appraiser data and information, the following crops are found within the BMAP boundary.
 - Each county was evaluated individually based on the available information
 - The individual application rates for the different crops is listed
- We looked at the Florida Department of Agriculture fertilizer sales to determine how much nitrogen was used for non-agricultural use.
 - Land use percentages for urban land areas were utilized to estimate the amount of nitrogen being applied within the BMAP boundary
- The last category shown is drainage wells, located in Ocala.
 - The location of each drainage well was determine based on the best available information
 - Land use and soil type was taken into consideration to estimate the contribution of nitrogen to the aquifer via these wells
- Environmental attenuation factors are shown.
 - Each environmental source was evaluated to estiamte how much nitrogen is taken up by the environment.
 - For atmospheric deposition, a 90% attenuation factors indiciates that 90% of all the atmospheric deposition will be taken up by the environment leaving only 10% with the potential of reaching ground water
- Recharge factors estimate the degree of recharge expected in each of the 3 recharge areas
- Displayed is the average amount of nitrogen a year loaded to the groundwater.
 - Septic tanks were the highest at 36%.
- Displayed is how much nitrogen comes from each recharge area.
- The 10 year capture zone was also evaluated given its close proximity to the spring vent.
 - By land area it is 20% of the BMAP boundary but contributes 31% of the load to ground water
- Displayed is a graph showing the amount of nitrogen put into the system from fertilizer since 1940.
 - That amount peaked in the 1980s.
 - Non-farming fertilizer rates have picked up in last 20 years or so.
- Displayed is a graph showing the population and number of septic tanks trend since 1970.
 - There has been a substantial increase.
- There was a large decrease in fertilizer sales in the early 80s; this can be attributed to a decrease in corn and citrus farming.
- We must take into account the fact that the spring water is 10-30 years old.
 - The next steps are to compile historical information on waste water treatment plants, fertilizer and other sources, along with land-use to look at changes and trends in nitrate in groundwater.

- We can calculate how lag time effects nitrate concentration in springs.
- Displayed is the estimated amount of nitrate loaded to the groundwater present day and the Total Maximum Daily Load (TMDL) target.
 - We recognize that there is some uncertainty in attenuation factors.
 - Even with the max attenuation, the amount of nitrate loaded to the groundwater needs to be substantially reduced.

Shane Williams- Keep in mind that there are many sources contributing nitrate to springs, we are not singling out a single source.

Question- You mentioned 42 drainage wells for Ocala, I thought it was actually closer to 20?

Answer- We utilized current data, but will update the layers. (Staff from Marion County Office of the County Engineer offered to get them the new data)

Question - There are plans to change the time of calves in the County from 6 months to adult, have you accounted for that possibility in your plan?

Answer- Right now we are making estimates from current information, not projecting estimates for future. We will make changes if the situation changes.

Question - If cattle are grazing and then being taken away, is that not taking away nitrogen away from the system?

Answer- That is why we use 6 month estimate and attenuation factors. The grass that is eaten by the cow is first taken up by the environment. This is removed from our ground water estimates based on the attenuation factors.

Question - 2.7 lbs per acre a year seems much lower than what I have encountered, how did you get that estimate?

Answer- We used data from wet and dry deposition stations.

Question – Is the TMDL for nitrate supposed to be at an amount that just comes from rainfall?

Answer- The TMDL number is higher than background, not meant to just be from rainfall.

Question - How did you get the unit loading number from septic tanks, the 9.92 lbs. of nitrate per person?

Answer- That number was taken from literature. The time in tank and other factors count towards the attenuation factor.

Question - Do you consider in-flow and out-flow of nitrate to system boundaries?

Answer- Our estimates are for what is entering the aquifer on an annual basis, and not what is exiting through the spring vent.

Question - We did dye studies in the past that showed that water left the spring in 6 weeks, how is that?

Answer- Some areas in the system have conduits, but water must first go through cracks and slower areas.

Question - What technology is used to date water?

Answer- Tritium and Helium 3 used. CFC's and sulfur hexafluoride are also used because they have a uniform and quantifiable increase in the atmosphere over time.

Question - Is it correct that most nitrate problems now are due to legacy nitrates?

Answer- We are not completely sure at this time. They likely are due to both present-day inputs and past inputs of nitrogen.

Question - Isn't it going to take a long time to get down to the TMDL because of legacy nitrates?

Answer- Yes, but we are hopeful that we will see improvements in water quality as a result of reductions in nitrogen loading over the next few years.

Question - Have there been any tests recently to see if any of the dye is still in the system?

Answer- It is very difficult to quantify at this time. The dyes would probably be non-existent by now because of degradation.

Question - If legacy concentration is a big deal, have you looked at number for 30 years ago, and 30 years before that to look at changes?

Answer- We are in the process of doing that and looking for those changes. Though we can't change legacy issues, we can look at how we move forward based on what is entering the system now.

Question - This is just summarizing what we have known for a long time. Septic tanks are a big issue; can we look at septic density areas to look at the benefit of removing them?

Answer- That will be discussed today.

Question - Is there a clear break between the different fertilizer uses?

Answer- Yes, and that information is provided by the state and based on retail sales data. We discussed using application rates but the values were not realistic. We're limited by data we can put into this tool. We are using application rate data for crop fertilizers though.

Question - For residential application, are commercial applications taken into account?

Answer- Yes, that is why we use sales data for state.

Question - Since we are a high recharge area, what depth is estimated for reaching the aquifer?

Answer- We don't estimate depth, it varies throughout the area. We know approximate depth of upper Floridan aquifer. Depth depends greatly on location.

Question - Are we including hay farming in calculations?

Answer- We do incorporate that data.

Question - Is the land breakdown from last year?

Answer- The data is from late 2013 and early this year from the property appraisers.

Question - Is septic tank attenuation at 40%?

Answer- Yes, that is the average.

Shane Williams- Has everybody has been getting the emails and spreadsheet for project information?

(Nobody said no.)

Update on SJRWMD Springs Initiative-Robert Mattson

- The main focus is where we think we'll be able to help 5 years from now; what new data we will have that will better inform management.
- The Springs Initiative consists of a research and project component.
 - The goal of the research component is to better understand the major drivers influencing the submerged plant community structure.
- Why should we research, is this a stall tactic? No. The major problem is that the system is starting to be dominated by nuisance algae.
 - We believe that increased nitrate concentrations are one component of that shift.
 - Some studies have found that certain species of snail can keep abundance of algae down.
 - Certain factors can limit the amount of grazers (e.g., dissolved oxygen).
 - We found that current velocity is other major factor that influences the amount of algae.
- Nitrate is the major focus of BMAP for various reasons. Literature has shown that nitrate may have some toxicity to grazers and reduce growth rates of some macrophytes.
- The Springs Initiative has linkages to many things that we do as a water management district. We work with various stakeholders.
- By 5 years, we hope to better delineate the divide between the Silver and Rainbow springshed.
- We hope to better understand nitrate loading rates and soil properties that affect nitrate transport and have much better models.
- With the University of Florida (UF), we are trying to look at other chemical compounds that are influencing algae growth.
 - We know that other chemicals may be a factor in algal proliferation.
- We will better understand the exchange of dissolved solutes with the river bottom.
- We will have a better understanding of long-term metabolism in the river and how the river is working.
- We will understand if reducing nitrate concentrations reduce the growth of algae.
- We will know if an increase in nitrate is suppressing the growth of submerged macrophyte cover.

- We will also know the ability of grazers to suppress algae and what is controlling or suppressing those grazers.
- Apart from UF, we would like to conduct a biological survey in other spring-run streams in the state.
- We now have 4 locations in the Silver River that are continuously taking measurements on dissolved oxygen, temperature, pH, turbidity, and nitrate.
 - Currently we are implementing projects based on what we know now, but things will change as we get more information from the science part of our program.
- We are looking at projects that involve stormwater and wastewater treatment plants.
- We are evaluating whether we want to do like Southwest Florida Water Management District and suction dredge algae.
- We are working with the Florida Department of Environmental Protection biology lab to monitor ultrasonic transmitters in Silver Springs; there are currently two of them, one at the boat basin and one at a side channel.
 - Do not lift these out of the water, look but don't touch.
- Here is our contact information. We have been doing solicitations for future projects but don't know how much money we will be getting for springs statewide.

Question - On those instruments, what is the effective range?

Answer- They treat an area of about 8 acres. We are monitoring for undesirable side-effects and to evaluate the properties of the sound field they transmit. Made by Sonic Solutions. We bought them from an Orlando vender.

Question - Is the County given any funding for this, or is it just coming from Tallahassee?

Answer- We are not looking for funding, but looking to provide funding to local governments.

Comment- Participating in BMAP may better qualify you for funding in the future.

Question - Are you talking about dredging thick algae in Silver Springs?

Answer- Yes, it is being considered. Final decision has not been made yet.

Question - What about manatees for grazers?

Answer- I am not aware of them doing much impact.

Question - Does your device kill duckweed?

Answer- Evidently no. Doesn't really work on the floating stuff. They are very resistant to the ultrasonic system.

Shane Williams- We are now going to talk about where we are, and where we are going with the BMAP.

Focus Areas for Future Projects - Mary Paulic

- We are on a very accelerated time schedule now.
- We have talked in the past about focus areas to get the best use of our dollars and to prioritize project selection.
 - We want to know the best way to do this.
- Within our BMAP area, not all areas are high recharge areas.
 - We want to target high recharge areas, proximity to spring, location of known conduits, and the types of management options.
 - These are some of our old dye studies looking for conduits. We have found some short travel times, and some going out very long.
- What are the next steps? I don't have a complete plan right now, I am viewing the results at the same time you are, but we will discuss this topic in more depth at the May meeting.
- We have around 150 projects right now and many future proposals.
 - We are looking at how to prioritize them.
 - I am open to suggestions or ideas for how to prioritize.
- We started a general fact finding discussion on monitoring plans with SJRWMD, Marion County, and Silver Springs Alliance.
- There is a large network of groundwater monitoring wells being designed for the basin by SJRWMD. The district's focus is within the 100 year time of travel. The BMAP area extends beyond the 100 year time of travel. We will most likely need assistance from SWFWMD for monitoring.
- I have to look for long-term commitments with people, at least 5 years or more.
 - We want that because in the 4th or 5th year we have to assess data and evaluate the results to outline the future plan for the BMAP.
- The networks are going to look at wells for ground water quality, the surface monitoring network on Silver River, and a targeted monitoring network that is not currently set up.

Question - On water quality monitoring, are these just periodic pull samples or long term flux measurements?

Answer (SJRWMD)- here has been discussion of using flux meters and we are going to make sure that future wells are large enough for other sampling.

- There are two options for the farm tour, either a long meeting day or a different date.
 - (The long day option gets the vote)
- We are looking at probably doing the tour a couple months from now.
- The tentative date for the BMAP draft is in August, we need to accelerate meetings.
 - One option is for meetings every 3 weeks.
 - Another is for one big meeting and smaller focused meetings in a month.
 - Meetings may be driven by topic and that may decide who needs to attend.

(Not much enthusiasm for either, most tend to favor the option of just one major meeting with spin-off meetings.)

Comment- We need better agenda information to decide when to come.

- We want to make sure that we get good complete representation from all stakeholders.
- We have quite a few projects and we are looking ahead and are trying to determine the best strategy.
- There are still major parts of the BMAP that need to be addressed.
 - We will have to have a public notice meeting at some point.
- More parts of the BMAP template are starting to be added.
 - Chapter 2 is the focus areas and deals with future growth.
 - Chapter 3 is a big picture type of piece looking at regulatory links and requirements.
 - Chapter 4 is the much more detailed management actions and long-term goals and objectives. If we need more data or other studies we can detail that there.
 - Chapter 5 is our monitoring networks and how we meet and access each year.
- This is still being refined but is the general format.

(May 22nd is agreed upon as the next meeting day)

Shane Williams- We want to look at projects and determine if there are any duplicates. We will assign project numbers. Here is a list of contacts and agencies that have submitted information. We have a variety of different types of projects. Some information was entered in from meetings and grant information. Most projects are not contingent on funding; they are already completed or underway. We do have some long-term planning projects that are dependent on funding. Focus areas can be used for additional prioritization or work. Not all information makes it to BMAP, sometimes because of lack of information. We need information if it is available. If you have mapping information, it is greatly appreciated. Some projects are public outreach projects; those don't really need maps but should be descriptive. There are current 83 projects that are stormwater or public outreach. Utilities has 41 projects. These numbers will likely not stay the same.

Is there anybody who hasn't submitting their information?

(No response.)

Please submit your information if you still need to.

Charlie Gauthier (FDEP) - We are anxious to move this along. A lot happens in the process and we are looking at August and September for adoption. There are a lot of pieces that need to come together so that we can put pen to paper and weigh the list of projects. We are on the home stretch. We have done pretty well, but there is a lot to do in a short time period. This

work is never done and many of the numbers are estimations. The tool we have is in pretty good shape at this point. It is for planning, but not perfect.

Meeting Adjourned