

October 24 Silver Springs Basin Management Action Plan meeting notes.

1. Opening Remarks

- Recording this meeting, so please speak up if you are talking

2. Agency Updates

- Introductions- around the room
- Marion County getting approximately 70% conversion of TN and maintaining nitrate concentration at the 31st St Retrofit Project. Also working on an aeration chamber retrofit for Bold and Gold project
- Mary Brabham- Silver Springs MFL has been approved by the Board for Rule Making and cost share program information is coming. The District is looking forward to getting more money out in this area.

3. Technical Program: Nitrogen Inventory Preliminary Results

- Nitrogen Source Inventory Loading Tool Overview
 - Non-point sources- atmospheric deposition, animal and human waste, agricultural and residential fertilizer, stormwater
 - 4-step process.
 - Estimate inputs from source inventory information
 - Apply attenuation factors based on potential processes
 - Apply areal weighting factor based on recharge rate
 - Account for proximity to spring- working on this now. This will be fine-tuned based on feedback from stakeholders. Please give feedback.
 - Recharge rate estimates- detailed map created from data provided by SJRWMD (rainfall, ET, hydraulic pressure between aquifers, leakance properties)
 - Most high recharge areas occur in what is referred to as 10 yr capture zone. Simplified information into 3 groups. Low<4 in/yr, med(4-12 in/yr), high (>12 in/yr)
 - Weighting factor for each recharge category
 - Nitrogen attenuation- represents N removal from various processes, used to estimate load to aquifer
- Loading estimate calculations-
 - Atmospheric Deposition- from National Atmospheric Deposition Program- 2 sites in area Bradford Forest and Orlando. Averaged results of these sites to get wet deposition estimate. Dry deposition from CASTNET in IRL 3.06 kg-N/ha
 - Fertilizer- Historic graph of fertilizer sale, huge amount of fertilizer sold in Marion. However, there was a fertilizer plant in Ocala, so need to determine how much of it was actually applied in springshed
 - Estimate of fertilizer application at horse farms supported by work of Jamie Cohen, Marion County UF/IFAS Farm Outreach Coordinator, who has visited more than 780 farms

- 18% apply fertilizer annually
 - 27% apply fertilizer every 3rd year
 - Most of remaining 53% don't apply fertilizer
 - Animal Waste- 2007 Ag Census ranks Marion #1 in horses and pony population, also large population of cattle
 - Horse farm manure management survey of 180 farms. About 62% of farms leave manure on land
 - Revisits show that farms are going toward composting, implementing BMPs
 - Livestock- Used Census of Agriculture from 2007 and applied a loading factor. The census is conducted every 5 years.
 - Human Waste- 21 WWTPs with discharge over 0.1 mgd. Smaller package plants are being accounted for, using 15mg/L as an estimate to start.
 - To calculate input, used 50% design capacity of WWTPS
 - Septic Tanks- Marion County provided data. The DOH provided model data for other counties, which accounts for tax parcel data and sewer service area. Applied an estimated # people per house in each county and used 4.1 kg-N/person.
 - Stormwater- Marion County and Ocala have NPDES permits for stormwater
 - 27 drainage wells in high recharge area. In many cases undergoing some sort of treatment. 19 wells in medium, 15 in low rate. Need to get volume estimates to calculate load through drainage wells
- Applied land use categories as % of land for each county. 79K-ha of livestock land in Marion. Approx. 40% of that is in BMAP area. Did same exercise for each county in each recharge area. Exception- horse farms. Used 62% estimate 14,507 horses in BMAP area. About 50K cattle in BMAP area.
 - For Urban Fertilizer- DACS Fertilizer Sales Data provides N for farms and non-farm applications. N input to surface in each recharge area
 - Farm Fertilizer- used land use categories on 49K ha, based on commodity. Application rates used were IFAS recommended with exception of horses. Jamie's data was applied.
- Attenuation factors- estimate how environment is handling load.
 - Atmospheric deposition, 90% is attenuated, leaving 10% potential to reach groundwater. Handle that 10% by applying a factor based on recharge area type.
 - Same effort applied to livestock waste, farm fertilizer and septic tanks
- N loading estimates for BMAP area are preliminary
 - Need additional population information,
 - Need actual vs. recommended fertilizer application rates
 - Still working on stormwater input

- Looking at 10 yr capture zone which is 21% of total BMAP area. That area is heavily urban.
- Using spatial statistical tools to determine area of concentrated source loading

Q&A

Most attenuation factors are similar to Wakulla, why are septic tanks different?	Looked at additional data and updated Wakulla to reflect these numbers.
Confused about attenuation. Are you accounting for attenuation for each category?	Look at total input, then for each category apply attenuation to that category in all recharge areas, then apply recharge factor. Estimated load = total input*category attenuation*recharge attenuation
If you take average springflow, what does that mean in terms of loading?	Ultimate goal isn't mass balance, it's a load. However, estimated 1.5M KG entering, about 1.0KG being exported in river. Little over, but in ball park. Need to tweak, but based on real information.
If it's improved pasture, do you know if it's used as hay?	No way of knowing. Assume that it's providing food for livestock. That's a good point. Can try to estimate exports.
How are you factoring in dye tracer studies?	Didn't directly, but by looking at 10 yr capture, looking at fastest moving, youngest water. Not looking at rates of movement, but would like to at some point. This is not a fate and transport model.
Example: Orange Lake, FWC wants to spray for plant control, but dye tracer study shows that it's a conduit.	
Tree crops: specialty or pine?	Not certain.
How will focus areas factor into this?	Focus areas have not been delineated. The focus area won't necessarily be the 10 yr. just selected because it was most vulnerable with youngest water. Will be used to show landuse in that area vs. entire BMAP. Because of conduit flow, need to be careful of assuming that it's the most vulnerable area.
Will this be posted? What is completion schedule? Will finished product include entire area?	Yes. Hoping to have completed by end of year. Numbers are already for entire BMAP area.
Any dairy farms in BMAP area?	According to land use, 2. Small, family owned.
Is this based on 2007 data? There have been a lot of land use changes since that time.	POR for Atmospheric Deposition- 2007-2012; WWTP- 2012; Septic Tanks- 2009; Farms- 2008-2009.

WWTP 15mg/L? did you look at DMRS?	Yes, 15mg/L selected for small package plants. Next step is to look at DMRs for operational and concentration data.
Comment: A lot of package plants aren't permitted for weekly or monthly, and are only monitoring for nitrate.	
Comment: There are other potential sources. Several land application sites. Importing biosolids	
Biosolids facilities take both human and animal waste and if permitted by DEP, reports will contain those numbers.	
Comment: Ag may be using lands as sprayfield.	
Reason for concern is that some monitoring wells have shown increased nitrogen.	
Why is the Northern portion of the springshed such a high recharge area?	This is based on SJRWMD data. Apparently a very thin confining unit. Sugar sand and scrub. Can get data from SJRWMD about specifics of how it's delineated.
Still evaluating stormwater. What will an additional load do for impact?	Based on Wakulla, concentrations in SW low, and then with attenuation in drainage retention areas, concentrations will be low.
What about irrigation?	Won't increase load from the water itself, but will impact ability of nutrients to move through the soil.
Is this a new tool? Are there others used around the nation?	Del Botcher has created a model. Similar in that the land use inputs are accounted for. MACTEC used a similar tool in Wekiva.
Is it possible to forecast?	We can look at how a land use change might affect the area by running different scenarios, but there is a lot of uncertainty.
After hurricanes, saw influx of people to this area. By 2043, may see big increase in population. Need to look at that.	This tool isn't meant to project changes.
Groundwater withdrawals. Recharge maps are based on potentiometric differences. Groundwater withdrawals are already accounted for.	
Can we get the actual data?	See the table provided earlier in the presentation. Need to recognize that these are rounded values. Separated out by county, recharge area and total.
Fertilizer sales reports are out as late as 2012.	Using that information from 2007-2012, Land Use is 2009.
Another factor for spatial resolution could be affluence of residential developments.	We've discussed and it's a possibility.
Economy does drive population of cattle.	We do know that it could be high.
In other BMAPS, ground truthed some of the farms.	FDEP has done some ground truthing and will do more.
To summarize, two largest contributors are farm fertilizer and livestock?	Yes.
Do we know if it's fertilizer or sprayfield?	No. the fertilizer is based on IFAS rates.

	With application rates, we're not saying that's how much is purchased. We're using recommended rate whether it's fertilizer or effluent. That is a good point. Can we get an estimate of how much is sprayed?
Comment: Part that is being discussed is part of WWTP calculation. The concern is imports of septage perhaps not accounted for.	
In spray fields, you can send leaf tissue samples for N analysis. Do all spray fields test?	Depends on operation and permit requirements.
WWTP Effluent is in WWT Column, are you double counting?	We may be and once we have data, we will evaluate. Farms may not be applying at recommended rate.
Comment: If cattlemen are using biosolids, they adjust fertilizer application.	
Comment: As FDACS signs people up for BMPs, they develop a nutrient management plan. So a lot of this will be worked out.	
David Holmes said he had detailed information.	Brian will follow up.
Attenuation says that a % doesn't get to water. But couldn't it still be "legacy"?	This tool is not looking at storage at all. That is a good point. There could be an amount of N stored.
Would it be helpful to sample farms for N? In Chesapeake, mortgage company wouldn't allow sale because of high N. Wondering if that exists anywhere in this state.	We're going to discuss after lunch. We do have DOH data. There have been instances in Ridge area. A lot of times high N is an indicator of other issues.
What about well water? Public doesn't even know about testing water. May want to get DOH involved	DOH has been participating. They oversee small wells. As you step up in connections, you are regulated by FDEP. Most health departments have closed labs. May be 1980s data from when FDEP and DOH worked to get a baseline.
Doesn't DEP have status and trend wells?	Yes, but limited. Monitoring has taken a different direction.
In surface water systems, is N export accounted for in low recharge areas?	Runoff is a minimal factor. Discharge at Silver, 1.4 mg/L, drops to 0.2 mg/L. Significant amounts of N are coming out of groundwater as opposed to running into the river.
Comment: Most of that difference is going to surface water in low recharge areas.	

4. Survey of Equine BMPs – Jaime Cohen

- Program targets water quality and natural resources conservation, including manure management and pasture fertilization.
 - Mostly focuses on horses but branching out into goats, chickens, small cow ops etc., some of which have high nitrogen content in manure and urine. It all needs to be addressed
 - For our area, the problem is N but in Wellington for example, its Phosphorus.

- In Florida, there are 18mil people and 500,000 horses (#3 in country).
 - In Marion County 30-50k horses 2008, lower in summer. Each horse produces 45-50 lbs of manure per day.
 - Horses are a \$39 billion per year industry.
- Issue is volume of manure. Horse manure doesn't have as much N (45-50 lbs/day of manure) as other animals but we have a lot of it.
- Agriculture isn't "bad" but we do things differently today such as mass farming versus each person owning their own chicken.
- Program reaches out to farms and other equine interest groups. Program began in 2007 and with University since 2010.
 - 200+ visits and revisits to farms who had problems. Don't revisit the farms that do things right already. I don't get you in trouble I help you get out of trouble.
 - I also try to visit new farms. Better to set them up right from the start. SWFWMD has also been a great partner for cost-share for improvements
- Proper manure management can involve dumpster disposal, containment bins, composting for fertilizer, storage away from sensitive areas like sinkholes, and using bedding as cow feed. We've eliminated a lot of manure piles through this program.
- Composting is very beneficial and is highly recommended. Examples of manure handling in other areas include:
 - In Wellington, FL you can't spread manure unless it is composted.
 - In PA one pony requires nutrient management plan for any land application.
- Manure to energy: two farms in County use this. Gasification to electricity.
- FDACS BMPs issues-
 - FDACS has BMP manuals for various sectors but problem with equine industry is that different breeds don't talk to each other.
 - FDACS is for commercial exercises but most don't qualify and Hobby Horse manual is not regulatory.

Q&A

What kind of facility is using manure to energy?. Dairy?	No it's a general farm but manure is covered.
Should there be a little more of BMPs as proposed in FDACS manual or reporting of activities?	yes, but I don't want to regulate. It's a tough one.
Would you say over half the farms in MC don't qualify for FDACS BMP enrollment?	yes. Its significant.
Comment: The problem with government is you make these laws but don't tell anyone.	
Response: We've seen a 70% improvement in manure handling since 2007. There has been progress on handling.	
Horse manure is about 12% N?	Look at the table 12.1 lbs/ton.

If I had farm and was stockpiling, why should I do it different?	I explain the potential impacts to groundwater and that's what they drink. For large piles there is a potential fine if it is not managed properly: 10k a day.
Have farms tested their well water?	They can if you don't sign for BMP program. In fact you have to. None that I know have opted for it. It's costly.
Where do the dumpsters go?	It's shipped to other people who compost it outside the County. FDEP nitrogen analysis may not reflect this export or piles now not in contact with ground.
Comment: If China could use gasification 30 years ago we can here.	

5. Technical Program: SJRWMD Groundwater Modeling Network – Dave Hornsby

- SJRWMD measures quality & quantity of water coming from springs.
 - Continuous discharge monitoring at Half Mile Creek and at Sharpes Ferry.
 - Contaminants monitoring at four points on the river.
- Water level measurements on river and aquifer.
- For Springs Initiative SJRWMD is increasing water quality monitoring to bi-monthly and biological monitoring (3-4 times over project). This includes benthic algae, SAV, benthic macro invert monitoring.
- SJRWMD initiative- looking at several springs beyond Silver.
- Now have continuous monitoring probes for nitrogen using in-situ samplers (YSI EXO). Parameters being monitored are: pH, N, Temp, Cond, DO and depth. Near real time data on web. FDEP provided additional funding so we were able to get slightly different sensor for low concentration of nitrate to thousandth of mg.
- Ground water monitoring: some existing WQ, stage and level wells. VISA (Very Intense Study Area, former DEP program) wells some of which will be reactivated. But still holes.
 - SJRWMD worked with FDEP to identify gaps and we are adding 22 additional wells based on different landuses. Using combined resources and goals; FDEP is identifying sites and getting access, SJRWMD is drilling.
- Final network of about 80 wells doing water level and chemistry. Hopefully locations will reflect landuse effects on groundwater and identify activities with high loading.

Is the hole in Sumter County because it is outside District boundary?	Yes primarily. But didn't meet District or Dept criteria.
What do different colored dots mean on the map?	Different colors indicate WQ well or WQ and level well. USGS has wells and they are included in this effort.

Where is the continuous data online?	On our webpage. Follow navigation links. Most recent equipment data is not yet up.
Will wells be reported in real time?	Most likely not. Data will be available by request.
You said you have to drill wells. Why aren't you looking for existing wells?	For a monitoring well we want to know what we have. So if no boring log, we drill our own. Also certain diameters needed. These will be 6". Also if we hit surficial or middle Floridan, we will have a well in it.
Comment: FDEP contract with URS also requires updates to land use.	
What parameters are you studying in the new wells?	More than just nitrogen. Metals, major ions but no organics or pesticides. Maybe isotope analysis.
Comment: Nitrogen is canary in coal mine.	Response: Yes. Pesticides are large ions and don't move as fast but it's possible if we see area with high nitrogen loading we could come back and do pesticides etc.
Do you have access to bottled water quality from silver springs?	It can be obtained, it is reported to USDA. Quantity from CUP. It's a small component of water use, 2-3%.
Comment: Walmart sells water from Silver Springs.	Response: Bottling Plants typically use about half of their capacity.
Bottling companies are taking water directly from the spring?	Yes and no. To be called spring water it must have the same chemistry which means well in the spring or in the same conduit or from nearby with chemical analysis. But look at scale of withdrawal versus flow, it's a small portion. Cumulatively it does have an impact though.
Comment: not only Walmart, but Publix etc. sell water.	
Comment: You can't call water treated by reverse osmosis spring water.	
Are you going to sample the spring water?	It has been done but we are planning on isotope analysis. Probably a mix of organic and inorganic sources. Might be able to use chemical analysis to track sources. Target areas causing problems. Springs vents have been grouped by chemistry. We'd like to go further and find the source for them.
So 33 vents are from 4 sources?	They have 4 similar chemistries.
When do you expect to drill and sample?	Early spring on the drilling.
How did you determine where to put new	Worked with FDEP. Goal was to find land uses

wells?	that existing wells weren't capturing.
How deep are the wells?	Top of Upper Floridan, but if we encounter surficial or intermediate we will also place a well in there. No set depth.
What is depth on surficial?	Surficial would be near surface so it'd most likely be near surface in low recharge areas.
Comment: Between US 441 and US- 301 aquifer is near surface.	
Was current land use used?	Yes. 2009 is the start but contract will update land use. Monitoring data and what is in aquifer right now. It's still a work in progress.

- DEP, SJRWMD, and Silver Springs Alliance held a teleconference on nitrate data and sources. Goal was to find sources of data and how to obtain them. It's a very preliminary discussion.
 - Goal is to map the conc of groundwater spatially and possibly temporally (historical or more recent). It will be useful to check nitrate study and identify hot spots with high conc.
 - Possible ideas discussed: medians by decade in whole management area, pick a point in time and do before and after. Possibility with new network is that recent historical data becomes reference period and new network is used for future comparisons.
 - This is from data originally for other purposes. Well depth is important and we don't want surficial wells. But also not extremely deep public water supply wells. Say about 30-150 feet. Most drinking water wells are in that range.
- Some data sources: SJRWMD, FDEP historical network, USGS Trudy Phelps wells, VISA, DOG wells for contaminant response. FDEP facility monitoring wells, FDEP water supply wells but these are finished water so may not be useful, DOH small facility data they are being geocoded by Shane. About 2000 wells Lisa provided from a data request to DOH. Locational information (NW, NE, etc.) was lacking and we are about 40% done.

Will you be able to discern whether it is surficial or not in the historic data?	We think yes. There may be depth data. There may be older DOH data but often don't have construction or depth data. We have a lot of data to dissect and hopefully by December we might have some results.
Are any ag operations testing their wells?	Not really but a few horse farms have had their water tested.

6. Farm Field Trip Coordination and Looking Ahead

- Next meeting at IFAS in Citra including peach and blueberry, irrigation systems and turf grass focusing on nutrient movement and setbacks. Also energycane which we guess is a emerging biofuel. Downside, no row cropping activity in December.
- It'll be a Friday meeting. December 6. Meeting at Citra and then field tour.
- Second farm tour would be working farm tour in January. Adena has made an offer for cow calf, equine and silvaculture. Also perhaps another site for more cattle or equine.
- Focus area discussion probably beginning in January. Nuts and bolts of BMAP beginning in January.
- Public meeting possible for late January. We're at a point it may be good to hold one as the nitrogen inventory is complete. Invite elected officials. Need to plan details now.
- No meeting in November.

Q&A

Is it a goal to have source inventory distributed by December, or at least a methods report?	Not by December 6 th but maybe by January. But a progress update would be possible in December.
Comment: In the past the working group met at springs. Would be nice to get on glass bottom boats and see the problem first hand.	
We talked about manure, but does that include urine?	Yes.
Comment: Compost only addresses the solid portion of waste	
Comment: There are still legacy issues with contaminants previously placed in aquifer.	