

Florida Department of Environmental Protection



Water Quality Restoration Program

Silver Springs BMAP Meeting

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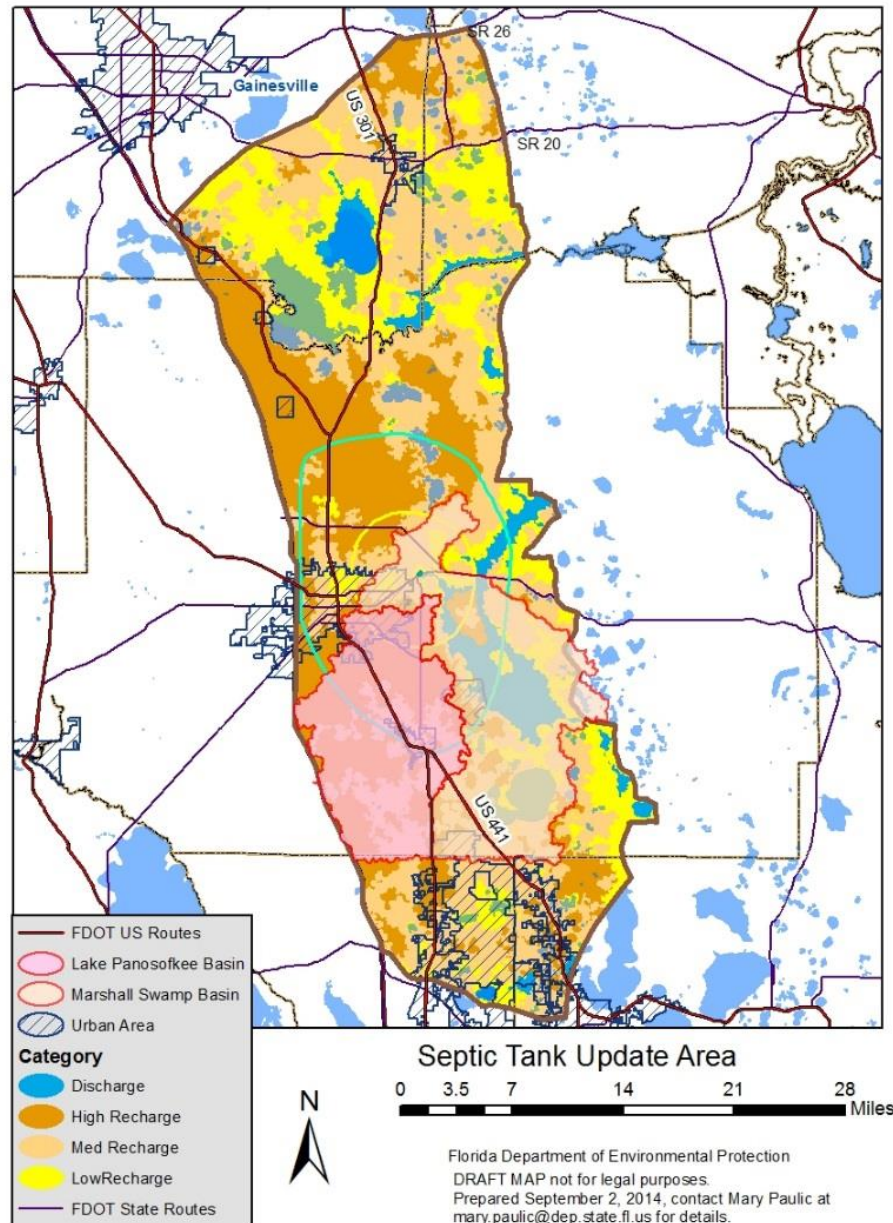




Nitrogen Source Inventory Revision

- Marion County provided best available septic tank data.
- Data was updated, but not reflected in the nitrogen source inventory.
 - Marshall Swamp Basin
 - Includes Silver Springs Shores area
 - Lake Panosoffkee Basin

Area Revised





Change in Septic Tank Number

BMAP Area	Old #	New #	Added
High Recharge	27,349	33,367	6,018
Medium Recharge	25,296	26,397	1,101
Low Recharge	6,728	6,750	22
Total	59,373	66,514	7,141
10 year capture zone	Old #	New #	Change
High Recharge	11,487	17,588	6,101
Medium Recharge	5,117	5,586	469
Low Recharge	884	931	47
Total	17,488	24,177	6,617



Changes

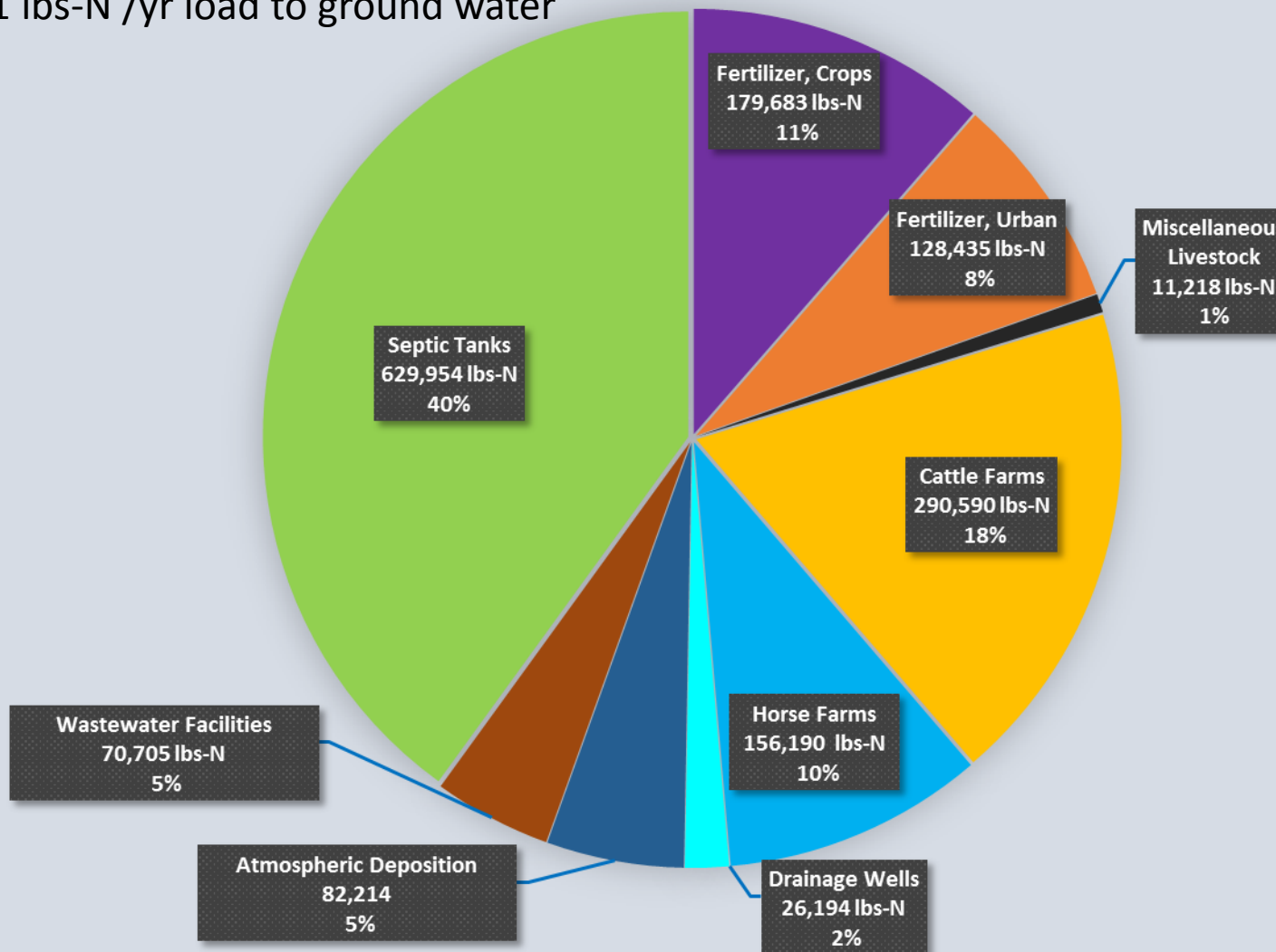
- Increased loading to land surface – now 12.082 million lbs-N/yr.
- Increase in ground water loading from septic tanks.
- Changes proportion of loading contributed by each source.
- Change in estimated ground water loading for entire BMAP area:

Old GW Loading	New GW Loading
1,489,715 lbs-N/yr	1,575,181 lbs-N/yr
Old Septic Tank Loading	New Septic Tank Loading
544,487 lbs-N/yr	629,954 lbs-N/yr



Estimated Ground Water Load for Entire BMAP Area

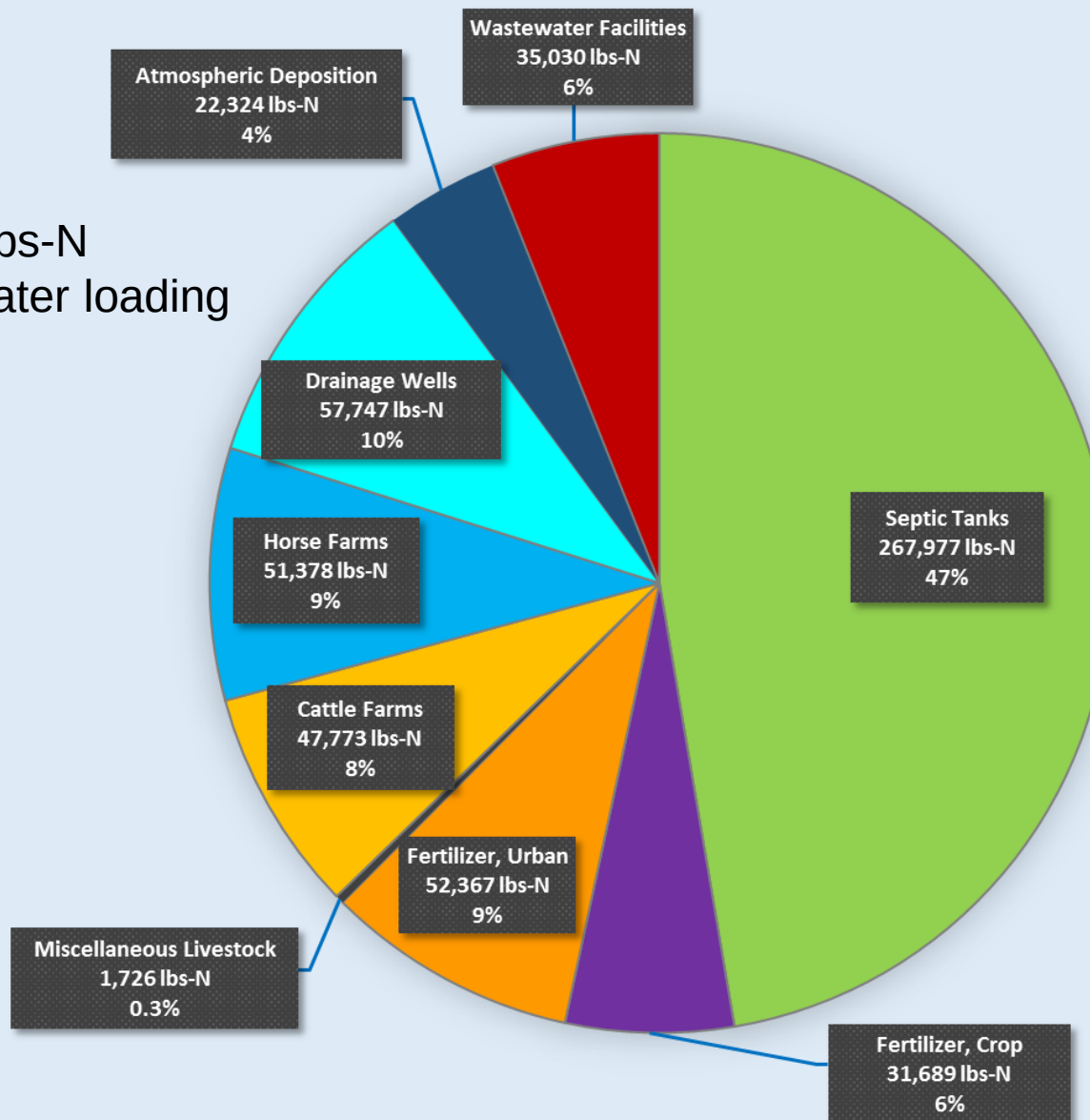
1,575,181 lbs-N /yr load to ground water





Loading to Ground Water in 10 Year Capture Zone

568,012 lbs-N
ground water loading





Project Summary



Project Categories

- Funded – either complete or in progress.
- Planned – funded or within a plan that is expected to have funding.
- Conceptual – projects which do not have committed funding, but as opportunities arise this is a project that should be started.



Stormwater Project Summary

Urban Fertilizer - stormwater

Project type	Number of Projects-Funded	Number of Projects - Planned	Number of Projects - Conceptual
Urban Structural BMP	38	5	2
Urban Non-Structural BMP	12	--	--
Regulation /Ordinance	7	--	--
Planning Designations	5	--	--
Education/Outreach	20	--	--

Total number of projects= 89



Drainage Wells

Project Type	Number of Projects-Funded	Number of Projects – Planned	Number of Projects - Conceptual
Drainage wells	--	2	--

Total Number of Projects = 2



Wastewater Project Summary

Wastewater Treatment Facilities – Septic Tanks

Project type	Number of Projects-Funded	Number of Projects - Planned	Number of Projects - Conceptual
Reuse	5	--	1
Wastewater Collection System Maintenance	9	1	--
Wastewater Service Area Expansion	4	1	1
Wastewater System Upgrade	4	2	1
Connection of Septic Tanks to Sewer	2	--	1

WWTF=29 Projects

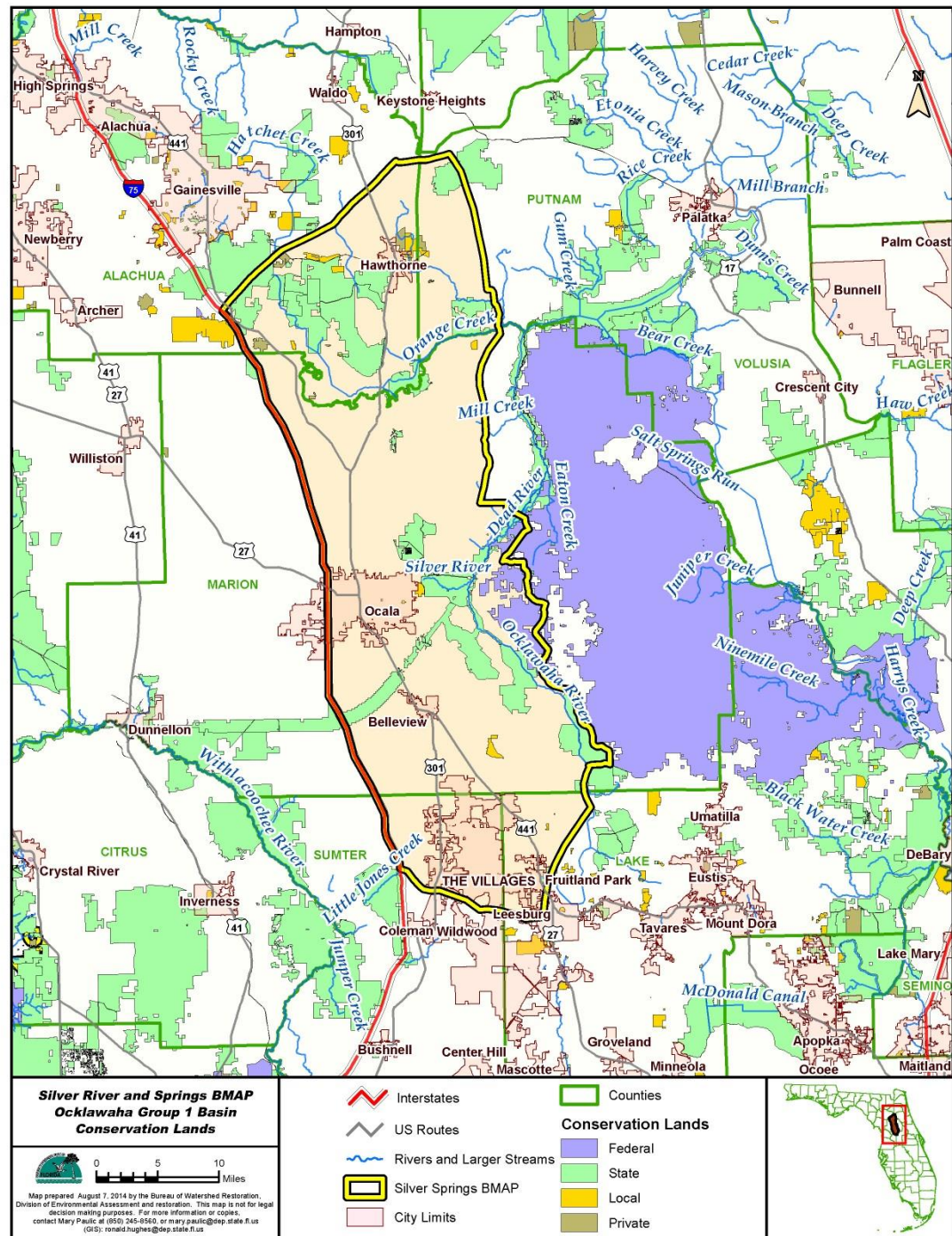
Septic Tank=3 Projects

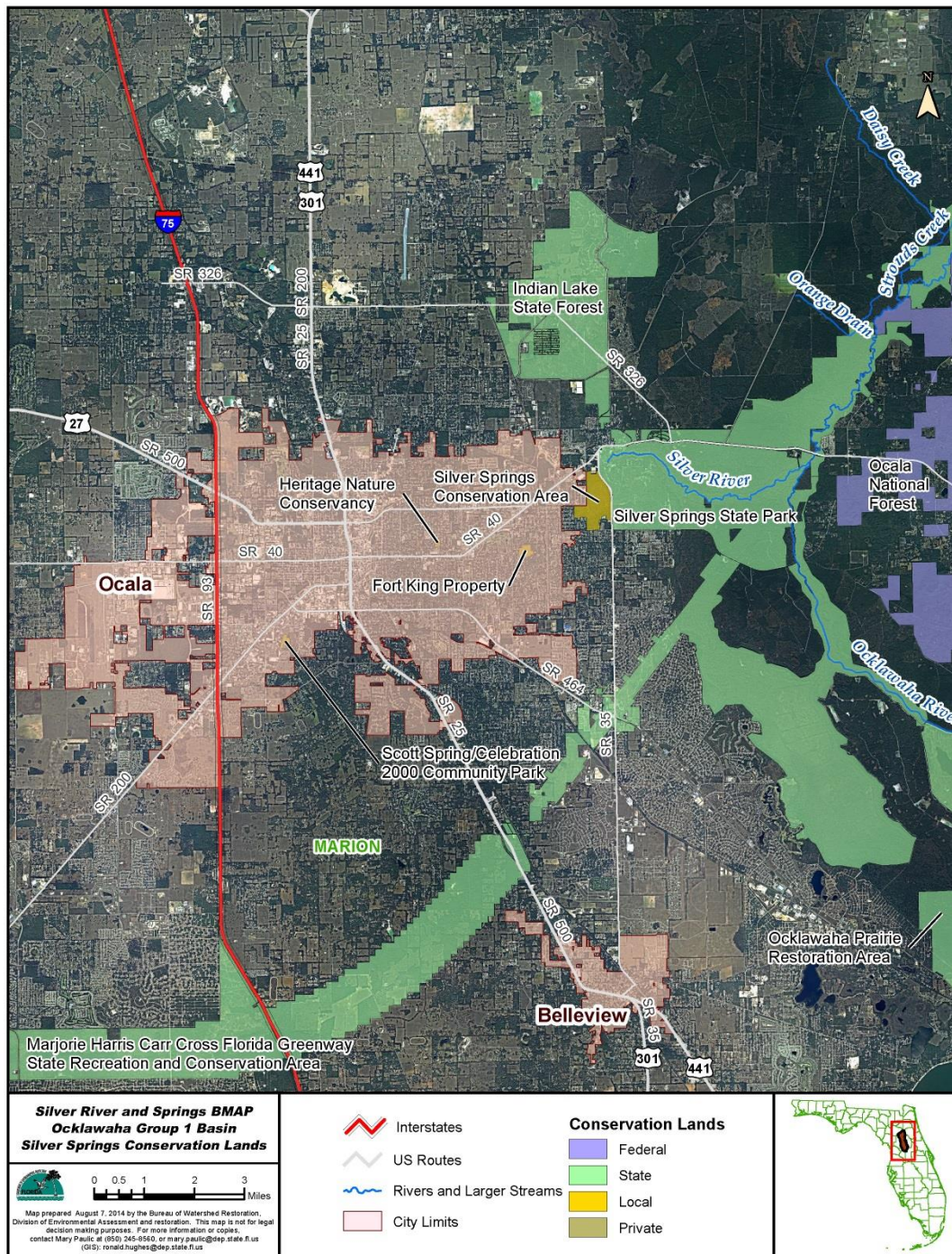


Conservation Projects

- 9 projects submitted as conservation land purchases.
- Includes Indian Lake State Forest (Avatar Property) and Silver Springs Conservation Area.
- Other projects are located in the north of the basin near Lochloosa Lake.

Location of Conservation Lands





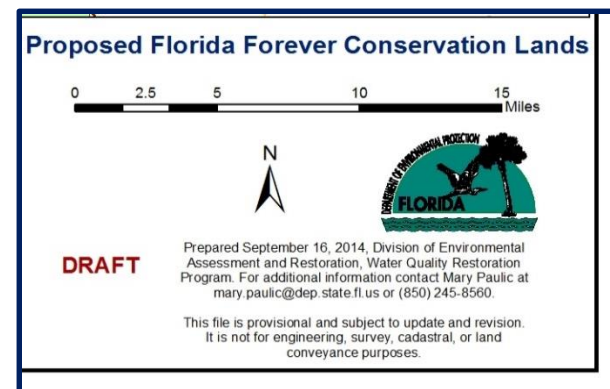
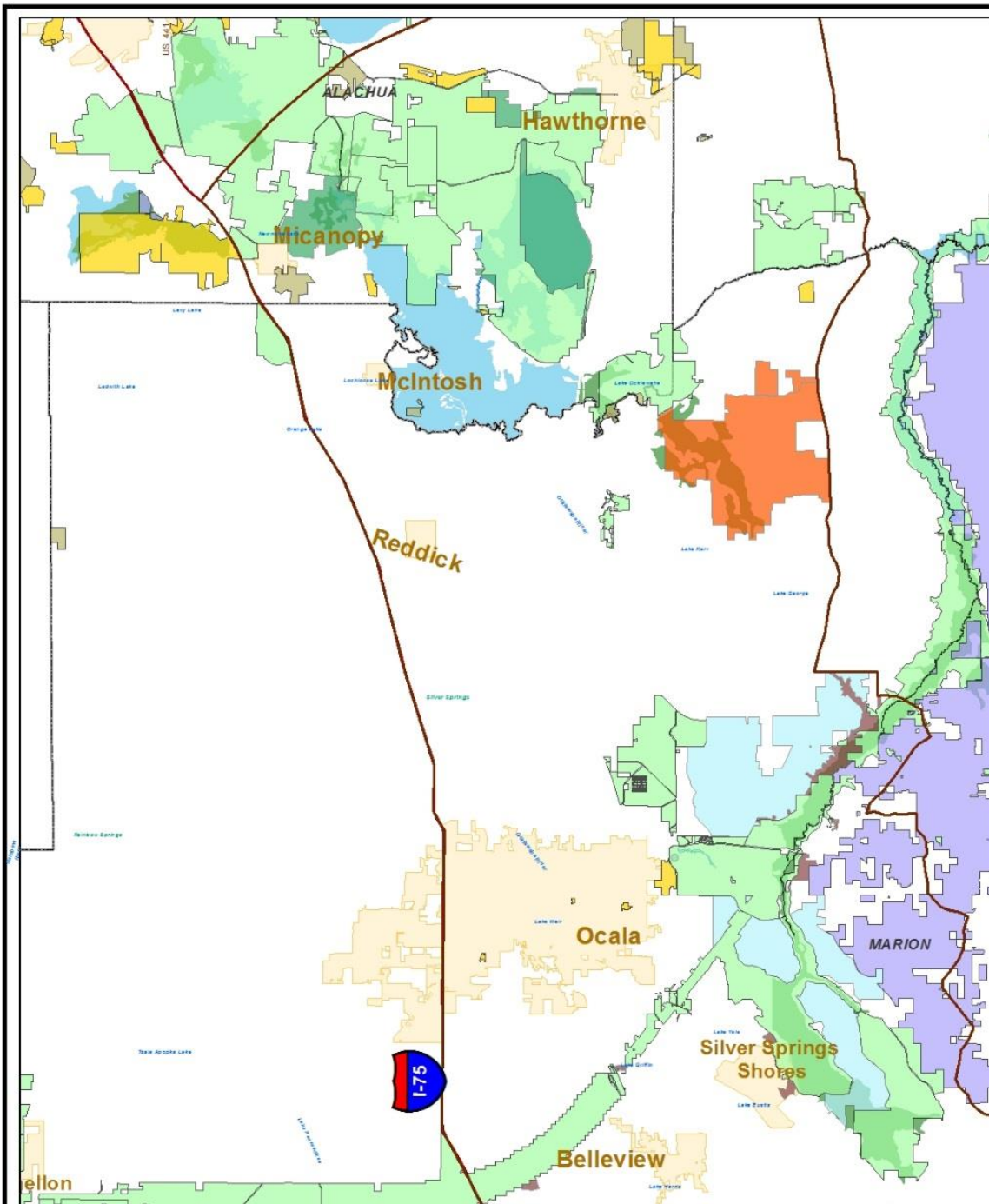


Future Conservation Projects

Projects Proposed in 2014 Florida Forever Five Year Plan

Site Name	Project Name	Area (acres)
Florida's First Magnitude Springs - Silver Springs	Florida's First Magnitude Springs	156.21
Etoniah/Cross Florida Greenway - Cross Florida Greenway Phase II	Etoniah/Cross Florida Greenway	1,292.58
Etoniah/Cross Florida Greenway - Cross Florida Greenway FPL Additions	Etoniah/Cross Florida Greenway	28.62
Etoniah/Cross Florida Greenway - Cross Florida Greenway 2001 Additions	Etoniah/Cross Florida Greenway	424.30
Heather Island/Ocklawaha River	Heather Island/Ocklawaha River	19,245.25
Lochloosa Wildlife	Lochloosa Wildlife	9,191.30
Mill Creek	Mill Creek	12,292.67

Proposed Florida Forever Projects





Agricultural Land Uses in the Silver Springs BMAP Area –from DACS

LAND USE CODE	CODE DESCRIPTION	TOTAL ACRES	PERCENT OF TOTAL ACRES
2100	Cropland and Pastureland	14,157.5	9.2%
2110	Improved Pasture	59,076.6	38.3%
2120	Unimproved Pasture	3,582.2	2.3%
2130	Woodland Pasture	8,880.1	5.8%
3100	Herbaceous Upland Nonforested	4,464	2.9%
3200	Shrub and Brushland	2,127.3	1.4%
3300	Mixed Upland Nonforested	2,761.1	1.8%
2140	Row Crop	1,137.6	0.7%
2150	Field Crops	20,125.6	13.0%
2160	Mixed Crops	737.3	0.5%
2200	Tree Crops	888.2	0.6%
2210	Citrus	2,025.8	1.3%
2240	Abandoned Trees	65.1	--
2300	Animal Feeding Operations	83.1	0.1%
2310	Cattle Feeding Operation	81.4	0.1%
2320	Poultry Feeding Operation	74.8	--
2400	Nurseries	454.7	0.3%
2410	Tree Nurseries	366.6	0.2%
2430	Ornamentals	629.7	0.4%
2500	Specialty Farms	830.6	0.5%
2510	Horse Farm	28,674.3	18.6%
2520	Dairies	1,004.6	0.7%
2540	Aquaculture	11.1	--
2600	Other Open Lands – Rural	1,661.0	1.1%
2610	Fallow Cropland	54.7	--
-	TOTAL	154,283.4	100%

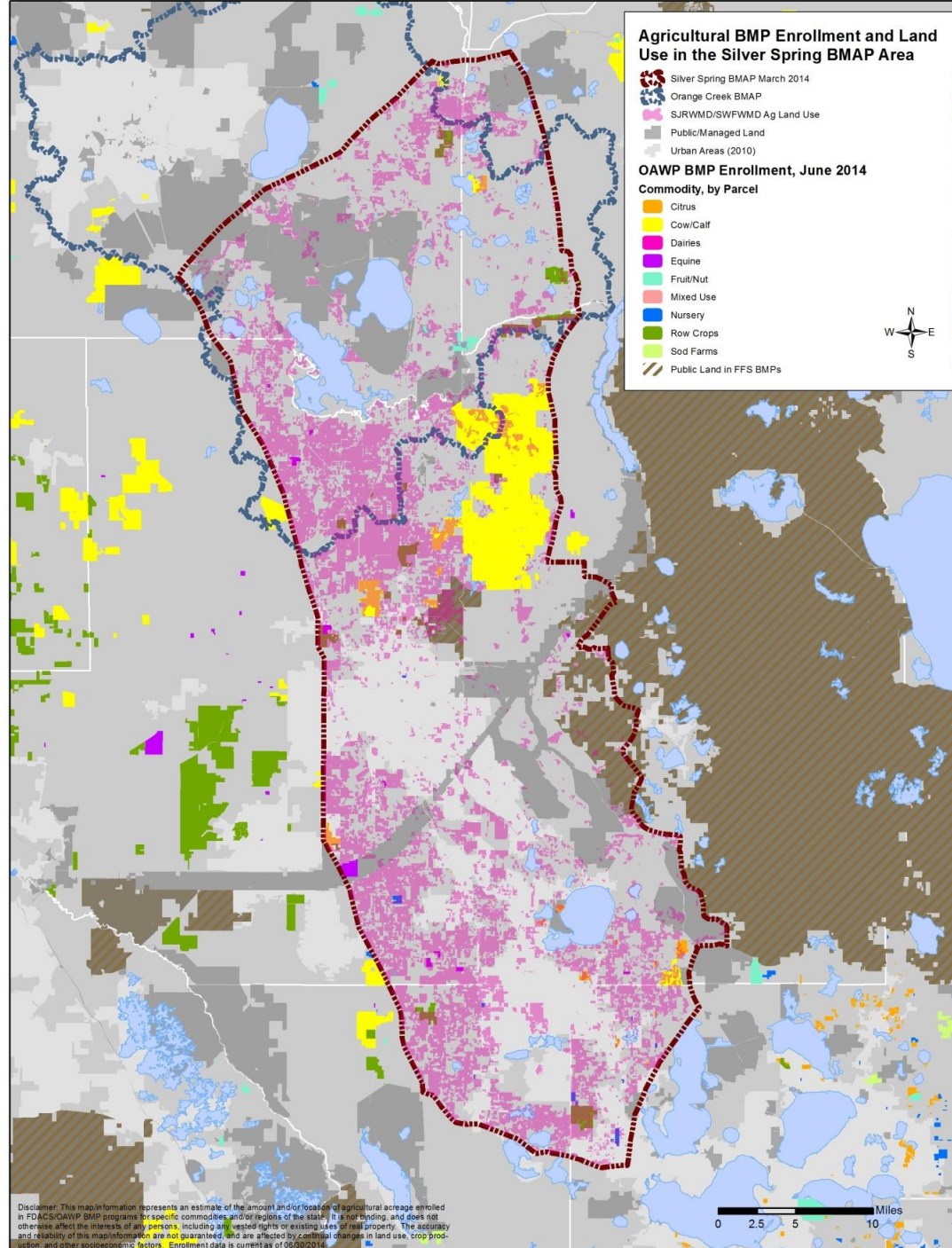


Agriculture Priorities

- BMP enrollment - 18.2 % or 27,240 acres currently enrolled as of June 30, 2014.
- All agricultural producers in the basin are required to sign up for BMPs.
- Based on acreage equine, cow/calf, and vegetable/agronomic crop BMPs cover the greatest area.
- Important areas for enrollment are high recharge rate and the BMAP area shared with the Orange Creek Basin.

Areas with NOI

- Information provided by DACS





Agriculture Guidance

- Nutrient Management:
 - Strive to achieve the most appropriate combination of nutrient source, amount, placement, and application timing based on crop needs, soils, and weather.
 - For animal operations, strive to ensure proper management of manure.
- Irrigation Management:
 - Maximize irrigation system efficiency.
 - Manage frequency, timing, and amount of irrigation to target delivery to plant root zone.
 - Incorporate simple but effective irrigation management tools.
 - If available, consult with a Mobile Irrigation Lab.



Agriculture Guidance

- Sedimentation and Erosion Control:
 - Strive to maintain vegetation in areas prone to erosion, to hold soil and decrease velocity of irrigation and stormwater runoff.
- Water Resource Protection:
 - Employ buffers, swales, and/or setbacks to reduce potential for pollutant discharge.



Agriculture Projects

- Silviculture compliance program. Florida Forest Service.
- Marion County Clean Farms Program.
- Small Farms Equine BMP Outreach development and implementation.
- Water Quality Education and Equine Farm BMPs (SWFWMD).
- DACS cost share programs.
 - DACS has committed \$250,000 in cost share for the Silver Springs BMAP



How to Measure Reductions?

- How do we estimate loading reduction from projects for each source category?
 - Wastewater and stormwater projects have loading reductions associated with them.
 - A loading reduction can be calculated for septic tank removal by connection to central sewer.
 - Ordinances and public education are a little tougher to define – but DEP has established a draft crediting system for these type of activities.
 - Agricultural BMP implementation can be estimated.



Loading Calculations

- Calculated as reduction in loading to land surface – reduction from 12 million lbs-N/year.
 - Starting point
 - All numbers are provisional!!
- These methods are used in other BMAPs.



Loading Calcs. cont.

- **Caveat** – not all projects currently have an estimated TN loading reduction. **Actually may be underestimating what we are accomplishing.**
 - Planning tools such as ordinances are difficult to assess to estimate a pounds reduction.
 - DEP has not established a method for calculating a loading reduction for purchase of conservation lands.
 - Not all project types fit into Nitrogen Inventory Category.



Agriculture Loading Reductions

- Starting load of 7,596,591 lbs-N/yr to the land surface.
- Assume 30% reduction achieved with implementation of BMPs. (not distinguishing between BMPs)
- If all the agriculture acreage in the basin was covered by BMPs then the draft estimated reduction is:
 $7,596,591 \times 0.3 = 2,278,977 \text{ lbs-N/yr.}$
- This illustrates just how important BMPs for agriculture are in this basin!
- DACS is working with growers to sign them up for BMPs.



Calculated Wastewater Reductions

- How different calculations were made.
- Upgrades in treatment based on difference between improved effluent quality and previous reported effluent quality.
- Drainage wells – incorporate pretreatment that removes nitrogen before discharge.
- Septic tank – pounds that are removed currently calculated as contribution per person x number of people.
- Reuse water = volume x quality of effluent.



Draft Calculations

Category	Estimated TN Load Reduction (lbs/yr)*	Total TN Land Surface Load (lbs/yr)
Wastewater Land Application includes Reuse	194,434	321,083
Septic Tanks	40,666	1,592,560
Drainage Wells	1,424	40,298

*All numbers are provisional



Education Credits

Activity	Included?	Activity Details
Florida Yards and Neighborhoods Program	☐ YES	--
Landscaping local code/ordinance	☐ YES	--
Irrigation local code/ordinance	☐ YES	--
Fertilizer local code/ordinance	☐ YES	--
Pet waste management local code/ordinance	☐ YES	--
Public Service Announcements	☐ YES	--
Informational pamphlets	☐ YES	--
Website	☐ YES	--
Inspection program and call-in number for illicit discharges	☐ YES	--



Crediting scheme

- If all activities are conducted, then the full 6% reduction is assigned.
- If only PSAs, websites, brochures, and the inspection program are provided, a 1% reduction credit is assigned.
- If only the FYN program is implemented, a 3% reduction credit is assigned.
- If only the four ordinances are implemented, then a 2% reduction is assigned.
- Credit scheme based on work done by Center for Watershed Protection (Maryland).



Education Calculation

- Education and outreach reduction applied to urban fertilizer loading.
- Applied 3% across basin as a starting point.
- Need to verify what proportion of urban fertilizer usage is covered by different education and outreach efforts.
 - May be able to apply more than 3% credit.



Stormwater

- Street sweeping – pounds of nutrient removed can be estimated from volume or weight of material collected.
- Stormwater BMPs –
 - Dry retention without soil amendments or other modifications not calculated – still working through acceptable crediting.
- Fertilizer cessation – start with total fertilizer pounds and assumed that 36.3% had washed off as stormwater runoff. Reduction is the portion that was estimated to be in runoff.



Urban Fertilizer

- Estimated loading reductions need refinement.
- Education credit assumed at 3% across basin:
 $1,028,117 \text{ lbs-N/yr} \times 0.03 = 30,844 \text{ lbs-N/yr}$
- Remainder of reduction comes from stormwater ponds and fertilizer cessation.
- Draft estimates are:

Category	Estimated TN Load Reduction (lbs/yr)*	Total TN Land Surface Load (lbs/yr)
Urban Fertilizer – ground water	47,296	1,028,117
Urban Fertilizer surface water – Lake Griffin and Silver River and Lochloosa Lake	6,119	N/A

*All numbers are provisional



Measuring Sufficiency of Effort



Sufficiency of Effort

- The BMAP represents a commitment to restore water quality to Silver Springs and Upper Silver River. Refer to as sufficiency of effort.
- Focus of our conversation is ways we can measure sufficiency of effort.
- Present some ideas on how to measure.
- Get feedback on your thoughts on these different approaches.
- Following are examples only. Each measure has weaknesses and strengths and gives us different information.



Sufficiency of Effort Example Measures

- Number of projects by recharge category.
- Number of projects by source category.

Example, provisional:

Category	Number of Projects
Wastewater	29
Septic Tanks	3
Urban Fertilizer	89
Drainage Wells	2
Agriculture	BMPs+5



Sufficiency Measures Examples

- Number of projects by entity. Example, provisional:

Entity Name	Number of Projects
Marion County	34
Alachua County	7
Lake County	4
Ocala	10
Bellevue	2
The Villages	24
McIntosh	To be determined
Lady Lake	4
Hawthorne	To be determined
Fruitland Park	To be determined



Sufficiency Measures Examples

- Number of projects represented as proportion of the contribution by a given source.
- Reduction in surface loading- measure as lbs-N/yr.
- Weight number of projects by area of each entity.

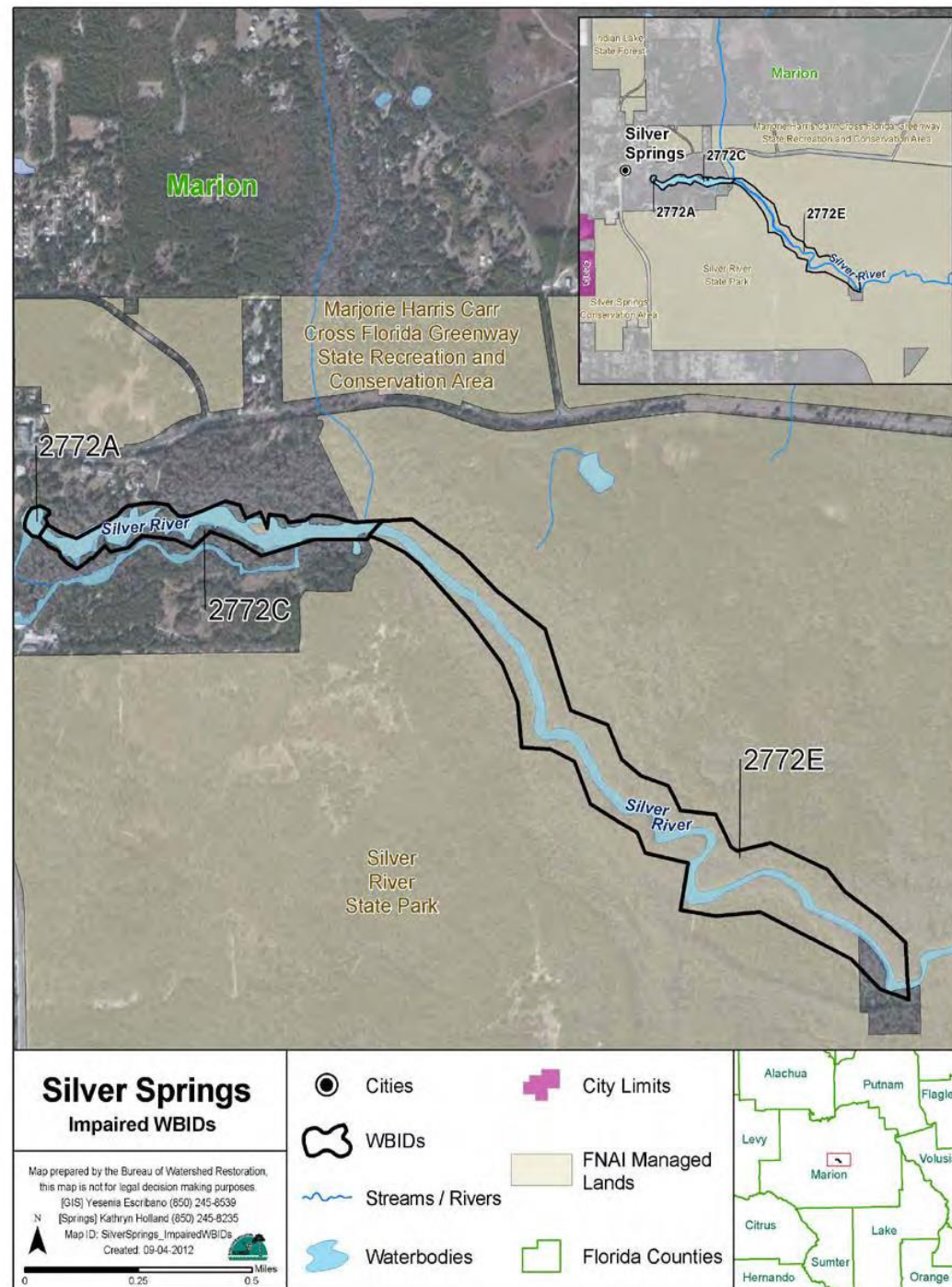


What should we do?

- Discussion???

Water Quality Monitoring

Location of impaired waterbodies



Surface Water Monitoring

- Upper Silver River was considered impaired because of algal mats. TMDL set a nitrate limit as 0.35 mg/L as a long term monthly average.





Monitoring

- Purpose: propose minimum monitoring network that will support the evaluation of progress made to achieve TMDL target.
- Integrate effort with SJRWMD Springs Initiative where practical.
- Surface water and ground water components.
 - Surface water sampling to include chemical and biological indicators.
 - Groundwater monitoring well network.
 - Research related monitoring – Silver Springs Initiative.
 - Targeted monitoring.
 - Potable Water Supply data – DEP permitted water supply systems and DOH limited use 64E-8 systems



Surface Water

- Proposed Goals and Objectives
 1. *Identify and track changes in nitrate concentration in Silver Springs, Silver Springs Group, and Silver River to determine if TMDL targets are being achieved.*
 2. *Identify and track biological response of Silver Springs, Silver Springs Group, and Silver River to changes in nitrate concentration.*



Water Quality Stations

- Minimal sampling network with at least one station in each impaired waterbody.
- Sampling at least 5 locations to cover impaired waterbodies.
- Main vent, Silver River upstream of Half Mile Creek, Silver River downstream of Half Mile Creek, downstream Silver River closer to Ocklawaha River, Half Mile Creek.



What to Sample

- Response Indicators:
 - In-situ measures: DO, pH, specific conductance, light attenuation measure or water clarity measure
 - Measure of PAR is preferred
 - Secchi depth to be avoided if possible – problem is that in shallow water bottom is still visible, will not accurately reflect changes in clarity of water column
 - Chemical: TP, NO₃, TKN, NH₃, TOC, TSS or turbidity, cations and anions
 - Discharge measurement



Biology

- SJRWMD performs annual SAV monitoring and algal surveys.
- DEP is adding Rapid Periphyton Survey, habitat assessment, and Stream Condition Index.



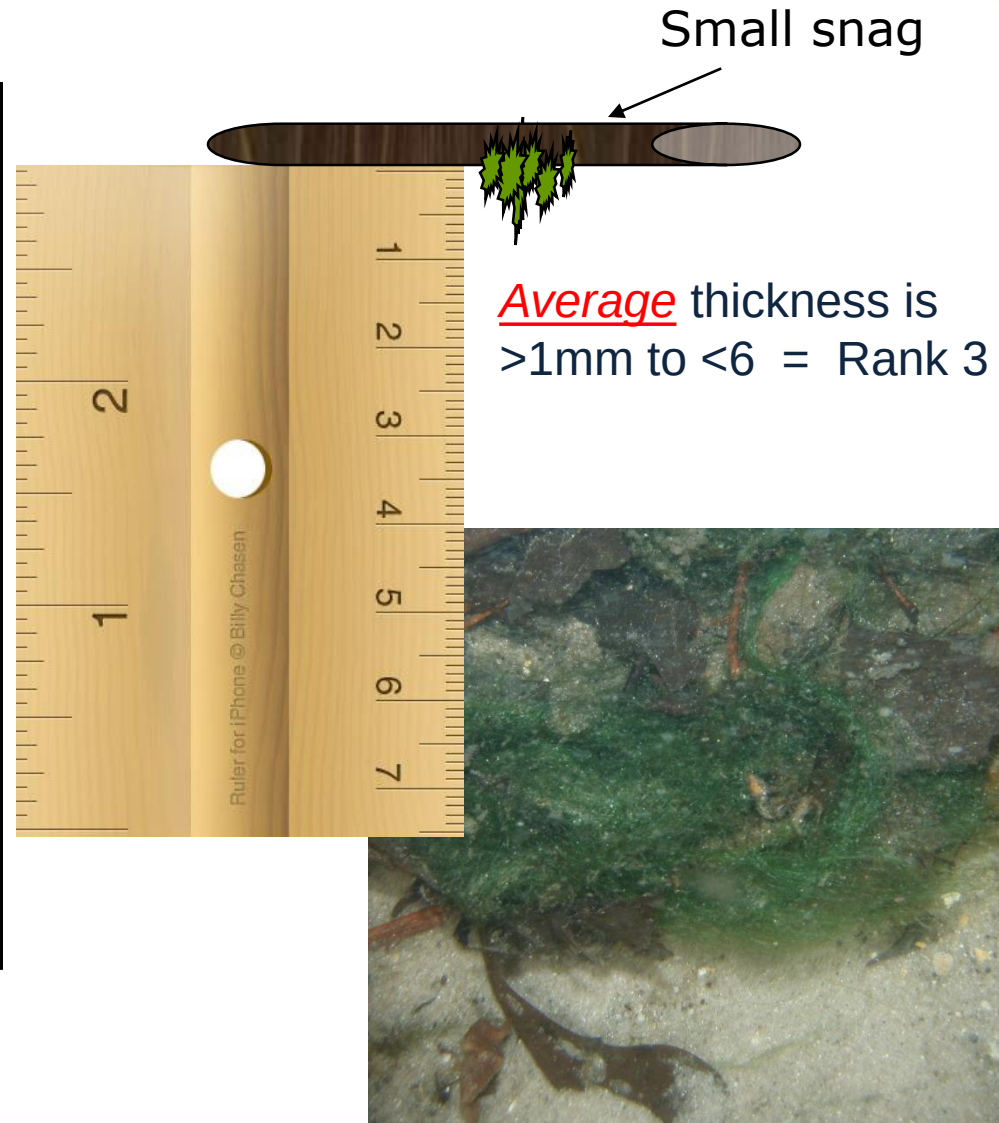
Rapid Periphyton Survey

- The Rapid Periphyton Survey (RPS) quantifies the extent (coverage) and abundance (thickness) of attached algae in a 100m stream segment.
- Follows DEP SOP FS 7230.
- Conduct in conjunction with Stream and River Habitat Assessment (SOP FT 3100) and Linear Vegetation Survey (LVS; SOP FS 7320).
- Sampled at least every other year. But considering increased frequency because there are no RPS data for this system.



Rapid Periphyton Survey

Rank	Algae Thickness
N	rough surface with no algae, slimy, or algae up to 1 mm
3	>1 mm to 6 mm
4	6 mm to 20 mm
5	20 mm to 10 cm
6	>10 cm



Stream Condition Index





Ground Water

- Proposed Goals and Objectives
 1. *Identify and track changes in nitrate concentration within the Floridan aquifer to determine progress made to achieving TMDL target concentration at Silver Springs.*
 2. *Determine response of Floridan aquifer nitrate concentrations to different land uses.*

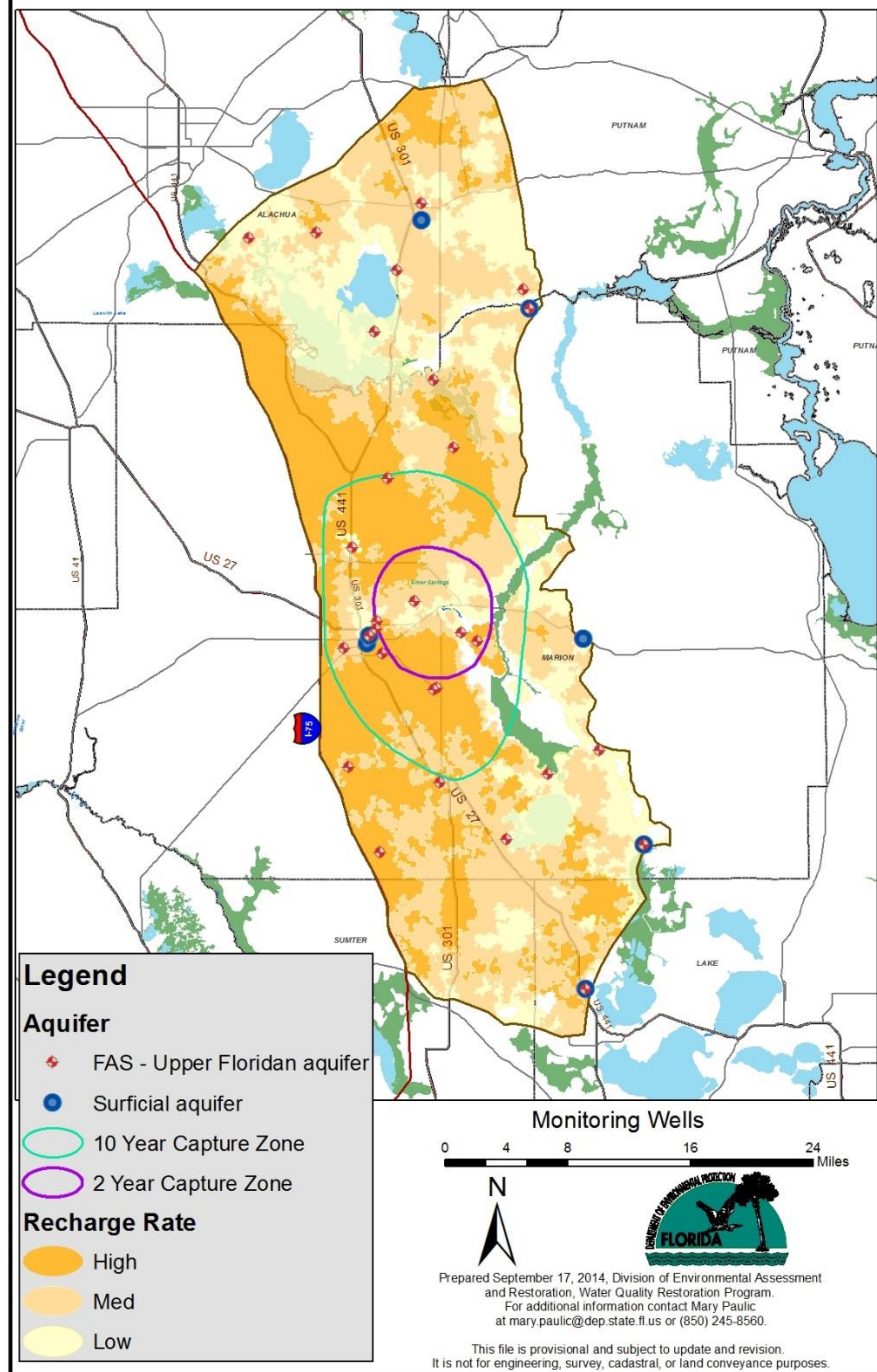


GW Objectives

3. *Provide comparison of nitrate concentrations between surficial and Floridan aquifer.*

SJRWMD Ground Water Network

- Existing ground water monitoring data collected by SJRWMD. More wells planned.
- Additional sampling needed in Sumter County.
- 7 Surficial wells, remainder are Upper Floridan aquifer.
- At minimum need to collect data for nitrate, TN, and TP.





Targeted Ground Water

- Proposed Goals and Objectives
 1. *Evaluate condition of Floridan aquifer to determine if patterns in nitrate concentration are occurring.*
 2. *Identify areas with persistent elevated levels of nitrate.*
- Data source is DEP's public water supply and DOH limited use programs.
- Data are collected on different time frames. Some small public water supply wells only sampled every 5 years.
- Frequency of data collection may limit evaluation to 5 year intervals.



Measuring Success

- TMDL used a longterm monthly average nitrate concentration (2000-2011).
- Calculated by each month over period of record.
- Current sampling frequency is not monthly.
- Propose evaluating longterm concentration change as a rolling average.
 - Calculate as annual means
 - Calculate as monthly means over data period
- Measure biological response to changes in nitrate concentration.



Annual Monthly Average Main Vent or Mammouth Spring

- Example rolling average using data from the Impaired Waters Database for time period of 2002-2013. Values are mg/L as N.
- SJRWMD has installed continuous data loggers so all months of the year will have data starting in 2014.

Month	Average of result*	Maximum	Count
January	1.08	1.275	7
February	1.15	1.2	7
March	1.08	1.251	5
April	0.99	1.1	5
May	1.15	1.24	8
June	1.02	1.02	1
July	1.09	1.2	4
August	1.12	1.23	9
September	1.13	1.27	7
October	1.09	1.37	6
November	1.20	1.27	6
December	1.14	1.277	2
Grand Total	1.11	1.37	67

* Provisional data



Next Steps

- Probably hold next gathering later this fall, possibly November.
- Between now and then DEP will be talking with public works staff to finalize project crediting approach and project list and monitoring staff to finalize monitoring plan.
- Still need to schedule at least one public meeting to present the BMAP.

Questions?





Website and FTP Addresses

- <http://www.dep.state.fl.us/water/watersheds/bmap.htm> - website for meeting announcements.
- http://www.dep.state.fl.us/water/tmdl/final_tmdl.htm - website for TMDL documents, under Ocklawaha Basin.
- http://publicfiles.dep.state.fl.us/DEAR/BMAP/Silver_springs/ - FTP site for meeting notes and presentations.