



Florida Department of Environmental Protection

Silver Springs, Upper Silver River, Rainbow Spring Group and Rainbow River Basin Management Action Plan

May 24, 2018

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Acknowledgments

- OSTDS Advisory Committee.
 - Marion County
 - Ocala
 - Belleview
 - Dunnellon
 - FDOH Marion, Alachua, Levy Counties
 - Bay Laurel Utilities (On Top of the World)
 - Oklawaha Valley Audubon
 - Rainbow River Conservation Coalition
 - Florida Onsite Wastewater Association
 - Florida Home Builders Association
- FDACS, Florida Farm Bureau, IFAS, SJRWMD, SWFWMD.
- FDOT, Lake County, Alachua County, The Villages, Williston.
- Silver Springs State Park, Rainbow Springs State Park.
- Residents, business interests.



BMAP Status

- Initially adopted in 2015 as separate documents:
 - Silver Springs, Silver Springs Group, and Upper Silver River BMAP.
 - Rainbow Springs Group and Rainbow Springs Group Run BMAP.
- 2018 combined BMAP document replaces or supercedes standing adopted BMAPs.
- Revised to meet requirements of Florida Springs and Aquifer Protection Act passed in 2016.



Florida Aquifer and Springs Protection Act

- Chapter 2016-1 Laws of Florida.
 - Signed on January 21, 2016.
- Florida Springs and Aquifer Protection Act.
 - Sub-Sections 373.801– 373.813, Florida Statutes (F.S.).
 - Outstanding Florida Springs.
 - Silver Springs.
 - Rainbow Spring Group.



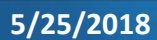
Why One BMAP?

- The two spring systems have a zone of interaction that influences the movement and direction of groundwater flow.
 - There is no clear delineation between the two systems' groundwater contributing areas.
- Management policies implemented to address pollutant sources are largely the same for both spring systems.
 - Marion County has the largest land area within both BMAP areas—60 % of Silver Springs and 65 % of the Rainbow Spring Group.
 - The City of Ocala spans both BMAP areas. WWTFs transfer wastewater between portions of Ocala east and west of I75.
 - A single BMAP provides greater consistency in local jurisdiction planning and policy making.



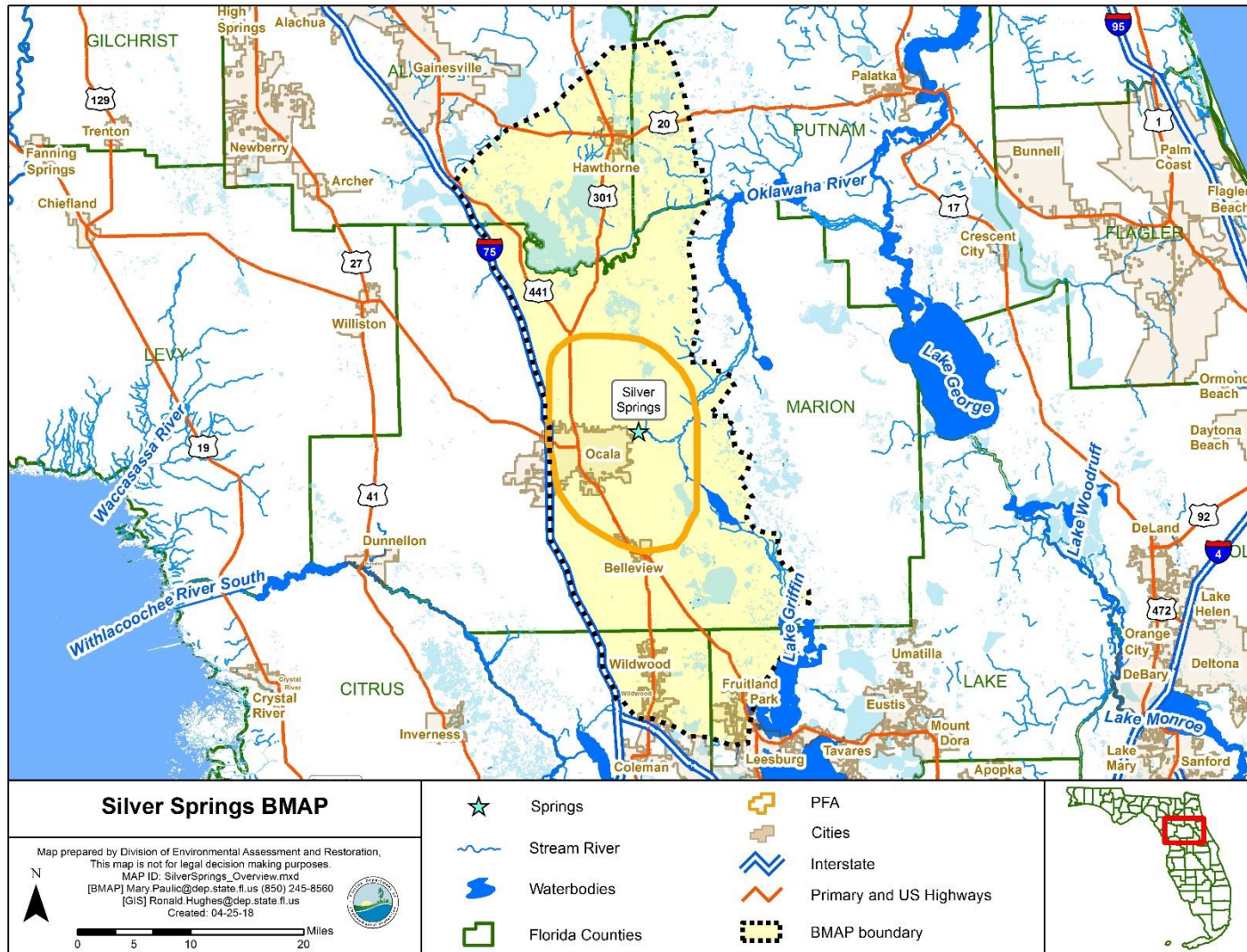
Why One BMAP cont.?

- Two distinct BMAP areas are maintained for the calculation of loadings and identification of sources.
 - Separated by I-75, divides the area overseen by the St. Johns River Water Management District (SJRWMD) from that of the Southwest Florida Water Management District (SWFWMD).
 - One BMAP provides an opportunity for increased coordination and consistency in the programs and policies implemented by the two water management districts (WMDs).



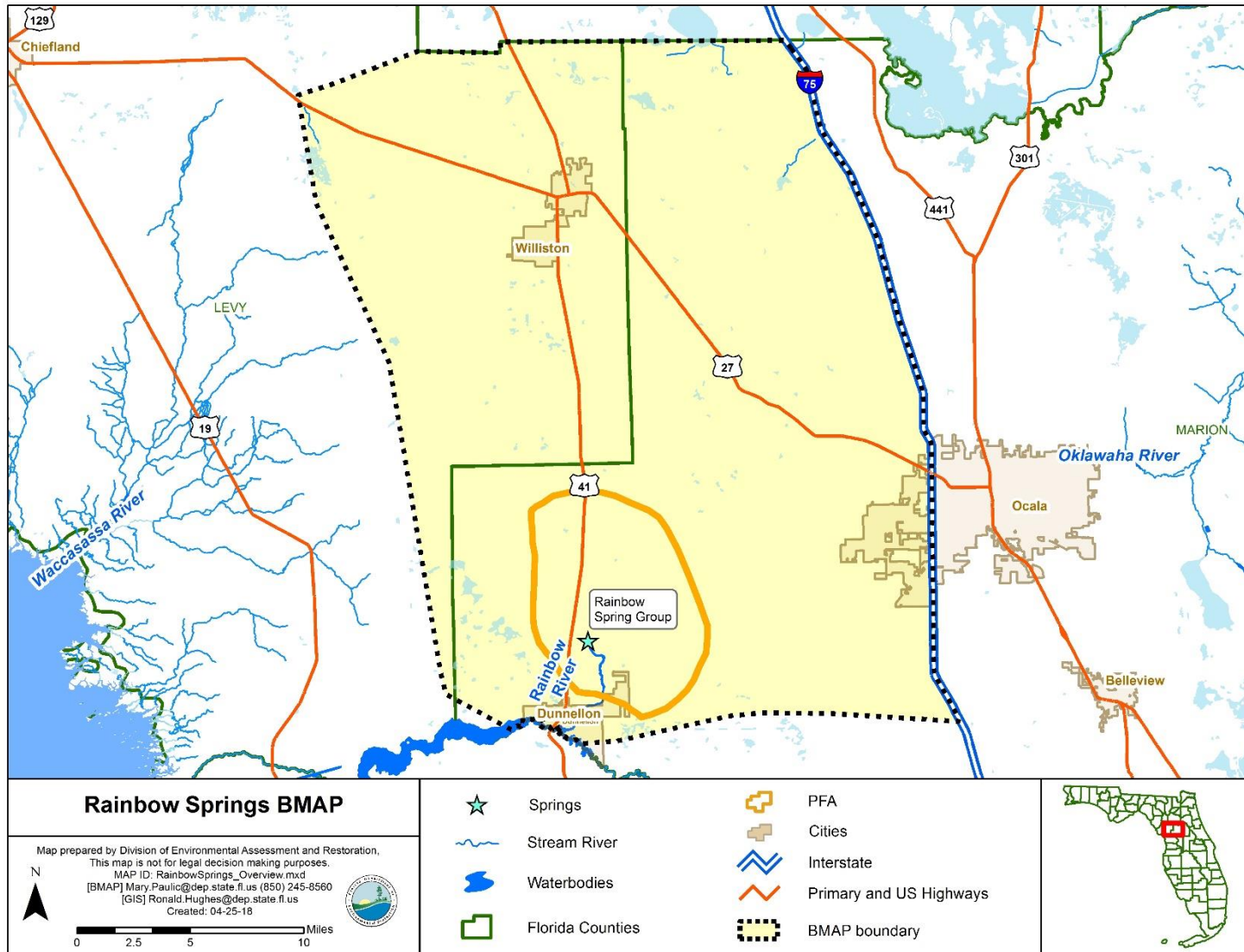


Silver Springs BMAP Area





Rainbow Springs BMAP Area





Loadings and Sources



Silver Springs Loading

Draft

Description	Nitrogen Loads (lb-N/yr)	Notes Regarding Data Used
Total Load for Upper Silver River	1,298,498	Upper 95 % confidence interval—nitrate data and average annual flow data from 2005 to 2016 (535.6 cubic feet per second [cfs])
TMDL Load	368,363	TMDL target is 0.35 mg/L at spring vents using the same average annual flow data from 2005 to 2016
Required Reduction	930,135	



Rainbow Spring Group Loading

Draft

Description	Nitrogen Loads (lb-N/yr)	Notes Regarding Data Used
Total Load for Upper Rainbow River	2,198,348	Upper 95 % confidence interval – nitrate data from 2012 to 2016 and average annual flow data from 2005 to 2016 (603.2 cfs)
TMDL Load	414,741	TMDL target is 0.35 mg/L at spring vents using the same average annual flow data from 2005 to 2016
Required Reduction	1,783,607	



Reduction Schedule

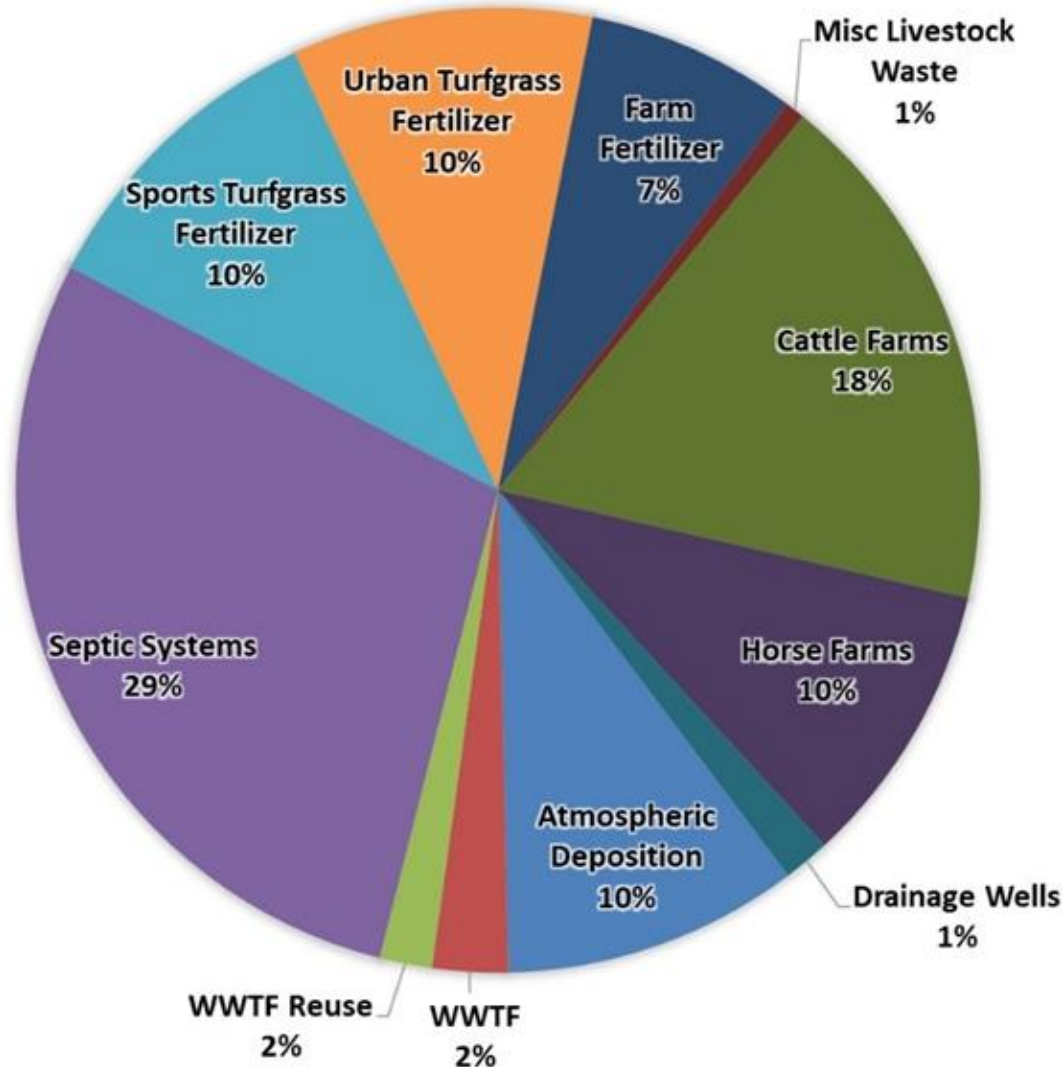
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Spring BMAP Area	5-Year Milestone (30 % of Total) lb-N/yr	10-Year Milestone (40 % of Total) lb-N/yr	15-Year Milestone (30 % of Total) lb-N/yr	Total Nitrogen Reduction (100 %) lb-N/yr
Silver Springs and Upper Silver River	279,041	372,054	279,040	930,135
Rainbow Spring Group and Rainbow River	538,917	718,555	538,916	1,783,607



Silver Springs NSILT

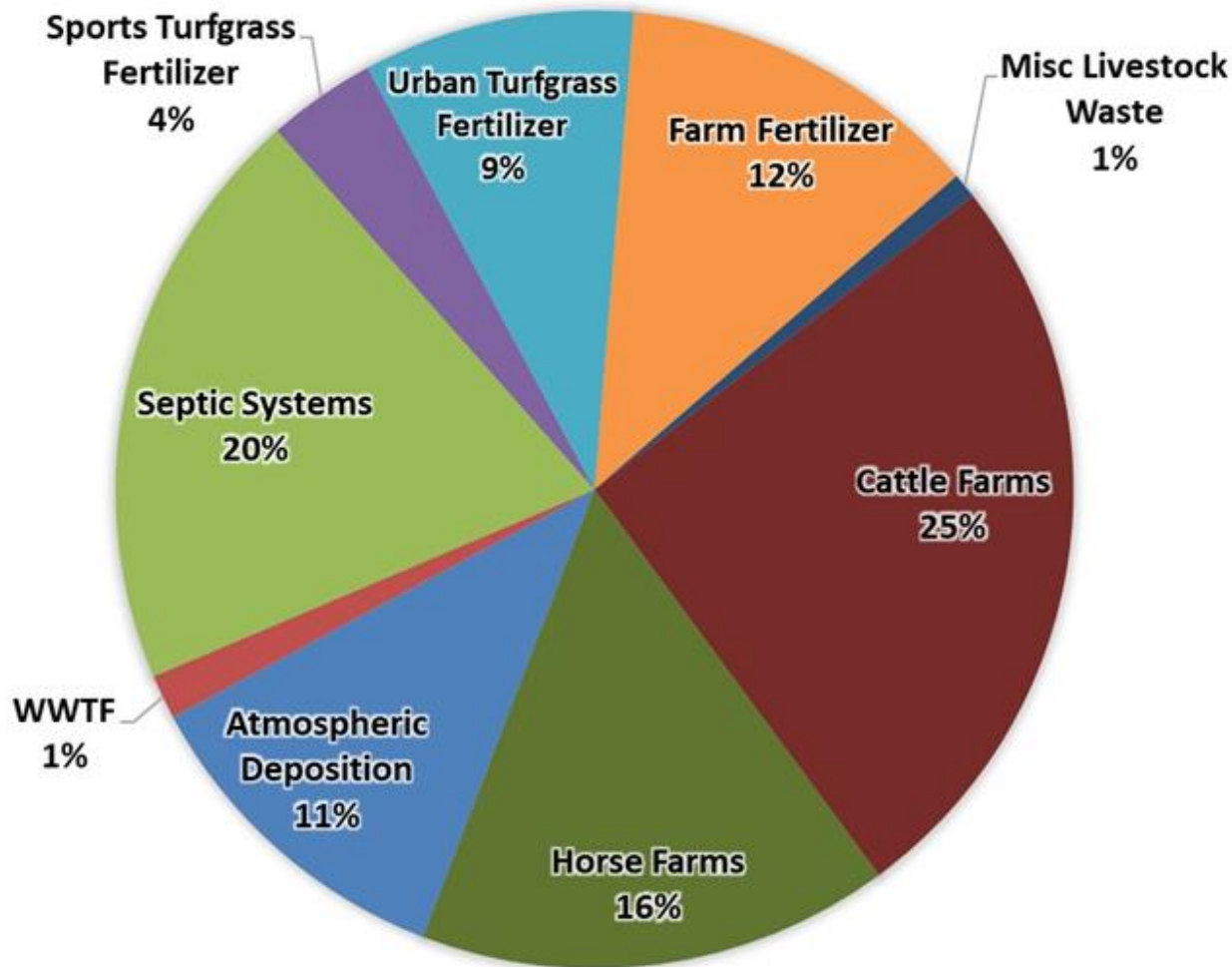
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Rainbow Springs NSILT

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Silver Springs Reductions

Draft

Nitrogen Source	Credits to Load to Groundwater (lb-N/yr)
Septic Systems	313,865-458,461
Urban Turf Fertilizer	17,226
Sports Turf Fertilizer	16,880
Atmospheric Deposition	0
Farm Fertilizer	17,868
Livestock Waste	46,949
Wastewater Treatment Facility (WWTF)/WWTF Reuse	46,345
Drainage Wells	1,322
Total Credits from BMAP Policies and Submitted Projects	460,454 – 605,050
Advanced Agricultural Practices and Procedures	19,749 – 98,743
Total Credits	480,203 – 703,793

Target Reduction =930,135 lb-N/yr



Rainbow Springs Reductions

Draft

Nitrogen Source	Credits to Load to Groundwater (lb-N/yr)
OSTDS	199,154 – 291,071
Urban Turf Fertilizer	12,108
Sports Turf Fertilizer	5,610
Farm Fertilizer	28,514
Livestock Waste	65,024
WWTF	11,272
Total Credits from BMAP Policies and Submitted Projects	321,680 – 413,598
Advanced Agricultural Practices and Procedures	52,050 – 93,690
Total Credits	373,730 – 507,288

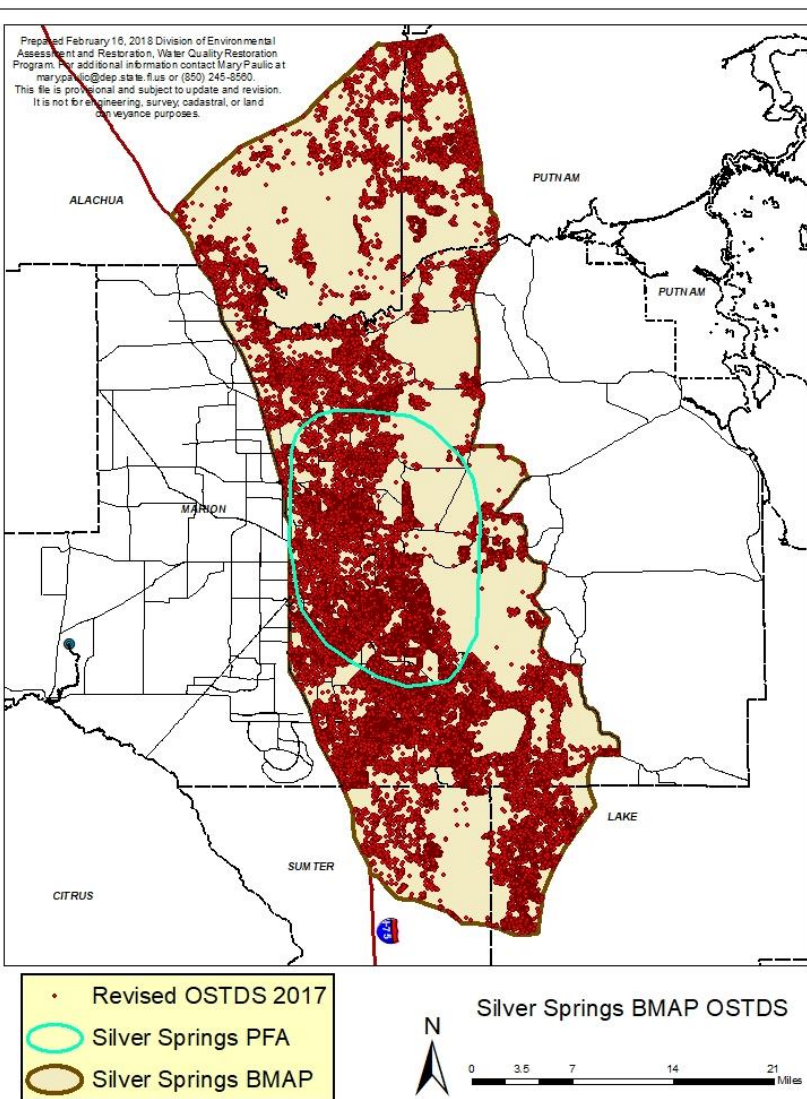
Target Reduction =1,783,607 lb-N/yr



OSTDS (Septic System) Remediation Plan



OSTDS Distribution Silver



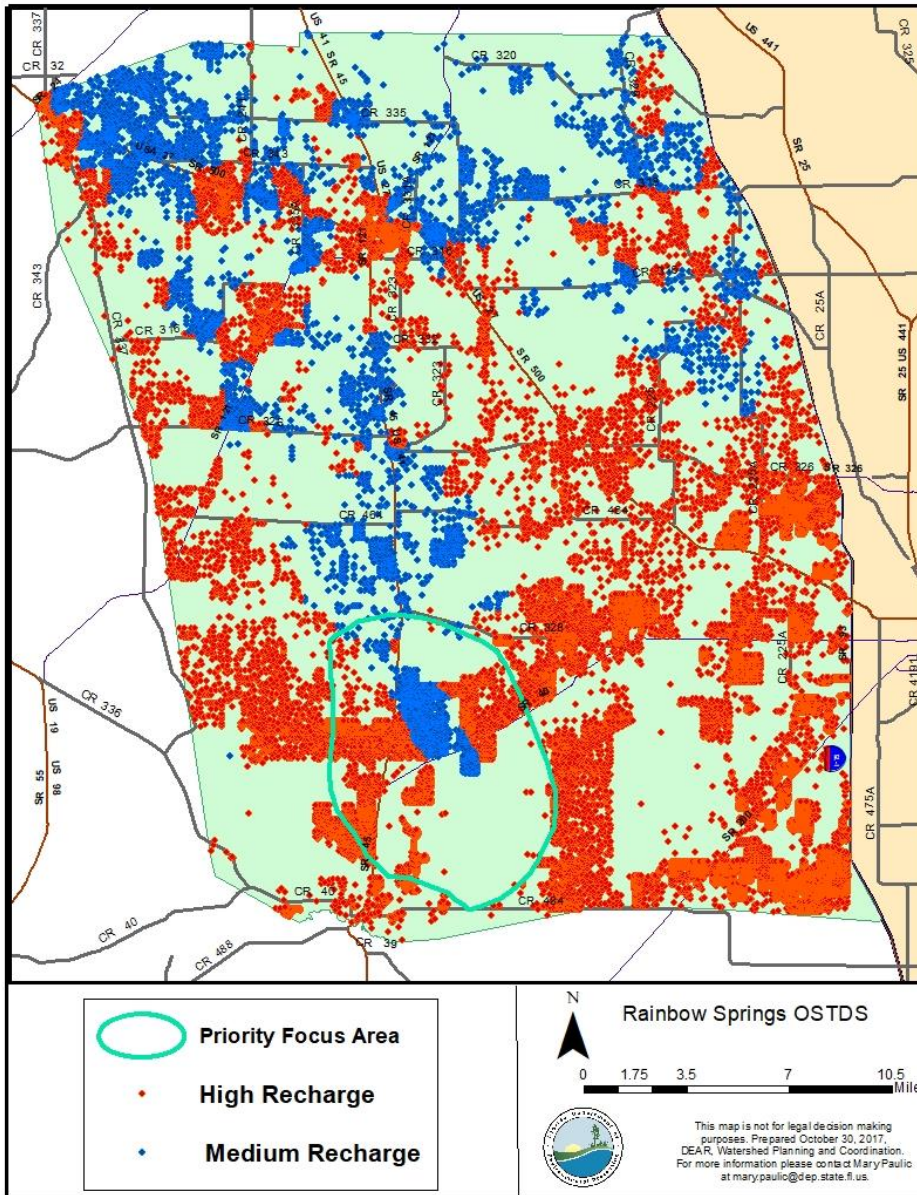
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County	OSTDS High Recharge	OSTDS Medium Recharge	OSTDS Low Recharge	OSTDS Discharge
Alachua	731	1,079	479	30
Lake	2,953	3,104	437	35
Marion	29,896	18,678	4,043	137
Sumter	576	1,394	97	1
Putnam	301	1,265	1,278	3
Total	34,457	25,520	6,334	206

Total number of OSTDS= 66,517



OSTDS Distribution Rainbow



Draft

- Numbers from DOH database, updated 2017, used in NSILT. Draft Data.

County	OSTDS High Recharge	OSTDS Medium Recharge
Marion	23,797	1,980
Levy	3,950	4,132
Total	27,747	6,112

Total number of OSTDS= 33,859



Priority Focus Area New Systems

- New Systems: Florida Springs and Aquifer Protection Act has language specific to new systems in the PFA.
 - New OSTDS on lots < 1 acre required to have enhanced treatment of nitrogen or nitrogen reducing OSTDS approved by FDOH.
 - Definitions of new system and lot size defined by FDOH.
 - Effective on July 1, 2018.
 - **Or** new lots connected to central sewer.



New Septic Systems

- Same policy applies to both Rainbow and Silver Springs Priority Focus Areas (PFA).
- The PFAs for Silver Springs and Rainbow Springs are located exclusively within Marion County.
- They are the Marion County Primary Protection Zones.



Existing Septic System Credits for PFAs

Silver Springs and Upper Silver River BMAP area Draft

Recharge Area	Septic System Parcels Less Than One Acre in PFA	Credit for Enhancement (lb-N/yr)	Credit for Sewering (lb-N/yr)	Septic System Parcels One Acre and Greater in PFA	Credit for Enhancement (lb-N/yr)	Credit for Sewer (lb-N/yr)
High	15,169	96,365	140,842	4,186	26,593	38,866
Medium	4,642	16,383	23,945	1,347	4,754	6,948
Low	930	656	959	276	195	285
Total	20,741	113,405	165,746	5,809	31,542	46,099

Rainbow Spring Group and Rainbow River BMAP area Draft

Recharge Area	Septic System Parcels Less Than One Acre in PFAs	Credit for Enhancement (lb-N/yr)	Credit for Sewer (lb-N/yr)	Septic System Parcels One Acre and Greater in PFAs	Credit for Enhancement (lb-N/yr)	Credit for Sewer (lb-N/yr)
High	1,272	8,081	11,810	1,460	9,275	13,556
Medium	92	325	475	799	2,820	4,121
Total	1,364	8,405	12,285	2,259	12,095	17,677



Existing Septic System Credits Outside PFAs

Silver Springs and Upper Silver River BMAP area

Draft

Recharge Area	Septic System Parcels Less Than One Acre Outside PFA	Credit for Enhancement (lb-N/yr)	Credit for Sewer (lb-N/yr)	Septic System Parcels One Acre and Greater Outside PFA	Credit for Enhancement (lb-N/yr)	Credit for Sewer (lb-N/yr)
High	8,305	52,894	77,306	6,797	43,289	63,109
Medium	12,040	42,601	62,263	7,491	26,505	38,640
Low	2,695	1,907	2,787	2,433	1,722	2,510
Total	23,040	97,402	142,356	16,721	71,516	104,259

Rainbow Spring Group and Rainbow River BMAP area

Draft

Recharge Area	Septic System Parcels Less Than One Acre Outside PFA	Credit for Enhancement (lb-N/yr)	Credit for Sewer (lb-N/yr)	Septic System Parcels One Acre and Greater Outside PFA	Credit for Enhancement (lb-N/yr)	Credit for Sewer (lb-N/yr)
High	15,312	97,637	142,700	9,701	62,099	90,760
Medium	1,241	4,518	6,603	3,982	14,400	21,046
Total	16,553	102,154	149,303	13,683	76,499	111,806



Existing Septic System Summary

Draft

- Total Silver Springs reduction in N loading estimated between 313,865 (all septic systems enhanced) and 458,461 (all septic connected to sewer) lb-N/yr.
- Total Rainbow Springs reduction in N loading estimated between 199,154 (all septic systems enhanced) and 291,071 (all septic connected to sewer) lb-N/yr.



Existing Systems Policy

- First option, all existing septic system in BMAP area upgraded to an enhanced nitrogen reducing system.
 - Enhanced treatment of nitrogen or nitrogen reducing OSTDS approved by FDOH.
 - Ignores reductions from wastewater treatment facilities.
 - Applies to more than 66,000 existing septic systems in Silver Springs and more than 33,000 existing septic systems in Rainbow Springs (all lot sizes).



Existing Systems

- Second option, connection to central sewer system.
 - Sewer connection project is identified in BMAP.
 - Currently, not all potential projects noted in BMAP.
 - Need feasibility plans to determine which areas could be sewerred.



Implementation

- **Phased Implementation.**
- First phase requires new OSTDS within PFA on less than 1 acre lot to have nitrogen enhancement or connection to central sewer.
 - Effective July 1, 2018.
 - Implements policy as referenced in Florida Springs and Aquifer Protection Act.
- Or require connection to central sewer service when such service is available (subsection 381.00655, F.S.).



Second Phase Implementation

- Second phase extends nitrogen enhancement policy to all existing lots within PFAs and all lots outside PFAs.
- Or alternatively, connection to central sewer.
- Effective no later than 5 years from adoption of BMAP (July 1, 2023).



Additional Implementation Steps

- For phase 2 to start, several issues will have to be addressed:
 - Funding Program to assist homeowners with cost of enhanced systems.
 - Feasibility plans for expansion of sewer service completed. State funded planning.
 - FDOH completes rule making.
 - Final refinements to identify which areas will be sewerred and which will need enhanced OSTDS.
- Meet nitrogen-reducing technology no later than 20 years after BMAP adoption (statutory backstop).





Definitions

- Sports Turf estimates loading of fertilizer applied to golf courses and sporting fields.
- Urban Turf estimates loading of fertilizer used on residential lawns and in commercial areas and public areas.
- Drainage wells estimate loading of nitrogen where stormwater is discharged into a well.



Urban Turf Credit Calculations

- Total Loading:

Draft

- Silver Springs = 169,488 lb-N/yr.
- Rainbow Springs = 141,267 lb-N/yr.

- Reduction credits given for stormwater projects with nitrogen enhancement, street sweeping, not using fertilizer.

- Adjust for attenuation rate and recharge factor applied when loading to the aquifer was calculated.

- Education credits up to 6 % of loading.

UTF Source Control	Percent Credit	UTF Source Control	Percent Credit
Fertilizer Ordinance	0.5	Irrigation Ordinance	0.5
Pet Waste Ordinance	0.5	Florida Friendly Landscaping Program	3.0
Landscape Ordinance	0.5	Public Education Program	1.0



Urban Turf Credits

- Possible credit based on full 6 % education credit implemented.

Draft

Project Category	Silver Springs Current Project Credits (lb-N/yr)	Possible Credit Silver Springs (lb- N/yr)
Fertilizer Ordinances and Public Education Activities	5,877	10,169
Stormwater Improvements	7,057	
Total Project Credits	12,934	

Project Category	Rainbow Springs Current Project Credits (lb-N/yr)	Possible Credit Rainbow Springs (lb-N/yr)
Fertilizer Ordinances and Public Education Activities	4,484	8,476
Stormwater Improvements	3,631	
Total Project Credits	8,115	



Sport Turf Credits

Draft

- Implement DEP Golf Course BMPs for all golf course acreage, based at 10 % of loading.
- Sports field BMPs for all sports fields, credits based at 6 % of loading.

STF Source Control Measures	Credit Based on Estimated Load to Groundwater (%)	Silver Springs Possible Nitrogen Credits (lb-N/yr)	Rainbow Springs Possible Nitrogen Credits (lb-N/yr)
Golf Course BMP Implementation	10	15,915	5,530
Sports Fields BMPs	6	965	80
Total Possible Credits		16,880	5,610



Drainage Well Credit

Draft

Project Category	Project Credits (lb-N/yr)
Drainage Well Remediation	1,322
Total Possible Credits	1,322



Agriculture Sources



Agriculture Description

Draft

- Silver Springs.
 - 129,887 acres.
 - 23,407 acres currently covered by NOI for best management practices.
 - Livestock waste (LW) loading = 469,486 lb-N/yr.
 - Farm fertilizer (FF) loading = 119,120 lb-N/yr.
- Rainbow Springs.
 - 169,712 acres.
 - 67,885 acres currently covered by NOI for best management practices.
 - LW loading = 650,235 lb-N/yr.
 - FF loading = 190,092 lb-N/yr.



Loading Reduction Credits

Draft

- Farm fertilizer 100 % BMP enrollment given 15 % credit for reduction to groundwater based on loading from FF.
 - Silver Springs = 17,858 lb-N/yr credit.
 - Rainbow Springs = 28,514 lb-N/yr credit.
- Livestock waste 100 % BMP enrollment given 10 % credit for reduction to groundwater based on loading from LW.
 - Silver Springs = 46,949 lb-N/yr credit.
 - Rainbow Springs = 65,024 lb-N/yr credit.
- Reductions from additional agricultural projects or practices.



Silver Springs Additional Agricultural Practices

Draft

Action	Acreage	Low Reduction Credit (lb-N/year)	Medium Reduction Credit (lb-N/yr)	High Reduction Credit (lb-N/year)
Precision Irrigation	1,148	77	386	694
Soil Moisture Probes	4,959	2,888	14,442	25,995
Precision Fertilization	2,623	1,457	7,284	13,111
Controlled-Release Fertilizer	2,382	715	3,574	6,432
Cover Crops	16,050	14,445	72,223	130,002
Rotational Production	83	167	835	1,502
Total	27,245	19,749	98,743	177,737



Rainbow Springs Additional Agricultural Practices

Draft

Action	Acreage	Medium Reduction Credit (lb-N/year)	High Reduction Credit (lb-N/year)
Precision Irrigation	2,038	411	740
Soil Moisture Probes	5,960	15,392	27,705
Precision Fertilization	3,787	8,281	14,906
Controlled-Release Fertilizer	78	116	210
Cover Crops	4,931	22,190	39,942
Rotational Production	1,165	5,660	10,188
Total	17,959	52,050	93,690



Wastewater Treatment Plant Sources





Description of WWTF

Draft

- Silver Springs.
 - 42,643 lb-N/yr loading. Reuse accounts for 29,574 lb-N/yr.
 - NSILT identified 95 domestic WWTF, 1 industrial, and 1 residuals site.
- Rainbow Springs.
 - 23,102 lb-N/yr loading.
 - NSILT identified 37 domestic WWTF.



New WWTF Effluent Standards

- All new DEP-permitted discharges in the PFA with permitted capacities of 100,000 gallons per day or greater meet a nitrogen effluent limit of 3 mg/L.
 - Policy set by Florida Aquifer and Springs Protection Act.



Effluent Standards for Other WWTF

- WWTF in the PFAs.
- WWTF effluent standards for existing DEP-permitted discharges and new DEP-permitted discharges less than 100,000 gpd.

Designed Average Daily Flow (mgd)	TN Concentration Limits for Rapid-Rate Land Application (RRLA) Effluent Disposal System	TN Concentration Limits for Slow-Rate Land Application Effluent Disposal System	TN Concentration Limits for Public Access Reuse Effluent Disposal System
Greater than or equal to 0.5	3 mg/L	3 mg/L	10 mg/L
Less than 0.5 and greater than or equal to 0.01	3 mg/L	6 mg/L	10 mg/L
Less than 0.01	10 mg/L	10 mg/L	10 mg/L



Effluent Standards Outside PFA

Permitted Capacity (gpd)	TN Concentration Limits for all disposal methods besides reused	Public Access Reuse Effluent Disposal System
Greater than or equal to 10,000	6 mg/L	10 mg/L
Less than 10,000	10 mg/L	10 mg/L



Monitoring

- Surface Water Networks to evaluate water quality of Silver River and Rainbow River.
 - Identify and track changes.
- Groundwater Networks to evaluate changes in groundwater quality.
- A Targeted Groundwater Network to evaluate the general conditions of the Floridan aquifer.
 - Aid in the identification of "hot spot" areas with persistent elevated concentrations of nitrate.
 - Potential use of public water supply data.
- Aquatic Vegetation Monitoring for Silver River and Rainbow River.



Summary

- Silver Springs potential credits 480,203 – 703,793 lb-N/yr.
- Rainbow Springs potential credits 373,730 – 507,288 lb-N/yr.
- Work to be done:
 - Implement appropriate BMPs for different sources.
 - Expand BMP tools as needed. Potential for new policy.
 - Septic system conversion to sewer feasibility plans.
 - Complete implementation of effluent standards.
 - Hot spots project - identify and evaluate most vulnerable areas.
- Annual reporting for projects and water quality.
- Update NSILT by 2023.



Next Steps

- Document posted at http://publicfiles.dep.state.fl.us/DEAR/BMAP/Silver_springs/BMAP_2018_document/
- Provide comments to DEP by close of business on June 4, 2018.
- Following comments BMAP will be finalized and adopted by July 1, 2018.





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