Florida Department of Environmental Protection

Silver Springs and Rainbow Springs Annual Meeting Basin Management Action Plans

January 26, 2017

Mary Paulic



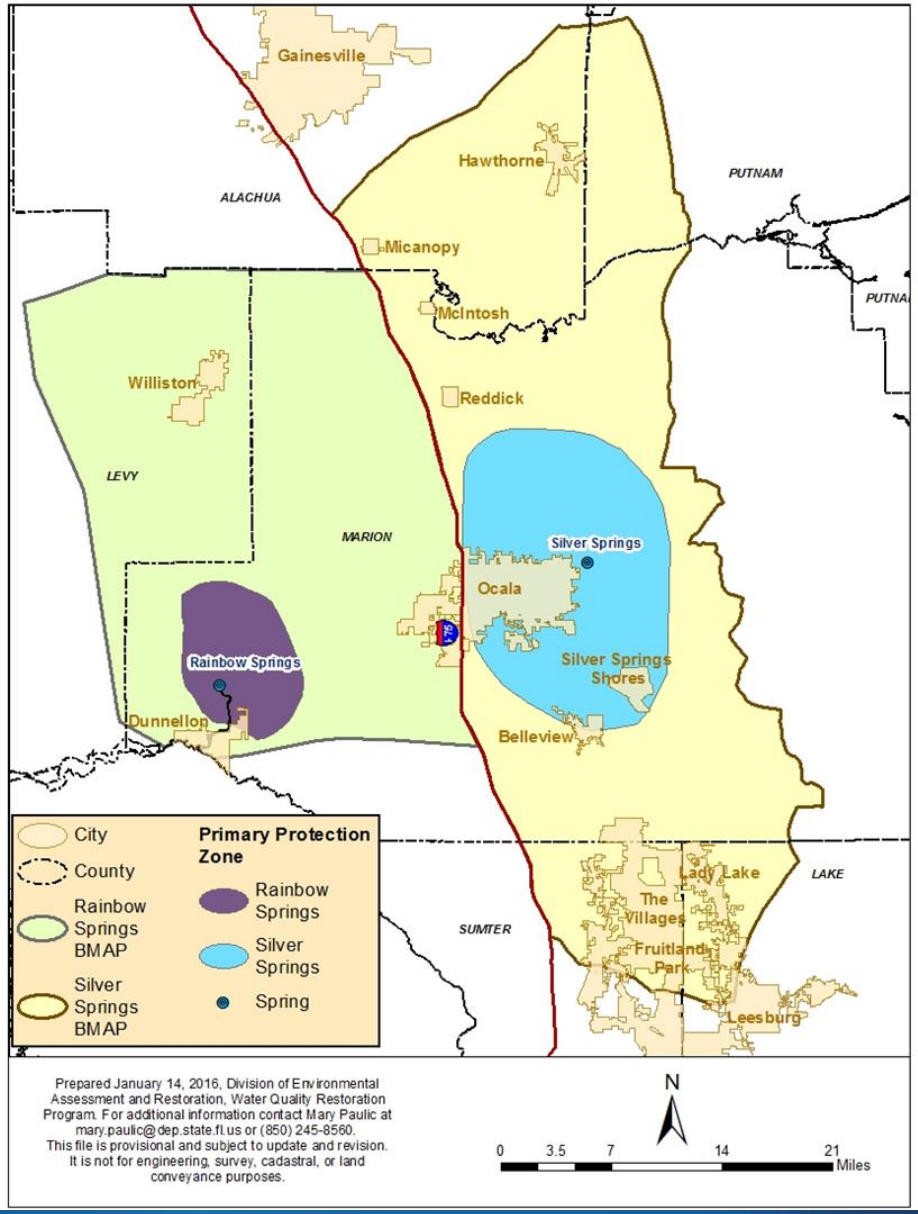


Agenda

- Welcome and Opening Remarks
- Water Quality Status of Silver and Rainbow Springs
  - Review of Concentration TMDL Reductions were Based on
  - Recently Observed Concentration
- Project Status and Updates from Local Governments
  - General Status of Projects in Adopted BMAPs
  - Projects Added in 2016 and Call for Additional Projects
- Agriculture BMP Implementation
  - Enrollment and Compliance Efforts
  - Small Farm Equine
- Urban Fertilizer Project Update
  - New Stormwater Projects
  - New Stormwater Education (Source Control) Efforts
- Utility and OSTDS Project Update
  - New Projects
  - OSTDS Remediation Plan Update
- Loading Calculation and Revision of BMAPs
  - Review of Springs Bill
  - Setting Reduction Goals

Silver and Rainbow BMAPs

- Silver Springs adopted October 2015.
- Rainbow Springs adopted December 2015.



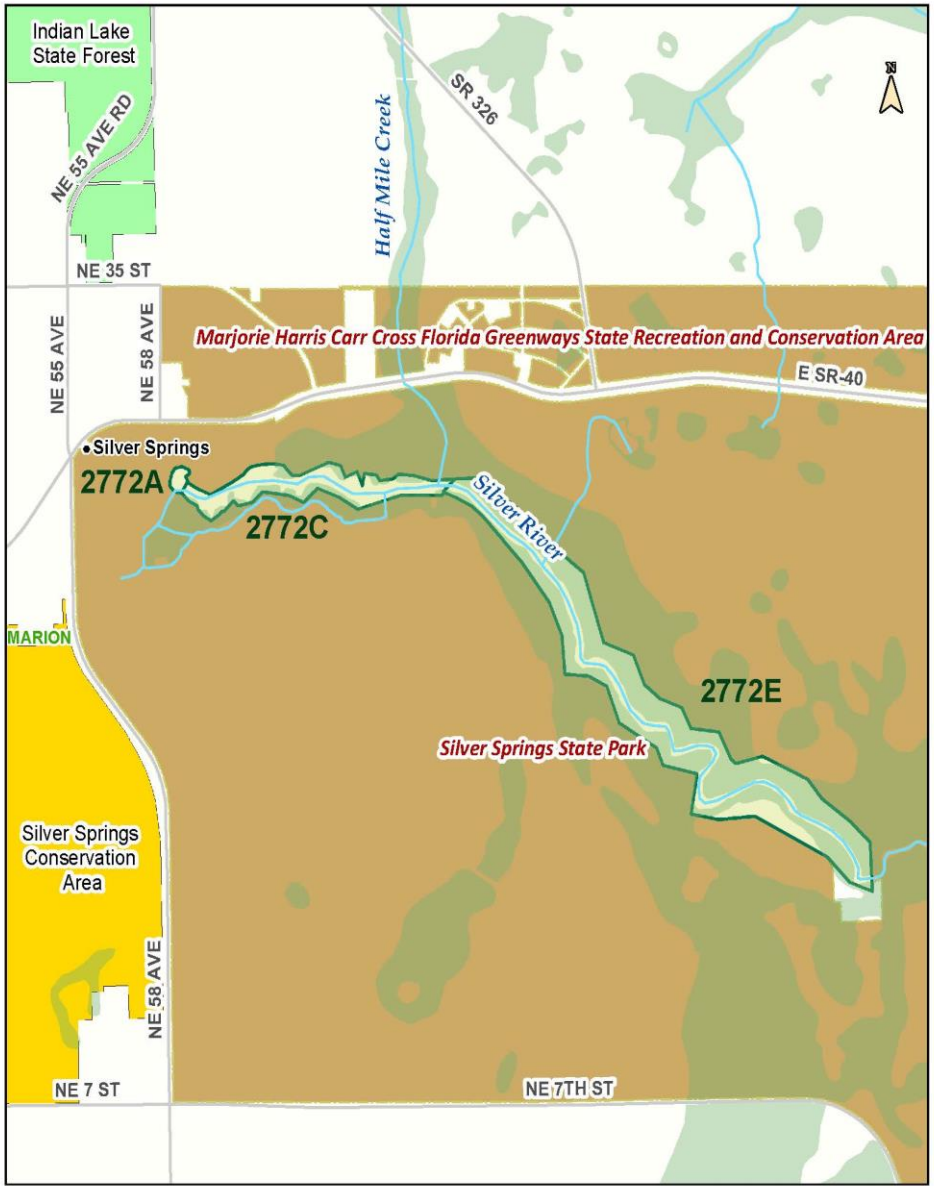
TMDLS

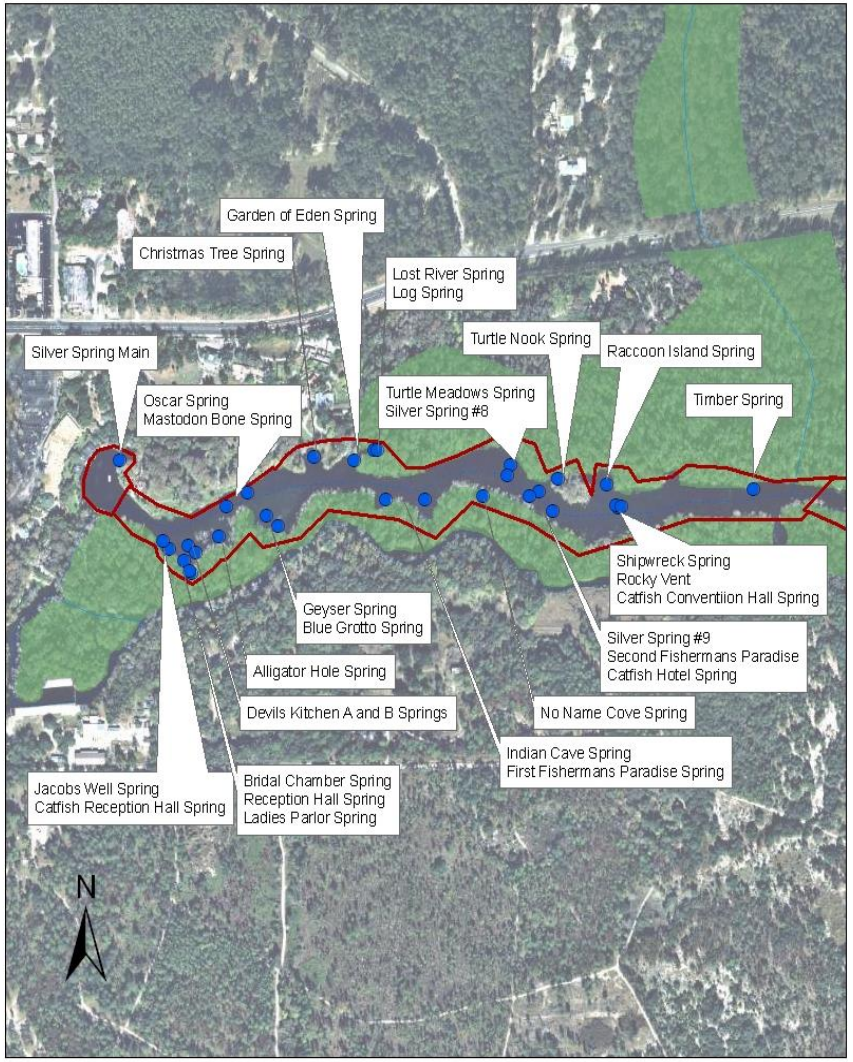
- Target nitrate concentration of 0.35 mg/L.
- Algal mats identified as a problem and linked to elevated nitrate.
- Silver Springs requires 79% reduction in concentration to meet TMDL.
- Rainbow Springs requires 82% reduction in concentration to meet TMDL.

Water Quality Overview

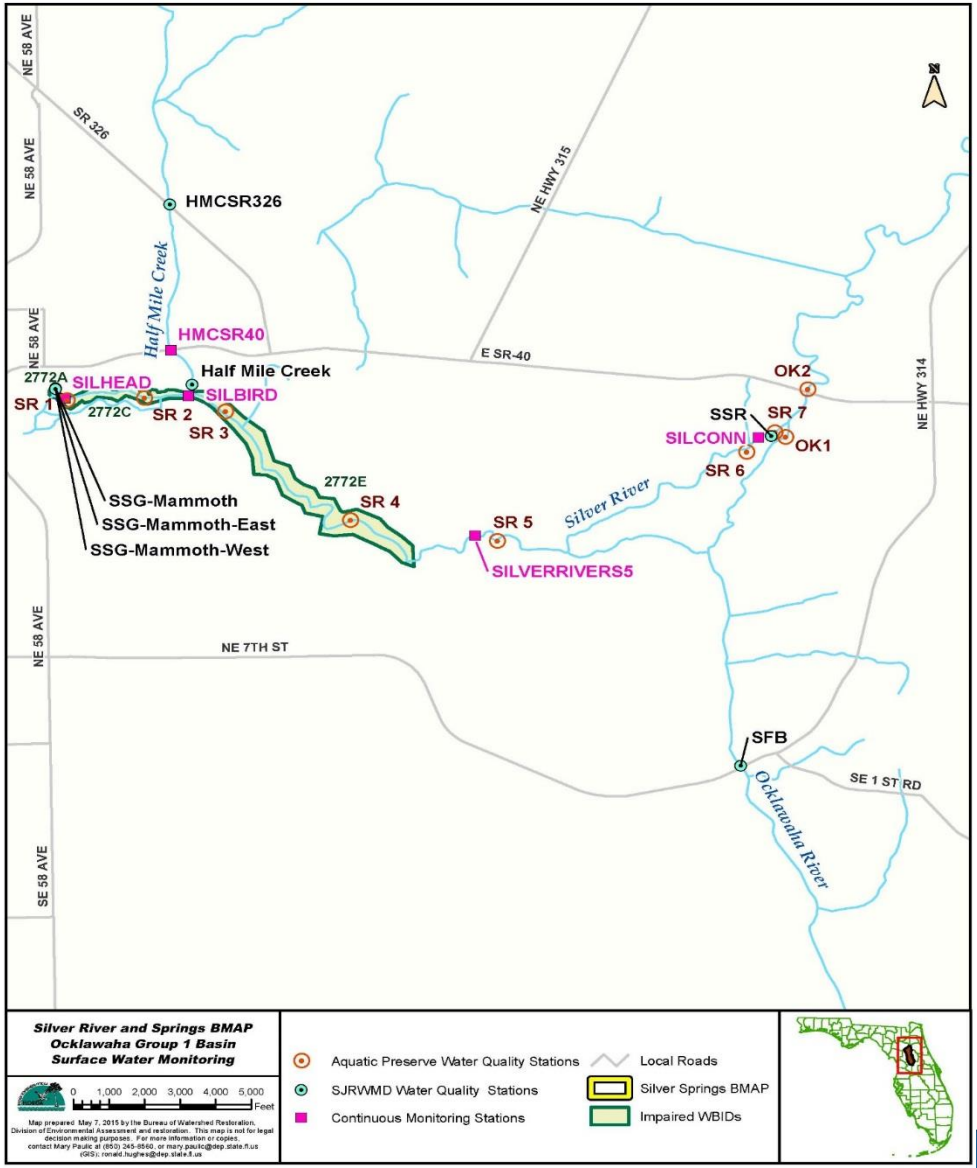
- Focus on nitrate levels.
- Evaluated data for period of 2005-2016 compared to TMDL Period.
  - TMDL period covered 2000-2011 for Silver and 2000-2010 for Rainbow. Used 2000-2011 for consistency.
  - Add 5 years and drop 5 years to create a rolling average.
  - Composite individual station data by WBID or impaired waterbody.
- Percent required reductions based on highest long-term monthly average.
- Results are draft as additional data are under review to be added.
- Data obtained through several sources.
  - DEP's Impaired Waters Database.
  - DEP Ground Water Databases.
  - SJRWMD Environmental Database.
  - SWFWMD Water Management Information System.
  - For Silver, DEP Aquatic Preserve, Florida Coastal Office.

Silver Springs Impaired Waters





Silver Springs Monitoring

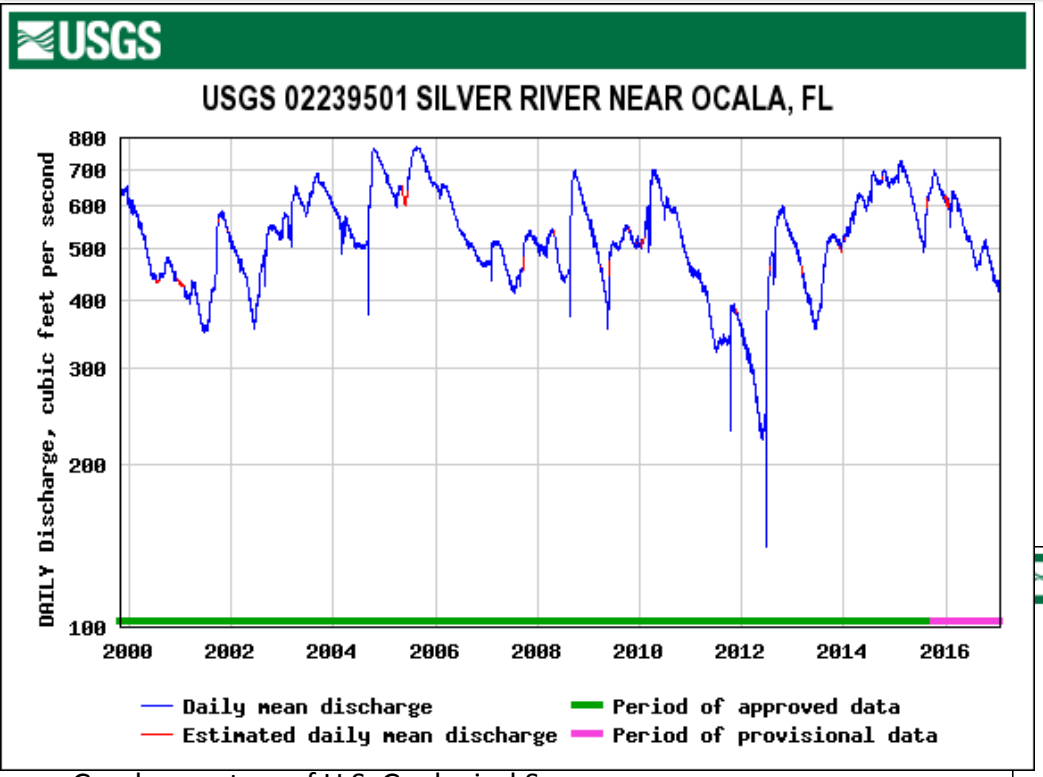


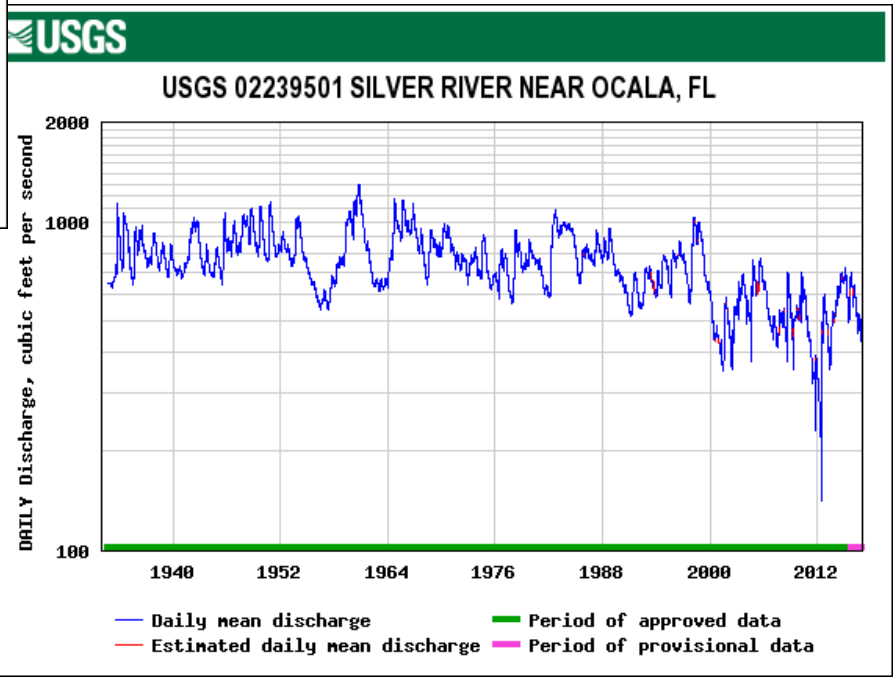
Silver Springs Draft Monthly Averages

* Only one sample

Month	WBID 2772A 2005-2016 Monthly Nitrate Average mg/L	WBID 2772A 2000-2011 Monthly Nitrate Average mg/L	WBID 2772C 2005-2016 Monthly Nitrate Average mg/L	WBID 2772C 2000-2011 Monthly Nitrate Average mg/L	WBID 2772C 2005-2016 Monthly Nitrate Average mg/L	WBID 2772E 2000-2011 Monthly Nitrate Average mg/L
January	1.235	1.18	1.504	1.69	1.220	0.98*
February	1.183	1.09	1.514	1.6	ND	ND
March	1.152	1.05	1.372	1.41	ND	ND
April	1.188	1.08	1.372	1.41	1.200	0.97*
May	1.125	0.95	1.386	1.43	ND	ND
June	1.180	0.98	1.421	1.3	ND	ND
July	1.192	1.08	1.386	1.45	1.187	ND
August	1.159	1.09	1.426	1.58	ND	ND
September	1.132	1.07	1.371	1.38	1.300	1.30*
October	1.171	1.14	1.354	1.46	1.173	ND
November	1.219	1.13	1.422	1.54	ND	1.00*
December	1.229	0.97	1.306	1.3	ND	1.00*
Maximum Monthly Average	1.235	1.18	1.514	1.69	Not calculated	Not calculated

Silver River Discharge





Graphs courtesy of U.S. Geological Survey

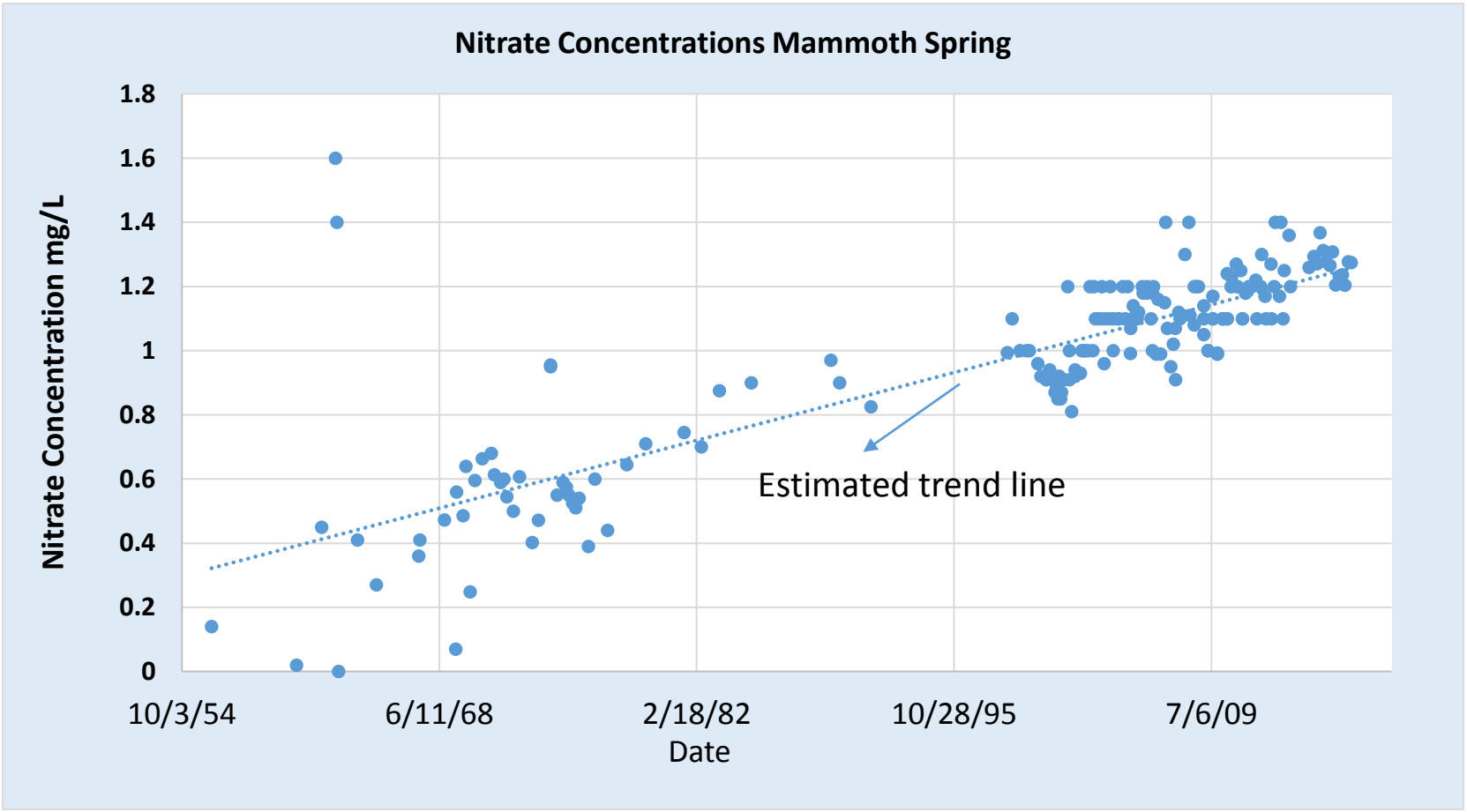
WBID 2772A Draft Summary

Average Nitrate Level 2005-2016 = 1.179 mg/L

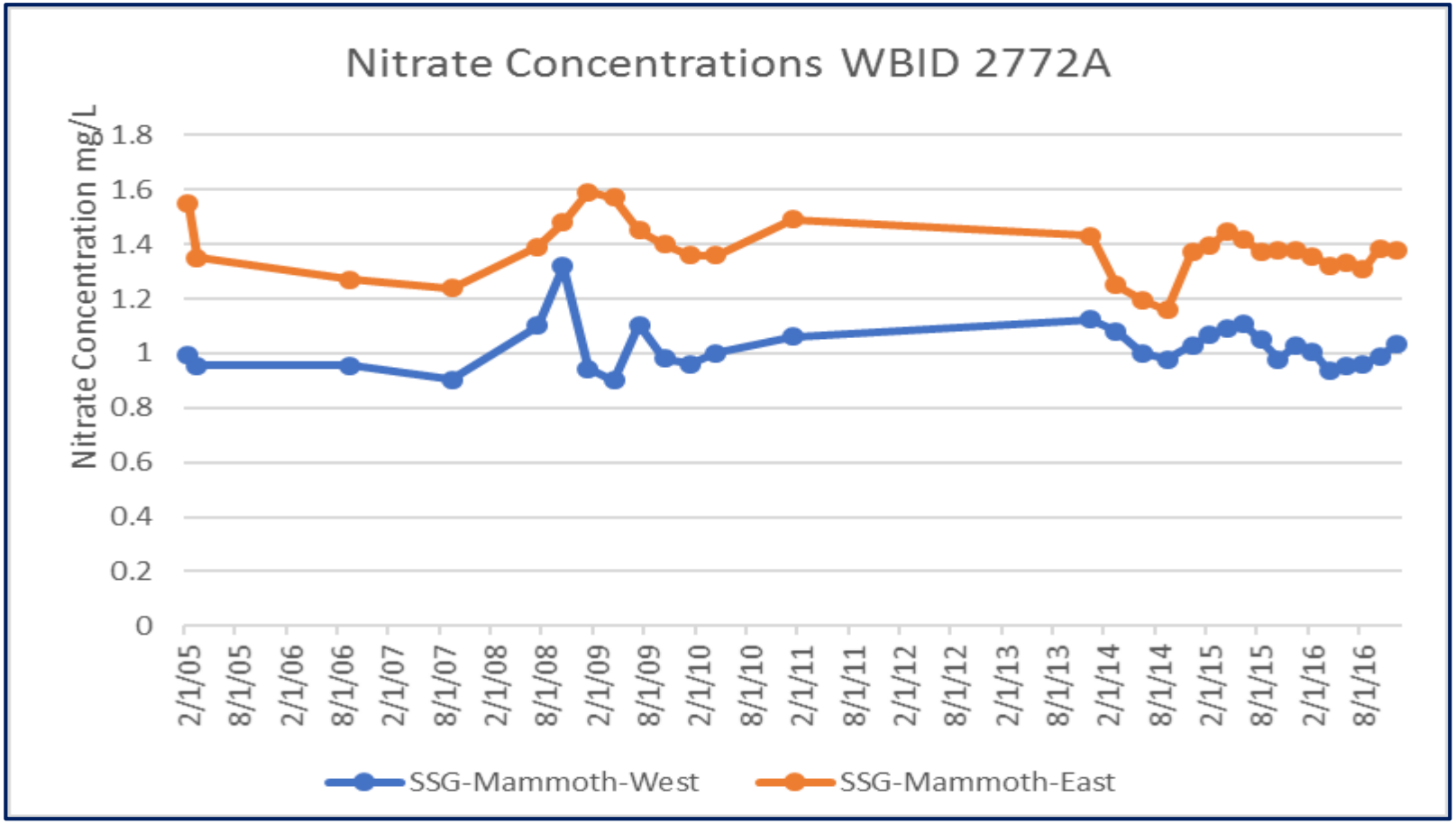
Average Nitrate Level 2000-2011 = 1.09 mg/L

Year	Annual Arithmetic Average Nitrate mg/L	Annual Geometric Mean Nitrate mg/L	Median Nitrate mg/L	Maximum Nitrate mg/L	Minimum Nitrate mg/L	Count Total Number of Samples
2005	1.145	1.141	1.120	1.550	0.956	13
2006	1.092	1.093	1.130	1.270	0.910	12
2007	1.083	1.076	1.070	1.400	0.904	11
2008	1.264	1.076	1.070	1.480	1.080	11
2009	1.134	1.119	1.100	1.590	0.884	19
2010	1.179	1.165	1.200	1.360	0.958	16
2011	1.188	1.186	1.200	1.490	1.060	11
2012	1.218	1.214	1.200	1.400	1.100	8
2013	1.254	1.249	1.225	1.430	1.100	8
2014	1.157	1.155	1.177	1.421	0.978	10
2015	1.251	1.241	1.293	1.444	0.979	18
2016	1.184	1.177	1.235	1.384	0.934	18

Mammoth Spring Draft Nitrate Time Series



East and West Mammoth Spring Vents Draft NitrateTime Series



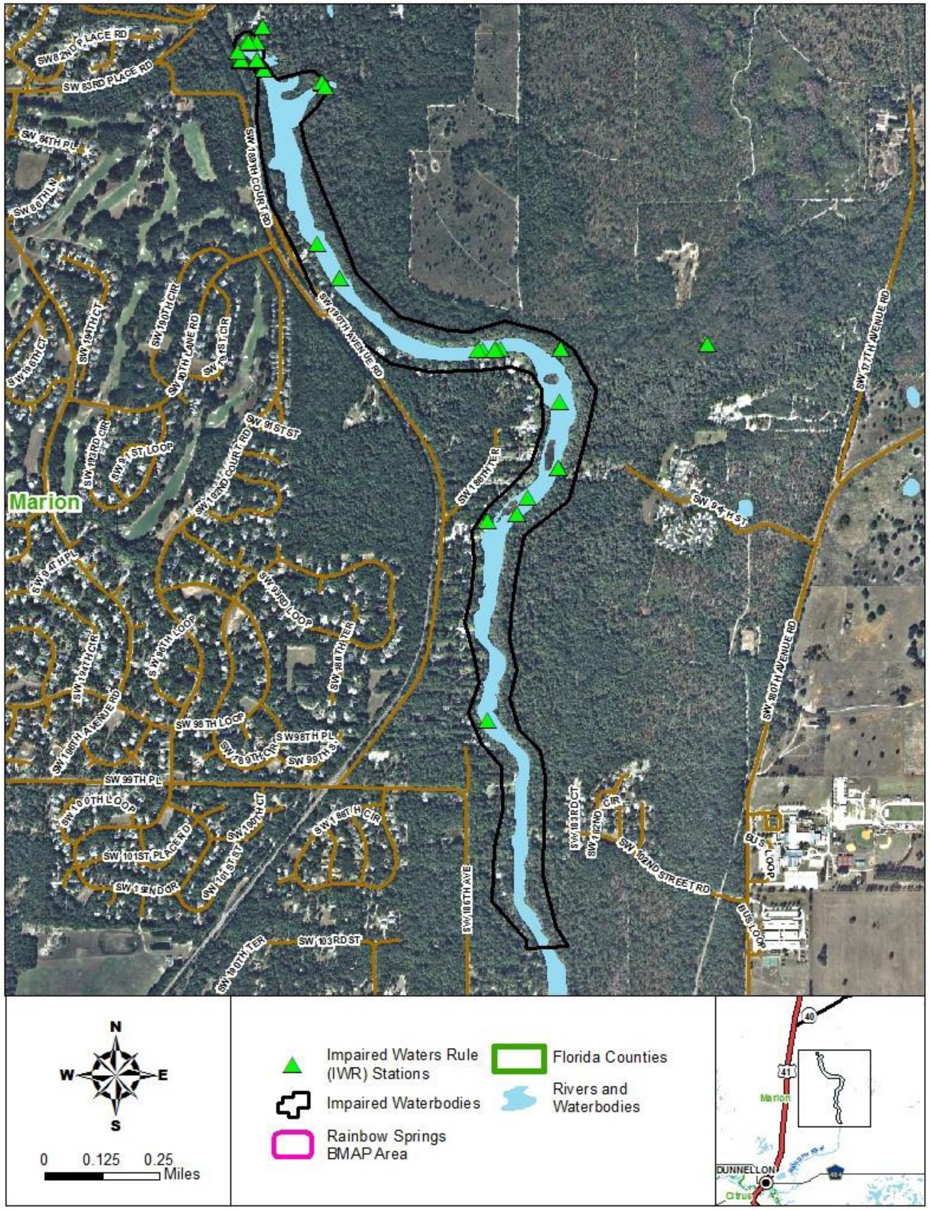
WBID 2772C Draft Summary

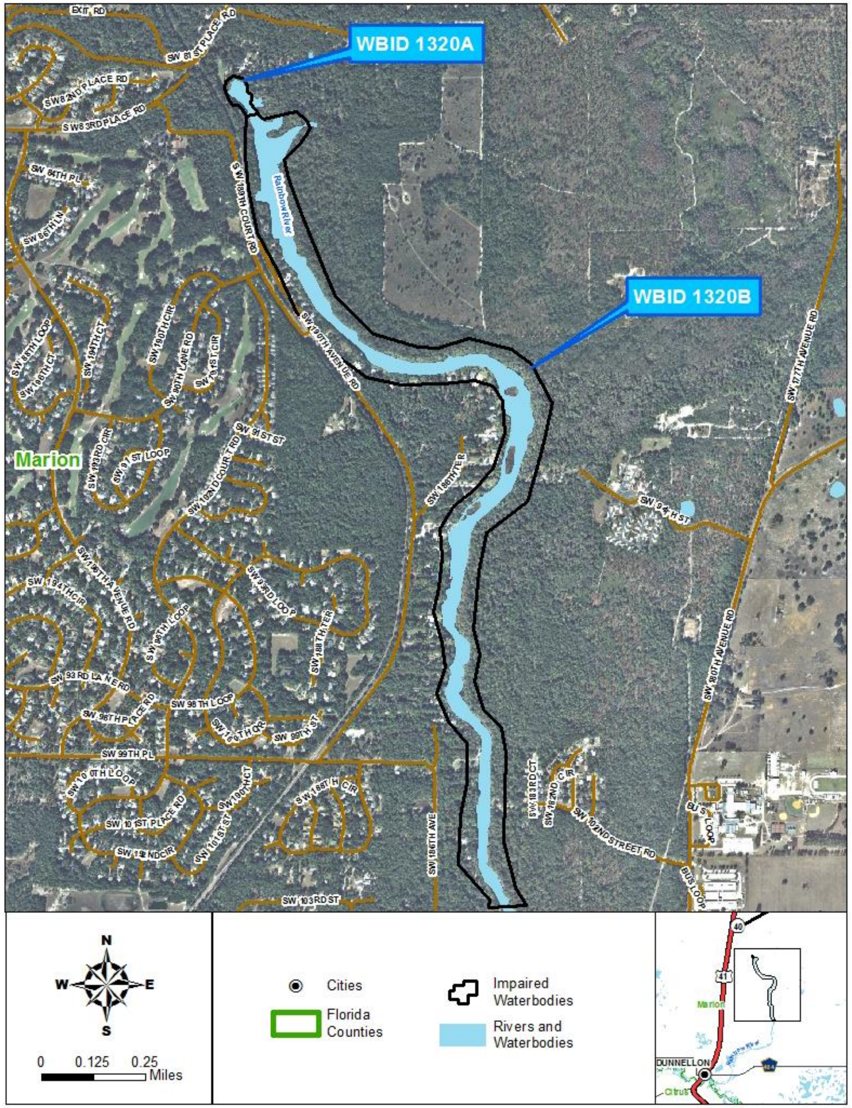
Average Nitrate Level 2005-2016 = 1.495 mg/L

Average Nitrate Level 2000-2011 = 1.459 mg/L

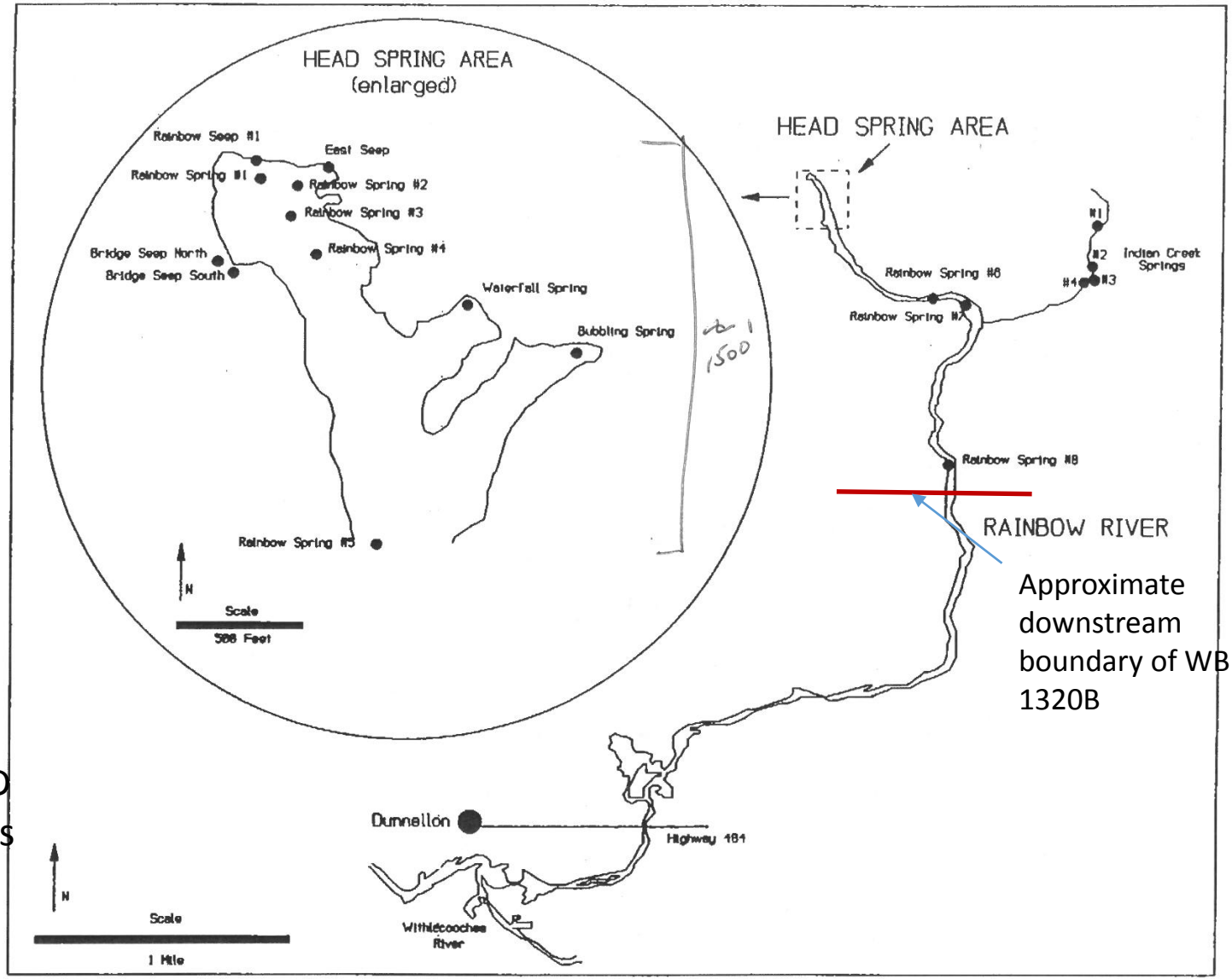
Year	Annual Arithmetic Average Nitrate mg/L	Annual Geometric Mean Nitrate mg/L	Median Nitrate mg/L	Maximum Nitrate mg/L	Minimum Nitrate mg/L	Total Number of Samples
2005	1.635	1.640	1.650	2.450	1.15	15
2006	1.510	1.398	1.440	1.890	0.869	40
2007	1.506	1.446	1.500	1.720	0.918	14
2008	1.568	1.574	1.550	1.710	1.5	10
2009	1.608	1.605	1.600	1.760	1.45	12
2010	1.617	1.604	1.600	1.700	1.55	7
2011	1.703	1.704	1.700	1.720	1.7	5
2012	1.575	1.573	1.550	1.700	1.5	4
2013	1.487	1.465	1.460	1.600	1.3654	6
2014	1.242	1.219	1.222	1.420	0.99	15
2015	1.230	1.228	1.227	1.350	1.1	29
2016	1.263	1.258	1.201	1.765	1.02	46

Rainbow Springs WBIDs



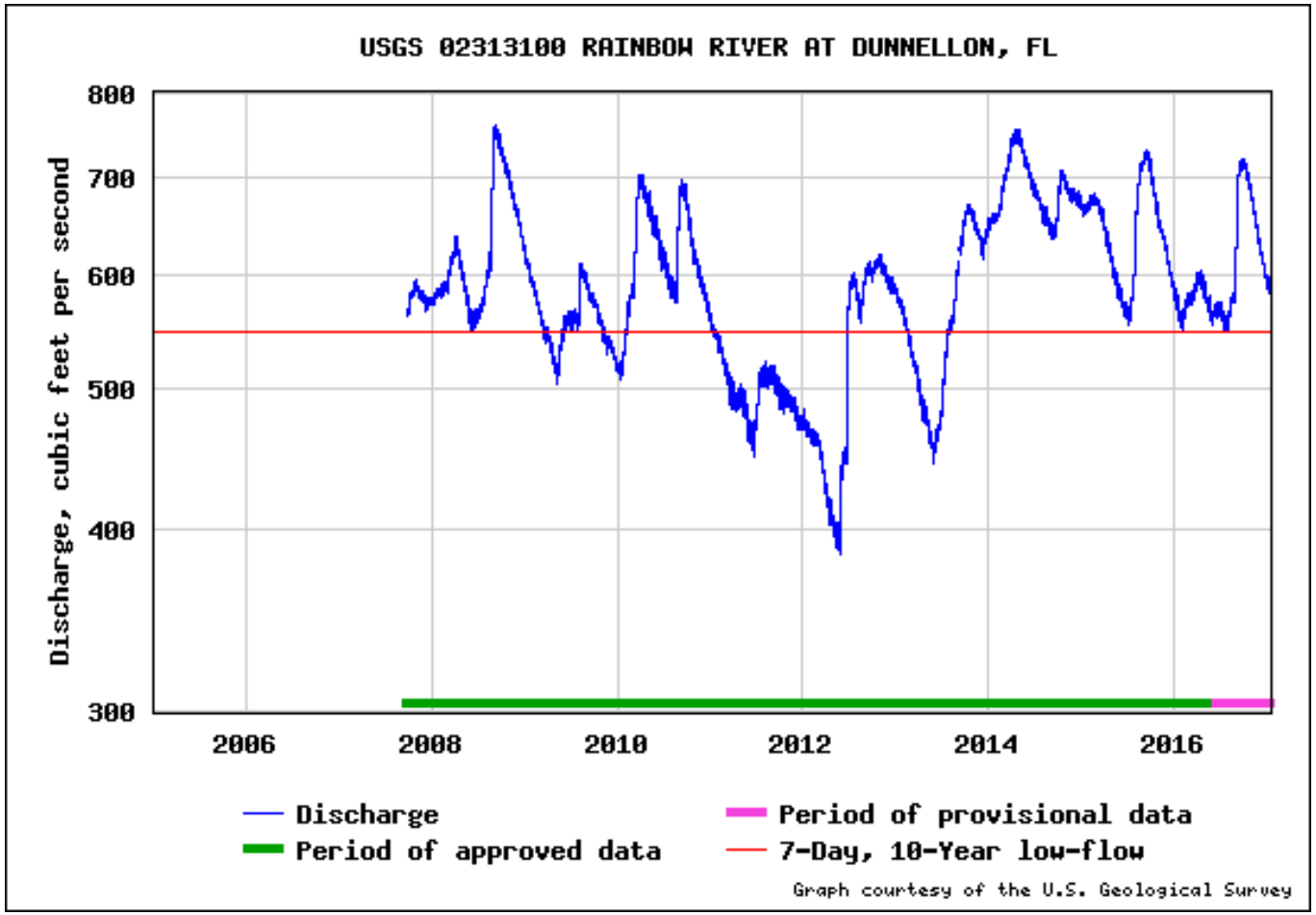


Rainbow Springs Water Quality Sites



Graphic from 1996 SWFWMD report, by Jones et al.

Rainbow River Discharge



Rainbow Springs Draft Monthly Averages

Month	WBID 1320B 2005-2016 Monthly Average mg/L	WBID 1320B 2000-2010 Monthly Average mg/L	WBID 1320A 2005-2016 Monthly Average mg/L	WBID 1320A 2000-2010 Monthly Average mg/L
January	1.627	1.38	1.811	1.55
February	1.463	1.39	1.985	1.92
March	1.486	1.37	1.659	1.57
April	1.663	1.23	1.846	1.44
May	1.487	1.42	1.833	1.71
June	1.323	1.26	1.775*	1.47*
July	1.642	1.39	1.785	1.55
August	1.449	1.37	1.797	1.72
September	1.374	1.32	1.705	1.56*
October	1.689	1.24	2.233!	1.45
November	1.454	1.42	1.827	1.76
December	No data	1.15*	No data	No data
Maximum Monthly Average	1.689	1.42	2.233!	1.92

* Limited data

!Potential data entry error in dataset

WBID 1320A Draft Annual Averages

Average Nitrate Level 2005-2016=1.923 mg/L Average Nitrate Level 2000-2010=1.574 mg/L

Year	Annual Geometric Mean Nitrate mg/L	Annual Arithmetic Mean Nitrate mg/L	Total Number of Samples	Median Nitrate mg/L	Maximum Nitrate mg/L	Minimum Nitrate mg/L
2005	1.454	1.470	11	1.6	1.75	0.968
2006	1.760	2.616	21	1.65	18*	1.09
2007	1.059	1.481	28	1.62	2.05	0.005*
2008	1.764	1.776	26	1.78	2.1	1.33
2009	1.738	1.768	39	1.8	2.2	1.02
2010	1.920	1.926	19	1.96	2.22	1.53
2011	2.018	2.031	16	2.08	2.36	1.62
2012	2.013	2.030	16	2.115	2.4	1.53
2013	1.975	1.990	21	2.1	2.37	1.59
2014	1.959	1.983	17	1.8	2.5	1.64
2015	2.018	2.046	16	1.95	2.65	1.6
2016	1.868	1.954	12	2.015	2.65	0.8133

* Potential data entry errors noted on previous slide

Corrected Draft Values for WBID 1320A

- If the values of 18 mg/L and 0.005 mg/L of nitrate recorded for WBID 1320A are considered data entry errors and removed from calculation, this it what happens to means.
- 2005-2016 monthly average for October = 1.54 mg/L nitrate. The highest monthly mean for 2005-2016 would then be
- 2006 geometric mean = 1.567 mg/L nitrate.
- 2006 arithmetic mean = 1.59 mg/L nitrate.
- 2007 arithmetic mean = 1.622 mg/L nitrate.
- 2007 geometric mean = 1.6 mg/L nitrate.

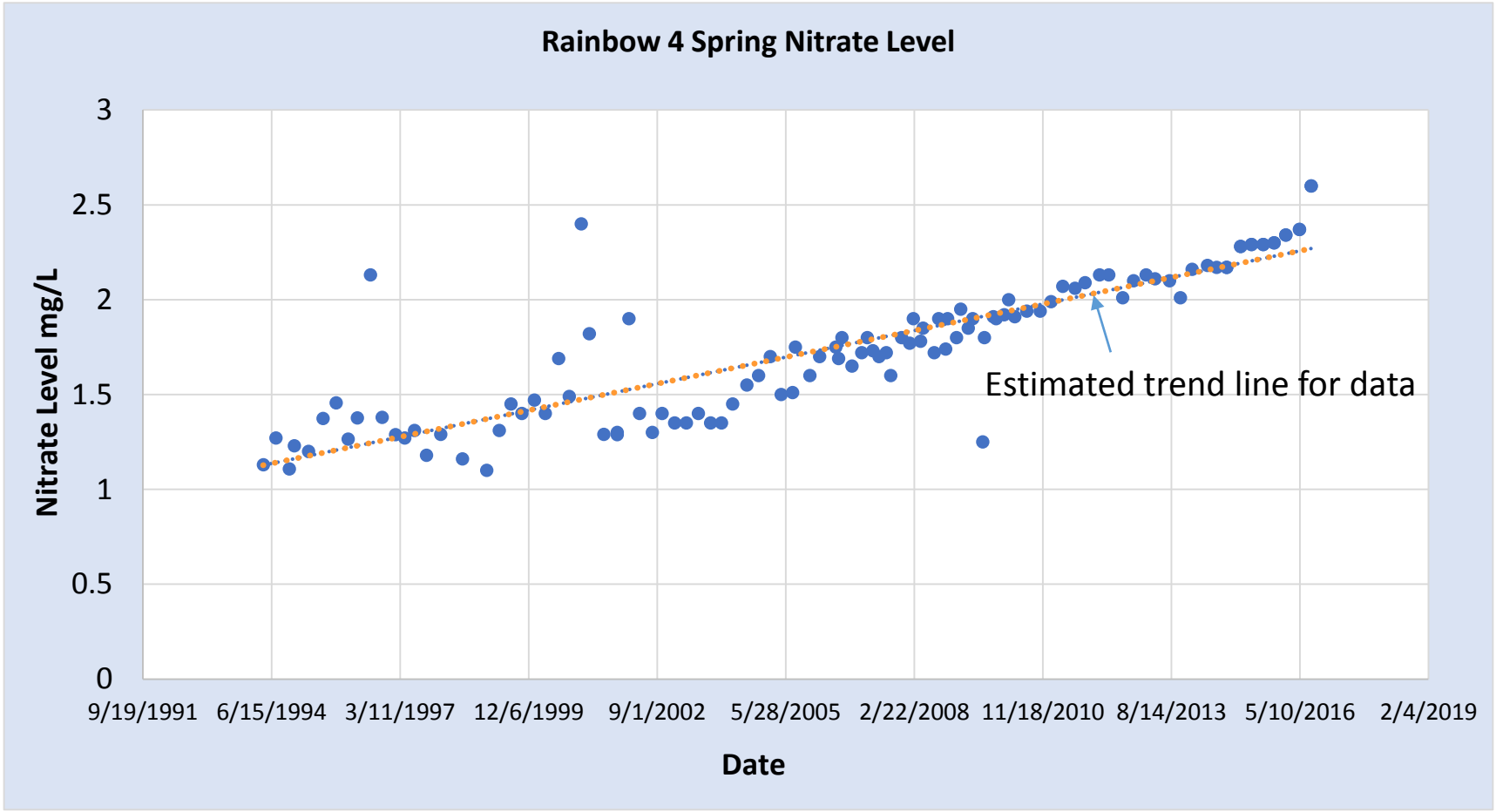
WBID 1320B Draft Annual Averages

Average Nitrate Level 2005-2016=1.591 mg/L

Average Nitrate Level 2000-2010=1.292 mg/L

Year	Annual Geomean Nitrate mg/L	Annual Arithmetic Mean Nitrate mg/L	Total Number of Samples	Median Nitrate mg/L	Maximum Nitrate mg/L	Minimum Nitrate mg/L
2005	1.250	1.262	11	1.230	1.450	1.050
2006	1.348	1.353	21	1.400	1.500	1.100
2007	1.396	1.408	22	1.400	1.600	1.100
2008	1.459	1.459	20	1.455	1.600	1.330
2009	1.527	1.539	21	1.580	1.700	1.200
2010	1.651	1.603	12	1.615	1.700	1.400
2011	1.730	1.731	8	1.735	1.820	1.650
2012	1.750	1.751	8	1.755	1.870	1.610
2013	1.673	1.679	24	1.710	1.840	1.340
2014	1.670	1.671	16	1.756	1.910	1.340
2015	1.743	1.756	16	1.820	1.990	1.390
2016	1.820	1.879	14	1.935	2.120	1.440

Rainbow 4 Spring Draft Nitrate Times Series

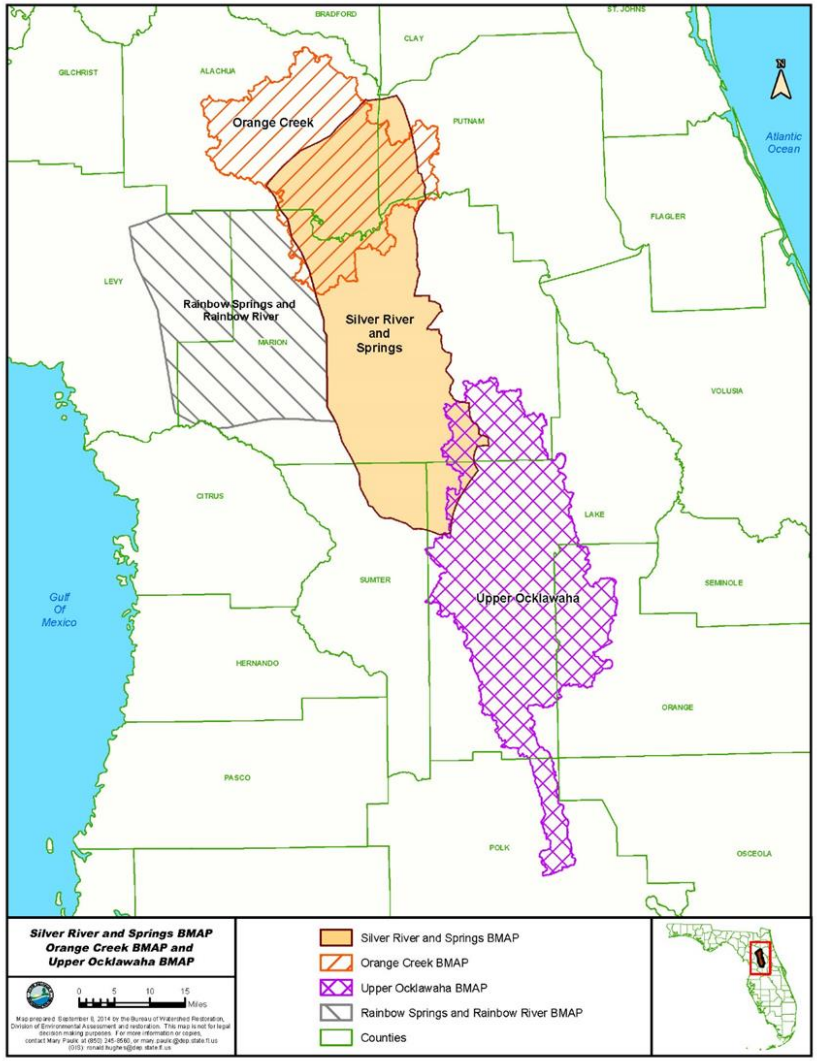


Project Overview

- Since August 2016, stakeholders were asked to provide updates to projects adopted in both the Silver Springs and Rainbow Springs BMAPs including any new projects.
  - Most projects proceeded on schedule or with minor delay.
- 20 new projects were added by stakeholders.
  - 8 were utility or OSTDS related.
  - 4 urban stormwater.
  - 5 Agricultural: New or updated BMP manuals, enhanced implementation assurance.
  - 2 Education and outreach projects.
  - 1 restoration project: Silver Springs Forest.
- 9 projects were cancelled.
  - These were conceptual projects that did not move forward and projects that were determined to be unfeasible either in an initial phase or in the design phase.

Agriculture

- Orange Creek Compliance effort. Started 2015.



Orange Creek BMP Implementation Effort

- Florida Department of Agricultural and Consumer Services (FDACS) contacts land owners including visits to property.
- If no response to offer of assistance, Florida Department of Environmental Protection (DEP) contacts and informs of requirement for BMP enrollment.
- If no response to offer of assistance, DEP sends a warning letter notifying producer that they appear to have not implemented the requirements of Section 403.067(7)(b)2.g., Florida Statutes.
  - Currently 26 landowners have received Warning Letter.
- Future potential for compliance enforcement action by DEP, Notice of Violation, if no response to Warning Letter.

Urban Fertilizer

- New Stormwater Projects.
  - First of four to five years of Drainage Retention Area retrofits with Bold and Gold by Marion County. One project in each spring BMAP area.
  - Florida Department Of Transportation District 2 calculated the benefit of fertilizer cessation in Levy County within the Rainbow Springs BMAP Area.

- New Education Effort. Public education coordination project will start this year. The purpose is to ensure consistent message on nutrient pollution prevention.

Drainage Wells

- Continuing Projects.
- Ocala has 3 projects to utilize bioabsorptive media to pretreat stormwater and enhance denitrification before discharge to wells.

Fertilizer Ordinance

- Florida Springs and Aquifer Protection Act.
- Local governments within spring BMAP area must have fertilizer ordinance!
  - ***Deadline is July 2017.***
  - Department has model ordinance available.
  - Meets Section 403.9337, F.S.
  - DEP will be contacting local governments to confirm status.
  - Ordinance is counted as education credit for urban fertilizer loading.

Wastewater and OSTDS New Projects

New Projects.

- Silver Springs.
  - Conceptual planning by Belleview for OSTDS. conversion west of SE 92nd Loop.
  - Marion County currently decommissioning the Sleepy Hollow Package plant. Completed the force main on CR 464 to allow for increased flows to Silver Springs WWTP.
- Rainbow Springs.
  - Dunnellon took the Rio Vista WWTP offline.
  - Williston has proposed an OSTDS abatement. project and a WWTP upgrade.

Wastewater and OSTDS Conceptual Projects

Rainbow Springs.

- Only one of the three conceptual projects for the Rainbow Springs area to move forward was the force main from Juliette Falls to the City of Dunnellon Plant off CR 484.
  - –This will allow up to four package plants to be taken off line.
- Two conceptual projects, a new WWTP and infrastructure for future OSTDS abatement through public-private partnership, will not proceed.

Wastewater and OSTDS Other Projects

- Marion County is currently seeking funding for a new project, a feasibility study for improvements in the Rainbow Springs area.
- OSTDS Remediation Advisory Committee formed.
  - Meeting since July 2016.

Wastewater Effluent Standards

Primary Protection Zone Standards Based on TN mg/L:

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

Remaining BMAP Area Standards based on TN mg/L:

- Apply to all permitted facilities with permitted capacity of 10,000 gallons per day or greater.
  - 6 mg/L TN as an annual average or,
  - 10 mg/L TN for discharge to a public reuse system.
- Apply 10 mg/L TN standard to facilities with permitted capacity less than 10,000 GPD.

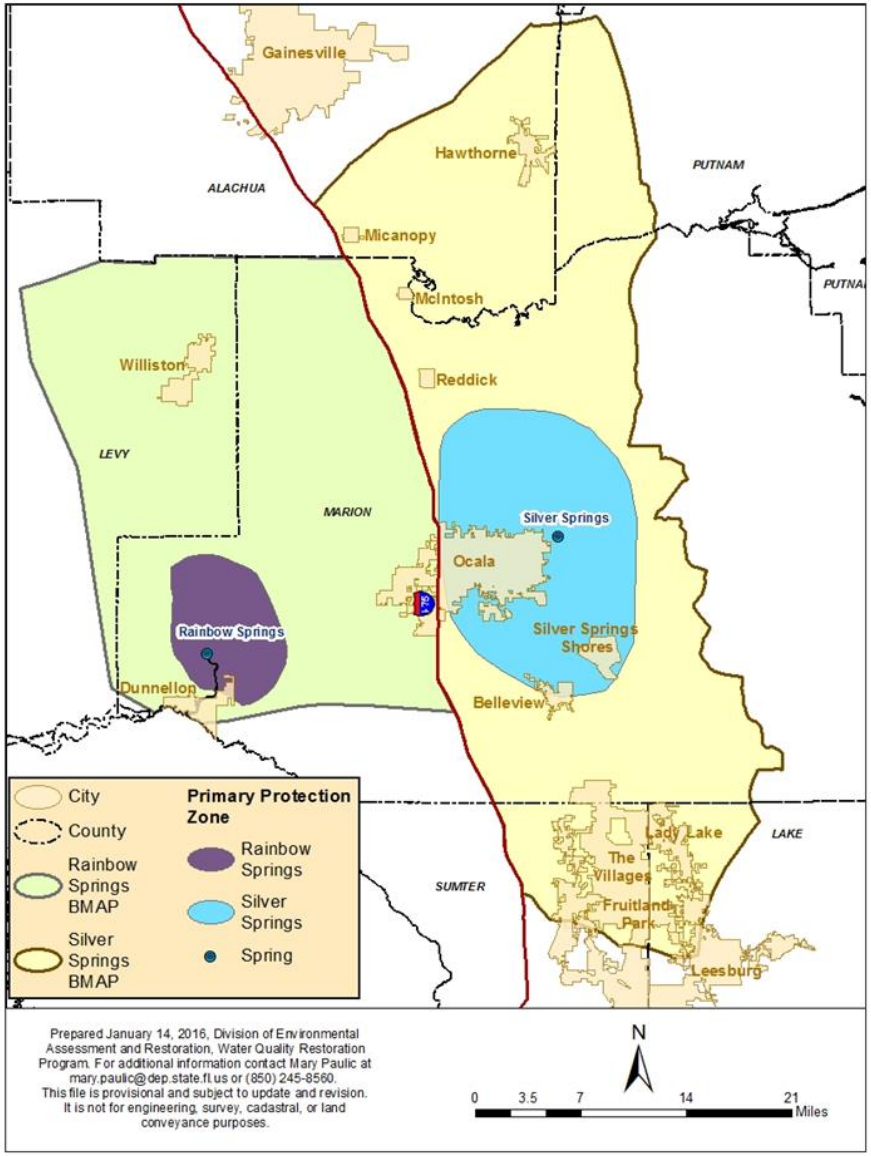
Status of Effluent Standards

- All facilities within Priority Focus Areas notified of standard change.
  - Both springs.
- Administrative Order issued implementing new effluent standard.

2016 Law

- Florida Springs and Aquifer Protection Act.
- Requires 5, 10, 15, and 20 year goals to achieve TMDLs for each source identified in Nitrogen Inventory.
- Revise adopted BMAPs to include source specific goals as well as OSTDS remediation plan by July 1, 2018.
- Delineate Priority Focus Area.

Priority Focus Area (PFA)



Requirements of Act

- Local governments within spring BMAP area must have fertilizer ordinance!
- Onsite Sewage Treatment and Disposal System (OSTDS) remediation plan.
- Outlines restrictions/prohibitions within PFAs.
- Within PFA, notification to local governments of 10-2 (Environmental Resource Permit) General Permit.

PFA Prohibitions

- Directed to new development.
- Prohibition on some activities:
  - Domestic wastewater disposal facilities unless they meet treatment requirements.
    - Applies to ≥100,000 gallons per day unless it meets standard of 3 mg/L on an annual basis or better, if needed.
    - BMAP effluent standards apply in these basins.
  - New hazardous waste disposal facility.
  - Land application of residual unless there is approved nutrient management plan.
  - New OSTDS on lots smaller than 1 acre.
    - IF the specific systems conflicts with an OSTDS remediation plan in a BMAP.
  - New agriculture operations that do not implement best management practices or do approved monitoring.

OSTDS Remediation Plan

- Plan needs to:
  - Provide for BMAP revision by July 2018.
  - Include development of 5-year, 10-year, and 15-year goals.
    - *20 year plan started at adoption of BMAPs in 2015.*
  - Include detailed plan to meet TMDL in 20 years.
- OSTDS Advisory Committee members:
  - Represent the sectors that are affected by the OSTDS Remediation Plan.
  - Have expertise to lend to the process and to successful outcomes to reduce nitrogen loadings from OSTDS sources.
  - Advise/provide DEP with opinions or direction on Wastewater/OSTDS Remediation Plan.

Advisory Committee Members

Sector	Name of Representative	Entity/Group
DOH	Dan Dooley, Anthony Dennis, Wesley Asbell	FDOH in Marion County, Alachua County, and Levy County
County	Tracy Straub	Marion County
City	Bruce Phillips	Belleview
City	Sean Lanier, Rusella Johnson, Daryll Muse	Ocala
City		Dunnellon
Public/Private Utility	Bryan Schmalz	Bay Laurel Center CDD (On Top of the World)
Environmental Interest Rainbow Springs	Burt Eno	Rainbow River Conservation, Inc.
Environmental Interest Silver Springs	Russ Melling	Oklawaha Valley Audubon
Other Interests	Dave Harden Robert Himschoot Roxanne Groover	Marion County Building Industry Association Florida Home Builders Association Florida Onsite Wastewater Association (FOWA)

OSTDS Remediation Plan

- Three prongs: Projects, Scientific information, Education.
- Projects/Management Strategies.
  - Proposed or revised projects/management strategies funded/started since the adoption of the BMAP.

Remediation Options

- Provide central sewer service.
- Install nitrogen reducing septic systems.
- Implement maintenance program.

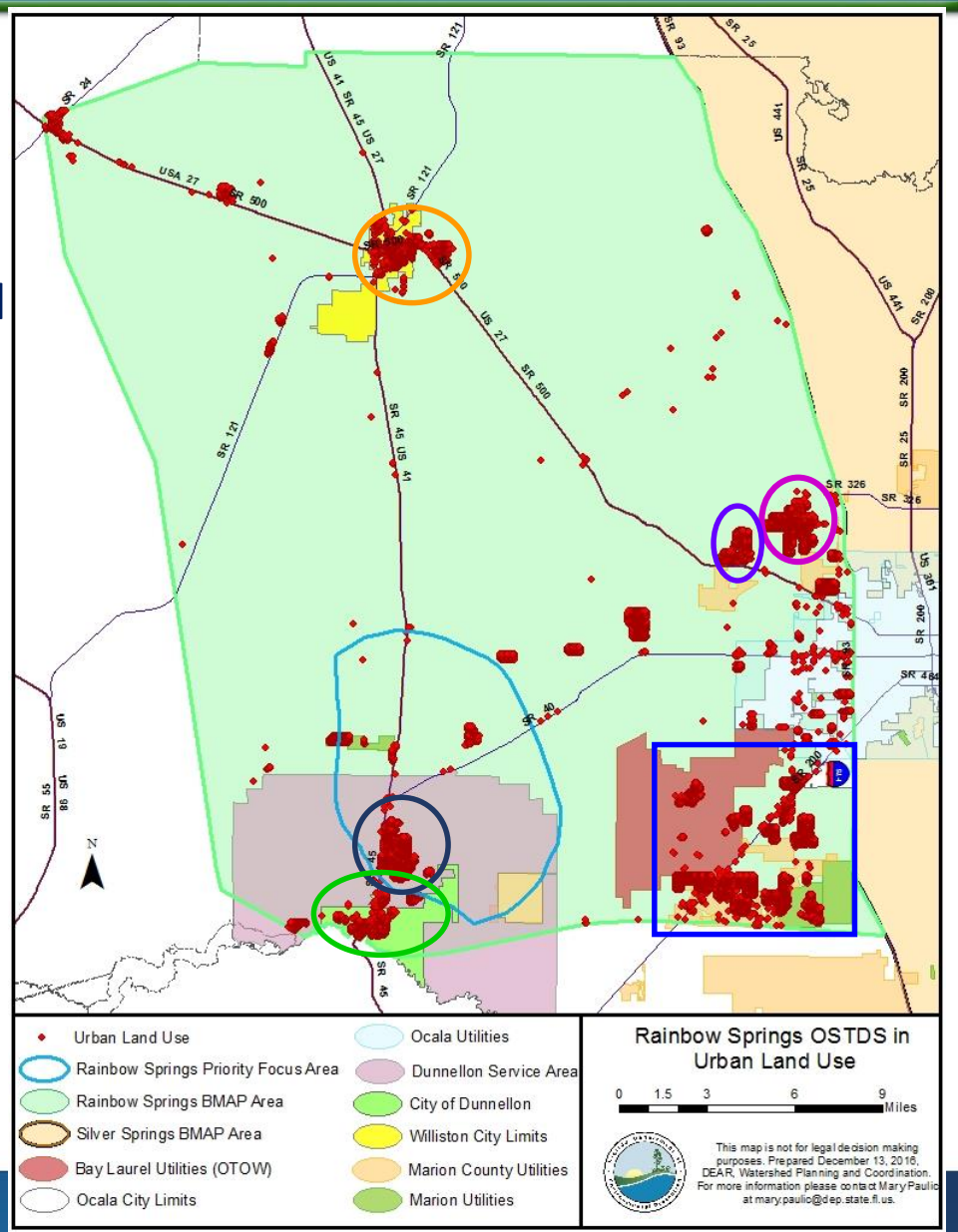
Geographic Focus Rainbow Springs

Draft Coarse estimates of number of OSTDS by area:

- Close to Spring.
- PFA – Area on map sewered in high and medium recharge urban land use. About 3,325 low density development west of US 41 not sewered.
- Dunnellon largely sewered, about 330 tanks outside city limits.

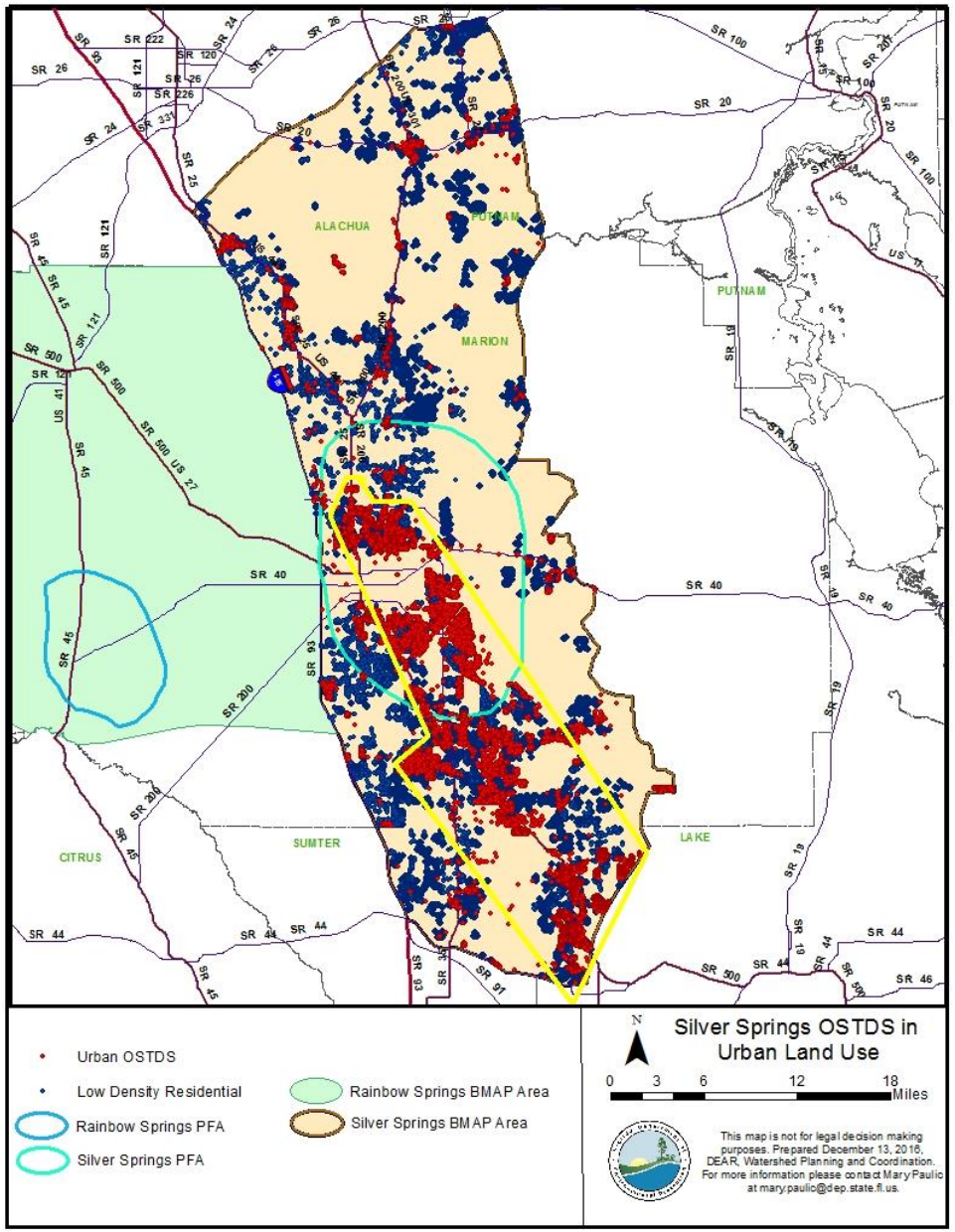
- Williston – ~1400
- SR 200 Corridor - ~8000

- Closer to Silver Springs
- NW Ocala 1 - ~1800
- NW Ocala 2 - ~380



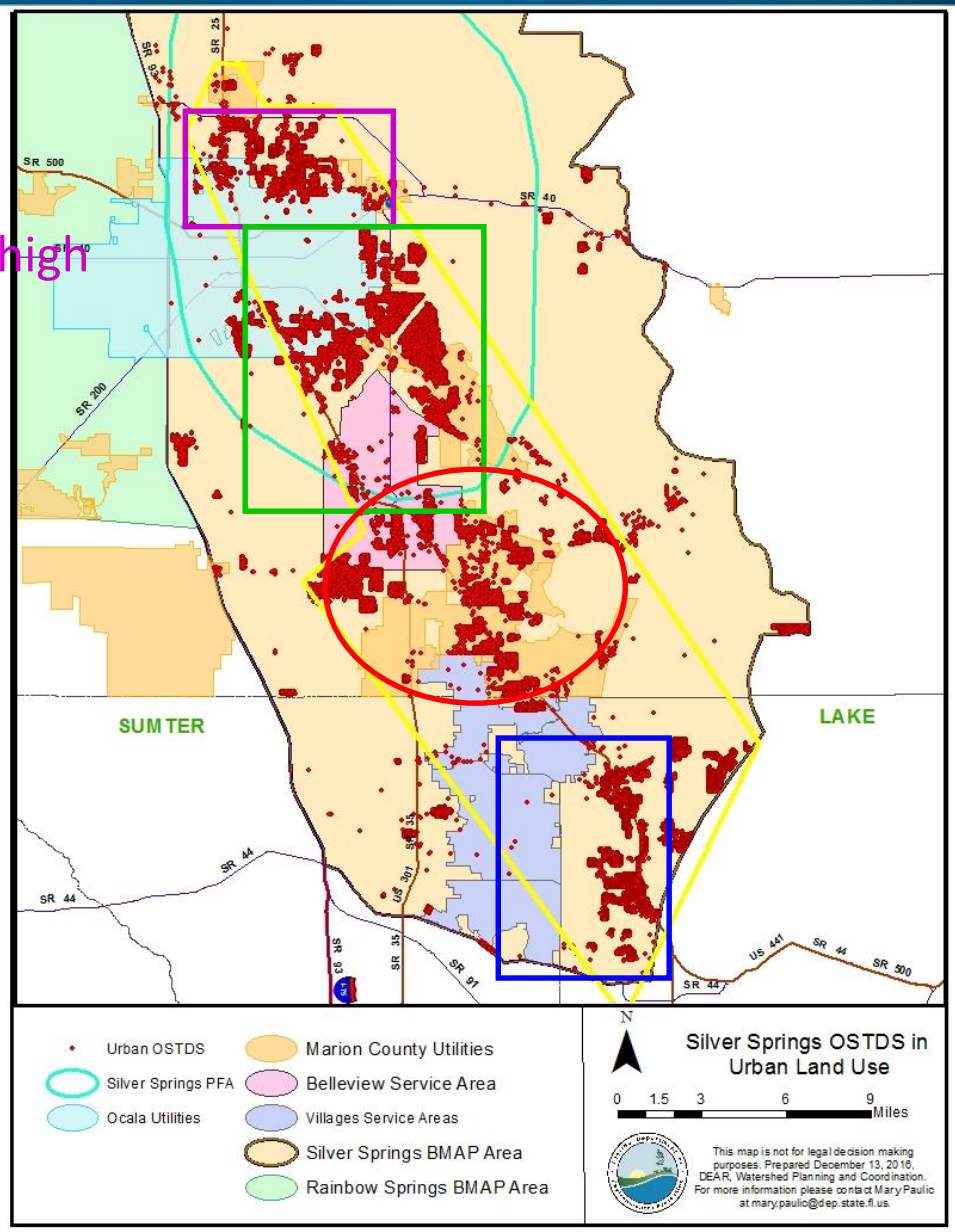
Silver Springs Urban Land Use

- Urban includes high density residential, medium density residential, industrial, commercial, and institutional land uses.



Geographic Focus Silver Springs

- Draft coarse estimates of OSTDS by area.
- North PFA (Ocala) - ~4100 OSTDS, ~1600 high recharge and ~2500 medium recharge.
- South PFA - ~10900, ~9850 high recharge and ~1050 medium recharge.
- South Marion - ~8400, ~2400 high recharge and ~6000 medium recharge.
- Lake County (low priority area) - ~5000, ~2440 high recharge and ~2560 medium recharge.



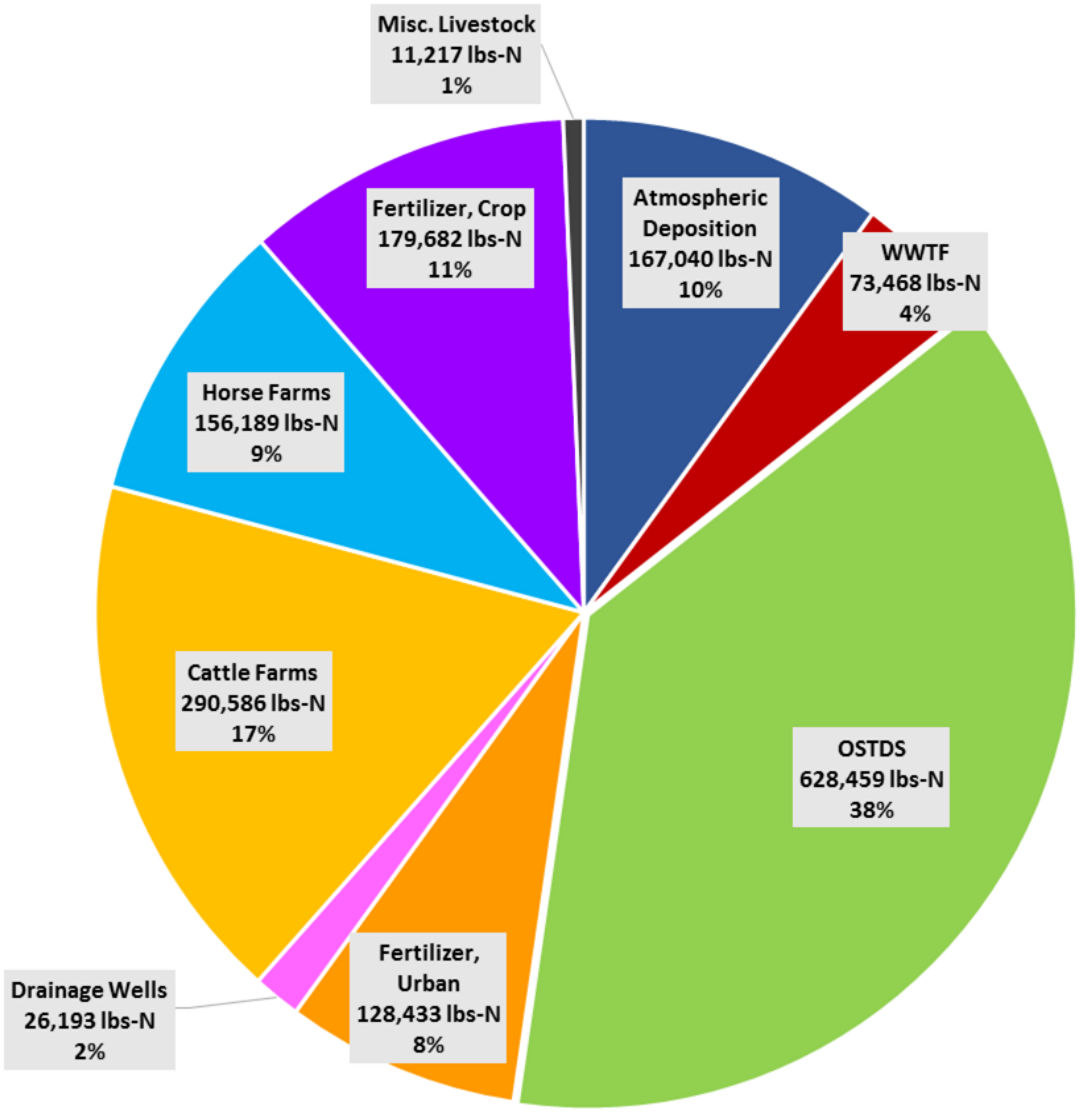
Revision of BMAPs

- Law now requires revision of BMAPs to include projected 5, 10, 15, and 20 year goals.
- Meet TMDLs in 20 years which, for these BMAPs the start date was 2015 and end date is 2035.
- DEP goal to meet reductions in 15 years. Propose:
  - 30% first 5 years.
  - 40% second 5 years.
  - 30% third 5 years.
  - Use last 5 years to finish up.

How to Do This?

- Need to develop planning benchmarks or management strategies that set goals for each source.
  - Projects defined that fit within those strategies that will meet specific loading reductions.
  - Projects planned for further out in time will by necessity be more conceptual (less detail confirmed) and the BMAPs will need to adjusted to accommodate.
- Start with Nitrogen Source Inventory LoadingTool to define loading. TMDLs define the percent reduction needed to achieve water quality standards.

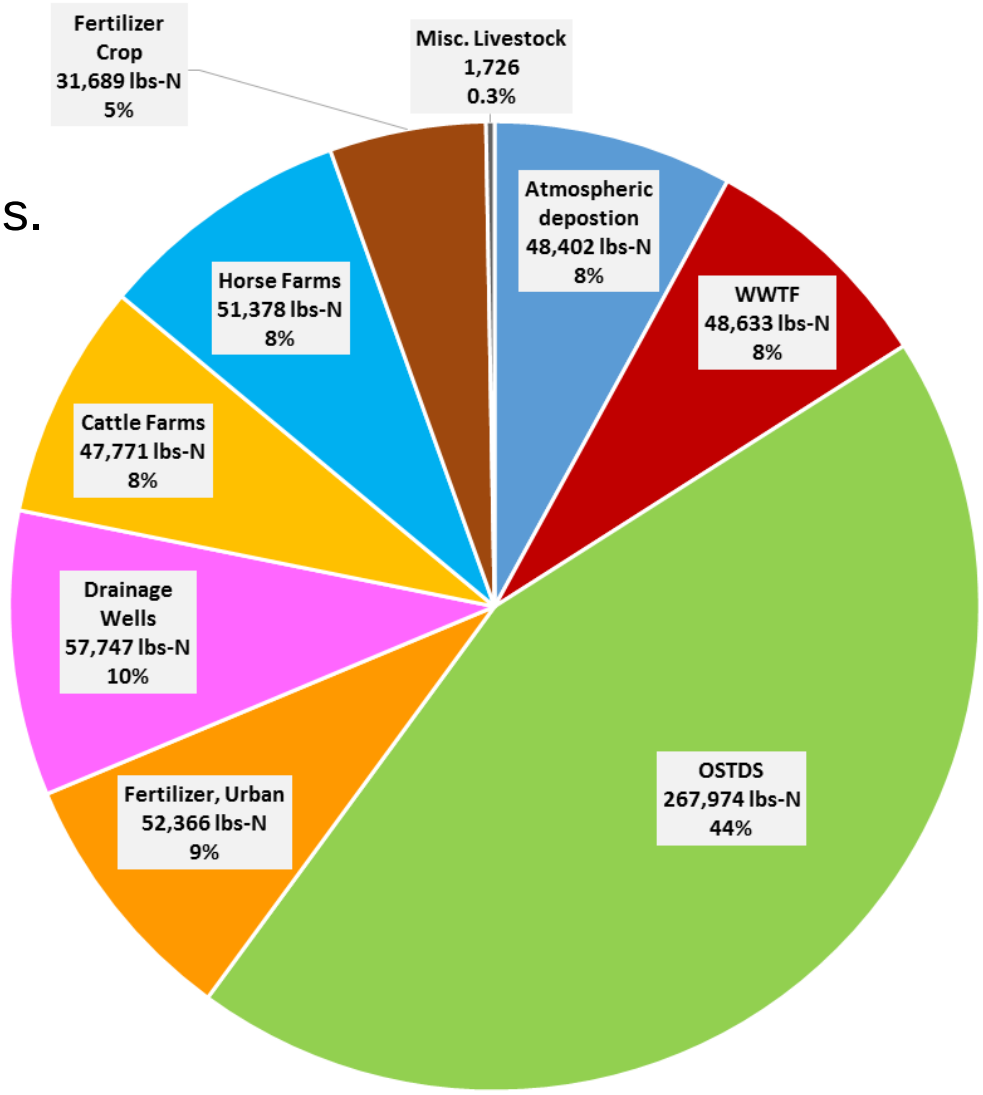
Silver Springs BMAP Area NSILT Result



- Estimated input of nitrogen loading to Upper Floridan aquifer.
- Agriculture 38%.
- OSTDS 38%.
- Urban 14%.
- Total load at Upper Floridan =1.66 million lbs-N
- Provides basis for sources contribution to overall loading.

Silver Springs NSILT Priority Focus Area

- OSTDS portion of loading increases.
- Urban sources more prominent.
- Agriculture 21.3% of loading.
- Total load at Upper Floridan = 607,686 lbs-N.



Atmospheric Deposition Load

- Distributed across land surface.
- Currently no feasible remediation techniques.
- Set aside to be addressed in later BMAP cycle as tools become available.
- Not assigned to other sources.
- Strategy applies to both Silver and Rainbow.
- Represents 10% of loading for Silver and 7% for Rainbow.

Silver Springs Reduction Priority Focus Area

- Use NSILT estimates of loading with percent reduction needed by TMDL.
- Source Category load x 79% reduction = Target Load Reduction.

Priority Focus Area Source Category	Draft Load lbs-N	Percent of Total Loading	Draft Target Load Reduction lbs-N
OSTDS	267,974	44%	211,699
Drainage Wells	57,747	10%	45,620
Urban Fertilizer	52,366	9%	41,369
WWTF	48,633	8%	38,420
Agriculture Fertilizer	31,689	5%	25,034
Horse Farms	51,378	8%	40,589
Cattle	47,771	8%	37,739
Other Livestock	1,726	<1%	1,364

Silver Springs BMAP Area Reduction

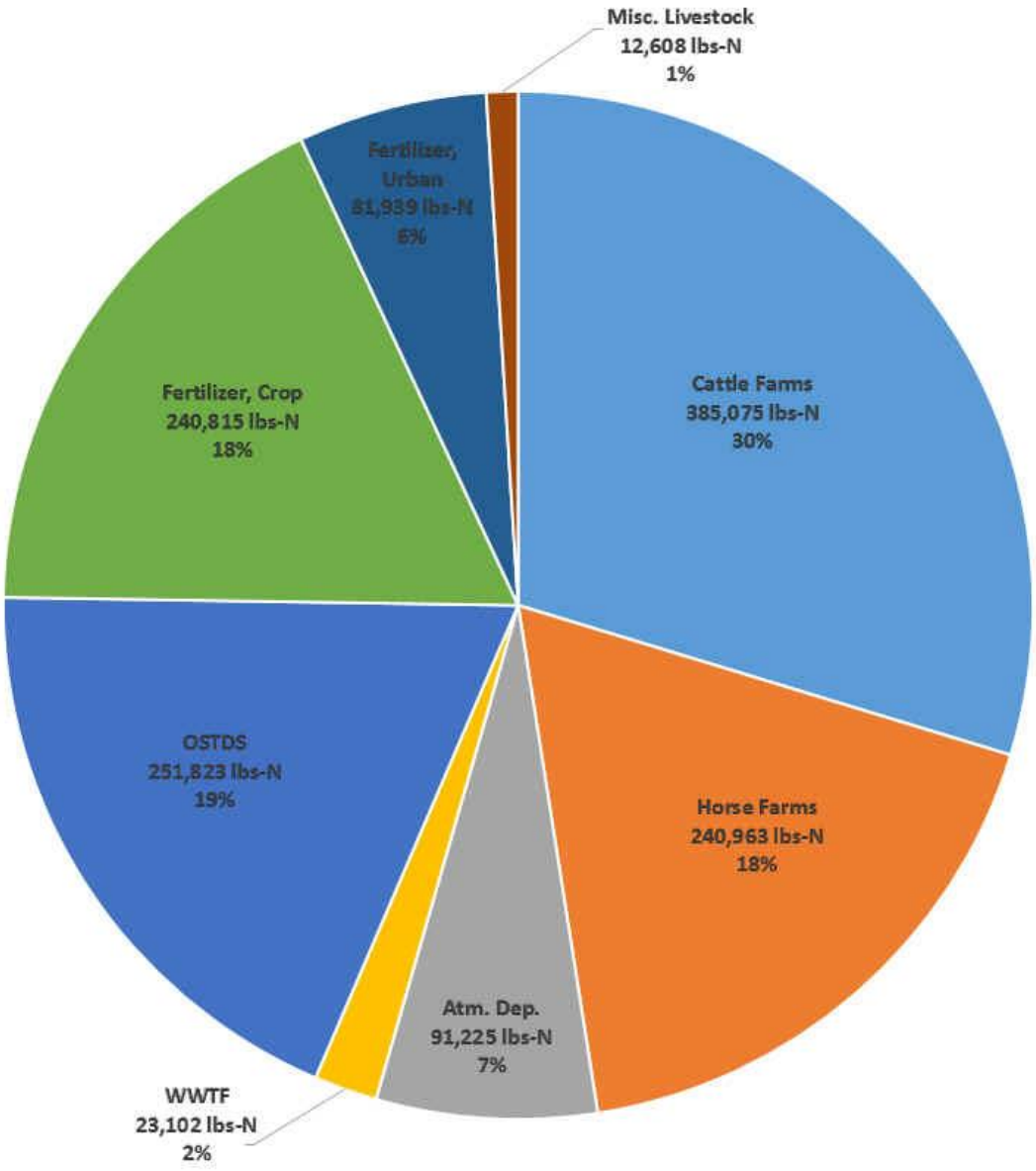
Entire BMAP Area Source Category	Draft Load lbs-N	Percent of Total Loading	Draft Total Target Load Reduction lbs-N
OSTDS	628,459	38%	496,483
Drainage Wells	26,193	2%	20,692
Urban Fertilizer	128,433	8%	101,462
WWTF	73,468	4%	58,040
Agriculture Fertilizer	179,682	11%	141,949
Horse Farms	156,189	9%	123,389
Cattle	290,586	17%	229,563
Other Livestock	11,217	1%	8,861

Silver Springs BMAP

- Priority focus area is included within BMAP area. Need to adjust BMAP area calculation to account for Priority Focus Area.
- BMAP area target loading – PFA target loading = adjusted BMAP target loading.

Entire BMAP Area Source Category	Total Draft Target Load Reduction lbs-N for BMAP Area	Final Draft Target Load Reduction lbs-N Adjusted for PFA
OSTDS	496,483	284,784
Drainage Wells	20,692	Not present outside PFA
Urban Fertilizer	101,462	60,093
WWTF	58,040	19,620
Agriculture Fertilizer	141,949	116,915
Horse Farms	123,389	82,800
Cattle	229,563	191,824
Other Livestock	8,861	7,497

Rainbow NSILT Results



- Estimated input of nitrogen Loading to Upper Floridan aquifer.
- Agriculture 67%.
- OSTDS 19%.
- Urban 6%.
- Total load to Upper Floridan = 1.33 million lbs-N

Rainbow Springs BMAP Area Reduction

- Use NSILT estimates of loading with percent reduction needed by TMDL.
- Source Category load x 82% reduction.

Entire BMAP Area Source Category	Draft Load lbs-N	Percent of Total Loading	Draft Target Load Reduction lbs-N
OSTDS	251,823	19%	206,495
Urban Fertilizer	81,939	6%	67,190
Fertilizer Crop	240,815	18%	197,468
WWTF	23,102	2%	18,944
Horse Farms	421,746	18%	345,832
Cattle	385,075	30%	315,762
Other Livestock	12,608	1%	10,339


Questions?

Summary and Action Items

- Summary.
  - TMDL needs to be achieved no more than 20 years after adoption of BMAP.
- Need to update information (data, projects, studies, etc.) and start gathering necessary information.
  - Identify management strategies and projects to meet the 5-year, 10-year and 15-year targets.
  - Identify what and where scientific information is needed.
  - Identify what public education efforts exist & what needs to be done.
- Action Items.
  - Next meeting, June to July time frame.
  - Annual report, draft end of February early March.


Questions?

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