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

Updates

May 30, 2024 at 1:30 PM EDT

Via Webinar
Webinar Registration Link:
https://attendee.gotowebinar.com/register/4413889812968306526

Agenda

- Siver and Rainbow Springs Basin Management Action Plan (BMAP) Overview.
- Nitrogen Source Inventory Loading Tool (NSILT) Results.
- Spring Vent Load Analysis Results.
- Next Steps - BMAP Updates.

Please note the FTP site for documents pertaining to the various BMAPs:
publicfiles.dep.state.fl.us - /DEAR/BMAP/Outstanding Florida Springs BMAPs/
For more information on the Silver and Rainbow Springs BMAP, contact: Jessica Fetgatter at (850) 245-8107
Jessica.Fetgatter@FloridaDEP.gov.

WEBINAR HOUSEKEEPING

Attendee Participation

Open your control panel.

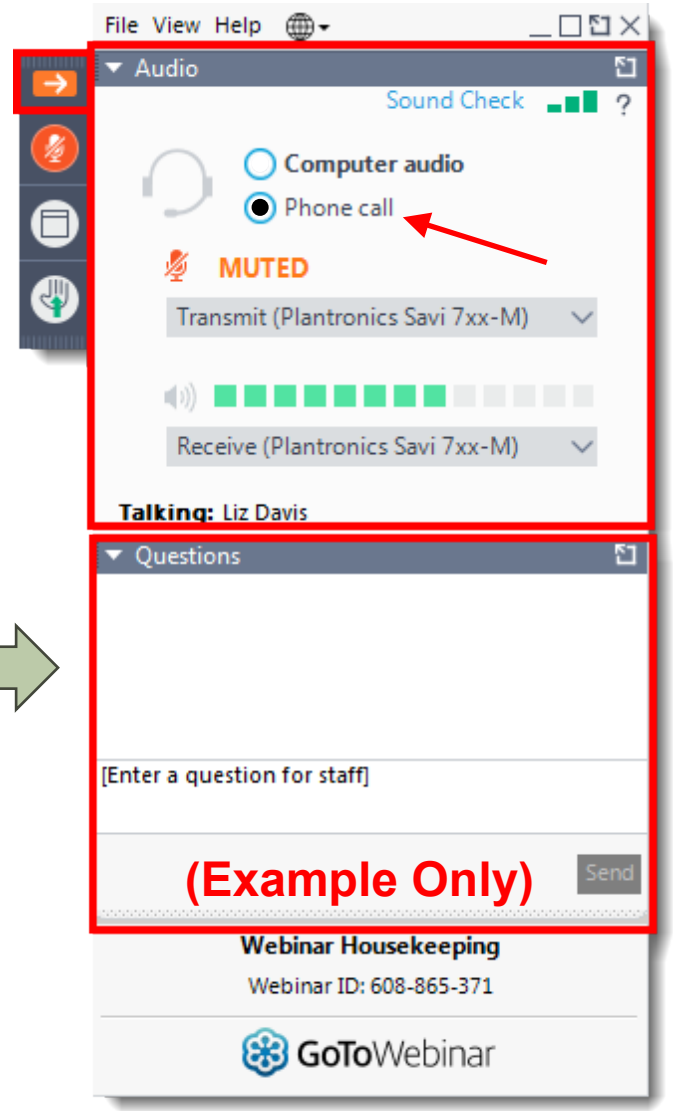
Join audio:

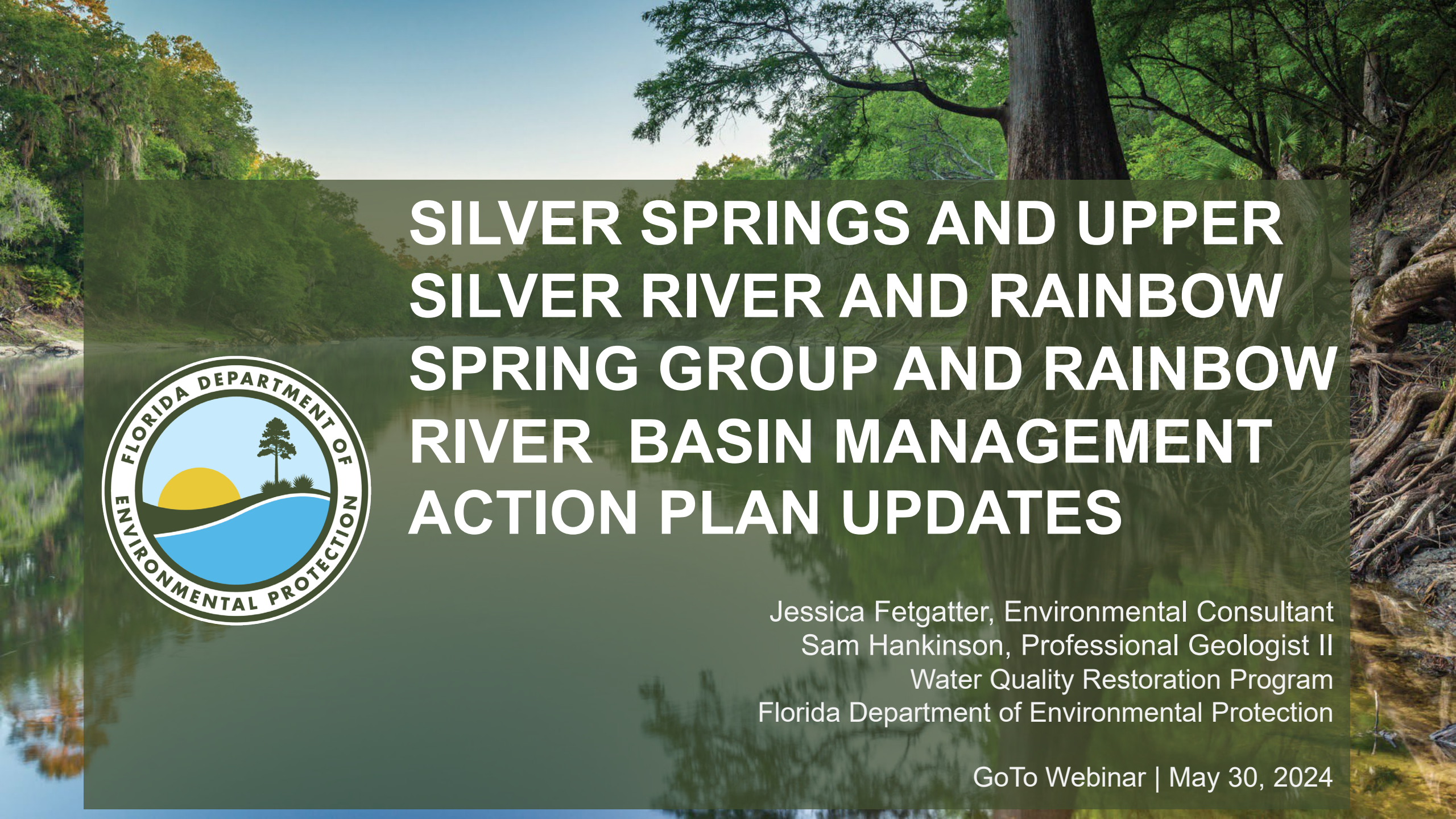
- Choose **Phone Call** and dial using the information provided.
- Or choose **Computer Audio** to use your computer's speakers for audio.
- Attendee audio will be muted.

Submit questions and comments via the Questions panel. If you would like to unmute and ask your questions, please specify that in the Questions Panel.

If viewing this webinar as a group, please provide a list of attendees via the Questions panel.

Note: Today's presentation is being recorded and will be provided on the FTP after the webinar.





SILVER SPRINGS AND UPPER SILVER RIVER AND RAINBOW SPRING GROUP AND RAINBOW RIVER BASIN MANAGEMENT ACTION PLAN UPDATES

Jessica Fetgatter, Environmental Consultant
Sam Hankinson, Professional Geologist II
Water Quality Restoration Program
Florida Department of Environmental Protection

GoTo Webinar | May 30, 2024

AGENDA

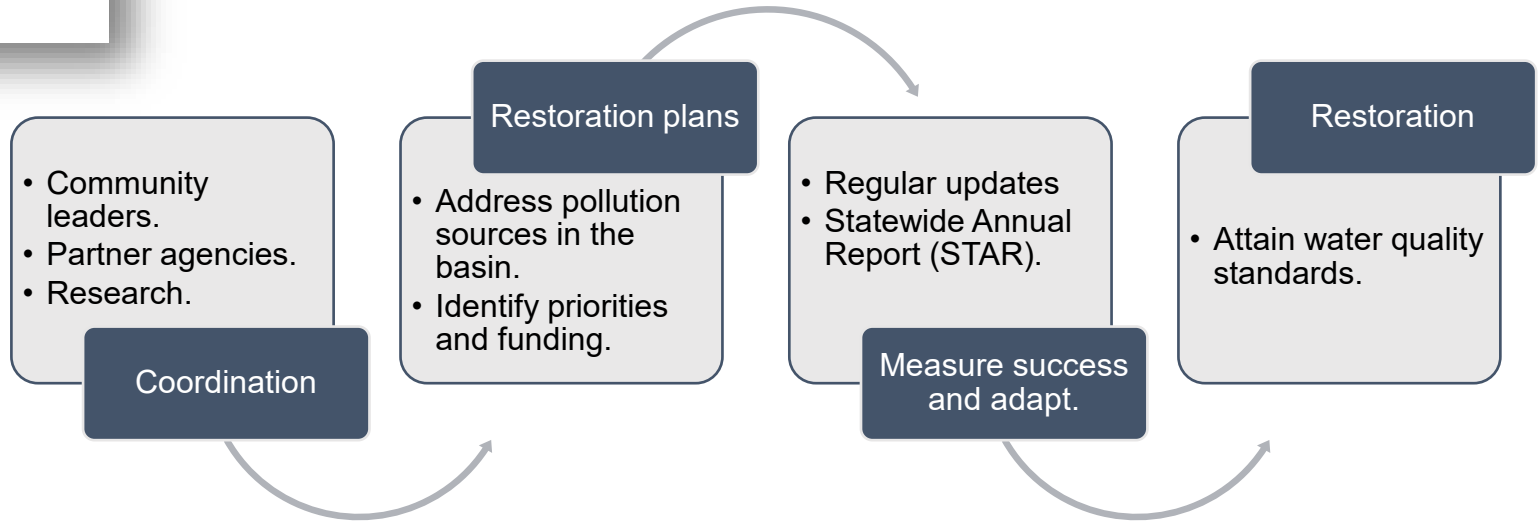
- Basin Management Action Plan (BMAP) Overview.
- Nitrogen Source Inventory Loading Tool (NSILT):
  - Updates.
  - Draft Results.
- Spring Vent Load Analysis.
- Next Steps - BMAP Updates:
  - Draft Allocation Approach.
  - Milestones.

BMAPs

One of DEP's methods for **restoring water quality** in an impaired waterbody.

BMAPs are:

- Developed with stakeholder input.
- Adopted by The Florida Department of Environmental Protection's (DEP) Secretarial Order.
- Enforceable.
- Implemented through a phased approach.
- Reported on annually.
- Updated regularly.



KEY BMAP COMPONENTS

- Total maximum daily loads (TMDLs) being addressed.
- Area addressed by the restoration plan.
- Identify sources.
- Phased implementation approach.
- Milestones.
- Projects and management strategies.
- Future growth impacts.

Projects to meet the TMDL:

- Implementation timeline.
- Commitment to projects.
- Expected water quality improvement from projects and management strategies.

Process to assess progress toward achieving the TMDL:

- Monitoring plan.
- Project reporting.
- Periodic follow-up meetings.
- Water quality analyses.

STAKEHOLDERS

Local Governments:

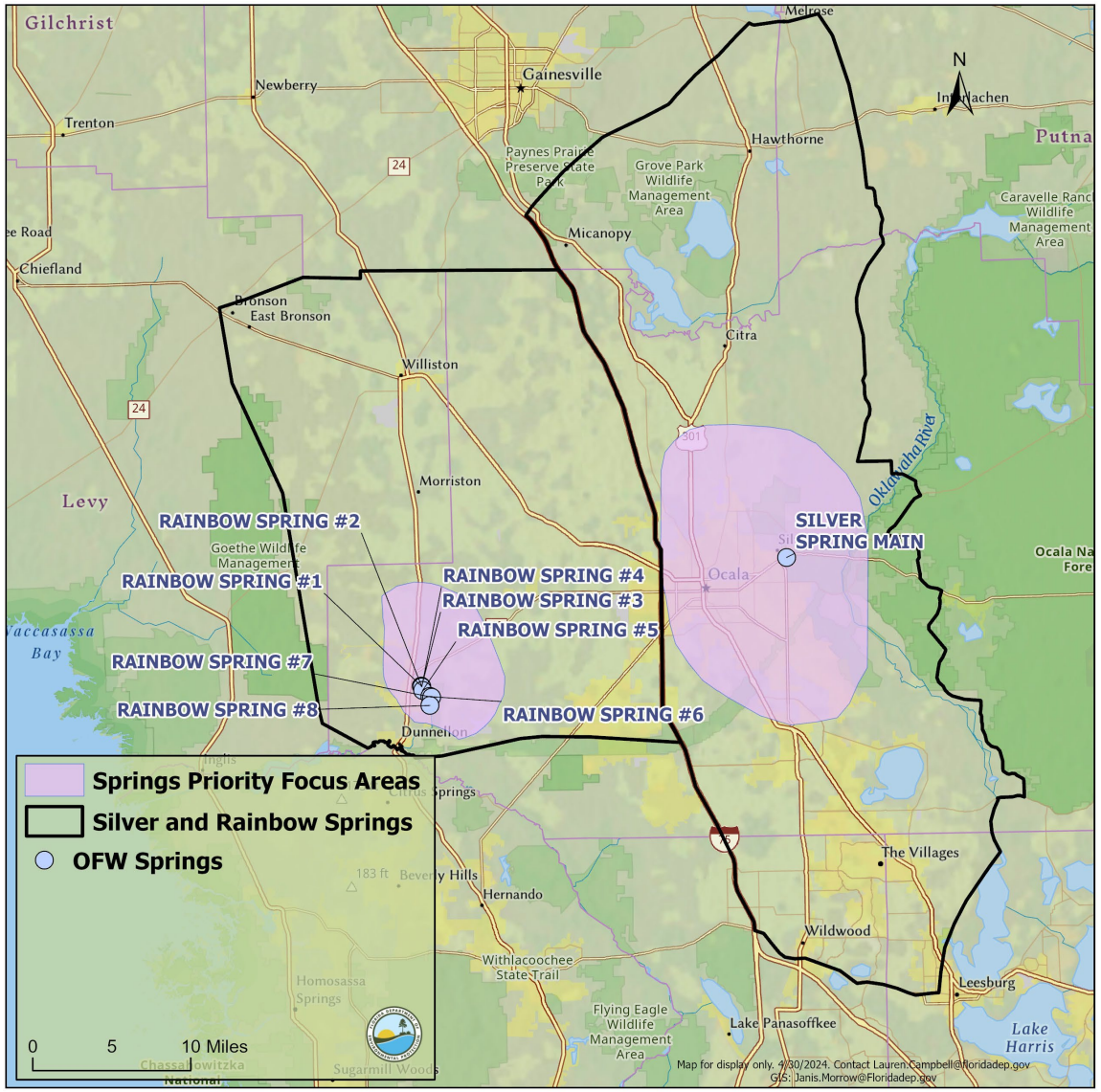
- Marion County.
- Alachua County.
- Lake County.
- Sumter County.
- Levy County.
- Putnam County.
- City of Ocala.
- City of Dunnellon.
- City of Belleview.
- The Villages.
- On Top of the World.
- Town of McIntosh.
- City of Williston.
- Town of Bronson.
- City of Micanopy.
- City of Hawthorne.
- Town of Lady Lake.
- City of Fruitland Park.
- Bay Laurel CDD.
- Agricultural Producers.

Regional and State Agencies:

- Florida Department of Agriculture and Consumer Services.
- Florida Department of Environmental Protection, including Silver Springs State Park and Rainbow Springs State Park, Ocklawaha River Aquatic Preserve, and Rainbow Springs Aquatic Preserve.
- Florida Department of Health.
- Florida Department of Health in Marion County.
- Florida Department of Health in Alachua County.
- Florida Department of Health in Levy County .
- Florida Department of Transportation District 2.
- Florida Department of Transportation District 5.
- St. Johns River Water Management District.
- Southwest Florida Water Management District.

SILVER & RAINBOW BMAP AREA

- The Silver Springs and Upper Silver River BMAP area is approximately 989 square miles.
- The Rainbow Spring Group and Rainbow River BMAP area is approximately 679 square miles.
- Both are impaired for the nitrate form of nitrogen.
- TMDL is 0.35 mg/L of nitrate, as monthly arithmetic mean target.



CLEAN WATERWAYS ACT: TIMELINE

June 12, 2023

Final Order signed by the Secretary.

July 12, 2023

Deadline for written explanation of potential exemption to be submitted to the department.

Feb. 1, 2024

Deadline for submitting draft onsite sewage and treatment and disposal (OSTDS) remediation and/or wastewater treatment plans for the department's review.

Aug. 1, 2024

Deadline for submitting complete OSTDS remediation and/or wastewater treatment plans to the department.

The nutrient BMAPs included in the Final Order require these plans.

HOUSE BILL (HB) 1379: ENVIRONMENTAL PROTECTION

Increased protection for Outstanding Florida Springs (OFS).

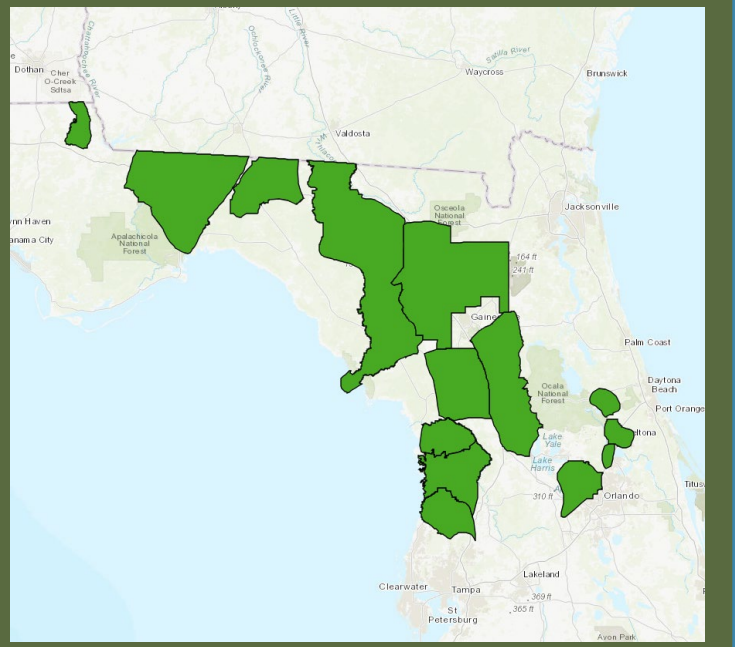
Strengthens Water Quality Protections and BMAPs.

HB 1379

Improves Local Government Long-Term Comprehensive Planning.

Expands Funding Opportunities to Address Water Quality Impairments.

Expanded prohibitions in OFS to entire BMAP area. (section 373.811, Florida Statutes [F.S.])



- New conventional OSTDS where sewer is available.
- New domestic wastewater disposal facilities with permitted capacities of 100,000 gallons per day or more, unless they meet Advanced Waste Treatment (AWT) standards.
- New HAZMAT disposal facilities.
- Land application of Class A or B biosolids not in accordance with a DEP-approved nutrient management plan.
- New agricultural operations not implementing best management practices (BMPs), measures necessary to achieve pollution reduction levels or groundwater monitoring plans.

2024 DEP AGENCY BILL: HB 1557

Advances the protection of our environmental resources by:

- Enhancing protections for Florida's Coral Reef and aquatic preserves.
- Strengthening Florida's resilience planning.
- Furthering the Onsite Septic Program transfer.

Improving Treatment of Reclaimed Water

Ensures that reclaimed water is treated to meet AWT or a more stringent treatment standard in certain BMAP areas, while still promoting its use to eliminate surface water discharges and meet water supply challenges.

Expanding Wastewater Facility Plans

Supports the development of domestic wastewater treatment plans and OSTDS remediation plans within BMAP or other restoration areas by requiring facilities to provide information to the local entities developing these plans.

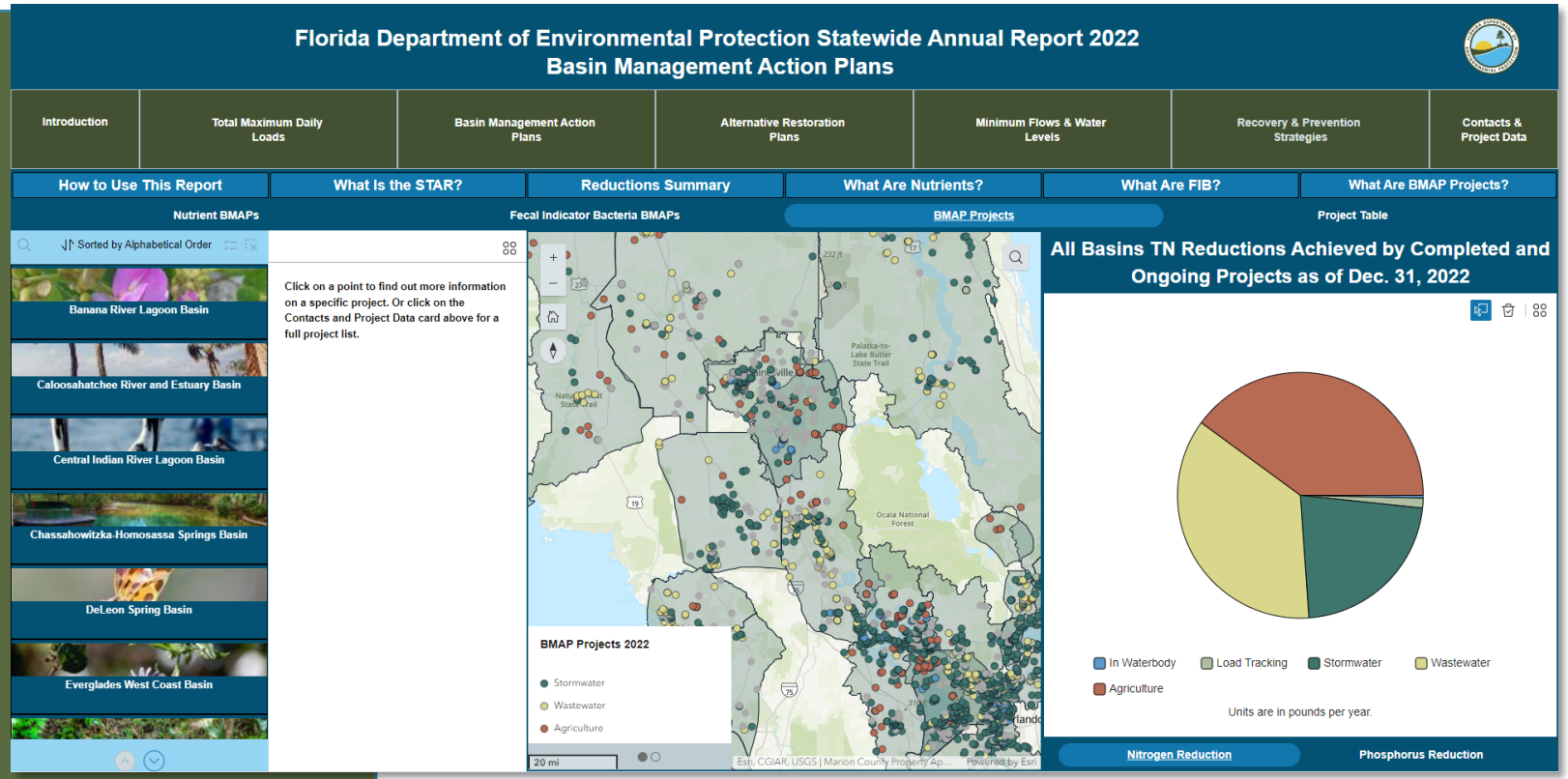
Investing in Innovative Technologies

Creates a program to expeditiously review new and innovative enhanced nutrient-reducing OSTDS to reduce the nutrients entering Florida's waterways.

STAR
STATEWIDE ANNUAL REPORT – PROJECT REPORTING

What is the STAR?

- Summarizes accomplishments in the BMAPs statewide.
- Reports on restoration projects and management strategies.
- Published July 1 of each year.
- Currently in the process of project updates and verification for STAR 2023.



PRELIMINARY STAR RESULTS FOR 2023

Silver BMAP	
Project Status	Count of Projects
Planned	20
Ongoing	71
Underway	36
Completed	162
Total	**289**

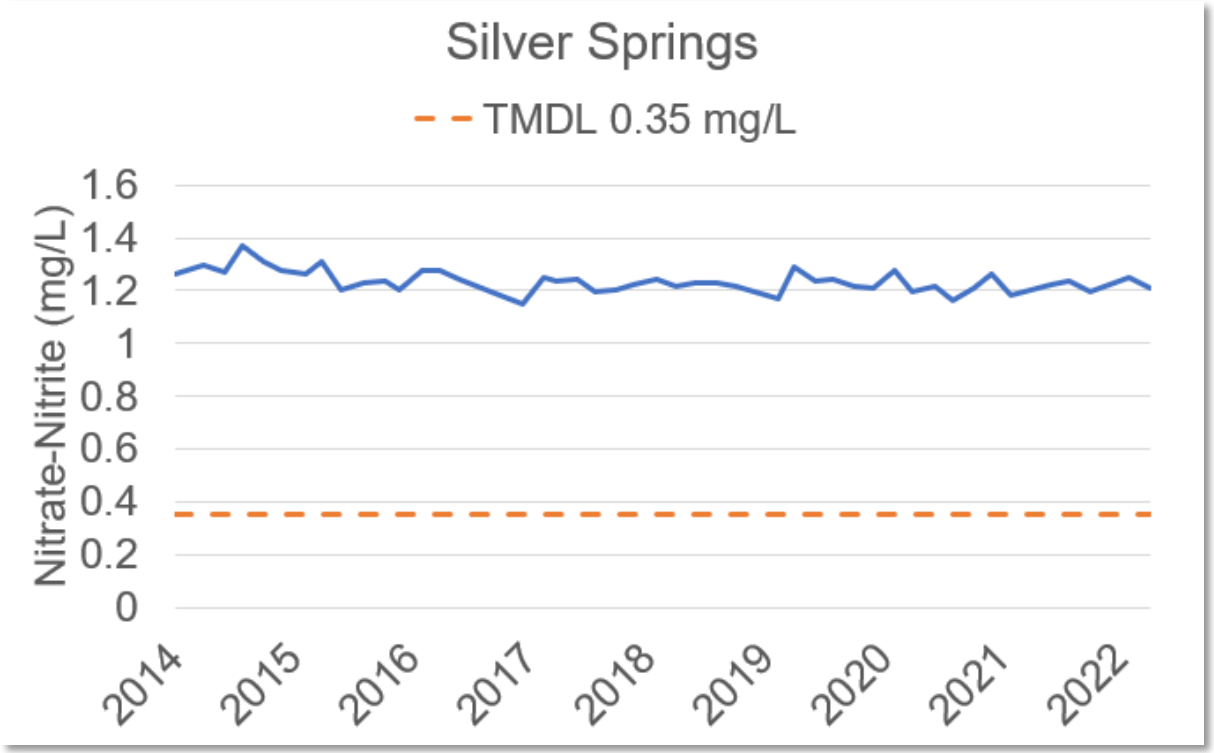
As of Dec. 31, 2023, verified projects in the Silver BMAP have reduced **76,982 lbs./yr.** of TN.

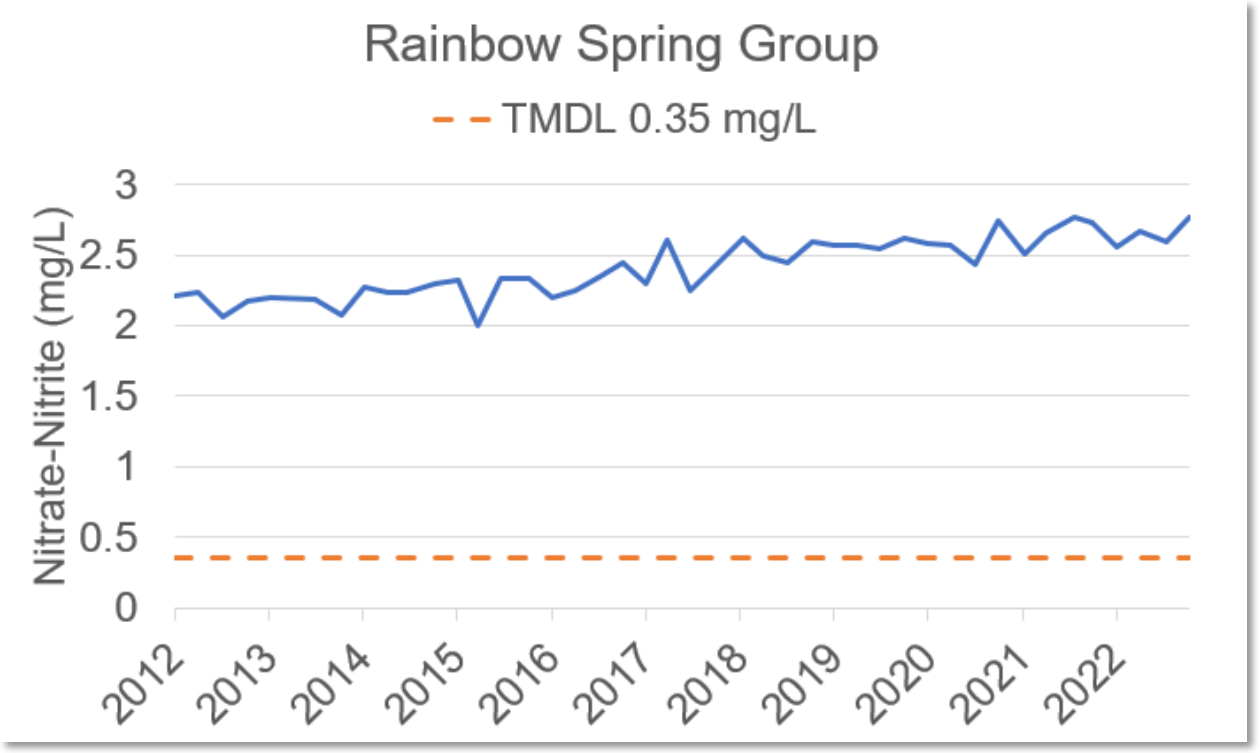
Rainbow BMAP	
Project Status	Count of Projects
Planned	21
Ongoing	20
Underway	29
Completed	90
Total	**160**

As of Dec. 31, 2023, verified projects in the Rainbow BMAP have reduced **42,519 lbs./yr.** of TN.

WATER QUALITY DATA

SPRING VENT DATA





DATA UPLOAD
WATERSHED INFORMATION NETWORK (WIN)

- Through both the Watershed Information Network (WIN) and Florida STORET (STOrage and RETrieval) data repositories, DEP implements Florida statutory requirements, DEP rule requirements and U.S. Environmental Protection Agency (EPA) funding requirements for management of environmental (non-regulatory) data for the state.

- Data from WIN are used by DEP for standards development, Impaired Waters Rule assessments, TMDL development, reasonable assurance plans, alternative restoration plans, **BMAP development and assessment** and for providing data as required to EPA and to the public.

- WIN data can be retrieved through the WIN Reports and Extracts menu at https://prodenv.dep.state.fl.us/DearWin/.

- Data providers to WIN and STORET include Division of Environmental Assessment and Restoration and other DEP entities, water management districts (WMDs), cities, counties, other state agencies, universities, private and volunteer organizations.

- If your entity is collecting ambient water quality data, please upload it to WIN.

WIN COORDINATORS

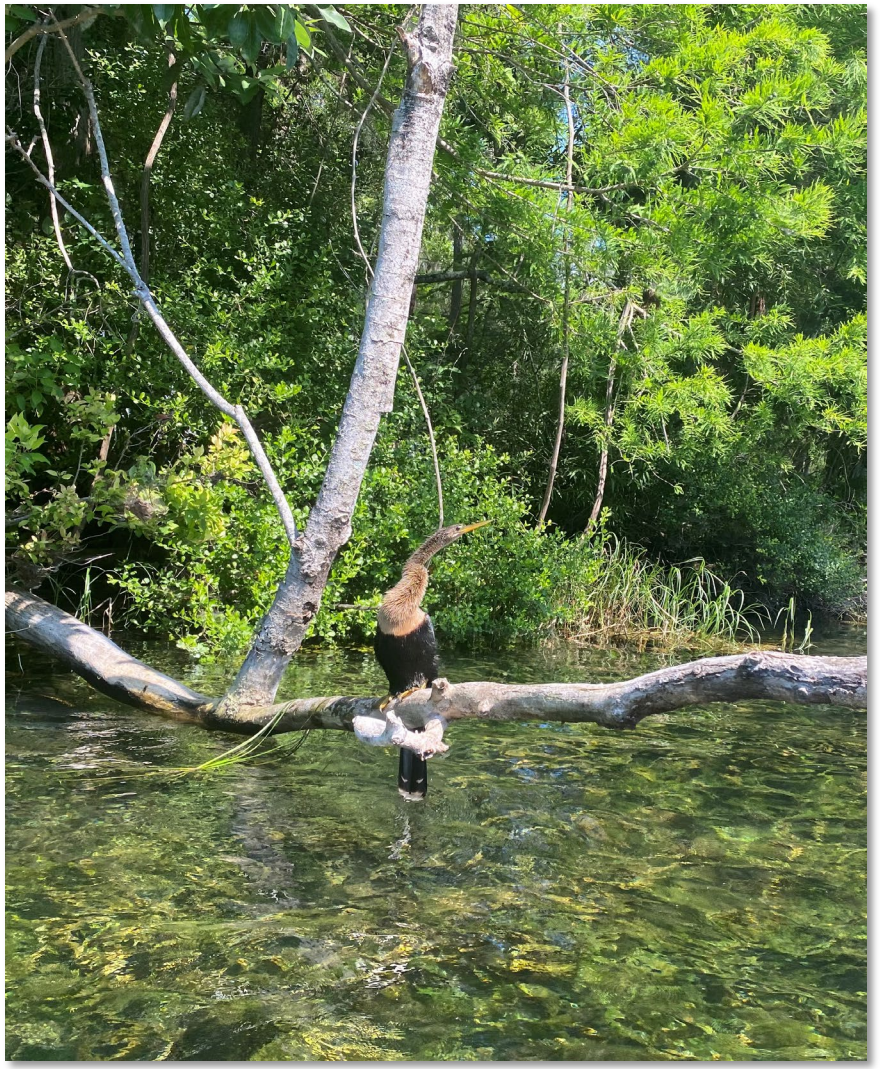
WIN Coordinator	DEP District Area or Role	Phone	Email
Justin Nelson	Northeast, Northwest, Southeast	850-245-8510	Justin.M.Nelson@FloridaDEP.gov
Casey Marston	South, Southwest	850-245-8049	Casey.Marston@FloridaDEP.gov
Lisa Schwenning	SPA (STORET Public Access), WQX (U.S. EPA Water Quality Exchange)	850-245-8509	Lisa.Schwenning@floridaDEP.gov
Jason Storrs	Central, Statewide	850-245-8467	Jason.Storrs@FloridaDEP.gov

BMAP UPDATES

ADOPTED BY JULY 1, 2025

- NSILT updates.
- Spring vent load analyses.
- Entity allocation development.
- Future growth.
- Establish five-year milestones for project implementation.
- Incorporate additional projects.
- Incorporate Clean Waterways Act (Senate Bill 712) requirements.
- Incorporate HB 1379 requirements.
- Incorporate regional projects.

- Water quality data evaluation:
  - Evaluation of the monitoring network (spring vent and groundwater).
  - Water quality trend analyses.
- Evaluate further OSTDS provisions.
- Evaluate AWT or other more stringent effluent limits.
- Update the BMAP documents.



NSILT UPDATES

- NSILT Process.
- Methodology review for sources.
  - Atmospheric deposition (AD).
  - Wastewater treatment facilities (WWTFs).
  - OSTDS.
  - Urban turfgrass fertilizer (UTF).
  - Sports turfgrass fertilizer (STF).
  - Farm fertilizer (FF).
  - Livestock waste (LW).
  - Biosolids.
- Draft results.

NSILT GENERAL PROCESS SUMMARY

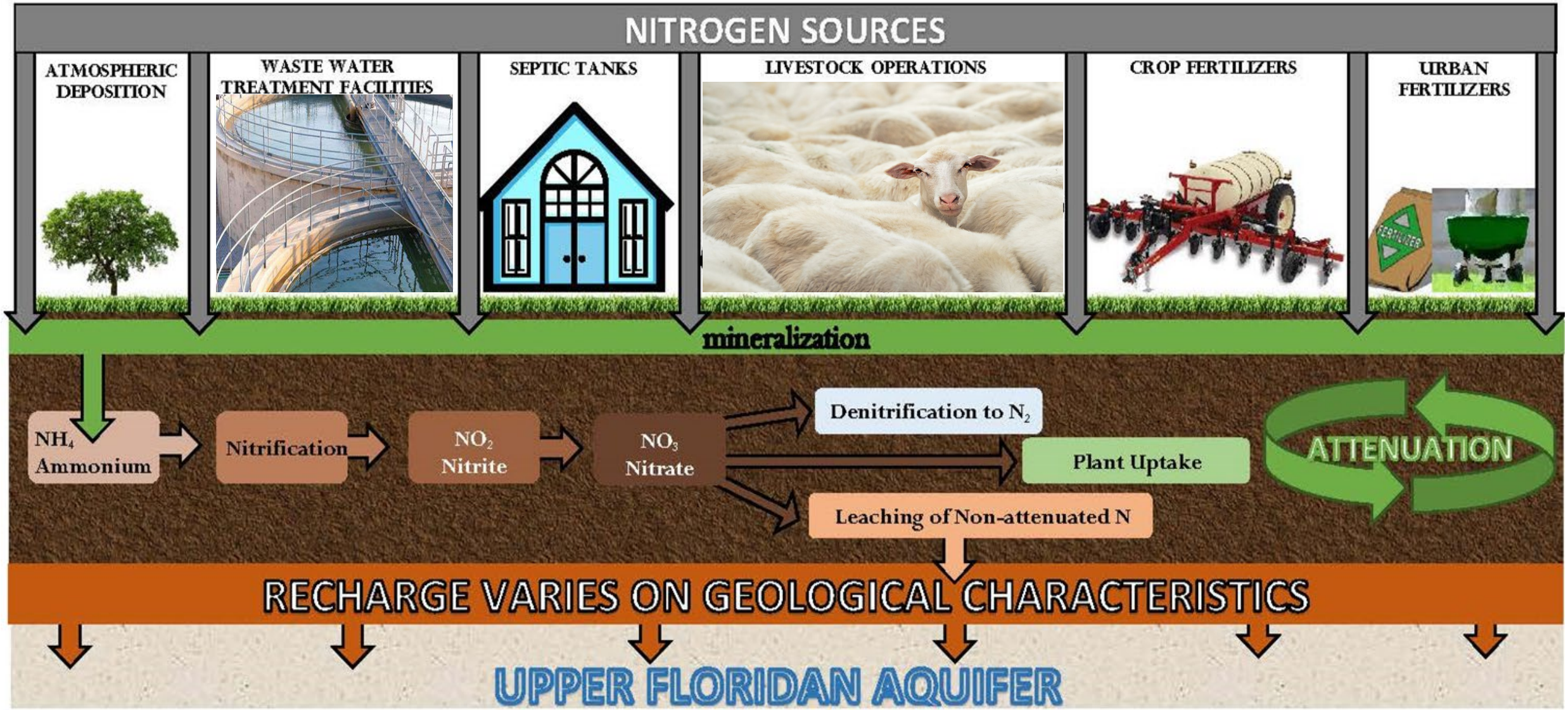
Estimate loading to land surface for each source category.

Apply a source specific, literature derived biochemical attenuation factor to surface loading estimate.

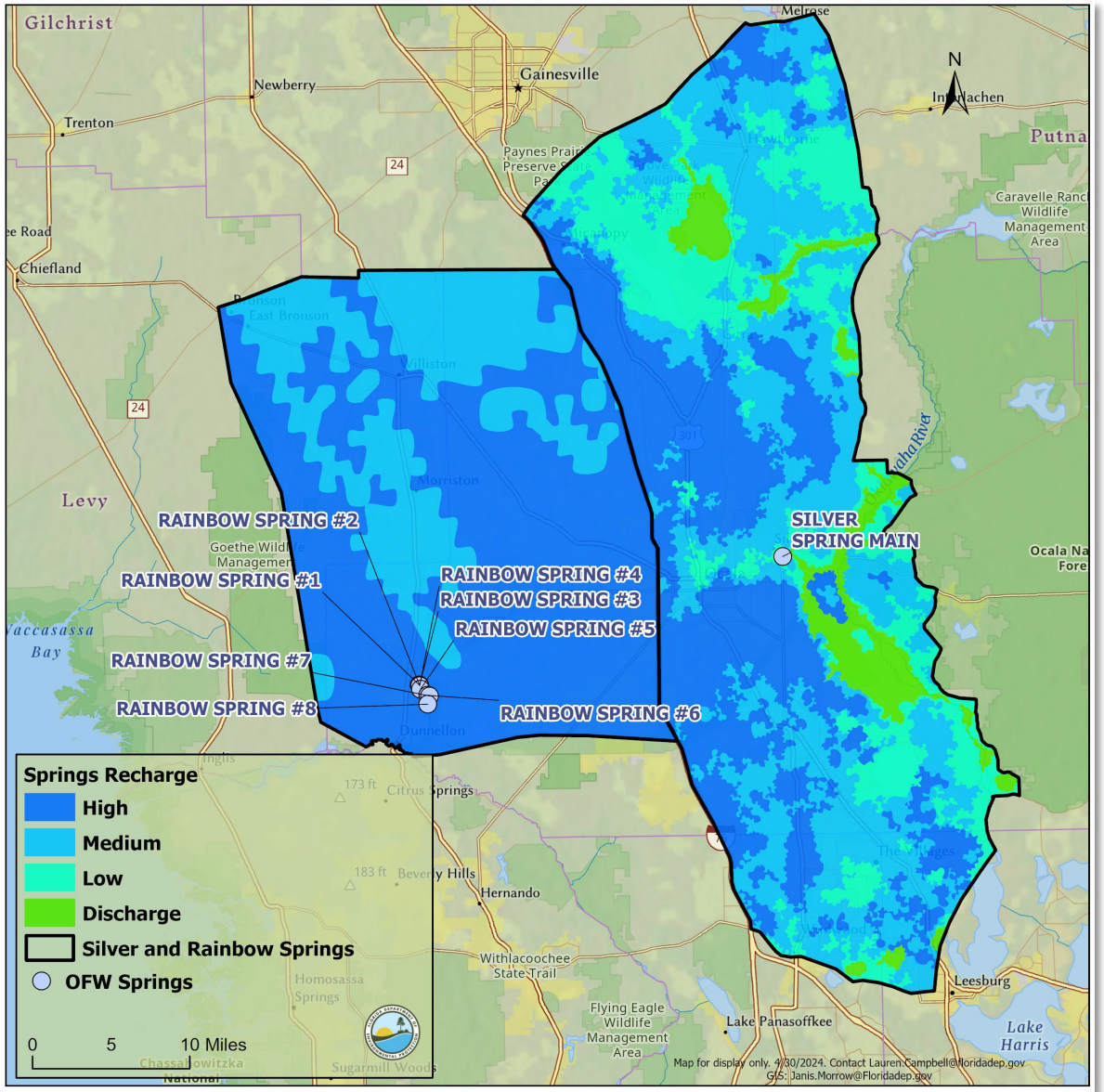
Apply a location specific recharge factor to surface loading estimate.

LOADING TO GROUNDWATER.

NITROGEN CYCLE AND ATTENUATION



RECHARGE TO GROUNDWATER



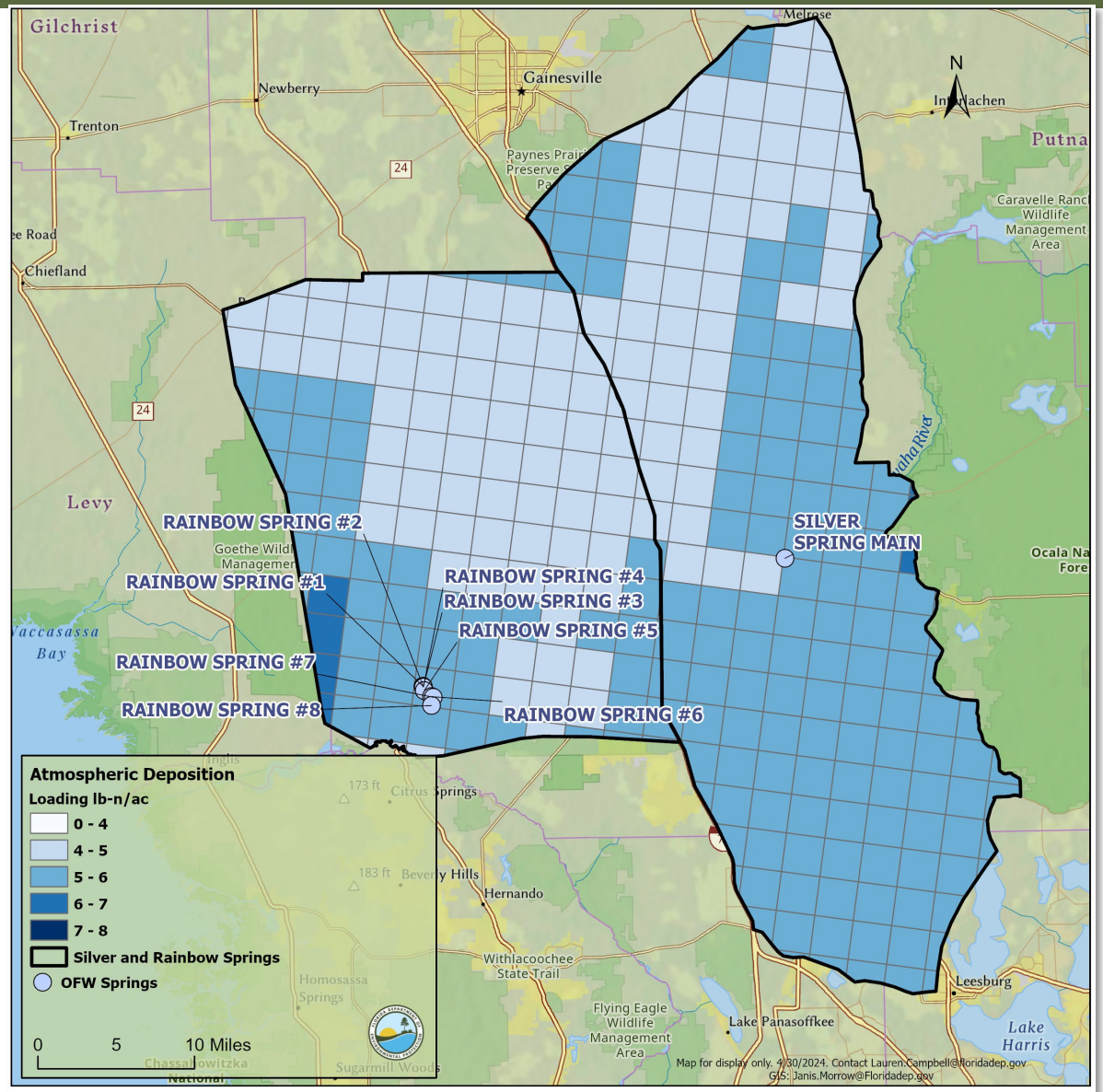
- There are four recharge categories based on a composite recharge map of the Floridan aquifer .
- The recharge amount evaluates the percent of nitrogen loading that is expected to impact spring vent after bioattenuation is considered. Recharge rates are summarized in the table below for each recharge category.
- Delineation of recharge areas and associated recharge rates are consistent with the previous NSILT report.
- Recharge factors are applied to estimate loading for all source categories based on location of deposition.

Recharge to Groundwater	
Category	Rate
High	90%
Medium	50%
Low	10%
Discharge	0%

AD

BMAP Area	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (after attenuation and recharge) (lb-N/year)
Silver	3,051,694	166,814
Rainbow	2,188,634	105,275

- AD of nitrogen was estimated using a nationwide model developed by the Total Deposition Science Committee and EPA called the Total Deposition (TDEP) model.
- AD estimates from 2019 and 2020 were averaged to estimate annual loading.
- Methodology is consistent with previous NSILT.

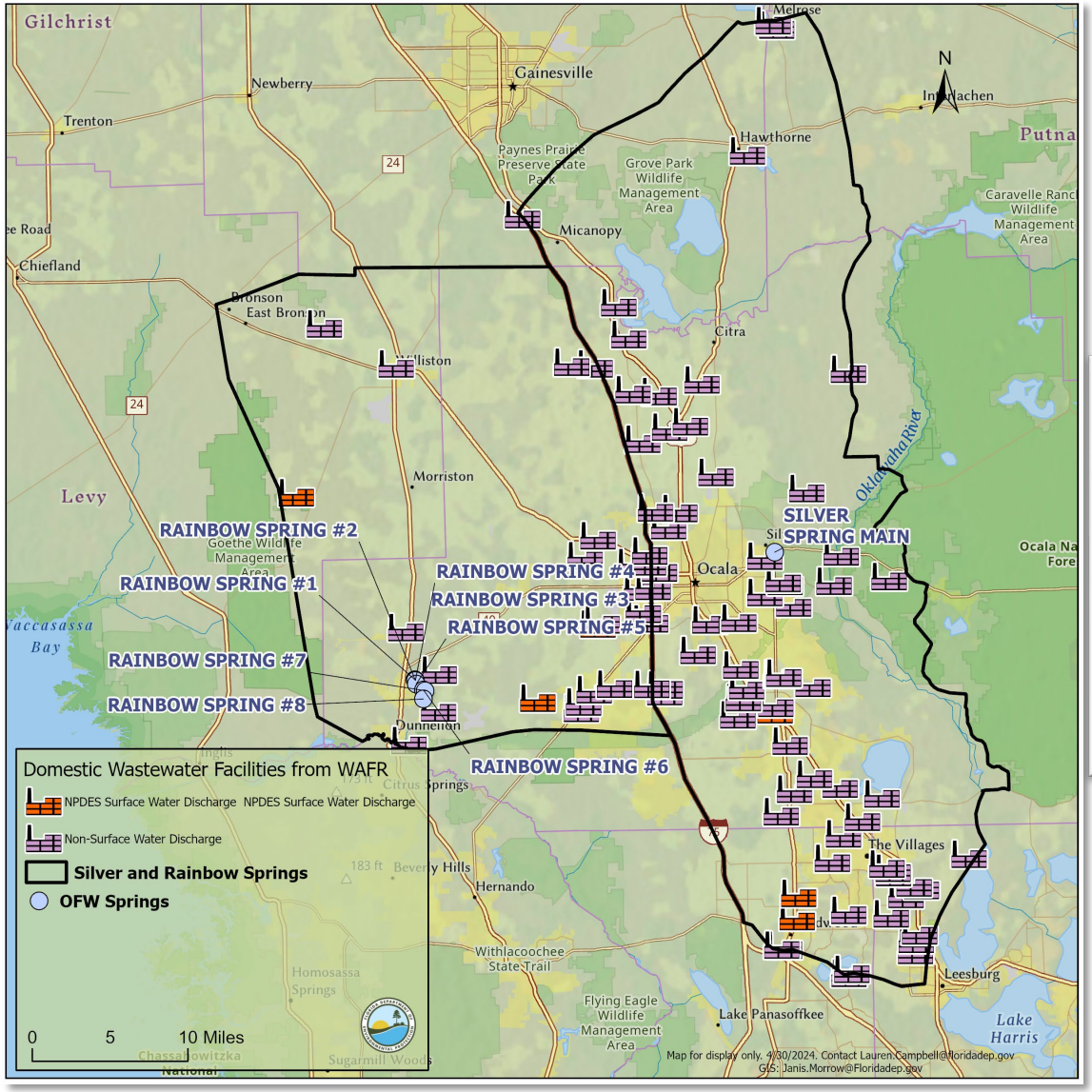


WWTFs

- Wastewater Facility Regulation information was reviewed to determine the location of all WWTFs, as well as their effluent application or disposal sites.
- Discharge monitoring report data collected by Wastewater Facility Regulation from 2019 to 2021 were reviewed to determine effluent discharge volume and total nitrogen (TN) concentration for each disposal stream.
- Effluent disposal sites evaluated include reuse, disposal in a rapid infiltration basin, sprayfield, absorption field or wetland. Each method has its own estimated attenuation factor.

Wastewater Treatment Effluent Attenuation			
Reuse	RIB	Sprayfield	Wetland
75%	25%	60%	85%

WWTFs



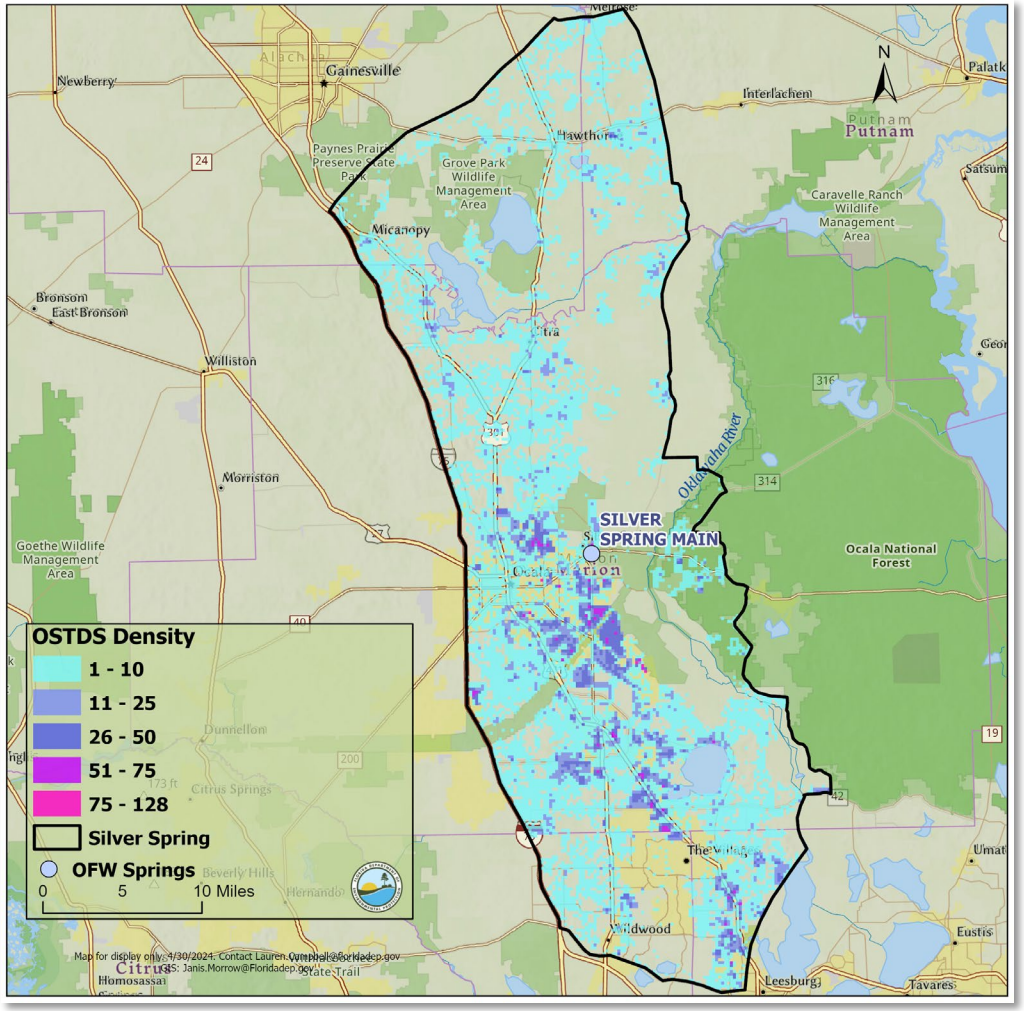
BMAP Area	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (after attenuation and recharge) (lb-N/year)
Silver	221,690	50,763
Rainbow	94,805	31,135

OSTDS

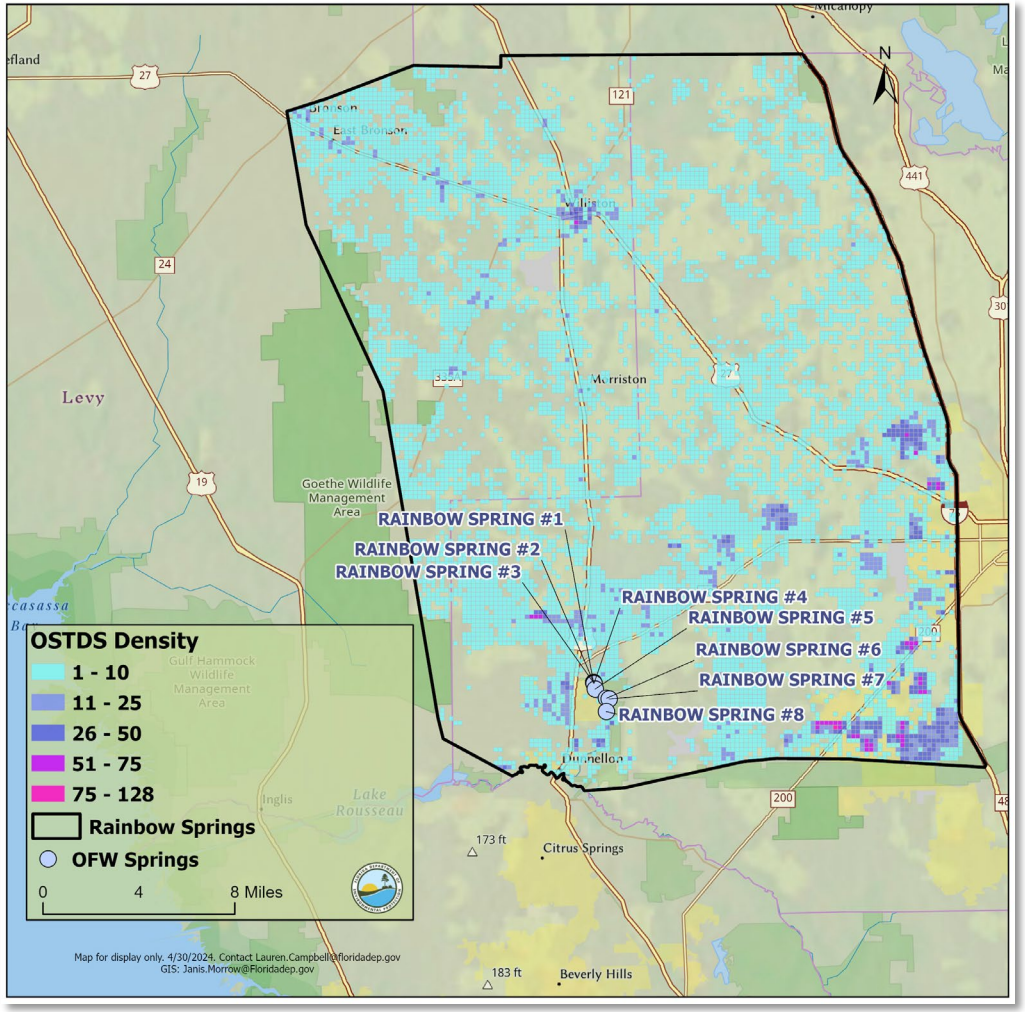
- Florida Water Management Inventory data was used to estimate the number of OSTDS (updated 2021-2022).
- Parcels identified as "known septic," "likely septic," and "somewhat likely septic" were considered to have one septic system per parcel.
- 2020 U.S. Census data was used to estimate the average persons per household (pph).
- Estimated loading of 10 lb-N/year per person (Armstrong, 2015).
- Estimated load per tank is based on multiplying the average persons per household by loading per person.
- Credited enhanced nutrient reducing OSTDS with a 50% reduction in TN loading from the existing condition.
- Loading from OSTDS is estimated to attenuate at 30%.

OSTDS

Silver Spring BMAP



Rainbow Springs BMAP



*Density is per 300-meter by 300-meter grid cell.

OSTDS

The results of the NSILT analysis for OSTDS in the Silver and Rainbow BMAPs are presented in the table below.

BMAP Area	Estimated # of OSTDS	Estimated # of Enhanced OSTDS	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (after attenuation and recharge) (lb-N/year)
Silver	69957	98	1,682,149	784,228
Rainbow	34569	13	828,704	480,981

UTF

- UTF loading was evaluated separately for single family residential, non-single family residential and sports turfgrass.
- Sports turfgrass loading includes the application of fertilizers to both sports fields and golf courses.
- Loading from UTFs are estimated to attenuate at 70%.

Source: Pexels

UTF

Single Family Residential Fertilization:

- 2021 Florida Department of Revenue Cadastral information was used to determine size and value of single-family residential parcels.
- Assumed 27.8% of parcel as impervious area (Tilley & Slonecker, 2006).
- Assumed 0.5 acres maximum for fertilized area for single family residential parcels greater than 0.5 acres.
- Assumed likelihood to fertilize rate is based on home value. Three tiers of home value considered.
- Fertilizer application rates are informed by local survey information and the Green Industries Best Management Practice (GIBMP) manual.

Lawn Care Source	
Service	33%
Self	51%
None	16%

Self Application Rates	Percent of Self Lawn Care Source	Application Rate (lbs/N/ac/application)	Number of Applications
BMP	20%	26.136	5
Label	60%	34.78	2.98
Other	20%	43.56	2.98

UTF
NON-SINGLE FAMILY RESIDENTIAL

- WMD land use/land cover data was used to estimate non-single family residential UTF application acreage estimates.
- Land use data year is dependent on the WMD with all data updated between 2019 and 2022.
- Fifteen land cover codes were assumed to be likely to receive fertilizer.

WMD Land Cover Code	Percent Impervious	Percent of Pervious area Receiving Fertilizer
1220: Medium Density, Mobile Home Units	32.6%	17.7%
1230: Medium Density, Mixed Units (Fixed and Mobile Home Units)	32.6%	15.4%
1320: High Density, Mobile Home Units	44.4%	20.7%
1330: Multiple Dwelling Units, Low Rise	44.4%	27.8%
1340: High Density, Multiple Dwelling Units, High Rise (Four Stories or More)	44.4%	32.8%
1400: Commercial and Services	72.2%	31.3%
1411: Shopping Centers	72.2%	31.3%
1480: Cemeteries	8.3%	42.2%
1700: Institutional	34.4%	43.3%
1710: Educational	30.3%	60.6%
1720: Religious	39.9%	37.7%
1740: Medical and Health Care	72.2%	33.8%
1750: Governmental	35.4%	41.0%
1850: Parks and Zoos	12.5%	44.9%
1860: Community Recreational Facilities	12.5%	59.8%

- Impervious area was estimated using a United States Geological Survey study (Tilley & Slonecker, 2006). Percent impervious area was dependent on the land use category.
- The area of pervious surface expected to receive fertilizer was evaluated by local land cover data. The percentage of pervious area evaluated to be bare ground or grass surface was applied to the estimated pervious areas of the 15 land cover codes to then estimate the area expected to receive fertilization.

UTF

- Estimated fertilizer application rates for non-single family residential fertilized areas were based on an evaluation of the GIBMP Manual. It is estimated that fertilizer is applied at a rate of 3 lbs.-N/1,000 ft^2 to turfgrass in the region.

BMAP Area	Single Family Residential Area		Non-single Family Residential Area	
	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (lb-N/year)	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (lb-N/year)
Silver	2,223,173	428,976	398,497	78,348
Rainbow	922,797	239,803	105,647	27,206

STF

STF is a combination of golf course and other sports turfgrass areas:

- BMAP areas were evaluated to identify active golf courses.
- Previous NSILT estimates of other STF areas were used in this evaluation to estimate loading from this source.
- Fertilizer application rates and area from the previous NSILT were used to estimate current nutrient loading where information was available.

BMAP Area	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (lb-N/year)
Silver	72,998	16,080
Rainbow	5,285	1,319

Source: Pexels

STF

GOLF COURSES

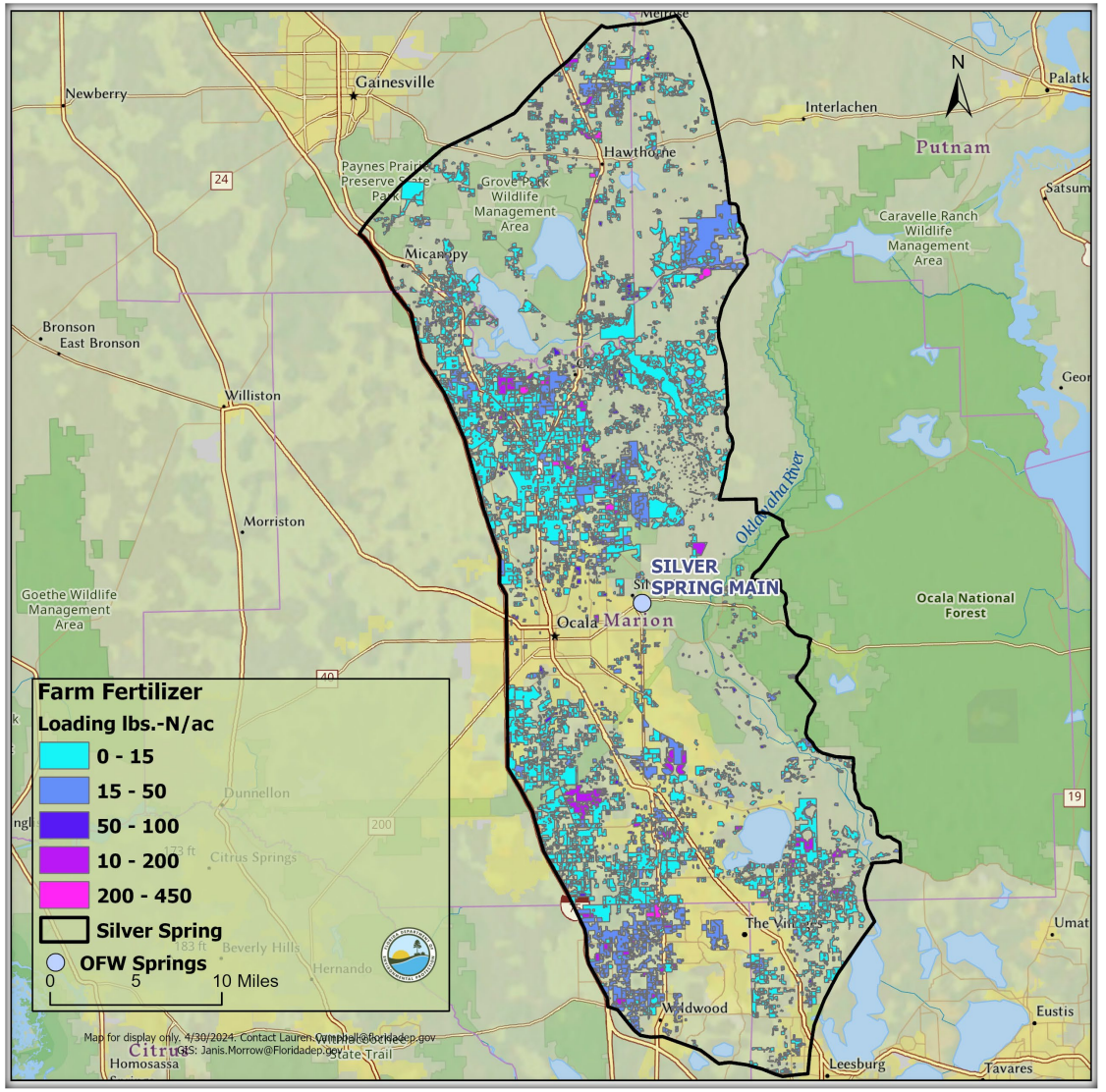
- There are approximately 47 named golf courses in the Silver BMAP and 11 in the Rainbow BMAP.
- Checked for permanent course closures.
- Where site specific data was not available, golf course application rates were updated based on a study of regional golf course practices published by HortTechnology (Shaddox, et al., 2023).

Golf Course Study Rate		
Application Rate	95.832	lb-N/ac
% fertilized	100%	

BMAP Area	Total Estimated Acres	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (lb-N/year)
Silver	7,148	665,318	107,970
Rainbow	1,644	146,671	39,415

FF

- Florida Statewide Agricultural Irrigation Demand 9 (FSAID 9) data layer published in 2021 was analyzed to estimate acreage of all crop types within each recharge category.
- Application rates previously used in the NSILT were reviewed by the Florida Department of Agriculture and Consumer Services, WMDs, and University of Florida Institute of Food and Agricultural Science.



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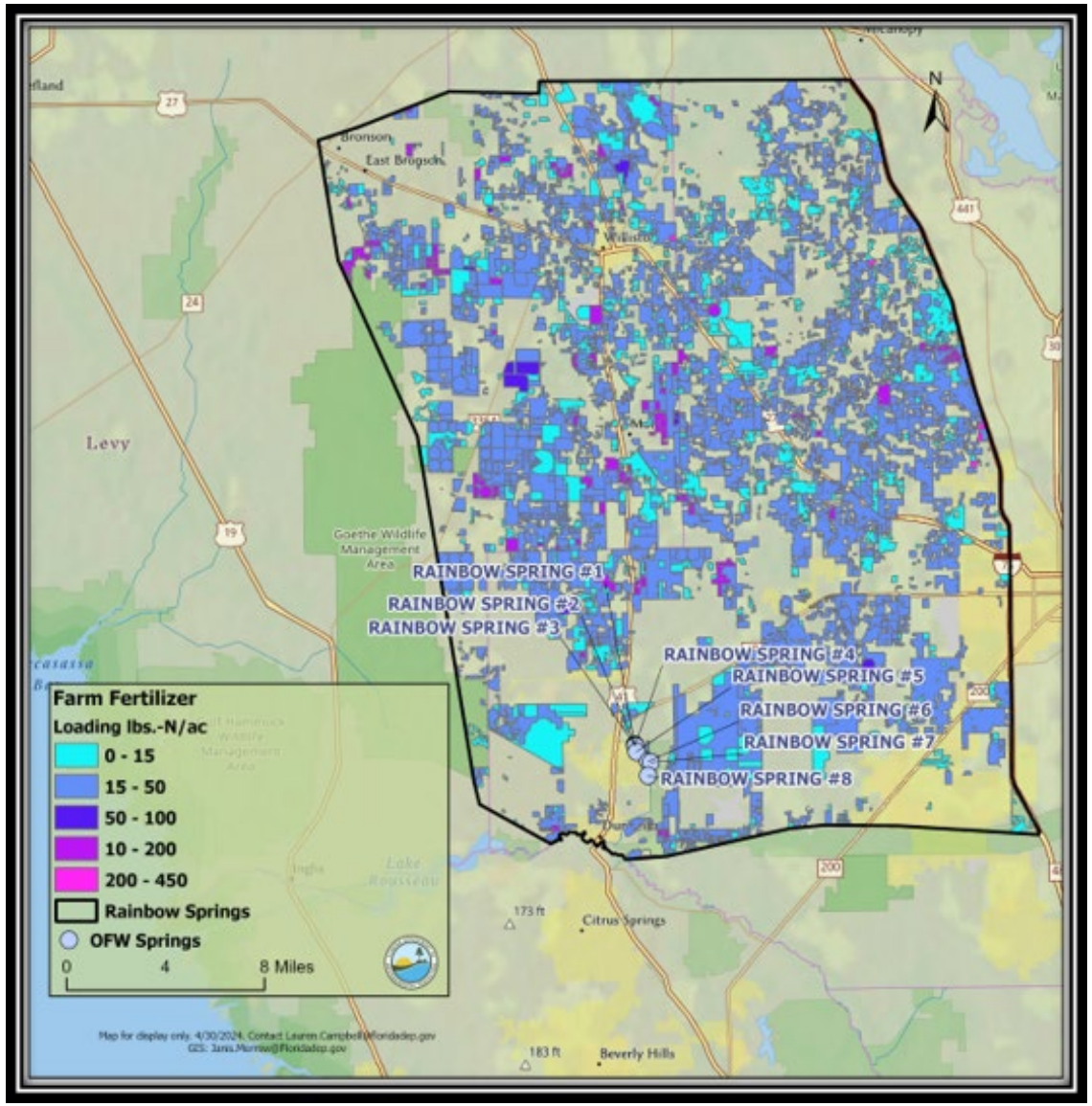


- For all crops besides pasture and nurseries, loading to land surface was calculated by multiplying the acreage of a given crop type by the estimated fertilizer application rate.
- Loading from FF is estimated to attenuate at 80%.

BMAP Area	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (lb-N/year)
Silver	1,094,498	140,219
Rainbow	1,411,413	208,523

FF

Nursery Crops	Fertilizer Application Rate (lb-N/acre)	Effective Application Rate (lb-N/acre)
Asparagus Fern	90	21.6
Aspidistra	90	21.6
Container Nursery	150	36
Coontie Fern	90	21.6
Fern	90	21.6
Field Nursery	90	21.6
Leatherleaf	90	21.6
Liriope	90	21.6
Nurseries and Vineyards	90	21.6
Nursery	90	21.6
Ornamentals	90	21.6
Pittosporum	90	21.6
Timber Nursery	50	12
Tree Nurseries	90	21.6

Crop	Fertilizer Application Rate (lb-N/acre)	Effective Application Rate (lb-N/acre)
Grass Pasture	80	16
Horse Farms	50	10
Improved Pastures	50	10
Pasture	50	10

- For nurseries that use containers:
  - A reduction of 20% of the FSAID 9 land area was made to account for plant spacing.
  - A reduction of 70% of loading was estimated to account fertilizer being applied to containers that hold the nutrients longer.
- Adjustment to fertilizer application rates were made to pastureland that utilize field rotation.
  - Fertilizer was estimated to be applied to 20% of pasturelands annually.

FF
SILVER BMAP

Crop	Fert. Application Rate (lb-N/year)	Total Acres	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (lb-N/year)
Field Crops	90	2,314	208,242	28,024
Citrus	140	1,257	176,009	22,587
Sweet Corn Zucchini	450	265	119,303	21,474
Peanuts	20	7,212	144,248	12,108
Cropland Pastureland	50	1,267	63,359	8,073
Corn	240	366	87,747	7,557
Blueberries	100	612	61,182	6,523
Melons	150	244	36,526	5,223
Sod	200	258	51,664	5,166
Pecans	100	330	33,050	4,757

- The most common crop type by acreage within the Silver BMAP is peanuts.
- When the fertilizer application rates and the adjustments for pasture and nursery crops are considered, field crops have the highest estimated loading within the BMAP.

FF
RAINBOW SPRINGS BMAP

- The most common crop type by acreage within the Rainbow BMAP is peanuts.
- When the fertilizer application rates and the adjustments for pasture and nursery crops are considered, peanuts have the highest estimated loading within the BMAP.

Crop	Fert. Application Rate (lb-N/year)	Total Acres	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (lb-N/year)
Peanuts	20	20,854	417,078	62,716
Melons	150	2,301	345,113	50,281
Cropland Pastureland	50	5,227	261,361	39,782
Sod	200	390	78,054	11,634
Peanuts Rye	60	770	46,207	7,903
Other Hay Non Alfalfa	180	291	52,425	7,348
Grains	70	490	34,281	5,018
Cucumbers Fall Melon	150	166	24,949	4,491
Hay Melons	180	171	30,838	3,543
Nursery	90	659	14,236	2,526

LW

- Livestock populations were estimated using 2017 U.S. Department of Agriculture (USDA) census of agriculture data. USDA population estimates are provided by county.
- FSAID 9 land use was used to evaluate the proportion of livestock land within a BMAP and adjust USDA population estimates.
- Waste factors were multiplied by the estimated animal population to calculate LW loading.
- Loading from LW is estimated to attenuate at 90%.
- Loading from dairy cattle was estimated separately.

Livestock Type	Waste Factor (lb-N/day)
Beef Cattle	0.337
"Other" Cattle	0.31
Calves	0.068
Dairy Cows	0.977
Donkeys	0.1
Horses	0.273
Chicken, Broilers	0.002
Chicken, Layers	0.003
Goats	0.035
Hogs	0.19
Sheep	0.198
Turkeys	0.006

LW
SILVER SPRINGS BMAP

Livestock Type	Total Head Count	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (lb-N/year)
Donkeys	822	30,009	2,107
Chicken, Broilers	226	165	11
Chicken, Layers	7,265	7,955	567
Goats	3,459	44,190	3,006
Hogs	739	51,267	3,472
Sheep	1,660	119,936	8,571
Turkeys	371	812	57

- An estimated total of 252,536 pounds of nitrogen per year are deposited on the land surface from livestock.
- When recharge and attenuation are applied, an estimated 17,790 pounds of nitrogen per year loaded to groundwater annually.

LW
RAINBOW SPRINGS BMAP

Livestock Type	Total Head Count	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (lb-N/year)
Donkeys	490	17,869	1,417
Chicken, Broilers	79	58	5
Chicken, Layers	4,614	5,053	404
Goats	2,007	25,634	2,011
Hogs	387	26,859	2,144
Sheep	933	67,423	5,440
Turkeys	236	517	40

- An estimated total of 143,412 pounds of nitrogen per year are deposited on the land surface from livestock.
- When recharge and attenuation are applied, an estimated 11,462 pounds of nitrogen per year loaded to groundwater annually.

CATTLE AND HORSE FARMS

Cattle Farms		
BMAP Area	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (lb-N/year)
Silver	5,455,695	371,648
Rainbow	2,422,300	188,215

Horse Farms		
BMAP Area	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (lb-N/year)
Silver	1,923,732	143,711
Rainbow	2,051,119	162,060

- Cattle Farms:
  - Non-dairy cattle counts, 80% Pasture Lands in Silver and 60% of Pasture Lands in Rainbow.
- Horse Farms:
  - Horse counts, Horse Farms, 20% Pasture Lands in Silver and 40% of Pasture Lands in Rainbow.

DAIRIES

- Non-Confined Animal Feeding Operation dairy information was provided by the Florida Department of Agriculture and Consumer Services, including information on herd size, waste handling practices, and animal confinement.
- If a dairy herd was identified as grazed, it was estimated that they would be confined for 15% of the time to account for time in the milking parlors.
- A waste factor of 0.36 lb.-N/day for dairy cows and 0.15 lb.-N/day for non-milking cows was assumed.
- Annual loading was estimated by multiplying the number of cows by the daily waste factor multiplied by 365 days per year multiplied by application loss coefficients based on waste handling practices.
- Dairy waste was estimated to attenuate at 50%.

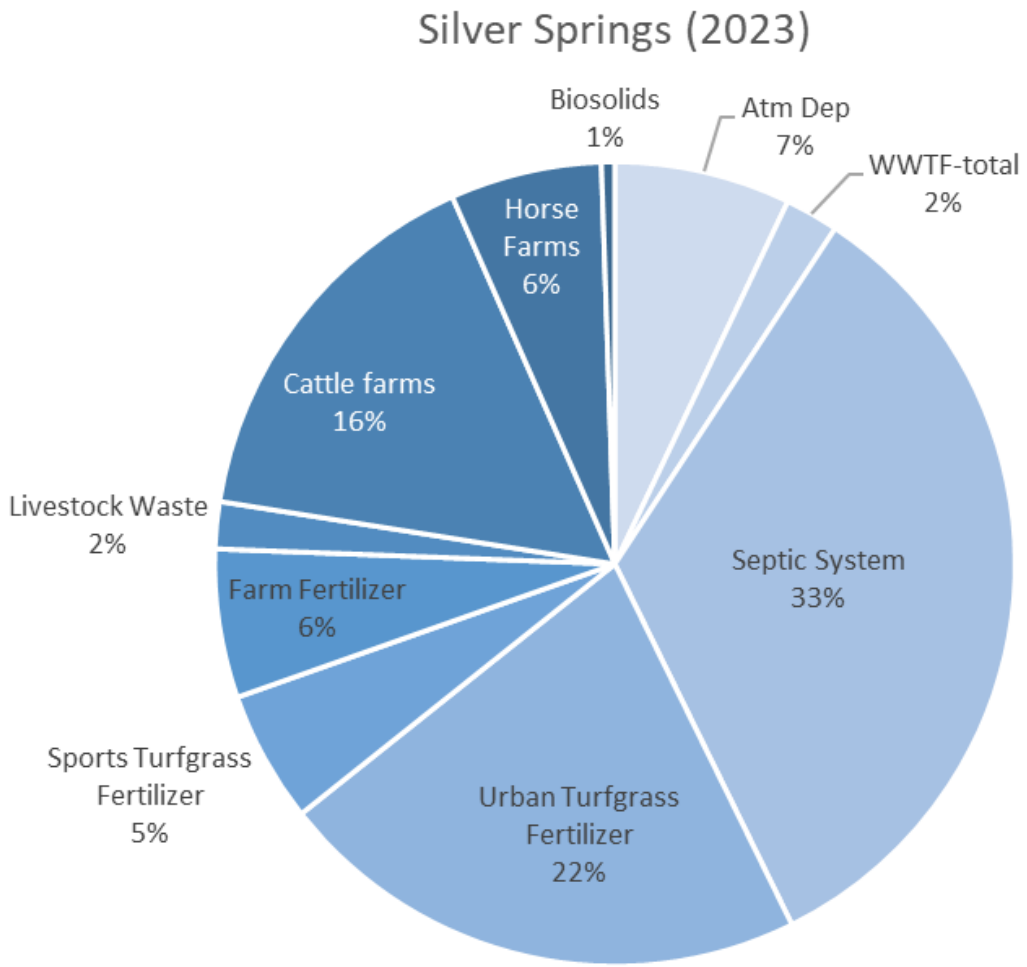
BIOSOLIDS

- Biosolid application quantity estimates were derived from calculating the average application quantity reported from 2018 to 2022, where data was available.
- Application quantities are provided in tons of material, it was assumed biosolid material has an estimated nitrogen content of approximately 5%.
- Loading to land surface was calculated by multiplying the average application quantity for the period of record by the estimated nitrogen content of 5%.
- Loading from biosolids is estimated to attenuate at 50%.

BMAP Area	Estimated Load to Surface (lb-N/year)	Estimated Load to Groundwater (lb-N/year)
Silver	32,443	12,613
Rainbow	71,643	28,948

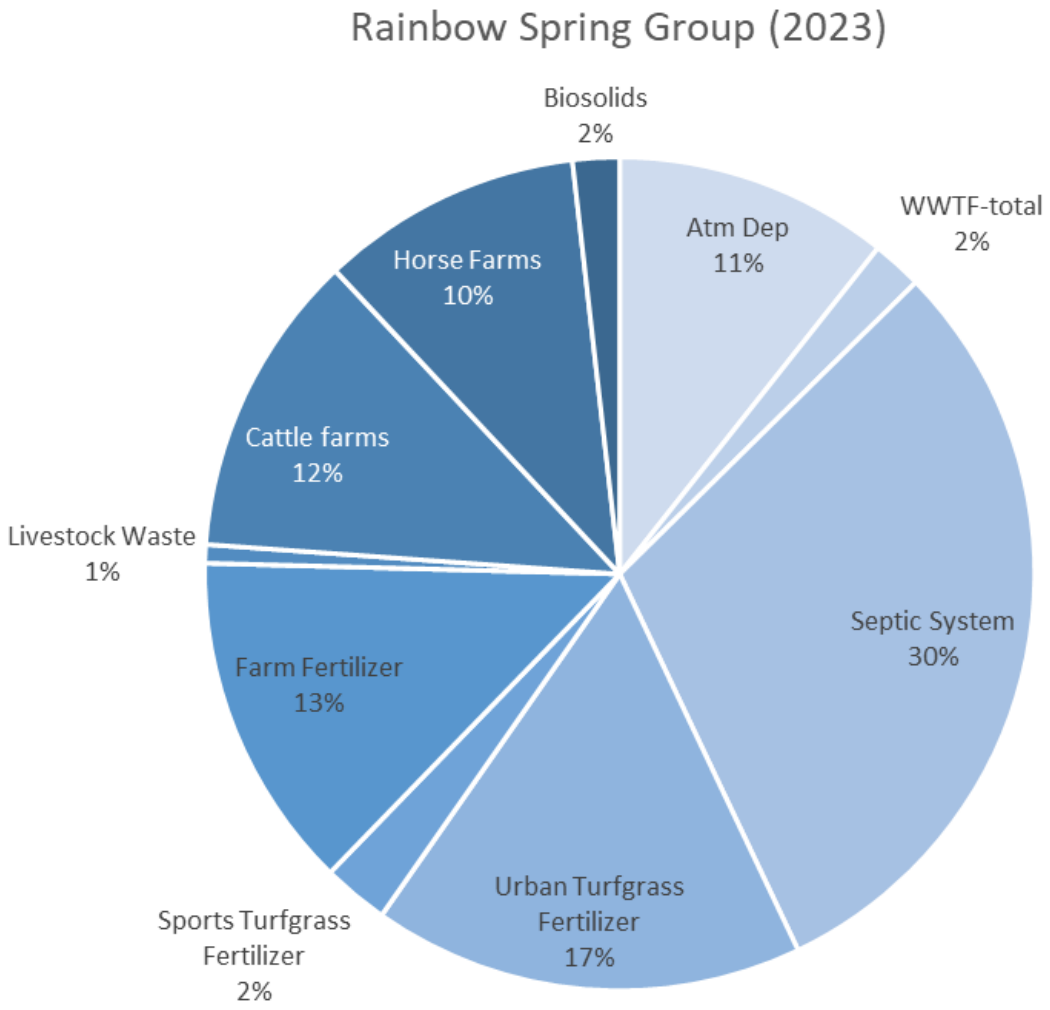
DRAFT NSILT LOADING

SILVER SPRINGS BMAP



Silver Springs and Upper Silver River BMAP Area	
Source	**Estimated Annual Loading (lb-N/yr)**
Atm Dep	166,815
WWTF-total	50,763
Septic Systems	784,228
Urban Turfgrass Fertilizer	507,324
Sports Turfgrass Fertilizer	124,050
Farm Fertilizer	140,219
Livestock Waste	44,324
Cattle Farms	371,648
Horse Farms	143,711
Biosolids	12,613
Total	2,345,695

DRAFT NSILT LOADING
RAINBOW SPRINGS BMAP



Rainbow Spring Group and Rainbow River BMAP Area	
Source	**Estimated Annual Loading (lb-N/yr)**
Atm Dep	169,993
WWTF-total	31,135
Septic Systems	480,981
Urban Turfgrass Fertilizer	267,009
Sports Turfgrass Fertilizer	40,734
Farm Fertilizer	208,523
Livestock Waste	11,462
Cattle Farms	188,215
Horse Farms	162,060
Biosolids	28,948
Total	1,589,060

BMAP MEETING
PUBLIC QUESTIONS PERIOD

Verbal Questions:

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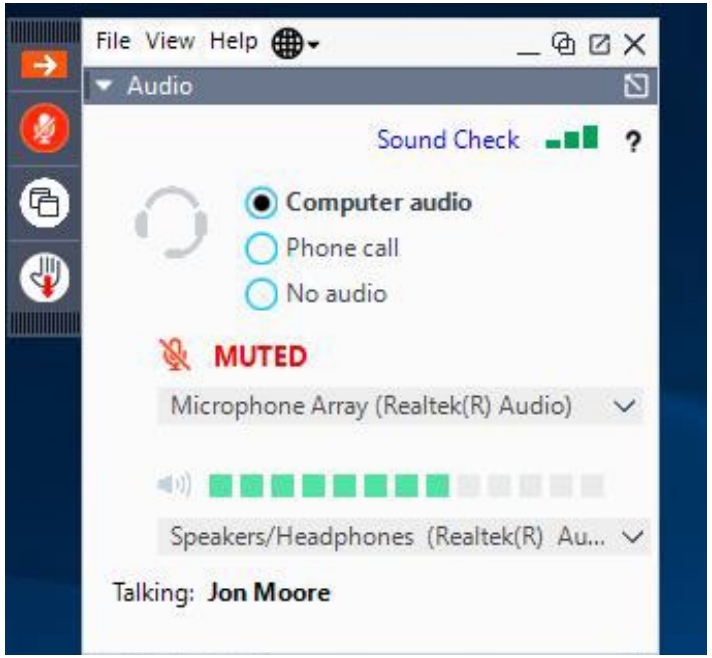
- Please type in the chat if you would like to unmute yourself and ask a question or comment.



Written Comments:

- Submit written comments concerning today's meeting to BMAPProgram@FloridaDEP.gov.

BMAP UPDATES
SPRING VENT LOAD ANALYSIS

Calculated the current loading using the most recent 10 years of nitrate and discharge data.

Calculated the percent reduction using the TMDL and current loading.

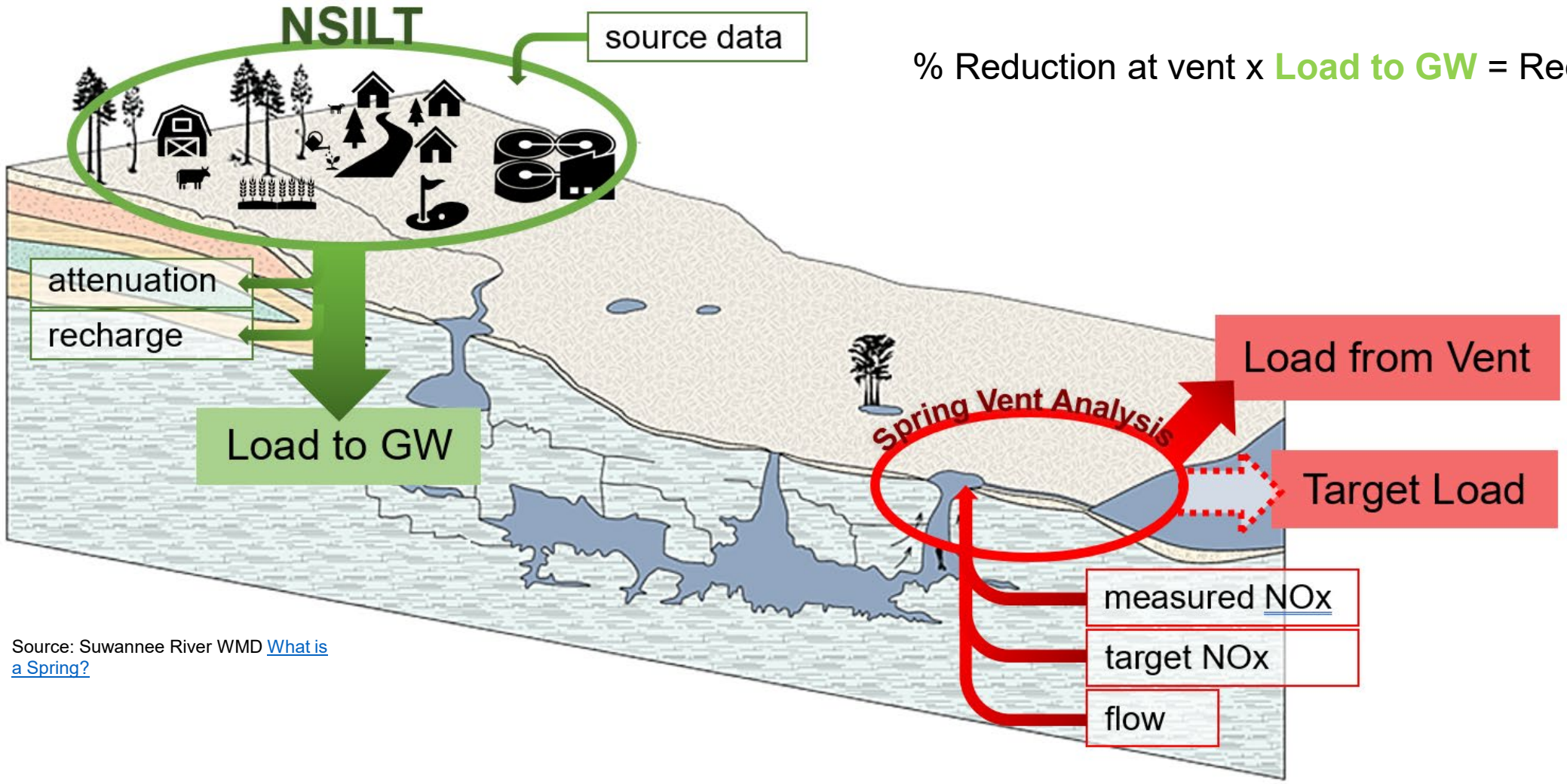
Applied the spring vent percent reduction to the updated NSILT loading.

Estimate the total reduction needed to meet the TMDL.

BMAP UPDATES
SPRING VENT LOAD ANALYSIS

Load from Vent – **Target Load** = Reduction Goal
(at vent)

% Reduction at vent x **Load to GW** = Required Reductions
(from sources)



Source: Suwannee River WMD What is a Spring?

BMAP UPDATES
DRAFT SPRING VENT LOAD ANALYSIS

Springshed	Draft Nitrate Loads (lb-N/yr)			
	Total Load at Spring Vent*	TMDL Load[1]	Required Reduction	Percent Required Reduction
Silver	1,461,175	420,139	1,041,036	71%
Rainbow	2,852,259	452,543	2,399,716	84%

*Upper 95% confidence interval - nitrate data and flow data from 2012 to 2022.
[1]TMDL target is 0.35 mg/L and using the same flow data from 2012 to 2022.

BMAP UPDATES

ALLOCATION AND REDUCTION APPROACH

- The percent reduction calculated from the spring vent analysis is applied to the estimated NSILT load to determine the overall required reduction needed in the basin.
- Each source will be evaluated for a reduction strategy.
- Responsible entities will receive an allocation based on the combined necessary reductions estimated by source for their area based on the NSILT loading.

BMAP UPDATES

ALLOCATION AND REDUCTION APPROACH

OSTDS

- Reduction strategy based on BMAP OSTDS requirements in Appendix D, with additional reductions based on actual loading from OSTDS.

WWTFs

- Reduction strategy is based on BMAP effluent requirements in the BMAP document and requirements in Florida law established 2021-2024.

Agriculture

- Reduction strategy based on:
  - BMP enrollment using a 15% reduction applied to FF load to groundwater.
  - BMP enrollment using a 10% reduction applied to LW and dairies.
  - Any remaining agricultural reductions will be allocated to agricultural cooperative elements, which could include regional projects, cost-share practices and innovative technologies.

AD

- Anticipate reductions to be addressed by reductions from other sources and regional projects.

BMAP UPDATES

ALLOCATION AND REDUCTION APPROACH

UTF

- Apply the spring vent percent reduction to the total UTF load to groundwater and allocate to the applicable local governments.

STF

- Apply the spring vent percent reduction to the STF load to groundwater and allocate to the applicable governments.

Golf Courses

- Reduction based on requirement of all golf courses to submit information on the implementation of BMPs and a nutrient management plan to address nutrient loading.

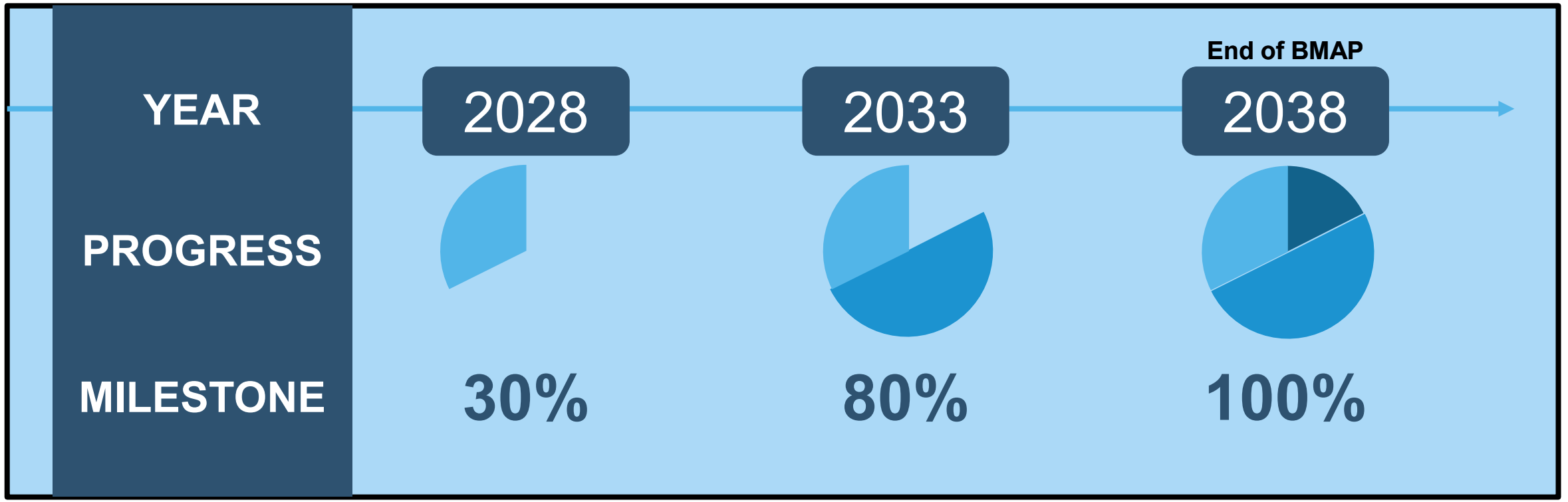
BMAP UPDATES
FUTURE GROWTH

- **Domestic Wastewater Projections:**
  - Use wastewater to estimate future growth projections.
  - Start with population growth for each county from Bureau of Economic and Business Research:
    - 2040 Medium Growth Projections.
  - Proportion growth for each entity based on land area.
  - Distinguish the future population expected to be served by sewer versus those with OSTDS based on the most recent Florida Water Management Inventory for each BMAP county.
  - Use per person calculations to estimate future loads from WWTF and OSTDS.

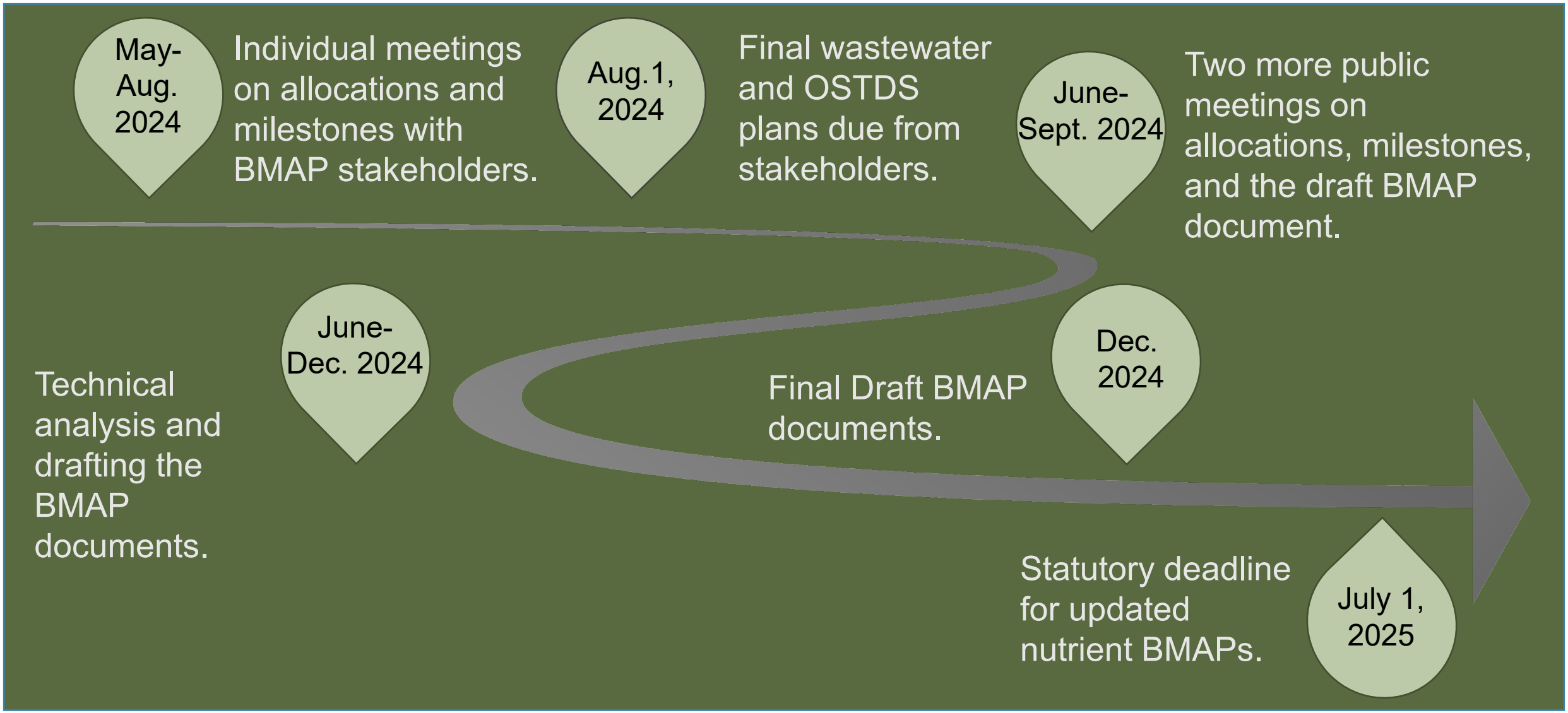
- **Agriculture Projections:**
  - Exploring different tools to estimate future changes in agricultural acreage in the BMAPs to estimate changes in agricultural loading.

BMAP UPDATES

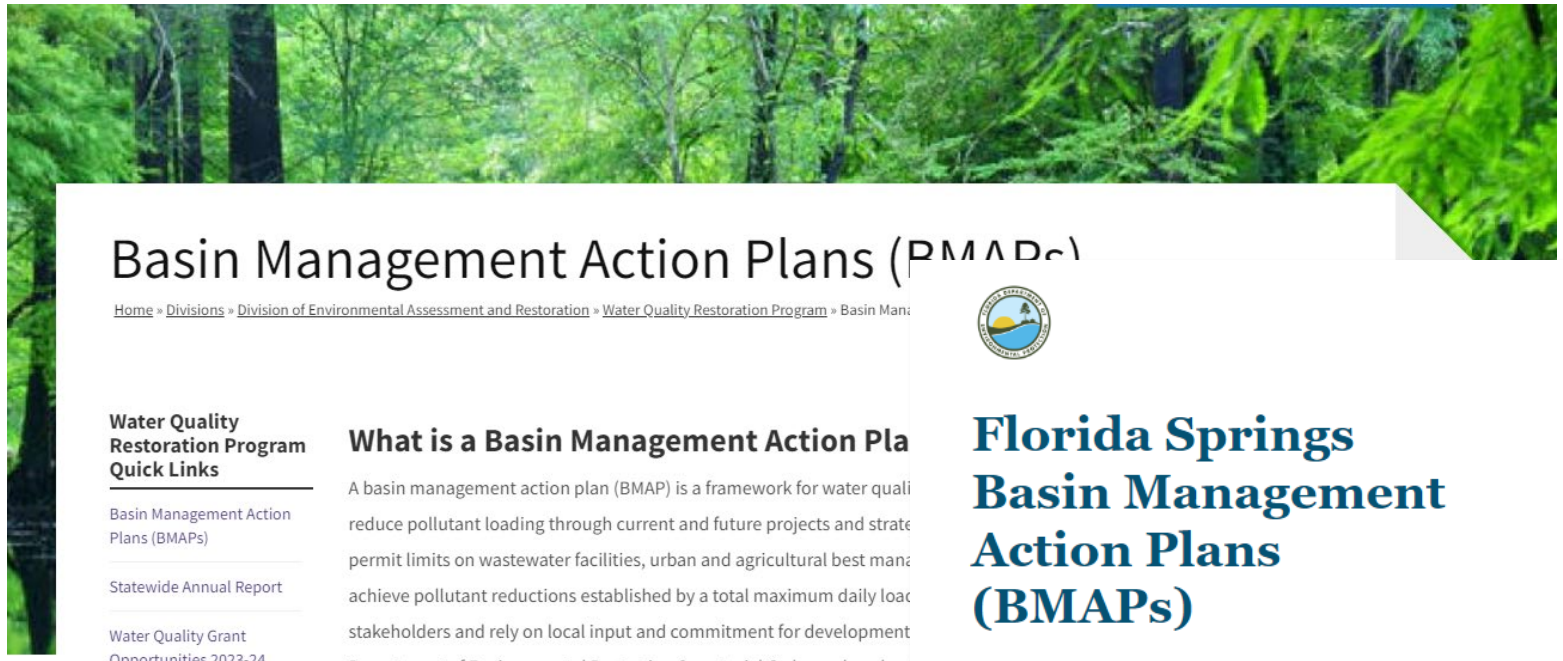
5-, 10-, AND 15-YEAR MILESTONES/REDUCTION SCHEDULE



SPRINGS BMAP UPDATES TIMELINE



RESOURCES
BMAP WEBSITE AND STORYMAP



Basin Management Action Plans (BMAPs)

Home » Divisions » Division of Environmental Assessment and Restoration » Water Quality Restoration Program » Basin Mana

Water Quality Restoration Program Quick Links

- Basin Management Action Plans (BMAPs)
- Statewide Annual Report
- Water Quality Grant Opportunities 2023-24
- BMAP Public Meetings
- Impaired Waters, TMDLs and Basin Management Action Plans Interactive Map
- Tools and Guidance for

What is a Basin Management Action Pla

A basin management action plan (BMAP) is a framework for water quali reduce pollutant loading through current and future projects and strate permit limits on wastewater facilities, urban and agricultural best mana achieve pollutant reductions established by a total maximum daily loac stakeholders and rely on local input and commitment for development Department of Environmental Protection Secretarial Order and are lega

Water Quality Protection Grant P

DEP has launched an online grant portal to provide eligible entities the programs. Eligible entities include local governments, academic institu application portal opened July 5, 2023. Closing dates for individual gra the posted date f each grant program. Applicants are encouraged to s

Florida Springs Basin Management Action Plans (BMAPs)

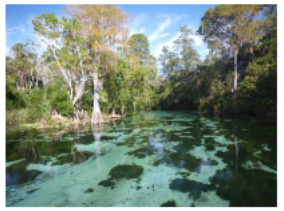
Welcome to the Florida Springs Basin Management Action Plan (BMAP) StoryMap

The springs BMAPs are developed with specific provisions for the protection and restoration of the state's Outstanding Florida Springs. This story map focuses on the springs-related BMAPs; for more details about other BMAPs or more information about the BMAP program in general, visit https://floridadep.gov/bmaps.

* The story map will display differently depending on the screen size and resolution being used. Story map best viewed in Chrome or Firefox.

Overview

1 Legislative Requirements



2 2018 Nitrogen Source Inventory and Loading Tool (NSILT)

3 (COPY) Crystal River - Kings Bay BMAP Story Map

4 (COPY) DeLeon Spring BMAP Story Map

5 (COPY) Gemini Springs BMAP Story Map

6 (COPY) Homosassa and Chassahowitzka Springs Grou...

7 (COPY) Jackson Blue and Merritts Mill Pond BMAP Stor...

8 (COPY) Santa Fe River BMAP Story Map

9 (COPY) Silver Springs, Upper Silver Springs, and Rainbow...

RESOURCES
FUNDING OPPORTUNITIES

Florida Department of Environmental Protection
Funding Opportunities

FloridaDEP.gov/Funding

SUBSCRIBER PAGE

HOW TO CONTACT US

BMAPProgram@FloridaDEP.gov

REFERENCES

- Armstrong, J.H., (2015). Florida Onsite Sewage Nitrogen Reduction Strategies Study Final Report.
- Eller, K. T., & Katz, B. G. (2017). Nitrogen Source Inventory and Loading Tool: An integrated approach toward restoration of water-quality impaired karst springs. *Journal of Environmental Management.*
- Helgeson, T., & McNeal, M., (2009). A Reconnaissance-Level Quantitative Comparison of Reclaimed Water, Surface Water, and Groundwater.
- Shaddox, T.W., Unruh, B.J., Johnson, M.E., Brown, C.D., & Stacey, G. (2023). Nutrient Use and Management Practices on United States Golf Courses. HortTechnology.
- Tilley, J.S., & Slonecker, E.T. (2006). Quantifying the Components of Impervious Surfaces: U.S. Geological Survey Open-File Report 2006-1008.
- GI-BMP Manual, UF/IFAS Extension, (ufl.edu).

BMAP MEETING
PUBLIC QUESTIONS PERIOD

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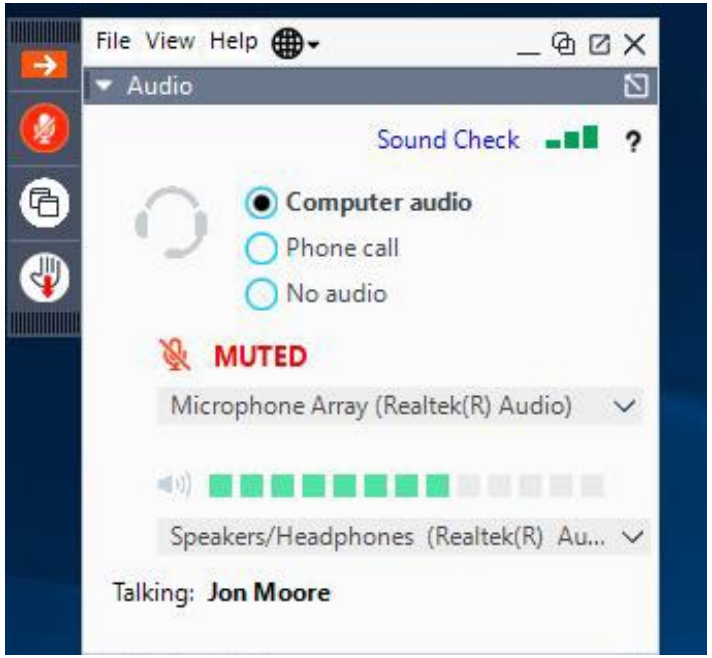

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THANK YOU

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FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION

Florida Department of Environmental Protection (DEP)
Silver Springs and River and Rainbow Spring Group and Rainbow River Basin Management Action Plans (BMAPs)
Question and Answer (Q&A) Summary
Public Meeting on May 30, 2024
1:30 pm – 2:48 pm
Via GoToWebinar

Attendees

Suzanne Archer, SJRWMD
Nicki Bailey, Levy County
Lisa Bally, ATM
Michael Barr, DEP
Sean Beaudet, Lake County
Evelyn Becerra, DEP
Connie Becker, DEP
Vivianna Bendixson, SWFWMD
Reese Bourgeois, Flow Consulting
Beth Brady, Save the Manatee Club
Tiffany Busby, Wildwood Consulting
Jason Cambre, Marion County
John Campbell, Citizen
Andy Canion, SJRWMD
Andrew Carswell, Levy County
Cathie Catasus, Lake County
Stacy Cecil, SJRWMD
Mitchell Chauncey, Ardurra
Carolin Ciarlariello, DEP
Terry Clark, Citizen
Doneda Cole, Putnam County
Amber Connolly, FDOH
Kevin Coyne, FSA
Kristina Deak, SWFWMD
Chloe Dougherty, Florida Springs Council
Bryanna Edgar, Citizen
Burton Eno, Citizen
Yesenia Escribano, FDACS
Kristine Eskelin, SRWMD
Trevor Fagan, SWFWMD
Jessica Fetgatter, DEP
Barbara Fitos, Citizen
Tyler Foerst, Citizen
Suzannah Folsom, Withlacoochee Regional Water Supply Authority
Diane Garte , Citizen
Tina Gordon, Wildwood Consulting
Karrin Gordon, Citizen
Roxanne Groover , FOWA
Sam Hankinson, DEP
Gordon Hart, Citizen
Kenny Hayman, DEP
Margarita Hernandez, DEP
Bob Himschoot, Crew Environmental
Teresa Irby-Butler, FGUA
Andrew Jorgensen, On Top of the World
Chandler Keenan, DEP
Trevor Knight, Citizen
Joy Kokjohn, SJRWMD
Charles Legros, DEP
Celeste Lyon, RES
Allison M Chancy, DEP
Michael McGrath, Sierra Club
Matt McKinney, Duke Energy
James Moulton, CPH
Ryne Nimmo, DEP
Sky Notestein, Wetland Solutions
Randall Oliver, Vikus Water
Robin Orlandi, Citizen
Robert Palmer, Citizen
Jim Peterson, SJRWMD
Wendy Poag, Lake County
Robyn Preston, Ocala
Derek Reiners, FGCU
Erika Ritter, Citizen
Mike Saxton, Vikus Water
Christopher Seufert, Jones Edmunds
Ryan Smart, Florida Springs Council
Randy Smith, SWFWMD
Renee Smith, Vikus Water
Jeff Sowards, Citizen

Ken Storey, East Central Florida Regional Planning Council
Kristine Switt, Citizen
Bethany Trees, Vikus Water
Madison Trowbridge, SWFWMD
Diana Turner, DEP
Unknown, The Florida Channel
Lisa Van Houdt, DEP
Devon Villareal, SWFWMD
Christine Vrabic, Marion County
Ken Weaver, DEP
Tanya Welborn, DEP
Brenda Wells, Florida Springs Council
Carol White, Citizen
Catherine Wolden, SWFWMD
Sarah Younger, Citizen

Siver and Rainbow Springs Basin Management Action Plan (BMAP) Overview
There were no questions for this section.

Nitrogen Source Inventory Loading Tool (NSILT) Results
Q: The Villages' stormwater ponds are lined. How was that accounted for in the loading estimates to groundwater?
A: This feature would be captured on the project crediting side. The NSILT evaluates loading based on land use, but reduction credits can be given for best management practices (BMPs) that reduce nitrogen loading.

Q: Was the proximity of golf courses to the Rainbow River taken into consideration?
A: We did not consider proximity to surface waters as a factor in the NSILT. We did look at the geologic recharge characteristics spatially, where more vulnerable areas (areas that have more connection between the surface to deep groundwater) were given a higher weight. Distance from the river was not considered, because the focus was on loading to groundwater.

Q: There are significant farm acres north of Route 40, north of the Rainbow River. It does not show those areas on the farm fertilizer graphic that was shown in the presentation.
A: Agricultural acres are assessed using the Florida Statewide Agricultural Irrigation Demand (FSAID) which is produced by the Florida Department of Agriculture and Consumer Services (FDACS). It is possible that the agricultural land is new and may not have been captured in FSAID 9, which was the version used for these updates.

Q: Hay was, by far, the largest contributor among crop types in the Santa Fe and Suwannee BMAPs. In this basin, that loading is trivial. Why is there such a difference?
A: That is more of an FDACS question. We utilize the FSAID, which was provided by FDACS, to identify the various agricultural commodities and location of agricultural land. There were some categories for the farm fertilizer in this basin that were split out into horse farms and cattle farms. The areas classified as horse farm and cattle farm include an estimate of farm fertilizer loading, so some of the acres cultivated in hay may be classified as those categories.

Q: The slide with the summary of House Bill 1557 mentions that *certain BMAPs* will require wastewater facilities to use advanced wastewater treatment (AWT). How is it determined which facilities in the BMAPs are required to use AWT?

A: This legislation was recently signed into state law. The BMAP group will be working with the DEP-Division of Water Resource Management (DWRM) to identify which facilities within BMAPs will be subject to that legislation.

Spring Vent Load Analysis Results

Q: Can you elaborate on why the total required reduction for Rainbow Springs is higher than the total annual loading estimate for the basin?

A: The Rainbow and Silver springsheds share a large area of overlapping interactions, so loading can influence both springs, depending on the groundwater dynamics at a given time. The NSILT estimate is based on the best available information we have on current loading sources. The spring vent analysis is based on the most recent 10 years of measured data at the spring vent. Interpretation of the spring vent measurements is complicated by the fact that the water flowing out of the spring vent includes nitrogen that traveled into the aquifer from this year, recent years, and loading from a long time ago. Both the NSILT and the spring vent analysis represent the best information with which we have to make estimates. In these springs, it is important that the responsible entities in both springs areas make progress with their load reductions since the loading affects the concentration in both springs, depending on conditions.

Next Steps - BMAP Updates

Q: Will non-local governments or other statewide entities receive allocations?

A: Allocations will be given to the entities responsible for the nitrogen sources, not only local governments.

Public Comments

There were no public comments.

Adjournment

The meeting adjourned at 2:48 pm.