Santa Fe River Basin Management Action Plan Updates

May 24, 2024 at 1:30 PM EDT

Via Webinar
Webinar Registration Link:
https://register.gotowebinar.com/register/572033457797768288

Agenda

- Santa Fe River 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 Santa Fe River BMAP, contact: Chandler Keenan at (850) 245-8555
Chandler.B.Keenan@FloridaDEP.gov.

WEBINAR HOUSEKEEPING

Attendee Participation

Open your control panel.

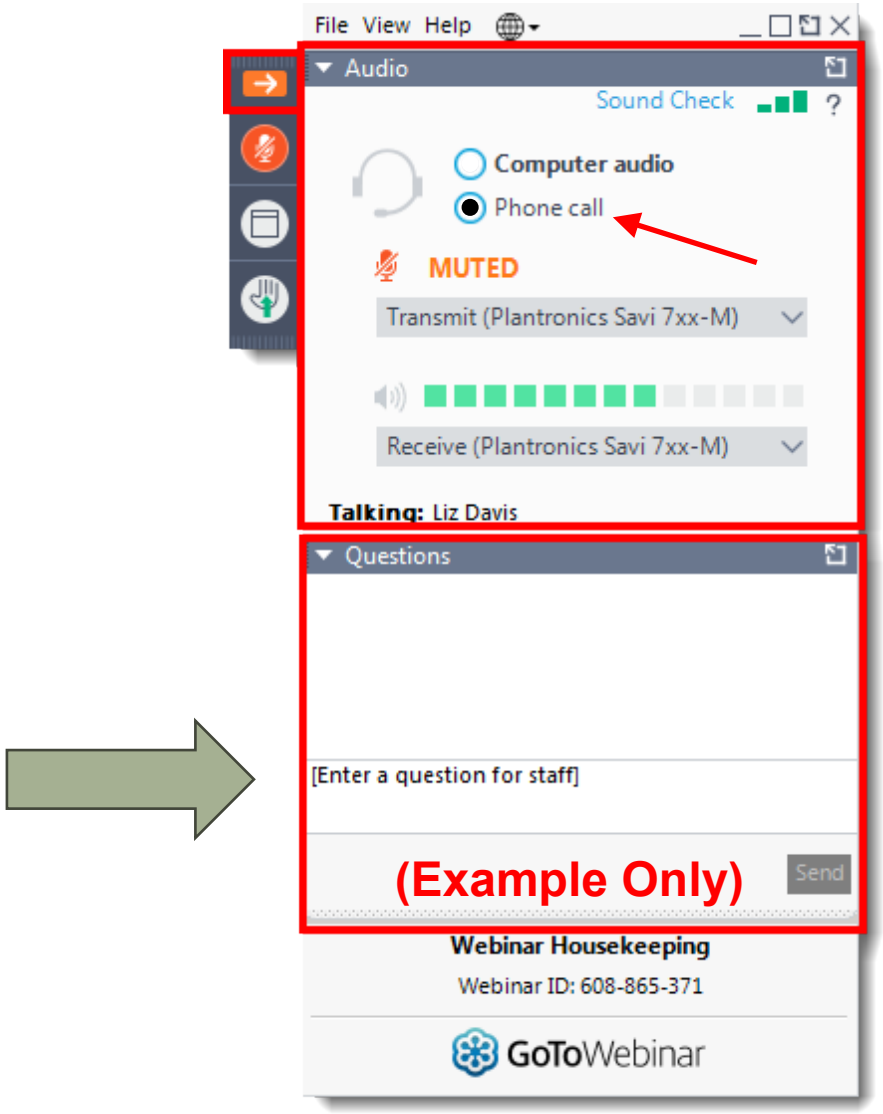
Join audio:

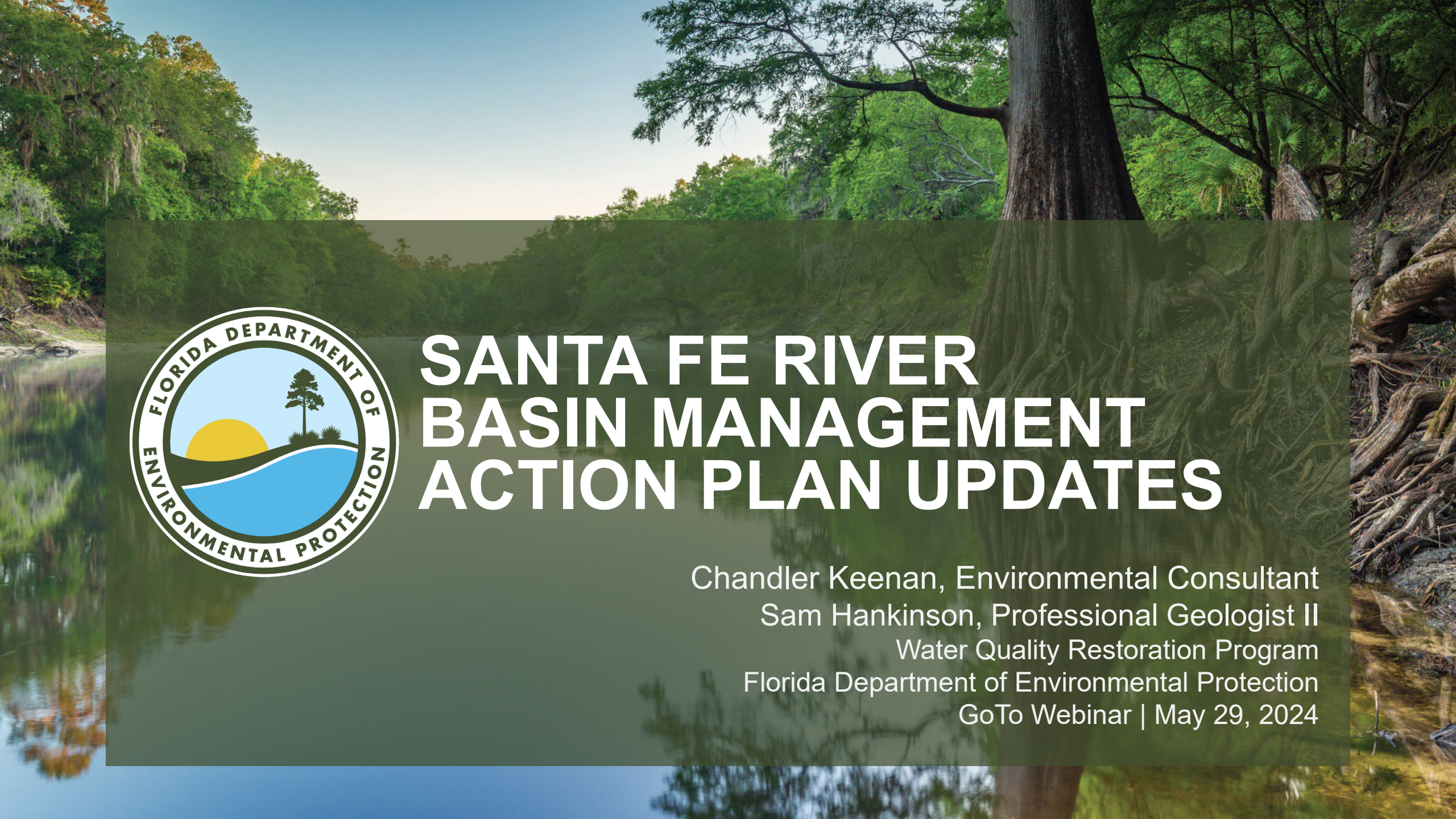
- Choose **Phone Call** and dial using the information provided.
- Or choose **Computer Audio** to use your computer's speakers for audio.
- Attendee audio will be muted.

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.





SANTA FE RIVER BASIN MANAGEMENT ACTION PLAN UPDATES

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

GoTo Webinar | May 29, 2024

AGENDA

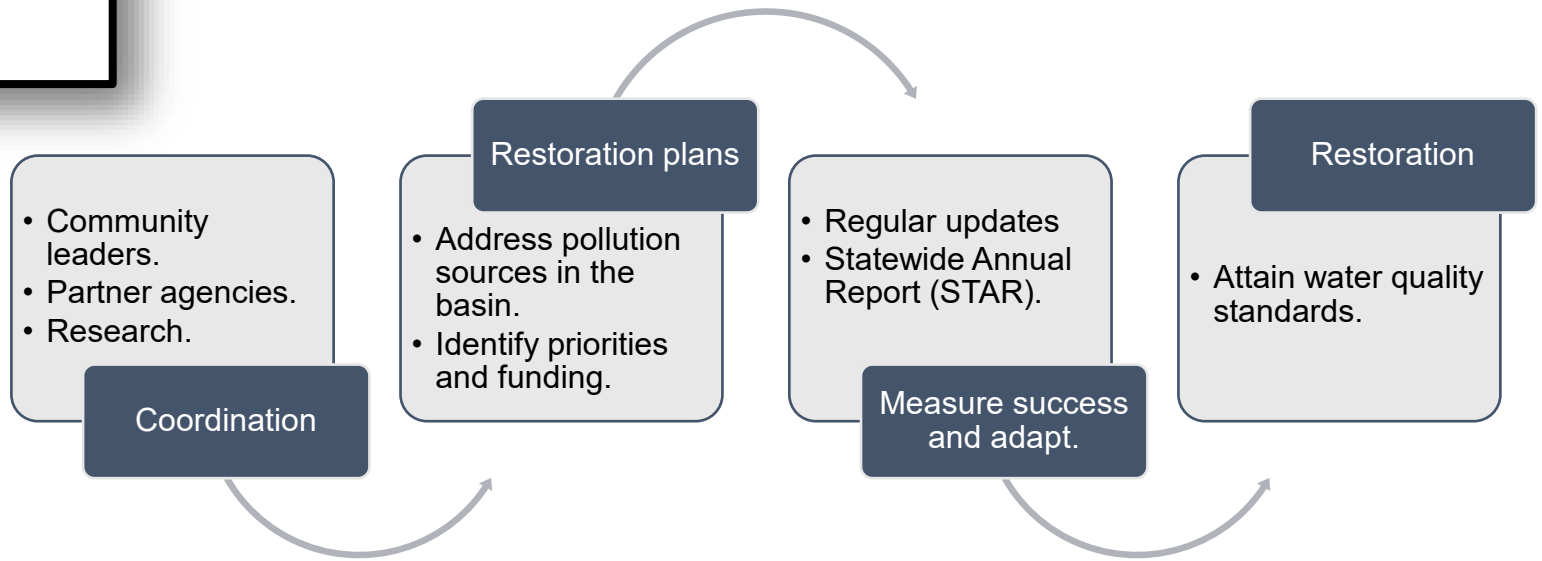
- Basin Management Action Plan (BMAP) Overview.
- Nitrogen Source Inventory Loading Tool (NSILT).
  - Updates.
  - Draft Results.
- Spring Vent Load Analysis.
- Next Steps - BMAP Updates.
  - Draft Allocation Approach.
  - Milestones.

BASIN MANAGEMENT ACTION PLANS (BMAPs)

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

Basin management action plans (BMAPs) are:

- Developed with stakeholder input.
- Adopted by 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:

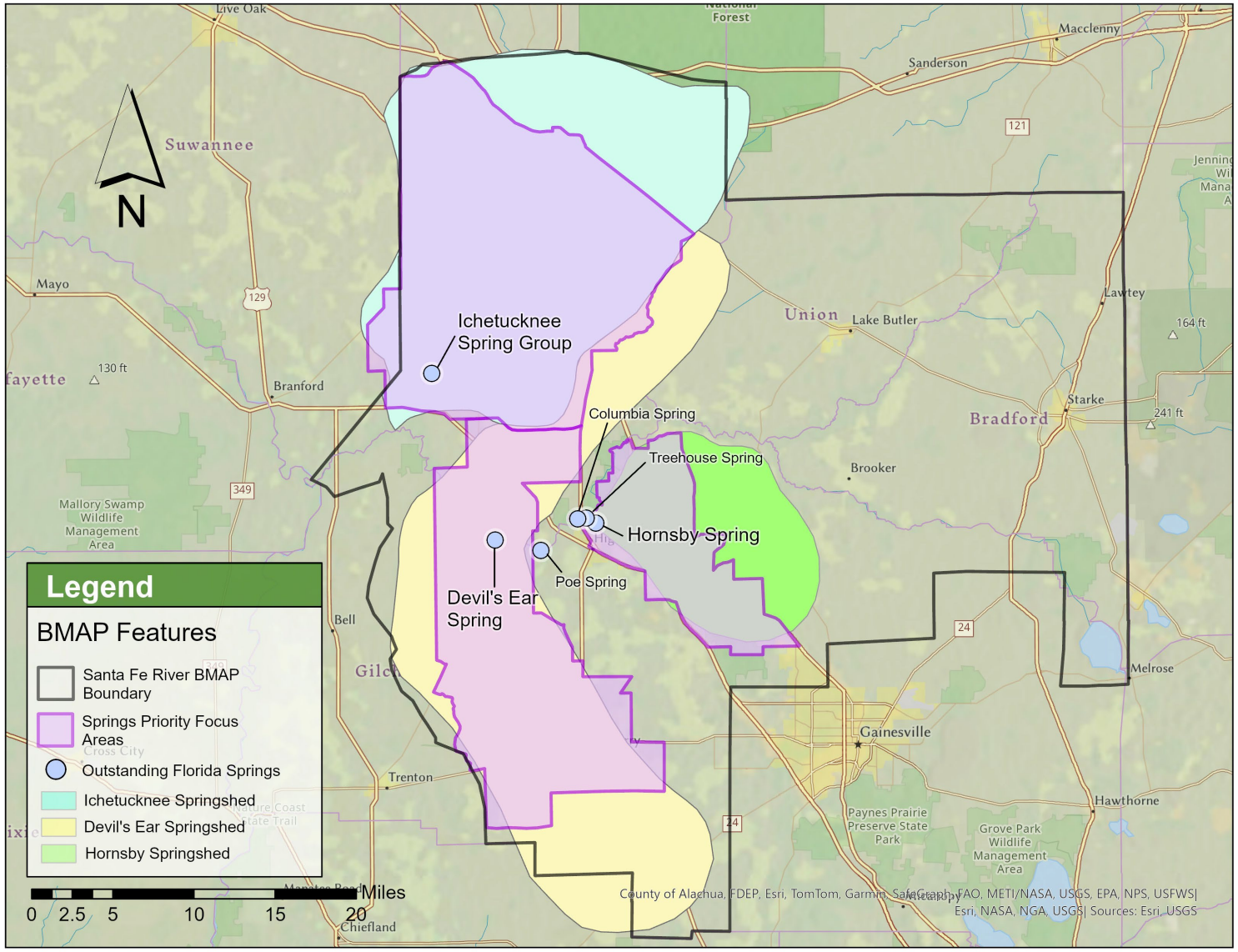
- Implementation timeline.
- Commitment to projects.
- Expected water quality improvement from projects and management strategies.

Process to assess progress toward achieving the TMDL:

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

SANTA FE RIVER BMAP

- BMAP area is over 1 million acres.
- There are three subbasins that are associated with the three outstanding Florida springs (OFS):
  - Ichetucknee.
  - Devil's Ear.
  - Hornsby.
- Impaired for the nitrate form of nitrogen.
- TMDL is a monthly average target of 0.35 mg/L of nitrate.



STAKEHOLDERS
BACKGROUND

Responsible stakeholders:

Agricultural producers

Counties:
Alachua
Bradford
Columbia
Gilchrist
Union

Cities, Towns and Communities:
Archer
Fort White
High Springs
La Crosse
Lake City
Newberry

Responsible agencies:

- Florida Department of Agriculture and Consumer Services (DACS).
- Florida Department of Environmental Protection (DEP).
- Florida Department of Health.
- Florida Fish and Wildlife Conservation Commission.
- Suwannee River Water Management District (SRWMD).
- Florida Department of Transportation.

Other interested stakeholders:

Homeowners/citizens, Santa Fe River Partnership, The Ichetucknee Partnership, Ichetucknee Springs Partnership, Ichetucknee Springs Working Group, Santa Fe Springs Working Group, Florida Farm Bureau Federation, Florida Onsite Wastewater Association, Florida Springs Council, Florida Springs Institute, University of Florida Institute of Food and Agricultural Sciences (UF IFAS).

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 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.

HB 1379: ENVIRONMENTAL PROTECTION

Increased protection for Outstanding Florida Springs (OFS).

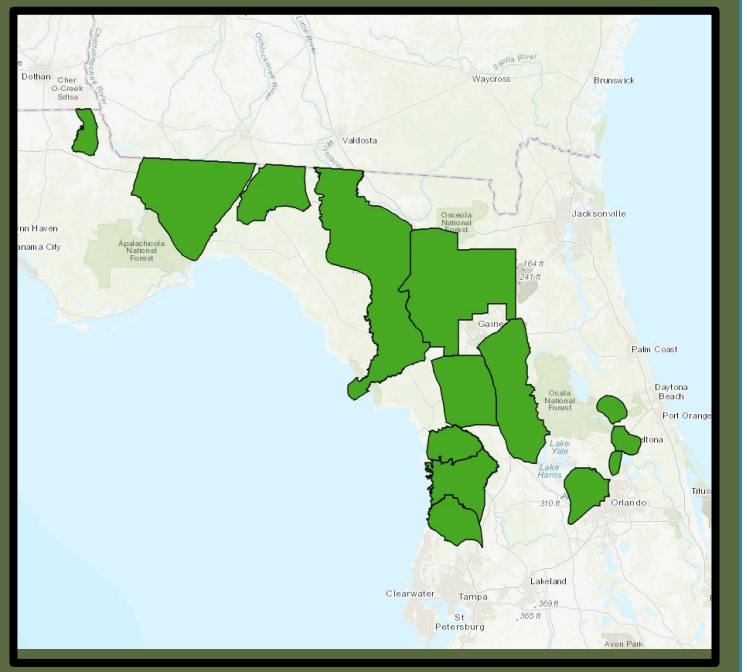
Strengthens Water Quality Protections and BMAPs.

HB1379

Improves Local Government Long-Term Comprehensive Planning.

Expands Funding Opportunities to Address Water Quality Impairments.

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

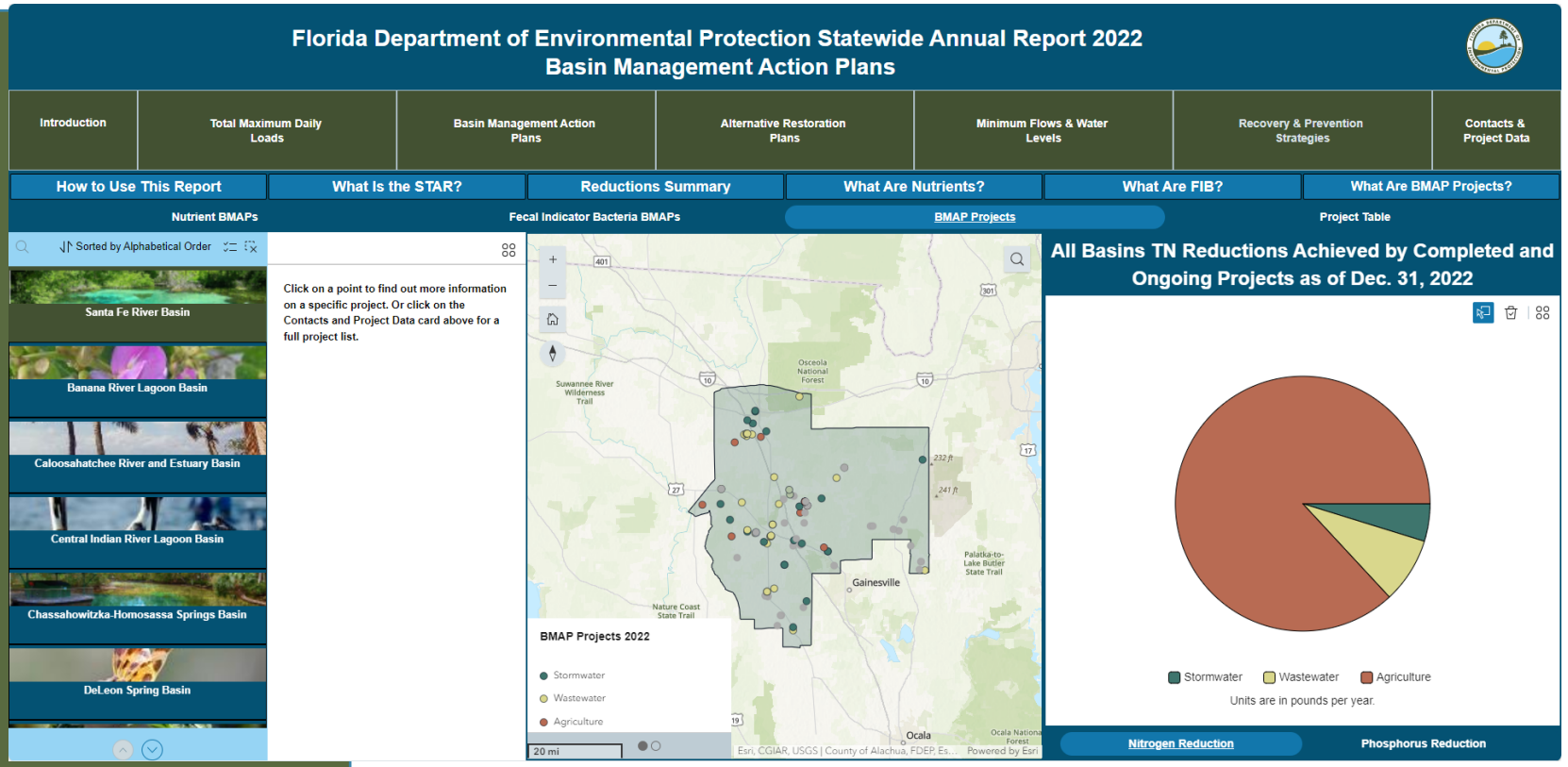


- New conventional Onsite Sewage and Treatment Disposal System (OSTDS) where sewer is available.
- New domestic wastewater disposal facilities with permitted capacities of 100,000 gallons per day or more, unless they meet Advanced Wastewater Treatment (AWT) standards.
- New HAZMAT disposal facilities.
- 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.

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

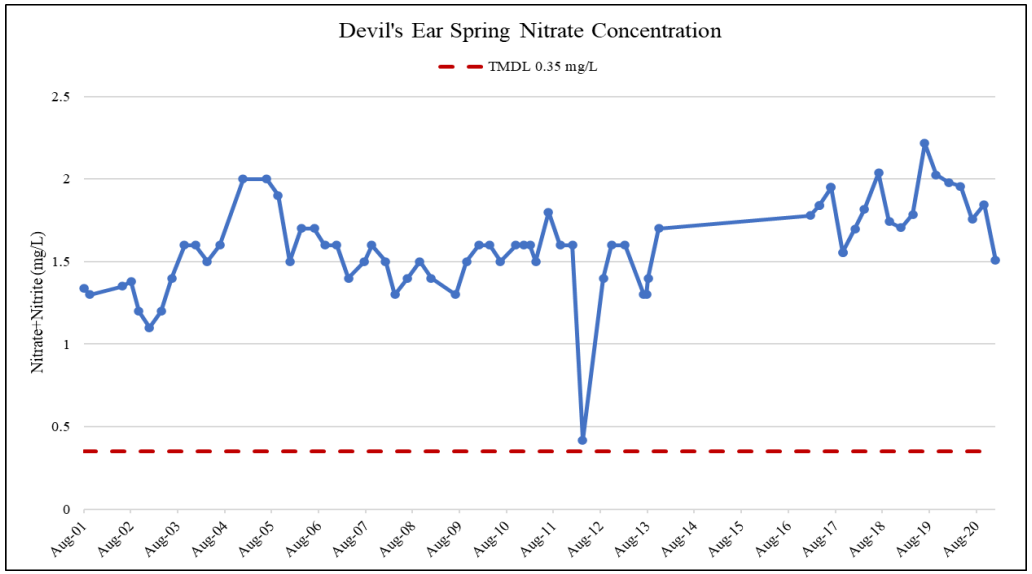
SANTA FE RIVER BMAP

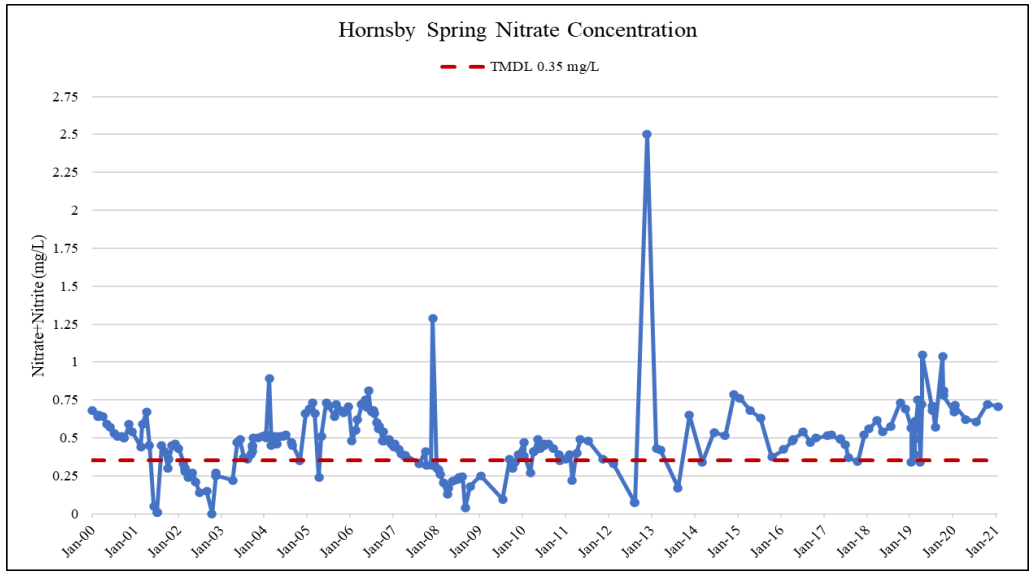
Project Status	Count of Projects
Planned	25
Ongoing	10
Underway	37
Completed	54
Total	**126**

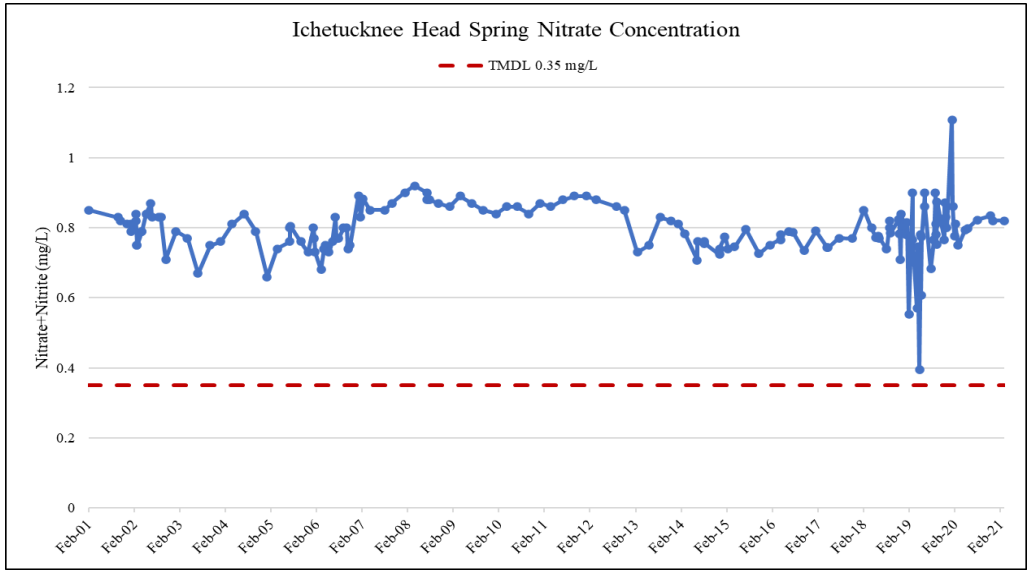
As of Dec. 31, 2023, verified projects in the Santa Fe River BMAP have reduced **156,352 lbs./yr.** of total nitrogen (TN).

WATER QUALITY DATA

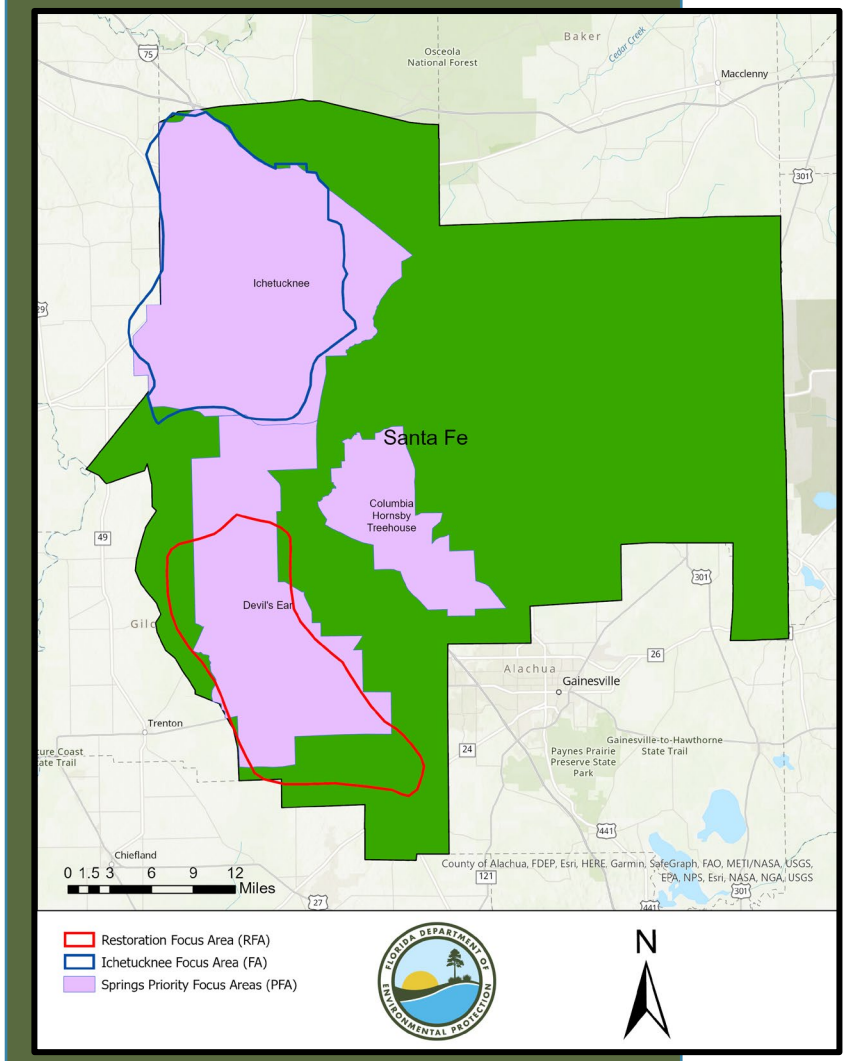
OUTSTANDING FLORIDA SPRING DATA







WATER QUALITY MONITORING
RESTORATION FOCUS AREAS



Two special project locations:

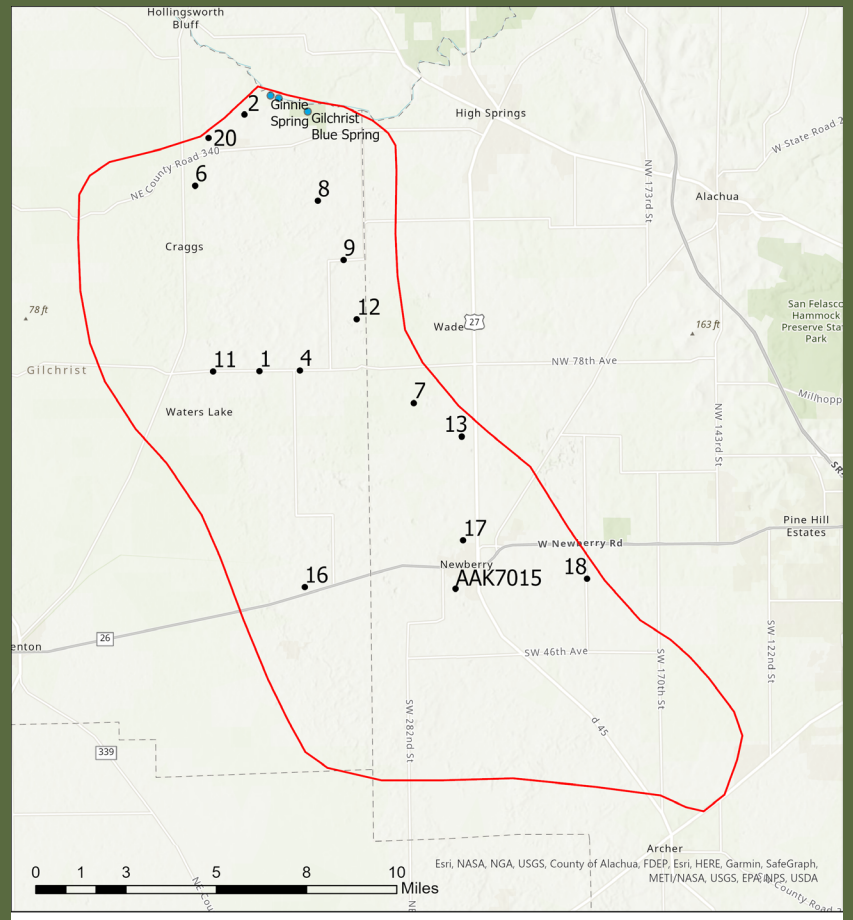
- Santa Fe Restoration Focus Area (SFRFA).
- Ichetucknee Restoration Focus Area (IRFA).

The SFRFA and IRFA were created to support the BMAP and address the nitrate TMDL (0.35 mg/L):

- **Focus restoration efforts** in a smaller area to test the effectiveness of management practices over time.
- **Monitor water quality conditions** in samples from groundwater wells and springs to track nitrate concentrations over time.
- **Compare changes in nitrate concentration** in groundwater wells and with land use changes and best management practice (BMP) enrollment to determine restoration progress.
- **Help inform** where to implement DEP and local resources and encourage implementation of possible additional agricultural and urban BMPs and other activities.

WATER QUALITY MONITORING

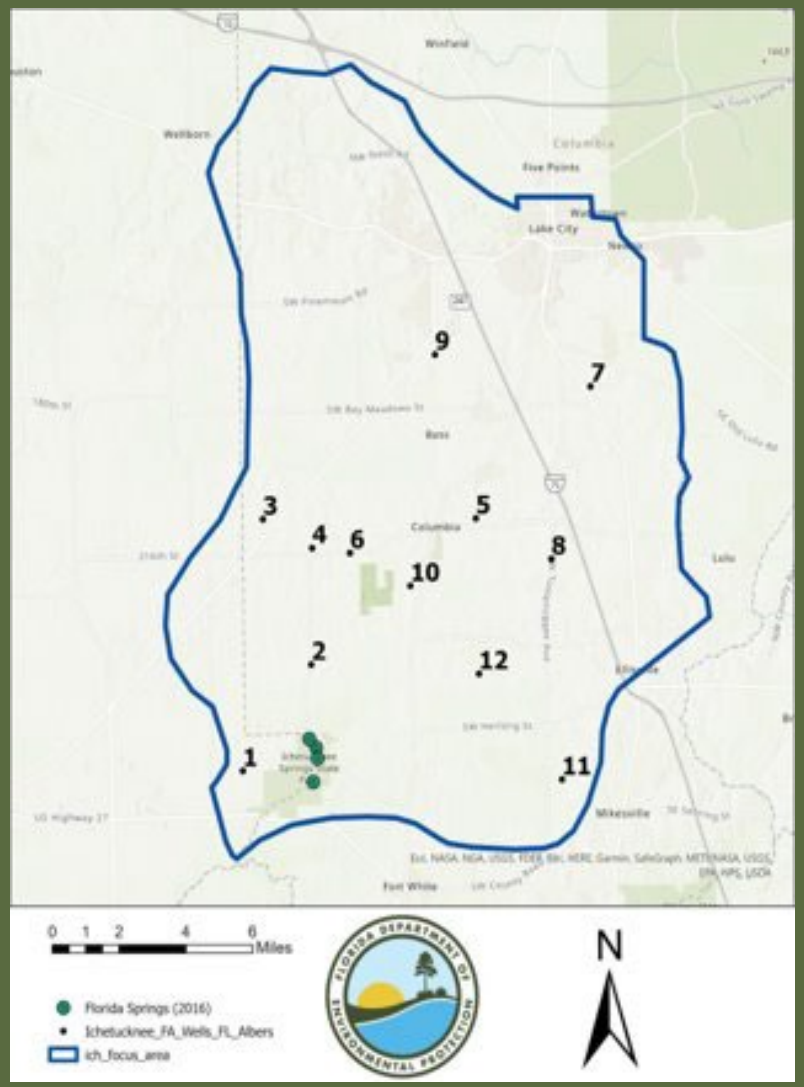
SANTA FE RESTORATION FOCUS AREA (RFA)



- Located within the Devil's Ear Priority Focus Area (PFA).
- Fifteen (15) groundwater monitoring wells (GMW) in the study.
- Quarterly sampling started in 2013.
- The land use types around the groundwater wells are:
  - Pastureland and hay.
  - Irrigated cropland.
  - Low density residential and wastewater treatment facilities.

WATER QUALITY MONITORING

ICHETUCKNEE RESTORATION FOCUS AREA



- Monitor water quality in the primary groundwater contributing area to Ichetucknee Springs.
- Twelve GMWs in the study.
- Quarterly sampling started in 2016.
- Next steps is to perform a trend analysis.
- When examining land use changes and enrollment in best management practices (BMPs), there is a shift to less intensive land use practices and an increase in BMP enrollment around most of the groundwater wells.
- These shifts could take a few years to see results in water quality improvements due to a lag effect from when BMPs and restoration projects are implemented to when improvements are seen.

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 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 (IWR) 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 (DEAR) and other DEP entities, water management districts, 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

- Nitrogen Source Inventory Loading Tool (NSILT) updates.
- Spring vent load analyses.
- Entity allocation development.
- Future growth.

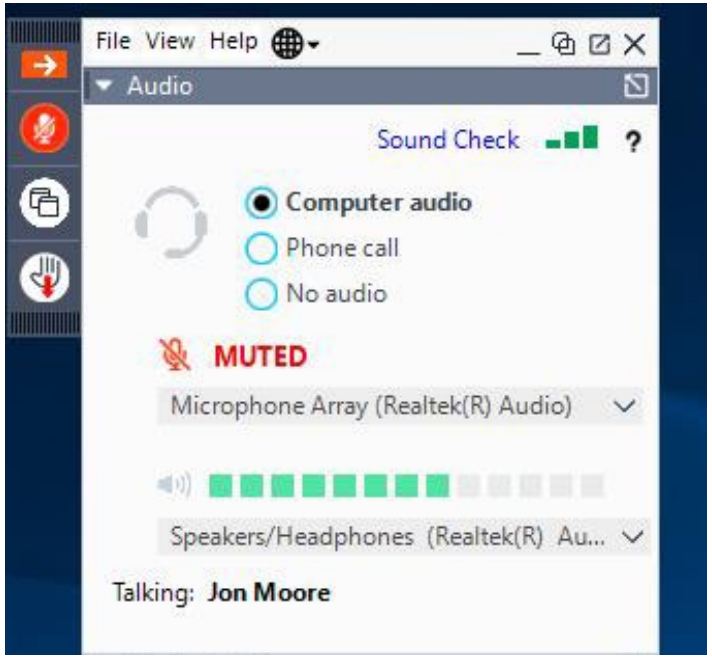
- Establish five-year milestones for project implementation.
- Incorporate additional project s.
- Incorporate Clean Waterways Act (SB 712) requirements.
- Incorporate HB 1379 requirements.
- Incorporate regional projects.

- 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.

BMAP MEETING
PUBLIC QUESTIONS PERIOD

Verbal Questions

- We ask that questions and comments be limited to **three minutes** so that we may hear from everyone.
- 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.

NITROGEN SOURCE INVENTORY LOADING TOOL (NSILT) UPDATES

- NSILT Process.
- Methodology review for sources.
  - Atmospheric deposition.
  - Wastewater treatment facilities.
  - OSTDS.
  - Urban turfgrass fertilizer.
  - Sports turfgrass fertilizer.
  - Farm fertilizer.
  - Livestock waste.
  - Biosolids.
- Draft results.

NSILT GENERAL PROCESS SUMMARY

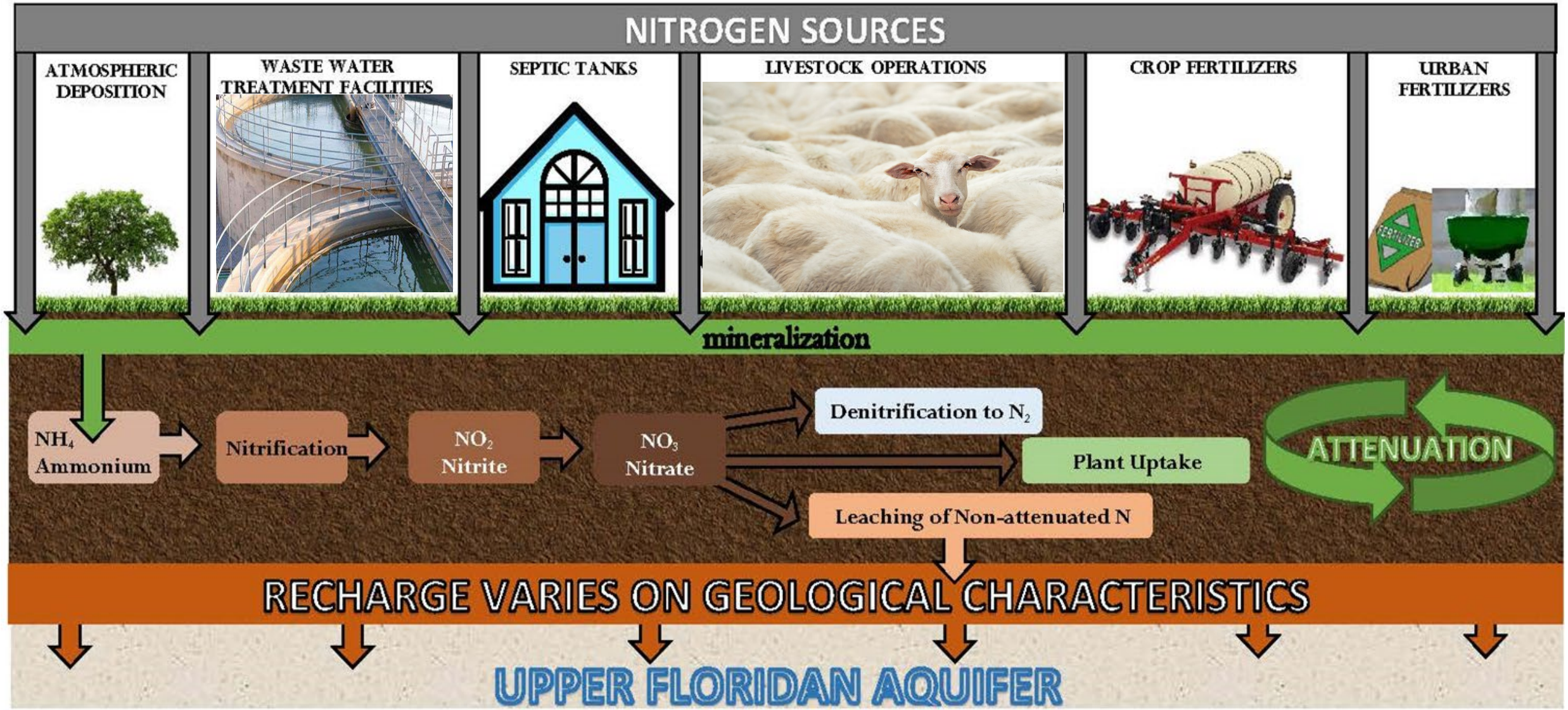
Estimate loading to land surface for each source category.

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

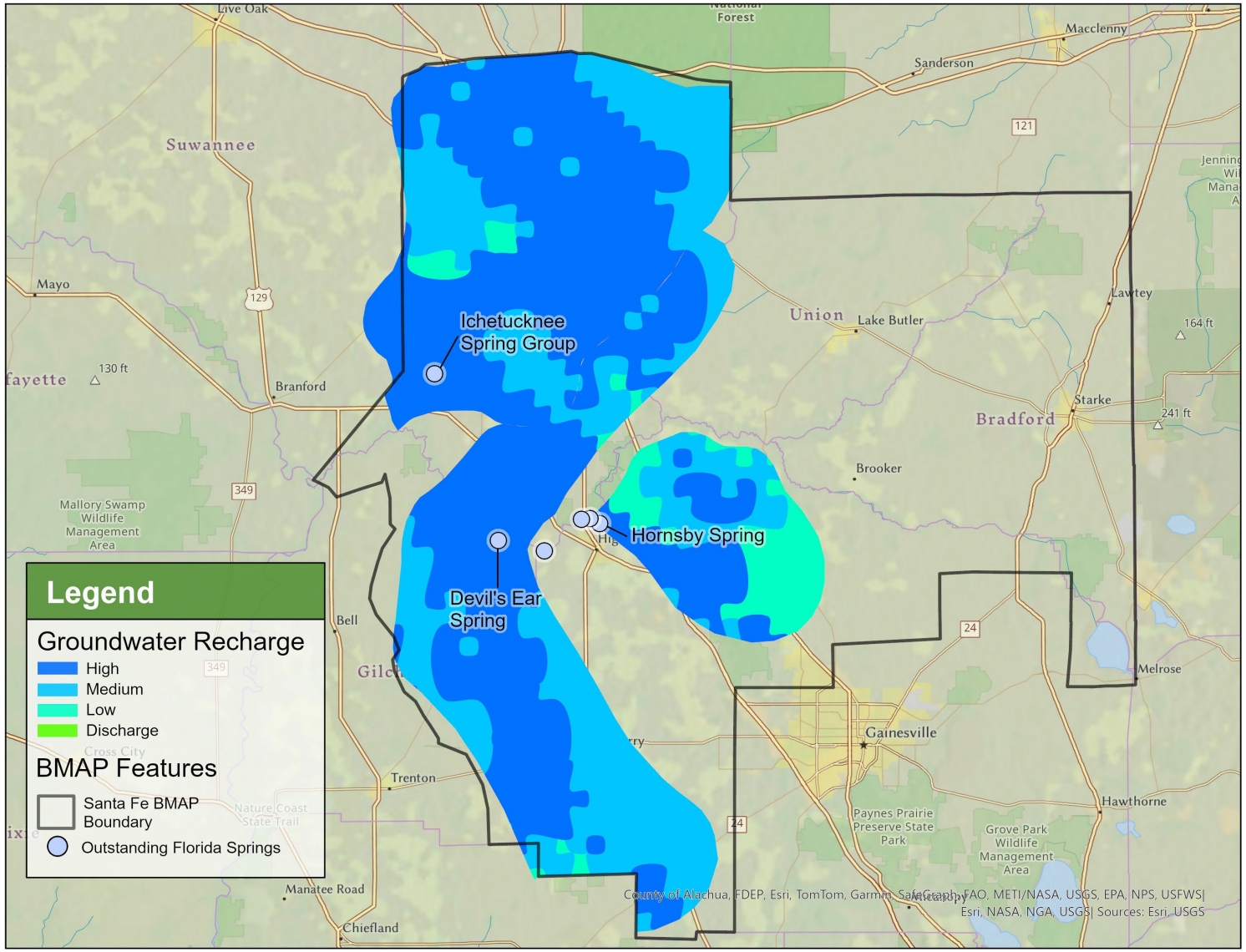
Apply a location specific recharge factor to surface loading estimate.

LOADING TO GROUNDWATER.

NITROGEN CYCLE AND ATTENUATION



RECHARGE TO GROUNDWATER



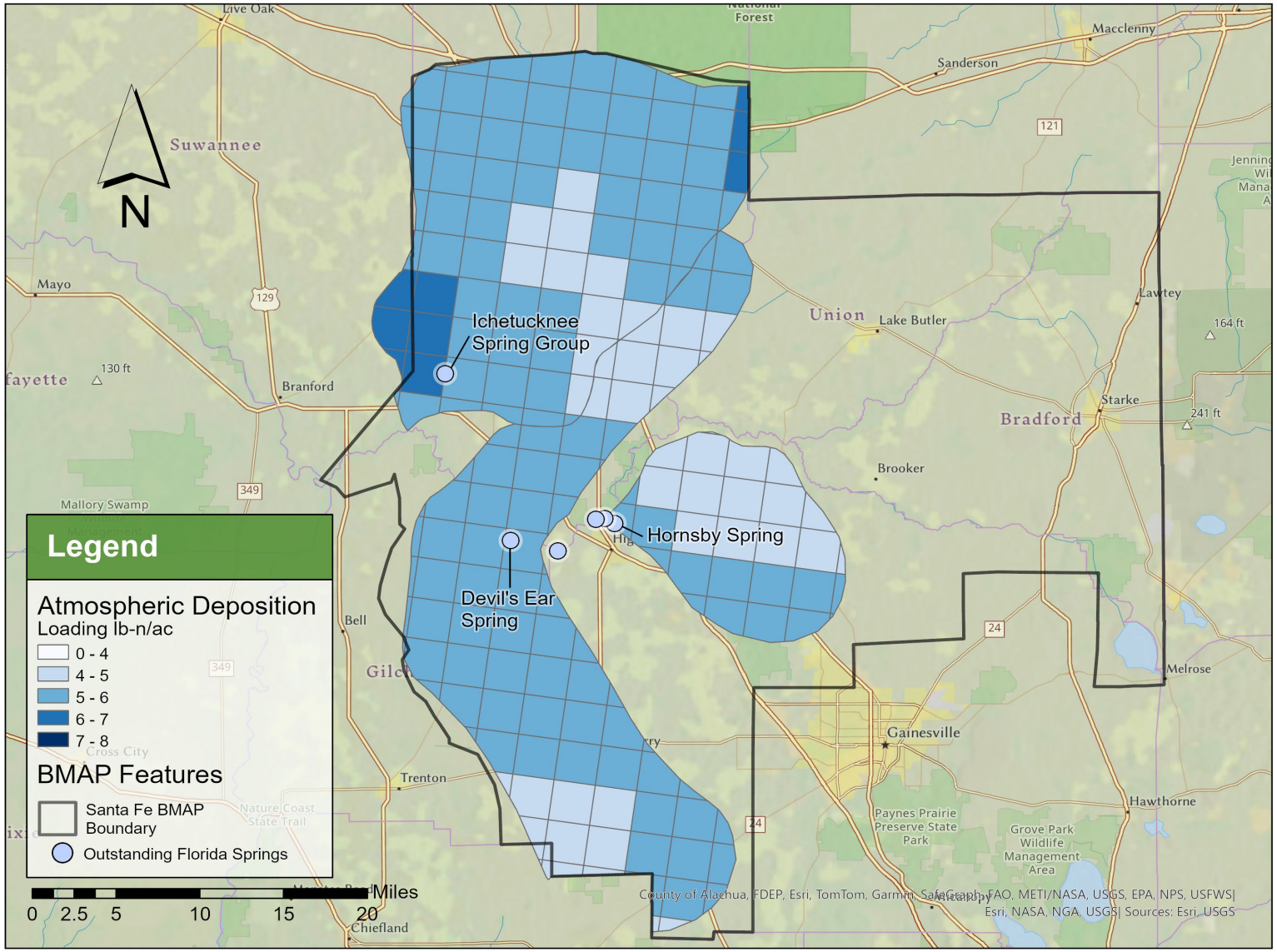
- Divided into four recharge categories based on a composite recharge map of the Floridan aquifer.
- The recharge amount evaluates the percent of nitrogen loading that is expected to impact spring vent after bioattenuation is considered.
- Delineation of recharge areas and associated recharge rates are 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%

ATMOSPHERIC DEPOSITION (AD)

- 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 in the springsheds.
- Methodology is consistent with previous NSILT.

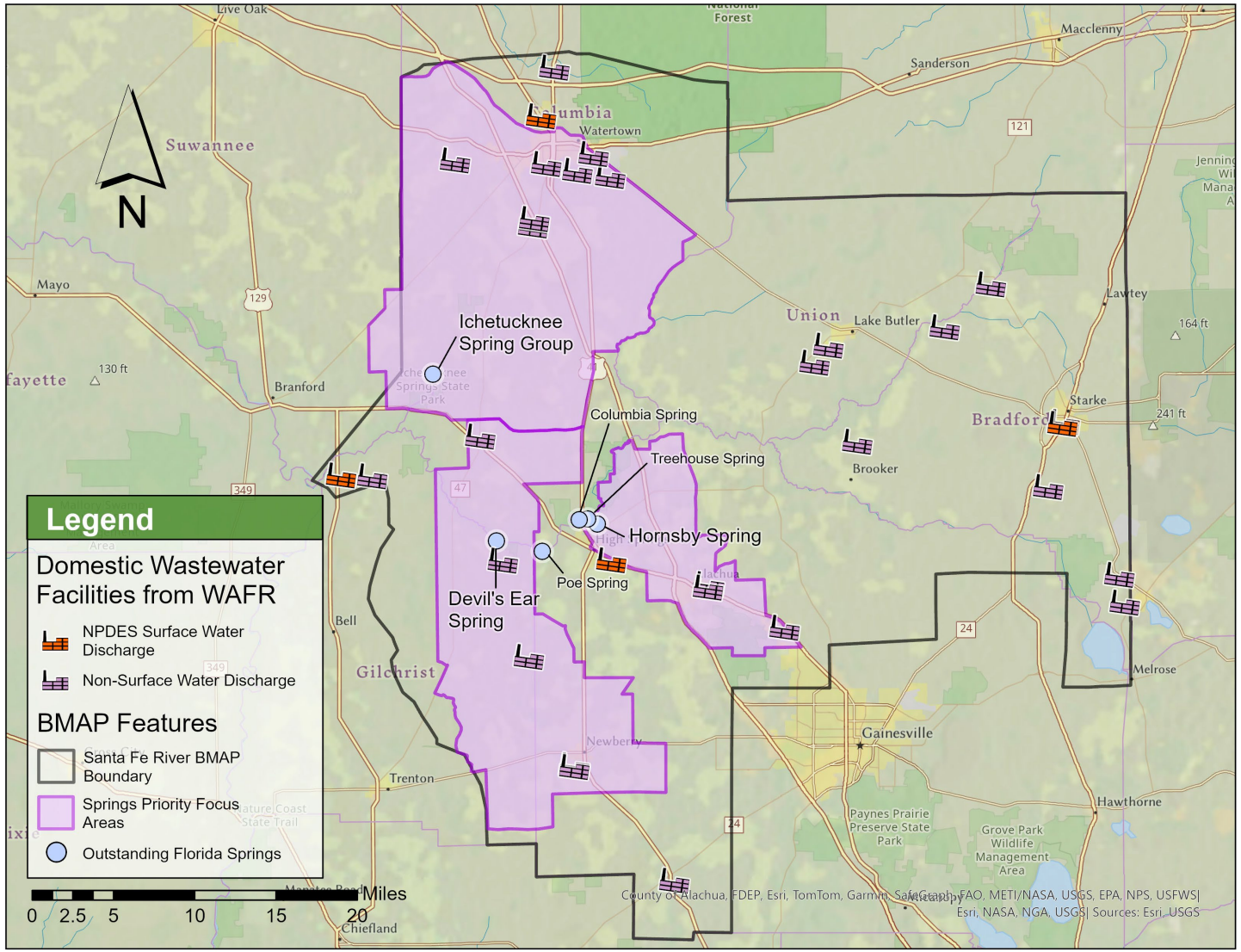
Springshed	Est. Load to Surface (lbs-N/yr)	Est. Load to Groundwater (lbs-N/yr)
Ichetucknee	1,314,505	100,805
Devil's Ear	1,139,814	82,725
Hornsby	368,957	18,671



WASTEWATER TREATMENT FACILITIES

- Wastewater Facility Regulation (WAFR) information was reviewed to determine the location of all wastewater facilities (WWTFs), as well as their effluent application or disposal sites.
- Discharge monitoring report (DMR) data collected by WAFR 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 (RIB), sprayfield, or wetland.
  Each method has its own estimated attenuation factor.

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



WASTEWATER TREATMENT FACILITIES

Santa Fe BMAP Waste Water Treatement Facility Loading to Land Surface Summary						
Springshed	**County**	**Facility ID**	**Facility Name**	**Disposal Type**	**Recharge Type at**	**Total Nitrogen Load (lbs/yr)**
Ichetucknee	Columbia	FLA011394	Columbia City Elementary School WWTF	Absorption Field	High	68.89
Ichetucknee	Columbia	FLA011398	Paradise Village Mobile Home Park WWTF	RIB	High	131.8
Ichetucknee	Columbia	FLA011403	Super 8 Motel WWTF	Sprayfield	High	306.26
Ichetucknee	Columbia	FLA011406	Pondview Mobile Home Park WWTF	RIB	High	65.59
Ichetucknee	Columbia	FLA011408	Lake City KOA North WWTF	RIB	High	181.1
Ichetucknee	Columbia	FLA011402	Eastside Village Mobile Home Park WWTF	RIB	High	447.61
Ichetucknee	Columbia	FLA011412	Cannon Creek Mobile Home Park WWTF	RIB	High	539.18
Ichetucknee	Columbia	FLA011418	Columbia Correctional Institution WWTF	Sprayfield	Medium	3565.77
Ichetucknee	Columbia	FLA113956	Lake City, City of - WWTF	Wetland	Medium	14036.3
Ichetucknee	Columbia	FLA113956	Lake City, City of - WWTF	Sprayfield	Low	6461.36
Ichetucknee	Columbia	FLA113956	Lake City, City of - WWTF	Sprayfield	Medium	5964.34
Ichetucknee	Columbia	FLA181587	Westside Elementary School WWTF	RIB	High	97.7
Ichetucknee	Columbia	FLA605778	Pinemount Elementary School WWTF	RIB	High	39.83
Devil's Ear	Alachua	FLA011281	Archer Community School WWTF	RIB	Medium	78.8
Devil's Ear	Alachua	FLA011292	Newberry WWTF	Sprayfield	Medium	15,878.96
Devil's Ear	Alachua	FLA011298	Archer Homes WWTF	Absorption Field	Medium	131.16
Devil's Ear	Columbia	FLA011417	FDOT I-75 Rest Area SB - Ellisville WWTF	Sprayfield	Medium	480.41
Devil's Ear	Columbia	FLA178306	Fort White High School WWTF	RIB	High	145.66
Devil's Ear	Columbia	FLA632759	South Columbia County Regional WWTF	RIB	Medium	1,454.81
Hornsby	Alachua	FLA011290	Alachua, City of - AWRF	Sprayfield	High	8,874.35
Hornsby	Alachua	FLA011313	Florida Welcome Station WWTF	RIB	Medium	80.06

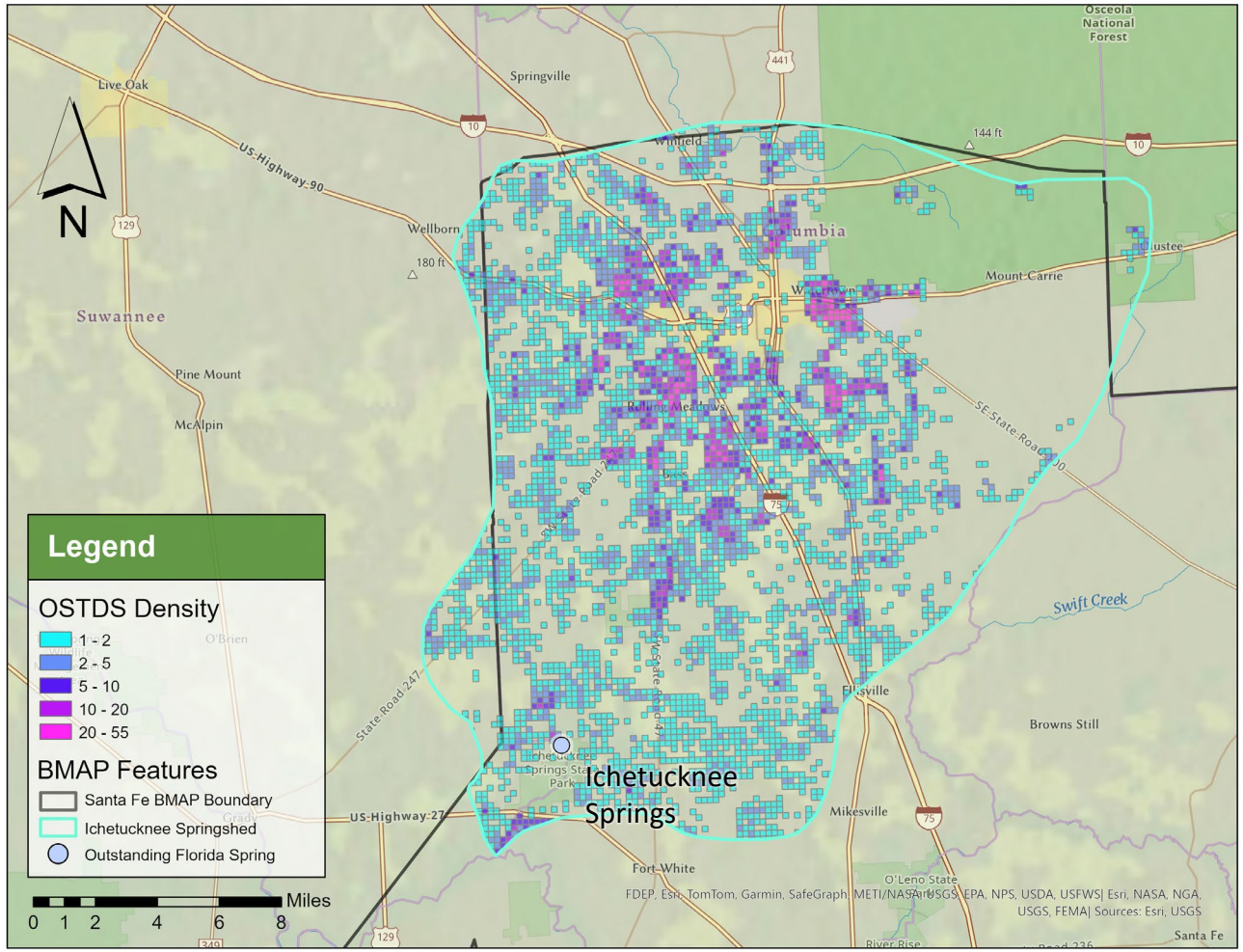
WASTEWATER TREATMENT FACILITIES

- Twenty-one domestic WWTFs were evaluated to determine contributions to groundwater loading.
- RIB application is the most common disposal method in the BMAP area, followed by sprayfield.
- The results of the NSILT analysis for all WWTFs and disposal types in all three springsheds are presented in the table below.

Springshed	Facilities	Est. Load to Surface (lbs.-N/yr.)	Est. Load to Groundwater (lbs.-N/yr.)
Ichetucknee	13	31,906	4,373
Devil's Ear	6	18,170	3,994
Hornsby	2	8,954	3,225

ONSITE SEWAGE TREATMENT AND DISPOSAL SYSTEMS (OSTDS)

Ichetucknee Springshed OSTDS Density

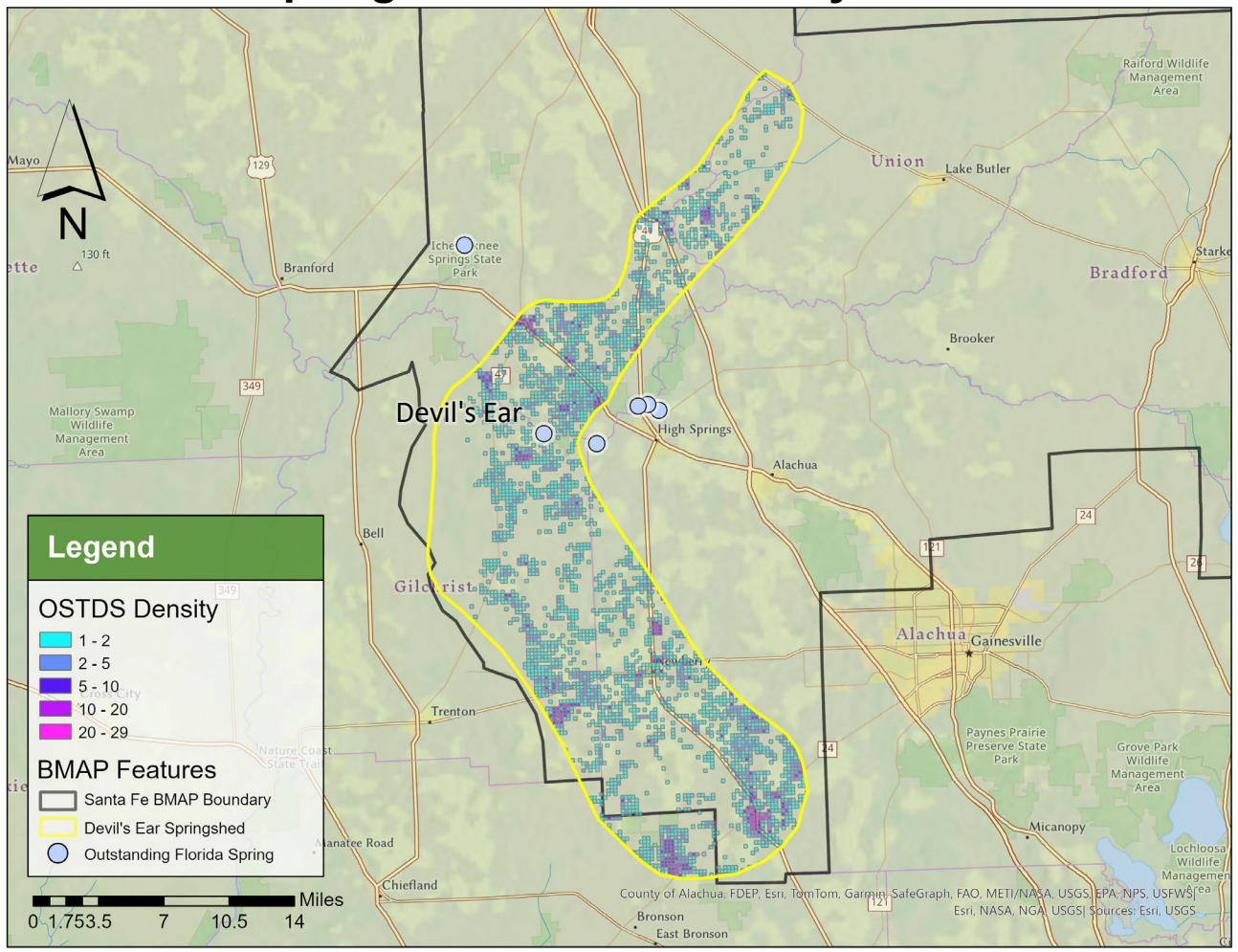


- Florida Water Management Inventory (FLWMI) data was used to estimate the number of OSTDS (updated 2021-22).
- Parcels identified as "known septic", "likely septic", and "somewhat likely septic" were considered to have one septic system per parcel.
- Estimated load per tank is based on multiplying the average persons per household (2020 U.S. Census data) by loading per person, which is estimated to be 10 lbs./yr. (Armstrong 2015).
- 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%.

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

ONSITE SEWAGE TREATMENT AND DISPOSAL SYSTEMS (OSTDS)

Devil's Ear Springshed OSTDS Density

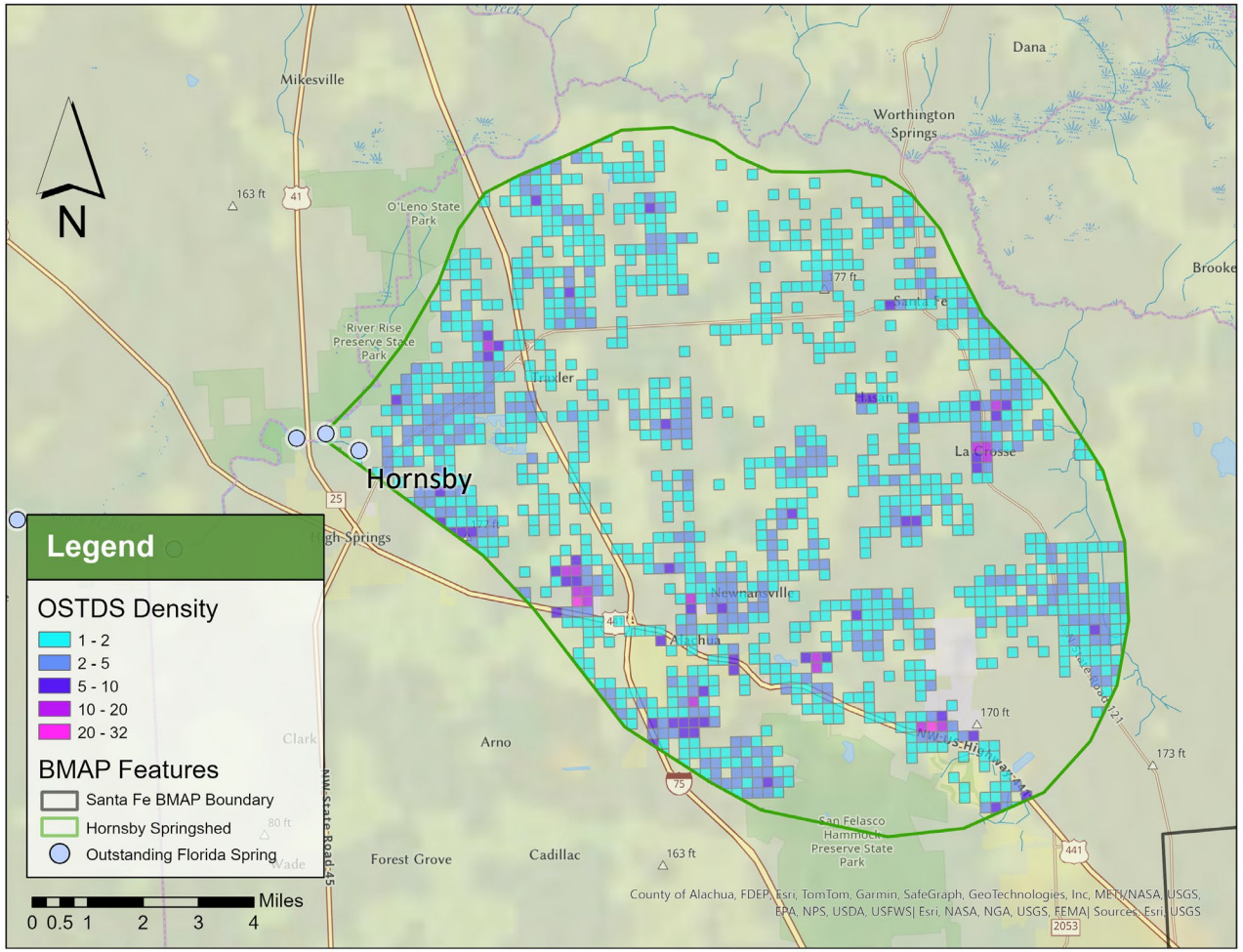


- FLWMI data was used to estimate the number of OSTDS (updated 2021-2022).
- Parcels identified as "known septic", "likely septic", and "somewhat likely septic" were considered to have one septic system per parcel.
- Estimated load per tank is based on multiplying the average persons per household (2020 U.S. Census data) by loading per person, which is estimated to be 10 lbs./yr. (Armstrong 2015).
- 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%.

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

ONSITE SEWAGE TREATMENT AND DISPOSAL SYSTEMS (OSTDS)

Hornsby Springshed OSTDS Density



- FLWMI 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.
- Estimated load per tank is based on multiplying the average persons per household (2020 U.S. Census data) by loading per person, which is estimated to be 10 lbs./yr. (Armstrong 2015).
- 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%.

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

ONSITE SEWAGE TREATMENT AND DISPOSAL SYSTEMS (OSTDS)

The results of the NSILT analysis for OSTDS in all three springsheds are presented in the table below.

Springshed	Number of OSTDS	Number of enhanced OSTDS	Est. Load to Drain Fields (lbs.-N/yr.)	Est. Load to Groundwater (lbs.-N/yr.)
Ichetucknee	14,311	0	375,772	214,633
Devil's Ear	7,424	1	187,448	96,194
Hornsby	2,929	0	72,639	26,750

URBAN TURF FERTILIZER

- Urban Turfgrass Fertilizer (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 urban turfgrass fertilizers are estimated to attenuate at 70%.

Source: Pexels

URBAN TURF FERTILIZER
SINGLE FAMILY RESIDENTIAL

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 in these springsheds.
- 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	32%
Self	68%

Self Application Rates	Percent	Application Rate (lbs/N/ac/applications)	Number of Applications
BMP	15%	26.136	4.17
Label	74%	34.78	2.98
None	11%	0.00	0.00

URBAN TURF FERTILIZER
SINGLE FAMILY RESIDENTIAL

The results of the NSILT analysis for single family residential UTF in all three springsheds are presented in the table below.

Springshed	Est. Load to Surface (lbs-N/yr)	Est. Load to Groundwater (lbs-N/yr)
Ichetucknee	248,844	62,280
Devil's Ear	55,893	12,708
Hornsby	20,162	3,785

URBAN TURF FERTILIZER
NON-SINGLE FAMILY RESIDENTIAL

- SRWMD 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 water management district 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 (USGS) 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.

URBAN TURF FERTILIZER
NON-SINGLE FAMILY RESIDENTIAL

- 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 2.5 lb-N/1,000 ft^2 to fertilized turfgrass in the region.
- The results of the NSILT analysis for non-single family residential UTF in all three springsheds are presented in the table below.

Springshed	Est. Load to Surface (lbs.-N/yr.)	Est. Load to Groundwater (lbs.-N/yr.)
Ichetucknee	76,937	20,443
Devil's Ear	13,737	3,034
Hornsby	12,251	2,690

SPORTS TURFGRASS FERTILIZER (STF)

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

- 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.

- Three golf courses operating within the springsheds were reviewed.
  - Acreage for operating courses were consistent with the previous NSILT evaluation.
  - 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%	

Source: Pexels

SPORTS TURFGRASS FERTILIZER (STF)

The results of the NSILT analysis for sports turfgrass fertilizer in all three springsheds are presented in the table below.

Springshed	Acres STF	Number of Golf Courses	Est. Load to Surface (lbs.-N/yr.)	Est. Load to Groundwater (lbs.-N/yr.)
Ichetucknee	71	2	40,237	10,864
Devil's Ear	18	0	799	156
Hornsby	9	1	14,926	1,316

FARM FERTILIZER

- 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 DACS, water management districts and UF IFAS.

- 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 farm fertilizer (FF) is estimated to attenuate at 80%.

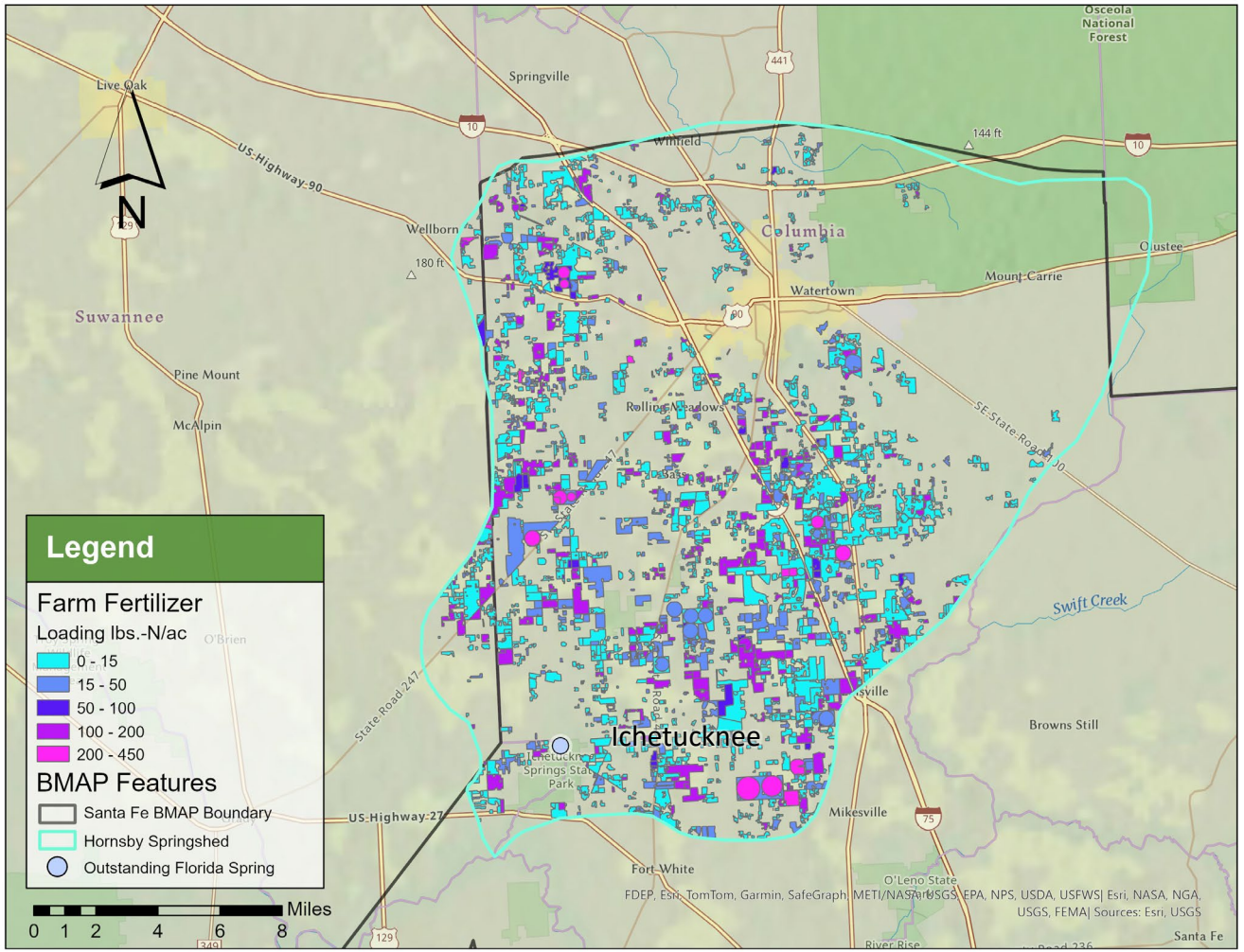
FARM FERTILIZER

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

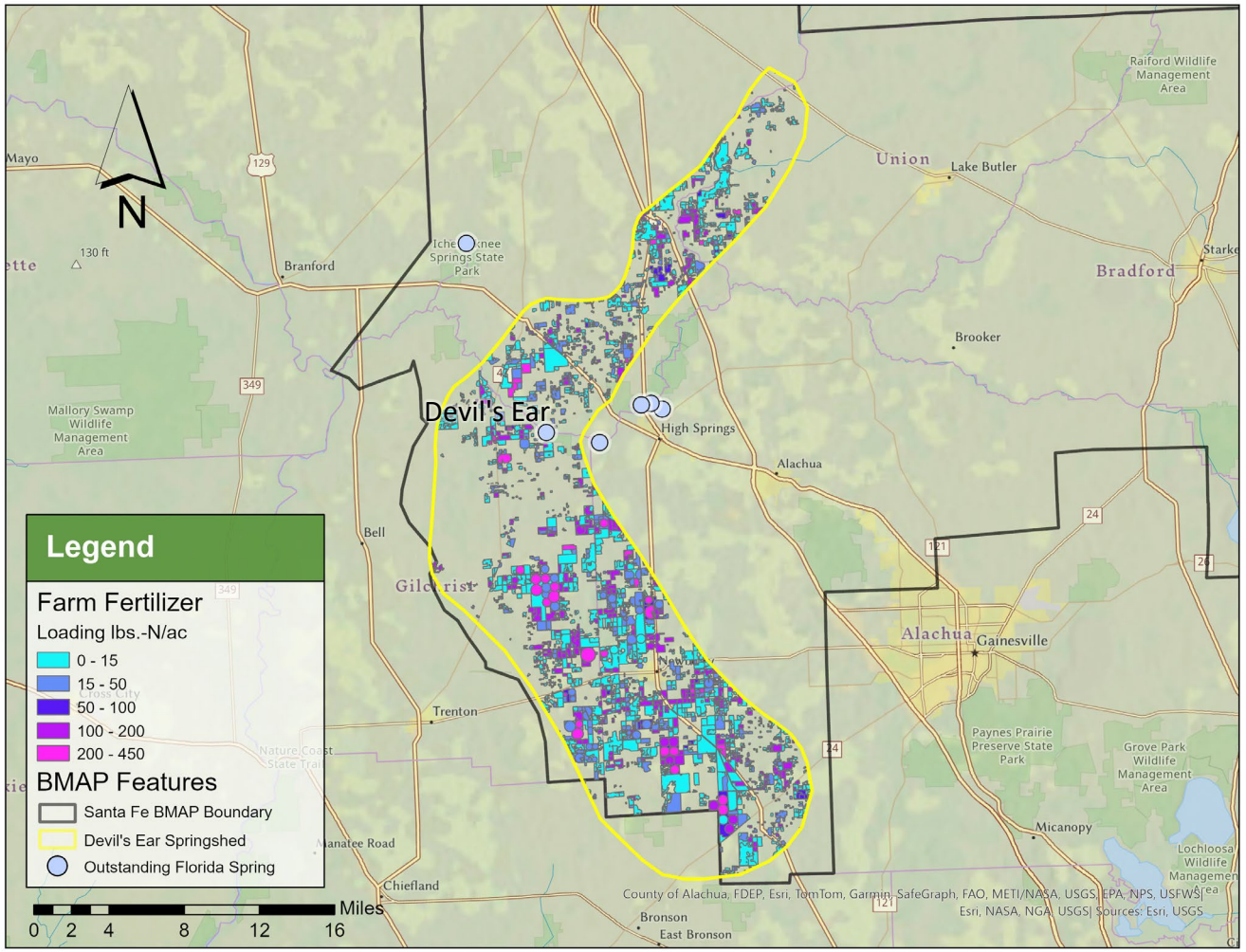
- For nurseries that use containers:
  - A reduction of 20% of the FSAID 9 land area was made to account for plant spacing.
  - A reduction of 70% of loading was estimated to account fertilizer being applied to containers that hold the nutrients longer.
- Adjustment to fertilizer application rates were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

FARM FERTILIZER



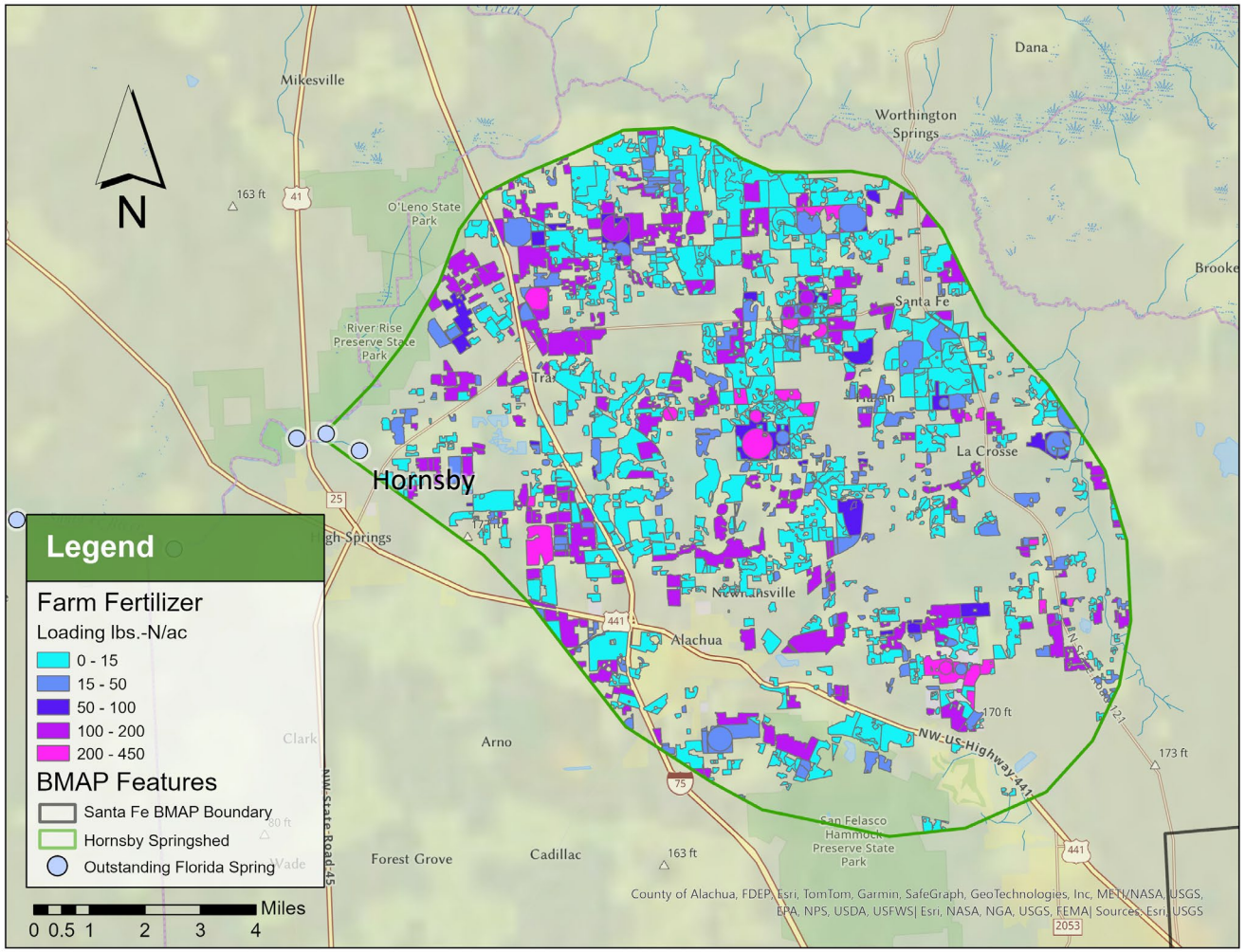
Crop	Total Acres	Loading to Land Surface (lb-N/year)	Loading to Groundwater (lb-N/year)
Hay	9,419	1,695,449	260,403
Improved Pastures	19,469	194,688	31,185
Corn	828	191,588	23,762
Field Corn	652	156,368	19,412
Cropland Pastureland	1,792	89,582	14,453
Peanuts	3,963	79,255	13,128
Row Crops	998	59,868	8,097
Grass Pasture	3,172	50,758	6,464
Corn Rye	125	35,052	6,309
Millet	364	18,186	2,557

FARM FERTILIZER



Crop	Total Acreage	Loading to Land Surface (lb-N/year)	Loading to Groundwater (lb-N/year)
Hay	12,040	2,167,144	303,364
Corn	3,112	717,190	113,604
Improved Pastures	26,041	260,414	39,233
Field Corn	682	163,709	27,344
Peanuts	6,352	127,033	19,083
Row Crops	1,491	89,490	12,109
Grass Pasture	5,278	84,454	12,020
Cropland Pastureland	1,692	84,619	11,759
Other Hay Non Alfalfa	329	59,204	7,403
Melons	263	39,476	3,948

FARM FERTILIZER



Crop	Total Acres	Loading to Land Surface (lb-N/year)	Loading to Groundwater (lb-N/year)
Hay	6,372	1,146,992	126,280
Corn	801	172,579	16,462
Improved Pastures	11,240	112,404	11,795
Field Corn	302	72,574	10,800
Vegetables	243	36,415	3,646
Other Hay Non Alfalfa	130	23,383	3,319
Row Crops	788	47,276	2,888
Peanuts	1,541	30,827	2,818
Cropland Pastureland	521	26,066	1,973
Millet	226	11,314	1,572

FARM FERTILIZER

The results of the NSILT analysis for farm fertilizer in all three springsheds are presented in the table below.

Springshed	Est. Load to Surface (lbs-N/yr)	Est. Load to Groundwater (lbs-N/yr)
Ichetucknee	2,645,424	396,844
Devil's Ear	3,967,175	571,544
Hornsby	1,760,413	190,615

LIVESTOCK WASTE (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 livestock waste loading.
- Loading from livestock waste (LW) is estimated to attenuate at 90%.

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

LIVESTOCK WASTE (LW)

Ichetucknee springshed:

Livestock Type	Total Head Count	Loading to Land Surface (lb-N/year)	Loading to Groundwater (lb-N/year)
Beef Cattle	10,070	1,238,666	98,101
"Other" Cattle	2,091	236,594	18,957
Calves	6,548	81,486	6,467
Donkeys	264	9,622	761
Horses	841	83,758	6,632
Chicken, Broilers	35,092	25,617	2,291
Chicken, Layers	1,948	2,133	191
Goats	1,617	20,651	1,630
Hogs	176	12,206	966
Sheep	501	36,242	2,863
Turkeys	33	71	6

Devils Ear springshed:

Livestock Type	Total Head Count	Loading to Land Surface (lb-N/year)	Loading to Groundwater (lb-N/year)
Beef Cattle	11,388	1,400,816	104,981
"Other" Cattle	4,216	477,031	38,950
Calves	8,402	104,558	8,025
Donkeys	258	9,432	715
Horses	1,159	115,525	8,567
Chicken, Broilers	271	198	15
Chicken, Layers	2,410	2,639	191
Goats	1,918	24,498	1,897
Hogs	412	28,579	2,147
Sheep	416	30,096	2,245
Turkeys	392	858	71

Hornsby springshed:

Livestock Type	Total Head Count	Loading to Land Surface (lb-N/year)	Loading to Groundwater (lb-N/year)
Beef Cattle	4,009	493,186	25,817
"Other" Cattle	570	64,534	3,378
Calves	2,466	30,688	1,606
Donkeys	84	3,071	164
Horses	465	46,299	2,472
Chicken, Broilers	54	39	2
Chicken, Layers	1,114	1,220	65
Goats	539	6,885	368
Hogs	149	10,356	553
Sheep	156	11,257	601
Turkeys	24	53	3

LIVESTOCK WASTE (LW)

The results of the NSILT analysis for livestock waste in all three springsheds are presented in the table below.

Springshed	Est. Load to Surface (lbs.-N/yr.)	Est. Load to Groundwater (lbs.-N/yr.)
Ichetucknee	1,747,046	138,864
Devil's Ear	2,194,229	167,804
Hornsby	667,587	35,028

DAIRIES

- There is one non-permitted dairy operation within the Hornsby springshed with a surface water loading of 46,254 lbs-N/yr, and an estimated load to groundwater after attenuation and recharge of 2,313 lbs-N/yr.
- There are no Confined Animal Feeding Operation (CAFO) dairies operating under a DEP permit within the springsheds.
- Non-CAFO dairy information was provided by DACS, 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% for the Santa Fe BMAP.

BIOSOLIDS

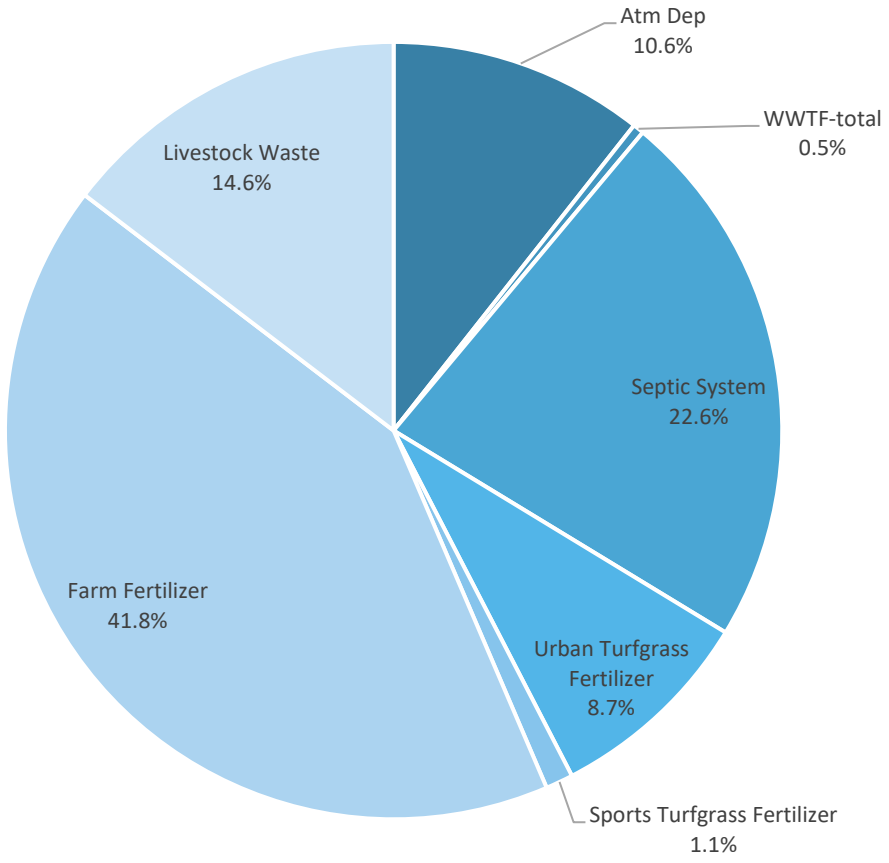
- Biosolid application quantity estimates were derived from calculating the average application quantity reported from 2018 to 2022, where data was available.
- Application quantities are provided in tons of material, it was assumed biosolid material has an estimated nitrogen content of approximately 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%.

Springshed	Est. Load to Surface (lbs.-N/yr.)	Est. Load to Groundwater (lbs.-N/yr.)
Devil's Ear	3,421	855

DRAFT NSILT LOADING RESULTS

ICHETUCKNEE SPRINGSHED

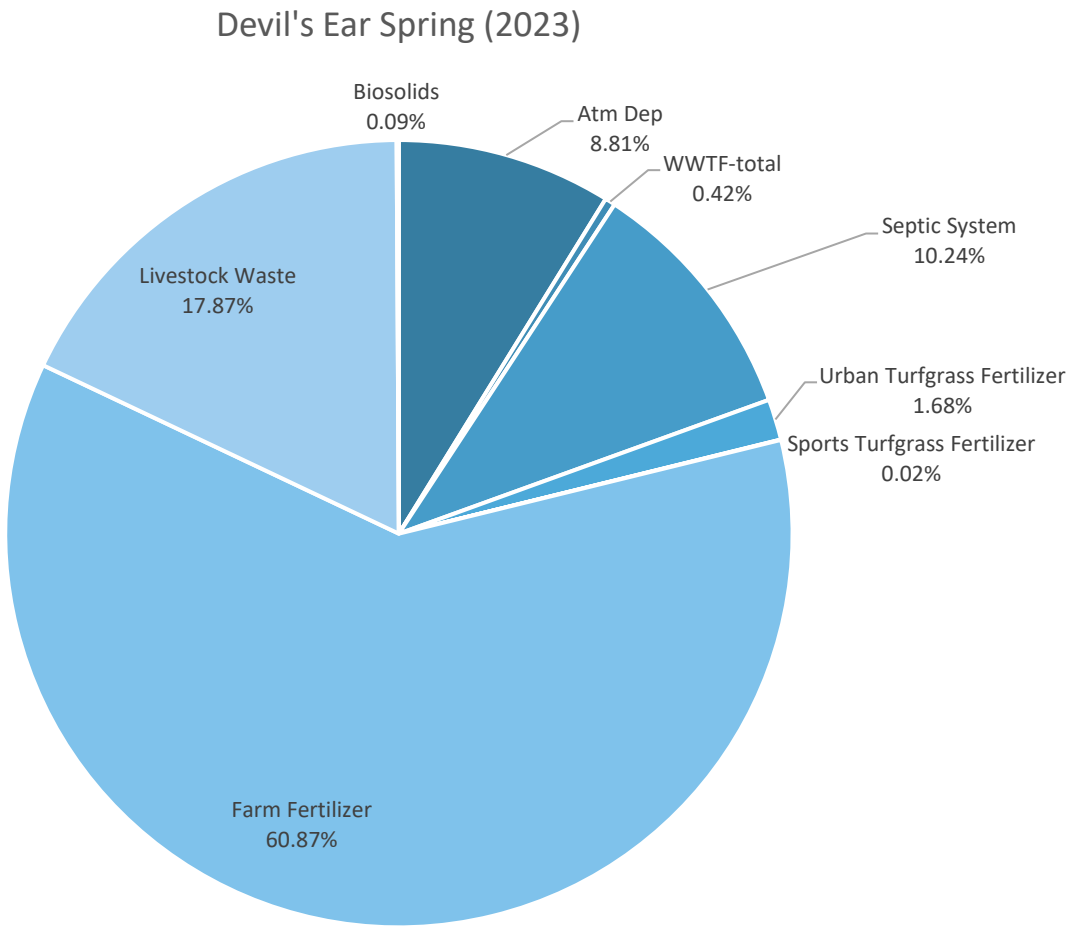
Ichetucknee Spring Group (2023)



Ichetucknee Springshed	
Source	**Annual Loading (lb-N/year)**
Atmospheric Deposition	100,805
Wastewater Treatment Facilities	4,373
OSTDS	214,633
Urban Turfgrass Fertilizer	82,723
Sports Turfgrass Fertilizer	10,864
Farm Fertilizer	396,844
Livestock Waste	138,864
Total	949,106

DRAFT NSILT LOADING RESULTS

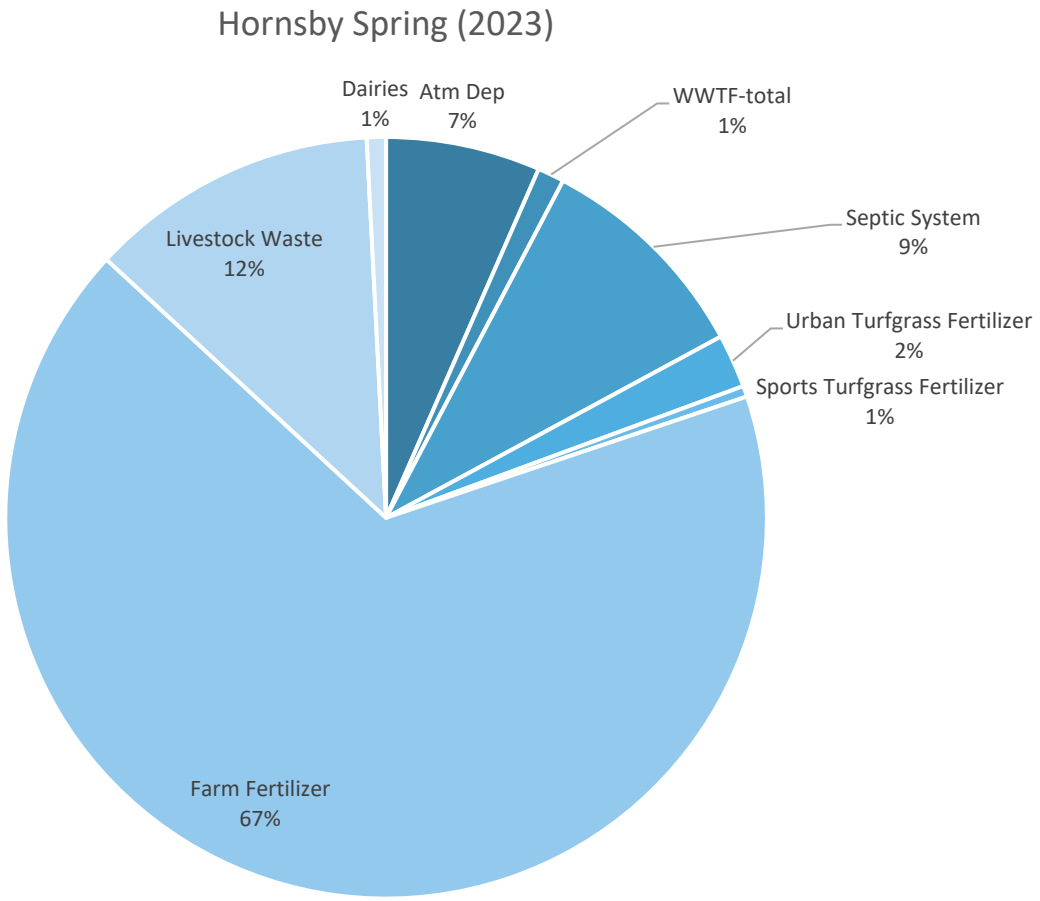
DEVIL'S EAR SPRINGSHED



Devil's Ear Springshed	
Source	**Annual Loading (lb-N/year)**
Atmospheric Deposition	82,725
Wastewater Treatment Facilities	3,994
OSTDS	96,194
Urban Turfgrass Fertilizer	15,743
Sports Turfgrass Fertilizer	156
Farm Fertilizer	571,544
Livestock Waste	167,804
Biosolids	855
Total	939,015

DRAFT NSILT LOADING RESULTS

HORNSBY SPRINGSHED



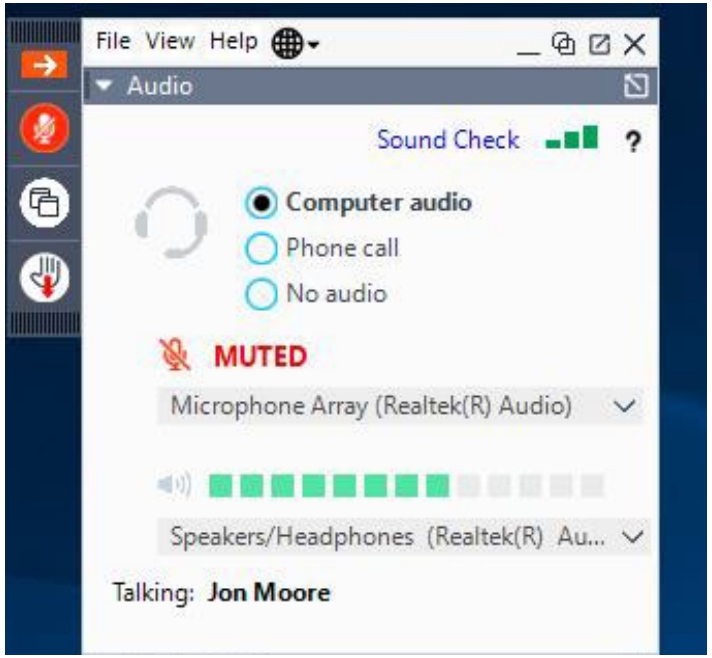
Hornsby Springshed	
Source	**Annual Loading (lb-N/year)**
Atmospheric Deposition	18,671
Wastewater Treatment Facilities	3,225
OSTDS	26,750
Urban Turfgrass Fertilizer	6,466
Sports Turfgrass Fertilizer	1,316
Farm Fertilizer	190,615
Livestock Waste	35,028
Dairies	2,313
Total	284,384

BMAP MEETING
PUBLIC QUESTIONS PERIOD

Verbal Questions

- We ask that questions and comments be limited to **three minutes** so that we may hear from everyone.

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



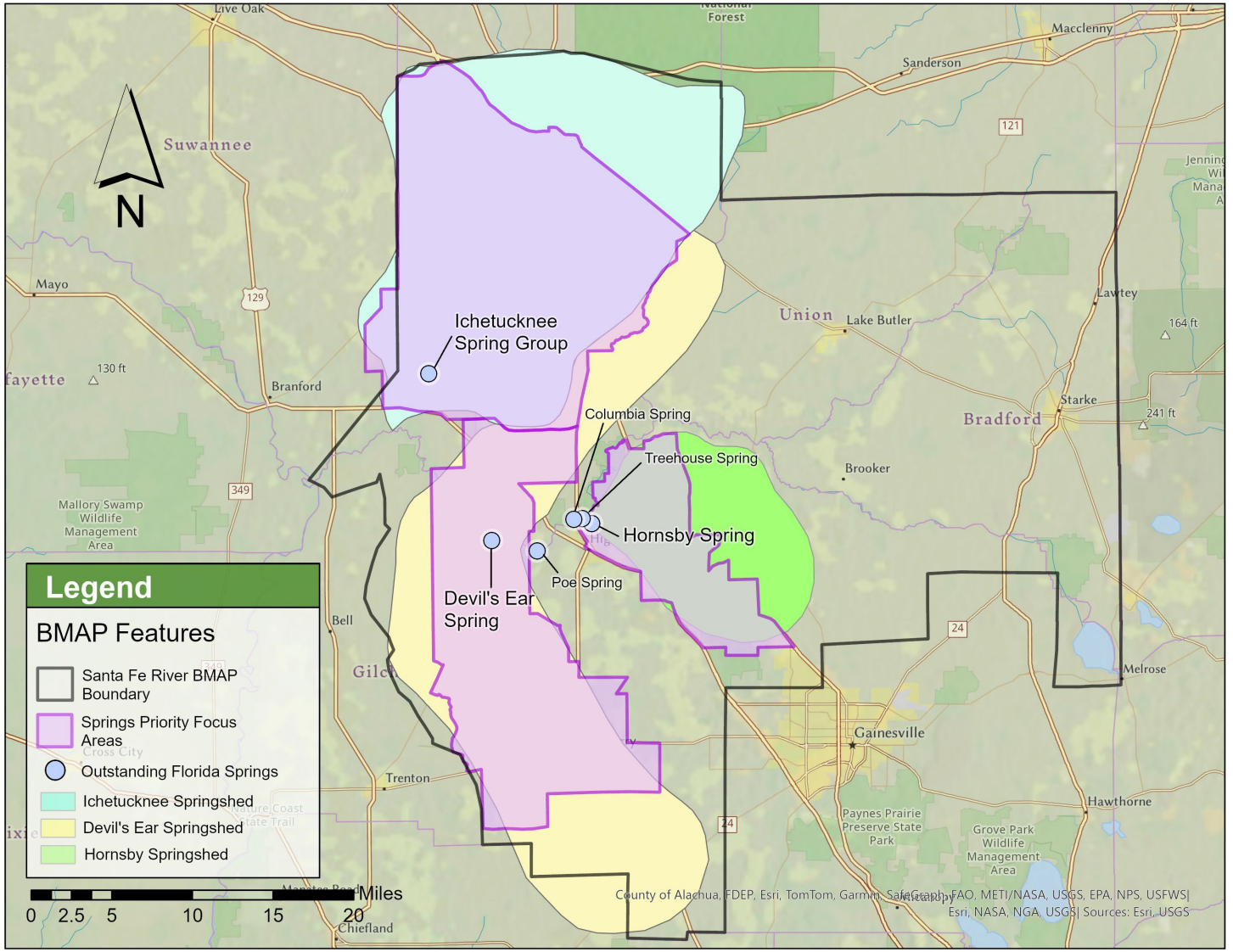
Written Comments

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

DRAFT SURFACE WATER LOADING RESULTS

OUTSIDE THE SPRINGSHED BOUNDARIES

- Annual nutrient loading estimates for outside the Santa Fe River springsheds were calculated using a similar approach to the Pollutant Load Screening Model (PLSM).
  - Statewide Land Use Cover Data-Level 2 Codes.
  - Event Mean Concentrations (EMCs).
  - Runoff Coefficients (ROCs).



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.

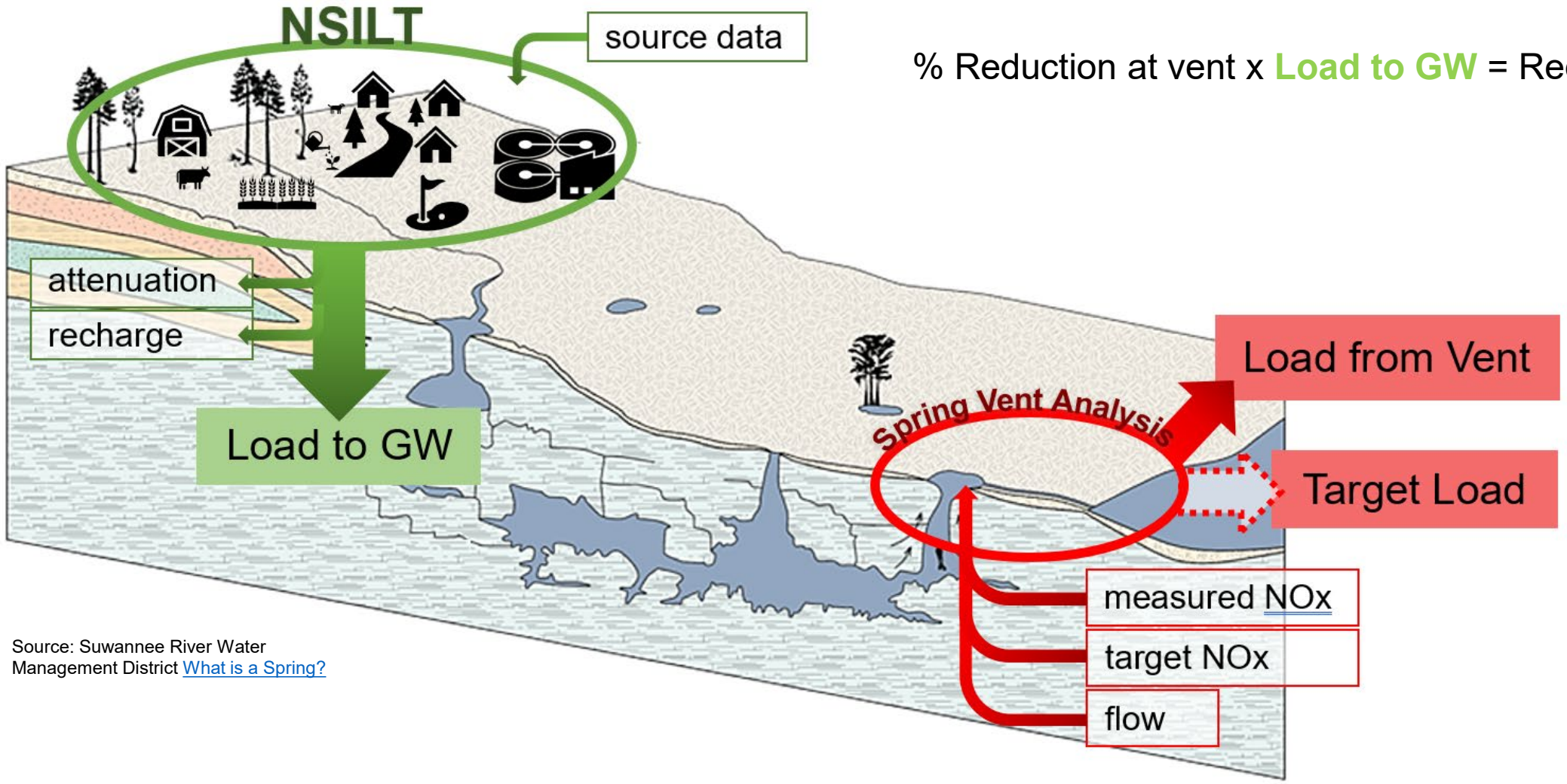
Applied the spring vent percent reduction to the updated NSILT loading.

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 Water Management District 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	Required Reduction	Percent Required Reduction
Ichetucknee	347,612	177,042	170,570	49%
Devil's Ear	2,249,219	617,388	1,631,831	73%
Hornsby	652,823	474,374	178,449	27%

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

Onsite Sewage Treatment and Disposal Systems (OSTDS)

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

Wastewater Treatment Facilities (WWTF)

- 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 farm fertilizer (FF) load to groundwater.
  - BMP enrollment using a 10% reduction applied to livestock waste (LW) and dairies.
  - Any remaining agricultural reductions will be allocated to agricultural regional cooperative elements, which could include regional projects, landowner initiatives, cost-share practices and innovative technologies.

Atmospheric Deposition (AD)

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

BMAP UPDATES

ALLOCATION AND REDUCTION APPROACH

Urban Turf Fertilizer (UTF)

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

Sports Turf Fertilizer (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 BMP implementation and a nutrient management plan (NMP) to address nutrient loading.

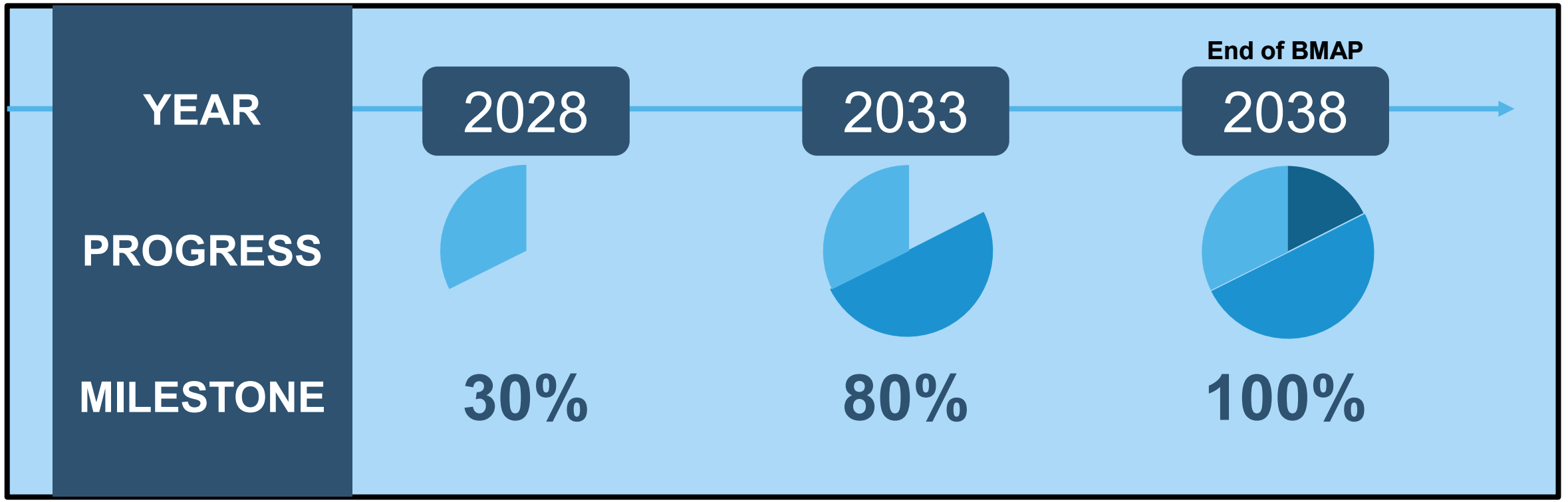
BMAP UPDATES
FUTURE GROWTH

- **Domestic Wastewater Projections:**
  - Use wastewater to estimate future growth projections.
  - Start with population growth for each county from Bureau of Economic and Business Research (BEBR)
    - 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 FLWMI for each BMAP county.
  - Use per person calculations to estimate future loads from WWTF and OSTDS.

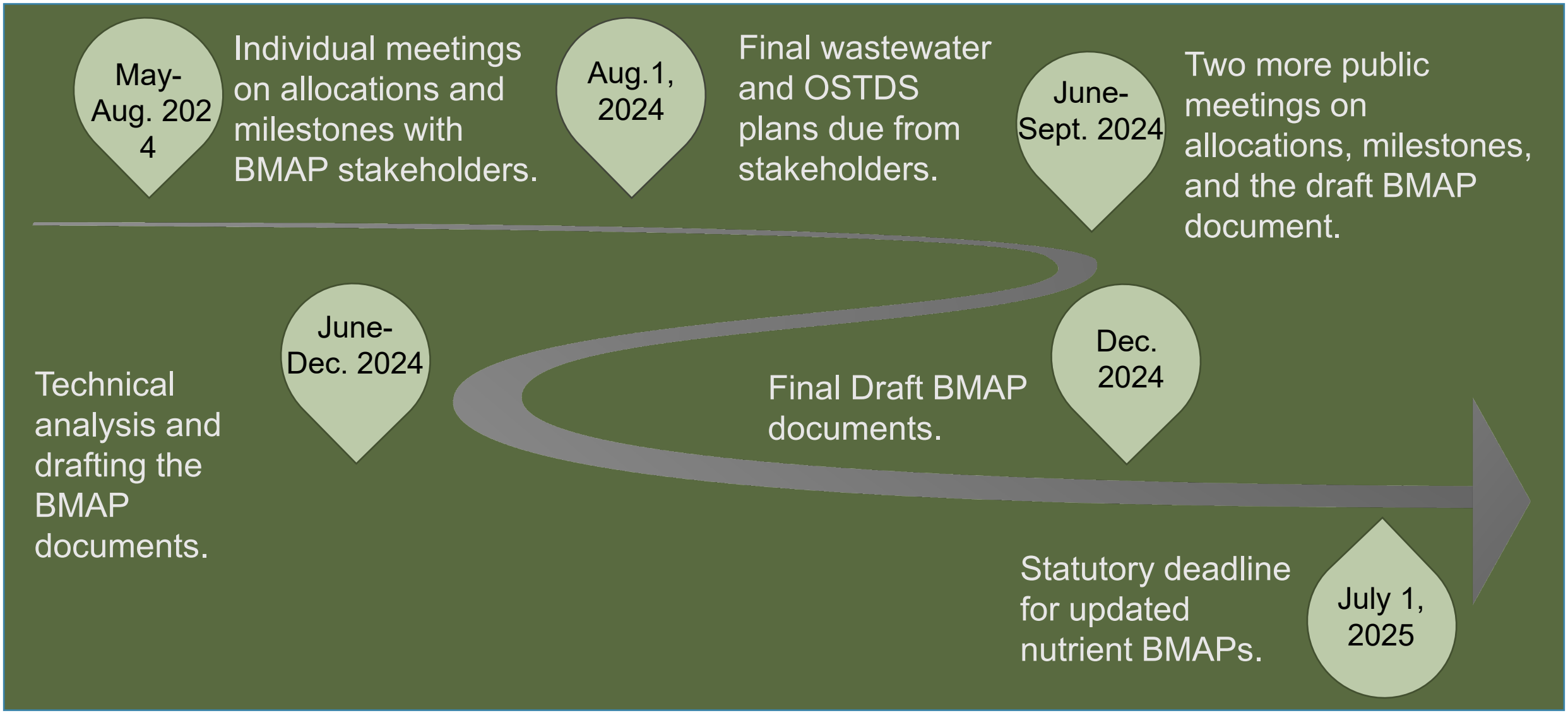
- **Agriculture Projections:**
  - Exploring different tools to estimate future changes in agricultural acreage in the BMAPs to estimate changes in agricultural loading.

BMAP UPDATES

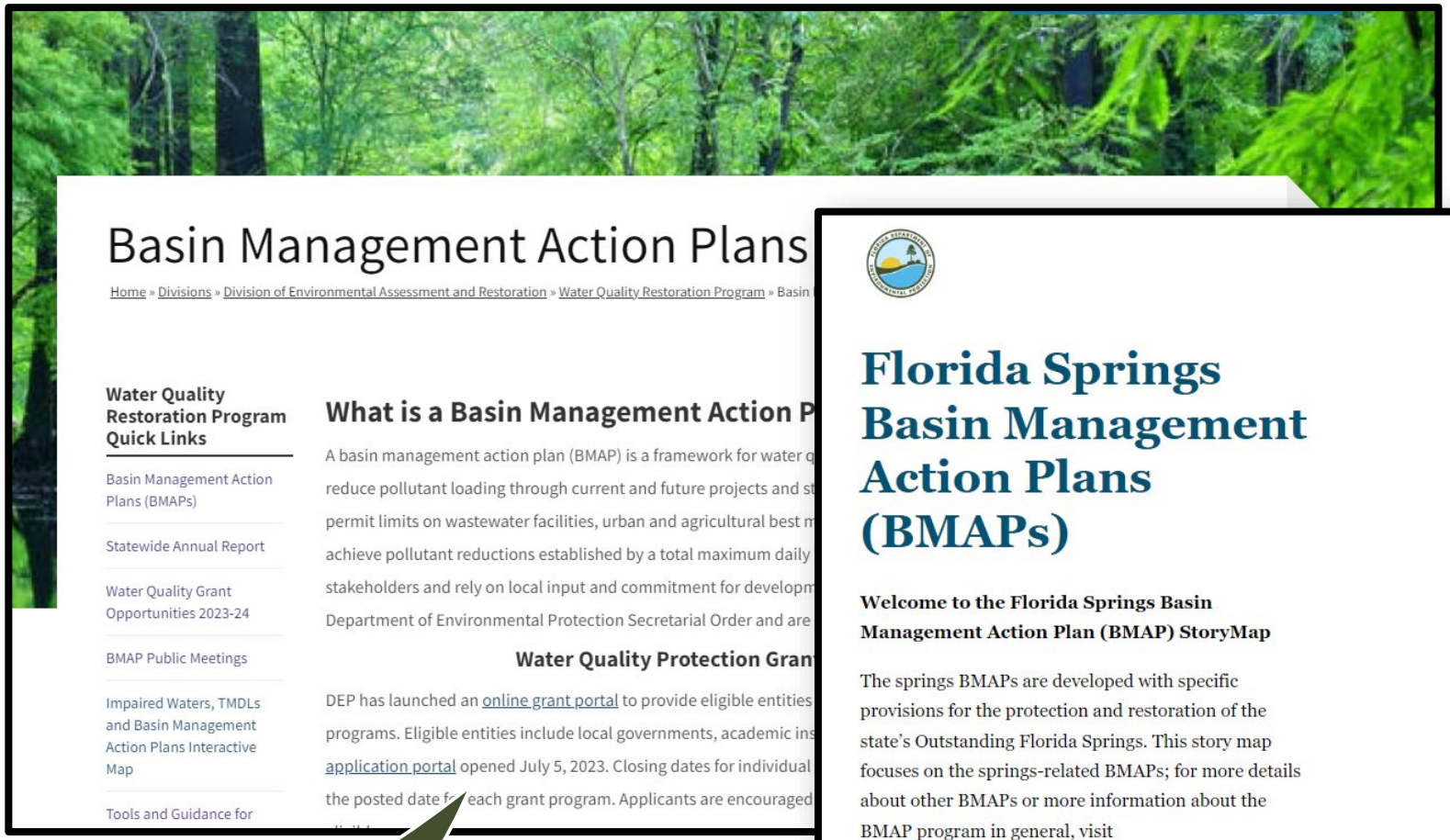
5-, 10-, AND 15-YEAR MILESTONES/REDUCTION SCHEDULE

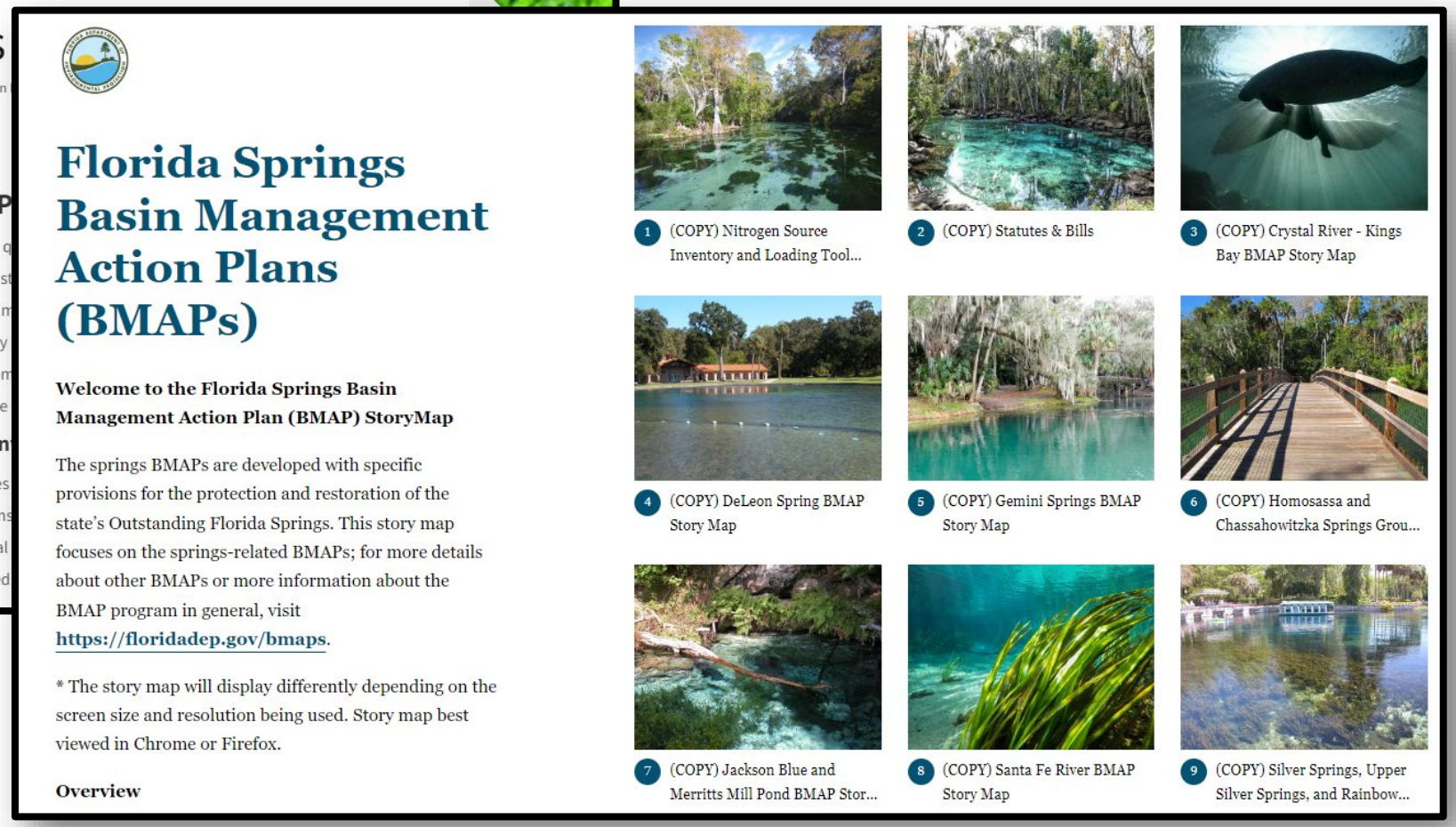


SPRINGS BMAP UPDATES TIMELINE



RESOURCES
BMAP WEBSITE AND STORYMAP





RESOURCES
FUNDING OPPORTUNITIES

Florida Department of Environmental Protection
Funding Opportunities

FloridaDEP.gov/Funding

SUBSCRIBER PAGE

HOW TO CONTACT US

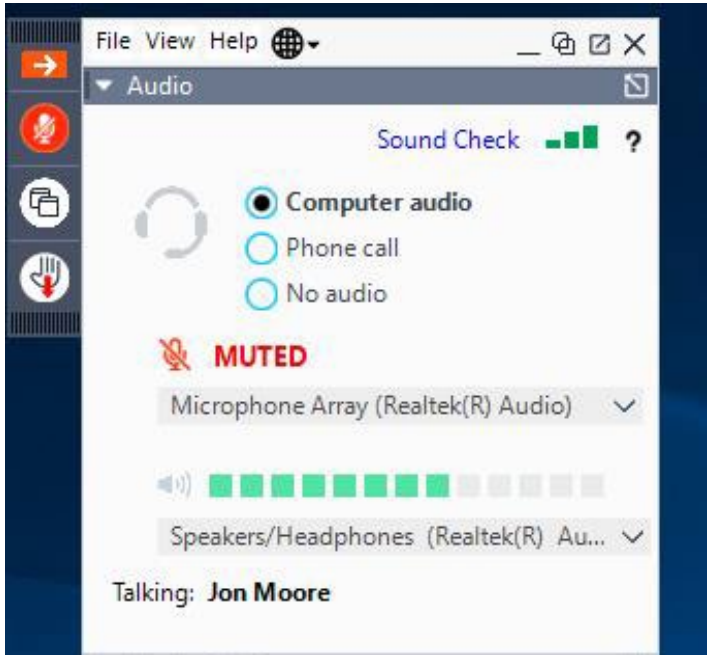
BMAPProgram@FloridaDEP.gov

BMAP MEETING
PUBLIC QUESTIONS PERIOD

Verbal Questions

- We ask that questions and comments be limited to **three minutes** so that we may hear from everyone.

- 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.

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).

THANK YOU

Chandler Keenan
Environmental Consultant
850-245-8555
Chandler.B.Keenan@FloridaDEP.gov

Samuel Hankinson, P.G.
Environmental Consultant
(850) 245-8086
Samuel.Hankinson@FloridaDEP.gov

Lauren Campbell, Ph.D.
Environmental Administrator
850-245-8083
Lauren.Campbell@FloridaDEP.gov


FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION

Florida Department of Environmental Protection (DEP)
Santa Fe River Basin Management Action Plan (BMAP)
Question and Answer (Q&A) Summary
Public Meeting on May 24, 2024
1:30 pm – 2:52 pm
Via GoToWebinar

Attendees

Richmond Abellera, DEP
Eesa Ali, Applied Sciences
Mitchell Allen, State Representative Allison Tant's Office
Stephanie Armstrong, SRWMD
Kelly Aue, University of Florida
Nicki Bailey, Levy County
Lisa Bally, ATM
Emily Beach, University of Florida
Evelyn Becerra, DEP
Connie Becker, DEP
JP Bell, Florida Realtors
Marcelo Blanco, DEP
Eric Blount, Palm Bay
Del Bottcher, SWET
Amy Brown, SRWMD
Lynette Brown, BDA
Tiffany Busby, Wildwood Consulting
Andrew Carswell, Levy County
Leidyane Carter, SRWMD
Laura Catlow, Citizen
Stacy Cecil, SJRWMD
Unknown, The Florida Channel
Sandra Chupinsky, DEP
Daniel Corbett, DEP
Chris Dawson, Gray Robinson
Mary Diaz, SRWMD
Paul Donsky, University of Florida
Chloe Dougherty, Florida Springs Council
Kim Duffek, DEP
Michael Dukes, University of Florida
Douglas Dycus, FDOT
Kristine Eskelin, SRWMD
Amanda Exposito-Ferree, Atkins Realis
Chris Fagerstrom, Pond Co.
Chris Farrell, Audubon Florida
Jessica Fetgatter, DEP
Casey Fitzgerald, Citizen
Sher Gache, Citizen
Meriah Gannon, CDM Smith
Diane Garte, Citizen
Tina Gordon, Wildwood Consulting
Trisha Green, DEP
Jade Greene, DEP
Roxanne Groover, FOWA
Sam Hankinson, DEP
Kira Hansen, Kimley-Horn
Madeline Hart, FDACS
Kenny Hayman, DEP
Janet Hearn, ATM
Stacey Hectus, Levy County
Ray Hodge, United Dairy Farmers
Robin Holland, FDACS
Moira Homann, DEP
Jason Icerman, City of Tallahassee
Merrillee Jipson, Citizen
Andrew Johnston, Citizen
Dustin Jones, FDOH
Chandler Keenan, DEP
Chuck Key, Citizen
Sean King, SRWMD
Scott Knight, Wetland Solutions
Jacob Landfield, SFWMD
Greg Lang, Mittauer & Associates
Celeste Lyon, RES
Leroy Marshall, SRWMD
Max McAmis, Pasco County
Kelsey McDaid, University of Florida
Morgan Morrow, FDACS
Jim Myles, DB Environmental

Ryne Nimmo, DEP
Trevor Noyes, NFPS
Brittney O'Neal, FDACS
Alan Obaigbena, Citizen
Kevin O'Donnell, DEP
Michael Osborn, Lake County
Robert Palmer, Citizen
Lindsey Pavao, Alachua County
John Petrohovich, Mittauer & Associates
Henry Phillips, Citizen
Elizabeth Pickett Gray, Citizen
Nicolas Pisarello, ATM
Paul Plourde, Citizen
Marty Proctor, Citizen
John S. Quarterman, Citizen
Lorna Radcliff, SRWMD
Joanna Reilly-Brown, Alachua Conservation Trust
Alden Rosner, Suwannee Parks
Kristin Rubin, Citizen
Kimberly Shugar, DEP
Ryan Smart, Florida Springs Council
Patricia Spellman, University of South Florida
John Spencer, Geosyntec
Jennifer Thera, FDACS
John Thomas, Citizen
Debby Tipton, DEP
Joanne Tremblay, Citizen
Jonathan Turner, FDOT
Shreya Vuttaluru, Tampa Bay Times
Brandon Wanner, Stantec
Ken Weaver, DEP
Stefani Weeks, Holloway
Tanya Welborn, DEP
Brenda Wells, Florida Springs Council
Benita Whalen, Dispersed Water
Kim Wheeler, Citizen
Barton Wilder, FDACS
Kevin Wright, Oak River Farms
Sarah Younger, Citizen

Santa Fe River BMAP Overview

Q: Does the Watershed Information Network (WIN) have data on nitrate measurements in the aquifer?
A: Yes, WIN is the state's repository for water quality data, including nitrate from both groundwater and surface water monitoring locations. Please contact Justin Nelson (Justin.M.Nelson@FloridaDEP.gov) for questions related to WIN. Justin is the WIN Coordinator for the northeast region of the state.

Nitrogen Source Inventory Loading Tool (NSILT) Results

Q: For wastewater treatment facilities (WWTFs), were all sizes of facilities included in the Nitrogen Source Inventory Loading Tool (NSILT) and did the wastewater loading include biosolids if they are spread onsite?
A: All domestic wastewater facilities were evaluated for the updated NSILT, including those outside the springshed areas which have disposal within the springshed. Biosolids were evaluated as a separate category, but WWTF biosolids were included in the biosolids loading estimates.

Q: From the chart, it appears that only 6.7% of the nitrogen loading at the surface reaches groundwater. This percentage is considerably lower than what was calculated in the 2018 BMAP. Why?
A: We ran this calculation and it is closer to 9-14% depending on the springshed, and the overall percentage will differ based on each basin's makeup of sources and hydrogeological characteristics. There were some methodology changes between the prior NSILT and this update, but the recharge and attenuation stayed the same with the exception of OSTDS attenuation factor. The OSTDS

attenuation was changed from 50% to 30%, so that change increased the OSTDS loading estimate to groundwater. The original NSILT was used as a starting point, but the methodology or assumptions were updated as applicable, which changed the loading estimates.

Q: How are springsheds, priority focus areas (PFAs), restoration focus areas (RFAs), and BMAP area interrelated?
A: The BMAP area is the entire area of concern that may contribute to loading or impacting waters of concern. The springshed areas were the best estimation of the extent of contributing areas to the Outstanding Florida Springs (OFS). The PFAs are generally consistent with the springsheds but can be slightly different due to the statutory requirements on how the PFA boundaries must be defined. PFA boundaries are primarily used for project planning and prioritizing and policy implementation. The RFAs are similar to the springshed boundaries and are fairly consistent to the springsheds that are evaluated in the NSILT and are used as a study area to monitor groundwater quality and evaluate effectiveness of management strategies.

Spring Vent Load Analysis Results
Q: Is the timeline of achieving the BMAP reductions still within 20 years (by 2038)?
A: Yes, the timeline for meeting the TMDLs in the springs BMAPs has not changed.

Q: Are the NSILTs only used within the springsheds?
A: Yes, the NSILTs only address the springshed areas.

Next Steps - BMAP Updates
There were no questions during this section.

Adjournment.
The meeting adjourned at 2:52 pm.